POSSIBLE GROUNDWATER INFLUENCE ON HABITAT OF OIL IN GULF COAST

Within the geologic setting of the Gulf Coast the regional movement seaward of groundwater has a significant effect on some phases of oil and gas movement and concentration. Evidence indicates that the beginning of hydrocarbon formation comes fairly soon after deposition of the sediments.

The effects of groundwater on oil or gas accumulation may be separated into two categories: (1) accumulation in shallow, relatively unconsolidated sediments with a high water content, and (2) accumulation at greater depths where shale is at least moderately compacted and where fluid movement is mainly through sandstone, siltstone or permeable carbonate rocks. Evidence of the effects of groundwater in the first case must come mainly from studies of modern sediments and from groundwater hydrology and geochemistry. In the second case, the evidence rests on data from all phases of subsurface geology and from the history as well as the distribution of hydrocarbon reservoirs, both structural and stratigraphic.

An increased understanding of both of these categories of groundwater effects on oil or gas concentration should result in a concomitant increase in exploration efficiency and success.

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ORGANIC CARBON δ C^{13} VALUES FROM QUATERNARY MARINE SEQUENCES IN GULF OF MEXICO: A REFLECTION OF PALEOTEMPERATURE CHANGES

Variations in stable carbon isotope ratio values on combustible organic matter in Gulf of Mexico sediments correlate with Pleistocene warm and cold climates. Warm stages are characterized by C^{13}/C^{12} isotopic ratios of -20 to -22°/oo, compared with the PDB standard, whereas colder stages are characterized by -24 to -26°/oo.

Piston core samples from the present bottom show similar δ C^{13} values (-20 to -22°/oo) characterizing the warm post-glacial period regardless of bathymetric environment (shelf, slope, or abyss) except where relict Pleistocene sediments crop out (-24 to -26°/oo). Sedimentation patterns and paleontology confirm the relict nature of the latter. Samples from 1,000-ft cores on the present slope represent post-Pliocene sequences; δ C^{13} values alternate from more positive to more negative. These alternations from about -21°/oo to -25°/oo coincide with the glacial-inter-glacial stages which are independently identified by planktonic Foraminifera.

Interpretations of the data lead to the conclusion that the principal reason for the observed correlations is variation of water temperatures in the photosynthetic zone during warm interglacial climates and during cooler glacial climates. There are other alternative processes which could affect the data, one of which, the relative contribution of terrestrially-derived organic matter versus marine-derived organic matter, would change the δ C^{13} values in the same relative direction as the water-temperature variation. Thus, it is not possible to unequivocally interpret the contributions of different processes for individual samples.

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GEOCHEMISTRY OF URANIUM IN CARIACO TRENCH

The geochemistry of uranium and thorium isotopes and of protactinium was investigated in cores from the Cariaco Trench. Though the sediments could not be dated, they showed some features characteristic to anoxic basins. Uranium is a very valuable marker for geologic events.

Core P6603-2, taken at a depth of 940 m, at 10°25′N long., 64°38′W lat., spans the upper Pleistocene. At 356 cm there is a sharp break between the laminated sediments above and a homogeneous clay below. The uranium content shows a significant change at the 354–359 cm interval. The uranium present in this narrow band is only a third to a quarter of that found in the sediments above and below, whereas the thorium and protactinium contents remain constant.

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URANIUM GEOCHEMISTRY OF GULF OF MEXICO

The economic importance, the dissimilarity in chemical behavior of its two oxidation states, and the unique usefulness of its radioactive daughter products make uranium and its geochemistry extremely interesting to earth scientists. The Gulf of Mexico has the attractive feature of being a semi-closed system that offers the possibility of complete monitoring of all input and removal processes for trace elements such as uranium. Experimental values obtained in this study of the geochemical cycle of uranium in the Gulf of Mexico are as follows:

Ranges of Amounts and Isotopic Composition of Uranium

Type of Sample	*Uranium Concentration* $\times 10^{-6}$ g l	*Isotopic Composition* A_U^{235}/A_U^{238}
Gulf of Mexico profiles of surface to 3,600 m	3.4 → 3.6 ± 0.2	1.14 → 1.18 ± .03
Estuaries and bays along Gulf Coast	2.1 → 17.3 ± 0.2	1.12 → 1.54 ± .04
Midwest rivers	0.6 → 3.0 ± 0.2	1.01 → 1.44 ± .04

High uranium concentrations in midwest USA rivers relative to other rivers of the world can be explained by solubilization of the uranium in phosphate fertilizers applied to the land surface. Estimated pre-fertilizer uranium input to the Gulf of Mexico is nearly balanced by uranium co-deposition with carbonates on the Yucatan shelf.

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PLEISTOCENE DISCOASTERS FROM STRATOTYPE OF CALABRIAN STAGE (SANTA MARIA DI CATANZARO) AND SECTION AT LE CASTELLA, ITALY

Strata exposed near the town of Santa Maria di Catanzaro in southern Italy is the accepted stratotype for the Calabrian Stage (earliest Pleistocene). Although a Pliocene-Pleistocene boundary has been discussed as