age of the rocks overlying both unconformities seems to indicate slow transgressive marine overlap in the two basins.

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GEOTHERMAL AND GEOPRESSURE RELATIONS AS TOOL FOR PETROLEUM EXPLORATION

The Uinta basin represents a timely model for the study of many interesting geologic and geochemical problems that are pertinent to current exploration research investigations and to technical problems concerning petroleum production which face the petroleum industry, particularly in light of the present energy crisis. The primary areas of investigation in this reported study on the Uinta basin concern the complexities in the exploration of ultraparaffinic crudes from fresh- and brackish-water lacustrine sedimentary deposits.

An investigative study of the subsurface temperature and pressure distribution patterns within the potentially productive section of the Wasatch Formation (Eocene) has produced highly favorable results as an exploration tool in predicting the recent successful exploratory trends within the Uinta basin. A direct relation has been documented between the occurrence of productive hydrocarbons within the Wasatch Formation and the simultaneous occurrences of high geotemperatures, abnormally high pressures, and the presence of an organic-rich shale facies. These relations currently are being investigated as a potential tool for the exploration of stratigraphic traps in Tertiary basins.

In addition, this study illustrates an application of computer techniques to geologic evaluations on a regional basis: rapid data-processing methods, data banks, computer-contoured maps, and statistical analysis of geologic data.

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TEXTURAL PARAMETERS OF ROCKS FROM BOREHOLD MEASUREMENTS AND THEIR APPLICATIONS IN DETERMINING DEPOSITIONAL ENVIRONMENTS

No abstract available.

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DISCRIMINATION AMONG GRAIN-SIZE DISTRIBUTIONS BY CANONICAL ANALYSIS AS AID TO ENVIRONMENTAL INTERPRETATION

Grain-size analyses of sediments and sedimentary rocks have been made for many purposes. During the last 10 to 15 years, grain-size analyses have been made of sands and sandstones as a means of determining their depositional environments. Most of the published work on discrimination of depositional environments has been based on modern sands which contain little fine material. The results of this work generally cannot be applied to sandstones because of the presence of considerable amounts of diagenetic silt- and clay-sized material that often is present in sandstones. In the present study, sandstones were used rather than sands.

A problem that always occurs when using grain-size analyses, regardless of whether they are of sands or sandstones, is that of comparing the size distributions. Canonical analysis is a statistical method of comparing grain-size distributions. The primary aim of canonical analysis is to determine numerical characteristics that best separate size distributions or determine the characteristics they have in common. In using canonical analysis, a typical or model size distribution is selected against which all the size distributions are compared. If physical theory can be applied to the choice of a reference distribution or weight function, then the results may be interpreted more easily in a physical sense. Two sets of numerical values are calculated for each size distribution. The discriminate functions show which variable or variables, size classes in this case, are important for discrimination; and the discriminate moments show how the size distributions are related so they may be sorted and classified. A set of characteristic roots or eigenvalues also are calculated. These eigenvalues, arranged in decreasing numerical order, show the proportion of variation among the distributions. Generally, two to three characteristic roots, each having a set of discriminate functions and moments, account for most of the variation among the size distributions.

Canonical analysis techniques were applied to grain-size distributions of samples from known depositional environments to see if discrimination could be achieved. Outcrop samples from the Gallup Sandstone of the San Juan basin, and Brushy Canyon Formation of the Delaware basin, and core samples from the "J" formation of the Denver basin were used. Even though the samples contained considerable amounts (greater than 20%) of silt- and clay-sized material, consistent grouping of similar types of size distributions were obtained. It was not possible to assign, from the grain-size data alone, groups of sandstone samples to specific depositional environments. The numbers generated by canonical analysis are not unique to a particular environment.

However, by using the canonical analysis techniques with grain-size data combined with a knowledge of sedimentary structures of the same samples, a geologist can obtain more information about transportation mechanisms and depositional environments than could be obtained by the use of either approach separately.

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EARLY CAMPANIAN (CRETACEOUS) DELTA-FRONT SEDIMENTATION, SOUTH FLANK OF WIND RIVER BASIN, WYOMING

Upper Cretaceous rocks of the Mesaverde Formation, exposed between Hudson and Muskrat Creek on the south flank of the Wind River basin, accumulated in an ascending succession of delta-front, tidal-flat, and delta-plain environments. Rocks of the lower two environments grade east and northeast into strata deposited in an offshore marine environment, whereas rocks of the youngest environment grade east into deposits of a delta-front platform. During early Campanian time, the delta-front facies accumulated across a 14-km-wide belt near Alkali Butte. Repeated fluctuations of strand position produced interbedded units of siltstone and sandstone in the facies, and intermittent development of low-relief bars permitted accumulation of estuarine or swamp sediments across subjacent deposits of the delta front.

Sandstone units of the delta-front facies show an upward gradation from siltstone and sandy siltstone