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Analysis of large-scale Quaternary landslide deposits: El Cajon basin, south-eastern Puna margin, NW Argentina

H. Wulf (1), L. M. Schoenbohm (2), M. R. Strecker (1)

(1) Institut für Geowissenschaften, Universität Potsdam, Postfach 601553, D-14415, Germany (HendrikWulf@gmx.de), (2) Dept. of Geological Science, Ohio State University, 125 S Oval Mall, Columbus, OH 43210, USA

Landslides are important manifestations of natural hazards in tectonically active orogens and their distribution is mainly governed by structural, and lithologic, controls as well as seismicity. This study characterizes and analyzes three large-scale Quaternary landslide deposits along the eastern border of the Puna Plateau in the northern part of the El Cajon Basin, Catamarca Province, Argentina. Mapping of structures and lithologies related to the landslide deposits were carried out using Landsat 7 and ASTER (L1B) satellite images, aerial photographs at a scale of ca. 1:25,000, and detailed field surveys. Landslide volumes and run-out distances were determined using a DEM generated from ASTER data. The lowermost and oldest deposit is a block slide (648 x 10^6 m^3) composed of an internally shattered block of Neogene sediments. The break-away scarp is located to the NW and the transport direction was to the SE. Above the block slide we mapped a debris-flow unit (140 x 10^6 m^3) and a related rock glide deposit (490 x 10^6 m^3). These units constitute mainly reworked Neogene and Quaternary sediments, and occasional crystalline bedrock. Here, the transport direction is from north to south. Five lacustrine units have been identified above/within the landslide deposits as well, resulting from the disruption of drainage. Streams diverted by the landslides have cut new channels up to 50 m into bedrock. The landslides originated as a consequence of folding and steepening of Neogene strata along the uplifting mountain front on the west side of the basin in Plio-Pleistocene time. Strata are inclined up to 35° and likely detached along the unconformity between the Neogene units and bedrock to source the landslides. This geometry could have had an impact on the extraordinary large volume of the block slide. Because the landslide is located

along a fault which appears to have been reactivated in Quaternary time as a dextral strike-slip fault with a normal component, we infer that the landslides were triggered by local seismic events. However, climate change cannot be ruled out, as regional landslide density in NW Argentina appears to be closely linked to humid periods in the past.