Ocean Science

Discussions

EGU

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Interactive comment on "The transient sensitivity of sea level rise" *by* Aslak Grinsted and Jens Hesselbjerg Christensen

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This document outlines our plan for the revision. It is gathered from our responses to the four review comments and grouped by topic.

Limitations of the metric

- Elaborate substantially on the limitations of the metric.

- Emphasize more strongly the limitations of the comparison to the observational estimate. Especially in abstract.

- Expand the discussion and emphasize more strongly the limitations of the comparison to the observational estimate.

- Stress even more limitations of a comparison between two different periods: historical and projections.

- Talk more about the limitations of the TSLS.

Future may be different from past

- Discuss the physical mechanisms behind the relationship and thereby stress that sensitivity may be different in future from past, and that this could potentially explain "the discrepancy".

- Ensure careful phrasing of the conclusions. We do not want to overstate the significance of "the discrepancy" between past and future. But we will emphasize the caveats related to the use of GCM climate projections further processed to get SLR information.

- Stress that sensitivity may be different in future from past, and that this can possibly explain "the discrepancy" and assess the involved physical mechanisms more clearly.

- Stress that we do not expect TSLS to be constant over time.

Extrapolation is a comparison, not projection

- Expand the discussion to better clarify that extrapolation is only used for a comparison, and not a projection.

- Stress that extrapolation is not a projection but plotted for comparison.

Clarity on time periods

- Discuss time periods more clearly. Both in figure caption, and when introducing TSLS.

- State time-intervals in figure caption.

- Discuss "century time scale" choice more in main text.

- Explain more in main text time period.

Figure

- Remove superscripts from figure.

- Expand description of figure.

- Expand caption – Explain what each point is, especially their time span.

Statistics

- Explain statistical methods in detail.

- Add a more complete description that explains that full covariance is unlikely, and how it impacts results.

Miscellaneous

- Check if it makes sense to move GMST definition into the main body of text.

- Point out that AR5 SROCC have no hind casts in their presentation of the SLR discussions and it has therefore not been demonstrated that these models can reproduce past sea level rise.

C3

- Address explicitly the premises adopted in AR5 (and implicitly in SROCC) that a universal linear relationship between sea level rise rate and temperature is questionable.

- Discuss non-linearity and non-stationary.

- Consider discussing common misconception.

- Call for hindcast validations for future sea level projections.

- Call for historical validation of models used for sea level projections. Not just of the individual contributor models, but also of the aggregate model.

- Be explicit about baseline motivation.

- Explain that we only use published estimates, and motivation.

- Discuss Slangen2017 as context.

- Add more to the motivation part of the manuscript

- Add an outlook for how TSLS discrepancies can be addressed.

    - Brainstorm to consider when revising:
    - Ensure that projection models also have hindcasts of the historical past.
    - Look into the transient sensitivity of individual contributors.
    - Understand how TSLS changes over time
    - Model studies to understand the limitations of TSLS.

- Consider adding a short speculative paragraph on uncertainties in balance temperature.

C4