FAN MODE SHOOTING TO REDUCE INFILL RATES FOR MARINE SEISMIC ACQUISITION IN AREAS OF STRONG AND UNPREDICTABLE SEA CURRENTS

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Conventional towed marine seismic reflection surveys are typically designed to acquire a uniform surface coverage across the area of interest. However, given that the streamer spread is anywhere between 200 and 1000m wide and generally between 3000 and 10,000m long, sea currents often force the streamer to divert significantly from the vessel path or modify the streamer shape. This results in reduced coverage for some offsets or offset ranges, or in an extreme case, a complete lack of coverage or "hole" in the data.

Such coverage holes can vary in size, regularity, and sample density leading to problems in the processing of the seismic data and ultimately degrade the quality of the final image. As a result it is necessary to acquire a program of infill to ensure that the survey is properly sampled. This is typically between 15 and 30% of the total kilometers of the survey, resulting in a proportional increase in costs and survey time.

Recent deployments of streamer steering devices have shown great value in mitigating this effect by maintaining streamer shape and matching adjacent line feather. However, it is also possible to actively steer the streamer to acquire a larger sub-surface swath at the tail. Fan Mode Shooting is a 3D marine acquisition technique where the streamers are deployed with variable separation with offset (Figure 1). Since the high frequencies are attenuated at longer offset and depth, the bin size can be increased with offset and depth, without damaging the quality of the final data. Monk (2010) has recently shown that adopting this methodology dramatically reduces the amount of infill required and produces significant cost savings.

This paper will present a regional case example of how 'Fan Mode Shooting' was successfully used to reduce the infill requirement during a marine seismic acquisition in South China Sea between June and August 2010 (Figure 2).

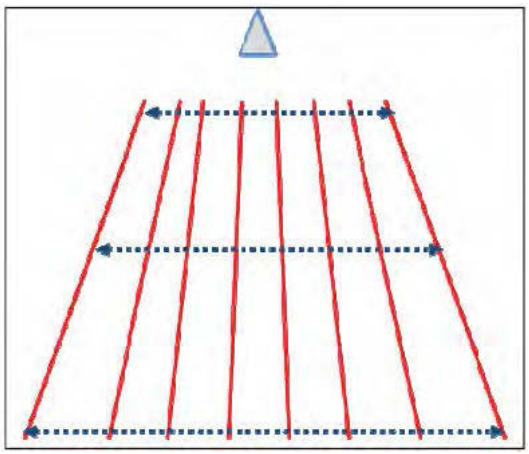

Figure 1: Cartoon shows Fan Mode Shooting with streamer interval were varies over offset, typically 25% to 50% wider at for offset compared to near offset

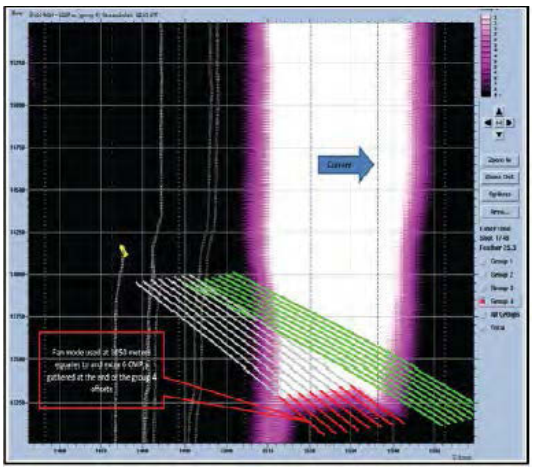

Figure 2: Active sail line(grey) feather is greater than the previous sail line (green) and not overlapping, therefore fan mode is used to compensate for the feather mismatch.

REFERENCES

DAY, A AND REKDAL, T., Determining Infill Specifications Based on Geophysical Criteria. SEG 2005 Annual Meeting, Extended Abstract.

P. CAPELLE, P. MATTHEWS, Intelligent Infill for Cost Effective 3D seismic Marine Acquisitions. 71st EAGE Conference & Exhibition, Amsterdam, The Netherlands, June 2009

DAVID J MONK, 2010. Reducing Infill Requirements Using Fresnel Zone Binning and Steerable Streamers. SEG Denver 2010 Annual Meeting, Extended Abstract.

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