

Paper Number: 3373

A multidisciplinary approach to decipher the complexity and potential of an unconventional gas resource: The Permian Whitehill Formation (Karoo Basin, South Africa)

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In 2015 two deep drill cores, KZF-1 (Western Cape) and KWV-1 (Eastern Cape), were drilled in the Karoo within the framework of the research programme KARIN (Karoo Research Initiative) to investigate the shale gas potential of the Permian Whitehill Formation, which has been identified as a potential unconventional gas resource of the Main Karoo Basin [1]. Both boreholes represent the first deep Karoo boreholes since the SOEKOR exploration drilling programme undertaken in the 1960's and 1970's and the cores are curated at the Council for Geoscience (CGS), Pretoria.

The cores give new insights into Karoo stratigraphy, facies changes and basin dynamics, as well as into the provenance, diagenetic and thermal history of the southern Karoo. Here, we highlight first analyses on the shale gas potential in the light of the complex structural features revealed from borehole KZF-1 close to the Cape Fold Belt (Western Cape) and the effect of dolerite intrusions on thermal alteration of sedimentary organic matter revealed from borehole KWV-1 northeast of East London (Eastern Cape). Furthermore, first data on groundwater characteristics, desorbed and residual gas measured from Whitehill shales, their TOC content, and organic facies characteristics will be discussed with regard to the formation's potential as an unconventional gas resource.

High TOC values place the Whitehill shales into the group of "hot shales", however very low residual gas values make the resource potential questionable. These preliminary results require further research to assess the Whitehill Formation's shale gas potential.

References:

- [1] EIA (2013) EIA/ARI Report.

