The Mazeri Valley in the Greater Caucasus (Georgia) is characterized by a highly dynamic landscape with several active mass-wasting processes. The spatial and temporal dynamics of these geomorphic processes have, over time, resulted in the formation of large cones and fans. In this context, the coupling between the hillslope and the channel plays a fundamental role in controlling the catchment sediment dynamics. The sediment produced at higher altitudes on hillslopes may occasionally reach the debris-flow channel network, and downstream propagation may have significant effects on the fluvial environment and create potential hazards for the resident population, tourists and infrastructures. In this study, we aim to better understand sediment fluxes in the mountain headwater stream in the Mazeri Valley. In this regard, a tree-ring-based chronology of the debris-flow activity on a large cone was created, to shed light on sediment connectivity and better understand the coupling between the main debris-flow channel and the bedload of Dolra river. The 161 disturbed trees sampled allowed to reconstruct a minimum of 12 significant debris-flow events over the last 65 years, with all of these events involving possible sediment input into the stream system of the Dolra river. These successional events, with a return interval of 5.4 years, have partially destabilized the fluvial system and locally induced a switch in the channel style to a braided channel. Although the cone studied is not directly located in a proglacial environment, its geomorphological dynamics remain highly dependent on water and sediment inputs from upstream, giving the presence of retreating glaciers and then paraglacial conditions at high altitude. The ongoing glacial retreat and increased climate variability will certainly lead to a massive output of sediments at high altitude, favoring an increase in geomorphic activity in the area. Many other fan and cone complexes are present in the Mazeri Valley, as well as in other adjacent valleys, and there are no documentations regarding their dynamics (e.g., typology, nature and source areas of hillslope processes, their coupling with channelized sediment-water flows, frequency-magnitude relationships). In this regard, we expect that the present pioneering study in this area will encourage more researches to investigate sediment fluxes for a better land use and preservation of water in Georgia under climate change.
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