

Master 2 - Research Training – 01/02 to 30/06/2026

Laboratory: PhysicoChimie des Processus de Combustion et de l'Atmosphère (PC2A)
and Laboratoire d'Optique Atmosphérique (LOA)

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AREA Work Package: 1

Laboratory determination of the optical properties of biomass burning aerosols.

The aim of this internship is to contribute to measuring the optical properties of aerosols produced by biomass combustion. These biomass burning aerosols (BBA) are known to be one of the most significant sources of absorbing aerosols in the Earth's atmosphere, making them a key parameter in atmospheric chemistry and the radiation balance. However, their great chemical and microphysical diversity makes them one of the most poorly understood types of aerosols, and very difficult to observe and quantify by remote sensing. In addition, BBA are a major source of uncertainty for chemistry-transport and climate modelling.

You will conduct experiments in the PC2A laboratory to generate particles from 2 phases of biomass combustion: pyrolysis and open combustion. The extinction spectra of these BBA will be recorded using FTIR and UV-visible spectrometers. Simultaneously, the physical properties of these particles will also be studied using particle counters and particle sizers. Chemical analysis will be performed after sampling these BBA on filters. Finally, the recorded extinction spectra will be processed to retrieve the complex refractive indices (CRI) using a numerical method developed at the LOA. The CRIs of BBA are key parameters from which all optical properties can be derived: absorption coefficient, diffusion coefficient, single scattering albedo, mass absorption coefficient, which are necessary for atmospheric remote sensing and monitoring of biomass fires.

Keywords: Biomass burning aerosols (BBA) - Aerosol metrology - Optical properties - Light scattering and absorption - Fourier transform infrared and UV-visible spectroscopy - Atmospheric remote sensing.