(1) SOSAA - model to Simulate Organic Compounds, Sulfuric Acid and Aerosols

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(3) Available modes for the model runs: Research

(4) Components & processes: Atmosphere, Hydrosphere, Biosphere & Physical, Chemical, Biological

(5) Brief model description

SOSAA is a one-dimension chemical-transport model constructed to study emissions, transport, chemistry and aerosols in the planetary boundary layer in and above a forest canopy. The boundary layer meteorology module is based on a one-dimensional version of SCADIS (Scalar Distribution, Sogachev et al. 2002). The emission module in the model is based on MEGAN (Model of Emissions of Gases and Aerosols from Nature, Guenther et al. 2006). The chemical mechanistic scheme information is mainly taken from the Master Chemical Mechanism via website: http://mcm.leeds.ac.uk/MCM. The chemical scheme accommodates great flexibility with respect to the freedom of selecting desired reactions. The aerosol module in SOSAA is based on the aerosol dynamics model UHMA, which is a sectional box model developed for studies of tropospheric new particle formation and growth in clear sky conditions (Korhonen et al. 2004). It has all basic aerosol processes, including nucleation, condensation, coagulation and deposition. SOSAA is written in Fortran90 with the MPI parallel libraries. Chemistry and aerosol dynamics in each layer of the atmosphere can be calculated in parallel making it possible to increase the length of simulations and include more chemical reactions. For a detailed model description, please see Boy et al. (2011) and Zhou et al. (2014). The model has been applied in several studies of atmospheric science, e.g. Kurtén et al. 2011, Mogensen et al. 2011, Bäck et al. 2012, Boy et al. 2013, Greens et al. 2014, Smolander et al. 2014, Mogensen et al. 2015, Rannik et al. 2016, Zhou et al., 2017.

The model is for research interests and results are available at:
https://wiki.helsinki.fi/pages/viewpage.action?pageId=149307435

SOSAA publications:

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** Gierens, R. T., Laakso, L., Mogensen, D., Vakkari, V., Beukes, P., van Zyl, P., Hakola, H., Guenther, A., Pienaar, K., Boy, M.: Modelling new particle formation events in the South African Savannah, South African Journal of Science, 110(5/6), Art. Nr2013-0108, 12 pages, 2014.*
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** Smolander S., He Q., Mogensen D., Zhou L., Bäck J., Ruuskanen T., Noe S., Guenther A., Aaltonen H. Kulmala M. and Boy M.: Comparing three vegetation monoterpene emission models to measured gas concentrations with a model of meteorology, air chemistry and chemical transport. Biogeosciences Discuss. 10: 1856318611, 2013.*
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** Bäck, J., Aalto, J., Henriksson, M., Hakola, H., He., Q. and Boy, M.: Chemodiversity in terpene emissions at a boreal Scots pine stand, Biogeosciences, 9, 689-702, 2012.*
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** Boy M., Sogachev A., Lauros J., Zhou L., Guenther A. & Smolander S.: SOSA a new model to simulate the concentrations of organic vapours and sulphuric acid inside the ABL Part 1: Model description and initial evaluation. Atmos. Chem. Phys. 11: 4351, 2011.*

Other publications cited in the description:

** Guenther A., Karl T., Harley P., Wiedinmyer C., Palmer P.I. & Geron C. 2006. Estimates of global terrestrial isoprene emissions using MEGAN (Model of Emissions of Gases and Aerosols from Nature). Atmos. Chem. Phys. 6: 31813210.*
** Korhonen H., Lehtinen K.E.J. & Kulmala M.: Multicomponent aerosol dynamics model UHMA: model development and validation. Atmos. Chem. Phys. 4: 757771, 2004.*
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