

IDÆA is a modern environmental science institute devoted to the study of the footprint of the chemical changes our species is imposing on the biosphere. Much of the research work at this institute is centred on two of the great environmental challenges of our time, namely the cleanliness and availability of the WATER we drink and the quality of the AIR we breathe.

The Institute brings together a wide range of expertise in environmental science and organized under two broad Departments (Environmental Chemistry and Geosciences) established with a strong record of publication in top scientific journals, leading international projects, membership on international committees, and adopting a high-profile contribution to the identification and remediation of environmental problems. IDÆA has demonstrated particular strengths in the analysis of organic pollutants and their impact on ecosystems, the study and management of water resources, the development of multivariate resolution algorithms in chemometrics, and in the study of inhalable particulate matter and toxic gases. IDÆA focuses on six main research lines, namely water chemistry, chemometrics, ecotoxicology, biogeochemistry, hydro-geoscience, and atmospheric geochemistry.

Researchers in WATER CHEMISTRY at IDÆA have a world-class reputation in pioneering the development and validation of mass spectrometric based methods to study the occurrence, fate and behaviour of organic pollutants. Examples include the development of robust analytical methods to identify organic contaminants and study their degradation products including a wide range of toxic substances ranging from legacy-persistent organic pollutants (POPs) to emerging compounds such as pharmaceuticals and personal care products, drugs of abuse, pesticides and industrial contaminants such as plasticisers and flame retardants. Monitoring studies are carried out in different aquatic systems including surface, groundwater, wastewater, coastal waters and the open sea, using organic compounds as markers of the health status of ecosystems and organisms.

The CHEMOMETRICS unit is an international leader in the development of multivariate resolution algorithms, particularly with the Multivariate Curve Resolution-alternating Least Squares (MCR-ALS) method, applicable to many different environmental fields. The inherently interdisciplinary nature of chemometrics, which applies its methods to solve problems in experimental natural sciences, makes this research line especially valuable within the mixed group of environmental research scientists working in IDÆA. The BIOGEOCHEMISTRY group is active in assessing the role of organic contaminants as a vector of environmental change during the Anthropocene and their interactions with major biochemical cycles. Other objectives of this group include quantifying the effects of organic pollutants on microbial structure and function, and using environmental forensic approaches to connect pollution events to their causes in order to find nature-based approaches to mitigate environmental pollution and the impact of human activity on ecosystems. Similarly involved with ecosystem damage is the ECOTOXICOLOGY group equipped to investigate the bioavailability and risk impacts of pollutants such as endocrine disrupting chemicals, neurotoxic compounds, and polycyclic aromatic hydrocarbons. Notable achievements of this group to date include the use of biomarkers and sentinel species to monitor aquatic toxins, revealing the first evidence of endocrine disruption in aquatic organisms.

HYDRO-GEOSCIENCE research at IDÆA has a distinguished tradition of investigation and outreach to university students and society at large. The field and laboratory data generated by this group have promoted their involvement in exploration of groundwater resources, urban aquifer management, marine intrusion in coastal aquifers, a wide variety of applications in civil and mining engineering, and study of processes associated with competition for deep pore space (storage of CO₂, storage of nuclear waste, geothermal energy, "shale" gas, induced seismicity). In addition, hydrological investigation at IDÆA includes researchers skilled in the understanding of the links between surface waters and erosional consequences of land abandonment in sub-humid Mediterranean mountainous environments such as the Pyrenees, adding another facet to the environmental research activities taking place within the institute.

The ATMOSPHERIC GEOCHEMISTRY group has generated a prolific scientific publication record which has established it as an international leader in the study of atmospheric pollution, source receptor modelling and air quality-climate science. The Barcelona Metropolitan Area and the Pyrenees have provided an excellent setting for the IDÆA's atmospheric monitoring "supersites" enabling cutting edge research on air quality at urban, regional and transboundary scales. The research impact of this group on urgent global issues such as urban air quality, the abatement of industrial and traffic emissions, the presence of microplastics in the air, occupational exposure and the transboundary movement of regional aerosol plumes, is reflected by its current influence on environmental policy at the highest international levels.

IDÆA offers the opportunity to be part of this research centre working on the following PhD projects within the DOCTORAL INPhINIT FELLOWSHIPS PROGRAMME (INCOMING FRAME) 2020:

PhD	Supervisors
Analytical and Chemometrics methodologies for monitoring the effects of environmental pollutants in bird species	S Lacorte & R Tauler
EDIBLE CITIES – health benefits vs health risks from Mediterranean urban food production	M Izquierdo & S Díez
How can we restrict Antibiotic Resistance Gens transport during Artificial Recharge of Aquifers?	B Piña & C Valondo
Human Exposure Assessment To Plastic Additives Through Ingestion And Inhalation	E Eljarrat & T Moreno
Life cycle neurotoxicity after the developmental exposure to classical and emerging pollutants	D Raldua & M Farias
Multimomics imaging to increase spatial and structural knowledge in environmental studies	J Jaumot & L Navarro
New insights into atmospheric organic aerosols and their impact on health	MC Minguiñon & B van Drooge
Non-EXhaust emissions from road Transport: Developing cost-effective measures based on impact on air quality, health and the implications of electric vehicles uptake	F Amato & B van Drooge
Obesogens, a threat to public and environmental health: characterization of mechanisms underlying transgenerational inheritance	C Barata & L Navarro
Study of human exposure to potentially neurotoxic and metabolotoxic pesticides and herbicides based on urine analyses	J Grimalt & P Fernandez