

**Joint Meeting of the GSICS Research and Data Working Groups
EUMETSAT, Darmstadt, Germany, 12-14 June 2007**

Final Minutes

SECTION A: JOINT SESSION

The Global Space-based Inter-Calibration System (GSICS) Research Working Group (GRWG) and Data Working Group (GDWG) held a joint meeting at EUMETSAT, Darmstadt, Germany, 12-14 June 2007. The first one and half day was devoted to joint presentations by both groups to facilitate communications. This was followed by one day of break-out sessions, and concluded with a half-day joint session of summary and recommendations. The agenda is attached as Annex 1 and participants are listed in Annex 2.

The meeting started with a brief remark by M. Rattenborg who welcomed the participants to EUMETSAT. M. Goldberg then reviewed the GSICS programme and conveyed the following from the GSICS Executive Panel to the GSICS members:

- 2007 Activities
 - Annual Operating Plan
 - Two GRWG meetings
 - GDWG meeting to discuss data management issue
 - Commission the GSICS Website
 - Routine LEO-LEO inter-calibration, with performance reports to GCC.
 - Inter-comparisons of AIRS and IASI
- 2008 Activities
 - Routine inter-calibration of SEVIRI and AIRS/IASI at EUMETSAT
 - Routine inter-calibration of GOES and AIRS/IASI at NESDIS
 - Routine inter-calibration of MTSAT and AIRS/IASI at JMA
 - Routine inter-calibration of FY-2C/D and AIRS/IASI at CMA
 - Performance report from each GPRC to GCC.

He encouraged the GRWG and GDWG working together to ensure that the GSICS goals are met in time. J. Lafeuille re-emphasized the need to agree on tangible deliverables.

L. van de Berg presented EUMETSAT inter-calibration of METEOSAT using HIRS, both a manual method currently used in operation and an automated method slated for MSG, for both WV and IR channel. In addition, plans were presented for a complete re-calibration (including inter-calibration using HIRS data) of all MFG data. The presentation demonstrated the readiness to go operational with the presented methods, including a regular reporting on the EUMETSAT web site and to the GCC.

Y. Tahara offered a critical review of the current GSICS GEO-AIRS algorithm Version 0.0. In addition to uncovering several errors such as wrong value for AIRS FOV and the use of T_b instead of radiance, his analysis of one year's MTSAT data provided valuable insights into

selecting proper values for various thresholds. He also presented recent results of MTSAT-AIRS inter-calibration and spectral correction, the latter is relevant to all inter-calibration using hyperspectral data.

P. Zhang announced CMA's full support to GSICS. In particular, CMA will inter-calibrate FY-2C/D using IASI and AIRS data in 2008. He informed the members that while FY2-C/D data are available to general public, special assistance is available to GSICS members (contact Z. Rong rongzg@cma.gov.cn). He further offered possible collaborations in ground-based calibration, using in-situ data collected at selected Chinese Satellite Calibration Reference Sites in conjunction with the over-flying satellite data from members.

M. König presented the first results of inter-calibration of SEVIRI on Meteosat-8/9 with IASI. Comparisons over five consecutive days showed that the differences are stable and small ($\delta T_b < 0.5$ K) for most SEVIRI thermal channels. The only exception is the IR13.4 channel onboard MSG-2, for which the difference is around 1.5 K. This discrepancy is in line with the ECMWF radiance monitoring and is probably due to a change in filter spectral response function following sensor decontamination. She also clarified that, for SEVIRI, radiance is defined as monochromatic radiances of the brightness temperature (details at www.eumetsat.int).

R. Armante compared Infrared Imaging Radiometer (IIR) with MODIS and SEVIRI, using the LMD radiative transfer model to reconcile the differences in spectral response functions among sensors. D. Blumstein evaluated the early performance of IASI (radiometric, spectral, and geometric). X. Wu presented recent modifications and results of GEO-LEO algorithm. P. Henry, Y. Govaerts, and D. Doelling discussed calibration of solar channels.

Members of the GSICS Data Working Group presented their ideas on practical data management in the joint plenary session. Y. Tahara made comprehensive suggestions on data exchange for GSICS. This was followed by an explanation and introduction on the EUMETSAT data services, presented by M. Jenner. The view of NOAA/NESDIS was provided by talks given by A. Jelenak and B. Barkstrom, who outlined the problems and potential solutions for the long term preservation of results and data from GSICS activities. All presentations will be available at the GSICS Web site <http://www.orbit.nesdis.noaa.gov/smcd/spb/calibration/ievs/GSICS/index.html>

After the joint presentations, the two working groups met separately to discuss issues of their expertise and concerns. This was the second meeting for GRWG but the first one for GDWG. The summary outcome of GRWG-2 and GDWG-1 are provided below as Section B and Section C, respectively.

These conclusions were reported and endorsed in a final joint session. The session was concluded with thanks to EUMETSAT for hosting the meeting, to all participants for their contribution, and to their organizations for their support to GSICS that is expected to provide large benefits to all WMO Members.

SECTION B:
GSICS RESEARCH WORKING GROUP

Second Meeting
Summary Outcome

Recommendations

1. CMA to provide information on the new calibration sites.
2. Members to verify the operational calibration of their sensors during CMA's annual field campaign at their calibration sites.
3. AIRS and IASI teams to make documents of current issues, efforts, and achievements of these instruments to be accessible by the GSICS community.
 - a. Especially since AIRS and IASI are considered reference IR instruments for GSICS
 - b. Can provide copies or links.
 - c. In particular, need the most current IASI spectral response function.
4. NASA/Langley and EUMETSAT to explore the apparent "sensor saturation" of MSG Chl2 as indicated by MODIS.
5. GSICS Executive Panel to inform the Head of NASA Delegation at CGMS2007 on the important contribution to the GSICS by the NASA/Langley group and to suggest continuity in the future.
6. Members to support the GCC in creating and maintaining a repository on instrument characterisation
 - a. Pre-launch
 - i) Spectral (relative response, out of band)
 - ii) Radiometric (NEdN, NEdR, NEdT)
 - iii) Spatial (MTF, co-registration, geo-location)
 - b. Post-launch
 - i) Anomaly (detection, diagnosis, resolution, and impact)
 - ii) Performance monitoring
 - c. Executive Panel to obtain agreement at CGMS2007 that this repository be maintained as sole source of pertinent information by satellite operators participating in GSICS.
7. Operational GSICS software to be version-controlled (per GDWG recommendation).
8. Member to deliberate on the final product, e.g., difference with some measure of confidence reported regularly.

9. Members (particularly JMA and NESDIS, in collaboration with UW) to revisit the spectral corrections recommended by the University of Wisconsin, both Tobin and Gunshor methods and may be some combination thereof.

10. GRWG to adopt GDWG recommendations on archiving sufficient data to enable reprocessing.

11. Members to keep closer contact through email etc. to exchange the results, to discuss the technique and science in very detail.

Actions:

| ACTION No. | ACTION | ACTIONEE |
|-------------------|---|-----------------------------|
| GRWG-II 01 | Provide test data, Version 1 of GSICS algorithm for GEO-AIRS co-location and spectral convolution (pseudo-code and one working code), and test results for all GEO's. | X. Wu July 2007 |
| GRWG-II 02 | Implement inter-calibration of FY-2C/D with AIRS. | P. Zhang June 2008 |
| GRWG-II 03 | Implement inter-calibration of MTSAT with AIRS. | Y. Tahara June 2008 |
| GRWG-II 04 | Implement inter-calibration of METEOSAT-9/8/7 with AIRS. | M. König June 2008 |
| GRWG-II 05 | Implement inter-calibration of COMS with AIRS. | S. Chung Dec 2009 |
| GRWG-II 06 | Implement inter-calibration of all operational GEO's with AIRS at GCC | X. Wu June 2008 |
| GRWG-II 07 | Provide subset of AIRS measurements to members for inter-calibration | X. Wu Sep 2007 |
| GRWG-II 08 | Provide subset of IASI measurements to members for inter-calibration | M. König June 2008 |
| GRWG-II 09 | Define the initial content of the output data to GDWG | X. Wu & Members Dec 2007 |
| GRWG-II 10 | Provide HDF5 template based on the content | V. Gärtner Dec 2007 |
| GRWG-II 11 | Provide and maintain the English website (with proper disclaimer) that contains instrument characteristics | X. Wu & Member Dec 2007 |

SECTION C:
GSICS WORKING GROUP ON DATA MANAGEMENT
First Meeting
Summary Outcome

1. Purpose of the meeting

The purpose of the meeting was to:

- Identify the GSICS data management needs,
- Propose a practical way forward on data and information exchange,
- Facilitate cooperation amongst participants of the GSICS research and data working groups.

2. GDWG Discussions

The minutes document the open discussion for the improved collaboration of the GSICS partners. The meeting was chaired by Volker Gärtner.

During day 1 of the meeting the members of the data working group participated in the presentation of the research working group to get a feeling of the associated demands for data and information handling in GSICS cooperation.

In the morning of day 2 the members of the data working group presented their ideas on practical data arrangements in the joint plenary session. Mr. Y. Tahara (JMA) made some comprehensive suggestions on data exchange for GSICS. This was followed by an explanation and introduction on the EUMETSAT data services, presented by Mr. M. Jenner. The view of NOAA/NESDIS was provided by talks given by Mr. A. Jelenak and Mr. B. Barkstrom who outlined the problems and potential solutions for the long term preservation of results and data from GSICS activities. All presentations will be available from the current GSICS Web site at:

<http://www.orbit.nesdis.noaa.gov/smed/spb/calibration/icvs/GSICS/index.html>

The joint plenary ended with a short summary discussion, before the two working groups went into break out sessions for an in depth discussion aiming at a set of recommendations and actions on the way forward.

3. Recommendations

During the working group discussion it soon became very clear that two areas for coordination had to be addressed. For the information provision on GSICS the establishment, upgrade and maintenance of a central Web site was seen as mandatory. It was noted that a GSICS Web site already existed, however it was seen necessary to raise the profile of it by

trying to get it placed onto a dedicated server with its own domain name. Through this Web site links to the participating organisation's web sites should be established, making this a central entry point from where all relevant information and results of GSICS can be found.

As well on the central Web site as on the participant's dedicated Web pages the logo of GSICS should be shown to give this endeavour a unique identity. For the maintenance and coordination of the information content it was seen necessary to establish the job of a librarian, whose tasks would be to continuously maintain the central Web site and its embedded information. And furthermore the librarian would coordinate the balance between the central and the local information, which stored on all participating agency's Web pages.

The other area of coordination required was the operation and maintenance of a set of federated FTP servers to collect and store the data samples for inter-calibration calculations together with the results of those computations. To start this activity, it was suggested that NOAA/NESDIS and EUMETSAT would establish a set of mirrored servers. This setup would allow other partners to operate additional servers at a later stage whenever convenient.

Resulting from these discussions the following set of recommendations and actions were suggested to the final plenary joint meeting on day 3:

1. Concerning the enhancement of the current publicly accessible GSICS Web site(s):
 - Provide a central Web site where all relevant information can be consistently shared between GSICS partners.
 - Provide on this Web site URLs to link to the GSICS GPRC/CSS Web sites' pages that provide information on their current and historic satellites. Information such as how these systems were calibrated and the relevant data sets used, which characterised their sensors (e.g. spectral response function, noise figures) should be accessible via these links.
 - Enable the GSICS partners to regularly provide input to the central Web site (e.g. publications regarding the operational calibration of the instruments, news, recent progress reports).
 - On these individual GSICS GPRC/CSS web pages, make use of the GSICS logo.
 - Provide the characteristics of the collocation data sets shared by the GSICS partners (e.g. the sub-area defined, the frequency for which the data sets will be distributed, format guides and the recipients of these data sets).
 - Store useful tools such as data readers from GPRC/CSS, scientist and interested parties like the CSS.
 - Store Wiki pages providing useful information such as algorithms, techniques, pseudo code recommended and used by GSICS partners. These can be reviewed and edited by all GSICS partners to facilitate sharing of knowledge.
 - Store software code submitted by GSICS partners (this Web area will NOT be publicly accessible and will be limited to GSICS partners use only).
 - Store a mailing list where emails sent can be automatically transferred to GSICS partners.
 - Provide a software configuration environment where software developed between GSICS partners can be stored and versioned.

2. Resources shall be requested from cooperation partners to employ a librarian (in future librarians) to maintain this Web site. The librarian will be the central point of contact for updates and will periodically check that all GPRC/CSS links are alive and that they are updated with the latest information relevant to GSICS.
3. The GRWG shall define the co-location sub-areas for each partner's data sets (e.g. definition of spectral channels, time frequency, granules within a geo bounding box).
4. The co-location datasets during the test and operational phases shall be stored permanently, if affordable and technically feasible.
5. For the co-location data sets, NOAA/NESDIS shall provide the MODIS and AIRS data, and EUMETSAT shall provide the AVHRR and IASI data.
6. The geo collocation data sets shall also be stored.
7. For the initial implementation of these collection centres, a federated set of FTP servers at NOAA/NESDIS and EUMETSAT shall be set up to store and mirror all GSICS partner's co-location data. This can be considered as a vital part of the GCC implementation. New partners can easily be incorporated into this federated network. These centres shall be used for data exchange.
8. EUMETSAT will take the lead in the definition of the metadata and common catalogue schema.
9. NOAA/NCDC will take the lead in the definition of the registration of the filenames and documentation guidelines.
10. An initial static set of GEO/LEO data sets covering a 1-month period will be provided by NOAA/NESDIS and EUMETSAT on the federated FTP servers for GSICS benchmark processing. The inter-calibration results from these data sets shall be made available to GSICS partners and will be discussed in a subsequent meeting in 2008.
11. The data format for the co-location data sets shall be initially HDF5. This format is compatible with tools such as OPeNDAP, McIDAS, and IDV. Once NetCDF 4 is validated, the data will then be provided in this new format.
12. A set of common terms from Climate and Forecasting (CF) profile of NetCDF 4 for names, units, etc shall be adopted by the GSICS partners in order to use the same terminology during meetings.

The request to provide MODIS and AVHRR data in addition to the AIRS and IASI co-location data sets was originated by CMA. CMA expressed an interest in obtaining inter calibration data from AIRS, AVHRR, MODIS and IASI at 0° Lat, 105° E to 86.5° E ($\pm 40^\circ$). As EUMETSAT is archiving the AVHRR data globally in 1 km resolution, it was felt that for inter-calibration purposes these data would be most suitable.

4. Actions

In relation to the above recommendations the following list of actions was established:

| ACTION No. | ACTION | ACTIONEE |
|-------------------|---|--|
| WG 1 / 01 | Investigate the possibility of providing a server to host the GSICS Web site together with registering a domain like www.gsics.int . | Aleksandar Jelenak End July 2007 |
| WG 1 / 02 | Depending on the outcome of action 1, development of all services for the Web site. | Aleksandar Jelenak |
| WG 1 / 03 | Investigate whether it is possible for GSICS partners to receive MODIS data sets from NASA. | Bruce Barkstrom End July 2007 |
| WG 1 / 04 | Define the metadata and catalogue schemes for data exchange. | Marc Jenner End 2007 |
| WG 1 / 05 | Define the logical namespace for the files and documentation guidelines. | Bruce Barkstrom End October 2007 |
| WG 1 / 06 | Provide a new schedule to the GSICS executive panel for updating its schedule. | Bruce Barkstrom Mid October 2007 |
| WG 1 / 07 | GRWG shall define the co-location sub-area for each partner's data sets. | Volker Gärtner Fred Wu End June 2007 |
| WG 1 / 08 | Depending on the outcome of action 1, request the pseudo code / code offered by GSICS partners. | Aleksandar Jelenak |

It was agreed that the report from GDWD 1 would be presented to the next GSICS Executive panel beginning of November 2007.

5. Any other business

The meeting of GDWG 1 was concluded with the review of actions and recommendations by the joint meeting of GRWD and GDWG. It was agreed that the next GDWG meeting will be held together with GRWG 3 around beginning of February 2008 somewhere at the east coast of the United States.

GLOBAL SPACE-BASED INTER-CALIBRATION SYSTEM (GSICS)

Agenda for the Joint Meeting of Data Working Group (GDWG-I) and Research Working Group

12-14 June 2007, EUMETSAT, Darmstadt, Germany

DAY 1 Joint Session with GDWG-I Focusing on Research Issues

| | | |
|---------------|--|------------------|
| 09:30 – 09:45 | Coffee | |
| 09:45 – 10:00 | Welcome / Introduction | Johannes Schmetz |
| 10:00 – 10:30 | Recent GSICS Executive Panel Meeting and Operation Plan | Mitch Goldberg |
| 10:30 – 10:45 | Topic TBD | Jerome Lafeuille |
| 10:45 – 11:00 | Overview of GRWG-II (goal, outline, assignment) | Xiangqian Wu |

11:00 - 11:30 Coffee Break

| | | |
|---------------|--|-----------------|
| 11:30 – 12:00 | HIRS – METEOSAT inter-calibration | Leo van de Berg |
| 12:00 – 12:30 | IR Calibration Monitoring System for COMS in Korea | Sung-Rae Chung |

12:30 – 13:30 Lunch

| | | |
|---------------|--|----------------|
| 13:30 – 14:00 | Comparison of Method Suggested at GRWG-I | Yoshiko Tahara |
| 14:30 – 15:00 | Title TBD | Peng Zhang |

15:00 – 15:30 Coffee Break

| | | |
|---------------|--|------------------|
| 15:30 – 16:00 | CNRS LMD Infrared Inter-Calibration of MSG/Seviri-Calipso/IIR-Modis | Olivier Chomette |
| 16:00 – 16:30 | Inter-Comparisons between IASI and MSG | Marianne Koenig |
| 16:30 – 17:00 | IASI Performance during the Commissioning | Denis Blumstein |
| 17:00 – 17:30 | GSICS AIRS-GEO Inter-Calibration Algorithm and Initial Results | Xiangqian Wu |

End of Day 1

Day 2 Continuation of Day 1

| | | |
|---------------|--|---------------|
| 09:00 – 09:30 | CNES Methodology for In-Orbit Calibration of Visible and NIR Sensors | Patrice Henry |
| 09:30 – 10:00 | Operational Vicarious Calibration of the MSG/SEVIRI Solar Channels | Yves Govaerts |
| 10:00 – 10:30 | Title TBD | Dave Doelling |
| 10:30 – 11:00 | Summary / Discussion | All |

11:00 - 11:30 Coffee Break**DAY 2 Joint Sessions with GDWG-I Focusing on Data Issues**

| | | |
|---------------|--|----------------|
| 11:30 – 11:45 | Overview of GDWG-I (goal, outline, assignment) | Volker Gärtner |
| 11:45 – 12:15 | Suggestions on Data Exchange | Yoshiko Tahara |
| 12:15 – 12:45 | EUMETSAT Data Services | Marc Jenner |

12:45 – 13:45 Lunch**Joint Session with GDWG-I Focusing on Data Issues (continued)**

| | | |
|---------------|---|-------------------|
| 13:45 – 14:15 | NESDIS Title TBD | Alexander Jelenak |
| 14:15 – 14:45 | Science Data Stewardship Advances in Provenance Tracking for Data Production | Bruce Barkstrom |
| 14:45 – 15:00 | Summary / Discussion | All |

15:00 – 15:30 Coffee Break**15:30 – 17:30 Breakout Session for GRWG-II Discussion**

- ❖ Improve Collaboration – Work as a team
 - Common goal
 - Manageable database that helps to
 - Characterize differences among sensors and
 - Identify instrument performance issues
 - Steps towards the goal
 - Consensus algorithm
 - Ability to exchange and use data and algorithm
 - Verified by benchmark data, code, and results
- ❖ Distributed Research – Member take a lead in a coordinated ways
 - Solar bands

- Broadband sensors (e.g., MODIS with GEO)
- Narrow band instruments (GOES Sounder, HIRS)
- Convolution of hyperspectral measurements

- ❖ Technical Issues
 - Data issues that GDWG should know
 - Improve the AIRS-GEO algorithm
 - Modules (e.g., geometry)
 - Logics
 - Thresholds
 - Efficiency
 - Documentation (online and offline)

- ❖ Next Meeting
 - When – ~six month? Avoid certain months (e.g., December)?
 - Where – rotate among members?

- ❖ Other Topics

15:30 – 17:30 Breakout Session for GDWG-I Discussion

- ❖ Archiving requirements
- ❖ Access methods
- ❖ Data sets
- ❖ Meta Data
- ❖ Documentation
- ❖ Security Requirements

19:00 Social Event

DAY 3

09:00 – 10:30 Breakout Session for GRWG-II Discussion

Member's observations

- ❖ Three important issues, good or bad but prioritized
- ❖ 10 minutes presentation + 5 minutes discussion for each member
- ❖ Unlimited "minor points" in writing – may not have time for oral discussion but will be distributed

09:00 – 10:30 Breakout Session for GRWG-I Discussion (continued)

10:30 – 11:00 Coffee Break

11:00 – 12:30 Breakout Session for GRWG-II Discussion

Summarize meeting outcomes

Identify and prioritize issues that need and can be resolved

Tasks for members before GRWG-III

11:00 – 12:30 Breakout Session for GRWG-I Discussion (continued)

12:30 – 13:30 Lunch

Joint Session with GDWG-I – Summary

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|---------------|---------------------------------|------------------|
| 13:30 – 14:30 | Summary of the GRWG-II Outcomes | Xiangqian Wu |
| 14:30 – 15:30 | Summary of the GDWG-I Outcomes | Volker Gärtner |
| 15:30 – 15:45 | Closing Remarks | Johannes Schmetz |
| 15:45 | Meeting Adjourned | |

Participants to the Joint Meeting of the GSICS Data and Research Working Group

| Name | Affiliation | GRWG | GDWG |
|---------------------|--------------------|-------------|-------------|
| Zhang, Peng | CMA | X | |
| Rong, Zhiguo | CMA | | X |
| Henry, Patrice | CNES | X | |
| Blumstein, Denis | CNES | X | |
| Armante, Raymond | LMD | X | |
| Chomette, Olivier | LMD | X | |
| Tahara, Yoshihiko | JMA | X | |
| Barkstrom, Bruce | NOAA/NESDIS | | X |
| Jelenak, Aleksander | NOAA/NESDIS | | X |
| Wu, Xiangqian | NOAA/NESDIS | X | |
| Goldberg, Mitch | NOAA/NESDIS | X | |
| Doelling, David. R | NASA Langley | X | |
| Lafeuille, Jerome | WMO | X | X |
| Chung, Sung-Rae | KMA | X | |
| Park, Hye-Sook | KMA | X | |
| Gärtner, Volker | EUM | | X |
| Govaerts, Yves | EUM | X | |
| Jenner, Marc | EUM | | X |
| König, Marianne | EUM | X | |
| Rattenborg, Mikael | EUM | X | |
| Schmetz, Johannes | EUM | X | |
| Van de Berg, Leo | EUM | | X |
| Peter Miu | EUM | | X |