



## Modelling alpha-HCH concentrations in Chinese surface soil

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A gridded mass balance model, Gridded PTSs (persistent toxic substances) Emission and Residue Model (GPERM) on a grid system with a horizontal resolution of 1/6 degree latitude by 1/4 degree longitude, was developed to compile emission and residue inventories for PTSs, including persistent organic pollutants (POPs). The model considers four matrixes, air (air, particulates), soil (air, water and solids), water (water, suspended solids), and sediment (water and solids), and includes 2 components, transfer and transport modules. The transfer module describes the changes of PTS concentrations and inter-compartmental transfer of the substance in the multimedia environment using a level IV fugacity method. The module is solved by a 5th order Runge-Kutta algorithm. The transport module depicts mass exchange of the component between different grid cells due to atmospheric transport, which is solved by a Lagrangian method.

The model was used to create Chinese inventories of emission to air and residue in soil from 1952 to 2005 for alpha-hexachlorocyclohexane (alpha-HCH), the major isomer of technical HCH, by integrating interpolated daily meteorological data from the National Centers for Environmental Prediction (NCEP) and interpolated soil density, porosity, organic carbon content, and compiled gridded landuse datasets and usage inventories from 1952 to 1984. The results indicate that, concentrations in Chinese surface soil (the soils within HCH manufactures or HCH storage area were not considered here) for 2005 were from < 0.001 pg/g dry weight (dw) to 1,400 pg/g dw with a mean of  $94 \pm 140$  pg/g dw. Modeled soil concentrations agreed well with 162 measured data across China in 2005 by the International Joint Research Center for Persistent Toxic Substances (IJRC-PTS), China (Spearman correlation coefficient  $R = 0.37$ ,  $p < 0.05$ ) and 32 measured data for different period and various regions collected from previous literatures (Spearman correlation coefficient  $R = 0.44$ ,  $p < 0.05$ ). Both monitoring and model results indicated higher alpha-HCH soil concentrations in the northeastern China than the southeastern China. Historical use of technical HCH was much higher in the southeast of China than the northeast of China during 1952-1984, and the concentrations of alpha-HCH were accordingly higher in the southeast of China than the northeast of China for a long time. The model results showed that, this trend, however, reversed around the beginning of the 2000's, probably indicating the "cold condensation" phenomenon. Detailed discussion will be given during the presentation.