

Interactive
Comment

Interactive comment on “Tidal controls on trace gas dynamics in a seagrass meadow of the Ria Formosa lagoon (southern Portugal)” by E. Bahlmann et al.

Anonymous Referee #2

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The paper of Bahlmann et al. presents an advanced way to directly measure fluxes from coastal sites. It was shown that the method works for several gases including CO₂, CH₄ and VOCs. The paper presents nice results over different states of tidal cover, and generally contributes to the understanding of sediment flux dynamics of different gases, especially of CO₂ and CH₄. This could also be a nice way to broaden our understanding of flux dynamics of further trace gases not mentioned.

However, I am a bit confused by the presentation of the VOCs. I would appreciate a small section in which it is described how the “enhancement” in fluxes was calculated. Does 1 mean that fluxes are twice as high as the mean? Which mean was used to calculate the enhancement and why this mean? Also, how could you ensure that

C6828

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Interactive Discussion

Discussion Paper



Interactive
Comment

this is really enhancement and not the drift of the measurement system if there was no standard available or was their an internal standard? I will further go into detail in the specific comments section. Nevertheless, I feel like this could also be nice for the specific compounds that could not yet be quantified once a standard for them is available. Therefore, I feel like it would be sufficient to mention that these compounds can also be measured here, but I am not sure that they need to be included to the current extent.

I generally would advice to check the paper for comma and apostrophe placement (e.g. VOCs is written without apostrophe). Several citations throughout the text are not in chronological order. The authors should check for this in the whole text. I would also recommend to check the text for too complicated and long sentences (especially in the discussion section). Some are difficult to follow. I have pointed some out in the specific comments below.

Specific comments:

P10572 L25: sulphur-bearing (or without the minus, but it needs to be persistent throughout the text)

P10575 L1-2: Can the authors specify in which direction fluxes were calculated? In L1, the authors measure that they calculate from the difference of the inlet to the outlet, but in the equation this is the other way around. Maybe it could also be helpful to mark the in- and the outlet in Fig. 1, then this would be clear at first glance.

P10577: How were the precision and the drift of the measurement systems determined / monitored? How was the working standard prepared?

P10578 L9: "following" instead of "followed"

P10578 L21: Instead of "circadian" maybe "diurnal" (and if it's not a clear day-night-cycle, then "diel")

P10579 L24: Here, the Scott TOC 15/17 standard is mentioned. I think some clarifica-

tion regarding this standard is needed in the method section (see comment regarding P10577). Was this a liquid standard? A gaseous standard? Etc.

BGD

11, C6828–C6831, 2014

Interactive
Comment

P10580 L3: Here, clarification on how the enhancement was determined is severely needed. And why is “enhancement” discussed for the halogenated VOCs when these could actually be quantified? I understand that this is probably for comparison with the other gases, but I don’t really see the point when for example CO₂ and CH₄ are also given in absolute values and COS and CS₂ aren’t really discussed. Either this concept needs to be better explained or I would use the total number. The concept of “enhancement” as it is used here is quite difficult to grasp.

P10580 L16: Is it possible that there is a word missing behind “high”? E.g. “tide”?

P10581 L4-6: Please rephrase this sentence. Something is messed up in the word order. Maybe it would be helpful to divide the sentence. I would also recommend to break up the following sentence as it is difficult to follow as well.

P10582 L17-20: I would recommend breaking this sentence into two.

P10582 L24: Not sure that “confounding” is the right word here. Maybe “interfering with” instead?

P10584 L1-6: I am a bit confused by this explanation. I thought that CH₄ fluxes were higher in the night (P10578 L6-7)? This doesn’t get clear here in the discussion.

P10584: I would abbreviate “Methane” here as was done in the remaining text.

P10584: Please introduce the short explanation for DIC, some readers might not be familiar with this abbreviation.

P10585 L13-17: Please rephrase. This sentence is too complicated to be able to follow it to the end.

P10585 L18-20: I wonder how variable emissions from different species of sea grass are? Is it plausible to calculate global emissions from one sampling site as the emission

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Interactive Discussion

Discussion Paper



rates may vary significantly?

P10586 L6-10: Please rephrase, this sentence is very complicated and long.

P10586 L25: Please explain the abbreviation "NCP".

P10587 L10: "different" instead of "difference"

P10587 L17-21: To be honest, I wonder why COS, CS2 and propane are included if the discussion is beyond the scope of the paper and only enhancements of fluxes can be provided? I feel like they are actually not needed, and it would be sufficient in my opinion to mention that they can be measured. If they can't be quantified and can't really be discussed, I don't see the point to include them to this extension.

P10588 L21: Please remove the "a" that is written before "very few".

P10588 L23: "In contrast to" instead of "contrasting to"

Table 2: I find it confusing to put the compounds that can be quantified and the ones that cannot be quantified into one table. I would rather divide this table, because for me, it does not make sense to report total amounts and enhancements in one column when units are only valid for half of the entries.

Figure 2: For easier understanding of Figure 1 would mark the in- and outlet.

Figure 4: I don't really see the point to only show enhancements of fluxes if you can actually show real variations with total numbers. This refers to the comment that it is difficult to understand the concept of "enhancement". If this is clarified in the text, it could improve the Figure. I think I would prefer the total amounts where total amounts are possible. And I am not sure why the compounds that are not really discussed (like COS and CS2) are actually included here.

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11, C6828–C6831, 2014

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Comment

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