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Modeling atmospheric mercury at European scale

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POLAIR3D the three-dimensional chemistry-transport model developed at ENPC (École Nationale des Ponts et Chaussées) has recently been extended to cope with mercury dispersion at European scale.

In spite of quite low ambient concentrations, mercury represents a health concern due to its ability to bioaccumulate in organisms in the form of methylmercury. Gaseous elemental mercury (GEM) with a rather long life time of one year constitutes by far the main part of atmospheric mercury, but oxidised and particulate mercury species can also be found. These components are likely to be removed much more quickly than GEM via dry and wet deposition processes. For this reason it is essential to simulate atmospheric transport, and chemical reactions in both gaseous and aqueous phases of oxidised and particulate mercury species.

Simulations for 2001 are performed with two different mercury chemistry models: a basic one (Petersen, 1995) modeling only one mercury species and no chemical reactions in gaseous phase, and a more complex one allowing to simulate several reactions and more species in gaseous phase. POLAIR3D is used with the EMEP emission inventory and ECMWF meteorological data. Simulated atmospheric concentrations and deposition fluxes are compared with measurements from the monitoring network of EMEP. A challenging work is to perform data assimilation in order to improve some key parameters (boundary conditions, emission speciation) for mercury.