Geophysical Research Abstracts,
Vol. 11, EGU2009-5114, 2009
EGU General Assembly 2009

Regional trends and dyke emplacement conditions inferred from tectonic and AMS analysis (Corvo and Flores Islands, Western Azores, Portugal).

Ó. Pueyo Anchuela (1), A. Gil Imaz (1), M. Lago Sanjosé (1), Z. França (2), E. Widom (3), and V. H. Forjaz (2)

(1) Universidad de Zaragoza. Zaragoza. Spain (opueyo@unizar.es), (2) Observatório Volcanológico e Geotérmicos dos Açores. Portugal , (3) University of Miami (Ohio, USA)

Flores and Corvo Islands represents the subaerial outcrop of a volcanic complex of Quaternary age with a main trend NNE-SSW. This complex shows a parallel disposition to the Middle Atlantic Ridge (MAR) and is located over North American Plate (Western Azores).

The volcanic history of both islands has a very different appearance. While Corvo Island is mainly composed by a stratovolcano that represents the main part of the Island, Flores Island shows different calderas and a more complex volcanic history. In both cases, the basal complex shows similar geochemistry signatures that reveals a similar origin and a contribution from a high enriched mantle source. The main differences between both islands can be ascribed to differences in the evolution of different magmatic chambers. While the whole history of Corvo Island can be related with the same magmatic chamber, Flores show a more long history with evolved volcanism in the most modern units. The characteristics of the volcanism of both islands makes that basal complex from Flores and the whole history from Corvo are very similar, while the Upper Complex from Flores shows different features.

On the other hand, the fracture net from both islands show similar patterns. Corvo Island shows a system of fractures ranging from N20E to N85E, with a main trend of N30E. In the case of Flores island different fracturation systems can be defined, lower complex show a system of fractures ranging from N25E to N40E, with a main trend of N30E, and in the upper complex a radial system related with the different calderas can be identified. On the other hand, at a cartographic scale, different strike-slip faults with a general E-W trending can be observed. The N-S net is parallel to the MAR and configures the orientation of both islands, while the E-W trend is parallel to the transcurrent faults and configures some of the coasts of the islands.

AMS have been used as a petrofabric technique to infer the sense of flow and conditions of emplacement of tabular igneous intrusions. The results obtained from both islands show a magnetic foliation parallel to the dyke wall, or slightly imbricated respect it. As the orientation of the dykes is similar in both islands, similar results have been obtained. The main differences in the dykes reside in the plunge of the magnetic lineation. The magnetic lineation shows a plunge ranging from subvertical to subhorizontal. The position of the different plunges is not arbitrary, showing a progression of change of the plunge: subvertical in the central part of Corvo Island and in the Southwestern zone of Flores Island, and lower plunges surrounding these zones decreasing the plunge with the distance to these zones. On the other hand subvertical flows can be inferred in places with higher density and thickness of dykes and lower plunges in zones with less density of dykes.

The constant disposition of the fracturation net that affects to the lower complex of Flores and Corvo, and the constant orientation of dykes along both islands, permit to relate both dikes and fracturation nets with the same origin along both islands. The disposition of the magnetic lineation, in the main part of the cases, parallel to the flow, without an imbrication pattern respect the walls, is compatible with a passive emplacement where the flow is controlled by a Newtonian flux.

The relation between higher density and thickness of dykes and vertical flow is related with a higher distension and passive injection of the magmatic materials. On the contrary, lower density of dykes, lower thickness and subhorizontal flow can be related with a lateral injection and lower distension. The passive injection and the tectonic control of the fractures permit to relate the origin and evolution of both islands with a same tectonic setting related with the evolution of the Middle Atlantic Ridge and its transformants.