

Development of an innovative VOC sampling system for drone measurements



Research Center: ENERGY AND ENVIRONNEMENT

Affiliation: Ecole Nationale Supérieure Mines-Télécom Lille Douai (IMT Lille Douai)

Context:

Created by the merger of Mines Douai and Telecom Lille on January 1st, 2017, IMT Lille Douai is the largest graduate school of engineering in the north of Paris. It aims at teaching the general engineers and digital experts of the future. Located at the crossroads of Europe, between Paris, London, Brussels and Amsterdam, IMT Lille Douai intends to become a major player in industrial and digital transformation of the society by combining engineering science and digital technologies.

Based on two sites dedicated to research and education in Douai and Lille, IMT Lille Douai has research facilities of almost 20,000m² devoted to high-level scientific activities in the following areas:

- Digital science,
- Energy and Environment,
- Materials and Process engineering applied to polymers, composites and civil engineering.

The Energy and Environment center and the Digital System center join their effort in a common project, « ALPAGA » (**Aerial Platform for sampling Atmospheric Gases and Aerosols**), to use drones for atmospheric measurements. The long-term vision of this project consists in building a robust multi drone fleet to autonomously map atmospheric volumes using our own specific sampling techniques.

Scientific project:

Volatile Organic Compounds (VOCs) play a crucial role on Earth's atmosphere, affecting the oxidative capacity and serving as precursors for secondary pollutants such as ozone and particulate matter. Although precise measurements at trace levels are conducted routinely, such observations are often performed at ground level with expensive instruments, on a fixed point (tower, container), raising questions regarding their representativeness on complex environments such as urban or forested areas. Nowadays, multi-copter drone systems have proven to be an accessible and complementary tool to fixed (e.g. ground, tower) and mobile (e.g. aircraft, tethered balloon) atmospheric measuring platforms. On this context, the ALPAGA project combines atmospheric and computer scientists to develop autonomous systems and multi-drone coordination capable of accurate atmospheric sampling contributing to spatio-temporal mapping of pollutants.

Objectives:

The objective of this post-doc is to develop the analytical tools for VOC measurements onboard drone systems. Activities will include testing different measurement designs and evaluating their performance with a particular focus on biogenic VOCs. The post-doc will both benefit and contribute to the innovative technical developments planned within the EU-ACTRIS topical center for reactive trace gases at IMT LD. The postdoctoral researcher shall also contribute to development of nacelle design and system control, as well as field deployments foreseen

for summertime 2021, including forested areas. The strategy is to complete a ground-based measurement station with Aerial vehicle platforms equipped with samplers and sensors in order to map the vertical profile and horizontal distribution of selected atmospheric compounds. The postdoctoral researcher can also be expected to participate in teaching activities according to his/her background.

Candidate profile, personal skills, and requirements:

The successful applicant will hold an PhD degree, preferably in a relevant area of atmospheric sciences. Previous experience with instrumentation, electronics and data analysis will be assets for this position. Good proficiency in English is a prerequisite.

Applicants are invited to send their Curriculum Vitae, a cover letter, and reference letters. Applications will be considered until the position is filled.

Further information:

- Full-time postdoctoral position
- Duration: 12 months
- Starting date: from November 2020

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