Statistics of Double Difference

A) [Mtsat2/Imager-MetopB/IASI]-[Mtsat2/Imager-MetopA/IASI]
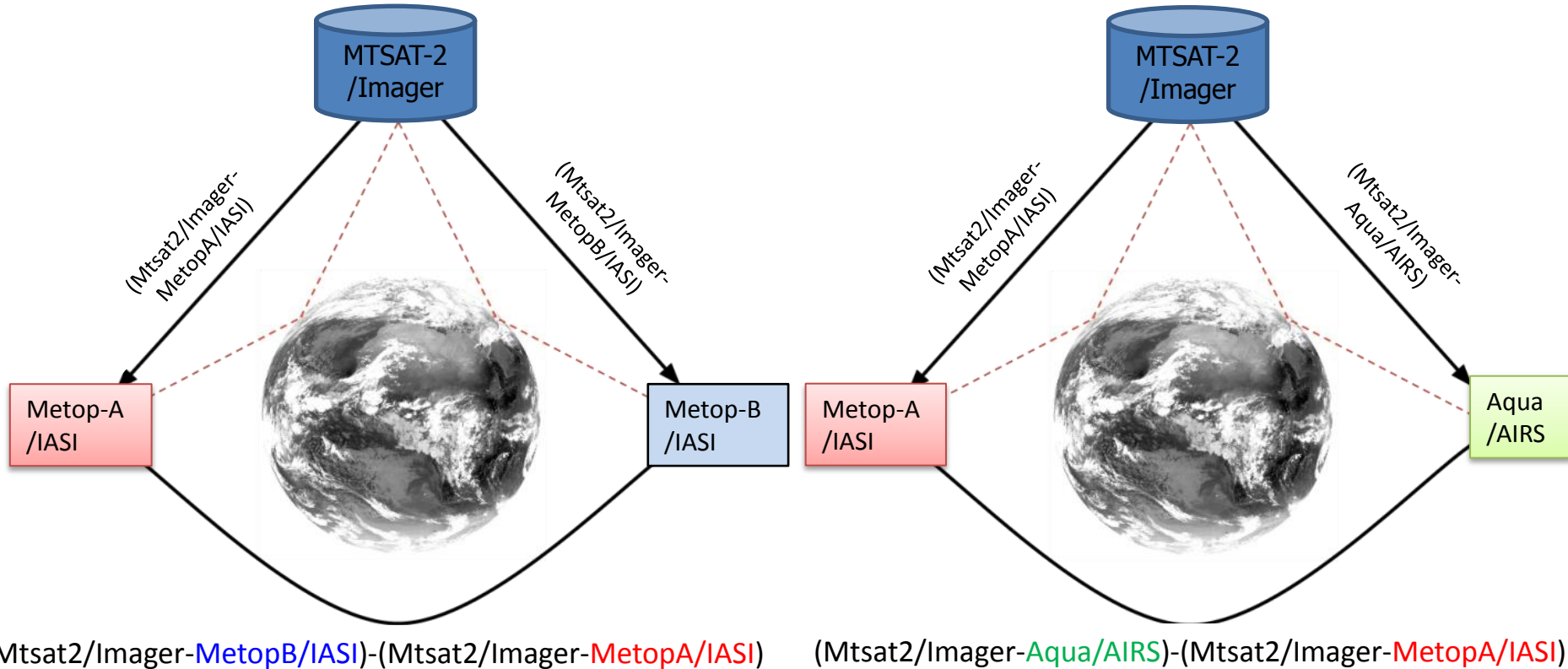**B) [Mtsat2/Imager-Aqua/AIRS]-[Mtsat2/Imager-MetopA/IASI]**

JMA/MSC

27 May 2014

Correspondences of double difference analysis

A) MetopB/IASI vs. MetopA/IASI

B) Aqua/AIRS vs. MetopA/IASI

(Mtsat2/Imager-MetopB/IASI)-(Mtsat2/Imager-MetopA/IASI)

(Mtsat2/Imager-Aqua/AIRS)-(Mtsat2/Imager-MetopA/IASI)

(Redesign the figure from Tim's slide of GSICS Working Group Meeting in March)

A) [Mtsat2/Imager-MetopB/IASI]-[Mtsat2/Imager-MetopA/IASI]

・From Daily GSICS Corrections

・Only <u>24 days</u> statistics

Biases for standard radiances

	MTSAT-2/Imager Channel	Mean Difference of Standard Biases [K]	Std Deviation of the Difference of Standard Biases [K]
Day data	IR1 (10.8 um)	+ 0.030	0.162
	IR2 (12.0 um)	+ 0.037	0.155
	IR3 (6.8 um)	- 0.009	0.138
	IR4 (3.8 um)	---	---
Night data	IR1 (10.8 um)	+ 0.006	0.090
	IR2 (12.0 um)	+ 0.025	0.065
	IR3 (6.8 um)	+ 0.027	0.131
	IR4 (3.8 um)	- 0.059	0.167
Day and night data	IR1 (10.8 um)	- 0.006	0.098
	IR2 (12.0 um)	+ 0.016	0.085
	IR3 (6.8 um)	+ 0.019	0.131
	IR4 (3.8 um)	-0.059	0.167

A) [Mtsat2/Imager-MetopB/IASI]-[Mtsat2/Imager-MetopA/IASI]

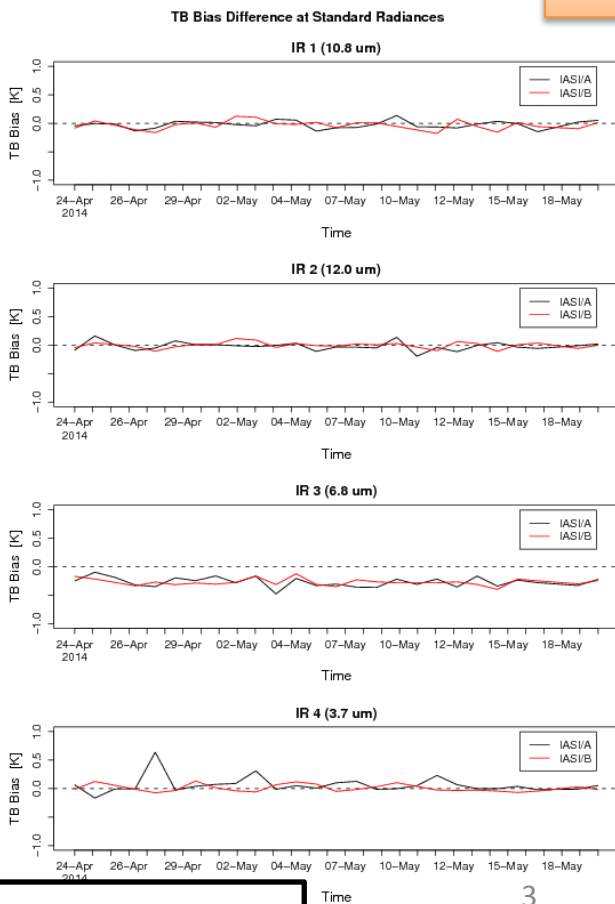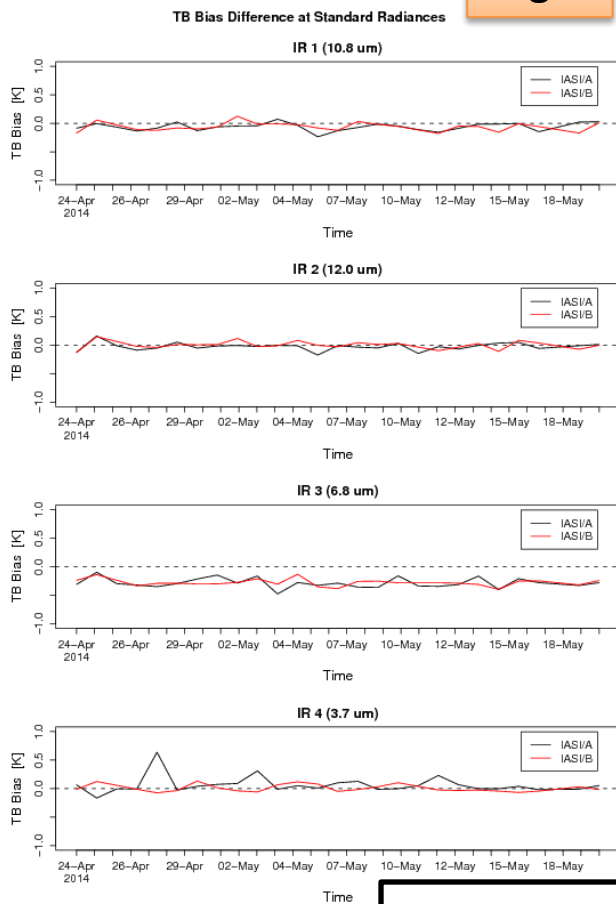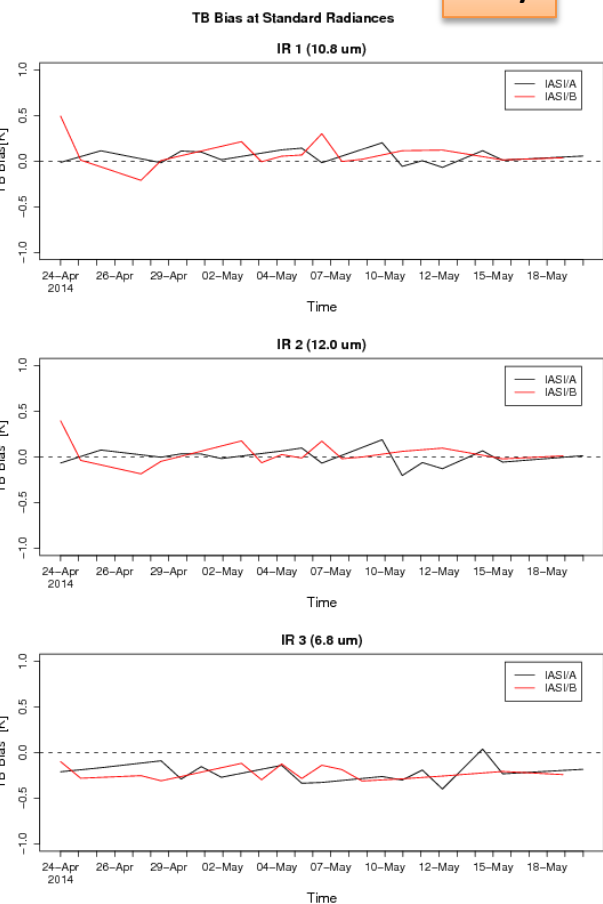· From Daily GSICS Corrections
· Only 24 days statistics

Preliminary result

TB Biases of MetopA/IASI and MetopB/IASI for standard radiances

--- MetopA   --- MetopB

A) [Mtsat2/Imager-MetopB/IASI]-[Mtsat2/Imager-MetopA/IASI]

‣ From Daily GSICS Corrections
‣ Only 24 days statistics

Preliminary result
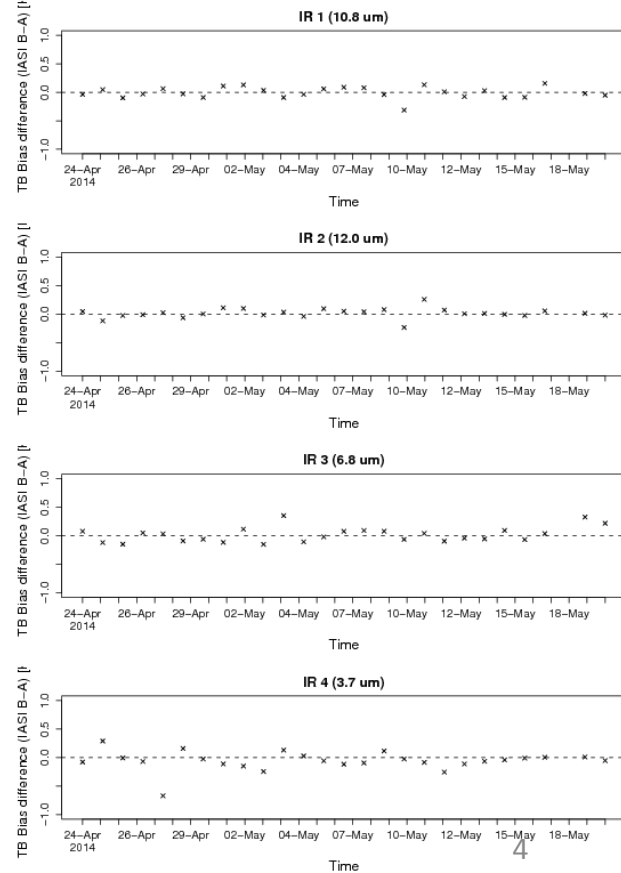
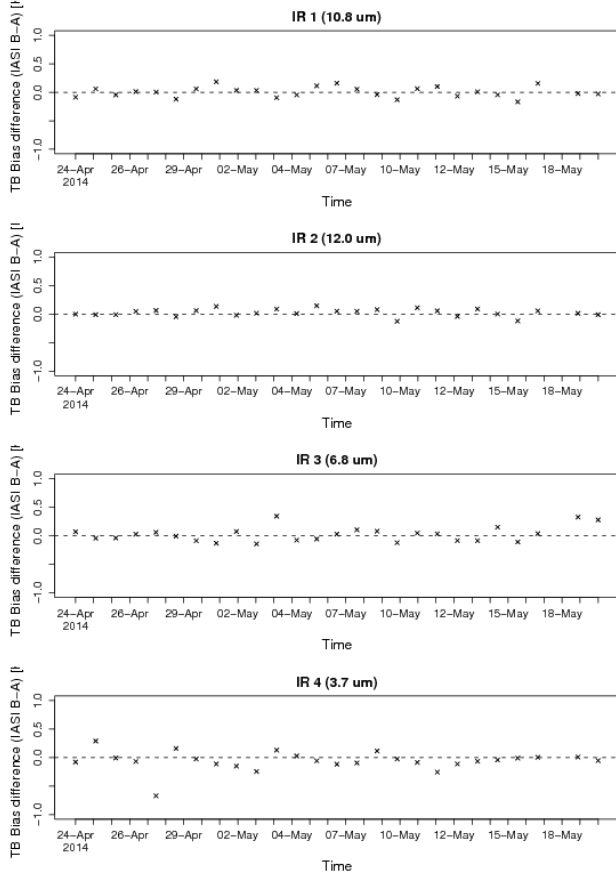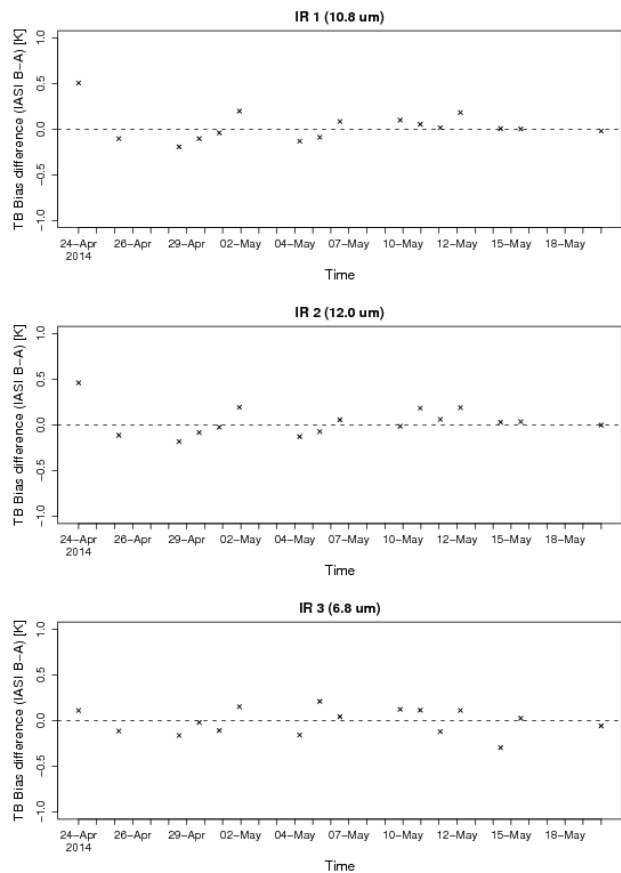## Bias difference of IASI/B – IASI/A for standard radiances

Day

Night

All

B) [Mtsat2/Imager-Aqua/AIRS]-[Mtsat2/Imager-MetopA/IASI]

・From Daily GSICS Corrections
・12 months data statistics (Number of sample is ~ 200)

Biases for standard radiances

	MTSAT-2/Imager Channel	Mean Difference of Standard Biases [K]	Std Deviation of the Difference of Standard Biases [K]
Day data	IR1 (10.8 um)	- 0.073	0.273
	IR2 (12.0 um)	- 0.069	0.239
	IR3 (6.8 um)	- 0.099	0.151
	IR4 (3.8 um)	---	---
Night data	IR1 (10.8 um)	- 0.139	0.720
	IR2 (12.0 um)	+ 0.152	0.860
	IR3 (6.8 um)	- 0.169	0.118
	IR4 (3.8 um)	- 0.255	0.872
Day and night data	IR1 (10.8 um)	- 0.044	0.132
	IR2 (12.0 um)	+ 0.102	0.197
	IR3 (6.8 um)	- 0.126	0.076
	IR4 (3.8 um)	-0.374	1.527

B) [Mtsat2/Imager-Aqua/AIRS]-[Mtsat2/Imager-MetopA/IASI]

・From Daily GSICS Corrections
・12 months data statistics (Number of sample is ~ 200)

TB Biases of Aqua/AIRS and MetopA/IASI for standard radiances

Day   Night   All

--- Aqua/AIRS   --- MetopA/IASI

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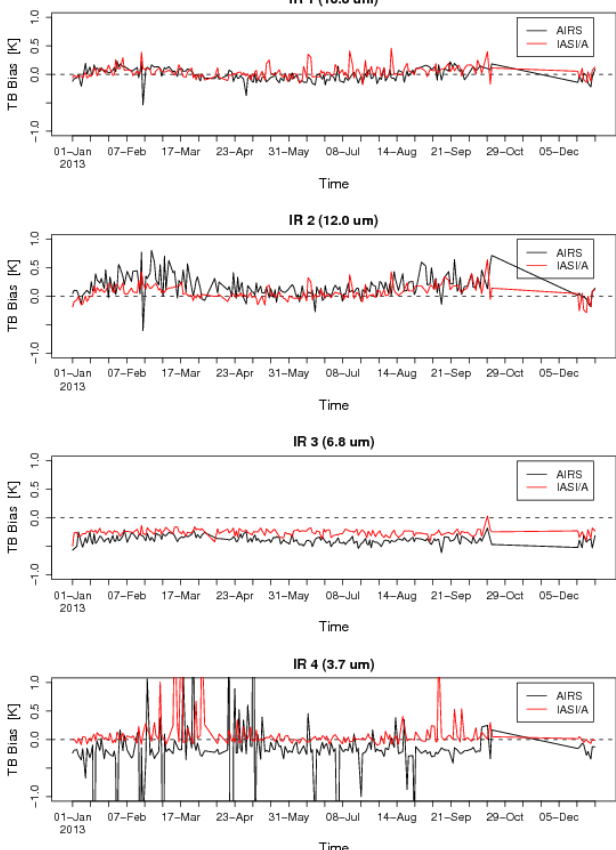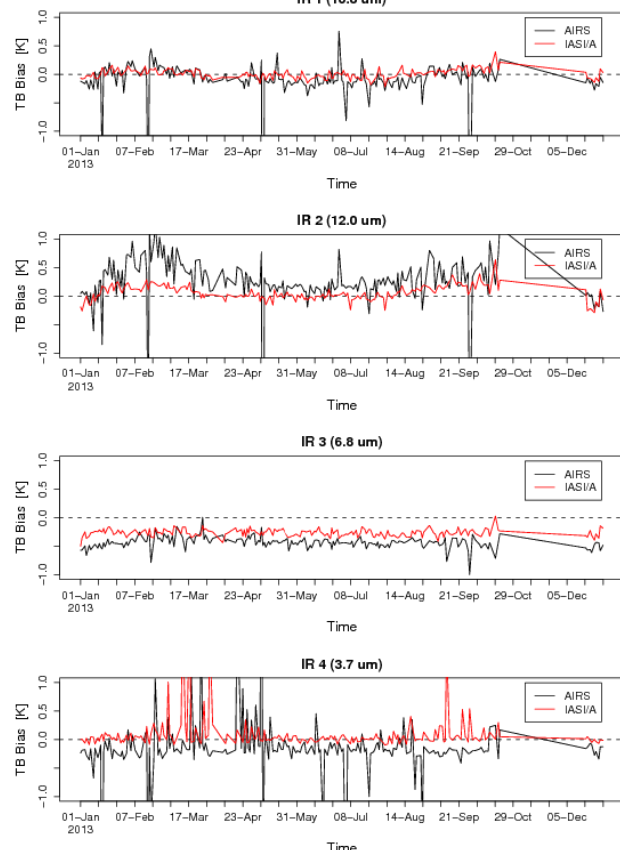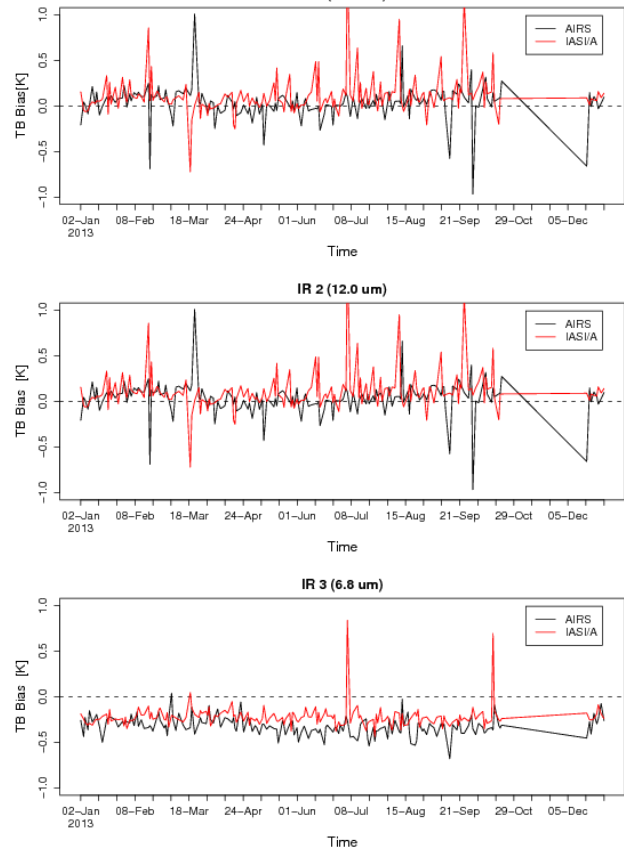
B) [Mtsat2/Imager-Aqua/AIRS]-[Mtsat2/Imager-MetopA/IASI]
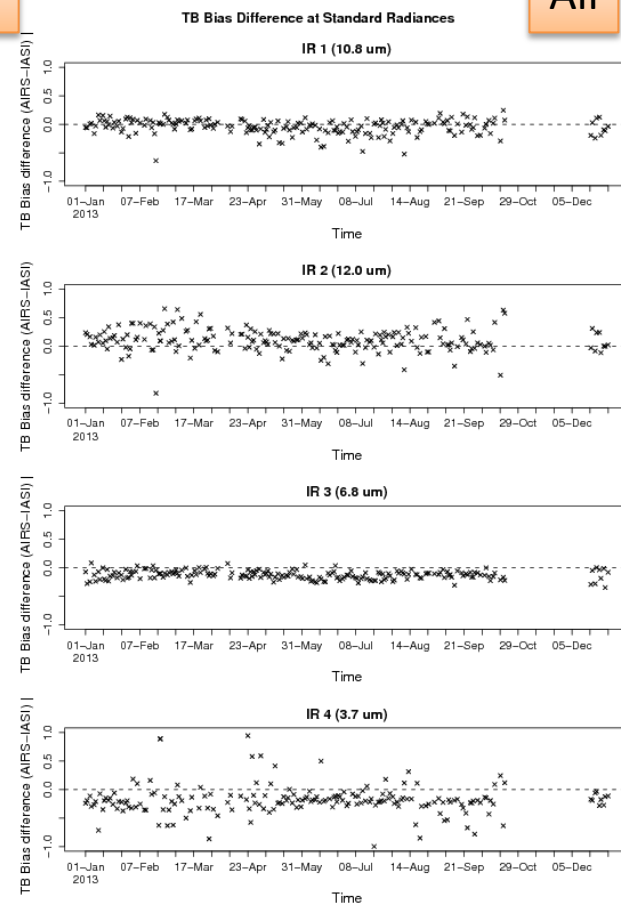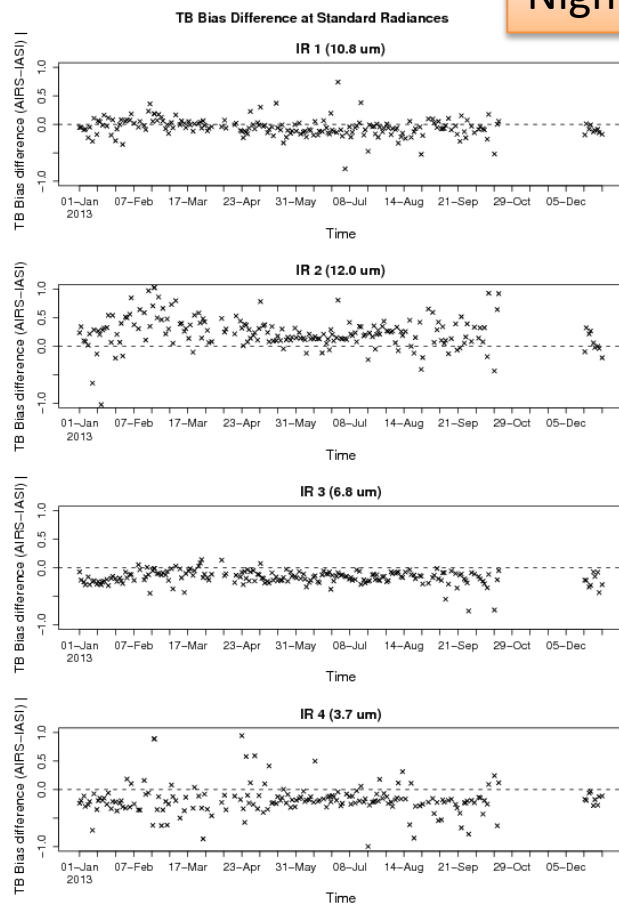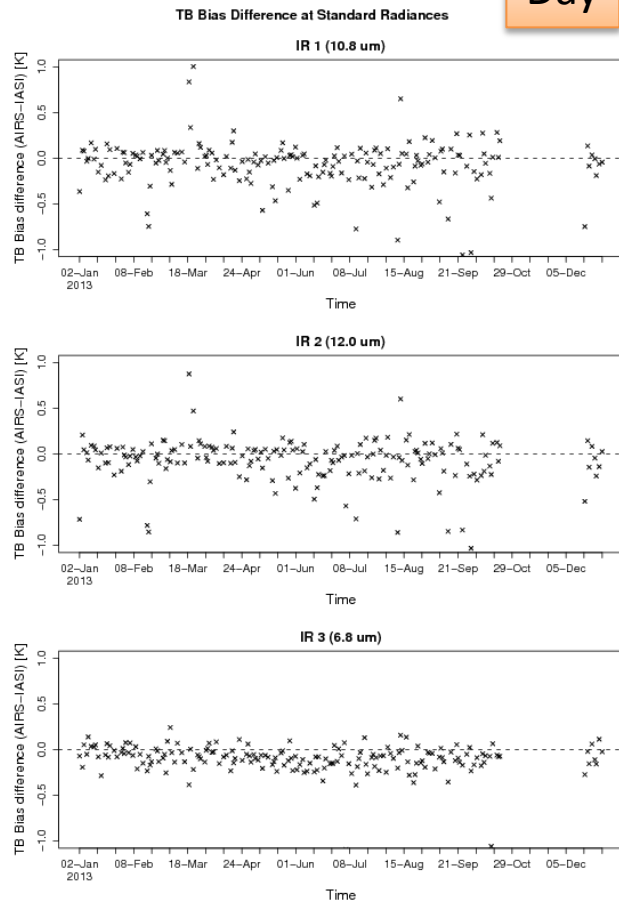
・From Daily GSICS Corrections

・12 months data statistics (Number of sample is ~ 200)

Biases for standard radiances

Summary and future plans

- JMA started to analyze the statistics for double difference using the data of MTSAT-2 and
  - A) Metop-A/IASI and Metop-B/IASI (N=24)
  - B) Metop-A/IASI and Aqua/AIRS (N=~200)

A) Metop-A/IASI and Metop-B/IASI (N=24)
  - Mean difference (MD) are small to be ~±0.05 K
  - Standard deviation (SD) are 1.0 ~ 1.5 K

B) Metop-A/IASI and Aqua/AIRS (N=~200)
  - MD are ±0.1~0.3 K
  - SD are 0.1~1.0 (and more)
  - MD and SD are larger than that of Metop-A/B comparison

- JMA will continue the analysis including
  - Increase the data set
  - Check the time series
  - Revise the calculation method (e.g. set the threshold …)

Appendix
- Bias for 220K radiance -

A) [Mtsat2/Imager-MetopB/IASI]-[Mtsat2/Imager-MetopA/IASI]

・From Daily GSICS Corrections

・Only 24 days statistics

Bias difference of IASI/B – IASI/A for 220 K radiances

Preliminary result

	MTSAT-2/Imager Channel	Mean Difference of Standard Biases [K]	Std Deviation of the Difference of Standard Biases [K]
Day data	IR1 (10.8 um)	+ 0.011	1.141
	IR2 (12.0 um)	+ 0.100	1.033
	IR3 (6.8 um)	+ 0.0001	0.491
	IR4 (3.8 um)	---	---
Night data	IR1 (10.8 um)	- 0.046	1.047
	IR2 (12.0 um)	- 0.009	0.888
	IR3 (6.8 um)	+ 0.100	0.439
	IR4 (3.8 um)	- 3.890	6.332
Day and night data	IR1 (10.8 um)	- 0.037	1.116
	IR2 (12.0 um)	+ 0.044	0.850
	IR3 (6.8 um)	+ 0.064	0.443
	IR4 (3.8 um)	- 3.890	6.332

A) [Mtsat2/Imager-MetopB/IASI]-[Mtsat2/Imager-MetopA/IASI]

・From Daily GSICS Corrections
・Only 24 days statistics

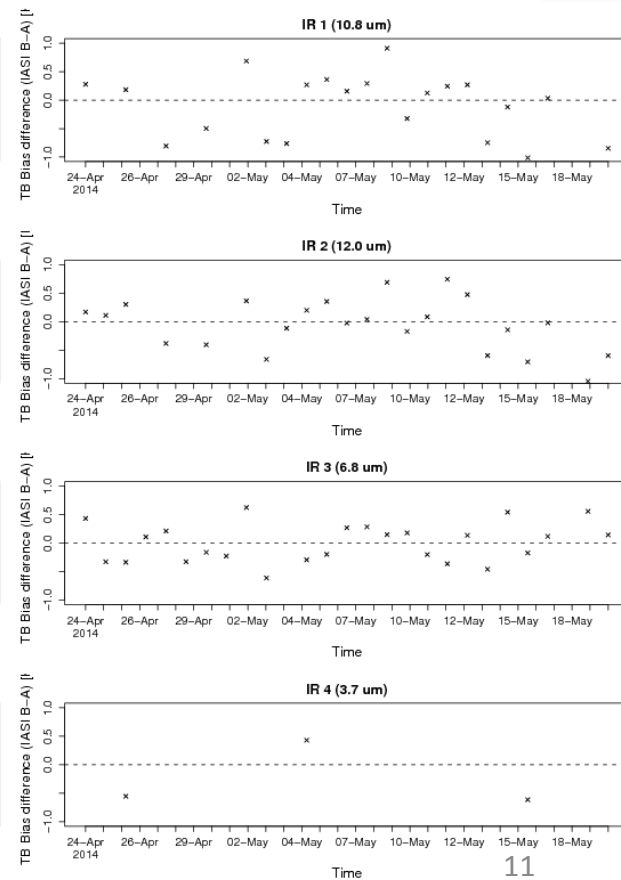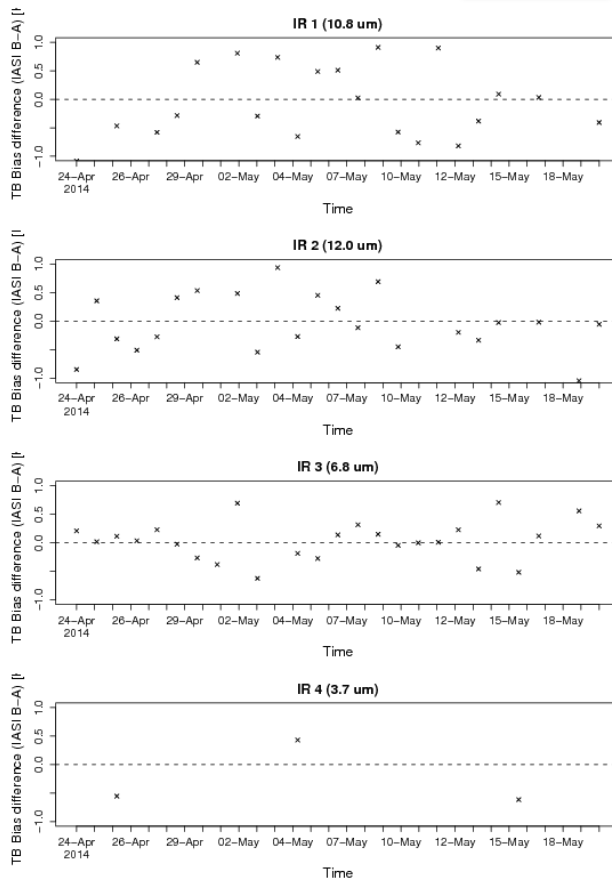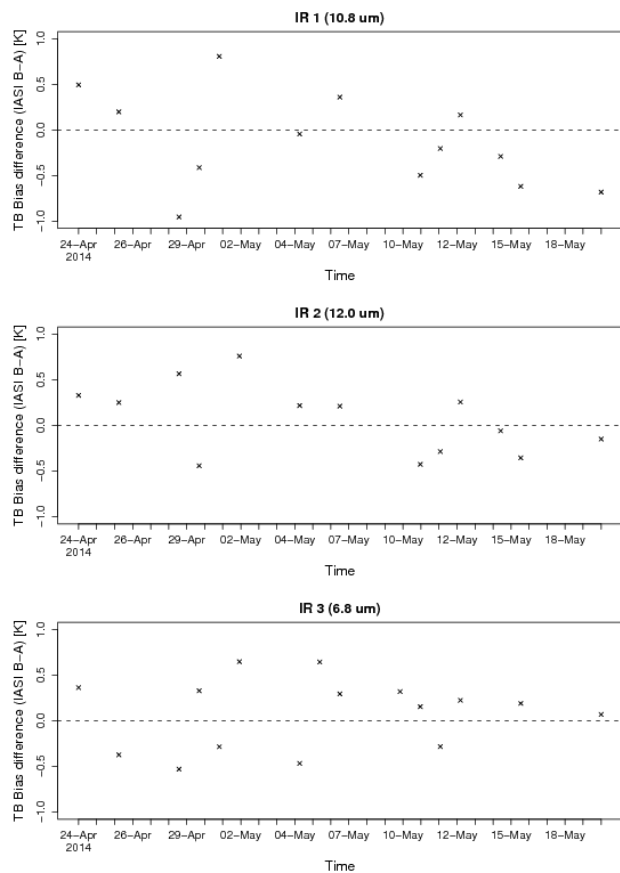## Bias difference of IASI/B – IASI/A for 220 K radiances
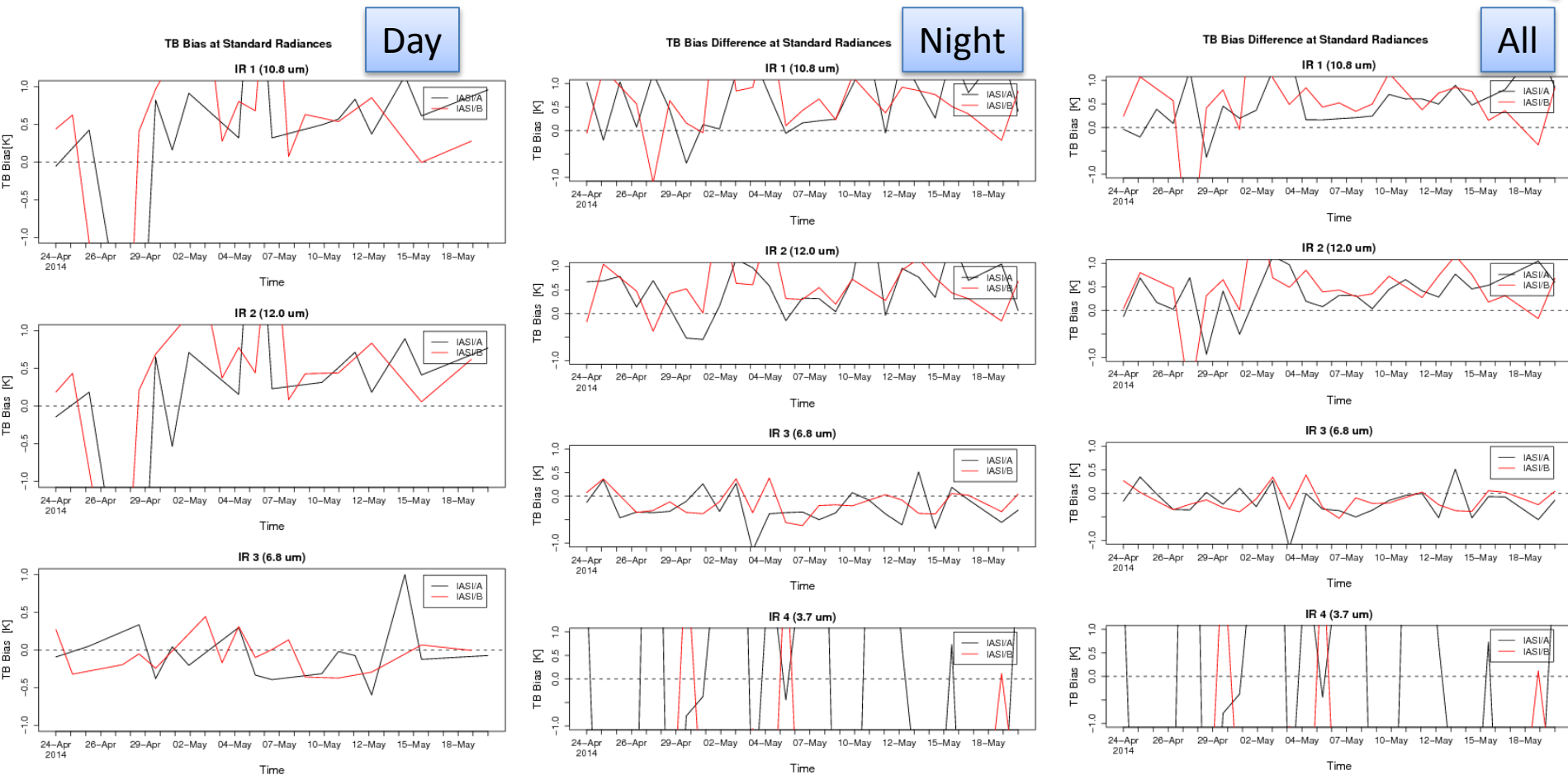
Preliminary result

A) [Mtsat2/Imager-MetopB/IASI]-[Mtsat2/Imager-MetopA/IASI]

・From Daily GSICS Corrections
・Only 24 days statistics

Preliminary result

TB Biases of MetopA/IASI and MetopB/IASI for 220 K radiances

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B) [Mtsat2/Imager-Aqua/AIRS]-[Mtsat2/Imager-MetopA/IASI]

· From Daily GSICS Corrections

· 12 months data statistics (Number of sample is ~ 200)

Bias difference of Aqua/AIRS – MetopA/IASI for 220 K radiances

	MTSAT-2/Imager Channel	Mean Difference of Standard Biases [K]	Std Error Difference of Standard Biases [K]
Day data	IR1 (10.8 um)	+ 0.109	2.976
	IR2 (12.0 um)	+ 0.033	2.300
	IR3 (6.8 um)	- 0.171	0.630
	IR4 (3.8 um)	---	---
Night data	IR1 (10.8 um)	+ 0.184	1.574
	IR2 (12.0 um)	+ 0.176	1.689
	IR3 (6.8 um)	-0.056	0.559
	IR4 (3.8 um)	+ 2.305	12.107
Day and night data	IR1 (10.8 um)	- 0.135	1.076
	IR2 (12.0 um)	+ 0.025	1.046
	IR3 (6.8 um)	- 0.117	0.296
	IR4 (3.8 um)	+ 2.393	12.139

B) [Mtsat2/Imager-Aqua/AIRS]-[Mtsat2/Imager-MetopA/IASI]

・From Daily GSICS Corrections
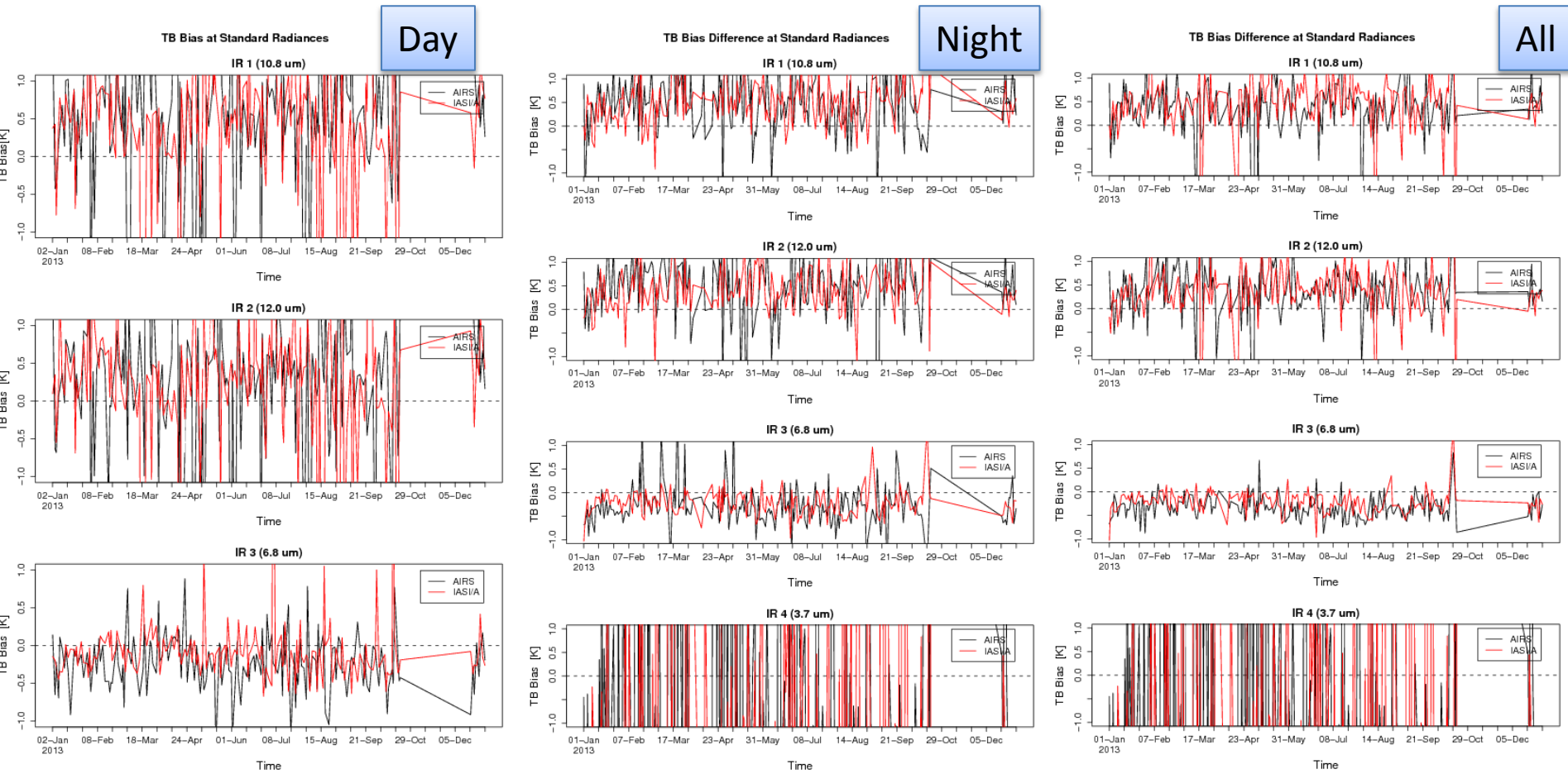・12 months data statistics (Number of sample is ~ 200)

TB Biases of Aqua/AIRS and MetopA/IASI for 220 K radiances

--- Aqua/AIRS   --- MetopA/IASI

B) [Mtsat2/Imager-Aqua/AIRS]-[Mtsat2/Imager-MetopA/IASI]

・From Daily GSICS Corrections

・12 months data statistics (Number of sample is ~ 200)

Bias difference of Aqua/AIRS – MetopA/IASI for 220 K radiances