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Discussions

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

**J. M. Beltrán-Abaunza et al.**

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**Anonymous reviewer 3**

General comment 1

The overall presentation is good, yet some paragraphs could be cleaned up to ease readability. As an example, the processing steps are given very detailed which to my opinion, facilitates repeatability and traceability of the study. This part could be clarified by a schematic diagram.

Reply to comment 1

The recommendation by the reviewer is fully taken into account. A figure showing the processing work flow of the study has been added to the paper.

General comment 2

Concerning readability: Some sentences are quite full of information. E.g., page 2177 lines 22-25: These differences may also be linked to the relatively small ranges on in situ SPM and Chl a concentrations in comparison to the higher range of the processors, combined with relatively high aCDOM.

Reply to comment 2

The paper has been revisited to improve its readability. Please refer also to the general comment reply to reviewer Peters. Long sentences have been reduced to improve the writing style.

General comment 3: Page 2161 lines 27-30

What does this mean: Besides the further development of MERIS processing, the algorithm to retrieve the MERIS reflectance for the in situ radiometer (TACCS) used for validation was also improved.

Reply to comment 3

The sentence highlight the improvement of the TACCS processor to derive reflectance in comparison with the previous study done by Kratzer and Vinterhav (2010).

Comment 4

The accuracy of water Finland:sample analyses for CDOM, Chl a and SPM is set in relation to prior investigations on this matter. Did you sporadically also take triplicates for the three parameters? If yes, do these results comply with prior investigations?

Reply to comment 4

As the reviewer points out the accuracy of the water sample analysis refers to the work of Kratzer (2000). We always take triplicates for SPM (at all stations) and for chlorophyll (at all satellite overpass stations). For CDOM it was shown during previous sampling that triplicates are not needed as the standard deviation is zero. However, some stations along the transect does not always have triplicates, because we need find an optimal field work to maximise the number of stations closest to the match-up time, the distance travelled to each location and the time required to move to the next station. Although, all the results comply with those of Kratzer (2000).

General comment 5

In situ radiometric are used for comparison with MERIS remote sensing reflectance data. The calculation of remote sensing reflectance with TACCS in combination with in situ absorption and attenuation data is certainly a good approximation, yet, it should be noted that the in situ values are not the "real" reflectance either.

Reply to comment 5

The authors fully agree with the comment given by the reviewer. The uncertainties for the TACCS processor used in the study is within 7% in the blue-green, and 8% in the red and has been recently described in Zibordi et al. 2010.

General comment 6.Page 2172, line 10

Good to give Secchi depth, but these measurements did not appear in the methods section, where they also belong to. Taxonomic names should be set in italics, e.g. Nodularia spumigena

Reply to comment 6

The recommendation by the reviewer has been fully taken into account. A paragraph describing the Secchi depth measurements has been added to the method section. All the taxonomic names have been revised to comply with the standard style set as italics.

General comment 7

Regarding the conclusions that were reached: why is ICOL better for Baltic Sea Waters? Several aspects concerning the ICOL issue were already well addressed by Zibordi. The inclusion of evidence for a better performance when applying ICOL may be eased by a clear statement of what will be compared against what already in the methods section (including some of the suggestions on "how" by Zibordi).

Reply to comment 7

The ICOL+ version used in the study has been improved for its application over over case 2 waters where clouds and sea ice are considered. The Baltic Sea is considered a case 2 waters where narrow bays, islands and fjords can be found along the coast. The results of our study confirms early findings by Kratzer and Vinterhav (2010), and more recently Vaičiūtė et al. (2012). ICOL has also shown good results over lakes (Guanter et al. 2010). See also reply to reviewer Peters-comment 5, and reply to reviewer Zibordi comments 5 and 7.

General comment 8

Regarding the recommendation to use red absorption bands for phytoplankton: Can you give a short example of where this was done and if Chl a concentrations were similar? Given the relatively low Chl a concentrations, the red peak may be too weak.

Reply to comment 8

The authors have not yet tested an algorithm that uses the red absorption bands for phytoplankton in the Baltic Sea. However, an example of its use has been referred in the reply to Peters-comment 11.

General comment 9

Figures and tables: - In general, good choice of figures and tables with good captions. Except: table 4 and 8 could be embraced to just one table, but this is not essential. Caption of table 4 is with "in situ water constituent concentrations" quite short and could contain more information.

Fig 1 map could be set in larger context for non-European people.

Technical corrections: Page 2158 line 18: from MERIS measurements instead of measurement

Page 2158, line 18: in the range instead of in te range

Page 2174, lines 12-13: were instead of are

Page 2179, line 19: Random errors seem. . .

Page 2168, line 5: Abbreviation for SPM already given in 2162, line 22.

Page 2171, lines 18-21 More discussion rather than result.

Page 2171, line 19: HSTP already defined in 2163, line 4

Page 2180, line 22: CHL can be derived instead of can be derive

Reply to comment 9

All the suggested editorial changes will be performed.

References

[Kratzer (2000)]: Kratzer, S., 2000. Bio-optical studies of coastal waters. UK: University of Wales, Bangor.

[Kratzer and Vinterhav (2010)]: Kratzer, S. and Vinterhav, C.: Improvement of MERIS level 2 products in Baltic Sea coastal areas by applying the Improved Contrast between Ocean and Land processor (ICOL)-data analysis and. Oceanologia. 2010.

[Vaičiūtė et al.(2012)]: Vaičiūtė, D., Bresciani, M., and Bučas, M.: Validation of MERIS bio-optical products with in situ data in the turbid Lithuanian Baltic Sea coastal waters,

J. Appl. Remote Sens., 6, 063568–1, 2012.

[Guanter et al. (2010)]: Guanter, L., Ruiz-Verdú, A., Odermatt, D., Giardino, C., Simis, S., Estellés, V., Heege, T., Domínguez-Gómez, J. A. and Moreno, J.: Atmospheric correction of ENVISAT/MERIS data over inland waters: Validation for European lakes, Remote Sens. Environ., 114(3), 467–480, 2010.

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