

## ***Interactive comment on “Block and boulder transport in Eastern Samar (Philippines) during Supertyphoon Haiyan” by S. M. May et al.***

**S. M. May et al.**

mays@uni-koeln.de

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We thank reviewer 1 for his valuable comments and suggestions and we will consider these comments in the revised version. In the following we address each of the major and minor comments given by reviewer 1.

1. Abstract: the term 'dislocated' is not appropriate. Suggest 'dislodged' instead.

Author response: Ok, we'll change to dislodged.

2. Abstract: change 'uphill' to 'upslope'.

Author response: Ok, we'll change to upslope.

3. Abstract: the authors state that the high flow velocity calculations from boulder mea-

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surements exceed flows predicted by a hydrodynamic model, and that this therefore supports the notion of infragravity waves produced by Typhoon Haiyan. But it may also point towards the underperformance of the hydrodynamic model. Please address briefly.

Author response: Indeed, the discrepancy also results from the underperformance of the hydrodynamic model: a possible explanation would be a limited spatial resolution (e.g., of the local bathymetry and topography) of the model input data. However, Bricker and Roeber (2015) recently presented such a detailed Delft3D-based model for Hernani using own bathymetric mapping in the sheltered bay off of the town; they generally infer very similar conclusions. The main reason for the discrepancy between the flow velocities calculated from boulder measurements and the application of initiation-of-motion criteria, and those predicted by the hydrodynamic model, is thus due to the fact that phase-averaged models such as Delft3D cannot resolve the influence of infragravity waves. While we cannot incorporate this discussion into the abstract (see section 6.2 for further discussion), we have added a note on the recently published phase-resolving wave models into the abstract (e.g. referring to Shimozono et al., 2015). It should now be clear for the reader that the discrepancies also imply underperformances of the presented model.

4. Abstract: 'demand to carefully reassess' - please rephrase.

Author response: Ok, we rephrased the sentence to "...demand a careful re-evaluation of storm-related transport. ..."

5. Course of the event: correct to 'in a westward direction...'

Author response: We changed the sentence accordingly.

6. Coastal flooding: correct to 'similar to how TC Nargis...'

Author response: We changed the sentence accordingly.

7. Previous typhoons: use 'Eastern Samar' throughout instead of 'E Samar'. Currently

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both are used.

Author response: Ok, we change to Eastern Samar.

8. Field and laboratory work: multi-view image methods for coastal boulder size estimation were recently published by Gienko (2014), *ESPL*, v.39, p.853–864.

Author response: Thanks, we will include the reference.

9. Field evidence: change 'subrecent transport' to 'historical transport'

Author response: We changed to "recent transport"; "historical transport" refers to the 13 further clasts that "must have been transported by a previous event based on their mature vegetation cover".

10. Storm surge and wave model: please rephrase 'the here presented Delft3D model'.

Author response: Ok, we rephrased this section.

11. Boulder transport and flow velocities: the authors admit that 'flow velocities modeled with Delft3D are insufficient to account for the transport of the documented clasts'. This leads on to their proposal that this is evidence for a range of hydrodynamic processes having been responsible for the movement of the large coastal clasts. Although I do not necessarily disagree with this, I feel this issue could benefit from further consideration. The discrepancy in flow results may have several alternative explanations, either that the flows calculated using the transport equations are overestimated, or that the flows determined by the model are underestimated, or likely both to some unknown degree. The authors could make a valuable contribution here, providing more discussion on how to proceed in such cases where multiple methodologies used for the best intentions (i.e. validation) then yield results that are not in agreement.

Author response: We agree that the applied formulae are simplifying and depend on a number of coefficients (i.e., coefficients of lift, drag, or static friction). However, it has been shown that they can produce reasonable estimates of minimum flow velocities

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needed for the transport of large clasts. The use of case-sensitive coefficients and/or the application of min/max values for these coefficients given by previous studies (Nott, 2003; Noormets et al., 2004; Benner et al., 2010; Paris et al., 2010; Nandasena et al., 2011) results in even higher velocities in most cases. Thus, when following previous studies (e.g., Paris et al., 2010; Nandasena et al., 2011) and applying these equations, it seems that overestimation by the applied equations can be excluded – the flow velocities presented here are therefore interpreted to represent minimum values for the transport of the clasts. We will briefly discuss the influence of the use of case-sensitive coefficients (drag, lift, and friction) in the revised version of the manuscript. As to the underestimation of flow velocities by the presented hydrodynamic model, we agree that higher resolution models may indeed result in more realistic estimation of flow velocities for the study area. Bricker and Roeber (2015) recently presented such a detailed model for Hernani based on own bathymetric mapping in the sheltered bay off of the town. Nevertheless, they generally infer very similar conclusions. Thus, the discrepancy (as stated before) results from the underperformance of phase-averaged models such as Delft3D, which cannot resolve the influence of infragravity waves. We will also mention the study of Bricker and Roeber (2015) in the revised version of the manuscript.

12. Conclusions: 'a variety of hydrodynamic processes .... must be considered when interpreting boulder deposits...' This is too a vague statement to include in the conclusions, especially since this is one of the main thrusts of this paper. Please be more specific. List and briefly outline these various processes.

Author response: We have changed the conclusions in the revised version accordingly, now specifically listing and outlining the various processes potentially being involved in the boulder movement.

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