rents; (4) specific water masses; (5) conditions of preservation; (6) presence and strength of upwelling onto shelves and under boundary currents; (7) eutrophic conditions; and (8) tectonic events (isolating radiolarian populations).

These biologic indicators and their related forms are useful in determining similar parameters in the fossil record. Studies of radiolarians from Neogene Deep Sea Drilling Project and onshore samples indicate: (1) relative distance from continents; (2) relative paleodepths; (3) strengths and directions of paleocurrents; (4) presence and degree of paleo-upwellings; (5) origin, development, and presence of paleowater masses; (6) paleoeutrophic conditions; and (7) paleotectonic activity. These biologic indicators may provide a framework for paleo-oceanographic interpretations of Mesozoic and perhaps even Paleozoic radiolarian-bearing sediments.

SPLETTSTOESSER, JOHN F., Univ. Minnesota, St. Paul, Minn.

Coal in Antarctica

Coal has been reported from numerous locations in Antarctica beginning about 70 years ago. Only since about 1960, however, have data become available on petrologic and analytic studies. Nearly all Antarctic coal deposits are in the Transantarctic Mountains of East Antarctica, that portion of the continent lying mostly south of Africa, Asia, and Australia. All appear to be of Permian age, and most have been altered by contact thermal metamorphism; they range in rank from low-volatile bituminous to semianthracite. The coal beds generally lack marine deposits and underclay. In addition to those in the Transantarctic Mountains, coal deposits have been reported from the Prince Charles Mountains. Coals in the Prince Charles Mountains mostly are unaffected by thermal metamorphism and have a rank of high-volatile bituminous. Most coal deposits in Antarctica have very limited horizontal extent; beds range to 3 or 4 m in thickness, but are generally thinner. Except for some deposits in the coastal parts of the Transantarctic Mountains and those in the Prince Charles Mountains, coal is found mainly in the interior of the continent. The location of most coal poses a major transportation problem for potential mines. Some coal could possibly be mined and used locally as an energy source for heating or power production. Another potential problem, yet to be resolved, is the matter of territorial claims, which might dictate the ownership of mineral deposits.

STAHL, W. J., E. FABER, Federal Inst. or Geosciences and Natural Resources, Hannover, Germany, and B. D. CAREY, and D. L. KIRKSEY

Origin of Gases Adsorbed in Near-Surface Sediment Identified by Carbon Isotopes

No abstract available.

STAHL, WOLFGANG J., E. FABER, Federal Inst. Geosciences and Natural Resources, Hannover, Germany, and B. D. CAREY, Tenneco Oil Co., Houston, Tex.

Carbon Isotopes—New Tool in Hydrocarbon Correlation and Exploration

The recently developed isotopic type-curve technique is based on the $^{13}C/^{12}C$ ratios of saturates, aromatics, heterocyclics, asphaltenes, and kerogen. This technique has been applied to problems of correlation of oil with oil and oil with source rocks, and has also been used to identify bacterial degradation in crude oils. Correlation of gas with source rock is essentially related to the determination of the carbon isotope ratio of methane. The ratio links the gas to the type and maturity of its organic source material. This technique was applied to head space analyses of canned drillhole samples. The type and maturity of source rocks can be evaluated as shown by isotope-depth profiles from different basins. Migration of gaseous hydrocarbons from deep sources to higher strata becomes evident.

STANLEY, DANIEL JEAN, Smithsonian Inst., Washington, D.C., and R. JOHN KNIGHT, Petro-Canada Exploration Inc., Calgary, Alta.

"Giant" Mudflow Deposits in Submarine Trenches; Hellenic Basins and Slopes in Eastern Mediterranean

Mud rather than sand is the predominant sediment type in submarine trenches, and most studies attribute fine-grained layers to pelagic and hemipelagic mechanisms or to turbidity-current and slump emplacement. Analysis of 28 piston cores in the eastern Hellenic Trench (eastern Ionian basin) in the eastern Mediterranean Sea sheds light on thick muds that form a major component of late Pleistocene–Holocene trench lithofacies. Several 600-cm-long core sections consist entirely of clayey silt that in X-radiographs appears structureless or displays vague lamination or subtle graded bedding. Size analysis reveals an upward increase in the relative percentage of the clay fraction. The sand-size fraction, generally less than 2%, includes planktonic and benthonic forams, shell fragments, and terrigenous components (light and heavy minerals, mica and plant debris). Carbonate content ranges from 20 to 40%, and that of organic matter from 3 to 5%. A 3.5-kHz subbottom survey of the region reveals discontinuous, acoustically transparent layers in trench basins and locally on slopes and depressions that bound the Hellenic Trench. A mudflow–turbidity-current origin is proposed, and is substantiated by radiocarbon dates showing rapid emplacement.

It would appear that "giant" mudflow deposits of this type are a particularly characteristic component of the typical trench lithofacies. Transport in many cases involved displacement of 1 cu km (e.g., a 10-m-thick layer covering 100 sq km). However, it should be noted that comparable or even greater volumes of mud have been displaced by single-event processes such as turbidity currents in almost all large basins of the Mediterranean such as the Algéro-Balearic, Ligurian, and Tyrrhenian basins on the west and the Ionian, Sea of Crete, and Herodotus basins in the eastern Mediterranean. The marked thickness of mudflow deposits in the Hellenic Trench and other trenches primarily reflects ponding in structurally mobile and topographically restricted de-