



ORAL PRESENTATION

Pre-Terumbu clastic Plays in the Tuna PSC, East Natuna Basin, Indonesia

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The Tuna oil and gas field, Tuna PSC, is located in the Natuna Sea 260km north of Natuna Besar Island, Indonesia. Geologically the field is within the East Natuna basin, bounded to the north by the Nan Con Son Basin in Vietnam, to the south and east by the Sarawak Basin of Malaysia, and to the west by Natuna Arch, which separates this basin from West Natuna. The basin comprises several sub-basinal areas which formed during the Neogene as a result of extension associated with the opening of the South China Sea. Several small half-grabens occur in the northern part of the Tuna PSC forming the structural closure for the Tuna Field, where Upper Oligocene Gabus and Lower Miocene Terumbu Formation clastics form the main reservoirs.

Exploration in the East Natuna Basin began in the 1970's, mainly targeting the Upper Terumbu Formation carbonate buildups, which were easily mapped on available 2D seismic data. Initial wells were drilled in the 1970's by AGIP, followed by Mobil, Total, Amoseas and Exxon. Some discoveries were made including the supergiant D Alpha field (high CO₂ gas) discovery by AGIP in 1973, and also by Mobil at Bursa-1 (oil). However tests of carbonate buildups located further up on the Terumbu platform were generally dry and this has been attributed to the absence of top seal (Muda Formation) when hydrocarbon expulsion occurred. However, the clastics underlying the Terumbu carbonates have remained relatively under-explored partly due to poor seismic imaging on the older data, with many wells not optimally located for testing of these deeper intervals. Acquisition and processing of more recent seismic data including multiclient 2D and the 2009 3D seismic survey over the Tuna PSC has produced large improvements in imaging under the Terumbu carbonates. This has permitted more accurate mapping of the lower Terumbu, Arang and Gabus levels and facilitated dry hole analysis of many of the older wells across the area. It also yielded a number of new prospects across the Tuna PSC, some with 'bright spot' anomalies, including the adjacent Kuda Laut and Singa Laut structures in the northern part of the Tuna PSC

In 2014 Harbour Energy (formerly Premier Oil) discovered hydrocarbons in Lower Terumbu and Gabus sandstones in the Kuda Laut-1 and Singa Laut-1 wells. This confirmed the exploration potential of the clastic play in East Natuna, having already been recognized to the north at the Chim Sao and CRD fields in Vietnam. The 2014 discoveries, now known as the Tuna Field, consists of two structures separated by a NE-SW trending normal fault which juxtaposes the main reservoir of Lower Terumbu sandstones in the hanging wall (Kuda Laut) structure against the main reservoir Gabus sandstones in the footwall (Singa Laut) structure. The field has been appraised by two additional wells in late 2021 confirming the presence of rich/wet gas with a high condensate yield, but also encountering oil rims, underlying the previously discovered gas columns. The wells included conventional cores, a full wireline dataset, and three DST's to provide sufficient appraisal data to constrain resource estimates, determine development concepts and to support the submission, and subsequent approval of POD I for Tuna Field at the end of 2022.

SPEAKER BIOGRAPHY

Dono Mulyono gained a bachelor degree in Geological Engineering at Bandung Institute of Technology, in 1999 and has subsequently worked as an Exploration Geologist at Kondur Petroleum, Semco, PetroChina, Petronas and Vico covering Sumatera and East Kalimantan regions. Since 2010 has been Natuna and Tuna Sea Exploration Team Leader at Premier Oil - Harbour Energy Indonesia, where his role to deliver exploration programme in the operated blocks and new ventures opportunities in Natuna Sea.