



EUSAAR: European Supersites for Atmospheric Aerosol Research

For many years, greenhouse gases have got the blame for our changing climate. But atmospheric physicists have singled out a new and far more complex player in the climate game - aerosol particle matter. Aerosols are small particles or droplets in the atmosphere, as small as a few nanometres but with a vast physical potential affecting global warming or cooling and even stratospheric ozone depletion. But it is not just the hole in the ozone layer that scientists have to plug as the lack of coordination programmes for non-regulated measurements of aerosol properties is a major gap in Earth Observation that urgently needs to be filled. This is where the EUSAAR Integrated Infrastructure Initiative comes in. With EU funding of €5.1 million, its network of 20 ground-based atmospheric research stations will be striving over the next 5 years to integrate European research infrastructures for measuring aerosol properties and collecting high-quality data, exploiting the excellence of monitoring equipment and technologies and the diversity of regional backgrounds.

■ Catch them while you can

Aerosol particles are a largely natural, though highly variable, component of our atmosphere. They come from many diverse sources, like burning coal and oil, smoke from burning forests, wind blowing over dusty regions, evaporation of sea spray, and even conversion of some gases emitted by plants. Aerosols only remain in the atmosphere for a few days to weeks, unlike greenhouse gases, which have a lifespan of decades or even centuries.

Atmospheric aerosols influence climate by reflecting sunlight back to space, affecting the Earth's store of energy and thus cooling the planet, and by acting as cloud condensation nuclei, making clouds more reflective and longer lasting. It is currently estimated that in the most heavily polluted regions of the Northern Hemisphere, the cooling effects of man-made sulphate aerosols actually exceed the warming effects of the past century's increases in greenhouse gases. Scientific findings over the last few decades have clearly highlighted the need for a more comprehensive approach to atmospheric change processes.

Particulate matter has become a priority in international pollution control, so scientists need the right data. Currently, it is only measured at comparatively few regional background stations usually belonging to national weather services, universities, national air monitoring networks and because these measurements are taken outside coordinated protocols, access to this information is often difficult and results are often not coherent or not even comparable. Given the complexity of physical and chemical mechanisms involved in atmospheric cycling of pollutants, Europe needs a much more integrated atmospheric observing system for air quality and climate studies.

■ Ground control to Supersites

EUSAAR has opened up transnational access to 11 ground-based Supersites with a long record of international access, outstanding instrumentation for atmospheric research and highly-relevant long-term monitoring data series. Since air pollution is a phenomenon that goes way beyond local emissions, collaboration between these European Supersites is indispensable.

Coordinated by the French Centre National de la Recherche Scientifique in Clermont-Ferrand, the EUSAAR team of world-recognised experts in the field of aerosol research hailing from partner organisations across 16 European countries is pooling its skills to ensure

that available resources are used as efficiently as possible. EUSAAR is striving to take current observation efforts further by harmonising and validating measurements of particle, optical, physical and chemical properties carried out at the Supersites as these are critical to ensure their scientific value. Approved measurements will then be centralised in a common database accessible to all users. EUSAAR's partners are keen to spread good practice and information on new protocols both within and outside the project. In this way, they hope to advance up-to-date data reporting across Europe that can serve to improve monitoring strategies.

It is hoped that all these integration efforts will lead to a reliable, operational service providing key data on aerosols to back up environmental policy issues in the field of air quality, long-range transport of pollutants and climate change.

■ Collecting, sampling and measuring

EUSAAR focuses in particular on parameters on which there is an obvious lack of coordination such as aerosol chemical properties (inorganic/organic composition), physical properties (size distribution, mass), optical properties (light scattering, absorption coefficient, optical depth) and 3D-distribution (vertical profile), which together make up the basic information required to detect any long-term change in aerosol source emissions and assess possible climatic effects.

The lion's share of the EU grant will be spent on networking activities to establish standards and exchange of good practice on sampling, measurement and analysis of aerosol parameters, backed up by training on sampling and measurement, as well as an Internet portal and a database on aerosol properties.

Joint research activities will involve putting together a methodology for determining aerosol optical density, developing standard procedures for aerosol hygroscopic growth determination and real-time data collection of aerosol measurements. More specifically, this concerns retrieval of the aerosol column with a novel technology, development of a new generation of humidity-controlled instruments and new methodologies for real-time acquisition of aerosol parameters.

A major concern of EUSAAR is for networking and joint research activities to consolidate current observation efforts across Europe to ensure their continuation beyond the frame of the project and their wider contribution to international air quality and climate studies and programmes like CAFÉ (Clean Air For Europe).

■ European Supersites for Atmospheric Aerosol Research in summary

Project acronym: EUSAAR

Funding scheme: Integrated Infrastructure Initiative (I3)

EU financial contribution: €5.1 million

EU project officer: Anna-Maria Johansson

Duration: 60 months

Start date: 1 April 2006

Completion date: 31 March 2011

Project webpage: www.eusaar.net

Coordinator: Andrea Flossmann, CNRS – LaMP, A.Flossmann@opgc.univ-bpclermont.fr

Partners: Centre National de la Recherche Scientifique (FR), Paul-Scherrer-Institut (CH), Stockholm Universitet (SE), Joint Research Centre (IT), Netherlands Organisation for Applied Scientific Research (NL), Leibniz Institute for Tropospheric research (DE), Norwegian Institute for Air Research (NO), Consiglio Nazionale delle Ricerche (IT), University of Helsinki (FI), Finnish Meteorological Institute (FI), National University of Ireland (IE), University of Crete (EL), Pannon University (HU), Institute of Chemical Process Fundamentals (CZ), Ruprecht-Karls-Universität Heidelberg (DE), Institute for Nuclear Research and Nuclear Energy, Bulgarian Academy of Science (BG), University of Birmingham (UK), Institute of Physics (LT), Lund University (SE), Institute of Earth Sciences (SP), Hoffmann Messtechnik GmbH (DE)

