GLOBAL SPACE-BASED INTER-CALIBRATION SYSTEM (GSICS)

Minutes of 2013 Meeting of GSICS Data and Research Working Groups

Version: 2013-08-02

Attendees of 2013 Meeting of GSICS Data and Research Working Groups
(Photo by George Homich, NASA Langley Research Center)

Executive Summary

For the first time this year, a mini conference was held the day before meeting to give the latest updates on activities of interest to GSICS. This was dominated by results from the cal/val of instruments on Suomi/NPP and the host's (NASA) development of the CLARREO concept, which is particularly important to GSICS as it would provide a climate quality inter-calibration reference instrument, which is directly traceable to SI standards.

The Research Working Group initially focused on the steps necessary to progress to operational status the current GSICS products to inter-calibrate the IR channels of current geostationary imagers (GEO-LEO IR) to IASI, and discussed ways to extend these products to more GEOs and transfer from one reference instrument to another. The group then turned its attention to the inter-calibration of GEO channels in the reflected solar band. We planned a series of milestones to develop prototype GSICS products, initially using deep convective clouds to transfer the calibration from the MODIS reference. This method will then be extended to apply to LEO instruments and combined with results using clear ocean targets (Rayleigh scattering) and/or lunar observations to cover the monitored instruments' full dynamic range.

Tuesday (2013-03-05)

Welcome and Guidance from WMO - Jérôme Lafeuille (WMO)

Jerome first reported the out-comings of GSICS EP 13th meeting. It was agreed that GRWG should distribute lead responsibilities according to technical areas. Mr. Ashok SHARMA from IMD was candidate vice-Chair in EP. A statement on collaboration with GRUAN was drafted to highlight the mutual benefit of coordinated activities in specific area; the draft needs to be finalized. The next EP meeting will be held in Tokyo, Japan on 15-16 July 2013.

Jerome also introduced the WMO strategic framework for intercalibration activities, including the WMO Integrated Global Observing System (WIGOS), the conclusions of the Commission for Basic Systems (CBS-XV), the Global Framework for Climate Services (GFCS) and the Architecture for Climate Monitoring from Space. Jerome concluded that GSICS is –more than ever – an important building block of the space-based observing system and of these related major undertakings. It is recognized by WMO CBS, who recalled the need to bring products to operational stage and make them routinely available like the « operational » calibration. He also thanked all GSICS member organizations, and all experts involved in the work of GSICS through GDWG and GRWG.

In the discussion that followed, Jerome stated that CBS endorsed an updated specification of the space-based observing system, which requires on-orbit reference instruments to support routine inter-calibration. He clarified that the Architecture for Climate Monitoring from Space is a framework for future climate missions, as well as for near-real-time monitoring of current situation compared with climate normals, and re-analysis of historic data. The issue was also raised of whether raw observational data should be transmitted and archived at its lowest level. The group supported this approach, in accordance with the GCOS Monitoring Principles (http://www.wmo.int/pages/prog/gcos/documents/GCOS_Climate_Monitoring_Principles.pdf).

Executive Panel report by Mitch Goldberg (NOAA)

GSICS's Mission has been updated to provide sustained calibration and validation of satellite observation, by inter-calibrating critical components of global observing system to climate quality benchmark observations and/or reference sites (also for issued calibration for weather study), and to provide corrected observations and/or correction algorithms to the users community for current and historical data.

High level priorities (current activities stage/suggestion) included:

- GEO-LEO IR correction products
- Corrections for heritage instruments – review methodology
- Correction for visible channels
- MW activities
- Consolidation of infrastructure and general methodology
- Enhancing interaction with users
- Expanding membership and partnerships

Important measures included:

- Event log/shared leadership with GRWG/guideline for the design of future satellite/CGMS membership
- NOAA/ICVS-like instrument monitoring

Mitch reported that ROSHYDROMET promised to open the data of ELECTRO-L, MSU-GS instrument to fully support GSICS activities. Mitch also showed some theoretical inter-calibration works of MSG/SEVIRI vs. ELECTOR-L/GS instruments.

Joint Action: All GPRCs to consider inviting members of IMD/ROSH as visiting scientists to help implement GEO-LEO IR ATBD and communicate possibilities to EP Chair by 1 July 2013.

Joint Action: EP Chair to contact IMD/ROSH and invite as visiting scientist to host institutions by CGMS in July 2013.

GRWG report by Tim Hewison (EUMETSAT)

Tim congratulated the group on its achievements in the last year, which included

- GSICS Corrections for two GEO-LEO IR are now pre-operational and JMA will join soon.
- Progress on GEO-LEO vis – DCC/lunar & other methods
- Publication of a special issue of IEEE-TGRS on the inter-calibration of satellite instruments

He saw the aim of this GRWG meeting being to focus on GSICS products: doc/roadmap of products/develop of new products.

In the discussion that followed, the group recognised the importance of NIST's planned activity to tie lunar irradiance models to an absolute scale.

Re-structuring GRWG – Suggestion for changing the structure of the Research Working Group by defining Sub-Groups in order to increase efficiency and provide expert guidance to steer and monitor the development of new GSICS products in different specialist areas. It was proposed that candidates to chair the sub-group draft outline terms of reference and planned activities to define the scope of the sub-groups.

Tentative Sub-groups:

1. Microwave (covering imagers and sounders)
2. Reflected solar bands: GEO/LEO + traceability (LEO/LEO)
3. Infra-red: GEO/LEO + traceability (LEO/LEO)
4. Historical instrument recalibration

Joint Action: GRWG Chair to outline scope and expectations for sub-group chairs and circulate to GRWG by 1 May 2013, asking for 1-2 page proposal to chair a sub-group, outlining objectives, planning, and deliverables by 1 June 2013.

Joint Action: The GPRC members responsible for the development of new products to communicate requirements to archive data to GDWG chair during prototyping phase.

Officially, chairmanship of GRWG and GDWG is for 3 year period, with optional renewal. Tim Hewison and Aleksandar Jelenak have held these respective positions for 3 years now. If anyone is interested in taking over

these positions, please let us know. If suitable candidates are found the current chairs have offered to support their replacements with a phased hand-over period extending to the next annual meeting.

GDWG Report - Aleksandar Jelenak (NOAA)

Aleksandar welcomed new member from JMA and provided an update on ongoing activities, which highlighted the groups achievements of the last year:

- User messaging service update
- Product catalog with searching function
- Development of prototype GSICS Bias Monitoring Tool by EUMETSAT

Joint Recommendation: EP to recognize EUMETSAT for providing the resources and Peter Miu for the leadership in developing the bias monitoring plotting web application.

Breakout session highlights

- Common THREDDS config. Require GRWG give more information on the products to be finished in this annual meeting.
- New product data
- Instr. Event logging – NOAA/NASA draft ISO metadata standard revision proposal / NOAA has no resource for the implementation/EUMETSAT is recommended.

Joint Recommendation: EUMETSAT is recommended to implement the event logging (EUMETSAT).

- NetCDF metadata validation tool
- Official documents

GCC Report

Joint Recommendation: Fangfang Yu (NOAA) to set up joint web meetings/telecons with GSICS and QA4EO – they should not expect us to be able to respond to every request from them

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Special issue

Joint Action: Tim to draft the announcement of special issue and Aleksandar to send to GUMS, by 1 April 2013, thanking Chander, maybe including ToC and link to Special Issue

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2012 Users Workshop

Following repeated requests from the GSICS Users' Workshops, GRWG is to consider recommending methodology to allow users to convert observations from different instruments to *Common Reference Channels*. However, GSICS will not generate products to do this ourselves, as it was previously agreed that this did not adhere to GSICS Principles, and that users should be encouraged to use the most accurate available SRF for each instrument.

Joint Action: GRWG Chair to ask for volunteer to lead the development of suitable guidelines to define Common Reference Channels, based on the analysis performed for the Spectral Band Adjustment Factors.

Joint Action: Mitch to discuss with CGMS the recommendation for future instruments to include a selection of standard channels and ask GSICS to review.

Check with Mitch: Mitch Goldberg: to check within CEOS to recommend a methodology for uses to use a common reference channel.

EUMETSAT GSICS Collaboration Servers Status

Joint Recommendation: GCC to consider adding link to allow users feedback on the GCC webpage

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NASA GPRC - CLARREO status report (by Bruce Wielicki)

CLARREO is seen as one of the corner stones of climate observations, and has been endorsed by GSICS as critical to tie satellite to an absolute SI scale by inter-calibration. Bruce showed that compared to current instruments CLARREO will be able to detect climate trends about 20 – 50 years earlier.

In order to reduce costs, there is a proposal to mount CLARREO on the International Space Station.

The Multi-Instrument Inter-Calibration (MIIC) framework was described by C. Lukashin during the Mini Conference before the meeting. This is currently work-in-progress but will provide a valuable tool to compare collocated observations from pairs of sensors. It is hoped to make this available to GSICS members to enhance cooperation with the CLARREO project.

Joint Action: NASA to provide CLARREO papers to GCC for distribution on the GSICS wiki (Dave D. & Bruce W)

CMA GPRC (by X. Hu)

Latest progress in CMA on the FY-2 and FY-3 inter-calibrations. The GSICS GEO-LEO IR inter-calibrations were implemented as the operational IR calibration for FY-2D and FY-2E in 2012 and is used to monitor the operational calibration accuracy of FY-2F which uses the lunar data for the IR operational calibration. A self-emission model based on the onboard BB and collocated GEO-LEO data was developed for the onboard calibration of FY-2E IR channels.

FY-3B IR calibration accuracy was evaluated with the IASI data. Results show that most IR band Tb difference to IASI is less than 1K.

Multisite observations and corresponding simulated data were implemented for the monitoring of FY-3B MERSI solar reflective channels. The DCC method result is comparable with those of multisite one.

Instrument performance Monitoring (IPM) for FY satellites is also under development.

CNES Report (by B. Fougnie)

Cross-calibration over desert in 2012-2013, including:

- GEOS-IVOS working group 4 (WG4) activities and conclusion – general consistency between methods within 2-3% after spectral correction for selected instruments/sites
- CEOS-IVOS Libya-4 workshop – cross calibration within 2-3%, for long-term trend better than 2%, absolute calibration accuracy is 5%. Difficult in blue channel
- Desert site – paper in TGRS special issue, ongoing effort of characterization of the BRDF of Libya-4 site

SADE dataset opening thru scientific mission website, new sensor added.

- http://smsc.cnes.fr/CALIBRATION/
- Password mandatory for the "SADE data" page

EUMETSAT report (S. Wagner)

Sebastien reported progress made by EUMETSAT during 2012 and results from the inter-calibration support provided during the commissioning of Metop-B and MSG-3 and a timeline for the development of inter-calibration products, which has already been taken as an example by other GPRCs.

Joint Recommendation: EUMETSAT to consider moving one of MSG over Indian ocean before 2016.

Outstanding actions

- **Action update: GRWG06_18 report on the documentation the difference between IASI-A and IASI-B before July 2013 (action)**

JMA report (M. Takahashi)

JMA's GSICS GEO-LEO IR product is on the way toward the pre-operational phase. Some issues were identified to comply with the netCDF name conventions and now they just need to combine RAC files and complete the uncertainty analysis.

Vicarious calibration for the visible channel using RTM over ocean/land/cloud/dcc was reported. JMA plans to expand the vicarious calibration method to the pre-MODIS era and the NIR channels for Himawari-8 and -9, the next generation of JMA's GEO satellite. Himawari-8 will be launched in 2014 and plans to be in operation in 2015. Himawari-9 will be launched in 2016. The AHI SRF and samples of simulated AHI data are available online at AHI SRF:
http://mscweb.kishou.go.jp/himawari89/space_segment/spsg_ahi.html

and
http://mscweb.kishou.go.jp/himawari89/space_segment/spsg_ahi_proxy.html.

Masaya also reported on the action EP-12.05 (to consider the correction coefficients on L1B data) that this is difficult to implement at L1B data, but is under consideration for H-8/9.

KMA report (by S. Na)

Sunmi reported on GSICS activity of KMA. This included the implementation of the GEO-LEO IR algorithm for COMS, which showed Tb biases of <1K, and the vicarious calibration of the visible channel with moon/desert/dcc/water cloud/ocean. KMA is also developing online GSICS bias monitoring. Sunmi also demonstrated the benefit of their inter-calibration for COMS' SST retrievals, when validated with buoy observations. The corrected radiance significantly reduces the bias to buoys SST with reduced RMSE.

Joint Recommendation: KMA to consider distributing details on the SST study (on wiki page) as a case study showing impact of GSICS Correction.

NOAA GPRC report (by F. Yu)

Fred reported that NOAA's GSICS Correction for GOES13/15-IASI now in pre-operational status and retro-processing is underway at U Wisc. NOAA's investigations so far suggest that for GOES-W there are not sufficient DCCs, however, the DCC method for GOES-East works fine. GOES-15/Sounder calibration anomaly in LW channels was detected by GEO-GEO inter-comparison. And the GOES/Imager band-to-band co-registration error follows diurnal cycle in E-W direction. GOES-AIRS/CrIS/IASI double-differencing – bias within 0.2K. The double difference between CrIS/AIRS didn't show significant day/night calibration difference.

Outstanding Actions: NOAA cannot incl NRT in L1B data (nor can GOES-R). Another outstanding action to provide quality flags for AIRS channels is still needed, as these can change – esp important for gap-filling.

GSICS bias monitoring plotting tool (by P. Miu)

Plotting tool reads Re-Analysis Correction data from GSICS Servers and dynamically generates plots of bias time series. For the GEO-LEO IR products, these are displayed in brightness temperatures, after being converted from radiances using functions and coefficients that are included in the metadata of the netCDF file. Currently the tool is available on EUMETSAT's validation server, but it is planned to be rolled out operationally soon and can be offered for installation on other servers. There was a discussion on what enhancements are needed for this tool on Wednesday.

Event logs (by R. Roebeling)

Achievements

- Assessment of Eumetsat's event logging systems; high-level logging items identification; generate the general concept – uniform calibration event logging system ; virtual hierarchical design;
- Main categories include mission information, irregular events, processing events and data outages
- Generate event type list – event database
- Requires common standard and procedures to improve traceability and uniformity cross space agencies.
- Need additional information to complete the database, mined from historical data.

Mitch Goldberg demonstrated some of the event logging information of NOAA satellites can be found at http://www.oso.noaa.gov/poesstatus/. This website is very high level and only reports events that really stick out.

Action: Rob Roebeling to consider using this high level concept to illustrate how the event logging WG could start with a simple concept acceptable for all space agencies.

Wednesday (2013-03-06) – GRWG Session

GSICS Contribution to improve FY-2D/2E operational calibration accuracy (N. Xu)

CMA used the GL correction as operational calibration for FY-2D/2E since 2012/Jan. delivered once per week.

- Adjusted the collocation criteria (time difference < 10 minutes, adding the spatial uniformity check), as the result, improved the regression correlation.
- Smoothing using 7 days sliding regression method for the daytime data for water vapor channel
- Non-linear regression for Ch10.8um. (prelaunch vacuum measurements) to improve the correction accuracy for the cold scenes for FY-2D. Yet FY-2E nonlinear issue is improved.
- Time-series of Tb bias to AIRS improved significantly with the GL correction implementation. The Tb bias variation over the eclipse season also greatly reduced.
- The result effectively improves the Typhoon monitoring.

Recommendation: CMA to consider using independent calibration method (e.g. MODIS) to validate the GSICS operational calibration

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Feedback to GDWG: Need to include definition of formulae to apply GSICS Correction and propagation of uncertainty in global attributes of netCDF files to allow for flexibility, such as addition of non-linear coefficients. If these formulae are not present, plotting tools should default to built-in formula

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Calibration of SEVIRI/MSG2 (reflective channel) (B. Fougnie)

Synergic calibration of desert, Rayleigh, sunglint, DCC, Dome-C, and Moon were reported based on data from the SADE(database) and MUSCLE(toolbox).

Multiple calibration methods: Rayleigh, desert, sun-glint, Antarctica, Clouds, moon

- Methods implement is wavelength dependent.

Cross-calibration over desert sites

- Cloud screening is critical, used SMOL cloud mask; MUSCLE cross-calibration with MODIS/AQUA, MERIS, PARASOL, VGT2, work is still ongoing. Preliminary results on 2 sites Algeria-3 and Libya-4
- Cross-calibration loop – geometrical matching and spectral interpolation are two important steps to predict the observed reflectance
- Using MERIS as reference, SEVIRI VIS06/08 stable, no significant trending; SEVIRI vs. PARASOL = good matchup to investigate the azimuth impact.
- Archiving data

Calibration over Rayleigh Scattering – absolute calibration

- Applicable for VIS06 band, from 400-650nm
- 6 recommended oceanic sites
- Not sensitive to viewing zenith angle, latitude, yet sensitive to scattering angle >160^{o} (error in backscattering and quantization from band vis08 due to very small signal)

Sunglint – inter-calibration for VIS and SWIR band.

- Successfully used for VGT/PARASOL/MERIS sensors
- Slightly linear regression for longitude and vzn at VIS08 and NIR16

Synergy calibration over SEVIRI/MSG2 - ongoing

Recommendation: CNES to consider using C6 Aqua/MODIS data for the inter-calibration

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JMA uncertainty analysis (M. Takahashi)

Systematic error – sensitivity analysis on temporal mismatch, longitudinal and latitudinal mismatches are done.

Toward pre-operational phase

Action: JMA to complete Uncertainty analysis for MTSAT-IASI products by analyzing random errors contribution from spatial and temporal variability at least and combine these with the currently analysed systematic uncertainty. That will be sufficient for promotion to pre-operational status.

Recommendation: JMA to consider analysis of gap filling method used with AIRS data in future revision.

Ice contamination model (T. Hewison)

- 2µm of ice MSG2 Ch13.4um effectively shifted SRF ~2cm-1.
- Interference theory is validated at Ch3.9um
- Due to transmittance through loss of Dielectric layer

Spectral Band Adjustment Factors (Patrick Minnis)

Pat's group is planning to re-calibrate their entire series of satellite observations by calculating pseudo-radiances from SCIAMACHY (IASI, CRIS, AIRS). For infrared the re-calibration is done in brightness temperature space. Question is what differences do we expect when doing the same approach in radiance space. The method proves to be very accurate. Largest differences occur for the 3.8 channels, although corrections in IR for the modern satellites are small (< 0.5%), for the heritage satellites the errors are larger (~1.5 %). SBAF corrections for modern IR channel small; satellite to satellite transfer errors larger than SBAF corrections; Errors can probably be reduced by taking longer datasets;

Suggestion using RTM/GOME for long-term reference to validate the results.

Recommendation: NASA to communicate uncertainty in SBAFs as part of a potential new GSICS Product at 1st DCC web meeting.

Discussion (T. Hewison)

How to select a best available reference instrument? The following factors were considered as important:

- Spectral coverage (mandatory)
- Spectral resolution
- Orbital coverage
- Diurnal coverage
- Navigation accuracy
- Geometric coverage (angle)
- Spatial sampling (field of view & swath)
- Polarization knowledge & control
- Long lifetime (instrument + series) – sensitivity through climate change trends?
- Radiometric dynamic range
- Radiometric resolution
- Demonstrable Radiometric stability (after operational & reprocessing corrections)
    - Calibration consistency with others
- Calibration traceability
- Data availability (mandatory)

The discussion then turned to how these factors can be quantified. It was suggested that an error budget for each application would allow the impact of changing each variable to be ascertained - even the operational lifetime, in the case of generating FCDRs from multiple instruments. However, it was recognised that this is a relatively cumbersome process. So it was suggested that we could review the existing uncertainty assessment for the GEO-LEO IR products to assign a weighting to each factor, based on the sensitivity of the resulting GSICS Correction to

the likely range of each variable. Each potential reference instrument could then be scored in comparison to IASI and the scores combined in some way, as yet to be determined.

Action: Tim Hewison to draft proposal for a simple scoring scheme based on the uncertainty analysis for GEO-LEO IR and review this at a web meeting by 1 March 2014.

The discussion continued to address developing other GEO-LEO IR GSICS products and progressing these to operational status. This generated the following outcomes:

Recommendation: KMA to consider producing GSICS Corrections for COMS and submitting to the GPPA.

Recommendation: CMA to consider whether it is suitable to generate GSICS GEO-LEO IR product for FY-2F and submit to GPPA.

Recommendation: EUMETSAT to consider performing a decontamination on Meteosat-7/MVIRI to allow impact of ice contamination to be quantified by inter-calibration against Metop/IASI.

Action: NOAA & EUMETSAT to analyse GEO-GEO difference after applying the GEO-LEO correction to quantify the diurnal calibration uncertainty before promotion to Operational status (target 1 September 2013).

Action: GRWG Chair to set up web meeting to define Best Practice for Process of defining SBAF and uncertainties by 1 June 2013.

Requests of Bias monitoring tool for reflective channels – correction coefficients, all the parameters/uncertainty to determine the correction coefficients; add the reflectance<->radiance conversion coefficients at the global attribute.

Decision: Bias Monitoring Tool is not a product; The GRWG expressed a desire for the tool to include daily results with rotating 30 days of intermediate collocation data.

Action: EUMETSAT to propose solution based on modification of plotting tool and server structure and content to allow this daily results to be displayed by 1 Sept 2013.

Action: Aleksandar Jelenak to add column to GSICS Product Catalog for Visualisation with links to Bias Monitoring by 1 April 2013.

Metop IASI/CrIS/AIRS inter-comparisons (D. Jouglet)

Radiometric inter-comparison

- SNO (20min time diff, 300km*300km area; 33 broad pseudo-bands; delta-T = (Liasi-Lairs)@280K;
    - delta-T over 5 years <0.1K (AIRS is slightly warmer than IASI); no seasonal variation; jump of ~0.05K @1500cm-1; small trend of scene dependent Tb bias.
    - IASI-A/AIIASI-B/AIRS inter-comparison; biases <0.1K, same patterns
    - IASI-A/CrIS vs. IASI-B/CrIS; bias <0.2K (CrIS is warmer).
- IASI-A/IASI-B – over stable scenes;
    - Direct IASI-A/IASI-B bias < 0.1K

- Double difference comparison thru AIRS and CrIS: bias <0.1K; confirmation of the direct comparison

To conclude, it was shown that IASI-A and IASI-B very close (bias < 0.1 K), that both IASI and AIRS appear very stable in time (2007 – 2012) and that IASI is proven to be a reliable reference.

Korah Saha on MICROS updates

Radiometric consistency between AVHRR, MODIS, and VIIRS in SST bands: Add MODIS, VIIR, and Metop-B AVHRR; 4 AVHRRs (N-16, 18, 19 and Metop-A) VIIRS, MODIS/Terra consistent to within 0.1K; Terra/MODIS and Aqua/MODIS consistent ~-.3K. For IR37, the T/A MODIS cross-platform is most likely due to the inaccurate CRTM MODIS coefficients.

Update of MICROS double differences show the update of VIIRS re-calibration and CRTM version update, and N16 out of family performance in early 2012; for metop-B/AVHRR@ch11um performance is out of family, needed to tune the coefficients in crtm v2.1.

The GRWG would also be interested in evaluating the NWP method of LEO-LEO inter-calibration by comparing double-differences of NWP bias monitoring against direct comparisons.

Recommendation: MICROS team to consider comparing results from MICROS double differencing of a pair of satellite instruments with another group's direct comparison of the same and report to GRWG.

Migrating IASI/A to Metop-B (Tim Hewison)
Tim reviewed the concept of delta correction and discussed how to implement it.

Time-series of standard biases (met9 – IASI/B) – (met9 – IASI/A) showed Tb difference at standard scene ~0.K, and differences <1K for all channels @220K. Neither difference is significant given the uncertainty on the GSICS Corrections (~0.01K and ~1K, for standard and 220K scenes, respectively). Tim discussed the challenge of propagation of covariances for the delta correction.

Recommendation: Tim Hewison to consider generating covariance statistics empirically from a longer time series of double differencing results.

Inter-Satellite Differences of HIRS long-wave channels (L. Shi)

Lei analyzed HIRS channel differences and showed that the inter-satellite differences are for many of the tropospheric temperature sounding channels a function of observed vertical lapse rate. For channel 4, it was recommended that the inter-calibration difference be modelled by linear regression. While many of the channels also vary with respect to channel brightness temperatures, this is not the case for channel 4. Satellite differences are partly explained by the vertical lapse rate of the atmospheric profile. If the lapse rate is high, the sensitivity to shifts in the SRF increases.

Inter-comparison activities @LMD/EUMETSAT/LARMOS/CNES (D. Jouglet)

Denis discussed the processing and validation of l1 and l2 satellite data combining forward and inverse RTM, which is considered to be within the frame of GSICS, as it uses inter-calibration and stand-alone methods to identify which instrument deviates from the others.

The ARSA radiosonde database has been elaborated in LMD so that is suitable for inverse RTM and validation of L1B and L2B data. Some early results of stand-alone + inter-calibration approach are very encouraging in investigating the radiance performance.

Inter-comparison of IASI-A and IASI-B spectra based on the radiance monitoring within Operations at EUMETSAT, result show that IASI-A and B radiometric calibrations are very close (~0.1K). They also found IASI-A/HIRS-A vs. ISI-B.HIRS are very close for Ch8 (~0.15K), and IASI-A vs. IASI-B thru HIRS is also very small.

Comparisons of IASI and GOSAT show GOSAT has now been corrected well.

IASI/AVHRR inter-calibration. Discrepancy between IASI-B vs. AVHRR Ch4 may be attributed to AVHRR because the non-linearity in IASI-B is constant over its B1 band and lower than 0.1K @ 293K, while IASI-B/AVHRR Ch5 does not display the same feature as IASI/AVHRR Ch4. The observed 0.2K variation of IASI/AVHRR bias with scan angle is not observed at IASI/IASI inter-calibration, so it is attributed to AVHRR scan mirror polarization.

GRWG + GDWG group discussion

The outcome on the discussion on LEO-LEO IR products was to initially concentrate on plans to develop delta corrections for existing GEO-LEO IR products to migrate from Metop-A/IASI to Metop-B/IASI, by defining the double difference against the GEO imagers.

Decision: It was agreed that delta corrections of this type are not independent GSICS Products, as they are specific to the monitored instrument. As such, they do not need to complete a full new GPPA – only a supplement will be necessary for them to be accepted as part of their associated GSICS Correction.

Post-meeting note: The delta corrections could be distributed as part of the netCDF files containing the GSICS Correction using additional variables to allow users to convert directly back to the common reference. E.g. We could include delta corrections from MetopB/IASI to MetopA/IASI in correction files for GOES-15/Imager to MetopB/IASI. That way we can trace everything back to MetopA/IASI - and we don't need to change anything we already have.

Action: Tim Hewison to draft example of netCDF file incorporating the delta correction to convert from MetopB/IASI to MetopA/IASI and distribute to GRWG+GDWG by 1 March 2014.

Further discussion continued to address the question of what combination of RSB calibration methods is expected to be precise and applicable to all GEO satellites? It was agreed that it is important to cover the full dynamic range of RSB channels' reflectance, which will require a combination of methods (not just DCC). For other products, the group encouraged developers to submit one product for each method in demo version, allowing users to evaluate each method. The intention being to come to one common method finally in the operational phase.

Action: Dave Doelling to define an appropriate vocabulary to describe the level for the maturity of products based on combination of methods by 1 March 2014.

Decision: During the development of products for the reflected solar band channels, we aim to generate demonstration products based on different methods (or combinations of methods) and provide advice to users on the limitations of each, following the example of CNES. These methods may then be combined into further products, based on the results of their evaluation in demonstration phase.

SCOPE-CM: inter-calibration projects (R. Roebeling)

SCOPE-CM coordinates activities that anticipate the generation of common climate datasets or increase the maturity of existing climate datasets. SCOPE-CM projects are inter-space agency activities, that are occasionally supported by national metrological offices and/or research centres. These projects are carried out on best practices, with in some cases third party funding as additional work resource.

The objective of SCOPE-CM is to advance on the sustained generation of Climate Data Records (CDRs) from satellite data, benefits for space agencies to improve their capability to service the society. SCOPE-CM applies the maturity matrix (scale from 1 to 6) to evaluate the CDR maturity, and aims to improve the maturity of CDRs that are part of SCOPE-CM projects.

Three projects related to inter-calibration, IOGEO, AVHRR FCDR, ISCCP and RO-CLIM are currently undergoing, yet some constrains of the inter-calibration projected are recognized.

Recalibrate time-series of MFG and MSG historical channels (R. Roebeling)

Rob's presentation outlined EUMETSATs plans to generate FCDRs from passive imager radiances in VIS, NIR, IR, and WV. The work is embedded in a SCOPE-CM activity. EUMETSAT have developed Spectral Band Adjustment Factors for WV and 11um channels using ECMWF profiles and RTTOV. They also found small difference in the HIRS L1b radiances processed by 3 different institutes, the root causes of which are being identified.

The time line for IR and WV is to generate FCDRs by ~2016 and for VIS and NIR by 2018. These include the following anticipated activities which involve GSICS partners:

- To resolve differences between the NOAA and EUMETSAT HIRS level1b data;
- To decide upon an approach for the IR/WV channels including:
  -> applying double-difference method to back process the historical data.
- To investigate potential of using aging models for the VIS/NIR channels;
- To define a combined approach for the VIS/NIR channels for SCOPE-CM that:
  -> exploits the potential of spectral aging method for the visible channels on MFG (I. Decoster)
  -> covers the full reflectance ranges by combining the strength of different individual methods (e.g. using DCCs, ocean & deserts targets, or ray-matching methods).

- To contribute to the inter-calibration activities of SCOPE-CM

Variogram Stability Analysis (T. Hewison)

Tim demonstrated that the instrument calibration drift can be quantified from the inter-calibration results wrt IASI using variogram analysis. The temporal variograms for Metop-A/HIRS Ch12 & Ch8 showed that Metop-A/HIRS may serve as stable inter-calibration reference for WV+IR channels as the contribution from its calibration drift to the overall uncertainty budget is negligible compared to the SBAF.

This led to a discussion on how the HIRS instruments operated on older NOAA platforms compared with that on Metop-A in terms of calibration drift, and whether known changes to instruments SRFs should be handled separately, or included in the empirical correction function provide by satellite inter-calibration.

Action: Fred Wu to contact HIRS instrument scientist (Changyong Cao) for the question of quantifying the stability of the calibration of HIRS on previous missions and report to GRWG by 1 April.

Action: GRWG Chair to invite I. Decoster to next GSICS annual meeting (GRWG Chair) to report on Spectral Aging model.

Wednesday (2013-03-06) - GDWG Breakout Session Meeting Minutes

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Introduction and Breakout Session Agenda

Aleksandar Jelenak (NOAA) opened up the GDWG breakout session. He introduced the agenda items for the two day session and briefly explained the expected high level outcomes. The agenda was accepted without any changes.

Xiuqing Hu (CMA) reported that there may be changes to the official CMA representatives on GDWG and that he will confirm later and inform the WMO if needed.

GPRC Website Review

NOAA GPRC

Action: NOAA to fix the extra GSICS banner image showing at the right side.

Action: NOAA to remove port 8080 from all the NOAA THREDDS server links.

Action: NOAA to add KMA GPRC website link with all the other GPRC websites.

Action: NOAA to investigate and, if possible, correct the product performance monitoring plots, which have not updated since Sep 2010.

Action: EUMETSAT (lead) + GDWG members to work with EUMETSAT to use their bias plotting tool for GPRC product monitoring plots.

Discussion led to the agreement on the minimal common content available on GPRC websites:

- Correct GSICS logo linking to the WMO GSICS portal (gsics.wmo.int)
- Links to other GPRC websites
- Pages with bias monitoring graphs for GPRC products (all if possible)
- Links to where the GPRC data can be downloaded (preferably THREDDS data servers)
- GPRC website contact information
- Links to GPRC official documents (ATBDs, reports, etc.)
- The link to the GSICS product catalog.
- The link to the GCC home page.

Action: NOAA to update the links under "Documents" to include all that is publicly available.

Action: NOAA to add the link to the GSICS product catalog under "Links".

CMA GPRC Website

The GPRC website URL was determined to be http://giscs.nsmc.cma.gov.cn. There is a spelling mistake in the server name "giscs" instead of "gsics". The CMA representative reported it will be corrected.

Action: CMA is invited to make the modifications according to the minimal content rules (see above).

Action CMA: The "Data" link on the CMA GPRC website points to a private THREDDS server (http://10.0.65.110:8080/thredds). CMA is advised not to use port 8080 but instead port 80 for this server to avoid public access problems. As an example, the EUMETSAT plotting tool will not work with THREDDS servers on any port other than 80.

Action: CMA to remove the old GSICS logo (to the left from the NSMC logo) in the banner image of the CMA GPRC website.

EUMETSAT GPRC Website

Action: EUMETSAT to add the link to the WMO GSICS portal to the GSICS logo.

Action: EUMETSAT to add the links to other GPRC websites.

Action: EUMETSAT to add the link to the GSICS product catalog.

Action: EUMETSAT to add the link to the GCC home page.

JMA GPRC Website

Action: JMA to correct the link to the CMA GPRC website.

KMA GPRC Website

Action: KMA is encouraged to continue developing their GPRC website and take into account the agreed minimum content requirements (see above).

Common THREDDS Server Configuration

Action: NOAA to develop a common catalog template which can be used to generate the initial catalog configuration file for all future new catalogs by using the work on THREDDS template catalog configuration done by EUMETSAT.

Feedback from GRWG on Bias Monitoring

Overall good

One thing to change to add into the metadata global attributes the description of the GSICS correction function and how to propagate uncertainty errors. They are currently built in the EUMETSAT plotting tool.

Other one, related to getting more real time feedback and spot data gaps and report them immediately. It would be good to add daily results to the plots but also instantaneous results. This requires daily data on servers.

Feedback from GRWG on Formats and Data

Nothing to report.

NetCDF Content for New Data Sets

There was no new requirement reported by the GRWG.

Review of the GSICS NetCDF and Filename Convention Document

Aleksandar Jelenak (NOAA) presented the current status where the file naming and netCDF conventions exist as web pages on the GSICS wiki. Given the decision to migrate all the official documents from the wiki to PDF he proposed to For the file naming part, keep only the GSICS-specific descriptions and remove all the material that repeats what is in the WMO Manual on the GTS.

Keep the template description in the document. No need for providing general descriptions of all the content elements that are used as long as used elements are properly referenced.

Action: Aleksandar Jelenak to use the current wiki pages for the file naming and netCDF conventions to prepare a document according to the agreed principles for the content. Provide the document to GDWG for comments.

Task: Investigate the feasibility of the Apache FOP project for the generation of GSICS documentation based on XML files.

Future Development of the EUMETSAT Bias Monitoring Plotting App

Peter Miu (EUMETSAT) presented the current status of the EUMETSAT plotting tool. He highlighted two issues for discussion: where to host the tool, and whether other GPRCs would be interested to contribute toward its future development.

The tool is built using the Google Web Toolkit technology. It requires a workspace of not more than couple of gigabytes, the exact amount to be confirmed. Aleksandar Jelenak (NOAA) expressed interest in hosting the tool on their data server and will investigate this possibility. Peter Miu (EUMETSAT) responded that EUMETSAT agrees to host the only copy of the tool if no other GPRC is willing or able to host its own instance.

The new requirements for the tool stemming from the discussion and the GRWG feedback are:

 Support generating plots from all the variables in GSICS netCDF product templates.

 Investigate if it would be possible to generate plots out of virtual aggregated datasets.

Tetsuro Kurita (JMA) inquired whether the plotting tool would be able to plot slope and offset variables from JMA GEOLEOIR product files. Peter Miu (EUMETSAT) responded that first JMA's RAC product need to be in a single file and that this issue will be resolved when the new capability is being tested. He also remarked that it would be helpful if all variables for plotting have a standard_name attribute as that would allow the plotting tool to automatically identify such variables and display them in its menus.

Cataloging and Discovering GSICS Data

First, make GSICS product catalog discoverable in WIS.

Aleksandar Jelenak (NOAA) reported on the current status. There is the GSICS product catalog as the central information point about the available GSICS products. It lists a small set of the most important attributes for each product, such as: algorithm type, product type, monitored and referenced instrument, data start and end times.

Action: JMA to provide information on what is required to enter metadata on the GSICS product catalog in the WIS Portal GISC Tokyo.

Task: Produce requirements and implement a tool for scanning GSICS THREDDS catalogs and build inventory of available data in order to regularly update the GSICS product catalog.

Thursday (2013-03-07) – GRWG Session

Use of Deep Convective Clouds as invariant targets to inter-calibrate Reflected Solar Band Channels

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On the path towards reference sensor calibration transfer using DCC invariant targets (D. Doelling)

- Sensitivity study
- DCC AMD is nearly zero <40 vzn
- SBAF effect is also small
- Spatial variation <1%, <2% seasonal, <1% annual
- 3 methods to transfer MODIS -> DCC. 1) 3-yr of MODIS data – described in ATBD, 2) compare matched angle results (not coincident), and 3) DCC ray-matching (match angle and coincident) – one method for stability and one for transfer
- DCC ray-matching is going to work, enough ray-match radiance pairs
- possible 0.7% change in visible radiance due to spatial resolution on scene identification – largest uncertainty

If DCC ray-matching is successful, then the DCC calibration transfer is independent of the DCC selection for temporal stability. This will allow each GEO domain to optimize its DCC identification to reduce its monthly temporal uncertainty or standard error about the calibration trend. This is critical for the GOES-West location, which has the fewest DCC. The goal is to finalize DCC ray-matching method by the November time frame over each GEO domain to have a pre-operational DCC calibration for each GEO domain by the annual 2014 meeting.

DCC characterization and regression (T. Chang)

T. Chang described the use of cumulative probability density function (CPDF) as a robust method to characterize DCC reflectance. This method can work for very small monthly samples of DCC. This method is invariant of sample size. This conclusion is based on using the complete dataset as truth and drastically reducing the sample size and determining the CPDF was not a function of sample size. It remains to be seen how well this method works over the lifetime of a satellite, when perhaps the shape of the PDF changes over time.

Action: T. Chang to compare the uncertainties in summary statistics (mode, mean or median) from PDF and CPDF methods of characterizing DCC reflectance and report these at the 2nd DCC web meeting in Summer 2013.

Regional characterization of DCC by LIS (1998-2010) (D. Buechler)

Denis uses VIRS 11um to identify DCC (<205K; ADM not applied); LIS DCC radiance distribution are very similar from 1998-2010 (no trending, very stable; Atmospheric Research 2013). 91.5% LIS DCC over ocean, 8.5% over land. Land/ocean DCC distr. Similar in each region except at Africa - Land DCC refl > ocean refl at Africa. The land DCC reflectance is a function of local time, since the life cycle of DCC is repeated daily. It was noted that as long as

the DCC selection was confined to the same local time, the land regions over a GEO domain can be used in the DCC calibration and provide consistent DCC reflectances over time.

Decision: This highlighted that it may be necessary to process DCCs over land and ocean separately (especially over Africa), so all DCCs should be categorized according to a land/sea mask.

FY-3/MERSI and FY-2 DCC (X. Hu)

RTM simulation of COD with various aerosol and VZN values on cloud reflectance; 10day bin of DCC result is noisier than that of 30 days; median reflectance is least sensitive to the DCC Tb threshold among the mode and mean values. DCC trending shows MERSI degrades non-linear pattern and the degradation value is comparable with the other two methods used on MERSI. Yet FY-2D and FY-2E DCC reflectance have large difference. Effort of implementing the DCC method for FY-2 is ongoing. Mode of reflectance is insensitive to accumulating period with/without ADM correction. The uncertainty increases for mean and median statistics, when an ADM is not used over one, which uses an ADM.

MTSAT-1R PSF (D. Doelling)

A GSICS success story – redefine the MTSAT-1R PSF improve the MTSAT-1R image quality and improve the linear response of the sensor. The MTSAT sensor can now be calibrated using multiple methods and the methods should have consistent results, since the linear regression of the collocated co-angled, coincident (ray-matched) radiance pairs between MTSAT-2 and MTSAT-1R are linear and the offset does go through the space count.

This could not have happened without Arata Okuyama, who provided the coincident MTSAT-2 images during commissioning phase that have been compared with the MTSAT-1R images. This then showed that the clear regions neighboring very bright clouds were brighter than clear regions more than 100 km away from bright clouds. This suggested that there was a small contribution up to 200 km in diameter for a given 1-km visible pixel, from which a point spread function was constructed.

Desert-based calibration of collocated GEO (Raj Bhatt)

DERM (daily exoatmospheric radiance model) using the daily clear-sky data near noon time. The DERM data is used to transfer the radiance from one GEO to another. The result is consistent with the ray-matching one. It is based on the assumption that GEO image scheduling does not change so that the daily angular configuration over an invariant desert site is repeated annually. There for a well-calibrated GEO reference sensor can inter-calibrate a GEO target sensor, which are at the same longitude and imaging schedule. This desert calibration method does not require a BDRF, one of the greatest uncertainties in desert calibration. The SBAF is based on SCIAMACHY.

Action: R. Bhatt to supply 1 month of data from Meteosat-7, -9, GOES-13, -15, MTSAT-2, FY2E and COMS by 1 June 2013.

DCC implementation @ EUMETSAT

- VIS06 @MET9 and VIS06_MVIRI @MET8 and MET10; implementation of ADM change the shape of PDF.
- Need Further checks and debug before moving into product + Uncertainty analysis to provide abs calibration + drift monitoring for current SSCC system. Based on the inconsistent monthly PDF shapes of both MET-9 and Aqua-MODIS it seems that DCC ADM may not have been properly implemented.

Discussion on the Use of Deep Convective Clouds as invariant targets to inter-calibrate Reflected Solar Band Channels

Action: NASA Langley to share the DCC data at pixel level./exchange one month of DCC pixel level in May (NASA to provide GEO data + MODIS data to validate implementation of the DCCs to GPRCs)

Action: Web meeting to discuss each GEO domain DCC selection criteria and PDF construction and to finalize uniform selection criteria.

Action: Byeung-Il Lee (KMA) and X. Hu (CMA) to contact D. Doelling to share the COMS and possibly FY-2F DCC data.
(COMS data is now available through McIDAS starting in June 2012.)

Action: Each GPRC provides angular data available in the May web meeting and present the result to decide ADM model in another web meeting in summer; July-Nov for threshold sensitivity analysis.

ADMs to be exchanged for testing:

1 CNES PARASOL data + analysis, KMA (to be confirmed), CERES, Hu, JMA, EUMETSAT (OCA)

2 NASA to Provide SBAF + uncertainties for all GEOs with respect to the latest SCIAMACHY calibrated data

3 CNES: PARASOL data at DCC

Decision: We aim to repeat this exercise for LEO instruments after the first demonstration products are available for GEOs.

See Friday morning for more details, where the objectives of the 3 web meetings are discussed, in order to achieve pre-operation mode by the next GSICS annual meeting.

Other inter-calibration techniques for the Reflected Solar Band

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Visible vicarious calibration using RTM (Masaya Takahashi)

A Radiative Transfer Model approach is taken using MODIS cloud and surface properties over DCC, liquid clouds, desert, and clear ocean are used to predict the coincident MTSAT radiance. This approach allows the RTM to provide the SBAF and angular variations between MODIS and MTSAT. Monthly predicted and MTSAT reflectance pairs are then regressed and found to be linear over the various scene types. This approach was tried with both Terra and Aqua-MODIS and found to be similar although monthly spikes could be a result of clear-sky identification mismatches.

A GMS-5 without MODIS calibration approach is being developed that uses climatology and constant inputs over invariant cloud free and DCC targets, respectively. This approach is then compared with the MODIS approach and found to be significantly different and further investigation is required to resolve the differences.

COMS visible channel Calibration (Sunmi Na)

A radiative transfer model multi-target calibration and lunar calibration approach was presented. The clear ocean, desert, bright liquid and DCC predicted and COMS radiance pairs were regressed monthly. There were some outliers, and some possibilities from the group were suggested. The temporal variability of these scenes were relatively stable, however the predicted scene gains were not consistent. The predicted radiances of the scene types where ratioed and it was found that desert predicted reflectances were much brighter than DCC. Possibly explanations included if the spectral difference was properly modeled for deserts.

The COMS lunar calibration group was concerned if they were implementing the ROLO model correctly and asked if anyone had the latest ROLO coefficients.

Rayleigh scattering method (B. Fougnie)

Version 3.5 of CNES' Rayleigh-scattering absolute calibration method has been implemented for SeaWiFS, MERIS, MODIS(soon), SPOT6, Pleiades 1A and 1B, SEVIRI etc. Bertrand reported on their updated uncertainty analysis. However, it is difficult to extend this method to sensors without a channel in the SWIR (0.8-1.1 micron), which is used as a filter to reject cases with turbidity.

Recommendation: CNES to investigate the sensitivity to sub-pixel cloud using data from high resolution sensor (e.g. Pleiades or SPOT) at native and degraded resolution.

Bruce Wielicki mentioned it was almost impossible to have a pristine clear-sky scene based on his work using Landsat data. This may cause difficulty pinning down an absolute calibration based on Rayleigh method.

Recommendation: The MODIS team, Jack Xiong, to implement the CNES Rayleigh scattering model in order to transfer the Aqua-MODIS calibration using clear ocean targets.

Sonoran Desert for GOES-I VIS (Fangfang Yu)

Fangfang reported how the original coordinates of the Sonoran Desert had been shifted south to avoid vegetation. Results showed that Sonoran desert is stable at decadal scale and can be used a reference for long-term GOES visible channel calibration. The Aqua-MODIS calibration was transferred using matched GEO/MODIS solar zenith angles, since GEO/MODIS ray-matching was not possible. The long term stability of the Sonoran desert is ~1% based on Aqua-MODIS. Fangfang also showed some fitting residual oscillations in the desert calibrations that she could not explain and wanted some feedback.

SEVIRI Solar Channel Calibration (SSCC) Desert Sites (Sebastien Wagner)

Sebastien described the possibility to re-assess the desert targets currently used in the SSCC in terms of temporal stability, spatial homogeneity and spectral behaviour. The calibration method was implemented for MSG-3 and revealed a 5% uncertainty. A dataset of MODIS observations was kindly provided by B.J.Sohn (Seoul National University) which would allow the investigation of the temporal stability and spatial homogeneity. This dataset can be offered to any party interested in conducting this analysis.

Sebastien cautioned participants that the GEO orbit may not be centered at the equator and primary longitude.

Spectral Band Adjustment Factors in the RSB (Ben Scarino)

Ben Scarino (NASA) described the calculation of Spectral Band Adjustment Factors (SBAFs) derived for channels in the reflected solar band, based on SCIAMACHY observations, noting the importance of customizing these for specific scene types, due to their different spectral characteristics.

Action: Ben Scarino to analyse SBAFs for each GEO imager and supply to GPRCs, together with the uncertainty due to DCC variation - due by 2nd DCC web meeting.

Recommendation: NASA to consider generating SBAF for clear sky scenes over the ocean in support of the Rayleigh scattering inter-calibration method.

However, it was recognised that trying to find a clear-sky SCIAMACHY 30x240km footprint will be difficult.

Aqua-MODIS L1B Collection6 Reflective Solar Bands (Amit Angle)

Most of the Collection 6 changes impacted Terra only. RVS functionality removed using lunar, and solar diffuser and invariant targets as a function of scan angle. All known temporal trends were removed, especially for the shorter wavelengths.

Lunar

Calibration over Moon (Bertrand Fougnie)

- POLO; (Pleiades Orbital Lunar Observations): started Pleiades 1A and 1B commissioning phases in Jan12, and Jan13; intensive observations of the Moon in various conditions
- Details will be reported on Thursday

Several GPRCs are actively developing calibration methods based on lunar observations.
Fred Wu expressed concerns about relying on lunar irradiance model that was not fully published in the peer-reviewed literature. Tim Hewison reminded the GRWG that the USGS had been considering providing lunar irradiance predictions from the ROLO model as a service to GSICS.

Sebastien Wagner offered to provide Meteosat/SEVIRI observations of the Moon to other GRWG members to analyse. Bertrand Fougnie expressed an interest in doing so.

Discussion on Other inter-calibration techniques for the Reflected Solar Band

Fred Wu (NOAA) expressed his concerns about relying on unpublished aspects of the ROLO lunar irradiance model as part of an operational processing system. Tom Stone (USGS) pointed out that the ROLO model is published, but that there are additional aspects to its application, which are not documented in the original paper.

Action: EUMETSAT and CNES to liaise to exchange lunar observation data and report in March 2014.

Action: Jack Xiong to investigate possibility of comparing Moon observations from Aqua/MODIS to ROLO lunar irradiance model to provide inter-calibration reference for lunar method and report to GRWG by 1 Sept 2013.

Thursday (2013-03-07) – GDWG Break-out session

Implementation Proposal for Datacasting Feed on GSICS Data Servers
Action: NOAA and EUMETSAT to prepare a feasibility study on utilizing Datacasting feed protocol for alerting and downloading GSICS product files between the data servers.
https://metacpan.org/module/dado

Satellite Instrument Event Logging
Action: NOAA and EUMETSAT to work together to produce examples of events in XML format.
Action: All GPRC to provide examples of the events applicable to their instruments. Support NOAA and EUMETSAT work on the common list of event types.

Updates to the CF Convention
Peter Miu (EUMETSAT) presented his experience on going throught the procedure for accepting standard names.
Task: All GPRC are invited to keep informed of the developments of the CF convention as they relate to their GSICS data production requirements.

GSICS NetCDF Metadata Validation Tool
Action: Aleksandar to upload the tool's code into a Github repository so other GPRCs can contribute in further development.

Official GSICS Document Identification Schema
Action: Aleksandar to inquire with Jerome whether official GSICS documents could be numbered according to the WMO identifier schema and also use WMO's ISBN issuing capability. If this is not possible, then Peter Miu (EUMETSAT) will check with his organization whether the proposed identifier schema is acceptable.

During the discussion of the template the participants were of the opinion that official documents should not specify the names of the people working on them but only their affiliation. Tetsuro asked whether the GSICS Quarterly Newsletter would be considered an official document and others agreed that should be the case.

Preparation for 2013 Users' Workshop
The 2013 Users' Workshop will be held on April 8 in College Park, Maryland. There is a 15minute slot reserved for data management presentation. Aleksandar Jelenak (NOAA) presented two choices for how to utilize the time: make a standard presentation or do a live demonstration on how users can find, examine, and access GSICS data. He stated his preference for the latter. Other participants agreed.

Demonstration outline:

- Start with a Google search
- Find WMO portal
- Go to product catalog
- select a product
- go to its THREDDS page
- pick a file (RAC better)
- invoke the plotting app (Pete or Tim do a demo)
- show how to download file from the app

- show how to access file from the THREDDS dataset page
- TBD: include Datacasting feed
- a demo of the NCO command line tools for obtaining data via OPeNDAP
- The End!

GDWG Strategic Directions

What are GDWG priorities and responsibilities in the future:

- GRWG will always be supported on issues directly related to its mission
- GDWG acknowledges that it is exhausting the pool of free and available technological solutions that can be easily utilized to support its mission therefore any further progress will be greatly influenced by the resources made available from member organizations

Further priorities:

- Implementation of the Datacasting feed protocol on all data servers
- Working with various international standard bodies on improving the best practices and conventions in order to support GSICS goals
- Satellite instrument event logging
- Archiving GSICS products
- Implementing new capabilities in the EUMETSAT plotting tool
- Improving the cataloging and documentation capabilities for GSICS products
- Developing a methodology for capturing and storing processing history (lineage) of every single GSICS product file and making this information discoverable
- Finding and enhancing IT technologies that can be used to interconnect various components of the GSICS data value chain, for example: have an instrument performance monitoring system be able to automatically communicate with a satellite event logging system and record anomalies which then can be both included as auxiliary information in the plotting tool or in the metadata documentation provided to a user download a single GSICS product file.
- There are no resources to specifically support any requirements coming from downstream international initiatives, such as SCOPECM.

Closing Remarks

The chairman thanked everyone on their participation in this breakout session.
Aleksandar Jelenak (NOAA) brought up the issue that his three year term as the chairman has expired as of this meeting. He intends to ask GSICS Executive Panel to start looking for a new chairman. Peter Miu (EUMETSAT) expressed the desire for Aleksandar to stay as the chairman and offered to serve as his vice-chairman, noting the reduced amount of time available to him for any GSICS related work. The JMA and KMA representatives at the meeting were asked to go back to their agencies and seek appropriately skilled candidates for this position. The KMA representative reported that their GSICS activities are still early in development and they are not in the position to propose a suitable candidate.

Friday (2013-03-08) – Joint session of GRWG+GDWG

Tim Hewison reviewed the decisions, actions and recommendations that had come out of the joint session and GRWG working group session and Aleksandar Jelenak reviewed the objectives set by the GDWG session. The incumbent chairs reminded participants that their 3 year terms are now ending, and invited proposals for new chairs, while offering to support any replacements during a handover period extending to the next WG meetings. Fangfang Yu reviewed the agenda for the 2013 Users' Workshop and went through the Procedure for Product Acceptance to remind us the next steps necessary to progress GSICS Products into Submission, Demonstration, Pre-Operational and Operational distribution mode. This led to some discussion, and generated the following additional actions and recommendations:

Recommendation: GPRCs are encouraged to reprocess their GSICS Re-Analysis Corrections when their products are promoted to the next distribution mode.

Action: GRWG + GDWG Chairs to solicit proposals from any GSICS member wishing to be considered as GRWG or GDWG chair by drafting a 1-2 page proposal to the Exec Panel by 1 July 2013.

Action: All GPRCs to provide GCC with links to the official SRFs for all instruments for which GSICS Products are being developed for publication on GCC website.

Action: Fangfang to discuss with F. Weng and X. Wu the possible transfer of GCC responsibilities to WMO and report to EP in July 2013.

Action: X. Xiong to initiate draft traceability report for Aqua/MODIS and circulate to GRWG for review & contribution by 1 Sept 2013.

Recommendation: CMA to consider hosting a GSICS Users' Workshop at the 2014 meeting of the Asia/Oceania Meteorological Satellite Users' Conference

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Summary of proposed Web Meetings for 2013/2014:

Fangfang Yu (NOAA) to set up joint web meetings/telecons with GSICS and QA4EO

May 2013 (Dave Doelling) - 1st DCC Progress Meeting: NASA to provide GEO pixel-level datasets for case study month for each GEO location in 2012, GPRC's to provide DCC ADM models to GSICS archive, GPRC's to provide visible SRFs in order to compute Aqua-MODIS and GEO DCC SBAF factors.

by 1 June 2013 (GRWG Chair) Best Practice for Process of defining SBAF and uncertainties,

Summer 2013 (Dave Doelling) - 2nd DCC Progress Meeting: Ensure all GEOs have the identified the same DCC pixels that NASA has. Specify sensitivity tests, as function of temporal variability, to be performed by each GPRCs GEO domain with regards to histogram summary statistics, DCC selection criteria (temperature threshold and homogeneity tests), ADM selection, PDF construction and histogram statistics. These sensitivity studies to be discussed at the 3rd DCC meeting. Discuss GDWG on requirements for plotting tool, monthly PDF plots, and temporal trending plots.

Fall 2013 (Rob Roebeling) - Event Logging

Fall 2013 (Dave Doelling) - 3rd DCC Progress Meeting: Preparation for Demo products: GPRC to report results of sensitivity analyses, Finalise uniform DCC selection criteria across all GEO domains, feedback to GDWG on data requirements. NASA to provide the Aqua-MODIS calibration transfer using DCC invariant targets using DCC ray-matching and discuss the path forward to implement the DCC calibration transfer. Discuss the components of the GEO DCC calibration uncertainty.

by 1 March 2014 (Tim Hewison) - Propose scoring scheme to select reference instrument

by 1 March 2014 (Rob Roebeling) - SCOPE-CM requirements

Summary of New Actions Generated

Action GWG_13.1: All GPRCs to consider inviting members of IMD/ROSH as visiting scientists to help implement GEO-LEO IR ATBD and communicate possibilities to EP Chair by 1 July 2013.

Action GWG_13.2: EP Chair to contact IMD/ROSH and invite as visiting scientist to host institutions by CGMS in July 2013.

Action GWG_13.3: GRWG Chair to outline scope and expectations for sub-group chairs and circulate to GRWG by 1 May 2013, asking for 1-2 page proposal to chair a sub-group, outlining objectives, planning, and deliverables by 1 June 2013.

Action GWG_13.4: The GPRC members responsible for the development of new products to communicate requirements to archive data to GDWG chair during prototyping phase.

Action GWG_13.5: Tim to draft the announcement of special issue and Aleksandar to send to GUMS, by 1 April 2013

Action GWG_13.6: GRWG Chair to ask for volunteer to lead the development of suitable guidelines to define Common Reference Channels, based on the analysis performed for the Spectral Band Adjustment Factors.

Action GWG_13.7: Mitch to discuss with CGMS the recommendation for future instruments to include a selection of standard channels and ask GSICS to review.

Action GWG_13.8: NASA to provide CLARREO papers to GCC for distribution on the GSICS wiki

Action GWG_13.9: Rob Roebeling to consider using this high level concept to illustrate how the event logging WG could start with a simple concept acceptable for all space agencies.

Action GWG_13.10: JMA to complete Uncertainty analysis for MTSAT-IASI products by analyzing random errors contribution from spatial and temporal variability at least and combine these with the currently analysed systematic uncertainty. That will be sufficient for promotion to pre-operational status.

Action GWG_13.11: Tim Hewison to draft proposal for a simple scoring scheme based on the uncertainty analysis for GEO-LEO IR and review this at a web meeting by 1 March 2014.

Action GWG_13.12: NOAA & EUMETSAT to analyse GEO-GEO difference after applying the GEO-LEO correction to quantify the diurnal calibration uncertainty before promotion to Operational status (target 1 September 2013).

Action GWG_13.13: GRWG Chair to set up web meeting to define Best Practice for Process of defining SBAF and uncertainties by 1 June 2013.

Action GWG_13.14: EUMETSAT to propose solution based on modification of plotting tool and server structure and content to allow this daily results to be displayed by 1 Sept 2013.

Action GWG_13.15: Aleksandar Jelenak to add column to GSICS Product Catalog for Visualisation with links to Bias Monitoring by 1 April 2013.

Action GWG_13.16: Tim Hewison to draft example of netCDF file incorporating the delta correction to convert from MetopB/IASI to MetopA/IASI and distribute to GRWG+GDWG by 1 March 2014.

Action GWG_13.17: Dave Doelling to define an appropriate vocabulary to describe the level for the maturity of products based on combination of methods by 1 March 2014.

Action GWG_13.18: Fred Wu to contact HIRS instrument scientist (Changyong Cao) for the question of quantifying the stability of the calibration of HIRS on previous missions and report to GRWG by 1 April.

Action GWG_13.19: GRWG Chair to invite I. Decoster to next GSICS annual meeting (GRWG Chair) to report on Spectral Aging model.

Action GWG_13.20: T. Chang to compare the uncertainties in summary statistics (mode, mean or median) from PDF and CPDF methods of characterizing DCC reflectance and report these at the 2nd DCC web meeting in Summer 2013.

Action GWG_13.21: R. Bhatt to supply 1 month of data from Meteosat-7, -9, GOES-E, -W, MTSAT and COMS by 1 May 2013??

Action GWG_13.22: NASA Langley to share the DCC data at pixel level./exchange one month of DCC pixel level in May
(NASA to provide GEO data + MODIS data to validate implementation of the DCCs to GPRCs)

Action GWG_13.23: Web meeting to discuss each GEO domain DCC selection criteria and PDF construction and to finalize uniform selection criteria.

Action GWG_13.24: Byeung-Il Lee (KMA) and X. Hu (CMA) to contact D. Doelling to share the COMS and possibly FY-2F DCC data.

Action GWG_13.25: Each GPRC provides angular data available in the May web meeting and present the result to decide ADM model in another web meeting in summer; July-Nov for threshold sensitivity analysis.

Action GWG_13.26: Ben Scarino to analyse SBAFs for each GEO imager and supply to GPRCs, together with the uncertainty due to DCC variation - due by 2nd DCC web meeting.

Action GWG_13.27: EUMETSAT and CNES to liaise to exchange lunar observation data and report in March 2014.

Action GWG_13.28: Jack Xiong to investigate possibility of comparing Moon observations from Aqua/MODIS to ROLO lunar irradiance model to provide inter-calibration reference for lunar method and report to GRWG by 1 Sept 2013.

Action GWG_13.29: GRWG + GDWG Chairs to solicit proposals from any GSICS member wishing to be considered as GRWG or GDWG chair by drafting a 1-2 page proposal to the Exec Panel by 1 July 2013.

Action GWG_13.30: All GPRCs to provide GCC with links to the official SRFs for all instruments for which GSICS Products are being developed for publication on GCC website.

Action GWG_13.31: Fangfang to discuss with F. Weng and X. Wu the possible transfer of GCC responsibilities to WMO and report to EP in July 2013.

Action GWG_13.32: X. Xiong to initiate draft traceability report for Aqua/MODIS and circulate to GRWG for review & contribution by 1 Sept 2013.

Actions and Tasks Generated from GDWG Break-out Session

Action GWG_13.33: NOAA to fix the extra GSICS banner image showing at the right side.

Action GWG_13.34: NOAA to remove port 8080 from all the NOAA THREDDS server links.

Action GWG_13.35: NOAA to add KMA GPRC website link with all the other GPRC websites.

Action GWG_13.36: NOAA to investigate and, if possible, correct the product performance monitoring plots, which have not updated since Sep 2010.

Action GWG_13.37: EUMETSAT (lead) + GDWG members to work with EUMETSAT to use their bias plotting tool for GPRC product monitoring plots.

Action GWG_13.38: NOAA to update the links under "Documents" to include all that is publicly available.

Action GWG_13.39: NOAA to add the link to the GSICS product catalog under "Links".

Action GWG_13.40: The GPRC website URL was determined to be http://giscs.nsmc.cma.gov.cn. There is a spelling mistake in the server name "giscs" instead of "gsics". The CMA representative reported it will be corrected.

Action GWG_13.41: CMA is invited to make the modifications according to the minimal content rules.

Action GWG_13.42: CMA: The "Data" link on the CMA GPRC website points to a private THREDDS server (http://10.0.65.110:8080/thredds). CMA is advised not to use port 8080 but instead port 80 for this server to avoid public access problems.

Action GWG_13.43: CMA to remove the old GSICS logo (to the left from the NSMC logo) in the banner image of the CMA GPRC website.

Action GWG_13.44: EUMETSAT to add the link to the WMO GSICS portal to the GSICS logo.

Action GWG_13.45: EUMETSAT to add the links to other GPRC websites.

Action GWG_13.46: EUMETSAT to add the link to the GSICS product catalog.

Action GWG_13.47: EUMETSAT to add the link to the GCC home page.

Action GWG_13.48: JMA to correct the link to the CMA GPRC website.

Action GWG_13.49: KMA is encouraged to continue developing their GPRC website and take into account the agreed minimum content requirements.

Action GWG_13.50: NOAA to develop a common catalog template which can be used to generate the initial catalog configuration file for all future new catalogs by using the work on THREDDS template catalog configuration done by EUMETSAT.

Action GWG_13.51: JMA to provide information on what is required to enter metadata on the GSICS product catalog in the WIS Portal GISC Tokyo.

Action GWG_13.52: GDWG to produce requirements and implement a tool for scanning GSICS THREDDS catalogs and build inventory of available data in order to regularly update the GSICS product catalog.

Action GWG_13.53: NOAA and EUMETSAT to prepare a feasibility study on utilizing Datacasting feed protocol for alerting and downloading GSICS product files between the data servers. https://metacpan.org/module/dado

Action GWG_13.54: NOAA and EUMETSAT to work together to produce examples of events in XML format.

Action GWG_13.55: All GPRC to provide examples of the events applicable to their instruments. Support NOAA and EUMETSAT work on the common list of event types.

Action GWG_13.56: All GPRC are invited to keep informed of the developments of the CF convention as they relate to their GSICS data production requirements.

Action GWG_13.57: Aleksandar to upload the tool's code into a Github repository so other GPRCs can contribute in further development.

Action GWG_13.58: Aleksandar to inquire with Jerome whether official GSICS documents could be numbered according to the WMO identifier schema and also use WMO's ISBN issuing capability. If this is not possible, then Peter Miu (EUMETSAT) will check with his organization whether the proposed identifier schema is acceptable.

Summary of Recommendations

1. EP to recognize EUMETSAT for providing the resources and Peter Miu for the leadership in developing the bias monitoring plotting web application.

2. EUMETSAT is recommended to implement the event logging (EUMETSAT).

3. Fangfang Yu (NOAA) to set up joint web meetings/telecons with GSICS and QA4EO.

4. GCC to consider adding link to allow users feedback on the GCC webpage.

5. EUMETSAT to consider moving one of MSG over Indian ocean before 2016.

6. KMA to consider distributing details on the SST study (on wiki page) as a case study showing impact of GSICS Correction.

7. CMA to consider using independent calibration method (e.g. MODIS) to validate the GSICS operational calibration.

8. CNES to consider using C6 Aqua/MODIS data for the inter-calibration.

9. JMA to consider analysis of gap filling method used with AIRS data in future revision.

10. NASA to communicate uncertainty in SBAFs as part of a potential new GSICS Product at 1st DCC web meeting.

11. KMA to consider producing GSICS Corrections for COMS and submitting to the GPPA.

12. CMA to consider whether it is suitable to generate GSICS GEO-LEO IR product for FY-2F and submit to GPPA.

13. EUMETSAT to consider performing decontamination on Meteosat-7/MVIRI to allow impact of ice contamination to be quantified by inter-calibration against Metop/IASI.

14. MICROS team to consider comparing results from MICROS double differencing of a pair of satellite instruments with another group's direct comparison of the same and report to GRWG.

15. Tim Hewison to consider generating covariance statistics empirically from a longer time series of double differencing results.

16. CNES to investigate the sensitivity to sub-pixel cloud using data from high resolution sensor (e.g. Pleiades or SPOT) at native and degraded resolution.

17. The MODIS team, Jack Xiong, to implement the CNES Rayleigh scattering model in order to transfer the Aqua-MODIS calibration using clear ocean targets.

18. NASA to consider generating SBAF for clear sky scenes over the ocean in support of the Rayleigh scattering inter-calibration method.

19. GPRCs are encouraged to reprocess their GSICS Re-Analysis Corrections when their products are promoted to the next distribution mode.

20. CMA to consider hosting a GSICS Users' Workshop at the 2014 meeting of the Asia/Oceania Meteorological Satellite Users' Conference.

Attendees at GSICS Mini Conference and Working Group Meetings

1 Amit Angal
2 Rosemary Baize
3 Dennis Buechler
4 Tiejun (Tim) Chang
5 Chris Currey
6 Dave Doelling
7 Bertrand Fougnie
8 Mitch Goldberg
9 Conor Haney
10 Tim Hewison
11 Xiuqing (Scott) Hu
12 Bob lacovazzi
13 Aleksandar Jelenak
14 David Johnson
15 Denis Jouglet
16 Seiji Kato
17 Tetsuro Kurita
18 Byung-II Lee
19 Costy Lukashin
20 Patrick Minnis
21 Peter Miu
22 Sunmi Na
23 Yolanda Roberts
24 Rob Roebeling
25 Carlos Roithmavr
26 Korak Saha
27 Benjamin Scarino
28 Lei Shi
29 Alok Shrestha
30 Masaya Takahashi
31 Kurt Thome
32 Dave Tobin
33 Denis Tremblay
34 Sebastien Wagner
35 Bruce Wielicki
36 Likun Wang
37 Aisheng Wu
38 Xiaoxiong (Jack) Xiong
39 Fangfang Yu
40 Yong Zhang
41 Cheng-Zhi Zou
42 Raj Bhatt
43 Rich Cagaeo
44 Tom Stone (Remote)
45 Keiji Imaoka (Remote)
46 Bartolomeo Viticchie (Remote)
47 Jerome Lafeuille (Remote)
48 Xiangquian (Fred) Wu (Remote)
49 Junilla Applin
50 Wenbo Sun
51 Jhonghai Jin