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The chemical and physical properties of biomass burning aerosol over the South-East Atlantic and the modelling of transport history during CLARIFY

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During August-September 2017, we conducted the CLoud-Aerosol-Radiation Interactions and Forcing (CLARIFY) campaign using the UK FAAM Bae-146 airborne research aircraft. 28 research sorties were flown out of Ascension Island over the South Atlantic, in order to study the contribution of Africa Biomass Burning (BB) during the dry season and the influence on climate system via their interaction with radiation and clouds.
The aircraft was equipped with a variety of aerosol-related instruments to measure aerosol composition (aerosol mass spectrometer, AMS and single-particle soot photometer, SP2) and size distribution (passive cavity aerosol sizing probe, PCASP and scanning mobility particle sizer, SMPS). Here, we will present a classification of different types of pollution condition over the South-East Atlantic during CLARIFY. We will discuss the average and variations in aerosol properties between boundary layer (BL) and free troposphere (FT) plumes, i.e. chemical composition, size distribution and BC mixing state. We will also employ the Met Office's Numerical Atmospheric-dispersion Modelling Environment (NAME) to investigate different sources and transport processes of BL and FT aerosol. The model results show that lofted plumes in central Africa can descend when traveling west and then mix into BL. Combining the transport history and measured aerosol tracer ratio (BC/ΔCO), we will also discuss the BC removal during transport.