

Wednesday 26 October 2016, 13.00-14.00
Venue: P1.16, The Pavillon

Title: “MATRIX-VBS: Implementing organic aerosol volatility in an aerosol microphysics model”

Speaker:

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Abstract:

The gas-particle partitioning and chemical ageing of semi-volatile organic aerosol are presented in a newly developed box model scheme, where its effect on the growth, composition and mixing state of particles is examined.

The volatility-basis set (VBS) framework is implemented into the aerosol microphysical scheme MATRIX (Multiconfiguration Aerosol TRacker of mIXing state), which resolves mass and number aerosol concentrations and in multiple mixing-state classes.

The new scheme, MATRIX-VBS, has the potential to significantly advance the representation of organic aerosols in Earth system models by improving upon the conventional representation as non-volatile particulate organic matter, often with also an assumed fixed size distribution.

We present results from idealized cases representing Beijing, Mexico City, a Finnish and a Southeast U.S. forest, and investigate the evolution of mass concentrations and volatility distributions for organic species across the gas and particle phases, as well as assessing their mixing state among aerosol populations.

Emitted semi-volatile primary organic aerosols evaporate almost completely in the high volatile range, while they remain in the particle phase in the low volatility range. Their volatility distribution depends on the applied emission factors, oxidation by OH radicals, and temperature.

We also compare against parallel simulations with the original scheme, which represented only the particulate and non-volatile component of the organic aerosol, examining how differently the condensed phase organic matter is distributed across the mixing states in the model.

The results demonstrate the importance of representing organic aerosol as a semi-volatile aerosol, and explicitly calculating the partitioning of organic species between the gas and particulate phases.

Host:

Ulas Im, PhD Scientist, Atmospheric Modeling Section (ATMO), Aarhus University

External guests should email Klaus Condé Christensen, kcc@envs.au.dk