Geophysical Research Abstracts
Vol. 13, EGU2011-4759, 2011
EGU General Assembly 2011

Paleoseismology trenching in central S. Miguel Island (Azores): the Altiprado faults

Rita Carmo (1), José Madeira (2), Ana Hipólito (1), and Teresa Ferreira (1)

(1) CVARG - Centro de Vulcanologia e Avaliação de Riscos Geológicos, Universidade dos Açores, Ponta Delgada, Açores, Portugal (Rita.L.Carmo@azores.gov.pt; Ana.RC.Hipolito@azores.gov.pt; Teresa.JL.Ferreira@azores.gov.pt), (2) Universidade de Lisboa, GeoFCUL, LATTEX/IDL-Laboratório Associado, Lisboa, Portugal (jmadeira@fc.ul.pt)

The Achada das Furnas plateau, located in the central part of S. Miguel Island, between Fogo and Furnas volcanoes, is dominated by several basaltic cinder cones and associated lava flows, mantled by trachytic fall deposits from the two adjacent central volcanoes. The cones define WNW-ESE, NW-SE and NNE-SSW alignments. Two E-W trending scarps were identified by aerial photo analysis. Trenching across these scarps confirmed their tectonic nature revealing two normal faults: the Altiprado faults (AF1 and AF2). Preliminary data on those faults are now presented.

The AF1 fault trace is marked by an 835 m-long and 3m-high south-facing scarp. A ∼18 m-long trench exposed a fault trending N87E and dipping 65S; the scarp is an uneroded free-face almost devoid of soil that corresponds to the projection of the fault to the surface. The stratigraphic succession exposed by trenching comprises 5 units of pumice fall deposits well separated by paleosols. Separation values of 1.38m were measured at the lower units (units 1 and 2) and of 0.38m at the upper units (units 3 to 5) revealing two main surface rupturing paleoearthquakes, which produced an accumulated dip-slip value of 1.38m. These displacement values (1m + 0.38m) correspond to earthquakes of Mw of 6.7 and 6.4 respectively (using the Wells & Coppersmith's, 1994, M/MD correlation). The southward dipping of units 1 and 2 might also suggests that they were deposited over an existing fault scarp formed by previous surface rupturing events.

The AF2 fault trace is marked by an almost imperceptible 1690 m-long and ∼40 cm-high south facing scarp, trending N87E. A trench, 29 m-long, exposed two faults (N75 to 89E, dipping 62 to 88S). In the stratigraphic succession units 1 and 5 are absent. As in AF1, the faults show different separation values of the lower unit (unit 2) and upper unit (unit 3), which produced accumulated dip slips of 33 cm (26 + 7 cm) and 15 cm (11 + 4 cm), respectively, indicating two surface rupturing earthquakes. An E-W trending paleochannel, which truncates units 2 and 3 and is filled with unit 4, may have developed at the base of a previous fault scarp.

Considering that the deposits age is probably younger than 5000 years B.P. based on regional stratigraphy (radiocarbon dating of the deposits are not yet available) and the youthful aspect of the scarp, it is possible that the most recent rupture in AF1 may have been produced by the October 22nd, 1522 earthquake, the deadliest in the Azores archipelago, whose location is close to the epicentral area proposed by Silveira et al. (2003). Due to the proximity between AF1 and AF2, the youngest ruptures in AF2 faults could represent triggered events.

This work is supported by a PhD Grant from Fundo Regional da Ciência e Tecnologia, Azores for RC.

Silveira, D.; Gaspar, J.L.; Ferreira, T. & Queiroz G. (2003) Reassessment of the historical seismic activity with major impact on S. Miguel Island (Azores). Natural Hazards and Earth System Sciences 3: 615-623.

Wells, D. L. & Coppersmith, K. J. (1994) New empirical relationships among Magnitude, Rupture Length, Rupture Width, Rupture Area, and Surface Displacement. Bull. Seism. Soc. Am. 84(4): 974-1002.