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| WEATHER CLIMATE WATER | **World Meteorological Organization**  **COMMISSION FOR OBSERVATION, INFRASTRUCTURE AND INFORMATION SYSTEMS**  **Third Session** 15 to 19 April 2024, Geneva | **INFCOM-3/Doc. 8.1(4)** |
| Submitted by: Chair  16.IV.2024  **DRAFT 2** |

**AGENDA ITEM 8: TECHNICAL DECISIONS**

**AGENDA ITEM 8.1: WMO Integrated Global Observing System – networks**

# Global basic observing network: implementation and expansion including the systematic Observations Financing Facility, metadata AND TOOLS

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| **Summary** |
| **Document presented by:** the Chair of the Standing Committee on Earth Observing Systems and Monitoring Networks (SC-ON)  **Strategic objective 2024–2027:** 2.1 Optimize the acquisition of Earth system observation data through the WMO Integrated Global Observing System (WIGOS)  **Financial and administrative implications:** Within the parameters of the Strategic and Operating Plans 2024–2027  **Key implementers:** INFCOM, in collaboration with Members, RAs, and Systematic Observations Financing Facility (SOFF)  **Time frame:** 2024–2025  **Action expected:** Review the proposed draft recommendation and two draft decisions |

# GENERAL CONSIDERATIONS

### I. Global Basic Observing Network (GBON) Implementation and the Systematic Observations Financing Facility (SOFF)

GBON compliance status for surface and upper-air stations over land

1. The compliance status and reporting for GBON surface and upper-air stations over land is now available. A dedicated web tool based on information from the WMO Integrated Global Observing System (WIGOS) Data Quality Monitoring System (WDQMS) web tool will be launched at INFCOM-3, and is based on the criteria found in Section 11.4 of the [*Guide to the WMO Integrated Global Observing System*](https://library.wmo.int/records/item/55696-guide-to-the-wmo-integrated-global-observing-system?offset=3) (WMO-No. 1165). A summary of Member compliance is provided in [INFCOM-3/INF. 8.1(4)](https://meetings.wmo.int/INFCOM-3/InformationDocuments/Forms/AllItems.aspx), along with further information on SOFF.
2. As of January 2024, some Members are GBON compliant at standard and at (recommended) high horizontal resolution. Another significant fraction of Members meets GBON standard horizontal resolution requirements based on reporting stations but need to increase the frequency of reporting to be fully GBON compliant. Yet, there remain significant gaps in GBON compliance, most notably in Least Developed Countries (LDCs), Small Island Developing States (SIDS), and Lower Middle-Income Countries. Compliance monitoring is updated on a quarterly basis and its status is dynamic.

GBON compliance guidance for surface marine stations in Exclusive Economic Zones (EEZ)

1. The [*Manual on the WMO Integrated Global Observing System*](https://library.wmo.int/records/item/55063-manual-on-the-wmo-integrated-global-observing-system?offset=1)(WMO-No. 1160) contains a provision for GBON surface marine meteorological stations/platforms within Members’ EEZ, paragraph 3.2.2.10). INFCOM is invited to adopt compliance criteria for these stations/platforms through a revision of the [*Guide to the WMO Integrated Global Observing System*](https://library.wmo.int/records/item/55696-guide-to-the-wmo-integrated-global-observing-system?offset=3) (WMO-No. 1165), proposed in [INFCOM-3/Doc. 8.1(2)](https://meetings.wmo.int/INFCOM-3/_layouts/15/WopiFrame.aspx?sourcedoc=%7b496A6FD2-7200-4EFF-9ADA-A29CBA44C24F%7d&file=INFCOM-3-d08-1(2)-WIGOS-GUIDE-AND-RWC-GUIDELINES-UPDATE-draft1_en.docx&action=default). This sets the framework for preparation of a WMO global gap analysis and compliance monitoring for GBON surface marine stations/platforms in EEZs.

SOFF operations and plan for 2024–2025

1. The SOFF provides innovative, long-term finance and technical assistance for sustainable progress towards GBON compliance, as UN Multi-Partner Trust Fund created by WMO, UNEP and the United Nations Development Programme (UNDP). The initial scope of SOFF financing is focused on surface and upper-air GBON land stations, the sustainability of operating capacity and reporting, with priority for support to LDCs and SIDS. Since opening for business in June 2022, the SOFF Steering Committee has approved funding for the readiness phase in 60 beneficiary countries, and for the investment phase in six countries, with an average of only 3.7 months between programming and readiness funding approval.
2. By January 2024 SOFF secured US$ 83 million in pledges, mobilized in less than two years, but a US$ 117 million funding gap remains to deliver on its work programme by June 2025, as approved by the SOFF Steering Committee. The SOFF resource mobilization pace to date does not allow SOFF to respond to strong country demand – 39 country support requests have not been considered yet, and many of the countries already programmed and receiving SOFF Readiness support are moving to the SOFF Investment phase.
3. SOFF has mobilized the work of 20 Members as peer advisors, and 60 Members as beneficiary countries since the start of its work in June 2022. As work progresses from the readiness to investment phases of SOFF, these Members have provided the WMO and SOFF Secretariats with valuable feedback on both WMO GBON Technical Regulations and the SOFF model in supporting GBON.

Expected action: GBON compliance and SOFF

1. Based on the above, INFCOM may wish to adopt [Draft Recommendation 8.1(4)/1 (INFCOM-3)](#_Draft_Recommendation_8.1(4)/1) with an annexed draft resolution for consideration by EC-78 that encourages Member GBON compliance, urges Members to consider contributing to SOFF, and requests SOFF via the WMO Secretary-General to consider expansion of its support to cover surface marine GBON stations/platforms in EEZs.

### II. Global Basic Observing Network (GBON) Expansion

1. As part of [Resolution 2 (Cg- Ext.(2021))](https://library.wmo.int/doc_num.php?explnum_id=11113/#page=29), Congress requested INFCOM to continue exploring potential paths for the future evolution of GBON into broader Earth system domains and disciplines beyond its current scope of support for global numerical weather prediction (NWP) and climate analysis. Congress also adopted [Resolution 4 (Cg-Ext.(2021))](https://library.wmo.int/viewer/57850?medianame=1281_en_#page=36&viewer=picture&o=bookmark&n=0&q=) – WMO Vision and Strategy for Hydrology and its associated Plan of Action.

Adopted principles for GBON expansion

1. The president of INFCOM with support of Standing Committee on Earth Observing Systems and Monitoring Networks (SC-ON), and in consultation with the Hydrological Coordination Panel (HCP), prepared a concept note for study on the potential integration of additional hydrological and cryosphere variables into GBON, which was adopted by [Decision 6 (EC-75)](https://library.wmo.int/viewer/58160/?offset=2#page=65&viewer=picture&o=bookmark&n=0&q=), and included principles for expansion of GBON into other hydrological and cryosphere domains:

*It should be noted that the GBON concept arose from the Rolling Review of Requirements (RRR) Process administered by JET-EOSDE and its predecessor under the former Commission for Basic Systems. This provides a framework for considering the future expansion of GBON to include additional variables.*

*The analysis on how, when and in which direction to expand GBON to include additional variables should begin with an analysis starting from the following list of guiding questions:*

1. *What is the main driver behind the need to incorporate additional hydrological and cryosphere variables in GBON? Is it within the scope of the current purpose of GBON as approved by Cg-Ext(2021), or will it require an extension of the scope?*
2. *Will the proposed additional GBON variables be supplying necessary input data for global NWP and climate reanalysis? If yes, has it been documented via the RRR, or is there a likelihood that it can be?*
3. *Is there sufficient clarity on the observing remit of the WMO Members for the variables in question?*
4. *Is there a sufficient level of common understanding and agreement about the data requirements to specify detailed network characteristics?*
5. *Is there a broadly understood and agreed requirement among the vast majority of the WMO Members for mandatory global exchange of hydrological and cryosphere data?*
6. The Task Team on EarthHydroNet has been examining GBON expansion to hydrological variables, with progress reported in the president of INFCOM’s report ([INFCOM-3/ Doc. 2](https://meetings.wmo.int/INFCOM-3/English/Forms/AllItems.aspx) and [INFCOM-3/INF. 2](https://meetings.wmo.int/INFCOM-3/InformationDocuments/Forms/AllItems.aspx)).
7. The adoption of the Technical Regulations for GBON by Members through [Resolution 2 (Cg-Ext(2021))](https://library.wmo.int/idviewer/57850/29) relied on a number of key factors that should be considered in proposed future expansion. These include clearly defined requirements for a WMO application area for global public good, widely available, and proven observation stations/platforms and technologies, demonstrated willingness for data exchange through WMO mechanisms, the availability of good quality monitoring for compliance, a significant existing level of Member compliance, and documented gaps which SOFF has been designed to help Members fill.

SOFF expansion and long-term vision

1. The SOFF Steering Committee, at its fifth meeting (20 and 21 June 2023) endorsed a “SOFF within the Multilateral Climate Finance Architecture: Role, Actions, Vision” document ([SOFF Decision 5.5](https://www.un-soff.org/document/decision-5-5-soff-within-the-multilateral-climate-finance-architecture/)), with potential axes of SOFF expansion and a long-term vision. A first axis would be consideration of phased support to Middle-Income Countries (MICs), which will be examined by the SOFF Steering Committee in 2024.

*“The longer-term vision of SOFF is for it to serve as the financial instrument for the implementation of GBON as GBON continues to evolve based on WMO Members’ decisions. While surface-based weather and climate observations compliant with GBON in SIDS and LDCs are for now the main focus of SOFF, with a possible expansion to cover MICs, there are other areas of potential expansion which SOFF needs to acknowledge as part of a long-term vision”.*

1. These include expansion to GBON marine-based observations, and potential future GBON expansion into other observing domains and for other application areas, including those covering climate and early warning.

Expected action: GBON expansion

1. Based on the above, INFCOM may wish to adopt draft [Decision 8.1(4)/1 (INFCOM-3)](#_Draft_Decision_8.1(4)/1) to prepare a road map for GBON expansion for consideration by Cg-Ext(2025) and to prepare amended Technical Regulations for consideration by Cg-20 in 2027.

### III. GBON Metadata and Tools

1. Consultation with Members in the adoption of [Resolution 21 (Cg-19)](https://library.wmo.int/idviewer/67177/203) on GBON Implementation revealed occasional differences in Member opinion on location metadata on GBON stations held in the WIGOS Information Resource tools (described in the [*Manual on the WMO Integrated Global Observing System*](https://library.wmo.int/index.php?lvl=notice_display&id=19223) (WMO-No. 1160), Attachment 2.3) and its outputs.
2. [Resolution 21 (Cg-19)](https://library.wmo.int/idviewer/67177/203) on GBON Implementation considered that “*the Convention of WMO … gives it no mandate to express any opinion whatsoever concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries”.* It recalled “*that GBON consists of stations operated by Members which share the data as defined in the* [*Manual on the WMO Integrated Global Observing System*](https://library.wmo.int/index.php?lvl=notice_display&id=19223) *(WMO-No. 1160), paragraph 3.2.2 on GBON*”, and requested INFCOM to *“continue to develop the technical guidelines, processes and procedures needed to ensure the expedient and efficient implementation of GBON, to prepare for the effective performance and compliance monitoring of GBON, and report to the Executive Council”.*

GBON metadata sharing is required and under the authority of the Permanent Representative

1. The [*Manual on the WMO Integrated Global Observing System*](https://library.wmo.int/index.php?lvl=notice_display&id=19223) (WMO-No. 1160) stipulates that, inter alia:

* Members shall make available the metadata of their GBON observing stations/ platforms in accordance with the provisions of Section 2.5 (paragraph 3.2.2.21)
* WIGOS metadata in the Observing Systems Capability Analysis and Review Tool ([OSCAR](https://oscar.wmo.int/surface/#/)) are under the authority of the Permanent Representatives with WMO (Attachment 2.3 The WIGOS Information Resource, Section 4)

1. [*The WIGOS Metadata Standard*](https://library.wmo.int/records/item/55626-wigos-metadata-standard) (WMO-No. 1192) referred to in Section 2.5 of the WIGOS Manual includes the WIGOS identifier, station/platform metadata that specifies the observing facility at which the observation is made, as well as ownership and data policy metadata that specifies who is responsible for the observation.

A key metadata for quality management is the supervising Member for an observation

1. The WIGOS Quality Data Monitoring System (WDQMS), described in Attachment 2.4 of the WIGOS Manual, has the objective to support Members in ensuring quality control of WIGOS observations. The Incident Management Function of WDQMS raises incident tickets which must be ultimately resolved by the data providers – the supervising organization for the observation – making this a key piece of WIGOS metadata. However, the link between supervising organization and Member is not always clearin WIGOS metadata*.*

***Expected action: GBON metadata and tools***

1. Based on the above, INFCOM may wish to adopt the draft [Decision 8.1(4)/2 (INFCOM-3)](#_Draft_Decision_8.1(4)/2) to consider examining *[Republic of Korea]* the WIGOS Metadata Standard and WIGOS Information Resource tools.

# DRAFT RECOMMENDATIONS

## Draft Recommendation 8.1(4)/1 (INFCOM-3)

### Global Basic Observing Network (GBON) Implementation and the Systematic Observations Financing Facility (SOFF)

THE COMMISSION FOR OBSERVATION, INFRASTRUCTURE AND INFORMATION SYSTEMS,

**Recalling** [Resolution 2 (Cg-Ext(2021))](https://library.wmo.int/doc_num.php?explnum_id=11113/#page=29) – Amendments to the Technical Regulations related to the establishment of the Global Basic Observing Network,

**Having considered** the draft amendments to the to the [*Manual on the WMO Integrated Global Observing System*](https://library.wmo.int/index.php?lvl=notice_display&id=19223) (WMO-No. 1160), provided in the annex to Draft Resolution ##/1 EC-78 of [Recommendation 8.1(1)/1 (INFCOM-3)](https://meetings.wmo.int/INFCOM-3/_layouts/15/WopiFrame.aspx?sourcedoc=%7b08125CC0-7434-4BC4-AC50-4A395C77B61D%7d&file=INFCOM-3-d08-1(1)-AMENDMENTS-WIGOS-MANUAL-draft1_en.docx&action=default),

**Taking note** of the [Systematic Observations Financing Facility (SOFF) Action Report 2023](https://www.un-soff.org/soff-action-report-2023/),

**Having examined** the draft updates to the [*Guide to the WMO Integrated Global Observing System*](https://library.wmo.int/records/item/55696-guide-to-the-wmo-integrated-global-observing-system?offset=3) (WMO-No. 1165), provided in the annex to [Draft Resolution 8.1(2)/1 (INFCOM-3)](https://meetings.wmo.int/INFCOM-3/_layouts/15/WopiFrame.aspx?sourcedoc=%7b496A6FD2-7200-4EFF-9ADA-A29CBA44C24F%7d&file=INFCOM-3-d08-1(2)-WIGOS-GUIDE-AND-RWC-GUIDELINES-UPDATE-draft1_en.docx&action=default), related to compliance monitoring of GBON surface marine stations in EEZs,

**Recommends** to the Executive Council to encourage GBON compliance, to urge Members to provide support to the SOFF United Nations Multi-Partner Trust Fund, and to encourage the expansion of SOFF as resources permit to [*USA*] support [*USA*] marine surface stations in EEZsthroughthe draft resolution provided in the [annex](#Annex_to_draft_Recommendation) to the present Recommendation.

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## Annex to draft Recommendation 8.1(4)/1 (INFCOM-3)

**Draft Resolution ##/1 (EC-78)**

THE EXECUTIVE COUNCIL,

**Recalling** [Resolution 2 (Cg-Ext(2021))](https://library.wmo.int/doc_num.php?explnum_id=11113/#page=29) – Amendments to the Technical Regulations related to the establishment of the Global Basic Observing Network, and the GBON requirements as listed in the [*Manual on the WMO Integrated Global Observing System*](https://library.wmo.int/records/item/55063-manual-on-the-wmo-integrated-global-observing-system?offset=2) (WMO-No. 1160), [section 3.2.2](https://library.wmo.int/doc_num.php?explnum_id=11157#page=77) GBON,

**Noting** the GBON compliance criteria identified in the [*Guide to the WMO Integrated Global Observing System*](https://library.wmo.int/records/item/55696-guide-to-the-wmo-integrated-global-observing-system?offset=3) (WMO-No. 1165),

**Having considered** the draft amendments to the to the [*Manual on the WMO Integrated Global Observing System*](https://library.wmo.int/records/item/55063-manual-on-the-wmo-integrated-global-observing-system?offset=2) (WMO-No. 1160), provided in the annex to Draft Resolution ##/1 EC-78 of [Recommendation 8.1(1)/1 (INFCOM-3)](https://meetings.wmo.int/INFCOM-3/_layouts/15/WopiFrame.aspx?sourcedoc=%7b08125CC0-7434-4BC4-AC50-4A395C77B61D%7d&file=INFCOM-3-d08-1(1)-AMENDMENTS-WIGOS-MANUAL-draft1_en.docx&action=default),

**Taking note** of the [SOFF Action Report 2023](https://www.un-soff.org/soff-action-report-2023/),

**Noting** that the construction, operation, and maintenance of ocean-based observation stations is much more difficult than land-based stations, *[China]*

**Encourages** Members to improve their station-level and Member-level compliance with GBON provisions;

**Further encourages** Members to operate surface marine stations in their Exclusive Economic Zones; [*China*]

**Urges** Members to consider financial contributions to the Systematic Observations Financing Facility (SOFF) United Nations Multi-Partner Trust Fund to close critical GBON gaps;

**Requests** the Secretary-General to invite the SOFF Steering Committee to consider an expansion of the present scope of SOFF to cover surface marine GBON stations/platforms in EEZs;

**Further requests** the Secretary-General invite the SOFF Steering Committee to work with INFCOM in developing appropriate mechanisms to bring Member feedback for their joint consideration.

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See [INFCOM-3/INF. 8.1(4)](https://meetings.wmo.int/INFCOM-3/InformationDocuments/Forms/AllItems.aspx) for more information.

# DRAFT DECISIONS

## Draft Decision 8.1(4)/1 (INFCOM-3)

### Global Basic Observing Network (GBON) Expansion

**The Commission for Observation, Infrastructure and Information Systems decides:**

To request the Standing Committee on Earth System Observing Systems and Monitoring Networks (SC-ON) to:

(1) Prepare a phased road map for GBON development and expansion which balances the need to sustainably deliver an initial GBON network to the required specification against the aspiration to broaden the scope of GBON into other domains and variables *[UK]:*

1. Continue ongoing work focused on hydrological variables;
2. Within the present scope of GBON for global numerical weather prediction and climate reanalysis by:

(i) Exploring potential GBON ocean and cryosphere variables in collaboration with Global Ocean Observing System (GOOS), AG-Ocean, and AG-GCW, and

(ii) Considering changes to the Technical Regulations that would have high impact for climate reanalysis, maximizing links with the Global Climate Observing System (GCOS);

1. Considering an expansion of GBON to the climate monitoring application areas, in cooperation with GCOS, using the concept of Essential Climate Variables (ECVs), and in cooperation with the Global Greenhouse Gas Watch (G3W);
2. Emphasizing contribution to WMO’s Strategic Plan 2024–2027 and WMO priorities in considering additional application areas for GBON;

(2) Prepare a recommendation for Cg-Ext(2025) with this road map, with a target of proposing amended Technical Regulations relevant to GBON at Cg-20 in 2027.

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Decision justification:

[Resolution 2 (Cg-Ext(2021))](https://library.wmo.int/viewer/57850/?offset=2#page=29&viewer=picture&o=bookmark&n=0&q=) - Amendments to the Technical Regulations related to the establishment of the Global Basic Observing Network,

[Resolution 4 (Cg-Ext(2021))](https://library.wmo.int/viewer/57850/?offset=2#page=36&viewer=picture&o=bookmark&n=0&q=) - WMO Vision and Strategy for Hydrology and its associated Plan of Action,

[Decision 6 (EC-75)](https://library.wmo.int/viewer/58160/?offset=#page=65&viewer=picture&o=bookmark&n=0&q=) - Study on the potential integration of additional hydrological and cryosphere variables into the Global Basic Observing Network.

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## Draft Decision 8.1(4)/2 (INFCOM-3)

### Global Basic Observing System Metadata and Tools

**The Commission for Observation, Infrastructure and Information Systems decides:**

To request the Standing Committee on Earth System Observing Systems and Monitoring Networks (SC-ON), in collaboration with the Standing Committee on Information Management and Technology (SC-IMT), to examine the [*WIGOS Metadata Standard*](https://library.wmo.int/records/item/55626-wigos-metadata-standard?offset=6) (WMO-No. 1192) and WIGOS Information Resource tools (including OSCAR, WDQMS, and GBON compliance monitoring), to:

1. Consider the need for Members to track their contribution to WIGOS, for all observation sites supervised by them;
2. Explore appropriate procedures to determine compliance monitoring *[Republic of Korea]* of observing stations/platforms by WMO Members in the WIGOS Information Resource tools;
3. Review any other needed changes to the WIGOS Metadata Standard and the implications for WIGOS Information Resource tools and guidance; and
4. Consider throughout the importance of not interrupting the operational flow of metadata and data for important weather, climate, water, and related environmental applications, under the WMO Unified Data Policy ([Resolution 1 (Cg-Ext(2021))](https://library.wmo.int/idviewer/57850/9) – WMO Unified Policy for the International Exchange of Earth System Data).

Further request SC-ON to develop guidance material on how to address GBON high density recommendations where capability exists respectively and [*Republic of Korea*] to report back to INFCOM-4[*Republic of Korea*].

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