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.

The crystalline igneous and metamorphic rocks of the Precambrian basement, the Paleozoic and Mesozoic sediments of the Beacon Group, and the Cenozoic and recent volcanic rocks have been examined. Localized concentrations of radioactive minerals have been detected in Precambrian rocks, but only small concentrations have been found associated with pegmatites.

Thus far, the area covered by the radiometric survey has been too limited to provide any detailed assessment of the uranium resource potential of Antarctica. In general, however, it appears that the potential for uranium resources in the ice-free areas is essentially the same as that of the surface area of any other continental landmass.

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Federal Barriers to Energy Resource Development

It has been almost 5 years since the American people suffered the rude awakening to the fact that its energy supply no longer was in United States control. Since that time, the American people have witnessed a circus-like performance of institutions, political movements, and individual politicians, both local and national, as they have used the energy issue as a vehicle to achieve their goals to reorder society and to jockey for a redistribution of power. The energy "crisis" has been manna from heaven for the common denominator for most of the evils which it seeks to correct in our society. The net result of actions taken to correct the energy problems has been a barrage of recommended and enacted regulations which, rather than improve energy supply, act to inhibit it severely. More often than not actions taken by the federal government in the name of correcting the energy problem are more oriented toward increasing the severity of the problem.

Federal policies and regulations which act to inhibit energy-resources development range from limitations and restrictions to the exploration for energy resources to the development of new technologies to create and use energy. Every step in the process of discovering, producing, delivering, and using energy has come under federal control by a myriad of federal agencies.

As a technologist and a pragmatist, it is hard for me to accept the "crisis" atmosphere of the energy issue when so many are accepting the proclamation of so few that "up" is "down" and the "moon is made of green cheese." It is time for thinking people to knuckle down and to dispel the energy myths with truth and fact in order that we, the American people, can get on with our business of assuring ourselves a viable future as an industrial society based on the free enterprise system. I fear that if we falter on this mission it will mean the end of the standard of living and the personal freedoms we have worked so hard to establish and to maintain in the United States of America.

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Shallow Subsurface Dolomitization of Subtidally Deposited Carbonate Sediment in Hanson Creek Formation (Ordovician-Silurian), Central Nevada—Evidence for Groundwater Mixing

Stratigraphic sequences of the Hanson Creek Formation are grouped into two categories based on differing paleogeographic settings and diagenetic histories. Sequences in northeastern Eureka County record deposition in shallow subtidal to peritidal environments. Replacement dolomitization was the main diagenetic process affecting the original calcium carbonate skeletal grains, ooids, and mud. Lack of associated evaporite minerals or their pseudomorphs precludes sabkha diagenesis. Stratigraphic sequences in southwestern Eureka County consist of laminated carbonate and shale of moderately deep-water deposition, succeeded by a shoaling-upward sequence capped by oolitic grainstone. Stabilization of original carbonate sediment to low-magnesian calcite was the main diagenetic process affecting these rocks.

Thin sections stained with potassium ferricyanide indicate that Fe^{++} did not have a role in the formation of Hanson Creek dolomites. Sr^{++} concentrations of the dolomites (20 to 91 ppm) are much lower than values reported for Holocene dolomites. The low values indicate reaction with solutions of strontium/calcium ratio lower than that of seawater. For Hanson Creek dolomites, δO^{18} values range from -0.75 to -6.73 parts per thousand PDB. Such distinctly light values reflect the influence of solutions depleted in O^{18} relative to normal seawater. The data suggest that dolomitization occurred in the shallow subsurface as a result of the mixing of meteoric-derived groundwater and marine pore water. Intrusion of fresh water into subtidally deposited sediment took place as a result of lateral extension of freshwater lenses developed beneath subaerially exposed tracts of the inner carbonate platform. Dolomite-to-limestone transitions mark the lateral extent of freshwater lenses in the subsurface. Undolomitized deeper water carbonates of southwestern Eureka County, remote from areas of freshwater recharge, were positioned beyond the greatest lateral extent of freshwater lenses and were not subjected to the early influence of meteoric derived groundwater.

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Applied Biostratigraphy, South Louisiana and Gulf of Mexico

Paleontologic control in south Louisiana and the adjacent Gulf of Mexico is among the best in the world. With this control it is possible to construct relatively detailed paleogeographic maps and interval-isopach maps based on biostratigraphic markers. Careful study of these maps clearly defines areas having maximum potential for hydrocarbon accumulation. Currently accepted biostratigraphic units as defined by Foraminifera range in age from Paleocene through Pleistocene.

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Facies Patterns and Depositional Models, Pennsylvanian System, Palo Duro Basin, Texas Panhandle