



**Ecole Doctorale - 104**  
Sciences de la Matière, du Rayonnement  
et de l'Environnement

**EDSMRE** Université Lille Nord de France

**UNIVERSITY:** LILLE, Faculty of Sciences and Technologies

**Scientific field :** « Science de la Terre et de l'Univers, Terre – Enveloppes fluides »

**Title of the thesis:** Development of a fluorescence Lidar for the study of atmospheric particles and gases

**Supervisor:** Goloub, Philippe, Professeur, philippe.goloub@univ-lille.fr

**Co-supervisor :** Qiaoyun Hu, Igor Veselovskii, Stéphane Victori

**Laboratory:** Laboratoire d'Optique Atmosphérique

**Related research project (international/national/regional):** PIA3/Labex CaPPA, PIA3/Equipex OBS4CLIM

**Expected/obtained funding:** Université de Lille (financement obtenu)

### ABSTRACT

The atmosphere of the Hauts-de-France region is regularly affected by atmospheric events of very variable magnitude and nature. These aerosols, clouds and atmospheric gases play a crucial role in atmospheric processes on a global scale.

The parameters describing their properties are for the most part considered essential climatic variables (ECVs). As the meteorological atmosphere and the lower stratosphere are their main reservoirs, we need to access their vertical distribution and monitor it over time. Lidars are one of the measurement techniques for probing the atmosphere with great finesse.

As part of this research project, the student will participate in the development of a new lidar (LIFE, Lidar Fluorescence Explorer). This new lidar will incorporate a high level of automation (functioning, data processing), which is fundamental to maximizing observation, especially during crises (e.g., health containment 2020; volcanic eruption, etc.). LIFE will combine a higher-power laser than the LILAS lidar currently in operation on the Lille ATOLL (ATmospheric Observatory in liLLe) platform and a detection adapted to very weak atmospheric signals such as Raman and fluorescence (Veselovskii et al., 2020, AMT; Hu et al., in preparation).

This experimental and flexible lidar will be able to profile aerosols, clouds and certain gaseous species such as methane (Veselovskii et al., 2019, AMT), water vapour, etc., adapting its configuration.

This research will be carried out in collaboration with Dr. Q. Hu (LOA), Dr. I. Veselovskii (GPI, Russia) and in partnership with Dr. S. Victori (CIMEL, Paris). This project is part of the Equipex OBS4CLIM project, contributing to the ACTRIS research infrastructure and will participate in one of the research areas of the joint AGORA-Lab laboratory.

**Planned recruitment date :** 01/10/2021

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