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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "A comparative assessment of two different debris flow propagation approaches – blind simulations on a real debris flow event" *by* L. M. Stancanelli and E. Foti

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Dear Referee #1,

we thank the Referee #1 for his useful suggestions that contribute to improve the overall quality of the manuscript. In the following, we present specific answers to his comments.

Regarding the "Introduction":

Regarding the FLO-2D and TRENT-2D model application to other case studies, as suggested, we added the following references:

Armanini, A., Fraccarollo, L., Rosatti, G., 2009. Two-dimensional simulation of debris flows in erodible channels. Computers & Geosciences.

Armento, M.C., Genevois R., Tecca P.R., 2008. Comparison of numerical models of two debris flows in the Cortina d'Ampezzo area, Dolomites, Italy. Landslides 5:143–150

Rosatti, G., Zorzi, N., Begnudelli, L., Armanini, A., 2015. Evaluation of the Trent2D Model Capabilities to Reproduce and Forecast Debris-Flow Deposition Patterns Through a Back Analysis of a Real Event. Engineering Geology for Society and Territory-Volume 2. Springer International Publishing, 2015. 1629-1633.

Nocentini, M., Tofani, V., Gigli, G., Fidolini, F. Casagli, N., 2014. Modeling debris flows in volcanic terrains for hazard mapping: the case study of Ischia Island (Italy). Landslides(on line first).

In particular, the above mentioned references have been considered in the introduction, at page 7092 after line 9, adding the following sentences:

The FLO-2D is a propagation model for debris flows worldwide adopted. Indeed, it is easy to find several applications of such a model, which mainly differ for the sediment characteristics, and in turn, for the rheological adopted parameters (see, for example, Bertolo et al, 2005; Boniello et al., 2010; Wu et al, 2013; etc). In literature, it is possible to find comparisons between its performances and those of other methodologies. In particular, Armento et al. (2004) and Nocentini et al. (2014) compared the FLO-2D with the DAN-W model, which is a one-dimensional code based on a mono phase rheological approach. Both studies demonstrated that FLO-2D, if appropriately calibrated, represents a useful tool also for predicting the behaviour of future landslides of the same type and in similar settings.

The TRENT-2D has been successfully applied in the eastern Italian Alps for modelling

the propagation of debris flows in erodible channels that is in situations where the entrainment of sediment bed material is important during the propagation. It has been showed (Armanini et al 2009; Rosatti et. al 2015) the effectiveness of the code in order to verify hazard mapping and to design defensive work assessment. To Authors knowledge, there are no extensive published comparisons among TRENT-2D and others 2D models.

Regarding details of the “Input data for modelling”:

LIDAR data characterized by a spatial resolution of 8 points per square meter have been adopted for the construction of the DTM. Moreover, for the urbanized area others elevation data acquired on purpose by means of a theodolite have been used too.

The rheological data for the TRENT-2D (such as friction angle, transport capacity, etc.) have been chosen considering literature values usually adopted for soil characteristics similar to those of the Messina region. At page 7100 lines 1-7 the rheological values selected for the simulation are described.

Regarding some specific comments:

In order to enhance the readability of the paper, as suggested, we increased figure sizes. We also added in the table caption the explanation of abbreviations. For example, the caption of Table 1 has been changed as follows: Measured and predicted values of maximum flow depths (hmax) and thickness of final sediments deposition (hfinal) for the Giampilieri event, acquired by means of surveys, FLO-2D results and TRENT-2D results. For lack of event data records value of maximum velocities (vmax) are provided only in case of model simulations.

Please note that in Table 1, the survey data concerning the deposit thicknesses are now indicated as hfinal and not as dzb.

The manuscript is under revision by a native English speaking scientist.

Best regards.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 7089, 2014.