

# **Geochemical support to a two large cells convective mantle structure. Inferred characteristics of this structure**

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An 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 ratio ( $^{208}\text{Pb}/^{204}\text{Pb}$  vs  $^{206}\text{Pb}/^{204}\text{Pb}$ ) representations. 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 process.

This approach allows to distinguish two “upper mantle domains” with distinct compositions, emplaced in opposed earth hemispheres (the Pacific North Atlantic and Indian ocean domains), and establishes the intra-mantle magmatic differentiation (IMMD) nature of the MORB-OIB relationships within these domains. A first type of OIB (OIB type 1) is defined fitting the MORB-OIB trends from these domains with the OIB sources being representative of the IMMD differentiated melts (mainly formed by oceanic crust materials), and the MORBs sources of the residues. It thereafter evidences the existence of a second type of OIB (OIB type 2) with compositions unfitting the previous MORB-OIB trends, and geographically linked to the two LLSVPs entities at the mantle base. These OIB type 2 sources should also be represented by ROC rich material but differentiated from less depleted mantle domains, thus more primitive, than those at the origin of the OIB type 1 sources.

In agreement with some tomographic data interpretations, these geochemical features may satisfactorily be integrated in the frame of a two large cells convective structure of the mantle. The geochemical approach bring constrains on this structure. The two convective cells (so called Pacific and African cells) display distinct global compositions, the Pacific cell being characterized by more depleted characteristics (induced by CC differentiation) than the African one. It is interesting to note that the compositional contrast between the two cells operates in between the sources of the OIB type1 as of the OIB type 2 sources (LLSVP entities), supporting therefore the existence and permanency of this contrast since primitive Earth time, supporting therefore a primitive setting of the two cells convective structure.