RE: NHESS 2017 411 Tiranti et al. Regional landslide forecasting in Piemonte (Italy) and in Norway: experiences from 2013 late spring

Overview

Two different warning systems against rapid landslide phenomena hazard are shown in present work. The work is, in general, well written but has two main deficiencies:

1) Some details about phenomena and warning thresholds are missing
2) A final comparison between warned phenomena and those occurred is missing

Landslide phenomena "warned" by the two systems seem different.
In the case of ARPA Piemonte shallow landslide, deep landslides and channelized debris flows. ARPA Piemonte has three different forecasting approaches: one for each type of phenomenon.
In the case of Norvegian Forecasting Service, the "warned" phenomena are: shallow landslide, debris avalanches, slushflows and debris flows. In this case, the writer supposes that debris flow is landslide induced debris flow. Is it right?
Then, the writer suggests a section after the introduction where all the "warned" phenomena are briefly introduced and schematized. This section would help the reader to focuse the phenomena, increasing the value of the work.
About Norvegian Forecasting Service, there is an unique threshold for all the type of landslides. Authors should justify this.

At the end a comparison between launched warnings and occurred phenomena should very useful for understanding the effectiveness of the warning systems. As in the case above, this should increase the value of the work and consequently its diffusion.

The following are the detailed comments and specifications.

Abstract

Sentences at lines 14-17 ("In Italy,.....in Northwestern Italy.") are redundant. Just write that in Italy the landslide hazard assessment is not national but provided by the Regional Agency for Environmental Protection and that in present paper it is shown the work of ARPA Piemonte.
Sentence at lines 24-27 is too long.

Introduction

Sentences at lines 7-16 ("The spatial occurrence……shallow landslides") appears confuse. At the beginning rainfall and snowmelt induced landslide are introduced. After that rapid mass movements are introduced and rainfall and snowmelt induced landslide becomes a subcategory of them. Finally, there are the shallow landslides. Authors should to identify all the phenomena they warn to avoid confusion in the reader.
At line 19, you could insert the reference Thiene et al., (2016).

The Vb cyclones

About line 14 of page 3, are you sure about" eastern part of the Alps to NorthWest?"; maybe it could be the contrary.

The landslide forecasting services in …

At line 14 of page 9: "is not based only on a threshold" but also on……

Piemonte's landslide forecasting service

About the use of DEFENSE. What type of weather radar is used? In some cases after using movable weather radar it could be possible reliably estimate the rainfall depth. In a mountain environment in many cases, radar estimates could be not reliable due to the high spatial variability of rainfall and the distance from the fixed weather radar (Germann et al., 2006; Rabiei and Haberlandt, 2015; Bernard et al., 2016).
Authors should introduce some details and cautions on the use of weather radar in a mountain environment.

The Norwegian Forecasting Service

This section is a bit confused and should be reorganized and rewritten. Initially, it is stated that the daily assessment is built on thresholds, real time observations and landslide events (occurring

during the event?) previous occurred landslides (inventory) and susceptibility maps. It is reasonable that the inventory of landslide be used for determining the threshold. Is not it?
Moreover, also runoff is simulated (by which model?): which is the scope if the threshold combine rainfall and snow with the soil saturation degree?
In other words, it is better only describe what it is strictly related to the landslide warning.
At last most references are not in English language. Therefore, some detail about model could be written in an appendix.

Antecedent condition

At line 6 of page 13, it is better 5 days instead of 120 hours.

Piemonte

What is ECMWF at line 12 of page 14?

In the sentences of pages 15-16 a big emphasis is addressed to the occurred flood and the reaching of warning level in the hydrological network. The writer think that this is eccentric respect to the main object of this work, the landslide forecasting. Therefore, the writer suggests the authors to give a brief description of occurred flood and stress the description of occurred phenomena related to the landslide hazard object of forecasting.

Warning levels

The first sentence states that to each warning level corresponds a measure. Is it true? In this case further details will be useful.
About debris flows warned (see line 5 of page 20) which radar was used?

Bernard M., Stancanelli L., Berti M., Simoni A., Gregoretti C., Lanzoni S. (2016) *Field results from the runoff generated debris flows occurred at Rovina di Cancia (Venetian Dolomites)* XXXV Convegno di Idraulica e Costruzioni Idrauliche – Bologna

Germann, U., Galli, G., Boscacci, M., and Bolliger, M. (2006). Radar precipitation measurement in a mountainous region. Quarterly Journal of the Royal Meteorological Society, 132(618), 1669-1692. http://doi.org/10.1256/qj.05.190

Rabiei, E., and Haberlandt, U. (2015). Applying bias correction for merging rain gauge and radar data. Journal of Hydrology, 522, 544-557. http://doi.org/10.1016/j.jhydrol.2015.01.020

Thiene, M., Shaw, W. D., and Scarpa R., (2016). Perceived risks of mountain landslides in Italy: Stated choices for subjective risk reductions. Landslide, doi:10.1007/s10346-016-0741-3.