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Sea-bed imaging through high resolution short offset re-processing in the Malay Basin

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Amerada Hess (Malaysia) recently re-processed 149 km^2 of 3D seismic data over the Cendor-Desaru structure to further enhance the seismic imaging at shallow depths as well as below a shallow-gas affected zone. High resolution, short offset 3D seismic processing was developed primarily to reduce costs involved in site survey exercises by utilising pre-existing 3D seismic data rather than acquiring dedicated 2D site survey seismic data for shallow hazard analysis. The Robertson Research's method of high resolution, short offset approach differs from conventional 3D processing in a number of important ways:-

- The data are processed at a sample interval of 2 ms (as opposed to 4 ms in conventional processing) allowing for the inclusion of un-aliased frequencies of up to 250 Hz to be processed. This potentially doubles the vertical resolving power of the data over conventionally processed 3D.
- The data are limited to near offset ranges only, typically 3–6 fold depending on signal/noise ratios. This excludes the requirement for far offset corrections as applied in conventional processing (e.g. accurate NMO, DMO) prior to zero offset migration. Restricting processing to near offsets also reduces ray-path & stacking complications in areas of non-hyperbolic move-out (e.g. areas affected by shallow gas concentrations) and leads to improved imaging in such areas.
- Data positioning is exactly honoured in short offset processing i.e. the data are not binned prior to migration. This reduces spatial averaging and results in more accurate migrated data positioning and hence improves lateral resolution. Data regularisation is achieved via a 2-pass 3D-migration approach, inline followed by crossline.

The results of the re-processing have resulted in excellent imaging of the sea–bed and shallow intervals.

Warta Geologi (Newsletter of the Geological Society of Malaysia), Vol. 28, No. 5, September-October 2002