Sediment Intrusion Phenomena in the Redbeds of Prince Edward Island. A Preliminary Classification of Pre-Collapse Structures

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Secondary sedimentary structures from physical diagenesis of the Stephanian-Lower Permian redbeds of Prince Edward Island can be broadly classified into two major groups:

1) those that reflect post depositional mud enrichment during compaction and
2) those that reflect post depositional mud enrichment and subsequent collapse of the sediments by surface and/or subsurface flow.

Field relationships of the structures suggest that initial mud enrichment and intrusion during compaction has led to a general lowering of the shear strength of the strata which in turn promoted collapse of the sediments during periods of induced shear. Overprinting of primary sedimentary features of the strata by the effects of the physical diagenesis is extremely common in the Prince Edward Island redbeds.

Attention is drawn here to a broad range of pre-collapse mud enrichment and intrusion phenomena, classifying them on the basis of increasing mud enrichment from diffuse matrix concentrations of mud, through mud plumes and mud replacement bodies by stoping to mud intrusion structures by forceful injection.

Both lateral and vertical components in the intrusion pathways are usually discernable, showing a combined overall angle of discordance of around 20° to the enclosing strata. The cause for this prevailing angle of intrusion-discordance is not clear but it presumably represents a vector direction of least resistence reflecting a balance between upward mobility of the sediment from bouyancy related to density inversion and upward restriction of sediment mobility by the loss of permeability from compaction.

This presentation forms part of a long term continuing program of research on the nature, origin, effects, applicability and facies significance of physical diagenesis.