Unraveling Gunung Botak Sandstones: An Implication for Triassic to Jurassic Reservoir Characterization of the Bird's Head Area, West Papua, Indonesia

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ABSTRACT

Mesozoic sandstones of the Bird's Head of New Guinea, Indonesia, is one of the main exploration objectives since the early 70's. Limited data and its unfossiliferous character make it difficult to determine its character. Recent sandstones exposure in the Gunung Botak area of the Bird's Head has provide an important data to understand the missing knowledge of the Bird's Head Mesozoic history especially for the reservoir characteristic. New findings from the outcropped sandstones in Gunung Botak area become an important added value and no research has been carried out concerning its character. Previous work misinterpreted that this area was part of the Paleozoic Basement of the Bird's Head. A hundreds meter of vertical section were carried out and more than hundreds samples were collected. Some of sandstones have been thin sectioned and examined for the provenance analysis. More than thirty claystones were selected for the biostratigraphy analysis. A drone photogrammetric method was also used for the 3D mapping and correlation. The sandstones were deposited during the Triassic to Early Jurassic and classified as litharenite, quartz arenite, lithic wacke, and quartz wacke sandstones. Clay matrix in most of sandstone samples are no more than 10 percent, and most of sandstone samples catagorised as "clean" sandstone, suggesting high-energy fluvial setting as depositional environments. Thin sections show strong compaction and in some samples secondary quartz outgrowth formation reduced primary intergranular porosity. However, subsequent dissolution of clay matrix and unstable detrital grains has created secondary intergranular porosities and fractures. This study suggests the sandstones could potentially as a good hydrocarbon reservoir. Provenance study also suggests there was granitic (ryholitic) magmatism in the Bird's Head region during the Triassic and Quartzose recycled was interpreted as source rock in Recycled Orogen provenance, which was located in the back-arc area. Nearby paleohigh as main source area was most likely located in the northwestern and southern area of present-day Gunung Botak and was part of back-arc region behind Triassic volcanic arc.