

PLEISTOCENE HUGE ROCK AVALANCHES IN THE ARGENTINEAN ANDES

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ABSTRACT

At 32° 30' SL - 69° 20' WL, in nor-occidental extreme of Cordón del Plata range (The Andes), huge rock avalanches have been geomorphological study: Tigre Dormido (TD), Placetas Amarillas (PA-1), and Piedras Blancas (PB). The former mobilised $1.7 \times 10^9 \text{ m}^3$ 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 PA-1 ran 9 km descending 2000 m topographically. This event, covering $\sim 6.8 \text{ km}^2$ and with $1.6 \times 10^9 \text{ m}^3$ in volume, blocked up a secondary creek generating a paleo-lake evidenced by 32 m of fine sediments. Whereas, the PB, causing a $\sim 0.7 \text{ km}^2$ dammed paleo-lake, has a volume $\sim 9.6 \times 10^8 \text{ m}^3$ and an H/D relation equal to 0.2. Pleistocene age for these rock avalanches have been determined by stratigraphic relations and tephrochronology. Firstly, 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 $360 \pm 70 \text{ Ky}$ by fission track. Then, the PA-1 is younger than an ash level dated $350 \pm 80 \text{ Ky}$ ($\text{Ar}^{39}/\text{Ar}^{40}$ method). And, the PB deposit is overlain by three ash layers interbedded in alluvial fans that have been correlated, by field observations and geochemistry analysis, with those numerically dated. Therefore a simultaneous seismic triggering mechanism is assumed in accordance with historical $M_s > 7$ earthquakes recorded in the region link to flat segment subduction of Nazca Plate 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. These findings let to extend the paleo-seismicity of this region. What is more, occurrence of $M > 6$ paleo-earthquakes is suggested according to involved rock avalanche volumes, and liquefaction phenomena commonly link to $M_s > 5$ earthquakes. However, forcing paleo-climate conditions are not underestimated.

Keywords: rock avalanche, Pleistocene, paleo-earthquakes, liquefaction, Argentina