Geophysical Research Abstracts
Vol. 16, EGU2014-9709, 2014
EGU General Assembly 2014

Estimation of active faulting in a slow deformation area: Culoz fault as a case study (Jura-Western Alps junction).

Camille DE LA TAILLE (1,2,3), Francois JOUANNE (1,3), Christian CROUZET (1,3), Hervé JOMARD (2), Christian BECK (1,3), Koen DE RYCKER (4), Maarten VAN DAELE (4), and Thomas LEBOURG (5)

(1) Institut des Sciences de la Terre, Université de Savoie, 73376 Le Bourget du Lac, France (camille.de-la-taille@univ-savoie.fr), (2) Institut de Radioprotection et de Sureté Nucléaire, BERSSIN, 92260 Fontenay aux Roses, France, (3) CNRS, ISTerre, 73376 Le Bourget du Lac, France, (4) Renard Center of Marine Geology, University of Gent, 281 S8 Krijgslaan, 900 Gent, Belgium, (5) Univ. Nice Sophia Antipolis, Observatoire Cote Azur, Geoazur, CNRS,UMR 7329, 06560 Valbonne, France

The north-western Alps foreland is considered as still experiencing distal effects of Alpine collision, resulting in both horizontal and vertical relative displacements. Based on seismological and geodetic surveys, detailed patterns of active faulting (including subsurface décollements, blind ramps and deeper crustal thrusts have been proposed (Thouvenot et al., 1998), underlining the importance of NW–SE left-lateral strike-slip offsets as along the Vuache and Culoz faults (cf. the 1996 Epagny event: M=5.4; Thouvenot et al., 1998 and the 1822 Culoz event I=VII-VIII; Vogt, 1979). In parallel to this tectonic evolution, the last glaciation-deglaciation cycles contributed to develop large and over-deepened lacustrine basins, such as Lake Le Bourget (Perrier, 1980). The fine grain, post LGM (ie post 18 ky), sedimentary infill gives a good opportunity to evidence late quaternary tectonic deformations.
This study focuses on the Culoz fault, extending from the Jura to the West, to the Chautagne swamp and through the Lake Le Bourget to the East. Historical earthquakes are known nearby this fault as ie the 1822 Culoz event. The precise location and geometry of the main fault is illustrated but its Eastern termination still needs to be determined. High resolution seismic sections and side-scan sonar images performed in the 90's (Chapron et al., 1996) showed that the Col du Chat and Culoz faults have locally deformed the quaternary sedimentary infill of the lake. These studies, mainly devoted to paleo-climate analysis were not able to determine neither the geometry of the fault, or to quantify the observed deformations. A new campaign devoted to highlight the fault geometry and associated deformation, has been performed in October 2013. Very tight profiles were performed during this high resolution seismic survey using seistec boomer and sparker sources. In several places the rupture reaches the most recent seismic reflectors underlying that these faults were active during these last centuries.
Discussion on this point will be presented according to on shore investigations such as structural geology in the bed rock, geomorphological analysis and electrical resistivity tomography (ERT). The ERT profiles allowed to evidence resistivity differences that are interpreted to follow the alleged passing of the Culoz fault, in quaternary sediments
As a conclusion, first results allowed to better constraint the geometry and the segmentation of the Culoz fault and of the Col du Chat Fault; and to propose a first scenario of the quaternary activity of the fault segments based on the age of the deformed sediments. Onshore, our results have allowed locating trenches for paleoseismological studies. In the future we will quantify key parameters needed to a better estimation of the seismic hazard (e.g. vertical and horizontal offset, fault segmentation, evidences of deformation) (Demanet et al., 2001; McBride, 2003; Suzuki et al., 2000).