WP6- NA6: WP "Integration, outreach, and sustainability"

Deliverable D6.11: International communication on ACTRIS activities and opportunities

Report on International communication on ACTRIS activities and opportunities

Date	Title/ subject of meeting / workshop	Location
13-14 September 2011	Workshop on EU-US cooperation on environmental research infrastructures and e-infrastructures	Brussels, Belgium
26 September-1 October 2011	VI Workshop on Lidar Measurements in Latin America,	La Paz, Bolivia,
6-8 October 2011	GAW Aerosol SAG	Kyushu, Japan
16-17 November 2011	8th Plenary Session of the Group on Earth Observations (GEO-VIII)	Istanbul, Turkey
21- 23 March 2012	ICRI 2012 (International Conference on Research Infrastructures)	Copenhagen, Denmark

- **EU-US cooperation for environmental research infrastructures and e-infrastructures**

ACTRIS was presented at the workshop on EU-US cooperation on environmental research infrastructures and e-infrastructures, in Brussels (13-14 September 2011). In particular active cooperation between ACTRIS and, NOAA, NASA and the ARM program in US, related to coordinated observations of aerosol and clouds for both climate and environmental studies was discussed including also the validation programs for current and future satellite missions.

- **VI Workshop on Lidar Measurements in Latin America**

ACTRIS is developing a very strong partnership in South America in particular with involvement in the new GAW station of Chacaltaya which follows all quality principles of ACTRIS. First measurements at the station are also being included in EBAS (http://www.chacaltaya.edu.bo/downloads/Chacaltaya_GAW%20project.pdf).

The training course on lidars for researchers and students in Latin America (collocated with the VI Workshop on Lidar measurements in Latin America, La Paz, Bolivia) was an opportunity to promote the ACTRIS activities . In addition to an overview of aerosol and their impact on climate, the participants to the course were informed about opportunities offered within the ACTRIS project, in particular for associated partners to participate in all sort of activities offered within the different WPs, and most notably WP2. http://www.chacaltaya.edu.bo/index.php?option=com_content&view=article&id=230:program-course-lidarvi-wlmla&catid=62:workshop&Itemid=115.

- **GAW-Scientific Advisory Group on Aerosols (GAW Aerosol SAG)**

Scientists are nominated individually within the SAG of GAW. Nevertheless, both ACTRIS coordinators and several ACTRIS WP leaders are participating in SAG meetings where ACTRIS related issues are

discussed (http://www.wmo.int/pages/prog/arep/gaw/documents/Members5Sept11.pdf). ACTRIS is seen as an essential part of the European component of GAW in particular for the implementation of the GAW strategic plan.
During the first 18 months of ACTRIS, GAW a SAG meeting was organized in Japan and with numerous items discussed of interest to ACTRIS. ACTRIS partners have contributed to the elaboration of reports, in particular the ENAN/INAN report of which we provide here the executive summary:

> The impact of aerosols on the atmosphere is widely acknowledged as one of the most significant and uncertain aspects of climate change projections. The observed global warming trend is considerably less than expected from the increase in greenhouse gases much of which is explained by aerosol effects. Aerosols impact climate through direct scattering and absorption of incoming solar radiation and trapping of outgoing long-wave radiation as well as through alteration of cloud optical properties and the formation of clouds and precipitation. Furthermore, there is growing concern for the impact of aerosols on human health and interest by many sectors such as weather prediction, the green energy industry (regarding their influence on solar energy reaching the ground) and the commercial aircraft industry (regarding the impact of volcanic ash and dust storms on operations and aircraft). Comprehensive, long-term, high quality observations of aerosols have been initiated only recently, and only in a few locations and regions. The monitoring and observations of aerosols are still to a large degree uncoordinated regionally or globally despite the crucial importance of aerosols as short-lived climate forcers and their importance for air quality.
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> **Current State of Aerosol Networks**
> Worldwide, there are numerous aerosol networks, regional or global in scope. They are divisible into two types; networks driven by environmental policy frameworks, and networks driven by project-based research. The objectives, development, maintenance and financial structure of these two types of networks are very different and there are often limited interactions between them. The global coverage was analyzed and found lacking particularly in Africa, Russia, and large parts of Asia. At present there are more than two hundred aerosol observatories in Europe measuring various aerosol properties. A major challenge is to integrate observational activities. Several European research projects are contributing to a solution. For instance, the EC project ACTRIS (Aerosols, Clouds, and Trace gases Research InfraStructure Network) involves integration of the networks EARLINET, EUSAAR/EMEP and CLOUDNET (see 2.3.1). This report summarizes information on about 29 key continental and global aerosols networks, the main aerosol variables measured in each network, distribution of sites, and the availability of data.
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> **The Vision**
> Comprehensive integrated sustained observations of aerosols on a global scale through a consortium of existing research aerosol networks complementing aircraft, satellite and environmental agency networks. In Europe, there are many networks that should be integrated with a large added value for policy, environmental services and advancement of science. A demonstrated integrated observing system on a European scale would accelerate integration on global scale. This observing system would foster aerosol-related process studies, validation of satellite sensors, model development and evaluation, assimilation of aerosol data into operational models, and creation of comprehensive aerosol climatology on a global scale. It will form the non-satellite component of an Integrated Global Aerosol Observing System fulfilling the strategy originally recommended in the 2004 IGACO assessment report on Integrated Global Atmospheric Chemistry Observations.
> Sustained observations in the next 5-10 years will benefit from the integration of existing aerosol networks and observatories. The realization and potential of such an integrated system will not be reached unless there is long-term sustainability of project-based research networks. This requires a long-term commitment from national and international funding agencies for research

infrastructures. Research is necessary to improve observational methodologies for use by networks operated under environmental regulatory frameworks.

The integration of the many advanced European networks could be the basis for a federated global aerosol network. In a decade, the IGACO vision for an Integrated Global Aerosol Observations system with surface-based observations complementing aircraft and satellite observations with integration through assimilation by atmospheric numerical models.

Integration requires the following:

i. Implement surface based supersites at which comprehensive set of in situ and remote sensing aerosol measurements are made together.
ii. Create surface-based observatories in climate regions not yet covered by in situ and/or ground-based profiling/remote sensing aerosol measurements.
iii. Link the surface-based network activities to space-borne missions. (Validation of many satellite based remotely-sensed aerosol properties and products is still inadequate. High-quality ground-based measurements are essential for these validations. It should be emphasized that they are a small fraction of the cost of a satellite mission while adding great value to satellite observations.)
iv. Utilize satellite observations to achieve cost effective expansion of surface-based networks (i.e. in network design).
v. Improve standardization and harmonization of observations. Presently the same aerosol variables measured by different techniques are not necessarily providing comparable data. A quality assurance program is needed not only for primary variables but also for advanced derived aerosol products. This is a critical issue that limits the integration and assimilation of measurements by atmospheric numerical models.
vi. Ensure easy access to observation data through a common data policy and data base management structure. The final database structure will need to be flexible enough to accommodate a heterogeneous set of sub databases organised around specific observed parameters and/or regions. (This requires years of preparation but it could be developed step by step once the community has agreed on the general architecture. Part of this work for European and also global data was initiated in the FP6 EC project GEOmon and is continued in ACTRIS. Near-Real-Time (NRT) collection and dissemination (i.e. within 1 – 3 hours of the observation) is also crucial particularly during special events like heat waves, huge fires and volcanic eruptions.)
vii. Develop a coalition of research and operational observational system. The model of a federated network will give the opportunity of spreading “best practise” for each particular instrument/variable from regional to a global scale; a good example is the approach for implementing GALION, the GAW Aerosol Lidar Network as a federated network of existing regional research and operational
viii. Use state-of-the-art in situ, aircraft and LIDAR remote sensing instruments in synergy to characterize the state of the atmosphere.
ix. Establish links to atmospheric chemistry networks and incorporate variables to strengthen implementation of the monitoring of reactive trace gases/short-lived climate forcers (VOCs, NOxy, O3). In Europe this work was initiated by EMEP already in the 1980ies and will be further developed within EMEP and ACTRIS in the near future.

The Way Forward:

Implementation of a European/International Network of Networks (ENAN/INAN)

A well-defined strategy implementing integration of aerosol measurement capabilities on continental or larger scales will result in clear benefits such as improved data access and availability, improved comparability of data, more uniform data quality standards from different networks, increased synergy of measurements and prevention of unnecessary duplication. Suggested steps are:

a. Consult with network representatives and respective stakeholders on the ENAN/INAN vision.
b. Establish an ongoing engagement of networks with network principals (or representatives) acting as a high-level steering committee and providing guidance in the development of monitoring strategies for an ENAN/INAN.
c. Establish several specific working groups of network representatives involving the Aerosol SAG (Scientific Advisory Group) of the WMO-GAW program to address specific harmonization issues on the global scale.
d. Establish mechanisms for regular communication between networks.
e. Develop an agreement on a shared/common metadata access portal.
f. Develop common harmonized methodologies, Data quality objectives, quality assurance / quality control procedures etc. across measurement frameworks to the extent possible.
g. Facilitate expertise exchange programs / exchange of model tools / regular intercomparison activities.

- **8th Plenary Session of the Group on Earth Observations (GEO-VIII)**

The ACTRIS coordinator attended the Group on Earth Observations, Eighth Plenary Session – GEO-VIII, Istanbul, Turkey, 16-17 November 2011. The ACTRIS project was presented at the EU stand.

- **ICRI 2012**

The ACTRIS-I3 project was presented at the ICRI 2012 (International Conference on Research Infrastructures) in Copenhagen in March 2012 in the Climate Change session / Global Observing Systems, Data Governance.

Future planned international cooperation

The planned PEEX "PanEurasian Experiment" study is a multidisciplinary climate and environmental change program focused on the Northern Eurasian particularly arctic and boreal region. It is a bottom up initiative by several European, Russian and Chinese research organizations and institutes. PEEX is open for other institutes to join in.

PEEX' scientific aim and future actions towards a Pan Eurasian research infrastructure can be linked to several EC and ESA funded activities intending to develop the next generation research infrastructures and data products: EU-FP7-ACTRIS-I3-project (Aerosols, Clouds, and Trace gases Research InfraStructure Network-project 2011-2015); ICOS a research infrastructure to decipher the greenhouse gas balance of Europe and adjacent regions; EU-FP-7 e-infra ENVRI "Common Operations of Environmental Research Infrastructures" project. New Siberian research infrastructure and data products should be developed in line with the ACTRIS, ICOS and ENVRI approaches. Furthermore, The Pan-Eurasian Experiment will be supported by iLEAPS (Integrated Land Ecosystem – Atmosphere Processes Study) bringing the PEEX under the umbrella of the International Geosphere-Biosphere Programme (IGBP).