

## **Volcaniclastic Rocks of Western Canary Islands' Rift Zones: The Variability of Submarine Rift Zone Volcanism**

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The youngest and westernmost Canary Islands La Palma and El Hierro are growing by intrusive and extrusive activity focussed along rift zones. During the RV „Meteor“ cruise 43-1 in December 1998 a significant proportion of volcaniclastic rocks (ca. 30 %) associated with lava was recovered from both islands' southern submarine rift zone extensions. About 60 volcaniclastic samples, dredged from the ridge axes, ridge flanks and off-axis seamounts at depth from 280 - 3120 m below sea level (bsl) and 2.5 - 33 km offshore, cover a broad compositional, textural and sedimentological spectrum. Compositions, deduced from microprobe analysis and phenocryst assemblages, range from basanitic to phonolitic and trachytic. Mafic and felsic compositions occur in a ratio of about 5:1.

The volcaniclastics are grouped into 4 main types: (1) fine-grained, angular basaltic hyaloclastites; (2) highly vesicular basaltic lapilli tuffs; (3) volcaniclastic calcarenites with biogenic components; and (4) coarse heterogenous lapilli tuffs consisting of glassy clasts, crystals and xenolithic rock fragments of both basaltic and evolved composition. The material was emplaced by turbidity currents, debris falls, debris flows and fallout processes. Monomict samples, such as type (1) and (2), are interpreted to be emplaced after short transport with little mixing, and are thus close to their original site of formation. In contrast, type (3) rocks, dredged from > 300 m bsl containing shallow water fossils, and type (4) rocks, characterized by multiple redeposition events, indicate longer transport and final deposition into the deep-sea.

Important outcomes of this study are two-fold:

(A) Rock type distribution along the two ridges and near-by seamounts show an increase in variation of volcaniclastics with distance from the islands. Near the islands homogeneous types (1) and (2) prevail; with increasing distance the more heterogenous types (3) and (4) dominate, and more types occur altogether. This pattern correlates with an increasingly more rugged morphology away from the islands. In the south, less well confined rift zones of an erosion-dominated system contrast to the more constructional northern parts of the ridges, which appear to be formed by volcanism restricted to central, narrow zones.

(B) Additionally, a significant proportion of porous, low-density volcaniclastic rocks in the substructure of the Canary Islands, and perhaps of ocean island volcanoes in general, has important implications for their physical properties.