Validation of IASI Surface Temperature Under Dusty Conditions: Application to the West Africa Region

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Abstract

Results and discussion

Daytime

Nighttime

A near equal SDV (about 2K) is observed for both AATSR and AQUA which decreases during winter when AOD is low, they decrease in summer to a near equal SDV (about 2K) which is smaller than the SDV of all the satellites STs are nearly constant over the study period.

Low AOD case (Fig. 4-a)

- A constant AOD of 0.1 is observed over the entire year.
- IASI have almost constant bias with ECMWF during winter.
- A lower SDV has been found for AATSR (around 2K) and for AQUA (~2K) and TERRA (~3K).

High AOD case (Fig. 3-a)

- A constant AOD of 0.1 is observed over the entire year.
- IASI have almost constant bias with ECMWF during winter.
- A lower SDV has been found for AATSR (around 2K) and for AQUA (~2K) and TERRA (~3K).

Figure 3-a. Daytime monthly biases and ECMWF forecast profile

Figure 3-b. Daytime monthly biases and ECMWF forecast profile

Figure 1-a. Daytime monthly biases and ECMWF forecast profile

Figure 1-b. Daytime monthly biases and ECMWF forecast profile

High AOD case (Fig. 5-a)

- This area is characterized by a large increase of the AOD during summer (from 0.1 to 0.7).
- AATSR shows almost constant bias (~2K) over the year 2011 except for August (~3K) and for TERRA (~1K).
- For AATSR, AQUA and TERRA, biases observed with ECMWF correspond to constant values. The bias observed with ECMWF corresponds to constant values. We acknowledge the AMMA project for providing processed SEVIRI data.

Low AOD case (Fig. 6-a)

- A constant AOD of 0.1 is observed over the entire year.
- IASI have almost constant bias with ECMWF during winter.
- A lower SDV has been found for AATSR (around 2K) and for AQUA (~2K) and TERRA (~3K).

Figure 5-a. Daytime monthly AOD for 2011

Figure 5-b. Daytime monthly AOD for 2011

Figure 4-a. Daytime monthly AOD for 2011

Figure 4-b. Daytime monthly AOD for 2011

Nighttime ST for these satellites seem to be significantly underestimated in presence of dust, in particular during daytime. IASI ST determined simultaneously with dust properties, appears less impacted.

Nighttime

Sea

Examples of the three cases are shown in Fig. 2. All the satellites perform well with SEVIRI having the best results for this area, except for the AATSR, which seems to perform better during the night. The AOD remains weak all along the year 2011 except for August (~5K) associated to a maximum of AOD.

Examples of the three cases are shown in Fig. 2. All the satellites perform well with SEVIRI having the best results for this area, except for the AATSR, which seems to perform better during the night. The AOD remains weak all along the year 2011 except for August (~5K) associated to a maximum of AOD.

- IASIs do not have an absolute difference between the considered ST and the reference IASI exceeds 10K.
- For the sub-region statistics on pixels where more than 5,000 observations per month are recorded.

- The monthly means and SDs have been estimated over all the considered area and over some homogeneous regions.
- We acknowledge the AMMA project for providing processed SEVIRI data.

- In presence of dust, AATSR TERRA and to a lesser extend SEVIRI and AATSR present a decreasing bias against ECMWF, due to a systematic decrease of their ST estimation (~4K) not observed by IASI nor by ECMWF, and an increase of the standard deviation.

- ST for these satellites seem to be significantly underestimated in presence of dust, in particular during daytime. IASI ST, determined simultaneously with dust properties, appears less impacted.

- In absence of dust, IASIs TERRA and SEVIRI (for STs biases are smaller. This bias is limited to the over sea and only at right over solid surface, whereas it can reach AOD during the day and regions.

- In presence of dust, AATSR, TERRA and to a lesser extend SEVIRI and AATSR present a decreasing bias against ECMWF, due to a systematic decrease of their ST estimation (~4K) not observed by IASI nor by ECMWF, and an increase of the standard deviation.

- ST for these satellites seem to be significantly underestimated in presence of dust, in particular during daytime. IASI ST, determined simultaneously with dust properties, appears less impacted.