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**15th Observations Coordination Group (**[**OCG-15**](https://oceanexpert.org/event/3981)**)**

**Workshop on**

**Strengthening Data Exchange with WIS 2.0**

13 May 2024, 11:00-12:30 PDT

Zoom link:[*https://us02web.zoom.us/j/87253992347*](https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fus02web.zoom.us%2Fj%2F87253992347&data=05%7C02%7Ccgallage%40wmo.int%7Ccd7734f6b0e84b45d67508dc4d7af2d9%7Ceaa6be54468740c49827c044bd8e8d3c%7C0%7C0%7C638470437660112110%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=QuBbnvB%2BkH3hV%2BTuZv7qydScU76RgWQIiTdfxg1%2FDsE%3D&reserved=0)*.*

**Introduction**

In 2007, the WMO Information System (WIS) entered operations to complement the Global Telecommunication System (GTS), providing a searchable catalogue and a global cache to enable additional discovery, access, and retrieval. The success of WIS was limited as the system only partially met the requirement of providing simple access to WMO data. Today's technology developed for the Internet of Things (IoT) opens the possibility of creating a WIS 2.0 able to stand to its expectations of delivering an increasing number and volume of real-time data to WMO Centres in a reliable and cost-effective manner.

WIS2 has been designed to meet the shortfalls of the current WIS and GTS, support the [WMO's Unified Data Policy](https://wmo.int/wmo-unified-data-policy-resolution-res1) and the Global Basic Observing Network ([GBON](https://community.wmo.int/en/activity-areas/wigos/gbon)), and is based on Web-Architecture and open standards, comprising many WIS2 Nodes for publishing data and metadata, and Global Services that enable highly available data distribution for a global community.

The WIS2 pilot phase completed at the end of 2023, with several countries collaborating in building the WIS2 infrastructure. Each country had a different role in the WIS2 framework and implemented a specific component. Starting in January 2024, the implementation of WIS2 entered the pre-operational phase, and the WIS2 services shall be ready to transition to an operational configuration, which is critical to ensure that WIS2 can serve the WMO community operationally, from the beginning of 2025. It is planned to migrate to WIS2 between 2025 and 2030, with an expected progress rate of up to 90%. The GTS is planned to be decommissioned by 2033.

This document provides a short introduction to WIS 2.0 and discusses how the visibility of data could be improved by creating consolidated discovery metadata and how data provision to, and data exchange within, WIS 2.0 can be addressed in general.

**WIS2 Infrastructure**

WIS2 is a federated system of systems based on Web-Architecture and open standards, comprising WIS2 Nodes for publishing data and Global Services that enable fault-tolerant, highly available, low latency data distribution and discovery.

The Global services consist of:

* Global Discovery Catalogue: enables users to search all Datasets provided by Data Publishers and discover where and how to access and interact with those Datasets.
* Global Broker: provides highly available messaging services where users may subscribe to notifications about all Datasets provided by Data Publishers.
* Global Cache: provides highly available download service for cached copies of core data downloaded from Data Publishers' Web-services.
* Global Monitor: gathers and displays system performance, data availability, and other metrics from all WIS2 Nodes and Global Services.

WIS2 Nodes are operated by National Centres (NC) and Data Collection or Production Centres (DCPC) to publish their Core and Recommended data holdings as per the WMO Unified Data Policy.

Users of WIS 2.0 will be able to access data in real-time by subscribing to Global Brokers and receiving notifications when new data are available for download from Global Caches or from the data provider (WIS2 Node).

During the pilot phase completed in 2023, many countries invested significant resources in building the WIS 2.0 global infrastructure that provides data discovery, access, real-time notifications, and monitoring services to the international WMO community. It consists of:

* Four Global Brokers operated respectively by Brazil, China, France, and USA
* Four Global Caches operated by Germany, Japan, the Republic of Korea, and the USA in collaboration with the United Kingdom
* Three Global Discovery Catalogues operated by Canada, China, and the Republic of Korea
* A Global monitor operated by Morocco

Regarding the WIS2 Nodes, the number of countries that have installed and operated a WIS2 Node has been increased to over 54 countries.

**Improving data exchange within WIS2.0**

Data is shared on WIS2 in accordance with the WMO Unified Data Policy (Resolution 1 (Cg-Ext 2021)). This data policy describes two categories of data: Core and Recommended:

• Core data is considered essential for the provision of services for the protection of life and property, and for the well-being of all nations. Core data is provided on a free and unrestricted basis, without charge and with no conditions on use.

• Recommended data is exchanged on WIS2 in support of Earth system monitoring and prediction efforts. Recommended data may be provided with conditions on use and/or subject to a license.

WIS 2.0 uses an event-driven "publish-subscribe" pattern, as is the case for IoT, where users subscribe to a topic to receive new data in real-time. The mechanism is similar to WhatsApp and other messaging applications. The notifications are re-published by Global Brokers to ensure resilient distribution. Data Consumers requiring real-time notifications must subscribe to Global Brokers. A Data Consumer should subscribe to more than one Global Broker, thereby ensuring that notifications continue to be received in the event that a Global Broker instance fails. A Dataset in WIS2 is associated with a given topic. Notifications about updates to a Dataset are published to the associated topic and organized according to a standard scheme. It is a reliable and straightforward way to allow users to choose the data they are interested in and to receive them reliably.

Data consumers need to use data rapidly once it has been published (e.g., for input to a weather prediction model); they should subscribe to one or more Global Brokers to get notification messages using publish-subscribe protocols.

Links to where data or products can be accessed are made available through Dataset discovery metadata (via the Global Discovery Catalogue) and data notification messages published by Global Brokers. Links can be used to directly download the data (according to the network protocol and content description provided in the link) using a mechanism appropriate to the workflow of the Data Consumer. This could include Web and/or desktop applications, custom tooling, or other approaches. If a download link implements access control, where the Data Consumer needs to take some additional action(s) to download the data object, the download link will contain a security object that provides the pertinent information (e.g., the access control mechanism used, and where/how a Data Consumer would need to register to request access).

**WIS2 Discovery metadata**

Discovery metadata is the mechanism by which potential consumers will be informed about the data, how it may be accessed, and any conditions that may be placed on the use of the data.

Each dataset you want to publish must have an associated discovery metadata record. This record is encoded as GeoJSON (RFC 7946) and must conform to the specification given in the Manual on WIS (WMO-No. 1060), Volume II, Appendix F: WMO Core Metadata Profile (WCMP2).

Copies of all discovery metadata records from WIS2 are held in the Global Discovery Catalogues, where data consumers can search and browse to find data that is of interest to them. Discovery metadata records should be published using one of two ways:

• The simplest method is to encode the discovery metadata record as a file and publish it to an HTTP server where it can be accessed with a URL.

• Alternatively, you may operate a local metadata catalogue through which discovery metadata records can be shared using an API (e.g., OGC API - Records). Each discovery metadata record can be accessed with a unique URL via the API (e.g., as an item which is part of the discovery metadata catalogue). In both cases, a notification message needs to be published on a message broker that tells WIS2 there is new discovery metadata to upload and that it is accessed at the specified URL. These discovery metadata records are then propagated through the Global Service components into the Global Discovery Catalogue where Data Consumers can search and browse for datasets of interest.

[Video on WIS2.0](https://wmo.int/media/news/congress-acclaims-wmo-information-system-basis-data-sharing)

**Workshop Agenda**

1. Introduction to WIS2.0 (what is WIS, capabilities, GTS to WIS transition timelines) 15 min (*Hassan Haddouch*)

2. WIS2 implementation / [WIS2 in a box](https://docs.wis2box.wis.wmo.int/)  (All about the toolbox, functionalities, requirements to use, etc.) 20 min (*Tom Kralidis*)

3. WIS2.0 pilot on drifting buoy data (advantages of using WIS2.0 for ocean community, lessons learned) 10 min (*Lance Braasch*)

4. Discussion, 45 min

 - How ocean community can benefit from WIS2.0

 - Can WIS2.0 handle climate data

 - How to integrate ERDDAP with WIS2.0

- What are the data policy implications and how can WIS2 metadata support the Ocean community requirements?

- Assistance needed by Ocean community to transition to WIS2.0