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# Palynofacies of Permian black shales (Karoo Basin, South Africa): A powerful tool for shale gas exploration

Ruckwied, K.[1] and Götz, A.E.[2]

[1]Shell International Exploration and Production, Houston, TX 77079, USA
[2]Keele University, School of Physical and Geographical Sciences, Staffordshire ST5 5BG, United Kingdom; a.e.goetz@keele.ac.uk

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Permian black shales of South Africa's Karoo Basin are seen as promising unconventional gas resources, the Whitehill Formation being the main target formation for future shale gas production. However, so far little is known about the resource potential, mainly due to the lack of integrated studies on the sedimentology, organic geochemistry and palynology.

To determine the original source potential for shale gas we analysed black shales from two deep boreholes which were recently drilled within the framework of the Karoo Research Initiative (KARIN) in the south-western and southern part of the Karoo Basin (boreholes KZF-1, KWV-1) and from a borehole in the northern part of the basin (DP 1/78) which was drilled during the SOEKOR exploration programme of the 1970's. We investigated the depositional environments in which the potential source rocks formed, addressing the research question of how much sedimentary organic matter the shales contained when they originally formed.

In the south-western Karoo Basin, palynofacies indicates marine conditions of a stratified deep basin setting with low marine phytoplankton percentages (acritarchs, prasinophytes), good AOM preservation, high terrestrial input, and moderate to high spores:bisaccates ratios. In the southern part, palynofacies suggests a restricted marginal marine setting with low marine phytoplankton percentages (prasinophytes), low AOM preservation, high terrestrial input, and a high spores:bisaccates ratio. In the northern part of the basin, palynofacies reveals a shallow marine setting with low marine phytoplankton percentages (leiospheres, prasinophytes), low AOM preservation, high terrestrial input, and a moderate spores:bisaccates ratio. Palynofacies data plot in the fields II and IV of the AOM-Phytoclast-Palynomorph Plot [1], and reveal kerogen type III. Lateral and stratigraphic facies changes point to a much more complex basin topography and dynamics than previously assumed. Furthermore, palynological data confirms the correlation of marine black shales of the Prince Albert and Whitehill formations in the northern, southern and south-western Karoo Basin with the terrestrial coals of the Vryheid Formation in the north-eastern part of the basin [2].

*References:*

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