a brief two- to three-week breakup period in late May and early June. Streamflow virtually ceases in all streams, including the largest rivers, during the long, cold winters.

At a few locations, ground-water supplies have been obtained from shallow thawed zones adjacent to or underlying streams. Most ground water beneath the permafrost is brackish at best. Large perennial springs such as Shublik and Sadlerochit discharge from carbonate rocks in the central and eastern Brooks Range and foothills and within the southwestern Brooks Range, but are remote from areas of present development.

The most successful water-supply developments combine the use and removal of gravel with simultaneous creation of deep surface reservoirs to store abundant summer streamflow.

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Late Paleozoic to Cenozoic Reconstruction of the Arctic

The plate tectonic evolution of the Arctic is reassessed in the context of the known histories of the North Atlantic and North Pacific Oceans, and of the tectono-stratigraphic development of the lands around the Arctic Ocean. Computer map-drawing facilities were used to provide geometrical constraints on the reconstructions, which are presented in the form of eight palinspastic maps.

Stratigraphic similarities among presently dispersed continental areas identify fragments of a former "Barents plate." Collision of this plate with the Euramerican plate was the cause of the Late Devonian Ellesmerian orogeny. In later Paleozoic time, the Siberian continent also joined Pangea by collision with the combined Barents and Euramerican plates along the Urals-Taymyr suture. The Mesozoic-Cenozoic history of the Arctic is concerned with the fragmentation and dispersal of the former Barents plate, as well as the accretion of new continental fragments from the Pacific.

Of the major basins of the present-day Arctic Ocean, the Eurasia basin formed contemporaneously with the North Atlantic Ocean and is still spreading, while the earlier opening of the Canada basin was largely connected with events in the Pacific. The Canada basin formed by the separation of northern Alaska from the area now occupied by the Alpha Ridge. Initial rifting in the Late Jurassic was contemporaneous with the earliest major accretionary events in eastern Siberia and the northwestern Cordillera of North America. An Early to mid-Cretaceous age for the main phase of spreading is confirmed by the age-depth relationship for the floor of the Canada basin. After this time, the Canada basin formed part of the North Atlantic plate, and subsequent movements related to the opening of the North Atlantic and Eurasia basins were taken up within Siberia and the Bering Sea area. The history of the latter is not yet clear for times earlier than the late Eocene—the earliest time for which it is possible to make a geometrically realistic reconstruction of that area.

Earliest stages of spreading in the northern North Atlantic caused the initial separation of Greenland from North America. The Eurekan orogeny in the eastern Canadian Arctic is a local result of this spreading. Palinspastic restoration of the eastern Canadian Arctic Islands is required to fill the gap otherwise left in reconstruction of that area. The Eurasia basin opened contemporaneously with the Norwegian Sea and thus entirely postdates the Canada basin. Geometrical constraints suggest that the Makarov basin, between the Alpha and Lomonosov Ridges, formed during the Eocene.

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Gravity Data from the Wiseman Quadrangle, South-Central Brooks Range

Bouger gravity in the Wiseman quadrangle is dominated by a steep north-dipping regional gradient. Within the regional gradient are several residual anomalies that correspond spatially to mapped geologic units. These residual anomalies have a persistent east-west trend, attesting to the continuity of the east-striking geology. The northern end of the gravity gradient is a broad gravity low of down to −100 Mgal and is believed to be due to a low-density root near the core of the Brooks Range. The southern termination of this gradient is a relative gravity maximum located near the "suture" of the Arctic Alaska terrane with the Angayuchum terrane. This relative high is typical of sutures found throughout the world where continental and oceanic plates once converged. In this case, the anomalies appear to be due to the juxtaposition of denser, mafic oceanic rocks to the south (Angayuchum terrane) with less dense, metamorphic continental rocks of the Arctic Alaska terrane to the north. By accounting for the relative densities of the rock units through gravity modeling, it is evident that the low-density root extends south to underlie the schist belt and possibly the mafics of the Angayuchum terrane.

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Plant Megafossil Biostratigraphy and the Late Cretaceous Environment of the North Slope, Alaska

The Early Cretaceous evolution and subsequent geographic spread of flowering plants resulted in major global floristic changes. Studies of recently collected angiosperm fossil leaf-forms using analyses of comparative leaf architecture, facies associations, migrations, and community structure have resulted in a biostratigraphic tool for Alaskan Cretaceous nonmarine deposits, and a greater understanding of the Late Cretaceous terrestrial environment of the North Slope when substantial coal resources were being laid down.

Angiosperms first arrived in northern Alaska, from the south, in latest Albian time. The Brooks Range apparently acted as a filter for some taxa and may have locally modified the climate. There is no evidence for major plant radiations at high paleolatitudes at this time.

Putative evergreens form a large component of the pre-angiosperm floras. Throughout the Late Cretaceous, progressive loss of evergreen and thermophilic elements suggest a deteriorating climate. Paleoclimatic interpretations based on gymnosperm and angiosperm taxa are that: (1) there was no seasonal dark period on the North Slope in mid-Cretaceous times; (2) a mid-Cretaceous warm, mildly seasonal climate deteriorated to being cool temperate, with pronounced seasonality, by the Paleocene; and (3) vegetation may have been light- or cold-limited by latest Cretaceous times. The paleolatitude of greater than 70°N predicted for northern Alaska by paleogeographic reconstructions would appear to conflict with the interpretation that plants experienced no seasonal dark period. An obliquity of 15° could explain this conflict and a closer relative position to the rotational pole accounts for the apparent climatic deterioration.

A detailed study of high-latitude terrestrial-plant ecosystems provides information critical to global climate models and therefore our understanding of the biosphere as a whole.

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Mississippian Alaska-Siberian Connection: Evidence from Plant Megafossils

The protolepidodendrid genera *Tomiodendron, Ursodendron, Angarophloios*, and *Meyenodendron* have been discovered on the North Slope. These taxa, with the exception of *Tomiodendron*, are known only from Mississippian (Tournaisian-Visean) units in eastern Siberia and therefore are of uniquely Angaran affinity. The absence of these genera from extensively collected European assemblages strongly suggests that eastern Siberia and northern Alaska were joined, or in very close proximity, during Mississippian time, contrary to most paleogeographic reconstructions. A disjunct relict distribution is discounted on the basis of paleogeographic reconstructions showing even greater separations between Alaska and Siberia during the Devonian.

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McArthur River Field—A Cook Inlet Giant

The eighth major discovery in Cook Inlet basin was announced on October 24, 1965, as a result of drilling the Union-operated Grayling 1-A well near the crest of a broad, low-relief anticline that had been mapped from seismic data as early as 1959. The prolific Hemlock Conglomerate was tested at rates exceeding 2,000 BOPD. As delineation wells confirmed the size of the accumulation, three separate platforms were ordered and were in place by July 1967, and within three months, production from the Hemlock had begun.

Additional oil-productive sands in the Tyonek Formation, immediately overlying the Hemlock as well as several more in the underlying West