

Inverted Intra Arc Transtensional Deepwater Basin in West Central Java Border: New Interpretation of Basin Evolution and Its Implication to the Petroleum System

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Play system in Java which has been proven in hydrocarbon production is generally dominated by the Tertiary back-arc basin in the northern part of the island. To the south of this system, deepwater intra-arc basin also developed parallel to this Tertiary back-arc system. This deepwater basin is then experienced inversion by thrust fault system prograding from south to the north. At present time this basin has been entirely uplifted and formed mountain range in the mainland. Previous studies indicate these inverted deepwater intra-arc basins have a high risk in hydrocarbon exploration due to the absent of source rock, tectonic complexity, volcanoclastics reservoir and difficulties in seismic acquisition.

However, interesting points can be observed in the inverted intra-arc basin zone: Northwest-southeast oriented highs were crossed this zone and so called the Pamanukan Cilacap Fault Zone (PCFZ) at West-Central Java Border; the Miocene-Pliocene volcanoclastic turbidites deposited along the PCFZ; and oil seeps also distributed along this fault zone. These indicate the geological relationship between PCFZ, distribution of volcanoclastics, oilseeps and an active petroleum system.

PCFZ is interpreted being initially developed as a trans-tension fault which controlled the development of isolated volcanic complex. The volcanics initiated the deposition of Miocene-Pliocene volcanoclastics. This transtensional zone relic can be observed by pull-apart pattern based on regional gravity map in the area around Ciremai volcano. The transtensional Pamanukan - Cilacap zone was then inverted after Mio-Pliocene and formed structural highs that divided the Bogor Trough in West Java, North Serayu Basin in Central Java and Banyumas Basin in the south Central Java. Oil seeps along the PCFZ indicate the distribution of source rock is widespread throughout these basins. The expelled and migrated hydrocarbon could reach in to potential traps and accumulated in reservoirs in these basins.

Geological complexity along the PCFZ formed a distinctive petroleum system in the isostatic deepwater basins formed along the fault zone. These tectonic and paleogeographic reconstructions are expected to reveal the characteristics of petroleum systems formed in the basins formed along the PCFZ.