Master's Internship Subject 2025-2026

Title: Global synthesis of volatile organic compounds (VOCs): composition, variability, and origins
Location: Institute of Environmental Geosciences (IGE, Université Grenoble Alpes, Grenoble, France)
Supervisors: Pamela Dominutti (IGE-UGA) & Agnès Borbon (LaMP-UCA-OPGC)

Duration: 6 months, starting late January 2026

Keywords: Volatile Organic Compounds, Global Concentrations, Emission Sources, Global Emissions Initiative (GEIA)

Context

Volatile organic compounds (VOCs) are key drivers of **atmospheric chemistry and air quality**. Because of their high reactivity, VOCs shape the oxidative capacity of the atmosphere, act as precursors of tropospheric ozone, and contribute to the formation of secondary organic aerosols. These processes directly affect climate regulation and, at elevated concentrations, have significant health impacts.

Despite their importance, global information on VOC **levels, sources, and composition** remains incomplete. Observational data are still scarce in many regions, limiting our ability to fully understand their variability and impact.

To address this, the **Global Emissions Initiative (GEIA)** has mobilized an international community to gather and harmonize VOC datasets from diverse observational campaigns worldwide. Within this framework, the intern will contribute **to the largest-ever synthesis of VOC measurements, providing essential insights for both science and policy.**

Internship Objectives

The internship will focus on processing and analyzing a **unique dataset** that compiles VOC observations from about **150 field campaigns worldwide**. The objectives are to:

- Characterize the **composition and variability** of VOCs across contrasting regions.
- Compare **natural vs. anthropogenic influences** on VOC levels.
- Identify **global patterns and regional specificities** in atmospheric VOC chemistry.
- Detect **gaps in current observational coverage**, pointing to priorities for future research.

The work will combine data science techniques, statistical analyses, and geospatial methods to deliver a global overview of VOC distributions and drivers.

Optional Mission: For candidates interested in gaining hands-on laboratory experience in addition to the data analysis project, a **compact experimental project** can be proposed.

🚀 Learning Outcomes

By the end of the internship, the student will have:

- Experience in **data analysis and visualization applied to atmospheric sciences**.
- Knowledge of **air quality, VOC chemistry, and climate interactions**.
- Practical skills in handling **large and heterogeneous environmental datasets**.
- Experience in **scientific writing and international collaboration**.
- Direct involvement in the preparation of a **peer-reviewed publication** based on this unique dataset.

👤 Candidate Profile

We are looking for a motivated Master's student with:

- Training in **environmental sciences, atmospheric chemistry, physics, or data science**.
- Skills or desire to learn in **statistical and/or geospatial data analysis**.
- A good command of **English** (oral and written).
- Curiosity for **global-scale environmental challenges** and enthusiasm for collaborative research.

Supervision Method

Weekly in-person meetings will be held during the first months of the internship, with a monthly update with both supervisors. The intern will also have the opportunity to participate in GEIA-VOC team meetings, which occur every three months.

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