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# ECHMERIT: A new on-line global mercury-chemistry model

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Mercury is a volatile metal, that is of concern because when deposited and transformed to methylmercury accumulates within the food-web. Due to the long lifetime of elemental mercury, which is the dominant fraction of mercury species in the atmosphere, mercury is prone to long-range transport and therefore distributed over the globe, transported and hence deposited even in regions far from anthropogenic emission sources. Mercury is released to the atmosphere from a variety of natural and anthropogenic sources, in elementary and oxidised forms, and as particulate mercury. It is then transported, but also transformed chemically in the gaseous phase, as well as in aqueous phase within cloud and rain droplets. Mercury (particularly its oxidised forms) is removed from the atmosphere though wet and dry deposition processes, a large fraction of deposited mercury is, after chemical or biological reduction, re-emitted to the atmosphere as elementary mercury.

To investigate mercury chemistry and transport processes on the global scale, the new, global model ECHMERIT has been developed. ECHMERIT simulates meteorology, transport, deposition, photolysis and chemistry on-line. The general circulation model on which ECHMERIT is based is ECHAM5. Sophisticated chemical modules have been implemented, including gas phase chemistry based on the CBM-Z chemistry mechanism, as well as aqueous phase chemistry, both of which have been adapted to include Hg chemistry and Hg species gas-droplet mass transfer. ECHMERIT uses the fast-J photolysis routine. State-of-the-art procedures simulating wet and dry deposition and emissions were adapted and included in the model as well.

An overview of the model structure, development, validation and sensitivity studies is presented.