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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Brief Communication: A new testing field for debris flow warning systems and algorithms" *by* M. Arattano et al.

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The referee asks and comments:

1. What's the purpose of this brief communication? I assume the authors would like to give notice of this new installation, which is one of only few such debris-flow observation sites world-wide. This is a laudable aim, and it's good for the natural hazard community to know of this test site. However, I wonder if it's not a little bit too early for a communication in a scientific journal such as NHESSD. The authors cannot yet provide any results or new insights from this installation after only a few months of operation. They have observed one event (15 July 2014) resulting in a few (interesting!) images (Fig. 3); but no further analysis of e.g. flow depth, geophone signals or speed are

shown.

Answer: as required also by referee#2, we have rewritten the abstract to clarify which kind of installation we have realized. Our installation is a testing site for debris flow Early Warning Systems that has explicitly included an important informative component. This latter, which consist of a flashing light framed by a videocamera, is a relatively new idea that has already delivered a first important video to divulge information on the performances and possibilities of the specific debris flow EWS under test. Decision makers, practitioners, but also the general public will be able to directly watch in the images which kind of event the EWS is capable to detect, how far in advance and for how long. This provides a much more real understanding of the possibilities offered by the system.

New abstract:

A permanent field installation for the systematic test of debris flow warning systems and algorithms has been equipped on the Eastern Italian Alps. The installation was designed to produce also didactic videos and host informative visits. The populace education is essential and should be envisaged in planning any research on hazard mitigation interventions. This new installation responds to this requirement and offers an example of integration between technical and informative needs. The occurrence of a debris flow in 2014 allowed to test a warning system and to record an informative video on its performances. This paper will provide a description of the installation and an account of the first technical and informative results obtained.

2. An equipment called ALMOND-F is highlighted as being the "core" of the warning system. There's only very little information about the used algorithms and the specific features of this equipment (compared to other debris-flow EWS). I think it would be worth to go a little bit more into detail about this equipment.

Answer: there are actually still very few examples of algorithms for debris flow detection and warning in literature to provide a good number of examples. However we have

introduced a reference to the algorithms proposed by (Badoux et al., 2008) and also by (Abancó et al., 2014), giving an explanation of their working principle and referring to the authors for more details. The warning algorithms we are referring to, require that a certain signal intensity threshold is exceeded to spread the alarm, for example and they need a check of the correct choice of this threshold (Badoux et al., 2008). As far as the specific features of the ALMOND-F equipment are concerned we have detailed some of them in the text, specifying that it was particularly intended for the seismic detection of debris flows. we also added that when it is connected to geophone sensors the system allows to set different values of signal amplification (gain range 1 - 128) for each geophone. This allows to install the geophones also at great distance from the torrent, according to the specific morphologic conditions that may be found in the field. The ALMOND-F samples the geophone signal at a maximum frequency of 128 Hz and then calculate the signal Amplitude directly on board.

3. Concerning the warning aspect of this debris-flow observation station: the reader definitely needs some information about what area/people/infrastructures are at risk. Is there a passage for hikers through the channel? Is there a road below the site? Also it would be interesting to know if there is a plan of action in case of an event (in addition to the flashing light).

Answer: there are actually no area/people/infrastructures at risk downstream of the testing field. We have specified in the text that Downstream of the equipped reach there is a deposition basin where the debris flows generally completely stop. At the downstream end of this basin there is a slit check dam that allows the passage of water and finer sediments. The deposition basin is periodically mechanically emptied. No significant risk exists for the village of Lasa, which is located several kilometers downstream.

4. An additional important information for this communication would be: what do we know about typical debris flows in this channel? How often? Some information about typical composition / characteristics of past debris flows. Typical triggering conditions

(rainfall situations) for debris flows in this area. Maybe a few words about the catchment area where the debris flows are forming.

Answer: information concerning typical debris flows in this channel, how often they occur, etc. can be found in Comiti et al. (2014). We have more clearly specified this in the text.

5. Minor issues: - I suggest to mention a few other examples of existing (similar) debris-flow observation stations (from Japan and the Alps) in the introduction.

Answer: we have mentioned other examples of existing debris-flow warning testing sites (Koschuch et al., 2015; Moser et al., 2002)

References

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Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/3/C855/2015/nhessd-3-C855-2015-supplement.pdf

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 1717, 2015.