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Hydrovolcanic hazard assessment in Snowy Coropuna (Southern Peru)

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The Nevado Coropuna volcanic complex (16°S, 73°W, 6377m) is in the northernmost sector of the CVZ of the Andes. The Coropuna included several stratovolcanoes completely covered by the largest tropical-glacier of the Earth (~46 km2 in 2010). The Coropuna complex is on the edge of a steep ramp linking the Altiplano with the coast of Pacific Ocean: an altitude difference of 6000m. Four factors shape a hydro-volcanic scenario of hazard, which must be evaluated: the size of the glacier system; the steep slopes; the concentration of the population into the channels of drainage network (> 50,000 people) and the very young lava flows, in the west, northeast and southeast of the volcanic complex. The research results suggest that Coropuna is an active volcano and possible future eruptions could cause lahars: 1) For lava flows the following 36Cl exposure ages were obtained: ~6.0 kyr (west); ~2.1 kyr (northeast) and ~0.7 kyr (southeast of the complex). 2) The observations of soil temperatures reflect cycles of days or weeks, which could be due to endogen activity. In addition, a differential transmission of geothermal heat also was detected: In the buried-thermometers at 5694m, barely were recorded freezing episodes, while at a lower altitude (5200m) other buried-thermometers reflect the presence of permafrost. 3) Around the volcano hot springs have been identified, with lower temperature to 52 °C, with a typical alkaline-sulfated, chemical composition of volcanic hydrothermal systems. By isotopy they have been associated with the glacier that covers the volcano. Taken together, the data suggest that Coropuna is an active volcano and future eruptions could trigger lahars. These hypersaturated flows would have great destructive power, because of the steep slopes. Therefore, it is necessary to increase the hazard monitoring, in order to evaluate the volcanic threat and the population vulnerability.