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The statistical distribution of aerosol properties in sourthern West Africa

Sophie Haslett (1), Jonathan Taylor (1), Michael Flynn (1), Keith Bower (1), James Dorsey (1,2), Ian Crawford (1), Joel Brito (3), Cyrielle Denjean (4), Thierry Bourrianne (4), Frederic Burnet (4), Anneke Batenburg (5), Christiane Schulz (5), Johannes Schneider (5), Stephan Borrmann (5), Daniel Sauer (6), Jonathan Duplissy (7), James Lee (8), Adam Vaughan (8), and Hugh Coe (1)

(1) Centre for Atmospheric Science, University of Manchester, Manchester, United Kingdom (sophie.haslett@manchester.ac.uk), (2) National Centre for Atmospheric Science, University of Manchester, Manchester, United Kingdom, (3) Laborotoire de Météorologie Physique, Université Blaise Pascal, Clermont-Ferand, France, (4) Centre National de Recherches Météorologiques, Météo-France, Toulouse, France, (5) Max Planck Institute for Chemistry, Mainz, Germany, (6) German Aerospace Center, DLR, Oberpfaffenhofen, Wessling, Germany, (7) Department of Physics, University of Helsinki, Helsinki, Finland, (8) Department of Chemistry, University of York, York, United Kingdom

The population and economy in southern West Africa have been growing at an exceptional rate in recent years and this trend is expected to continue, with the population projected to more than double to 800 million by 2050. This will result in a dramatic increase in anthropogenic pollutants, already estimated to have tripled between 1950 and 2000 (Lamarque et al., 2010). It is known that aerosols can modify the radiative properties of clouds. As such, the entrainment of anthropogenic aerosol into the large banks of clouds forming during the onset of the West African Monsoon could have a substantial impact on the region's response to climate change. Such projections, however, are greatly limited by the scarcity of observations in this part of the world.

As part of the Dynamics-Aerosol-Chemistry-Cloud Interactions in West Africa (DACCIWA) project, three research aircraft were deployed, each carrying equipment capable of measuring aerosol properties in-situ. Instrumentation included Aerosol Mass Spectrometers (AMS), Single Particle Soot Photometers (SP2), Condensation Particle Counters (CPC) and Scanning Mobility Particle Sizers (SMPS). Throughout the intensive aircraft campaign, 155 hours of scientific flights covered an area including large parts of Benin, Togo, Ghana and parts of Côte D'Ivoire. Approximately 70 hours were dedicated to the measurement of cloud-aerosol interactions, with many other flights producing data contributing towards this objective.

Using datasets collected during this campaign period, it is possible to build a robust statistical understanding of aerosol properties in this region for the first time, including size distributions and optical and chemical properties. Here, we describe preliminary results from aerosol measurements on board the three aircraft. These have been used to describe aerosol properties throughout the region and time period encompassed by the DACCIWA aircraft campaign. Such statistics will be invaluable for improving future projections of cloud properties and radiative effects in the region.