

## ***Interactive comment on* “Characterisation and quantification of regional diurnal SST cycles from SEVIRI” by I. Karagali and J. L. Høyer**

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### **GENERAL COMMENTS:**

- *This manuscript is focused on characterization the regional diurnal warming distribution on the SEVIRI disc in the period 2006 to 2012. The questions that this paper aims to answer make sense and deserve the investigative effort made by the authors. The first half of the paper is devoted to the validation of SEVIRI against ATSR and on the validation of the test foundation fields after their definition. Then the second, and more interesting, part describes and comments the spatial and temporal variability of the DW over the area observed by SEVIRI giving an interesting and exhaustive picture of the DW phenomenon in the area*

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sensed by SEVIRI. Very interesting, even if only mentioned in the conclusion, is the relation between ocean colour and surface water warming: "... Thus, it is postulated that the very high water turbidity, verified by composite maps from the GlobColour project (Morel et al., 2007), reduces the incoming solar radiation's penetration depth in the water column thus strengthening the top layer warming...". This subject has already been discussed in Karagali et al. 2012 for the North Sea and merits to be further investigated (may be in a future paper) at global scale. The future work section at the end of the conclusions should include this subject. In conclusion, I would recommend publication of the manuscript provided revisions are made to address the above specific (very minor) comments below.

We thank Dr. Marullo for his comments and suggestions. Regarding the future work part at the end of the conclusions, this has now been extended to include a comment regarding the role of water turbidity as a promoter of diurnal warming. Please see end of conclusions section: " It is outside the scope of the present paper to investigate in detail the mechanisms that lead to such regional differences in the diurnal cycle. Water turbidity may hold a role in promoting the development of a diurnal layer, a topic which merits further investigation. Future work will focus on reproducing the observed diurnal variability using a 1-D turbulence model, which allows for the selection of different light absorption schemes, amongst others. This will allow identification of the dominating terms in the ocean and atmosphere heat fluxes for each of the regions."

## SPECIFIC COMMENTS:

- *Section 2.2, page 1097, line 9: ...uncertainty lower than 0.8. Can the authors add a comment about this 0.8?*

This value has been decided after the authors' experience with the data. We have also derived statistics without using any uncertainty flag on the AATSR data

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and while the amount of data increased by approximately  $10^5$ , the mean bias, standard deviation and correlation coefficient remained the same. This is now added to the text: “Derived statistics without using any uncertainty flag on the AATSR data produced higher data availability (by approximately  $10^5$ ) while the mean bias, standard deviation and correlation coefficient remained the same.”

- *Section 3.2: The TFF definition: The moving window in table 1 is always 00:00-04:00 except for TFF5. I do not understand in which sense the window is “moving”. Moreover, quality flags considered are: 1,2,3,4,5 – 3,4,5 and 5, why 4,5 is not included?*

Indeed, the night-time window is not “moving” much in the presented TFFs. We have performed sensitivity tests using 4 more TFFs (not shown) where the night-time window was actually moving. Therefore it only makes sense that we remove the “moving” part. Regarding the quality flags, we do not use only QF 4,5 because (as Table 2 indicates), that would not mitigate the issue of low data availability for the construction of the foundation fields. This has now shortly been mentioned: “For the latter reason, we do not use a combination of only QF 4, 5 for the TFFs, as this would not mitigation the issue of potentially low data availability (see number of available data N. shown in Table 2, rows 3–5).”

- *Section 4.1, page 1099, line 11: the most significant decrease is observed going from QF 3 to QF 4. QF 4 and QF 5 are both very close to zero (between 3 and 6 time closer than QF 3). A similar difference is observed for sigma. This observation would support the use of QF 4 and 5 rather than 3,4,5.*

Indeed. But data availability for the TFFs would be severely reduced. See previous comment.

- *Section 4.1: Which QF is used for comparison with the drifters?*

The SEVIRI QF used for the drifter comparisons are the same as with the AATSR comparisons, i.e. 3–5. This is now clarified in the text: “Note that the last row

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is different from rows 1 to 5 in that the number of match-ups is limited by the availability of drifting buoy measurements and that the SEVIRI QF and AATSR uncertainty values used for these comparisons are the same as before.”

- *Section 4.2, page 1102, line 8-9: “...but absent from the drifter measurements which are taken from a reference depth of 20 cm” This sentence is quite obscure.*

It is not clear to the authors why the reviewer thinks the sentence is quite obscure. Doesn't the reviewer agree that the skin effect will not be “felt” by the drifter measurements, typically obtained at 20 cm depth? To avoid definitive statements we have modified from “absent” to “most likely absent”.

- *Section 4.3, page 1104, line 20: “given the biases and the standard deviation... 1 K or more is used”. What is the rule that produces 1K? It is just a bit more than the standard deviation or some statistical theorem must be invoked?*

Given the biases and standard deviations found from the validation of the SEVIRI TFFs against Drifter TFFs, the threshold is selected. This is already explained in the text and it is based on the statistics available in Table 3.

- *Section 4.3, page 1106, line 3: ok for the vertical stripes but what about the small squares effect present in most of the maps?*

This is an artefact of converting very high resolution pdf figures to moderate resolution png files, to minimize their size. The squares do not appear in the pdf figures, but each file is approximately 30 MB (!). This can be mitigated when/if the manuscript is published.

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