

## ***Interactive comment on “Observability of fine-scale ocean dynamics in the Northwest Mediterranean Sea” by Rosemary Morrow et al.***

**Rosemary Morrow et al.**

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Detailed response to Reviewer 2's comments : [1] My first comment is related to the filters applied to both altimetry and glider data. In Table 2, authors indicate that altimetric data is filtered by applying a Loess filter while glider data is filtered by using a 2-step Butterworth filter. Why the authors did not use the same kind of filter for both datasets? Is the choice of the filters based on previous studies? I think that this issue should be clarified and an explanation should be included in the text. On the other hand, it is not clear to me how the authors have chosen the filtering scales showed in Table 2 for the different altimeter missions. Did they perform a sensitivity test in order to choice the more suitable window cut-off or it is based on the spectral analysis results? If the latter applies and that is also the reason for choosing a filtering scale of 30 km in Saral track #388, it should be specified in the text to avoid confusion.

Reply : The filtering for the alongtrack altimetry data is based on the standard filtering applied to the CTOH coastal processed data (Birol et al., 2010; Birol and Nino, 2015). The glider filtering is based on the 2-step Butterworth filter to remove the high-frequency noise below the Rossby radius, based on expertise with Saral AltiKa data where numerous filters were tested. The references for these 2 choices are now more clearly expressed in the paper. For the final filtering scales applied in Table 2, the first estimate was based on the seasonal spectral analysis results. However other cut-off frequencies were tested. The filter which gave the best results in terms of correlation coefficient and which had the lowest cut-off wavelength was then chosen. This detailed description has also been added to the text in the introduction to section 4 (glider-altimeter comparisons).

[2] In the first sentence of section 2.3 (line 25 of page 5) the meaning of “over a number of year” is not clear. I guess that authors refer to the time period over which the radar has been working. If so, please indicate this time period.

Reply : This has been replaced by “with gridded data available since 2012”

[3] in line 31 onwards of the same page it sounds better “The system uses two WERA radars that provide surface current vectors over a region extending 80-100 km offshore, with a spatial resolution of 3 km and an angular resolution of 2 degrees. They operate at 16-17 Mhz. Observations are collected every 20 min and data have been edited and averaged:::”

Reply : This has been re-worded accordingly

[4] In section 3 (line 6 of page 6), it should be written “than 50 km from the coast are analysed to avoid the increased errors in the coastal zone” because the authors did not apply any procedure to remove these errors, but selected a dataset with a typical reduced coastal noise.

Reply : OK. This has been reworded as : “This segment length was chosen to allow

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a large number of altimeter segments in different regions in between the numerous islands and to be more than 50 km from the coast, to avoid the increased errors in the coastal altimeter data."

[5] Concerning to the previous point, why authors selected segments of 200 km? Please give a reasonable explanation.

Reply : This has been reworded – see previous comment [4] [6] In lines 11 - 13 of page 6 (section 3), authors state that “an example of the power spectral density (PSD) of sea level anomaly averaged for all of the Jason-2 data in the NW Mediterranean Sea is shown as the black curve in Fig. 2”. This is not correct because in this Figure the dataset used spans from 1st April 2013 to 30th April 2014 while the whole dataset investigated for the Jason-2 data (Table 1) spans from 2008 to 2015. Actually, this is the common period investigated in the three satellite missions (given in line 28 of the same page) for the spectral analysis. Therefore, this sentence should be reworded to properly indicate the time-period used.

Reply : this has been reworded to specify that the example in Figure 2 covers the longer time period from 2008 to 2015

[7] The red line in Figure 2 showing the spectral slope is not easily observed. Please change its color. Moreover, in line 17 of section 3 it should be written “black line” instead of “red line” according to plots in Figure 2. Also, in line 19 it should appear “red line” instead of “black line”

Reply : The red slope line has been replaced by a red dashed line to be clearer. The text has been modified for these points to specify the correct line color in the text and in the Figure. We apologise for this.

[8] As an overall comment, authors should be consistent with the dimension of the units along the text. Sometimes velocities are given in m/s and sometimes in cm/s. Since units in all figures are given in m/s, I strongly recommend putting all velocities in m/s

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within the text. Furthermore, in section 4 velocities and times are expressed in km/sec, secs and m/sec. It is more appropriate to refer time as “s” instead of “sec”.

Reply : this has been changed throughout.

[9] Label of color bar in Figure 5.c indicates density (kg/m3). Please change to T (C)

Reply : this has been modified

[10] In line 9 of page 9 (section 4.1) it should be written “(in pink)” instead of “(in red)” in order to be consistent with Figure 6.

Reply : The Figure has been modified to be in pink, to be consistent with Figure 6b as well. The text remains “in pink”.

[11] In line 11 of page 10 it sounds better “Figure 8 shows the five days needed by the glider to ::” Please change it in the text.

Reply : Done

[12] In the first sentence of section 5 (page 11) please remove “an” since “additional means” is plural. Furthermore, in line 15 change “leaving the geostrophic ::” by “retaining the geostrophic::” this is more formal.

Reply : Done

[13] In line 22 of page 12 please remove the word “altimetric” since it is redundant.

Reply : Done

[14] Red arrow denoting the current scale in Figure 10 should be in m/s in order to be consistent with velocities displayed in the figure. The same applies to panel a in Figure 7. Moreover, label of color bar in Figure 10 should be “m/s” or “m s 1” instead of (m/s-2).

Reply : Done

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[15] Finally, caption of Figure 11 indicates that Saral data has been filtered at 45 km wavelength but according both to the text and Table 2 it is filtered at 35 km. Please change it.

Reply : Done

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