



Long-range transport and fate of semivolatile organic compounds - a study using a 3D general circulation model

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The presence of pesticides in the environment of remote regions has become growing concern for the environmentalist as well as scientists in the last half century. Under most conditions this presence in air, or in rain water has no significant effect on non-target organisms except for persistent organic pollutants (POPs). Many POPs have the ability to exist in both gas and particulate phase (semivolatility, and hence also called semivolatile organic compounds, SOCs), facilitating long-range transport and accumulation over remote regions. Combined with environmental persistence and resistance to biological degradation, they accumulate over these regions. Numerical models are the only tools to estimate the transport and fate of these substances. In this study, an atmospheric general circulation model combined with a dynamic aerosol model (ECHAM-HAM) has been used for the first time to study the behaviour of SOCs in the different media. Two agrochemicals, DDT and gamma-HCH, both are subject to regulations were studied. Model experiments show that while emission takes place in the warm tropical regions, the Arctic is contaminated. This long-range transport was quantified. Case studies show that together with the general circulation of the atmosphere, regional weather systems play a key role in dispersing the substance regionally and hence deciding the fate. The simulated seasonality in atmospheric concentrations over continental sites of the Arctic compares well with those of observations.