Geophysical Research Abstracts
Vol. 21, EGU2019-4213, 2019
EGU General Assembly 2019

Hydrocarbon Exploration Insights from Scientific Ocean Drilling

Andrew Davies and Mike Simmons
Halliburton, Landmark, Abingdon, United Kingdom (andrew.davies@halliburton.com)

The Integrated Ocean Discovery Program (IODP) and its predecessors, the Ocean Drilling Program (ODP) and Deep Sea Drilling Program (DSDP), represent some of most successful scientific programs in Earth science. These programs have revolutionised our knowledge of Earth history and this, along with the data gathered by the drilling campaigns of the last 50 years, have made a significant contribution in hydrocarbon exploration. Managing geological uncertainty is one of the primary challenges in exploration. Uncertainty can be reduced through direct evidence for or against the presence of petroleum systems elements (e.g., reservoir) and indirectly through the context provided by better understanding the processes controlling sedimentary systems. This paper provides case studies to demonstrate how IODP and its predecessors have helped to reduce geological uncertainty, both directly and indirectly.

ODP Leg 160 visited the Eratosthenes Ridge in the Eastern Mediterranean and recovered cores demonstrating the presence of Miocene and mid-Cretaceous platform carbonates on this remnant high of rifted continental crust. Industry seismic data identified smaller detached highs to the south and west of the Eratosthenes Ridge with potential carbonate build-ups present. Because ODP Leg 160 had proven the presence of carbonates on such highs in the region, reservoir presence risk was reduced. Reservoir presence was proven when the giant Zohr gas field was discovered in 2015. 30 trillion cubic feet (TCF) of recoverable biogenic gas is located within mid-Cretaceous and Miocene shallow-marine carbonates. This play is now being expanded to similar structures in the region and has already resulted in the discovery of the Calypso field in 2018.

In some frontier areas or plays, direct data are not available, even from scientific drilling programs. In these cases, a variety of contextual information and predictive tools can be used to help evaluate plays. The lithological, sedimentological, palaeontological, and isotopic data that have been gathered from scientific oceanic drilling are important inputs into (i) Earth systems modelling (including palaeoclimate and source-to-sink studies); (ii) the development of sequence stratigraphic and eustatic models; (iii) the recognition of global events, such as oceanic anoxic events (OAEs); and (iv) the generation of biostratigraphic schema for inter-regional correlation. All of these are useful in the ongoing prediction of the presence of source, reservoir, and seal in the absence of hard data.