



Terracing and hydrogeological risk. A study of the environmental disaster of 25 October 2011 in Cinque Terre

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The 25th October 2011, an extremely intense rainfall event occurred in the Cinque Terre area. The major damages have been registered in Monterosso and Vernazza basins, that have been affected by hundreds of landslides, mud flows and erosions. The main feature of this area is the steepness of the slopes combined with the presence of wide terraced portions. This work aimed to analyze the landslide distribution in reference of land use, focusing on the effect of land abandonment on hydrogeological risk. In fact, during the last 40 years agriculture in such difficult lands decreased constantly, leading to a progressive abandonment of terraces and consequent re-colonization by spontaneous pioneer species. This phenomena seems to be the main cause of failure during heavy rainfall events. Two studies have been conducted on two different failures samples. The first analysis regarded about 100 failures surveyed by mean of a helicopter flight, randomly chosen along the whole affected area. Besides land use, an overview of the effects of other factors have been taken into account: landslide size, average landslide slope, concavity/convexity of the uphill area. The same analysis has been conducted both for landslide bodies and landslide head scarps. Some differences have been highlighted between these two studies, confirming that land use are a determinant factor for landslide occurrence. The second analysis regards a sub-sample of all the failures registered in the Vernazza catchment, selected by aerial photogrammetry interpretation. This set has been selected excluding all the failures with a size less than 100 m². An historical aerial image (1973) was geo-referenced and overlaid on the 2011 image, in order to explore the land use before the secondary forests. The objective of this new analysis was to explore the ground under the tree cover, in order to know if the slope failures in forested areas were connected with the presence of abandoned terraces, or simply to an intrinsic instability of the rooted slope. The analysis has been conducted on landslide-size classes. In all classes the failures resulted connected mainly with the abandonment of terraces, with a decrease of instability in forested areas. According to our work, the forest seems to be a stabilizing factor for abandoned terraces.

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