M2 SOAC : Fiche de stage de recherche en laboratoire

Laboratoire : Laboratoire de l'Atmosphère et des Cyclones (LACy), Université de La Réunion

Titre du stage : EarthCARE ATLID Aerosol Profile Validation Using Maïdo Lidar Observations

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Sujet du stage :

Atmospheric aerosols and clouds interact with solar and terrestrial radiation and have an impact on the Earth's radiative balance and climate. The Earth Cloud Aerosol and Radiation Explorer (EarthCARE) satellite was launched in 2024 to improve our knowledge of cloud–aerosol–radiation interactions. One of its instruments is the Atmospheric Lidar (ATLID), a 355 nm high-spectral-resolution lidar that provides vertical information on aerosols and clouds.

EarthCARE aerosol products need to be compared with independent observations for validation. This is especially important under low aerosol loading conditions, where the aerosol signal is weak. The Maïdo Observatory, located on Réunion Island, performs long-term aerosol measurements with a ground-based lidar at 355 nm. The site is located in a relatively clean atmosphere in the Southern Hemisphere where long-range transported aerosol layers and stratospheric aerosol perturbations are frequently observed.

Objective. The objective of this work is to perform Cal/Val of EarthCARE ATLID L1 and L2 aerosol products using ground-based lidar observations at the Maïdo Observatory.

The work will be divided into 3 distinct parts:
1. Identification of EarthCARE overpasses close to Maïdo and selection of ATLID and Maïdo lidar observations close in time and space.
2. Comparison of ATLID and Maïdo aerosol vertical profiles in the troposphere and stratosphere. Aerosol extinction, layer altitude and layer thickness will be compared.
3. Study of ATLID performance at different altitude ranges and aerosol conditions, and comparison of the observations at local, regional and zonal scales.

This work aims at evaluating the performance of ATLID aerosol products in the troposphere and stratosphere under different atmospheric conditions.
Dataset. ATLID datasets vertically resolved: L1B NOM, L2AER, L2EBD, L2FM and L2TC and column-integrated: L2ALD. The latest baseline will be chosen, unless inversion retrievals are not available.