

Deliverable 5.3: Report on support activities for NFs and RPFs

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1. Introduction

This report summarizes the activities within Task 5.2 of ACTRIS-IMP (support for new National Facilities (NFs) and Regional Partner Facilities (RPFs)). Whereas NFs comprise Observational and Exploratory Platforms within the countries that are part of ACTRIS ERIC, the potential RPFs represent Platforms in countries outside of ACTRIS ERIC.

This task was dedicated to the technical integration of new NFs (Section 2) and RPFs (Section 3) to enable them to meet the technical standards of ACTRIS. The aim of the related work has been to support new and existing facilities in planning and decision-making for setting up or upgrading instrumentation and operation procedures, so that these new stations meet the ACTRIS requirements. Furthermore, new facilities have been invited to physical technical workshops and training events. Although, due to the COVID-related restrictions, this part of the task was extremely hard to fulfil, many activities took place remotely in the first part of the ACTRIS-IMP project. This was then an excellent starting point for the last part of ACTRIS-IMP, when finally courses and hands-on training at experienced NFs as well as individual partnerships and site visits were possible again. Nevertheless, also after the lift of travel restrictions, a considerable number of remote activities have continued in the second part of the project, so combining in-person and hands-on activities with remote ones. A detailed report on all training events will be provided in deliverable D5.5 (Report on training of NF and RPF operators) towards the end of the project (month 48).

The definition of an RPF in the contexts of ACTRIS was worked out on several meetings during the ACTRIS-IMP project, and is as follows:

A Regional Partner Facility (RPF) in ACTRIS is a facility hosted by a country not being a member or permanent observer of ACTRIS ERIC, but the facility is filling or in the process to fill all other requirements of ACTRIS NFs (measured parameters, data provision, instrument QA/QC procedures, and RPO commitment for funding).

This means that an RPF follows the same technical standards as an NF but is located in and hosted by a country (within or outside Europe) without national commitment to ACTRIS ERIC. The data produced by an RPF are fully ACTRIS compliant, and the RPF will make a contract with ACTRIS ERIC to get the same operation support as an NF. The facilities within ACTRIS ERIC countries cannot be RPFs, as they should be NFs. Also, facilities in a third country operated, proposed, and paid by an ACTRIS ERIC member country in its membership fee are to be considered as NFs of the paying country. The participation model and related financial implications for the different facilities other than NFs are being worked out within and beyond the framework of ACTRIS IMP. As they are not finalized by the time of the submission of this document there might be implications on the RPF concept not considered here.

Finally, a number of sites in Estonia, Portugal, Ireland, Slovenia, Iceland, and Bolivia were identified to match the definition of a Regional Partner Facility. The potential RPFs in these countries are listed in Table 1, and support actions are specifically discussed in Section 3 of this report for the identified facilities /

countries. As it has not been possible to sign an RPF agreement with ACTRIS ERIC yet, the identified facilities are systematically referred to as potential RPFs in this document.

The facilities in Estonia, Ireland, and Portugal have been generally more connected to ACTRIS as these countries have representation in the ACTRIS IMP project. Greece and UK are currently discussing a membership to ACTRIS ERIC. If these countries do not join ACTRIS ERIC, also the National Facilities in these two countries would qualify as RPFs.

2. Support of new NFs

Overall, ACTRIS has supported new NFs or the installation of new components at existing NFs by fostering collaboration, providing technical assistance, facilitating access to infrastructure and data, and advocating for their establishment.

A list of existing and new NFs proposed by the potential ERIC members and permanent observer countries in 2021 has been provided in the deliverable D5.1 ([ACTRIS NF Labelling Plan](#)). At that time, 117 NFs had been proposed, of which 15 were completely new and 20 planned to be upgraded. In 2022, also Sweden joined the preparation of ACTRIS ERIC and proposed six additional NFs, with upgrades planned for all of them. From the original countries, UK and Greece have not joined ACTRIS ERIC by the time of submission of this deliverable. This leaves 11 facilities out from the NF list but potentially joining in as RPFs. As a result, the number of NFs at the time of submission of this document is 123, of which 15 are completely new and 32 are including new components compared to the pre-ACTRIS situation.

Figure 1 shows the relation of existing consolidated NFs to existing NFs where new components will be installed, and completely new NFs (status in July 2023). It can be seen that 26% of the existing NFs have plans to upgrade operations to new components. An additional 12% of NFs will be completely new. This shows the large need for support of these NFs in order to integrate new components and whole stations as smoothly as possible into the ACTRIS infrastructure network.

New NFs proposed by ACTRIS ERIC countries have had the same possibilities to connect with different bodies of ACTRIS as existing NFs. First, they were invited to general meetings, which fostered networking and collaboration, with possibilities for interaction with NFs from other countries. Furthermore, these meetings were an opportunity to gain insight into the most important developments in the field, in technical issues, analysis of data, and in the interaction with policymakers. Overall, these meetings facilitated the exchange of knowledge, expertise, and resources necessary for establishing and operating new national facilities.

Furthermore, technical workshops and webinars have progressively been used by the Topical Centers to foster knowledge transfer in terms of quality assurance and instrument issues. Here, new NFs were especially in the focus of the providers of these workshops in order to enable the new NFs to close the gap to the existing NFs as fast as possible. This includes technical support and guidance to help countries to establish new NFs by sharing best practices, standardizing measurement protocols, and providing training

and capacity-building activities. In this way, new NFs proposed by the countries have had the opportunity to develop into fully ACTRIS-compliant sites in a straightforward way for their delivery of long-term, high-quality observations of aerosols, clouds, and trace gases.

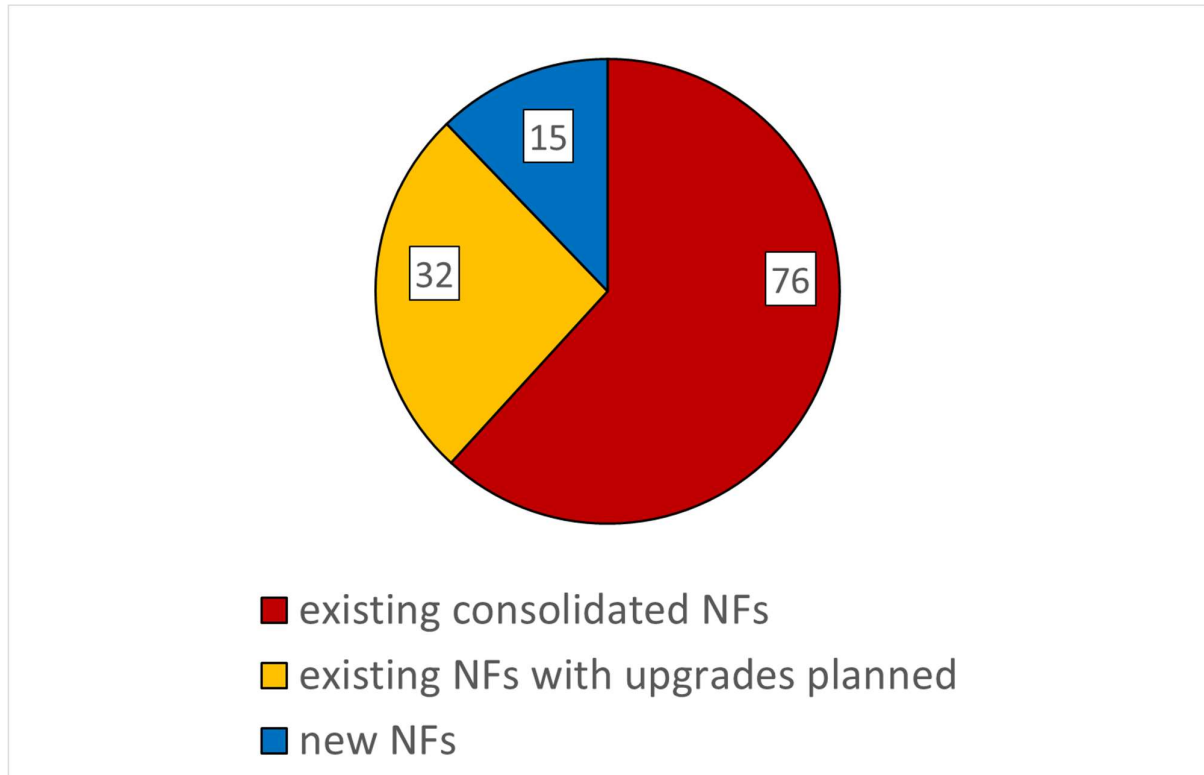


Figure 1: Relation of existing consolidated NFs, NFs with new components and completely new NFs.

3. Support for potential RPFs

RPFs have in principle the same possibilities as new NFs to attain the same quality in their data and the interconnection with the whole ACTRIS research community. In this section, the support provided to the identified potential RPFs is outlined for facilities in countries not being part of ACTRIS.

3.1 Ireland

In Ireland, the measurement sites at Mace Head (coastal background, operated by the University of Galway, UoG) and the measurement site and a simulation chamber at the University of Cork (UCC) are potential RPFs. At Mace Head (Figure 2), trace gas in-situ and aerosol in-situ measurements are performed with instruments and procedures compliant to ACTRIS standards and data are submitted to EBAS accordingly. Mace Head was among the first sites in the ACTRIS community for which an ACTRIS-compliant

Scanning Mobility Particle Sizer (SMPS) system has been purchased. Interaction has been through participation at ACTRIS meetings and individual consulting on ACTRIS standard operations by ACTRIS Topical Centres CiGas for the VOC in-situ measurements and CAIS-ECAC for aerosol in-situ measurements. At the urban station in Dublin, an ACMS is running continuously compliant with ACTRIS, which included the attendance at several intercalibration exercises.

The University College Cork (UCC) represented by Prof. John Wenger is the national contact point (NCP) of ACTRIS and he attends ACTRIS NCP meetings and provides updates on the situation in Ireland as required. UCC is also a member of the ACTRIS Atmospheric Simulation Chamber Committee (ASCC), which is looking at chamber-specific aspects and ways to increase the visibility of the chamber community within ACTRIS and has attended technical meetings on chambers. The University of Galway, responsible for the Mace Head station, has contributed to technical discussions with the aerosol in-situ community and has attended technical meetings on aerosol in-situ measurements. UoG and UCC have participated in several science meetings over the years.



Figure 2: The Mace Head research station with the inlet tower.

3.2 Estonia

The SMEAR-Estonia site (forest background site) is a potential RPF related to ACTRIS (Figure 3). Trace gas in-situ and aerosol in-situ measurements are performed continuously. Interaction with ACTRIS has been through regular participation at different general meetings (ACTRIS week and the ACTRIS national

consortia meetings) and through specific meetings related to trace gases and aerosol in-situ (CiGas and CAIS-ECAC meetings).

Within Estonia, the internal knowledge transfer occurs through the national consortium, which is partnering with the SMEAR Estonia and the Estonian Environmental Observatory projects. The participants are in most cases Estonian University of Life Sciences and Tartu University.



Figure 3: The SMEAR-Estonia research station

3.3 Portugal

In Portugal, the EVASO facility (rural background site) is a potential RPF for ACTRIS (Figure 4). Observations for aerosol remote sensing with the PAOLI Lidar (PollyXT type) are continuous, depending on the meteorological condition, and the station managers are in permanent contact with CARS and the ARES DC Unit to follow the QA/QC procedures. The two AERONET photometers are working and are regularly calibrated. Furthermore, the mobile station for air quality measurements equipped with the SPATRAM DOAS spectrometer has been moved to Granada (Observational Facility AGORA) for the deployment of the TNA project named Ground-based/Satellite Synergies for TrAcers Monitoring in Urban Areas. (GSS-TAMUA) in the period 30.01-04.02.2023. One more TNA Project (Measurements Intercomparison for New Spectroscopic Instrument Calibration - MINSPEC) focused on the MAX-DOAS performance assessment of the SPATRAM2 instrument has been conducted at the ISAC-CNR Institute (Observational Facility CMN - PV) from 05.02 to 13.02.2023. The instruments for the in-situ measurements as well as the DOAS

spectrometers are ready to participate to intercomparison campaigns. In this regard, the participation to the CINDI3 campaign is already scheduled. The EVASO facility hosted 2 TNA projects: a) LIRTASOM - Lidar data in a RT model for dust direct radiative effect estimation and evaluation against solar measurements from 11.07 to 18.07.2022 and b) INESP-NO₂ - Integration of near-surface and vertical NO₂ observations, in the period 11-16.04.2023. One more TNA project IBERIA - Improvement of the atmospheric Boundary layer height estimation from COSMIC-2 data by using microwave radiometry and radiosondes- is already scheduled to be deployed at the EVASO facility during the 03-08.09.2023 period. EVASO is involved in the Pilot TNA for validation of EarthCare satellite products. EVASO since 2006 is equipped with a low power lidar (Ceilometer CL31) that is now providing data to the E-PROFILE network and the acquisition of a new Lufft CHK15 instrument is on-going. In 2013 operation started with a RPG HatPro microwave radiometer.



Figure 4: Laser beam of the Polly instrument at the EVASO station.

3.4 Slovenia

In Slovenia, there are two potential RPFs to be connected to ACTRIS: First, the rural background station Otlica as an observation platform (Figure 5) and second, the OM-ADC aircraft as a mobile platform (Figure 6).

The interactions with ACTRIS in general were the participation in ACTRIS Weeks. Interactions with TCs were related to CAIS-ECAC, where the data providers were part of calibration experiments at TROPOS. Furthermore, they were part of an ambient campaign at SIRTa (The Influence of the Mixing State on Aerosol Light Absorption, IMSALA; Feb-May 2022).



Figure 5: Lidar Systems at Otlica.

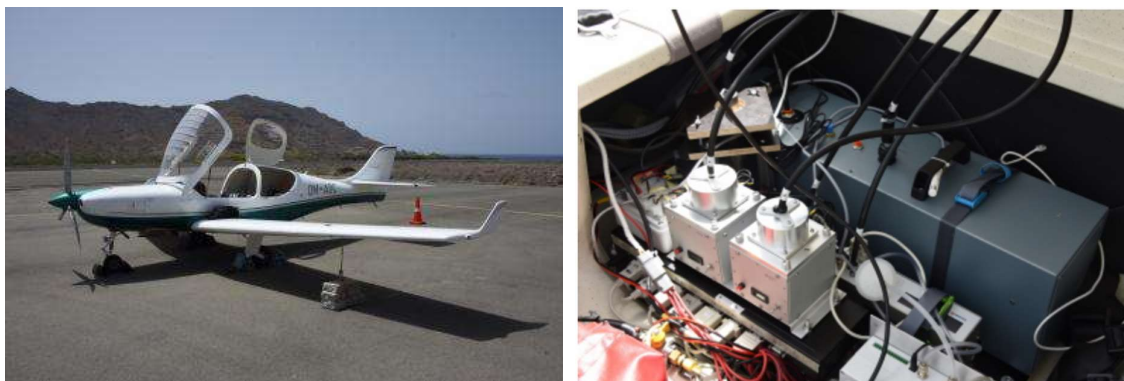


Figure 6: Aerovizija's Aerospool Advantic WT-10 aircraft.

3.5 Iceland

In Iceland, several sites are related to the measurement of the dust aerosol concentration, with a wide range of instruments (e.g. mass concentrations measurements by high-volume samplers for PM₁, PM_{2.5}, PM₄, PM₁₀ and Light Aerosol Optical Counter (LOAC, particle number concentrations at 19 size bins of PM_{0.3} – PM₁₀₀)). Furthermore, particulates and gases are measured by the Environmental Agency of Iceland (EAI) at 29 stations.

Up to now, interaction with ACTRIS is only weak but cooperation is planned for the future.

3.6 Bolivia

Chacaltaya (CHC) (high-altitude background station) has been related to ACTRIS for several years. During this time, CHC has followed most ACTRIS recommendations for ground-based monitoring atmospheric composition. The technical staff has been attending training meetings and participating actively in the group discussion, especially when there were problems with instrumentation. In addition, the international consortium that runs the station has been organizing meetings every year (except during the pandemic) where useful and fruitful discussions, both at a scientific and technical level, were carried out. Chacaltaya could be included in ACTRIS as an NF proposed by one of the ACTRIS member countries in the international consortium or as an RPF by the Bolivian host institute.

Table 1: Identified potential RPFs connected to ACTRIS

non ACTRIS country	RPO	Facility name coordinates	Facility type	Readiness	Facility PI	Topical Center	Component
Ireland	University of Galway	Mace Head 53.33 N, 9.90 W	Observational	Ready	Colin O'Dowd	CiGAS, CAIS-ECAC	Aerosol in-situ, trace gas in-situ
Ireland	University College Cork (UCC)	Cork chamber	Chamber	Ready	John Wenger	CiGAS, CAIS-ECAC	Aerosol in-situ, trace gas in-situ
Ireland	University College Cork (UCC)	UCC 51.89 N, 8.50 W	Observational	Needs upgrade	John Wenger	CiGAS, CAIS-ECAC	Aerosol in-situ, trace gas in-situ
Ireland	University College Dublin (UCD)	Dublin urban site 53.31 N, 6.22 W	Observational	Ready	Jurgita Ovadnevaite	CAIS-ECAC	Aerosol in-situ
Estonia	Estonian University of Life Sciences	SMEAR-Estonia 58.16 N, 27.16 E	Observational	Needs upgrade	Steffen Noe	CiGAS, CAIS-ECAC	Aerosol in-situ, trace gas in-situ
Portugal	Evora University	EVASO 38.56 N, 7.91 W	Observational	Ready	Daniele Bortoli	CARS	Aerosol remote sensing
Slovenia	University of Nova Gorica	Otlica 45.9 N, 13.91 E	Observational	Needs upgrade	Griša Močnik	CAIS-ECAC, CARS	Aerosol in-situ. Aerosol remote sensing
Slovenia	University of Nova Gorica	GLWF airplane	Mobile	Ready	Griša Močnik	CAIS-ECAC	Aerosol in-situ
Iceland	Agricultural University of Iceland	several	Mobile	Potentially needs upgrade	Pavla Dagsson Waldhauserova	CAIS-ECAC	Aerosol - in situ, vertical balloon; focused on dust.
Bolivia	La Paz University	Chacaltaya 16.35 S, 68.13 W	Observational	Ready	Marcos Andrade	CAIS-ECAC	Aerosol - in situ,