Helsinki Commission

Evaluation of airborne pollution load of heavy metals and POPs to the Baltic Sea is carried out in the framework of long-term cooperation between EMEP and the Helsinki Commission (HELCOM). In 2022 MSC-E continued collaborating with HELCOM and evaluating pollution levels and trends for extended list of heavy metals and POPs that includes metals of the first and the second priority as well as legacy POPs and chemicals of emerging concern.

In accordance with the contract, the compilation of data on atmospheric emissions and model assessment of atmospheric deposition of cadmium and B(a)P for the period 1990-2020 is presented in the Joint report of the EMEP Centres for HELCOM [*Gauss et al.*, 2022]. In addition, a review of information on regulation, emissions, monitoring, and model assessment of HBCDD, PCNs and PeCB is included in the report. Besides, information on emissions and modelling results on cadmium and B(a)P is also summarized in the Baltic Environment Fact Sheets, published on the HELCOM website (http://www.helcom.fi). This information is based on the results presented to the 8th Joint session of the Working Group on Effects and the Steering Body to EMEP, which took place on 12-16 September 2022. In this section a brief outline of MSC-E contribution to the Joint EMEP report for HELCOM is provided.

Anthropogenic emissions of Cd and B(a)P in the HELCOM countries reduced from 1990 to 2020 by 66% and 23%, respectively (Fig. 1a). The most substantial decline of the emissions took place in period 1990-2000, while in subsequent period the rate of emission reduction slowed down. In 2020 the main contributions to Cd and B(a)P emissions among the HELCOM countries were made by Russia, Poland and Germany. Their emissions in total contributed more than 90% to total emissions of the HELCOM countries.

The model simulations showed large decline of Cd deposition to the Baltic Sea from 1990 to 2020 by 79%, whereas B(a)P deposition declined only by 34% (Fig. 1b). Significant inter-annual variability of atmospheric Cd and B(a)P deposition is noted due to changes in meteorological conditions (precipitation amount, atmospheric transport patterns) from year to year. Decline of calculated deposition varied among the different sub-basins of the Baltic Sea. Particularly, the highest reduction of Cd deposition is noted for the Sound and the Gulf of Finland sub-basins (about 80%). In case of B(a)P the highest decline is estimated for the Sound and Western Baltic sub-basins (around 50%). The highest total Cd deposition fluxes over the Baltic Sea in 2020, exceeding 10 g/km^2/y, are estimated for the Sound and the Western Baltic sub-basins (Fig. 1c). In case of B(a)P, the highest deposition fluxes, about 15-20 g/km^2/y, are estimated for the Gulf of Finland and Sound sub-basins (Fig. 1d).

Anthropogenic emission sources of the HELCOM countries contributed 43% and 76% to deposition to the Baltic Sea for Cd and B(a)P, respectively. Cd emissions of Poland and Germany were the main contributors to anthropogenic deposition of heavy metals. Main anthropogenic sources of B(a)P deposition were Poland and Finland.

The information on airborne input of Cd and B(a)P to the Baltic Sea was presented and discussed during the third informal consultation session of the HELCOM Pressure Working Group (IC PRESSURE 3-2022) held in October 2022.

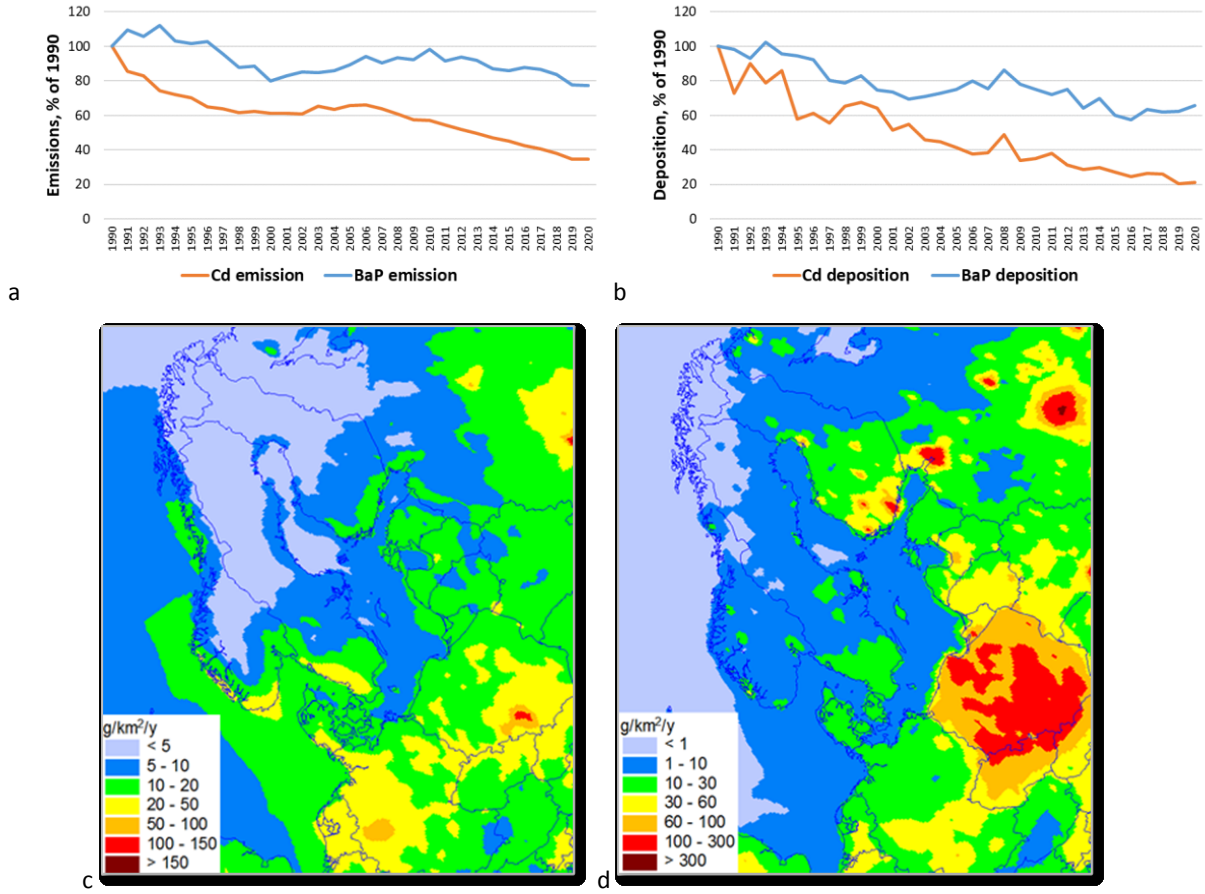

Fig. 1. *Relative changes of annual total emissions of HELCOM countries (a) and annual atmospheric Cd and B(a)P deposition (b) to the Baltic Sea in the period 1990-2020. Total annual deposition fluxes of Cd (c) and B(a)P (d) estimated for 2020.*