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| **WORLD METEOROLOGICAL ORGANIZATION****COMMISSION FOR BASIC SYSTEMS****Open Programme Area Group on Integrated Observing Systems****Inter Programme Expert Team onObserving System Design and Evolution****Third Session**Geneva, Switzerland, 29 January – 1 February 2018 | CBS/OPAG-IOS/IPET-OSDE3/Doc. 7.1.2 |
| l 23.XI.2017**Draft 1** |

**RRR: harmonizing lists of variables**

*(Submitted by John Eyre, UK)*

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| **SUMMARY AND PURPOSE OF DOCUMENT**The document provides information on activities to resolve conflicts between the names and definitions of geophysical variables in different parts of the OSCAR databases and in the WIGOS Metadata Standard.  |

**ACTION PROPOSED**

 The Meeting is invited to note the information contained in this document when discussing how it organises its work and formulates its decisions and recommendations using the proposed template.

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**Appendix 1. OSCAR variable names and definitions:**

 **some issues to be resolved concerning variables for humidity, cloud, precipitation and aerosol**

**DISCUSSION**

**INTRODUCTION**

It has been recognised that there are some conflicts between the names and definitions of variables held in different parts of the WMO OSCAR database:

* between the names and definitions in OSCAR/Requirements (which are currently consistent with those used in OSCAR/Space), used for the RRR process,
* and the names and definitions used in OSCAR/Surface (which are currently consistent with those used in the WIGOS metadata database).

In April 2017, the Secretariat initiated discussions within a small ad hoc group representing WIGOS, CBS and other interests to agree a way forward to resolve these conflicts. The group has met by teleconference and has agreed a management approach for the work.

The group has agreed that the objective is to develop a coherent list of variables in the WIGOS Metadata Standard that can be used in OSCAR/Requirements, OSCAR/Surface and OSCAR/Space, and to minimize impact on those activities that use these facilities when implementing required changes. Also, it will be necessary preserve the observational user requirements currently recorded in OSCAR.

The group has recalled that governance for the evolution of the lists of variables is currently the following:

* IPET-OSDE: OSCAR/Requirements
* WIGOS TT on WMS: WIGOS Metadata Standard
* WIGOS TT on OSCAR Development: OSCAR/Surface and OSCAR/Space
* IPET-CM: WMO Codes Lists
* TT-ACV: Content of WMO code lists concerning atmospheric composition

The group invited John Eyre (UK) and Léa Freydier (Switzerland) to lead a small team working with identified experts to solve identified issues.

The group has also agreed a number of Actions to take forward the technical work involved and has advised on the technical experts who may be approached to be involved in this work.

As an aid to resolving the conflicts in variable names and definitions, a new database has been created, here called the “OSCAR variables database” -

<https://docs.google.com/spreadsheets/d/1Vcn-4nnahLsAciOGCdYJbqKyAq-ENf2lN1mq7zuCyJQ/edit?usp=sharing> -

in which are listed:

* the variable name,
* the variable’s ID number and definition for each of:
	+ the WIGOS metadata database,
	+ OSCAR/Surface,
	+ OSCAR/Requirements,
	+ the TT-ACV database,
* comments on issues to be resolved.

Work has progressed to the point where many of the conflicts, or apparent conflicts, have been resolved, and those that remain have been clearly identified. Further progress will now rely on the engagement of groups and/or their representatives who have expertise in particular RRR Application Areas and/or in particular observing technologies. This includes:

* experts in space-based observations (and in OSCAR/Space),
* representatives of GCW,
* representatives of GCOS,
* representatives of CHy,
* representatives of the Task Team on WIGOS metadata standards.

This list is not intended to be complete – as the work progresses it is likely that representatives of other WMO interests will need to be involved.

The work has also identified groups of variables that appear to lack the required consistency and completeness, and which are also common to observations for several Application Areas and from several observing technologies. These variables and the work to resolve these issues are presented in Appendix 1.

**ISSUES AND PROPOSED DECISIONS AND RECOMMENDATIONS**

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| **Issue #1** | See CBS/OPAG-IOS/IPET-OSDE3/Doc.7.1.1 Issue #4  |
| **Background** |  |
| **Rationale for the proposed decision/action or recommendation** |  |
| **Proposed decision(s)/****action(s)** | *What* | *By whom* | *Deadline* |
|  |  |  |
|  |  |  |
|  |  |  |
| **Proposed recommendation(s)** | *What* | *To whom (e.g. EC-70, Cg-18, …)* | *Time frame* |
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**APPENDIX 1**

**OSCAR variable names and definitions: some issues to be resolved concerning variables for humidity, cloud, precipitation and aerosol**

**Introduction**

The purpose of this note is to document some issues with selected sets of variables in the current version of the OSCAR variables database, namely the sets of variables for: humidity, cloud, precipitation and aerosol. There are issues to be resolved concerning other variables, but these can probably be resolved through one-to-one discussions with representatives of selected user or measurement communities. The issues identified with the four variable groups listed above will probably need discussion with more than one user community and with representatives of the surface-based and space-based observation communities.

**The four sub-sets of variables**

The list below gives the IDs and variable names for these four subsets, for both OSCAR/Surface and Oscar/Requirements. Missing values in this table indicate that this variable is missing from either OSCAR/Requirements or OSCAR/Surface. In most cases, the variable names are the same in both databases. Where they are different, this is a result of the current status of an exercise to find the closest match between the two databases (and improvements may still be possible). Further details, including the variable definitions and comments are in the attached spreadsheet.

|  |  |  |
| --- | --- | --- |
|  | **OSCAR/Surface** | **OSCAR/Requirements** |
|  | **ID** | **Variable name** | **ID** | **Variable name** |
| **Humidity** |  |  |  |  |
|  | 206 | H2O (as a chemical species) | 76 | H2O |
|  | 207 | HDO (as a chemical species) | 78 | HDO |
|  | 251 | Humidity (at specified distance from reference surface) | 11 | Air specific humidity (at surface) |
|  | 252 | Integrated water vapour | 162 | Integrated Water Vapour (IWV) |
|  | 253 | Mass mixing ratio |  |  |
|  | 255 | Water vapour pressure |  |  |
|  | 256 | Watervapor profile |  |  |
|  |   |   | 161 | Specific humidity |
|  |  |  |  |  |
| **Cloud** |  |  |  |  |
|  | 179 | Cloud amount |  |  |
|  | 180 | Cloud cover | 27 | Cloud cover |
|  | 181 | Cloud drop effective radius | 28 | Cloud drop effective radius |
|  | 182 | Cloud hydrometeor concentration |  |  |
|  | 183 | Effective radius of cloud hydrometeors |  |  |
|  | 186 | Melting layer depth in clouds | 101 | Melting layer depth in clouds |
|  | 188 | PSC occurrence | 131 | PSC occurrence |
|  | 327 | Cloud ice | 29 | Cloud ice |
|  | 328 | Cloud ice (total column) | 30 | Cloud ice (total column) |
|  | 329 | Cloud ice effective radius | 31 | Cloud ice effective radius |
|  | 330 | Freezing level height in clouds | 67 | Freezing level height in clouds |
|  | 331 | Icing potential | 86 | Icing potential |
|  | 373 | Cloud liquid water (CLW) | 32 | Cloud liquid water (CLW) |
|  | 374 | Cloud liquid water (CLW, total column) | 33 | Cloud liquid water (CLW) total column |
|  | 506 | Cloud optical depth | 34 | Cloud optical depth |
|  | 507 | Optical depth of fog |  |  |
|  | 508 | Optical depth within each layer |  |  |
|  | 509 | Short-wave cloud reflectance | 141 | Short-wave cloud reflectance |
|  | 522 | Hydrometeor radius |  |  |
|  | 523 | Hydrometeor type | 211 | Hydrometeor type |
|  | 531 | Height of cloud base | 26 | Cloud base height |
|  | 532 | Height of cloud top | 35 | Cloud top height |
|  | 550 | Type of cloud | 37 | Cloud type |
|  | 551 | Type of high clouds |  |  |
|  | 552 | Type of low clouds |  |  |
|  | 553 | Type of middle clouds |  |  |
|  |  |  |  |  |
| **Precipitation** |  |  |  |  |
|  | 210 | Amount of precipitation | 1 | Accumulated precipitation (over 24 h) |
|  | 211 | Duration of precipitation |  |  |
|  | 212 | Intensity of precipitation | 128 | Precipitation intensity at surface (liquid or solid) |
|  | 213 | Occurrence of precipitation during last period |  |  |
|  | 214 | Rate of ice accretion |  |  |
|  | 215 | Type of precipitation | 207 | Precipitation type at the surface |
|  |   |   | 127 | Precipitation (liquid or solid) |
|  |   |   | 129 | Precipitation intensity at surface (solid) |
|  |  |  |  |  |
| **Aerosol** |  |  |  |  |
|  | 314 | Aerosol Absorption Optical Depth | 213 | Aerosol Absorption Optical Depth |
|  | 315 | Aerosol Extinction Coefficient | 4 | Aerosol Extinction Coefficient |
|  | 316 | Light absorption coefficient, PM1 |  |  |
|  | 317 | Light absorption coefficient, PM10 |  |  |
|  | 318 | Light absorption coefficient, total aerosol |  |  |
|  | 319 | Light backscattering coefficient, PM1 |  |  |
|  | 320 | Light backscattering coefficient, PM10 |  |  |
|  | 321 | Light backscattering coefficient, total aerosol |  |  |
|  | 322 | Light scattering coefficient, PM1 |  |  |
|  | 323 | Light scattering coefficient, PM10 |  |  |
|  | 324 | Light scattering coefficient, total aerosol |  |  |
|  | 325 | Multiwavelength optical depth, total aerosol | 6 | Aerosol Optical Depth |
|  | 361 | Aerosol column burden (mass density) | 2 | Aerosol column burden |
|  | 361 | Aerosol column burden (mass density) | 8 | Aerosol species total column burden |
|  | 362 | Aerosol Extinction Coefficient | 3 | Aerosol effective radius |
|  | 364 | Mass concentration (coarse) or Mass PM10 |  |  |
|  | 365 | Mass concentration (fine) or Mass PM1 |  |  |
|  | 366 | Mass concentration (medium), PM2.5 |  |  |
|  | 367 | Mass concentration (size fractionated) |  |  |
|  | 368 | Mass concentration (total aerosol) or Mass TSP |  |  |
|  | 370 | N4umber size distribution, PM10 |  |  |
|  | 411 | CCN concentration at single supersaturation |  |  |
|  | 412 | CCN concentration spectra |  |  |
|  | 413 | Hygroscopic growth factor, 110 μm equivalent |  |  |
|  | 414 | Hygroscopic growth factor, 165 μm equivalent |  |  |
|  | 415 | Hygroscopic growth factor, 35 μm equivalent |  |  |
|  | 416 | Hygroscopic growth factor, 50 μm equivalent |  |  |
|  | 417 | Hygroscopic growth factor, 75 μm equivalent |  |  |
|  | 418 | Hygroscopic growth factor, total aerosol |  |  |
|  | 727 | Aerosol dust concentration (mass) | 208 | Aerosol dust concentration |
|  | 728 | Aerosol volcanic ash (mass concentration) | 173 | Aerosol volcanic ash |
|  | 729 | Aerosol volcanic ash (Total column) | 174 | Aerosol volcanic ash (Total column) |
|  |   |   | 5 | Aerosol mass mixing ratio |
|  |   |   | 7 | Aerosol species mole fraction |
|  |   |   | 9 | Aerosol type |

**Some issues to be addressed** (not intended to be comprehensive)

* Names inconsistent between the two databases – mainly resolved but some remain.
* Names inconsistent with the definition. In most cases there is a comment in the “comments” column to describe the problem.
* Definitions not satisfactory. In most cases there is a comment in the “comments” column to describe the problem.
* Duplication of name (different name used for the same variable) – mainly resolved but some issues of this type remain.
* Variables in OSCAR/Surface that are missing in OSCAR/Requirements, or vice versa. This is not necessarily a problem; it is possible that requirements have been identified for which there are no surface-based observations, and vice versa. However, some cases may represent other issues, i.e. duplication of names, unintended gaps, etc.
* Specific issues within each set of variables (humidity, cloud, precipitation, aerosol):
	+ Closely related variables, for which an observing capability for one is likely to address stated requirements for the other. This is not necessarily a problem: for observing capability, names should correspond to what is observed and/or disseminated; for observing requirements, this is how users have chosen to state their requirement (in a technology-free way).
	+ The set of variables for 3D fields, 2D surface fields, 2D total column fields, etc., does not appear complete or coherent.
	+ Precipitation: issues concerning integrals over time.
	+ Aerosol: not all aerosol-related variables are listed – only those where there are anticipated conflicts between (broadly speaking) the meteorological community and the atmospheric composition community.
* General issues within each set of variables (humidity, cloud, precipitation, aerosol):
	+ Lack of scientific coherence when the list is considered as a set. Why have these variables been chosen? Why not others?

**Actions needed from this activity**

To propose:

* variables to be added to the lists,
* variables to be removed from the lists,
* definitions to be revised,

in order to make these lists more coherent and complete sets.

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