LINAPACAN LIMESTONE FRACTURE – ILLUMINATED THROUGH SEISMIC, A CASE STUDY

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The West Linapacan field is situated 60 kilometers offshore Palawan Island, The Philippines. This field was discovered in 1990, with some production during a 3 year period. It was subsequently shut-in due to economics, which were exacerbated by increasing water production. The West Linapacan A and B structures are NW/SE trending, fault bounded anticlines. West Linapacan B is approximately 7.6 km to the ESE of the 'A' structure. Both are comprised of Upper Eocene to Lower Miocene age fractured limestone.

In order to better understand the distribution of fractures within the Linapacan limestone a geophysical study was commissioned to characterize the density and the predominant alignment of the fracture system.

3D seismic data covered the West Linapacan field. The seismic data was recently reprocessed, with angle sub-stacks generated as part of the reprocessing exercise. The availability of the seismic angle sub-stacks made possible the use of the simultaneous seismic inversion technique to compute for multiple rock physics data cubes such as acoustic impedance, shear impedance, and density.

Fracture clusters within hard rock such as limestone and granite are generally characterized by a lower acoustic impedance of the local area but do not provide sufficient information on the fracture azimuthal trends. Productive fractures are considered to be longitudinally connected, and these would be better imaged by shear component seismic data. The computation of shear seismic responses by means of the simultaneous seismic inversion process provides a practical alternative to the prohibitive cost of acquiring shear seismic
data. The shear-rich seismic based calibrated data is then used in the Ant-Tracking procedure where fracture, faults and vugs within the limestone body in a 3D manner. The Ant-Track results show the fracture cluster density as well as the predominant fracture strike orientation. FMS data acquired in one of the West Linapacan wells affirmed the fracture strike orientation sampled in the well bore.