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Vanishing traces of mantle heterogeneity in the oceanic crust

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Mantle decompression under Mid Ocean Ridges is by far the most efficient process of melt production. Here, melts form in a wide melting region and must coalesces from several hundreds of kilometres into a narrow zone few kilometres wide, to be erupted along the spreading axis. Although the average compositions of global Mid Ocean Ridge Basalts (MORB) reveal efficient mixing during their ascent [1], comparative studies on abyssal peridotites, gabbros, and melts erupted in single MOR sections show that the oceanic crust still preserves a variable pre-existing record of chemical heterogeneity [2, 3]. Magma mixing, crystal fractionation and reaction between migrating magmas and the surroundings conceal the original compositional variability, thereby influencing fundamentally the trace elements and isotopic records of the mantle melts. This contribution assesses the extent to which traces of mantle heterogeneity is preserved in the chemical and isotopic composition of the oceanic crust. Study cases of gabbro and basalts from the Southwest Indian Ridge, the Equatorial portion of Mid Atlantic Ridge and the Arctic Ocean will be considered in the framework of the existing literature. As our knowledge of the chemical variability of the oceanic crust increases, the mechanism, style and depth of melt extraction are some of the most challenging issues to deconvolve.

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