of the record are (1) a rapid drop of both high- and low-latitude temperatures at approximately Eocene-Oligocene time, and (2) a drop in high-latitude temperature correlated with a warming in low latitudes in early middle Miocene time. The latter probably corresponds to the onset of major Antarctic icecap development.

The steepness of the thermocline in low latitudes has varied. The vertical thermal structure of Oligocene oceans resembled that of the modern ocean most closely, and the thermal structures of Paleocene and Late Cretaceous times differed most from the modern structure.

Causes of the observed climatic variations are not known, but the variations may be related at least in part to changes in oceanic circulation resulting from changing continental positions, and to changes in eustatic sea level.

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Locating Stratigraphic Features and Hydrocarbons by Measurements Derived from Seismic Data

Color displays of seismic amplitude, frequency, velocity, and other measurements commonly make evident patterns and changes in patterns which can be associated with stratigraphic features and hydrocarbon accumulations. Sections across productive fields show the correlation between such measurements and hydrocarbon pools, and the degree to which seismic measurements can define productive limits.

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Bacterial Degradation of Crude Oils—Identification by Carbon Isotopes

The recently developed isotope type-curve technique for oil/oil and oil/source rock correlation is based on the determination of the carbon isotope ratios of different crude oil fractions. This method can be used for the identification of bacterial oxidation of crude oils and might be useful in controlling the rate of degradation after environmental catastrophes such as oil spills. Laboratory experiments show the change in compositional and isotopic data of a crude oil and of gases which are dissolved in the oil under attack. The results are in agreement with geochemical data of naturally degraded crude oils.

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

Carbon isotope ratios of gases desorbed from nearshore sediment samples collected from the Anadarko basin and from the North Sea have been determined by a technique recently developed in the Hannover laboratories. The results show a relation to geochemical data of the deep pooled hydrocarbons in both areas. Because of this relation, isotope analyses of adsorbed gases are of great interest in crude oil exploration.

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Structural Analysis of Northern Termination of Lewis Thrust, Front Ranges, Southern Canadian Rocky Mountains

The Lewis thrust, which has a surface trace of over 300 km, is inferred to terminate within the Rundle thrust sheet at Mount Kidd, 120 km southwest of Calgary. The south face of Mount Kidd is dominated by a spectacular chevron fold pair which has long been considered the manifestation of the surface termination of the Lewis thrust. Previous workers interpreted the Lewis thrust as forming a core high within the anticline of this fold pair. This interpretation dictates that folding takes a minor role in shortening and the solution of "room" problems. However, detailed mapping of the termination has shown that the leading edge of the Lewis thrust remains structurally low beneath the anticline. Within the core of the anticline, complex folding of both competent and incompetent units, with only minor interformational faulting, is seen to be an important mechanism. The major fold pair is observed to die out abruptly to the north within a lateral distance of 3 km. This geometry is unexpected in view of the scale of the folds and is seen to be the direct result of a flanking conical fold (half apical angle = 64°) and the noncoaxial geometry of the major fold pair. The recognition of the flanking structure as noncyclindrical is critical to the structural interpretation. Local decollements aid in room-problem solutions in anticlinal cores because they result in intraformational folding. Based on the fold geometry and the low magnitude of the intragranular twinning strains, it can be inferred that bedding-plane slip was a major factor in the deformation.

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Ekofisk—First of Western European Giant Oil Fields

The discovery in December 1969 of Ekofisk field in the Norwegian sector of the North Sea was a major turning point in the exploration for petroleum in Western Europe and rejuvenated the search for oil in the North Sea. Current production in the North Sea is 1,466,000 BOPD, and the total proved reserves are estimated at 18 billion bbl, with estimates of ultimate reserves ranging as high as 40 billion bbl.

Records reveal that Phillips had been operator of seven wells in Norway (one of which was at that time considered to be a noncommercial gas-condensate discovery) before Ekofisk was found with its eighth well. The company had drilled 25 exploratory wells in the North Sea, one of which had found a major gas deposit, but none had found oil. A total of 33 wells had been drilled in Norway without finding commercial oil before Ekofisk was discovered by the 34th well.

The Ekofisk structure was mapped by Phillips using its