the cores were leached for lead. Activity levels of the lead isotope were counted for 24 hours on an alpha spectrometer. A constant exponential decrease of lead-210 with depth was found, implying a relatively constant flux of the isotope from the atmosphere to the estuary, with little bioturbation and negligible vertical diffusion of lead within the sediment. The resulting sedimentation rates show that parts of the estuary have been filling rapidly with sediment over the past 100 years.

The lead-210 technique appears to be readily extendable to estuaries and to any other environment of relatively undisturbed deposition.

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Nugget-Navajo Sandstone Environmental War—Can Trace Fossils Help?

No abstract available.

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KOALA—Minicomputer Log Analysis System for Geologists

An interactive computer medium for log analysis is generally preferable to batch processing in view of the almost inevitable uncertainties regarding key petrophysical parameters and even the compositional nature of subsurface units. KOALA is an interactive package of log analysis routines developed by the Kansas Geological Survey and run on its minicomputer system. Resolution of mineralogic and porosity proportions is made by either maximum variance, unique solution, or least-squares matrix algorithms, depending on the degree of determinancy prescribed by the number of components as related to number of logs. An alternative linear programming method is also available for the incorporation of local geologic information to aid in solutions with restricted log data. Reservoir analyses of fluid saturations, permeability indices, and invasion characteristics are programmed following standard solution procedures. Wherever possible, error diagnostics are generated to alert the user to inconsistencies which are implied between the solutions, input parameters, and log values. Intelligent response to these diagnostics allows the user to initiate revisions in a learning sequence of modifications that converge on a satisfactory solution.

Dipmeter data are processed via a variety of graphic options such as flat and perspective cylindrical projections, Wulff and Schmidt polar plots, together with eigenvector analyses of vector fabrics. A simple synthetic seismic modeling procedure is also included and multivariate statistical procedures, such as discriminant functions and factor analysis, will be incorporated to serve as aids in pattern recognition studies.

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Can Geochemistry Find Oil?

No abstract available.

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Vitrinite Reflectance—What, How, and Why?

Vitrinite reflectance is a proven technique for determining the thermal evolution of sedimentary organic matter. The reflectance power of the coal maceral, vitrinite, increases with depth of burial in response to increasing temperature and time. Because most coals and sedimentary kerogens contain vitrinite, the technique has universal application in determining rank or degree of catagenesis.

Kerogens are concentrated by acid leaching, then are mounted in epoxy and polished, and the degree of reflectance (R_o) is determined with a reflecting-light microscope. Most kerogens contain mixtures of primary and recycled materials commonly with various contamination products such as drill-bit cavings and mud additives. Vitrinite reflectivity can also be affected by chemical or physical weathering, bitumen or pyrite inclusions, natural coke and, in low-rank rocks, by variations in various vitrinite subgroups. Semifusinite, pseudovitrinite, and some solid bitumens are often misidentified as vitrinite. All of these variables must be dealt with before the maturity (average R_o) of a sample can be determined.

A sequence of R_o values in a well or exposed sedimentary section results in a maturation gradient, the slope of which depends on the geothermal gradient and the sedimentation rate. Because both reflectance increase and oil and gas generation are time- and temperature-dependent chemical reactions, maturation gradients based on vitrinite reflectance can be used to determine whether hydrocarbons have been generated in source beds or preserved in reservoirs. Maturation gradients can also be used to recognize major faults and unconformities and to estimate the amount of section lost, proximity to igneous activity, the rank of recycled material when deposited, geothermal history, and other features useful in understanding the geologic history of basins. If properly measured and interpreted, vitrinite reflectance can be a powerful exploration tool.

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Uranium Resource Evaluation in Antarctica

The continent of Antarctica is the only large land area on earth that has been left almost totally unexplored for uranium resources. In 1976 the first systematic uranium resource evaluation was started as part of the Antarctic International Radiometric Survey. Two areas in the Transantarctic Mountains and one area in Marie Byrd Land have been examined by airborne gamma-ray spectrometric methods. Most flight operations are conducted using Bell 212 helicopters. The equipment in use is a GeoMetrics GR-800 gamma-ray spectrometer with a GAX 512 detector and a GAR 6 analog-recorder. The equipment has proved to be satisfactory, and no plans have been made to increase detector size or to alter data acquisition systems owing to the extremely rigorous nature of the Antarctic field operations.