AERIAL PHOTOGRAPH 105-6-4

INTERPRETATION KEY for FOSHEIM PENIN. ELLESMERE ISLAND.

by V.SIM

Part 1.

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AERIAL PHOTOGRAPH INTERPRETATION KEY

FOR

FOSHEIM PENINSULA, ELLESMERE ISLAND

By

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Ottawa

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ACKNOWLEDGEMENT

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Maps Missing

INTRODUCTION

This Aerial Photo Interpretation Key is a collection of aerial photographs, ground photographs, stereograms, and accompanying descriptive texts. It is intended as a tool for the interpretation of landforms and surface features in the Fosheim Peninsula of Ellesmere Island and in areas of similar characteristics elsewhere in the Arctic.

Field research for this key was carried out during the months of June, July, August and September, 1955, by Mr. V.M. Sim, and Mr. M. Marsden of the Geographical Branch, Department of Mines and Technical Surveys. Extensive traverses were made throughout the portion of Fosheim Peninsula lying west of the Sawtooth Mountains. In the field all variations in terrain conditions were related, as closely as possible, to variations in photo-image appearance. To assist in the adequate illustration of all features, several hundred black and white ground photographs were taken under both winter and summer conditions. Sketch maps were made to augment the photographs.

Since most of the terrain conditions which can be identified on aerial photographs of the Fosheim Peninsula are of comparatively wide distribution it was decided to extend the photo key observational research to include, in so far as possible, the entire Fosheim Peninsula. It was not felt to be either necessary or desirable to make a detailed interpretation of all features on a small number of photographs. Rather, the interpretation of significant features was carried out on a large number of widely separated photographs. All the necessary information required for the construction of the Air Photo Interpretation Key was thus collected.

Aerial Photographs

Aerial photographs at two scales have been used in the compilation of this key. All the photographs were taken by the Royal Canadian Air Force during June and July, 1950, 1951 and 1952. They are of good quality.

Vertical and oblique trimetrogon photographs taken from an altitude of 20,000 feet with a camera having a 6-inch lens were used. The scale of the vertical trimetrogon photographs is approximately 1:40,000 (1 inch: 3,333 feet). The scale, of course, varies on the oblique photographs. Trimetrogon photographs may be readily identified by the letter "T" which precedes the photo number. All aerial photographs and stereograms used in the key are numbered.

An area approximately 24 miles long and 16 miles wide extending in an east-west direction around Slidre Fiord has been photographed vertically from low altitude by the R.C.A.F. These photographs, taken from 9,000 feet using a camera with a 6-inch lens, have an approximate scale of 1:18,000 (1 inch: 1,500 feet). Vertical photographs may be identified by the letter "A" which precedes the photo number.

Two flight line index maps are contained in the folder on the inside back cover of Volume 2.

Scope and Technical Level of the Key

This key is designed to permit the accurate interpretation of surface conditions and landforms in the Fosheim Peninsula of Ellesmere Island. As such it is, therefore, a regional key composed of a number of individual item keys each of which can be used to interpret one specific feature or condition.

So far as possible the textual material has been kept non-technical. It is designed primarily for the use of interpreters who have no had intensive professional or technical training. It is assumed, however, that persons using this key will have some familiarity with basic physical processes and elementary geomorphologic nomenclature.

The key is intended for the direct interpretation of features and conditions visible on the aerial photographs. A considerable amount of associative material has, however, been included in the text accompanying each item key. This associative material includes information which cannot be directly interpreted from inspection of the aerial photographs but which ground surveys have revealed to be true for the area under consideration. Interpreters familiar with northern conditions will be able to supply additional associative material from their own experience.

Organization and Use of the Key

Descriptions and illustrations for 26 specific surface conditions and landforms are contained in this photo key. To identify any one of these features on an unfamiliar aerial photograph the interpreter will first examine the features carefully by stereoscope noting peculiarities of pattern, photo tone, texture, and topography. He will then turn to the Short Key (page) and by reading the short, word descriptions found there he will narrow to several possibilities the feature which he wishes to identify. Turning to the Long Key a quick inspection of the possible features will determine which inspection of the possible features will determine which one most nearly corresponds to the feature under examination. In the folder for this feature a complete description of the photo and ground appearance of the feature will be found. In the folder aerial photographs, ground photographs, stereograms, and sketches are associated with textual materials.

A more complete description of the Short and Long Keys appears below.

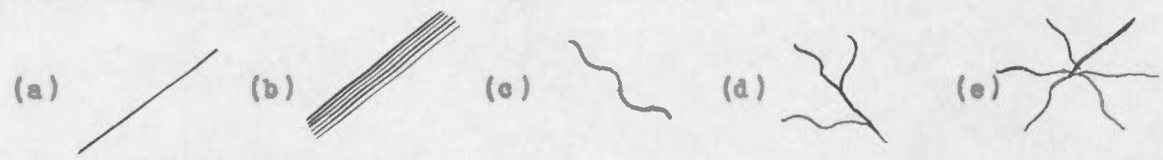
1. Short Key.

All the features described in this photo key have been included within one of five general classifications. The first two of these five classifications have been further subdivided to facilitate the identification of specific features. The five major classifications together with their subdivisions, where such exist, are discussed below.

(A) Linear Features:

Linear features are those which exhibit a definite linearity or elongation in their photo appearance. Linear features are subdivided into two groups whose essential characteristics may be grasped by reading the Short Key. Six of the features included in the Long Key have been classified as linear features.

Sketches of the photo-pattern of several types of linear features appear below.



Straight Parallel Sinuous Branching Radial

(B) Area Features:

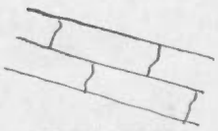
Area features cover comparatively broad areas upon the photographs. They are extensive rather than intensive or localized features. Area features have been subdivided into three groups. Six of the features included in the Long Key have been classified as area features.

(C) Patterned Features:

Patterned features are those in which a regular, repeating pattern of polygons, rectangles, or stripes is apparent. Sketches of the photo-pattern of three types of patterned features appear below. Three of the features included in the Long Key have been classified as patterned features.

(a) 

Polygons

(b) 

Rectangles

(c) 

Stripes

(D) Discrete Geomorphologic Features:

Discrete geomorphologic features are comparatively small topographic forms which can be detected on the aerial photographs. They usually show a marked contrast to surrounding areas. Area features, by comparison, usually merge imperceptibly with surrounding areas. Six of the features included in the Long Key have been classified as discrete geomorphologic features.

(E) Miscellaneous:

Five easily recognized features have been included in the miscellaneous classification. These have all been discussed briefly and included together in one folder in the Long Key.

2. Long Key.

Each folder in the Long Key contains a detailed description of one specific feature or terrain condition. This description, including both textual and illustrative material, is divided in the following way:

(a) Photo appearance:

Features are described using the accepted terminology of photo-description. Such words as "form", "pattern", "tone", and "texture" are used often. The exact meaning of these words, when used in a photo interpretation context, may be found by consulting any standard text on the subject (Aerial Photographs and their Applications by H.T.U. Smith and published by D. Appleton Century Company, New York in 1943, is recommended).

A "tone scale" has been used to make the description of photo tone more accurate. Ten shades of grey ranging from white to black are included on the scale. The tone value for any photo feature can be determined by selecting the tone of the feature which most nearly corresponds with one of the ten tones shown on the "tone scale card" contained in the pocket on the inside front cover. A numerical value can then be assigned to the tone. This

is a more precise method of describing the tone value of a feature than the older method of using descriptive words (such as medium grey, or light grey).

(b) Ground appearance:

A conventional description of the ground appearance of the feature under examination. Such things as slope, surface material, drainage, and vegetation are discussed. Any unusual surface features such as fissures, tussocks, pillows, etc., are also described.

(c) Examples:

Examples of the feature under consideration are included in this section. Usually the examples take the form of stereograms with an accompanying descriptive text and ground photographs. Sometimes rough sketches are also included. These sketches are not drawn to scale and are intended only as additional illustrative material. The sketches are usually profiles and the line of the profile is indicated by a red line on the stereogram.

The position from which ground photographs were taken (where they were taken within the stereogram area) is indicated by a small red acute angle appropriately numbered on the stereogram. The vertex of the angle marks the position of the photographer and the angle opens in the direction the photograph was taken.

Small red arrows are often used to mark the locations of features discussed in the text.

(d) Discussion:

A brief statement on the trafficability within the area of the feature is contained in this section.

(e) Aerial photographic examples:

Several examples of the feature under discussion, as it appears on full size aerial photographs, are included on the inside back cover of each folder. Red arrows indicate the features. Brief descriptive texts are also included.

PHYSICAL GEOGRAPHY OF FOSHEIM PENINSULA

1. Structure and Physiography.

Fosheim Peninsula may be described as a low, dissected, sedimentary plain which is locally interrupted by high plateau remnants characterized by steeply dipping sedimentary strata and frequent outcrops of intrusive rock.

The structural geology of the peninsula is not completely known. The area is, however, underlain by Triassic and Lower Jurassic sandstones, limestones, and shales. These rocks during a period of late Mesozoic crustal movement were badly folded and faulted. At the same time intrusive activity along the trend of Eureka Sound resulted in the formation of numerous basalt and gabbro dikes and sills. A long period of peneplanation was followed by uplift of the land mass and dissection along the present fiord lines. Softer strata were eroded and the high plateau remnants, mentioned above, remained. These remnants are today known as Northwest Ridge, Hare Cape Ridge, and Black Top Ridge.

During an early Cenozoic rise of the sea further sedimentation took place. Tertiary shale and clay beds, deposited at this time, are preserved today east of Black Top Ridge. These strata have been slightly folded and have had considerable influence on the recent physiographic development of the peninsula.

The area was almost certainly glaciated during the Pleistocene but little direct evidence of this event is apparent.

Much of the present surface appearance of Fosheim Peninsula can be explained in terms of stream dissection. The rivers start to flow in early June. At this time, due to the large volume of water available from melting snow, erosion is rapid and downcutting is most pronounced. Streams which rise in the highland areas flow longest in the spring. Often these streams, where they emerge from the highlands, flow in braided channels. Stream valleys are usually steep sided and V-shaped. Coarse sand and sub-angular boulders compose the stream debris.

Evidences of post-glacial marine submergence are found widely distributed on Fosheim Peninsula. Raised beaches were noted at elevations up to 700 feet. Marine shells were found at greater elevations.

Patterned ground is a feature of wide distribution in the peninsula. In materials ranging from clay to fine gravel large areas of repeating patterns of polygons, rectangles, and circles occur. Individual diameters range from 30 to 150 feet. A considerable depth of overburden is required for the development of patterns. In highland regions considerable areas are covered with layers of frost-shattered bedrock. In this material stone and vegetation stripes are often seen.

Lowland areas of Fosheim Peninsula are generally well vegetated. On sheltered valley sides and in broad depressions willow, mountain avens, and a wide variety of other flowering plants are to be found. Mosses and lichens also occur. Broad, barren stream interfluves do, however, exist. Elsewhere sandy plains support only scant vegetation cover.

Thin beds of Tertiary coal and frequent carbonized logs are found widely distributed in Fosheim Peninsula.

Many small ponds and a few lakes are distributed on the surface of the peninsula. Most of these occur in the eastern portion.

2. Physiographic Regions.

(a) Highlands: The highland areas of Fosheim Peninsula rise to elevations of 2,000 to 2,500 feet. The flanks of these massif areas are formed of the steeply dipping sedimentary rocks previously described. Many dikes and sills are apparent on the surface. These usually project as linear, tabular exposures.

The surface of the massif areas is generally barren. Saxifrage oppositifolia, mosses and lichens are the most common vegetation species. Large quantities of frost shattered rock debris commonly occurs in highland areas.

Streamswithin the massif areas are steep sided and V-shaped in profile. Gradiants, too, are steep. Talus cones occur at the base of steep slopes capped by bedrock outcrops. The coasts of the peninsula, where highlands drop directly to the sea are high and inhospitable.

(b) Lowlands: Several subdivisions are apparent in the lowland areas of the Fosheim Peninsula. These are discussed below.

(i) Eureka Syncline

A broad syncline of Mesozoic sandstone and shale occurs between Northwest Ridge and Black Top Ridge and extends to the south side of Slidre Fiord. Although the geologic strata form a syncline the general topographic appearance of the area is that of a plain at an elevation of 350 to 400 feet. Bedrock is extremely close to the surface in most places. Only a very thin veneer of residual rock material covers the ground. Long, second cycle streams with sources in the high lands cross the syncline. Short, steep tributary gullies are cutting back into the interfluvial ridges.

Vegetation in the interior is quite considerable. On the hillsides thick mats of willow, mountain avens, and mosses grow. On the valley bottoms and in broad depressional areas moss, willow and flowering plants grow in quantity.

This area is a generally rolling plain crossed by numerous valleys.

(ii) Eastern Sedimentary Plain

A generally high plain whose surface is composed of alternating broad interfluvial ridges, occasional low escarpments, and long strike-controlled streams. These streams drain north and south toward the Slidre River depression. A veneer of well-rounded gravel of glaciofluvial origin covers portions of the area. This gravel mixed with coarse sand occurs on the tops of hills and as isolated kame-like hills on valley sides and on plain surfaces. Material of this type is generally bare of vegetation and resembles a cobbled road surface. Vegetation over the entire area is generally sparse. The tops of the sand and clay hills are usually bare. The vegetation cover increases down the hillsides.

(iii) Glacial Outwash Plain

A flat topped plain of well rounded gravel and sand occurs in southwestern Fosheim Peninsula at a general elevation of 800 feet. This sparsely vegetated plain abuts on the valleys opening westward from the Sawtooth Mountains. Many low hillocks of classical kame form rise from the gravel plain. The plain declines in elevation toward the north and gradually merges, at an elevation of approximately 400 feet with the area covered by marine submergence.

SHORT KEY

A. LINEAR FEATURES:

1. SINGLE LINEAR FEATURES, OR MULTIPLE PARALLEL LINEAR FEATURES ASSOCIATED WITH BEDROCK OUTCROPS. PRONOUNCED ANGULARITY IS FREQUENTLY PRESENT. THE FEATURES MAY BE STRAIGHT OR CURVED AND ARE OFTEN LIGHT IN TONE.

   1) Sedimentary Rock Outcrops.

   2) Mantled Sedimentary Outcrops.

   3) Dikes and Sills.

2. SINUOUS, BRANCHING, OR RADIAL LINEAR FEATURES ASSOCIATED WITH WATER COURSES OR OPEN WATER BODIES.

   4) Raised Beaches.

   5) Drainage Channels.

   6) Braided Streams.

B. AREA FEATURES:

1. LEVEL, ROLLING, OR HUMMOCKY TERRAIN CHARACTERIZED BY A LIGHT TONE VALUE INDICATIVE OF SPARSE VEGETATION. SLOPES ARE USUALLY MODERATE.

   7) Unconsolidated Gravel.

   8) Sparsely Vegetated Flat or Gently Rolling Terrain.

2. LEVEL TO ROLLING TERRAIN CHARACTERIZED BY A PREVAILING DARK TONE VALUE INDICATIVE OF A COMPARATIVELY COMPLETE VEGETATION COVER. SLOPES MAY BE STEEP ON VALLEY SIDES.

   9) Well Vegetated Flat to Moderately Rolling Terrain.

   10) Heather Pillows.

3. MODERATE TO STEEPLY SLOPING TERRAIN IN AREAS OF HIGH RELIEF. ANGULAR OR JAGGED BEDROCK OUTCROPS MAY BE NOTED.

   11) Intrusive Rock Outcrops.

   12) Fragmented Rock Slopes.

C. PATTERNED FEATURES:

1. LEVEL TO MODERATELY SLOPING TERRAIN IN WHICH A REGULAR, REPEATING PATTERN OF POLYGONS, RECTANGLES, OR STRIPES IS APPARENT.

   13) Patterned Ground Associated with Well Vegetated Terrain.

   14) Patterned Ground Associated with Sparsely Vegetated Terrain.

   15) Vegetation or Stone Stripes.

D. DISCRETE GEOMORPHOLOGIC FEATURES:

1. ISOLATED OR UNIQUE TOPOGRAPHIC FORMS IN WHICH MARKED HOMOGENEITY IN PHOTO APPEARANCE IS APPARENT. THESE FEATURES ARE USUALLY SMALL IN AREA.

16) Solifluction Lobes.

17) Deltas.

18) Thermokarst Depressions.

19) Alluvial Fans.

20) Talus Slopes.

21) Lakes and Ponds.

E. MISCELLANEOUS FEATURES:

22) (i) Shadows.
(ii) Lake Plains.
(iii) Erosional Rock Remnants.
(iv) River Flats.
(v) Present Beaches.

1. SEDIMENTARY ROCK OUTCROPS:

(a) Photo Appearance.

Sedimentary outcrops occur, in Fosheim Peninsula, in association with a great variety of terrain types. They may be found on level, lowland plains; in steeply sloping upland regions; or in areas of high relative relief. Where they occur these sedimentary outcrops may form steep, rocky cliffs; escarpments having abrupt scarp slopes; or series of step-like terraces rising up valley or ridge sides. Sedimentary outcrops may be flat-lying, gently dipping, or steeply inclined.

The most important photo-recognition feature associated with bedrock outcrops is the pronounced linearity which is almost invariably apparent. The linears may occur singly marking the edge of one sedimentary stratum or they may occur in a closely repeating pattern of parallel bands or streaks where a number of strata outcrop at the surface. The linear appearance is due to one or more of the following factors:

(i) Broad linear bands of alternating light and darker tones may be due to alternating outcrops of sandstone (tone 1-3) and shale or bituminous shale (tone 4-5).

(ii) Broad linear bands of alternating light and darker tones may be due to alternating ridges of resistant rock strata (tone 1-3) and depressions formed in less resistant strata (tone 4-8). In the latter case poor drainage conditions in the depressions contribute to the darker tone.

(iii) Single, fine, but clearly defined lines may be caused by the break in slope at the top of a rock escarpment formed in gently dipping sedimentary strata. Frequently a pronounced angularity or ruggedness will be associated with a linear of this type.

A second important diagnostic feature of bedrock outcrops is angularity. Angularity is the rugged, jagged, or craggy appearance associated with bedrock on aerial photographs. Angularity may range from minor serrations marking the edge of a single rock stratum to coarsely chiseled, rugged areas marking cliffs and escarpments. The direction in which escarpments and cliffs face usually gives a good indication of the direction of dip of the sedimentary strata. Where strata outcrop in gully and valley sides it is frequently possible to determine roughly the degree of dip. Shadows may accentuate angularity.

Sedimentary bedrock outcrops are generally associated with a predominantly light tone. Since bare or residual rock surfaces have a high light reflective capacity the tone value of such areas usually ranges from 1 to 3. Clay strata are lightest in tone (tone 1) followed by sandstone (tone 1-2), shale (tone 2-3, and bituminous shale (tone 3-4). Darker beds of Tertiary coal may occasionally be seen on the aerial photographs. These usually have a tone value of 4 to 7 and are associated with much lighter toned sandstone and shale beds.

Within bedrock outcrop areas darker toned areas are often apparent. These are most frequently caused by poor drainage conditions. Often dark toned drainage swales mark the location of less resistant beds. In such cases the swales extend along the strike of the rock strata. Similarly, dark toned (tone 4-7) streaks may

sometimes be noted on scree slopes at the base of cliffs and escarpments. Finally, dark toned gullies frequently cross bedrock outcrop areas. These appear as darker cross-hatching lines which may give the area a peculiar, building block appearance. The dark tone is due to moist surface conditions and to a thicker growth of vegetation.

Rock outcrop areas have bery variable textural appearance. The texture of the photo image may usually be related to the surface conditions in the area. A smooth, even texture is usually indicative of a bare rock surface. A very slightly stippled texture is of more common occurrence and marks the shattered residual rock material which often lies on top of the rock strata. This residual material is formed in the course of normal weathering by frost action. A mottled texture of irregular light and dark patches will often be caused by minor variations in surface relief of the outcrop. The darker patches are poorly drained depressions while the lighter toned areas are well drained mounds or hillocks. Further discussion of texture differences is reserved until specific examples are discussed.

(b) Ground Appearance.

Sedimentary rock outcrops may be found having any degree of slope from level to steeply dipping. Moderate to steeply dipping strata are most common. Usually only the exposed edge of a rock layer is apparent. These edges may form low cliffs only a foot or two in height where the eroded edge of only one stratum outcrops. Where the eroded edges of several rock layers outcrop in a valley side cliffs or escarpments over 100 feet in height may occur.

Usually bedrock outcrops are mantled by a layer of weathered residual material of variable depth. This material may be composed of sand, clay, gravel or large angular rock fragments. Often well rounded sandstone boulders up to 3 feet in diameter are scattered about on the surface.

Vegetation is usually very scattered. Seldom is more than 10% to 15% of the ground surface covered by plant growth. Usually only 5% of the land surface is vegetated. Scattered willow mats, occasional small areas of mountain avens, clumps of purple saxifrage, and a small amount of bunch grass are found in association.

Drainage conditions in sedimentary outcrop areas are generally good. Occasionally dark toned areas along the strikeline of less resistant strata may be observed. The dark tone (tone 4-8) is due to a greater amount of surface moisture and to a more complete plant cover.

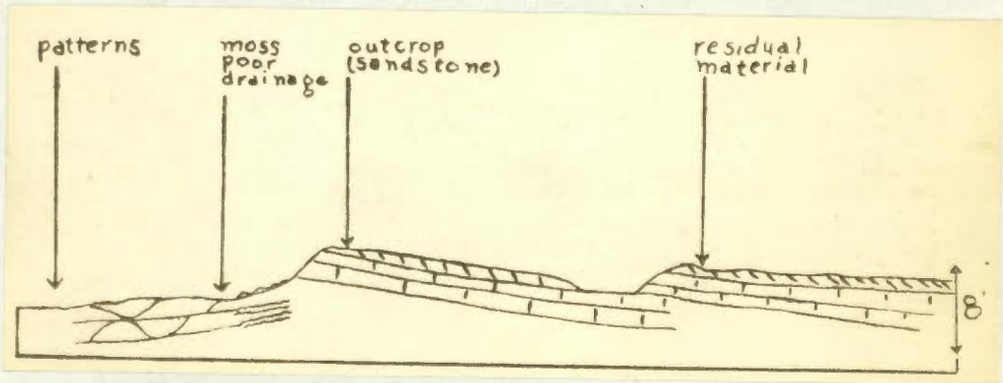
Occasionally the mantled surface of rock outcrops may exhibit traces of patterning. For a discussion of this feature see Section 13.

(c) Examples.

1. A12725-181, 182

Steeply east-dipping sedimentary strata which may be traced across the full width of several adjacent photographs. These beds outcrop at the surface in clearly defined, craggy outcrop ridges up to 20 feet in height. The slope of the ground surface is from 15 to 20 degrees. Frost shattered rock débris and coarse sand lie on the slopes below each succeeding outcrop edge. Very little vegetation can be found. A sparse growth of moss survives in poorly drained areas at the base of more prominent outcrops. Elsewhere a little saxifrage and bunch grass covers 2% of the surface area.

2. A12725-113, 112.



Two outcropping beds of extremely crumbly and fossiliferous sandstone. The beds outcrop in the form of low escarpments 2-3 feet high. The gentle dip slopes of the outcrops are mantled by a layer of residual sand. Scattered, rounded sandstone boulders litter the surface. Vegetation covers approximately 25% of the surface and consists of willow mats up to 3 feet in diameter, occasional mountain aven clumps, and a little purple saxifrage. A small dark-toned drainage runnel extends along the base of the most eastern outcrop. A dark-toned band at the base of the western outcrop is caused by a slightly more luxuriant growth of moss. Here the ground remains moist for a longer period in the spring since the location is comparatively sheltered and snow remains longer on the ground.

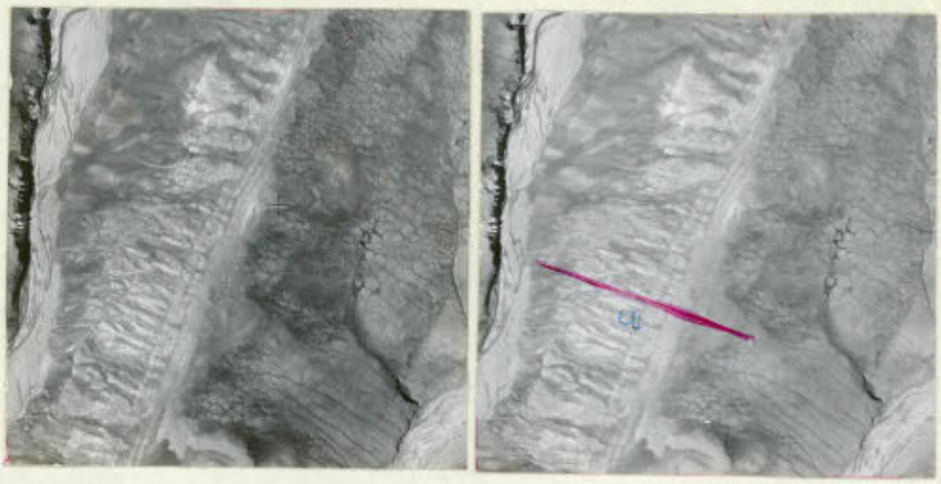
Outcrop areas such as this may be distinguished from strand lines in the following way:

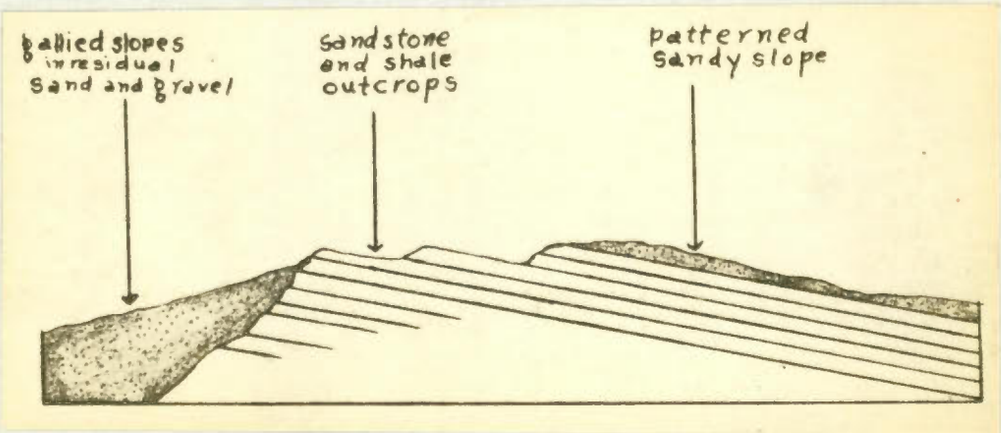
(i) Outcrops usually have steep profiles while strand line profiles are more gentle.

(ii) Outcrops may cut across contours and invariably bend either upstream or downstream where they cross valleys. Strand lines follow contours and are broken where they cross young or recent valleys.

(iii) Outcrops are frequently straighter or more smoothly curved than strand lines.

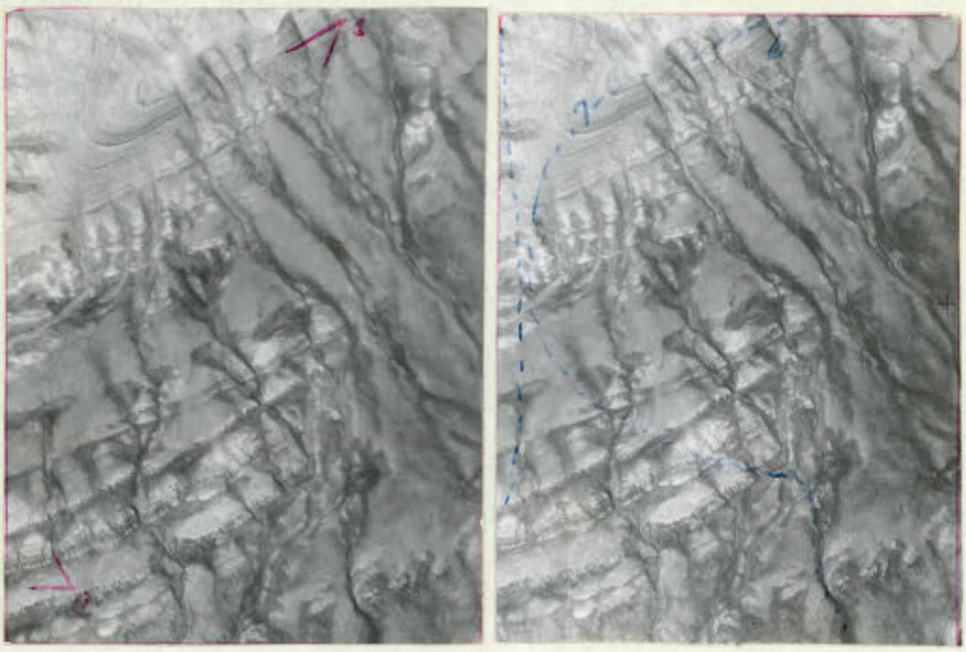
3. A12725-182, 183.





Outcrops of shale and sandstone at the top of the slope forming a valley side. The pronounced light-toned lineation is clearly apparent and angularity and ruggedness are present. The linears are not continuous, however, but are broken by shallow gullies draining to the stream in the left portion of the stereogram. Residual sand and rock fragments partially mask the outcrops. Each outcrop edge is only 1-2 feet in width. Vegetation in the immediate outcrop area is very sparse. In the gullies on the slope to the left and in the patterned area on the dip slope of the strata moss, willow, and grass are most common. Drainage is usually good.

4. A12725-210, 209.



The concentric, light-toned linear features visible in the top left portion of the stereogram are exposed, badly weathered and gullied shale beds. The edges of the outcrops are so completely decomposed that little trace of angularity can be seen. Within the general area of light tone slightly darker lines are apparent. These mark outcrops of thin-bedded lignite or bituminous shale. The land surface slopes downward at an angle of 15 to 20 degrees. Approximately 85% of the surface is bare, sun-dried clay and shale. The remaining area supports a vegetation consisting of bunch grass and mountain aven. Drainage conditions are good.

Lower on the slope included in the stereogram a pronounced swale-and-bench topography is found. Resistant coal beds form the benches while the easily eroded shale beds form the swales. These are less well drained than the benches. They appear darker in tone due to a greater vegetation cover of grass tussocks and small hummocks composed of moss and lichen. The coal beds are thin and are interbedded with shale which has a predominantly white tone. The benches vary in height from 10 to 20 feet. The swales may be up to 60 feet in width.

Erosion gullies drain down-slope. These are well-vegetated. The general vegetation cover noticeably increases toward the base of the slope. Viewed from the crest of the hill the area is a long, rolling slope dropping in a series of undulating steps to sea-level.

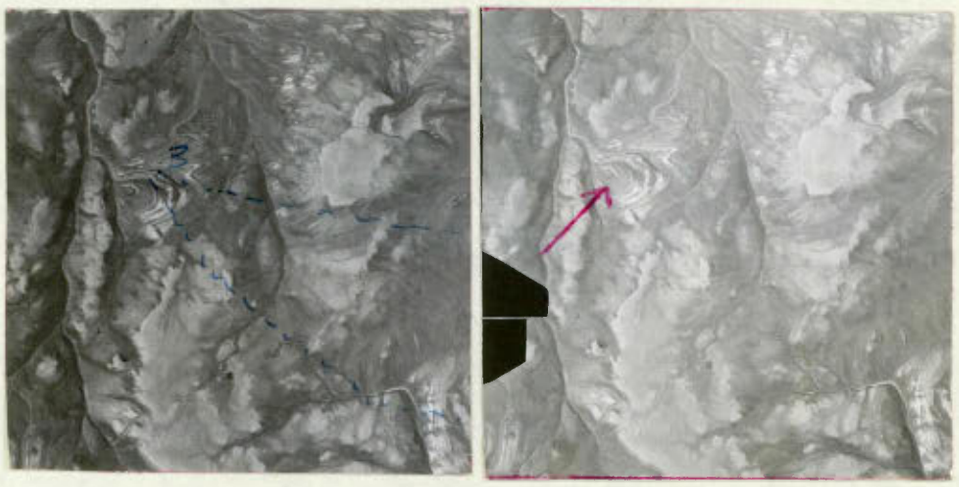
Photo 1. View near top of slope in stereogram. Note dark bands marking outcrops of Tertiary lignite or bituminous shale. More grass than is usual in such areas is seen in the left foreground.

T7-5

Photo 2. View along front edge of bench in area discussed above. Note how grass grows along bedding plains and erosion runnels. The black, coal-like material has weathered to a black silty-sand.

V4-6

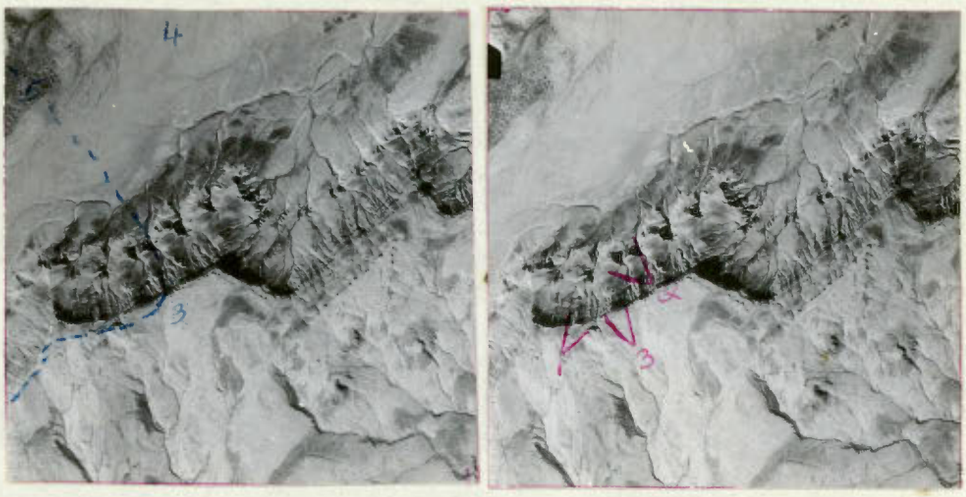
5. T490C-9, 10.



A peculiar contorted pattern caused by alternating outcrops of beds of clay and lignite or carbonaceous shale. These beds are exposed on the surface of a low dome-like hill. The darker, pebbly-textured bands are composed of residual lignite material while the lighter toned bands are bare clay. The beds are almost flat-lying and have been exposed in such an unusual pattern by normal processes of erosion which have formed the low hill on which the beds are apparent. No outcrops of competent rock are to be seen in the area. Vegetation consists of scattered willow mats, clumps of bunch grass, and moss. Drainage conditions are good although the clay areas may be sticky and difficult to walk upon during the spring melt period.

The arcuate linear pattern which appears in the extreme lower right corner of the stereogram marks an area of outcropping clay beds. The extremely white tone (tone 1) and the tenuous nature of the lineation indicate that this is a clay area.

6. T4920-72, 73.



Easterly dipping sandstone strata outcrop in the stereogram above to form a prominent escarpment. The capping layer of rock is a massive grey-brown, coarse sandstone which forms a cliff 15 to 20 feet in height. Below this cliff residual sand and clay slopes drop steeply to the level of the stream system draining the scarp face of the escarpment. These slopes are formed of material weathered from the sandstone and shale strata underlying the cliff-forming member. The slopes have been deeply gullied by running water flowing down the face of the escarpment. Vegetation is almost entirely lacking on the scarp slope. It consists of isolated patches of moss growing in the gullies and occasional bunch grass tussocks.

The dip slope of the escarpment is formed either of bare, wind-swept sandstone or of loose sand. Frequently the sandstone has been shattered by frost action. Large, flat, angular fragments litter the ground surface. Round, flat-topped rock remnants occur on the top of the escarpment (see Photo 3). These are visible on the aerial photographs as small, round, slightly darker (tone 3), and shadowed eminences. Such features are erosional remnants and may perhaps be peculiar to arid, arctic conditions.

The edge of the escarpment is clearly demarcated by the abrupt change in slope and by the angular, jagged appearance at the edge.

35-9

Photo 1. View north from summit of sandstone escarpment shown in stereogram above. Note massive sandstone bed forming the capping stratum of the escarpment.

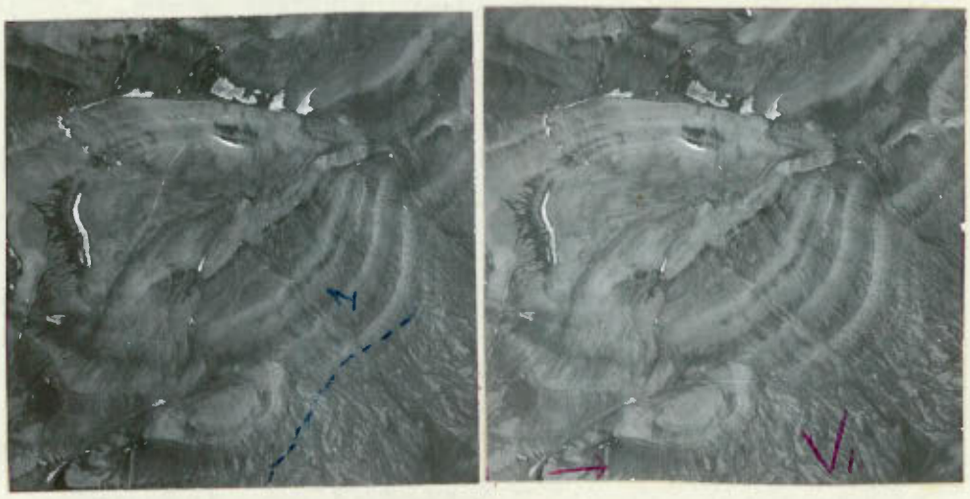
35-8

Photo 2. View of weathered sandstone at summit of escarpment shown in stereogram above. Note quantities of residual sand. The rounded edges of the sandstone beds suggest sand or snow blasting.

Photo 3. Sandstone strata standing as a remnant knob on top of escarpment shown in stereogram above. These features are apparent on aerial photographs.

35-11

7. T403C 189, 188



Badly weathered, flat-lying strata which descend in a series of regular steps to the sloping valley side. Weathered rock fragments fall away from the outcropping beds as scree slopes formed of coarsely angular material. This area has an unusually dark tone (tone 3-4). This may be due to the considerable amount of igneous rock in the vicinity. The sedimentary beds have in some cases been intruded by sills of basalt, a dark coloured rock having a tone 4 or 5 photo appearance. A small dike (indicated by arrow) may be noted in the lower left corner of the stereogram.

The banded appearance on the aerial photograph is due to alternating occurrence on the slope of the light toned scree areas (tone 3) and the dark toned (tone 5), poorly drained, and mossy swales on the dip slope of each outcrop. The outcrops are easily recognized by the jagged, rocky appearance.

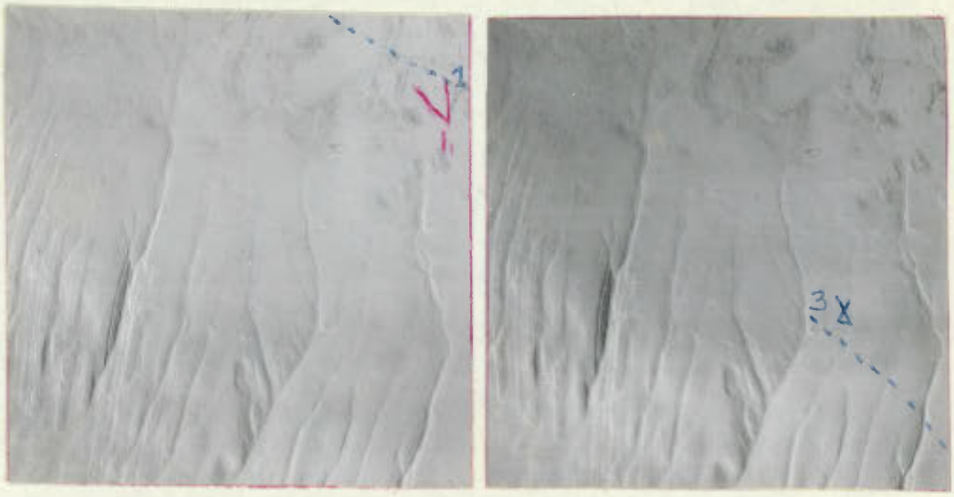
The scree slopes are crossed by shallow, mossy drainage swales. These are only a few feet in width. They appear as dark brush-like markings oriented down-slope.

Where rock outcrops occur along valley sides steep, vertical cliffs may be seen. These may be from 20 to 100 feet in height. Scree slopes are usually apparent at the base of the cliffs. An example of cliffs of this type may be seen in the lower left corner of the stereogram.

T3-8

Photo No. 1. View east toward area shown in stereogram above. Note step-like appearance of slope leading to top of ridge. Dark swales draining across slopes formed of residual rock fragments are also apparent.

8. A12725-251, 252.



A sandstone outcrop area. The beds dip steeply to the east and weathered residual sand partially mantles the competent strata. For this reason the outcrop pattern is very faint and appears only as an indistinct parallel orientation of fine white scratches on the aerial photograph. On the ground these scratches appear as low bedrock outcrops which project a few inches above the loose, wind-blown sand which covers the area. The general slope of the hillside is from 6 to 10 degrees. Long, unusually straight gullies drain the slope. These gullies rapidly erode the sand material during the spring melt period. Slumping of sand along the gully sides, however, maintains a broad, shallow gully cross-section. The gullies are seldom more than 15 feet deep or more than 40 to 50 feet in width. Vegetation is practically non-existent.

Wind erosion is important in sandy areas such as this. Sand blasting during the summer and snow blasting during the winter form smoothly rounded and etched rock outcrops. Much loose wind-blown sand forms banks and small dunes on the surface. The whole area has a typical desert appearance. The very light toned (tone 1-2) uniform appearance is characteristic of the photo appearance of sandy areas.

V5-4

Photo No.1. Sand and gravel at the top of the slope shown in the stereogram above. Such areas have a very white tone on aerial photos. No competent sandstone outcrops are visible in this photograph.

V5-5

Photo No.2. Abrasive effect of sand and blowing snow on sandstone outcrop. Note the quantities of wind-blown sand partially covering the outcrop.

(d) Discussion.

The greatest hindrance to travel in areas of sedimentary rock outcrop is steepness of slope. Steeply dipping rock strata having slopes up to 25 degrees are passable with difficulty for foot travellers but are major obstacles to mechanical transport. In some instances progress may be made by traversing slopes along the contours. Where deep, steep-sided gullies cross the contours, however, this method of travel may also be impossible. The degree of trafficability for mechanical equipment may usually be accurately determined by stereoscopic examination of the aerial photographs.

Drainage conditions in bedrock outcrop areas are usually excellent. Steep slopes and permeable rock debris prevent the formation of extensive boggy areas. Occasional local areas of poor drainage may be found along the strike of less resistant strata which have eroded to form swales. During the spring melt period when travel, even by foot, is virtually impossible on the lowland plains good conditions are to be found in outcrop areas at higher elevations. One important exception should be noted. Areas of residual clay formed by the weathering of shale strata are usually very sticky for a period of three weeks in early June. Such areas have a very white tone in photo appearance (only snow banks are whiter).

T492L-72: Steeply dipping sandstone and shale strata fall in a very prominent concave slope to the level of the lowland plain in the foreground of the photograph.

T405L-124: "Flatirons" of sedimentary strata lying on the flanks of an intrusive dome. The triangular facets are formed of sandstone and are located at the end of spurs in the intrusive material. The characteristic linear pattern of sedimentary rock strata is still apparent.

T490L-8: Steeply dipping sandstone and shale beds appear as prominent linear features in the foreground of this photograph.

A12725-156: Easterly dipping beds of badly shattered and disintegrated white sandstone. The beds can be traced across the entire width of the photograph. The rather coarse texture which is apparent in the central portion of the photograph is due to a widespread distribution of large angular boulders on the surface. These boulders may be up to 10 feet in maximum dimention and have an average distance apart of 8 to 10 feet. The land surface slopes upward to the left at an angle of 10 to 15 degrees.

Vegetation covers 1% to 5% of the land surface. Grasses, aretic poppy, and willow are the most common species.

Although weathering and frost-shattering have resulted in the formation of a thick mantle of angular rock fragments this material does not completely mask the angularity of the rock structure.


T 492L-72

T405L-124


T4904-8

A12725-156

A12725-156

2. MANTLED SEDIMENTARY OUTCROPS:

(a) Photo Appearance.

At many locations in Fosheim Peninsula sedimentary strata do not outcrop as clearly defined linear features. Although lineation is apparent it is frequently not continuous over long distances on the photographs. Rather the lineation has a broken or dashed appearance and may be hazy, cloudy, or indistinct.

A photo appearance such as that described above is most often found in areas of poorly-consolidated or unconsolidated material. Shales and certain sandstones, for example, are very easily eroded. The residual material formed by their weathering covers the surface and effectively obscures any trace of the underlying strata. Under such conditions the linear appearance is due to differences in the colour and texture of the weathered surface material rather than to outcrops of actual rock layers.

Clay beds, too, are easily eroded. Lineation is often discontinuous. Areas of clay may be crossed by dark toned gullies having a dendritic pattern at right angles to the strike of the beds. Clay areas may be reliably interpreted by the very white photo appearance which they exhibit. Tone 1 is common. Only snow has a whiter photo appearance.

Other photo characteristics discussed in Section 1 may be reliably used to interpret mantled sedimentary outcrops.

(b) Ground Appearance.

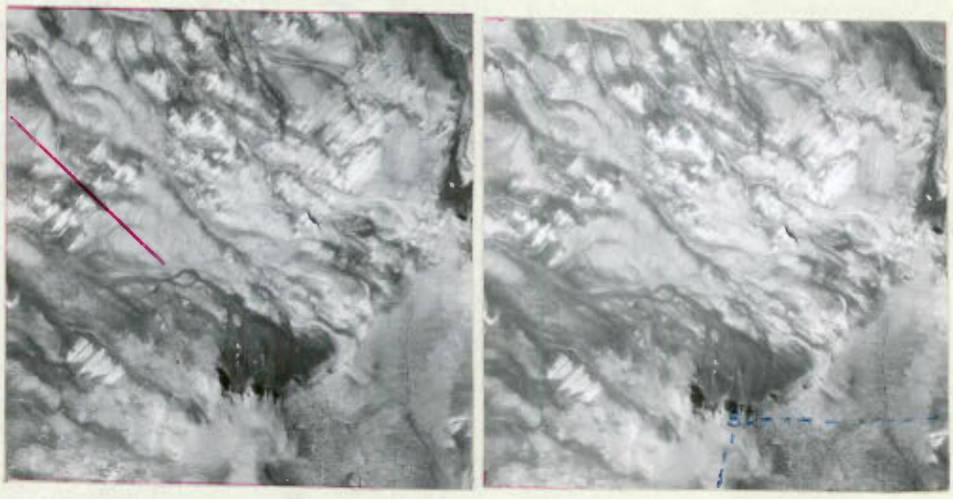
Sedimentary deposits of the type discussed in this section usually occur on level to moderately steep slopes. The surface material may consist of clay, sand, or fine gravel. Bedding lines are usually not readily apparent on the ground. Colour differences in the surface material may give a slightly banded appearance.

Vegetation in such areas is usually sparse. Up to 25% of the land surface may support a willow-moss-grass association. Other flowering plants occur to a limited extent. Elsewhere the surface covering is bare, sun-cracked clay or sand.

Drainage conditions are generally good. During the spring melt period there may be a time when foot travel is difficult on level residual clay sites.

(c) Examples;

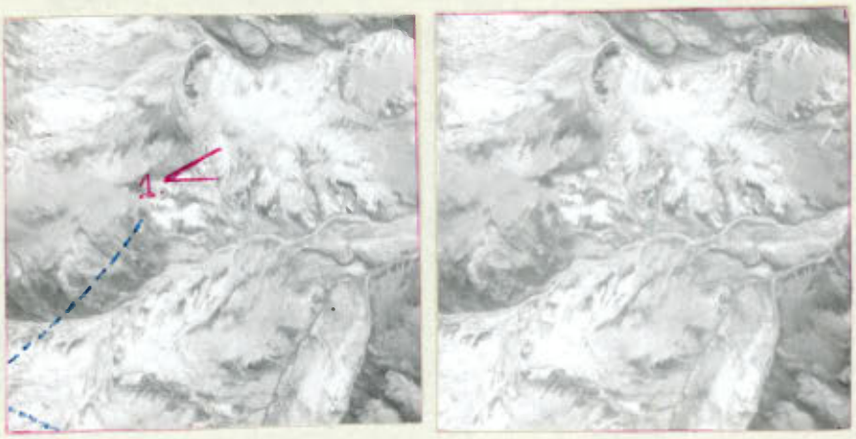
1. A12725-185, 186.



The very light toned broken lineation in the stereogram above marks the exposure of white to light grey clay beds in an area of gently rolling topography. The slightly darker toned grey areas (tone 2) intermixed with the light-toned clay beds (tone 1) mark deposits of unconsolidated and well-rounded gravel which overlie the clay beds. The clay beds have been exposed by the normal erosion of the gullies which cross the area. Excellent examples of down-slope stripes may be noted on the gravel deposits (see Section 15). No pronounced angularity is apparent.

The land surface slopes downward to the left at an angle of 5 to 10 degrees. During the summer period the area has a white, dried, and sun-baked appearance. Vegetation of the grass-mountain avens association covers perhaps 10% to 15% of the surface. Occasional well-rounded sandstone boulders occur on the surface.

2. A12725-126, 127



Grey clay beds in the above stereogram have been eroded to form low, rounded hills whose summits are almost bare of vegetation. Where the clay beds are exposed the photo tone is almost pure white. Only a very indistinct lineation (trending from top-right to bottom-left in the stereogram) is apparent since the bedding planes have been obscured by sheet washing. Short, light-toned streaks which frequently occur near the edge of gullies mark the trend of the clay beds.

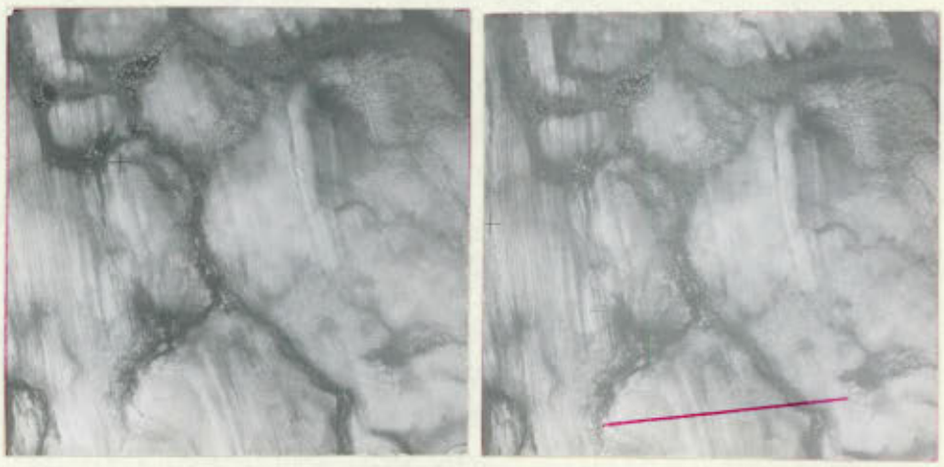
The drainage depressions between the rounded clay hills support a 25% cover of mosses and grasses. This cover together with the fact that the depressions are naturally damp in summer causes a slightly darker photo tone.

The area has a subdued "badlands" topography. During the summer the surface has a dry, sun-cracked appearance. Occasional sandstone boulders are scattered about on the surface.

V3-8

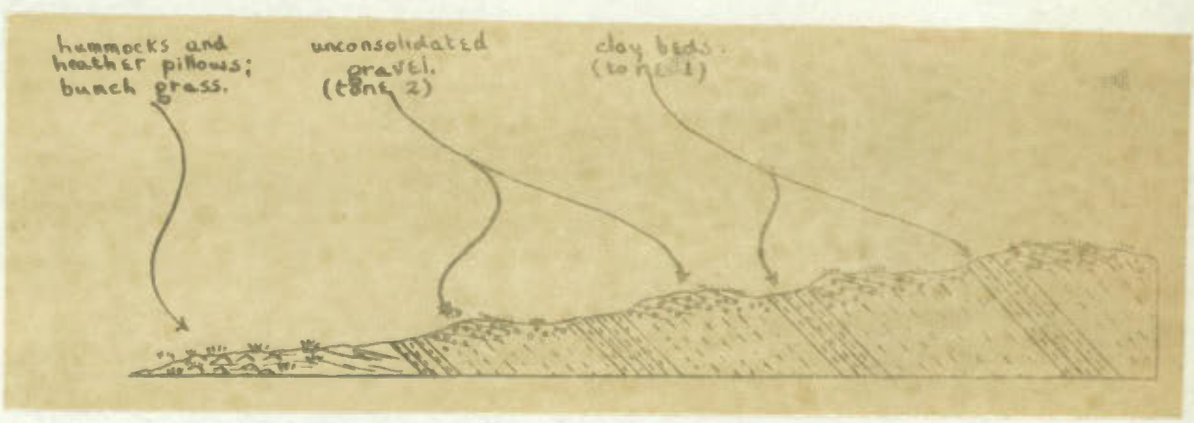
Photo No. 1. A low, rounded clay hill typical of the type which occurs in the area covered by the stereogram above. Note the bare wind-swept hill tops, the absence of vegetation and the melting snow bank in the gully to the right. It may also be noted that the tops of the hills are dry while the sides are still damp.

3. A12725-360, 359.

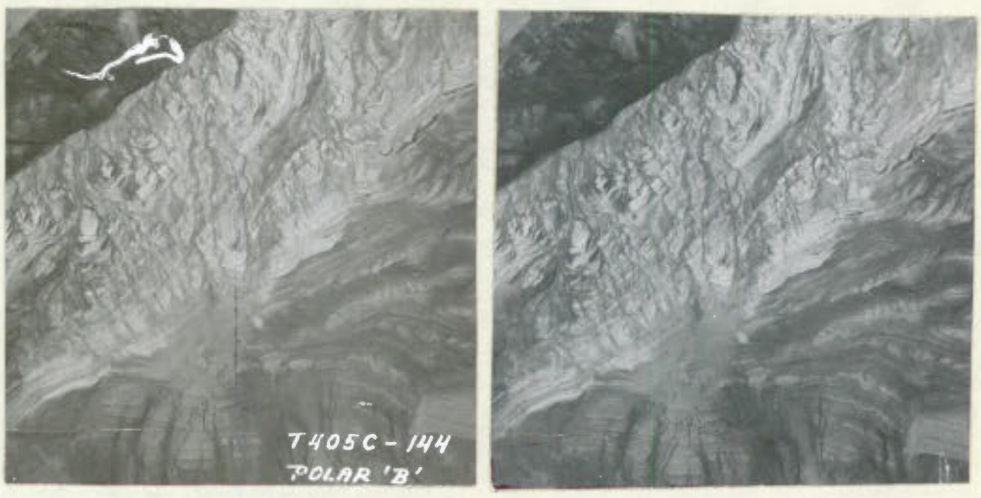


The fine, dark, parallel streaks apparent in the stereogram above mark the outcrop pattern of steeply dipping sandstone and shale strata. The weathering processes have formed a residual mantle of sand and clay which completely covers all rock outcrops. The lineation which is apparent is due to differences in the colour and texture of this residual material. Such areas frequently have a very light tone (tone 1-3) and may have a slightly mottled texture. The light tone is principally due to the absence of vegetation. Only a very sparse growth of bunch grass, arctic poppy, and saxifrage manages to exist.

The area has a gently rolling surface and has been partially dissected by intermittent melt water streams. These streams flow for a few weeks in the spring in the dark-toned swales visible in the stereogram. The swales are poorly drained and their bottoms are frequently covered with small, grassy tussocks and a thick growth of moss, heather, and willow. Thin beds of peat may sometimes be found below the present vegetation cover. In the depression where several of these channels join there may be small, shallow, pools of standing water. On the photos these appear as black spots. Patterned ground commonly occurs in the depressional areas and may extend for considerable distances up the sides of the depressions.



4. T405C-144, 145.



Exposures of eroded and gullied shale beds may in some cases be interpreted by the contorted, swirling, and sub-parallel lineation which is apparent. This lineation is seldom continuous over long distances and may resemble the appearance of the grain in a piece of wood. The tone is predominantly white (tone 1) but darker tones are apparent in depressions. Darker tones may also mark the location of bituminous shale or lignite beds (see Photo 1.). Angularity is seldom apparent.

In actual ground appearance the land is formed of bare clay, silt, or sand which is dried and sun-hardened. The surface drops in gentle undulations to the stream in the top left portion of the stereogram. Vegetation covers approximately 10% of the land area and is concentrated in the gullies and depressions.

T17-3

Photo No. 1. View of residual clay slopes in an area similar to the area in the stereogram above. The black-toned streak in the centre of the photo is residual shale material marking the location of an underlying shale bed.

T17-2

Photo No.2. A typical view of eroded shale beds exposed on a hillside in an area similar to the area in the stereogram above. Note the bedding planes which appear as linears on the aerial photos. Note, also, the absence of vegetation.

(d) Discussion.

Since mantled sedimentary outcrop areas often occur in areas of only moderate relief and gentle slope drainage conditions may, in some locations, be less than perfect. Especially in clay and silt areas boggy conditions may impede foot travel for several weeks during the spring melt period. Sand areas offer more permeable conditions and the period of saturation in such locations is reduced.

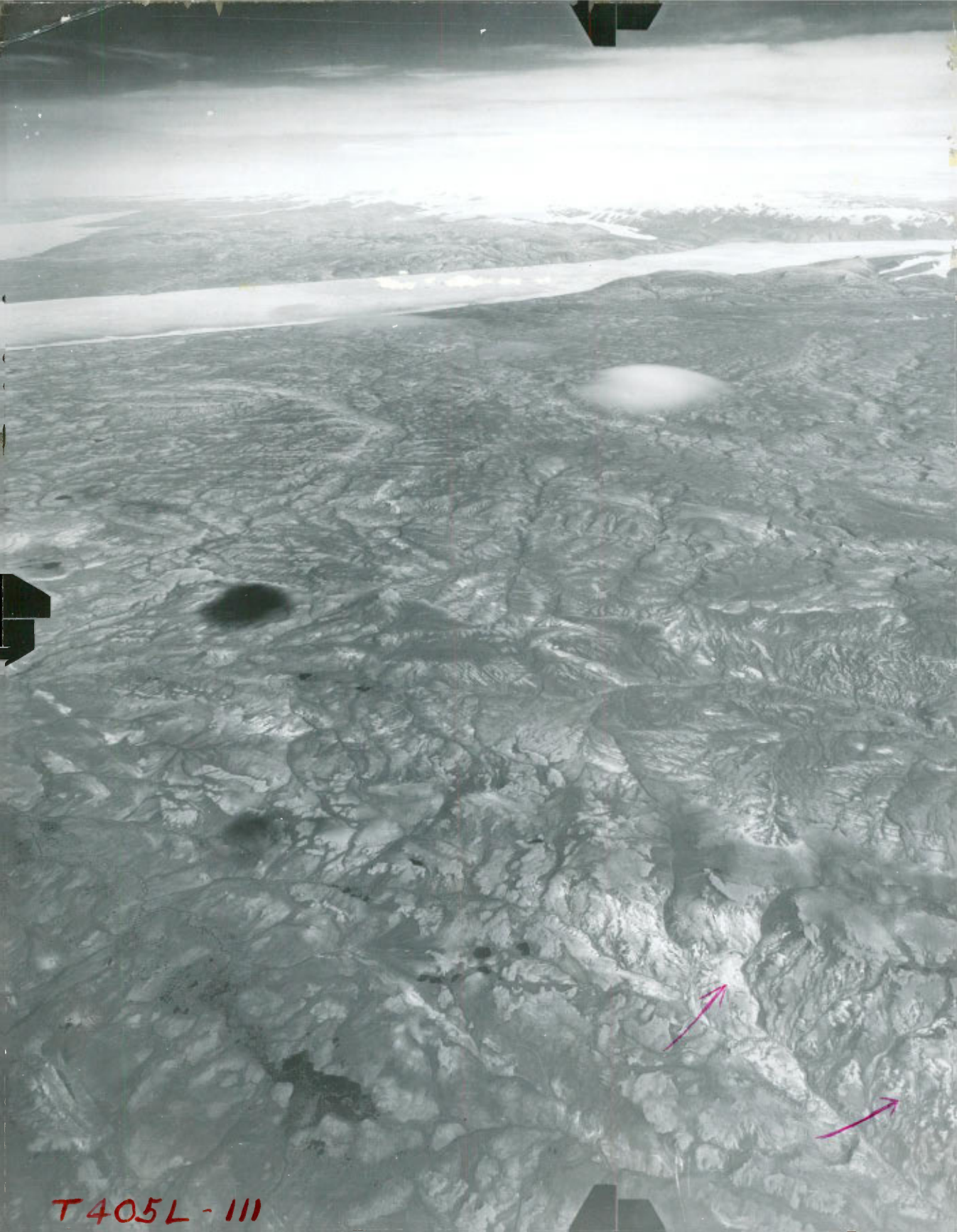
Often gullies and stream valleys have broad shallow profiles and gentle gradiants. It is therefore possible for mechanical vehicles to travel in such areas with a minimum of difficulty.

T453L-189: At the locations marked by the red arrows traces of sedimentary strata may be seen appearing through a masking overburden of unconsolidated gravel. These strata appear on the ground as minor breaks in slope which usually have a surface cover of sand, fine gravel, and occasional sandstone boulders. On the air photos such areas appear as short, broken, and shadowed lines which may sometimes be etched by remnant snow banks. No angularity is apparent.

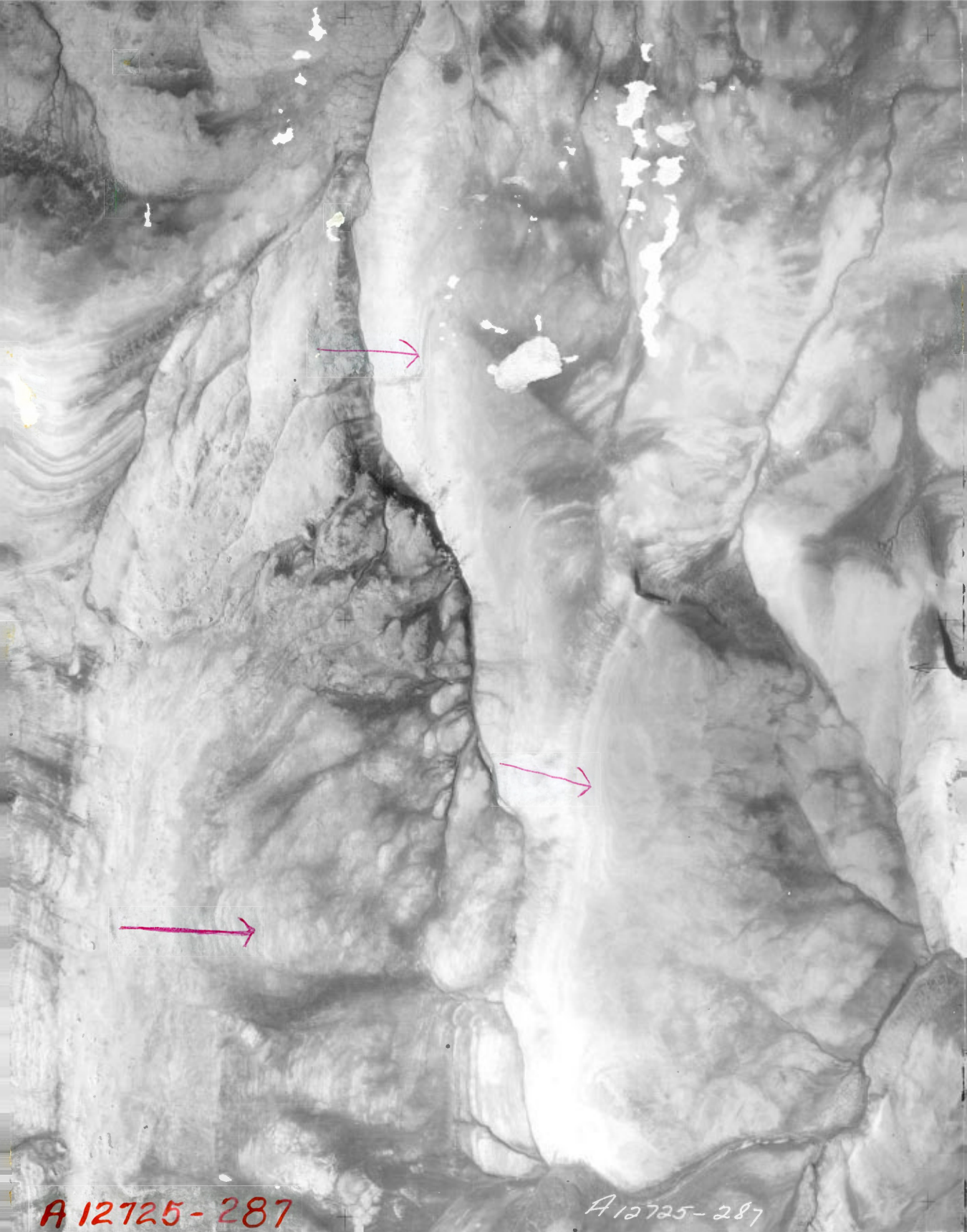
T405L-111: Eroded clay beds are indicated by the red arrows in this photo. These beds are very similar to those discussed in the examples contained in the text. Note the white tone, the intermittent nature of the lineation, and the undulating topography.

A12725-237: Gently dipping sandstone and shale strata are indicated on this photo by the "fuzzy" and indistinct lineation. The beds are mantled by surface residual sand and gravel. The dark lines (see upper red arrow) mark the location of black shale beds which alternate with lighter-toned fine sandstone. Surface of the land is bare sand and gravel. Almost no vegetation survives.


T 453 L - 189



T405L-111



A 12725-287

A 12725-287

3. DIKES AND SILLS:

(a) Photo Appearance.

In areas of high relief in Fosheim Peninsula hard, dark-coloured, and fine-grained igneous rocks have intruded the sedimentary strata to form a network of dikes and sills. Where these intrusive features outcrop at the surface of the ground they may be easily identified on the aerial photographs.

In photo appearance dikes and sills are almost invariably recognizable by their narrow, black-toned, and angular linear appearance. They may occur singly or in groups. In the latter case they are seldom parallel to each other. Rugged or jagged angularity may be observed when the dikes or sills have considerable topographic expression. At other times they may resemble nothing more than low, dark-toned beach ridges.

Dikes are most easily recognized on the aerial photographs since they extend across the outcrop pattern of the strata into which the dike has intruded. Sills, on the other hand, since they intrude between the sedimentary beds and outcrop along the strike of these beds are more difficult to identify. They may be apparent only as dark-toned, angular beds which obviously conform to the bedrock structure. Both dikes and sills may be interpreted by the presence of deep, black shadows on their shaded sides.

Dikes are most easily recognized by (i) their dark, linear, wall-like appearance, (ii) their obvious discordance with the prevailing geological structure, and (iii) their straight or gently curved courses.

(b) Ground Appearance.

On the ground, dikes and sills range in appearance from low, embankment-like ridges to steep-sided, massive, wall-like ramparts of black, hard rock. Dikes especially may be recognized by their remarkably straight courses across the land.

The embankment type of dike or sill is invariably composed of dark, angular rock fragments which have weathered from the underlying intrusive body. The embankment may be 12 to 15 feet in height, up to 20 feet in width, and may be a mile or more in length. Little vegetation of any type grows on the surface. Moss, lichen, and grass are present in small quantities. Drainage conditions are excellent. Often dikes of this type are breached by small drainage swales.

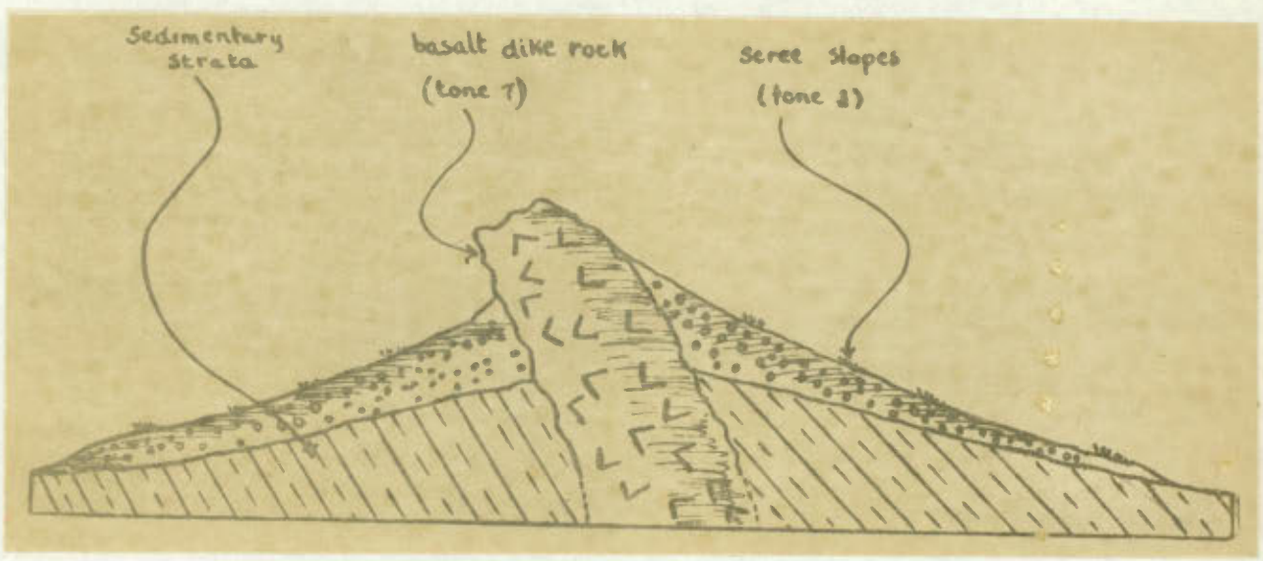
Since the intrusive rock of which dikes and sills are composed is usually much harder than the rock composing the intruded beds it is not uncommon to find dikes and sills projecting as rugged tabular masses across the terrain. These ramparts may be up to 50 feet in height. They may form steep cliffs where they outcrop on a valley side. The larger dikes usually have jagged, or knife-like tops below which scree slopes composed of black angular rock fragments fall steeply. Almost no vegetation of any type grows on such features. The dimensions of most dikes can be accurately interpreted by the inspection of stereoscopic pairs of aerial photographs.

(c) Examples.

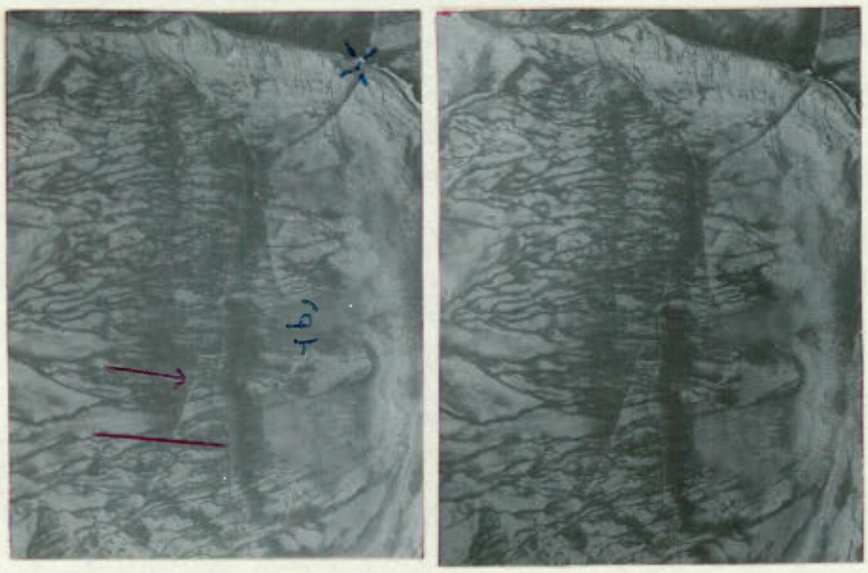
1. A12725-364, 363.

A very regular dike in the stereogram above cuts across the sedimentary strata. The dike appears on the ground as a knife-edged ridge of black basalt forming a rampart which runs for a mile or more over the countryside. In this example the dike projects from 20 to 30 feet above the surrounding land area. On both sides of the dike light-toned scree slopes fall away at a steep angle of repose. The scree material is formed of coarse, angular, black rock fragments. In general the photo tone of this dike is lighter than would normally be the case since the intrusive material is mixed with quantities of wind-blown sand.

In the stereogram above the straightness of the dike, the surface angularity, and the delimiting shadow are all apparent.



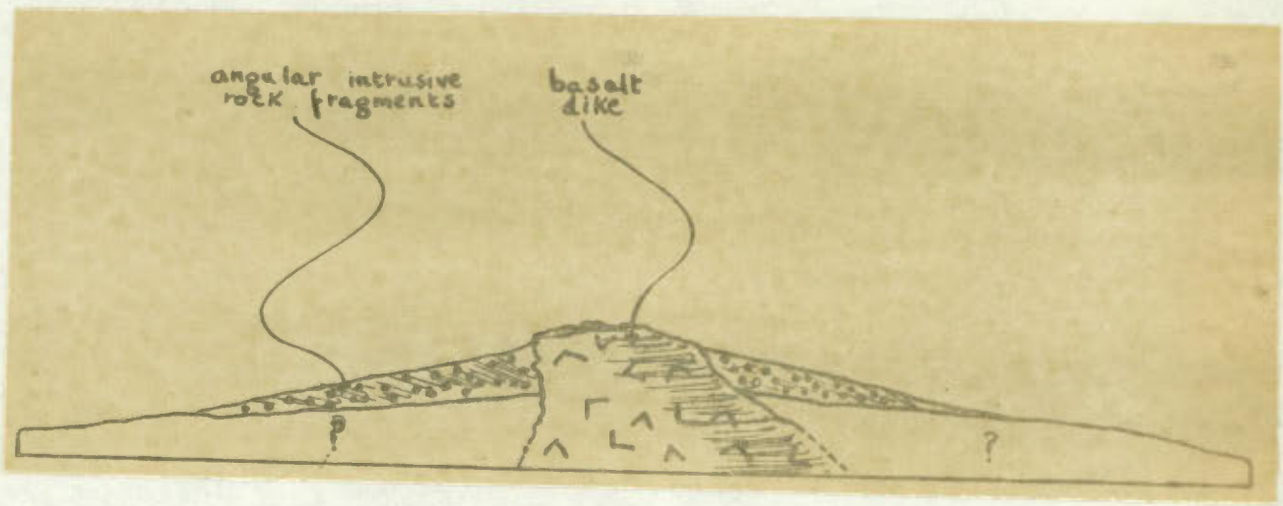
2. T403C-190, 189.



The fine, jagged lines apparent in the stereogram above mark low, narrow and flat-topped dikes composed of basalt. These dikes may be up to 15 feet in height and are characterized by angular rock fragments along the axis of the dike and by gently sloping residual slopes along the flanks.

A small amount of moss and grass grows in the bottoms of the swales which breach the dikes. Elsewhere vegetation is very sparse. Drainage conditions are excellent in the areas of residual and angular intrusive material.

The very prominent dike in the top right corner of the stereogram is of the embankment type. It resembles nothing more than a low, linear ridge curving down the valley side. It has been breached by the stream flowing across the top of the stereogram. In photo appearance this dike displays less angularity than the others.



3. A12725-370, 369.

In the stereogram above a number of extremely prominent dikes may be noted. These dikes stand out as well defined and sharp-crested ridges which have been breached by the stream flowing from right to left across the stereogram. The characteristic black tone (tone 7-8) and the contrasting much lighter tone of the areas to either side suggest that the rocks forming the ridges are of intrusive origin.

The jagged outcrop edge of a sill is visible in the top right corner of the stereogram above. Steep scree slopes fall to the stream below.

The dikes in the example above are more closely grouped and are less well defined individually than is usually the case.

T19-5

Photo No.1. View of a vertical tabular dike where it has been breached by the stream in the foreground.

T19-8

Photo No.2. Looking upstream along a steep-sided valley. Note the dike crossing the valley in the foreground, the sill in the top right corner, and the scree slopes falling to the level of the stream.

(d) Discussion.

Dikes and sills, although of frequent occurrence in Fosheim Peninsula, are usually found in areas of high relief. Like raised beaches they are sometimes useful as routes-of-march. This is especially true during the early spring melt period when upland residual sedimentary surfaces may be saturated with water. Since dikes and sills are usually found in terrain where mechanical transport would not normally be operating these features offer little impediment to vehicles.

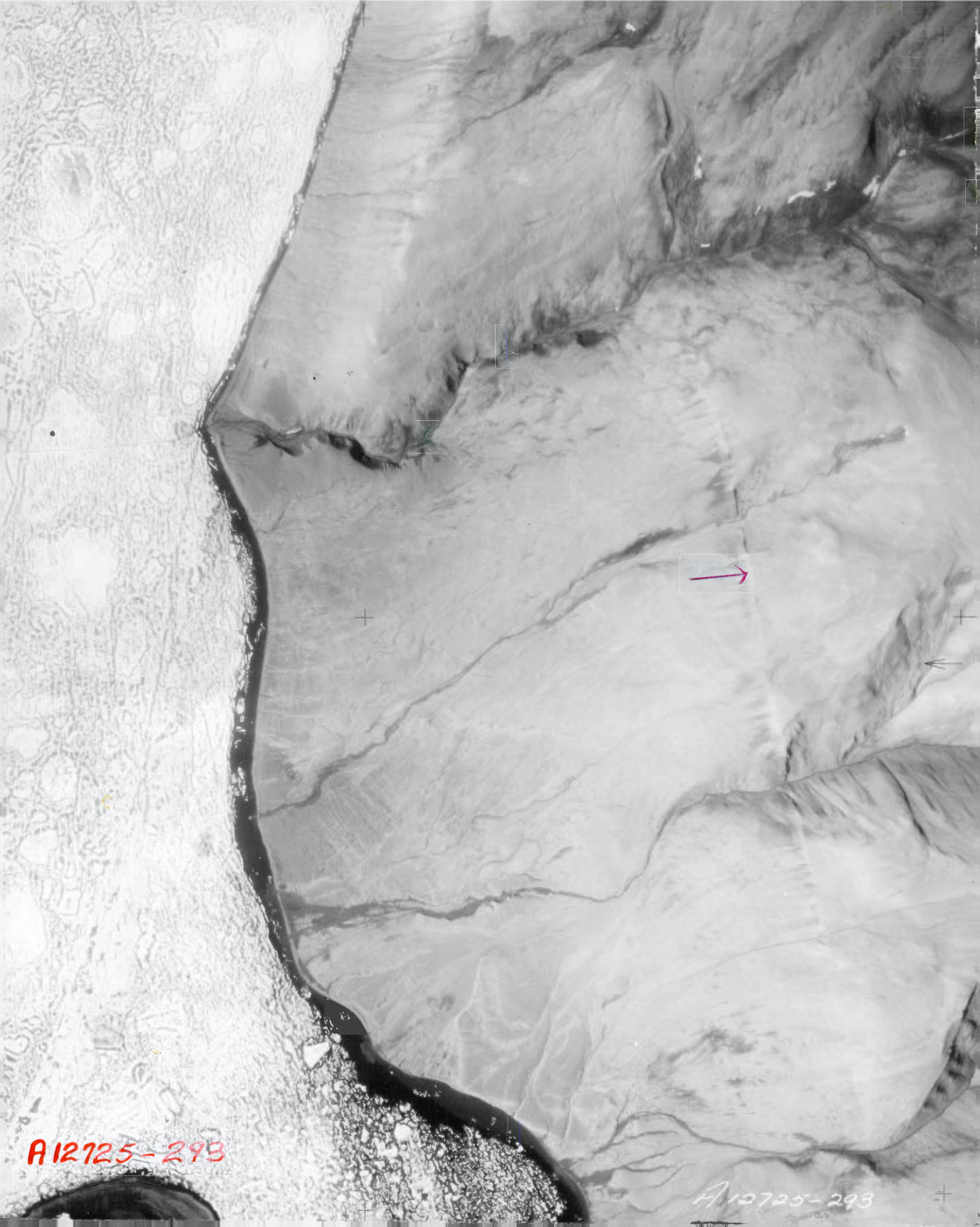
T403C-187: A prominent basalt dike extends across the top left corner of this photograph. It projects as a high (30 feet) flat-topped wall which drops steeply on its western side. Partially vegetated scree slopes in which willow stripes may be apparent drop away from the base of the dike. In several places the dike is crossed by erosional gullies.

A12725-293: A low, straight dike may be seen in this photograph extending along the long axis of the print. In portions of its length it is distinguishable only as a white-toned linear feature from which darker-toned (tone 4-5) streaks project down-slope to the left. These are shallow, well-vegetated drainage depressions which extend from the low ridge which is the dike. Elsewhere the familiar, black, and angular dike appearance may be seen. Note the remarkable straightness of this dike.

A12725-145: Short but prominent basalt dikes may be noted in the positions indicated on the accompanying photographs.

A12725-304: A very fine-lined dike extends across the full width of this photograph. On the ground it appears as a low ridge 6 to 10 feet in height formed of black, jagged basalt. Loose, angular rock fragments fringe the dike for a few feet on both sides.


T403C-187
T403C-187



A12725-293

A12725-293

A12725-145

A 12725-

A12725-304

4. RAISED BEACHES:

(a) Photo Appearance:

Raised beaches are of frequent occurrence in coastal areas of Fosheim peninsula. These features mark former sea-levels and have been preserved on the landscape following the post-glacial rise of the land. Raised beaches may occur singly but are most often found in association with other similar features. On aerial photographs they may be readily identified as fine, light-toned linear streaks which extend in sub-parallel alignment along the trend of the coast. Often individual streaks may be traced for considerable distances across the photograph. At other times the beaches are apparent only as discontinuous, scarcely visible linears.

With only cursory examination raised beaches may appear to be outcropping sedimentary strata. On careful inspection, however, certain differences are apparent. Raised beaches for example, never exhibit the angularity or jagged serration distinctive of bedrock. They appear, under stereoscopic examination, as rather smoothly rounded and subdued corrugations or low ridges. They may be further distinquished from stratified bedrock by observing the air photo pattern of their occurrence where they cross stream valleys. Where the observed lineation is caused by raised beaches the linears do not normally bend up-stream but break abruptly at the valley edge and reappear on the opposite side. Stratified bedrock lineation, on the other hand, can almost invariably be seen to bend or project either up- or down- stream where the strata cross a valley.

Raised beaches are most often found on terrain which rises in a gentle or moderate slope from the sea coast. On such terrain darker, down-slope brush markings indicative of drainage rills may be seen. Where the seaward face of the beach ridge is abrupt the beach itself may be accentuated in photo appearance by a dark shadow. Often the swales between succeeding beach ridges present a dark (tone 5-6) photo appearance due to the poor drainage conditions and to the greater vegetation cover.

(b) Ground Appearance:

Raised beaches are most frequently found in Fosheim peninsula in gently to moderately sloping backshore areas where the lodgement and consequent slow erosion of marine materials has been possible. The beaches may occur singly but are most easily observed when they occur in series. In the latter case the beach lines parallel the trend of the coast and rise up the slope in regular fashion as low terracettes. They rise in Fosheim peninsula to maximum elevations of at least 800 feet (?).

Individual raised beaches range in prominence from low, sandy or gravelly swells which are scarcely noticeable on the landscape to well-defined gravel ridges having steep sides and distinct topographic expression. In dimensions raised beaches may be up to 30 feet in width and may have maximum heights up to 10 feet.

The material of which raised beaches are composed ranges from coarse sand through well-rounded gravel to water-worked boulders. Because of the permeable nature of the beach material drainage conditions are usually excellent.

The amount of vegetaion cover on raised beach ridges varies with the type of material composing the ridges. On prominent gravel beaches there will usually be very little vegetation. The swales in front of

these prominent beaches will, however, be gently hummocked, less well-drained and will support a thick vegetation cover of mountain avens, willow, and grass. On less prominent coarse sandy beach ridges the difference in vegetation cover from terrace to swale is much less apparent. In such cases the top of the beach will often support a 40% cover of avens, moss, and grass while the remainder of the surface is composed of dried and sun-cracked sand. The nearby swale will support a 65% to 70% cover of grass tussocks, avens, and willow.

Over the entire area of the raised beaches ice-rafted boulders up to 3 feet in diameter may be encountered. These are frequently encrusted with moss and lichen and may be embedded in thick sphagnum growths.

(c) Examples:

1. T4030-193, 194

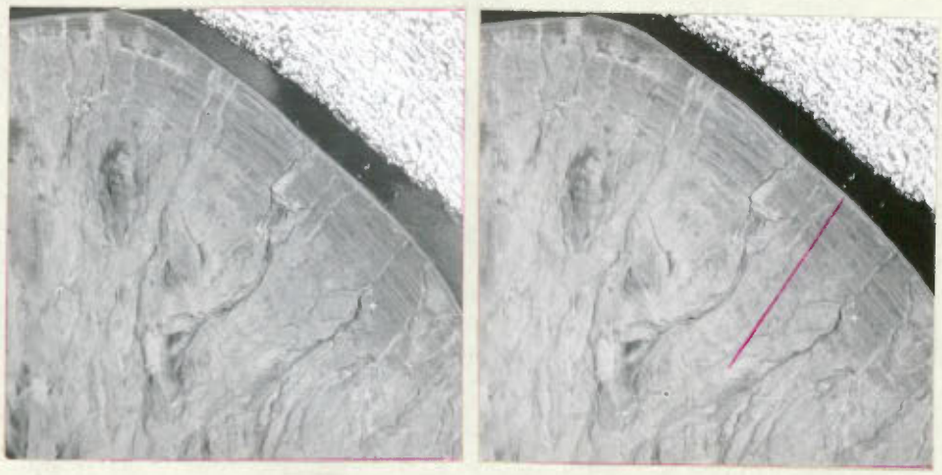
Clearly defined beaches are apparent in the stereogram above as the light-toned (tone 3-4) streaks which follow the trend of the coast in sub-parallel alignment. These beaches are low, linear swells composed of sand and fine gravel which rise up the 5 degree slope from the shore of Greely Fiord which is visible in the right portion of the stereogram.

The darker-toned areas bettween the beach lines are vegetated swales. The difference in elevation between the top of a beach and the bottom of a swale varies from 5 to 10 feet. The dark, down-slope streaks which may be seen in the centre of the stereogram are drainage rills which cross the beach lines.

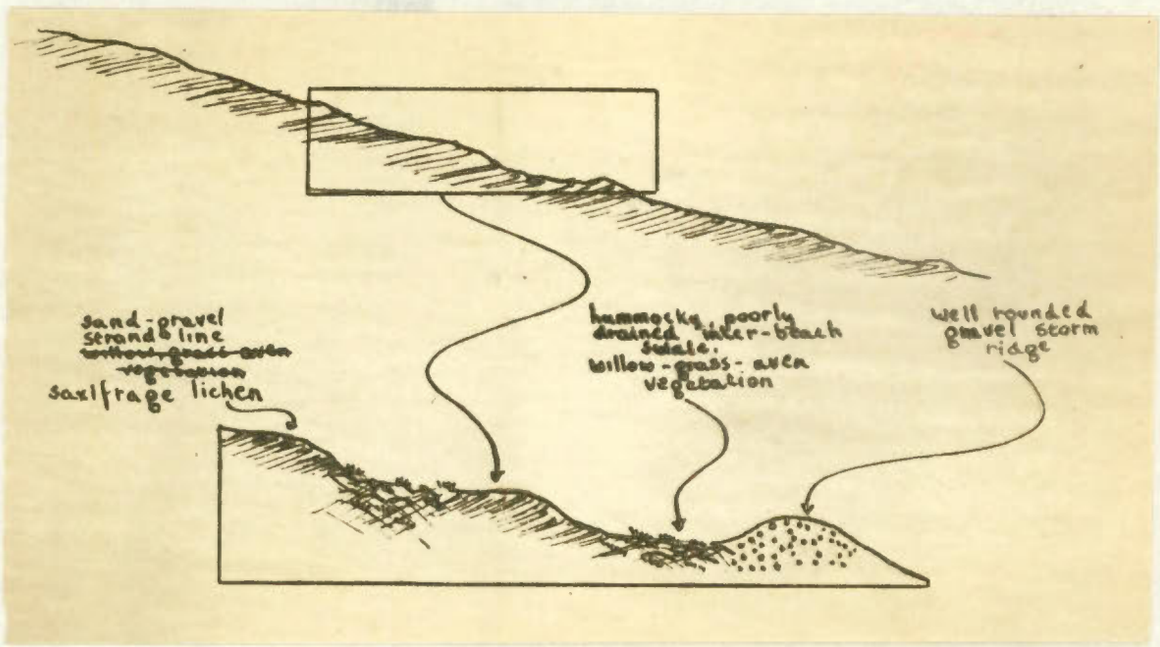
T4-6

Photo 1: A low beach may be seen curving off into the background of the photo above. The beach material is a dry silt-sand. It supports a comparatively thick cover of willow. The darker area in the right portion of the photo marks a swale between two succeeding beach ridges. The hummocky nature of the ground and the willow-moss-grass association can be noted.

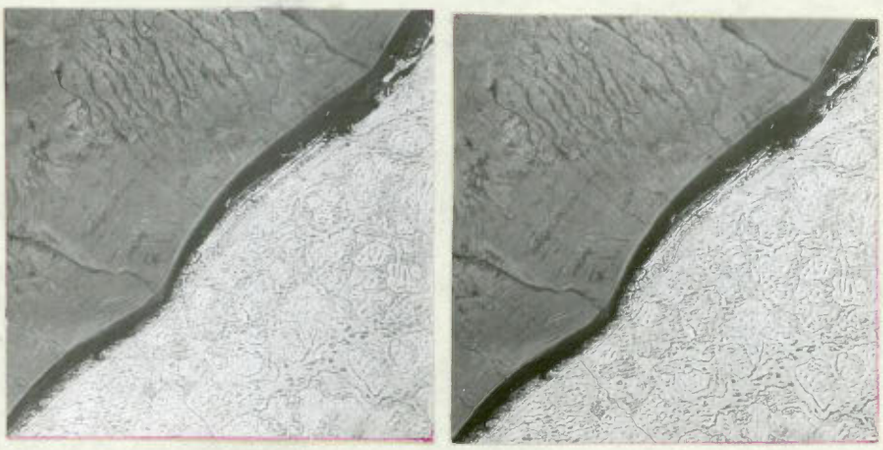
2. T12725-159, 160



Clearly apparent on the stereogram above are parallel, fine gravel beach ridges on a clay slope. The light-toned linear streaks marking the beaches may be seen to break where they are crossed by recent down-slope gullies. The darker streaks between the beaches mark shallow swales. Only in these swales does any considerable vegetation grow. Elsewhere the land surface is formed of bare, sun-dried clay or well-rounded gravel. Many large sandstone boulders are scattered about on the surface.



3. T405C-122, 123



Poorly-defined beach lines may be seen on the above stereogram. The short, light-toned, discontinuous streaks along the trend of the coast mark very low, partially eroded sand beaches. These beaches are not easily seen on the gound. They may be noted as slight corrugations on the landscape. These corrugations are partially outlined by a lineation of the vegetation.

(d) Discussion:

Beach lines are exceptionally well-drained features. This characteristic together with their linear embankment-like structure make them suitable as routes of march along the coastal areas where they occur. In all seasons men on foot and mechanical vehicles would have no difficulty in using them for this purpose. Often those gullies which do cross the beach lines are so shallow that mechanical equipment would be able to traverse them.

A12725-247: A beach line which appears on the gound as a very slight break-in-slope near the shore of Slidre Fiord. The beach is composed of a mixture of sand silt. The slope upward from the shore varies from 4 to 7 degrees.

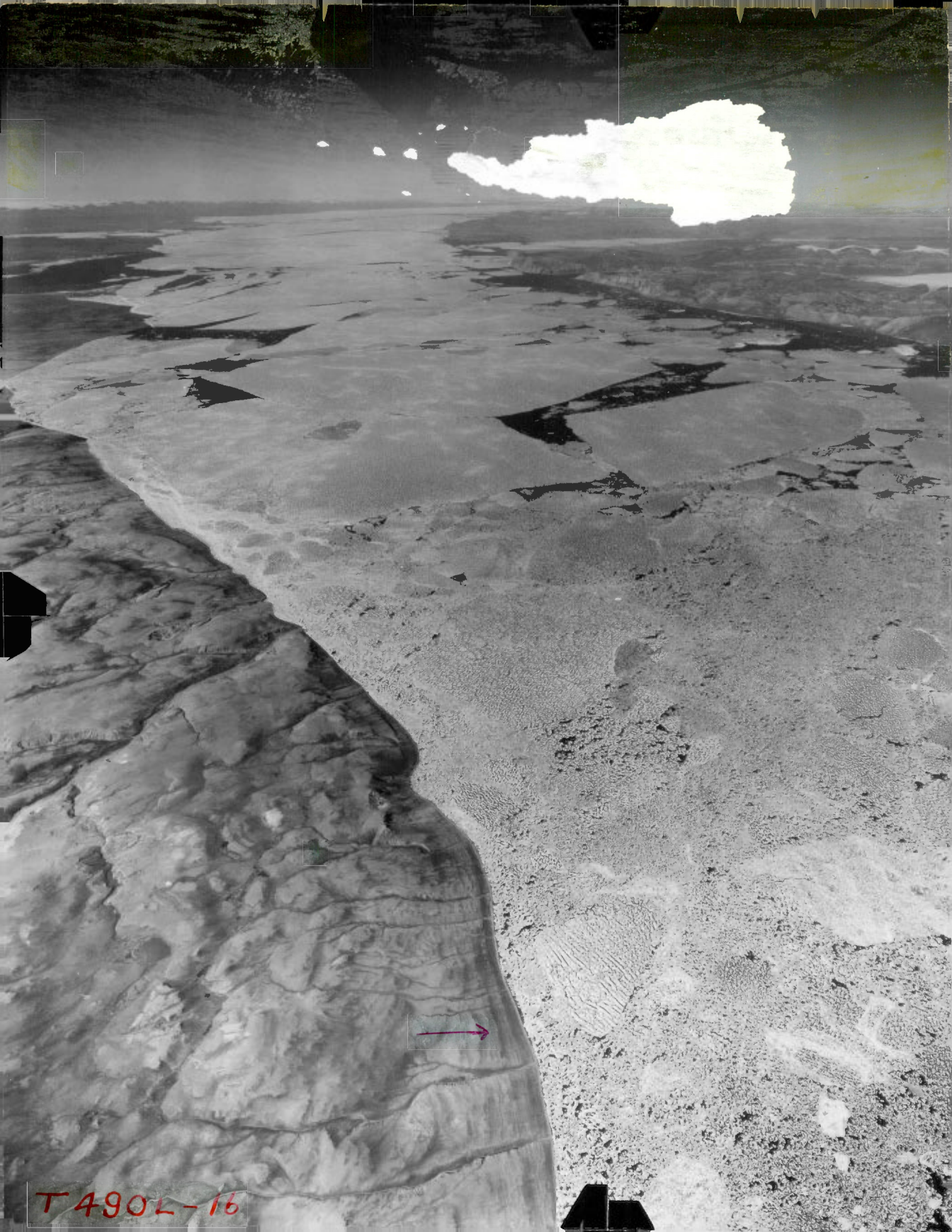
T490L-16: Lineation indicative of raised beaches along the south shore of Greely Fiord. Note the abrupt breaks where the beaches are crossed by gullies.

T405R-103: Raised beaches along the south shore of Greely Fiord.

A12725-171: Prominent, terrace-like raised beaches appearing on the shore of Slidre Fiord. The beaches near sea-level on the hill of unconsolidated material near the mouth of the large gully are formed of fine, well-rounded gravel mixed with clay. They are 2 and 3 feet in height.

T454R-3: Raised beaches along the west coast of Canyon Fiord.

A 12726


T490L-16


T405R-103
T405R-103


T
A12725-171
A12725-171


T454R-3
T454 R-3

5. DRAINAGE CHANNELS:

(a) Photo Appearance:

Distribution widely in lowland areas of Fosheim peninsula are numerous, well-vegetated channels or linear trenches in which little or no evidence of stream flow is apparent. These channels vary in size from broad shallow swales to deep, steep-sided troughs. Often they are short, (frequently less than 1 mile in length) and do not conform to the existing drainage pattern. Elsewhere they may extend for considerable distances across the landscape and are linked to the existing drainage pattern.

The larger depressions may perhaps be remnants of an early post-glacial drainage system. While the smaller swales are seasonal drainage channels.

These drainage channels most often occur on level to gently rolling plains in association with deposits of rounded, unconsolidated gravel. Under stereoscopic examination they may often be observed to have steep, concave sides on which willow stripes are apparent. Elsewhere the sides of the channels slope very gently to the bottom of the depression and the channel itself is delimited only by the slight break in slope at its edge.

Predominantly dark tones characterize the depressions. Tone values ranging from 5 to 8 are most common. The lighter tones (5 and 6) usually are seen where the depressions are floored by comparatively well-drained unconsolidated gravel which supports a thin vegetation cover. The darker tones (7 and 8) occur most often in shallow depressions where drainage conditions are poor and where a thick growth of moss-grass vegetation has resulted. Usually the drainage channels are much darker in tone than the surrounding photo area and are therefore prominent features on the photograph.

(b) Ground Appearance:

The larger drainage channels to which reference is made in this section are wide (60 to 125 yards), usually flat-bottomed trenches which may be a mile or more in length and vary from 40 to 60 feet in depth. They are almost invariably formed in rounded, unconsolidated gravel deposits (See section). This material forms the steeply sloping sides of the channels.

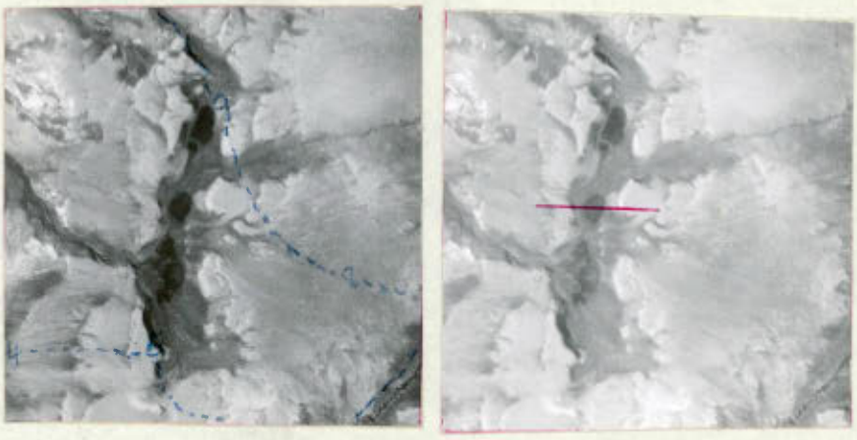
Often these features appear as continuations or extensions of shallow vales which may or may not contain standing or running water. The channels themselves may be dry or may contain a number of small ponds having a beaded orientation along the trough. These ponds are bordered by sedges and grasses. Elsewhere on the floors of the trenches well-developed moss hummocks and low hillocks may be noted. Vegetation cover is virtually complete on the floors of the channels and usually decreases up the sides.

The less prominent channels may be up to 100 feet in width but are usually not more than 10 to 20 feet in depth. They are usually more obviously linked to an existing drainage system although often no definite stream flow is apparent. Not uncommonly numerous, small, shallow ponds follow the course of these depressions to where they join a prominent stream valley.

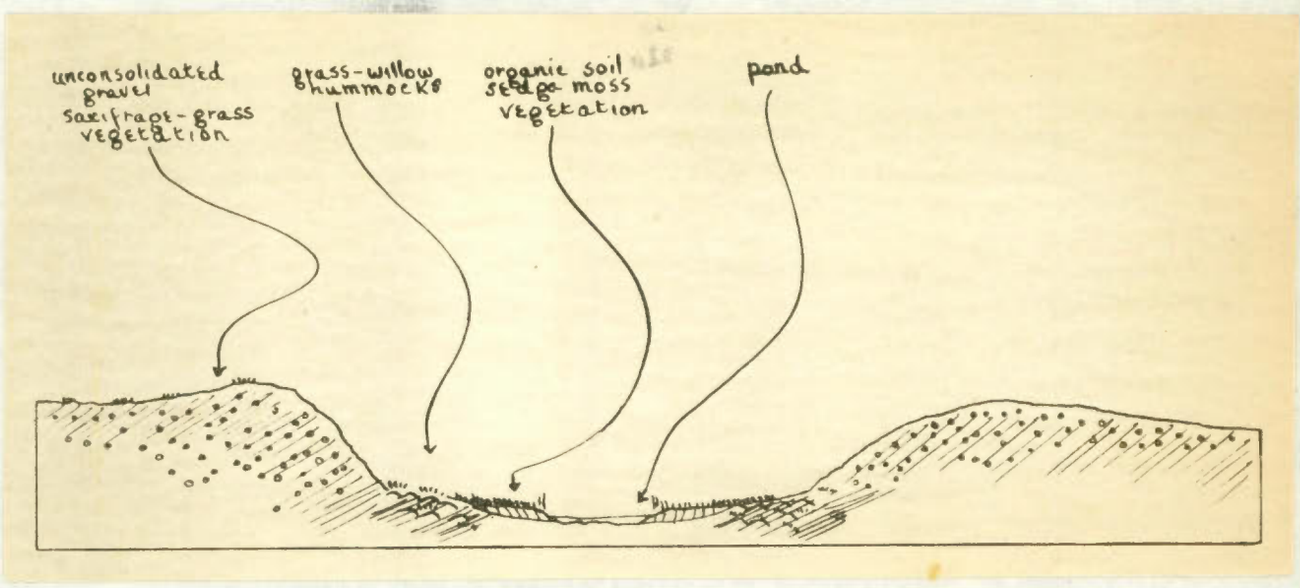
In the shallow depressions drainage conditions are usually poor, patterned ground may be noted and the vegetation consists of a thick growth of grass, moss and heather.

(c) Examples:

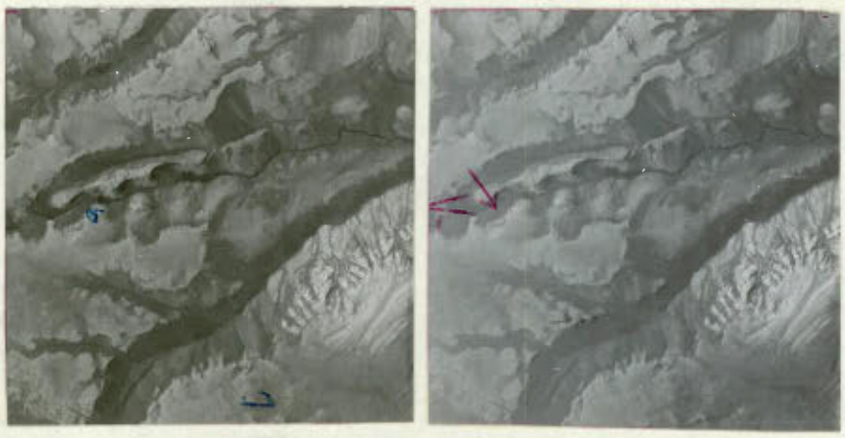
1. A12725-186, 187



The drainage channels in the stereogram above is a prominent depression in the surrounding leight toned unconsolidated gravel (See section). The steep sides drop a height of 30 feet to the floor of the depression where are located a series of small shallow ponds. These ponds are seldom more than a foot or so in depth as evidenced vy their tone 7 value. They are bordered by thick organic soil material which supports a vegetation consisting of sedges and moss. Elsewhere the dark tone (tone value 5-6) is due to the moist condition of the gravel material and to the presence of vegetation on the surface. Willow and saxifrage stripes are apparent at the lower end of the depression. Several shallow tributary channels can also be noted.



2. T405C-144,145



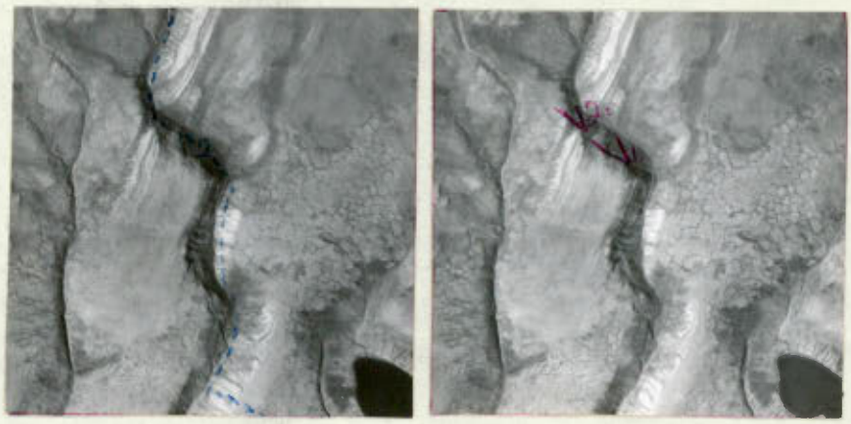
In the stereogram above a prominent channel, in which flows a small stream, may be observed. This channel is approximately 80 feet deep and has a steep-sided, U-shaped cross section. The unconsolidated gravel in which it has been formed may be observed as the light toned (tone 3) areas which bound it on either side.

The gravel slopes which form the sides of the channel are well-drained and sparsely vegetated with saxifrage and grass. Downslope stripes are barely visible. In the bottom of the trough grass tussocks, moss, and sedges border small ponds

T18-5

Photo 1: The channel described above. Note the deposits of unconsolidated gravel which slope steeply to the bottom of the trough. Beyond the pond the thick vegetation cover of grass and moss underlain by organic material may be noted.

3. A12725-209, 208



A U-shaped, grassy-bottomed drainage channel is shown in the stereogram above. This channel may be noted to cross at right angles to the underlying bedrock structure indicated by the white-toned lineation. The small rivulet which flows intermittently in the depression is probably a misfit stream.

The depression is extremely well-vegetated. The bottom supports a complete cover of grass and moss over a thick layer of organic matter while the sides are slightly hummocked and are thickly grown with willow, mountain aven, and grass.

The vact that no clearly defined stream channel is apparent in the ground photographs below indicates that the channel carries melt water from a small catchment area only for a short period in the spring.

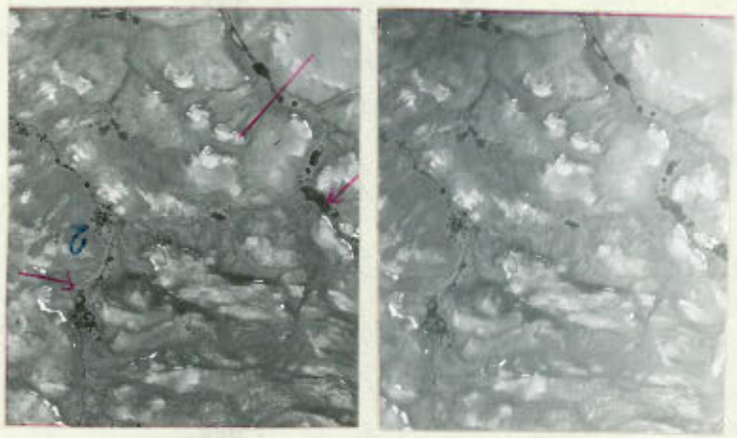
T7-3

Photo 1: The drainage depression above is 30 to 40 feet in depth. Note the smooth, grassy bottom and the hummocked sides. A concentration of surface moisture in the depression has been responsible for the lush vegetative growth.

T7-2

Photo 2: Another view of the same depression. A very faint stream channel can be seen in the foreground of the photo.

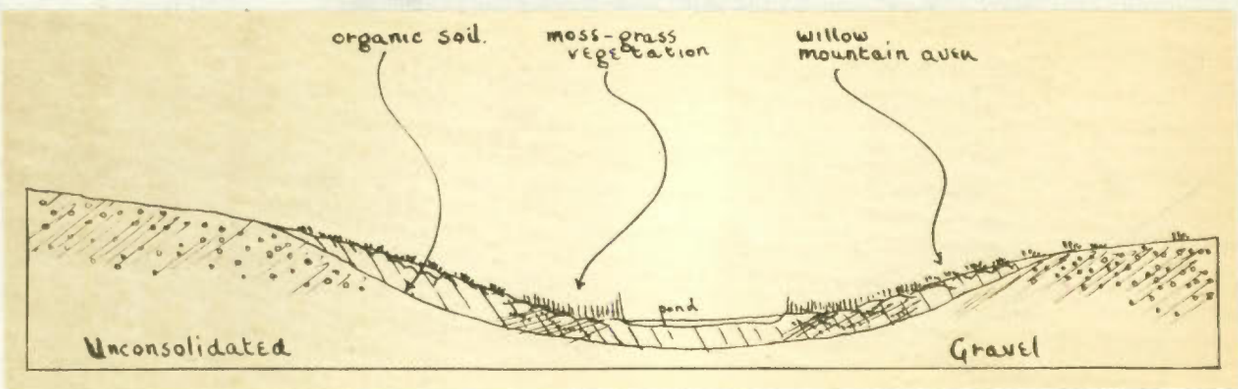
4. T453C-207, 206



Examples of shallow, seasonal drainage channels are contained in the stereogram above. They are the dark-toned, sinuous swales which wind between the much lighter toned areas marking hillocks of unconsolidated gravel. The swales usually have a tone value of 6 to 8 and they may be further identified by the presence of chains of small ponds along their courses. These ponds have a very dark tone value. No clearly defined stream is apparent.

The drainage channels are several hundred feet in width, but are not more than 20 feet in depth. The dark tone may be attributed to poor drainage conditions and to the thick growth of grass-moss-willow vegetation which occupies the depression.

Such drainage channels as these have extremely low gradiants and carry rivulets of melt water only for a short period in the spring.



(d) Discussion:

Drainage channels, due to their extremely low gradiant, are poorly drained. Frequently shallow ponds and pools of standing water occupy the bottoms of the channels while elsewhere marshy conditions may be present throughout most of the summer.

The marshy nature of these areas make them unsuitable as routes of travel for mechanical vehicles. Better conditions are usually found on the plains of unconsolidated gravel which border the depressions.

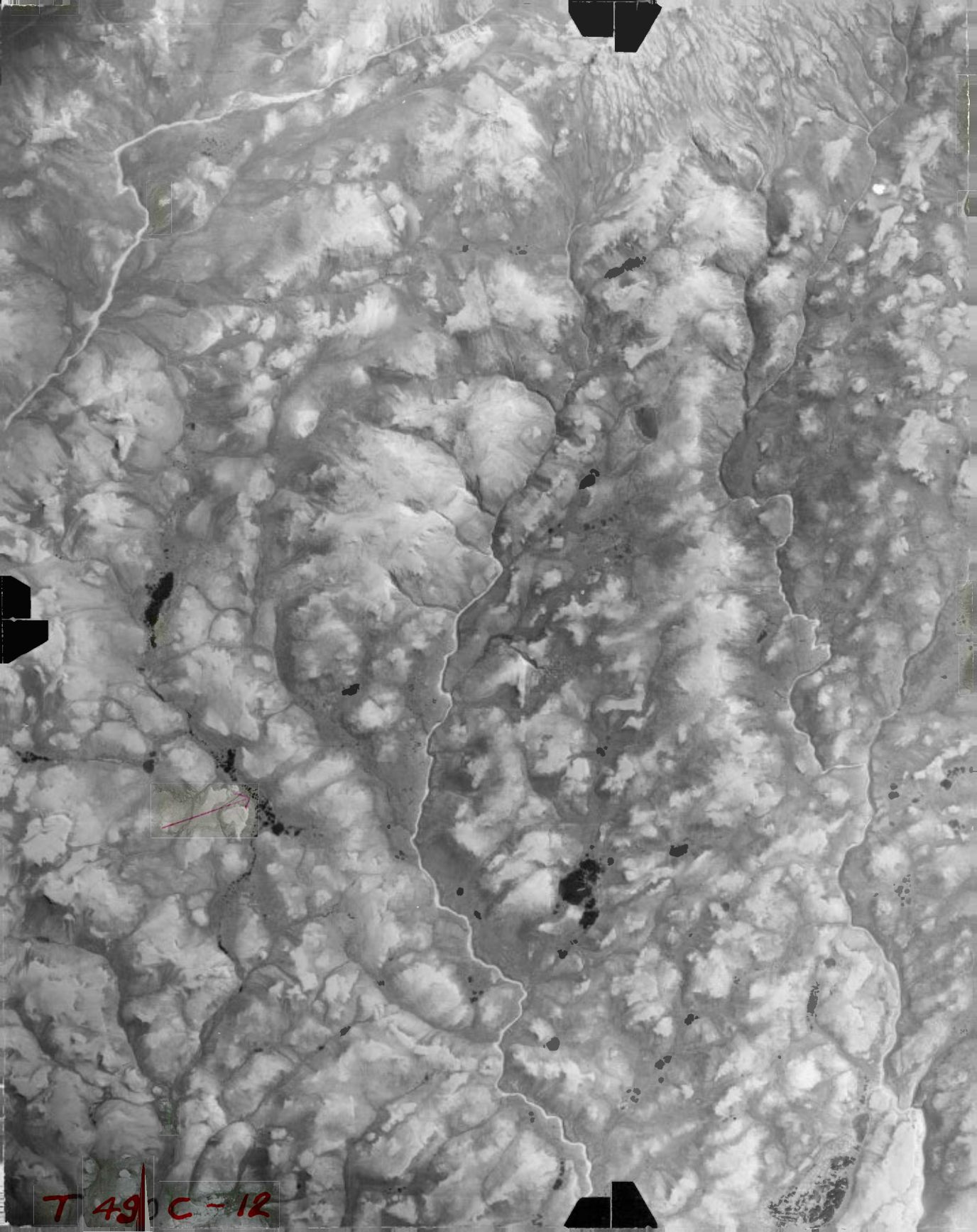
Foot travel is impeded in the depressions both by the thick snow banks which occupy them until late in the spring and by the swampy grass tussocks which are widely distributed over the floor. Walking conditions are ideal on the surrounding gravel plains.

T490C-12: A prominent linear swale is indicated by the arrow on this photograph. It is broad and comparatively shallow. In places along its length ponds of variable size occupy depressed centre polygons. The gradiant is low and the depression is not obvously linked to any stream system.

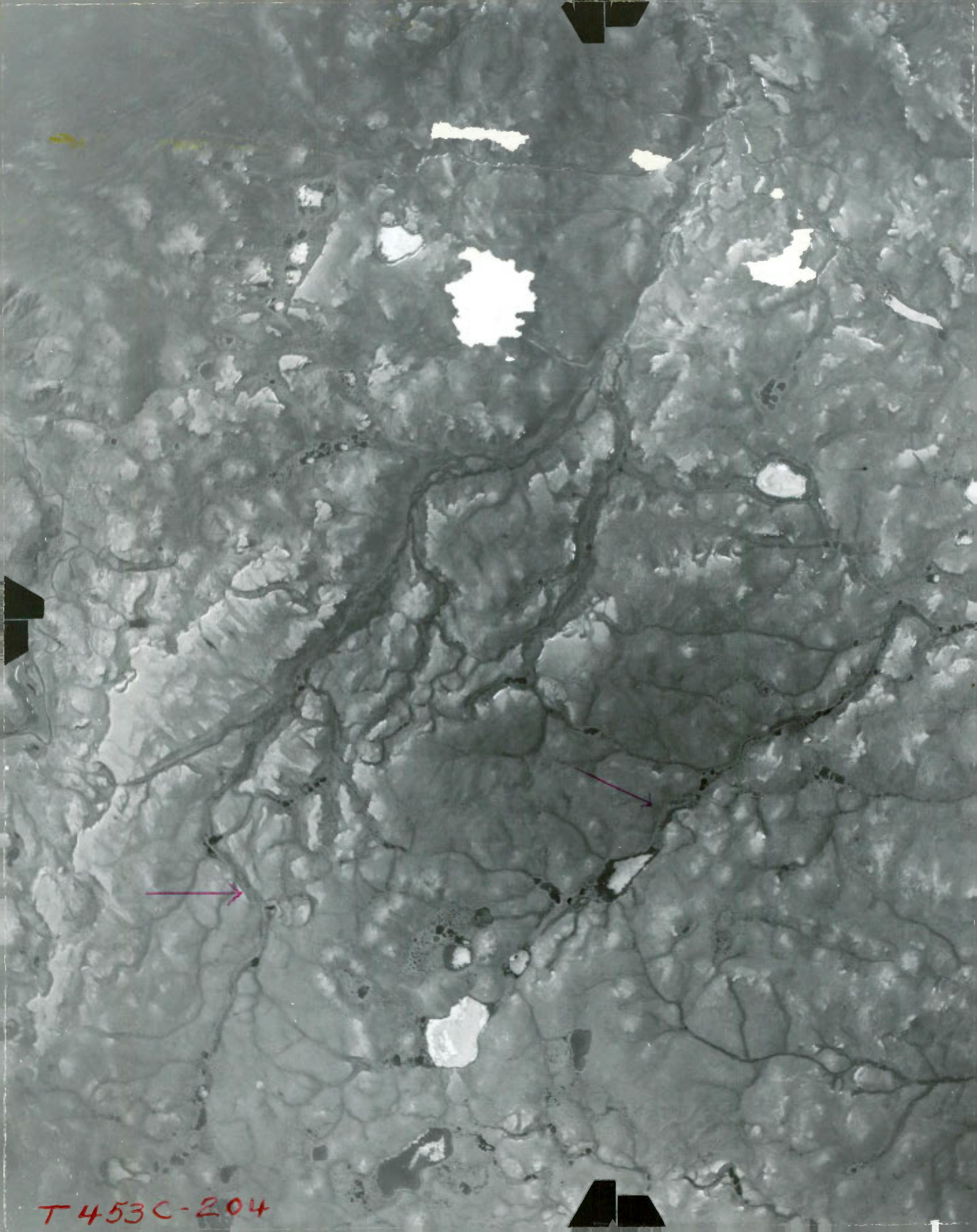
T454R-19: Swales of a type similar to those shown on the previous photo are shown here. These depressions stand out as lighter-toned features against the tone 7 background. They occur on broad flat plains of unconsolidated gravel.

T453C-204: Broad, shallow depressions which in this case are more obviously linked to the existing drainage system. Larger ponds of water oriented along the axis of the depressions are visible.

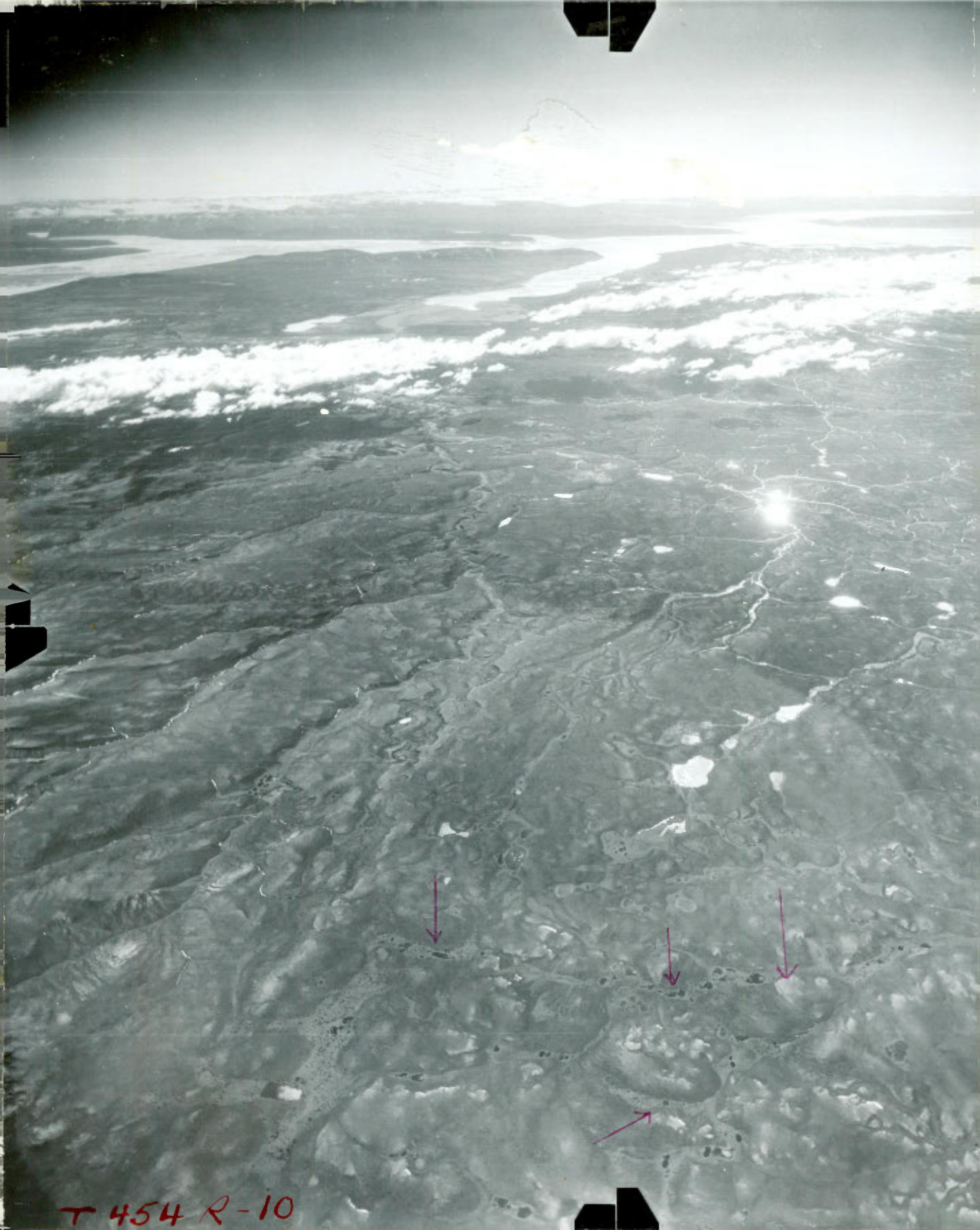
T454R-10: Further examples of linear depressions containing small pools of water. The vegetation cover is virtually complete in all the examples here displayed. The depressions on this photo occur on a rolling sedimentary plain.


T 49 C - 12


T454R-19



T453C-204


T 454 R-10

6. BRAIDED STREAM:

(a) Photo Appearance.

The lower courses of many of the major streams in Fosheim Peninsula are braided. The streams flow in broad, flat, gravel-filled valleys having a very low gradiant. The braided characteristic is due to the inability of the stream, because of its lack of transporting power, to carry off all the débris which occupies its valley. These features are most frequently found at the point where a stream leaves a steeply rising upland to flow across a level or gently rolling plain.

In form, braided streams may be recognized by their sinuous, winding courses which can often be traced across the full width of one or more photographs. Often the larger tributary streams are similarly braided for a short distance from their mouths.

In photo appearance braided streams look like winding, medium grey bands bounded on both sides by clearly-defined breaks-in-slope marking abrupt channel sides. Super-imposed upon the tone 3 to 6 bands are fine, dark, intertwining lines (tone 7 or 8) which follow the general trend of the stream and mark channels containing running water. Occasionally these occupied channels may have a flat, white tone value. This appearance only occurs, however, when sunlight is reflected directly from the water into the lens of the aerial camera.

Often light-toned patches (tone 2 or 3) in the channel of a braided stream may be noted. These are well-drained and dry deposits of river gravel which stand slightly above the general level of the channel. Similarly, light-toned streaks along the trend of the river mark abandoned channels in which the sand has become dry enough to give a white tone.

Wherever extensive areas having a light-toned photo appearance are detected it may be assumed that a considerable portion of the river sediment is composed of sand and fine gravel. Darker tone values in braided streams generally indicate coarse gravel and bouldery river material.

(b) Ground Appearance.

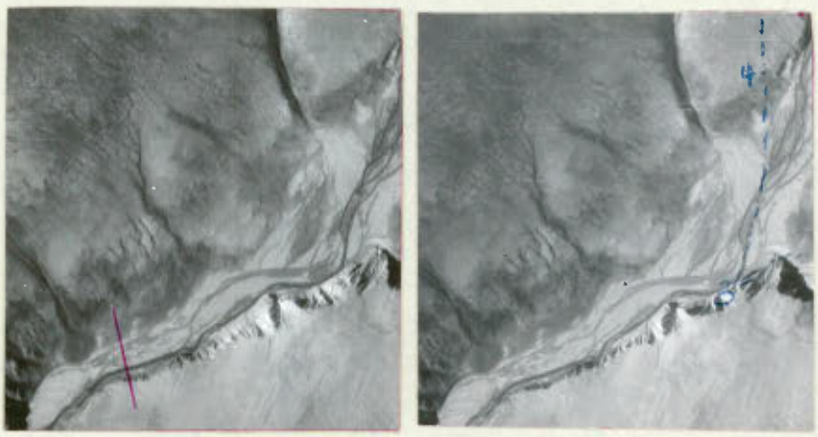
Braided stream valleys are flat, gravel or sand filled features which may be up to several hundred yards in width. Within the valley a number of channels containing running water branch, reunite, and intertwine as they flow along. The number of these channels varies with the size of the stream and the season of the year. During the spring spate a maximum of 20 or 30 rivulets may occupy one valley. These migrate back and forth as they aggrade one channel and begin to erode a new one. Frequently thick deposits of gravel or sand are laid down by one of these transient streams. These deposits are left when the stream migrates to a new course. At midsummer the number of rivulets may decline to 2 or 3.

Often the terraces along the rivulets in a braided stream are several feet in height. Along an abandoned channel they may reach a maximum height of 6 feet. The material of which they are composed is usually coarse sand or well-rounded coarse gravel or boulders. The general appearance of a braided stream is of a flat, gravel-filled depression incised by numerous small channels of variable depth.

Vegetation in braided streams is almost non-existent. Occasional grass tussocks in unusually high sites are all that occur.

(e) Examples.

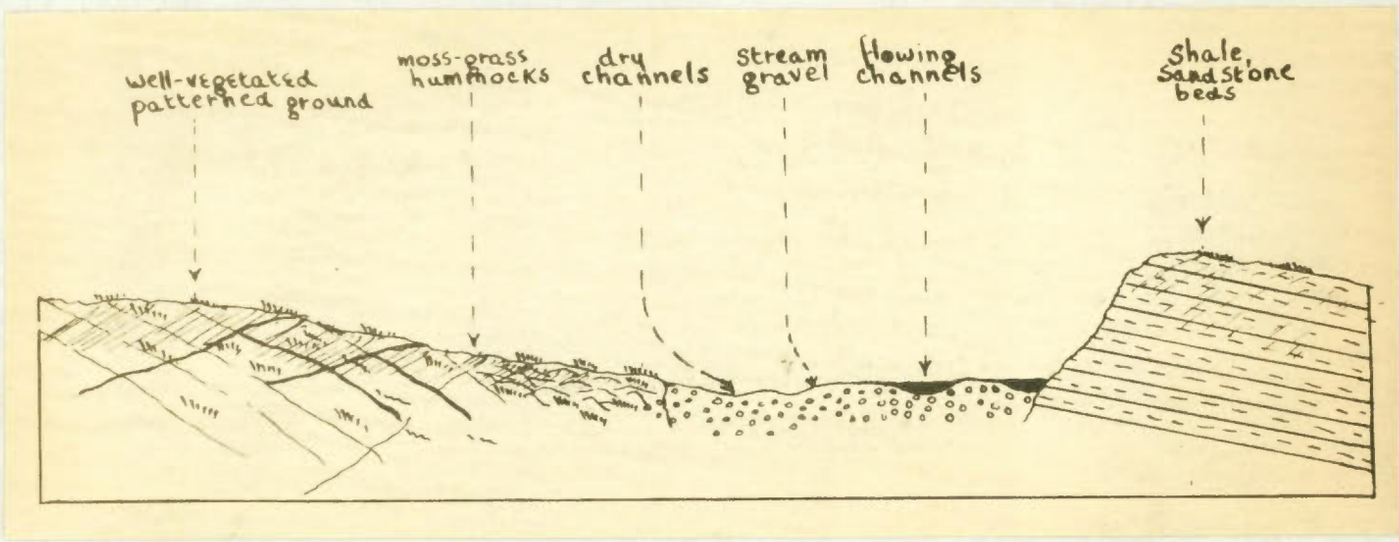
1. A12725-213, 212.



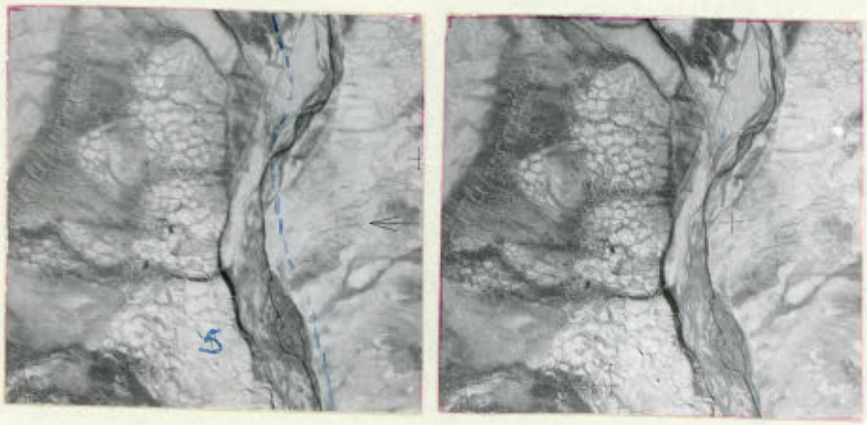
The braided course of the river in the stereogram above appears as an even-toned, light grey band upon which darker (tone 6) intertwining lines are visible. These darker lines mark active water courses flowing along the braided stream.

The floor of the braided stream channel is composed of coarse sand and well-rounded gravel. During the spring melt period many, fast-moving torrents pour down the valley. In midsummer the number of rivulets decreases considerably and the channel is a broad flat in which mounds of gravel and empty swales are more often seen than are small rivulets. Vegetation forms no significant part of the surface cover.

Gentle, well-vegetated slopes fall to the braided stream on the north bank while the south bank is a steep river bluff.



2. A12725-154, 155.



In midsummer most of the channels of a braided stream are unoccupied and are visible on an aerial photograph only as medium grey, sinuous lines along the stream course. In the stereogram above one channel is occupied by a rivulet of running water. It has occasional bifurcations which give the characteristic braided appearance. This occupied channel is easily identified by the darker, tone 7 value which it exhibits.

Within the braided stream valley very light-toned areas (tone 2) mark dry sand bars which were deposited by the stream during the period of maximum flow in spring. Elsewhere the stream material is composed of coarse gravel and rounded boulders. The banks of the stream are clearly apparent in the stereogram.

Note the well-developed ground patterns in the left portion of the stereogram.

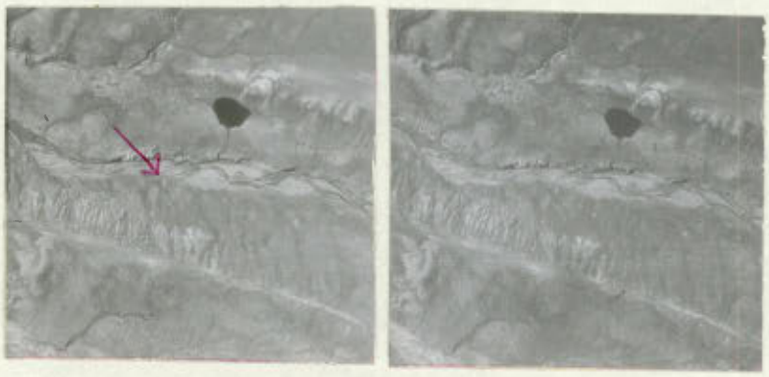
T14-2

Photo No. 1. Sand and fine, well-rounded gravel in a braided stream channel. The sand has a recently deposited appearance. Note the flowing channel in the right background.

T15-4

Photo No. 2. View along a typical braided stream valley. One occupied channel is visible in the extreme background. Note the large, rounded boulders in a matrix of sand.

3. T405C-113, 112.



A braided stream in midsummer. Only one major channel is occupied but fine-grained, downstream lineation marks the location of dry channels. The stream material is of a finer texture than is usually found in braided river valleys. It is composed of coarse sand and well-rounded medium-textured gravel. Note the outcropping sedimentary strata in the right portion of the stereogram.

T14-3

Photo No. 1. A typical braided stream valley. Note the rounded gravel, the recently deposited sand in the foreground, and the pool of standing water.

T14-4

Photo No. 2. A wide braided stream valley. Note the small flowing channel in the foreground. Considerable quantities of coarse sand compose the river material.

(d) Discussion.

During the spring melt period braided stream valleys are often more easily crossed by foot travellers than are single-channel streams. The great volume of water flowing down the valley at this season is distributed in a large number of rivulets no one of which is sufficiently deep to impede progress. It is important however to use caution in crossing such a stream since the swift current in even a shallow stream is often enough to upset a heavily loaded man.

Mechanical vehicles should experience little difficulty either in fording or travelling along a briaded stream valley. During midsummer or winter especially good conditions are to be found. During the summer the permeable nature of the river materials and the shallow depth of water in the rivulets assures a good route of march for mechanical equipment.

T454R-17: A braided stream appears prominently in the foreground of this oblique photograph. The flowing channels have a white tone because the light has been reflected from the water directly into the lens of the aerial camera.

A12725-362: A braided stream having a characteristic low gradiant flows in a V-shaped valley across steeply-dipping sedimentary strata. The rock lineation is clearly apparent. Coarse, rounded gravel and boulders compose the stream material.

A12725-214: A wide, braided stream flows along the southern edge of a prominent rock ridge. The extremely white toned area at the bottom of the photograph is a residual sand plain. A large proportion of the river sediments are composed of coarse, white sand.

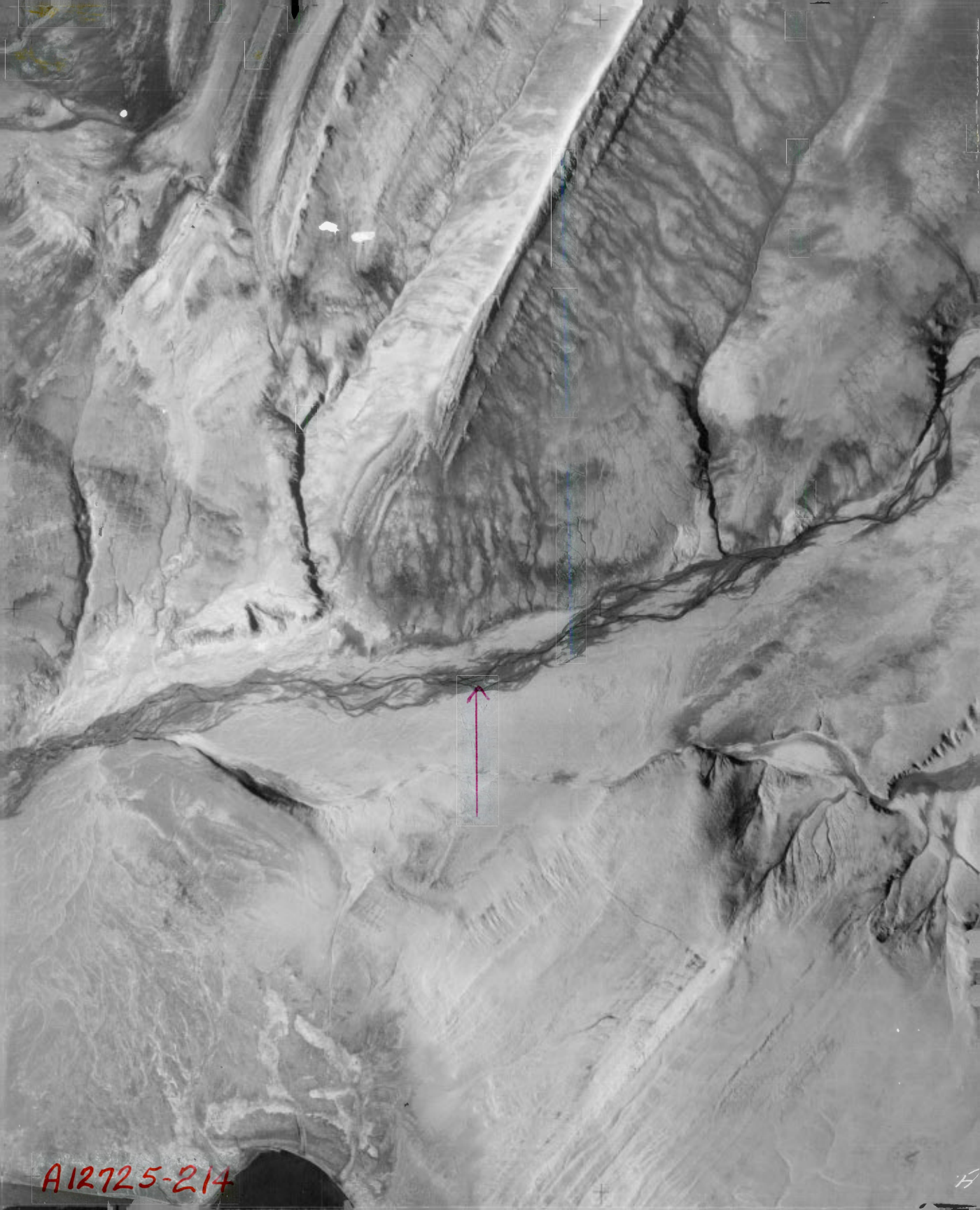
T454R-17: A braided stream appears prominently in the foreground of this oblique photograph. The flowing channels have a white tone because the light has been reflected from the water directly into the lens of the aerial camera.

A12725-362: A braided stream having a characteristic low gradiant flows in a V-shaped valley across steeply-dipping sedimentary strata. The rock lineation is clearly apparent. Coarse, rounded gravel and boulders compose the stream material.

A12725-214: A wide, braided stream flows along the southern edge of a prominent rock ridge. The extremely white toned area at the bottom of the photograph is a residual sand plain. A large proportion of the river sediments are composed of coarse, white sand.


T454R-17
T454R-17

A12725-362



A12725-214

7. UNCONSOLIDATED GRAVEL DEPOSITS:

(a) Photo Appearance.

Distributed widely in Fosheim Peninsula are deposits of well-rounded gravel and coarse sand of recent origin. This material occurs under a variety of topographic conditions but is most frequently found in lowland areas of the peninsula. It may occur as low, isolated, flat or round-topped hillocks, as broad, undulating and dissected plains, or as a capping material on high, rock ridges. It is of variable depth, ranging from a foot or less where the gravel mantles a rock ridge to a maximum of 25 or 30 feet in broad, low-lying depressions. The gravel is possibly a glacial outwash deposit which, at lower elevations, has been reworked by marine action.

The most evident and consistent photo recognition characteristic of unconsolidated gravel is its light-toned and smooth-textured appearance. Although seldom so white as sand, gravel has a tone value which ranges from 1 to 3. The darker toned areas (tone 3) are usually restricted to poorly-drained lowlands or to the depressional areas near stream partings.

Where unconsolidated gravel occurs as isolated hillocks or as a veneer covering a rock ridge the deposits often have a very steep-sided or kame-like appearance when viewed with a stereoscope. This is due to the steep angle of repose characterisitic of unconsolidated material of this texture. Where such deposits have been dissected by a stream or drainage swale the sides of the gravel deposits may have a scalloped appearance suggestive of stream meanders.

Often unconsolidated gravels may exhibit traces of patterning. Elsewhere downslope willow or drainage stripes may be noted. Where a sheet of gravel has been severely dissected by stream erosion broad, light-toned areas separated by an intricate of low-gradiant, sluggish streams and wide, well-vegetated swales may be observed. Terrain such as this often covers the full area of several aerial photographs.

Traces of the underlying bedrock structure may often be observed in gravel areas. Fine-lined lineation can, in these cases, be observed in the deeper gullies draining the slopes of the gravel.

(b) Ground Appearance.

Unconsolidated gravel ranges, in occurrence from broad, rolling plains areas to steep-sided hillocks up to 60 feet or more in height. Elsewhere the gravel may be found as narrow flat-topped terraces along the major stream valleys or as low, round-topped domes on lake plains or in low-lying, level areas.

On the ground the gravel appears as a close packed aggregate of rounded cobbles and small boulders. Mixed with this coarser material there is a variable quantity of sand and sandy silt. Often the gravel surface resembles a cobble-stoned street. On this surface occasional shallow (4 to 10 inches) and short (80 to 100 feet) fissures may be observed. Vegetation is very scanty. Seldom does the ground support more than a 3% or 4% cover of saxifrage oppositifolia, lichen, grass and occasional willow mats. Most of the surface area has the dry, beige-brown appearance of the sandstone which composes the gravel.

The limits of the unconsolidated gravel areas may usually be seen clearly on the ground. The edge of the gravel often occurs as an abrupt break-in-slope along a valley side or as a sudden change in the appearance of the ground surface. In the latter case the typical cobble appearance gives way to a dry, sun-cracked clay surface or to a well-vegetated drainage swale.

Drainage conditions are usually escellent in gravel areas. It is partially due to this condition and partially to the lack of suitable soil material that vegetation growth is deficient on the unconsolidated gravel hills. Occasionally, in low-lying places in a gravel plain, shallow ponds of standing water may collect. These are prevented from draining rapidly by the permafrost table which is seldom very far below the surface of the ground.

(c) Examples.

1. T405C-153, 152.

Unconsolidated gravel occurs in the stereogram above as a capping material on top of a bedrock ridge. The ridge has a steep scarp slope and a gently sloping dip slope roughly resembling an escarpment. Although the slopes and top of the ridge are covered with well-rounded, coarse gravel and sand traces of bedrock lineation may be faintly seen on the lower part of the scarp slope.

The top of the ridge has a gentle, smoothly rolling appearance. Frequent low conical hills of typical kame profile are scattered about the surface. There is no trace of patterning.

Dark-toned drainage swales extend down the slopes of the ridge. These depression contain a thick vegetation cover of willow and grass. Well-developed vegetation stripes not visible in the stereogram occur on the more steeply sloping portions of the ridge.

The abrupt break-in-slope at the top of the ridge is caused by a resistant strata of sandstone.

T490R-12.

An oblique aerial view toward the ridge shown in the stereogram above. The light tone is more characteristic of such areas than is the tone in the stereogram.

V6-2

Photo No. 1. The gravel-covered rock ridge shown in the stereogram is seen in the background of this photo. The low eminences referred to elsewhere are visible at the end of the ridge. Note also the gravel in the foreground.

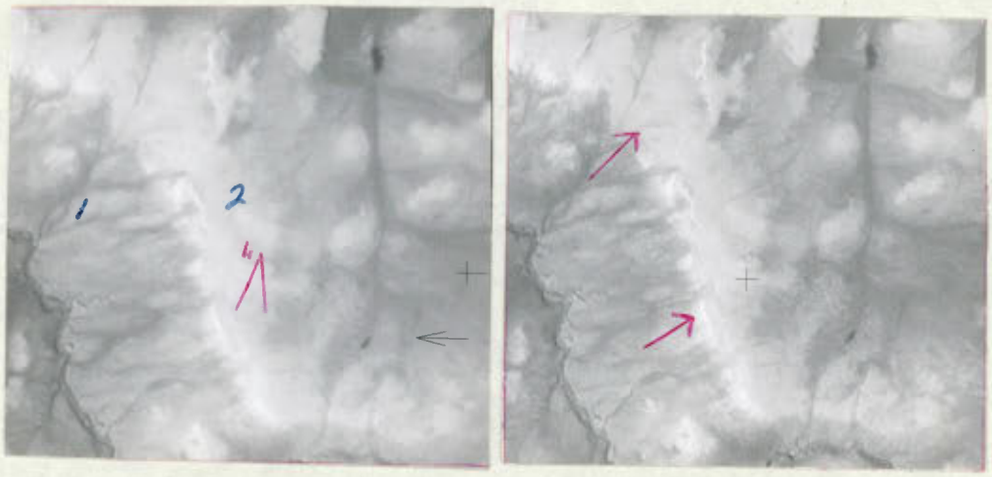
V6-3

Photo No. 2. A low, kame-like hill on top of the ridge. Note the well-rounded nature of the gravel and the almost complete lack of vegetation

V6-4

Photo No. 3. The typical, cobbled appearance of the unconsolidated gravel is apparent in this photo. Note the low, broad hillocks in the background and dark clumps of saxifrage oppositifolia.

2. A12725-343, 342.



The white-toned areas in the stereogram above mark unconsolidated gravel deposits. Gravel, several feet in depth, mantles the low ridge which extends from top to bottom across the stereogram. Additional deposits form low, broad mounds in the depressional area in the right-hand portion of the stereogram. A gently dipping sandstone bed may be seen to outcrop at the break-in-slope near the top of the ridge. A slightly jagged lineation is apparent and is indicated by the arrow.

The surface of the ridge is broad and rolling. It has the familiar cobbled ground appearance to which has been added scattered, angular sandstone fragments. Vegetation is very scanty. Traces of incipient polygons may be detected in the stereogram and the fissures which bound these patterns support the greatest plant growth. On more steeply sloping portions of the ridge willow stripes having a slightly darker tone are apparent. Such stripes may be noted near the top of the stereogram as faint, downslope brush markings. (See arrow).

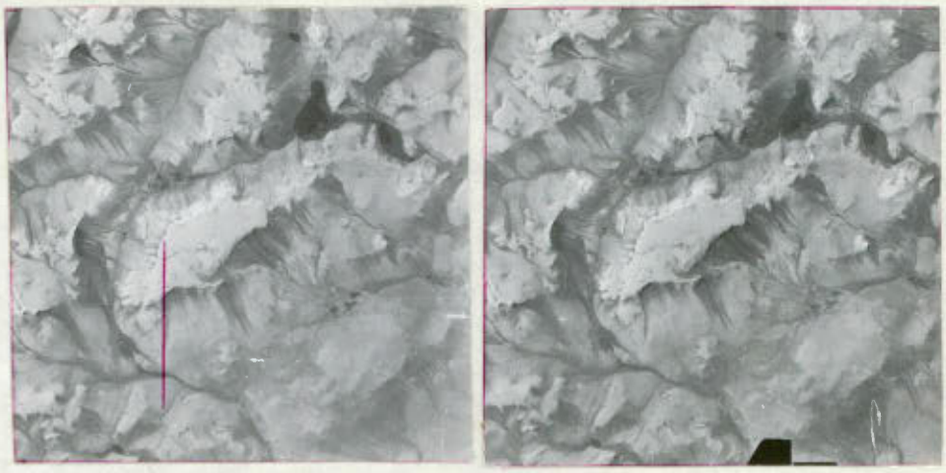
The low mounds mentioned above may be up to 30 feet in height and often have a diameter of 300 feet. They, too, are virtually bare of vegetation. In photo appearance they may have a fluffy, poorly-defined outline where they merge with the poorly-drained but well-vegetated land in the depressions.

Drainage conditions are exceptionally good in gravel areas such as this.

V6-1

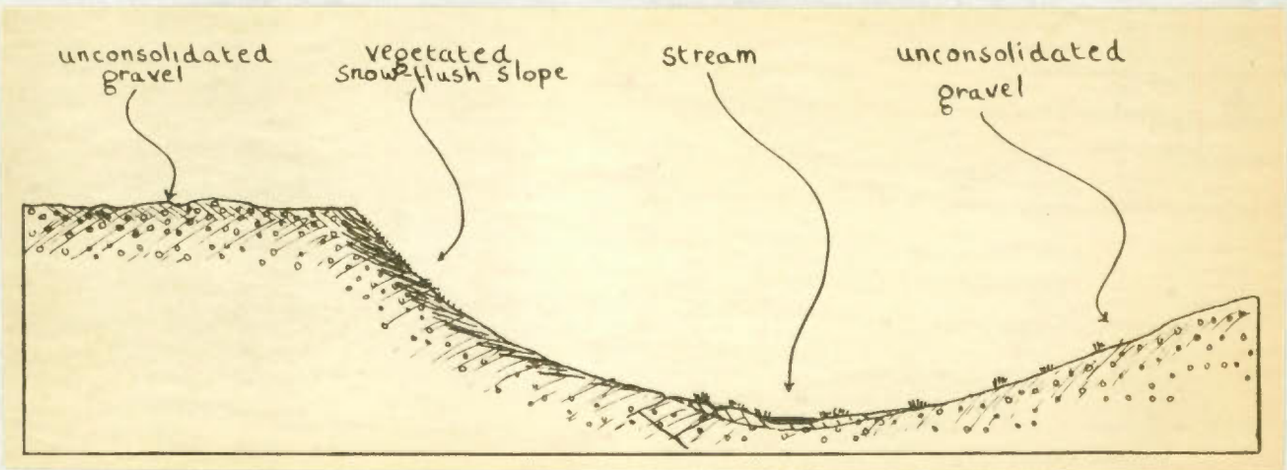
Photo No. 1. The cobbled surface of the unconsolidated gravel discussed above. Note the flat surface at this particular location and the sparse saxifrage oppositifolia and moss.

3. T405C-154, 155.



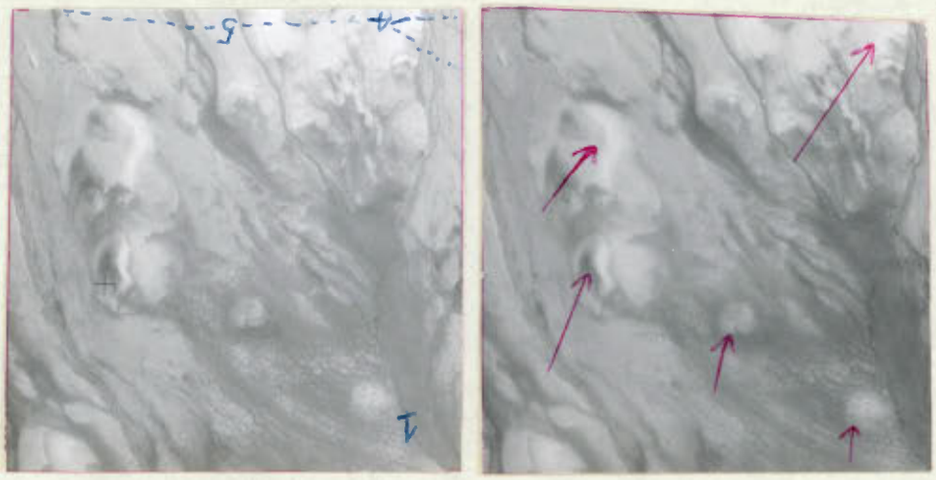
An area in which deep deposits of unconsolidated gravel have been dissected by stream erosion to form wide, plateau-like features having abrupt steeply sloping sides. These features may rise 50 feet above the level of the stream courses. They are exceptionally even-textured and have a tone value ranging from 1 to 3. The surface appearance is entirely similar to that pictured in previous examples.

The slopes forming the sides of the gravel hills contain larger quantities of surface moisture than the tops. For this reason there is a greater growth of vegetation, consisting of willow and saxifrage, and such areas have a much darker photo tone than have the tops of the hills. The very dark areas immediately below the break-in-slope at the edge of the gravel features are damp areas where a thick cover of moss, grass, and willow grows. Snow banks often remain in such sheltered locations until late in the summer. It is on these snow-flush slopes below snow banks that the thickest vegetation is found.



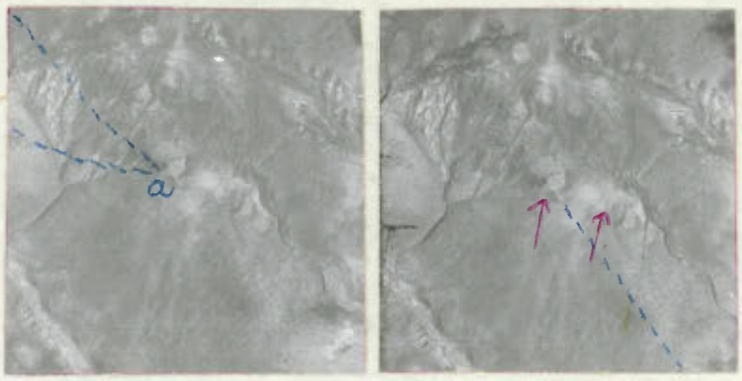
4. A12725-357, 358.

1.



T405C-112-113.

2.



Often unconsolidated gravel deposits occur as isolated mounds or low, conical hills in areas where the land surface is flat or gently rolling.

In stereogram 1 the gravel hills project from an alluvial fan of coarse river gravel which extends across a broad, gently sloping lake plain. The gravel of which the hills are composed is similar in every respect to the deposits previously discussed. The circular areas indicated in the lower portion of the stereogram are mounds of unconsolidated gravel which rise only a few feet above the surface of the lake plain.

Two isolated hillocks of unconsolidated gravel are indicated in stereogram 2. These hillocks are composed of typical, well-rounded sandstone cobbles. Vegetation consists almost entirely of clumps of purple saxifrage and a little lichen.

(d) Discussion.

Unconsolidated gravel areas are invariably well-drained. Hills of this material may be used as camp sites. Where such gravel occurs as broad level or gently rolling plains it provides an easy route of travel for both mechanical equipment and men on foot. Deep, steep-sided gullies are rare and the gravel hills can usually be by-passed. Other impediments to travel are infrequent.

T454R-20: The foreground of this photograph is a wide, gently rolling plain of unconsolidated, partially rounded gravel. Small lakes and shallow ponds occupy the broad depressional areas. Many low, kame-like hills and short gravel ridges are distributed on the surface of the plain. These are not readily visible on the photograph.

A sparse vegetation of purple saxifrage, willow mats, and grass covers approximately 5% of the area. The remainder of the surface is composed of the partially rounded sandstone gravel mentioned previously.

The photo appearance of this gravel area is darker than is usually found in such areas (tone 7). The wide swales which merge and interconnect in the area have a lighter, tone 5 appearance. It is in these swales that most of the ponds are located. A selection of photographs typical of the area are mounted below.

T14-6.

Photo No. 1. Low hills of unconsolidated gravel. Note the smoothly rounded profiles.

T16-6.

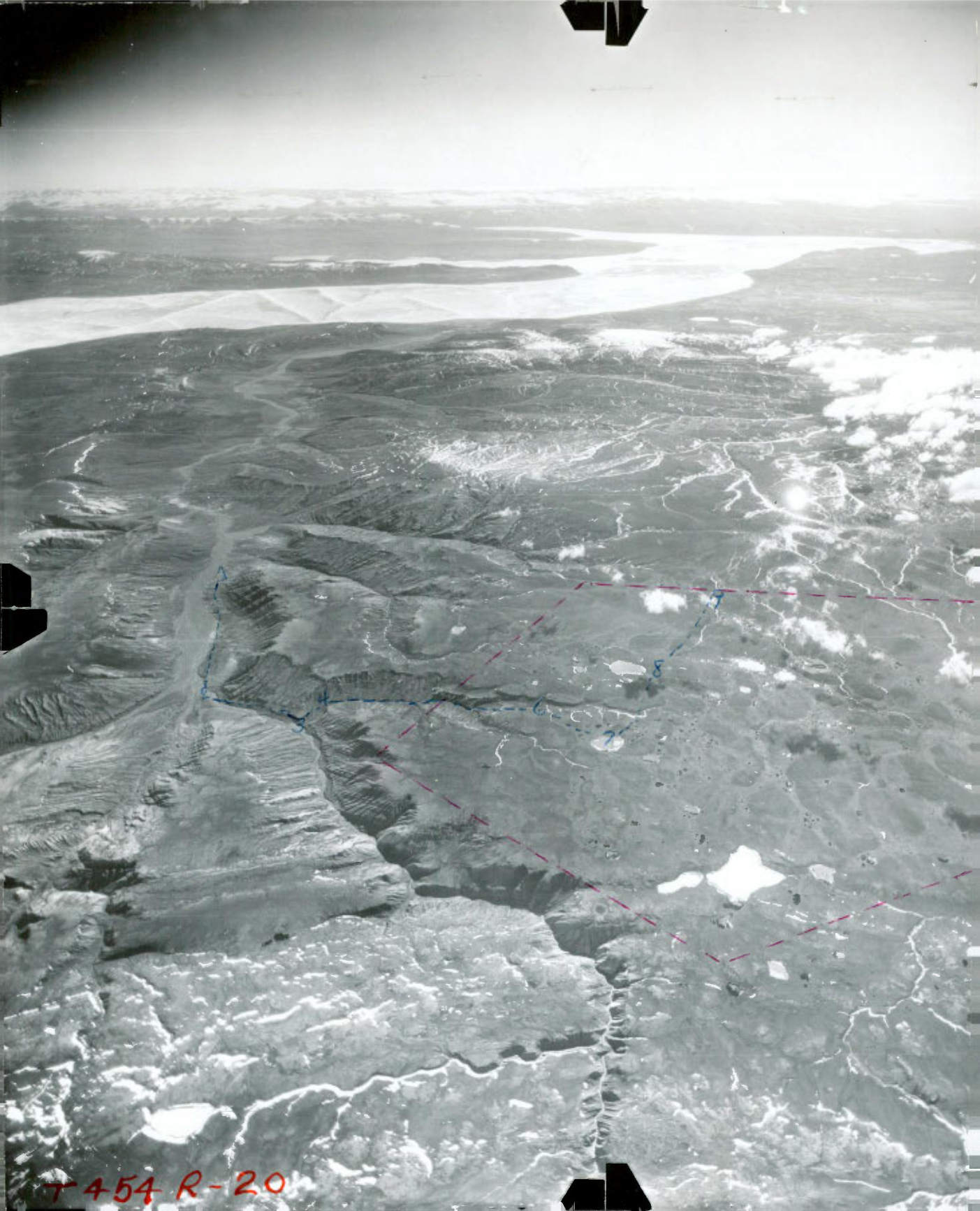
Photo No. 2. A close-up view of a typical gravel area. Note the lichen-covered and partially rounded sandstone boulders and the sparse clumps of purple saxifrage.

T16-7.

Photo No. 3. Lichen-covered, rounded cobbles on a plain of unconsolidated gravel.

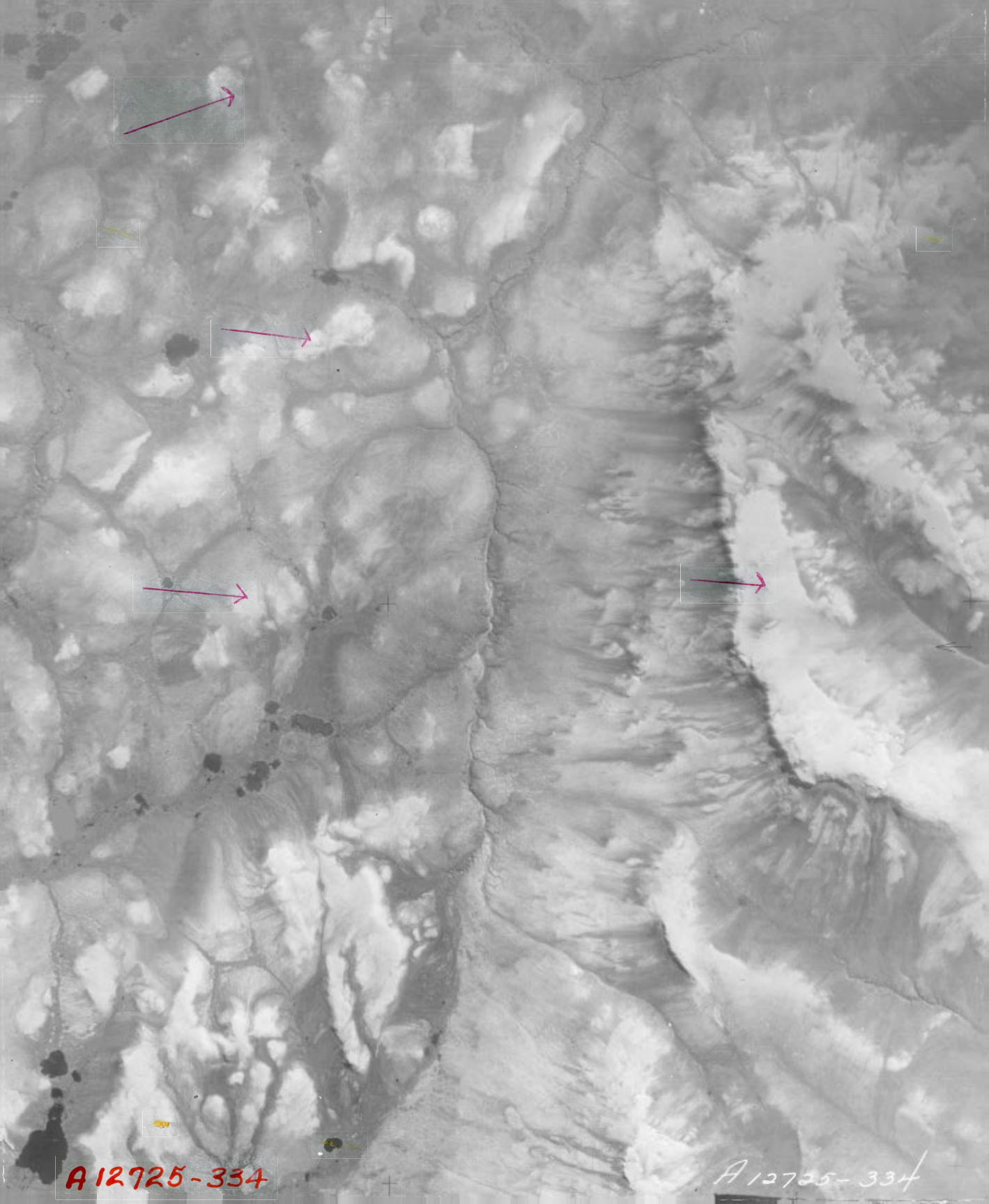
A12725-334: Prominent hills and ridges of unconsolidated gravel may be noted in the lower and right-hand portions of this photograph. Less well-defined mounds of gravel are common in the top left corner of the photograph. A general tone value of 1 or 2 prevails throughout.

T453C-203: A broad, flat plain of unconsolidated gravel covers almost the entire area of this photograph. The tone 2 or 3 gravel materials are crossed by frequent, shallow, marshy swales. Elsewhere shallow lakes and ponds occur in depressions. Note the scalloped appearance at the edge of the gravel terrace indicated by the double arrow.


T 454 R-20

T453C-203

T453C-203



A12725-334

A12725-334

8. SPARSELY VEGETATED FLAT OR GENTLY SLOPING TERRAIN:

(a) Photo Appearance.

Sparsely vegetated terrain of the type referred to here is usually confined to lowland areas. It most often occurs on the tops or sides of gently sloping hills, on flat, low-altitude plains, or on the flanks of the larger deltas.

In photo appearance these areas have a general tone value which ranges from 1 to 3. Sandy areas may be almost pure white while sandy-silt areas are correspondingly darker. The prevailing light tone is caused by the sparse vegetation cover.

This type may be distinguished from the unconsolidated gravel material previously discussed in the following ways:

(i) It is seldom so clearly defined in areal extent.

(ii) It usually has a slightly mottled texture.

(iii) Smoothly rounded hill profiles and steep slopes along the edges of the area are generally absent. Instead, the sparsely vegetated terrain merges gradually downslope with terrain having a much greater vegetation cover.

(iv) Frequently a clearly apparent pattern of polygons or circles can be detected on the photograph.

(v) Relief is seldom so pronounced as it is in unconsolidated gravels.

Often dendritic or trellis drainage patterns may be observed in areas of this type. The dark-toned drainage channels stand out clearly in the much lighter-toned background.

(b) Ground Appearance.

Terrain of this type is flat to gently rolling. Slopes seldom exceed 7 to 10 degrees.

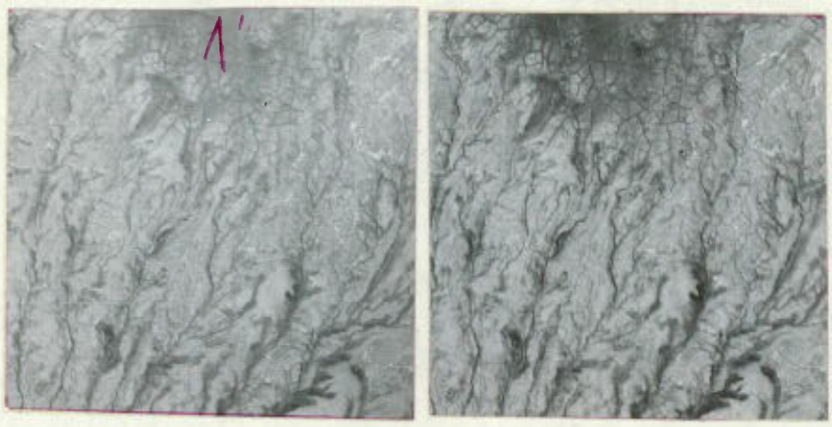
The surface material is often composed of residual rock material which so completely mantles the surface that little trace of the underlying structure can be seen. Sand, silty-sand and clay are the most common surface materials. In addition scattered sandstone boulders occur. These may be up to several feet in maximum extent but are usually much smaller. During the short summer season these materials are thoroughly dried by the sun and the wind. A hard-packed and sun-cracked surface results.

Drainage conditions in the coarse textured materials are excellent. The permeable nature of the sands and the greater depth to the permafrost surface in such material during the summer ensures good percolation.

Vegetation is very sparse. The surface cover may range from almost no vegetation at all to a maximum of 15%. In dry, sandy locations scattered clumps of bunch grass and a few willow mats may compose the vegetation cover in an area of several hundred square feet. Elsewhere a more complete cover of "barrens" vegetation consisting of willow, mountain avens, purple saxifrage, and bunch grass occurs. Always, however, it is the bare ground and scattered boulders rather than the vegetation which characterize the area.

(c) Examples.

1. A12725-114, 115.



A light-toned, gently sloping area in sandy clay. Shallow, V-shaped gullies drain toward Slidre Fiord. The darker tone of these gullies is caused by surface moisture and a thicker growth of vegetation. Occasional well-rounded and possibly wind eroded sandstone boulders are distributed over the surface.

Patterning may be noted in the top portion of the stereogram. Here, too, a slightly darker tone indicates a more complete vegetation cover of grass, avens, and willow. Elsewhere vegetation covers less than 5% of the surface area.

The very white, flaky patches which may be noted in the top right corner of the stereogram mark deposits of a white salt which covers the bare slopes with a layer only a fraction of an inch thick. This salt is deposited with the evaporation of surface moisture during the summer.

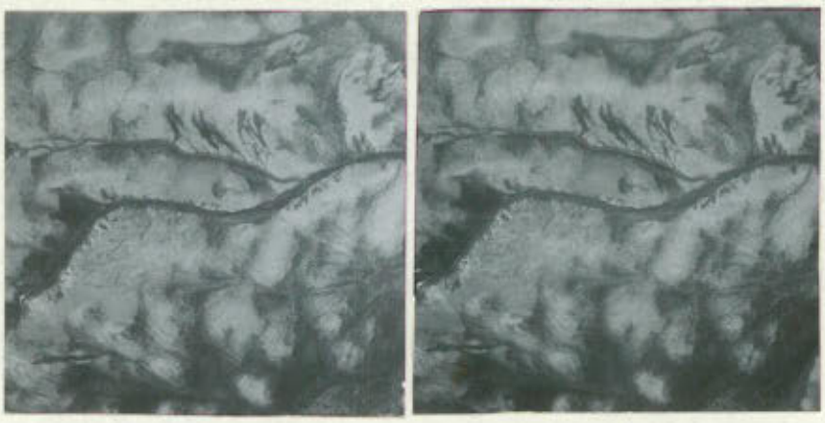
T20-6

Photo No. 1. Comparatively well-vegetated sandy clay slopes dropping to Slidre Fiord in the background. Eureka weather station is visible on the shore of the fiord. Note sandstone boulders distributed on the surface.

T23,8

Photo No. 2. Typical ground appearance in terrain of this type. The bare, sun-cracked ground, the willow mat, and the sandstone boulder are characteristic of these areas.

2. T403C 190, 191.



An area of sun-dried and cracked clay on the gently undulating land falling to Greely Fiord. The surface of the clay supports a 3% cover of willow mats and arctic avens. Occasional well-rounded sandstone boulders up to 12 inches in diameter may also be seen on the surface. The general slope of the land varies from 3 to 7 degrees and frequent shallow, well-vegetated melt water gullies cross the area.

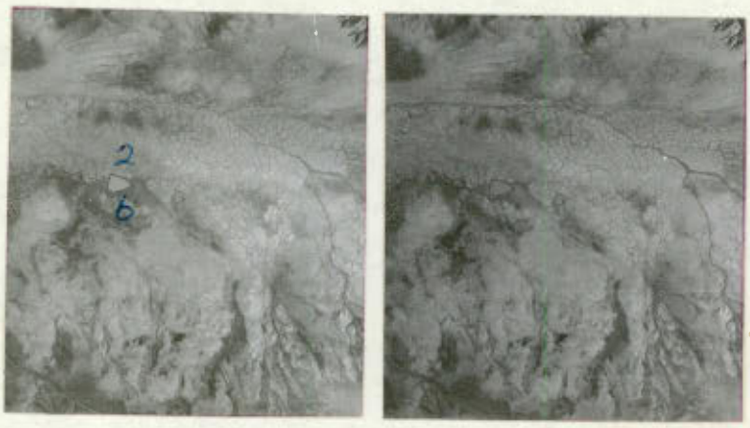
The fine, down-slope brush markings which are visible in certain areas of the clay are willow stripes. Faint traces of patterning are also visible in the lower portion of the stereogram.

The dark patches in the stereogram mark damp, depressional areas which support a continuous vegetation cover.

T23,6

Photo No. 1. Terrain typical of the type discussed above. Note the sun-dried and cracked appearance, the willow mats, and the scattered boulders.

3. T405C-118, 119.

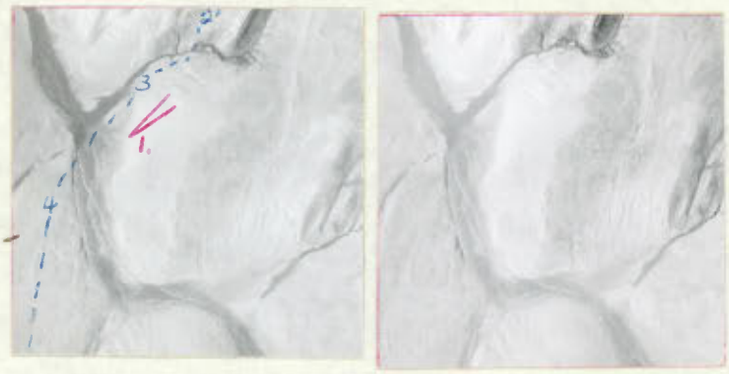


A broad, flat plain having a desert-like appearance rises, in the stereogram above, to a series of low, bare hillocks. The plain is composed of a surface material of dried and sun-baked clay and clay-sand. Vegetation consists of a 10% cover of willow and bunch grass. Occasional small sand blow-outs are present.

A very regular, repeating pattern occurs over the entire area of the plain. This pattern appears as a dark net super-imposed on the light-toned background. The fissures or rills which bound the patterns are several feet in width but are seldom more than a few inches deep. The polygons may be from 80 to 120 feet in maximum extent.

The slightly darker even-toned appearance which is apparent around the shallow pond in the stereogram is due to a thick growth of grass and sedge in the moist surface material at this location.

4. A12725-213, 212.



A coarse sand area covered with a thin veneer of small, well-rounded beach pebbles. It is the sandy material which gives the area the characteristic white tone. Vegetation consists entirely of scattered bunch grass and lichen.

Drainage conditions in the permeable sand are so good that even the braided stream which crosses the area has an unusually light tone. Traces of patterning may be noted in the central portion of the stereogram. Indistinct shadows marking the shallow linear depressions which limit the polygons are apparent.

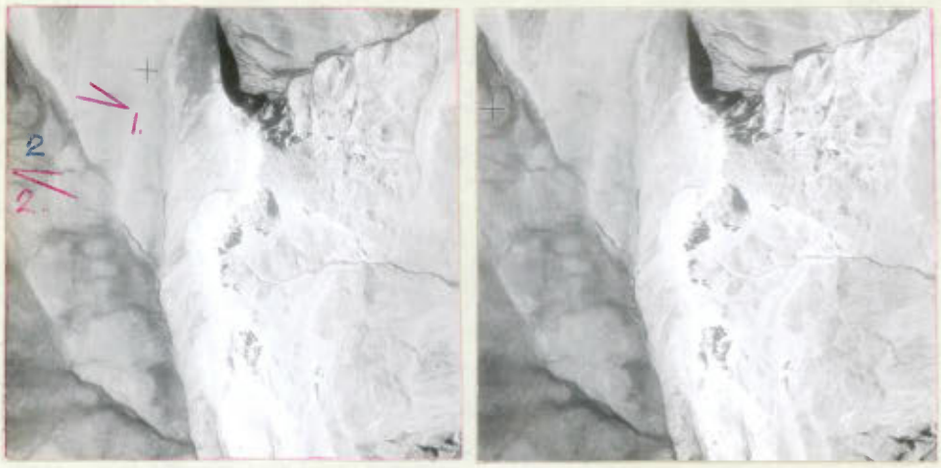
Small sand blow-outs, seldom more than 6 or 8 feet in width, occur on the surface.

Extensive white toned areas such as this may safely be interpreted as sparsely vegetated sandy tracts.

V5-3

Photo No. 1. Gently sloping sand plain with sparse vegetation consisting of grass and lichen. Note the beach pebbles in the foreground.

5. A12725-286, 285.



Residual sandy slopes having contrasting photo appearances are contained in the stereogram above. The left portion pictures a gently sloping surface of a dark, coarse sand. On this surface are scattered numerous angular fragments of sandstone. Vegetation is restricted to the dark-toned depressions in the area. It consists of a very sparse growth of willow and lichen.

The right portion of the stereogram exhibits the characteristic light tone of a residual white sand plain. Here, too, there is virtually no vegetation of any type. Quantities of loose sand cover the surface completely masking the underlying structure. Occasional low dunes of wind-blown sand are present.

The jagged, pinnacle-like structures apparent near the centre of the stereogram are the eroded remnants of a low sandstone escarpment. Sand and snow blasting has formed a series of high, fretted rock stacks.

T25-3

Photo No.1. Dark, coarse sand and angular sandstone fragments on the sloping terrain described above.

35-6

Photo No.2. View toward the sandstone escarpment described above. Scattered boulders may be noted on the sandy plain in the foreground.

(d) Discussion.

The terrain described in this section usually occurs on the tops and sides of exposed hills or on broad high level plains. In these locations strong winds prevent the accumulation of much snow. As a consequence they are usually snow free and dry in early spring. Where such sandy areas extend over considerable distances they provide ideal camping sites and convenient routes of march.

T405C-115: Sand flats flanking the Slidre River delta are indicated by arrows. The dendritic drainage pattern apparent on the terrain between the lake and the delta is characteristic of unconsolidated sandy areas. Fine, light-toned lines along the flanks of the delta mark the channels of earlier delta streams.

T19-2

Photo No.1. Bunch grass vegetation on the sand flats along Slidre River delta.

A12725-240: The light-toned areas on this photograph are bare, sun-dried flats of residual sand and silt which support a sparse vegetation of willow mats.

T-20-5

Photo No.2. Scattered willow mats on a sun-cracked surface of residual clay.

A12725-251: Long straight stream channels cross a bare, residual sand plain. A dendritic drainage pattern of dark-toned gullies has developed on the more rolling terrain in the lower right portion of the stereogram.

Tc-6

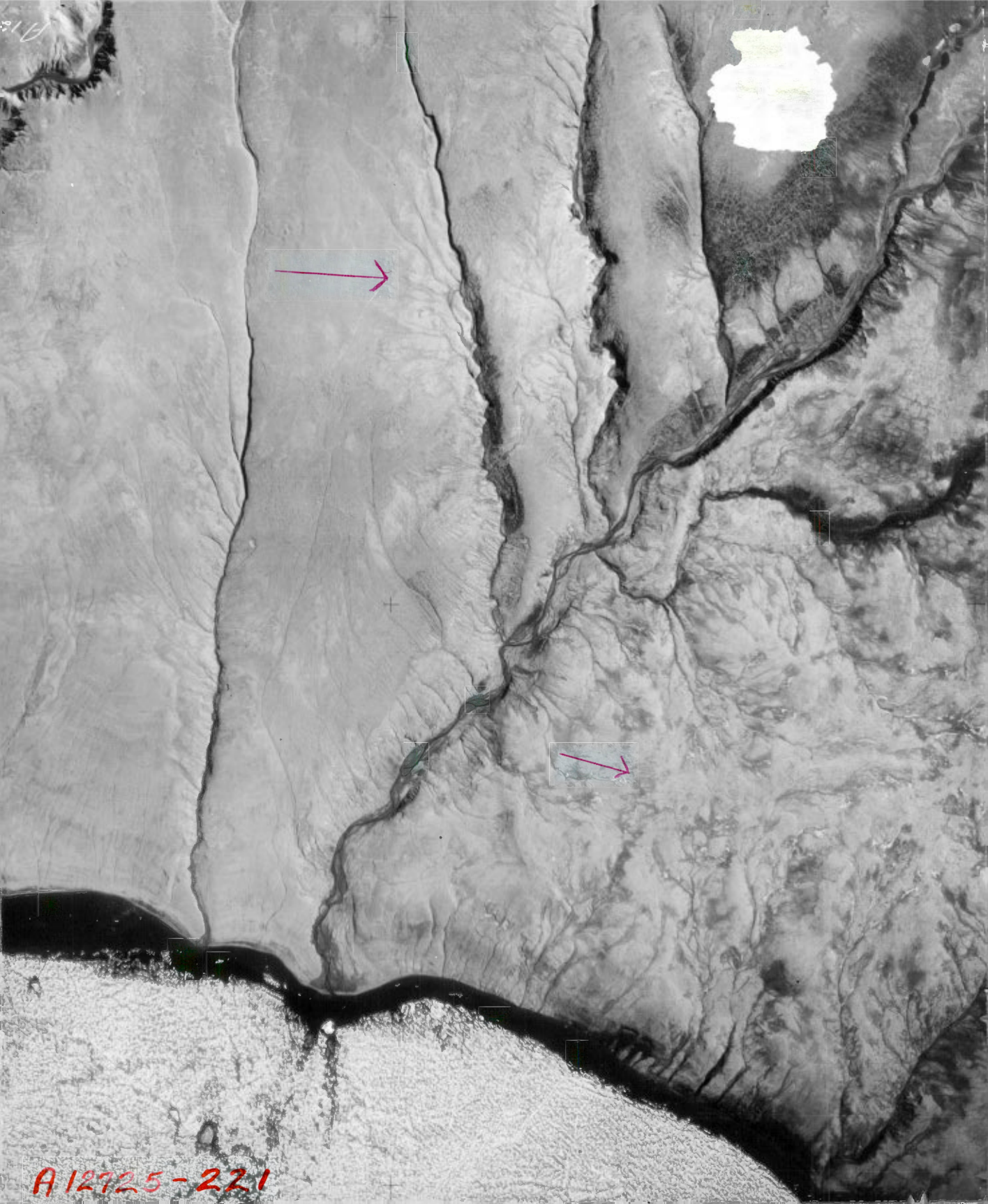
Photo No.3. A typical view on a sandy clay plain.

T490R-3: The white toned area in the centre of this photograph includes the area of photograph T405C-115. The delta, flanking sand flats, are clearly apparent.

T 405C - 115

A12725-240

A12725-240



A12725-221


T 490 R-3

9. WELL-VEGETATED FLAT TO MODERATELY ROLLING TERRAIN:

(a) Photo Appearance.

Well-vegetated terrain occurs as broad, rolling plains at low elevations or on moderately sloping valley sides. It may be found at the base of steep slopes, in shallow swales trending down-slope, or in large, poorly drained depressions near the headwaters of some streams.

The outstanding photo recognition feature of terrain of this type is its prevailing dark tone and smooth texture. Tone values ranging from 4 to 6 are most common. Occasionally a blotched or mottled texture may be noted. This mottled photo appearance is characteristic of small, well-vegetated depressions on the land surface.

Often the photo tone becomes darker down-slope. This is due to more moist surface conditions and to thicker vegetation cover. A similar difference in photo tone may be frequently noted on opposite sides of a vegetated valley. The darker side is usually the sheltered or shaded slope where snow banks remain longest in spring.

Patterned ground frequently occurs on well-vegetated terrain. The fissures bounding the patterns are apparent on the photographs as dark-toned lines enclosing the characteristic polygonal areas. Patterned ground is usually found on level or gently sloping terrain. It is seldom found on land having a slope greater than 8 or 10 degrees.

Small ponds and shallow lakes are often found in association with well-vegetated terrain.

(b) Ground Appearance.

Slopes in well-vegetated areas seldom exceed 15 to 20 degrees and are usually much less. Steepest slopes are usually on valley sides or on the lower slopes of massif areas.

Surface materials may be clay, sandy clay, or sand. Often the surface material is disturbed and may resemble a ploughed field. Low hummocks, 6 to 12 inches high and only a few inches apart, are distributed over many square miles in Fosheim Peninsula.

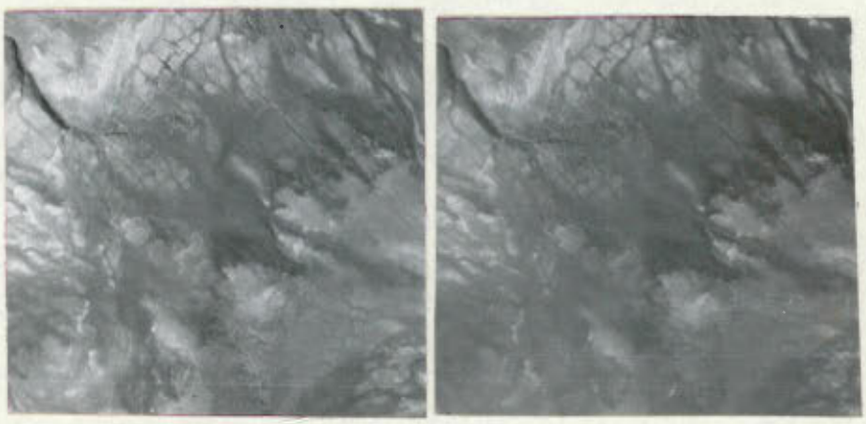
Well-vegetated terrain usually occurs in areas of heavy-textured surface material such as clay or sandy clay or in sandy, depressional areas. In such locations the surface remains moist throughout the summer. Drainage conditions are imperfect. The area may be marshy for a period of several weeks during the spring.

The vegetation cover usually exceeds 60%. In some areas it may approach 90%. On level to gently rolling plains arctic willow is the most common species closely followed by the mountains avens. Many types of flowering plants, grasses, mosses, and lichens complete the plant cover. On badly drained hillsides or in depressional areas grass tussocks and moss are common. Smooth, bright green carpets of short grass are common on slopes below snowbanks.

Ground patterns often occur in well-vegetated areas. These are discussed in Section 13.

(c) Examples.

1. A12725-184, 185.



A sloping, hummocky, well-vegetated hillside. Over most of the area the tone value ranges from 5 to 6. Traces of patterned ground may be noted. The texture is smooth.

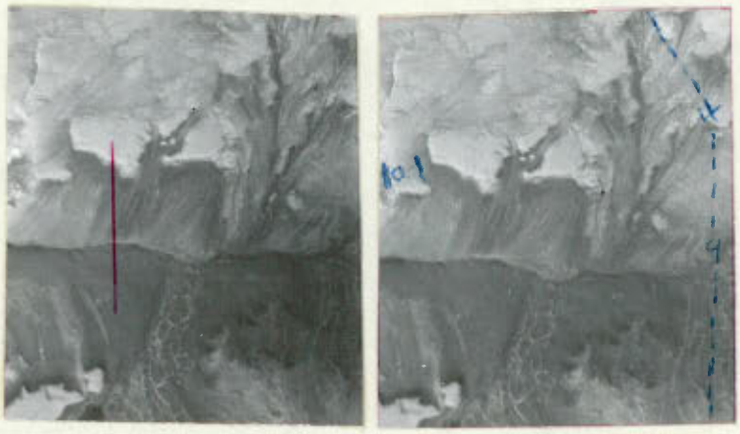
Vegetation consists of a 90% cover of willow, mountain avens, flowering plants on a surface material of sandy clay. The area is saturated and muddy during the spring but dries by mid-summer.

Slope varies from 5 to 7 degrees. Vegetation cover is much less in top left corner of stereogram.

TB4

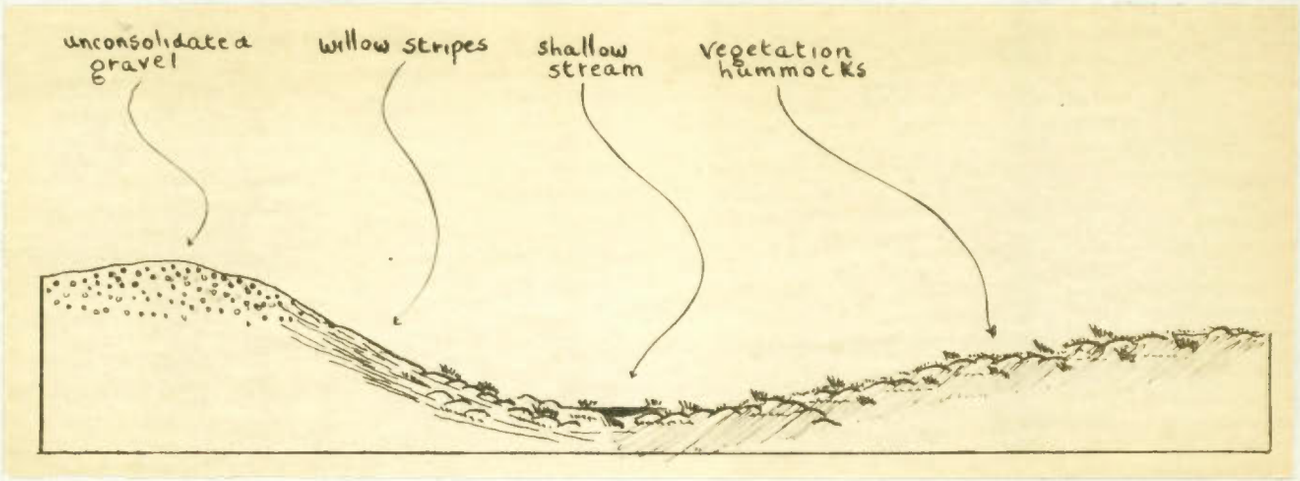
Photo No.1. Hummocky, well-vegetated terrain similar to that discussed above. Note the thick willow-avens-grass vegetation.

2. A12725-126, 127.

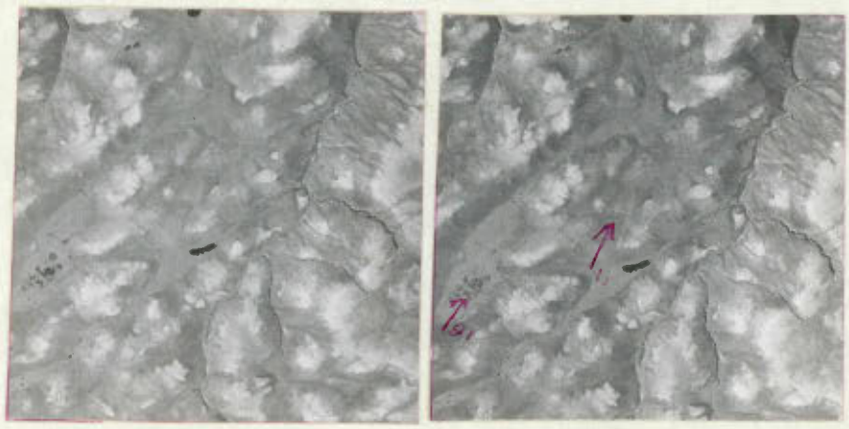


The broad, shallow valley in the lower portion of this stereogram has the usual dark tone (tone value 6). The grey clay surface material supports a lush vegetation cover consisting of willow, mountain avens, white heather, and grass.

Down-slope willow stripes are apparent on the upper side of the valley. The lower side is very hummocky. Slopes range from 6 to 12 degree.



3. T490C-10, 11.



Dark-toned (tone 6) areas in the stereogram above are well-vegetated, hummocky slopes on the sides of the bare, white-toned gravel hills. The hummocks increase in size toward the bottom of the slopes. They vary in height from 6 to 12 inches and have an average diameter of 15 inches. The tops of the hummocks support a thick cover of moss, grass and occasional willow mats. The crevices between hummocks are choked with white heather. The heather increases in occurrence toward the bottom of the slopes. Slopes seldom exceed 10 degrees.

Slightly lighter tone (tone 5) areas at the bottoms of the swales between the gravel hills are flat, non-hummocked, and marshy locations. Shallow ponds occur and the vegetation is composed of greater quantities of grass and sedge. Small grass tussocks and occasional low grass and moss covered hillocks may be noted.

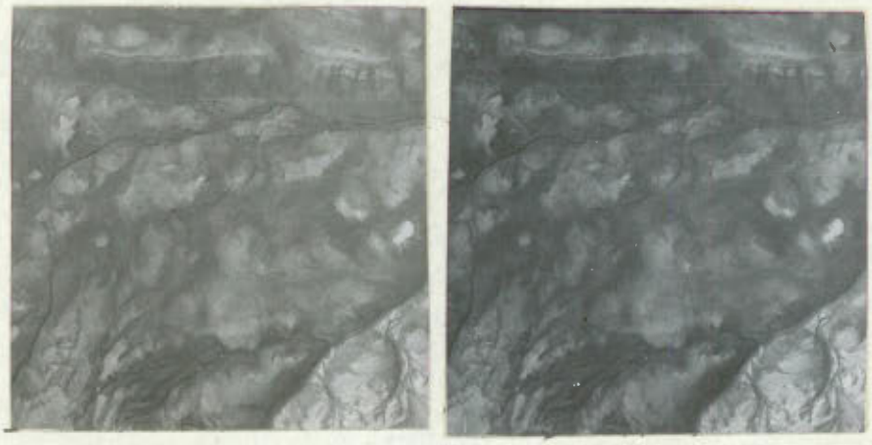
T4-3

Photo No.1. A hummocky, well-vegetated area ~~si~~ similar to the area indicated by the arrow in the stereogram above. Note the shallow fissure extending diagonally across the foreground of the photograph.

V4-2

Photo No.2. Scattered grass tussocks on a marshy grass and moss flat. A low, broad hillock can be seen beyond the tussocks. A similar area in the stereogram is indicated by arrow 2.

4. T4050-144, 145.



With the exception of the top left corner the entire area of this stereogram supports a vegetation cover exceeding 75%. The darker-toned areas along the broad, sluggish streams and between the low hillocks are disturbed clay hummock areas. Here the vegetation cover approaches 100%. Drainage conditions are poor. In the slightly lighter (tone 5-6) areas vegetation cover is less complete and consists of a 75%-80% cover of willow, flowering plants, and grass. The bare ground surface is dry and sun-cracked during the summer.

Slopes do not exceed 12 degrees. Down-slope stripes are not readily apparent.

(d) Discussion.

Well-vegetated areas do not generally provide good routes of march for either foot travellers or mechanical vehicles. Walking is almost invariably difficult in hummocky or tussocky areas. Unsteady footing on the tussocks and marshy conditions between, make progress tedious and tiresome. During the spring poor drainage conditions and the clay and sandy clay surface material combine to make foot travel almost impossible.

Mechanical vehicles would have much less difficulty than men on foot in travelling over well-vegetated terrain. It is doubtful, however, if such vehicles could cross the broad, marshy depressions which are found at the headwaters of some streams. It is most practical to follow the tops of well-drained ridges.

T405L-112: Almost without exception the dark-toned areas in this oblique photograph are well-vegetated. The arrows indicate valley sides or gently sloping hummocked areas. The dark-toned gullies in the foreground of the photograph also support a thick vegetation cover.

T17-7

Photo No.1. Hummocky, willow-covered terrain typical of the type indicated in the aerial photograph.

A12725-263: The arrows indicate areas in which the vegetation cover is well-developed. Many areas are prominently patterned. As in the above aerial photograph, all the dark-toned areas are thickly vegetated.

T7-1

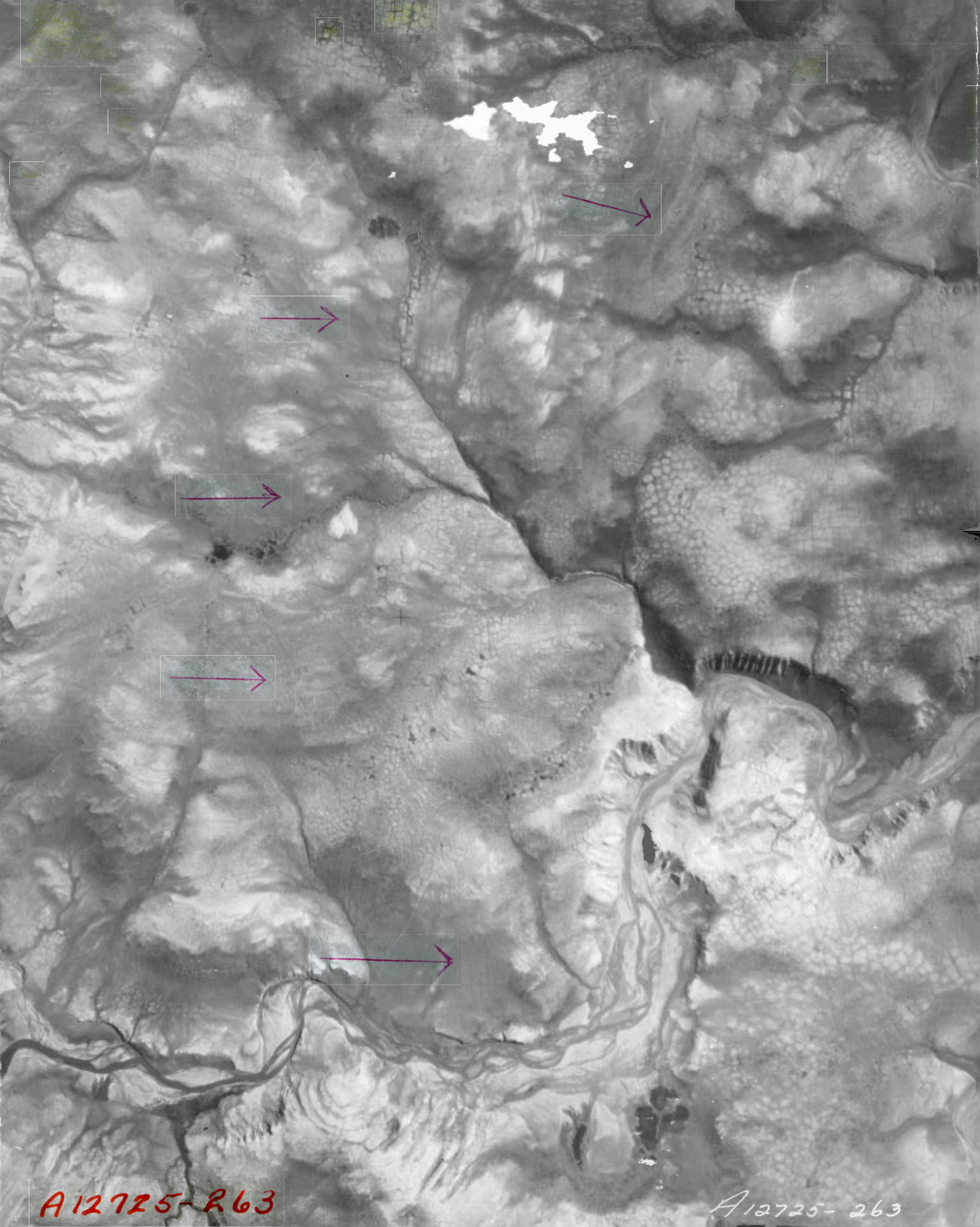
Photo No.2. Silty clay, hummocky tundra. Note the "ploughed field" appearance of the terrain and the willow-avens-grass vegetation.

T490R-11: Arrows indicate vegetation covered valley sides between unconsolidated gravel hills.

A12725-257: Arrows indicate vegetation covered, rolling plains. In general all dark-toned areas are well-vegetated. Variations in the intensity of the grey tones may be interpreted as indicating differences in the extent of vegetation cover. The lighter the tone the more scattered the vegetation.

T4050-11: Arrows indicate well-vegetated slopes. Darker tones may be noted on linear drainage swales.


T405L-112
T405L-112



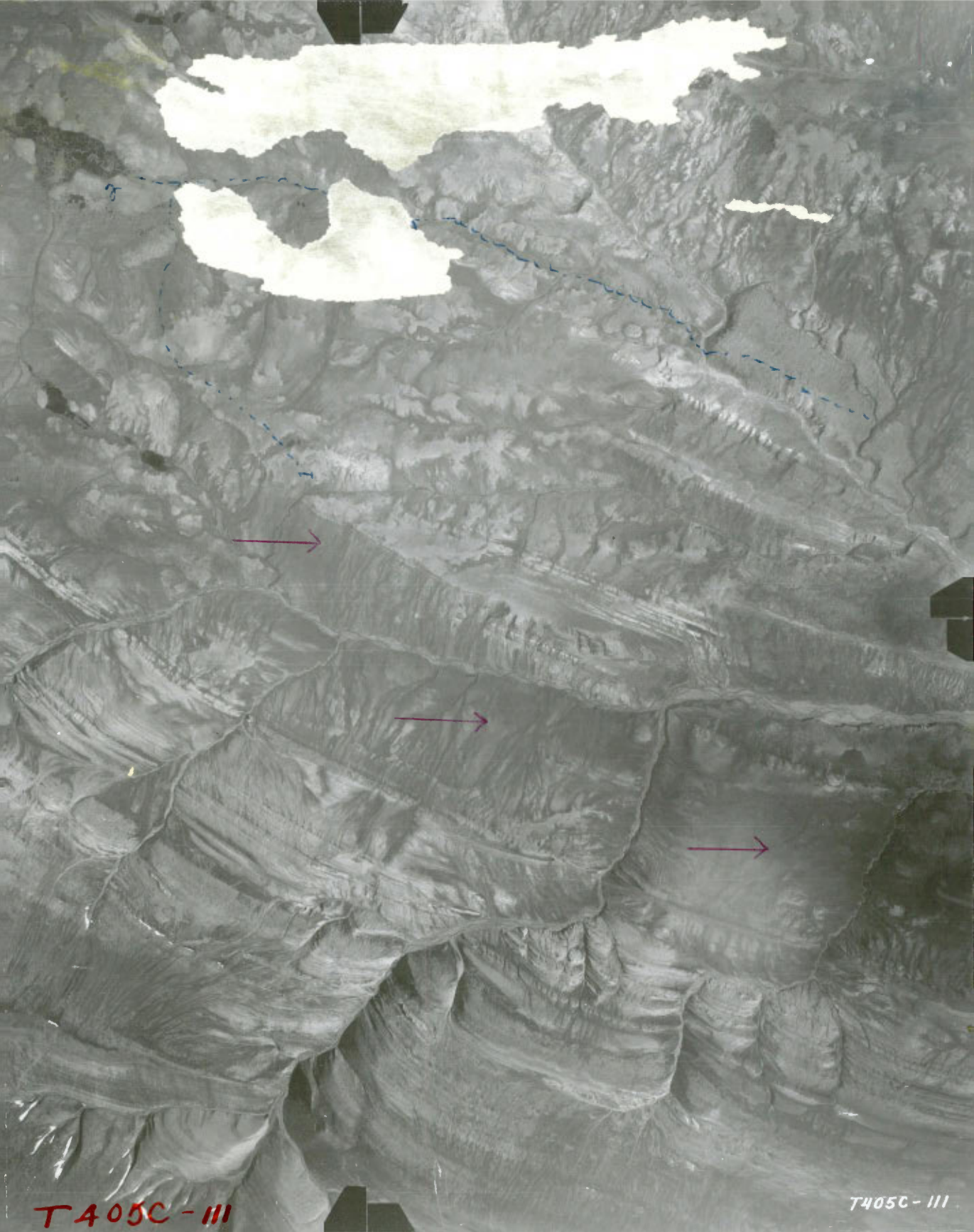
A12725-R63

A12725-263


T490R-11

A12725-257

A12725-257


T405C-111
T405C-111

10. HEATHER PILLOWS:

(a) Photo Appearance:

Heather pillows are low, broad mounds composed of clay or sandy clay. They may be several feet in diameter and are 18 inches to 2 feet in height. A thick growth of arctic heather covers them with a smooth, dark green blanket. Heather pillows occur in regular proximity to each other on the lower portions of gently concave slopes and are of such uniformity that areas in which they occur, when seen upon the ground, have a distinctly mammilated appearance.

Heather pillows have a characteristic very dark grey photo tone. Tone values ranging from 8 to 9 are common. Only shadows, water bodies, and certain rock structures are darker.

On low level aerial photographs heather pillows often have a slightly stippled or speckled texture.

They occur most frequently at the base of steep sedimentary rock outcrops, on the upper portions of snow-flush slopes, and along the valley sides of small streams.

Heather pillows often occur in association with prominently patterned ground. Frequently pillows are found on the raised rims of depressed centre polygons. Broad polygons on the upper portions of gentle hillsides sometimes merge downslope into typical pillows.

(b) Ground Appearance.

Heather pillows most frequently occur on slopes ranging from 6 to 12 degrees. They may, however, be well-developed on the comparatively level terrain on the banks of small, sluggish streams and on steep slopes associated with rock outcrops.

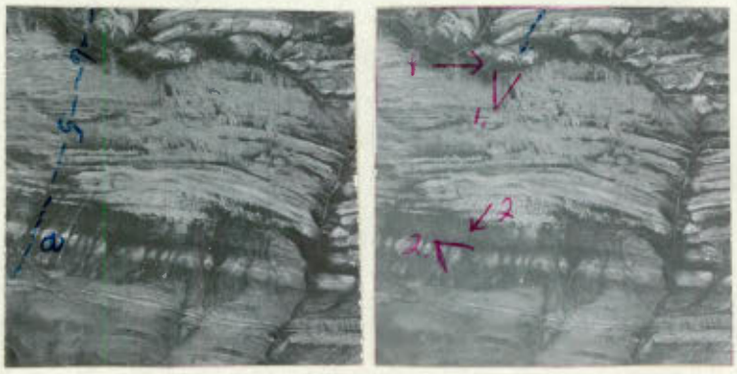
Pillows are composed of a mixture of mineral and organic materials. The core of the pillow is usually formed of clay or sandy clay to which has been added a quantity of decaying vegetable matter. During most of the year the pillows are frozen solidly. For a brief period during the summer the surface portions thaw leaving a hard frozen core. Frequently the depressions between the pillows contain ice until mid-summer.

Drainage conditions are imperfect. Often pools of standing water occupy the depressions between the pillows.

Although arctic (white) heather is the most common vegetation type other species do occur. Willow mats, flowering plants, grasses and moss are all found in small quantities. The vegetation cover is usually complete.

(c) Examples.

1. T403C-184, 185.



The very dark-toned area indicated by the upper arrow in the above stereogram is a well-vegetated, comparatively steep valley side. The lower portion of the slope is completely covered by heather pillows. These pillows are a maximum of 3 feet in width and are separated by intervening fissures 18 inches deep. Toward the top of the slope the pillows become less pronounced and patterning is more evident. The patterns are not visible in the stereogram.

The lower arrow indicates an area of heather pillows on a short, 7 degree slope at the base of a rock outcrop. The pillows are formed of residual sand completely covered by a heather-willow vegetation. Drainage is poor and scattered sandstone boulders are distributed on the surface.

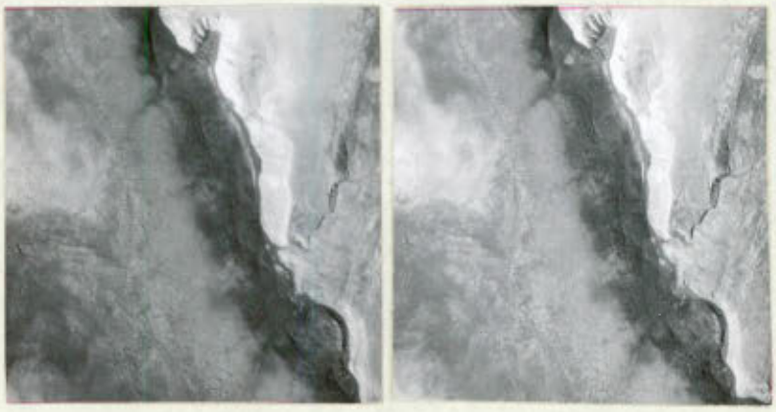
T64

Photo No.1. Heather pillows on the sides of a small valley. Note the vegetation-free, residual sand hilltop and the broad polygons.

T6-5

Photo No.2. Heather pillows on the slope indicated in the stereogram above.

2. A12725-281, 280.

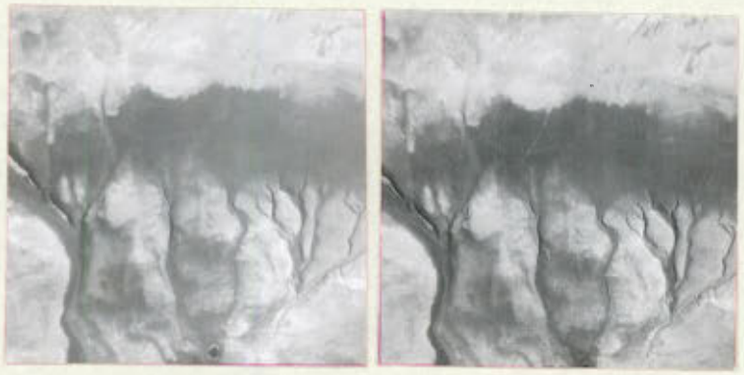


Typical heather pillows cause the dark (tone 8) area along the bank of the stream above. Polygonal patterns are well-developed in certain portions of the area.

T24-3

Photo No. 1. Heather pillows similar to those in the stereogram above. These pillows support a greater growth of willow than is usual in such locations.

3. A12725-272, 273.



Well-developed heather pillows on a 10 degree slope. Note how the pillows are concentrated in a band along the steepest portion of the slope. The area has a very dark tone value (tone 9).

(d) Discussion.

Areas of heather pillows cover relatively little total area in Fosheim Peninsula. They occur widely but in relatively small single locations. They offer little impediment to foot travel. It is not often that mechanical vehicles would find it necessary to travel up a heather pillow hillside.

T405L-120: Red arrows indicate areas of heather pillows along small stream valleys.

T490R-2: Red arrows indicate areas of heather pillows and large tussocks along stream valleys.

A12725-279: Red arrows indicate areas of heather pillows on gently sloping hillsides.


T405L-120
10
9
8
7a
6
7
1
2
3
4
T 405L-120


T490R-2

A12725-279

11. INTRUSIVE ROCK OUTCROP:

(a) Photo Appearance.

Extensive areas of intrusive rock occur in the high relief areas of Fosheim Peninsula. These rocks, primarily basalt and gabbro, are resistant, dark-coloured, and massive. They may occur as prominent ridges, as broad massifs, or as dikes or sills (see Section 3). It is the occurrence in massive form which concerns us in this section.

Areas of intrusive rock may be distinguished from areas of sedimentary rock by:

(i) The absence of well-defined linear orientation or parallelism.

(ii) The generally prevailing darker tone (tone 5 or 6), and

(iii) The irregular, cross-hatched pattern of darker joints and fracture lines within the area.

Often in areas of rugged relief and complex structure intrusive rock outcrops may appear on the aerial photographs as round or oval-shaped hills or low, linear ridges having smooth profiles. Usually in such cases a clearly apparent angularity or jagged irregularity marks the presence of a rock outcrop.

Intrusive rock areas often have a stippled or pebbly texture. Occasionally a network of very white lines covers such areas. These are easily distinguished from the repeating pattern in polygonal ground.

(b) Ground Appearance.

Intrusive rock areas occur almost exclusively in areas of high local relief. Slopes may range from horizontal surfaces to steep rocky and jagged cliffs.

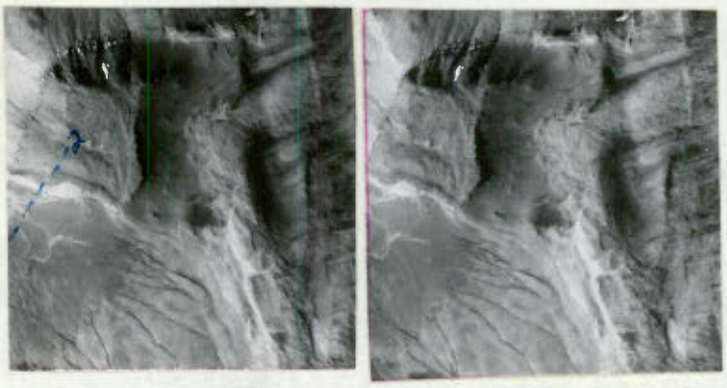
The rock surface may often be locally covered with a variable thickness of large, frost-shattered, angular rock fragments. Steep scree slopes composed of similar coarse, angular rock debris frequently fringe intrusive areas. Very often no cover of residual material is present. In such locations the rock surface may have a smoothly-rounded mammillated appearance.

Joints and fracture lines occur frequently in intrusive areas. These are exploited by the forces of erosion to form steep sided, narrow trenches which cross and intersect within the area. The sides of these trenches are often talus slopes composed of frost-shattered rock debris. It is on the poorly-drained floors of these troughs that most of the vegetation occurs. Thick clumps of grass and moss grow on the damper sites while willow, and a little saxifrage are found in drier locations.

On the bare, upland intrusive surfaces practically no vegetation survives. Scattered clumps of purple saxifrage cover a negligible surface area.

(c) Examples

1. A12725-227,226.



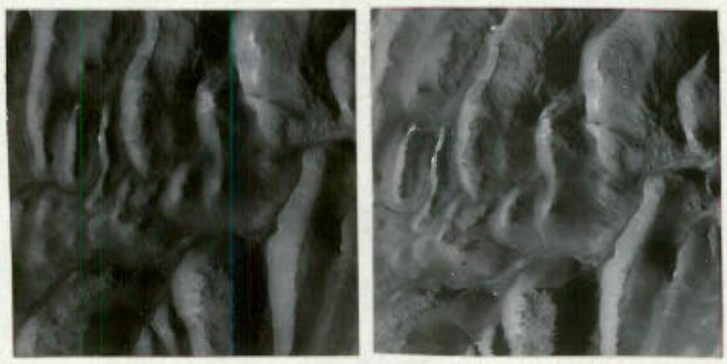
A small, mesa-like feature composed of black resistant basalt. The medium grey tone (tone 6) and stippled texture are characteristic of intrusive rock surfaces. Fine, dark lines on the irregular surface are joint planes. The hard, angular shaded areas near the break-in-slope at the edge of the mesa mark jagged outcrop faces.

The steep sides of the area fall to scree slopes composed of large, angular basalt fragments. Vegetation is very sparse over the entire area. A small amount of willow and aven grows in the shallow downslope drainage runnels. Clumps of purple saxifrage occur elsewhere.

T22-4

Photo No. 1. View toward basalt hill across slopes of frost-shattered, angular intrusive fragments.

2. A12725-352, 351.



A bedrock outcrop area which is not characterized by a linear pattern of outcropping sedimentary beds but by jagged, angular, and irregular outcrops of a dark fine-grained intrusive rock known as basalt. The basalt, in this location, occurs as a series of low, dissected ridges separated by steep-sided, rubble-filled valleys. Talus slopes of frost-shattered, angular rock fragments fringe the more prominent ridges. These are visible in the stereogram as very even-textured areas falling from the angular outcrop edges.

The photo tone varies but ranges, generally, from 6 to 9. The texture of the bare intrusive rock surfaces is stippled or pebbled.

Vegetation is restricted to a sparse growth of grass in the vallley bottoms and to occasional clumps of saxifrage on debris-covered hillsides.

Photo No.1. A general view in an intrusive outcrop area. Note the angular outcrop edges at the top of the slopes and the talus material at the base.

3. A12725-313, 312.

Intrusive outcrops occur in the stereogram above as round or oval-shaped hills. A clearly apparent angularity marks the outcrop edge from which fall scree slopes of variable steepness and composed of large angular basalt fragments.

The basalt has the usual 5 to 7 tone value and a pebbly texture where bare rock surfaces are exposed. Almost no vegetation grows in the above area.

T21-5

Photo No.1. A low basalt outcrop typical of the type in the stereogram is seen here. Note jagged outcrop edge at the crest of the hill and the scree slopes falling to the sparsely vegetated alpine meadow in the foreground.

T21-4

Photo No.2. Outcrops of hard, angular intrusive rocks form steep cliffs at the top of this scarp face. Note the steep angle of repose in the frost-shattered scree slopes.

T21-6

Photo No.3. Another view of typical intrusive outcrop ridges bounded by scree slopes.

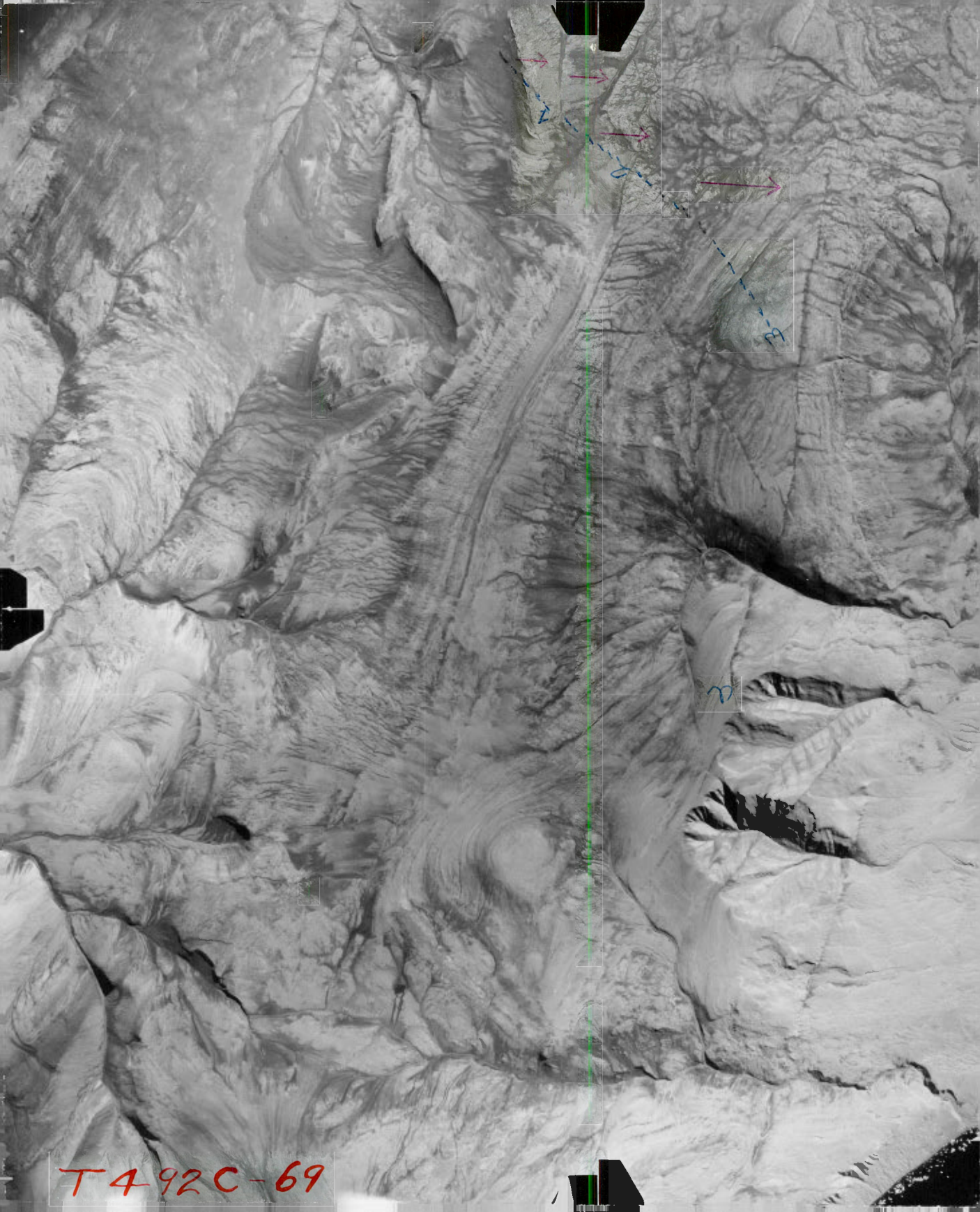
(d) Discussion.

Intrusive rocks outcrop in areas of high relief in Fosheim Peninsula. Although they may provide good surfaces for travelling upon they are seldom used for this purpose since level surfaces are not continuous over long distances. Often the steep-sided gullies which traverse intrusive areas may be used to a limited extent as routes of access to the interior.

T492C-69: An area of intrusive rock appears in the top right portion of this photograph. An irregular pattern of comparatively dark-toned lines mark joint and fracture depressions. The light-toned rock areas (tone 5) are irregular on the surface and may be locally covered with thin deposits of frost-shattered debris.

T490L-9: An oblique aerial view of the entire area of which the stereogram in Example 2 is a part. The dark tone of the intrusive rock ridges is apparent and a certain sub-parallel alignment of some of the ridges is noticeable. Prominent stream valleys may be seen trending across the intrusive rock structure in several places.

T492R-69: A continuation on the right oblique of the area described in the top right corner of photograph T492C-69 above. Arrows indicate fracture or joint planes.



T492C-69


1
L-490-9


T492R-69
3
T492R-69