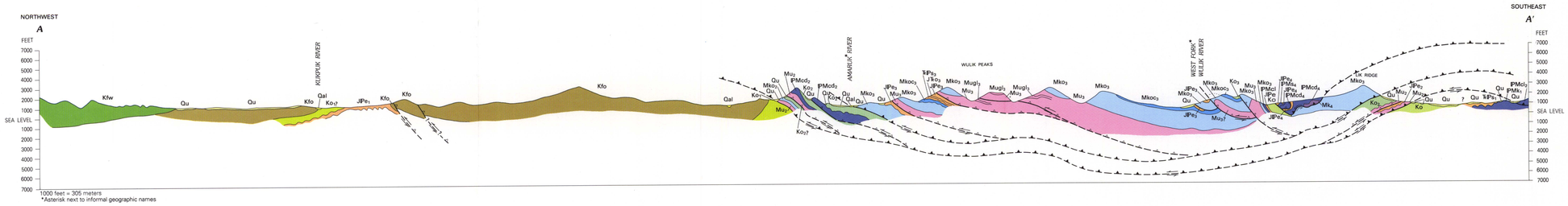
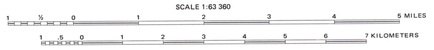
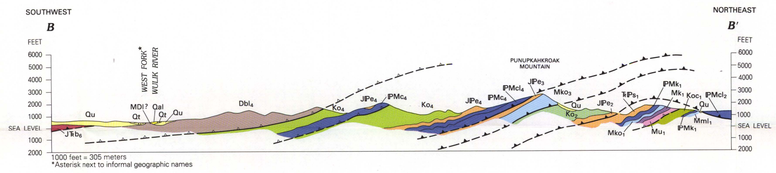
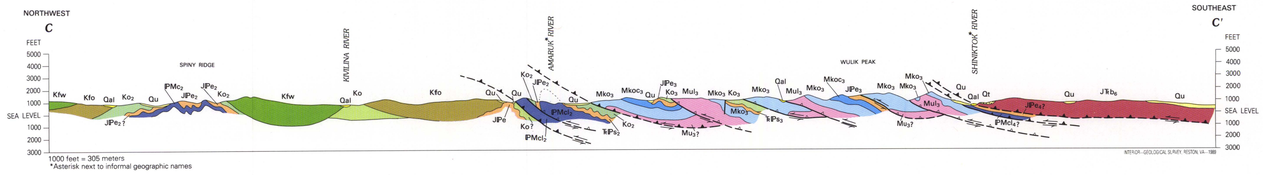




Cross sections are intended to show the generalized relations between allochthons. Detailed relations between rock units are largely schematic. In a few areas, folds or faults are shown on the cross sections in order to rationalize the apparent structure, but they are not included on the map. Rock units have not been extrapolated beneath the color on the sections, although thrust faults are schematically illustrated below the color.
See sheet 1 for explanation of map symbols.





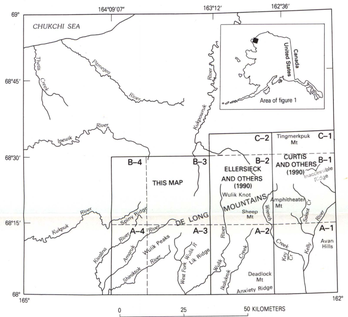


FIGURE 1.—The De Long Mountains 1:250,000-scale quadrangle showing location of this map, two adjacent maps in this series, and 1:63,360-scale quadrangles in area of these reports.

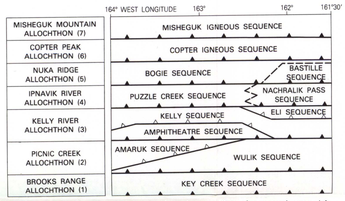


FIGURE 2.—Diagram showing the usual stacking position of structural units (allochthons) and stratigraphic units (sequences) in the southern part of the De Long Mountains quadrangle and the southwestern part of the Misheguk Mountain quadrangle (Curtis and others, 1984). Allochthons are numbered from structurally lowest (1) to structurally highest (7). Although the lowest thrust sheets of the Brooks Range allochthon are not exposed in the quadrangle, field relations from other areas indicate that the base is in fault contact with relatively autochthonous rocks (Mull and others, 1976; Mull and Tailleur, 1977). Lateral and vertical positions of stratigraphic sequences are shown as a schematic cross section from west to east. Thrust faults that separate allochthons shown with solid teeth; thrust faults that separate sequences within an allochthon shown with open teeth. Facies changes or uncertain relations between sequences shown with dashed lines.

TABLE 1.—*Comparison of allochthons in this report with equivalent structural units of other authors*

This report	Curtis and others, 1984; Ellersieck and others, 1984; Mayfield and others, 1984	Ellersieck and others, 1979	Mull, 1979	Churkin and others, 1979	Mayfield and others, 1978a	Martin, 1970	Snelson and Tailleur, 1968; Tailleur and Brosgé 1970	Tailleur and others, 1966
Misheguk Mountain allochthon	Misheguk Mountain allochthon	Misheguk Mountain thrust sequence	Misheguk sequence	Not distinguished	Misheguk Mountain thrust sequence	Ultrabasic pluton sequence	Misheguk thrust tectonic unit	Not distinguished
Copter Peak allochthon	Copter Peak allochthon	Copter Peak thrust sequence	- - -do- - - -	- - -do- - - -	- - -do- - - -	- - -do- - - -	- - -do- - - -	Do.
Nuka Ridge allochthon	Nuka Ridge allochthon	Nuka Ridge thrust sequence	Nuka sequence	- - -do- - - -	Nuka Ridge thrust sequence	Nuka Ridge sequence	Nuka Ridge thrust tectonic unit	Nuka Ridge sequence
Ipnavik River allochthon	Ipnavik River allochthon	Ipnavik River thrust sequence	Ipnavik sequence	- - -do- - - -	Ipnavik River thrust sequence	Ipnavik sequence	Ipnavik thrust tectonic unit	Ipnavik sequence
Kelly River allochthon	Kelly River allochthon	Kelly River thrust sequence	Kelly sequence	- - -do- - - -	Kelly River thrust sequence	De Long sequence	Kelly thrust tectonic unit	Not distinguished
Picnic Creek allochthon	Picnic Creek allochthon	Picnic Creek thrust sequence	Not distinguished	- - -do- - - -	Northwestern Brooks Range thrust sequence	Not distinguished	Wulik thrust tectonic unit	Sequence at Kiligwa River (eastern facies)
Brooks Range allochthon	Brooks Range allochthon	Brooks Range thrust sequence	Endicott sequence (eastern facies)	Kagvik structural sequence	Northwestern Brooks Range thrust sequences	Brooks Range sequence		Foothills sequence
					North-central Brooks Range thrust sequence (eastern facies)	Ivotuk Hills sequence (eastern facies)	Foothills thrust tectonic unit	Assemblages on Drenchwater Creek
								Sequence at Mount Bupto (eastern facies)

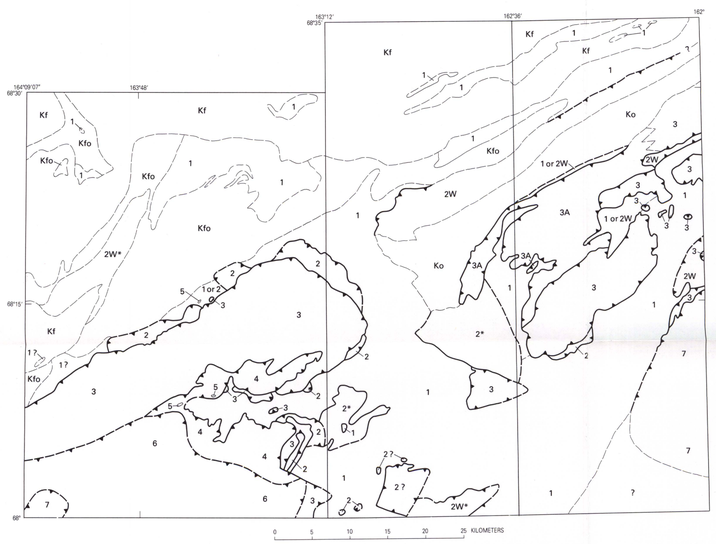
TABLE 2.—*Important criteria used to distinguish sequences*

Sequence	Approximate age of diagnostic lithologies	Description of diagnostic lithologies in the sequence
Misheguk igneous sequence	Jurassic(?)	Only sequence composed of gabbro and peridotite
Copter igneous sequence	Jurassic(?) and Triassic	Only sequence that contains extensive pillow basalt
Bogie sequence	Carboniferous	Only sequence that contains the Nuka Formation
Puzzle Creek sequence	Early Pennsylvanian(?) to mid-Mississippian	Relatively thick black chert and (or) black chert and limestone or dolomite (thickness generally greater than 100 m). Underlain by:
	Middle and Early Mississippian	Kayak Shale and Utukok Formation
	Late and Middle Devonian	Base of section is limestone unit of the Baird Group
Kelly sequence	Late and mid-Mississippian	Thick section of Kogruk Formation (thickness greater than 300 m). Underlain by:
	Middle and Early Mississippian	Thick section of Utukok Formation (thickness generally greater than 500 m).
	Late Devonian	Base of section is limestone unit of the Baird Group
Amphitheatre sequence	Late Mississippian	Thick section of Kogruk Formation (thickness generally greater than 500 m). Underlain by:
	Late and Early Mississippian	Thick section of micritic limestone (thickness generally greater than 200 m).
Amaruk sequence	Early Pennsylvanian(?) to mid-Mississippian	Relatively thick black chert and (or) black chert and carbonate rocks (thickness as much as 200 m). Underlain by:
	Middle Mississippian	Relatively thin and discontinuous Kogruk Formation (thickness less than 20 m). Underlain by:
	Middle and Early Mississippian	Base of section is Kayak Shale and (or) Utukok Formation
Wulik sequence	Early Pennsylvanian(?) to mid-Mississippian	Relatively thick black chert and (or) black chert and limestone units (thickness generally greater than 75 m). Underlain by:
	Late and middle Mississippian	Thin and discontinuous Kuna Formation (thickness generally less than 30 m). Underlain by:
	Middle Mississippian	Thin to thick section of micritic limestone unit (thickness up to 80 m)
	Early Pennsylvanian to middle Mississippian	Relatively thick shaly Kuna Formation (thickness approx. 60 m). Bedded black chert unit on top of Kuna Formation is generally less than 15 m thick. Unit underlain by:
Key Creek sequence	Middle Mississippian	Relatively thin and discontinuous Kogruk Formation (thickness less than 30 m), or micritic limestone unit (thickness less than 30 m).
	Early Mississippian(?) and Late Devonian	Base is thick section of Upper Devonian sandstone and shale of the Kanayut Conglomerate, Noatak Sandstone, and Hunt Fork Shale (thickness at least 600 m).

TABLE 3.—*Selected fossils from De Long Mountains A–3 and B–3 quadrangles and parts of the A–4 and B–4 quadrangles, Alaska*
[Most fossils collected in 1979 during fieldwork for this mapping project, but includes previously unpublished fossil collections. Some collections by geologists from private industry and dated by USGS paleontologists.]

Map locality	Field number	Latitude north	Longitude west	USGS collection number	Fossil age	Map unit	Fossil type	Identified by
1	68ATr193	68°07′30″	163°39′33″	——	Devonian or older	Dbl_4	Stromatoporoids(?)	[8]A.K. Armstrong
2	63ATr206	68°20′42″	163°51′54″	21421-PC	Late Mississippian to possibly Early Pennsylvanian	$\mathbb{P}Mk_2$	Brachiopods, gastropods	[8]E.L. Yochelson
3	26AS19	68°15′33″	163°54′52″	13716	Early Cretaceous	Ko	Pelecypods	[3]J.B. Reeside, Jr.
4	79EJs290C	68°15′21″	163°36′00″	——	Probably Permian[1]	$\mathbb{P}Mn_3$	Bryozoans, brachiopods, fish fragments	[3]J.T. Dutro, Jr.
5	[2]AF491	68°15′18″	163°35′54″	M2477	Probably Late Jurassic	Ko	Pelecypods	[4]D.L. Jones
6	[2]AF2421	68°10′02″	163°22′24″	M2484	Late Jurassic to Early Cretaceous	Ko	Pelecypods	[4]D.L. Jones
7	[2]AF477	68°19′31″	163°15′48″	M2474	Early Cretaceous (Valanginian)	Ko_1	Pelecypods	[4]D.L. Jones
8	[2]AF464	68°24′51″	163°27′06″	M2475	Probably Early Cretaceous	Ko_1?	Pelecypods	[4]D.L. Jones
9	[2]AF480	68°19′57″	163°17′54″	M2473	Early Cretaceous (Berriasian)	Ko_1	Pelecypods	[4]D.L. Jones
10	[2]AF2422	68°09′50″	163°23′42″	M2483	Late Jurassic to Early Cretaceous	Ko	Pelecypods	[4]D.L. Jones
11	[2]AF536	68°12′54″	163°51′06″	M2478	Early Cretaceous (Valanginian)	Kfo	Pelecypods	[4]D.L. Jones
12	55ATr76 55ATr77	68°07′18″ 68°07′18″	163°13′54″	——	Early Mississippian	Mu_1	Corals, bryozoans, brachiopods	[3]J.T. Dutro, Jr.
13	55ATr80	68°06′30″	163°15′10″	——	Late Mississippian	Mko_3	Corals, brachiopods	[3]J.T. Dutro, Jr.
14	63ATr225	68°18′30″	163°52′48″	——	Late Mississippian	$\mathbb{P}Mk_2$	Cephalopods	[8]M. Gordon,Jr.
15	[2]6377	68°01′09″	163°12′39″	9150-SD	Devonian to Silurian	Db_5	Corals	[6]W.A. Oliver, Jr.
16	[2]6378	68°00′18″	163°15′06″	9169-SD	Devonian to Silurian	Db_5	Corals	[6]W.A. Oliver, Jr.
17	[2]6640	68°00′54″	163°14′30″	9170-SD	Devonian to Silurian	Db_5	Corals	[6]W.A. Oliver, Jr.
18	79CsJ127G	68°08′39″	163°38′36″	——	Early Mississippian [4]CAI = 2½–3	Mk_4	Conodonts, crinoids, corals	[5]A.G. Harris; [3]J.T. Dutro, Jr.
19	79Mt086B	68°06′00″	163°36′20″	10167-SD	Late Devonian (Fasenian) [4]CAI = 2½–3	Dbs_4	Conodonts	[5]A.G. Harris
20	79Tr142	68°00′20″	163°15′18″	27595-PC	Late Mississippian (late Meramecian to Chesterian) [4]CAI = 2½	Mko_3	Conodonts	[5]A.G. Harris
20	79Tr142C	68°00′20″	163°15′18″	——	Mississippian (Visean)	Mko_3	Foraminifers	[4]B.L. Mamet
21	79Tr144	68°08′22″	163°25′54″	27596-PC	Early Mississippian (Kinderhookian) [4]CAI = 2½–3	MDI	Conodonts	[5]A.G. Harris
22	79Cs125H1	68°07′57″	163°38′42″	——	Early Pennsylvanian (early to middle Morrowan) [4]CAI = 2½–3	$\mathbb{P}Mn_3$	Conodonts	[5]A.G. Harris [7]H.R. Lane
23	79Mt107C	68°24′26″	163°31′48″	——	Early Triassic (latest Spathian) [4]CAI = 2	$J\grave{e}_1$	Conodonts	[5]B.R. Wardlaw
24	79Es175C	68°06′06″	163°34′18″	27553-PC	Early Mississippian (late Kinderhookian) [4]CAI = 3	Mu_{1d}	Conodonts	[5]A.G. Harris
25	79Es180C	68°10′35″	163°34′28″	——	Middle Devonian to middle Mississippian (middle Osagean) [4]CAI = 3	Mu_{1fa}	Conodonts	[5]A.G. Harris
26	79Es189C2	68°22′14″	163°22′03″	27555-PC	Middle to Late Mississippian (middle Osagean to middle Chesterian) [4]CAI = 2½–3	$\mathbb{P}Mk_1$	Conodonts	[5]A.G. Harris
27	79Mt115 E, F	68°10′36″	163°24′33″	10150-SD	Late Devonian (Famennian) [4]CAI = 3	Dbl_4	Conodonts	[5]A.G. Harris
28	79Mt116B	68°10′15″	163°26′06″	——	Middle Devonian to Early Mississippian (middle Osagean [4]CAI = 3–4	Db_{5e}	Conodonts	[5]A.G. Harris
29	79Mt146D	68°18′20″	163°19′27″	27556–PC	Late Mississippian (probably late Meramecian) [4]CAI = 3	Mko_3	Conodonts	[5]A.G. Harris
30	79Mt171A	68°08′03″	163°41′30″	10151-SD	Latest Early to Middle Devonian [4]CAI – 3	Db_{5e}	Conodonts	[5]A.G. Harris
31	79Mt171D	68°07′49″	163°43′06″	27559-PC	Early Mississippian (late Kinderhookian) [4]CAI = 2½–3	Mk_4	Conodonts	[5]A.G. Harris
32	79Mt180	68°06′15″	164°06′20″	27567-PC	Mississippian (late Osagean to early Chesterian) [4]CAI = 1½–2	Mko_3	Conodonts	[5]A.G. Harris
33	79Cs227–Om	68°07′45″	163°33′06″	——	Latest Devonian (late Famennian) to Late Mississippian (early Meramecian) [4]CAI = 3–4	Mk_1	Conodonts	[5]A.G. Harris
34	73ATr135.3	68°10′30″	163°12′36″	1138	Late Mississippian (Meramecian)	Mko_3	Foraminifers, corals, algae	[5]A.K. Armstrong
35	79ATr137	68°00′45″	163°13′12″	1137	Mississippian (Osagean?)	Mko_3	Corals foraminifers, algae	[5]A.K. Armstrong
36	68ATr162	68°00′50″	163°12′42″	——	Late Mississippian (possibly late Meramecian)	Mko_3	Foraminifers	[5]A.K. Armstrong
37	26S05	68°04′06″	163°12′36″	M1115	Mississippian	Mu_1	Foraminifers	[5]A.K. Armstrong
38	79Es173D	68°07′28″	163°33′46″	——	Mississippian to Early Pennsylvanian	JP_{e1}	Radiolarians	[9]B.L. Murchey
39	79Mt162C	68°12′58″	163°44′12″	——	Mesozoic	$\grave{T}\mathbb{P}_3$	Radiolarians	[9]B.L. Murchey
40	79Es193C	68°24′22″	163°23′51″	——	Mesozoic	$J\grave{e}_{cu}$	Radiolarians	[9]B.L. Murchey
41	79Es193D	68°24′30″	163°23′32″	——	Mesozoic	$J\grave{e}_{cu}$	Radiolarians	[9]B.L. Murchey
42	79Es194D	68°25′22″	163°31′00″	——	Mesozoic	$\grave{T}\mathbb{P}_3$	Radiolarians	[9]B.L. Murchey
43	79mOm 79Cm13	68°06′42″	163°19′28″	——	Late Triassic (early to middle Karnian at bottom of section; Early Jurassic (Late Pleinsbachian or Toarcian) at top	$J\grave{e}_{cu}$	Radiolarians	[9]C.D. Blome
44	79Md122C	68°13′32″	163°20′40″	——	Late Mississippian (early-late Visean) Mamet zones 14–15	$Mkoc_3$	Foraminifers	[4]B.L. Mamet
45	79Es179B	68°08′30″	163°33′20″	——	Late Mississippian (early-late Visean) Mamet zones 14–15	$\mathbb{P}Mn_3$	Foraminifers	[4]B.L. Mamet
45	79Es179A 79Es179C	68°08′30″	163°33′20″	28381-PC 28382-PC	Probably Permian[1]	$\mathbb{P}Mn_3$	Brachiopods	[3]J.T. Dutro, Jr.
46	79Tr16A 79Tr16B	68°01′36″	163°14′48″	——	Late Mississippian (Visean) Mamet zone 11 or younger	Mko_3	Foraminifers	[4]B.L. Mamet
47	79Tr24E2	68°03′36″	163°20′16″	——	Late Mississippian (Visean) Mamet zone 11 or younger	Mko	Foraminifers	[4]B.L. Mamet
48	79Tr69A	68°07′06″	163°38′24″	——	Late Devonian	Dbl_4	Foraminifers	[4]B.L. Mamet
49	79Tr71A 79Tr71B 79Tr71C	68°11′10″	163 30′54″	——	(Late Mississippian (middle Visean) approximately Mamet zone 12	Mko_3	Foraminifers	[4]B.L. Mamet
50	79Tr95D 79Tr95E	68°11′18″	163°29′33″	——	Late Mississippian (middle Visean) approximately Mamet zone 12	Mu_1	Foraminifers	[4]B.L. Mamet
51	79Tr104D	68°10′42″	163°12′06″	——	Late Mississippian (middle Visean) Mamet zone 12 or younger	Mko_3	Foraminifers	[4]B.L. Mamet
52	79Tr105E	68°10′24″	163°12′38″	——	Latest Devonian earliest Mississippian Mamet zone 6	MDI	Foraminifers	[4]B.L. Mamet
53	79Tr119A	68°12′18″	163°13′30″	——	Mississippian (latest Tournaisian) Mamet zone 9 or younger	Mu_{1b}	Foraminifers	[4]B.L. Mamet
54	79Tr119B 79Tr119C	68°12′06″	163°13′36″	——	Late Mississippian (Visean) Mamet zone 12	Mu_3	Foraminifers	[4]B.L. Mamet
55	79Tr119F	68°11′45″	163°13′13″	——	Late Mississippian (Visean) Mamet zone 12 or younger	Mu_{1b}	Foraminifers	[4]B.L. Mamet
56	79Tr122D 79Tr122F 79Tr122G	68°19′20″	163°16′52″	——	Late Mississippian (Visean) Mamet zone 11 or younger	Mko_2	Foraminifers	[4]B.L. Mamet
57	79Tr126E	68°13′38″	163°27′36″	——	Late Mississippian (Visean) Mamet zones 14–15	$Mkoc_3$	Foraminifers	[4]B.L. Mamet
58	79Tr127B	68°13′58″	163°26′22″	——	Late Mississippian (Visean) approximately Mamet zones 11–12	$Mugl_3$	Foraminifers	[4]B.L. Mamet
59	79Tr128A	68°12′46″	163°25′17″	——	Late Mississippian (Visean) approximately Mamet zones 11–12	Mko_3	Foraminifers	[4]B.L. Mamet
60	79Tr128B	68°12′46″	163°25′48″	——	Late Mississippian (Visean) approximately Mamet zones 11–12	Mu_3	Foraminifers	[4]B.L. Mamet
61	79Tr129C	68°12′09″	163°27′57″	——	Late Mississippian (Visean) Mamet zone 12	$Mugl_3$	Foraminifers	[4]B.L. Mamet
62	79Tr129D	68°12′15″	163°28′28″	——	Late Mississippian (Visean) Mamet zone 12	Mu_3	Foraminifers	[4]B.L. Mamet
63	79Tr135B	68°11′38″	163°30′48″	——	Mississippian (Visean)	Mko_3	Foraminifers	[4]B.L. Mamet
64	79Tr135C	68°11′42″	163°30′42″	——	Late Mississippian (Visean) approximately Mamet zone 12	Mko_3/Mu_3 contact	Foraminifers	[4]B.L. Mamet
65	79Tr135G	68°12′22″	163°30′47″	——	Late Mississippian (Visean) approximately Mamet zone 11	$Mugl_3$	Foraminifers	[4]B.L. Mamet
66	79Tr148B	68°15′17″	163°33′10″	——	Mississippian (Visean)...	Mko_3	Foraminifers	[4]B.L. Mamet
67	79Tr149A	68°09′31″	163°50′06″	——	Late Mississippian (Visean) Mamet zone 12–13	Mko_3/Mul_3 contact	Foraminifers	[4]B.L. Mamet
68	79Tr23	68°03′10″	163°20′42″	10471–SD	Middle Devonian	Dbl	Brachiopods	[3]J.T. Dutro, Jr.
69	79Tr67A	68°07′02″	163°32′28″	10473–SD	Devonian (?)	Db_{1e}	Corals	[3]J.T. Dutro, Jr.
70	79Tr72E	68°10′33″	163°32′18″	28374–PC	Early Mississippian (probably Osagean)	Mu_{1fa}	Brachiopods	[3]J.T. Dutro, Jr.
71	79Tr122G	68°19′21″	163°17′24″	28376–PC	Mississippian (late Osagean to early Meramecian)	Mko_3/Mu_3 contact	Bryozoans	[3]J.T. Dutro, Jr.
71	79Tr122H	68°19′21″	163°17′24″	28377–PC	Mississippian (possibly Osagean)	Mu_3	Gastropods	[3]J.T. Dutro, Jr.
72	79Es174	68°05′47″	163°35′48″	10475–SD	Probably Devonian	Dbl	Corals	[3]J.T. Dutro, Jr.
73	79Es175E	68°05′33″	163°35′12″	10476–SD	Probably Middle Devonian (Givetian)	Dbl	Brachiopods	[3]J.T. Dutro, Jr.
74	79Cs24B	68°09′06″	163°20′12″	28385–PC	Late Mississippian (late Meramecian to Chesterian)	Mko_3	Brachiopods	[3]J.T. Dutro, Jr.
75	79Es16C	68°01′45″	163°12′18″	10474–SD	Late Devonian (Famennian)	Db_{1g}	Brachiopods, corals	[3]J.T. Dutro, Jr.

[1]The Nuka Formation has fossil ages for brachiopods that are younger than those ages determined for conodonts and foraminifers. See description of map units.
[2]Collected by geologists from British Petroleum Company.
[3]Collected by geologists from Standard Oil Company of California.
[4]Conodont color alteration index (CAI) estimated maximum temperatures reached during diagenesis: CAI = 1½–2 (50°–100°C); CAI = 2 (60°– 140°C); CAI2½–3 (100°–160°C); CAI = 3 (120°–160°C); CAI = 4 (170°–200°C).
[5]USGS
[6]University of Montreal
[7]Amoco



EXPLANATION

- Kf Fortress Mountain Formation (autochthonous)
- Kfo Fortress Mountain Formation (autochthonous) and Okpikruak Formation (allochthonous), undivided
- Ko Okpikruak Formation, allochthon unknown
- 1 Brooks Range allochthon, Key Creek sequence
- 2 Picnic Creek allochthon, Amaruk sequence
- 2W Picnic Creek allochthon, Wulik sequence
- 3 Kelly River allochthon, Kelly sequence
- 3A Kelly River allochthon, Amphitheatre sequence
- 4 Ipnavik River allochthon, Puzzle Creek sequence
- 5 Nuka Ridge allochthon, Bogie sequence and (or) olistoliths of Bogie sequence within other allochthons
- 6 Copter Peak allochthon, Copter igneous sequence
- 7 Misheguk Mountain allochthon, Misheguk igneous sequence

FIGURE 3.—Generalized allochthon and sequence map of south-central and southeastern De Long Mountains 1:250,000-scale quadrangle. Sawteeth on upper side of intersequence thrust faults. Dashed lines indicate boundaries with uncertain locations. Parts of Picnic Creek allochthon shown with an asterisk may belong to Wolverine Creek allochthon of Moore and others (1986), which is correlative with Ivotuk sequence of Brooks Range allochthon (Mayfield and others, 1988).

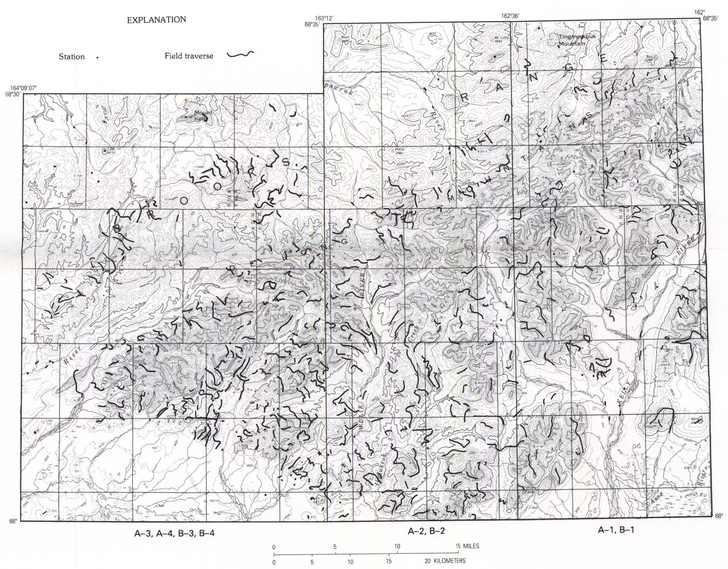


FIGURE 4.—Location of stations and field traverses used in compilation of this map and the two other maps in this series.

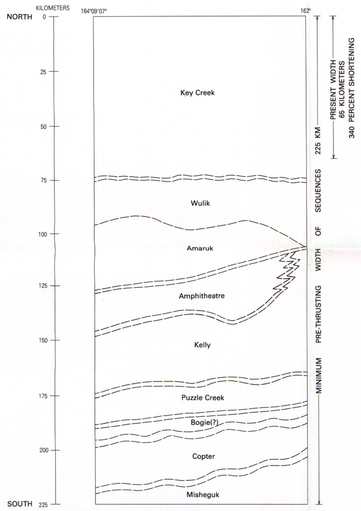


FIGURE 5.—Generalized palinspastic map of sequences exposed in the south-central and southeastern De Long Mountains quadrangle, prior to late Mesozoic thrust faulting. Inferred direction of thrust transport is along a north-south line. The north-south depositional width of sequences is based on outcrops within the map area only and does not take into account the extent of some of the sequences south of the De Long Mountains quadrangle. Double-dashed lines between sequences indicate an unknown geographical separation between different coeval facies. Some parts of the Amaruk and Wulik sequences shown on this map may have been deposited to the north of the Key Creek sequence. See text for more complete explanation.

CROSS SECTIONS TO ACCOMPANY

RECONNAISSANCE GEOLOGIC MAP OF THE DE LONG MOUNTAINS A–3 AND B–3 QUADRANGLES AND PARTS OF THE A–4 AND B–4 QUADRANGLES, ALASKA

By
C.F. Mayfield, S.M. Curtis, Inyo Ellersieck, and I.L. Tailleur

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