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INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C., MR 8259 For sale by U. S. Geological Survey, price 50 cents

MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-84

Paleozoic and (or) pre-Cambrian. Includes Triassic and Lower Jurassic in some areas. In most areas includes igneous bodies of Jurassic and (or) early Cretaceous age; many are of batholithic size.

PACIFIC

Topographic basin. Known to be or possibly caused by Ceno-zoic tectonic movement.

1440	N N shown)	ge northward and northwestware rocks of the Chugach Mountai ous rocks may be included as set, but the sequence probably it fossils found in the outer island fossils indicative of age. To for fet account rocks. It profess	2000  OZOIC GREENSTONE-GRAY  DERING GULF OF ALASKA: A by the presence of marine vo					STATE ASSESSED.	35 UPPPER UPANANAA BASIN	CANADA CANADA UNITED STATES	ARCH 30	29 ANDIK GMENT	13		Mesozoic Mesozoic			
Composition of the composition o	FLOOR  FLOOR  FLOOR	ns geosyncline. Late Cre- synclinal or downfaulte d s mostly older. Neocomian s of southeastern Alaska are he sequence may consist in bably underlies the Terriary	WACKE-SLATE SEQUENCE Whick sequence character- plicanic rocks. Believed to			800	Schammur Landing Landi	62°	For further details in regard to Cenazoic basins see table	K1 - Lower part of Cretaceous (see table)  K2 - Middle part of Cretaceous (see table)  K3 - Upper part of Cretaceous (see table)  Most rectanic elements south of Brooks  Range include bodies of Cenazoic ex-  trusive rocks, some of large size. Active  volcanes in Aleutian islands, Alaska  Peninsula, Aleutian Range, and  Wrangell Mountains.	Tr - Triassic; Jr - Middle Jurassic JI - Lower Jurassic; Jr - Middle Jurassic Ju - Upper Jurassic; K - Crefaceous	Colville geosyncline but uplift in Teritory time dong east-striking thrust faults resulted in removal of Mesozoic rocks.  11. BROOKS RANGE GEANTICLINE. Age: J, K, Paleocene. Expases mostly Paleozoic rocks; some pre-Cambrian and Triassic. Source of sediments in 5, 6, 7, and 15.  12. KOBUK TROUGH. Age: Eccene(?).	Archic Ocean lay north of this shelf.  6. UMIAT BASIN. Age: K3 and Paleocene(?).  7. CHUKCHI BASIN. Age: K3 and Paleocene(?).  8. MEADE ARCH. Age: K3 and Paleocene(?).  8. MEADE arch. Age: K3 and Paleocene(?) rocks of 6 and 7 are obsent. Exposed rocks are K2.  9. TIGARA UPLIFT. Age: Tertiary(?).  Paleozoic and Trocks upfaulted and lying adjacent to great thickness of Mesozoic rocks.  10. ROMANZOF UPLIFT. Age: Tertiary.	5. COLVILLE GEOSYNCLINE. Age: IT, J, K1-2. Greatest thickness where geosynclinal axis is shown. Sequence of IT, J, and K1 rocks thins northward toward Arctic Platform. Platform, as well as geosyncline, subsided in K2 time, and a shelf composed of K2 sediments was built northward across the geosyncline and approximately to the necessar court it is court of Geosyncline.	Audternary deposits throughout. Pilocenet(?), Miocene, and possibly earlier deposits reported in thick Tertiary sequence north of Romanzof uplift. A lake-studded lowland except in eastern area, where Quaternary and Tertiary deposits have been slightly uplifted.  3. BEAUFORT SHELF. Age: K3 and Cenzzoic. Thick Cretaceous (K3) sequence in Cape Simpson area, east of Point Barrow, extends into shelf, as does also thick Tertiary sequence north of Romanzof uplift (see above). Shelf constructed by outbuilding of these deposits into Arctic Ocean basin.  4. BARROW ARCH. Age: Mesozaic.  80 Buried structure on which basement slates, possibly pre-Cambrian, age: A BARROW ARCH. Age: Mesozaic.	Oo 1. ARCTIC PLATFORM. Age: Palezzic, Tr, J, KI.  A pre-Albian tectonic feature that occupied the northern part of the present Arctic coastal plain and the adjacent area of the present Arctic Coeson. Southern border of platform shown on map: Source area during Palezzic time. Palezzic formations wedge out northward toward platform. Thin accumulation of It and J sediments of platform facies, including fasiliferous limestone, glauconite, and limenite oolite.  2. ARCTIC COASTAL PLAIN. Age: Cenazaic.	19 DESCRIPTION OF TE (For further details see table. Age of negative elemen	OF AL
YNCLINE: A large linear negative element in which sediments accumulated. issa a belt of relatively young rocks flanked by belts of older rocks.  GH: Similar to geosyncline but not as extensive.  I: Similar to geosyncline but nonlinear in form.  ORM: A shieldlike element that was either emergent as a source of sediments or submergent as an area of relatively little accumulation.  I A body of sediments built outward into an ocean.  YNCLINAL SEGMENT: A part of a geosynclinal trend that is separated from the eosynclinal mass by uplifted older rocks.	DEFINITION OF TECTONIC TERMS  TICLINE: A large linear positive element that was either uplifted and a source of finits or was an area of little or no accumulation. Comprises a belt of relatively old flanked by belts of younger rocks.  Similar to geanticline but not as extensive.  T. Similar to geanticline but not as extensive.	560		588	Submarine contours in fathoms  Base from Alaska Map A	Scale 1:5,000,000  50 0 50 100 150 Miles	hickness about 25,000 feet.  54. MIDDLETON SHEIF. Age: Tertiory.  Probably composed of Tertiory deposits built southward in shelf form. Continuous with but probably hinner than Tertiory in Yokahaga geosyncline.  55. SHUMAGIN SHEIF. Age: Tertiory(?).  56. ALEUTIAN TRENCH. Age: Quaternary and Tertiory(?).  Part adjacent to Middleton shelf believed to be an area of thick Quaternary sedimentary accumulation. Subsidence and accumulation may have	Journal of Notice of Notice At Postably represented in thick slate-grayworker-conglianerite sequence.  52. MESOZOIC GREENSTONE-GRAYWACKE-SLATE SEQUENCE BORDERING GULF OF ALASKA. See note inset in Gulf of Alaska area of map.  53. YAKATAGA GEOSYNCLINE. Age: Terriary. Includes Eccene, Oligocene, Miocene, and Pliocene. Maximum	Contains normarine Eocene, continuing northward under Quaternary of Cook Inlet basin. Marine Eocene, Miocene, and Pliocene(?), overlying normatine Eocene, reported only in southwestern part (area of Pavlof and Herendeen Bays and Ungo Island.  49. COOK INLET BASIN. Age: Cenazaic. 50. SELDOVIA GEANTICLINE. Age: May, KI-3(?). Passibly not developed until Tertiary. Expass Paleozaic, Tr., and JI rocks. 51. CHUGACH MOUNTAINS GEOSYNCLINE. Age: KZ(?), K3.	44. PRINCE OF WALES GEANTICLINE. Age: Jmu, KI-3. Exposes Releazio; and J-K barholithic intrusives. Source of sediments in 41 and in belt of Mesozaic rocks bordering Gulf of Alaska.  45. COPPER RIVER BASIN. Age: Cenozoic.  46. ADMIRALTY TROUGH. Age: Eccene.  47. MATANUSKA GEOSYNCLINE. Age: Tr, Jimu, KI-3, and Paleocene(?).  Paleocene(?). Poported only in Matanuska Valley but may underlie Eccene in Cook Inlet basin.  48. SHELIKOF TROUGH. Age: Tertiary.	40. NUTZOTIN SEGNENT (OF 39). Age: Tr, J, K1-3. Part of Alaska Range geosynclinal trend. 41. SEYMOUR SEGOSYNCLINE: Age: Tr, J, K1. Same trend as Alaska Range geosyncline. 42. NUSHACAK BASIN. Age: Cenozoic. 43. TALKEETNA GEANTICLINE: Age: Jmu, K1-3. Exposes Paleozoic, Tr, JI, J-K batholithic intrusives. Source of sediments in 39, 40, and 47.	34. HEALY TROUGH, Age: Tertiary.  Col-bearing Eacene sequence and younger gravels.  35. UPPER TANANIA BASIN. Age: Cenozoic.  36. MIDDLE TANANIA BASIN. Age: Cenozoic.  37. MINCHUMINA BASIN. Age: Cenozoic.  38. HOLITIA BASIN, Age: Cenozoic.  39. ALASKA RANGE GEOSYNCLINE. Age: Tr. J. KI-3.	29. KANDIK SEGMENT (OF 26). Age: Tr, KI-2; J(?).  Part of Kuskokwim geosynclinal trend. 30. NATION ARCH. Age: K or Tertiary.  Exposes Paleozoic and pre-Cambrian rocks. 31. EAGLE TROUGH. Age: Locene. 32. TANANA GEANTICLINE. Age: J-K.  Exposes pre-Cambrian, Paleozoic, and J-K botholithic intrusives.  Source of sediments in 26, 28, 29, and 39.  33. COAST MOUNTAINS GEANTICLINE. Age: J-K.  Exposes pre-Cambrian, Paleozoic, Tr, and J-K botholithic intrusives.  Source of J and KI sediments in 41.	26. KUSKOKWIM GEOSYNGLINE. Age: Tr, J, K1-3. 27. GOODNEWS ARCH. Age: K2-3. Exposes pre-Cambrian, Palezzoic, Tr, J, and K1 racks. Source of K2-3 sediments in adjacent jorks of Kuskokwim geosyncline. 28. TOFTY SEGMENT (OF 26). Age: K1-2; Tr-J(?). Part of Kuskokwim geosynclinal trend.	19. NORTON BASIN. Äge: Cenozoic. 20. RUBY GEANTICLINE. Age: J(7) and K. Exposes pre-Cambrian and possibly Palezzoic metamorphic rocks and J-K intrusives. Source of sediments in 15 and 26. 21. RAMPART TROUGH. Age: Eccene. A topographic trench, occupied by Yukon River and Hess Creek, in which are remmants of facene rocks. 22. YUKON FLATS BASIN. Age: Cenozoic. 23. LOWER TANANA BASIN. Age: Cenozoic. 24. INNOKO BASIN. Age: Cenozoic. 25. BETHEL BASIN. Age: Cenozoic.	In time of erosion or little or no accumulation.)  14. CHUKOTSKIY-SEWARD UPLIFT. Age: Mesozoic. Exposes mostly Poleozoic, pre-Combrian, and J-K intrusives. Source of sediments in 15.  15. KOYUKUK GEOSYNCLINE. Age: KI-2; possibly Tr-J.  16. HOGATZA UPLIFT. Age: K2-3 or Tertiary.  Exposes Ki rocks. K2 rocks of Koyukuk geosyncline are absent, due to Cretaceous or Tertiary uplift.  17. GALENA BASIN. Age: Cenazoic.  18. SELAWIK BASIN. Age: Cenazoic.	55  ECTONIC ELEMENTS  and to age of sediments	ASKA nomas G. Payne
emerg emergence subsid subsidence accum accumulation def deformation	Upper (Ju), Different in facies Lower (JI). In facies not report.  TRIASSIC: Upper (Tru) Different full facies not facies. Le.	nies:	CRETACEOUS, 1. Not EARLY Possibly Proceed (s. (K1)	Late Neocomian- Aptian orageny (stratigraphic hiatus)  1. Eme Cape Str Barrow. 4. Tr, J eroded o	Ž	TURONIAN (Turonian hiatus and orogeny) and orogeny) Canyons c 1. Platform	7 500 2 4 4	(3)	TERTIARY out-buildi PALEOCENE(?) shelf into basin. Pe ed to sout basin (6). 4. Not re	Post-Paleocene K2-3 de orageny (early Laramide) bly elsev to surface	2 0 0 0 0 0 0	Post-Eocene 2-3. No orogeny (late Laramide)  2-3. Pos	TERTIARY, Miocenno OLIGOCENE ing 7,00 north of PLIOCENE to shelf ther out-			SEDIMENTATION 2. AR AND OROGENY 4. BA		
metam metamorphism int intrusion max maximum thous thousand	Different from geosyncli-JI absent in south central nad facies in 5. Jmu and JIm absent in south-not reported.  1. Marine Tru; platform facies. Less than 200 feet. Few hundred ft. Mostly nal facies in 5.	Mod. def., emerg., erosion along southern border. Callovian and Portlandian phases recognized.  5. Marine Kingak shale. whundred feet. Jimu. Max. 4,000 ft.	sported. sposited and e above).	J. Emerg., erosion. Jmu and K1 absent at Cape SImpson and erosion along southern border. T., J, and K1 border. Troded on Barrow arch.	overlain by marine a by marine Nanushuk gr Maximum 10,000-15 feet. These deposits form of continental s that was built northw cross geosyncline (st	synk Z shelf depos.  A Serine rolangs emergy erosion followed by earl e	eet of K3 sediments built marine Colville group.  Ocean basin. Reported in Continus bentonite, tuff.  Tape Simpson area and to outh in Umiat basin (6).  Not reported.  Not reported.  Not reported.  Reconstitution	ported.  6-8. Not reported.  6. Slight emergence and erosion in foothills province.	le continued ing of Beaufort Arctic Ocean leocene report h in Umiat	in southern, n central, and g northern (cass area.  9. Uplift occu Paleozoic roc 5-9. Eroded to low relief.	ut-building of Beaufort lelf into Arctic Ocean ssin. Eocene not report- it, possibly present be- arth Quarternary in astral plain.  3. Gentle warning of 5-9. Deformation: strong	No evidence (*).    S-9. No evidence (*).   Eroded to surface of low relief.	n Arctic coastal in Arctic coastal in Arctic coastal in north of Romanzz (see 3).	2-4. Little or no defor 3-7. Mod. uplitt in mation and upliff except southern, little or no upin area north of Roman—lift in northern area. zof uplift; see 10. Erosion.  2-3. Marine Plincese(2) 6.0 Not area.	(Gubik fm.). marine Gubik formatii in coastal plain; maxii 200 feet. Glacial outween moraines, terrace depoin foothills of Brooks Range. Slight uplift; erosion.	ACTIC COASTAL AIN AUFORT SHELF RROW ARCH		
ABBREVIATIONS  ft feet fm formation fms formations seds sediments	Kingak shale deposited.  10. Part of Colville geosyncline. Shublik fm. deposited.	10. Def., probably same as in Colville geosyncline. Mafic int.(?).  10. Part of Colville geosyncline.	m. 10. Part of Colville geo- syncline. Okpikruak for- mation probably deposited but thinner than in area to west.	10. Def., probably same as in Colville geosyncline Mafic int.(?).	tion. Area positive relative to Colville geosyncline to west.	10. No evidence (*).	- 10. Emerg. Little or Volcanis seds. in Chukchi	10. Emergence(?).	10. Emergence(?).	n) 10. Strong def. Uplift dipping along south-dipping faults. Eroded to surface of low relief. of low re	10. Not reported. Continued erosion (?).	Froded to surface of low relief.	able uplift and erosion. Source of sediments in thick Tertiary sequence in coastal plain north of uplift(?).	Erosion. Folding of thick Tertiary sequence in coastal plain north of uplift.	region. Glaciation. Further uplift; erosion.	10. ROMANZOF UPLIFI		
mod moderate pre-E - pre-Cambrian Pal Paleozoic Tert Tertiary	seds. in Colville geosyn- cline. deposition in southern half of Chukotskiy Peninsula.  11. Probable deposition of marine Tru.  14. Marine deposition in southern half of Chukotskiy Peninsula, western part of St. Lawrence Island, and possibly elsewhere.		11. Continued uplift. Source of seds, in Colville and Koyukuk geosynclines.  14. Continued Erosion.	11. Strong def. in northern part. Intense def., metam., granitic int., mineralization in southern part. Erosion.	Source of seds. in Colville and Koyukuk geosynclines.	The second	tinued uplift.  14. Mo m(?). Source of erosion.  Umlat and depositic basins.  part of (	Continued uplift. 14. Emergen	11. Continued uplift. Volcanism(?). Source of erosion. Nonmarine seds. in Umiat and Chukchi basins.  14. Mostly emerg. and erosion. Nonmarine deposition in southern part of Chukotskiy Pen.	imbric Erodec Hief.	11. Not reported. Erosion. 12–13. Subsid. and I., Seward Pen., nonmarine deposition.  11. Nonmarine deposition. 14. Nonmarine deposition deposition. 15. Nonmarine deposition. 16. Nonmarine deposition.	12-13. Mod. def. of lat. Mod. def. of leccene beds. 11-13. Eroded to surface of low relief.	sported.	Great uplift.	JA mountainous Glaciation.  Glaciation.  Glaciation.  Glaciation.  Glaciation.  Glaciation.  Glaciation.  Glaciation.  A topographic area  area area  area for a factoria and basin (13), and basin (13), and ch Eccene has been in a factoria fooded.	1. BROOKS RANGE 14. CHUKOTSI SEWARD UPLIFT 18. COLEEN BASIN		
I Island Pen Peninsula mts mountains R River	them half covered.  sition in 15-16. Possible deposition of covered.  15-16. Possible deposition of covered.  Chukotskiy Pre-K1 rocks not un-gard, and ere.	Beginning 15-16. No evidence(*).  I mafic  15-16. Possible deposition		def., metam., 15–16. Deformation, ., mineraliza— granitic intrusion, meta- grain. morphism. Probably east grain. Erosion.	in Koyukuk tolik groups; mostly m Several thousand feet tolik group divided in (descending) Kaltag fr mation (nonmatine), N and Melozi formation	e (*). 15-16. No evidence	Nonmarine 15–16. Not reported. Nonmarine n in southern Chukotskiy Pen.	ice (?) 15-16. Not reported.	15-16	orth to north-def. Few small granitic intrusives.  15-16. Mod. to strong granitic focus of low exposing K1 beds.  15-16. Eroded to surface of low relief.	ine deposition 5-19. Not reported. Lawrence 17-19. Possible subsid. en., and deposition. Possibly en. present beneath Quaternary.	ff. of local 15-19. No evidence(*) ene. Eroded to surface of low face of low relief.	). oorted r Nome Quater- rusion		of shallow sea, S-16. Region of hills and is, low mis. Iow mountains. Further in and near mt. Uplift and erosion. In the size of lava and larine deposits and Norton basins. Slawik apht uplift. Extrusion of lava and ruff.	<b> </b>	(Fc	
). Deformation is known to have of Alaska and may have occurre	20. Not reported. 26. 26. 26. 26. 27. 26. 26. 27. 26. 26. 27. 26. 27. 27. 27. 27. 27. 27. 27. 27. 27. 27	20. No evidence(*).  1. 20. Not reported.	20. Not reported.	20. Deformation. Large granitic intrusives in Melozi, Tozi, and Dall districts may be of this age.	20. Upliff and source of seds. in Koyukuk and Kuskokwim geosynclines.	20. No evidence (*).	20. Uplift and source of seds. In Kuskokwim of seds. In Kuskokwim of seasyncline.	20. Continued uplift(?). 26-	20. Continued uplift(?).	20. No evidence (*). Few small granitic intrusives. Eroded to surface, of low relief.	21–25. Subsid. and non- marine deposition. Eccene beds exposed in and marginal to Rampart trough, Yukon Flats and Bethel basins.	21-25. Def. of Eocene; strong in Rampart trough gentle in Bethel basin. Eroded to surface of low relief.	20–25. Not reported(*). Extrusion of lava and tuff. 22–25. Possible subsid. and deposition.		20-21. Region of hills and low mountains. Further upliff; erosion. 22-25. Lowland basins. Stream deposition; possibly marine deposition in Bethel basin.	20. RUBY GEANTICLINE 21. RAMPART TROUGH 22. YUKON FLATS BASIN 23. LOWER TANANA BASIN 24. INNOKO BASIN 25. BETHEL BASIN	r continuity read from bottom to top of	
ccurred at this time in other parts ed in area for which symbol is shown.	Jimu. Includes lava and tuff. 33.  28-30. Not reported but possibly present in 28, 29. and 26-27. Includes lava and tuff. 28. Not reported; possibly present. 32.	def., emerg., nce(*).	26-30. Marine deposition. Several 32- thousand feet. Kandik formation sou in 29. Upper part of Gemuk group in 26. 26-27. Includes lava and tuff.	mation, emergence, ion, metamorphism, sion, mineralization.	Marine deposition. Several thousand feet.  27. Not reported. Emergence and source of sediments in 26. 28-29. Nonmarine and marine deposition. Deposits underlie Eocene in 31.  30. Not reported; possible emergence.	Deformation, probably gentle. 32 in Deformation, probably gentle. 32 inergence and erosion. Followed deposition of Turonian beds(?)30. No evidence(*).	26. Upper part of Kuskokwim group. Many thousand feet; mostly marine. Extrusion of lditurad basalt. 27. Not reported. Emergence; source of sediments in 26(?).	-30. Not re		26-30. Strong deformation. Many 3: small silicic to mafic intrusives. ni Mineralization. 30. Nationarch formed(?); erosion exposses Paleozoic and pre-Cambrian rocks. 26-30. Eroded to surface of low relief.	26-31. Not reported except in sn Eagle trough and two very small bodies not shown on map. 31. Nonmarine deposition, few thous, ft.(?).	31. Moderate deformation of 3. Eccene beds. b. 26-31. Eroded to surface of low d. 3. relief.	26–31. Not reported (#). Ex- trusion of lava and tuff. 26. Holokuk basalt. Quick- silver mineralization. 28. High-level, gold-bearing stream gravels, preserved in Rampart district, may be Pliocene.	26-31. Uplift. Erosion. 3	Low mountainous region. ion in and near mountains. uplift; faulting. Erosion. k faulting. k faulting. usion of lava and tuff.	26. KUSKOKWIM GEOSYNCLINE 27. GOODNEWS ARCH 28. TOFTY SEGMENT (OF 26) 29. KANDIK SEGMENT (OF 26) 30. NATION ARCH 31. EAGLE TROUGH	Compiled by 1	MESOZOIC AND CENO
MEANING OF SYMBOLS  (#). Although post-Eocene Termostly or entirely eraded topographically low during interior region was invade mapping.	33. Marine deposition (II), Laverge series of Canadian usage, reported in Canadian part of Coast Mountains fim, Trea and in Yukon area to north.  32. Not reported in Alaska. 33. Marine deposition, Tru. Reported in Canadian part of Coast Mountains.  33. Marine deposition, Tru. Ference ics inclusional inclu	st phase of mineralization. on middle and orce of seds. in like Range, lines.	2-33. Continued uplift and 39- urce of seds. in Kuskokwim, Few laska Range, and Seymour sosynclines.	32-33. Intense def., batholi- thic int., and mineralization. lith Erosion.	2-33. Continued uplift and urce of seds. in Kuskokwim and tion laska Range geosynclines.  41.	-33. No evidence(*).	32–33. Probably continued up— If the and erosion. Possibly a source of seds, in Alaska Range geosyncline.  33 41 41	-33. Continued uplift(?).	32-33. Probably continued up- 39	2-33. Deformation. Small gra- itic intrusives. Eroded to surface in flow relief.  Er	2-33. Nonmarine deposition in apparent intermontane basins; isolated symmants reported. 4. Nonmarine deposition; maxium 2,000 feet. 5-37. Probable nonmarine deputition.	A. Moderate deformation of Eocene 31 eds along southern border; gentle formation to north.	on (Nenan ) feet. and tuff. on in area ce and dep in in and ansported in basal	32–34. Uplift; erosion.  33. Gentle to moderate deformation D Nenana gravel. 35–38. Possibly little or no uplift in und erosion.	s and low d near osion. region. pliff; hm Canal s. Stream 36.	32. TANANA GEANTICLINE 33. COAST MOUNTAINS GEANTICLINE 34. HEALY TROUGH 35. UPPER TANANA BASIN 36. MIDDLE TANANA BASIN 37. MINCHUMINA BASIN 38. HOLITNA BASIN	Thomas G. Payne 55 its in columns is according to their occ	ZOIC HISTORY OF ALAS
tiary sediments have not been reported during Pliocene and Quaternary upl g much of Tertiary time, and there it d by the sea. More extensive Tertia	kwentna group, Tordrillo han, Treadwell slate, and hane and Douglas I. elacanic groups.  A4. Not middle an indeposition, ru. Few thous, ft. Volcants: included in 41 and possis y in 39 and 40. Includes abesna limestone.	Def. and first phase blithic int. in middle Jurassic time.	39—41. Marine deposition. 43–44. few thous. ft. in 39,	39-41. Intense def., batho- lithic int., and mineraliza- tion. Erosion.	39-40. Nonmarine deposition, several thous. It. Cantwell fm. of Alaska Range. 41. Not reported.	39–40. Strong deformation and 43–44 erosion in Alaska Range area . 41. No evidence(*) .	39-40. Nonmarine deposition, 43-44. (including volcanics. Beds unconformably overlie Cant-was sour well formation in Alaska Range-Matanus 41. Not reported.	-41. Not reported. 43-44.	-41. Not reported.  43-44. Prouplift and geanticling sediments geosynclir	39–41. Strong deformation, 43–4. silicic to maffic batholithic intrusion. Mineralization(?). relief. Eroded to surface of low relief.	39. Nonmarine deposition in 46. local basins in Alaska Range truff carea. Possible subsid. and deposition. Quant	mation of Eocene deposits in local basins. Eroded to surface of low relief.	a 39. Differential uplift. Non- marine deposition in fault -block Extra basins (Nenana gravel) . 42. Possible subsidence and dep- osition. Marine fossils, pos- sibly of Plicene age, reported from Nushugak formation. 43-4 44-4 45-4 46-4 47-4 48-4 49-4 49-4 49-4 49-4 49-4 49-4 49	9-41. Great uplift; faulting. eformation of Nenara gravel , arrly concurrent with deposition basins. 2. Little or no uplift and erosion.	39-41. Mountainous region. Glaciation. Further uplift; faulting. Erosion. 41. Glacial scouring of valleys later drowned as fiords and straits. 42. Lowland. Deposition, in part marine. Slight uplift of Quatermary beds. 43-46 Glac Glac Glac Glac Glac Glac Glac Glac	39. ALASKA RANGE GEOSYNCLINE 40. NUTZOTIN SEGMENT (OF 39) 41. SEYMOUR GEOSYNCLINE 42. NUSHAGAK BASIN 44.	urrence in major geologic trends or pro	SKA
d, they may have been deposited and ff. Large parts of Alaska were evidence, although meager, that the ry deposits may be found by detailed	leanics. Few thous. 10,000 to 20,000 in J1 (Talkeetna fi includes Tuxedni, plift and erosion in Chinitra, Shelikold del J time; source fms, Staniukovich Aarine deposition, 47. Marine deposition, few thous. ft. International control of the state of the	iza-	43-44. Continued uplift 47. Marine de and possible source of seds. In 39, 40, 41, 47. Nelchina limes in 39, 40, 41, 47.	Def. and possibly int. and mineraliza-	Continued uplift 47. Marine del thous, ft. Kotsi and Kennicott f Valley. Not re Nonmarine arka nuska Valley marka taken in the transfer of the	No evidence(*).  47. Uppermos formation may tian. Danian	Continued uplift and 47. Marine Talkeetha geanticline 5,000 ft. Marine cae of sediments in ka geoxyncline.	Continued uplift(?)  47. Gentle d and erosion.	bably continued 47. No erosion. Talkeetna 5,000 ft Wishbone in Matanuska but possi		46. Nonmarine deposition; thousand fee few thous, ft, Includes truff and breccia. 45. Probable subsid. and deposition. Plesent beneath Quaternary(?).	46. Gentle def. of Eocene deposits. 43-46. Eroded to surface of low relief.	43-46. Not reported(*).  Extrusion of lava and tuff, several thous, ft. in Wrangell and St. Elias Mts. (Wrangell lava).  45. Possible subsid. and deposition( glomerate. 49. Possible	6. Uplift; erosion.  48. Gentle deformation and Pliocene(?) beds.  47-48. Uplift; erosion.  49. Little or no uplift.	4. Mountainous region. 47–48. Re iation. Volcanism. hills, and volcanoes. Volcanism. erosion. 49. Low pied by se position.	TALKEETNA GEANTICLINE PRINCE OF WALES GEANTICLINE COPPER RIVER BASIN ADMIRALTY TROUGH 47. MAT. GEO 48. SHEL 49. COO	vinces.)	
	10,000 to 20,000 ft. Volcanics in J1 (Talkeetna fm.). Jmu includes Tuxedni, Kialagvik, Chinitra, Shelikof, and Naknek fms, Staniukovich shale.  47. Marine deposition, Jl; in J1 (Talkeetna fm.). Jmu mastly volcanics. Jmunot reported; possibly little or no Jmu deposition.  47. Marine deposition, Jmu mastly volcanics. Jmunot reported; possibly little or no Jmu deposition.  50. Marine and nonmarine mostly volcanics. Jmunot reported; possibly little or no Jmu deposition.  50. Marine and nonmarine mostly volcanics. Jmunot reported; possibly little or no Jmu deposition, few thous. ft. Includes lava and tuff. Includes lava and tuff.	ntle to mod.  50. Deformation(?). Silinaticated by unconcic to ultramafic intrusives may be of this age.	position, few 50. Not report thous. ft. little or not none, Herendeen	def. Erosion. 50. No evide	deposition, few  50. Not reported. Possibly tsina conglomerate It fm. of Chitina reported elsewhere. rkose fm. in Mata- may be of this age.	st beds of Matanuska 50. No evide be early Maestrich-not reported.	deposition, max. 50. Not reported. Possibly atanuska and Chignik little or no deposition.	eformation, upliff, 50. Probable	relief.  Chickaloon fm. and emergent. So fm. of Matanuska ments in Mata Not reported elsewhere syncline(?).	Silicic s, of low	48–49. Nonmarine deposition, few thousand feet. Kenai formation in and marginal to Cook Inlet basin.  Marine Eocene reported in southern part of 48, where trough merges with Shumagin shelf (55). Eocene	48-49. Gentle deformation of Eocene deposits. Eroded to Eroded to surface of low relief.	147–48. Extrusion of lava and sion.  48. Marine Miocene and Pliocene (?) deposits reported in routhern part of trough (area of avolof and Herendeen Bays and Jnga 1.). Includes Unga conjunarente.	deformation of Miocene 50. Uplift;ene(?) beds. iff; erosion.	47-48. Relatively low region; bhallow seaway, broad valleys, lying between ills, and mts., including volcanoes. Extensive glaciation. and lower by volcanism. Slight upliff; srosion. Slight upliff; srosion. Shelikof tro 19. Lowland basin; party occupied by sea. Subsid. and deerosion.	AATANUSKA GEAN HELIKOF TROUGH COOK INLET BASIN		
Gentle def.: open folds, with dips generally.  Mod. def.: open folds, with dips generally.  Strong def.: complex tight folds, some over lntense def.: folds and dips as above, but st	nonmarine file. Possible deposition. If reported.  51. Possible deposition. Pre-Cretaceous rocks not by little or ion.  51. Possible deposition. Pre-Cretaceous rocks not reported.		rited. Possibly 51. Not reported. Possible deposition.	Albian.  51. Def. indicated by unconformity (see above).	position. Conglomerate, few thousand feet, exposed in Ellamar district, may be of this age. Unconformably overlies greenstone-bearing sequence believed to be pre-	ence(*). 51. No evidence(*).	rted Possibly 51. Marine deposition, many thous. ft. Valdez group.	emergence. 51. Not reported.	50. Not reported. Probably 51. Not reported. Pro- emergent. Source of sedi- ments in Matanuska geo- syncline(?).	50. Strong deformation indicated by deformation of dicated by deformation of granitic int., mineralization. Eroded to surface of low relief.	reported. Ero- 51. Uplift; erosion. Probable source of Eocene seds. in Shelikof trough, Yakataga geosyncline, and Middleton shelf.		ported. Ero- 51. Continued uplift; erosion. Probable source of seds. in Yakaraga geosyncline and Middle- ton shelf. Glaciation in Plicene. Source of ice depositing thick Pliocene marine glacial deposits in 53 and	rosion. 51. Great uplift;	50. Mountainous region 51. High mountainous lying between higher region. Extensive glacia-Chugach and Kenai Mis. tion. Further upliff; and lower belt of Matanuska geosyncline and Shelikof trough. Glaciation. Further upliff; erosion.	SELDOVIAI CHOR ST.E CHUGACH, A GEANTICLINE GEOSYNCLINE	× i	RECEIVED
TYPES OF DEFORMATION  open folds, with dips generally less than 20 degrees; few or no thrust faults. open folds, with dips generally 20 to 60 degrees; some thrust faults. complex tight folds, some overturned; dips steep and errotic; numerous thrust faults folds and dips as above, but structures largely obliterated by metamorphism.	52. Possible marine deposition. Jurasic rocks may be included in greenstone-graywacke-slate sequence.  52. Not reported.	52. No evidence(*).	52. Marine deposition. KI fossils reported in rocks of this belt in southeastern Alaska. Lithologic similarity of rocks in other parts of belt suggests possibility of widespread KI deposition.	52. Probable def. See 51.	)). 52. Probable uplift and erosion in mad Prince William Soundarea. Greenstone-bearing sequence was source of detritus in conglomerates of Ellamar district. See 51.	Prince William Sound area.  52. No evidence(*).	n, 52. Probable deposition; thinner than in Chugach Mountains geosyncline. Rocks believed to be K3 are infolded and infaulted with rocks of greenstone-baaring sequence in the	52. Not reported.	52. Not reported.	tram. 52. Probable strong def. (See liza- 51). Granitic intrusives may be ace of 6 this age. Eroded to surface of low relief.	53–55. Marine and nonmarine deposerie asition. Stillwater, Kushtaka, and John Tokun formations in area 53, maxi- gh, mum 7,000 feet. 55. Shelf deposits continuous with those of Shelikof trough	ous with those of Shelikof trough.  53. Little or no deformation.  54-55. No evidence(*).	5. No evidence.  1: 53-55. Marine deposition, Oligorome, Katalla, and Roul Creek, Yakataga formations; Midlenmaximum 18, 000 feet(?) in 53.  Pliocene marine glacial deposits. to see 54. Shelf deposits continuous with ling but probably thinner than those in Yakataga geosyncline.	erosion. 53. Deformation strong to north, gentle to south. North-dipping nerse faults. Upliff; erosion. 4. Gentle deformation. Little up.	Jus 52–53. Region of mountains, shallow 5 lacia- sea, islands. Glaciation in mountains. Further uplify, erosion.  54–55. Continental shelf, including the submarine canyons, rocky shoals and wislands of Teritary rocks. Slight uplify erosion. Probably little or noacdumulation of Quaternary sediments.	52. MESOZOIC GREENSTONE- GRAYWACKE-SLATE SEQUENCE BORDERING GULF OF ALASKA 53. YAKATAGA GEOSYNCLINE 54. MIDDLETON SHELF 55. SHUMAGIN SHELF		is.
faults. s thrust faults.			1 5		0 5 5		10 <sup>-4</sup> 5 1			ever, that the entire trench is a Quaternary feature.	Mountains geosyncline, p- but remains unfilled be- rad sedimentation; the east- em arc was developed in Tertiary or Quaternary time. It is possible, how-	According to one theory, the western arc began to subside in Cre- taceous time, was con- tinuous with the Chugach	rinental shelf and moved on to trench by slumping and turbidity currents.  North side probably is a depositional slope related is to out-building of the shelf into the trench.  Trench is a double—arc feature; only the eastern	fime. Probably shick Countermany accumulation fein part of trench adjacent to Middleton shelf. Sedi-	allow 56. Oceanic trench. Depth un more than 2,500 fathoms in eastern part and more ding than 3,500 fathoms in and western part (not shown up- on map). Faulting in yac- dicated by seismic re- unts. cords. Probably active	NCE TRENCH		

ertiary, in areas where Quaternary deposits re thin or absent. Includes Eocene in most re-Tertiary areas. Later Tertiary known in a sw areas. See table for further details. Unerlying pre-Tertiary units shown in color here age may be inferred. EXPLANATION
ENTARY ROCK UNITS

DEPARTMENT OF THE INTERIOR UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-84