

Secondary Organic Aerosols in the coupled climate aerosol model ECHAM-HAM: Insights into production dependencies and climate impacts

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Aerosols are an integral part of the climate system, because they play essential roles in the atmosphere's radiation budget and in the hydrological cycle. An important fraction of the aerosols in the troposphere are organic. So far, most models only considered Primary Organic Aerosol (POA) emissions into the atmosphere. However, Secondary Organic Aerosols (SOA) are a non negligible fraction of the total organic.

We aim to investigate SOA processing and impacts on the climate system using two sets of simulations with ECHAM-HAM: two equilibrium simulations for 2000 conditions without SOA and with interactive computation of SOA, and a 50-year hindcast (1960-2010).

The hindcast simulation shows a general increase in SOA burdens in the Northern Hemisphere from 1960 to 2010. SOA production increases from 25 to 30Tg/yr globally and 0.75 to 1.3Tg/yr in Europe. This translates in a increase in SOA surface concentrations of roughly 30% globally and 40% in Europe. In Europe, the reported changes mainly resulted from an increase in biogenic precursor emissions, which are, in turn, most likely connected to changes in anthropogenic land cover and in a lower degree to changes in surface radiation. In other regions of the world other factors like anthropogenic precursor emissions and temperature changes have higher importance. According to the model, SOA has impact on the Earth radiation budget, with a direct radiative effect at the top-of-the-atmosphere (TOA) of -0.35W/m^2 . We will present details of the effect on other climate variables, especially on cloud properties at the conference.

Best practices for reducing energy poverty and (as a result) emissions of methane, carbon dioxide, and black carbon/aerosols

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This presentation demonstrates how small-scale renewable energy technologies such as solar panels, cookstoves, biogas digesters, microhydro units, and wind turbines are helping Asia eradicate energy poverty and (as a result) reduce greenhouse gas emissions. Through an in-depth exploration of case studies in Bangladesh, China, India, Laos, Indonesia, Malaysia, Mongolia, Nepal, Papua New Guinea, and Sri Lanka, the presentation highlights the applicability of different approaches to the promotion of renewable energy in developing countries. It also illuminates how household and commercial innovations occur (or fail to occur) within particular energy governance regimes. It lastly, and uniquely, explores successful case studies alongside failures or "worst practice" examples that are often just as revealing as those that met their targets. Based on these successes and failures, the presentation concludes by presenting twelve salient lessons for policymakers and practitioners wishing to expand energy access and raise standards of living in some of the world's poorest communities.