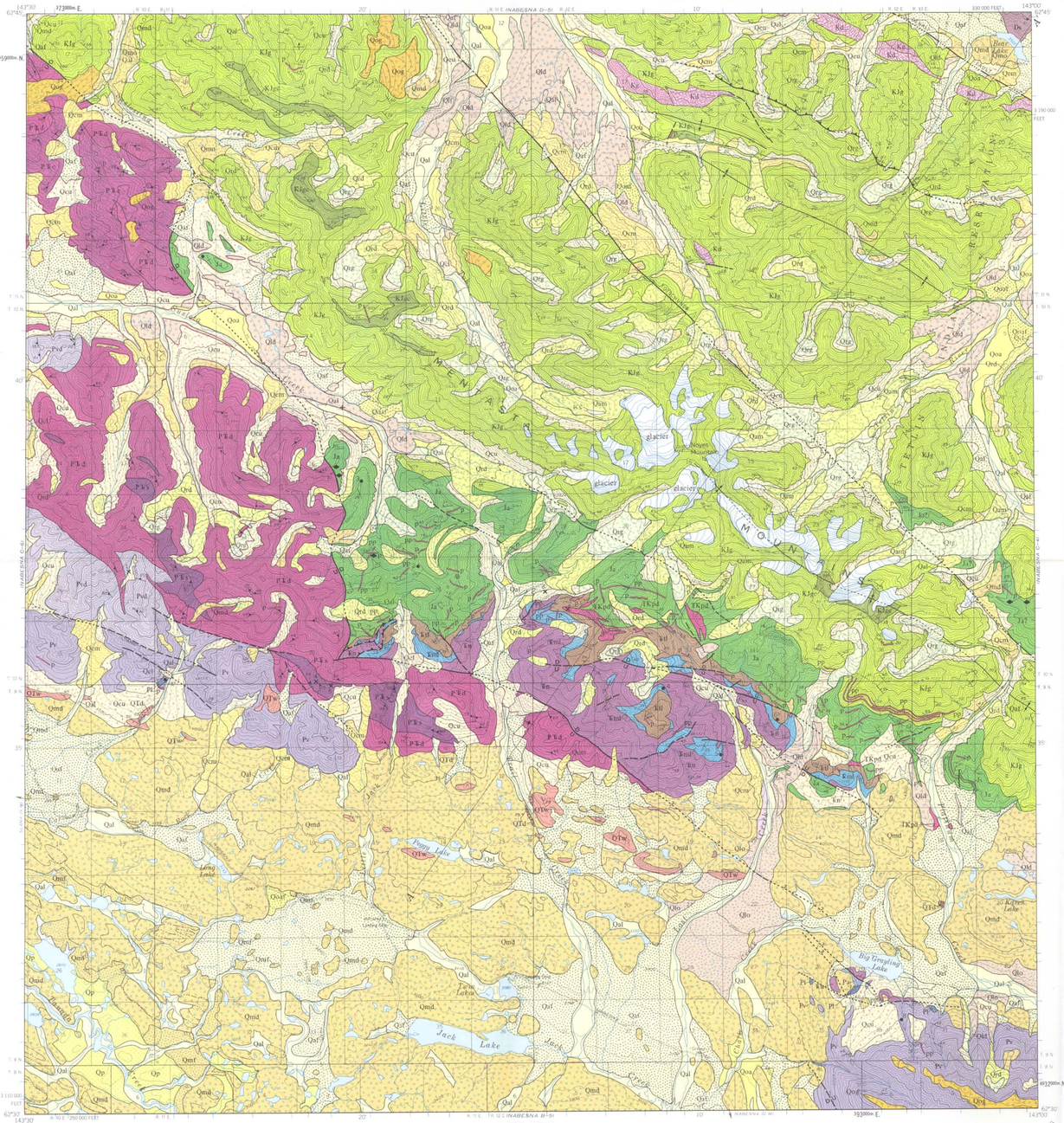
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

GEOLOGIC QUADRANGLE MAP
NABESNA C-5 QUADRANGLE, ALASKA
GQ-1062



Base from U.S. Geological Survey, 1960
10,000 foot grid based on Alaska coordinate system, zone 2
1000 meter Universal Transverse Mercator grid ticks, zone 7

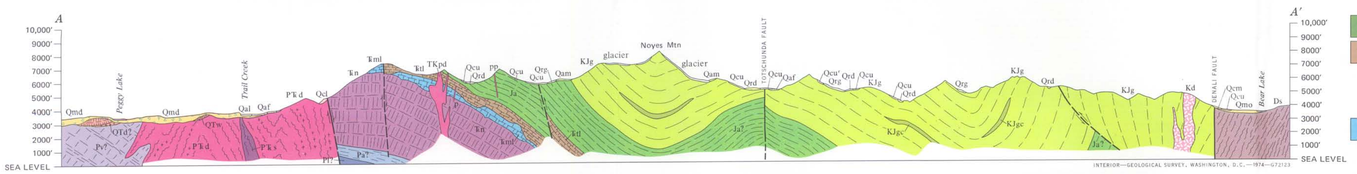
TRUE NORTH
MAGNETIC NORTH
29½°
APPROXIMATE MEAN DECLINATION, 1973

SCALE 1:63 360

CONTOUR INTERVAL 100 FEET
DOTTED LINES REPRESENT 50-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

Bedrock geology mapped by D.H. Richter, 1966-70 and N.A. Matson, Jr., 1967-70; assisted by P.C. Lowe, 1969-70 and R.A. Lamarre, 1970

Surficial geology mapped by H.R. Schmoll principally by air photo interpretation; assisted in the field by R.H. Bennett, 1960-61, and J. Trach, 1963; additional air photo interpretation 1971



INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1974—G72123

GEOLOGIC MAP OF THE NABESNA C-5 QUADRANGLE, ALASKA

By
D. H. Richter and H. R. Schmoll
1973

CORRELATION OF MAP UNITS

SURFICIAL DEPOSITS

Lacustrine: Qp
Alluvial: Qal, Qaf, Qoa, Qoaf
Glacial: Qam, Qrg, Qrd, Qcl, Qcm, Qcu, Qlo, Qlf, Qld, Qmo, Qmf, Qmd, Qog
Colluvial

Holocene
Holocene and Pleistocene
Pleistocene
QUATERNARY

SEDIMENTARY AND VOLCANIC ROCKS

QTw — QUATERNARY AND TERTIARY
ANGULAR UNCONFORMITY
Klg, Klgc — Lower Cretaceous and Upper Jurassic — CRETACEOUS AND JURASSIC
BROAD GRADATIONAL CONTACT
Ja, Js — Upper Jurassic — JURASSIC
DISCONFORMITY
Ktl — Upper Triassic
LOCAL ANGULAR UNCONFORMITY
Kml
DISCONFORMITY (?)
Kn — Upper and (or) Middle Triassic — TRIASSIC
DISCONFORMITY (?)
Pa, Pl — Middle and (or) Lower Permian — PERMIAN
ANGULAR UNCONFORMITY (?)
Pv, Pvd — PERMIAN AND (OR) PENNSYLVANIAN

INTRUSIVE ROCKS

Hypabyssal rocks: TKpd, pp, pv — TERTIARY OR CRETACEOUS
Plutonic rocks: Kd, Kg — CRETACEOUS (?)
Plutonic and metaplutonic rocks: P€d, P€s, P€c, P€s — JURASSIC, TRIASSIC AND PERMIAN

METAMORPHIC ROCKS

Ds — DEVONIAN

DESCRIPTION OF MAP UNITS

SURFICIAL DEPOSITS

YOUNGER ALLUVIUM

Qal — Alluvium on active flood plains and on lowest terraces of major streams. Chiefly gravel and sand. Includes finer alluvium (silt and fine sand) along minor streams on extensive drift-covered surface (Qmd) in southern part of quadrangle

Qaf — Alluvial fans and cones. Chiefly gravel and sand. Only larger, better defined cones differentiated from Qcu

ROCK GLACIER DEPOSITS

Qrg — Rock glaciers, active and recently active, with pronounced tongue-shaped forms. Chiefly rubble and diamicton

Qrd — Deposits of formerly active rock glaciers, both tongue-shaped and lobate forms. Chiefly rubble and diamicton

COLLUVIAL DEPOSITS

Qcl — Young landslide deposits, chiefly debris avalanches. Differentiated from Qcm by freshness of form

Qcm — Mass-wasting deposits. Chiefly deposits of older landslides, including block glides, slumps, debris slides, debris avalanches, and earth flows; may also include rock glacier deposits

Qcu — Colluvium on valley walls and other steep slopes. Chiefly talus and other slope debris; includes alluvium of numerous minor streams, and locally undifferentiated glacial, rock glacier, and mass-wasting deposits. Chiefly rubble, gravel, sand, silt, and diamicton; usually poorly sorted

OLDER ALLUVIUM

Qoa — Alluvium in higher terraces along major streams; terraces partly concealed beneath colluvium from adjacent slopes. Chiefly gravel and sand. Uppermost terraces may represent outwash from the older phase of the Alaskan Glaciation

Qoaf — Alluvial fans and cones graded to terraces mapped as Qao. Chiefly gravel and sand

Qam — DRIFT OF THE ALASKAN GLACIATION: end moraines of the younger phase of Alaskan Glaciation left after recession of presently existing glaciers. Includes moraines that generally extend beyond the front of rock glacier deposits in the upper Tetlin, Little Tok, and Suslota valleys; these moraines probably correlate with an older phase of the Alaskan Glaciation. Chiefly rubble and diamicton

Qp — POND DEPOSITS: chiefly silt and clay; may include some fine sand that may be alluvium in part; commonly overlain by peat. Occurs in kettles and other depressions on surface of ground moraine.

DRIFT OF LATE WISCONSIN AGE

Qlo — Well-defined outwash fan. Chiefly gravel and sand

Qlf — Fluvioglacial kame terraces in Little Tok valley. Chiefly gravel and sand

Qld — Ground moraine, chiefly diamicton; includes minor fluvioglacial deposits of gravel and sand and scattered pond deposits of silt and clay

DRIFT OF MAIN WISCONSIN AGE

Qmo — Probable outwash deposits in terraces along the Suslositna Creek valley. Chiefly gravel and sand

Qmf — Fluvioglacial kame deposits. Chiefly gravel and sand

Qmd — Ground moraine, chiefly diamicton; may include small post-glacial pond deposits (silt and clay). Well-defined drumlinoid forms shown by discontinuous dotted lines. Unit may include small areas of bedrock where drift is thin, especially on hills of sharp relief

Qog — DRIFT OF OLDER GLACIATIONS: chiefly diamicton on high-level surfaces. Principally glacial in origin but may also include residum derived from bedrock; on moderately sloping surfaces solifluction of this material is common

SEDIMENTARY AND VOLCANIC ROCKS

WRANGELL LAVA AND ASSOCIATED ROCKS

QTw — Chiefly brown massive augite-hypersthene and augite-olivine andesite and basaltic andesite flows with well-developed columnar jointing. Generally porphyritic. Includes altered tan porphyritic biotite rhyodacite, that may in part be intrusive, near head of Rock Creek. Andesite flow on Caribou Creek has been dated as 1.97+ 0.15 m.y. old (M. Lanphere, written commun. 1971)

QTd — Chiefly diamictite and volcanic rubble deposits. Includes weakly consolidated tillites on Caribou Creek; light-gray rhyodacitic(?) vitric avalanche deposits associated with volcanic mudflow deposits and nonvolcanic tillite(?) on Trail Creek; and volcanic boulder conglomerates on Platinum Creek. This association of lava flows and diamictites may be similar to the Miocene and Pliocene series of volcanic and glacial deposits described by Denton and Armstrong (1969) 70 miles to the southeast

GRAYWACKE-ARGILLITE

Klg — Graded beds of dark-gray to gray argillite-siltstone-graywacke less than 1/2 inch to as much as 10 inches thick. Grading less well developed, with argillite predominant in lower part changing upward to exceptionally well-developed graded beds with graywacke predominant in upper part. Argillite clasts common in the graywacke and siltstone strata of the graded beds. Nonfossiliferous

Klgc — Massive, fine- to coarse-grained graywacke, locally pebble to boulder bearing, and extraformational pebble to boulder conglomerate in beds as much as 100 feet thick and locally thicker. Only thicker and more extensive units shown

ARGILLITE

Ja — Chiefly dark shaly argillite in poorly defined beds with abundant thin beds and lenses of dense dark-gray iron-carbonate-bearing mudstone and siltstone, weathering to a conspicuous reddish brown, and minor interbeds of gray calcareous siltstone, gray-green calcareous sandstone, graywacke, and dark-gray impure limestone. Blocks and smaller clasts of Triassic(?) limestone locally abundant. In upper part of unit rocks change gradually into graded beds of unit KJg. Poorly preserved *Buchias* indicate a Late Jurassic age

Js — Gray-green massive sandstone and minor graywacke with abundant angular grains of limestone. Exposed only in Platinum Creek valley

Ktl — THIN-BEDDED LIMESTONE: dark-gray fine-grained limestone in beds a few inches to 5 feet thick with thin interbeds of black chert, siliceous argillite, and carbonaceous shale. Minor beds of medium- to coarse-grained calcareous sandstone and calcareous grit as much as 2 feet thick scattered through unit. Limestones are chiefly micrite and biomicrite, locally recrystallized and dolomitized, that weather light gray (micrite) and buff (spiculitic biomicrite). Spheres of coarse calcite as much as 1 inch in diameter locally abundant in limestone. Siliceous argillite and shale interbeds contain *Monotis subcircularis* Gabb. In divide between Lost and Trail Creeks, limestone is thermally metamorphosed by small intrusive mass (TKpd) to conspicuous white marble with garnet-epidote skarn

Kml — MASSIVE LIMESTONE: gray to dark-gray fine-grained massive limestone with lenses and nodules of black chert and irregular patchworks of disseminated fine-grained quartz. Bedding generally indistinguishable. Chiefly micrite and microsparite, locally recrystallized and dolomitized. Commonly strongly brecciated and veined by coarsely crystalline calcite. Weathers light gray. Contains a few fossils

Kn — NIKOLAI GREENSTONE: green, dark-brown, reddish-brown, and maroon amygdaloidal basalt flows separated locally by thin reddish-brown volcaniclastic beds. Intermixed aa and pahoehoe flows with individual flow units ranging from a few inches to more than 50 feet thick. Amygdules consist of quartz, calcite, chlorite, epidote, pumpellyite, prehnite, and some zeolite minerals. Native copper locally present in flow tops, fracture zones and amygdules. Unit referred to as amygdaloidal basalt of Permian or Triassic age in the Nabesna A-3 and B-4 quadrangles (Richter, 1971a, 1971b) but subsequently has been found to be underlain by *Daonella*-bearing beds in the Nabesna A-4 quadrangle. The age is therefore Middle and (or) Late Triassic, the same age as the type Nikolai Greenstone in the southern Wrangell Mountains (MacKevett, 1970)

Pa — ARGILLITE: dark-gray thin-bedded siliceous argillite. Exposed only south of Big Grayling Lake in southeast corner of quadrangle

Pl — LIMESTONE: light-gray to gray, fossiliferous limestone in beds a few inches to as much as 10 feet thick, with sparse beds of calcareous sandstone. Chiefly biosparrudite but commonly recrystallized. Limestone in Caribou Creek may be interbed in volcanic and volcaniclastic unit (Pv)

VOLCANIC AND VOLCANICLASTIC ROCKS

Pv — Interbedded dark-green to gray-green volcanic flows, volcanic mud and debris avalanches, lapilli-pumice tuffs, volcanic mudstone to coarse-grained volcanic sandstone, volcanic pebble conglomerates, and minor fossiliferous impure limestone. Volcanic flows and fragmental rocks are characteristically massive; volcaniclastic rocks are thin bedded and locally graded. Volcanic rocks chiefly andesitic in composition. Gabbro dikes and sills (not shown) intrude the unit

Pvd — Hornfelsed and dioritized volcanic and volcaniclastic rocks along broad contact zone of meta-igneous complex (P€d). Rocks largely recrystallized to massive fine-grained hornblende-chlorite-epidote-feldspar assemblage containing very abundant irregular masses and bands of hornblende diorite and amphibolite

INTRUSIVE ROCKS

Hypabyssal rocks

PORPHYRITIC DIORITE AND HORNBLENDE-PLAGIOCLASE PORPHYRY

TKpd — Small, complex intrusive masses consisting chiefly of a variety of augite-hornblende diorites. Biotite is generally present, and potassium feldspar may be locally abundant. All rocks are conspicuously porphyritic with phenocrysts of hornblende, augite, and sparse feldspar in a fine- to medium-grained subhedral-granular to pilotaxitic groundmass

pp — Gray to light-gray dikes and sills of plagioclase porphyry with conspicuous zoned phenocrysts of plagioclase, as much as 2 centimeters in diameter, and minor hornblende in a fine-grained groundmass of altered feldspar, calcite, and quartz

pv — Undifferentiated greenish-gray to dark-gray dikes and sills of hornblende-plagioclase porphyry. Rocks are generally strongly altered and contain small ragged hornblende and saussuritized feldspar phenocrysts in a very fine grained turbid groundmass. Only larger dikes and sills shown

Plutonic rocks

HORNBLENDE DIORITE AND GRANODIORITE

Kd — Chiefly hornblende diorite containing small irregular masses and layers of pyroxene hornblendite and hornblende-mica peridotite. Medium grained, subhedral granular, locally exhibiting weak foliation. Hornblende in diorite largely altered to chlorite

Kg — Chiefly light-colored hornblende granodiorite but includes hornblende monzonite and hornblende-biotite quartz diorite. Fine- to medium-grained, subhedral granular. Hornblende largely altered to chlorite

Plutonic and metaplutonic rocks

DIORITE, DIORITE GNEISS, SYENITE-MONZONITE GNEISS, AND CATACLASITE

An igneous and meta-igneous complex consisting principally of a variety of diorite and syenite-monzonite gneisses with subordinate amphibolite, schistose cataclasite, and nonfoliate diorite. Gneissosity characterized by hornblende- and (or) biotite-rich layers alternating with feldspar-rich layers, often extremely contorted

P€d — Heterogeneous hornblende diorite gneiss, pyroxene-hornblende-feldspar gneiss, hypersthene-hornblende-feldspar gneiss, amphibolite, nonfoliate hornblende diorite locally containing biotite, and minor syenite-monzonite gneiss and cataclasite. Foliated rocks are fine- to coarse-grained generally with xenoblastic texture. Nonfoliated varieties are medium- to coarse-grained with subhedral to anhedral granular texture and are gradational into gneissic rocks

P€s — Pink biotite-hornblende syenite-monzonite gneiss with interlayers of hornblende-diorite gneiss. Small pegmatitic syenite dikes, locally corundum bearing, cut the alkali gneiss

P€c — Cataclasite consisting principally of quartz-biotite and quartz-amphibole schist. Strong deformational fabric of porphyroblastic feldspar and occasionally garnet in a fine-grained granoblastic to crushed matrix of quartz with thin bands of biotite and amphibole

METAMORPHIC ROCKS

Ds — METASEDIMENTARY ROCKS: chiefly dark-gray phyllite and brown schistose metaconglomerate. Greenschist-facies metamorphism. Interbedded recrystallized limestone in adjacent Nabesna C-4 quadrangle contains tabulate and rugose corals of Devonian age

Contact, showing dip – Gradational or inferred

Contact between individual alluvial fans

Outline of drumlinoid feature

Fault, showing dip – Dashed where approximate or inferred; dotted where concealed; queried where inferred under extensive surficial deposits. U, upthrown side; D, downthrown side. Arrows indicate relative lateral movement. Totschunda and Denali faults offset deposits of Holocene age (Richter and Matson, 1971).

Thrust fault – Dashed where approximate or inferred; dotted where concealed. Sawteeth on upper plate

Anticline – Showing trace of axial plane. Dotted where concealed

Syncline – Showing trace of axial plane. Dotted where concealed

Strike and dip of beds or flows – Arrow indicates direction of tops in vertical beds

Inclined

Vertical

Overturned

Horizontal beds or flows

Direction and plunge of lineation – Principally preferred orientation of mineral grains

Strike and dip of foliation – Showing direction and plunge of lineation

Inclined

Vertical

Strike and dip of slaty cleavage

Inclined

Vertical

Fossil locality – Numbers refer to collections described in accompanying list

Area of abundant limestone megaclasts

Radiocarbon sample locality
Sample W-2444; age, 8,370 years B.P. (M. Rubin, U.S. Geol. Survey)

Prospect or mineral occurrence
1. Au (Moffit, 1942)
2. Pb, Zn, Ag
3. Au, placer (Moffit, 1942)
4. Mo (Moffit, 1954)
5. Corundum (Richter, 1970)

Altered area – Principally limonite-staining due to oxidation of iron-bearing sulfides

LIST OF FOSSILS

Map No.	U.S.G.S. No.	Identification	Studied by
1	M-5381	*Buchia* sp., possibly *B. rugosa*	D.L. Jones
2	M-5387	*Buchia* sp., possibly *B. fischeriana*	D.L. Jones
3	M-5385	*Buchia concentrica* (J. deC. Sowerby)	D.L. Jones
		Pleuromya sp. indet.	
4	M-29618	*Lovenipora?* sp.	H. Duncan
5	M-29617	*Spondylospira* sp.	R. E. Grant
6	M-5029	*Monotis subcircularis* Gabb	N. J. Silberling
7	PC-23430	*Cancrinella* sp.	R. E. Grant
		Liosotella sp.	
		Megousia sp.	
		Stepanoviella sp.	
8	PC-23431	cf. *Cancrinella* sp.	R. E. Grant,
		Liosotella pseudohorrida (Wiman)	M. Gordon, Jr.
		Thamnosia arctica (Whitfield)	
		Paragastrioceras sp.	
		Strigoniatites sp.	

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