Trace elemental and Hf-isotope data for Felsic-Mafic mingling zone of the Isua Supracrustal Belt

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The Isua Supracrustal Belt (ISB) contains a large coherent unit of variably deformed and altered felsic rock. The proposed protoliths of the unit have included volcanoclastics, intrusive sheets and/or calc-silicate sediments. Here we present Hf-isotope and trace elemental results from a newly discovered low deformation outcrop in the lower western limb of the ISB as well as for felsic samples from throughout the outer western limb. We propose that the low deformation outcrop represents a felsic-mafic magma mingling zone.

The immobile trace elemental patterns of the felsic mingling component resemble that of other Eoarchaean felsic rocks within the ISB. The patterns are less variable than those of surrounding TTGs and are similar to those of TTGs derived from melting in the middle crust [1]. This suggests that the samples from the mingling zone are good geochemical and isotopic representatives of the protolith end-members of altered and deformed felsic rocks of the ISB and that felsic ISB units were generated by partial melting at pressures equivalent to mid-crustal levels.

Values for εHf for both mafic and felsic mingling zone samples scatter around the chondritic value, similar to TTGs and many mafic rocks in Isua. This either implies melting from the same isotopic reservoir or that the felsic melt represents the enriching component in ISB tholeiites.

Tholeiites have Gd/Yb significantly lower than the felsics and some are contaminated by an enriched component.Thus, we propose that melting of the felsic melts occurred at greater depths in the presence of residual garnet. Mantle melting was simultaneously triggered, producing co-mingling tholeiites that intruded into a felsic crystal-mush magma chamber.

[1] Hoffmann, J. Elis, et al. "Constraining the process of Eoarchean TTG formation in the Itsaq Gneiss Complex, southern West Greenland." *Earth and Planetary Science Letters* 388 (2014): 374-386