

Why Accept One Sensor When You Can Have Two-Dual-Sensor Towed Marine Streamer Seismic?

Adrian Burke, Jason Robinson, Anthony Day, Andrew Long, Martin Widmaier, Eivind Fromyr

PGS

Traditionally, towed marine cables measure the seismic wavefield using only pressure sensors (hydrophones). To image shallow targets the focus will be on resolution and enhancing the higher frequencies, normally achieved by towing the streamer more shallow in the water. Imaging of deeper targets the focus will be on penetration and enhancing the lower frequencies, this time achieved by towing the streamer deeper in the water.

By introducing a dual sensor streamer PGS has now overcome this limitation making it possible to record broadband seismic data, both higher and lower frequencies, with a single acquisition configuration.

In a dual-sensor streamer, independent measurements of the total pressure and particle velocity wavefields are obtained using collocated sensors. These two measurements of the seismic wavefield can be combined in processing to separate the wavefield into up- and down-going components.

2-D case examples have demonstrated that this procedure is both robust and accurate. This concept has now been widely extended to 3-D acquisition geometries.

The dual sensor streamer technology has the unique ability to remove the receiver ghost resulting in broadband seismic data including more of the higher and lower frequencies.

Due to the ability of removing the receiver ghost the dual sensor streamer can be towed deeper than a conventional streamer enabling recording of even more lower frequencies, and will still record the high frequency information reflected from the sub-surface.

The deep tow also gives the benefits of less noise and improved acquisition efficiency especially in marginal weather conditions.

Several datasets have been acquired throughout the world, resulting in significant uplift in data quality when compared to conventional seismic. The dual sensor streamer data will further contribute to better inversion results due to the broader frequency bandwidth of the input data.

These applications are illustrated using data examples from a number of 2D & 3-D dual-sensor streamer surveys.