



CGMS-37 WMO-WP-10
v1, 8 October 2009
Prepared by WMO
Agenda Item: D1
Discussed in Plenary

DOSSIER ON THE SPACE-BASED GLOBAL OBSERVING SYSTEM

In response to CGMS action 36-02

WMO WP-10 introduces the Dossier on the space-based GOS. It recalls its background and main features; lists the main updates since CGMS-36; and informs on current and future developments of the Dossier.

The Dossier is updated three times a year in January, June and October. The January 2009 issue incorporated the updated information collected at CGMS-36; similarly, the updates provided by CGMS Members at CGMS-37 will be included in the January 2010 issue.

The latest issue of the Dossier can be downloaded from the WMO ftp site at the following address: <ftp://ftp.wmo.int/Documents/PublicWeb/sat/DossierGOS>. It consists of a zipped package of six files: *Introduction*, *Programmes*, *Instruments*, *GapAnalysis*, *Products* and *Compliance*. The files are connected by hyperlinks, therefore must be unzipped all at once in the same folder without changing their names. The current Dossier contains descriptions of 203 satellite missions and 234 satellite instruments.

Two main developments are ongoing and planned to continue over the next year:

- Cooperation with CEOS, specifically through NASA and ESA, to seek convergence on, e.g., geophysical parameters definition, instruments categorization, and approximate product performance evaluation from categorized instruments;
- Supporting the WMO Rolling Requirements Review (RRR) in comparing user requirements and satellite performances, highlighting non-compliances and suggesting ways forward to address these non-compliances.

Action/Recommendation proposed:

Recommendation 36-02 (Confirmed): WMO to continue to keep the Dossier on the Space-based Global Observing System under review by the relevant groups of experts of WMO Members (e.g. the CBS/OPAG-IO Expert Teams on Satellite Systems and on Satellite Utilization and Products).

New Recommendation (Updating Recommendation 36.03): WMO to pursue harmonization of structure and contents of the GOS Dossier and the CEOS databases, in cooperation with CEOS.

New Recommendation: WMO to keep CGMS informed of the status of the Rolling Requirements Review process (RRR).

New Action: CGMS space agencies to support WMO for filling the gaps in the GOS Dossier Volume II (Instrument descriptive tables). Deadline: in response to specific requests by WMO.

New Action (Renewing Action 36.02): WMO to report at CGMS on the major updates brought to the Dossier on the Space-based Global Observing System. Deadline: CGMS-38.

DOSSIER ON THE SPACE-BASED GLOBAL OBSERVING SYSTEM

1 STRUCTURE OF THE DOSSIER

The Dossier on the space-based component of GOS is an evolution of the document “Status of the Space-based Component of GOS”, that has been regularly presented by WMO to the annual meetings of the Coordination Group for Meteorological Satellites since CGMS-32 (Sochi, 17-20 May 2004). It has gradually grown until it reached the current structure at CGMS-36 (Maspalomas, 3-7 November 2008).

Currently the GOS Dossier consists of an Introduction and 5 Volumes, as follows:

Volume I - *Satellite Programme Description (file: “Programmes”)* - It gathers information on satellite programmes from operational and R&D agencies. The number of space agencies and the nature of the programmes considered have been greatly extended in respect of previous issues.

Volume II - *Earth observation satellites and their instruments (file: “Instruments”)* - It gathers descriptive tables for instruments that are currently operating, or close to be operating, or at an advanced stage of their approval process. It has also been greatly extended in respect of previous issues.

Volume III - *Gap analysis in the space-based component of GOS (file: “GapAnalysis”)* - It is based on the schedule of current and planned programmes up to year 2025, and contains a gap analysis with respect to user requirements, taking into account the suitability of the technological level of current or planned instruments to meet these requirements. The analysis is complemented by recommendations.

Volume IV - *Estimated performance of products from typical satellite instruments (file: “Products”)* - For over 100 user required geophysical parameters, it evaluates the data quality potentially achievable by reference instruments in a typology of about 30 instrument categories that are relevant for these parameters.

Volume V - *Compliance analysis of potential product performances with user requirements (file: Compliance)* - This last volume is specifically intended to support the WMO Rolling Requirements Review process (RRR), that aims at updating user requirements by iterating with actual or perspective satellite capabilities. It extracts user requirements from authoritative lists (first of all, the WMO/CEOS Database) and performs the assessment on to which extent the potential products quality estimated in Volume IV comply with user requirements.

Since 2009, three issues of the GOS Dossier are provided every year:

- 1st January, to incorporate information from the latest session of CGMS;
- 30th June, to take account of possible events in the first half of the year;
- 1st October, to be submitted to the next session of CGMS.

2 ACCESS TO THE DOSSIER

The latest available issue of the dossier is available at the following WMO ftp site: <ftp://ftp.wmo.int/Documents/PublicWeb/sat/DossierGOS>. Currently, this contains the GOS-2009-October issue. In addition, Volume I (*Programmes*) is planned to be available in printed form as a WMO Technical Document.

The six files (including the Introduction) are provided in electronic form in a single zipped folder. The five volume files are connected by hyperlinks. In order to maintain the capability to navigate with hyperlinks among the volumes, the following instructions should be followed when unzipping the files:

- The six files shall be extracted all at once (Use “Extract all files” command).
- The six files shall be saved in a single folder. The current folder is named “GOS-2009-October”. The previous were named GOS-2009-January and GOS-2009-June, respectively. The next will be named “GOS-2010-January” and will incorporate the information to be collected at CGMS-37.
- **Never change the name of a file in the folder**, otherwise, the hyperlinks from or to that file would be lost. Only internal hyperlinks within Volume II would still work.
- When working with hyperlinks between two files, it is recommended to keep both files open: in this case the link will be immediate, otherwise it will be slow.

3 RECORD OF CHANGES FROM THE JANUARY 2009 EDITION

A detailed “Change record” is kept by WMO. The main changes are related to recent launches or modification of planned launch dates as listed in the following tables.

Satellites launched in 2009 (by end-September)

Satellite	Launch	End of service	Height	LST/incl.	Status (Sept 2009)	Instruments
GOSAT	23 Jan 2009	expected ≥ 2014	666 km	13:00 a	Operational	TANSO-FTS, TANSO-CAI
NOAA-19	6 Feb 2009	expected ≥ 2014	870 km	13:54 a	Operational	AVHRR/3, HIRS/4, AMSU-A, MHS, SBUV/2, SEM/2, Argos, SARSAT
OCO	24 Feb 2009	Failed at launch	-	-	Inactive	OCO
GOCE	17 Mar 2009	expected ≥ 2011	260 km	06:00 d	Operational	Solid Earth
RISAT-2	20 Apr 2009	expected ≥ 2014	550 km	41°	Operational	SAR-X
GOES-14	27 Jun 2009	expected ≥ 2016	GEO, 89.5°W		In commissioning	IMAGER, SOUNDER, DCIS, SEM, SXI, GEOSAR
UK-DMC-2	29 Jul 2009	expected ≥ 2012	686 km	10:30 a	Operational	SLIM6
Deimos-1	29 Jul 2009	expected ≥ 2012	686 km	10:30 a	Operational	SLIM6
Meteor-M N1	17 Sep 2009	expected ≥ 2014	835 km	09:30 d	In commissioning	MSU-MR, MTVZA, KMSS, Severjanin, GGAK-M

Satellites still planned for launch in 2009 (but not yet launched by end-September)

Satellite	Launch	End of service	Height	LST/incl.	Status (Sept 2009)	Instruments
DMSP-S18	2009	expected \geq 2013	833 km	05:30 d	Close to launch	SSMIS
CryoSat-2	2009	expected \geq 2012	717 km	92°	Close to launch	SIRAL
SMOS	2009	expected \geq 2014	763 km	06.00 d	Close to launch	MIRAS
OceanSat-2	2009	expected \geq 2014	723 km	12:00 d	Close to launch	OCM, MSMR, SCAT, ROSA
ResourceSat-2	2009	expected \geq 2013	817 km	10:30 d	Close to launch	LISS-3, LISS-4, AWIFS
TanDEM-X	2009	expected \geq 2014	514 km	06:00 d	Close to launch	SAR-X, IGOR
COMS-1	2009	expected \geq 2016	GEO, 128.2°E		Close to launch	MI, GOCI
INSAT-3D	2009	expected \geq 2016	GEO, 83°E		Close to launch	IMAGER, SOUNDER, DCS
GOMS-N2	2009	expected \geq 2016	GEO, 76°E		Close to launch	MSU-GS, DCS, HMS, GEOSAR

It is noted that Volume V (Compliance analysis), although presented as a draft in the January issue, has not been updated because a user requirement review process is ongoing in WMO (see below) that will take a large fraction of 2010. Therefore Volume V will be updated only on the occasion of CGMS-38.

4 COOPERATION WITH CEOS

CGMS-36 adopted Recommendation 36-03: "WMO to coordinate as appropriate with CEOS for further updates of the Dossier on the Space-based Global Observing System, with a view to avoid duplication in the call for input from space agencies, taking into account the updating process of the CEOS Earth Observation (EO) Handbook (www.eohandbook.com)."

Cooperation on the CEOS EO Handbook started soon between WMO and ESA, who is responsible of the Handbook. Contacts were then established with the NASA/Langley System Engineering Office (SEO), thus three-party cooperation is now taking place. The major progress so far has been on:

- Harmonizing the names of the geophysical parameters to be considered for observation by satellite;
- Classifying the various remote sensing instruments as a function of their operating principle.

ESA will not publish the CEOS EO Handbook as a brochure as was done in the past; but its content, with significant updates, will be made available online through interactive access to a database that ESA plans to update on a yearly basis. This information has been used in the GOS Dossier for Volume I (Programmes) and partially for Volume II (Instruments). WMO intends to use the CEOS database as a primary source of information as regards programmes and instruments. However a higher level of detail is required in the GOS Dossier for instrument description, since it is used to attempt evaluating product performances (Volume IV).

The objective of NASA/SEO is more product-oriented. The SEO has established user panels to specify requirements, and aims at assessing expected product quality and their compliance with requirements. Therefore it looks at the GOS Dossier, specifically Volumes IV and V, with much interest. Progress has been achieved on harmonizing parameter names. Effort is being made to express requirements in a comparable way;

however the requirements are not necessarily identical since they may address the needs of different communities of practice.

5 LINK WITH THE WMO ROLLING REQUIREMENTS REVIEW PROCESS

As noted, Volume V of the GOS Dossier (Compliance analysis) has not been updated. This is because it relies on user requirements that need to be further refined and validated. These requirements are currently undergoing a thorough review, coordinated by the WMO CBS Expert Team on Evolution of the Global Observing System (ET-EGOS) and its focal points in a range of application areas.

The WMO/CEOS Database of Observational Requirements¹ collects User Requirements from:

- WMO Technical Commissions and Panels, currently covering 10 applications:
 - Global NWP
 - Regional NWP
 - Synoptic meteorology
 - Nowcasting and very short range forecasting
 - Seasonal to inter-annual monitoring
 - Atmospheric chemistry
 - Aeronautical meteorology
 - Agricultural meteorology
 - Hydrology and water resources
 - Ocean applications (requirements still under development);
- WMO co-sponsored programmes:
 - GCOS (Global Climate Observing System)
 - WCRP (World Climate Research Programme)
 - GOOS (Global Ocean Observing System);
- Other international Organizations related to WMO, currently including:
 - ICSU (International Council of Scientific Unions)
 - IGBP (International Geosphere-Biosphere Programme)
 - IOCCG (International Ocean Colour Coordinating Group)
 - UNEP (United Nations Environment Programme)
 - UNOOSA (United Nations Office for Outer Space Affairs).

(In this last category, there was no recent update of requirements by the relevant Organizations).

The mechanism to pursue convergence between user requirements and observing capabilities is called *Rolling Requirements Review* (RRR).

In parallel with the regular updating cycle of the WMO requirements, a process has been initiated that aims at “harmonizing” the WMO requirements database. The

¹ See <http://www.wmo.int/pages/prog/sat/Databases.html#UserRequirements>.

requirements of different applications for the same parameters are systematically compared in order to check that the differences are actually accounted for by the differences of applications, and that there is a consistency across parameters. This process will require some time, since it has to involve meetings of authoritative groups, starting with ET-EGOS in early December 2009.

It is anticipated that the work on Volume V will be resumed and completed on the basis of updated requirements, with a view to be included in the GOS-2010-October issue submitted to CGMS-38. Furthermore, the revised (and streamlined) user requirements will be used to pursue convergence with CEOS.

6 CONCLUSIONS

The GOS Dossier is a record of reference information (Volume I, “Programmes” and Volume II, “Instruments”) and a tool to support planning and other work such as gap analysis (with Volume III), estimation of product performances (with Volume IV), and the compliance analysis (with Volume V, still at draft stage).

WMO intends to keep updating this information, with the collaboration of space agencies within CGMS and CEOS. From the maintenance viewpoint, the most difficult part of the GOS Dossier is Volume II (Instruments); little progress could be achieved over the past few years in collecting the missing details in instrument characteristics. This can only be completed with input from space agencies. As concerns harmonization with CEOS, it is progressing well; this cooperation should be continued and reinforced.

Recommendations and actions had been adopted by CGMS-36 with respect to the Dossier. It is proposed to confirm or update these recommendations and actions as indicated below:

- Recommendation 36-02 (Confirmed): “WMO to continue to keep the Dossier on the Space-based Global Observing System under review by the relevant groups of experts of WMO Members (e.g. the CBS/OPAG-IOS Expert Teams on Satellite Systems and on Satellite Utilization and Products).”
- New Recommendation (Updating Recommendation 36.03): WMO to pursue harmonization of structure and contents of the GOS Dossier and the CEOS databases, in cooperation with CEOS.
- New Recommendation: WMO to keep CGMS informed of the status of the Rolling Requirements Review process (RRR).
- New Action: CGMS space agencies to support WMO for filling the gaps in the GOS Dossier Volume II (Instrument descriptive tables). Deadline: in response to specific requests by WMO.



- New Action (Renewing Action 36.02): WMO to report at CGMS on the major updates brought to the Dossier on the Space-based Global Observing System. Deadline: CGMS-38.