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## **WMO INFORMATION SYSTEM STANDARDS**

*(Submitted by the WMO Secretariat)*

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### **Summary and Purpose of Document**

This document describes the WMO Information System (WIS) and related standards.

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### **ACTION PROPOSED**

The Expert Team is invited to take note and discuss potential issues related to interfacing of satellite data systems developed under different standards.

## WMO INFORMATION SYSTEM STANDARDS

### INTRODUCTION

Since the 1960s, WMO's Global Telecommunications System (GTS) has served the operational meteorological community well, delivering crucial observations and products reliably in near real time. The very factors that contribute to this reliability make it difficult for users outside the operational meteorology community to exploit the GTS: it is difficult for such users to find out that information exists, to discover how to access the information, to receive information if they are not connected to the private GTS network, to read the data in specialised formats, or to make their own information available to the operational community and others. The WMO Information System (WIS) has been created to resolve these issues, and the WIS became operational in January 2012.

### AIMS OF WIS AND HOW THEY WILL BE ACHIEVED

The aims of WIS are simple:

- to increase the visibility of data created by the WMO community
- to broaden the access to data
- making WMO data more accessible to more communities
- allowing WMO Members to make use of data from other communities
- to simplify data use.

These aims have to be met if meteorology, water and climate sciences are to meet the demands being placed on them. Operational weather forecasting needs a wider variety of information than before, seeking observations from communities that are on the border between operations and research, such as glacier or ozone observations. The Global Framework for Climate Services will lead to a need for more systematic exchange of climate information, and application areas, such as Health, are seeing the benefits from combining weather and climate information in their decision making processes to reduce costs and to save lives. WIS will make it easier to meet these challenges.

### WHAT IS WIS?

WIS is intended to build on the success of the GTS, and is taking an evolutionary approach, adding new access and telecommunications technologies to those of the GTS while allowing existing GTS users to maintain an unbroken service. For those organizations already on the GTS, the WIS offers an opportunity to simplify their operations, but only if they wish. For those that have had difficulty in connecting to the GTS for technical or financial reasons, the WIS offers alternative approaches to the routine exchange of information.

The WIS Specifications (in the Manual on WIS<sup>1</sup>) give the technical and procedural constraints that centres operating as information providers within WIS have to meet, and the Guide to the WIS<sup>2</sup> provides and guidance on how the WIS should operate.

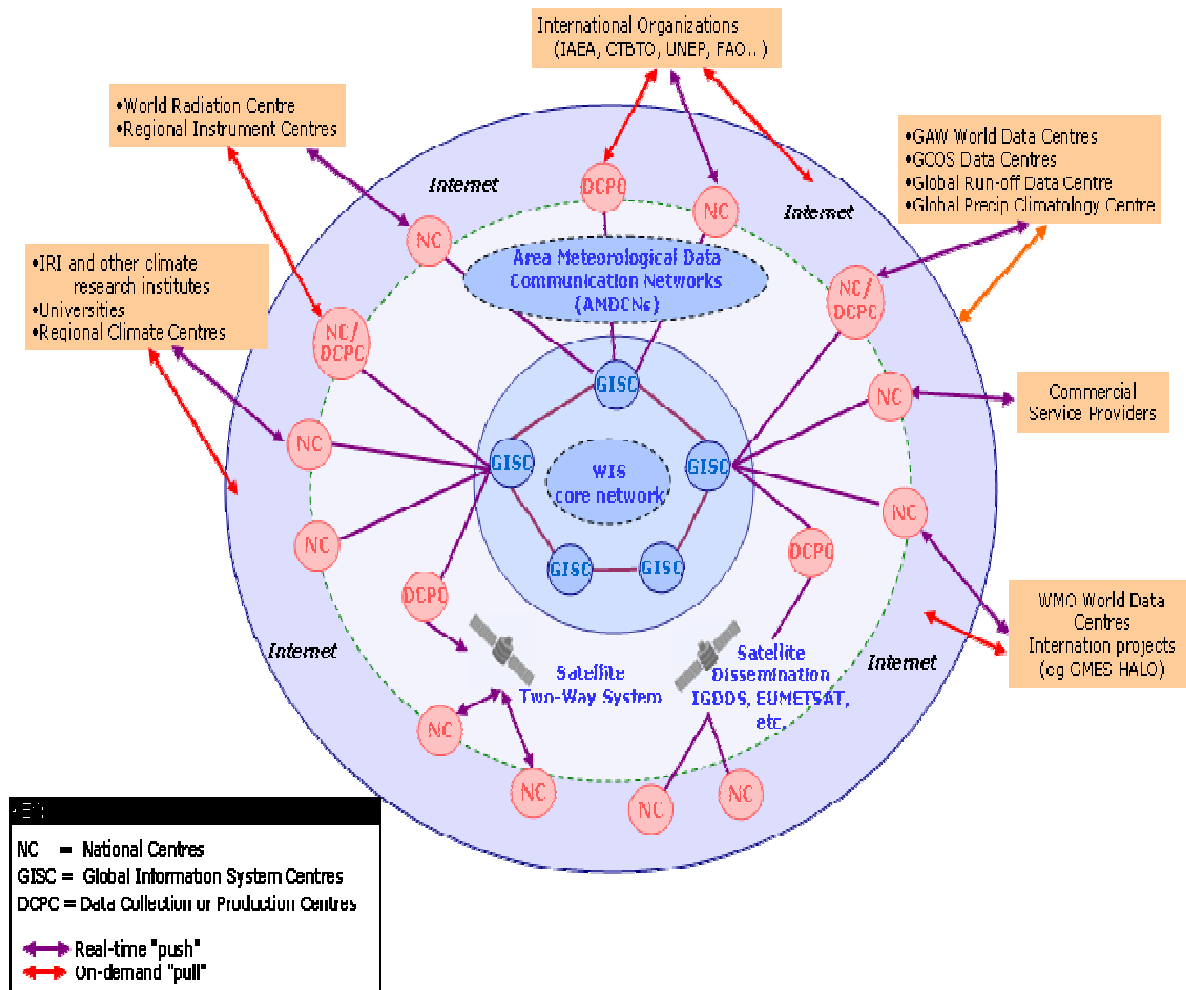
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<sup>1</sup> Manual on WIS: <http://www.wmo.int/pages/prog/www/WIS/documents/Manual-on-WIS-en.pdf>

<sup>2</sup> Guide to WIS: <http://www.wmo.int/pages/prog/www/WIS/documents/Guide-to-WIS-en.pdf>

The WIS is implemented at three types of information providing centre.

- GISCs (Global Information System Centres) hold the metadata catalogues, ensure that the regularly required information is passed rapidly and reliably around the world, and act as a conduit between the other types of centre and the rest of the world,
- DCPCs (Data Collection or Production Centres) are those with a specialist role; this may be in creating numerical products (such as ECMWF), collecting observations (such as EUMETSAT and other satellite operators), or channelling information to the GISCs (the current Regional Telecommunications Hub role), or providing support for particular Programmes (such as the Arctic Data Centre<sup>3</sup>).
- NCs (National Centres) are centres that have a national responsibility; the National Meteorological Service will provide an NC, for example, but there may be others (such as an oceanographic centre). NCs will usually provide the main interface between national users and the WIS.



<sup>3</sup> The Arctic Data Centre is operated by Met.No and is a WIS DCPC: <http://arcticdata.met.no/>

## HOW WILL DATA USERS INTERACT WITH THE WIS?

At the heart of the WIS, and the major difference between the WIS and the GTS, is the metadata catalogue. This contains a description of all the information and services that WMO Members wish to make available through the WIS. The metadata allows users to discover that information exists, and tell them how they can access it. The metadata catalogue is synchronised between all the GISCs.

The GISCs present the metadata catalogue to users in ways that allow them to search for metadata and, when they have discovered datasets that meet their requirements, will provide information on how to obtain the information. For information that is regularly exchanged around the world, it will be possible for users to download the current data immediately (if they are authorised to receive the data), or to request that the information is delivered to them when it becomes available (through a subscription service). In other cases, the metadata record may contain information on how to request the information or link to a request service, for example at a DCPC.

Data owners are responsible for creating the metadata records for their own data. The metadata records that were used to initialise the metadata catalogue were generated automatically from the information held about data exchanged on the GTS. Although technically correct, this is not often helpful to those outside the operational meteorology community and does not cover all the information that WMO Programmes need to exchange. For WIS to be successful, data owners need to take care in crafting their metadata so that it is easily recognised and understood by the user communities for their metadata. Those datasets with the “best” metadata are those that are most likely to be used.

Technically, these discovery metadata are represented using a subset of the international standard ISO 19115, called the WMO Core Profile version 1.2<sup>4</sup> of the ISO 19115 metadata standard. Using the ISO standard for the WMO standard ensures that standard tools will be able to handle the WMO metadata. The choices made in defining which elements should always be present in the WMO Core Profile and in the terms used to describe information together mean that not all metadata records that are compliant with ISO 19115 are compliant with the WMO Core Profile, so some conversion may be required between existing metadata records and those passed to GISCs for inclusion in the WIS catalogue.

## PROVIDING DATA TO THE WIS

One of the objectives of the WIS is to increase the amount of information available for exchange. This means that the methods of providing data have to be more flexible than for the GTS, but there also have to be constraints on who is able to insert what types of information, otherwise it would not be possible to meet the quality or performance objectives for the WIS.

The route for inserting information into WIS is through a National Centre or Data Collection or Production Centre. Whereas for the GTS this would usually involve having dedicated telecommunications networks, the arrangements for WIS will be more flexible. The actual arrangement will depend on the particular NC or DCPC and the arrangements agreed by the sponsoring WMO Programme, but centres have already implemented ways of accepting information by email from authorised addresses, transfer using authenticated ftp to a server at the NC or DCPC, and upload using a web site.

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<sup>4</sup> WMO Core Profile: <http://www.wmo.int/pages/prog/www/WIS/wiswiki/tiki-index.php?page=ipetmdiPackage>

A prime need of WIS is for information to be understandable by a broad user community. This means that the format of data exchanged by the WIS has to be publicly available and agreed by the Programme sponsoring the data collection. In addition to the Traditional Alphanumeric Codes and the Table Driven Code Forms (GRIB and BUFR) exchanged on the GTS and defined in the Manual on Codes<sup>5</sup>, the Commission for Basic Systems has already agreed that NetCDF will be a major data format used in the WIS, and is looking towards the exchange of information in XML. To facilitate translation between formats, CBS will be using the concept of a “data model” as it evolves its data representations. If a WMO Programme has sponsored a data representation it may be used in WIS, but data contributors are encouraged to limit the variety of formats used to reduce the workload on data users. IPET-DRC is the team that develops the WMO data representations; although within CBS, from which the majority of its members have been drawn in the past, it is an Inter-Programme Expert Team and has a responsibility, within the resources available to it, for meeting the needs of all WMO Programmes, especially for changes to the Table Driven Code Forms.

The final requirement for data producers is to provide on or more metadata records describing the data set that they are providing. A key point is that the metadata describes a dataset, not individual data records, and that it only for discovery, access and retrieval purposes. More detailed metadata (for example about instrument characteristics or observing practices) are from a WIS perspective a dataset in their own right. Data that are provided in real time are normally considered as an (unfinished) dataset, but it is conceivable that in other cases a dataset could contain a single observation. The objective of the WIS metadata is to allow users, who are probably not experts in the same field as the originator, to discover the existence of information and to form an initial judgement on whether it is relevant to what they are trying to achieve. Writing good metadata contains an element of making sure that the technical details are right, but the most important aspect is ensuring that the keywords and descriptions are meaningful to a broad readership.

## **STATUS OF THE WIS**

WIS became formally operational in January 2012, with three GISCs (Offenbach, Beijing and Tokyo) having been declared operational. Others are in pre-operational running.

So, the technical facilities are there. WIS now needs the data and metadata – which relies on the whole WMO community to participate.

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<sup>5</sup> Manual on Codes: <http://www.wmo.int/pages/prog/www/WMOCodes.html>