

Co-tutorial PhD Thesis (The Cyprus Institute – IMT Lille Douai)
(Sept. 2018)

CLOSING DATE FOR APPLICATIONS: 09/03/2018

**Experimental characterization of Organic Aerosol and Volatile Organic
Compound sources in Cairo (Egypt)**

Scientific context

By the end of the century, model projections point to the Eastern Mediterranean & Middle East (EMME) as one of the major regional climate change hot spot with poor air quality and predicted gradual warming and drying climate. Although anthropogenic emissions of gaseous and particulate pollutants are suspected to be one of the key factor responsible for those environmental impacts, our current knowledge on these emissions and their impacts remains highly uncertain. In 2014, the World Health Organization (WHO) has released new evidence that ambient air pollution is among the most important risks to health in the EMME region. In 2010, Egypt was among the top 15 countries ranked for premature mortality linked to outdoor air pollution. With over 20 million of inhabitants, Greater Cairo megacity has the worst air pollution in Egypt; the level of air pollution in Cairo typically ranging from 10 to 100 times higher than the standards set by the WHO. In this context, the POLCAIR (Air pollution in Greater Cairo: sources and impacts) project aims at assessing (i) the sources of atmospheric anthropogenic pollution and (ii) the impact of air pollution on health with Greater Cairo as a representative megacity of the EMME region.

Scientific Objectives

The overall scientific objective of the PhD is to improve our scientific knowledge of the gaseous and fine organic pollution in Greater Cairo. It will focus on the chemical characterization of their different natural/anthropogenic sources, their concentration levels (reconciliation with regional emission inventories), their spatial and temporal variability (geographic origin, hourly/daily patterns), their chemical fingerprints, their intrinsic characteristics (aerosol size distribution, optical properties, mixing state, etc), and their fate in the atmosphere (photochemical ageing). This PhD will shed new light on one of the most polluted worldwide megacities and advance our scientific knowledge on anthropogenic emissions and their various impacts.

Experimental strategy

The successful candidate will be trained on a comprehensive suite of state-of-the-art gas/aerosol instruments providing real-time measurements of Organic Aerosols and Volatile Organic Compounds (ACSM, PTR-MS, TD/GC/2FID) complemented by on-line/off-line observations of aerosol properties (Absorption, Light scattering, Number Size Distribution, ...) and a wide range of key VOCs. The candidate will be involved in field observations in Cyprus (CAO¹) in the framework of the EU-H2020 ACTRIS2 project, and participate to an intensive field campaign (around 1 month) in Greater Cairo that will overlap with the "black cloud" period associated with intense agriculture waste burning from the Nile delta.

This large amount of data will offer the candidate to further exploiting them with up-to-date statistical source apportionment models. His/her work will be embedded within an international scientific environment with active participation in COST actions (COLOSSAL²) and ERASMUS+ mobility opportunities.

Qualifications

This 3-year cotutelle PhD will be organized within two periods (18 months in Nicosia, Cyprus; 18 months in Douai, France) and therefore be rewarded with two doctoral degrees. The successful candidate will hold a Master of Science in Environmental Sciences/Chemistry/Analytical chemistry (preferably a Master in atmospheric sciences) with excellent communication and interpersonal skills. Previous experience of field measurements will be an asset for this position. Good proficiency in English is a prerequisite.

Contacts

Please submit detailed CV (incl. MSc ranking information) + letter of motivation to:

- IMT Lille Douai (France): Dr Stéphane Sauvage (stephane.sauvage@imt-lille-douai.fr)
- The Cyprus Institute (Cyprus): Prof. Jean Sciare (j.sciare@cyi.ac.cy), Dr Charbel Afif (c.afif@cyi.ac.cy)

¹ CAO : Cyprus Atmospheric Observatory : <http://www.cyi.ac.cy/index.php/cao.html>

² COLOSSAL : Chemical On-Line Composition and Source Apportionment of fine Aerosols: <https://www.costcolossal.eu/>