Siberian province the largest gas field in the world was discovered (Urengoy). Productive and prospective strata are known to range through the whole Jurassic and Upper Cretaceous sections. Prospective oil and gas structures extend offshore into the southern part of the Kara Sea shelf.

In the Timan-Pechora area west of the Polar Urals–Pay-Khoy, several oil and gas fields have been discovered. Productive and prospective zones are in the middle and upper Paleozoic, and possibly in the Mesozoic. Structures favorable for oil and gas accumulation extend offshore into the southern part of the Barents Sea shelf.

The great petroleum possibilities of the northern part of the Siberian platform and of the bordering Mesozoic troughs are confirmed by the discovery of gas fields in the western part of the Yenisey-Khatanga trough and of oil fields in the eastern part of the trough. In addition a large bitumen (tar) field is near the southern border of the Lena-Anabar trough, and abundant oil and bitumen shows occur through the whole section from the upper Precambrian through the Lower Cretaceous.

The Mesozoic-Cenozoic troughs and depressions of the Verkhoyansk-Kolyma, Koryak-Kamchatka, and Chukotsk areas in the northeastern part of the USSR also are prospective for oil and gas.

The high estimate of the oil and gas possibilities for the shelf seas is based on the favorable geologic and geophysical facts from the Soviet Arctic islands and shelves. The most prospective are structures within the Barents-Kara platform, the offshore part of the West Siberian basin, the Chukotsk-East Siberian troughs, the southern Chukotsk and southern Laptev troughs, and the Wrangel rise.

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RECONNAISSANCE GEOLOGY OF CHUKCHI SEA AS DETERMINED BY ACOUSTIC AND MAGNETIC PROFILING

The geologic framework of the Chukchi Sea, which lies between Alaska and Siberia north of Bering Strait, was determined by low-frequency sparker profiles, magnetometer profiles, sonobuoy runs, and published gravity and magnetic data. Most of the southern Chukchi Sea is underlain by the Hope basin of Tertiary (and possibly in part Upper Cretaceous) nonmarine and probably marine sedimentary rocks. The basin locally reaches depths of 3 km and its rocks contains gentle folds and high-angle faults. The downwarping that produced the Hope basin continued into late Cenozoic time and, together with Quaternary marine planation, produced the present outlines of the southern Chukchi Sea. The downwarping also must have helped set the stage for the marine invasions that periodically severed the Bering Land Bridge.

A belt of acoustically incoherent rocks trending northwest from Cape Lisburne 300 km to Herald Shoal is interpreted to be the offshore extension of the pre-Cretaceous rocks of the Brooks Range. Very young sedimentary beds lap against the southwest flank of this belt, indicating that it was emergent during Plio-Pleistocene time. A major northwest-striking thrust-fault zone separates the inferred offshore extension of Brooks Range rocks and structures from acoustically coherent rocks interpreted to represent the offshore extension of Cretaceous rocks in the North Slope's Colville geosyncline. Thrust faults and folds in the Cretaceous rocks near the major fault zone strike northwest and are superimposed across older, east-striking faults and folds that trend into the Chukchi Sea from the North Slope. The folds in both fault and fold systems are of the "wrinkled carpet" type associated with detachment thrust-fault zones. The structural relation of the 2 systems indicates that the great bend in Brooks Range rocks and structures on the Lisburne Peninsula is due to this superposition of an older across a younger fault and fold system, rather than to the oroclinal folding of only one.

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GEOPHYSICAL EVIDENCE FOR ANCIENT SEA-FLOOR SPREADING FROM ALPHA CORDILLERA AND MENDELEYEV RIDGE

This paper presents the geophysical findings from Fletcher's Ice Island (T-3) for the period 1962 to mid-1970. During this time the station traversed the Chukchi Rise, parts of the Alpha Cordillera and Mendeleyev Ridge, and the Chukchi, Mendeleyev, and Canada plains. The findings support the suggestion of earlier investigators that the Alpha Cordillera is a fossil center of sea-floor spreading. Five fractures were observed to cut the Mendeleyev Ridge and the Alpha Cordillera, and many other closely spaced fractures are suggested by topographic, magnetic, and gravity trends. Seismic reflection profiles show a buried topography similar to that of the Mid-Atlantic Ridge. Offsets in the apparent axial rift suggest that the fractures are transform faults. The angular relation between the Mendeleyev Ridge and the Alpha Cordillera appears to result from a southerly displacement of the Alpha Cordillera crest along numeous *en echelon* transform faults. Magnetic anomalies are consistent with the sea-floor spreading hypothesis, but no spreading dates are available. A broad zone of low amplitude anomalies over the central and southern Canada Plain might represent the Kiaman Magnetic Interval in Permian time or similar quiet intervals in the early Mesozoic. A crustal gravity model based on a 600 km long gravity and bathymetric profile and an unreversed refraction measurement from Station Alpha shows the observed gravity to be consistent with a section of East Pacific Rise type with a 5 km thick oceanic layer overlying 27 km of anomalous ($p = 3.15$) mantle. The relation of this ridge to the surrounding continental geology is explored. It is suggested that this ridge generated a sea floor which was consumed by marginal trenches along the Lomonosov Ridge (then the northern margin of the European continental block), the northern Alaskan coast, and the Canadian Archipelago. Sea-floor generation and consumption apparently ended with the separation of Greenland from Labrador in late Mesozoic time. The age of the basin is reflected in the large sediment thickness observed. Seismic reflection profiles show more than 2 km of sediment beneath the Mendeleyev and Canada plains, with prominent reflectors suggesting major climatic or depositional changes. Sediment cover on the ridge varies from several hundred meters to more than a kilometer. Sedimentary ridges blanket the crestal plateau of the Alpha Cordillera, apparently the result of currents which transport sediment across the crest from northwest to southeast. This process is presently inactive, and may have terminated with the initiation of continental glaciation as far back as late Miocene time. Similar sedimentary structures 700 m beneath the Mendeleyev plain suggest a strong bottom circulation in the past. A zone of bottom erosion along the Mendeleyev Ridge flank may reflect a circulation of water through the Cooperation Gap, a trough which appears to cross the ridge. Two buried channels extending to subbottom depths of 700 m were observed between the Mendeleyev fracture zone and the Mendeleyev plain.

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CONTINENTAL DRIFT IN ARCTIC

Cretaceous and Cenozoic spreading of the northern Atlantic basins steps via transform faults to the Arctic Ocean, where simple spreading of the Eurasia basin appears highly probable, and more complex opening of the polar half of the Amerasia basin by spreading of Alpha and Mendeleyev Ridges appears likely. The Alaskan half of Amerasia basin may have opened behind counterclockwise-rotating Alaska, as proposed by S. W. Carey; this accounts for many features, including the provenance and northern source of clastic upper Paleozoic and lower Mesozoic sediments of northern Alaska.

As no young subduction zones are evident around the Arctic Ocean, these spreading motions must be matched by continental deformation and transform faults in Alaska and northeastern Siberia. A transform fault from the Eurasia basin may cross the East Siberian shelf, displacing the New Siberian Islands from Taimyr and separating Wrangel Island and northeastern Chukotka from mainland Siberia. Further deformation is absorbed by clockwise oroclinal rotation of the Verkhoyansk geosyncline south of this fault.

Reversing these motions indicates that the late Paleozoic and early Mesozoic Verkhoyansk, Wrangel, and Brooks geosynclinal terranes were parts of a continuous continental shelf, facing the open Pacific Ocean. The Laurasian continent fringed by this shelf was an aggregate of North American, European, and Siberian plates that had collided in Paleozoic time as Caledonian and Uralian oceanic plates vanished beneath them.

The stability of the Verkhoyansk-Brooks shelf ended when Jurassic subduction inaugurated conveyor-belt accretion at the Pacific continental margin, and magmatism above Benioff zones. Lena River and northern Alaska foreland basins, superimposed on the old continental shelf, received sediments from the new Pacific mountain systems concurrently with thin-skinned overthrusting. In middle Cretaceous time, the Verkhoyansk belt was wrapped into a compound orocline. Later Cretaceous and Cenozoic subduction produced successively the Okhotsk-Chukotsk, Kamchatka-Koryak, and Kuril-Aleutian systems. Central and southern Alaska may consist largely of debris (including continental fragments and island arcs) swept in since Triassic time on oceanic plates, and of successor-basin deposits and Benioff-zone magmatic rocks.

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MESOZOIC GEOLOGY OF SVALBARD

Mesozoic rocks are known from most of the major islands of Svalbard, namely Spitsbergen, Nordaustlandet, Barentsøya, Edgeøya, Kong Karls Land, Hopen, and Bjørnøya.

Sedimentary rocks range in age from Triassic (early Scythian) through Early Cretaceous (Albian), with facies mostly drab shale, siltstone, and sandstone—generally marine shale and continental sandstone—and comprise 2 lithostratigraphical units: Sassendalen Group (Griesbachian to Toarcian) and Adventdalen Group (Bathonian to mid-Albian). These units contrast markedly with the underlying Permian cherty carbonates, and not so obviously with the resistant overlying Tertiary coal measures. The marine strata are characterized by ammonites, bivalves, and saurians; the continental strata have plant beds, thin coal seams, some bivalves, and vertebrates. The succession and facies are very similar to those of Arctic Canada.

The most conspicuous rocks in the older part of the sequence are the cliff-forming basic igneous sills and flows of latest Jurassic and/or Early Cretaceous age.

The Mesozoic tectonic pattern followed a relatively stable late Paleozoic history with a marked change of facies but conformable strata. The maximum known thickness of Meozoic strata is about 3 km. The first distinguishable disturbance (warping and faulting) accompanied basic igneous activity but with little change of sedimentary facies. The principal unconformity represents a hiatus which took place in late Albian to early? Paleocene time. There is local overstep of Tertiary rocks onto lowermost Triassic, but generally only the uppermost Albian members are missing. These minor distrubances may be related to movements that culminated in the West Spitsbergen Orogeny in early to mid-Tertiary time, and to the mainly Tertiary Arctic Ocean spreading. Svalbard was probably moved from subtropical to temperate latitudes in Mesozoic time, only subsequently achieving arctic latitudes.

Petroleum prospects in the Arctic must take Mesozoic rocks into account as providing source, cap, and reservoir rocks.

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TECTONIC EVOLUTION OF BARENTS SHELF AND RELATED PLATES

In this paper an attempt has been made to reconstruct successively earlier configurations of lithosphere plates and their constituent parts, as related to the Barents Shelf. This involved a brief investigation of some possible past relations between Spitsbergen and the northwestern Eurasian plates, Greenland, the Canadian Arctic Islands, and the intervening seas and ocean basins. The restoration of observed crustal strains from structural and geophysical evidence were tested in each case for stratigraphical consistency of the implied reconstructions.

Working backward in time the study begins by reversing the late Phanerozoic spreading of the Norwegian and Greenland Sea basins of the Atlantic Ocean and the Eurasian basin of the Arctic Ocean. This leads to familiar reconstructions of Triassic/Permian paleogeology, with Spitsbergen adjacent to North Greenland and Ellesmere Island. There are some alternative reconstructions which have been rejected.

The restoration of Paleozoic displacements depend mainly on different interpretations of the Caledonides (especially the amount of closing and the amount of sinistral transcurrence involved). Relations between these structures, the North Greenland and Innuitian fold belts, the Lomonsov Ridge, and the Uralides, for instance, are critical.

There are more speculative possibilities for unraveling late Precambrian movements. The development of