

GEOCHEMICAL EVALUATION OF CRUDE OILS FROM ASMARI AND BANGESTAN RESERVOIRS IN MARUN OILFIELD, SW IRAN

Hossein ALIMI¹, Bahram ALIZADEH², Daniel M. JARVIE¹,
Mohammad Hossein ADABI³, Fareid TEZHEH² and Brian JARVIE¹

1. Humble Geochemical Services, P.O. Box 789, Humble, Texas 77338, USA

2. Department of Geology, Faculty of Earth Science, University of Shahid Chamran, Ahvaz, Iran

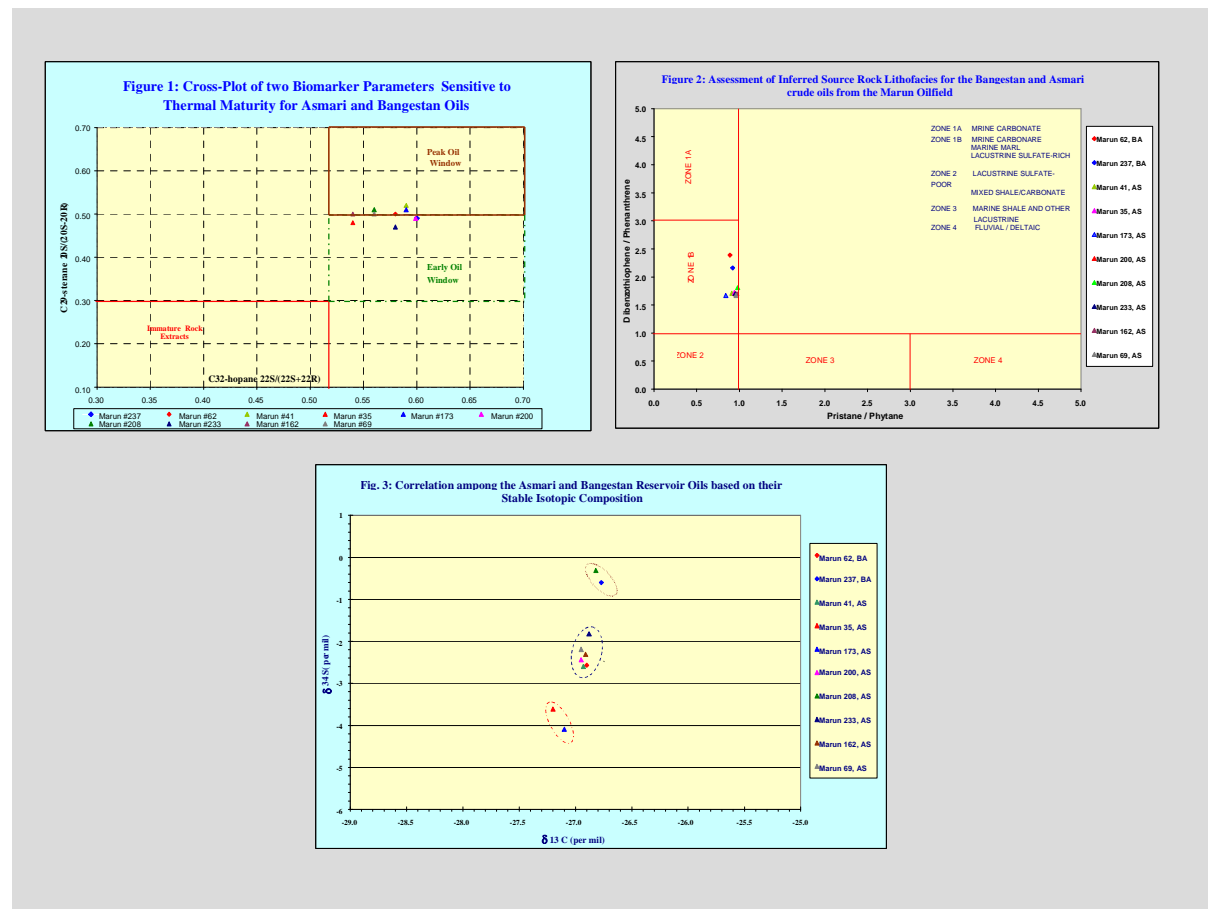
3. Department of Geology, Faculty of Earth Science, University of Shahid Beheshti, Tehran, Iran

Southwestern Iran constitutes one of the most prolific hydrocarbon (oil and gas) producing habitats. Although the geological framework of this area is well defined, considerable uncertainty exists as to the origin of these hydrocarbons. Marun oilfield is located at the end of simply folded zone, very close to the border of folded zone and unfolded zone (Albian plate). During Upper Cretaceous to early Tertiary, stratigraphy and structural geology in Marun area have been severely influenced by tectonic activities.

A total of 10 crude oils from the Asmari (Oligocene-Miocene) and Bangestan (Cretaceous) reservoirs in the Marun oilfield have been studied using their biomarker and stable isotopic compositions. The Asmari and Bangestan oils investigated in this study are rich in aliphatic hydrocarbons, having yields of up to 53.9%, characteristic of mature, paraffinic oils. Biomarker (sterane and triterpane) distribution patterns of Asmari and Bangestan oils are closely similar to each other. For example, all crude oils investigated show pristane /phytane ratio < 1 and their hopane mass chromatograms reveal a noticeable dominance of C₃₅-homohopanes over C₃₄-homohopanes, characteristic of oils derived from marine carbonate source rocks. The maturity sensitive biomarker parameters suggest that the Asmari and Bangestan oils have been generated at the peak oil window maturation (Fig. 1). Biomarker data also indicate that Asmari and Bangestan oils are derived from algal sapropelic kerogen (Type II) deposited in an oxygen-poor (anoxic) environment. Pristane-to phytane versus aromatic (dibenzothiophene / phenanthrene) biomarker parameter (Fig. 2) also supports a marine carbonate source rock for these (Hughes, 1984). This finding is further supported by the predominance of C₂₉-norhopane over C₃₀-hopane, which is characteristic of carbonate-rich source rocks.

Asmari and Bangestan oils were also correlated using their stable carbon and sulfur isotopic compositions. Although the oils investigated are closely related based on their biomarker evaluation and carbon isotope ratios, their sulfur isotope results demonstrate some differences. Bangestan oils containing H₂S gas contributions originating from thermochemical sulfate reduction (TSR) (Valley et al., 1986) show isotopic compositions

similar to those of Asmari oils, suggesting either mixing or a similar organic facies source rock (Fig.3).



REFERENCES

Hughes, W.B. (1984) Use of thiophenes organosulfur compounds in characterizing crude oils derived from carbonate versus siliciclastic sources. In: Petroleum Geochemistry and Source rock potential of Carbonate Rocks (J.G. Placas, ed), AAPG, Tulsa, OK, pp 181-196.

Valley, J.W., Taylor, H.P., and O’Neil, J.R. (1986) Stable isotopes and high temperature geological processes. Reviews in Mineralogy: Mineralogical Society of America, No.16