



Dam effect of the “Lavini di Marco” landslide on the valley of Adige River (NE Italy): geomorphological and geoarchaeological investigation

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The research investigated the evolution of the valley of Adige River, that is one of main valleys of the Alps and has a major role in connecting the southern and the southern sides of this mountain chain. This study focused on the area of Rovereto (Trentino), which is characterized by the existence of the huge complex landslide named “Lavini di Marco”. This is one of the largest landslides of the southern Alps and was mentioned also by Dante in the *Divina Commedia* (*Inferno*, Canto XII). The related deposit consists of different bodies and several researches tried to date it through radiocarbon and cosmogenic exposure dating, obtaining different results. We adopted a different perspective, investigating the alluvial terrace existing upstream of the landslide and looking for the effects that the mass-failure events generated along the valley. In particular, we analyzed the archaeological site of Navicello, near the present channel of Adige River, about 0.5 km upstream of the major landslide deposit. The area was settled since the Roman period and at least until the 6th century AD; after that time the site was suddenly buried by 2-3 m of sandy deposits related to the flooding activity of Adige. The stratigraphic setting, the thickness and the extent of the depositional unit burying the site, have been investigated analyzing the pre-existing geotechnical logs available in the area and realizing about 30 new manual boreholes that reached a depth between 1.5 and 4.7 m. The combined use of LiDAR, aerial pictures and field data allowed to demonstrate that the depositional unit covering the site form one of the largest fluvial terraces along the Adige Valley. The surface of this landform is about 6 m above the present channel of Adige and it extends in the whole floor of the valley. The top of the terrace is flat, almost lacks of any inclination and its elevation is between 171-172 m a.s.l. This value is exactly matching the top of the landslide deposit where it constrains the present Adige channel along a narrow passage. These data allowed to demonstrate that the main body of the Lavini di Marco landslide caused the temporary damming of the Adige River, triggering the formation of an alluvial plain occupying the whole width of the valley. After a relatively short period, the river eroded part of the slope deposit and restored the pre-existing fluvial profile, entrenching also the alluvial units that buried the post-Roman site. Thus, the new evidence highlights that the Lavini di Marco landslide occurred after 6th century, it is likely that it matches with the landslide described in the historical chronicles “*Fulda Annales*” (883 AD) and it dammed the Adige River with consequent block of the solid yield upstream the deposit.