WMO Regional Association VI (RA VI)

Webinar on Regional Basic Observing Network (RBON)

(10 June 2025)

Overview of Global and Regional Basic Observing Networks (GBON & RBON)

Why RBON?

(Krunoslav Premec, WMO Secretariat)

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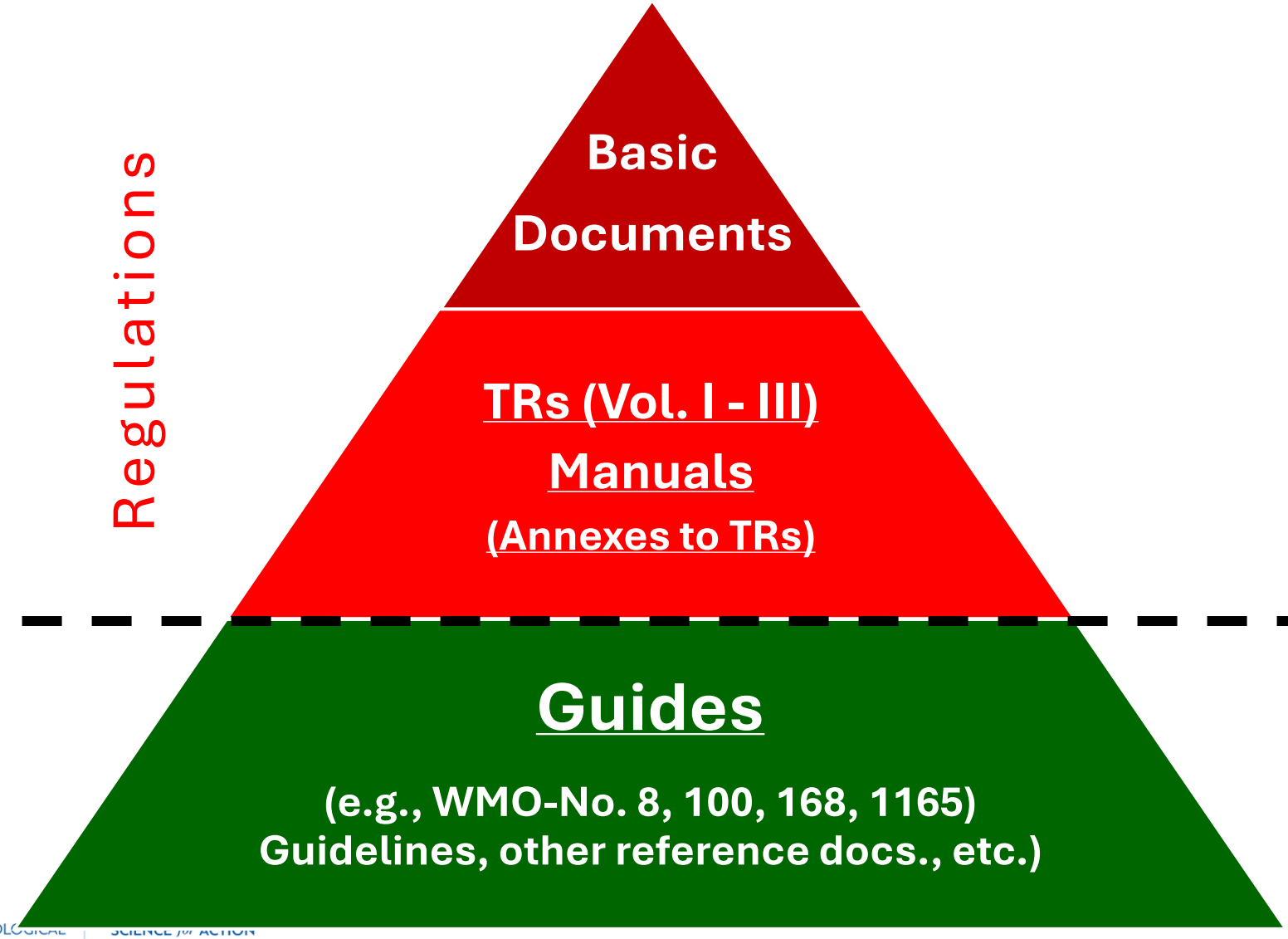
Contents

WMO Regulatory and Guidance Publication Structure



"Shall"s and "Should"s have specific meaning

Approved by Congress or Executive Council

No "Shall"s!
"Should"s have ordinary meaning

Approved by Technical Commissions

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Technical Regulations (WMO-No. 49)

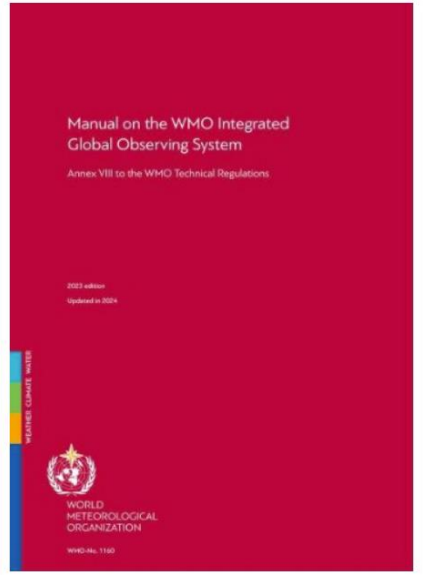
Members' duties regarding RBON are defined through the provisions in:

- Technical Regulations, Volume I – General Meteorological Standards and Recommended Practices, Volume I, Part I (WMO-No. 49) (2023 edition, **updated in 2024**, approved by EC-78 in June 2024, is available via WMO Library).
  - 3.2.1.3 Members shall establish and manage Regional Basic Observing Networks (RBONs) in their respective Region(s) and in the Antarctic.
  - Note: The RBON is **a subset of the surface-based component of WIGOS which provides observations for international exchange** to address the requirements of WMO application areas. It is described further in the WIGOS Manual (WMO-No. 1160), section 3.2.3..

Regulatory and Guidance material

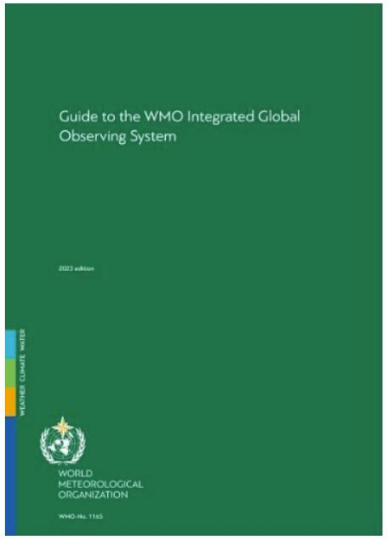
Members' duties regarding GBON and RBON are defined through the provisions in:

- Manual on the WMO Integrated Global Observing System (WMO-No. 1160), Section 3.2.2. GBON, 3.2.3 RBON
  - (2023 edition, **updated in 2024**; approved by EC-78 in June 2024, is available via WMO Library).



Guidelines on how to address the provisions and design GBON and RBON are described in:

- Guide to the WMO Integrated Global Observing System (WMO-No. 1165), Chapter 10 – GBON, 11 – RBON.
  - (**2024 edition**, approved by INFCOM-3 in April 2024, is available via WMO Library).



Why GBON?

Facts:

- ❑ Global Numerical Weather Prediction (NWP) and climate reanalysis play essential roles for all products and services provided by NMHSs to their constituencies, even at regional and local levels.
- ❑ Within the WMO Rolling Review of Requirements (RRR) process, many application areas have some level of dependency on Global NWP and climate reanalysis products.
- ❑ Weather prediction beyond the 3-4 day range essentially requires observations from the whole world.
- ❑ WMO is the only organization with the mechanisms to provide these observations.

Critical Need:

- ❑ Continuous real-time supply of observational data from all areas of the globe.

Solution:

- ➢ **Global Basic Observing Network (GBON)**

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GBON development - Resolutions

- ✓ **Resolution 34** (Cg-18) – Global Basic Observing Network - 2019
- ✓ **Resolution 1** (Cg-Ext(2021)) WMO Unified Policy for the International Exchange of Earth System Data - 2021
- ✓ **Resolution 2** (Cg-Ext(2021)) – Amendments to the Technical Regulations related to the establishment of the Global Basic Observing Network (GBON) - 2021

  *Cg-Ext(2021) Approves the amendments to the Technical Regulations related to establishment of GBON, as provided in the annex to the present resolution, with the implementation taking effect from **1 January 2023**, considering that the GBON implementation plan takes into account the individual capabilities of Members;*

- ✓ **Resolution 3** (Cg-Ext(2021)) – Systematic Observations Financing Facility: Supporting Members in the Implementation of the Global Basic Observing Network, - 2021

Manual on WIGOS (WMO-No. 1160)
GBON Definition

3.2.2 Global Basic Observing Network

3.2.2.1 The Global Basic Observing Network (GBON) shall be:

- ❑ a subset of the surface-based subsystem of WIGOS,
- ❑ used in combination with the space-based subsystem,
- ❑ and other surface-based observing systems of WIGOS,

to contribute to meeting the requirements of Global NWP, including reanalysis in support of climate monitoring.

History

Manual on the Global Observing System – Volume I & Volume II – Regional Aspects (WMO-No. 544) - DEPRECATED

Regional Basic Climatological Network (RBCN):

A network composed of **climatological stations** within a WMO Region with a specified observational programme, which is a minimum regional requirement to permit Members to fulfil their World Weather Watch responsibilities, and also serves as a target list for WWW monitoring of climatological data.

Regional Basic Synoptic Network (RBSN) of surface and upper-air observing stations:

A network composed **of synoptic stations** within a WMO Region with a specified observational programme, which is a minimum regional requirement to permit Members to fulfil their World Weather Watch responsibilities and in the application of meteorology.

Antarctic Observing Network (AntON):

Consists of manned and automatic weather stations in operation **in Antarctica and the sub-Antarctic islands** (ABSN and ABCN).

RBON concept

(was approved by Decision 21 (EC-69) REGIONAL BASIC OBSERVING NETWORK, in 2017)

The WMO Executive Council **recognized**:

The need to integrate the RBSN and RBCN into the future Regional Basic Observing Network (RBON) and include additional observing stations/platforms into the RBON in order to reflect its multi-disciplinary nature in support of all WMO application areas,

Decided to endorse the Regional Basic Observing Network (RBON) concept.

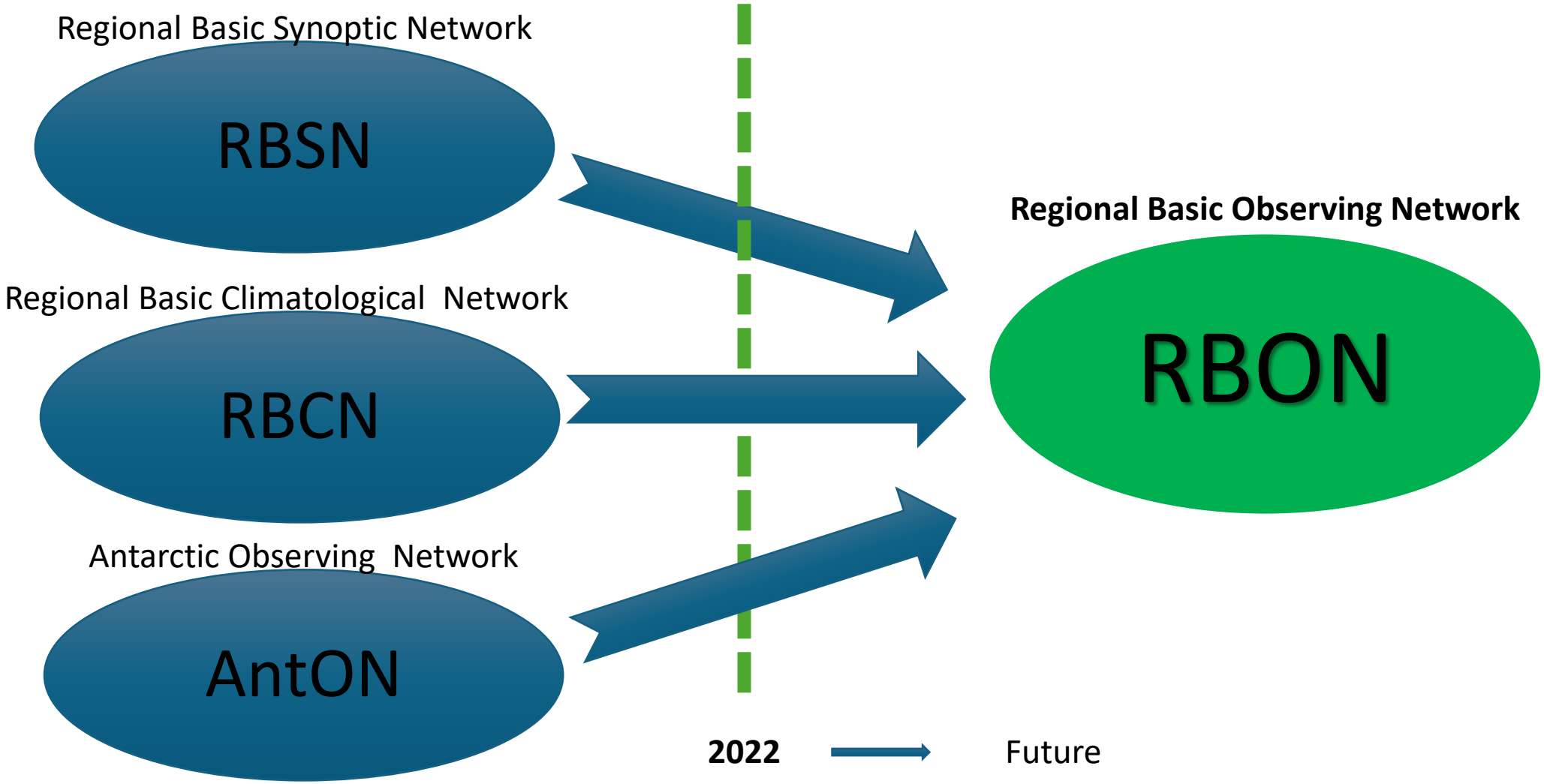
Requested regional associations:

To establish, on the model of RA II, pilot RBON in each WMO Region, comprised initially of the merging of all RBSN and RBCN stations of that Region;

Requested Members:

To actively participate in the further development of the RBON Concept, and propose inclusion of additional surface-based observing stations, such as weather radars, wind profiler systems, lightning detection systems, data buoys, voluntary observing ships and aircraft, in the Pilot RBON established by the regional association.

Initial RBON



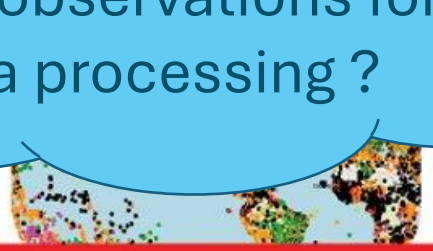
Regional Basic Observing Network (RBON)

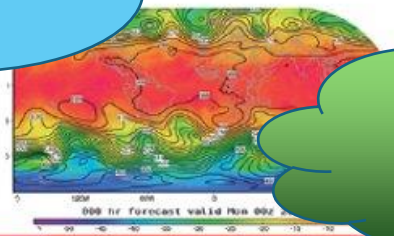
(Approved by Decision 21 (EC-69) REGIONAL BASIC OBSERVING NETWORK, in 2017)

- network of surface-based meteorological, hydrological and related observing stations/platforms to address the **key regional weather, water, climate and other environmental challenges**.
- leads to **improved services** by delivering more and enhanced observations to stakeholders.
- enables the **full benefit of regional and national observing capabilities** to be realized.
- consider **EW4All** observational user requirements and gaps through RBON.
- is defined and adopted by the relevant **WMO Regional Association**, or the Executive Council or the World Meteorological Congress for the Antarctic.

The value chain

RRR [for observations]: What observations for data processing ?





GBON

Observations from the entire globe

International exchange of observations

Global Numerical Weather Prediction

Weather and climate-related infrastructure - **must be designed and managed globally**

Last-mile activities undertaken **primarily at regional, national and local level**

Effective decision-making and action

Delivery of weather and climate services

Local data processing, forecast, warning and advisory products

RBON

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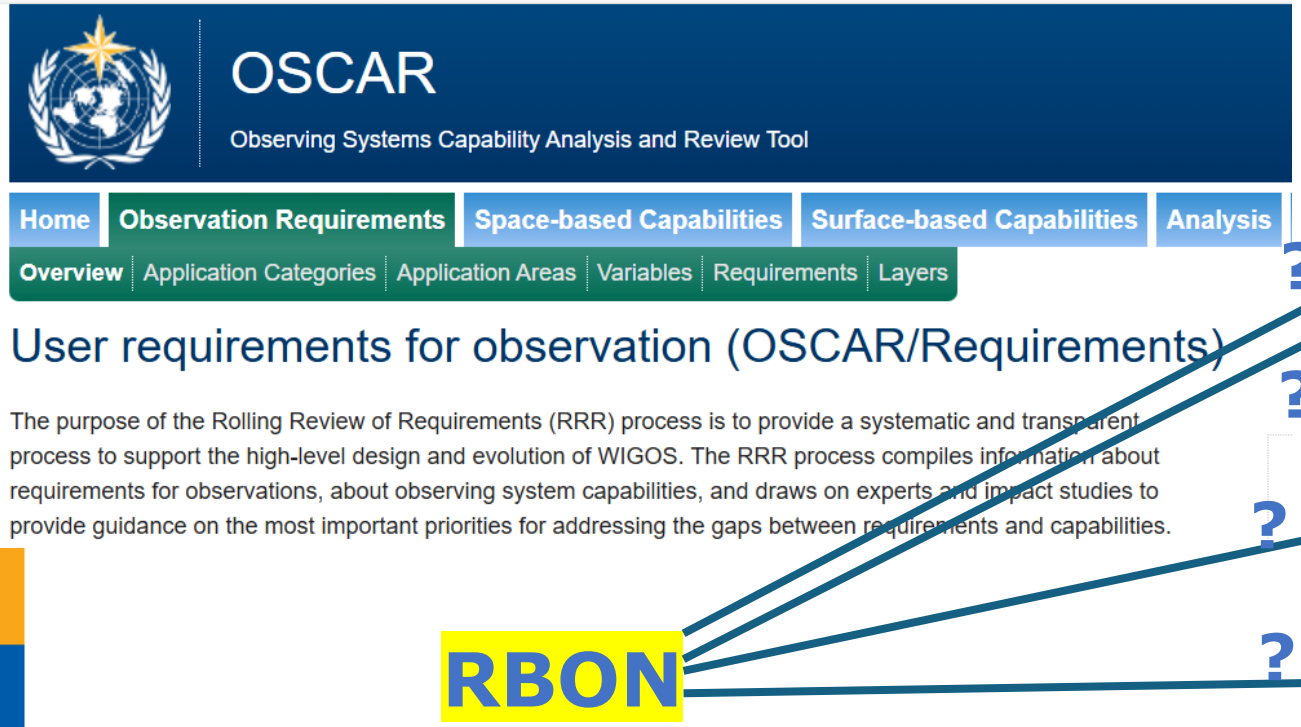
OSCAR/Requirements

GBON



RBON

ESAC	Application areas
1. Space Weather Applications	1.1 Sun, Heliosphere and Solar Wind Forecasting and Monitoring 1.2 Energetic Particle and Magnetosphere Forecasting and Monitoring 1.3 Ionosphere, Thermosphere and Geomagnetic Field Forecasting and Monitoring
2. Atmospheric Applications	2.1 Global Numerical Weather Prediction and Real-time Monitoring 2.2 High-Resolution Numerical Weather Prediction 2.3 Nowcasting / Very Short-Range Forecasting 2.8 Aeronautical Meteorology 2.9 Agricultural Meteorology 2.6 Atmospheric Composition Forecasting and Monitoring 2.7 Atmospheric Composition Information Services in Urban and Populated Areas 2.4 Sub-Seasonal to Longer Predictions 2.5 Atmospheric Climate Monitoring
3. Oceanic Applications	3.1 Ocean Forecasting and Real-Time Monitoring 3.2 Coastal Forecasting 3.3 Oceanic Climate Monitoring and Services 3.4 Tsunami Monitoring and Detection 3.5 Marine Environmental Emergency Response 3.6 Maritime Safety (ports to open ocean) 3.7 Ocean Biogeochemical Cycles
4. Hydrological and Terrestrial Applications	4.1 Hydrological Forecasting and Real-time Monitoring 4.2 Hydrological and Terrestrial Climate Monitoring
5. Cryospheric Applications	5.1 Terrestrial Cryosphere Forecasting and Monitoring 5.2 Sea-Ice Forecasting and Monitoring 5.3 Cryospheric Climate Monitoring
6. Integrated Earth System Applications	6.1 Earth System Forecasting and Monitoring 6.2 Understanding Earth System Processes

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Early Warnings for All and RBON

Disaster risk knowledge

Systematically collect data and undertake risk assessments

- Are the hazards and the vulnerabilities well known by the communities?
- What are the patterns and trends in these factors?
- Are risk maps and data widely available?

Detection, observations, monitoring, analysis and forecasting of hazards

Develop hazard monitoring and early warning services

- Are the right parameters being monitored?
- Is there a sound scientific basis for making forecasts?
- Can accurate and timely warnings be generated?

Preparedness and response capabilities

Build national and community response capabilities

- Are response plans up to date and tested?
- Are local capacities and knowledge made use of?
- Are people preapred and ready to react to warnings?

Warning dissemination and communication

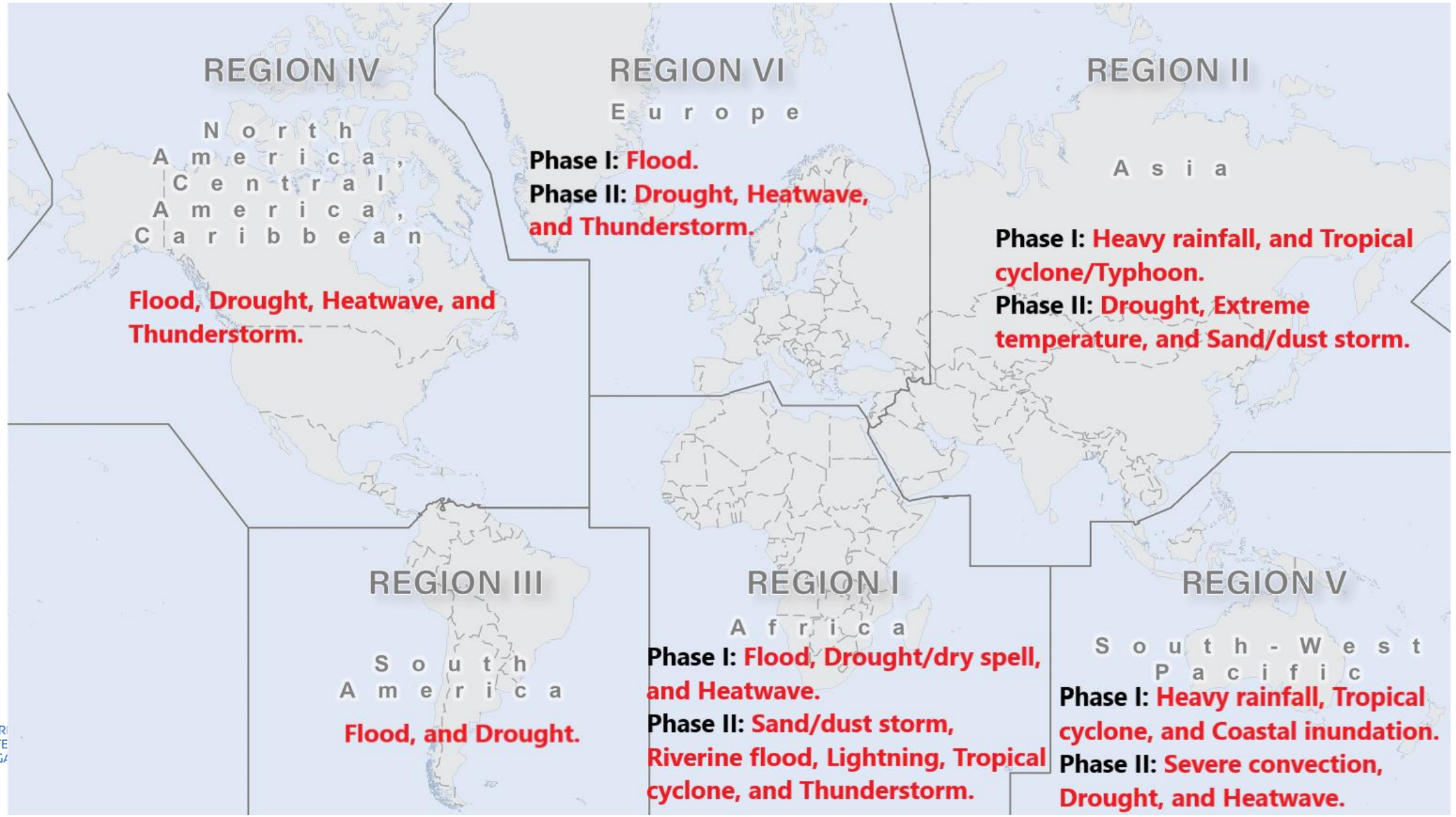
Communicate risk information and early warnings

- Do warnings reach all of those at risk?
- Are the risks and warnings understood?
- Is the warning information clear and usable?

Work Plan for consideration of EW4All observational user requirements and gaps through RBON was approved at EC-78.

RBON – Key challenges per RAs

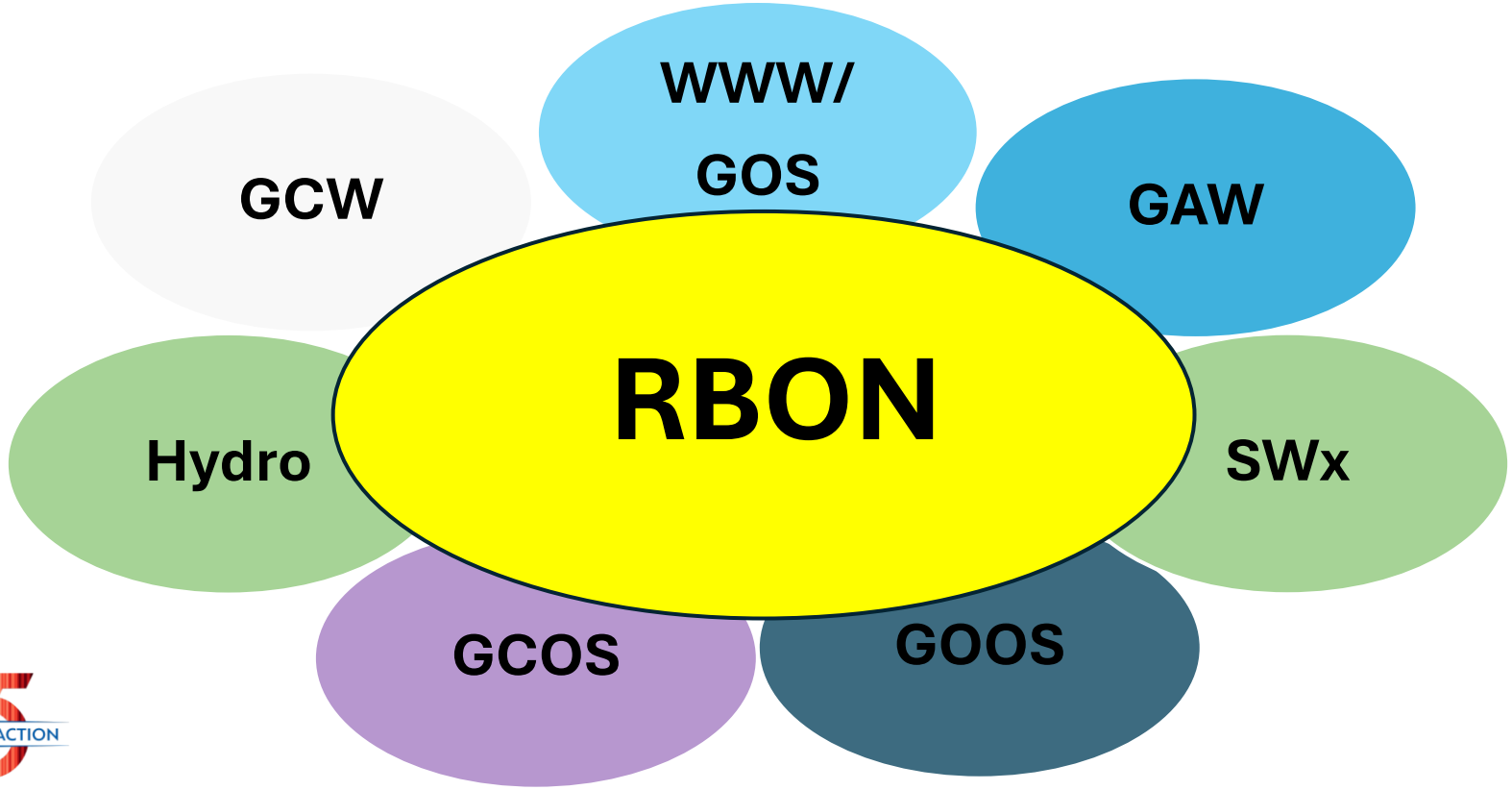
- The phenomena to be addressed in order to bring substantial socioeconomic benefits.



RBON stakeholders - WIGOS

WMO Integrated Global Observing system (WIGOS)

a framework for all WMO observing systems and contributions to co-sponsored observing systems in support of all WMO Programmes and activities, with the following component observing systems:



RBON design – Role of Members

- **Establish and manage RBON** in their Region (RAs) and the Antarctic (EC).
- **Propose and commit existing stations** (consider national partnerships and upgrading stations to meet RBON requirements if needed).
- **Ensure** the observations are available **for international exchange in real or near-real time.**
- **Commit to operate** the stations for **at least four years, (10 years preferred).**
- **Review** regularly **RBON composition and monitor its performance.**
- **Nominate National Focal Point** on WIGOS, OSCAR/Surface and WDQMS.
- **Record station metadata** in Metadata Repository (OSCAR/Surface).

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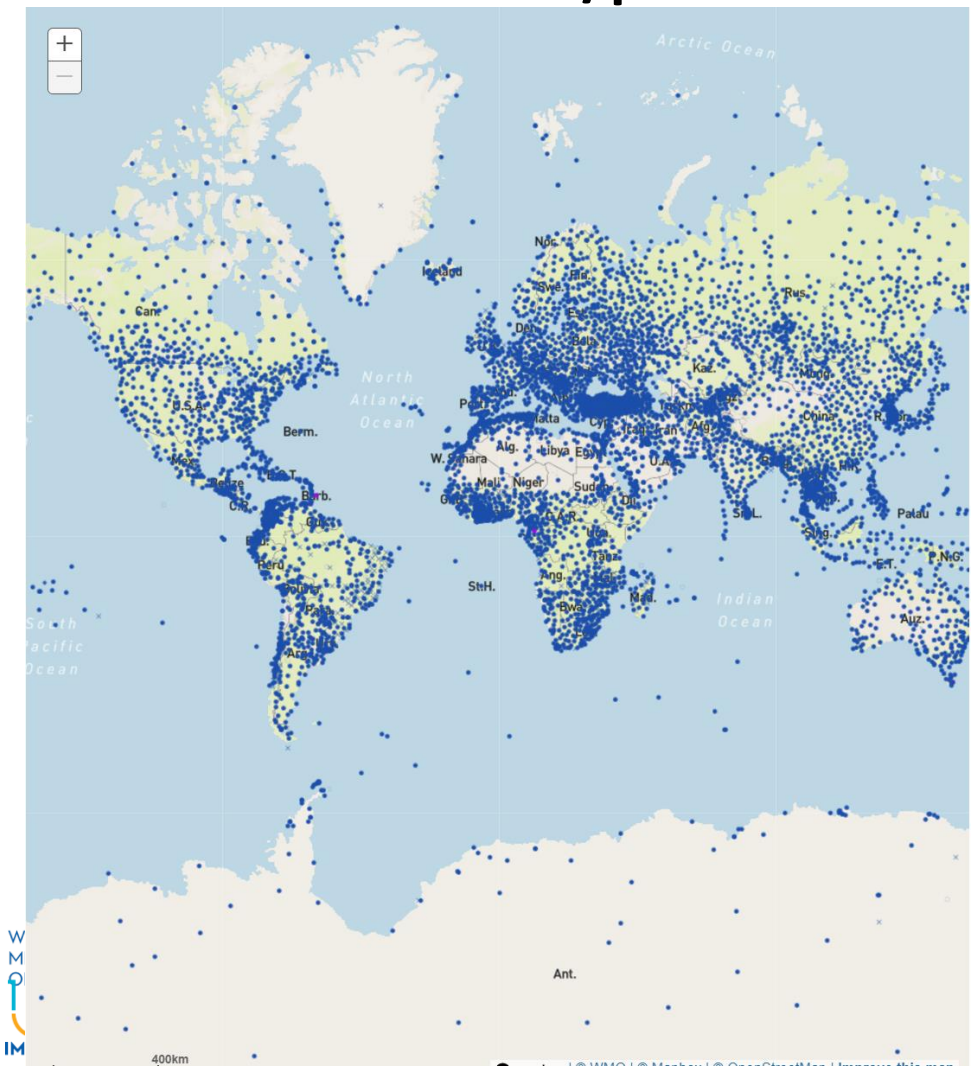
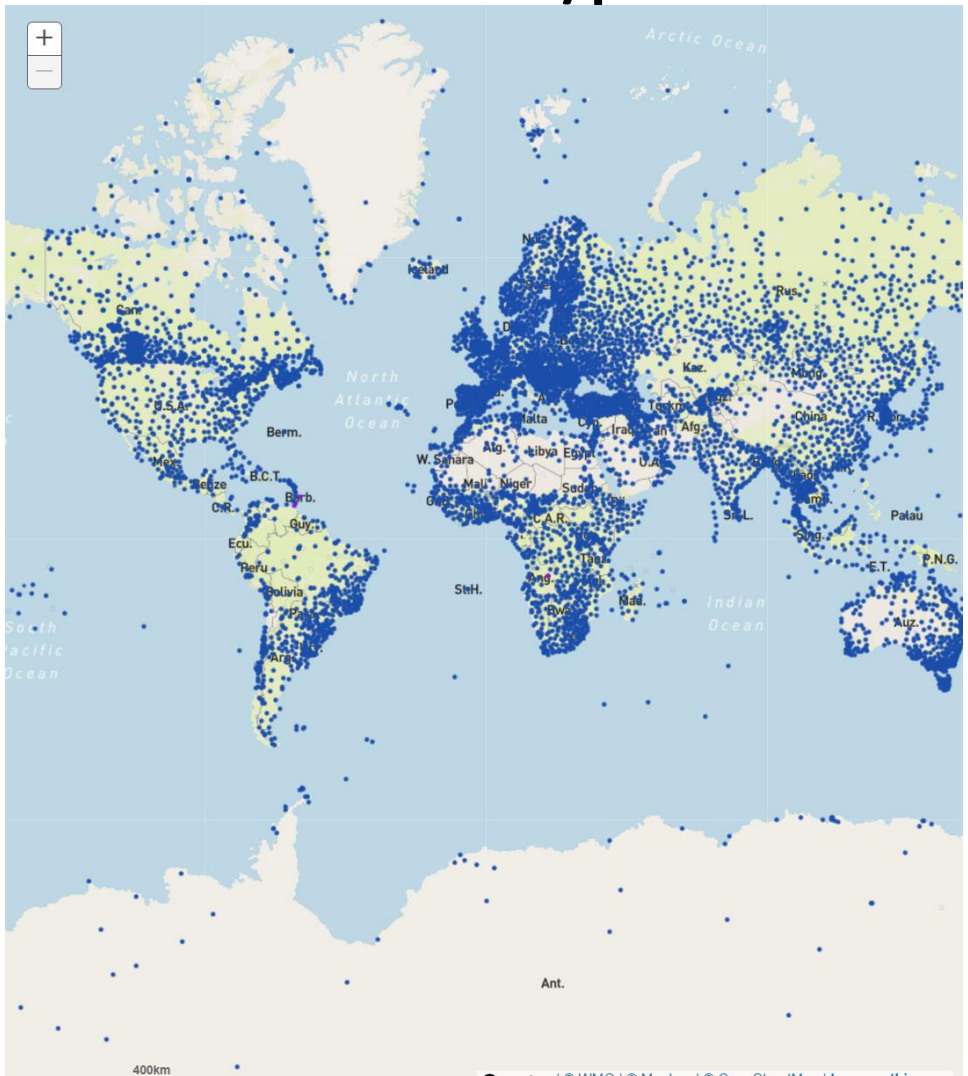
OSCAR/Surface - global

Program/Network affiliation/WIGOS/GOS/GOS surface networks (as of 10 June 2025):

RBON: 7551 stations/platforms



GBON: 8849 stations/platforms



OSCAR/Surface – RA VI

Program/Network affiliation/WIGOS/GOS/GOS surface networks (as of 10 June 2025):

RBCN (deprecated) – 945 stations

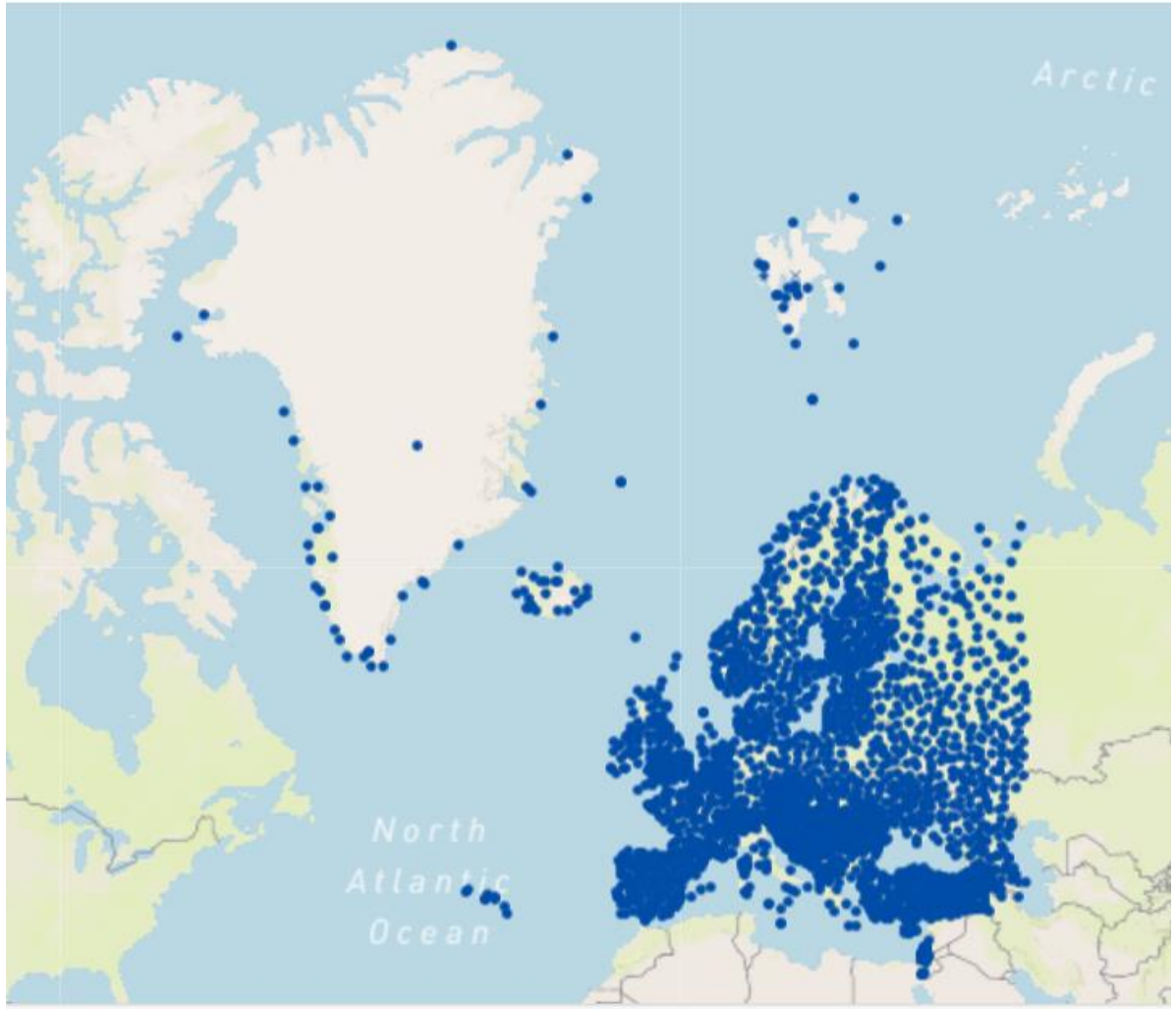
RBSN (deprecated) – 1151 stations

Total: 2096 stations

RBCN&RBSN (deprecated) – 1557 stations

GBON – 2848 stations

RBON – 1609 stations



GBON vs RBON

RBON

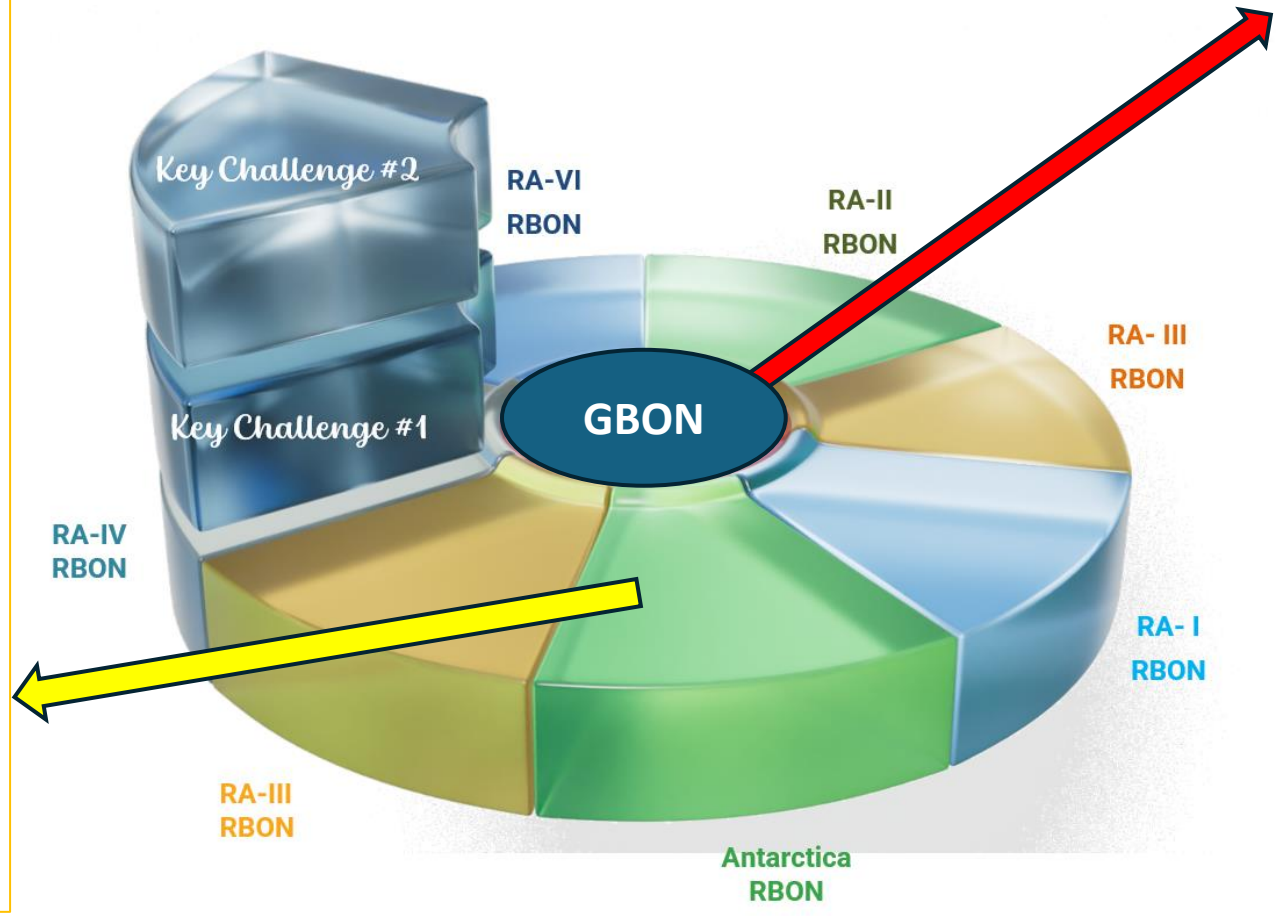
Purpose
- regional requirements,
- key regional challenges (e.g., floods, droughts, tropical cyclones, thunderstorms, heat waves)

Stations (shall)
- all surface-based observing stations as per requirements defined by Region

Stations (should)
- weather radars

In charge: RA

Note: **GBON is part of RBON**



GBON

Purpose
- global requirements,
- global NWP
- climate reanalysis

Stations (shall)
- surface land meteorological (SLP, T, H, W, P, SD)
- upper-air land meteorological (T, H, W)
- surface marine in EEZ (SLP, SST)
- upper-air marine in EEZ (T, H, W)

Stations (should)
- aircraft-based (T, H, W)
- remote sensing profilers (T, H, W)

In charge: INFCOM

Thank you!

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