

## ***Interactive comment on “Sources of 21st century regional sea level rise along the coast of North-West Europe” by T. Howard et al.***

**Anonymous Referee #2**

Received and published: 24 January 2014

### **Review**

Howard et al. Sources of 21st century regional sea level rise along the coast of NW Europe

The paper addresses the combination of climate driven regional sea level changes and changes in set up of water by a certain storm frequency. The main focus of the paper in my view is how this needs to be done (adding up), and indicating that locally both effects maybe of the same order of magnitude. There are a lot of small remarks to be made but basically it is a valid approach, which deserves publication after addressing the long list of details which I fear make it some work to get it at the requested level.

### **Abstract**

C849

Line 10. Fully coupled suggests regional sea-level effects drivers of the climate system itself, that seems not a very important feedback. I suspect you merely mean that the system is not treated in a comprehensive way.

Line 11. I don't think you consider all processes as you state later yourself in the paper (land water storage, tides etc), so restrict yourself to mentioning what you combine here.

Line 12. I don't think you treat extreme flood height. You specifically focus on 1/50-year events not on the full range of extremes.

Line 12. It is regrettable that you base this work on A1B it is outdated and you use an incomplete ensemble. It is probably a bridge to far to reject the paper on this basis but it implies that it will be hard to compare with more modern results.

Line 22. You need to place the 22 cm in perspective of the total regional sea level rise.

Line 24-26. I don't think it is a good idea to use an example in your abstract, which is not extensively discussed in the main text, as is the case here.

Line 26 are changes in vertical land movement significantly contributing to the differences between the locations mentioned? If so quantify.

### **Introduction**

Line 5-6 you may wish to add references to papers attempting to quantify process based contributions of Greenland or Antarctica.

Line 5. You disqualify the paper by Katsman a bit by arguing it uses rather diverse sources for contributions. Don't you do the same? I suggest you rephrase this sentence.

Line 8. I suggest rephrasing that the ice loss contribution is based on extrapolation of short time series of observation rather than plausible arguments.

C850

Line 10. You mix up things here. Slangen et al. 2012 is not an extension of the Katsman work and it does examine regional variations in sea level rather than global variations in sea level. It does so over the entire ocean.

Line 19 add after change the period they considered

Line 25 you mention that you use improved modeling with respect to Lowe et al. 2009. Specify what you improved. Results in this paper are now impossible to reproduce.

Page 2438

Line 5 unclear what upper end means here is that the 100% percentile?

Line 16 Here you contradict the abstract by stating that you don't include everything

Line 19 close to why not the mean or the median?

Line 24 it seems not logical to fit your results to a normal distribution, I think there are arguments that your distribution is positively skewed, so justify this.

Line 28. It is unclear what you mean with you expert judgment of process-based models. I fear it deviates from the consensus in the AR5 report as I get the impression it is based on the approach in Spada et al. 2013 I think? Fine to deviate from AR5 but discuss it explicitly for what reason you did so. I fear that you now only took a pragmatic approach of what you had already available rather than having a solid reasoning to deviate from AR5.

Nomenclature

Add MME and PPE to Table. I guess you need to explain in a sentence what PPE means.

Line 10 Explain that TE+ADSL is what is typically calculated by a GCM.

Page 2440

Reference to figure 4 disturbs the flow of the figure numbering

C851

Line 3. You need to compare your results in the light of AR5 in addition to AR4 more extensively than you do.

Line 8. You suggest yourself that your referencing period is not identical for the different components. Please correct this even if it may be necessary to do some recalculations.

Line 24 Which RCM are used

Page 2440

Indicate at line 3 that you use a mixture of CMIP3 results and HADCM3 PPE results. You undermine your approach, which is probably pragmatic because you don't have for all CMIP3 models the possibility to drive your RCMs but be at least transparent about this.

Page 2441

Line 12. I do find it embarrassing that you use a somewhat outdated data set and then start to make corrections because from this outdated data set you did not use all ensemble members. Sloppy approach

Line 16. The difference in mean and standard deviation is maybe not large but that does not mean that the pattern is not affected and that is what your interest is, so I guess you do need to redo your calculations with the full set of CMIP3 results. Which 11 members are used?

Page 2442

Header of section simply use full terms rather than acronyms

Line 8 no logical sequence of sentences

Page 2443

Line 10-14. Seems pointless remark, as Nicholls does not explicitly discuss NW Europe.

C852

Line 18. Katsman discussed subsidence, which I guess includes GIA, so please rephrase.

Page 2444

It seems worth discussing why local sea level rise is larger than the global mean here whereas this is not the case in the two other studies.

Page 2446

Indicate position 5°E 55°N in one of the figures.

Line 16 unclear CL of [-16,37] and mind units seems a double per second in the sentence

Page 2447

Why RCP6.0 whereas earlier on you make the comparison with RCP4.5

Discuss why you didn't take a rigorous approach by forcing your RCMs with CMIP5/3 boundary conditions.

Figure 3 indicate 0/5/10/15 with lines

Figure 4 doesn't use acronyms. GCFF is confusing as it is a quantity with respect to the global mean whereas for instance TE is not expressed with respect to the global mean. Why not make a panel A with all components expressed as global mean values and one panel with all components for NW- Europe. Alternatively add GCFF and TIM, to have the local expression of TIM, which can be compared with the local TE.

Figure 5 high-end to be placed at right side of mid-range.

---

Interactive comment on Ocean Sci. Discuss., 10, 2433, 2013.