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Interactive comment on "Evaluation of MERIS products from Baltic Sea coastal waters rich in CDOM" *by* J. M. Beltrán-Abaunza et al.

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Referee 1. Zibordi,G.

Comment 1. Page 2163, line index 20 (and Figure 6).

The in situ data include the absorption coefficient of CDOM. It appears this quantity is considered equivalent to the absorption coefficient of the so called "yellow_subs" in the official ESA MEGS products (not clear if the same assumption applies for FUB, C2R and BOREAL data products). However, MERIS MEGS "yellow_subs" is the sum of the absorption coefficient of CDOM and of non-pigmented particles, and thus it is not simply the absorption coefficient of CDOM. This element should be detailed and,

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eventually, any assumption should be justified.

Reply to comment 1

As recommended by the reviewer, more details has been included in the paper. As the reviewer mention, MERIS MEGS "yellow_subs" is the absorption coefficient of CDOM plus the non-pigmented particles. This assumption also applies for the processors FUB, C2R and BOREAL. The later two share the similar implementations as MEGS (ATDB 2.25 v1.0, http://earth.esa.int/envisat/instruments/meris/atbd/). A detail discussion on the similarities between BEAM-C2R and MEGS was posted in the ODESA forum (http://www.odesa-info.eu/forum/, view topic- What are the main differences between MEGS C2 and C2R). FUB derives the product yellow_subs trained with the CDOM absorption as described in the Coastlooc dataset (Babin et al. 2000, Schoeder et al. 2007). The assumption to use only the absorption coefficient of CDOM in our region of study is based on the relative high absorption of CDOM in the Baltic Sea in relation to non-pigmented particles (Babin et al 2000, Kowalczuk et al. 2006), therefore it is assumed that yellow_subs is mainly due to absorption of CDOM.

Comment 2. Page 2163, line index 25.

An error of 7% is declared for Chla concentration determined with the trichromatic method. Considering this value was determined from triplicate analysis, is it really an error or the precision (or repeatability) of measurements?.

Reply to comment 2

The declared percentage error of the in situ values (i.e., SPM, Chla) correspond to the coefficient of variation (standard deviation / mean), using all the available samples

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from different bottles (Kratzer 2000), therefore is not only determined from triplicates as considered by the reviewer. More details will be included in the paper to avoid confusion by the readers.

Comment 3. Page 2172, line index 15.

The work documents major differences between the radiometric products from satellite observations and from in situ measurements. This may suggest that the derived products (e.g. Chla, SPM), being determined from highly inaccurate radiometric data, may not be reliable and worthwhile to consider. On the other hand, until a better atmospheric correction is possible, these are the available products for MERIS. This point should be used to defend the effort in assessing the MERIS derived data products.

Reply to comment 3

The recommendation by the reviewer is fully taken into account. Stronger emphasis has been added in the discussion section to raise this point.

Comment 4. Page 2173, line index 20

Results are discussed in terms of "random errors" and "systematic errors". The terminology is certainly correct, but it assumes a "truth". Thus, if all the uncertainties are assigned to the remote sensing data products and the in situ data can be considered "exact", the terminology can certainly be preserved. If, like in this case, the in situ data are affected by their own uncertainties, it should be more appropriate to consider "dispersion" instead of "random errors" and "bias" instead of "systematic error".

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Reply to comment 4

In this study the in situ data has been assumed to be a "true" value. The in situ uncertainties that one can expect from the in situ samples in our region of interest have been mentioned in order to provide the reader with information regarding the natural variability of the samples (Kratzer 2000). However, we acknowledge that the "in situ" data is not exact and that we cannot assign all the uncertainties to the remote sensing data products, therefore the terms random errors and systematic errors will be changed accordingly to the reviewer suggestion.

Comment 5. Page 2170, line index 10

The work has been developed using ICOL (a processing scheme proposed for the minimization of adjacency effects in satellite data). When looking at the spatial distribution and distance from land of the validation points, it is clear that the adjacency effects may differently affects the results as a function of the in situ measurement station. Because of this, rather than making a cumulative evaluation of the ICOL performance, not really supported by evidence, it would relevant to show the effects of ICOL corrections as a function of the geographic poistion (at least distance from from land). Clearly, considering the small number of matchups, this requires duly accounting for in situ measurement uncertainties.

Reply to comment 5

This study is built on previous findings of Kratzer and Vinterhav (2010) where the proposed assessment of ICOL has been taken fully into account. Based on those findings, in terms of ICOL our only objective was if by using the MERIS 3rd reprocessing datasets the findings of Kratzer and Vinterhav still hold. That was confirmed to be still

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true, so no further details were released with the paper, as our main objective was not to validate ICOL. However, considering the relevance of using ICOL in the coastal zone, a new image as been added to the results section showing the percentage of change between no-ICOL and ICOL based processing for selected wavelengths. So the reader can appreciate the extent of the ICOL influence over the region of interest.

Comment 6. Page 2176, line index 20

The discussion does not at all include recent studies on the assessment of MERIS data from the same reprocessing and for the Baltic Sea (e.g., Zibordi et al. Ocean Science, 9, 521-533, 2013; Kajiyama et al, IEEE GRSL, 10, 283-287, 2013). Considering that some of the findings presented and discussed in the manuscript were already anticipated in previous publications, those literature results should be duly cited.

Reply to comment 6

The recommendation by the reviewer is fully taken into account. The omission of the publications has been acknowledged and the discussion is now enhanced with those previous findings.

Comment 7. Page 2177, line index 5

It is reported that ICOL improves the radiometric results. As already stated, this conclusion should be supported by some numerical evidence. For instance, it should be reported the level of improvement as a function of the distance from the coast.

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Reply to comment 7

The recommendation by the reviewer have now been fully taken into account in the revision. In addition to the reply to comment 5 a new figure is shown in the study with the results of the level of improvement as a function of the distance from the coast.

Comment 8. Page 2180, line index 15

The overall discussion on the accuracy of MERIS data products should mention that accuracies reported in past literature should be related to the different performance of the various MEGS processors applied in successive reprocessing. Specifically, while the atmospherically corrected data were largely overestimated in the second MERIS reprocessing, the opposite is observed with the third reprocessing (see Zibordi et al., Ocean Science 2013). Clearly, this severely affects the accuracy of derived data products.

Reply to comment 8

We fully agree with the comment of the reviewer. The accuracy of the derived data products is affected by the use of 2nd or 3rd MERIS reprocessing as input into the processing chain. In an early version of this study, the assessment of the processors between 2nd and 3rd re-processing was performed. However, it was decided later on, by an internal peer-review of the paper, to focus only on the results of the 3rd reprocessing which was the main objective of the assessment and to keep the paper focused and more easy to follow. However, if the editorial agrees we can make the results about the evaluation using the MERIS 2nd reprocessing available as complementary data to the study, or we can keep it to request by the reader. Is worth to mentioning, that our continue evaluation of the data products after submitting the paper for publication,

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also includes the validation of the CoastColour products for the region of the study. This evaluation was done as technical report for the WaterS and CoastColor projects and are available per request to the reader. Nevertheless, the accuracy of MERIS data related to the different performance of the various MEGS processors applied in successive reprocessing as been taken into account in the discussion.

References

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Interactive comment on Ocean Sci. Discuss., 10, 2157, 2013.