sediment input, evolution and integration of sediment dispersal systems, and varying water depth.

Morrowan time was characterized by a widespread transgression by a shallow sea flanked by low-lying, muddy strand plains. At this time the surrounding uplifts were relatively low-relief features and supplied only fine-grained sediment to the basin. By Atokan time, vertical movements elevated the Uncompahgre uplift to the west of the trough, and coarse alluvial fan, braided stream, and fan-delta complexes prograded eastward into the basin. During this episode of intense diastrophism to the west, the eastern side of the trough remained fairly stable and a broad, shallow-marine shelf sloped gently off the Sierra Grande arch. Farther south, carbonates accumulated on the Pecos shelf.

This general depositional and paleogeographic pattern continued into Desmoinesian time. However, to the north the Cimarron arch had become a major positive feature by earliest Desmoinesian time and several braided stream–fan-delta systems prograded southward and southwestward into the basin. By middle Desmoinesian time an extensive coastal plain had developed along the western margin of the trough, with low-sinuosity rivers feeding lobate deltas.

A major middle to late Desmoinesian transgression inundated this coastal plain and shallow shelf conditions prevailed throughout most of late Desmoinesian time. In latest Desmoinesian time, southward prograding fluvial-deltaic systems began filling the northern part of the basin causing a net southward regression. By Early Permian time the basin was dominated by continental sedimentation with southward flowing braided streams.

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Spectrum of Deltaic Systems in Pennsylvanian Tectonically Active Cratonic Basin, North-Central New Mexico

The Pennsylvanian sedimentary fill of the Taos trough of New Mexico contains a variety of coarse-grained deltaic systems typical of tectonically active, cratonic basins. This delta spectrum reflects the interaction of a large number of variables including: water depth, substrate stability, basin energy, fluvial feeder system variations, and tectonic activity. The deltas evolve from small, coarse-grained fan-deltas into more extensive wave-modified, river-dominated, lobate deltas. This evolutionary trend results from an increase in water depth and basin energy.

During Early Pennsylvanian time, vertical movements west of the Taos trough elevated the Uncompahgre uplift and coarse-grained fan-deltas prograded eastward into the basin. When these deltas prograded into water deeper than 4 m, frontal splays spread bedload sediment on the delta slope. Continued progradation gave rise to coarsening upward sequences 4 to 15 m thick capped by coarse channel deposits. When deltas built into very shallow water (<4 m), steep delta foresets developed. If the fan deltas advanced over thick mud sequences, syndepositional deformation occurred.

As the delta complexes extended into the basin, a broad coastal plain was constructed, and the braided streams evolved into low-sinuosity, bed-load rivers. Water depth in the basin increased, and channel-mouth sand was reworked into extensive delta-front sheet sand bodies by the higher wave energy. On delta abandonment, delta-front sand was reworked into barrier islands with associated washovers, and inlets. In contrast, fan-delta abandonment is only represented by thin, bioturbated calcareous sandstone or limestone beds capping the progradational sequence.

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Radiolarian Characteristics of Major Oceanographic Environments

Plankton samples from major oceanographic environments (mainly DUCA high-speed net tows) and evaluated by radiolarian species and microplankton-group (foraminiferan, pteropod, diatom, copepod, etc) compositions, diversities, and densities have been used to characterize the radiolarian components of these major oceanographic environments.

Eastern and western high productivity boundary currents contain high standing crops of polycystine radiolarians, with the eastern boundary current revealing a higher radiolarian standing crop and diversity than the western boundary current region. The eastern boundary current also reveals its greater upwelling by containing more deep water upwelled individuals in the surface water than does the more mesotrophic western boundary current. Open ocean oligotrophic gyres are dominated by colonial radiolarian species and other species containing algal symbionts. Some extremely eutrophic shelf regions exhibit very low diversities and densities of polycystine radiolarians although the general microplankton standing crop is extremely high. Seasonal studies of the south Texas shelf exhibit oligotrophic to eutrophic conditions (which can be characterized by the radiolarian fauna) that can be related to the seasonal physical oceanography of the area.

The evaluation of detailed vertical samples has suggested radiolarian interactions with other planktonic groups, such as a decrease in radiolarians during the blooming of solitary centric diatoms. Vertical samples also suggest interactions among different groups of radiolarians such as the situation in which polycystine radiolarians may be competitively excluded on either a large (regional) or small (patchy) scale by the presence of ancantharian radiolarians.

Several radiolarian characteristics of major oceanographic environments can be and have been used to interpret paleo-oceanographic environments.

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Genetic Stratigraphy and Provenance of Baca Formation of New Mexico and Eagar Formation and Mogollon Rim Gravels of Arizona

The Baca Formation of New Mexico and the Eagar