

The WMO Global Basic Observing Network (GBON)

In response to CGMS action A45.09

HLPP reference: 1.1

International exchange of observational data is critical to applications such as global Numerical Weather Prediction (NWP) and climate reanalysis, which form the backbone of most products and services delivered by the National Meteorological and Hydrological Services (NMHSs) of the WMO Members. In order to help ensure an adequate supply of observations to these systems, a new approach is proposed in which the basic surface-based observing network that supports these applications is designed, defined and monitored at the global level. This network is the Global Basic Observing Network, or GBON.

Design, implementation and management of the GBON will be specified in the Manual on the WMO Integrated Global Observing System (WMO-No. 1160), section 3.2.2 Global Basic Observing System.

The GBON development is brought to the attention of CGMS for two reasons:

- (i) It reaffirms the vital importance of global NWP as a core application area and WMO's commitment to ensure a free and unrestricted access to all relevant observational data:
- (ii) There are areas on the globe where the GBON provisions cannot be met within a reasonable expenditure, due to geographical constraints; the CGMS agencies are invited to take note of this and take it into account in their planning of future space-based systems.

Action/Recommendation proposed: CGMS to take note of this development

WMO GLOBAL BASIC OBSERVING NETWORK (GBON)

1 INTRODUCTION

Global Numerical Weather Prediction (NWP) and climate reanalysis play essential roles as backbones for all products and services provided by the National Meteorological and Hydrological Services of the WMO Members to their constituencies, even at regional and local levels.

In order to ensure that observational requirements for Global NWP and climate reanalysis are met more effectively, a new approach is proposed, in which the basic surface-based observing network that is essential to support these applications is designed and defined at the global level. This network is the Global Basic Observing Network, or GBON.

The GBON will 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 re-analysis in support of climate monitoring. The GBON responds to Global NWP requirements that cannot currently be met, or fully met, by space-based observing systems alone.

The overall GBON Concept has been submitted to the 18th World Meteorological Congress for approval (see Annex).

Pending approval of the GBON Concept at Cg-18, the design, implementation and management of the GBON will be defined in the Manual on the WMO Integrated Global Observing System (WMO-No. 1160), section 3.2.2 Global Basic Observing System, which will be submitted to the 72th Session of the WMO Executive Council in June 2020. This will include the procedure for the nomination, review and approval of the list of stations and systems included in GBON.

With the implementation of GBON, WMO is poised to take an important step in improving observational support for critical global NWP and climate analysis systems.

THE WMO INTEGRATED GLOBAL OBSERVING SYSTEM

DRAFT RESOLUTIONS

Draft Resolution 6.1(1)/1 (Cg-18)

GLOBAL BASIC OBSERVING NETWORK

THE WORLD METEOROLOGICAL CONGRESS,

Recalling Resolution 40 (Cg-XII) - WMO Policy and Practice for the Exchange of Meteorological and Related data and products including Guidelines on Relationships in Commercial Meteorological Activities, Resolution 2 (EC-68) – Plan for the WMO Integrated Global Observing System pre-operational phase 2016–2019, and Decision 21 (EC-69) – Regional Basic Observing Network,

Noting Recommendation 5 (EC-70) Global Basic Observing Network,

Noting also:

- (1) Draft Resolution 6.1(1)/4 (Cg-18) WIGOS transition to operational status commencing in 2020,
- (2) Draft Resolution 6.2(1)/1 (Cg-18) Emerging Data Issues,

Having considered:

- a) The essential role played by global applications such as numerical weather prediction (NWP) and climate analysis as a backbone for all products and services provided by all WMO Members to their constituencies, including at regional and local levels,
- b) The need for a continuous real-time supply of observational data from all areas of the globe to critical global NWP and climate analysis systems as being vital to product generation and service delivery capabilities of all WMO Members,
- c) The preliminary reports from the [WIGOS Data Quality Monitoring System NWP Pilot Project](#) showing that the current international exchange of observational data in many areas falls significantly short of agreed requirements, and that this limits the ability of all WMO Members to understand and predict the atmosphere at all time-scales,
- d) The Global Basic Observing Network Concept (hereafter/thereafter referred to as "GBON Concept") as provided in the [Annex](#) to the present resolution,

Recognizing that the new GBON requirements for international data exchange introduced in the annex may necessitate a review of the existing data exchange policies and practices, and that such a review should be a part of a coordinated effort,

Adopts the GBON Concept as provided in the [Annex](#) to the present resolution;

Requests the Infrastructure Commission to draft relevant provisions of the *Manual on the WMO Integrated Global Observing System* (WMO-No. 1160) regarding the implementation of the Global Basic Observing Network, which will clarify international requirements for the exchange of observations and respective obligations of the Members in this regard, and to submit these to EC-72 for approval;

Requests further the Infrastructure Commission to:

- (1) Develop a proposal for a process for nomination, review and approval of the composition of the GBON and submit it to EC-72 for approval, with the overall aim of having the initial composition of GBON approved by the Extraordinary World Meteorological Congress in 2021;
- (2) Establish a consultative process to assist Members and relevant international organizations and programmes with the implementation of the GBON;
- (3) Develop a GBON Communication Plan, including necessary capacity development actions, and GBON Guidance to be submitted to EC-72 for endorsement;

Requests presidents of regional associations to develop a plan for a phased GBON implementation, taking into account the unique circumstances and capabilities of the individual WMO Members;

Requests the Executive Council to take into account the GBON requirements in any update to existing WMO data exchange policies and practices it may propose;

Requests the Secretary-General:

- a) To provide the necessary assistance and Secretariat support for the implementation of GBON,
- b) To ensure communication and consultation with relevant international organizations and programmes and their engagement in the implementation of the GBON.

[Annex: 1](#)

Annex to draft Resolution 6.1(1)/1 (Cg-18)

GLOBAL BASIC OBSERVING NETWORK CONCEPT

1. Preamble

Global Numerical Weather Prediction (NWP) and climate reanalysis play essential roles as backbones for all products and services provided by the National Meteorological and Hydrological Services of WMO Members to their constituencies, even at regional and local levels. Within the WMO Rolling Review of Requirements (RRR) process, all application areas currently listed, with the sole exception of space weather, have some level of dependency on global NWP and climate reanalysis products.

The global systems delivering these products depend on access to globally consistent sets of observations provided by surface- and space-based observing systems. WMO facilitates, coordinates and monitors the collection and international exchange of such observations.

Preliminary reports from the WIGOS Data Quality Monitoring System (WDQMS) NWP pilot show continued poor availability of surface-based observational data over many areas of the global domain. This limits the ability of all WMO Members to provide high quality weather and climate products and services to their constituencies.

In order to ensure that observational requirements for global NWP and climate reanalysis are met more effectively, a new approach is proposed, in which the basic surface-based observing network that is essential to support these applications is designed and defined at the global level. This network is the Global Basic Observing Network, or GBON¹.

2. Concept of Global Basic Observing Network (GBON)

The GBON is 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. The GBON responds to global NWP requirements that cannot currently be met, or fully met, by space-based observing systems alone.

The GBON is the foundation upon which the Regional Basic Observing Networks (RBONs) are built to respond to requirements of a broader range of WMO application areas, including further requirements of global NWP beyond the essential base provided by the GBON. Hence all GBON stations/platforms and their observing programmes (variables and schedules) are included in the respective RBON of the region in which they are operating.

2.1 Key attributes of the GBON (not exclusive)

GBON stations/platforms must comply with the following:

- (a) Requirements for real-time and near-real-time data exchange at the global level,
- (b) Requirements for regular updates of WIGOS metadata in the Observing Systems Capability Analysis and Review tool (OSCAR/Surface),

¹ See: [GBON, Executive Summary](#)

- (c) Requirements for data exchange in defined WMO formats,
- (d) Requirements for complying with the WIGOS quality management,
- (e) Requirements for change management

as specified in the *Manual on the WMO Integrated Global Observing System* (WMO-No. 1160).

Note: GBON stations/platforms are not necessarily limited to those that fall directly under the responsibility of NMHSs.

2.2 Design, implementation and management of GBON

The GBON is designed starting from the technology-free requirements captured in the Rolling Review of Requirements, and is based on employing currently available technologies that can help address these requirements. The design takes into account the cost-effectiveness of the various technologies, the way in which they complement each other, and the contribution made by space-based observations. The overall aim is to ensure that the GBON observations, together with satellite data and other sources of observations available, adequately address global NWP requirements.

Design, implementation and management of the GBON will be defined in the *Manual on the WMO Integrated Global Observing System* (WMO-No. 1160), section 3.2.2 Global Basic Observing System to be submitted to EC-72 for approval.

In response to the GBON provisions listed in the Manual, Members and relevant international organizations and programmes are requested to commit specific observing stations/platforms with specific observing programmes (variables and schedules) to be part of the GBON, or to take any steps nationally or regionally to develop the required observing capacity. OSCAR/Surface and WDQMS will play important roles in the designation and monitoring of the GBON stations, respectively.

2.3 Monitoring of the GBON design and implementation

The Infrastructure Commission will be responsible for defining the tasks necessary for monitoring of the GBON design and implementation. The regional associations in collaboration with the Infrastructure Commission will coordinate the actual monitoring activities. Some monitoring functions and incident management will be coordinated through the WIGOS Data Quality Monitoring System.

Monitoring will include the following functions:

a) Progress of implementation

Progress with regard to GBON implementation and commitments of Members and relevant international organizations and programmes to the GBON will be monitored.

b) Effectiveness of the design

The GBON will be routinely monitored globally to assess adequacy and effectiveness of the design of the GBON to address global NWP requirements.