Insights into the hydration and fertilization of the Kalkarindji CFB magmas: Evidence for a hydrated source?

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The Kalkarindji continental flood basalt (CFB) province are geochemically homogeneous low-Ti basaltic-andesites in north central Australia. The current model for Kalkarindji argues for decompression melting after a period of mantle warming of a fertile mantle [1] at ca. 511 Ma [2], but the nature of their mantle source, including the role of metasomatism, remains enigmatic.

Two low-Ti sills, intruded into the Officer Basin of central Western Australia, contain hydrous minerals (biotite). $^{40}Ar/^{39}Ar$ (plateau) ages of biotite separates (520 ± 2 and 521 ± 2 Ma) compared with a series of $^{40}Ar/^{39}Ar$ (plateau) and U-Pb ages of ~ 511 Ma [2] for the Kalkarindji CFBs indicate that the biotite crystals appear to be primary features, albeit suggesting that these magmas might be slightly older.

Initial (511 Ma) Sr-Nd-Pb isotopic compositions and existing crustal assimilation models indicate that the geochemical characteristics and homogeneity across the entire province cannot be explained by assimilation of continental crust but rather indicate a contribution of enriched crustal-like material to the manlte source at 2.5 Ga [1]. The presence of primary biotite and the lack of geochemical evidence for crustal contamination through assimilation [1] suggests a hydrous mantle during the generation of the Kalkarindji magmas. Additional Os, Fe, and Hf isotopic data together with Sr-Nd-Pb geochemical information will be used to determine if the water present in the system is indeed representative of a lithospheric/asthenospheric mantle metasomatized by paleo-subduction fluids and assess the role of hydrous mantle sources in CFB magmatic systems in general.

[1] Ware et al., *Journal of Petrology*, **in review**. [2] Jourdan et al. (2014) *Geology*.