

Specification: A new approach for the real-time analysis of multi-site observation data of Volatile Organic Compounds (VOC) in the industrial zone of the étang de Berre.

Workplace : AtmoSud (Marseille, France) and IMT Nord Europe (Douai, France)

Type of contract and duration: PhD contract, type CIFRE (3 years) in Analysis of environmental data

CONTEXT :

AtmoSud acts for the health of all. As an official air surveillance organisation, AtmoSud is continuously improving its knowledge of air pollutants and air quality. It identifies the populations exposed to air pollutants exceeding levels of health standards in order to highlight areas where action is needed. The organisation fulfils a mission of public interest. AtmoSud informs and raises awareness among citizens, the public authorities, local communities and economic actors and helps decision-making to implement the most relevant actions for air quality. This way, AtmoSud contributes to changes in everyone's behaviour.

Public institution belonging to the IMT (Institut Mines-Télécom) group, placed under the supervision of the Ministry of Industry, **IMT Nord Europe** has three main objectives: providing our students with ethically responsible engineering practices enabling them to help solve the issues of the 21st century, carrying out R&D activities leading to outstanding innovations and supporting territorial development through innovation and entrepreneurship. Ideally positioned at the heart of Europe, 1 hour away from Paris, 30 min from Brussels and 1h30 from London, IMT Nord Europe has strong ambitions to become a main actor of the current industrial, digital and environmental transformations, by combining engineering and digital technologies, in research as well as in education.

Located on two main campuses dedicated to research and education in Douai and Lille, IMT Nord Europe offers research facilities of almost 20,000m² in the following areas:

- Digital science,
- Processes for industry and services,
- Energy and Environment,
- Materials and Processes.

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This position is based in the CERI (Teaching, Research and Innovation Centre) Energy and Environment, in the group of Atmospheric Sciences. The CERI EE's research focus is on the physical chemistry of trace species in the air and its fields of application. The aim is to achieve a better understanding of the processes of formation and transformation of air pollutants and to propose solutions adapted to the needs of society and economic operators. The CERI EE offers an international working environment in a Shanghai ranked research group, with labs based in Douai, a middle-sized town close to Lille, a cosmopolitan metropolis with a thriving cultural scene and lively atmosphere.

Background of the position:

Air quality is one of the major challenges of our era. The WHO estimates that 7 million premature deaths per year globally are caused by bad air quality. There exist a wide variety of air pollutants which undergo complex

physical and chemical processes. The term Volatile Organic Compounds (VOC) regroups a large variety of compounds, of which only a few are currently subjected to regulatory levels in France (e.g. benzene, 1,2-butadiene). However, these VOC play a crucial role in the atmosphere, notably as precursors of ozone and particulate matter. VOC can have a direct impact on human health, particularly in proximity of their sources, where concentrations are the highest. For these reasons, the French agencies of air quality surveillance (ASQAA), such as AtmoSud, are deploying systematic measurements of VOC levels in certain zones of interest, where exposition is high.

VOC sources, that can be natural or anthropogenic, are multiple, making the understanding of the links between sources and measurements of VOCs in ambient air often very complex. However, with high resolution multi-species observation and the use of data processing techniques such as PMF (Positive Factor Matrix), it is possible to attribute chemical signatures to certain determining factors (sources, processes, meteorology). Industrial areas in the vicinity of urbanised areas, such as the étang de Berre area in the Provence-Alpes-Côtes d'Azur region, show high VOC emissions from very heterogeneous sources. Therefore, AtmoSud has set up an observation network around this area of interest, including continuous measurements of a selection of VOCs. The variety of sources, the local meteorology characterised by intense sunshine and contrasting wind regimes, and the particular atmospheric dynamics in a coastal zone, make the understanding of determining factors of VOC pollution events particularly complicated. In addition, the use of advanced data analysis methods requires large observation databases of excellent quality in order to have the high variability due to contrasting situations that is needed for the data analysis. The processing methodologies are still underdeveloped for these pollutants and do not currently allow for rapid information and preventive actions.

In this context, the PhD project aims to develop new methods to process the data measured on AtmoSud's instrumented sites around the étang de Berre, in order to (1) continuously qualify the data according to criteria to be defined, (2) to detect VOC pollution in near-real time and (3) identify the main determinants of these events (weather, source, etc.). These elements will constitute the learning basis for the development of a predictive approach.

This CIFRE thesis will be divided into two periods of time: the first period will be at AtmoSud (Marseille), where the PhD student will follow VOC measurements on different sites; the second period will be at IMT NE (Douai) where the research group will provide support on data processing tools and guidance for the research project and publications. The candidate will be enrolled at the Doctoral School SMRE of Lille and will benefit from its doctoral training offer.

REQUIRED PROFILE :

Before the start of the PhD, the candidate must have obtained a master in Atmospheric Science or environmental data analysis.

Skills	Knowledge
Good level of English, both orally and in writing Experience in scientific coding (R, Python...) or experience with data treatment (Matlab, Igor...) Competency to conduct individual and collaborative (research) projects Demonstrated good communication skills, both oral and writing, are essential (reports, presentations...)	A background in atmospheric chemistry Knowledge in dispersion of pollutants or understanding of meteorology in the troposphere Having a background in analytical chemistry is considered a plus

CONDITIONS :

The PhD funding is offered on a full-time basis for a period of 36 months with a starting date aimed on 01/10/2022 (temporary contract). The successful student will be part of the Doctoral School SMRE of Lille and at the end of his/her/their contract graduate from IMT Nord Europe.

INFORMATION AND APPLICATION :

For any information on the position, please contact

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For any administrative information, please contact the Human Resources Department: jobs@imt-nord-europe.fr

To apply, please connect to our recruitment platform via the following link:

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DEADLINE DATE FOR APPLICATIONS: 20/06/2022