2.67 Ga high-Mg andesites from the Musoma-Mara greenstone belt, northern Tanzania

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Neoarchaean (2.67 Ga) High-Mg andesites occur in the Musoma-Mara greenstone belt, northern Tanzania. They are associated with dacites and Na-granitoids both of which are adakitic in composition. The high-Mg andesites are characterized by higher contents of MgO (2.42 – 9.47 wt %), Cr (41-797 ppm) and Ni (11-254 ppm) than those of normal island arc andesites. Their La/Yb ratios are 9.87 – 22.5 whereas their Sr/Y ratios are 20 – 131.These characteristics are similar to those shown by Cenozoic Setouchi High Magnesian Andesites (HMA). These rocks are characterized by $^{143}Nd/^{144}Nd$ ratios that range from 0.511062 ± 7 to 0.511308 ± 12 with corresponding εNd (t) of +0.44 and +1.81.

The high contents of Mg, Cr and Ni argue in favour of equilibration of their parental magma with mantle peridotite whereas their relatively low La/Yb ratios argue against the involvement of garnet and amphibole as residual phases during partial melting. Thus, the high-Mg andesites are interpreted to have formed by partial melting of the mantle peridotite that has been fluxed by slab-derived fluids. Overall, the geochemical features of high-Mg andesites, their close association with adakitic rocks in the MMGB together with the short time interval taken for their emplacement are interpreted in terms of a ridge-subduction model. It is considered that such a model was important for generation of late Archaean continental crust.

Extraterrestrial ^{3}He and constraints on eolian fluxes and provenance in sediments from the Shatsky Rise

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Extraterrestrial ^{3}He in deep-sea sediments has been used successfully as a constant-flux proxy [1]. Such proxies permit accurate assessments of changing mass accumulation rates through time. Although the flux of extraterrestrial ^{3}He is slightly more variable across the long timescales of the late Cretaceous and Tertiary, on shorter timescales, such as the Quaternary and the Paleocene, this flux appears to be relatively invariant [1, 2]. Across a 1-Myr interval in Shatsky Rise sediments of late Palecoene age, several eccentricity cycles have been identified. At this time, the Shatsky Rise was located in the central tropical Pacific far from any continent, and virtually all of the sedimentary ^{3}He (>99%) is of extraterrestrial origin. Assuming a constant flux of extraterrestrial ^{3}He, we calculate bulk sediment accumulation rates that range from about ~0.5 to 2 $g \cdot cm^{-2} \cdot kyr^{-1}$, similar to those found in the central equatorial Pacific today. By using ^{4}He concentrations as a proxy for the eolian component [3], we determine that there are approximately 2- to 3-fold changes in the flux of dust. Further work will elucidate the extent to which changing patterns of dust accumulation are related to variations in orbital insolation. Additionally, we shed light on the provenance of the eolian fraction by examining the $^{3}He/^{4}He$ isotope systematics. Changes in sedimentary provenance can be caused by changes in response to climatic shifts in the a) aridity of competing dust sources or b) prevailing patterns of atmospheric circulation and, therefore, location of the intertropical convergence zone.

[1] Marcantonio *et al.* (2001) *Paleoceanog.* **16**, 260-267.
[2] Mukhopadhyay *et al.* (2001) *GCA* **65**, 653-669.
[3] Patterson *et al.* (1999) *GCA* **63**, 615-625.