

## **Palynofacies patterns of the Highveld coal deposits (Karoo Basin, South Africa): Clues to reconstruction of palaeoenvironment and palaeoclimate**

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### **Abstract**

The early Permian represents a crucial period of climate change in Gondwana. This climate signature is captured in the palynological record that represents the floral assemblage of the region. Palynofacies analysis of the No. 2 Coal Seam of the Highveld Coalfield provides a high-resolution picture of this climatic shift, as well as detailing the vegetation patterns and local environments. Core samples taken from two localities were studied with respect to the characteristics of the plant debris and the palynomorph assemblages to differentiate between regional and local signatures. At both of the sampling localities, the No. 2 Coal Seam is split into a Lower Coal Seam and an Upper Coal Seam by a siltstone and a sandstone intraseam parting, respectively. The uneven palaeotopography and distal depositional environment of the Highveld Coalfield distinguish it from the northern Witbank Coalfield as a river-dominated delta plain, with differences in the palaeoenvironment at each locality. Results from the Lower Coal Seam indicate a fern-dominated lowland and conifer-dominated upland. This gives way to a Glossopteris-dominated lowland and a diverse gymnospermous assemblage in the upland of the Upper Coal Seam. This change in floral composition is also observed in the adjacent Witbank Coalfield and is likely caused by climate amelioration related to the movement of Gondwana away from the South Pole.

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### **Keywords**

Highveld coalfield, Palaeoclimate, Palaeoenvironment, Palynofacies, Permian, South Africa