ACTRIS - Contribution of the Czech Republic: National and Central Facilities.

Ondráček, Jakub
2018

ACTRIS – CONTRIBUTION OF THE CZECH REPUBLIC: NATIONAL AND CENTRAL FACILITIES

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Keywords: ACTRIS, NF, CF, NAOK, PACC

INTRODUCTION

ACTRIS (Aerosols, Clouds and Trace gases Research Infrastructure) is an initiative gathering partners all over Europe concentrating on high-quality observations of different atmospheric processes. ACTRIS aims to provide high quality open access data of aerosols, clouds and trace gases and to create a platform for researchers to combine their efforts in resolving the most important environmental challenges (such as air quality, health, climate change, etc.). It is a logical continuation of 15 years of development funded by both Member States and the European Commission through the Research Infrastructure programme (including EARLINET, EUSAAR, CREATE and Cloudnet). ACTRIS has become an important pan-European research infrastructure in 2016 by being accepted into ESFRI (The European Strategy Forum on Research Infrastructure) Roadmap. Currently the ACTRIS is in the phase of becoming pan-European research infrastructure with its own legal entity and operational structure, being supported by two EU projects (ACTRIS-2 and ACTRIS PPP – Preparatory Phase Project).

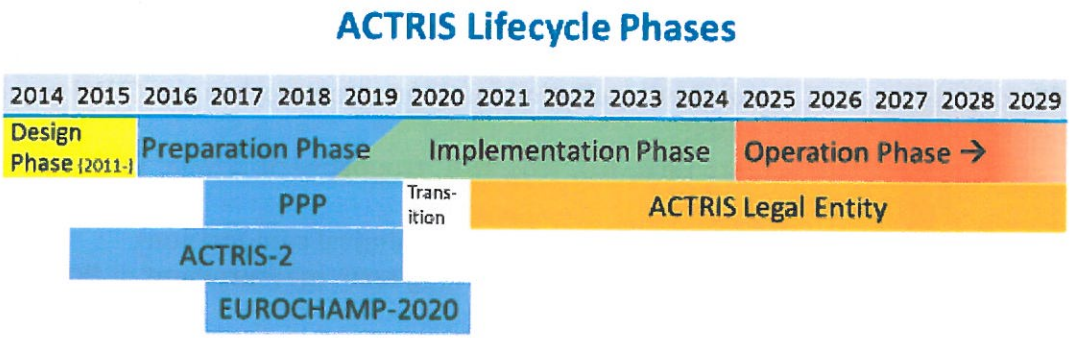

Fig. 1: The roadmap of ACTRIS to become operating research infrastructure.

The majority of the ACTRIS measurement data will be provided by ACTRIS National Facilities (NF). ACTRIS Central Facilities (CF) will provide up-to-date operation support

to the NFs as well as services to the users according to the ACTRIS access policy. ACTRIS CF include following units:

- ACTRIS Head Office (HO)
- ACTRIS Data Centre (DC)
- ACTRIS Topical Centres (TCs)
  - Centre for Aerosol Remote Sensing
  - Centre for Aerosol In Situ Measurements
  - Centre for Cloud Remote Sensing
  - Centre for Cloud In Situ Measurements
  - Centre for Reactive Trace Gases Remote Sensing
  - Centre for Reactive Trace Gases In Situ Measurements.

The ACTRIS Science Community currently gathers more than 100 research institutions or organisations from 23 European countries.

CZECH REPUBLIC IN ACTRIS

The participation of the Czech Republic in ACTRIS includes four Research Performing Organizations (RPOs): Czech Hydrometeorological Institute (CHMI), Institute of Chemical Process Fundamentals of CAS (ICPF), Global Change Research Institute of CAS (GCRI) and Research Centre for Toxic Compounds in the Environment at MU (RECETOX). All these institutions are cooperating within four projects: ACTRIS-2, ACTRIS CZ, ACTRIS-CZ RI and ACTRIS PPP. ACTRIS-CZ is on the national research infrastructure roadmap. The aim of the Czech ACTRIS team is to contribute to ACTRIS within NF and CF. The plan in regards to NF participation in ACTRIS is to have three stations: Kosetice (CHMI, ICPF, GCRI, RECETOX), Usti nad Labem (CHMI) and Prague (ICPF). Currently there is one station fully complying with the requirements of ACTRIS to become ACTRIS NF within more TCs – National Atmospheric Observatory Kosetice (NAOK). The other stations require still some improvements in regards to measurement instrumentation. The contribution of CR in ACTRIS Central Facilities is planned within Centre for Aerosol in Situ Measurements as a calibration laboratory for aerosol physical properties (ICPF). This calibration laboratory will be closely linked to World Calibration Centre for Aerosol Physics (WCCAP, TROPOS, IfT, Leipzig).

NATIONAL ATMOSPHERIC OBSERVATORY KOSETICE (NAOK)

National Atmospheric Observatory Kosetice (NAOK) consists of Kosetice Observatory and Atmospheric tall-tower. The Kosetice Observatory was founded in 1988 and it is a part of atmospheric pollution monitoring network of the CHMI currently measuring following quantities:

- gaseous pollutants (SO_2, NO, NO_2, NO_x, tropospheric ozone, VOCs, methane, PAHS, benzene)
- aerosol properties (PM_{10}, $PM_{2.5}$, EC/OC, chemical composition).

In adition to these quantities, RECETOX holds a long term measurement of POPs within Kosetice Observatory.

Moreover, Kosetice Observatory (CHMI) is part of the CHMI network of professional meteorological stations (25 allover CR) and measures following quantities:

- climatology (temperature, atmospheric pressure, RH, wind speed and direction, etc.)
- solar radiation (UV-A, UV-B, diffusional radiation)

- precipitations.

The Atmospheric tall-tower was built recently by GCRI in 2012. The tall-tower is 250 m high and has several platforms and places, where various instruments can be installed (10, 50, 80, 125, 230 and 250 m), and sampling spots for greenhouse gases. There are two permanent containers installed at the height of 230 m (one for gaseous pollutants – tropospheric ozone and gaseous Hg (GCRI) and one for aerosol measurements (ICPF)). Currently the tall/tower measurements include following variables:

- greenhouse gases (CO_2, CH_4, N_2O and CO at 10, 50, 125 and 250 m – GCRI)
- gaseous Hg and tropospheric ozone (at 3, 8, 50, 230 and 240 m – GCRI)
- aerosol fluxes (at 80 m – ICPF, GCRI)
- aerosol physical properties (total number concentration at 230 m – ICPF).

The tall-tower measurement is also part of the ICOS Atmospheric Measurement Network. ICOS (Integrated Carbon Observation System) program is a pan-European research infrastructure providing harmonized and high precision scientific data on carbon cycle and greenhouse gases budget. Part of the tall-tower measurements is a container at the base level containing following measurements:

- aerosol optical properties (scattering and absorption – GCRI, ICPF)
- EC/OC (GCRI)
- aerosol physical properties (number size distribution <1μm, nucleation particles size distribution <3nm, total number concentration – ICPF).

In the near future, the plan for the extension of research activities includes following measurements

- at 230 m:
  - aerosol optical properties (scattering and absorption – GCRI)
  - aerosol physical properties (number size distribution <1μm – ICPF)
- at ground level:
  - aerosol physical properties (number size distribution >1μm, hygroscopic properties, CCN – ICPF)
  - aerosol chemical properties (ACSM, AMS, PM_{10} offline – ICPF).

PRAGUE AEROSOL CALIBRATION CENTRE (PACC)

Prague Aerosol Calibration Centre will be part of the Centre for Aerosol In Situ Measurements and it will be hosted by Laboratory of Aerosol Chemistry and Physics (LACP) at ICPF. The initial plan of PACC activities includes calibration of aerosol instruments measuring physical properties of aerosols such as MPSS, CPC and APSS. Furthermore, the activities of PACC include organization of related workshops and training of aerosol instrumentation users (NF, ACTRIS users or external users of ACTRIS services). The PACC unit of ACTRIS Centre for Aerosol In Situ Measurements should be fully operational in 2023. Meanwhile the PACC will undergo implementation and pre-operation phase, where only some services will be offered.

SERVICES OFFERED TO EXTERNAL USERS

The NAOK infrastructure offers the access to the users on national or international level through open access policy (national) or Trans-National Access (TNA) within ACTRIS-2 project (international). There is a possibility to install new devices at NAOK as well as access to following measurements:

- in-situ chemical and physical properties of aerosols
- air quality data
- meteorological data and precipitation
- vertical gradient of greenhouse gases
- gaseous compounds.

The instrumentation can be extended on demand by various techniques (such as highly time and size-resolved chemical composition, size-resolved aerosol hygroscopicity, volatility studies, etc.).

Measured data from permanently running instruments are accessible through various data portals:

- EBAS (aerosol chemical, optical and physical properties, meteorology, gaseous pollutants – CHMI, ICPF, GCRI)
- GENASIS (POPs – RECETOX)
- WDCGG (greenhouse gases - CHMI, GCRI).

The services of PACC calibration facility will be offered on the open access policy basis (national) and through TNA access (international users) as well. The services offered by PACC will include:

- calibration of aerosol instrumentation according to ACTRIS standards (MPSS, CPC, APSS)
- training of users for operation of aerosol instrumentation
- workshops for ACTRIS internal and external users.

ACKNOWLEDGEMENT

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement: No 654109; and Research and Innovation Framework Programme, H2020-INFRADEV-2016-2017, Grant Agreement number: 739530; and is supported by Ministry of Education, Youth and Sports of the Czech Republic within project for support of national research infrastructure ACTRIS – participation of the Czech Republic (ACTRIS-CZ - LM2015037).

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