

# GEO-LEO IR Progress at ISRO

**Annual Meeting of GRWG/GDWG, JAXA, Japan  
29-Feb to 5-Mar, 2016**

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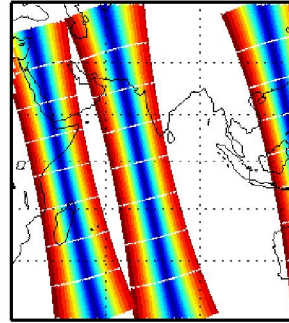
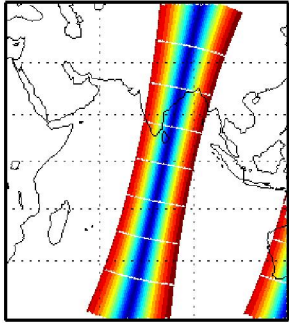
*Space Applications Centre (ISRO)  
India*

- Implementation of GSICS procedure of ISRO's GEO satellite started with IASI data in bufr format received from EUMETCAST.
- There were large gaps in data reception from EUMETCAST (due to location and position of antenna, weather related problem etc.)
- After last year GSICS meeting, EUMETSAT made an arrangement to provide IASI data (in netcdf format) through THREDDS server.
- Made necessary changes in GSICS procedure chain to fetch data from EUMETSAT THREDDS server and to handle netcdf format.
- The data received from THREDDS couldn't make seamless arrangements. The data latency was not fixed, older data is also pushed, there were data gaps (during day time) over Indian land mass.
- Explored possibility of getting data from NOAA CLASS. Data was available in native format.
- Switched over to manually ordering and downloading from eo-portal (eumetsat website). We decided to download data in bufr format.
- Problem arose because of limited quota of ISRO users and ROI filtering while fetching data in bufr format.
- Finally switched over to manually ordering and downloading from eo-portal (eumetsat website). We decided to download data in netcdf format (different from the netcdf files fetched from THREDDS server)

MetopA Day

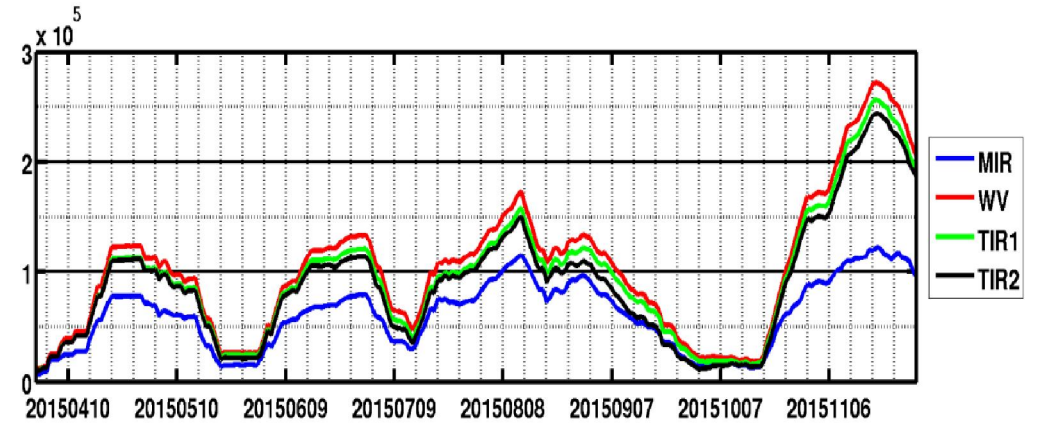
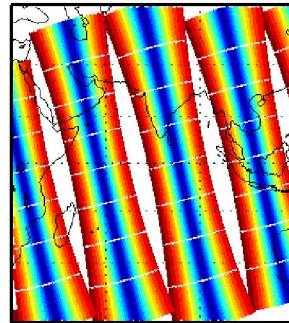
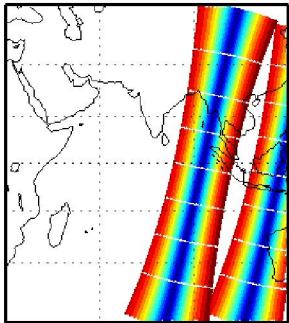
20151224

MetopA-Night

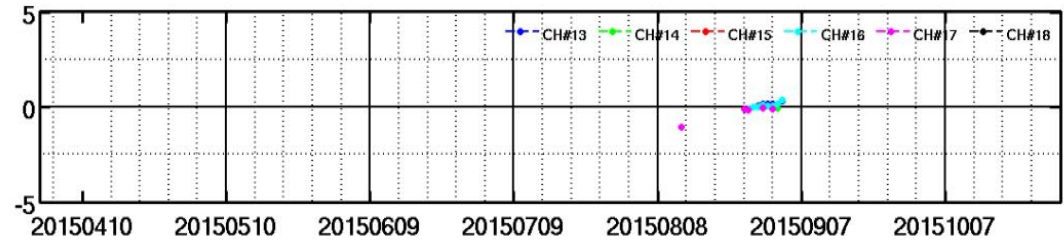


MetopB-Day

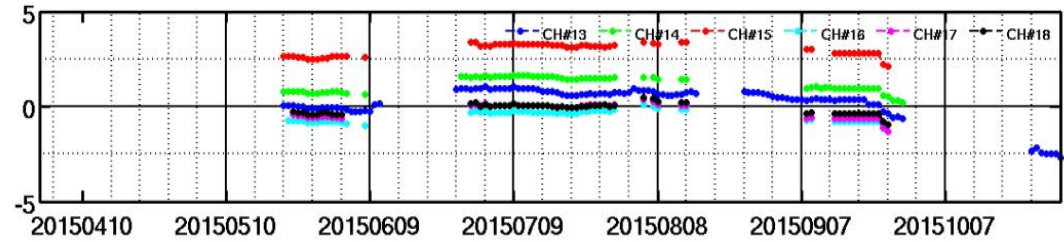
MetopB-Night

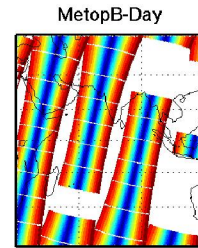
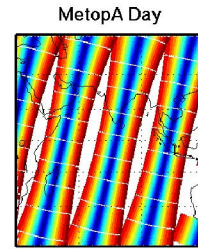
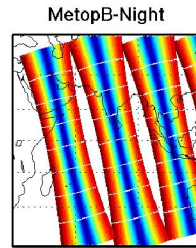
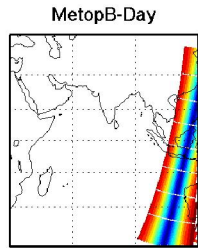
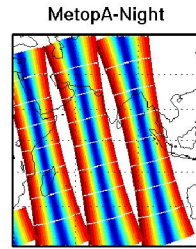
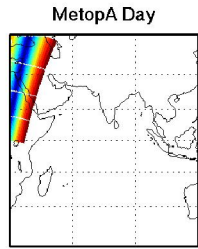


$T_b$  Bias (Day)



$T_b$  Bias (Night)

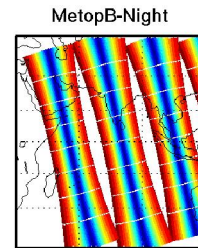
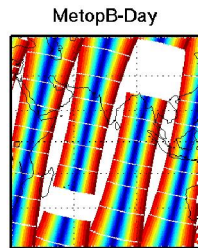
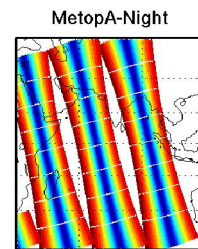
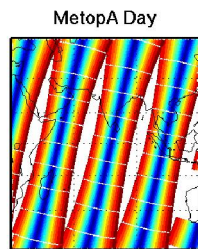




NO data!

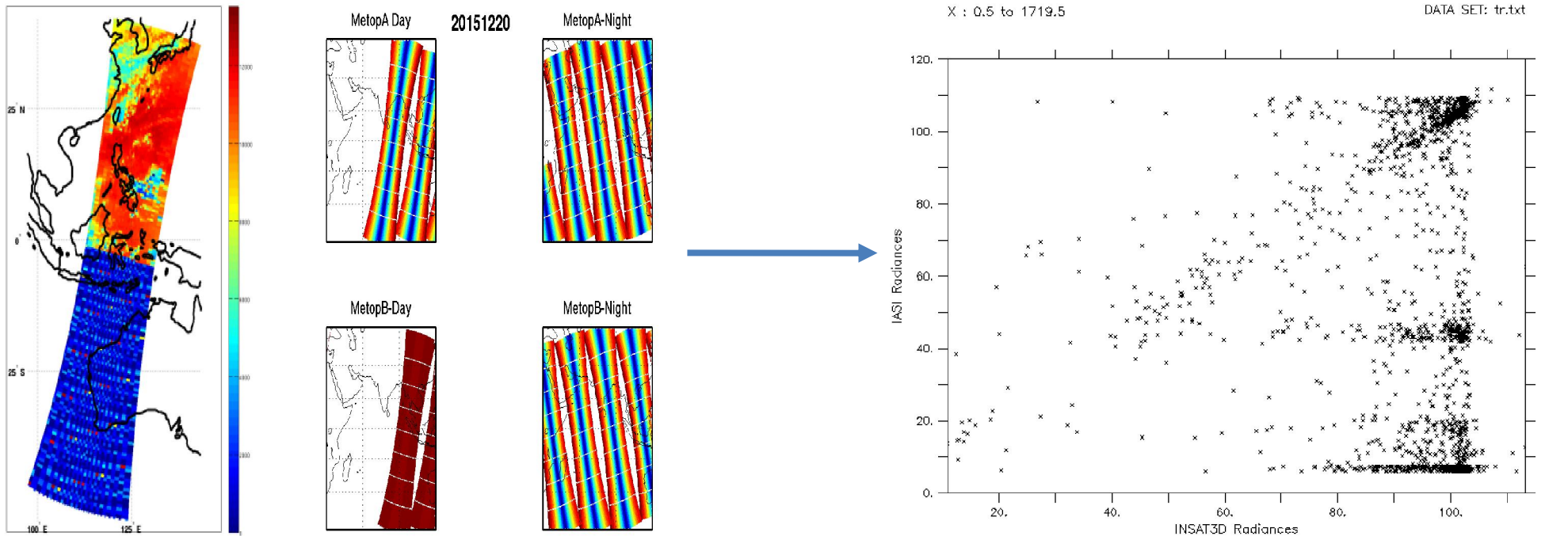
Parallel and combined

Advancement in extracting BUFR files...

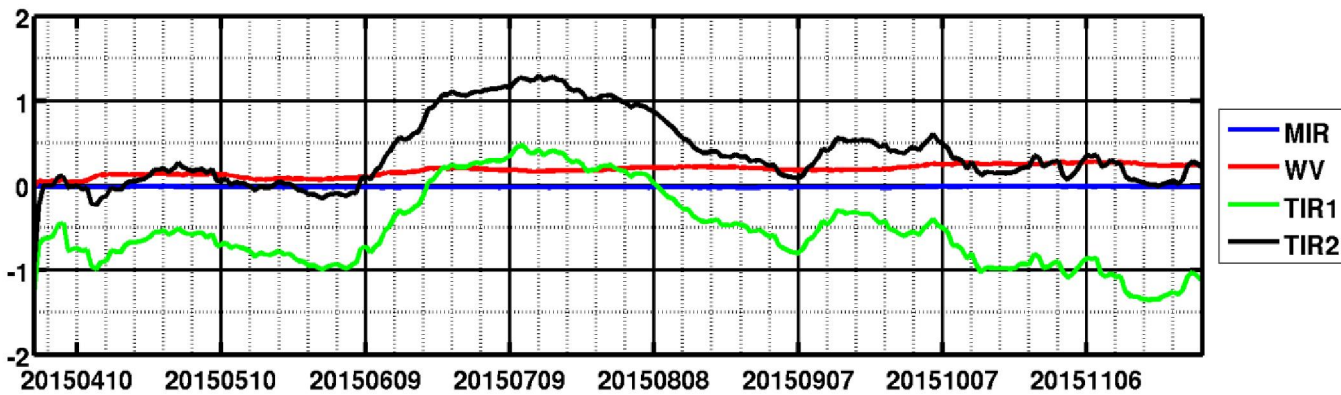


# Procedure to filter out spurious data set

- Break orbital data into granules (~ the extent of 3 minutes)
- Apply quality checks on each granule match-up. If quality criterion are not satisfied then the whole match-up data set for that particular granule is rejected.
- Quality checks are based on calculating percentage of outliers, outliers removed bias, rmsd and correlation.
- Outliers are calculated based on Median Absolute Deviation (MAD) of LEO – GEO pair radiance differences.

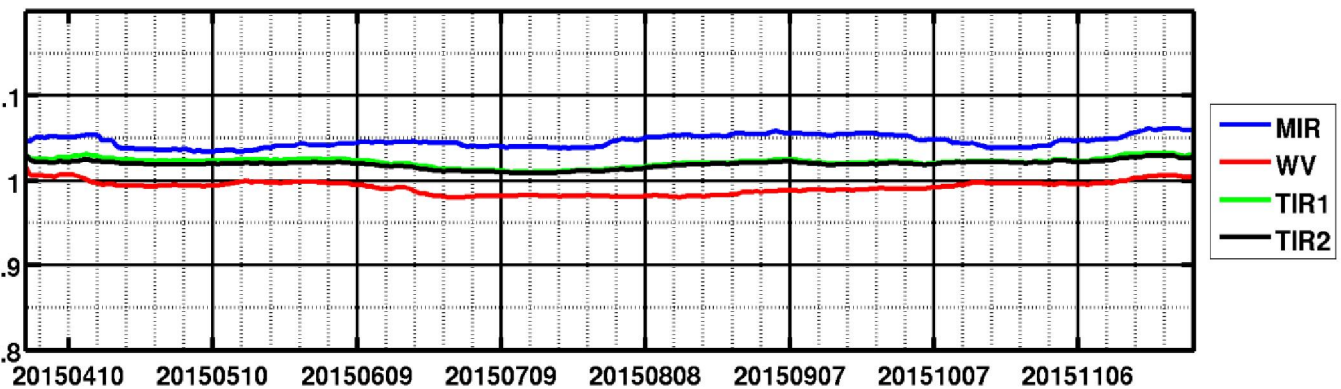


### Intercept

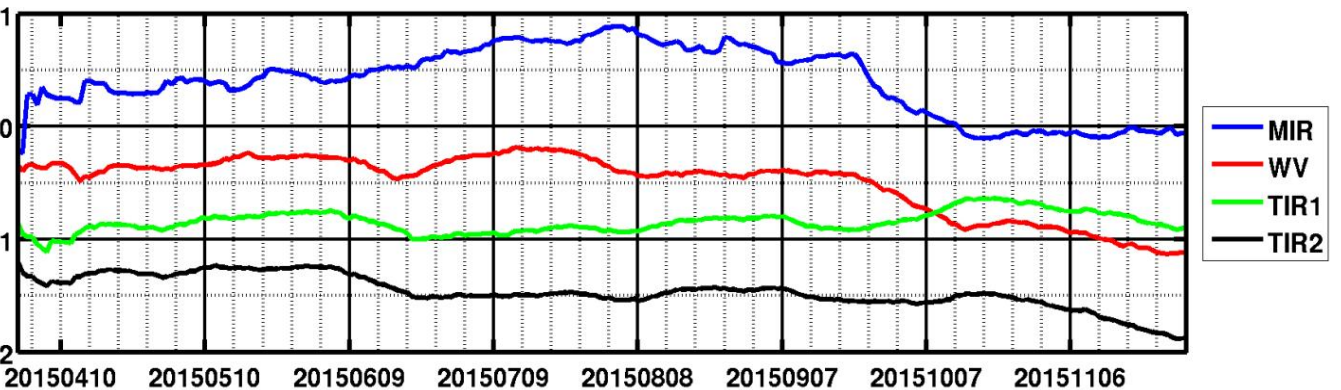


Weighted linear regression to directly compare collocated radiances observed from each pair of GEO-LEO instruments and systematically generate a set of calibration correction functions referred to as GSICS Corrections.

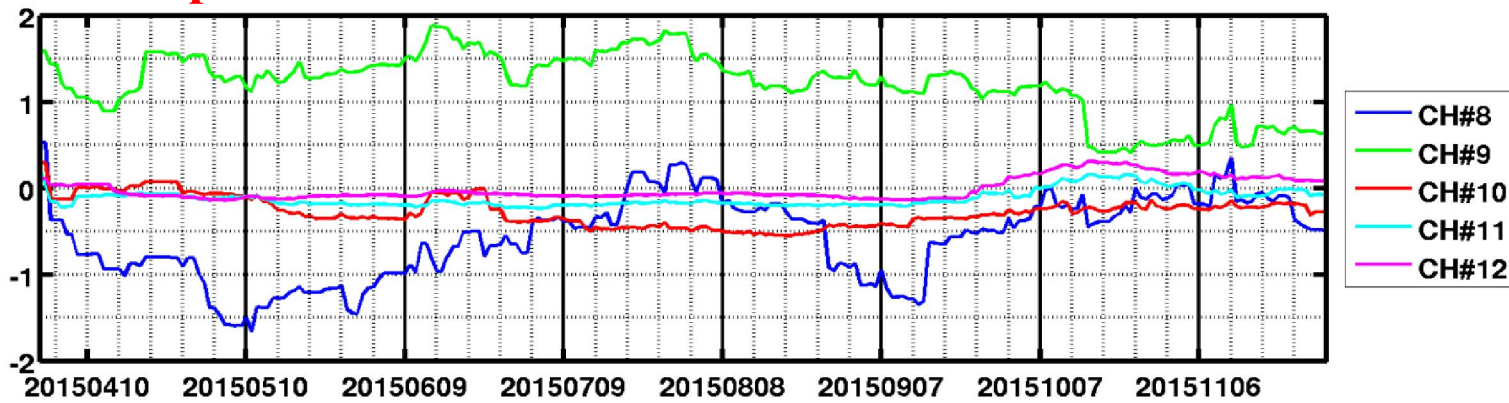
### Slope



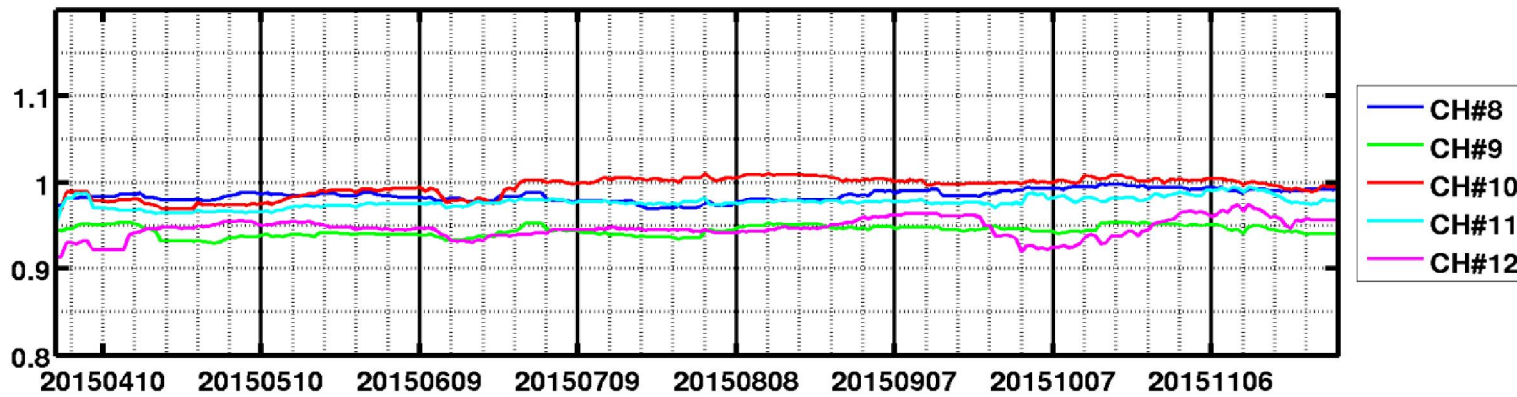
### Bias



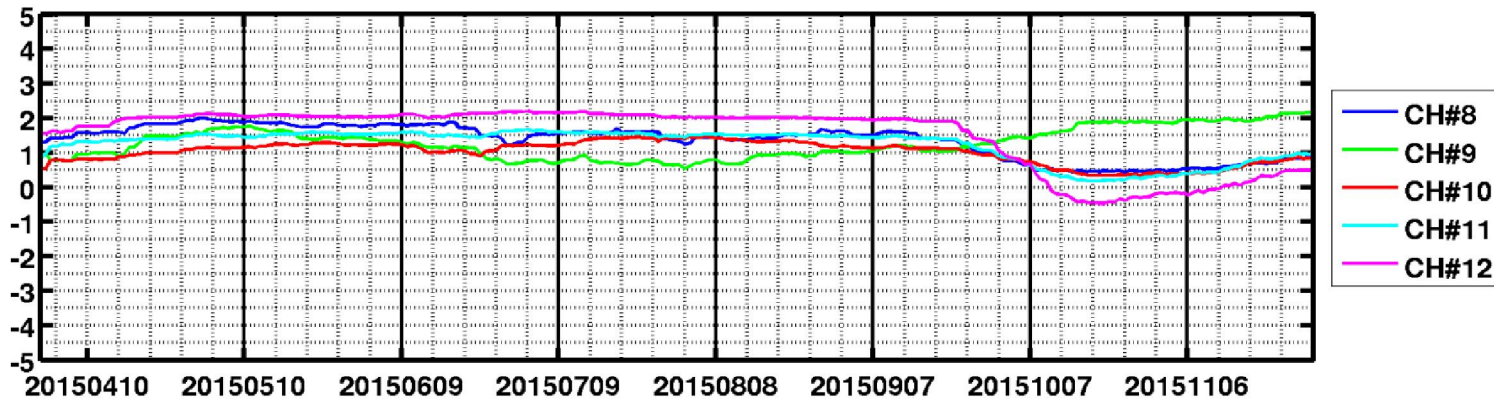
## Intercept



## Slope

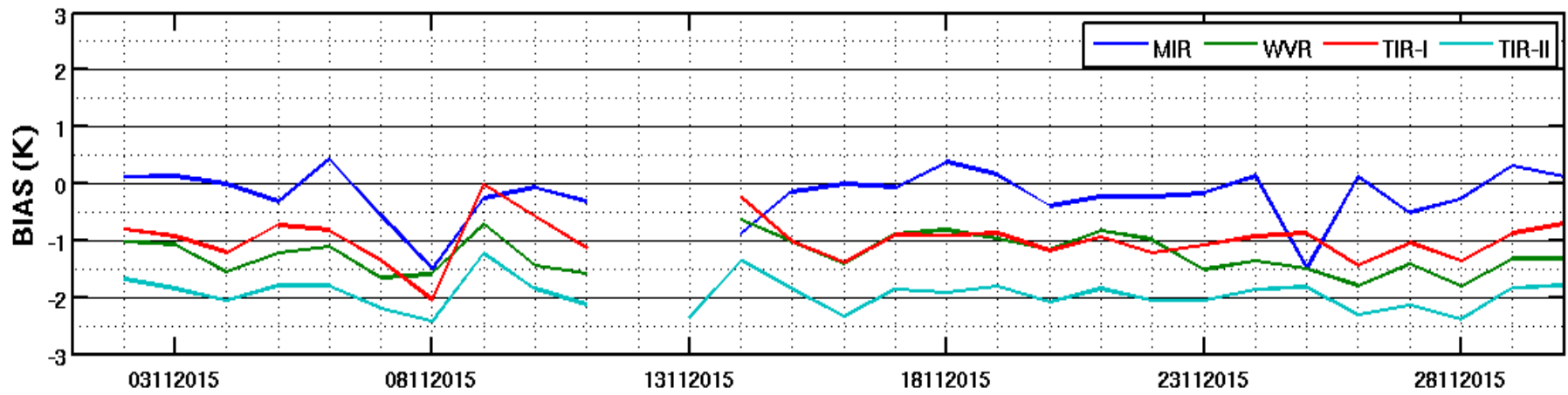


## Bias

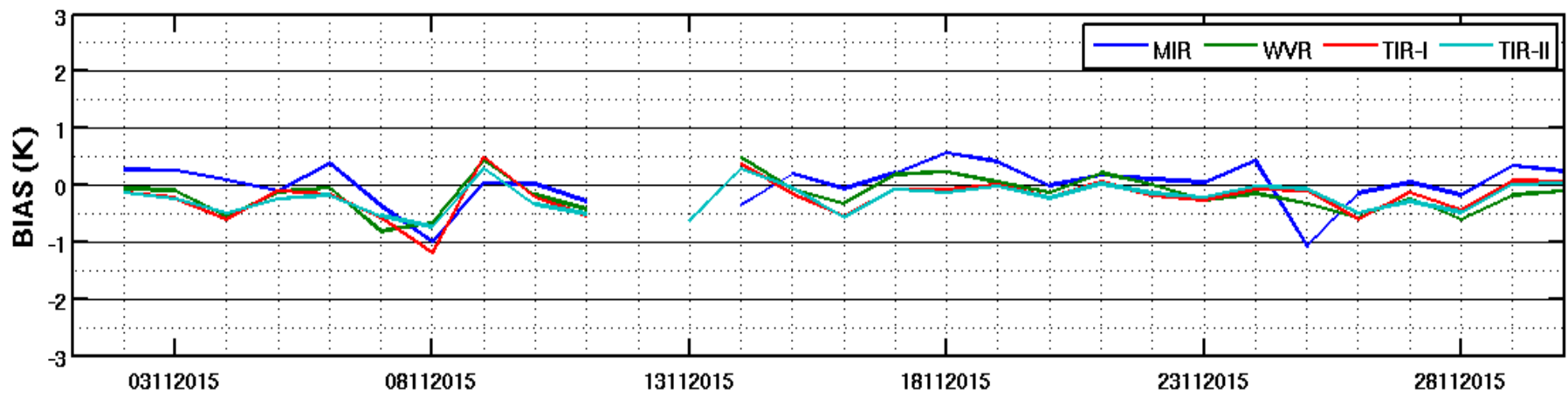


# BIAS observed before and after applying monthly GSICS correction coefficients (OFFLINE)

## INSAT-3D Imager Before GSICS Correction



## After GSICS Correction

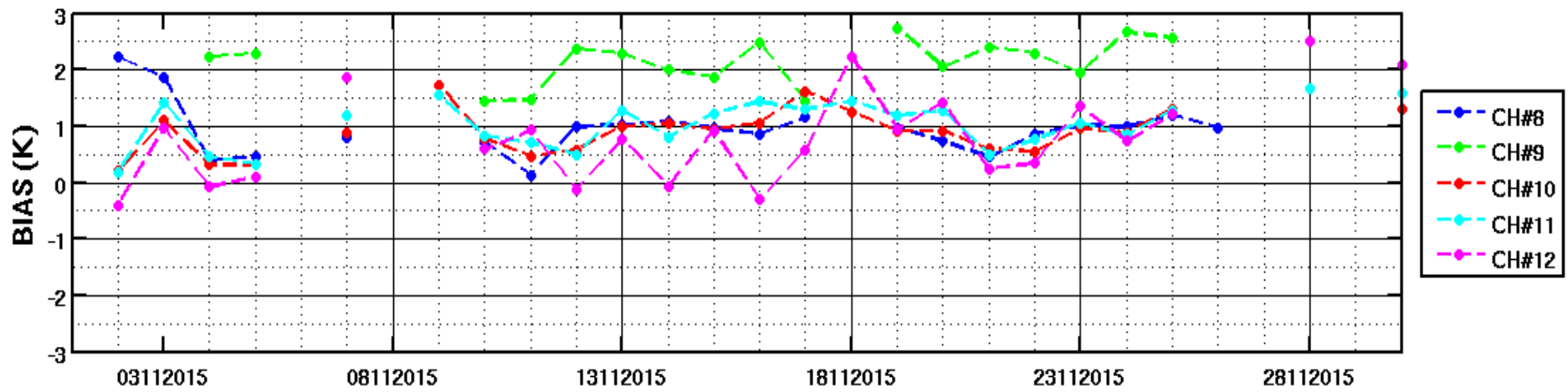




# BIAS observed before and after applying monthly GSICS correction coefficients (OFFLINE)

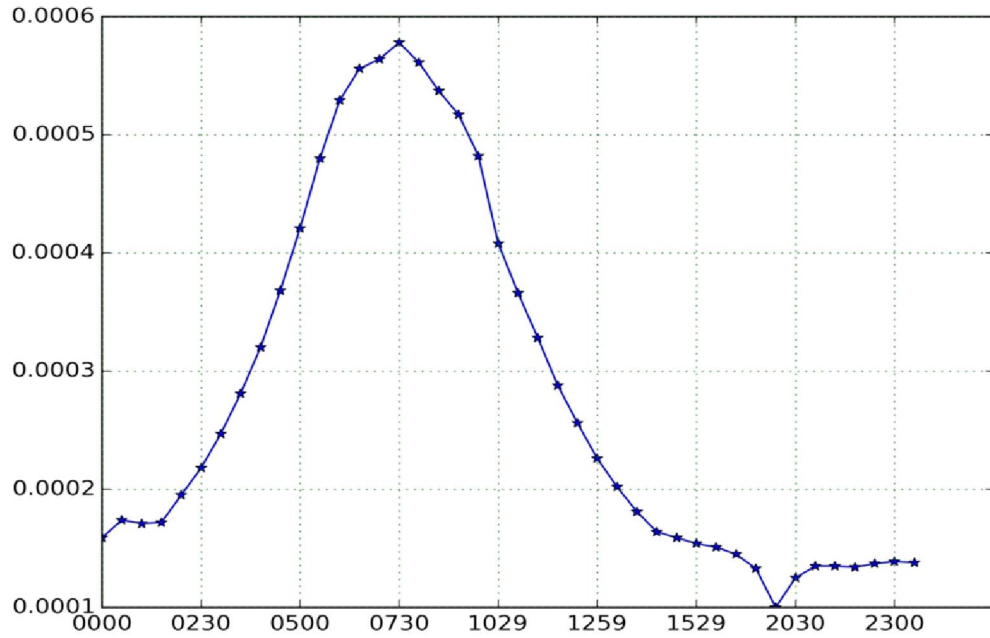
## INSAT-3D Sounder

Before GSICS Correction

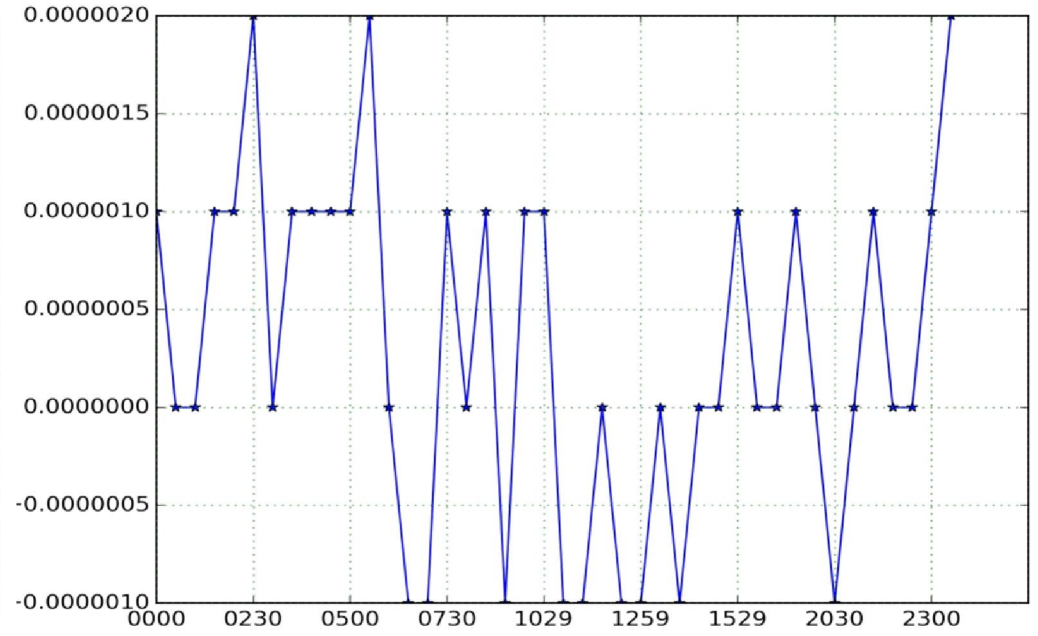


# UNCERTAINTY ANALYSIS

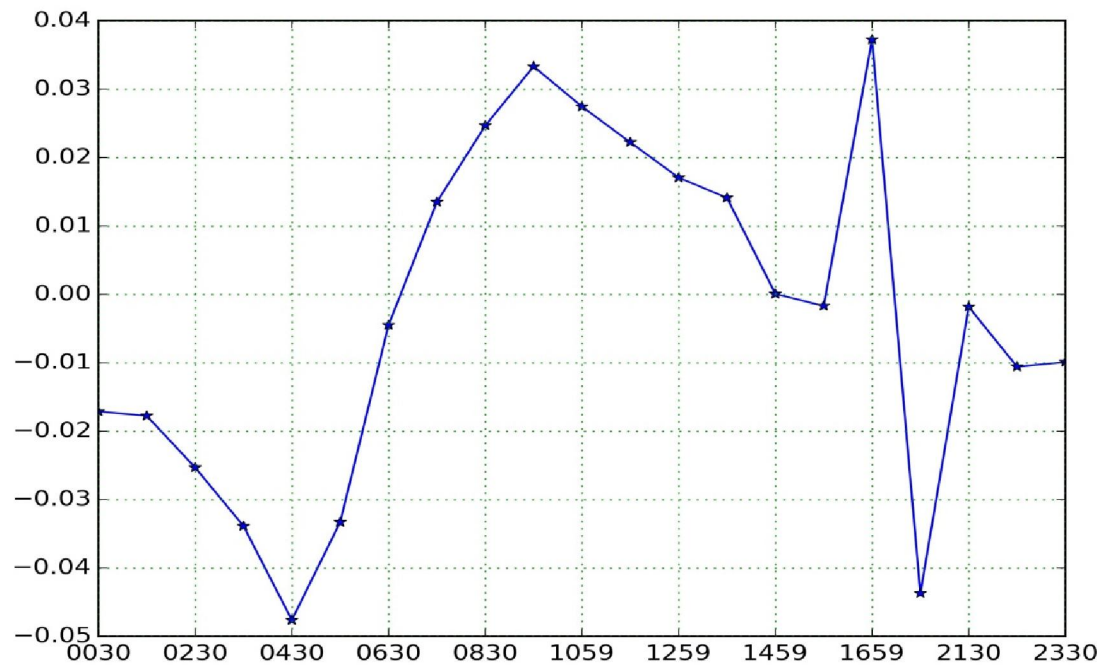
SYS\_BIAS\_LAT for channel MIR on 21022016



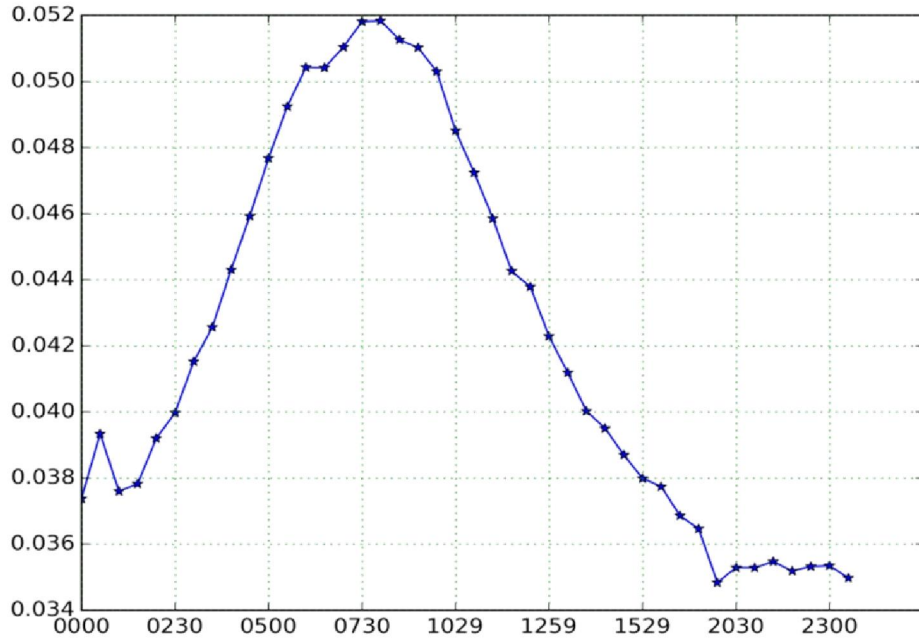
SYS\_BIAS\_LONG for channel MIR on 21022016



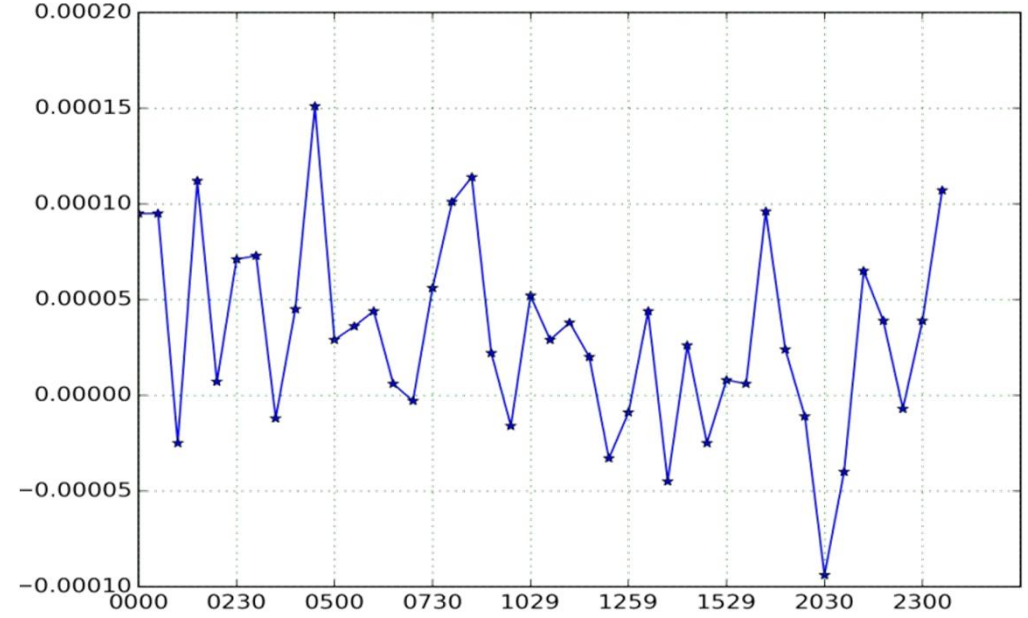
SYS\_BIAS\_TIME for channel MIR on 21022016



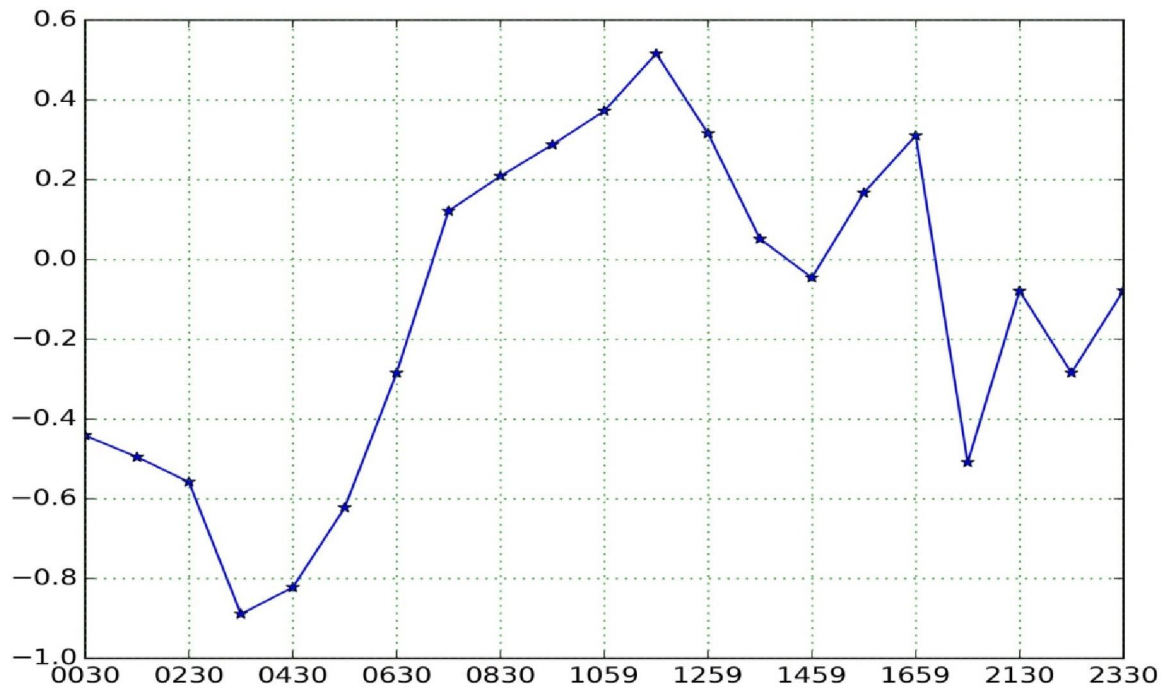
SYS\_BIAS\_LAT for channel TIR1 on 21022016



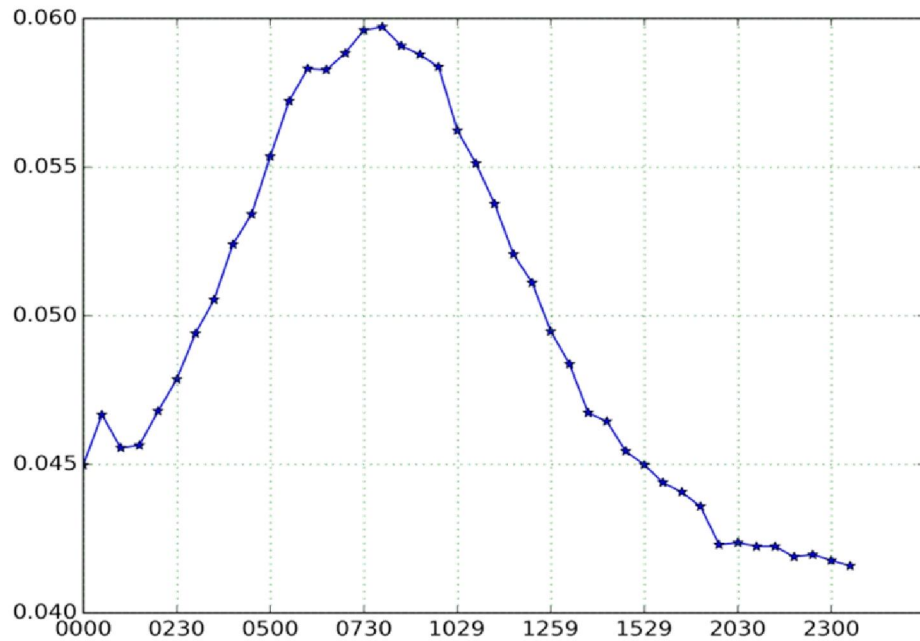
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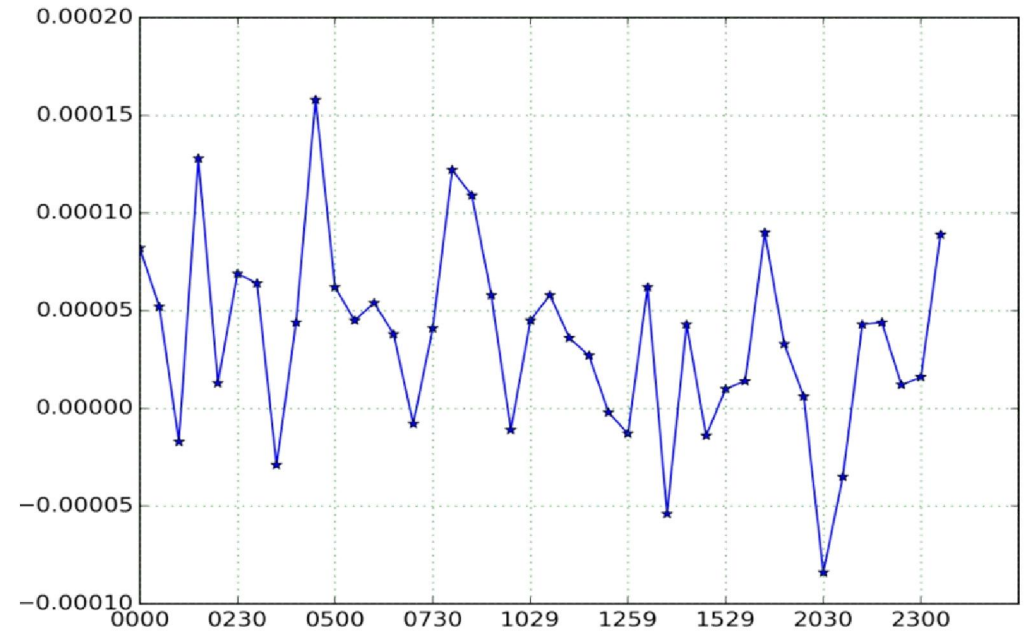
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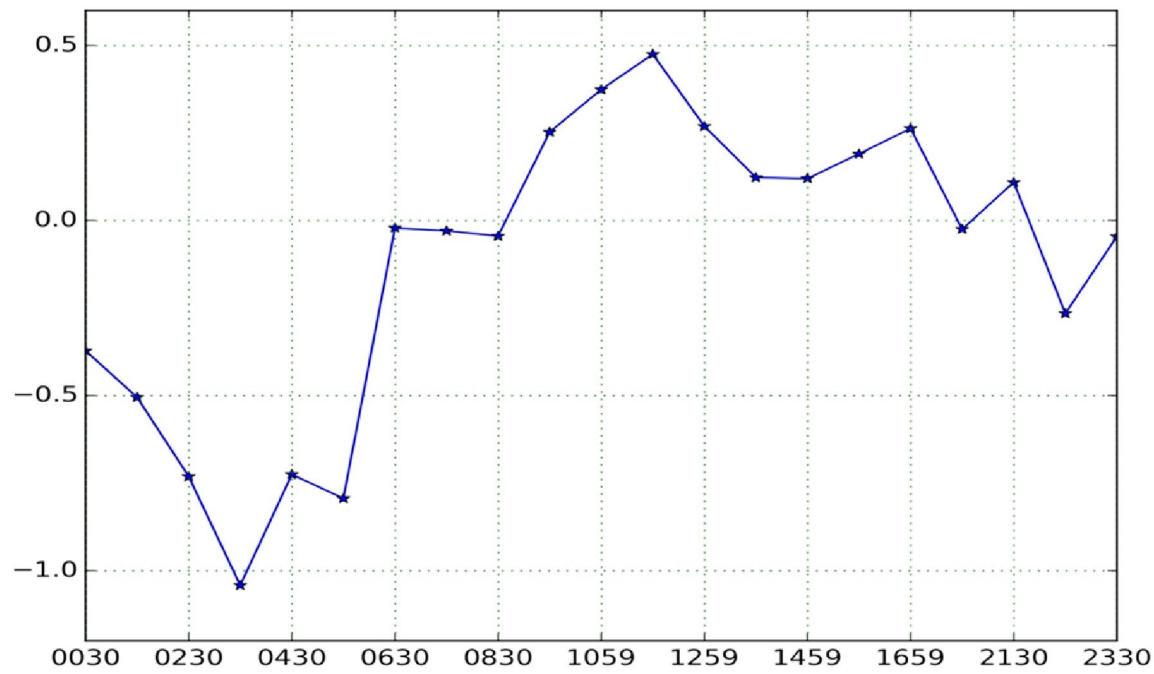
SYS\_BIAS\_LAT for channel TIR2 on 21022016



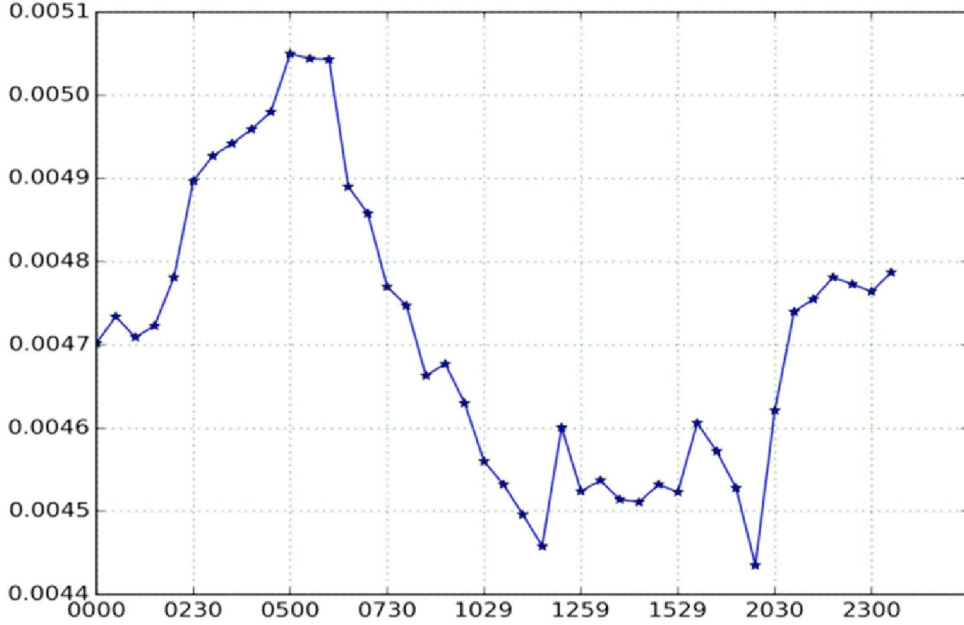
SYS\_BIAS\_LONG for channel TIR2 on 21022016



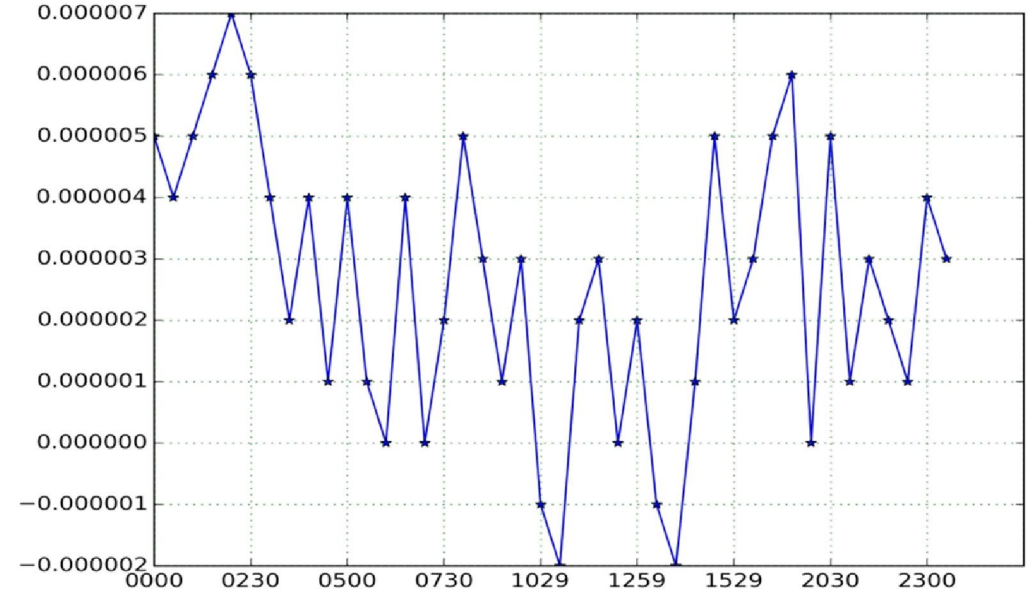
SYS\_BIAS\_TIME for channel TIR2 on 21022016



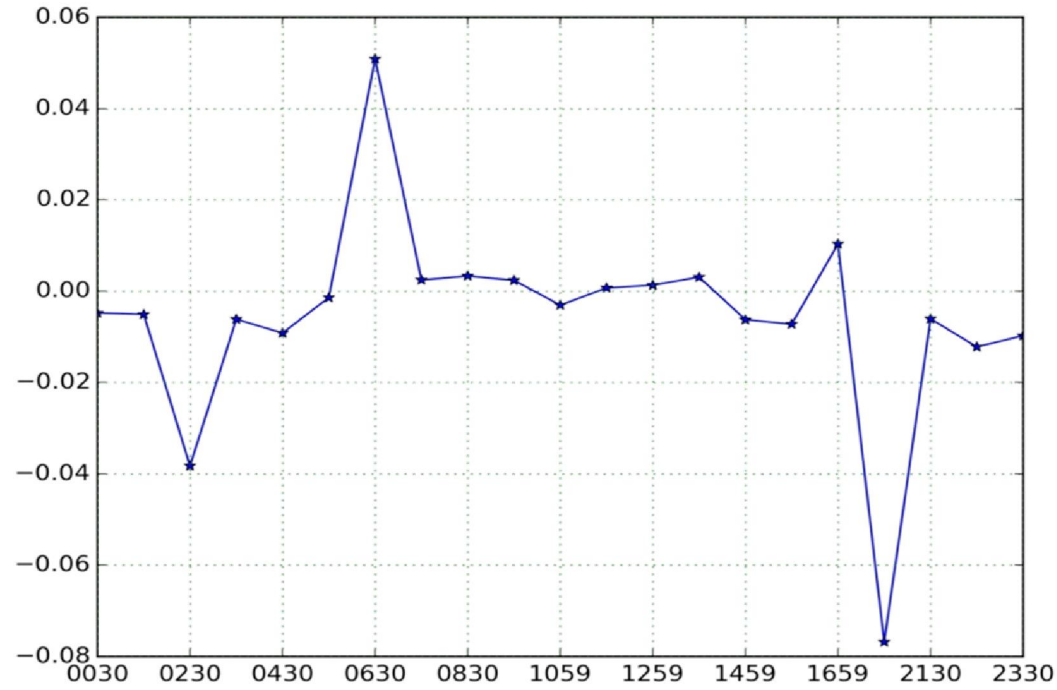
SYS\_BIAS\_LAT for channel WVR on 21022016



SYS\_BIAS\_LONG for channel WVR on 21022016



SYS\_BIAS\_TIME for channel WVR on 21022016



## Future Objectives

- Operationalization of GSICS website (webpage submitted to GCC for review).
- Routine generation RAC netcdf file and uploading to GSICS site.
- Operational implementation of demo GSICS coefficients products.

## Seeking guidelines

- Should uncertainty analysis be carried out for each day?
- Results of uncertainty analysis to be put on GSICS site?
- Generation of GSICS calibration coefficients files (netcdf format) from Metop-B and day time?

**THANKS**