

PhD position: Evaluating of the impact of volatile organic compounds from shipping emissions in the Channel on air quality



Discipline : Atmospheric sciences

Workplace : IMT Nord Europe

Type of contract and duration : PhD contract, 3 years

CONTEXT :

Public establishment belonging to IMT (Institut Mines-Télécom), placed under the supervision of the Ministry of Industry, IMT Nord Europe has three main objectives: providing our students with ethically responsible engineering practice enabling them to solve 21st century issues, carrying out our 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 transitions, digital and environmental, by combining education and research on engineering and digital technologies.

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.

For more details, visit the School's website : www.imt-nord-europe.fr

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:

Shipping is a central infrastructure for world trade, serving more than 80% of total freight transport. Although ships exhibit comparatively low fuel consumption per unit of cargo-distance, they produce high specific emissions of nitrogen oxides (NO_x), sulphur oxides (SO_x) and particulate matter (PM).^{1,2} Evolving regulations impose stricter norms for NO_x, SO₂ and CO₂, and although traditionally maritime transport is not considered a major source of volatile organic compounds (VOCs), this could evolve with the use of alternative fuels and stricter emission norms. VOCs are considered major contributors to secondary pollutants, such as ozone and particles, but their multiple sources and fates are not always well confined.³ Disentangling the contributions of different VOCs sources remains a real challenge, particularly in areas with a multitude of sources. Port areas typically present a mix of industrial, land transport and shipping sources that can influence the air quality (AQ) of port cities. Shipping emissions can represent a contribution comparable to road traffic, especially in urban

harbour areas where large vessel docks are located in the proximity of the cities. Harbours along the Channel, one of the densest maritime traffic straits, could be particularly affected.

The objective of this PhD project is to study the sources of VOCs in harbour areas and to evaluate the influence of new practices on VOC emissions from shipping with the aim to better understand their impact on the local urban AQ. This will be done by measuring VOC concentrations at different locations on the Channel (using GC-MS and PTR-MS), using state-of-the art data analysis methods to deconvolute sources and linking VOCs to secondary pollutants measured on the same locations. The PhD project is framed by two funded research projects, PIRATE (AQACIA, ADEME) and SHIPAIR (ANR), that investigate the influence of shipping emissions on urban air quality through field campaigns and modelling. The PhD project will be carried out in collaboration with Dr. Thomas Bell and Dr. Ming Xi Yang from the Plymouth Marine Laboratory at Plymouth, in the U.K.

REQUIRED PROFILE :

Skills	Knowledge
Good level of English, both orally and in writing is essential Competency to conduct individual and collaborative (research) projects Experience in scientific coding (IgorPro, Matlab...) Willingness to participate in field campaigns	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 METHOD :

For any information on the missions, 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 SUBMISSIONS : 10/05/2022

References:

1. Yang, M., Buxmann, J. C. E., Delbarre, H., Fourmentin, M. & Smyth, T. J. Temporal and spatial trends in aerosols near the English Channel – An air quality success story? *Atmos. Environ. X* **6**, 100074 (2020).
2. Gobbi, G. P., Di Liberto, L. & Barnaba, F. Impact of port emissions on EU-regulated and non-regulated air quality indicators: The case of Civitavecchia (Italy). *Sci. Total Environ.* **719**, 134984 (2020).
3. Xiang, Y. *et al.* Development of a methodology examining the behaviours of VOCs source apportionment with micro-meteorology analysis in an urban and industrial area. *Environmental Pollution* vol. 162 15–28 (2012).