## Stratigraphy of the Machinchang and Tarutao Formations C.P. LEE, Jabatan Geologi, Universiti Malaya, Kuala Lumpur

The Cambro - Ordovician Machinchang and Tarutao Formations each consist of about 3000 m of predominantly clastic deposits which are part of the miogeosynclinal shelf sediments of the southern Yunnan-Malayan geosyncline. These two equivalent formations have no known base and each can be differentiated into three informal units (i.e. lower, middle and upper) with the middle unit further subdivided into three subunits.

The lower unit (1620 m in Langkawi; 450 m+ in Tarutao) is a coarsening upward sequence of rhythmically interlayered graded siltstones and mudstones interbedded with thicker fine clayey sandstones. Rare cross-bedding, small load structures, ripple marks, slumped bedding and small burrows are found in this unit which is interpreted as an offshore shelf deposit affected by occasional storms.

The middle unit consists of abundantly cross-bedded, medium to thick beds of coarse to fine sandstones, conglomerates and rare coarse acid tuffs and heavy mineral bands in its lower subunit (575 m in Langkawi; 500 m+ in Tarutao) which is interpreted as estuarine channel lag deposits cutting upper shoreface deposits. The middle subunit (340 m in Langkawi; 700 m+ in Tarutao) is of thin to medium thick, wavybedded, medium to fine grained cross-bedded sandstones with occasional pebbly, argillaceous and fine tuffaceous intercalations. It is interpreted as an upper estuarine facies. The upper subunit (700 m+ in Langkawi; 750 m in Tarutao) is of fine to very fine, thick straightbedded sandstones with thin to thick intervals of very fine acid tuffs and it is increasingly argillaceous upsection. The sandstones are usually parallel laminated or low angle planar cross-bedded with occasional heavy mineral and fragmentary trilobite and brachiopod fossil bands. This subunit is interpreted as upper shore face to beach deposits belonging to a series of barrier-beach complexes.

The upper unit (420 m in Langkawi; 575 m in Tarutao) is a fining upward sequence of siltstone, mudstone (some tuffaceous) and very fine sandstone with minor thin limestone intercalations. Trilobite and brachiopod fossils of Uppermost Cambrian to Lowermost Ordovician age and various types of shallow-marine trace fossils are present in this unit. It is interpreted as an open back-barrier lagoon deposit. It grades upwards into the shelf limestones of the Setul and Thung Song Formations.

The overall interpretation of the facies sequence is that of a highdestructive, wave-dominated delta which had built over an offshore shelf deposit to produce a series of barrier-beach sands aligned parallel to the shoreline with subdued channel sands cutting across them.

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