SURFICIAL MATERIALS LEGEND
ELLEF RINGNES AND KING CHRISTIAN ISLANDS

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TEXTURE

Summary of grain size classes

The textural description of a map-unit is drawn from scattered field observations, shallow drill cores and sand: silt: clay grain size analyses; from estimates of the composition of depositional landforms identified on air photographs; and from estimates of the weathering products of source rocks.

In many units, materials are composed of more than one grain size class. In this case, classes air combined into a broader group (e.g. fines), or listed in the order of their importance.

c clay (<.004 mm)

si silt (.004-.063 mm)

¢ silt and clay undifferentiated (<.063 mm)

s silt and fine sand undifferentiated (.004-.25 mm)

f fines: clay, silt and fine sand undifferentiated (<.25 mm)

s sand; including fine sand if present (.063-2 mm)

g gravel, little or no fines (2-256 mm)

b boulders (>256 mm)

r rubble: angular rock fragments (>2 mm)
Note that the character of rubble is dependent on the source rock; e.g. consolidated sandstone may produce blocky fragments and sand, shale produces platy fragments and silt-clay. Refer to the rock formation-lithology superscript to determine the lithology of the source rocks.

o outcrop: exposed bedrock surface, rock intact though may be moderately weathered. Refer to rock formation-lithology superscript to determine lithology.

SYMBOLS

____ definite material boundary

_ _ _ approximate material boundary

..... assumed or gradational material boundary

⌒ tie line linking units with some designation

✳ gravel knoll (TQ or Q)

ıılıı scarp, >10 m high, >1 km long, developed on fine grained bedrock (scarps ubiquitous in coarse formations).

? expression of uncertainty

EXPLANATION OF UNIT DESIGNATION

The MATERIAL-GENETIC Term forms the core of the unit designation. It describes a certain range of landforms and materials.

The TEXTURAL MODIFIER provides more specific information on the grain size distribution within a material.

The ROCK FORMATION-LITHOLOGY SUPERSCRIPT provides detail on the composition of rock/residual units, using the notation from the relevant bedrock map of the area as the key. A stratigraphic formation unit, which may be composed of more than one lithology, is not the ideal mode for presenting lithological information; however a great deal more field work would be necessary to map out each lithology.

The maps provide base data on the character and genesis of surficial materials. A further description of materials, plus information on topography, drainage, geomorphic processes, ground ice content and vegetation is provided in the generalized map unit legend.

EXAMPLE

MATERIAL-GENETIC TERM

Marine sediment veneer over rock

TEXTURE

Clay and silt undifferentiated ——— ¢ $\frac{W}{R}$ Kc ——— LITHOLOGY SUPERSCRIPT

Christopher Formation: papery shale, minor sandstone, siltstone, nodules.

MATERIAL-GENETIC TERM

Identified from air photographs and by field observations

E Eolian deposits

Wind-blown material, usually sand or coarse silt, with a smooth or ripple marked surface. Eolian processes are most active on sandy fluvial and marine sediments and on poorly consolidated sandstone and siltstone, particularly where marine reworked. Deposits are commonly superficially indistinguishable from the source material, hence the term is used only where the eolian deposit has a different texture (usually coarser grained) than the underlying material. Thickness rarely >50 cm.

Fp Fluvial valley flat: channel zone and flood plain

Only valley flats wider than 100 m mapped. Most are straight or slightly sinuous with no or rare terraces, except for inactive delta surfaces. During peak discharge, at snowmelt, the whole channel zone is filled for 1-2 weeks. At lower water stages, flow is restricted to one or more narrower channels, rarely >1 m deep. A minority of valleys and channel zones are irregular to meandering in form, and only here are flood plains or terraces common.

Channel sediments only partially reflect materials through which a river passes; material from upstream sources, particularly where coarse grained, may dominate over the whole course. Even a minor outcrop of indurated rock may introduce gravel and boulder size material downstream over several km.

Ft Fluvial terrace

Inactive fluvially worked surface at higher elevation than laterally adjacent valley flat, and usually separated from it by a bluff 1-10 m high. Only terraces wider than 100 m mapped.

Fpf Fluvial valley flat and terraces indivisible at the scale of the map.

Ff Fluvial fan

Fan shaped terriginous deposit of stream sediments, common where a stream gradient abruptly decreases and/or flow is no longer confined by channel banks. At peak snowmelt, the entire fan surface may be under a thin (few cm) sheet of flowing water, which forms low ripple marks. Flow is soon confined to one or more shallow channels and for much of the summer the fan is dry.

Thickness rarely >2 m; material generally sand.

Fd Fluvial delta

Sediment deposited where a river enters a large relatively static water body (in the map area, the sea). Active deltas are invariably fan shaped, with an arcuate front which may thrust up to 2 km beyond the adjacent coastline, indicating little wave or current erosion, or lateral deflection of the channel. Prograding due to sediment deposition, together with the relative fall of sea level over the last 9000 years has advanced the delta front as much as 20 km seawards on some rivers, though 1-10 km is more common. As a result, the modern channel is incised 2-30 m into older deltaic sediments, over this distance. The inactive surface is usually higher than the laterally adjacent marine plain. Deltaic sediments older than Holocene are preserved locally.

Thickness of sediments exceeds 30 m in larger deltas. Succession normally silty clay bottomset beds overlain by transitional fine to coarse foresets, overlain by coarse (usually sand) topset beds. However, all beds may be of fine or coarse materials depending on source materials in the drainage basin.

Affix 'A' indicates an active delta surface, 'I' indicates on inactive usually raised surface.

C Colluvial deposits

Material displaced or altered by rills or mass wasting processes to such a degree that it markedly differs in texture and/or structure from subjacent material. May occur on slopes of any angle. However material on most slopes does not fall under this definition of colluvium.

$\frac{C}{R}$ Colluvial veneer

Deposit of colluvium, <2 m thick (and often much thinner) over rock/residual material.

W Marine sediments-undifferentiated

A generally planar surface of marine sediments deposited in a low energy environment (i.e. generally ice covered sea), and uncovered by the relative fall in sea level over the last 9000 years. Includes nearshore and offshore sediments, marine reworked underlying deposits (chiefly rock), ice-rafted sediments, and minor (i.e. inseparable at mapping scale) beach deposits and fluvial and deltaic sediments of minor drainage lines. Overlain by eolian sediment where adjacent to (usually to SE of) a suitable sediment source.

Composition varies from medium sand to silty clay and may be similar to or quite different from texture of underlying bedrock. The bedrock contact may be transitional or sharp, with scattered evidence of thin onlap beach gravels. Rarely >5 m thick; thickness commonly decreases inland to a feather edge.

$\frac{W}{R}$ Marine sediment veneer

Veneer, <2 m; may be thicker in valleys, much thinner on divides. Underlying bedrock commonly exposed in stream cuts.

Wb Beach sediments

A single beach berm, or flight of ridges and swales. Although a low sand beach berm is commonly developed along much of the modern shoreline (even where inland sediments are fine grained), ridges are rarely preserved inland, probably because predominantly sand size material is readily windblown (see W(b)). Where present, raised flights are of gravel, or sand and gravel.

W(b) Sandflat 'beach'

Generally planar sand or silty and nearshore marine sediments in a zone extending from 0.1 to 5 km inland from the present shoreline. Distinctive striped pattern on airphotos resembles close-spaced beach ridges. On the ground, stripes have no or little morphological expression and mark moisture differences. Sediment thickness generally 1-2 m over sandstone or siltstone. Commonly transected at close-spaced intervals by fluvial fans and wide braided channel zones.

Q Quaternary fluvial sediments?

Linear, in places winding subdued ridges of gravelly silty sand; gravel of similar lithology to TQ. Possibly fluvioglacially reworked TQ? Thickness >5 m.

TQ Late Tertiary or Quaternary fluvial sediments?

Flat lying to rolling plateau remnants developed on unconsolidated sand, fines, gravel and boulders which unconformably overlie Mesozoic sediments, and commonly function as a capping rock. Gravel and boulders round to angular; dominantly quartzose sandstone, minor siltstone, gabbro, limestone, granite. Stratified sand with rare non-carbonised wood to 5 m thick, also observed, probably underlying the gravel places.

Conjectured to be a remnant of a Quaternary or older sheet of fluvial sediments which formerly covered lower, less resistant lithologies of the eastern Queen Elizabeth Islands.

RW Marine-washed rock

A morphologically subdued form of the rock units described below. Between present sea-level and ca. 50 m bedrock has been repeatedly washed, reworked or planed during higher Quaternary or older sea-levels.

A discontinuous veneer of marine sediments (see W) is commonly present, and may introduce coarse materials into predominantly fine grained bedrock units, and fines into coarse units.

Note on marine limits:

There are no clearly defined Holocene or older marine limits. Marine sediments feather out at a variety of elevations, and planed bedrock grades to dissected rock units. However, radiocarbon dates of marine molluscs indicate that the Holocene limit (at ca. 9000 B.P.) is >100 m on Cornwall Island, and eastern Amund Ringnes Island, and decreases northwestwards to ca. 50 m in west central Ellef Ringnes Island.

R Rock/residual material

Bedrock; commonly mantled by residual weathered material 0.5-2 m thick on all but the most resistant lithologies or where slopes are steep and erosional processes highly active. Erosion, chiefly fluvial has continued over an indeterminate time span. This unit may extend below the marine limit where relief is rugged and marine sediments either not deposited or eroded away.

The composition of materials can be determined from:

1) the textural modifier (note that 'o' denotes outcrop of fresh to moderately weathered rock).

2) the rock formation-lithology superscript (see adjacent description.

ROCK FORMATION-LITHOLOGY SUPERSCRIPT

Descriptions of the bedrock are based chiefly on reports by Balkwill (1973, 74), Balkwill and Hopkins (1976), and Stott (1969).

Typical weathering products and residual materials were examined in the field in 1976-77.

KTe-u Eureka Sound Formation - informal upper member

Sandstone, poorly to noncemented, with minor beds of mudstone, gravel, lignite and carbonized wood.

Weathers to fine to medium grained sand with a discontinuous lag gravel cover and local thicker gravel deposits.

KTe-l Eureka Sound Formation - informal lower member

Sandstone, mudstone, shale; poorly consolidated, transitional from Kanguk shale.

Weathers to fine sand to silty clay, minor sandstone, mudstone and shale rubble.

KTe Eureka Sound Formation - undivided

Kk Kanguk Formation

Black, soft, papery, slightly silty shale, with abundant ironstone nodules in upper part. Minor siltstone beds support prominent escarpments.

Weathers to clayey silt, papery shale rubble, with discontinuous veneer of ironstone nodules. pH 3-5; liquid limit 41-55; plasticity index 1-20.

Kh Hassel Formation

Succession of generally poorly cemented fine to coarse grained sandstone, minor siltstone and carbonaceous shale.

Weathers to fine to coarse grained sand, minor silt or clay (discrete or intermixed), discontinuous sandstone rubble veneer, minor outcrop of well cemented sandstone. pH 6-7.

Kc Christopher Formation

Shale, soft, with glauconitic sandstone interval in middle. Numerous calcareous siltstone and ironstone small to very large (>2 m) concretions.

Weathers to silty clay. Scattered granule to boulder size concretions and nodule fragments; locally concentrated in stream courses. pH 5-9.

Ki Isachsen Formation

Poorly to noncemented sandstone, minor siltstone, shale, coal and conglomerate. Lower part of formation is massive quartzose sandstone, locally well cemented.

Weathers to strike aligned bands of fine to coarse grained sand, lesser silt, minor clay. Minor outcrop of consolidated sandstone beds. Lag cover of granule to cobble size sandstone and siltstone rubble. Relatively resistant though differentially eroded. pH 6-8.

JKd Deer Bay Formation

Papery shale, poorly lithified.

Weathers to clayey silt. pH 3-8.

Pe Diapiric domes

Dominantly gypsum, with anhydrite, limestone and dolomite.

Weathers to large crystals to granules of gypsum, solution pitted outcrop, minor limestone and dolomite rubble.

I Intrusive rocks

Inclusions of very fine to coarse grained diabase, basalt and gabbro, in diapirs.

Moderately to highly weathered outcrop; also breaks down to granule to boulder size rubble, minor silt, sand and clay.

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