



GEOLOGY HOW TO DO IT . . No.3 SEDIMENTARY STRUCTURES

The following is a basic list of sedimentary structures – what you observe and the process this represents with an interpretation. Of all the geological skills this one is the most pleasing to beginners and professionals alike – as it is providing direct interpretation of your basic observations. It is the only way to unlock those ‘stories in stone’! (* indicates there is an image at the end of the list)

Structure	Observation	Process/interpretation
Bioclast frags/shell lag	Collection of broken bioclasts along bedding surface.	Wave or current action breaking bioclasts and removing sediment.
Bioturbation	Masses of burrows churning up the sediment layers.	Slow sedimentation leaving a great deal of time for organisms to burrow
Convolute bedding	Distorted, folded layers	Disturbance e.g. slumping
Cross-stratification*:	Sedimentary layering within and at an angle to bedding plane. Lines point in current direction.	Currents, depositional feature.
Bidirectional	Lines visible in 2 opposing directions.	Current reversals which might be typical of estuary.
Herringbone*	Another name for bi-directional.	
Hummocky*	Lines show 3-D hummocks	Storm activity producing oscillatory water motion, deeper water than swaley XS
Parallel	Fine, flat, parallel layers	Suspension, low energy
Planar	Lines straight and one direction.	Formed by straight-crested dune.
Swaley	Lines show depressions, which may thicken into ‘swale’ No or few hummocks.	Oscillatory motion of water (e.g. during storms) in shallow water. Hummocks eroded.
Tidal bundles	Sand/mud couplets with 14 couplets in a bundle	Tidal cycle (fortnightly lunar cycle) typical of estuaries.
Trough	Lines showing trough shape	Bedform is curved (e.g. barchan or sinuous dune) and view is into direction of dune movement.
Desiccation cracks*	V-shaped in vertical profile, Irregular shapes, can be polygons	Wet muds and silts which have dried
Escape structures	Columns, tubes of sediment	Escape of water or organisms, rapid sedimentation
Flame structures*	Upward, pointed ‘flame’	Sed. movement due to compaction
Flute casts*	Elongate gouge with bulbous end and flared end.	Currents eroding sediment.
Graded bedding* energetic	Coarser grading to finer grains	Flow becoming less
Groove casts	Lines gouged out on surface	Erosional feature, caused by currents dragging objects along sed surface.
Load casts	Bulbous, rounded protrusions	Weight of overlying sediment (usually sandstone over mudstone), a deformational structure.
Mud drape*	Thin layer of mud draped over a structure such as a ripple	Still stand of the water column.

Ripples, symmetrical	Both sides of ripple same angle.	Wave formed (oscillatory motion)
Ripples, asymmetrical*	Two sides not the same angle. There is a gentle stoss side, and a steeper lee side.	Indicative of currents moving sed. Lee slope is inclined in direction of current flow.
Ripples, climbing	Ripple cross-laminae overlap	Rapid sediment deposition.
Ripples, interference	Two intersecting trains of ripples.	Two influences of currents, e.g. may be wave and wind interfering in shallow water.
Rip up clasts*	Fragments of older sediment often incorporated in the beds of younger sediment.	Current activity, ripping up semi-lithified beds and re-depositing them as pebbles elsewhere.
Stromatolites	Laminated build ups	Algal layers trapping carbonate mud as they grow
Stylolites	Wiggly lines in limestones	Compaction and solution after the sediment is formed

