THEMATIC MAP SERIES

Regional Geoscience Compilations

Thematic Map Series No. 94/1 (part A)

Kap Farvel - Ivittuut, South Greenland

GRØNLANDS GEOLOGISKE UNDERSØGELSE
Kalaallit Nunaanni Ujarassiortut Misissuisoqarfiat
GEOLOGICAL SURVEY OF GREENLAND

Regional compilations of geoscience data from the Kap Farvel – Ivittuut area, South Greenland

edited by

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1994

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GRØNLANDS GEOLOGISKE UNDERSØGELSE
Ujarassiortut Kalaallit Nunaanni Misissuisoqarfiat
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The Geological Survey of Greenland (GGU) is a research institute affiliated to the Mineral Resources Administration for Greenland (RMA) within the Danish Ministry of Environment and Energy. As with all other activities involving mineral resources in Greenland, GGU's investigations are carried out within the framework of the policies decided jointly by the Greenland Home Rule Authority and the Danish State.

1. Introduction

This volume presents a set of thematic maps based on regional geodata from South Greenland. The maps contain most of the data known from the area, much of it unpublished until now. They have been compiled to assist mineral exploration activities, and especially the identification of factors favourable for ore deposits. The main objective of this publication is to encourage more widespread use of the data. Because much of the data have been collected in investigations carried out by GGU and mining companies in connection with mineral exploration activities, the maps should provide a good basis for further activities in this field. They will also form part of the basis for GGU's continued scientific investigations in the area.

Following the objectives of the Thematic Map Series, the 71 maps included in this edition present several different themes. This introductory text gives some general background information for the area, and includes for each type of map details on data acquisition, methods, and form of presentation. The notes to each map theme include some interpretive comments, but it is not the intention to present a comprehensive interpretation of all the data at this stage.

The region covered by the maps encompasses the southern part of Greenland from its southernmost point, Kap Farvel (59°47′N, 43°55′W, see Fig. 1), with the communes of Nanortalik, Narsaq, Qaqortoq/Julianehåb Pamiut/Frederikshåb, and Ivittuut. A part of the coast of East Greenland within the map area is situated in Tasiilaq/Ammassalik commune. Whereas habitation is widespread in the western part of the map area, there is practically none on the east coast. Qaqortoq is the largest town with

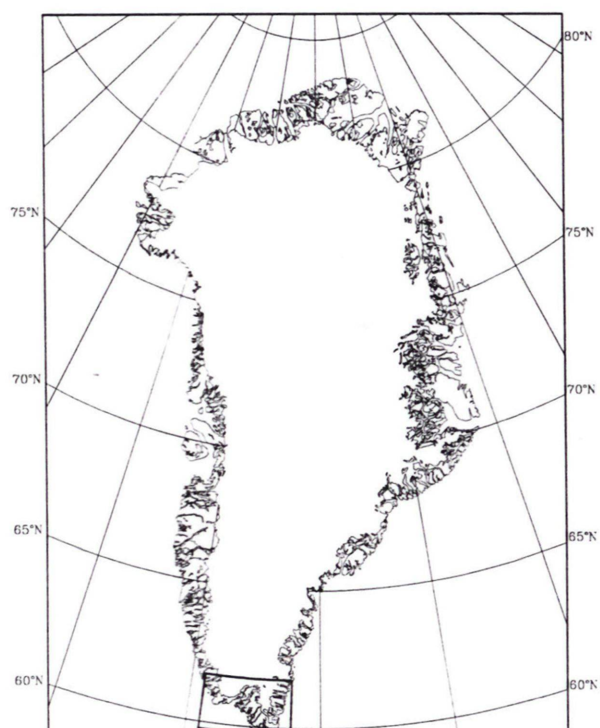

Figure 1. Map of Greenland with position of the Kap Farvel – Ivittuut area

Table 1. List of maps in Thematic Maps Series 94/1

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Satellite image map with place names	000

Geology

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Bouguer anomaly map	111
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Geochemistry

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Major elements:		Trace elements ((=dot map, remainder as contour maps):			
Silicium SiO_2	201	Arsenic As	211	Strontium Sr *	227
Titanium TiO_2	202	Gold Au *	212	Tantal Ta *	228
Aluminium Al_2O_3	203	Barium Ba	213	Thorium Th	229
Iron Fe_2O_3	204	Cobolt Co	214	Uranium U	230
Manganese MnO	205	Chromium Cr *	215	Vanadium V *	231
Magnesium MgO	206	Caesium Cs *	216	Wolfram W *	232
Calcium CaO	207	Copper Cu *	217	Yttrium Y *	233
Sodium Na_2O	208	Gallium Ga *	218	Zinc Zn *	234
Potassium K_2O	209	Hafnium Hf	219	Zirconium Zr *	235
Phosphorus P_2O_5	210	Molybdenum Mo*	220	Lanthanum La	236
		Niobium Nb *	221	Cerium Ce	237
		Nickel Ni *	222	Neodymium Nd	238
		Lead Pb *	223	Samarium Sm	239
		Rubidium Rb *	224	Europium Eu	240
		Antimony Sb *	225	Terbium Tb	241
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				Lutetium Lu	243

Heavy mineral concentrate

Arsenic As	301	Copper Cu	307	Tantalum Ta	313
Gold Au	302	Hafnium Hf	308	Thorium Th	314
Barium Ba	303	Lutetium	309	Uranium U	315
Cerium Ce	304	Nickel Ni	310	Wolfram W	316
Cobolt Co	305	Lead Pb	311	Zinc Zn	317
Chromium Cr	306	Antimony Sb	312		

Mineral occurrences

Au, Ag, Pt, Pd, Fe, Ni, Cu, Mo, and W	401
U, Th, Zr, Nb, Ta, Y, REE, and industrial minerals	402

The first edition of Thematic Map Series 94/1 (Kap Farvel – Ivittuut) contains 71 maps in scale 1:1 000 000 on A3-size sheets with accompanying legends on A4-size paper.

3500 inhabitants (figures from 1988) and then, in descending order, Nanortalik (2700), Narsaq (2200), and Ivittuut (20). Apart from the main communities mentioned there are many small settlements. The only permanent habitation on the east coast is the telecommunication station of Prins Christiansund usually manned by a crew of four to six technicians. Thus, approximately 15% of the inhabitants of Greenland live in this region. Main trades in South Greenland are fishery, services and education, tourism, and sheep farming.

Most passenger traffic into the area today takes place through the airport of Narsarsuaq, which has regular connections to Copenhagen in Denmark, Reykjavik in Iceland, and the capital of Greenland, Nuuk, some 500 km further north on the west coast. Local transport is by scheduled helicopter flight or by boat. There are also connections by coastal ship along the west coast. Freight into the area is by air or by transatlantic shipping from Denmark. Inland areas can only be reached by helicopter or by foot.

South Greenland is an area of considerable scenic attraction. The topography of the eastern and southern parts of the region are alpine with altitudes above 2000 metres, with many deeply incised fjords, and an abundance of glaciers. The southernmost tip of the Inland Ice forms a natural barrier creating very different weather conditions east and west of it. Consequently, conditions for living and for field operations are also different. During the summer navigation difficulties can be encountered because of sea-ice drifting with the East Greenland Polar current and being pushed against the land and into the fjords by a branch of the Gulf Stream.

The climate in the area is arctic to subarctic with mean temperature for the warmest month slightly below +10°C. South Greenland lies on the path of many low-pressure systems moving from North America towards Iceland and the Atlantic Ocean. This causes unstable and unpredictable weather conditions, with the risk of rain, snow, and severe storms even during the summer; there may also be quite long periods of calm, sunny and warm weather. Several fjords and valleys experience strong føhn winds. Snow usually disappears during June and returns during September, but may linger on significantly longer on the east coast. Compared with other parts of Greenland the vegetation is almost lush, with 'trees' up to 3–4 metres in sheltered valleys and knee-high bushes on many mountain sides, especially those facing south.

The area has a long history of mineral exploration activities and geological investigations, many of which were carried out by GGU. One of the most successful mines in Greenland was the cryolite mine at Ivittuut. The classical geological locality of Ilímaussoq intrusion is situated near Narsaq, and north-east of Narsarsuaq lies the Motzfeldt intrusion. An old graphite mine, Amitsoq, is situated near Nanortalik. The geology and mineral occurrences in the area are discussed below under the relevant headings. A brief summary of investigations is also included.

2. Comment and selected references to each theme

In the following sections each of the main themes of the maps (Table 1) are commented, giving background information, interpretational comments and reviews as appropriate.

2.1 Geology *(Feiko Kalsbeek)*

The geological map (94/1-001) is a simplified version of the 1:500000 Geological Map of Greenland, Sheet 1, Sydgrønland (Allaart, 1975) digitised to show lithology only.

Most geological mapping in the area was carried out during the 1950s and 1960s, and geological maps at 1:100000 have been published for large parts of the area (see index map in GGU List of Publications). Regional geological descriptions have been presented by Allaart (1976), Kalsbeek *et al.* (1990) and Windley (1991) and in papers cited therein. Map sheet descriptions are available for the 1:500000 map (Kalsbeek *et al.,* 1990) and for several of the 1:100 000 map sheets (Allaart, 1973, 1983; Berthelsen & Henriksen, 1975; Higgins, 1990). A plate-tectonic model for the early Proterozoic evolution of South Greenland has been presented by Windley (1991).

In outline, South Greenland consists of three main chronostratigraphic units (Fig. 2): (1) the southern part of the *Archaean craton* of Greenland, which forms the north-western part of the region covered by the present map, (2) the early Proterozoic *Ketilidian orogenic belt*, which occupies the rest of the area, and (3) the middle Proterozoic *Gardar Province*, which occurs as scattered outcrops. Most Archaean rocks (granitoid orthogneisses and amphibolites) were formed *c.* 3000–2800 Ma ago. They were intruded by numerous basic dykes at about 2150 Ma. Rocks of the Ketilidian belt (mainly granitoid rocks and high-grade metasediments) were accreted upon the southern margin of the Archaean

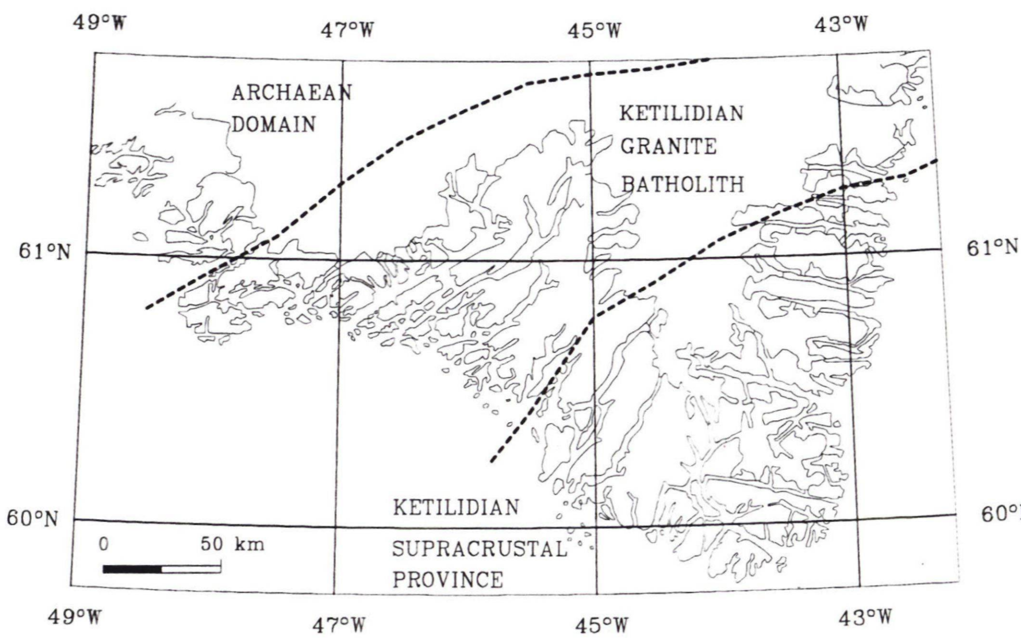

Figure 2. Major tectono-stratigraphical units of the Kap Farvel – Ivittuut region

craton between *c.* 1850 and 1750 Ma. No Archaean rocks have been found within this belt. Rocks of the Gardar Province (sandstones, basalts, and a variety of intrusive rocks) formed during a period of rifting, *c.* 1350–1150 Ma ago. Phanerozoic dykes (dolerite and rare kimberlite) occur locally. They are not shown on the map and will not be discussed in this summary.

Archaean craton

About 80% of the Archaean craton of Greenland consists of grey orthogneisses, mainly of tonalitic to granodioritic composition. Major outcrops of true granitic (K-feldspar rich) rocks occur north of the fjord Sermiligaarsuk. The remaining 20% of the area is mainly made up of amphibolite of metavolcanic origin with local units of high-grade metasediments. These rocks occur as large rafts or inclusions within the gneisses. Anorthositic and leucogabbroic rocks, which form major outcrops further north in the craton, are not common within the map sheet area. They occur as trains of inclusions in well defined gneiss units around Ivittuut. Most Archaean rocks are strongly deformed and at high metamorphic grade (amphibolite facies).

Only few age determinations are available for Archaean rocks. Taylor & Kalsbeek (1986) report Pb-Pb whole-rock isochron ages for gneisses from five localities; these range from *c.* 3100 to 2750 Ma. A gneiss sample collected at 61°32.3'N, 49°12'W has yielded a SHRIMP U-Pb zircon age of 2920-2930 Ma, but also contains a younger (metamorphic) zircon component with an age of 2820–2830 Ma (A. P. Nutman, pers. commun., 1993).

Tartoq Group

The Tartoq Group (Higgins & Bondesen, 1966; Higgins, 1968; Berthelsen & Henriksen, 1975; Evans & King, 1993) is a several kilometre thick greenstone belt which forms major outcrops on both sides of Sermiligaarsuk north-west of Ivittuut. It consists of strongly deformed basic volcanic rocks and siliceous schists at relatively low metamorphic grade: greenschist to low amphibolite facies. Siliceous schists may in part represent acid metavolcanic rocks (Higgins, 1990). Several minor occurrences of gold as well as sulphide showings with both stratiform and vein-type mineralisation have been recorded (Appel, 1984; Appel & Secher, 1984; Erfurt, 1990; Evans & King, 1993).

The age of the Tartoq Group is not known, but a minimum age is provided by a 2944 ± 7 Ma SHRIMP U-Pb zircon date on tonalite sheets which cut greenschists of the Group (Nutman & Kalsbeek, 1994). Contacts between the Tartoq Group and the surrounding gneisses are commonly very strongly sheared, and the relationships between these rock units are not well understood.

Early Proterozoic dykes in the Archaean craton

The Archaean craton of southern Greenland contains numerous gabbroic and doleritic dykes, up to more than a hundred metres wide (Hall *et al.,* 1985). They are not shown on the map. The age of a few dykes in the southern part of the craton has been determined by the Rb-Sr whole rock isochron method as 2130 ± 65 Ma (Kalsbeek & Taylor, 1985a). On approaching the Ketilidian belt from the north, the dykes become progressively deformed and metamorphosed (Bondesen & Henriksen, 1965), and in the Ivittuut area the grade of early Proterozoic metamorphism reaches amphibolite facies.

Ketilidian supracrustal rocks overlying Archaean basement

In the Midternæs/Grænseland area, north and north-east of Ivittuut, Archaean gneisses are unconformably overlain by well preserved sediments (up to 1200 m thick) and basic volcanic rocks (up to *c.* 5 km). The island Arsuk Ø is almost completely built up of basic volcanics. The depositional age of these rocks is not known.

The lower part of the sediments consists of shelf deposits: dolomitic shale, quartzite, conglomerate and dolomite beds. Ripple marks and mud cracks are common. This succession is overlain by a more homogeneous sequence of pelitic and semipelitic shales and thick graded greywackes, deposited in deeper water. The upper part of the sequence consists of dolomitic shales, locally with abundant pyrite and graphite, cherts and dolomites, deposition of which apparently took place under quiet, sometimes euxinic conditions.

The overlying volcanic unit consists mainly of well preserved tholeiitic pillow lavas, locally with abundant pyroclastic material and some sediments (Bondesen, 1970; Higgins, 1970). The sequence contains numerous basic sills, which make up 25-40% of the section.

Southwards from Midternæs/Grænseland the Ketilidian supracrustal rocks become progressively more strongly deformed and metamorphosed. The sediments grade into mica schists, and the basic lavas and intrusions become greenschists and amphibolites. East and south-east of Ivittuut the supracrustal rocks are deflected into a strongly deformed ENE-trending belt, where they are thinned down to about 1 km. Here the sequence is intruded by Ketilidian granite.

Kobberminebugt shear zone

A zone of intensely sheared metavolcanic and metasedimentary rocks runs along the southern shore of Kobberminebugt. Windley (1991) interprets this shear zone as a suture that separates the continental margin, shelf and foredeep succession to the north-west from an Andean-type magmatic arc to the south-east.

Julianehåb batholith

The area south-east of Kobberminebugt down to the fjord Søndre Sermilik is underlain by granitic (*sensu lato*) rocks of the 'Julianehåb batholith' (Windley, 1991; Chadwick *et al.*, 1994). A major geologic boundary running north-east through Søndre Sermilik separates this belt of granitic rocks to the north-west from an area to the south-east within which high-grade supracrustal rocks occur with granitic rocks.

The Julianehåb batholith, earlier referred to as the 'Julianehåb granite', probably formed in an Andean type setting by subduction of an early Proterozoic ocean south-east of the Archaean craton. Windley (1991) refers to inclusions of metavolcanic rocks within the granites, and interpreted these to represent remnants of an early island arc into which the batholith was emplaced. Recent field work by Chadwick *et al.* (1994), however, has not confirmed the presence of such inclusions.

The batholith consists of tonalitic, granodioritic and granitic rocks, with numerous basic and intermediate intrusions, among which dykes of appinitic affinity are locally prominent. On published maps 'early' and 'late' granites are distinguished. The early granites are commonly foliated, whereas late granites, which occupy large portions of the centre of the batholith, are better preserved. However, many 'early granites' are excellently preserved, and some of these are shown as 'late granite' on the maps (A. Garde, pers. comm., 1994).

Early granites from two localities have been dated at *c.* 1850 Ma, whereas late granites have yielded ages of about 1750 Ma (Van Breemen *et al.,* 1974). It is as yet not known whether the batholith evolved during one prolonged event of igneous activity or if the early and late granites were formed in two distinct episodes.

Early Proterozoic granite plutons were also emplaced into Archaean gneisses and overlying supracrustal rocks in the border zone between the Ketilidian belt and the Archaean craton. These consist partly of rejuvenated Archaean crustal material, and their relationship to the Julianehåb batholith is not clear. The youngest pluton dated yielded an age of *c.* 1675 Ma (Kalsbeek & Taylor, 1985b).

Supracrustal rocks in the south-eastern part of the Ketilidian belt

The supracrustal rocks in the south-eastern part of the Ketilidian belt are at high metamorphic grade (high amphibolite to granulite facies), and are generally strongly migmatised and transformed into anatectic granites. Structures are commonly flat-lying, large recumbent folds and nappe structures have been recognised, and it is possible that the supracrustal rocks lie in a stack of slabs, thrust on top of each other (Escher, 1966; Windley, 1991). Large parts of this region are, however, not investigated in detail, and further work may lead to other interpretations.

Among the supracrustal rocks pelitic and semipelitic gneisses and arkosic quartzites are prominent, and conglomerates are locally abundant. In the Tasermiut area semipelitic gneisses attain a thickness of 1000-1500 m. They are overlain by basic metavolcanic rocks, within which pillow lavas and tuffs have been observed. Arkosic quartzites with conglomerate beds make up the upper part of the sequence in the Tasermiut area. It is possible that parts of the arkosic rocks are of volcanogenic origin. Intrusive sheets of basic rock are common in this part of the sequence, which again is overlain by basic metavolcanics (Escher, 1966).

The semipelitic gneisses are rich in biotite, and garnet is often conspicuous. Presence of sillimanite, cordierite and andalusite suggests that metamorphism took place at high temperature and relatively low pressure.

Field relationships between the sediments and the Julianehåb batholith are ambiguous. Locally metasediments are intruded by granites, and conglomerates commonly have granitic boulders. Possibly, sedimentation took place more or less simultaneously with granite emplacement in different parts of the evolving Ketilidian orogen.

Rapakivi granites and associated rocks

Post-tectonic granitic rocks, locally characterised by rapakivi textures, and associated norites occupy large areas in the south-easternmost part of the Ketilidian belt. They form large (up to 5000 km^2) flat-lying elongated intrusions with steeply inward dipping roots. Main rock types are quartz monzonite, quartz syenite, norite and granite, quartz monzonite being the most common variety. They were emplaced at relatively shallow crustal levels (6–10 km) during an extensional tectonic regime. According to Windley (1991) they formed in response to collapse of the thrust-thickened crust of the Ketilidian orogen, but Brown *et al.* (1992) questioned this suggestion. Rocks of the rapakivi suite have geochemical characteristics of A-type (anorogenic) granites, such as high Fe/Mg ratios, high Zr etc.: all these rocks, even noritic members have abundant accessory zircon.

The rocks into which plutons of the rapakivi suite were emplaced underwent high-grade metamorphism, up to granulite facies. Migmatised supracrustal rocks and early granites commonly have lost their structural coherence during high-grade metamorphism and partial melting and were transformed into granitoid rocks.

Gulson & Krogh (1975) have obtained two distinct zircon U-Pb age groups for rocks of the rapakivi suite, at *c.* 1755 and 1740 Ma. The surrounding migmatites and granitoid rocks yielded ages of *c.* 1800 Ma.

Gardar province

The mid-Proterozoic Gardar Province of South Greenland encompasses episodes of faulting, sedimentation and alkaline igneous activity. A sequence of sandstones and lavas accumulated in a NE–SW trending continental rift. Within and outside the rift major central intrusions and numerous generations of dykes were emplaced. The Gardar Province has recently been reviewed by Upton & Emeleus (1987). This review and the map sheet description of Kalsbeek *et al.* (1990) contain references to the extensive literature on the Gardar Province.

Early Gardar (1300–1270 Ma). Rocks of the early Gardar period comprise a sequence of sandstones and lavas that rests unconformably on denuded Ketilidian granites, as well as three central intrusions of nepheline syenite.

The present outcrop of the supracrustal rocks is restricted to an ENE-trending fault block in the central part of the Gardar graben system. Sandstone members comprise conglomerates, arkoses, red sandstones and white quartzites, formed in fluviatile and aeolian environments. Volcanic rocks include basalts, hawaiites, trachyandesites, trachytes and phonolites, with subordinate carbonatitic lavas. There is an upward development towards more evolved magmas.

One of the central intrusions, the 1280 Ma Motzfeldt nepheline syenite centre, contains volatile-rich peralkaline phases which are strongly enriched in Zr, Nb, Ta, REE, U and Th, sometimes forming deposits of economic interest (Tukiainen, 1986; Thomassen, 1988).

Mid-Gardar (1250–1200 Ma). Mid-Gardar was a period of mainly dyke intrusion. In addition, two small central intrusions were emplaced in the westernmost part of the Gardar province, in the Archaean craton north-west of the Ketilidian belt. The easternmost of these are the Ivittuut granite which hosts the well known, now almost exhausted, Ivittuut cryolite deposit.

Late Gardar (1185–1120 Ma). By far the largest volumes of Gardar rocks were emplaced in the Late Gardar period. Magmatic activity was widespread over the entire province, and encompasses emplacement of ENE-trending dyke swarms (including giant dykes), as well as a number of central intrusions, some of which are very large.

Central intrusions comprise nepheline syenites, syenites and alkaline granites. Highly differentiated rocks occur, for example, in the Ilímaussaq nepheline syenite intrusion, which contains exotic rocks such as pulaskite, sodalite foyaite, naujaite, kakortokite and lujavrite. These rocks are enriched in volatiles (Cl, F) and a number of rare elements, notably Li, Be, Zr, Zn, REE, Y, U and Th. The enrichment is greatest in the lujavrites which represent the most strongly differentiated magma. The lujavrites and kakortokites contain deposits of, respectively, U and Zr of economic interest.

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2.2 Magnetometry *(Leif Thorning)*

The aeromagnetic data (total magnetic intensity) is presented on one map (94/1-101), as a composite anomaly map superimposed with a shaded version of the same data. There are three sources of data:

(1) An unpublished aeromagnetic survey carried out in 1967 for Kryolitselskabet Øresund A/S. The flight line separation was 2 kilometres and the flying height approximately 300 metres over the tops of mountains with 'draped' flying over the topography. The original line data had been lost, but some years ago GGU received the originally prepared magnetic anomaly maps in scale 1:50000. The contours of the magnetic anomalies were digitised and regridded after subtraction of the appropriate IGRF65 (this had not been done in the preparation of the original maps). Unfortunately, there are severe levelling problems in the original maps and these were unavoidably carried over into the grid

years ago GGU received the originally prepared magnetic anomaly maps in scale 1:50000. The contours of the magnetic anomalies were digitised and regridded after subtraction of the appropriate IGRF65 (this had not been done in the preparation of the original maps). Unfortunately, there are severe levelling problems in the original maps and these were unavoidably carried over into the grid produced from the digitised contours. It has, therefore, been necessary to filter the gridded data to remove the diurnal effects and other errors. This has been done in the Fourier domain with various directional filters using the Geosoft Magmap package.

(2) A compilation of offshore ship- and airborne magnetic data by Atlantic Geoscience Centre (AGC). The version included on the map is a preliminary version kindly released by AGC from their compilation of magnetic data over the Atlantic and polar regions (e.g. Macnab *et al.*, 1992). No additional processing of these data has been carried out. This survey provides a generalised view only of the offshore areas.

(3) The southern part of the two GGU surveys from the GICAS (Greenland Ice Cap Aeromagnetic Survey) project 1985 and 1987 (Thorning *et al.,* 1986, 1988). These are regional surveys aimed at mapping the larger structures under the ice. The N-S survey lines have a separation of approximately 10 kilometres (corresponding to 12′), and the flying height was 300 metres over the surface of the Ice Cap, draped over the coastal onshore region, and 300 metres above sea level offshore. Thus, for this survey only regional structures are significant.

The aeromagnetic survey of project EASTMAR (Larsen & Thorning, 1980), a high resolution survey carried out in 1979 by Aero Service for GGU, covers the region offshore the east coast at the eastern margin of the map, but no data from this survey are included in the version of the anomaly map compiled in map 94/1-101.

The three surveys were treated separately and then brought together in the final preparation of the composite anomaly map. The same colour scale has been applied for all grids, and they are not seriously misaligned. However, the surveys display varying degrees of detail. In order to homogenise the data it would have been necessary to filter the data, which would have slurred some of the detail. Therefore, the surveys have not been fitted together at the edges. The shading effect outlines the boundaries of the surveys.

The magnetic anomaly patterns illucidate the different regional features of the map area: The Archeaen block to the north exhibits a typical pattern, although only a small area is visible on this map. The Ketilidian boundary is shown by a relative minimum caused by a decrease in magnetisation. Within this minimum, the granite batholith intrusions can be seen as large positive anomalies, to which the volcanic rocks of the Gardar province contribute on a smaller scale. This band of highly magnetic rocks can be followed from offshore the west coast to offshore the east coast (though the latter is best seen in the EASTMAR survey mentioned above). The northern boundary at the east coast cannot be seen on this map. The south-eastern block is magnetically quiet. Indications of semi-parallel SW–NE trending linear features and some individual anomalies can be seen to agree well with both geological units and the geochemically mapped boundaries (see later). One apparent SE–NW trending linear feature created by termination of anomalies crosses the east coast near the mouth of Danell Fjord. It may be just an effect of poor data density, but if is is real then this is a hitherto unknown, but interesting feature to which no explanation can presently be given.

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2.3 Gravimetry (*Leif Thorning*)

The gravity anomaly maps (94/1-111 and 94/1-112) show Bouguer anomalies calculated from data in the gravity data base of the National Survey and Cadastre (Kort- og Matrikkelstyrelsen, KMS). This data base contains practically all known gravity observations, including those acquired by GGU. The latest measurements in South Greenland were carried out by KMS and GGU in 1992, when close to 500 new stations were measured. No airborne gravity measurements are included in the maps.

The density of the data coverage varies considerably over the map. KMS's objective with gravity work in Greenland is the geodetic determination of the geoide, and consequently their station network is open with up to 30 km between measurements. GGU's objective is to obtain geologically relevant anomalies, and therefore GGU gravity acquisition projects attempt to increase the sampling density in certain areas, in SE Greenland by acquiring gravity observations at all geochemical sampling points. However, on these gravity maps some anomalies are only defined by a single observation. The position of all observation sites used for the gravity anomaly maps are therefore shown, so that the validity of the anomalies can be evaluated.

Calculation of the Bouguer anomalies was carried out at KMS using standard parameters (see details on map legend). No terrain corrections have been determined, because no digital elevation model exists from the area. The gridding of the data was performed with the RANGRID program of the Geosoft Ltd suite of programs. It employs a version of the minimum curvature gridding method. The residual Bouguer anomaly map was created by Fourier filtering of the grid using a Gauss regional/residual filter with a cut-off wavelength of approximately 80 km.

The dominant trend in the Bouguer anomaly map is clear and well defined. A large gradient is created because of negative Bouguer values over the ice cap and generally positive values offshore. This trend almost exactly follows the coast and effectively masks most smaller anomalies. In the residual anomaly map this trend is reasonably well removed, and the anomalies all have wavelengths shorter than 80 km and can tentatively be correlated with the geology, although the scarcity of the data creates serious problems. The gravity high related to the Ilimaussoq intrusion can be seen, and it looks as if this may continue to the north-east, maybe with an offset to the north-west. Some of the gravity lows correlate with syenite intrusions, others cannot easily be related to known surface geology. The residual map clearly demonstrates the need for more detailed measurements if gravity is to be used for the interpretation of local geology.

2.4 Gamma-ray spectrometry *(Tapani Tukiainen)*

The radiometric maps (94/1-121 to 124) are based on the data from the airborne gamma-ray spectrometer survey carried out as a part of the SYDURAN project (South Greenland Uranium Exploration project) which was conducted by the Geological Survey of Greenland in collaboration with Risø National Laboratory (Armour-Brown *et al.,* 1982). The airborne survey comprised about 12000 line kilometres. The flight lines tended to follow the topographic contours in order to reduce, as far as possible, necessary corrections in radiation level due to changes in ground clearance in the rugged terrain.

The enrichment of the radioactive elements in the alkaline intrusions of the mid-Proterozoic Gardar province is well displayed by the radiometric maps, the volatile-rich peralkaline rocks of the Ilímaussaq intrusion and the Motzfeldt Centre of the Igaliko Nepheline Syenite Complex having the highest concentrations of U and Th.

The central part of the Julianehåb batholith shows an elevated level of radioactivity with a number of more anomalous areas, particularly in the northern part of the Julianehåb batholith adjacent to the Inland Ice. A large number of uranium mineral occurrences as veins and cavity fillings of pitchblende, brannerite and other radioactive minerals and disseminated uraninite in the Ketilidian gneiss was discovered by the uranium exploration programme (Armour-Brown *et. al.,* 1982, Nyegaard & Armour-Brown, 1986).

The migmatised supracrustal rocks in the south-eastern part of the Ketilidian belt (the area east and south-east of Søndre Sermilik) stands out on the radiometric maps because of their elevated contents of radioactive elements. The rocks are at high amphibolite to granulite facies and often transformed into anatectic granites. Uranium mineral occurrences as uraninite concentration in the neosome of migmatite are known in the Tasermiut area (Nielsen & Tukiainen, 1981) and as disseminated uraninite in the supracrustal rocks at Illorsuit (Armour-Brown *et al.,* 1982, Nyegaard & Armour-Brown, 1986).

The airborne radiometric data on these maps reveal many anomalously high uranium values in a number of localities which still remain to be investigated.

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2.5 Drainage geochemistry

The major part of the maps of TMS 94/1 are the geochemical maps. In the following two sections those based on the fine fraction of stream sediments and those based on the heavy mineral concentrates are treated separately.

2.5.1 Stream sediment, fine fraction (*Agnete Steenfelt*)

The element distribution maps are based on analysis of stream sediment samples collected during three different surveys, the coverage of which is shown in Fig. 3.

(1) SYDURAN (South Greenland Uranium Exploration project). This project was conducted by the Geological Survey of Greenland in collaboration with Risø National Laboratory (Armour-Brown *et al.*, 1982). In the geochemistry part of the project *c.* 2300 samples were collected with an average density of 5–6 samples per km² in South Greenland up to Sermiligaarsuk (61°30′N) on the west coast and up to Lindenow Fjord (60°30′N) on the east coast. The < 0.1 mm grain size fraction was analysed at Risø National Laboratory, Denmark, for U by delayed neutron counting (DNC), and for major and trace elements (Table 2) by isotope excited energy dispersive X-ray fluorescence spectrometry (XRF; Kunzendorf & Løvborg, 1981). The results were reported as geochemical maps by Armour-Brown *et al.* (1982) and by Olesen (1984). At a later stage (1990) the samples were analysed at Activation Laboratories Ltd. for 34 major and trace elements (Table 2) by instrumental neutron activation (INA) analysis. These analyses were financed by Nunaoil A/S. Up till now only results for selected elements

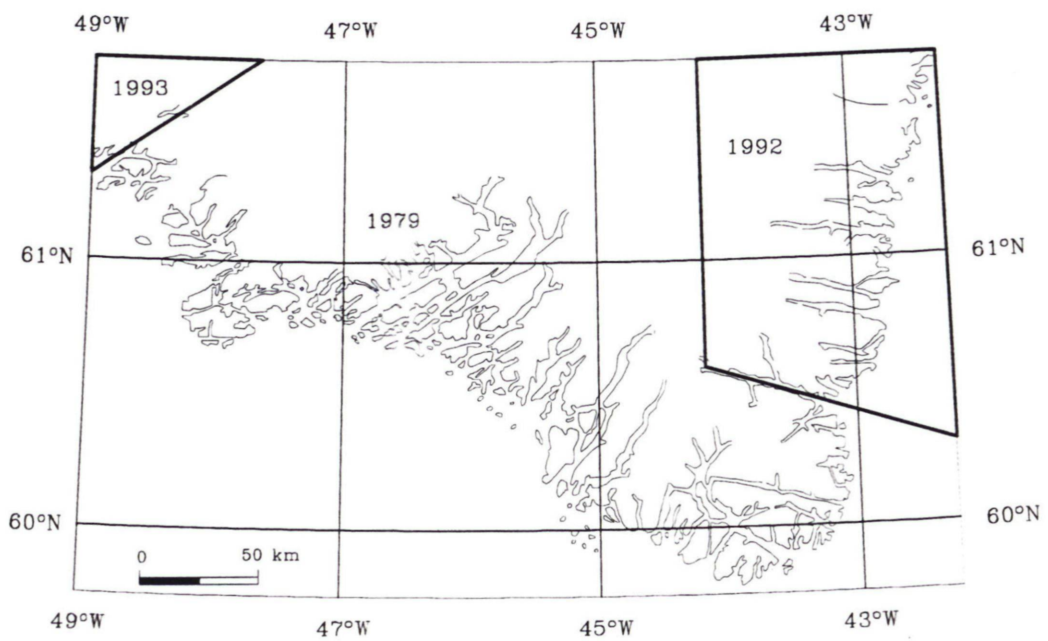

Figure 3. Regions of geochemical sampling by GGU 1979 – 1993

Table 2: Analytical methods and elements determined in the geochemical mapping of South Greenland

Elem	GGU XRF	GGU AAS	Act XRF	Act INA	Risø XRF	Risø DNC
SiO_2	**X**		**X**			
TiO_2	**X**				x	
Al_2O_3	**X**		**X**			
Fe_2O_3	**X**		**X**	x	x	
MnO	x		**X**		**X**	
MgO	**X**		**X**			
CaO	**X**		**X**	x	x	
Na_2O		**X**	**X**	x		
K_2O	**X**		**X**		x	
P_2O_5	**X**		**X**			
As				**X**		
Au				**X**		
Ba	x		x	**X**	x	
Co			x	**X**		
Cr	**X**		**X**	x	x	
Cs				x		
Cu		**X**	**X**		x	
Ga			**X**		**X**	
Hf				**X**		
Mo				**X**		
Nb	**X**		**X**		x	
Ni	**X**		**X**			
Pb			**X**		**X**	
Rb	**X**		**X**	x	x	
Sb				**X**		
Sc				**X**		
Sr	**X**		**X**	x	x	
Ta				**X**		
Th				**X**		
U				**X**		x
V	**X**		**X**		x	
W				**X**		
Y	**X**		**X**		x	
Zn	**X**		**X**		x	
Zr	**X**		**X**		x	
La				**X**		
Ce				**X**		
Nd				**X**		
Sm				**X**		
Eu				**X**		
Tb				**X**		
Yb				**X**		
Lu				**X**		

The data used for the element distribution maps are shown in capital bold (**X**). XRF: X-ray fluorescence spectrometry. AAS: Atomic absorption spectrometry. INA: Instrumental neutron activation analysis. DNC: Delayed neutron counting. GGU: Geological Survey of Greenland. Act: Activation Laboratories Ltd. Risø: Risø National Laboratory.

Table 3. Summary of stream sediment sampling and analysis in TMS 94/1

Survey	No of samples	Analysis method	Laboratory
Syduran	2197	XRF	Risø
	2042	INA	Actlabs
	1100	XRF	GGU
Suprasyd	141	INA	Actlabs
	140	XRF	Actlabs
Paamiut	57	INA	Actlabs
	47	XRF	GGU

(Au, As, Sb, Ta) have been published (Steenfelt, 1990; Steenfelt & Tukiainen, 1991). Later (1990-1992) the remaining sample material was analysed at GGU for major element oxides and 5 trace elements (Table 2) by X-ray fluorescence (XRF) on fused glass discs using sodium tetraborate as flux. Na_2O and Cu were determined at GGU by atomic absorption spectrometry (AAS). The GGU analyses have not previously been published.

(2) SUPRASYD. As part of GGU's reconnaissance geochemical mapping programme (Steenfelt, 1993) and the 'Suprasyd' programme (Nielsen *et al.,* 1993) a total of 142 stream sediment samples were collected in 1992 in the area along the east coast of South Greenland from Lindenow Fjord to Otte Rud Øer (62° N). Due to steep topography and extensive ice cover in this area the sample spacing is very irregular (see dot maps). An average figure for the sample density is in the order of 1 sample per 50 km². The < 0.1 mm grain size fractions of the samples were analysed at Activation Laboratories Ltd. for major oxides by XRF on fused discs using lithium tetraborate as flux, for 14 trace elements by XRF on pressed powder tablets, and for 35 major and trace elements by INA. The results are reported in Steenfelt *et al.* (1992) 126 data points from this survey are included in the present data set.

(3) Paamiut region. This area was sampled in 1993 in the course of GGU's reconnaissance geochemical mapping programme (Steenfelt, 1993). The <0.1 mm grain size fractions of the stream sediment samples were analysed at GGU by XRF using fused glass discs for major elements (except Na_2O) and 5 trace elements. Na_2O and Cu were determined by AAS. The samples were further analysed at Activation Laboratories Ltd for 35 major and trace elements by INA and for 14 trace elements by XRF using pressed powder tablets. The results are reported in Steenfelt *et al.* (1994). 57 sample points from this survey lie within the present map area.

The quantity of sample material did not always allow three or four different consecutive analyses. Hence, the number of analysed samples decreases in analyses performed later(Table 3). The number of analysed samples for a given element is listed in the legends of the element distribution maps.

Table 4. Analytical detection limits for analyses of fine fractions

Instrumental Neutron Activation Analysis (Activation Laboratories Ltd.)

Au	5.0 ppm	Ag	5.0 ppm	As	2.0 ppm	Ba	100.0 ppm
Br	1.0 ppm	Ca	1.0 %	Co	5.0 ppm	Cr	10.0 ppm
Cs	2.0 ppm	Fe	0.02 %	Hf	1.0 ppm	Hg	1.0 ppm
Ir	5.0 ppm	Mo	5.0 ppm	Na	500.0 ppm	Ni	50.0 ppm
Rb	30.0 ppm	Sb	0.2 ppm	Sc	0.1 ppm	Se	5.0 ppm
Sn	0.01 %	Sr	0.05 %	Ta	1.0 ppm	Th	0.5 ppm
U	0.05 ppm	W	4.0 ppm	Zn	50.0 ppm	La	1.0 ppm
Ce	3.0 ppm	Nd	5.0 ppm	Sm	0.1 ppm	Eu	0.2 ppm
Tb	0.5 ppm	Yb	0.05 ppm	Lu	0.05 ppm		

X-ray fluorescence spectrometry (pressed powder tablets) (Activation Laboratories Ltd.)

Ba	5.0 ppm	Co	5.0 ppm	Cr	5.0 ppm	Cu	5.0 ppm
Ga	5.0 ppm	Nb	2.0 ppm	Ni	5.0 ppm	Pb	5.0 ppm
Rb	2.0 ppm	Sr	2.0 ppm	V	5.0 ppm	Y	2.0 ppm
Zn	5.0 ppm	Zr	5.0 ppm				

X-ray fluorescsence spectrometry (fused glass discs)

SiO_2	0.25%	Fe_2O_3	0.15 %	CaO	0.08%	P_2O_5	0.015%
TiO_2	0.01%	MnO	0.003%	Na_2O	0.1 %		
Al_2O_3	0.05%	MgO	0.08 %	K_2O	0.01%		
Cr	5 ppm	Cu	1 ppm	Ni	2 ppm	Rb	2 ppm
Sr	1 ppm	V	2 ppm	Zn	10 ppm		

Data quality

The precision and accuracy of the analyses vary with method and element. The Risø National Laboratory analyses of U by DNC have high precision and accuracy while the isotope excited XRF analyses vary in quality (Armour-Brown *et al.,* 1982). The precision is rarely better than 15 % relative and the accuracy varies from element to element. However, as discussed by Armour-Brown & Olesen (1984) the regional variation is large enough to give significant regional distribution patterns.

The analyses for major elements by XRF on fused glass discs have high precision and accuracy. The analyses for the trace elements V, Cr, Ni, Rb, Sr and Zn, also determined in the glass discs, are very noisy at low levels (below *c.* 100 ppm). The accuracy is reasonable at higher levels. Sr levels changed *c.* 10 % during the period of the GGU-XRF analysis. Detection limits are shown in Table 4.

The IAN analyses have reasonable precision and accuracy for a number of the 34 elements in the analytical suite. Others have lower quality. For a number of the elements (e.g. Au, Ag, Hg, Ir, Mo) the concentrations are rarely above the detection limit (Table 4).

The XRF analyses of pressed powder tablets are reasonable in accuracy and precision and they agree within 10-20% with the corresponding glass disc based XRF trace element analyses. The powder tablet results are more reliable at low levels owing to much better counting statistics.

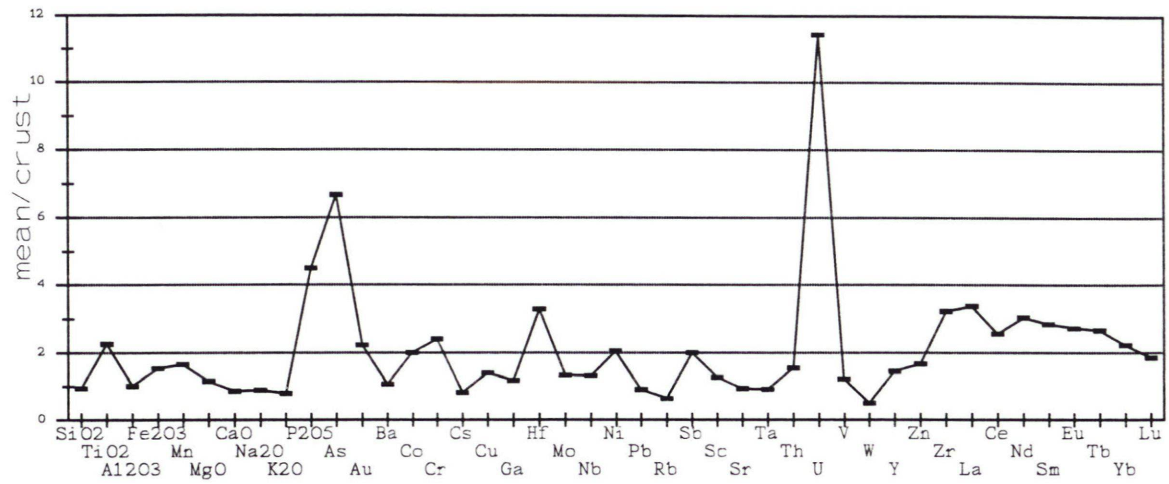

Figure 4. Spider diagram showing stream sediment means normalised against estimated composition of upper continental crust (Taylor & McLennan, 1985)

The data sets selected for the present production of element distribution maps represents the most reliable and consistent of the available analytical data (Table 2). It was not possible with simple arithmetic methods to make all of the Risø results from the Syduran area compatible with the XRF analyses from the two marginal areas, therefore only the Mn, Ga and Pb analyses from Risø have been used here. Because the Syduran data (17 major and trace elements) have been reported earlier (Armour-Brown *et al.,* 1982; Olesen, 1984) it was decided to present the data based on Actlabs INA and XRF, and GGU XRF. The distribution patterns based on the later analysis of the same elements are very similar but due to analytical bias the actual concentration levels differ somewhat.

Data presentation

The element distributions are shown as contoured colour maps or dot plots. As a rule contoured maps are used to display elements with concentrations mostly above the detection limit such as major and some trace elements like Ba, Co and REE while dot plots are used for elements with concentrations mostly below the detection limit such as Au, Cs, Sb etc. Exceptions to this rule are elements with poor precision at low levels, Nb, Rb, Sr, Y, Zn and Zr. They are displayed as dot plots, because it is possible to choose the scaling of the dot size so that variations at low levels are suppressed. In addition to showing element concentrations the dot maps also illustrate the distribution of sample locations.

Results of the geochemical surveys

The stream sediment data from South Greenland may be used to characterise chemically the southernmost part of the Greenlandic Precambrian crust which is dominated by the Proterozoic Ketilidian orogenic complex with later additions of mantle derived alkaline magmatic products, see the

Table 5. Geochemical characterisation of tectonostratigraphical units and Gardar intrusive complexes in South Greenland

Unit	High level	Low level
Archaean		
Gneiss complex	Mg Co Cu Ni Sc V Au	Ba Rb Th Sr
Tartoq mafic sc	As	
Ketilidian mafic sc	Fe Ti As Co Sc	
Granites (Arch+Prot)	Rb U Th	
Proterozoic		
Granite province	Na Ba Sr U Au V REE	Cr Rb Sc Zn
Migmatite complex	K As Rb Sb Sc Au	Na Ba
Felsic sc	Si K As Cs Rb Sb U	Co Sr
Synorogenic granites	K Th REE	Eu
Rapakivi granites	P Ga Hf Y Zr HREE	
Gardar province	Fe Mn P Ga Rb Ta Th Zn REE	Co Sc
Igaliko intrusions	Mn Na K Ba Ga Hf Nb Pb Rb Sr Ta Th Y Zn Zr REE	
Ilímaussaq intrusion	Mn Na Ga Hf Nb Pb Rb Sb Ta Th Y Zn Zr REE	
Nunarssuit intrusions	Ti Fe Mn Ga Hf Pb Rb Ta Th Y Zn REE	
Grønnedal-Ika intrusion	Fe Mn Na Ba Mo Nb Rb Sr Ta Th Y REE	
Qassiarsuk volcanic complex	Mn K Ba Sr Zn	

sc: supracrustal rocks

section on geology. Figure 4 shows the stream sediment means normalised against average upper crust (Taylor & McLennan, 1985).

The very pronounced uranium enrichment was recognised at an early stage when data from the Syduran project was used to demonstrate that large parts of South Greenland constituted a geochemical uranium province (Armour-Brown et al., 1983; Steenfelt & Armour-Brown, 1988). The Syduran data also revealed the Nb enrichment which is associated with the alkaline intrusive complexes of the Gardar province and led to the discovery of a Nb-Ta prospect at Motzfeldt Sø (Tukiainen, 1985; Thomassen, 1989; Steenfelt, 1987, 1991).

When the INA analyses of the Syduran samples were carried out the abundance of samples with elevated concentrations of gold and the gold pathfinder elements As and Sb was noticed, and a gold prospective province was outlined in the Nanortalik region (Steenfelt, 1990; Steenfelt & Tukiainen, 1991). The province was shown to continue into eastern South Greenland (Steenfelt et al., 1992).

Figure 4 shows that South Greenland is enriched in many other elements than the ones just mentioned. The distribution maps show that the elevated element concentrations are not evenly distributed but are associated with major tectonostratigraphical divisions or lithological units (Table 5).

The Archaean craton is clearly distinguished from the Ketilidian orogenic belt by higher concentrations of elements contained in ferro-magnesian minerals Mg, Co, Ni etc and low levels of lithophile elements except where granite bodies occur. The Proterozoic granite batholithic province characterised by high Na, Ba and Sr differs geochemically from the migmatite province which is enriched in Rb, Th, Y, Zr and HREE. The post-orogenic intrusions of Rapakivi granites are reflected by high Hf, Zr, Y.

The middle Proterozoic Gardar province has a very strong geochemical signature with anomalously high concentrations of many elements, particularly HFSE and REE, but also Fe, Mn and Zn. Each of the major alkaline intrusive complexes has its own geochemical signature in which high Ba and Sr at Motzfeldt (in the Igaliko complex), Grønnedal-Ika and Qassiarsuk reflect the occurrence of associated carbonatitic rocks.

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2.5.2 Heavy mineral concentrates *(B. Thomassen and J. L. Pedersen)*

The data stems from a geochemical survey carried out in 20 subareas by Nunaoil A/S in 1990 (Olsen & Pedersen, 1991).

The selection of these sub-areas was based on the gold distribution pattern in the stream sediment samples collected by GGU in 1979 (Steenfelt, 1990). The main aim of the survey was to confirm the anomalous gold values in the stream sediment pinpoint targets for gold exploration.

The raw samples consisted of 15–20 kg of unsorted stream sediment. After wet-sieving, a heavy mineral concentrate was produced from the <0.5 mm fraction on a vibrating gold screw. Subsequently the <0.25 mm fraction of the concentrate was analysed for 36 trace elements by instrumental neutron activation or atomic absorption spectrometry after aqua regia digestion (Cu and Pb only).

The distribution of 17 elements important for mineral exploration is shown on maps 94/1-301 to 317. They illustrate the distribution of anomalous and highly anomalous values, which can approximately be defined by the 90th and 98th percentiles, respectively. Clusters of anomalous values outline the following regions:

(1) The Archaean Tartoq Group is characterised by anomalously high values of Co and Cr, and also has high values of As, Au, Cu and Ni. This is explained by the occurrence of mineralisation with gold-bearing arsenopyrite-pyrite-chalcopyrite and iron oxides in the area.

(2) The Midternæs – Arsuk Ø area of Lower Proterozoic supracrustals is anomalous in especially Co and Cu in addition to Au. Corresponding mineralisation of chalcopyrite and gold is known from the area.

(3) The Bredefjord – Igaliko Fjord – Motzfeldt Sø area comprising a major part of the Middle Proterozoic Gardar province is especially anomalous in Ba, Hf, Pb and Ta, and also in Ce, U and Zn. This pattern is explained by known mineralisation of uranium, rare earth elements and base metals.

(4) The peninsula west of Søndre Sermilik, underlain by Lower Proterozoic granitoides, is highly anomalous in Au and W, and to a lesser degree in As. This reflects the occurrence of gold and scheelite mineralisation in the area.

(5) The northern part of the Nanortalik peninsula, underlain by Lower Proterozoic supracrustals, is highly anomalous in As, Sb, W and to a lesser degree in Au and Hf. The area's known mineralisation of semi-massive iron sulphides only partially explains the anomalies.

(6) The area between Tasermiut and Aappilattoq is underlain by Lower Proterozoic metasediments and granitoides. It is highly anomalous in Ce, Lu, Th and U, and also anomalous in As, Au, Ba, Hf, Ni, Pb, Ta and Zn. No outcropping mineralisation is known from this area.

(7) The Lindenow Fjord area, underlain by Lower Proterozoic metasediments and granitoids, is highly anomalous in Lu and U. No mineralisation is known from this area.

References

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2.6 Mineral occurrences *(Mogens Lind & Tapani Tukiainen)*

The mineral occurrence maps (94/1-401 & 94/1-402) are based on data stored in the GREENMIN data base system at GGU which contains information on mineral occurrences provided by companies holding concessions as well as by GGU and associated research groups (Lind *et al.,* 1994). The maps show the location of the most important mineral occurrences and characteristic mineralisation patterns recorded in the area. Each occurrence is represented by a composite symbol which conveys lithological, mineralogical, morphological and other descriptive attributes in the data base. The genetic classification generally reflects the opinion expressed by the original source. Their economic importance is indicated by the symbol size; a prospect is a showing which has been drilled or channel-sampled, while a mine is a past or present producer. The symbol includes a GREENMIN identification number (given in brackets in the following) to be used if more detailed information is required from the database at a later time. Underlining of the GREENMIN number on the maps shows that more than one occurrence is present at the locality.

References have been kept to a minimum in this section as many papers cited contain extensive literature lists. The map sheet description by Kalsbeek *et al.* (1990) includes a summary of the economic geology of the region.

Copies of released industry mineral assessment reports are available for inspection at GGU in Copenhagen or can be purchased on microfiche. A bibliographic index of released industry reports (Nielsen, 1992) can be obtained from GGU on request.

There are no present producers of metals or industrial minerals in the area. Among the past producers the Ivittuut cryolite mine (Bondam, 1991) was a world class deposit producing 3 722 510 tons of ore with 58 % cryolite (GREENMIN no: 231/1). The mining activities at Kobberminebugt area (no: 241/9) were very modest whereby *c.* 90 tons of copper was produced at the beginning of the century (Erfurt & Lind, 1990). From 1911 to 1922 *c.* 6000 tons of graphite were mined at Amitsoq (no: 156/1; Bondam, 1992b).

The Archaean Tartoq Group greenstone belt (nos: 42/6, 43/1,6,9, 44/36) hosts an extensive sulphide and magnetite banded iron formation with low but persistent gold values. Higher, but more erratic gold grades are associated with quartz-ankerite and arsenopyrite-pyrite-chalcopyrite lenses occurring within a system of carbonated shear zones (Evans & King, 1993; Petersen, 1993).

The Ketilidian supracrustal rocks overlying the Archaean basement include sediment-hosted showings of base metals and gold (nos: 44/9,22) and magnetite-pyrite bands in a quartz conglomerate (no: 44/19; Erfurt, 1990). At higher metamorphic grades skarn type Au-W-Cu-showings are reported (no: 243/1) and Au-Cu within mixed mica schist/greenschist units (no: 242/3; Erfurt & Lind, 1990). From the upper metavolcanic part of the sequence Au is reported in discordant quartz veins (no: 45/1) (unpublished exploration data provided by Nunaoil A/S). The greenschists of the Kobberminebugt shear zone contain several Cu-Au showings related to fault breccias and shear zones (nos: 241/2,7,9; Erfurt & Lind, 1990).

Greenstones within supracrustal rocks in the south western part of the Ketilidian belt host visible gold in quartz veins parallel to foliation (no: 511/1; Gowen *et al.,* 1993). On the east coast low grade Au showings occur in sulphide bearing cherty matasediments (no: 471/2; Nielsen et al., 1993).

The peninsula west of Søndre Sermilik contains several epigenetic Au bearing quartz veins often associated with amphibolites (no: 512/2) or mica schists in a granitic terraine (nos: 513/1,3,4; unpublished exploration data provided by Nunaoil A/S). A close link between these showings and steep NE–SW trending regional shear zones is suggested by Chadwick *et al.* (1994).

Other mineralised localities within the Ketilidian orogenic belt include a number of small intrusions of hornblende peridotite with minor contents of Cu, Ni and noble metals (nos: 151/5,6,7,11; Appel *et al.,* 1993).

The supracrustal rocks in the southern part of the Ketilidian belt host occurrences of uraninite: the most important of these is the occurrence at Illorsuit (no: 211/1: Armour-Brown, 1986). An enclave of Ketilidian gneiss with disseminated uraninite is also known from the northern part of the Julianehåb batholith (no: 201/3). The central area of the Julianehåb batholith contains a number of uranium occurrences as veins or cavity fillings with pitchblende, brannerite and other uranium minerals. The available U-Pb isotopic results suggest a Gardar age for these occurrences (Armour-Brown *et al.,* 1984; Nyegaard & Armour-Brown, 1986).

The peralkaline, volatile-rich phases in some of the Gardar alkaline intrusions are enriched in Zr, Nb, Ta, REE, U, Th, Cl, F, P, Li, Be and Y (Bailey *et al.,* 1981; Bondam, 1991, 1992a; Sørensen *et al.,* 1974; Thomassen, 1988; Tukiainen, 1986). The most important occurrences are:

Locality	Commodity	GREENMIN no:
Ivigtut granite	Cryolite	231/1
Grønnedal-Íka	Fe,P,REE	351/2
Kvanefjeld/Ilímaussaq	U,REE,Zr,Y	61/1
Kringlerne/Ilímaussaq	Zr,REE,Y	62/1
Motzfeldt Sø	Ta,Nb,U,Zr	1/7

The radioactive elements in the Gardar alkaline intrusions are characteristically incorporated in the refractory minerals such as steenstrupine, thorite, uraniferous pyrochlore etc.

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3. Acknowledgements

The production of an issue in GGU's Thematic Map Series is decidedly a team effort involving many different people, and incorporating the work of many different projects and people in the past. The editors gratefully acknowledge the valuable contributions of all.

GGU's compilation of Thematic Maps are financially supported by the Mineral Resources Administration for Greenland, Ministry of Energy.

The geological map has been checked and discussed with many colleagues. The magnetic map includes data from Atlantic Geoscience Centre (Ron Macnab), and the data for the gravity maps were obtained through René Forsberg, Kort- og Matrikelstyrelsen. Mette Svane Jørgensen, GGU, was involved in the processing of the magnetic data. The geochemical maps based on the fine fraction of stream sediment are the result of many activities involving sampling (Ashlyn Armour-Brown and sampling teams of the Syduran project; Peter Erfurt, Egon Hansen and Anette Petersen), sample preparation (Inge Rytved), analyses by Risø National Laboratory (Helmar Kunzendorf), INA analyses financed by Nunaoil A/S and analyses by GGU's XRF laboratory. Tapani Tukiainen implemented and improved the computer programs used in the production of the geochemical maps and Else Dam has undertaken all the tedious work with data handling and plotting. The geochemical maps based on heavy mineral concentrates are based entirely on data from Nunaoil A/S and kindly made available for this project by the company. Inge Rytved produced the maps. Original master copies of maps were produced by use of a GGU developed program (GGURAS).

Thematic map 94/1-000

SATELLITE IMAGE MAP

Kap Farvel - Ivittuut

Compiled by Tapani Tukiainen

LEGEND

Town

Settlement

Explanation of colours.

Dark grey to grey: barren areas and the marginal parts of the Ice Cap

Reddish brown to brown: vegetated areas

Black: water and shadow

DATA SOURCE

Landsat MSS scenes:

Track	Frame	Acquisition date	Landsat
251	17/18	81-AUG-09	L3
001	17/18	79-JUL-25	L2
001	17/18	79-AUG-30	L2
003	17/18	79-SEP-01	L2

DATA PROCESSING

The image is a colour composite of the IHS transformed MSS bands 7, 5, and 4.

Prior to the mosaicking the scenes were orthorectified by using the method of second order polynomial and bilinear interpolation. Promiment topographical features from the published maps were used as tiepoints for the interpolation.

Projection: Lambert conformal conic	
Standard parallel:	66° 30'N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coastlines digitized from 1:250 000 topographic maps. Permission No: KMS A.200/87

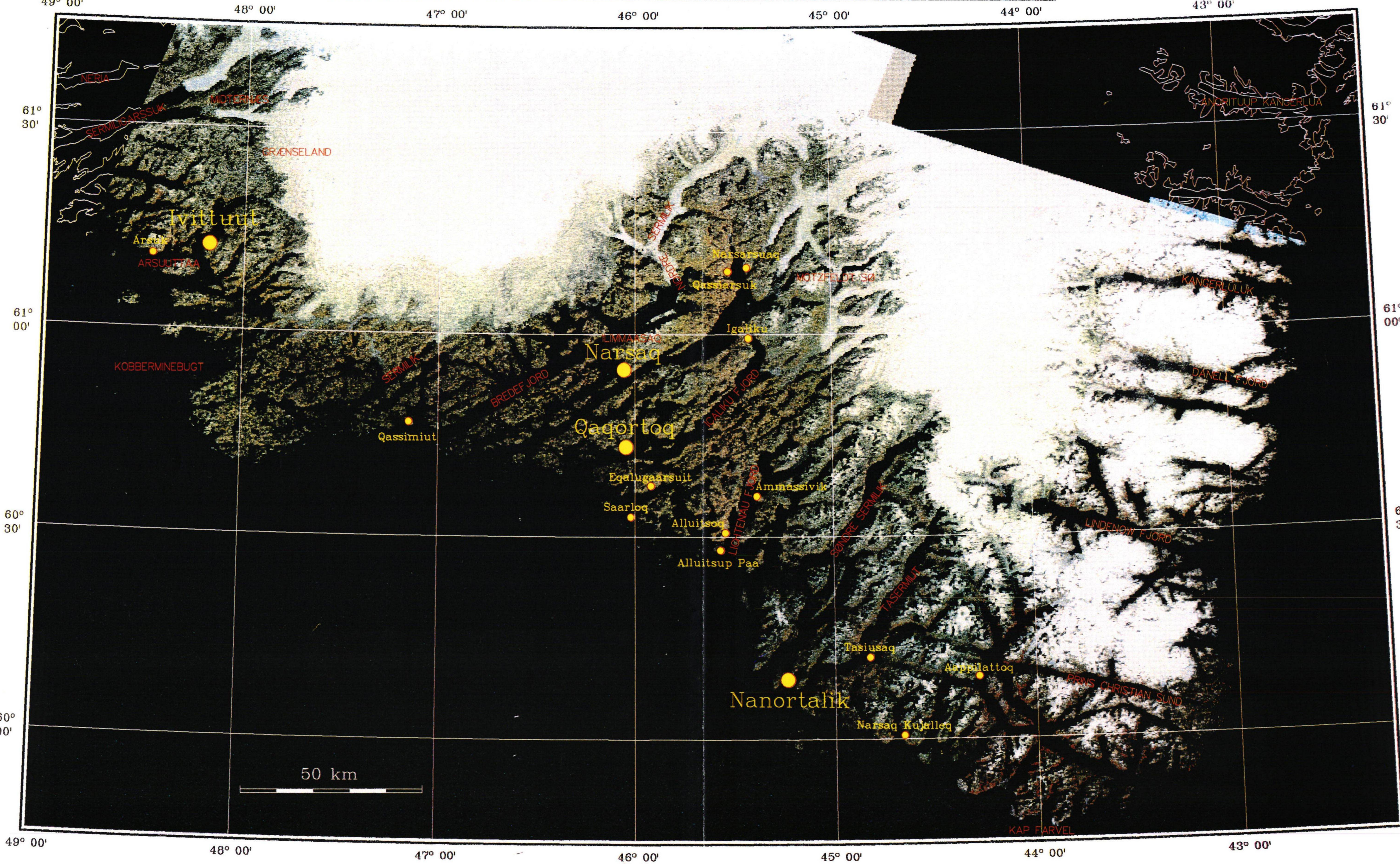
Released: 01-JUN-1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK-1350 København K Danmark

SATELLITE IMAGE MAP

94/1-000: Kap Farvel – Ivittuut

01-JUN-94



Thematic map 94/1-1

GEOLOGICAL MAP

Kap Farvel – Ivittuut

Compiled by F. Kalsbeek and T. Tukiainen

LEGEND

MIDDLE PROTEROZOIC

- Nepheline syenite, syenite and granite (Gardar alkaline complexes)
- Predominantly basalt of the Eriksfjord Formation and dolerite dykes
- Sandstone of the Eriksfjord Formation

EARLY PROTEROZOIC

- Rapakivi suite (granite, norite and associated monzonitic rocks)
- Early and late granitoids (granite, granodiorite and tonalite)
- Mafic metavolcanic rocks with associated mafic intrusions
- Silicic metasediments with subordinate carbonate and calc–silicate rocks
- Acid to intermediate metavolcanic rocks
- Intermediate to mafic intrusions (predominantly diorite and gabbro with minor ultramafic rocks
- Pyroxene–biotite monzonite

ARCHAEAN

- Tartoq Group (metavolcanic rocks and subordinate metasediments)
- Amphibolite
- Granodioritic gneiss
- Granodioritic gneiss with abundant gabbro–anorthositic enclaves

DATA SOURCE

Geological maps in scale 1:500 000 and 1:100 000 published by the Geological Survey of Greenland. The eastern part of the area is revised on the basis of oral communications by B. Chadwick, A. A. Garde and T. F. D. Nielsen.

DATA PROCESSING

The geological units were digitised as polygons in scale 1:500 000 and supplied with a lithological code. The colour coding of the polygons is controlled by the lithological code.

Projection: Lambert conformal conic	
Standard parallell:	66° 30'N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps. Permission No: KMS A.200/87

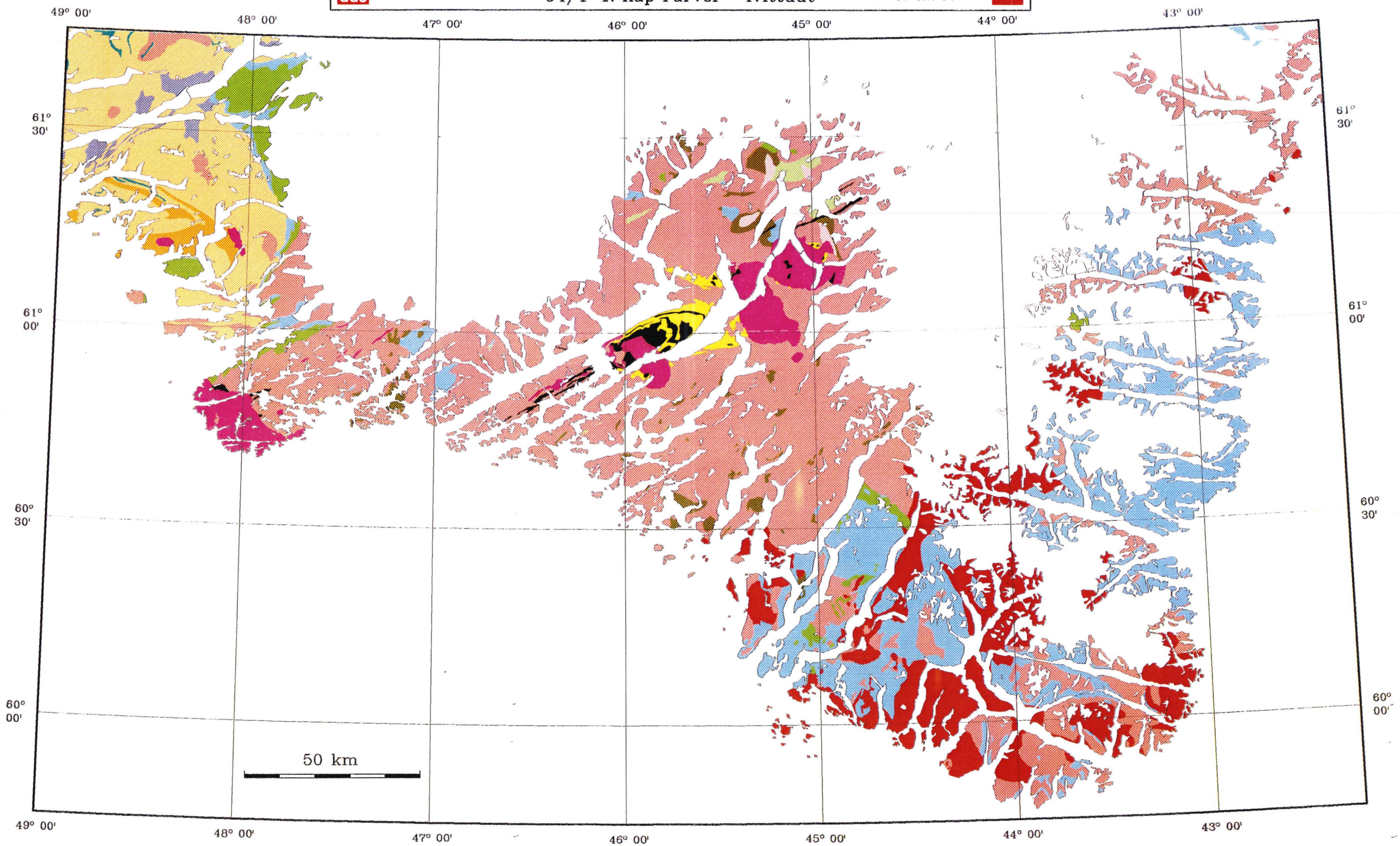
Released: 01–JUN–1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK–1350 København K Danmark

GEOLOGICAL MAP

94/1-1: Kap Farvel – Ivittuut

01-JUN-94



Thematic map 94/1-101

AEROMAGNETIC TOTAL INTENSITY SHADED ANOMALY MAP

Kap Farvel – Ivittuut

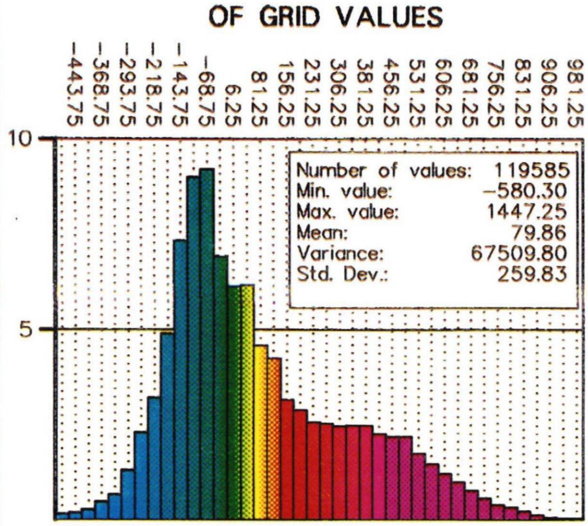
Compiled by Leif Thorning

CONTOUR INTERVALS

Total intensity (nT)

ABOVE
405.34 - 435.45
355.80 - 405.34
310.73 - 355.80
270.91 - 310.73
240.26 - 270.91
205.68 - 240.26
175.18 - 205.68
150.68 - 175.18
145.21 - 150.68
140.78 - 145.21
135.40 - 140.78
120.03 - 135.40
105.30 - 120.03
90.63 - 105.30
80.00 - 90.63
60.27 - 80.00
50.63 - 60.27
40.00 - 50.63
30.37 - 40.00
20.71 - 30.37
10.06 - 20.71
-15.43 - 10.06
-30.80 - -15.43
-60.20 - -30.80
-95.63 - -60.20
-130.11 - -95.63
-170.71 - -130.11
-195.44 - -170.71
-245.39 - -195.44
-313.60 - -245.39
-454.00 - -313.60
BELOW

STATISTICAL PARAMETERS OF GRID VALUES



DATA SOURCE

The data are from three different surveys of varying quality. The shading has been used to show positions of the three survey areas. See introduction for details.

SURVEY SPECIFICATIONS

The most detailed onshore survey flown at 300 m over the tops of mountains (draped) with 2 km line separation. Remaining onshore area flown 300 m over surface of ice cap (draped) with 10–12 km line separation. Offshore: gridded data (many sources), details not available.

DATA PROCESSING

Each survey processed separately, including diurnal correction, decorrugation and filtering. Anomalies are relative to appropriate IGRF. Gridding by a minimum total curvature method (1000 m by 1000 m). The shading uses a light source to the NW at 45° inclination.

Projection:	Lambert conformal conic
Standard parallel:	66° 30'N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coastlines digitized from 1:250 000 topographic maps. Permission No: KMS A.200/87

Released: 01–JUN–1994

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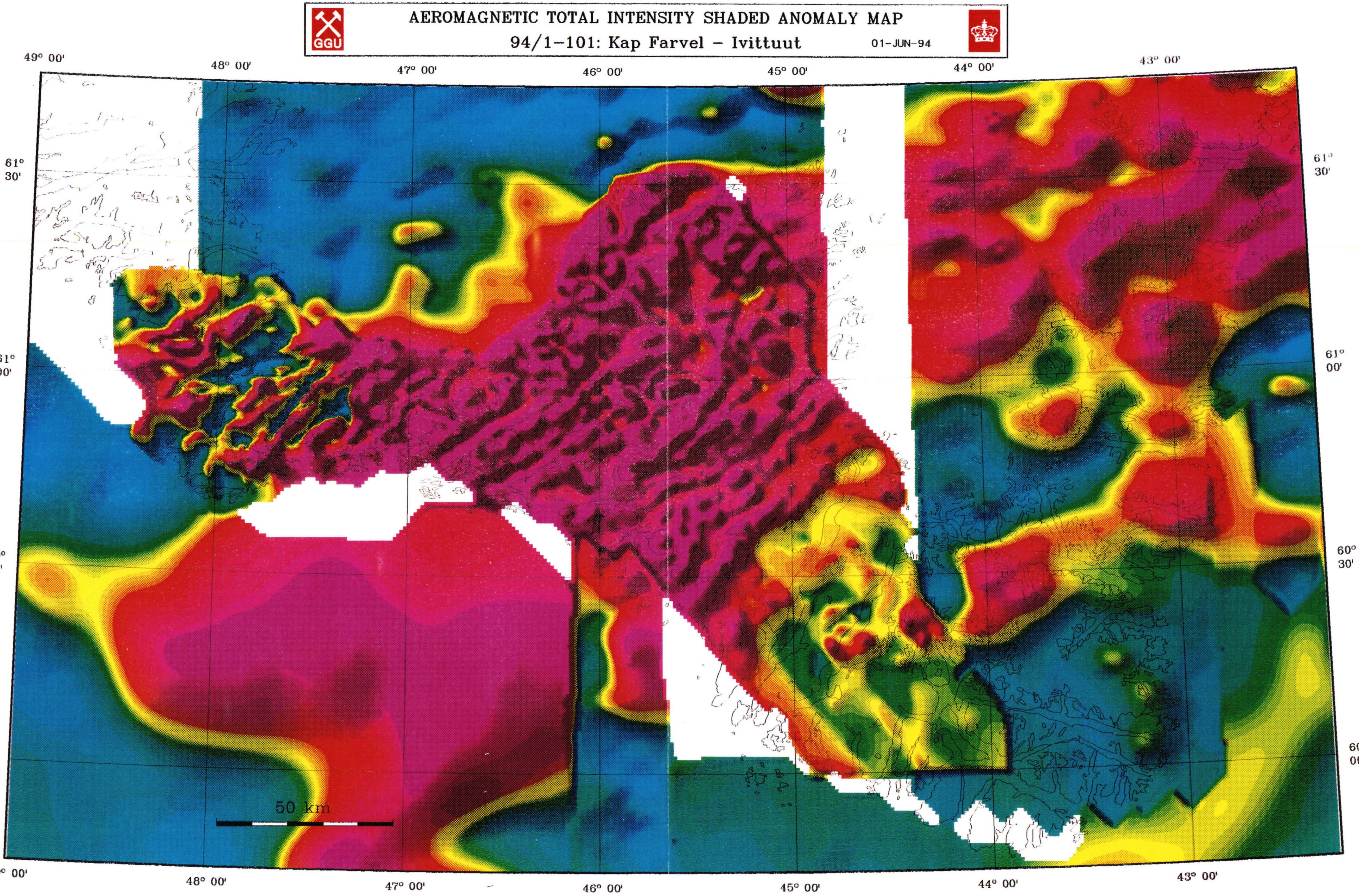


GGU
AEROMAGNETIC TOTAL INTENSITY SHADED ANOMALY MAP
94/1-101: Kap Farvel - Ivittuut
01-JUN-94
49° 00'
48° 00'
47° 00'
46° 00'
45° 00'
44° 00'
43° 00'
61° 30'
61° 00'
60° 30'
60° 00'
50 km

Thematic map 94/1-111

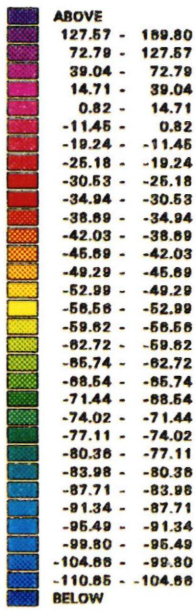
BOUGUER ANOMALY MAP

Kap Farvel – Ivittuut

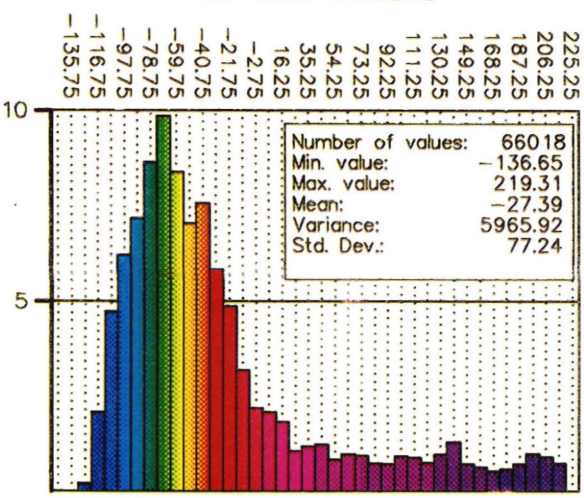
Compiled by Leif Thorning

CONTOUR INTERVALS

Bouguer anomaly (mgal)



STATISTICAL PARAMETERS OF GRID VALUES



DATA SOURCE

The data have been obtained from the gravity data base at Kort- og Matrikel-styrelsen (KMS), and encompass data from many surveys over a span of years, mostly by KMS. The most recent survey was the joint survey by GGU and KMS in 1992.

DATA PROCESSING

The calculation of Bouguer anomalies was done at KMS using a density of 2.67 g/cm^3 for rocks and 1.00 g/cm^3 for water.
No terrain corrections have been applied.
Anomalies are relative to GRS67/IGSN71.

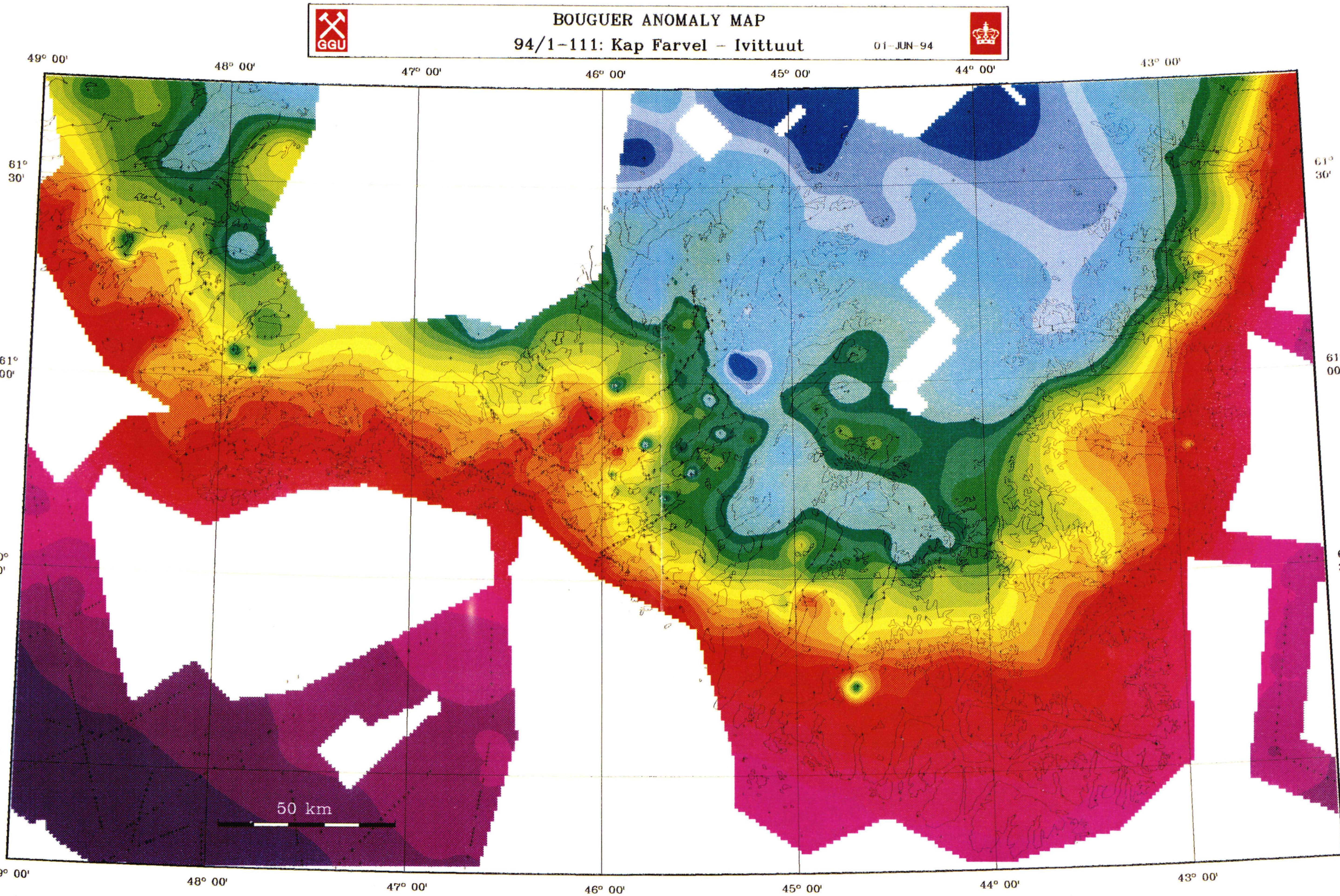
The data were interpolated into a 1000 by 1000 m grid using the method of total minimum curvature.
Grid points with insufficient data for the calculation are left white. Points of observation are indicated by small crosses.

Projection:	Lambert conformal conic
Standard parallel:	66° 30'N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coastlines digitized from 1:250 000 topographic maps.
Permission No: KMS A.200/87

Released: 01-JUN-1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK-1350 København K Danmark


GGU
BOUGUER ANOMALY MAP
94/1-111: Kap Farvel – Ivittuut
01-JUN-94
49° 00'
48° 00'
47° 00'
46° 00'
45° 00'
44° 00'
43° 00'
61° 30'
61° 00'
60° 30'
60° 00'
50 km

Thematic map 94/1-112

RESIDUAL BOUGUER ANOMALY MAP

Kap Farvel – Ivittuut

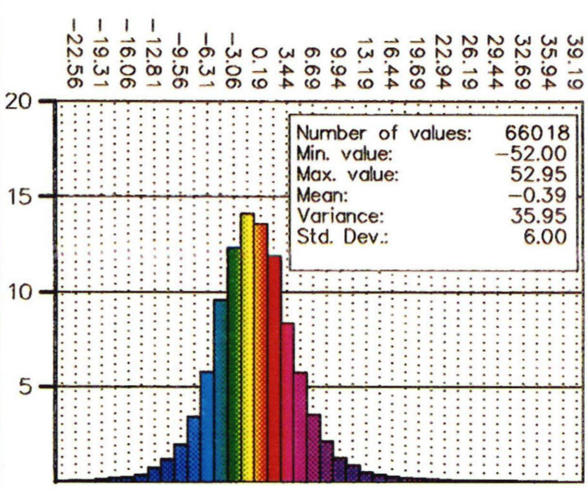
Compiled by Leif Thorning

CONTOUR INTERVALS

Residual Bouguer anomaly (mgal)

ABOVE
7.34 - 9.45
5.80 - 7.34
4.73 - 5.80
3.91 - 4.73
3.26 - 3.91
2.68 - 3.26
2.18 - 2.68
1.68 - 2.18
1.21 - 1.68
0.78 - 1.21
0.40 - 0.78
0.03 - 0.40
-0.30 - 0.03
-0.63 - -0.30
-0.94 - -0.63
-1.27 - -0.94
-1.63 - -1.27
-2.00 - -1.63
-2.37 - -2.00
-2.71 - -2.37
-3.06 - -2.71
-3.43 - -3.06
-3.80 - -3.43
-4.20 - -3.80
-4.63 - -4.20
-5.11 - -4.63
-5.71 - -5.11
-6.44 - -5.71
-7.39 - -6.44
-8.60 - -7.39
-10.56 - -8.60
BELOW

STATISTICAL PARAMETERS OF GRID VALUES



DATA SOURCE

The data have been obtained from the gravity data base at Kort- og Matrikel-styrelsen (KMS), and encompass data from many surveys over a span of years, mostly by KMS. The most recent survey was the joint survey by GGU and KMS in 1992.

DATA PROCESSING

The calculation of Bouguer anomalies was done at KMS using a density of 2.67 g/cm^3 for rocks and 1.00 g/cm^3 for water. No terrain corrections have been applied. Anomalies are relative to GRS67/IGSN71.

The data were interpolated into a 1000 by 1000 m grid using the method of total minimum curvature. Grid points with insufficient data for the calculation are left white. Points of observation are indicated by small crosses.

The Residual anomaly map was produced from map 94/1-111 by use of a Gauss residual/regional filter in the frequency domain with a cut-off corresponding to 80 km.

Projection: Lambert conformal conic	
Standard parallel:	66° 30'N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coastlines digitized from 1:250 000 topographic maps. Permission No: KMS A.200/87

Released: 01-JUN-1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
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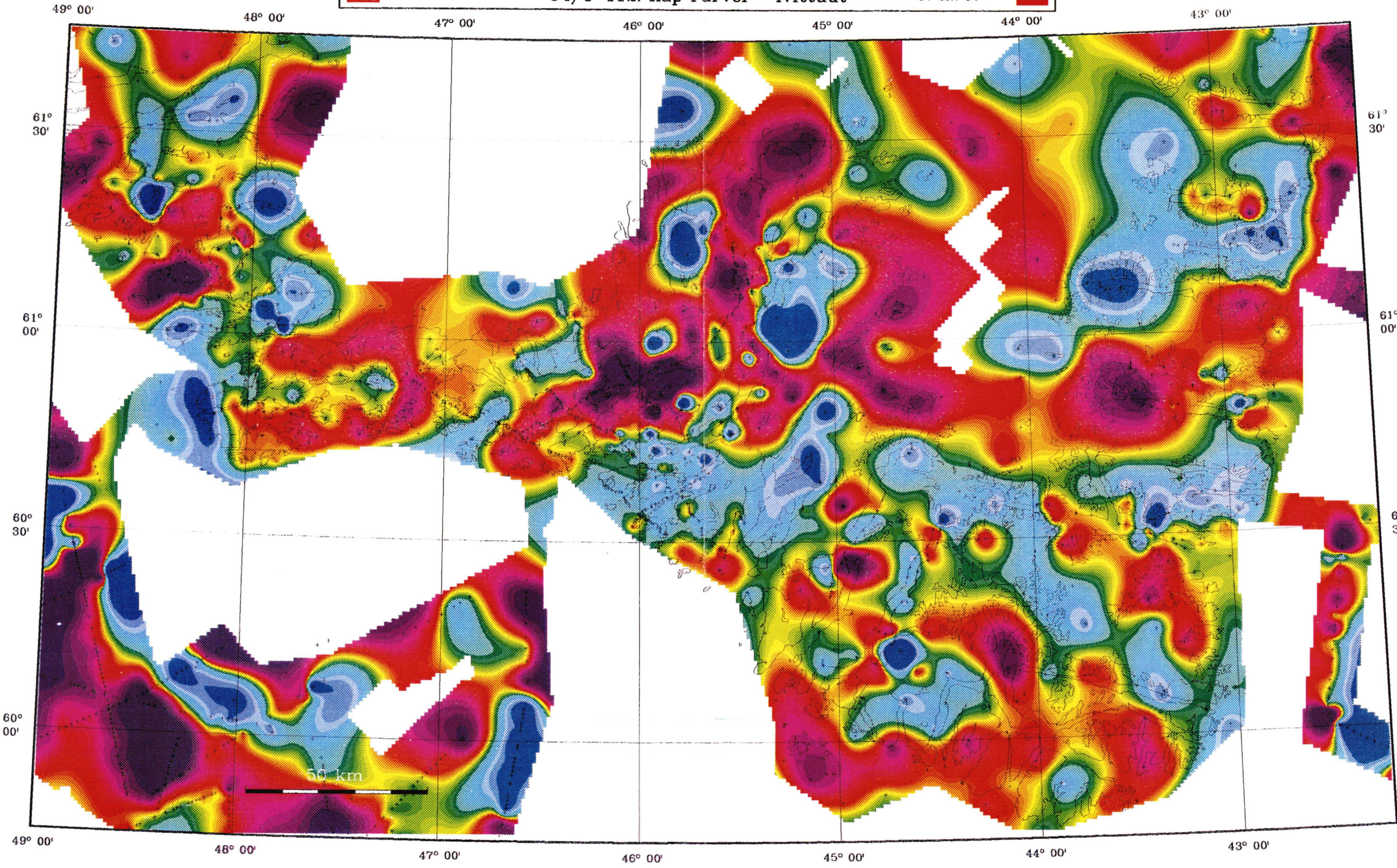
RESIDUAL BOUGUER ANOMALY MAP

94/1-112: Kap Farvel - Ivittuut

01-JUN-94



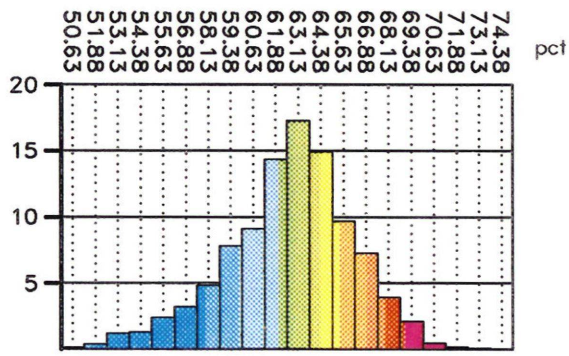
Thematic map 94/1-201

GEOCHEMICAL MAP: SiO_2 IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION OF GRID VALUES



CONTOUR INTERVALS AND PERCENTILES OF GRID VALUES

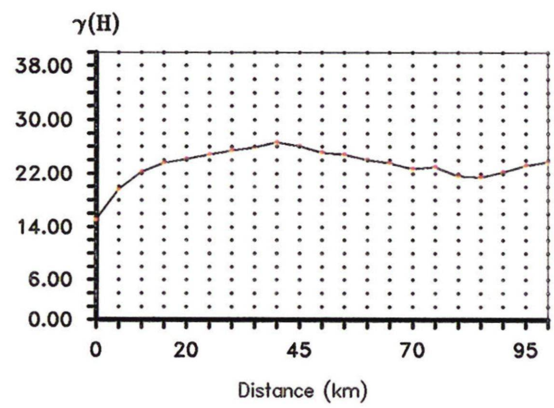
ABOVE	99
67.95 – 69.03	98
66.88 – 67.95	95
65.42 – 66.88	90
64.37 – 65.42	80
63.62 – 64.37	70
62.88 – 63.62	60
62.13 – 62.88	50
62.03 – 62.13	40
59.85 – 62.03	39
57.95 – 59.85	20
BELOW	10

STATISTICAL PARAMETERS OF ANALYTICAL VALUES

SiO_2 pct

Number of samples:	1187
Min. value:	37.19
Max. value:	74.28
Mean:	62.43
Median:	63.08
Variance:	25.60
Std. Dev.:	5.06

SEMI-VARIOGRAM



DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km^2
- 1992 survey average: 1 per 50 km^2
- 1993 survey average: 1 per 20 km^2

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3–10 subsamples

Size fraction:
- < 0.1 mm dry–sieved in laboratory

Method and laboratory:
- 1979 survey: XRF at GGU
- 1992 survey: XRF at Actlabs
- 1993 survey: XRF at GGU

DATA PROCESSING

Colour contouring based on 2.5 km x 2.5 km grid. Grid values obtained by the Kriging method using a search radius of 7.5 km. Colour scale based on the percentiles of grid values.

Projection:	Lambert conformal conic
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps. Permission No: KMS A.200/87

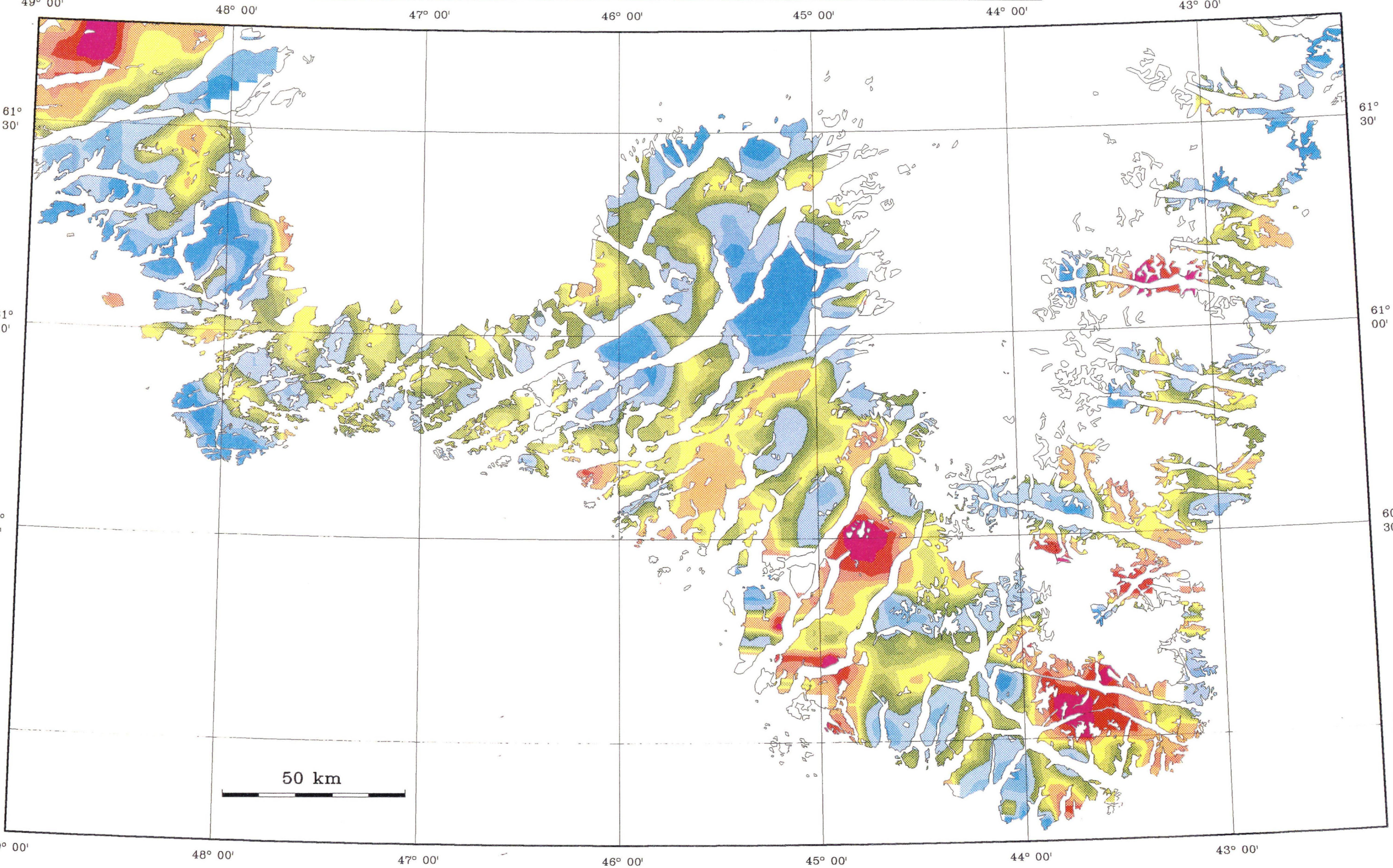
Released: 01–JUN–1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK–1350 København K Danmark

GEOCHEMICAL MAP : SiO_2 IN STREAM SEDIMENT

94/1-201: Kap Farvel – Ivittuut

01-JUN-94



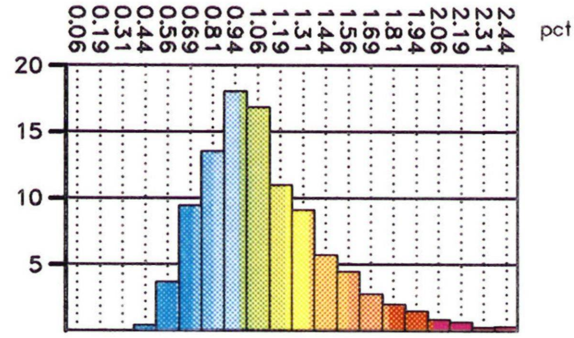
Thematic map 94/1-202

GEOCHEMICAL MAP: TiO_2 IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION OF GRID VALUES



CONTOUR INTERVALS AND PERCENTILES OF GRID VALUES

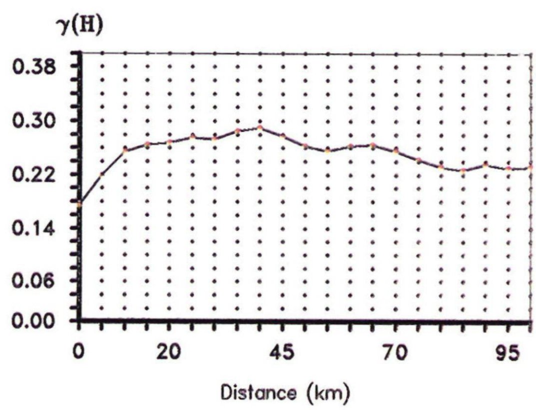
ABOVE	99
1.78 – 2.03	98
1.57 – 1.78	95
1.35 – 1.57	90
1.22 – 1.35	80
1.11 – 1.22	70
1.03 – 1.11	60
0.97 – 1.03	50
0.96 – 0.97	40
0.82 – 0.96	39
0.71 – 0.82	20
BELOW	10

STATISTICAL PARAMETERS OF ANALYTICAL VALUES

TiO_2 pct

Number of samples:	1187
Min. value:	0.24
Max. value:	4.20
Mean:	1.13
Median:	0.99
Variance:	0.29
Std. Dev.:	0.53

SEMI-VARIOGRAM



DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km^2
- 1992 survey average: 1 per 50 km^2
- 1993 survey average: 1 per 20 km^2

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3–10 subsamples

Size fraction:
- < 0.1 mm dry-sieved in laboratory

Method and laboratory:
- 1979 survey: XRF at GGU
- 1992 survey: XRF at Actlabs
- 1993 survey: XRF at GGU

DATA PROCESSING

Colour contouring based on 2.5 km x 2.5 km grid. Grid values obtained by the Kriging method using a search radius of 7.5 km. Colour scale based on the percentiles of grid values.

Projection: Lambert conformal conic	
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps. Permission No: KMS A.200/87

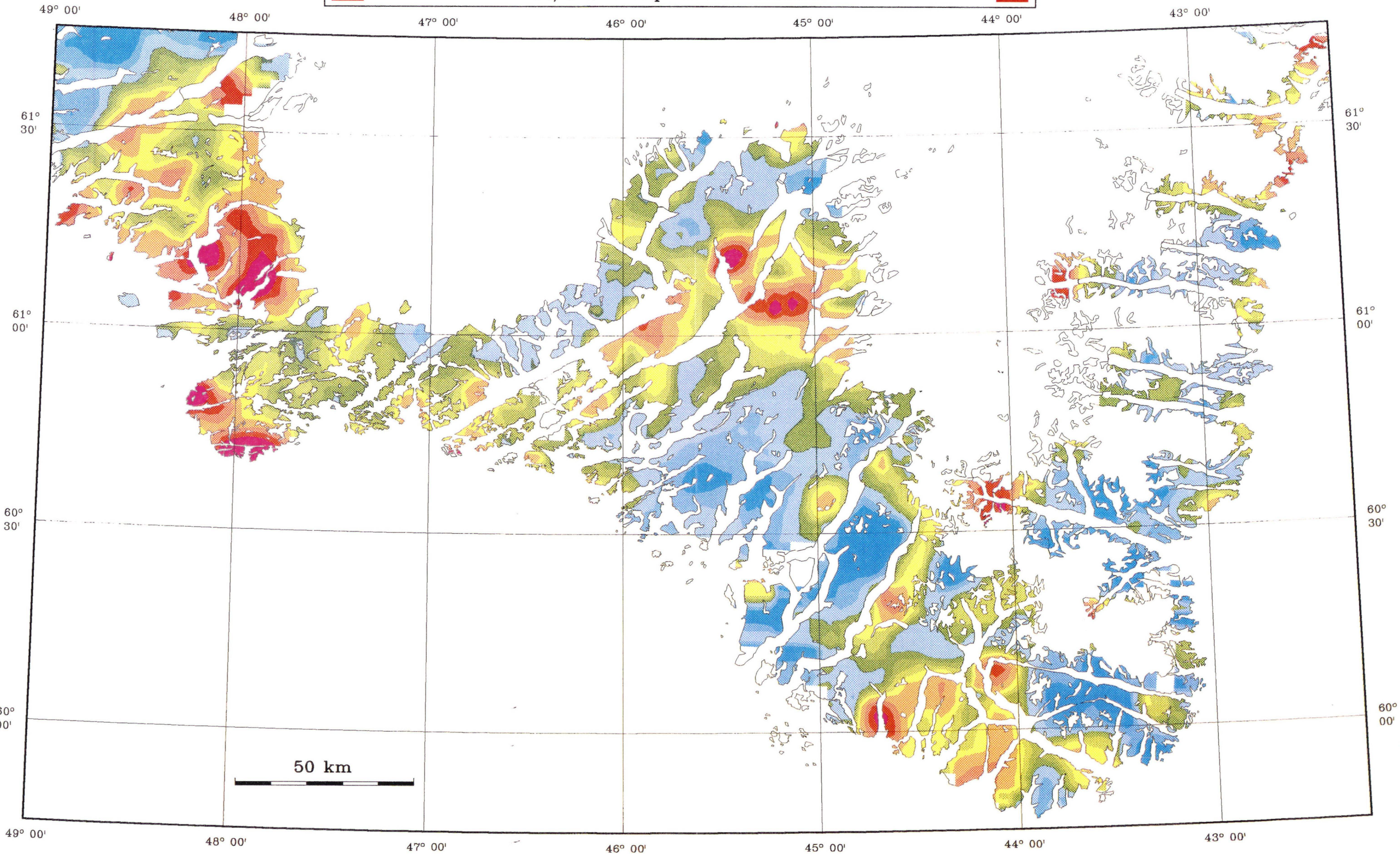
Released: 01-JUN-1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK-1350 København K Danmark

GEOCHEMICAL MAP : TiO_2 IN STREAM SEDIMENT

94/1-202: Kap Farvel – Ivittuut

01-JUN-94



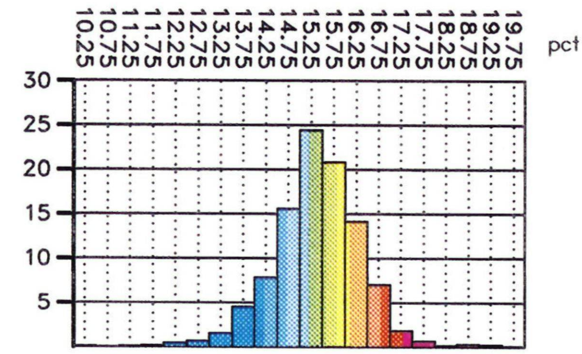
Thematic map 94/1-203

GEOCHEMICAL MAP: Al_2O_3 IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION OF GRID VALUES



CONTOUR INTERVALS AND PERCENTILES OF GRID VALUES

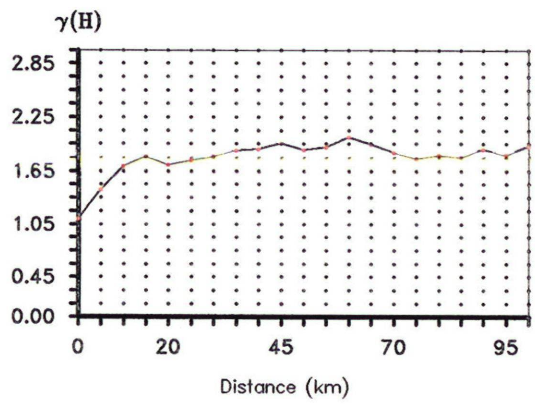
ABOVE	99
16.79 – 17.30	98
16.51 – 16.79	95
16.11 – 16.51	90
15.84 – 16.11	80
15.60 – 15.84	70
15.40 – 15.60	60
15.21 – 15.40	50
15.19 – 15.21	40
14.72 – 15.19	39
14.22 – 14.72	20
BELOW	10

STATISTICAL PARAMETERS OF ANALYTICAL VALUES

Al_2O_3 pct

Number of samples:	1187
Min. value:	9.05
Max. value:	22.82
Mean:	15.39
Median:	15.32
Variance:	1.89
Std. Dev.:	1.38

SEMI-VARIOGRAM



DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km^2
- 1992 survey average: 1 per 50 km^2
- 1993 survey average: 1 per 20 km^2

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3–10 subsamples

Size fraction:
- < 0.1 mm dry–sieved in laboratory

Method and laboratory:
- 1979 survey: XRF at GGU
- 1992 survey: XRF at Actlabs
- 1993 survey: XRF at GGU

DATA PROCESSING

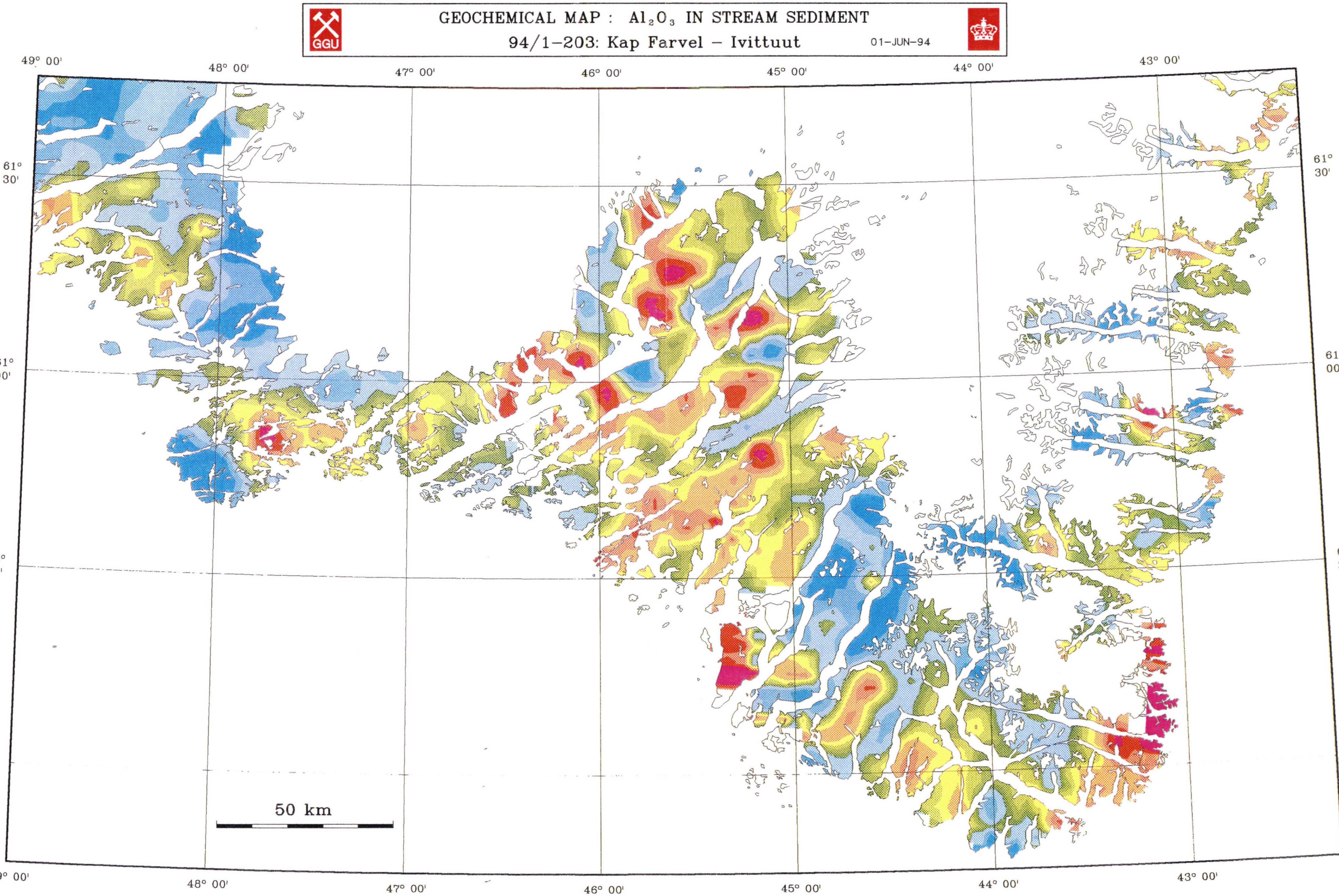
Colour contouring based on 2.5 km x 2.5 km grid. Grid values obtained by the Kriging method using a search radius of 7.5 km. Colour scale based on the percentiles of grid values.

Projection: Lambert conformal conic	
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps.
Permission No: KMS A.200/87

Released: 01–JUN–1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK–1350 København K Danmark


GGU
GEOCHEMICAL MAP : Al_2O_3 IN STREAM SEDIMENT
94/1-203: Kap Farvel - Ivittuut
01-JUN-94
49° 00'
48° 00'
47° 00'
46° 00'
45° 00'
44° 00'
43° 00'
61° 30'
61° 00'
60° 30'
60° 00'
50 km

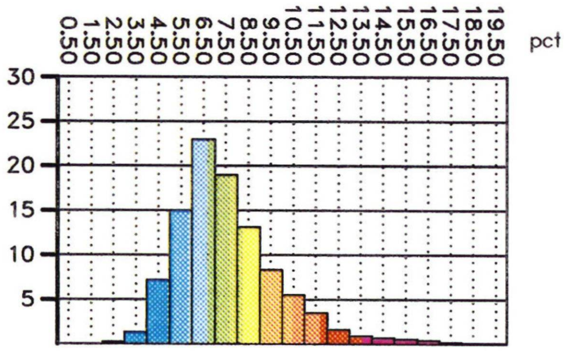
Thematic map 94/1-204

GEOCHEMICAL MAP: Fe_2O_3 IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION OF GRID VALUES



CONTOUR INTERVALS AND PERCENTILES OF GRID VALUES

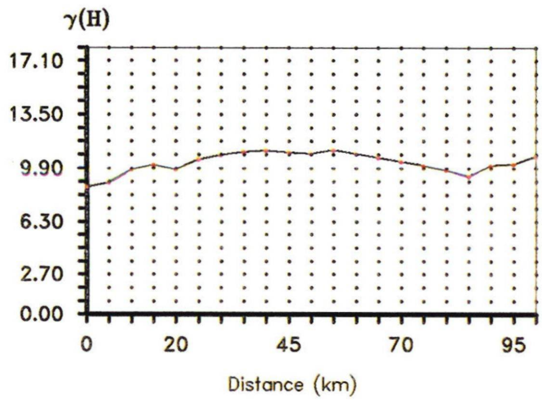
ABOVE	99
11.70 – 13.60	98
10.49 – 11.70	95
9.14 – 10.49	90
8.29 – 9.14	80
7.70 – 8.29	70
7.15 – 7.70	60
6.74 – 7.15	50
6.71 – 6.74	40
5.83 – 6.71	39
5.14 – 5.83	20
BELOW	10

STATISTICAL PARAMETERS OF ANALYTICAL VALUES

Fe_2O_3 pct

Number of samples:	1187
Min. value:	1.58
Max. value:	34.60
Mean:	7.68
Median:	6.99
Variance:	11.29
Std. Dev.:	3.36

SEMI-VARIOGRAM



DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km^2
- 1992 survey average: 1 per 50 km^2
- 1993 survey average: 1 per 20 km^2

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3–10 subsamples

Size fraction:
- < 0.1 mm dry-sieved in laboratory

Method and laboratory:
- 1979 survey: XRF at GGU
- 1992 survey: XRF at Actlabs
- 1993 survey: XRF at GGU

DATA PROCESSING

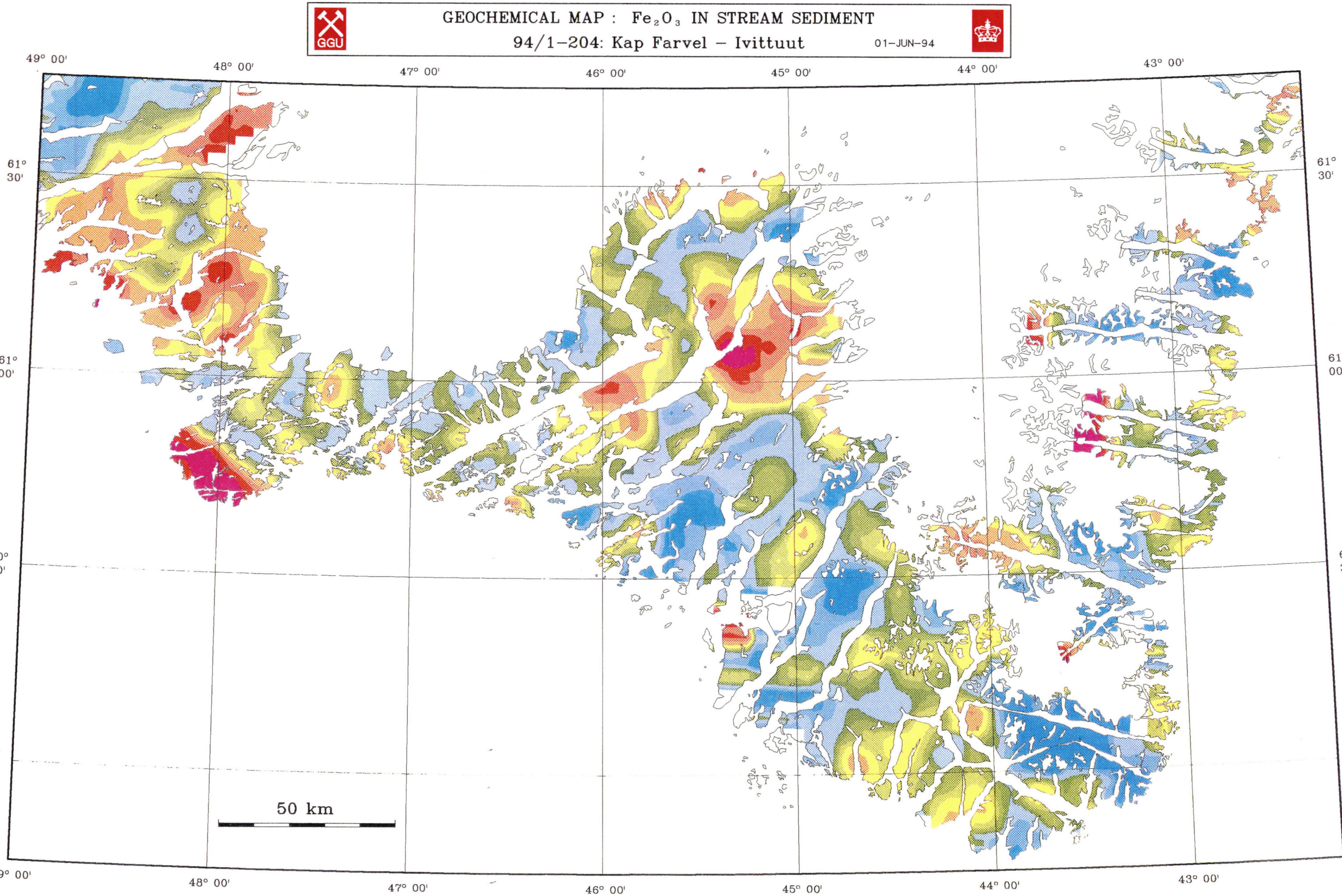
Colour contouring based on 2.5 km x 2.5 km grid. Grid values obtained by the Kriging method using a search radius of 7.5 km. Colour scale based on the percentiles of grid values.

Projection: Lambert conformal conic	
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps. Permission No: KMS A.200/87

Released: 01-JUN-1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK-1350 København K Danmark



GEOCHEMICAL MAP : Fe_2O_3 IN STREAM SEDIMENT
94/1-204: Kap Farvel – Ivittuut
01-JUN-94
GGU
49° 00'
48° 00'
47° 00'
46° 00'
45° 00'
44° 00'
43° 00'
61° 30'
61° 00'
60° 30'
60° 00'
50 km

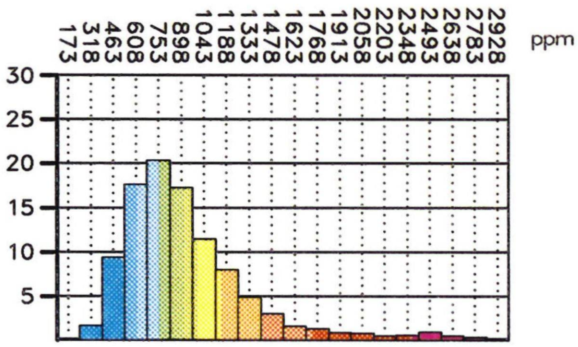
Thematic map 94/1-205

GEOCHEMICAL MAP: Mn IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION OF GRID VALUES



CONTOUR INTERVALS AND PERCENTILES OF GRID VALUES

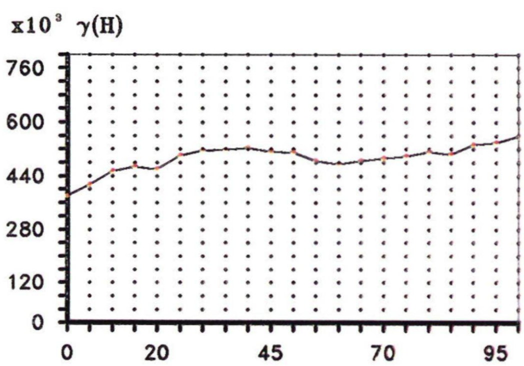
ABOVE	99
1739 – 2377	98
1401 – 1739	95
1153 – 1401	90
1010 – 1153	80
914 – 1010	70
835 – 914	60
763 – 835	50
755 – 763	40
613 – 755	39
525 – 613	20
BELOW	10

STATISTICAL PARAMETERS OF ANALYTICAL VALUES

Mn ppm

Number of samples:	2375
Min. value:	130
Max. value:	8610
Mean:	994
Median:	807
Variance:	518083
Std. Dev.:	720

SEMI-VARIOGRAM



DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km²
- 1992 survey average: 1 per 50 km²
- 1993 survey average: 1 per 20 km²

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3–10 subsamples

Size fraction:
- < 0.1 mm dry-sieved in laboratory

Method and laboratory:
- 1979 survey: XRF at Risø
- 1992 survey: XRF at Actlabs
- 1993 survey: XRF at GGU

DATA PROCESSING

Colour contouring based on 2.5 km x 2.5 km grid. Grid values obtained by the Kriging method using a search radius of 7.5 km. Colour scale based on the percentiles of grid values.

Projection:	Lambert conformal conic
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps. Permission No: KMS A.200/87

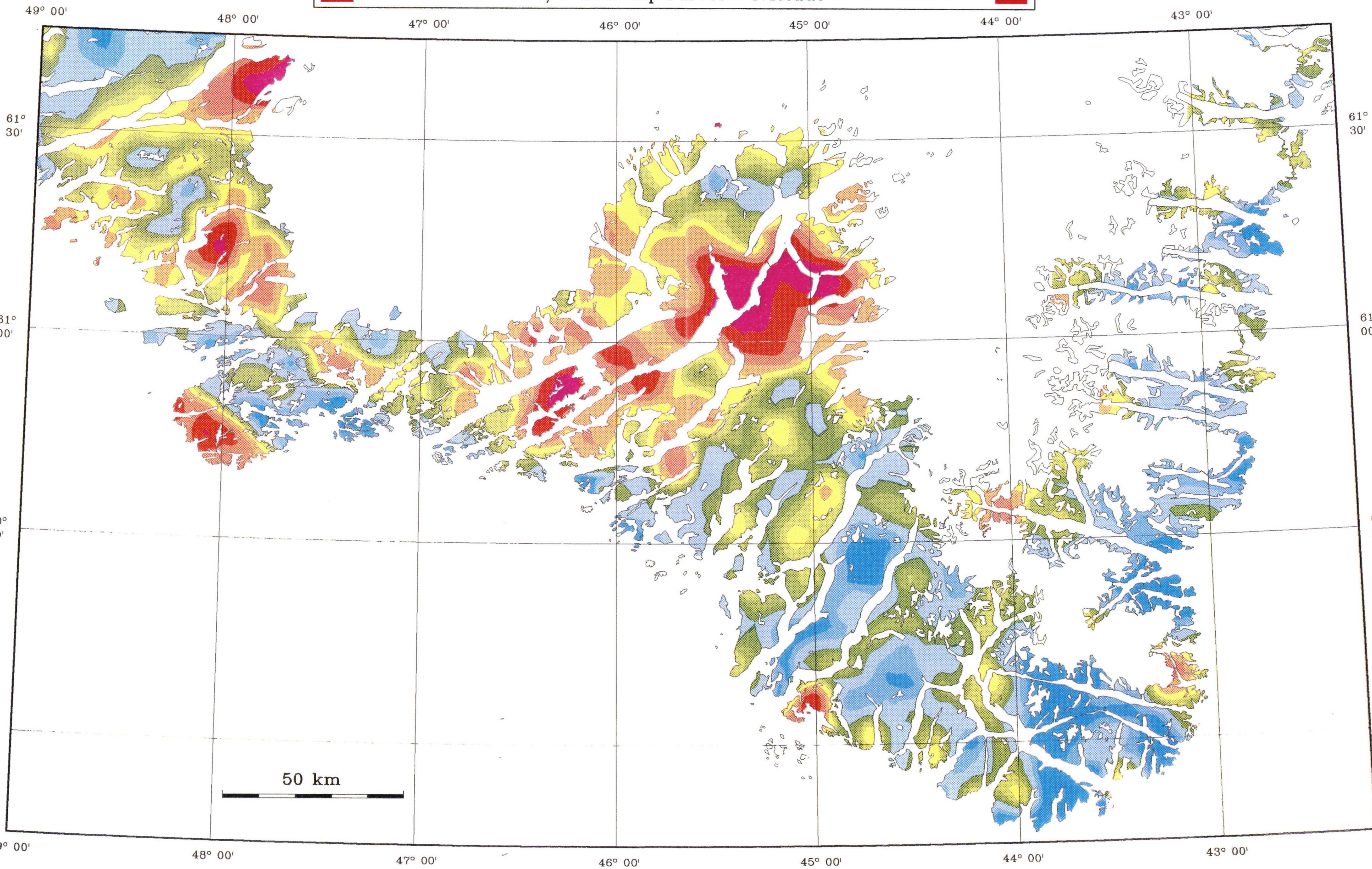
Released: 01-JUN-1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK-1350 København K Danmark

GEOCHEMICAL MAP : Mn IN STREAM SEDIMENT

94/1-205: Kap Farvel – Ivittuut

01-JUN-94



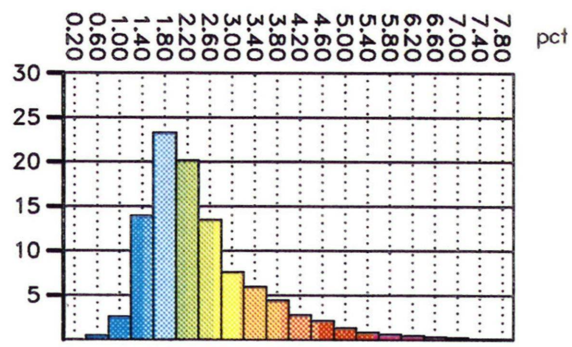
Thematic map 94/1-206

GEOCHEMICAL MAP: MgO IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION OF GRID VALUES



CONTOUR INTERVALS AND PERCENTILES OF GRID VALUES

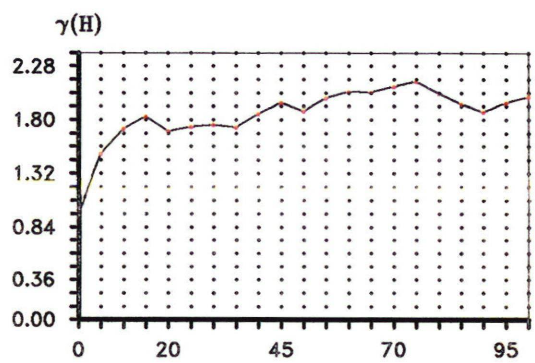
ABOVE	99
4.54 – 5.52	98
3.88 – 4.54	95
3.14 – 3.88	90
2.69 – 3.14	80
2.40 – 2.69	70
2.18 – 2.40	60
2.00 – 2.18	50
1.98 – 2.00	40
1.66 – 1.98	39
1.43 – 1.66	20
BELOW	10

STATISTICAL PARAMETERS OF ANALYTICAL VALUES

MgO pct

Number of samples:	1187
Min. value:	0.30
Max. value:	14.75
Mean:	2.52
Median:	2.08
Variance:	2.29
Std. Dev.:	1.51

SEMI-VARIOGRAM



DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km^2
- 1992 survey average: 1 per 50 km^2
- 1993 survey average: 1 per 20 km^2

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3–10 subsamples

Size fraction:
- < 0.1 mm dry–sieved in laboratory

Method and laboratory:
- 1979 survey: XRF at GGU
- 1992 survey: XRF at Actlabs
- 1993 survey: XRF at GGU

DATA PROCESSING

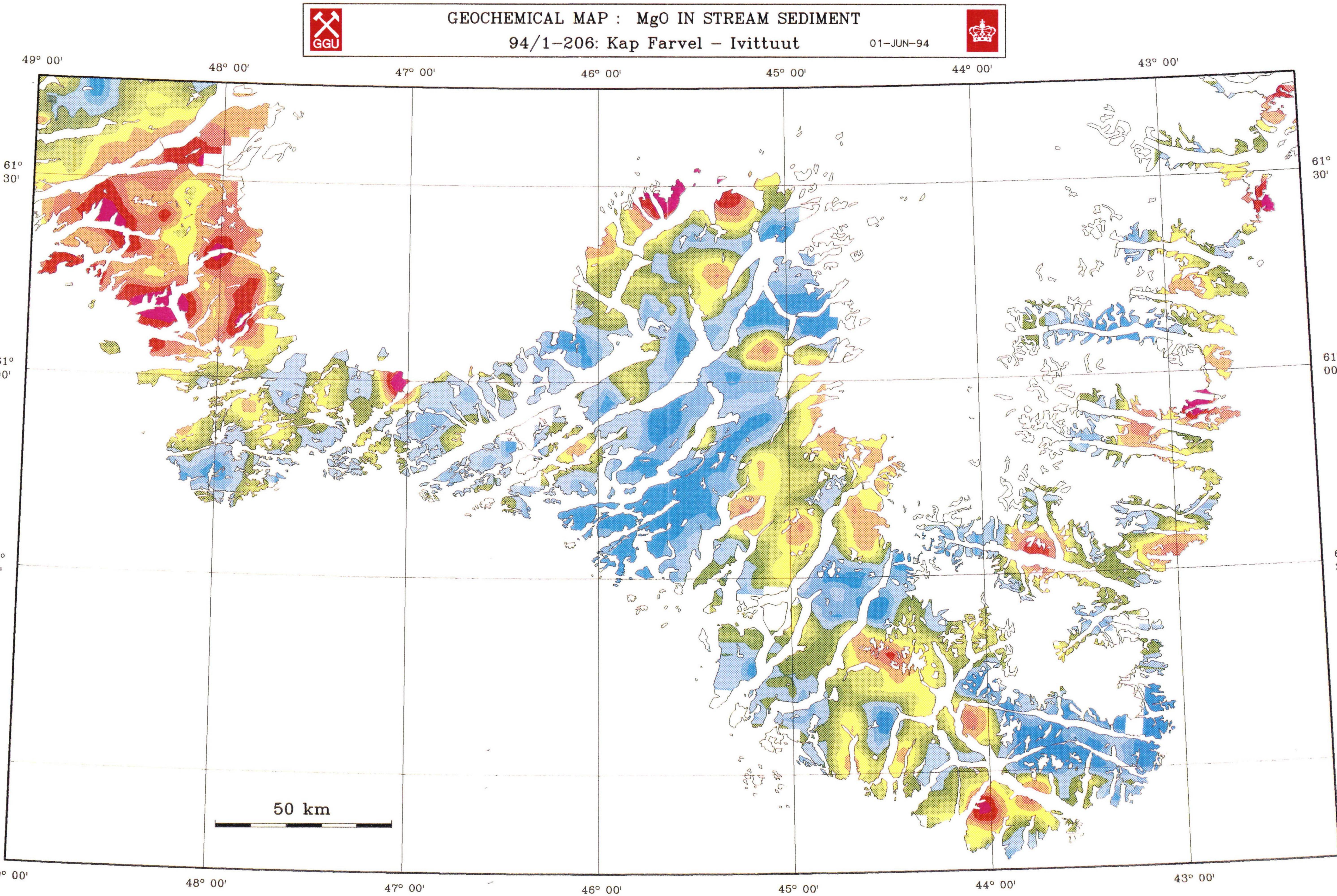
Colour contouring based on 2.5 km x 2.5 km grid. Grid values obtained by the Kriging method using a search radius of 7.5 km. Colour scale based on the percentiles of grid values.

Projection:	Lambert conformal conic
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps. Permission No: KMS A.200/87

Released: 01–JUN–1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK–1350 København K Danmark


GEOCHEMICAL MAP : MgO IN STREAM SEDIMENT
94/1-206: Kap Farvel - Ivittuut
01-JUN-94
GGU
50 km

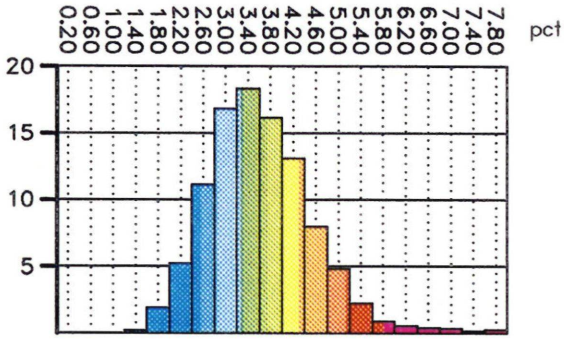
Thematic map 94/1-207

GEOCHEMICAL MAP: CaO IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION OF GRID VALUES



CONTOUR INTERVALS AND PERCENTILES OF GRID VALUES

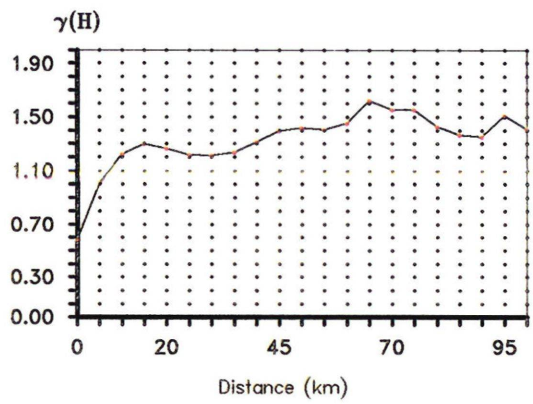
ABOVE	99
5.14 – 5.82	98
4.77 – 5.14	95
4.30 – 4.77	90
4.01 – 4.30	80
3.75 – 4.01	70
3.53 – 3.75	60
3.31 – 3.53	50
3.28 – 3.31	40
2.85 – 3.28	39
2.56 – 2.85	20
BELOW	10

STATISTICAL PARAMETERS OF ANALYTICAL VALUES

CaO pct

Number of samples:	1187
Min. value:	0.58
Max. value:	15.98
Mean:	3.60
Median:	3.41
Variance:	1.47
Std. Dev.:	1.21

SEMI-VARIOGRAM



DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km^2
- 1992 survey average: 1 per 50 km^2
- 1993 survey average: 1 per 20 km^2

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3–10 subsamples

Size fraction:
- < 0.1 mm dry-sieved in laboratory

Method and laboratory:
- 1979 survey: XRF at GGU
- 1992 survey: XRF at Actlabs
- 1993 survey: XRF at GGU

DATA PROCESSING

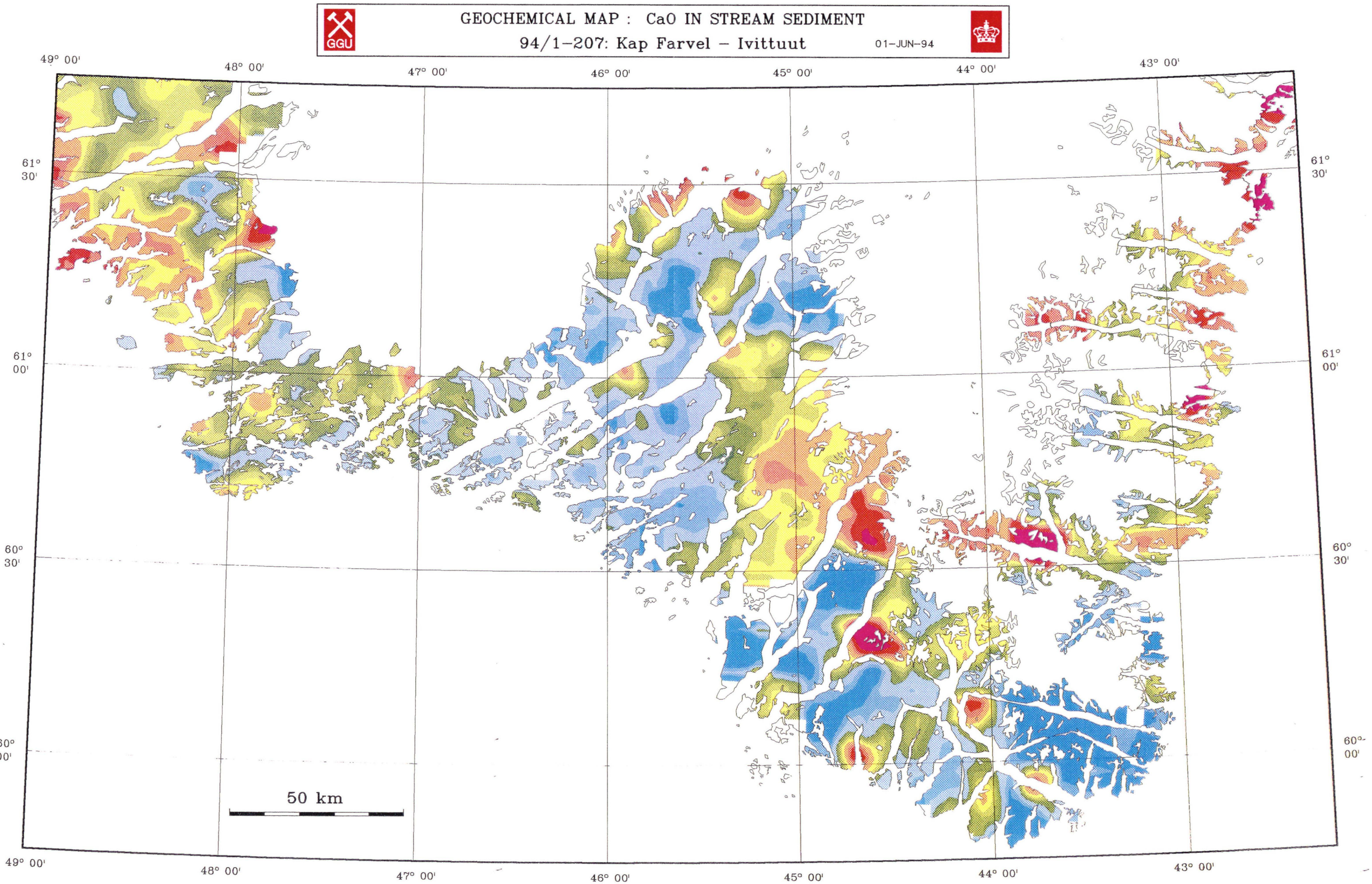
Colour contouring based on 2.5 km x 2.5 km grid. Grid values obtained by the Kriging method using a search radius of 7.5 km. Colour scale based on the percentiles of grid values.

Projection: Lambert conformal conic	
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps. Permission No: KMS A.200/87

Released: 01-JUN-1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK-1350 København K Danmark



GEOCHEMICAL MAP : CaO IN STREAM SEDIMENT
94/1-207: Kap Farvel - Ivittuut
01-JUN-94
GGU
49° 00'
48° 00'
47° 00'
46° 00'
45° 00'
44° 00'
43° 00'
61° 30'
61° 00'
60° 30'
60° 00'
50 km

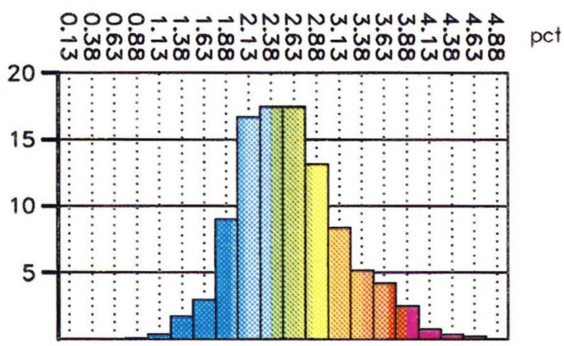
Thematic map 94/1-208

GEOCHEMICAL MAP: Na_2O IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION OF GRID VALUES



CONTOUR INTERVALS AND PERCENTILES OF GRID VALUES

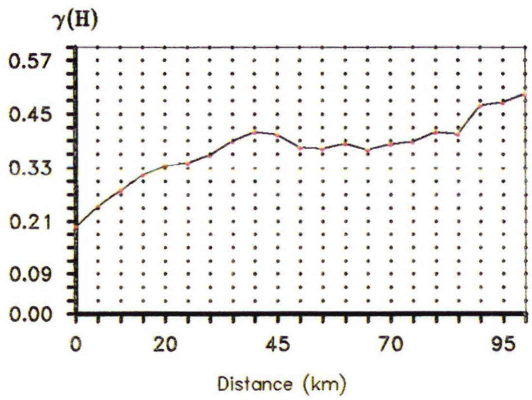
ABOVE	99
3.67 – 3.87	98
3.39 – 3.67	95
3.04 – 3.39	90
2.83 – 3.04	80
2.67 – 2.83	70
2.53 – 2.67	60
2.39 – 2.53	50
2.37 – 2.39	40
2.09 – 2.37	39
1.93 – 2.09	20
BELOW	10

STATISTICAL PARAMETERS OF ANALYTICAL VALUES

Na_2O pct

Number of samples:	1187
Min. value:	0.00
Max. value:	7.25
Mean:	3.49
Median:	3.51
Variance:	0.44
Std. Dev.:	0.66

SEMI-VARIOGRAM



DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km^2
- 1992 survey average: 1 per 50 km^2
- 1993 survey average: 1 per 20 km^2

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3–10 subsamples

Size fraction:
- < 0.1 mm dry–sieved in laboratory

Method and laboratory:
- 1979 survey: AAS at GGU
- 1992 survey: XRF at Actlabs
- 1993 survey: AAS at GGU

DATA PROCESSING

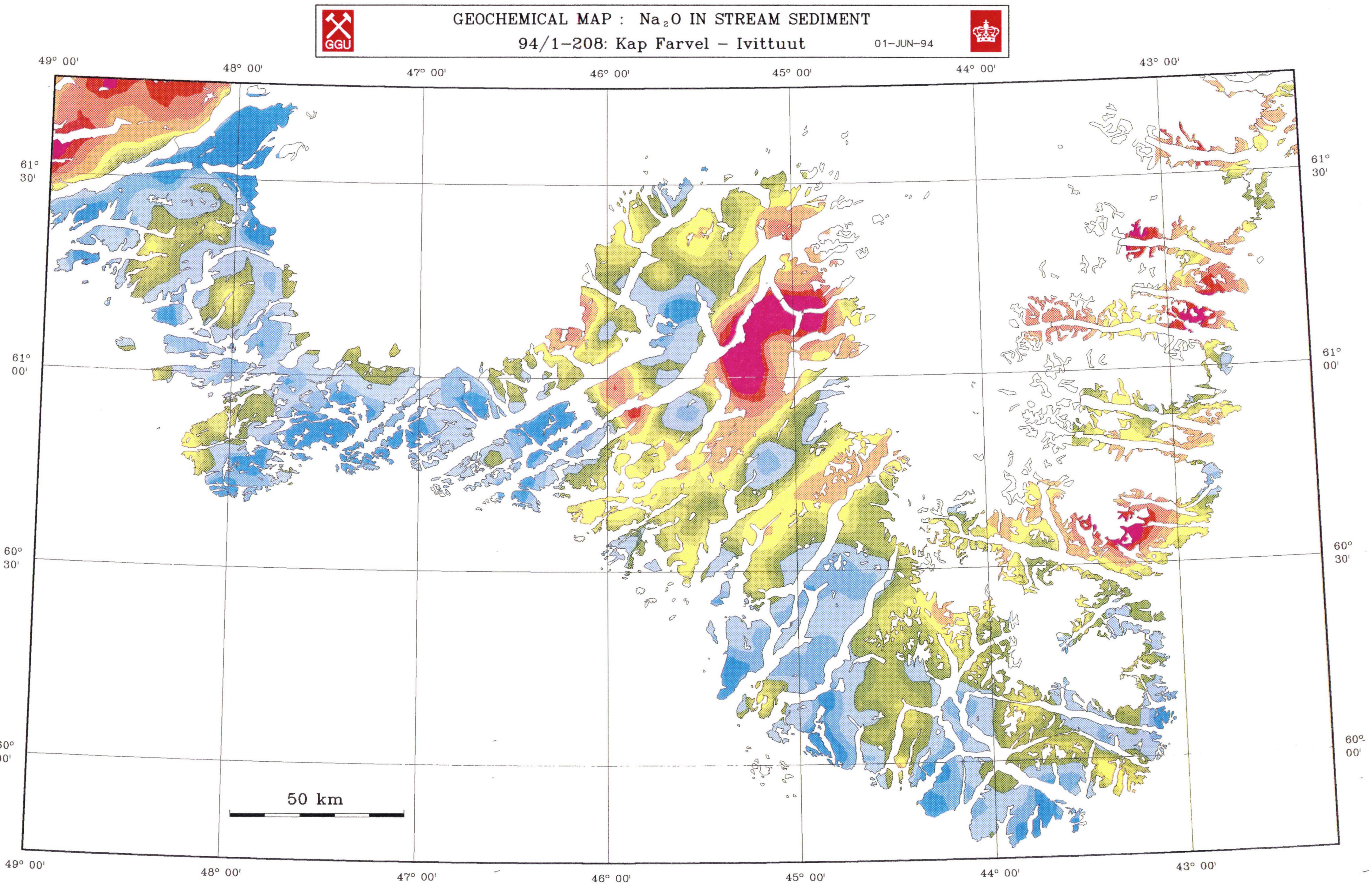
Colour contouring based on 2.5 km x 2.5 km grid. Grid values obtained by the Kriging method using a search radius of 7.5 km. Colour scale based on the percentiles of grid values.

Projection: Lambert conformal conic	
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps. Permission No: KMS A.200/87

Released: 01–JUN–1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK–1350 København K Danmark


GEOCHEMICAL MAP : Na_2O IN STREAM SEDIMENT
94/1-208: Kap Farvel - Ivittuut
01-JUN-94
GGU
49° 00'
48° 00'
47° 00'
46° 00'
45° 00'
44° 00'
43° 00'
61° 30'
61° 00'
60° 30'
60° 00'
50 km

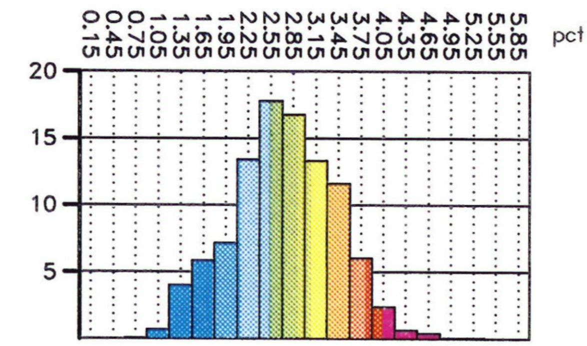
Thematic map 94/1-209

GEOCHEMICAL MAP: K_2O IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION OF GRID VALUES



CONTOUR INTERVALS AND PERCENTILES OF GRID VALUES

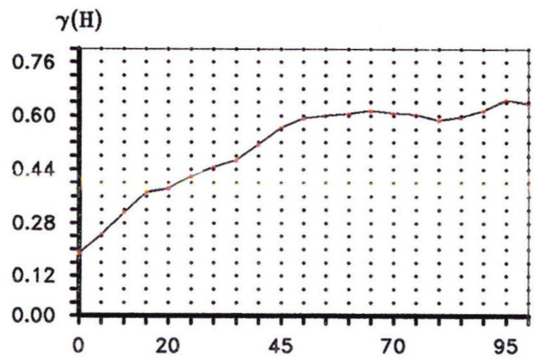
ABOVE	99
3.81 – 4.04	98
3.59 – 3.81	95
3.33 – 3.59	90
3.09 – 3.33	80
2.90 – 3.09	70
2.72 – 2.90	60
2.56 – 2.72	50
2.53 – 2.56	40
2.16 – 2.53	39
1.77 – 2.16	20
BELOW	10

STATISTICAL PARAMETERS OF ANALYTICAL VALUES

K_2O pct

Number of samples:	1187
Min. value:	0.65
Max. value:	5.79
Mean:	2.67
Median:	2.69
Variance:	0.75
Std. Dev.:	0.87

SEMI-VARIOGRAM



DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km^2
- 1992 survey average: 1 per 50 km^2
- 1993 survey average: 1 per 20 km^2

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3–10 subsamples

Size fraction:
- < 0.1 mm dry–sieved in laboratory

Method and laboratory:
- 1979 survey: XRF at GGU
- 1992 survey: XRF at Actlabs
- 1993 survey: XRF at GGU

DATA PROCESSING

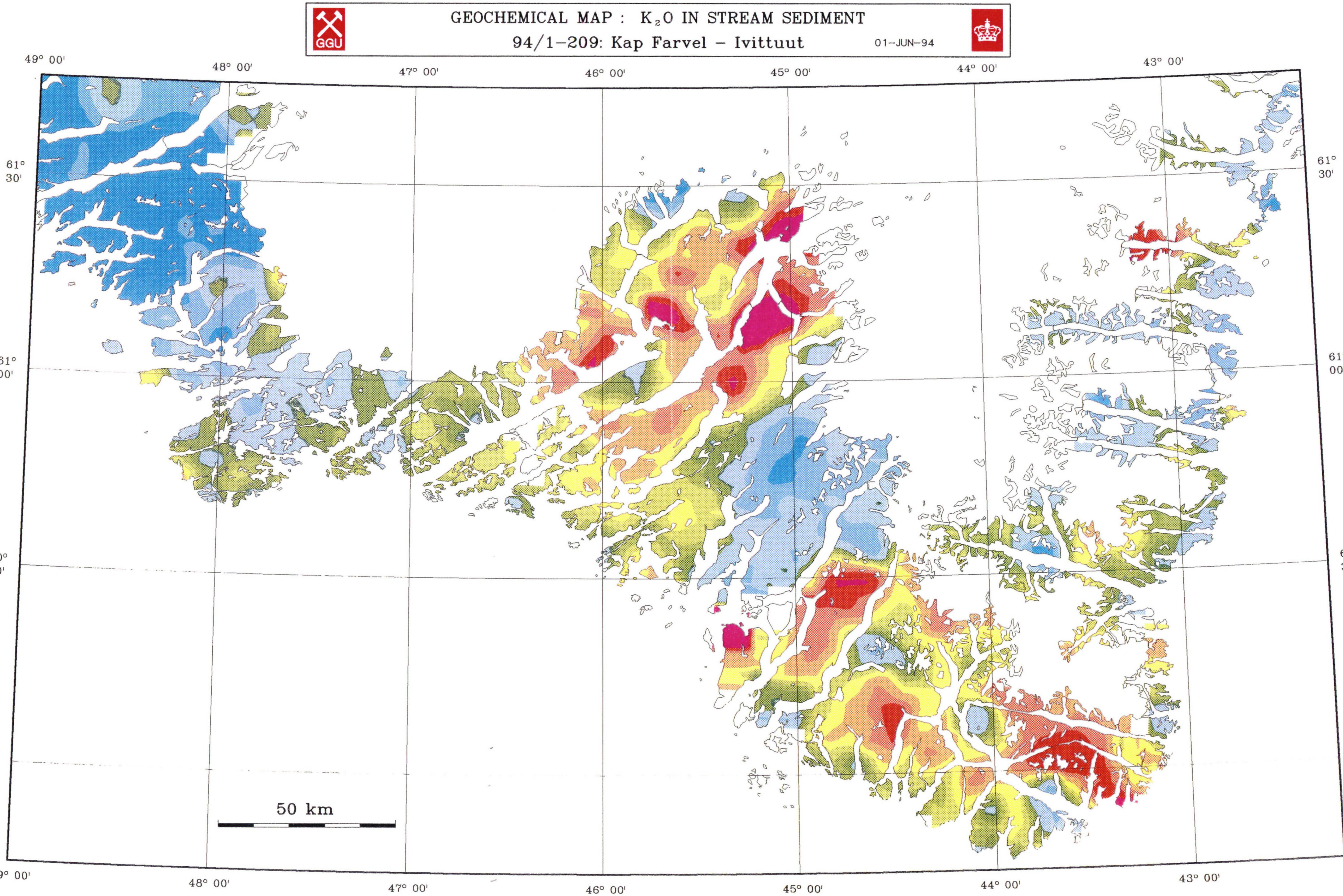
Colour contouring based on 2.5 km x 2.5 km grid. Grid values obtained by the Kriging method using a search radius of 7.5 km. Colour scale based on the percentiles of grid values.

Projection:	Lambert conformal conic
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps. Permission No: KMS A.200/87

Released: 01–JUN–1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK–1350 København K Danmark


GEOCHEMICAL MAP : K_2O IN STREAM SEDIMENT
94/1-209: Kap Farvel - Ivittuut
01-JUN-94
GGU
49° 00'
48° 00'
47° 00'
46° 00'
45° 00'
44° 00'
43° 00'
61° 30'
61° 00'
60° 30'
60° 00'
50 km

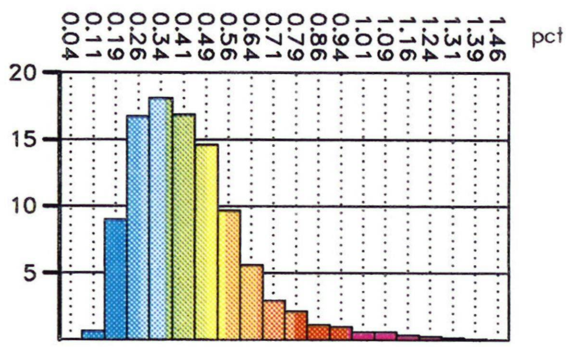
Thematic map 94/1-210

GEOCHEMICAL MAP: P_2O_5 IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION OF GRID VALUES



CONTOUR INTERVALS AND PERCENTILES OF GRID VALUES

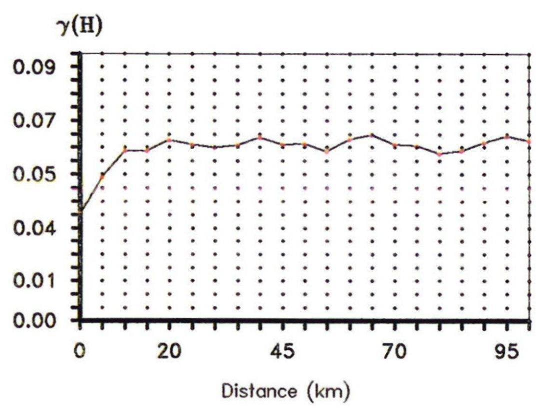
ABOVE	99
0.78 – 0.96	98
0.66 – 0.78	95
0.55 – 0.66	90
0.49 – 0.55	80
0.44 – 0.49	70
0.40 – 0.44	60
0.36 – 0.40	50
0.35 – 0.36	40
0.27 – 0.35	39
0.23 – 0.27	20
BELOW	10

STATISTICAL PARAMETERS OF ANALYTICAL VALUES

P_2O_5 pct

Number of samples:	1187
Min. value:	0.02
Max. value:	2.90
Mean:	0.43
Median:	0.37
Variance:	0.07
Std. Dev.:	0.27

SEMI-VARIOGRAM



DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km^2
- 1992 survey average: 1 per 50 km^2
- 1993 survey average: 1 per 20 km^2

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3–10 subsamples

Size fraction:
- < 0.1 mm dry–sieved in laboratory

Method and laboratory:
- 1979 survey: XRF at GGU
- 1992 survey: XRF at Actlabs
- 1993 survey: XRF at GGU

DATA PROCESSING

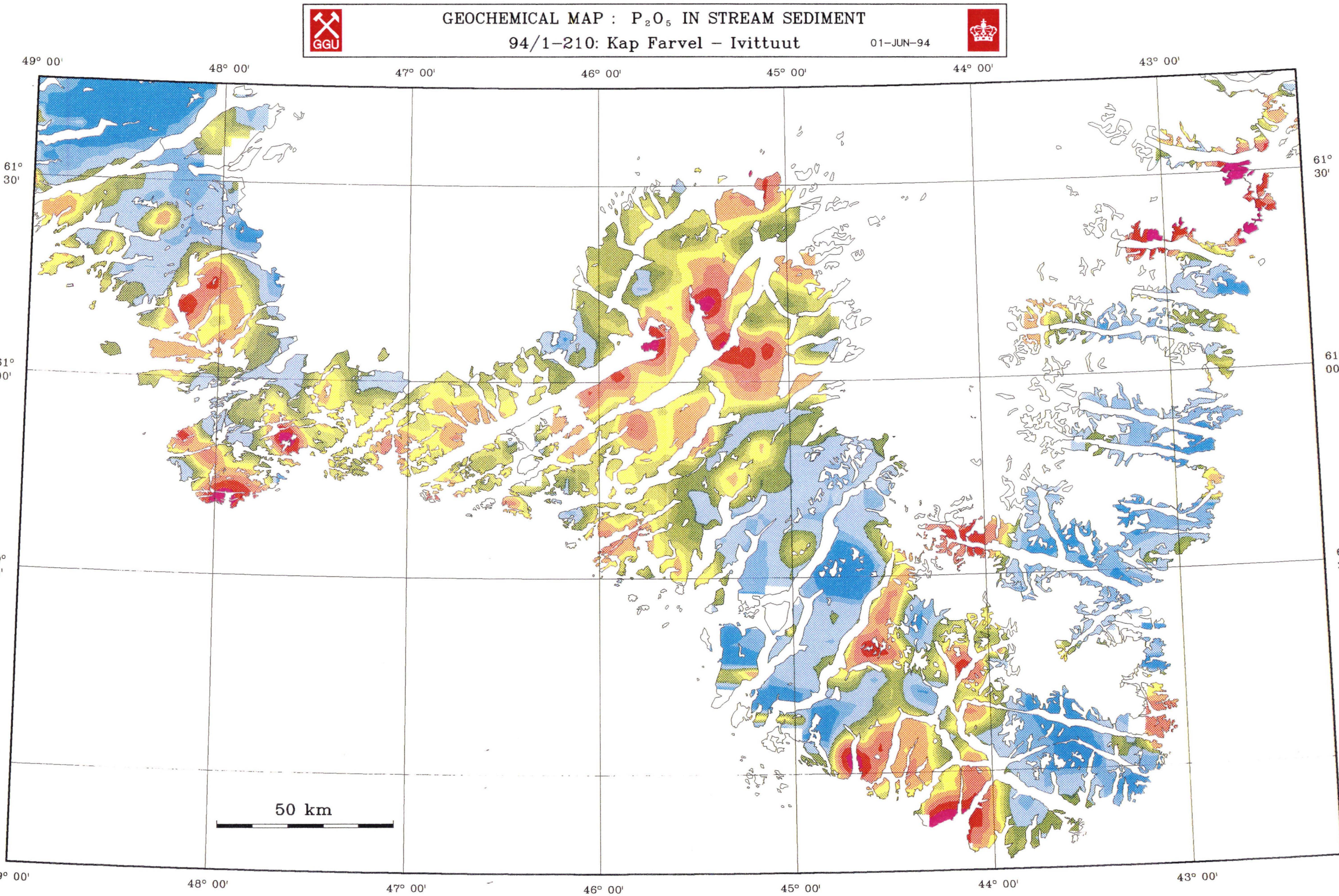
Colour contouring based on 2.5 km x 2.5 km grid. Grid values obtained by the Kriging method using a search radius of 7.5 km. Colour scale based on the percentiles of grid values.

Projection: Lambert conformal conic	
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps. Permission No: KMS A.200/87

Released: 01–JUN–1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK–1350 København K Danmark



GEOCHEMICAL MAP : P2O5 IN STREAM SEDIMENT
94/1-210: Kap Farvel - Ivittuut
01-JUN-94
GGU
49° 00'
48° 00'
47° 00'
46° 00'
45° 00'
44° 00'
43° 00'
61° 30'
61° 00'
60° 30'
60° 00'
50 km

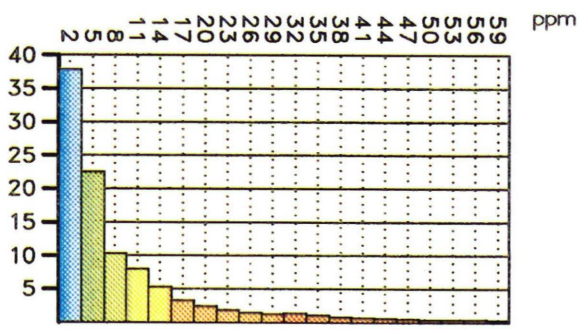
Thematic map 94/1-211

GEOCHEMICAL MAP: As IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION OF GRID VALUES



CONTOUR INTERVALS AND PERCENTILES OF GRID VALUES

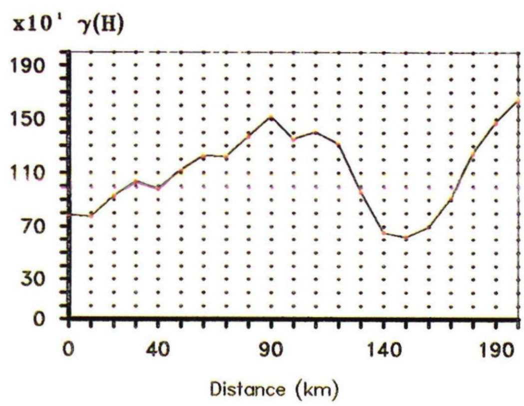
ABOVE	99
48 – 86	98
29 – 48	95
15 – 29	90
10 – 15	80
6 – 10	70
5 – 6	60
3 – 5	50
3 – 3	40
2 – 3	39
1 – 2	20
BELOW	10

STATISTICAL PARAMETERS OF ANALYTICAL VALUES

As ppm

Number of samples:	2240
Min. value:	0
Max. value:	1100
Mean:	10
Median:	3
Variance:	1135
Std. Dev.:	34

SEMI-VARIOGRAM



DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
  1979 survey average: 1 per 6 km^2
  1992 survey average: 1 per 50 km^2
  1993 survey average: 1 per 20 km^2
Sample type:
  minerogenic sediment from stream bed or bank as composite of 3–10 subsamples
Size fraction:
  < 0.1 mm dry–sieved in laboratory
Method and laboratory:
  1979 survey: INA at Actlabs
  1992 survey: INA at Actlabs
  1993 survey: INA at Actlabs

DATA PROCESSING

Colour contouring based on 2.5 km x 2.5 km grid. Grid values obtained by the Kriging method using a search radius of 7.5 km. Colour scale based on the percentiles of grid values.

Projection: Lambert conformal conic	
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

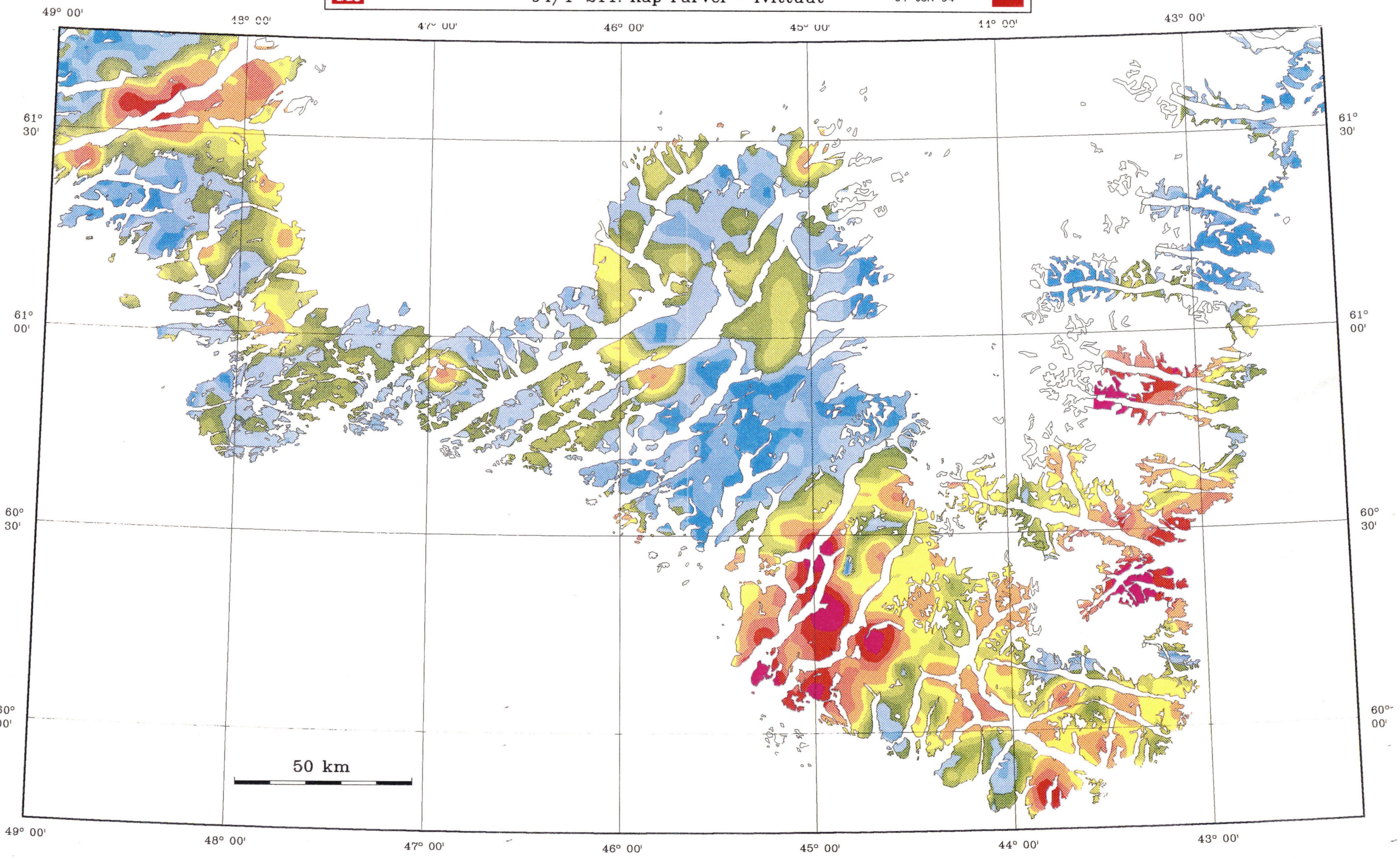
Ice margins and coast lines digitized from 1:250 000 topographic maps.
Permission No: KMS A.200/87

Released: 01–JUN–1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK–1350 København K Danmark

GEOCHEMICAL MAP : As IN STREAM SEDIMENT

94/1-211: Kap Farvel – Ivittuut 01-JUN-94



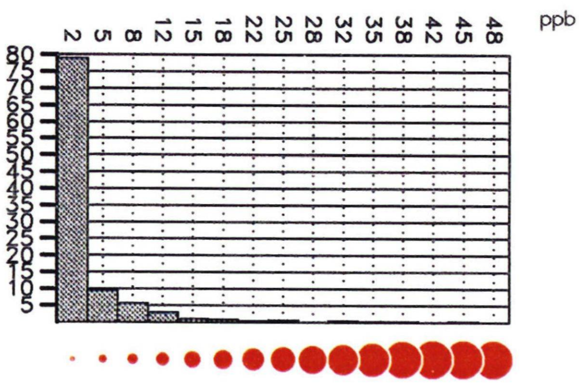
Thematic map 94/1-212

GEOCHEMICAL MAP: Au IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION AND SYMBOL SIZE



Au ppb

STATISTICAL PARAMETERS
OF ANALYTICAL VALUES

Number of samples:	2240
Min. value:	0
Max. value:	850
Mean:	4
Median:	0
Variance:	720
Std. Dev.:	27

DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km^2
- 1992 survey average: 1 per 50 km^2
- 1993 survey average: 1 per 20 km^2

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3–10 subsamples

Size fraction:
- < 0.1 mm dry–sieved in laboratory

Method and laboratory:
- 1979 survey: INA at Actlabs
- 1992 survey: INA at Actlabs
- 1993 survey: INA at Actlabs

DATA PROCESSING

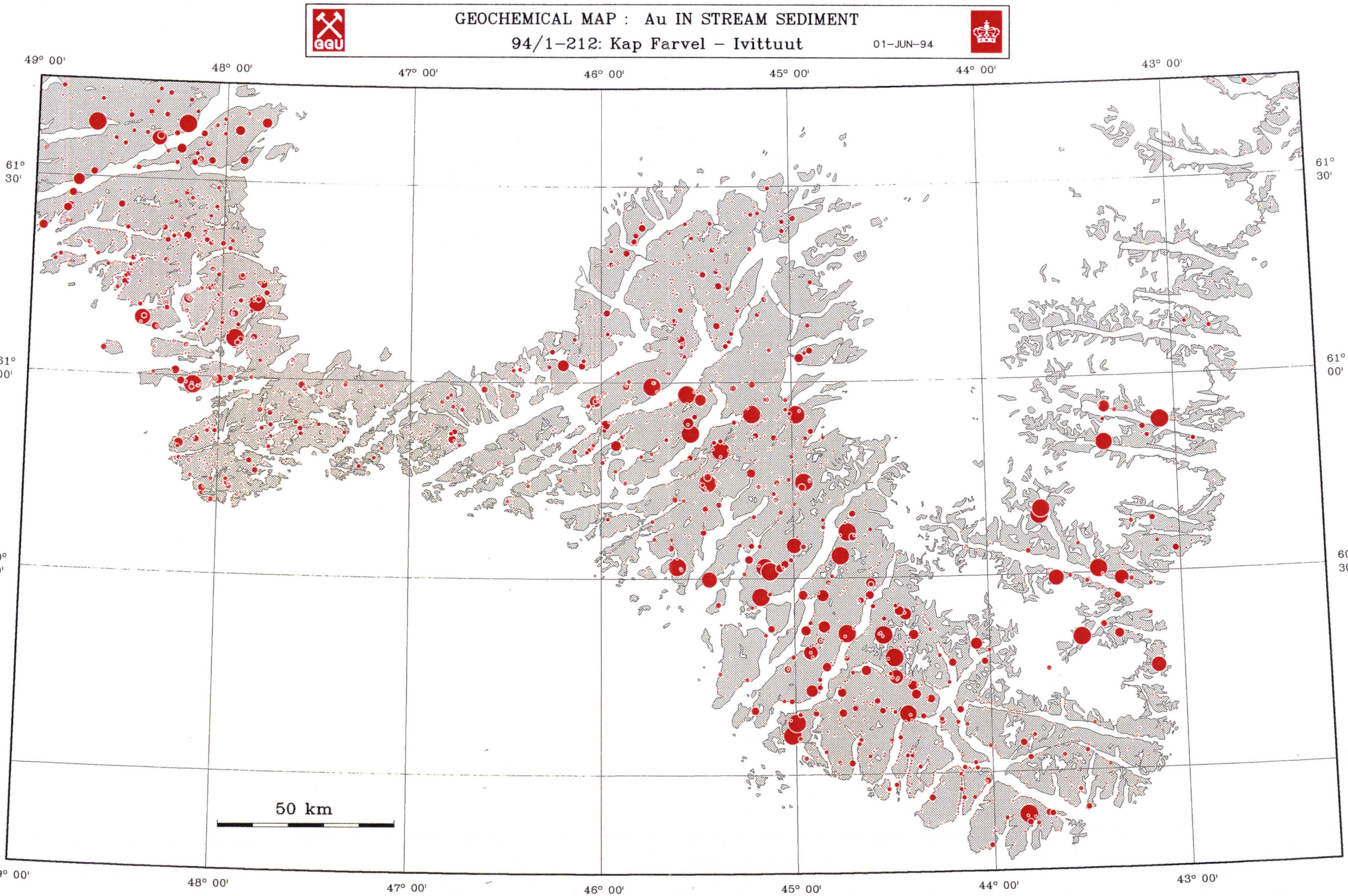
Dot plot illustrating element concentrations at sample sites. Scaling of dot size selected in each case to suppress noise at low concen–tration levels and enhance anomalous areas or regional features.

Projection: Lambert conformal conic	
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps.
Permission No: KMS A.200/87

Released: 01–JUN–1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK–1350 København K Danmark


GEOCHEMICAL MAP : Au IN STREAM SEDIMENT
94/1-212: Kap Farvel - Ivittuut
01-JUN-94
GGU
49° 00'
48° 00'
47° 00'
46° 00'
45° 00'
44° 00'
43° 00'
61° 30'
61° 00'
60° 30'
60° 00'
50 km

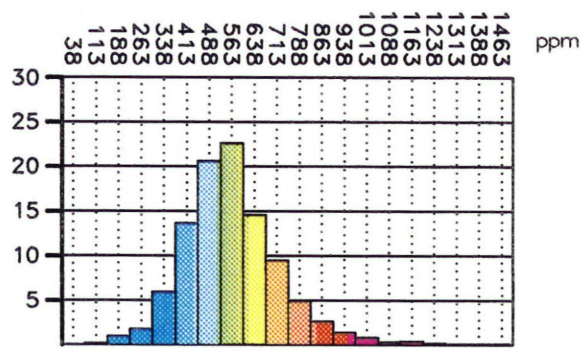
Thematic map 94/1-213

GEOCHEMICAL MAP: Ba IN STREAM SEDIMENT

Kap Farvel - Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION OF GRID VALUES



CONTOUR INTERVALS AND PERCENTILES OF GRID VALUES

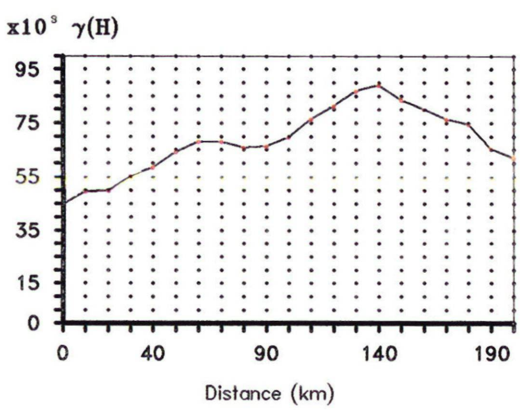
ABOVE	99
845 - 951	98
755 - 845	95
675 - 755	90
619 - 675	80
580 - 619	70
548 - 580	60
517 - 548	50
513 - 517	40
440 - 513	39
383 - 440	20
BELOW	10

STATISTICAL PARAMETERS OF ANALYTICAL VALUES

Ba ppm

Number of samples:	2240
Min. value:	0
Max. value:	5400
Mean:	581
Median:	550
Variance:	68494
Std. Dev.:	262

SEMI-VARIOGRAM



DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km^2
- 1992 survey average: 1 per 50 km^2
- 1993 survey average: 1 per 20 km^2

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3-10 subsamples

Size fraction:
- < 0.1 mm dry-sieved in laboratory

Method and laboratory:
- 1979 survey: INA at Actlabs
- 1992 survey: INA at Actlabs
- 1993 survey: INA at Actlabs

DATA PROCESSING

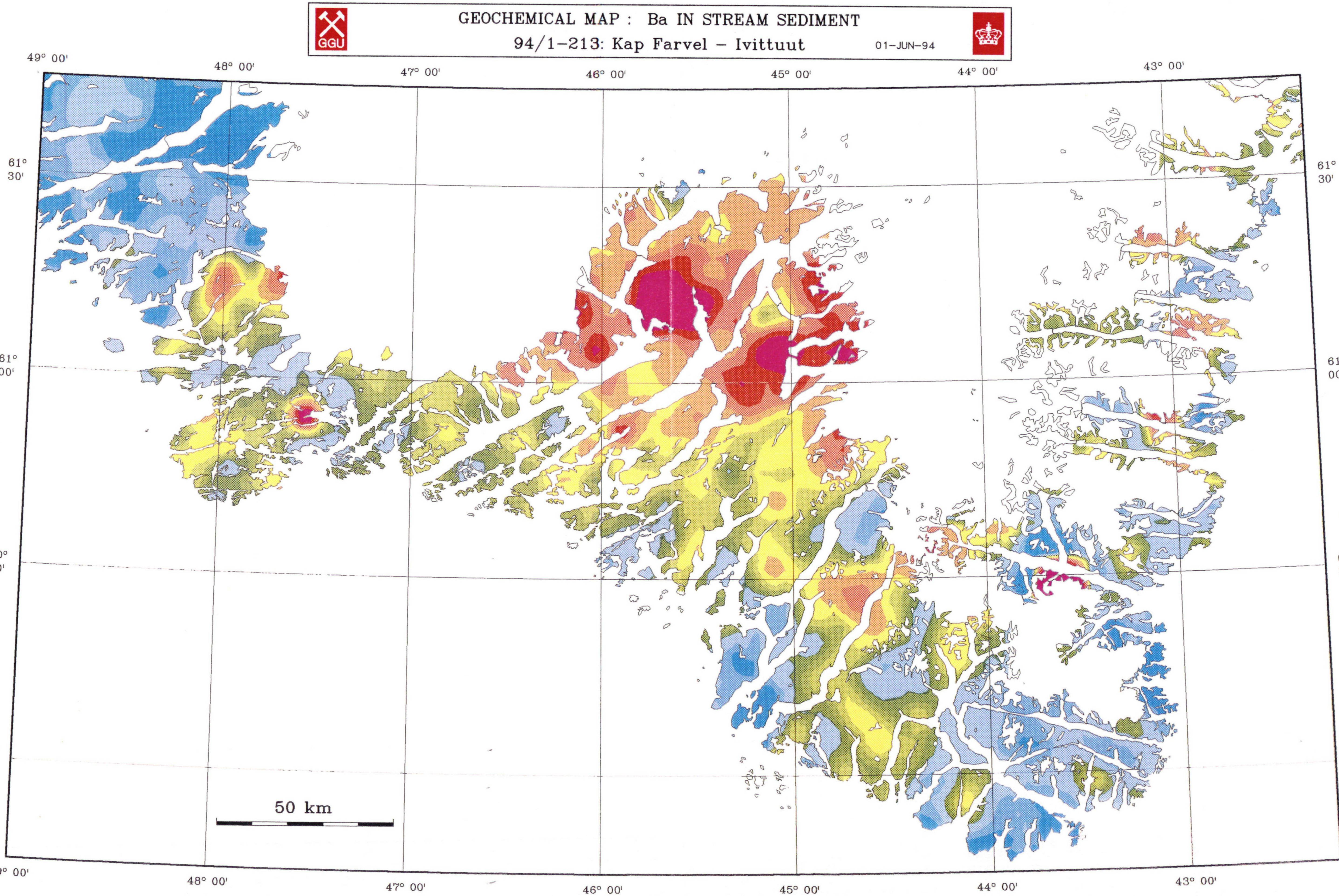
Colour contouring based on 2.5 km x 2.5 km grid. Grid values obtained by the Kriging method using a search radius of 7.5 km. Colour scale based on the percentiles of grid values.

Projection:	Lambert conformal conic
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps.
Permission No: KMS A.200/87

Released: 01-JUN-1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK-1350 København K Danmark



GGU
GEOCHEMICAL MAP : Ba IN STREAM SEDIMENT
94/1-213: Kap Farvel - Ivittuut
01-JUN-94
49° 00'
48° 00'
47° 00'
46° 00'
45° 00'
44° 00'
43° 00'
61° 30'
61° 00'
60° 30'
60° 00'
50 km

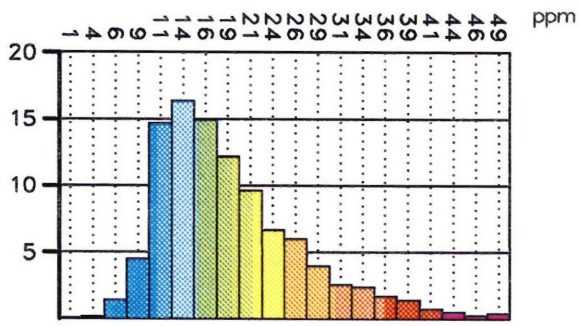
Thematic map 94/1-214

GEOCHEMICAL MAP: Co IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION OF GRID VALUES



CONTOUR INTERVALS AND PERCENTILES OF GRID VALUES

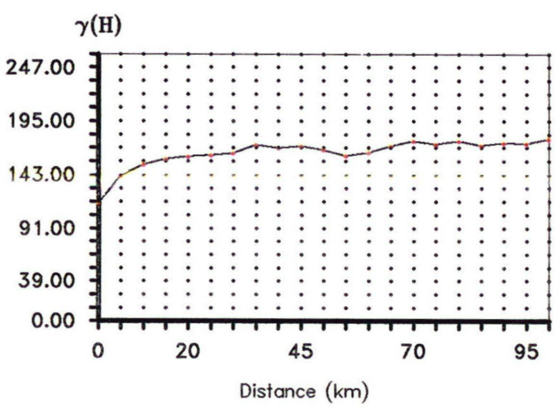
ABOVE	99
36 – 42	98
31 – 36	95
25 – 31	90
22 – 25	80
19 – 22	70
17 – 19	60
16 – 17	50
15 – 16	40
12 – 15	39
11 – 12	20
BELOW	10

STATISTICAL PARAMETERS OF ANALYTICAL VALUES

Co ppm

Number of samples:	2240
Min. value:	1
Max. value:	131
Mean:	20
Median:	16
Variance:	193
Std. Dev.:	14

SEMI-VARIOGRAM



DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
1979 survey average: 1 per 6 km^2
1992 survey average: 1 per 50 km^2
1993 survey average: 1 per 20 km^2
Sample type:
minerogenic sediment from stream bed or bank as composite of 3–10 subsamples
Size fraction:
< 0.1 mm dry-sieved in laboratory
Method and laboratory:
1979 survey: INA at Actlabs
1992 survey: INA at Actlabs
1993 survey: INA at Actlabs

DATA PROCESSING

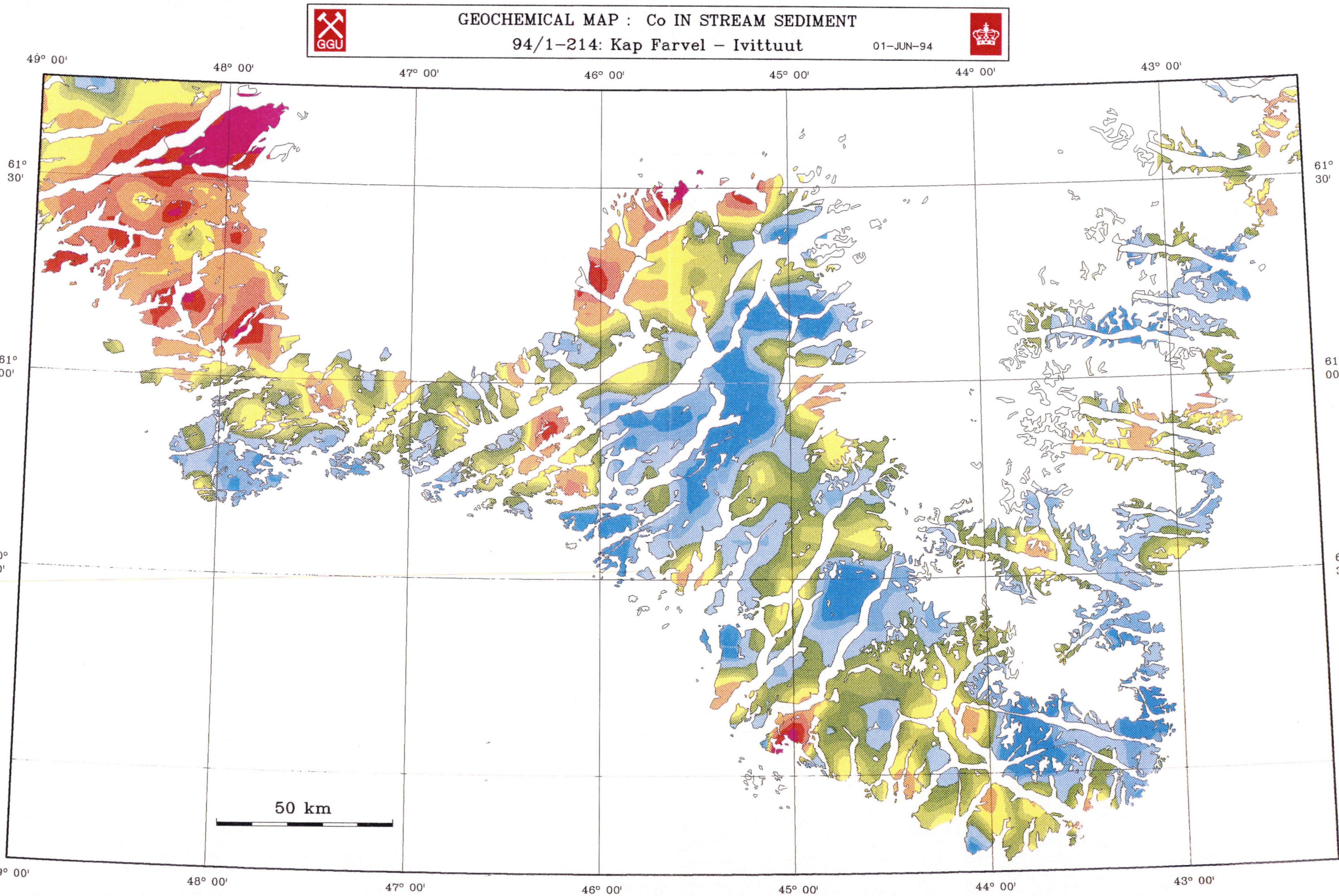
Colour contouring based on 2.5 km x 2.5 km grid. Grid values obtained by the Kriging method using a search radius of 7.5 km. Colour scale based on the percentiles of grid values.

Projection:	Lambert conformal conic
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps. Permission No: KMS A.200/87

Released: 01-JUN-1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK-1350 København K Danmark


GGU
GEOCHEMICAL MAP : Co IN STREAM SEDIMENT
94/1-214: Kap Farvel - Ivittuut
01-JUN-94
49° 00'
48° 00'
47° 00'
46° 00'
45° 00'
44° 00'
43° 00'
61° 30'
61° 00'
60° 30'
60° 00'
50 km

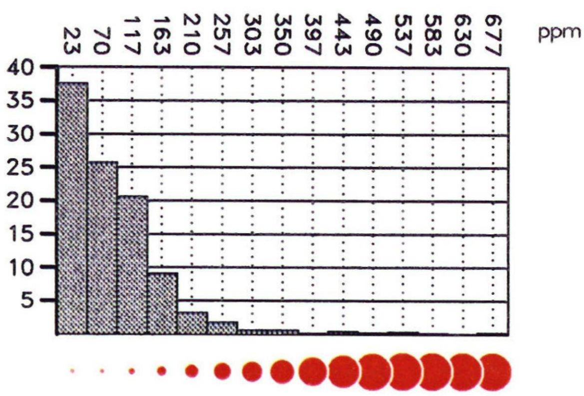
Thematic map 94/1-215

GEOCHEMICAL MAP: Cr IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION AND SYMBOL SIZE



Cr ppm

STATISTICAL PARAMETERS
OF ANALYTICAL VALUES

Number of samples:	1196
Min. value:	0
Max. value:	1229
Mean:	84
Median:	72
Variance:	8044
Std. Dev.:	90

DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km^2
- 1992 survey average: 1 per 50 km^2
- 1993 survey average: 1 per 20 km^2

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3–10 subsamples

Size fraction:
- < 0.1 mm dry–sieved in laboratory

Method and laboratory:
- 1979 survey: XRF at GGU
- 1992 survey: XRF at Actlabs
- 1993 survey: XRF at Actlabs

DATA PROCESSING

Dot plot illustrating element concentrations at sample sites. Scaling of dot size selected in each case to suppress noise at low concentration levels and enhance anomalous areas or regional features.

Projection: Lambert conformal conic	
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps.
Permission No: KMS A.200/87

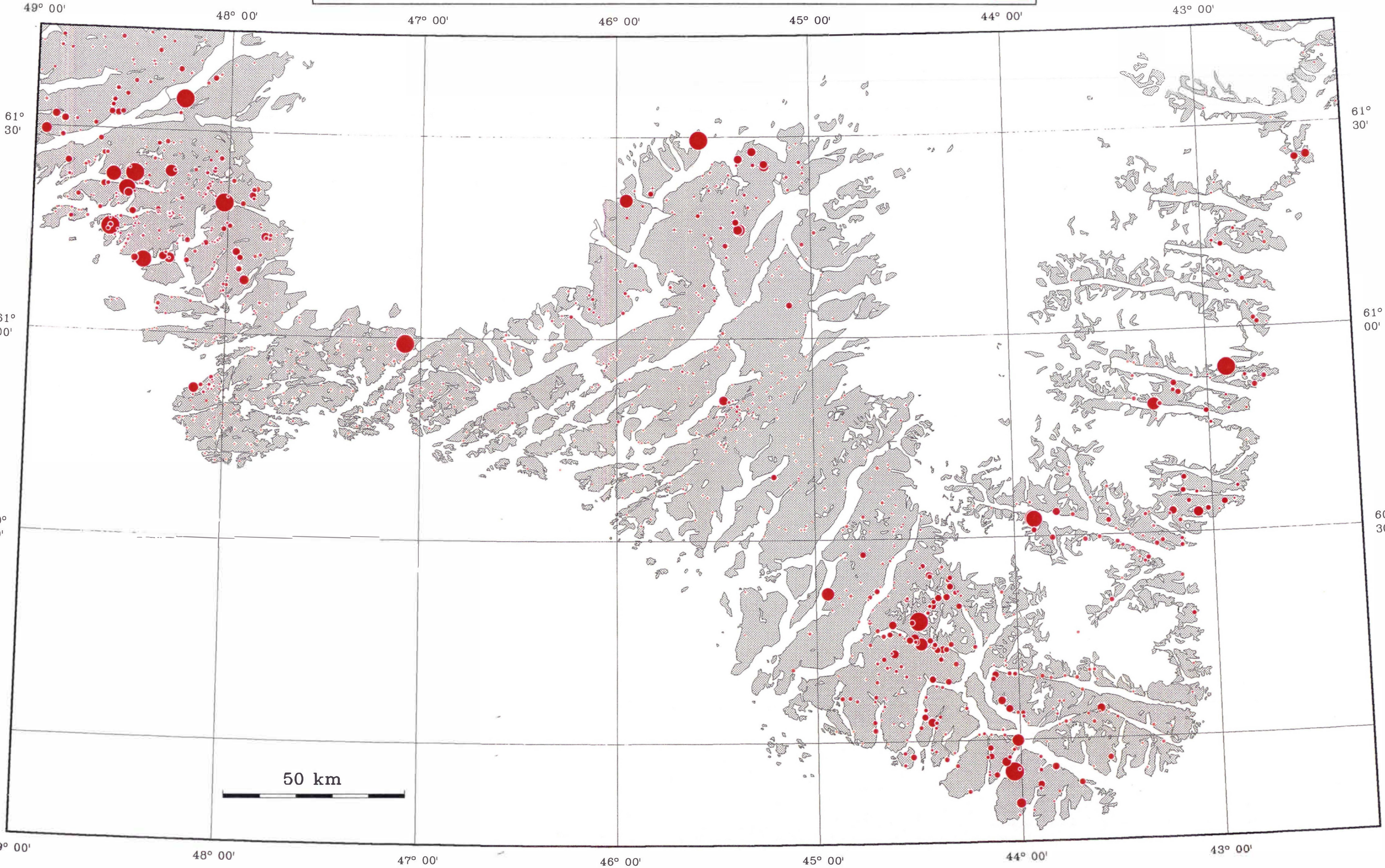
Released: 01–JUN–1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK–1350 København K Danmark

GEOCHEMICAL MAP : Cr IN STREAM SEDIMENT

94/1-215: Kap Farvel - Ivittuut

01-JUN-94



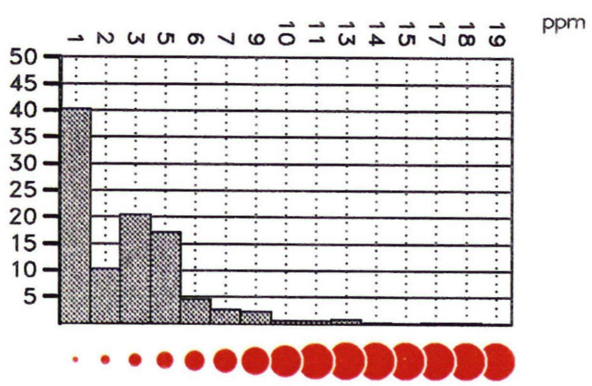
Thematic map 94/1-216

GEOCHEMICAL MAP: Cs IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION AND SYMBOL SIZE



Cs ppm

STATISTICAL PARAMETERS
OF ANALYTICAL VALUES

Number of samples:	2240
Min. value:	0
Max. value:	19
Mean:	3
Median:	2
Variance:	8
Std. Dev.:	3

DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km^2
- 1992 survey average: 1 per 50 km^2
- 1993 survey average: 1 per 20 km^2

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3–10 subsamples

Size fraction:
- < 0.1 mm dry-sieved in laboratory

Method and laboratory:
- 1979 survey: INA at Actlabs
- 1992 survey: INA at Actlabs
- 1993 survey: INA at Actlabs

DATA PROCESSING

Dot plot illustrating element concentrations at sample sites. Scaling of dot size selected in each case to suppress noise at low concentration levels and enhance anomalous areas or regional features.

Projection: Lambert conformal conic	
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps.
Permission No: KMS A.200/87

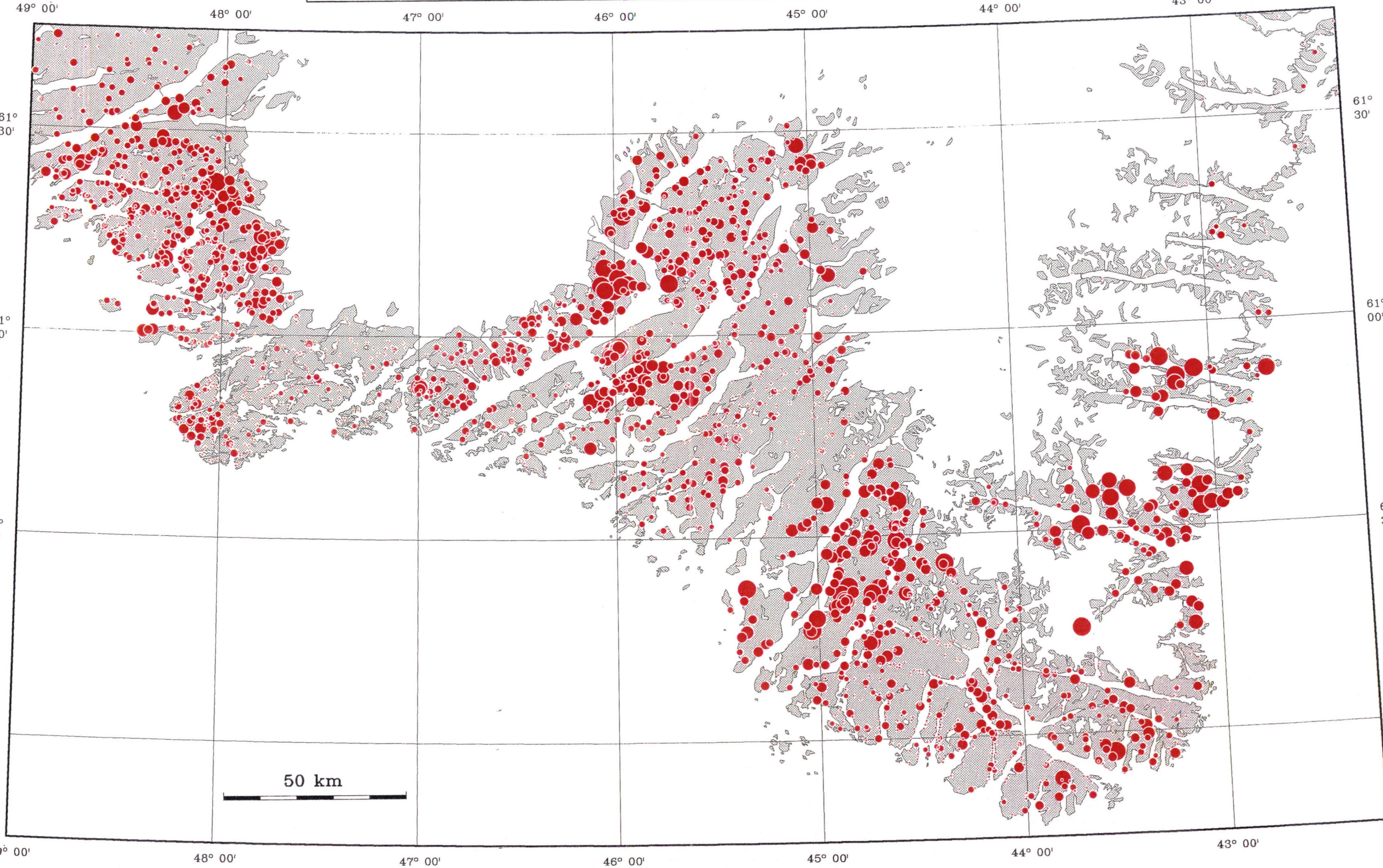
Released: 01-JUN-1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK-1350 København K Danmark

GEOCHEMICAL MAP : Cs IN STREAM SEDIMENT

94/1-216: Kap Farvel – Ivittuut

01-JUN-94



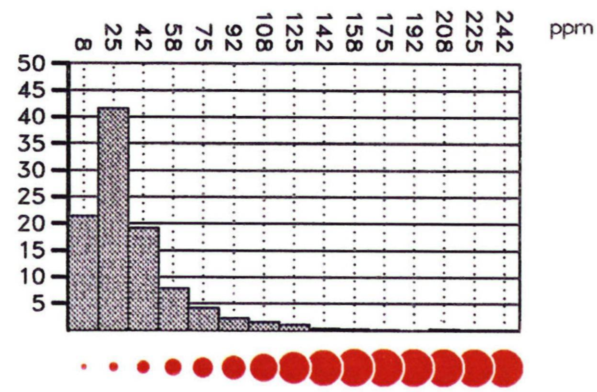
Thematic map 94/1-217

GEOCHEMICAL MAP: Cu IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION AND SYMBOL SIZE



Cu ppm

STATISTICAL PARAMETERS
OF ANALYTICAL VALUES

Number of samples:	1194
Min. value:	0
Max. value:	253
Mean:	35
Median:	27
Variance:	769
Std. Dev.:	28

DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
1979 survey average: 1 per 6 km^2
1992 survey average: 1 per 50 km^2
1993 survey average: 1 per 20 km^2
Sample type:
minerogenic sediment from stream bed or bank as composite of 3–10 subsamples
Size fraction:
< 0.1 mm dry-sieved in laboratory
Method and laboratory:
1979 survey: AAS at GGU
1992 survey: XRF at Actlabs
1993 survey: AAS at GGU

DATA PROCESSING

Dot plot illustrating element concentrations at sample sites. Scaling of dot size selected in each case to suppress noise at low concentration levels and enhance anomalous areas or regional features.

Projection: Lambert conformal conic	
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

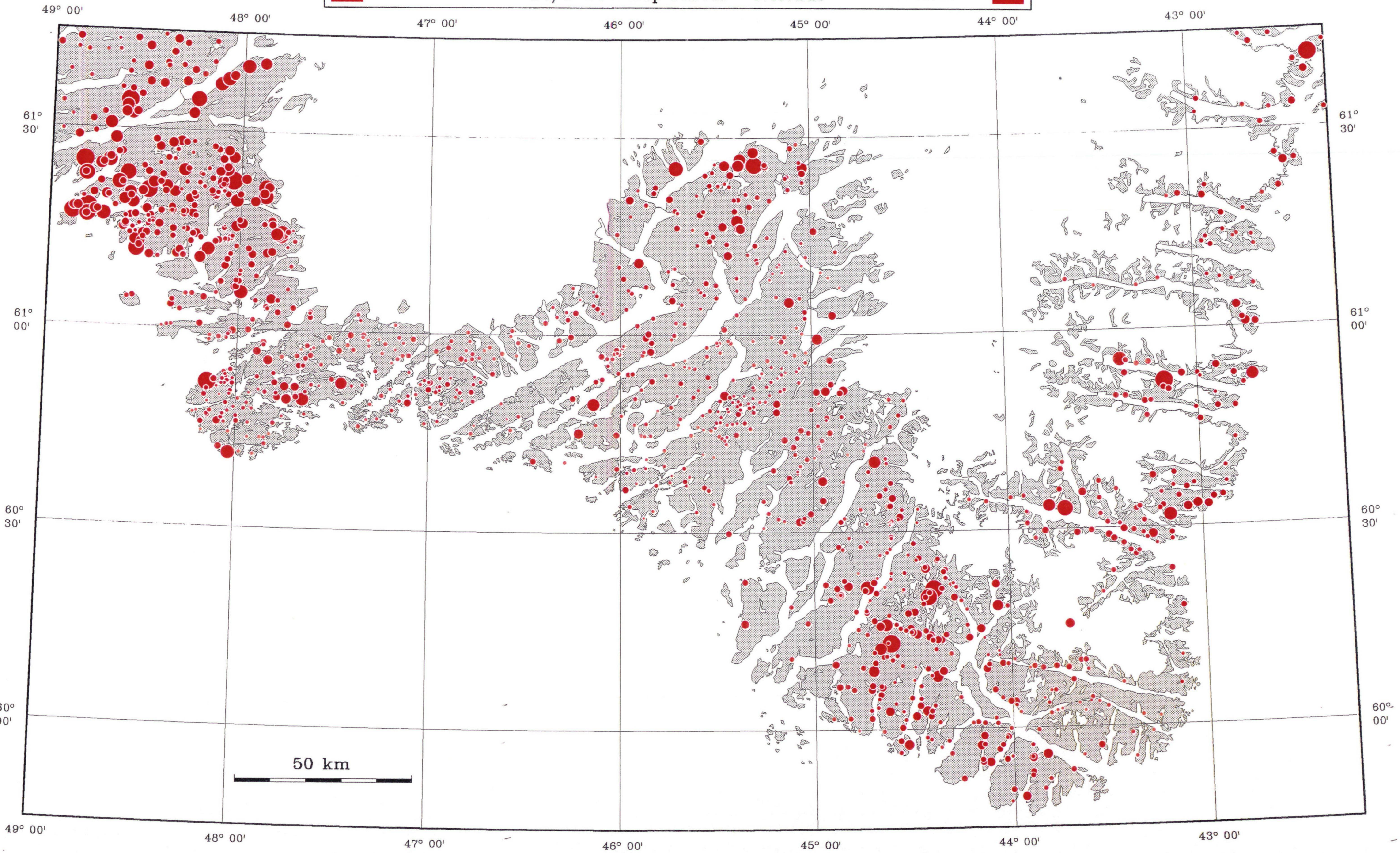
Ice margins and coast lines digitized from 1:250 000 topographic maps.
Permission No: KMS A.200/87

Released: 01-JUN-1994

GRØNLANDS GEOLOGISKE UNDERSØGELSE
The Geological Survey of Greenland
Øster Voldgade 10 DK-1350 København K Danmark

GEOCHEMICAL MAP : Cu IN STREAM SEDIMENT

94/1-217: Kap Farvel – Ivittuut 01-JUN-94



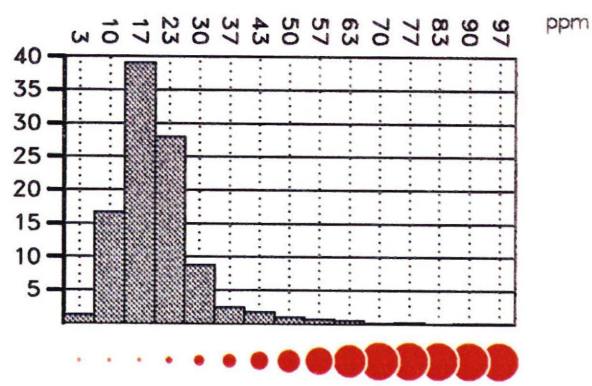
Thematic map 94/1-218

GEOCHEMICAL MAP: Ga IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION AND SYMBOL SIZE



Ga ppm

STATISTICAL PARAMETERS
OF ANALYTICAL VALUES

Number of samples:	2384
Min. value:	0
Max. value:	97
Mean:	20
Median:	18
Variance:	85
Std. Dev.:	9

DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km^2
- 1992 survey average: 1 per 50 km^2
- 1993 survey average: 1 per 20 km^2

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3–10 subsamples

Size fraction:
- < 0.1 mm dry–sieved in laboratory

Method and laboratory:
- 1979 survey: XRF at Risø
- 1992 survey: XRF at Actlabs
- 1993 survey: XRF at Actlabs

DATA PROCESSING

Dot plot illustrating element concentrations at sample sites. Scaling of dot size selected in each case to suppress noise at low concentration levels and enhance anomalous areas or regional features.

Projection:	Lambert conformal conic
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps.
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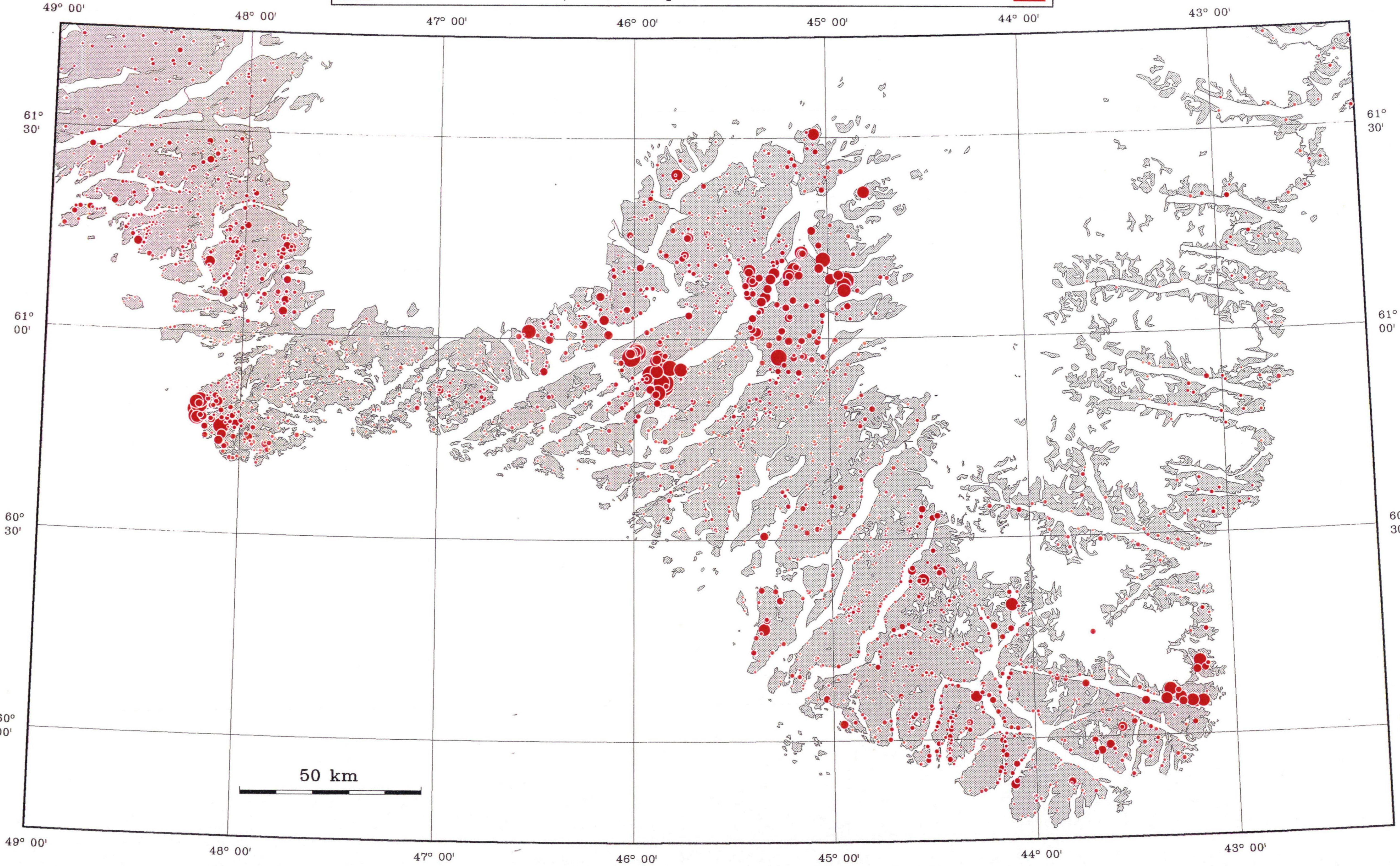
GGU

GEOCHEMICAL MAP : Ga IN STREAM SEDIMENT

94/1-218: Kap Farvel - Ivittuut 01-JUN-94



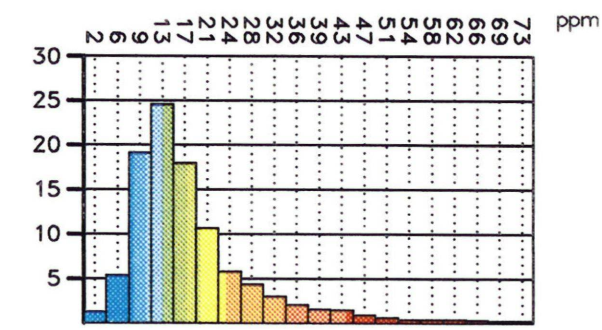
Thematic map 94/1-219

GEOCHEMICAL MAP: Hf IN STREAM SEDIMENT

Kap Farvel – Ivittuut

Compiled by Agnete Steenfelt

FREQUENCY DISTRIBUTION OF GRID VALUES



CONTOUR INTERVALS AND PERCENTILES OF GRID VALUES

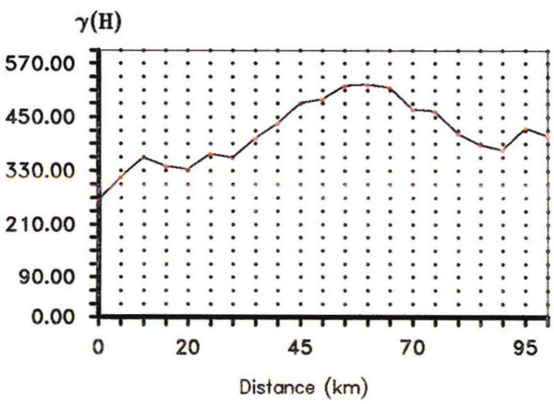
ABOVE	99
44 – 68	98
33 – 44	95
24 – 33	90
20 – 24	80
17 – 20	70
15 – 17	60
13 – 15	50
13 – 13	40
10 – 13	39
8 – 10	20
BELOW	10

STATISTICAL PARAMETERS OF ANALYTICAL VALUES

Hf ppm

Number of samples:	2240
Min. value:	2
Max. value:	400
Mean:	19
Median:	13
Variance:	470
Std. Dev.:	22

SEMI-VARIOGRAM



DATA SOURCE

Stream sediment surveys carried out by the Geological Survey of Greenland in 1979, 1992 (east coast N of 60° 30') and 1993 (west coast N of 61° 30').

SURVEY SPECIFICATIONS

Sample density:
- 1979 survey average: 1 per 6 km^2
- 1992 survey average: 1 per 50 km^2
- 1993 survey average: 1 per 20 km^2

Sample type:
- minerogenic sediment from stream bed or bank as composite of 3–10 subsamples

Size fraction:
- < 0.1 mm dry–sieved in laboratory

Method and laboratory:
- 1979 survey: INA at Actlabs
- 1992 survey: INA at Actlabs
- 1993 survey: INA at Actlabs

DATA PROCESSING

Colour contouring based on 2.5 km x 2.5 km grid. Grid values obtained by the Kriging method using a search radius of 7.5 km. Colour scale based on the percentiles of grid values.

Projection:	Lambert conformal conic
Standard parallel:	66° 30' N
Scale factor:	0.99700
Ellipsoid:	Hayford
Datum:	Qornoq
Scale:	1:1 000 000

Ice margins and coast lines digitized from 1:250 000 topographic maps. Permission No: KMS A.200/87

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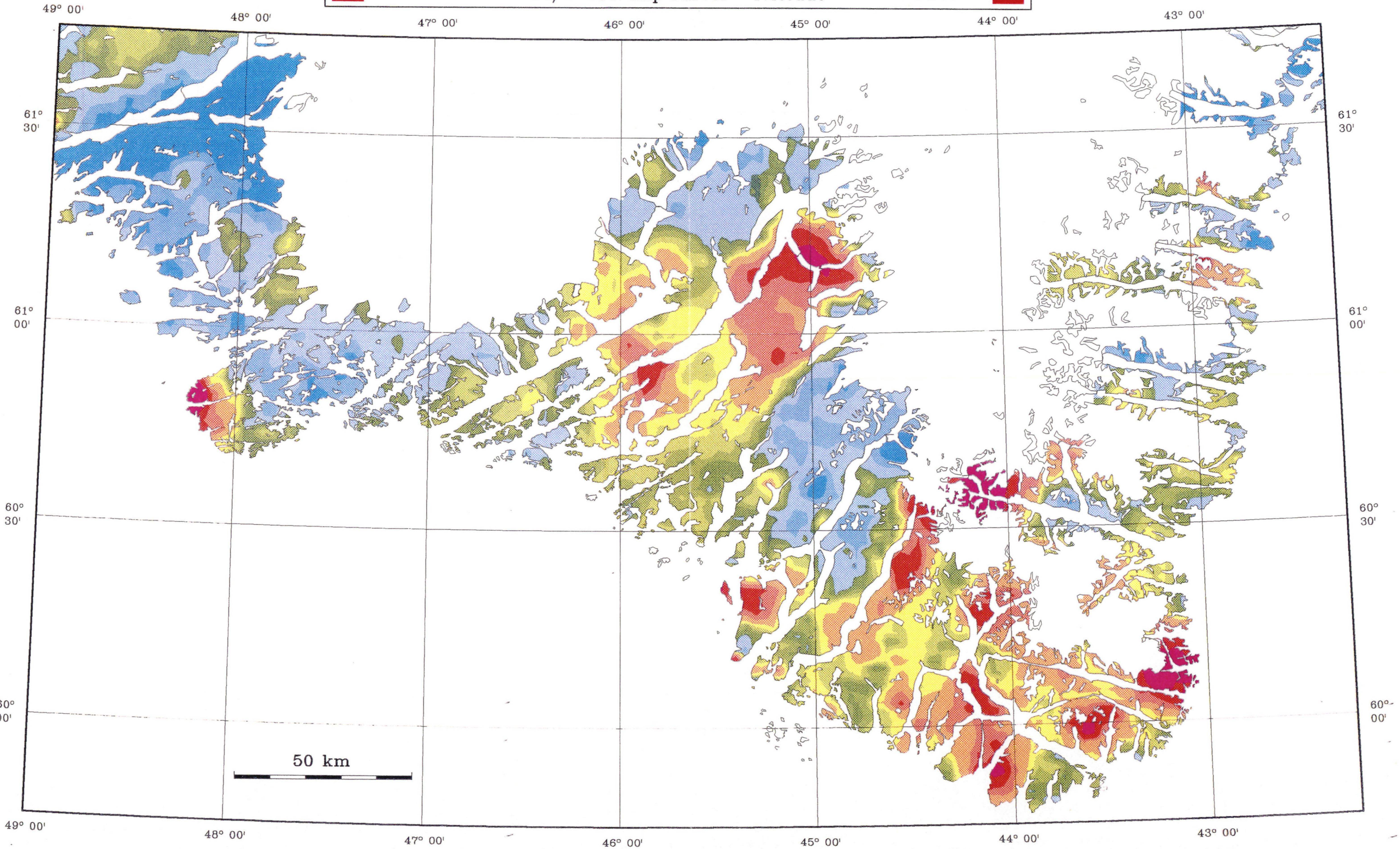
GEOCHEMICAL MAP : Hf IN STREAM SEDIMENT

94/1-219: Kap Farvel – Ivittuut 01–JUN–94



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