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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF– 536

Geologic summary

The McCarthy A-5 quadrangle is largely underlain by terrane that characterizes much of the Wrangell Mountains and nearby regions. This terrane contains an upper Paleozoic basement, which is inferred to reflect an island arc that formed on oceanic crust (Richter and Jones, 1971, and Jones, MacKevett, and Plafker, 1971) and a thick superjacent sequence that includes Mesozoic epicontinental sedimentary rocks and subaerial lavas and Cenozoic subaerial volcanic rocks. Only a small part of the superjacent terrane, the marine sedimentary rocks of the Cretaceous Kennicott, Chititu, and MacColl Ridge Formations, is represented in the A-5 quadrangle. The upper Paleozoic basement rocks are represented by metamorphic rocks. These rocks, which Moffit (1938) included in his Strelna Formation, of Mississippian age, are now believed to be Pennsylvanian and Permian.

The Border Ranges fault (MacKevett and Plafker, 1973, p. 76, 77, and 1973, in press) separates the terrane characterized by an upper Paleozoic basement from upper Mesozoic flysch deposits of the Valdez Group near the southwestern corner of the quadrangle. This fault is interpreted to mark a plate boundary that developed near the end of the Mesozoic or in the early Tertiary. Intrusive rocks in the quadrangle consist of quartz diorite and associated rocks that probably developed during tectonism related to the coupling of the Valdez Group to the continent and of Tertiary rocks that are related to a younger tectonic regime.

Lineaments in the southern part of the quadrangle probably are subsidiary faults that are associated with the Border Ranges fault. Some lineaments appear to transect Quaternary surficial deposits and are suggestive of recent faulting. Young Creek and several of its tributaries in the northeastern part of the quadrangle have sustained small-scale placer gold mining; however, no significant lode deposits are known in the quadrangle.

CORRELATION OF MAP UNITS

Q		QUATERNARY	
UNCONFORMITY			
NORTH OF BORDER RANGES FAULT		SOUTH OF BORDER RANGES FAULT	
Tif	TERTIARY	Tgd	TERTIARY
Kmr	Upper Cretaceous	KJv	CRETACEOUS AND JURASSIC(?)
Kc	Lower Cretaceous		
Kk	CRETACEOUS		
UNCONFORMITY			
KJqd	CRETACEOUS AND JURASSIC		
Pma	PERMIAN		
PPm	PENNSYLVANIAN		

DESCRIPTION OF MAP UNITS

(References pertain to more detailed published descriptions of the rock units or to germane geologic information, generally from nearby areas)

Q UNDIFFERENTIATED SURFICIAL DEPOSITS--Unconsolidated or poorly consolidated; includes extensive glaciofluvial deposits and alluvium, subordinate rock glaciers, moraines, landslides, and talus.

Tif FELSIC INTRUSIVE ROCKS--Hypabyssal dikes and sills, chiefly dacite; includes some unmapped dikes and sills that cut Cretaceous rocks north of the Chitina River; altered porphyritic rocks with plagioclase (zoned Ca andesine-Na labradorite) phenocrysts in a felty groundmass. Groundmass contains plagioclase and quartz, minor K-feldspar, rare ilmenite, and abundant alteration products including calcite and chlorite and minor amounts of sericite, leucoxene, hematite, and clay minerals. Ref. MacKevett, 1970, p. 27, 28.

Tgd GRANODIORITE--Medium-grained hypidiomorphic granular hornblende granodiorite; locally granulated near intercrystal boundaries. Contains plagioclase (Na-andesine), quartz, K-feldspar, and hornblende; minor to rare sphene, apatite, ilmenite, and zircon, and sparsely distributed alteration products including sericite, epidote, brown carbonates, leucoxene, hematite, clay minerals, and chlorite.

Kmr MacCOLL RIDGE FORMATION (Campanian or Maestrichtian, Upper Cretaceous)--Chiefly poorly sorted greenish gray sandstone (lithic wacke) with subangular clasts between 0.1 and 1.0 mm long in a chlorite-rich matrix that constitutes about 20 percent of the rock's volume. The dominant clasts comprise quartz, plagioclase, and cherty lithic fragments. Other minerals in the rock include hornblende, abundant chlorite, and minor amounts of epidote, ilmenite, magnetite, leucoxene, hematite, pyrite, biotite, sphene, calcite, sericite, and glauconite. Ref. Jones and MacKevett, 1969, p. K17-K19; MacKevett, 1970, p. 23.

Kc CHITITU FORMATION (Albian? to Campanian, Lower? to Upper Cretaceous)--Mainly dark-greenish-gray mudstone and siltstone. Composed of extremely small clasts, chiefly quartz and plagioclase, in a chlorite-rich matrix. Contains lesser amounts of calcite, sericite, sphene, magnetite, hematite, clay minerals, and epidote. Ref. Jones and MacKevett, 1969, p. K15-K17; MacKevett, 1970, p. 20-23.

Kk KENNICOTT FORMATION (Albian, Lower Cretaceous)--Chiefly fine sandstone (lithic wacke) that is dark greenish gray. Contains subangular clasts, mainly quartz, plagioclase, and cherty lithic fragments, in a chlorite-sericite matrix that constitutes about 15 percent of the rock's volume. Also contains small to trace amounts of calcite, sphene, biotite, K-feldspar, epidote, garnet, magnetite, ilmenite, hematite, glauconite, and clay minerals. Ref. Jones and MacKevett, 1969, p. K6-K11; MacKevett, 1970, p. 17-19; MacKevett, 1971, p. 19, 20.

KJv VALDEZ GROUP (Jurassic? and Cretaceous)--Interbedded metagraywacke and argillite, dark gray to greenish black; locally schistose and phyllitic. Typically metamorphosed to greenschist facies assemblages. The metagraywacke consists of subrounded clasts, chiefly quartz, plagioclase, and cherty lithic fragments, in a phyllosilicate matrix that forms about 30 percent of the rock. The matrix contains abundant biotite and subordinate chlorite and opaque minerals. The argillite is extremely fine grained, crudely laminated, and contains finely dispersed opaque minerals. Its dominant minerals are quartz, chlorite, muscovite, and albite or oligoclase. Schistose and phyllitic rocks are strongly foliated, generally intricately folded, and characterized by abundant quartz and biotite and by lesser amounts of plagioclase (chiefly albite), opaque minerals, chlorite, and sericite. Ref. Moffit, 1938, p. 89-92; Brabb and Miller, 1962.

KJqd QUARTZ DIORITE--Medium-grained hornblende quartz diorite with local hornblende-rich segregations; generally foliated; cut by a few unmapped aplite and alaskite dikes. Hypidiomorphic granular in texture. Contains abundant plagioclase (andesine), quartz, and hornblende, less abundant biotite, and minor to rare K-feldspar, apatite, chlorite, opaque minerals, epidote, sphene, clay minerals, and sericite. Small amounts of endomorphic garnet locally developed near contacts with invaded rocks. Similar quartz diorite in the McCarthy A-4 quadrangle gave an age of 138±4 million years on hornblende using the K-Ar dating method (M. A. Lanphere, written communication, 1968).

The aplite and alaskite are compositionally similar. The aplite is xenomorphic granular with crystals that range between 0.1 and 1.0 mm in maximum dimensions. The alaskite is hypidiomorphic granular with most crystals between 1 and 4 mm long. Both rocks contain abundant K-feldspar and quartz, and fairly abundant plagioclase, mainly oligoclase. Their less abundant to rare minerals include chlorite, biotite, clay minerals, opaque minerals, sericite, chlorite, calcite, prehnite, zircon, and garnet. Ref. Brabb and Miller, 1962.

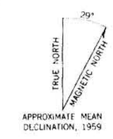
Pma MARBLE--Impure very light gray banded marble with granoblastic crystals between 0.1 and 1.0 mm long; locally granulated. Contains abundant calcite and quartz, fairly abundant diopside and actinolite, and minor to rare apatite, sphene, K-feldspar, chlorite, and clinozoisite. Metamorphosed to grades in the greenschist-amphibolite transition facies. The marble probably is a metamorphosed correlative of limy parts of the Hasen Creek Formation (Smith and MacKevett, 1970) and parts of the Mankomen Formation.

PPm METAMORPHIC ROCKS--Schist, amphibolite, and gneiss; largely derived from volcanic and volcaniclastic assemblages; deformed and metamorphosed to grades in the greenschist-amphibolite transition facies or the amphibolite facies; locally cut by alaskite and aplite dikes and sills similar to those described in unit KJqd. The schist is fine grained and greenish or medium gray; it contains abundant plagioclase (andesine or oligoclase), quartz and biotite or actinolite, less abundant muscovite, and minor to rare sphene, calcite, garnet, hematite, pyrite, magnetite, apatite, chlorite, and monazite(?). The amphibolite is dark gray, fine to medium-grained, and rich in hornblende. It also contains plagioclase (andesine) and subordinate sphene, tremolite, K-feldspar, opaque minerals, sericite, epidote, chlorite, clay minerals, and prehnite. Uncommon variants are locally altered to calcite-chlorite-quartz-rich assemblages and cut by numerous veinlets. A few amphibolites retain faint relict volcanic textures. The gneiss is fine grained and rich in biotite, K-feldspar, and calcite. Its less abundant to minor minerals include sphene, plagioclase, muscovite, ilmenite, pyrite, leucoxene, prehnite, tourmaline, chlorite, allanite, tremolite, and quartz.

The metamorphic rocks are interpreted as metamorphic equivalents of the Skolai Group (Smith and MacKevett, 1970) and of the mainly volcanic and volcaniclastic rocks that are subjacent to the thick limestone section at Mankomen Lake.

Base: U. S. Geological Survey, 1959

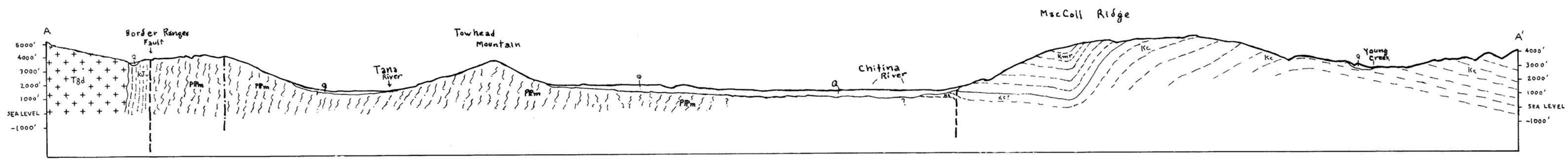
Geology mapped in 1972



CONTOUR INTERVAL 500 FEET
DATUM IS MEAN SEA LEVEL

SCALE 1:63360

1 ½ 0 1 2 3 4 MILES
3000 0 3000 6000 9000 12000 15000 18000 21000 FEET
1 5 0 1 2 3 4 5 KILOMETERS



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EXPLANATION

Contact, approximately located
Dotted where concealed

Fault, approximately located, showing dip
Dotted where concealed; U, upthrown side; D, downthrown side

Lineament, probably a fault, from aerial photographs
Not checked or identified on ground

Anticline, approximately located
Showing crestline

Syncline, approximately located
Showing troughline

Strike and dip of beds

Horizontal beds

Strike and dip of foliation

Strike of vertical foliation

Glacier

RECONNAISSANCE GEOLOGIC MAP OF THE McCARTHY A-5 QUADRANGLE, ALASKA

By
E. M MacKevett, Jr.
1973

For sale by U. S. Geological Survey, price $.50