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Validating the structural trend of Central Luconia province through airborne Full Tensor Gradiometry (FTG) gravity

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Abstract: A set of Full Tensor Gradiometry (FTG) Gravity vintage proprietary data for Central Luconia in offshore Sarawak is made available for academic purposes. FTG data is the direct measurement of the gravity field in all directions which determines minute changes in density distribution in all tensor components, which include the X, Y and Z domains. The vertical integration of TZZ domain is most useful since the data captures short to intermediate wavelengths that is not always available in conventional gravity. The anomalies expressions on Tzz map produced from 20-50 km wavelengths filter are dominated by numbers of isolated domal and elongated gravity anomalies ranges from positive to negative values. When overlay with seismic profiles, the features observed on the Tzz gravity map matched well with the position of the carbonate build-ups, both the pinnacle and elongated shape. Extracted depth profiles from the FTG data indicate shallow structures at depth less than -2000 m with features similar to Cycle IV/V top carbonate and the deeper structures at depth approximately -3500 to 4000 m equivalent to the Cycle I or Pre-Cycle sediments. Two deep seated wells that reached sediments of Cycle I & II overlay precisely within the FTG

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data coverage. FF6 well was drilled on a low-density contrast of FTG data whilst LH1 well is found to be drilled at the edge of a high-density contrast structure. A low-density contrast FTG data represents a deeper section of the basin, which related to depression, subsidence or structurally deep. At the same time, a high-density contrast structure represents elevated, uplifted or less sedimentary cover location. Cross examinations with seismic data crossing these two wells reveal elongate graben, bounded with normal listric faults on both sides just underneath FF6 well, while LH1 sit directly on top of horst block with high angle fault. Through synthetization of airborne gravity with seismic interpretation and validation of the wells, we can increase the confidence in mapping the structural trend for Central Luconia and eventually revise the marking of the stratigraphic horizons on seismic data.

Keywords: Full Tensor Gradiometry (FTG), stratigraphic