Structural geormophology and paleoseismology in the Altiplano of Peru: First geological evidence of the 1950 earthquake

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The Pachatusan Faults System (SFP) is located 5km NW of the city of Cusco. It presents sub-parallel segments that are distributed along 25 km in a width of 2 km. Deposits and geoforms of fluvial-glacial environment are affected, as well as quaternary volcanic rocks (0.5 Ma). Benavente et al. (2013) y Sébrier et al. (1988) they describe moraines, and morphologies associated with glaciers, affected by normal type faults. Peru has a limited historical catalogue of earthquakes, in this sense, with this work we contribute to widen the window of observation in the region of Cusco, region known for earthquakes of great magnitude (1650, 1950, 1986).

Studies focused on acquisition of high-resolution images and DEMs (5cm x pixel), which allowed detailed morphostructural analyses to be carried out. In addition, we excavated a paleosismological trench that allowed, together with new radiocarbon ages, to reconstruct holocene deformation associated with SFP.

The morphostructural analysis of 201 Swath profiles, in morphologies of the last glacial maximum advance (14 ka), resulted in a vertical displacement of 20 m, resulting in a slip rate of 1.4 mm/year. The paleosismological analysis, from a trench 8 m long and 3 m high, allowed to identify 4 reactivations with superficial rupture in the last 4 ka. Being the last event or reactivation between 1876 - 1948 cal AD. We propose that this event would be associated with the 1950 earthquake, where great damage was recorded in the city of Cusco (Silgado, 1978). According to the length of rupture and vertical displacement, this earthquake was 6.3 M (Wells & Coppersmith, 1994).