Chapter 3

COMPARISON OF RESULTS OF STAGE II COMPUTATIONAL EXPERIMENTS FOR PCB-153

A comparison of results on computational experiments of Stage II obtained by the participating models is presented in this Chapter. This stage is aimed at the comparison of mass balance estimates and calculated deposition and concentration fields of POPs in different environmental compartments and a sensitivity study with respect to physical-chemical parameter values used for mass balance estimates. Eight models participated in this comparison: ADEPT, CAN/POPs, CliMoChem, DEHM-POP, EVN-BETR and UK-MODEL, G-CIEMS, SimpleBox, and MSCE-POP.

Following the programme of this stage, a base year for the calculation is 2000. The results of computational experiments formulated at Stage II include annual and monthly values (quarterly data as optional) of the following mass balance estimates:

- masses of PCB-153 in specified sub-domains in air, soil and seawater compartments (see Section 3.1 below):
  - the atmosphere: layers of 1 km, 5 km and 10 km height,
  - soil: 5 cm and 10 cm depth,
  - sea: 200 m depth;
- masses of PCB-153 degraded in specified sub-domains of these compartments (see Section 3.2 below);
- mass flows of PCB-153 transported in/out the specified domain: inflow and outflow (for each transport media as optional) (see Section 3.3 below);
- mass flows of PCB-153 transported from one compartment to another in both directions (dry and wet deposition, gaseous exchange) (see Section 3.4 below);
- PCB-153 concentrations at each interface (in the atmosphere at its interface with soil, ocean and vegetation; in surface ocean layer; in vegetation; in surface soil layer) (see Section 3.5 below) and calculated annual deposition and concentration fields of PCB-153 in different environmental compartments (optional) (see Section 3.6). Besides, calculation results on masses of PCB-153 deposited into deep sea presented by CliMoChem model are also given in Section 3.2.6.

The calculation results mentioned above and presented in this Chapter are devoted to PCB-153 (a substance of the first priority); appropriate results on PCB-28 and PCB-180 are presented in Annexes B and C.

The comparison of model results on PCB depositions and air concentrations with monitoring data (optional) are presented in Section 3.7. Results on comparison of model estimates vs measurements are given here for the three considered PCB congeners.

The calculation experiments are performed with the use of physical-chemical data set of the individual model (“own” data set) on the basis of agreed input data (POP emission data scenario with zero initial concentrations and, as optional, with initial concentrations in media of the specified calculation domain for comparison of calculated and measured data) and a number of geophysical parameters of the calculation domain (e.g. land cover data, leaf area index, organic matter content in soil, etc). In order

to evaluate sensitivity of each model to variation of physical-chemical parameter values, the calculation experiments are carried out also with the use of "reference" data set common for all models. The results obtained with "own" data set are compared with this latter. For models using "reference" data set as own set of physical-chemical properties, this sensitivity study is carried out with the use of "alternative" data set based on individual physical-chemical data sets of some other participating models. G-CIEMS and SimpleBox carried out these calculations with the use of "reference" and "alternative" data sets. Results of EVN-BETR and UK-MODEL and ADEPT models were obtained only on the basis of "reference" data set; results of CAN/POPs – on the basis of "own" data set. All other models performed the calculations on the basis of "reference' and "own" data sets.

SimpleBox and EVN-BETR and UK-MODEL obtained three sets of results on the basis of initial concentrations given as input data, zero initial concentrations for one-year period (2000) and with historical emissions for 20-year period (from 1981 to 2000). The calculations of SimpleBox model are performed with two versions: SimpleBox 3.0 and SimpleBox 3.12. The latter version does not assume that the soil compartment has homogeneous concentrations, but it assumes an exponentially decline of soil concentration with depth. Results of CliMoChem model are calculated on the basis of their own Land Cover Data [*DeFries and Townshend*, 1994] (below CliMoChem_1) as well as results obtained with the help of Land Cover Data given as input data for this intercomparison study [*Guo and Chen*, 1994] (below CliMoChem_2). Of note, for CliMoChem_2, DEHM-POP, G-CIEMS and MSCE-POP models there are two sets of results obtained. In particular, CliMoChem_2 simulations for 2000 are based on both a historical emission scenario run from 1981 to 1999 and on zero initial concentrations. DEHM-POP, G-CIEMS and MSCE-POP models performed calculations both with initial concentrations given as input data and with zero initial concentrations. Results of CAN/POPs were calculated with the use of initial concentrations. Results of ADEPT model were calculated with zero initial concentrations in the main environmental media for the beginning of 2000.

In all model results emissions are based on the expert estimates of 2000 and historical emissions presented by [*Breivik et al*. 2002a,b] (see also www.nilu.no/projects/globalpcb/). Emissions are equally distributed around the year. The only exception is the simulation of PCB-153 mass deposited into deep see obtained by CliMoChem model with two different Land Cover Data (Section 3.2.6). In this calculation PCB-153 is emitted as pulse emission into air each year at the beginning of season one.

CliMoChem model calculates masses and mass fluxes per season (each three months, starting in January, April, July and October) and monthly values are not available. For comparison with these results, seasonal values of all output parameters were calculated on the basis of monthly values given by all other models.

The comparison of results on each computation experiment consists of two parts. In the first part the results of calculation experiments are compared between the models. The comparison of absolute values obtained by the models on the basis of "reference" data set as well as on the basis of "own or alternative" data sets is made. The following statistical parameters for each experiment are used:

- m - the mean values of the considered parameters averaged between participating models;
- σ – the values of square deviation between results obtained by different models.

At that, the corresponding statistical processing is made for two groups of results obtained. The first group includes results calculated on the basis of initial concentrations or historical emissions (non-zero initial conditions); in the second group results based on zero initial conditions are involved. A preliminary analysis of the results is carried out for these two groups separately.

The second part of comparison devoted to the sensitivity study of the calculation results to the variations of input parameters is based on two set of results obtained by each model on the basis of two different physical-chemical data sets ('reference" and "own/alternative"). The percentage difference in the results calculated on the basis of "own or alternative" data sets of pollutant-specific properties in comparison with those obtained with the use of "reference" data set and normalized to the "reference" results is shown. In the case of computational experiments on mass flows transported in/out of the specified domain and gaseous exchange between media, the absolute values of the calculation results are compared.

3.1. Distribution of PCB-153 mass between environmental compartments

3.1.1. Comparison of calculated values of PCB-153 mass in the atmosphere

According to the programme of Stage II results of computational experiments on mass balance include masses of PCB-153 contained in the atmosphere within layers of 1 km, 5 km and 10 km height.

Reference data set. Calculation results on PCB-153 mass contained in 1 km layer of the atmosphere (kg) calculated by models on the basis of "reference" data set together with statistical parameters used for evaluation are presented in Table 3.1.

Monthly values of PCB-153 mass contained in 1 km layer of the atmosphere calculated by all participating models on the basis of "reference" data set and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.1 a and b, respectively. Seasonal variations of low values of mass contained in 1 km layer of the atmosphere calculated by the participating models on the basis of "reference" data set and non-zero initial conditions are also shown in Fig. 3.1c in more detail.

Calculation results on PCB-153 mass contained in 5 km layer of the atmosphere (kg) calculated by models on the basis of "reference" data set together with statistical parameters used for evaluation are presented in Table 3.2.

Monthly values of PCB-153 mass contained in 5 km layer of the atmosphere calculated by the models on the basis of "reference" data set are compared in Fig. 3.2.

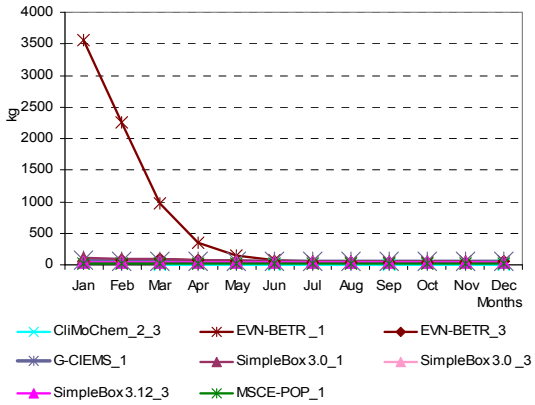


Fig. 3.1a. *PCB-153 mass in the 1 km layer of the atmosphere (kg) calculated by the participating models on the basis of "reference" data set and non-zero initial conditions (all models)*

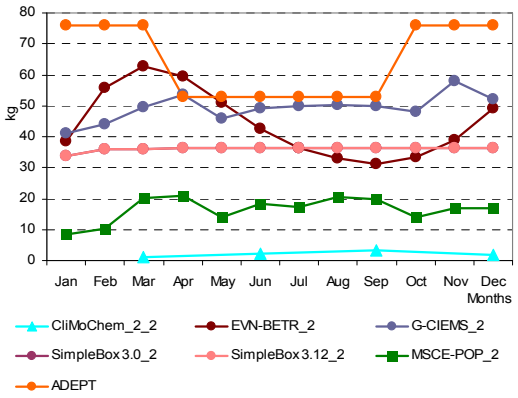


Fig. 3.1b. *PCB-153 mass in the 1 km layer of the atmosphere (kg) calculated by the participating models on the basis of "reference" data set and zero-initial conditions*

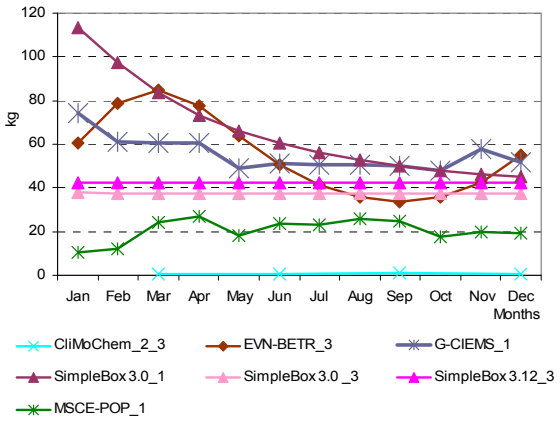


Fig. 3.1c. *PCB-153 mass in the 1 km layer of the atmosphere (kg) calculated by the participating models on the basis of "reference" data set and non-zero initial conditions (models with low values)*

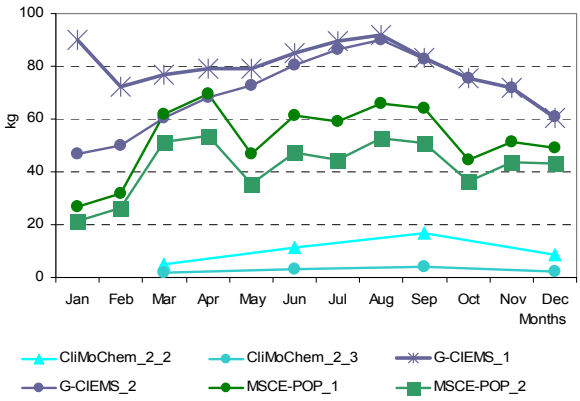


Fig. 3.2. *PCB-153 mass in the 5 km layer of the atmosphere (kg) calculated by the participating models on the basis of "reference" data set*

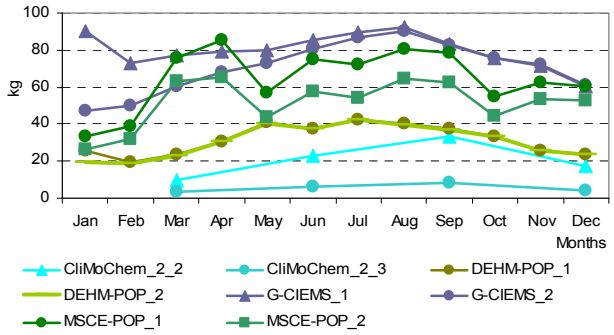


Fig. 3.3. *PCB-153 mass in the 10 km layer of the atmosphere (kg) calculated by the participating models on the basis of "reference data set"*

Table 3.1. *Calculation results: PCB-153 mass contained in 1 km layer of the atmosphere (kg) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data				Results obtained on the basis of historical emissions				*m*	σ	Month	Results obtained on the basis of zero initial concentrations							*m*	σ
	EVN-BETR_1[a]	G-CIEMS_1	SimpleBox 3.0_1[b]	MSCE-POP_1	EVN-BETR_3[a]	CliMo Chem_2_3	SimpleBox 3.0_3[b]	SimpleBox 3.12_3[b]				EVN-BETR_2[a]	G-CIEMS_2	CliMo Chem_2_2	SimpleBox 3.0_2[b]	SimpleBox 3.12_2[b]	MSCE-POP_2	ADEPT		
Jan	3551.91	74.11	113.59	10.51	60.56		37.71	42.19	*555.80*	*1321.55*	Jan	38.66	41.27		33.73	33.73	8.32	75.90	*38.60*	*21.74*
Feb	2249.35	61.03	97.31	12.38	78.93		37.40	42.19	*368.37*	*829.90*	Feb	55.84	43.99		36.02	36.02	10.26	75.90	*43.01*	*21.99*
Mar	968.63	60.40	83.61	24.12	84.74		37.40	42.19	*185.87*	*345.93*	Mar	62.83	49.39		36.10	36.10	20.05	75.90	*46.73*	*20.27*
Seas_1	**2256.63**	**65.18**	**98.17**	**15.67**	**74.74**	**0.38**	**37.50**	**42.19**	***323.81***	***781.62***	**Seas_1**	**52.44**	**44.88**	**0.98**	**35.28**	**35.28**	**12.88**	**75.90**	***36.81***	***24.83***
Apr	356.03	60.79	73.44	27.13	77.75		37.41	42.19	*96.39*	*116.02*	Apr	59.34	53.74		36.16	36.16	20.86	52.80	*43.18*	*14.57*
May	145.43	48.83	65.98	18.14	63.99		37.41	42.19	*60.28*	*40.93*	May	50.92	45.81		36.21	36.21	13.83	52.80	*39.30*	*14.33*
Jun	76.12	50.98	60.37	23.83	50.64		37.41	42.19	*48.79*	*16.76*	Jun	42.57	49.05		36.25	36.25	18.42	52.80	*39.22*	*12.19*
Seas_2	**192.53**	**53.53**	**66.60**	**23.03**	**64.13**	**0.65**	**37.41**	**42.19**	***60.01***	***57.80***	**Seas_2**	**50.94**	**49.53**	**2.27**	**36.21**	**36.21**	**17.71**	**52.80**	***35.10***	***18.95***
Jul	50.48	50.68	56.10	23.07	41.23		37.41	42.19	*43.02*	*10.94*	Jul	36.49	49.77		36.28	36.29	17.29	52.80	*38.15*	*12.61*
Aug	40.23	50.65	52.74	25.69	35.92		37.41	42.19	*40.69*	*9.18*	Aug	32.86	50.33		36.31	36.31	20.45	52.80	*38.18*	*11.92*
Sep	36.30	50.11	50.13	25.01	33.50		37.41	42.19	*39.24*	*9.06*	Sep	31.07	50.08		36.33	36.34	19.89	52.80	*37.75*	*12.21*
Seas_3	**42.33**	**50.48**	**52.99**	**24.59**	**36.88**	**0.85**	**37.41**	**42.19**	***35.97***	***16.67***	**Seas_3**	**33.47**	**50.06**	**3.33**	**36.31**	**36.31**	**19.21**	**52.80**	***33.07***	***17.20***
Oct	38.68	47.82	48.05	17.40	35.98		37.41	42.19	*38.22*	*10.36*	Oct	33.33	48.01		36.35	36.36	14.11	75.90	*40.68*	*20.45*
Nov	45.99	57.77	46.36	19.92	42.48		37.41	42.19	*41.73*	*11.49*	Nov	38.82	58.15		36.37	36.38	16.92	75.90	*43.76*	*20.47*
Dec	60.30	51.61	44.98	19.19	55.08		37.41	42.19	*44.39*	*13.59*	Dec	49.22	52.01		36.39	36.39	16.83	75.90	*44.46*	*19.81*
Seas_4	**48.32**	**52.40**	**46.46**	**18.84**	**44.51**	**0.43**	**37.41**	**42.19**	***36.32***	***17.74***	**Seas_4**	**40.46**	**52.72**	**1.76**	**36.37**	**36.38**	**15.95**	**75.90**	***37.08***	***24.01***
Annual	**634.95**	**55.40**	**66.06**	**20.53**	**55.07**	**0.58**	**37.43**	**42.19**	***114.03***	***211.53***	**Annual**	**44.33**	**49.30**	**2.08**	**36.04**	**36.05**	**16.44**	**64.35**	***35.51***	***20.74***

EVN-BETR _1 - EVN-BETR and UK-MODEL results calculated on the basis of initial concentrations given as input data;
EVN-BETR _2 - EVN-BETR and UK-MODEL results calculated on the basis of zero initial concentrations;
EVN-BETR _3 - EVN-BETR and UK-MODEL results calculated on the basis of historical emissions for 20-year period;
G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
[a] - EVN-BETR and UK-MODEL results were calculated with the help of a single box version of European model.
[b] - SimpleBox data presented here are overall masses calculated as sum of regional and continental level estimates.

Table 3.2. *Calculation results: PCB-153 mass contained in 5 km layer of the atmosphere (kg) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data		Results obtained on the basis of historical emissions	*m*	σ	Month	Results obtained on the basis of zero initial concentrations			*m*	σ
	G-CIEMS_1	MSCE-POP_1	CliMoChem_2_3				G-CIEMS_2	CliMoChem_2_2	MSCE-POP_2		
Jan	89.85	26.99		*58.42*	*44.45*	Jan	46.89		21.38	*34.13*	*18.04*
Feb	72.44	31.82		*52.13*	*28.73*	Feb	49.89		26.37	*38.13*	*16.63*
Mar	76.71	61.98		*69.35*	*10.42*	Mar	60.34		51.53	*55.93*	*6.22*
Seas_1	**79.67**	**40.26**	**1.91**	***40.61***	***38.88***	**Seas_1**	**52.37**	**4.92**	**33.10**	***30.13***	***23.87***
Apr	78.95	69.71		*74.33*	*6.54*	Apr	68.06		53.61	*60.84*	*10.22*
May	79.31	46.60		*62.96*	*23.13*	May	72.64		35.55	*54.09*	*26.23*
Jun	85.05	61.22		*73.14*	*16.85*	Jun	80.54		47.33	*63.93*	*23.48*
Seas_2	**81.11**	**59.18**	**3.25**	***47.85***	***40.14***	**Seas_2**	**73.75**	**11.34**	**45.50**	***43.53***	***31.25***
Jul	89.36	59.28		*74.32*	*21.27*	Jul	86.52		44.43	*65.47*	*29.76*
Aug	91.62	66.00		*78.81*	*18.11*	Aug	90.09		52.55	*71.32*	*26.54*
Sep	83.02	64.27		*73.65*	*13.26*	Sep	82.55		51.12	*66.84*	*22.23*
Seas_3	**88.00**	**63.19**	**4.27**	***51.82***	***43.01***	**Seas_3**	**86.39**	**16.65**	**49.37**	***50.80***	***34.89***
Oct	75.55	44.72		*60.13*	*21.80*	Oct	75.64		36.25	*55.94*	*27.85*
Nov	71.64	51.19		*61.42*	*14.46*	Nov	72.03		43.47	*57.75*	*20.19*
Dec	60.58	49.30		*54.94*	*7.98*	Dec	61.00		43.24	*52.12*	*12.56*
Seas_4	**69.26**	**48.40**	**2.13**	***39.93***	***34.35***	**Seas_4**	**69.56**	**8.79**	**40.99**	***39.78***	***30.40***
Annual	**79.51**	**52.76**	**2.89**	***45.05***	***38.89***	**Annual**	**70.51**	**10.42**	**42.24**	*41.06*	*30.06*

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations.

Calculation results on PCB-153 mass contained in 10 km layer of the atmosphere (kg) calculated by models on the basis of “reference” data set together with statistical parameters used for evaluation are presented in Table 3.3.

Monthly values of PCB-153 mass contained in 10 km layer of the atmosphere calculated by the participating models on the basis of “reference” data set are compared in Fig. 3.3.

Own/alternative data set. Calculation results on PCB-153 mass contained in 1 km layer of the atmosphere (kg) calculated by models on the basis of “own or alternative” data sets together with statistical parameters used for evaluation are presented in Table 3.4.

Monthly values of PCB-153 mass contained in 1 km layer of the atmosphere calculated by participating models on the basis of “own or alternative” data sets and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.4 a and b, respectively.

Calculation results on PCB-153 mass contained in 5 km layer of the atmosphere (kg) calculated by models on the basis of “own or alternative” data set together with statistical parameters used for evaluation are presented in Table 3.5.

Monthly values of PCB-153 mass contained in 5 km layer of the atmosphere calculated by the models on the basis of “own or alternative” data sets are compared in Fig. 3.5.

Calculation results on PCB-153 mass contained in 10 km layer of the atmosphere (kg) calculated by models on the basis of “own or alternative” data sets together with statistical parameters used for evaluation are presented in Table 3.6.

Monthly values of PCB-153 mass contained in 10 km layer of the atmosphere calculated by the participating models on the basis of “own or alternative” data sets are compared in Fig. 3.6.

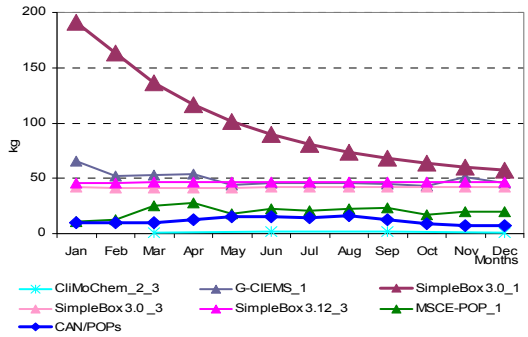


Fig. 3.4a. *PCB-153 mass contained in 1 km layer of the atmosphere (kg) calculated by the participating models on the basis of “own or alternative” data sets and non-zero initial conditions*

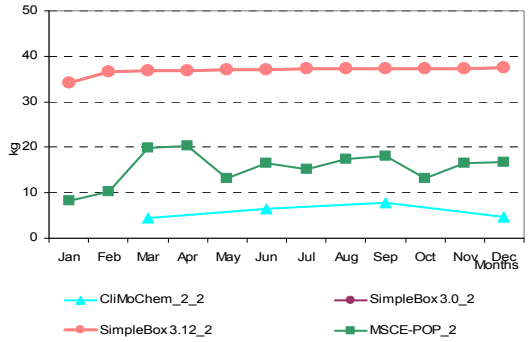


Fig.3.4b. *PCB-153 mass contained in 1 km layer of the atmosphere (kg) calculated by the participating models on the basis of “own or alternative” data sets and zero initial conditions*

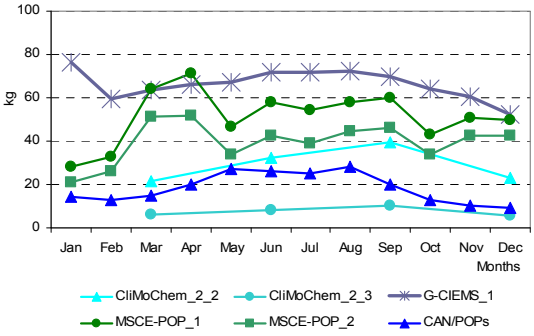


Fig. 3.5. *PCB-153 mass in the 5 km layer of the atmosphere (kg) calculated by the participating models on the basis of “own or alternative” data sets*

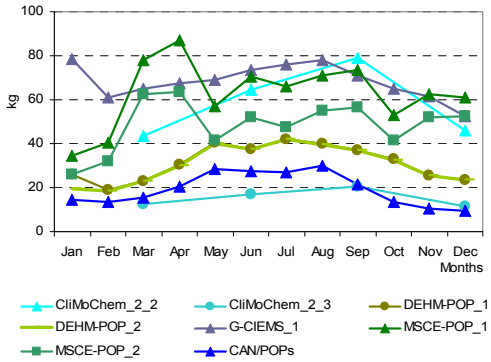


Fig. 3.6. *PCB-153 mass contained in 10 km layer of the atmosphere (kg) calculated by the participating models on the basis of “own or alternative” data sets*

Table 3.3. *Calculation results: PCB-153 mass contained in 10 km layer of the atmosphere (kg) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data			Results obtained on the basis of historical emissions	*m*	σ	Month	Results obtained on the basis of zero initial concentrations				*m*	σ
	DEHM-POP_1[a]	MSCE-POP_1	G-CIEMS_1	CliMoChem_2_3				G-CIEMS_2	CliMoChem_2_2	DEHM-POP_2[a]	MSCE-POP_2		
Jan	25.99	33.01	90.27		*49.76*	*35.26*	Jan	46.90		19.59	26.15	*30.88*	*14.25*
Feb	19.35	38.91	72.80		*43.69*	*27.04*	Feb	49.94		18.79	32.25	*33.66*	*15.63*
Mar	23.46	75.80	77.24		*58.83*	*30.64*	Mar	60.50		23.15	63.02	*48.89*	*22.33*
Season_1	**22.93**	**49.24**	**80.10**	**3.81**	***39.02***	***33.12***	**Season_1**	**52.45**	**9.83**	**20.51**	**40.47**	***30.82***	***19.22***
Apr	30.53	85.25	79.40		*65.06*	*30.05*	Apr	68.29		30.26	65.56	*54.70*	*21.21*
May	40.63	56.99	79.67		*59.10*	*19.61*	May	72.88		40.35	43.47	*52.23*	*17.95*
Jun	37.75	74.87	85.29		*65.97*	*24.99*	Jun	80.72		37.50	57.89	*58.70*	*21.62*
Season_2	**36.30**	**72.37**	**81.46**	**6.50**	***49.16***	***34.48***	**Season_2**	**73.96**	**22.67**	**36.04**	**55.64**	***47.08***	***22.46***
Jul	42.37	72.50	89.72		*68.20*	*23.97*	Jul	86.83		42.11	54.33	*61.09*	*23.11*
Aug	40.17	80.72	92.05		*70.98*	*27.28*	Aug	90.49		39.93	64.27	*64.90*	*25.29*
Sep	37.28	78.60	83.15		*66.34*	*25.27*	Sep	82.68		37.12	62.51	*60.77*	*22.83*
Season_3	**39.94**	**77.27**	**88.31**	**8.55**	***53.52***	***36.43***	**Season_3**	**86.67**	**33.30**	**39.72**	**60.37**	***55.02***	***24.05***
Oct	33.13	54.69	75.62		*54.48*	*21.25*	Oct	75.71		33.05	44.33	*51.03*	*22.11*
Nov	26.02	62.61	71.69		*53.44*	*24.17*	Nov	72.07		25.98	53.16	*50.40*	*23.17*
Dec	23.72	60.29	60.62		*48.21*	*21.21*	Dec	61.05		23.69	52.88	*45.87*	*19.64*
Season_4	**27.62**	**59.19**	**69.31**	**4.27**	***40.10***	***29.76***	**Season_4**	**69.61**	**17.57**	**27.57**	**50.12**	***41.22***	***23.31***
Annual	**31.70**	**64.52**	**79.80**	**5.78**	***45.45***	***33.20***	**Annual**	**70.67**	**20.85**	**30.96**	**51.65**	***43.53***	***22.18***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
DEHM-POP_1 - DEHM-POP results calculated on the basis of initial concentrations given as input data;
DEHM-POP_2 - DEHM-POP results calculated on the basis of zero initial concentrations;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
* - data of DEHM-POP are given for 15 km layer of the atmosphere.

Table 3.4. *Calculation results: PCB-153 mass contained in 1 km layer of the atmosphere (kg) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation.*

Month	Results obtained on the basis of initial concentrations given as input data				Results obtained on the basis of historical emissions			*m*	σ	Month	Results obtained on the basis of zero initial concentrations				*m*	σ
	G-CIEMS_1	SimpleBox 3.0_1[a]	MSCE-POP_1	CAN/POPs	CliMo Chem_2_3	SimpleBox 3.0_3[a]	SimpleBox 3.12_3[a]				CliMo Chem_2_2	SimpleBox 3.0_2[a]	SimpleBox 3.12_2[a]	MSCE-POP_2		
Jan	65.92	191.04	11.00	9.57		41.79	46.08	*60.90*	*67.34*	Jan		34.14	34.14	8.28	*25.52*	*14.93*
Feb	52.26	163.19	12.83	9.68		41.54	46.13	*54.27*	*56.22*	Feb		36.60	36.60	10.23	*27.81*	*15.23*
Mar	52.53	136.47	24.85	9.92		41.60	46.21	*51.93*	*44.24*	Mar		36.77	36.76	19.87	*31.13*	*9.75*
Seas_1	**56.90**	**163.57**	**16.23**	**9.72**	**1.26**	**41.64**	**46.14**	***47.92***	***54.98***	**Seas_1**	**4.36**	**35.84**	**35.84**	**12.79**	***22.21***	***16.11***
Apr	53.95	116.33	27.70	12.20		41.65	46.27	*49.68*	*35.84*	Apr		36.90	36.90	20.20	*31.33*	*9.64*
May	44.18	101.27	18.07	15.30		41.69	46.31	*44.47*	*30.94*	May		37.00	37.00	13.15	*29.05*	*13.77*
Jun	46.06	89.80	22.48	14.80		41.72	46.35	*43.54*	*26.18*	Jun		37.09	37.09	16.61	*30.27*	*11.83*
Seas_2	**48.06**	**102.47**	**22.75**	**14.10**	**1.69**	**41.69**	**46.31**	***39.58***	***32.77***	**Seas_2**	**6.44**	**37.00**	**37.00**	**16.65**	***24.27***	***15.28***
Jul	45.88	80.96	21.07	14.40		41.75	46.38	*41.74*	*23.46*	Jul		37.17	37.17	15.07	*29.80*	*12.76*
Aug	45.91	73.92	22.64	16.30		41.76	46.41	*41.16*	*20.42*	Aug		37.23	37.23	17.44	*30.64*	*11.42*
Sep	44.99	68.40	23.37	12.70		41.79	46.42	*39.61*	*19.48*	Sep		37.29	37.28	18.00	*30.86*	*11.14*
Seas_3	**45.59**	**74.43**	**22.36**	**14.47**	**2.03**	**41.77**	**46.40**	***35.29***	***24.19***	**Seas_3**	**7.92**	**37.23**	**37.23**	**16.84**	***24.80***	***14.80***
Oct	42.82	63.95	16.81	9.07		41.79	46.44	*36.81*	*20.30*	Oct		37.33	37.33	13.24	*29.30*	*13.91*
Nov	51.26	60.30	19.83	7.20		41.80	46.44	*37.81*	*20.19*	Nov		37.37	37.37	16.48	*30.41*	*12.06*
Dec	45.89	57.31	19.38	7.32		41.82	46.44	*36.36*	*18.94*	Dec		37.41	37.40	16.65	*30.49*	*11.99*
Seas_4	**46.66**	**60.52**	**18.67**	**7.86**	**1.14**	**41.80**	**46.44**	***31.87***	***22.53***	**Seas_4**	**4.61**	**37.37**	**37.37**	**15.46**	***23.70***	***16.39***
Annual	**49.30**	**100.25**	**20.00**	**11.54**	**1.53**	**41.73**	**46.32**	***38.67***	***32.75***	**Annual**	**5.83**	**36.86**	**36.86**	**15.44**	***23.75***	***15.64***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
[a] - SimpleBox data presented here are overall masses calculated as sum of regional and continental level estimates.

Table 3.5. *Calculation results: PCB-153 mass contained in 5 km layer of the atmosphere (kg) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data			Results obtained on the basis of historical emissions	*m*	σ	Month	Results obtained on the basis of zero initial concentrations		*m*	σ
	G-CIEMS_1	MSCE-POP_1	CAN/POPs	CliMoChem_2_3				CliMoChem_2_2	MSCE-POP_2		
Jan	76.65	28.27	14.26		*39.73*	*32.73*	Jan		21.27		
Feb	59.51	32.96	12.85		*35.11*	*23.41*	Feb		26.29		
Mar	63.51	63.86	14.97		*47.45*	*28.13*	Mar		51.07		
Season_1	**66.56**	**41.70**	**14.03**	**6.29**	***32.14***	***27.52***	**Season_1**	**21.78**	**32.88**	***27.33***	***7.85***
Apr	66.30	71.17	19.84		*52.44*	*28.34*	Apr		51.91		
May	67.43	46.42	27.00		*46.95*	*20.22*	May		33.78		
Jun	71.66	57.76	25.90		*51.77*	*23.46*	Jun		42.68		
Season_2	**68.47**	**58.45**	**24.25**	**8.43**	***39.90***	***28.26***	**Season_2**	**32.18**	**42.79**	***37.48***	***7.50***
Jul	71.80	54.13	25.00		*50.31*	*23.63*	Jul		38.73		
Aug	72.46	58.17	28.10		*52.91*	*22.64*	Aug		44.82		
Sep	69.61	60.06	19.80		*49.82*	*26.44*	Sep		46.24		
Season_3	**71.29**	**57.45**	**24.30**	**10.17**	***28.39***	***28.39***	**Season_3**	**39.62**	**43.27**	***2.58***	***2.58***
Oct	64.04	43.18	12.88		*40.03*	*25.72*	Oct		34.03		
Nov	60.76	50.96	10.10		*40.61*	*26.87*	Nov		42.34		
Dec	52.20	49.80	9.28		*37.09*	*24.12*	Dec		42.77		
Season_4	**59.00**	**47.98**	**10.75**	**5.72**	***26.59***	***26.59***	**Season_4**	**23.05**	**39.71**	***11.79***	***11.79***
Annual	**66.33**	**51.40**	**18.33**	**7.65**	***35.93***	***27.52***	**Annual**	**29.16**	**39.66**	***34.41***	***7.43***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations.

Table 3.6. *Calculation results: PCB-153 mass contained in 10 km layer of the atmosphere (kg) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data				Results obtained on the basis of historical emissions	*m*	*σ*	Month	Results obtained on the basis of zero initial concentrations			*m*	σ
	DEHM-POP_1[a]	G-CIEMS_1	MSCE-POP_1	CAN/POPs	CliMoChem_2_3				CliMoChem_2_2	DEHM-POP_2[a]	MSCE-POP_2		
Jan	25.84	78.74	34.57	14.73		*38.47*	*28.05*	Jan		19.50	26.01	*22.76*	*4.61*
Feb	19.18	60.83	40.31	13.39		*33.43*	*21.62*	Feb		18.65	32.15	*25.40*	*9.55*
Mar	23.24	64.81	78.10	15.63		*45.44*	*30.68*	Mar		22.95	62.45	*42.70*	*27.93*
Seas_1	**22.75**	**68.13**	**50.99**	**14.58**	**12.58**	***33.81***	***24.57***	**Seas_1**	**43.56**	**20.37**	**40.21**	***34.71***	***12.54***
Apr	30.27	67.39	87.04	20.59		*51.32*	*31.21*	Apr		30.00	63.48	*46.74*	*23.67*
May	40.42	68.79	56.77	28.29		*48.57*	*17.83*	May		40.14	41.31	*40.72*	*0.83*
Jun	37.60	73.30	70.64	27.52		*52.27*	*23.15*	Jun		37.35	52.19	*44.77*	*10.50*
Seas_2	**36.10**	**69.83**	**71.48**	**25.47**	**16.86**	***43.95***	***25.32***	**Seas_2**	**64.35**	**35.83**	**52.33**	***50.84***	***14.32***
Jul	42.12	76.15	66.20	26.98		*52.86*	*22.40*	Jul		41.85	47.36	*44.61*	*3.90*
Aug	39.98	77.87	71.14	30.21		*54.80*	*23.26*	Aug		39.75	54.82	*47.28*	*10.65*
Sep	36.98	70.99	73.45	21.43		*50.71*	*25.65*	Sep		36.83	56.55	*46.69*	*13.94*
Seas_3	**39.69**	**75.00**	**70.26**	**26.21**	**20.34**	***51.33***	***25.91***	**Seas_3**	**79.24**	**39.48**	**52.91**	***57.21***	***20.22***
Oct	32.77	64.82	52.81	13.68		*41.02*	*22.52*	Oct		32.69	41.61	*37.15*	*6.31*
Nov	25.63	61.26	62.32	10.60		*39.95*	*25.95*	Nov		25.59	51.78	*38.69*	*18.52*
Dec	23.39	52.58	60.90	9.60		*36.62*	*24.15*	Dec		23.37	52.31	*37.84*	*20.46*
Seas_4	**27.26**	**59.55**	**58.67**	**11.29**	**11.44**	***39.23***	***23.85***	**Seas_4**	**46.09**	**27.22**	**48.57**	***40.63***	***11.68***
Annual	**31.45**	**68.13**	**62.85**	**19.39**	**15.30**	***39.42***	***24.59***	**Annual**	**58.31**	**30.72**	**48.50**	***45.85***	***13.98***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
DEHM-POP_1 - DEHM-POP results calculated on the basis of initial concentrations given as input data;
DEHM-POP_2 - DEHM-POP results calculated on the basis of zero initial concentrations;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
[a] - data of DEHM-POP are given for 15 km layer of the atmosphere.

Comparison between results obtained on the basis of two data sets. The percentage difference between calculation results on PCB-153 mass contained in 1, 5 and 10 km layers of the atmosphere obtained with two data sets of physical-chemical properties (for those models who provided calculations for both these sets) is shown in Tables 3.7-3.9.

Table 3.7. *The percentage difference between calculation results on PCB-153 mass contained in 1 km layer of the atmosphere obtained by models on the basis of two data sets: "reference" and "own or alternative" data sets*

Month	CliMo Chem_2_2	CliMo Chem_2_3	G-CIEMS_1	SimpleBox 3.0_1	SimpleBox 3.0_2	SimpleBox 3.12_2	SimpleBox 3.0_3	SimpleBox 3.12_3	MSCE-POP_1	MSCE-POP_2
Jan			-11.1%	68.2%	1.2%	1.2%	10.8%	9.2%	4.7%	-0.5%
Feb			-14.4%	67.7%	1.6%	1.6%	11.1%	9.3%	3.6%	-0.3%
Mar			-13.0%	63.2%	1.8%	1.8%	11.2%	9.5%	3.0%	-0.9%
Seas_1	**343.0%**	**229.8%**	**-12.7%**	**66.6%**	**1.6%**	**1.6%**	**11.0%**	**9.4%**	**3.6%**	**-0.7%**
Apr			-11.3%	58.4%	2.0%	2.0%	11.3%	9.7%	2.1%	-3.2%
May			-9.5%	53.5%	2.2%	2.2%	11.4%	9.8%	-0.4%	-5.0%
Jun			-9.6%	48.8%	2.3%	2.3%	11.5%	9.9%	-5.7%	-9.8%
Seas_2	**183.8%**	**159.2%**	**-10.2%**	**53.9%**	**2.2%**	**2.2%**	**11.4%**	**9.8%**	**-1.2%**	**-6.0%**
Jul			-9.5%	44.3%	2.4%	2.4%	11.6%	9.9%	-8.7%	-12.8%
Aug			-9.4%	40.2%	2.5%	2.5%	11.6%	10.0%	-11.9%	-14.7%
Sep			-10.2%	36.4%	2.6%	2.6%	11.7%	10.0%	-6.5%	-9.5%
Seas_3	**137.9%**	**138.1%**	**-9.7%**	**40.5%**	**2.5%**	**2.5%**	**11.6%**	**10.0%**	**-9.1%**	**-12.4%**
Oct			-10.5%	33.1%	2.7%	2.7%	11.7%	10.1%	-3.4%	-6.1%
Nov			-11.3%	30.1%	2.8%	2.7%	11.7%	10.1%	-0.5%	-2.6%
Dec			-11.1%	27.4%	2.8%	2.8%	11.8%	10.1%	1.0%	-1.1%
Seas_4	**162.3%**	**167.9%**	**-11.0%**	**30.3%**	**2.8%**	**2.7%**	**11.7%**	**10.1%**	**-0.9%**	**-3.1%**
Annual	**179.7%**	**164.6%**	**-11.0%**	**51.8%**	**2.3%**	**2.3%**	**11.5%**	**9.8%**	**-2.6%**	**-6.1%**

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations.

Table 3.8.*The percentage difference between calculation results on PCB-153 mass contained in 5 km layer of the atmosphere obtained by models on the basis of two data sets: "reference" and "own or alternative" data sets*

Month	CliMoChem_2_2	CliMoChem_2_3	G-CIEMS_1	MSCE-POP_1	MSCE-POP_2
Jan			-14.7%	4.7%	-0.5%
Feb			-17.9%	3.6%	-0.3%
Mar			-17.2%	3.0%	-0.9%
Seas_1	**343.0%**	**229.8%**	**-16.5%**	**3.6%**	**-0.7%**
Apr			-16.0%	2.1%	-3.2%
May			-15.0%	-0.4%	-5.0%
Jun			-15.7%	-5.7%	-9.8%
Seas_2	**183.8%**	**159.2%**	**-15.6%**	**-1.2%**	**-6.0%**
Jul			-19.7%	-8.7%	-12.8%
Aug			-20.9%	-11.9%	-14.7%
Sep			-16.2%	-6.5%	-9.5%
Seas_3	**137.9%**	**138.1%**	**-19.0%**	**-9.1%**	**-12.4%**
Oct			-15.2%	-3.4%	-6.1%
Nov			-15.2%	-0.5%	-2.6%
Dec			-13.8%	1.0%	-1.1%
Seas_4	**162.3%**	**167.9%**	**-14.8%**	**-0.9%**	**-3.1%**
Annual	**179.7%**	**164.6%**	**-16.6%**	**-2.6%**	**-6.1%**

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations.

Table 3.9. *The percentage difference between calculation results on PCB-153 mass contained in 10 km layer of the atmosphere obtained by models on the basis of two data sets: "reference" and "own or alternative" data sets*

Month	CliMoChem_2_2	CliMoChem_2_3	DEHM-POP_1	DEHM-POP_2	G-CIEMS_1	MSCE-POP_1	MSCE-POP_2
Jan			-0.6%	-0.5%	-12.8%	4.7%	-0.5%
Feb			-0.9%	-0.7%	-16.4%	3.6%	-0.3%
Mar			-0.9%	-0.9%	-16.1%	3.0%	-0.9%
Seas_1	**343.0%**	**229.8%**	**-0.8%**	**-0.7%**	**-14.9%**	**3.6%**	**-0.7%**
Apr			-0.9%	-0.9%	-15.1%	2.1%	-3.2%
May			-0.5%	-0.5%	-13.7%	-0.4%	-5.0%
Jun			-0.4%	-0.4%	-14.1%	-5.7%	-9.8%
Seas_2	**183.8%**	**159.2%**	**-0.6%**	**-0.6%**	**-14.3%**	**-1.2%**	**-6.0%**
Jul			-0.6%	-0.6%	-15.1%	-8.7%	-12.8%
Aug			-0.5%	-0.5%	-15.4%	-11.9%	-14.7%
Sep			-0.8%	-0.8%	-14.6%	-6.5%	-9.5%
Seas_3	**137.9%**	**138.1%**	**-0.6%**	**-0.6%**	**-15.1%**	**-9.1%**	**-12.4%**
Oct			-1.1%	-1.1%	-14.3%	-3.4%	-6.1%
Nov			-1.5%	-1.5%	-14.5%	-0.5%	-2.6%
Dec			-1.4%	-1.4%	-13.3%	1.0%	-1.1%
Seas_4	**162.3%**	**167.9%**	**-1.3%**	**-1.3%**	**-14.1%**	**-0.9%**	**-3.1%**
Annual	**179.7%**	**164.6%**	**-0.8%**	**-0.8%**	**-14.6%**	**-2.6%**	**-6.1%**

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
DEHM-POP_1 - DEHM-POP results calculated on the basis of initial concentrations given as input data;
DEHM-POP_2 - DEHM-POP results calculated on the basis of zero initial concentrations;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data.
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations.

3.1.2. Comparison of calculated values of PCB-153 mass in soil

According to the programme of Stage II results of computational experiments on mass balance include masses of PCB-153 contained in soil within 5 cm and 10 cm depth.

Reference data set. Calculation results on PCB-153 mass contained in 5cm layer of soil (kg) calculated by models on the basis of "reference" data set together with statistical parameters used for evaluation are presented in Table 3.10.

Monthly values of PCB-153 mass contained in 5cm layer of soil calculated by the participating models on the basis of "reference" data set and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.7a and b, respectively.

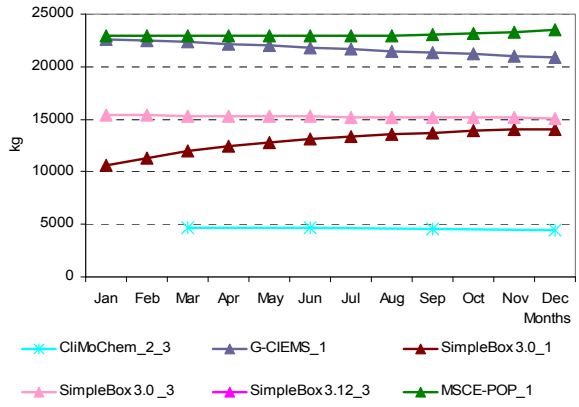


Fig.3.7a. *PCB-153 mass contained in 5cm layer of soil (kg) calculated by the participating models on the basis of "reference" data set and non-zero initial conditions*

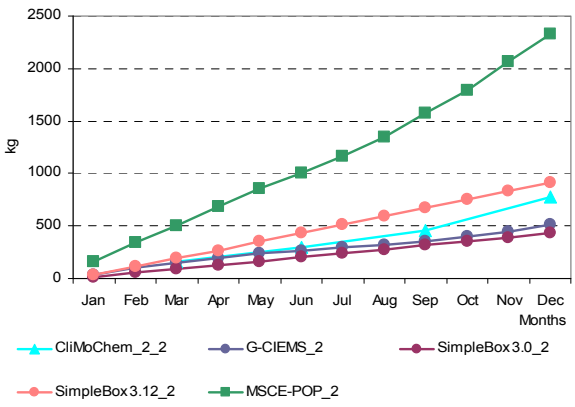


Fig.3.7b. *PCB-153 mass contained in 5cm layer of soil (kg) calculated by the participating models on the basis of "reference" data set and zero initial conditions*

Calculation results on PCB-153 mass contained in 10 cm layer of soil (kg) calculated by models on the basis of "reference" data set together with statistical parameters used for evaluation are presented in Table 3.11.

Monthly values of PCB-153 mass contained in 10 cm layer of soil calculated by the participating models on the basis of "reference" data set and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.8a and b, respectively.

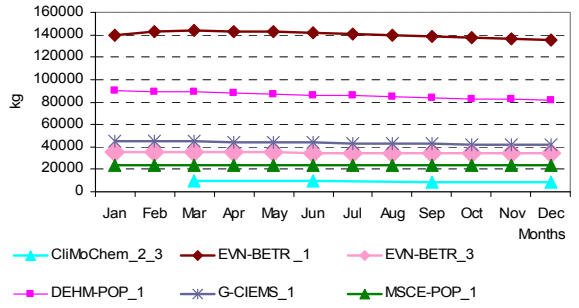


Fig.3.8a. *PCB-153 mass contained in 10cm layer of soil (kg) calculated by the participating models on the basis of "reference" data set and non-zero initial conditions*

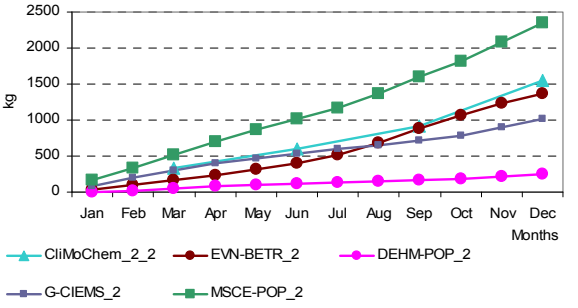


Fig.3.8b. *PCB-153 mass contained in 10cm layer of soil (kg) calculated by the participating models on the basis of "reference" data set and zero initial conditions*

Table 3.10. *Calculation results: PCB-153 mass contained in 5cm layer of soil (kg) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data			Results obtained on the basis of historical emissions			*m*	σ	Month	Results obtained on the basis of zero initial concentrations					*m*	σ
	G-CIEMS_1	SimpleBox 3.0_1[a]	MSCE-POP_1	CliMo Chem_2_3	SimpleBox 3.0_3[a]	SimpleBox 3.12_3[a]				G-CIEMS_2	CliMo Chem _2_2	Simple Box 3.0_2[a]	SimpleBox 3.12_2[a]	MSCE-POP_2		
Jan	22599.4	10616.1	22907.6		15407.7	253179.2	*64942.0*	*105354.2*	Jan	39.7		16.4	34.8	158.0	*62.2*	*64.6*
Feb	22496.3	11357.6	22934.1		15379.3	253179.2	*65069.3*	*105270.1*	Feb	100.7		52.3	111.1	337.2	*150.3*	*127.2*
Mar	22353.6	11940.2	22943.3		15351.3	253179.2	*65153.5*	*105213.0*	Mar	152.2		88.8	188.8	506.4	*234.0*	*186.2*
Seas_1	**22483.1**	**11304.7**	**22928.3**	**4723.9**	**15379.4**	**253179.2**	***54999.8***	***97332.1***	**Seas_1**	**97.6**	**165.4**	**52.5**	**111.6**	**333.8**	***152.2***	***109.3***
Apr	22199.4	12413.2	22965.2		15323.1	253179.2	*65216.0*	*105170.3*	Apr	199.5		126.3	264.6	685.7	*319.0*	*250.9*
May	22030.0	12793.0	22972.4		15295.3	253179.2	*65254.0*	*105142.7*	May	234.6		164.0	348.6	855.7	*400.7*	*312.7*
Jun	21856.1	13101.9	22945.9		15267.2	253179.2	*65270.1*	*105128.2*	Jun	264.8		202.0	429.0	1003.6	*474.9*	*365.3*
Seas_2	**22028.5**	**12769.4**	**22961.2**	**4628.7**	**15295.2**	**253179.2**	***55143.7***	***97247.8***	**Seas_2**	**233.0**	**301.3**	**164.1**	**347.4**	**848.4**	***378.8***	***271.5***
Jul	21684.6	13354.5	22926.5		15239.7	253179.2	*65276.9*	*105119.9*	Jul	296.1		240.1	509.6	1162.1	*552.0*	*423.0*
Aug	21511.1	13565.5	22952.5		15212.0	251211.9	*64890.6*	*104233.5*	Aug	323.9		278.8	591.6	1345.8	*635.0*	*493.5*
Sep	21342.6	13737.1	23057.4		15184.7	253179.2	*65300.2*	*105101.8*	Sep	355.3		317.0	672.0	1574.6	*729.7*	*585.3*
Seas_3	**21512.8**	**13552.4**	**22978.8**	**4539.7**	**15212.2**	**252523.5**	***55053.2***	***96963.4***	**Seas_3**	**325.1**	**460.3**	**278.6**	**591.1**	**1360.8**	***603.2***	***440.8***
Oct	21182.8	13878.6	23154.1		15157.6	253179.2	*65310.4*	*105094.8*	Oct	394.4		355.2	752.5	1795.3	*824.3*	*671.6*
Nov	21039.6	13995.4	23324.8		15130.9	253179.2	*65334.0*	*105081.6*	Nov	449.3		393.4	832.8	2063.4	*934.7*	*777.4*
Dec	20904.4	14090.9	23492.9		15104.8	253179.2	*65354.4*	*105070.6*	Dec	511.4		430.9	907.8	2327.1	*1044.3*	*880.3*
Seas_4	**21042.2**	**13988.3**	**23323.9**	**4489.3**	**15131.1**	**253179.2**	***55192.3***	***97215.3***	**Seas_4**	**451.7**	**776.8**	**393.2**	**831.0**	**2061.9**	***902.9***	***676.0***
Annual	**21766.7**	**12903.7**	**23048.1**	**4595.4**	**15254.5**	**253015.3**	***55097.3***	***97188.3***	**Annual**	**276.8**	**426.0**	**222.1**	**470.3**	**1151.2**	***509.3***	***373.2***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;

[a] - SimpleBox data presented here are overall masses calculated as sum of regional and continental level estimates.

Own/alternative data set. Calculation results on PCB-153 mass contained in 5cm layer of soil (kg) calculated by the models on the basis of "own or alternative" data sets together with statistical parameters used for evaluation are presented in Table 3.12.

Monthly values of PCB-153 mass contained in 5cm layer of soil calculated by all participating models on the basis of "own or alternative" data sets and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.9a and b, respectively.

Calculation results on PCB-153 mass contained in 10 cm layer of soil (kg) calculated by models on the basis of "own or alternative" data sets together with statistical parameters used for evaluation are presented in Table 3.13.

Monthly values of PCB-153 mass contained in 10 cm layer of soil calculated by the participating models on the basis of "own or alternative" data sets and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.10a and b, respectively.

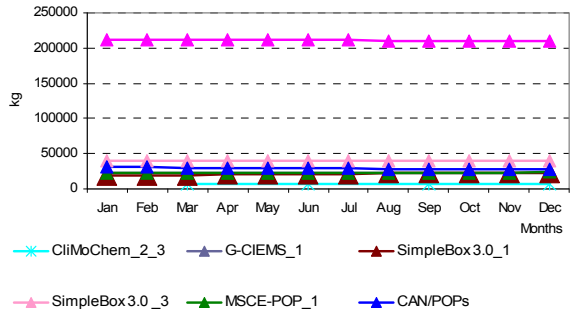


Fig. 3.9a. *PCB-153 mass contained in 5cm layer of soil (kg) calculated by the participating models on the basis of "own or alternative" data sets and non-zero initial conditions*

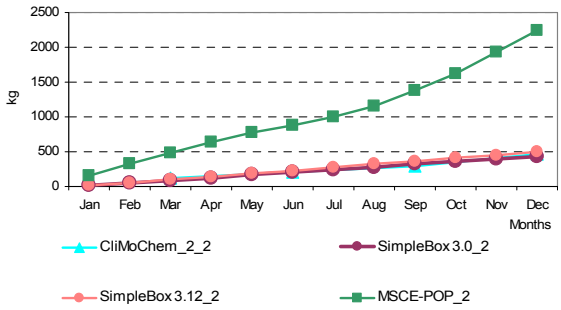


Fig. 3.9b. *PCB-153 mass contained in 5cm layer of soil (kg) calculated by the participating models on the basis of "own or alternative" data sets and zero initial conditions*

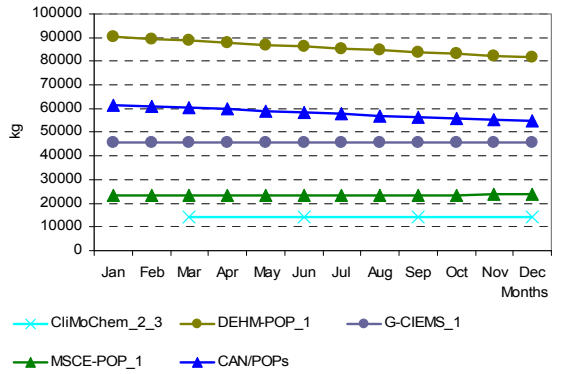


Fig.3.10a. *PCB-153 mass contained in 10cm layer of soil (kg) calculated by the participating models on the basis of "own or alternative" data sets and non-zero initial conditions*

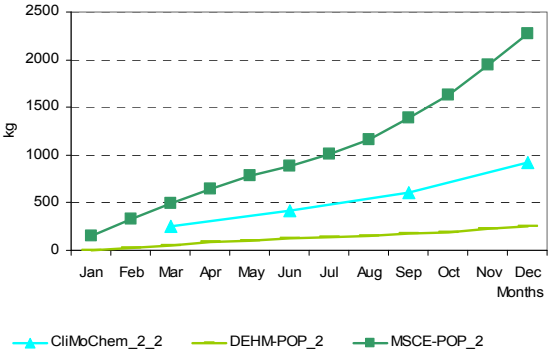


Fig.3.10b. *PCB-153 mass contained in 10cm layer of soil (kg) calculated by the participating models on the basis of "own or alternative" data sets and zero initial conditions*

Table 3.11. *Calculation results: PCB-153 mass contained in 10 cm layer of soil (kg) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data				Results obtained on the basis of historical emissions		*m*	σ	Month	Results obtained on the basis of zero initial concentrations					*m*	σ
	DEHM-POP_1[a]	MSCE-POP_1	EVN-BETR_1[b]	G-CIEMS_1	EVN-BETR_3[b]	CliMoChem_2_3				EVN-BETR_2[b]	G-CIEMS_2	CliMoChem_2_2	DEHM-POP_2[a]	MSCE-POP_2		
Jan	90190.0	23157.9	139064.3	45198.8	35870.0		*66696.2*	*47689.3*	Jan	39.3	79.5		6.1	159.7	*71.1*	*66.2*
Feb	89380.0	23184.8	142960.5	44992.5	35630.6		*67229.7*	*49139.4*	Feb	101.0	201.5		22.7	340.9	*166.5*	*137.4*
Mar	88600.0	23194.1	143816.5	44707.3	35390.9		*67141.8*	*49452.7*	Mar	168.1	304.4		44.9	511.9	*257.3*	*200.1*
Seas_1	**89390.0**	**23179.0**	**141947.1**	**44966.2**	**35630.5**	**9447.8**	***57426.8***	***49539.0***	**Seas_1**	**102.8**	**195.1**	**330.8**	**24.5**	**337.5**	***198.1***	***138.1***
Apr	87820.0	23216.3	143341.7	44398.8	35153.0		*66786.0*	*49252.8*	Apr	237.3	399.0		81.7	693.2	*352.8*	*261.3*
May	87020.0	23223.5	142408.2	44059.9	34924.5		*66327.2*	*48878.4*	May	313.7	469.2		101.3	865.1	*437.3*	*322.6*
Jun	86240.0	23196.7	141329.3	43712.3	34710.9		*65837.8*	*48455.9*	Jun	403.4	529.6		117.7	1014.6	*516.3*	*374.2*
Seas_2	**87026.7**	**23212.1**	**142359.7**	**44057.0**	**34929.5**	**9257.4**	***56807.1***	***49524.3***	**Seas_2**	**318.1**	**466.0**	**602.7**	**100.2**	**857.6**	***468.9***	***286.2***
Jul	85450.0	23177.1	140226.6	43369.2	34526.8		*65349.9*	*48016.4*	Jul	520.3	592.1		136.7	1174.8	*606.0*	*428.7*
Aug	84680.0	23203.4	139155.6	43022.2	34391.3		*64890.5*	*47574.1*	Aug	683.3	647.8		154.2	1360.5	*711.5*	*495.5*
Sep	83910.0	23309.4	138105.2	42685.2	34285.9		*64459.1*	*47116.6*	Sep	876.2	710.6		168.9	1591.8	*836.9*	*587.0*
Seas_3	**84680.0**	**23230.0**	**139162.5**	**43025.6**	**34401.3**	**9079.4**	***55596.4***	***48265.5***	**Seas_3**	**693.3**	**650.2**	**920.6**	**153.3**	**1375.7**	***758.6***	***444.3***
Oct	83170.0	23407.2	137052.9	42365.6	34181.2		*64035.4*	*46661.5*	Oct	1069.1	788.7		189.6	1815.0	*965.6*	*674.7*
Nov	82420.0	23579.8	135978.3	42079.2	34053.1		*63622.1*	*46180.6*	Nov	1236.9	898.6		220.2	2085.9	*1110.4*	*775.7*
Dec	81690.0	23749.7	134866.5	41808.7	33886.8		*63200.3*	*45692.3*	Dec	1365.5	1022.8		245.0	2352.6	*1246.4*	*873.8*
Seas_4	**82426.7**	**23578.9**	**135965.9**	**42084.5**	**34040.3**	**8978.6**	***54512.5***	***46941.8***	**Seas_4**	**1223.8**	**903.4**	**1553.7**	**218.3**	**2084.5**	***1196.7***	***699.9***
Annual	**85880.8**	**23300.0**	**139858.8**	**43533.3**	**34750.4**	**9190.8**	***56085.7***	***48564.3***	**Annual**	**584.5**	**553.7**	**851.9**	**124.1**	**1163.8**	***655.6***	***385.6***

EVN-BETR _1 - EVN-BETR and UK-MODEL results calculated on the basis of initial concentrations given as input data;
EVN-BETR _2 - EVN-BETR and UK-MODEL results calculated on the basis of zero initial concentrations;
EVN-BETR _3 - EVN-BETR and UK-MODEL results calculated on the basis of historical emissions for 20-year period;
G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
DEHM-POP_1 - DEHM-POP results calculated on the basis of initial concentrations given as input data;
DEHM-POP_2 - DEHM-POP results calculated on the basis of zero initial concentrations;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
[a] - data of DEHM-POP are given for 15 cm layer of soil;
[b] - EVN-BETR and UK-MODEL results were calculated with the help of a single box version of European model.

Table 3.12. *Calculation results: PCB-153 mass contained in 5cm layer of soil (kg) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data				Results obtained on the basis of historical emissions			*m*	σ	Month	Results obtained on the basis of zero initial concentrations				*m*	σ
	G-CIEMS_1	SimpleBox 3.0_1[a]	CAN/POPs	MSCE-POP_1	CliMo Chem_2_3	SimpleBox 3.0_3[a]	SimpleBox 3.12_3[a]				CliMo Chem_2_2	SimpleBox 3.0_2[a]	SimpleBox 3.12_2[a]	MSCE-POP_2		
Jan	22762.5	18372.1	30747.6	22930.8		39429.6	212172.7	*57735.9*	*76024.0*	Jan		16.1	18.4	153.2	*62.6*	*78.5*
Feb	22815.1	19223.8	30521.3	22974.7		39430.4	211972.3	*57822.9*	*75862.4*	Feb		51.7	58.9	324.9	*145.2*	*155.7*
Mar	22830.6	19909.8	30242.0	22996.4		39427.4	211773.2	*57863.2*	*75729.2*	Mar		88.2	100.6	481.8	*223.5*	*223.8*
Seas_1	**22802.7**	**19168.6**	**30503.6**	**22967.3**	**7145.5**	**39429.2**	**211972.7**	***50569.9***	***71859.0***	**Seas_1**	**123.3**	**52.0**	**59.3**	**319.9**	***138.6***	***125.0***
Apr	22834.0	20481.5	29958.2	23010.7		39427.7	211629.1	*57890.2*	*75632.9*	Apr		125.9	141.4	636.5	*301.3*	*290.4*
May	22820.5	20954.7	29604.1	22994.7		39425.4	211368.3	*57861.3*	*75509.5*	May		164.0	187.0	771.4	*374.2*	*344.2*
Jun	22801.8	21351.4	29231.3	22928.2		39425.8	211167.5	*57817.7*	*75425.2*	Jun		202.6	230.9	876.8	*436.8*	*381.3*
Seas_2	**22818.8**	**20929.2**	**29597.9**	**22977.9**	**7129.5**	**39426.3**	**211388.3**	***50609.7***	***71558.4***	**Seas_2**	**209.8**	**164.2**	**186.5**	**761.6**	***330.5***	***288.0***
Jul	22783.9	21686.5	28869.3	22874.0		39424.3	210967.2	*57767.5*	*75345.8*	Jul		241.5	275.2	995.7	*504.1*	*426.1*
Aug	22762.6	21977.8	28557.7	22884.2		39424.0	210075.1	*57613.6*	*74980.3*	Aug		281.4	320.4	1151.1	*584.3*	*491.2*
Sep	22744.6	22223.7	28298.8	23021.2		39425.7	210564.5	*57713.1*	*75165.1*	Sep		320.8	365.0	1379.3	*688.4*	*598.7*
Seas_3	**22763.7**	**21962.7**	**28575.3**	**22926.5**	**7103.7**	**39424.7**	**210535.6**	***50470.3***	***71229.6***	**Seas_3**	**300.9**	**281.2**	**320.2**	**1175.4**	***519.4***	***437.6***
Oct	22733.6	22437.0	28090.8	23171.5		39425.3	210365.2	*57703.9*	*75067.5*	Oct		360.4	409.9	1614.1	*794.8*	*709.9*
Nov	22738.1	22623.5	27919.3	23436.8		39425.4	210165.7	*57718.1*	*74957.7*	Nov		400.3	454.8	1923.8	*926.3*	*864.3*
Dec	22749.2	22784.4	27762.1	23716.5		39426.6	209971.7	*57735.1*	*74849.7*	Dec		439.5	496.5	2243.6	*1059.9*	*1025.5*
Seas_4	**22740.3**	**22615.0**	**27924.1**	**23441.6**	**7113.4**	**39425.8**	**210167.5**	***50489.7***	***71050.2***	**Seas_4**	**462.3**	**400.1**	**453.8**	**1927.2**	***810.8***	***744.7***
Annual	**22781.4**	**21168.9**	**29150.2**	**23078.3**	**7123.0**	**39426.5**	**211016.0**	***50534.9***	***71421.3***	**Annual**	**274.1**	**224.4**	**254.9**	**1046.0**	***449.9***	***398.0***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;

MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;;

MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;

SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;

SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;

SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;

[a] - SimpleBox data presented here are overall masses calculated as sum of regional and continental level estimates.

Table 3.13. *Calculation results: PCB-153 mass contained in 10 cm layer of soil (kg) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data				Results obtained on the basis of historical emissions	*m*	σ	Month	Results obtained on the basis of zero initial concentrations			*m*	σ
	DEHM-POP_1[a]	G-CIEMS_1	MSCE-POP_1	CAN/POPs[b]	CliMoChem_2_3				CliMoChem_2_2	DEHM-POP_2[a]	MSCE-POP_2		
Jan	90190.0	45524.9	23181.4	61403.5		*55075.0*	*28175.1*	Jan		6.3	154.9	*80.6*	*105.0*
Feb	89380.0	45630.1	23225.8	60853.6		*54772.4*	*27769.5*	Feb		23.3	328.4	*175.9*	*215.7*
Mar	88600.0	45661.1	23247.7	60260.8		*54442.4*	*27391.1*	Mar		46.0	487.0	*266.5*	*311.9*
Season_1	**89390.0**	**45605.4**	**23218.3**	**60839.3**	**14290.9**	***46668.8***	***30105.2***	**Season_1**	**246.6**	**25.2**	**323.4**	***198.4***	***154.8***
Apr	87820.0	45668.0	23262.2	59663.5		*54103.4*	*27018.9*	Apr		83.4	643.5	*363.4*	*396.0*
May	87020.0	45641.0	23246.0	58999.0		*53726.5*	*26650.1*	May		103.4	779.9	*441.6*	*478.3*
Jun	86240.0	45603.7	23178.8	58317.9		*53335.1*	*26310.6*	Jun		120.3	886.3	*503.3*	*541.7*
Season_2	**87026.7**	**45637.5**	**23229.0**	**58993.5**	**14259.0**	***45829.2***	***29060.3***	**Season_2**	**419.7**	**102.4**	**769.9**	***430.7***	***333.9***
Jul	85450.0	45567.7	23124.1	57649.9		*52947.9*	*25964.2*	Jul		139.7	1006.6	*573.2*	*613.0*
Aug	84680.0	45525.2	23134.3	57029.2		*52592.2*	*25606.1*	Aug		157.6	1163.7	*660.6*	*711.4*
Sep	83910.0	45489.3	23272.8	56468.0		*52285.0*	*25202.7*	Sep		172.6	1394.3	*783.5*	*863.9*
Season_3	**84680.0**	**45527.4**	**23177.1**	**57049.0**	**14207.4**	***44928.2***	***28037.3***	**Season_3**	**601.8**	**156.6**	**1188.2**	***648.9***	***517.4***
Oct	83170.0	45467.2	23424.8	55961.1		*52005.8*	*24809.1*	Oct		193.7	1631.7	*912.7*	*1016.8*
Nov	82420.0	45476.2	23693.0	55493.2		*51770.6*	*24366.7*	Nov		224.9	1944.8	*1084.8*	*1216.1*
Dec	81690.0	45498.4	23975.8	55043.8		*51552.0*	*23927.6*	Dec		250.0	2268.2	*1259.1*	*1427.0*
Season_4	**82426.7**	**45480.6**	**23697.9**	**55499.4**	**14226.8**	***44266.3***	***26969.0***	**Season_4**	**924.7**	**222.9**	**1948.2**	***1031.9***	***867.7***
Annual	**85880.8**	**45562.7**	**23330.6**	**58095.3**	**14246.0**	***45423.1***	***28537.3***	**Annual**	**548.2**	**126.8**	**1057.4**	***577.5***	***466.0***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
DEHM-POP_1 - DEHM-POP results calculated on the basis of initial concentrations given as input data;
DEHM-POP_2 - DEHM-POP results calculated on the basis of zero initial concentrations;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
[a] – data of DEHM-POP are given for 15 cm layer of soil;
[b] - in CAN/POPs results the second layer of soil is applied as 5cm.

Comparison between results obtained on the basis of two data sets. The percentage difference between calculation results on PCB-153 masses contained in soil within 5 and 10 cm layers obtained with two data sets of physical-chemical properties (for those models who provided calculations for both these sets) is shown in Tables 3.14-3.15.

Table 3.14. *The percentage difference between calculation results on PCB-153 masses contained within 5 cm soil layer obtained by models on the basis of two data sets: "own or alternative" and "reference"*

Month	CliMo Chem_2_2	CliMo Chem_2_3	G-CIEMS_1	SimpleBox 3.0_1	SimpleBox 3.0_2	SimpleBox 3.12_2	SimpleBox 3.0_3	SimpleBox 3.12_3	MSCE-POP_1	MSCE-POP_2
Jan			0.7%	73.1%	-1.5%	-47.2%	155.9%	-16.2%	0.1%	-3.0%
Feb			1.4%	69.3%	-1.1%	-46.9%	156.4%	-16.3%	0.2%	-3.7%
Mar			2.1%	66.7%	-0.7%	-46.7%	156.8%	-16.4%	0.2%	-4.9%
Seas_1	**-25.5%**	**51.3%**	**1.4%**	**69.6%**	**-0.9%**	**-46.8%**	**156.4%**	**-16.3%**	**0.2%**	**-4.2%**
Apr			2.9%	65.0%	-0.3%	-46.5%	157.3%	-16.4%	0.2%	-7.2%
May			3.6%	63.8%	0.0%	-46.3%	157.8%	-16.5%	0.1%	-9.8%
Jun			4.3%	63.0%	0.3%	-46.2%	158.2%	-16.6%	-0.1%	-12.6%
Seas_2	**-30.4%**	**54.0%**	**3.6%**	**63.9%**	**0.0%**	**-46.3%**	**157.8%**	**-16.5%**	**0.1%**	**-10.2%**
Jul			5.1%	62.4%	0.6%	-46.0%	158.7%	-16.7%	-0.2%	-14.3%
Aug			5.8%	62.0%	0.9%	-45.8%	159.2%	-16.4%	-0.3%	-14.5%
Sep			6.6%	61.8%	1.2%	-45.7%	159.6%	-16.8%	-0.2%	-12.4%
Seas_3	**-34.6%**	**56.5%**	**5.8%**	**62.1%**	**0.9%**	**-45.8%**	**159.2%**	**-16.6%**	**-0.2%**	**-13.6%**
Oct			7.3%	61.7%	1.5%	-45.5%	160.1%	-16.9%	0.1%	-10.1%
Nov			8.1%	61.6%	1.7%	-45.4%	160.6%	-17.0%	0.5%	-6.8%
Dec			8.8%	61.7%	2.0%	-45.3%	161.0%	-17.1%	1.0%	-3.6%
Seas_4	**-40.5%**	**58.5%**	**8.1%**	**61.7%**	**1.8%**	**-45.4%**	**160.6%**	**-17.0%**	**0.5%**	**-6.5%**
Annual	**-35.7%**	**55.0%**	**4.7%**	**64.1%**	**1.0%**	**-45.8%**	**158.5%**	**-16.6%**	**0.1%**	**-9.1%**

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations.

Table 3.15. *The percentage difference between calculation results on PCB-153 mass contained within 10 cm soil layer obtained by models on the basis of two data sets: "own or alternative" and "reference"*

Month	CliMoChem_2_2	CliMoChem_2_3	DEHM-POP_1	DEHM-POP_2	G-CIEMS_1	MSCE-POP_1	MSCE-POP_2
Jan			0.0%	3.7%	0.7%	0.1%	-3.0%
Feb			0.0%	2.8%	1.4%	0.2%	-3.7%
Mar			0.0%	2.4%	2.1%	0.2%	-4.9%
Season_1	**-25.5%**	**51.3%**	**0.0%**	**2.6%**	**1.4%**	**0.2%**	**-4.2%**
Apr			0.0%	2.1%	2.9%	0.2%	-7.2%
May			0.0%	2.1%	3.6%	0.1%	-9.8%
Jun			0.0%	2.2%	4.3%	-0.1%	-12.6%
Season_2	**-30.4%**	**54.0%**	**0.0%**	**2.1%**	**3.6%**	**0.1%**	**-10.2%**
Jul			0.0%	2.2%	5.1%	-0.2%	-14.3%
Aug			0.0%	2.2%	5.8%	-0.3%	-14.5%
Sep			0.0%	2.2%	6.6%	-0.2%	-12.4%
Season_3	**-34.6%**	**56.5%**	**0.0%**	**2.2%**	**5.8%**	**-0.2%**	**-13.6%**
Oct			0.0%	2.2%	7.3%	0.1%	-10.1%
Nov			0.0%	2.1%	8.1%	0.5%	-6.8%
Dec			0.0%	2.0%	8.8%	1.0%	-3.6%
Season_4	**-40.5%**	**58.5%**	**0.0%**	**2.1%**	**8.1%**	**0.5%**	**-6.5%**
Annual	**-35.7%**	**55.0%**	**0.0%**	**2.2%**	**4.7%**	**0.1%**	**-9.1%**

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
DEHM-POP_1 - DEHM-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data.

3.1.3. Comparison of calculated values of PCB-153 mass in water

According to the programme of Stage II model results of computational experiments on mass balance include masses of PCB-153 contained in sea within a layer of 200 m depth.

Reference data set. Calculation results on PCB-153 mass contained in 200 m layer of seawater (kg) calculated by models on the basis of "reference" data set together with statistical parameters used for evaluation are presented in Table 3.16.

Monthly values of PCB-153 mass contained in 200 m layer of seawater calculated by all participating models on the basis of "reference" data set and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.11a and b, respectively.

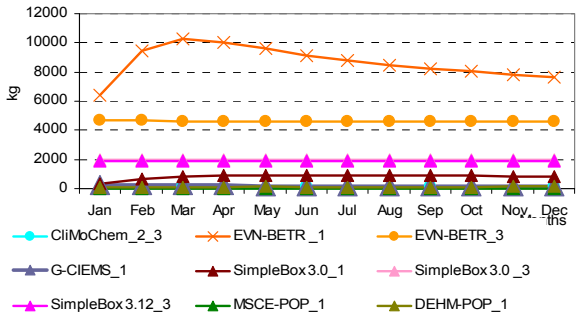


Fig. 3.11a. *PCB-153 mass contained in 200 m layer of seawater (kg) calculated by the participating models on the basis of "reference" data set and non-zero initial conditions*

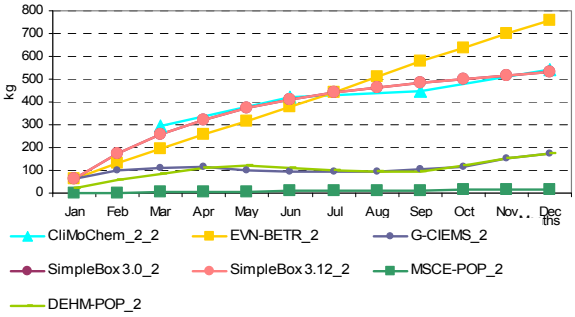


Fig. 3.11b. *PCB-153 mass contained in 200 m layer of seawater (kg) calculated by the participating models on the basis of "reference" data set and zero initial conditions*

Own/alternative data set. Calculation results on PCB-153 mass contained in 200 m layer of water (kg) calculated by models on the basis of "own or alternative" data sets together with statistical parameters used for evaluation are presented in Table 3.17.

Monthly values of PCB-153 mass contained in 200 m layer of water calculated by all participating models on the basis of "own or alternative" data sets and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.12a and b, respectively.

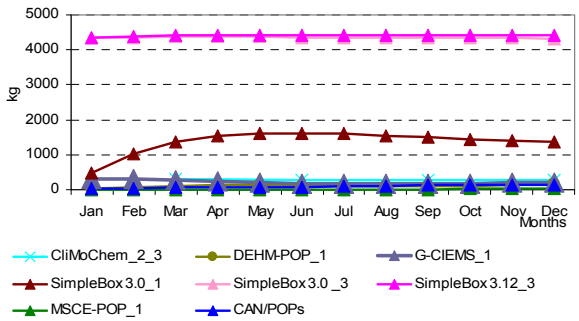


Fig. 3.12a. *PCB-153 mass contained in 200 m layer of water (kg) calculated by the participating models on the basis of "own or alternative" data sets and non-zero initial conditions*

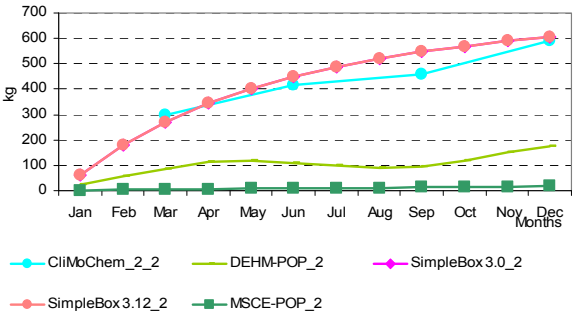


Fig. 3.12b. *PCB-153 mass contained in 200 m layer of water (kg) calculated by the participating models on the basis of "own or alternative" data sets and zero initial conditions*

Table 3.16. *Calculation results: PCB-153 mass contained in 200 m layer of seawater (kg) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data					Results obtained on the basis of historical emissions				*m*	σ	Month	Results obtained on the basis of zero initial concentrations							*m*	σ
	DEHM-POP_1	MSCE-POP_1	EVN-BETR_1[a]	G-CIEMS_1	SimpleBox 3.0_1[b]	EVN-BETR_3[a]	CliMo Chem_2_3	SimpleBox 3.0 _3[b]	SimpleBox 3.12_3[b]				EVN-BETR_2[a]	G-CIEMS_2	CliMo Chem_2_2	SimpleBox 3.0_2[b]	SimpleBox 3.12_2[b]	DEHM-POP_2	MSCE-POP_2		
Jan	48.39	2.04	6380.63	279.64	315.69	4681.94		1933.49	1923.70	*1945.69*	*2389.46*	Jan	62.40	64.26		60.97	60.96	22.06	1.68	*45.39*	*26.78*
Feb	77.42	2.80	9461.64	261.10	625.51	4662.43		1946.93	1923.70	*2370.19*	*3257.41*	Feb	130.12	101.53		173.23	173.21	56.15	2.34	*106.10*	*67.63*
Mar	99.07	4.05	10254.78	232.15	797.39	4634.48		1956.11	1923.70	*2487.72*	*3491.94*	Mar	195.53	111.33		257.56	257.55	82.86	3.46	*151.38*	*102.64*
Seas_1	**74.96**	**2.96**	**8699.02**	**257.63**	**579.53**	**4659.62**	**166.46**	**1945.51**	**1923.70**	***2034.38***	***2916.72***	**Seas_1**	**129.35**	**92.37**	**293.96**	**163.92**	**163.91**	**53.69**	**2.49**	***128.53***	***93.69***
Apr	122.60	6.45	10043.12	209.73	886.41	4604.02		1962.46	1923.70	*2469.81*	*3415.47*	Apr	256.57	115.08		322.30	322.30	110.50	5.48	*188.71*	*130.70*
May	127.10	9.23	9582.66	172.14	923.14	4580.43		1966.61	1923.70	*2410.62*	*3268.57*	May	316.50	98.83		371.59	371.57	118.60	7.78	*214.14*	*158.15*
Jun	116.00	9.99	9136.24	151.02	930.29	4568.00		1969.21	1923.70	*2350.56*	*3130.88*	Jun	378.06	94.26		409.81	409.81	110.50	8.35	*235.13*	*183.45*
Seas_2	**121.90**	**8.56**	**9587.34**	**177.63**	**913.28**	**4584.15**	**160.85**	**1966.09**	**1923.70**	***2160.39***	***3150.37***	**Seas_2**	**317.04**	**102.72**	**419.64**	**367.90**	**367.89**	**113.20**	**7.20**	***242.23***	***163.30***
Jul	104.40	10.56	8764.05	139.01	921.37	4566.54		1970.67	1923.70	*2300.04*	*3019.08*	Jul	442.38	95.74		439.99	440.00	100.70	8.80	*254.60*	*206.56*
Aug	97.76	11.54	8467.39	126.95	904.50	4575.36		1971.38	1923.70	*2259.82*	*2932.75*	Aug	510.87	95.04		464.80	464.80	95.18	9.50	*273.36*	*229.29*
Sep	99.29	15.42	8223.26	124.05	885.16	4584.58		1971.46	1923.70	*2228.36*	*2861.36*	Sep	576.52	103.34		484.98	485.00	97.36	12.66	*293.31*	*247.77*
Seas_3	**100.48**	**12.50**	**8484.90**	**130.00**	**903.67**	**4575.49**	**147.04**	**1971.17**	**1923.70**	***2027.66***	***2836.76***	**Seas_3**	**509.92**	**98.04**	**446.96**	**463.26**	**463.27**	**97.75**	**10.32**	***298.50***	***217.78***
Oct	120.70	17.26	8018.23	128.62	865.88	4592.69		1971.10	1923.70	*2204.77*	*2799.58*	Oct	639.40	117.64		502.15	502.18	119.20	14.08	*315.78*	*261.97*
Nov	152.20	19.68	7840.79	156.10	848.14	4599.04		1970.45	1923.70	*2188.76*	*2742.63*	Nov	700.71	153.57		517.15	517.20	150.90	16.09	*342.60*	*271.40*
Dec	173.90	20.87	7673.69	171.34	832.89	4596.40		1969.59	1923.70	*2170.30*	*2690.31*	Dec	755.98	175.76		530.32	530.41	172.80	17.27	*363.76*	*283.27*
Seas_4	**148.93**	**19.27**	**7844.24**	**152.02**	**848.97**	**4596.05**	**150.30**	**1970.38**	**1923.70**	*1961.54*	*2655.16*	**Seas_4**	**698.70**	**148.99**	**543.81**	**516.54**	**516.60**	**147.63**	**15.82**	***369.73***	***259.79***
Annual	**111.57**	**10.82**	**8653.87**	**179.32**	**811.36**	**4603.83**	**156.16**	**1963.29**	**1923.70**	***2045.99***	***2887.31***	**Annual**	**413.75**	**110.53**	**426.09**	**377.90**	**377.92**	**103.07**	**8.96**	***259.75***	***177.49***

EVN-BETR _1 - EVN-BETR and UK-MODEL results calculated on the basis of initial concentrations given as input data;
EVN-BETR _2 - EVN-BETR and UK-MODEL results calculated on the basis of zero initial concentrations;
EVN-BETR _3 - EVN-BETR and UK-MODEL results calculated on the basis of historical emissions for 20-year period;
G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
DEHM-POP_1 - DEHM-POP results calculated on the basis of initial concentrations given as input data;
DEHM-POP_2 - DEHM-POP results calculated on the basis of zero initial concentrations;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
[a] - EVN-BETR and UK-MODEL results were calculated with the help of a single box version of European model;
[b] - SimpleBox data presented here are masses calculated for continental level.

Table 3.17. *Calculation results: PCB-153 mass contained in 200 m layer of water (kg) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation.*

Month	Results obtained on the basis of initial concentrations given as input data					Results obtained on the basis of historical emissions			*m*	σ	Month	Results obtained on the basis of zero initial concentrations					*m*	σ
	DEHM-POP_1	G-CIEMS_1	SimpleBox 3.0_1[a]	CAN/ POPs	MSCE-POP_1	CliMo Chem_2_3	SimpleBox 3.0_3[a]	SimpleBox 3.12_3[a]				CliMo Chem_2_2	SimpleBox 3.0_2[a]	SimpleBox 3.12_2[a]	DEHM-POP_2	MSCE-POP_2		
Jan	48.75	306.41	468.13	44.41	2.24		4358.64	4366.41	*1370.71*	*2050.56*	Jan		61.33	61.32	22.21	1.78	*36.66*	*29.68*
Feb	78.40	291.15	1032.01	50.95	3.03		4366.08	4389.25	*1458.70*	*2024.52*	Feb		178.11	178.09	56.75	2.45	*103.85*	*88.56*
Mar	100.60	265.09	1356.30	56.90	4.33		4369.75	4404.60	*1508.22*	*2020.53*	Mar		270.14	270.11	83.95	3.58	*156.94*	*134.74*
Seas_1	**75.92**	**287.55**	**952.15**	**50.75**	**3.20**	**296.98**	**4364.82**	**4386.75**	***1302.26***	***1920.34***	**Seas_1**	**298.74**	**169.86**	**169.84**	**54.30**	**2.60**	***139.07***	***115.33***
Apr	124.40	246.13	1529.43	63.82	6.81		4369.75	4414.91	*1536.46*	*2019.92*	Apr		343.97	343.96	111.80	5.61	*201.33*	*170.31*
May	127.20	208.82	1602.51	72.45	9.54		4369.48	4421.31	*1544.47*	*2023.85*	May		402.51	402.47	118.40	7.78	*232.79*	*201.09*
Jun	113.80	186.47	1615.65	83.82	10.29		4366.11	4424.15	*1542.90*	*2026.39*	Jun		449.56	449.53	108.10	8.32	*253.88*	*229.58*
Seas_2	**121.80**	**213.81**	**1582.53**	**73.36**	**8.88**	**286.08**	**4368.44**	**4420.12**	***1384.38***	***1925.06***	**Seas_2**	**417.08**	**398.68**	**398.66**	**112.77**	**7.24**	***266.88***	***192.65***
Jul	100.80	173.90	1593.80	97.91	10.77		4362.07	4425.73	*1537.85*	*2026.91*	Jul		487.85	487.81	97.08	8.69	*270.36*	*253.70*
Aug	93.46	160.36	1552.71	114.86	11.65		4356.65	4423.02	*1530.39*	*2025.16*	Aug		520.00	519.96	90.84	9.27	*285.02*	*273.35*
Sep	95.26	156.82	1503.92	130.04	15.47		4350.62	4420.88	*1524.72*	*2021.19*	Sep		546.58	546.56	93.30	12.29	*299.68*	*286.99*
Seas_3	**96.51**	**163.70**	**1550.14**	**114.27**	**12.63**	**265.69**	**4356.45**	**4423.21**	***1372.82***	***1926.85***	**Seas_3**	**457.23**	**518.14**	**518.11**	**93.74**	**10.08**	***319.46***	***247.28***
Oct	118.00	162.17	1452.94	140.37	17.39		4344.19	4416.97	*1521.72*	*2014.26*	Oct		569.36	569.32	116.50	13.72	*317.22*	*294.12*
Nov	151.80	191.44	1403.42	145.83	20.03		4336.99	4412.76	*1523.18*	*2003.84*	Nov		589.26	589.20	150.50	15.87	*336.21*	*297.29*
Dec	175.90	208.01	1358.15	150.67	21.32		4330.00	4407.63	*1521.67*	*1996.23*	Dec		606.58	606.57	174.70	17.13	*351.24*	*301.76*
Seas_4	**148.57**	**187.21**	**1404.84**	**145.62**	**19.58**	**267.38**	**4337.06**	**4412.46**	***1365.34***	***1908.27***	**Seas_4**	**590.94**	**588.40**	**588.36**	**147.23**	**15.57**	***386.10***	***282.02***
Annual	**110.70**	**213.06**	**1372.42**	**96.00**	**11.07**	**279.03**	**4356.69**	**4410.64**	***1356.20***	***1917.91***	**Annual**	**441.00**	**418.77**	**418.74**	**102.01**	**8.87**	***277.88***	***205.91***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
DEHM-POP_1 - DEHM-POP results calculated on the basis of initial concentrations given as input data;
DEHM-POP_2 - DEHM-POP results calculated on the basis of zero initial concentrations;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
[a] - SimpleBox data presented here are overall masses calculated as sum of regional and continental level estimates.

Comparison between results obtained on the basis of two data sets. The percentage difference between calculation results obtained with two data sets of physical-chemical properties (for those models who provided calculations for both these sets) is shown in Table 3.18.

Table 3.18. *The percentage difference between calculation results on PCB-153 mass in water (kg) obtained by models on the basis of two data sets: "own or alternative" and "reference"*

Month	CliMo Chem_2_2	CliMo Chem_2_3	DEHM-POP_1	DEHM-POP_2	G-CIEMS_1	SimpleBox 3.0_1	SimpleBox 3.0_2	SimpleBox 3.12_2	SimpleBox 3.0_3	SimpleBox 3.12_3	MSCE-POP_1	MSCE-POP_2
Jan			0.7%	0.7%	-2.9%	48.3%	0.6%	0.6%	125.4%	127.0%	9.8%	5.6%
Feb			1.3%	1.1%	-53.5%	65.0%	2.8%	2.8%	124.3%	128.2%	8.4%	4.7%
Mar			1.5%	1.3%	-66.8%	70.1%	4.9%	4.9%	123.4%	129.0%	6.7%	3.5%
Seas_1	**1.6%**	**78.4%**	**1.3%**	**1.1%**	**-50.4%**	**64.3%**	**3.6%**	**3.6%**	**124.4%**	**128.0%**	**7.9%**	**4.3%**
Apr			1.5%	1.2%	-72.2%	72.5%	6.7%	6.7%	122.7%	129.5%	5.6%	2.3%
May			0.1%	-0.2%	-77.4%	73.6%	8.3%	8.3%	122.2%	129.8%	3.4%	0.0%
Jun			-1.9%	-2.2%	-80.0%	73.7%	9.7%	9.7%	121.7%	130.0%	3.0%	-0.4%
Seas_2	**-0.6%**	**77.9%**	**-0.1%**	**-0.4%**	**-76.6%**	**73.3%**	**8.4%**	**8.4%**	**122.2%**	**129.8%**	**3.8%**	**0.5%**
Jul			-3.4%	-3.6%	-81.1%	73.0%	10.9%	10.9%	121.3%	130.1%	2.0%	-1.3%
Aug			-4.4%	-4.6%	-82.3%	71.7%	11.9%	11.9%	121.0%	129.9%	1.0%	-2.4%
Sep			-4.1%	-4.2%	-82.3%	69.9%	12.7%	12.7%	120.7%	129.8%	0.4%	-2.9%
Seas_3	**2.3%**	**80.7%**	**-4.0%**	**-4.1%**	**-81.9%**	**71.5%**	**11.8%**	**11.8%**	**121.0%**	**129.9%**	**1.0%**	**-2.3%**
Oct			-2.2%	-2.3%	-81.3%	67.8%	13.4%	13.4%	120.4%	129.6%	0.8%	-2.5%
Nov			-0.3%	-0.3%	-77.4%	65.5%	13.9%	13.9%	120.1%	129.4%	1.8%	-1.4%
Dec			1.2%	1.1%	-75.0%	63.1%	14.4%	14.4%	119.8%	129.1%	2.2%	-0.8%
Seas_4	**8.7%**	**77.9%**	**-0.2%**	**-0.3%**	**-77.9%**	**65.5%**	**13.9%**	**13.9%**	**120.1%**	**129.4%**	**1.6%**	**-1.5%**
Annual	**3.5%**	**78.7%**	**-0.8%**	**-1.0%**	**-73.7%**	**69.1%**	**10.8%**	**10.8%**	**121.9%**	**129.3%**	**2.3%**	**-0.9%**

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
DEHM-POP_1 - DEHM-POP results calculated on the basis of initial concentrations given as input data;
DEHM-POP_2 - DEHM-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;

3.1.4. Comparison of calculated values of PCB-153 mass in vegetation

Reference data set. Calculation results on PCB-153 mass in vegetation (kg) calculated by models on the basis of "reference" data set together with statistical parameters used for evaluation are presented in Table 3.19.

Monthly values of PCB-153 mass in vegetation calculated by all participating models on the basis of "reference" data set and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.13a and b, respectively.

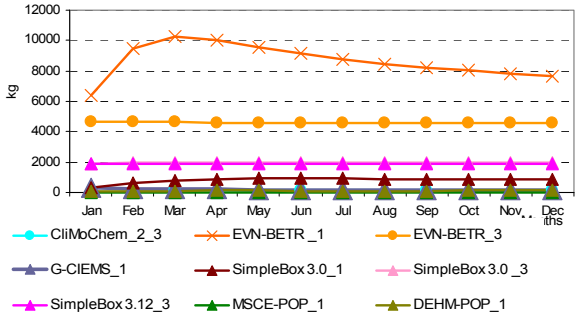


Fig. 3.13a. *PCB-153 mass contained in vegetation (kg) calculated by the participating models on the basis of "reference" data set and non-zero initial conditions*

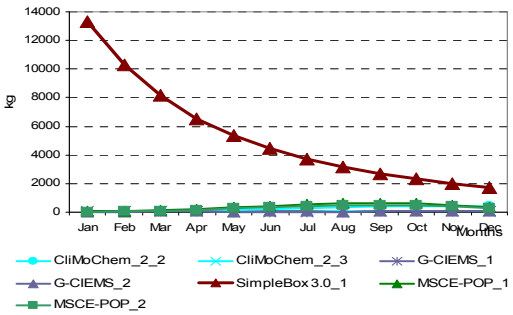


Fig. 3.13b. *PCB-153 mass contained in vegetation (kg) calculated by the participating models on the basis of "reference" data set and zero initial conditions*

Own/alternative data set. Calculation results on PCB-153 mass in vegetation (kg) calculated by models on the basis of "own or alternative" data sets together with statistical parameters used for evaluation are presented in Table 3.20.

Monthly values of PCB-153 mass in vegetation calculated by all participating models on the basis of "own or alternative" data sets and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.14a and b, respectively.

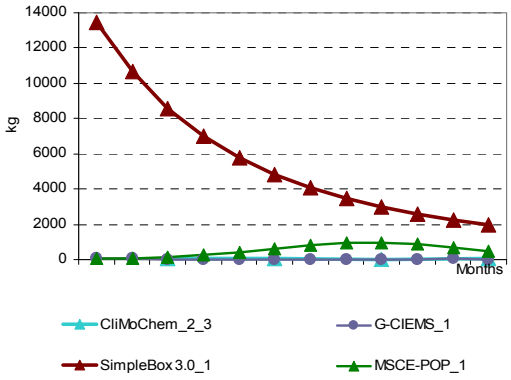


Fig. 3.14a. *PCB-153 mass contained in vegetation (kg) calculated by the participating models on the basis of "own or alternative" data sets and non-zero initial conditions*

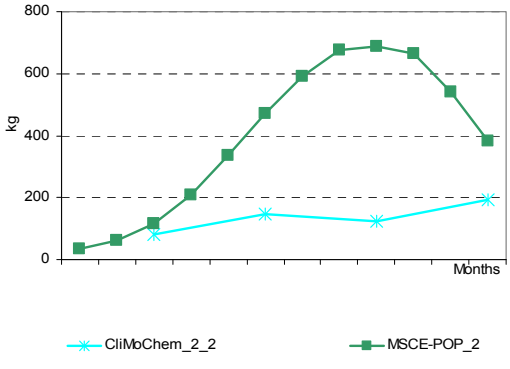


Fig. 3.14b. *PCB-153 mass contained in vegetation (kg) calculated by the participating models on the basis of "own or alternative" data sets and zero initial conditions*

Table 3.19. *Calculation results: PCB-153 mass in vegetation (kg) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data			Results obtained on the basis of historical emissions	*m*	σ	Month	Results obtained on the basis of zero initial concentrations			*m*	σ
	G-CIEMS_1	SimpleBox 3.0_1[a]	MSCE-POP_1	CliMoChem_2_3				G-CIEMS_2	CliMoChem_2_2	MSCE-POP_2		
Jan	88.00	13308.03	34.8		*4476.9*	*7648.0*	Jan	27.5		29.4	*28.4*	*1.4*
Feb	48.75	10307.84	61.9		*3472.8*	*5919.3*	Feb	33.4		52.0	*42.7*	*13.2*
Mar	43.54	8156.51	110.2		*2770.1*	*4664.9*	Mar	38.1		91.5	*64.8*	*37.7*
Season_1	**60.10**	**10590.79**	**69.0**	**96.2**	***2704.0***	***5257.9***	**Season_1**	**33.0**	**73.2**	**57.6**	***54.6***	***20.3***
Apr	43.44	6548.31	195.1		*2262.3*	*3712.6*	Apr	42.0		159.1	*100.5*	*82.9*
May	31.68	5348.60	312.9		*1897.7*	*2991.9*	May	32.5		251.4	*142.0*	*154.8*
Jun	33.48	4431.05	436.0		*1633.5*	*2431.1*	Jun	35.0		341.7	*188.4*	*216.9*
Season_2	**36.20**	**5442.65**	**314.7**	**81.1**	***1468.6***	***2652.1***	**Season_2**	**36.5**	**233.2**	**250.8**	***173.5***	***118.9***
Jul	32.92	3716.25	555.6		*1434.9*	*1992.9*	Jul	35.0		426.3	*230.7*	*276.7*
Aug	29.45	3138.80	636.5		*1268.2*	*1648.1*	Aug	31.6		482.6	*257.1*	*318.9*
Sep	34.74	2679.47	644.9		*1119.7*	*1384.8*	Sep	38.0		493.3	*265.7*	*322.0*
Season_3	**32.37**	**3178.17**	**612.3**	**95.0**	***979.5***	***1488.7***	**Season_3**	**34.9**	**381.1**	**467.4**	***294.5***	***228.9***
Oct	37.75	2302.33	615.8		*985.3*	*1176.6*	Oct	42.1		477.4	*259.7*	*307.8*
Nov	45.41	1988.08	491.0		*841.5*	*1017.6*	Nov	51.4		388.8	*220.1*	*238.6*
Dec	41.52	1728.00	344.5		*704.7*	*899.1*	Dec	48.1		279.8	*163.9*	*163.8*
Season_4	**41.56**	**2006.13**	**483.8**	**102.8**	***658.6***	***919.4***	**Season_4**	**47.2**	**437.1**	**382.0**	***288.8***	***211.0***
Annual	**42.56**	**5304.44**	**369.9**	**93.8**	***1452.7***	***2571.9***	**Annual**	**42.6**	**281.1**	**289.4**	***204.4***	***140.2***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
[a] - SimpleBox data presented here are overall masses calculated as sum of regional and continental level estimates.

Table 3.20. *Calculation results: PCB-153 mass in vegetation (kg) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data			Results obtained on the basis of historical emissions	*m*	σ	Month	Results obtained on the basis o zero initial concentrations		*m*	σ
	G-CIEMS_1	SimpleBox 3.0_1[a]	MSCE-POP_1	CliMoChem_2_3				CliMoChem_2_2	MSCE-POP_2		
Jan	68.9	13470.8	42.1		*4527.3*	*7745.3*	Jan		34.3		
Feb	36.9	10656.3	78.2		*3590.5*	*6119.2*	Feb		63.4		
Mar	33.6	8573.6	143.5		*2916.9*	*4899.2*	Mar		114.9		
Season_1	**46.5**	**10900.2**	**88.0**	**35.8**	***2767.6***	***5421.8***	**Season_1**	**81.1**	**70.9**	***76.0***	***7.2***
Apr	33.1	6975.8	267.2		*2425.4*	*3942.5*	Apr		208.7		
May	23.2	5756.8	441.2		*2073.7*	*3196.4*	May		338.0		
Jun	24.2	4808.4	630.8		*1821.2*	*2604.8*	Jun		469.9		
Season_2	**26.9**	**5847.0**	**446.4**	**34.7**	***1588.7***	***2845.6***	**Season_2**	**147.9**	**338.9**	***243.4***	***135.0***
Jul	23.9	4060.0	814.1		*1632.7*	*2138.9*	Jul		593.1		
Aug	21.2	3449.6	937.2		*1469.4*	*1775.0*	Aug		674.7		
Sep	24.8	2960.6	945.8		*1310.4*	*1501.5*	Sep		688.8		
Season_3	**23.3**	**3490.1**	**899.1**	**27.7**	***1110.0***	***1639.3***	**Season_3**	**121.9**	**652.2**	***387.1***	***374.9***
Oct	27.5	2557.2	899.0		*1161.2*	*1285.1*	Oct		665.7		
Nov	34.6	2219.8	712.6		*989.0*	*1118.5*	Nov		541.1		
Dec	32.5	1939.5	491.0		*821.0*	*995.4*	Dec		384.1		
Season_4	**31.5**	**2238.8**	**700.8**	**42.1**	***753.3***	***1038.6***	**Season_4**	**193.7**	**530.3**	***362.0***	***238.0***
Annual	**32.0**	**5619.0**	**533.6**	**35.1**	***1554.9***	***2719.6***	**Annual**	**136.1**	**398.0**	***267.1***	***185.2***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;

[a] - SimpleBox data presented here are overall masses calculated as sum of regional and continental level estimates.

Comparison between results obtained on the basis of two data sets. The percentage difference between calculation results obtained with two data sets of physical-chemical properties (for those models who provided calculations for both these sets) is shown in Table 3.21.

Table 3.21. *The percentage difference between calculation results on PCB-153 mass in vegetation (kg) obtained by models on the basis of two data sets: "own or alternative" and "reference"*

Month	CliMoChem_2_2	CliMoChem_2_3	G-CIEMS_1	SimpleBox 3.0_1	MSCE-POP_1	MSCE-POP_2
Jan			-21.7%	1.2%	21.1%	16.7%
Feb			-24.3%	3.4%	26.3%	21.9%
Mar			-22.9%	5.1%	30.3%	25.6%
Seas_1	**10.8%**	**-62.8%**	**-22.7%**	**2.9%**	**27.6%**	**23.0%**
Apr			-23.7%	6.5%	36.9%	31.1%
May			-26.7%	7.6%	41.0%	34.4%
Jun			-27.7%	8.5%	44.7%	37.5%
Seas_2	**-36.6%**	**-57.2%**	**-25.8%**	**7.4%**	**41.9%**	**35.1%**
Jul			-27.5%	9.2%	46.5%	39.1%
Aug			-27.9%	9.9%	47.3%	39.8%
Sep			-28.5%	10.5%	46.7%	39.6%
Seas_3	**-68.0%**	**-70.9%**	**-28.0%**	**9.8%**	**46.8%**	**39.5%**
Oct			-27.2%	11.1%	46.0%	39.5%
Nov			-23.8%	11.7%	45.1%	39.2%
Dec			-21.7%	12.2%	42.5%	37.3%
Seas_4	**-55.7%**	**-59.0%**	**-24.1%**	**11.6%**	44.9%	38.8%
Annual	**-51.6%**	**-62.6%**	**-24.7%**	**5.9%**	**44.2%**	**37.5%**

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data.
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;

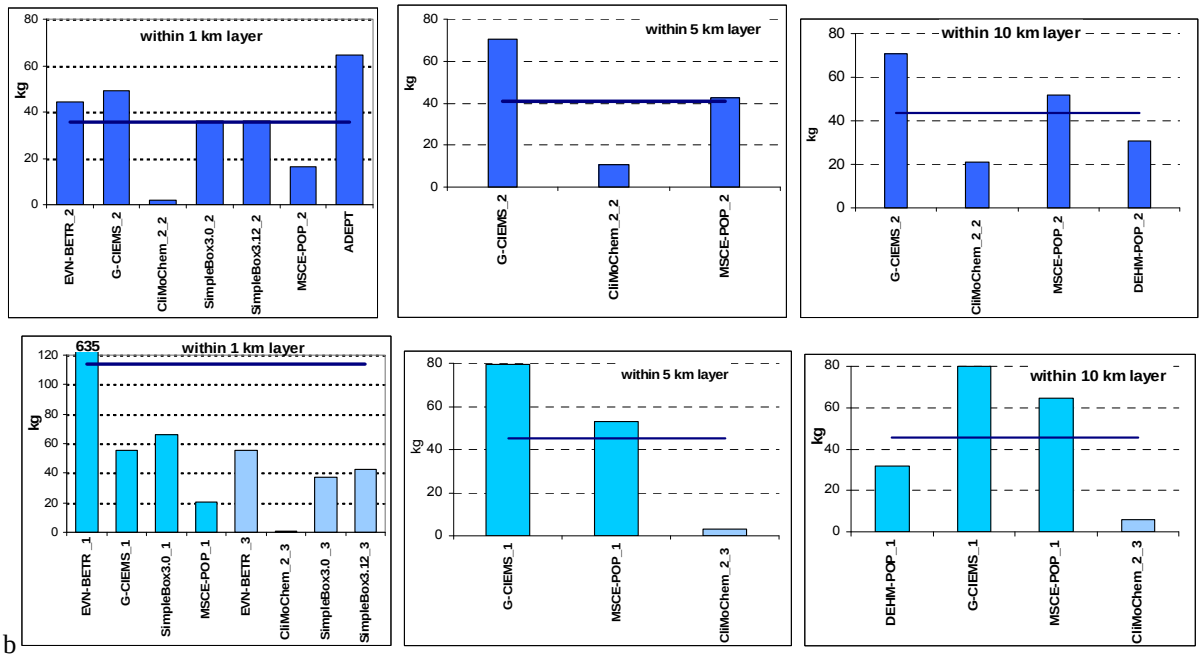
3.1.5. Comparison of distribution of PCB-153 mass between environmental media

Mass balance estimates presented in Sections 3.1.1-3.1.4 comprise masses of PCB-153 contained in different environmental compartments calculated by the participating models. The considered estimates of mass distribution in 2000 include results of one-year calculation with zero initial concentrations obtained by ADEPT, CliMoChem, DEHM-POP, EVN-BETR and UK-MODEL, G-CIEMS, MSCE-POP, SimpleBox models and with initial concentrations in media given as input data calculated by CAN/POPs, DEHM-POP, EVN-BETR and UK-MODEL, G-CIEMS, MSCE-POP, and SimpleBox models; as well as results of long-term calculations for 20-year period with zero initial data with historical carried out by CliMoChem, EVN-BETR and UK-MODEL and SimpleBox models. Results of CliMoChem, DEHM-POP, G-CIEMS, MSCE-POP, and SimpleBox models obtained on the basis of two different physical-chemical data sets allow us to reveal sensitivity of these models' calculations to the variations in the input data.

A preliminary analysis of the comparison of absolute values and relative fractions of PCB-153 mass contained in the main environmental compartments is presented in this section. The analysis is made separately for results calculated on the basis of initial concentrations or historical emissions (non-zero initial conditions) and for results based on zero initial conditions.

Atmosphere. According to the calculation results on PCB-153 mass contained in 1km layer of the atmosphere obtained on the basis of "***reference"*** data set and non-zero initial conditions (Table 3.1, Section 3.1.1), square deviation σ exceeds the mean value of this parameter averaged between the participating models. In the case with calculations made with zero initial conditions for 1 km layer (Table 3.1, Section 3.1.1) and with both zero and non-zero initial conditions for 5 and 10 km atmospheric layers (Tables 3.2 and 3.3, Section 3.1.1) using "reference*"* data set the participating

models give close enough results in terms of annual and monthly (seasonal) absolute values of PCB-153 atmospheric content. Comparison of annual values of PCB-153 masses contained in the atmosphere within 1, 5 and 10 km layers calculated by different models on the basis of zero initial concentrations and with the use of "reference" data set is presented in Fig.3.15a. Fig. 3.15b shows the same results but obtained on the basis of initial concentrations or historical emissions. In the latter figure different colour of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; and then long-tem calculations with historical emissions). The blue line in the plots shows the value of the corresponding parameter averaged between models.



b

Fig.3.15. *Comparison of annual values of PCB-153 masses contained in the atmosphere within 1, 5 and 10 km layers calculated by different models on the basis of "reference" data set (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

The highest values of PCB-153 atmospheric content within 1 km layer are obtained by ADEPT model with zero initial concentrations (see Fig. 3.15a) and by EVN-BETR and UK-MODEL on the basis of initial conditions given as input data (see Fig. 3.15b). For 5 and 10 km layers, the maximum values calculated on the basis of zero and non-zero initial concentrations are characteristics of G-CIEMS results. The lowest values of PCB-153 mass contained in the different layers of the atmosphere are obtained by CliMoChem model. Comparison of air content profiles of annual values of PCB-153 mass calculated by three models (G-CIEMS, MSCE-POP and CliMoChem) for the considered atmospheric layers (1, 5 and 10 km) on the basis of "reference" data set is presented in Fig.3.16.

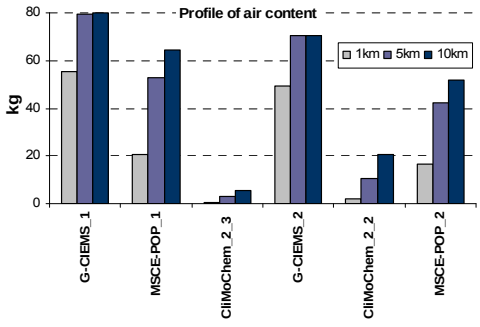


Fig. 3.16. *Comparison of air content profiles of annual values of PCB-153 mass calculated by four models for the considered atmospheric layers (1, 5 and 10 km) on the basis of "reference" data set*

Seasonal and monthly variations of PCB-153 mass contained in the considered layers of the atmosphere are observed in results of ADEPT, CliMoChem, DEHM-POP, G-CIEMS and MSCE-POP models (see Figs. 3.1a,b,c, 3.2 and 3.3 given in Section 3.1.1). Decreasing trend of this parameter values is presented in results of EVN-BETR and UK-MODEL and SimpleBox 3.0 models made with initial

concentrations given as input data (Fig. 3.1a and c). Negligible seasonal variations of the considered parameter values are characteristic of all other results of SimpleBox model (versions 3.0 and 3.12) (Fig. 3.1a, b, c).

Results on PCB-153 mass content in 1, 5 and 10 km layers of the atmosphere obtained on the basis of "***own or alternative"*** data set (Tables 3.4, 3.5 and 3.6, respectively, given in Section 3.1.1) to some extent differ from those obtained on "reference" data set due to changes in the number of models performed calculations. However, the participating models also provided rather close results in terms of absolute values of PCB-153 air content. For annual and monthly (seasonal) values of PCB-153 mass in each of these layers obtained on the basis of both zero and non-zero initial conditions, square deviation between different model results is less than the averaged value. Comparison of annual values of PCB-153 masses contained in the atmosphere within 1, 5 and 10 km layers calculated by different models on the basis of zero initial concentrations and with the use of "own or alternative" data sets is presented in Fig.3.17a. Fig. 3.17b shows the same results but obtained on the basis of initial concentrations or historical emissions. In the latter figure different color of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions). The blue line in the plots shows the value of the corresponding parameter averaged between models.

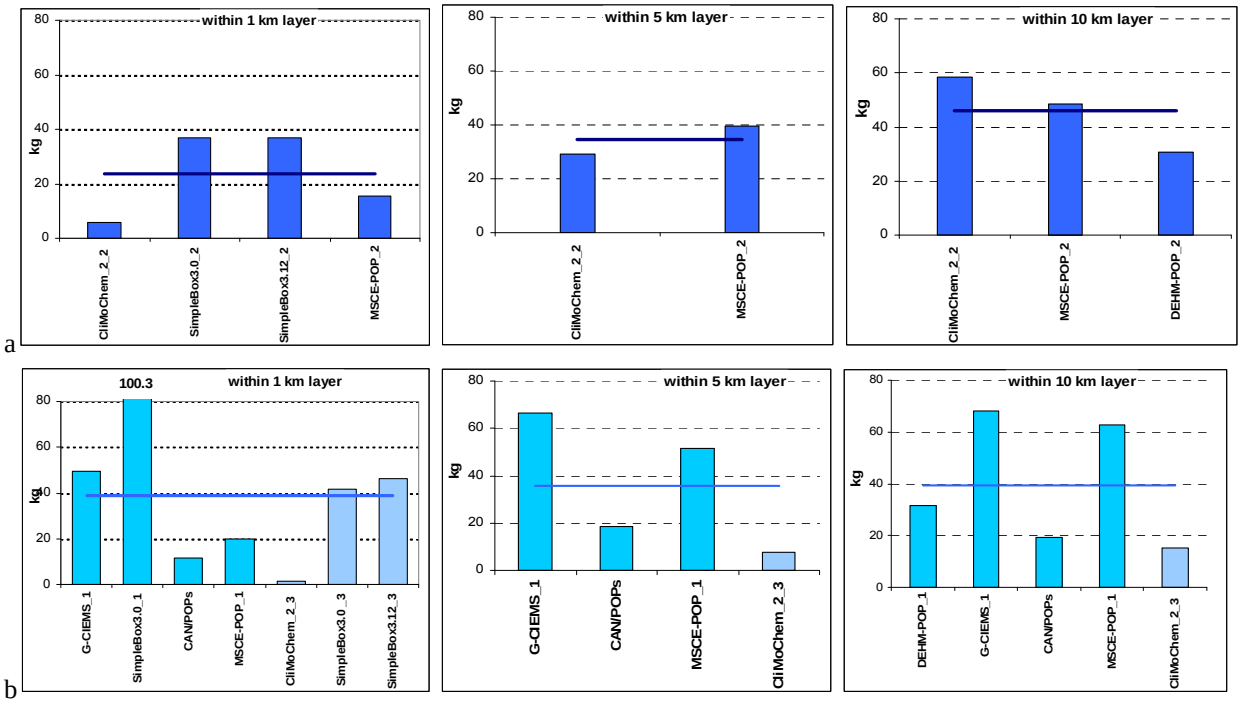


Fig. 3.17. *Comparison of annual values of PCB-153 masses contained in the atmosphere within 1, 5 and 10 km layers calculated by different models on the basis of "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

Values of PCB-153 atmospheric content within 1 km layer obtained by SimpleBox model with both zero and non-zero initial conditions are higher than those calculated by other models. Calculations of MSCE-POP and CliMoChem models performed on the basis of zero initial conditions are characterized by the maximum absolute values of PCB-153 mass within 5 km and 10 km layers, respectively (see Fig. 3.17a). The maximum values for 5 and 10 km layers of the atmosphere calculated on the basis of non-zero initial conditions are obtained by G-CIEMS models (see Fig. 3.17b). Results of CliMoChem model obtained on the basis of non-zero initial conditions for the

considered atmospheric layers are lower than those calculated by other models (Fig. 3.17b). Comparison of air content profiles of annual values of PCB-153 mass calculated by four models (G-CIEMS, CAN/POPs, MSCE-POP and CliMoChem) for 1, 5 and 10 km layers on the basis of "own or alternative" data sets is presented in Fig.3.18.

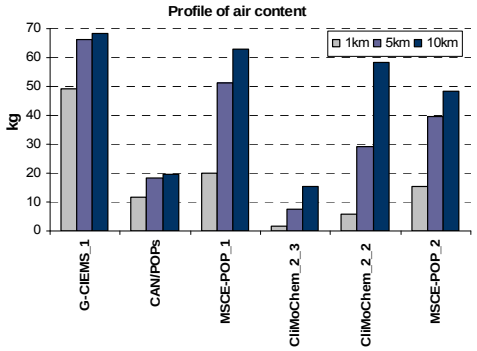


Fig. 3.18. *Comparison of air content profiles of annual values of PCB-153 mass calculated by five models for the considered atmospheric layers (1, 5 and 10 km) on the basis of "own or alternative data sets"*

For models performed calculations with the use of both physical-chemical data sets, characteristics of seasonal variations of PCB-153 mass contained in the considered layers of the atmosphere obtained with "own/alternative" data sets (see Figs. 3.4a,b, 3.5 and 3.6 given in Section 3.1.1) are similar to those for "reference" results. Monthly values of PCB-153 mass contained in the atmospheric layers presented by CAN/POPs demonstrate considerable changes depending on months.

Comparison of annual values of PCB-153 mass contained in 1, 5 and 10 km layers of the atmosphere obtained by the participating models with the use of "reference" and "own/alternative" data sets is presented in Fig. 3.19.

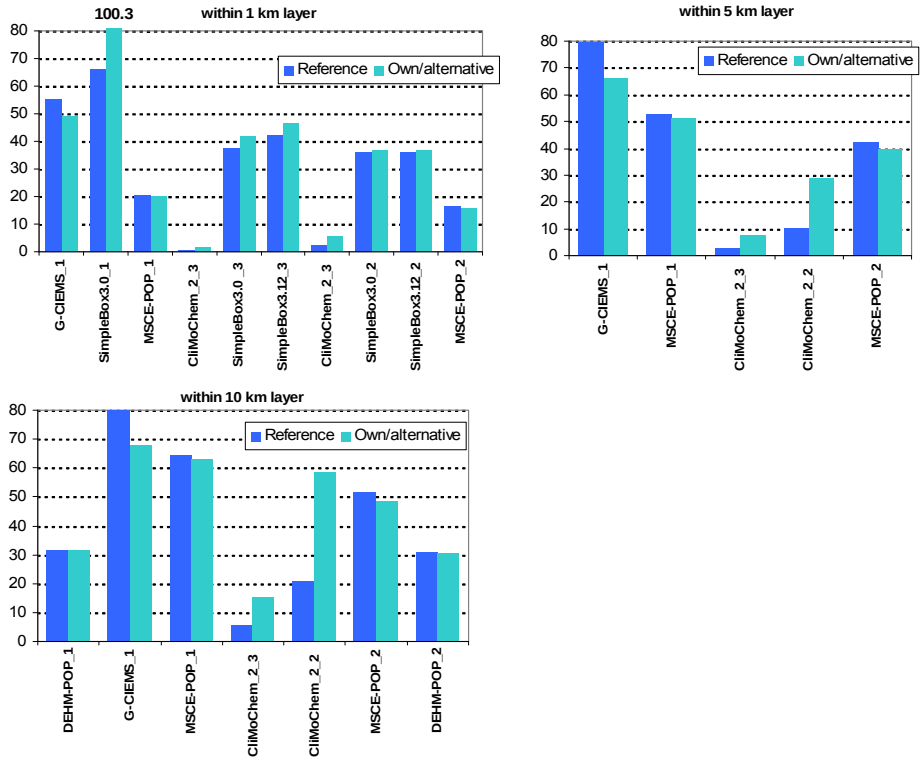


Fig.3.19. *Comparison of PCB-153 mass contained in the atmosphere within 1, 5 and 10 km layers calculated by different models on the basis of two data set*

According to these results and data on percentage difference between PCB-153 mass values obtained with two data sets of physical-chemical properties (Tables 3.7- 3.9), for DEHM-POP, G-CIEMS and MSCE-POP models, the annual values of calculation results calculated with the use of

"own or alternative" data sets are smaller than those obtained with "reference" data set; and vice versa for CliMoChem and SimpleBox models. The most considerable differences in the results obtained with two data sets are characteristic of CliMoChem and SimpleBox 3.0_1 results. Minor differences are observed for DEHM-POP results. The results of other models show rather weak sensitivity of air content values with respect to variations of pollutant-related parameters.

Soil. Differences in calculation results of the participating models on PCB-153 mass contained in soil are more considerable than those in results on air content. It can be explained that in the case of PCBs soil is more inert media than atmosphere. Therefore, in contrast to the one-year calculations made on the basis of zero initial conditions, the usage of initial concentrations obtained within long-term calculations or historical emissions affect calculated mass accumulated in soil much more drastically than that contained in the atmosphere.

Scattering of calculated values of PCB-153 mass contained in 5 cm layers of soil obtained with the use of "***reference"*** data set and non-zero initial conditions is much higher than that calculated on the basis of zero initial conditions (Table 3.10, Section 3.1.2). In the first case, the square deviation presented for annual values exceeds considerably the mean value averaged between all models. The square deviations between results of participating models on soil content within 10 cm layer (Table 3.11, Section 3.1.2) calculated on the basis of "reference" data set and both zero and non-zero initial conditions is lower than the corresponding mean values. Comparison of annual values of PCB-153 masses contained in soil within 5 and 10 cm layers calculated by different models on the basis of zero initial concentrations and with the use of "reference" data set is presented in Fig.3.20a. Fig. 3.20b shows the same results but obtained on the basis of initial concentrations or historical emissions. In the latter figure different colour of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; and then long-tem calculations with historical emissions). The black line in the plots shows the value of the corresponding parameter averaged between models.

All models' results can be divided into two close groups: results of models performed calculations on the basis of zero initial concentrations and characterizing by low values of soil content and results of models used initial concentrations and/or historical emissions with considerably higher values. The results of MSCE-POP model on PCB-153 mass contained in soil within 5 and 10 cm layers calculated on the basis of zero initial concentrations are the highest among results of other models (see Fig 3.20a). The lowest value of soil content obtained with the use of zero initial conditions is characteristic of SimpleBox 3.0 model for 5 cm layer and of DEHM-POP model for 10 cm layer. The reason for the high scattering of soil content values for 5 cm layer based on non-zero initial conditions is more than an order of magnitude difference in simulation results of SimpleBox 3.12 model (historical emissions) and results of other models (see Fig 3.20b). This discrepancy leads to significant bias of averaged value (black line) to the maximum calculated value. The highest values of PCB-153 masses contained in soil within 10 cm layers calculated by different models on the basis of non-zero initial conditions are obtained by EVN-BETR and UK-MODEL with the use of initial concentrations given as input data; and the lowest values – by CliMoChem model.

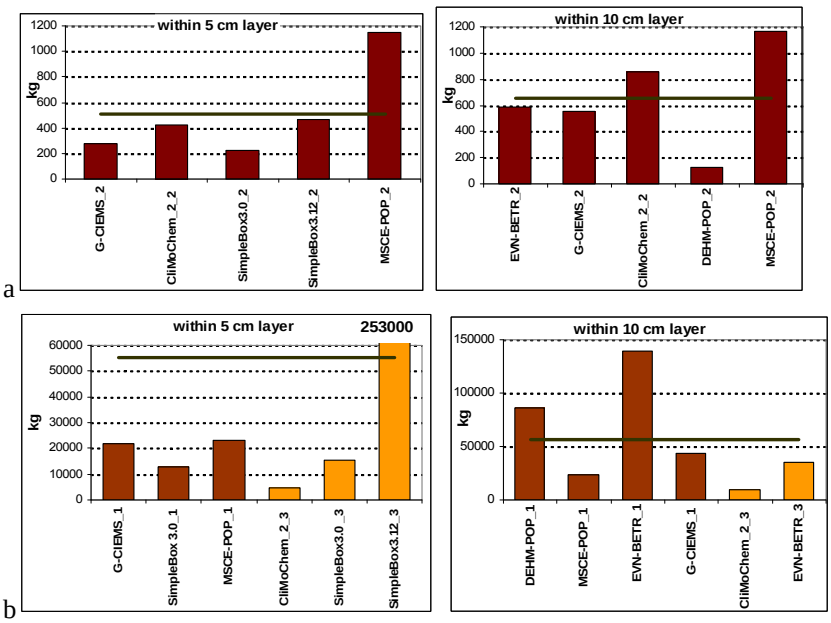


Fig. 3.20. *Comparison of annual values of PCB-153 masses contained in soil within 5 and 10 cm layers calculated by different models on the basis of "reference" data set (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

Comparison of soil content profiles of annual values of PCB-153 mass calculated by the participating models for the considered soil layers (5 and 10 cm) on the basis of "reference" data set is presented in Fig.3.21.

According to the MSCE-POP modeling approach, the most part of overall PCB-153 mass accumulated in soil is contained within 5 cm layer. According to the results of CliMoChem and G-CIEMS models soil content within 10 cm layer is two times higher than that within 5 cm layer.

Seasonal and monthly variations of PCB-153 mass contained in soil within 5 and 10 cm layers (see Figs. 3.7a,b and 3.8a,b, Section 3.1.2) are not essential for all participating models' results.

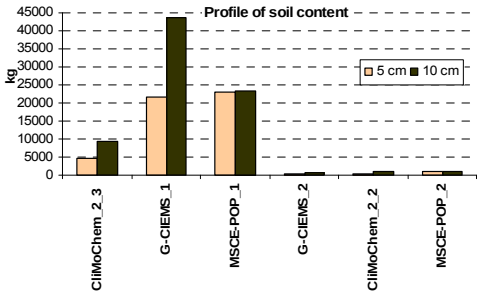


Fig. 3.21. *Comparison of soil content profiles of annual values of PCB-153 mass calculated by the models for the considered soil layers (5 and 10 cm) on the basis of "reference" data set*

Like in the case of calculations performed on the basis of "reference" data set, there is also rather large difference between values on PCB-153 mass contained in 5cm layer of soil obtained with the use of "***own or alternative"*** data sets and non-zero initial conditions (Table 3.12, Section 3.1.2). The scattering of results on soil content within 5 cm layer calculated on the basis of zero initial conditions is considerably lower. For the results on soil content within 10 cm layer obtained by the participating models with the use of both zero and non-zero initial conditions, square deviation of annual values does not exceed the mean values averaged between all models (Table 3.13, Section 3.1.2). Comparison of annual values of PCB-153 masses contained in soil within 5 and 10 cm layers calculated by different models on the basis of zero initial concentrations and with the use of "own or alternative" data sets is presented in Fig.3.22a. Fig. 3.22b shows the same results but obtained on the basis of initial concentrations or historical emissions. Different colour of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; and then long-tem

calculations with historical emissions). The black line in the plots shows the value of the corresponding parameter averaged between models.

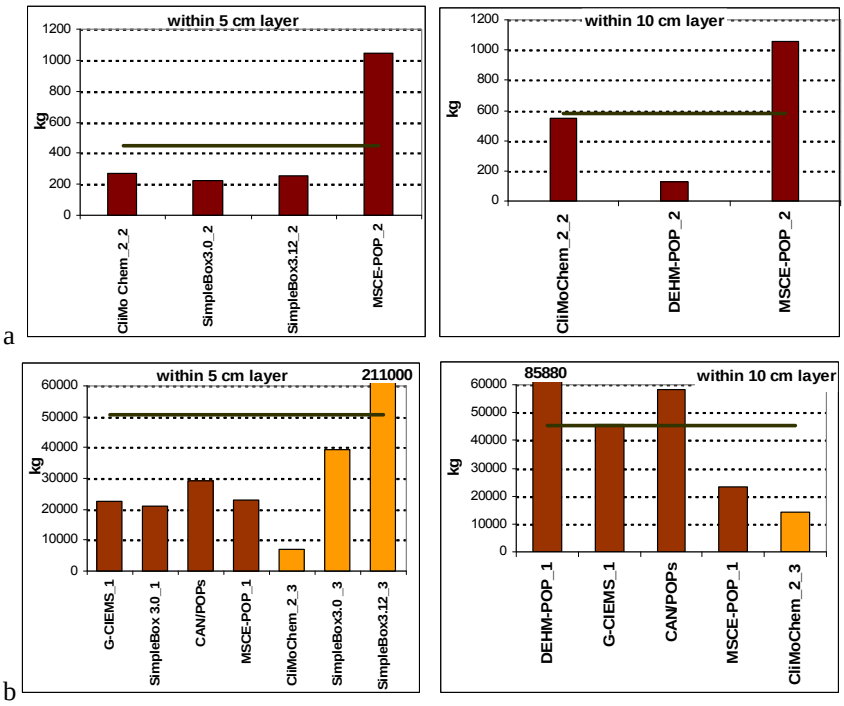


Fig. 3.22. *Comparison of annual values of PCB-153 masses contained in soil within 5 and 10 cm layers calculated by different models on the basis of "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non- zero initial conditions)*

The difference in calculated absolute values obtained with the use of zero and non-zero initial conditions is again considerable. The highest values of PCB-153 mass contained in soil within 5 and 10 cm layers calculated on the basis of zero initial concentrations are observed for MSCE-POP model (see Fig 3.22a). The lowest values of soil content obtained with zero initial conditions for 5 and 10 cm layers are characteristic of SimpleBox 3.0 and DEHM-POP model, respectively. According to the data based on non-zero initial conditions (see Fig 3.22b), the highest and lowest values of PCB-153 mass contained in 5 cm soil layer are characteristic of SimpleBox 3.12 and CliMoChem models calculated on the basis of historical emissions. The minimum and maximum values for 10 cm soil layer are obtained by CliMoChem and DEHM-POP models, respectively.

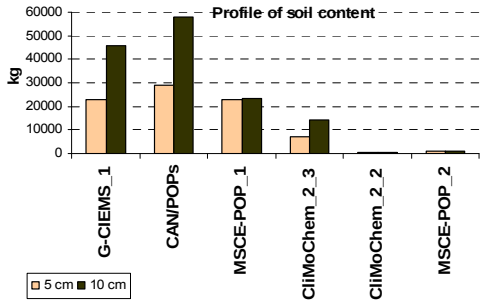


Fig. 3.23. *Comparison of soil content profiles of annual values of PCB-153 mass calculated by the models for the considered soil layers (5 and 10 cm) on the basis of "own or alternative" data sets*

Comparison of soil content profiles of annual values of PCB-153 mass calculated by the participating models for the considered soil layers (5 and 10 cm) on the basis of "own or alternative" data sets is presented in Fig.3.23.

In all models' results obtained on the basis of "own/alternative" data set calculated masses of PCB-153 in the considered soil layers (see Figs. 3.9 and 3.10, Section 3.1.2) are not subjected to the considerable seasonal and/or monthly variations.

Comparison of annual values of PCB-153 mass contained in the considered different layers of soil obtained with "reference" and "own/alternative" data sets is presented in Fig. 3.24.

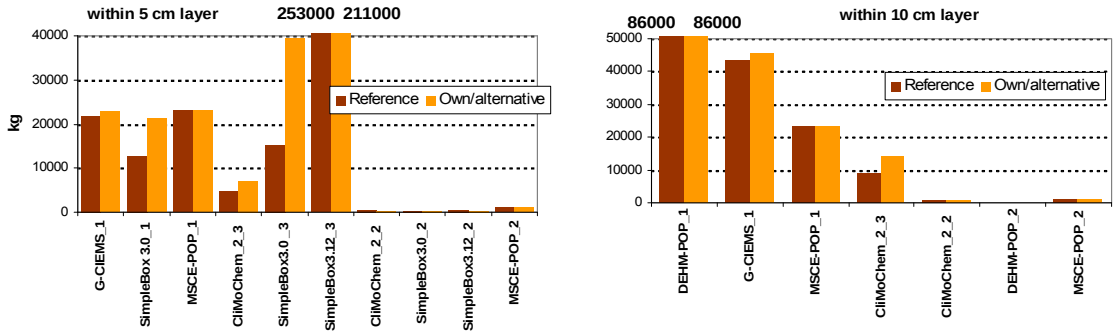
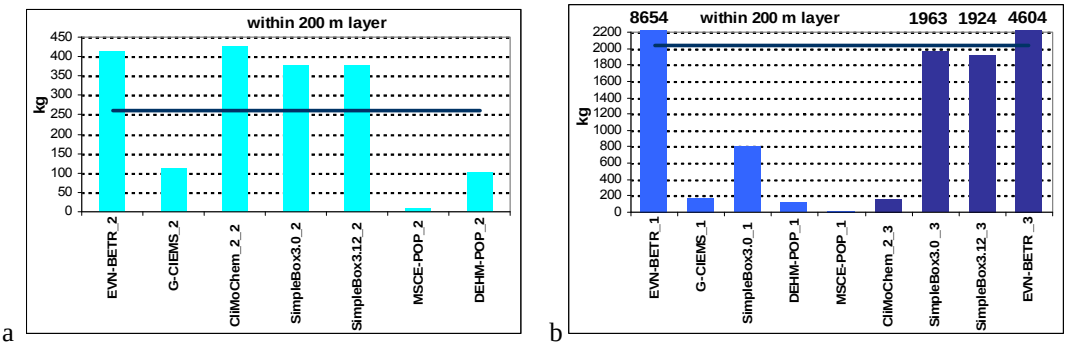


Fig.3.24. *Comparison of PCB-153 mass contained within 5 and 10 cm soil layers calculated by different models on the basis of two data set*

Contrary to the results of most models, values of PCB-153 soil content obtained by CliMoChem 2_2, SimpleBox 3.12_2, SimpleBox 3.12_3 and MSCE-POP_2 models with the use of "own or alternative" data sets are less than those obtained with "reference" data set. The largest difference in the results calculated with two data sets is characteristic of SimpleBox 3.0 results based on historical emissions. According to the data presented in Table 3.14 (Section 3.1.2), the difference in results of this model totals approximately to 160%. For other models percentage difference between calculation results on PCB-153 mass contained in soil is not high varying from 0.1 to 64%. There is no difference for results of DEHM-POP obtained with the use of initial conditions on the basis of two data sets: "reference" and "alternative" data sets.

Water. The difference between annual and monthly values of PCB-153 mass contained in water layer of 200 m calculated by the participating models with the use of "***reference***" data set and non-zero initial conditions is more essential than that between values obtained on the basis of zero initial concentrations (Table 3.16, Section 3.1.3). Square deviation of these values in the second group of results is lower than mean values averaged between all models results. Comparison of annual values of PCB-153 water content calculated by different models on the basis of zero initial concentrations and with the use of "reference*"* data set is presented in Fig.3.25a. Fig. 3.25b shows the same results but obtained on the basis of initial concentrations or historical emissions. Different colour of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions). The blue line in the plot shows the value of the corresponding parameter averaged between models.

For results obtained on the basis of zero initial conditions (see Fig. 3.25a), the highest and the lowest values are characteristic of CliMoChem and MSCE-POP models, respectively. According to the data presented in Fig 3.25b, absolute value of PCB-153 water content obtained by EVN-BETR and UK-MODEL on the basis of initial concentrations given as input data exceeds essentially results of other models. Then come values of EVN-BETR and UK-MODEL, SimpleBox 3.0 and 3.12 models calculated using historical emissions. In comparison with them, results of CliMoChem, DEHM-POP, G-CIEMS and SimpleBox 3.0 (initial concentrations) are considerably lower. The minimum value of PCB-153 water content is obtained by MSCE-POP model.

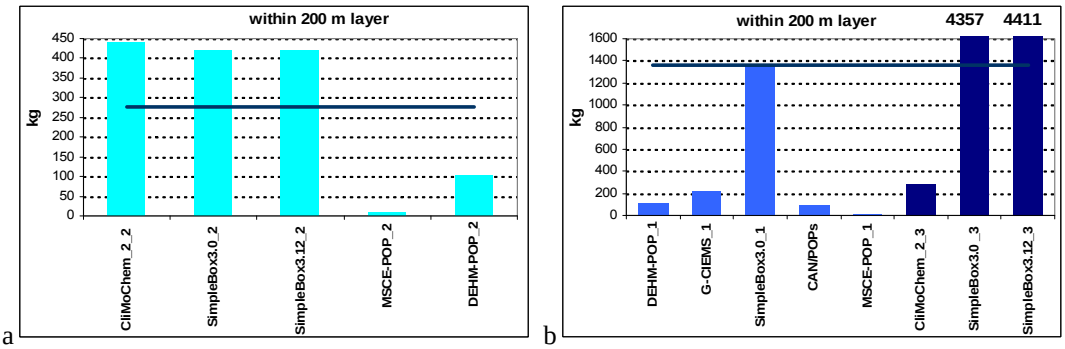


a b

Fig. 3.25. *Comparison of annual values of PCB-153 masses contained in water within 200 m layer calculated by different models on the basis of "reference" data set (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

In results on water content within 200 m layer calculated with the use of "***own/alternative***" data set, square deviation of values obtained by the participating models on the basis of zero initial conditions does not exceed the mean value averaged between all models; and vice versa for results based on non-zero initial conditions (Table 3.17, Section 3.1.3). Figs.3.26a and 3.26b show the annual values of PCB-153 masses contained in water layer of 200 m and calculated by different models on the basis of "own or alternative" data set and zero and non-zero initial conditions, respectively (blue line corresponds to the averaged value). Different colour of columns corresponds to the different types of calculations (a - one-year calculations on the basis of zero initial conditions; b - one-year calculations on the basis of initial data; then long-tem calculations with historical emissions).

The dispersion of absolute values of PCB water content calculated on the basis of zero initial conditions with the use of "own or alternative" data set (see Fig. 3.26a) is similar to that in the results obtained with the use of "reference" data set. The highest and the lowest values are also characteristic of CliMoChem and MSCE-POP models, respectively. In the results obtained on the basis of non-zero initial conditions (see Fig. 3.26b) the difference in absolute values of different models is also considerable. The maximum value obtained by SimpleBox 3.0 and 3.12 model with the use of historical emissions differs more than two orders of magnitude from the minimum value calculated by MSCE-POP model.



a b

Fig. 3.26. *Comparison of annual values of PCB-153 masses contained in water within 200 m layer calculated by different models on the basis of "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

According to the data presented (see Figs. 3.11a,b and 3.12a,b, Section 3.1.3), seasonal variations of PCB-153 mass contained in water layer of 200 m are minor in both sets of SimpleBox 3.0 and 3.12

results calculated on the basis of historical emissions. Increasing trends of water content are characteristic of all models' results based on zero initial conditions.

Comparison of annual values of PCB-153 mass contained in the 200m layer of water obtained by the participating models on the basis of "reference" and "own/alternative" data sets is presented in Fig. 3.27.

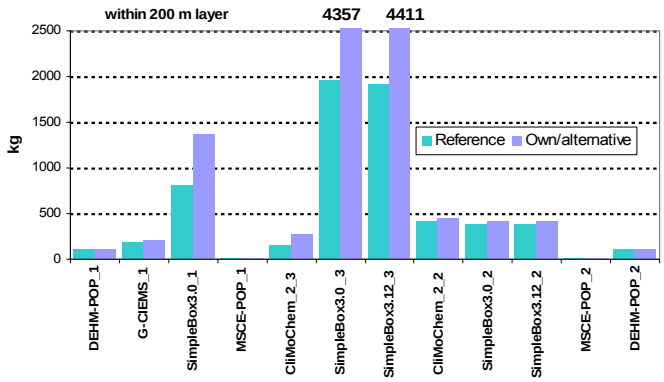


Fig.3.27. *Comparison of PCB-153 mass contained within 200 m water layer calculated by different models on the basis of two data sets*

For the results of most models, values of PCB-153 water content calculated on the basis of "own or alternative" data sets exceed those obtained with the use of "reference" data set (Table 3.18, Section 3.1.3). The largest difference in the results obtained with two data sets equal to 130% is characteristic of SimpleBox 3.12 (calculations with historical emissions). For results of DEHM-POP_1 and *2,* G-CIEMS_1 and MSCE-POP_2, the values of PCB-153 masses contained in water obtained with the use of "own or alternative" data sets are smaller than those obtained with "reference" data set.

Vegetation. The scattering in values of PCB-153 mass contained in vegetation obtained by the participating models on the basis of non-zero initial conditions is rather large for both results based on two different data sets of physical-chemical properties (Tables 3.19 and 3.20, Section 3.1.4). The difference between the maximum values obtained by SimpleBox model and the minimum values calculated by G-CIEMS on the basis of initial concentrations given as input data reaches several orders of magnitude. Square deviation σ between different model results obtained on the basis of zero initial conditions does not exceed the mean value of this parameter.

Annual values of PCB-153 mass contained in vegetation obtained on the basis of zero initial conditions and with the use of "reference" and "own/alternative" data sets are presented in Fig. 3.28a. Fig. 3.28b shows the results obtained with the use of non-zero initial conditions.

According to the calculation results of CliMoChem and G-CIEMS models, the values of PCB-153 mass in vegetation obtained with the use of "own or alternative" data sets are smaller than those obtained with "reference" data set; and vice versa for MSCE-POP and SimpleBox results. The largest difference in the results obtained with two data sets equal to 63% is characteristic of CliMoChem results (Table 3.21, Section 3.1.4). Percentage difference between results of other models calculated with the use of both data sets varies from 6 to 52 %.

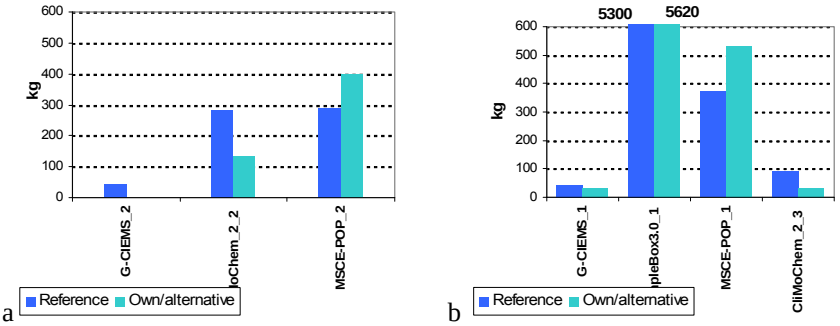


Fig.3.28. *Comparison of PCB-153 mass contained in vegetation calculated by different models on the basis of "reference" and "own/alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

Relative distribution of PCB mass. According to the results on relative distribution of PCB-153 mass between different environmental compartments, all models show that bulk fraction of overall environmental PCB content is accumulated in soil. The average distribution of PCB-153 mass between main environmental compartments is presented for the results of participating models obtained on the basis of zero and non-zero initial conditions in Fig. 3.29a and b, respectively. In these figures results calculated with the use of "reference" and "own/alternative" data sets are given. Of note, values of average fraction of PCB-153 mass in each medium calculated with two different data sets of physical-chemical properties could not be directly compared between each other since calculation results of different number of participating models are enclosed in them.

The distribution of PCB-153 mass between main environmental compartments obtained by the participating models on the basis of zero initial conditions (see Fig. 3.29a) shows that soil compartment contains the largest fraction of overall environmental mass (more than 50%). Then come seawater compartment with 27 and 32% in "reference" and "own/alternative" results, respectively and vegetation compartment with 9 and 12% in "reference" and "own/alternative" results, respectively. The atmospheric content of PCB-153 is equal to approximately 5 %. According to the calculations performed on the basis of non-zero initial conditions (see Fig. 3.29b), PCB-153 is mainly accumulated in soil (96%) and only about 4% of its overall mass in the environment is distributed between other compartments. The difference between relative values calculated with "reference" and "own/alternative" data sets is not high.

To show redistribution of the pollutant between main environmental compartments for each participating model in more detail, plots of PCB-153 fractions in different environmental compartments calculated by the models on the basis of zero and non-zero initial conditions are presented below. Fractions of PCB-153 mass contained in soil calculated by the different models with the use of "reference" and "own/alternative" data sets are compared in Figs. 3.30a and b. The red line in the plots shows the value of the corresponding fraction averaged between models.

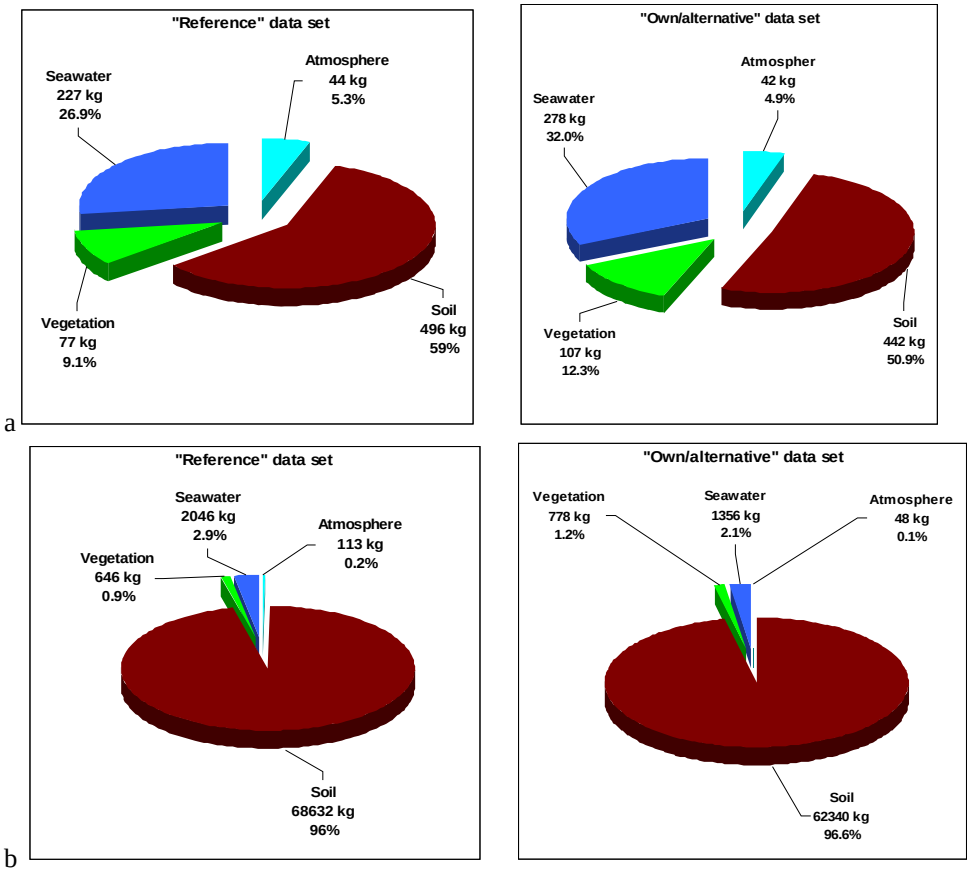


Fig. 3.29. *Distribution of PCB-153 mass between environmental compartments (kg) averaged for all participating models and calculated on the basis of "reference" and "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

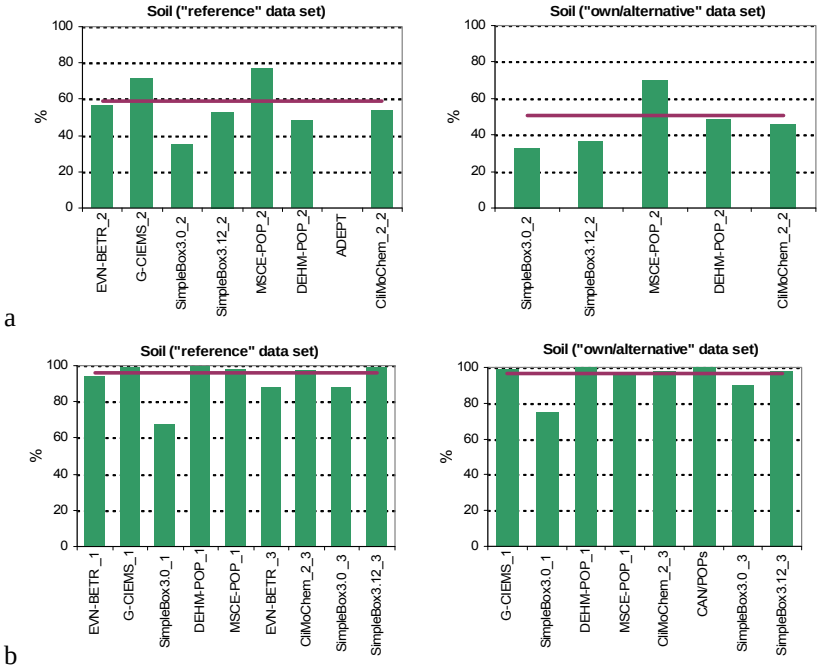


Fig. 3.30. *Fractions of PCB-153 mass in soil calculated by the participating models on the basis of "reference" and "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

The values of PCB fraction in soil obtained by the participants on the basis of zero initial concentrations (Fig. 3.30a) vary from 35 to 77% in the case of use of “reference” and from 33 to 70% in the case of use of “own or alternative” data sets. ADEPT model does not include soil compartment like any other compartments except the atmospheric one. For MSCE-POP and SimpleBox 3.12 results (zero initial conditions), the fraction of overall environmental mass of PCB-153 accumulated in soil calculated on the basis of “reference” data set is noticeably higher than that obtained with the use of “own or alternative” data set. For most models the fraction of overall environmental content in soil calculated using initial conditions in media or historical emissions (see Fig. 3.30b) is higher than 90% for results of both physical-chemical data sets (“reference” and “own/alternative”). The value of SimpleBox 3.0 model calculated with initial concentrations of the pollutant in media with the use of “own/alternative” data set is higher than that based on “reference” data set.

PCB fractions in all other compartments are lower than those in soil. Fractions of PCB-153 mass in the atmosphere calculated by the participating models on the basis of zero and non-zero initial conditions are presented in Fig. 3.31a and b, respectively. In these figures fractions of PCB-153 mass in the atmosphere calculated by the different models with the use of “reference” and “own/alternative” data sets are also compared. The red line in the plots shows the value of the corresponding fraction averaged between models.

Since ADEPT model is a purely atmospheric one, all environmental content of PCB-153 calculated by this model is concentrated in this medium making up respectively 100%. The results of other models calculated on the basis of zero initial concentrations (see Fig.3.31a) are characterised by higher values of relative fractions of total environmental mass of PCB-153 contained in the atmosphere (1.3-12%) than the results obtained with initial conditions or historical emissions (0.02-0.43%) (Fig.3.31b). The considerable difference between calculations made on two different data sets of physical-chemical properties is observed in results of G-CIEMS_1, SimpleBox 3.0_3 and 3.12_2 and CliMoChem_2-3 models.

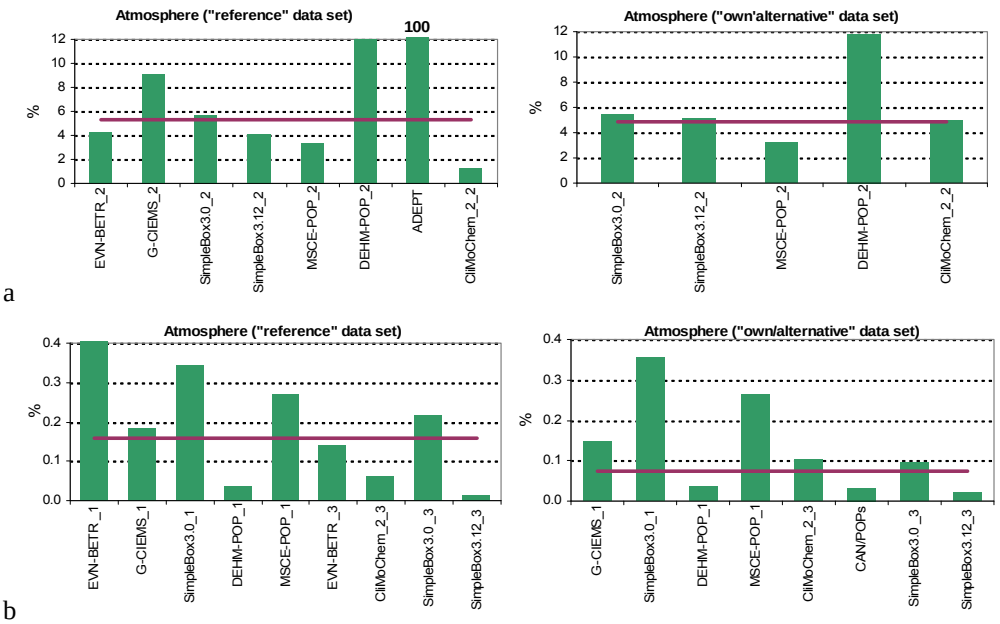


Fig. 3.31. *Fractions of PCB-153 mass in the atmosphere calculated by the participating models on the basis of “reference” and “own or alternative” data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

Fractions of PCB-153 mass in seawater calculated by the participating models on the basis of zero and non-zero initial conditions are presented in Fig. 3.32a and b, respectively. In these figures fractions of PCB-153 mass in seawater calculated by the different models with the use of “reference” and “own/alternative” data sets are also compared. The red line in the plots shows the value of the corresponding fraction averaged between models.

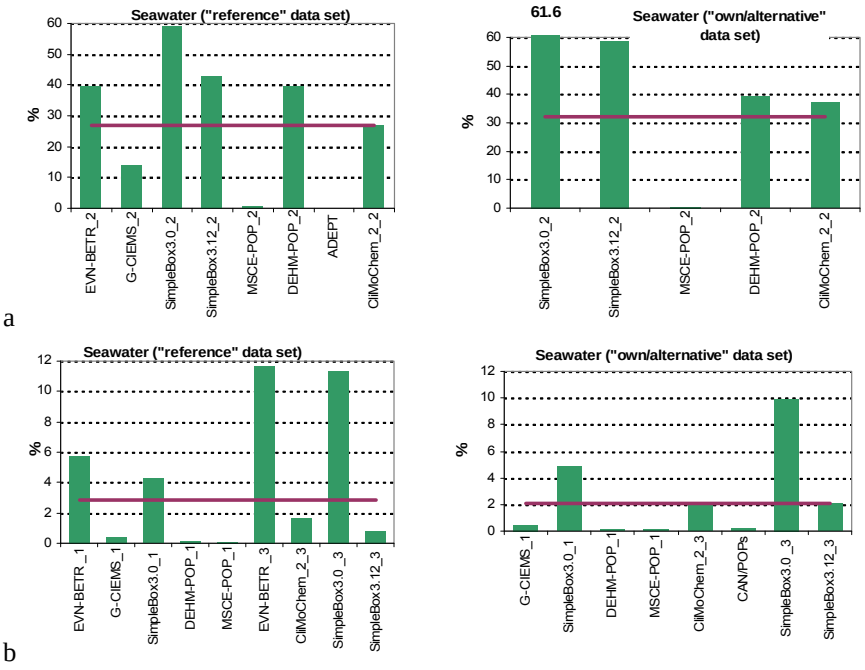


Fig. 3.32. *Fractions of PCB-153 mass in seawater calculated by the participating models on the basis of “reference” and “own or alternative” data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

As in the case of atmospheric content, relative fractions of PCB-153 water content obtained by most models on the basis of zero initial concentrations and both physical-chemical data sets vary from 14 to 62% and considerably exceed values calculated with initial conditions (See Fig. 3.32 a). MSCE-POP model provided the minimum seawater fractions equal to 0.6 % in both cases. The results of participating models obtained on the basis of initial concentrations of the pollutant in media or historical emissions (See Fig. 3.32b) strongly differ between each other. The highest values among these results are obtained by EVN-BETR and UK-MODEL and SimpleBox 3.0 model using historical emissions. The lowest values are characteristic of results of MSCE-POP, DEHM-POP, CAN/POPs and G-CIEMS models calculated using initial conditions. Considerable difference between fractions of PCB-153 water content calculated with the use of two different physical-chemical data sets can be seen for SimpleBox results.

Fractions of total environmental mass of PCB-153 contained in vegetation calculated by the participating models on the basis of zero and non-zero initial conditions are presented in Fig. 3.33a and b, respectively. In these figures fractions of PCB-153 mass in vegetation calculated by the different models with the use of “reference” and “own/alternative” data sets are also compared. The red line in the plots shows the value of the corresponding fraction averaged between models. Of note, the models, for which vegetation compartment was not included into calculations of mass balance, are also shown in the plots.

Fig. 3.33a shows that fractions of total environmental mass of PCB-153 contained in vegetation calculated by MSCE-POP model on the basis of zero initial conditions are the highest among other models for both data sets of physical-chemical properties. At that the value obtained on the basis of "reference" data set is lower than that based on "own/alternative" data set. The results obtained by the participating models on the basis of non-zero initial conditions differ considerably between each other (see Fig. 3.33b). The scattering of calculated lowest and highest fractions of vegetation content between models reaches two orders of magnitude. The highest and the lowest fractions of vegetation content are obtained by SimpleBox 3.0 and by G-CIEMS models, respectively. In all models' results except those of G-CIEMS there is noticeable difference between calculated values based on two different data sets of physical-chemical properties.

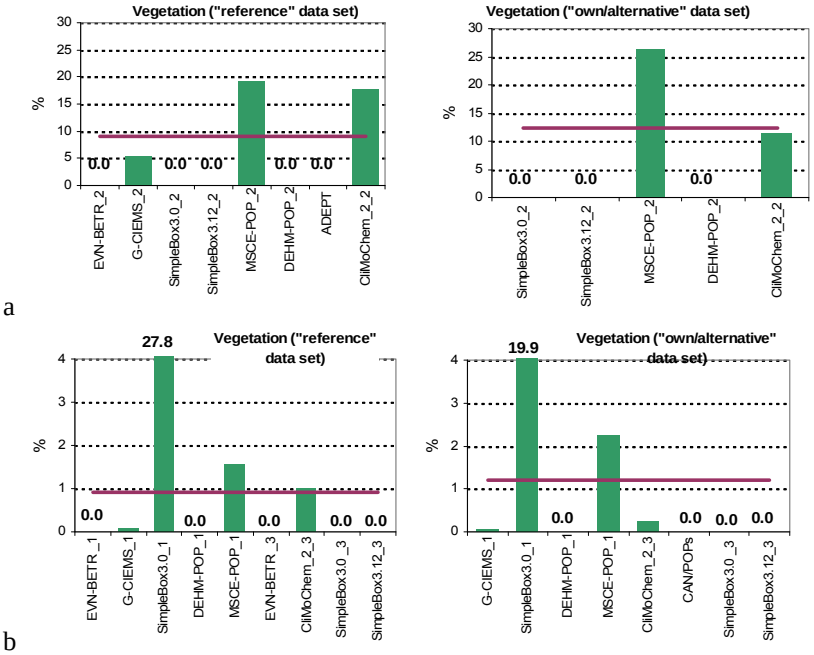


Fig. 3.33. *Fractions of PCB-153 mass in vegetation calculated by the participating models on the basis of "reference" and "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

Thus, according to the results of most participating models' based of both physical-chemical data sets ("reference" and "own/alternative"), the absolute values of PCB-153 mass contained in the considered layers of the atmosphere are rather close. Differences in calculated values of PCB-153 mass accumulated in other media than atmosphere are more considerable.

According to the results presented by most models, PCB-153 is mainly accumulated in soil. PCB fractions in all other compartments are essentially lower and depend on type of calculations performed. The variability between PCB fractions in other environmental compartments is higher.
For most participating models the comparison of absolute and relative values of PCB-153 mass in the environmental media calculated with two different data sets ("reference" and "own/alternative") show relatively weak sensitivity of mass balance values with respect to variations of pollutant-related parameters. Only in some cases the differences are essential.

3.2. Masses degraded in the environmental compartments

3.2.1. Comparison of calculated values of PCB-153 mass degraded in the atmosphere

According to the programme of Stage II results of computational experiments on mass balance include masses of PCB-153 degraded in the atmosphere within layers of 1 km, 5 km and 10 km height.

Reference data set. Calculation results on PCB-153 mass degraded in 1 km layer of the atmosphere (kg) calculated by the models on the basis of "reference" data set together with statistical parameters used for evaluation are presented in Table 3.22.

Monthly values of PCB-153 mass degraded in 1 km layer of the atmosphere calculated by all participating models on the basis of "reference" data set and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.34 a and b, respectively. Seasonal variations of low values of mass contained in 1 km layer of the atmosphere calculated by the participating models on the basis of "reference" data set and non-zero initial conditions are also shown in Fig. 3.34c in more detail.

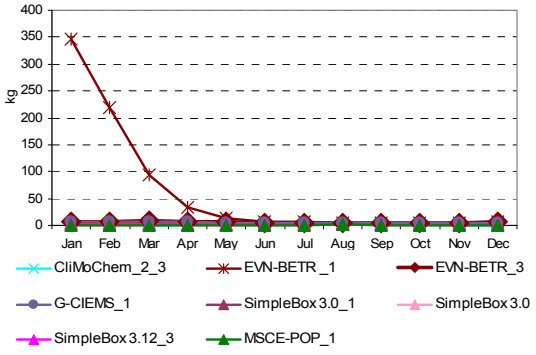


Fig. 3.34a. *PCB-153 mass degraded in 1 km layer of the atmosphere (kg) calculated by the participating models on the basis of "reference" data set and non-zero initial conditions (all models)*

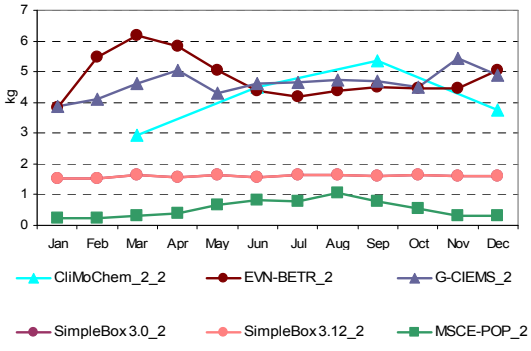


Fig. 3.34b. *PCB-153 mass degraded in 1 km layer of the atmosphere (kg) calculated by the participating models on the basis of "reference" data set and zero-initial conditions*

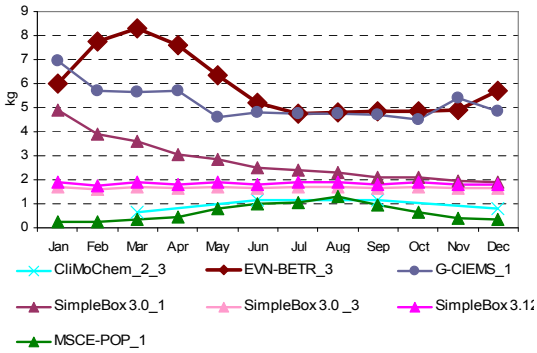


Fig. 3.34c. *PCB-153 mass degraded in 1 km layer of the atmosphere (kg) calculated by the participating models on the basis of "reference" data set and non-zero initial conditions (models with low values)*

Calculation results on PCB-153 mass degraded in 5 km layer of the atmosphere (kg) calculated by models on the basis of “reference” data set together with statistical parameters used for evaluation are presented in Table 3.23.

Monthly values of PCB-153 mass degraded in 5 km layer of the atmosphere calculated by the models on the basis of “reference” data set are compared in Fig. 3.35.

Calculation results on PCB-153 mass degraded in 10 km layer of the atmosphere (kg) calculated by models on the basis of “reference” data set together with statistical parameters used for evaluation are presented in Table 3.24.

Monthly values of PCB-153 mass degraded in 10 km layer of the atmosphere calculated by the participating models on the basis of “reference” data set are compared in Fig. 3.36.

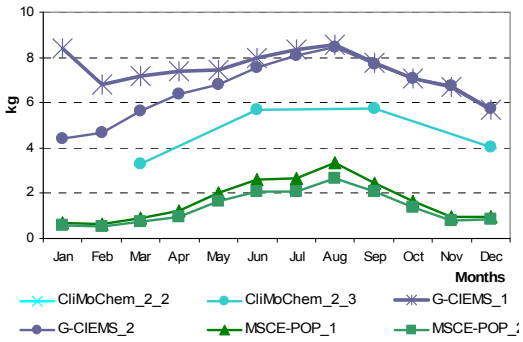


Fig. 3.35. *PCB-153 mass degraded in 5 km layer of the atmosphere (kg) calculated by the participating models on the basis of “reference” data set*

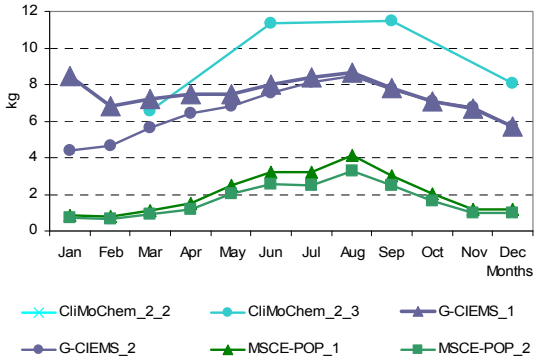


Fig.3.36. *PCB-153 mass degraded in 10 km layer of the atmosphere (kg) calculated by the participating models on the basis of “reference” data set*

Table 3.22. *Calculation results: PCB-153 mass degraded in 1 km layer of the atmosphere (kg) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data				Results obtained on the basis of historical emissions				*m*	σ	Month	Results obtained on the basis of zero initial concentrations						*m*	σ
	MSCE-POP_1	EVN-BETR _1[a]	G-CIEMS_1	SimpleBox 3.0_1[b]	EVN-BETR _3[a]	CliMo Chem_2_3	SimpleBox 3.0 _3[b]	SimpleBox 3.12_3[b]				EVN-BETR_2[a]	G-CIEMS_2	CliMo Chem_2_2	SimpleBox 3.0_2[b]	SimpleBox 3.12_2[b]	MSCE-POP_2		
Jan	0.26	347.37	6.95	4.88	6.00		1.70	1.88	*52.72*	*129.95*	Jan	3.84	3.87		1.53	1.53	0.23	*2.20*	*1.60*
Feb	0.25	218.72	5.72	3.90	7.74		1.58	1.76	*34.24*	*81.39*	Feb	5.49	4.12		1.52	1.52	0.22	*2.57*	*2.16*
Mar	0.35	93.93	5.66	3.58	8.29		1.68	1.88	*16.48*	*34.26*	Mar	6.16	4.63		1.63	1.63	0.30	*2.87*	*2.43*
Seas_1	**0.86**	**660.02**	**18.33**	**12.35**	**22.04**	**0.66**	**4.96**	**5.52**	***90.59***	***230.22***	**Seas_1**	**15.49**	**12.62**	2.93	**4.68**	**4.68**	**0.74**	***6.86***	***5.83***
Apr	0.47	34.46	5.70	3.04	7.62		1.63	1.82	*7.82*	*12.01*	Apr	5.82	5.04		1.58	1.58	0.38	*2.88*	*2.40*
May	0.80	14.15	4.58	2.83	6.33		1.68	1.88	*4.61*	*4.61*	May	5.04	4.29		1.63	1.63	0.65	*2.65*	*1.90*
Jun	1.02	7.68	4.78	2.51	5.22		1.63	1.82	*3.52*	*2.43*	Jun	4.38	4.60		1.58	1.58	0.81	*2.59*	*1.76*
Seas_2	**2.29**	**56.29**	**15.05**	**8.38**	**19.17**	**1.14**	**4.94**	**5.52**	***14.10***	***18.15***	**Seas_2**	**15.25**	**13.93**	4.51	**4.79**	**4.80**	**1.84**	***7.52***	***5.60***
Jul	1.03	5.69	4.75	2.42	4.75		1.68	1.88	*3.17*	*1.84*	Jul	4.18	4.67		1.64	1.64	0.80	*2.58*	*1.72*
Aug	1.30	5.29	4.75	2.28	4.82		1.68	1.88	*3.15*	*1.73*	Aug	4.38	4.72		1.64	1.64	1.04	*2.68*	*1.72*
Sep	0.95	5.18	4.70	2.10	4.87		1.63	1.82	*3.04*	*1.80*	Sep	4.48	4.69		1.59	1.59	0.80	*2.63*	*1.82*
Seas_3	**3.29**	**16.16**	**14.20**	**6.80**	**14.44**	**1.15**	**5.00**	**5.58**	***8.33***	***5.74***	**Seas_3**	**13.04**	**14.08**	5.34	**4.86**	**4.86**	**2.65**	***7.47***	***4.82***
Oct	0.64	5.13	4.48	2.09	4.85		1.68	1.88	*2.97*	*1.80*	Oct	4.47	4.50		1.64	1.64	0.53	*2.56*	*1.82*
Nov	0.38	5.24	5.42	1.96	4.91		1.63	1.82	*3.05*	*2.07*	Nov	4.47	5.45		1.59	1.59	0.32	*2.68*	*2.17*
Dec	0.37	6.16	4.84	1.91	5.68		1.63	1.82	*3.20*	*2.30*	Dec	5.06	4.88		1.59	1.59	0.32	*2.69*	*2.15*
Seas_4	**1.39**	**16.53**	**14.74**	**5.96**	**15.44**	**0.80**	**4.94**	**5.52**	***8.17***	***6.42***	**Seas_4**	**13.99**	**14.83**	3.75	**4.81**	**4.81**	**1.17**	***7.23***	***5.73***
Annual	**7.83**	**749.01**	**62.32**	**33.49**	**71.09**	**3.75**	**19.84**	**22.15**	***121.19***	***254.83***	**Annual**	**57.78**	**55.46**	**16.53**	**19.15**	**19.15**	**6.40**	***29.08***	***21.86***

EVN-BETR _1 - EVN-BETR and UK-MODEL results calculated on the basis of initial concentrations given as input data;
EVN-BETR _2 - EVN-BETR and UK-MODEL results calculated on the basis of zero initial concentrations;
EVN-BETR _3 - EVN-BETR and UK-MODEL results calculated on the basis of historical emissions for 20-year period;
G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
[a] - EVN-BETR and UK-MODEL results were calculated with the help of a single box version of European model;
[b] - SimpleBox data presented here are overall masses calculated as sum of regional and continental level estimates.

Table 3.23. *Calculation results: PCB-153 mass degraded in 5 km layer of the atmosphere (kg) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation.*

Month	Results obtained on the basis of initial concentrations given as input data		Results obtained on the basis of historical emissions	*m*	σ	Month	Results obtained on the basis of zero initial concentrations			*m*	σ
	G-CIEMS_1	MSCE-POP_1	CliMoChem_2_3				G-CIEMS_2	CliMoChem_2_2	MSCE-POP_2		
Jan	8.42	0.68		*4.55*	*5.48*	Jan	4.40		0.59	*2.49*	*2.69*
Feb	6.79	0.65		*3.72*	*4.35*	Feb	4.68		0.55	*2.62*	*2.91*
Mar	7.19	0.90		*4.04*	*4.45*	Mar	5.66		0.76	*3.21*	*3.46*
Seas_1	**22.4**	**2.22**	**3.28**	***9.30***	***11.36***	**Seas_1**	**14.7**	**14.63**	**1.91**	***10.42***	***7.37***
Apr	7.40	1.22		*4.31*	*4.37*	Apr	6.38		0.98	*3.68*	*3.82*
May	7.43	2.05		*4.74*	*3.81*	May	6.81		1.67	*4.24*	*3.63*
Jun	7.97	2.61		*5.29*	*3.79*	Jun	7.55		2.08	*4.81*	*3.87*
Seas_2	**22.8**	**5.88**	**5.68**	***11.46***	***9.83***	**Seas_2**	**20.7**	**22.53**	**4.72**	***16.00***	***9.81***
Jul	8.38	2.65		*5.52*	*4.05*	Jul	8.11		2.06	*5.08*	*4.28*
Aug	8.59	3.35		*5.97*	*3.70*	Aug	8.45		2.68	*5.56*	*4.07*
Sep	7.78	2.45		*5.12*	*3.77*	Sep	7.74		2.05	*4.90*	*4.02*
Seas_3	**24.7**	**8.45**	**5.74**	***12.98***	***10.28***	**Seas_3**	**24.3**	**26.71**	**6.80**	***19.27***	***10.87***
Oct	7.08	1.65		*4.37*	*3.84*	Oct	7.09		1.36	*4.23*	*4.05*
Nov	6.72	0.97		*3.84*	*4.07*	Nov	6.75		0.82	*3.78*	*4.20*
Dec	5.68	0.94		*3.31*	*3.35*	Dec	5.72		0.83	*3.27*	*3.46*
Seas_4	**19.5**	**3.56**	**4.02**	***9.02***	***9.06***	**Seas_4**	**19.6**	**18.76**	**3.01**	***13.78***	***9.33***
Annual	**89.44**	**20.11**	**18.73**	***42.76***	***40.43***	**Annual**	**79.32**	**82.64**	**16.44**	***59.47***	***37.30***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;

Table 3.24. *Calculation results: PCB-153 mass degraded in 10 km layer of the atmosphere (kg) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data		Results obtained on the basis of historical emissions	*m*	σ	Month	Results obtained on the basis of zero initial concentrations			*m*	σ
	G-CIEMS_1	MSCE-POP_1	CliMoChem_2_3				G-CIEMS_2	CliMoChem_2_2	MSCE-POP_2		
Jan	8.46	0.83		*4.64*	*5.40*	Jan	4.40		0.73	*2.56*	*2.60*
Feb	6.82	0.79		*3.81*	*4.27*	Feb	4.68		0.68	*2.68*	*2.83*
Mar	7.24	1.10		*4.17*	*4.34*	Mar	5.67		0.93	*3.30*	*3.35*
Seas_1	**22.53**	**2.71**	**6.57**	***10.60***	***10.50***	**Seas_1**	**14.8**	**29.26**	**2.33**	***15.45***	***13.48***
Apr	7.44	1.49		*4.47*	*4.21*	Apr	6.40		1.20	*3.80*	*3.68*
May	7.47	2.50		*4.99*	*3.51*	May	6.83		2.04	*4.44*	*3.39*
Jun	8.00	3.20		*5.60*	*3.39*	Jun	7.57		2.54	*5.05*	*3.56*
Seas_2	**22.91**	**7.19**	**11.36**	***13.82***	***8.14***	**Seas_2**	**20.8**	**45.07**	**5.78**	***23.88***	***19.83***
Jul	8.41	3.24		*5.83*	*3.65*	Jul	**8.14**		2.52	*5.33*	*3.97*
Aug	8.63	4.10		*6.36*	*3.20*	Aug	**8.48**		3.28	*5.88*	*3.68*
Sep	7.80	3.00		*5.40*	*3.39*	Sep	**7.75**		2.51	*5.13*	*3.70*
Seas_3	**24.84**	**10.34**	**11.48**	***15.55***	***8.06***	**Seas_3**	**24.4**	**53.42**	**8.31**	***28.70***	***22.87***
Oct	7.09	2.02		*4.55*	*3.59*	Oct	**7.10**		1.67	*4.38*	*3.84*
Nov	6.72	1.18		*3.95*	*3.92*	Nov	**6.76**		1.00	*3.88*	*4.07*
Dec	5.68	1.15		*3.42*	*3.20*	Dec	**5.72**		1.01	*3.37*	*3.33*
Seas_4	**19.49**	**4.35**	**8.04**	***10.63***	***7.89***	**Seas_4**	**19.6**	**37.52**	**3.68**	***20.26***	***16.93***
Annual	**89.76**	**24.60**	**37.45**	***50.60***	***34.52***	**Annual**	**79.50**	**165.27**	**20.10**	***88.29***	***72.98***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;

CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations.

Own/alternative data set. Calculation results on PCB-153 mass degraded in 1 km layer of the atmosphere (kg) calculated by models on the basis of "own or alternative" data sets together with statistical parameters used for evaluation are presented in Table 3.25.

Monthly values of PCB-153 mass degraded in 1 km layer of the atmosphere calculated by all participating models on the basis of "own or alternative" data sets and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.37 a and b, respectively.

Calculation results on PCB-153 mass degraded in 5 km layer of the atmosphere (kg) calculated by models on the basis of "own or alternative" data set together with statistical parameters used for evaluation are presented in Table 3.26.

Monthly values of PCB-153 mass degraded in 5 km layer of the atmosphere calculated by the models on the basis of "reference" data set are compared in Fig. 3.38.

Calculation results on PCB-153 mass degraded in 10 km layer of the atmosphere (kg) calculated by models on the basis of "own or alternative data sets" together with statistical parameters used for evaluation are presented in Table 3.27.

Monthly values of PCB-153 mass degraded in 10 km layer of the atmosphere calculated by the participating models on the basis of "own or alternative" data sets are compared in Fig. 3.39.

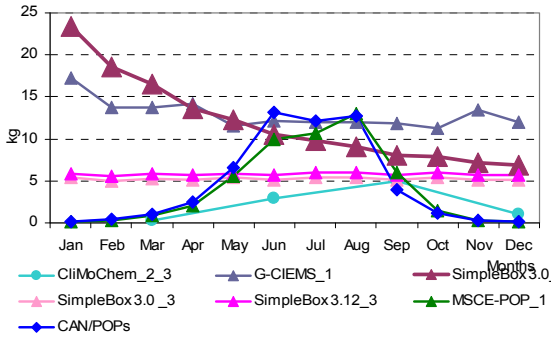


Fig. 3.37a. *PCB-153 mass degraded in 1 km layer of the atmosphere (kg) calculated by the participating models on the basis of "own or alternative" data sets and non-zero initial conditions*

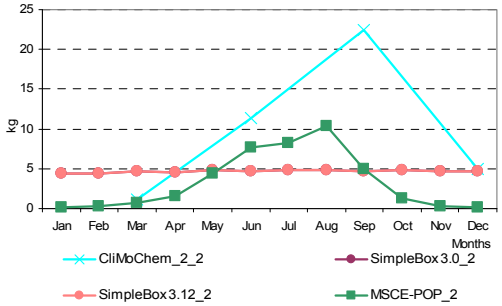


Fig. 3.37b. *PCB-153 mass degraded in 1 km layer of the atmosphere (kg) calculated by the participating models on the basis of "own or alternative" data sets and zero initial conditions*

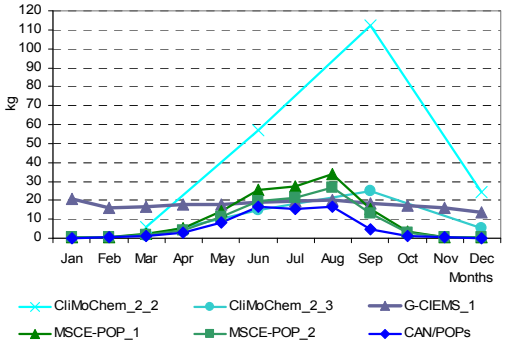


Fig. 3.38. *PCB-153 mass in 5 km layer of the atmosphere (kg) degraded by the participating models on the basis of "own or alternative" data sets*

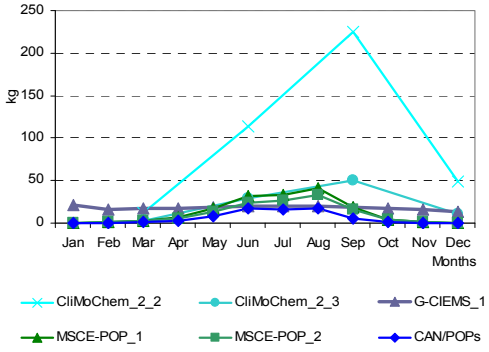


Fig. 3.39. *PCB-153 mass degraded in 10 km layer of the atmosphere (kg) calculated by the participating models on the basis of "own or alternative" data sets*

Table 3.25. *Calculation results: PCB-153 mass degraded in 1 km layer of the atmosphere (kg) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data				Results obtained on the basis of historical emissions			*m*	σ	Month	Results obtained on the basis of zero initial concentrations				*m*	σ
	MSCE-POP_1	G-CIEMS_1	SimpleBox 3.0_1[a]	CAN/ POPs	CliMo Chem_ 2_3	SimpleBox 3.0 _3[a]	SimpleBox 3.12_3[a]				CliMo Chem_2_2	SimpleBox 3.0_2[a]	SimpleBox 3.12_2[a]	MSCE-POP_2		
Jan	0.18	17.27	23.34	0.19		5.36	5.89	*8.70*	*9.51*	Jan		4.42	4.42	0.15	*3.00*	*2.46*
Feb	0.32	13.69	18.57	0.39		4.98	5.52	*7.24*	*7.39*	Feb		4.41	4.41	0.27	*3.03*	*2.39*
Mar	0.84	13.76	16.56	1.06		5.33	5.90	*7.24*	*6.54*	Mar		4.73	4.73	0.70	*3.39*	*2.33*
Seas_1	**1.33**	**44.71**	**58.47**	**1.64**	**0.28**	**15.67**	**17.31**	***19.92***	***23.06***	**Seas_1**	**1.20**	**13.56**	**13.56**	**1.12**	***7.36***	***7.16***
Apr	2.02	14.13	13.64	2.47		5.17	5.72	*7.19*	*5.39*	Apr		4.59	4.59	1.56	*3.58*	*1.75*
May	5.56	11.57	12.27	6.56		5.34	5.92	*7.87*	*3.17*	May		4.76	4.76	4.37	*4.63*	*0.23*
Jun	9.96	12.07	10.54	13.13		5.18	5.73	*9.43*	*3.29*	Jun		4.62	4.62	7.61	*5.62*	*1.73*
Seas_2	**17.55**	**37.77**	**36.45**	**22.16**	**2.94**	**15.69**	**17.37**	***21.42***	***12.24***	**Seas_2**	**11.36**	**13.97**	**13.97**	**13.55**	***13.21***	***1.25***
Jul	10.73	12.02	9.84	12.08		5.35	5.92	*9.32*	*2.98*	Jul		4.78	4.78	8.22	*5.93*	*1.98*
Aug	13.07	12.03	9.00	12.67		5.35	5.93	*9.67*	*3.44*	Aug		4.79	4.79	10.33	*6.63*	*3.20*
Sep	5.94	11.78	8.08	3.94		5.18	5.74	*6.78*	*2.80*	Sep		4.64	4.64	5.01	*4.76*	*0.21*
Seas_3	**29.75**	**35.83**	**26.92**	**28.69**	**4.98**	**15.88**	**17.58**	***22.81***	***10.51***	**Seas_3**	**22.48**	**14.20**	**14.20**	**23.55**	***18.61***	***5.11***
Oct	1.46	11.22	7.83	1.14		5.35	5.93	*5.49*	*3.84*	Oct		4.80	4.80	1.22	*3.60*	*2.07*
Nov	0.29	13.43	7.17	0.27		5.18	5.74	*5.35*	*4.90*	Nov		4.65	4.65	0.25	*3.18*	*2.54*
Dec	0.15	12.02	6.84	0.11		5.19	5.74	*5.01*	*4.49*	Dec		4.65	4.65	0.13	*3.15*	*2.61*
Seas_4	**1.90**	**36.66**	**21.84**	**1.52**	**1.08**	**15.72**	**17.40**	***13.73***	***13.28***	**Seas_4**	**4.90**	**14.10**	**14.10**	**1.60**	***8.67***	***6.41***
Annual	**50.53**	**154.98**	**143.68**	**54.02**	**9.28**	**62.97**	**69.66**	***77.87***	***52.58***	**Annual**	**39.94**	**55.83**	**55.83**	**39.82**	***47.86***	***9.21***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
[a] - SimpleBox data presented here are overall masses calculated as sum of regional and continental level estimates.

Table 3.26. *Calculation results: PCB-153 mass degraded in 5 km layer of the atmosphere (kg) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data			Results obtained on the basis of historical emissions	*m*	σ	Month	Results obtained on the basis of zero initial concentrations		*m*	σ
	CAN/POPs	G-CIEMS_1	MSCE-POP_1	CliMoChem_2_3				CliMoChem_2_2	MSCE-POP_2		
Jan	0.24	20.52	0.46		*7.07*	*11.65*	Jan		0.40		
Feb	0.43	15.86	0.81		*5.70*	*8.80*	Feb		0.69		
Mar	1.23	16.89	2.16		*6.76*	*8.78*	Mar		1.80		
Seas_1	**1.90**	**53.27**	**3.43**	**1.38**	***15.00***	***25.53***	**Seas_1**	**6.02**	**2.88**	***4.45***	***2.21***
Apr	2.93	17.58	5.20		*8.57*	*7.89*	Apr		4.02		
May	8.06	17.96	14.29		*13.44*	*5.00*	May		11.23		
Jun	16.89	19.16	25.59		*20.55*	*4.51*	Jun		19.56		
Seas_2	**27.89**	**54.70**	**45.09**	**14.71**	***35.60***	***17.80***	**Seas_2**	**56.78**	**34.81**	***45.79***	***15.53***
Jul	15.60	19.88	27.58		*21.02*	*6.07*	Jul		21.11		
Aug	16.59	20.31	33.59		*23.50*	*8.94*	Aug		26.54		
Sep	5.01	18.57	15.27		*12.95*	*7.07*	Sep		12.86		
Seas_3	**37.20**	**58.76**	**76.44**	**24.88**	***49.32***	***22.87***	**Seas_3**	**112.38**	**60.52**	***86.45***	***36.67***
Oct	1.38	16.96	3.75		*7.36*	*8.40*	Oct		3.13		
Nov	0.31	16.04	0.75		*5.70*	*8.96*	Nov		0.64		
Dec	0.13	13.76	0.39		*4.76*	*7.80*	Dec		0.34		
Seas_4	**1.81**	**46.77**	**4.88**	**5.41**	***14.72***	***21.43***	**Seas_4**	**24.51**	**4.11**	***14.31***	***14.43***
Annual	**68.80**	**213.50**	**129.84**	**46.38**	***114.63***	***74.75***	**Annual**	**199.68**	**102.32**	***151.00***	***68.84***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations.

Table 3.27. *Calculation results: PCB-153 mass degraded in 10 km layer of the atmosphere (kg) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data			Results obtained on the basis of historical emissions	*m*	σ	Month	Results obtained on the basis of zero initial concentrations		*m*	σ
	G-CIEMS_1	MSCE-POP_1	CAN/POPs	CliMoChem_2_3				CliMo Chem_2_2	MSCE-POP_2		
Jan	20.63	0.56	0.24		*7.14*	*11.68*	Jan		0.48		
Feb	15.93	0.99	0.43		*5.79*	*8.79*	Feb		0.84		
Mar	16.98	2.64	1.23		*6.95*	*8.71*	Mar		2.20		
Seas_1	**53.54**	**4.19**	**1.90**	**2.76**	***15.60***	***25.31***	**Seas_1**	**12.03**	**3.53**	***7.78***	***6.01***
Apr	17.65	6.36	2.93		*8.98*	*7.70*	Apr		4.92		
May	18.02	17.48	8.07		*14.52*	*5.60*	May		13.73		
Jun	19.20	31.30	16.89		*22.47*	*7.74*	Jun		23.92		
Seas_2	**54.87**	**55.14**	**27.89**	**29.42**	***41.83***	***15.23***	**Seas_2**	**113.55**	**42.57**	***78.06***	***50.19***
Jul	19.95	33.73	15.61		*23.09*	*9.46*	Jul		25.82		
Aug	20.40	41.08	16.59		*26.02*	*13.18*	Aug		32.46		
Sep	18.60	18.67	5.01		*14.09*	*7.86*	Sep		15.73		
Seas_3	**58.94**	**93.48**	**37.21**	**49.77**	***59.85***	***24.13***	**Seas_3**	**224.76**	**74.01**	***149.38***	***106.59***
Oct	16.98	4.58	1.38		*7.65*	*8.24*	Oct		3.83		
Nov	16.05	0.91	0.31		*5.76*	*8.92*	Nov		0.78		
Dec	13.77	0.47	0.13		*4.79*	*7.78*	Dec		0.42		
Seas_4	**46.80**	**5.97**	**1.81**	**10.82**	***16.35***	***20.63***	**Seas_4**	**49.02**	**5.03**	***27.02***	***31.11***
Annual	**214.15**	**158.79**	**68.81**	**92.77**	***133.63***	***65.80***	**Annual**	**399.37**	**125.14**	***262.25***	***193.91***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations.

Comparison between results obtained on the basis of two data sets. The percentage difference between calculation results on PCB-153 mass degraded in 1, 5 and 10 km layers of obtained with two data sets of physical-chemical properties (for those models who provided calculations for both these sets) is shown in Tables 3.28 – 3.30.

Table 3.28. *The percentage difference between calculation results on PCB-153 mass degraded in 1 km layer of the atmosphere obtained by models on the basis of two data sets: "reference" and "own or alternative" data sets*

Month	CliMo Chem_2_2	CliMo Chem_2_3	G-CIEMS_1	SimpleBox 3.0_1	SimpleBox 3.0_2	SimpleBox 3.12_2	SimpleBox 3.0 _3	SimpleBox 3.12_3	MSCE-POP_1	MSCE-POP_2
Jan			149%	378%	189%	189%	216%	213%	-32%	-33%
Feb			139%	376%	190%	190%	216%	213%	26%	24%
Mar			143%	363%	190%	190%	217%	214%	141%	137%
Seas_1	-59%	-58%	144%	373%	190%	190%	216%	213%	55%	51%
Apr			148%	349%	191%	191%	217%	214%	327%	311%
May			153%	334%	191%	191%	217%	214%	598%	572%
Jun			152%	320%	192%	192%	218%	215%	879%	843%
Seas_2	152%	159%	151%	335%	191%	191%	217%	214%	667%	637%
Jul			153%	307%	192%	192%	218%	215%	940%	925%
Aug			153%	295%	192%	192%	218%	215%	902%	889%
Sep			151%	284%	193%	192%	218%	215%	523%	526%
Seas_3	321%	333%	152%	296%	192%	192%	218%	215%	804%	790%
Oct			150%	274%	193%	193%	218%	215%	127%	129%
Nov			148%	266%	193%	193%	218%	215%	-23%	-22%
Dec			148%	259%	193%	193%	218%	215%	-59%	-59%
Seas_4	31%	35%	149%	267%	193%	193%	218%	215%	37%	37%
Annual	142%	148%	149%	329%	192%	192%	217%	214%	545%	522%

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period.

Table 3.29. *The percentage difference between calculation results on PCB-153 mass degraded in 5 km layer of the atmosphere obtained by models on the basis of two data sets: "reference" and "own or alternative" data sets*

Month	CliMoChem_2_2	CliMoChem_2_3	G-CIEMS_1	MSCE-POP_1	MSCE-POP_2
Jan			144%	-32%	-33%
Feb			134%	26%	24%
Mar			135%	141%	137%
Seas_1	-59%	-58%	138%	55%	51%
Apr			138%	327%	311%
May			142%	598%	572%
Jun			140%	879%	843%
Seas_2	152%	159%	140%	667%	637%
Jul			137%	940%	925%
Aug			137%	902%	889%
Sep			139%	523%	526%
Seas_3	321%	333%	137%	804%	790%
Oct			140%	127%	129%
Nov			139%	-23%	-22%
Dec			142%	-59%	-59%
Seas_4	31%	35%	140%	37%	37%
Annual	142%	148%	139%	545%	522%

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations.

Table 3.30. *The percentage difference between calculation results on PCB-153 mass degraded in 10 km layer of the atmosphere obtained by models on the basis of two data sets: "reference" and "own or alternative" data sets*

Month	CliMoChem_2_2	CliMoChem_2_3	G-CIEMS_1	MSCE-POP_1	MSCE-POP_2
Jan			144%	-32%	-33%
Feb			134%	26%	24%
Mar			134%	141%	137%
Seas_1	-59%	-58%	138%	55%	51%
Apr			137%	327%	311%
May			141%	598%	572%
Jun			140%	879%	843%
Seas_2	152%	159%	140%	667%	637%
Jul			137%	940%	925%
Aug			136%	902%	889%
Sep			139%	523%	526%
Seas_3	321%	333%	137%	804%	790%
Oct			139%	127%	129%
Nov			139%	-23%	-22%
Dec			142%	-59%	-59%
Seas_4	31%	35%	140%	37%	37%
Annual	142%	148%	139%	545%	522%

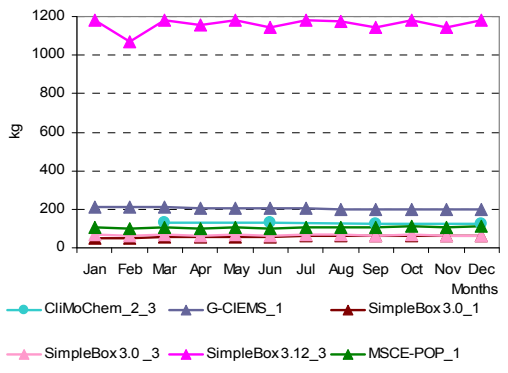
G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations.

3.2.2. Comparison of calculated values of PCB-153 mass degraded in soil

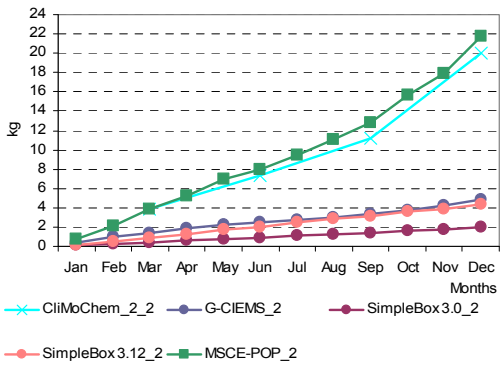
According to the programme of Stage II results of computational experiments on mass balance include masses of PCB-153 degraded in soil within 5 cm and 10 cm depth.

Reference data set. Calculation results on PCB-153 mass degraded in 5cm layer of soil (kg) calculated by models on the basis of "reference" data set together with statistical parameters used for evaluation are presented in Table 3.31.

Monthly values of PCB-153 mass degraded in 5 cm layer of soil calculated by the participating models on the basis of "reference" data set and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.40a and b, respectively.



a



b

Fig. 3.40a. *PCB-153 mass degraded in 5 cm layer of soil (kg) calculated by the participating models on the basis of "reference" data set and non-zero initial conditions*

Fig. 3.40b. *PCB-153 mass degraded in 5 cm layer of soil (kg) calculated by the participating models on the basis of "reference" data set and zero initial conditions*

Calculation results on PCB-153 mass degraded in 10 cm layer of soil (kg) calculated by models on the basis of “reference” data set together with statistical parameters used for evaluation are presented in Table 3.32.

Monthly values of PCB-153 mass degraded in 10 cm layer of soil calculated by all participating models on the basis of “reference” data set and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.41a and b, respectively. Seasonal variations of low values of mass degraded in 10 cm layer of soil calculated by the participating models on the basis of “reference” data set and non-zero initial conditions are also shown in Fig. 3.41c in more detail.

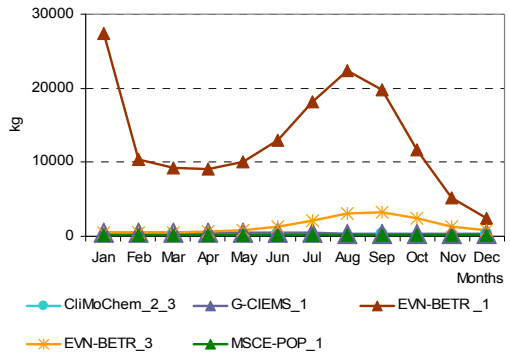


Fig.3.41a. *PCB-153 mass degraded in 10cm layer of soil (kg) calculated by the participating models on the basis of “reference” data set and non-zero initial conditions (all models)*

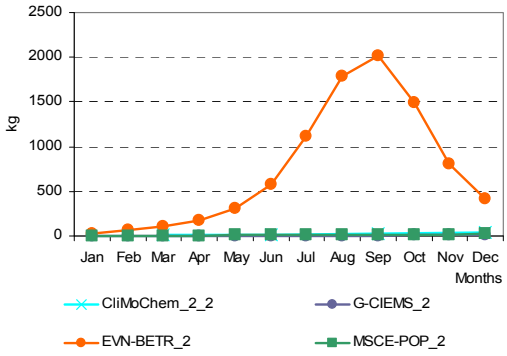


Fig.3.41b. *PCB-153 mass degraded in 10cm layer of soil (kg) calculated by the participating models on the basis of “reference” data set and zero-initial conditions*

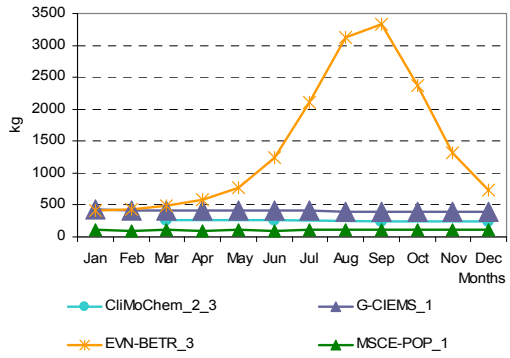


Fig.3.41c. *PCB-153 mass degraded in 10cm layer of soil (kg) calculated by the participating models on the basis of “reference” data set and non-zero initial conditions (models with low values)*

Table 3.31. *Calculation results: PCB-153 mass degraded in 5cm layer of soil (kg) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data			Results obtained on the basis of historical emissions			*m*	σ	Month	Results obtained on the basis of zero initial concentrations					*m*	σ
	MSCE-POP_1	G-CIEMS_1	SimpleBox 3.0_1[a]	CliMo Chem_2_3	SimpleBox 3.0 _3[a]	SimpleBox 3.12_3[a]				G-CIEMS_2	CliMo Chem_2_2	SimpleBox 3.0_2[a]	SimpleBox 3.12_2[a]	MSCE-POP_2		
Jan	103.9	211.9	48.1		67.8	1183.0	*322.9*	*485.0*	Jan	0.4		0.1	0.2	0.7	*0.3*	*0.3*
Feb	97.5	210.9	48.1		63.2	1068.5	*297.6*	*435.6*	Feb	0.9		0.2	0.5	2.1	*1.0*	*0.8*
Mar	104.6	209.6	53.9		67.4	1183.0	*323.7*	*484.2*	Mar	1.4		0.4	0.9	3.9	*1.7*	*1.5*
Seas_1	**305.9**	**632.3**	**150.1**	**131.9**	**198.4**	**3434.6**	***808.9***	***1299.5***	**Seas_1**	**2.7**	**3.9**	**0.7**	**1.6**	**6.7**	***3.1***	***2.3***
Apr	101.6	208.1	54.2		65.1	1156.8	*317.1*	*473.3*	Apr	1.9		0.6	1.2	5.3	*2.2*	*2.1*
May	105.2	206.5	57.6		67.1	1183.0	*323.9*	*483.9*	May	2.2		0.8	1.7	6.9	*2.9*	*2.7*
Jun	101.8	204.9	56.9		64.8	1144.9	*314.7*	*467.8*	Jun	2.5		0.9	2.0	8.0	*3.3*	*3.1*
Seas_2	**308.6**	**619.5**	**168.7**	**129.2**	**197.0**	**3484.6**	***817.9***	***1318.4***	**Seas_2**	**6.6**	**7.4**	**2.2**	**5.0**	**20.1**	***8.3***	***6.9***
Jul	105.2	203.3	59.9		66.8	1183.0	*323.6*	*483.8*	Jul	2.8		1.1	2.5	9.5	*4.0*	*3.8*
Aug	105.6	201.7	60.7		66.6	1175.5	*322.0*	*480.4*	Aug	3.0		1.3	2.9	11.0	*4.6*	*4.4*
Sep	103.5	200.1	59.4		64.3	1144.9	*314.4*	*467.6*	Sep	3.3		1.4	3.2	12.8	*5.2*	*5.1*
Seas_3	**314.2**	**605.0**	**180.0**	**126.6**	**197.8**	**3503.4**	***821.2***	***1325.2***	**Seas_3**	**9.1**	**11.1**	**3.8**	**8.5**	**33.3**	***13.2***	***11.5***
Oct	108.9	198.6	61.9		66.3	1183.0	*323.8*	*483.5*	Oct	3.7		1.7	3.7	15.7	*6.2*	*6.4*
Nov	107.9	197.2	60.3		64.1	1144.9	*314.9*	*467.2*	Nov	4.2		1.8	3.9	17.9	*7.0*	*7.4*
Dec	114.6	196.0	61.4		64.3	1183.0	*323.9*	*483.4*	Dec	4.8		2.0	4.4	21.8	*8.2*	*9.1*
Seas_4	**331.4**	**591.8**	**183.7**	**125.2**	**194.7**	**3510.9**	***823.0***	***1327.4***	**Seas_4**	**12.7**	**20.0**	**5.4**	**12.0**	**55.4**	***21.1***	***19.9***
Annual	**1260.2**	**2448.6**	**682.5**	**513.0**	**787.9**	**13933.5**	***3270.9***	***5270.3***	**Annual**	**31.1**	**42.4**	**12.2**	**27.0**	**115.6**	***45.7***	***40.5***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;

MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;

SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;

SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;

SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;

[a] - SimpleBox data presented here are overall masses calculated as sum of regional and continental level estimates.

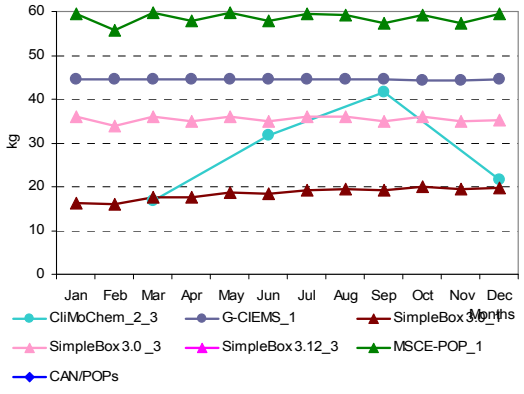
Table 3.32. *Calculation results: PCB-153 mass degraded in 10 cm layer of soil (kg) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data			Results obtained on the basis of historical emissions		*m*	σ	Month	Results obtained on the basis of zero initial concentrations				*m*	σ
	EVN-BETR_1[a]	G-CIEMS_1	MSCE-POP_1	EVN-BETR_3[a]	CliMo Chem_2_3				EVN-BETR_2[a]	G-CIEMS_2	CliMo Chem_2_2	MSCE-POP_2		
Jan	27437.1	423.7	105.0	420.5		*7096.6*	*13561.2*	Jan	31.3	0.7		0.7	*10.9*	*17.6*
Feb	10358.2	421.8	98.5	427.6		*2826.5*	*5023.5*	Feb	69.1	1.9		2.2	*24.4*	*38.7*
Mar	9260.7	419.1	105.7	482.2		*2566.9*	*4465.5*	Mar	113.3	2.9		3.9	*40.0*	*63.5*
Seas_1	**47056.0**	**1264.6**	**309.3**	**1330.2**	**263.8**	***10044.8***	***20696.1***	**Seas_1**	**213.6**	**5.5**	**7.7**	**6.8**	***58.4***	***103.5***
Apr	9079.4	416.2	102.7	577.6		*2544.0*	*4361.4*	Apr	181.0	3.7		5.3	*63.4*	*101.9*
May	10002.6	413.0	106.4	778.8		*2825.2*	*4792.8*	May	308.5	4.4		7.0	*106.6*	*174.9*
Jun	12957.7	409.8	102.9	1233.1		*3675.9*	*6206.3*	Jun	579.6	5.0		8.0	*197.5*	*330.9*
Seas_2	**32039.7**	**1239.0**	**312.0**	**2589.5**	**258.4**	***7287.7***	***13869.0***	**Seas_2**	**1069.1**	**13.1**	**14.7**	**20.4**	***279.3***	***526.6***
Jul	18155.0	406.6	106.3	2100.3		*5192.1*	*8686.4*	Jul	1110.3	5.6		9.6	*375.1*	*636.6*
Aug	22413.5	403.3	106.7	3122.7		*6511.5*	*10687.8*	Aug	1791.0	6.1		11.1	*602.7*	*1029.1*
Sep	19809.1	400.1	104.6	3323.1		*5909.2*	*9379.7*	Sep	2018.1	6.7		12.9	*679.2*	*1159.5*
Seas_3	**60377.5**	**1210.0**	**317.7**	**8546.0**	**253.2**	*14140.9*	*26078.2*	**Seas_3**	**4919.4**	**18.3**	**22.3**	**33.6**	*1248.4*	*2447.3*
Oct	11641.1	397.2	110.1	2376.8		*3631.3*	*5434.1*	Oct	1486.5	7.4		15.8	*503.2*	*851.5*
Nov	5211.2	394.5	109.1	1311.9		*1756.6*	*2359.5*	Nov	807.7	8.4		18.1	*278.1*	*458.7*
Dec	2417.7	391.9	115.9	735.2		*915.2*	*1033.2*	Dec	416.7	9.6		22.0	*149.4*	*231.5*
Seas_4	**19270.0**	**1183.6**	**335.1**	**4424.0**	**250.5**	***5092.6***	***8105.6***	**Seas_4**	**2710.8**	**25.4**	**40.1**	**56.0**	***708.1***	***1335.2***
Annual	**158743.2**	**4897.2**	**1274.0**	**16889.8**	**1026.0**	***36566.0***	***68603.8***	**Annual**	**8912.9**	**62.3**	**84.8**	**116.8**	***2294.2***	***4412.5***

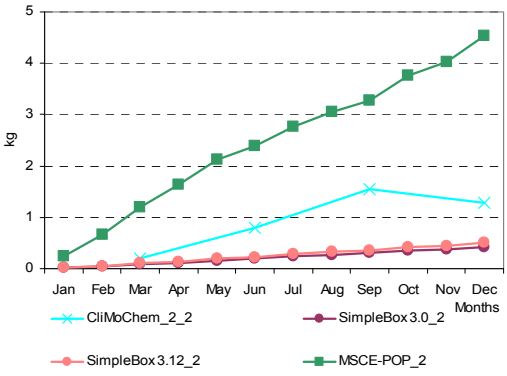
EVN-BETR _1 - EVN-BETR and UK-MODEL results calculated on the basis of initial concentrations given as input data;
EVN-BETR _2 - EVN-BETR and UK-MODEL results calculated on the basis of zero initial concentrations;
EVN-BETR _3 - EVN-BETR and UK-MODEL results calculated on the basis of historical emissions for 20-year period;
G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
a - EVN-BETR and UK-MODEL results were calculated with the help of a single box version of European model.

Own/alternative data set. Calculation results on PCB-153 mass degraded in 5cm layer of soil (kg) calculated by the models on the basis of "own or alternative" data sets together with statistical parameters used for evaluation are presented in Table 3.33.

Monthly values of PCB-153 mass degraded in 5cm layer of soil calculated by the participating models on the basis of "own or alternative" data sets and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.42a and b, respectively.



a



b

Fig. 3.42a. *PCB-153 mass degraded in 5cm layer of soil (kg) calculated by the participating models on the basis of "own or alternative" data sets and non-zero initial conditions*

Fig. 3.42b. *PCB-153 mass degraded in 5cm layer of soil (kg) calculated by the participating models on the basis of "own or alternative" data sets and zero initial conditions*

Table 3.33. *Calculation results: PCB-153 mass degraded in 5cm layer of soil (kg) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data				Results obtained on the basis of historical emissions			*m*	σ	Month	Results obtained on the basis of zero initial concentrations				*m*	σ
	CAN/POPs	MSCE-POP_1	G-CIEMS_1	SimpleBox 3.0_1[a]	CliMo Chem_2_3	SimpleBox 3.0 _3[a]	SimpleBox 3.12_3[a]				CliMo Chem_2_2	SimpleBox 3.0_2[a]	SimpleBox 3.12_2[a]	MSCE-POP_2		
Jan	281.5	59.6	44.4	16.2		36.1	230.8	*111.4*	*114.1*	Jan		0.0	0.0	0.2	*0.1*	*0.1*
Feb	261.3	55.8	44.5	15.9		33.8	208.2	*103.2*	*104.1*	Feb		0.0	0.1	0.7	*0.3*	*0.4*
Mar	276.7	59.7	44.6	17.6		36.1	230.2	*110.8*	*112.3*	Mar		0.1	0.1	1.2	*0.5*	*0.6*
Seas_1	**819.4**	**175.1**	**133.6**	**49.7**	**16.7**	**106.0**	**669.2**	***281.4***	***323.4***	**Seas_1**	0.2	**0.1**	**0.2**	**2.1**	***0.7***	***1.0***
Apr	265.2	57.9	44.6	17.6		34.9	226.0	*107.7*	*108.3*	Apr		0.1	0.1	1.6	*0.6*	*0.9*
May	270.7	59.8	44.6	18.6		36.1	229.7	*109.9*	*110.2*	May		0.2	0.2	2.1	*0.8*	*1.1*
Jun	258.6	57.8	44.5	18.3		34.9	222.0	*106.0*	*105.4*	Jun		0.2	0.2	2.4	*0.9*	*1.3*
Seas_2	**794.5**	**175.5**	**133.7**	**54.5**	**31.6**	**105.9**	**677.7**	***281.9***	***315.7***	**Seas_2**	0.8	**0.5**	**0.6**	**6.2**	***2.0***	***2.8***
Jul	263.8	59.5	44.5	19.2		36.1	229.1	*108.7*	*108.1*	Jul		0.2	0.3	2.8	*1.1*	*1.4*
Aug	260.9	59.3	44.4	19.5		36.1	228.3	*108.1*	*107.0*	Aug		0.3	0.3	3.0	*1.2*	*1.6*
Sep	250.1	57.3	44.4	19.1		34.9	221.2	*104.5*	*102.8*	Sep		0.3	0.4	3.3	*1.3*	*1.7*
Seas_3	**774.7**	**176.0**	**133.3**	**57.8**	**41.6**	**107.0**	**678.6**	***281.3***	***308.8***	**Seas_3**	1.6	**0.8**	**1.0**	**9.1**	***3.1***	***4.0***
Oct	256.5	59.2	44.4	19.9		36.1	228.3	*107.4*	*105.7*	Oct		0.3	0.4	3.8	*1.5*	*1.9*
Nov	246.6	57.4	44.4	19.4		34.9	220.7	*103.9*	*101.6*	Nov		0.4	0.4	4.0	*1.6*	*2.1*
Dec	253.4	59.4	44.4	19.7		35.1	227.8	*106.6*	*104.9*	Dec		0.4	0.5	4.5	*1.8*	*2.4*
Seas_4	**756.5**	**175.9**	**133.2**	**59.1**	**21.7**	**106.0**	**676.8**	***275.6***	***306.2***	**Seas_4**	1.3	**1.1**	**1.4**	**12.3**	***4.0***	***5.5***
Annual	**3145.1**	**702.5**	**533.8**	**221.1**	**111.5**	**424.9**	**2702.3**	***1120.2***	***1253.7***	**Annual**	**3.8**	**2.6**	**3.1**	**29.7**	***9.8***	***13.3***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
a - SimpleBox data presented here are overall masses calculated as sum of regional and continental level estimates.

Calculation results on PCB-153 mass degraded in 10 cm layer of soil (kg) calculated by models on the basis of "own or alternative" data sets together with statistical parameters used for evaluation are presented in Table 3.34.

Table 3.34. *Calculation results: PCB-153 mass degraded in 10 cm layer of soil (kg) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data			Results obtained on he basis of historica emissions	*m*	σ	Month	Results obtained on the basis of zero initial concentrations		*m*	σ
	CAN/POPs	G-CIEMS_1	MSCE-POP_1	CliMoChem_2_3				CliMo Chem_2_2	MSCE-POP_2		
Jan	562.0	88.9	60.2		*237.0*	*281.8*	Jan		0.2		
Feb	520.9	89.1	56.4		*222.1*	*259.3*	Feb		0.7		
Mar	551.3	89.2	60.4		*233.6*	*275.5*	Mar		1.2		
Seas_1	**1634.3**	**267.1**	**177.0**	**33.3**	***527.9***	***743.8***	**Seas_1**	**0.4**	**2.1**	***1.3***	***1.2***
Apr	528.1	89.2	58.5		*225.3*	*262.7*	Apr		1.7		
May	539.4	89.1	60.5		*229.7*	*268.6*	May		2.1		
Jun	515.8	89.0	58.4		*221.1*	*255.7*	Jun		2.4		
Seas_2	**1583.3**	**267.3**	**177.4**	**63.2**	***522.8***	***711.9***	**Seas_2**	**1.6**	**6.2**	***3.9***	***3.3***
Jul	526.7	89.0	60.1		*225.3*	*261.5*	Jul		2.8		
Aug	520.9	88.9	59.9		*223.2*	*258.2*	Aug		3.1		
Sep	499.0	88.8	57.9		*215.2*	*246.2*	Sep		3.3		
Seas_3	**1546.6**	**266.7**	**178.0**	**83.1**	***518.6***	***689.5***	**Seas_3**	**3.1**	**9.2**	***6.1***	***4.3***
Oct	510.9	88.8	59.9		*219.8*	*252.4*	Oct		3.8		
Nov	490.1	88.8	58.0		*212.3*	*241.1*	Nov		4.1		
Dec	502.2	88.8	60.0		*217.0*	*247.4*	Dec		4.6		
Seas_4	**1503.2**	**266.4**	**177.9**	**43.4**	***497.7***	***676.6***	**Seas_4**	**2.5**	**12.5**	***7.5***	***7.0***
Annual	**6267.5**	**1067.6**	**710.2**	**223.1**	***2067.1***	***2821.6***	**Annual**	**7.7**	**30.0**	***18.8***	***15.8***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
a - EVN-BETR and UK-MODEL results were calculated with the help of a single box version of European model on the basis of initial concentrations given as input data;
[b]– in CAN/POPs results the second layer of soil is applied as 5cm;

Monthly values of PCB-153 mass degraded in 10 cm layer of soil calculated by the participating models on the basis of "own or alternative" data sets and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.43a and b, respectively.

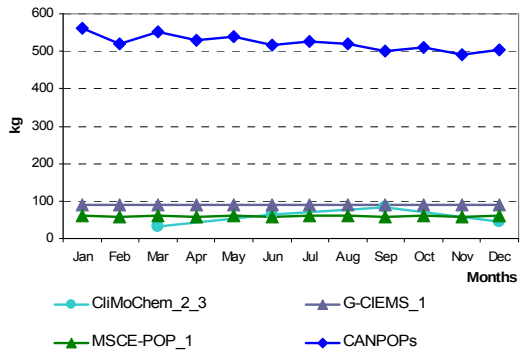


Fig.3.43a. *PCB-153 mass degraded in 10cm layer of soil (kg) calculated by the participating models on the basis of "own or alternative" data sets and non-zero initial conditions*

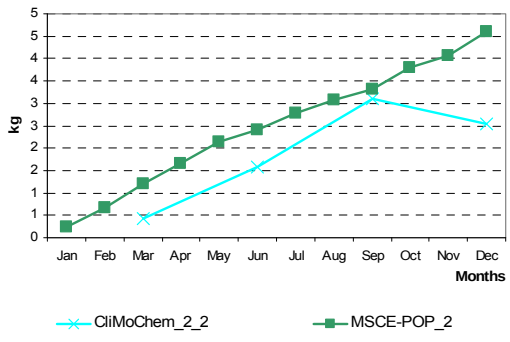


Fig.3.43b. *PCB-153 mass degraded in 10cm layer of soil (kg) calculated by the participating models on the basis of "own or alternative" data sets and zero initial conditions*

Comparison between results obtained on the basis of two data sets. The percentage difference between calculation results on PCB-153 mass degraded in soil within 5 and 10 cm layers obtained with two different data sets of physical-chemical properties (for those models who provided calculations for both these sets) is shown in Tables 3.35-3.36.

Table 3.35. *The percentage difference between calculation results on PCB-153 mass degraded within 5 cm soil layer obtained by models on the basis of two data sets: "own or alternative" and "reference"*

Month	CliMo Chem_2_2	CliMo Chem_2_3	G-CIEMS_1	SimpleBox 3.0_1	SimpleBox 3.0_2	SimpleBox 3.12_2	SimpleBox 3.0 _3	SimpleBox 3.12_3	MSCE-POP_1	MSCE-POP_2
Jan			-79%	-66%	-79%	-89%	-47%	-80%	-43%	-67%
Feb			-79%	-67%	-79%	-89%	-47%	-81%	-43%	-69%
Mar			-79%	-67%	-79%	-89%	-46%	-81%	-43%	-69%
Seas_1	**-95%**	**-87%**	**-79%**	**-67%**	**-79%**	**-89%**	**-47%**	**-81%**	**-43%**	**-69%**
Apr			-79%	-68%	-79%	-89%	-46%	-80%	-43%	-69%
May			-78%	-68%	-79%	-89%	-46%	-81%	-43%	-69%
Jun			-78%	-68%	-79%	-89%	-46%	-81%	-43%	-70%
Seas_2	**-89%**	**-76%**	**-78%**	**-68%**	**-79%**	**-89%**	**-46%**	**-81%**	**-43%**	**-69%**
Jul			-78%	-68%	-79%	-89%	-46%	-81%	-43%	-71%
Aug			-78%	-68%	-79%	-89%	-46%	-81%	-44%	-72%
Sep			-78%	-68%	-79%	-89%	-46%	-81%	-45%	-74%
Seas_3	**-86%**	**-67%**	**-78%**	**-68%**	**-79%**	**-89%**	**-46%**	**-81%**	**-44%**	**-73%**
Oct			-78%	-68%	-79%	-89%	-46%	-81%	-46%	-76%
Nov			-77%	-68%	-79%	-89%	-46%	-81%	-47%	-78%
Dec			-77%	-68%	-79%	-89%	-45%	-81%	-48%	-79%
Seas_4	**-94%**	**-83%**	**-77%**	**-68%**	**-79%**	**-89%**	**-46%**	**-81%**	**-47%**	**-78%**
Annual	**-91%**	**-78%**	**-78%**	**-68%**	**-79%**	**-89%**	**-46%**	**-81%**	**-44%**	**-74%**

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period.

Table 3.36. *The percentage difference between calculation results on PCB-153 mass degraded within 10 cm soil layer obtained by models on the basis of two data sets: "own or alternative" and "reference"*

Month	CliMoChem_2_2	CliMoChem_2_3	G-CIEMS_1	MSCE-POP_1	MSCE-POP_2
Jan			-79%	-43%	-67%
Feb			-79%	-43%	-69%
Mar			-79%	-43%	-69%
Seas_1	-95%	-87%	-79%	-43%	-69%
Apr			-79%	-43%	-69%
May			-78%	-43%	-69%
Jun			-78%	-43%	-70%
Seas_2	-89%	-76%	-78%	-43%	-69%
Jul			-78%	-43%	-71%
Aug			-78%	-44%	-72%
Sep			-78%	-45%	-74%
Seas_3	-86%	-67%	-78%	-44%	-73%
Oct			-78%	-46%	-76%
Nov			-77%	-47%	-78%
Dec			-77%	-48%	-79%
Seas_4	-94%	-83%	-77%	-47%	-78%
Annual	-91%	-78%	-78%	-44%	-74%

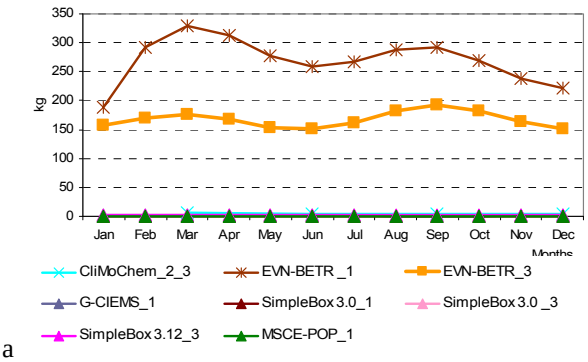
G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations.

3.2.3. Comparison of calculated values of PCB-153 mass degraded in water

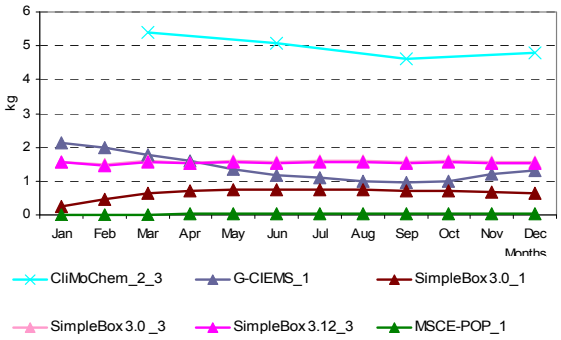
According to the programme of Stage II model results of computational experiments on mass balance include masses of PCB-153 degraded in sea within a layer of 200 m depth.

Reference data set. Calculation results on PCB-153 mass degraded in 200 m layer of water (kg) calculated by models on the basis of "reference" data set together with statistical parameters used for evaluation are presented in Table 3.37.

Monthly values of PCB-153 mass degraded in 200 m layer of water calculated by all participating models on the basis of "reference" data set and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.44a and b, respectively. Seasonal variations of low values of mass degraded in 200 m layer of water calculated by the participating models on the basis of "reference" data set and zero initial conditions are also shown in Fig. 3.44c in more detail.



a



b

Fig. 3.44a. *PCB-153 mass degraded in 200 m layer of water (kg) calculated by the participating models on the basis of "reference" data set and non-zero initial conditions*

Fig. 3.44b. *PCB-153 mass degraded in 200 m layer of water (kg) calculated by the participating models on the basis of "reference" data set and zero initial conditions*

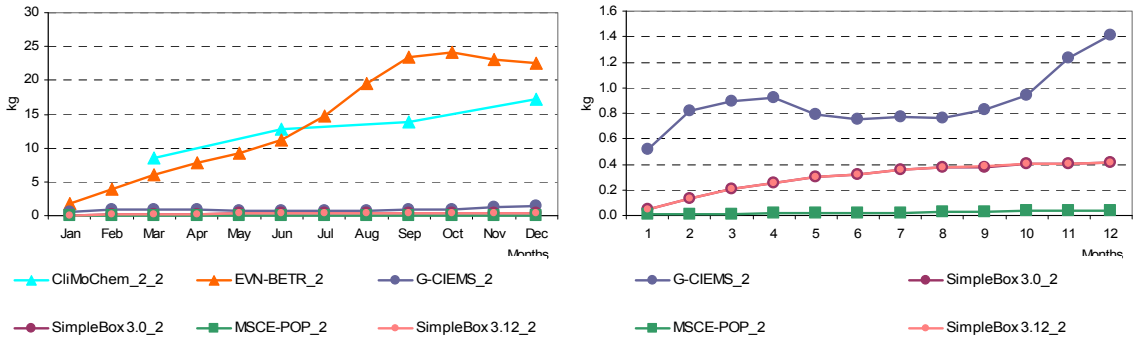


Fig. 3.44c. *PCB-153 mass degraded in 200 m layer of water (kg) calculated by the participating models on the basis of "reference" data set and zero initial conditions (models with low values)*

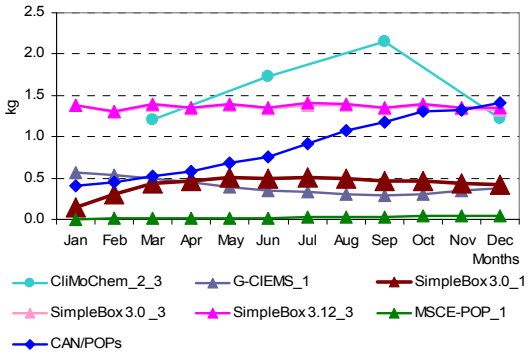
Table 3.37. *Calculation results: PCB-153 mass degraded in 200 m layer of water (kg) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data				Results obtained on the basis of historical emissions				*m*	σ	Month	Results obtained on the basis of zero initial concentrations						*m*	σ
	EVN-BETR_1[a]	G-CIEMS_1	SimpleBox 3.0_1[b]	MSCE-POP_1	EVN-BETR_3[a]	CliMo Chem_2_3	SimpleBox 3.0 _3[b]	SimpleBox 3.12_3[b]				EVN-BETR_2[a]	G-CIEMS_2	CliMo Chem_2_2	SimpleBox 3.0_2[b]	SimpleBox 3.12_2[b]	MSCE-POP_2		
Jan	187.50	2.12	0.26	0.01	157.79		1.57	1.56	*50.12*	*84.15*	Jan	1.82	0.52		0.05	0.05	0.01	*0.49*	*0.77*
Feb	291.36	1.98	0.48	0.01	169.45		1.48	1.46	*66.60*	*117.30*	Feb	3.92	0.82		0.13	0.13	0.01	*1.00*	*1.66*
Mar	328.72	1.77	0.65	0.01	175.30		1.59	1.56	*72.80*	*130.19*	Mar	6.07	0.89		0.21	0.21	0.01	*1.48*	*2.59*
Seas_1	**807.58**	**5.87**	**1.38**	**0.03**	**502.55**	**5.39**	**4.64**	**4.59**	***166.50***	***312.38***	**Seas_1**	**11.80**	**2.23**	**8.53**	**0.39**	**0.39**	**0.03**	***3.89***	***5.03***
Apr	311.71	1.61	0.70	0.02	166.92		1.54	1.51	*69.14*	*123.54*	Apr	7.74	0.92		0.25	0.25	0.02	*1.84*	*3.32*
May	277.49	1.34	0.75	0.02	153.72		1.60	1.56	*62.35*	*110.62*	May	9.15	0.79		0.30	0.30	0.02	*2.11*	*3.94*
Jun	259.90	1.18	0.73	0.03	150.40		1.55	1.51	*59.33*	*104.51*	Jun	11.21	0.76		0.32	0.32	0.02	*2.53*	*4.86*
Seas_2	**849.09**	**4.13**	**2.18**	**0.07**	**471.03**	**5.07**	**4.69**	**4.59**	***167.60***	***320.31***	**Seas_2**	**28.10**	**2.47**	**12.72**	**0.88**	**0.88**	**0.06**	***7.52***	***11.14***
Jul	267.85	1.09	0.75	0.03	162.20		1.60	1.56	*62.15*	*108.80*	Jul	14.77	0.77		0.36	0.36	0.02	*3.26*	*6.44*
Aug	287.40	1.00	0.73	0.03	181.77		1.60	1.56	*67.73*	*117.99*	Aug	19.55	0.76		0.38	0.38	0.02	*4.22*	*8.58*
Sep	292.12	0.97	0.70	0.03	191.98		1.55	1.51	*69.84*	*121.15*	Sep	23.38	0.83		0.38	0.38	0.03	*5.00*	*10.28*
Seas_3	**847.37**	**3.06**	**2.18**	**0.09**	**535.96**	**4.62**	**4.75**	**4.64**	***175.33***	***329.38***	**Seas_3**	**57.70**	**2.36**	**13.86**	**1.12**	**1.12**	**0.08**	***12.71***	***22.63***
Oct	269.82	1.00	0.70	0.04	182.31		1.60	1.56	*65.29*	*112.70*	Oct	24.23	0.94		0.41	0.41	0.04	*5.20*	*10.64*
Nov	238.21	1.20	0.67	0.05	162.85		1.55	1.51	*58.01*	*99.77*	Nov	23.08	1.23		0.41	0.41	0.04	*5.03*	*10.10*
Dec	220.90	1.31	0.65	0.05	150.50		1.55	1.51	*53.78*	*92.38*	Dec	22.48	1.41		0.42	0.42	0.04	*4.95*	*9.81*
Seas_4	**728.93**	**3.50**	**2.02**	**0.14**	**495.67**	**4.81**	**4.70**	**4.59**	***155.55***	***288.73***	**Seas_4**	**69.78**	**3.59**	**17.26**	**1.23**	**1.23**	**0.12**	***15.53***	***27.33***
Annual	**3232.97**	**16.56**	**7.76**	**0.33**	**2005.20**	**19.88**	**18.77**	**18.40**	***664.98***	***1249.96***	**Annual**	**167.39**	**10.65**	**52.36**	**3.61**	**3.61**	**0.28**	***39.65***	***65.52***

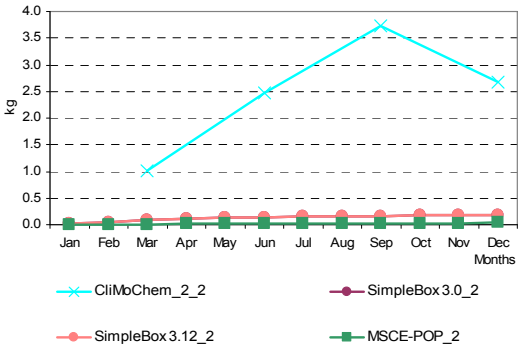
EVN-BETR _1 - EVN-BETR and UK-MODEL results calculated on the basis of initial concentrations given as input data;
EVN-BETR _2 - EVN-BETR and UK-MODEL results calculated on the basis of zero initial concentrations;
EVN-BETR _3 - EVN-BETR and UK-MODEL results calculated on the basis of historical emissions for 20-year period;
G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
[a] - EVN-BETR and UK-MODEL results were calculated with the help of a single box version of European model;
b - SimpleBox data presented here are overall masses calculated as sum of regional and continental level estimates.

Own/alternative data set. Calculation results on PCB-153 mass degraded in 200 m layer of water (kg) calculated by models on the basis of "own or alternative" data sets together with statistical parameters used for evaluation are presented in Table 3.38.

Monthly values of PCB-153 mass degraded in 200 m layer of water calculated by the participating models on the basis of "own or alternative" data sets and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.45a and b, respectively.



a



b

Fig. 3.45a. *PCB-153 mass degraded in 200 m layer of water (kg) calculated by the participating models on the basis of "own or alternative" data sets and non-zero initial conditions*

Fig. 3.45b. *PCB-153 mass degraded in 200 m layer of water (kg) calculated by the participating models on the basis of "own or alternative" data sets and zero initial conditions*

Table 3.38. *Calculation results: PCB-153 mass degraded in 200 m layer of water (kg) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data				Results obtained on the basis of historical emissions			*m*	σ	Month	Results obtained on the basis of zero initial concentrations				*m*	σ
	CAN/POPs	G-CIEMS_1	SimpleBox 3.0_1a	MSCE-POP_1	CliMo Chem_2_3	SimpleBox 3.0 _3a	SimpleBox 3.12_3a				CliMo Chem_2_2	SimpleBox 3.0_2a	SimpleBox 3.12_2a	MSCE-POP_2		
Jan	0.41	0.56	0.15	0.004		1.38	1.38	*0.65*	*0.60*	Jan		0.02	0.02	0.003	*0.01*	*0.01*
Feb	0.44	0.53	0.31	0.007		1.30	1.30	*0.65*	*0.53*	Feb		0.05	0.05	0.006	*0.04*	*0.03*
Mar	0.53	0.49	0.43	0.009		1.39	1.40	*0.71*	*0.56*	Mar		0.09	0.09	0.008	*0.06*	*0.04*
Seas_1	**1.39**	**1.58**	**0.88**	**0.021**	**1.21**	**4.06**	**4.08**	***1.89***	***1.57***	**Seas_1**	**1.00**	**0.16**	**0.16**	**0.017**	***0.33***	***0.45***
Apr	0.58	0.46	0.47	0.014		1.34	1.35	*0.70*	*0.54*	Apr		0.11	0.11	0.012	*0.07*	*0.05*
May	0.68	0.39	0.51	0.019		1.39	1.40	*0.73*	*0.56*	May		0.13	0.13	0.016	*0.09*	*0.06*
Jun	0.76	0.35	0.50	0.021		1.34	1.36	*0.72*	*0.54*	Jun		0.14	0.14	0.017	*0.10*	*0.07*
Seas_2	**2.01**	**1.20**	**1.47**	**0.054**	**1.73**	**4.07**	**4.11**	***2.09***	***1.50***	**Seas_2**	**2.47**	**0.37**	**0.37**	**0.044**	***0.82***	***1.12***
Jul	0.92	0.33	0.51	0.024		1.38	1.40	*0.76*	*0.57*	Jul		0.15	0.15	0.019	*0.11*	*0.08*
Aug	1.07	0.30	0.49	0.026		1.38	1.40	*0.78*	*0.59*	Aug		0.16	0.16	0.020	*0.12*	*0.08*
Sep	1.18	0.29	0.46	0.028		1.33	1.36	*0.78*	*0.58*	Sep		0.17	0.17	0.023	*0.12*	*0.08*
Seas_3	**3.17**	**0.92**	**1.46**	**0.078**	**2.16**	**4.10**	**4.16**	***2.29***	***1.58***	**Seas_3**	**3.73**	**0.49**	**0.49**	**0.062**	***1.19***	***1.70***
Oct	1.31	0.30	0.46	0.038		1.38	1.40	*0.82*	*0.62*	Oct		0.18	0.18	0.030	*0.13*	*0.09*
Nov	1.32	0.35	0.43	0.041		1.33	1.35	*0.81*	*0.60*	Nov		0.18	0.18	0.032	*0.13*	*0.09*
Dec	1.41	0.38	0.42	0.046		1.33	1.35	*0.82*	*0.61*	Dec		0.19	0.19	0.037	*0.14*	*0.09*
Seas_4	**4.05**	**1.04**	**1.31**	**0.125**	**1.22**	**4.04**	**4.11**	***2.27***	***1.72***	**Seas_4**	**2.68**	**0.55**	**0.55**	**0.099**	***0.97***	***1.16***
Annual	**10.61**	**4.74**	**5.12**	**0.278**	**6.31**	**16.26**	**16.47**	***8.54***	***6.14***	**Annual**	**9.89**	**1.56**	**1.56**	**0.223**	***3.31***	***4.43***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
[a] - SimpleBox data presented here are overall masses calculated as sum of regional and continental level estimates.

Comparison between results obtained on the basis of two data sets. The percentage difference between calculation results obtained with two data sets of physical-chemical properties (for those models who provided calculations for both these sets) is shown in Table 3.39.

Table 3.39. *The percentage difference between calculation results on PCB-153 mass degraded in 200 m layer of water obtained by models on the basis of two data sets: "own or alternative" and "reference"*

Month	CliMo Chem_2_2	CliMo Chem_2_3	G-CIEMS_1	Simple Box 3.0_1	SimpleBox 3.0_2	SimpleBox 3.12_2	SimpleBox 3.0_3	SimpleBox 3.12_3	MSCE-POP_1	MSCE-POP_2
Jan			-74%	-42%	-61%	-61%	-12%	-11%	-41%	-44%
Feb			-73%	-36%	-60%	-60%	-12%	-11%	-35%	-37%
Mar			-72%	-34%	-59%	-59%	-13%	-11%	-29%	-32%
Seas_1	-88%	-78%	-73%	-36%	-60%	-60%	-12%	-11%	-34%	-37%
Apr			-72%	-33%	-58%	-58%	-13%	-10%	-26%	-28%
May			-71%	-32%	-58%	-58%	-13%	-10%	-18%	-21%
Jun			-70%	-32%	-57%	-57%	-13%	-10%	-16%	-19%
Seas_2	-81%	-66%	-71%	-32%	-58%	-58%	-13%	-10%	-19%	-22%
Jul			-70%	-32%	-57%	-57%	-14%	-10%	-15%	-18%
Aug			-70%	-33%	-56%	-56%	-14%	-10%	-14%	-18%
Sep			-70%	-34%	-56%	-56%	-14%	-10%	-14%	-18%
Seas_3	-73%	-53%	-70%	-33%	-56%	-56%	-14%	-10%	-14%	-18%
Oct			-70%	-34%	-56%	-56%	-14%	-10%	-13%	-16%
Nov			-70%	-35%	-56%	-56%	-14%	-10%	-12%	-16%
Dec			-71%	-36%	-55%	-55%	-14%	-11%	-9%	-12%
Seas_4	-84%	-75%	-70%	-35%	-56%	-56%	-14%	-10%	-11%	-15%
Annual	-81%	-68%	-71%	-34%	-57%	-57%	-13%	-10%	-16%	-19%

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period.

3.2.4. Comparison of calculated values of PCB-153 mass degraded in vegetation

Reference data set. Calculation results on PCB-153 mass degraded in vegetation (kg) calculated by models on the basis of "reference" data set are presented in Table 3.40.

Monthly values of PCB-153 mass degraded in vegetation calculated by the participating models on the basis of "reference" data set are compared in Fig. 3.46.

Table 3.40. *Calculation results: PCB-153 mass degraded in vegetation (kg) calculated by models on the basis of "reference" data set*

Month	Results obtained on the basis of initial concentrations given as input data	Results obtained on the basis of historical emissions	Results obtained on the basis of zero initial concentrations	
	G-CIEMS_1	CliMoChem_2_3	G-CIEMS_2	CliMoChem_2_2
Jan	27.8		0.3	
Feb	15.4		0.3	
Mar	13.8		0.4	
Seas_1	**57.0**	**0.0**	**0.9**	**0.0**
Apr	13.7		0.4	
May	10.0		0.3	
Jun	10.6		0.3	
Seas_2	**34.3**	**0.0**	**1.0**	**0.0**
Jul	10.4		0.3	
Aug	9.3		0.3	
Sep	11.0		0.4	
Seas_3	**30.7**	**0.0**	**1.0**	**0.0**
Oct	11.9		0.4	
Nov	14.4		0.5	
Dec	13.1		0.5	
Seas_4	**39.4**	**0.0**	**1.3**	**0.0**
Annual	**161.4**	0.0	**4.3**	0.0

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
* - In MSCE-POP model degradation in vegetation is not taken into account.

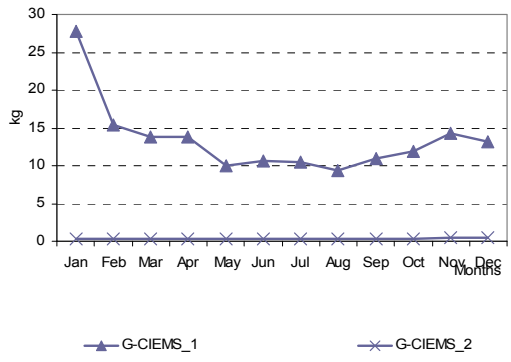


Fig. 3.46. *PCB-153 mass degraded in vegetation (kg) calculated by the participating models on the basis of "reference" data set)*

Own/alternative data set. Calculation results on PCB-153 mass degraded in vegetation (kg) calculated by models on the basis of "own or alternative" data sets together with statistical parameters used for evaluation are presented in Table 3.41.

Table 3.41. *Calculation results: PCB-153 mass degraded in vegetation (kg) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data	Results obtained on the basis of historical emissions	*m*	σ	Month	Results obtained on the basis of zero initial concentrations
	G-CIEMS_1	CliMoChem_2_3				CliMoChem_2_2
Jan	21.8				Jan	
Feb	11.7				Feb	
Mar	10.6				Mar	
Seas_1	**44.1**	17.1	***30.6***	***13.5***	**Seas_1**	32.4
Apr	10.5				Apr	
May	7.3				May	
Jun	7.7				Jun	
Seas_2	**25.5**	42.6	***34.1***	***8.6***	**Seas_2**	179.1
Jul	7.5				Jul	
Aug	6.7				Aug	
Sep	7.9				Sep	
Seas_3	**22.1**	70.1	***46.1***	***24.0***	**Seas_3**	322.6
Oct	8.7				Oct	
Nov	10.9				Nov	
Dec	10.3				Dec	
Seas_4	**29.9**	40.4	***35.2***	***5.3***	**Seas_4**	186.4
Annual	**121.5**	170.3	***145.9***	***24.4***	**Annual**	720.5

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
* - In MSCE-POP model degradation in vegetation is not taken into account.

Monthly values of PCB-153 mass degraded in vegetation calculated by the participating models on the basis of "own or alternative" data sets are compared in Fig. 3.47.

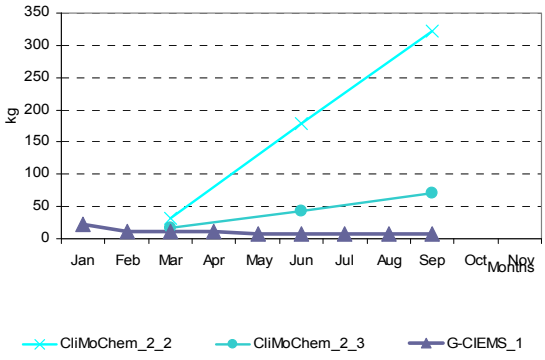


Fig. 3.47. *PCB-153 mass degraded in vegetation (kg) calculated by the participating models on the basis of "own or alternative" data sets*

Comparison between results obtained on the basis of two data sets. The percentage difference between calculation results obtained by G-CIEMS model with two data sets of physical-chemical properties (for those models who provided calculations for both these sets) is shown in Table 3.42.

Table 3.42. *The percentage difference between calculation results on PCB-153 mass degraded in vegetation obtained by G-CIEMS models on the basis of two data sets: "own or alternative" and "reference"*

Month	G-CIEMS_1
Jan	-21.7%
Feb	-24.3%
Mar	-22.9%
Seas_1	-22.7%
Apr	-23.7%
May	-26.7%
Jun	-27.7%
Seas_2	-25.8%
Jul	-27.5%
Aug	-27.9%
Sep	-28.5%
Seas_3	-28.0%
Oct	-27.2%
Nov	-23.8%
Dec	-21.7%
Seas_4	-24.1%
Annual	-24.7%

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;

3.2.5. Comparison of distribution of PCB-153 mass degraded in the environment

Sections from 3.2.1 to 3.2.4 above are devoted to the comparison between the results of participating models on PCB-153 mass degraded in the main environmental compartments (atmosphere, soil, water and vegetation). The comparison includes results of one-year calculations made on the basis of initial conditions (CAN/POPs, EVN-BETR and UK-MODEL, G-CIEMS, MSCE-POP, SimpleBox) and zero initial concentrations (CliMoChem, EVN-BETR and UK-MODEL, G-CIEMS, MSCE-POP and SimpleBox) along with results of long-term calculations performed with historical emissions (CliMoChem, EVN-BETR and UK-MODEL and SimpleBox). Calculation results obtained with the use of two different physical-chemical data sets are submitted by CliMoChem, G-CIEMS, MSCE-POP and SimpleBox models.

A preliminary analysis of the main results on comparison of absolute and relative values of PCB-153 mass degraded in the main environmental compartments is presented in this section. The analysis is made separately for results calculated on the basis of initial concentrations or historical emissions and for results based on zero-initial conditions.

Atmosphere. In the results obtained by the participating models on the basis of "***reference"*** data set and non-zero initial conditions the scattering of absolute values on PCB-153 mass degraded in 1 km layer of the atmosphere is higher than that in results based on zero initial conditions as well as than difference in the results for 5 and 10 km atmospheric layers (Tables 3.22 – 3.24 given in Section 3.2.1). Square deviation σ of annual values of degraded mass presented by different participating models for 5 and 10 km layers do not exceed the averaged value.

Comparison of annual values of PCB-153 masses degraded in the atmosphere within 1, 5 and 10 km layers calculated by different models on the basis of zero initial concentrations and with the use of "reference" data set is presented in Fig.3.48a. Fig. 3.48b shows the same results but obtained on the basis of initial concentrations or historical emissions. In the latter figure different color of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions). The blue line in the plots shows the value of the corresponding parameter averaged between models.

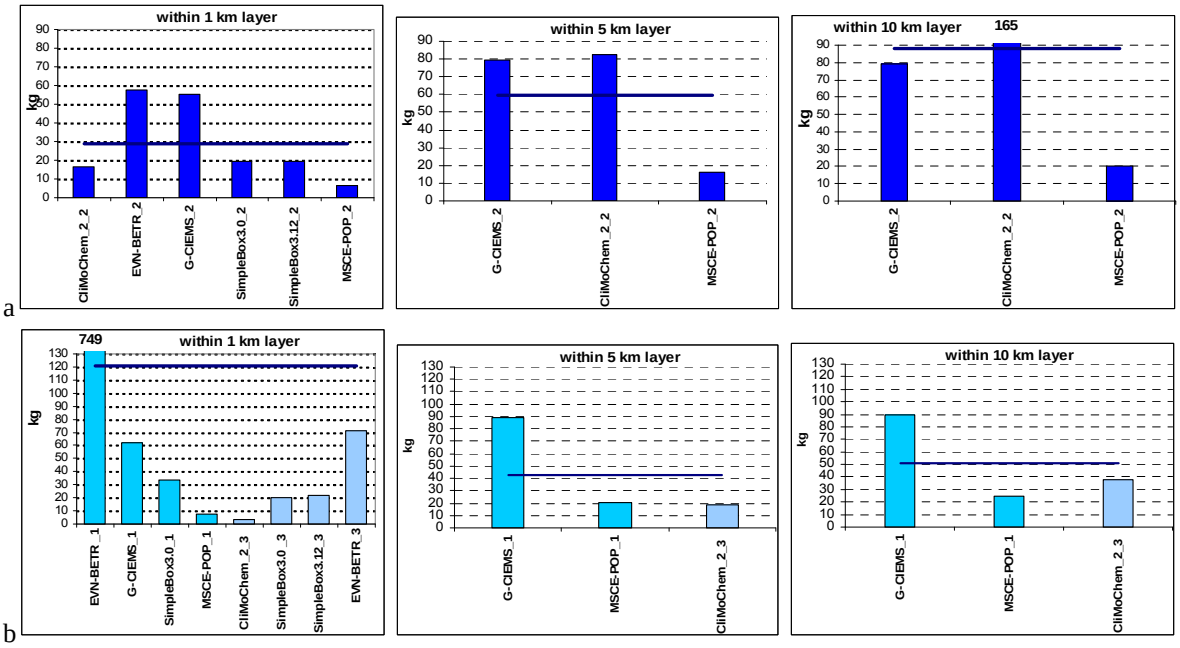


Fig.3.48. *Comparison of annual values of PCB-153 masses degraded in the atmosphere within 1, 5 and 10 km layers calculated by different models on the basis of "reference" data set (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

The difference in absolute values on PCB-153 mass degraded in the atmosphere obtained by the models on the basis of "reference" data set and zero initial conditions is within a factor of nine for 1 km layer, - within a factor of five for 5 km layer, and – within a factor of eight for 10 km layer (see Fig. 3.48a). The difference between the maximum and minimum annual values of PCB-153 mass degraded within 1 km atmospheric layer, which are obtained on the basis of non-zero initial conditions, reaches more than two orders of magnitude (see Fig. 3.48b). For 5 and 10 km layers, the maximum annual values exceed the minimum ones 5 and 4 times, respectively. Comparison of profiles of annual values of PCB-153 degraded mass calculated by three models (G-CIEMS, CliMoChem and MSCE-POP) for the considered atmospheric layers (1, 5 and 10 km) on the basis of "reference" data set is presented in Fig.3.49.

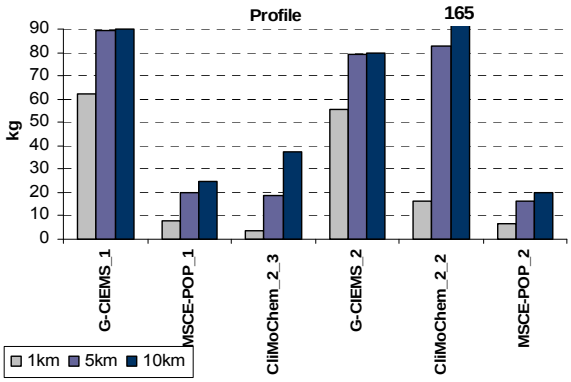


Fig. 3.49. *Comparison of profiles of annual values of PCB-153 degraded mass calculated by four models for the considered atmospheric layers (1, 5 and 10 km) on the basis of "reference data set»*

Results on PCB-153 mass degraded in the atmosphere calculated by the participating models on the basis of zero and non-zero initial conditions and with the use of "***own or alternative"*** data set (Tables 3.25 – 3.27 given in Section 3.2.1) demonstrate reasonable agreement between all model calculations for each considered layer. For annual and most monthly values of PCB-153 mass degraded in each of these layers, square deviation do not exceed the averaged value.

Comparison of annual values of PCB-153 masses degraded in the atmosphere within 1, 5 and 10 km layers calculated by different models on the basis of zero initial concentrations and with the use of "own or alternative" data sets is presented in Fig.3.50a. Fig. 3.50b shows the same results but obtained on

the basis of given initial concentrations or historical emissions. In the latter figure different color of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions). The blue line in the plots shows the value of the corresponding parameter averaged between models.

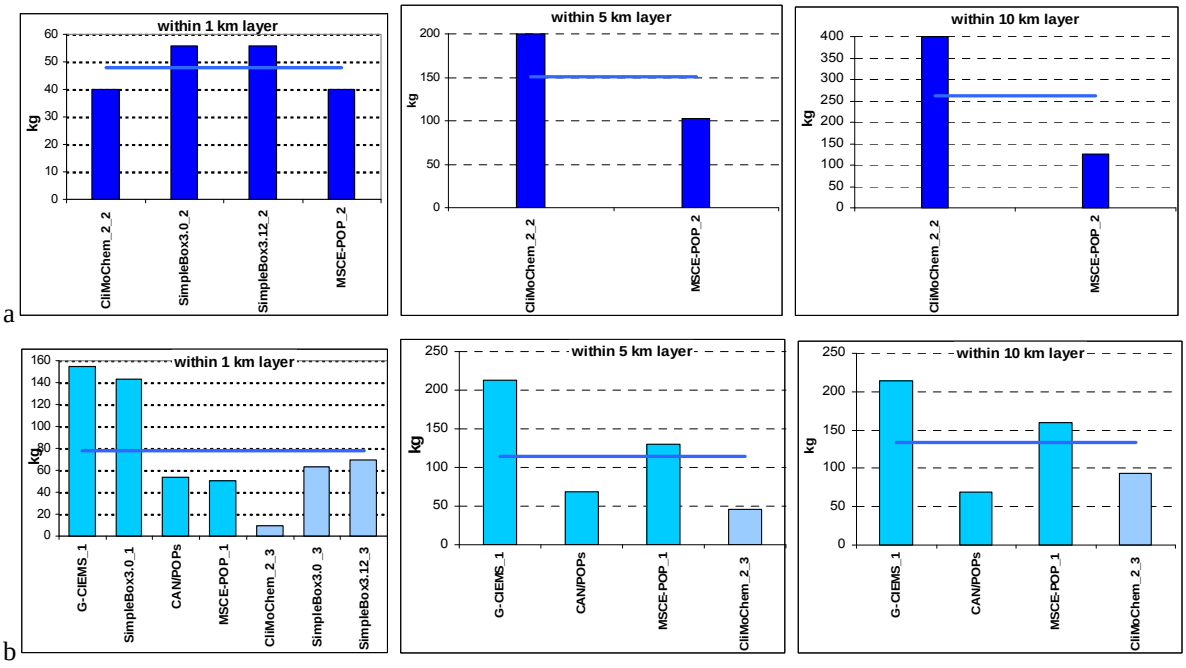


Fig. 3.50. *Comparison of annual values of PCB-153 masses degraded in the atmosphere within 1, 5 and 10 km layers calculated by different models on the basis of "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

According to the results obtained on the basis of zero initial conditions (see Fig. 3.50a), the maximum and minimum absolute values of PCB-153 masses degraded in the atmosphere differ between each other 1.4 times for 1 km layer, 2 times for 5 km layer, and 3 times for 10 km layer. The highest absolute value of PCB mass degraded in 1 km atmospheric layer obtained on the basis of non-zero initial conditions exceed the lowest value approximately 17 times (see Fig. 3.50b). The scattering of values obtained for 5 and 10 km layers is within a factor of 5 and 3, respectively. Comparison of profiles of annual values of PCB-153 degraded mass calculated by four models (G-CIEMS, CAN/POPs, CliMoChem and MSCE-POP) for the considered atmospheric layers (1, 5 and 10 km) on the basis of "own or alternative" data sets is presented in Fig.3.51.

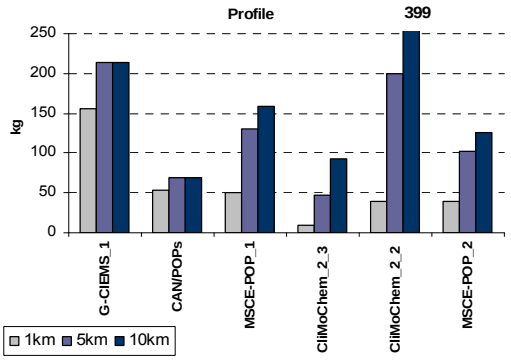


Fig. 3.51. *Comparison of profiles of annual values of PCB-153 degraded mass calculated by five models for the considered atmospheric layers (1, 5 and 10 km) on the basis of "own or alternative data sets"*

For the results obtained on the basis of both physical-chemical data sets, it is obvious that absolute values of PCB-153 mass degraded in the considered layers of the atmosphere presented by CAN/POPs, CliMoChem and MSCE-POP models show seasonal variations with some increase in summer time (see Figs. 3.34 – 3.36 and 3.37-3.39 given in Section 3.2.1). This increase is especially noticeable in results obtained on the basis of "own" data sets. It can be explained that in these models degradation processes in the atmosphere as gas-phase reaction of the pollutant with hydroxyl radicals

is described using temperature dependent second order rate constant [*Shatalov et al*., 2004]. Decrease in PCB degraded mass within the year is observed in results obtained by EVN-BETR and UK-MODEL and SimpleBox 3.0 models on the basis of initial concentrations given as input data (Fig. 3.34a,c and 3.37a).

Comparison of annual values of PCB-153 mass degraded in the considered different layers of the atmosphere obtained with “reference” and “own/alternative” data sets is presented in Fig. 3.52.

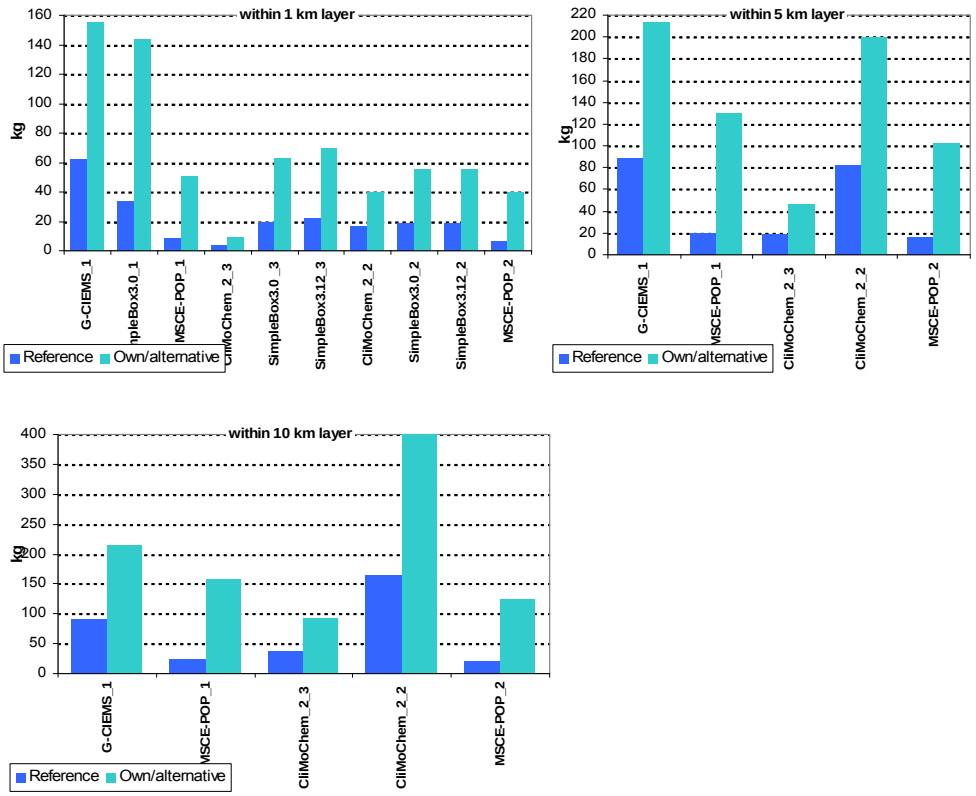


Fig.3.52. *Comparison of PCB-153 mass degraded in the atmosphere within 1, 5 and 10 km layers calculated by different models on the basis of two data set*

For the participating models, the annual values of calculation results on PCB-153 masses degraded in the atmosphere obtained with the use of “own or alternative” data sets noticeably exceed those obtained with “reference” data set. According to the data presented in Tables 3.28-3.30 (see Section 3.2.1), percentage difference between results obtained with two data sets of physical-chemical properties varies from 142 to 545%. The largest difference in the results obtained with two data sets is characteristic of MSCE-POP results calculated on the basis of initial concentrations given as input data.

Soil. There is a considerable difference in calculated values of PCB-153 mass degraded in 5 and 10 cm soil layers obtained on the basis of “***reference”*** data set (Tables 3.31 and 3.32, Section 3.2.2). Only in the results based on zero initial conditions for 5 cm layer, the square deviation presented for annual value does not exceed the mean value averaged between the different models.

Comparison of annual values of PCB-153 masses degraded in soil within 5 and 10 cm layers calculated by different models on the basis of zero initial concentrations and with the use of “reference” data set is presented in Fig.3.53a. Fig. 3.53b shows the same results but obtained on the basis of initial concentrations or historical emissions. In the latter figure different color of columns corresponds to the

different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions). The black line in the plots shows the value of the corresponding parameter averaged between models.

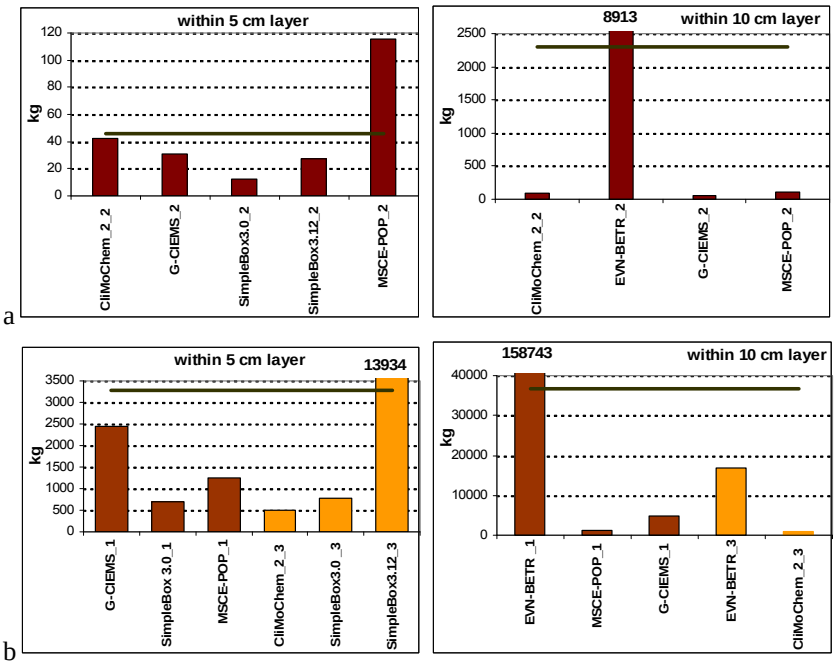


Fig. 3.53. *Comparison of annual values of PCB-153 masses degraded in soil within 5 and 10 cm layers calculated by different models on the basis of "reference" data set (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

Results of most models performed calculations on the basis of zero initial concentrations are characterized by relatively low values of mass degraded in soil (see Fig. 3.53a). Results with higher values of PCB-153 mass degraded in soil are obtained by the models, which used initial concentrations and/or historical emissions (see Fig. 3.53b). For both types of calculations the maximum values of PCB-153 mass degraded in 5 cm soil layer are characteristic of MSCE-POP (zero initial conditions) and of SimpleBox 3.12 (historical emissions) models. For 10 cm layer EVN-BETR and UK-MODEL provided the maximum annual values of PCB-153 degraded mass.

A comparison of profiles of annual values of PCB-153 degraded mass calculated by the participating models for the considered soil layers (5 and 10 cm) on the basis of "reference" data set is presented in Fig.3.54.

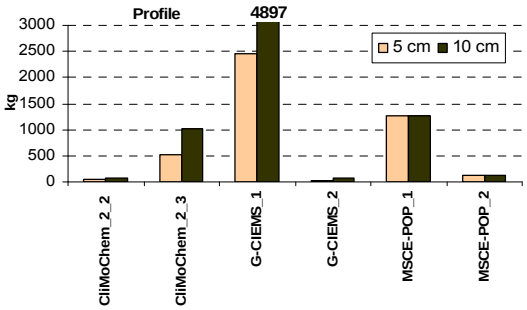


Fig. 3.54. *Comparison of profiles of annual values of PCB-153 degraded mass calculated by the models for the considered soil layers (5 and 10 cm) on the basis of "reference data set"*

In compliance with the results of CliMoChem and G-CIEMS on soil content profile, values of PCB-153 mass degraded within 10 cm layer is approximately two times higher than that degraded within 5 cm layer. For MSCE-POP model results, values of mass degraded in both layers are equal to each other.

According to the calculation results on PCB-153 mass degraded in 5 cm layers of soil calculated by models on the basis of zero and non-zero initial conditions and with the use of "***own or alternative"***

data sets (Table 3.33 given in Section 3.1.2), square deviation σ between different model results for each of these layers exceed the averaged value. The same can be noted for the results obtained by the models for 10 cm layer with the use of non-zero initial conditions. At that, square deviation of the absolute values of PCB-153 mass degraded in 10 cm layers of soil calculated on the basis of zero initial conditions is less than the averaged value (see Table 3.34 given in Section 3.1.2). Comparison of annual values of PCB-153 masses degraded in soil within 5 and 10 cm layers calculated by different models on the basis of zero initial concentrations and with the use of "own or alternative" data sets is presented in Fig.3.55a. Fig. 3.55b shows the same results but obtained on the basis of initial concentrations or historical emissions. In the latter figure different color of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions). The black line in the plots shows the value of the corresponding parameter averaged between models.

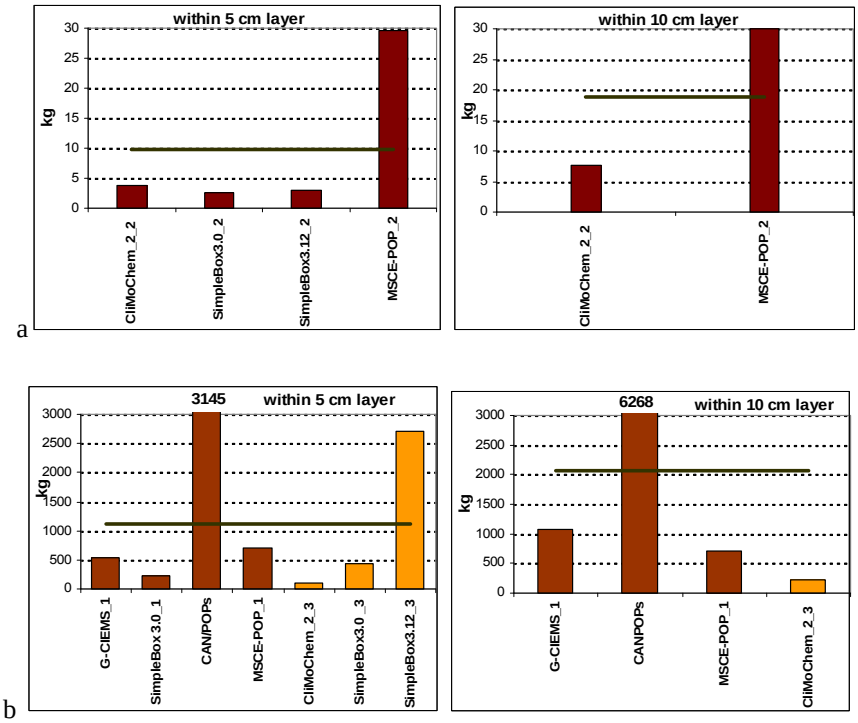


Fig. 3.55. *Comparison of annual values of PCB-153 masses degraded in soil within 5 and 10 cm layers calculated by different models on the basis of "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

The highest results for 5 and 10 cm soil layers obtained using zero initial conditions (see Fig. 3.55a) are characteristic of MSCE-POP model. According to the results presented in Fig. 3.55b, the maximum values of PCB-153 mass degraded in 5 and 10 cm soil layers are characteristic of CAN/POPs results calculated on the basis of initial concentrations given as input data.

Comparison of profiles of annual values of PCB-153 degraded mass calculated by the participating models for

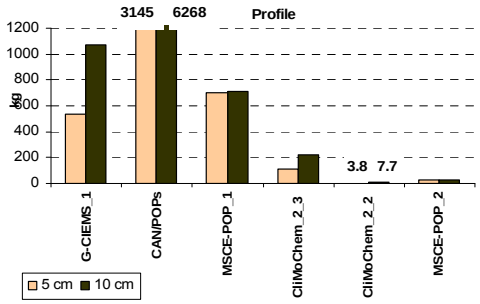


Fig. 3.56. *Comparison of profiles of annual values of PCB-153 degraded mass calculated by the models for the considered soil layers (5 and 10 cm) on the basis of "own or alternative data sets"*

the considered soil layers (5 and 10 cm) on the basis of “own or alternative” data sets is presented in Fig.3.56.

According to the results of CAN/POPs, CliMoChem and G-CIEMS obtained on the basis of “own or alternative” data set, values of PCB-153 mass degraded within 10 cm layer exceed those for 5 cm layer about two times. MSCE-POP model presented approximately equal values of mass degraded in both layers.

Seasonal variations in absolute values of PCB-153 mass degraded in soil within 5 and 10 cm layers (see Figs. 3.40 – 3.43 given in Section 3.2.2) are observed in results of CliMoChem model obtained on the basis of their own physical-chemical data set and EVN-BETR and UK-MODEL results based on “reference” data set.

Comparison of annual values of PCB-153 mass degraded in the considered different layers of soil obtained with “reference” and “own/alternative” data sets is presented in Fig. 3.57.

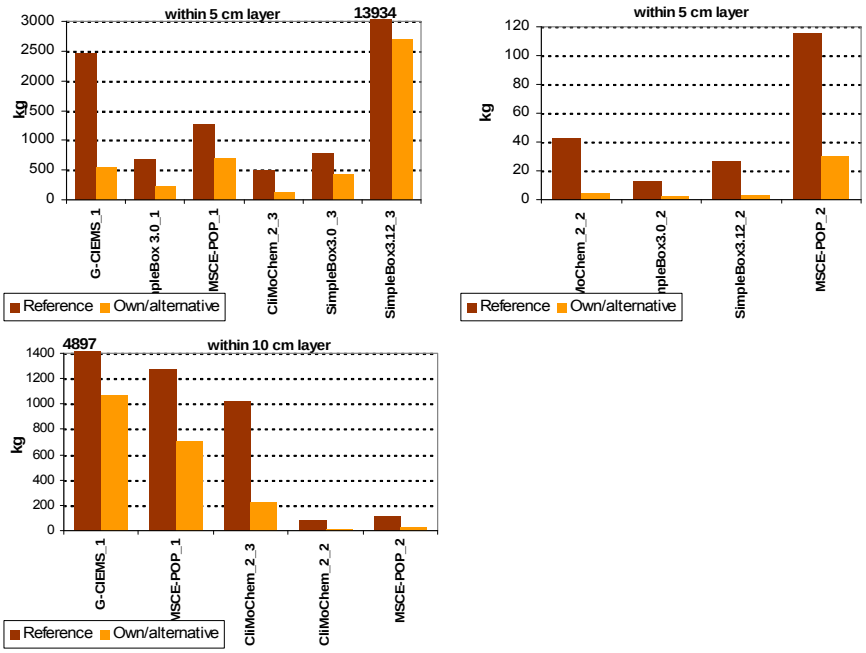


Fig.3.57. *Comparison of PCB-153 mass degraded within 5 and 10 cm soil layers calculated by different models on the basis of two data set*

For all models’ results, the values of PCB-153 masses degraded in soil obtained with the use of “own or alternative” data sets are less than those obtained with “reference” data set. The largest difference in the results obtained with two data sets exceeding 90% is characteristic of CliMoChem results calculated using zero initial conditions. According to the data on percentage difference between calculation results on PCB-153 mass degraded in soil (Tables 3.35 and 3.36 Section 3.2.2), the difference in other models’ results varies from 44 to 89%.

Water. Most models provide relatively close annual and monthly values of PCB-153 masses degraded in water layer of 200 m calculated on the basis of non-zero initial conditions and “own/alternative” physical-chemical data sets (see Tables 3.37 and 3.38 given in Section 3.2.3). In all other cases, square deviation of annual values between different model results considerably exceeds the mean values.

Comparison of annual values of PCB-153 masses degraded in water layer of 200 m calculated by different models on the basis of zero initial concentrations and with the use of "***reference"*** data set is presented in Fig.3.58a. Fig. 3.58b shows the same results but obtained on the basis of initial concentrations or historical emissions. In the latter figure different color of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions). The blue line in the plot shows the value of the corresponding parameter averaged between models.

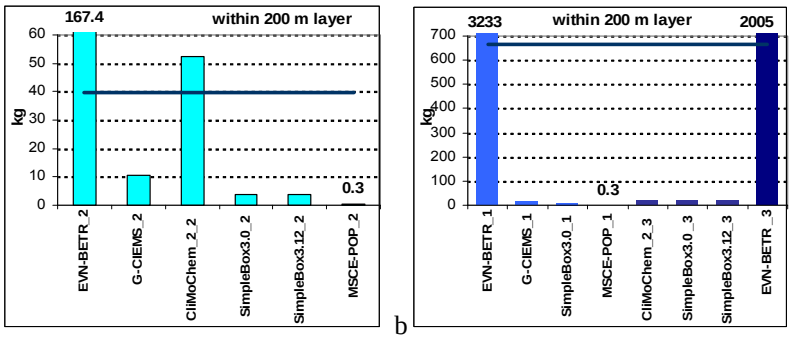


Fig. 3.58. *Comparison of annual values of PCB-153 masses degraded in water within 200 m layer calculated by different models on the basis of "reference" data set (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

According to the results based on zero initial conditions (see Fig. 3.58a), the maximum absolute value of PCB-153 mass degraded in water layer of 200 m calculated by EVN-BETR and UK-MODEL considerably exceed the minimum one obtained by MSCE-POP model (more than 600 times). In the results calculated on the basis of initial conditions or historical emissions (see Fig. 3.58b), the maximum calculated value is characteristic of EVN-BETR and UK-MODEL results based on given initial concentrations. At that the minimum value of PCB-153 mass degraded in water is also obtained by MSCE-POP model.

Comparison of annual values of PCB-153 mass degraded in water layer of 200 m calculated by different models on the basis of zero initial concentrations and with the use of "***own or alternative"*** data sets is presented in Fig.3.59a (blue line corresponds to the averaged value). Fig. 3.59b shows the same results but obtained on the basis of initial concentrations or historical emissions. In the latter figure different color of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions).

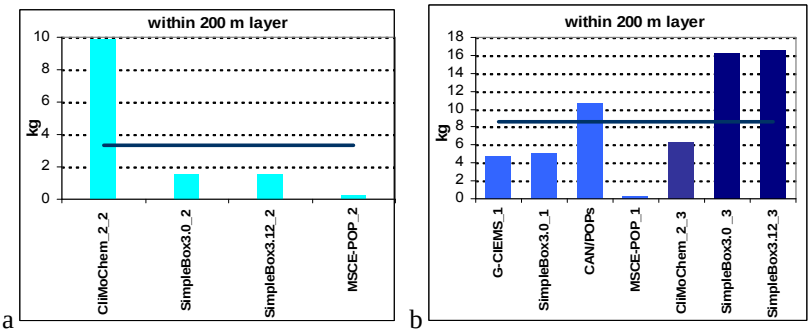


Fig. 3.59. *Comparison of annual values of PCB-153 masses degraded in water within 200 m layer calculated by different models on the basis of "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

For all models performed calculations on both zero and non-zero initial conditions, the results obtained on the basis of initial conditions or historical emissions exceed those calculated with zero initial concentrations (except for CliMoChem). In MSCE-POP results both calculated values are equally small in comparison with other models' results. The maximum values in results obtained on the basis of zero and non-zero initial conditions are characteristic of CliMOChem and SimpleBox 3.12 models, respectively.

According to the data presented (see Figs. 3.44a,b and 3.45a,b Section 3.2.3), some seasonal variations of PCB-153 mass degraded in water layer of 200 m are observed in and CliMoChem, EVN-BETR and UK-MODEL and G-CIEMS results. Increasing trend of water content is characteristic of CAN/POPs results. There are no any considerable seasonal variations in results of SimpleBox 3.0 and 3.12 calculated with historical emissions.

Annual values of PCB-153 mass degraded in the 200m layer of water obtained by the participating models on the basis of "reference" and "own/alternative" data sets are compared in Fig. 3.60.

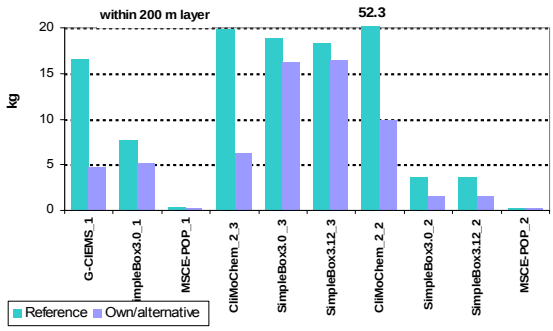


Fig. 3.60. *Comparison of PCB-153 mass degraded within 200 m water layer calculated by different models on the basis of two data sets*

For all models' results, the values of PCB-153 masses degraded in water obtained with the use of "own or alternative" data sets are less than those obtained with "reference" data set (see also Table 3.39 given in Section 3.2.3). The percentage difference between results of both calculations varies from 10 to 81%.

Vegetation. The difference between results on PCB-153 masses degraded in vegetation obtained on the basis of "reference" and "own or alternative" data set is considerable (see Tables 3.40 and 3.41, Section 3.2.4). Annual values of PCB-153 mass degraded in vegetation obtained by the participating models on the basis of "reference" and "own/alternative" data sets are shown in Fig. 3.61.

The values of PCB-153 mass degraded in vegetation obtained by G-CIEMS model with the use of "own or alternative" data sets on the basis of initial concentrations given as input data are smaller than those obtained by this model with "reference" data set. The difference in the results obtained with two data sets is equal to 25% (see Table 3.42, Section 3.2.4).

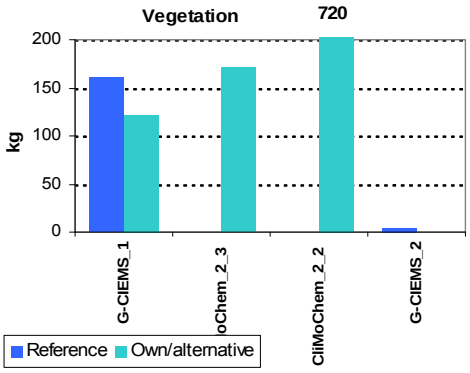


Fig.3.61. *Comparison of PCB-153 mass degraded in vegetation calculated by different models on the basis of two data sets*

Relative distribution of PCB mass degraded in the environmental compartments

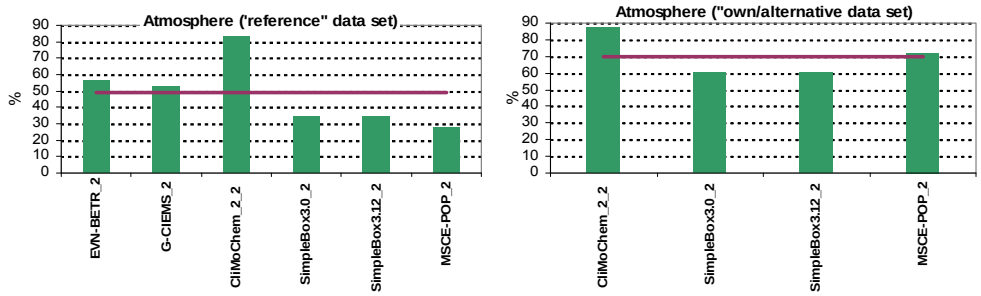
The presented estimates of PCB-153 masses degraded in the main environmental compartments allow one to reveal the relative contributions of degradation process occurs in this or that media to the overall mass of PCB-153 in the whole environment. Below, the comparison of relative fractions of PCB-153

mass degraded in the main environmental media in relation to the mass balance estimates is presented. Of note, here and hereinafter fractions of mass degraded in different media are the ratios of the degraded mass and the mass contained in the considered compartment (taking into account also degraded mass).

Fractions of PCB-153 mass degraded in the atmosphere calculated by the participating models on the basis of zero and non-zero initial conditions are presented in Figs. 3.62a and b, respectively. In these figures fractions of PCB-153 mass degraded in the atmosphere calculated by the different models with the use of "reference" and "own/alternative" data sets are also compared.

According to the results obtained on the basis of zero and non-zero initial conditions and with the use of both physical-chemical data sets, most models provide rather close values of the fraction of PCB-153 mass degraded in the atmosphere. For most models the fraction of PCB-153 mass degraded in the atmosphere calculated on the basis of "own or alternative" data set exceed essentially that obtained with the use of "reference" data set. The results based on zero initial conditions vary from 28 to 89% ("reference" data set) and from 60 to 87% ("own/alternative" data set) of the overall mass contained originally in this compartment (See Fig. 3.62a). According to the results obtained with the use of non-zero initial conditions (see Fig. 3.62b) mass of PCB-153 degraded in the atmosphere makes up from 28 to 87% ("reference" data set) and from 59 to 86% ("own/alternative" data set) of the overall mass in this compartment.

a



b

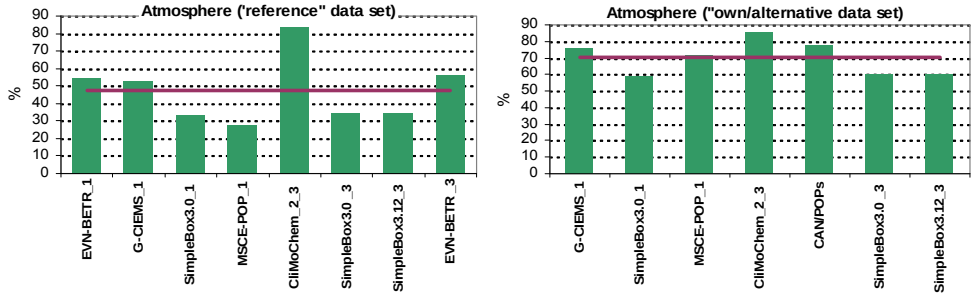


Fig. 3.62. *Fractions of PCB-153 mass degraded in the atmosphere calculated by the participating models on the basis of "reference" and "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

In Fig. 3.63 a and b fractions of PCB-153 mass degraded in soil calculated by the different models on the basis of zero and non-zero initial conditions are presented, respectively. In these figures fractions of PCB-153 mass degraded in soil calculated by the different models with the use of "reference" and "own/alternative" data sets are also compared.

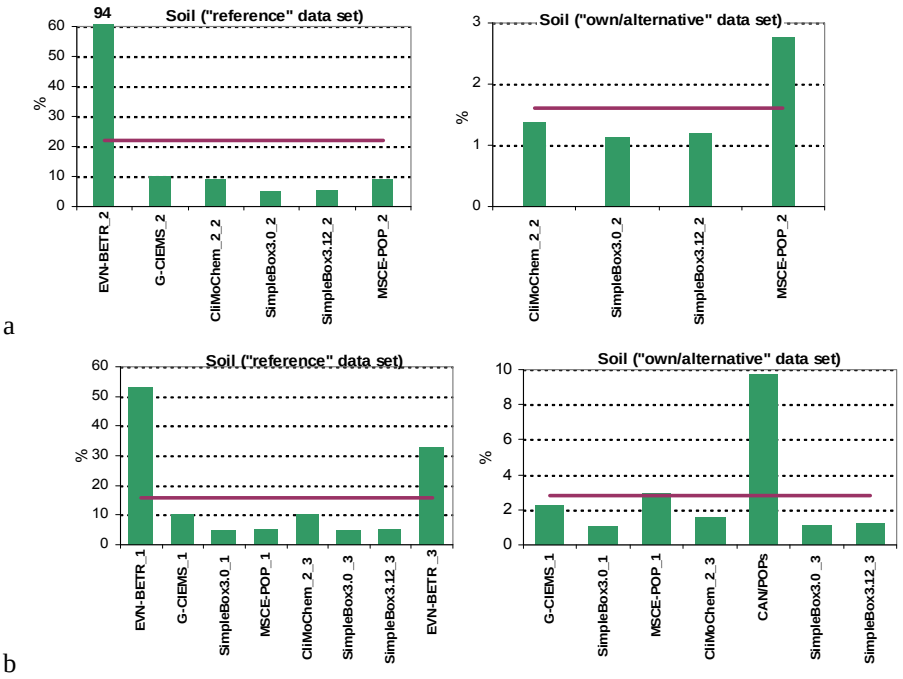


Fig. 3.63. *Fractions of PCB-153 mass degraded in soil calculated by the participating models on the basis of "reference" and "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

The results obtained by most models on the basis of both zero and non-zero initial conditions are in reasonable agreement between each other. The fraction of PCB-153 mass degraded in soil calculated by all models on the basis of "reference» data set is considerably higher than that obtained with the use of "own or alternative" data set. The values of fraction of PCB-153 mass degraded in soil obtained on the basis of zero initial conditions and "reference" data set (see Fig. 3.63a) vary from 5 to 94% and are higher than those calculated using "own or alternative" data set (1.1 – 2.8%). The fractions of PCB-153 mass degraded in soil obtained on the basis of non-zero initial conditions and "reference" data set (see Fig. 3.63b) are observed in the range from 5 to 53%; the results calculated using "own or alternative" data set vary from 1.0 to 9.7%.

Fractions of PCB-153 mass degraded in seawater calculated by the participating on the basis of zero and non-zero initial conditions are presented in Figs. 3.64a and b, respectively. In these figures fractions of PCB-153 mass degraded in the atmosphere calculated by the different models with the use of "reference" and "own/alternative" data sets are also compared.

Results of SimpleBox model based on both zero and non-zero initial conditions as well as on "reference" and "own or alternative" data sets are lower than results of others models. The maximum values in results obtained on the basis of zero initial conditions are characteristic of EVN-BETR and UK-MODEL ("reference") and MSCE-POP model ("own/alternative') (See Fig. 3.64a). The maximum fractions of PCB-153 mass degraded in water based on non-zero initial conditions are obtained by EVN-BETR and UK-MODEL with "reference" data set and by CAN/POPs model with "own or alternative" data set (See Fig. 3.64b). As in the case of results on fractions of mass degraded in soil, for all models the values of fraction of PCB-153 mass degraded in water obtained on the basis of "reference» data set exceed those obtained with the use of "own or alternative" data set.

For the participating models provided results on PCB-153 degradation in vegetation, fractions of PCB-153 mass degraded in vegetation calculated on the basis of zero and non-zero initial conditions are

presented in Figs. 3.65a and b, respectively. In this figure fractions of PCB-153 mass degraded in the atmosphere calculated by the different models with the use of “reference” and “own/alternative” data sets are also compared. Results obtained by CliMoChem and G-CIEMS models using non-zero initial conditions and “own/alternative” data set are rather close to each other.

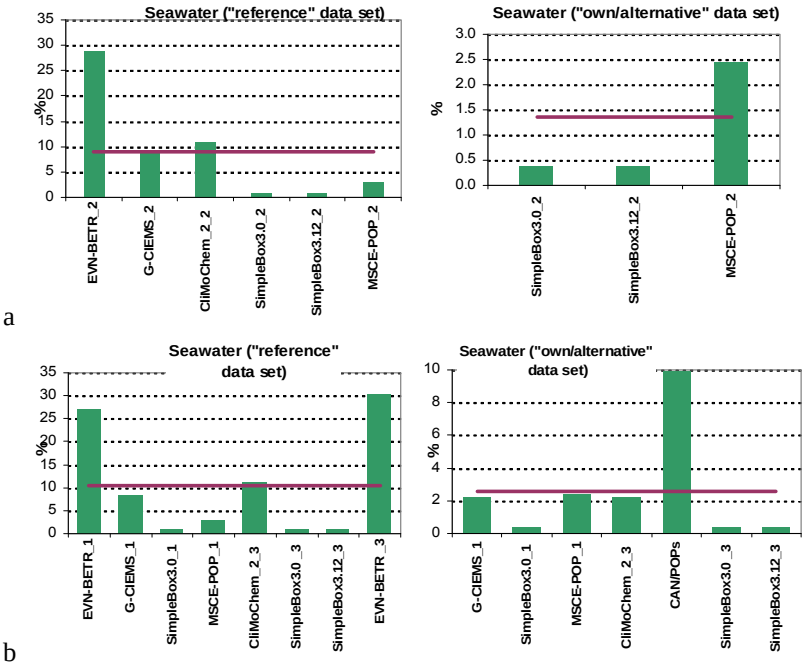


Fig. 3.64. *Fractions of PCB-153 mass degraded in seawater calculated by the participating models on the basis of “reference” and “own or alternative” data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

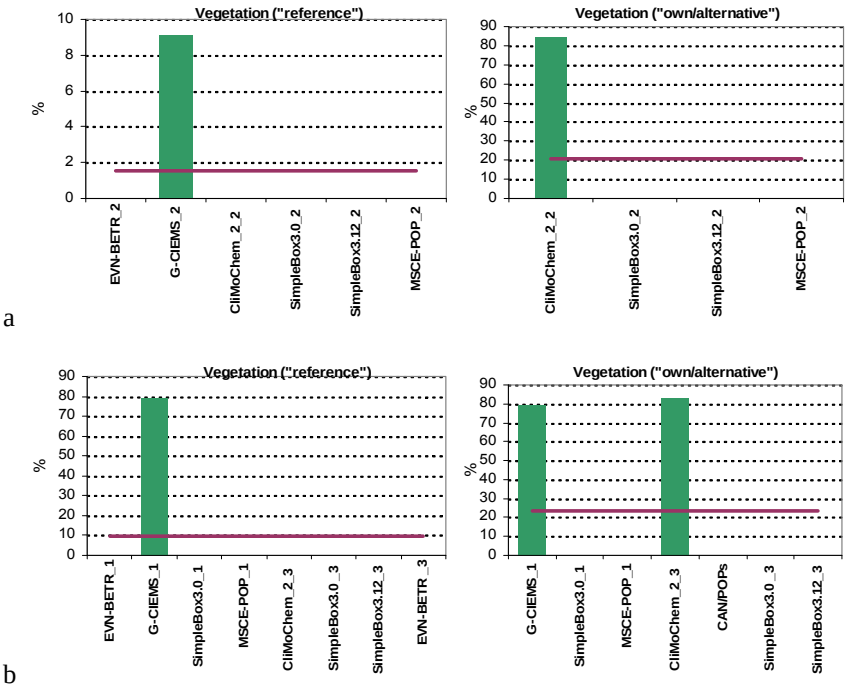


Fig. 3.65. *Fractions of PCB-153 mass degraded in vegetation calculated by the participating models on the basis of “reference” and “own or alternative” data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

Thus, in calculations based on both physical-chemical data sets ('reference" and "own/alternative") most participating models provide rather close absolute values of PCB-153 mass degraded in the atmosphere, soil and water. Noticeable seasonal variations in absolute values obtained are mostly characteristic of models that use temperature dependent degradation rates.

The comparison of masses degraded in main environmental media calculated with "reference" and "own/alternative" data sets shows that almost all models use higher degradation rates in the atmosphere in their "own or alternative" set of parameters compared with that in "reference" data set. That is why the annual values of calculation results on PCB-153 masses degraded in the atmosphere obtained with the use of "own or alternative" data sets noticeably exceed those obtained with "reference" data set. On the opposite, degradation rates in soil and water used by models are lower than that given in "reference" data set. Therefore, for all models' results, the values of PCB-153 masses degraded in these media obtained with the use of "own or alternative" data sets are less than those obtained with "reference" data set.

A preliminary analysis of relative fractions of PCB-153 mass degraded in the main environmental media that are ratios of the degraded mass and the mass contained in the considered compartment (taking into account also degraded mass) shows that most models closely describe degradation in the atmosphere, soil and water.

3.2.6. Comparison of calculated values of PCB-153 mass deposited into deep sea

In this section a comparison of results calculated by CliMoChem model with historical emission scenario on the basis of their own Land Cover Data [*DeFries and Townshend*, 1994] and Land Cover Data given as input data for this intercomparison study [*Guo and Chen*, 1994] is presented. Of note, contrary to the calculations discussed in the previous and subsequent sections in this simulation, PCB-153 is emitted as pulse emission into air each year at the beginning of season one.

Reference data set. Two sets of calculated values of PCB-153 mass deposited into deep sea (kg) obtained by CliMoChem model on the basis of "reference" data set together with statistical parameters used for evaluation are presented in Table 3.43.

Table 3.43. *Calculation results: PCB-153 mass deposited into deep sea (kg) calculated by CliMoChem model on the basis of "reference" data set and statistical parameters used for evaluation*

Month	CliMoChem_1_3	CliMoChem_2_3	*m*	σ
Season_1	135.308	155.224	145.27	14.08
Season_2	87.353	99.588	93.47	8.65
Season_3	54.413	61.803	58.11	5.22
Season_4	44.870	51.616	48.24	4.77
Annual	**321.944**	**368.230**	**345.09**	**32.73**

CliMoChem_1_3 – CliMoChem results calculated on the basis of their own Land Cover Data;
CliMoChem_2_3 – CliMoChem results calculated on the basis of Land Cover Data given as input data for this intercomparison study

Seasonal values of PCB-153 mass deposited into deep sea calculated by CliMoChem model on the basis of "reference" data set are compared in Fig. 3.66.

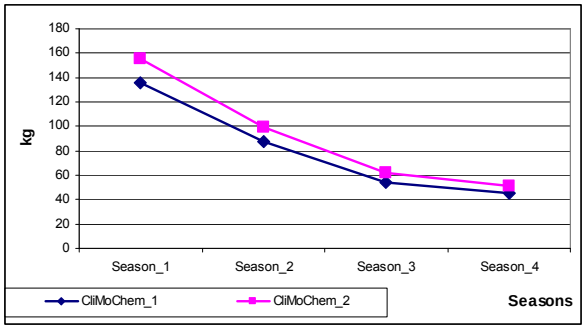


Fig. 3.66. *PCB-153 mass deposited into deep sea (kg) calculated by CliMoChem model on the basis of "reference" data set*

Own/alternative data set. Two versions of calculation results on PCB-153 mass deposited into deep sea (kg) obtained by CliMoChem model on the basis of "own or alternative" data sets together with statistical parameters used for evaluation are presented in Table 3.44.

Table 3.44. *Calculation results: PCB-153 mass deposited into deep sea (kg) calculated by CliMoChem model on the basis of "own or alternative" data sets and statistical parameters used for evaluation.*

Month	CliMoChem_1_3	CliMoChem_2_3	*m*	σ
Season_1	92.538	114.090	103.31	15.24
Season_2	68.027	83.628	75.83	11.03
Season_3	49.630	61.286	55.46	8.24
Season_4	50.966	64.479	57.72	9.56
Annual	261.162	323.484	292.32	44.07

CliMoChem_1_3 – CliMoChem results calculated on the basis of their own Land Cover Data;
CliMoChem_2_3 – CliMoChem results calculated on the basis of Land Cover Data given as input data for this intercomparison study

Seasonal values of PCB-153 mass deposited into deep sea calculated by CliMoChem model on the basis of "own or alternative" data sets are compared in Fig. 3.67.

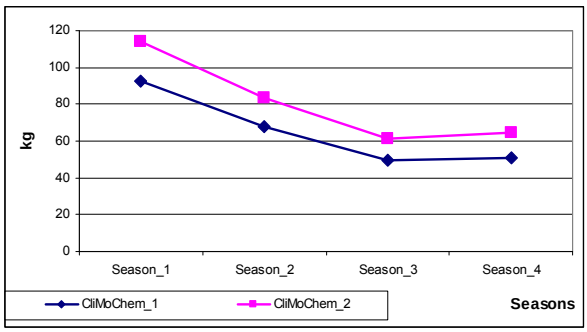


Fig. 3.67. *PCB-153 mass deposited into deep sea (kg) calculated by CliMoChem model on the basis of "own or alternative" data sets*

Comparison between results obtained on the basis of two data sets. The percentage difference between calculation results obtained with two data sets of physical-chemical properties (for those models who provided calculations for both these sets) is shown in Table 3.45.

Table 3.45. *The percentage difference between calculation results on PCB-153 mass deposited into deep sea obtained by CliMoChem model on the basis of two data sets: "reference" and "own or alternative" data sets*

Month	CliMoChem_1_3	CliMoChem_2_3
Season_1	-31.6%	-26.5%
Season_2	-22.1%	-16.0%
Season_3	-8.8%	-0.8%
Season_4	13.6%	24.9%
Annual	-18.9%	-12.2%

CliMoChem_1_3 – CliMoChem results calculated on the basis of their own Land Cover Data;
CliMoChem_2_3 – CliMoChem results calculated on the basis of Land Cover Data given as input data for this intercomparison study

For both variants of CliMoChem results, the annual values and practically all seasonal values of PCB-153 masses deposited into deep sea obtained with the use of "own or alternative" data sets (except those obtained for season 4) are less than those obtained with "reference" data set.

3.3. Mass flows transported in/out the specified domain: inflow and outflow

Mass flows of PCB-153 transported in/out the specified domain (inflow and outflow) are calculated by the participating models on the basis of atmospheric emission estimates presented by [*Breivik et al*. 2002a] (see also www.nilu.no/projects/globalpcb/). The higher (or worst-case) emission estimates for 1981-2000 are applied.

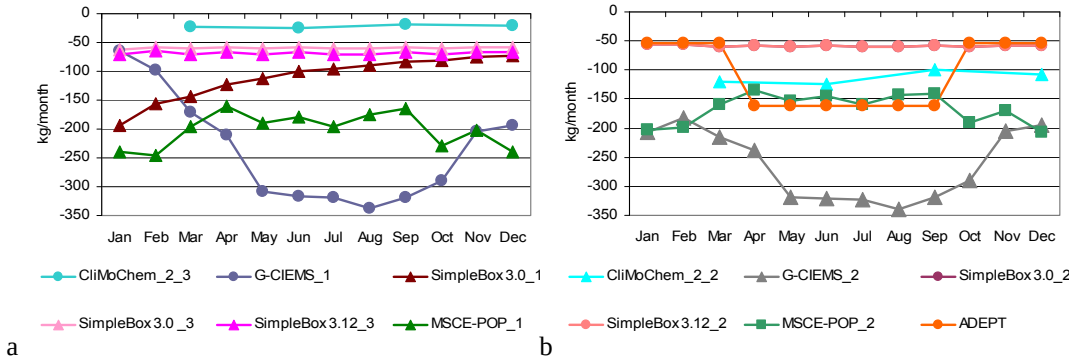
All amount of emissions is released into the atmosphere and is uniformly distributed throughout a year. In calculations of ADEPT, CAN/POPs, G-CIEMS, SimpleBox and MSCE-POP models, a value of PCB-153 total annual emissions in 2000 totals on average 5600 kg. In CliMoChem model the global emission data were summarized to zone-specific emissions (10 zones) and for the specified domain emission data for the model zones 2 and 3 (of 10) are used. At that emission value in 2000 used by CliMoChem for PCB-153 totals to 8953 kg.

It should be noted that transport into the calculation domain is supposed to be positive.

3.3.1. Comparison of calculated values of PCB-153 mass flows transported in/out the calculation domain through the atmosphere.

Reference data set. Calculation results on PCB-153 mass flows transported in/out the calculation domain through the atmosphere calculated by the models on the basis of "reference" data set together with statistical parameters used for evaluation are presented in Table 3.46.

Monthly values of PCB-153 mass flows transported in/out the calculation domain through the atmosphere calculated by all participating models on the basis of "reference" data set and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.68 a and b, respectively.



a b

Fig. 3.68a. *PCB-153 mass flows transported in/out the calculation domain through the atmosphere (kg/month) calculated by the participating models on the basis of "reference" data set and non-zero initial conditions*

Fig. 3.68b. *PCB-153 mass flows transported in/out the calculation domain through the atmosphere (kg/month) calculated by the participating models on the basis of "reference" data set and zero initial conditions*

Own/alternative data set. Calculation results on PCB-153 mass flows transported in/out the calculation domain through the atmosphere calculated by models on the basis of "own or alternative" data sets together with statistical parameters used for evaluation are presented in Table 3.47.

Monthly values of PCB-153 mass flows transported in/out of the calculation domain through atmosphere calculated by the participating models on the basis of "own or alternative" data sets and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.69 a and b, respectively.

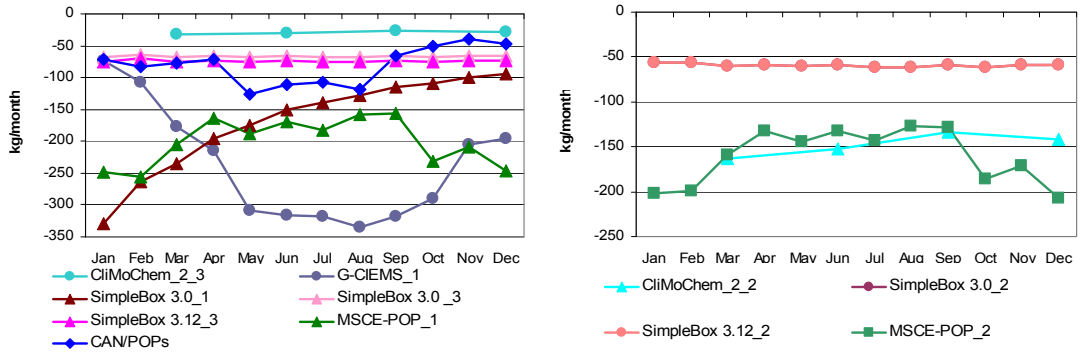


Fig. 3.69a. *PCB-153 mass flows transported in/out the calculation domain through the atmosphere (kg/month) calculated by the participating models on the basis of "own or alternative" data set and non-zero initial conditions*

Fig. 3.69b. *PCB-153 mass flows transported in/out the calculation domain through the atmosphere (kg/month) calculated by the participating models on the basis of "own or alternative" data set and zero initial conditions*

Comparison between results obtained on the basis of two data sets. A comparison of the calculation results obtained with two data sets of physical-chemical properties (for those models who provided calculations for both these sets) is shown in Table 3.48.

Table 3.46. *Calculation results: PCB-153 mass flows transported in/out the calculation domain through the atmosphere (kg/month) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data			Results obtained on the basis of historical emissions			*m*	σ	Month	Results obtained on the basis of zero initial concentrations						*m*	σ
	G-CIEMS_1	SimpleBox 3.0_1[a]	MSCE-POP_1	CliMo Chem_2_3	SimpleBox 3.0 _3[a]	SimpleBox 3.12_3[a]				G-CIEMS_2	CliMo Chem_2_2	SimpleBox 3.0_2[a]	SimpleBox 3.12_2[a]	MSCE-POP_2	ADEPT		
Jan	-65.1	-194.7	-239.7		-61.9	-69.9	*-126.2*	*84.6*	Jan	-206.5		-55.1	-55.1	-203.3	-53.0	*-114.6*	*82.4*
Feb	-97.9	-156.1	-245.0		-57.3	-65.4	*-124.4*	*77.8*	Feb	-182.4		-55.2	-55.2	-199.8	-53.0	*-109.1*	*75.1*
Mar	-171.4	-143.6	-196.0		-61.3	-69.9	*-128.4*	*60.4*	Mar	-216.1		-59.1	-59.1	-159.6	-53.0	*-109.4*	*74.4*
Seas_1	**-334.4**	**-494.3**	**-680.7**	**-67.0**	**-180.5**	**-205.2**	***-327.0***	***226.7***	**Seas_1**	**-605.0**	**-361.9**	**-169.4**	**-169.4**	**-562.7**	**-159.0**	***-337.9***	***205.5***
Apr	-210.9	-122.0	-160.6		-59.3	-67.7	*-124.1*	*63.8*	Apr	-238.3		-57.3	-57.3	-134.2	-162.5	*-129.9*	*76.4*
May	-309.0	-113.1	-190.2		-61.3	-69.9	*-148.7*	*103.1*	May	-318.6		-59.3	-59.3	-153.7	-162.5	*-150.7*	*106.1*
Jun	-317.1	-100.0	-179.8		-59.3	-67.7	*-144.8*	*107.4*	Jun	-321.6		-57.5	-57.5	-145.1	-162.5	*-148.8*	*108.1*
Seas_2	**-837.1**	**-335.1**	**-530.7**	**-72.3**	**-180.0**	**-205.2**	***-360.0***	***281.6***	**Seas_2**	**-878.5**	**-373.3**	**-174.2**	**-174.2**	**-433.0**	**-487.5**	***-420.1***	***260.0***
Jul	-318.4	-95.7	-196.8		-61.3	-69.9	*-148.4*	*109.3*	Jul	-323.1		-59.5	-59.5	-159.0	-162.5	*-152.7*	*107.9*
Aug	-336.5	-89.7	-174.4		-61.3	-69.9	*-146.4*	*115.4*	Aug	-339.9		-59.5	-59.5	-143.6	-162.5	*-153.0*	*114.7*
Sep	-319.3	-82.3	-164.9		-59.3	-67.7	*-138.7*	*109.3*	Sep	-319.7		-57.6	-57.6	-139.9	-162.5	*-147.5*	*107.3*
Seas_3	**-974.2**	**-267.8**	**-536.0**	**-58.2**	**-182.0**	**-207.5**	***-370.9***	***335.3***	**Seas_3**	**-982.7**	**-297.1**	**-176.6**	**-176.6**	**-442.5**	**-487.5**	***-427.2***	***301.7***
Oct	-289.6	-81.3	-229.5		-61.3	-69.9	*-146.3*	*105.8*	Oct	-290.7		-59.6	-59.6	-189.7	-53.0	*-130.5*	*106.4*
Nov	-203.2	-75.7	-201.6		-59.3	-67.7	*-121.5*	*74.1*	Nov	-204.9		-57.7	-57.7	-169.6	-53.0	*-108.6*	*72.9*
Dec	-193.4	-73.2	-240.0		-59.3	-67.7	*-126.7*	*83.9*	Dec	-194.2		-57.7	-57.7	-206.4	-53.0	*-113.8*	*79.1*
Seas_4	**-686.2**	**-230.2**	**-671.1**	**-64.4**	**-180.0**	**-205.2**	***-339.5***	***268.8***	**Seas_4**	**-689.9**	**-324.7**	**-175.0**	**-175.0**	**-565.7**	**-159.0**	***-348.2***	***228.2***
Annual	**-2831.9**	**-1327.4**	**-2418.5**	**-261.9**	**-722.4**	**-823.1**	***-1397.5***	***1017.8***	**Annual**	**-3156.1**	**-1357.0**	**-695.2**	**-695.3**	**-2003.9**	**-1293.0**	***-1533.4***	***932.6***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
[a] - SimpleBox data are presented for moderate scale.

Table 3.47. *Calculation results: PCB-153 mass flows transported in/out the calculation domain through the atmosphere (kg/month) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data				Results obtained on the basis of historical emissions			*m*	σ	Month	Results obtained on the basis of zero initial concentrations				*m*	σ
	CAN/POPs	G-CIEMS_1	SimpleBox 3.0_1[a]	MSCE-POP_1	CliMo Chem_2_3	SimpleBox 3.0 _3[a]	SimpleBox 3.12_3[a]				CliMo Chem_2_2	SimpleBox 3.0_2[a]	SimpleBox 3.12_2[a]	MSCE-POP_2		
Jan	-72.1	-74.1	-329.3	-248.1		-68.1	-75.1	*-144.5*	*114.7*	Jan		-55.8	-55.8	-202.1	*-104.6*	*84.5*
Feb	-82.1	-107.3	-263.6	-255.6		-63.3	-70.3	*-140.4*	*93.6*	Feb		-56.1	-56.1	-199.6	*-104.0*	*82.8*
Mar	-76.6	-177.2	-236.1	-204.4		-67.8	-75.3	*-139.6*	*75.1*	Mar		-60.3	-60.3	-159.4	*-93.3*	*57.2*
Seas_1	**-230.7**	**-358.6**	**-829.0**	**-708.1**	**-97.2**	**-199.2**	**-220.6**	***-377.6***	***279.9***	**Seas_1**	**-490.3**	**-172.3**	**-172.3**	**-561.1**	***-349.0***	***206.1***
Apr	-71.3	-214.3	-195.0	-164.2		-65.7	-73.0	*-130.6*	*68.3*	Apr		-58.6	-58.6	-132.2	*-83.1*	*42.5*
May	-126.7	-308.1	-175.4	-187.5		-67.9	-75.5	*-156.9*	*89.0*	May		-60.7	-60.7	-144.6	*-88.7*	*48.4*
Jun	-111.9	-316.2	-150.4	-170.2		-65.8	-73.1	*-147.9*	*92.2*	Jun		-58.9	-58.9	-132.5	*-83.4*	*42.5*
Seas_2	**-309.9**	**-838.6**	**-520.9**	**-521.9**	**-92.4**	**-199.4**	**-221.5**	***-386.4***	***256.7***	**Seasl_2**	**-459.0**	**-178.2**	**-178.2**	**-409.4**	***-306.2***	***149.2***
Jul	-106.3	-317.6	-139.9	-182.5		-68.0	-75.6	*-148.3*	*93.2*	Jul		-61.0	-61.0	-143.5	*-88.5*	*47.6*
Aug	-118.2	-335.3	-127.5	-158.8		-68.1	-75.6	*-147.2*	*98.1*	Aug		-61.1	-61.1	-127.4	*-83.2*	*38.3*
Sep	-66.1	-318.0	-113.9	-155.6		-65.9	-73.2	*-132.1*	*97.6*	Sep		-59.2	-59.2	-128.9	*-82.5*	*40.2*
Seas_3	**-290.6**	**-970.9**	**-381.3**	**-496.9**	**-80.9**	**-202.0**	**-224.4**	***-378.2***	***293.3***	**Seas_3**	**-402.8**	**-181.4**	**-181.4**	**-399.8**	***-291.3***	***127.0***
Oct	-50.6	-288.9	-109.7	-230.7		-68.1	-75.7	*-137.3*	*98.6*	Oct		-61.3	-61.3	-185.2	*-102.6*	*71.5*
Nov	-38.8	-205.0	-99.8	-208.4		-65.9	-73.3	*-115.2*	*73.5*	Nov		-59.4	-59.4	-170.5	*-96.4*	*64.2*
Dec	-46.6	-194.8	-94.6	-247.0		-66.0	-73.3	*-120.4*	*81.1*	Dec		-59.5	-59.5	-207.4	*-108.8*	*85.4*
Seas_4	**-136.0**	**-688.8**	**-304.2**	**-686.1**	**-84.4**	**-200.0**	**-222.2**	***-331.7***	***252.5***	**Seas_4**	**-424.2**	**-180.1**	**-180.1**	**-563.1**	***-336.9***	***189.7***
Annual	**-967.2**	**-2856.8**	**-2035.4**	**-2413.1**	**-354.9**	**-800.6**	**-888.8**	***-1473.8***	***950.0***	**Annual**	**-1776.3**	**-712.0**	**-712.0**	**-1933.3**	***-1283.4***	***662.9***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
a - SimpleBox data are presented for moderate scale.

Table 3.48. *Comparison of the calculation results on PCB-153 mass flows transported in/out the calculation domain through the atmosphere (kg/month) obtained by models on the basis of two data sets: "reference" and "own or alternative"*

Month	CliMoChem_2_3		G-CIEMS_1		SimpleBox 3.0_1		SimpleBox 3.0_2		SimpleBox 3.12_2		SimpleBox 3.0 _3		SimpleBox 3.12_3		MSCE-POP_1		MSCE-POP_2		CliMoChem_2_2	
	ref	own	ref	alt	ref	alt	ref	alt	ref	own	ref	alt	ref	alt	ref	own	ref	own	ref	own
Jan			-65.1	-74.1	-194.7	-329.3	-55.1	-55.8	-55.1	-55.8	-61.9	-68.1	-69.9	-75.1	-239.7	-248.1	-203.3	-202.1		
Feb			-97.9	-107.3	-156.1	-263.6	-55.2	-56.1	-55.2	-56.1	-57.3	-63.3	-65.4	-70.3	-245.0	-255.6	-199.8	-199.6		
Mar			-171.4	-177.2	-143.6	-236.1	-59.1	-60.3	-59.1	-60.3	-61.3	-67.8	-69.9	-75.3	-196.0	-204.4	-159.6	-159.4		
Seas_1	**-67.0**	**-97.2**	**-334.4**	**-358.6**	**-494.3**	**-829.0**	**-169.4**	**-172.3**	**-169.4**	**-172.3**	**-180.5**	**-199.2**	**-205.2**	**-220.6**	**-680.7**	**-708.1**	**-562.7**	**-561.1**	**-361.9**	**-490.3**
Apr			-210.9	-214.3	-122.0	-195.0	-57.3	-58.6	-57.3	-58.6	-59.3	-65.7	-67.7	-73.0	-160.6	-164.2	-134.2	-132.2		
May			-309.0	-308.1	-113.1	-175.4	-59.3	-60.7	-59.3	-60.7	-61.3	-67.9	-69.9	-75.5	-190.2	-187.5	-153.7	-144.6		
Jun			-317.1	-316.2	-100.0	-150.4	-57.5	-58.9	-57.5	-58.9	-59.3	-65.8	-67.7	-73.1	-179.8	-170.2	-145.1	-132.5		
Seas_2	**-72.3**	**-92.4**	**-837.1**	**-838.6**	**-335.1**	**-520.9**	**-174.2**	**-178.2**	**-174.2**	**-178.2**	**-180.0**	**-199.4**	**-205.2**	**-221.5**	**-530.7**	**-521.9**	**-433.0**	**-409.4**	**-373.3**	**-459.0**
Jul			-318.4	-317.6	-95.7	-139.9	-59.5	-61.0	-59.5	-61.0	-61.3	-68.0	-69.9	-75.6	-196.8	-182.5	-159.0	-143.5		
Aug			-336.5	-335.3	-89.7	-127.5	-59.5	-61.1	-59.5	-61.1	-61.3	-68.1	-69.9	-75.6	-174.4	-158.8	-143.6	-127.4		
Sep			-319.3	-318.0	-82.3	-113.9	-57.6	-59.2	-57.6	-59.2	-59.3	-65.9	-67.7	-73.2	-164.9	-155.6	-139.9	-128.9		
Seas_3	**-58.2**	**-80.9**	**-974.2**	**-970.9**	**-267.8**	**-381.3**	**-176.6**	**-181.4**	**-176.6**	**-181.4**	**-182.0**	**-202.0**	**-207.5**	**-224.4**	**-536.0**	**-496.9**	**-442.5**	**-399.8**	**-297.1**	**-402.8**
Oct			-289.6	-288.9	-81.3	-109.7	-59.6	-61.3	-59.6	-61.3	-61.3	-68.1	-69.9	-75.7	-229.5	-230.7	-189.7	-185.2		
Nov			-203.2	-205.0	-75.7	-99.8	-57.7	-59.4	-57.7	-59.4	-59.3	-65.9	-67.7	-73.3	-201.6	-208.4	-169.6	-170.5		
Dec			-193.4	-194.8	-73.2	-94.6	-57.7	-59.5	-57.7	-59.5	-59.3	-66.0	-67.7	-73.3	-240.0	-247.0	-206.4	-207.4		
Seas_4	**-64.4**	**-84.4**	**-686.2**	**-688.8**	**-230.2**	**-304.2**	**-175.0**	**-180.1**	**-175.0**	**-180.1**	**-180.0**	**-200.0**	**-205.2**	**-222.2**	**-671.1**	**-686.1**	**-565.7**	**-563.1**	**-324.7**	**-424.2**
Annual	**-261.9**	**-354.9**	**-2831.9**	**-2856.8**	**-1327.4**	**-2035.4**	**-695.2**	**-712.0**	**-695.3**	**-712.0**	**-722.4**	**-800.6**	**-823.1**	**-888.8**	**-2418.5**	**-2413.1**	**-2003.9**	**-1933.3**	**-1357.0**	**-1776.3**

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;

CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;

CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;

MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;

MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;

SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;

SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;

SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period.

3.3.2. Comparison of calculated values of PCB-153 mass flows transported in/out the calculation domain through ocean

Reference data set. Calculation results on PCB-153 mass flows transported in/out the calculation domain through ocean calculated by the models on the basis of "reference" data set together with statistical parameters used for evaluation are presented in Table 3.49.

Monthly values of PCB-153 mass flows transported in/out the calculation domain through ocean calculated by all participating models on the basis of "reference" data set and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.70 a and b, respectively.

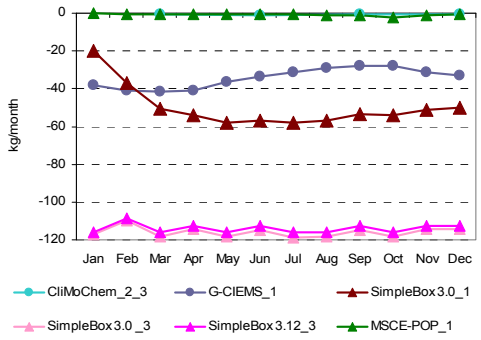


Fig. 3.70a. *PCB-153 mass flows transported in/out the calculation domain through ocean (kg/month) calculated by the participating models on the basis of "reference" data set and non-zero initial conditions*

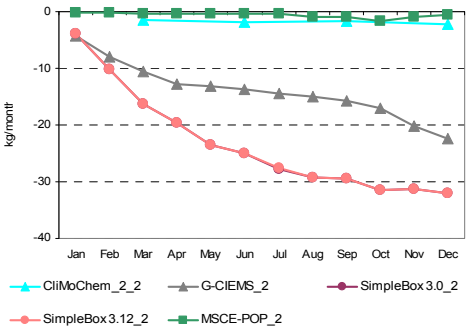


Fig. 3.70b. *PCB-153 mass flows transported in/out the calculation domain through ocean (kg/month) calculated by the participating models on the basis of "reference" data set and zero initial conditions*

Own/alternative data set. Calculation results on PCB-153 mass flows transported in/out the calculation domain through ocean calculated by models on the basis of "own or alternative" data sets together with statistical parameters used for evaluation are presented in Table 3.50.

Monthly values of PCB-153 mass flows transported in/out the calculation domain through ocean calculated by all participating models on the basis of "own or alternative" data sets and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.71 a and b, respectively.

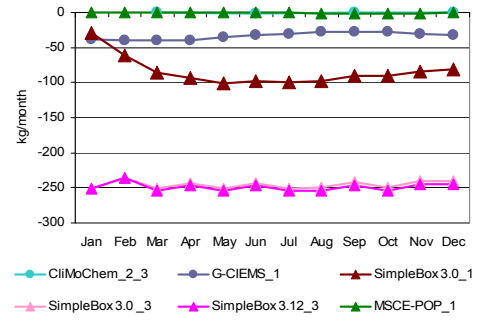


Fig. 3.71a. *PCB-153 mass flows transported in/out the calculation domain through ocean (kg/month) calculated by the participating models on the basis of "own or alternative" data set and non-zero initial conditions*

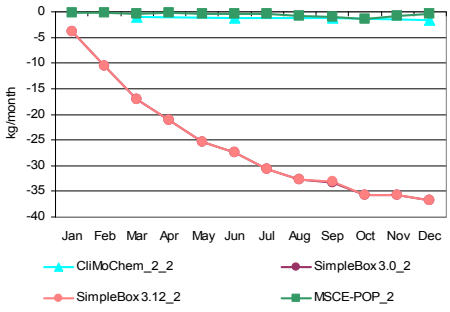


Fig. 3.71b. *PCB-153 mass flows transported in/out the calculation domain through ocean (kg/month) calculated by the participating models on the basis of "own or alternative" data set and zero initial conditions*

Comparison between results obtained on the basis of two data sets. A comparison of the calculation results obtained with two data sets of physical-chemical properties (for those models who provided calculations for both these sets) is shown in Table 3.51.

Table 3.49. *Calculation results: PCB-153 mass flows transported in/out the calculation domain through ocean (kg/month) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data			Results obtained on the basis of historical emissions			*m*	σ	Month	Results obtained on the basis of zero initial concentrations					*m*	σ
	MSCE-POP_1	G-CIEMS_1	SimpleBox 3.0_1[a]	CliMo Chem_2_3	SimpleBox 3.0_3[a]	SimpleBox 3.12_3[a]				G-CIEMS_2	CliMo Chem_2_2	SimpleBox 3.0_2[a]	SimpleBox 3.12_2[a]	MSCE-POP_2		
Jan	-0.2	-38.3	-20.1		-116.9	-116.2	*-58.3*	*54.8*	Jan	-4.3		-3.9	-3.9	-0.1	*-3.0*	*2.0*
Feb	-0.3	-41.1	-37.1		-110.0	-108.7	*-59.5*	*48.3*	Feb	-8.0		-10.3	-10.3	-0.3	*-7.2*	*4.8*
Mar	-0.4	-41.6	-50.5		-118.1	-116.2	*-65.4*	*50.9*	Mar	-10.6		-16.3	-16.3	-0.3	*-10.9*	*7.5*
Seas_1	**-0.8**	**-121.1**	**-107.7**	**-2.4**	**-345.0**	**-341.2**	***-153.0***	***155.7***	**Seas_1**	**-22.9**	**-4.3**	**-30.5**	**-30.4**	**-0.7**	***-17.8***	***14.3***
Apr	-0.3	-41.0	-54.2		-114.6	-112.5	*-64.5*	*49.0*	Apr	-12.7		-19.7	-19.7	-0.3	*-13.1*	*9.2*
May	-0.4	-36.6	-58.2		-118.5	-116.2	*-66.0*	*51.3*	May	-13.1		-23.5	-23.4	-0.3	*-15.1*	*11.0*
Jun	-0.5	-33.5	-56.6		-114.8	-112.5	*-63.6*	*49.9*	Jun	-13.8		-25.0	-25.0	-0.4	*-16.0*	*11.7*
Seas_2	**-1.2**	**-111.1**	**-169.0**	**-2.6**	**-347.9**	**-341.2**	***-162.2***	***155.3***	**Seas_2**	**-39.6**	**-5.4**	**-68.2**	**-68.1**	**-1.0**	***-36.5***	***32.5***
Jul	-0.5	-31.4	-57.9		-118.6	-116.2	*-64.9*	*52.1*	Jul	-14.5		-27.7	-27.7	-0.4	*-17.6*	*13.0*
Aug	-1.0	-28.9	-56.7		-118.5	-116.2	*-64.3*	*52.3*	Aug	-14.9		-29.2	-29.2	-0.8	*-18.5*	*13.6*
Sep	-1.3	-27.7	-53.6		-114.6	-112.5	*-61.9*	*50.6*	Sep	-15.8		-29.5	-29.4	-1.0	*-18.9*	*13.6*
Seas_3	**-2.9**	**-88.0**	**-168.1**	**-2.4**	**-351.8**	**-345.0**	***-159.7***	***158.6***	**Seas_3**	**-45.2**	**-5.1**	**-86.4**	**-86.3**	**-2.3**	***-45.0***	***41.3***
Oct	-2.0	-27.7	-54.0		-118.4	-116.2	*-63.7*	*52.3*	Oct	-17.1		-31.5	-31.5	-1.6	*-20.4*	*14.3*
Nov	-1.2	-31.3	-51.1		-114.4	-112.5	*-62.1*	*50.2*	Nov	-20.1		-31.3	-31.3	-0.9	*-20.9*	*14.3*
Dec	-0.7	-33.0	-50.1		-114.3	-112.5	*-62.1*	*50.1*	Dec	-22.5		-32.1	-32.1	-0.5	*-21.8*	*14.9*
Seas_4	**-3.9**	**-91.9**	**-155.3**	**-2.2**	**-347.1**	**-341.2**	***-156.9***	***156.0***	**Seas_4**	**-59.7**	**-6.5**	**-94.9**	**-94.8**	**-3.0**	***-51.8***	***45.3***
Annual	**-8.7**	**-412.0**	**-600.1**	**-9.7**	**-1391.7**	**-1368.7**	***-631.8***	***623.7***	**Annual**	**-167.5**	**-21.2**	**-279.9**	**-279.7**	**-7.1**	***-151.1***	***133.2***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
[a] - SimpleBox data are presented for moderate scale.

Table 3.50. *Calculation results: PCB-153 mass flows transported in/out the calculation domain through ocean (kg/month) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data			Results obtained on the basis of historical emissions			*m*	σ	Month	Results obtained on the basis of zero initial concentrations				*m*	σ
	G-CIEMS_1	SimpleBox 3.0_1[a]	MSCE-POP_1	CliMo Chem_2_3	SimpleBox 3.0_3[a]	SimpleBox 3.12_3[a]				CliMo Chem_2_2	SimpleBox 3.0_2[a]	SimpleBox 3.12_2[a]	MSCE-POP_2		
Jan	-37.8	-29.8	-0.2		-251.1	-251.5	*-114.1*	*126.1*	Jan		-3.9	-3.9	-0.1	*-2.6*	*2.2*
Feb	-40.3	-61.2	-0.3		-235.3	-236.5	*-114.7*	*112.8*	Feb		-10.6	-10.6	-0.3	*-7.1*	*5.9*
Mar	-40.5	-85.9	-0.4		-251.6	-253.6	*-126.4*	*119.1*	Mar		-17.1	-17.1	-0.4	*-11.5*	*9.7*
Seas_1	**-118.6**	**-176.8**	**-0.9**	**-2.1**	**-738.0**	**-741.6**	***-296.3***	***350.2***	**Seas_1**	**-2.9**	**-31.6**	**-31.5**	**-0.8**	***-16.7***	***17.2***
Apr	-39.9	-93.5	-0.3		-243.4	-245.9	*-124.6*	*114.5*	Apr		-21.1	-21.0	-0.3	*-14.1*	*12.0*
May	-35.6	-101.1	-0.4		-251.4	-254.4	*-128.6*	*119.1*	May		-25.4	-25.4	-0.3	*-17.0*	*14.5*
Jun	-32.6	-98.4	-0.5		-242.9	-246.3	*-124.2*	*115.5*	Jun		-27.4	-27.4	-0.4	*-18.4*	*15.6*
Seas_2	**-108.1**	**-293.0**	**-1.2**	**-2.4**	**-737.7**	**-746.6**	***-314.9***	***347.7***	**Seas_2**	**-3.9**	**-73.9**	**-73.9**	**-1.0**	***-38.2***	***41.3***
Jul	-30.6	-100.1	-0.5		-250.7	-254.5	*-127.3*	*120.0*	Jul		-30.7	-30.7	-0.4	*-20.6*	*17.5*
Aug	-28.2	-97.3	-1.0		-250.2	-254.2	*-126.2*	*120.3*	Aug		-32.7	-32.7	-0.8	*-22.1*	*18.4*
Sep	-27.0	-91.0	-1.3		-241.7	-245.7	*-121.3*	*116.4*	Sep		-33.2	-33.2	-0.9	*-22.5*	*18.6*
Seas_3	**-85.7**	**-288.4**	**-2.8**	**-2.2**	**-742.6**	**-754.3**	***-312.7***	***353.4***	**Seas_3**	**-3.7**	**-96.6**	**-96.6**	**-2.1**	***-49.8***	***54.1***
Oct	-27.0	-90.7	-2.0		-249.2	-253.5	*-124.5*	*120.3*	Oct		-35.7	-35.7	-1.5	*-24.3*	*19.7*
Nov	-30.5	-84.6	-1.1		-240.7	-245.0	*-120.4*	*115.7*	Nov		-35.7	-35.7	-0.8	*-24.1*	*20.1*
Dec	-32.2	-81.7	-0.6		-240.1	-244.6	*-119.9*	*115.5*	Dec		-36.7	-36.7	-0.5	*-24.6*	*20.9*
Seas_4	**-89.7**	**-256.9**	**-3.7**	**-2.0**	**-730.0**	**-743.1**	***-304.2***	***347.5***	**Seas_4**	**-4.6**	**-108.1**	**-108.1**	**-2.8**	***-55.9***	***60.3***
Annual	**-402.2**	**-1015.2**	**-8.6**	**-8.7**	**-2948.3**	**-2985.7**	***-1228.1***	***1396.4***	**Annual**	**-15.1**	**-310.3**	**-310.1**	**-6.7**	***-160.5***	***172.8***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;

MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;

SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;

SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;

SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;

a - SimpleBox data are presented for moderate scale.

Table 3.51. *Comparison of the calculation results on PCB-153 mass flows transported in/out the calculation domain through ocean (kg/month) obtained by models on the basis of two data sets: "reference" and "own or alternative" data sets*

Month	CliMoChem_2_3		G-CIEMS_1		SimpleBox 3.0_1		SimpleBox 3.0_2		SimpleBox 3.12_2		SimpleBox 3.0 _3		SimpleBox 3.12_3		MSCE-POP_1		MSCE-POP_2		CliMoChem_2_2	
	ref	own	ref	alt	ref	alt	ref	alt	ref	alt	ref	alt	ref	alt	ref	own	ref	own	ref	own
Jan			-38.3	-37.8	-20.1	-29.8	-3.9	-3.9	-3.9	-3.9	-116.9	-251.1	-116.2	-251.5	-0.2	-0.2	-0.1	-0.1		
Feb			-41.1	-40.3	-37.1	-61.2	-10.3	-10.6	-10.3	-10.6	-110.0	-235.3	-108.7	-236.5	-0.3	-0.3	-0.3	-0.3		
Mar			-41.6	-40.5	-50.5	-85.9	-16.3	-17.1	-16.3	-17.1	-118.1	-251.6	-116.2	-253.6	-0.4	-0.4	-0.3	-0.4		
Seas_1	**-2.4**	**-2.1**	**-121.1**	**-118.6**	**-107.7**	**-176.8**	**-30.5**	**-31.6**	**-30.4**	**-31.5**	**-345.0**	**-738.0**	**-341.2**	**-741.6**	**-0.8**	**-0.9**	**-0.7**	**-0.8**	**-4.3**	**-2.9**
Apr			-41.0	-39.9	-54.2	-93.5	-19.7	-21.1	-19.7	-21.0	-114.6	-243.4	-112.5	-245.9	-0.3	-0.3	-0.3	-0.3		
May			-36.6	-35.6	-58.2	-101.1	-23.5	-25.4	-23.4	-25.4	-118.5	-251.4	-116.2	-254.4	-0.4	-0.4	-0.3	-0.3		
Jun			-33.5	-32.6	-56.6	-98.4	-25.0	-27.4	-25.0	-27.4	-114.8	-242.9	-112.5	-246.3	-0.5	-0.5	-0.4	-0.4		
Seas_2	**-2.6**	**-2.4**	**-111.1**	**-108.1**	**-169.0**	**-293.0**	**-68.2**	**-73.9**	**-68.1**	**-73.9**	**-347.9**	**-737.7**	**-341.2**	**-746.6**	**-1.2**	**-1.2**	**-1.0**	**-1.0**	**-5.4**	**-3.9**
Jul			-31.4	-30.6	-57.9	-100.1	-27.7	-30.7	-27.7	-30.7	-118.6	-250.7	-116.2	-254.5	-0.5	-0.5	-0.4	-0.4		
Aug			-28.9	-28.2	-56.7	-97.3	-29.2	-32.7	-29.2	-32.7	-118.5	-250.2	-116.2	-254.2	-1.0	-1.0	-0.8	-0.8		
Sep			-27.7	-27.0	-53.6	-91.0	-29.5	-33.2	-29.4	-33.2	-114.6	-241.7	-112.5	-245.7	-1.3	-1.3	-1.0	-0.9		
Seas_3	**-2.4**	**-2.2**	**-88.0**	**-85.7**	**-168.1**	**-288.4**	**-86.4**	**-96.6**	**-86.3**	**-96.6**	**-351.8**	**-742.6**	**-345.0**	**-754.3**	**-2.9**	**-2.8**	**-2.3**	**-2.1**	**-5.1**	**-3.7**
Oct			-27.7	-27.0	-54.0	-90.7	-31.5	-35.7	-31.5	-35.7	-118.4	-249.2	-116.2	-253.5	-2.0	-2.0	-1.6	-1.5		
Nov			-31.3	-30.5	-51.1	-84.6	-31.3	-35.7	-31.3	-35.7	-114.4	-240.7	-112.5	-245.0	-1.2	-1.1	-0.9	-0.8		
Dec			-33.0	-32.2	-50.1	-81.7	-32.1	-36.7	-32.1	-36.7	-114.3	-240.1	-112.5	-244.6	-0.7	-0.6	-0.5	-0.5		
Seas_4	**-2.2**	**-2.0**	**-91.9**	**-89.7**	**-155.3**	**-256.9**	**-94.9**	**-108.1**	**-94.8**	**-108.1**	**-347.1**	**-730.0**	**-341.2**	**-743.1**	**-3.9**	**-3.7**	**-3.0**	**-2.8**	**-6.5**	**-4.6**
Annual	**-9.7**	**-8.7**	**-412.0**	**-402.2**	**-600.1**	**-1015.2**	**-279.9**	**-310.3**	**-279.7**	**-310.1**	**-1391.7**	**-2948.3**	**-1368.7**	**-2985.7**	**-8.7**	**-8.6**	**-7.1**	**-6.7**	**-21.2**	**-15.1**

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period.

3.3.3. Calculated values of PCB-153 mass flows transported in/out the calculation domain through other compartments

Reference data set. Calculation results on PCB-153 mass flows transported in/out the calculation domain through sediments, soil and vegetation calculated by SimpleBox model on the basis of "reference" data set together with statistical parameters used for evaluation are presented in Table 3.52.

Monthly values of PCB-153 mass flows transported in/out the calculation domain through sediments, soil and vegetation calculated by SimpleBox model on the basis of "reference" data set are presented in Fig. 3.72.

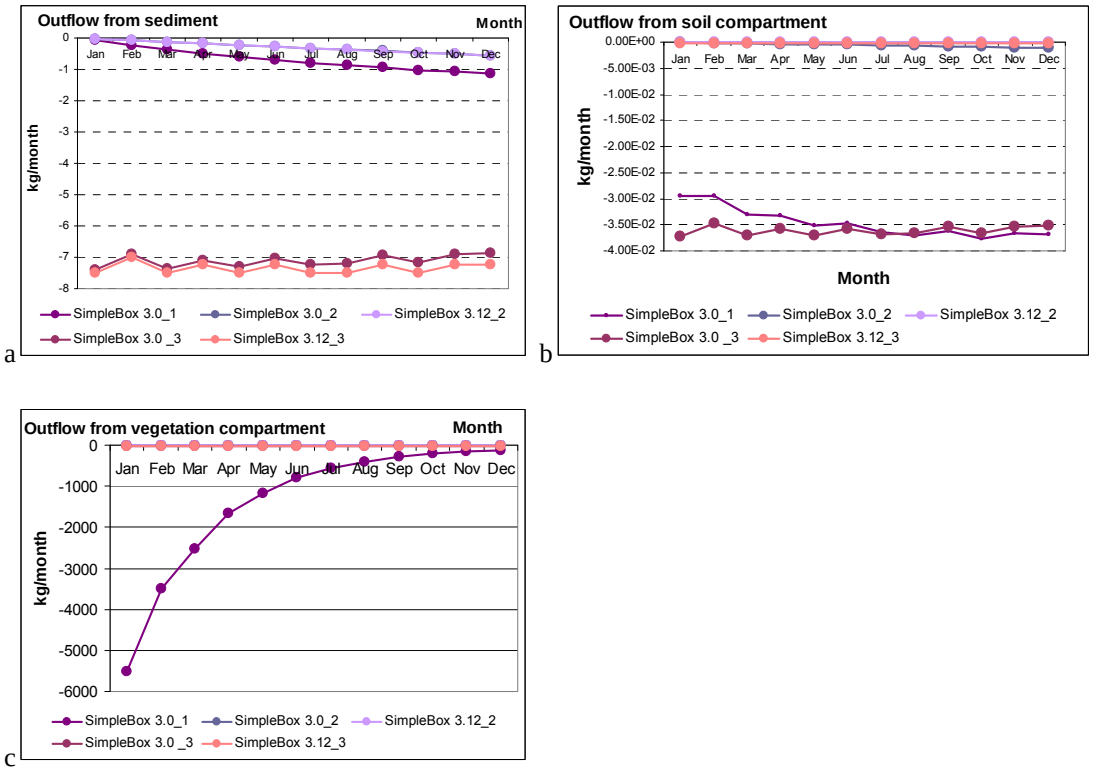


Fig. 3.72. *PCB-153 mass flows transported in/out the calculation domain through sediment (a), soil (b) and vegetation(c) calculated by SimpleBox on the basis of "reference" data set*

Own/alternative data set. Calculation results on PCB-153 mass flows transported in/out the calculation domain through sediments, soil and vegetation calculated by SimpleBox model on the basis of "alternative" data sets together with statistical parameters used for evaluation are presented in Table 3.53.

Monthly values of PCB-153 mass flows transported in/out the calculation domain through sediments, soil and vegetation calculated by SimpleBox model on the basis of "alternative" data set are compared in Fig. 3.73.

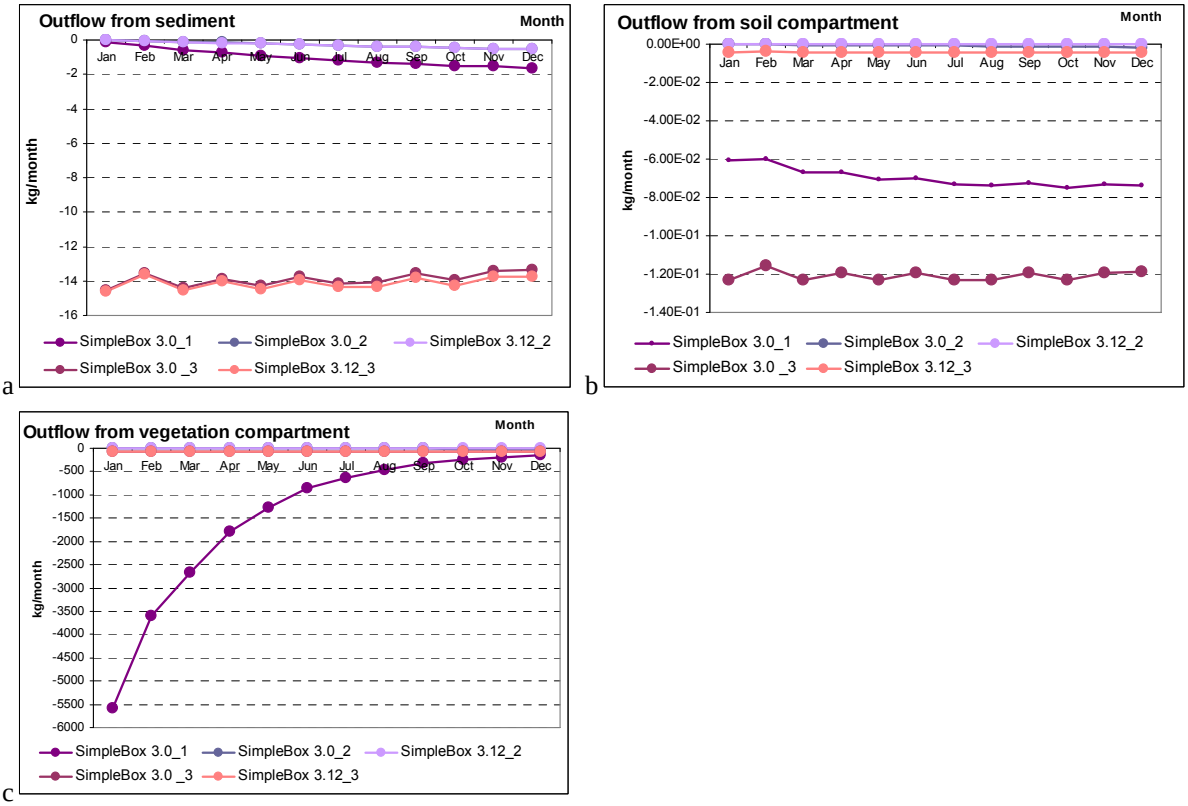


Fig. 3.73. *PCB-153 mass flows transported in/out the calculation domain through sediment (a), soil (b) and vegetation(c) calculated by SimpleBox on the basis of "alternative" data sets*

Comparison between results obtained on the basis of two data sets. The percentage difference between calculation results obtained with two different data sets of physical-chemical properties (for SimpleBox model) is shown in Table 3.54.

In results on mass flows of PCB-153 transported in/out the calculation domain through sediments, soil and vegetation obtained on the basis of "alternative" and "reference" data sets, there is the largest difference between values of mass flows transported out soil observed for SimpleBox 3.12_2 and SimpleBox 3.12_3 output.

Table 3.52. *Calculation results: PCB-153 mass flows transported in/out the calculation domain through sediments, soil and vegetation (kg/month) calculated by SimpleBox on the basis of "reference" data set*

Month	Sediment					Soil					Vegetation				
	Outflow from sediment compartment = burial					Outflow from soil compartment = leaching					Outflow from vegetation compartment = harvest of agricultural vegetation				
	SimpleBox 3.0_1	SimpleBox 3.0_2	SimpleBox 3.12_2	SimpleBox 3.0 _3	SimpleBox 3.12_3	SimpleBox 3.0_1	SimpleBox 3.0_2	SimpleBox 3.12_2	SimpleBox 3.0_3	SimpleBox 3.12_3	SimpleBox 3.0_1	SimpleBox 3.0_2	SimpleBox 3.12_2	SimpleBox 3.0 _3	SimpleBox 3.12_3
Jan	-0.08	-0.02	-0.02	-7.41	-7.49	-2.95E-02	-4.31E-05	-1.18E-08	-3.73E-02	-1.37E-04	-5522.1	-1.8	-1.8	-34.9	-34.9
Feb	-0.23	-0.07	-0.07	-6.90	-7.00	-2.95E-02	-1.28E-04	-3.42E-08	-3.48E-02	-1.28E-04	-3493.3	-4.5	-4.4	-32.6	-32.7
Mar	-0.38	-0.12	-0.12	-7.35	-7.49	-3.31E-02	-2.33E-04	-6.12E-08	-3.71E-02	-1.37E-04	-2538.2	-6.9	-6.7	-34.8	-34.9
Apr	-0.48	-0.17	-0.17	-7.09	-7.24	-3.32E-02	-3.20E-04	-8.33E-08	-3.58E-02	-1.32E-04	-1664.4	-8.1	-7.9	-33.6	-33.8
May	-0.61	-0.22	-0.23	-7.29	-7.49	-3.52E-02	-4.29E-04	-1.11E-07	-3.70E-02	-1.37E-04	-1174.1	-9.4	-9.1	-34.7	-34.9
Jun	-0.68	-0.27	-0.27	-7.03	-7.24	-3.48E-02	-5.11E-04	-1.31E-07	-3.57E-02	-1.32E-04	-782.0	-9.7	-9.4	-33.5	-33.8
Jul	-0.80	-0.33	-0.33	-7.24	-7.49	-3.65E-02	-6.27E-04	-1.60E-07	-3.68E-02	-1.37E-04	-563.6	-10.6	-10.1	-34.6	-34.9
Aug	-0.88	-0.38	-0.38	-7.21	-7.49	-3.70E-02	-7.28E-04	-1.84E-07	-3.67E-02	-1.37E-04	-397.4	-10.9	-10.4	-34.6	-34.9
Sep	-0.93	-0.41	-0.42	-6.95	-7.24	-3.61E-02	-8.01E-04	-2.01E-07	-3.55E-02	-1.32E-04	-278.6	-10.9	-10.3	-33.4	-33.8
Oct	-1.03	-0.47	-0.48	-7.15	-7.49	-3.76E-02	-9.27E-04	-2.32E-07	-3.66E-02	-1.37E-04	-214.6	-11.4	-10.8	-34.5	-34.9
Nov	-1.06	-0.51	-0.51	-6.90	-7.24	-3.66E-02	-9.93E-04	-2.47E-07	-3.53E-02	-1.32E-04	-159.8	-11.2	-10.5	-33.3	-33.8
Dec	-1.13	-0.55	-0.56	-6.87	-7.24	-3.68E-02	-1.09E-03	-2.69E-07	-3.53E-02	-1.32E-04	-128.1	-11.4	-10.6	-33.3	-33.8
Annual	**-8.29**	**-3.51**	**-3.56**	**-85.38**	**-88.13**	**-4.16E-01**	**-6.83E-03**	**-1.72E-06**	**-4.34E-01**	**-1.61E-03**	**-16916.1**	**-106.9**	**-101.9**	**-408.0**	**-411.4**

SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;

SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;

SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;

* - SimpleBox data are presented for moderate scale

Table 3.53. *Calculation results: PCB-153 mass flows transported in/out the calculation domain through sediment, soil and vegetation (kg/month) calculated by SimpleBox on the basis of "alternative data sets"*

Month	Sediment					Soil					Vegetation				
	Outflow from sediment compartment = burial					Outflow from soil compartment = leaching					Outflow from vegetation compartment = harvest of agricultural vegetation				
	SimpleBox 3.0_1	SimpleBox 3.0_2	SimpleBox 3.12_2	SimpleBox 3.0 _3	SimpleBox 3.12_3	SimpleBox 3.0_1	SimpleBox 3.0_2	SimpleBox 3.12_2	SimpleBox 3.0 _3	SimpleBox 3.12_3	SimpleBox 3.0_1	SimpleBox 3.0_2	SimpleBox 3.12_2	SimpleBox 3.0 _3	SimpleBox 3.12_3
Jan	-0.13	-0.02	-0.02	-14.52	-14.63	-6.09E-02	-6.13E-05	-3.17E-07	-1.23E-01	-4.27E-03	-5576.0	-1.9	-1.8	-69.3	-69.5
Feb	-0.36	-0.07	-0.07	-13.52	-13.65	-6.02E-02	-1.83E-04	-9.48E-07	-1.15E-01	-3.99E-03	-3596.6	-4.8	-4.7	-66.0	-66.6
Mar	-0.60	-0.12	-0.12	-14.39	-14.55	-6.71E-02	-3.33E-04	-1.73E-06	-1.23E-01	-4.26E-03	-2663.1	-7.4	-7.2	-71.5	-72.3
Apr	-0.76	-0.17	-0.17	-13.86	-14.03	-6.69E-02	-4.59E-04	-2.38E-06	-1.19E-01	-4.12E-03	-1779.6	-8.7	-8.4	-69.8	-70.7
May	-0.94	-0.22	-0.23	-14.26	-14.46	-7.08E-02	-6.18E-04	-3.21E-06	-1.23E-01	-4.25E-03	-1278.4	-10.1	-9.8	-72.5	-73.6
Jun	-1.04	-0.26	-0.27	-13.74	-13.95	-6.98E-02	-7.38E-04	-3.83E-06	-1.19E-01	-4.11E-03	-866.5	-10.6	-10.2	-70.5	-71.5
Jul	-1.20	-0.32	-0.33	-14.13	-14.38	-7.31E-02	-9.09E-04	-4.71E-06	-1.23E-01	-4.24E-03	-634.7	-11.5	-11.0	-73.0	-74.1
Aug	-1.32	-0.37	-0.38	-14.07	-14.34	-7.40E-02	-1.06E-03	-5.48E-06	-1.23E-01	-4.24E-03	-454.2	-11.9	-11.4	-73.1	-74.2
Sep	-1.37	-0.41	-0.42	-13.56	-13.83	-7.23E-02	-1.17E-03	-6.04E-06	-1.19E-01	-4.10E-03	-322.4	-11.9	-11.3	-70.9	-71.9
Oct	-1.51	-0.47	-0.48	-13.95	-14.26	-7.53E-02	-1.35E-03	-7.01E-06	-1.23E-01	-4.23E-03	-250.6	-12.5	-11.9	-73.3	-74.3
Nov	-1.55	-0.50	-0.51	-13.44	-13.76	-7.34E-02	-1.45E-03	-7.53E-06	-1.19E-01	-4.09E-03	-187.7	-12.3	-11.6	-70.9	-71.9
Dec	-1.62	-0.55	-0.56	-13.38	-13.72	-7.38E-02	-1.59E-03	-8.26E-06	-1.19E-01	-4.08E-03	-150.7	-12.5	-11.7	-70.9	-71.9
Annual	**-12.39**	**-3.49**	**-3.55**	**-166.83**	**-169.55**	**-8.38E-01**	**-9.92E-03**	**-5.14E-05**	**-1.45E+00**	**-5.00E-02**	**-17760.5**	**-115.9**	**-111.1**	**-851.8**	**-862.6**

SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;

SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;

SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;

* - SimpleBox data are presented for moderate scale.

Table 3.54. *The percentage difference between calculation results on PCB-153 mass flows transported in/out the calculation domain through sediments, soil and vegetation calculated by SimpleBox model on the basis of two data sets: "reference" and "alternative"*

Month	Sediment					Soil					Vegetation				
	Outflow from sediment compartment = burial					Outflow from soil compartment = leaching					Outflow from vegetation compartment = harvest of agricultural vegetation				
	SimpleBox 3.0_1	SimpleBox 3.0_2	SimpleBox 3.12_2	SimpleBox 3.0 _3	SimpleBox 3.12_3	SimpleBox 3.0_1	SimpleBox 3.0_2	SimpleBox 3.12_2	SimpleBox 3.0 _3	SimpleBox 3.12_3	SimpleBox 3.0_1	SimpleBox 3.0_2	SimpleBox 3.12_2	SimpleBox 3.0 _3	SimpleBox 3.12_3
Jan	53.6%	-3.3%	-3.2%	96.0%	95.5%	106%	42%	2583%	231%	3026%	1%	4%	5%	98%	99%
Feb	57.7%	-2.4%	-2.3%	95.9%	94.9%	104%	43%	2674%	231%	3023%	3%	5%	6%	102%	104%
Mar	57.2%	-2.0%	-1.9%	95.8%	94.3%	103%	43%	2723%	232%	3019%	5%	6%	7%	105%	107%
Apr	55.8%	-1.7%	-1.6%	95.7%	93.7%	102%	44%	2762%	233%	3016%	7%	7%	7%	108%	109%
May	54.3%	-1.4%	-1.3%	95.6%	93.2%	101%	44%	2796%	233%	3012%	9%	8%	8%	109%	111%
Jun	52.7%	-1.2%	-1.1%	95.4%	92.6%	101%	44%	2826%	234%	3008%	11%	8%	9%	110%	111%
Jul	51.1%	-1.0%	-0.8%	95.3%	92.1%	100%	45%	2853%	235%	3005%	13%	9%	9%	111%	112%
Aug	49.5%	-0.7%	-0.6%	95.2%	91.5%	100%	45%	2879%	235%	3001%	14%	9%	10%	112%	112%
Sep	48.1%	-0.5%	-0.4%	95.1%	91.0%	100%	46%	2903%	236%	2997%	16%	9%	10%	112%	113%
Oct	46.7%	-0.3%	-0.2%	95.0%	90.4%	100%	46%	2925%	236%	2994%	17%	9%	10%	112%	113%
Nov	45.3%	-0.1%	0.1%	94.9%	89.9%	100%	46%	2947%	237%	2990%	17%	10%	10%	113%	113%
Dec	44.1%	0.1%	0.3%	94.8%	89.4%	101%	47%	2967%	238%	2987%	18%	10%	10%	113%	113%
Annual	**49.5%**	**-0.7%**	**-0.5%**	**95.4%**	**92.4%**	**101%**	**45%**	**2882%**	**234%**	**3007%**	**5%**	**8%**	**9%**	**109%**	**110%**

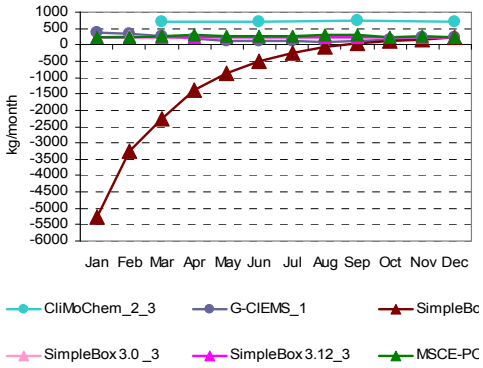
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;

3.3.4. Comparison of calculated values of PCB-153 total mass flows transported in/out the specified domain

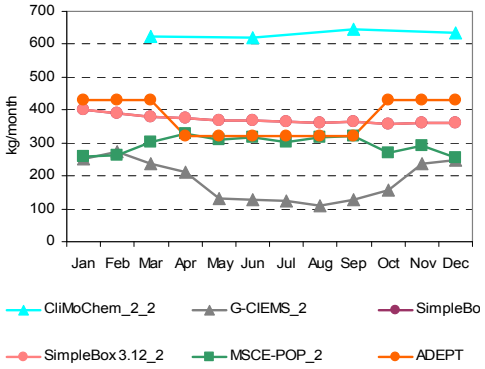
Values of total mass flow transported in/out the calculation domain are calculated as sum of inflow (emissions) and all outflows through the main transport media.

Reference data set. Calculation results on PCB-153 total mass flows transported in/out the specified domain calculated by the models on the basis of "reference" data set together with statistical parameters used for evaluation are presented in Table 3.55.

Monthly values of total PCB-153 total mass flows transported in/out the specified domain calculated by the participating models on the basis of "reference" data set and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.74 a and b, respectively. Seasonal variations of positive values of total PCB-153 total mass flows transported in/out the specified domain calculated by the participating models on the basis of "reference" data set and non-zero initial conditions are also shown in Fig. 3.74c in more detail.



a



b

Fig. 3.74a. *PCB-153 mass flows transported in/out the specified domain (kg/month) calculated by the participating models on the basis of "reference" data set and non-zero initial conditions*

Fig. 3.74b. *PCB-153 mass flows transported in/out the specified domain (kg/month) calculated by the participating models on the basis of "reference" data set and zero initial conditions*

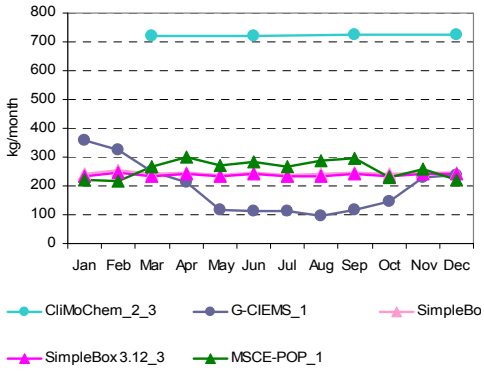
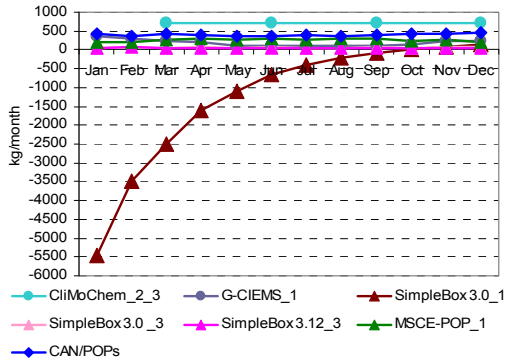


Fig. 3.74c. *PCB-153 mass flows transported in/out the specified domain (kg/month) calculated by the participating models on the basis of "reference" data set and non-zero initial conditions (positive values)*

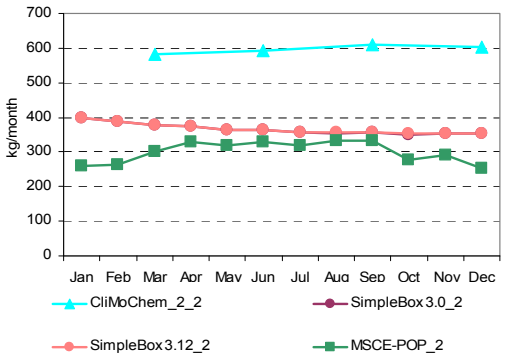
Own/alternative data set. Calculation results on PCB-153 total mass flows transported in/out the specified domain calculated by the models on the basis of "own or alternative" data sets together with statistical parameters used for evaluation are presented in Table 3.56.

Monthly values of total PCB-153 mass flows transported in/out the specified domain calculated by the participating models on the basis of “own or alternative” data sets and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.75 a and b, respectively. Seasonal variations of positive values of total PCB-153 total mass flows transported in/out the specified domain calculated by the participating models on the basis of “own or alternative” data sets and non-zero initial conditions are also shown in Fig. 3.74c in more detail.



a

Fig. 3.75a. *PCB-153 mass flows transported in/out the specified domain (kg/month) calculated by the participating models on the basis of “own or alternative” data set and non-zero initial conditions*



b

Fig. 3.75b. *PCB-153 mass flows transported in/out the specified domain (kg/month) calculated by the participating models on the basis of “own or alternative” data set and zero initial conditions*

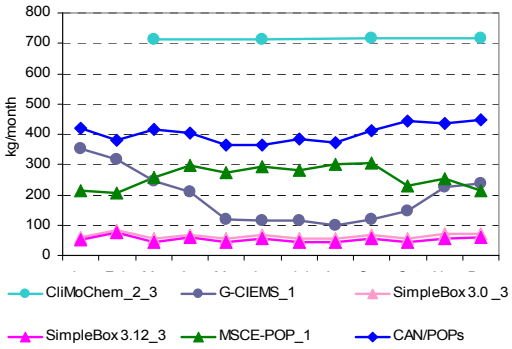


Fig. 3.75c. *PCB-153 mass flows transported in/out the specified domain (kg/month) calculated by the participating models on the basis of “own or alternative” data sets and non-zero initial conditions (positive values)*

Comparison between results obtained on the basis of two data sets. A comparison of the calculation results obtained with two data sets of physical-chemical properties (for those models who provided calculations for both these sets) is shown in Table 3.57.

Table 3.55. *Calculation results: PCB-153 total mass flows transported in/out the specified domain (kg/month) calculated by models on the basis of "reference" data set and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data			Results obtained on the basis of historical emissions			*m*	σ	Month	Results obtained on the basis of zero initial concentrations						*m*	σ
	G-CIEMS_1	SimpleBox 3.0_1[a]	MSCE-POP_1	CliMo Chem_2_3	SimpleBox 3.0 _3[a]	SimpleBox 3.12_3[a]				G-CIEMS_2	CliMo Chem_2_2	SimpleBox 3.0_2[a]	SimpleBox 3.12_2[a]	MSCE-POP_2	ADEPT		
Jan	359.6	-5266.8	222.4		240.2	232.7	*-842.4*	*2473.9*	Jan	252.2		400.5	400.5	258.8	430.3	*348.5*	*85.7*
Feb	324.0	-3262.2	216.9		254.4	247.4	*-443.9*	*1576.0*	Feb	272.7		391.2	391.3	262.1	430.3	*349.5*	*76.7*
Mar	250.1	-2262.5	265.9		239.7	232.7	*-254.8*	*1122.4*	Mar	236.3		378.8	379.0	302.3	430.3	*345.3*	*76.2*
Seas_1	**933.6**	**-10791.5**	**705.2**	**2168.7**	**734.2**	**712.8**	***-922.8***	***4867.6***	**Seas_1**	**761.2**	**1871.9**	**1170.5**	**1170.8**	**823.2**	**1290.9**	***1181.4***	***398.5***
Apr	211.2	-1386.2	301.3		246.6	240.1	*-77.4*	*732.4*	Apr	212.0		376.0	376.2	327.7	320.8	*322.5*	*67.1*
May	117.4	-875.9	271.6		239.4	232.7	*-3.0*	*491.5*	May	131.3		368.9	369.2	308.2	320.8	*299.7*	*98.1*
Jun	112.4	-484.4	281.9		246.6	240.1	*79.3*	*321.6*	Jun	127.7		368.8	369.1	316.7	320.8	*300.6*	*99.9*
Seas_2	**441.0**	**-2746.5**	**854.8**	**2163.3**	**732.6**	**712.8**	***359.7***	***1638.1***	**Seas_2**	**471.0**	**1859.4**	**1113.6**	**1114.5**	**952.6**	**962.4**	***1078.9***	***449.6***
Jul	113.3	-247.9	264.9		239.5	232.7	*120.5*	*214.1*	Jul	125.4		363.2	363.7	302.8	320.8	*295.2*	*98.5*
Aug	97.6	-74.6	286.8		239.6	232.7	*156.4*	*147.1*	Aug	108.2		361.2	361.8	317.8	320.8	*294.0*	*106.0*
Sep	116.1	39.5	296.0		246.9	240.1	*187.7*	*106.2*	Sep	127.5		362.9	363.5	321.3	320.8	*299.2*	*98.3*
Seas_3	**327.0**	**-283.0**	**847.8**	**2177.5**	**726.0**	**705.4**	***750.1***	***811.9***	**Seas_3**	**361.2**	**1936.0**	**1087.3**	**1088.9**	**941.9**	**962.4**	***1063.0***	***506.1***
Oct	145.7	119.2	230.7		239.9	232.7	*193.6*	*56.7*	Oct	155.2		358.3	359.0	270.9	430.3	*314.7*	*105.6*
Nov	228.6	167.3	259.5		247.2	240.1	*228.5*	*36.1*	Nov	238.0		360.5	361.2	291.8	430.3	*336.4*	*73.6*
Dec	236.7	217.6	221.5		247.4	240.1	*232.6*	*12.7*	Dec	246.4		359.5	360.3	255.2	430.3	*330.4*	*78.2*
Seas_4	**611.0**	**504.0**	**711.7**	**2171.5**	**734.6**	**712.8**	***907.6***	***625.2***	**Seas_4**	**639.6**	**1906.9**	**1078.3**	**1080.5**	**817.9**	**1290.9**	***1135.7***	***441.0***
Annual	**2312.6**	**-13317.0**	**3119.5**	**8680.9**	**2927.4**	**2843.9**	***1094.5***	***7446.5***	**Annual**	**2232.9**	**7574.3**	**4449.8**	**4454.8**	**3535.7**	**4507.0**	***4459.1***	***1761.6***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
G-CIEMS_2 - G-CIEMS results calculated on the basis of zero initial concentrations;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
a - SimpleBox data are presented for moderate scale.

Table 3.56. *Calculation results: PCB-153 total mass flows transported in/out the specified domain (kg/month) calculated by models on the basis of "own or alternative" data sets and statistical parameters used for evaluation*

Month	Results obtained on the basis of initial concentrations given as input data				Results obtained on the basis of historical emissions			*m*	σ	Month	Results obtained on the basis of zero initial concentrations				*m*	σ
	CAN/POPs	G-CIEMS_1	SimpleBox 3.0_1[a]	MSCE-POP_1	CliMo Chem_2_3	SimpleBox 3.0 _3[a]	SimpleBox 3.12_3[a]				CliMo Chem_2_2	SimpleBox 3.0_2[a]	SimpleBox 3.12_2[a]	MSCE-POP_2		
Jan	420.2	351.2	-5465.1	214.0		58.1	50.6	*-728.5*	*2325.3*	Jan		399.7	399.7	260.0	*353.1*	*80.7*
Feb	378.4	315.4	-3497.2	206.3		83.0	74.3	*-406.6*	*1519.0*	Feb		389.7	389.8	262.3	*347.3*	*73.6*
Mar	415.7	245.4	-2515.6	257.4		55.9	45.5	*-249.3*	*1118.9*	Mar		376.4	376.6	302.5	*351.8*	*42.7*
Seas_1	**1214.2**	**912.0**	**-11478.0**	**677.6**	**2138.8**	**197.0**	**170.4**	***-881.1***	***4720.8***	**Seas_1**	**1744.9**	**1165.8**	**1166.1**	**824.8**	***1225.4***	***381.9***
Apr	405.1	208.9	-1614.0	297.7		68.5	57.6	*-96.1*	*755.5*	Apr		372.8	373.0	329.7	*358.5*	*24.9*
May	365.5	119.3	-1085.8	274.3		55.1	43.4	*-38.0*	*528.8*	May		364.8	365.1	317.3	*349.1*	*27.5*
Jun	364.4	114.2	-661.5	291.5		68.2	56.4	*38.9*	*365.3*	Jun		364.1	364.5	329.3	*352.6*	*20.2*
Seas_2	**1135.0**	**442.4**	**-3361.4**	**863.5**	**2143.3**	**191.7**	**157.4**	***224.6***	***1723.9***	**Seas_2**	**1775.3**	**1101.7**	**1102.6**	**976.3**	***1239.0***	***362.4***
Jul	385.9	114.9	-405.9	279.2		55.3	42.7	*78.7*	*273.0*	Jul		357.7	358.2	318.3	*344.7*	*22.9*
Aug	374.1	99.6	-210.2	302.4		55.7	42.9	*110.7*	*208.3*	Aug		355.1	355.7	334.0	*348.3*	*12.4*
Sep	410.3	118.1	-73.8	305.3		69.2	56.6	*147.6*	*177.9*	Sep		356.5	357.1	332.4	*348.7*	*14.1*
Seas_3	**1170.2**	**332.5**	**-689.9**	**887.0**	**2155.0**	**180.1**	**142.2**	***596.7***	***908.0***	**Seas_3**	**1831.6**	**1069.4**	**1071.0**	**984.8**	***1239.2***	***397.0***
Oct	441.7	147.1	17.6	229.6		56.6	43.4	*156.0*	*160.5*	Oct		351.3	352.0	275.6	*326.3*	*43.9*
Nov	437.5	227.5	81.2	252.7		70.2	57.3	*187.7*	*148.6*	Nov		353.3	354.1	290.9	*332.8*	*36.3*
Dec	445.6	236.0	141.4	214.6		70.7	57.8	*194.3*	*142.8*	Dec		352.1	352.9	254.4	*319.8*	*56.6*
Seas_4	**1324.8**	**610.6**	**240.2**	**696.8**	**2151.8**	**197.5**	**158.5**	***768.6***	***733.7***	**Seas_4**	**1809.3**	**1056.7**	**1058.9**	**820.8**	***1186.4***	***430.0***
Annual	**4844.3**	**2297.5**	**-15289.1**	**3124.9**	**8588.8**	**766.4**	**628.6**	***708.8***	***7566.4***	**Annual**	**7161.1**	**4393.6**	**4398.6**	**3606.6**	***4890.0***	***1559.2***

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;
a - SimpleBox data are presented for moderate scale.

Table 3.57. *Comparison of the calculation results on PCB-153 mass flows transported in/out the specified domain (kg/month) obtained by models on the basis of two data sets: "reference" and "own or alternative"*

Month	CliMoChem_2_3		G-CIEMS_1		SimpleBox 3.0_1		SimpleBox 3.0_2		SimpleBox 3.12_2		SimpleBox 3.0_3		SimpleBox 3.12_3		MSCE-POP_1		MSCE-POP_2		CliMoChem_2_2	
	ref	own	ref	alt	ref	alt	ref	alt	ref	alt	ref	alt	ref	alt	ref	own	ref	own	ref	own
Jan			359.6	351.2	-5266.8	-5465.1	400.5	399.7	400.5	399.7	240.2	58.1	232.7	50.6	222.4	214.0	258.8	260.0		
Feb			324.0	315.4	-3262.2	-3497.2	391.2	389.7	391.3	389.8	254.4	83.0	247.4	74.3	216.9	206.3	262.1	262.3		
Mar			250.1	245.4	-2262.5	-2515.6	378.8	376.4	379.0	376.6	239.7	55.9	232.7	45.5	265.9	257.4	302.3	302.5		
Seas_1	**2168.7**	**2138.8**	**933.6**	**912.0**	**-10791.5**	**-11478.0**	**1170.5**	**1165.8**	**1170.8**	**1166.1**	**734.2**	**197.0**	**712.8**	**170.4**	**705.2**	**677.6**	**823.2**	**824.8**	**1871.9**	**1744.9**
Apr			211.2	208.9	-1386.2	-1614.0	376.0	372.8	376.2	373.0	246.6	68.5	240.1	57.6	301.3	297.7	327.7	329.7		
May			117.4	119.3	-875.9	-1085.8	368.9	364.8	369.2	365.1	239.4	55.1	232.7	43.4	271.6	274.3	308.2	317.3		
Jun			112.4	114.2	-484.4	-661.5	368.8	364.1	369.1	364.5	246.6	68.2	240.1	56.4	281.9	291.5	316.7	329.3		
Seas_2	**2163.3**	**2143.3**	**441.0**	**442.4**	**-2746.5**	**-3361.4**	**1113.6**	**1101.7**	**1114.5**	**1102.6**	**732.6**	**191.7**	**712.8**	**157.4**	**854.8**	**863.5**	**952.6**	**976.3**	**1859.4**	**1775.3**
Jul			113.3	114.9	-247.9	-405.9	363.2	357.7	363.7	358.2	239.5	55.3	232.7	42.7	264.9	279.2	302.8	318.3		
Aug			97.6	99.6	-74.6	-210.2	361.2	355.1	361.8	355.7	239.6	55.7	232.7	42.9	286.8	302.4	317.8	334.0		
Sep			116.1	118.1	39.5	-73.8	362.9	356.5	363.5	357.1	246.9	69.2	240.1	56.6	296.0	305.3	321.3	332.4		
Seas_3	**2177.5**	**2155.0**	**327.0**	**332.5**	**-283.0**	**-689.9**	**1087.3**	**1069.4**	**1088.9**	**1071.0**	**726.0**	**180.1**	**705.4**	**142.2**	**847.8**	**887.0**	**941.9**	**984.8**	**1936.0**	**1831.6**
Oct			145.7	147.1	119.2	17.6	358.3	351.3	359.0	352.0	239.9	56.6	232.7	43.4	230.7	229.6	270.9	275.6		
Nov			228.6	227.5	167.3	81.2	360.5	353.3	361.2	354.1	247.2	70.2	240.1	57.3	259.5	252.7	291.8	290.9		
Dec			236.7	236.0	217.6	141.4	359.5	352.1	360.3	352.9	247.4	70.7	240.1	57.8	221.5	214.6	255.2	254.4		
Seas_4	**2171.5**	**2151.8**	**611.0**	**610.6**	**504.0**	**240.2**	**1078.3**	**1056.7**	**1080.5**	**1058.9**	**734.6**	**197.5**	**712.8**	**158.5**	**711.7**	**696.8**	**817.9**	**820.8**	**1906.9**	**1809.3**
Annual	**8680.9**	**8588.8**	**2312.6**	**2297.5**	**-13317.0**	**-15289.1**	**4449.8**	**4393.6**	**4454.8**	**4398.6**	**2927.4**	**766.4**	**2843.9**	**628.6**	**3119.5**	**3124.9**	**3535.7**	**3606.6**	**7574.3**	**7161.1**

G-CIEMS_1 - G-CIEMS results calculated on the basis of initial concentrations given as input data;
CliMoChem_2_2 – CliMoChem results calculated on the basis of Land Cover Data given as input data and with zero initial concentrations;
CliMoChem_2_3 - CliMoChem results calculated on the basis of Land Cover Data given as input data and with historical emissions for 20-year period;
MSCE-POP_1 - MSCE-POP results calculated on the basis of initial concentrations given as input data;
MSCE-POP_2 - MSCE-POP results calculated on the basis of zero initial concentrations;
SimpleBox 3.0_1 - SimpleBox results of version 3.0 calculated on the basis of initial concentrations given as input data;
SimpleBox 3.0_2 and SimpleBox 3.12_2 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated on the basis of zero initial concentrations;
SimpleBox 3.0_3 and SimpleBox 3.12_3 – SimpleBox results of versions 3.0 and 3.12, respectively, calculated with historical emissions for 20-year period;

3.3.5. Comparison of PCB-153 mass flows transported in/out the specified domain

The calculation results on PCB-153 transport inside and outside the calculation domain through main transport media such as atmosphere and seawater are discussed in this subsection. Transport of this pollutant from sediment, soil and vegetation compartments due to such processes as burial, leaching and harvest of agricultural vegetation, respectively, is considered in SimpleBox model.

The results considered in Sections 3.3.1-3.3.4 above are obtained with one-year calculations with zero initial concentrations (ADEPT, CliMoChem, G-CIEMS, MSCE-POP, SimpleBox) and with initial concentrations in media (CAN/POPs, G-CIEMS, MSCE-POP, SimpleBox); and with long-term calculations with historical emissions (CliMoChem, SimpleBox). CliMoChem, G-CIEMS, MSCE-POP, and SimpleBox models presented results obtained on the basis of two different physical-chemical data sets. Of note, the calculated values compared below are negative in the case if a model predicted PCB-153 transport out the calculation domain through the considered media.

A preliminary analysis of the comparison of absolute values PCB-153 transport mass flows inside and outside the calculation domain through main transport media is presented in this section. The analysis is made separately for results calculated on the basis of initial concentrations or historical emissions and for results based on zero initial conditions.

Transport through the atmosphere. According to the results on PCB-153 mass flows transported out the calculation domain through the atmosphere calculated on the basis of "reference" and 'own/alternative" data sets (see Tables 3.46 and 3.47 in Section 3.3.1), all models in two groups performed calculations on the basis of non-zero and zero initial conditions give rather close values in terms of annual and monthly absolute values. Square deviation σ does not exceed the mean value of this parameter averaged between the participating models.

Comparison of annual values of PCB-153 mass flows transported out the calculation domain through the atmosphere calculated by different models on the basis of zero initial concentrations and with the use of "***reference***" data set is presented in Fig.3.76a together with the averaged value given as the blue line. Fig. 3.76b shows the same results but obtained on the basis of initial concentrations and historical emissions. In the latter figure different color of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions).

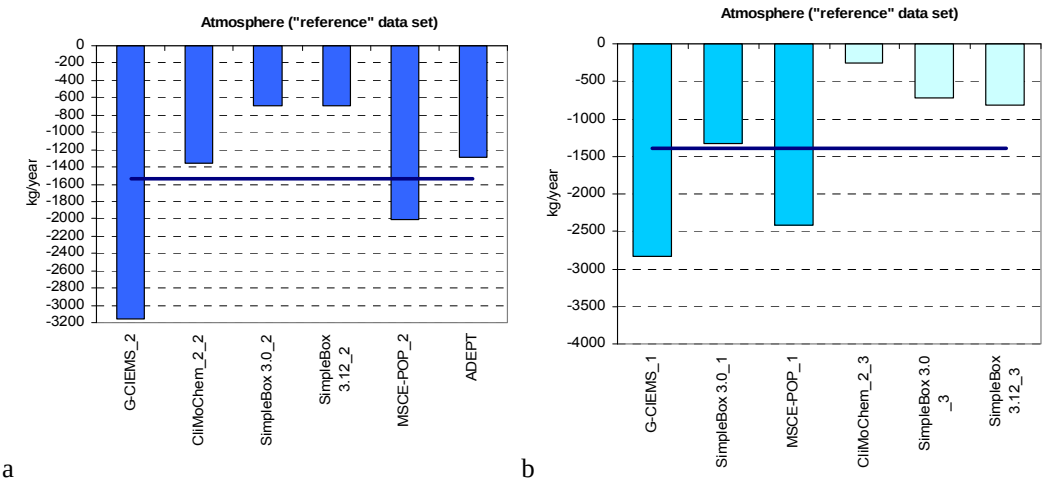
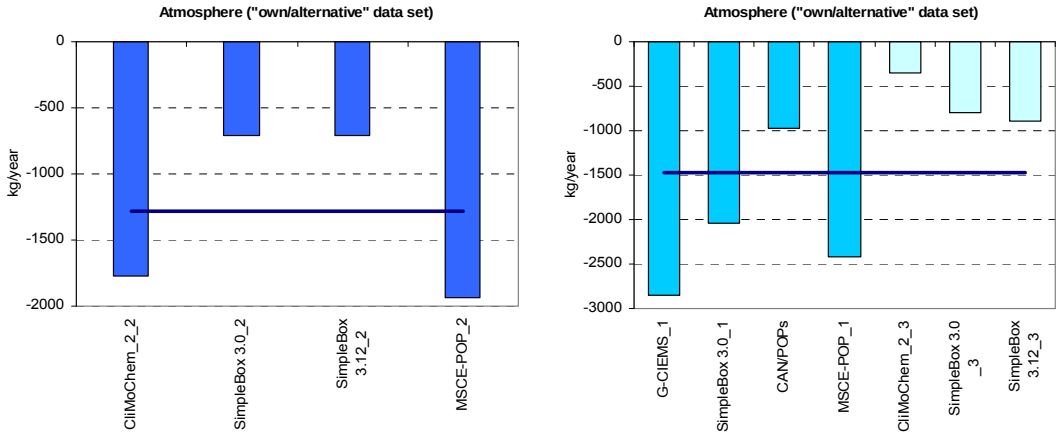


Fig.3.76. *Comparison of annual values of PCB-153 mass flows transported in/out the calculation domain through the atmosphere calculated by different models on the basis of "reference" data set (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

According to the results based on zero initial conditions (see Fig. 3.76a), the difference in absolute values of PCB-153 mass flows transported out the calculation domain through the atmosphere is within a factor of 4.5. At that G-CIEMS and MSCE-POP results calculated on the basis of zero initial conditions exceed the same results of CliMOChem, SimpleBox and ADEPT models and the mean value averaged for all models' results. The calculated absolute values obtained by G-CIEMS, MSCE-POP and SimpleBox 3.0 on the basis of initial conditions are higher than those obtained by CliMoChem and SimpleBox 3.0 and 3.12 with the use of historical emissions (see Fig. 3.76b). The maximum value of PCB-153 mass flows transported out the calculation domain through the atmosphere was obtained by G-CIEMS; the minimum – by CliMoChem model.

Fig.3.77a demonstrates the comparison of the annual values of PCB-153 mass flows transported out the calculation domain through the atmosphere calculated on the basis of zero initial concentrations and with the use of "**own or alternative"** data sets. Fig. 3.77b shows the same results but obtained on the basis of initial concentrations and historical emissions. In the latter figure different color of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions). The blue line in the plots shows the value of the corresponding parameter averaged between models.



a b

Fig.3.77. *Comparison of annual values of PCB-153 mass flows transported in/out the calculation domain through the atmosphere calculated by different models on the basis of "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

As in the case of results obtained with the use of "reference" data set, absolute values of PCB-153 mass flows transported out the calculation domain through the atmosphere results calculated by MSCE-POP and CliMoChem models on the basis of zero initial conditions are higher than those of SimpleBox model and the mean averaged value (see Fig. 3.77a). The scattering between different results based on non-zero initial conditions is less considerable than that in the case of calculations made with the use of "reference" data set (see Fig. 3.77b). The maximum and the minimum absolute values obtained on the basis of non-zero initial conditions are characteristic of G-CIEMS and CliMoChem models' results.

Comparison of annual values of PCB-153 mass flows transported out the calculation domain through the atmosphere obtained with "reference" and "own/alternative" data sets is presented in Fig. 3.78 (see also Table 3.48 given in Section 3.3.1).

According to the data presented, for MSCE-POP results based on initial concentrations of the pollutant in the environmental media there is practically no difference between the annual values calculated with the use of both physical-chemical data sets. In calculations made by this model with zero initial conditions, the usage of "reference" data set slightly increases the absolute value of the considered parameter in comparison with the use of "own or alternative" data. All other models provided higher results obtained on the basis of "own or alternative" data set than those based on "reference" data set.

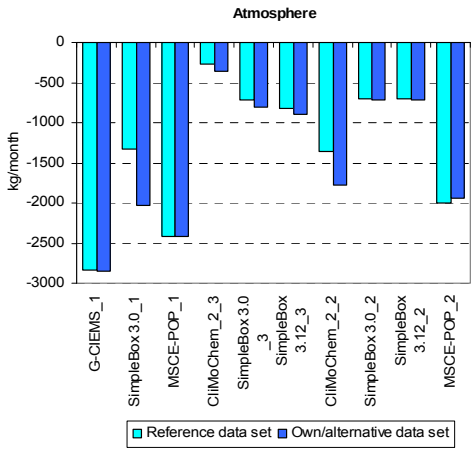


Fig.3.78. *Comparison of PCB-153 mass flows transported in/out the calculation domain through the atmosphere calculated by different models on the basis of two physical-chemical data sets*

Transport through ocean. The difference between participating models in terms of description of PCB transport through seawater compartment is more considerable than that in the case of atmospheric transport. This is observed for results obtained with the use of "own/alternative" data sets both on the basis of zero initial conditions and historical emissions and initial concentrations of the pollutant in the media (see Tables 3.49 and 3.50 given in Section 3.3.2). In the results based on "reference" data set, the square deviation presented for annual and monthly values mainly does not exceed the averaged values.

Comparison of annual values of PCB-153 mass flows transported out the calculation domain through ocean calculated by different models on the basis of zero initial concentrations and with the use of "***reference***" data set is presented in Fig.3.79a. Fig. 3.79b shows the same results but obtained on the basis of initial concentrations and historical emissions. In the latter figure different color of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions). The blue line in the plots shows the value of the corresponding parameter averaged between models.

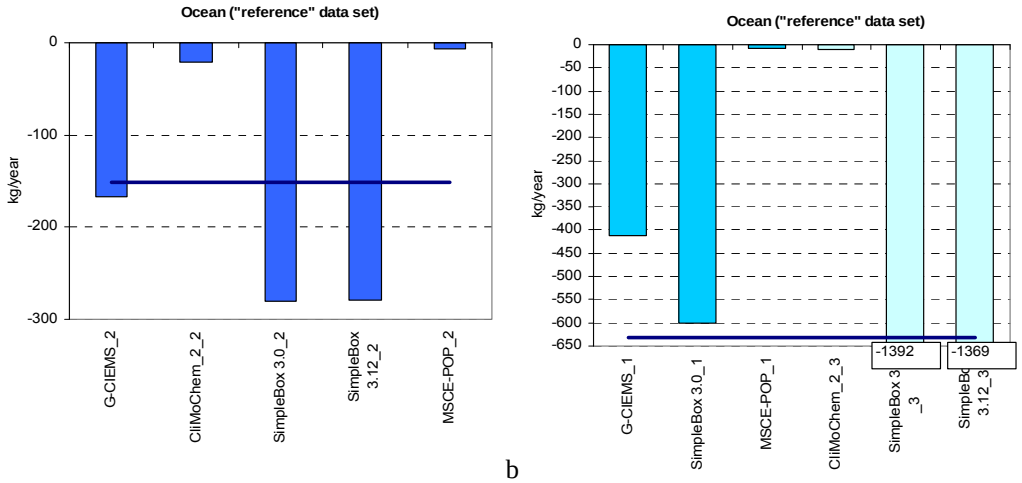
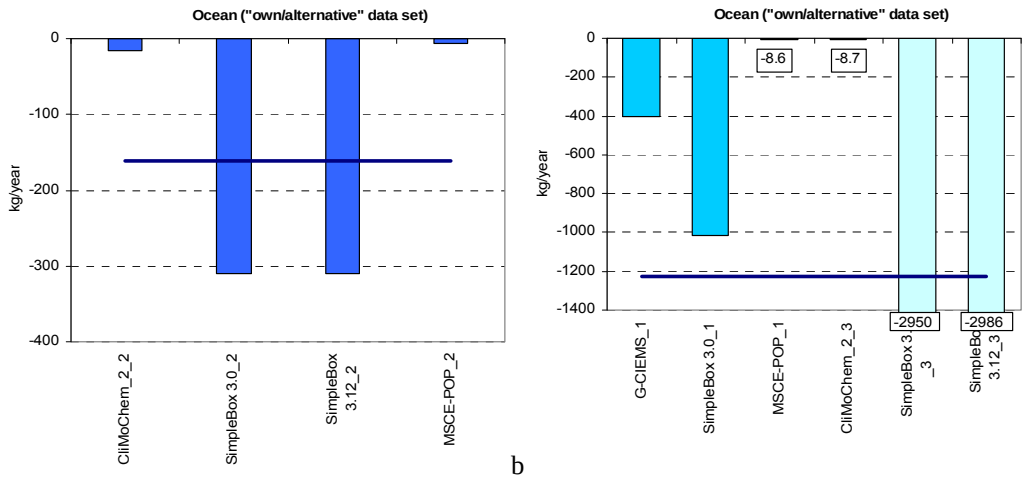


Fig.3.79. *Comparison of annual values of PCB-153 mass flows transported in/out the calculation domain through ocean calculated by different models on the basis of "reference" data set (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

The absolute value of PCB-153 mass flows transported out the calculation domain through ocean calculated by MSCE-POP and CliMoChem models on the basis of zero initial conditions is lower than the same values of G-CIEMS and SimpleBox 3.0 and 3.12 (see Fig. 3.79a). The difference in annual values of PCB-153 mass flows transported out the calculation domain through ocean based on the initial conditions reaches several orders of magnitude due to the minimum and maximum values corresponding to the results of MSCE-POP and SimpleBox 3.0 models, respectively (see Fig. 3.79 b). Three groups of the models' results can be conditionally divided in this experiment: results with the high absolute values (SimpleBox 3.0 and 3.12 used historical emissions); with the medium values (G-CIEMS, and SimpleBox 3.0 based on initial concentrations) and with the low values (MSCE-POP and CliMoChem).

Comparison of annual values of PCB-153 mass flows transported out the calculation domain through ocean calculated by different models on the basis of zero initial concentrations and with the use of "**own or alternative"** data sets is presented in Fig.3.80a. Fig. 3.80b shows the same results but obtained on the basis of initial concentrations and historical emissions. In the latter figure different colour of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions). The blue line in the plots shows the value of the corresponding parameter averaged between models.



a b

Fig.3.80. *Comparison of annual values of PCB-153 mass flows transported in/out the calculation domain through ocean calculated by different models on the basis of "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

The absolute values of PCB-153 mass flows transported out the calculation domain through ocean calculated by SimpleBox 3.0 and 3.12 on the basis of zero initial conditions exceed that obtained by MSCE-POP and CliMoChem models (see Fig. 3.80a). The highest values of PCB-153 mass flows transported out the calculation domain through ocean based on non-zero initial conditions are calculated by SimpleBox model on the basis of historical emissions; and the lowest values are characteristic of results of MSCE-POP and CliMOChem calculations (see Fig. 3.80b).

Comparison of annual values of PCB-153 mass flows transported out the calculation domain through ocean obtained with “reference” and “own/alternative” data sets is presented in Table 3.51 given in Section 3.3.2 and in Fig. 3.81a below. The same data for models with low values of mass flows transported out the calculation domain through ocean are also shown in Fig. 3.81b in more detail.

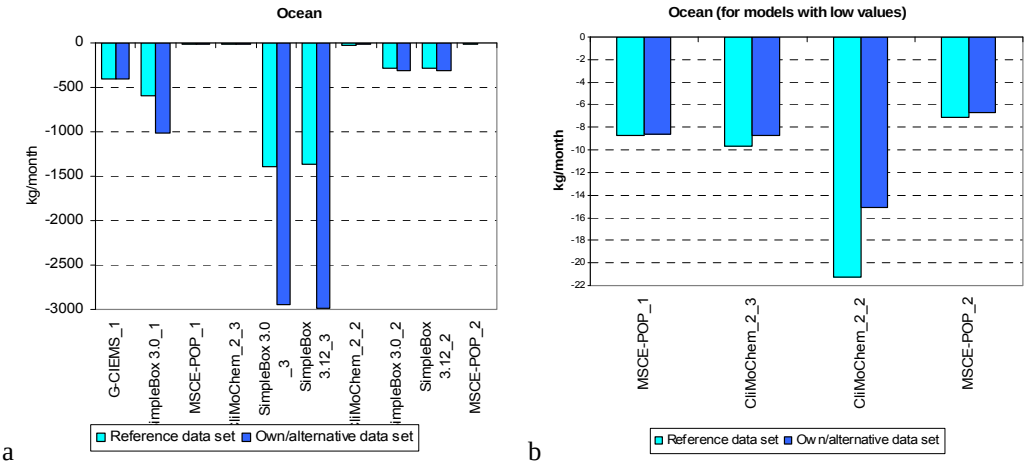


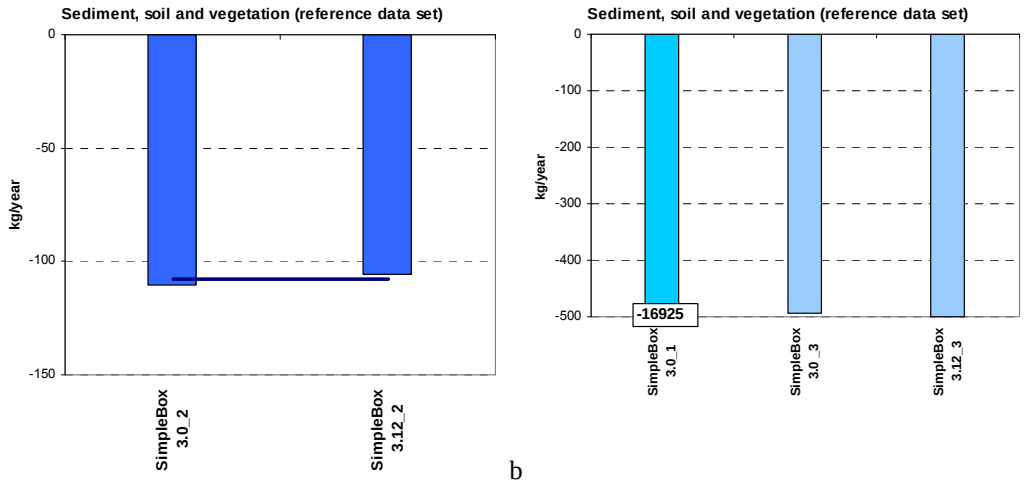
Fig.3.81. *Comparison of PCB-153 mass flows transported in/out the calculation domain through ocean calculated by different models on the basis of two data sets (a - all models; b – models with low values of PCB-153 mass flows transported in/out of ocean).*

For G-CIEMS, MSCE-POP and CliMoChem models, absolute values of PCB-153 mass flows transported out the calculation domain through ocean obtained with “reference” data set are somewhat higher than those obtained with “own/alternative” data set. The most considerable difference between two sets of results is characteristic of SimpleBox 3.0 and 3.12 calculations carried out on the basis of historical emissions.

Transport through other media. In addition to the results on mass flows of PCB-153 transported out the calculation domain via the atmosphere and ocean, SimpleBox model presented calculated values of outflows from sediments, soil and vegetation. Transport of this pollutant from these compartments is considered to be due to such processes as burial, leaching and harvest of agricultural vegetation, respectively.

According to the data presented in Tables 3.52 and 3.53 (see Section 3.3.3), the scattering between absolute values of PCB-153 mass flows transported out the calculation domain obtained on the basis of both data sets with different type of SimpleBox 3.0 and 3.12 calculations exceed an order of magnitude for sediment compartment; two orders of magnitude for vegetation compartments and four orders of magnitude for soil compartments. The highest absolute values are characteristic of PCB-153 outflow through vegetation compartment; then come transport via sediments and then – outflow from soil compartment.

Comparison of annual values of PCB-153 mass flows transported in/out the calculation domain through three media as a whole (sediment, soil and vegetation) calculated by SimpleBox model on the basis of zero initial concentrations and with the use of “**reference”** data set is presented in Fig.3.82a. Fig. 3.82b shows the same results but obtained on the basis of initial concentrations and historical emissions. In the latter figure different color of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions). The blue line in the plots shows the value of the corresponding parameter averaged between calculations of different types.

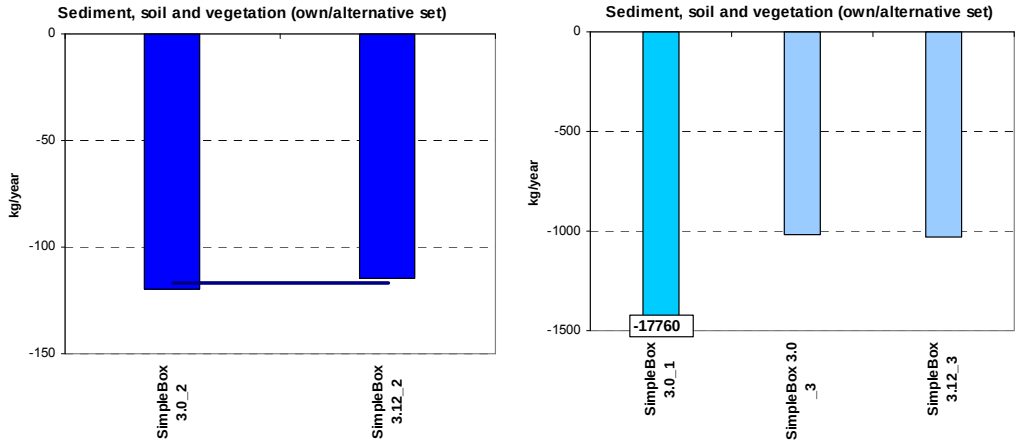


a b

Fig.3.82. *Comparison of annual values of PCB-153 mass flows transported in/out the calculation domain through three media as a whole (sediment, soil and vegetation) calculated by SimpleBox model on the basis of "reference" data set (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions).*

The maximum annual value of PCB-153 mass flows transported out the calculation domain through three considered media as a whole is obtained by SimpleBox model (version 3.0) on the basis of initial concentrations given as input data (see Fig. 3.82b). The smaller are values calculated by SimpleBox 3.0 and 3.12 with the use of historical emissions. Then come results based on zero initial conditions (see Fig. 3.82a).

The annual values of PCB-153 mass flows transported out the calculation domain through three considered media calculated by SimpleBox model on the basis of zero initial concentrations and "**alternative**" data set are compared in Fig.3.83a. Fig. 3.83b shows the same results but obtained on the basis of initial concentrations or historical emissions. In the latter figure different color of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions). The blue line in the plots shows the value of the corresponding parameter averaged between different versions of this model.



a b

Fig.3.83. *Comparison of annual values of PCB-153 mass flows transported in/out the calculation domain through three media as a whole (sediment, soil and vegetation) calculated by SimpleBox model on the basis of "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

Annual values of PCB-153 mass flows transported out the calculation domain through such media as sediment, soil and vegetation obtained with “reference” and “own/alternative” data sets are compared in Fig. 3.84.

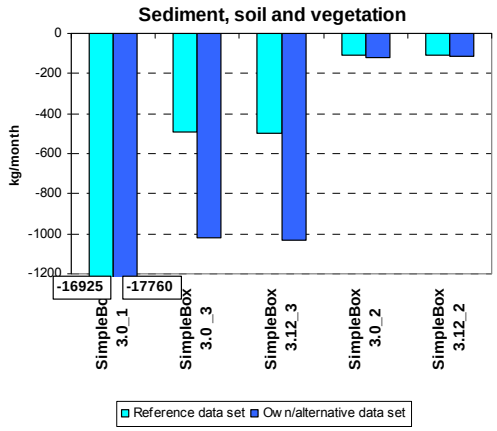


Fig.3.84. *Comparison of PCB-153 mass flows transported in/out the calculation domain through the atmosphere (a), other media (sediment, soil and vegetation)(b) and seawater(c, d) calculated by different models on the basis of two data sets*

This comparison demonstrates that the considered values of PCB-153 mass flows transported out the calculation domain through all three considered media as a whole obtained on the basis of “alternative” data set are higher than those based on “reference” data set. At that, for sediment (see Table 3.54 Section 3.3.3), results of calculations of SimpleBox model (versions 3.0 and 3.12) based on zero initial conditions and “reference” data set exceed slightly those obtained on the basis of “alternative” data set. According to the data on percentage difference between calculation results presented in Table 3.54, the major difference between two sets of results is found in results of SimpleBox 3.12 on PCB-153 mass flows transported out the calculation domain through soil making up approximately 3000%.

Total mass flow. The scattering of total mass flow values calculated on the basis of historical emissions and initial concentrations is rather high both in results based on “reference” and ‘own/alternative” data sets (Tables 3.55 and 3.56 in Section 3.3.4). However, the difference between results obtained with the use of zero initial conditions is considerably lower. According to the results of most models obtained on the basis of two different data sets, total mass flow calculated as sum of emissions and outflows through the considered media is transported into the calculation domain. Exceptions are results of SimpleBox 3.0 model obtained on the basis of initial concentrations given as input data.

Comparison of annual values of PCB-153 total mass flows transported in/out the calculation domain calculated by different models on the basis of zero initial concentrations and with the use of “***reference***” data set is presented in Fig.3.85a. Fig. 3.85b shows the same results but obtained on the basis of initial concentrations and historical emissions. In the latter figure different color of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions). The blue line in the plots shows the value of the corresponding parameter averaged between models.

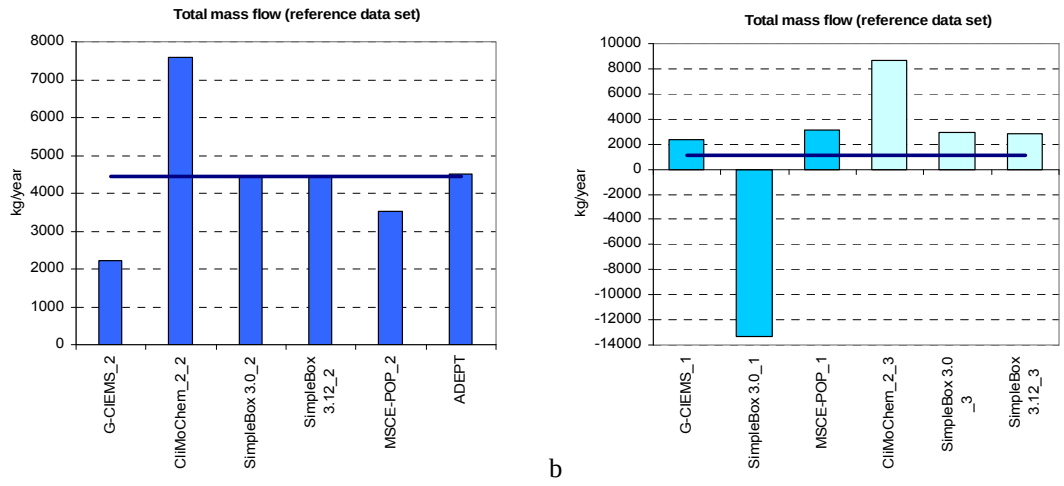


Fig.3.85. *Comparison of annual values of PCB-153 total mass flows transported in/out the calculation domain calculated by different models on the basis of "reference" data set (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

The most part of participating models performed calculations on the basis of zero initial conditions provide rather close estimates of total mass flow (see Fig. 3.85a). According to the results of SimpleBox 3.0 models obtained on the basis of initial concentrations given as input data, PCB-153 emissions value in the considered year do not exceed the value of total mass flow of this pollutant transported outside calculation domain (see Fig. 3.85b). The only negative absolute value is characteristic of SimpleBox 3.0 result obtained on the basis of initial conditions. The highest value among flows directed to the calculation domain is obtained by CliMoChem model.

Comparison of annual values of PCB-153 total mass flows transported in/out the calculation domain calculated by different models on the basis of zero initial concentrations and "***own or alternative***" data sets is presented in Fig.3.86a. Fig. 3.86b shows the same results but obtained on the basis of initial concentrations and historical emissions. In the latter figure different color of columns corresponds to the different types of calculations (one-year calculations on the basis of initial data; then long-tem calculations with historical emissions). The blue line in the plots shows the value of the corresponding parameter averaged between models.

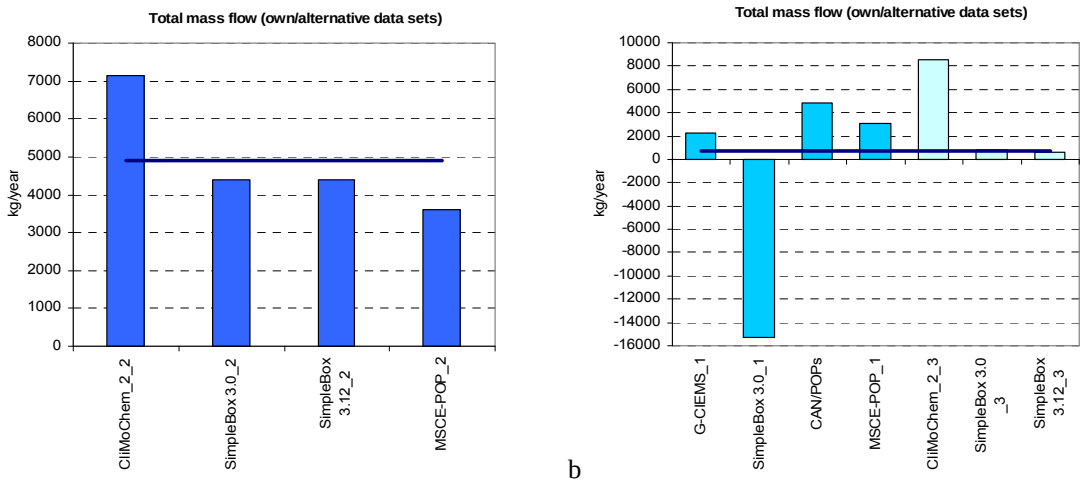


Fig.3.86. *Comparison of annual values of PCB-153 total mass flows transported in/out the calculation domain calculated by different models on the basis of "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

As in the case of results obtained on the basis of "reference" data set, the results on total mass flow obtained on the basis of zero initial conditions are close for most participating models (see Fig. 3.86a). The main difference in total mass flow obtained on the basis of non-zero initial conditions reaching several orders of magnitude is observed between results of SimpleBox 3.0 models obtained on the basis of initial concentrations given as input data and CliMoChem results based on historical emissions (see Fig. 3.86b).

For models performed calculations on two data sets, the annual values of PCB-153 mass flow transported inside and outside the calculation domain (taking into account emissions) obtained with "reference" and "own/alternative" data sets are compared in Fig. 3.87a. Fig. 3.87b presents also the comparison of absolute values of overall mass flow transported outside the calculation domain (not taking into account emission value).

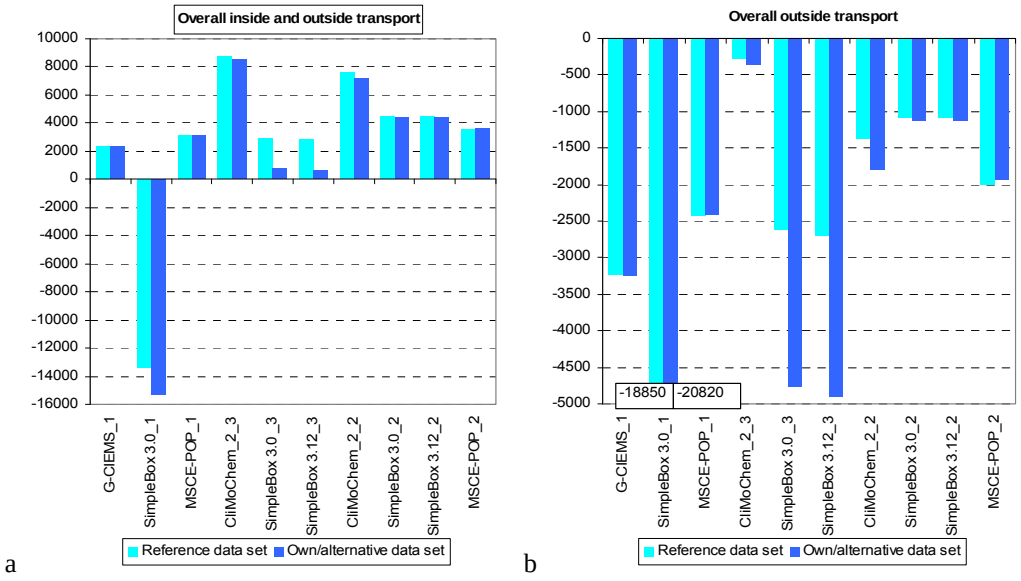


Fig.3.87. *Comparison of PCB-153 overall transport inside and outside the calculation domain (taking into account emissions) (a) and overall transport outside the calculation domain (b) calculated by different models on the basis of two data sets*

According to the data presented in Figs. 3.87 a and b, it can be concluded that the largest difference in the results obtained with two data sets ('reference" and 'own/alternative") is characteristic of SimpleBox 3.0 and 3.12 calculations performed on the basis of initial concentrations and historical emissions. At that results of these model on overall outside transport flow obtained with the use of "own or alternative" data sets are higher than those obtained with "reference" data set (see Fig. 3.87 b). For other models difference in two sets of results is not essential. The latter figure also testifies that the highest and lowest absolute values of overall mass flow transported outside the calculation domain and calculated not taking into account emission value are obtained by SimpleBox 3.0 and CliMoChem models on the basis of initial conditions and historical emissions, respectively.

Fractions of overall outside transport through atmosphere, ocean and other media (sediment, soil and vegetation) calculated on the basis of zero and non-zero initial conditions are presented in Figs. 3.88a and b, respectively. In these figures fractions of PCB-153 mass in soil calculated by the different models with the use of "reference" and "own/alternative" data sets are also compared.

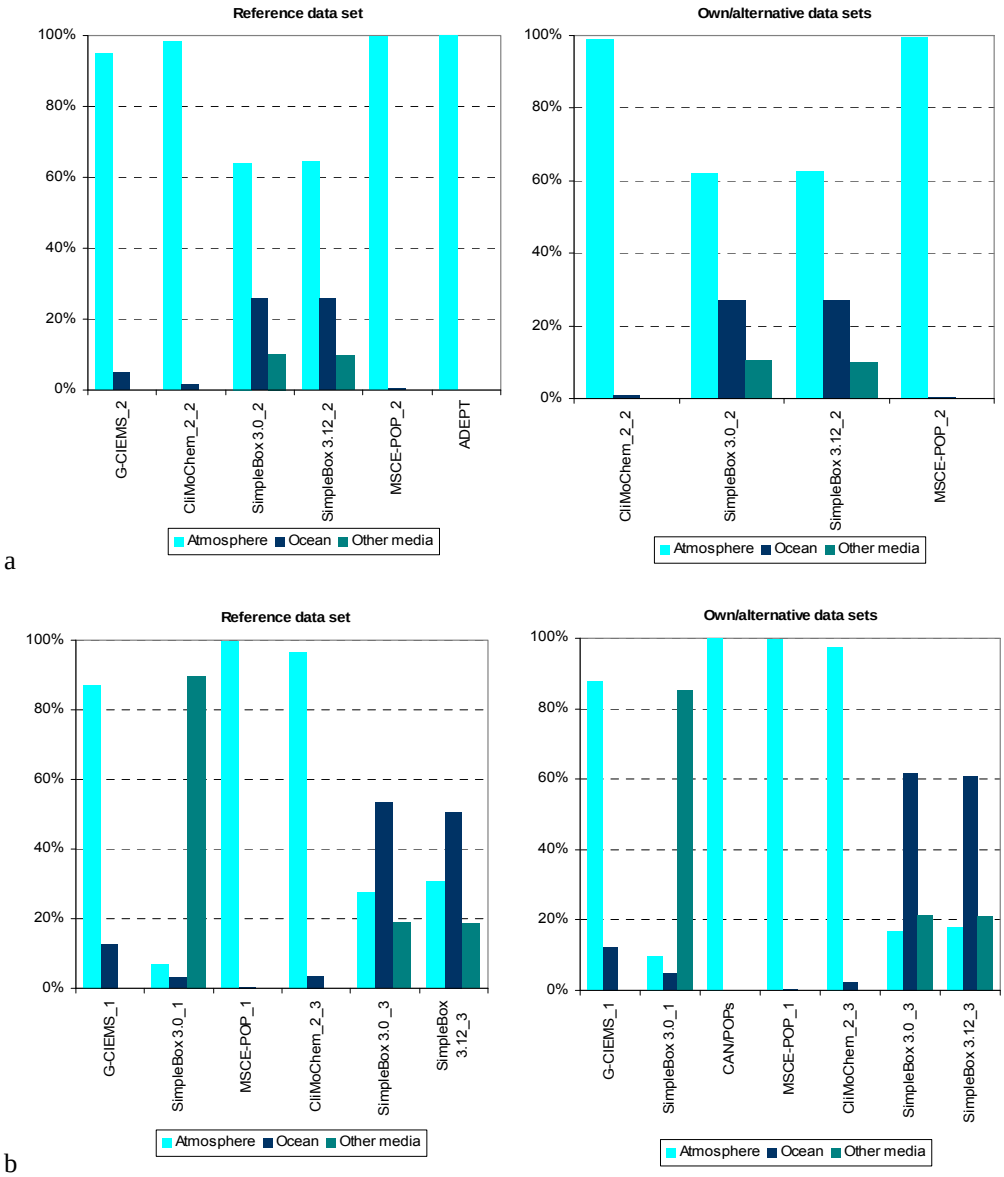


Fig.3.88. *Comparison of PCB-153 fractions of overall outside transport through atmosphere, ocean and other media (sediment, soil and vegetation) calculated by different models on the basis of "reference" and "own or alternative" data sets (a – results obtained on the basis of zero initial conditions; b – results based on non-zero initial conditions)*

According to the data presented for both "reference" and "own/alternative" data sets, in ADEPT, CAN/POPS and MSCE-POP model results the atmosphere is the main media of PCB-153 outside transport. Calculated fractions of overall outside transport through atmosphere considerably exceed those for other media in results of G-CIEMS, CliMoChem and SimpleBox 3.0 and 3.12 (zero initial conditions) models. It is worth noting that results of SimpleBoxs 3.0 and 3.12 based on historical emissions are characterised by higher annual transport in the marine environment than in the atmosphere. The most considerable contribution to the outside transport of PCB-153 due to the other considered media (sediment, soil and vegetation) than ocean and atmosphere is observed in the results of SimpleBox 3.0 model made on the basis of initial conditions.

3.4. Mass flows transported from one compartment to another in both directions

3.4.1. Comparison of calculated values of PCB-153 mass flows transported from the atmosphere to soil

Dry deposition

Reference data set. Calculation results on PCB-153 mass flows transported from the atmosphere to soil: dry deposition calculated by the models on the basis of "reference" data set together with statistical parameters used for evaluation are presented in Table 3.58.

Monthly values of PCB-153 mass flows transported from the atmosphere to soil: dry deposition calculated by all participating models on the basis of "reference" data set and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.89 a and b, respectively.

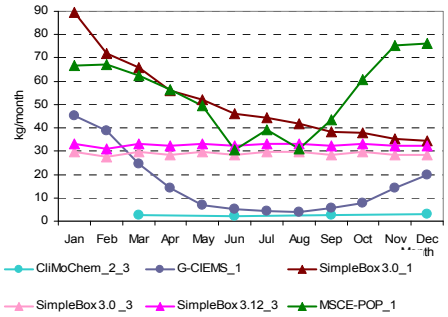


Fig. 3.89a. *PCB-153 mass flows transported from the atmosphere to soil: dry deposition (kg/month) calculated by the participating models on the basis of "reference" data set and non-zero initial conditions*

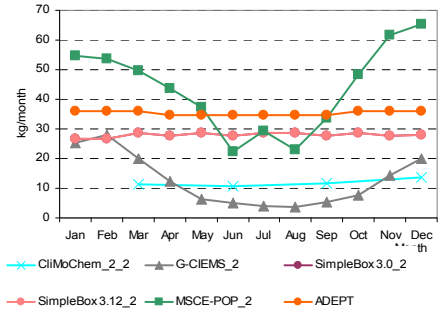


Fig. 3.89b. *PCB-153 mass flows transported from the atmosphere to soil: dry deposition (kg/month) calculated by the participating models on the basis of "reference" data set and zero-initial conditions*

Own/alternative data set. Calculation results on PCB-153 mass flows transported from the atmosphere to soil: dry deposition calculated by models on the basis of "own or alternative" data sets together with statistical parameters used for evaluation are presented in Table 3.59.

Monthly values of PCB-153 mass flows transported from the atmosphere to soil: dry deposition calculated by participating models on the basis of "own or alternative" data sets and taking into account non-zero (initial concentrations in media or historical emissions) and zero initial conditions are compared in Fig. 3.90 a and b, respectively.

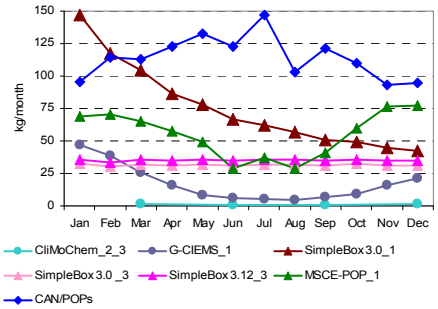


Fig. 3.89a. *PCB-153 mass flows transported from the atmosphere to soil: dry deposition (kg/month) calculated by the participating models on the basis of "own or alternative" data sets and non-zero initial conditions*

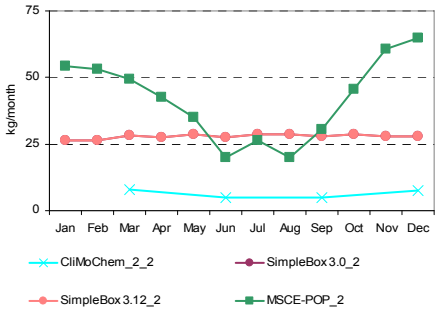


Fig. 3.89b. *PCB-153 mass flows transported from the atmosphere to soil: dry deposition (kg/month) calculated by the participating models on the basis of "own or alternative" data sets and zero-initial conditions*