A comprehensive formation model of the lower Onverwacht Group, Barberton Greenstone Belt

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The lower *Onverwacht Group* of the Barberton Greenstone Belt (BGB) incudes the coeval ca. 3.53-3.56 Ga Sandspruit and Theespruit Formations that mainly comprise tholeiitic and komatiitic basalts interlayered with felsic volcanic rocks as well as the Komati Formation that is dominated by low-Alumina komatiites, komatiitic and tholeiitic basalts. On the basis of our new isotope and trace element data set, we here propose an comprehensive formation model of the entire lower Onverwacht Group.

The felsic volcanics yield heterogeneous initial Hf isotope compositions [1] accompanied by enriched ^{142}Nd signatures [2] implying reworking of older felsic material. On the basis of initial Hf isotope compositions, the Theespruit and Sandspruit mafic and ultramafic rocks can be divided into two groups: (1) one with εHf_i of ca. +3 and (2) one with ca. 0, both yielding ^{176}Lu-^{176}Hf and ^{147}Sm-^{143}Nd isochron relationships, representing the magmatic age of these rocks. The two groups further display distinct trace element patterns. A mixing model reveals that *group 2* melts are mixtures of felsic and mafic magmas. *Group 1* patterns are parallel to those of tholeiites and komatiites from the 3.48 Ga Komati Fm. Trace element modelling implies that the latter evolved as hybrids of high degree melts of both depleted mantle and primitive mantle origin. Subsequent fractional crystallization of komatiite magmas in layered complexes, such as those of the BGB, was an important process to form *group 1* tholeiites. The proposed model can coherently reproduce the trace element patterns *and* isotope signatures of lower *Onverwacht Group* mafics and ultramafics. We suggest, that the lower *Onverwacht Group* formed either plume related by lithospheric mantle canibalism in relation to extension and ascent of hot asthenosphere-derived komatiites or, alternatively, in response to delamination-induced extension and ascent of hot asthenospheric mantle, triggering first mafic, and later increasingly komatiitic volcanism.

[1] Kröner, A. et al. (2015) *Precambr. Res.* 279*,* 123-143.

[2] Schneider, K.P. et al. (this volume)