

ABSTRACT

Geology and Tectonic Evolution Using 2D Palinspastic Reconstruction of The Cendrawasih Bay Petroleum System

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Cendrawasih Bay has significant hydrocarbon potential, as oil seeps on the seabed indicate. Still, how the petroleum system exists in Cendrawasih Bay has yet to be discovered. This research was conducted to determine the tectonic evolution of Cendrawasih Bay so that the petroleum system of the research area can be identified based on existing tectonic events. The method used in this research is seismic interpretation to determine stratigraphic relationships and balanced cross-section reconstruction to determine kinematic analysis of each geological event that occurs.

The evolution of the geological structure of Cendrawasih Bay began in the Extensional on the western edge of the Australian Plate during the split of Gondwana (Early Triassic), resulting in the formation of a downward fault structure trending relatively northeast–southwest (NE-SW) in the Waipoga Basin area. Then, when Australia separated from Antarctica, Australia moved north and caused a subduction collision with the Pacific-Caroline Plate. This event formed the Lengguru Fold Thrust which trends relatively northwest–southeast (NW-SE), the Waipoga Fold Thrust which northeast–southwest (NE-SW) and also created the Yapen Fault which is a left horizontal fault west–east direction (W-E). The Yapen Fault develops to produce positive flower structures and negative flower structures. Subduction-collision resulted in uplift and erosion, making the sediment supply abundant during the Pliocene-Pleistocene.

Palinspastic analysis, flattening combined with isopach map thickness analysis produces data that Unit 1 and Unit 2 of the Waipoga Basin have different thicknesses with minus extension values, so these two units are categorised as syn-extensional. Unit 3, dated to the Late Miocene in both basins, has relatively the same vertical thickness with constant extension values, so this unit is categorised as drifting. Unit 4a, Unit 4b, Unit 5 and Unit 6 have different thicknesses and tend to experience thickening in several places with plus shortening values, so this unit is categorised as a syn-compressional unit. The research area's petroleum system consists of source rocks, which are interpreted as shale and coal; reservoir rocks, which are interpreted as clastic and non-clastic limestone, seal rocks in the form of lithology shale and mudstone, with developing traps in the form of structural traps and the presence of indications of DHI (Direct Hydrocarbon Indicator) namely bright spots.

Keywords: *Deformation Evolution, Petroleum System, Cendrawasih Bay.*