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USE OF SUE[1] SYSTEM IN MARINE PROSPECTING

The Seismic Underwater Explorer (SUE) is a marine seismic system which uses a mixture of oxygen and propane as an explosive source. The system is described and some typical results of its use are shown. In a development program over the past 2 years, power of the signal source has been increased and significant improvement of the signal-to-noise ratio of the system has been obtained. A major advantage gained through the development program has been to increase the penetration obtainable with the system. Present system capabilities are for penetration to depths of 10,000 ft. or more. Displays resulting from exploration work with the system are shown to demonstrate its usefulness as a prospecting tool for application in marine areas. The system is being used in many parts of the world to obtain reconnaissance seismic coverage and also to secure detailed information. Cost of surveys conducted with the SUE system is markedly lower than cost of conventional marine-seismic surveys, and consideration of exploration objective *vs.* survey cost *vs.* system advantages and limitations is a major factor in determining applicability of the SUE system in a particular prospect area.

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REGIONAL CORRELATION OF PACIFIC COAST OLIGOCENE MICROFAUNAS

Pacific Coast paleontological correlations in the Oligocene have been hindered by misinterpretations of faunas, because of biofacies differences and limited stratigraphic evidence from too few samples.

The "lower Zemorrian" is redefined, and the boundary between the Refugian and Narizian microfaunal stages is re-examined. The type areas of the Saucesian, Zemorrian, and Refugian stages are compared with the historically complete sections in the Santa Cruz Mountains of California and in the coastal ranges of Oregon, Washington, and southern Alaska.

Figures show bases for correlation in the phylogeny of the Uvigerininae. A chart presents correlations of microfaunas compared with the record of North American vertebrate provincial ages, geochemical dating, and the Gulf of Mexico and Mediterranean regions.

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DIGITAL SEISMOGRAMS

To use digital seismograms economically and effectively, it is essential to know the purpose for which the seismic data are to be put into digital form. In the digitizing process, a large number of options are available. Proper choice of these options can easily make a 10 to 1 or even a 100 to 1 change in the overall cost of processing.

Digital seismic records can be used effectively with large-scale computers to perform virtually any type of linear or non-linear filtering, correlation, weighted stacking, or statistical analysis. Experimental procedures commonly are performed most economically in the digital domain.

[1] Service mark of Geophysical Service Inc.

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MINERALOGY OF RECENT SEDIMENTS OF LUCERNE DRY LAKE, CALIFORNIA

The mineralogical composition of 50 samples of Recent sands and clays from Lucerne Dry Lake, San Bernardino County, California, was determined by X-ray diffraction. Areal variations in the distribution of the major mineral components were studied and compared with basin geometry and geology of the watershed areas in order to illustrate geological controls on fine sediment mineralogy within an isolated desert-lake basin. The major silicate and carbonate minerals are of detrital origin; relative abundance of these decreases toward the center of the basin, where halite and gypsum are concentrated. The San Bernardinos on the south, and Granite and Ord Mountains on the north, contributed quartz, feldspar, and hornblende. The carbonate distribution pattern suggests that the San Bernardinos also contributed detrital calcite and dolomite, probably derived from outcropping late Paleozoic marbles. The clay-mineral suite is dominantly illite and chlorite, with minor kaolinite and montmorillonite. Minor clay-mineral variations can be ascribed to source influences. The San Bernardinos contributed more chlorite and better crystalline illite (probably of metamorphic derivation) than the Ord and Granite mountains. There is no evidence of major diagenetic change of the detrital clay-mineral suite in the saline lake waters.

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MIGRATION AND SEGREGATION OF OIL AND GAS

Although knowledge of the physical and chemical factors influencing petroleum migration is insufficient to permit the proposal of acceptable mechanisms for primary or secondary petroleum migration, geochemists have shown that petroleums undergo small but measurable changes in chemical composition during secondary migration. In most instances, these changes can be distinguished from those chemical transformations which stationary petroleums slowly experience in response to reservoir temperatures and pressures over geologic time intervals.

In contrast to the relatively minor chemical changes attributed to secondary migration, certain petroleums, produced from different reservoirs within a single field or limited geographic area, are markedly different in chemical composition. Other chemical characteristics of these oils, however, suggest that they were derived from a common source. The observed chemical differences can not be explained as transformations of the stationary maturation variety. Detailed studies of the compositional differences encountered in such oil sequences imply that these oils must have experienced physical separations of major petroleum fractions prior to or during the migration process. This variety of petroleum segregation, capable of producing major chemical changes, is designated as a "separation-migration" mechanism to distinguish it from the typical secondary migration phenomenon, which results in relatively minor changes in chemical composition.

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