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Press Release

Aerosols – one crucial factor in climate change

Atmospheric aerosols and trace gases affect the quality of our life in many ways. In polluted urban environments, they influence human health and deteriorate visibility. On regional and global scales, aerosol particles and trace gases have a potential to change climate patterns and the hydrological cycle. Aerosol particles also influence the radiation intensity distribution that reaches the Earth's surface, and thus have a direct influence on the terrestrial carbon sink. Better understanding of the various effects in the atmosphere requires detailed information on how different sources and transformation processes modify the properties of aerosol particles and trace gases.

Trace gases like the volatile organic compounds (VOCs) enter the atmosphere through processes associated with life, such as growth, maintenance and decay of plants, animals and microbes. Another source is combustion of organic material, such as fossil fuel consumption or biomass burning. VOCs and their reaction products can participate in the formation and growth processes of atmospheric particles. Mass-balance-based estimates indicate that approximately half of the global emitted VOCs oxidize to low vapor pressure products and transform into secondary organic aerosols (SOA). The importance of biogenic and anthropogenic precursors for SOA is a major current research topic; however, knowledge of the formation mechanism, composition, particle phase chemistry, and their role in the climate is still extremely limited.

The fourth assessment report of the Intergovernmental Panel on Climate Change (IPCC, 2007) concludes that anthropogenic contributions to aerosols together produce a cooling effect. Aerosols remain the dominant uncertainty in predicting radiative forcing, and the development of better aerosol parameterisations is perhaps the single most important challenge for the next generation of climate models.