

PS PUBLIC SERVICE REVIEW

Europe 25

an independent review

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Atmospheric monitoring

The latest Intergovernmental Panel on Climate Change (IPCC) Assessment Report and the recent revision of the Thematic Strategy on air pollution of the EU assert the need for long-term observation of aerosols and short-lived trace gases.

The Aerosols, Clouds and Trace Gases Research Infrastructure Network (ACTRIS) is an outstanding research infrastructure launched in 2011 and will, for the first time, provide coordinated observations of the major atmospheric variables.

ACTRIS aims at integrating European ground-based stations equipped with advanced atmospheric probing instrumentation for aerosols, clouds and short-lived gas-phase species. ACTRIS has the essential role to support building of new knowledge, as well as policy issues on climate change, air quality and long-range transport of pollutants.

The main objectives of ACTRIS are:

- To provide long-term observational data relevant to climate and air quality research on the regional scale, produced with standardised or comparable procedures throughout the network;
- To provide a coordinated framework to support transnational access to large infrastructures strengthening high-quality collaboration in and outside the EU and access to high-quality information and services for the user communities (research, environmental protection agencies, etc.);
- To develop new integration tools to fully exploit the use of multiple atmospheric techniques at ground-based stations, in particular for the calibration/validation/integration of satellite sensors and for the improvement of the

parameterisations used in global and regional-scale climate and air quality models;

- To enhance training of new scientists and new users in particular students, young scientists and scientists from Eastern European and non-EU developing countries in the field of atmospheric observation;
- To promote development of new technologies for atmospheric observation of aerosols, clouds and trace gases through close partnership with EU SMEs.

‘...EMEP and ACTRIS have worked closely together to coordinate an intensive field campaign in summer 2012 mainly devoted to study Saharan dust particles.’

The ACTRIS research infrastructure is built on the basis of a consortium joining existing networks/observatories providing consistent datasets of observations using state-of-the-art measurement technology and data processing. In particular, ACTRIS merges two existing research infrastructures funded by the European Commission under FP6: European Supersites for Atmospheric Aerosol Research (EUSAAR) and European Aerosol Research Lidar Network (EARLINET). ACTRIS also includes the distributed infrastructure on aerosol – cloud interaction existing from a previous EU research project CLOUDNET and by grouping the existing EU ground-based monitoring capacity for short-lived trace gases, which is, at present, not coordinated

Coordinated observations of dust particles over Europe in the summer of 2012...

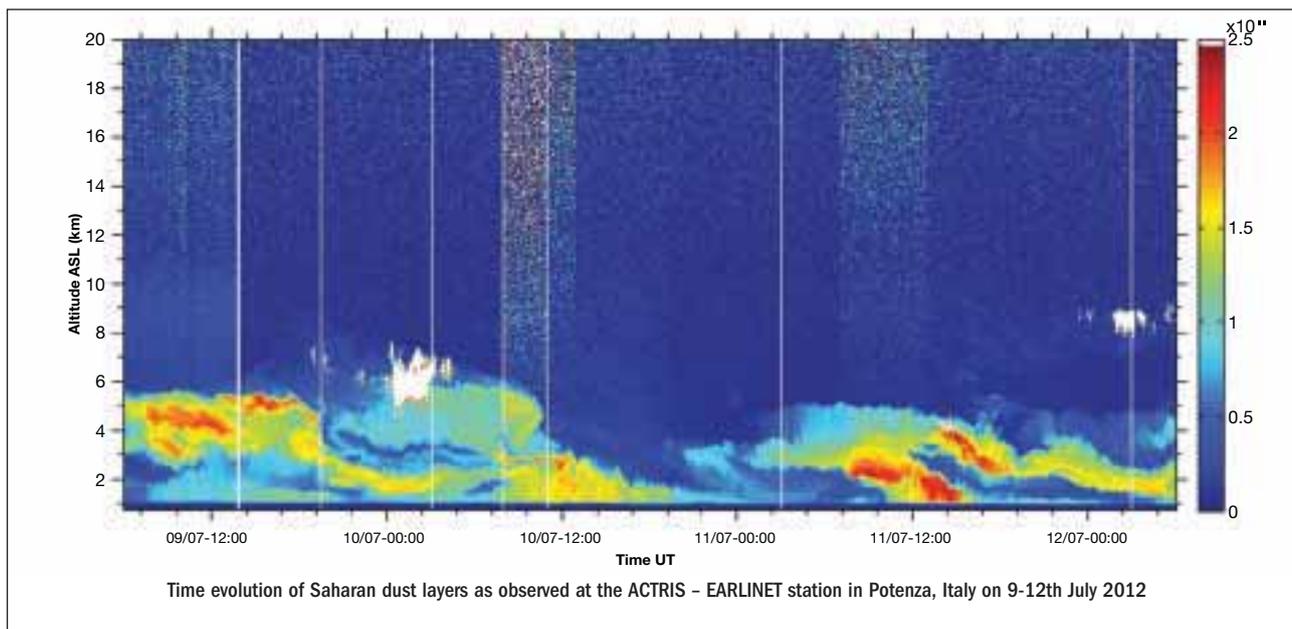


Map of ACTRIS and EMEP stations participating in the intensive measurement campaign in June-July 2012

at any level, besides the European Monitoring and Evaluation Programme (EMEP) and the Global Atmosphere Watch (GAW) caring for a few specific compounds. Therefore, ACTRIS represents an unprecedented effort towards integration of a distributed network of ground-based stations, covering most climatic regions of Europe and responding to a strong demand from the atmospheric research community.

ACTRIS is strongly cooperating with EMEP, which is a scientifically-based and policy-driven programme under the Convention on Long-range Transboundary Air Pollution for international cooperation to solve transboundary air pollution problems.

The regular EMEP monitoring programme is complemented with specific intensive measurements periods. The main purpose of these campaigns is to improve the spatial and temporal resolution of advanced measurements, which are highly needed to better understand transport and composition of atmospheric constituents. On the base of previous positive EMEP experiences with these intensive measurement periods as important supplements to the regular measurement programme, EMEP



and ACTRIS have worked closely together to coordinate an intensive field campaign in summer 2012 mainly devoted to study Saharan dust particles.

Mineral dust is an important component of the atmospheric aerosol loading because desert areas represent the major source of natural aerosols in the atmosphere, and every year very large quantities (millions of tons) of desert dust from the Sahara and surrounding regions are exported to the North Atlantic Ocean and the Mediterranean Sea. Dust causes large uncertainties with respect to the assessment of climate forcing by atmospheric aerosols. Model studies suggest that the direct radiative forcing of dust on a regional as well as global scale may be comparable to or even exceed the forcing by anthropogenic aerosols. In addition, mineral dust particles play an important role in the Earth's radiation balance and climate by acting as cloud condensation nuclei (CCN) and thereby determining the concentration of the initial droplets, albedo, precipitation formation and lifetime of clouds.

During this intensive campaign in summer 2012, extended measurements of aerosols and its precursors were conducted at EMEP and ACTRIS sites. In particular, ACTRIS contributed

to this intensive campaign providing advanced observations of physical and chemical aerosol properties.

ACTRIS provided continuous Aerosol Chemical Speciation Monitor (ACSM) measurements for the aerosol chemical composition while vertical profiles of the aerosol optical properties over Europe were conducted at ACTRIS-EARLINET lidar stations, providing information about the 3D distribution of European atmospheric aerosols and the monitoring of Saharan dust intrusions.

11 selected ACTRIS lidar stations (Athens, Barcelona, Bucharest, Cork, Cyprus, Evora, Granada, Ispra, L'Aquila, Potenza, and Sofia) provided daily lidar-profiling measurements around sunset for the whole 8th June to 17th July 2012 period. Some of the stations providing extended measurements (Barcelona, Ispra, L'Aquila and Athens) were co-located or close to EMEP sites participating in the campaign; others (Évora, Granada, and Potenza) were stations close to dust or biomass-burning sources and were equipped with multi-wavelength lidar systems for the retrieval of aerosol microphysical properties. The Sofia and Bucharest stations provided a connection with pollution events typical of Eastern Europe. Cork lidar station bridged the

gap with the EMEP UK stations participating in the intensive campaign.

The EARLINET Single Calculus Chain (SCC) was used for near real-time processing of the lidar data for a selected 72 hour period (9-12th July) characterised by a medium-intensity Saharan dust event in the central Mediterranean. For the first time, lidar aerosol profiles were provided in near real-time at network level during a measurement campaign.

A first analysis of collected lidar data performed in near real-time indicates that during the observational period, Saharan dust layers were often observed over Southern Europe (Western, Central and Eastern as well) and in some of these cases, dust was also observed in the very low troposphere close to the surface.



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