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Abstracts of Posters

Poster 1

A deep seismic section across the Malay Basin: Processing of data and tectonic interpretation

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A regional 2D seismic line across the Malay Basin was processed and analysed to improve the deep structural image of the subsurface. The line is about 185 km long, trending from SW to NE and was recorded down to 12 seconds. A total of 480 receivers with 12.5 m receiver spacing were used in the survey resulting in 6,000 m of streamer length. During preprocessing, the data set was sampled from 4 ms to 8 ms and decimated to 3:1. Hence the Nyquist frequency of the data reduces to 62.5 Hz and the number of channels to 160, which are adequate for this processing objective. The 80-fold coverage remains unchanged.

Seismic inversion, using a combined scheme of prestack travel time inversion and post stack depth migration was carried out to estimate a velocity depth model for the line. The approach is a model-based technique where depth migration is an integral part of the velocity estimation procedure. Significant improvements have been achieved in imaging the deep structural pattern across the line down to about 9 seconds which is equivalent to about 15 km. Major faults, especially within the areas masked by gas effect, were also clearly resolved.

Study of the processed line has arrived at the interpretation that, (1) the basin fill exceeds 14.5 km in thickness, (2) the basement on the flanks is composed of an upper and a lower rock complex, (3) the arcuate and concentric seismic layering on the northeastern flank of the basin may represent granite cupolas intruded into the lower complex of its basement. Nine major, basement-reaching fault zones were identified. Along the centre of the Malay Basin runs the Axial Malay fault zone, an interpreted extension of the Three Pagodas fault. Very steep to vertical fault zones form the SW and NE boundaries of the basin below the Oligocene(?) sequence represent the rifted margins. Much gentler basement slopes of the flanks above this horizon are consistent with the sagging due to thermal cooling and sediment loading following the rifting phase. The pre-Oligocene(?) sequences are stronger deformed than the overlying beds. The majority of the main fault zones display flower structures, while the Axial Malay fault zone is associated with the strongest expression of structural inversion. This deep seismic section corroborates our interpretation that the Malay Basin originated as a rift, at least 60 km wide, possibly representing one of the rift arms of the Cretaceous-Tertiary Malay dome and that its development had been strongly modified by transcurrent movement along major fault zones, especially along NW-SE.