

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

Laboratory: LOA

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Variability and long-term trends of vertical aerosol profiles at the ATOLL site: influence of extreme events and long-range transport

Abstract.

Atmospheric aerosols play a major role in the climate system, influencing both the Earth's radiative balance and cloud microphysics. Their dynamics are strongly affected by climate change and extreme events such as large-scale wildfires, volcanic eruptions, or Saharan dust outbreaks. These phenomena can significantly modify the composition and vertical structure of aerosols, with impacts extending to intercontinental scales.

The ATOLL site offers a unique long-term observational record, with continuous vertical aerosol profile measurements available since 2006. This dataset provides a rare opportunity to investigate interannual variability, identify long-term trends, and detect the specific signatures of extreme events.

The aim of this internship is to (i) characterize the statistical variability of vertical aerosol profiles, (ii) assess potential long-term changes over almost two decades, and (iii) link these findings to selected case studies, including Canadian wildfires, Saharan dust transport, and volcanic plumes. The approach will combine statistical analyses with complementary datasets, such as satellite observations and trajectory reanalyses).

This work will contribute to a better understanding of atmospheric evolution in the context of global change and help assess the representativeness of local observations for larger-scale processes.

Keywords: Aerosols, vertical profiles, time series, extreme events