

Petit-spot lavas as test for alkaline magma generation

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Petit-spot volcanoes are interpreted as low-degree alkaline melts extracted from the base of the lithosphere in response to plate flexure and/or crack propagation. Two distinct hypotheses have been suggested to explain the potassic ($K_2O/Na_2O > 0.8$) composition of *petit-spot* melts. The first implies that *petit-spot* lavas are associated to the melting of K- and trace element-rich domains located in the Low-Velocity-Zone (LVZ). An alternative is that *petit-spot* melts acquire their specific composition by the interaction of low-degree melts extracted from the LVZ with phlogopite-rich lithologies present in the lower lithospheric mantle; metasomatic cumulates formed during an early stage of LVZ melt migration. This later hypothesis is supported by the presence of metasomatized grt- and spl- xenoliths in *petit-spot* lavas similar to metasomatized phl-bearing xenoliths observed in continental settings. This indicates that low degree melts percolate and metasomatize the base of the oceanic lithosphere.

Geochemical forward modeling of metasomatic processes in the oceanic lithosphere quantifies the interaction of low degree melts from the convecting mantle with lithospheric peridotite and can explain the chemical characteristics of *petit-spot* lavas from Costa Rica and Japan. We propose that the composition of the lavas at the surface do not necessarily represents the composition of the melt delivered from the asthenosphere.