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NEW CGMS BASELINE FOR THE SPACE-BASED GOS

(Submitted by the WMO Secretariat)

Summary and Purpose of Document

This document reports on the new baseline adopted by the Coordination Group for Meteorological Satellites (CGMS) for its contribution to the WMO Global Observing System (GOS), based on the proposal elaborated by ET-SAT-6.

The new baseline records a considerable enhancement with respect to the previous level of commitments from satellite operators. This reflects not only advances in technology to support meteorological missions but also the expanding scope of missions assumed by CGMS members in particular in support of climate and environmental monitoring. The new baseline represents already a significant part of the way towards the full implementation of the Vision of the GOS in 2025.

Document provided for information

NEW CGMS BASELINE FOR THE SPACE-BASED GOS

1. Background

The Coordination Group for Meteorological Satellites (CGMS) is providing technical coordination among satellite operating agencies that contribute to WMO Programmes. The detailed scope of this contribution, as agreed by CGMS Members, is reflected in Chapter 4 of the Manual of the Global Observing System (WMO N°544) and the Guide to the Global Observing System (WMO N°488).

Since the Vision for the GOS in 2025 was developed, discussions have taken place within CGMS on how the satellite operators would upgrade their contributions in response to the new vision. It was agreed to define an intermediate objective that would be achievable in the short-term, which is the purpose of the present CGMS baseline. It was discussed by CGMS-38 in 2010, reviewed by ET-SAT-6 in April 2011, and adopted by CGMS-39 in October 2011. The revised CGMS baseline reflects the plans that CGMS Members could agree to at this point of time. The relationships between the Vision, the Implementation Plan and the revised CGMS baseline are illustrated schematically in Figure 1.

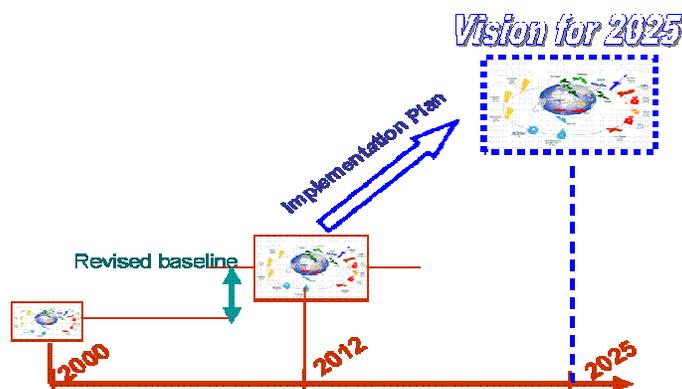


Figure 1: Schematic relationship between Vision, revised baseline, and EGOS-IP

The new CGMS baseline is a major enhancement with respect to the previous baseline, and represents a significant part of the way towards full implementation of the Vision of the GOS in 2025. It reflects not only advances in technology to support meteorology but also the expanding scope of missions assumed by CGMS members in particular for climate and environmental monitoring.

Missions that contribute to the baseline can be from either operational or R&D agencies, or transition missions in partnership among such agencies, as long as they have a clear perspective of long-term follow-on.

The baseline describes missions committed as a whole by CGMS members, without explicit mention of which member is taking responsibility for which mission. No CGMS Member would provide all the capabilities required in the baseline but the different missions of CGMS Members complement each other and –altogether– are expected to meet the requirements. ET-SAT and CGMS have drawn a mapping of the baseline with the plans of individual CGMS members, in order to give confidence that the baseline can be implemented.

2. Next steps

In adopting the baseline contained in Appendix, CGMS Members have confirmed their agreement to contribute with all reasonable efforts to implement their respective contributions to this baseline. WMO shall take into account the revised CGMS baseline in the updating process of relevant WMO Manuals and Guides, for submission to CBS-XV in September 2012 (See ET-SAT-7/Doc 8.1).

CGMS BASELINE FOR THE OPERATIONAL CONTRIBUTION TO THE GOS

(adopted by CGMS-39 on 6 October 2011)

FUTURE SATELLITE MISSIONS TO BE PERFORMED ON OPERATIONAL/SUSTAINED BASIS

Introduction

In support of the programmes coordinated or co-sponsored by WMO for weather and climate, CGMS Members plan to maintain the operational capabilities and services described below, that constitute the "CGMS baseline for the operational contribution to the GOS".

While this particular document focuses on missions that are decided and managed in an operational or sustained framework, with a perspective of long-term follow-on, this in no way precludes the importance of other missions undertaken e.g. on a research or demonstration basis. First of all, because today's research and development are the foundation of tomorrow's operational missions. Furthermore, because many missions initiated in an R&D framework for a limited duration are eventually extended well beyond their design life time and provide longstanding support to both scientific and operational activities.

This baseline defines a constellation of geostationary satellites, a core meteorological mission on three sun-synchronous orbits, other missions in sun-synchronous orbits, missions in other Low Earth Orbits, and contains cross-cutting considerations on contingency planning, inter-calibration, data availability and dissemination.

I. Constellation in geostationary orbit

At least six geostationary satellites shall be operated at evenly distributed locations with in orbit redundancy, and perform the following missions:

- (a) Advanced visible and infrared imagery (at least 16 spectral channels, 2km resolution) over the full disc at least every 15 minutes
- (b) Infrared sounding (hyperspectral on some positions)
- (c) Lightning detection
- (d) Data collection
- (e) Space environment monitoring

On selected positions, the following missions shall be performed:

- (f) Earth Radiation Budget monitoring
- (g) High spectral resolution UV sounding
- (h) Solar activity monitoring

II. LEO sun-synchronous missions

Operational sun-synchronous satellites shall be operated around three orbital planes in mid-morning ("am", nominally 09:30 descending, 21:30 ascending ECT), afternoon ("pm", nominally 13:30 ascending ECT) and early morning (nominally 05:30 descending, 17:30 ascending ECT) and, as a constellation, shall perform the following missions:

1) Core meteorological mission nominally on 3 orbital planes

- (i) Multispectral visible and infrared imagery
- (j) Infrared hyperspectral sounding (at least am and pm)
- (k) Microwave sounding
- (l) Microwave imagery

2) Other missions on sun-synchronous orbits

- (m) Wind scatterometry over sea surfaces (at least two orbital planes)
- (n) Ocean surface topography by radar altimetry (at least on am and pm orbits, supplemented by a reference mission on a high-precision, inclined orbit)
- (o) Radio-occultation sounding (at least am and pm, supplemented by a constellation in specific orbits)
- (p) Broadband VIS/IR radiometer for Earth Radiation balance (at least am and pm)
- (q) Total Solar Irradiance (at least one)
- (r) Contribution to atmospheric composition observations (at least am and pm)
- (s) Narrow-band Vis/NIR imagers (at least one sun-synchronous, am spacecraft) for ocean colour, vegetation and aerosol monitoring
- (t) High-resolution multi-spectral Vis/IR imagers (constellation of sun-synchronous satellites, preferably in am)
- (u) IR dual-angle view imagery for high-accuracy SST (at least one am spacecraft)
- (v) Particle detection and / or electron density (at least am and pm)
- (w) Magnetic field (at least am and pm)
- (x) Solar activity (at least two)
- (y) Data collection

III. Other LEO missions

The following missions shall be performed on an operational basis by Low Earth Orbit satellites on appropriate orbits:

- (z) Ocean surface topography by radar altimetry (A reference mission on high-precision, inclined orbit, complementing two instruments on sun-synchronous am and pm orbit)
- (aa) Radio-Occultation sounding (dedicated constellation of sensors on appropriate orbits)

IV. Contingency Planning

The CGMS baseline is associated with contingency plans for geostationary and polar-orbiting satellite systems, which are detailed in the CGMS Global Contingency Plan¹.

V. Inter-calibration

Instruments should be inter-calibrated on a routine basis against reference instruments or calibration sites. The routine and operational intercalibration and corrections shall be performed in accordance with standards as agreed by the Global Space-based Inter-calibration System (GSICS).

VI. Data availability and dissemination

VI.1. Data open availability with suitable timeliness

All operational environmental observation satellite systems should be designed to ensure the provision of data with suitable timeliness, as appropriate for their intended applications. Data should be preserved for the long term and documented with metadata allowing their interpretation and utilization. The satellite operators should establish dissemination contents and schedules that take into account the data requirements of users. Re-broadcast via telecommunication satellites should complement and supplement direct broadcast services, which allows cost-efficient access to integrated data streams including data from different satellites, non-satellite data and geophysical products. The dissemination systems should utilize all-weather resilient telecommunication means.

¹ The Global Contingency Plan (http://www.wmo.int/pages/prog/sat/documents/CGMS_Global-Contingency-Plan_version2_070507.pdf) should be updated accordingly. It should indicate that in case of potential gaps on core sun-synchronous missions, absolute priority should be given to observation from mid-morning and early afternoon orbits, in order to maintain the continuity of these datasets.

VI.2. Direct broadcast for core meteorological missions in LEO

The core meteorological satellite systems in LEO orbits, and other operational observation satellite systems when relevant, should ensure near-real-time data dissemination of imagery, sounding, and other real-time data of interest to Members by direct broadcast. Direct broadcast frequencies, modulations, and formats for polar-orbiting satellites should allow a particular user to acquire data from either satellite by a single antenna and signal processing hardware. Direct Broadcast should use allocations in all-weather resilient frequency bands.

VII. Note

The present update of the CGMS baseline is adopted in the light of satellite mission plans as they are known in October 2011.
