SCOPE-CM WEBEX

SCM-06 IOGEO
SCOPE, STATUS, AND PLANS 2015

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CMA: Peng Zhang, Xiuqing Hu

DWD: Marc Schroeder

IMD: TBD

SCM-06: Inter-calibration of passive imager observations from time-series of geostationary satellites

Objective:

to generate a Fundamental Climate Data Record (FCDR) of calibrated and quality-controlled geostationary sensor data, including the visible, infra-red window and water vapour absorption channels of geostationary satellites.

Composition Project Team

- **EUMETSAT:** European Organisation for the Exploitation of Meteorological Satellites (Rob Roebeling, Tim Hewison)

- **JMA:** Japanese Meteorological Agency (Masaya Takahashi)

- **NOAA:** National Oceanic and Atmospheric Administration (Kenneth Knapp, Anand Inamdar)

- **DWD:** Deutscher Wetterdienst (Marc Schroeder)

- **CMA:** China Meteorological Administration (Peng Zhang, Xiuqing Hu)

- **IMD:** TBC (A.K, Sharma and Ashim Mitra)

- **NASA:** TBC (Dave Doeling)

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Method IR and WV recalibration:

- to utilise the inter-satellite methodology developed by GSICS;

- to tie time series of IR and WV satellite data to the High Resolution Infrared Sounder (HIRS) data using Double Differencing;

- to monitor quality and stability of the HIRS observations with observations from IASI and AIRS;

- to adopt a common recalibration approach at NOAA, JMA, CMA, and EUMETSAT;

- to generate FCDRs of IR & WV radiances for the GEO satellites;

- to inter-compare FCDRs of IR & WV radiances in overlapping regions, and compare them against output from observational feedback archive at ECMWF;

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SCM-06: Inter-calibration of passive imager observations from time-series of geostationary satellites

Method VIS recalibration:

- to assess the VIS inter-calibration methodologies developed by GSICS;

- to develop a consensus inter-calibration approach for the VIS channels;

- to implement the consensus VIS inter-calibration approach at the 4 agencies;

- to generate of VIS reflected radiance FCDRs for the GEO satellites;

- to inter-compare the FCDRs of VIS reflected radiance for the 4 agencies;

- to gather feedback from beta users;

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| Task	Description	Period	Actors
WP 0 **Management**			
0.1	**Establish contacts with INPE, KMA, and CMA at the upcoming CGMS meeting (CGMS-41 in July 2013)**	**2013**	**EUM**
0.2	**Detail project implementation plan with participating partners. Among others, to include a schematic view of the data flow between the participating space agencies (as requested by the SEP).**	**2013**	**ALL**
0.3	**Define the involved of INPE, KMA, and CMA within this SCOPE-CM-project**	**Q1**	**EUM**
0.4	**Set-up a web application for exchange of project information**	**Q1**	**EUM**
0.5	**Attend quarterly Tele Conferences**	**Q1-Q4**	**ALL**
0.6	**Contribute to *Progress Report 2014* and *Work Plan 2015***	**Q4**	**ALL**
WP 1 **R & D inter-calibration methods for the infrared (IR) and water vapour (WV) channels**			
1.1	**Research the potential of using HIRS on Metop, tied to IASI observations, as reference instrument**	**Q1**	**EUM, NOAA**
1.2	**Contribute to the research on the potential of using HIRS on Metop as reference instrument (WP 1.1)**	**Q1**	**JMA**

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WP 2 Modification of the IR and WV inter-calibration approach			
2.1	Update of the IR and WV inter-calibration approach for the GOES satellites. This activity is performed jointly with JMA and EUMETSAT. The actions are: •to share and discuss inter-calibration methods used within the SCOPE-CM activity on ISCCP reprocessing •to compare inter-calibrated results derived from full resolution data against those derived using sub-sampled ISCCP data •to exchange experiences on settings to be used for selecting simulations overpasses between the monitored and reference instrument, and for applying the double difference approach.	Q2-Q3	NOAA
2.2	Update the IR and WV inter-calibration approach for the METEOSAT satellites in line with the approach proposed by NOAA. This task is performed jointly with JMA and NOAA. The actions are: •to include the useful temporal resolution imagery; •to apply double differencing for inter-calibration; •to tie the HIRS reference to IASI.	Q2-Q3	EUM
2.3	Contribute to the update of the IR and WV inter-calibration approach for the MTSAT satellites in line with the approach proposed by NOAA. This task is performed jointly with NOAA and EUMETSAT.	Q2-Q3	JMA, CMA
WP 3 Implementing and testing the IR & WV inter-calibration approach			
3.1	Implement the updated IR & WV inter-calibration approach at the participating space agencies;	Q3	EUM, NOAA, JMA, CMA
3.2	Prepare test datasets of observations from the geostationary satellites operated by the participating space agencies; (i.e. METEOSAT, GOES, or MTSAT)	Q3	EUM, NOAA, JMA, CMA
3.3	Test the updated IR & WV inter-calibration approach on the test datasets;	Q3-Q4	EUM, NOAA, JMA, CMA

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WP 4 Generation of inter-calibrated IR & WV radiances for the GEO satellites;			
4.1	Collect data required for the generation of the FCDRs, or the generation of inter-calibration coefficients, for the GEO satellites; (i.e. HIRS and IASI reference data, and geostationary satellite data of the satellites operated by the participating space agencies)	Q3-Q4	EUM, NOAA, JMA, CMA
4.2	Generation of FCDRs or inter-calibration coefficients for IR & WV radiances from observations from the METEOSAT, GOES, and MTSAT geostationary satellites;	Q4	EUM, NOAA, JMA, CMA
WP 5 Free Tropospheric Humidity demonstrator product			
5.1	Development and computation of a Free Tropospheric Humidity (FTH) geo-ring demonstrator product for July 2009. The items of this activity are: • to define a common reference channel; • to compute spectral calibration coefficients. *Note: this activity starts in 2013.*	Q1-Q2	DWD
5.2	Test the recalibrated WV radiances for the FTH demonstrator product and assess the differences with previously used calibration for the common reference channel.	Q4	DWD

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Meteosat-7 vs. HIRS/2 on NOAA-14 and NOAA-15
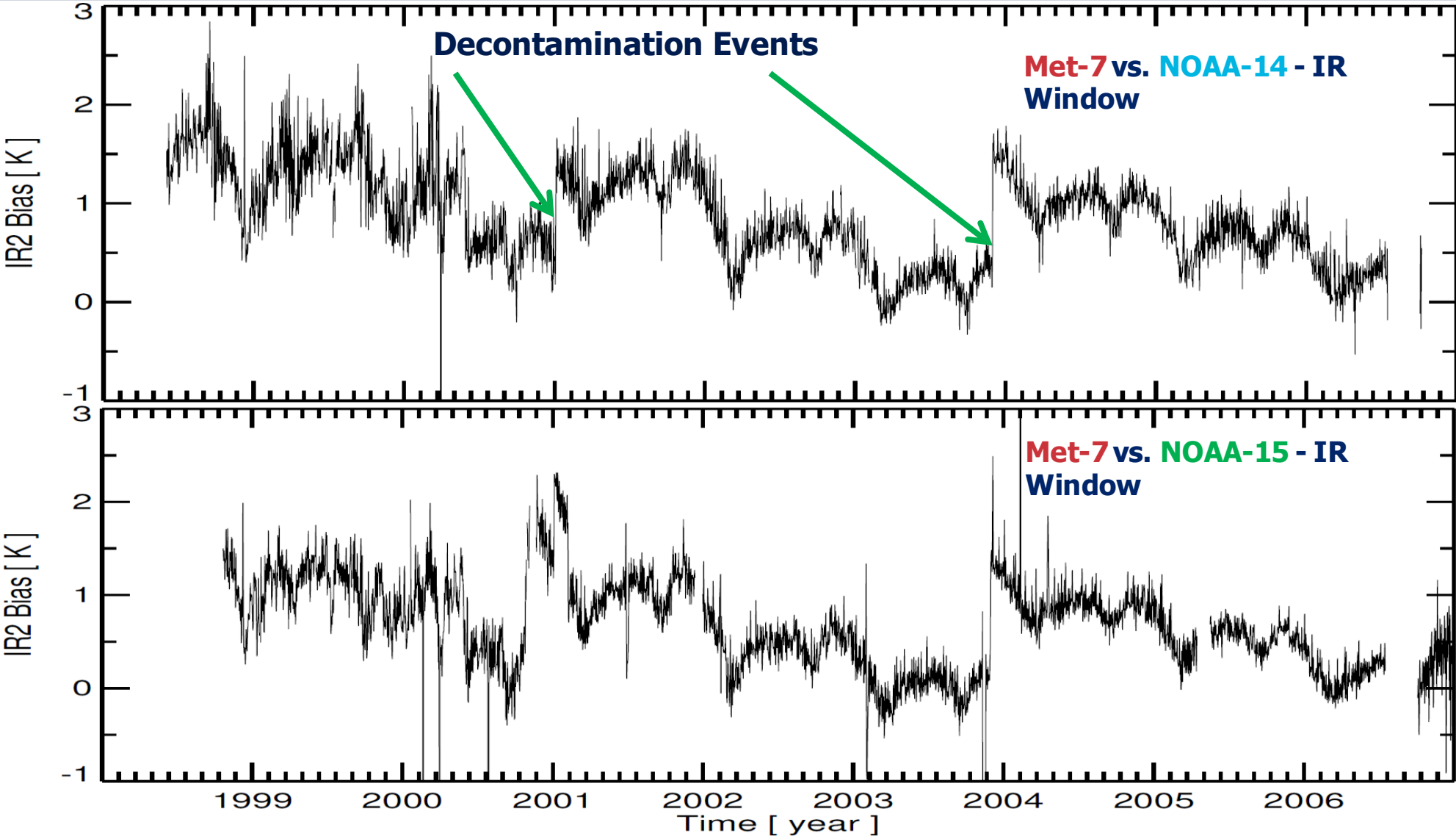
Discussion Topics

Should we re-calibrate and/or inter-calibrate?

Recommandation CGMS-ICWG: there is a need for accurate calibration of the visible (VIS) and near-infrared (NIR) channels of passive images (2-3%), and stresses the importance of providing these calibrations for the current and the heritage instruments *(e.g. MVIRI, SEVIRI, AVHRR, MODIS, VISSR, IMAGER, VIIRS..)*

Discussion on Fundamental Climate Data Records (FCDRs):
Absolute (unique for each sensor version) and relative (referring to one particular sensor version) recalibrations are both important. FCDRs shall provide three data representations that are internally convertible, i.e.:

1. *Raw counts (original counts and associated auxiliary data/measurements)*

2. *Conversion coefficients to calculate **Absolute radiances**
   (radiances converted to best estimate of the particular sensor matching its spectral response function)*

3. *Conversion coefficients to calculate **Relative radiances**
   (radiances converted to a reference sensor matching its spectral response function).*

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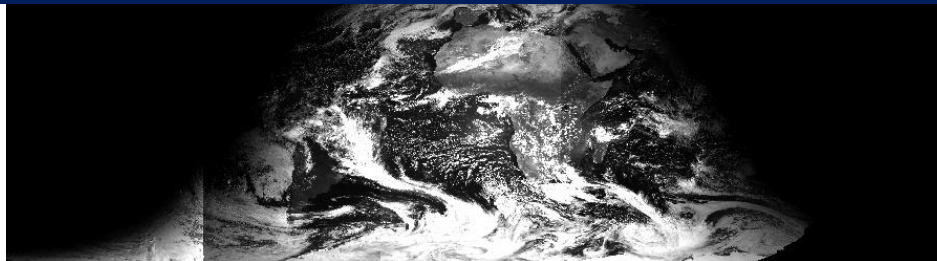# Should we derive combined GEO ring product?

IR Combined
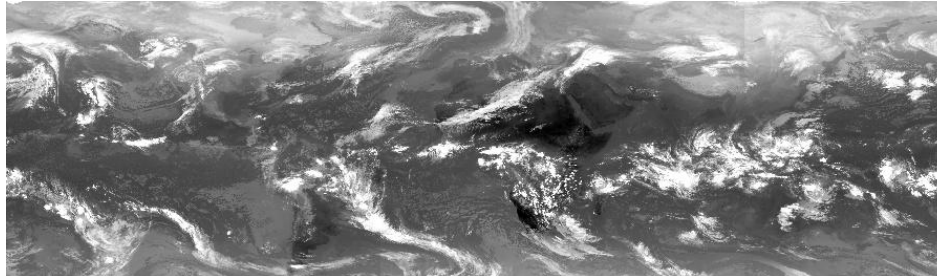
The results of SCM-06 can be used to generate a combined gridded products. SCM-06 to discuss such an activity could be part of the project

Proposal is to generate GridSat-B1 like product, but with:
- improved coverage (more satellites);
- improved temporal and spatial resolution (hourly, 0.05x0.05 degree).

VIS Combined

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Task	Description	Period	Actors
WP 0 Management			
0.1	**Define the involved of IMD and NASA within this SCOPE-CM-project**	**Q1**	**EUM**
0.2	**Set-up a web application for exchanging project information**	**Q1**	**EUM**
0.3	**Detail project implementation plan with participating partners. Among others, to include a schematic view of the data flow between the participating space agencies (as requested by the SEP).**	**Q1-Q4**	**ALL**
0.4	**Attend quarterly (and topical) Tele Conferences**	**Q1-Q4**	**ALL**
0.5	**Contribute to *Progress Report 2015* and *Work Plan 2016***	**Q4**	**ALL**
WP 1 R & D inter-calibration methods			
1.1	**R&D on method to create a bias correct time-series of HIRS/2, HIRS/2 (based on AIRS), and HIRS/2 (based on IASI) radiances.**	**Q1**	**EUM**
1.3	**Knowledge exchange with SCOPE-CM and GSICS activities:** • **to share and discuss inter-calibration methods used within the SCM-05 (AVHRR_FCDR) and SCM-09 (ISCCP);** • **to exchange experiences on settings to be used for selecting simulations overpasses between the monitored and reference instrument, and for applying the double difference approach.**	**Q1-Q4**	**EUM, NOAA, JMA,CMA**
1.4	**Assessment of visible (VIS) calibration methods in close collaboration with GSICS, including methods using well understood targets (e.g. DCC, desert, or moon targets) and simultaneous nadir overpass radiance comparisons (e.g. against other imagers or spectrometers);**	**Q1-Q4**	**EUM, NOAA, JMA,CMA**
1.5	**Initiate a pilot study on making a Gridded Satellite Data product including the heritage channels (VIS, IR, WV) on all geostationary satellites (e.g. hourly product at 0.05°x0.05° resolution)**	**Q4**	**EUM, NOAA, JMA,CMA**

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	WP 2 **Implementing and testing the IR & WV inter-calibration approach**		
2.1	Update of the IR and WV inter-calibration approach(es) for the METEOSAT, GOES, MTSAT, or FY-2 (C and later) satellites.	Q1	EUM, NOAA, JMA,CMA
2.2	Implement the updated IR & WV inter-calibration approach at the participating space agencies;	Q1	EUM, NOAA, JMA,CMA
2.3	Generate, for a common test period, a datasets of inter-calibrated IR and WV radiances from the geostationary satellites operated by the participating space agencies (i.e. METEOSAT, GOES, MTSAT, or FY-2 (C and later));	Q1	EUM, NOAA, JMA,CMA
2.4	Compare, for a common test period, the METEOSAT, GOES, MTSAT, or FY-2 (C and later) the inter-calibrated IR and WV radiances in overlap regions;	Q2-Q3	EUM, NOAA, JMA,CMA
2.5	Compare inter-calibrated IR and WV radiances derived from full resolution data against those derived using sub-sampled ISCCP data;	Q1-Q2	NOAA
	WP 3 **Generation of inter-calibrated IR & WV radiances for the GEO satellites;**		
3.1	Generation of FCDRs including inter-calibration coefficients for IR & WV radiances from observations from the METEOSAT geostationary satellites;	Q1	EUM
3.2	Generation of FCDRs, or inter-calibration coefficients, for IR & WV radiances from observations from the GOES, MTSAT, or FY-2 (C and later) geostationary satellites;	Q2-Q3	NOAA, JMA,CMA
3.3	Prepare and provide user documentation for public distribution of the IR & WV FCDRs or their recalibration coefficients;	Q4	EUM, NOAA, JMA,CMA

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WP 4 Free Tropospheric Humidity demonstrator product			
4.1	Regenerate the FTH demonstrator product with the WV FCDRs as input and assess the improvement	Q4	DWD
4.2	Prepare and provide user documentation for public distribution of the FTH demonstrator product;	Q4	DWD

SCM-06: Dependencies and Links

SCM-06: Internal dependencies

- CM SAF: needs inter-calibrated WV radiances from GEO's time-series (2015-2016)
- All partners: need inter-calibrated HIRS radiances for selection of channels (2015)

SCM-06: Links to external projects

- SCM Albedo   : needs re-calibrated VIS radiances GEO's
- SCM FCDR   : needs inter-calibrated HIRS data record
- ISCCP   : needs inter-calibrated IR and VIS radiances
- EU QA4ECV   : needs re-calibrated VIS radiances METEOSATs
- CM SAF   : compares WV products CM SAF and NOAA
- EU-H2020   : e.g. FIDUCEO (EO-02 project related to re-calibration)
- ESA-CCI   :
- SCM ISCCP   : provides scientific knowledge on IR, and VIS inter-calibration
- GSICS   : provides scientific knowledge
  - *Developing best practises to define reference instrument*
  - *Developing best practises to define Spectral Band Adjustment Factors*

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Thank You

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