# Geochemical support and constrains to a two large cells convective mantle structure based on the incompatible trace element ratio tool

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A new approach for the analysis of the oceanic basalts compositions is developed based on the conjugated use of the incompatible trace element ratio (Nb/La vs Th/La) and Pb isotopic (208Pb/204Pb vs 206Pb/204Pb) geochemical tools. This approach is particularly interesting as it allows estimates of the source compositions themselves of the basalts or close constrains on these compositions and estimates of the residual characteristics of the basalt sources induced by the CC differentiation and recycled oceanic crust (ROC) trap.

This approach shows the existence of two “upper mantle domains” with distinct compositions, emplaced in opposed earth hemispheres, and establishes the intra-mantle magmatic differentiation nature of the MORB-OIB relationships within these domains (with the OIB sources being representative of the differentiated melts, mainly oceanic crust materials, and the MORBs of the residues) . It thereafter also evidences the existence of two others domains, with OIBs compositions unfitting the previous MORB-OIB trends, and geographically linked to the two LLSVPs entities at the mantle base, with OIB sources magmatically differentiated from less depleted mantle domains than the respective upper mantle domains overlying each LLSVP entity.

A two large cells convective structure of the mantle, consistent with models developed on geophysical grounds, satisfactorily integrates all of these data. The geochemical approach bring constrains on this structure, as the ROC enriched nature and great longevity of the LLSVPs. It also allows mantle budgets to be done.