

Reply to Referee #1

We thank Anonymous Referee #1 for his/her useful comments, which improved our paper.

Our replies to the referee's comments are reported in the attached file "Reply_to_Referee1.pdf" uploaded as a supplemental material.

The changes referred to in our replies can be found in the attached file "Reviewed_text.pdf" uploaded as a supplemental material.

At the beginning of section 4.1 a paragraph has now been added to better introduce the application to coastal circulation modeling in the framework of the related scientific literature.

Specific comments:

Referee: *In wind direction retrieval the authors have used the Discrete Wavelet Transform Multi-Resolution Analysis. The question is: Was the wind direction ambiguity completely solved with this technique or there are more solutions to be taken into account?*

Authors' Reply: The SAR-based wind directions estimated with the WT-MRA approach (as well as with any other retrieval technique, at the best of our knowledge), still contain an inherent 180° wind direction ambiguity. The latter is properly solved either if wind shadowing (often visible in the lee of objects) is present in SAR imagery or by using external information, such as those provided by ASCAT scatterometer data (see p. 7-8 of the attached file).

Referee: *I suggest to check the discussion related to the methodology that has been used, i.e. How many steps are they using? twice "first step" and twice "second step"?*

Authors' Reply: The Methodology has been properly modified according to the referee's comment. Section 2 has now been divided into 2 sub-sections:

2.1 Pre-processing analysis.

2.2 SAR-based wind field estimation

(see p. 5 of the attached file).

Referee: *pp. 3260 line 16-26: I suggest to rearrange the discussion regarding the retrieval results: "Since both ..."*

Authors' Reply: The discussion has now been rearranged according to referee's suggestion.

In detail:

- pp. 3260 line 21-26 "Moreover...purposes" – This sentence has been removed from the discussion.
- pp. 3261 line 7: the following sentence is now inserted: "A SAR-based wind field retrieval gridding scale of 12.5 km×12.5 km is considered. Therefore, the timely co-located reference ground truth provided by ECMWF model wind fields is bi-linearly interpolated in space over both ASCAT scatterometer and the SAR wind field gridding scale, for both comparison and validation purposes."

(see p. 8, lines 18-31 of the attached file).

Technical corrections:

Referee: *pp 3260 line 15 and pp 3265 line 5: 0.2° or 1/5°?*

Authors' Reply: Done (the correct resolution is 1/4°). See the second paragraph of section 3.

Referee: *pp 3260 line 15: Change or add the ECMWF resolution in km x km*

Authors' Reply: Done.

Referee: pp 3263 line 3-21: *I suggest to rearrange the results from 1 to 6 in a table.*

Authors' Reply: A table is now used to summarize the results of the wind field products inter-comparison, according to the referee's suggestion.
(see Table 1, p. 19, of the attached file).

Referee: pp 3264 line 21: *"OPA-INGV" only acronym?*

Authors' Reply: Done. (see p. 11, line 17 of the attached file).

Referee: pp 3272-4: *Comparing Figs. 2-4 it seems that the wind direction difference in some data SAR-based - ASCAT, SAR-based-ECMWF and ASCAT-ECMWF is $> 30^\circ$, but this is not clear in Fig 4. To make it clearer, the same step for Xtick and Ytick should be set in Fig 4;*

Authors' Reply: Figure 4 has now been modified according to the referee's suggestion. The same step has been used for Xtick and Ytick to both improve the description of the obtained results and better clarify the details of the wind direction products inter-comparison. Moreover, an error found in Fig. 4(e) has now been removed.

(see the new "Figure4.pdf" attached as supplemental material).

Referee: pp 3277 replace *"ECMWFD forcing"* with *"ECMWF forcing"*;

Authors' Reply: Done. (see p. 21, line 1 of the attached file).