Structural history of the Upper Palaeozoic Mersing beds of the Kuala Sedili area, Johor: evidences for dextral transpression

MUSTAFFA KAMAL SHUIB, TAJUL ANUAR JAMALUDDIN, ZURAIMI AHMAD & JAMIN JAMIL

Geology Department
University of Malaya
50603 Kuala Lumpur

The complex array of structures found in the Kuala Sedili Area make it a critical area for the understanding of the structural and deformational history of the Eastern Belt. The Upper Palaeozoic Mersing Beds of the Kuala Sedili Area show evidence for 3 successive fold episodes.

The first generation folds (F_1) varies from broad to tight and isoclinal folds with fold axes generally gently plunging to the NNW or sub-horizontal. Their axial surfaces ranging from steep to gently dipping and commonly associated with bedding parallel cleavage (S_1). Transposition of layering during D_1 produce a high-strain zone characterize by minor en-echelon doubly plunging folds associated with dextral slip surfaces parallel to F_1 axes.

The second generation folds (F_2) varies from steeply plunging Z-asymmetrical folds to gently doubly-plunging periclinal folds. They are commonly closely associated with NNW strike-slip dextral shear zones. Well-developed crenulation cleavages (S_2) in the pelitic beds commonly transected the folds.

The third deformation event (D_3) was relatively mild and represented by subvertical kink bands and chevron folds, commonly associated with both minor NW sinistral and SW dextral strike-slip faults. Both the kink bands and chevron folds orientations are generally sub-perpendicular to the general structural strike.

In places, the association of upright to recumbent folds with thrust faults and the occurrences of high-strain zone of dextral shear suggest that the D_1 deformation were derived from intense NE-SW compression with significant dextral strike-slip component (i.e. dextral transpressive). A number of evidence suggests that the D_2 deformation was dextral transpressive. These include 1) the predominance of F_2 Z-asymmetrical folds, 2) steeply dipping dextral shear zones, which bound the zones of intense F_2 folding. 3) Asymmetric pinch-and-swell structure as well as asymmetric boundinages, 4) dextral shear bands, 5) Right-stepping, en-echelon, cleavage-transected periclinal folds. 6) Non-coaxial superposition of en-echelon folds. Dextral transpressive deformation of D_2 produced zones of high flattening strain and NNW-striking dextral brittle-ductile shear zones.

The association of steeply plunging F_3 folds with NW-SE sinistral and NE-SW dextral faults probably indicates that the D_3 deformation was the result of an E-W shortening resulting from a NW-trending sinistral strike-slip deformation.

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The timing of deformation is difficult to constrain due to lack of palaeontological data. However, from regional correlation, it can be speculated that the D_1 structures would have been resulted from strong dextral transpressional deformation as early as Mid-Permian, while the D_2 transpressional deformation could occur as late as Late Triassic. The D_3 strike-slip deformation could possible be a post-Cretaceous feature.

Many workers have reported multiple deformation in the Eastern Belt rocks. The earliest deformations were generally assumed to be compressive. The recognition of dextral transpressive deformations here during D_1 and D_2 implies that the deformations were non-coaxial and rotational in character. It suggests that the initial closure of the Permo-carboniferous basin involved a progressive ENE-WSW shortening with a significant component of strike-parallel dextral strike-slip movement that continued into the Late-Triassic Indosinian Orogeny.