Reply on RC1
Matthias Gröger et al.

This paper provides a very complete and clear overview of the state-of-the-art of the regional Earth system modeling in the Baltic Sea and stands out future challenges for the climate modeling community studying the region, such as the role of aerosols or hydrological model coupling. The paper is very well written and the structure and objective very clear. Thus, I recommend it for publication. In the text below you find a list of minor comments to improve the manuscript.

We gratefully thank the reviewer for a thorough review of the manuscript and appreciate the suggestions and recommendations that definitely will help to improve the manuscript.

General comments:

• Please, avoid the use of back-to-back brackets along the text.

• Be consistent with the capitalization of the term “Earth System” all over the text, also in the title.

• Write the word “modeling” with a single “L” in order to be consistent with the USA English style that is used in this manuscript.

We will remove all back-to-back brackets and also use the term Earth System in a consistent way along the text. We will likewise use the word “modeling” instead of “modelling”.

Specific comments:

L75 □ You can consider adding Cabos et al. (2020).

We thank the reviewer for this suggestion and will include this reference in a revised version of the manuscript.
A dot is missing by the end of the sentence.
Will be done.

What do you mean by process? Please, be more specific
We mean here the comprehensiveness of processes brought in by additional coupled models. We will clarify this in a revised version.

What do you mean by compartment behavior?
We mean the different dynamical behavior of a coupled model compared to an uncoupled model. We will make the clearer in a revised version.

Please cite in chronological order: Bonan 2008; Anderson et al. 2011...
Will be done.

I think this sentence belongs to the previous paragraph.
Yes indeed. We correct this.

Please, specify the year of the references you provide.
Thank you will be done.

Please, replace “summarise” with “summarize” to be consistent with the USA English style.
Will be done.

Please, replace “work has” by “works have”.
Will be done.

What is LAI?
It’s Leaf area index. We will clarify this in the next version.

Please, replace “favour” with “favor” to be consistent with the USA English style.
Will be done.

What is PCO? Please, define it.
We mean here the passively coupled ocean model or more precisely the ocean model driven by prescribed atmospheric boundary fields. We will clarify this in a revised version.

Please, add model data to reanalysis data.
Will be done.

Please, add other relevant studies such as Cabos et al. (2020).
We will add some additional references from outside the Baltic Sea such as Cabos et al.
L464-466 □ Is this sentence referred to the Baltic Sea? If so, specify it since, to my knowledge, this is not the case in other regions of the world.

This refers to the study of Pham et al. (2014), i.e. the Baltic Sea and North Sea. We will make clear this in the next version.

L509 □ Please, add a comma after 70 hours.

Will be done.

L516 □ I guess ERAI refers to ERA-Interim. Please, specify it for consistency.

Will be done.

L538 □ An “A” is missing in “ERA40”.

Will be corrected.

L552 □ Remove the word “far”.

Will be done.

L567 □ Please, avoid repetition.

We will shorten this sentence and avoid repetition.

L569 □ Replace “behaviour” by “behavior”.

Will be done.

L590-592 □ Could you please add more details about the development of this effect?

We will be more verbose here and provide more details. This is effect can be considered for many mid to high latitude stratified marginal seas.

L599 □ You can also consider adding Cabos et al. (2020), in which a coupled model setup including the Mediterranean and the North Atlantic is used.

Will be done.

L758 □ Please replace “parametrized” by “parameterized”.

Will be done.

L830-833 □ Please rewrite the sentence to make it clearer

Will will reformulate this sentence to make our point clearer.

L928 and L944 □ Change compared with by compared to.

Will be done.

L987-L990 □ Isn’t the information presented contradictory?
We will rephrase the two sentences to avoid confusion and make our point clearer.

L1087  □ I would say “Previous works have shown...”.
Will be done.

L1101-1104  □ Please rephrase the sentence, it is hard to understand.
Yes, we will rephrase the sentence. It relates to the fact that in a coupled ocean atmosphere model not necessarily the whole ocean must be coupled to the atmosphere but can be only a part, such as the Baltic Sea and North Sea coupled, but the N-Atlantic and or Mediterranean uncoupled. We will make this clearer.

L1118  □ add “to assess whether”.
Will be done.

L1157  □ Please, keep the word ”This”.
Will be done.

L1201  □ What do you mean by realized?
Basically we mean that this kind of marine feedbacks have so far not been included in ocean atmosphere models. We will make this clearer in the revised version.

References:


05238-x.