Oil and Gas Exploration Surveys for Offshore Myanmar – An Overview of Leading Technologies

Maz Farouki[1]

[1]PGS (Petroleum Geo-Services), Kuala Lumpur

Abstract

The results of the first Myanmar international offshore bidding round announced in March 2014 awarded 20 blocks to some 17 operators and partners comprised of a mix of both IOCs, NOCs, and 'Independents'. The ensuing commitments to conduct seismic surveys by the award winning operators ensured that despite the current worldwide downturn in exploration activity, Myanmar was to be a 'hot spot' for the seismic industry in the 2015-2016 and 2016-2017 seasons. The blocks span an area, which extends offshore from the Myanmar coast across the continental shelf and into several thousand meters water depth. Up to 60,000 km^2 of 3D seismic surveys have either already been acquired or are in a planning stage, and, given the rigorous geophysical objectives and challenges anticipated by the operators, almost all have indicated a requirement for broadband towed marine seismic.

In the deep-water domain, modern seismic vessels capable of towing in excess of 16 streamers in a 'wide-tow' configuration can deliver highly efficient acquisition of thousands of sq kms of quality 3D broadband seismic data. In the shallow water shelf areas, however, wide-tow acquisition may not be suitable unless the associated loss of coverage in the shallow section (a characteristic referred to as 'cross-line acquisition footprint') can be mitigated. For example, in 100 m water depth, and with a streamer separation of 100m, in order to record the water bottom, the number of streamers deployed should be no more than 6. This presents a data acquisition challenge for the series of Myanmar offshore blocks that span the shelf, the shelf break, and deep water. One solution is to retain the efficiency of wide-tow acquisition over the entire survey area, and then to interleave additional seismic sail lines over the shallow water and shelf break areas. An alternate technology solution utilizes multiple arrivals in the recorded seismic data, previously treated as noise, to better illuminate and image the shallow section; this approach not only mitigates the acquisition footprint, but the resulting high resolution near-surface seismic volume can be used as a 'reconnaissance' geohazard survey, and as a basis for a better understanding of the complex and rugose shelf break.

Whilst the seismic method has always been the staple industry tool for exploration, interpreted seismic data alone cannot definitively confirm the presence of hydrocarbon charge in prospective structural or stratigraphic traps. A complementary geophysical tool – estimating subsurface rock resistivity via electro-magnetic (EM) surveying – has gained mainstream acceptance in the industry as a viable method to assess prospectivity in frontier areas and/or to de-risk existing prospects. Traditionally Marine Controlled Source EM (CSEM) data was acquired using seafloor node receiver systems; however, in recent years an innovative and highly efficient method of acquiring EM data has been introduced, utilizing a towed EM streamer instead of nodes. The method allows for simultaneous acquisition of both EM and 2D seismic from the same vessel and is particularly well suited to the shelf areas offshore Myanmar.