

Paper Number: 5390

On the remarkable similarity of the Archaean geological evolution of the Singhbhum and Kaapvaal cratons

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The Singhbhum craton of India has an Archaean geological history quite similar to the Kaapvaal craton. The most ancient rocks currently known in the Singhbhum craton include 3.5 Ga old TTG gneisses and greenstone belts known as the southern and eastern Iron Ore Group. The Daitari greenstone belt includes a well preserved submarine volcano-sedimentary succession of mafic-ultramafic rocks and intercalated banded cherts and iron formation. Felsic volcanoclastic rocks dated at 3.51 Ga [1] allow direct comparisons with the lower portions of the Onverwacht and Nondweni groups of the Kaapvaal craton. Immature clastic sedimentary rocks are locally associated with the volcanic successions, but are as yet poorly studied. Palaeoarchaean successions wrap around, or are intruded by the Singhbhum granite complex, an assemblage of TTG and granite, the youngest suite of which is 3.1 Ga old [2]. Its emplacement was associated with stabilization of the central part of the Singhbhum craton, in much the same way as the widespread intrusion of 3.1 Ga granites of the Kaapvaal craton. Layered mafic-ultramafic complexes are widespread in both cratons. In the Singhbhum craton, these contain important PGE and chromite deposits and have been dated at c. 3.12 Ga [3]. Such complexes in the Kaapvaal craton are as yet undated, and no metal deposits have been found so far.

The Singhbhum and Kaapvaal cratons acted as stable basement for the development of continental rift and cover successions from 3 billion years onwards. The western Iron Ore Group and a number of poorly characterized quartzite-rich units of the Singhbhum craton were likely deposited at the time of Pongola and Witwatersrand basin evolution. The western Iron Ore Group consists of a package of shallow-marine quartzite, continental flood basalts and a ferruginous/manganiferous shale-BIF succession. Quartz pebble conglomerates near the base of the succession contain sub-economic U mineralization much similar to Dominion and Pongola strata, while BIFs higher up in the succession host important iron and manganese ore deposits. Similar, albeit uneconomic deposits are associated with Pongola and West Rand Group strata. Neoproterozoic to Palaeoproterozoic sedimentary successions occur mainly along the margin of the Singhbhum craton, where they have been subjected to deformation and metamorphism. Time-stratigraphic correlations with the Ventersdorp and Transvaal basins of the Kaapvaal craton remain to be evaluated.

References:

[1] Mukhopadhyay et al. (2008) *J Geol* 116: 449-461

[2] Saha AK (1994) *Geol Soc India Memoir* 27, 341pp

[3] Augé et al. (2003) *Precambrian Res* 121: 85-101

