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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Uncertainty propagation in a cascade modelling approach to flood mapping" *by* J. P. Rodríguez-Rincón et al.

Anonymous Referee #2

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This paper presents an interesting case study application of uncertainty propagation through a model cascade consisting of a NWP model through a hydrological model to a flood inundation model. The paper is well structured and well referenced and provides an interesting read. The standard of English is acceptable, although the paper would benefit from a further proof reading.

Each of the three modelling techniques applied within the cascade are found in current flood risk management practice and there is nothing new in their application to this problem other than the fact that simulations have been undertaken using multiple boundary conditions. On page 7988 the background to Mike 21(FM) is discussed and it is emphasised that continuity, momentum, temperature, salinity and density equations are involved. From my experience it is most unusual to use equations involving tem-

perature, salinity and density in flood inundation simulations. Can the authors expand on why they are required in this instance?

From my perspective the use of flood mapping in the title is confusing. The modelling approach is best suited to flood warning where one is interested in the prediction of flood inundation extents that allow emergency intervention to take place, whereas, flood mapping is normally undertaken for a specific return period flood for planning and risk analysis purposes. The key difference being that flood warning is best undertaken starting with a rainfall prediction from step 1 in the model cascade and flood mapping is best undertaken with a river flow input to step 3 in the model cascade. I would much prefer if the term inundation prediction were substituted for flood mapping throughout the paper.

The paragraph on page 7979 discussing the growth in the frequency of flooding limits examples to the UK and Mexico. This is rather limited in scope and the authors should extend this discussion to other international examples.

No information is provided on the computer resources used or model runtimes. This is an omission which requires correction. It remains the case that common application of uncertainty analysis is limited by the resource required to undertake the ensemble of simulations required.

At the end of each step in the cascade the skill in model prediction is estimated through a variety of statistical comparisons with observed data. This is a worthwhile exercise however no account is taken of the uncertainty in the observed data and how observed data uncertainty varies from rainfall depth, to river flow to inundation extent. Indeed, no information has been provided on how river flow was measure in the field or how inundation extent was estimated. Presumably for the inundation extent were extracted from some remotely sensed data set however this process can include miss-classification of wet and dry areas of flood plain.

The abstract concludes that "..the error associated [with] the determination of the

runoff, is [shown] to be lower than that obtained for the precipitation estimation suggesting that uncertainty [does] not necessarily increase within a model cascade." This is an interesting point and I was hoping to read an analysis of why this might be in the conclusions, however, this point is discussed further by the authors, which is a significant omission.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 7977, 2014.