Volcanological and chemical comparison of rhyolites from different stratigraphic units of the Rooiberg Group, Bushveld Magmatic Province.

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The Rooiberg Group (RG) represents the extrusive component of the Bushveld Magmatic Province (BMP). It comprises a lower portion (Dullstroom Formation), made up predominantly of basaltic and andesitic lavas, overlain successively by the Damwal (dacitic), Kwaggasnek and Schrikkloof Formations (the latter two dominated by rhyolites). An exception to this trend is provided by a prominent rhyolitic lava at the base of the Dullstroom Formation [1]. The Dullstroom rhyolite, together with its associated basaltic andesites, were extruded as lavas beneath, and are intruded by, the Rustenburg Layered Suite (RLS). The Kwaggasnek and Schrikkloof rhyolites, by comparison, comprise rheomorphic to 'lava-like' ignimbrites that were subaerially deposited above the RLS [2] – the relationship between these rhyolites and the acid plutonic phases of the BMP (i.e. the Lebowa Granite Suite, LGS) is uncertain and they may be coeval. The volcanology and petrogenesis of these lavas, and their emplacement histories relative to the RLS and LGS, are key to understanding the evolution of the BMP. The Dullstroom rhyolites reveal high MgO contents (1.41-1.87 wt.%) in comparison to the 0.01-0.09 wt.% in all upper rhyolites, The Dullstroom rhyolites also have distinct trace element contents (Nb, Zr, Y and Rb) suggesting that the lower and upper RG magma packages evolved from different sources and at different times. MELTS modelling suggests that the Dullstroom rhyolite evolved from the B1 magma type (i.e. the parent to the lower parts of the RLS), whereas the upper rhyolites may be fractionates of a low-Ti Dullstroom basaltic magma. Multiple cycles of fractionation from discrete magma sources reflect a more convoluted and longer-lived extrusion history for the RG than hitherto thought.

References: [1] Buchanan et al. (2002) *Contrib. Mineral Petrol.* **144**, 131-143.

[2] Lenhardt et al. (2017) *J. Afri Earth. Sci.* **131**, 213-232.