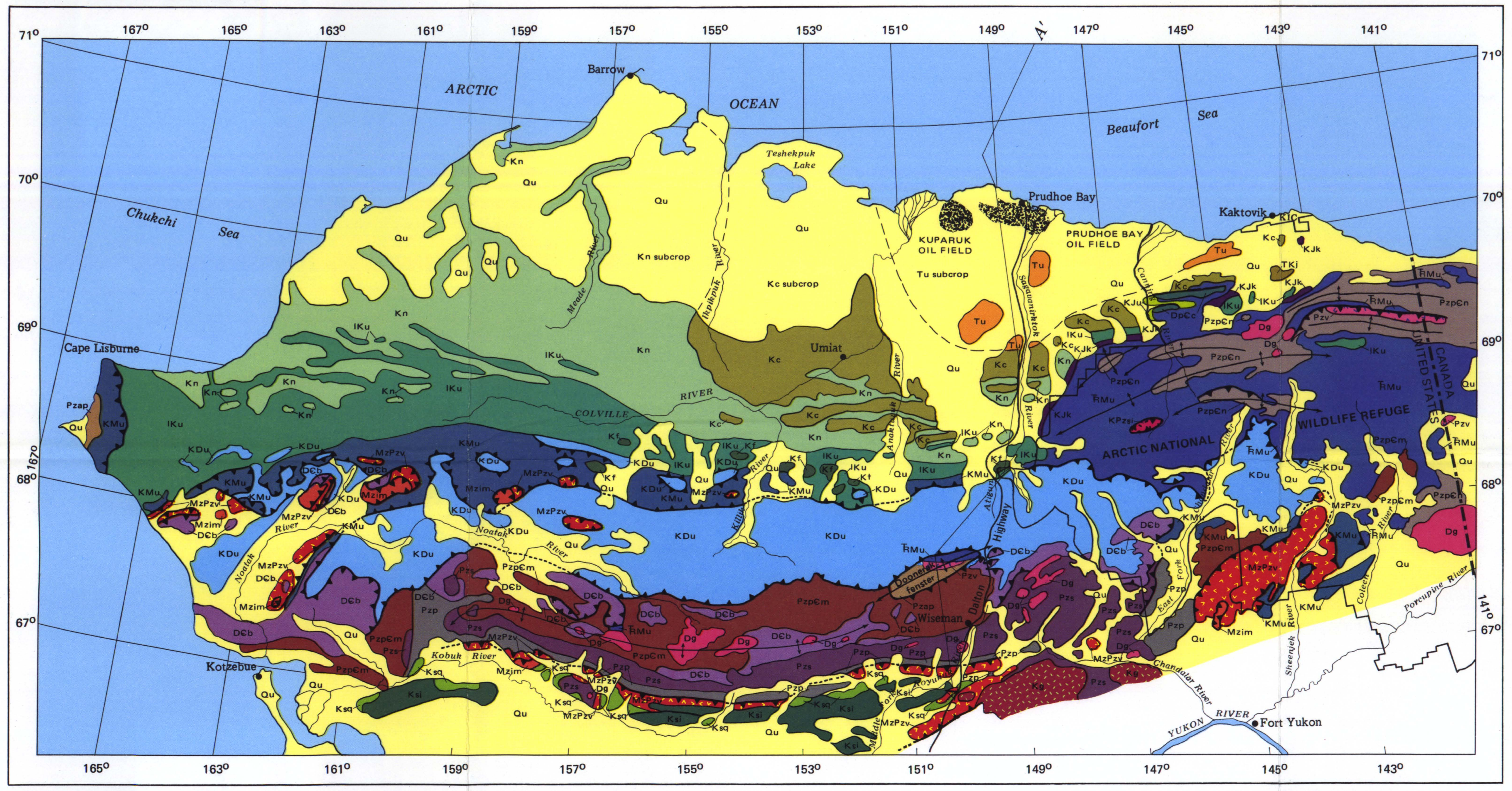
ALASKA DIVISION OF GEOLOGICAL &
GEOPHYSICAL SURVEYS

GUIDEBOOK 7, SHEET 1
MULL (1989)

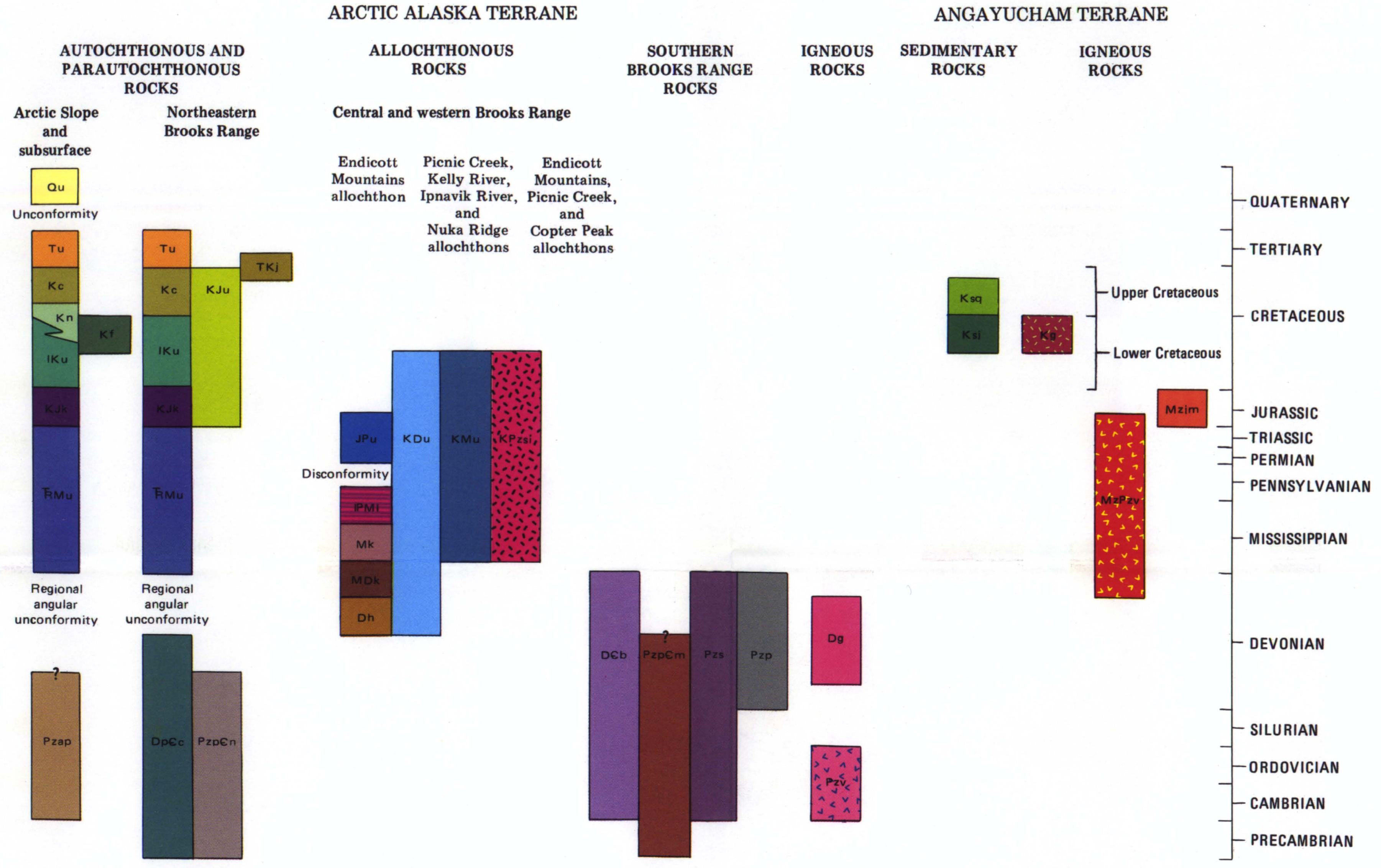


Albers' equal-area projection.
National geodetic vertical datum of 1929.
Base from U.S. Geological Survey National Atlas, 1970.

SCALE 1: 2,851,200
1 INCH = 45 MILES
0 50 100 150 miles
0 50 100 150 kilometers

Geology modified from Lathram, 1965; Grybeck and others, 1977; and Beikman, 1980. Cartography by Ann-Lillian Schell.

CORRELATION OF MAP UNITS



MAP SYMBOLS

- ——— Contact
- — — — Sub-Quaternary contact—Approximately located
- ━━━ Fault—Sense of movement unknown
- ▲▲ Thrust fault—Dotted where concealed. Sawteeth on upper plate
- ←┼→ Regional antiform, showing trace of axial plane and direction of plunge
- ∿∿∿ Regional unconformity
- ⌖ Dry hole or abandoned well
- ● Oil well

SOURCES OF MAP DATA

Beikman, H.M., 1980, Geologic map of Alaska: U.S. Geological Survey, scale 1:2,500,000, 2 sheets.

Grybeck, Donald, Beikman, H.M., Brosgé, W.P., Tailleur, I.L., and Mull, C.G., 1977, Geologic map of the Brooks Range, Alaska: U.S. Geological Survey Open-file Map 77-166B, scale 1:1,000,000, 2 sheets.

Lathram, E.H., 1965, Preliminary geologic map of northern Alaska: U.S. Geological Survey Open-file Map, scale 1:1,000,000.

DESCRIPTION OF MAP UNITS

ARCTIC ALASKA TERRANE

AUTOCHTHONOUS AND PARAUTOCHTHONOUS ROCKS

Arctic Slope and subsurface and northeastern Brooks Range

Qu QUATERNARY DEPOSITS, UNDIFFERENTIATED—Alluvium, terrace gravel, and glacial moraine and outwash. Includes Gublik Formation

Tu TERTIARY DEPOSITS—Poorly consolidated mudstone, siltstone, sandstone, and conglomerate. Deposited in nonmarine and shallow-marine environments. Includes Sagavanirktok Formation

TKj JAGO RIVER FORMATION (PALEOCENE TO MAASTRICHTIAN)—Lithic sandstone and conglomerate, carbonaceous shale, and minor coal. Deposited dominantly in nonmarine environments

Kc COLVILLE GROUP (UPPER CRETACEOUS)—Sandstone, conglomerate, siltstone, and organic shale interbedded with tuff and bentonite. Dominantly shallow-marine deposits with nonmarine tongues. Includes Prince Creek, Schrader Bluff, and Seabee Formations on central Arctic Slope and Canning Formation and Hue Shale on northeastern Arctic Slope

Kn NANUSHUK GROUP (CENOMANIAN TO ALBIAN)—Quartzose sandstone, siltstone, carbonaceous shale, coal, and minor conglomerate. Forms deltaic sequence that grades from shallow-marine deposits at base to nonmarine deposits at top—except to northeast, where deposited as turbidites

IKu LOWER CRETACEOUS ROCKS, UNDIFFERENTIATED—Dominantly shaley turbidite deposits. Includes Okpikruak Formation (Neocomian to Aptian?), Kongakut Formation (Aptian to Albian?), and Torok Formation (Albian)

Kf FORTRESS MOUNTAIN FORMATION (ALBIAN)—Conglomerate, lithic sandstone, and shale. Proximal turbidite deposits at base; nonmarine(?) deposits at top

KJu CRETACEOUS AND JURASSIC ROCKS, UNDIFFERENTIATED—Includes Canning Formation (Upper Cretaceous)—sandstone and shale turbidite deposits; Hue Shale (Upper Cretaceous)—shallow-marine organic shale interbedded with tuff and bentonite; unnamed pebble shale (Lower Cretaceous)—marine organic shale; Kemik Sandstone (Lower Cretaceous)—shallow-marine quartzose sandstone; and Kingak Shale (Jurassic and Lower Cretaceous)—shallow-marine clay shale

KJk KINGAK SHALE (LOWER CRETACEOUS AND JURASSIC)—Thick, black clay shale. Deposited in shallow-marine environment

TRMu TRIASSIC TO MISSISSIPPIAN ROCKS, UNDIFFERENTIATED—Includes Shublik Formation (Triassic)—shallow-marine black shale and limestone; Sadlerochit Group (Triassic Ivishak and Permian Echooka Formations)—dominantly quartzose marine shale, sandstone, and conglomerate; Lisburne Group (Mississippian and Lower Pennsylvanian)—shallow-marine carbonate rocks; Kayak Shale (Mississippian)—marine black shale; and Kekiktuk Conglomerate (Mississippian)—nonmarine quartzose sandstone and minor conglomerate. Present in Arctic Slope subsurface, northeastern Brooks Range, and Doonerak fenster

DpЄc CARBONATE ROCKS (DEVONIAN TO PRECAMBRIAN)—Dominantly shallow-marine deposits. Includes Nanook Limestone (Cambrian to Devonian) and Katakturuk Dolomite (Precambrian)

Pzap ARGILLITE AND PHYLLITE (LOWER PALEOZOIC)—Deep-marine deposits. Present in Doonerak fenster, on Lisburne Peninsula, and in Arctic Slope subsurface

PzpЄn NERUOKPUK FORMATION (MIDDLE PALEOZOIC TO PRECAMBRIAN)—Dominantly low-grade metamorphic rocks, including chert, phyllite, limestone, graywacke, semischist, quartz arenite, and mafic igneous rocks

ALLOCHTHONOUS ROCKS

Central and western Brooks Range

ENDICOTT MOUNTAINS ALLOCHTHON

KDu LOWER CRETACEOUS TO UPPER DEVONIAN ROCKS, UNDIFFERENTIATED—Includes Hunt Fork Shale (Dh), Kanayut Conglomerate (MDk), Kayak Shale (Mk), Lisburne Group (IPMl), and Jurassic to Permian rocks (JPu) described below. Also includes rhythmic sandstone and shale (turbidites) of Neocomian Okpikruak Formation

JPu* JURASSIC TO PERMIAN ROCKS—Includes Echooka Formation (Permian)—shallow-marine shale and silty limestone; Otuk Formation (Triassic and Jurassic)—shallow-marine shale and limestone; and, locally, unnamed coquinoid limestone (Valanginian)—shallow-marine deposit

IPMl* LISBURNE GROUP (LOWER PENNSYLVANIAN AND MISSISSIPPIAN)—Shallow-marine carbonate rocks

Mk* KAYAK SHALE (MISSISSIPPIAN)—Shallow-marine shale

MDk* KANAYUT CONGLOMERATE (LOWER MISSISSIPPIAN AND UPPER DEVONIAN)—Deltaic complex composed of conglomerate, sandstone, siltstone, and shale. Includes Noatak sandstone (shallow-marine deposit) at base

Dh* HUNT FORK SHALE (UPPER DEVONIAN)—Prodelta shale. Includes Beaucoup Formation at base

PICNIC CREEK, KELLY RIVER, IPNAVIK RIVER, AND NUKA RIDGE ALLOCHTHONS

KMu CRETACEOUS TO MISSISSIPPIAN ROCKS, UNDIFFERENTIATED—Consist dominantly of Okpikruak Formation (Neocomian)—rhythmic sandstone and shale turbidite deposits; Etivluk Group (Pennsylvanian to Triassic)—shallow-marine siliceous deposits; and Lisburne Group (Mississippian and Pennsylvanian)—shallow-marine carbonate rocks and siliceous deposits

ENDICOTT MOUNTAINS, PICNIC CREEK, AND COPTER PEAK ALLOCHTHONS

KPzsi CRETACEOUS TO PALEOZOIC SEDIMENTARY AND IGNEOUS ROCKS, UNDIFFERENTIATED—Includes sedimentary rocks of Endicott Mountains and Picnic Creek allochthons (KDu and KMu) and basalt and associated extrusive igneous rocks of Copter Peak(?) allochthon (MzPzv). Exposed in Porcupine Valley, Philip Smith Mountains

SOUTHERN BROOKS RANGE ROCKS

DЄb BAIRD GROUP (DEVONIAN TO CAMBRIAN)—Includes Skajit Limestone, Kugururok Formation, and other shallow-marine carbonate-platform rocks

Pzs QUARTZ-MICA SCHIST (MIDDLE AND LOWER PALEOZOIC, PROBABLY MOSTLY DEVONIAN)—Consists of quartz-mica schist and associated metasedimentary and metavolcanic rocks in schist belt of southern Brooks Range. Includes Anirak and Mauneluk Schists of Ambler mining district

Pzp PHYLLITE AND GRAYWACKE (MIDDLE PALEOZOIC, PROBABLY DEVONIAN)—Turbidite deposits. Includes Beaver Creek phyllite of Ambler mining district

PzpЄm METASEDIMENTARY AND METAIGNEOUS ROCKS (MIDDLE PALEOZOIC TO PRECAMBRIAN?)—Composed dominantly of calc-schist, marble, quartzite, phyllite, and greenstone. Includes Kogoluktuk Schist of Ambler mining district

IGNEOUS ROCKS

Dg GRANITIC ROCKS (DEVONIAN)—Dominantly granite gneiss. Most yield discordant Devonian U/Pb and Cretaceous K/Ar ages

Pzv VOLCANIC ROCKS (LOWER PALEOZOIC)—Basalt, andesite, tuff, and agglomerate. Includes volcanic rocks in Doonerak fenster

ANGAYUCHAM TERRANE

SEDIMENTARY ROCKS

Ksq QUARTZ-PEBBLE CONGLOMERATE AND GRAYWACKE (UPPER CRETACEOUS)—Quartz-, schist-, and quartzite-pebble conglomerate and lithic sandstone. Deposited in marine to nonmarine environments

Ksi IGNEOUS-CLAST CONGLOMERATE AND GRAYWACKE (ALBIAN)—Greenstone-, gabbro-, and chert-cobble conglomerate and lithic sandstone. Deposited in marine to nonmarine environments

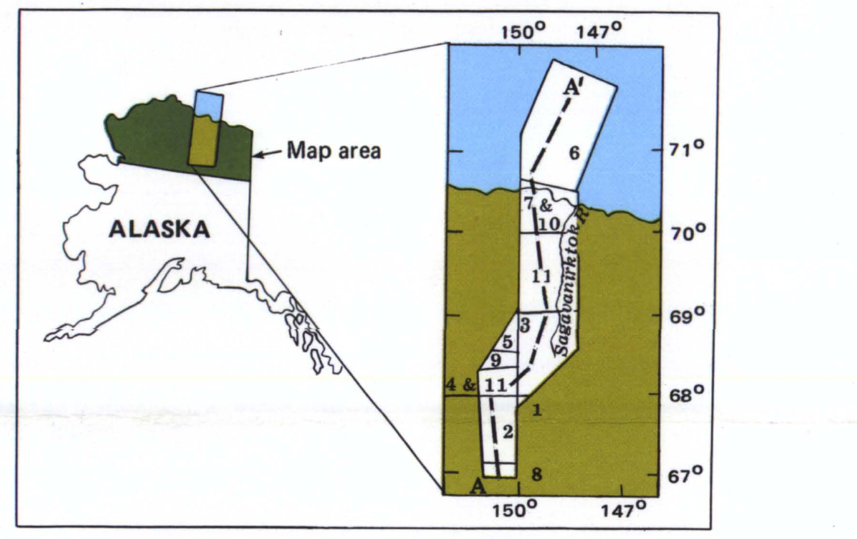
IGNEOUS ROCKS

Kg GRANITIC ROCKS (ALBIAN)—Bodies of granite, monzonite, diorite, and syenite that intrude Angayucham volcanic rocks (MzPzv)

Mzim LAYERED ULTRAMAFIC AND GABBROIC ROCKS (MIDDLE JURASSIC)—Partly cumulate, partly tectonized peridotite and gabbro that form Misheguk Mountain allochthon

MzPzv VOLCANIC ROCKS (LOWER MESOZOIC AND PALEOZOIC)—Pillow basalt and associated chert and carbonate rocks that form Copter Peak allochthon. Includes Killak River Volcanics and Angayucham Basalt

*Unit present on cross section only.



SOURCES OF CROSS-SECTION DATA

1. Brosgé, W.P., and Reiser, H.N., 1964, Geologic map and section of the Chandalar Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-375, scale 1:250,000, 1 sheet.
2. ________ 1971, Preliminary bedrock geologic map, Wiseman and eastern Survey Pass Quadrangles, Alaska: U.S. Geological Survey Open-file Map 71-56, scale 1:250,000, 2 sheets.
3. Brosgé, W.P., Reiser, H.N., Dutro, J.T., Jr., and Detterman, R.L., 1979, Bedrock geologic map of the Philip Smith Mountains Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF 879-B, scale 1:250,000, 2 sheets.
4. Brosgé, W.P., Reiser, H.N., Dutro, J.T., Jr., and Nilsen, T.H., 1979, Geologic map of Devonian rocks in parts of the Chandler Lake and Killik River Quadrangles, Alaska: U.S. Geological Survey Open-file Map 79-1224, scale 1:200,000, 2 sheets.
5. Detterman, R.L., Bickel, R.S., and Gryc, George, 1963, Geology of the Chandler River region, Alaska: U.S. Geological Survey Professional Paper 303-E, p. 223-324.
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8. Patton, W.W., Jr., and Miller, T.P., 1973, Bedrock geologic map of Bettles and southern part of Wiseman Quadrangles: U.S. Geological Survey Miscellaneous Field Studies Map MF 492, scale 1:250,000, 1 sheet.
9. Patton, W.W., Jr., and Tailleur, I.L., 1964, Geology of the Killik-Itkillik region, Alaska: U.S. Geological Survey Professional Paper 303-G, p. 409-500.
10. Tailleur, I.L., Bird, K.J., and Engwicht, S.E., 1978, Map showing depth to basement from drilling and from seismic exploration, eastern North Slope petroleum province, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF 928-U, scale 1:500,000, 1 sheet.
11. Unpublished mapping.

GENERALIZED GEOLOGIC MAP OF THE BROOKS RANGE AND ARCTIC SLOPE, NORTHERN ALASKA

by

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