GEOLOGY POSTER 7

SALINITY STRATIFICATION AND IT EFFECTS ON THE MALAY BASIN BIOFACIES ASSEMBLAGES

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Salinity stratification usually occurs when tidal currents and waves are not strong enough to mix the water column (e.g. in wave-dominated estuary). Such situation can lead to an anoxic condition because bottom waters can become isolated from dissolved oxygen (source: www.ozcoasts.org.au). Stratified salinity is a feature of partially enclosed seas and paralic environment (Debenay et al., 2000). In a stratified water column, the exchange of water and nutrients between layers is restricted, therefore there can be quite different water quality between the stratified layers; which has direct effect on the biofacies assemblages and distribution. (Debenay and Guillou, 2002). This biofacies event provides a possible explanation that for much of the Miocene, the Malay Basin might have been an enclosed sea, with a limited marine connection at the south to let saline water in.

Over five hundred surface sediment samples were analysed from three selected modern environment namely; Sedili Besar Estuary, Klang-Langat Delta and Pahang Delta (Figure 1). Of all samples analysed, the assemblages from Sedili Besar River Estuary showed domination of Ammonia cf. takanabensis (formerly identified as Ammonia beccarii), (PRSB, 2009). Monospecific assemblage, Ammonia cf. takanabensis dominated within the stratified water column of marine base and freshwater top. (Figure 2). However, in Klang-Langat and Pahang Deltas, the Ammonia assemblages are quite scattered and not confined to only specific area as in the Sedili Besar Estuary. Salinity stratification is very minimal or almost absent in both Klang-Langat and Pahang Deltas. Salinity studies in Sedili Besar Estuary indicates that the areas with abundant A. cf. takanabaensis have strongly stratified salinity, with near normal salinities at the channel floor, and very low salinities at the surface. This concept can be used to explain the high occurrence of Ammonia spp. in the Malay Basin. However, this is still an initial observation, further investigation is needed to firm up the idea.

On the other hand, the agglutinated forms mainly the Arenoparrella group dominates the less stratified water column (freshwater top and base salinity). Benthonic foraminifera live on the water bottom, but mangroves live along coastlines, so when there is a big water body with stratified water, mangroves will react to the fresh/brackish surface layer, whereas the foraminifera will indicate bottom salinities. The two models in Figure 3 help explain many of the foraminifera-palynology associations in the Malay Basin Group E cores. In both instances, the water bodies would retain tidal influence, and respond to sea level change, as the water bodies are virtually always connected to the sea. It can also be used to explain the Ammonia spp. and agglutinated foraminiferal occurrences for biofacies interpretation in the Malay Basin.

Figure 1: Localities of the three modern analogs studied

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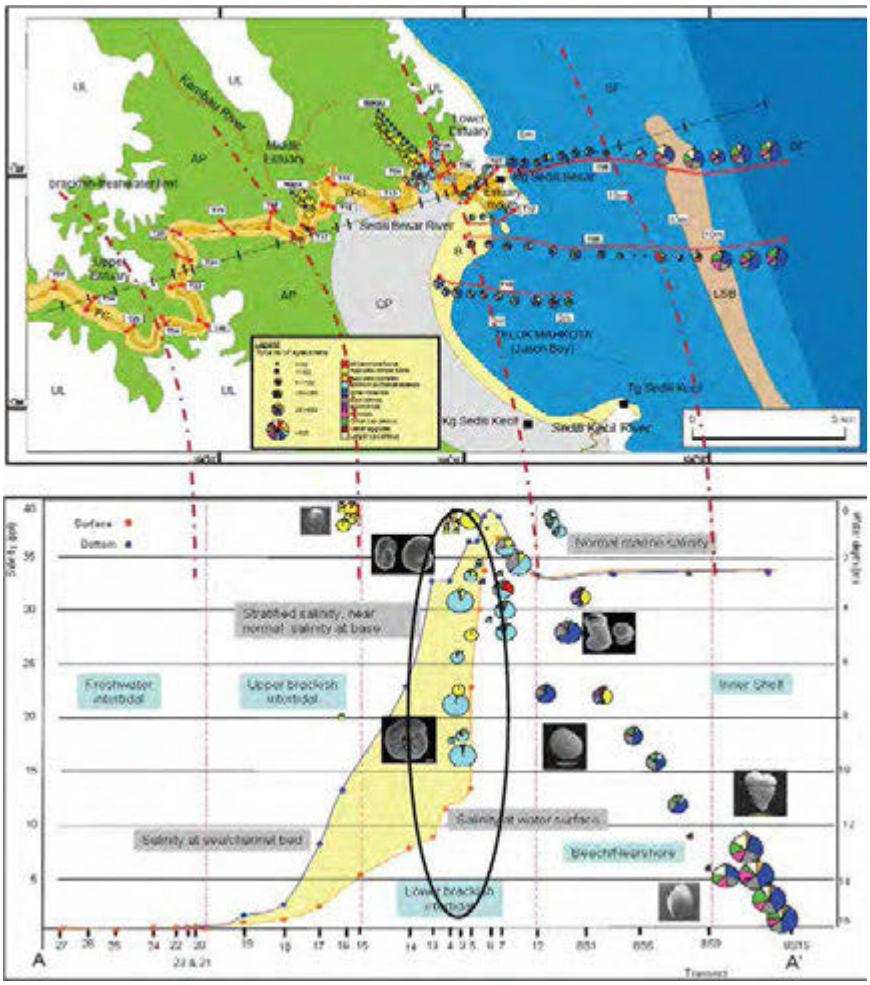

Figure 2: Ammonia cf. takanabensis (light blue) abundance in the stratified water column as observed from Sedili Besar Estuary

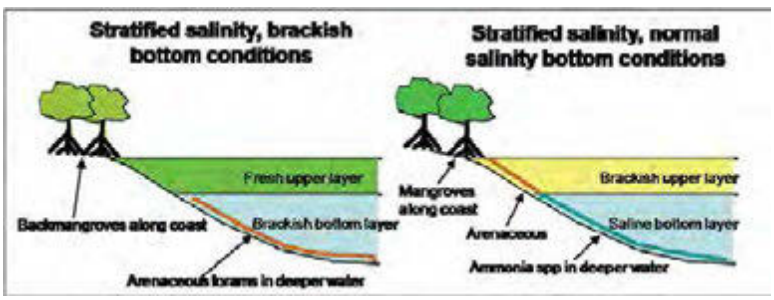

Figure 3: Two models with different stratified salinity

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