



Palynological records of the Early Permian icehouse-greenhouse transition (Ecca Group, South Africa)

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The Permian coal-bearing formations of the South African Karoo Basin play a crucial role in the study and interpretation of Gondwana's climate history and biodiversity in this time of major global changes in terrestrial and marine ecosystems. Here, we report on new palynological data from the No. 2 coal seam of the northern Witbank coal field, documenting the switch from Icehouse to Greenhouse conditions in the Early Permian (Lower Ecca Group). The studied postglacial fluvio-deltaic deposits of a highly proximal setting comprise coarse-grained to pebbly sandstones, partially with an abrupt upward transition into fine-grained sediments and coal, trough cross-stratified medium- to coarse-grained sandstones, and horizontally laminated fine- to medium-grained sandstones and siltstones. The sedimentary organic matter content clearly documents stratal changes in the palynomorph assemblage and variations in the amount and in the type, size and shape of plant debris. Generally, palynofacies is characterized by a high amount of opaque phytoclasts. Amorphous organic matter is characteristic of laminated siltstones and coals. The palynological record indicates a cold climate, fern wetland community, characteristic of lowland alluvial plains, and an upland conifer community in the lower part of the coal seam. Up section, these communities are replaced by a cool-temperate cycad-like lowland vegetation and gymnospermous upland flora. Ongoing studies focus on the cyclic architecture of the coal seam, applying palynofacies analysis as high-resolution correlation tool with respect to decipher signatures of prominent climate amelioration on basin-wide, intercontinental and intra-Gondwanic scales.