Large-scale collapses of the late Jurassic–Cretaceous Pedawan Basin margin: Evidence from the Batu Kitang–Siniawan area, Sarawak

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New exposures along the realigned Batu Kitang-Siniawan road provide new insights into the sequences of sedimentary facies and facies relationships of the late Jurassic-Cretaceous Pedawan Formation of West Sarawak.

Against the background of black carbonaceous shale, which in places are marked by the presence of sideritic/limonitic nodules aligned along the bedding planes, thin and thick graded beds of feldspathic sandstone, coarse-tail graded, polymictic extraformational conglomerate sheets and channels and several horizons of mass-flow deposits occur.

These mass flow deposits have stratigraphic thicknesses ranging from a meter to thicknesses in excess of 80 meters. They occur within a variety of facies association; thinner ones within sequences of thin-bedded turbidite sandstone and shale, and the thicker ones within coarse, thick-bedded sandstone, channellised and sheet conglomerate and minor shale sequence. Most of the blocks in the thicker deposits consists of contorted beds of thick turbidite sandstone which exhibits a spectrum of soft sediment deformational features resulting in the beds being in coherent, semi-coherent to incoherent state. These blocks range in size from a few centimeters to more than 8 meters in diameter. Closely associated with these contorted beds are shale diapirs, supporting the interpretation that beds were deformed in a high pore pressure condition through elastic and plastic behavior. The matrix of these deposits consists mainly of mud, but in some of the thicker beds the matrix are muddy sand. The sedimentological features suggest that the thicker mass flow deposits originated in the slope and base of slope environments where thick-bedded turbidite and conglomerate were initially deposited. Thinner bedded mass flow deposits could either represent the collapse of the basinal sediments or that they are the distal portion of much larger mass flow deposits.

The frequency of these mass flow deposits and the turbidites suggests that the margin of the Pedawan basin intermittently collapsed shedding their deposits into the deeper part of the basin. The paleoslope of the Pedawan basin determined from the sequence in the Batu Kitang-Siniawan area was to the west and southwest.

The main provenance for the sediments of the Pedawan Formation in the Batu Kitang-Siniawan area is inferred to be uplifted volcanics, older sandstone and chert to the east and northeast. Regional consideration suggests that the sediments of the Pedawan Formation in west Sarawak could have been deposited in several small basins separated by uplifted landmass. These probably resulted in these basins being barred, providing a suitable condition for the accumulation of carbonaceous shale.

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