

Training program

The PhD thesis will be performed in the Environmental Geochemistry and Atmospheric Research Group (EGAR). The PhD will be supervised by Professors Xavier Querol and Andres Alastuey, leading EGAR.

EGAR is nowadays integrated by 49 researchers (including PhDs) and Technicians, being 12 permanent researchers (7 postdocs, 20 PhD students, and 9 technicians), mainly working in Air Quality, Aerosols and Climate and Exposure. Collaboration with this varied and highly productive scientific team provides considerable "added value" to the research experience and training of new, young postgraduate students. The student will also collaborate in European projects, in which the research group is involved, such as RI-URBANS. This international collaboration has enormous benefits for PhD students and early postdocs, since it implies the option of training schools, short visits, workshops and interaction with international top researchers.

The PhD student will profit from interaction with different members of the EGAR research group, who can provide training in theoretical aspects of atmospheric aerosols, operation of measurement instruments, work in the laboratory of chemistry, use of statistical and graphical software for data treatment. The PhD student will attend International aerosol courses: in recent years, 11 PhD students have attended the course EUSAAR/ACTRIS "Aerosol Advanced Training Course " and 1 to GAWTEC course on aerosol measurements. The PhD student will perform short stays (3 months) at two of the centres of the international researchers involved in the project: i) At UGA for OP analysis and interpretation; 2) at PSI for online data interpretation and SA.

EGAR Research team

The research team on Environmental Geochemistry and Atmospheric Research (EGAR, <https://www.idaea.csic.es/egar/>) of the Institute of Environmental Assessment and Water Research from the Spanish Research Council (IDAEA-CSIC, <https://www.idaea.csic.es/>). IDAEA has been awarded with the Severo Ochoa Award (the most prestigious award for research centres in Spain). EGAR is nowadays integrated by 49 researchers (including PhDs) and Technicians, being 12 permanent researchers (7 postdocs, 20 PhD students, and 9 technicians). EGAR has operated, for more than twenty years, a unique network of monitoring stations for long term and intensive measurements of atmospheric aerosols and gaseous precursors in different environments

EGAR performs research in the sectors of air quality, aerosols and climate, exposure, industrial emission, and waste. EGAR's research on Air Quality aims at understanding the chemical and physical processes responsible for the emission, transport, fate, and removal of atmospheric pollutants with an impact on human health and vegetation. The EGAR group is specialized in air quality assessment and monitoring, using state of the art air pollutant instrumentation combined with innovative monitoring strategies based on sensor networks. The team has strong expertise in source apportionment to aid in the identification of major sources impacting air quality degradation, which in turn supports the implementation of mitigation strategies. Similarly, the EGAR group is experienced in health impact assessment to translate air pollution impacts into premature mortality and morbidity outcomes, easier to understand by the general population.

EGAR has wide experience on:

- Developing robust atmospheric pollution monitoring and chemical characterization strategies, focusing on aerosols but also including precursors such as semi-volatile organic species and gaseous pollutants. The team has produced some of the longest (since 2001) aerosol chemical composition time series in Europe.
- Source apportionment using receptor modelling (PMF and hybrid multi-linear engine (ME) scripts) targeting sources like Saharan dust outbreaks and non-exhaust traffic emissions (brake and tire wear, road dust).
- Assessing of source contribution to optical properties and radiative forcing linking AQ with climate.
- Source apportionment of organic aerosols using state-of-the-art instrumentation (ACSM).
- Innovative aerosol monitoring based on sensor networks and citizen science approaches.

EGAR operates a network of monitoring stations for long term and intensive measurements of atmospheric aerosols and gaseous precursors. This network integrates 3 fixed monitoring sites: Barcelona urban background site, Montseny (MSY) regional background site; and Montsec (MSA) remote background site. These sites are equipped with different instruments for measuring chemical, optical and physical properties of atmospheric aerosols. The design of the network, with simultaneous measurements in three different environments, provides an ideal framework to investigate sources and processes of atmospheric aerosols, being representative of NE Spain, in the Western Mediterranean. Moreover, it provides insight in order to define adequate strategies for air quality and climate policies. State of the art instrumentation enables source apportionment, measurement of physical parameters and toxicity of atmospheric aerosols. The most relevant labs and instruments are:

- i) The three supersites are equipped with instrumentation to measure levels of a large number of pollutants, optical properties of aerosols and sampling of PM_x for subsequent analysis.
- ii) Two ACSMs (one at each site) to measure online the PM₁ composition, with a major focus on OA. The opportunity to have two Aerosol Chemical Speciation Monitors (ACSM) working for a common objective is very unique, and clearly the only option in Spain at the moment, including qualified personnel to coordinate the use and the interpretation of results.
- iii) One new ToF PTRMS installed at BCN site
- iv) IDAEA-CSIC's full equipped biogeochemical laboratories with ICP-AES, ICP-MS, CG-MS, IC, and TOT, for the treatment and analysis of PM_x samples for inorganic and organic species.
- v) A fully equipped mobile laboratory, to be used during intensive campaigns.