bonate buildups. Today, these blocks are exploration targets in southwest Alabama.

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Depositional Environment of Lower Permian Stone Corral Formation

The Lower Permian Stone Corral Formation is a 5-8 ft thick unit of dolomitic limestone and shale in a sequence of red beds that crops out in south-central Kansas. It forms a good stratigraphic marker bed in the subsurface, where it consists mainly of anhydrite (the Cimmaron anhydrite) up to 100 ft thick.

At outcrop, the formation is weathered and consists of 2 interfingering facies—a crinoidal-echinoidal grainstone (in the north) and a laminated mudstone (in the south). Both the grainstone and mudstone exhibit diagenetic alteration. The grainstone is composed of well-rounded allochems of crinoid and echinoid fragments with scattered ooids, sponge spicules, peloids, and possible foraminifers and ostracods. Layers of sponge spicules alternate with peloid or ooid layers. The mudstone facies has a clotted texture and has laminations defined by the occurrence of fenestral fabric and peloids. Dolomite occurring in the Stone Corral Formation is of secondary origin.

The grainstone is interpreted as being lagoonal in origin, whereas the mudstone facies is interpreted as supratidal. The grumous (clotted) texture may indicate phreatic diagenesis. The absence of anhydrite on outcrop, where it was presumably leached by surface waters leaving the less soluble dolomite, is additional evidence for a regional disconformity above the unit on the eastern side of a large, shallow, evaporitic basin.

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Mechanical Analysis of Salt Dome Growth in East Texas Basin

Analysis of the early pillow phase of salt dome growth is used to interpret observations of salt dome growth in the East Texas basin. Two limiting models are those of "redistribution" (R), in which erosion and sedimentation keep the overburden surface planar, and "no redistribution" (NR), in which the topography induced by dome growth is not modified. Spacing between nearest neighbor domes, (13 $\pm$ 4 km) and initial salt thickness ($h = 1.8 \pm 0.3$ km) yields a spacing/thickness ratio of 7, with range from 4 to 11. If salt viscosity (η) is less than overburden viscosity (η_1), and overburden thickness is $h_1 \geq h$, this implies $0.01 < \eta/\eta_1 < 1$ for both (R) and (NR). Growth rate is proportional to amplitude ($dA/dt = A/t^*$), where A is half the relief between the pillow top and the lowest point of the peripheral sink, and t^* is a characteristic time. For a salt viscosity of 10^{18} poise, and a density contrast of 0.2 g/cm^3, t^* ranges from 0.1 to 1 m.y. for (R), with values 2-5 times larger for (NR). For the former, a dome with 100-m amplitude grows at rates ranging from 1,000 to 100 m/m.y.; maximum reported rates of 40-100 m/m.y. are in fair agreement. Both facies patterns around domes and slower growth rates can be explained by the presence of substantial dome-induced topography. Spatial patterns and growth histories of groups of domes are investigated by following the development of a variety of local perturbations.

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Modeling Thermal Evolution and Petroleum Potential of Basins Formed by Extension

In recent years, considerable progress has been achieved in modeling the subsidence and temperature histories of sedimentary basins. A knowledge of the mechanisms of basin formation may make it possible to compute the variation of heat flow with time, and consequently the temperature distribution in the sediments with time, if the basin geometry and sediment material properties are known. Further studies are necessary to understand how thermal conductivity, radiogenic heat production, and ground-water flow influence the subsurface temperature distribution in different types of basins.

Model-derived temperatures can be used to make theoretical predictions of organic maturity using chemical reaction kinetic theory. In addition to vitrinite reflectance, a promising technique involves looking at aromatization-isomerization (A-I) reactions associated with biologic marker compounds that commonly occur in most organic-rich sediments. These are unimolecular, first-order reactions that precede the main phase of oil generation and therefore can be used to locate the top of the "oil window." The Labrador continental margin off northeastern Canada is a typical rifted margin, believed to have formed by stretching of the crust and subcrustal lithosphere during rifting, followed by thermal contraction subsidence. A 1-dimensional, finite element model that considers nonuniform extension and allows for variations in sediment thermal properties was used to compute the thermal history of sediments in this region. It is assumed that thermal conduction is the primary mode of heat transfer in this style of basin and that advection of heat by fluid motion is negligible. Model results can be compared with direct maturity measurements (A-I products, vitrinite reflectance), crustal thickness estimates from seismic refraction experiments, and corrected bottom-hole temperatures or heat-flow measurements.

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Influence of Pressure, Salinity, Temperature, and Grain Size on Silica Diagenesis and Reservoir Quality in Quartzose Sandstones

Based on calculated silica solubilities (1-4 km depth range), there is a suggested predictable effect of pressure (P), temperature (T), and salinity (S) on silica diagenesis. Silica distribution under various P-T-S conditions is in turn influenced by grain-size differences. Quartz solubility related to increasing grain-contact pressure with depth is about 7 times greater at 4 km than at 1 km ($m_S = 1.5 \times 10^{-3}$ vs. 2.0×10^{-4}). The differences between solubilities based on hydrostatic and point-contact pressures (orthorhombic closest packing) increase with increasing depth (excluding overpressured areas). At greater depths, local precipitation of silica appears more likely, whereas at shallower depths, larger scale silica migration may occur preceding precipitation. The effect of increasing salinity generally decreases solubility regardless of depth (e.g., at 3 km and 3 m, $m_S = 8.9 \times 10^{-4}$; at 6 m, $m_S = 7.5 \times 10^{-4}$); hence, reservoir-quality loss by pressure solution is impeded in those sandstones containing more saline pore fluids. Pressure solution is far more active in basins characterized by high heat flow. Very fine-, fine-, and medium-grained sand laminae (perfect sorting; several grain diameters thick) will experience 500, 64, and 8 times (all other factors equal) the amount of pressure solution compared to coarse-grained sand. Chemical potential gradients are suggested among centimeter-scale size laminated intervals, resulting in migration of silica to coarser grained areas before precipitation. Reservoir-quality loss in the finer laminae is caused primarily by pressure solution, whereas, in coarser intervals, silica precipitation is mainly responsible.

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Time-Transgressive Neogene Radiolarian Events: Equatorial Indian and Pacific Oceans

Fifty radiolarian events (first or last occurrences) of Quaternary and Neogene age were identified in a transect from 5 drill sites (503, 573, 289, 586, 214) in the equatorial Indian and Pacific Oceans, extending from the Panama basin to the 90°E Ridge. Using an "absolute" chronology for each site based on correlation with the paleomagnetic time scale, we have estimated the degree of synchroneity or time-transgressiveness for each datum. Of those events that appear to be synchronous within the probable uncertainty of our estimate (ca. 0.3 m.y.), 85% are last occurrences. Of those events that are unmistakably time-transgressive (i.e., 1 m.y. or more), 75% are first occurrences in which the taxon evolves earliest in the Indian Ocean and progressively later in the western and eastern Pacific. This study, to our knowledge, is the first to document nonsynchroneity of microfossil events within a given latitudinal zone. If this effect proves characteristic of other microfossil groups as well (foraminifera, nannofossils, diatoms), it has important implications for biostratigraphy, geochronology, and plankton evolution. In particular, it suggests a reevaluation of events that presently define zonal boundaries, using precisely dated material, perhaps with the ultimate consequences of favoring last occurrences over first occurrences. The earlier evolution of taxa in the Indian Ocean is particularly unexpected in view of the strong westward zonal flow in low latitudes.