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Distinguishing multiple sulphide zones in the Platreef within a single core from the Turfspruit Farm prospect, Northern Limb of the Bushveld Complex.

Marquis, E.¹, McDonald, I.², and Grobler, D. F.³

¹School of Environment and Technology, University of Brighton, Brighton, UK. (e.marquis@brighton.ac.uk)

²School of Earth and Ocean Sciences, Cardiff University, Cardiff, UK.

³Ivanplats Pty Ltd, Mokopane, South Africa.

The Platreef is one of the world's largest platinum group element (PGE) deposits. It is a typically pyroxenitic unit hosting variable Ni-Cu and PGE mineralisation [1] but on the farm Turfspruit, situated in the southern sector of the Bushveld Complex's Northern Limb, PGE mineralisation is hosted within a series of layered pyroxenites, norites and anorthosites collectively referred to as the Turfspruit Cyclic Unit (TCU). The TCU is subdivided into four distinctive subunits: an upper mottled anorthosite (MAN), underlain successively by the T1 mela-gabbro-norite, the T2U mineralised norite and finally the T2L subunit comprising troctolitic to harzburgitic lithologies. In borehole UMT083 ~360m of hybrid and mixed rocks (divided into Footwall Assimilation Zone (FAZ) and Pyroxenite-Norite Zone (PNZ)) are present between the TCU and the country rocks of the Transvaal Supergroup. FAZ is a highly heterogeneous unit containing abundant xenoliths, mafic pegmatite veins and chromite-rich layers. PNZ is dominated by gabbro-norite and olivine norite with a basal norite that contains skeletal inverted pigeonite. PNZ correlates best with Marginal Member lithologies documented at Grasvally by Hulbert [2]. To the authors' knowledge, many features observed in this core have not previously been documented in the Northern Limb.

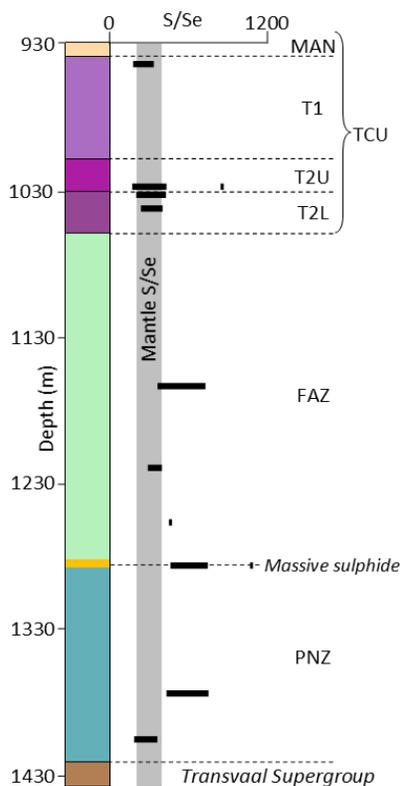


Figure 1: S/Se ratio variation downhole. Stratigraphic codes described in main text.

A distinctive feature at the base of FAZ is the presence of several massive sulphide layers (up to ~1 m thick) with crustal S/Se signatures (5000-11000) but minimal PGE grade. Formation of these massive sulphide layers is proposed to be the result of ponding of low R-factor sulphide melt derived from assimilated country rocks above areas of low permeability, such as the chilled silicates at the base of

FAZ. In contrast, sulphides from the chilled base of PNZ exhibit magmatic S/Se values with appreciable PGE grade that is not associated with sulphides but with arsenide and telluride PGM. Negligible interaction of basal PNZ sulphide with crustal S is inferred to result from the rapid crystallisation of a supercooled parental magma.

References:

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- [2] Hulbert L J (1983) *unpub DSc thesis*, Univ Pretoria, 556.
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- [4] Kerr A and Leitch A M (2005) *Economic Geology* 100: 311-332.

