exists between grain size and volume of quartz cement. These relationships indicate that silica was selectively dissolved via intergranular pressure solution in finer grained sandstones and that, at least locally, quartz cement was selectively precipitated as overgrowths on detrital grains in coarser grained sandstones. Little primary porosity is preserved in the pressolved, finer grained sandstones, whereas appreciable primary porosity may be retained in coarser grained sandstones that contain more quartz cement.

These relationships are also sensitive to thermal maturity, which increases eastward across the basin. This thermal trend is probably related to elevated temperatures associated with intrusions in as much as maximum burial depth of the Hartshorne decreases eastward. As thermal maturity increases, more intergranular pressure solution is evident for a given grain size whereas the volume of quartz cement does not change significantly. Thus, primary porosity tends to be preferentially preserved in areas of lower thermal maturity.

In areas of higher thermal maturity, the sandstones have lost more silica via intergranular pressure solution than has been precipitated as quartz cement whereas the opposite is true in areas of lower thermal maturity.

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Depositional Facies of Cretaceous Spring Canyon Member, Blackhawk Formation, Book Cliffs, Utah

Facies study of the Spring Canyon Member indicates a shoreline characterized by beaches and river mouth bars. We envision the wave-affected river mouth bars building seaward and furnishing sediment to the downdrift, protected beaches. The beach sequences are characterized by a shoreface containing laminated-to-burrowed beds overlain by cross-bedded sands and a foreshore of parallel laminated sand. In contrast, the river mouth bar sands are hummocky bedded.

Associated transitional marine facies include channel-fill, splay, levee, swamp, and bays containing coal deposits. Three principal coal seams within this facies are related to the three Spring Canyon beaches. The lower two formed in a delta plane. The upper coal is associated with a marginal marine sheet sand. Low sulfur content, roots, plant remains, and continuity of coal seams suggests in-situ coal deposition in swamps flanking channels. Paleocurrent directions within most channels indicate a landward flow perhaps due to storm surges or flood tidal effects. The transitional facies contains abundant marine indicators including oyster shells, terrido borings, *Ophiomorpha,* and holes excavated by rays.

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Paleo-Oceanographic Significance of Cretaceous and Cenozoic Diatomites Along Eastern Pacific Margin

Diatomaceous mudstones and laminated diatomites punctuate the upper Mesozoic and Cenozoic marine sequence of California. These largely bathyal deposits provide a clear record of upwelling, primary productivity, and development of oxygen minima along the eastern margin of the North Pacific Ocean during the past 80 million years. Marine diatomites exposed in uplifted continental margin sequences in California include the uppermost Cretaceous Marca Shale Member of the Moreno Formation, the middle and upper Eocene Kreyenhagen Formation, and the middle to upper Miocene Monterey Shale. All three of these deposits contain pelletal or nodular phosphorite and represent fossil analogs of various Recent basin plain, slope, and outer shelf settings in which organic-rich diatomaceous sediments are currently accumulating beneath the well-developed oxygen minimum layer of the marginal eastern Pacific. Moreover, each of these units forms a known or potential source rocks for hydrocarbons in this region. The deposition and preservation of Cretaceous, Eocene, and Miocene diatomites along the California margin each demand: (1) a period of intensified upwelling, primary productivity, and associated development of oxygen minima via climatically induced accelerations of atmospheric and oceanic circulation; (2) coincident reductions in the flux of terrigenous clastic material to the continental margin through eustatic and/or tectonic adjustment of adjacent strandlines and pathways of sediment distribution; and (3) tectonic production of appropriate continental margin depocenters. Each diatomaceous unit can be correlated with a major climatic event or threshold associated with increased polar refrigeration, resultant increases in the pole-to-equator thermal gradient, compression of middle and low latitude surface circulation, and associated intensification of upwelling and siliceous productivity.

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Predication of Organic Maturation Levels: Scotian Shelf

Recorded maximum bottom-hole temperatures may vary significantly from true formation temperatures. Circulation time and time since circulation are important variables in estimation of equilibrium bottom-hole temperatures. A theoretical temperature correction technique incorporating these factors was applied to well log-heading data to compute 191 static temperatures for 64 wells in the Scotian Shelf. A linear regression, performed on 140 computed temperatures produced an average geothermal gradient of 2.66°C/100 m; correlation coefficient 0.97. A geothermal gradient map constructed from the corrected data shows that areas of thicker sediment accumulation are marked by thermal highs (e.g., Abenaki, Sable subbasins), whereas areas of shallow basement coincide with thermal lows (e.g., LeHave Platform, Canso Ridge).

A technique for calculating maturation level of organic matter based on Lopatin's method and corrected bottom-hole temperatures was developed for the Scotian Shelf. A geologic model is constructed by superimposing a temperature grid on burial history curves. From this, TTI (Time-Temperature Index) values are derived which give the maturity level for specific sedimentary horizons. A comparison of 47 calculated TTI values with vitrinite reflectance measurements for 13 wells established a calibration of this technique for the Scotian Shelf. A correlation coefficient of 0.96 was obtained for the relation, log TTI = 6.7367 log Ro + 2.7317. This particular calibration of TTI is probably valid only for the Scotian Shelf since tectonic age and history play a role in the calibration. The procedure of calculating TTI values is readily adaptable to a computer since a standard approach is followed for every well.

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Initiation of Salt Flow, East Texas Basin

Salt structures constitute five domains subparallel to the basin margin and the Louann Salt updip limit: (1) thin (< 340-640 m) planar salt wedges at the margin; (2) low-amplitude periclinal salt pillows (mother salt 550-625 m thick); (3) intermediate-amplitude elongated salt anticlines separated by synclines evacuated of salt