How *petit-spot* mantle xenoliths will refine LAB processes

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A discrepancy of ~20 km exists between the thermal definition of the lithosphere –asthenosphere boundary (LAB) – intersection between the conductive and convective geotherm – and the seismic definition, which fixes this limit at the top of the low velocity zone (LVZ). The seismic and electric properties of the LVZ are commonly explained by small fraction of melts located at the base of the lithosphere, but the existence of these melts is highly dependent on the volatile content of the residual mantle after MORB extraction.

Mantle xenoliths and xenocrysts with a metasomatic imprint in *petit-spot* lavas provide the first direct evidence that metasomatic processes unrelated to plume activity affect the deep part of the oceanic lithosphere. In particular mantle xenoliths preserve cpx and opx trace elements patterns typical for metasomatized garnet-peridotite suggesting an equilibration depth higher than about 70 km, i.e. within the area currently associated to the seismic LVZ. Our results suggest that the base of the lithosphere could be metasomatized and the LAB does not necessarily represent an impermeable barrier for melt percolation. The presence of melt and metasomatic cumulates will modify the rheology and the seismic properties of the base of the lithospheric mantle. We hypothesize that some of the geophysical anomalies observed at the LAB could represent metasomatized lithosphere rather than asthenosphere LVZ as usually assumed.