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Uranium Distributions in Recent Skeletal Carbonates

Fission-track analysis, used to map uranium distributions in sections at the ppb to ppm level, revealed considerable intraskeletal heterogeneities in corals and mollusks. In a layer next to the internal surface of the corallite in the corals studied, uranium is enriched in comparison with the inner parts of the skeleton; configuration and the factor of relative uranium enrichment of the layer differ among corals. The branching coral *Oculina diffusa,* in addition, exhibits alternating bands of relatively high and low uranium contents arranged subparallel with the external surface. In the mollusk shells studied, uranium concentrations vary between different layers of a given shell; further variations exist within a given shell perpendicular to the direction of accretion. These systematic heterogeneities result from variations in the processes of skeleton formation and growth. In all samples, apparently random variations were observed; they are superimposed on any distributional pattern which may exist. Trace-element distribution in carbonate skeletons is determined primarily by biologic processes and can be expected to change when affected by physicochemical diagenetic influences. Hence, the patterns of uranium distribution shown are potential indicators of uranium mobility during diagenesis and checks on the closed system requirement for uranium series dating of biogenic carbonates. This study also demonstrates that compositional complexities known from major elements are present on the trace-element level in skeletal carbonates.

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Applications of Potassium-Argon Dating in Oil Exploration

The dating of minerals and whole rocks by the potassium-argon method is now available to the petroleum industry on a low-cost, routine commercial basis. This service can provide valuable information regarding provenance of detrital material, and age correlations of volcanic rocks and nonfossiliferous strata. The method is particularly useful in distinguishing minor intrusives from basement. Application of potassium-argon dates is not restricted to long-term studies because modern analytic methods make possible the return of data in lengths of time consistent with decisions required by an active drilling operation.

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Bethany Falls Limestone (Missourian) Sedimentation and Diagenesis, Missouri and Kansas

The Bethany Falls Limestone is a 15–30-ft-thick shelf deposit within lower Missourian rocks of the Mid-Continent region. In outcrop the lower Bethany Falls is typically an open-marine, faunally diversified, carbonate wackestone. The upper Bethany Falls consists of a wide variety of shallower water carbonate mudstone, wackestone, and grainstone. Cross-bedded oolitic grainstone and faunally restricted mudstone are perhaps the most distinctive rocks in the upper Bethany Falls. Cross-bed dip azimuths in the oolitic facies provide evidence that deposition resulted from 2 dominant current systems, one basically longshore drift toward the northwest and another essentially onshore tidal flow toward the north-northeast.

The sequence of open-marine wackestone succeeded by shallower water limestone resulted from rapid transgression. As progradation built the sea floor into the zone of agitation, oolitic "sand bars" developed. These bars restricted circulation in many interbar and backbar areas which became sites of the faunally restricted carbonate mud. Carbonate deposition ceased when progradation built to normal high tide.

Color mottling, ubiquitous in most upper Bethany Falls mudstone and wackestone, is a diagenetic effect related to selective bleaching of the original medium-gray or grayish-tan color. The bleaching apparently follows areas of initially high permeability. The controlling paths are commonly burrows or churned areas, "crumbly vugs" resulting from bioturbation and other processes, and microfractures formed by slumping and shrinkage. Grain diminution or removal commonly accompanies the bleaching, and many of the bleached areas exhibit microslump and convergence of laminae.

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Pennsylvanian Deltaic Stratigraphic Traps, Eastern Shelf, Midland Basin, Texas

Hydrocarbon occurrence in Strawn (Pennsylvanian) sandstones in the West Tuscola field, near Abilene, Texas, is the result of stratigraphic entrapment in deltaic sandstone. The origin of the reservoir rock in the field area and the overall geometry and internal character of the deltaic complex were determined from the vertical sequence in numerous cores of the reservoir sandstone and associated units and from numerous E-logs of uncored wells.

The vertical succession of deltaic facies consists from base to top of a progradational sequence (prodelta and delta-front), an aggradational unit (delta plain, marsh, and interdistributary bay), and an overlying "transgressive" shallow-marine interval. Reservoir sandstones are present within the delta-front facies as stream-mouth-bar deposits, known locally as the "Grey sandstone."

The stream-mouth-bar sandstone in the West Tuscola reservoir is lenticular, highly irregular in outline, and has varied trends of porosity; these are characteristics common to deltaic deposits. Such features present problems in developing effective secondary-recovery methods and in predicting occurrences of other deltaic sandstones.

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Cationic Balance and Early Diagenesis of Glacio-Marine Sediments

Throughout the Quaternary, glaciers have provided considerable amounts of sediments to the oceans. However, little is known concerning the physical and chemical characteristics of these sediments. Rapid recession of glaciers during the past 100 years has deposited large amounts of glacial sediments in the fiords and inlets of southeast Alaska. These mechanically weathered, rapidly deposited sediments provide an unparalleled laboratory to study sediment-seawater