Structural geochemistry of a detachment fault and associated volcanism

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The structure and composition of the oceanic lithosphere is mainly controled by the supply of magmatic melts to the ridge axis. At slow-spreading, mid-oceanic ridges are characterized by complex spreading styles, where large variations in the melt supply are resulting in intermittent volcanism. During periods of reduced magmatic activity, spreading is accomodated by displacement on low-angle extensional detachement faults, forming Oceanic Core Complexes (OCC). These deep-seated faults are ultimately exhuming lower crust and upper mantle material, exposing all types of eruptive and plutonic igneous rocks, as well as mantle-derived ultramafic rocks variably altered and deformed [1, 2, 3]. This composite geological setting is suggesting a complex history and interplay between tectonic deformation and magmatic supply around OCCs.

The aim of our study is to characterize the spatio-temporal evolution of magmatic processes concomitant with the development of a detachment fault. The foundation of this geochemical work is a recent detailed study of the tectonic structure and evolution of detachment fault zones at 13°20'N and 13°30'N along the Mid-Atlantic Ridge [4]. High-resolution microbathymetry, coupled with samples collected by deep-sea vehicles are allowing us to present a geochemical dataset integrated in a complex OCC geological landscape. New major, trace elements and Sr, Nd, Pb and Hf isotopes, together with previously published data [5], are used to build a petrogenetic model. Large variations in all geochemical parameters are illustrating the variety of mantle sources involved in the melting process as well as the variety of differention paths to the crust surface.

[1] Dick et al. (2008) *G3* **9**, Q05014 [2] Escartin et al. (2003) *G3* **4**, 1067 [3] MacLeod et al. (2002) *Geol.* **30**, 279–282. [4] Escartin et al. (2017) *G3* [5] Wilson et al. (2013) *G3* **14**, 1–18.