



## **Modeling four occurred debris flow events in the Dolomites area (North-Eastern Italian Alps)**

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Four occurred debris flows in the Dolomites area (North-Eastern Italian Alps) are modeled by back-analysis. The four debris flows events are those occurred at Rio Lazer (Trento) on the 4th of November 1966, at Fiames (Belluno) on the 5th of July 2006, at Rovina di Cancia (Belluno) on the 18th of July 2009 and at Rio Val Molinara (Trento) on the 15th of August 2010. In all the events, runoff entrained sediments present on natural channels and formed a solid-liquid wave that routed downstream. The first event concerns the routing of debris flow on an inhabited fan. The second event the deviation of debris flow from the usual path due to an obstruction with the excavation of a channel in the scree and the downstream spreading in a wood. The third event concerns the routing of debris flow in a channel with an ending the reservoir, its overtopping and final spreading in the inhabited area. The fourth event concerns the routing of debris flow along the main channel downstream the initiation area until spreading just upstream a village. All the four occurred debris flows are simulated by modeling runoff that entrained debris flow for determining the solid-liquid hydrograph. The routing of the solid-liquid hydrograph is simulated by a bi-phase cell model based on the kinematic approach. The comparison between simulated and measured erosion and deposition depths is satisfactory. Nearly the same parameters for computing erosion and deposition were used for all the four occurred events. The maps of erosion and deposition depths are obtained by comparing the results of post-event surveys with the pre-event DEM. The post-event surveys were conducted by using different instruments (LiDAR and GPS) or the combination photos-single points depth measurements (in this last case it is possible obtaining the deposition/erosion depths by means of stereoscopy techniques).