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Climate impacts of biogenic organic compounds

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Currently the most uncertain driver of climate change, impact of anthropogenic aerosols on earth's radiative balance depends significantly on estimates of cloud condensation nuclei (CCN), representation of the pre-industrial atmosphere among others. Nearly 90% of aerosols in the tropics are organic in nature of which a major part comes from biogenic sources. About 45% of the CCN in the atmosphere are formed in-situ via nucleation. Understanding the role of biogenic organic compounds in particle formation and their subsequent growth is hence imperative in order to quantify the climate impact of aerosols.

The CLOUD experiment at CERN, which measures particle formation and growth rates in a uniquely clean chamber under atmospherically relevant conditions, found evidence of a nucleation mechanism involving only biogenic organic compounds. This mechanism significantly changes our pre-industrial estimates. The experimental results have been parameterized and included in a global aerosol microphysics model, GLOMAP, to quantify the impact of pure biogenic nucleation on CCN formation and their climatic impact. Further the treatment of secondary organic compounds in GLOMAP has been improved and the sensitivity of our estimates of radiative forcing to the same has been evaluated.