Palaeobathymetrical Changes in NW Sarawak during the Oligocene to Pliocene

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The predominantly siliciclastic Oligocene to Pliocene deposits of NW Sarawak were deposited during a number of successive transgressions and regressions. These cyclic phases are relatively well known and they are used within Shell for a subdivision of the stratigraphical record into informal lithostratigraphical units consisting of sediments deposited during one cyclic sedimentation phase. Little is known, however, about the nature and origin of the palaeobathymetrical changes which caused the transgressions and regressions, and little information is available on the individual impact of the main factors controlling these relative sea level changes: eustacy, epeirogenesis, sedimentation rate and compaction. Therefore a study was initiated which focused on the following:

- 1. What were the main factors controlling the palaeobathymetrical changes which occurred in NW Sarawak during the Oligocene to Pliocene?
- 2. What were the lateral and vertical dimensions of these palaeobathymetrical changes?
- 3. To what extent were these palaeobathymetrical changes isochronous over the area?
- 4. Are these changes a local feature or can they be correlated with global events?

To find the answers to these questions the following method was applied:

The palaeobathymetrical nistory was interpreted for each adequately documented Balingian and Luconia well on file in SSB. This was done by plotting palaeodepths of deposition against geological time and by constructing a "palaeobathymetrical curve". Next the main observed palaeobathymetrical events in all wells were defined and subsequently mutually compared. It appeared then that a great number of the relative sea level changes observed in the individual wells were of a more or less general character, suggesting that they occurred over a wide area within a relatively short time interval, i.e. within one foram or pollen zone (0.5-4·m.y.). By combining all data, a "best fit" curve could be constructed which shows the major palaeobathmetrical changes in Balingian and Luconia for Late Oligocene to Pliocene times. These observed "general" palaeobathymetrical changes reflect the combined, averaged result of eustacy, subsidence, sedimentation rate and compaction.

Although the constructed palaeobathymetrical curve is thought to be valid on a regional scale, local deviations do occur. The reason for these deviations is probably mainly the difference in magnitude between epeirogeny/ sedimentation rates on one hand and regional relative sea level changes on the other. The study showed that the subsidence rate is generally several times greater than the amount of relative sea level change, indicating that local minor changes in the subsidence/sedimentation ratio may obscure regional palaeobathymetrical changes.
