

Dear Prof Goosse,

Thanks a lot for your effort to go through the manuscript again!

Please find here my responses to your comments.

In the attachment, I appended the new LaTeX file and a PDF highlighting the differences. All other files remain unchanged.

Thank you again!

With best regards,

Hagen Radtke

> Lines 56-57. When you mention a 'lack of volume changes', is it a 'lack of volume transport changes' ?

It is a lack of volume changes. We rephrase "a lack of volume changes" to "a lack of changes in Baltic Sea volume".

> Line 126. Maybe explicit what is 'n.m.'

Replaced by "a~2 nautical miles (n.m.) RCO model"

> Line 186. I would define what you mean by 'residuals' as it is may be not totally clear to the reader. The text already states "the variance in the residuals, i.e. the difference between observations and model."

> Line 189. To come back to a point raised by the Reviewer, I wonder if a negative value of the explained variance is systematically due to an anticorrelation.

> Anticorrelation can lead to a negative value of rho but if the two time series are non-correlated and model has a much larger variance than the data, wouldn't

> it lead to a negative value too? On the same topic, maybe giving the value of the correlation line 623 would be instructive.

You are indeed right, and exactly this is the explanation in our case. Thank you for pointing us at this! We actually find a positive correlation ($R=0.44$), so we remove the term "anticorrelation" from the text and give the correct explanation here and in the Results and Appendix section.

> Is \hat{T} defined in Eq. 6 ?

You are right, it was not. We replace it by $T_{\hat{S}}$ in the formula and update a sentence about the transports:

"They are zero at high salinities, show a maximum value $T_{\hat{S}}$ at a salinity of \hat{S} which depends on the cross section, ..."

> Line 269. I would give the value of alpha here or at least specify more precisely where this is discussed in the manuscript

We add the value here: "It is determined by a least-squares fit of $\tilde{Q}_{\text{surface}}^s$ to Q_{surface}^s , we obtain a value of $\alpha=1.17$."

Am 28.07.2020 um 17:53 schrieb Hugues Goosse:

Dear Dr. Radtke,

Thanks a lot for this new version and sorry again for the delay in the processing of your paper.

After reading your answers and the manuscript, I consider that you have well addressed the points raised by the reviewer, taking into account the special circumstances in which you have received those comments.

I just have a few technical points that you may want to consider before the final publication.

Best regards

Hugues Goosse

Technical points :

Lines 56-57. When you mention a 'lack of volume changes', is it a 'lack of volume transport changes' ?

Line 126. Maybe explicit what is 'n.m.'

Line 186. I would define what you mean by 'residuals' as it is may be not totally clear to the reader.

Line 189. To come back to a point raised by the Reviewer, I wonder if a negative value of the explained variance is systematically due to an anticorrelation. Anticorrelation can lead to a negative value of ρ but if the two time series are non-correlated and model has a much larger variance than the data, wouldn't it lead to a negative value too? On the same topic, maybe giving the value of the correlation line 623 would be instructive.

Is T defined in Eq. 6 ?

Line 269. I would give the value of α here or at least specify more precisely where this is discussed in the manuscript