Replies to the reviewer's comments and suggestions.

1. Clarity of experiment design. It is not clear to me how the four nonlinear experiments were designed, especially the fourth one (OBF). From what I understand, the first experiment is to include all the nonlinear terms in the governing equations (FTM) which forms a base model (control) for the study; the second experiment only removes advection terms in the momentum equations; the third expeirments only removes free surface elevation out of the divergence term in the continuity (mass conservation) equation; and then the fourth experiment would be only removing the free surface component out of H in the bottom friction formula. This means as each comparative experiment among experiments 2-4 investigates effects of a single nonlinear term while keeping the other two. This makes perfect sense as it would tell us the effects/contribution of that nonlinear term when comparing its result with FTM outputs. However, the description on the fourth expeirment (OBF) on page 13 seems telling a different story - it only keeps bottom friction term while removing the other two nonlinear terms (i.e. advection term in momentum equations and free surface elevation in the divergence term in the mass equation). Could you please revise section 5 a bit to clearly state how the experiments were designed?

   As you noticed, nonlinearity analysis experiments are designed so that FTM is a control calculation with all the system's nonlinearity. WMA calculation without taking into account moment advection in the equation of motion. In this case, two other elements of nonlinearity are present. WNC without calculating the free surface in the mass conservation equation, while moment advection and bottom friction are present in the system. Final experiment: turning off all nonlinearity except for bottom friction. Bottom friction is the only stabilizer of the numerical solution, and calculations without considering it are only possible in

some test problems, for example, the roll-up of a symmetrical wave onto a flat shore. In this case, the wave velocities along the entire front are quasi-uniform, and the scheme is stabilized due to weak internal viscosity. In the real modelling presented in the work, complete elimination of bottom friction is not possible due to the strong heterogeneity of the solution in the flood zone. A more or less stable solution is achieved by a significant (by orders of magnitude) reduction in the time step, which in turn leads to an imbalance of the time derivative and gradient terms, i.e. the change in speed over time can be calculated with significant errors due to the smallness of their difference, which will lead to instability of the solution. In this regard, to evaluate the effect of the bottom friction coefficient, we additionally conduct a series of experiments with its different values and monitor the nature of the solution.

A necessary clarification has been included in the text.

2. Figure improvements

- Colour scheme for figure 1 is not ideal, a bit too dark. I recommend to use the same colour scheme as figure 2's for clarity and consistency.
-Figure 2: panel label a) and b) are missing.

-Figure 11, Figure 12, Figure A2, Figure A4: could you please add coastal line contours to assist with data interpretation?

The mentioned figures were updated, the coastline was added as a topography contour line and font sizes were somewhat enlarged to facilitate reading.

2. Appendix

- Figure A4 shows shows large descrepancies in maximum absolute veocities along the section between Tsunami-HySEA and TsunAWI simulations. Could you please provide some

comments/discussions on what might be the factors contributing to the differences?

The difference in absolute velocity is not so significant, in our opinion. The absolute maxima are well consistent along the section, and the difference in amplitudes is mainly due to the different spatial resolution of the two models in the flood zone, where the Tsunami-HySEA has a spatial resolution of 12 meters, and the other is slightly worse for this particular region. And a model with better resolution naturally describes extrema better. But note that the Tsunami-HySEA has fine resolution only in a specific area, and for the rest of the domain, the resolution is relatively coarse. At the same time, TsunAWI has quasi-uniform high resolution for the entire coastal zone.

For the two upper panel figures, their titles are not quite right. What the colour scale shows are maximum wave amplitudes in water area and maximum flow depth on land; but the figure caption describes this correctly.

Thank you for pointing us at the discrepancy. We updated the titles and added a colorbar to figure A4 (now A5).

We thank the reviewer for carefully reading the article and useful comments.

Authors.