

Deliverable D4.4: Final report on innovation

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Purpose of the document

The overall objective of this document is to report on the ACTRIS-2 cooperation with the private sector and, in particular, with European SMEs.

In order to efficiently promote this collaboration, in the frame of ACTRIS-2 WP4, an ACTRIS Innovation Platform has been established. This represents a tool devoted to foster a culture of co-operation in innovation between the whole ACTRIS scientific community and relevant stakeholders, especially European industries and SMEs.

This report describes the instruments implemented within the ACTRIS Innovation Platform and the analysis of the final status of the cooperation with the private sector and on the effectiveness of planned actions.

1. Introduction

Nowadays, there is an increasing awareness among policymakers that innovative activities are the main drivers of economic progress and growth, as well as that SMEs should be empowered and stimulated to innovate, also in order to face, within a fair and competitive system, the competition of large international companies. Technology transfer effectively contribute to translate scientific discoveries and research results into new commercially available products. Moreover, innovation represents a potential factor in tackling global challenges, in particular in domains such as the environment. Innovative products and services could effectively be applied to solve societal issues for the benefit of the whole society. This is a very important aspect also in order to maximize the socio-economic impacts of the investment in Research Infrastructures.

Private sector involvement in research activities is a clear opportunity to put in place technology transfer activities, but it involves a series of sensitive issues, e.g., competitiveness vs. collaboration, open access policy vs Intellectual Property Rights (IPR), etc.

In this context, Research Infrastructures must clearly act as the bridge between research and industries. ACTRIS, as a Research Infrastructure, aims to contribute to build the *Innovation Union*¹, the European Union strategy to create an innovation-friendly environment that makes it easier for great ideas to be turned into products and services that will bring economic growth and jobs. ACTRIS aims to be the facilitator for the joint development of innovative instruments, processes and solutions for atmospheric monitoring.

Worldwide, the mitigation and adaptation policies linked to climate change require a dedicated innovative monitoring capacity². So, a potential large market exists for improved, cost-effective and innovative instrumentation for cloud, aerosol, and gas monitoring. Moreover, industrial production of applications is expected to grow fast with the international markets more and more sensitive to air pollution and climate change issues.

The innovation potential of ACTRIS is represented by the large number of products and software currently available on the market directly achieved within ACTRIS I3 (FP7, 2011-2015) activities or within previous related INFRA projects. In particular, ACTRIS has a long history of joint technological developments with private sector and links, more or less formalized, with several companies. To contribute to innovation of the commercial scientific atmospheric instrumentation is one of the fundamental building blocks of ACTRIS-2 activities.

Within WP4 “ACTRIS Innovation Platform” of ACTRIS-2, several actions contributed to reinforce partnership with the private sector and to support EU-SMEs in the competitive eco-industry market, in Europe and at international scale.

2. ACTRIS-2 work breakdown for innovation

ACTRIS has a long and fruitful story of cooperation with the private sector. In fact, ACTRIS-2 project and its predecessor projects (ACTRIS I3, EARLINET, Cloudnet, and EUSAAR) have strongly promoted innovation and standardization through partnerships with the private sector. The already established collaboration in near-surface and remote sensing techniques has contributed to the development and improvement of observation technologies, software, methods and standardization processes within the atmospheric domain. ACTRIS is indeed the framework to evaluate metrological performances, robustness, operation procedures including potential adaptation strategy for long-term studies and costs of both commercial and custom-made instrumentation as well as the readiness transfer level of prototype instruments in the atmospheric domain. Achievements so far are well represented by products and methodologies that are now commercially available on the market.

In order to better facilitate the dialogue between ACTRIS community and the private sector, to further develop the innovation potential of ACTRIS activities, a platform for exchange of expertise and information has been established.

A specific work package in ACTRIS-2 WP4 “ACTRIS Innovation Platform” aims at the coordination of the innovation aspects which are covered in detail by the different ACTRIS-2 activities and mainly by the Networking Activities (NA2, NA3) and by Joint Research Activities (JRA1 and JRA2).

The three different tasks foreseen in WP4 (here graphically reported) have different aim and are detailed in the following.

Task 4.1. Technological standardization

- ➡ D4.1: Progress report on standard-making process.

Task 4.2 Tests of new instrumentation by SMEs

- ➡ D4.2: Progress report on the use of ACTRIS facilities and calibration centres for testing novel instruments.

Task 4.3 Exchange of expertise

- ➡ D4.3: Progress report on innovation
- ➡ D4.4: Final report on Innovation

Task 4.1. “Technological standardization” is devoted to maintain and further develop standard-making processes for technologies relevant to ACTRIS observations in cooperation with specific SMEs and national, European and, when applicable, international centres for normalization and standards. Because ACTRIS has a leading role in defining technical recommendations for future standardization, it is reinforcing the capacity of European private sector to respond to the evolution of standardized protocols for monitoring the atmosphere.

The Deliverable D4.1 “Progress report on standard-making process” and the Milestones MS4.4 “Final report on standard-making process” outline standard-making processes for technologies relevant to ACTRIS observations and also devoted to support ACTRIS-2 partners in getting EU license for specific software products developed within the project, in cooperation with specific SMEs and national, European and international centres for normalization and standards. The activities carried out during the ACTRIS-2 project cover involvement in several CEN or ISO initiatives but also cover the development of internal measurement and calibration procedures for different instruments and techniques relevant to the consortium. The improvement of standard operating procedures and the development of standardization protocols (CEN and ISO) are essential aspects for ACTRIS and for this reason ACTRIS experts participated in numerous ISO/CEN initiatives (see D4.1 and MS4.4 for more detail).

Task 4.2. “Tests of new instrumentation by SMEs” is devoted to promote the private sector access to the ACTRIS-2 facilities for testing new instrumentation. ACTRIS-2 provides a large number of

installations/facilities where novel instruments used in atmospheric observations can be tested. This concerns, in particular, the facilities providing TNA in WP9 and the Calibration Centres (WP6-7-8). This set of ACTRIS-2 facilities represents a unique opportunity for European SMEs for testing new instrumentation to be launched on the market. Specific experimental tests and calibrations from SMEs have been promoted in cooperation with Task 4.1 for technological standardization.

The Deliverable D4.2 “Progress report on the use of ACTRIS facilities and calibration centres for testing novel instruments” and the Milestone MS4.5 “Final report on the use of ACTRIS facilities and calibration centres for testing novel instruments” outline several joint collaborations with the private sector for calibrating commercial instruments, testing new instrumentation, and developing novel methods and equipment (see D4.2 and MS4.5 for more details).

Task 4.3. “Exchange of expertise” is devoted to establish a protocol, a mutual-support concept that allows a fair and productive bilateral exchange of expertise and information with the private sector. This is ensured via the ACTRIS Innovation Virtual Platform.

The ACTRIS Innovation Virtual Platform, described more in deep in next section, provided during the project stable support to companies operating in the field of atmospheric observation by promoting exchange of expertise and knowledge transfer, facilitating a correct flow of information about developments of state-of-the-art technologies and ensuring, through a specific *Non-Disclosure Agreement*, the proper management of the IPRs.

3. Tools for innovation: the ACTRIS Innovation Platform

The ACTRIS Innovation Platform is a tool devoted to foster a culture of co-operation in innovation between the whole ACTRIS community and the private sector, especially European SMEs.

The Innovation Platform promoted private sector access to calibration facilities and observation facilities through the Trans National Access (TNA) programme. It encouraged private sector cooperation with the scientific community and stimulated the creation of solid partnerships whose functioning has been regulated case by case through specific agreements, especially in order to better manage the IPR issue.

The platform facilitated the flow of information from the scientific community to the private sector and vice versa.

At the beginning of the ACTRIS-2 project, a specific workshop was planned (MS4.2) in order to invite all the SMEs operating in the specific sector with the idea to start the establishment of a continuous exchange of expertise and information, to promote joint public-private collaborations for high-risk innovation and to foster close-to-market activities for the development of atmospheric observation technologies. After consulting the SMEs, the method preferred to establish this dialogue was by exploiting the direct bilateral contacts. Therefore, it was decided to do not organize a specific workshop but to establish a Virtual Platform for a continuous exchange of expertise and information through the project website and through the use of a specific mailing list for dedicated communication with private sector.

The *Platform* has been designed taking into account the user’s needs in order to facilitate collaboration and to strengthen the links among companies and among them and the scientific community.

The *Virtual* nature allowed a continuous exchange of knowledge, information and expertise; for advertisement and dissemination, and for collecting feedback from the private sector in order to improve the ACTRIS innovation services.

The ACTRIS Innovation Virtual Platform is a web-based tools available via the ACTRIS Website at www.actris.eu.

The main features of the ACTRIS Innovation Virtual Platform are:

- a) Continuous and Specific calls for Associated Partnership with the Private Sector;

- b) Announcement of opportunities for testing new instruments at the Calibration Centres and ACTRIS stations providing TNA;
- c) Documentation on technological standardization;
- d) Announcement of specific tools, software etc. available through Virtual Access;
- e) Announcement of specific technical meetings and workshop;
- f) Collection of feedback from the private sector;
- g) Reports on cooperation with the private sector.

During the ACTRIS-2 project the platform has been continuously updated. All the documents, also based on previous projects (i.e. ACTRIS in FP7) which could be relevant for the private sector, are available via the ACTRIS Website.

This platform will remain available after the end of the ACTRIS-2 project for a long term continuous exchange of information with the private sector following the long term strategy for ACTRIS as a Research Infrastructure.

a) Continuous and Specific calls for Associated Partnership with the Private Sector

The companies active in the field of aerosols, clouds, and trace gases have been encouraged to become Associated Partner in the ACTRIS-2 project.

A specific Non-Disclosure Agreement (NDA) has been developed together with the private sector for assuring that the exchange of expertise and information respects the intellectual property rights on both sides and the classified information from the industry. This Agreement has been used as part of the available documents in the call addressed to associated partners from private sector, launched already in October 2015 (www.actris.eu).

Since then, a continuous open call for associated partnership with the private sector has been maintained and all the related documents (NDA, information how to apply, guidelines etc.) have been made available on the Virtual Innovation Platform. For the data of associate partnership see the section 4.

b) Announcement of opportunities for testing new instruments at the Calibration Centres and ACTRIS stations providing TNA

ACTRIS-2 offered physical and remote access to four different facilities, Calibration facilities and Observational facilities, through the TNA programme. All the opportunities to access the services have been advertised through permanent open calls:

- **Access to Lidar Calibration Centre (LiCal)**
LiCal offered a wide range of free services to test and calibrate lidars and ceilometers, starting from the characterization and optimization of single components, to the assessment of the whole system's performance and training of instrument operators. LiCal is a multi-installation facility located in Romania (INOE), Germany (LMU), and Italy (CNR-IMAA). For more information, please visit <http://lical.inoe.ro/>
- **Access to AERONET-EUROPE Calibration Centre**

AERONET-Europe provided free calibration and standard maintenance services for CIMEL sun/lunar photometers involved in AERONET Network. Calibration has been also offered to other types of sun/lunar-photometer. AERONET-Europe is led by LOA/CNRS and distributed between 3 calibration infrastructures in France, (CNRS/Meteo France) and Spain, (UVa/AEMET). For more information, please visit:

<https://www.actris.eu/DataServices/InstrumentCalibration/AERONETEurope.aspx>

- **Access to European Centre for Aerosol Calibration (ECAC)**

ECAC provides free access to quality-assurance of physical, optical, and chemical in-situ aerosol measurements and to capacity building to perform high-quality physical, optical, and chemical in-situ aerosol characterization. ECAC is a multi-installation facility and consists of 3 nodes in Germany (the *World Calibration Center for Aerosol Physics* – [WCCAP](#), operated by TROPOS), Italy (the *European Reference Laboratory for Air Pollution* – [ERLAP](#), operated by JRC) and in France (the *Aerosol Chemical Monitor Calibration Center* – [ACMCC](#), operated by CNRS). For more information, please visit: <https://www.actris-ecac.eu/>

- **Access to Observational facilities**

18 world-class Observing Platforms spread throughout Europe, representative for their uniqueness within Europe and offering a comprehensive measurement programme at the forefront of the advancement of research in the specific domains (vertical aerosol distribution, in-situ aerosol properties, trace gases, cloud-aerosol observations) together with state-of-the-art equipment, high level of services, and capacity. For more information, please visit: <http://www.actris.eu/DataServices/ObservationalFacilities/AccessstoObservationalFacilities.aspx>

About the use of the ACTRIS facilities and calibration centres for testing novel instruments please see D4.2 and MS4.5 for more detail.

ACTRIS access policy is based on the European Charter for Access to Research Infrastructure⁴, a non-binding document of the European Commission outlining a set of non-regulatory principles and guidelines to be used as a reference when defining access policies for Research Infrastructures and related services. This Charter also promotes interaction with a wide range of social and economic activities, including business, industry and public services, in order to maximise the return on investment in Research Infrastructures and to drive innovation, competitiveness and efficiency in terms of use of the scarce resources available.

Innovation and development of innovation capabilities are often very expensive. This is even more true for SMEs, which, unlike large industries, often do not have the resources they need to undertake these activities. The availability of this set of free-of-charge calibration centres and observational facilities represented indeed a great support for SMEs.

Moreover, through access to these facilities, SMEs had the unique opportunity to work with the best available instrumentation and expertise in the field of atmospheric science.

c) Documentation on technological standardization

The development of pending and new standard-making procedures is of great importance for the ACTRIS community, especially to enhance and promote cooperation with the private sector and in particular with European SMEs. ACTRIS is centrally coordinating all ongoing efforts on standardization. These efforts cover the involvement in several CEN or ISO initiatives and also the development of internal measurement and calibration procedures for different instruments and techniques relevant to the consortium (for more information please see D4.1 and MS4.4 in detail).

Documentation on technological standardization including specific reports and guidelines are available on the ACTRIS Virtual Innovation Platform.

d - e) Announcements

Announcement of specific services for the private sector (specific tools, software etc.) provided through Virtual Access have been made available on the ACTRIS Virtual Innovation Platform. Announcements of specific technical meetings and workshop which could be of interest for the private sector have also been made available.

f) Collection of feedback from the private sector

All the feedback from the private sector have been collected centrally:

- TNA reports including evaluation of the services provided and suggestions for improvements;
- feedback from the private sector related to specific cooperation activities not related to the TNA program;
- feedback related to IPR and other legal issues.

Feedback from the private sector have been collected and handled according to the specific Non-Disclosure Agreement. All the no confidential aspects have been made publically available through the ACTRIS Virtual Innovation Platform.

g) Reports on cooperation with the private sector

A series of reports on standard-making process, on the use of ACTRIS facilities and calibration centres for testing novel instruments, and on all innovation aspects have been made available through the ACTRIS Virtual Platform.

4. Status of the ACTRIS-2 cooperation with the private sector

20 SMEs have accessed the ACTRIS-2 facilities and calibration centres for research and development activities through TNA. This represents almost 10 % of the total access experienced by ACTRIS via TNA.

LiCal has provided, for a total of 92,5 Research Working Days (RWDs) of access to users from private sector. This represents almost 10% of total access to LiCal installations. Several companies have used LiCal installations not only for standard calibrations, but also for testing and developing new instruments: Andøya Space Center (Norway), Sigma Space Corporation (USA), Campbell Scientific Ltd. (UK / France), CIMEL Electronique S.A.S (France), INOESY Romania, Lufft GmbH (Germany), Raymetrics SA (Greece), VAISALA (Finland).

AERONET-EUROPE has provided approximately 8% of total access to the private sector (30 calibrations over the whole project). The main companies that are using AERONET-EUROPE facilities are CIMEL Electronique S.A.S (France), GRASP S.A.S (France) and TENUM (France).

9 projects led by SMEs accessed to ECAC for a total of 21 RWDs. These accesses have been made for training and calibration purposes mainly. Notably the TSI company calibrated three instruments. Other companies are strongly collaborating with ECAC as they are involved in inter-comparison exercises or for the deployment of instruments and/or for the development of new products and methods: ADDAIR (France), Aerodyne Research Inc. (USA), Aerosol d.o.o (Slovenia), Brechtel (USA), TOFWERK AG (Switzerland).

For more information related to the access from private companies to ACTRIS Calibration Centres please see D4.2 and MS4.5.

11 companies accessed ACTRIS-2 Observational facilities: Aerodyne Research Inc. (USA), Aerosol d.o.o. (Slovenia), Airclip Service GmbH (Germany), Droplet measurement technologies (USA), Envricontrol SA (Belgium), EKO Instruments EUROPE BV (The Netherlands), GRASP S.A.S (France), IONICON Analytik (Austria), Palas GmbH (Germany), Raymetrics (Greece) and Sunset Laboratory Inc. (The Netherlands).

This represents 6% of the total access to these facilities via TNA.

Access has been requested to the CNR-IMAA Atmospheric Observatory and to the Monte Cimone/Po Valley facility in Italy, to the CSIC Montseny and Izaña Subtropical Access Facility in Spain, to the Puy de Dôme high altitude station and to the SIRTA Atmospheric Research Observatory in France, to the Cabauw Experimental Site for Atmospheric Research in The Netherlands, to the FINOKALIA Atmospheric Observatory in Greece, to the TROPOS Research Station Melpitz in Germany, to the Cyprus Observatory in Cyprus and to the Pallas-Sodankylä Global Atmospheric Watch Station in Finland for a total access time of 89 RWDs. For more information, related to the access to advanced ACTRIS stations, please see D9.2.

This brief overview shows the great attractiveness that these facilities have on the leading companies operating in the field of atmospheric monitoring. It also shows the positive impact of the ACTRIS strategy in involvement with SMEs.

The distribution of the different types of the carried out activities is illustrated in Figure 1.

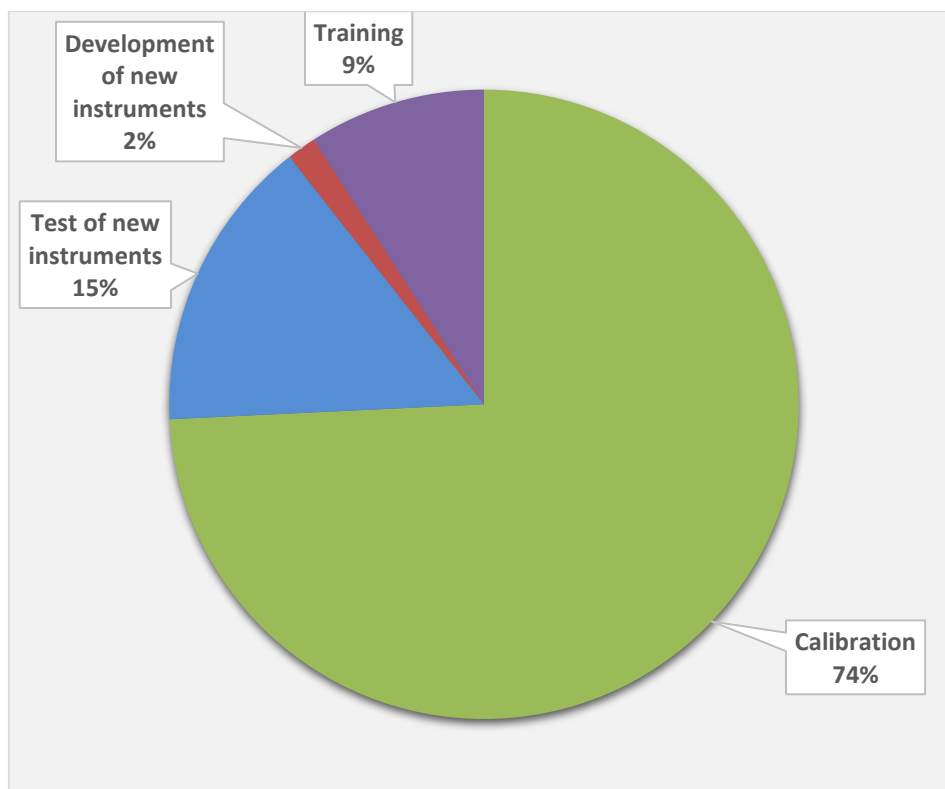


Figure 1: Distribution of types of activities carried out from the private sector through access to ACTRIS-2 facilities within the period 1 May 2015 - 30 April 2019. The distribution is reported as share of TNA projects per activity.

As can be seen from the chart, 74% of TNA projects are related to calibration activities, 9 % to training of instruments operators, 2% to development of new instruments and 15 % to test of new instruments. The share of testing and development of new instrumentation is affected by the lack of data related to access on a national basis, beside the TNA programme. Nevertheless, the access quota for these sensitive activities is already encouraging (17%).

The share of access for training purposes (9%) shows that ACTRIS has also served to train several SME instrument operators. This aspect is very important since very often, in the SME's innovative process, industrial training component is lacking. However, it is widely acknowledged that this element is crucial towards an effective innovative process and, above all, it strongly impacts on the development of local human resources and hence on local economic development with a view to maximize the local socio-economic impact generated by the ACTRIS Research Infrastructure.

22 SMEs (15 EU-based, 3 based in Switzerland, 2 based in UK, 1 based in Australia and 1 based in USA) are associated to ACTRIS-2.

Associated SMEs have been always invited to technical workshops (NA1, NA2, JRA1, JRA3) in order to build relationships and reinforce the mutual cooperation.

An overview of the ACTRIS-2 Associated Partnership with SMEs is given in table 1.

Table 1. ACTRIS-2 Associated Partners

Associated Partnership	
Company	Country
Aerosol Consulting ML SarL	Switzerland
Abacus Laser	Germany
Aerodyne Research Inc.	USA
Aerosol d.o.o.	Slovenia
Air Lorraine	France
Airmodus Oy	Finland
Alpes Lasers S.A	Switzerland
CIMEL Electronique	France
CNC Solutions	Greece
Ecotech Pty Ltd	Australia
GRASP SAS	France
GWU-Umwelttechnik GmbH	Germany
Licel GmbH	Germany
LuftBlick OG	Austria
Meteomodem	France
METEK GmbH	Germany
Raymetrics SA	Greece
Ricardo-AEA Ltd.	UK
RPG Radiometer Physics GmbH	Germany
Remote Sensing Consultants Limited	UK
TSI GmbH	Germany
TOFWERK AG	Switzerland

Not all SMEs collaborating with ACTRIS are Associated Partners. Several companies are users of the calibration facilities for technological developments, hardware improvements and software updates and developments, and/or suppliers of instrumentation and components (Collaborative Partnerships), as reported in table 2.

Table 2. ACTRIS-2 Collaborative Partnership

Collaborative Partnership	
Company	Country
ADDAIR	France

Air Quality Design	USA
Airclip Service GmbH	Germany
Air Quality Design	USA
Andøya Space Center	Norway
Brechtel	USA
Campbell Scientific Ltd.	UK, France
Catalysts	Austria
Cooper Environmental	USA
Dekati Oy Finland	Finland
Droplet Measuring Technologies	USA
Ecophysic: CLD	Germany
EKO Instruments EUROPE BV	The Netherlands
Envicontrol	Belgium
EnviMeS: ICAD	Germany
Environnement S.A	France
Halo Phototonics	UK
IONICON Analytik	Austria
LEOSPHERE	France
Los Gatos: CAPS, CEAS	USA
Lufft GmbH	Germany
Metrohm Applikon	The Netherlands
ML SaRL	France
Nicarnica Aviation	Norway
Palas GmbH	Germany
Perkin Elmer	USA
Sigma Space Corporation	USA
Sunset Laboratory Inc	The Netherlands
Teledyne Api CLD	USA
Tenum	France
Tera Environnement France Consultancy services	France
Thermo Electronics: Thermo Fisher CLD	USA
TSI GmbH / TSI Inc.	Germany / USA
VAISALA	Finland

Other SMEs (not listed in the tables above) are involved with their instrumentation and components deployed for standardized measurements within ACTRIS-2, e.g., Apel-Riemer Environmental Inc. (USA), Teknocalor (Finland).

The ACTRIS Research Infrastructure, beyond the ACTRIS-2 project, will continue to encourage the association of SMEs operating on the market for technologies and services related to atmospheric observations for future joint actions and new strategic partnerships.

Opportunities of cooperation with the private sector are continuously promoted at relevant events, conferences and exhibits, workshops, project meetings, communications and through direct announcements.

A non-exhaustive overview of the conferences where ACTRIS opportunities for cooperation with the private sector have been actively promoted is given in table 3.

Table 3. Relevant events in which ACTRIS-2 cooperation with SMEs has been actively promoted

Event	Date	Location	No. of attendees	Website link
International Laser Radar Conference (ILRC27)	5-10 July 2015	New York USA	200	http://www.epj-conferences.org/articles/epjconf/abs/2016/14/contents/contents.html
European Aerosol Conference (EAC) 2015	6-11 September 2015	Milan Italy	500	http://www.eac2015.it/
SPIE Remote Sensing, Lidar Technologies, Techniques, and Measurements for Atmospheric Remote Sensing Conference	21-22 September 2015	Toulouse France	20	https://spie.org/ERS15/conferencedetails/lidar-technologies-techniques-measurements-atmospheric-remote-sensing
SPIE Remote Sensing, Remote Sensing of Clouds and the Atmosphere Conference	23-24 September 2015	Toulouse France	20	http://spie.org/ERS15/conferencedetails/remote-sensing-clouds-atmosphere
Advance in Metrology Conference	5 February 2016	New Delhi India	50	http://www.admetindia.org/images/160/Admet-workshop-Feb_23-2016-Metrology%20in%20Chemistry.pdf
European Geosciences Union (EGU) 2016	17-22 April 2016	Vienna Austria	>13.000	http://www.egu2016.eu/
4th Iberian Meeting on Aerosol Science and Technology, RICTA2016	29 June-1 July 2016	Aveiro Portugal	60	http://ricta2016.web.ua.pt/
European Aerosol Conference (EAC) 2016	4-9 September 2016	Tours France	770	http://www.eac2016.fr/
RICH Symposium "Fostering the Innovation Potential of RIs"	8 May 2017	Lisbon Portugal	150	http://www.rich2020.eu/symposium2017
1st EU Environmental RIs – Industry Joint Innovation Partnering Forum	18–19 May 2017	Grenoble France	150	http://www.envriplus.eu/2017/01/26/1st-eu-environmental-ris-industry-forum/

European Geosciences Union (EGU) 2017	23–28 April 2017	Vienna Austria	>14.000	https://www.egu2017.eu/
International Laser Radar Conference (ILRC28)	25-30 June 2017	Bucharest Romania	300	http://ilrc28.inoe.ro/
European Aerosol Conference (EAC) 2017	27 August-1 September 2017	Zürich Switzerland	500	https://www.pmiscience.com/science/conferences/conference/european-aerosol-conference-2017-(eac)
European Geosciences Union (EGU) 2018	8–13 April 2018	Vienna Austria	>15.000	https://www.egu2018.eu/
European Lidar Conference (ELC 2018)	03-05 July 2018	Thessaloniki Greece	200	https://elc2018.eu/
GEOweek 2018	29 Oct – 2 Nov 2018	Kyoto, Japan	+ 500	http://www.earthobservations.org/geo15.php
European Geosciences Union (EGU) 2019	7–12 April 2019	Vienna Austria	>16.000	https://www.egu2019.eu/

5. Conclusions and future activities

More than 50 European and International companies have been involved so far in ACTRIS-2 activities, as Associated Partners or Collaborative Partners, as users and/or providers of services and instrumentations. The number of associated and collaborative SMEs constantly increased during the project. ACTRIS as a Research Infrastructure will continue to proactively foster the collaboration with the private sector, in line with the concept "private sector as a full partner" (both as a supplier and as a user)⁴.

Joint initiatives between ACTRIS partners and SMEs in particular in relation to standardization have been promoted and reinforced.

The use of TNA by the private sector has been constantly encouraged and 20 companies have accessed the ACTRIS facilities and services via TNA.

The set of ACTRIS Calibration and Observational facilities providing physical and remote access, technical support and training, offers private companies a unique opportunity to work with the best knowledge and expertise in the field of atmospheric science. Alike, the contribution of the best European and International companies operating in atmospheric monitoring is essential to ACTRIS, especially in a long-term Research Infrastructure perspective and, in general, in view of the establishment of a long-term win-win approach to innovation and risks/benefits co-sharing.

ACTRIS is improving its strategy to raise awareness on the ACTRIS opportunities and services, the existing huge potential for cooperation and its large socio-economic impact.

Active cooperation with specific SMEs to develop and test new instruments and subsystems is in progress, and further results are expected.

Dissemination and stimulation actions have proven to be efficient, and ACTRIS will continue in this direction in close connection with the private sector.

Last but not least, the ACTRIS community will continue to work and to appeal for a favourable political, regulatory, legal and financial environment as a crucial condition to help bringing together both RIs and private sector needs.

Reference documents

Deliverables, milestones, reports

1. [D 4.1 Progress report on standard-making process](#)
2. [D 4.2 Progress report on the use of ACTRIS facilities and calibration centres for testing novel instruments](#)
3. [D 4.3 Progress report on innovation](#)
4. [D 9.1 Intermediate report on access to advanced ACTRIS stations](#)
5. [D 9.2 Final report on access to advanced ACTRIS stations](#)
6. [MS 4.3 Protocol for the exchange of expertise and information with the private sector](#)
7. [MS 4.5 Final report on the use of ACTRIS facilities and calibration centres for testing novel instruments](#)
8. [Core Technical report \(TR1\) - 1st Periodic Reporting - 05/2015 > 08/2016](#) (access restricted to Project Partners)
9. [Core Technical report \(TR2\) – 2nd Periodic Reporting - 09/2016 > 12/2017](#) (access restricted to Project Partners)

Projects

- [ACTRIS I3: Aerosols, Clouds, and Trace gases Research InfraStructure Network](#)
- [ACTRIS-2 IA: Aerosols, Clouds and Trace gases Research InfraStructure Integrated Activities](#)
- [EARLINET: European Aerosol Research Lidar NETwork](#)
- [Cloudnet: CLOUD NETwork](#)
- [EUSAAR: EUropean Supersites for Atmospheric Aerosol Research](#)
- [ENVRIplus: ENVironmental Research Infrastructures](#)

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2. [IPCC Fourth Assessment Report: Climate Change 2007](#)
3. [European Charter for Access to Research Infrastructure](#)
4. [Report of the ESFRI Working Group on Innovation to ESFRI, FI16-56-05, March 2016](#)