WMO Unified Data Policy and the Global Basic Observing Network (GBON)

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## Introduction

Awareness that the international exchange of information is essential for understanding and predicting the weather is as old as the scientific discipline of meteorology itself. Under the WMO umbrella, data exchange gradually became more formalized, first via the WMO World Weather Watch (WWW), which covered operational activities, and the Global Atmospheric Research Programme (GARP), which supported scientific development. Both were established in 1967 and provided increased recognition of the socioeconomic benefits of weather forecasting and the potential commercial value of meteorological data. In the mid-nineties the WMO community reaffirmed and reinforced its commitment to free and unrestricted international exchange of meteorological data with the adoption by the World Meteorological Congress of Resolution 40 (Cg-XII, 1995) – ‘WMO policy and practice for the exchange of meteorological and related data and products, including guidelines on relationships in commercial meteorological activities’. Resolution 40, which dealt primarily with weather data, was later complemented by adoption of Resolution 25 (Cg-XIII, 1999), promoting the free and unrestricted exchange of hydrological data, and Resolution 60 (Cg-17, 2017), doing the same for climate data.

Over recent decades, steady progress in scientific understanding, complemented by development of new and better algorithms for modeling and data assimilation, progress in satellite observing technologies and access to vastly expanded computational capabilities, all helped to dramatically improve the quality and temporal range of weather prediction products. These improvements helped further stimulate the demand for meteorological data from all sectors, and for regions of the globe where the human presence has increased, including in the polar regions. Therefore, meteorological data users and data providers today comprise a large and heterogeneous group that includes, government agencies beyond the National Meteorological Services, national and international research programs, commercial companies, non-profit entities from a variety of sectors, and academic institutions. In parallel with these developments, growing concerns about observed climate change and its anthropogenic nature triggered large-scale investments in climate observations and climate research. This led to a broader recognition of the fact that Earth’s climate must be studied and understood as an integrated system, encompassing not only the atmosphere but also the ocean and the land surface, and the interactions between them, as well as the need to better reflect the role of polar regions in the global climate system. The WMO community therefore began to expand its data exchange to areas beyond weather, climate and water data to include domains such as atmospheric composition, oceanography, the cryosphere and space weather. These developments, combined with the practical need to ensure reliable and robust access to weather and climate data for all nations, rich and poor, led to a growing realization that it was becoming necessary to review and update WMO’s data policy. As a result, in early 2020 WMO launched an intense 18-month study of existing practices and needs, and a broad consultation process that led to the adoption on October 18, 2021, of the [WMO Unified Data Policy](https://meetings.wmo.int/Cg-Ext-2021/English/2.%20PROVISIONAL%20REPORT%20(Approved%20documents)/Cg-Ext(2021)-d04-1-WMO-UNIFIED-POLICY-FOR-THE-INTERNATIONAL-approved_en.docx?Web=1) as Resolution 1 of the Extraordinary Session of the World Meteorological Congress. In keeping with the WMO’s strategic focus on adopting an integrated Earth system approach to monitoring and prediction, the Unifies Data policy integrated all WMO-relevant Earth system discipline and domain areas under a single umbrella policy statement.

***WMO Unified Data Policy: what does it do?***

The main text of Resolution 1 establishes the purpose, scope and intent of the data exchange, while the annexes to the resolution establish the practice to be followed by WMO members in its implementation. Full implementation of the WMO Unified Data Policy holds the promise of large benefits for all WMO stakeholders and the entire global community.

Key characteristics of the new policy include:

• Integrated Earth system data policy. Encompassing all WMO-relevant Earth system data: weather, climate, hydrology, ocean, atmospheric composition, cryosphere and space weather.

• Clear commitment to free and unrestricted data exchange. Clarifying the explicit and literal interpretation of the term ‘free and unrestricted’ exchange and expressing clear organizational commitment to it as the core principle of the policy.

• Expanded scope and purpose. Introducing new terminology on data, replacing ‘essential’ and ‘additional’ data (Resolution 40) with ‘core’ data (standard practice, shall be exchanged) and ‘recommended’ data (best practice, should be exchanged). The scope and purposes of core and recommended data, respectively, are described in general terms for each domain or discipline.

• Call for subsequent implementation of policy via regulatory material. Specific details of what data is to be considered core and recommended will be included, and regularly updated, in the WMO Technical Regulations.

***Implementation***

Full implementation of the sweeping intent behind the new data policy will take years of commitment and dedicated effort. Once it is fully implemented, the landmark Unified Data Policy will help all WMO members to greatly expand and improve their monitoring and prediction capabilities. A key innovative feature of the policy is its focus on ensuring that WMO members in developing countries will be able to reap the full benefits of the improved model products that will result from the increased exchange of observational data.

Implementation of the WMO Unified Data Policy will offer members a critical tool to help them meet some of the major challenges of the 21st century, giving them vastly improved and much more timely and reliable weather, climate, water and related environmental data and information, in the context of Earth system modeling, monitoring, and prediction. This in turn will support informed decision making at all levels, which will help save lives, protect property and foster economic prosperity, by providing a better understanding of rapid changes in the global climate system and their impact at different scales.

***Global Basic Observing Network (GBON)***

Whilst many regions provide a reliable feed of observational data, some areas under-report or have a sub-optimal observing network density. Recognizing the essential role played by these observations, the World Meteorological Organization (WMO) decided to proceed with the design of a Global Basic Observing Network (GBON), which was approved by WMO members at the Extraordinary World Meteorological Congress in 2021, as [Resolution 2](https://meetings.wmo.int/Cg-Ext-2021/English/2.%20PROVISIONAL%20REPORT%20(Approved%20documents)/Cg-Ext(2021)-d05-2-AMENDMENTS-TECHNICAL-REGULATIONS-ESTABLISHMENT-OF-GBON-approved_en.docx?Web=1).

The provisions within the GBON design are based on up-to-date observational requirements for global Numerical Weather Prediction (NWP). Drawing on 20 years of NWP observational data impact studies coordinated by WMO, the provisions specify – in clear, quantitative terms – the obligations of WMO Members to acquire and exchange these critically needed observations: which parameters to measure, how often, at what horizontal and vertical resolution, and which measurement techniques to use.

All of today’s quantitative weather forecast and climate analysis products – even down to the finest local scales and immediate “nowcasting” time ranges – ultimately rely on global-scale NWP. This therefore acts as a backbone for everything that a modern weather and climate service does.

Overall, the most significant impact of GBON is expected to be a major strengthening of global observational data availability, with all that will follow in terms of availability of better products and services at global, regional, national and local levels. However, with GBON come new, or at least more clearly articulated obligations that will require additional effort by some WMO Members. The sustained access to observations taken from stations operated under the Antarctic Treaty System is an integral component of meeting the goals of robust global NWP systems, and WMO is committed to continue its support to facilitating the access and the necessary engagements.

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