10 November 2016

Review of Prime GSICS Correction for Meteosat Imagers - Demonstration Phase

The SEVIRI Prime GSICS Corrections submitted by EUMETSAT to GPPA ensures traceability back to single primary reference instrument. In addition to that, it is useful for users because they can keep using single file even after the end of reference instrument life time. As Manik Bali noted on his review document, I have mainly reviewed the ATBD, product validation report and GSICS file naming / netCDF Conventions from a standpoint of JMA GPAT member and GDWG co-chair. After some minor changes (please find the following my reviews), I think the SEVIRI-IASI Prime GSICS Correction would be enough to enter Demonstration Phase. I would also like to point that *Preliminary Validation of SEVIRI-IASI Prime GSICS Corrections*, which was reported by Tim Hewison on 7 November 2016, meets a request of product validation report from GSICS-EP (discussed at GSICS-EP-17 in June 2016).

Masaya Takahashi
Meteorological Satellite Center, Japan Meteorological Agency

2015-12-16 17:44
From: Masaya Takahashi
To: Manik Bali and Tim Hewison
Cc: Ashim Mitra, Dohyeong Kim, Fangfang Yu, Peter Miu and Na Xu

Dear Manik and Tim,

I am very pleased to see EUMETSAT submitted new kind of GSICS Correction which will ensure traceability back to single primary reference instrument. It is also useful from users point of view: we can keep using single file even after the end of reference instrument life time. I have the following minor comments and questions. Once my comments are reflected, I would like to encourage SEVIRI Prime GSICS Corrections to enter Demonstration Phase.

A) ATBD
Please have a look of attached docx file.

B) GPAF
B-1) Tim's comment [RSP/TJH1]: I agree with you. Manik, would you please update the point of contact from Bob to you?
B-2) [RSP/TJH2]: It would be a nice proposal to be discussed at the forthcoming annual meeting. I think we have two ways for the operation/distribution: one is GSICS THREDDS server and the another is operational L1 dataset which contains a part of GSICS Correction.

C) netCDF file

File naming

C-1) "20120812------" for the filename is fine, but it may be good to keep using "000000" to clarify the starting period of time.

Just for your information, Simon's comments can be found on:
https://groups.google.com/forum/#!topic/gsics-dev/uV-UmMoijgM (11 Nov 2014):
"Just a thought about the use if the naming convention: note that "If a particular date and time stamp field is not specified,
it should be replaced by a '-' (minus) character. For example: ------311500-- represents a stamp that specifies only the day (31st), hours (15) and minutes (00)."
So please don't put zeroes in the name unless you really mean that time. If the seconds or minutes are not relevant, you should use a '-'."

I think the expression using '-' is suitable for the data such as collocation intermediate data. The example is at the bottom of https://gsics.nesdis.noaa.gov/wiki/Development/FilenameConvention.

Global Attributes

C-2) How about adding a comment that this is Prime GSICS Correction?
C-3) Can we suppose "reference_instrument" represent Primary Reference in this case? It would be good to add Global Attributes to clarify Prime reference and Secondary references.
C-4) I would recommend to use window_period = "P-14D+14D". This is the outcome of the discussion through gsics-dev.
C-5) It would be useful if we add a comment on period of data for each reference to new Global Attribute or summary.

Variables

C-6) Does "number_of_collocation" represent total number of the collocation data (e.g. IASI-A + IASI-B) if there is an overwrap period?

C-7) Attached two figures are time series of standard TB biases and its standard error (uncertainty) from the Prime Correction netCDF attached in Manik's previous email and IASI-A/-B RAC "demo" files on the EUMETSAT THREDDS server:

IASI-A) http://gsics.eumetsat.int/thredds/catalog/msg3-seviri-metopa-iasi-demo-rac/catalog.html;
IASI-B) http://gsics.eumetsat.int/thredds/catalog/msg3-seviri-metopb-iasi-demo-rac/catalog.html.

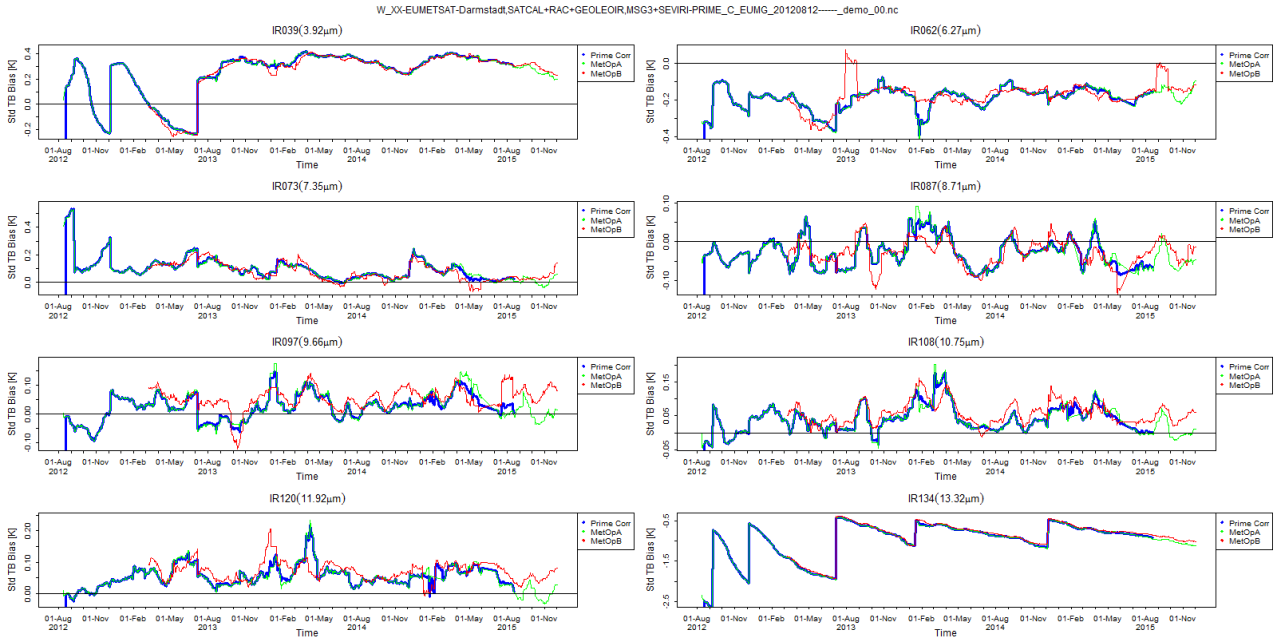
The first 6 standard TB bias in the Prime Correction (12-17 Dec. 2012) are about -282 [K]. Are they expected values? I also found uncertainty jumps around Feb/Mar 2014 even though the uncertainty for IASI-A/-B looks

smooth and not so large. Did I use wrong netCDF files for IASI-A/-B?

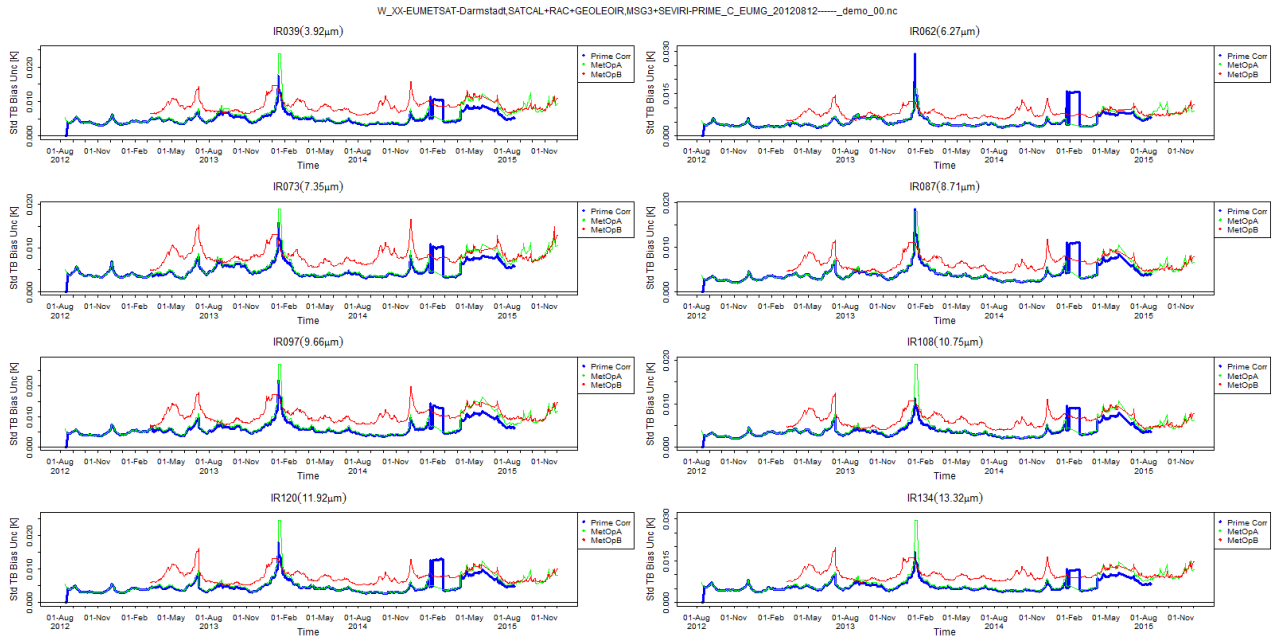
All the best,

Masaya

Time series of TB bias at standard scene



Time series of uncertainty of TB bias at standard scene



2015-12-18 02:44
From: Tim Hewison
To: Masaya Takahashi
Cc: Ashim Mitra, Dohyeong Kim, Fangfang Yu, Manik Bali, Peter Miu and Na Xu

Hi Masaya,

Thanks for your feedback and careful review - most valuable as always.

A) ATBD
I have corrected the typos you pointed out in the ATBD. With regard to your other comments:

>It's not clear how to calculate this quantity (equivalent biases calculated from cumulative Delta
> Correction). Would you please add a short explanation?

I revised the text a bit:
"Figure 3 shows the time series of their double difference, and the delta correction defined cumulatively from it using Equation 4 (after converting to equivalent brightness temperature bias for a standard radiance scene), together with their associated uncertainties. This shows that step changes in either time series increase the uncertainty in the delta correction."

>Is it reasonable (to assume no correlation between Delta Correction and GISCS Corrections)?
>It would be great if you could add the reason why we can assume that.
There are no reasons to assume we can neglect these terms, but otherwise the equations become unmanageable. So I have just re-written that as: "For simplicity, we assume no correlation between Delta Correction and GSICS Corrections:"

Similarly, for simplicity, we make the crude approximation that the coefficients' covariance is proportional to their fractional uncertainty, scaled by the covariance of the secondary correction coefficients

>Just a comment. IASI-B uncertainty is smaller than that you presented at the web meeting in July
> 2014: slide 52 of
> https://gsics.nesdis.noaa.gov/pub/Development/20140723/PrimaryReferences_Examples2.pptx.
>Did you change the processing?

Well spotted! Yes - I made several changes since July 2014, including fixing a bug in the way I inflated the uncertainties generated by the Demo GSICS products.

>How about referring the ATBD for Operational Phase?
Just as soon as it is published on our website!

B) GPAF

>B-2) [RSP/TJH2]: It would be a nice proposal to be discussed at the forthcoming annual meeting.
>I think we have two ways for the operation/distribution: one is GSICS THREDDS server and the
> another is operational L1 dataset which contains a part of GSICS Correction.
Agreed - I added it to the topics on the GSICS Wiki:

C) netCDF file
I will keep the '000000' term in the filename for the 'hhmmss' field - at least for now.

Global Attributes
>C-2) How about adding a comment that this is Prime GSICS Correction?
Changed "Comment" Global attribute to read:

"These Prime GSICS Re-Analysis Corrections allow the data from the infrared channels of this Meteosat SEVIRI to be corrected to be radiometrically consistent with the Primary GSICS Reference (MetopA/IASI). This is achieved by combining inter-calibration results using different IASIs, as Secondary References.

Use the RAC with the time closest to the time of interest. Take great caution when applying it at a date where this difference is greater than the window_period."

>C-3) Can we suppose "reference_instrument" represent Primary Reference in this case? It would be
> good to add Global Attributes to clarify Prime reference and Secondary references.
There is already a variable called "reference_name", which is a character array. However, it was not correctly populated in the versions I distributed with the GPPA. I have corrected this, so it now contains
reference_name =
"METOPA+IASI",
"METOPB+IASI" ;

>C-4) I would recommend to use window_period = "P-14D+14D". This is the outcome of the
> discussion through gsics-dev.
Thanks for spotting this too. I have changed it.

>C-5) It would be useful if we add a comment on period of data for each reference to new Global
> Attribute or summary.

Agreed! But I would like to agree a format for this first. I was thinking of adding a new variable 'reference_weight', with dimensions ['chan', ,'ref', 'date']. However, I have not managed to get this working yet.

Variables

>C-6) Does "number_of_collocation" represent total number of the collocation data (e.g. IASI-A +
> IASI-B) if there is an overwrap period?

This refers to the total number of collocations from all reference instruments used in this window_period (not the total used to define the delta correction).

>C-7) Attached two figures are time series of standard TB biases and its standard error (uncertainty)
> from the Prime Correction netCDF attached in Manik's previous email and IASI-A/-B RAC
> "demo" files on the EUMETSAT THREDDS server:
>IASI-A)
>http://gsics.eumetsat.int/thredds/catalog/msg3-seviri-metopa-iasi-demo-rac/catalog.html;
>IASI-B)
>http://gsics.eumetsat.int/thredds/catalog/msg3-seviri-metopb-iasi-demo-rac/catalog.html.
>The first 6 standard TB bias in the Prime Correction (12-17 Dec. 2012) are about -282 [K]. Are
> they expected values? I also found uncertainty jumps around Feb/Mar 2014 even though the
> uncertainty for IASI-A/-B looks smooth and not so large. Did I use wrong netCDF files for
> IASI-A/-B?

Thanks for spotting this too. It did not show up in my plotting tools. There must be a bug in the part of my code that deals with short overlap periods. I will check… Also, I don't know what went wrong in Feb 2015. I will recheck after fixing the short overlap bug.

So, to sum up. Thanks again for your feedback. For the official Demo products I will:

1. Update the ATBD as mentioned.
2. Fix the above bugs in the code.
3. Make the changes to the netCDF you suggested.

I had hoped to get all this done this week, but now I'm leaving for my Christmas break, so it will have to wait for the new year.

Regards,
Tim

2015-12-24 14:37
From: Masaya Takahashi
To: Tim Hewison
Cc: Ashim Mitra, Dohyeong Kim, Fangfang Yu, Manik Bali, Peter Miu and Na Xu
Hi Tim,

My pleasure. I also appreciate your reply every time. I look forward to seeing your reviced ATBD and netCDF files. I just recall I forgot to point that the sample IDL code in the ATBD is absolutely useful to understand how the Prime Correction is generated.

Best wishes,
Masaya

2016-01-12 19:06
From: Tim Hewison
To: Manik Bali
Cc: Masaya Takahashi, Ashim Mitra, Dohyeong Kim, Fangfang Yu, Peter Miu and Na Xu
Subject: RE: Fwd: GPPA Submission for Meteosat-IASI Prime GSICS Corrections to enter Demo Phase

Hi Masaya, and other GPAT members,
Just an update. Now I have caught up and fixed the outstanding issues mentioned in this email:

1. Fixed the bug with short overlap periods, which caused the zero correction coefficients in the first 7 days. (This also removed the erroneous uncertainty jump you reported.)
2. Added reference_weight variable.
3. Reprocessed the data with the revised code and uploaded to our GSICS Server: http://gsics.eumetsat.int/thredds/catalog/msg3-seviri-prime-iasi-demo-rac/catalog.html?dataset=msg3-seviri-prime-iasi-demo-rac/W_XX-EUMETSAT-Darmstadt,SATCAL%2BRAC%2BGEOLEOIR,MSG3%2BSEVIRI-PRIME_C_EUMG_20120812000000_demo_00.nc
4. Revised the ATBD with the updated code sample and uploaded it to the GSICS Wiki: ATBD for EUMETSAT Demonstration Prime GSICS Corrections for Meteosat-SEVIRI<https://gsics.nesdis.noaa.gov/pub/Development/AtbdCentral/ATBD_for_EUMETSAT_Demonstration_Prime_GSICS_Corrections_for_Meteosat-SEVIRI.docx> (Candidate for Demonstration Mode)

Please continue your reviews.

I look forward to hearing your confirmation that this product can enter demonstration mode asap.
Best regards,
Tim

2016-01-14 22:23
From: Masaya Takahashi
To: Tim Hewison
Cc: Ashim Mitra, Dohyeong Kim, Fangfang Yu, Manik Bali, Peter Miu and Na Xu

Hello Tim and all,

I appreciate your work to update the product file and the ATBD. Reviced ATBD is fine with me, but I have the following comments on the netCDF file.

a) new variables

reference_weight has "NaN" values at t=209. What does it mean? I found "reference_name" variable is also added, but all the values are blanks. In addition to that, both variables have few attributes. Would it be possible for you to add some attributes (e.g. long_name, units, valid_min/max, _FillValue)?

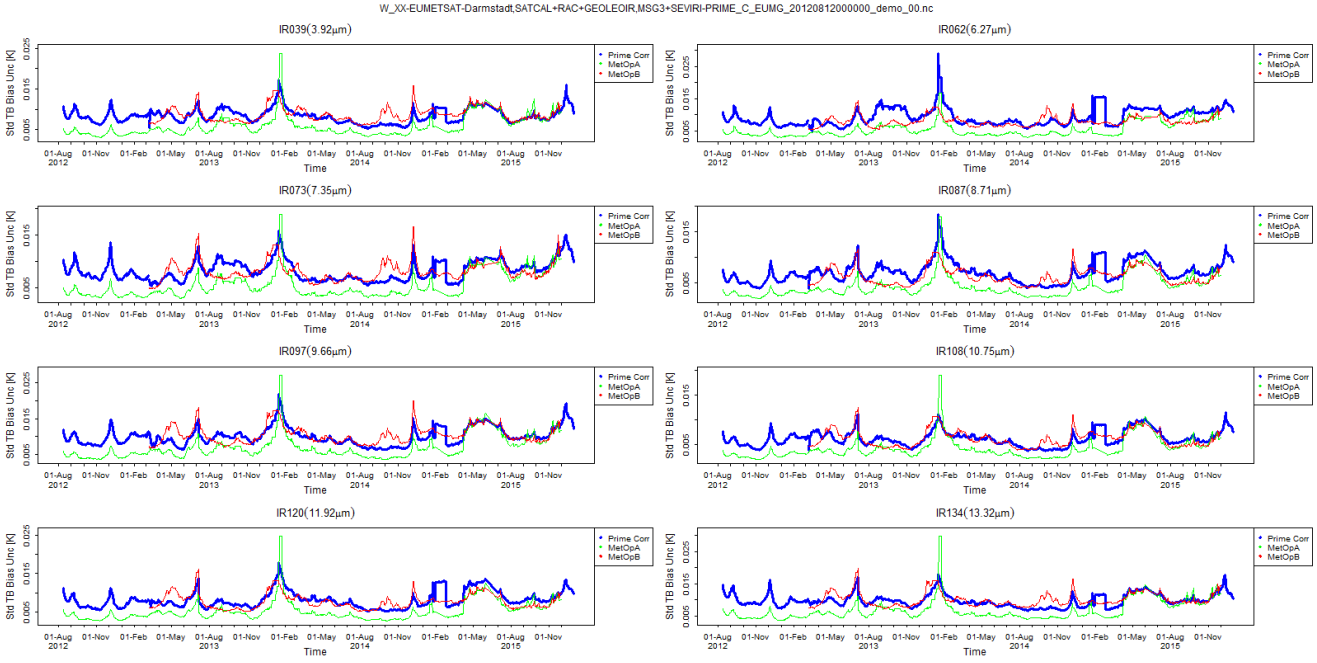
b) TB bias uncertainty at standard scene

Attached png files are time series plots of the standard uncertainty. *_rev.png is the plot using the revised Prime GSICS Correction, and *_1st.png is the plot using the file before the bug fix. Zero correction coefficients are fixed, but I found the uncertainty of the Prime Corrections seems to have systematic bias compared with that of IASI-A. Is this the result of an inflation? I also found a period of stepwise uncertainty at around March 2015. Is it correct?

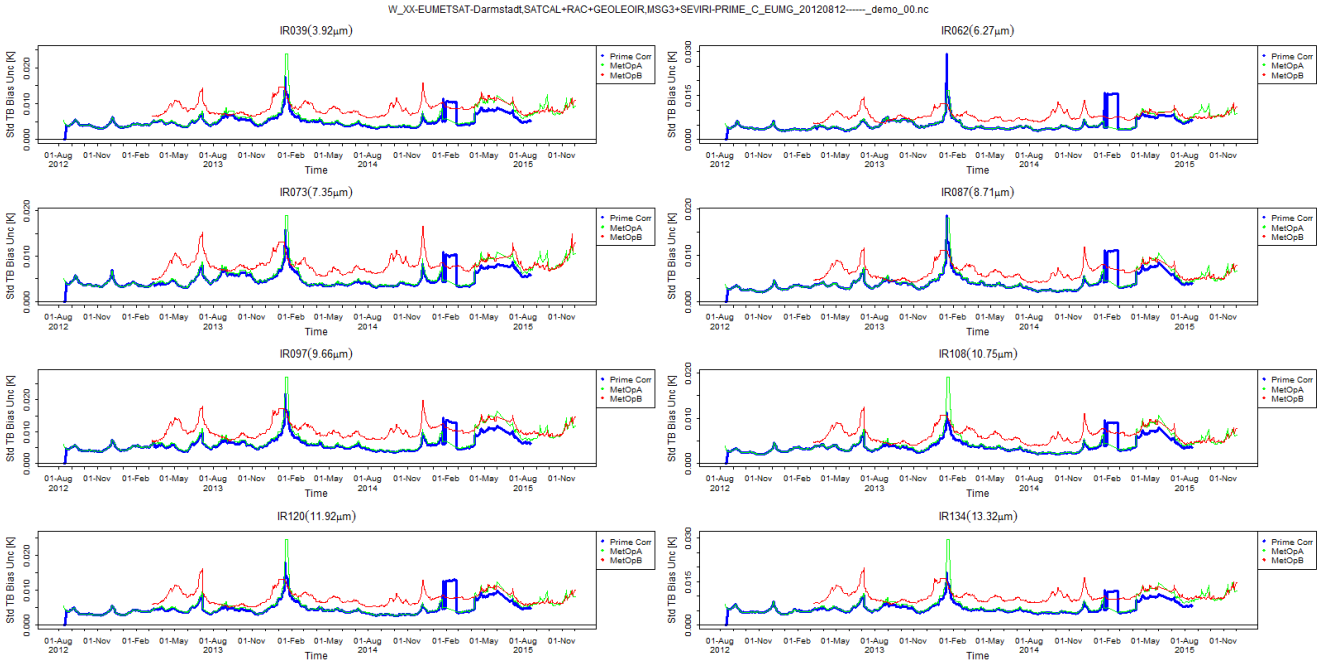
> I look forward to hearing your confirmation that this product can
> enter demonstration mode asap.
That's fine with me, but I think one or two other GPAT members' comments should be provided before entering the Demo-phase.

Best regards,
Masaya

Time series of TB bias at standard scene



Time series of uncertainty of TB bias at standard scene



2016-01-19 18:32
From: Tim Hewison
To: Masaya Takahashi
Cc: Ashim Mitra, Dohyeong Kim, Fangfang Yu, Manik Bali, Peter Miu and Na Xu
Subject: RE: Fwd: GPPA Submission for Meteosat-IASI Prime GSICS Corrections to enter Demo Phase

Hi Masaya and all,

Thanks again to Masaya for his continued eye to detail and quality!

a) new variables
> I found "reference_name" variable is also added, but all the values are blanks.
Oops! - Fixed that!

> reference_weight has "NaN" values at t=209. What does it mean?
It means Not A Number. It is caused by a corresponding absence of uncertainty information in the first time step of the RAC for the secondary reference, which is propagated to the Prime Correction. However, reviewing this, I spotted a bug that handles the start of the overlap period. I have fixed that now.

> In addition to that, both variables have few attributes. Would it be possible for you to add some attributes (e.g. long_name, units, valid_min/max, _FillValue)?
Fixed!

b) TB bias uncertainty at standard scene
> Attached png files are time series plots of the standard uncertainty.
*_rev.png is the plot using the revised Prime GSICS Correction, and *_1st.png is the plot using the file before the bug fix. Zero correction coefficients are fixed, but I found the uncertainty of the Prime Corrections seems to have systematic bias compared with that of IASI-A. Is this the result of an inflation? I also found a period of stepwise uncertainty at around March 2015. Is it correct?

Yes - that is the result of the artificial inflation applied to correct for the underestimation of the uncertainties in my demo SEVIRI-IASI products. The uncertainty jump around March 2015 was also probably caused by me applying this inflation in the SEVIRI-IASI products also for this period.

I have further revised the sample code in the ATBD:
https://gsics.nesdis.noaa.gov/pub/Development/AtbdCentral/ATBD_for_EUMETSAT_Demonstration_Prime_GSICS_Corrections_for_Meteosat-SEVIRI.docx

Best regards,
Tim

2016-01-20 10:42
From: Masaya Takahashi
To: Tim Hewison
Cc: Ashim Mitra, Dohyeong Kim, Fangfang Yu, Manik Bali, Peter Miu and Na Xu

Hello Tim and all,

Thanks for your quick updates of the netCDF and the ATBD, I confirmed them.

> > reference_weight has "NaN" values at t=209. What does it mean?
> It means Not A Number. It is caused by a corresponding absence of
> uncertainty information in the first time step of the RAC for the secondary reference
Sorry, my question was not correct. I know the mean of NaN, I wanted to know the reason (so thank you for explaining that!).

Both the product file and the ATBD have been revised well. I would still like to hear other GPAT members' comments, but I think the SEVIRI-IASI Prime GSICS Correction would be enough to enter Demo-Phase.

All the best,
Masaya