STORM BEDS: THEIR SIGNIFICANCE IN EVENT STRATIGRAPHY

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Stratigraphy quo vadis? The answer of the symposium participants was that, more than anything else, land- and sea-based stratigraphers should get together to find a common language and coordinate their goals, and also should adapt their traditional uniformitarian views to the geologic time scale, at which rare events unlikely to be sampled by our short human experience become a dominating factor. Some of these events, such as climatic fluctuations, sea level changes or the consequences of asteroid impacts, are very rare and may have global effects. Others, such as earthquakes, volcanic eruptions, floods, storms and turbidity currents, are only regional in effect; but they have the right size to be recorded by individual event beds and are common enough to form the "grain" in many sedimentary sequences. Deviating from earlier usage (Seilacher, 1981) I now propose to call the level of research centered on the analysis of individual beds "event stratigraphy" in order to make the broader term "event stratigraphy" available for the study of rare events at any scale.

The present review on storm deposits draws largely from work in the project "Fossil-Lagerstätten" of the Tübingen Sonderforschungsbereich 53 ("Palökologie") and its recent symposium volume (Einsele and Seilacher, 1982). Since that book contains all the necessary details, illustrations and references, I can restrict myself here to a few general remarks.

A. Sandy Tempestites

Sandy storm beds alternating with pelitic layers are common in shallow marine sequences. They lend themselves to a basic understanding of the processes involved in storm sedimentation because they show little complication by diagenetic processes, and because they can be directly compared with the familiar sandy turbidites in deeper basins and with the less well-known flood deposits (inundites) in estuarine and fluviatile environments.

Tempestites, turbidites and inundites have in common:
(1) the upward grading of grain size and depositional structures (Bouma sequence) that reflect erosion during the onset and a succession of depositional regimes during the waning of the event,
(2) a biological countergradient of burrows (or plant roots) penetrating to different levels below the post-event sediment surface, which was muddy in typical cases, and
(3) rapidly deposited layers that were potential quicksands and became therefore secondarily deformed by fluidization and water escape in many cases.

Differences between the three types refer to the fact that (Figure 1):
(1) turbidites and inundites are current-dominated, while tempestites reflect mainly wave action,
(2) inundites and tempestites typically consist of sediment that had become pre-sorted into sand and clay during fair weather intervals, while turbidites, having picked up various grain sizes on their way, usually show a less bimodal grain size distribution and therefore lack the sharp interface between sandy and muddy part of each event deposit,
(3) inundites commonly contain graded subcycles reflecting the shift of stream courses during one flood, and