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Preliminary data on vesicle size distribution and magma degassing features found in basalts from the Terceira Rift (Azores)

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The Azores archipelago, located in the northern Atlantic Ocean, emerges in a complex tectonic setting and is characterized by many subaerial and submarine volcanic centers. The Terceira Rift (TR) is a relatively recent structure (< 1 Ma), with a spreading rate of 4 mm/y [Vogt and Jung, 2004]. The TR has been interpreted as the Nubia/Eurasia plate boundary and with the Mid-Atlantic Ridge, forms the Azores triple junction. Apart from the presence of volcanic highs (islands and seamounts) alternating with deep basins, the morphology of the TR is also characterized by the occurrence of several parallel submarine volcanic ridges. Some of these structures formed temporary islands (e.g. D. João de Castro Bank) while others resulted exclusively from submarine volcanism, like the Serreta ridge with a recent volcanic event (1998-2001) that occurred at approximately ≈5 nautical miles west of Terceira Island. We report the preliminary findings on the petrographic observations and vesicle size distribution analysis (VSD) carried out on fresh volcanic rocks sampled along the Terceira rift. Samples were collected both by dredge or ROV, in the volcanic highs Serreta and D. João de Castro bank, and in the deep Hirondelle basin during the EMEPC's 2007, 2008, and 2009 oceanographic missions. Sampled basalts are vesicular and their textures range from porphyritic to aphanitic. In the porphyritic samples, the mineralogy consists of clinopyroxene, olivine and plagioclase phenocrysts surrounded by groundmass composed of plagioclase ± olivine ± pyroxene ± (skeletal) magnetite ± glass. Highly vesicular rocks depict fabric and mineral phases similar to those of the more porphyritic less vesicular rocks. However, highly vesicular samples display a predominance of glass over mineral phases as the principal constituent of the groundmass. Petrographic observations indicate that variations of the vesicle's shape, size and distribution are related with particular textural features, namely the degree of groundmass crystallization. VSD studies in samples collected along Terceira Rift allowed us to characterize the vesicularity of the different samples according to specific parameters namely, area, equivalent diameter and roundness. Integration of this data will improve the understanding of the degassing mechanisms of magmas occurring along the Terceira Rift and contribute to the general knowledge of these complex volcanic systems and how they evolve.

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