#### WORLD METEOROLOGICAL ORGANIZATION

**WMO INTEGRATED GLOBAL OBSERVING SYSTEM
(WIGOS)**

**WIGOS OPERATIONAL (PLAN) 2020-2023**

Ver.2 (2019-01-23)



**EXECUTIVE SUMMARY**

This document describes the objectives and main planned activities for the initial part of the WIGOS Operational Phase, beginning with the eighteenth WMO financial period (2020-2023). The document outlines the initial operational capabilities of WIGOS to be in place by 2020, and it describes the main activities that are planned take place from 2020 and beyond in order to further develop the system during this next period. These activities are structured in six main priority areas, namely:

(1) National WIGOS implementation;

(2) Implementation of the Global Basic Observing Network and the Regional Basic Observing Networks;

(3) Operational deployment of the WIGOS Data Quality Monitoring System;

(4) Operational deployment of Regional WIGOS Centres;

(5) Further development of the Observing Systems Capability Analysis and Review (OSCAR) databases and integration with other system elements;

(6) Fostering a culture of compliance with the WIGOS technical regulations.

**1. WIGOS Priority areas for the 2020-2023 Financial Period**

Thanks to the development activities undertaken during the pre-operational phase (2016-2019), the WMO Integrated Global Observing System (WIGOS) has now matured to a level where it is ready to enter its initial operational phase commencing in 2020. However, there are significant remaining capability gaps and other challenges that will need to be addressed during the next phase of WIGOS in order for the system to fully serve all WMO application areas and help Members exploit the full potential of partnership agreements.

The development of WIGOS will thus need to continue during the eighteenth financial period (2020-2023), building upon and adding to the capabilities developed during the pre-operational phase.

The highest priorities for WIGOS during this period are:

1. National WIGOS implementation, including necessary capacity development efforts, partnership agreements and integration of observing systems for all application areas;
2. Implementation of the Global Basic Observing Network and the Regional Basic Observing Networks;
3. Operational deployment of the WIGOS Data Quality Monitoring System;
4. Operational implementation of Regional WIGOS Centres;
5. Further development of the Observing Systems Capability Analysis and Review (OSCAR) databases;
6. Fostering a culture of compliance with the WIGOS technical regulations.

High priority will be given to those activities that will assist Members in developing and implementing their national WIGOS plans, with special emphasis on the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States where the needs are the highest.

An important underlying issue is the need to implement sound practices, policies and capabilities within individual meteorological institutions in relation to the lifecycle management of data, to ensure that Members are able to manage their observations and data efficiently and effectively, to extract the value from the data in support of their services, and to integrate observations and data from diverse platforms and from external sources.

Central guidance provided by the Commission for Observations, Infrastructure and Information Systems (COIIS) and support provided by the WMO Secretariat will be important. During the the WIGOS operational phase, National Meteorological and Hydrological Services (NMHSs) are expected to take on greater responsibility for the national implementation of WIGOS and use the framework provided by WIGOS to exert leadership in the acquisition and management of meteorological observations at the national level. The NMHSs are thus expected to become the key integrators at the national level, both by strengthening their own observing systems in accordance with the WMO Technical Regulations, and by building national partnerships and providing national leadership based on their experience in the acquisition, processing and dissemination of observational data for environmental monitoring and prediction purposes.

**2. CURRENT STATUS OF WIGOS**

By the end of the WIGOS Pre-operational Phase in December 2019, the expected status of WIGOS can be summarized as follows:

**2.1 National WIGOS Implementation**

Almost all Members have had exposure to both the WIGOS concept and to the the specifics of the WIGOS Technical Systems via dedicated WIGOS Workshop arranged by the WMO Secretariat in all Regions. A majority of Members have had at least some level of activities in using the OSCAR/Surface database to manage their surface-based observing systems. A small number of countries have developed and approved their National WIGOS Implementation Plans. The bulk of the national WIGOS implementation work is expected to take place once the Regional WIGOS Centers are fully functional and once National WIGOS Implementation Plans have been developed and approved.

**2.2 WIGOS Regulatory and Guidance Material**

The Manual on WIGOS has undergone revision, in particular as concerns the WIGOS Metadata Standard and the description of the Global Cryosphere Watch. It has been expanded very significantly with new provisions describing a series of Regional Basic Observing Networks serving a large number of application areas at the global, regional and sub-regional levels, and an overarching Global Basic Observing Network to specifically serve Global NWP and climate analysis.

A guide to WIGOS has been developed and is being continually expanded with new material.

**2.3 Observing Systems Capabilities and Review (OSCAR) databases**

OSCAR/Requirements has been amended and updated to include all 14 currently recognized application areas. Work toward completing the actual requirements tables is ongoing.

OSCAR/Space 2.0 has been deployed and is widely used by the space agencies and the user community. A strategy for the longer-term evolution of this database and for maintaining both the IT infrastructure and the information content is under development.

The OSCAR/Surface database was operationally deployed in 2016, replacing WMO Pub. 9 Vol. A, while offering much more extensive metadata information for far more stations than those included in Vol. A.

**2.4 WIGOS Data Quality Monitoring System**

The concept for the overarching WDMS is relatively mature. A pilot project using the existing monitoring capabilities of the global NWP centers for the surface component of the Global Observing System is being transitioned to pre-operational status, and has already demonstrated the value of such a system

**2.5 Regional WIGOS Centers**

Informal agreements to establish two Regional WIGOS Center Pilot Projects in Region I have been made with the NMHS’s of Kenya, Tanzania, and Morocco.

Two formal proposals to establish Regional WIGOS Centers have been received from China and Japan, respectively.

A Virtual RWC was approved by RA-III-17, with distributed functions involving two Members, Brazil and Argentina, and a coordination committee. Detailed plans for the operational implementation are maturing for both Members to cover the mandatory functions, as well as some optional functions.

A concept for a distributed Regional WIGOS Center for RA-V was approved by RA-V-17.

A formally approved Regional WIGOS Center pilot project with partial functionality has been established in Region VI.

**3. KEY DELIVERABLES AND OUTCOMES FOR THE 2020-2023 PERIOD**

The work to be undertaken during the eighteenth financial period (2020-2023) is driven by (i) the desire to fully develop the key WIGOS networks, namely the Global Basic Observing Network (GBON) and the Regional Basic Observing Networks (RBONs), (ii) the need to further mature the technical tools so that WIGOS can support all official WMO application areas, and (iii) to strengthen the regional support of national WIGOS implementation.

The projected status of WIGOS at the end of the 18th WMO financial period in 2023 can be described via the following two elements:

***Expected deliverables***: Which elements must be completed, and what are the necessary operational functionalities; and

***Expected outcomes***: What is the expected impact of WIGOS, and in particular, what are the expected benefits to the WMO Members.

**3.1 Expected Deliverables**

By the end of the 2020-2023 financial period, the WIGOS framework at the global, regional, and national levels will have been completed, encompassing:

* The Global Basic Observing Network (GBON) will have been implemented;
* An Implementation Plan listing near- and medium-term actions to be taken by observing system developers in response to the Vision for WIGOS in 2040 will have been developed;
* Regional Basic Observing Network (RBON) will have been implemented in all Regions;
* Regional WIGOS Centres will have been established and functional in each Region, and all Members will have affiliated themselves with one RWC;
* National WIGOS Implementation Plans will have been adopted/approved by majority[[1]](#footnote-1) of WMO Members;
* National WIGOS governance mechanism will have been established by a majority of Members;
* National WIGOS partnership agreements for integration and open-sharing of observations across all WIGOS component observing systems (WMO and partners) implemented and used by majority of Members;
* WIGOS Station Identifiers: technical issues resolved and new system adopted; policy for issuing IDs defined, adopted and implemented by Members;
* The WIGOS Data Quality Monitoring System (WDQMS) will be fully operational for all essential real-time components of the Global Observing System; national processes for acting on issues and incidents received from the WDQMS will be in place; The WDQMS will have at least functioning pilots for all WIGOS components.
* All Observing Systems Capability Analysis and Review (OSCAR) databases fully operational and updated; a majority of Members will be actively maintaining their metadata in the system; a gap analysis support tool or function will have been implemented.

**3.2 ExpectedOutcomes**

* Enhanced WMO Integrated Global Observing System delivering observations to support all WMO Priorities, Programmes and application areas;
* Increased visibility and strengthened role of NMHSs at their national level;
* Increased integration and open sharing of observations from WMO and non-WMO sources across national and regional boundaries;
* Enhanced capabilities to identify gaps in global, regional, subregional, and national observing systems in context of user needs, issues, etc.;
* Enhanced cooperation with partners at the national and regional levels;
* Enhanced compliance with WMO Technical Regulations;
* Improved human and technical capacity of all WMO Members for planning, implementation and operation of WIGOS;
* Improved availability and quality of WIGOS observational data and metadata.

**3.3 Planning**

It is proposed that a *Plan for the WIGOS Initial Operational Phase* (the 2020-2023 period) be developed by the Commission for Observations Infrastructure and Information Systems and submitted to EC-72 for its approval. This Plan will guide the development and initial operation of WIGOS over the coming four years at the global and regional levels, it will help set priorities and define targets, and will serve as a reference for Members in the development of their National WIGOS Implementation Plans. Some proposed elements of this plan will be, in course, provided in the Annex to this document.

**4. ACTIVITIES**

A number of specific activities supporting the milestones laid out within the six proposed priority areas of the WIGOS Operational Phase listed in Section 1 are being planned for the 2020-2023 period. An activity table with identified deliverables/outcomes, timelines, responsibilities, resources will be developed and maintained by the responsible department in the WMO Secretariat.

**5. CAPACITY DEVELOPMENT**

Capacity development (CD) will remain a critical activity area during the WIGOS Operational Phase, and regional and national needs in this area will be one of the main drivers of the expenditure of resources during the 2020-2023 financial period.

It should be noted that it is difficult to distinguish between specific CD efforts and WIGOS as a whole, since a majority of WIGOS activities (development of guidance material, training, support through Regional WIGOS Centres) are in effect capacity development efforts.

The overarching goal of the WIGOS CD effort is to help equip the staff of the NMHS with the requisite understanding, skills, information and knowledge to enable them to implement WIGOS at a national level, including the development of national partnerships. This will be supported both through the development of guidance material listed in Annex and via the outreach efforts outline in Section 6.

Close collaboration with international, regional and sub-regional development organizations (e.g. the World Bank, GEF, ADB) is needed in order to ensure that donors will benefit from and provide benefit to WIGOS.

**6. COMMUNICATIONS AND OUTREACH**

Communications and Outreach (C&O) will also play important roles also during the 2020-2023 financial period, both internally and externally.

Internally to the WMO community, there is a continuing need to educate and interact with the Permanent Representatives, partly due to natural turn-over, partly due to the fact that as WIGOS matures and gains visibility, the expectations from the WMO Members tend to increase. In addition to the PRs, there is also a need to engage with their observing system managers, partly to keep them abreast of WIGOS developments, partly to learn from their experiences with national and regional WIGOS development and implementation efforts.

Externally, it is important to engage with partners, e.g. other international organizations, NGOs and commercial entities, both to keep them informed about the WIGOS development and to foster the development of partnerships at all levels.

A number of generic C&O activities are planned:

(a) A WIGOS newsletter will be published and disseminated on a regular schedule (quarterly), targeting a broad audience with varying levels of technical knowledge;

(b) As far as possible, WIGOS side events will be arranged at all WMO constituent body sessions;

(c) The set of communications/outreach material to be showcased and shared with external partners at a variety of events (WMO constituent body sessions, national and international scientific conferences, meetings of GEO, GFCS, etc.);

(d) Continuous updates of the WIGOS portal with presentations, articles, publications, examples of success stories, case studies, lessons learned, and other material for use by Members and their partners.

**7. GOVERNANCE, MANAGEMENT AND EXECUTION**

Similar to the WIGOS implementation and pre-operational phases, the development and operations of WIGOS during the 2020-2023 phase will follow the decisions by the World Meteorological Congress, with subsequent governance assigned to the Executive Council and its Technical Coordination Committee, and (assuming the WMO Governance Reform as proposed by EC is approved by Cg-18) the Commission for Observation, Infrastructure and Information Systems (COIIS).

Expert Teams or Study Groups established under COIIS will be responsible for guiding specific aspects of WIGOS development, e.g. regulatory and guidance material, observing methodology network design, monitoring, various integration issues, etc. This will be similar to the roles now played by various existing Technical Commissions jointly with ICG-WIGOS, but with a more efficient working structure and less coordination overhead.

**7.1 Global level**

The management and execution functions will be carried out by the WMO Secretariat, following the guidance provided by delegate bodies as described above. Support to all delegate body discussions regarding WIGOS, as well as the work of Study Groups, Expert Teams and various ad hoc structures will be provided by the WMO Secretariat.

The WIGOS technical systems, primarily OSCAR and WDQMS, will continue to require strong management and coordination support. Many Members and partner organizations are willing and able to contribute to the activities, but it is anticipated that the global coordination role will have to be taken care of by the WMO Secretariat.

Also the Regional WIGOS Centers will continue to rely on strong support from the WMO Secretariat as described in the next section.

**7.2 Regional Level**

All regional associations are expected to establish regional WIGOS related teams to provide governance and oversight at the regional level. Their specific roles should be:

(a) Regularly (at least annually) review the WIGOS implementation efforts in their respective Region;

(b) Guide and prioritize the activities listed in their R-WIP;

(c) Facilitate and coordinate regional WIGOS projects;

(d) Submit updates to the R-WIP to the regional association management group for approval;

(e) Fostering the establishment of Regional WIGOS Centre(s) in the respective Region, providing full regional coverage, by 2022;

(f) Guide the work of Regional WIGOS Centre(s) when established in the respective Region;

(g) Provide regional support to Members in accordance with the R-WIP and in a response to their requests (subject to availability of resources/funds);

(h) Oversee the establishment of the Regional Basic Observing Network in the respective Region.

(i) Possible regional mechanisms or strutures for allocation of WIGOS station IDs

According to the Regional WIGOS Center concept developed during the Pre-operational Phase, much of the support for the WIGOS implementation activities at the regional level would be provided by the Regional WIGOS Centres. However, based on the initial experience with the Regional WIGOS Center pilots during the Pre-operational Phase, it has become clear that the Regional WIGOS Centers will require a substantial amount of external support and strong global coordination unit in order for this concept to work. It is therefore expected that the Secretariat will have to strengthen its support for these entities.

**7.3 National Level**

The following activities are envisaged to take place at a national level:

(a) Development of a National Observing Strategy;

(b) Development of a National WIGOS Implementation Plan (N-WIP), building on the National Observing Strategy;

(c) Establishment of national WIGOS governance, coordination and implementation mechanisms and team;

(d) Identification and mitigation of critical gaps in the WIGOS component observing systems (national RRR process implementation);

(e) Sustained and standardized operation of national observing networks/systems;

(f) Operational implementation of WIGOS Metadata Standard through populating the OSCAR/Surface database and keeping its content up-to-date;

(g) Capacity development of staff managing and operating national observing networks/systems;

(h) Development of national WIGOS partnership agreements for integration and open-sharing of observations across all WIGOS component observing systems (WMO and partners);

(i) Operational implementation of national process for acting on issues and incidents received from the WDQMS in place;

(j) Adoption and implementation of national policy for issuing WIGOS Station IDs.

**8. MONITORING AND EVALUATION**

In order to foster the general culture of compliance with WMO Regulations and ensure optimal performance of the system, all aspects of WIGOS implementation will be monitored and evaluated using quantitative and objective methodology wherever possible. The WDQMS will be central to monitoring the implementation and performance of the observing networks themselves, but also other aspects of the WIGOS framework will be tracked, e.g. the implementation of the metadata standard, the engagement with Regional WIGOS Centers, the maturity of the national planning efforts, etc.

To specific metrics and tools for this will be described in the *Plan for the WIGOS Initial Operational Phase*.

**9. RESOURCES**

The resourcing of WIGOS be further detailed in the *Plan for the WIGOS Initial Operational Phase*, which will be developed only after the budget decision has been meade at Cg-18.

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1. “Majority” in this context means more than 75 % of WMO Members [↑](#footnote-ref-1)