



Pre-historic rockslides (Eastern Alps/Austria) and their impact on valley floor development up to now

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Two cases of adjacent mass movements in the upper Drau valley (Pustertal/Eastern Tyrol) located in the Eastern Alps exemplify the challenge of landslides in an Alpine setting. This includes the identification of failure mechanisms, dating landslides and their heritage in the sense of blocked rivers and re-activation phases up to now. The results of geological mapping in combination with drill-core data showed that the emplacement of both medium sized rock masses ($V = 0.01 - 0.04 \text{ km}^3$) made up of calcareous rocks was the result of catastrophic rockslides descending from the steep flanks of the Lienz dolomites. Such a mechanism was possible due to the presence of marls and claystones as the weakest lithologies of the whole sequence. The deformation of these rocks at the base of the landslide masses resulted in shearing and even in fluidal structures. In contrast, the predominantly dolomitic lithology of one landslide shows a high degree of fragmentation with very angular clasts. However, the geometry of this deposit does not indicate fluidization as is known from typical sturzstrom events.

The age of the landslides was constrained in one case by ^{36}Cl exposure dating of dolomite boulders. ^{14}C dating of wood and other organic remains at the base of the landslides provided maximum ages. The dating of terrace deposits in the backswamp area of one landslide yielded further geochronological information. A sequence exhibits the onlap of lacustrine organic-bearing sediments due to blocking of the river Drau on a pre-existing landscape indicated by a soil. Both events took place in the last 4000 years, thus in a period when human settlement was already established in the Alps. Consequently these findings will be compared with archeological data.

The long-term legacy of these mass movements is evident not only by an unbalanced river profile along the river Drau but also by catastrophic re-activation in 2010, mobilizing a $900,000 \text{ m}^3$ and blocking again the river Drau.