



Age and origin of the alkaline lavas from northern Tore-Madeira Rise (Iberia margin): U-Pb ages, geochemistry and Pb-Sr isotopes

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The Tore-Madeira Rise (TMR) occurs on the west Iberia margin extending over about 1000 km in SSW-NNE direction, 300 km off the coast of Portugal and Morocco. It is located at the boundary between Atlantic oceanic crust and stretched continental lithosphere of the Iberia margin. It roughly matches the oldest, 130-125 Ma magnetic anomaly of the oceanic crust in this region (J anomaly). Because of this particular location, TMR was thought to have been built up at the end of continental rifting by an anomalous slow spreading center. Another hypothesis argues for the Madeira archipelago hotspot as a possible origin of TMR. Geochemical data from ten differentiated lavas (six trachytes and four trachy-andesites) dredged on six seamounts on the northern part of TMR show an alkaline affinity being similar in petrologic characteristics to alkaline magmatism of Ormonde seamount (67 Ma) on the Gorringe bank. The concordant U-Pb ages obtained on titanite size-fractions range from 103 to 88 Ma substantiating that northern TMR alkaline magmatism occurred about 25 m.y. after the first formation of Atlantic oceanic crust (130-125 Ma). In consequence, edification of the northern TMR cannot be attributed to Atlantic spreading center and should be considered as intra-plate magmatism. There is no clear age-trend along the 500 km of the northern TMR. This rules out a Hawaiian hot-spot model for the emplacement pattern of this alkaline magmatism, even in considering the complex rotations of the Iberia plate. A simple genetic link between the whole Tore-Madeira Rise and the Madeira hot-spot magmatism is not evident. Pb and Sr isotopic ratios of the differentiated lavas from northern TMR are clearly distinct from those measured in the Madeira archipelago. The $^{206}\text{Pb}/^{204}\text{Pb}$ and $^{207}\text{Pb}/^{204}\text{Pb}$ ratios of the studied samples are close

to the field of the Serra de Monchique (southern Portugal) and Ormonde seamount alkaline suites suggesting a similar enriched and/or contaminated source.