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# Pb (double spike)-Nd-isotopic variation of ∼15 Ma oceanic crust basalts drilled at IODP Site 1256 in the Eastern Pacific: Constraints on mantle processes during a phase of superfast spreading at the East Pacific Rise and the timing of subsequent alteration

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Continuous formation of oceanic crust records the geochemical signature of mid-ocean ridge magma sources through time. The radiogenic isotopic variation of drilled young oceanic crust - once corrected for alteration processes - can thus provide new constraints on temporal changes of mantle processes at mid-ocean ridges. We examine the Pb (double spike, DS)-Nd-isotopic and trace element variation of ∼15 Ma young oceanic crust drilled at Cocos Plate IODP Site 1256. The basalts were formed during a phase of superfast spreading ∼11-20 Ma ago at the East Pacific Rise (EPR) in a near-equatorial position and were subsequently variably affected by low- to high-temperature alteration[1]. Corrections for radiogenic ingrowth, following perturbation of the U-Th-Pb system involving seawater cycling, indicate that alteration was generally completed several million years after the formation of the basalts at the EPR. Most Pb-isotope data currently available for Site 1256 plot along an array above and parallel to the Northern Hemisphere Reference Line in the Pb-isotope diagrams suggesting that all basalts, prior to alteration, plotted along a common array inherited from magma source heterogeneity. The measured and alteration-corrected Nd-Pb-isotopic data of Site 1256 lavas have hybrid radiogenic isotopic characteristics between more depleted EPR and enriched Galápagos lavas and Nd- and Pb DS-isotope data show

correlations along the co-variations formed by these endmembers. Comparison of ∼15 Ma old Site 1256 data with Recent equatorial EPR glass compositions (6 ˚S to 6˚N) point to higher Pb- but lower Nd-isotopic compositions of basalts formed during the phase of superfast spreading ∼11-20 Ma ago. This suggests temporal variations in the EPR magma source involving mantle heterogeneity, eventually associated with a period of more vigorous upper mantle convection. Magma source heterogeneity may either arise from upwelling of more fertile ambient upper mantle material beneath the EPR or pollution of the equatorial EPR magma source with material from the nearby Galápagos mantle plume.

[1] Teagle et al. (2007) Proc. ODP, Sci. Results, 206.