Gochemical studied of the basement rock at Abu Ghalaga area, South Eastern Desert, Egypt

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The analysis of structural and metamorphic events affecting Abu Ghalaga area revealed the presence of two lithostructural unite, viz. infrastructure (Abu Masila gneissose granite), suprastructure (ophiolitic metavolcanics) and arc metavolcanics. These rocks are syn - and late - tectonically intruded by metagabbros, granitoids (subduction-related), followed by younger gabbros. Hammamat sediments unconformably overlie these rocks.

The geochemical characteristics of the Abu Masila gneissose granite and granitoids of the study area have calc-alkaline, sodic character and peraluminous to peraluminous nature. The different discrimination diagrams indicate that the Abu Masila gneissose granite and granitoids are subduction-related, crustal origin (C-type), of igneous origin (I-type) and were generated in a volcanic arc environment (VAG). The estimated thickness is 20-30 km which is in accordance with thickness estimated reported for the pan-African crust. The Abu Masila gneissose granite and granitoids display low Σ REE. The Abu Masila gneissose granite displays a positive Eu anomaly whereas the granitoids is negative Eu anomalies.

Probing the intrinsically oil-wet surfaces of pores in North Sea chalk at sub-pore resolution

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Pore surface properties control oil recovery. Wettability, the tendency for a surface to cover itself with fluid, is traditionally defined by the angle a droplet makes with a surface, but this macroscopic definition is meaningless when the particles are smaller than even the smallest droplet. Understanding surface wetting, at the pore scale, will provide clues for more effective oil recovery. We used a special mode of atomic force microscopy (AFM) and a hydrophobic tip to collect matrices of 10,000 force curves over chosen areas on internal pore surfaces and constructed maps of topography, adhesion and elasticity. We investigated chalk samples from a water-bearing formation in the Danish North Sea oil fields that had never seen oil. Wettability and elasticity were inhomogeneous over scales of 10's of nanometers, smaller than individual chalk particles. Some areas were soft and hydrophobic, whereas others showed no correlation between hardness and adhesion.

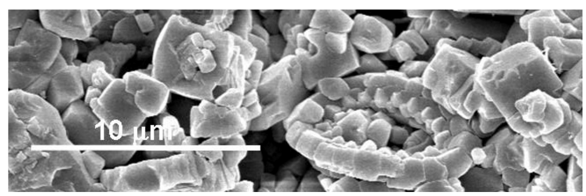

Figure 1. SEM picture of Chalk from the North Sea.

We conclude that the macroscopic parameter, "wetting", averages the nanoscopic behaviour along fluid pathways and "mixed wet" samples have patches with vastly different properties. Development of reservoir hydrophobicity has been attributed to infiltrating oil, but these new results prove that wettability and elasticity are inherent properties of chalk [1].

[1] Hassenkam *et al.* (2009), PNAS, *in press.*