Université de Lille 1 SCIENCES ET TECHNOLOGIES — UFR de Physique

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International Master 2 Atmospheric Environment: Research Training 2017-2018

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CaPPA Work Package: WP-2

**Retrieval of aerosol above clouds properties using combined airborne sun-photometer and flux meter observations during the AEROCLO-SA field campaign in Namibia.**

The representation of aerosols, clouds and cloud-aerosol-radiation interaction remain one of the largest uncertainties in climate change. The South East Atlantic is a region where high atmospheric aerosol loadings can be transported above or within clouds. This area provides a unique natural laboratory for studying aerosol-radiation and aerosol-cloud interactions. The AEROCLO-SA[1] project is a field campaign focusing on the South East Atlantic off the western coast of Namibia (September 2017). This project is the French contribution of an international project, including partners from the UK and USA. During AEROCLO-SA, the LOA[2] will deploy the airborne OSIRIS[3], a multi-viewing, multi-spectral, multi-polarization imager. Flux measurements will also be performed in the visible and in the thermal infrared. An airborne sun-photometer (PLASMA[4]) that measures the aerosol optical thickness and a lidar will be also onboard the aircraft. Airborne in-situ measurements will be also performed. During the field campaign, vertical transects and spirals through the layers will be performed. The main goal of this subject is to estimate the optical and radiative properties of aerosols observed during the experiment as well the vertical distribution of these properties. In particular, the candidate will evaluate the PLASMA data by applying algorithms that allows retrieving the particles size distribution. Then, he/she will have to apply a method to account for the aircraft attitude to properly estimate the flux and the heating rates. Comparison with available satellite products and OSIRIS retrievals will be achieved. The possibility of retrieving the aerosol absorption by comparing flux measurements and simulations will be also evaluated.

Key words: aerosol, clouds, radiation, flux, heating rates, aerosol absorption, microphysics

[1] AErosol RadiatiOn and CLOuds in Southern Africa (http://www.agence-nationale-recherche.fr/?Project=ANR-15-CE01-0014)
[2] Laboratoire d'Optique Atmosphérique
[3] Observing System Including PolaRisation in the Solar Infrared Spectrum
[4] Photomètre Léger Aéroporté pour la Surveillance des Masses d'Air