

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

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In this work, the authors investigate both the noise level and observable ocean scales for three altimeter missions (Jason-2, Saral/AltiKa and Cryosat-2) in the northwestern Mediterranean Sea through a spectral analysis approach. Along-track satellite data collected over several years are used. Furthermore, comparisons with in-situ observations from glider and HF radar in different individual case studies are also performed in order to validate the altimetric data.

I think that this paper presents original work and I consider that it must be published in Ocean Science with some minor corrections. I have, however, some suggestions and questions that should be taken into account and reasonably solved. There are also some typographical and grammatical errors that need to be corrected.

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In the following there is the list of my 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 choose 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.

[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.

[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 . . .”

[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.

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

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[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.

[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”

[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 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”.

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

[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.

[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.

[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.

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

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[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/s²).

[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.

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