facies are, in ascending order, a prodelta shale and siltstone facies, a distributary channel sandstone facies, an overbank shale and siltstone facies, an interdistributary bay and splay channel facies, an estuarine sandstone, shale, and siltstone facies, and a lagoonal sandstone and siltstone facies. This genetic vertical sequence package, typical of fluvial-deltaic sediments, is typified by an upward change in the scale of sedimentary structures, an increase in radioactivity of the gamma ray log, a decrease in grain size, a decrease in permeability, and a subsequent increase in the amount of interstitial clay matrix.

Permeability is primarily controlled by packing, sorting, the presence of ductile rock fragments, and the amount of clay matrix. Permeability of the distributary channel sandstone facies, the primary reservoir, decreases from 60 to 100 md in trough cross-bedded sandstones to 20 to 60 md in rippled sandstones and siltstones. Low permeability values (0 to 20 md) are characteristic of facies containing siltstone and shale.

The distributary channel sandstone facies (28 to 62 ft or 8 to 19 m thick) is continuous across the pilot project area and varies in thickness in a predictable manner. Dip directions of trough cross-beds observed in four oriented cores suggest that the distributary channel flowed to the west-southwest across the project area. The overbank shale and siltstone facies and the interdistributary bay and splay channel facies are not continuous across the project area and are interpreted to have been deposited in the topographically low area adjacent to the distributary channel.

JORDAN, TERESA E., Cornell Univ., Ithaca, NY

Crustal Loading and Foreland Basin Evolution, Cretaceous, Western United States

Two-dimensional computer modeling of the development of the Andean-type Idaho-Wyoming thrust belt shows that formation of the foreland basin was controlled by the isostatic subsidence of an elastic crust due to thrust loading. The palinspastic shape of the sedimentary wedge on the west side of the Cretaceous Western Interior seaway corresponds best to predicted crustal downwarping by thrust plate loads as computed from cross section with a flexural rigidity of 10^{23} Nm. Material eroded from the uplifted thrust plates and deposited in the basin effectively redistributed the load, causing subsidence over a much wider area than could have been accomplished only by loading in the thrust belt.

After three major Cretaceous thrust events, paleotopography was reconstructed from load and subsidence. The resulting mountains, gentle alluvial plain, and flat sea floor correspond well to local paleogeographic data and to topography of the modern Andean foreland system. The predicted sea floor level rose through time, as did reported eustatic sea level. In the thrust belt, topography was controlled by the subsurface geometry of thrusts (particularly positions of ramp zones) and by isotatic subsidence.

This quantified mechanical model and data from only thrust belt or basin may allow prediction of the geometry of the other part of the foreland couplet. Furthermore, with this mechanical model and future models of other foreland systems (e.g., Himalayan-type), exploration models in foreland basins in frontier regions may be developed from a knowledge of regional plate-margin tectonics.

KAHLE, CHARLES FRANZ, Bowling Green State Univ., Bowling Green, OH

Origin of Ooids in Pleistocene Miami Limestone, Florida Keys

Scanning electron microscopy reveals that ooids in this marine unit are of biogenic origin in the sense that endolithic and epilithic algae, fungi?, and mucilage played primary roles in constructing laminae in the cortex of each ooid. Three end-member types of original laminae are recognized (1, 2, 3, below); each is made up of fundamental building blocks of aragonite crystals typically shaped like miniature batons. (1) Filaform (common): laminae composed of a network of calcified algal or possibly fungal filaments, or both. Batons in such laminae are typically less than 1 μ long and most are randomly oriented relative to the nucleus. The batons formed within a mucilaginous sheath surrounding the original algae or fungi. Filaments in such laminae could go through life as epiliths or begin as epiliths that became endoliths which eventually became epiliths once again. (2) Spheroform (rare): laminae composed mainly of calcified spherical bodies of algal or fungal origin. (3) Sheet (common): pavement-like layers of batons that are typically 0.5 to 2.0 μ long and are oriented tangentially relative to the nucleus. Most batons in type (3) laminae originated in a layer of mucilage or mucous that did not surround algae or fungi, but which enveloped all or much of the surface of a developing ooid. Examples of typical sequences of laminae development are (1)-(1)-(1) etc, (3)-(3)-(3) etc, and (1)-(3)-(1)-(3) etc, possibly with a final type (2) lamina. Contrary to evidence from many modern marine aragonite ooids, filamentous algae was not a constructive factor in the formation of all laminae in the cortex of all ooids in the Miami Limestone.

KARL, H. A., P. R. CARLSON, and D. A. CACCHIONE, U.S. Geol. Survey, Menlo Park, CA

Factors Influencing Sediment Transport at Shelf Break

Recent investigations of sediment dynamics at the shelf break suggest that the factors which control the transport of sediment there can be grouped into two major categories: oceanographic and geologic. Oceanographic factors include tides, surface waves, internal waves, fronts, and meteorlogically driven currents that create a wide range of unsteady and quasi-steady water motions whose influences on sediment dispersal is poorly understood. These phenomena affect sediment along the shelf break in zones that have a large spatial and temporal variability. Geologic factors include shelf geometry and physiography, tectonism, and sediment type and supply. These factors influence shelf-break processes either by modifying oceanographic processes or by controlling the geologic setting of the shelf break. An example of the former is that the physical structure of the bottom boundary layer depends strongly on the shape of the sea floor. An example of the latter is that sediment supply partly determines whether the shelf break is a net depositional or an erosional zone.

Whereas both oceanographic and geologic factors interact to influence sediment transport processes at the shelf break, a particular continental margin may be dominated by one of these factors. For instance, such oceanographic agents as the Gulf Stream and winter storms control sediment dynamics over large segments of the east United States coast, whereas such geologic factors as large sediment supply and active tectonism overshadow oceanographic phenomena in the eastern Gulf of Alaska. Many intermediate conditions also exist. An example is at the complex shelf break off southern California, where active tectonism and oceanographic phenomena nearly equally influence shelf-edge processes.