



Crustal structure across the Sao Miguel Island – Azores

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The São Miguel Island is one of the nine islands of the Azores Archipelago. Situated around the triple junction between the Eurasian, African and North American tectonic plates, the Azores plateau depicts a triangular shape defined by the Mid Atlantic Ridge (MAR) to the west, the Terceira Rift (TR) to the north and the East Azores Fracture Zone (EAFZ) to the south. São Miguel is located in the Eastern part of the Azores plateau, close to the intersection of the TR with the west segment of the Gloria Fault (GF).

The Azores islands and the plateau have been mostly studied from the kinematics, morphological, bathymetric and geochemical points of view. This study aims at complementing these previous works adding knowledge to the crustal structure. This was achieved by acquisition, processing and interpretation of a seismic refraction profile across the São Miguel Island and seismic reflection profiles acquired in the M79/2 cruise with RV Meteor.

The 160 km long seismic refraction profile with 18 Ocean Bottom Seismometers across São Miguel show that the island edifice is made up of the following 3 crustal layers. A sedimentary layer including a 2 km thick sedimentary basin south of São Miguel, upper crust and lower crust layers. The Moho discontinuity is located at 15 km depth underneath the island and shallows to 11 to 9 km towards north and south. The central crustal region beneath the volcanic edifice shows a complex pattern of velocities distribution that may account for intrusive bodies. Beneath the island a 2.5 km thick layer with a V_p velocity interval of 7.2-7.6 km/s is observed between the lower crust and the upper lithospheric mantle. Two hypotheses are raised to explain this layer: i) magmatic underplating due to a mantle plume or decompression melting or ii) Serpentinization of the upper lithospheric mantle induced by water circulation.

Seismicity activity is frequent in the São Miguel region as showed by the seismic crises of 12-02-2018. The seismo-stratigraphic interpretation shows that landslides deposits are common in the area and possibly associated to seismic activity.