

# CGMS-50

## WMO Report on WIGOS 2040 and Decisions of Extraordinary Congress 2021








WMO OMM

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# Outline

- WMO Strategy
  - Earth Systems Approach
- Unified Data Policy
  - GBON and SOFF
  - Core Satellite Data
  - Access to NWP Products
- WIGOS Vision 2040
  - High-Level Guidance

# WMO Vision, Mission, Objectives and Strategy

|                               |   |   |   |   |  |
|-------------------------------|---|---|---|---|--|
| <b>VISION 2030</b>            | By 2030, we see a world where all nations, especially the most vulnerable, are more resilient to the socioeconomic consequences of extreme weather, climate, water and other environmental events; and underpin their sustainable development through the best possible services, whether over land, at sea or in the air <i>(and in space)</i> . |   |   |   |  |
| <b>OVERARCHING PRIORITIES</b> | Preparedness for, and reducing losses from hydrometeorological extremes   | Climate-smart decision-making to build resilience and adaptation to climate risk  | Socioeconomic value of weather, climate, hydrological and related environmental services  |   |  |
| <b>CORE VALUES</b>            | Accountability for Results and Transparency   | Collaboration and Partnership   |   | Inclusiveness and Diversity   |  |
| <b>LONG-TERM GOALS</b>        | <b>1 Services</b><br><br>Better serve societal needs   | <b>2 Infrastructure</b><br><br>Enhance Earth system observations and predictions   | <b>3 Science &amp; Innovations</b><br><br>Advance targeted research  | <b>4 Member Services</b><br><br>Close the capacity gap   | <b>5 Smart Organization</b><br><br>Strategic realignment of structure and programmes                    |
| <b>STRATEGIC OBJECTIVES</b>   | <ul style="list-style-type: none"> <li>Strengthen national multi-hazard early warning/alert systems</li> <li>Broaden provision of policy- and decision-supporting climate, water and weather services</li> </ul>  | <ul style="list-style-type: none"> <li>Optimize observation data acquisition</li> <li>Improve access to, exchange and management of Earth system observation data and products</li> <li>Enable access and use of numerical analysis and prediction</li> </ul> | <ul style="list-style-type: none"> <li>Advance scientific knowledge of the Earth system</li> <li>Enhance science-for-service value chain to improve predictive capabilities</li> <li>Advance policy-relevant science</li> </ul> | <ul style="list-style-type: none"> <li>Enable developing countries to provide and utilize essential weather, climate, hydrological and related environmental services</li> <li>Develop and sustain core competencies and expertise</li> </ul> | <ul style="list-style-type: none"> <li>Optimize WMO constituent body structure</li> <li>Streamline WMO programmes</li> <li>Advance equal, effective and inclusive participation</li> </ul> |
| <b>FOCUSED ON 2020-23</b>     |   |   |   |   |  |

# Successful application of weather and climate services depend on a functioning meteorological value chain

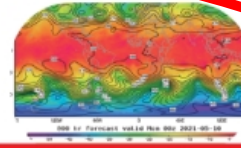
**Global meteorological infrastructure**



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

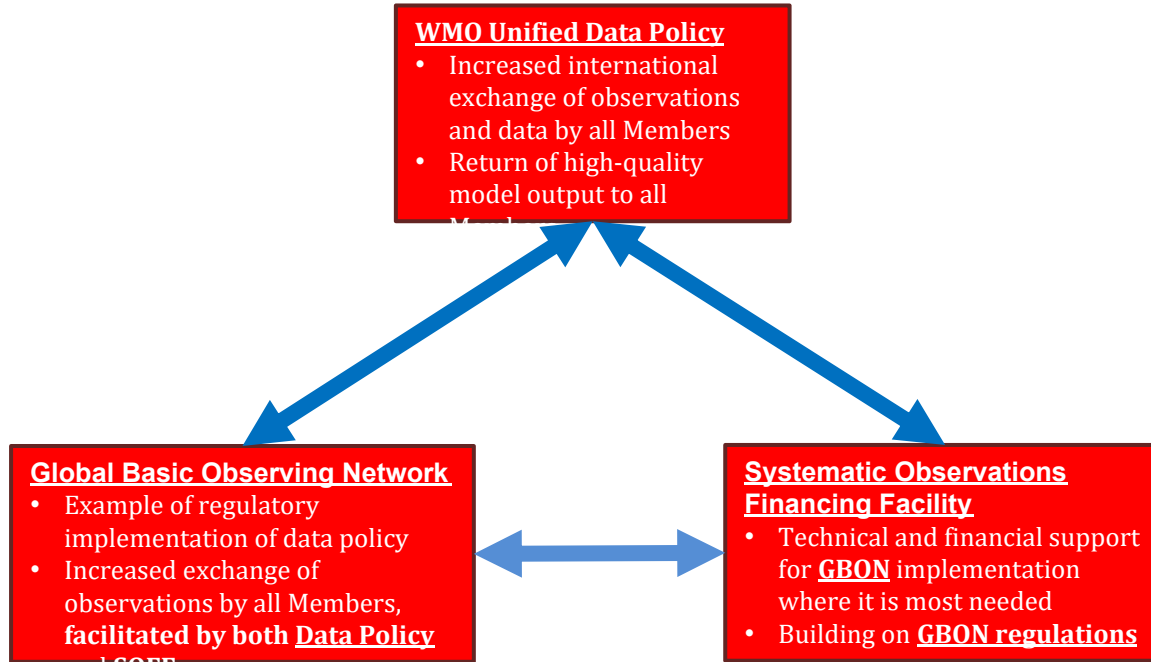


# International exchange of data is a major purpose of WMO WMO Convention, Art. 2 b

## What does it take to do this?

- I. **Requirements and gap analysis;**
- II. **Outreach and advocacy** – analyzing and explaining benefits of data exchange to stakeholders;
- III. **Data policy** – general commitment of national governments to exchange certain data for certain purpose(s);
  - WMO Unified Data Policy;
- IV. **Regulatory material** – agreement on specifics of data exchange (what, when, where, how, ...);
  - Global Basic Observing Network;
- V. **Financial and technical support if needed;** capacity development;
  - Systematic Observations Financing Facility;

# The World Meteorological Congress approved three linked strategic infrastructure initiatives



# New WMO Unified Data Policy (2021)

*Key changes with respect to Resolution 40 (1995)*

## Resolution 40 (1995)

1. Covers weather data only;
2. Two main categories of data:
  - Essential (*shall* be exchanged);
  - Additional (*should* be exchanged);
3. Specific "essential" datasets listed directly in Annex I to the resolution (with some reference also to RBSN);
4. "Free and unrestricted" exchange (term not defined in the Resolution);
5. Covers exchange of data between NMHSs



## Resolution 1 (2021)

1. Covers all WMO Earth system data: weather, climate, hydrology, ...
2. Two main categories of data:
  - Core (*shall* be exchanged);
  - Recommended; (*should* be exchanged);
3. Specifics on *core* and *recommended* data referred to Technical Regulations, primarily Manuals on WIGOS, GDPFS;
4. "Free and unrestricted" exchange (term defined directly in the Resolution, literal interpretation);
5. Addressed to Members, but covers exchange of data between all partners, including private sector, academia, etc.

## 1. Weather-related data

This section lists observational and other data necessary to support weather monitoring and prediction efforts of the WMO Members. Such data are generally exchanged in real or near-real time, depending on the specific application.

### 1.1 Core observational data:

#### 1.1.1 Surface-based:

Observations provided by the Global Basic Observing Network (GBON) and other observational data, as specified in the *Manual on the WMO Integrated Global Observing System* (WMO-No. 1160).

#### 1.1.2 Space-based:

- (a) Satellite data required in order to ensure the performance and quality of NWP output, as agreed with Members operating satellites or relevant satellite operators, and listed in the *Manual on the WMO Integrated Global Observing System* (WMO-No. 1160);
- (b) Satellite data required to support nowcasting applications including the generation of warning and advisory products, as agreed with Members operating satellites or relevant satellite operators, and listed in the *Manual on the WMO Integrated Global Observing System* (WMO-No. 1160).





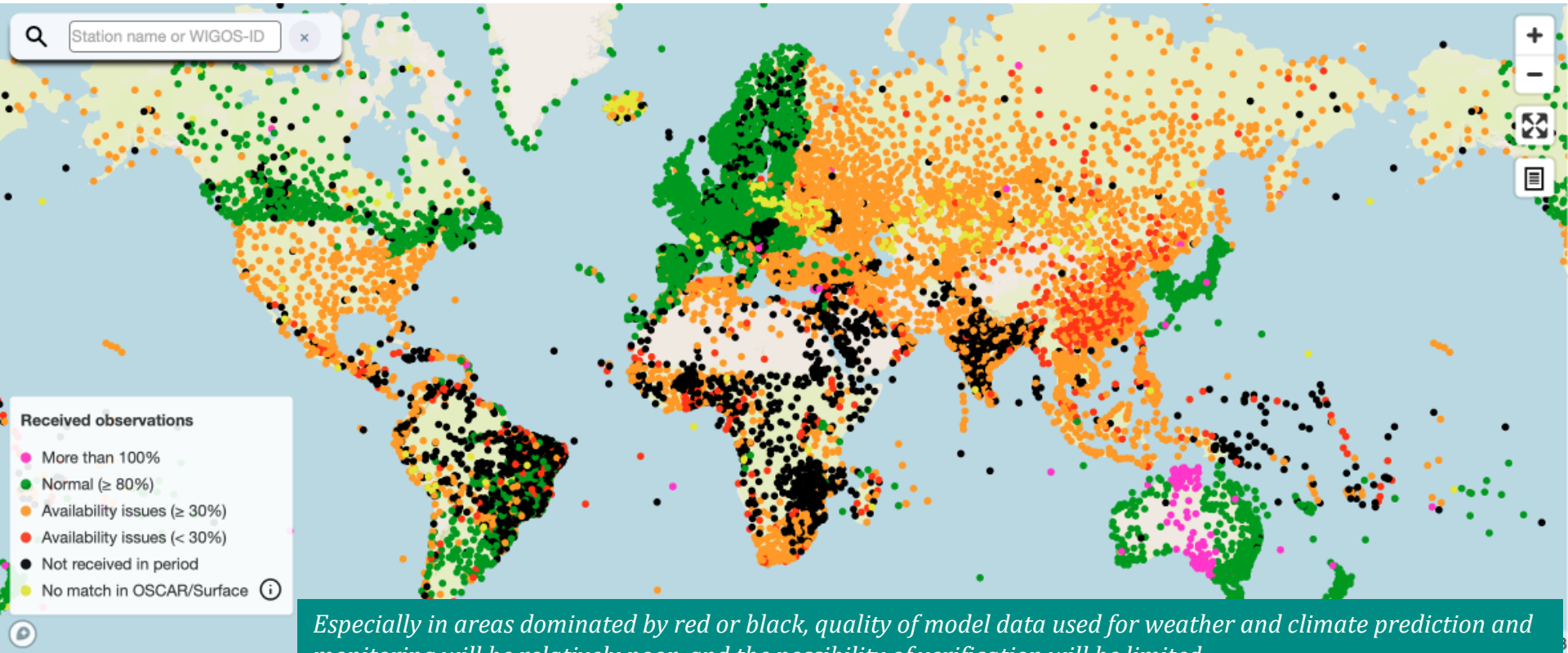
# Cg-Ext (2021)/Resolution 1, WMO Unified Data Policy

## *Current implementation activities*

- Regulatory Material
  - Manual on WIGOS
  - Manual on GDPFS
  - Other regulatory texts as needed (e.g. Services, GAW, IOC, ...)
- Guidance material
- Technical systems (WIS, OSCAR/Surface, WDQMS, GDPFS monitoring,...)
  - Compliance monitoring
- Outreach to international partners
- Support for national implementation
- ...

**Dr. Sue Barrell appointed as Data Coordinator under INFCOM-MG to oversee this, using the Implementation Roadmap for Resolution 1, WMO Unified Data Policy**

# 1. The persistent problem of insufficient observational data coverage

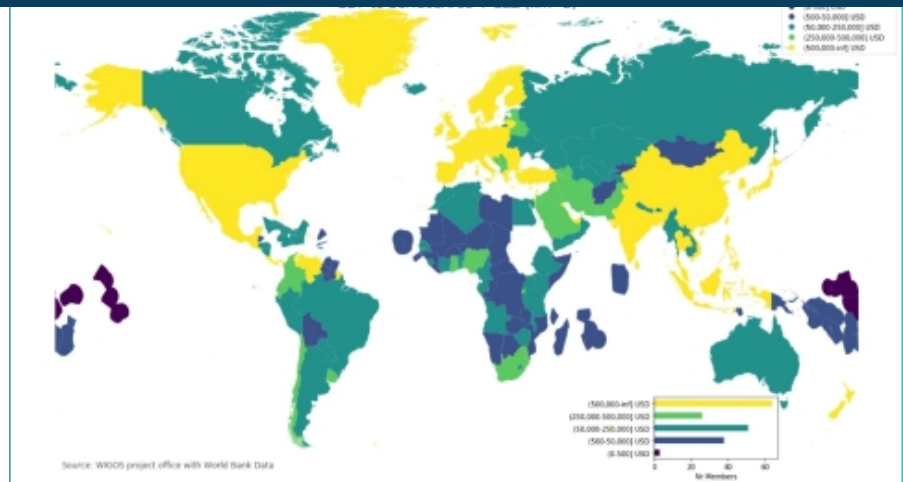
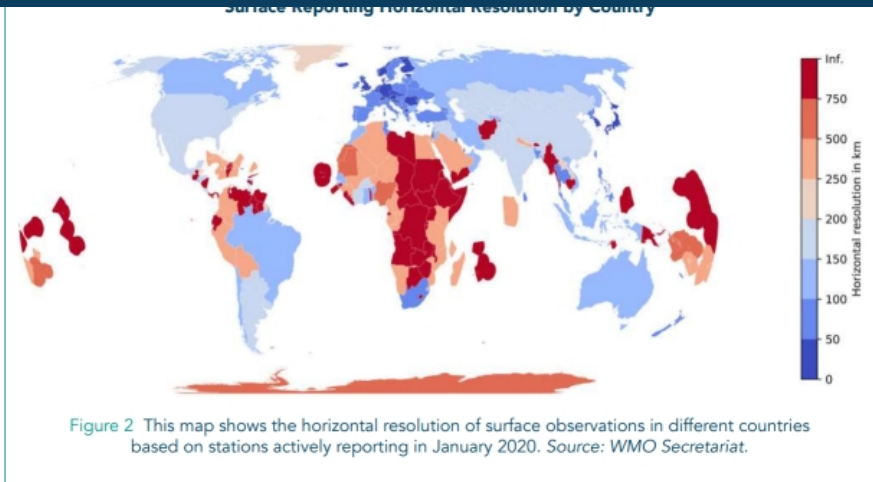


*Especially in areas dominated by red or black, quality of model data used for weather and climate prediction and monitoring will be relatively poor, and the possibility of verification will be limited*

## 2. Some reasons for persistent observational data gap

# Availability of observations versus national resources

WMO Convention and Paris Agreement implicitly assume that observations is solely a national responsibility



- **Ability to observe (left panel):** Observing systems in countries depicted in red fail to meet minimum observations requirements for weather and climate analysis and prediction
- **Ability to pay (right panel):** Affordability of observing responsibility (GDP/km<sup>2</sup> of surface area) of countries in yellow up to ten million times higher than for countries in dark blue



### 3. Global Basic Observing System; addressing the data gap (part 1)

## GBON regulations approved by WMO Congress in October 2021 (effective on January 1, 2023)



- GBON regulations establish commitment of all WMO Members to acquire and transmit in real time certain observations at fixed minimum horizontal density and at fixed minimum time frequency;
- GBON provides critical input to weather prediction and climate analysis needed for disaster preparedness, climate adaptation, etc.
- SOFF has as its sole purpose to provide technical and financial support to the implementation and operation of GBON where it is most needed



Implementation of GBON will be monitored using data from the WIGOS Data Quality Monitoring System (WDQMS; shown); GBON (and SOFF) metrics of success are simple and unequivocal: “green dots on the map”

## The Systematic Observation Financing Facility (SOFF)

- **New financing mechanism jointly created by WMO, UNDP, UNEP** to address a foundational problem in a systematic manner
- **Will provide financial and technical assistance** to SIDS and LDCs for long-term generation and international exchange of basic surface-based observations (GBON)

# SOFF value proposition

Global approach and  
data exchange as  
measure of success

- Optimal, detailed and **agreed global design and metrics** –GBON

Innovative finance

- **Results-based, long-term finance**, incl. operations and maintenance
- **Grants-only**, recognizing a global public good

Technical competency  
and coordination

- **Peer-to-peer technical assistance** by advanced met offices
- **Standardized, authoritative technical advice**



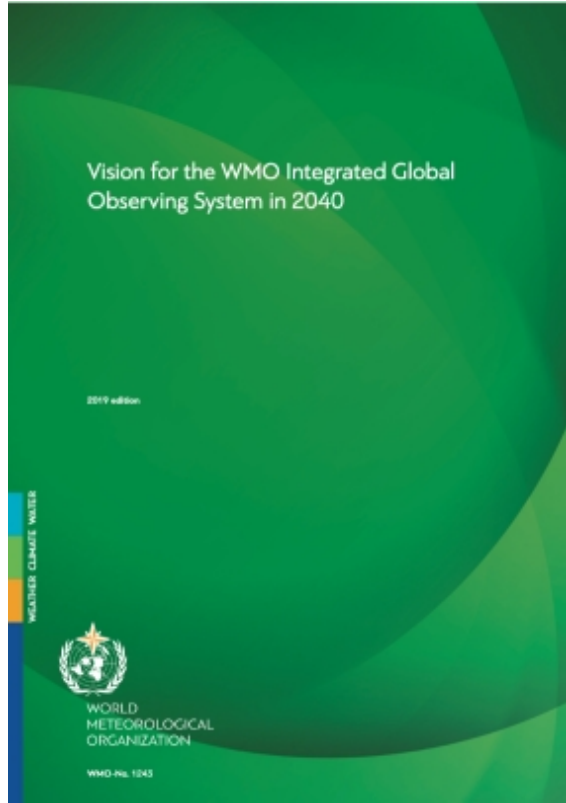
# WMO Infrastructure Commission preparations for GBON Implementation

Task Team established on GBON Implementation (TT-GBON); chaired by INFCOM President, representation from all SCs and all WMO Regions

TT-GBON ToRs includes oversight over the following major activity areas:

1. Establishing initial (January 2023) composition of GBON;
2. Definitions and temporal and spatial criteria for GBON compliance;
3. Updated global GBON gap analysis;
4. Updates to WMO station catalogue (OSCAR/Surface);
5. Updates to WDQMS and links to OSCAR/Surface;
6. Draft technical specifications for AWS, upper air and marine equipment and consumables for tendering purposes;
7. Updates to WIGOS Guide, e.g. on National GBON Gap Analysis and GBON Contribution Plan;
8. Reporting practices for hourly observations (BUFR templates, technical documentation);
9. Guidance material and training for SOFF peer advisors;
10. Technical criteria for initial SOFF prioritization;

# CGMS and Vision for WIGOS in 2040



- The “**Vision for WIGOS in 2040**” describes high-level targets to guide the evolution of WIGOS towards a desired, future state of the space- and in-situ based observing system
- WMO Strategy is driven by an Earth-system monitoring approach
  - Continued and increased need to support global NWP (underpinning most WMO application areas)
  - Support to GHG/Carbon monitoring and GSTs
  - Consider additional application areas with poor observations in remote areas e.g. hydrology
- Operational sustained observations are key
- **CGMS role in delivering the Vision is critical with an even stronger role foreseen for the future**



# WIGOS HLG document

- Full title: “High Level Guidance on the evolution of global observing systems during the period 2023-2027 in response to the Vision for WIGOS in 2040”
- Purpose of document
  - Provide guidance to WMO Members for key activities to be implemented within the next five years to accomplish the scenario of the Vision for the WMO Integrated Global Observing System (WIGOS) in 2040
  - Includes principles of general nature that should be considered for the development of implementation plans by Members, agencies, and other operators of observing networks
  - Covers observations for which NHMSes are directly responsible, as well as other observations for which NHMSes are stakeholders (including satellite systems)

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