EUMETSAT

OSI SAF

OCEAN AND SEA ICE

Sea Surface Temperature over Indian Ocean from METEOSAT-8 data, validation report

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Prepared by Stéphane Saux Picart, Météo-France/CMS

1. Presentation

The OSI SAF Sea Surface Temperature (SST) from Geostationary satellites consists in hourly fields projected onto a regular 0.05° lat/lon grid. The operational SST chain processes GOES-E and METEOSAT (at 0E) data, covering the Atlantic from 60S to 60N and from 100W to 45E. [1]. A new processing chain has been setup at the Centre de Météorologie Spatiale (CMS) of Météo-France. This chain ingests data from METEOSAT-8 located at 41.5E, it is the same as the operational chain, but parameterized for a different geographical area.

The METEOSAT-8 SST product is produced on the area 60S-60N–19.5W-101.5E, partially covering the Indian Ocean. The products have been validated against in situ data with the same method as for the operational products [2].

The processing chain and validation of METEOSAT-8 SST is not an OSI SAF commitment, it is done on best effort basis.

References :

[1]   Geostationary Sea Surface Temperature (Products OSI-206, 207) Product User Manual, version 1.6 (2017), SAF/OSI/CDOP/M-F/TEC/MA/181

[2]   Operational SST retrieval from MSG/SEVIRI and GOES-E Upgraded chain Validation report (products OSI-206, 207) (2011), version 1.1, SAF/OSI/CDOP/M-F/TEC/MA/183

2. Validation procedure

METEOSAT-8 hourly SST product is evaluated against drifting buoy measurements available on the Global Telecommunication System (GTS). These measurements are taken at a depth of about 20 cm and are considered to be the ground truth for remotely sensed SST validation.

In situ measurements are collocated and compared with satellite SST respecting the few following rules:

- Collocation with the pixel where the buoy measurement is falling into.

- Search time frame [t-1h,t+1h].

- Only quality levels 3, 4 and 5 are considered.

- Statistics are computed separately for day-time and night-time.

More information about validation procedure and the processing chain can be found in [1] and [2].

3. Results

Comparison to drifting buoys measurements have been performed from 28/2/2017 until 23/6/2017. Global mean and standard deviation of the difference $SST_{satellite}$-$SST_{in\ situ}$ are presented in table 1 for day-time and night-time separately. There is noticeable overall cool bias greater than 0.1°C slightly greater than the one for METEOSAT-10 over Atlantic ocean (in 0°E position).

	Nb case	Mean difference	Standard deviation
Day	77832	-0.14	0.57
Night	65135	-0.12	0.54

Table 1: Global statistics of the difference $SST_{satellite}$-$SST_{in\ situ}$

Figure 1 shows the temporal evolution of the daily mean difference and standard deviation calculated on the whole domain. Statistics are stable during the period of analysis. At the end of the period a difference is noticeable between night-time and day-time biases.
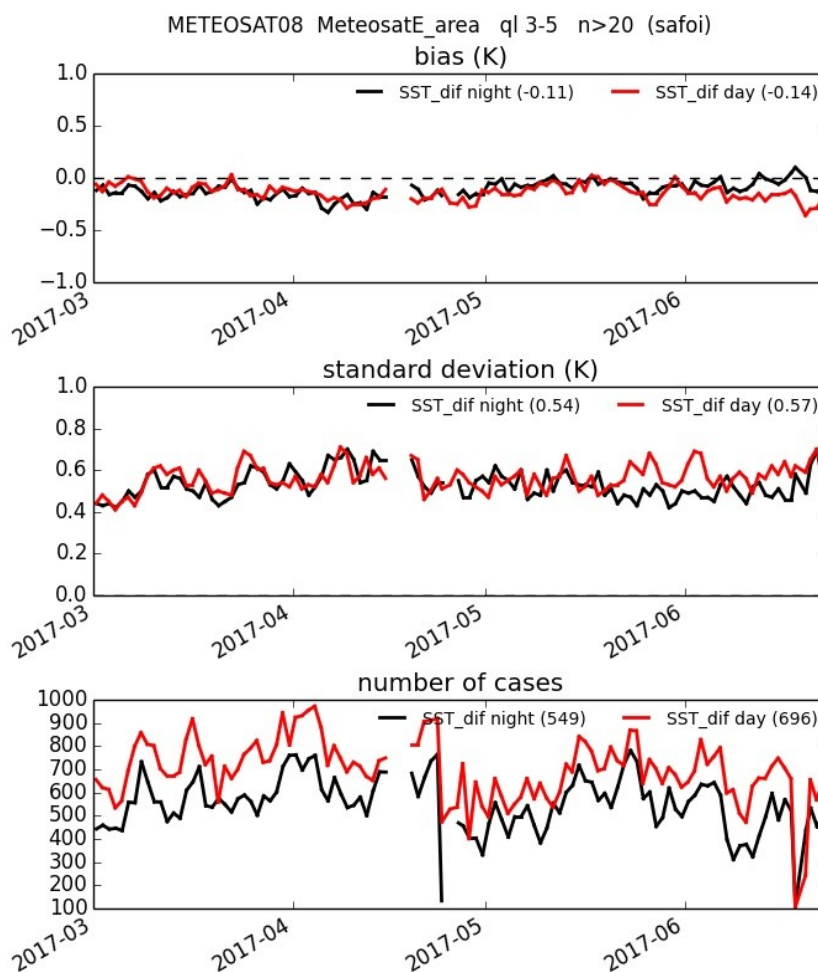

Figure 1: Temporal evolution of the statistics $SST_{satellite}$-$SST_{in\ situ}$ calculated daily.

Figure 2 shows day-time and night-time maps of the mean difference binned into 5x5° boxes. There is a quite obvious pattern with negative biases in the North, especially in the Mediterranean Sea and in the Arabian Sea, and slightly positive biases in the South especially around the Southern African continent

and in the southern Indian Ocean. This North/South pattern is not visible at all on operational data from METEOSAT-10 over Atlantic Ocean.

While we cannot fully explain why such patterns exists, we know that they are coming from the bias correction scheme (figures not shown here). The bias correction does a reasonable job in the Southern hemisphere, and creates a cool bias in the Northern hemisphere. As of now, we have not identified precisely the causes.
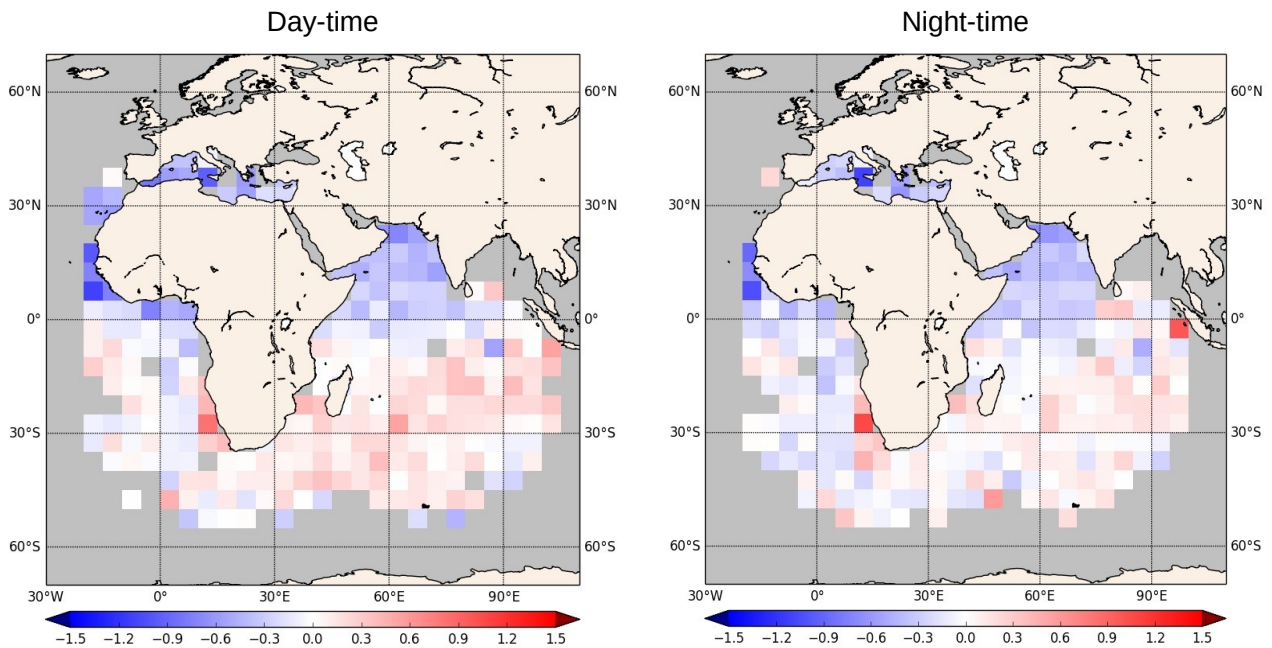

Figure 2: Map of the mean difference $SST_{satellite}-SST_{in\ situ}$ binned into 5x5° boxes for the period 28/2/2017 to 23/6/2017 for day-time on the left and night-time on the right.

4. Conclusion

SST product from METEOSAT-08 over Indian Ocean is of expected quality. The bias correction may be improved, although the biases it produces are small and regional.