



GIIRS/IASI

(Preliminary results)

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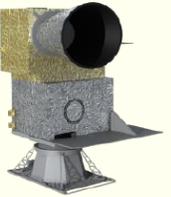
GIIRS/ FY4A

Satellite: FY4A Instrument: GIIRS

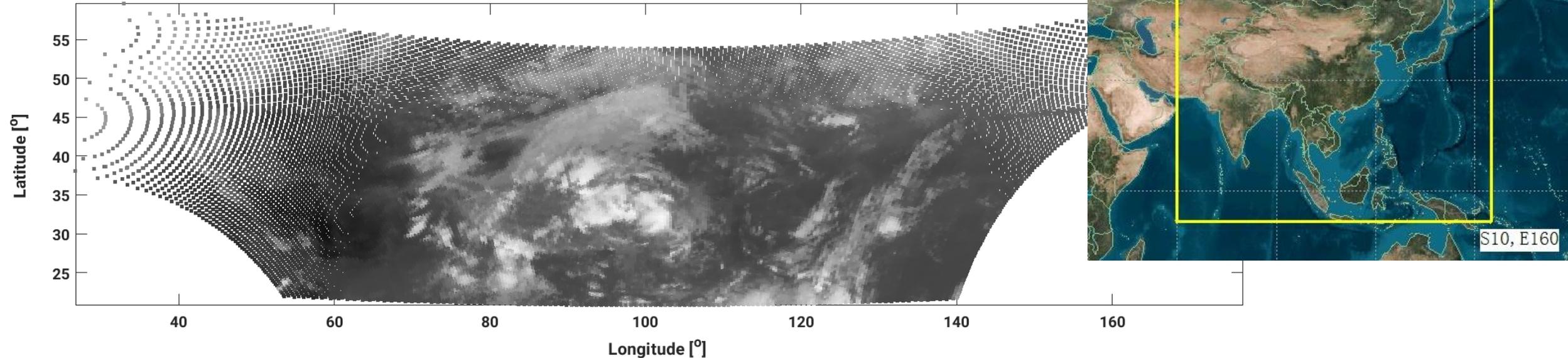
- Geostationary 120°E
- 128 pixels of 16km
- 6 x 59 scans over ASIA
- OPD $\cong \pm 8.3\text{mm}$

	Range	Resolution	Channels
Spectral Parameters (Normal mode)	LWIR: 700-1130 cm^{-1}	0.625 $^{-1}$	689
	MWIR: 1650-2250 cm^{-1}	0.625 $^{-1}$	961
	VIS : 0.55- 0.75 μm		
Spatial Resolution	LWIR/MWIR :	16 Km @ nadir	
	VIS :	2 Km @ nadir	
Operational Mode	China area	5000 \times 5000 Km^2	
	Mesoscale area	1000 \times 1000 Km^2	

Temporal Resolution	China area	<1 hr
	Mesoscale area	<1/2 hr
Sensitivity ($\text{mW}/\text{m}^2.\text{sr}.\text{cm}^2$)	LWIR: 0.5-1.1	MWIR: 0.1-0.14
	VIS: S/N>200($\rho=100\%$)	
Radiometric Accuracy	1.5 K	
Spectral Accuracy	10 ppm	
Quantization Bits	13 bits	

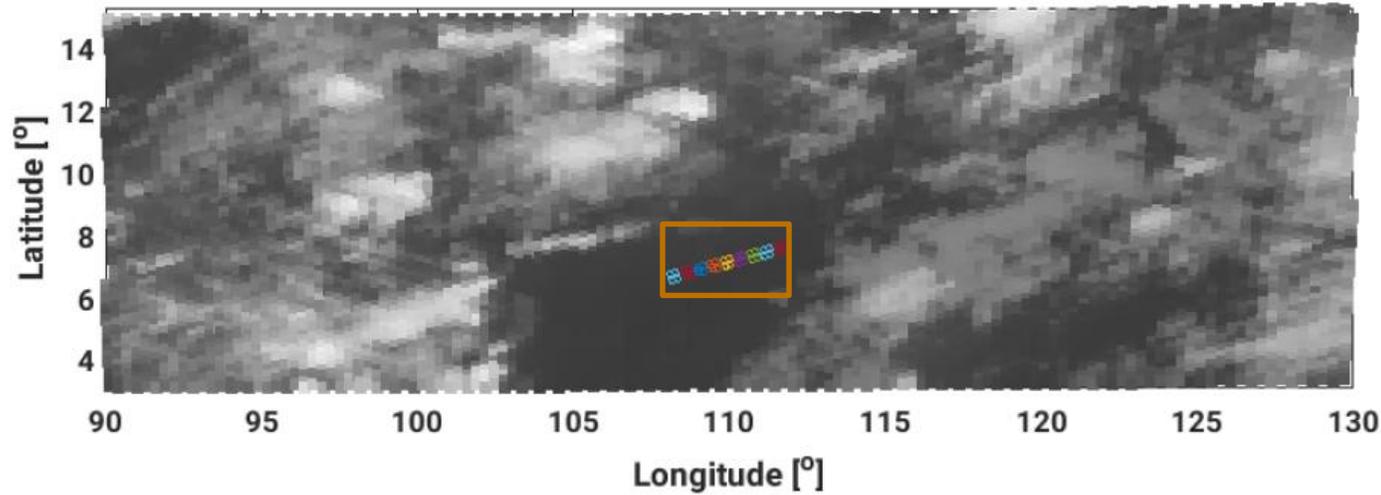


China Surface Temperature 18/08/2019 12:00 FY4A-GIIRS
(black = 330K, white = 220K)



Colocation : GIIRS/IASI

GIIRS/IASI-B - 2019/09/08 13:30



Chinese meridional sea :

- Late afternoon (20h)
- Clear sky

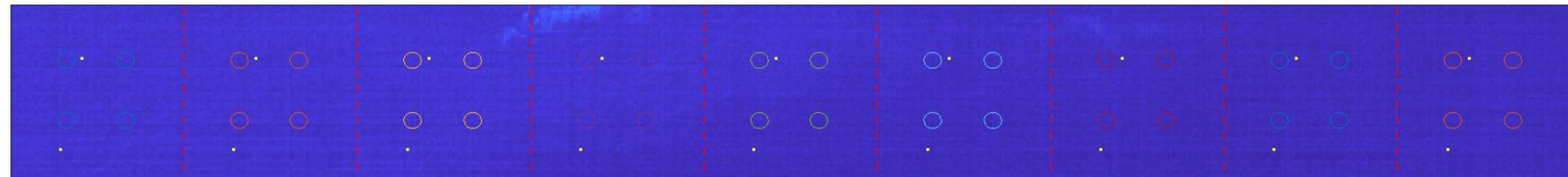
IASI (36 spectra):

- 08/09/2019 14:04 (GMT)
- Near Nadir

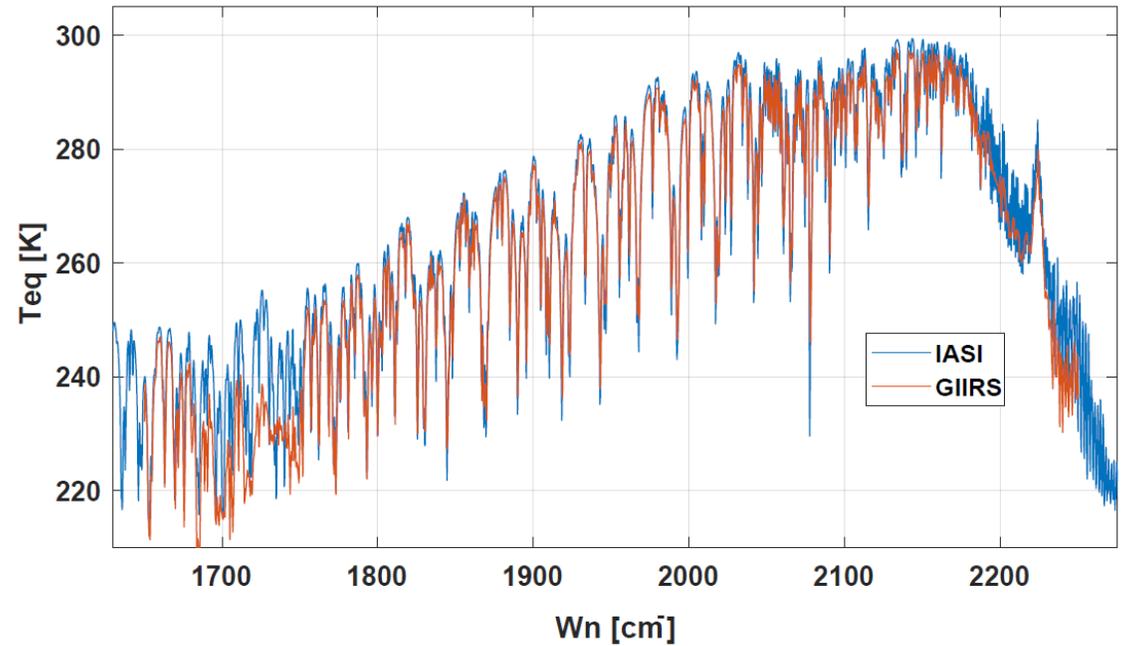
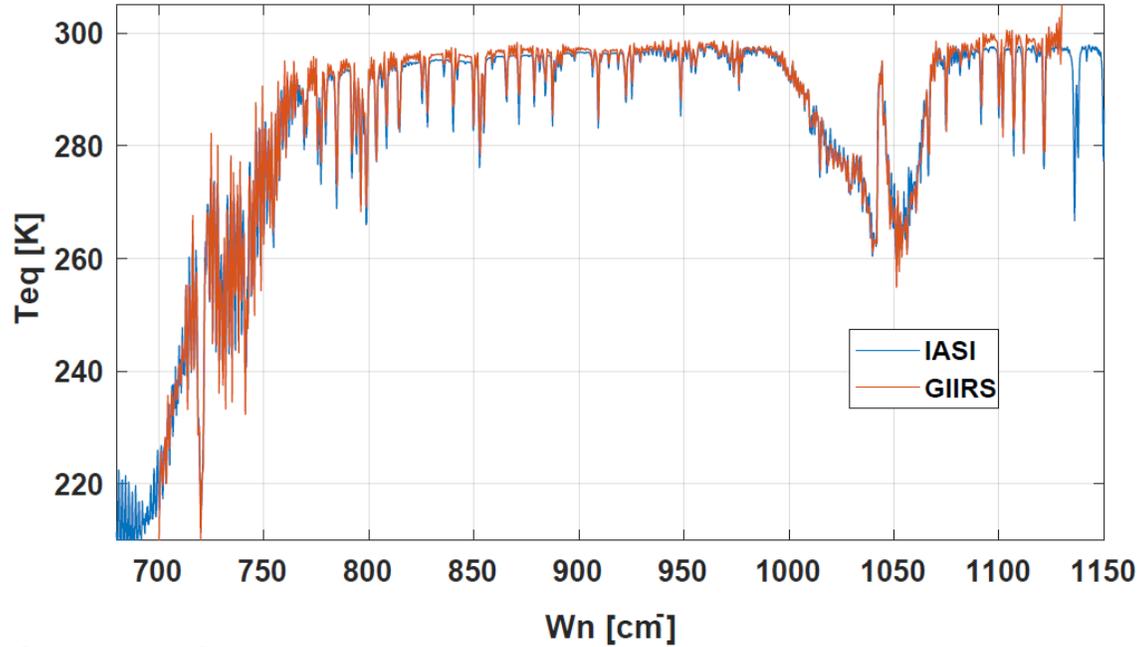
GIIRS (168 spectra):

- 08/09/2019 13:36 (GMT)
- Low latitude = 7 degrees

Merged IASI-B Images, 2019/09/08 14:04 Line 13, center = NADIR



Radiometry GIIRS/IASI



Discrepancies:

LWIR

- 750-950 cm^{-1} : +2K
- 950-1075 cm^{-1} : 0K
- 1075-1125 cm^{-1} : +4K

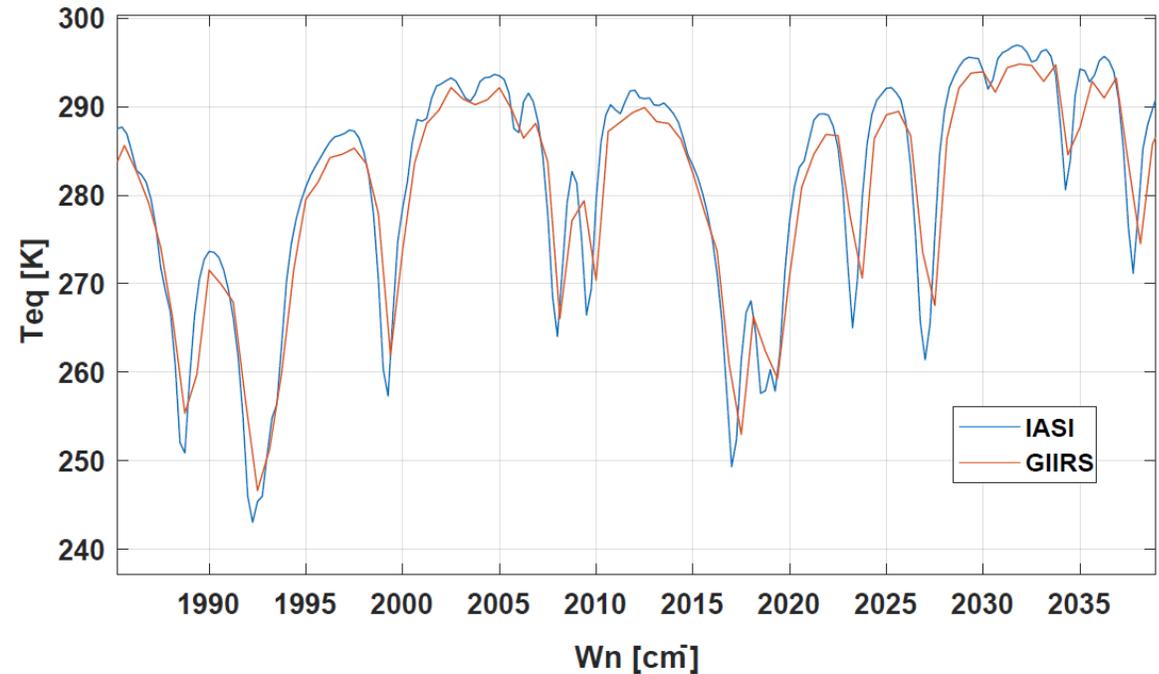
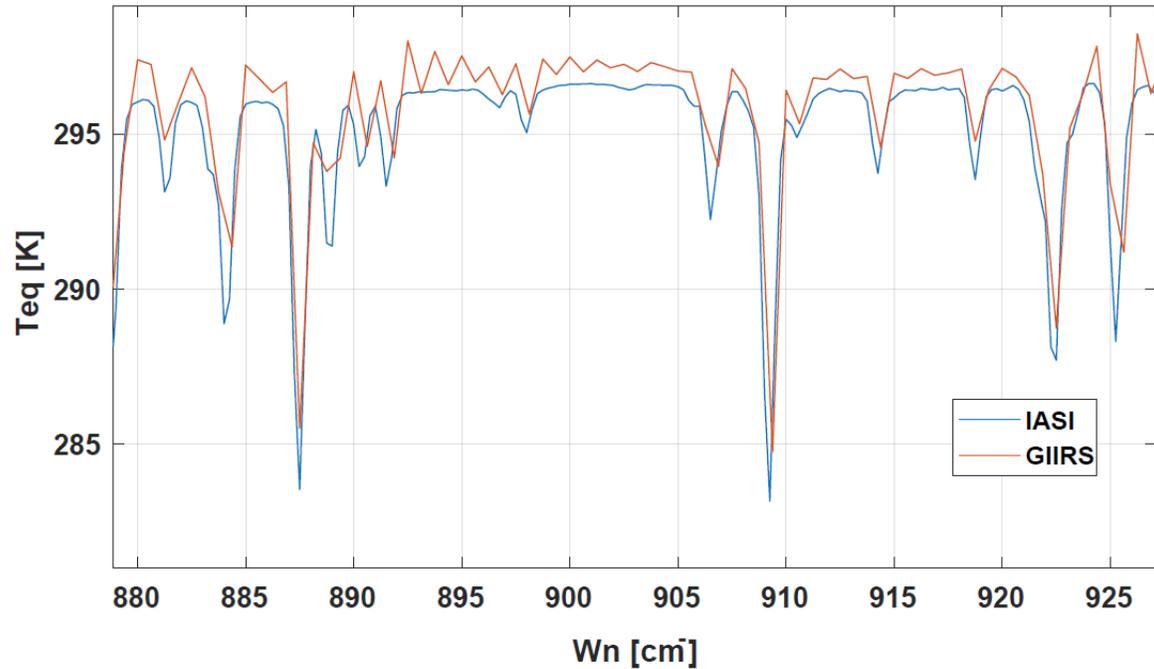
MWIR

- 1650-1750 cm^{-1} : -10K
- 1950-2150 cm^{-1} : -2K
- 2200-2250 cm^{-1} : -10K

New server will allow a finer comparison gathering many spatial and temporal colocations.

Spectral calibration : IASI/GIIRS

Clear spectral shift in both bands:



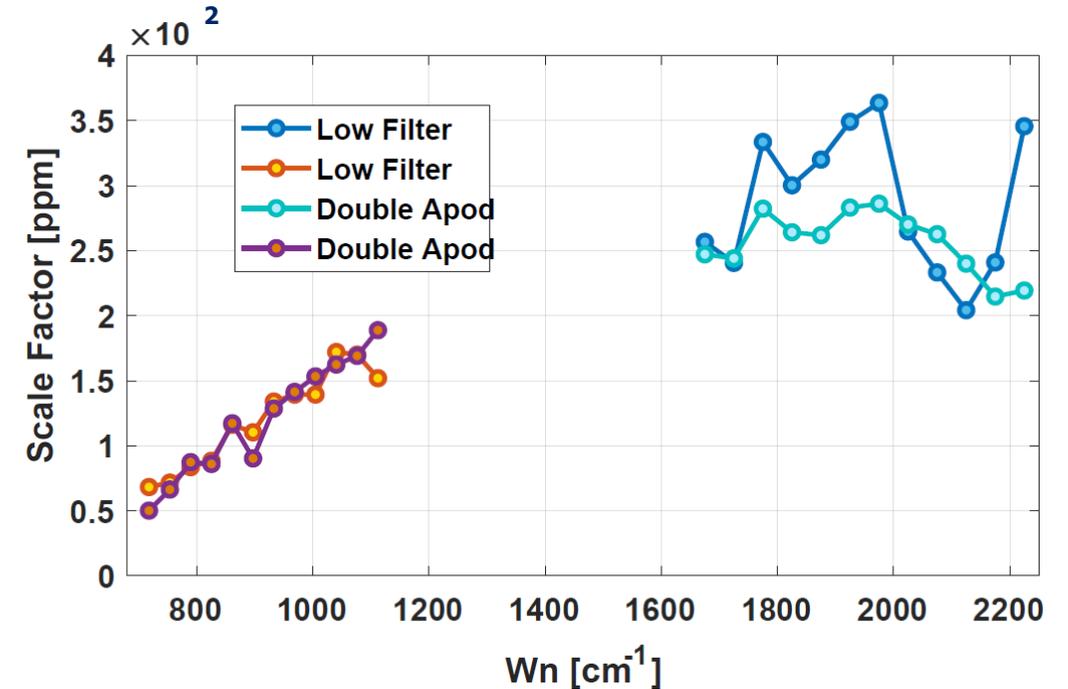
GIIRS is always red-shifted !!

Spectral calibration : IASI/GIIRS

Inspired by IASI monitoring method:

- **IASI and GIIRS spectra -> interferograms calculation with same sampling**
- **IASI is un-apodized and its OPD is shorten to +/-8mm**
- **GIIRS and IASI centre fringes are cut (low frequency filter) or a Double Apodization is applied**
- **Fourier transform to get the spectra (same grid)**
- **Over sampling with cubic interpolation: step of 0.001 cm^{-1}**
- **Correlation function between the two spectra in MWIR and LWIR bands for 12 sub-windows:**

$$C_i(d\nu) = \frac{\sum_{\nu=\nu_{min}(i)}^{\nu_{max}(i)} (S_{iasi}(\nu) - M_{iasi}^i) \cdot (S_{GIIRS}(\nu + d\nu) - M_{GIIRS}^i)}{\sqrt{\sum_{\nu=\nu_{min}(i)}^{\nu_{max}(i)} (S_{iasi}(\nu) - M_{iasi}^i)^2 \cdot (S_{GIIRS}(\nu + d\nu) - M_{GIIRS}^i)^2}}$$



Conclusion

- **Radiometry :**
 - **Big discrepancies around the band edges**
 - **Need an internal server to realize a finer study (Setup in preparation)**
- **Spectral calibration :**
 - **100-300ppm red-shifts are witnessed on both bands**
 - **Preliminary results (with mid-august data) suggest also pixel dependent spectral shifts :**

