

International Master 2 Atmospheric Sciences: Research Training 2012-2021

Laboratory: LOA

Supervisor: Philippe Goloub

Tél: 03.20.43.67.08, E-mail: Philippe.Goloub@univ-lille.fr

Collaborator: Luc Blarel, Gaël Dubois, Benjamin Torres

CaPPA Work Package: Aerosol observations: Instrumentation and intensive field campaigns
Monitoring from networks and satellite (WP3)

Ground-based aerosol monitoring over the ocean: a step forward with ship-photometer

Aerosols are an Essential Climate Variable (ECV) affecting the Earth's climate but also its environment as well as human health. They have quite diverse origins ranging from natural (Sea Salt, Desert Dust, Smoke from Biomass burning (wildfire), Biological, Volcanic Ash, Sulfate, ...) to anthropogenic (smoke from human caused biomass burning activities, pollutant particles due to fossil fuel combustion emitted by industry, transportation, and energy production, ...). To assess their impacts, their physical and chemical properties (AOD, SSA, VSD, refractive indexes) have to be measured accurately and widely both from space and ground.

Ground-based network such as AERONET are providing continuously and automatically part of this information at permanent and stationary sites. The maritime branch of AERONET (MAN- Maritime Aerosol Network) is operating hand-held photometers (Microtops) basically providing spectral AOD from various scientific and commercial boats/vessels. Recent research and development made in the frame of a joint academic and industrial partnership are addressing the full automation of this observation type. This implies, at the same time, adaptation of existing commercial instrument (CIMEL 318T) and the development of new instrument (PLASMA) measuring spectral AOD and directional atmospheric radiance. Both are handled at Laboratoire d'Optique Atmosphérique and are, by end 2020, associated to different TRL (technology Readiness Level).

LOA is involved in the first phase of the MAP-IO project (Marion Dufresne Atmospheric Program Indian Ocean), aiming to setup and operate a first automatic ship-photometer onboard the French Marion Dufresne ship. Setup and beginning of data acquisition is scheduled for mid-January 2021.

The proposed internship will consist in analyzing (retrieving and interpreting primary data and aerosol properties) from (i) the first data recorded by the Marion Dufresne and from (ii) the regular data acquired by a second and smaller fishership equipped with the same instrument and operated from Boulogne/Mer (1h30 distance from Lille) in the North Sea. Some data obtained in the North Sea in september 2020 and sampling the Californian smoke plume are already available. The work will contribute to the observations and sciences activities performed by exploratory platforms in the frame of the European ACTRIS atmospheric infrastructure.

Keywords: Climate, Aerosols, Remote Sensing, Mobile Photometry, exploratory platform, ACTRIS.