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Digital field mapping and the interpretation of the complex geomorphologcal setting of the Flims and Tamins Landslides ((Rhein River valley Switzerland)

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We analyze landforms and deposits related to the Flims and Tamins landslides (Rhein Valley, Switzerland) using an integrated geomorphologic-geomatic approach that includes literature analysis, field mapping and remote sensing. These huge landslides (estimated volumes of 9.3 km3 for Flims and 1.6 km3 for Tamins) occurred at a time of large slope instabilities in the Rhein valley around 9000 years ago. Our focus is peculiar landforms called "Tomas" that occur as a series of distributed hills in the vicinity of and downstream of the Vorderrhein-Hinterrhein confluence. Their origin has been debated for more than one and one-half centuries, but current thinking is that they are, depending on the area, intact rootless masses of Flims or Tamins landslide debris rafted downvalley in a thick layer of liquefied valley fill (“Bonaduz gravel” for the ones upstram) during the Flims landslide event.
Our analysis of the features involved: 1) analysis of a LiDAR-derived DTM (Swissmap) and base maps produced from the DTM for field work (hillshade and 1 m spacing contour maps); and 2) field data collection and digital GIS mapping of deposits and landforms with a pocket PC and GPS. We created a geo-database that includes morphometric, structural and sedimentological data on the Tomas. We produced a digital map from the DTM and field data, along with a comprehensive legend linked to our kinematic and dynamic interpretations.
We recognize and describe four groups of Tomas, which provide new insights into the genesis of these peculiar features. Remote sensing and field data also allow us to precisely map the eastern boundary of the Flims landslide deposit and to interpret the spatial relation between the Tomas and the Bonaduz gravel.