INTRODUCTION

Following the recommendations of the Executive Body for the Convention on Long-Range Transboundary Air Pollution UN ECE [*ECE/EB.AIR/75*], the POP model intercomparison study was initiated under EMEP in 2002. Four EMEP expert meetings on intercomparison of POP models have been held since that year (Moscow, Russia, 2002; 2003; 2005).

Main aim of POP model intercomparison study is to exchange scientific experience between different groups of POP modelers. National experts from a large number of countries take part in this study, which concerns a wide spectrum of models designed for the simulation of POP behaviour in the environment and differing by their type (box or spatially resolved), resolution and scope (from regional to global scales). According to the agreed programme, the POP model intercomparison study is performed within three stages:

Stage I. Comparison of descriptions of main processes determining POP behaviour in various environmental compartments.

Stage II. Comparison of mass balance estimates and calculated deposition and concentration fields of POPs in different environmental compartments. Sensitivity study with respect to physical-chemical parameter values used in basic process descriptions and mass balance estimates.

Stage III. Comparison of calculated overall environmental persistence and long-range transport potential for evaluation of new substances

Stage I of the intercomparison study was launched in 2002 and completed last year. Fourteen scientific groups from Canada, the Czech Republic, Denmark, France, Germany, Japan, the Netherlands, Norway, Switzerland, the United Kingdom, the USA and representatives of the OECD and MSC-E took part in the first stage. At which model approaches to the description of such processes as gas/particle partitioning, dry deposition of particulate phase, wet deposition, gaseous exchange between the atmosphere and different types of underlying surface (soil, water, vegetation) and degradation processes were considered. This implied the comparison of process descriptions as well as results of relevant computation experiments. Main outcome of Stage I was published in the joint Technical Report 1/2004 “POP Model Intercomparison Study. Stage I. Comparison of descriptions of main processes determining POP behaviour in various environmental compartments” [*Shatalov et al*., 2004].

Stage II of the POP model intercomparison study has been ongoing since 2004. The third and fourth EMEP expert meetings on intercomparison of POP models (Moscow, February, 2005; October, 2005) were attended by national experts from Canada, Germany, Japan, the Netherlands, Norway, Switzerland, the United Kingdom, the USA and MSC-E. Experts and their twelve models participating in this stage of the intercomparison study are listed in Table 1. Computational experiments on calculation of mass balance, inflow/outflow, intermedia transport and spatial distribution of depositions and concentrations together with a comparison of model results with monitoring data were performed by participants in the framework of Stage II. PCB-153 (first priority), and PCB-28, PCB-180 and B[a]P (second priority) were considered within the computational experiments. Sensitivity of each model to variation in physical-chemical parameter values used in mass balance estimates as well as in descriptions of basic processes was also examined. A sensitivity study on wet deposition process included a comparative model simulation of the atmospheric scavenging of particulate B[a]P over the entire troposphere containing a precipitating cumulus cloud with different precipitation rates and was carried out by ADOM-POP and MSCE-POP models. At the fourth meeting it was agreed to proceed with the exercise on wet deposition for PCB-153 proposed by GKSS-CMAQ modeling group. Model results within the sensitivity study will be presented in the final report on the whole POP model intercomparison study.

Since the beginning of 2005 Stage III of the POP model intercomparison study has been started. This stage is aimed at the comparison of relative order in ranking a number of chemicals with respect to LRTP and P_{over} calculated by different models. An extended work-programme and time-schedule of Stage III were elaborated at the latter two meetings.

Table 1. *The list of participating models*

	Model name	Experts	Institution
1	HYSPLIT 4	P. Bartlett	CBNS, Queens College, USA
2	EVN-BETR and UK-MODEL	K. Jones, A. Sweetman	Lancaster University, UK
3	CliMoChem	M. Scheringer, J. Stocker, K. Hungerbühler, F. Wegmann	ETH Zürich, Switzerland
4	CAN/POPs	S. Gong, P. Huang	Air Quality Research Branch, Canada
5	G-CIEMS	N. Suzuki	National Institute for Environmental Studies, Japan
6	ADOM-POP	G. Petersen, A. Aulinger	GKSS, Germany
7	GKSS-CMAQ		
8	DEHM-POP	J. Christensen, K.M. Hansen	National Environmental Research Institute, Denmark
9	SimpleBox	D. van de Meent, A. Hollander	RIVM Laboratory for Ecological Risk Assessment, the Netherlands
10	LOTOS	M.G.M. Roemer	TNO-MEP, the Netherlands
11	ADEPT	A.C. Baart	Delft Hydraulics, the Netherlands
12	MSCE-POP	S. Dutchak, V. Shatalov, A. Gusev, E. Mantseva	EMEP/MSC-E
POP emissions and measurements		K. Breivik	NILU, Norway

In this Intermediate Technical Report a preliminary analysis of results obtained by participating models within Stage II for PCBs is presented. This report is organized in four chapters and five annexes. Brief outline of their contents is given below.

Chapter 1 is devoted to the description of the programme on Stage II of the POP model intercomparison study.

In Chapter 2 a brief overview of the input data used in Stage II calculation experiments is presented. Description of the calculation domain specified for the experiments (land cover data, leaf area index, organic matter content in the soil, parameters of the environmental compartments), physical-chemical properties and degradation rate constants for pollutants in question, emission scenario and measurement data is included. There is also information on initial concentrations of pollutant in main media obtained by the participating models for the end of 1999. In addition, alternative data set of physical-chemical properties for the three considered congeners is presented in Annex A.

Chapter 3 provides information on comparison of results of Stage II computational experiments for PCB-153 obtained by the participating models. Mass balance estimates, deposition and concentration fields in different environmental compartments and results of sensitivity study with respect to physical-chemical parameter values used for mass balance estimates are discussed in this chapter. The comparison of model results on POP depositions and concentrations in various environmental compartments with monitoring data is also presented. A comparison of results of Stage II computational experiments for PCB-28 and PCB-180 is given in Annexes B and C, respectively.

In Chapter 4 results of the sensitivity study with respect to substance-specific properties used in the description of basic processes are presented for PCB-153. A comparison of the similar results for PCB-28 and PCB-180 is given in Annexes D and E, respectively.

Main conclusions are drawn in the end of the Intermediate Technical Report.

As it was agreed at the fourth EMEP expert meetings on intercomparison of POP models, a mechanistic interpretation and detailed analysis of similarities and distinctions between different models' results obtained within Stage II calculations will be prepared as a scientific paper.

More detailed information on the POP model intercomparison study can be found at the MSC-E website: www.msceast.org.