

EGU2020-2324

<https://doi.org/10.5194/egusphere-egu2020-2324>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



Impact of ship emission controls recorded by cloud properties

Edward Gryspeerd¹, Tristan Smith², Eoin O'Keefe^{2,3}, Matthew Christensen⁴, and Fraser Goldsworth⁴

¹Space and Atmospheric Physics Group, Imperial College London, London, UK (e.gryspeerd@imperial.ac.uk)

²UCL Energy Institute, University College London, London, UK

³University Maritime Advisory Services, London, UK

⁴Department of Physics, University of Oxford, Oxford, UK

The impact of aerosols on cloud properties is one of the largest uncertainties in the anthropogenic forcing of the climate system. As large, isolated sources of aerosol, ships provide the ideal opportunity to investigate aerosol-cloud interactions. However, their use for quantifying the aerosol impact on clouds has been limited by a lack of information on the aerosol perturbation generated by the ship.

In this work, satellite cloud observations are combined with ship emissions estimated from transponder data. Using over 17,000 shiptracks during the implementation of emission controls, the central role of sulphate aerosol in controlling shiptrack properties is demonstrated. Meteorological factors are shown to have a significant impact on shiptrack formation, particularly cloud-top relative humidity. Accounting for this meteorological variation, this work also demonstrates the potential for satellite retrievals of ship sulphate emissions, providing a pathway to the use of cloud observations for monitoring air pollution.