

Multiple Streamers and Sources in 3D Marine Seismic Surveys,  
Offshore Sarawak - 1986

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A 3D marine seismic survey generates up to ten times more data than conventional 2D surveys. In the Balingian Province, offshore Sarawak, most of the structures are geologically complicated and often intensely faulted. In order to adequately resolve these features a bin size of 25 x 25 m is required. If one considers a base programme of 10 x 10 km sq of 3D seismic survey, it would require some 60 days to complete the 4000 line-km programme. The fair weather window for offshore Sarawak extends from mid-March till mid-September, giving some 6 months of optimum survey period. When a number of 3D programmes are scheduled in one survey campaign it becomes necessary to find more cost effective methods of acquiring the data. Two options are available:

- 1) Reduction in data volume required by increasing the bin size.
- 2) Reduction in the multiplicity of the common depth point coverage.

Increasing the bin size would be detrimental to the spatial resolution of the dataset whereas it has been shown that 3D seismic surveys generally do not require as high a degree of CDP coverage as 2D surveys when migration is included in the data processing (KREY). The option of reduction in multiplicity is therefore preferred.

During the 1986 survey season, Sarawak Shell Berhad utilised the twin-streamers-twin-sources technique which acquired 4 seismic profiles at 25 m separation per ship's traverse. Three 3D surveys totalling 639 sq km were completed within a three and half months period. Some 39,000 km of data were acquired giving an average production rate of some 11,000 km per month.

The use of the twin-streamers-twin-sources technique raised two points of concern. One, of maintaining streamer separation parallelity and second, a possible compromise in data quality due to the large offset ratio between shot and receiver intervals. Monitor of streamers' shapes by the least square spline-fit method of data from the 12 compasses located at regular intervals along each streamer indicated that parallelity of separation was constant to a large extent. Preliminary data processing extracted in the 2D mode have shown good quality data acquired as compared to previous vintages at similar localities.

Known operational constraints common to seismic surveys in the region were alleviated by sufficient preparatory groundwork. The twin-streamers-twin-sources technique has proven its capability to 'condense' the time needed to obtain large volume of 3D data during the 1986 survey season.

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