



## **Preservation of Late Pliocene-Middle Pleistocene huge rock avalanches in the Central Andes, Argentina: its implications.**

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In the Argentinean Central Andes (at 32° 30' S - 69° 20' W) preservation of huge Late Pliocene- Middle Pleistocene rock avalanches let to know about the behaviour of this extreme events in the past, as well as, evidence the regional neotectonic activity.

The Tigre Dormido rock avalanche (TD) mobilised  $1.7 \times 10^9$  m<sup>3</sup> of debris material with a velocity of 100 m/s (H/D 1.55) running 10 Km until reached the Mendoza valley that was dammed up. The Placetas Amarillas rock avalanche (PA) ran 9 km descending 2000 m topographically and covering  $\sim 6.8$  km<sup>2</sup>. This event reached  $1.6 \times 10^9$  m<sup>3</sup> in volume and also generated a paleo-lake of 32 m-sequence of fine sediments. Whereas, the Piedras Blancas rock avalanche (PB), causing a  $\sim 0.7$  km<sup>2</sup> dammed paleo-lake, had a volume  $\sim 9.6 \times 10^8$  m<sup>3</sup> and an H/D relation equal to 0.2.

The TD deposit is eroded by an outwash related to Uspallata Glaciation assigned to Middle Pleistocene as its moraine is related with an ash level dated  $360 \pm 70$  Ky by fission track. The PA-1 and PB are overlain by three ash layers interbedded in alluvial fans which middle level was dated  $350 \pm 80$  Ky by Ar<sup>39</sup>/Ar<sup>40</sup> method. Thus, in the impounded paleo-lake related to the PB, an old horse identified as *Hippidion devillei* was found. This mammal specie lived in South America from Upper Pliocene to Upper Pleistocene.

A simultaneous seismic triggering mechanism is assumed for these paleo-events. Historical Ms > 7 earthquakes have been recorded in the region linked to the Nazca Plate flat-slab subduction at this latitude. Furthermore, liquefaction features were observed

in the 30 m-thick lake sequence related to the PB, which is also intensively deformed in the paleo-lake boundary.

This work's findings extend the paleo-seismicity of this region. Occurrence of  $M > 6$  paleo-earthquakes is suggested according to involved rock avalanche volumes. Moreover, liquefaction phenomenon is commonly linked to high magnitude earthquakes. What is more, Quaternary activity of regional faults is suggested as generally liquefaction features are associated with nearby seismic source.

Nevertheless, forcing paleo-climate conditions are not underestimated. Even through evidences of local warm period is lacking, rock avalanches are previous to a glacial period and the existence of paleo-lakes suggests a humid period. Thus, horse's rests may implicate that this areas were non-glaciated during this period at this altitude (2650 m a.s.l.). Future effort in numerical dating and regional paleo-climate proxies are required.