

SEG 100 Conference: Celebrating a Century of Discovery

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Who Moved The Goalposts? Game-changers in the Bushveld Complex, South Africa – The First Hundred Years

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One hundred years on, the Bushveld Complex is still one of the greatest ore deposits on Earth and still has undeveloped and unexplored resources.

The Bushveld intrusion was first shown on a map in the 1860's by Karl Mausch, although the first use of the term Bushveld Complex was by Molengraff in 1901. In 1906, William Bettel produced PGMs from gold-bearing conglomerate concentrates of the Witwatersrand Basin, but as far back as 1885, Dick Hart, a prospector, displayed samples containing "platina" in Church Square in Pretoria according to a newspaper of the time. By 1923, platinum was being mined from quartz veins near Mookgopong (formerly Naboomspruit) and, in 1923, the prospector Adolf Erasmus identified platinum on two farms near Mokopane (formerly Potgietersrus).

However, it was the discovery in 1924 of the platinum-bearing horizon by Andries Lombaard and confirmed by Merensky, at Maandagshoek in the Eastern Bushveld, that was really the beginning of the Bushveld bonanza. Within three years, Merensky had traced the reef that was named after him all the way around the eastern, western, and northern limbs of the Complex. The main Ni-Cu-PGE host of the northern limb was discovered by Merensky in 1925 and originally termed the Merensky Platinum Horizon, but termed the 'Platreef' by Van der Merwe in 1976. Platinum mining began in the late 1920's, but the Great Depression resulted in cessation of operations until 1992 when world-class opencast operations resumed. Meanwhile the western limb had become the focus of PGE mining.

Chromium, first noted by Mausch in 1865 near Rustenburg and then reported by Hall and Humphrey in 1908, wasn't mined until 1924 in the Steelpoort area of the eastern limb. Three groups were defined with decreasing chromium content upward from the LG's through the MG's to the UG's, with the LG6 being the thickest and most amenable chromitite for mining. A game changer in the late 1970's was the development of the methodology for extracting PGE from chromitite layers. As the UG2 was the richest, and had been left unmined because of its low Cr content, it has now become a greater PGE resource than the Merensky Reef.

Just as the fortunes of the Bushveld Complex might have appeared to be waning over the last decade, the discovery of two Tier 1 deposits in the northern limb, the sub-horizontal Flatreef mineralization located down-dip of the exposed Platreef and the palladium-dominant Waterberg Ni-Cu-PGE deposit under cover north of the Hout River Shear Zone, have been game-changers, especially as the mineralization in the latter is at different stratigraphic levels to that in other limbs.

What is poorly appreciated is that the Bushveld Complex is a world-class producer of gabbro-norite and granite dimension stone, andalusite from its metamorphic aureole, and fluorite from Vergenoeg. Cassiterite mineralisation has been of importance in the past, whilst vanadium from the magnetite layers of the Upper Zone is increasingly important for vanadium batteries for energy storage for the future. Satellite intrusions are also the focus of ongoing exploration.