Volatile organic compounds and new particle formation from agricultural recycling of sewage sludge

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Abstract

Secondary organic aerosols (SOA) are one of the main uncertainty sources in the current understanding of the Earth's Climate. It is known that agriculture contributes to primary aerosols emissions but there is no estimate for the secondary organic aerosol formation from precursor gas phase. Organic waste products are applied to cropland as fertilizers and in this work we show that they are an unaccounted source of nucleation precursors (e.g. skatole, C_9H_9N). The skatole emission and nucleation rates due to ozone reactivity were determined in the laboratory and based on our results, SO_2 plays a key role in the oxidation of skatole and leads to new particle formation. The results presented here provide new insights into this novel nucleation mechanism and aid our understanding of the organic waste agricultural recycling contribution to the aerosol balance in the atmosphere.