

# **Basement and Crustal Controls on Hydrocarbons Maturation on the Exmouth Plateau, Northwest Australian Margin**

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A consistent approach to the assessment of basement and crustal controls on hydrocarbons maturation in mature exploration area of the Exmouth Plateau is justified by the availability of high quality refraction seismic data recorded in the area during two major ocean bottom seismograph (OBS) projects undertaken by Geoscience Australia, and jointly by the Scripps Institution of Oceanography, USGS, Lamont-Doherty Earth Observatory and the University of Hawaii's.

The tectonic elements of the Exmouth Plateau, which contains the largest oil-producing fields in Australia, developed as a result of rift tectonics initiated in the Early Jurassic and continuing until the Late Jurassic, preceding the final continental separation of Greater India from Australia. The Palaeozoic evolution and stratigraphy of the area is poorly known but it seems to be increasingly important for petroleum geology.

Measurements of radioactive elements contents in rock samples taken from outcrops of Pilbara Craton allow an estimation of heat production in the Exmouth basement and crust below it. These estimates and presence in the area of several wells for which geohistory was modelled using Winbury software (Brigadier 1, Jupiter 1, Sirius 1) allows advanced burial and thermal geo-history modelling to be carried out using Fobos Pro modelling software without relying on default or inferred values such as heat flow or geothermal gradient. Estimates of total crustal thickness (only 30-34 km) prior to rifting were derived from onshore refraction work in the Pilbara Craton. Crustal thickness and composition underneath major depocentres of the Exmouth Plateau were constrained by results of OBS studies in the area indicating that total crustal thickness (excluding up to 18 km of sediments) is reduced to just 4 km. The effect of possible underplating in the lower crust of the Exmouth Plateau on hydrocarbon maturation needs to be accounted for in geohistory modelling.