

GRUAN interaction with the WIGOS metadata task team

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Outline



- WIGOS
- WIGOS Metadata Standard draft
- GRUAN interaction
- Discussion







WMO Integrated Global Observing System

- A new framework for advancing, integrating and coordinating WMO and co-sponsored observing systems.
- WIGOS is one of the WMO five strategic priorities, and it lays the foundations for each of the other four, especially the Global Framework for Climate Services, Disaster Risk Reduction and Capacity Development.
- By strengthening the global monitoring of the Earth's atmosphere, ocean surface and hydrology, WIGOS will greatly improve the information and forecasts available to decision-makers and society as a whole.



WIGOS: A future observing framework for WMO



Weather

· Climate
· Water

WMO Global Observing System



WIGOS Observing Systems

- Global Observing System (WWW/GOS)
- Observing component of Global Atmospheric Watch (GAW)
- WMO Hydrological Observations (including WHYCOS)
- Observing component of Global Cryosphere Watch (GCW)
- Pilot projects, include AMDAR,
 GRUAN

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Selected GRUAN Requirements



- The WIGOS Framework Implementation Plan (WIP) details the activities that WMO and its partners will undertake from 2012 to 2015 in order to establish an operational WIGOS by 2016.
- The plan focuses on integrating governance and management mechanisms, functions and activities among the contributing systems.
- Goals include:
 - improving the quality and availability of data
 - improving the quality and availability of metadata
 - developing capacity
 - improving access to data

Key Implementation activities



- Royal Netherlands Meteorological Institute Ministry of Infrastructure and the Environment
- 1 Management of WIGOS implementation
- 2 Collaboration with the WMO co-sponsored observing systems and international partner organizations and programmes
- 3 Design, planning and optimized evolution
- 4 Integrated observing system operation and maintenance
- 5 Integrated quality management
- 6 Standardization, systems interoperability and data compatibility
- 7 The WIGOS Operational Information Resource (WIR)
- 8 Data discovery, delivery and archiving
- 9 Capacity Development
- **10** Communications and outreach

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Inter-Commission Coordination Group on the WMO Integrated Global Observing System (ICG-WIGOS) Task Team on WIGOS Metadata (TT-WMD)

•Membership:

- CBS: Karl Monnik, Bureau of Meteorology, Australia (co-chair 2014-)
- CAS: Jörg Klausen, Federal Office of Meteorology and Climatology MeteoSwiss, Switzerland (co- chair 2014-)
- CIMO: Brian Howe, Environment Canada, Canada (Chair, 2013-2014), Ercan Büyükbas, Turkish State Meteorological Service, Turkey (2014-)
- JCOMM: Joe Swaykos, NOAA National Data Buoy Center, United States
- CCI: Manuel Bañón Garcia, Antonio Mestre, State Meteorological Agency (AEMET), Spain
- CAeM: Stewart Taylor, Met Office, United Kingdom
- CHy: Tony Boston, Bureau of Meteorology, Australia
- Member: ZHAO Licheng, China Meteorological Administration, China
- Associate Member: Tim Oakley (GCOS)

WMO Secretariat

• Roger Atkinson, Steve Foreman, Luis Nunes



- An important aspect of WIGOS (WMO Integrated Global Observing System) implementation is ensuring maximum usefulness of WIGOS observations.
- Observations without metadata are of very limited use: it is only when accompanied by adequate metadata (data describing the data) that the full potential of the observations can be utilized. (GCOS Climate Monitoring Principle #3)
- Metadata of two complementary types:
 - **Discovery metadata** information that facilitates data discovery, access and retrieval. These metadata are **WIS** (WMO Information System) metadata and are specified and handled as part of WIS.
 - Interpretation/description or observational metadata information that enables data values to be interpreted in context. These metadata are WIGOS metadata.
- The WIGOS metadata standard provides WIGOS a standard for the interpretation metadata required for the effective utilization of observations from all WIGOS component observing systems by all users.





- WIGOS metadata should describe
 - the observed variable,
 - the conditions under which it was observed,
 - how it was measured, and
 - how the data has been processed,

in order to provide data users with confidence that the use of the data is appropriate for their application.

The details and history of local conditions, instruments, operating procedures, data processing algorithms and other factors pertinent to interpreting data (i.e., metadata) should be documented and **treated with the same care as the data themselves**.





Terms of Reference for Task Team on the WIGOS Metadata (TT-WMD)

Last updated: 10/16/2013

- (a) To identify the information that is needed to allow the majority of users to use WIGOS observations in appropriate contexts and in a defensible way;
- (b) To create the WIGOS Core Metadata Standard that allows the essential information to be exchanged unambiguously, regardless of the format used for the transfer;
- (c) To define a mechanism for maintaining the WIGOS Core Metadata Standard, including how metadata might be provided that is additional to the Core and coordinate with the ICG-WIGOS Task Team on Regulatory Material (TT-WRM) on any appropriate documentation as needed for WIGOS related Manuals and Guides;
- (d) To implement within the WIGOS Core Metadata Standard, and the WMO Core Metadata Profile, a standard method of providing users with an indication of the quality of the data, and to do so in a way that distinguishes with the quality management of the data ("quality of the observation") and ensuring that the user is able to identify which applications the data are suitable for ("classification" of the observation");
- (e) To coordinate regularly with the ICG-WIGOS as needed and report at least annually to the ICG-WIGOS on the progress;
- (f) To complete its tasks and hand over additional requirements to its successor (if required) in time for approval by Cg-17.





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Elements are classified as either

• Mandatory

Important for all WMO Technical Commissions

Conditional

Must be reported under certain conditions

Optional

Provide useful information that can help to better understand an observation. As is to be expected for a 'core' metadata standard, very few elements are considered optional. Optional elements are likely to be important for a particular community, but less so for others.



Core Metadata Categories



1	observed quantity	The specification of a measurand requires knowledge of the kind of quantity, description of the state of the phenomenon, body, or substance carrying the quantity, including any relevant component, and the chemical entities involved. [VIM3, 2.3].	М
2	purpose of observation	Specifies the main application area of an observation and the observation program an observation is affiliated to.	М
3	data quality	Specifies the data quality and traceability of an observation or dataset	М
4	environment	Specifies the geographical setting within which an observation was made	М
5	data processing	Specifies how raw data are transferred into the reported physical quantities	М
6	sampling and analysis	Specifies how the observation was made or a specimen collected	М
7	station/platform	Environmental monitoring facilities, including fixed stations, moving equipment or remote sensing platforms, at which an observed quantity is measured using an instrument.	М
8	instrument	Specifies characteristics of the instrument used to make the observation	М
9	ownership and data policy	Specifies who is responsible for the observation and owns it	M
10	contact	Specifies where information about an observation or dataset can be obtained	M



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- It is important to understand that WIGOS metadata are intended to describe an individual observation or a dataset, i.e. one or several observations, including the where, when, how, and even why the observations were made. As a consequence, references to space and time are made in several places throughout the standard.
- The WIGOS metadata standard therefore needs to take into account such elements as:
 - the spatial extent of the observed variable (e.g. atmospheric column above a Dobson Spectrophotometer) (cf. 1-04)
 - the geospatial location of the station/platform (e.g. radar transmitter/receiver or aircraft position/route) (cf. 3-07)
 - the geospatial location of the instrument (e.g. the anemometer is adjacent to a runway) (cf. 5-05 Vertical Distance and 5-12 geospatial location)
 - the spatial representativeness of the observation (cf. 1-05)



- A station/platform can be:
 - collocated with the observed quantity as for in situ surface observing station (e.g. an Automatic Weather Station - AWS)
 - collocated with the instrument but **remote** to the observed quantity (e.g. radar)
 - remote from where the instrument may transmit data to the station (e.g. airport surface station where instruments are located across the airport, or a **balloon atmosphere profiling station**)
 - in motion and travelling through the observed medium (e.g. AMDAR Aircraft Meteorological Data Relay equipped aircraft)
 - in motion and remote to the observed medium (e.g. satellite platform)
- An instrument can be:
 - collocated with the observed variable (e.g. surface temperature sensor)
 - remote to the observed variable (e.g. radar transmitter/receiver)
 - in motion but located in the observed medium (e.g. radiosonde)
 - in motion and remote from the observed quantity (e.g. satellite based radiometer)
 - located within a standardized enclosure (e.g. a temperature sensor within a Stevenson screen)

Temporal Elements



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Spatial Elements



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Technical Implementation



- The likely implementation is XML (Extensible Markup Language), in line with the specifications for WIS metadata and common interoperability standards.
- Not all elements need to be updated at the same frequency. Some elements (e.g. position of a land-based station) are time-invariant, while others (e.g. a specific sensor) may change regularly. Still other elements, such as environment, may change gradually or rarely, but perhaps abruptly.
- Not all applications of observations require the full suite of metadata. The amount of metadata that needs to be provided to be able to make adequate use of an observation, for example for the purpose of issuing a heavy precipitation warning, is much less than for the adequate use of even the same observation for a climatological analysis. Metadata needed for near-real-time applications also needs to be provided in near-real-time.
- Users need to filter datasets according to certain criteria/properties. This functionality requires either a central repository for WIGOS metadata or full interoperability of the archives collecting WIGOS metadata.



Technical Implementation



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Schematic of the relationship of WIS and WIGOS metadata and the scope of the ISO19115 standard. The WMO Core is a profile of ISO19115. WIGOS metadata exceed the scope of ISO19115 standard. A possible profile (subset) of WIGOS metadata elements for some specific near-real-time application is also shown. (Fig.4 WMDS_v0.2_20150127.doc)



Phased Implementation



- Balancing the effort required to generate and make available the metadata elements, and the need to have this information to make adequate use of observations, implementation will proceed through three phases:
 - Phase I (2016) are either listed as mandatory elements in WMO-No. 9, Vol. A or are of critical importance for the Observing Systems Capability Analysis and Review (OSCAR) tool of the WIR (WIGOS Information Resource), and are considered of benefit for all application areas.
 - Phase II (2017-2018) adds elements recognized to be more challenging for Members, but the knowledge of which is still of rather immediate need for the adequate use of observations, in particular for assessing quality of observations.
 - **Phase III** (2019-2020) adds the remaining elements specified in the WIGOS metadata standard.





GRUAN is a WIGOS pilot project (WPP) Project Aims

- Provide an interface for GRUAN to the implementation of WIGOS, to WMO in general, and to other WPPs, the GSICS WPP in particular...
- The Pilot Project has the following deliverables:
- (iv) Develop proposal to define data dissemination among all GRUAN partners, including GRUAN Metadata congruent with WIS metadata standards (Mar'10)



Summary



- Royal Netherlands Meteorological Institute Ministry of Infrastructure and the Environment
- WIGOS implementation is under way
- GRUAN is involved as a pilot project
- The WIGOS Metadata Standard drafted (v0.2)
- GRUAN is involved in (following) the WIGOS Meta Data Task Team
- Involved in review
- Link with GRUAN data streams

