EGU22-9959
https://doi.org/10.5194/egusphere-egu22-9959
EGU General Assembly 2022

The impact of viscous self-organised phase formation on the lifetime of a fatty acid aerosol proxy: nanometre films to micrometre particles

Adam Milsom[1], Adam Squires[2], and Christian Pfrang[1,3]
[1]University of Birmingham, Geography, Earth and Environmental Sciences, United Kingdom (a.milsom.2@bham.ac.uk)
[2]University of Bath, Department of Chemistry, United Kingdom
[3]University of Reading, Department of Meteorology, United Kingdom

The atmospheric lifetime of a common fatty acid cooking emission, oleic acid, is longer than what is predicted by laboratory experiments. This could impact on the cloud condensation nucleus (CCN) ability of an aerosol via oleic acid's role as a surfactant. Oleic acid can self-organise into a range of viscous phases which we showed can have a significant impact on its rate of reaction with the common atmospheric oxidant, ozone. We established this using a number of synchrotron X-ray and neutron experiments which probed this self-organised proxy system from the nanometre to the micrometre scale as levitated particles and coated films. We supported our findings with kinetic multi-layer modelling of these results to demonstrate that the atmospheric lifetime of oleic acid could increase by an order of days upon viscous self-organised phase formation. There are implications not only for cloud formation and the climate, but more persistent viscous organic material could contribute to the protection of harmful compounds found co-existing with fatty acids in aerosol samples.