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GEOCHEMICAL DATA INTERPRETATION TECHNIQUES AND MINERAL TARGET GENERATION OF THE NORTHERN LIMB, BUSHVELD COMPLEX, SOUTH AFRICA.

Hlatshwayo, S.M¹. Strauss, S.W².

¹Council for Geoscience, Private Bag # 112, Silverton, Pretoria, 0001. South Africa. Email Address: shlashwayo@geoscience.org.za

²Council for Geoscience, Private Bag # 112, Silverton, Pretoria, 0001. South Africa.

The Council for Geoscience (CGS) of South Africa initiated a high density geochemical mapping programme within the Kaapvaal Craton at a sampling density of one soil sample per km² which was standardised and implemented for the National Geochemical Mapping Programme. The current study area is located within the Kaapvaal Craton and focuses on the Northern Limb of the Bushveld Complex and surroundings. The geology of the study area comprises of the Archean basement, early Proterozoic Transvaal Supergroup, Proterozoic Bushveld Complex, Waterberg Group sediments and Phanerozoic Karoo Supergroup. The A horizon soil samples were collected at a density of one soil sample per km² with an approximate mass of 5 kg per sample. Samples were analysed at the CGS on a Simultaneous X-ray Fluorescence Spectrometer (XRF) for the following oxides and trace elements: TiO₂%, MnO%, Fe₂O₃%, Sc, V, Cr, Co, Ni, Cu, Zn, As, Rb, Sr, Y, Zr, Nb, Sn, Ba, W, Pb and Th.

The geochemistry pattern of the targeted Northern Limb mainly reflects the bedrock of plutonic element association suggested by Levinson 1974 (1). Potential Sn, V and PGMs deposits were identified and classified with bubble plot maps of principal components consisting of positively correlating elements and confirmed with elemental ratios of negatively correlating elements. The combinations of existing and potential mineral targets were reflected in VThNi krigged ternary map. The ordinary krigged maps are preferred for geochemical mapping because they show cluttered geological and anomalous trends, despite showing synthetic data values. The bubbled plot maps are however ideal for mineral target generation because they show original data values and can recognize isolated anomalous values. The identified potential mineral targets require ground truthing prior to follow up studies or applying further mineral exploration methods.

References:

(1) Levinson AA (1974): Introduction to Exploration Geochemistry. ISBN. 0-915834-01-4

