

SEDIMENTARY STRUCTURES CAUSED BY SEISMIC EVENTS

by

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The incorporation of seismic events into the framework of modern "event stratigraphy" depends on their fingerprinting in the sedimentary record. While seismic fingerprints are lost in turbidites and slumps, which may or may not have been triggered by earth quakes, distinctive seismites can be expected in basins, in which the resulting lateral sediment transport was minimal.

One group of potential earthquake indicators is found in laminated slope muds, whose gradational compaction is reflected by a graded sequence of deformational features such as pleating, microfaulting, crumbling and homogenization.

Another group of potential indicators are shell beds (coquinas) with unusual biostratigraphic relationships of skeletal particles. In vertical sections through some "filament limestones", shells are preferentially stacked in a convex-down position, suggesting vertical settling and shaking into position of resuspended material. In another case the accumulation of shell material into starved wave ripples disagrees with the current orientation of conical shells across the ripples. This may reflect the extreme length of tsunami waves that are recorded as waves by the slow process of accumulation, but as currents by the faster re-orientation of individual shells.

A third group of phenomena is more questionable. It relates to nodular cephalopod limestones, in which sedimentation relative to diagenesis may have been so slow that already lithified layers could be exposed by shock erosion. This would explain how the narrow cavities left after the solution of aragonitic shells became filled with fine mud resettling from suspension after the event.

A better understanding of the hydrodynamic consequences of seaquakes and the critical evaluation of relevant bedding phenomena may enable future field geologists to identify seismic events in ancient sediments with more confidence.