Geophysical Research Abstracts
Vol. 16, EGU2014-14004, 2014
EGU General Assembly 2014

Influence of climate change on the Arctic Contamination Potential

Kaj M. Hansen, Jesper H. Christensen, and Jørgen Brandt
Aarhus University, Department of Environmental Science, Roskilde, Denmark (jbr@dmu.dk, +45-(0)4630-1214)

Using the Danish Eulerian Hemispheric Model (DEHM) we have calculated the Arctic Contamination Potential (ACP). ACP is defined as the sum of masses in the arctic surface compartments (soil, vegetation, snow and water) at the end of a ten year simulated period normalised either with the total mass within the model domain of with the total amount emitted into the atmosphere during the ten year simulation. In this study we use the emission normalized ACP termed eACP. We have calculated the eACP for the physical-chemical phase space spanned by compounds with log Koa between 3 and 12 and log Kaw between -4 and 3 and for each point in this phase space grid we have included a perfectly persistent compound in the model.

DEHM is a 3-D atmospheric chemistry-transport model modelling the atmospheric transport of four chemical groups: a group with SOx-NO_x-VOC-ozone chemistry, a group with primary particulates group, a mercury chemistry group, and finally a group with Persistent Organic Pollutants with 2-d surface compartments (soil, vegetation, ocean water and a dynamic temporal snow cover) with inter-compartmental mass exchange process parameterizations. The model domain covers the Northern Hemisphere and thus includes all important source areas for the Arctic. The spatial horizontal resolution of the model system in this work is 150km x 150km and the model includes 20 vertical levels up to approximately 15km above the surface. The model system was run with meteorology obtain from ECHAM5/MPI-OM (SRES A1B scenario) for two decades: 1990-1999 and 2090-2099.

Highest potential (12%) for reaching the Arctic surface compartments for the 1990s is seen for compounds with low log Koa and low log Kaw values. These are relative water soluble compounds referred to as "swimmers". For the 2090s, the overall pattern of the ACP phase space is similar to the pattern for the 1990s. ACP is generally larger for the 2090s than for the 1990s, with a maximum of 15%.