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Interactive comment on "Prospects for improving the representation of coastal and shelf seas in global ocean models" *by* Jason Holt et al.

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We thank Dr Proctor for his careful consideration of this paper and his helpful suggestions on how to improve it. We agree that sections 1.2 and 1.3 can be shortened and figure 2 simplified. However, we feel figures 4 and 5 provide important information but are not so well exploited. In the revision we will aim to use the data from fig. 4 to validate the runs in figure 5 to demonstrate (or otherwise) that these coastal-ocean features (e.g. tides) improve the simulations. We may also be able to use this data to assess other current generation global ocean models (e.g. from CMIP5) in the coastal ocean. Figure 6 is important in illustrating the method of calculating the size of the multiscale models – without it figure 7 would be difficult to interpret. But we could combine 6 and 7 into a single figure.

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Discussion paper

We agree unstructured mesh modelling is discussed in insufficient detail in the paper. In the revision we will consider more recent approaches in greater detail, but will stop short of a comprehensive review as this is outside the scope of the present paper. We will focus on issues of time-stepping, scalability and efficiency, looking for evidence in the literature as to what these might be. The scaling factor currently used in the paper reflects our present experience with regional nemo and fvcom models. Dr Proctor is most probably correct in asserting that this may well not be appropriate for a global analysis, so we will aim to provide a more robust estimate or omit it if this is not possible. In the wider considerations of scalability and efficiency, we will aim to go beyond NEMO to see how it compares with other structured grid models as suggested. But this comparison may be limited by the available evidence.

Finally, regarding the estimate of including additional coastal ocean processes (such as tides and sea-ice) on model costs, we will draw on our experience with the Northern North Atlantic model (fig 5) to inform a discussion on this.

The other more detailed and minor comments will be dealt with on a case by case basis.

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