

GRWG Report

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On behalf of Tim Hewison

15 July 2013

Outline

- Status Updates – For Information only
 - GEO-LEO IR
 - GEO Solar
 - Lunar
 - Archive Re-Calibration Products
 - Special Issue
 - Instrument Event Logs
 - Calibration Change Alerts
 - Development of Guidelines
 - Recent & Future Meetings
- Issues requiring Exec Panel guidance
 - Chairing GRWG & Sub-Groups
 - Strategic Partnerships:
(CEOS: WGCV, IVOS & ACC, GPM X-CAL, Ocean Colour Science, WG_DGR)

GEO-LEO IR (1)

- Most of the GSICS Corrections for the infrared channels of current geostationary imagers are now in demonstration mode.
- NOAA and EUMETSAT products for the GOES and MSG series were promoted to pre-operational status in early 2013.
 - While these are mature products, they are subject to limitations - in particular the range of time over which they are valid.
- Many GEOs suffer from diurnal variations in the calibration - and in particular during the period around local midnight.
 - These are being addressed by the development of a method to transfer the inter-calibration reference over more of the diurnal cycle, initially using Aqua/AIRS to transfer the calibration from Metop-A/IASI.

GEO-LEO IR (2)

- GRWG have also been preparing a framework to allow the transfer our inter-calibration reference instrument from Metop-A/IASI to Metop-B/IASI by calculating "Delta Corrections", based on double-differences of the GSICS Corrections calculated using each independently.
 - Plan to include in Metop-B GSICS Corrections
 - To allow users to convert back to MetopA/IASI
- This is complemented by CNES' plans to perform comparisons of Metop-A/IASI and Metop-B/IASI by a number of different methods to account for the unavailability of simultaneous collocated observations due to the orbital configuration.

GEO Solar (1)

- Development work has continued to focus on inter-calibration for the channels of the current geostationary imagers in the reflected solar band.
- Outline ATBD was produced by Dave Doelling (NASA),
 - based on comparing statistical distributions of the reflectances of Deep Convective Clouds (DCCs) observed from the GEO imagers
 - and MODIS, as an inter-calibration reference instrument.
 - This is being implemented at EUMETSAT, NOAA & JMA
 - Reviewed in a series of Web Meetings, led by Dave Doelling
- NASA are preparing centralised processing of MODIS data
 - to generate statistics of the reference instrument,
 - which will be commonly used for all GEO imagers.

GEO Solar (2)

- Members of GRWG have also been involved in a review of the Saharan desert sites currently used as calibration reference targets.
- The spatial, temporal and spectral variability of different sites has been analysed to quantify the uncertainties associated with their use, and potentially to reduce this by refining the site selections.
 - This has included a dedicated workshop on the Libya #4 site, coordinated by IVOS.
- GRWG to investigate potential use of GOME/SCIAMACHY hyperspectral observations to validate models and/or as an inter-calibration reference for solar band channels.

GEO Solar (3)

- Rayleigh Scattering provides Pseudo-Invariant target
 - Over the ocean in clear skies, in light winds, with low aerosol load
 - Can be used as inter-calibration transfer target
 - Globally available at no cost
 - Low reflectance – complements DCC method
- ATBD originally developed for LEO vicarious calibration by Bertrand Fougnie (CNES)
- Now being modified to used to inter-calibrate GEO-LEO Vis
- Presented at Web Meeting 2013-07-03

Lunar

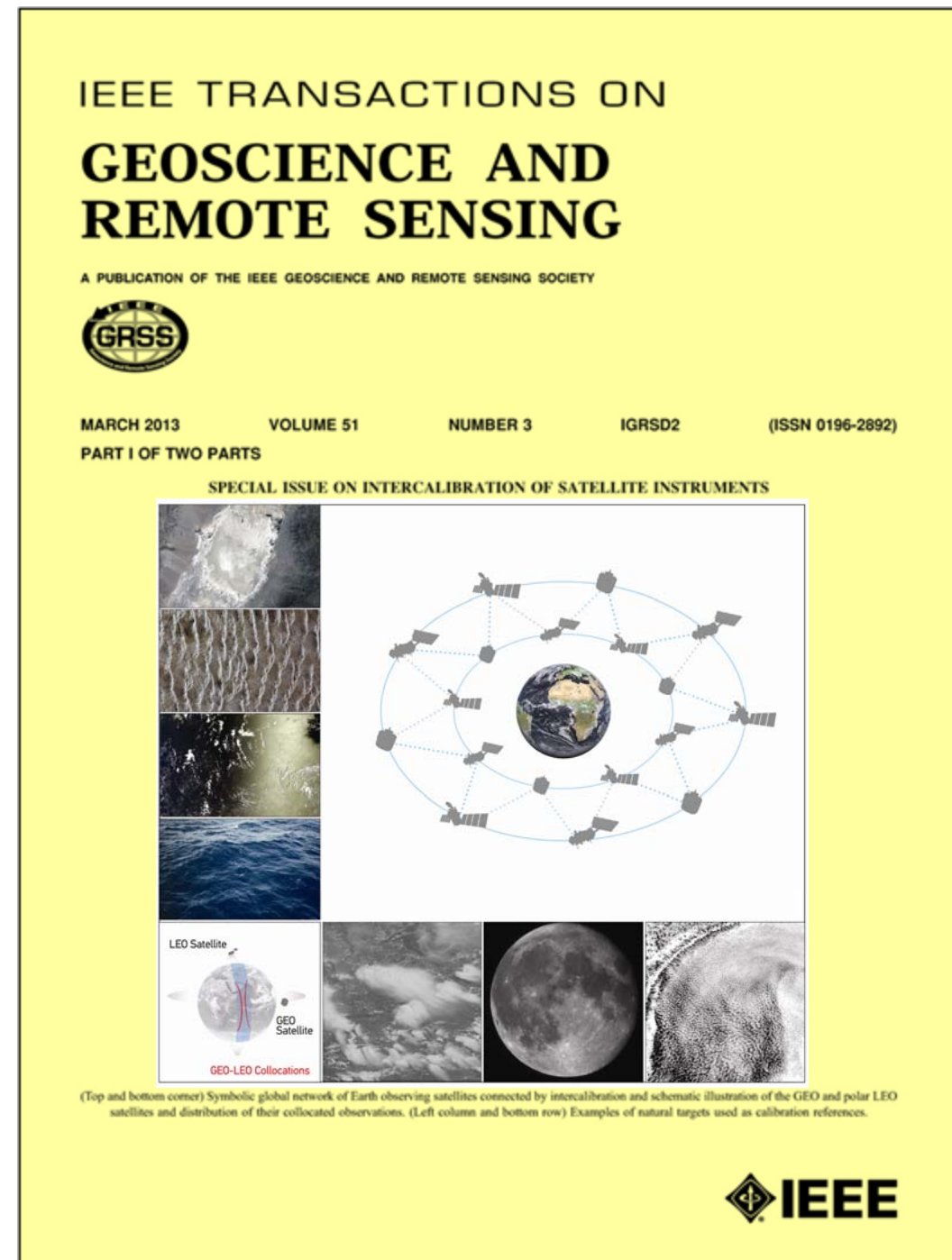
- Several GRWG members have been investigating the Moon
 - as a calibration transfer reference for Geostationary imagers channels in the reflected solar band
 - although it is also applicable to LEO instruments.
 - EUMETSAT and CNES found phase-dependent bias in ROLO.
- GRWG has encouraged USGS to set up an online facility to provide irradiance predictions from their ROLO model
 - customised for specific observations of various instruments,
 - accounting for their viewing geometry and spectral response.
- GRWG has encouraged NIST to consider tying the current lunar irradiance models to SI-traceable standards,
 - Would allow lunar observations to provide useful absolute calibration
 - (at present their application is practically limited to detecting calibration trends and inter-channel differences).

Archive Re-Calibration

- GRWG identified need for new class of inter-calibration product: to provide a consistent calibration for whole datasets from different satellite instruments
 - to generate Fundamental Climate Data Records.
- These *Archive Re-Calibration* products will complement existing products,
 - which have mostly focused on near real-time applications.
- Examples now in demonstration mode:
 - PATMOS-x product for AVHRR
 - (A)MSU inter-calibration products, developed at NOAA
- EUMETSAT are also developing inter-calibration products for the Meteosat archive, using various HIRS instruments as references.

Special Issue on Satellite Inter- Calibration

- IEEE Transactions on Geoscience and Remote Sensing
- On inter-calibration of satellite instruments
- 5 Guest GSICS/IVOS Editors
- 40 papers
 - From CAS, CMA, CNES, ESA, EUMETSAT, ISRO, JAXA, KMA, JMA, MIT, NASA, NOAA, SDSU, USGS, etc.
 - Covering AVHRR, AMSU, (A)ATSR, CLARREO, ETM+, FY-2 & -3B, GOES, HIRS, Hyperion, IASI, Jason-2/OSTM, MODIS, PROBA, SCAIMACHY, Sentinel-2, etc.
- Including 13 Open Access
 - Thanks to WMO funding
- Published [March 2013](#)



Calibration Event Logs – Brief Recap

1. Draft concept for a calibration event logging system → database providing info on:
 - Mission
 - Irregular Events
 - Processing Events
 - Data Outages
2. Contribution presented at CGMS meeting 40

Calibration Change Alerts

- At 2013 GSICS Users' Workshop: Request for new service:
- Alerts when instrument's calibration changes significantly
 - from GSICS Bias Monitoring
- Already defined in ATBD for GEO-LEO IR,
 - based on $3\text{-}\sigma$ departure from trend
- Discussed setting up GSICS Service at Web Meeting (11/06)
- Alerts to include:
 - Date/Time, Satellite/Instrument/Channel, Magnitude and Significance of Outlier wrt hard/soft limits, previous alerts, hyperlink to Bias monitoring, disclaimer
- Distributed by email, subscription-based service + archive
- EUMETSAT, NOAA & JMA currently investigating feasibility

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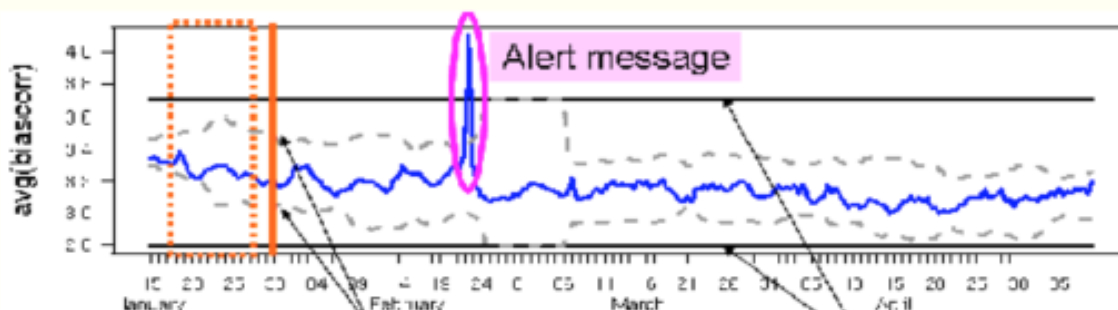
Satellite Data Automatic Checking

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An experimental automatic satellite data checking system has been implemented recently at ECMWF. It triggers the production of alarm messages if an anomaly is detected in the quality or the availability of the satellite data assimilated by the model.

Selected statistical parameters (number of observations, bias correction, and mean bias-corrected background and analysis departures) are checked against an expected range. An appropriate alert message (including a time series plot) is generated if statistics are outside the specified ranges. A [Screen Shot 2013-06-11 at 09.29.46.png](#) is assigned to each message depending on how far the statistics are from the expected range. Two kinds of ranges are used by the automatic checking: Soft and Hard limits. Soft limits are updated automatically using statistics from the last twenty days (extremes are excluded during this process). Hard limits are adjusted manually when required.



Soft limits (mean \pm 5 stdev of statistic to be checked, calculated from past statistics over a period of 20 days, ending 2 days earlier)

Hard limits (fixed)

Currently, the automatic checking is limited to data passing through the minimisation process (including VarBC passive data). It's being applied, twice a day, to the long cut-off 4D-VAR cycles (DCDA).

- [Operational Satellite Data Checking for 2013061012 DCDA](#)
- [Operational Satellite Data Checking for 2013061000 DCDA](#)

Developing New Guidelines

- GRWG plan to develop new Guideline documents starting 2013:
- How to Select a Reference Instrument
 - Define a score for each possible reference for each application
 - In a range of different criteria (spectral, spatial, temporal coverage, stability...)
 - Based on minimum requirements and uncertainty analysis
 - Allows objective decision of when to switch from one reference to another
- How to Define Spectral Band Adjustment Factors
 - Needed to convert radiances in comparisons of
 - instruments with similar, but not identical, SRFs
 - Potentially combining multiple channels
 - From Radiative Transfer Models and/or hyperspectral observations
 - Including uncertainty estimates
 - Could extend to recommend how to define Common Reference Channels
- Web Meetings on both topics planned

GRWG Web Meetings

Date	Group	Topics
2012-10-23	GRWG/GDWG -Roebeling/Jelenak	Instrument Event Log
2012-10-31	GRWG/GDWG - D. Doelling	Follow-up on DCC method
2012-11-28	GRWG	Desert Targets
2012-12-19	GRWG - T. Hewison	Moon and More Desert Targets
2013-01-29	GRWG/GDWG -Hewison/Jelenak	Preparation for GDWG & GRWG Meeting
2013-02-26	GRWG+GDWG - F. Yu	Preparation for Users' Workshop
2013-03-04/08	GRWG/GDWG	Annual GRWG+GDWG Meeting in Williamsburg, USA
2013-04-08	Users	2013 GSICS Users Workshop
2013-05-29	GRWG - D. Doelling	DCC Algorithm Application - Part I
2013-06-11	GRWG - T. Hewison	Calibration Change Alerts
2013-07-03	GRWG - B. Fougne	Rayleigh scattering ATBD

Date	Group	Topics
	GRWG - D. Doelling	DCC Algorithm Application - Part II
	GRWG - R.Roebeling	GSICS Requirements from SCOPE-CM Phase 2 Proposals
	GRWG - T. Hewison	Propose scoring scheme to select reference instrument
	GRWG - A. Heidinger	Sun glint algorithm update
	GRWG - D. Doelling	DCC Algorithm Application - Part III
	GRWG+GDWG - R. Roebeling	Event Logging
	GRWG+GDWG - T. Hewison	File format for Delta Corrections
	Microwave Subgroup	FY3/MWRI inter-calibration with AMSR-E and TMI - Tiger Hu
	GRWG - T. Hewison	Best Practice for Process of defining SBAF and uncertainties
2014-03-24/28	GRWG/GDWG	Annual GRWG+GDWG Meeting at EUMETSAT, Germany

Web Meeting Invitations sent to gsics-dev@google-groups.com
 Annual Meeting Invitations sent to [GSICS Contacts](#)
 User Workshop invitations sent to [GSICS User Messaging Service](#)

2014 GRWG+GDWG Meeting

Next annual GRWG+GDWG meeting:

- Tentative Dates: 24-28 March 2014
- Tentative Location: EUMETSAT
- Format:
 - Mon: 1 Day Mini Conference
 - Tues: Plenary – GPRC Reports and WG Briefs
 - Wed: GRWG+GDWG Breakouts
 - Thur: GRWG+GDWG Breakouts
 - Fri am: Plenary – wrap-up



EUMETSAT Headquarters, Darmstadt, Germany

- in the sunshine!

2014 GSICS Users' Workshop:

- Asia?

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GRWG Sub-Groups - Motivation

Issue: Increasing Expectations – Non-increasing Resource Support

- Following our initial success with GEO-LEO infrared and users' demand for further inter-calibration products,
- GSICS is aiming to expand to cover other instruments and other parts of the spectrum.
- This requires the development of multiple techniques appropriate for different spectral bands.
- It is difficult for one person to keep abreast of all the developments in each of these areas, let alone guide the development of future products.

Concept:

- Instead of vice-chairs, identify Chairs of Sub-Groups

Other Issues: Chairing GRWG

- GRWG chair shall continue to rotate with 3-year tenures with optional renewals,
 - the chairmanship being selected by the Chair of the Executive Panel,
 - upon recommendation from members of the GRWG.
 - In the absence of other volunteers, current chair offers to continue with rolling 1 year extensions
 - But **needs additional support** from member agencies
- GRWG defining Sub-Groups
 - And define a chair for each, seeking consensus agreement
- Sub-group chairs shall be selected with complementary fields of expertise
 - to lead the development of inter-calibration products
 - or review algorithms developed by 3rd parties
 - and help ensure GSICS principles, file naming and variables conventions are followed
 - for specific classes of instruments and/or applications.
- Sub-group chairs shall be responsible for
 - organising and chairing portions of agenda of annual GRWG meeting as well as web meetings,
 - monitoring actions related to the development of inter-calibration products in their field.
- Reporting progress to Exec Panel & Users' Workshops
 - could continue to be done through the GRWG chair, or by Sub-Group chairs as available.

Other Issues: Chairing Sub-Groups

- GRWG chair invited applications to chair sub-groups,
 - outlining proposed scope and working plan
 - to develop GSICS products for a specific application or spectral band
 - and send that to the GRWG Chair by 1 June 2013 (in time for Exec Panel meeting).

- Possible Sub-Groups include, but are not limited to:
 - a) Microwave (covering imagers and sounders)
 - this group already exists, but **needs a Chair** and review of membership
 - **members need to be encouraged to review GPAF for MSU/AMSU/SSU Demo Product**
 - b) Vis/NIR : GEO/LEO
 - c) IR: GEO/LEO – GRWG chair could chair, if replacement found
 - d) Ultra-violet channels/instruments
 - e) Archive Re-Calibration of historic instruments (FCDR generation) ?
 - f) Use of Synthetic observations for inter-calibration (NWP/RAOB+RTM) ?

Other Issues: Defining Sub-Groups Chairs

- Received one application for VIS/NIR:
 - Dave Doelling (NASA) to lead a Sub-Group on the Reflected Solar Band
 - with comprehensive plan
 - Propose: Accepting application, naming Dave as Chair of VIS/NIR Sub-Group
 - Need: Further support – ideally from other member agencies

- Received tentative offer for Microwave Sub-Group:
 - Isaac Moradi (University of Maryland)
 - 8 years of experience working on calibration and validation of MW instruments
 - “Some limitations” in terms of international trips mainly due to availability of funds.
 - “I guess GSICS does not have any fund to support the trips, right?”
 - “I may get some fund from NASA in 2014 that can be used for international trips”
 - Directly linked with NOAA through NOAA Cooperative Institute for Climate and Satellites
 - But not NOAA employee – is that an issue?

Other Issues: Strategic Partnerships

Invited GSICS presentations at several meetings

- CEOS:
 - @ET-SAT 8 meeting: Request for GSICS presentation at WGCV plenary
 - @ET-SAT 8 meeting: [NASA Satellite Calibration Interconsistency Studies](#)
 - @ACC meeting: interest in participating in UV Sub-Group
 - @IVOS meeting: identified need for greater cooperation IVOS-GSICS
 - **Invite Nigel Fox to future Executive Panel meeting?**
- GPM X-CAL:
 - Some interest in submitting products to GPPA (not central GPM products)
 - Some members interested in participating in Microwave Sub-Group
- Ocean Colour Science:
 - Community felt too early to form Sub-Group on Ocean Colour
 - Scheduled series of web meeting, will invite GRWG
- Working Group on Dataset Generation:
 - Interest in inter-calibration products for AVHRR – **Who will do AVHRR-IASI?**
 - Coordination with NWP centres in Bias Monitoring & calibration change alerts