



Modelling Secondary Organic Aerosol Formation in the Troposphere: Knowledge and Challenges

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The present paper reviews existing knowledge with regard to Secondary Organic Aerosol (SOA) of importance for global climate modelling. Organic material significantly contributes to the total fine aerosol mass. A substantial fraction of the organic component of atmospheric particles consists of water-soluble, possibly multifunctional compounds. Model studies indicate that under certain circumstances the main fraction of organic aerosol can be of secondary origin, i.e. chemically formed in the atmosphere, highlighting the importance of SOA for climate forcing. In recent years volatile organic compounds emitted from biogenic sources (BVOCs) have been identified as precursor substances to the formation of SOA in the atmosphere. Several multiphase chemistry mechanisms have been also proposed to modify SOA mass and properties but further experimental work is needed to translate laboratory results to atmospheric conditions. There is still a paucity of, data on and understanding of, the composition and the properties of the aerosol formed from the gas phase photooxidation of biogenic hydrocarbons. The up-to-date understanding of the atmospheric chemical formation and transformation of SOA is outlined together with its representation in global models. SOA global budget estimates are discussed. Critical areas where research is needed to reduce the involved uncertainties are summarised.

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