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CLARIFY-2017: Biomass burning aerosol properties and impacts on stratocumulus cloud and radiation in the South Atlantic

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In the Boreal summer, biomass burning aerosol (BBA) from wildfires in central Africa is advected eastward over the South Atlantic, where it interacts with a semi-permanent stratocumulus cloud deck and consequently impacts cloud microphysical properties, thermodynamics and radiation. CLARIFY-2017 - a collaborative project between the Met Office and the Universities of Exeter, Oxford, Manchester, Leeds and Reading (UK) - aims to constrain the properties and impacts of BBA in this region. In situ observations of cloud, aerosol and precipitation were collected using research aircraft (FAAM BAe146) in the South Eastern Atlantic over a 4 week period during August-September 2017; in harmony with a suite of surface, satellite, and in situ aircraft data-collection campaigns [Zuidema et al., 2016].

I will give an overview of the CLARIFY-2017 campaign and present key findings from the Met Office and University of Exeter. In particular, I will discuss the impacts of high BBA loadings on marine boundary layer (MBL) height and MBL thermodynamics and case studies where BBA entrainment into the boundary layer in pockets of open cells (POCs) was inhibited suggesting that BBA vertical mixing is highly sensitive to the underlying cloud scheme.The development of new retrievals of absorbing aerosols above clouds using the geostationary SEVIRI sensor will be critically examined for a number of case studies. These datasets provide a robust and comprehensive set of observations with which to challenge models with a range of spatial resolutions; the Met office global numerical weather prediction and climate model will be challenged with these observations and the results presented.

References:

Zuidema P, Redemann J, Haywood J, Wood R, Piketh S, Hipondoka M, Formenti P. 2016. Smoke and clouds above the southeast Atlantic: Upcoming field campaigns probe absorbing aerosol's impact on climate. Bull. Am. Meteorol. Soc. 97, doi: 10.1175/BAMS-D-15-00082.1.