

Interactive comment on “Storm surge forecasting: quantifying errors arising from the double-counting of radiational tides” by Joanne Williams et al.

Anonymous Referee #1

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The manuscript addresses current practices to predict water level changes for various operational marine applications. Such predictions need to include sea surface height changes due to all acting processes including atmospherically induced surge and lunisolar ocean tides. Typically, information on tidal effects and the time evolution of the general ocean circulation are obtained from different sources and are added by means of linear superposition. This assumption of linearity can be, however, questioned in view of distinct periodicities in the atmospheric-induced circulation associated with the either the seasonal cycle or atmospheric tides.

The present manuscript addresses this topic in a way I certainly believe worth to be

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published in Ocean Sciences. However, a number of points raised below might be addressed in order to increase clarity of the representation and expand the discussion to cover all relevant aspects of the topic:

(1) The nomenclature applied is somewhat problematic: M obviously represents model-based sea surface heights, W apparently stands for observed water levels. H, however, is used for harmonic estimations/predictions for either models, observations, or final combined forecasts. This is difficult to comprehend, so I suggest to reserve capital letters to identifying the source of water level informations (i.e., model (M); tide gauge (G); water level forecasts (W)), and indicate the actual signal component by subscripts (time series of tides (t), harmonic estimates from a time series of tides (th); time series of surge and other meteorological forcings (s); harmonic estimates from a time series of tides and surge and other meteorological forcing (tsh), etc.).

(2) W_g is apparently not properly introduced at all.

(3) The example of Section 2.4 is only partially convincing. What is the usual base period taken to estimate H_g? Isn't it plausible to assume that surge event effects on H_g will cancel out over time? Are there recommendations available on the number of constituents to be considered? What about the treatment of minor tides?

(4) The effects of the annual tide S_a and the semi-annual tide S_{sa} might be discussed in more detail, in particular in view of the fact that the ocean circulation might have also a distinct annual periodicity.

(5) Changes in river discharge and their consequences on local water levels might be not relevant for the U.K. but can have a profound impact for estuaries in other parts of the world. A few comments about this process might be helpful.

A few rather minor points might be also addressed during the revision:

(5) It could be mentioned somewhere in the text that M2 is also having a very weak atmospheric pressure signature (see 10.1002/2015JD024243).

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(6) Figure 1 is difficult to read. Maybe enlarging the vertical extend of the figure would help?

(7) The frequent change in units between cm and m in the text is rather unfortunate.

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