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Normal versus earthquake-induced clastic sedimentation processes in Lago Puyehue, Chilean Lake District, 41˚S

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The recent evolution of clastic sedimentary processes in Lago Puyehue, as characterized by high-resolution seismic profiling and multidisciplinary analysis of sediment cores from two contrasted coring sites (PU-I and PU-II), is presented and compared to the catastrophic impact of the 1960 Chilean earthquake (Mw 9.5). Lake Puyehue's catchment area was strongly influenced by this earthquake: (i) multiple earthquake-induced land slides and debris avalanches temporally dammed the course of the main tributary (Rio Golgol) and (ii) ca. 7.10^6 m^3 of white fine pumiceous sands and black medium-sand-sized scoria were deposited in the catchment area during the Puyehue-Cordon-Caulle volcanic eruption that followed two days after the main seismic shock.

Based on the correlation of seismic data and sediment cores dated by ^{137}Cs and the identification of historical events, we argue that "normal" clastic sedimentation is essentially resulting from the development of homopycnal flows at the end of the winter season in these oligothrophic monomictic lakes from the Chilean Lake District. While distal clastic environments (PU-II coring site) are dominated by a biogenic production and appear to have been little affected by the 1960 earthquake and Puyehue volcanic eruptions in 1960 and 1921-22, this might not be the case for more proximal clastic environments (PU-I coring site) as well submitted to sporadic hyperpycnal flows during major flood events. In 1960, for example, as several landslide dams broke in the Golgol valley after the earthquake and the volcanic eruption, a mega-hyperpycnal

flow reworked a mixture of volcanoclastic and soils sediments from the catchment as well as lacustrine sediments surrounding the Golgol delta during the rising limb of the flood and accumulated ca. 3.10^6 m^3 of material in the deep basin.