

Towards an integrated atmospheric observing system in Europe

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Outcomes of the EU Workshop,
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OUTLINE

- Motivation
- Workshop
- Main outcomes
- International cooperation

Motivation

There is a convincing evidence of the need to build a pan-European Integrated Observing System for geosciences covering the Atmospheric, Ocean and Terrestrial domains.

The atmospheric domain is central for climate, environment, weather, and also for environmental risks.

The overall objective of the workshop is to develop synergies between atmospheric ESFRI research infrastructures (RI), existing research infrastructures implemented as I3 and relevant Joint Programming Initiatives (JPI) in the field of Atmospheric Sciences.

A better integration of the existing programs and projects in the atmospheric field will help to build the European component of the IGOS (Integrated Global Observing System) in a coordinated and more sustainable way.

Research Infrastructures are a key component of the European Research Area (ERA):

- they bring together a wide variety of stakeholders to search for solutions to the scientific problems being faced by society today,
- they offer unique research opportunities to users from different countries and from different disciplines, attract young scientists and help to shape scientific communities,
- and they play an increasingly important role in the advancement of knowledge and the development of technology to help Europe compete in an increasingly globalized knowledge economy.

The European Strategy Forum on Research Infrastructures (ESFRI) was set up

- To support a coherent and strategy-led approach to policy making on research infrastructures in Europe; and
- To facilitate multilateral initiatives leading to a better use and development of research infrastructures.

To perform its tasks, the Forum has decided to set up Strategic Working Groups for assistance in the following domains:

- Health and Food
- Energy
- Environment and Climate Change
- Key Enabling Technologies
- Social and Cultural Innovation

Role of the SWGs

- a) Monitor the scientific developments and emerging research challenges in the domain of its competence, taking innovation into account, and addressing the issue of socio-economic impact;
- b) Contribute on:
 - the objectives of the Innovation Union and ESFRI Strategy report;
 - the dissemination and sharing of best practices;
 - promoting the use and the development of e-infrastructures;
- c) Advise ESFRI for developing and overseeing coordinated actions for:
 - catalysing the development and implementation of the remaining Preparatory Phase projects;
 - stimulating all the stakeholders, including the prospective funders, to work together on a shared and coherent strategy;
 - monitoring the specific landscape to which the new / upgraded Research Infrastructures belong;
 - developing the ties with industry.

ENV SWG Terms of reference (Annex I)

The ENV SWG has the mandate to follow up the scientific developments and initiatives in the field of the environmental science and to formulate and communicate an Environmental RIs Strategy to support the objectives of the Europe 2020 Strategy and ESFRI's Strategy report.

ENV SWG shall cover the following thematic fields:

- Integrated Global Observing System
- Adaptation to and mitigation of Climate Change
- Resource management including raw materials
- Environmental risks
- Environmental Solutions to exploit fully the potential of new technologies
- Ecosystems
- Water cycle

The ENV SWG shall develop synergies between ESFRI research infrastructures in the field of Environmental Sciences and relevant Joint Programming Initiatives (JPI).

The role of research infrastructures in the next framework programme for research and innovation – HORIZON2020 should be considered carefully.

The roadmap: one of the roles of ESFRI

48 new - or major upgrade of - Research Infrastructures of pan-European interest

(+ 3 additional projects from the CERN Council strategic roadmap for particle physics*)

Social Sc. & Hum. (5)	Life Sciences (13)		Environmental Sciences (9)		Energy (7)	Material and Analytical Facilities (6)	Physics and Astronomy (10)		e-Infra-structures (1)
SHARE	BBMRI	ELIXIR	ICOS	EURO-ARGO	ECCSEL	EUROFEL	ELI	TIARA*	PRACE
European Social Survey	ECRIN	INFRA FRONTIER	LIFEWATCH	IAGOS	Windscanner	EMFL	SPIRAL2	CTA	
CESSDA	INSTRUCT	EATRIS	EMSO	EPOS	EU-SOLARIS	European XFEL	E-ELT	SKA	
CLARIN	EU-OPENSREEN	EMBRC	SIOS	EISCAT_3D	JHR	ESRF Upgrade	KM3NeT	FAIR	
DARIAH	Euro BioImaging	ERINHA BSL4 Lab		COPAL	IFMIF	NEUTRON ESS	SLHC-PP*	ILC-HIGRADE*	
	ISBE	MIRRI			HiPER	ILL20/20 Upgrade			
	ANAEE				MYRRHA				

Distributed research infrastructures

Single sited research infrastructures

The ESFRI roadmap will be updated in 2015

The process for establishing new ESFRI RIs in the Environmental field has started

- To involve scientific community and stakeholders
- To launch calls at Member State level
- Proposals to be submitted to ESFRI (3 MS at least)
- Selection done by ESFRI

- Start from the existing RIs grouping them for specific domain

trying to identify:

- synergies in order to improve the impact and the sustainability
- gaps to be filled



- look at the whole Environmental framework

trying :

- to identify synergies (between different domains)
- to identify gaps to be filled (domains not covered)
- to establish link/interface among the different domains

ESFRI + I3, in cooperation with JPI and relevant programmes as GMES, GEO, the Artic plan etc., and stakeholders

To involve all the scientific communities

Planned actions

- Series of workshops in the different domains involving ESFRI, I3, relevant research projects, JPI, and the scientific community
 - synergies
 - gaps
 - impact (scientific and socio-economic)
 - sustainability

(Solid Earth, Atmosphere, Ecosystem, Ocean, ..)

- First draft report from the ENV SWG ready by the end of 2013

Atmosphere

The atmospheric domain is central for climate, environment, weather, and also for environmental risks.

Impacts in different thematic areas (climate change, environment, air pollution, weather, extreme events, environmental risks, air traffic, ecosystems, resource management, water cycle) and link to other domains (ocean and terrestrial).

A better integration of the existing programs and projects in the atmospheric field will help to build the European component of the IGOS (Integrated Global Observing System) in a coordinated and more sustainable way.

the workshop

The overall objective of this workshop is to develop synergies between atmospheric ESFRI research infrastructures (RI), existing research infrastructures implemented as I3 and relevant Joint Programming Initiatives (JPI) in the field of Atmospheric Sciences.

1. RI: PREPARATORY PHASE

- 1.1. ICOS
- 1.2. IAGOS
- 1.3. COPAL
- 1.4. EISCAT_3D
- 1.5 SIOS

2. RI: INTEGRATING ACTIVITY (I3)

- 2.1. ACTRIS
- 2.2. InGOS
- 2.3. EUFAAR
- 2.4. IS-ENES
- 2.5. EUROCHAMP
- 2.6 INTERACT

3. RI: DESIGN STUDIES

- 3.1 ARISE

4. RESEARCH PROJECT and COORDINATION ACTIONS

- 4.1. EUCLIPSE
- 4.2. RECONCILE
- 4.3. SHIVA
- 4.4. IMPLICC
- 4.5. ICEPURE
- 4.6 ACCENT PLUS
- 4.7 PEGASOS
- 4.8 ECLIPSE
- 4.9 MACC –II (Space project)
- 4.10 PASODOBLE (Space project)
- 4.11 NORS (Space Project)

5. JPI

- 5.1 Climate Change
- 5.2 Urban Europe

the workshop

Plenary session:

EC tools (RIs, JPIs)

Long-term consistent data at Global Scale

Presentations of selected projects

Future directions of Atmospheric research

Parallel sessions:

- Identification of possible synergies, overlap and gaps between different initiatives:
- Long-term strategy and sustainability (including databases)
- Impacts in different thematic areas (climate change, environment, air pollution, weather, extreme events, environmental risks, air traffic, ecosystems, resource management, water cycle) and link to other domains (ocean and terrestrial)

Plenary session:

Reporting the outcomes of the splinter sessions

Discussion, Conclusions and recommendations

Expected outcome:

Report from this workshop to be included in the ENV Strategy report to be submitted to ESFRI

http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=synergies



Name
 Measurements
 Vertical domain
 Horizontal domain
 Platform

IAGOS (ERI)

GLOBAL

O₃, CO, Clouds + NO_x, NO_y
 SO₂
 CO₂, CH₄
 Aerosols

5-20
 In-service
 Aircraft

Tropospheric profiles
 and UTLS

CO, CO₂, CH₄
 Surface
 (inc. Tower)

Clouds Aerosols
 Tropospheric Columns

NO_x, NO_y
 Surface

EUROPE

Surface-BL

ACTRIS (I3)

ICOS (ERI)

Other greenhouse
 gases (N₂O, SF₆) in
 the future, as in

InGOS (IA)

Ground Based
 Measurements :

~40 sites

Ground Based
 Remote sensing : 27 lidar stations

VOCs Surface

What is needed?

- World-class RIs – an integrated network of RIs
- Excellent science – quality, critical mass and interdisciplinary research
- Education and training – knowledge exchange
- Innovations – contributing to innovation environment
- Science to society – continuous dialog

Characteristics of RI

- Long-term
- Own identity
- Clear organization and governance
- Provide access to data, instruments, tools, methods, analyses, research environments and/or research services

Crucial

- Experiments and continuous observations
- Experimental platforms
- Hierarchy of stations
 - Network of supersites
- All atmospheric components
 - T, RH, Wind, Precipitation, Radiation, ...
 - Aerosols, clouds, atmospheric chemistry, greenhouse gases
 - In-situ, ground based remote sensing
 - Concentrations, fluxes, processes
 - Feedbacks with different surfaces
- Land, ocean, urban, biosphere, cryosphere, ...
 - Air quality – climate interactions

Research infrastructures we should establish (1-5 years):

- Joint Comprehensive Measurement Stations
- solid (incl. facilities, measurement procedures, equipment, funding) measurement stations
- based on comprehensive stations
 - ICOS (greenhouse gases)
 - ACTRIS (aerosols, clouds, trace gases)
 - IAGOS (airborne)
 -
 - Global / European network
- Joint Experiments
- COPAL (airborne)
- ANAEE (experimental ecology, fluxes / processes)
- EUROCHAP (atmospheric chemistry, aerosols)

Sustainability

(very) long-term vision:

to include the mature observational parts of the atmospheric RIs into operational services.

Mid-term vision:

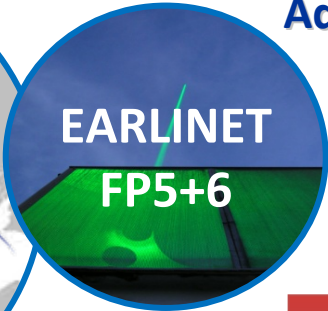
to ensure the long-term sustainability of the atmospheric RIs and key networks by including all the important atmospheric research (observing) components into a one integrated European distributed research infrastructure.

Harmonized measurements of physical, chemical and optical aerosol properties



Long-range transport

Climate Change



Advanced laser remote sensing for 4-D spatio-temporal distribution of aerosols

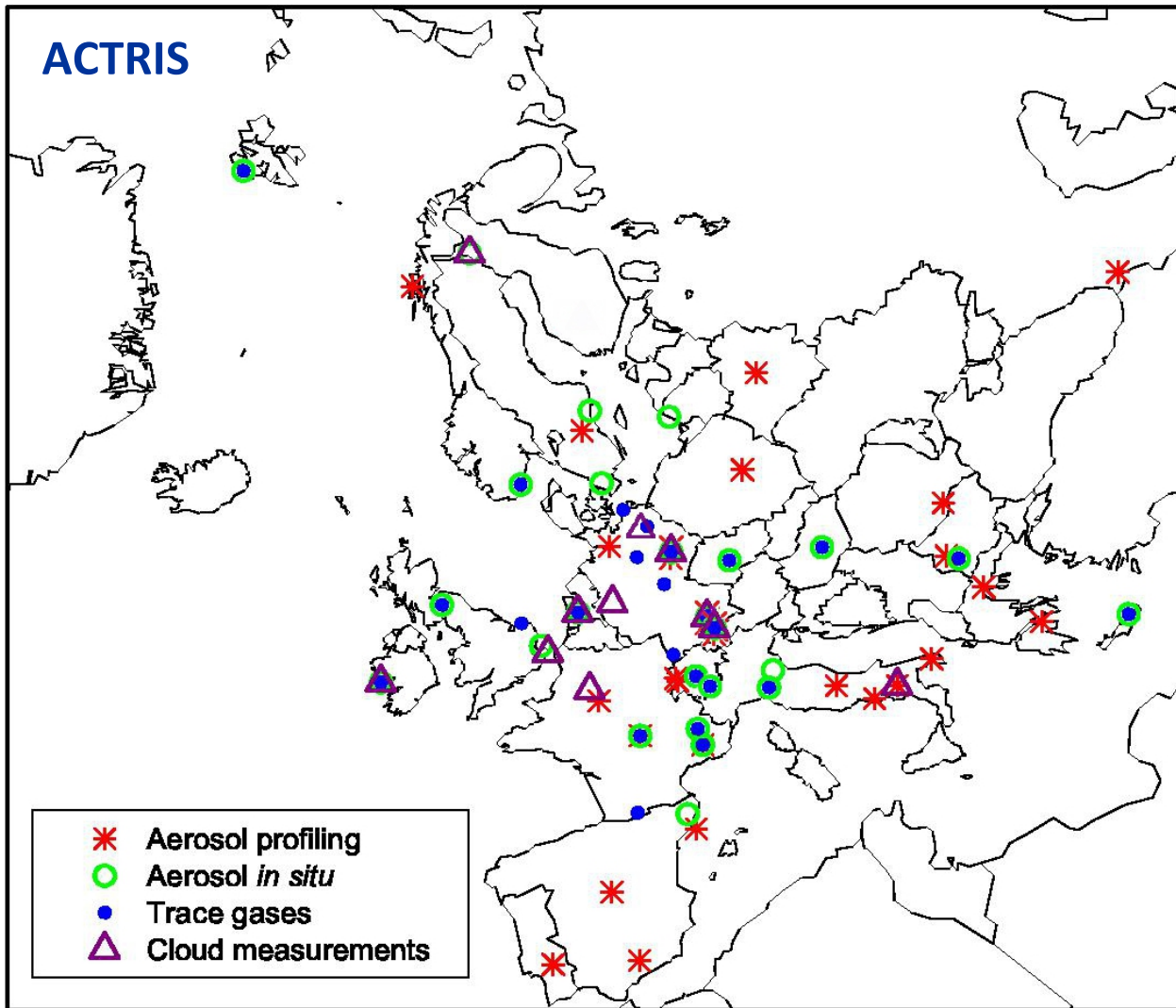
Observation of vertical profiles of important cloud parameters

Air Quality & Health

Radiative Forcing



Measurement of atmospheric precursor compounds



Co-location with GRUAN

- Cabauw
- Lindenberg
- Payerne
- Potenza
- Sodankylä



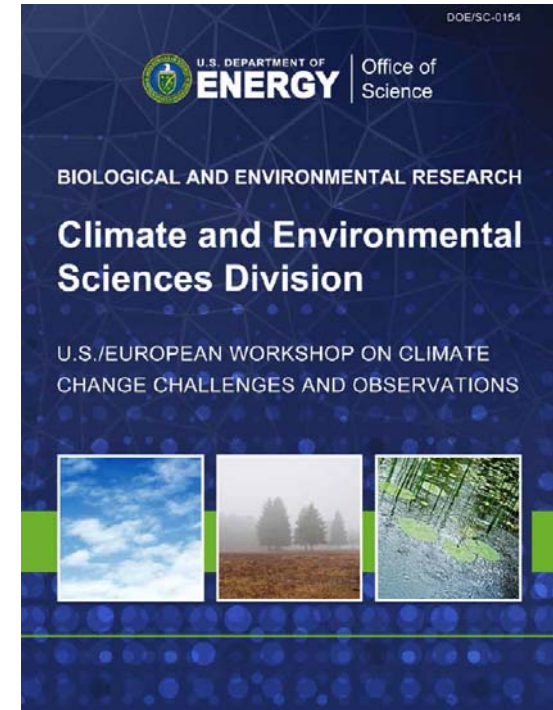
AMO	Auchencorth Moss	Penicuik, United Kingdom
CESAR	Cabauw Experimental Site for Atmospheric Research	Lopik, The Netherlands
CIAO	CNR-IMAA Atmospheric Observatory	Potenza, Italy
FKL	Finokalia	Crete, Greece
HPB	Hohenpeissenberg Meteorological Observatory	Hohenpeissenberg, Germany
JFJ	High Altitude Research Station Jungfrauoch	Switzerland
MAIDO	Observatory of Atmospheric Physics of Reunion Island - Maïdo Station	Reunion Island, France (at 20°60'S, 55°30'E)
MHD	Mace Head Atmospheric Research Station	Carna, Ireland
PAL	SIRTA Atmospheric Observatory	Palaiseau, France
SMR	Station for Measuring Forest Ecosystem-Atmosphere Relations - SMEAR II	Hyytiälä, Finland
RADO	Romanian Atmospheric research 3D Observatory	Magurele, Romania

Opportunity for field campaigns, specific observations, training

Info how to apply at www.actris.net

Work to be done

- To build the critical mass
- To link existing networks (monitoring, reference, research)
- Link to international programs (WMO, GCOS, GAW, GEO)
- International cooperation



http://science.energy.gov/~media/ber/pdf/CESD_EUworkshop_report.pdf