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Implementation of a volatility basis set in ECHAM-HAM-SALSA

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The influence of secondary organic aerosol (SOA) on climate is still poorly constrained, thus SOA contributes a large amount of uncertainty to current climate projections. To improve our understanding of the role of SOA in the atmosphere, further measurement campaigns and modelling studies will be necessary. Here we introduce a volatility basis set (VBS) SOA scheme to the aerosol-climate model ECHAM-HAM-SALSA, which models the oxidation of volatile organic compounds (VOC) to form SOA precursor gases and their successive partitioning into the aerosol phase. Both biogenic and anthropogenic VOC sources are considered. We evaluate our model results against a wide range of observational data, including ground-based and airborne mass spectrometry data and find generally good agreement between model and observations. Also the modelled AOD agrees better with satellite retrievals in regions where large amounts of organics are emitted. We further performed several sensitivity studies with the model to investigate how SOA volatility affects SOA burden and CCN concentrations. Interestingly, decreasing the SOA volatility leads to a larger SOA burden, but does not necessarily increase CCN concentrations.