

REPORT ON THE TASK FORCE ON CODES
In response to CGMS action/recommendation A35.23

In response to CGMS Actions 34-27 and 34-28, the CGMS Task Force on Satellite Data Codes was established in order to advise CGMS and WMO on issues related to satellite data representation, identification and handling within the WMO Information System. The first meeting of the TFSDC was held at the WMO Headquarters in Geneva, 26 – 27 February 2008.

In addition to reviewing its function and Terms of Reference, the Task Force considered a number of technical issues relating to the encoding and exchange of satellite data. The Final Report of the meeting is given in the Annex to this paper.

Action/Recommendation proposed: CGMS is invited (i) to revise the terms of reference of its Task Force on Satellite Data and Codes in accordance with the proposal in Annex 3 of the Final Report, and (ii) to decide whether to continue the activities of the Task Force in their current form or to establish a different structure for this purpose.

Report on the Task Force on codes

1 INTRODUCTION

The CGMS Task Force on Satellite Data Codes (TFSDC) was established in response to CGMS Actions 34-27 and 34-28. The TFSDC was established in order to advise CGMS and WMO on issues related to satellite data representation, identification and handling within the WMO Information System. The first meeting of the TFSDC was held at the WMO Headquarters in Geneva, 26 – 27 February 2008. The Final Report of this meeting is given in Appendix A.

2 MAIN TEXT

The discussions of the Task Force focussed on its future activities, the relative advantages and disadvantages of various data formats for different purposes and the specification of a classification for satellite data products to be used for the identification and management of the data.

The details of these discussions are summarised in the Final Report of the meeting given in Appendix A.

3 CONCLUSIONS

The Task Force provides an effective and important interface between the producers of satellite data (CGMS) and the users of the data (as represented by WMO). It gives an opportunity for data providers to respond to the requirements of their user communities, particularly in the area of data formats. Furthermore, by acting as a collation point for new requirements for the representation of satellite data, the Task Force will also facilitate some degree of devolution of responsibility from WMO's Expert Team on Data Representation and Codes.

In order to fulfil its potential, the Task Force requires

- the adoption of the modified Terms of Reference, given in Annex 3 of the Final Report,
- the involvement of representatives of the broader user community, especially from major NWP centres, and
- either a longer mandate to continue in its current form, or the establishment of a permanent structure in its place.

APPENDIX A – Final report of the first meeting of the TFSDC

CGMS Task Force on Satellite Data Codes (TFSDC) First meeting (Geneva, 26-27 February 2008)

1. Introduction

The meeting was opened by J. Lafeuille who welcomed the participants. He noted that representatives from CMA and Roshydromet had also been appointed in the Task Force but could not attend this first meeting. He considered that this initial meeting would need to have an open discussion on the scope of the Task Force and the methodology to be followed, which can be efficiently discussed in a reduced session, but he expected that more CGMS Members will be able to participate when the Task Force will enter deeper into the matter.

The Task Force unanimously agreed to designate S. Elliott as Chairman and Rapporteur, with the understanding that the designation of the Chairman will be reconsidered at the next meeting, when more members will be present.

2. Review and adoption of the agenda

The agenda was adopted, as attached in Annex 1.

3. Review Terms of Reference and Membership

In reviewing the draft Terms of Reference (TFSDC-1, Doc.3) the Task Force considered that:

- The definition and maintenance of codes is a support to operational activity, which requires continuity and quick reactivity. While understanding that CGMS has not established the Task Force as a permanent body, it is recommended that, if the Task Force is not maintained in its current form, CGMS-36 should consider establishing a permanent structure in place of the Task Force.
- The involvement of representatives of the user community is essential, especially from major NWP centres.
- The work of the Task Force should be coordinated with the newly established Expert Team on Assessment of Data Representation Systems (ET-ADRS).

The draft Terms of Reference were revised accordingly (Annex 3).

Furthermore, consideration should be given to inviting the Task Force to advise CGMS and WMO on issues related to satellite metadata representation, in particular by interacting with the CBS Inter-Programme Expert Team on Metadata Implementation (IPET-MI).

4. Outstanding issues and difficulties with the use of current Codes

The Task Force noted that no blocking difficulty was encountered with the current WMO codes, for real time exchange of satellite data and products between satellite data producers and National Meteorological Services, as confirmed by the Chairman of the CBS Expert Team on Data Representation and Codes (ET-DRC) and that the existing mechanism to maintain the coding standards by the ET-DRC had allowed, so far, accommodating the new data in WMO codes.

However, scope for progress was identified in the following directions in particular:

- Need to serve a wider community, namely in the WIS and GEOSS context, for whom the use of WMO codes GRIB and BUFR is perceived as a limiting factor and who sees advantages in using other formats such as NetCDF, for which applications are widely available.
- Need to adopt a forward-looking view and anticipate as far as possible the new data types and needs that will result of future satellite programmes in the coming decades.
- Need to involve in this exercise all satellite operators contributing to the GOS.

The Task Force felt that it could play a useful role to progress on each of these three directions and that it was quite timely to initiate this action alongside the WIS implementation.

5. Updating of tables in the Manual on Codes and the Manual on the GTS

5.1. Development of a typology of satellite data and products to be used to update Common Table C-13 of the Manual on Codes and the Table C6 of Attachment II-5 of the Manual on the GTS (TFSDC-1, Doc.5.1).

The Task Force noted that Common Table C-13 was used both for BUFR encoding and as a basis for the WIS file naming convention to be implemented by the end of 2008. It was thus urgent to review it.

The Task Force noted that in most cases space-borne observations (mainly passive radiometric measurements) were not specific to one particular geophysical variable but often allowed to derive multiple variables, separately or in combination with other observations. The Task Force thus considered three different approaches for defining categories:

- either based on instrument types (i.e. level 1 data associated with these instruments),
- or based on geophysical variables (i.e. level 2 and beyond, including composite products relying on different instruments),
- or based on a combination of both (i.e. one series of numbers referring to instrument types, continued by a series of numbers referring to geophysical products).

The Chairman of ET/DRC explained that, when data are archived directly in BUFR (as is the case e.g. at ECMWF) the sub-category plays a key role to identify the 'product'.

As a starting point, the Task Force agreed to try the following approach:

- to define categories based on instruments types,
- to check whether the existing sub-categories could be accommodated in a meaningful way into these categories,
- if needed, to consider additional categories for those sub-categories that cannot easily find a home in the initial categories.

The Task Force furthermore noted that the "Gap Analysis" presented at CGMS 35 (CGMS-35 WMO-WP-05) included a typology of satellite missions and instruments, which could be relevant to the definition of satellite data categories. The document also includes a table of geophysical variables potentially derived from these missions and instruments. The typology of instruments/missions is attached as Annex 4.

The typology of 29 instruments/missions was thought to be a useful starting point, with the possibility of some adjustments, for example:

- merging the similar categories for LEO and GEO, if not essential
- possibly splitting the IR sounding into classical and hyperspectral IR sounding
- adding other non-meteorological missions (e.g. gravity measurement, precision orbit, space environment, calibration datasets)

Action TFSDC-1.1: S. Elliott to prepare a proposal for data categories, based on the typology of satellite missions/instruments. Deadline: 31 May 2008

Action TFSDC-1.2: S. Elliott (with assistance of WMO/SAT if necessary) to request CGMS Members to draw an inventory of the products they generate and list them under the proposed categories. Deadline: CGMS-36

In an input provided by T. Smith after the meeting, there was however further support to the approach of categories based on concatenating a list of instruments types and of a list of geophysical variables.

5.2. Updating of common Tables C-1, C-11 and C-12 of the Manual on Codes related to the identification of originating/generating centres and sub-centres

The need to designate sub-centres had been highlighted by the RARS Implementation Group at its first meeting.

The WMO Secretariat clarified that when an originating centre had to distribute data generated by sub-centres, the centre (in this case, the RARS coordinator) should contact the “Focal Point for Codes” competent for the centre (<http://www.wmo.int/pages/prog/www/WMOCodes/FocalPoints-Migration.doc>) in order to obtain identifiers for each sub-centre. He should then inform WMO Secretariat (Joël Martellet, OBS/WIS/DRMM) who will forward the information to ET-DRC and take action to update Common Code Tables C-1, C-11 and C-12.

Action TFSDC-1.3: WMO/SAT (J. Lafeuille) to inform the RARS coordinators of the procedure for determination of sub-centre identifiers. Deadline: 1 April 2008

5.3. Allocation of abbreviated headings, file naming conventions and metadata

The Task Force noted the proposal to adopt T1T2=IN for satellite data in BUFR and the subsequent possibility to define A1A2 identifiers to describe satellite data type.

It was clarified that the definition of abbreviated headings was relevant to the exchange of bulletins, which might be superseded by the exchange of files. However, this would only occur in the long term, since the use of files would not be immediately applicable in all WMO Members. Abbreviated headings would thus be required for the transition period. During this transition period, bulletins might be contained in files.

The Task Force acknowledged the issue and agreed that it should best be addressed after the definition of data categories and sub-categories per Common Table C-13 (See Item 5.1) and base on such categories.

6. Impact of WIS for satellite data exchange

The Task Force noted the implementation approach of the WIS and the need to define metadata and filenames. The Task Force recognized the importance of ensuring that the various activities related to satellite data description through the definition of codes, through the definition of associated metadata and through the adoption of filename conventions should be coordinated since they are all aspects of the same issue. As an example, the definition of satellite data categories and sub-categories, being considered by this group in the context of BUFR encoding, is also directly relevant to the file name conventions for data exchange within the WIS as well as influencing – and being influenced by – the definition of the associated metadata.

7. Use of data formats other than BUFR and GRIB (e.g. NetCDF)

The Task Force noted that ET-ADRS would consider the respective advantages and implications of using different data formats, beyond the WMO maintained GRIB and BUFR, in the WIS context.

The Task Force highlighted the following points:

- The increasing demand for data in NetCDF format, especially for non time-critical data exchange in scientific and environmental applications
- The availability and use of specific formats within the satellite community, that should be acknowledged:
 - The internationally agreed standards HRIT/LRIT and HRPT/LRPT are defined and maintained by CGMS. These standards have been initially developed for direct readout from the satellites but are also used now in further data exchange, e.g. imbedded in file transfer via EUMETCAST or for MTSAT imagery distribution via Internet by JMA, or for archive data retrieval by operational users who want to recover some gaps in their direct readout datasets. They are used operationally worldwide.
 - McIDAS format developed and maintained by the University of Wisconsin, SSEC is also widely used and coupled with a software environment with a number of applications.
 - A summary description of these formats is available in the WMO Space Programme [web pages:](http://www.wmo.int/pages/prog/sat/Formatsandstandards.html)
<http://www.wmo.int/pages/prog/sat/Formatsandstandards.html>
- The need for a standard implementation for any format be it proprietary or non-proprietary, if it is adopted for use with meteorological satellite data. For NetCDF, Unidata has developed the Climate and Forecast Convention (CFC), which is widely used (e.g. for JASON-2 and for data retrieved from EUMETSAT's U-MARF).
- The implications on data volume and the suitability of file formats for data compression.

8. Anticipated long-term evolution of satellite data characteristics

The Task Force welcomed the information summarized in TFSDC-1 Doc.8 about anticipated trends for satellite data and products and noted that it should also mention Jason-2 as future satellite (planned launch in June 2008) and include wide-swath altimetry among the technologies that will generate significant new amounts of data. The Task Force was informed that summary planning information on all satellite missions contributing to the GOS was available on the WMO-CGMS web pages: http://cgms.wmo.int/CGMS_home.html (select: *latest satellite status*)

The Task Force was content that the approach to the problem of defining appropriate codes for satellite data broadcast and exchange would not be invalidated by the additions of new and enhanced satellites and instrument types but expressed natural concern over the impact that the vastly increased data volumes would have on the issue of data circulation.

The Task Force agreed that the solutions to this problem are likely to take several forms: More emphasis is likely to be placed on the generation and circulation of value-added products generated by global or regional specialized centres, techniques of data compression will become ever more important as will pre-processing to achieve a reduction in data volume based on geographical, spectral or temporal data sub-setting or other more sophisticated techniques.

The discussion highlighted, however, that actual data exchange volumes were difficult to anticipate because:

- The efficiency of compression depends very much on the data auto-correlation
- The implications on data volume are totally different whether users are handling low-level data or high-level processed products, and there may be a change of paradigm in data usage in the coming decade as a result of increased data sources and instrument complexity.

9. Discussion on the concept of a new BUFR Master Table for satellite data

The Task Force recalled the role played by the BUFR Master Table in that it represents a high level demarcation of the disciplines for which the code is being used. It recognized also that only one new master table other than meteorology has been introduced thus far (oceanography). The Task Force recognized that the effort/process to maintain and evolve the table entries will be the same, whether this is achieved through a new master table or using some of the space left in the existing master table 0 (meteorology). The group agreed that it is not necessary to adopt a new master table for now, but to revisit this issue at the next opportunity, noting that it will be possible to adopt a new master table at some point in the future, the constraints being quite clear.

10. Request for additions and other changes for submission to CBS XIV

The Task Force noted the request for additions and other changes to GRIB and BUFR that had been presented to CGMS-35, and was informed that these changes had been set to pre-operational status in November 2007. In particular, sub-categories had been defined for the IASI and ATOVS instruments within the current category 003 (vertical sounding by satellite), which responded to a need from RARS-IG1. The group recognized that this definition was necessary in order that the various RARS systems could proceed with a consistent approach to the distribution of RARS data sets but also noted that the wider question of the definition of satellite data categories and sub-categories is ongoing (see agenda item 5) and will potentially impact this subject in the future.

New additions for atmospheric chemistry were introduced, and they will be addressed by ET-DRC.

In future, the Task Force will be asked to review such additions (and also to generate new ones itself) before submission to ET-DRC.

11. Future milestones for TFSDC

The Task Force reviewed the likely schedule of related meetings in the coming year and recognized the following as being relevant to their future work:

- CBS: November 2008 or February 2009;
- CGMS-36: November 2008;
- ET-DRC: June 2008 or September 2008 (depending on CBS);
- ET-ADRS: April 2008.

Noting this schedule the Task Force derived the following milestones:

- Input to ET-DRC: June 2008 (Final Report of TFSDC-1 plus a paper requesting allocation of new categories in CCT 13/ BUFR Table A via Rapporteur/Chair TFSDC);
- Input to ET-ADRS: April 2008 (Final Report of TFSDC-1 plus verbal report from TFSDC Rapporteur (who is also a member of ET-ADRS) and from WMO Secretariat);
- Input to CGMS-36: September 2008 (Paper summarizing TFSDC-1 findings including future status of the Task Force).

The Task Force considered the question of when to hold its next meeting. The group noted that in its Terms of Reference it is stated that “The Task Force will meet at least once a year, and more if necessary” but it felt that it would be appropriate to await the outcome of CGMS deliberations on the groups future status before deciding on a date.

12. Conclusions

The Chairman concluded in stating that the discussion held had confirmed the relevance of the work of the Task Force, which had been successfully initiated. He stressed however that clear outcomes of the discussion were that the Task Force needed more members from CGMS satellite operators and users of satellite data, and that the work of the Task Force would require continuity.

Annex 1

AGENDA

1. Introduction

- Welcome
- Designation of a Chairman

2. Review and adoption of the agenda

3. Review Terms of Reference and Membership

4. Outstanding issues and difficulties with the use of current Codes

5. Updating of tables in the Manual on Codes and the Manual on the GTS

- Development of a typology of satellite data and products to be used to update Common Table C-13 of the Manual on Codes and the Table C6 of Attachment II-5 of the Manual on the GTS
- Updating of common Tables C-1, C-11 and C-12 of the Manual on Codes related to the identification of originating/generating centres and sub-centres

6. Impact of WIS for satellite data exchange

- Metadata issues and filename conventions

7. Use of data formats other than BUFR and GRIB (e.g. NetCDF)

8. Anticipated long-term evolution of satellite data characteristics

9. Discussion on the concept of a new BUFR Master Table for satellite data

- Relevance
- Guiding principles
- Practical way forward and timeline

10. Request for additions and other changes for submission to CBS XIV

11. Future milestones for TFSDC

- Next meetings
- Inter-sessional work
- Reports to ET-DRC, CGMS

12. Conclusions

Annex 2

LIST OF PARTICIPANTS

Representatives of CGMS Members

Simon Elliott (EUMETSAT)

Thomas Smith (NOAA/NESDIS) [only partly, by phone]

ET-DRC Chairman

Milan Dragosavac (ECMWF)

WMO Secretariat

Pierre Kerhervé (WMO/OBS/WIS/DRMM)

Joël Martellet (WMO/OBS/WIS/DRMM)

Jérôme Lafeuille (WMO/OBS/WIGOS/SAT)

Richard Francis (WMO/OBS/WIGOS/SAT)

Akihiro Shimizu (WMO/OBS/WIGOS/SAT)

CGMS TASK FORCE ON SATELLITE DATA CODES (TFSDC)

DRAFT TERMS OF REFERENCE

PROPOSED REVISION TO THE MEMBERSHIP AND ORGANIZATION

Background

The CGMS Task Force on Satellite Data Codes (TFSDC) is established in response to CGMS Actions 34-27 and 34-28 agreed by the Coordination Group for Meteorological Satellites (CGMS) at its thirty-fourth session.

Purpose

The TFSDC is established in order to advise CGMS and WMO on issues related to satellite data representation, identification and handling within the WMO Information System.

Membership and organization

The TFSDC is comprised of experts nominated by CGMS satellite operators, assisted by WMO Secretariat and, as appropriate, by external experts representing user communities ~~as appropriate~~.

It will nominate among its Members a Rapporteur and a Chairman.

The Task Force will meet at least once a year, and more if necessary. It will pursue its work by correspondence between its meetings.

The Task Force will interact as appropriate with the WMO/CBS Expert Team on Data Representation and Codes (ET-DRC), ~~and~~ the WMO/CBS Expert Team on WIS Operation and Implementation (ET-OI), and the Expert Team on Assessment of Data Representation Systems (ET-ADRS), with cross-representation at relevant meetings.

The TFSDC will report annually to the CGMS plenary which will decide on ~~the need whether~~ to continue the activity or to terminate it once the main objectives are completed ~~in the same way or hand it over to a different structure~~.

Annex 4

TYOLOGY OF INSTRUMENT/MISSIONS EXTRACTED FROM THE GAP ANALYSIS (CGMS-35-WMO-WP-05)

1. Multi-purpose VIS/IR imagery from LEO
2. Multi-purpose VIS/IR imagery from GEO
3. IR temperature/humidity sounding from LEO
4. IR temperature/humidity sounding from GEO
5. MW temperature/humidity sounding from LEO
6. MW temperature/humidity sounding from GEO
7. Conical-scanning MW imagery (intermediate frequencies)
8. Low-frequency MW imagery
9. Radio occultation sounding
10. Earth radiation budget from LEO
11. Earth radiation budget from GEO
12. Wind scatterometry
13. Radar altimetry
14. Ocean colour imagery from LEO
15. Ocean colour imagery from GEO
16. Imagery with special viewing geometry
17. Lightning imagery from LEO
18. Lightning imagery from GEO
19. Cloud and precipitation radar
20. Lidar-based missions (for wind, for cloud/aerosol, for water vapour, for altimetry)
21. Cross-nadir short-wave spectrometry (for chemistry) from LEO
22. Cross-nadir short-wave spectrometry (for chemistry) from GEO
23. Cross-nadir IR spectrometry (for chemistry) from LEO
24. Cross-nadir IR spectrometry (for chemistry) from GEO
25. Limb-sounding short-wave spectrometry
26. Limb-sounding IR spectrometry
27. Limb-sounding Sub-millimetre wave spectrometry
28. High-resolution short-wave imagery for land observation
29. Synthetic Aperture Radar