

The volcanic rocks of São Nicolau: Isotopic evidence for the inhomogeneity of the Cape Verde mantle plume

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The volcanic rocks of one of the major islands of the Cape Verde hotspot have been investigated in order to test mantle plume models. São Nicolau (SN), 343 km², is the eastern of the northern HIMU-type Cape Verde islands which constitute a east-west trending radial array at the Cape Verde Rise. Sixty representative samples of primitive basanitic composition from the four volcanic stages during the 6.2 – 0.1 Ma evolution of the island have been analysed for Sr, Nd and high precision Pb isotopic composition. On SN Pb ranges to a less radiogenic composition than on the western island of Santo Antão (SA) [1] and has lower ϵ_{84}^{Pb} than the rocks of the southern EM1-type Cape Verde islands. Most SN lavas have a young HIMU character with negative ϵ_{74}^{Pb} . The most radiogenic Pb at SN is less thorogenic than Pb at SA. Some samples have as radiogenic Sr as otherwise only found in the southern islands. An intermediate age group of samples have particularly low La/Nb = 0.4 - 0.5 and the least LREE-enrichment for SN. The youngest group of rocks has the lowest Zr/Nb = 2.5 – 3.0 and relatively unradiogenic Sr and radiogenic Nd. For this group the isotopic composition may be correlated with depth and degree of melting as modelled by REEs, and this may indicate a close relationship between two mantle components. We conclude that at least four of the mantle source components for the SN magmas are different from any found in the SA magmas or southern islands. For the northern Cape Verde rocks there is a compositional variation of the source from E to W. Occasional influence of the EM1-type mantle component is seen in rocks from the eastern parts of of SN. A model for the relationship between the systematic variation of the northern Cape Verde magmas and source dynamics will be presented.

[1] Holm P.M., Wilson J.R., Christensen B.P., Hansen S.L., Hein K.M., Mortensen A.K., Pedersen R., Plesner S., and Runge M.K. (2006) *JPetrol* **47**, 145-189.