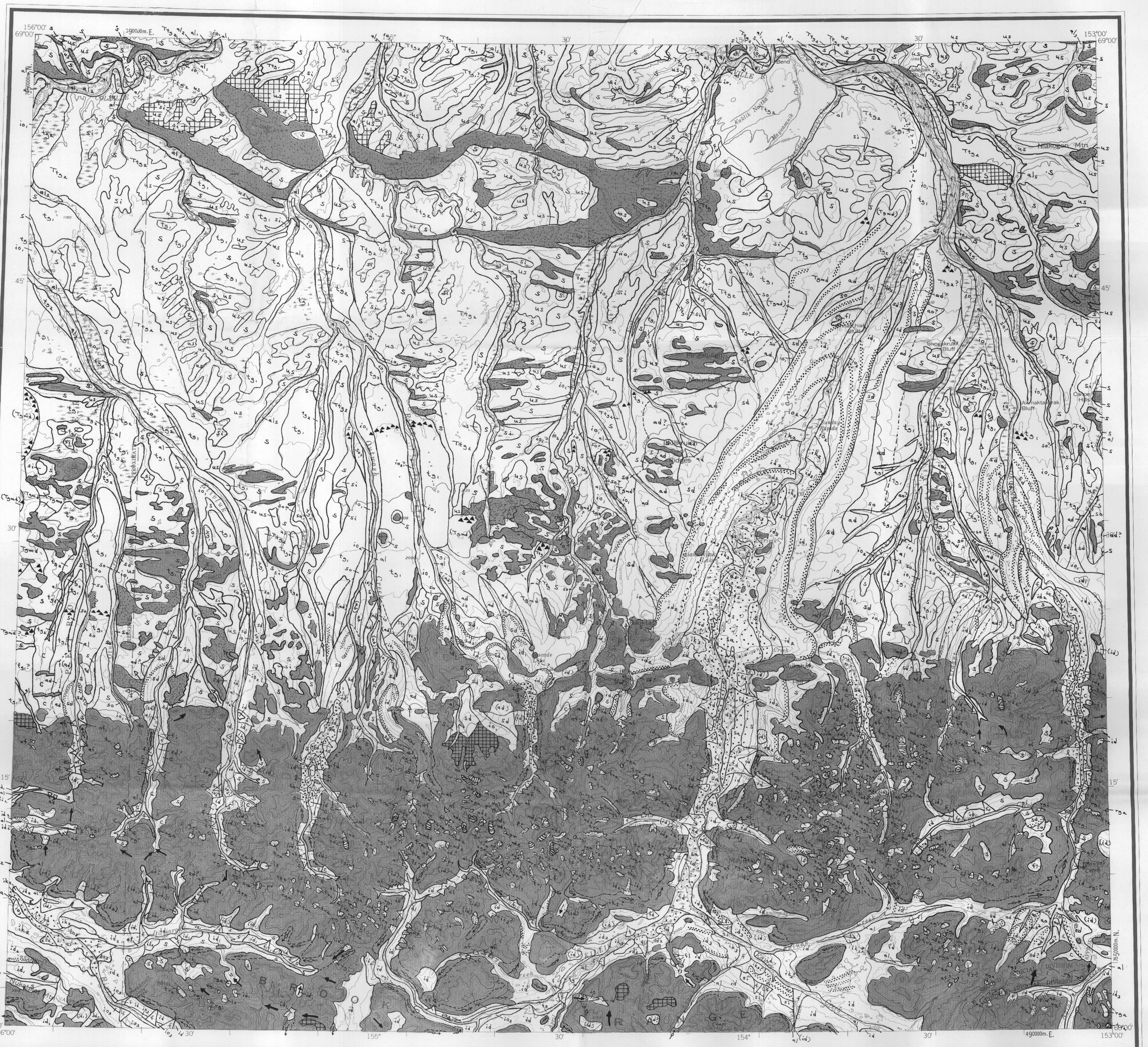
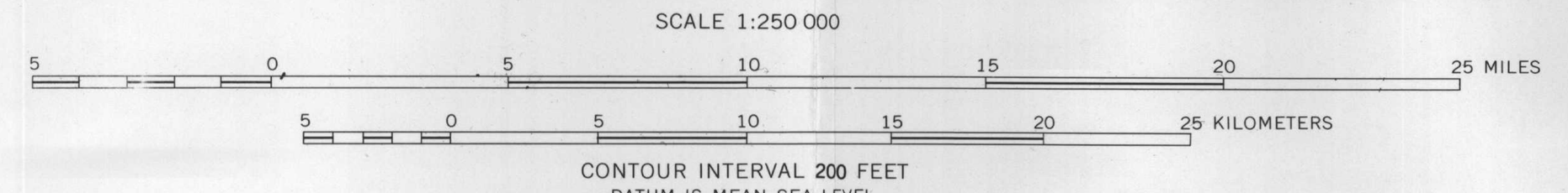
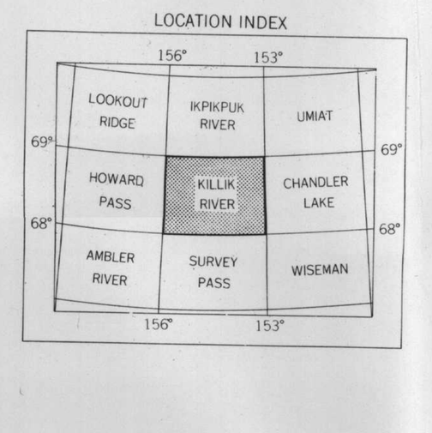
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF—1234



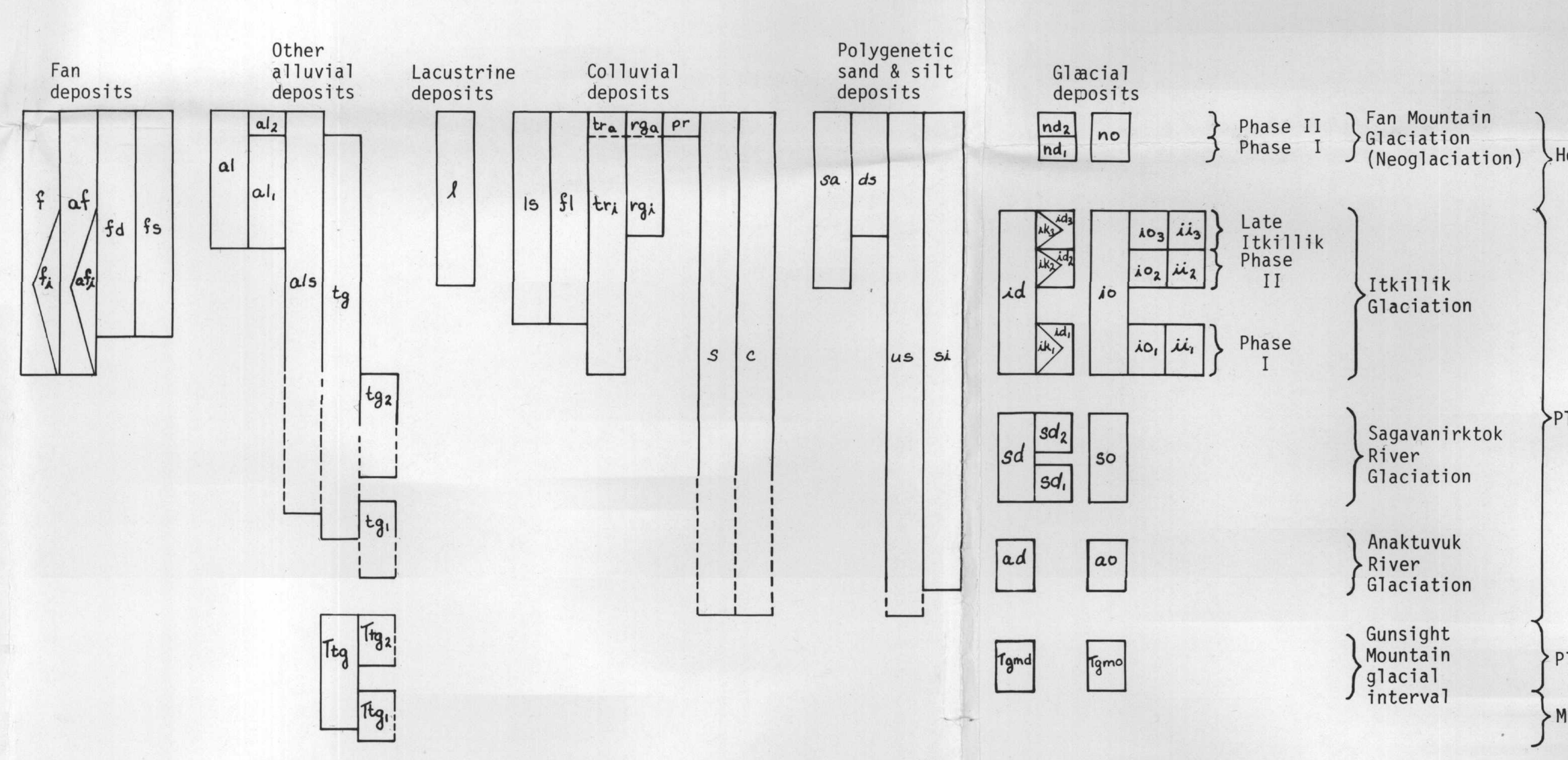
Base from U.S. Geological Survey, 1956





Geology by R.M. Chapman, R.L. Detterman, and M.D. Mangus, 1949-1953; and T.D. Hamilton, 1965-1979.

CORRELATION OF MAP UNITS



SURFICIAL GEOLOGIC MAP OF THE KILLIK RIVER QUADRANGLE, ALASKA

By
Thomas D. Hamilton

1980

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INTRODUCTION

Surficial geologic mapping of the Killik River quadrangle was based on (1) surface observations of morphology and composition of unconsolidated deposits, (2) distribution and interrelation of terraces, abandoned meltwater channels, moraines, and other landforms, (3) stratigraphic study of exposures along river bluffs, and (4) analysis of previously published geologic maps and reports (for example, Chapman, Detterman, and Mangus, 1964; Brosgé, Reiser, Dutro, and Nilsen, 1979). The map units are defined on the basis of their character, age, and genesis; most are identical to units mapped previously within the central Brooks Range (Hamilton, 1978a, 1978b, 1979a, 1979b).

The basic stratigraphic framework for the surficial map units is provided by the central Brooks Range glacial sequence of Detterman, Bowsher, and Dutro (1958), with modifications by Porter (1964), Hamilton and Porter (1975), and Hamilton (1978c, 1979c). Glaciers originated in cirques near the north flank of the Brooks Range and along the Continental Divide a few kilometers south of the Killik River quadrangle; they flowed north and south through deeply incised valley systems to terminate at and beyond the flanks of the range. Outwash trains were deposited along streams that issued from the ice fronts, and loess derived from outwash and other glacial deposits formed thick and extensive blankets across upland surfaces that lay beyond the limits of the younger glacial advances.

Drift of five major glacial intervals is recognized within the Killik River quadrangle. Drift and erratics of the Gunsight Mountain glacial interval represent one or more glaciations of probable late Tertiary age (Hamilton, 1979a, 1979c). Extensive alluvial terraces of younger Tertiary(?) age (unit Ttg_2) originate or are truncated at the northern limits of Gunsight Mountain drift and erratics; the terraces may in part be contemporaneous with Gunsight Mountain glacial advances and incorporate Gunsight Mountain outwash. The oldest Pleistocene terraces (unit tg_1) contain scattered residual boulders derived from Gunsight Mountain drift; these terraces therefore postdate the glacial advances of Gunsight Mountain time. Northern limits of Gunsight Mountain residual boulders within tg_1 terrace deposits are shown by a dark triangle pattern on the map. Probably correlative erratic limits were mapped farther east near Anaktuvuk Valley by Detterman, Bickel, and Gryc (1963).

The Anaktuvuk and Sagavanirktok Glaciations of Detterman (1953) are currently termed Anaktuvuk River and Sagavanirktok River Glaciations to avoid confusion with previously named rock-stratigraphic units (Keroher and others, 1966, p. 91 and 3379). Drift sheets of Anaktuvuk River age have been modified by stream erosion, forming dissected surfaces that extend downvalley into alluvial terraces of early Pleistocene age (unit tg_1). The terraces stand at the same general level as Anaktuvuk River outwash; therefore they may in part be contemporaneous with the Anaktuvuk River Glaciation. Drift and outwash of Sagavanirktok River age show the same relation to younger Pleistocene terraces (unit tg_2), which are believed to be in part younger and in part contemporaneous with this glacial event. Pediment surfaces at the north flank of the range southwest of Kurupa Lake (cross-hatched pattern on map) have been cut into glacial deposits of probable Sagavanirktok River age. A major erosion interval appears to have separated the Sagavanirktok River Glaciation from ice advances of Itkillik age.

The Itkillik Glaciation has been divided into Itkillik I and II phases (Hamilton and Porter, 1975); drift of late Itkillik age (unit id_3) represents deposits formed during final readvances of the waning Itkillik glaciers. Radiocarbon dates on glacial deposits farther east in the Brooks Range (Hamilton, 1979d, 1979e, 1980a, 1980b, 1980c) indicate that the Itkillik I phase occurred largely or wholly before 53,000 ^{14}C years B.P. (before present), and that Itkillik II glacial advances began about 29,000 yr B.P. and culminated about 20,000 years ago. Late Itkillik readvances to positions at or near the north flank of the Brooks Range took place as recently as 12,000 yr B.P. (Hamilton, 1979e). The Itkillik II glaciation clearly lies within the time range of late Wisconsin glaciation in the standard North American glacial succession. Glacier advances of Itkillik age were extensive in the eastern part of the map area but became progressively more restricted westward because of lower lying potential source areas at valley heads. Iteriak and Ivotuk Valleys, near the west margin of the quadrangle, did not support Itkillik-age glaciers. These valleys differ from their neighbors farther east in containing inactive fans and thick colluvial aprons that presumably formed on ice-free surfaces during Itkillik time.

Fan Mountain I and II phases (Porter, 1964) are equated with the late Holocene Neoglacial interval as described by Porter and Denton (1967) for the North American Cordillera. Cirque-glacier activity, with correlative episodes of talus formation and rock-glacier motion, has been dated provisionally by Calkin and Ellis (1980) using lichenometry and by Hamilton (in press) on the basis of ^{14}C-dated episodes of alluviation in cirque-headed stream valleys. Fan Mountain I moraines may have formed mainly between about 4000 and 2000 yr B.P., with some inner moraines perhaps as young as 800 years. Fan Mountain II deposits represent widespread glacial readvances of the past 450 years. Fan Mountain moraines and other cirque deposits are abundant in the southeastern and south-central parts of the map area but become increasingly rare westward as the altitude of valley heads decreases.

Permafrost is present beneath all of the Killik River quadrangle. Depth of its upper surface ranges from 15 to 25 cm in poorly drained deposits beneath thick moss and sod cover to about half a meter in permeable coarse-grained sediments and several tens of meters beneath the larger lakes and rivers. Although exact thicknesses are unknown, records from other parts of the northern Brooks Range and Arctic Foothills (for example, Ferrians, 1965; Williams, 1970) suggest that the base of permafrost probably lies at depths of 150-300 m in most of the map area.

FAN DEPOSITS

f FAN DEPOSITS--Range from very poorly sorted weakly stratified subangular silty sandy coarse gravel at mouths of steep canyons to moderately sorted and stratified, subrounded to rounded, sandy gravel at mouths of large tributary valleys with relatively gentle gradients. Locally subject to icings during winter (Sloan and others, 1976)

Subunit f_i designates inactive fan deposits, as described above, that generally are weathered and covered with sod and vegetation. Formed during Itkillik Glaciation in Ivotuk Valley, which was free of ice at that time

af DEPOSITS OF STEEP ALPINE FANS--Coarse very poorly sorted nonstratified to weakly stratified subangular to subrounded silty sandy gravel at mouths of avalanche chutes and steep canyons near heads of moutain valleys. Upper segments generally channeled, with levees of angular to subangular coarse debris. Subject to snow avalanches during winter (Luckman, 1978), slushflows during spring snowmelt (Washburn, 1980, p. 193-195), and debris flows during summer (Rapp and Strömquist, 1976). Surface gradients generally 12°-25°, intermediate between those of alluvial fans and talus cones

Subunit af_i designates inactive alpine fan deposits, as described above, that generally are weathered and covered with sod and vegetation. Formed during Itkillik Glaciation in Iteriak Valley

fd FAN-DELTA DEPOSITS--Alluvial-fan facies (poorly sorted weakly stratified subangular sandy gravel) near valley walls, grading into deltaic and lacustrine facies (well sorted and stratified silt, sand, and fine gravel) near valley centers. Occur in moraine-dammed basins within Nigu, Kurupa, Killik, Okpikruak, and Okokmilaga Valleys. Locally subject to icings

fs SILT FANS--Unusually fine-grained fan deposits consisting of poorly sorted silt and sandy silt. Present only in valley of Kugukpak Creek, where associated with widespread solifluction deposits and outcrops of Hunt Fork Shale (as mapped by Brosgé and others, 1979)

OTHER ALLUVIAL DEPOSITS

al ALLUVIUM, UNDIFFERENTIATED--Ramges from poorly sorted moderately well stratified subangular coarse gravel near heads of mountain valleys to moderately well sorted gravelly sand and sandy fine gravel along slow-flowing stretches of some rivers north of Brooks Range and along moraine-dammed segments of glaciated valleys farther south. Includes fan, flood--plain, and low terrace deposits too small to be designated separately

al_2 MODERN ALLUVIUM--Gravel and sandy gravel, as described above; generally unvegetated and commonly subject to icings. Differentiated only along major valleys

al_1 LOW ALLUVIAL TERRACE DEPOSITS--Gravel and sandy gravel, as described above; mantled with 0.3 to 1 m of silt, sand, or peat, typically vegetated, and forming terraces generally within 3-4 m of modern stream levels. Differentiated only along major valleys

als ALLUVIUM, SILTY--Unusually fine grained alluvium consisting of generally well sorted silt, organic silt, and sandy silt. Occurs along streams that did not originate in glaciated valleys and did not transport glacial outwash. Present along Kucher, Heather, Aupuk, and Coal Creeks, and along unnamed small tributaries to Kurupa and Colville Rivers

tg LOWER TERRACE GRAVELS, UNDIFFERENTIATED--Gravel and sandy gravel of variable composition forming alluvial terraces of uncertain age or origin along parts of Killik River, west fork of Kurupa River, Inyugakuligit Creek, and unnamed stream between Verdant and Fire Creeks

tg_2 LOWER TERRACE GRAVELS, YOUNGER--Oxidized coarse gravel to sandy fine gravel of Pleistocene age, forming terraces, generally 12-15 m high, that are inset within higher alluvial surfaces. Forms lower terraces or valley floors along some smaller streams that originate north of Brooks Range. Bears thick (4-8 m) cap of ice-rich organic silt in some localities. Composed of undifferentiated nonglacial alluvium plus distal outwash of Sagavanirktok River age

tg_1 LOWER TERRACE GRAVELS, OLDER--Oxidized gravel of Pleistocene age, consisting of rounded to subrounded pebbles and cobbles in sandy matrix. Forms terraces 30-45 m above major rivers and 10-25 m above smaller streams and above segments of Kurupa River and Outwash Creek 5-20 km north of Brooks Range. Generally contains residual erratic boulders in areas south of Gunsight Mountain erratic limit (solid triangle pattern on map). Bears thick (5-10 m) cap of ice-rich silt in most localities and overlies 10-20 m of bedrock exposed by downcutting. Composed of undifferentiated nonglacial alluvium plus distal outwash of Anaktuvuk River age

Ttg HIGHER TERRACE GRAVELS, UNDIFFERENTIATED--Strongly oxidized gravel of Tertiary age, containing rounded stones to large cobble size in sand matrix. Forms terracelike erosion remnants 60-90 m above modern stream levels

Ttg_2 HIGHER TERRACE GRAVELS, YOUNGER--Strongly oxidized gravel, as described above, forming extensive surfaces 50-70 m above Colville River and lower courses of its major tributaries. Gravel generally 10-15 m thick, with underlying exposed bedrock 30-50 m thick. Capped by ice-rich silt, as much as 10 m thick, that bears large and coalescent marshy thaw basins (these are designated unit si on map). Terminates southward at Gunsight Mountain erratic limit and probably includes outwash of Gunsight Mountain age. Near north border of map, terraces merge southward with pedimentlike erosion surfaces (cross-hatched map pattern) on flanks of prominent bedrock ridges

Ttg_1 HIGHER TERRACE GRAVELS, OLDER--Strongly oxidized gravel, as described above, forming small, silt-capped isolated erosion remnants 75-110 m above modern stream levels. Most common near Colville River, between Killik and Kurupa Rivers, where terrace patches stand about 30 m above the more extensive younger Tertiary (Ttg_2) surfaces

LACUSTRINE DEPOSITS

ℓ LACUSTRINE DEPOSITS--Well stratified clay, silt, and sand, grading into sand and gravelly sand near former shorelines and sandy fine gravel near former stream mouths. Extensive thick deposits occur behind Itkillik-age moraines along floors of Nigu, Outwash, Kurupa, Killik, Okpikruak, and Okokmilaga Valleys. Shown only by stippled map pattern where buried beneath alluvium, sand sheets, or solifluction and fan deposits. Include beach deposits too small to be designated separately

COLLUVIAL DEPOSITS

ls LANDSLIDE DEPOSITS--Unsorted nonstratified coarse to fine angular rubble forming tongues and lobes associated with detachment scars and slide tracks on high, steep walls of mountain valleys. Subject to episodes of rapid downslope motion and long periods of relative stability. Most common near cirques at heads of valleys that supported active glaciers during late Itkillik time

fl FLOW DEPOSITS--Very poorly sorted angular generally tabular rubble; in abundant muddy matrix. Forms lobes subject to slow and probably continuous downslope motion, generally below arcuate detachment scars. Most common on shale members of Devonian Hunt Fork Shale and Kanayut Conglomerate, as mapped by Brosgé and others (1979). Also occur on Triassic Shublik and Cretaceous Tuktu Formations (Chapman and others, 1964)

tr_a TALUS RUBBLE, ACTIVE--Angular unsorted nonstratified rock debris forming cones and aprons more than 2 m thick and generally sloping 30°-33° along lower walls of moutain valleys and in cirques at valley heads. Also forms thinner and generally discontinuous sheets over many uplands mapped as "bedrock". Generally unvegetated, unweathered to slightly weathered, and with lichen cover sparse to absent. Subject to rockfalls, especially during spring thaw

tr_i TALUS RUBBLE, INACTIVE--Angular rock debris, as described above, generally weathered and lichen covered, and with partial sod cover at some localities. Thin (less than 1-2 m) blankets of stabilized talus occur on some uplands north of Brooks Range (see stippled bedrock pattern)

rg_a ROCK-GLACIER DEPOSITS, ACTIVE--Very poorly sorted nonstratified coarse angular rock debris with matrix of silt and fine rubble; contains abundant interstitial ice. Upper surfaces generally unvegetated, unweathered to moderately weathered, and with sparse lichen cover. Frontal slopes barren, steep (37°-38°), and unstable, meeting upper surfaces at abrupt angle. Form (1) lobate deposits at bases of talus cones along valley walls and (2) tongue-shaped deposits within cirques (see White, 1976). The tongue-shaped variety commonly overlies stagnant glacier ice (Ellis and Calkin, 1979). Subject to slow downslope motion

rg_i ROCK-GLACIER DEPOSITS, INACTIVE--Coarse angular rock debris, as described above, but lacking interstitial ice. Upper surfaces and frontal slopes weathered and lichen covered, commonly with partial sod or vegetation cover. Frontal slopes grade into upper surfaces without abrupt angles

pr PROTALUS RAMPART DEPOSITS--Unsorted nonstratified coarse angular rock debris forming arcuate low ridges at bases of cirque headwalls. Associated with persisting snowbanks in shaded sites. Subject to rockfalls during spring thaw. Restricted to the higher cirques 15-20 km south of north flank of the Brooks Range

s SOLIFLUCTION DEPOSITS--Very poorly sorted nonstratified to weakly stratified stony silt and organic silt in sheets and aprons more than 1-2 m thick. Platy to elongate stones generally oriented parallel to slope. Forms widespread deposits on gentle to moderate slopes beyond limits of Anaktuvuk River drift north of Brooks Range; locally present on deposits of Anaktuvuk River and younger age. Present locally within Brooks Range on shale members of Devonian Hunt Fork Shale and Kanayut Conglomerate and on glacial deposits derived from these rock units

c COLLUVIUM, UNDIFFERENTIATED--Mixed talus rubble and solifluction deposits, as described above, in sheets and aprons more than 1-2 m thick on till and bedrock slopes. Most common in Iteriak and Ivotuk Valleys; locally present in more recently glaciated valleys farther east

POLYGENETIC SAND AND SILT DEPOSITS

sa SAND DEPOSITS--Moderately sorted fine to medium sand, horizontally bedded to slightly crossbedded, commonly with thin interbeds of sandy peat or organic silty fine sand. Deposited initially by slow-moving streams within basins partly dammed by end moraines in Nigu, Outwash, Kurupa, Killik, Okpikruak, and Okokmilaga Valleys. Upper 1-10 m locally reworked by wind into sand sheets and dunes. Commonly grades downward into lacustrine deposits (see stippled map pattern). Generally dissected by postglacial streams, forming terraces 5-15 m high

ds DUNE SAND--Moderately well sorted medium to fine sand, commonly containing shale chips and with thin interbeds of sandy peat; grass rootlets generally abundant. Forms extensive parabolic and longitudinal dunes along Killik River near north flank of Brooks Range

us UPLAND SILT DEPOSITS--Poorly to moderately sorted generally unstratified silt, organic silt, and slightly clayey, sandy, or stony silt on uplands of low to moderate relief north of oldest drift limits. Formed from loess mixed by frost action with local organic matter and weathering products. Generally bears tussock cover broken by frost boils. Grades laterally into solifluction deposits on slopes steeper than about 1°-2°

si ORGANIC SILT DEPOSITS--Weakly stratified sandy silt, organic silt, and silty peat, containing abundant ice in form of lenses, wedges, and interstitial grains. Formed largely of loess, with admixed organic and solifluction deposits. Fills widespread coalescent thaw basins on terrace surfaces of Tertiary age; forms smaller and more localized deposits on younger surfaces; generally absent from deposits younger than Anaktuvuk River age

GLACIAL DEPOSITS

Fan Mountain Glaciation (Neoglaciation)

nd_2 DRIFT OF FAN MOUNTAIN PHASE II--Unsorted nonstratified coarse to fine angular rubble forming ice-cored lobes and arcuate ridges with steep, unstable frontal slopes. Unvegetated, unweathered to slightly weathered, and with lichens sparse to absent. Restricted to cirques, and generally associated with modern glaciers. Most common in valley heads east of Outwash Creek and 10-20 km south of Brooks Range margin

nd_1 DRIFT OF FAN MOUNTAIN PHASE I--Angular rubble, as described above, forming more subdued lobes and ridges with stable frontal slopes; generally eroded by axial streams. Weathered and lichen encrusted, with partial (about 30-50%) sod cover in most localities

no FAN MOUNTAIN OUTWASH--Moderately well sorted and stratified sandy coarse gravel forming modern flood plains and low (1-3 m) vegetated terraces that extend downvalley from modern glaciers and from end moraines of Fan Mountain age. Forms mappable unit only in unnamed small valleys tributary to Outwash Creek and Kurupa River and near head of east fork of Okpikruak River; too small to be designated separately in other valley heads

Itkillik Glaciation

id ITKILLIK DRIFT, UNDIFFERENTIATED--Unsorted to poorly sorted generally nonstratified compact till ranging in composition from muddy sandy gravel to clayey stony silt, with local stratified ice-contact deposits consisting of moderately sorted sand and sandy gravel. Contains faceted and striated stones up to large boulder size. Designates thick (greater than 3 m) drift deposits, usually within mountain valleys, that cannot be assigned to a specific Itkillik moraine system

id_3 DRIFT OF LATE ITKILLIK AGE--Till and stratified ice-contact deposits, as described above. Forms sharp-crested end moraines, irregular ground moraine, and steep-sided ice-contact stratified drift deposits in Killik Valley near mouth of Easter Creek and in valley heads between Killik and Okokmilaga Rivers. Forms unusually subdued moraines and silty till composed of probable redeposited lacustrine sediments in Killik Valley north of range front. Loess cover generally absent, and exposed stones very slightly weathered; oxide penetration to only 20-30 cm depth in most permeable deposits

Subunit ik_3 (KAME DEPOSITS) designates unusually extensive and thick (greater than 30 m) deposits of moderately well to well sorted sandy gravel, usually with less than 0.2 m cover of silt, organic silt, and sod. Formed within late Itkillik drift sheet in Killik Valley

id_2 DRIFT OF ITKILLIK PHASE II--Till and stratified ice-contact deposits, as described above, with ice-contact deposits very abundant in most valleys. Forms sharply defined drift lobes with narrow (generally 1-3 m) morainal ridges, prominent knob and kettle morphology, and conspicuously channeled outwash trains. Crests and upper slopes lack loess and solifluction cover, and exposed boulders and cobbles exhibit slight to moderate weathering; oxidation has penetrated 30-40 cm into better drained deposits. Most swales lack solifluction deposits, and abandoned meltwater channels commonly are floored with lichen-covered coarse gravel

Subunit ik_2 (KAME DEPOSITS) designates thick and extensive gravel deposits, as described above, near outer limit of Phase II drift in Killik Valley

id_1 DRIFT OF ITKILLIK PHASE I--Till and stratified ice-contact deposits, as described above, with till predominating in most valleys. Forms closely nested concentric end moraines with flanking slopes up to 20° and subdued knob and kettle topography; associated with outwash trains partly obscured by solifluction. Moraine crests generally 3-10 m wide and partly bare of loess; upper slopes are blanketed by 0.5 to 2 m of stony organic silt (loess and colluvium). Exposed cobbles and boulders moderately to heavily weathered; stones are etched, pitted, and oxidized to depth of about 1 m. Swales partly filled with 1-3 m of ice-rich organic silty solifluction deposits. Subject to shallow earthflows on steep slopes. Unstable kettles with actively caving gravel rims west of Killik River indicate that residual glacier ice may be present locally

Subunit ik_1 (KAME DEPOSITS) designates unusually thick and extensive gravel deposits, as described above, in Phase I drift near head of East Fork Etivluk River

io ITKILLIK OUTWASH, UNDIFFERENTIATED--Moderately well sorted and stratified sandy gravel forming aprons and valley trains in front of Itkillik moraines and isolated terrace remnants farther downvalley. Largest stones decrease in size from subrounded cobbles and small boulders near moraine fronts to rounded to subrounded pebbles and cobbles farther downvalley

io_3 OUTWASH OF LATE ITKILLIK AGE--Sandy gravel, as described above, generally without loess or peat cover and oxidized to only 20-30 cm depth. Forms valley trains along upper reaches of Nigu and Killik Rivers. Terraces up to 12 m high near moraine fronts; generally merge downvalley with outwash terraces of Phase II

io_2 OUTWASH OF ITKILLIK PHASE II--Sandy gravel, as described above, generally lacking loess. Stones etched, fractured, and pitted to 30-40 cm depth; oxidized to depths of 30-45 cm. Forms extensive aprons and valley trains in front of Phase II moraines. Terraces near moraine fronts are up to 40 m high; decrease downvalley to about 3-5 m near Colville River

io_1 OUTWASH OF ITKILLIK PHASE I--Sandy gravel, as described above, generally with thin to moderate (0.3 to 3 m) loess and solifluction cover that contains frost-churned stones with vertical orientations. Upper 1-1.5 m oxidized, with silt illuviation and weathered stones. Forms aprons and valley trains in front of Phase I moraines. Terraces near moraine fronts are up to 40 m high; decrease in height progressively downvalley to about 4-8 m near Colville River

ii_3 INWASH OF LATE ITKILLIK AGE--Well to moderately sorted and stratified gravelly sand and sandy fine gravel, commonly grading upvalley into fan deposits and downvalley into lacustrine beds. Deposited near mouths of nonglaciated tributaries blocked by Itkillik-age glaciers in main valleys, forming benches and terraces that abut outer flanks of lateral moraines or outer faces of drift lobes

ii_2 INWASH OF ITKILLIK PHASE II--Gravelly sand and sandy fine gravel, as described above, forming terraces that abut drift of Itkillik II age in valleys tributary to Nigu River

ii_1 INWASH OF ITKILLIK PHASE I--Gravelly sand and sandy fine gravel, as described above, forming terraces that abut drift of Itkillik I age in pass at head of Iteriak Creek

Sagavanirktok River Glaciation

sd SAGAVANIRKTOK RIVER DRIFT, UNDIFFERENTIATED--Poorly sorted nonstratified till ranging in composition from silty sandy boulder gravel to clayey stony silt, with local deposits of moderately well sorted ice-contact gravel; generally oxidized and strongly jointed. Erratic boulders generally protrude less than 0.15 m above ground surface and are composed only of strongly indurated quartzite and conglomerate of Kanayut Conglomerate. Forms distinct but subdued end moraines and ground moraine with most crests and flanks covered by continuous blanket of organic silt (loess and solifluction deposits). Swales and kettles generally contain more than 5 m of ice-rich organic silt (colluvial and lacustrine deposits). Some ridge crests locally lack silt cover, exposing weathered subrounded gravel of resistant lithologies. Broadly dissected (2-3 km) along major rivers, with depth of erosion 25-40 m

sd_2 DRIFT OF YOUNGER SAGAVANIRKTOK RIVER AGE--Till and ice-contact gravel, as described above, east of Kurupa River at north flank of Brooks Range. Forms subdued end moraine and ground moraine with many ridge crests bare of loess and solifluction cover. Swales and kettles more abundant and less modified than on older deposits of Sagavanirktok River age

sd_1 DRIFT OF OLDER SAGAVANIRKTOK RIVER AGE--Glacial deposits of probably similar composition forming distinct but very subdued and dissected moraines east of Kurupa River at north flank of Brooks Range. Ridge crests and flanks bear generally continuous cover of organic silt

so SAGAVANIRKTOK RIVER OUTWASH, UNDIFFERENTIATED--Moderately well sorted and stratified oxidized sandy gravel, with largest stones generally decreasing in size from cobbles and small boulders near moraine fronts to pebbles and cobbles farther downvalley. Generally overlain by 1-4 m of organic silt (loess and solifluction deposits). Commonly associated with underfit or abandoned stream courses and dissected to depths of 10-20 m along most valleys

Anaktuvuk River Glaciation

ad DRIFT--Bouldery glacial deposits of uncertain composition overlain by continuous cover of organic silt (loess and solifluction deposits) generally more than 2-3 m thick. Erratic boulders generally protrude less than 0.2 m above ground surface and consist only of most resistant (thick-bedded and nonferruginous) facies of Kanayut Conglomerate. Forms subdued till plains and low broad morainal ridges with gentle (1°-2°) flanking slopes except where steepened by postglacial erosion. former swales and kettles generally filled with ice-rich, silty, organic colluvial and lacustrine deposits more than 5 m thick. Deeply and broadly dissected by minor as well as major streams: to width of 6 km and depth of 100 m in Killik Valley; to widths of about 1 km and 40-60 m depth in smaller valleys farther west. Forms oldest continuous drift sheets in Killik River quadrangle

ao OUTWASH--Oxidized gravel of uncertain composition forming terrace remnants 50-60 m high that originate at outer limits of drift lobes of Anaktuvuk River age. Generally overlain by 3-5 m of organic silt (frost-churned loess and solifluction deposits)

Gunsight Mountain Glacial Interval

Tgmd DRIFT--Highly eroded bouldery glacial deposits of unknown initial composition, lacking primary relief and overlain by continuous cover of organic silt generally more than 2-3 m thick. Occurs beyond limits of Anaktuvuk River drift in region between Kurupa and Killik Rivers and at extreme west margin of map. Former distribution north of range front elsewhere is marked by northern limits of erratic boulders (solid triangle pattern) incorporated in terrace deposits of early Pleistocene (tg_1) age. Eroded to depth of about 100 m along Killik River and to about 300 m along range front east of Kurupa Lake

Tgmo OUTWASH--Highly weathered and eroded gravel of uncertain composition that originates at outer limits of Gunsight Mountain drift sheet west of Iteriak Creek. Forms terrace remnants that stand above deposits of early Pleistocene (tg_1) age

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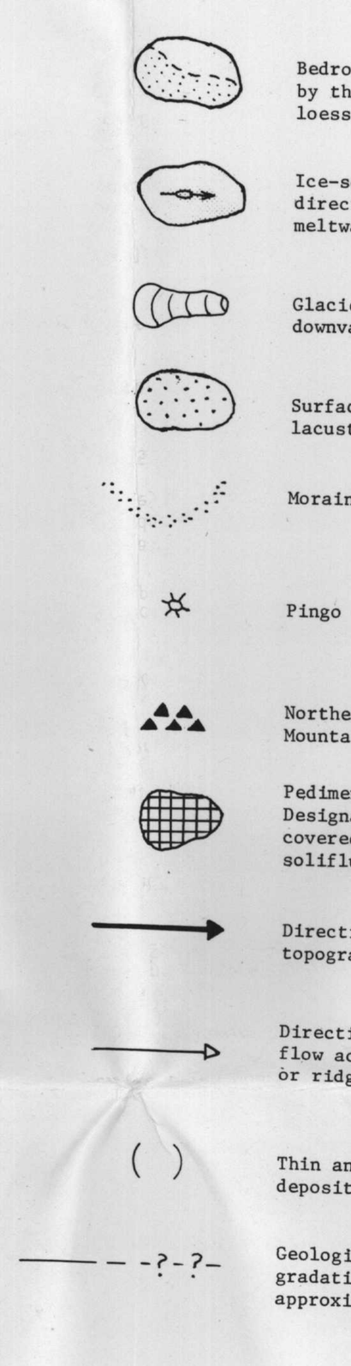

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