result of organo-mineral metamorphism. Consequently, they are useful thermal indices, especially for carbonate rocks and cherts in which other organic and mineral indices are virtually absent. Because of their mineral composition, conodonts can be concentrated from a variety of sedimentary rocks (particularly limestone, dolomite, shale, and chert) and persist into low-grade metamorphic rocks (marble and metacarbonate interbedded with chlorite-, biotite-, and garnet-bearing pelitic rocks).

Relatively new applications for conodonts include: (1) dating of siliceous facies; (2) dating of low to medium-grade metamorphic rocks; (3) timing of thermal events; (4) assessment of hydrocarbon and mineral-resource potential; and (5) tectonic interpretation. New techniques for thermal assessment and age determination, such as autofluorescence and stable-isotope analysis, are being actively investigated by several workers. Conodonts are versatile tools that provide chronologic and thermal clues for interpretation of the geologic history and evaluation of the resource potential of Paleozoic and Triassic sedimentary and metasedimentary terranes throughout the world.

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Conodont-Based Assessment of Thermal Maturity in Paleozoic and Triassic Rocks, Central Great Basin

Conodonts (marine apatitic microfossils) are of organic origin and have biostratigraphic value. They are used as mineral thermal indices that undergo visible color changes between 50 and 500°C. Using these changes, color alteration index (CAI) maps were compiled for Ordovician through Triassic Systems in Nevada and adjacent parts of Idaho, Utah, and California using more than 5,000 samples. The maps show three thermal intervals which generally correspond to: (a) the thermal window for oil generation (CAI 1 to 2); (b) the upper thermal interval for gas generation (CAI 2 to 4.5); and (c) the thermal cutoff for most hydrocarbon generation (CAI >4.5).

The Great Basin is one of the most difficult areas in which to interpret thermal metamorphism in Paleozoic and Triassic rocks. Original burial metamorphic patterns are disrupted by thrust and normal faulting, masked by post-Triassic sedimentary and igneous rocks, and "overprinted" by post-Triassic thermal events. Nevertheless, maps show broad regional thermal patterns for Paleozoic and Triassic Systems which help delineate prospective areas for continued hydrocarbon and mineral exploration.

In general, Ordovician through Triassic rocks west of 117°30′W longitude and most Ordovician through Pennsylvanian rocks north of 41°30′N latitude and west of 113°W longitude and in the Oquirrh basin have CAI values >4.5 and appear to be unfavorable targets for hydrocarbon exploration.

Ordovician through Triassic rocks in central Nevada and Millard County, Utah, have regional moderate to low CAI values. This area, which includes the only two producing oil fields in Nevada, should provide a variety of hydrocarbon exploration targets. The Paleozoic and Triassic rocks of the Overthrust belt of southeast Idaho and Utah predictably have low to moderate CAI values.

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Cretaceous Sea Level and Stratigraphy, Eastern Arabian Peninsula

The stratigraphy of the eastern Arabian Peninsula should accurately record Cretaceous sea level changes owing to long-term regional tectonic quiescence and carbonate platform deposition. The setting is thus not dependent on coastal or shelf-edge processes. We have constructed from well studies and numerous published sources a regional sea level curve for the Cretaceous using paleobathymetric relations within precisely dated stratigraphic sequences adjusted for isostatic response to sea level motion. The isostatic response for any section encountered in a well can be calibrated by constructing a depth/burial curve which is corrected for compaction, sediment loading, thermal cooling, and tectonic subsidence.

The Cretaceous of the eastern Arabian Peninsula is comprised of three lithic sequences bounded by four regional unconformities. The lithic sequences are: the Lower Cretaceous Thammama Group, shallow-water carbonate rocks; the middle Cretaceous Wasia Group, shallow-water carbonate rocks; and the Upper Cretaceous Aruma Group, deep-water shales changing laterally into shallow-water limestones. The unconformities, agreeing closely with eustatic sea level lows, occur during: the latest Jurassic/earliest Cretaceous, the middle Aptian, the late Cenomanian-Turonian, and the latest Cretaceous/earliest Paleocene. The Turonian exposure was reinforced by regional tectonic upwarp. Low stands of less magnitude occur during the Barremian, late middle Albian, and middle Cenomanian. A Valanginian unconformity, recognized in the stratigraphic sequence of eastern Saudi Arabia, does not appear to be regional in extent. In the Upper Cretaceous (Coniacian-late Campanian), the effect of regional tectonic subsidence on the sedimentary facies overshadows the general eustatic high stand.

Our examination of carbonate provinces elsewhere indicate that the major unconformities are not localized and therefore probably represent global eustatic sea level lows.

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Freshwater Cementation of Holocene and Jurassic Grainstones

Freshwater cementation of Holocene sands in the Bahamas provides a modern analog to enhance our understanding of some cements in Jurassic grainstones of southern Arkansas. The Joulters Cays, three late Holocene islands on Great Bahama Bank, formed when ooid sands were subaerially exposed and lithified by freshwater cements. Cement fabric above the standing water table (vadose zone) and below (phreatic zone) is strikingly different. Vadose cements, characterized by