

RA VI Workshop on Regional WIGOS Centres Functions and Tools,
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Introduction to WIGOS implementation/operation and to GBON

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Outline

1. Introduction to WIGOS

- What is WIGOS and WIGOS Observing Components
- Why WIGOS; WIGOS Principles and integration
- An example of what WIGOS is addressing
- WIGOS initial Operational Plan 2020-2023
- WIGOS Station Identifiers
- WIGOS Regulatory and Guidance material
- National and Regional Implementation of WIGOS
- The WIGOS tools

2. Implementation of GBON

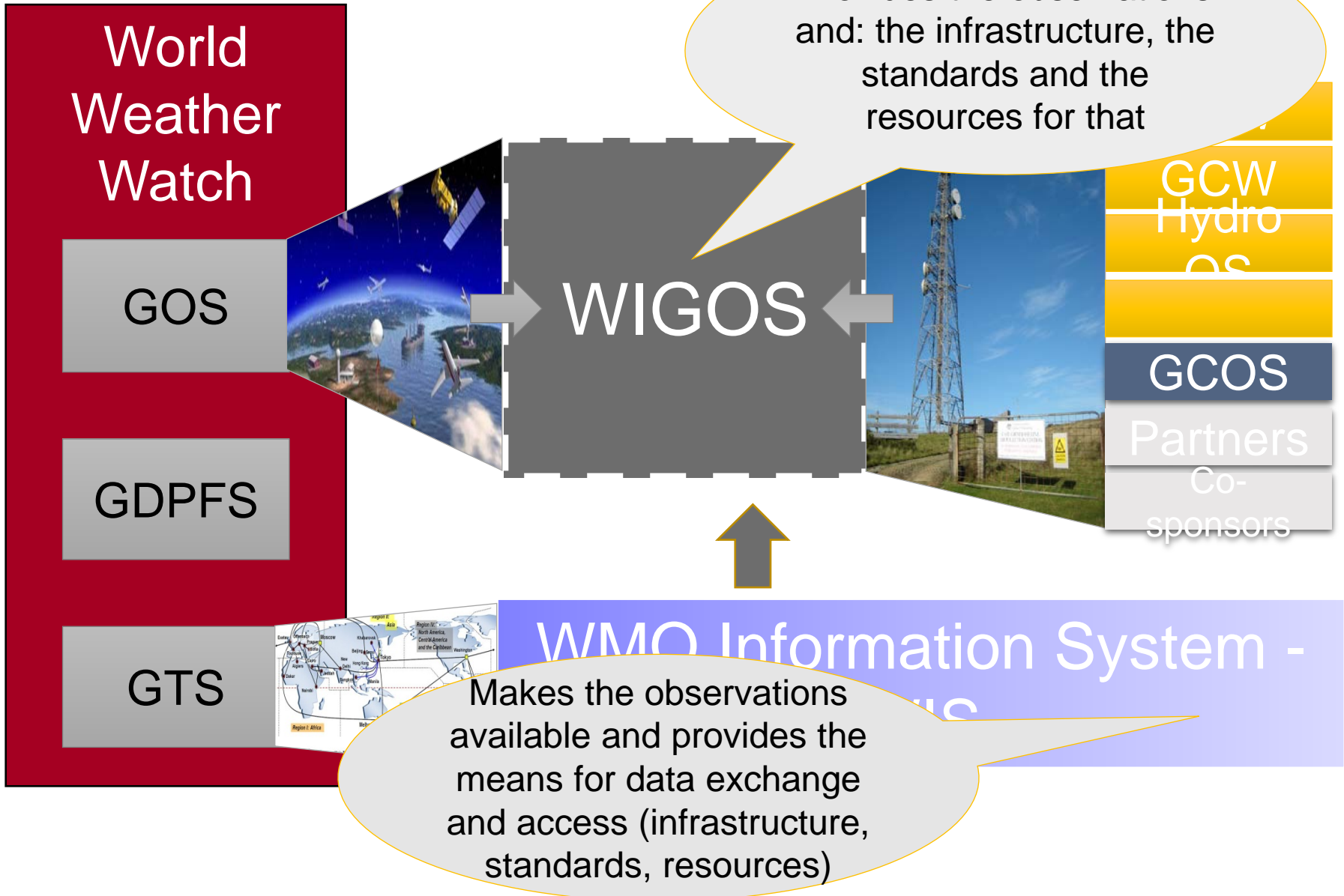
- What is GBON
- GBON requirements and GBON gap analysis
- Initial composition and compliance monitoring

What is WIGOS

- A WMO **foundational activity addressing the needs of Members services** (weather, climate, water and environmental services) **for observations**
- A **umbrella for** all WMO and co-sponsored observing systems following common **standards** and **procedures**
 - **WIGOS Regulatory & Guidance material**
- WIGOS is not:
Replacing or taking over existing observing systems, they continue being owned and operated by a diverse array of organizations and programmes, national and international.

– [WIGOS homepage](#)

What is WIGOS



Observing components of WIGOS

- Global Observing System (WWW/**GOS**)
- Observing component of Global Atmospheric Watch (**GAW**)
- WMO Hydrological Observations (**WHOS**, including WHYCOS)
- Observing component of Global Cryosphere Watch (**GCW**)
- Co-sponsored programmes:
 - Global Climate Observing System (**GCOS**)
 - Others...



Why WIGOS? It is needed to respond to...

I. Broader mandates of NMHSs, as compared to when the World Weather Watch and the GOS were created, including e.g.

- Climate monitoring/climate change/mitigation,
- Air quality, Atmospheric composition,
- Oceans,
- Cryosphere,
- Water resources

II. Technical and scientific advances, such as:

- Observing technology,
- Telecommunications,
- Numerical modeling and data assimilation,
- Increased user demand to access and use observations in decision making

III. Economic realities

- Budgetary pressure on many NMHS, in spite of expanding mandates and increasing demand for services
- NMHSs need to collaborate to fulfill their mandate

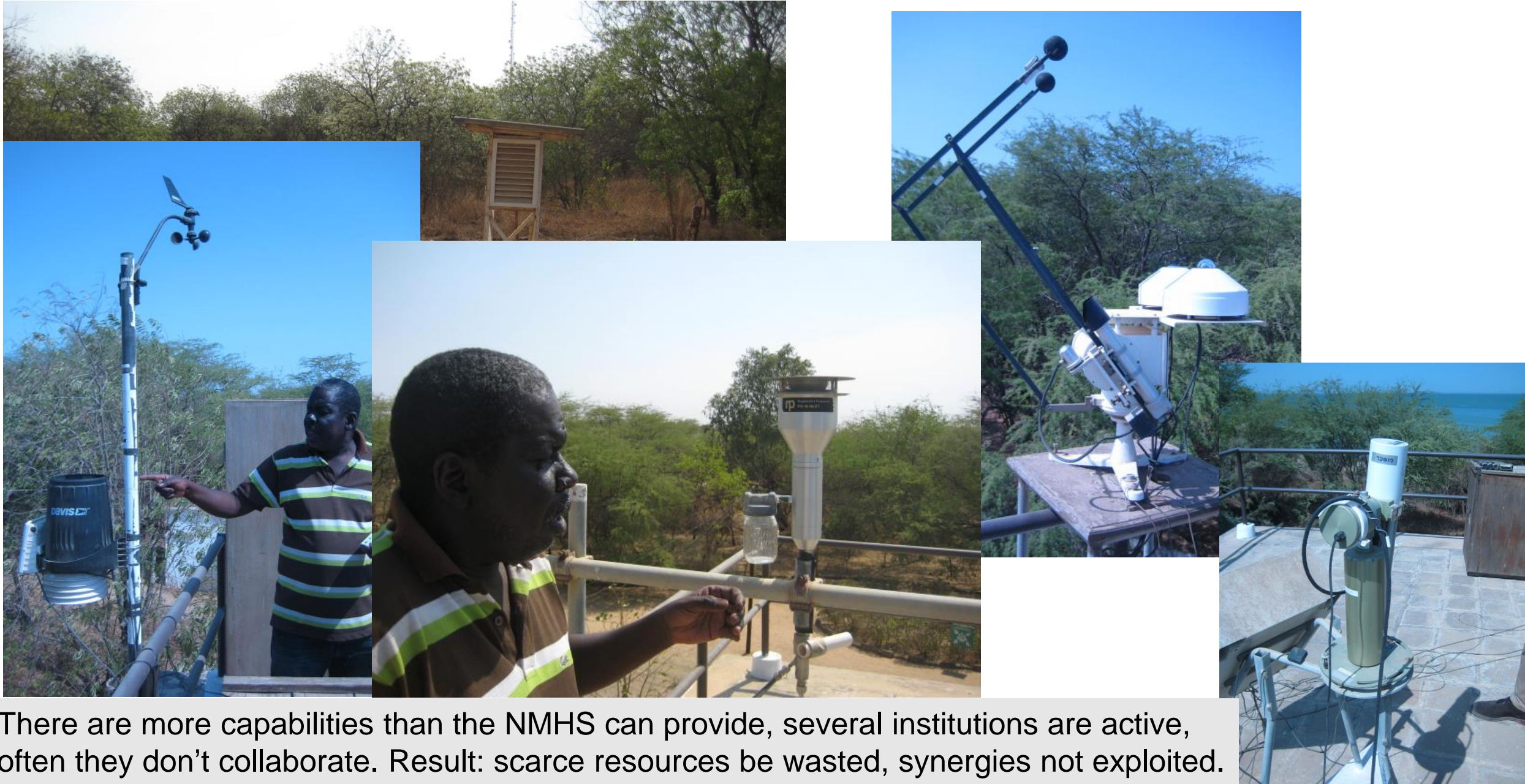
WIGOS principles

What does it mean to implement WIGOS

- **Integration** & increased interoperability of systems
 - across disciplines/domains, organizational, technological and performance
- **Sharing** internationally (more) data and metadata
- **Partnerships** & cooperation
 - at national and regional levels
- **Leadership**
 - of NMHSs
- **Planning**
 - Observing Strategy
 - WIGOS Implementation Plans
- **Culture of compliance**
(with regards to the WMO Technical Regulations)
- **Following guidance**
 - Aware and use of guidance material for implementation of WIGOS

Improving quantity and quality of data and metadata in an efficient and sustainable way

An example of what WIGOS is addressing



There are more capabilities than the NMHS can provide, several institutions are active, often they don't collaborate. Result: scarce resources be wasted, synergies not exploited.

A vision for a better future



- All observations are documented publicly (metadata)
- Instruments are calibrated and maintained
- Observations are exchanged and compared
- Obsolete instrumentation may be de-commissioned
- User requirements can be met better at less cost

WIGOS Initial Operational Plan 2020-2023

The 6 highest priorities of WIGOS Initial Operational Phase 2020-23:

1. **National** WIGOS implementation
2. Fostering a culture of compliance with **WIGOS technical regulations**
3. Implementation of the **GBON** and **RBON**
4. Operational deployment of quality monitoring based on **WDQMS***
5. Operational implementation of **Regional WIGOS Centres (RWC)**
6. Further development of the **OSCAR*** databases

[*WIGOS tools]

- The **WIGOS Station Identifiers (WSI)** are also a critical and common element of WIGOS tools and part of the WIGOS operational plan

Basics of the WIGOS Station Identifiers

| 1 st block (number) | 2 nd block (number) | 3 rd block (number) | 4 th block (character) |
|--|---|--------------------------------|--------------------------------------|
| WIGOS Identifier Series | Issuer of Identifier | Issue number | Local Identifier |
| Allows future expansion | Allows to distinguish between identifiers issued by different organizations | Allows sub-delegation | Allocated to station |
| 0 | 0...65534 | 0...65534 | 16 characters |



Example of a WIGOS Station Identifier

| WIGOS Identifier Series (number) | Issuer of Identifier (number) | Issue Number (number) | Local Identifier (characters) |
|--|---|---------------------------------|---|
| 0 | 20000 | 0 | 08023 |

Example of station SANTANDER, Spain

It is written as: **0-20000-0-08023**

Please note that:

- WSIs should not have meaning in themselves
- Users must not interpret any patterns they see in WSIs
- Users should use OSCAR/surface to look up the metadata for the station associated with the WIGOS Station Identifier.



General requirements for assigning WSIs (1)

- The WSI is an element of the **WIGOS Metadata Standard**: the "Station/platform unique identifier, 3-06" [WMO-No.1192]
- Members are requested to **implement WSIs** following the:
 - WMO Technical Regulations (WMO-No.49) - Regulatory material
 - **Manual on WIGOS (WMO-No.1160)** - Regulatory material
 - **Guide to WIGOS (WMO-No.1165)** - Guidance material
- Members **shall**:
 - **issue WSIs for stations/platforms within their geographic area of responsibility** that contribute to a WMO or co-sponsored programme
 - ensure that WSI is issued to **no more than one station** =>OSCAR/Sf
 - make available the **updated metadata** each time a new WSI is issued
- Members should (before issuing a station identifier):
 - ensure that the operator of a **station/platform has committed to providing and maintaining metadata** for that station/platform



General requirements for assigning WSIs (2)

- Each observing station must have **at least one WSI** associated with it
- **Observing stations that have identifiers from a WMO Programme:**
 - may continue to use those, they are not required to have additional WSIs
 - if a station take on new responsibility the WSI can also be used in the new context
- **It is possible for a station to be associated with more than one WIGOS identifier**, but it is **desirable to associate as few identifiers as possible**.
 - if a station has already a WSI, or is associated with an ID issued by a WMO or partner programme, an additional WSI should not be issued
- Do you need to take into account the type of station for assigning a WSI?
No!
- How do you describe the type of station, the Programme affiliation, the variables observed, the instruments used, etc => **GO to OSCAR/Surface!**

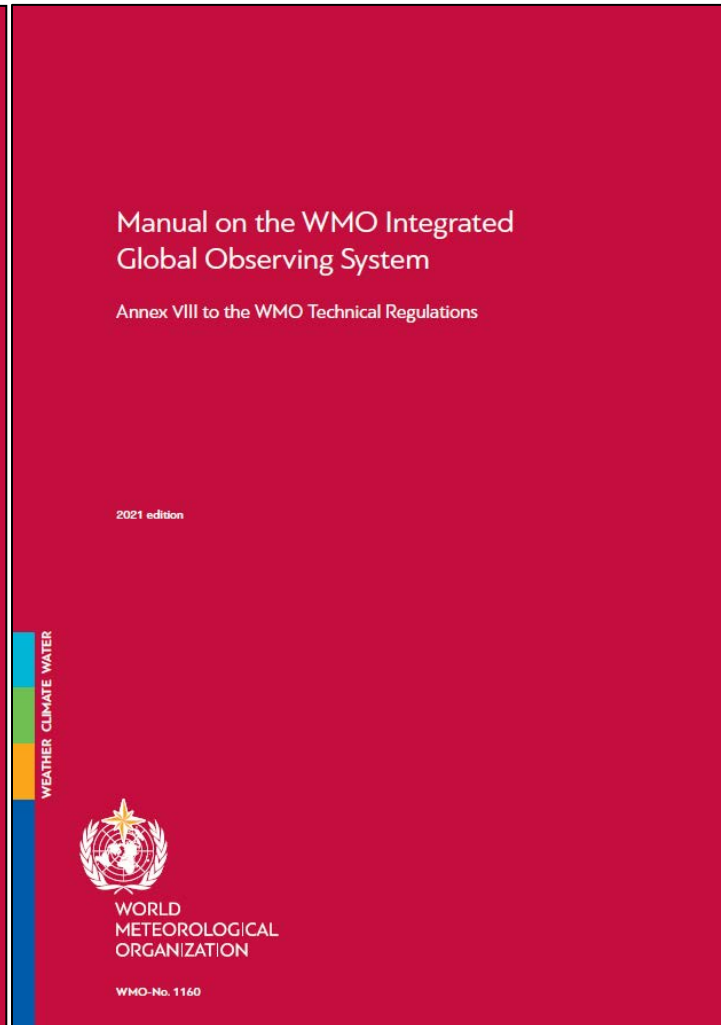


WIGOS Technical Regulations and Manual, and Guide

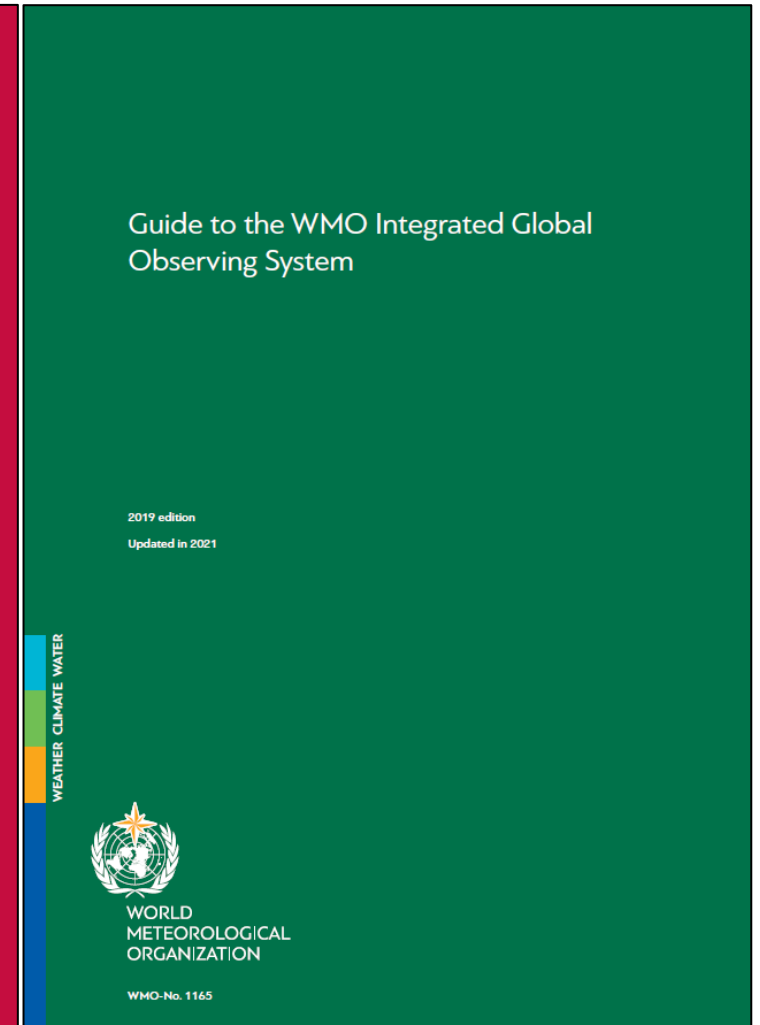
Technical Regulations Vol. I, Part I–WIGOS



Manual on WIGOS



Guide to WIGOS



National Implementation of WIGOS

WIGOS Indicators are intended to measure the national implementation:

- 1.(1) National **WIGOS partnerships** for integration/sharing of observations in place
- 1.(2,3,4) **National focal points nominated** for: WIGOS, OSCAR/Surface, WDQMS
- 1.(5) National **WIGOS Implementation Plan** adopted/approved
- 1.(6,7) **Staff trained** in OSCAR/Surface and WDQMS components and process

- 2.(1) Internationally reporting stations in WDQMS tool with **correct metadata**
- 2.(2) National contributions to **GBON** requirements in place

3. A number of internationally reporting stations included in OSCAR/Surface with all WIGOS metadata standard mandatory elements

- 4.(1) A number of internationally reporting stations making **available observations** according to the declared schedule in OSCAR/Surface

Regional Implementation of WIGOS

Regional WIGOS Centres

RA IV:

- Establishment under progress (BCT, Canada, Costa Rica, T&T, USA) approved to kick-off in Q3/Q4 2023

RA VI:

- EUMETNET – provides autom. monitoring function since 2018;
- Establishment under progress (Bosnia & Herzegovina, Kazakhstan, Romania, Türkiye and EUMETNET)

RA III:

- RWC (Argentina and Brazil), pilot phase operations since May 2020

RA II

- RWC Beijing and RWC Tokyo, fully operational since September 2021

RA I:

- RWC EAC (Kenya and Tanzania), Pilot Operations since July 2020
- RWC Southern Africa, pilot phase operations since March 2021
- RWC Casablanca, pilot phase operations since September 2021

RA V:

- RWCs Indonesia, Singapore and Fiji, initial pilot phase operations since October 2021

Antarctica

The WIGOS Tools

WIGOS tools comprise of

- **Metadata repository [OSCAR/Surface](#)**
- WIGOS Data Quality Monitoring System ([WDQMS](#)) [Web Tool](#) for quality monitoring and evaluation
- **WDQMS Incident Management System (IMS) Web Tool**



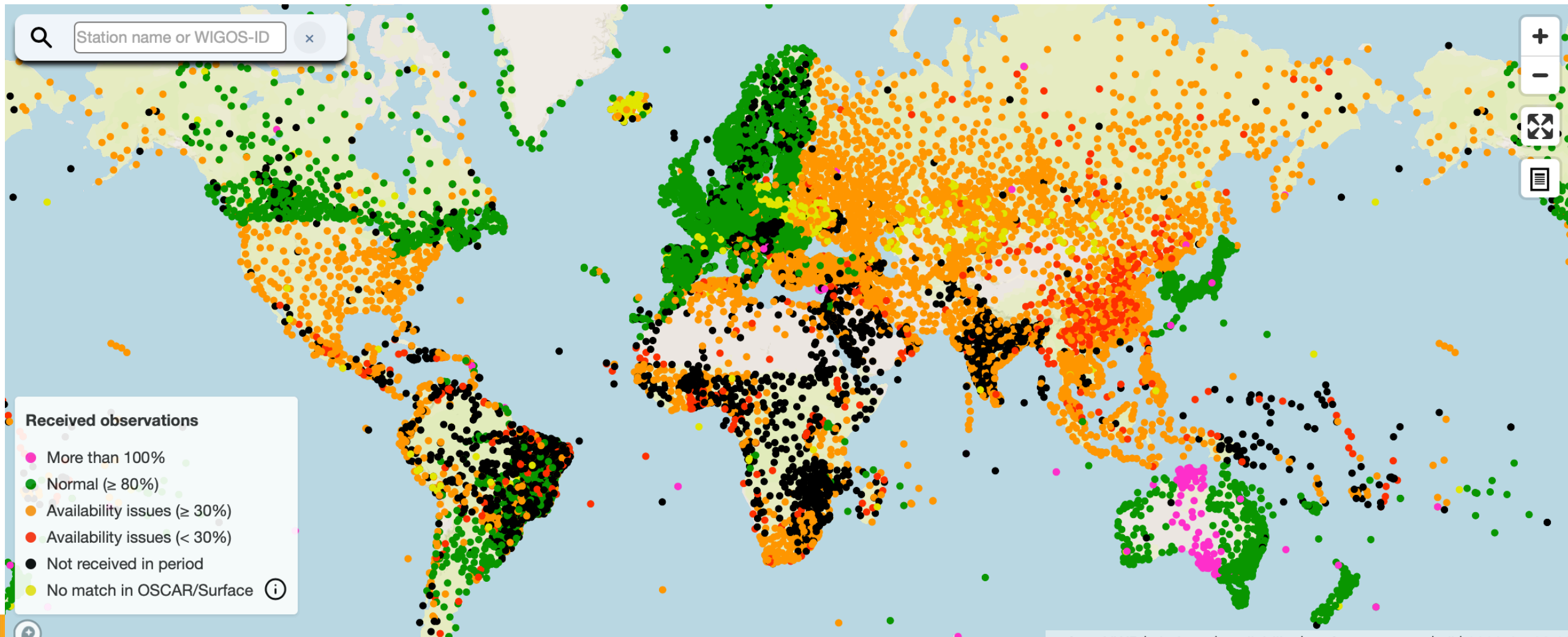
The RWCs are key users of the WIGOS tools

However, **all WMO Members are requested to make use of the WIGOS tools** as well.

Why and what is GBON?

- **Why GBON?**
 - Local weather forecasts based on Numerical Weather Prediction (NWP) depend on access to 24/7 global observations from around the globe.
 - But there are large geographical gaps in availability of surface and upper air observations.
 - GBON is designed to address this gap with basic data.
- GBON together with the Regional Basic Observing Network (RBON) replaces the former Regional Basic Synoptic and Climatological Networks (RBSN and RBCN)
 - Introduces more stringent requirements which WMO Members shall meet
 - Focuses on **surface land stations, upper air stations, and marine stations in EEZs**
- Addresses the **requirements of Global NWP and Climate Data re-Analysis**
 - Filling the identified gaps
 - Making data of existing stations available
- **Implementation** of GBON approved since January 2023
- Complemented by Regional Basic Observing Network (RBON)
 - All GBON stations are also RBON stations by definition
 - RBON stations addressing additional requirements as decided by the regional associations
- Technical Regulations in [WMO-No-1160](#), Manual on the WIGOS, section 3.2.2

The persistent problem of insufficient observational data coverage



Especially in areas dominated by red or black, quality of model data used for weather and climate prediction and monitoring will be relatively poor, and the possibility of verification will be limited

Surface pressure observations received by global NWP Centers on May 8 2022, 18Z)

(source: [WIGOS Data Quality Monitoring System](#))

GBON requirements (mandatory in bold font)

| | HR | VR | Obs cycle | Variables | Other requirements |
|---|------------------------|-------------------|--------------|---|---|
| Surface land stations | 200km 100km* | n/a | 1h | SLP, T, U, Wind, precip, snow depth | Exchanged in real time through WIS2 |
| Upper air land stations (operated from land) | 500km 200km* | 100m | 2/24h | T, U, wind | Up to 30 hPa, exchanged in real time through WIS-2 |
| Subset of upper air stations up to 10hPa | 1000km* | 100m | 24h | T, U, wind | Up to 10hPa, Exchanged in real time through WIS2 |
| Surface marine stations in EEZs | 500km | n/a | 1h | SLP, SST | Exchanged in real time through WIS2 |
| Upper air stations operated in EEZs | 1000km | 100m | 2/24h | T, U, wind | Up to 30 hPa, exchanged in real time through WIS2 |
| Aircraft data | 100km at flight level | 300m for profiles | 1h | T, U, wind | Data exchange per licensing agreement |
| Remote sensing profiler observations | Where available | 100m | 1h | T, U, wind | n/a |

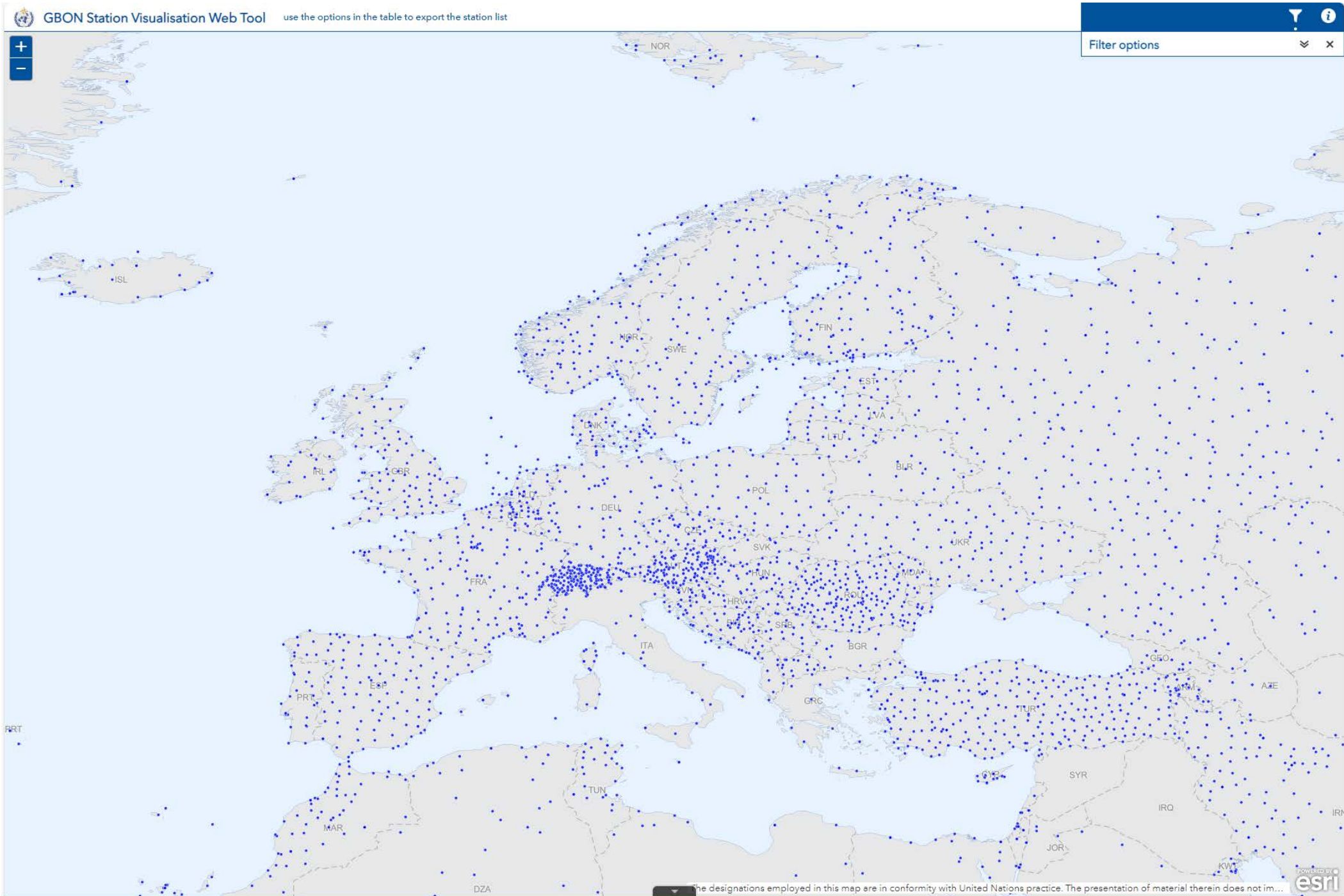
* High density network requirement is mandatory for data exchange where capability exists

GBON Initial implementation

(Steps and actions by Members)

- Nominate/update **NFPs** for WIGOS, for OSCAR/Surface and for WDQMS
- Define national GBON **targets** based on global or national GBON gap analysis
- Develop **national GBON gap analysis** and **GBON contribution plan**
 - Identify **existing** operational stations to be committed to GBON
 - Consider **upgrading** existing stations to meet GBON requirements
 - Consider arrangement with national **partners** for their long term commitment of GBON stations
 - Consider installing **new** observing stations to be committed to GBON
- Declare GBON stations in OSCAR/Surface
 - **Affiliate relevant observed variables** to GBON
- Check the status of GBON Stations **Visualization Web Tool**
- **Monitor** compliance of GBON stations via the WDQMS Web Tool
- Respond to incident tickets raised by Regional WIGOS Centres in IMS

Status of GBON station designation (screenshot)



Important Remarks (1)

- WIGOS is a **global framework for integrating** all WMO and co-sponsored observing systems under a common regulatory and management umbrella
 - It is now in place and the initial operational phase runs between 2020-2023
- Integrated approach for better provision and access to **more and better observations** at reduced costs
- Fosters a culture of compliance with WIGOS Technical Regulations and Manual, in particular the **GBON**:
 - GBON requirements are described in the Manual on WIGOS;
 - Implementation of GBON is of high priority with the initial composition and monitoring of stations performance and compliance starting “now” (after Cg.19)
 - If not yet, Members to do their GBON gap analysis, identify GBON targets, develop contribution plan and continue designating GBON stations

Important Remarks (2)

- The regular use of **WIGOS tools**, is critical to achieve national implementation of WIGOS - in particular by reviewing and updating stations metadata in OSCAR/Surface
- **Regional WIGOS Centers** provide support functions for Members to implement WIGOS and improve their metadata and data availability and quality in a sustainable way
- Guidance and learning material on WIGOS, including on GBON are available:
 - **Guide to WIGOS: WMO-No. 1165 includes the GBON guide**
 - **WIGOS Learning Portal** (Moodle) provides open online learning material, in particular on WIGOS tools: <https://etrp.wmo.int/course/view.php?id=146>

Thank you
Merci



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