Interactive comment on "Ocean Forecasting: From Regional to Coastal Scales" *by* Emil V. Stanev et al.

Anonymous Referee #1

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General comments ============

This paper provides a review of research work at HZG in the field of coastal oceanography in the German Bight, as part of a special collection of papers. This manuscript highlights and discusses a number of research issues relevant to others currently working in this field, and covers a lot of research angles aimed at improve model predictions. Contrasts between coastal and open ocean approaches are provided clearly, which is welcome. The paper is generally well written, and I would recommend it for publication following some minor updates.

The manuscript could be generally improved by making linkages and dependencies between sections a little clearer, so that the whole paper hangs together a little better as a coherent discussion. A few specific illustrations and suggestions are provided in

the specific comments below which may help to address this.

The authors set out two main goals: to showcase methodologies integrating observations and models in coastal areas, and to provide an analysis of the synergy of coastal and larger-scale forecasting systems. These aims are largely met.

Specific comments ============

Title – given the quite specific regional focus of research work covered in this paper on the German Bight, I would ask the authors to consider a more specific title for this paper, e.g. "Ocean Forecasting for the German Bight: From Regional to Coastal Scales" as a more descriptive title.

Section 1, please clarify further how your paper adds beyond other review papers (e.g. Kourafalou et al 2015a,b)

Section 2 – this whole section would benefit from clearer sign-posting of what is covered within each section, for example via a short introduction on p4, and clearer titles for sub-sections. At present it reads as a slightly ad-hoc list of different approaches and evaluations of improving model skill. It would aid the reader to understand how 2.2 links to 2.3? Should Section 2.3 better sit in its own section on model nesting?

Section 2.1 – on discussing "resolution capacity compliant with the dominant spatial scales", it would aid the reader to add another line of detail relating to how that choice can be sensibly made (e.g. consideration of the relevant Rossby radius of deformation? What are the relevant length scales for the German Bight?). Is it also possible to discuss sensible choices for vertical resolution in these domains?

Section 2.2.3 and 2.2.4 – to aid discussion of the different model configurations compared here, it would be helpful to provide a summary table (summarising the annex material) which highlights the key differences between systems shown. E.g. are all systems operating with the same horizontal and vertical resolution, Baltic model, atmospheric forcing, freshwater fluxes, etc?

Section 2.2.4 – please clarify whether differences in M4 tides are purely a function of different model resolutions, or are there other factors?

Section 2 – freshwater fluxes: there is no mention in this section of the importance of accurate freshwater fluxes for prediction in the coastal ocean (or indeed whether this is an issue in the German Bight). It could be helpful to the reader to provide a brief discussion on this, particularly in light of Section 4.3.

Section 3.2 – HF radar. Please provide summary statistics of the value of HF radar within the COSYNA system. It is difficult for the reader to understand the value of these data from the discussion alone as it stands (see also comment re. Figure 4). This is more complete in the discussion of SST assimilation.

Figure 4 – Can the authors provide any longer-term analysis of HF radar data vs model analyses and free run? E.g. long-term statistics (as provided in Figure 5 for example).

Section 3.3 – please comment on the errors in OSTIA in the coastal zone, given its dependence on satellite products for which errors are increased here. To what extent would the authors expect assimilation of OSTIA to provide information on the detailed structures in the coastal zone? This seems particularly relevant to the discussion relative to DA_BLEND results.

Figure 5 – while Figure 4 refers to a snapshot comparison (see above comment), it would be valuable to compare snapshots, or some assessment on sub-annual timescale of differences between OSTIA and the numerical model, to compare how well captured the near-coastal variability might be between OSTIA and the model.

Section 4.3 – it would be helpful to better link this section in to the preceding discussion. The key question, is how does the estuary-specific configuration interface with the larger-scale German Bight models, if at all, and what are the challenges to address in nesting right across scales from North Sea to estuary scale? Is this a 'solved' issue? It is currently difficult to understand how the Ems Estaury model fits relative to other

tools available to provide services.

Section 4.6 – please provide some context for the quantitative differences discussed. E.g. is a 40cm difference important for end-users and responding to natural hazards? How do underestimation of 30cm relative to gauge compare with long-term statistics for sea level predictions in this region – is this specific to extreme events or typical?

Technical corrections =============

P2, Para including line 20: "….similar devastations never happened again.". Please consider addressing the language in this sentence to something like …."similar devastation has not occurred since" – there are of course a number of reasons for this (e.g. have similar magnitude storms hit the region since?).

P2 – check citations Kourafalou et al 2014 or 2015?

P3, line 25 – please check language concerning "data problematics", suggest rephrasing this point.

P9, line 5 – please clarify status of "in preparation" paper ahead of publication

P15, line 10 – please check if "no-seamless" is a typing error, or if a clearer phrase can be used P15, para beginning line 20 – typo "Lagrangean"?