

## APPLICATION OF DIAMONDIDS IN MATURITY ASSESSMENT AND OIL TO SOURCE ROCK CORRELATION IN THE LIBYAN GHADAMIS BASIN

*M. Elkelani<sup>1</sup>, G.J. Reichart<sup>2,3</sup>, K.G.J. Nierop<sup>2</sup>, J. S. Sinninghe Damsté<sup>2,3</sup>, E. W. Tegelaar<sup>4</sup>, R. Dekker<sup>4</sup>*

<sup>1</sup>*Libyan Petroleum Institute (LPI), Tripoli, Libya*

<sup>2</sup>*Utrecht University, Faculty of Geosciences, Utrecht, The Netherlands.*

<sup>3</sup>*NIOZ Royal Netherlands Institute for Sea Research Texel, Den Burg, The Netherlands*

<sup>4</sup>*Shell Global solutions BV, Rijswijk, The Netherlands.*

Oil and source rock extracts from the Libyan sector of the Ghadamis basin were investigated for their thermal maturity and their potential relationship. The main regional source rocks, the lower Silurian Tanezzuft “Hot” shale, obtained from both the northern and southern part of the basin, and five crude oils from Silurian/Devonian reservoirs from across the Ghadamis basin were studied. Assessment of thermal maturity becomes increasingly difficult at higher levels as traditionally used biomarker-based indices get to the end of their useful range. This holds for both source rock extracts and crude oils in Ghadamis Basin. Therefore, diamondoids, known for their high but differing thermal stabilities, were analyzed and applied as maturity indicators. This approach revealed that the two source rock possess different levels of thermal maturity. Significant differences were also noted for the source rock extracts and the crude oils. Whereas the source rock extracts contain both adamantanes and diamantanes, the latter group is absent in the crude oils. Since the thermal stability of the diamantanes is actually higher than that of the adamantanes, this implies that the crude oils were expelled before diamantanes formed in the source rock. Considering the distributions of adamantanes in the crude oils and source rock extracts, strong similarities between the northern crude oils and both source rock extracts from the Ghadamis basin were noted. On the other hand the southern crude oils are similar to each other, but considerably differ from both the northern basin crude oils and the source rock extracts. This suggests that the crude oils in the northern part of the basin formed locally from the Tanezzuft “Hot” shale, the southern Ghadamis basin crude oils might have migrated from elsewhere from another (unknown) source.