Mantle lithosphere in basalts from the Kenya Rift

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The Kenya branch of the African Rift cuts across the east African plateau and is characterised by basaltic volcanism with many similarities to OIB. Lavas range in composition from transitional tholeiite to alkali basalt, basanite and nephelinite and the mean rate of magma production is ~0.03 km^3 yr^{-1}, similar to that of small ocean islands. Age progression of the onset of basaltic activity can be related to the counter-clockwise rotation of the Africa plate over a stationary hot-spot located beneath the Tanzania craton. Finally the East African plateau itself is dynamically supported from sub-lithospheric depths and mantle tomographic studies reveal the possible presence of a mantle plume beneath the Tanzanian.

Critical compositional features of Kenya basalts contrast with those expected of plume-related magmas and reflect a clear lithospheric control. Nd and Sr isotope ratios change with the age of the underlying lithosphere and critical trace element ratios are distinct from those characteristic of OIB. Zr/Hf is higher than OIB with similar Zr and REE contents and Th/U ratios are distinctly lower. By contrast U-series isotopes in Kenya basalts are characterised up to 40% ^{230}Th excess, consistent with REE fractionation that indicates residual garnet during melt generation. The amount of ^{230}Th excess is too great to be generated by simple batch or fractional melting and imply a dynamic melting regime beneath the rift axis in which porosity is low and mantle upwelling rates are or the order of 1 cm yr^{-1}. The data imply thermal erosion and reactivation of the mantle lithosphere by the underlying mantle plume, such that lithospheric material can undergo dynamic melting.

Iron reducing bacterial enrichments from arctic marine sediments at Tempelfjorden, Svalbard, Norway

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Svalvard fjords, affected by turbid overflow emanating from outlet glaciers, are modern analogues for Quaternary deglacial settings. We sampled the marine sediments at 8 stations along the axis of Tempelfjorden, Svalbard to better understand the response of the discharge of glacial meltwater including suspended sediments to the biogeochemistry and microbial community. Marine sediments were enriched for iron-reducing bacteria with acetate or lactate as the electron donors. The enrichments could reduce both Fe(III)-citrate and iron oxyhydroxide with either acetate or lactate as the electron donor. The enrichments were dominated by *Clostridium sp., Tissierella sp.,* and *Alkaliphilssp.* And the enrichments also contained strictly fermentative microorganisms and novel microrganisms. Iron-reducing bacteria enriched from the marine sediments showed active Fe(III) reduction at 8°C and 25°C. They reduced an iron oxyhydroxide, akaganeite, as an electron acceptor using lactate as an electron donor and formed nm-sized magnetites. Dynamic bacterial community succession was observed at 8 stations and archaeal community was quite distinct in the sediments affected by deglaciation compared to control sediments. This study indicated that microorganisms in marine sediments contribute significantly to global cycles of organic and inorganic matters because of their abundance.