FIELD WORK IN THE NÛGSSUAQ EMBAYMENT, WEST GREENLAND

Project 750036

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During the 1976 field season, the authors participated in one month's field work in central West Greenland between 70° and 72°N. The project was undertaken in conjunction with geologists of the Geological Survey of Greenland. From a base camp at Marrait kidlît on southwest Nûgssuaq Peninsula (Fig. 18.1), coastal sections were reached by the **M/V Steenstrup**, a vessel owned by the Geological Survey of Greenland. Remote and inland areas were visited by chartered helicopter. A total of 19 sections were investigated (Fig. 18.1). Lithologic and palynological analysis of the sample material collected at these sites will be conducted to confirm postulated ages of earlier workers and permit correlation with offshore areas of Eastern Canada.

All sites visited are in the Nûgssuaq Embayment, the site of a Cretaceous to Paleocene delta. The delta complex is between the Greenland landmass to the east and a central, north-trending basement high to the west (Fig. 18.1). An excellent evaluation of the Nûgssuaq Embayment and a description of its sedimentary facies, has recently been published by staff members of the Greenland Geological Survey (Henderson et al., 1976). Sediments within the embayment are mostly nonmarine and have been deposited in fluviatile and deltaic environments from a southern source (Table 18.1). The facies' belts trend east to west. Rare marine tongues are found as far south as south-central Nûgssuaq Peninsula, while on its north coast prodelta marine muds having a predominantly marine aspect occur. Scattered Cretaceous outcrops to the north, on the east coast of Svartenhuk Halvø, appear to have had local sediment sources, and were deposited in fault-generated depocentres not related to the deltaic complex.

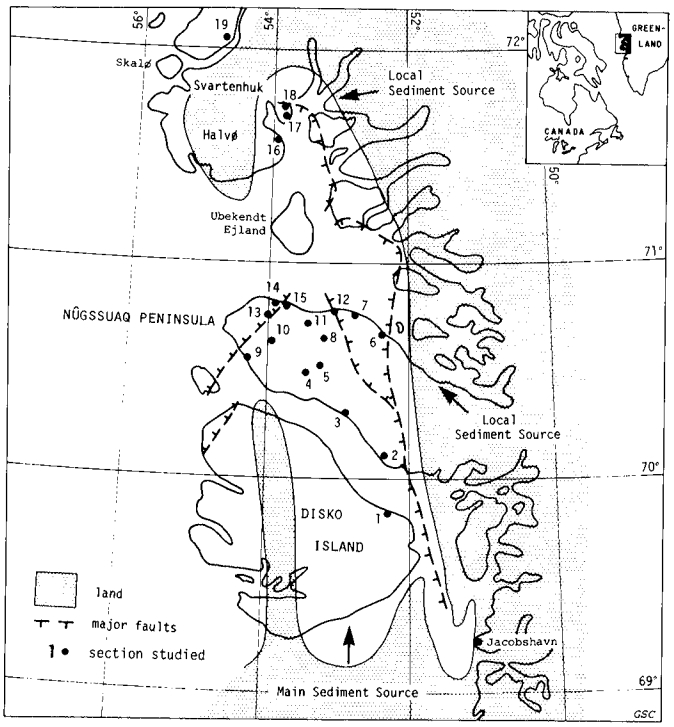
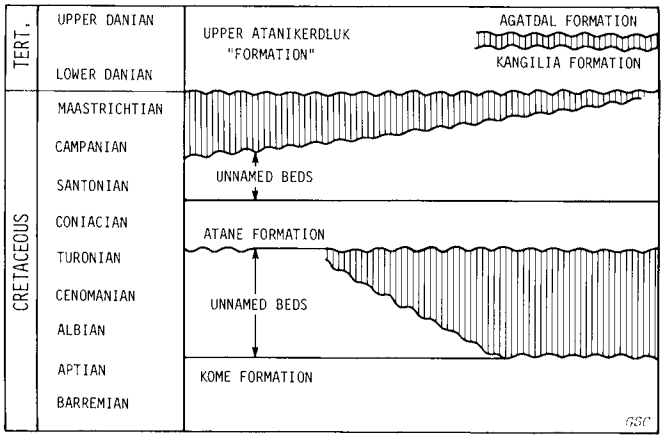


Figure 18.1. Paleogeographic map showing the localities investigated and sediment transport directions of the Cretaceous-Tertiary rocks of the Nûgssuaq Embayment, modified after Henderson et al., 1976.

Table 18.1

Generalized stratigraphy, Nûgssuaq Embayment.



Late Cretaceous to lowermost Tertiary sand and shale sections were measured on the northeast coast of Disko Island, and on the south coast of Nûgssuaq Peninsula. Farther north, scattered outcrops of poorly-exposed sediments of Lower Cretaceous to possibly Eocene age were visited. The so-called "burning shales", at a classic locality near Niaqornat on the north coast of Nûgssuaq were sampled extensively (locality 15, Fig. 18.1).

Sediments of the embayment are covered by very thick (5 km) basalts, which onlap the adjacent Precambrian terrane. The basalts consist of several discrete units. The lower breccia unit, locally up to 1 km thick, was extruded from the west and deposited in shallow lagoons of the delta complex during the early Paleocene. This was followed by a period of appreciable tectonic activity. Overlying units consist of subaerially-extruded varieties of olivine to feldspar-phyric basalts which locally contain interbasaltic nonmarine sediments. Final stages of volcanism are marked by diverse extrusives including, locally, acid lavas and pyroclastics.

Exposures are generally poor for several reasons, such as: the friable nature of the various sand units; the incompetence of the shales; post-extrusive faulting causing extensive large scale slumping of overlying brecciated basalts – a feature aggravated by undercutting due to recent marine erosion; and the severe erosion by continental glaciers during the Pleistocene. The problem

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of poor exposures, coupled with the similar nature of the predominantly nonmarine shale sequences, has led to doubtful correlations between exposures. It is expected that proposed palynological work to be performed at the Atlantic Geoscience Centre, will make future correlations more reliable.

Localities within the Nûgssuaq Embayment investigated during the 1976 field season (Fig. 18.1) are:

A. Disko Island

1. Nûgârssuk, west of Pingo 69°49'N 52°12'W — Atane Formation (Upper Cretaceous): massive current-bedded sandstones with coaly streaks, pebble bands, concretions, petrified tree trunks and coalified wood.

B. Nûgssuaq Peninsula

2. (i) Atanikerdluk 70°04'N 52°18'W — Atane Formation (Upper Turonian-Coniacian): massive fluvial sandstones with interbedded fossiliferous shale and thin coal beds.

   (ii) Atanikerdluk 70°05'N 52°21'W — Upper Atanikerdluk Formation (Early Tertiary (Upper Danian)) consisting of four members: (i) Quikavsak Member – "estuarine" sandstone and shales; (ii) Naujât Member – marine shales; (iii) Umiussat Member – quartz sandstone with interbedded siltstone and shale; (iv) Aussivik Member – black, bituminous shale, overlain by coarse sandstone.

3. Atâ 70°19'N 52°57'W — Atane Formation (Upper Turonian-Coniacian) and the Kangilia Formation (Danian): dark shale overlain by Quikavsak Member.

4. Auvfarssuaq Valley 70°27'N 53°28'W — Maastrichtian-Santonian alternating shales and fluvial sandstones overlain by Danian shales.

5. Auvfarssuaq Valley 70°27'N 53°27'W — Upper Cretaceous-Danian contact and unconformity between the Upper and Lower Danian sandstone/shale sequence.

6. Kûk 70°39'N 52°22'W — Rhyolites (including aquagene tuffs), laterite and ferric paleosols overlying a basal conglomerate of quartzite pebbles (equivalent to the basal Kome Formation).

7. Qaersut 70°45'N 52°45'W — Basal sandstone with plant remains, overlying deeply weathered basement.

8. Agatdalen 70°35'N 53°08'W — Kangilia and Agatdal formations (Upper and Lower Danian): See Rosenkrantz's (1970) classical marine sequence. A thick (5 m) conglomerate overlain by Upper Danian marine black shale, of the Agatdal Formation. The concretions are derived from Maastrichtian age sediments, within a Danian matrix and in turn is overlain by Danian.

9. Marrait kidlît 70°32'N 54°13'W — Upper Danian – fossiliferous limestone-volcanic breccia. The limestone has been injected upward into extruded pillow lavas. Similar breccias occur in the Triassic Karmutsen Formation of the Queen Charlotte Islands (Sutherland Brown 1968).

10. Itivdle Valley 70°36'N 54°03'W — Highly weathered Danian shales riddled by Tertiary dykes.

11. Tunorssuaq 70°43'N 53°28'W — A Lower Danian lithostrome consisting of Upper Danian-Eocene(?) reworked shales, containing massive fragments of volcanic breccia and conglomerate.

12. Ikorfat 70°46'N 53°03'W — Kome Formation (Lower Cretaceous (Aptian)): unconformably overlain by Albian/Cenomanian Atane Formation.

13. Kûp qûororssua 70°46'N 54°03'W — Ifsorisok Formation (Early Tertiary): interbasaltic sediments with light spotted shales and cleaved basalts, and some coaly material.

14. Nûluk 70°49'N 54°03'W — Ifsorisok Formation (Early Tertiary): interbasaltic sediments composed of volcaniclastic sediments plus alternating tuffs containing rootlets and coal seams.

15. Niaquornat 70°48'N 53°43'W — Late Cretaceous "burning shales" that are the result of surface oxidation of black shales, producing a sulphurous odor and reddish tinge on the sediments.

C. Svartenhuk Halvo Peninsula

16. Niagornakavsak 71°35'N 53°53'W — Cretaceous marine shales, overlying Precambrian basement.

17.	Southern Itsako Peninsula 71°38'N 53°48'W	An exposed basement high, found to have basalt flows with chilled margins and overlain by Tertiary basalts.
18.	Northern Itsako Peninsula 71°44'N 53°47'W	A Cretaceous sandstone unconformably overlain by shales.
19.	Painivik 71°58'N 55°00'W	A granule-sized Tertiary(?) grit overlain by columnar basalts.

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