WORLD METEOROLOGICAL ORGANIZATION

INTER-COMMISSION COORDINATION GROUP ON THE WMO INTEGRATED GLOBAL OBSERVING SYSTEM

TASK TEAM ON WIGOS METADATA

Fifth Session

Geneva, Switzerland, 5-7 December 2016

FINAL REPORT

DISCLAIMER

Regulation 42

Recommendations of working groups shall have no status within the Organization until they have been approved by the responsible constituent body. In the case of joint working groups the recommendations must be concurred with by the presidents of the constituent bodies concerned before being submitted to the designated constituent body.

Regulation 43

In the case of a recommendation made by a working group between sessions of the responsible constituent body, either in a session of a working group or by correspondence, the president of the body may, as an exceptional measure, approve the recommendation on behalf of the constituent body when the matter is, in his opinion, urgent, and does not appear to imply new obligations for Members. He may then submit this recommendation for adoption by the Executive Council or to the President of the Organization for action in accordance with Regulation 9(5).

Chairperson, Publications Board
World Meteorological Organization (WMO)
7 bis, avenue de la Paix
P.O. Box No. 2300
CH-1211 Geneva 2, Switzerland

Tel.: +41 (0)22 730 84 03
Fax: +41 (0)22 730 80 40
E-mail: Publications@wmo.int

CONTENTS

AGENDA

1. ORGANIZATION OF THE SESSION
2. REPORT OF THE CO-CHAIRS
3. RELEVANT RESOLUTIONS OF ICG-WIGOS-5 AND EC-68
4. RELEVANT OUTCOMES OF CBS-16
5. THE WIGOS METADATA EXCHANGE MODEL AND THE M-2-M API
6. REVIEW OF THE WIGOS METADATA STANDARD
7. OSCAR/SURFACE – OPERATIONAL STATUS AND FUTURE DEVELOPMENTS
8. GUIDANCE MATERIAL AND TRAINING EVENTS ON WMDS AND OSCAR/SURFACE
9. THE FUTURE TASK TEAM ON OSCAR DEVELOPMENT
10. ANY OTHER BUSINESS
11. CLOSURE OF THE SESSION

_____

EXECUTIVE SUMMARY

The fifth session of the Inter-Commission Coordination Group on the WMO Integrated Global Observing System (ICG-WIGOS) Task Team on WIGOS Metadata (TT-WMD-5) was held at Geneva, Switzerland, from 5 to 7 December 2016. The session was co-chaired by Mr J.Klausen (Switzerland) and Mr K. Monnik (Australia), co-Chairs TT-WMD.

The session reviewed and took into account, the relevant resolutions of the fifth session of ICG-WIGOS and of the sixty-eighth session of the Executive Council (EC-68), as well as the relevant outcomes from the sixteenth session of the Commission for Basic Systems (CBS-16).

The session considered feedback from user communities, in particular the specific requirements for description of space-based observations; it reviewed the status of OSCAR/Surface, as well as the plans for delivering training to Members; reviewed and completed a number of code tables; reviewed the progress on guidance material regarding the WIGOS Metadata Standard (WMDS) and the OSCAR/Surface; considered the current version of the formal WMDS data exchange model to facilitate machine-to-machine transfer of metadata; and suggested what should be the scope of the new established ICG-WIGOS task team on OSCAR development; it also reviewed the work plan of TT-WMD (Appendix III).

The session also identified the major benefits of the WMDS as well as the main use cases of OSCAR/Surface (Appendix II).

As outcome of the discussions the session elaborated a series of conclusions, actions and recommendations on the following topics: (1) the WIGOS Metadata Standard; (2) the WMDS Code tables; (3) the further development of the Guide to WIGOS; (4) the further development of the WIGOS Metadata Representation/Exchange Model; (5) the status and operation of OSCAR/ Surface and further development; (6) the training on WMDS and OSCAR/Surface.

_____

GENERAL SUMMARY

1. ORGANIZATION OF THE SESSION

1.1. Opening of the session

1.1.1. The fifth session of the Inter-Commission Coordination Group on the WMO Integrated Global Observing System (ICG-WIGOS) Task Team on WIGOS Metadata (TT-WMD-5) was opened by Dr Jörg Klausen (Switzerland) co-Chair TT-WMD, at 09:00 hours on Monday, 5 December 2016, at the WMO headquarters, in Geneva, Switzerland.

1.1.2. Dr Lars Peter Riishojgaard, WIGOS Project Manager, WMO Secretariat, welcomed the participants to Geneva, on behalf of the WMO Secretary-General Prof. Petteri Taalas. He mentioned that sixteenth session of the Commission for Basic Systems (CBS-16) did not request any changes to the submitted version of the WIGOS Metadata Standard (WMDS), although questions were raised about the Machine-to-Machine (M-2-M) interface. It is recognized that this team has been doing a huge task, but there is still a significant amount of work to do. Finally, he mentioned that ICG-WIGOS had decided to transition this TT-WMD into a TT on OSCAR Development, so this session should give some feedback to ICG-WIGOS if this is a good time for transition, as well as about its membership.

1.1.3. The list of participants is given in Appendix I.

1.2. Adoption of the agenda

1.2.1. TT-WMD-5 adopted the Agenda for the meeting, which is reproduced at the beginning of this report.

1.3. Working arrangements

1.3.1. TT-WMD-5 agreed on its working hours and adopted a tentative work plan for consideration of the individual agenda items.

2. REPORT OF THE CO-CHAIRS

2.1. Dr Klausen remembered Mr António Mestre (Spain) who passed away early 2016; He was a very kind man who contributed to the work of the team representing the Commission for Climatology (CCl).

2.2. Dr Klausen, on behalf of both TT-WMD co-Chairs, reported on the major activities since the previous session (TT-WMD-4) held in October 2015, and mentioned a presentation on WMDS and OSCAR/Surface delivered at CIMO/TECO, Madrid, Spain, 27 September 2016. He underlined the importance of the work of this team for the WMO Rolling Review of Requirements (RRR) process in order to improve our services to the society and wanted to learn about the development of the "Standardization of Observations" Reference Tool (SORT); The four components of OSCAR are not all available yet since the “Analysis module” is still to be developed. He mentioned the use statistics of OSCAR/Surface to date as being around 44.000 page views and he stressed that the two major issues for OSCAR/Surface are the delivery of training to Members, which means producing training materials, and the development of the M-2-M interface to become available to Members. Finally, he asked the team if OSCAR has been well promoted outside WMO community.

2.3. In the follow-up discussions it was agreed that the WMDS and OSCAR/Surface needs to be promoted outside the WMO community – within WMO, OSCAR/Surface has been promoted at every constituent body session and elsewhere; We need to publicize the standard beyond the WMO, and if we do that the OSCAR will also be promoted; The national implementation of WIGOS will help in this direction, because of the need to involve all the national organizations.

3. RELEVANT RESOLUTIONS OF ICG-WIGOS-5 AND EC-68

3.1. Mr Luis Nunes, WIGOS Scientific Officer, WMO Secretariat, summarized the relevant resolutions of ICG-WIGOS-5:

3.1.1. ICG-WIGOS expressed its opinion that Volume A and other relevant databases such as GAWSIS could now be migrated into OSCAR/Surface. However, an OSCAR User Manual and additional training of users are now urgently needed;

3.1.2. ICG-WIGOS asked TT-WMD in collaboration with IPET-MDRD to further develop WIGOS identifiers to meet the requirements for exchange of WIGOS metadata between Members, and to include these in the detailed definition of the data representation for WIGOS metadata;

3.1.3. ICG-WIGOS asked the OSCAR development team to make the necessary preparations to declare OSCAR/Surface operational on 2 May 2016, and to issue appropriate notices to Members

3.1.4. ICG-WIGOS recommended that Members should be informed that a pilot machine-to-machine interface was being developed, and that Members were welcome to experiment with this, but that interested Members should be cautioned that additional work would be needed to convert any development done during the experimental phase to work also with the final version of the data representation;

3.1.5. Several challenges were mentioned related to GCW, such as the provision of CryoNet Sites/Stations metadata to OSCAR/Surface;

3.2. Mr Nunes also summarized the relevant resolutions of sixty-eight session of the Executive Council (EC-68):

3.2.1. Regional WIGOS metadata management (work with data providers to facilitate collecting, updating and providing quality control of WIGOS metadata in OSCAR/Surface) is one of the mandatory functions in the concept of Regional WIGOS Centres (RWC) endorsed by EC;

3.2.2. Requested the Secretary-General: (1) To ensure editorial consistency of the Guide to WIGOS with the Manual on WIGOS (WMO-No. 1160); (2) To submit the document to CBS-16 (November 2016) for its review and endorsement;

3.2.3. Requested Members to continue to provide resources, including through the WIGOS Trust Fund and/or seconded experts, to help support the implementation of WIGOS, in particular to assist with the operational deployment of OSCAR/Surface.

The TT-WMD-5 participants recognized with appreciation the contributions made by Switzerland, Germany and China.

4. RELEVANT OUTCOMES OF CBS-16

4.1. Mr Nunes summarized the outcomes of CBS-16 relevant to the work of TT-WMD:

4.1.1. CBS-16 acknowledged the work done by the TT-WMD in improving and further developing the WMDS, in collaboration with experts from MeteoSwiss and other working bodies of WMO, namely, the IPET-WIFI, the IPET-SUP and the IPET-MDRD;

4.1.2. The Attachment to Appendix 2.4. of the Manual on WIGOS will be extracted from the Manual and be processed separately as a stand-alone Attachment in order to facilitate frequent update of its technical context and the code tables from the current Annex to the Attachment to Appendix 2.4 will be removed and included in the Manual on Codes (WMO-No. 306);

4.1.3. Recommends to the Executive Council to adopt the initial version of the Guide to WIGOS;

4.1.4. Requested the Secretary-General to maintain WMO-No.9 and the associated 5-digit WMO station identifiers until Congress 19;

4.1.5. Decided to assign different responsibilities within CBS working bodies for the technical development of OSCAR;

4.1.6. Recommended the Secretariat to facilitate maintenance and further development of the three components of OSCAR;

4.1.7. Recommends that ICG-WIGOS investigates the potential for developing and providing a freely available and open source OSCAR - compatible package that could be implemented at the national level;

4.1.8. Recommends that Members submit to OSCAR all the WIGOS metadata meant for international exchange through the following mechanisms: Directly to OSCAR, preferably through the M-2-M interface as it becomes available, for all relevant WIGOS observing systems they operate, in addition to the following ones: GAWSIS, WMO Weather Radar Database, JCOMMOPS;

4.1.9. Urges JCOMM to ensure that JCOMMOPS will be fully compliant with the WIGOS Metadata Standard and facilitate ingestion of relevant WIGOS metadata in its database;

4.1.10. Urges Members operating their own databases of WIGOS metadata to develop and implement procedures for the use of the machine-to-machine interfaces with OSCAR;

4.1.11. Recommends adoption of the Training Plan for OSCAR/Surface, for the period 2017-2018, as an important component of the WMO Education and Training Programme (ETR) plan;

4.1.12. Recommends the Secretary General to develop training materials, specially e-learning modules on OSCAR/Surface;

4.1.13. Recommends the WMO ETR Department to work closely with the Regional Training Centres (RTCs) and the WIGOS Project Office to organize and deliver training events according to the OSCAR/Surface Training Plan.

In the follow-up discussions Dr Riishojgaard explained the meaning of the OSCAR "compatible package" and suggested that it should be discussed by ICG-WIGOS rather than by this team; Different views were mentioned by participants, some would support such approach e.g. to allow OSCAR/Surface to accommodate confidential national metadata, such as those from military stations, while other participants wouldn't support the development of such software package. Regarding training on OSCAR/Surface it was mentioned by Secretariat that discussions are going on with Germany in view of a test-event to be organized at the Germany Meteorological Service's (DWD) facility at Langen.

5. THE WIGOS METADATA EXCHANGE MODEL AND THE M-2-M API

5.1. Mr Dominic Lowe delivered a presentation on the development of the WMDS representation/exchange model, pointing out the reasons for using the Observations & Measurements (O&M) Standard instead of ISO 19115; The WMDS is very specific, with many details and ISO 19115 is not capable of fully supporting it. He mentioned the model is flexible enough to allow metadata exchange not only specific for OSCAR.

5.2. The session accepted his suggestion to remove the concept of data (observation) segment because the observations are grouped in time series - the most relevant elements that trigger a new observation series are the variable and the station ID. In the future WIS will use the same list of variables as WIGOS for the catalogue of data series. During a break-out session, the team concluded that the "segment" concept would be removed while the "deployment" concept would be retained.

5.3. It was also discussed and agreed that the concept of grouping may be relevant for the exchange model, such as: grouping of rain gauges, a fleet of planes, etc.

5.4. The session agreed that the changes to the model would be circulated to the various communities in time for the deadline for submitting docs to EC-69 (end of March 2017).

5.5. Mr Timo Pröscholdt delivered a presentation on the M-2-M API, which is fully dependent on the schema that derives from the metadata exchange model.

5.6. The issue of implementing an interim version of the XML schema was discussed and it was agreed to start working with the new version of the model agreed at the session.

5.7. The processes that the API should address to instruct OSCAR/Surface what to do were discussed, e.g. how to delete pressure observations from a set of stations, how to correct existing bits of information in OSCAR/Surface (would be done by uploading the whole metadata records).

5.8. The development/applicability of the API to OSCAR/Space was discussed; It was mentioned that the number of stations is what drives the API and satellite agencies do not make updates in the same way as it is done for surface-based observations; It was agreed that this discussion should be started.

5.9. As an extra topic, Mr Pröscholdt presented a proposal for the WMDS compliance assessment per station, based on automatic "traffic lights":

5.9.1. The session considered it a good approach, but recommended to be careful how to do estimate and show the results of the assessment;

5.9.2. It should be complemented with best practices, to help Members how to improve their situation and to be an incentive for Members;
5.9.3. It was agreed that the quality of the information is relevant and that the timely indicator is a challenge;
5.9.4. The decision on how to show the results openly should be submitted to ICG-WIGOS;
5.9.5. Need to consider how to deal with stations from partner organizations.

6. REVIEW OF THE WIGOS METADATA STANDARD

6.1. Review of any changes proposed by CBS-16

6.1.1. This was already covered under agenda item 4.1 – no changes were proposed by CBS-16;

6.2. Review of any changes proposed by user communities

6.2.1. Mr Guillaume Aubert (EUMETSAT) delivered a presentation on the assessment of the applicability of WMDS for EUMETSAT satellite earth observations; His findings related to improving the WMDS to include the need for metadata on the WMDS and the need to review the elements related to the data quality (of the observations); The analysis done at EUMETSAT will be extended to other satellite agencies via the Coordination Group on Meteorological Satellites (CGMS) Task Force on Metadata implementation (TFMDI) by end of March 2017.
As a follow-up, the session discussed the granularity needed for the exchange of metadata, particularly the data quality elements. In that respect we should know what users expect from the WMDS, since its design depends on that.
6.2.2. Dr Øystein Godoy (Norway) addressed the session about applicability of WMDS for cryospheric observations and he suggested to add a metadata element to identify not only a station/platform but also a “site” under the concept used for the Cryonet that a site is a collection of stations focused on a geographic entity (e.g. glacier); That concept could also be used, for instance, for hydrologic observations covering a river basin, or for aircraft-based observations by a fleet. It was noted that OSCAR/Surface already supported the concept of a “station set”, which would serve the intended purpose (“sites” would be documented as individual entries in OSCAR and can then be grouped.)
At follow-up discussions it was agreed to investigate which category of the WMDS should accommodate such additional element, e.g. under category 3.
6.2.3. Mr Tim Oakley (UK/GCOS) briefed the session on the discussions held at the meeting of the CBS Lead Centres for GCOS (September 2016, Cambridge, UK); One of the actions agreed at that meeting was to run an experiment at the National Centers for Environmental Information (NCEI/NOAA, USA) of populating OSCAR/Surface with historical metadata for a number of climate stations.
The session recognized the need that everyone, e.g. in Europe, should make the necessary links and promote it in order to avoid parallel efforts regarding metadata standards; It should be recommended to ICG-WIGOS to include this topic in the Communications & Outreach strategy. In this respect closer links should be done with the Research Data Alliance (RDA).
6.2.4. Mr Tony Boston (Australia) guided participants through some proposed changes to the WMDS; It was recognized the relevance of drainage basin, therefore the code table for river basins should be used instead of free text.
As follow-up, the session also discussed the code tables, particularly the update of code tables 1-01 Observed Variable and 5-02 Measurement/Observing method; The ones existing in OSCAR/Surface have been circulated amongst the GAW people and they provided some input. There is no consensus in the community so far as to how to abbreviate complex names of chemical species.

7. OSCAR/SURFACE – OPERATIONAL STATUS AND FUTURE DEVELOPMENTS

7.1. Dr. Klausen introduced document 7 about OSCAR/Surface feedback and status and informed that from January 2017 there will be a follow-up project at MeteoSwiss (with support from the Swiss government) to be in charge of the follow-up actions, including relation to the WIGOS Data Quality Monitoring System (WDQMS), during the next three years; WMO effort is also relevant in the long-term, so there are plans to have OSCAR/Surface operations funding support from the regular budget. He mentioned that GAWSIS and OSCAR/Surface share the same underlying database; The Volume A legacy file from OSCAR/Surface is available on the WMO website (link in Vol.A webpage) which is updated on a daily base. The number of new stations inserted so far is 142.

7.2. He also informed that OSCAR/Space has a new release 2.0 just launched, but there is no plan for migrating it into the MeteoSwiss infrastructure. The future WMDS XML interface will not be used for metadata updates of OSCAR/Space.

7.3. The issue of changing the stations network affiliation in OSCAR/Surface was mentioned, and it was agreed that it should be part of guidance material to be made available to Members.

7.4. Some issues related to terminology were mentioned, so it was agreed that Mr Simon Gilbert (UK) would share some examples of inconsistencies, including the "station class" field.

7.5. It was noted that nomination of National Focal Points for OSCAR/Surface is around 60% of RA VI Members.

7.6. The session split into several breakout groups to develop a list of benefits of the WMDS and use cases of OSCAR/Surface; The results are summarized in Appendix II.

8. GUIDANCE MATERIAL AND TRAINING EVENTS ON WMDS AND OSCAR/SURFACE

8.1. The chapters related to WMDS and OSCAR/Surface of the initial Guide to WIGOS were considered, with the changes introduced by the WIGOS Editorial Board in June 2016.

8.2. It was agreed that the guidance on the WMDS needs to be further developed in order to better assist Members on how to do things; A list of questions about the use of WMDS for specific observing systems could help experts to further elaborate the guidance material.

8.3. For specific observing systems, e.g. for surface-based remote sensing observations, individual experts should be identified to contribute to that effort.

8.4. Other specific topics should also be addressed:

8.4.1. Ensuring the metadata embedded in BUFR messages are consistent with the records in OSCAR/Surface – The Task Team on WDQMS could contribute to this;
8.4.2. JCOMMOPS needs to be mentioned in sections 3.2 and 3.4 of the Guide to WIGOS; It was noted that the position of buoys in OSCAR/Surface, is that of the 2nd May when OSCAR/Surface became operational;
8.4.3. Dr Godoy will contribute to Section 3.5 "Stations on ice" and also for the concept of grouping sites/stations;
8.4.4. In Section 3.6 “Stations/platforms on lakes/rivers” the WMO Hydrologic Observing System (WHOS) should be mentioned, as well the Global Runoff Data Centre (GRDC) stations catalogue;
8.4.5. A whole new section will be needed for guidance on the M-2-M interface.

8.5. Dr Klausen informed that, for the purposes of training, the “deployment environment” of OSCAR/Surface (https://oscardepl.wmo.int/surface/index.html#/), could be used.

9. THE FUTURE TASK TEAM ON OSCAR DEVELOPMENT

9.1. The session discussed the scope and the membership of the future Task Team on OSCAR Development (TT-OD) established by ICG-WIGOS-5 and agreed that both activities related to WMDS, i.e. maintenance and implementation, should be captured in the TORs of the new Team and recommended to keep representation of various Technical Commissions in the Task Team.

9.2. The session reviewed and updated the TT-WMD Action Plan, to reflect the work developed during 2016; From the updated plan, which is provided in Appendix III, it is clear that there is still significant work to be done in order to finalize the tasks assigned to this team; Those tasks, which

should be concluded in 2017, are focused on the following major topics: the WIGOS Metadata Standard (WMDS), the WMDS Code tables, the further development of the Guide to WIGOS, the further development of the WIGOS Metadata Representation.

10. ANY OTHER BUSINESS

10.1. Nothing to report

11. CLOSURE OF THE SESSION

11.1. The co-Chairs thanked all participants for their attendance and relevant contributions, including the secretariat staff, and closed the session at 17:00 hours, on 7 December 2016.

_____

Appendix I

LIST OF PARTICIPANTS

Mr Jörg Klausen (Co-Chair, TT-WMD and representing CAS)	Federal Office of Meteorology and Climatology MeteoSwiss - Operation Center 1 | P.O. Box 257 CH-8058 Zürich-Flughafen, Switzerland Tel.: +41 58 460 92 23 Fax: +41 58 460 90 01 Email: joerg.klausen@meteoswiss.ch
Mr Karl Monnik (Co-Chair, TT-WMD and representing CBS)	Bureau of Meteorology, 700 Collins Street, GPO Box 1289K, Melbourne, VIC 3001, Australia Tel.: +61 (3) 9669 4205 Fax: +61 (3) 9669 4168 Email: karl.monnik@bom.gov.au
Mr Ercan BÜYÜKBAS (representing CIMO)	Turkish State Meteorological Service Devlet Meteoroloji Isleri Genel Müdürlügü Kètükcü Ali Bey Cad No. 4 Kalaba Ankara 06120, Turkey Tel.: +90 505 624 0619 Fax: +90 312 359 2310 Email: ebuyukbasalt@mgm.gov.tr
Mr Tony Boston (representing CHy)	Bureau of Meteorology, GPO Box 2334 Parkes ACT 2600, Australia Tel.: +61 (2) 6232 3503 Fax: +61 (2) 6232 3535 Email: Tony.Boston@bom.gov.au
Mr Joseph Swaykos (representing JCOMM)	Data Management Communications Branch National Data Buoy Center, Building 3205 Stennis Space Center, Mississippi (MS) 39571, USA Tel.: +1 (228) 688 4766 Fax: +1 (228) 688 1364 Email: joe.swaykos@noaa.gov
Mr. Stewart Taylor (representing AMDAR)	UK Met Office Unit 3 United Kingdom of Great Britain and Northern Ireland Tel: +44 1695 729 742 Fax: +44 1392 885 681 Mobile: +44 775 388 0518 Email: stewart.taylor@metoffice.gov.uk
Mr. Simon Gilbert (invited expert)	UK Met Office United Kingdom of Great Britain and Northern Ireland Tel: +44 7500 096278 Fax: +44 Email: simon.gilbert@metoffice.gov.uk
Mr Guillaume Aubert (invited expert)	EUMETSAT Darmstadt, Germany Tel.: + Fax: + Email: guillaume.aubert@eumetsat.int
Mr Oystein Godoy (invited expert)	Norwegian Meteorological Institute Oslo, Norway Tel.: + Fax: + Email: o.godoy@met.no

Mr Dominic Lowe (invited expert)	Oxford United Kingdom of Great Britain and Northern Ireland Tel.: + Fax: + Email: dominiclowe@gmail.com

WMO SECRETARIAT **Dr Lars Peter Riishojgaard**	7 bis, avenue de la Paix CH-1211 Geneva 2 Switzerland WIGOS Project Manager Tel.: +41 22 730 8193 Fax: +41-22 730 80 21 Email: sforeman@wmo.int
Mr Luis Nunes	WIGOS Project Office Tel: +41-22 730 81 38 Fax: +41-22 730 80 21 Email: lfnunes@wmo.int
Mr Timo Pröscholdt	WIGOS Project Office Tel: +41-22 730 8176 Fax: +41-22 730 80 21 Email: tproescholdt@wmo.int
Mr Etienne Charpentier	Chief, Observing Systems Division (OSD) Tel.: (+41 22) 730 8223 Fax: (+41 22) 730 8478 E-mail: echarpentier@wmo.intMonitoring
Mr Stephan Bojinski	WMO Space Programme Tel: +41-22 730 8319 Fax: +41-22 730 8021 Email: sbojinski@wmo.int
Mr Tim Oakley	GCOS Implementation Manager Global Climate Observing System (GCOS) Tel: +41 22 730 8068 Fax: +41 22 730 8052 E-mail: toakley@wmo.int
Mrs Champika Gallage	Observing Systems Division (OSD) Marine Observations Tel: +41 22 730 8096 Fax: +41 22 730 8181 E-mail: cgallage@wmo.int

_____

Appendix II

Conclusions and Actions/Recommendations of TT-WMD-5

1. Conclusions and recommendations on the WIGOS Metadata Standard

1.1 The WMDS is now at a mature state, but needs further development, such as additional metadata elements, e.g., a grouping element for sets of stations/platforms (e.g. fleet, super-site);

1.2 The implementation of WMDS is not complete; According to the Manual on WIGOS Appendix 2.4, the implementation phases II (2017-18) and III (2019-20) are still to come;

1.2.1 The WMDS does not contain metadata elements describing the version and language of the standard used; This could be managed by the implementation process;

1.3 It is important to keep representation of the various Technical Commissions in the new Task Team established by ICG-WIGOS;

1.4 Both aspects mentioned above, WMDS maintenance (1.1) and WMDS implementation (1.2), should be captured in the TORs of the new Task Team;

1.5 Other conclusions:

1.5.1 WIGOS MD is not intended to describe single observations (but does allow this);

1.5.2 Metadata elements of WMDS related to data quality for space based observations will be reviewed by the Coordination Group for Meteorological Satellites Task Force on Metadata Implementation (CGMS-TFMDI):

- EUMETSAT has analysed the latest version of WMDS, but other agencies should do the same, under the CGMS-TFMDI, deadline being end of March 2017;

1.5.3 The WMDS does not provide access points to observational data – this needs to be articulated with WIS using the WIGOS ID as the common element with WIS Metadata; the WIGOS Metadata Representation (schema), as well as OSCAR/Surface contains a possibility to specify this.

1.5.4 ICG-WIGOS is recommended to include in the Communications & Outreach Strategy the need to avoid parallel efforts regarding metadata standards, especially within the research community.

2. Conclusions and actions on the WMDS Code tables

2.1 As approved by CBS-16, the WMDS code tables have been moved from the Manual on WIGOS to the Manual on Codes;

2.2 There are still changes to introduce to the code tables, so there is work in progress that needs to be continued, for example the review/completion of definitions and codes in the code table of "Variables", which contains around 750 entries;

2.2.1 The updates to the code tables will be submitted through the CBS procedures, e.g. using the Fast Track Procedure;

2.2.2 To follow those procedures, there is a need for clarification about governance of the Code tables within ICG-WIGOS structure/working bodies;

2.2.3 The changes to the tables should be circulated for feedback/review by various communities before submission to CBS;

2.3 **Actions proposed**:

2.3.1 WMO Secretariat: to update the code tables with the changes proposed during TT-WMD-5, before the end of 2016;

2.3.2 Current TT-WMD Members: to bring the updated code tables to their communities for feedback by the end of February 2017.

3. Conclusions and actions for further development of the Guide to WIGOS

3.1 Further development is needed for most sections of the chapter in the Guide to WIGOS related to the WMDS, particularly guidance related to Cryosphere, Hydrological and Aircraft Based Observations (ABO);

3.2 There is the need to include guidance for the implementation phases II and III (cf. 1.2)

3.2.1 There is a need for clarification on the further contribution to the Guide regarding the mandate of the WIGOS Editorial Board;

3.2.2 It is proposed that the same sub-group of TT-WMD should discuss and work on this topic via webex in early February 2017;

3.3 There is a need to identify individual experts to contribute to the guide, for example, Volker Lehman for surface-based remote sensing observing systems.

4. Conclusions and actions for further development of the WIGOS Metadata Representation

4.1 There is the need to update the WIGOS Metadata Representation (WMDR) with the outcomes of discussion at TT-WMD-5:

4.1.1 Agreed changes to the data model/schema:

- dropped the concept of data segments, instead, a feature “Deployment” will be included
- include a "Reporting” feature, to be hierarchically under "Deployment",

4.1.2 It is proposed that the same sub-group of TT-WMD should work on this topic (Dominic Lowe, Jörg Klausen and Timo Pröscholdt), to produce the next candidate release to be shared with interested parties before the end of 2016.

5. Status and operation of OSCAR/Surface and further development

5.1 TT-WMD-5 recommends that the catalogue of radiosondes be migrated into OSCAR/Surface;

5.1.1 There is a need to investigate how to do this;

5.2 Regarding the “Machine-to-Machine” (M2M) interface to OSCAR/Surface it was agreed that the basic API should support the upload of metadata records in full (all elements), as well as in part (only some user selected elements);

5.2.1 Further (administrative) functionality changes need to be investigated.

5.3 Nomination of NFP for OSCAR/Surface: TT-WMD-5 recommends ICG-WIGOS to be aware of the lack of nominations from more than 50% of Members.

5.4 Information on WMDS compliance by Members (“traffic lights” in OSCAR/Surface):

5.4.1 TT-WMD noted the value of sharing compliance assessment, acknowledged that the computation and communication of the assessment results would need to be carefully handled;

5.4.2 ICG-WIGOS should make a decision on whether and how to openly share the results of compliance by Members in OSCAR and elsewhere.

6. Conclusions related to training on WMDS and OSCAR/Surface

6.1 TT-WMD supports the training plan for OSCAR/Surface for 2017 that was endorsed by CBS-16, and recognizes the need for proper resources, particularly to develop training material especially for e-learning modules.

7. BENEFITS OF WMDS

- In a world of diverse sources of observations, metadata provides the ability to discriminate between trustworthy data which can be used to provide as a sources suitable for making important decisions which affect life and property. Without metadata, you would be cautious of using data to make a forecast which could have life threatening decisions. [For example, the threat of an approaching cyclone caused the evacuation of a hospital (including intensive care) and some age care facilities which were in the path. These types of evacuations can result in death of patients.
- "Data without metadata is not data at all". Without metadata, data has dubious value. This applies in all situations dealing with scientific data.
- Gap analysis of coastal buoy locations - all positions can be obtained at one place.
- Ground truth locations of DART (tsunami) buoys to ensure if they are relocated we will know where they have been deployed in the past.
- Station (Buoy) histories - one stop shopping for instrument history, location, etc.
- Educating field staff in the importance of metadata, reinforces the value of the underlying observations. By documenting the metadata, staff do a better job collecting the observations.

- For NWP: the use of 4D time/position of the measurement is determined from the metadata; May need to know the instrument type in order to apply corrections, e.g. characteristics of different radiosondes; Provenance and calibration of instrument may come into the verification/validation of NWP; Application of tiered use of observations, e.g. professional networks versus citizens stations relies on metadata.
- For weather forecasting: Application of tiered use of observations, e.g. professional networks versus citizens stations relies on metadata; More information gives improved insight and better decision advice, e.g. knowing the characteristics of an observing site (warm/cold relative to surrounding sites) improves the forecast.
- For Climate: Historical record of observing technologies and practices; Application of tiered use of observations, e.g. professional networks versus citizens stations relies on metadata; Provides a global picture of the observing networks.
- For observations network management: Need to know the instruments in great detail; Example of identifying which stations are using alcohol thermometers versus platinum Resistance Thermometers, as their characteristics, especially in very cold climate, are different; Reliability of data. Identification of extremes relies on good calibration, which comes from the metadata; Observations Network design. Gap Analysis element of the RRR.
- Standards are intrinsically of use to support (meta)data sharing and interoperability
- Need to market the standard to each user community.
- Needs to be open and freely available and more than just WMO.
- Governance is critical in terms of change management and also ownership.
- Pragmatic approach to standard development, need to engage the science community, esp. important in polar regions.
- Avoids developing your own standard for metadata. Allows you to know what/how/when metadata should be collected and recorded.
- Enables to exchange metadata information in a standard way, especially across different countries.
- Facilitates the harmonization of the metadata collection from various organizations at national level.
- WMDS is a visible component needed for the success of WIGOS. It provides a key step in facilitating international cooperation.

8. USE CASES OF OSCAR/SURFACE

- OSCAR/Surface provides a "one stop" repository for ABO metadata on aircraft and data coverage. This removes multiple databases being maintained by individual NMHS, etc.
- Tool for network management, collaboration with other ABO regional programmes to design network coverage, remove duplication, redundancy of data and associated data costs.
- We are members of an international community. We can use OSCAR/Surface to investigate how other countries obtain their observations and operate their networks.
- Provides ability to evolve and design the national and regional network. Visible to see what by neighboring countries are also doing, and possible filling gaps along border areas using observations from neighboring territories.
- Gives visibility to the types of systems that are used in other countries. This is especially beneficial when planning to invest in new technology.
- OSCAR/Surface will improve cooperation between member countries and sharing of data. Example of Turkey and Black sea radars which the Russian federation identified using the WMO Radar database (now visible in Oscar/Surface).
- Provides ability to query for buoys in a geographical area and see what other institutions have buoys in the same area.
- Provides ability to manage RBON networks (i.e. WMO Region networks) through the common visibility of all countries networks.

- It is possible to query and identify the ownership/organizational responsibility for all observations in an area of interest.
- It provides Public visibility and accountability for observations and particularly their metadata which provide assurance of the quality and standards for networks. It makes it difficult for climate 'sceptics' to disregard data which has comprehensive metadata.
- It facilitates the estimation of the investment in networks over an area if interest.
- It is possible to compare the status and evolution of networks over a period of time (years and decades).
- Allows to know what is the current status (availability, location, equipment type) of the different observing networks; Can be used as a top level network design tool to understand current capabilities. Need to be able to overlay different outputs e.g. AMDAR and Radiosonde and Mode-S and radar winds.
- Provides me with a consistent picture of the regional and global observing networks.
- Allows to know what is the ABO profile coverage in my region, how many profiles/data will I get from an airport on a daily basis.
- Allows to know what is my regional data coverage, so I can review data coverage as part of my upper air network design.
- Allows to know where can I see humidity and/or turbulence data.
- Allows to know what data is available in a certain region to assist with aircraft incidents.
- Enables network design: Observing network density, location of stations.
- Enables the use metadata: how observations are captured, methods, procedures, etc.
- Allows to learn about the instrumentation: purpose, procedures, maintenance, calibration (but data in this area not populated in current OSCAR/Surface?)
- Allows to learn about the observations: what is being measured, where, when by whom?
- Allows to learn about data quality/uncertainty: what is the uncertainty intrinsic to this observation/measurement?
- Allows to visualize the existing observing capabilities in the neighboring countries.
- Allows to extract maintenance and calibration related metadata from stations in my country for management purposes, within certain dates.
- Allows to extract specific metadata about a particular station when performing weather or climate analysis.
- Allows to extract specific metadata related to external requests about the observations in a particular area, date and time.

_____

Appendix III

TT-WMD ACTION PLAN FOR THE PERIOD XI.2012 TO VII.2017

Version	Date	Comments
1	23/11/2012	Action plan developed at TT-WMD-01
2	15/3/2013	TT-WMD-1
2a	31/01/2014	Intermediate update for ICG-WIGOS
3	15/05/2014	TT-WMD-2
4	04/12/2014	TT-WMD-3
5	23/10/2015	TT-WMD-4
6	07/12/2016	TT-WMD-5

No.	Task	Deliverable/Activity	Deadline (if not stated end of month)	Responsible	Status*	Comment
0	Produce proposed definition of contents of WIGOS metadata	Initial version of WIGOS metadata	15 March 2013	Howe	Complete 15/3/2013	TT-WMD-1 achieved this
1	Define Initial Observation Types to be described	All WIGOS observational data types have been listed (the purpose of the list is to design a robust model for observation metadata, so although it may not be possible to include every observation type, those in the list should ensure that the range of requirements for metadata is covered), and each assigned to a relevant TC for specification of metadata requirements (TT-WMD)	May 2013	Klausen	Task completed with sufficient coverage in the presentations for TT-WMD-1 15/3/2013	Adequate information was provided through the presentations for the meeting. No direct further list required; review of metadata will identify further issues.
2	Define essential requirements of application areas beyond the Standard	TCs review the needs of application programmes against the specification of metadata, and propose additional elements that they consider essential for that application area. In doing this, TCs may recommend modifications to the metadata.	November 2013	TT member for Commissions CAgM, EC-PORS contacts needed	Completed	

3	Define essential metadata for observing systems beyond the Standard	TCs review the needs of observing programmes against the specification of Standard, and propose additional elements that they consider essential for that observing programme. In doing this, TCs may recommend modifications to the Standard.	November 2013	TT member for Commissions CAgM, EC-PORS contacts needed	Completed	
4	Confirm Metadata Elements	WIGOS Metadata reviewed following feedback from Commissions and first formal definition agreed. Mandatory, Conditional and Optional elements defined.	March 2014 (EC deadline for documents)	TT-WMD by correspondence	Completed	Completed with editorial changes needed
5	Formal definition of Metadata	Define, using a standard methodology, the detailed specification of WIGOS metadata, in a form that allows extension to other elements (eg using UML). Precursor to item 5 of WIP 8.1.1 (that may result in item 5 being redefined).	End of March 2016 (for submission to TCs)	Ad hoc group involving IPET-MDRD, TT-WMD and ET-CDMS	Provisional operational draft presented to CBS-16 for further development	A sub-group of TT-WMD and IPET-MDRD, is making progress
6	Recommend to ICG-WIGOS on how they should go about deciding on approaches for gathering, storing and exchanging WIGOS metadata	Within the principle that all data must be provided along with the relevant metadata, identify how WIGOS metadata may be gathered, stored and exchanged. (Precursor for item 5 in the WIP 8.1.1 work plan that may define that item)	March 2014 (EC document deadline)	TT-WMD in consultation with IPET-WIFI/SG-OD	Completed	OSCAR is part of the solution for gathering, storing and exchanging MD. TT-WMD-4 has provided definitions and roles regarding MD management
7	Decide on subsets of summary metadata and how they will be presented as catalogues	Identify a subset of the metadata that has to be recorded in globally available catalogues to meet requirements for an overview of the observations available through WIGOS and for exchanging critical metadata that changes infrequently. (Precursor to item 5 in the WIP 8.1.1 work plan that may define that item 5). This may include a complete station list similar to Volume A.	November 2014	Representative of each Commission In liaison with IPET-WIFI subgroup on WIGOS Information Resource	Completed	Completed after identification of the phases approach.
8	Monitor progress of plan	Quarterly teleconferencing meetings.	1st Week March, May, September, December	Co-Chairs	On going	

9	Create contents of code tables	Defined contents of code tables, classifications that are needed to operate the standard	March 2017	TT-WMD members to take responsibility for individual tables Co-Chairs to allocate responsibilities	95% completed	(1-01 and 2-02 by all TC representatıves, 5-02 by Ercan Büyükbas). A governance process has been proposed
10	Development of guidance material, with examples, to assist Members with the practical implementation of the Standard	Document with proposed guidance material	March 2017	TT-WMD	In progress First draft endorsed by CBS-16 as part of the Guide to WIGOS	TT-WMD in alignment with OSCAR development
11	Define the requirements and configuration of metadata exchange	Document requirements for operational MD use cases of metadata exchange	July 2017	TT-WMD and IPET-MDRD	In progress	Relates to task 5, 6 and 10 and partly started by the OSCAR project team
12	Develop competencies	Identify competencies required for those responsible for providing WIGOS metadata	May 2016	TT-WMD	Completed	TT-WMD-4: To be completed via webex
13	Complete the final draft of the WMDS	Draft version 0.2 to be submitted to ICG-WIGOS-4	January 2015	TT-WMD and Secretariat	Completed	

* STATUS column entries will be one of the following descriptors, as determined by the Chair TT-WMD based on consultation with the responsible party (in each case, elaborative comments can be added after the standard descriptor or in the "Comment" column):

Completed	Under-Stress	Overdue