



Structural geology of Povoação-Nordeste Region (S. Miguel Island, Azores)

R. Carmo (1), J. Madeira (2), J.L. Gaspar (1)

(1) Centro de Vulcanologia e Avaliação de Riscos Geológicos, Universidade dos Açores, (2) Lattex e Departamento de Geologia, Faculdade de Ciências da Universidade de Lisboa.
(rcarmo@notes.uac.pt / Fax: +351296650142)

The Povoação-Nordeste region corresponds to the eastern part of S. Miguel Island. Three groups of faults with different directions were identified in this area. The dominant structures have NW-SE to WNW-ESE directions, while the less representative ones have NNW-SSE and NE-SW directions. The kinematical data reveal two distinct groups of conjugated faults, indicating the presence of two different stress fields separated in time or in space: WNW-ESE normal dextral faults conjugated with NNW-SSE normal left faults; and WNW-ESE to NW-SE normal left lateral faults conjugated with NE-SW normal dextral faults.

The first conjugated fault set is in agreement with the present transtensive stress field proposed to the Azores Platform, with maximum horizontal compressive stress axis (s_1) trending NW-SE and maximum horizontal tension (s_3) in the NE-SW direction. A compressive vertical stress axis, generating strike slip events may produce normal faulting by permutation between s_1 and s_2 .

The second fault population reveals a different stress field, characterised by a horizontal s_1 acting in the E-W direction, a horizontal s_3 trending N-S and a compressive vertical s_2 .

The temporal relation between these two stress fields could not be established. The second one may reflect an older stress field that can be explained by a possible short inversion episode in the shear sense of the Eurasia-Africa plate boundary, considering a hypothetical higher expansion rate of the south Mid-Atlantic Ridge (MAR) segment relatively to the north one. This would make the WNW-ESE to NW-SE normal dextral structures turning to normal left lateral faults, creating new conjugated NE-SW normal

dextral faults. In opposition, this “anomalous” stress field may be younger resulting from a spatial change of the stress field as the plates move away from the MAR and enter into a region dominated by an E-W compressive regime.

The available seismic information is compatible with the present tectonic pattern. Published focal mechanisms agree in general with the kinematical data obtained by neotectonic studies. The “anomalous” stress field deduced for the eastern part of S. Miguel Island only fits with the published solutions for the 1939 and 1973 earthquakes and its significance needs to be clarified.