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UPDATE ON GSICS

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Summary and Purpose of Document

This document reports on the status of the Global Space-based Inter-Calibration System (GSICS), and in particular on the outcome of the joint meeting of the GSICS Research Working Group (GRWG) and the GSICS Data Management Working Group (GDWG) that was held in Daejeon, Republic of Korea from 22 to 25 March 2011.

ACTION PROPOSED

The Expert Team is invited to take note.

UPDATE ON GSICS

1. BACKGROUND

The Global Space-based Inter-calibration System (GSICS) was initiated in 2005 by WMO and the CGMS to monitor and harmonize data quality from operational weather and environmental satellites of the Global Observing System (GOS). GSICS aims at ensuring consistency among space-based observations worldwide for climate monitoring, weather forecasting, and environmental applications. This is achieved through a comprehensive calibration strategy involving operational inter-calibration of satellite instruments, tying the measurements to absolute references and standards, and recalibration of archived data. GSICS delivers calibration corrections needed for accurately integrating data from multiple observing systems into products, applications and services.

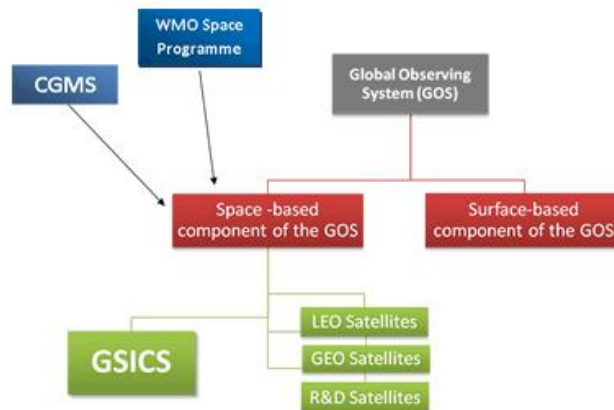


Figure 1: GSICS in the Global Observing System

In the WMO context, GSICS is considered a component of the space-based GOS (Figure 1). The implementation of GSICS for Infrared and Visible channels is registered as a Pilot Project for the WMO Integrated Global Observing Systems (WIGOS). GSICS contributes to the integration of satellite data within the Global Earth Observation System of Systems (GEOSS) of the Group on Earth Observations (GEO).

2. CURRENT GSICS STATUS AND WORK PLAN

Membership

The following organizations are participating in GSICS.

GSICS Members:

- China Meteorological Administration ([CMA](#))
- Centre National d'Etudes Spatiales ([CNES](#))
- European Organisation for the Exploitation of Meteorological Satellites ([EUMETSAT](#))
- Indian Space Research Organization ([ISRO](#))
- India Meteorological Department ([IMD](#))
- Japan Aerospace Exploration Agency ([JAXA](#))
- Japan Meteorological Agency ([JMA](#))
- Korea Meteorological Administration ([KMA](#))
- National Aeronautics and Space Administration ([NASA](#))
- National Institute of Standards and Technology ([NIST](#))
- National Oceanic and Atmospheric Administration ([NOAA](#))

- Russian Federal Service for Hydrometeorology and Environmental Monitoring ([ROSHYDROMET](#))
- United States Geological Survey ([USGS](#))
- World Meteorological Organization ([WMO](#))

Associate member:

- Inter-satellite Calibration Working Group of the Global Precipitation Measurement Mission ([GPM X-Cal](#))

Observers:

- European Space Agency ([ESA](#))
- Working Group on Calibration and Validation ([WGCV](#)) of the Committee on Earth Observation Satellites ([CEOS](#))

Achievements

Important achievements can already be recorded by GSICS.

- A common methodology has been developed and implemented for Infrared inter-calibration of geostationary imagers against Low-Earth Orbit (GEO-LEO) reference instruments (i.e. IASI and AIRS).
- A GSICS Procedure for Product Acceptance has been developed and implemented
- Data management practices have been agreed upon, including the use of netCDF convention, filenaming convention in accordance with WIS principles, definition of data categories and subcategories for inclusion in Common Code tables.
- Data servers have been implemented, initially by EUMETSAT and NOAA, mirroring each other, for sharing calibration datasets, software elements, documentation and products.
- Two User Workshops have been held in 2009 and 2010 respectively, a third one is planned in September 2011. Users have been invited to contribute as betatesters and provide feedback.
- A paper has been accepted for publication in the BAMS, a guide on pre-flight calibration has been published by NIST as a technical report, a number of references to GSICS have been made in various scientific conferences.
- A set of web sites have been developed by GSICS members, they are all accessible through the GSICS portal hosted by WMO: <http://gsics.wmo.int>. A wiki has been implemented to support collaborative work.
- Four products are now routinely available in the demonstration phase and will be moved to the operational status in due time, in accordance with the product acceptance procedure.

Priorities

The GSICS Executive Panel has currently defined the following priorities:

- To perform and deliver operational production of GSICS corrections, initially for infrared channels and thereafter for visible and microwave sensors;
- To consolidate the GSICS methodological basis and data management infrastructure, including collaborative data servers and unified web monitoring system; and
- To enhance user interaction, outreach, expand membership and partnerships.

Meetings

The Executive Panel holds a main annual meeting and an additional, short meeting, during the week of the CGMS plenary.

The two working groups are working mainly by correspondence, and web-based meetings (seven web meetings in 2010), sharing information through the GSICS wiki, and one annual joint meeting.

3. HIGHLIGHTS OF THE JOINT GDWG-GRWG IN DAEJEON

The GSICS Data Management Working Group (GDWG) and the GSICS Research Working Group (GRWG) met in Daejeon, Republic of Korea, from 22 to 25 April, partly as a joint session and partly in parallel breakout sessions. The main outcomes are highlighted below:

The GEO-LEO IR products are in the process of moving to operational phase.

The progress of studies on visible channel vicarious calibration was discussed in the sixth GRWG breakout session. It involved the following methods:

- DCC (Deep Convective Cloud)
- Ray matching method
- Liquid cloud/ model calculation
- Desert
- Moon
- Star
- Sunlint
- Rayleigh Scattering
- Cross calibration using LandSat and MODIS

One important step made at the meeting is that the developers of these methods agreed to provide the Algorithm Theoretical Baseline Document (ATBD) of their respective calibration method which can be implemented to each GSICS Production and Research Centre (GPRC) for monitoring and comparison. It is anticipated that the final scheme will combine several of these methods.

Traceability is essential to support applicability of the GSICS inter-calibration products. In this respect, the GRWG discussed the relevance of defining virtual Common Reference Channels (CRC) to facilitate the intercomparison of multispectral imagers having comparable channels. If this approach was implemented, GSICS would provide corrections to be applied to make a real channel comparable to such a virtual channel. The GRWG also discussed the possible use of such CRC for the generation of composite products from several geostationary imagers.

The GSICS Coordination Centre (GCC), all GPRC web sites, and the WMO GSICS portal were reviewed in the GDWG breakout session. The detailed implementation of netCDF file format, the contents of quality information and the development of metadata based on WMO Information System (WIS) guidelines were discussed.

4. CONCLUSION

Products from GEO-LEO inter-calibration in demonstration phase will move to pre-operation phase in 2011, followed by operational phase. The visible calibration shows a good progress with various studies performed, and there is a clear path towards operational. However, active participation and strengthened support from GSICS member are needed for the GRWG, and even more for the GDWG.

As GSICS results are being used for climate data records processing activities, such as the Sustained Coordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE-CM), international collaboration is essential to monitor, improve and harmonize data quality from environmental satellites.
