AAPG Annual Convention
Salt Lake City, Utah
May 11-14, 2003

Joep E.A. Storms[1], Donald J.P. Swift[2] (1) Delft University of Technology, Delft, Netherlands
(2) Old Dominion University, Norfolk, VA

Architecture of Shallow-Marine Sequences: Insights from Numerical Modeling

A two-dimensional multiple grain size process-response model (BARSIM) was used to study the geometry, internal architecture, preservation potential, bounding surfaces, condensed and expanded sections and facies assemblages of stacked parasequences and stacked high-frequency sequences. Although both depositional sequences may develop over comparable temporal and spatial scales their sea-level history differs by definition. BARSIM makes use of variable time steps to simulate individual storm and fair-weather periods. This results in a high-resolution simulated stratigraphy which reveals centimeter-scaled beds as well as areally extensive sequence stratigraphic bounding surfaces.

Both the simulated sequences show condensed sections due to starvation (*starvation condensation*) or due to wave erosion from high-energy events (*scour condensation*). Shoreface sediment is sorted in two ways. Progressive sorting occurs because sediment is most likely to be reworked several times before it is permanently deposited and preserved. Coarse sediment will preferentially be deposited near the shoreline, while finer grains will be bypassed and deposited in deeper water as flow competence decreases in an offshore direction. In addition, only the bases of rare event beds are preserved at the shoreface as successive events rework event beds. Beds originating from minor events or from fair-weather conditions are completely reworked by larger events. This leads to a preferred preservation of the lower portions of event beds that originated only from rare events thereby affecting the characteristic grain-size distribution of those beds. Both mechanisms, progressive sorting and stratal filtering, result in characteristic grain-size distributions as well as facies assemblages along the shoreface-shelf.