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OPEN ASIA
UNIFYING SCIENCE, EMPOWERING INNOVATION

OPEN SCIENCE in CLIMATE RESEARCH

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In climate research, open science promotes

transparency, accessibility, and collaboration between scientists, policy makers and public.

The most popular Open Science effort in climate:

Intergovernmental Panel on Climate Change Assessment Report

*… to provide **policymakers** with regular assessments of the **scientific basis of climate change**, its **impacts** and **future risks**, and options for **adaptation** and **mitigation.***

The most popular Open Science effort in climate:

The IPCC prepares comprehensive Assessment Reports about **knowledge** on climate change, its **causes**, potential **impacts** and **response** options.

*The IPCC also produces Special Reports, which are an assessment on a specific issue and Methodology Reports, which provide practical guidelines for the preparation of greenhouse gas inventories.

Intergovernmental Panel on Climate Change Assessment Report

IPCC

Working Group 1 *Physical Science of Climate Change*

e.g. Temperature projections, sea-level rise estimates

*Explains the **scientific certainty** around climate trends and future projections*

Working Group 2 *Impacts, Adaptation, and Vulnerabilities*

Case studies, regional climate impacts

*Includes regional breakdowns to **inform local policies** and adaptation planning*

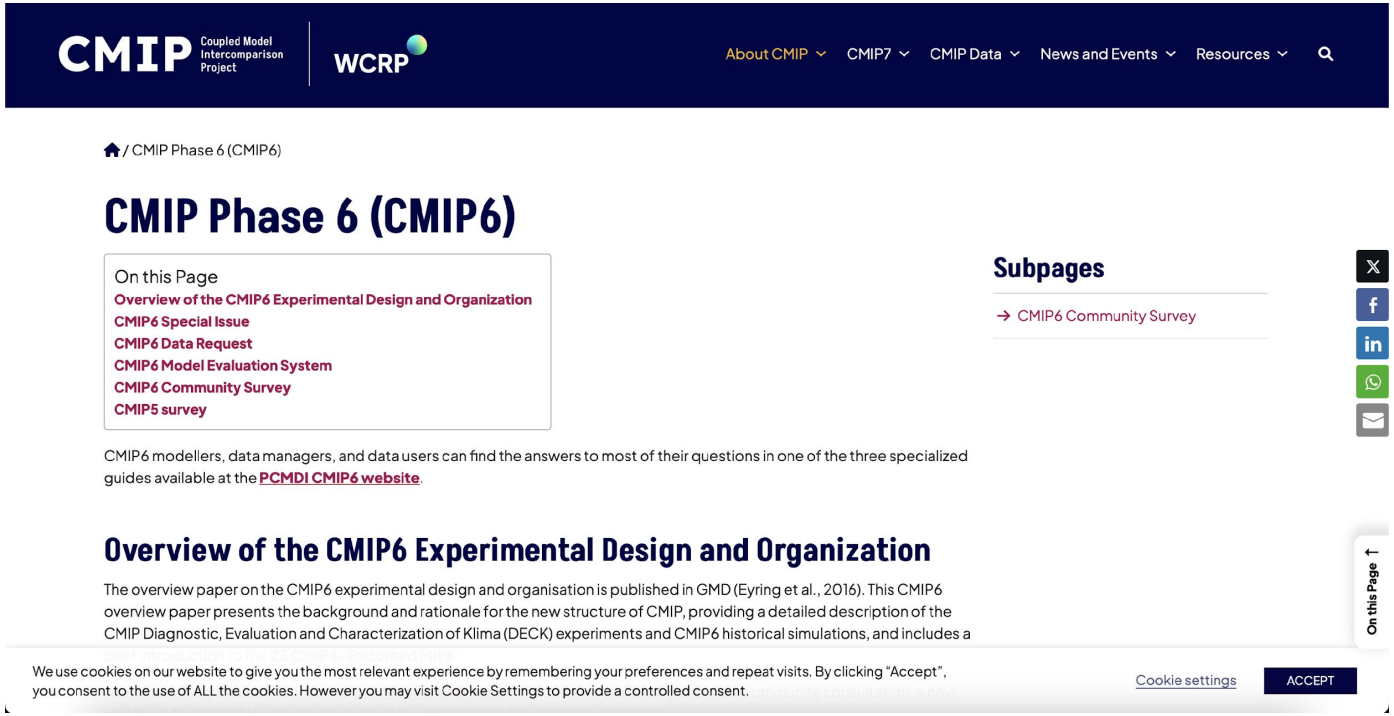
Working Group 3 *Mitigation strategies*

Emissions reduction pathways, policy recommendations

*Provides **roadmaps for decarbonization** and achieving **net-zero emissions**.*

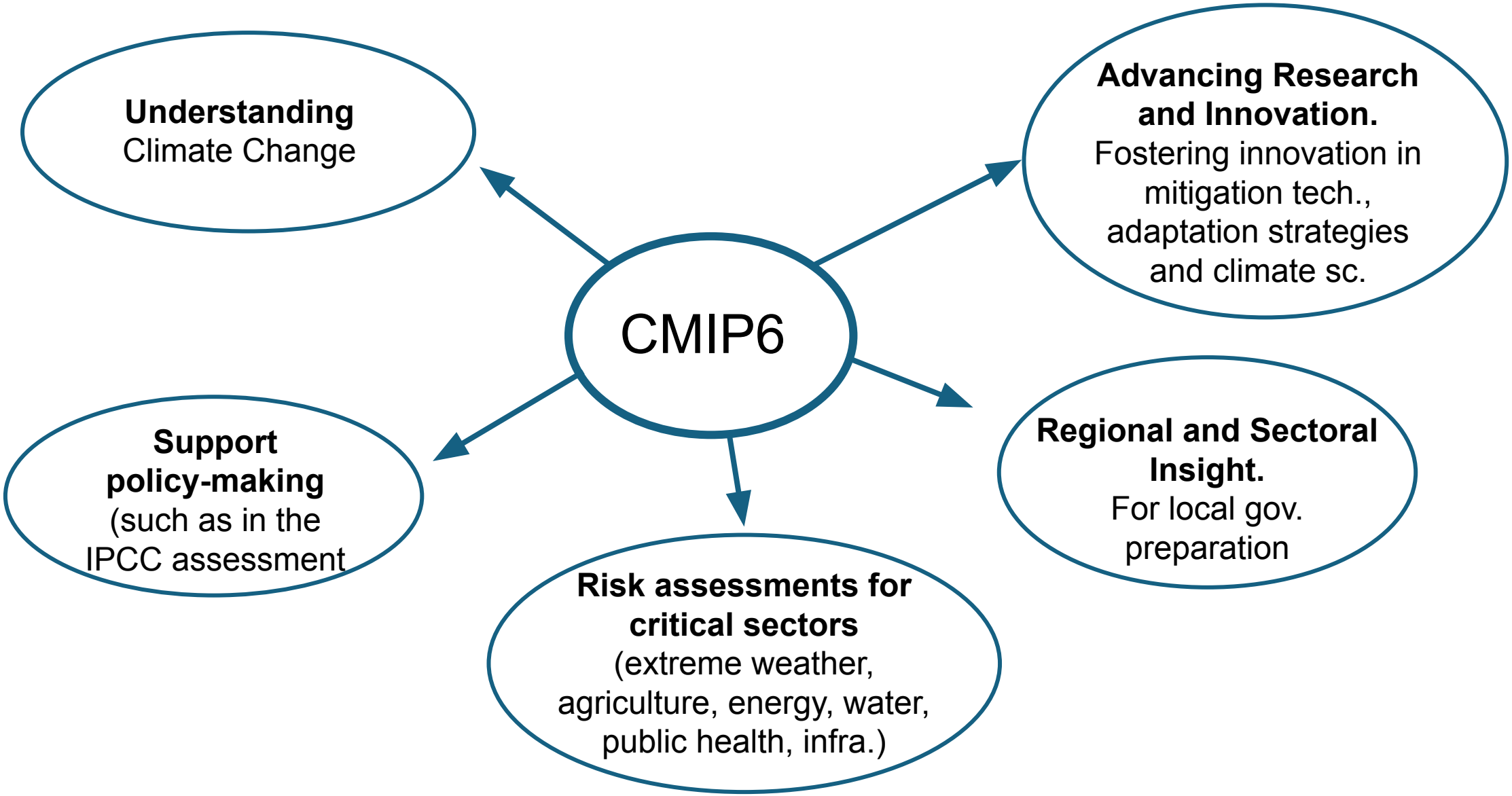
- The group of scientists will **cross-check** between findings and carry out additional fact-checking, and works on reference
- IPCC reports undergo **multiple rounds of drafting and review** to ensure they are comprehensive and objective and produced in an **open and transparent way**.
- Thousands of other experts **contribute** to the reports by acting as reviewers, ensuring the reports reflect the full range of views in the scientific community

Projection data:

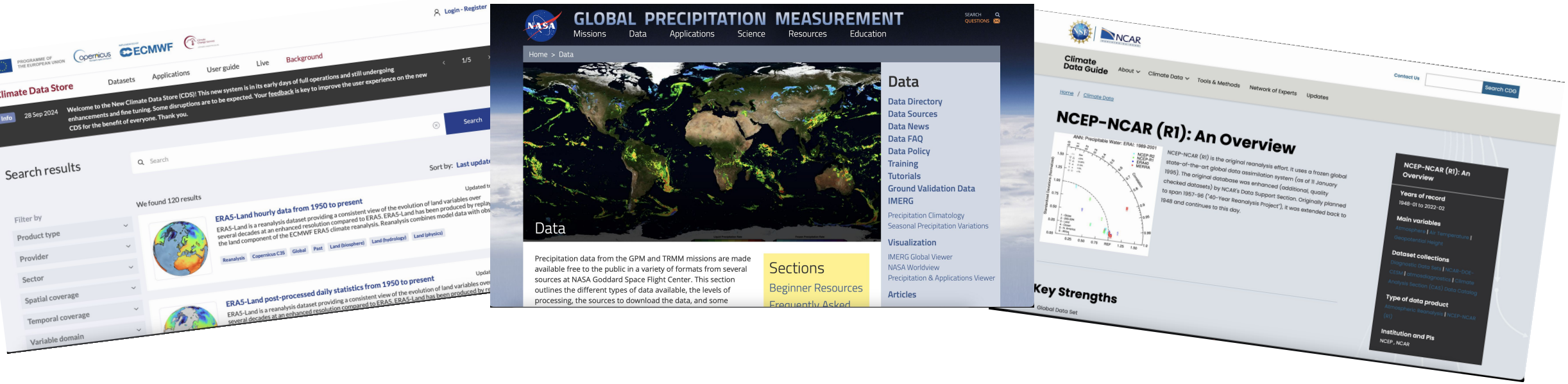


- An initiative from **World Climate Research Programme (WCRP)**.
- It involves **contributions** from many research institutions worldwide, generating standardized climate projections through the use of advanced **Earth system models** (ESMs)

- **Historical simulations**: Reproduce past climate data to validate models.
- **Future scenarios**: Simulate potential futures based on different **Shared Socioeconomic Pathways (SSPs)** (e.g., SSP1-2.6, SSP5-8.5), which consider greenhouse gas emissions and socio-economic trends.
- **Variables**: CMIP6 provides data for variables like temperature, precipitation, sea level rise, and ocean circulation.



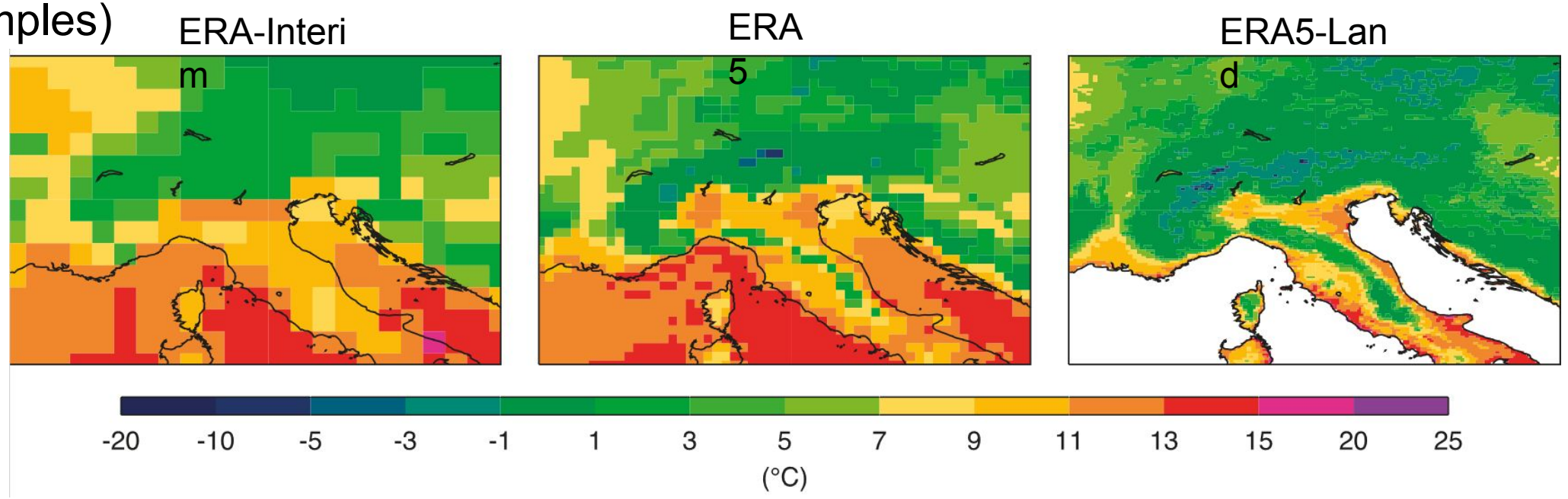
Open data I've been using:



- A combination of surface observations, satellite, etc and modelled to be a complete global data.
- The data is in slightly lower resolutions, but good enough (2.5° - NCAR, 31 km – ERA5, 0.1 ° - GPM)
- Models will calculate the values for each grid based on available data (stations, in-situ measurements and satellite radar).
- The data is useful for climate scientists and other scientists who are working with climate data

More open data available: MERRA, MERRA-2 (satellite data) and

Open data I've been using: (examples)



ERA5 (Pros)

- High spatial (30 km) and temporal (hourly) resolution
- Wide range of parameters available
- Long historical record (1950-present)
- Freely accessible (Open Access)

ERA5 (Cons)

- Limited ability to capture small-scale phenomena (thundestorms)
- Model biases, especially in regions with sparse observations
- Less accurate in remote areas (e.g., oceans, polar regions)
- Not a perfect substitute for direct observations

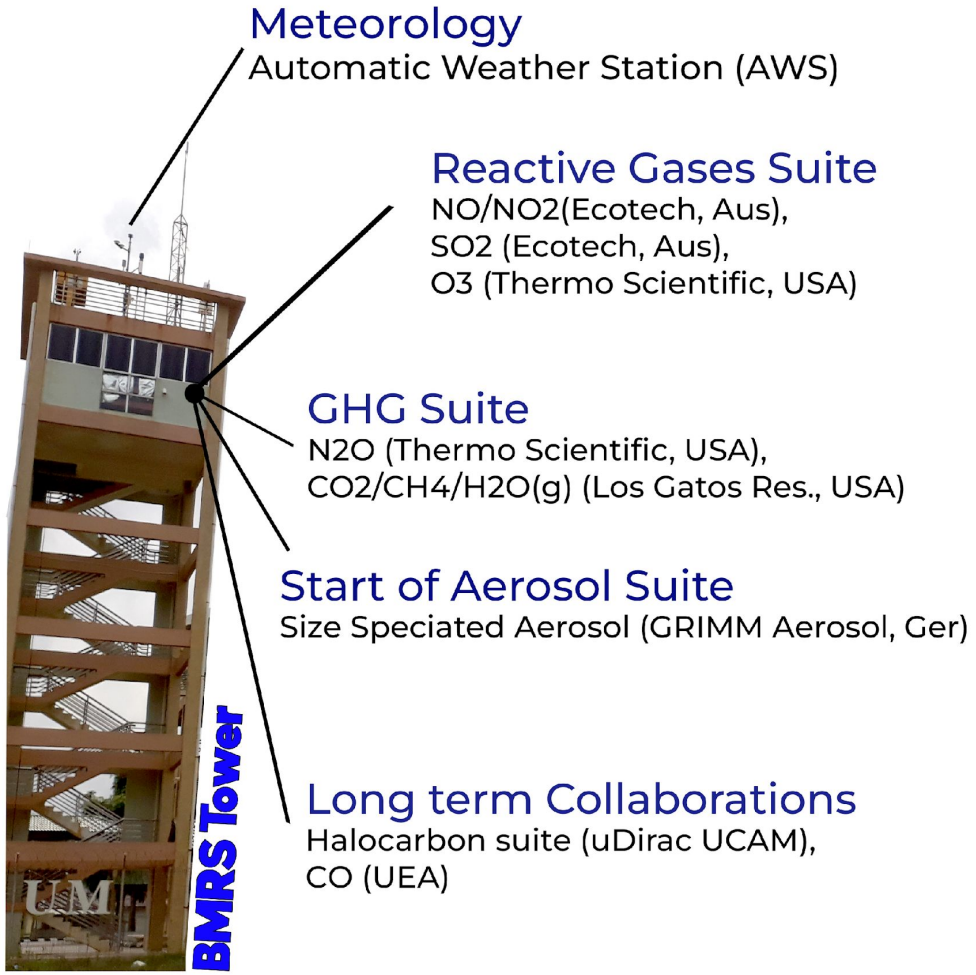
Atmospheric Monitoring Station (IOES's Bachok Marine Research Station, Bachok, Kelantan)

A collaboration between UM, University of Cambridge, University of East Anglia and Malaysian Meteorological Department (METMalaysia).

Planned to be one of the GAW contributing station with the help from METMalaysia.

GAW contributing station is under Global Atmospheric Watch, by World Meteorological Organisation WMO

Data available upon request.



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Atmospheric Monitoring Station (IOES's Bachok Marine Research Station, Bachok, Kelantan)

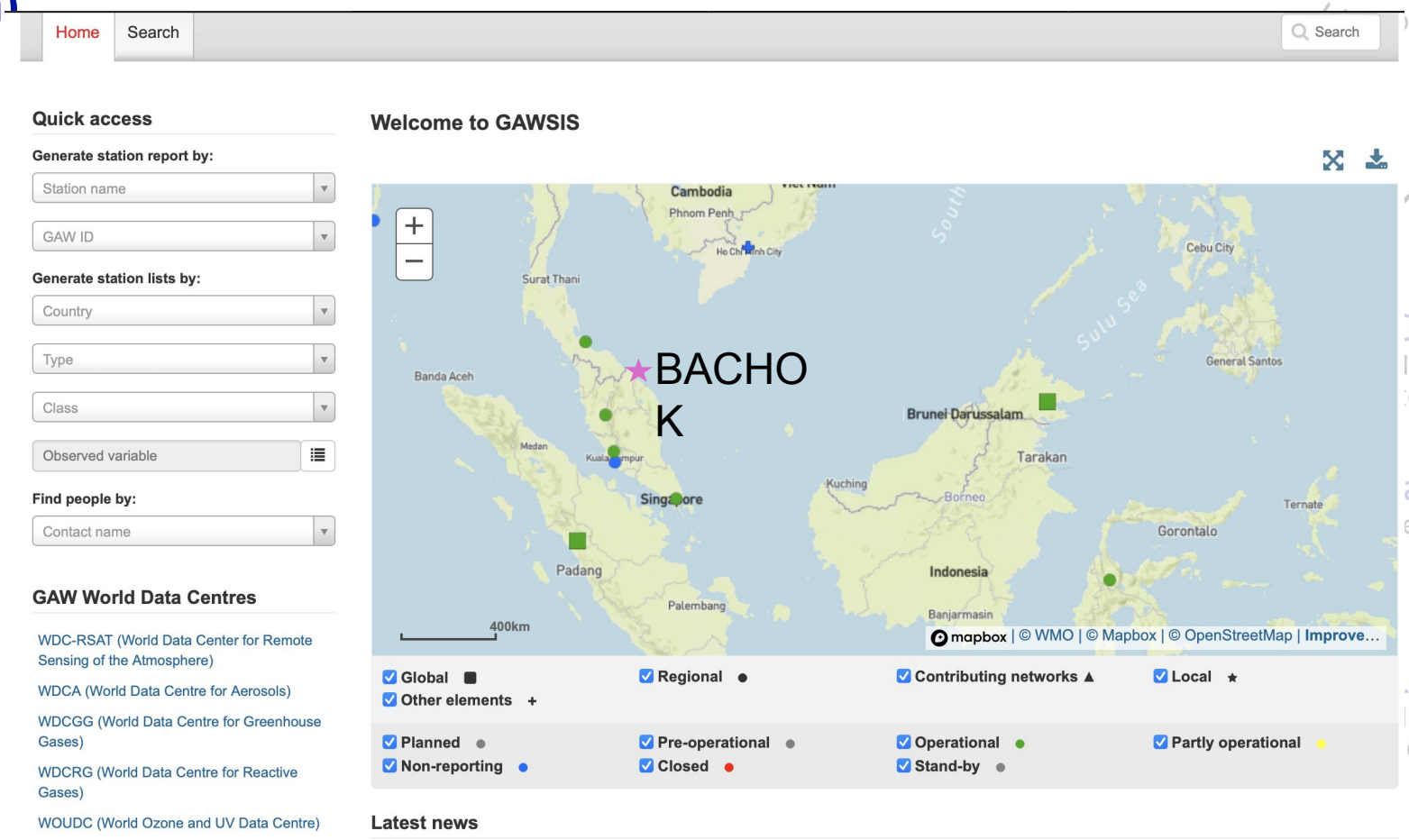
Meteorology
omatic Weather Station (AWS)

Reactive Gases Suite
NO/NO2(Ecotech, Aus),
SO2 (Ecotech, Aus),
O3 (Thermo Scientific, USA)

GHG Suite
I2O (Thermo Scientific, USA),
O2/CH4/H2O(g) (Los Gatos Res., USA)

art of Aerosol Suite
e Speciated Aerosol (GRIMM Aerosol, Ger)

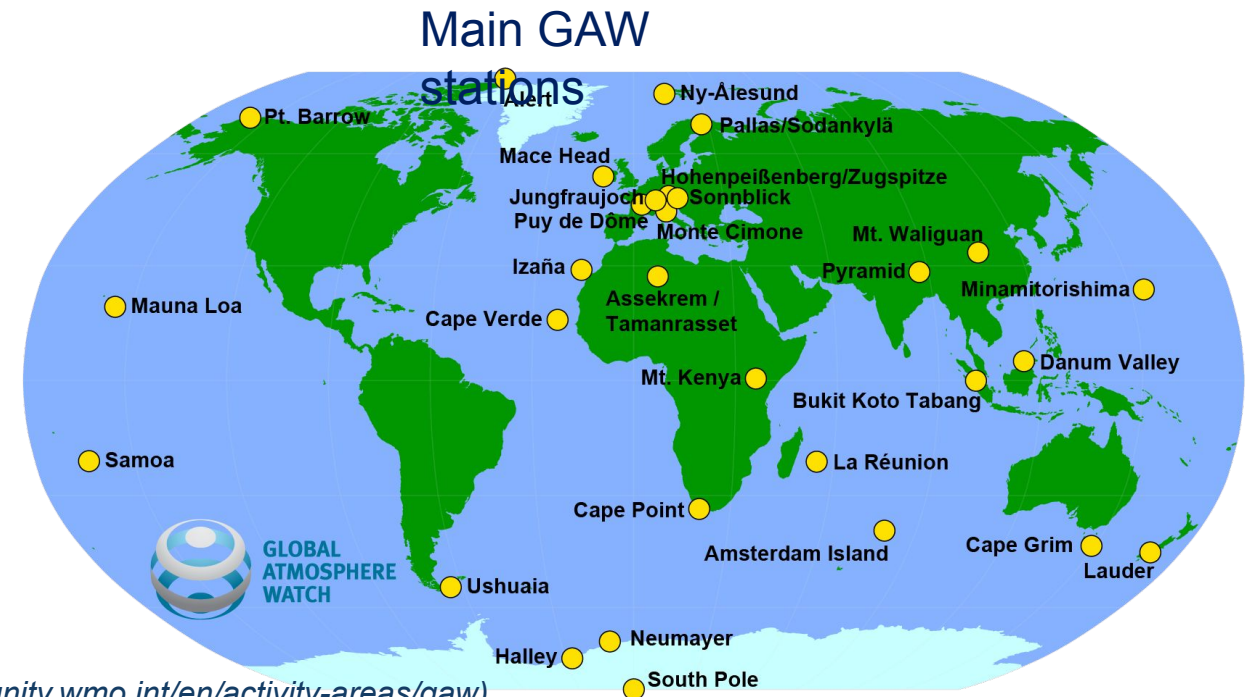
ong term Collaborations
alocarbon suite (uDirac UCAM),
O (UEA)



Global Atmospheric Watch (GAW) by World Meteorological Organization (WMO)

to monitor trends in the Earths's atmosphere. Missions:

- to conduct **accurate and thorough observations** of the atmospheric chemical composition and physical characteristics on both global and regional scales.
- To **provide** the scientific community with the means to predict future atmospheric states;
- To **organize assessments** in support of formulating environmental policy.



(https://community.wmo.int/en/activity-areas/gaw)

Acid Deposition Monitoring Network in East Asia (EANET)

Current Contributing Stations for Malaysia:

- Danum Valley (Sabah)
- Kuching,
- Petaling Jaya,
- Tanah Rata (Pahang)

https://www.met.gov.my/en/pendidikan/aktivitigaw/#Background

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Thank You

IPCC

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