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Multi-stage evolution of a sub-aerial volcanic ridge over the last 1.3 Myr: S. Jorge Island, Azores Triple Junction

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New K/Ar dating and geochemical analyses have been carried out on the WNW-ESE elongated oceanic island of S. Jorge (central Azores) to reconstruct the volcanic evolution of a linear ridge developed close to the triple junction between the American, the Eurasian and the Nubian lithospheric plates. We show that S. Jorge sub-aerial edification encompasses the last 1.3 Myr, a time interval far much longer than previously reported. The early development of the ridge involved a sub-aerial building phase exposed in the southeast end of the island and now constrained between 1.32 $\pm$ 0.02 and 1.21 $\pm$ 0.02 Ma. Basic lavas from this older stage are alkaline and enriched in incompatible elements, reflecting partial melting of an enriched mantle source. At least three differentiation cycles from basalts to mugearites are evidenced within this stage, with a temporal periodicity of about 40 kyr. The successive episodes of basic magma rising, storage and evolution suggest an intermittent re-opening of the magma feeding system, possibly due to recurrent tensional tectonic events. Present data show a gap in sub-aerial volcanism before a second main ongoing building phase starting at about 750 ka. Sub-aerial construction of the S. Jorge ridge migrated progressively towards the west, but involved several overlapping volcanic episodes constrained along the main WNW-ESE structural axis of the island. Mafic magmas erupted during the second phase have been also generated by partial melting of an enriched mantle source. Trace elements data suggest, however, variable and lower degrees of partial melting

of a shallower mantle domain, which is interpreted as an increasing control of lithospheric deformation on the genesis and extraction of primitive melts during the last 750 kyr. The multi-stage development of the S. Jorge volcanic ridge over the last 1.3 Myr has most likely been greatly influenced by regional tectonics, controlled by deformation along the diffuse boundary between the Nubian and the Eurasian plates, and the increasing effect of sea-floor spreading at the Mid-Atlantic Ridge.