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# The role of Thurwieser rock avalanche in the geomorphological evolution of Zebrù Valley (Italian Central Alps)

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On September 18th, 2004 a rock avalanche with an estimated volume of 2.5 M m3 propagated from the southern flank of Punta Thurwieser, affecting the Marè Valley, a tributary located in upper part of Zebrù Valley, 30 Km East from Bormio, in the Italian Central Alps. The landslide event deposited a thick debris cover on the pre-landslide morphology up to 2.2 Km from the source area. In this contribution, we aim at studying the role of the rock avalanche on the geomorphological evolution of the valley and in particular in controlling the evolution of the drainage system, the sediment budget and the mass balance of Zebrù glacier. In fact, after ten years it is possible to appreciate and valuate how such an event could modify the landscape and the geomorphology of an alpine valley. First, the landslide body formed a robust obstacle splitting the original watershed into two different sub-units. This caused a different distribution of the sediment yield rate in the upper part of the valley. As a consequence, an extremely rapid excavation of a new channel took place, ending in a new debris fan along the Zebrù valley bottom. A consistent groundwater flow still occurs within the rock avalanche deposit along the old valley axis, excepted for periods characterized by intense precipitation and snow melting events, which are able to activate the recently developed drainage channel. Thus implies that the main transport of sediments will occur along the new channel, during periods of high discharge. In the middle part of the landslide deposit, a sediment trap formed, collecting the material eroded by the surrounding ridges and by the upper sector of the deposit itself, forming a small plain under constant accretion. From this temporary trap, it was possible to estimate the periglacial sediment transport yield of the basin. The Zebrù glacier, flowing from the Mt Zebrù peak, was partially interested from the landslide, which covered a portion of the ice tongue with a shallow layer of blocks and finer matrix. The Thurwieser debris acted as a thermal insulation, preserving a significant ice volume and building up a steep bound, in the order of 10 m high, between non-covered and covered glacier surface. Topographic data collected since 2004 are presented and analyzed in this contribution to study the evolution both at a large and small scale.