

from all but the western part of the state during late Pliocene-Pleistocene erosion. The volcanic-ash beds that had existed in the eroded Ogallala are a potential source for some of the uranium occurrences.

Analyses of the Pearlette ash did not disclose any alteration trends or a downward decrease in the uranium concentration. The uranium content of the Pearlette is significantly higher than that of the altered Ogallala ash. The minimum ash of the Pearlette is 0.6 m.y. which suggests that efficient release of uranium from volcanic glass, at least in some examples, is not a geologically contemporaneous process.

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Triassic Paleocaliche in Red Beds of Dolores Formation, Southwestern Colorado

Early diagenesis of Upper Triassic lacustrine mudrocks and sandstones in southwestern Colorado includes pedogenic accumulation of calcium carbonate. Petrocalcic horizons, 0.4 to 1.5 m thick, are dominated by unlaminated micritic caliche concretions which range from pellets 1 mm in diameter to nodules 30 mm in diameter. Evidence for in-situ origin of these limestone concretions includes: irregular shape, floating texture, inverse grading, and truncation of back-filled burrows.

Mature paleocaliche profiles are capped by calcium carbonate plugged horizons which contain rootlets 1 to 2 mm in diameter. These plugged horizons also contain paleofracture systems filled with reddish brown mudrock. Locally paleofracture morphology suggests plant-root control in its development. In very fine sandstones, micritic caliche nodules coalesce in upward coarsening, sinuous vertical stacks that suggest a rhizonecretion origin.

A maximum of nine petroclastic profiles were observed over a vertical interval of 56 m in one outcrop north of Durango, Colorado. The most mature profile observed exhibited the Stage III development of Gile and others. Caliche nodules and pellets occur throughout the Dolores Formation in southwestern Colorado either in pedogenic profiles or as transported clasts in fluvial, lacustrine deltaic distributary, or fan delta deposits.

Literature descriptions suggest that caliche nodules are also present in the correlative Chinle Formation of New Mexico, Arizona, Utah, and Colorado. Based on the areal distribution of modern caliche, a semiarid climate is suggested for the Late Triassic in the Four Corners region of the western United States.

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Miocene Spumellarian Radiolaria from South Pacific

The taxonomy of Radiolaria, a subclass within the phylum Protozoa, was developed by Ernest Haeckel in the late 1800s. That classification was based primarily on gross geometric patterns which have been subsequently shown to be unsatisfactory. Reclassification research has been concentrated on the Nassellarian (conical)

radiolaria because of more pronounced characters. Spumellarian (spherical) radiolaria, however, have not been regrouped mainly because their morphology is more subtle and difficult. However, they are the most robust and most persistent in the fossil record (Ordovician to present), and therefore the likeliest to be preserved in strata.

Two core sites, 77B and 289 from the Deep Sea Drilling Project, provide a continuous time sequence during the Miocene and both probably represent a stable equatorial current system. Slides were made at 1-m intervals from the cores and spumellaria individuals were studied from successive time sequences. Nineteen characters were recorded for each and then subjected to a rigorous analytical technique provided by a numerical taxonomy program (NTPAC-11). Pearson's correlation coefficients detected 23 species throughout the Miocene. An unweighted pair group clustering method using arithmetic averages grouped these species into 14 genera.

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Calcium Budget in Frio Sandstones, Southwest Texas

Studies of active burial diagenesis in Frio (Oligocene) sandstones in the temperature range 90 to 160°C (burial depth, 2,500 to 4,450 m), combined with other studies at lower temperatures, show important sources and sinks for calcium. The main calcium sources are conversion of smectite to illite (40 to >150°C), pressure solution of detrital micrite (<90°C), albitization of calcic plagioclase (100 to 120°C), and to a lesser extent devitrification of acidic volcanic glass (<90°C).

The main calcium sink is cement-forming calcite. The composition of the calcite appears to reflect the various sources, thus calcite cement from the breakdown of smectite shows a late-stage iron-magnesium enrichment, whereas calcite replacing albitized plagioclase is nearly pure calcite. Another sink for calcium, previously undescribed for the Gulf Coast Tertiary, is authigenic sphene which is found at temperatures greater than 150°C.

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Signature Processing of North Sea Air-Gun Data

Results of development drilling on a North Sea oil field suggested that the actual structure was much more complex than the original interpretation. We present the results of a reprocessing project on selected seismic lines over the structure. The original data were recorded using a variable cable depth and a deep tow hydrophone for the gun signatures. The data were reprocessed using only signature correction to a zero-phase wavelet. However, results obtained at the horizon of interest were still affected by cable ghosts, frequency attenuation within the overlying sediments, and practical constraints on the recording of the source ghost.

Because the purpose of the project was to improve delineation of very small faults, we decided to try to improve resolution by applying corrections for these effects. The initial tests were done by designing and ap-