Ocean Science

Discussions

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Interactive comment on "Acoustic and optical methods to infer water transparency at the Time Series Station Spiekeroog, Wadden Sea (southern North Sea)" *by* Anne-Christin Schulz et al.

Anonymous Referee #1

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General comments The paper presents an interesting approach by comparing both optical and acoustical methods for obtaining information about the suspended sediments in the water, which is a key parameter for deriving water transparency. The study design is reasonable and the instrumental setup is well described. The introduction gives a good overview about the relevant topics, although some more information about the link between water transparency and the investigated optical proxies could be added (see also specific comments). However, in my opinion, especially the Results and Discussion section needs some revision before final publication. The data shown and arguments given are plausible and interesting, but the argumentation needs more focus. By now, it is relatively difficult to get some of the findings right on the first view,

especially the biofouling issue, which highlights the advantage of the reflectance and acoustic data. Hopefully, the following comments are helpful in this respect.

Specific comments

page 1, line 23: The optical properties of the water are also influenced by the dissolved and suspended matter present, so which additional factors play a role for determining water clarity/transparency? If it is only the dissolved and suspended matter, the reference to the optical properties is somewhat redundant and could be omitted.

page 2, line 1-11: Maybe it would be valuable to explain shortly how water color observations are linked to water transparency estimates. This would show the value of reflectance and Forel-Ule data more clearly.

page 3, line 28: How was the turbidity data quality-checked?

page 4, line 15: The polynomial fitting method is basically a linear fit, isn't it?

page 4, line 15: "The top right graphic shows the extrapolation results." This is confusing, because also in the top left figure there are the three results of the fits shown. The difference between left and right figure is the exclusion of data because of the bottom layer. Please rephrase the sentence.

page 4, line 23-24: Unfortunately, figure 5 confuses me a little bit. It is clear that you get an R^2 value for the correlation between the measured data and the fitted curves as a quality indicator of the respective fit. But I don't understand the histogram, where also R^2-values are shown. Have you repeated the respective fit several times and got different results? If this is the case, can you explain the reason? Otherwise, if the histogram has no special meaning and only the overall R^2-value is the important point, you should omit the histogram and give the R^2 values directly in the upper part of the figure (e.g. in the legend).

page 4, line 24: This is the only point in the manuscript where figure 6 is mentioned. The data shown are not used in the Results and Discussion section to explain certain

issues, so if it is not necessary, you should remove it.

page 4, line 27 to end of chapter: These paragraph should be moved to the Introduction, since it describes previous work, relationships between parameters and aims of the study.

page 5, line 3: Figure 8 shows the field of view of the sensors of the station. Maybe the figure should be mentioned and described the first time in the Materials and Methods section, since it is related to the measurement setup. Then it can be referred to in the Results and Discussion section.

Results and Discussion in general: At the beginning, the authors speak of a moderate correlation between the data shown in figure 7 observed by visual inspection. I assume that these are the same data which were used in table 1 for the one-day-correlation? If this is the case, please state this and refer also to these results at this point in the text to support your argumentation. Then there is no need to "confirm" correlations (line 19) afterwards, as they were already given and can be explained in the following. Generally, I would give the results of the Spearman-tests at the beginning of the chapter and then start to explain them (sediment types and different response of instruments). By now, it is the other way around. Furthermore, since the Forel-Ule data were already given in figure 7 and table 1, I would mention this method earlier in the section.

page 5 line 17: Do you mean the data shown in figure 7? If this is the case, why don't you give the tidal signal in the figure to support your statement?

page 5, line 26 - page 6, line 6: The differences between the correlations for the various tidal phases are shown, but not completely discussed. What are the reasons for the observed differences? The different kinds of sediments (fine, coarse) transported in the different tidal phases?

page 5, line 29: Is figure 9 the visual representation of two of the correlations shown in table 1? Why are explicitly these data shown again? Maybe this figure is redundant to

table 1?

page 5, line 31 - page 6, line 2: It is mentioned two times that figure 10 shows a comparison between backscatter and turbidity data. Please rephrase the sentence. Are the data shown also identical to the data used in table 2?

page 6, line 8-9: Where in the data or the Results and Discussion section has been shown the influence of biofouling? I assume it is the difference in the correlations between the one day period and the longer period (table 1). However, this should be clearly mentioned in the Results and Discussion, otherwise it is confusing why this statement is given in the conclusions and also in the abstract.

page 6, line 26-28: This sentence would be good at the beginning of the Conclusion section.

Technical corrections

page 2, line 4: "measurement" instead of measurements"

page 2, line 25: The last sentence of the paragraph could be better placed behind the sentence ending in line 22.

page 2, line 34: Please rephrase the sentence to "At the same time, this approach could contribute to an understanding of..."

page 3, line 5-6: The coordinates could be given without brackets.

page 3, line 9: The abbreviation TSS for Time Series Station Spiekeroog has already been introduced and could be used also here.

page 3, line 16: Maybe rather "Three radiometers continuously measure hyperspectral radiance and irridiance in 5 minute intervals to..."

page 3, line 21: Please rephrase to "...submerged ECO FLNTU sensor (WETlabs, USA)..."

page 4, line 14: "applied" instead of "implemented"

page 4, line 22: "whole" instead of "complete", because this is more related to the following abbreviation (wwc)

page 5, line 18: Please rephrase to "Thus, we presume these instruments provide reasonable proxies for the suspended material which are comparable."

page 5, line 20: "compare" instead of "compared"

Figure 1: The label "Turbidity Meter" should be placed closer the position of the instrument indicated in red. Furthermore, also the position of the radiometers should be indicated by red symbols to be consistent with the other instruments. Also the same font size should be used for all instrument labels.

Figure 2: The font size of the legend appears to be different. Furthermore, could you provide the units in e.g. brackets? Using a backslash gives the impression of a ratio on the first sight. This applies also to the other figures.

Figure 4: Line colors should be chosen according to the tidal phase to make the figure more clearly (e.g. red for flood, green for ebb etc.). To differentiate between two floods, for example, different shades of the respective color could be used or different types of lines.

Figure 8: Could you explain why the left square is turned? Also, the arrow indicating north should be given on the panel it belongs to.