**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

**Draft FINAL REPORT**

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***DRAFT***



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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 III](#Appendix_III)) including developing the guidance material and the competencies for the use of WMDS by WMO Members.

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**General summary**

1. **ORGANIZATION OF THE SESSION**
   1. **Opening of the session**
      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.
      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.
      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.
      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).
      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.
      6. The list of participants is given in [Appendix I](#Appendix_I).
   2. **Adoption of the agenda**
      1. TT-WMD-4 adopted the [Agenda](#AGENDA) for the meeting, which is reproduced at the beginning of this report.
   3. **Working arrangements**
      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**
   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:
      1. Consider the guidance from Cg-17 and EC-67, as well as recommendations of various WIGOS related groups and task teams.
      2. Review the current version of OSCAR/Surface, an implementation of the WMDS and archive of WIGOS metadata.
      3. Review and/or complete a number of code tables that have been developed for the WMDS to improve the metadata standard.
      4. Review proposed mechanisms for the governance of code tables.
      5. Develop a plan for the preparation of guidance material to assist Members in the application of the WMDS.
      6. Consider the current version of the generic data model and formal WMDS, with a view to facilitating machine-to-machine transfer of metadata.
      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.
      8. Discuss the development of competencies for the use of WMDS by WMO Members
      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. 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**
   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:
      1. National WIGOS implementation;
      2. WIGOS Regulatory Material, complemented with necessary guidance material to assist Members with the implementation of the WIGOS technical regulations;
      3. Further development of the WIGOS Information Resource (WIR), with special emphasis on the operational deployment of the OSCAR database;
      4. Development and implementation of the WIGOS Data Quality Monitoring System;
      5. Concept development and initial establishment of Regional WIGOS Centres
   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. 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.
   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.
   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.
   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**
   1. **IPET-MDRD - climate/WIGOS metadata representations**
      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.
   2. **IPET-WIFI SG-OD First session**
      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.
      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.
      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. 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.
      5. Regarding the development of OSCAR guidance for Members the possible overlapping roles of TT-WMD and the IPET-WIFI/SG-OD was questioned.
      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.
      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.
      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?
      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.
   3. **IPET-WIFI Third session**
      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.
      2. IPET-WIFI-3 recognized the urgent action needed on implementation of station identifiers and WIGOS metadata.
      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. **Ad hoc workshop on WIGOS Metadata for satellites**
      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**
   1. Mr Klausen updated the participants on the progress and plans for the OSCAR database.
   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.
   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.
   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. 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.
   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.
   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.
   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.
   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.
   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.
   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).
   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**
   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.
   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](http://www.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.

1. **APPROACHES FOR DEVELOPING WIGOS METADATA COMPETENCIES**
   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:
      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

* + 1. For people exchanging metadata:

• Encode metadata in XML using tools provided within organization (for automated exchange)

• Upload metadata to OSCAR

1. **FUTURE WORK PROGRAMME AND ACTION PLAN OF TT-WMD**
   1. The session reviewed and updated its Action Plan, including deadlines and responsible person, which is provided in Appendix III, 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.
2. **ANY OTHER BUSINESS**
   1. A teleconference session (WebEx) of TT-WMD was scheduled for 19 November, at 1200 UTC+1 for the follow-up of this session.
   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.
3. **CLOSURE OF THE SESSION**
   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.
   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.
   3. Mr Monnik, also thanked the participants, including the secretariat staff, and closed the session at 16:00 hours, on Friday, 23 October 2015.

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**Appendix I**

**LIST OF PARTICIPANTS**

|  |  |
| --- | --- |
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|  |  |
| --- | --- |
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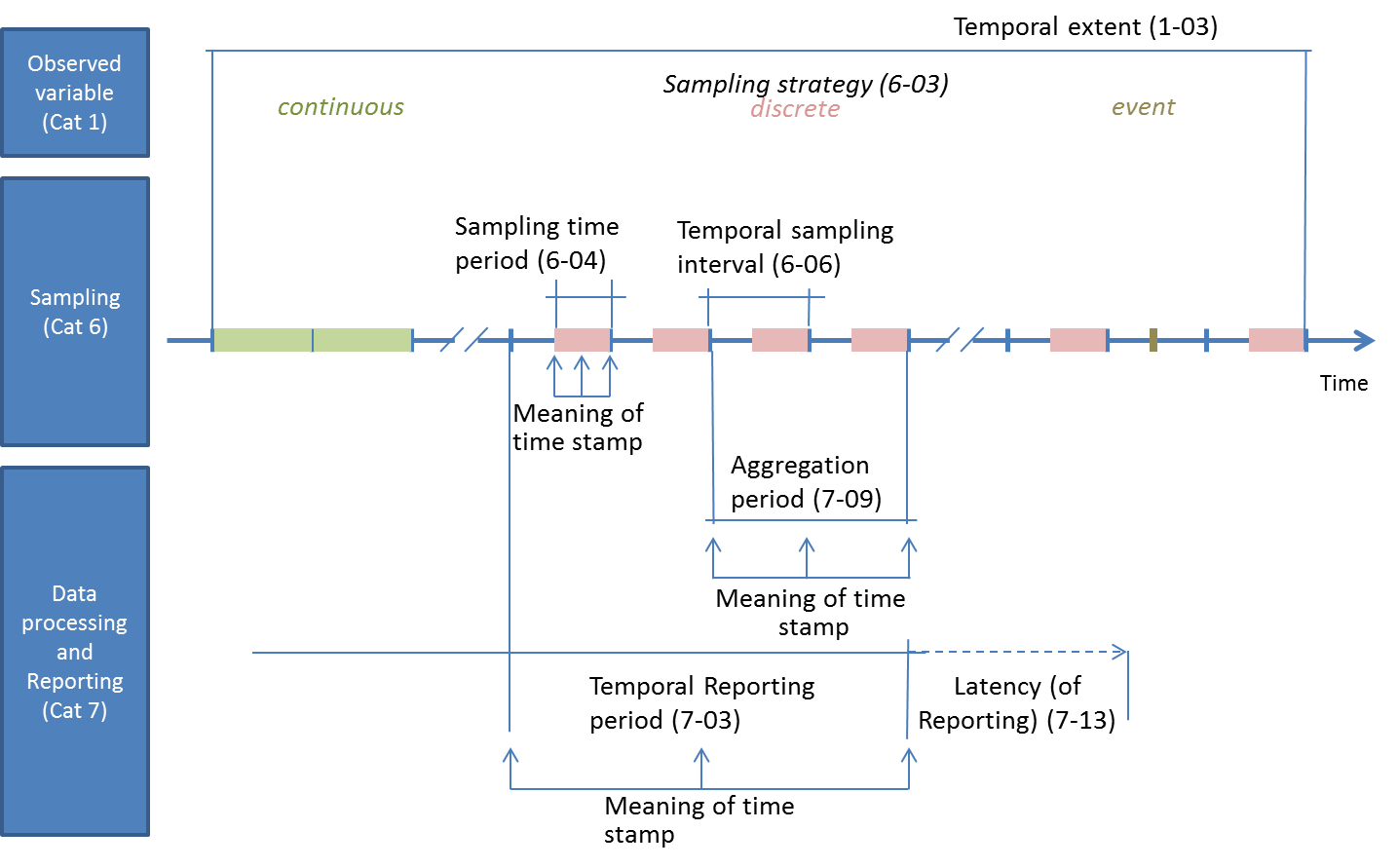
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## Appendix II-A

**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.**
   1. A *major* change of method necessitates a new ObservationSet (OSCAR current implementation). e.g. manual (mercury) to automatic (PT100) thermometer.
   2. Switching out *instances* of the same (or similar) instruments does not require a new set or segment – just a new *deployment*.
   3. Underlying idea that the ObservationSet describes a broadly homogeneous sequence of observations (but not necessarily a *homogenised* sequence…).
   4. [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’).** 
   1. Propose to use as a working term for now.
   2. Needs to be clarified in documentation and explanatory material that it describes a station/platform.
   3. Neutral term that carries some meaning, but is not aligned with any particular existing practice or domain (like Platform or Station are).
   4. Consider alignment with OGC and INSPIRE terminology
3. **Need to capture something like ObservingFacilitySet to group or relate facilities together.**
   1. Added ObservingFacilitySet to model.
4. **Clarifications around Figure 2**



* 1. Temporal extent is required for the whole ObservationSet (1-03)
  2. Temporal extent is also required for each segment (OM\_Observation om:phenomenonTime).

1. **6.04 Sampling Time Period**
   1. 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)
2. **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) 600km2

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

1. **7.03 ReportingPeriod**
   1. This is a duration
2. **7.04 Spatial Reporting Period**
   1. Use same encoding as SamplingResolution.(need to resolve 6.05 issue)
   2. ERROR- example should refer to 6.05 (resolution) not 6.06 (interval)
3. **7.07 Should Data Format be a code list?** 
   1. 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.
   2. Data Format must be 1..\* in model.
4. **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/>

1. **Discussion around Use of 19115**

Also discussion around use of 19115 (or not).

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

1. **Does ApplicationArea (2.01) need to be historical?**
   1. Propose no.
   2. Low priority. Leave as is, several Application Areas can be listed.
2. **Changes to EquipmentSpecification**
   1. Move ‘firmware’ to Equipment.
   2. Add 0…\* links to EquipmentSpecification
3. **Changes to Equipment**
   1. Remove controlSchedule and maintenanceRoutine from Equipment (they are duplicated (by mistake) in Deployment (which is where they should be).
   2. Equipment should link to 0..1 (not 0…\*) EquipmentSpecification.

## Appendix II-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 m2 s-2 |
| 1-02-14 | watt | W | W | W | kg m2 s-3 |
| 1-02-15 | coulomb | C | C | C | A s |
| 1-02-16 | volt | V | V | V | kg m2 s-3 A-1 |
| 1-02-17 | farad | F | F | F | kg-1 m-2 s4 A2 |
| 1-02-18 | ohm | Ω | Ohm | OHM | kg m2 s-3 A-2 |
| 1-02-19 | siemens | S | S | SIE | kg-1 m-2 s3 A2 |
| 1-02-20 | weber | Wb | Wb | WB | kg m2 s-2 A-1 |
| 1-02-21 | tesla | T | T | T | kg s-2 A-1 |
| 1-02-22 | henry | H | H | H | kg m2 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 | m2 s-2 |
| 1-02-28 | sievert | Sv | Sv | SV | m2 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 |  |
| 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 |  |
| 1-02-81 | millimetres to the sixth power per cubic metre | mm6 m-3 | mm6 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 | m2 | m2 | M2 |  |
| 1-02-90 | square metres per second | m2 s-1 | m2/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 | m2 s | m2 s |  |  |
| 1-02-101 | square metres per second squared | m2 s-2 | m2 s-2 |  |  |
| 1-02-102 | square metres per radian second | m2 rad-1 s | m2 rad-1 s |  |  |
| 1-02-103 | square metres per hertz | m2 Hz-1 | m2/Hz |  |  |
| 1-02-104 | cubic metres | m3 | m3 |  |  |
| 1-02-105 | cubic metres per second | m3 s-1 | m3/s |  |  |
| 1-02-106 | cubic metres per cubic metre | m3 m-3 | m3 m-3 |  |  |
| 1-02-107 | metres to the fourth power | m4 | m4 |  |  |
| 1-02-108 | metres to the two thirds power per second | m2/3 s-1 | m2/3 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) |  |  |
| 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 m2 kg-1 s-1 | k m2 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 | degree2 | deg2 |  |  |
| 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** |
| --- | --- | --- |
| 1-05-01 | 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 km2 |

### Code table: 2-01

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

| **#** | **Name** | **Definition** |
| --- | --- | --- |
| 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 |
| 2-01-03 | Nowcasting and very short range forecasting (NVSRF) | http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-Nowcasting-VSRF.pdf |
| 2-01-04 | Sub-seasonal to longer predictions | http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-SSLP.pdf |
| 2-01-05 | Aeronautical meteorology | http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-Aero.pdf |
| 2-01-06 | Forecasting Atmospheric Composition | 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 | Ocean applications | http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-Ocean.pdf |
| 2-01-10 | Agricultural meteorology | http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-Agriculture.pdf |
| 2-01-11 | Hydrology | http://www.wmo.int/pages/prog/www/OSY/SOG/SOG-Hydrology.pdf |
| 2-01-12 | Climate monitoring (as undertaken through the Global Climate Observing System, GCOS) | To be completed |
| 2-01-13 | Climate applications | http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-Climate-CCl.pdf |
| 2-01-14 | Space weather | http://www.wmo.int/pages/prog/www/OSY/SOG/SoG-SW.pdf |
| 2-01-15 | Cryosphere | Source: EGOS-IP |
| 2-01-16 | Energy sector | Economic activities that produce or distribute energy, such as renewable energies, e.g. solar, thermal, wind. |
| 2-01-17 | Transportation sector | Economic activities related to transportation of people and goods, on land, air and water |
| 2-01-18 | Health sector | Services provided to the populations, particularly those related to the prevention, e.g. pollen allergies, UV radiation, heat wave alerts. |
| 2-01-19 | Terrestrial ecology | Activities and services related to environment, such as bio-diversity |
| 2-01-20 | Operational air quality monıtorıng 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. |
|  |  |  |
|  |  |  |
| 2-01-21 | 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 |
|  |  |  |  |
|  |  |  |  |
| 2-02-04 | 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 |  |  |
|  | GAW/TCCON |  |  |
|  | GAW/CASTNET |  |  |
|  | GAW/ALINE |  |  |
|  | GAW/AGAGE |  |  |
|  |  |  |  |
| 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 |  |
|  |  |  |  |
| 2-02-10 | 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 |  |
|  |  |  |  |
| 2-02-15 | 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 |
| 2-02-31 | 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 |
| 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 |
|  |  |  |  |
| 2-02-56 | VOS | Voluntary Observing Fleet | JCOMM ; WMO/GOS |
| 2-02-57 | VOSCLIM | Voluntary Observing Fleet (VOS) Climate 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**

|  |  |  |
| --- | --- | --- |
| **#** | **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]](#footnote-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 |
| 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 |  |  |  |  |  |  |  |  |

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### 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 |

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### 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 | The station fully complies with the reporting obligations of the observation programme/network concerned |
| 3-09-04 | Partly operational | 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 |  |
| 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** |
| --- | --- | --- |
| 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 |  |
| 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) |
| 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 |
| 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 readıng | Automatically produced measurement result |
| 5-01-02 | Instrumental Manual readıng | Manual reading of instrument, both analog or digital outputs |
| 5-01-03 | Human observation | Human, non-instrumented observation |

### Code table: 5-02

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

### 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 |

### Code table: 5-08

**Code table title: Instrument control result**

| **#** | **Name** | **Definition** |
| --- | --- | --- |
| 5-08-01 | no changes - in calibration | Instrument verified and found to be in calibration |
| 5-08-02 | no changes - out of calibration | Instrument checked and found to be out of calibration; no changes to calibration function |
| 5-08-03 | no changes – calibration unknown | Instrument visited but calibration could not be carried out |
| 5-08-04 | 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**

| **#** | **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](http://www.wmo.int/pages/prog/www/IMOP/CIMO-Guide.html)-No. 8, 2008, Updated 2010) | **CEOS** [(http://www.ceos.org/images/WGISS/Documents/Handbook.pdf](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 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. | 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. |
| 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

**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 Commissi*o*ns  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 involvıng IPET-MDRD, TT-WMD and ET-CDMS | In progress | A joint Task team under IPET-MDRD, ıs 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 |

1. Hong Kong, China, (HKG) to be added [↑](#footnote-ref-1)