WORLD METEOROLOGICAL ORGANIZATION

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

TASK TEAM ON WIGOS METADATA

Fourth Session

Alanya, Turkey, 20-23 October 2015

FINAL REPORT

DRAFT

DISCLAIMER

Regulation 42

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Regulation 43

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EXECUTIVE SUMMARY

The fourth session of the Task Team on WIGOS Metadata (TT-WMD-4) of the Inter-Commission Coordination Group on the WMO Integrated Global Observing System (ICG-WIGOS) was held at Alanya, Turkey, from 20 to 23 October 2015, at the kind invitation of the government of Turkey. 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 for the discussions, the relevant resolutions of the 17th World Meteorological Congress (Cg-17) and of the 67th WMO Executive Council (EC-67), as well as the conclusions and recommendations from various groups and task teams working on matters related with observations metadata.

The session reviewed the latest version of the OSCAR/Surface (OSCAR is the WMO Observing Systems Capability Analysis and Review tool and OSCAR/Surface is the OSCAR database component concerning metadata for surface-based observations) and the need to reflect the recent changes of the OSCAR structure into the WIGOS Metadata Standard (WMDS). In particular, several code tables of the WMDS were reviewed and/or completed based on the code tables of OSCAR/Surface.

The session also reviewed the draft version of the logical data model, of OSCAR/Surface, for the exchange of metadata, and made proposals for its improvement and update, towards a more complete and functional model, including the facility of machine-to-machine procedures for the automatic insert and transfer of metadata.

From the discussions on the governance of the WMDS, it was proposed to use the Commission for Basic Systems (CBS) “simple/fast track” procedure, for the approval of new or revised code tables in 2016.

The session agreed on a plan for the development of guidance material to assist Members in the application of the WMDS, including guidance in the use of the web interface of OSCAR/Surface as well as for the use of machine-to-machine interfaces to ingest and retrieve their metadata.

Finally, taking into account the conclusions and the tasks that need to be completed before the entry into force (July 2016) of the WIGOS Regulatory Material approved by Cg-17, the session agreed on the updates to the work plan (Appendix II) including developing the guidance material and the competencies for the use of WMDS by WMO Members.

GENERAL SUMMARY

1. ORGANIZATION OF THE SESSION

1.1. Opening of the session

1.1.1. The fourth session of the Task Team on WIGOS Metadata (TT-WMD-4) of the Inter-Commission Coordination Group on the WMO Integrated Global Observing System (ICG-WIGOS) was opened by Dr Jörg Klausen (Switzerland) co-Chair TT-WMD, at 09:30 hours on Tuesday, 20 October 2015, at the hotel Sunprime Numa Beach, in Alanya, Turkey, at the kind invitation of the government of Turkey.

1.1.2. Mr Erol Aydin, Regional Director of the Turkish State Meteorological Service (TSMS) and Manager of the Antalya Regional Training Centre (RTC) welcomed the participants to Alanya, hoping that everyone could have some time to enjoy the area, which was a very popular tourist destination. He mentioned the importance of the meeting and wished a very successful outcome. Mr Aydin also thanked WMO for the opportunity to host this meeting in Turkey, which was a great honour for the TSMS. Mr Ercan Büyükbas, Head of the Observing Systems Department of TSMS also welcomed the participants to Alanya, Turkey.

1.1.3. Dr Steve Foreman, Chief of WIS Data Representation, Metadata & Monitoring Division, WMO Secretariat, welcomed the participants. On behalf of the Secretary-General of WMO, he thanked the TSMS for providing such excellent facilities, as well as the arrangements in support of the meeting. Dr Foreman noted the importance of the session for making WIGOS metadata real, relevant and deliver benefits. To do that, the meeting had to define the way forward for providing guidance on the use of the WIGOS metadata standard (WMDS), including defining competences and training to support them; exchanging metadata, including OSCAR and exchange formats; and maintaining the standard, including processes and procedures.

1.1.4. Mr Karl Monnik (Australia), co-Chair TT-WMD praised the group for the work developed so far and invited all participants to be inclusive, to allow all perspectives to be incorporated in order for a robust WMDS. He mentioned the WIGOS framework and the pre-operational phase for the next four years (2016-19).

1.1.5. Dr Klausen invited the personnel from TSMS attending the session to also participate actively in the discussions, considering the presence of real users and operational staff of a NMHS is an added-value for the goals of the meeting.

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

1.2. Adoption of the agenda

1.2.1. TT-WMD-4 adopted the Agenda for the meeting, which is reproduced at the beginning of this report.

1.3. Working arrangements

1.3.1. TT-WMD-4 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, on behalf of both TT-WMD co-Chairs, explained that the Task Team was set up to meet the needs of all WMO Commissions, with members drawn from all Commissions. He noted that Congress had approved the WMDS with no significant changes. He briefly summarized (Doc 2) the meetings that had been attended that were relevant to the work of TT-WMD. Dr Klausen outlined the objectives of the meeting, as the following:

2.1.1. Consider the guidance from Cg-17 and EC-67, as well as recommendations of various WIGOS related groups and task teams.

2.1.2. Review the current version of OSCAR/Surface, an implementation of the WMDS and archive of WIGOS metadata.

2.1.3. Review and/or complete a number of code tables that have been developed for the WMDS to improve the metadata standard.

2.1.4. Review proposed mechanisms for the governance of code tables.
2.1.5. Develop a plan for the preparation of guidance material to assist Members in the application of the WMDS.
2.1.6. Consider the current version of the generic data model and formal WMDS, with a view to facilitating machine-to-machine transfer of metadata.
2.1.7. Guidance material to assist Members in the use of the web interface of OSCAR/Surface as well as the use of machine-to-machine interfaces to ingest and retrieve their metadata is needed and the meeting shall develop a plan for this.
2.1.8. Discuss the development of competencies for the use of WMDS by WMO Members
2.1.9. Update the existing work plan to reflect present status and develop a work plan for the pre-operation period of WIGOS 2016-2019.

2.2. Mr Tim Oakley (UK and WMO) commented that the composition of the group may need to evolve as the aims of the group migrated from defining the requirements to implementing those requirements. Mr Monnik agreed that the work of the team required a wide range of skills, and explained that he expected these to be provided by close collaboration between existing teams: TT-WMD and IPET-MDRD (Inter-Programme Expert Team on Metadata and Data Representation Development) have started working together on the data model for the WMDS since June 2015. It was recognized that the session should build on the preliminary results of that collaboration and benefit from the presence of Mr Dominic Lowe (Australia), expert in data modelling and member of IPET-MDRD.

3. RELEVANT RESOLUTIONS OF CG-17 AND EC-67

3.1. Mr Luis Nunes, WIGOS Scientific Officer, WMO Secretariat, summarized the relevant resolutions by Cg-17 and EC-67. He outlined the five priorities of the WIGOS Pre-operational Phase (2016-19) approved by Cg-17:

3.1.1. National WIGOS implementation;
3.1.2. WIGOS Regulatory Material, complemented with necessary guidance material to assist Members with the implementation of the WIGOS technical regulations;
3.1.3. Further development of the WIGOS Information Resource (WIR), with special emphasis on the operational deployment of the OSCAR database;
3.1.4. Development and implementation of the WIGOS Data Quality Monitoring System;
3.1.5. Concept development and initial establishment of Regional WIGOS Centres

3.2. Mr Nunes stressed that the Technical Regulations Volume I, Part I-WIGOS and the Manual on WIGOS, which includes the WMDS as an attachment, were approved by Cg-17, which meant they would come into force on 1st July 2016. He recalled that Cg-17 emphasized the urgency of developing guidance to help the implementation of the regulations. It was mentioned that changes to the WMDS, e.g. code tables, needed to go through one of the formal approval procedures.

3.3. Mr Nunes noted that the implementation of WIGOS in the Pre-operational Phase would focus on regional and national levels rather than on global level. The Regional WIGOS Centres would have an important role in implementing WIGOS metadata and OSCAR.

3.4. Mr Monnik added that the current version of WMDS was stable enough to allow the development of its logical data model. In terms of guidance material for the practical implementation of WMDS, the priorities for its development should follow the three implementation phases. The inclusion of the data model in the Guide to WIGOS was discussed.

3.5. Mr Büyükbaş explained that in RA VI, it had been proposed producing a draft national implementation plan for Members, mentioning that there was little awareness of WIGOS implementation by Members. Mr Monnik stated that work is ongoing to provide information to Members, e.g. on metadata and OSCAR.

3.6. Dr Klausen recalled that Cg-17 and EC-67 had approved the re-establishment of ICG-WIGOS with updated Terms of Reference (ToR), no changes being made to the TT-WMD mandate.

4. OUTCOMES OF RECENT EXPERT TEAMS MEETINGS RELEVANT TO TT-WMD

4.1. IPET-MDRD - climate/WIGOS metadata representations

4.1.1. Dr Foreman outlined the achievements of the meeting with experts from IPET-MDRD, TT-WMD and ET-CDMS (CCl Expert Team on Climate Data Management Systems), held in Melbourne, Australia, from 22-25 June 2015, to develop a data representation for climate metadata and WIGOS metadata. As major deliverables, the meeting had prepared the high level structure of the data representation, i.e., how the logical data model "looks like" and a plan with the expected timeline for defining the full representation of the standard itself.

4.2. IPET-WIFI SG-OD First session

4.2.1. Dr Klausen reported on the conjoint meeting of the Inter-Programme Expert Team on WIGOS Framework Implementation (IPET-WIFI), Sub-Group on OSCAR Development (SG-OD) and the Ad Hoc Workshop on Rolling Review of Requirements (RRR) Gap Analysis for OSCAR.

4.2.2. Dr Klausen mentioned that the SG-OD team, chaired by Simon Gilbert, was formed to guide WMO secretariat and Météo-Suisse in developing OSCAR. He hoped that the team would provide long-term guidance to steer the future of OSCAR/Surface. Future demands for changes and improvements of OSCAR/Surface should be evaluated by SG-OD and that team should recommend if/how changes should be developed/implemented.

4.2.3. Dr Klausen explained that the SG-OD meeting reviewed the achievements of OSCAR, but that the analysis part of the RRR, was considered to be a complex task. Discussions included the representation of capabilities of remote sensing systems.

4.2.4. The issue of "derived data" was raised: were these to be considered as observations? The example of composite maps of precipitation amount using both in-situ (rain gauges) and remote sensing (radars/satellites) data. It was agreed that the main priorities for OSCAR/Surface were: a data model standard, a machine-to-machine (M-2-M) tool for automatic insertion of metadata and guidance, and Dr Klausen would raise this issue with ICG-WIGOS.

4.2.5. Regarding the development of OSCAR guidance for Members the possible overlapping roles of TT-WMD and the IPET-WIFI/SG-OD was questioned.

4.2.6. Mr Büyükbas asked about the integration of non-NMHS's observations into OSCAR; The benefits of WIGOS were mentioned, and Dr Øystein Godøy (Norway) explained that most of polar observations came from non-operational agencies, including many research groups, but that OSCAR should capture metadata from all of those. Dr Foreman said WMO's perspective was that Members encourage third parties in their territories to make available observational data and metadata; Mr. Büyükbaş mentioned the law in Turkey which states that whoever would like to make meteorological observations has to get permission from TSMS and submit the observational data, in regular basis as free of charge to TSMS, who ensured and guided how the observations were done in Turkey.

4.2.7. Dr Klausen mentioned that due to the lack of an agreed XML encoding, the OSCAR/Surface API was not yet ready to support the upload of observation metadata, including all WIGOS metadata, from the German Meteorological Service (DWD) into OSCAR. It needed to have the data model finalized before a sound tool could be built. The development of this prototype needed to be aligned with the work of IPET-MDRD.

4.2.8. Dr Godøy noted the need of having a cost-effective solution for the exchange of metadata, otherwise, no one will use it and mentioned the existing standard protocols. Mr Lowe explained that it was unclear which aspect of the data model should be given priority for development: on the contents to exchange or on the interfaces?

4.2.9. Mr Oakley suggested that discussions at this session should focus on WIGOS metadata not on OSCAR. Dr Foreman noted that OSCAR would be the reference source for providing information about observing systems.

4.3. IPET-WIFI Third session

4.3.1. Mr Monnik reported on the third session of IPET-WIFI, 1-4 September 2015, Exeter, UK. It noted the timeline for approving updates to the Regulatory Material and CBS, EC and Congress sessions. The meeting had identified the planned changes to the Manual on GOS needed for a consistent implementation of WIGOS.

4.3.2. IPET-WIFI-3 recognized the urgent action needed on implementation of station identifiers and WIGOS metadata.

4.3.3. Mr Monnik underlined the priority to first finalize the code tables which correspond to the phase one of the WMDS implementation, to be in place before July 2016.

4.4. Ad hoc workshop on WIGOS Metadata for satellites

4.4.1. Mr Nunes outlined the main outcomes of the workshop on metadata for satellites. Issues that were identified as needing resolution in the WIGOS metadata standard were:

- Code table 5-02 needs to be developed; Dr Klausen will share the OSCAR list for "Measuring/observing methods";
- A new entry "Stand by" needs to be added to code table 3-09;
- Element 5-05 needs clarification; This is an action for TT-WMD;
- Code table 5-08 needs to be reviewed/expanded
- For the elements dealing with calibration: it was agreed that they apply only to major changes; for very frequent changes on parameters, a specific link to external source should be provided; the notes should be improved to better explain what is expected in these elements for space-based observations, including what is mentioned above;
- It was agreed that the following elements are not applicable for space-based observations, a nil reason being acceptable (n/a): 5-10, 5-11, 5-12, 5-13; (for 5-12 the reason being that the geospatial location is the same as the platform);
- The following code tables should be revisited by TT-WMD: 3-09, 5-04, 5-14;
- An URL could be accepted for element 4-04, besides code table 4-04.

5. REVIEW OF LATEST DEVELOPMENTS OF THE OSCAR DATABASE

5.1. Mr Klausen updated the participants on the progress and plans for the OSCAR database.

5.2. He mentioned the plan for the transition of Vol.A into OSCAR which corresponds to a conversion from a station centric metadata repository (Vol.A) into an observation centric metadata repository (WMDS). According to the transition plan for Vol.A approved by Cg-17, Members would be able to continue to use the traditional update procedures and the OSCAR procedures in parallel, for two years, period after which only OSCAR updating would be permitted. When importing Volume A, OSCAR has to assume that a station is observing the parameters required of that type of station by the Manual on GOS.

5.3. Mr Monnik questioned what will happen with the updates to the WMO Radar Database (WRD), and the answer was that updates to the WRD will continue as they are today, but there will be a batch procedure to update OSCAR based on the contents of WRD. If there will be a need for Radar metadata that is not currently captured in the WRD, we will have to find a solution to accommodate it, since the revision of OSCAR records updated by machine to machine transfer will only be possible using a further machine to machine update.

5.4. Mr Nunes conveyed a question from a Member representative, during an OSCAR presentation in a WIGOS Workshop for RA II and RA V Members, consisting on what will be the required latency for updating the OSCAR contents, following changes happened, e.g. at a station; The reply didn't mention any specific time lag, just that updates should be made as soon as possible after the changes.

5.5. It was noted that the use of OSCAR database is not mandatory, based on the WIGOS Regulatory Material, but it is the only repository for global observational metadata and compliant with the WMDS, that is available.

5.6. Mr Oakley suggested to have a single access point for all metadata databases and Mr Klausen replied that, in the future, outsources of metadata could also be integrated in OSCAR.

5.7. Mr Klausen informed that many changes have been made to the OSCAR database in response to the feedback from the "beta-testers" (registered users) who have been trying the "beta

version" of OSCAR that has been made available online. He informed that the pre-operational start of OSCAR/surface had been postponed to February or March 2016.

5.8. It was mentioned that the session should use the updated OSCAR code tables to review and further develop the code tables of the WMDS.

5.9. Dr Klausen presented a promotional video on the OSCAR tool and he informed the video may be shown in various events where OSCAR could be of interest.

5.10. Mr Monnik reminded the participants that the history of metadata records is ensured in OSCAR database, but at first OSCAR will not be populated with historical metadata, only current stations metadata is expected, although in the future we should be able to know how/what were the networks sometime back in the past.

5.11. Mr Oakley asked about possible feedback from the beta testing phase regarding the WMDS itself, and Dr Klausen proposed that one of the breakout groups should look at the beta testing feedback table (prepared by Timo Proescholdt, WMO Secretariat).

5.12. Mr Lowe prepared a list of issues that would need to be resolved by a breakout session later in the meeting.

6. REVIEW OF THE WIGOS METADATA STANDARD AND THE LOGICAL DATA MODEL

6.1. Mr Lowe delivered a presentation to explain the standards framework from International Organization for Standardization (ISO) and Open Geospatial Consortium (OGC) that were being used to underpin the development of the WIGOS metadata standard. He further explained that a data model can be used to derive standard implementations, such as: Exchange formats, Database designs, M-2-M interface design. Therefore, a conceptual model such as the WMDS, drives a logical model, which drives the exchange model. Mr Lowe has summarized in a table the mapping of the WMDS elements against the preliminary logical data model.

6.2. Dr Foreman added that we should know what users expect from the WMDS, since its design depends on that.

7. DEVELOPMENT OF GUIDANCE MATERIAL ON WIGOS METADATA

For the discussion on guidance material, as well as for more dedicated discussions on the WMDS and the data model, the session break into groups with the following tasks and membership:

Breakout Group 1 - reviewing logical data model; Members: Dr. Jörg Klausen, Mr. Dominic Lowe and Dr. Øystein Godøy.

Breakout Group 2 - reviewing the code tables of WMDS; Members: Mr. Luis Nunes, Mr. Mestre Barcelo, Mr. Mustafa Sert, Mr. Hanifi Göktaş, Mr. Mustafa Atilan.

Breakout Group 3 - guidance material and reviewing comments received on the WMDS; Members: Mr. Karl Monnik, Dr. Steve Foreman, Mr. Ercan Büyükbaş, Mr. Tim Oakley and Mr. Stewart Taylor.

Breakout Group 4 - governance; Members: Mr. Karl Monnik, Dr. Steve Foreman, Mr. Ercan Büyükbaş, Mr. Tim Oakley and Mr. Stewart Taylor.

Breakout Group 1 - reviewing logical data model:

The group tackled the issue of deciding when to create a new "WIGOS observation set ". What would trigger a new set, rather than a segment within a set. Should the set include all observations even if there was not a homogenous observing method? The metadata elements that are common across different data sets are the variable and the station. Splitting into sets and segments is an arbitrary distinction to assist data storage, and there was not common feeling of natural triggers for dividing. The observing method and the geometry of observation were mentioned as metadata elements to distinguish members of an observation set, but only major changes in method should trigger a break in the observation set; A change of method (e.g. manual to automatic) but switching between similar instruments does not cause a new set. Other breaks can be made. The concept is

that an observation set is a broadly “homogeneous” sequence. Temporal extent is needed for the whole set and for each segment. The impact for users, of breaking observation sets was discussed, but it was concluded that users will be able to see the different sets and to select what they want to use. It was noted that an observation set is not defined in the WMDS, it should be described in the guidance material.

More work was needed on definitions of terms and clarifying meaning of concepts in the data model and changing model to reflect shared understanding.

In the data model, “Environmental Monitoring Facility” should be renamed as “Observing Facility”. Whenever referred to in a document it should also refer to Station/Platform. The concept of “Observing Facility Set” was added to allow station/platform to be grouped.

Regarding definitions and examples of metadata categories “Sampling” and “Data processing and reporting”, the following changes were suggested: The examples in element 6-04 (Sampling time period) should be moved to element 6-06 (Temporal sampling interval); In element 6-05 (Spatial sampling resolution, put in a representative value, according to the dimension (1-D, 2-D or 3-D), but allow free text to allow characteristics to be explained. The examples in element 7-04 (Spatial reporting interval) should refer to element 6-05 (not 6-06).

The way to code element 7-07 (Data format) was discussed, if there should be a code list, or keep it as free text entry, as it is currently in the WMDS.

Element 2-01 (Application area) was discussed and concluded to only record the current application area, no need to be held as a historic record.

In the data model, tying the purpose of the observation to the observed variable (rather than instrument) could be misleading – because different instruments could be used for different application areas – so it was recommended to tie to instrument. “Ownership and data policy” (category 9 of the WMDS) should be tied to the instrument, because multiple instruments may have different policies associated with them.

Element 6-07 (Diurnal base time) of WMDS should be conditional, instead of mandatory.

Breakout Group 2 - reviewing the code tables of WMDS:

Regarding the “Observed variable” (code table 1-01 in WMDS) the corresponding list of variables from OSCAR was checked and concluded it is comprehensive, so recommend adopting it for the WMDS, but for that the structure of branches and sub-branches of the OSCAR table should be re-formatted to fit the WMDS, and it was proposed to keep the first three levels of the OSCAR “tree”: domain (atmosphere, land, ocean), sub-domain and the third one, before the “end-point” (the actual variable). Most variables from OSCAR list were acceptable, but it was proposed to split atmospheric pressure into surface pressure and sea level pressure, and also to add maximum and minimum daily air temperature. It was recognized the need for a common terminology. In the existing 1-01 table it was agreed to remove column “Matrix” as well as references to BUFR/CREX tables.

Regarding “Measurement units” (code table 1-02) only editorial changes were proposed - number of digits in code column.

Regarding “Representativeness” (code table 1-05) it was agreed to remove the “nil-reason” from the table. A standard approach to handling “nil reason” should be implemented throughout the WMDS.

Regarding “Application areas”, code table 2-01 was updated to take into account changes in WMO application areas (there are three new areas to replace “atmospheric chemistry”); The breakout group also drafted some definitions for the extra non-WMO application areas, e.g. “Energy sector”. It was suggested not to use the Statements of Guidance for the definition of the WMO Application Areas; We should also avoid using links to large WMO documents, rather extract and use the actual definitions of each WMO Application Area.

Regarding “Programme/Network affiliation” (code table 2-02) repeated entries were checked and removed, some others were renamed, in order to make it more comprehensive, in comparison with the corresponding OSCAR code table. Some entries related to marine observations need further revision, which were suggested to be checked by the JCOMM representative in TT-WMD. Regarding the legal relations involved in the affiliation with some networks/programmes it was

noted that relations recorded using this table are informative, not legal. For some programs/networks there is an approval process for affiliating a station, which is identified when submitting a station in OSCAR.

Regarding “Region of origin” (code table 3-01), the reason for using only numbers and not WMO Regional Associations names was reminded as related to political issues.

Regarding “Territory of origin” (code table 3-02), Hong Kong China has to be added to the list, according to the request from Cg-17. The whole table needs further revision to check for completeness and spelling of Members and Territories names.

Regarding “Station/platform type”, code table 3-04 was discussed in comparison with the corresponding OSCAR code table. Taking into account that this element intends to describe where the station is, not what it measures, the following entries were agreed: Land (fixed), Land (mobile), Sea (fixed), Sea (mobile), Air (fixed), Air (mobile), Underwater (fixed), Underwater (mobile), Land (on ice), Sea (on ice), Lake/River (fixed), Lake/River (mobile), Space-based.

Regarding Data communication method, code table 3-08 should be more generic, e.g. in what concerns satellite systems, and should include postal systems.

Regarding “Station status”, code table 3-09 was discussed and concluded that it should not be used to state whether a station has national or international data exchange, rather use code table 9-02 (Data policy/use constraints) for that.

Regarding “Source of observation” (code table 5-01), after discussion about the different between an automatic and a manual observation, it was agreed to change the entries of the code table to: “instrumental – automatic”; “instrumental – manual reading”; “human observation”. The description of the quality control procedure, e.g. manual checks before release of information from an electronic sensor, must be included in the Data processing metadata category.

Regarding "Data policy/use constraints" (9-02) the addition of a new entry "No International Exchange" was considered, to support WIGOS metadata, and perhaps also for WIS metadata.

Breakout Group 3 - guidance material and reviewing comments received on the WMDS

Guidance material on WIGOS metadata should be included in the Guide to WIGOS. The focus should be on the metadata elements planned for the 1st phase of implementation.

It was recognized that the standard itself is not sufficient to explain how to fill in the metadata – we need to explain to someone filing in metadata what to fill in. In addition, it was suggested that definitions of metadata elements in the WMDS should be reviewed for clarity and completeness.

The proposed approach to develop guidance material is to structure it by role of people, for instance there should be guidance for someone managing an observing system. For the content a “flow chart” is proposed for recording the tasks of entering data (need to check that it maps onto the OSCAR entry screens) and a separate “flow chart” for deciding on how to update metadata.

The training materials were thought as associated with the guide (to make it more digestible), but not duplicating. Worked examples are needed, these were proposed to be in OSCAR. It was not clear whether to have real or fictitious worked examples. OSCAR could host worked examples using the concept of TrainingLand as a practice area for training courses. Training sessions should be held in association with WIGOS workshops and other observations related training events, e.g. those organized by the Secretariat Development and Regional Activities Department (DRA)/Education and Training Office (ETR) - to be coordinated with the WIGOS project office.

A brief document is proposed, describing national roles in WIGOS metadata, the Permanent Representatives (PRs), the Observations Director, the network manager, the station managers, the observers, the technicians, etc, not as a part of the formal guide. There is also a need for a communication plan to make sure that all Members know what to do – Regional Associations are a key resource in this, especially through regional meetings.

Guidance needs to make sure that it refers to capability to use machine-to-machine methods of updating OSCAR.

The role of the WIGOS focal points (FPs) versus the OSCAR focal points was raised. The ToR for the National WIGOS FPs already exist and many Members have already nominated their WIGOS FPs. The ToR for the OSCAR FPs are being developed, they are expected to be responsible at

national level for content of OSCAR, regarding the WIGOS metadata from their countries, and they should assign the credentials to edit OSCAR to the station contacts of their countries. In this context, it was mentioned the need to define the procedures for correcting OSCAR metadata. The existing contact points in each Member, for the various observing systems, should be used.

Breakout Group 4 - governance

Before initiating an approval process for changes in code tables, it is necessary to make the proposed changes visible to all Members, to avoid them from developing their systems not in accordance with the changes proposed for approval.

The existing approval procedures were reviewed: the Simple/Fast track (with two moments per year, in May and in November), the Standard/between sessions and the Complex/at sessions. The simple has to be approved, first by the Chair of a CBS Open Programme Area Group (OPAG) and then by the President of CBS. It was suggested to use a "pre-operational" approach for the management of the WMDS code tables; that means propose to ICG-WIGOS that the Inter-Programme Expert Team on Data Representation Maintenance and Monitoring (IPET-DRMM) of the CBS-ISS (Information Systems and Services) be responsible for the updates of the WMDS code tables in consultation with TT-WMD. In this regard, it was agreed to propose to ICG-WIGOS to publish the WIGOS metadata code tables online at codes.wmo.int and to implement a tracking system for recording and managing changes to the code lists and other aspects of regulations and guides.

It was also mentioned that the WIGOS Metadata logical model and its implementation schema will have to be part of the Manual on Codes, which means they will have to be approved by EC.

8. APPROACHES FOR DEVELOPING WIGOS METADATA COMPETENCIES

8.1. The session had a brainstorm discussion on the competencies for WIGOS metadata, using the Final Report of the CIMO Task Team on Competencies. As a result a preliminary list of competencies was identified, as outlined below, to be further developed after the session:

8.1.1. For people to record and enter WIGOS metadata:

- Reading (and writing) in technical English
- Navigate and complete web forms
- Knowledge of observational practices and information
- Familiarity with IT tools used in the preparation and entry of metadata
- Identify the categories of instrumentation used
- Describe equipment and instruments clearly and accurately according to the standard definitions
- Awareness of the importance of metadata
- Documentation of observations
- Awareness of importance of station
- Understand the purpose of WIGOS – to enter data in useful form
- Understand the purpose of their system or network
- Understand the purpose of data management
- Communicate with others using metadata
- Recognize what is a relevant change in the observing environment (instrument, system)
- Understanding of international programmes and networks - of WIGOS, WIGOS observing components and co-sponsored observing systems
- Understand delegated authority as to what they can and cannot change

8.1.2. For people exchanging metadata:

- Encode metadata in XML using tools provided within organization (for automated exchange)
- Upload metadata to OSCAR

9. FUTURE WORK PROGRAMME AND ACTION PLAN OF TT-WMD

9.1. The session reviewed and updated its Action Plan, including deadlines and responsible persons, which is provided in Appendix II, following the conclusions and according to the goals of the session. The updated version of the Action Plan includes the tasks identified as needed to cope with the date of entry in force of the WIGOS Technical Regulations, 1st July 2016.

10. ANY OTHER BUSINESS

10.1. A teleconference session (WebEx) of TT-WMD was scheduled for 19 November, at 1200 UTC+1 for the follow-up of this session.

10.2. Dr Klausen made a short presentation on features and usage of OSCAR/Surface to the engineers and technicians of TSMS who are responsible for the operation and maintenance of observing network of TSMS.

11. CLOSURE OF THE SESSION

11.1. Dr Klausen thanked TSMS for organizing the meeting at an excellent place and thanked the participants for their attendance and relevant contributions. He reminded the responsibilities and the work still to be done, as well as the short deadlines in front of us, to ensure real success of the task team.

11.2. Mr Nunes thanked all participants, mentioning the hard work and leadership of the co-chairs, and the special participation of the invited. He finally thanked Mr Büyükbas and his colleagues from the TSMS for the great support to the meeting.

11.3. Mr Monnik, also thanked the participants, including the secretariat staff, and closed the session at 16:00 hours, on Friday, 23 October 2015.

Appendix I

LIST OF PARTICIPANTS

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Appendix II

TT-WMD ACTION PLAN FOR THE PERIOD XI.2012 TO VI.2016

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**

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	In progress	A joint Task team under 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		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		

9	Create contents of code tables	Defined contents of code tables, classifications that are needed to operate the standard	Dec 2015	TT-WMD members to take responsibility for individual tables Co-Chairs to allocate responsibilities	90% 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	June 2016	TT-WMD	In progress	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	September 2016	TT-WMD and IPET-MDRD		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		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):

On-Track	Under-Stress	Overdue

Appendix III-A

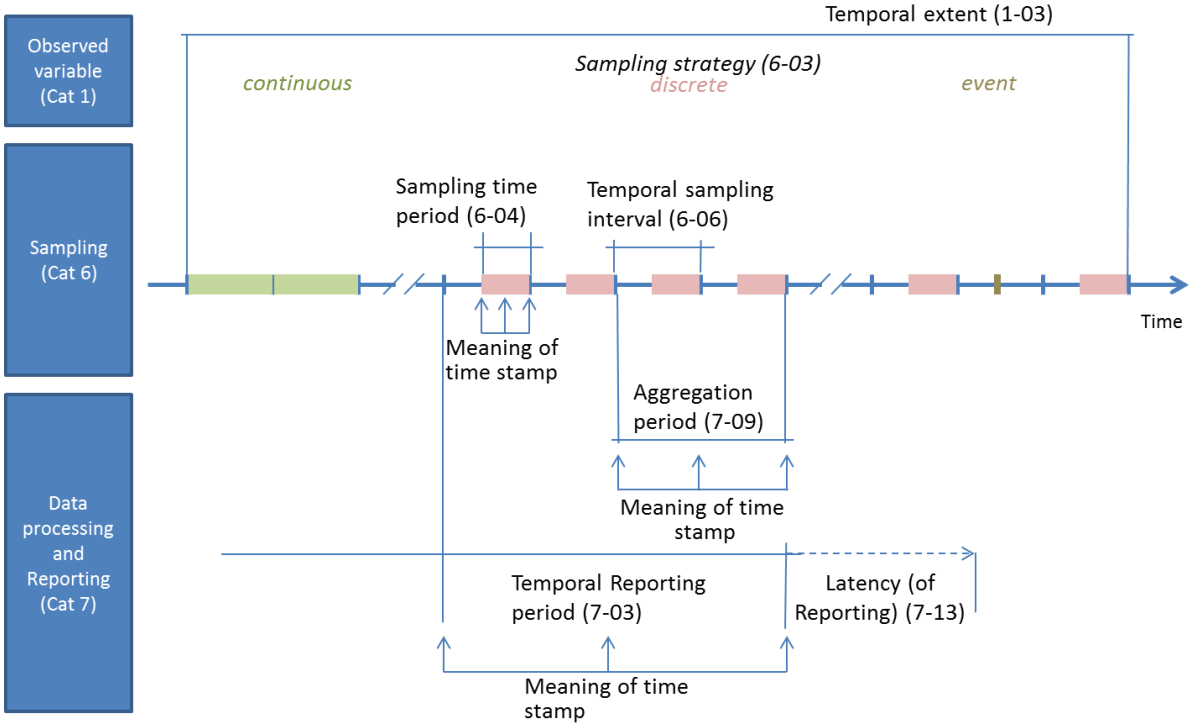
Notes from Breakout Group 1 – Logical data model

1. **What are the discriminating characteristics of the 'ObservationSet' i.e. when do you need a new record versus a new segment in the same record.**
   a. A *major* change of method necessitates a new ObservationSet (OSCAR current implementation). e.g. manual (mercury) to automatic (PT100) thermometer.
   b. Switching out *instances* of the same (or similar) instruments does not require a new set or segment – just a new *deployment*.
   c. Underlying idea that the ObservationSet describes a broadly homogeneous sequence of observations (but not necessarily a *homogenised* sequence…).
   d. [post meeting] the terminology is still not settled, another term may be ObservationCollection, whereby a segment may then be linked to an Observation in the O&M sense.

2. **Should we rename EnvironmentalMonitoringFacility to *ObservingFacility*? (spec says 'Station/Platform').**
   a. Propose to use as a working term for now.
   b. Needs to be clarified in documentation and explanatory material that it describes a station/platform.
   c. Neutral term that carries some meaning, but is not aligned with any particular existing practice or domain (like Platform or Station are).
   d. Consider alignment with OGC and INSPIRE terminology

3. **Need to capture something like ObservingFacilitySet to group or relate facilities together.**
   a. Added ObservingFacilitySet to model.

4. **Clarifications around Figure 2**



   a. Temporal extent is required for the whole ObservationSet (1-03)
   b. Temporal extent is also required for each segment (OM_Observation om:phenomenonTime).

5. **6.04 Sampling Time Period**
   a. ERROR - The example is wrong – it should indicate a duration not a frequency. The frequency example should be moved to the temporal sampling interval (6.06)

6. **6.05 SamplingResolution and SamplingResolutionDescription**

Question to Plenary: How complex do we go? - single value or x y z ?

Use a representative value, but allow one to annotate with additional information.

e.g. for an area of 20km x 30km do we report:

1) 25km, 2) 20km x 30km Or 3) 600km^2

To resolve. Radar is a good example to work through.

7. **7.03 ReportingPeriod**
   a. This is a duration

8. **7.04 Spatial Reporting Period**
   a. Use same encoding as SamplingResolution.(need to resolve 6.05 issue)
   b. ERROR- example should refer to 6.05 (resolution) not 6.06 (interval)

9. **7.07 Should Data Format be a code list?**

	DATA_FOI	NAME_TX	DESCRIPTION_TX
1	1	ASCII	General flat file, human readable
2	2	BUFR	NA
3	3	NASA AMES	NA
4	4	HDF4	NA
5	5	HDF5	NA
6	6	XML	NA
7	7	AMDAR	NA
8	8	CSV	ASCII, comma-separated
9	9	TXT	ASCII, tab-separated
10	10	NetCDF	NA

   a. Question for Plenary: Propose a new codelist is made available for data formats – no quick agreement found. Suggestion to drop the element (or choose not to implement it…). It is phase 3 anyway. Decision was made not to resolve this question now.
   b. Data Format must be 1..* in model.

10. **7.09 AggregationPeriod**

Check out TimeseriesML interpolation types for re-use (similar to WaterML2 shown below) – for meaning of the timestamp.

http://www.opengis.net/def/waterml/2.0/interpolationType/

11. **Discussion around Use of 19115**

Also discussion around use of 19115 (or not).

Park and discuss tomorrow. Make IPET-MDRD decide on best approach.

12. **Does ApplicationArea (2.01) need to be historical?**
   a. Propose no.
   b. Low priority. Leave as is, several Application Areas can be listed.

13. **Changes to EquipmentSpecification**
   a. Move ‘firmware’ to Equipment.
   b. Add 0…* links to EquipmentSpecification

14. Changes to Equipment

a. Remove controlSchedule and maintenanceRoutine from Equipment (they are duplicated (by mistake) in Deployment (which is where they should be).
b. Equipment should link to 0..1 (not 0…*) EquipmentSpecification.

Appendix III-B

Notes from Breakout Group 2 – Code tables

Code table: 1-01

Code table title: Observed variable – measurand [Code table under development]

#	Domain	Sub-domain	Variable class	Variable
	Atmosphere	Aerosol composition		Acidity/Alkalinity total aerosol
	Atmosphere	Aerosol composition	Inorganic anions	Chloride (Cl-), PM1
	Atmosphere	Aerosol composition	Inorganic anions	Chloride (Cl-), PM10
	Atmosphere	Aerosol composition	Inorganic anions	Chloride (Cl-), PM2.5
	Atmosphere	Aerosol composition	Inorganic anions	Chloride (Cl-), total aerosol
	Atmosphere	Aerosol composition	Inorganic anions	Fluoride (F-), total aerosol
	Atmosphere	Aerosol composition	Inorganic anions	Sulphate (SO4=), corrected
	Atmosphere	Aerosol composition	Inorganic anions	Sulphate (SO4=), total
	Atmosphere	Aerosol composition	Inorganic anions	Sulphate (SO4=), total, PM10
	Atmosphere	Aerosol composition	Inorganic anions	Sulphate (SO4=), total, PM2.5
	Atmosphere	Aerosol composition	Inorganic carbonaceous	Elemental carbon (coarse), PM10
	Atmosphere	Aerosol composition	Inorganic carbonaceous	Elemental carbon, PM1
	Atmosphere	Aerosol composition	Inorganic carbonaceous	Elemental carbon, PM2.5
	Atmosphere	Aerosol composition	Inorganic carbonaceous	Total carbon (coarse), PM10
	Atmosphere	Aerosol composition	Inorganic cations	Calcium (Ca++), PM10
	Atmosphere	Aerosol composition	Inorganic cations	Calcium (Ca++), PM2.5
	Atmosphere	Aerosol composition	Inorganic cations	Calcium (Ca++), total aerosol
	Atmosphere	Aerosol composition	Inorganic cations	Magnesium (Mg++), PM10
	Atmosphere	Aerosol composition	Inorganic cations	Magnesium (Mg++), PM2.5
	Atmosphere	Aerosol composition	Inorganic cations	Magnesium (Mg++), total aerosol
	Atmosphere	Aerosol composition	Inorganic cations	Potassium (K+), PM10
	Atmosphere	Aerosol composition	Inorganic cations	Potassium (K+), PM2.5
	Atmosphere	Aerosol composition	Inorganic cations	Potassium (K+), total aerosol
	Atmosphere	Aerosol composition	Inorganic cations	Sodium (Na+), PM10
	Atmosphere	Aerosol composition	Inorganic cations	Sodium (Na+), PM2.5
	Atmosphere	Aerosol composition	Inorganic cations	Sodium (Na+), total aerosol
	Atmosphere	Aerosol composition	Inorganic nitrogen species	Ammonia (NH3), PM2.5
	Atmosphere	Aerosol composition	Inorganic nitrogen species	Ammonium (NH4+), PM10
	Atmosphere	Aerosol composition	Inorganic nitrogen species	Ammonium (NH4+), PM2.5

	Atmosphere	Aerosol composition	Inorganic nitrogen species	Ammonium (NH4+), total aerosol
	Atmosphere	Aerosol composition	Inorganic nitrogen species	Ammonium nitrate (NH4NO3), total aerosol
	Atmosphere	Aerosol composition	Inorganic nitrogen species	Ammonium nitrate (NH4NO3, PM1
	Atmosphere	Aerosol composition	Inorganic nitrogen species	Nitrate (NO3-), PM10
	Atmosphere	Aerosol composition	Inorganic nitrogen species	Nitrate (NO3-), PM2.5
	Atmosphere	Aerosol composition	Inorganic nitrogen species	Nitrate (NO3-), total aerosol
	Atmosphere	Aerosol composition	Inorganic nitrogen species	Nitrite (NO2-), total aerosol
	Atmosphere	Aerosol composition	Inorganic nitrogen species	Sum of ammonia (NH3) and ammonium (NH4+), in air and aerosol
	Atmosphere	Aerosol composition	Inorganic nitrogen species	Sum of nitric acid (HNO3) and nitrate (NO3-), in air and aerosol
	Atmosphere	Aerosol composition	Major inorganic components	Major chemical components (size fractionated)
	Atmosphere	Aerosol composition	Major inorganic components	Major inorganic components (TSP)
	Atmosphere	Aerosol composition	Major inorganic components	Major inorganic components (coarse)
	Atmosphere	Aerosol composition	Major inorganic components	Major inorganic components (fine)
	Atmosphere	Aerosol composition	Major inorganic components	Other chemical components (coarse)
	Atmosphere	Aerosol composition	Major inorganic components	Other chemical components (fine)
	Atmosphere	Aerosol composition	Organic anions	C2H3O2- (CH3COO-, acetate), PM1
	Atmosphere	Aerosol composition	Organic anions	C2H3O2- (CH3COO-, acetate), in aerosol
	Atmosphere	Aerosol composition	Organic anions	C2O4= (oxalate, ethanedioate), PM1.0
	Atmosphere	Aerosol composition	Organic anions	C2O4= (oxalate, ethanedioate), PM10
	Atmosphere	Aerosol composition	Organic anions	C2O4= (oxalate, ethanedioate), total aerosol
	Atmosphere	Aerosol composition	Organic anions	CH3O3S- (methanesulphonate), PM1.0
	Atmosphere	Aerosol composition	Organic anions	CH3O3S- (methanesulphonate), total aerosol
	Atmosphere	Aerosol composition	Organic anions	CHO2- (HCOO-, formate), in aerosol
	Atmosphere	Aerosol composition	Organic carbonaceous	Carbonaceous/organic material (coarse), PM10
	Atmosphere	Aerosol composition	Organic carbonaceous	Carbonaceous/organic material (fine)
	Atmosphere	Aerosol composition	Trace elements	Titanium (Ti), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Aluminium (Al), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Aluminium (Al), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Antimony (Sb), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Antimony (Sb), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Arsenic (As), PM10
	Atmosphere	Aerosol composition	Trace elements	Arsenic (As), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Barium (Ba), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Barium (Ba), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Bismuth (Bi), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Bismuth (Bi), total aerosol

	Atmosphere	Aerosol composition	Trace elements	Cadmium (Cd), PM1
	Atmosphere	Aerosol composition	Trace elements	Cadmium (Cd), PM10
	Atmosphere	Aerosol composition	Trace elements	Cadmium (Cd), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Cadmium (Cd), PM2.5 thru PM10
	Atmosphere	Aerosol composition	Trace elements	Cadmium (Cd), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Cerium (Ce), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Cerium (Ce), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Chromium (Cr), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Cobalt (Co), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Copper (Cu), PM10
	Atmosphere	Aerosol composition	Trace elements	Copper (Cu), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Iron (Fe), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Lanthanum (La), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Lanthanum (La), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Lead (Pb), PM10
	Atmosphere	Aerosol composition	Trace elements	Lead (Pb), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Lithium (Li), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Lithium (Li), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Manganese (Mn), PM10
	Atmosphere	Aerosol composition	Trace elements	Manganese (Mn), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Mercury (Hg), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Nickel (Ni), PM10
	Atmosphere	Aerosol composition	Trace elements	Nickel (Ni), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Phosphorous (P), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Phosphorous (P), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Rubidium (Rb), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Rubidium (Rb), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Selenium (Se), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Strontium (Sr), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Strontium (Sr), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Thallium (Tl), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Thallium (Tl), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Thorium (Th), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Thorium (Th), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Tin (Sn), PM2.5

	Atmosphere	Aerosol composition	Trace elements	Tin (Sn), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Uranium (U), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Uranium (U), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Vanadium (V), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Vanadium (V), total aerosol
	Atmosphere	Aerosol composition	Trace elements	Zinc (Zn), PM2.5
	Atmosphere	Aerosol composition	Trace elements	Zinc (Zn), total aerosol

Code table: 1-02

Code table title: Measurement unit [according to common code table C–6 (WMO, 2013)]

#	Name	Conventional abbreviation	Abbreviation in IA5/ASCII	Abbreviation in ITA2	Definition in base units
1-02-01	metre	m	m	M	-
1-02-02	kilogram	kg	kg	KG	-
1-02-03	second	s	s	S	-
1-02-04	ampere	A	A	A	-
1-02-05	kelvin	K	K	K	-
1-02-06	mole	mol	mol	MOL	-
1-02-07	candela	cd	cd	CD	-
1-02-08	radian	rad	rad	RAD	-
1-02-09	steradian	sr	sr	SR	-
1-02-10	hertz	Hz	Hz	HZ	s^{-1}
1-02-11	newton	N	N	N	kg m s^{-2}
1-02-12	pascal	Pa	Pa	PAL	kg m^{-1} s^{-2}
1-02-13	joule	J	J	J	kg m^2 s^{-2}
1-02-14	watt	W	W	W	kg m^2 s^{-3}
1-02-15	coulomb	C	C	C	A s
1-02-16	volt	V	V	V	kg m^2 s^{-3} A^{-1}
1-02-17	farad	F	F	F	kg^{-1} m^{-2} s^4 A^2
1-02-18	ohm	Ω	Ohm	OHM	kg m^2 s^{-3} A^{-2}
1-02-19	siemens	S	S	SIE	kg^{-1} m^{-2} s^3 A^2
1-02-20	weber	Wb	Wb	WB	kg m^2 s^{-2} A^{-1}

#	Name	Conventional abbreviation	Abbreviation in IA5/ASCII	Abbreviation in ITA2	Definition in base units
1-02-21	tesla	T	T	T	$kg\ s^{-2}\ A^{-1}$
1-02-22	henry	H	H	H	$kg\ m^2\ s^{-2}\ A^{-2}$
1-02-23	degree celsius	°C	Cel	CEL	K+273.15
1-02-24	lumen	lm	lm	LM	cd sr
1-02-25	lux	lx	lx	LX	$cd\ sr\ m^{-2}$
1-02-26	becquerel	Bq	Bq	BQ	s^{-1}
1-02-27	gray	Gy	Gy	GY	$m^2\ s^{-2}$
1-02-28	sievert	Sv	Sv	SV	$m^2\ s^{-2}$
1-02-29	degree (angle)	°	deg	DEG	
1-02-30	minute (angle)	'	'	MNT	
1-02-31	second (angle)	"	"	SEC	
1-02-32	litre	l or L	l or L	L	
1-02-33	minute (time)	min	min	MIN	
1-02-34	hour	h	h	HR	
1-02-35	day	d	d	D	
1-02-36	tonne	t	t	TNE	
1-02-37	electron volt	eV	eV	EV	
1-02-38	atomic mass unit	u	u	U	
1-02-39	astronomic unit	AU	AU	ASU	
1-02-40	parsec	pc	pc	PRS	
1-02-41	nautical	mile			
1-02-42	knot	kt	kt	KT	
1-02-43	decibel	dB	dB	DB	
1-02-44	hectare	ha	ha	HAR	
1-02-45	week				
1-02-46	year	a	a	ANN	
1-02-47	per cent	%	%	PERCENT	
1-02-48	parts per thousand	‰	0/00	PERTHOU	
1-02-49	eighths of cloud	okta	okta	OKTA	
1-02-50	degrees TRUE	°	deg	DEG	

#	Name	Conventional abbreviation	Abbreviation in IA5/ASCII	Abbreviation in ITA2	Definition in base units
1-02-51	degrees per second	degree/s	deg/s	DEG/S	
1-02-52	degrees Celsius	°C	C	C	
1-02-53	degrees Celsius per metre	°C/m	C/m	C/M	
1-02-54	degrees Celsius per 100 metres	°C/100 m	C/100 m	C/100 M	
1-02-55	Dobson unit	DU	DU	DU	
1-02-56	month	mon	mon	MON	
1-02-57	per second (same as hertz)	s^{-1}	/s	/S	
1-02-58	per second squared	s^{-2}	s^{-2}		
1-02-59	knots per 1000 metres	kt/1000 m	kt/km	KT/KM	
1-02-60	Foot	ft	ft	FT	
1-02-61	Inch	In	in	IN	
1-02-62	decipascals per second (microbar per second)	dPa s^{-1}	dPa/s	DPAL/S	
1-02-63	centibars per second	cb s-1	cb/s	CB/S	
1-02-64	centibars per 12 hours	cb/12 h	cb/12 h	CB/12 HR	
1-02-65	dekapascal	daPa	daPa	DAPAL	
1-02-66	hectopascal	hPa	hPa	HPAL	
1-02-67	hectopascals per second	hPa s^{-1}	hPa/s	HPAL/S	
1-02-68	hectopascals per hour	hPa h^{-1}	hPa/h	HPAL/HR	
1-02-69	hectopascals per 3 hours	hPa/3 h	hPa/3 h	HPAL/3 HR	
1-02-70	nanobar=hPa 10-6	nbar	nbar	NBAR	
1-02-71	grams per kilogram	g kg^{-1}	g/kg	G/KG	
1-02-72	grams per kilogram per second	g kg^{-1} s^{-1}	g kg^{-1} s^{-1}		
1-02-73	kilograms per kilogram	kg kg^{-1}	kg/kg	KG/KG	
1-02-74	kilograms per kilogram per second	kg kg^{-1} s^{-1}	kg kg^{-1} s^{-1}		
1-02-75	kilograms per square metre	kg m^{-2}	kg m^{-2}		
1-02-76	acceleration due to gravity	g	G		
1-02-77	geopotential metre	gpm	gpm		
1-02-78	millimetre	mm	mm	MM	
1-02-79	millimetres per second	mm s^{-1}	mm/s	MM/S	
1-02-80	millimetres per hour	mm h^{-1}	mm/h	MM/HR	

#	Name	Conventional abbreviation	Abbreviation in IA5/ASCII	Abbreviation in ITA2	Definition in base units
1-02-81	millimetres to the sixth power per cubic metre	$mm^6\ m^{-3}$	$mm^6\ m^{-3}$		
1-02-82	centimetre	cm	cm	CM	
1-02-83	centimetres per second	cm^{-1}	cm/s	CM/S	
1-02-84	centimetres per hour	$cm\ h^{-1}$	cm/h	CM/HR	
1-02-85	decimetre	dm	dm	DM	
1-02-86	metres per second	$m\ s^{-1}$	m/s	M/S	
1-02-87	metres per second per metre	$m\ s^{-1}/m$	$m\ s^{-1}/m$		
1-02-88	metres per second per 1000 metres	$m\ s^{-1}/1000\ m$	$m\ s^{-1}/km$		
1-02-89	square metres	m^2	m^2	M2	
1-02-90	square metres per second	$m^2\ s^{-1}$	m^2/s	M2/S	
1-02-91	kilometre	Km	km	KM	
1-02-92	kilometres per hour	$km\ h^{-1}$	km/h	KM/HR	
1-02-93	kilometres per day	km/d	km/d	KM/D	
1-02-94	per metre	m^{-1}	m^{-1}	/M	
1-02-95	becquerels per litre	$Bq\ l^{-1}$	Bq/l	BQ/L	
1-02-96	becquerels per square metre	$Bq\ m^{-2}$	$Bq\ m^{-2}$	BQ/M2	
1-02-97	becquerels per cubic metre	$Bq\ m^{-3}$	$Bq\ m^{-3}$	BQ/M3	
1-02-98	millisievert	mSv	mSv	MSV	
1-02-99	metres per second squared	$m\ s^{-2}$	$m\ s^{-2}$		
1-02-100	square metres second	$m^2\ s$	$m^2\ s$		
1-02-101	square metres per second squared	$m^2\ s^{-2}$	$m^2\ s^{-2}$		
1-02-102	square metres per radian second	$m^2\ rad^{-1}\ s$	$m^2\ rad^{-1}\ s$		
1-02-103	square metres per hertz	$m^2\ Hz^{-1}$	m^2/Hz		
1-02-104	cubic metres	m^3	m^3		
1-02-105	cubic metres per second	$m^3\ s^{-1}$	m^3/s		
1-02-106	cubic metres per cubic metre	$m^3\ m^{-3}$	$m^3\ m^{-3}$		
1-02-107	metres to the fourth power	m^4	m^4		
1-02-108	metres to the two thirds power per second	$m^{2/3}\ s^{-1}$	$m^{2/3}\ s^{-1}$		
1-02-109	logarithm per metre	$\log (m^{-1})$	$\log (m^{-1})$		
1-02-110	logarithm per square metre	$\log (m^{-2})$	$\log (m^{-2})$		

#	Name	Conventional abbreviation	Abbreviation in IA5/ASCII	Abbreviation in ITA2	Definition in base units
1-02-111	kilograms per metre	kg m^{-1}	kg/m		
1-02-112	kilograms per square metre per second	kg m^{-2} s^{-1}	kg m^{-2} s^{-1}		
1-02-113	kilograms per cubic metre	kg m^{-3}	kg m^{-3}		
1-02-114	per square kilogram per second	kg^{-2} s^{-1}	kg^{-2} s^{-1}		
1-02-115	seconds per metre	s m^{-1}	s/m		
1-02-116	kelvin metres per second	K m s^{-1}	K m s^{-1}		
1-02-117	kelvins per metre	K m^{-1}	K/m		
1-02-118	kelvin square metres per kilogram per second	k m^2 kg^{-1} s^{-1}	k m^2 kg^{-1} s^{-1}		
1-02-119	moles per mole	mol mol^{-1}	mol/mol		
1-02-120	radians per metre	rad m^{-1}	rad/m		
1-02-121	newtons per square metre	N m^{-2}	N m^{-2}		
1-02-122	pascals per second	Pa s^{-1}	Pa/s		
1-02-123	kilopascal	kPa	kPa		
1-02-124	joules per square metre	J m^{-2}	J m^{-2}		
1-02-125	joules per kilogram	J kg^{-1}	J/kg		
1-02-126	watts per metre per steradian	W m^{-1} sr^{-1}	W m^{-1} sr^{-1}		
1-02-127	watts per square metre	W m^{-2}	W m^{-2}		
1-02-128	watts per square metre per steradian	W m^{-2} sr^{-1}	W m^{-2} sr^{-1}		
1-02-129	watts per square metre per steradian centimetre	W m^{-2} sr^{-1} cm	W m^{-2} sr^{-1} cm		
1-02-130	watts per square metre per steradian metre	W m^{-2} sr^{-1} m	W m^{-2} sr^{-1} m		
1-02-131	watts per cubic metre per steradian	W m^{-3} sr^{-1}	W m^{-3} sr^{-1}		
1-02-132	siemens per metre	S m^{-1}	S/m		
1-02-133	square degrees	$degree^2$	deg^2		
1-02-134	becquerel seconds per cubic metre	Bq s m^{-3}	Bq s m^{-3}		
1-02-135	decibels per metre	dB m^{-1}	dB/m		
1-02-136	decibels per degree	dB $degree^{-1}$	dB/deg		
1-02-137	pH unit	pH unit	pH unit		
1-02-138	N units	N units	N units		

Code table: 1-05

Code table title: Representativeness [(WMO, 2008) (WMO, 2013)], plus extension

#	Name	Definition
~~1-05-0~~	~~Nil reason~~	~~None of the codes in the table is applicable in the context of the observed quantity or unknown, or not available information~~
1-05-01	microscale	An area or volume less than 100 m horizontal extent (for example, evaporation)
1-05-02	toposcale, local scale	An area or volume of 100 m to 3 km horizontal extent (for example, air pollution, tornadoes)
1-05-03	mesoscale	An area or volume of 3 km to 100 km horizontal extent (for example, thunderstorms, sea and mountain breezes)
1-05-04	large scale	An area or volume of 100 km to 3000 km horizontal extent (for example, fronts, various cyclones, cloud clusters)
1-05-05	planetary scale	An area or volume of more than 3000 km horizontal extent (for example, long upper tropospheric waves)
1-05-06	drainage area	An area (also known as 'catchment') having a common outlet for its surface runoff, in km^2

Code table: 2-01

Code table title: Application area(s) [Code table under development]

#	Name	Definition[LFN1]
2-01-01	Global numerical weather prediction (GNWP)	Source: http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-Global-NWP.pdf
2-01-02	High-resolution numerical weather prediction (HRNWP)	http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-HighRes-NWP.pdf~~Ibid~~
2-01-03	Nowcasting and very short range forecasting (NVSRF)	http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-Nowcasting-VSRF.pdf~~Ibid~~
2-01-04	Sub-seasonal to longer predictions ~~Seasonal and inter-annual forecasting (SIAF)~~	http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-SSLP.pdf~~Ibid~~
2-01-05	Aeronautical meteorology~~General weather forecasting~~	http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-Aero.pdf~~Ibid~~
2-01-06	~~Aeronautical meteorology~~ Forecasting Atmospheric Composition	~~Ibid~~To be completed
2-01-07	Monitoring Atmospheric Composition	To be completed
2-01-08	Providing Atmospheric Composition information to support services in urban and populated areas	To be completed
2-01-09~~7~~	Ocean applications	http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-Ocean.pdf~~Ibid~~
2-01-10~~8~~	Agricultural meteorology	http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-Agriculture.pdf~~Ibid~~
2-01-11~~9~~	Hydrology	http://www.wmo.int/pages/prog/www/OSY/SOG/SOG-Hydrology.pdf~~Ibid~~
2-01-12~~0~~	Climate monitoring (as undertaken through the Global Climate Observing System, GCOS)	To be completed~~Ibid~~
2-01-	Climate applications	http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-Climate-CCl.pdf~~Ibid~~

#	Name	Definition[LFN1]
131		
2-01-124	Space weather	http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-SW.pdfIbid
2-01-153	Cryosphere applications	Source: EGOS-IP
2-01-164	Energy sector	Economic activities that produce or distribute energy, such as renewable energies, e.g. solar, thermal, wind.
2-01-175	Transportation sector	Economic activities related to transportation of people and goods, on land, air and water
2-01-186	Health sector	Services provided to the populations, particularly those related to the prevention, e.g. pollen allergies, UV radiation, heat wave alerts.
2-01-197	Terrestrial ecology	Activities and services related to environment, such as bio-diversity
2-01-2018	Operational air quality monitoring and forecasting	Services provided to the public and to the economic activities, related to the impact of phenomena, such as desert dust, forest fires, volcanic events.
2-01-19	Atmospheric composition forecasting	
2-01-20	Atmospheric composition monitoring and analysis	
2-01-21	Large urban complexes	Activities and services in large urban areas

Code table: 2-02

Code table title: Programme/Network affiliation [Code table under development]

#	Name	Definition	Sponsor and/or Contributing to
2-02-01	AMDAR	Global Aircraft Meteorological DAta Relay	WMO/GOS
2-02-02	EPA	Environmental Protection Agency	
2-02-03	EUMETNET	Grouping of European National Meteorological Services	WMO/GOS
2-02-04	WMO/GAW	World Meteorological Organization/Global Atmospheric Watch	
	AOD/AEROCAN		
	AOD/AERONET		
	AOD/PHOTONS		
	GAW/EMEP		
	GAW/NADP		
	GAW/CAPMon		
	GAW/EANET		
	GAW/ESRLCCG		
	GAW/IMPROVE		
	GAW/RAMCES		
	GAW/SHADOZ		

#	Name	Definition	Sponsor and/or Contributing to
	GAW/TCCON		
	GAW/CASTNET		
	GAW/ALINE		
	GAW/AGAGE		
~~2-02-05~~	~~GCOS~~	~~Global Climate Observing System~~	
2-02-06	GCW/CRYONET	Global Cryosphere Watch/….	
2-02-07	GOOS/ARGO	Global Ocean Observing System/…	
	GOOS/DBCP		
2-02-08	IPA	International Permafrost Association	
~~2-02-09~~	~~JCOMM~~	~~Joint Technical Commission for Oceanography and Marine Meteorology~~	~~WMO/GOS~~
2-02-10	WMO/GOS/Other elements	World Meteorological Organization/Global Observing System	
2-02-11	GTOS	Global Terrestrial Observing System	
2-02-12	GAW/IAGOS	In-service Aircraft for a Global Observing System	
2-02-13	WHOS/WHYCOS	World Hydrological Cycle Observing System	
~~2-02-14~~	~~WMO/CLW~~	~~World Meteorological Office/Climate and Water Department~~	
2-02-15	GAW/GALION/ADNET	Asian dust and aerosol lidar observation network	GALION ; WMO/GAW
2-02-16	Aeronet	**AE**rosol **RO**botic **NET**work	NASA?
2-02-17	ANTON	Antarctic Observing Network	WMO/GOS
2-02-18	ASAP	Automated Shipboard Aerological Program	WMO/GOS
2-02-19	GAW/BSRN	Baseline Surface Radiation Network	WMO/GAW & GCOS
2-02-20	GAW/CASTNET	Clean Air Status and Trends Network	(National – USA)
2-02-21	GAW/CIS-LiNet	Lidar network for monitoring atmosphere over CIS regions	GALION ; WMO/GAW
2-02-22	GAW/CLN	CREST Lidar Network	GALION ; WMO/GAW
2-02-23	DART	Deep-ocean Assessment and Reporting of Tsunamis	NOAA Centre for Tsunamis Research
2-02-24	E-AMDAR	European - Aircraft Meteorological DAta Relay	EUMETNET ; WMO/GOS
2-02-25	E-ASAP	European - Automated Shipboard Aerological Program	EUMETNET ; WMO/GOS
2-02-26	E-GVAP	European - GNSS water vapour programme	EUMETNET ; WMO/GOS
2-02-27	E-PROFILE	European – wind profiles from radar	EUMETNET ; WMO/GOS
2-02-28	E-SURFMAR	European - Surface Marine Operational Service	EUMETNET ; WMO/GOS
2-02-29	GAW/GALION/EARLINET	European Aerosol Research Lidar Network	GALION ; WMO/GAW
~~2-02-30~~	~~GALION~~	~~GAW Aerosol Lidar Observation Network~~	~~WMO/GAW~~
2-02-31	GAW-PFR	GAW-Precision Filter Radiometers	WMO/GAW
2-02-32	GAW/German AOD Network	**German Aerosol Optical Depth Network**	WMO/GAW
2-02-33	GOS/GLOSS	Global Sea Level Observing System	JCOMM ; WMO/GOS
2-02-34	GRUAN	GCOS Reference Upper Air Network	GCOS
2-02-35	GSN	GCOS Surface Network	GCOS
2-02-36	GTN-G	Global Terrestrial Network - Glaciers	GCOS
2-02-37	GTN-H	Global Terrestrial Network - Hydrology	WMO/CLW ; GCOS ; GTOS

#	Name	Definition	Sponsor and/or Contributing to
2-02-38	GTN-P	Global Terrestrial Network - Permafrost	IPA ; GCOS ; GTOS
2-02-39	GUAN	GCOS Upper Air Network	GCOS
2-02-40	IAGOS-MOZAIC	Measurement of Ozone and Water Vapour on Airbus in-service Aircraft	IAGOS
2-02-41	GAW/GALION/LALINET	Latin America Lidar Network	GALION ; WMO/GAW
2-02-42	GAW/GALION/MPLNET	Micro Pulse Lidar Network	GALION ; WMO/GAW
2-02-43	GAW/GALION/NDACC	**Network for the Detection of Atmospheric Composition Change**	GALION ; WMO/GAW
2-02-44	OPERA	**European Weather Radar Project**	**EUMETNET ; (WMO/GOS)**
2-02-45	ARGO/PIRATA	**Prediction and Research Moored Array in the Atlantic**	**GOOS ; WMO/GOS**
2-02-46	PolarAOD	**Polar Aerosol Optical Depth Measurement Network Project**	WMO/GAW
2-02-47	RAMA	**Research Moored Array for Afr-Asian-Austr Monsoon Anal.& Pred.**	**NOAA**
2-02-48	RBCN	Regional Basic Climatological Network	WMO/GOS
2-02-49	RBON	Regional Basic Observing Network	WMO/GOS
2-02-50	RBSN	Regional Basic Synoptic Network	WMO/GOS
2-02-51	TAO	Tropical Atmosphere and Ocean Array	NOAA; GCOS
2-02-52	GAW/AOD/SKYNET	Aerosol -cloud-radiation interaction in the atmosphere project	WMO/GAW
2-02-53	GAW/AOD/SibRad		WMO/GAW
2-02-54	SOOP	Ship of Opportunity	JCOMM ; WMO/GOS
~~2-02-55~~	~~U.S. IOOS~~	~~United States Integrated Ocean Observing System~~	~~(National – USA)~~
2-02-56	VOS	Voluntary Observing Fleet	JCOMM ; WMO/GOS
2-02-57	VOSCLIM	Voluntary Observing Fleet (VOS) Climate Project	JCOMM ; WMO/GOS
~~2-02-58~~	~~WRAP~~	~~Worldwide Recurring ASAP Project~~	~~JCOMM ; WMO/GOS~~
	CTBTO ?		

Code table: 3-01

Code table title: Region of origin of data

#	Name	Definition
3-01-01	I	Africa
3-01-02	II	Asia
3-01-03	III	South America
3-01-04	IV	North America, Central America and the Caribbean
3-01-05	V	South-West Pacific
3-01-06	VI	Europe
3-01-07	VII	Antarctica

Code table: 3-02

Code table title: Territory of origin of data[M2]

#	Name	ISO3 Country Code
3-02-001	Afghanistan	AFG
3-02-002	Albania	ALB
3-02-003	Algeria	DZA
3-02-004	Angola	AGO
3-02-005	Antarctica	ATA
3-02-006	Antigua and Barbuda	ATG
3-02-007	Argentina	ARG
3-02-008	Armenia	ARM
3-02-009	Australia	AUS
3-02-010	Austria	AUT
3-02-11	Azerbaijan	AZE
3-02-12	Bahamas	BHS
3-02-13	Bahrain	BHR
3-02-14	Bangladesh	BGD
3-02-15	Barbados	BRB
3-02-16	Belarus	BLR
3-02-17	Belgium	BEL
3-02-18	Belize	BLZ
3-02-19	Benin	BEN
3-02-20	Bhutan	BTN
3-02-21	Bolivia, Plurinational State of	BOL
3-02-22	Bosnia and Herzegovina	BIH
3-02-23	Botswana	BWA
3-02-24	Brazil	BRA
3-02-25	British Caribbean Territories	BCT
3-02-26	Brunei Darussalam	BRN
3-02-27	Bulgaria	BGR
3-02-28	Burkina Faso	BFA

3-02-29	Burundi	BDI
3-02-30	Cabo Verde	CPV
3-02-31	Cambodia	KHM
3-02-32	Cameroon	CMR
3-02-33	Canada	CAN
3-02-34	Central African Republic	CAF
3-02-35	Chad	TCD
3-02-36	Chile	CHL
3-02-37	China	CHN
3-02-38	Colombia	COL
3-02-39	Comoros	COM
3-02-40	Congo	COG
3-02-41	Cook Islands	COK
3-02-42	Costa Rica	CRI
3-02-43	Côte d'Ivoire	CIV
3-02-44	Croatia	HRV
3-02-45	Cuba	CUB
3-02-46	Curacao and Sint Maarten	CUW
3-02-47	Cyprus	CYP
3-02-48	Czech Republic	CZE
3-02-49	Democratic People's Republic of Korea	PRK
3-02-50	Democratic Republic of the Congo	COD
3-02-51	Denmark	DNK
3-02-52	Djibouti	DJI
3-02-53	Dominica	DMA
3-02-54	Dominican Republic	DOM
3-02-55	Ecuador	ECU
3-02-56	Egypt	EGY
3-02-57	El Salvador	SLV
3-02-58	Eritrea	ERI
3-02-59	Estonia	EST

3-02-60	Ethiopia	ETH
3-02-61	Fiji	FJI
3-02-62	Finland	FIN
3-02-63	France	FRA
3-02-64	French Polynesia	PYF
3-02-65	Gabon	GAB
3-02-66	Gambia	GMB
3-02-67	Georgia	GEO
3-02-68	Germany	DEU
3-02-69	Ghana	GHA
3-02-70	Greece	GRC
3-02-71	Guatemala	GTM
3-02-72	Guinea	GIN
3-02-73	Guinea-Bissau	GNB
3-02-74	Guyana	GUY
3-02-75	Haiti	HTI
3-02-76	Honduras	HND
1	Hong Kong, China	HKG
3-02-77	Hungary	HUN
3-02-78	Iceland	ISL
3-02-79	India	IND
3-02-80	Indonesia	IDN
3-02-81	Iran, Islamic Republic of	IRN
3-02-82	Iraq	IRQ
3-02-83	Ireland	IRL
3-02-84	Israel	ISR
3-02-85	Italy	ITA
3-02-86	Jamaica	JAM
3-02-87	Japan	JPN

1 Hong Kong, China, (HKG) to be added

3-02-88	Jordan	JOR
3-02-89	Kazakhstan	KAZ
3-02-90	Kenya	KEN
3-02-91	Kiribati	KIR
3-02-92	Kuwait	KWT
3-02-93	Kyrgyzstan	KGZ
3-02-94	Lao People's Democratic Republic	LAO
3-02-95	Latvia	LVA
3-02-96	Lebanon	LBN
3-02-97	Lesotho	LSO
3-02-98	Liberia	LBR
3-02-99	Libya	LBY
3-02-100	Lichtenstein	LIE
3-02-101	Lithuania	LTU
3-02-102	Luxembourg	LUX
3-02-103	Macao, China	MAC
3-02-104	Madagascar	MDG
3-02-105	Malawi	MWI
3-02-106	Malaysia	MYS
3-02-107	Maldives	MDV
3-02-108	Mali	MLI
3-02-109	Malta	MLT
3-02-110	Mauretania	MRT
3-02-111	Mauritius	MUS
3-02-112	Mexico	MEX
3-02-113	Micronesia, Federated States of	FSM
3-02-114	Monaco	MCO
3-02-115	Mongolia	MNG
3-02-116	Montenegro	MNE
3-02-117	Morocco	MAR
3-02-118	Mozambique	MOZ

3-02-119	Myanmar	MMR
3-02-120	Namibia	NAM
3-02-121	Nepal	NPL
3-02-122	Netherlands	NLD
3-02-123	New Caledonia	NCL
3-02-124	New Zealand	NZL
3-02-125	Nicaragua	NIC
3-02-126	Niger	NER
3-02-127	Nigeria	NGA
3-02-128	Niue	NIU
3-02-129	Norway	NOR
3-02-130	Oman	OMN
3-02-131	Pakistan	PAK
3-02-132	Panama	PAN
3-02-133	Papua New Guinea	PNG
3-02-134	Paraguay	PRY
3-02-135	Peru	PER
3-02-136	Philippines	PHL
3-02-137	Poland	POL
3-02-138	Portugal	PRT
3-02-139	Qatar	QAT
3-02-140	Republic of Korea	KOR
3-02-141	Republic of Moldova	MDA
3-02-142	Romania	ROM
3-02-143	Russian Federation	RUS
3-02-144	Rwanda	RWA
3-02-145	Saint Lucia	LCA
3-02-146	Samoa	WSM
3-02-147	Sao Tome and Principe	STP
3-02-148	Saudi Arabia	SAU
3-02-149	Senegal	SEN

3-02-150	Serbia	SRB
3-02-151	Seychelles	SYC
3-02-152	Sierra Leone	SLE
3-02-153	Singapore	SGP
3-02-154	Slovakia	SVK
3-02-155	Slovenia	SVN
3-02-156	Solomon Islands	SLB
3-02-157	Somalia	SOM
3-02-158	South Africa	ZAF
3-02-159	South Sudan	SSD
3-02-160	Spain	ESP
3-02-161	Sri Lanka	LKA
3-02-162	Sudan	SDN
3-02-163	Suriname	SUR
3-02-164	Swaziland	SWZ
3-02-165	Sweden	SWE
3-02-166	Switzerland	CHE
3-02-167	Syrian Arab Republic	SYR
3-02-168	Tajikistan	TJK
3-02-169	Thailand	THA
3-02-170	The former Yugoslav Republic of Macedonia	
3-02-171	Timor-Leste	TLS
3-02-172	Togo	TGO
3-02-173	Tonga	TON
3-02-174	Trinidad and Tobago	TTO
3-02-175	Tunisia	TUN
3-02-176	Turkey	TUR
3-02-177	Turkmenistan	TKM
3-02-178	Tuvalu	TUV
3-02-179	Uganda	UGA
3-02-180	Ukraine	UKR

3-02-181	United Arab Emirates	ARE
3-02-182	United Kingdom of Great Britain and Northen Ireland	GBR
3-02-183	United Republic of Tanzania	TZA
3-02-184	United States	USA
3-02-185	Uruguay	URY
3-02-186	Uzbekistan	UZB
3-02-187	Vanuatu	VUT
3-02-188	Venezuela, Bolivarian Republic of	VEN
3-02-189	Viet Nam	VNM
3-02-190	Yemen	YEM
3-02-191	Zambia	ZMB
3-02-192	Zimbabwe	ZWE

Code table: 3-04

Code table title: Station/platform type (simplified) [WMO, 2012]

	STATION_TYPE_ID	NAME_TX	DB_VERSION_NU	WMO306_CD	CREATED_BY_ID	CREATED_DT	MOD_BY_ID	MOD_DT	DESCRIPTION_TX	ORDER_NU
1	1	Land (fixed)	0	NA	NA	08.10.2015 11:16	NA	17.10.2015 20:05	Station/platform on solid terrain, at fixed position	NA
2	2	Land (mobile)	0	NA	NA	08.10.2015 11:16	NA	17.10.2015 20:05	Station/platform on solid terrain, moving around	NA
3	3	Sea (fixed)	0	NA	NA	08.10.2015 11:16	NA	17.10.2015 20:05	Station/platform at sea surface, at fixed position	NA
4	4	Sea (mobile)	0	NA	NA	08.10.2015 11:16	NA	17.10.2015 20:05	Station/platform at sea surface, moving around	NA
5	5	Air (fixed)	0	NA	NA	08.10.2015 11:16	NA	17.10.2015 20:05	Airborne station/platform, at fixed position	NA
6	6	Air (mobile)	0	NA	NA	08.10.2015 11:16	NA	17.10.2015 20:05	Airborne station/platform, moving around	NA

7	7	Underwater (fixed)	0	NA	NA	08.10.2015 11:16	NA	17.10.2015 20:05	Station/platform under water, at fixed horizontal position	NA
8	8	Underwater (mobile)	0	NA	NA	08.10.2015 11:16	NA	17.10.2015 20:05	Station/platform under water, moving around	NA
9	9	Land (on ice)	0	NA	NA	08.10.2015 11:16	NA	17.10.2015 20:05	Station/platform on ice-covered ground, moving with the ice	NA
10	10	Sea (on ice)	0	NA	NA	08.10.2015 11:16	NA	17.10.2015 20:05	Station/platform on floating ice, moving with the ice	NA
11	11	Lake/River (fixed)	0	NA	NA	17.10.2015 20:05	NA	17.10.2015 20:05	Station/platform at lake/river surface, at fixed position	NA
12	12	Lake/River (mobile)	0	NA	NA	17.10.2015 20:05	NA	17.10.2015 20:05	station/platform at lake/river surface, moving around	NA
		Space-based								

#	**Name**	**Definition**
3-04-1	land station	An observing station or field site situated on land, either fixed or mobile.
3-04-2	sea station	An observing station situated at sea. Sea stations include ships, ocean weather stations and stations on fixed or drifting platforms (rigs, platforms, lightships, buoys and ice floes).
3-04-3	aircraft	An airplane, helicopter or airship used to make environmental observations.
3-04-4	satellite	A platform placed in orbit around the earth to make environmental observations.
3-04-5	underwater platform	A platform under a lake or sea surface, including autonomous underwater vehicles.

Code table: 3-08

Code table title: Data communication method [Code table under development]

#	Name	Definition
	Voice/landline	Voice communications using a fixed terrestrial telecommunications network
	Voice/cellular	Voice communications using a cellular or similar terrestrial telecommunications network
	Voice/radio	Voice communications using a direct radio system (such as VHF, HF SSB)
	Voice/satellite	Voice communications using a satellite telecommunications network
	Data/landline	Data communications (digital or modem) using a fixed terrestrial telecommunications network
	Data/cellular	Data communications (digital or modem) using a cellular or similar terrestrial telecommunications network
	Data/radio	Data communications (digital or modem) using a direct radio system (such as VHF, HF SSB)
	Data/satellite/geostationary	Data communications (digital or modem) using a geostationary satellite service (such as METEOSAT)
	Data/satellite/constellation	Data communications (digital or modem) using a satellite constellation service (such as IRIDIUM)
	Data/satellite/intermittent	Data communications (digital or modem) using a satellite service with intermittent cover (such as ARGOS)
	Fax/landline	Facsimile using fixed terrestrial telecommunications network
	Fax/cellular	Facsimile using a cellular or similar terrestrial telecommunications network
	Fax/radio	Facsimile using a direct radio system (such as VHF, HF SSB)
	Post	Physical transfer of information by postal, delivery service, courier service or similar

#	Name	Definition
3-08-01	ARGOS	Argos is a Low-Earth Orbit (LEO) satellite-based system which collects data from Platform Terminal Transmitters, PTTs, and distributes sensor and location data to the final users. http://www.argos-system.org/
3-08-02	Cellular	Land based wireless communication network distributed over land areas, each served by at least one fixed-location transceiver, known as a cell site or base station
3-08-03	Globalstar	Globalstar is a low Earth orbit (LEO) satellite constellation for satellite phone and low-speed data communications
3-08-04	DCP	Collection of meteorological data from geostationary meteorological satellites Data Collection Platforms (DCP) installed on ships, buoys, aircraft and weather stations
3-08-05	Iridium	The Iridium satellite constellation is a large group of Low Earth Orbit (LEO) satellites providing voice and data coverage to satellite phones, pagers and integrated transceivers over Earth's entire surface
3-08-06	ORBCOMM	ORBCOMM is a company that offers machine-to-machine global asset monitoring and messaging services from its constellation of LEO communications satellites.
3-08-07	VSAT	A very small aperture terminal (VSAT) is a two-way satellite ground station used in satellite communications of data, voice and video signals which access satellites in geosynchronous orbit to relay data from small remote earth stations (terminals) to other terminals master earth station hubs.
3-08-08	Voice telephony	Voicetelephony refers to transmission of information by voice over a telephone line.
3-08-09	Radio modem	Data transmission by radio for short distance
3-08-10	E-mail/Internet	Data transmission using a Internet connection (LAN/WAN/VPN), via email, or other applications
3-08-xx	Data landline	Data transmission using a landline telephone modem or broadband connection
	Radio SSB	Voice communication via radio Single Side Band
3-09-xx	Direct Readout	… more on satellite coomunication[LFN3]

#	Name	Definition
	…	
	DVB-S2 Broadcast	
	Postal	
	Composed systems	e.g. radio link plus İnternet…

#	Name	Definition
3-08-01	ARGOS	Argos is a Geosynchronous/Geostationary Earth Orbit (GEO) satellite based system which collects data from Platform Terminal Transmitters, PTTs, and distributes sensor and location data to the final users. http://www.argos-system.org/
3-08-02	Cellular	Land based wireless communication network distributed over land areas, each served by at least one fixed-location transceiver, known as a cell site or base station
3-08-03	Globalstar	Globalstar is a low Earth orbit (LEO) satellite constellation for satellite phone and low-speed data communications
3-08-04	GMS (DCP)	Collection of meteorological data from the Geostationary Meteorological Satellite of the Japan Meteorological Agency (GMS) Data Collection Platform (DCP) installed on ships, buoys, aircraft and weather stations
3-08-05	Iridium	The Iridium satellite constellation is a large group of Low Earth Orbit (LEO) satellites providing voice and data coverage to satellite phones, pagers and integrated transceivers over Earth's entire surface
3-08-06	ORBCOMM	ORBCOMM is a company that offers machine-to-machine global asset monitoring and messaging services from its constellation of LEO communications satellites.
3-08-07	VSAT	A very small aperture terminal (VSAT) is a two-way satellite ground station used in satellite communications of data, voice and video signals which access satellites in geosynchronous orbit to relay data from small remote earth stations (terminals) to other terminals master earth station hubs.
3-08-08	Landline telephone	A landline telephone refers to a phone or modem that uses a physical telephone line for communication.
3-08-09	Radio modem	
3-08-10	E-mail	

Code table: 3-09

Code table title: Station operating status

#	Name	Definition
3-09-01	Planned	The station is planned to be deployed sometime in the future, and all information provided is indicative only. No observations are taken.
3-09-02	Pre-operational	The station is deployed and producing data but still not fully ready to start reporting operationally.
3-09-03	Operational/Reporting	The station fully complies with the reporting obligations of the observation programme/network concerned
3-09-04	Partly operational reporting	The station partially complies with the reporting obligations of the observation programme/network concerned
3-09-05	Temporarily suspended	The station is considered non-reporting/non-operational for a certain period of time; The station is expected to resume its operational/reporting status after the temporarily suspension interval
	Stand by[LFN4]	
3-09-06	Closed	The station has been declared as closed by the responsible supervising organization

Code table: 4-01-01

Code table title: Land cover types (IGBP)

#	Name	Definition[LFN5]
4-01-01-00	Not applicable	None of the codes in the table are applicable in the context of this particular observation (nilReason)
4-01-01-01	Water	Cf. https://lpdaac.usgs.gov/products/modis_products_table/mcd12q1
4-01-01-02	Evergreen Needleleaf forest	
4-01-01-03	Evergreen Broadleaf forest	
4-01-01-04	Deciduous Needleleaf forest	
4-01-01-05	Deciduous Broadleaf forest	
4-01-01-06	Mixed forest	
4-01-01-07	Closed shrublands	
4-01-01-08	Open shrublands	
4-01-01-09	Woody savannas	
4-01-01-10	Savannas	
4-01-01-11	Grasslands	
4-01-01-12	Permanent wetlands	
4-01-01-13	Croplands	
4-01-01-14	Urban and built-up	
4-01-01-15	Cropland/Natural vegetation mosaic	
4-01-01-16	Snow and ice	
4-01-01-17	Barren or sparsely vegetated	
4-01-01-99	Unclassified	

Code table: 4-01-02

Code table title: Land cover types (UMD)

#	Name	Definition
4-01-02-00	Not applicable	None of the codes in the table are applicable in the context of this particular observation (nilReason)
4-01-02-01	Water	Cf. https://lpdaac.usgs.gov/products/modis_products_table/mcd12q1
4-01-02-02	Evergreen Needleleaf forest	
4-01-02-03	Evergreen Broadleaf forest	
4-01-02-04	Deciduous Needleleaf forest	
4-01-02-05	Deciduous Broadleaf forest	
4-01-02-06	Mixed forest	
4-01-02-07	Closed shrublands	
4-01-02-08	Open shrublands	
4-01-02-09	Woody savannas	
4-01-02-10	Savannas	

#	Name	Definition
4-01-02-11	Grasslands	
4-01-02-12	Croplands	
4-01-02-13	Urban and built-up	
4-01-02-14	Barren or sparsely vegetated	
4-01-02-99	Unclassified	

Code table: 4-01-03

Code table title: Land cover types (LAI/fPAR)

#	Name	Definition
4-01-03-00	Not applicable	None of the codes in the table are applicable in the context of this particular observation (nilReason)
4-01-03-01	Water	Cf. https://lpdaac.usgs.gov/products/modis_products_table/mcd12q1
4-01-03-02	Grasses/Cereal crops	
4-01-03-03	Shrubs	
4-01-03-04	Broadleaf crops	
4-01-03-05	Savanna	
4-01-03-06	Evergreen broadleaf forest	
4-01-03-07	Deciduous broadleaf forest	
4-01-03-08	Evergreen needleleaf forest	
4-01-03-09	Deciduous needleleaf forest	
4-01-03-10	Non vegetated	
4-01-03-11	Urban	
4-01-03-99	Unclassified	

Code table: 4-01-04

Code table title: Land cover types (NPP)

#	Name	Definition
4-01-04-00	Not applicable	None of the codes in the table are applicable in the context of this particular observation (nilReason)
4-01-04-01	Water	Cf. https://lpdaac.usgs.gov/products/modis_products_table/mcd12q1
4-01-04-02	Evergreen needleleaf vegetation	
4-01-04-03	Evergreen broadleaf vegetation	
4-01-04-04	Deciduous needleleaf vegetation	
4-01-04-05	Deciduous broadleaf vegetation	
4-01-04-06	Annual broadleaf vegetation	
4-01-04-07	Non-vegetated land	
4-01-04-08	Urban	
4-01-04-99	Unclassified	

Code table: 4-01-05

Code table title: Land cover types (PFT)

#	Name	Definition
4-01-05-00	Water	None of the codes in the table are applicable in the context of this particular observation (nilReason)
4-01-05-01	Evergreen Needleleaf trees	Cf. https://lpdaac.usgs.gov/products/modis_products_table/mcd12q1
4-01-05-02	Evergreen Broadleaf trees	
4-01-05-03	Deciduous Needleleaf trees	
4-01-05-04	Deciduous Broadleaf trees	
4-01-05-05	Shrub	
4-01-05-06	Grass	
4-01-05-07	Cereal crops	
4-01-05-08	Broad-leaf crops	
4-01-05-09	Urban and built-up	
4-01-05-10	Snow and ice	
4-01-05-11	Barren or sparse vegetation	
4-01-05-254	Unclassified	
4-01-05-255	Fill Value	

Code table: 4-01-06

Code table title: Land cover types (LCCS)

#	Name	Definition
4-01-06-00	Not applicable	None of the codes in the table are applicable in the context of this particular observation (nilReason)
4-01-06-01	Cultivated and Managed Terrestrial Areas	cf. Antonio Di Gregorio (2005)
4-01-06-02	Natural and Semi-Natural Terrestrial Vegetation	
4-01-06-03	Cultivated Aquatic or Regularly Flooded Areas	
4-01-06-04	Natural and Semi-Natural Aquatic or Regularly Flooded Vegetation	
4-01-06-05	Artificial Surfaces and Associated Areas	
4-01-06-06	Bare Areas	
4-01-06-07	Artificial Waterbodies, Snow and Ice	
4-01-06-08	Natural Waterbodies, Snow and Ice	
4-01-06-99	Unclassified	

Code table: 4-02

Code table title: Surface cover classification scheme

#	Name	Definition
4-02-00	Not applicable	None of the codes in the table are applicable in the context of this particular observation (nilReason)

#	Name	Definition
4-02-01	Land cover types (IGBP)	International Geosphere-Biosphere Programme https://lpdaac.usgs.gov/products/modis_products_table/mcd12q1
4-02-02	Land cover types (UMD)	The University of Maryland Department of Geography generated global land cover classification collection from 1998. http://glcf.umd.edu/data/landcover/
4-02-03	Land cover types (LAI/fPAR)	Leaf Area Index (LAI) and Fractional Photosynthetically Active Radiation (FPAR). FPAR/LAI is the Fraction of Absorbed Photosynthetically Active radiation that a plant canopy absorbs for photosynthesis and growth in the 0.4 – 0.7nm spectral range.
4-02-04	Land cover types (NPP)	Net Primary Production (NPP) land cover scheme
4-02-05	Land cover types (PFT)	Plant Functional Types (PFT) land cover scheme
4-02-06	Land cover types (LCCS)	Land cover classification scheme (LCCS)

Code table: 4-03-01

Code table title: Local topography (based on Speight 2009)

#	Name	Definition
4-03-01-0	Not applicable	None of the codes in the table are applicable in the context of this particular observation (nilReason)
4-03-01-1	Hilltop	Higher than all or nearly all of the surrounding land or subsurface.
4-03-01-2	Ridge	Higher than all or nearly all of the surrounding land or subsurface, but elongated and extending beyond a 50 m radius.
4-03-01-3	Slope	Neither crest nor depression or valley bottom, and with a slope more than 3%.
4-03-01-4	Flat	Slope less than 3% and not a top, ridge, valley bottom or depression. Use for plains.
4-03-01-5	Valley bottom	Lower than nearly all of surrounding land or subsurface, but water can flow out.
4-03-01-6	Depression	Lower than surrounding land or subsurface, with no above-ground outlet for water.

Code table: 4-03-02

Code table title: Relative elevation

#	Name	Definition
4-03-02-0	Not applicable	None of the codes in the table are applicable in the context of this particular observation (nilReason)
4-03-02-1	Lowest	In the bottom 5% of the elevation range
4-03-02-2	Low	Between 5% and 25% of the elevation range
4-03-02-3	Middle	Between 25% and 75% of the elevation range
4-03-02-4	High	Between 75% and 95% of the elevation range
4-03-02-5	Highest	In the highest 5% of the elevation range

Code table: 4-03-03

Code table title: Topographic context (based on Hammond 1954)

#	Name	Definition
4-03-03-0	Not applicable	None of the codes in the table are applicable in the context of this particular observation (nilReason)
4-03-03-1	Plains	Very low relief
4-03-03-2	Hollows	Low relief, tending to convergent form

#	Name	Definition
4-03-03-3	Rises	Low relief, tending to divergent form
4-03-03-4	Valleys	Medium relief, tending to convergent form
4-03-03-5	Hills	Medium relief, tending to divergent form
4-03-03-6	Mountains	High relief

Code table: 4-03-04

Code table title: Altitude/Depth

#	Name	Definition
4-03-04-0	Not applicable	None of the codes in the table are applicable in the context of this particular observation (nilReason)
4-03-04-1	Very small	between -100 m and 100 m
4-03-04-2	Small	Between -300 and -100 m or between 100 and 300 m
4-03-04-3	Middle	Between -1000 and -300 m or between 300 and 1000 m
4-03-04-4	Large	Between -3000 and -1000 m Between 1000 and 3000 m
4-03-04-5	Very large	Deeper than -3000 m or above 3000 m

Code table: 4-04

Code table title: Events at station/platform [Code table under development]

#	Name	Definition
4-04-01	Grass-cutting	
4-04-02	Snow clearing	
4-04-03	Tree removal	
4-04-04	Construction activity	
4-04-05	Road work	
4-04-06	Biomass burning	Anthropogenic or natural
4-04-07	Dust storm	
4-04-08	Storm damage	
4-04-09	Wind storm	
4-04-10	Flood	
4-04-11	Fire	
4-04-12	Earthquake	
4-04-13	Land slide	
4-04-14	Storm surge or tsunami	
4-04-15	Lightning	
4-04-16	Vandalism	

Code table: 5-01

Code table title: Source of observation

#	Name	Definition
5-01-01	Instrumental Automatic reading ~~observation~~	Automatically produced measurement result
5-01-02	Instrumental Manual ~~observation~~ reading	Manual reading of instrument, both analog or digital outputs
5-01-03	~~Visual~~Human observation	Human, non-instrumented observation

Code table: 5-02

Code table title: Measurement/observing method [Code table under development] [LFN6]

Code table: 5-04

Code table title: Instrument operating status

#	Name	Definition
5-04-01	Operational	The instrument is declared operational and subject to routine maintenance
5-04-02	Testing / Commissioning	The instrument is deployed for testing purposes and the information provided may not be reliable
5-04-03	Not in service / inactive	The instrument is deployed but presently not in service [LFN7]

Code table: 5-08

Code table title: Instrument control result [LFN8]

#	Name	Definition
5-08-01	no changes - in calibration	Instrument verified and found to be in calibration
5-08-~~1~~02	no changes - out of calibration	Instrument checked and found to be out of calibration; no changes to calibration function
5-08-03~~2~~	no changes – calibration unknown	Instrument visited but calibration could not be carried out
5-08-~~3~~04	recalibrated - in calibration	Instrument checked and found to be out of calibration; instrument recalibrated (calibration function changed)

Code table: 5-14

Code table title: Status of observation [LFN9]

#	Name	Definition
5-14-01	Primary	The primary or official observation of the observed variable
5-14-02	Additional	Additional or supplemented observation of the observed variable

Code table: 5-15

Code table title: Exposure of instrument

#	Name	Definition
5-04-1	Class 1	exposure of instrument allows reference level measurements
5-04-2	Class 2	exposure of instrument has small or infrequence influence on measurement
5-04-3	Class 3	exposure of instrument leads to increased uncertainty or occasional invalid measurements
5-04-4	Class 4	exposure of instrument leads to high uncertainty or regular invalid measurements
5-04-5	Class 5	exposure of instrument leads to invalid measurements

Code table: 6-03

Code table title: Sampling strategy

#	Name	Definition
6-03-1	Continuous	Sampling is done continuously, but not necessarily at regular time intervals. Sampling is integrating, i.e., none of the medium escapes observations.
6-03-2	Discrete	Sampling is done at regular time intervals for certain sampling periods that are smaller than the time interval. Sampling is not integrating, i.e., parts of the medium escape observation.
6-03-3	Event	Sampling is done at irregular time intervals.

Code table: 7-06

Code table title: Level of data

#	Name	Definition	
		CIMO (WMO-No. 8, 2008, Updated 2010)	**CEOS** (http://www.ceos.org/images/WGISS/Documents/Handbook.pdf)
7-06-0	Unknown		
7-06-1	Raw		Physical information: Data in their original packets, as received from a satellite
7-06-2	Level 0	Analogue/digital electric signals	Physical information: Reconstructed unprocessed instrument data at full space time resolution with all available supplemental information to be used in subsequent processing (e.g., ephemeris, health and safety) appended.
7-06-3	Level I	Level I data (Primary Data): in general, are instrument readings expressed in appropriate physical units, and referred to Earth geographical coordinates. They require conversion to the normal meteorological variables (identified in Part I, Chapter 1). Level I data themselves are in many cases obtained from the processing of electrical signals such as voltages, referred to as raw data. Examples of these data are satellite radiances and water-vapour	Physical information: Unpacked, reformatted level 0 data, with all supplemental information to be used in subsequent processing appended. Optional radiometric and geometric correction applied to produce parameters in physical units. Data generally presented as full time/space resolution. A wide variety of sub level products are possible.

#	Name	Definition	
		CIMO (WMO-No. 8, 2008, Updated 2010)	**CEOS** (http://www.ceos.org/images/WGISS/Documents/Handbook.pdf)
		pressure, positions of constant-level balloons, etc. but not raw telemetry signals. Level I data still require conversion to the meteorological parameters specified in the data requirements.	
7-06-4	Level II	Level II Data (Meteorological parameters). They may be obtained directly from many kinds of simple instruments, or derived from Level I data. For example, a sensor cannot measure visibility, which is a Level II quantity; instead, sensors measure the extinction coefficient, which is a Level I quantity.	Geophysical information. Retrieved environmental variables (e.g., ocean wave height, soil moisture, ice concentration) at the same resolution and location as the level 1 source data.
7-06-5	Level III	Level III (Initial state parameters) are internally consistent data sets, generally in grid‑point form obtained from level II data by applying established initialization procedures. NOTE: Data exchanged internationally are level II or level III data.	Geophysical information. Data or retrieved environmental variables which have been spatially and/or temporally re-sampled (i.e., derived from level 1 or 2 products). Such re-sampling may include averaging and compositing.
7-06-6	Level IV		Thematic information. Model output or results from analyses of lower level data (i.e., variables that are not directly measured by the instruments, but are derived from these measurements).

Code table: 7-10

Code table title: Reference time [Code table under development]

#	Name	Definition
7-10-0	Unknown	
7-10-1	Time Server	
7-10-2	Radio Clock	
7-10-3	Manual Comparison	

Code table: 8-03-01

Code table title: Quality flag [From BUFR code table 0 33 020 (WMO, 2013) - Code table under development]

#	Name	Definition
8-03-01-0	Good	
8-03-01-1	Inconsistent	
8-03-01-2	Doubtful	
8-03-01-3	Wrong	
8-03-01-4	Not checked	
8-03-01-5	Has been changed	
8-03-01-6	Estimated	
8-03-01-7	Missing value	

Code table: 8-03-02
Code table title: Quality flag [From OGC WaterML 2.0]

#	Name	Definition
8-03-02-0	Good	The data has been examined and represents a reliable measurement.
8-03-02-1	Suspect	The data should be treated as suspect.
8-03-02-2	Estimate	The data is an estimate only, not a direct measurement.
8-03-02-3	Poor	The data should be considered as low quality and may have been rejected.
8-03-02-4	Unchecked	The data has not been checked by any qualitative method.
8-03-02-5	Missing	The data is missing.

Code table: 8-04
Code table title: Quality Flag System

#	Name	Definition
8-04-0	Unknown	Quality flag system not known
8-04-1	WMO BUFR table 0 33 020	http://codes.wmo.int/bufr4/codeflag/0-33-020
8-04-2	Other quality flagging system	Quality flags are specified according to another system

Code table: 8-05
Code table title: Traceability

#	Name	Definition
8-05-0	Unknown	Traceability not known
8-05-1	Traceable to international standard	Traceable to an international standard
8-05-2	Traceable to other standard	Not traceable to an international standard

Code table: 9-02
Code table title: WMO_DataLicenseCode (WMO 2013a, Table 14)

#	Name	Definition
9-02-1	WMOEssential	WMO Essential Data: free and unrestricted international exchange of basic data and products.
9-02-2	WMOAdditional	WMO Additional Data: free and unrestricted access to data and products exchanged under the auspices of WMO to the research and education communities for non-commercial activities. A more precise definition of the data policy may be additionally supplied within the metadata. In all cases it shall be the responsibility of the data consumer to ensure that they understand the data policy specified by the data provider – which may necessitate dialogue with the data publisher for confirmation of terms and conditions.
9-02-3	WMOOther	Data identified for global distribution via WMO infrastructure (GTS / WIS) that is not covered by WMO Resolution 25 neither WMO Resolution 40; e.g. aviation OPMET data. Data marked with “WMOOther” data policy shall be treated like “WMOAdditional” where a more precise definition of the data policy may be additionally supplied within the metadata. In all cases it shall be the responsibility of the data consumer to ensure that they understand the data policy specified by the data provider – which may necessitate dialogue with the data publisher for confirmation of terms and conditions.
9-02-4	NoLimitation	…

ADDITIONAL CODE TABLES, NOT SPECIFIC TO A PARTICULAR METADATA CATEGORY OR ELEMENT

Code table: 11-01
Code table title: "Coordinates Source/Service" [Code table under development]

#	Name	Definition
11-1-01	GPS	
11-1-02	ARGOS DOPPLER	
11-1-03	IRIDIUM DOPPLER	
11-1-04	ARGOS Kalman	
11-1-05	GALILEO	
11-1-06	LORAN	
11-1-07	Surveyed	
11-1-08	From map	

Code table: 11-02
Code table title: "Coordinates reference" [Code table under development]

#	Name	Definition
11-1-01	WGS84	
11-1-02		
11-1-03		
11-1-04		
11-1-05		
11-1-06		
11-1-07		

Code table: 11-03
Code table title: Meaning of time stamp

#	Name	Definition
11-03-1	Beginning	Time stamps indicate the beginning of a period covering the range up to but excluding the following time stamp.
11-03-2	End	Time stamps indicate the end of a period covering the range up to but excluding the preceding time stamp.
11-03-3	Middle	Time stamps indicate the middle of a period beginning at the middle of the range described by this and the preceding time stamp and ending right before the middle of the range described by this and the following time stamp.

Appendix III-C
Notes from Breakout Group 3

World Meteorological Organization
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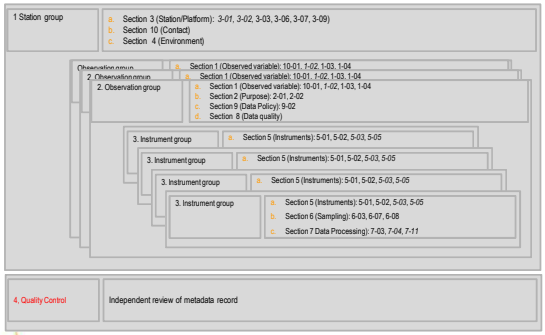
Flow when entering metadata

Changes since breakout session on Weds

- Following discussion with Dom on the data model
  - Data policy and "purpose" moved to "Observed Variable"
  - Can have many segments with same "Observed Variable"
    - Where the characteristics of the observations differ, repeat the observed variable (such as high uncertainty and low uncertainty measurement techniques).
    - Segments are also used to create the time series of metadata
      - Dom will find a way to link segments that form part of a time series so they can be distinguished from segments associated with another observed variable of the same type

Entering metadata



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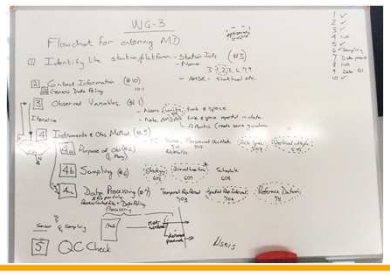


Key roles in managing WIGOS metadata

- PR
- Focal Points
- Observing systems managers
- Network managers
- Observers
- Technicians
- Users

Responsibilities: PR

- Deliver the commitments of Technical Regulations
- Designate national focal point (and inform secretariat of the contact details for the focal point)
- Delegate required authority to national focal point for WIGOS
- Ensure resources available to meet commitments
- Ensure metadata is maintained for all national system contributing to WIGOS
- Engage in regional and global coordination of WIGOS

Appendix III-C
Notes from Breakout Group 3

Responsibilities: WIGOS Focal Point

- Manage the national implementation and application of the WIGOS metadata standard
- Ensure that WIGOS metadata records are maintained
- Coordination nationally, Regional Associations and WMO/WIGOS
- Knowledgeable regarding content of Manuals and Guides
- Advocate WIGOS
- Delegate authority to those responsible for maintaining WIGOS metadata and ensure they have competencies to perform the required tasks

Responsibilities: Observing System Manager

- Monitoring implementation and operation of systems and process to maintain WDMS for the observing system
- Reporting to national Focal Point on the status of WIGOS metadata for the observing system
- Ensure that the information about the observing system is up-to-date and correct
- Delegate roles and ensure that those performing the roles have the competencies to perform them
- Ensure that responsibility for updating WIGOS metadata is assigned and that those with that responsibility have the relevant competencies
- Ensure that technicians and observers report events that need to be recorded in WIGOS metadata.

Responsibilities: Network Manager

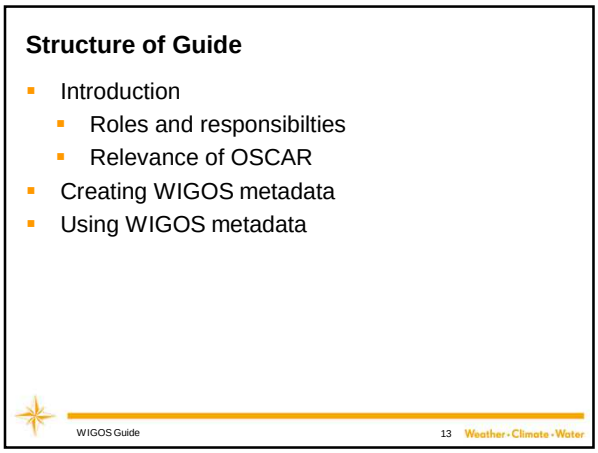
Responsibilities: Observers

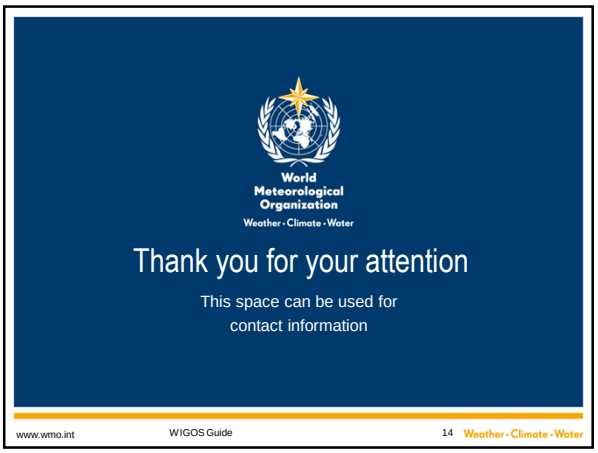
- Ensure that events potentially impacting the quality of observations are reported to the role responsible for maintaining WIGOS metadata

Responsibilities: Technicians

Responsibilities: Users

Appendix III-C
Notes from Breakout Group 3





Appendix III-D
Notes from Breakout Group 4

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WIGOS Governance

WMO; Name of Department (ND)

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Requirements

- All observing systems (that exchange data internationally) make metadata available
- Changing the standard
  - Intergovernmental approval at a session of Technical Commission (CBS) and approval by following EC
  - Sessions take place every 4 years (2 for CBS Extraordinary, but this is not guaranteed)
  - Need to make progress of proposed changes publicly visible
- Managing the code tables
  - Simple procedure on 6 month cycle (if miss a cycle could wait 11 months)
  - Some items can be “pre-operational”

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Changes to Code Lists

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Proposals

- Changes to code tables
  - Use CBS procedure
    - Simple – no cost, low risk
    - Standard – low cost, medium risk
    - Complex – not covered by others
  - Process can be applied to any Manual managed by CBS (agreed by Cg-17)
  - Need an interface to allow people to propose changes and to track progress.
- Aim for common set of code tables
- Aim to have one management team for all code lists

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Workflow in IPET-MDRD

1. Identifying initial proposals for changes to the WIS Core Metadata Profile
2. Committee review
3. Committee validation
4. OPAG review
5. Commission review (at session or between session) and National Review (fast track)
6. EC review (or President CBS)
7. Formal notification

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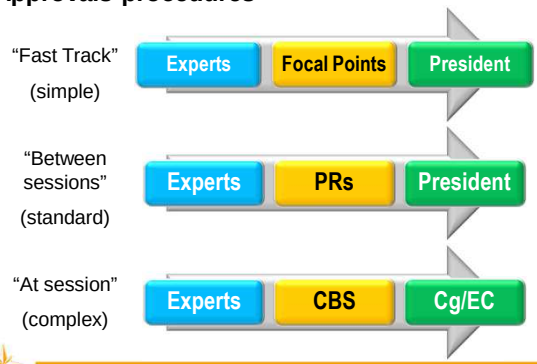
Approvals procedures



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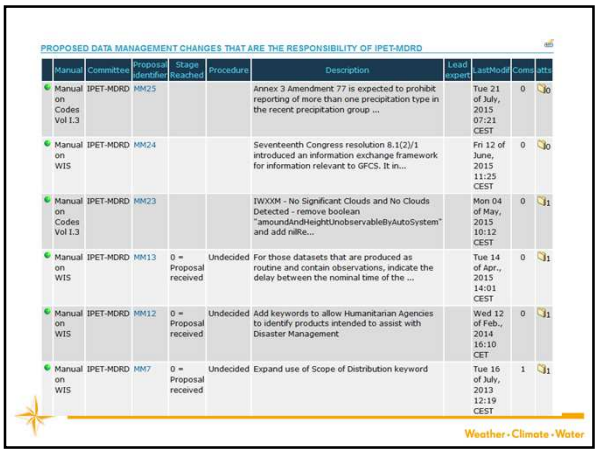
Appendix III-D
Notes from Breakout Group 4



PROPOSED DATA MANAGEMENT CHANGES THAT ARE THE RESPONSIBILITY OF IPET-MDRD

	Manual	Committee	Proposal Identifier	Stage Reached	Procedure	Description	Lead expert	LastModif	Comments
	Manual on Codes Vol I.3	IPET-MDRD	MM25			Annex 3 Amendment 77 is expected to prohibit reporting of more than one precipitation type in the recent precipitation group ...		Tue 21 of July, 2015 07:21 CEST	0
	Manual on WIS	IPET-MDRD	MM24			Seventeenth Congress resolution 8.1(2)/1 introduced an information exchange framework for information relevant to GFCS. It in...		Fri 12 of June, 2015 11:25 CEST	0
	Manual on Codes Vol I.3	IPET-MDRD	MM23			IWXXM - No Significant Clouds and No Clouds Detected - remove boolean "amountAndHeightUnobservableByAutoSystem" and add nilRe...		Mon 04 of May, 2015 10:12 CEST	0
	Manual on WIS	IPET-MDRD	MM13	0 = Proposal received	Undecided	For those datasets that are produced as routine and contain observations, indicate the delay between the nominal time of the ...		Tue 14 of Apr., 2015 14:01 CEST	0
	Manual on WIS	IPET-MDRD	MM12	0 = Proposal received	Undecided	Add keywords to allow Humanitarian Agencies to identify products intended to assist with Disaster Management		Wed 12 of Feb., 2014 16:10 CET	0
	Manual on WIS	IPET-MDRD	MM7	0 = Proposal received	Undecided	Expand use of Scope of Distribution keyword		Tue 16 of July, 2013 12:19 CEST	1

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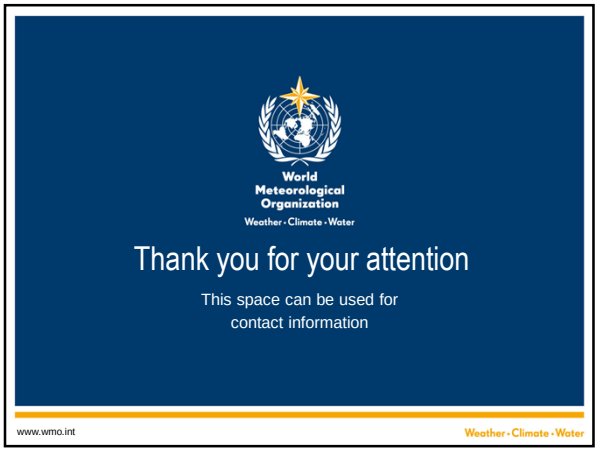

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View Item

Status	open
Manual	Manual on WIS
OPAG	ISS
Committee	IPET-MDRD
Proposal identifier	MM13
Stage Reached	0 = Proposal received
Procedure	Undecided
Description	For those datasets that are produced as routine and contain observations, indicate the delay between the nominal time of the observation and the observation becoming available in the product, dataset or service being described by the metadata record.
Proposer	TT-WMD
Target Release	
Associated proposals	
Documents	W-M-MM13-0-0-Timeliness_en
Email	sforeman@wmo.int
Name	Steve Foreman
Lead expert	
Change Type	
LastModif	Tuesday 14 of April, 2015 14:01:14 CEST

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Thank you for your attention

This space can be used for contact information

www.wmo.int

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