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**The Mid-Archaean Pongola Supergroup: volcanism, sedimentation and early life development on Earth's oldest stable continental margin**

Wilson, A.H.<sup>1</sup>, Hofmann, A.<sup>2</sup> and Siahi, M.<sup>1</sup>

<sup>1</sup>School of Geosciences, University of the Witwatersrand, Johannesburg: allan.wilson@wits.ac.za

<sup>2</sup>Department of Geology, University of Johannesburg, Johannesburg

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The Pongola Supergroup is the best preserved, lithologically continuous (270 km in length) and varied mid-Archaean volcano-sedimentary succession deposited c. 2.98 – 2.86 Ga ago on the SE side of the Kaapvaal Craton in South Africa and Swaziland. It consists of the lower Nsuze Group and the upper Mozaan Group. The Nsuze Group attains a maximum thickness in the north of 4500 m and is dominantly volcanic with increasing sedimentary components further south. The Mozaan Group has a thickness of 5000 m in the south and central areas and contains important volcanic and volcanoclastic units towards the top of the succession. Most of the volcanic rocks of the Nsuze group were deposited subaerially and although pillow lavas occur in some areas in the south they are highly vesicular and fragmented attesting to shallow water conditions. The sedimentary succession is dominated by shallow-marine sandstones and offshore shelf deposits of ferruginous shales and banded iron formations. Fluvial deposits are rare, but locally include conglomerate containing sub-economic gold and uranium mineralization.

The striking feature of the Pongola volcano-sedimentary belt is the high degree of preservation. In the northern area the stratigraphy is essentially flat lying and contrasts with the strongly deformed, pre-3.3 Ga granitoid-greenstone basement. The Pongola Supergroup, overall, represents volcanic and sedimentary deposits on a stable continental margin setting that has undergone extension producing strike-slip fault controlled basins in the upper part. Marked cyclicity both for the sedimentary units and the volcanic sequences is indicated, the latter encompassing the range from explosive to effusive lavas, and compositions from rhyolite through basalt to ultramafic remnants. Incompatible trace element ratios show differences between each volcanic segment indicating derivation from multiple sources with varying degrees of crustal contamination. An important feature throughout the entire belt is the substrate of granitoid basement (age c.3.32-3.25 Ga) which in many areas shows a well-developed palaeosol horizon, indicating denudation of the young craton prior to initiation of the Pongola Basin.

Rocks of the Pongola Supergroup therefore allow a detailed and comprehensive insight into the surface processes at that time and the interaction of sedimentation and volcanism. The interplay of shallow water, intertidal processes and volcanic activity would have provided an ideal habitat for the development of primitive life forms and these are indeed in evidence locally in the Nsuze Group. Laminated (stromatolite) and non-laminated microbialite types occur in a variety of tide-dominated shallow marine environments. An association with volcanoclastic sediments is frequently, but not always observed. Minor changes in the physical conditions of the environment may have influenced microbial assemblages and as a result changed microbialite morphologies. Therefore, differences in microbialite morphology, macrofabrics, and size within different sub-environments suggest that potentially distinct assemblages of microorganisms were present and responded differently to physical and environmental conditions.

There remain many outstanding geological issues to be resolved. Apart from further advancing the understanding of early life forms, these include the lithological correlations of the south region with the north. The high-Cr (of komatiite derivation) volcanoclastic rocks in the Mozaan Group appear to be geochemically identical to similar units in the supposed thrust sequence of the Ndikwe Formation in the south which is at variance with suggestions that the latter is the basal sequence of the entire Pongola Supergroup.

