East Shetland Platform Petroleum Geochemistry and Prospectivity

Arka Dyuti Sarkar[1]

[1]University of Manchester

Abstract

An investigative study into the East Shetland Platform, part of the mature UK Continental Shelf petroleum province with a focus on geochemistry. The platform bounds the Viking Graben to the west. It was a high throughout most of the Mesozoic, having been affected by Variscan deformation. A thin veneer of recent Tertiary sediment cover is found. The platform is significant for clastic sediment routed through incised valleys and channels on it, into the adjoining basin. Unlike the basin, there remains considerable scope for further exploration on marginal areas such as the platform. The dataset consisted primarily of geochemical reports of highly biodegraded oils, dating back to 1977 of wells drilled in the area. The aim of the study was to determine a link between oils found on the platform and basin based Kimmeridge Clay Formation source rocks. This was done through evaluation of the biomarker data embedded in gas chromatogram and mass spectroscopy data where available in the dataset. Isoprenoids such as pristane and phytane, and terpanes such as gammacerane provided the best indicators of both source maturity and environment. Existing stratigraphic templates were adapted and applied to the raw data to further constrain outputs. The results confirmed the decrease in oil maturity further inbound of the platform, while demonstrating the ability of distal Kimmeridge shales to charge over long distances onto reservoir units on the platform. High well coverage in the area is conducive to 3D petroleum systems modelling in future investigations. Application of statistical tests on biomarker variability posited a possible link between contamination and the observed standard deviation in the measurements. This raises a possible avenue of further research into the effects of drilling on the natural biomarker signature in mature petroleum provinces.