



## **Landslides in a changing environment: evidence from past activity records in the Dolomites (Italy)**

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The results here presented concern the study of the relationships between environmental changes and slope evolution during the Late Quaternary, with particular attention paid to landslide processes. The research has been carried out in test areas located in the Dolomites (Eastern Alps, Italy) following the basic idea that modifications in landslide frequency may be interpreted as changes in the hydrological conditions of the slopes, which are controlled by climate. More precisely, an effort has been made to assess the correspondence between temporal concentrations of landslide events and climatic events, with the aim to verify to what extent and under which boundary conditions the records of slope instability processes can be considered geomorphological indicators of environmental changes.

The set of dated phenomena is composed by landslides affecting comparable lithologies in a similar geomorphological context. Moreover, the richness of data allows climatic inference to be made using sets of contemporary landslides and not only movements isolated in time. At the moment 24 mass movements have been analysed and 75 radiocarbon ages have been determined, providing a record of landslide activity spanning from the late Pleistocene to date. The chronology so far obtained shows temporal clustering of dated mass movements, that is a basic condition to look for the possible causes of past periods of more intense activity. By analysing the data set, four periods of enhanced landsliding can be outlined:

- I. from 10,500 to 9500 cal BP, between Younger Dryas and the Preboreal;
- II. from 8000 to 7000 cal BP, during the older Atlantic;
- III. from 6000 to 4500 cal BP, between Atlantic and Subboreal;

IV. from 3000 to 2000 cal BP, between Subboreal and Subatlantic.

These four periods of enhanced landslide activity have been compared to Late Glacial and Holocene paleoenvironmental records obtained from different realms, in order to verify and confirm the relationship between landslide occurrence and climate changes. Besides the intrinsic difficulties in the cross-correlation among different paleoenvironmental records, which are mainly due to different spatial scales (local, regional and global), dissimilar time-resolutions and dating constraints, some remarkable evidence come forward. The four period of enhanced slope instability found in the Dolomites display a quite good correlation especially with the proxies of cold and humid climate, suggesting that these phases could have been climatically-driven and, in particular, that a positive moisture balance could have played a major role in conditioning landslide activity at the hundred to thousand years time scale.