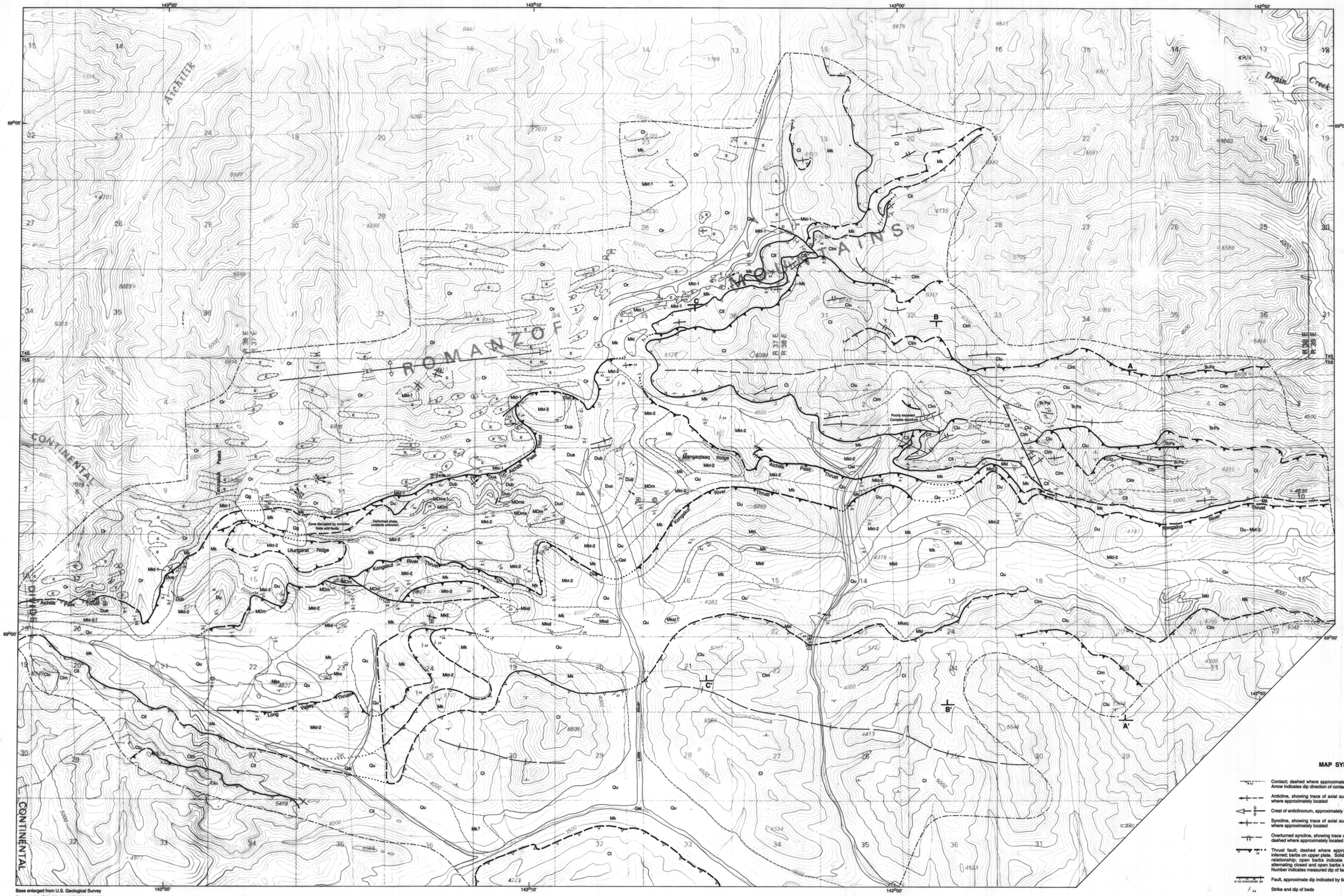
DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS IN COOPERATION WITH THE TECTONICS AND SEDIMENTATION RESEARCH GROUP DEPARTMENT OF GEOLOGY AND GEOPHYSICS, UNIVERSITY OF ALASKA FAIRBANKS

PUBLIC DATA FILE 93-77

Anderson, Sheet 1 of 1



Base enlarged from U.S. Geological Survey Demarcation Point (A-4) and Table Mountain (D-4) Quadrangles, Provisional edition, 1983.

Scale 1:25,000

0 1 2 3 4 5 Miles

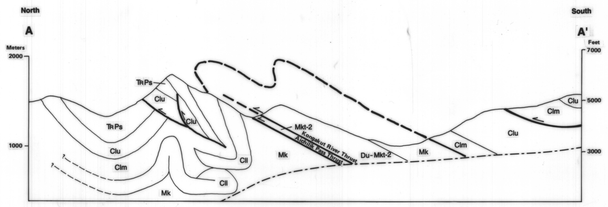
0 1 2 3 4 5 6 7 8 Kilometers

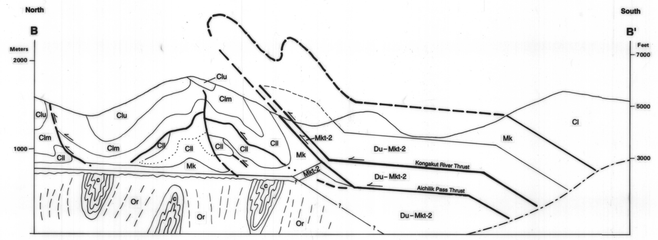
Contour Interval 100 Feet

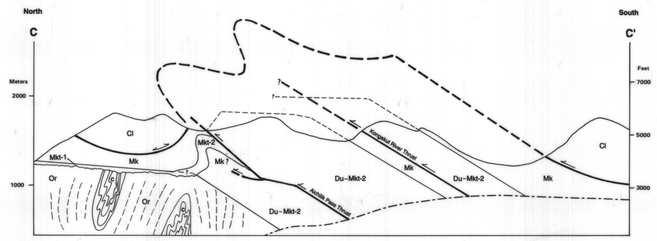
30° True north / Magnetic north

Approximate mean declination, 1983

No vertical exaggeration. Cross sections are schematic and are not balanced.







GEOLOGIC MAP AND CROSS SECTIONS

HEADWATERS OF THE KONGAKUT AND AICHILIK RIVERS DEMARCATION POINT (A-4) AND TABLE MOUNTAIN (D-4) QUADRANGLES EASTERN BROOKS RANGE, ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

By A.V. Anderson

1993

THIS REPORT HAS NOT BEEN REVIEWED FOR TECHNICAL CONTENT (EXCEPT AS NOTED IN TEXT) OR FOR CONFORMITY TO THE EDITORIAL STANDARDS OF DGGS.

DESCRIPTION OF MAP UNITS

QUATERNARY

Qg GLACIERS

Qal ALLUVIUM - Stream gravels, terrace gravels

Qu SURFICIAL DEPOSITS, UNDIVIDED

SADLEROCHIT GROUP

TrPs SADLEROCHIT GROUP, UNDIVIDED - Ivishak Formation - Sandstone, light-gray, weathers reddish-brown, medium-grained, thinly and regularly bedded with ripple cross-lamination. Underlain by dark gray silty shale with minor thin limy beds; may be Kavik Shale. Early Triassic age (Reiser and others, 1980). Echooka Formation - Sandstone, medium-grained, thin- to medium-bedded, fossiliferous. Permian age (Reiser and others, 1980). Thickness approximately 100 m.

TrPsi IVISHAK FORMATION - Locally differentiated.

LISBURNE GROUP

Cl LISBURNE GROUP, UNDIVIDED - Bioclastic limestone and micrite divided into three units. Forms short-wavelength (100's meters) folds above a detachment horizon in Kayak Shale. Forms cliffs. Thickness variable due to erosion and structural thickening, approximate thickness 800 to 1000 m. Late Mississippian to Early Pennsylvanian age (Reiser and others, 1980).

Clu UPPER PART - Fine-grained limestone, weathers light gray to yellowish cream. Forms high cliffs.

Clm MIDDLE PART - Bioclastic limestone. Weathers gray to very dark gray. Forms ledges and slopes. Has acted as a detachment horizon where Cll is present. Commonly structurally thickened. Early Late Mersmacian (locality 1) (A. Harris, U.S. Geological Survey, pers. comm., 1991).

Cll LOWER PART- Bioclastic limestone, in places pervasively replaced by black chert as nodules and layers. Weathers medium-gray to black. Forms steep cliffs. Locally depositionally absent. Less than 30 m thick.

KAYAK SHALE

Mk KAYAK SHALE, UNDIVIDED - Shale, steel gray to black; very finely fissile; in places phyllitic; in places siltstone with abundant plant fossils; carbonaceous; forms low passes and valleys beneath the Lisburne Group limestones; forms steep loose slopes where structurally overlain by Kekiktuk conglomerate and Ulungarat Formation; structurally thickened; 300 to 400 m thick in the southern part of the map area; approximately 100 m thick in the northern part of the map area; everywhere an important detachment horizon, even where in normal stratigraphic order. Location of detachment within Kayak Shale is uncertain except where specifically shown. Mississippian (Late Tournaisian to Visean) age based on conodonts (locality 2) and trilobites (locality 3). Contains locally differentiated sandstone and limestone units.

Mkl UPPER LIMESTONE - Bioclastic limestone, thin-bedded, upward-thickening intervals in fissile, calcareous black mudstone and siltstone. Weathers yellowish-brown to black. Crinoid and brachiopod debris common; ironstone concretions with pyrite centers. Commonly forms disharmonic folds below Lisburne Group. Present throughout the map area, but only locally differentiated where greater than 20 m thick. Generally mapped as part of Kayak Shale undivided. 2 to 40 m thick.

Mks SANDSTONE - Sandstone, gray, medium to coarse-grained quartzitic; amalgamated beds; low-angle trough cross-beds; rare preservation of shale interbeds, some coal; base is abrupt and irregular on underlying black mudstone (Mk). Overlain by black mudstone (Mk). In southeastern part of map area present in upper part of Kayak (Mksu). In south-central part of map area present in lower part of Kayak (Mksl) at same stratigraphic position as Mkll. Less than 15 meters thick.

Mkll LOWER LIMESTONE - Limestone, light gray, fossiliferous, contains large crinoid stems; some black chert nodules. Interbedded with black mudstone in lower part of Kayak Shale. Less than 50 meters thick.

KEKIKTUK CONGLOMERATE

Mkt KEKIKTUK CONGLOMERATE, UNDIVIDED - Divided into two sequences, Mkt-1 and Mkt-2, generally separated by a thrust fault. To the north, Mkt-1 is thin, with deposition on Ordovician chert and argillite (unit Or) controlled by local relief on the underlying unconformity surface. Mkt-2 is thicker and exposed in the southern part of the map area. Mississippian age.

Mkt-1 KEKIKTUK CONGLOMERATE, NORTHERN BELT - Quartz-chert breccia to pebble conglomerate and sandstone; weathers gray, often stained yellow-brown to rust-red, locally calcareous, fines upward; abrupt lateral changes in thickness. Basal breccia is difficult to distinguish from massive chert of Romanzof chert. As mapped, includes overlying siltstone and mudstone with abundant plant fossils. Generally less than 30 m thick.

Mkt-2 KEKIKTUK CONGLOMERATE, SOUTHERN BELT - Quartz-chert pebble conglomerate, sandstone, and siltstone; conglomerate includes white, gray, lavender and less common black chert pebbles and cobbles up to 17 cm in diameter. Matrix is light gray to lavender-gray, grading light gray to white quartzite, contains cubic voids from leached pyrite. Some channel geometry, tabular cross-beds, ripple cross-lamination, mud cracks, plant fossils. Upward-fining intervals in an overall fining-upward succession. Deposited with low-angle discordance on Ulungarat Formation; grades abruptly upward into Kayak Shale in the southern part of the map area. Intertongues(?) with Kayak Shale in central part of the map area. Generally 40 to 130 m thick.

MANGAQTAAQ FORMATION (new name)

MDm LIMESTONE - Black algal limestone with prominent oncoids, interbedded with sandstone and organic rich black shale. Sandstone interbeds are cross-bedded and ripple cross-laminated. Interpreted to unconformably overlie Ulungarat Formation; unconformably overlain by Kekiktuk Conglomerate. Age poorly constrained as Late Devonian or Early Mississippian, based on plant fossils (locality 4) (S. Mamay, U.S. Geological Survey, pers. comm., 1989). Composite reference section localities B and C. 200 m thick.

MDms (SANDSTONE UNIT) - Pebbly sandstone, subangular to angular chert pebbles; locally calcareous; locally contains sandstone dike which internally contains dish structures.

ULUNGARAT FORMATION (new name)

Du ULUNGARAT FORMATION, UNDIVIDED - Overall upward-thickening and -coarsening succession grading from marine mudstone and sandstone in lowest exposed strata upward to channelized conglomerate. Overall weathers red to brown. Base is a low-displacement thrust fault. Overlain by Mangaqtaaq Formation on an interpreted low-angle unconformity or by the Kekiktuk conglomerate on a low-angle unconformity. Consists of four informal members. The lowermost member is Middle Devonian (Eifelian, R. Blodgett, U.S. Geological Survey, pers. comm., 1992). The upper three members are bracketed between the Eifelian age of member A and the Mississippian age of the unconformably overlying Kekiktuk Conglomerate. Reference section is locality A.

Dud (MEMBER D) - Rose-red and gray-green mottled mudstone and siltstone. Isolated, small, channelized sandstone bodies. 20 to 50 m thick.

Duc (MEMBER C) - Chert granule to pebble conglomerate and sandstone; sandstones weather gray, often stained yellow-brown to rust-red. Thick successions of amalgamated conglomeratic channel-fill deposits fill major incised erosion surfaces. Forms steep cliff. Individual incised channel-fill successions are 20 to 30 m thick and 50 to 75 m wide. Brown-red mudstone with interbedded thin sandstone beds underlie, are lateral to, and overlie the cliff-forming conglomerates. Up to 110 m thick.

Dub (MEMBER B) - Chert pebble conglomerate, sandstone, and siltstone in multiple, upward-fining sandstone channel-fills with intervening siltstone beds. Sandstones weather gray, often stained yellow-brown to rust-red. Individual channel fills are 1 to 3 m thick. Rose-red and green-gray mottled mudstone. Plant fossils, mudcracks, root casts. Up to 110 m thick.

Dua (MEMBER A) - Upward-thickening and -coarsening succession of mudstone, siltstone, and sandstone; weathers gray; upper half of assemblage is dominated by thin, amalgamated sandstone beds. Commonly bioturbated; thin, fossiliferous calcareous beds occur near the base. Forms irregular weathering steep slopes. Shallow-marine invertebrate fauna of Middle Devonian (Eifelian) age (locality 5). Up to 160 m thick.

ROMANZOF CHERT (informal name)

Or ROMANZOF CHERT, UNDIVIDED - Structurally complex mixture of chert lenses in dark gray phyllite. Unit is 40% to 60% phyllite showing penetrative cleavage. Original depositional relationship between chert and phyllite is unclear. Phyllite forms recessive weathering intervals generally less than 100 m thick. Base of unit not exposed in map area. Top of unit is major angular unconformity. Chert and phyllite structurally duplicated by folds and imbricate thrust faults. Thickness unknown, but structural thickness greater than 1000 m. Forms high mountains in northwest part of map area. Ordovician age based on graptolites recovered from presumably equivalent rocks along strike to the southwest (Moore and Churkin, 1984).

c (CHERT UNIT) - Chert, massive- to medium-bedded; black, mottled gray, white, and less common raspberry color; includes black ribbon chert showing pinch and swell; tight to isoclinal folds and refolded folds. Chert crops out as thick resistant intervals up to 100's of m thick; interbedded or structurally interleaved with dark gray phyllite; forms long linear outcrops. Chert units locally differentiated.

MAP SYMBOLS

- Contact; dashed where approximately located, dotted where inferred. Arrow indicates dip direction of contact
- Anticline, showing trace of axial surface and plunge of axis; dashed where approximately located
- Crest of anticlinorun, approximately located
- Syncline, showing trace of axial surface and plunge of axis; dashed where approximately located
- Overturned syncline, showing trace of axial surface and plunge of axis; dashed where approximately located
- Thrust fault; dashed where approximately located, dotted where inferred; barbs on upper plate. Solid barbs indicate older-over-younger relationship; open barbs indicate younger-over-older relationship; alternating closed and open barbs indicate unknown age relationship. Number indicates measured dip of fault.
- Fault, approximate dip indicated by tick marks.
- Strike and dip of beds
- Vertical beds
- Overturned beds
- Estimated dip.
- Cleavage
- C–C' Line of cross section
- Limit of mapping
- Line of reference section
- Fossil locality.

CORRELATION OF MAP UNITS