

Aerosol-radiation-cloud interactions in the South-East Atlantic: results from the ORACLES-2016 deployment and a first look at ORACLES-2017 and beyond

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Seasonal biomass burning (BB) in Southern Africa during the Southern hemisphere spring produces almost a third of the Earth's BB aerosol particles. These particles are lofted into the mid-troposphere and transported westward over the South-East (SE) Atlantic, where they interact with one of the three semi-permanent subtropical stratocumulus (Sc) cloud decks in the world. These interactions include adjustments to aerosol-induced solar heating and microphysical effects. The representation of these interactions in climate models remains highly uncertain, because of the scarcity of observational constraints on both, the aerosol and cloud properties, and the governing physical processes.

The first deployment of the NASA P-3 and ER-2 aircraft in the ORACLES (ObseRvations of Aerosols Above Clouds and Their IntEractionS) project in August/September of 2016 has started to fill this observational gap by providing an unprecedented look at the SE Atlantic cloud-aerosol system. We provide an overview of the first deployment, highlighting aerosol absorptive and cloud-nucleating properties, their vertical distribution relative to clouds, the locations and degree of aerosol mixing into clouds, cloud changes in response to such mixing, and cloud top stability relationships to the aerosol.

We also expect to describe preliminary results of the second ORACLES deployment from Sao Tômé and Príncipe in August 2017. We will make an initial assessment of the differences and similarities of the BB plume and cloud properties as observed from a deployment site near the plume's northern edge. We will conclude with an outlook for the third ORACLES deployment in October 2018.