sabkha and dune facies were deposited over marine carbonate rocks. Desert conditions prevailed at the eastern edge of the sea as it transgressed eastward and regressed westward across northern Arizona. Eolian dunes with south-dipping cross-beds were formed by trade winds blowing southward toward the paleoequator south of Arizona during the Permian. Extensive coastal and continental sabkhas formed between the restricted mud flats and the dune fields. Westward, the restricted marine deposits of dolomite characterized by bivalves and gastropods gave way to shallow open-marine deposits of brachiopods, byrozoans, corals, and crinoids. The westward regression ended with a rapid transgression that deposited the Kaibab Limestone across the sabkhas and dune fields of the Toroweap and Coconino formations.

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Carbonate Depocenters and Facies Distribution on Passive Cambrian Shelf and Middle Ordovician Foreland Basin, Appalachian Orogene, Virginia

Depocenters in the southern and central Appalachians in Virginia appear to have been a major influence on thickness and carbonate facies distribution on the passive Cambrian-Ordovician shelf and in the Middle Ordovician foreland basin.

The Upper Cambrian Nolichucky Formation illustrates sedimentation patterns associated with a shelf embayment (located above the southern Appalachian depocenter) on the passive Cambrian shelf. The Nolichucky Formation is an onlap-offlap, shallow ramp to deep shelf sequence that consists of peritidal stromatolitic carbonate rocks, ooid grainstones, deeper ramp ribbon carbonate rocks, and embayment plain shale/siltstone/flat-pebble conglomerate facies. Facies bands are normal to the regional shelf edge and parallel the outline of the shelf embayment.

The Middle Ordovician sequence illustrates the influence of depocenters on foreland basin evolution during a time of profound tectonism, when the shelf edge was uplifted, deformed, and subjected to erosion. The Middle Ordovician ramp-to-basin sequence is an onlap-offlap package, that consists of peritidal fenestral lime mudstones, shallow subtidal cherty wackestones, ramp and downslope skeletal buildups, deeper ramp shaly skeletal wackestones, and basinal black limestones and shales. Widespread ramp and basin deposition commenced in southwest Virginia during south to north transgression from the southern depocenter. Widespread downwarping extended the basin into northern Virginia. Rapid clastic influx coupled with progradation of the carbonate ramp caused the southern basin to fill.

Recognition of depocenters associated with carbonate sequences in orogenic belts is important if controls on direction of transgression, facies distributions, and thicknesses of units are to be better understood. Furthermore, the carbonate depocenters appear to localize development of subsequent clastic wedges.

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Fluorescence of Acritarchs in Study of Marine Kerogen

Acritarchs, the organic-walled palynomorphs of algal affinities, exhibit strong fluorescence colors depending upon species type, stage of thermal maturity, and degree of oxidation.

This fluorescence readily enables identification of acritarchs in gross kerogen concentrates and provides a means of distinguishing acritarch fragments in poorly preserved kerogen assemblages.

Although acritarchs show similar fluorescence colors in an autochthonous assemblage, there may be minor differences as a result of different types and wall thicknesses. Similarily, the varying degrees of oxidation of individual palynomorphs can give differing colors.

Thick-walled marine algae also fluoresce but can be distinguished from acritarchs by the differences in intensity of the fluorescence colors.

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Depositional Environments and Kerogen Types

No abstract available.

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Hypothesis Involving Dilation and Natural Hydraulic Fracturing to Explain Petroleum Reservoirs in Monterey Shale, Santa Maria Area, California

Fractured reservoirs in the siliceous Monterey Shale of the Santa Maria area represent anomalous lithology and anomalous type of fracturing. Some, pehaps all, reservoirs are not fractured chert but chert embrittled by dolomitization. Abundant reservoir extension fractures are disordered and open, commonly containing epigenetic dolomite breccias. These fractures are partly dolomite-cemented but contain common open voids, many 15 cm across, some larger. Breccias locally have an exploded appearance and contain matched fragments separated by veins, which apparently were injected as a slurry of water, oil, and fragments of dolomite and dolomitic Monterey Shale.

The highly organic Monterey served also as source rock and probably originated as richly diatomaceous slope sediment beneath an oxygen-minimum zone at a depositional site much larger than the Santa Maria area, and not confined to a specific silled basin. Local dolomitization may have been due, at least in part, to rising solutions and injected slurries.

These reservoirs are explained by an hypothesis involving repeated episodes of rock dilation followed by natural hydraulic fracturing, all produced by continued episodic tectonic compression of the region (principal, maximum, effective stress oriented northeastward). High fluid pressures enlarged underpressured dilation microfractures into macrofractures and produced breccias by hydraulic fracturing. Viscous oil derived from the Monterey Shale was forced into voids as part of overpressured slurries whose breccia fragments were