



In situ

Data Sparse Regions

Copernicus Working Group on In Situ Observations

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Objective and background

A wide range of in situ monitoring infrastructures, each created to serve a number of different and diverse purposes, is utilised by the Copernicus Programme in order to produce, enrich and validate its services, improving their accuracy and reliability.

Even though the situation has improved over the last years (timeliness, data availability, data coverage), **data sparsity** still a common problem that affect all Copernicus Services.

By **setting up a catalog of existing data and identify datasets and campaigns** in **data sparse areas**, that could be utilized by the Services.



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Provide access to data

In COINS SC3 the focus shall be on:

- Observations related to data sparse areas, in particular the Polar Areas, Asia and Africa. Here, the **main purpose is to create an overview of on-going and planned activities** designed to improve the observation capacity and data availability.
- Observations shall be related to the currently flying missions, and upcoming Copernicus (expansion) missions. The goal is to identify Copernicus missions' key in-situ data requirements and
- **main gaps between requirements and current observation capabilities** and explore the capabilities for closing these



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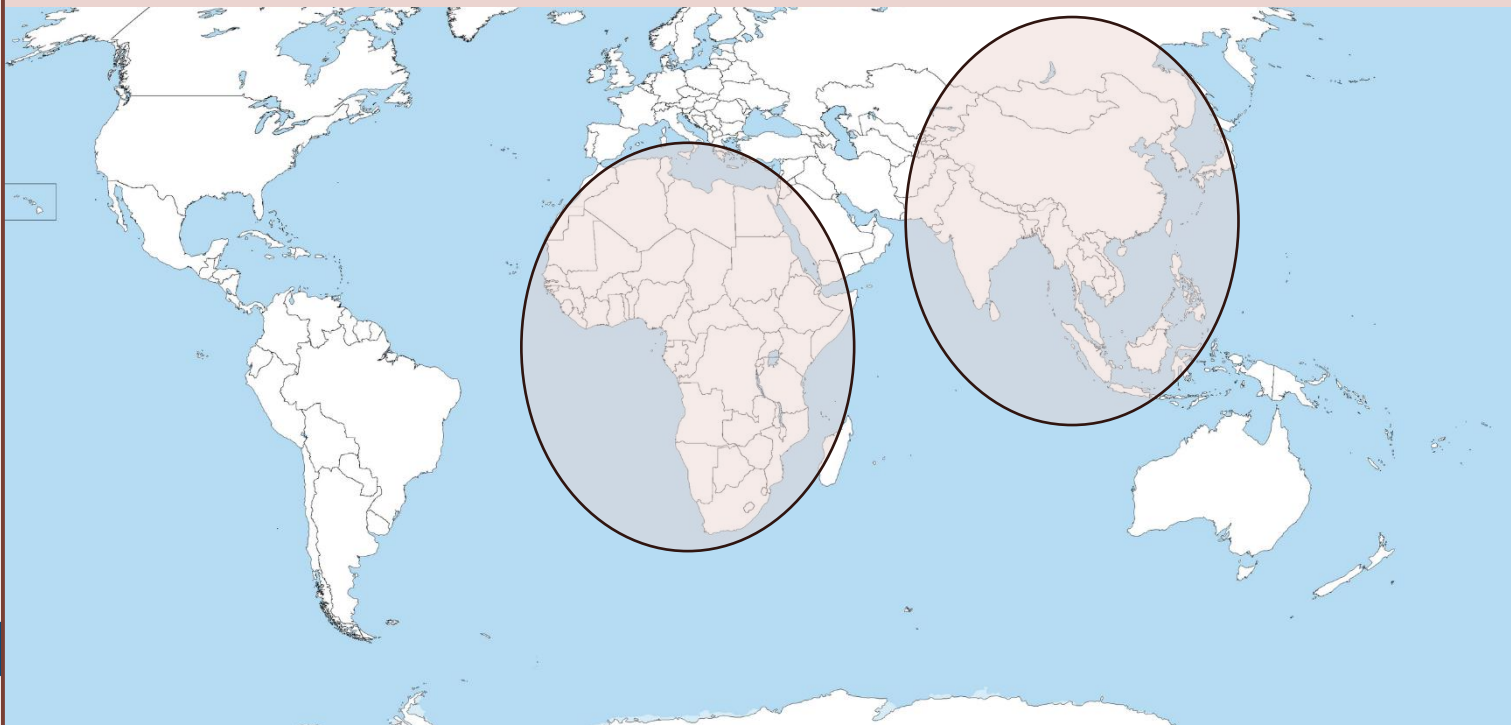


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Data Sparse Areas

High latitude - gapfilling



High latitude – gapfilling



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Provide access to data

Example of data sparse area for hydrology:

Conversation with WMO WHOS (Washington Otieno)

- Focus on Africa as data sparse area, issues include:
 - Data quality – no clear standards
 - Data may exist, but is not accessible
 - Cultural obstacles – why share data?
 - Political issues
- WMO does not host data systems, they're hosted by others
 - Produce catalogue of available data
 - Narrative on value and impacts of water
 - A paper in 2024.....?



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Data sparse areas, Hydrology of the alpine cryosphere:

- BAS-led Big Thaw project:
 - Very little data exists for snowfall in mountain glaciers
 - Terrestrial snow monitoring is poor, under-reporting being a big problem (source BAS, project meeting September 2023)
 - Snowmelt in California valued at \$90 bn
 - Big Thaw uses frozen high altitude lakes as raingauges (snow-gauges...?) by measuring surface pressure on the ice



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Example / Use Case- Africa

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KADI project

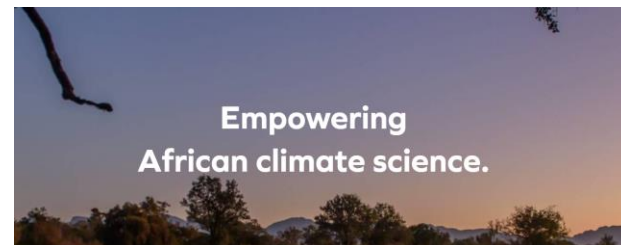
ICOS lead initiative - an African greenhouse gas observation infrastructure.

ICOS has over 170 measurement stations in the European continent and on the adjacent oceans. On the African continent, however, there is currently no stable infrastructure to standardize the operation of the existing stations, and to harmonies the data into one portal

Ongoing work in ICOS and <https://kadi-project.eu/>

South Africa, Cote d'Ivoire, Kenya + European partners

Knowledge and climate services from an African observation and Data research Infrastructure (KADI)



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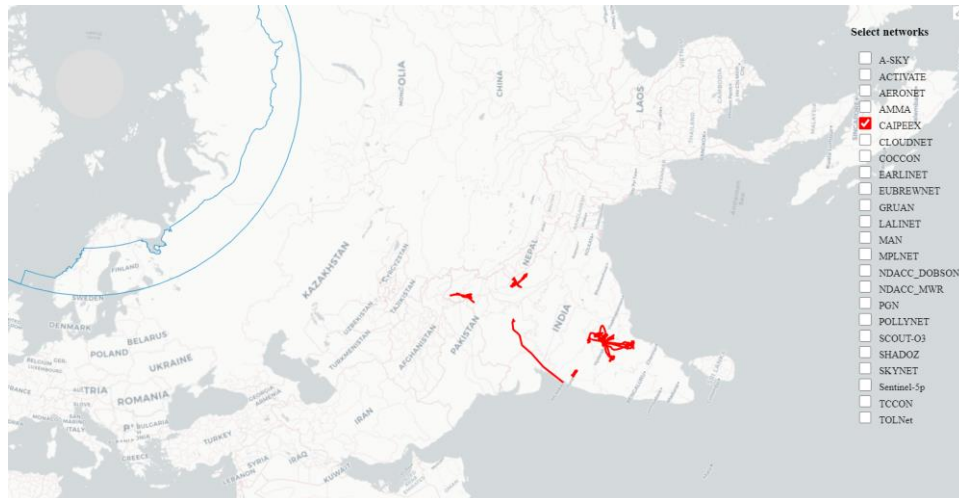
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Example / Use Case- India

Cloud Aerosol Interaction and Precipitation Enhancement Experiment

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CAIPEEX actively contacted EVDC (<https://evdc.esa.int>)
Strength of COINS – close contact with data centers and RIs.



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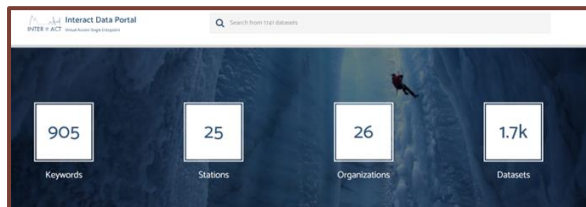
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Example / Use Case- Polar Field Campaigns

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- A huge number of field campaigns are organized via projects or organisations in Polar regions.
- Example; project INTERACT <https://eu-interact.org/project/>
- INTERACT was proposed by the existing SCANNET network of field stations situated in all eight Arctic countries.



INTERACT Virtual Access Single Entrypoint is a data portal that allows you to search and access data and information from the Arctic and beyond. The **INTERACT Data Portal** is based on metadata harvesting from several organizations and sites with end points to real data on various topics on e.g. earth sciences and ecosystems. The number of datasets presented in the portal is growing day by day, including both near real-time observation datasets and unique historical, retrospective data digitized and provided for open access. <https://youtu.be/QDsbCmxmb74>



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Utilising Field Campaign Data

Article VII of the Antarctica Treaty secures freely shared data from all expeditions to and within Antarctica, on the part of its ships or nationals, and all expeditions to Antarctica organized in or proceeding from its territory;

- The Australian Antarctic Data Centre (AADC), <https://data.aad.gov.au/about/> was established in 1996 to provide long-term management of Australia's Antarctic data, thereby improving the value and impact of our scientific activities.
- Snowpit measurements made from ice stations during the SIPEX II voyage of the Aurora Australis, 2012



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Utilising Field Campaign Data

Examples of other Antarctic campaigns that may be explored and utilized via COINS

- ESA's CryoVEx/Karen 2017-18 campaign took place in Antarctica from December 2017 to January 2018, <https://earth.esa.int/eogateway/campaigns/cryovex-karen-antarctica-2017-2018>
- Antarctic Field Campaign in Support of Satellite Data Analysis for Ice Sheet Topography, <http://www.enveo.at/news/189-antarctic-field-campaign-in-support-of-satellite-data-analysis-for-ice-sheet-topography>
- The Academy of Finland LAS3R project's field measurement campaign in Antarctica was successfully completed in February 2023, <https://www.maanmittauslaitos.fi/en/research/las3r>



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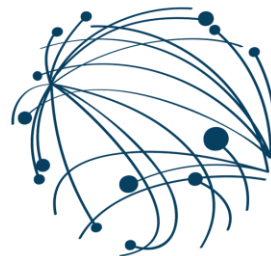


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Investigate Impact of other Initiatives

We are liaising with WMO to investigate the potential positive impact of current initiatives like **Early warnings For All** and **SOFF** on data sparse regions, especially Africa.

**Early
Warnings
for All**



SOFF

Systematic Observations
Financing Facility

Weather and climate information for the global public good



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Discussions

- Where and how can COINS contribute to explore and fill gaps in data sparse areas for the Copernicus missions and across the Services?
- Is COINS definition of sparse areas OK?
- Are there needs beyond COINS's identified sparse areas?
- Should COINS prioritize any data, or only data of high known quality and from standardized measurements? (experimental data, drones, microsensors..)



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