from crystalline sources, and thus it probably represents the contribution from such a "highland source terrane." Both assemblages are found in sands of both provinces, inasmuch as the major rivers in these provinces, which act as conduits for these sediments, drain both source terrane types. However, the amount of area of these terranes drained by the rivers differs between the two provinces; therefore the relative proportions of these assemblages in the sands of the two provinces also differ. Rio Grande province sands contain on the average 59% of the assemblage associated with the highland source terrane, whereas western Gulf province sands contain only 34% of this assemblage. Thus, it is the difference in the relative proportion of these two assemblages in the samples which can be used to identify and distinguish the sands from the two provinces.

The results of this pilot project indicate that the analysis of gross grain shape can indeed differentiate sediments from different sources in the Gulf of Mexico.

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Distribution and Provenance of Trace Elements in Gulf of Mexico Sediments

By knowing the dispersion patterns of river-borne sediments in marine environments, one can predict the spatial distribution of selected minerals, elements, and particle-bound pollutants. One potentially useful method for determining sediment pathways is by contouring selected trace metals in the sediments seaward of the river outflow. Using computer techniques involving trend surface analysis and a massive data set, we have contoured the regional distribution of chromium, copper, iron, nickel, and lead in surficial sediments from the Gulf of Mexico. Spatially, these metals range from very low concentrations in the sediments of the west Florida shelf to highest values on the Mississippi delta and along portions of the south Texas shelf. Intermediate concentrations are interspersed between these areas. Observed contour patterns are referenced to suspended matter trace metal data for the Apalachicola, Mobile, Mississippi, Brazos, and Rio Grande Rivers to determine sediment-metal provenance and thus infer river dispersal patterns. Statistical treatment of our trace metal and sediment data was also carried out to identify the important geochemical variables (grain-size, carbonate content, and clay mineralogy) that control the observed sediment trace metal patterns.

Late Rocky Mountain Abstract

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Structural Control of Sedimentation and Distribution of Uranium Deposits in Westwater Canyon Member of Morrison Formation, Northwestern New Mexico

Isopleth mapping of the Westwater Canyon and Brushy Basin Members of the Upper Jurassic Morrison Formation in the southern San Juan basin, New Mexico, constructed from approximately 1,800 geophysical logs and 100 measured sections, show that structural elements controlled depositional patterns in these two members. These compilations, which include isopach, sandstone-mudstone ratio, percent sandstone, net sandstone, and average number of shale interbeds per 100 ft (30.5 m) of section, illustrate the geometry of depositional units, the distribution of sandstone depocenters, and large-scale facies variations within the units. Paleotopographic mapping of the base of the Westwater Canyon compiled during this study shows a series of highs and lows trending east-southeast. The Westwater Canyon is thin and sand-poor over the paleotopographic highs and thick and sandy along the paleotopographic lows, suggesting active structural control of facies distribution during deposition of this unit. Sedimentation of the Brushy Basin also was affected by some of the same active structural elements. Basement faults, reactivated through time and defined by detailed reflection seismic studies conducted by other workers, apparently exerted a significant influence on depositional patterns in the Morrison Formation.

Depositional patterns appear to control the location of uranium deposits. Primary uranium ore in the Westwater Canyon Member is restricted to sandstone depocenters associated with east-southeast-trending isopach thicks and large sandstone-mudstone ratios. Redistributed ore deposits also are concentrated in the vicinity of isopach thicks but in rocks with relatively low sandstone-mudstone ratios. Their location, however, is much more closely related to the position of a regional oxidation-reduction interface whose three-dimensional configuration was influenced regionally and locally by Laramide structures. Remnant ore deposits are relict primary deposits that lie updip of the redox interface in oxidized ground. Sedimentologic controls are similar to those of primary ore. In general, these remnant deposits have been preserved from oxidation by a unique stratigraphic or structural setting.