Deliverable 10.14: Second assessment report of the services offered by the ACTRIS Data Centre

Editor: Cathrine Lund Myhre, (NILU)

Based on contributions from members of the external board (Dave Turner, NOAA-National Severe Storms Laboratory, USA, Michael Schultz, Norwegian Meteorological Institute, Norway, Martial Haeffelin, CNRS-IPSL / SIRTA, France) and invited expert data user (Bojan R. Bojkov EUMETSAT)

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1 Introduction

1.1 Purpose of external assessment

The overall goal of the ACTRIS Data Centre is to provide scientists and other user groups with free and open access to all ACTRIS infrastructure data, complemented with access to innovative and mature data products and tools for QA, data analysis and research.

The ACTRIS Data Centre is offering data and service for both internal and external user groups, and the purpose of the *Data Centre External Board* (DC-EB) of ACTRIS-2 is to assess the development and use of the data centre facility and that this is complying with the main plans and goals. The aim is to strengthen the ACTRIS Data Centre in accordance with the needs and goals of ACTRIS, for both internal and external users.

After the start of ACTRIS-2, a new project was initiated, ACTRIS Preparatory Phase Project (PPP). This has been central and highly beneficial for the external assessment of the ACTRIS Data Centre, and the description of needs and adjustments. ACTRIS PPP is an EU Horizon 2020 Coordination and Support Action (grant agreement No 739530) and started 1 January 2017 for a period of 3 years. The main objectives of ACTRIS PPP are to develop the organizational, operational and strategic frameworks of the RI. As a part of this, the concept of the ACTRIS data centre in the future will be developed from a detailed analysis of the current and near-future needs of the internal (ACTRIS national services providers) and external users. The assessment will be using the Delphi method[1] and address: (a) the nature of the services to be provided by the Data Centre; (b) the principles, methodologies and procedures to be used; (c) requirements in terms of infrastructure and human resources.

This was very beneficial for the assessment of the data centre, and important support covering processes assessing the data centre and future needs in detail. This has been used actively in the assessment of the services offered by the ACTRIS Data Centre and deliverable 10.14.

1.2 Mandate

The external user feedback and DC-EB reviews at least two time during the project the data centre activities towards the ACTRIS-2 plans and points out the needs in order to contribute to further development of the ACTRIS Data Centre and advice the ESB and GA on further improving their actions. The following reports were produced to document the ACTRIS data management, data provision and use, and serve as the central input to the DC-EB in addition to (web)meetings and discussions;

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	Title	Due
D10.1	Definition of the ACTRIS Data Management Plan	Nov. 2015
D10.2	First summary of the ACTRIS data offered by the ACTRIS Data Centre	Sep. 2016
D10.3	First summary of the monitoring of access to ACTRIS data and user statistics	Sep. 2016
D10.7	Second summary of the ACTRIS data offered by the ACTRIS Data Centre	Sep. 2017
D10.8	Second summary of the monitoring of access to ACTRIS data and user statistics	Sep. 2017
D10.9	Review of the ACTRIS Data Management Plan	Nov. 2017
D10.12	Third summary of the ACTRIS data offered by the ACTRIS Data Centre	Sep.2018
D10.13	Third summary of the monitoring of access to ACTRIS data and user statistics	Sep. 2018

Additionally, meetings and feedback from external board members and others, relevant deliverables, and assessments performed within the frame of ACTRIS-PPP will be used.

1.3 Composition

The expert members of the external board will consist of at least 2 independent scientists outside the project (e.g. external data users), who will collaborate with at least 3 scientists from the project whom are not partners of ACTRIS Data Centre.

1.4 Appointment and Term of Members

The members of the external board reflect the anticipated user community and was appointed at the first ACTRIS-2 GA. The composition of the DC-EB may be reviewed by the GA on request. Members serve in the DE-EB for the duration of ACTRIS-2 (4 years).

The ACTRIS Data Centre External Board (ACTRIS DC-EB) is set up and elected at the first ACTRIS-2 General Assembly meeting, in Rome, June 2015 with the following members

External members:

- Dr. Martijn Schaap, Netherlands Organisation for Applied Scientific Research (TNO), Netherlands
- Allison McComiskey, National Oceanic and Atmospheric Administration (NOAA), USA (supported by Betsy Andrews, NOAA)
- Dave Turner, NOAA-National Severe Storms Laboratory, USA

Internal members:

- Michael Schultz, Norwegian Meteorological Institute, Norway

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- Martial Haeffelin, CNRS-IPSL / SIRTA, France

In particular, Dave Turner (NOAA), Betsy Andrews (NOAA, representing Allison McComiskey), Michael Schultz (MetNo), Martial Haeffelin, (CNRS-IPSL / SIRTA), have been active. Additionally, Bojan Bojkov representing EUMETSAT, European Space Agency has been invited to provide concrete evaluation from the Earth Observation community.

2 Second assessment of the services offered by the ACTRIS Data Centre

The question provided by the DC-EB board (See D10.4) are the bases for the second assessment procedure, supported by the reports listed in section 1.2. The questions were used, discussed and answered at a series meeting in the work with defining the concept of the ACTRIS DC for future. This assessment procedure ensured a lot of feedback and resulting in adjustments and priorities for the data centre in the future. In particular, the following meetings where used:

Workshop Shaping the ACTRIS central facilities, NILU, Kjeller, 14 – 15 June 2017 (most part of the meeting including the introduction to Delphi method, see https://www.actris.eu/LinkClick.aspx?fileticket=3_aghWExFYM%3d&portalid=46)

ACTRIS Data Centre meeting 17-18 January 2018, FMI, Helsinki, Finland (full meeting see https://www.actris.eu/Events/Eventsdescriptions/ACTRISDCmeeting17-18_1_2018.aspx)

ACTRIS-PPP Community Meeting Oslo/Kjeller, February 5-9, 2018 (various sessions here, see https://www.actris.eu/Portals/46/Documentation/ACTRIS%20PPP/Meeting%20documents/2018/Oslo_5-9_2_2018/Materials/ACTRIS%20PPP%20Oslo%2020180205-09%20detailed%20agenda.pdf?ver=2018-02-02-100638-367)

Workshop on CF concept finalization, data and access policies, 20 23 March, 2018 Paris, France (various sessions here: http://www.actris.eu/Portals/46/Documentation/ACTRIS%20PPP/Meeting%20documents/2018/Paris%2020180320-23/ACTRIS-Paris-CF-Tentative-Agenda.pdf?ver=2018-03-13-104219-903)

ACTRIS Data Centre workshop – 9-10 January 2019 - Kjeller, Norway, First part of the meeting. https://www.actris.eu/Portals/46/Events/Events%20descriptions/2019/ACTRIS_DC_ENVRI_WS_agenda_v1.pdf?ver=2018-11-22-101912-483

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Summer 2018, a consortium was set up to apply for the ACTRIS Data Centre in the future, and an application was sent (see Appendix I) August 2018. The ACTRIS Data Centre application was reviewed by an anonymous external panel providing recommendations for the data centre development (Appendix II).

Additionally there has been a 2 hour virtual meeting March 6, 2019, with Betsy Andrews NOAA (and 2 others from NOAA) and Michael Schultz (and 1 other from met.no) and the NILU data centre group.

Finally, the satellite community was approached, and invited to give an evaluation of the data centre, and use of ACTRIS DC for satellite validation. This was given at the ACTRIS-2 meeting in Darmstadt 1-4 April 2019 (https://www.actris.eu/Events/Eventsdescriptions/ACTRIS-2Events/FinalACTRIS-2GeneralMeeting2019.aspx). Bojan R. Bojkov (Head of Remote Sensing and Products, EUMETSAT) provided an overview of EUMETSAT missions and products, and then there were separate presentations on detailed aerosols, clouds and trace gases needs for EUMETSAT missions, based assessment of the data centre.

3 Recommendations from second assessment

There has been information and ongoing assessment through the meetings listed in section 2 resulting in highly value recommendations and input for the ACTRIs Data Centre in the future. These were complied and takin into account in the ACTRIS Data Centre application for future. The final review report from the external anonymous evaluation panel is included in Appendix II, with their views and recommendations.

The following figures summarize the recommendations from EUMETSAT, more information are included in their presentations.

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Special Needs for Aerosol Products Validation - Focus on ACTRIS Operational Phase (2025+)

Is the ACTRIS Data Portal reflecting the full list of products i.e. available during the operational phase?
(e.g. Aerosol layer height was not found)

Time-frame, timeliness, format/structure, documentation, etc.
- As per other products (see "General conclusions")
- Timeliness <48h
- Easy data access (needed for continuous product monitoring)
- NetCDF is the current at EUMETSAT
- Harmonisation of the parameters and structure (e.g. retrievals, uncertainties)
- Product documentation and description

Special needs :

- It is still difficult to assess a dense and large spatial coverage over oceans : develop measurements from ship of opportunity, possibility of dedicated campaigns using mobile units…
- Adjustment or completion of protocols like Earlinet to better match overpasses time of S3, EPSSG

18 EUM/RSP/VWG/19/1058572, v1A Draft, 3 April 2019 Final ACTRIS-2 Science Meeting, 1-4 April., Darmstadt EUMETSAT

Special Needs for Cloud Products Validation - Focus on ACTRIS Operational Phase (2025+)

Spatial coverage:
The validation of EUMETSAT cloud products requires global coverage and coverage over sea:
- Increase the number of station over Europe (including mobile shipborne units)
- Transfer ACTRIS standards for cloud parameters to the non-European part of the network, e.g., EARLINET (talk by Vasillis Amiridis), AERONET, NDACC, etc. + ARM (Talk by Ulla Wandinger)
- Possibility of dedicated campaigns using mobile units

Additional parameters relevant for the validation of EUMETSAT cloud products
Target detection and classification at each level (clear, cloud, aerosol, volcanic ash → Talk by Anne C. Lange
Cloud phase classification at each level (liquid, ice or mixed)
Cloud top pressure & uncertainty for all cloud layers
Cloud base pressure & uncertainty for all cloud layers
Cloud optical thickness & uncertainty for all cloud layers
Average cloud particle size & uncertainty for all cloud layers (water and ice)

Time-frame, timeliness, format/structure, homogeneity across stations, documentation, etc.
- As per other products (see "General conclusions")

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Special Needs for Trace Gas Products Validation

Spatial coverage:
The validation of EUMETSAT trace gas products requires global coverage and ideally coverage over sea:
- Increase the number of stations in under-represented areas with a focus on e.g. special case such as biomass burning & polluted areas etc.
- Possibility of dedicated campaigns using mobile units.
- Improve coverage for GHG in general

Timeliness:
Operational validation of EUMETSAT trace gas products requires improved timeliness of data and robust reliable delivery:
- Best case is currently NDACC_RD where data area available within 1 month.
- Within NDACC improved timeliness can be negotiated with individual station operators but only on a case by case basis i.e. not at network level
- TCCON affiliated to NDACC

Site specification and selection:
Choice and characterisation of site is extremely important:
- Characterisation of site is particularly important for GHG but also for other species.
- Accuracy requirements for GHG are very challenging

Consistency of approach:
- How consistent is the approach across affiliated networks?
- What is the difference between ACTRIS variables and non-ACTRIS variables?
- Are common standards/formats etc. applied?

42 EUM/RSP/VWG/19/1058572, v1A Draft, 3 April 2019 Final ACTRIS-2 Science Meeting, 1-4 April., Darmstadt EUMETSAT

EUMETSAT requirements for the operational phase of ACTRIS

EUMETSAT plan for the use of ACTRIS:
- ACTRIS is currently used for products validation at EUMETSAT and the SAFs
- ACTRIS is the key ground-based network for the validation of EUMETSAT products from EPS-SG and MTG (2022+)

Time requirements:
- Target phase: MTG/EPS-SG operational/routine phase (2025+)
- Timeliness < 48h

Data harmonization & format:
- Easy access to data (i.e., suitable for continuous product monitoring)
- Current NetCDF format meets the needs of future EUMETSAT missions
- All stations shall include the same parameters with homogenous structure (same retrieval algorithm, uncertainty estimates, n. of atmospheric levels, time step, etc.)

Documentation:
- Product list for the ACTRIS operational phase
- Description of data access & policy for use
- Products description
- Description of retrievals, uncertainties, limitations, etc.

EUMETSAT's research-to-operations (and back from operations-to-research):
- need fully characterised, geographically diverse, easily accessible, and fully documented datasets

Campaigns are not officially foreseen in the frame of ACTRIS.
- ACTRIS partner campaigns could be communicated for information.

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Appendix I

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Application form for ACTRIS Central Facility host candidates

Goal and principles

ACTRIS (*Aerosols, Clouds, and Trace gases Research Infrastructure*) was adopted to the ESFRI roadmap in 2016. During the ongoing preparation phase (2017-2019), ACTRIS shall achieve maturity at organizational, operational, and strategic levels. The preparation phase is supported by the European Commission (ACTRIS Preparatory Phase Project, PPP) and partner countries and organizations at the national level. The ACTRIS Central Facilities (CFs) host selection will be an essential outcome of ACTRIS PPP *(D4.3 Report on CF host selection process and outcome).*

During the implementation phase (expected 2020-2024), the CFs are constructed and their services are tested. ACTRIS operations will start step-by-step by ramping up the service provision. After the necessary legal preparations, ACTRIS shall become a legal entity (ERIC, European Research Infrastructure Consortium) funded by the Member countries. The target is to launch ACTRIS ERIC in the beginning of 2021. It is foreseen that ACTRIS will be fully operational by 2025. The technical requirements and service provision of ACTRIS Central Facilities are detailed in the ACTRIS CF concept documents available in the call material.

The goal of the selection process is **to decide upon the undisputed host candidates for ACTRIS Central Facilities (CFs) - Head Office, Data Centre and six Topical Centres**.

The following principles are crucial to reach the above-mentioned goal:

- The host candidates must provide long-term certainty, clarity, continuity and commitment to the scientific community involved in ACTRIS.
- The selection process and evaluation is transparent and directed towards reaching consensus.
- The final decision is made by the Interim ACTRIS Council.

This form must be completed in English, converted into PDF-format and sent together with relevant attachments to ACTRIS Central Facility Selection task group *(actris-cf-selection-task-group@helsinki.fi)* by **8th August 2018** at 24:00 CET. The application shall be sent by the leader of the candidate consortium on behalf of all partner institutions involved in the proposal. Confirmation of receipt will be sent by e-mail.

The application will be evaluated by a team of external experts. The application will be evaluated along three criteria: 1) **Scientific/ Technical/ Management excellence and experience** on specific service provision, 2) **Feasibility**, including capacity and maturity of operation support and service provision, implementation plan, resources, and operational management and 3) demonstrated **institutional support**. Please note that this "Application form for ACTRIS Central Facility host candidates" must be accompanied by a statement (-s) of readiness of the involved institutes.

The guidelines for page limits of each of the application sections should be followed. Minimum single-spaced, Calibri font 11 and 2 cm margins all around should be applied. If needed, additional rows in tables and / or additional tables can be created.

A. General information on candidate consortium

1. Information on the application

The Central Facility being proposed:

( ) Head Office
(X) Data Centre
( ) Centre for Aerosol In Situ Measurements
( ) Centre for Cloud In Situ Measurements
( ) Centre for Reactive Trace Gases In Situ Measurements
( ) Centre for Aerosol Remote Sensing
( ) Centre for Cloud Remote Sensing
( ) Centre for Reactive Trace Gases Remote Sensing

Name and acronym of the Central Facility:

ACTRIS Data Centre - ACTRIS DC

Coordinator of the application

NILU - NORSK INSTITUTT FOR LUFTFORSKNING STIFTELSE

Street: INSTITUTTVEIEN 18

Town: KJELLER

Postcode: 2007

Country: Norway

Webpage: www.nilu.no

NILU was founded in 1969 and is an independent non-profit research institute specializing in climate and air pollution research with ca 180 employees. Since the year 2000, NILU has been involved in more than 90 EU and ESA financed projects and the most relevant are e.g. ACTRIS-1, ACTRIS-2, ACTRIS-PPP, ENVRIplus, NextGEOSS, InGOS, EUSAAR, ACCENT, EARLINET-ASOS, MACC2, GEOMON, EUCAARI, SCOUTO3, MEGAPOLI and also ESFRI initiatives e.g. ICOS and SIOS, and ESA-CCIs.

Contact person:

Senior scientist Cathrine Lund Myhre

e-mail: clm@nilu.no / Cathrine.Lund.Myhre@nilu.no

Telephone: +47 - 63898000

Other participating institutions

Partner 2

CNR – CONSIGLIO NAZIONALE DELLE RICERCHE

Street: P. le Aldo Moro n.7

Town: Roma

Postcode: 00185

Country: Italy

Webpages: www.cnr.it & www.imaa.cnr.it

The National Research Council of Italy is the main public research performing organization in Italy, reporting directly to the Ministry of the Education, University and Research. The activities will be specifically performed at the CNR Institute of Methodologies for Environmental Analysis (CNR-IMAA). CNR-IMAA is the main developer of the aerosol lidar processing chain, manages the EARLINET database and participates, amongst others in the following projects: ACTRIS-2, ACTRIS-PPP, ENVRIplus, EUNADICS-AV.

Contact person:

Researcher: Lucia Mona

e-mail: lucia.mona@imaa.cnr.it

Telephone: +39- 0971427271

Partner 3

CNRS - CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

Street: 3 rue Michel-Ange

Town: PARIS

Postcode: 75794

Country: France

Webpage: http://www.cnrs.fr/

The Centre National de Recherche Scientifique (CNRS) has more than 34.000 staff (researchers, engineers, technicians and administrative staff) and a 2010 budget of 3.204 billion euros. CNRS conducts research in all scientific, technological and societal fields. CNRS participates in numerous EU and ESA projects: ACTRIS, GEOMON, MACC, CAMS, Aerosol-cci, C3S-aerosol; and is involved in several Environmental ESFRI RIs such as EPOS, EURO-Argo, IAGOS, ICOS, EUROGOOS, JERICO.

Contact person:

Senior scientist Nicole Papineau

e-mail: nicole.papineau@ipsl.fr

Telephone: +33(0) 1 44 27 74 20

Partner 4

Finnish Meteorological Institute (Ilmatieteen Laitos in Finnish)

Street: Erik Palménin aukio 1

Town: Helsinki

Postcode: FI-00560

Country: Finland

Webpages: http://en.ilmatieteenlaitos.fi

The Finnish Meteorological Institute (FMI) is a research and service agency under the Ministry of Transport and Communications, with about 670 employees. To ensure public safety related to atmospheric and airborne hazards and to satisfy requirements meteorological products, FMI utilises numerical weather prediction, satellite, and ground-based observation networks. FMI has been involved in numerous international projects and RIs such as ACTRIS, ENVRIplus, ICOS, IAGOS, GAW, EUSAAR, JERICO-next.

Contact person:

Senior Scientist Antti-Pekka Hyvärinen

e-mail: Antti.Hyvarinen@fmi.fi

Partner 5

MetNo – Norwegian Meteorological Institute

Street: Henrik Mohns Plass 1

Town: Oslo

Postcode: 0313

Country: Norway

Webpage: http://www.met.no

Met.No is responsible for the public weather service in Norway and R&D is supported directly by the government, research council, EU, ESA, EUMETSAT and others. Met.No is representing Norway in many international conventions (EMEP-UNECE modelling centre, WMO, ECMWF, EUMETSAT) and hosts the AeroCom model intercomparison database, and has been in numerous EU and ESA projects: ACTRIS, GEOMON, Aerosol-cci, Prodex, CRESCENDO, ESTICC, C3S-aerosol, CAMS84, 50, 71, ECLIPSE.

Contact person:

Senior scientist Michael Schulz

e-mail: Michael.schulz@met.no

Telephone: +47 – 98471672

Partner 6

BSC – Barcelona Supercomputing Center

Street: Jordin Girona 29

Town: Barcelona

Postcode: 08034

Country: Spain

Webpage: http://www.bsc.es

BSC is the national supercomputing centre in Spain and member of the European PRACE Research Infrastructure. During last 5 years, the BSC Earth Sciences Department has participated in 14 EU projects including ACTRIS, 5 EU Copernicus projects, ESA projects and 1 ERC Consolidator Grant, amongst others. BSC-ES hosts two World Meteorological Organisation (WMO) regional centres specialized in sand and dust warning and forecasting, and participates in the Climate Services Partnership.

Contact person:

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B. Excellence and Expertise (max 1 page)

2. Relevant scientific, technical and management excellence of the candidate consortium

The data centre concept document available through the call[1] (later referred to as "*DC concept description*") gives specific technical details, and describes the operational support and services required from the ACTRIS Data Centre (DC). The task of the ACTRIS DC is to compile, archive and provide access to fully documented and traceable ACTRIS measurement data and data products, including digital tools for visualisation, data analysis and research. ACTRIS measurement data are generated from a wide variety of methodologies (+110 variables from more than 45 instruments or combination of instruments) covering: ground-based in situ and remote sensing; online and offline sampling; observational- (long term stationary facilities) and exploratory platforms (transportable or mobile systems adopting ACTRIS methodologies); and atmospheric simulation chambers. Simulation chambers are high volume reactors developed to support detailed studies of atmospheric processes governing air quality, climate and their environmental and health impacts. Temporal resolution of the measurements ranges from seconds to weeks. This range of applied methodologies and specific needs requires a **highly advanced, well-organised and structured Data Centre**. Hence, the consortium comprises specialised DC units: aerosol, cloud and trace gas in situ data; aerosol and trace gas remote sensing; cloud remote sensing; atmospheric simulation chamber data; each with the relevant in-depth competence and expertise. The consortium has demonstrated that it has long-term experience and excellence in all parts of scientific data management characterised by the research data lifecycle and the five phases as described in the ENVRI reference model[2]: Data Acquisition, Data Curation, Data Publishing, Data Processing and Data Use.

Data Acquisition: Efficient data acquisition for such a wide range of methodologies requires expertise across their measurement methods and data transfer, hence the need for specialised DC units that can continually review, improve and update functionality in collaboration with the corresponding topical centre (TC). The consortium has demonstrated the capacity to operate globally distributed real-time data acquisition[3].

Data Curation: ACTRIS data curation follows the FAIR principles: accompanied with comprehensive metadata, consistently documented provenance establishing traceability, data storage in archive-grade repositories using openly documented metadata and data formats, and data identification facilitating data quotation and data use accounting. ACTRIS DC units have developed common concepts for metadata, data levels and workflows establishing traceability, provenance documentation, and data identification, in collaboration with partner networks (EMEP, GAW, AERONET, EARLINET, Cloudnet, NDACC) at a global level.

Data Publishing: ACTRIS DC commits to the FAIR data principles, with data as open as possible for all users, discoverable by structured and semantic search, and including facilities for access and visualisation. External services and RIs will be able to search and access ACTRIS data via standardised (meta)data machine-to-machine interfaces. Through previous projects, the consortium has a track record of providing scheduled real-time data to operational users (e.g. ECMWF), has selected ACTRIS data searchable in the WMO Information System and GEOSS, and the consortium is involved in defining domain standards for data citation.

Data Processing: ACTRIS DC provides tools and services for all levels of data processing, from level 0, to level 3 in which observational data are combined with output from numerical models or with observations from other external repositories such as AERONET, NDACC, GAW-world data centres. To support data processing, ACTRIS DC offers statistical analysis and data mining services, and virtual research environments (VRE) for performing experiments, modelling, simulation and visualisation.

Data Use: ACTRIS DC consortium has extensive experience with monitoring the use of data[4], which will be further developed to understand user activities and requirements. Existing access-restricted data will be available to authorised users, with authentication services harmonised across the atmospheric RI domain.

[1] http://www.actris.eu/Portals/46/Documentation/ACTRIS%20PPP/call%20for%20CF%20hosts%20materials/DC_2018-05-24.pdf?ver=2018-06-11-125446-227 from http://www.actris.eu/Projects/ACTRISPPP(2017-2019)/CallforCFhosts.aspx

[2] https://wiki.envri.eu/display/EC/Model+Overview

[3] http://actris.nilu.no/content/nrt-data

[4] For details, see "Second summary of the monitoring of access to ACTRIS data and user statistics": https://www.actris.eu/Portals/46/Documentation/actris2/Deliverables/public/WP10_D10.8_M32.pdf?ver=2018-05-09-110028-160

3. RI expertise *(max ½ page)*

The experience with scientific data management and ACTRIS data is comprehensive. By 31 December 2017[5] the existing ACTRIS data centre (partners: NILU, CNR, CNRS, FMI) in the ACTRIS-2 project was handling data from 90+ sites, and providing data in real-real-time (RRT) or near-real-time (NRT) for 30+ sites. (The definition is RRT < 3 h and NRT < 3 days, in accordance Copernicus.) The existing system for monitoring ACTRIS data use highlights that, during 2015-2017, there were 1341 unique data base access IDs (each accessing numerous times) from 54 countries, with a total 38 125 full measurement years of data downloaded in this period[4]. EUROCHAMP consortium is now joining ACTRIS and has more than 10 years' experience in managing the data from simulation chamber experiments. Within EUROCHAMP-2020 and previous projects, more than 1000 experiments and 300 spectra provided by 20 partners have been made available to the scientific community through the EUROCHAMP Data Centre, which, since being created in 2005, has had more than 370,000 visits by guests (i.e. without registration) and more than 138,000 visits by registered users from 43 countries. The consortium also has experience with machine-to-machine solutions to interface with remote external databases such as AERONET and NDAAC.

Extensive ACTRIS data management experience has demonstrated the need for scientifically based operation; close links between instrument PI/data originators at the sites, the topic centres as listed in the call, and the DC. This will continue to be crucial for implementing efficient data and metadata curation, QA/QC functionality. Centralized processing of aerosol, trace gas and cloud remote sensing data products in ACTRIS follows the methodologies developed by the corresponding scientific communities. In ACTRIS-2, the consortium implemented synergetic level-3 processing combining photometer and lidar measurements to derive advanced aerosol products, developed other advanced in-situ and remote observational datasets and climatological products, and created a collocation service to produce satellite observations and derived products coincident with ground-based measurements[6]. Thus, the consortium is implementing a number of consolidated services that no single partner would have been able to provide alone.

[5] For details, see "*Second summary of the ACTRIS data offered by the ACTRIS Data Centre*" https://www.actris.eu/Portals/46/Documentation/actris2/Deliverables/public/WP10_D10.7_M32.pdf?ver=2018-04-11-114316-443

[6] https://www.actris.eu/Portals/46/Documentation/actris2/Deliverables/public/WP10_D10.10_M30.pdf?ver=2018-02-22-141415-603

4. Consortium as a whole *(max ½ page)*

The established consortium has demonstrated strong and successful collaboration over many years and proven its ability to serve a large community of both data providers and users. It consists of partners having the responsible and leading DC roles in ACTRIS-FP7 and ACTRIS-2 since the start in 2011, EUROCHAMP-2020, and in all pre-projects EUSAAR, EARLINET, EARLINET-ASOS, Cloudnet. The ACTRIS DC consortium is strengthened with new partners from joint research activities in ACTRIS-2 and will consist of 6 complementary units served through a single web interface entry point. 1) ***ACTRIS data and services access unit*** responsible for access to measurement data, services, tools and documentation, with scientific data management and support to observational and exploratory NFs. Then the DC is comprising 5 specialised data base units: 2) ***ACTRIS In situ data centre unit*** for aerosol, cloud and trace gas in situ data, 3) ***ACTRIS Aerosol remote sensing data centre unit,*** 4) ***ACTRIS Cloud remote sensing data centre unit***, 5) ***ACTRIS Trace gases remote sensing data centre unit***, 6) ***ACTRIS Atmospheric simulation chamber data centre unit***.

The consortium comprises 5 partner institutions, aiming to engage ca 19 full time equivalent (FTE) positions by the start of the operational phase (in 2025), covering the technical expertise necessary to assure transversal excellence across the different activities. The ACTRIS user community is large, and data used for a wide range of applications and purposes; ACTRIS is not a thematic-oriented research infrastructure. The proposed set of complementary units will facilitate and ensure broad competence in interaction with the scientific community, integrating user feedback, harmonising strategy, implementing new demand-led functionality while reducing the risk, ensuring contingency and facilitating consistency in data access, documentation and quality.

The consortium already owns and operates pre-existing infrastructure required for initiating implementation of the proposed data centre facility. In addition, the consortium has experience through their central and responsible roles in data management in other related projects and networks such as WMO-GAW (aerosol and trace gas in situ, GAW-WDCA, GAW-WDCRG, and lidar through GALION), AERONET, EMEP, EARLINET, Cloudnet, NDACC-France; thereby linking ACTRIS to global initiatives, impact and capacity building on other continents.

C. Internal organization and management of the Central Facility

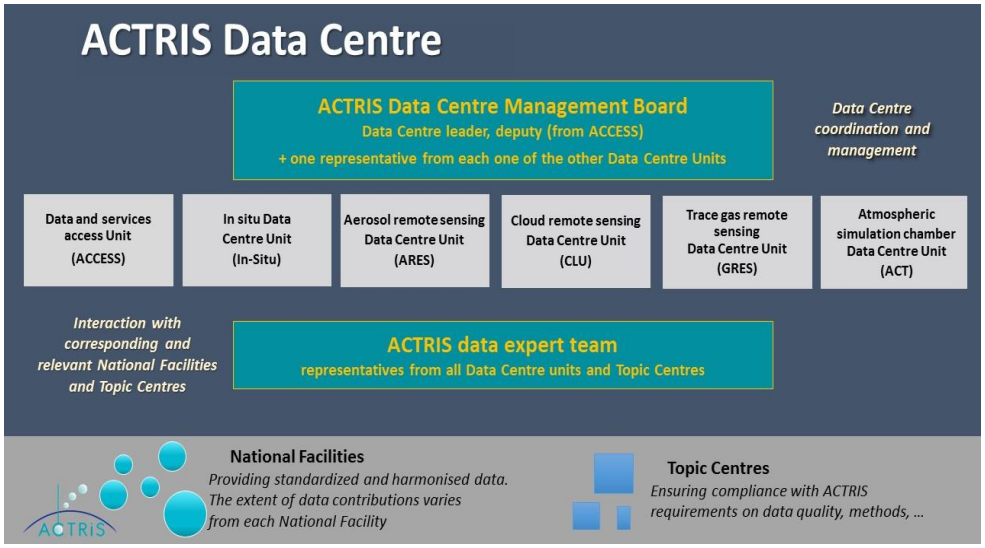
5. Composition of the proposed Central Facility

Name of Central Facility Unit	Hosting institution	Location (City, country)	Main activities	Estimated size in 2025 (in FTE)
ACTRIS data and services access unit (ACCESS)	**NILU (lead)** CNRS MetNo, BSC	Kjeller, Norway Paris, France Oslo, Norway Barcelona, Spain	ACTRIS web interface for data, services and tools, called "*The ACTRIS Data Centre*". Main activities are **Discovery and access** to ACTRIS data and data products, digital tools provided by the topic centres and the data centre units, documentation, software and tools for data production. **Visualisation** of ACTRIS data products. **Data production** of selected Level 3 data and synergy data products. The data centre will offer **bridge to external data bases and sources**.	1.4 (NILU) 4.2 (CNRS) 0.6 (MetNo) 0.6 (BSC)
ACTRIS In situ data centre unit (In-Situ)	**NILU**	Kjeller, Norway	Data curation service for In situ data: all aerosol, cloud and trace gas in situ data. This comprises inclusion of data in the data base EBAS, archiving and documentation. Support for centralized data processing, harmonization, traceability, quality control and product generation. Training and online tools for QA, QC. The activity enables RRT and NRT delivery.	3.7 (NILU)
ACTRIS Aerosol remote sensing data centre unit (ARES)	**CNR (Lead)** CNRS	Potenza, Italy Paris, France	Aerosol remote sensing data processing and curation. This includes centralized processing, traceability, harmonization and data versioning, quality control, data provision and archiving, and documentation. The activity enables RRT and NRT delivery. Tutorial activities. Production of level 3 data for climatological analysis and new products	4 (CNR) 0.9 (CNRS)
ACTRIS Cloud remote sensing data centre unit (CLU)	**FMI**	Helsinki, Finland	Data curation service for cloud remote sensing data. Support for centralized cloud remote sensing data processing, harmonization, automated quality control and product generation. Enables RRT and NRT delivery. Production of level 3 data for NWP model evaluation	2.4 (FMI)
ACTRIS Atmospheric simulation chamber data centre unit (ASC)	**CNRS**	Paris, France	Atmospheric simulation chamber data services curation, provision, standardized process for data submission	0.7 (CNRS)

ACTRIS trace gases remote sensing data centre unit (GRES)	**CNRS**	Paris, France	Data curation service for reactive trace gases remote sensing data. This comprises standardized process for data submission, quality control, inclusion of data in the data base, search metadata creation and provision and archiving. Production of level 3 data for climatological analysis, and added values products (quicklooks, links to EVDC - ESA Atmospheric Validation Data Centre).	0.65 (CNRS)

6. Internal coordination and management of the Central Facility (*max ½ page*)

Describe the coordination and management structure of the CF consortium and explain the required human resources foreseen for the coordination and management of the CF consortium. Please refer to the ACTRIS PPP deliverable D1.1 ACTRIS governance and management structure: https://www.actris.eu/Portals/46/Documentation/ACTRIS%20PPP/Deliverables/Public/ACTRIS%20Governance%20and%20management%20structure%20D1.1.pdf?ver=2017-06-02-101527-313. All Central Facilities (except for ACTRIS Head Office) are expected to have a governance structure consisting of a Central Facility Director and the Heads of the Central Facility Units involved. The Central Facility Director and the Heads of Units should form the Management Board of the Central Facility.



The ACTRIS DC will be organized in 6 Units as listed in section 5, with clear links and procedures for interaction between the DC Units, NFs and topical centres (TCs). There will be a well-defined decision-making process, with representatives from all units, using the structure proposed in the diagram. The ACTRIS DC will be coordinated by the ACCESS unit leader, and the Director will be Lund Myhre (NILU). The data centre will be managed by a DC Management Board, consisting of the DC Director, Director deputy, and leaders from each one of the other Units. The director and deputy should have complementary expertise. These procedures might change if an ERIC is established; as ERIC can employ the personnel. There will be clear and cost-efficient task sharing between the Units and a commonly defined risk management strategy. ACTRIS DC representatives will participate in ACTRIS decision making by sending representative(s) to the ACTRIS legal entity bodies, such as the RI committee and will comply with section 8 in the "ACTRIS PPP" deliverable "*D1.1 ACTRIS governance and management structure*" and the appendix of the same document. In addition to the DC Management Board, there will be established an "*ACTRIS data expert team*" with representatives from the topical centre (responsible for calibration, quality assurance of instruments, etc.) and each DC unit, together with representatives from NF and SAMU. This will ensure the necessary interaction on common topics and issues (standards, interoperability, QA/QC criteria proper documentation, user feedback) across the RI.

D. Description and implementation schedule of ACTRIS operation support and ACTRIS services offered

In this section, the candidates are asked to describe how and when the Central Facility will be implemented, and to indicate and quantify i) the operation support to ACTRIS National Facilities (ACTRIS glossary: *https://www.actris.eu/About/ACTRIS/ACTRISglossary.aspx*) and ii) the services to users that the Central Facility would offer. These include activities for assuring the quality of measurements and data, provision of long-term archiving and access to data, activities improving measurement methodologies and data life cycle, services for managing ACTRIS, training of ACTRIS operators and users, and transfer of knowledge.

7. Implementation plan (*max ½ page*)

Describe briefly the plan and schedule for implementing the Central Facility.

Many aspects of the activities described in the "*ACTRIS DC concept description"* are already being performed by the applicant consortium. In order to fulfil all needs expressed in the concept description, the consortium will build on pre-existing resources. For the implementation plan, this means that activities related to most services will commence immediately after the selection (using the current set-up), then the consortium will move to achieve full compliance with the criteria and requirements detailed in the concept description by the end of the implementation period (2024). The data centre will be ready to handle and provide access to ACTRIS data in accordance with the development in the TC and the implementation of the labelling process of ACTRIS data from the NFs. Accordingly, the data centre can only be fully operational after the label process of the NFs is performed, and ACTRIS labelled data are ready. Specific services, together with their implementation schedule, are reported in tables 8 and 9, followed in Section E by the necessary resources. The long list of services ACTRIS DC will put in place replies to all the mandatory services identified in the "ACTRIS DC concept description". Furthermore, additional services will be implemented in response to specific NF and user requests (in pale grey if additional funds are required).

All services that are ready now, are stated as "First service ready: Year 1" in the application. It is extremely important that these services continue to maintain and keep the data flow to the DC from the NFs. Accordingly, ACTRIS DC is in effect operational from the start, and explains why most of the services to NF and users will be available from year 1.

The ACTRIS DC will operate long-term (at least 10 years) and offer data curation for all ACTRIS variables obtained by NFs following the methodologies developed at TCs, providing virtual access to ACTRIS data, data processing, services and tools, offering legally binding license systems to regulate the conditions of use and facilitate open data access. To guarantee traceability, ACTRIS DC will implement FAIR principles (FORCE11), employ standardized Climate and Forecast Metadata (CF) nomenclature and implement standardised metadata exchange protocols to be used across RIs and frameworks (e.g. WIGOS, GEOSS, EOSC). Interaction with other RIs, particularly in the atmospheric domain, will be realised through the potential ENVRIfair project and other projects in the future.

All ACTRIS DC units will implement a secure and robust ICT infrastructure and an information security policy; in particular, all actions for guaranteeing the required level of protection in data archiving and provision. All units will implement regular and frequent back up schedule, off-line geographically independent backup, and design a disaster recovery plan.

8. Operation support activities for running of the research infrastructure

Add rows to the table as needed.

Activity #	Description of activity	Estimated quantity of the activity provided / year[7]	Proposed Implementation schedule [8]	CF Unit offering the operation support
Response to section 3 in the DC concept description Data archive service for ACTRIS aerosol, cloud, and trace gas data				
O1	Data archive service of ACTRIS aerosol level 2 & 3 data, incl. off-site backup, documenting provenance, link to QA / QC data.	400 annual data sets[9]	Start: Year 1 First service ready: Year 1 In accordance with section 3.1 by end year 5	In-situ, ARES, CLU, ASC (NILU, CNRS, CNR, FMI)
O2	Procedure and organising archiving of ACTRIS level 0 & 1 data, incl. documenting provenance, link to QA / QC data.	800 annual data sets	Start: Year 1 First service ready: Year 1 In accordance with section 3.1 by Year 5	In-situ, ARES, CLU, ASC (NILU, CNRS, CNR, FMI)
O3	Production of ACTRIS RRT & NRT data products.	200 annual data sets	Start: Year 1 First service ready: Year 1 In accordance with section 3.1 by Year 5	In-situ, ARES, CLU, ASC (NILU, CNRS, CNR, FMI)
Data curation service and tools for ACTRIS in situ aerosol, cloud, and trace gas data – service to NF (response to section 3.1.1 in in the DC concept description)				
O4	Data submission, curation, and review service of online ACTRIS aerosol in situ data.	230 annual data sets	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.1 (3.1.1.1) by Year 5	In-situ (NILU)
O5	Data submission, curation, and review service of online ACTRIS trace gas in situ data	40 annual data sets	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.1 (3.1.1.1) by Year 5	In-situ (NILU)
O6	Data submission & curation service of online ACTRIS cloud in situ data	60 annual data sets	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.1 (3.1.1.1) by Year 5	In-situ (NILU)

[7] The estimated quantity refers to the operational phase. Some of the support will be based request to SAMU, and offered after approval and capacity available, potentially connected with additional fee if it is connected to extra cost. Estimated quantity of the activity will not be provided.

[8] Some of the implementation is depending on external additional support. These are marked in grey, same for Table 9

[9] 1 Data set: One observational platform and one variable per year of measurement data with time resolution as defined in ACTRIS data management plan, at least 75% data coverage to fulfil 1 year. Exploratory platforms: one experiment in one chamber = 1 data set

Activity #	Description of activity	Estimated quantity of the activity provided / year[7]	Proposed Implementation schedule [8]	CF Unit offering the operation support
O7	Data submission & curation service of offline ACTRIS aerosol in situ data	25 annual data sets	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.1 (3.1.1.2) by Year 5	In-situ (NILU)
O8	Data submission & curation service of offline ACTRIS trace in situ data	40 annual data sets	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.1 (3.1.1.2) by Year 5	In-situ (NILU)
O9	Provision of data production and QC tools for ACTRIS in situ data, administration of data production workflow ensuring homogeneous data products.	Uptime: Min 90% of the year	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.1 (3.1.1.3, 3.1.1.4) by Year 5	In-situ (NILU)
O10	Data curation, QC, and archive services offered to NFs collocated sites for data reporting to EMEP GAW-WDCA, GAW-WDCRG.	At least for 100 annual data sets	Start: Year 1 First service ready: Year 1 In accordance with sections 3.1.1 & 4.8.2 by Year 5	In-situ (NILU)
Data curation service and tools of ACTRIS aerosol remote sensing data - service to NFs (response to section 3.1.2 in in the DC concept description)				
O11	Data curation service for ACTRIS aerosol remote sensing profile data (Level 0, Level 1, Level2 data)	70 annual datasets	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.2 by Year 5	ARES (CNR)
O12	Data curation service for ACTRIS aerosol remote sensing profile climatological data and new products (Level 3)	70 annual datasets	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.2 by Year 5	ARES (CNR)
O13	Online portal for the standardised data submission of NF data to the aerosol profile data centre unit	Uptime: Min 90% of the year	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.2 by Year 5	ARES (CNR)
O14	Automatic check of metadata formats during data submission	Uptime: Min 90% of the year	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.2 by Year 5	ARES (CNR)
O15	Automatic standardised sanity and consistency checks of data upon data submission	Uptime: Min 90% of the year	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.2 by Year 5	ARES (CNR)

Activity #	Description of activity	Estimated quantity of the activity provided / year[7]	Proposed Implementation schedule [8]	CF Unit offering the operation support
O16	Implementation of data quality control tools and procedures	1 complete procedure on all datasets following the time schedule defined by TC	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.2 by Year 3	ARES (CNR)
O17	Implementation of new quality assurance/control criteria defined by TCs	Max 1 update of complete procedure per year	Start: Year 3 First service ready: Year 3 In accordance with section 3.1.2 by Year 5	ARES (CNR)
O18	Feedback mechanisms to report data quality issues to Data originator	Continues services running in compliance with QC	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.2 by Year 5	ARES (CNR)
O19	Processing suite for the processing of lidar data for the retrieval of ACTRIS lidar aerosol products	1 complete processing chain on all datasets following the methodologies defined by TC	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.2 by Year 5	ARES (CNR)
O20	Processing suite for the processing of combined lidar and photometer data for the retrieval of ACTRIS aerosol products	1 complete processing chain on all datasets following the methodologies defined by TC	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.2 by Year 5	ARES (CNRS, CNR)
O21	Implementation of new products in the processing suite for aerosol lidar data in agreement with TCs	Max 1 update of complete procedure per year	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.2 by Year 5	ARES (CNR)
O22	Implementation of new products in the processing suite for the combined aerosol lidar and photometer data in agreement with TCs	Max 1 update of complete procedure per year	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.2 by Year 5	ARES (CNRS, CNR)
Data curation service and tools of ACTRIS cloud remote sensing data - service to NFs (response to section 3.1.3 in in the DC concept description)				
O23	Data curation service for ACTRIS cloud profile data (Level 0, Level 1, Level 2 data)	15 annual datasets	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.3 by Year 5	CLU (FMI)
O24	Data curation service for NWP model evaluation (level 3 data)	15 annual datasets	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.3 by Year 5	CLU (FMI)

Activity #	Description of activity	Estimated quantity of the activity provided / year[7]	Proposed Implementation schedule [8]	CF Unit offering the operation support
O25	Online portal for standardised submission of data by the NF operators to the cloud profile data centre unit	*Uptime:* *Min 90% of the year*	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.3 by Year 5	CLU (FMI)
O26	Standardised sanity and consistency checks of data on submission	*Uptime:* *Min 90% of the year*	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.3 by Year 5	CLU (FMI)
O27	Implementation of data quality control tools and procedures	In accordance with the QA procedures in TC	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.3 by Year 5	CLU (FMI)
O28	Implementation of new quality assurance/control criteria defined by TCs	In accordance with the QA procedures in TC	Start: Year 3 First service ready: Year 3 In accordance with section 3.1.3 by Year 5	CLU (FMI)
O29	Feedback mechanisms to report data quality issues to Data originator	Continuous service in accordance with the QA procedures in TC	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.3 by Year 5	CLU (FMI)
O30	Processing suite for the retrieval of all ACTRIS cloud profile products	Yearly review with updates included as requested by TC	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.3 by Year 5	CLU (FMI)
O31	Implementation of new products in the processing suite for cloud profile data in agreement with TCs	In accordance with update procedures in TC	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.3 by Year 5	CLU (FMI)
O32	Data curation service for climatological products and NWP model evaluation (level 3 data)	15 annual datasets	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.3 by Year 5	CLU (FMI)
Data curation service and tools of ACTRIS trace gas remote sensing data (response to section 3.1.4 in in the DC concept description)				
	~~CNRS is ready to organise the tasks related to the data curation of trace gas remote sensing data. This unit will be set up for trace gas remote sensing data services curation, processing and provision (0.65 FTP in operational phase).The activity is postponed to later and not a part of this application, in accordance with the DC concept description.~~			~~(CNRS)~~
O33	Data curation service for the FTIR data	Maximum 276 data files per year	Start: Year 1 First service ready: Year 1 by Year 3	GRES (CNRS)

Activity #	Description of activity	Estimated quantity of the activity provided / year[7]	Proposed Implementation schedule [8]	CF Unit offering the operation support
O34	Data curation service for the UV-VIS (MAXDOAS, SAOZ, PANDORA) data	20 045 data files per year	Start: Year 1 First service ready: Year 1 by Year 3	GRES (CNRS)
O35	Data curation service for the Lidar O3 data	Maximum 450 data files per year	Start: Year 1 First service ready: Year 1 by Year 5	GRES (CNRS)
O36	Online portal for standardised data submission of NF data to the data centre	Uptime: Min 90% of the year	Start: Year 1 First service ready: Year 1 by Year 5	GRES (CNRS)
O37	Automatic standardised sanity and consistency checks of data upon data submission	Uptime: Min 90% of the year	Start: Year 1 First service ready: Year 1 by Year 3	GRES (CNRS)
O38	Search metadata creation, inclusion in the datacentre and provision	Uptime: Min 90% of the year	Start: Year 1 First service ready: Year 1 by Year 3	GRES (CNRS)
O39	Implementation, production and provision of new level 3 data and added values products like quicklooks, visualisation tools,	In accordance with update procedures in TC	Start: Year 1 First service ready: Year 1 by Year 5	GRES (CNRS)
Data curation service and tools of ACTRIS atmospheric simulation chamber data (response to section 3.1.5 in in the DC concept description)				
O40	Data submission & curation service for the Database of Atmospheric Simulation Chamber Studies (DASCS)	150 data sets per year	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.5 by Year 5	ASC (CNRS)
O41	Data submission & curation service for the Library of Analytical Resources (LAR)	50 data sets per year	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.5 by Year 5	ASC (CNRS)
O42	Data submission & curation service for the Database of Advanced Data Products (LADP)	50 data sets per year	Start: Year1 First service ready: Year 1 In accordance with section 3.1.5 by Year 5	ASC (CNRS)
O43	Online portal for standardised data submission of NF data to the atmospheric simulation chamber data centre unit (DASCS, LAR, LDAP)	250 data sets per year	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.5 by Year 5	ASC (CNRS)
O44	Automatic standardised sanity and consistency checks of data upon data submission	250 data sets per year	Start: Year 1 First service ready: Year 1 In accordance with section 3.1.5 by Year 5	ASC (CNRS)

Activity #	Description of activity	Estimated quantity of the activity provided / year[7]	Proposed Implementation schedule [8]	CF Unit offering the operation support
O45	Tailored access to the GEISA spectroscopy database (line transition parameters, absorption cross sections). 52 molecules and isotopologues.	Updates every second year	Start: Year 3 First service ready: Year 4 In accordance with section 3.1.5 by Year 5	ACCESS (CNRS)
Campaign service for ACTRIS data as service to NF (response to the sections 3.1.1.5, 3.1.2.4, and 3.1.3.4 in in the DC concept description)				
O46	Provision of digital tools and data services during observation campaigns	On request, after approval in SAMU	Start: Year 1 First service ready: Year 2 In accordance with section 3.1 by Year 5	All units, all partners
O47	Data curation and archive of campaign data	On request, after approval in SAMU	Start: Year 1 First service ready: Year 2 In accordance with section 3.1 by Year 5	All units, all partners
ACTRIS Data provenance, attribution, and traceability as service to NFs (response to section 3.3 in the DC concept description)				
O48	Archive for documentation of QA measure results throughout ACTRIS, setup of infrastructure, and standards of operation, including identification of documents	In accordance with the QA procedures in TC	Start: Year 1 First service ready: Year 1 In accordance with section 3.3 by end year 5	All units, all partners
O49	PID identification of all objects in ACTRIS workflows executions, incl. data (pre-) products, software, humans, organisations, instruments, including versioning, DOIs for level 2 data products.	In accordance with the QA procedures in TC	Start: Year 1 First service ready: Year 2 In accordance with section 3.3 by end year 5	All units, all partners
O50	Document provenance throughout all ACTRIS workflows by use of standardised provenance scheme, facilitating attribution of entities involved in workflow execution	In accordance with the QA procedures in TC	Start: Year 1 First service ready: Year 3 In accordance with section 3.3 by end year 5	All units, all partners

Operation support for knowledge transfer and training as service to NF (response to section 3.4 in in the DC concept description)				
O51	Training events for data submitters to all data centre units	5 events (estimated 25 participants per event)	Start: Year 1 First service ready: Year 2 In accordance with section 3.4 by Year 4	All units, all partners
O52	Documentation, procedures, tutorials and tools, guidance and helpdesk available to NFs	Uptime: Min 90% of the year. Helpdesk: limited to max 6 intensive periods	Start: Year 1 First service ready: Year 2 In accordance with section 3.4 by Year 5	All units, all partners

9. Services offered to users of ACTRIS

Add rows to the table as needed.

Service #	Description of service	Estimated quantity of the service provided / year[7]	Proposed implementation schedule[8]	CF Unit offering the service
Access to ACTRIS Data, Services and digital tools response to section 4.2 in in the DC concept description				
S1	"*The ACTRIs Data Centre*" with interface for access to ACTRIS data, data products, and digital tools through a single point of entry, the ACTRIS data user interface.	Uptime for ACTRIS DC: Min 90% of the year, but expected more than 97% of the time	Start: Year 1 First service ready: Year 1 In accordance with section 4.2 by Year 5	ACCESS (NILU)
S2	Access to ACTRIS level 0	On request	Start: Year 1 First service ready: Year 1 In accordance with section 4.2.1 by Year 5	All units
S3	Access to ACTRIS level 1	Through "*The ACTRIS Data Centre*": No limitation or on request depending on variable. After approval by SAMU for tailored products.	Start: Year 1 First service ready: Year 1 In accordance with section 4.2.2 by Year 5	All units
S4	Access to ACTRIS level 2	Through "*The ACTRIs Data Centre*", No limitation.	Start: Year 1 First service ready: Year 1 In accordance with section 4.2.3 by Year 5	ACCESS in coop-eration with all units
S5	Access to ACTRIS level 3	Through the "*The ACTRIs Data Centre*": No limitation for regular level 3 data. On request, after approval in SAMU for tailored products	Start: Year 1 First service ready: Year 1 In accordance with section 4.2.4 by Year 5	All units, all partners
S6	Access to ACTRIS level 2 legacy data archived in the ACTRIS data repositories, will be accessible via the ACTRIS web entry point.	Through "*The ACTRIs Data Centre*". No limitation.	Start: Year 1 First service ready: Year 1 In accordance with section 4.2.5 by Year 5	NILU, CNR, CNRS, FMI
S7	Access to Software, digital tools and user support for processing of ACTRIS data tailored for analysis and research	Through "*The ACTRIs Data Centre*".	Start: Year 1 First service ready: Year 12 In accordance with section 4.2.6 by Year 5	All units, all partners

Service #	Description of service	Estimated quantity of the service provided / year[7]	Proposed implementation schedule[8]	CF Unit offering the service
Production of level 3 data solely based on ACTRIS observational platforms – response to section 4.3 in the DC concept description Entries in grey are not mandatory and can rely on external additional funding support				
S8	Aerosol surface in situ data – combination of variables and instruments. Production and distribution of surface in situ level 3 products.	Yearly updated data sets	Start: Year 1 First service ready: Year 1 In accordance with section 4.3.1 by Year 5	In-situ (NILU)
S9	Production and curation of level-3 products derived from synergetic inversion of coincident lidar and photometer observations at ACTRIS stations	70 data annual sets per year	Start: Year 1 First service ready: Year 1 In accordance with section 4.3.2 & 3.1.2 by Year 5	ARES (CNRS, CNR)
S10	Production and distribution of multi-parameter yearly ReOBS harmonized data sets aggregating level-1 and level-2 ACTRIS variables	1 file per NF per year for all variables	Start: Year 1 First service ready: Year 1 In accordance with section 4.3.3 by Year 5	ARES (CNRS)
S11	Climatology products for ACTRIS variables @National Facilities across Europe	Yearly update and release	Start: 1 First service estimated: Year 2 In accordance with section 4.3.4 by Year 5	In-situ, ARES, CLU, ACCESS (NILU, CNR, FMI, MetNo)
S12	Source apportionment of submicron organic aerosols in Europe	Yearly update and release	First service estimated: Year 12 In accordance with section 4.3.5 by Year 5	In-Situ, and external collaboration (NILU)
S13	Volatile Organic Compounds (VOC) source attribution in Europe	Yearly update and release	First service estimated: Year 12 In accordance with section 4.3.6 by Year 5	In-Situ, and external collaboration (NILU)
S14	Cloud occurrence @ cloud in situ National Facilities	For all sites providing cloud in situ data	First service estimated: Year 12 In accordance with section 4.3.7 by Year 5	In-Situ (NILU)

Service #	Description of service	Estimated quantity of the service provided / year[7]	Proposed implementation schedule[8]	CF Unit offering the service
Production of ACTRIS level 3 data and tools through multi-source data integration services, employing external ground based measurement data – response to section 4.4 in the DC concept description Entries in grey are not mandatory and can rely on external additional funding support				
S15	Bridge to external ground-based observational data relevant for ACTRIS	300 data sets per year	Start: Year 1 First service ready: Year 1 In accordance with section 4.4.1 by Year 5	ACCESS, In-situ, (CNRS, NILU)
S16	Collocation service of data from regional and global networks. Benchmark data products adding complementary data from GAW and EMEP together with ACTRIS data	yearly updates	Start: Year 1 First service ready: Year 1 In accordance with section 4.4.2 by Year 5	In-Situ (NILU)
S17	Production and distribution of AERONET data based on photometer observations	300 data sets per year	Start: Year 1 First service ready: Year 2 In accordance with section 4.4.3 by Year 5	ARES (CNRS)
S18	PM retrieval @GAW sites globally	Yearly update and release	First service estimated: Year 12 In accordance with section 4.4.4 by Year 5	In-Situ (NILU) external collaboration
S19	Production, curation and distribution of level-3 products derived from combined analysis of ground based aerosol lidar profiles and satellite data	Yearly updated data sets	Start: Year 1 First service ready: Year 2	ARES (CNR)
S20	Satellite data – combined with ground based ACTRIS data. On-demand distribution of satellite data collocated with ACTRIS ground-based observations	200 orders per year	Start: Year 1 First service ready: Year 1 In accordance with section 4.4.5 by year 5	ACCESS, In-situ, (CNRS, NILU)
Production of ACTRIS level 3 data products involving regional and global model data – response to section 4.5 in the DC concept description All entries in grey are relying on external additional funding support				
S21	Aerosol and Gas trend assessment	Yearly update and release	Start: Year 1 First service ready: Year 2 In accordance with section 4.5.1 by Year 5	ACCESS (MetNo)

Service #	Description of service	Estimated quantity of the service provided / year[7]	Proposed implementation schedule[8]	CF Unit offering the service
S22	Data Interpretation and Outlier Identification Tool	One release of full version	Start: Year 1 First service ready: Year 3 In accordance with section 4.5.2 by Year 5	ACCESS (MetNo)
S23	Optimal interpolation and Gap filling tool	One release of full version	First service estimated: Year 1 In accordance with section 4.5.3 by Year 5	ACCESS, In-Situ (NILU, MetNo) and external collaboration
S24	Model Evaluation Service	One release of full version	Start: Year 1 First service ready: Year 2 In accordance with section 4.5.4 by Year 5	ACCESS, ARES, CLU (NILU, CNR, FMI, MetNo, BSC)
S25	Transport modelling products for assessment of source regions at the NFs	Bi-annual update and release	First service estimated: Year 12 In accordance with section 4.5.5 by Year 5	ACCESS (NILU) and external collaboration and external collab-oration
S26	Alert Service for National Facilities	One release of full version	First service estimated: Year 12 In accordance with section 4.3.5 by Year 5	ACCESS, In-Situ (NILU, BSC) and external collaboration and external collab-oration
Production of level 3 data solely based on ACTRIS exploratory platforms – response section 4.6				
S27	Provision of level-3 data products based on simulation chamber experiments	Through the ACTRIS Data Centre. No limitation.	Start: Year 1 First service ready: Year 1 In accordance with section 4.6 by Year 5	ASC (CNRS)
Service to campaigns – response section 4.7				
S28	Digital tools and products for campaign support	On request, after approval in SAMU for tailored products	Start: Year 1 First service ready: Year 2 In accordance with section 4.7.1 by Year 3	All units, all partners

Service #	Description of service	Estimated quantity of the service provided / year[7]	Proposed implementation schedule[8]	CF Unit offering the service
S29	Campaign dashboard	On request, after approval in SAMU for tailored products	Start: Year 1 First service ready: Year 2 In accordance with section 4.7.1 by Year 3	All units, all partners
S30	Data curation and archive of campaign data	On request, after approval in SAMU for tailored products	Start: Year 1 First service ready: Year 3 In accordance with section 4.7.1 by Year 5	All units, all partners
User community support and services – response section 4.8				
S31	ACTRIS Data provenance, attribution, and traceability	No limitation	Start: Year 1 First service ready: Year 2 In accordance with section 4.8.1 by Year 5	All units
S32	Access to of the Single Calculus Chain (SCC) tool for aerosol lidar data processing	Online,	Start: Year 1 First service ready: Year 2 In accordance with section 4.8.2 by Year 5	ARES (CNR)
S33	Support to regional and global networks and related initiatives. ACTRIS will support international frameworks in the field of air quality and climate change, e.g. GAW including GALION, EMEP, and GCOS, and further utilize and add value to satellite based atmospheric observation	Not applicable	Start: Year 1 First service ready: Year 2 In accordance with section 4.8.2 by Year 5	All units, all partners
S34	Interoperability and link to other RIs and initiatives	Regular assessment to comply with recent recommendations in the community	Start: Year 1 First service ready: Year 1 In accordance with section 4.8.3 by Year 5	All units, all partners
S35	On-demand distribution of not-ACTRIS aerosol lidar data products processed through ACTRIS SCC	On request, after approval in SAMU for tailored products	Start: Year 1 First service ready: Year 1 In accordance with section 4.2.6 & 4.8.2 by Year 5	ARES (CNR)
S36	Knowledge transfer and training on the use of data products and tools	On request, after approval in SAMU for tailored products	Start: Year 1 First service ready: Year 2: In accordance with section 4.8.4 by Year 5	All units, all partners

E. Resources to be committed during the implementation phase (2020-2024) and early operation phase (2025-2030)

10. Foreseen overall costs for implementation and early operation phase

Foreseen overall costs for the implementation phase (2020-2024) and foreseen annual costs for the early operation phase (2025-2030) (in Euros). *Please, provide the costs for each CF Unit separately in separate tables.*

ACTRIS data and services access unit - *NILU*						
Year / Cost category	2020	2021	2022	2023	2024	2025-2030 (annual average)
Personnel*	533 431	553 345	610 243	610 243	490 128	214 773
Equipment**	2 400	2 400	2 400	2 400	2 400	3 840
Operations***	321 091	332 760	366 102	365 102	294 715	135 857
Total costs	856 922	888 505	978 745	977 745	787 243	354 470

ACTRIS data and services access unit - *CNRS*						
Year / Cost category	2020	2021	2022	2023	2024	2025-2030 (annual average)
Personnel*	379 650	420 150	412 650	376 650	376 650	376 650
Equipment**	340 000	68 000	68 000	68 000	68 000	168 000
Operations***	153 003	163128	161253	152 253	152 253	152 253
Total costs	872 653	651 278	641 903	596 903	596 903	696 903

ACTRIS data and services access unit - *Met.No*						
Year / Cost category	2020	2021	2022	2023	2024	2025-2030 (annual average)
Personnel*	72 500	72 500	72 500	72 500	72 500	67 500
Equipment**	20 000				20 000	20 000
Operations***	24 300	18 900	21 300	18 900	20 100	17 100
Total costs	116 800	91 400	93 800	91 400	112 600	104 600

ACTRIS data and services access unit - *BSC*						
Year / Cost category	2020	2021	2022	2023	2024	2025-2030 (annual average)
Personnel*	69 200	69 200	69 200	69 200	69 200	34 600
Equipment**	15 000			15 000		15 000
Operations***	1 000	1 000	1 000	1 000	1 000	1 000
Total costs	85 200	70 200	70 200	85 200	70 200	50 600

ACTRIS In situ data centre unit - *NILU*						
Year / Cost category	2020	2021	2022	2023	2024	2025-2030 (annual average)
Personnel*	857 395	825 652	842 811	734 436	734 436	493 399
Equipment**	9 600	2 400	2 400	2 400	2 400	6 144
Operations***	513 434	494 832	503 387	437 379	437 379	302 632
Total costs	1 380 429	1 322 884	1 348 598	1 174 215	1 174 215	802 175

ACTRIS Aerosol remote sensing data centre unit - *CNR*						
Year / Cost category	2020	2021	2022	2023	2024	2025-2030 (annual average)
Personnel*	270 620	270 620	270 620	270 620	290 420	295 370
Equipment**	500 000	500 000	500 000	50 000	50 000	104 000
Operations***	150 440	150 440	150 440	150 440	150 440	150 440
Total costs	921 060	921 060	921 060	471 060	490 860	549 810

ACTRIS Aerosol remote sensing data centre unit - *CNRS*						
Year / Cost category	2020	2021	2022	2023	2024	2025-2030 (annual average)
Personnel*	117 400	130 900	87 400	81 400	81 400	81 400
Equipment**						
Operations***	29 350	32 725	21 850	20 350	20 350	20 350
Total costs	146 750	163 625	109 250	101 750	101 750	101 750

ACTRIS Cloud remote sensing data centre unit - *FMI*						
Year / Cost category	2020	2021	2022	2023	2024	2025-2030 (annual average)
Personnel*	159 870	159 870	159 870	159 870	159 870	183 376
Equipment**						
Operations***	371 950	371 950	371 950	371 950	371 950	407 082
Total costs	531 820	531 820	531 820	531 820	531 820	590 458

ACTRIS trace gases remote sensing data centre unit - *CNRS*						
Year Cost category	2020	2021	2022	2023	2024	2025-2030 (annual average)
Personnel*	120 000	120 000	96 000	78 000	66000	66000
Equipment**						
Operations***	30 000	30 000	24 000	19 500	16 500	16 500
Total costs	150 000	150 000	120 000	97 500	82 500	82 500

ACTRIS Atmospheric simulation chamber data centre unit - *CNRS*						
Year Cost category	2020	2021	2022	2023	2024	2025-2030 (annual average)
Personnel*	135 500	90 500	90 500	63 500	63 500	63 500
Equipment**						
Operations***	33 875	22 625	22 625	15 875	15 875	15 875
Total costs	169 375	113 125	113 125	79 375	79 375	79 375

** Costs for personnel (gross salaries, social contributions, and other related staff costs).*
*** Instrument purchases, replacement and major upgrade. ACTRIS usage factor needs to be accounted for; as an example, instrument costs 100 000EUR and 50% of its usage will be for ACTRIS purposes, hence for the above table the equipment cost is 50 000 .*
**** Includes building and construction costs (e.g. space rental and building maintenance), consumables, travel of personnel, external services (bookkeeping/accounting services, IT services, legal services, etc.), utilities (e.g. water, gas, electricity), and other costs (meeting arrangements, needed office/laboratory supplies etc.)*

11. Secured financial resources to be committed for the CF

During implementation phase (2020-2024), the sum of secured funds and unsecured funds should equal the total implementation costs. Here, secured funds refer to funding which is already confirmed by contracts and / or agreed by the RPOs (Research Performing Organizations), e.g., in terms of in kind contribution (personnel).

	IMPLEMENTATION PHASE		
Unit	Total implementation phase cost* 2020-2024 (€)	Secured funds **	Unsecured funds
ACTRIS data and services access unit (NILU)	4 489 161	448 916	4 040 245
ACTRIS data and services access unit (CNRS)	3 359 640	2 845 862	513 778
ACTRIS data and services access unit (MetNo)	506 000	80 000	426 000
ACTRIS data and services access unit (BSC)	381 000	0	381 000
ACTRIS In situ data centre unit (NILU)	6 400 340	960 051	5 440 289
ACTRIS Aerosol remote sensing data centre unit (CNR)	3 725 080	2 967 610	757 470
ACTRIS Aerosol remote sensing data centre unit (CNRS)	623 125	460 200	162 925
ACTRIS Cloud remote sensing data centre unit (FMI)	2 659 100	2 350 000	309 100
ACTRIS trace gases remote sensing data centre unit (CNRS)	600 000	492 000	108 000
ACTRIS Atmospheric simulation chamber data centre unit (CNRS)	554 375	430 200	124 175
Total (sum over all units)	**23 297 821**	**11 034 839**	**12 262 982**

**Indicate here the sum of the implementation costs over years 2020-2024. The numbers should match with the numbers provided in the table of section 9.*

*** Secured funds to implement the relevant CF Unit (RPO contribution and other funds)*

During early operation phase (2025-2030), the sum of secured funds and unsecured funds should equal the total annual operation costs.

	OPERATION PHASE		
Unit	Annual operation cost* (€)	Secured funds**	Unsecured funds
ACTRIS data and services access unit (NILU)	354 469	103 751	250 718
ACTRIS data and services access unit (CNRS)	696 903	572 852	124 051
ACTRIS data and services access unit (MetNo)	104 600	30 000	74 600
ACTRIS data and services access unit (BSC)	50 600	0	50 600
ACTRIS In situ data centre unit (NILU)	802 175	234 793	567 382
ACTRIS Aerosol remote sensing data centre unit (CNR)	549 800	279 880	269 920
ACTRIS Aerosol remote sensing data centre unit (CNRS)	101 750	73 680	28 070
ACTRIS Cloud remote sensing data centre unit (FMI)	590 458	230 000	360 458
ACTRIS trace gases remote sensing data centre unit (CNRS)	82 500	67 200	15 300
ACTRIS Atmospheric simulation chamber data centre unit (CNRS)	79 375	61 200	18 175
Total (sum over all Units)	**3 401 380**	**1 642 556**	**1 758 824**

**Indicate here the annual operation cost from 2025 onwards. The numbers should match the numbers provided in the table of section 9.*

*** Secured funds to operate the relevant CF Unit (RPO contribution and other funds)*

If needed, additional information on the costs / funds can be provided briefly below (max 10 lines):

For CNR, the implementation phase started in 2016. In the table above only the implementation costs for the years 2020-2024 and the foreseen annual costs for the early operation phase (2025-2030) have been reported (accordingly to the format). The total costs of the implementation for CNR are 6 337 780 Euros (of which 2 472 880 Euros for personnel, 2 400 000 Euros for equipment, and 1 464 900 Euros for "other costs").

For NILU, CNRS, FMI, MetNo, and BSC the ACTRIS data centre work started with ACTRIS-1 in 2011, based on earlier investments also made in pre-projects. The investments prior to 2020 are not included in the cost tables.

At FMI the institutional regulations is such that any individual purchase under 10 000 Euro is considered as operational cost. Hence, all equipment is included as operational cost for the "*ACTRIS Cloud remote sensing data centre unit*"

F. Status of engagement for the Central Facility in concern

12. Statements of readiness from the organizations part of the candidate consortium for the Central Facility in concern

The statements to be provided should be listed below and attached as separate documents. The statements should give information about i) the Partner's readiness to participate and to provide the services, and ii) information about the Partner's willingness to provide the resources or, if already known, the readiness to provide the required resources during the implementation phase (2020-2024) and during the early operation phase (2025-2030). The template for the statement of readiness is provided as annex.

- Statement of coordinating partner: attached see annex I_NILU
- Statement of partner 2: attached see annex I_CNR
- Statement of partner 3: annex I_CNRS: was delayed and sent end of August, but now added to the proposal
- Statement of partner 4: attached see annex I_FMI
- Statement of partner 5: attached see annex I_MetNo
- Statement of partner 6: attached see annex I_BSC

13. Statements from countries (for example from ministries, funding agencies, Interim ACTRIS Council representatives)

Countries that are members or observers in the Interim ACTRIS Council have no obligation but have the choice to provide a statement if they see need for this. No specific template is provided for this purpose. The statements can be given on separate sheets, and just listed here as a list of attachments. CF candidate consortium partners from countries that are neither members nor observers in the Interim ACTRIS Council, and have not signed a Letter of Intent, should provide a statement from their country attached to this application. The template for the Letter of Intent is provided as annex.

- Statement of coordinating partner country:

NILU has signed the Annex I. The deputy director of the Ministry of Climate and Environment has signed the ACTRIS letter of intent. Norway has not made a decision with respect to membership in the ERIC, it will depend on the final structure of the research infrastructure.

G. Additional information

14. Please indicate any other relevant information that may help for the evaluation of the application *(max ½ page)*

Proposals directly relevant for the ACTRIS DC, currently in submission stage/under review:

- **ENVRI-FAIR:** submitted to EU H2020 call March 2018, partners: NILU, FMI, CNRS, CNR. NILU (Lund Myhre) leads the work package on implementation of the atmospheric subdomain. *Updated information: funded, project start 1 January 2019.*
- **ACTRIS-Norway** step 1 proposal submitted to Norwegian Research Council May 2018, step 2 was submitted 10 October 2018 (NILU, MetNo, Andøya Rocket Range)
- **PER-ACTRIS-IT** proposal submitted to the Italian Ministry of Research in June 2018 (CNR) within a dedicated call for ACTRIS. This proposal, if funded, will secure the upgrade needed for the full implementation of the ACTRIS ARES CNR unit.
- **ACTRIS in situ for CAMS**: project negotiations on in situ aerosol RRT and NRT data from ACTRIS to CAMS (TROPOS, PSI, CNRS, NOA, NILU)
- **ACTRIS aerosol profiles for CAMS**: project negotiations on RRT and NRT data from ACTRIS/EARLINET to CAMS (CNR).
- **EMEP for CAMS**: project negotiations on RRT and NRT data from EBAS to CAMS. EBAS is the in situ database for ACTRIS.

H. Signature of the Coordinator of the application

Cathrine Lund Myhre

Kjeller, Norway 13 November 2018

Annex I

1. NILU statement of readiness_signed.pdf
2. CNR statement of readiness_signed.pdf
3. CNRS statement of readiness_signed.pdf
4. FMI statement of readiness_signed.pdf
5. MetNo statement of readiness_signed.pdf
6. BSC statement of readiness_signed.pdf
7. ACTRIS_Letter of Intent_Ministry of Climate and Environment Norway.pdf
8. Draft of workflow for trace gas remote sensing data – *new*
9. BSC as new partner to the consortium

Appendix II

ACTRIS (www.actris.eu) is supported by the European Commission under the Horizon 2020 – Research and Innovation Framework Programme, H2020-INFRAIA-2014-2015, Grant Agreement number: 654109

Evaluation report for ACTRIS Central Facility host candidate

I. IDENTIFICATION OF THE APPLICATION

1. Information on the application

ACTRIS Central Facility:
( ) Head Office
(X) Data Centre
( ) Centre for Aerosol In Situ Measurements
( ) Centre for Cloud In Situ Measurements
( ) Centre for Reactive Trace Gases In Situ Measurements
( ) Centre for Aerosol Remote Sensing
( ) Centre for Cloud Remote Sensing
( ) Centre for Reactive Trace Gases Remote Sensing

Coordinator of the application
Name: Cathrine Lund Myhre
Institution: NILU - NORSK INSTITUTT FOR LUFTFORSKNING STIFTELSE
Country of the institution: Norway

Other participating institutions (if more than one, replicate the lines)
Contact person name: Lucia Mona
Institution: CNR – CONSIGLIO NAZIONALE DELLE RICERCHE
Country of the institution: Italy

Contact person name: Nicole Papineau
Institution: CNRS - CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE
Country of the institution: France

Contact person name: Antti-Pekka Hyvärinen
Institution: FMI - Finnish Meteorological Institute (Ilmatieteen Laitos in Finnish)
Country of the institution: Finland

Contact person name: Michael Schulz
Institution: MetNo – Norwegian Meteorological Institute
Country of the institution: Norway

Contact person name: Carlos Perez
Institution: BSC – Barcelona Supercomputing Center
Country of the institution: Spain

II. SPECIFIC ASSESSMENT FOLLOWING THREE MAIN CRITERIA

1) Scientific/ Technical/ Management excellence and experience on specific service provision (*questions 2-4*)

2) Feasibility, including capacity and maturity of operational support and service provision, implementation plan, resources and operational management (*questions 5-11*)

3) Demonstrated institutional support (*questions 12-13*).

<table>
<tr><th colspan="2">EXCELLENCE AND EXPERTISE</th></tr>
<tr><td>2. Short description of the relevant Scientific / Technical / Management excellence of the candidate consortium in the specific tasks of the CF.

Applicant is expected to show to have excellence in performing the specific tasks of the CF.

Main reference documents: CF specific descriptions and CF concept.

Has the applicant demonstrated sufficient scientific/ technical / management excellence?</td><td>Xyes ☐partially ☐no</td></tr>
<tr><td colspan="2">The candidate consortium (partners: NILU, CNR, CNRS, FMI, MetNo and BSC) demonstrated sufficient experience and scientific/technical/management excellence.</td></tr>
<tr><td>3. RI expertise

Applicant is expected to show to have experience in providing services related to the concerned CF.

Main reference documents: CF specific descriptions and CF concept.

Has the applicant demonstrated sufficient experience in providing services related to the concerned CF?</td><td>Xyes ☐partially ☐no</td></tr>
<tr><td colspan="2">The candidate consortium has the needed experience to provide the services related to the DC Central Facility and to coordinate and ensure long term archiving and access to ACTRIS measurement data.</td></tr>
</table>

4. Consortium as a whole. *Applicant is expected to highlight the relevance of the CF Units within the candidate consortium (e.g., particularity, complementarity) and experience of the CF consortium partners in joint operations.* ***Is the collaboration between multiple Units for this CF justified by gain in excellence?***	Xyes ☐partially ☐no
The consortium as a whole has a demonstrated capability to serve a large community of both data providers and users. The addition of BSC to the team nicely augments the capabilities of the other participants.	
INTERNAL ORGANIZATION AND MANAGEMENT OF THE CENTRAL FACILITY	
5. Composition of the proposed Central Facility *Applicant is expected to state the planned composition of the proposed CF to cover the offered activities.* *Main reference documents: CF specific descriptions and CF concept.* ***Is the sharing of work between the Units for this CF reasonable?***	X yes ☐partially ☐no
The sharing of the work between the Units for the ACTRIS DC is reasonable. We are satisfied with the answers given to our questions related to level 3 data product.	
6. Internal coordination and management of the Central Facility *Applicant is expected to describe the coordination and management structure of the CF consortium and the planned human resources to cover these activities. The internal governance of the CF should be consistent with ACTRIS governance and management structure (ACTRIS PPP deliverable D1.1, Section 8, available in the application material).* ***Is the candidate consortium internal coordination and leadership clearly established, and sound management proposed?***	Xyes ☐partially ☐no
We do not have specific comments on this point and we agree with the response provided by the	

Consortium. The coordination and leadership seems well established.	
DESCRIPTION AND IMPLEMENTATION SCHEDULE OF ACTRIS OPERATION SUPPORT AND ACTRIS SERVICES OFFERED	
7. Implementation plan *Applicant is asked to describe the overall plan and schedule for implementing the Central Facility to become fully operational. This question is strongly linked to the next two questions where the proposed implementation schedule for each specific operation support activity and service are requested. The general implementation schedule of ACTRIS is presented in ACTRIS Stakeholder Handbook (Section 3), available in the application material.* ***Does the candidate consortia as a whole show a realistic implementation plan that meets the timeline of ACTRIS implementation?***	X yes ☐partially ☐no
We agree with the responses provided by the Consortium on the questions raised by the reviewers on this point.	
8. Operation support activities for running of the research infrastructure *Applicant is asked to indicate and quantify the operation support activities to ACTRIS National Facilities. Please note that the nature of operation support provided by Head Office and Data Centre is different from the other Central Facilities. When evaluating the Head Office or Data Centre applications this should be kept in mind.* *Main reference documents: CF specific descriptions and CF concept.* ***Has the applicant demonstrated to cover the operation support activities at sufficient level and provide them at reasonable time schedule?***	X yes ☐partially ☐no

We understand that the level of detail we asked is beyond what is possible in the compact format of the application. For this reason we appreciate the response to our questions provided by the Consortium and we are confident that all the operation support activities will be properly covered.	
9. Services offered to users of ACTRIS *Applicant is asked to indicate and quantify the services offered to the users of ACTRIS. ACTRIS users originate from academia, public and private-non-profit research organisations, business, industry and public services, other non-profit organisations and citizen, from ACTRIS member countries as well as from countries, which are not ACTRIS members, inside and outside Europe.* *Main reference documents: CF specific descriptions and CF concept.* ***Has the applicant demonstrated to offer services to users at sufficient level and provide them at reasonable time schedule?***	X yes ☐partially ☐no
As in the point above. We accept that the limited space available prevented the Consortium to provide more (useful) details about the services offered to users. We are satisfied with the responses provided by the Consortium to our questions and we are confident that all necessary tools will be developed by the Consortium and provided/discussed with the users.	
RESOURCES TO BE COMMITTED DURING THE IMPLEMENTATION PHASE (2020-2024) AND EARLY OPERATION PHASE (2025-2030)	
10. Foreseen overall costs for implementation and early operation phase *Applicant is asked to provide the foreseen overall costs of each unit for the implementation phase (2020-2024) and the foreseen annual costs for the early operation phase (2025-2030).* ***Is the cost estimation realistic in respect to the offered quantity of services and operational support?***	X yes ☐partially ☐no

11. Secured financial resources to be committed for the CF *Applicant is expected to provide information on the current state of the secured and unsecured funds to build and operate the CF. Secured funds refer to funding which is already confirmed by contracts and / or agreed by the RPOs (Research Performing Organizations), e.g., in terms of in kind contribution (personnel).* *Note: It is not expected from the applicant to show that all of the costs are already covered. More secured funding is expected after the Central Facility hosts and ACTRIS financial model have been approved.* ***Do the proposed units of the Central Facility have already existing financial support?***	X yes ☐partially ☐no
Yes.	
STATUS OF ENGAGEMENT FOR THE CENTRAL FACILITY IN CONCERN	
12. Statements of readiness from the organizations part of the candidate consortium for the Central Facility in concern ***Do the organizations involved in the candidate consortium engage in the CF in concern (provide a statement of readiness)?***	X yes ☐partially ☐no
13. Statements from countries (for example from ministries, funding agencies, Interim ACTRIS Council	☐yes ☐no ☐not relevant

representatives) *Note: Mandatory only for applicants from countries that are neither members nor observers in the Interim ACTRIS Council, and have not signed a Letter of Intent.*[1] ***In case application includes participation from countries that are not represented in Interim ACTRIS Council, do those countries demonstrate support for ACTRIS?***	
<INSERT YOUR COMMENT>	

[1] As of June 2018, the following countries are represented in the **Interim ACTRIS Council**, Members: Austria, Belgium, Cyprus, Czech Republic, Finland, France, Greece, Italy, Netherlands, Norway, Poland, Romania, Spain, Switzerland, and United Kingdom, & Observers: Bulgaria, Denmark, and Germany.

III. OVERALL ASSESSMENT

a. Summary

Comments:

(X) Good to excellent proposal (The proposal demonstrates successfully the ability to cover the tasks and responsibilities foreseen for the Central Facility in concern with sound implementation plan, proper internal coordination and management structure, and strong institutional support).

( ) Acceptable proposal (The proposal demonstrates sufficient ability to cover most of the tasks and responsibilities foreseen for the Central Facility in concern with little deviation from requested implementation schedule and from the foreseen internal coordination and management structure and provide adequate institutional support).

( ) Unsatisfactory proposal (The proposal fails to demonstrate the ability to cover the tasks and responsibilities foreseen for the Central Facility in concern with improper implementation plan, poor internal coordination and management structure, and weak / non-existing institutional support).

b. Overall Recommendations