



World Meteorological Organization
Weather • Climate • Water

GRUAN and the WMO INTEGRATED GLOBAL OBSERVING SYSTEM (WIGOS)

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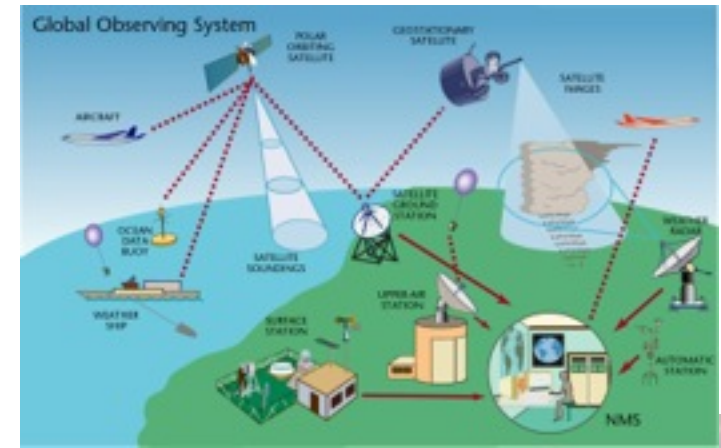
What is WIGOS?

- A framework for integrating all WMO observing systems and WMO contributions to co-sponsored observing systems.
- A WMO Strategic Priority Area
- Together with the WMO Information System (WIS), WIGOS is a WMO contribution to GEOSS.
- WIGOS is not:
 - Replacing or taking over existing observing systems, which will continue to be 'owned' and operated by a diverse array of organizations and programmes, national as well as international.



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**)



Why WIGOS?

- ***The mandate of modern NMHS's (Met Services) is much broader now than it was when WWW and the GOS were created, e.g.***
 - Climate monitoring, climate change, mitigation
 - Air quality, atmospheric composition from urban to planetary scales
 - Oceans
 - Cryosphere
 - Water resources
- ***Advances (scientific and technical):***
 - Observing technology
 - Telecommunications
 - Numerical modeling and data assimilation
 - Increased user demand to access and use observations in decision making



Why WIGOS (continued)?

- ***Shortcomings of the current situation:***
 - Observing networks/systems not sustainable and stable,
 - Design and planning not well coordinated,
 - Observing standards not respected (and in some cases not well defined)
 - Databases not integrated or interoperable, including metadata,
 - Deficiencies in Quality Management (maintenance, monitoring, reporting, ...)
 - Lack of qualified and trained staff;
- Through coordinated **data sharing** and **networks/systems development**, Members will be better equipped to address existing deficiencies and to meet future challenges



So where does GRUAN enter the picture?

- GRUAN is part of GCOS, which is part of WIGOS
 - It can be seen as a textbook example of how WIGOS deals with climate requirements
- In addition, seen from a traditional WWWW/GOS perspective:
 - WMO users (and the people behind their NWP systems) value radiosonde observations very highly
 - The upper air part of the RBSN (Regional Basic Synoptic Network) has been in slow but steady decline for years
 - GRUAN provides radiosonde observations
 - GRUAN is leading the way on aspects like metadata, certification process, change management, ...



Some WIGOS activities relevant to GRUAN

- WMO Regulatory Material:
 - Technical Regulations (WMO-49)
 - Manual on WIGOS
 - Guide to WIGOS
 - WIGOS Metadata Standards
 - Plan for Quality Management;
- CBS Activities:
 - Documentation of socioeconomic benefits of observations
 - Discussion about radiosonde scheduling - should we still be bound by the synoptic times (00 06 12 18Z) for our measurements?



...more WIGOS activities relevant to GRUAN

- Documents under development within CBS:
 - “Vision for WIGOS in 2040” (working title), following on to the “Vision for the GOS in 2025”
 - “Principles of Observational Network Design”
- Plans to initiate targeted “WIGOS Implementation Projects” at the sub-regional or national level, especially in WMO Regios I and III
 - GRUAN network expansion opportunities?



... yet more WIGOS activities of relevance to GRUAN

- Rolling Review of Requirements
 - Documentation of observational data requirements by application area (12 officially supported by WMO)
 - Documentation of observational capabilities (existing and planned)
 - Gap analysis, resulting in “*Statements of Guidance*”

Take a look at <http://www.wmo-sat.info/oscar/>

- Impact Workshops every four years, assessing the impact of all major components of the GOS on NWP; will likely be expanded to encompass all of WIGOS and impact on applications beyond NWP



List of all Requirements

This table shows all requirements. It can be sorted by clicking on the column headers. The filter on the right allows to display only specific requirements. [Filter instructions](#)

Export
» **Filter table**

Note: In reading the values, goal is marked blue, breakthrough green and threshold orange

Id	Variable	Layers	App Area	Theme(s)	Uncertainty	Stability / decade	Hor Res	Ver Res	Obs Cyc	Timeliness	Coverage	Conf Level
1	Air specific humidity (at surface)		Near Surface	CLIC		10 % 12 % 20 %		100 km 200 km 500 km		12 h 24 h 18 h 36 h 24 h 2 d	Global	tentative
2	Air temperature (at surface)		Near Surface	CLIC		0.2 K 0.3 K 0.5 K		100 km 200 km 500 km		12 h 24 h 16 h 30 h 24 h 2 d	Global	tentative
3	Cloud optical depth		TC	CLIC		15 dimless 20 dimless 30 dimless		100 km 200 km 500 km		12 h 24 h 16 h 30 h 24 h 2 d	Global	reasonable
4	Cloud top height		n/a (2D)	CLIC		0.5 km 0.7 km 1 km		100 km 200 km 500 km		12 h 24 h 15 h 30 h 24 h 2 d	Global	reasonable
5	Ice sheet topography		Land surface	CLIC		5 cm 6.3 cm 10 cm		0.1 km 0.171 km 0.5 km		10 y 30 d 11 y 43 d 15 y 90 d	Global land	tentative
6	Sea surface temperature		Sea surface	CLIC		0.5 K 0.8 K 2 K		25 km 39.7 km 100 km		24 h 30 d 30 h 38 d 2 d 60 d	Global ocean	reasonable
7	Sea-ice cover		Sea surface	CLIC	Cryosphere	10 % 13 % 20 %		1 km 2.2 km 10 km		1 y 30 d 2 y 43 d 4 y 90 d	Global ocean	tentative

What can WIGOS provide to GRUAN?

- Increased visibility among WMO members and their Permanent Representatives
- Additional substantiation for the requirements via links to all 12 WMO application areas, and GFCS
- Opportunities to grow the network, especially in the WMO Regions I and III
- Tremendous cal/val resources via NRT NWP monitoring; this is an aspect that is very well understood and heavily used by the satellite operators



Some challenges/things to think about

- How do we get more GRUAN data out in real time without interfering with the network?
 - Issues of communications capabilities, funding, organizational culture, ... ?
- What is the role of for instance the “Manual on GRUAN” in the overall WIGOS Regulatory Material?
- Better integration/representation of GRUAN in RRR, impact assessments, strategic developments within CBS (and possibly CIMO)?
- Can we use the WIGOS/GFCS/CD WMO Strategic Priority Areas to solidify and expand GRUAN, especially in the tropics and in Regions I and III?



Summary

- WIGOS is maturing; there is now an actual Project Office, and the Regulatory Material is on track toward approval by WMO Congress in 2015
 - Probably a stretch to claim that it will be operational by 2016, but the major parts of the WIGOS Framework will be in place
- It is a challenge to integrate observing systems developed within separate communities and cultures for different purposes (weather, climate, atmospheric composition, agriculture, hydrology, etc.) under one umbrella
 - However, WMO members have clearly expressed the need to do so
- GRUAN is an interesting test case - there are many areas where a much closer collaboration would be mutually beneficial

