Geophysical Research Abstracts,
Vol. 11, EGU2009-7054, 2009
EGU General Assembly 2009
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Modelling atmospheric concentrations of PCB congeners with the atmospheric chemistry transport model DEHM-POP

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The POP version of the Danish Eulerian Hemispheric Model (DEHM-POP) is a dynamic 3-D atmospheric chemistry-transport model developed to study the environmental fate of POPs. The model covers the majority of the Northern Hemisphere with a spatial resolution of 150 km X 150 km in the horizontal and 20 vertical layers. Surface modules for soil, ocean water, sea ice, vegetation, and snow are included in DEHM-POP to describe the air-surface exchange processes of POPs. The processes included in the model are: gas-particle partitioning in the atmosphere, wet deposition of particle- and gas-phase POPs, dry particle deposition and dry gas exchange flux between air and the different surface modules, as well as degradation in all environmental media. The model is driven by dynamic (non-averaged) meteorological data from a numerical weather prediction model and is thus able to resolve the atmospheric processes on short temporal scales, e.g. atmospheric transport episodes and intermittent precipitation events. The DEHM-POP model was previously successfully applied to study the atmospheric transport of alpha-HCH. In this study the DEHM-POP model was applied to study atmospheric transport and environmental fate of a range of PCB congeners. The predicted air concentrations were evaluated against measurements from monitoring sites within the model domain. There is a large uncertainty in the applied emission estimates and this is reflected in the model evaluation as this showed that the model only to a limited extend was able to predict short-term atmospheric variability as well as concentrations and distribution patterns on longer time-scales. Data from