Introduction

The Semantan Formation has been interpreted as deep-marine deposits based on sedimentological and palaeontological studies (e.g. Metcalfe et al. 1982; Metcalfe & Azhar Haji Hussin, 1994; Mohd Shafeea Leman & Masatoshi Sone 2001). Convergence between the Eastmal/Indosinia and Sibumasu blocks during the late Triassic resulted in closure of the Paleo-Tethys Ocean (Hutchison, 1989). Remnants of this ocean are represented by the deep-marine deposits of the Semantan Formation (Middle to Upper Triassic) in the Central Belt of Peninsular Malaysia. Some outcrops of the Semantan Formation at SK Sri Tualang and Taman Mutiara, near Temerloh and along the Karak-Kuantan highway, were studied to gain a better understanding of the deep-marine sedimentary facies and sedimentation processes in the distal parts of submarine fans and basin plain environments (Figure 1).

Lithology

The main facies recognized in the field is shale-dominated heterolithic sand-mud facies, with up to 40 m of composite thickness (Figure 2). The shale is black to dark grey and ranges in bed thickness from few cm to 3 m. It is commonly laminated and interbeds with mudstone, siltstone and thin sandstone. The sandstone, commonly tuffaceous, is light grey, fine grained and medium to well sorted. The beds are either planar or wavy with sharp to gradational contacts. Parallel and cross laminations are common internal structures within the bed.

Depositional Processes and Environment

Turbidity currents triggered by storms or earthquakes are able to carry large amount of sediment from slope to the basinal environment. When the turbidity current energy subsided, the sediment started to settle out of the water mass. Occasionally, thicker sand beds may be deposited by high-energy turbidity flows that were able to travel further out over extremely low gradients into the distal part of the basin. When the energy becomes weaker, turbidity currents are able to spread outwards into the basin and deposit thin sheet-like sandbodies, which typifies the outer fan environment. The shale-dominated heterolithic facies represents the distal parts of submarine fans (outer fan to basin plain) where weak turbidity flows carry silt and fine sand into a predominantly hemipelagic depositional environment. Sedimentary features observed in the outcrops, such as the fine grain size, thin bedded, gradational
upper contact, good lateral continuity, normal graded bedding (fining upward) and thin waning-flow sandy layers in shale indicates distal turbidity current processes. In the basin plain, turbidity currents are still able to entrain additional sedimentary particle as they travel. They produced scour features after loose particles are eroded from the sea floor. Low-angle cross, ripple and wavy laminations, resulting from bottom current reworking or weakly turbulent current suspensions, are also quite common features (Figure 3). Some shale and mudstone beds contain *Chondrites* burrows which are indicative of a quiet environment on the basin plain.

**Conclusions**

The Semantan Formation in the studied area represents the distal part of a submarine fan or basin plain environment, based on sedimentary facies and structures. The main facies is thick shale-dominated heterolithic sand-mud facies. Sedimentary structures in the thin bedded siltstone and sandstone support the turbidity current as the main depositional process that is responsible for supplying sand and silt to the basinal environment. The *Chondrites* burrows give evidence for a low-energy environment on the basin plain.

**References**


**Figure 2**: Shale-dominated heterolithic sand-mud facies deposited by weak turbidity flows that carry silt and fine sand to distal parts of submarine fans (outer fan to basin plain).

**Figure 3**: Normal graded bedding, load cast, ripple laminae, scoured structures signified of turbidity current deposits.