

Interactive comment on “Remote sensing algorithm for sea surface CO₂ in the Baltic Sea” by G. Parard et al.

Anonymous Referee #2

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Review of Parard et al. [2014]

“Remote sensing algorithm for sea surface CO₂ in the Baltic Sea”

The study by Parard et al. presents and assesses two different methods of mapping pCO₂ in the Baltic Sea exploiting in-situ and remote sensing data.

Overall evaluation: The study has a good potential to be published but at this point I can only recommend it for a re-submission. On the one hand the topic of the manuscript - Developing and testing methods of how to produce monthly pCO₂ maps for the Baltic Sea - is very relevant for the Biogeosciences community. Furthermore, the presented methods are sophisticated and the overall quality of their assessment is good. On the other hand, the number of grammar and spelling mistakes contained in the manuscript

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makes a thorough evaluation of many critical paragraphs impossible. In numerous cases I cannot tell whether the explanations provided by authors are wrong or if it is simply because of the language that is being used. And quite frankly, a simple spell check on top of a thorough proof-reading by the authors would have caught almost all of the spelling mistakes which makes me wonder with how much care the manuscript was written and checked.

A number of suggestions for a re-submitted version:

Validation of the method: All the parameters used (except for time) are subject to errors, e.g. remote sensing errors, errors and biases associated with the algorithms used to calculate e.g. NPP from remote sensing data, biases in the MLD model etc. All these errors affect the accuracy of the pCO₂ maps. In fact, they affect the accuracy in the training process as well as in the application. So the overall mapping error will be larger than the number provided in the manuscript and the authors need to present an estimate for the additional error. (e.g. Friedrich et al. [2009, JGR] provide an example of how to estimate the contribution of remote sensing errors)

The same is true for dealing with missing data. What is the effect of filling data gaps on the accuracy of the maps?

Flagging the maps is a good idea. The method used to derive the confidence level, however, assigns a lot of weight to areas where a lot of data are available. Figure 2 clearly shows that due to the scarcity of measurements the authors are forced to extrapolate from basically two lines of observations to the entire basin. Thus, in addition to the random 90%/5%/5% splitting of the data set we need to find out how large the mapping errors in the remote regions truly are.

Presenting a thorough error-analysis for the pCO₂ maps is as important as presenting the actual maps!

Methodology: The description of a SOM needs to be improved. The odd language

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and the grammar and spelling mistakes definitely contribute to the confusion but I also recommend checking how other studies have done it. E.g. Telszewski et al. [2009, BG] is a good example.

Figures: The figures need to be in substantially higher quality and resolution.

Again, the study is very relevant for a wide range of readers and has good potential for publication. But in the current version a careful and sophisticated evaluation is impossible.

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