Geophysical Research Abstracts
Vol. 12, EGU2010-12498-4, 2010
EGU General Assembly 2010

The Lower Tagus Valley (LTV) Fault System

G.M. Besana-Ostman, H. Fereira, A. Pinheiro, A.P. Falcao Flor, E. Nemser, S.P. Villanova, and J.D. Fonseca
Technical University of Lisbon, Instituto Superior Tecnico, ICIST, Portugal (glenda.besana-ostman@ist.utl.pt)

The LTV fault and its associated historical seismic activity have been the focus of several scientific studies in Portugal. There are at least three historical earthquakes associated with the LTV fault, in 1344, 1531, and 1909. Magnitude estimates for these earthquakes range from 6.5 to 7.0. They caused widespread damage throughout the Lower Tagus Valley region with intensities ranging from VIII to X from Lisbon to Entroncamento. During the great 1755 earthquake, the LTV fault was likewise proposed to have ruptured coseismically. The Azambuja fault or the Vila Franca de Xira fault are suggested origins of the 1909 earthquake.

Trenching activities together with borehole data analyses, geophysical investigations, and seismic hazard assessments were undertaken in the LTV in the recent years. Complex trench features along the excavated sections were argued to be either fault- or erosion-related phenomena. Borehole data and seismic profiles indicate subsurface structures within the Lower Tagus Valley and adjacent areas. Furthermore, recent attempts to improve seismic hazard assessment indicate that the highest values in Portugal for 10% probability of exceedance in 50 years correspond with the greater Lisbon area, with the LTV fault as the most probable source.

Considering the above, efforts are being made to acquire more information about the location of the LTV seismic source taking into account the presence of extensive erosion and/or deposition processes within the valley, densely populated urban areas, heavily forested regions, and flooded sections such as the Tagus estuary. Results from recent mapping along the LTV reveal surface faulting that left-laterally displaced numerous geomorphic landforms within the Lower Tagus River valley. The mapped trace shows clear evidence of left-lateral displacement and deformation within the valley transecting the river, its tributaries, and innumerable young terraces. The trace has been mapped by analyzing topographic maps, aerial photographs, and river systems together with other remotely-sensed data. Active fault-related features that were identified include fault scarps, pressure ridges, pull-apart basin, saddles, and linear valleys. Limited ocular investigation has also been undertaken to verify modifications that post-date the aerial photos, quantify both elevation differences across the fault, and possibly evaluate the cumulative lateral displacements. Thus, the newly-identified traces of an active fault in the LTV corresponds with a left-lateral fault along the Lower Tagus floodplains striking parallel to the principal structural trend (NNE-SSW) in the region. This trace clearly indicates continued tectonic movement along the LTV fault during the Holocene.

Taking into account the newly-mapped location and length of the active trace, trenching work is being planned to determine recurrence intervals along the LTV fault while further mapping of its possible extension and other related active structures are underway. Moreover, new estimates of slip rate along this structure will result from this study and can be used for an improved seismic hazard assessment for the region.