Hydrocarbon Discovery in the Frontier Area at Eastern Indonesia: Lessons for Future Discoveries

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The most significant discovery from the last two decade in Eastern Indonesia is the Jurassic-Permian Play System in Eastern Indonesia (Tangguh, Oseil and Abadi). These discoveries are found dominantly in Tertiary producing basin which has been explored since early 19th century, only one that found in non producing basin. Jurassic play system was found in producing Seram Basin, producing Bintuni basin and non producing south eastern edge of Palung Aru basin. Bintuni Basin has been produced oil from 1956 (Mogoi and Wasian discovery in 1938) but the oil was produced from tertiary sediments (Miocene Kais Limestone, only around 7 MBBLS oil was produced from 1956-1961), meanwhile production in Seram basin started in 1913 (Bula Field discovery in 1897) from Pliocene Fufa Formation and until now still producing around 45 BOPD.

The first discovery of Jurassic Play System at Eastern Indonesia is in 1988 when East-Nief-1 well in Seram basin tested Jurassic Manusela carbonate and recovered 1300 bbls of oil and 1.23 MMSCFD, since than the Jurassic Play System are being tested in others area. The effort are pay off by the discoveries of several fields, which is Tangguh Complex Giant Gas Field from 1990 to 1998 exploration campaign which tested Jurassic Sandstone Reservoir which known as Roabiba-Aalenian at Bintuni Area, Oseil Field was found by Oseil-1 well and tested 3800 BOPD oil from Manusela Carbonate at Seram basin, and Abadi Giant gas field which found by Abadi-1 well in 2000 and tested 25 MMSCFPD, 260 BOPD (52.5 API) & 178 BWPD from Jurassic Plover sandstone in SE edge of Palung Aru near Timor Gap.Jurassic plays system has found more than 4 BBOE reserve with success ratio for finding the play system around 56% in Bintuni Area, 66 % in Palung Aru and 66 % in Seram Basin.

Paleogene Tectonics Evolution and Sedimentation of East Java Basin: A Future Hydrocarbon Exploration Target

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Recent evidence from both subsurface data and outcrop suggested that southern part of East Java Basin is underlain by continental crust. This result reveals new knowledge in term of tectonics evolution and sediment in East Java Basinal area particularly during Paleogene time. Moreover, this new finding opens future exploration opportunity in the southern part of the East Java. Our works recognized two sets of faults, NE-SW and E-W trend controlling the distribution of Paleogene graben system in the southern part of East Java Basin. Sedimentation and structural relationship indicates that E-W trending faults are slightly older than NE-SW trends. It is evident that E-W trending faults controlled the distribution of Paleogene graben system. The lower part of the E-W grabens system filled by syn-rift deposit consist of conglomerate, quartz sandstone and shale as part of Ngimbang Fm. depositing in fluvial environments. Some of the field in the East Java produced from this clastic unit. However, the tectonics and provenance of Ngimbang clastic is poorly known.

A new tectonics model of Paleogene system of East Java is presented. Out tectonics model involves collision between rafted Australian continental crusts namely the East Java Microplate with Sundaland during late Cretaceous. The result of the collision is reactivated pre-existing E-W faults in the basement becoming strike-slip fault systems which control the development Ngimbang graben along the pull-apart area. Our tectonics model is not only explaining the sedimentation of Ngimbang Fm., but also tectonic evolution of East Java basinal area including its paleogeography.

New Insight on Tectonic of Central Java, Indonesia and Its Petroleum Implications

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Text to be added.

Basin Evolution and Hydrocarbon Potential of Majalengka-Bumiayu Transpression Basin, Java Island, Indonesia

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A structural zone striking NW-SE from Majalengka to Bumiayu is characterised by fold belt of Neogene sediments. The zone is located between two majors lineament striking NE-SW; i.e. Cimandiri and N70E fault zones. Both zones indicate left lateral movement and place Majalengka-Bumiayu folded zone within transpression zone.

Stratigraphic information is limited both for the Neogene and the Paleogene sections. Neogene stratigraphic nomenclature is complicated due to inconsistency in applying stratigraphic code. However, it can be generalised that the stratigraphy is composed of rocks ranging in age from Oligo-Miocene to Pleistocene.

The rock characteristics reflect basin evolved within progressive deformation zone, starting from deep marine depositional setting with distal turbidite system in the lower part, upward through shallower deposits with coarser turbidites, and to coarse clastics of fluvial-shallow marine deposits as eroded from the basin's edge in the Plio-Pleistocene time. Regional structural analysis indicates the basin developed in strike-slip transpression zone.

Source rocks, reservoir, and seal are present in the basin. Structural trap related to thrust-belt system and diapiric were observed. Potential stratigraphic trap related to channel in the turbidite system exist theoretically. Petroleum system in this area clearly works. This conclusion is supported by at least twelve oil seepages, ten suspected gas seepages and one discovery well. The well encountered oil bearing formation in the turbiditic sandstones of Early to Middle Miocene. Based on the analyses, a petroleum system events chart is constructed and exploration strategy is proposed to reduce risk.

The Fold and Thrust Belt Offshore Northern Sumatra

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While "modern" hydrocarbon exploration started in the North Sumatra Basin in the mid 1880's, the fold and thrust belt located in the Andaman Sea has seen relatively little drilling and almost no discussion in the literature. This fold and thrust belt covers an area of a ca. 6500 sq km, with the leading edge forming a large arcuate structural front that extends offshore up to 50 km. The primary detachment level appears to be in the transgressive M. Miocene Baong Shale, with the main phase of movement occurring in the Pliocene. Seismic data suggest relatively limited overall compression with the majority of the shortening expressed as low relief, tightly spaced folds occurring in fold sets. Localized ramp zones appear to form above or immediately outboard (N) of underlying structural highs, and are probably associated with dip changes in the main detachment horizon as it drapes over the underlying rift structures. The existing model for the origin of the fold and thrust belt is that it formed as the downdip compressional element of a linked updip extensional system, expressed as normal growth faults that occur near the present day coastline. However multiple lines of evidence suggest that the thin-skinned offshore fold belt is the leading edge of a basement-seated thrust zone directly related to the Barisan Uplift and bounded by lateral tear zones that correlate to 1) regional wrench systems in the Basin and 2) a major bend in the North Sumatra Fault Zone. The impact of this structural interpretation on the known petroleum systems in the Basin will be discussed.