Geophysical Research Abstracts
Vol. 13, EGU2011-11140, 2011
EGU General Assembly 2011

Paleoseismicity of the Pallatanga Fault and seismic hazard implications

Stéphane Baize (1), Laurence Audin (2), Thierry Winter (3), Alexandra Alvarado (4,2), Luis Pilatasig (5), Paul Kauffmann (1), Mercedes Taipe (4), Pedro Reyes (6,4)

(1) Institut de Radioprotection et Sûreté Nucléaire, BERSSIN, Fontenay-aux-Roses, France (stephane.baize@irsn.fr), (2) Institut de Recherche pour le Développement, ISTERRE, Grenoble, France, (3) Bureau de Recherche Géologiques et Minières, Service Risques Naturels, Orléans, France, (4) Escuela Politécnica Nacional, Instituto de Geofísica, Quito, Ecuador, (5) Ministerio de Recursos Naturales No Renovables, Quito, Ecuador, (6) GéoAzur, Sophia-Antipolis, France

The Pallatanga fault is a NNE-SSW segment of the Dolorès-Guayaquil deformation zone, a large structure accommodating the dextral displacement between the Northern Andean Block and the South America Plate with a rate of 6-8 mm/y. Previous morphotectonic study validated the Holocene right-lateral motion of the Pallatanga fault (Winter et al., 1993, GJI). The detailed topographic survey in the Pangor Rio area evidenced the 75° fault dip to the west and allowed to estimate the "near-field" displacement to be 41m for the dextral component and 8m for the reverse one. Finally Winter et al. (1993) inferred a cumulated striae dipping slightly to the south (11°) and an averaged slip rate of 2.9 to 4.6 mm/yr. Moreover, this particular fault segment is suspected to be the source of the main intraplate earthquake of South America (Riobamba earthquake, 1797/2/4, M∼7.5; Beauval et al., 2010, GJI). We propose to study the Pallatanga Fault System in order to (1) assess the occurrence of large past earthquakes and quantify their number, magnitude and recurrence times, and (2) enhance the seismic hazard assessment of the area. We focused on paleoseismological analyses (trench survey, mineralogical analyses, 14C datings) and on a detailed mapping of the active fault trace continuation towards the crowded area of Riobamba. The interpretation of the trenches demonstrates that the fault generated several (3 to 5) strong events (M>7) with individual dextro-reverse offsets from 1.3 m up to 5 m. These occurred since the beginning of the formation of the organic soils (3500 years BP) that cover the Tertiary basement, until the historic times (270 years BP). We then can infer a recurrence time of 700-1000 years for these major earthquakes, and we probably identified the surface rupture of the 1797 event. The mapping of active segments (thanks to remote sensing analysis and field work) allows prolongating the active fault northward from the trench sites. The deformation seems to split between a NS dextral branch to the west, and a NE-SW branch with a significant vertical component to the east. This latter segment could be the structural link between the Pallatanga fault (to the south) and the NW-SE Pucara fault (to the north) which is suspected to be the source of the Pelileo destructive earthquake (1949) (Beauval et al., 2010). This newly defined fault segment reaches the outskirts of the Riobamba city. Because of the short recurrence time for M7 events on the Pallatanga fault, it has sense to consider them for seismic hazard assessment. This implies a significant hazard nearby the vulnerable big city of Riobamba.