

Paper Number: 4721

The age, tectonic setting and magmatic stratigraphy of the Waterberg Project, Limpopo Province, South Africa

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The Northern Lobe of the 2.06 Ga [1] Bushveld Complex differs from the Eastern and Western Lobes of the Complex with which it may be connected. Its basal, pyroxene-dominated Platreef is one of the world's largest and most valuable deposits of platinum-group elements and associated significant Ni and Cu reserves [2]. Recently Platinum Group Metals (PTM) have intersected mineralized mafic rocks tentatively interpreted to be of Bushveld affinity in drill core north of the interpreted end of the Northern Lobe (Fig. 1). Since the discovery in 2011 extensive drilling has confirmed a >3.5 by 24 km lobate intrusion overlying basement rocks and itself covered by Paleoproterozoic sediments of the Waterberg Group [3]. Whereas the Northern Lobe is located in the stable Kaapvaal Craton, the Waterberg Project is located in the Southern Marginal Zone of the Limpopo Complex which may expose it to a level of Paleoproterozoic tectonism not previously observed in the Bushveld Complex.

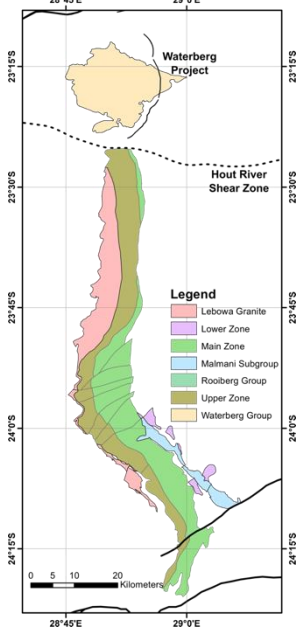


Figure 1: Northern Lobe of the Bushveld Complex

The mafic succession consists of the so-called Upper and Main Zones (UZ and MZ) resting on Archean gneiss and granofels. The UZ is composed of ferrogabbro and ferrogabbro-norite, however it lacks the magnetite layers typically observed in the Northern Lobe [4]. Below the UZ the putative MZ is composed of gabbro-norite transitioning into an ultramafic sequence composed of troctolite and harzburgite. Recently acquired age dates for these rocks are within error coeval with published ages for the rest of the Bushveld Complex [3,1]. Mineralization occurs in two zones located in the putative Upper Zone and Ultramafic Sequence (UmS) respectively. The so called T- and F-Zones are 3 to >60 m thick and have so far been intersected along 17 km of strike [5]. Mineralization in the UmS is generally concentrated along several NE- trending, elongated and highly mineralized “super F-Zones” with grades that can exceed 15 g/t 3E (Pt+Pd+Au) and that have no analogue in the Bushveld Complex.

There are a range of lithological and chemical differences between the Waterberg Project and the Platreef that include the position and grade-thickness of the mineralization, Pt/Pd ratios and the overall petrogenesis. We present new detailed whole-rock major, trace and logging data for one of the highly mineralized zones that combined with the work of other authors will highlight our current understanding of the evolution of this unusual and highly mineralized succession in northern South Africa.

References:

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