

Subsurface Planning and Outcomes of a Seabed Coring Programme for Petroleum Systems Modelling, Columbus Basin, Trinidad and Tobago

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Abstract

As an aid to ongoing play and prospect evaluation of its licensed acreage, BGTT and partners acquired 86 piston cores off the east coast of Trinidad in water depths up to 700 metres in August, 2014. Core locations were selected using a combination of tools and techniques including 3D seismic data, bathymetric features such as mud volcanoes, gas flags, and potential hydrocarbon leakage points such as seabed fault scarps, and mapped prospects. Existing hydrocarbon fields, discoveries and dry holes were sampled as calibration points. Cores were sited on a combination of potential macro-seepage sites such as faults and mud volcanoes, and in a regular grid at structurally benign locations to assess micro-seepage. Coincidentally, a present day seabed channel feature was also sampled. Some core locations were adjusted to sample features such as gas plumes that were identified during the 1000 metre acoustic line that was run across each site prior to acquisition. As well as fine grained sediments such as clay, silt and sand, cemented rock fragments and gas hydrates were also recovered.

Core samples were preserved and shipped to laboratories for geochemical analyses of headspace gas, fluorescence of extracted hydrocarbons, and isotope ratios of hydrocarbon gases and key biomarkers, using chromatography and mass spectrometry as the main tools of separation and analysis. Samples from the mud volcanoes were subject to biostratigraphic analyses in an attempt to date the source of the volcano mud and high resolution sampling of five cores was undertaken to support the research programme of a local university. This paper will describe the rationale for the seabed coring programme, the selection of the sites for coring and, as far as data confidentiality permits, the geochemical results of the laboratory analyses.