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Structural setting, morphology and surface processes in rock gullies: a case study in the Dolomites.

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The presented study aims to illustrate the relation between structural setting, severe climatic events and land processes. Rock outcrops cover large areas in the upper parts of alpine basins. Rock slopes are entrenched by chutes and gullies, which often correspond to fractures and faults. These landforms play an important role in the delivery of sediment to lower basin slopes, so that they deserve special attention in the analysis of sediment-related processes and in the recognition of channel network in upper basin slopes. On the basis of aerial photo interpretation, field surveys and geomorphic analysis on a digital elevation model, this work describes the morphological characteristics of bedrock channel and their drainage basins in a study area in the Dolomites (Northeastern Italy) and try to recognise relations between faults and the morphology of the rock gullies. A detailed structural map was developed in order to discriminate the fault typology and to understand the correlation between the structural setting and the gullies basins area. The results shown that these two features are linked and, moreover, that different fault typology may produce different size of sediment on the debris that can be involved on future debris flow event. The width of cross-section of rock gullies does not show well-defined relations with the contributing drainage area, whereas is influenced by the presence of debris on the gully floor, in turn depending on gully gradient. Field observations show that multiple processes contribute to sediment dynamics in the studied rock gullies: the structural setting of the area strongly influence the amount and the orientation of fractures along the rock outcrops, and weathering of rocks with crioclastic erosion and subsequent gravitational accumulation of debris give new strength for future debris flow events, directly affecting hazard. All these observations allowed us to finally prove that structural setting, important climatic event and hazard assessment are deeply linked together.