Reconnaissance geochemical mapping of Kronprins Christian Land and Mylius Erichsen Land (79°40′ to 81°20′N, 14° to 28°W), eastern North Greenland

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Ujarassiortut Kalaallit Nunaanni Misissuisoqarfiat
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Reconnaissance geochemical mapping of Kronprins Christian Land and Mylius Erichsen Land (79°40′ to 81°20′N, 14° to 28°W), eastern North Greenland

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Abstract

Geochemical sampling of stream sediment and water collected at a density of 1 sample per ~ 66 km^2 has been carried out over the northernmost parts of the Caledonian fold belt and its foreland in eastern North Greenland. The < 0.1 mm fractions of the sediment samples were analysed by X-ray fluorescence, instrumental neutron activation and inductively coupled plasma emission techniques, and are reported for 37 major and trace elements together with conductivity and fluoride contents of stream water samples.

The element distributions largely reflect compositions of drained bedrock lithologies, except for a 30-40 km wide belt along the margin of the Inland Ice characterised by low, flat topography and very high SiO_2 contents in the stream silt samples. The fine-grained sediment in this belt is dominated by quartz sand and silt deposited on the platform by Quaternary to recent glacio-fluvial and aeolian processes. The high content of exotic clastic quartz depresses the true geochemical signature of the underlying lithologies.

The element distribution patterns suggest possibilities for Cr and Ni mineralisation associated with voluminous Middle Proterozoic basic igneous rocks in parts of their outcrop area and base metal enriched Late Proterozoic shales in Caledonian nappes in the northeastern parts of the investigated region.

Contents

Introduction

The sampling of silt and water from streams in Kronprins Christian Land, Mylius Erichsen Land and adjacent areas (Fig. 1) in 1994 is a continuation of work in 1993, when Lambert Land to the south and parts of Kronprins Christian Land were investigated (Jensen et al., 1994). This report incorporates results from the 1993 project, in order to provide better coherence of the data.

Geochemical sampling in 1994 was carried out by M. Lind and T. Tukiainen during the second field season of a three-year mapping campaign by the Geological Survey of Greenland (GGU) in eastern North Greenland (Lind & Tukiainen, 1994; Henriksen, 1994). The expedition was based in a tent camp at Centrum Sø (Fig. 1) and used two MD 520 Notar helicopters for transportation within the operational area.

The work reported here is part of ongoing regional drainage geochemical mapping by GGU. This programme provides reconnaissance geochemical data that may be used together with geophysical and geological information to outline provinces or areas with a potential for mineral resources.

Geology

Kronprins Christian Land and Mylius Erichsen Land constitute the northern extremity of the East Greenland Caledonian fold belt, and are foreland to the slightly younger Canadian - North Greenland Franklinian mobile belt.

The geology of the surveyed area has been described by Adams & Cowie (1953), Fränkl (1954, 1955), Hurst et al. (1985) and Jepsen et al. (1994). General descriptions of the geology of the adjacent North Greenland Franklinian mobile belt are given in Dawes (1976), Higgins et al. (1985), Henriksen (1992) and in GGU Bulletin 160 (1991). The northern parts of the East Greenland Caledonian fold belt are described in Henriksen & Higgins (1976), Friderichsen et al. (1990, 1991), Strachan et al. (1991) and in GGU Rapport 162 (1994). The most recent of the above-mentioned papers and publications contain comprehensive literature references.

No recently published geological map covers the whole of the surveyed region. Modern 1:500 000 maps cover North Greenland north of 81° N (Bengaard & Henriksen, 1984; Henriksen, 1989, 1992), and parts of Kronprins Christian Land are included on a 1:1 000 000 geological map published in GGU Bulletin 160 (1991). An outdated geological/tectonic 1:1 000 000 map, parts of which were compiled in the early 1960s, covers North-East Greenland from 75° to 82° N (Haller, 1983). The geological map used in this report (Fig. 1) is simplified after a new, preliminary compilation by Jepsen (1994).

The surveyed region is dominated by sedimentary and volcanic successions that record a Middle Proterozoic to Lower Palaeozoic history of basin evolution (continental rifting and formation of a shelf on a passive plate margin) prior to the mid-Palaeozoic Caledonian and Ellesmerian orogenies. In the western parts of the region an undisturbed succession of Middle Proterozoic continental sandstones and basic volcanic rocks (2 and 3 on the geological map, Fig. 1), Late Proterozoic mainly shallow marine sedimentary rocks (4), and Lower Palaeozoic shelf carbonate rocks (5) is exposed. In eastern Kronprins Christian Land Late Proterozoic siliciclastic trough sediments (4) are preserved in westward-transported Caledonian nappes that overlie the Late Proterozoic to Lower Palaeozoic shelf carbonate rocks. In the eastern coastal region the Middle Proterozoic continental sandstones (2) and basic igneous rocks (3) are interfolded with underlying mainly Lower Proterozoic crystalline rocks (1, Fig. 1; Jepsen & Kalsbeek, 1985). Post-Caledonian, Carboniferous to Early Tertiary sediments (7 in Fig. 1) are prominent on Amdrup Land and Holm Land.

The crystalline basement is transected by a large NNE-SSW trending Caledonian shear zone which appears to be the continuation of the Storstrømmen shear zone of Dronning Louise Land some 300 km to the south of the present study area (6 in Fig. 1; Jepsen et al., 1994).

The oldest sedimentary units exposed within the surveyed region belong to the more than 2 km thick Middle Proterozoic Independence Fjord Group. This Group consists of fluvial and aeolian sandstones that were deposited on a sagging, peneplained Archaean and/or Lower Proterozoic crystalline basement (Sønderholm & Jepsen, 1991). Rb-Sr dating of clayey material from the middle parts of the Independence Fjord Group indicates an age of ~ 1380 Ma (Larsen & Graff-Petersen, 1980). The sandstone sequence is cut by voluminous basic sills and dykes (Midsommersø Dolerites) and overlain by extensive flows of the Zig-Zag Dal Basalt Formation (Jepsen & Kalsbeek, 1979; Jepsen et al., 1980; Kalsbeek & Jepsen, 1983, 1984). The dolerites and the basalts are considered to have been emplaced contemporaneously 1230 ± 25 Ma ago (Jepsen & Kalsbeek, 1979). The Middle Proterozoic sedimentary and basic igneous rocks are correlatable with Middle Proterozoic continental sedimentary and basic igneous successions in western North Greenland and in North-East Greenland (Sønderholm & Jepsen, 1991).

An erosional unconformity that represents a hiatus of perhaps 400-500 Ma forms the base of Late Proterozoic conglomerates and turbidites (Rivieradal sandstones) and partly equivalent shallow marine shelf siliciclastic and carbonate rocks of the Hagen Fjord Group (Clemmensen & Jepsen, 1992). The ~ 1 km thick Hagen Fjord Group sequence is well exposed around Danmark Fjord, but the Rivieradal sandstones are only seen in the Caledonian nappes in eastern Kronprins Christian Land, where the several kilometre thick sequence passes upwards into carbonate rocks of the middle parts of the Hagen Fjord Group (Jepsen & Sønderholm, 1994; Jepsen et al., 1994).

Middle Ordovician to Lower Silurian platform carbonates and a N-S trending belt of Lower Silurian carbonate reefs overlie the Hagen Fjord Group sequence. In the Caledonian foreland to the west of Centrum Sø thin-skinned thrusts with minor displacements and localised folding transect the Lower Palaeozoic carbonate platform (Higgins & Soper, 1994), and in eastern Kronprins Christian Land Rivieradal sandstones in Caledonian nappes overlie the carbonate platform.

The sediments of Amdrup Land and Holm Land belong to the post-Caledonian Wandel sea basin, and form a sequence of little deformed Carboniferous, Permian, Jurassic, Cretaceous and Early Tertiary sandstones, shales and limestones.

Exploration in North Greenland

During regional mapping campaigns GGU has explored western and central North Greenland by reconnaissance stream silt geochemistry (Jakobsen & Stendal, 1987; Steenfelt, 1985, 1987, 1991). In parts of eastern North Greenland to the north-west of Danmark Fjord GGU has carried out limited reconnaissance stream silt geochemistry (Henriksen, 1980; Steenfelt, 1980), and stream sand geochemistry and microscopy studies that have revealed widespread copper anomalies associated with the Middle Proterozoic basic igneous rocks and the Late Proterozoic sandstones and mudstones (Ghisler et al., 1979; Ghisler & Stendal, 1980; Ghisler, 1994). Recent follow-up on an occurrence of chalcopyrite in stream sand in Campanuladal (Fig. 1) led to two sandstone beds with small amounts of disseminated chalcopyrite and galena, respectively, in the Campanuladal Formation of the Late Proterozoic Hagen Fjord Group (Lind & Tukiainen, 1994).

In the Lower Palaeozoic Franklinian mobile belt of North Greenland a number of stream sediment Zn anomalies and Zn-Pb sulphide showings occur along the E-W trending Navarana Fjord escarpment which separates platform carbonates to the south from deep-water siliciclastic trough sediments to the north (Jakobsen & Steenfelt, 1985; Jakobsen, 1989; Steenfelt, 1991; Lind et al., 1994). At Citronen Fjord some 350 km to the north-west of Centrum Sø a major discovery was made in 1993 by the private company Platinova A/S: a large stratiform zinc deposit hosted by Lower Palaeozoic shales on the basinward side of the Navarana Fjord escarpment was revealed by exposed giant gossans; the deposit is currently being evaluated by drilling and geophysical methods (Schønwandt, 1994).

Physiography

The surveyed region shows a very wide range of physiographical conditions. In a NNE-SSW striking belt between Centrum Sø and Danmark Fjord flat-lying Ordovician to Silurian limestones and dolomites form a 300-500 m high plateau cut by a few, deep E-W trending valleys. The streams on the plateau are wide and shallow with gently flowing water derived from local snow fans and shield-shaped ice caps (Figs 42-44 in Jensen et al., 1994). Fine-grained sediment in the streams is sparse and often characterised by a very high content of organic matter. Exotic blocks and cobbles (gneisses and dolerites) are common in the streams. A thin blanket of Quaternary or recent fluvial and aeolian transported sand and silt may be seen in wide valleys in the western parts of the plateau. Wind-eroded outcrops and faceted pebbles on rocky pavements attest to frequent sand and dust storms.

The Caledonian nappe complexes in eastern Kronprins Christian Land are characterised by more rugged topography (Figs 43 & 44 in Jensen et al., 1994), and the streams are generally narrow and deep, with high water flows. In streams cutting the Upper Proterozoic Rivieradal sandstones blocks, cobbles and gravel appear to be of local origin.

In eastern Kronprins Christian Land and along the fjords on the east coast the Middle

Proterozoic Independence Fjord Group sandstones and Midsommersø Dolerites form a topographical high with altitudes up to about 1500 m. The exposures are steep, rugged peaks with no vegetation, and glaciers and glacier tongues cover about half of the surface area. All streams discharge from the fronts or sides of glaciers and are short, steep and deep, and carry a high load of suspended sediment.

Amdrup Land and Holm Land to the east consist of softer sediments and have a more subdued topography, with flat hills running up to *c.* 500 m. Most streams come from local ice caps and cut rather steep valleys into the otherwise relatively flat terrain.

Sampling

Stream silt and water samples were collected at 334 sampling sites (169 in 1993; 165 in 1994; Lind & Tukiainen, 1994) over an ice-free area of approximately 22 000 km^2 (12 000 km^2 in 1993; 10 000 km^2 in 1994); this corresponds to a density of 1 sample per 66 km^2.

The sample sites were selected and marked on aerial photographs prior to the field work, using selection criteria such as even geographical distribution, representation of major lithological units, size of upstream drainage area, and topography.

At each sampling site *c.* 500 g of fine-grained stream sediment was collected in a paper bag and 100 ml of stream water in a polyethylene bottle. Each numbered sediment sample is a composite of several subsamples collected from about 5 sand and silt accumulations within a few tens of metres distance from the recorded sampling site. In 1994 duplicate silt and water samples were collected at 12 localities, i.e. at *c.* 5 % of the total number of localities. Radioactivity (total gamma-radiation) was measured on representative outcrops or stream boulders, where available, using a scintillometer (Table 1).

Sample preparation and analysis

Sediment. In the expedition base camp at Centrum Sø the sample bags were laid out to dry in open air on plywood boards, and at the end of the field season sent by Royal Danish Air Force (RDAF) transport aircraft to GGU, Copenhagen. Here, the samples were further dried at 65°C and sieved into three grain size fractions using sieve apertures of 1 mm and 0.1 mm. The coarse fractions were discarded, the medium grain size fractions archived, and the fine grain size fractions submitted for analysis. The samples were analysed by instrumental neutron activation (INA) and inductively coupled plasma emission (ICP) methods for Au and 47 other elements by Activation Laboratories Ltd., Canada (Table 2). Major elements were determined at GGU, by X-ray fluorescence spectrometry on fused discs. Samples were fused with sodium tetraborate; Na_2O was therefore determined by atomic absorption spectrometry (AAS).

Water. The water samples were sent by RDAF transport aircraft to GGU, Copenhagen, where conductivity and fluoride concentrations were measured *c.* 3 months after collection (Table 1).

Data presentation

The analytical results are presented in this report as element distribution maps together with summary statistical parameters and histograms of the frequency distribution for each element (Figs 2-41).

In the element distribution maps each sample is represented by a dot, the size of which is proportional to the element concentration. For each element distribution map the scaling of dot sizes has been chosen so as to display as clearly as possible the regional variations in geochemical signatures.

For elements that have been determined by more than one analytical method, only one set of data is shown: the data set that is considered the most reliable or determined at the lowest detection limit. Major elements have been recalculated to volatile-free oxides; the arithmetic mean of volatile contents (determined as loss on ignition) is high: up to 7.5 %. High volatile contents are common in samples from the placid streams on the carbonate platform, where the fine-grained sediment is often rich in organic matter and carbonates.

Comments on the element distribution patterns

In Mylius Erichsen Land and south-western Kronprins Christian Land a 30-40 km wide belt parallel to the margin of the Inland Ice is characterised by very high SiO_2 contents (commonly ~ 80 %; Fig.2), irrespective of the underlying bedrock lithologies. This indicates that the fine-grained sediment largely consists of exotic quartz deposited by Quaternary to recent fluvio-glacial and aeolian processes. The quartz-rich sediment has probably been derived mainly from Independence Fjord Group sandstones that are partly buried under the Inland Ice. An analogous quartz sand/silt blanketing effect has been noted over parts of the deeply eroded Archaean/Lower Proterozoic gneiss region to the south of the present area (A. Steenfelt, unpublished data); Proterozoic sandstone formations broadly correlatable with those of the Independence Fjord Group are exposed on the westernmost nunataks of this region.

The quartz sand/silt blanketing depresses the main constituents (MgO and CaO) of the carbonate platform bedrock in the silt samples from this part of the area (Figs 7 and 8), and will tend to depress the geochemical signal of any anomalous element concentration. Levels of SiO_2, MgO and CaO believed to truly represent the carbonate platform are seen in the northern parts of the surveyed region which are characterised by higher altitudes and streams that cut canyons through the bedrock.

Most of the exposed Hagen Fjord Group rocks in the region around Danmark Fjord are affected by the glacial and aeolian sand/silt blanketing discussed above. High MgO and CaO contents characterise samples from streams draining the Fyns Sø Formation (dolomites) that dominate a narrow, arcuate belt of Hagen Fjord Group outcrops between Ingolf Fjord and Dijmphna Sund (Figs 1, 7 and 8).

The Rivieradal sandstones in the Caledonian nappes in eastern Kronprins Christian Land are enriched, relative to the carbonate platform, in a number of elements, as shown, for example, by slightly elevated levels of TiO_2, Al_2O_3, Fe_2O_2, K_2O, As, Cs, Pb, Rb, Sb, Th, U and rare earth elements. This moderate enrichment in several elements may be explained by the generally immature nature and varied composition (conglomerates, turbidites, dark mudstones) of the Rivieradal sandstones.

The Independence Fjord Group sandstones are characterised in all outcrop areas by high contents of SiO_2. Local elevated Co, Cr, Cu and Ni contents are probably related to mafic intrusive rocks and the basalts that are associated with the sandstones.

Total radiation is very low over the carbonate platform (Fig. 39). The distribution of gamma radiation levels closely follows the distribution of Th and U in stream sediments, and the highest levels (max. 130 cps) occur over the Rivieradal sandstones.

Water conductivity is very low in areas dominated by the Middle Proterozoic Independence Fjord Group in the west and the crystalline basement in the east (Fig. 40). Higher values occur in the Rivieradal sandstones around the inner parts of Ingolf Fjord, around the inner parts of Danmark Fjord, and on the carbonate platform along some of the wider valleys. The distribution pattern of fluoride in stream water (Fig. 41) closely follows the water conductivity distribution pattern.

Element distribution indicating mineralisation

No mineralisation is indicated by the geochemical survey, but, as discussed in the previous section, any anomaly in a 30-40 km wide belt along the margin of the Inland Ice would have been depressed by a large proportion of exotic quartz in the fine-grained sediment.

Gold values just above the detection limit of 5 ppb are scattered throughout the surveyed region (Fig. 13). Values of 10-40 ppb occur in Mylius Erichsen Land, and are associated with the sandstones of the Independence Fjord Group and basalts of the Zig-Zag Dal Formation.

A possibility for minor Cr and Ni mineralisation in the Middle Proterozoic basic igneous rocks on Lynn Ø, Hovgaard Ø and further north to western Amdrup Land is suggested by geographically well-defined anomalies (Figs 16 and 20).

The area around the inner parts of Ingolf Fjord is characterised by some enrichment in many trace elements, particularly As, Cu, Pb, Rb, Sb, Th, U, V, Zn and rare earth elements. In addition, some of the highest levels of gamma radiation, water conductivity and fluoride contents have been recorded here (Figs 39-41). This suggests either element redistribution along the thrust contact between the Caledonian nappe and the underlying platform or base metal enrichment of shale units in the Rivieradal sandstones. Several rusty weathering zones have been observed in this area, but no trace of sulphide mineralisation has yet been found (Jensen, 1993; Lind & Tukiainen, 1994).

Conclusions

The reconnaissance geochemical survey of the study area largely reflects bedrock compositions of lithologies drained by the sampled streams. However, most of the silt samples collected in a 30-40 km wide belt along the margin of the Inland Ice are dominated by exotic quartz that has been glacially eroded from Independence Fjord Group sandstones partly buried under the Inland Ice and transported by Quaternary to recent glacio-fluvial and aeolian processes. The exotic detrital quartz depresses the geochemical signal of underlying lithologies. The terrain in this belt, a combination of flat-lying, unmetamorphosed and easily eroded sedimentary rocks exposed along the margin of the Inland Ice, and sandstone formations buried under the ice, has not been adequately represented by the silt geochemical survey.

The element distribution patterns suggest that Cr, Ni and Cu mineralisation may be associated with the Middle Proterozoic basic igneous rocks on Lynn Ø, Hovgaard Ø, and further north. In addition, speculation based on the overall geological setting, as yet not corroborated by reconnaissance geochemistry or field observations, suggests a possibility of finding equivalents to known mineralisation along the Navarana Fjord escarpment in the North Greenland Franklinian mobile belt: epigenetic Pb-Zn in the Lower Palaeozoic carbonate platform and syngenetic Zn-Pb in the Rivieradal sandstones

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Table 1. Instrumentation at the Geological Survey of Greenland

Field measurement of gamma-radiation: Saphymo-Srat SPP-2 scintillometer

Water samples:

Conductivity: Chemotest JK 8800

Fluoride concentration: Orion EA 920 pH/ion analyzer

Table 2. Analytical detection limits

'Au + 47', combination INA / total digestion - ICP (Activation Laboratories Ltd.)

INA (instrumental neutron activation analysis)

Au	2	ppb	As	0.5	ppm	Ba	50	ppm	Br	0.5	ppm
Ce	3	ppm	Co	1	ppm	Cr	5	ppm	Cs	1	ppm
Eu	0.2	ppm	Fe	0.01	%	Hf	1	ppm	Hg	1	ppm
Ir	5	ppb	La	0.5	ppm	Lu	0.05	ppm	Na	0.01	%
Nd	5	ppm	Rb	5	ppm	Sb	0.1	ppm	Sc	0.1	ppm
Se	3	ppm	Sm	0.1	ppm	Sn	100	ppm	Ta	0.5	ppm
Th	0.2	ppm	Tb	0.5	ppm	U	0.5	ppm	W	1	ppm
Yb	0.2	ppm									

Total digestion - ICP (inductively coupled plasma emission)

Ag	0.4	ppm	Al	0.01	%	Be	2	ppm	Bi	5	ppm
Ca	0.01	%	Cd	0.5	ppm	Cu	1	ppm	K	0.01	%
Mg	0.01	%	Mn	1	ppm	Mo	1	ppm	Ni	1	ppm
P	0.001	%	Pb	5	ppm	Sr	1	ppm	Ti	0.01	%
V	2	ppm	Y	2	ppm	Zn	1	ppm			

XRF, X-ray fluorescence spectrometry on fused discs (Geological Survey of Greenland)

Cr	5	ppm	Ni	2	ppm	Rb	2	ppm	Sr	1	ppm
V	5	ppm	Zn	10	ppm						

AAS, atomic absorption spectrometry (Geological Survey of Greenland)

Cu	3	ppm

List of figures

Fig. 1. Geological map of the area in North-East Greenland for which geochemical data are presented in the following figures.

1. Crystalline basement (early Proterozoic).
2. Independence Fjord Group, mainly sandstone, middle Proterozoic.
3. Zig-Zag Dal Formation, basalts, middle Proterozoic.
4. Late Proterozoic deposits which occur in two distinct settings. (A) In eastern Kronprins Christian land the 'Rivieradal sandstones', which form major thrust sheets. (B) Around Danmark fjord shales and carbonate rocks of the Hagen Fjord Group.
5. Early Palaeozoic carbonate rocks.
6. Strongly deformed rocks in late Caledonian 'Storstrømmem shear zone'.
7. Late Palaeozoic to Tertiary deposits of the Wandel Sea Basin.

C: Campanuladal.

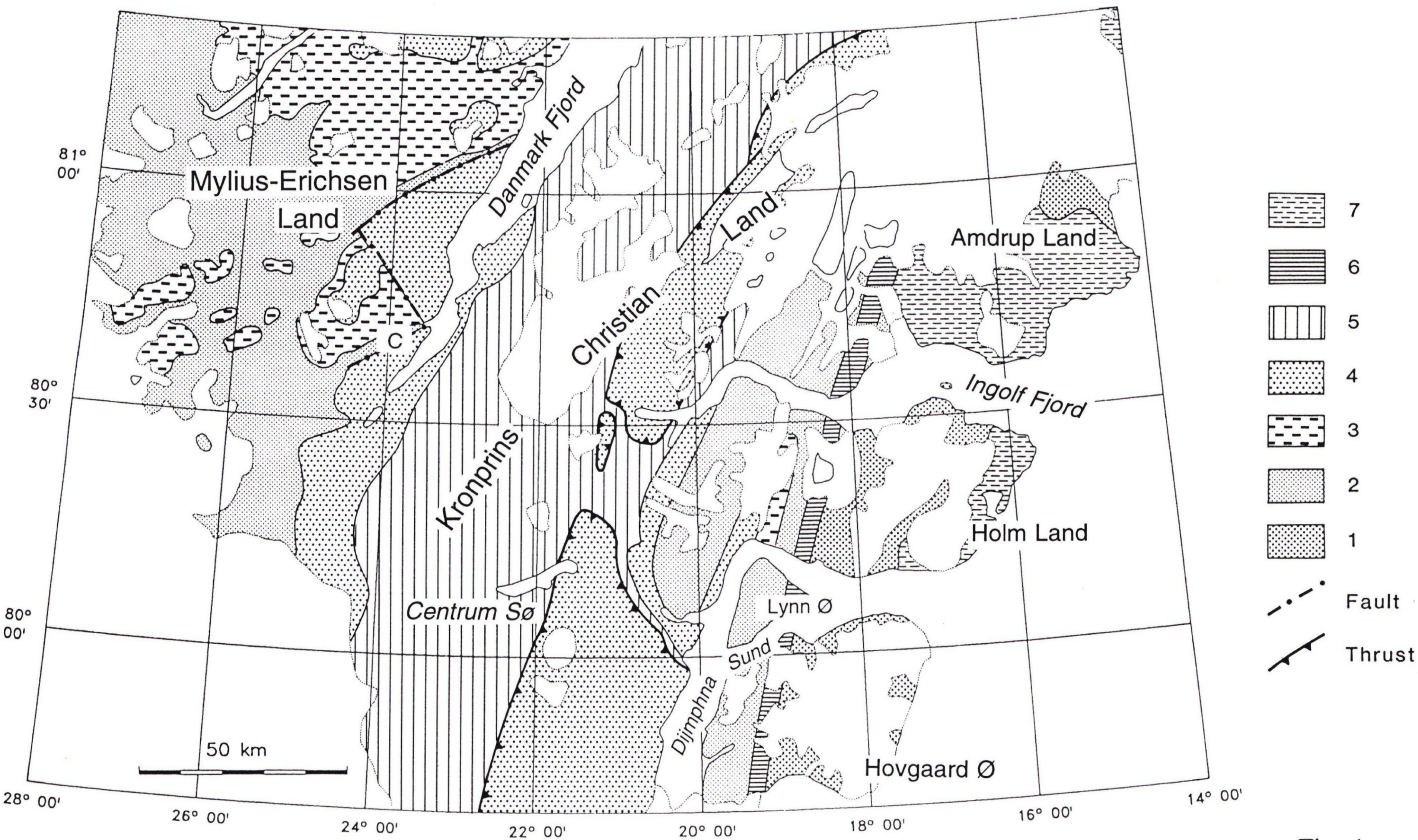

Mylius-Erichsen
Land
Danmark Fjord
Christian
Land
Amdrup Land
Ingolf Fjord
Kronprins
Centrum Sø
C
Holm Land
Lynn Ø
Sund
Dijmphna
Hovgaard Ø
50 km
81° 00'
80° 30'
80° 00'
28° 00'
26° 00'
24° 00'
22° 00'
20° 00'
18° 00'
16° 00'
14° 00'
7
6
5
4
3
2
1
Fault
Thrust

Fig. 1

Grønlands Geologiske Undersøgelse

SiO_2 in stream sediment

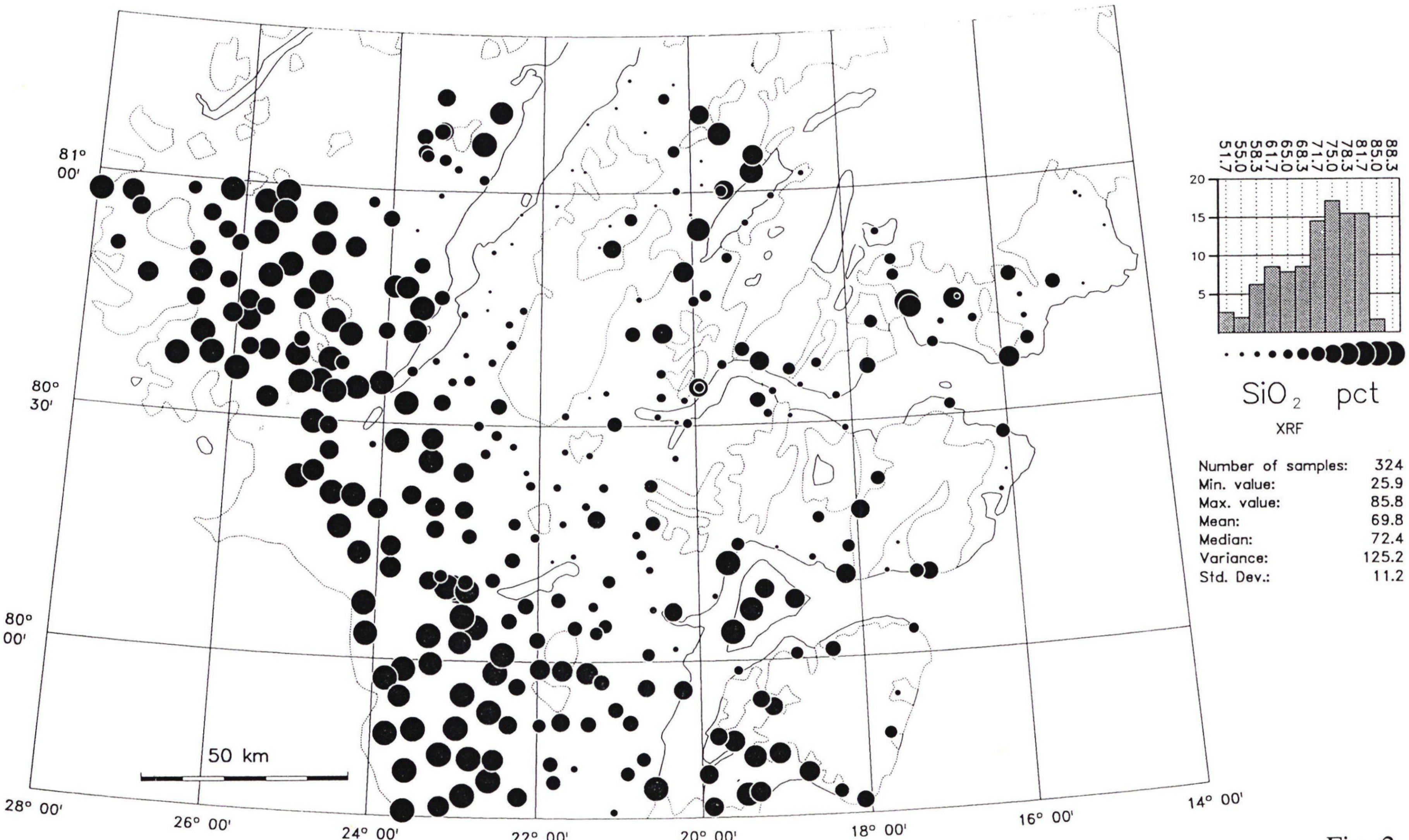


Fig. 2

Grønlands Geologiske Undersøgelse

TiO_2 in stream sediment

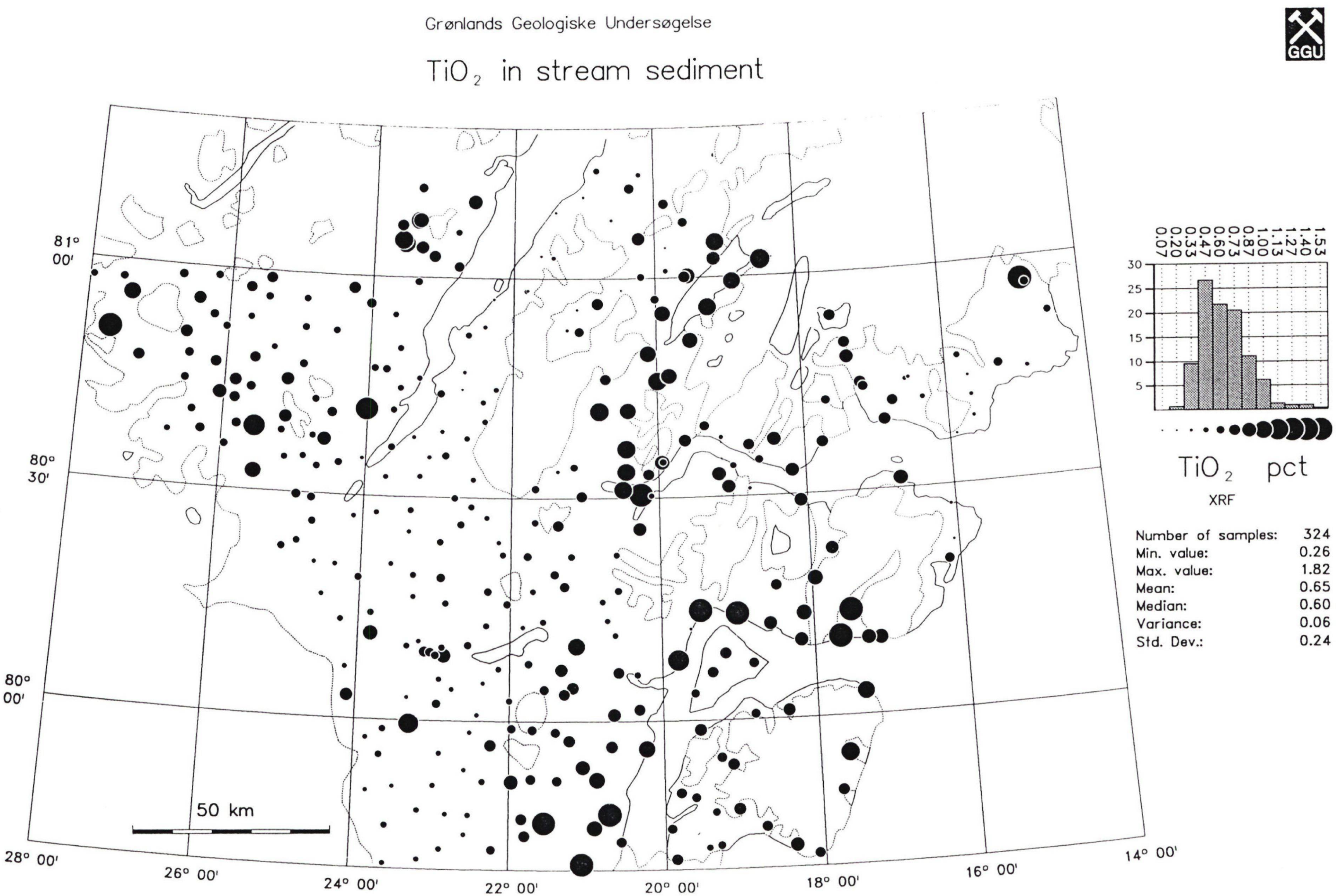


Fig. 3

Grønlands Geologiske Undersøgelse

Al_2O_3 in stream sediment

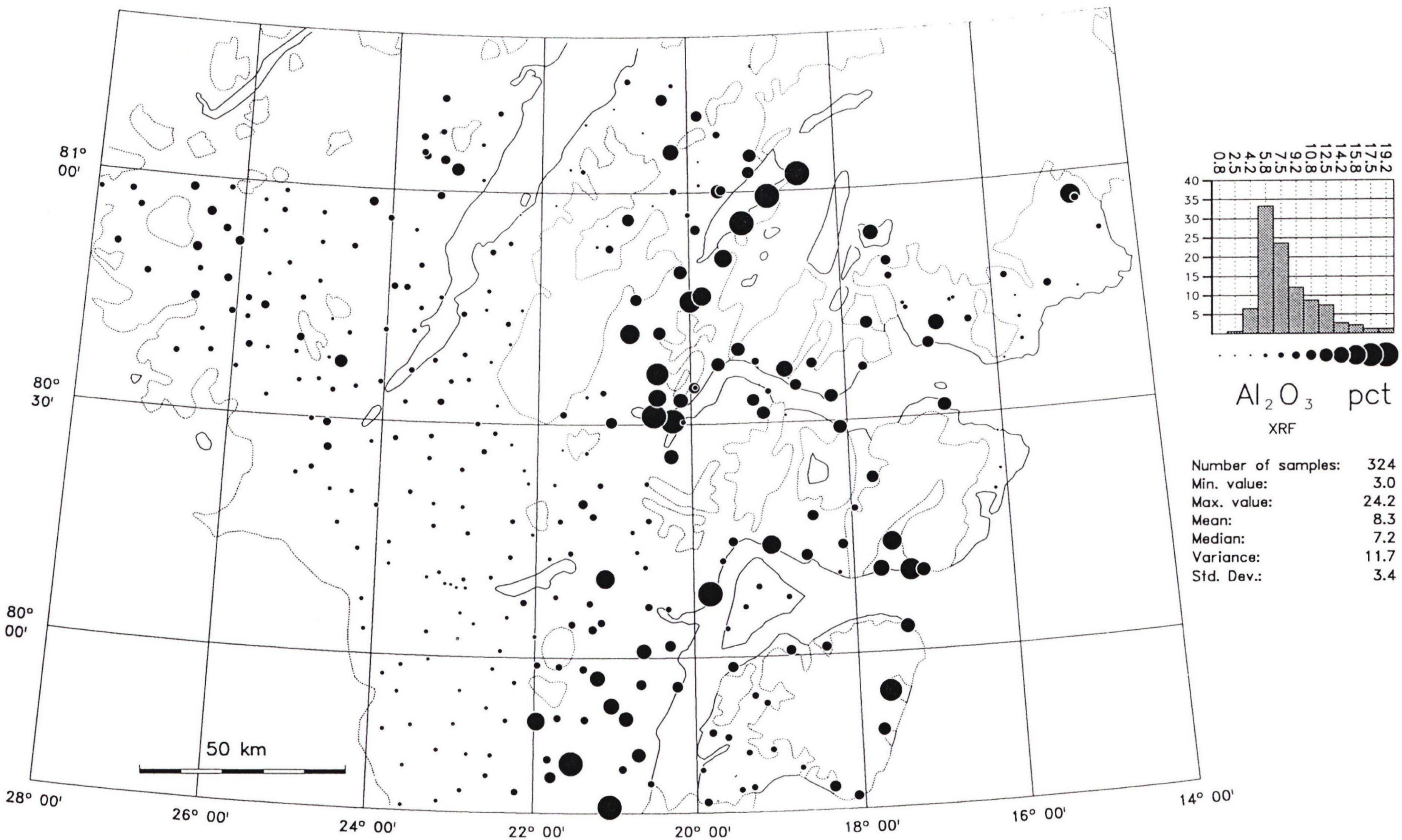


Fig. 4

Grønlands Geologiske Undersøgelse

Fe_2O_3 in stream sediment

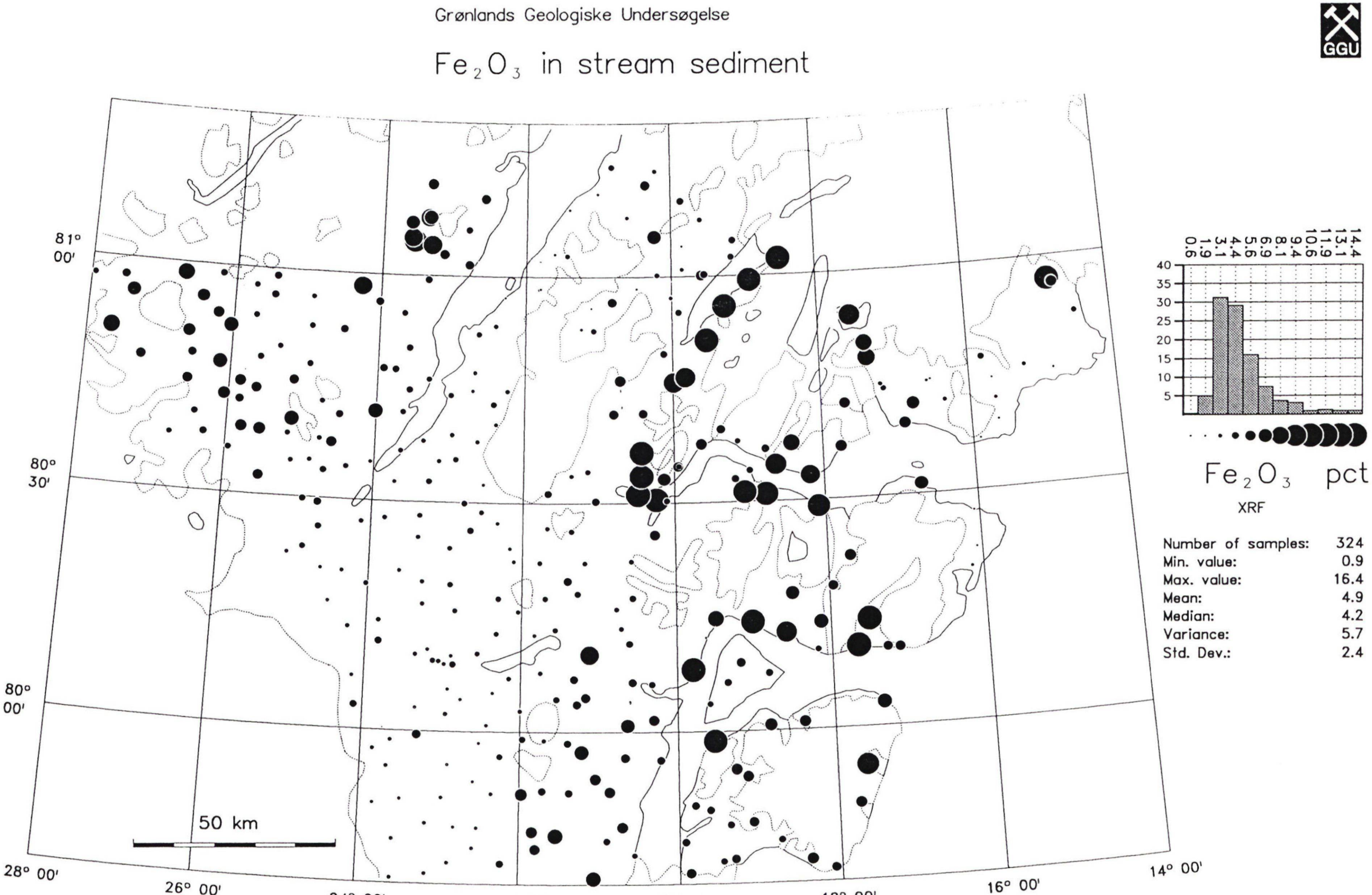


Fig. 5

Grønlands Geologiske Undersøgelse

MnO in stream sediment

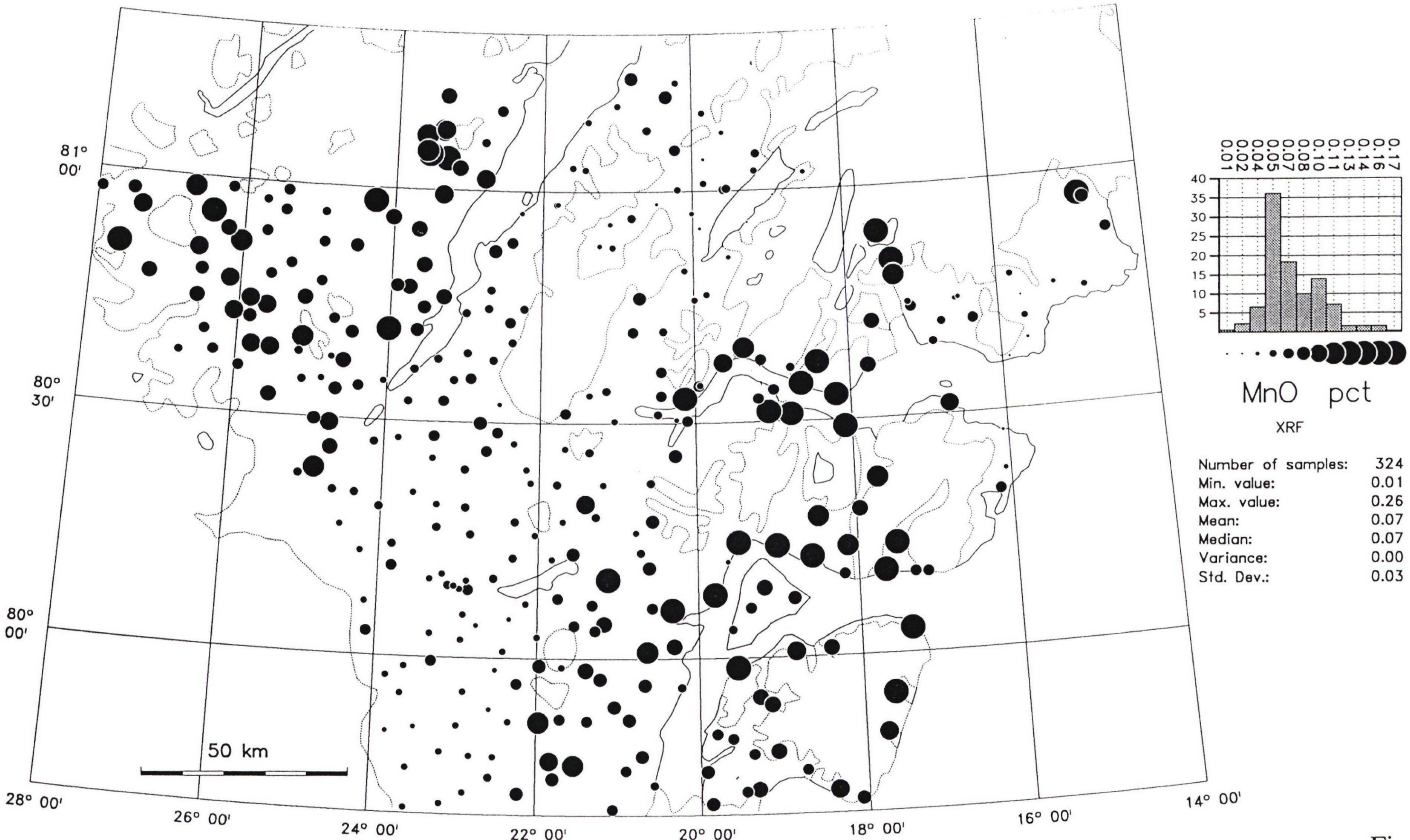


Fig. 6

Grønlands Geologiske Undersøgelse

MgO in stream sediment

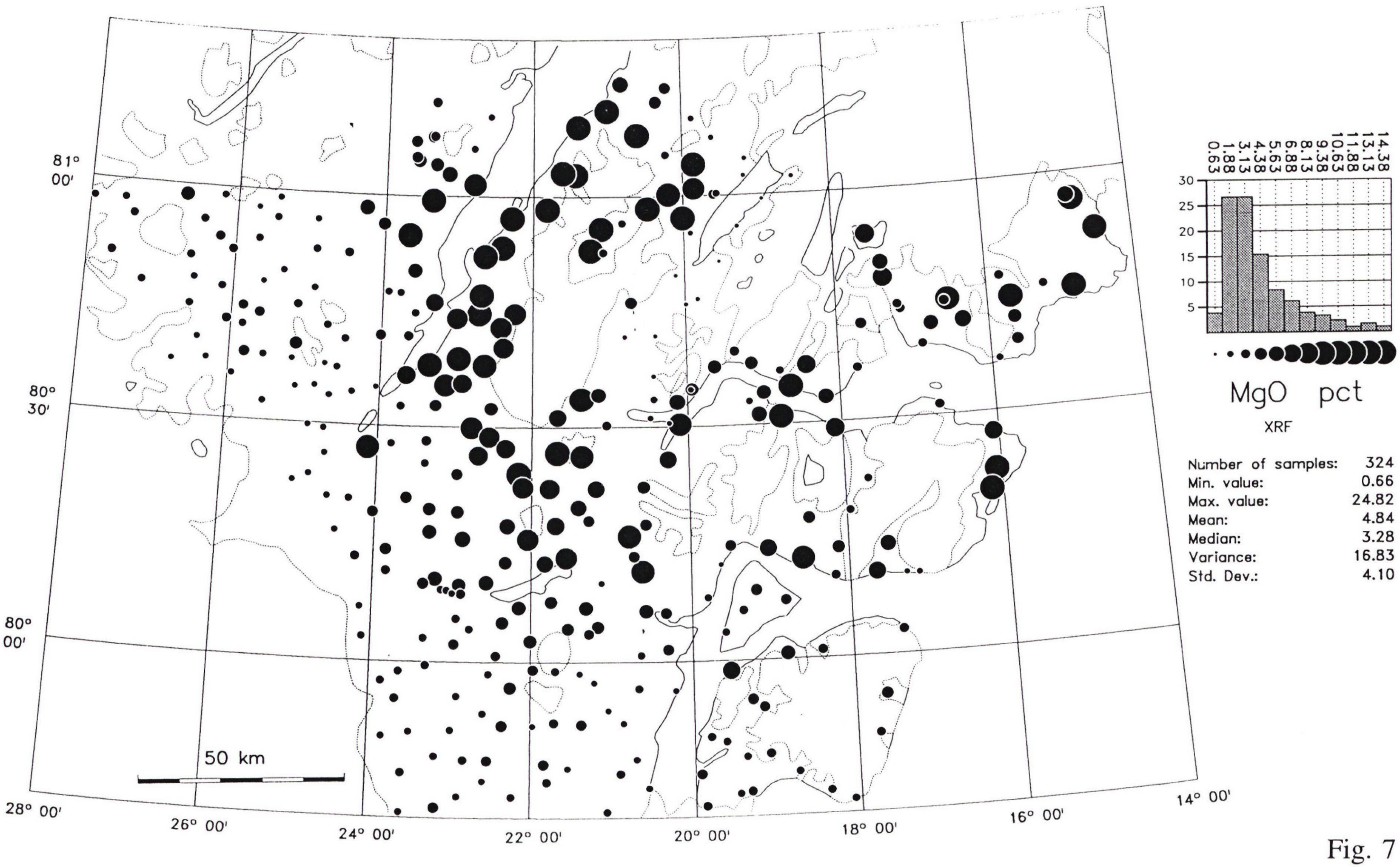


Fig. 7

Grønlands Geologiske Undersøgelse

CaO in stream sediment

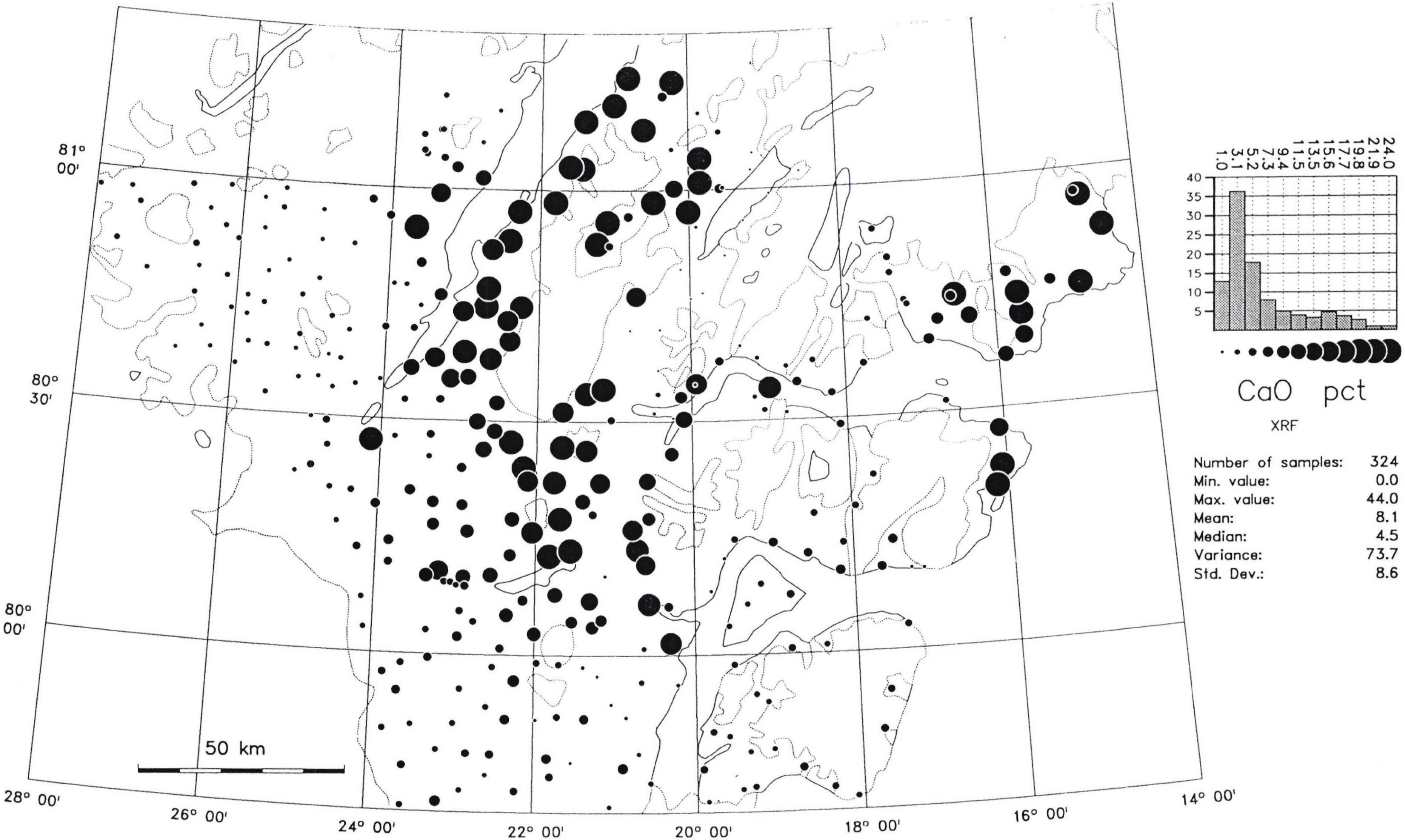


Fig. 8

Grønlands Geologiske Undersøgelse

Na_2O in stream sediment

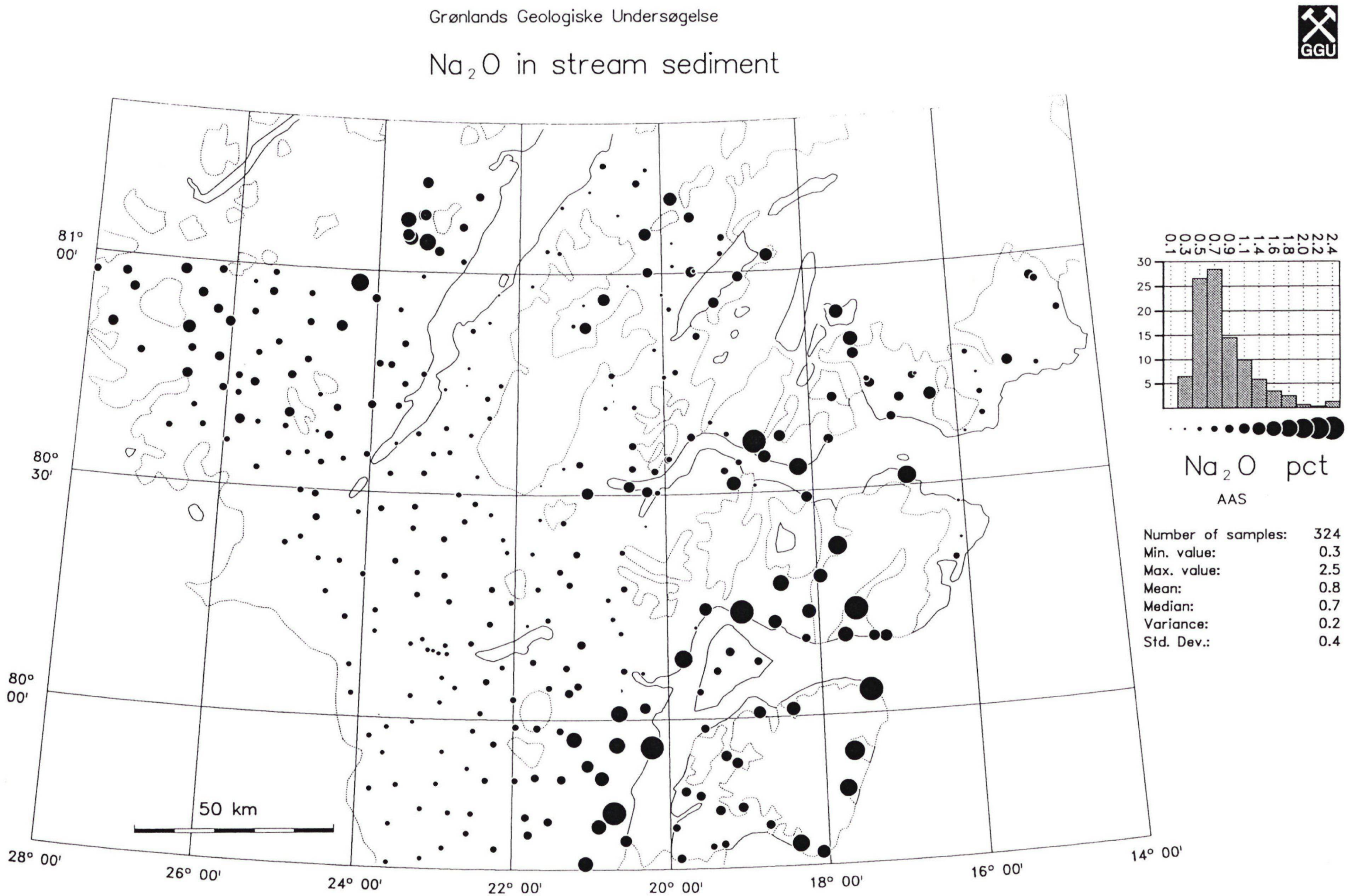


Fig. 9

Grønlands Geologiske Undersøgelse

K_2O in stream sediment

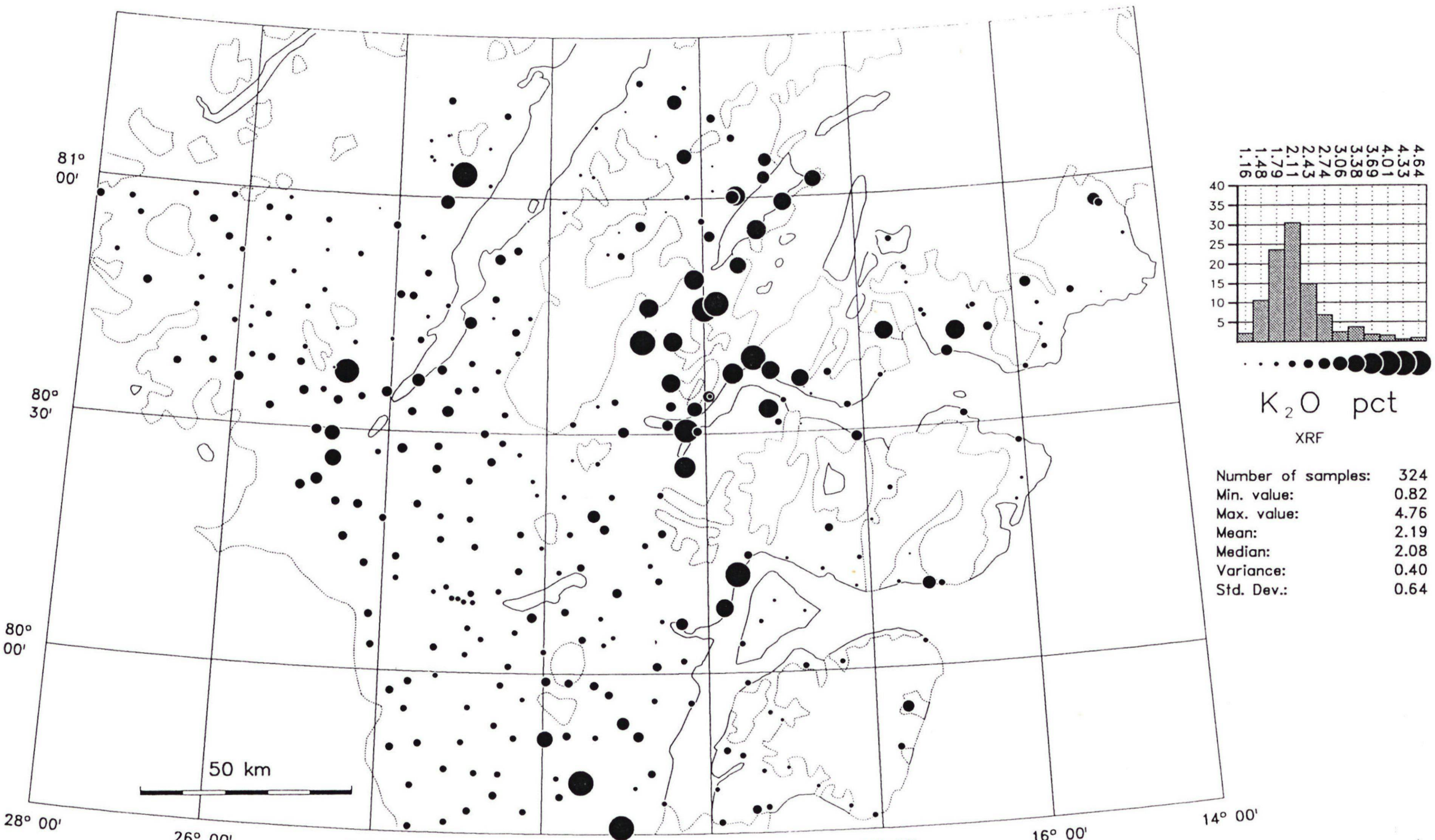


Fig. 10

Grønlands Geologiske Undersøgelse

P_2O_5 in stream sediment

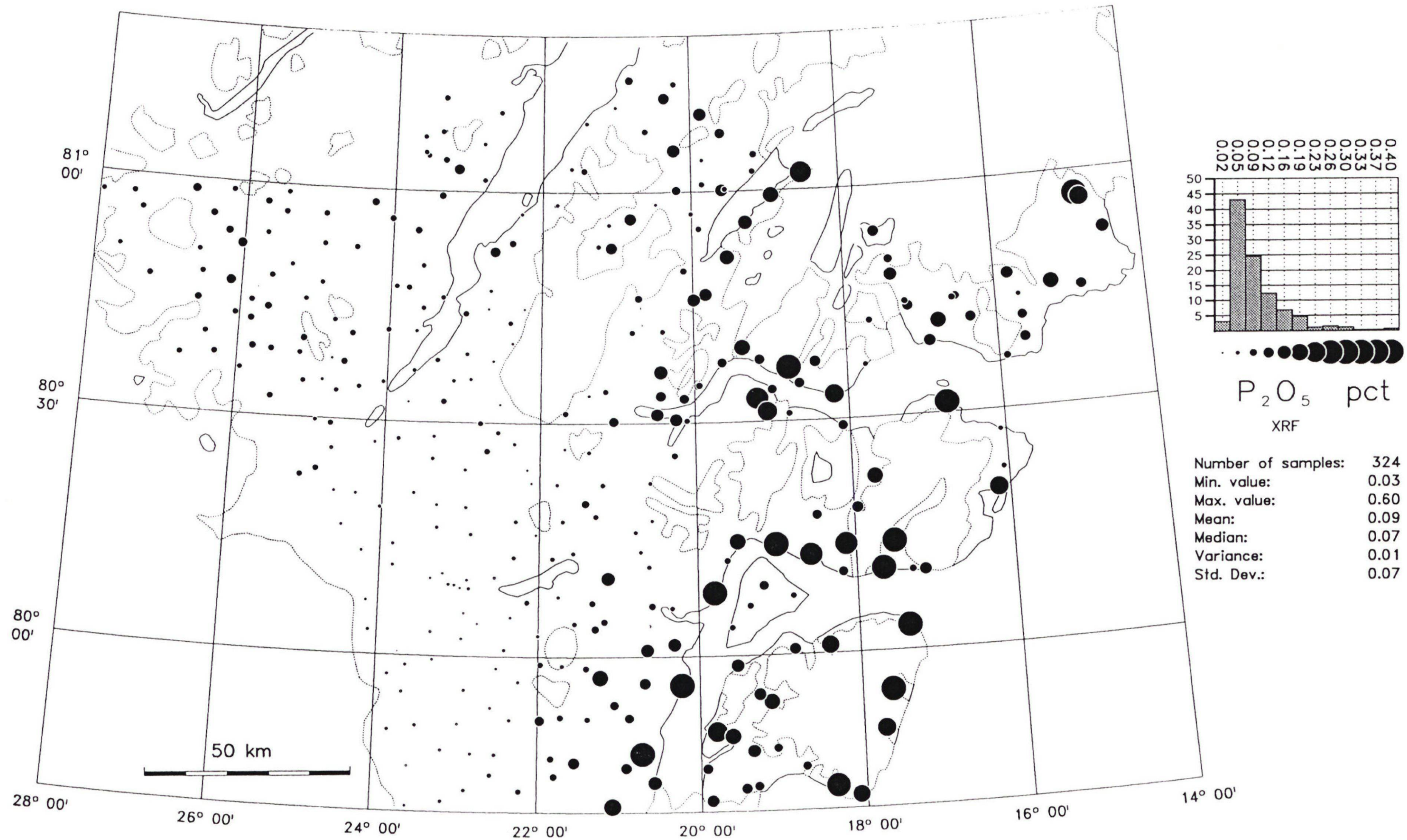


Fig. 11

Grønlands Geologiske Undersøgelse

As in stream sediment

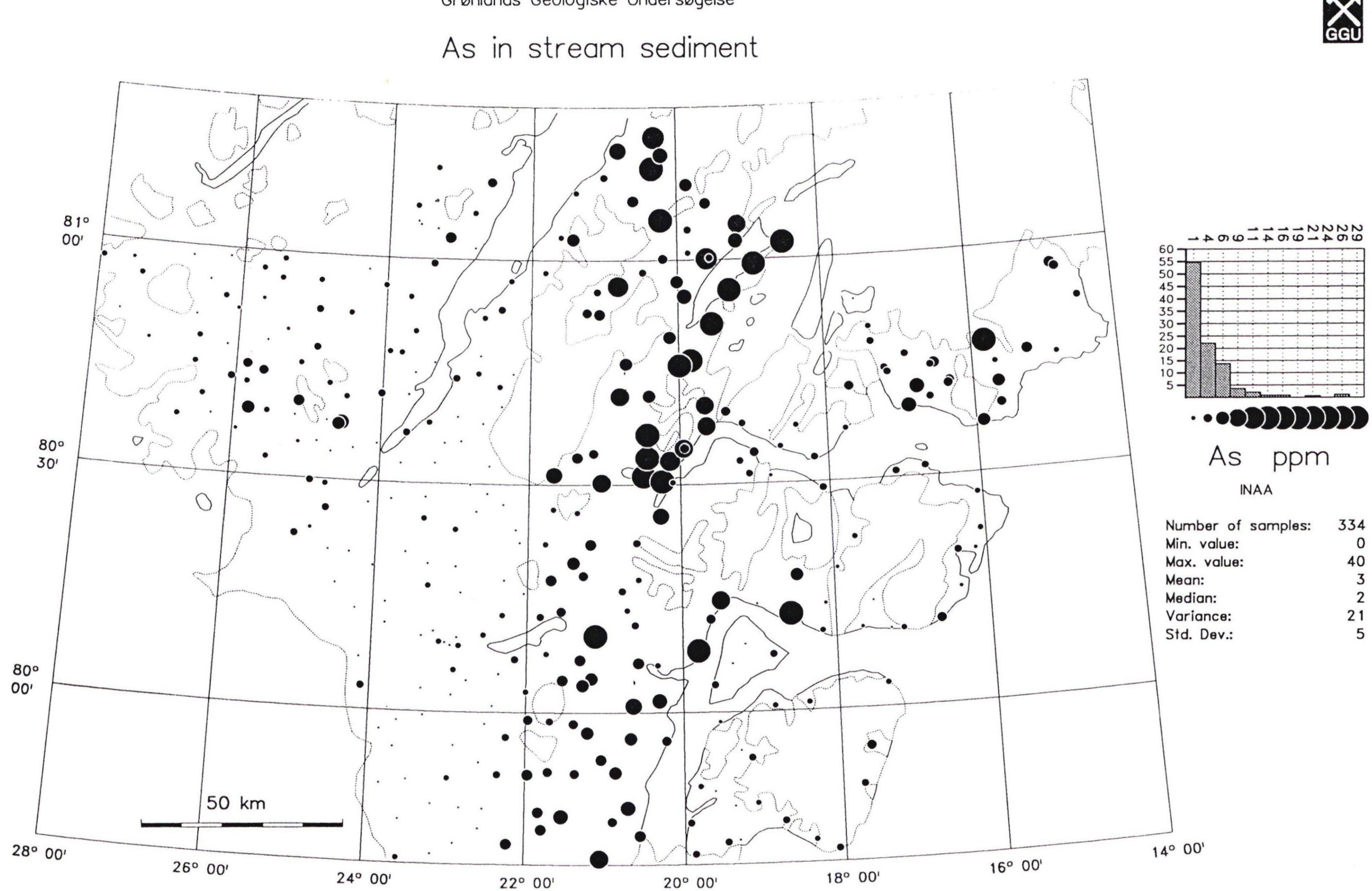


Fig. 12

Grønlands Geologiske Undersøgelse

Au in stream sediment

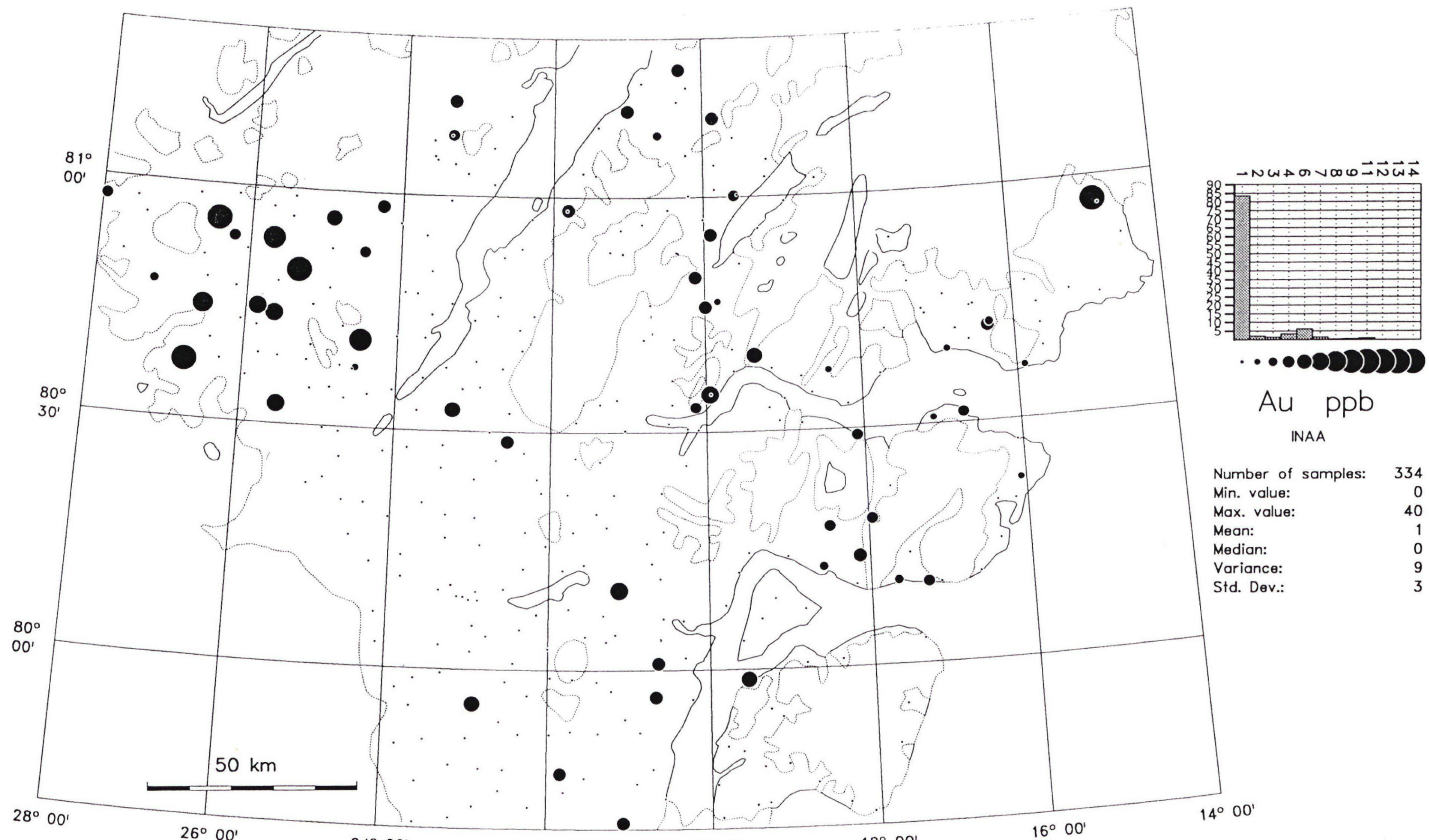


Fig. 13

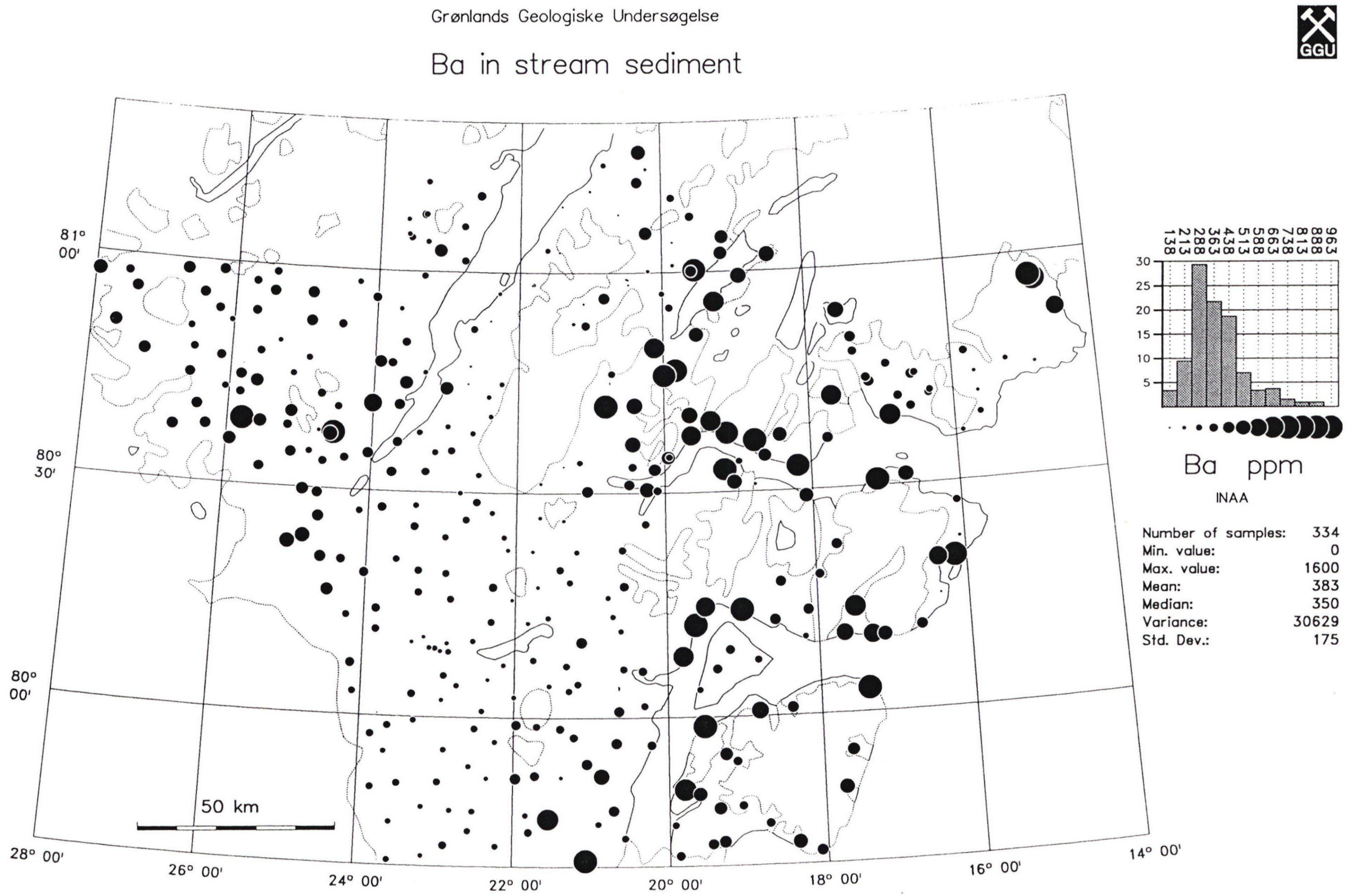

Grønlands Geologiske Undersøgelse
Ba in stream sediment
GGU
81° 00'
80° 30'
80° 00'
28° 00'
26° 00'
24° 00'
22° 00'
20° 00'
18° 00'
16° 00'
14° 00'
50 km
138 213 288 363 438 513 588 663 738 813 888 963
30 25 20 15 10 5
Ba ppm
INAA
Number of samples: 334
Min. value: 0
Max. value: 1600
Mean: 383
Median: 350
Variance: 30629
Std. Dev.: 175

Fig. 14

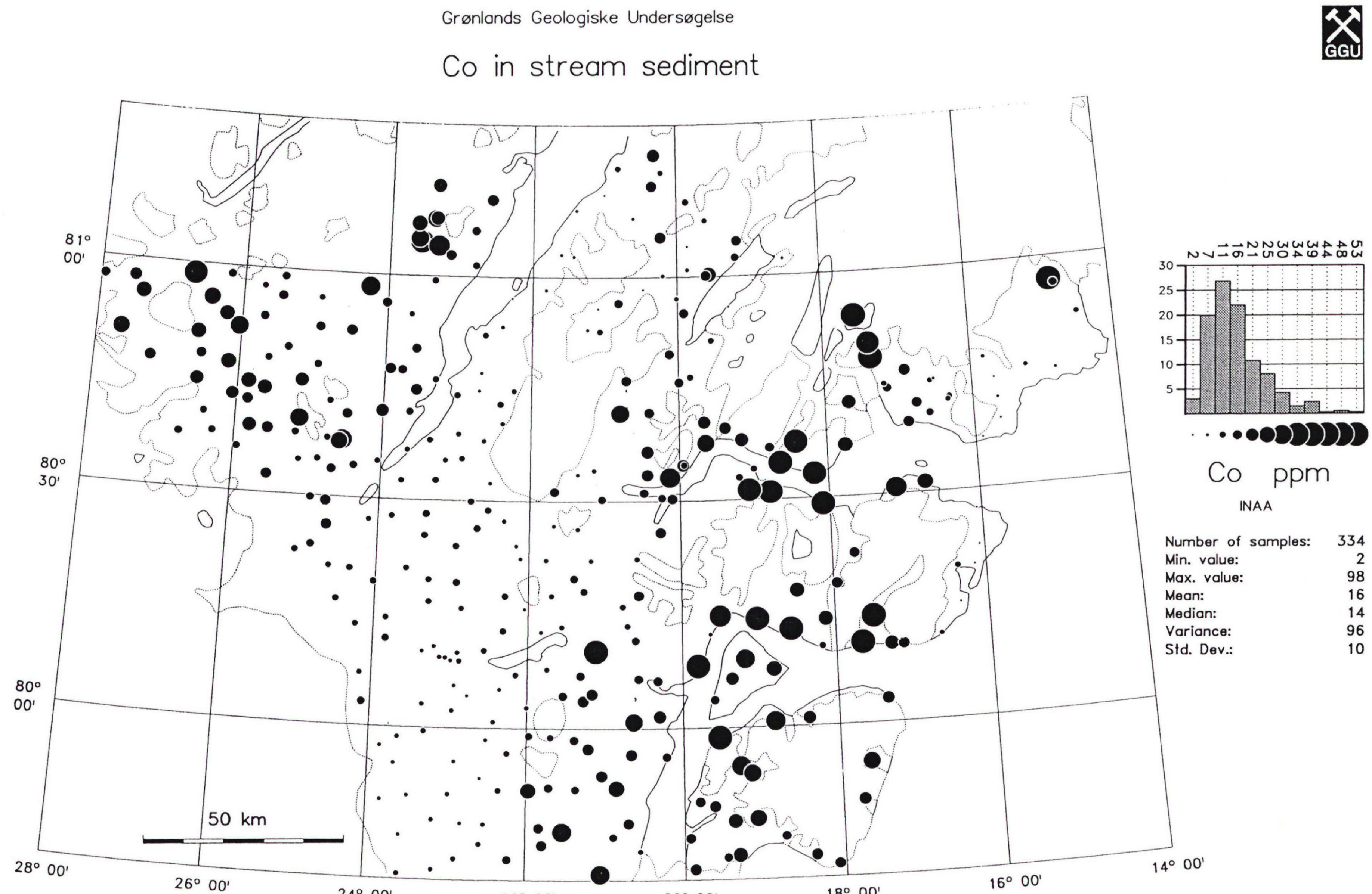

Grønlands Geologiske Undersøgelse
Co in stream sediment
GGU
81° 00'
80° 30'
80° 00'
28° 00'
26° 00'
24° 00'
22° 00'
20° 00'
18° 00'
16° 00'
14° 00'
50 km
2 7 11 16 21 25 30 34 39 44 48 53
30
25
20
15
10
5
Co ppm
INAA
Number of samples: 334
Min. value: 2
Max. value: 98
Mean: 16
Median: 14
Variance: 96
Std. Dev.: 10

Fig. 15

Grønlands Geologiske Undersøgelse

Cr in stream sediment

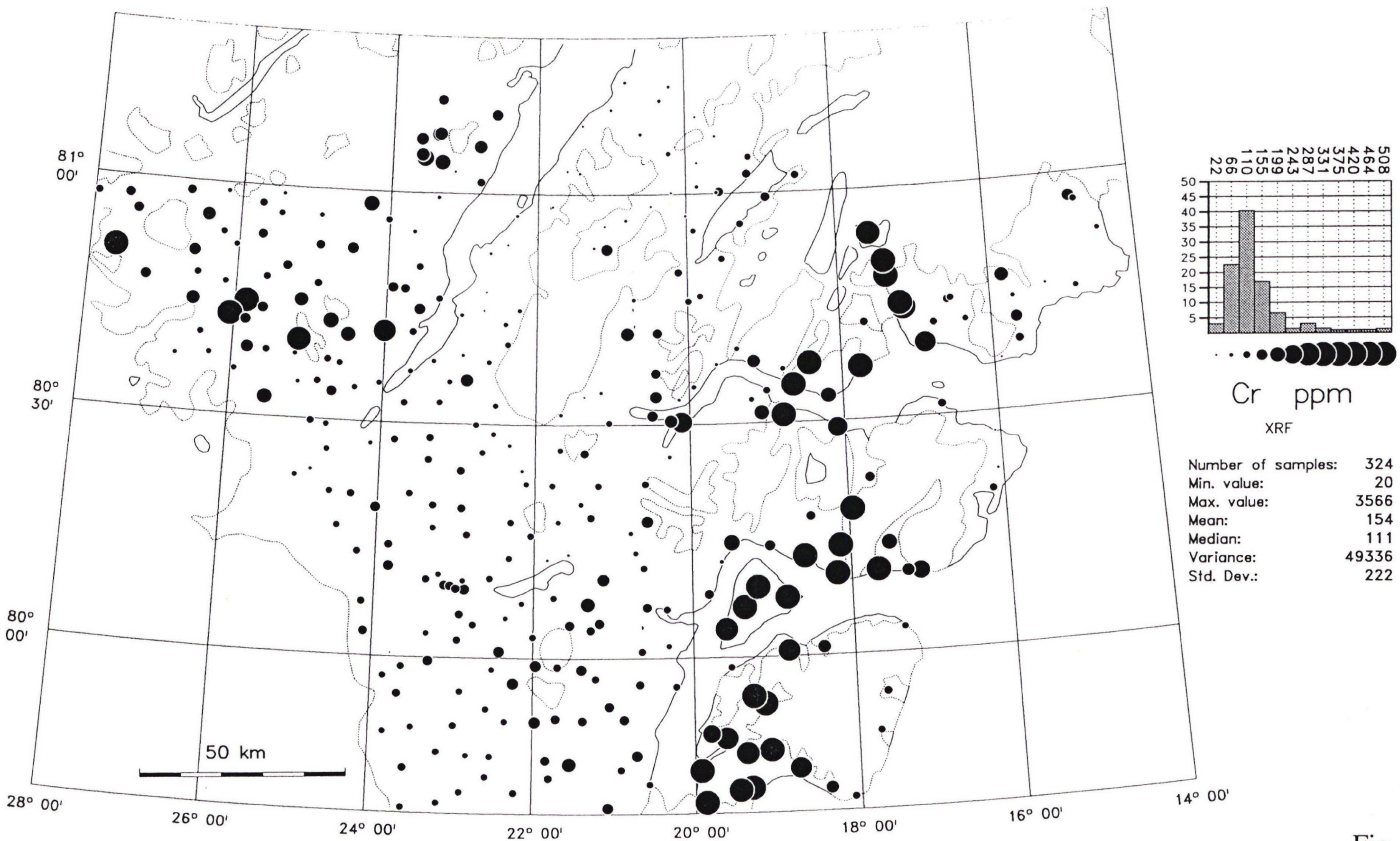


Fig. 16

Grønlands Geologiske Undersøgelse

Cs in stream sediment

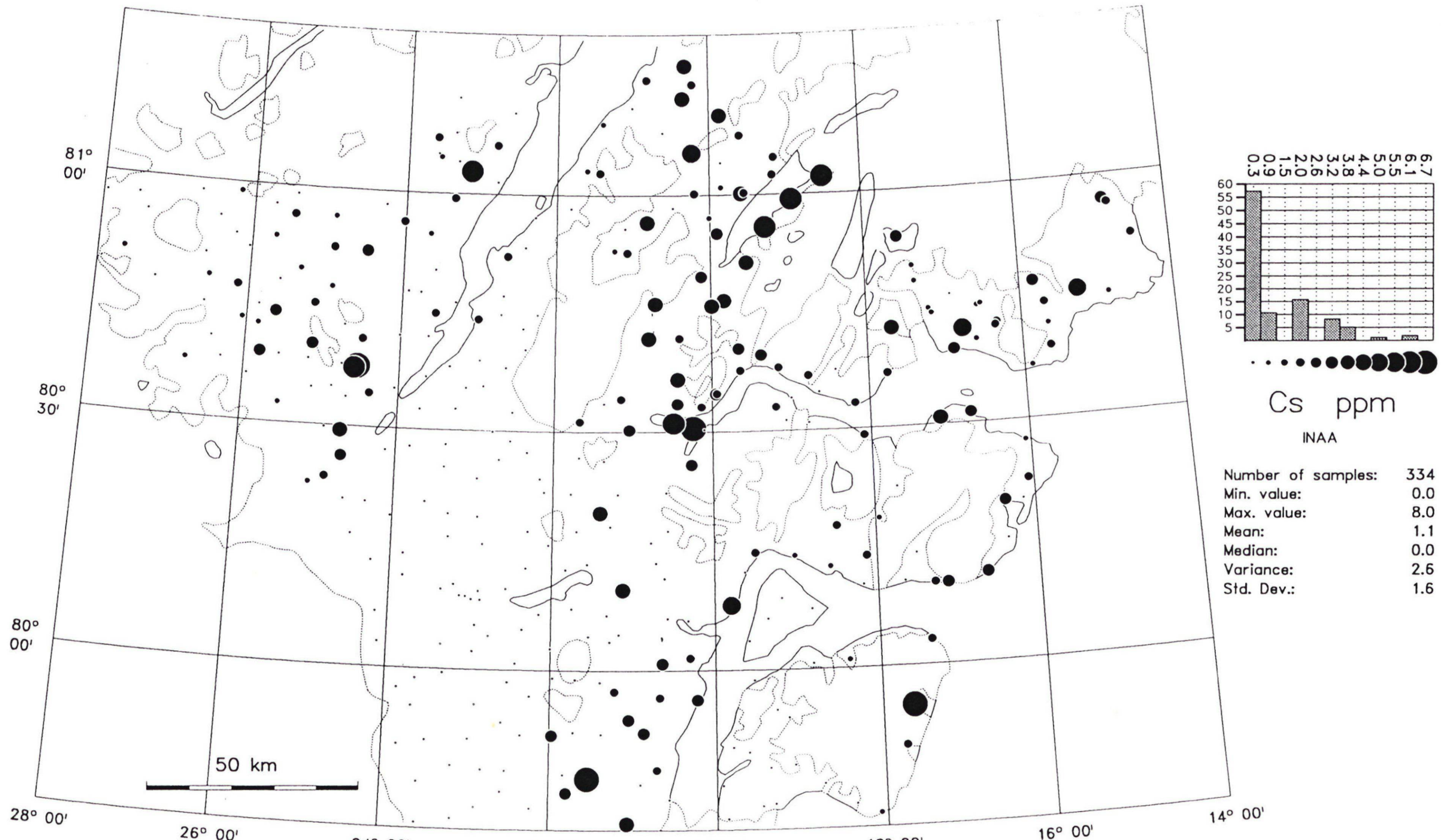


Fig. 17

Grønlands Geologiske Undersøgelse

Cu in stream sediment

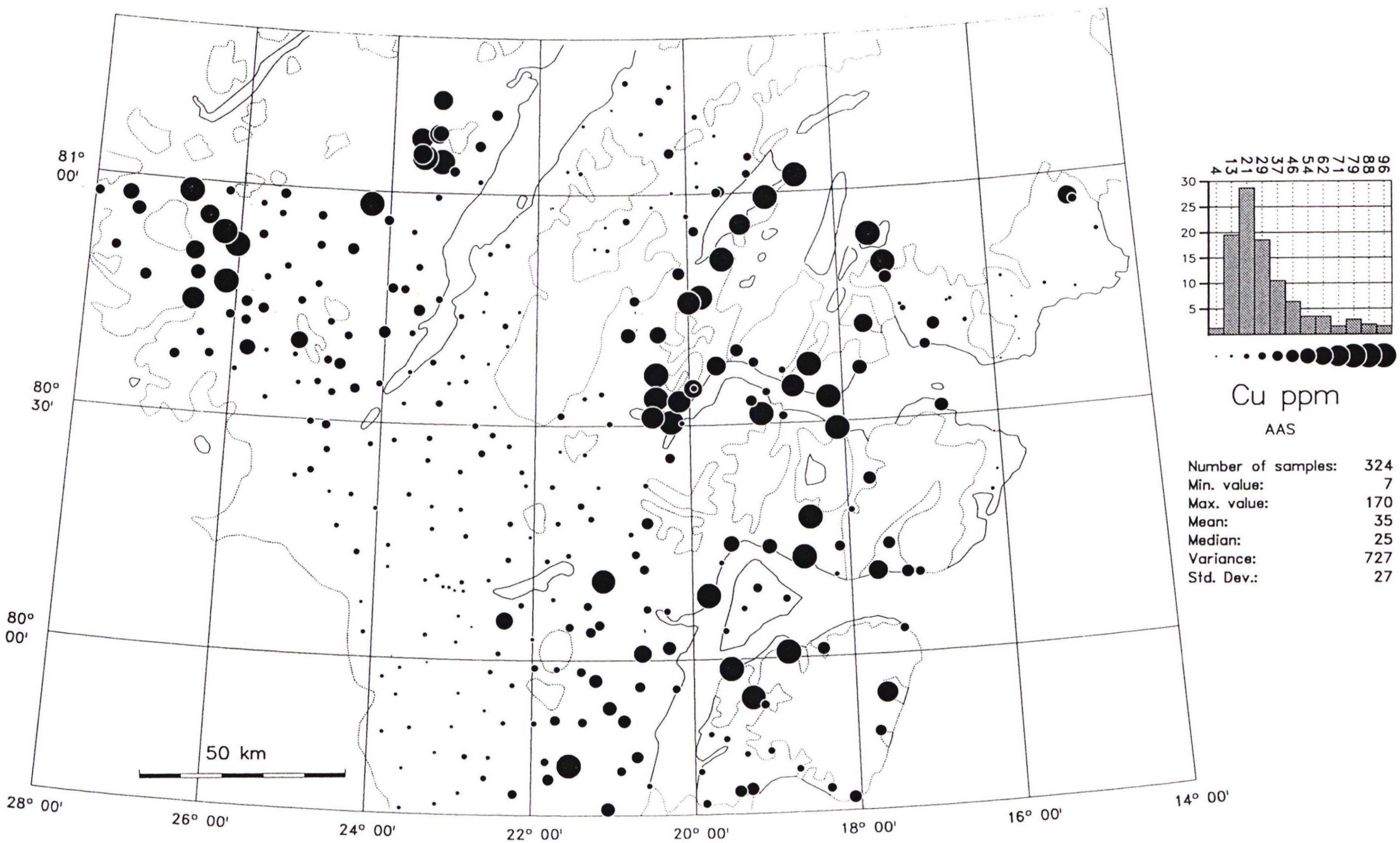


Fig. 18

Grønlands Geologiske Undersøgelse

Hf in stream sediment

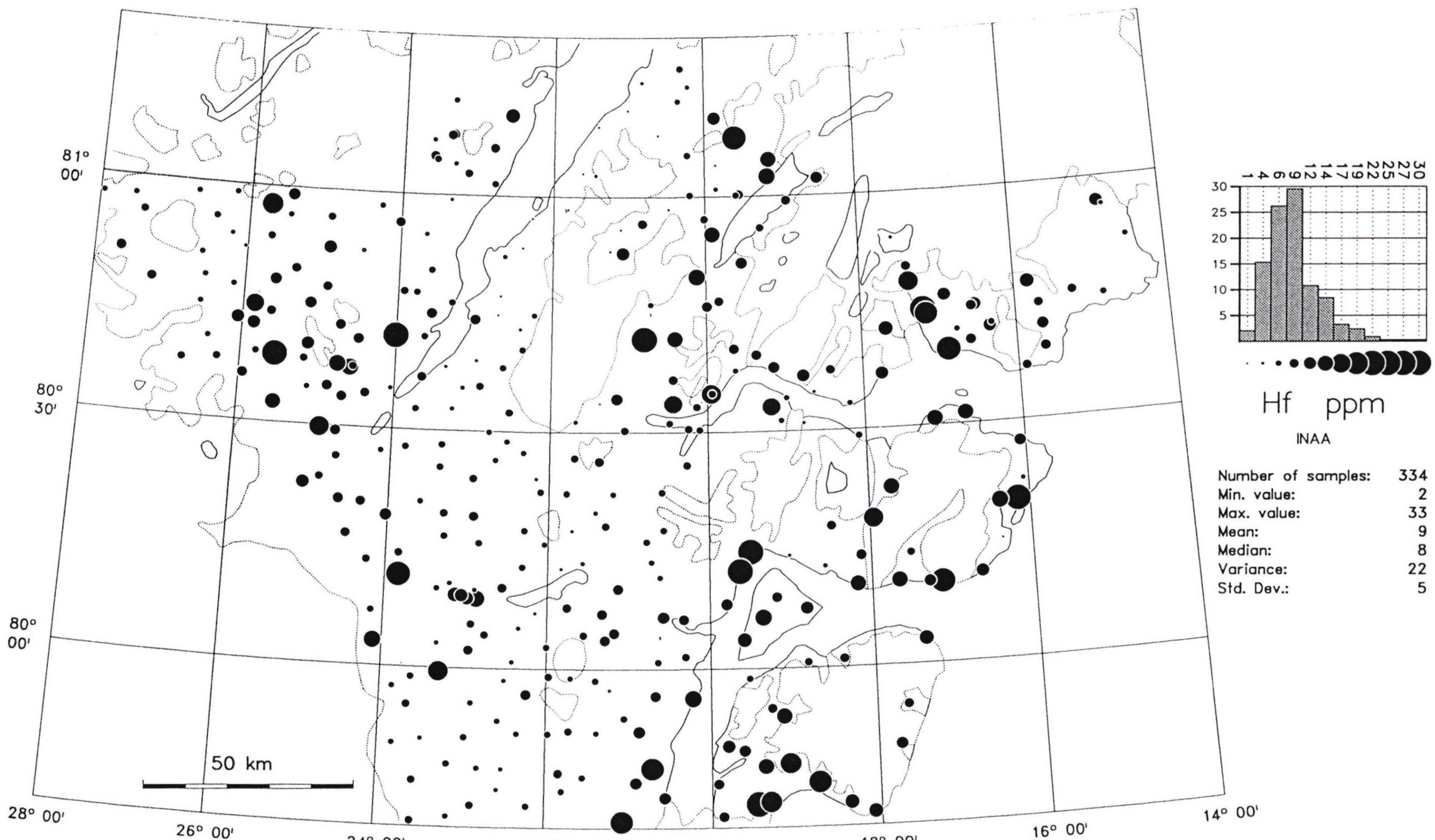


Fig. 19

Grønlands Geologiske Undersøgelse

Ni in stream sediment

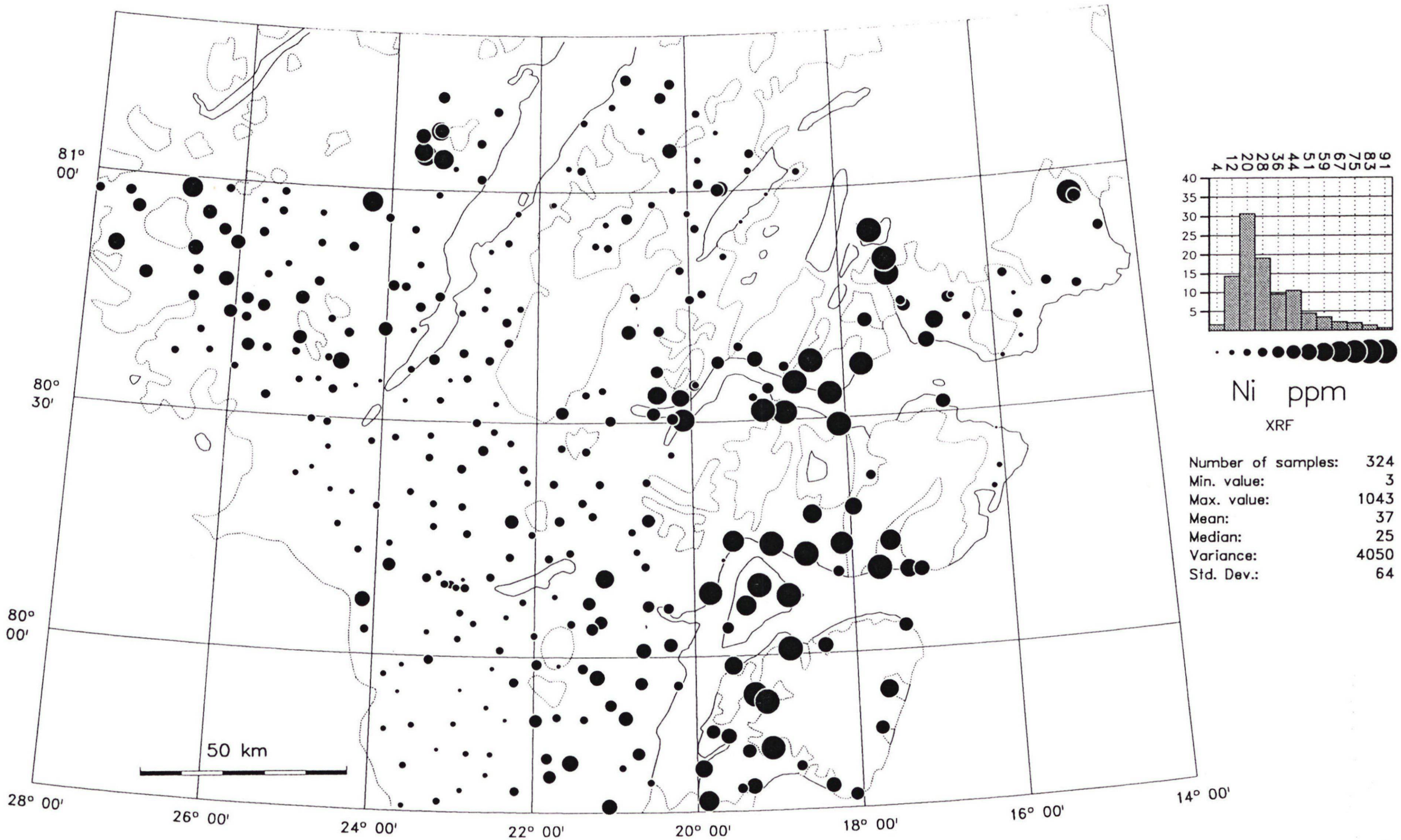


Fig. 20

Grønlands Geologiske Undersøgelse

Pb in stream sediment

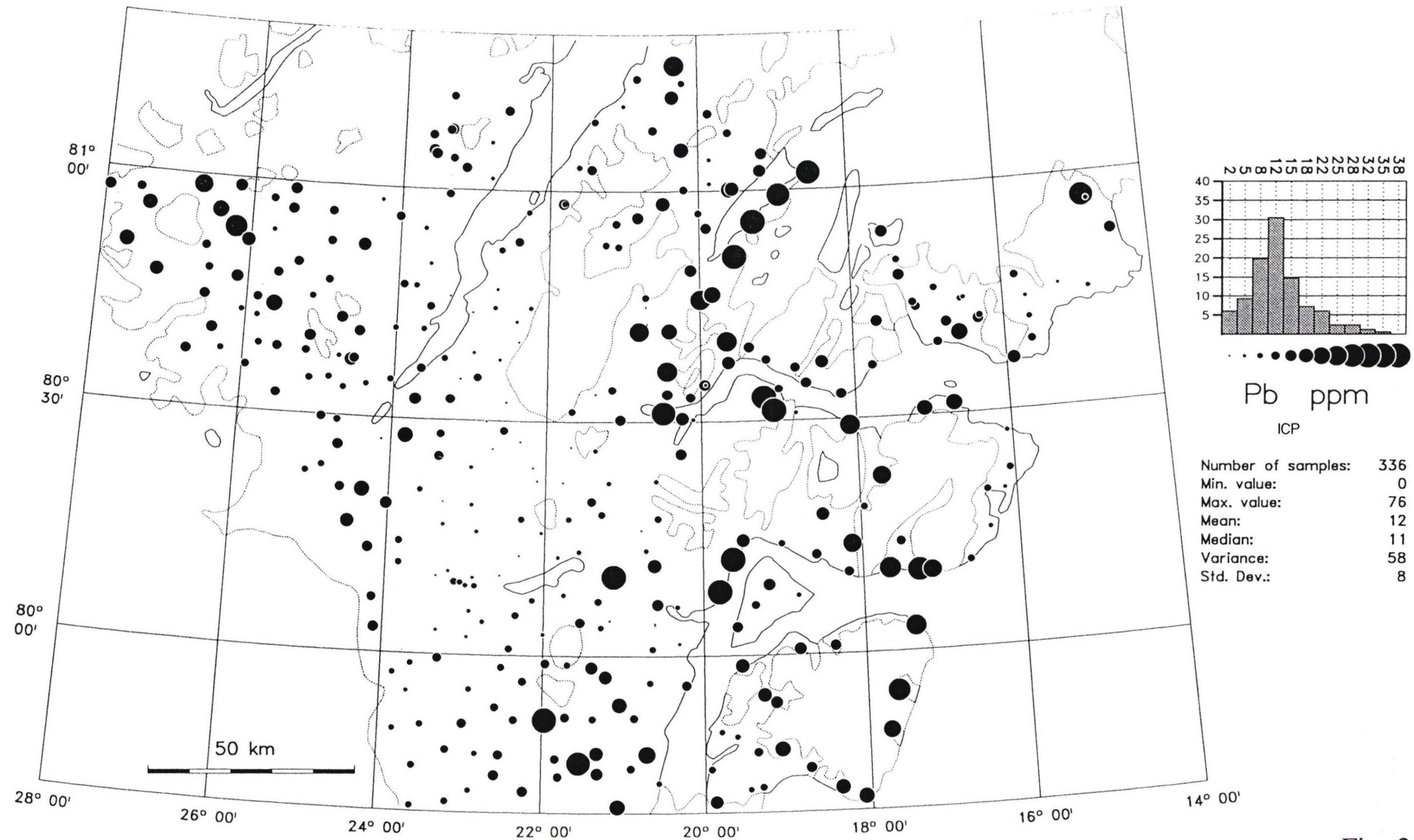


Fig. 21

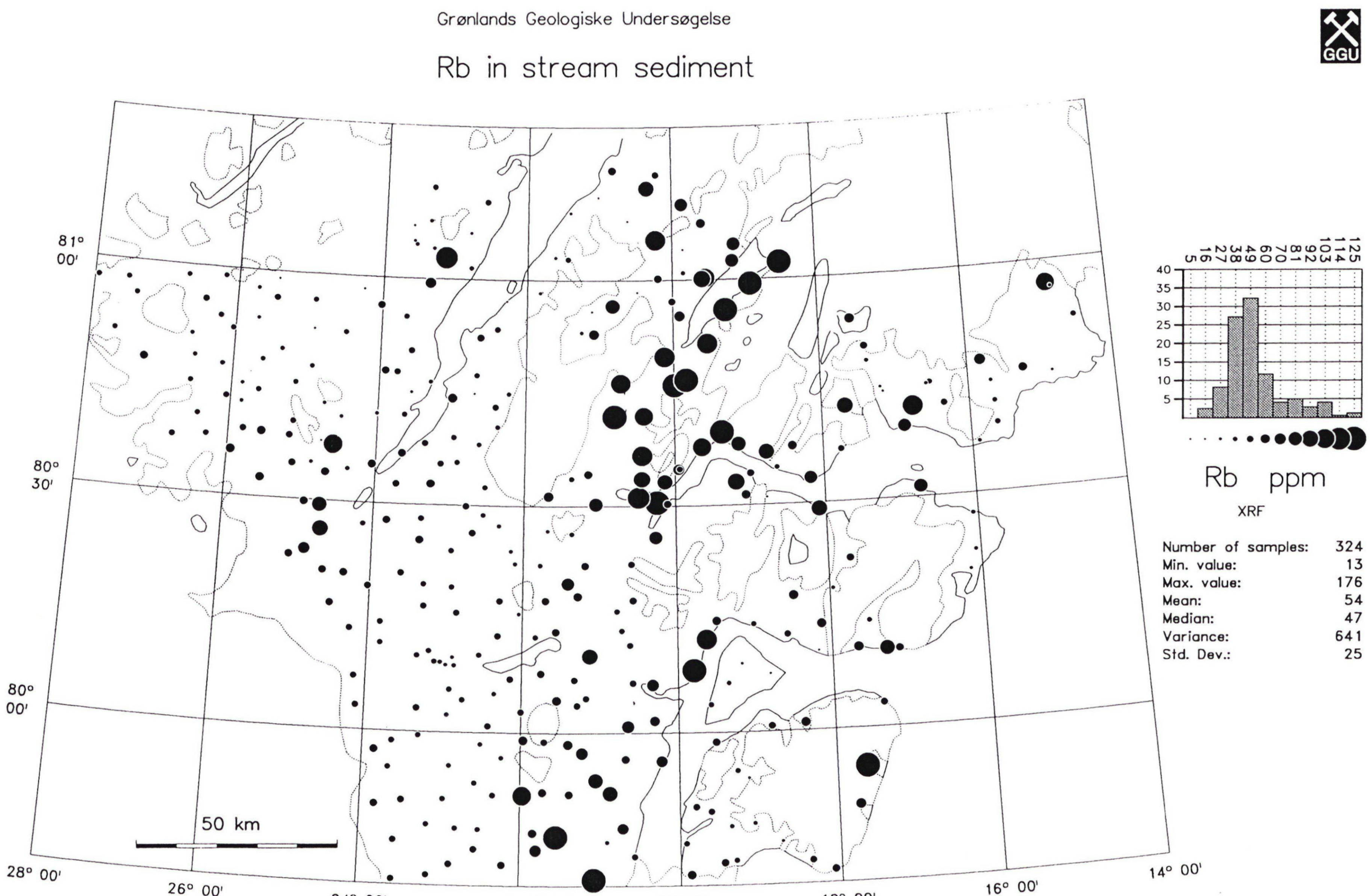

Grønlands Geologiske Undersøgelse
Rb in stream sediment
GGU
81° 00'
80° 30'
80° 00'
28° 00'
26° 00'
24° 00'
22° 00'
20° 00'
18° 00'
16° 00'
14° 00'
50 km
5 16 27 38 49 60 70 81 92 103 114 125
40 35 30 25 20 15 10 5
Rb ppm
XRF
Number of samples: 324
Min. value: 13
Max. value: 176
Mean: 54
Median: 47
Variance: 641
Std. Dev.: 25

Fig. 22

Grønlands Geologiske Undersøgelse

Sb in stream sediment

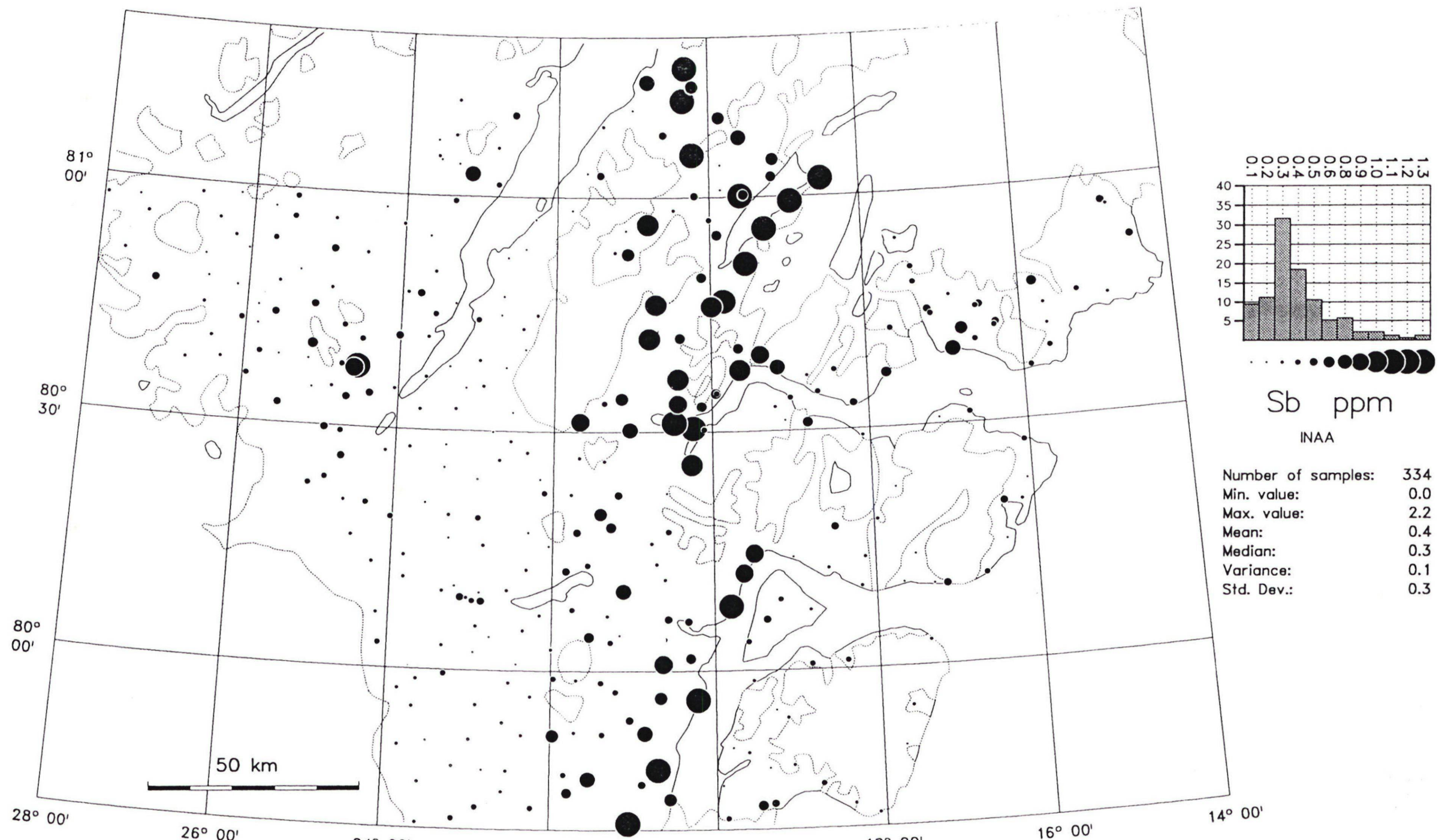


Fig. 23

Grønlands Geologiske Undersøgelse

Sc in stream sediment

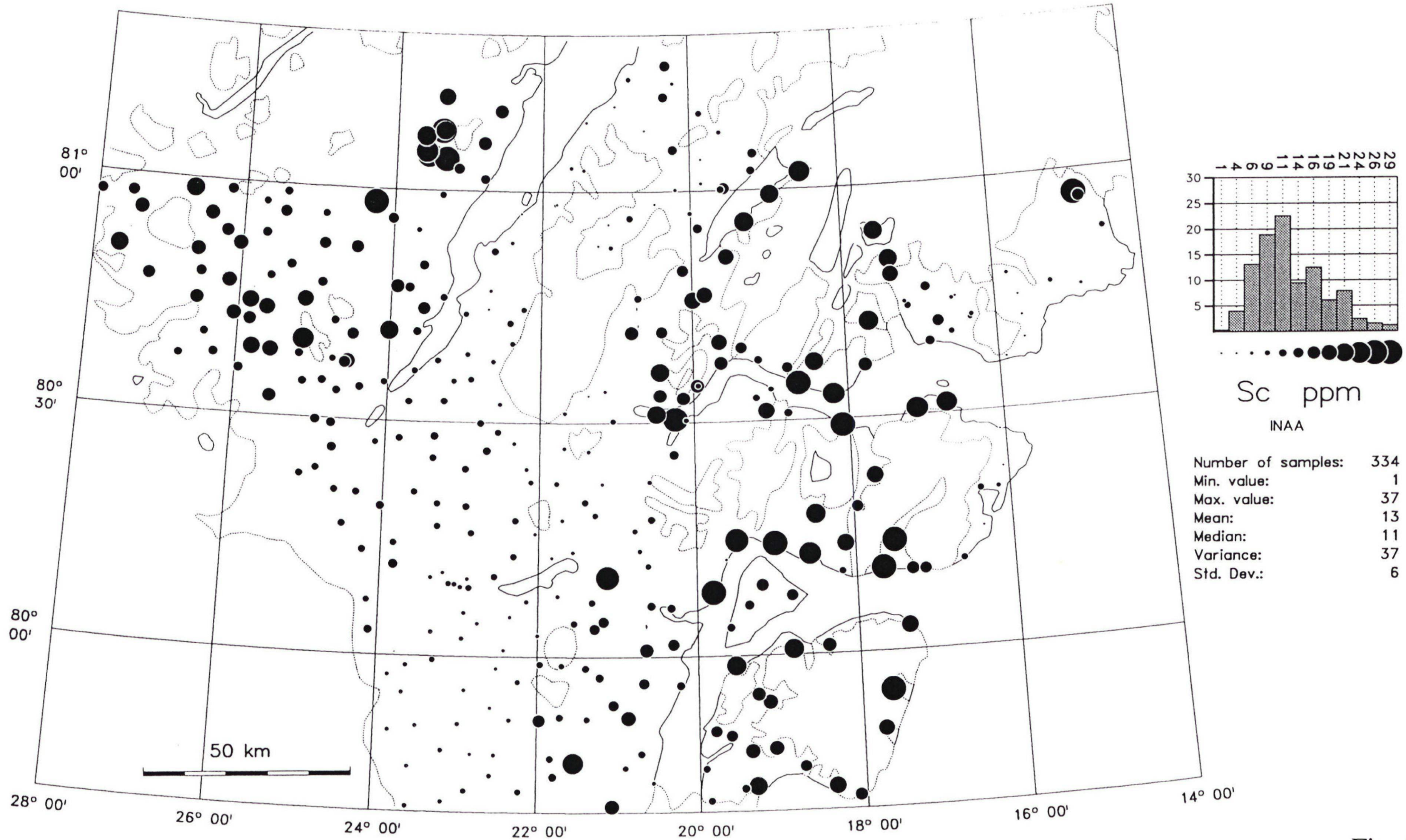


Fig. 24

Grønlands Geologiske Undersøgelse

Sr in stream sediment

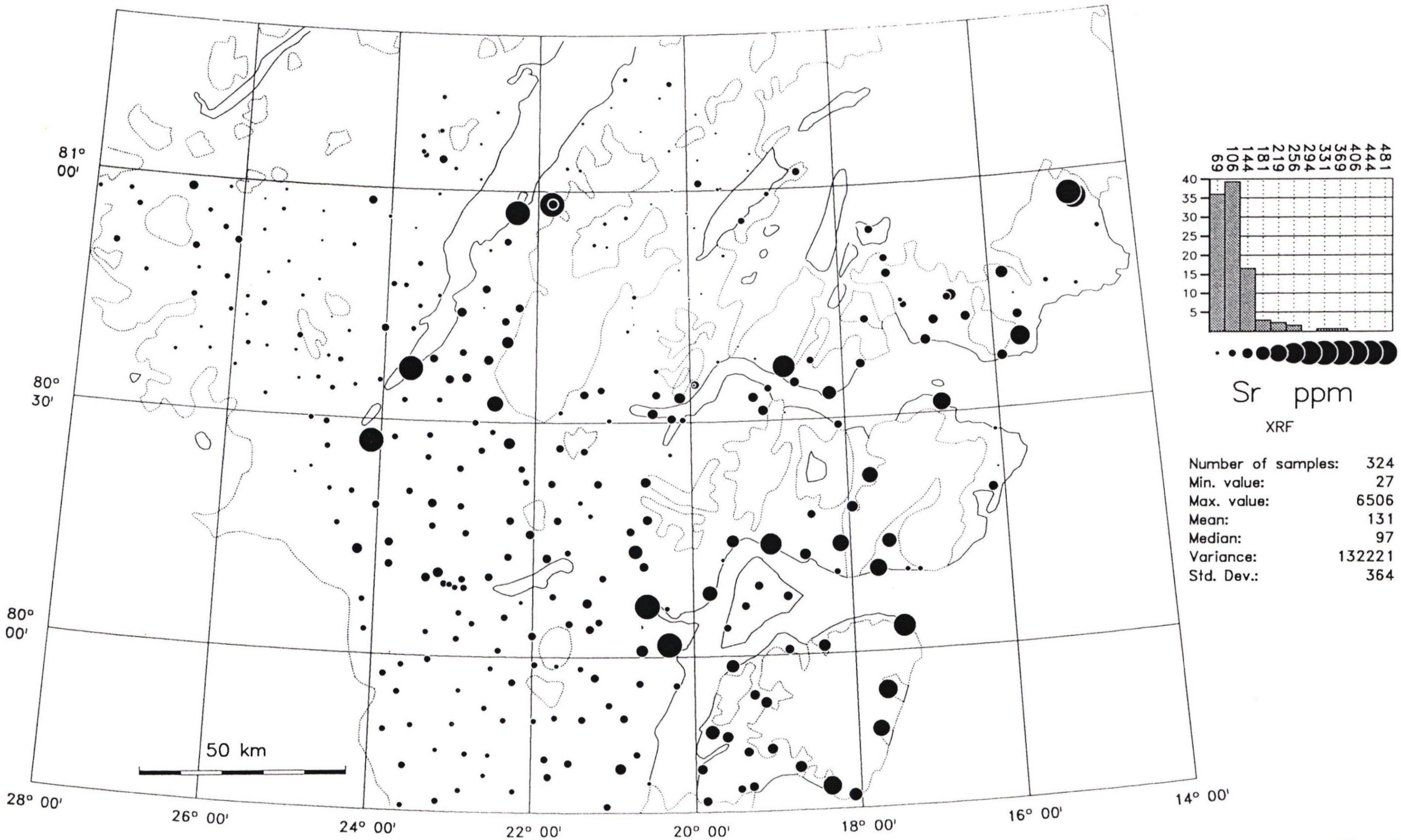


Fig. 25

Grønlands Geologiske Undersøgelse

Th in stream sediment

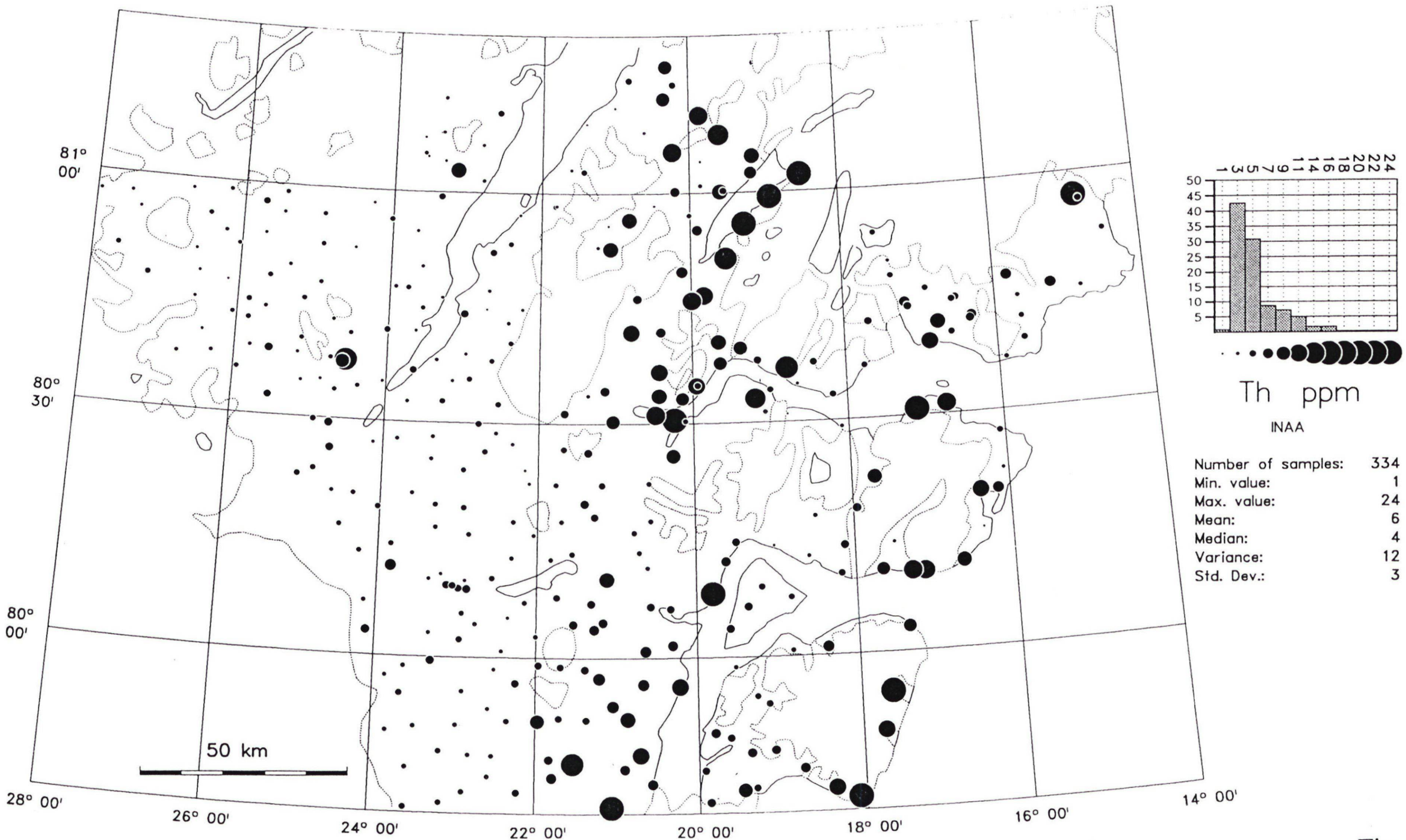


Fig. 26

Grønlands Geologiske Undersøgelse

U in stream sediment

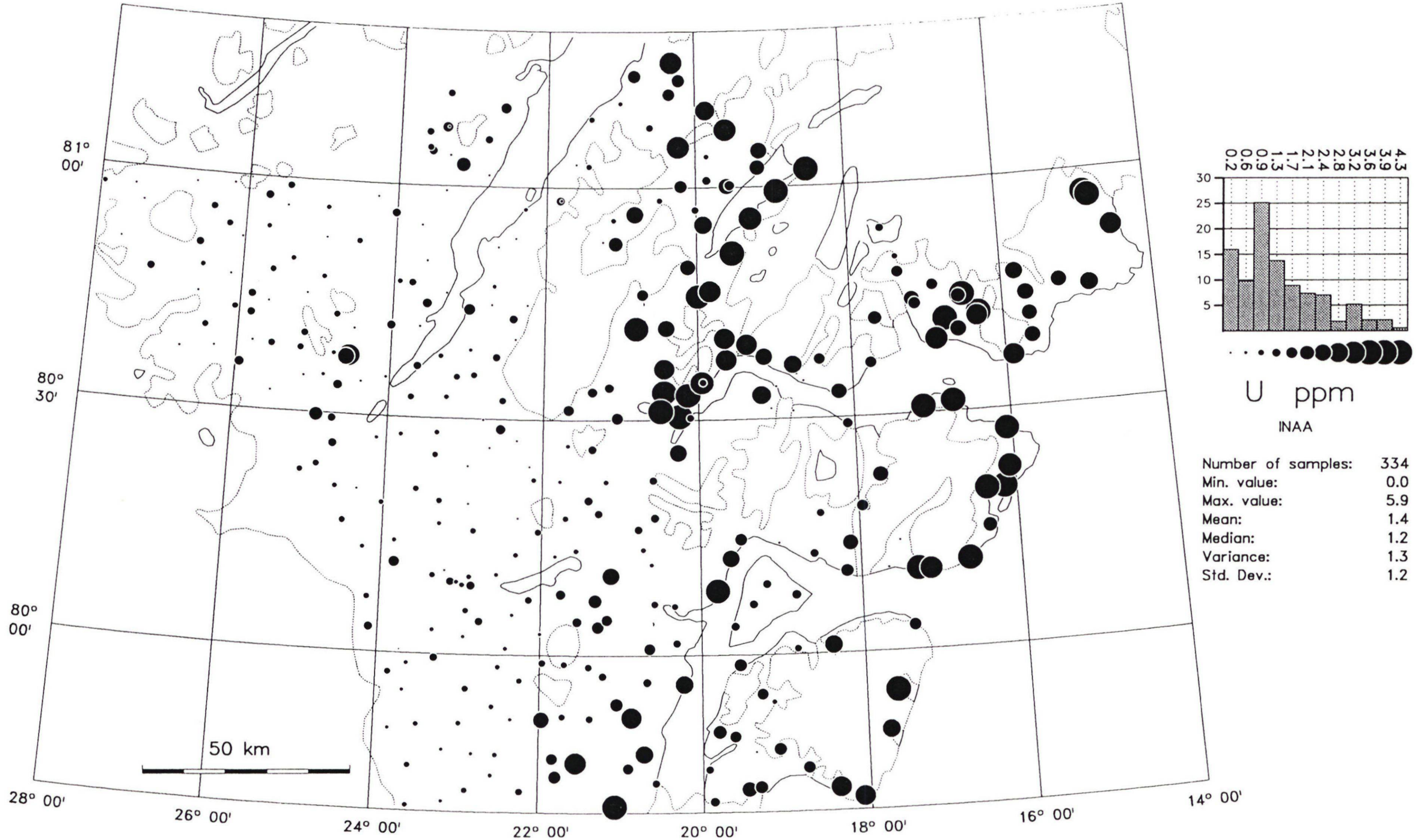


Fig. 27

Grønlands Geologiske Undersøgelse

V in stream sediment

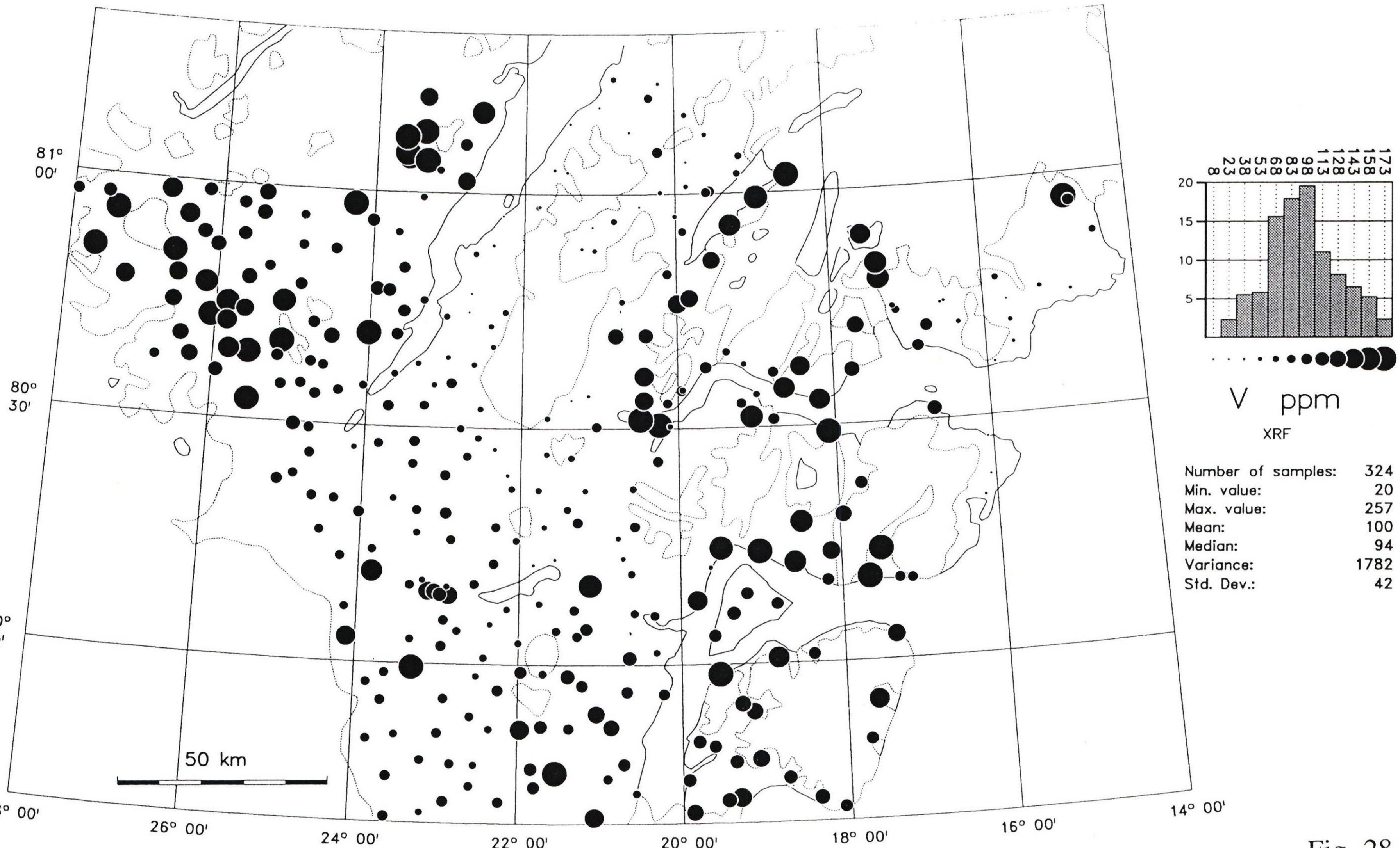


Fig. 28

Grønlands Geologiske Undersøgelse

Y in stream sediment

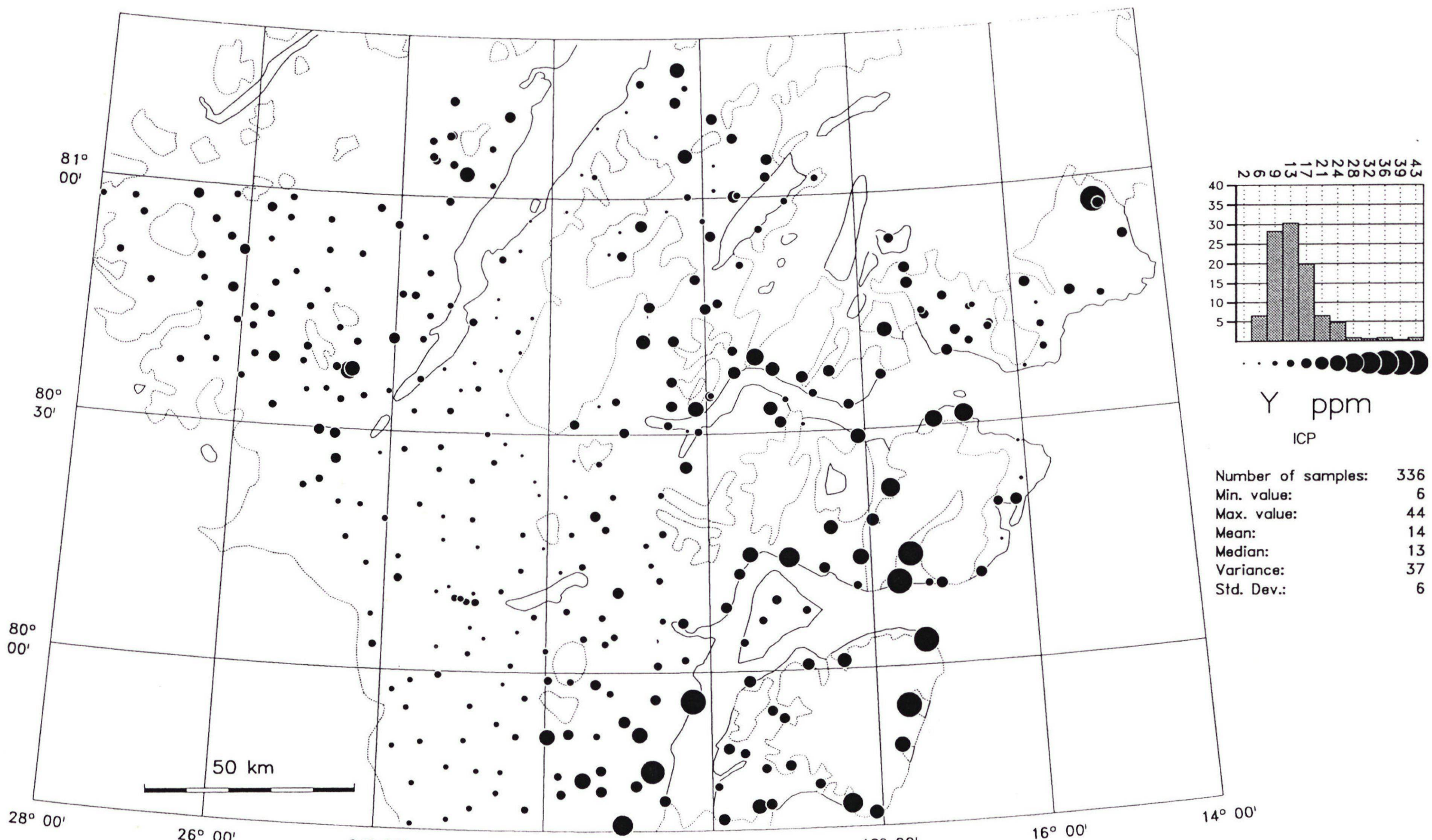


Fig. 29

Grønlands Geologiske Undersøgelse

Zn in stream sediment

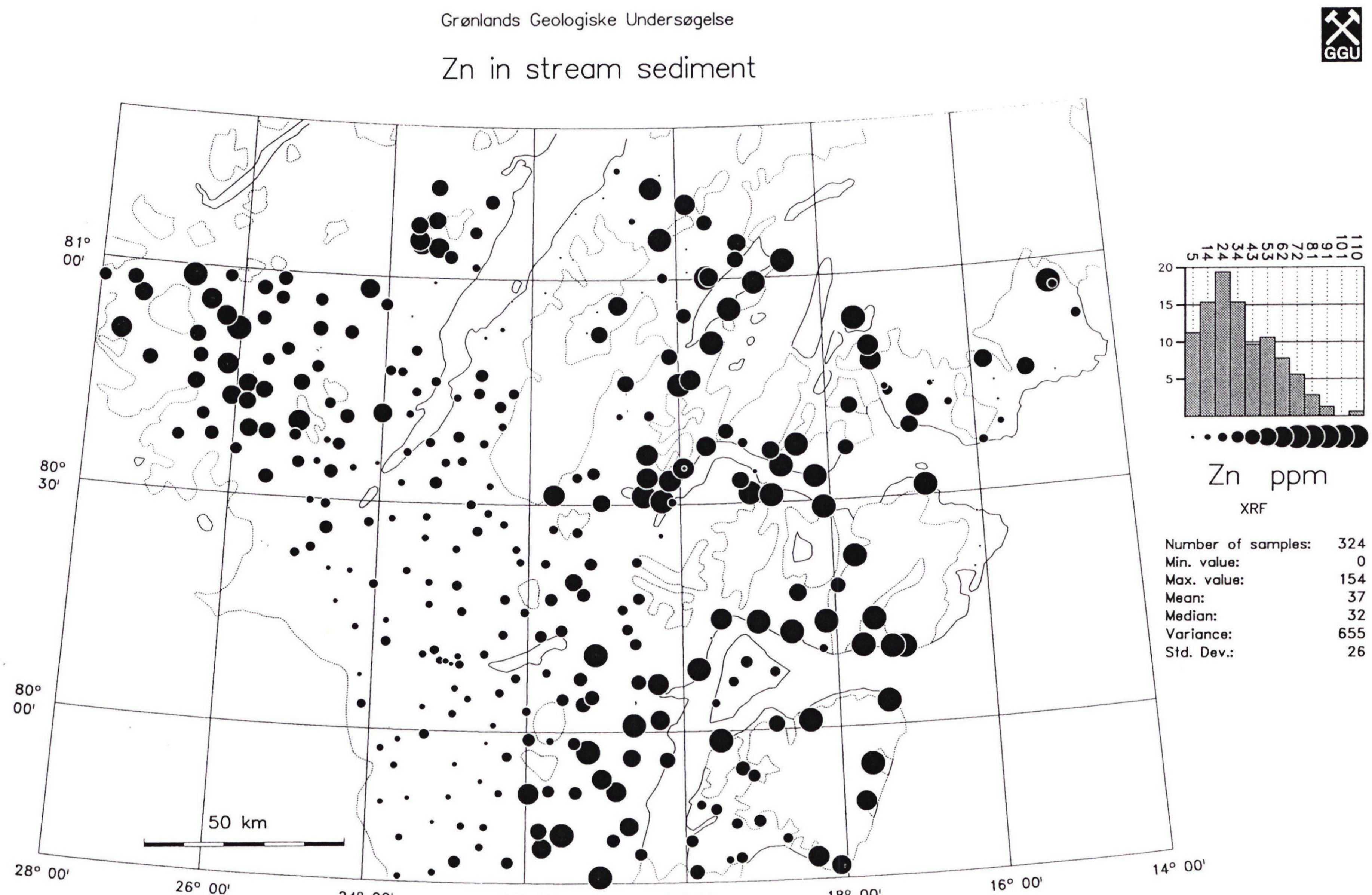


Fig. 30

Grønlands Geologiske Undersøgelse

La in stream sediment

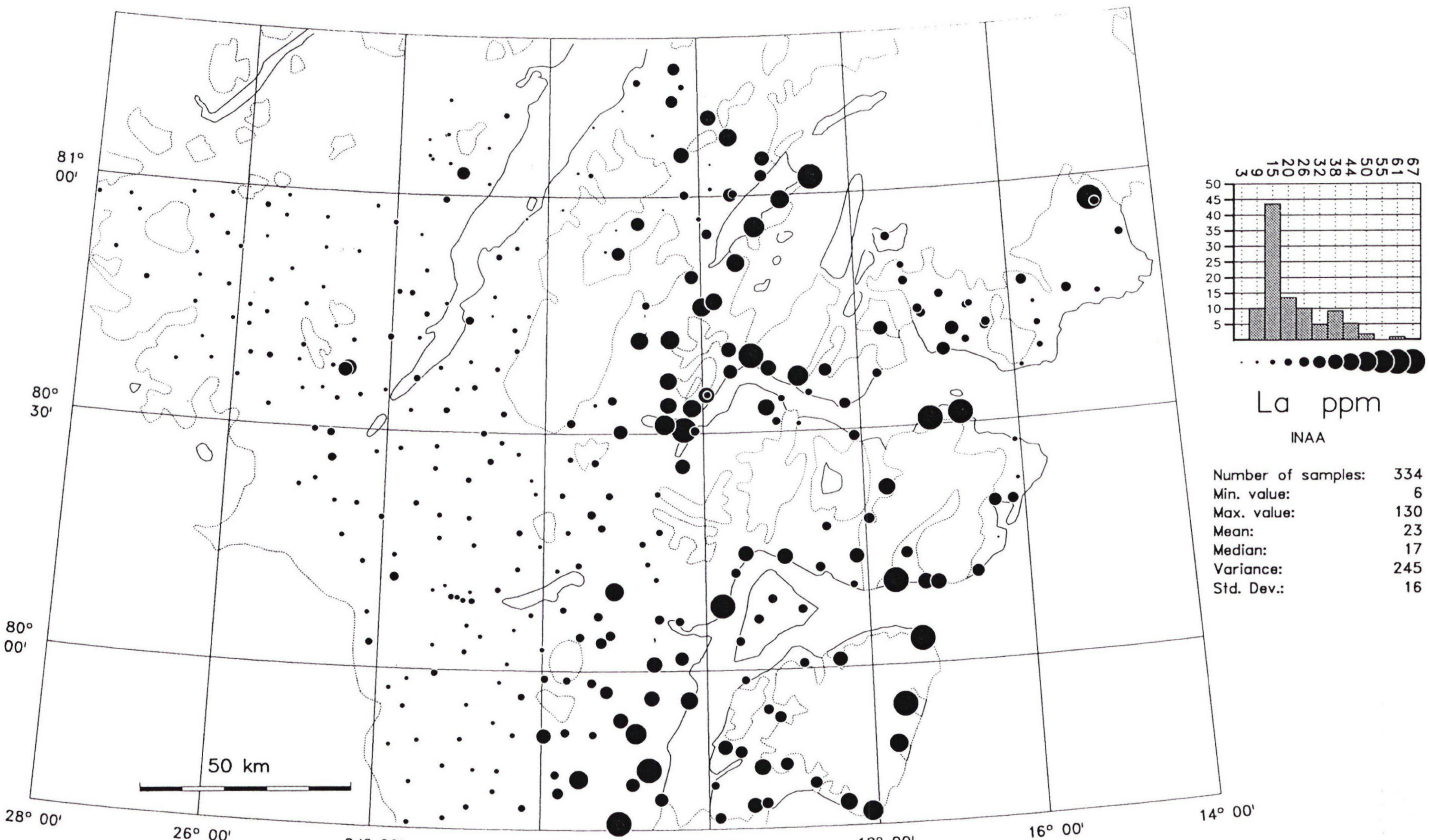


Fig. 31

Grønlands Geologiske Undersøgelse

Ce in stream sediment

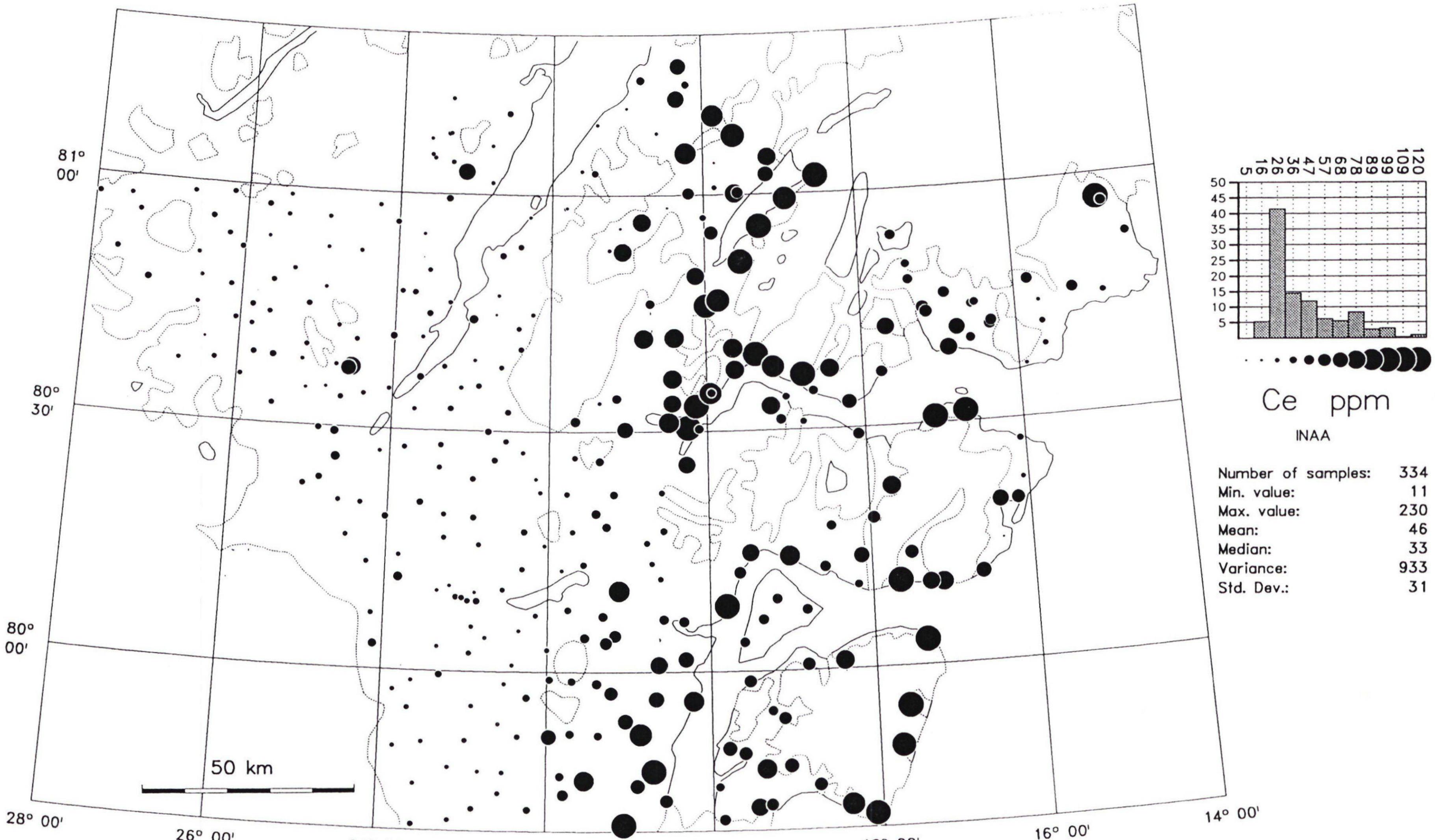
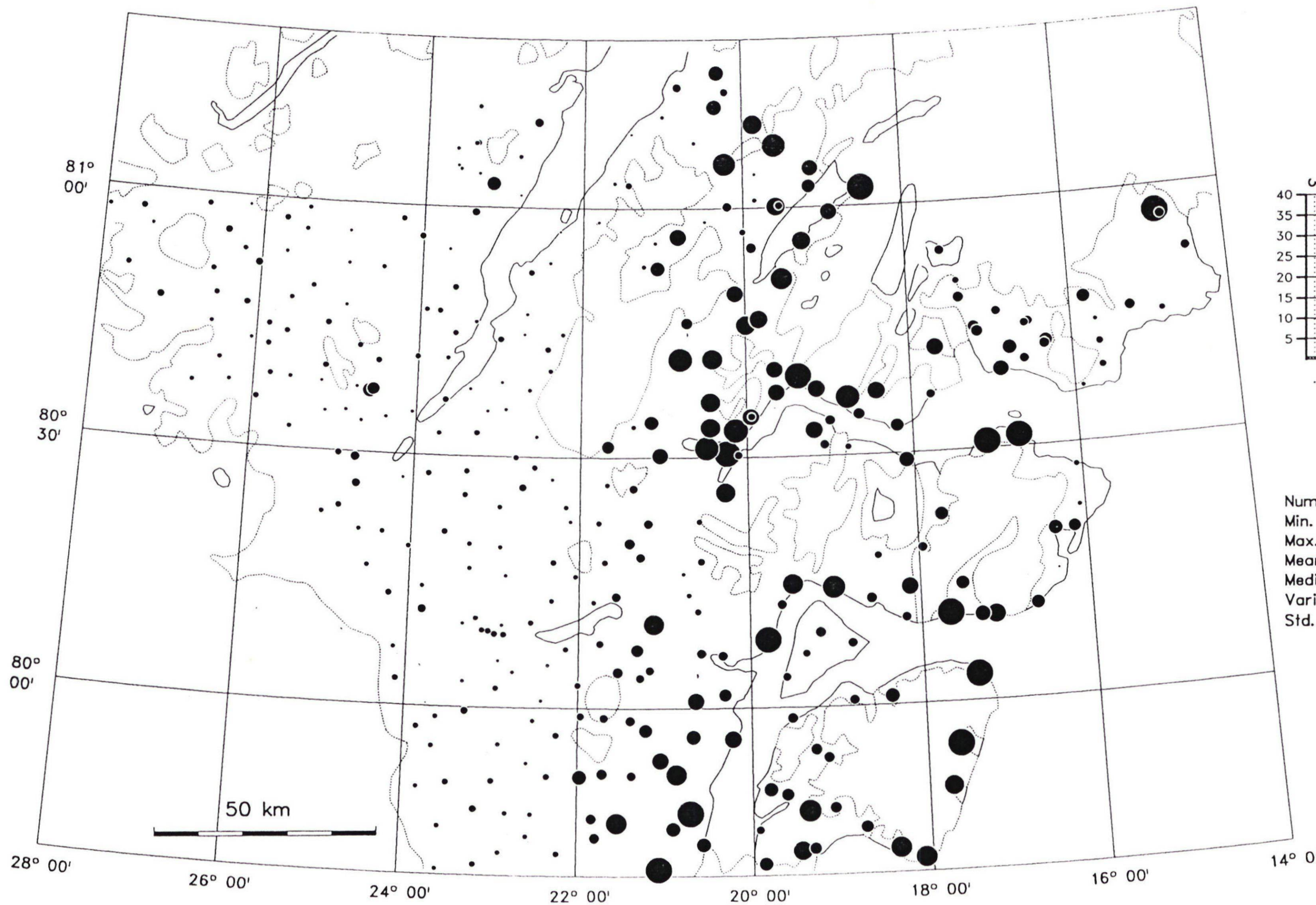
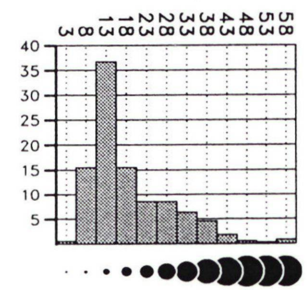


Fig. 32

Grønlands Geologiske Undersøgelse

Nd in stream sediment





Nd ppm

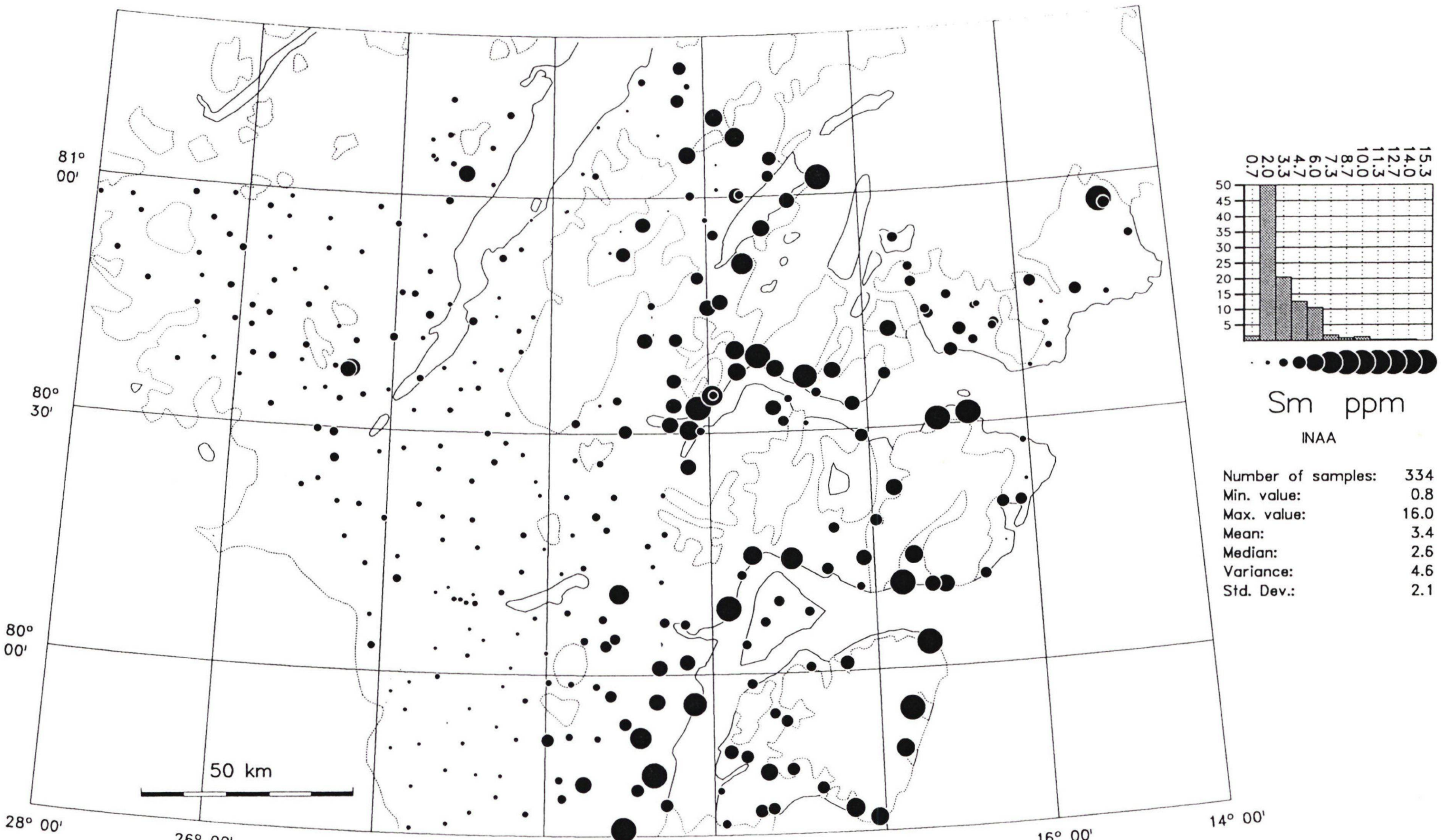
INAA

Number of samples:	334
Min. value:	0
Max. value:	96
Mean:	19
Median:	14
Variance:	152
Std. Dev.:	12

Fig. 33

Grønlands Geologiske Undersøgelse

Sm in stream sediment



Number of samples:	334
Min. value:	0.8
Max. value:	16.0
Mean:	3.4
Median:	2.6
Variance:	4.6
Std. Dev.:	2.1

Fig. 34

Grønlands Geologiske Undersøgelse

Eu in stream sediment

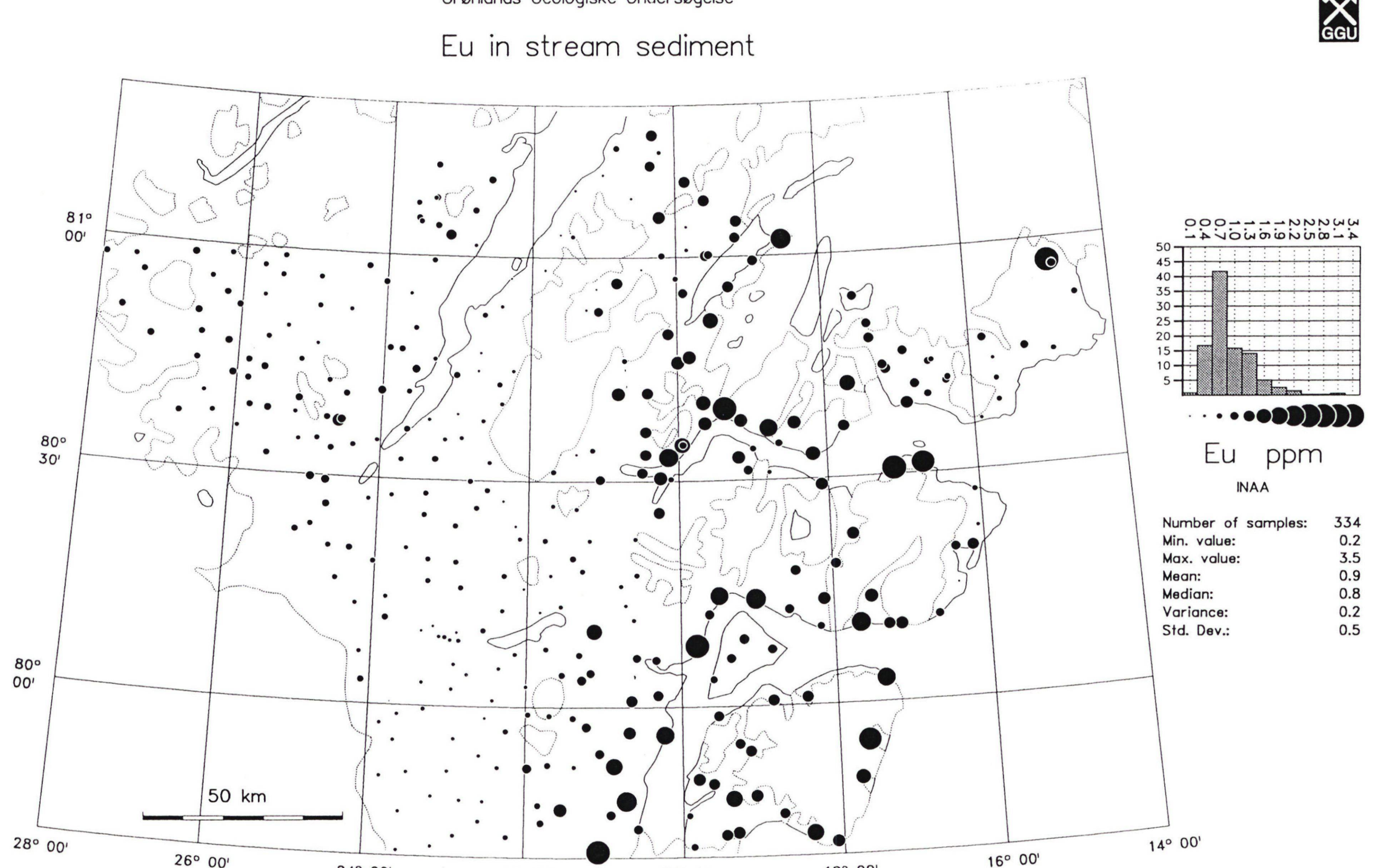


Fig. 35

Grønlands Geologiske Undersøgelse

Tb in stream sediment

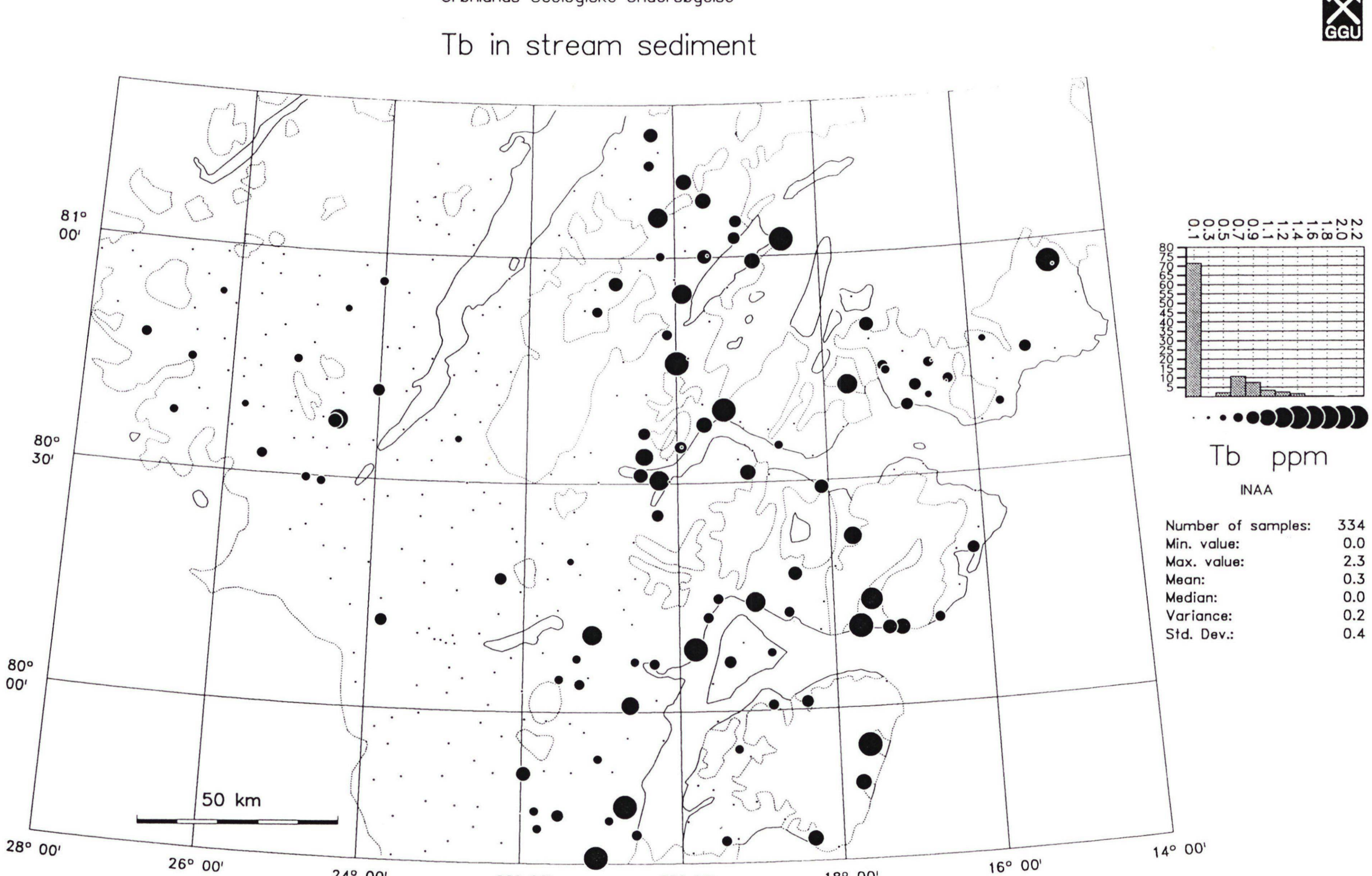


Fig. 36

Grønlands Geologiske Undersøgelse

Yb in stream sediment

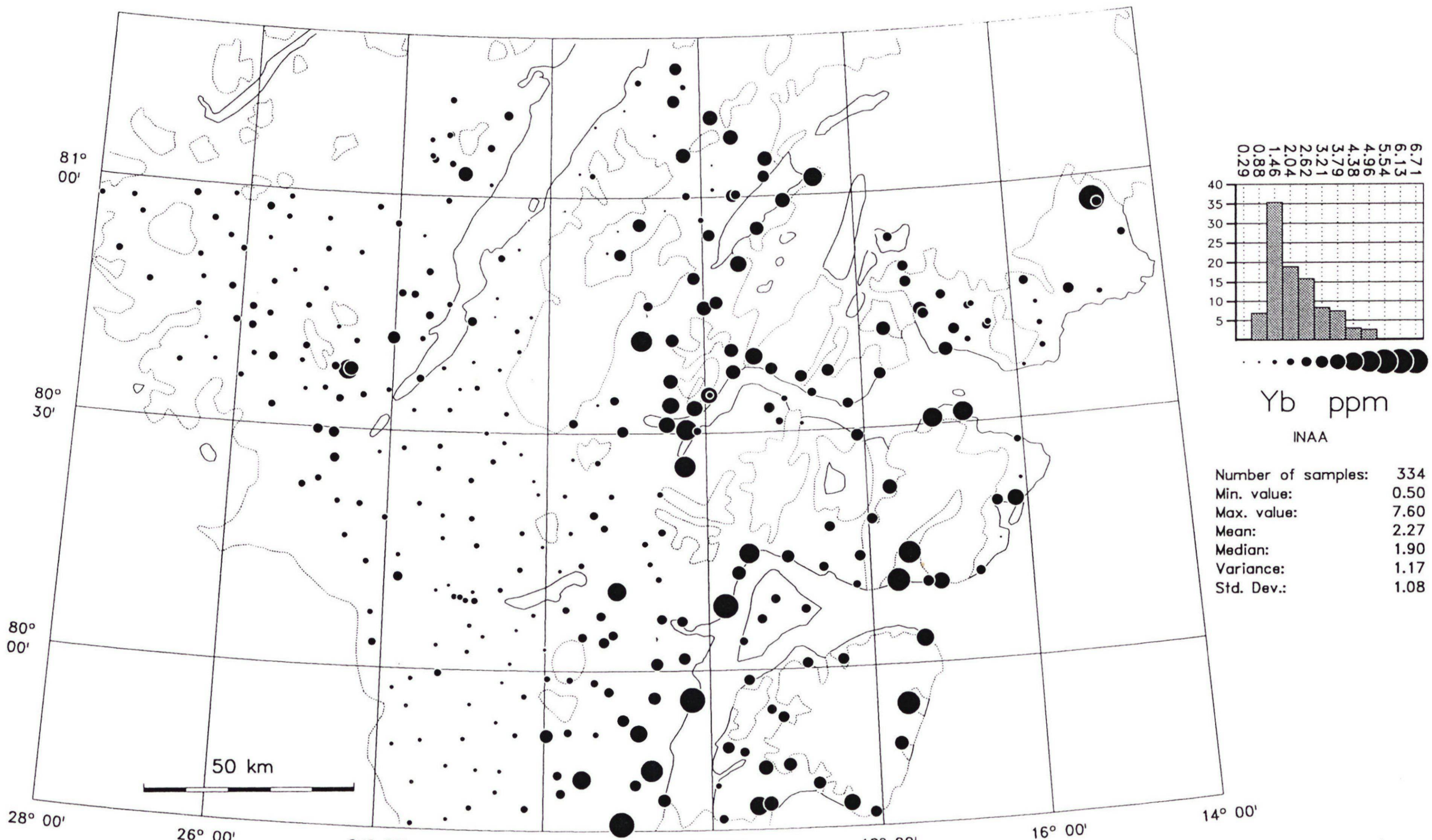


Fig. 37

Grønlands Geologiske Undersøgelse

Lu in stream sediment

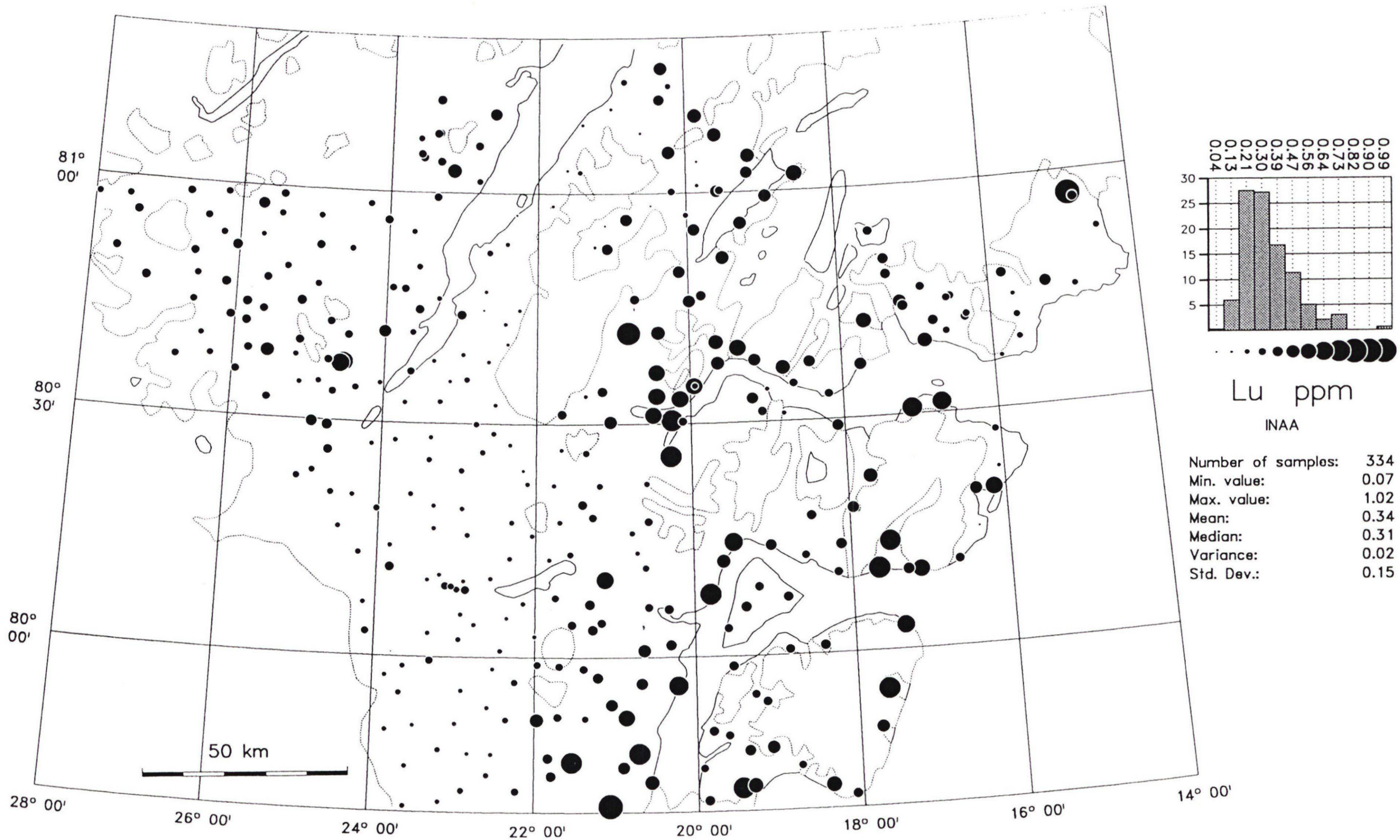


Fig. 38

Grønlands Geologiske Undersøgelse

Total radiation

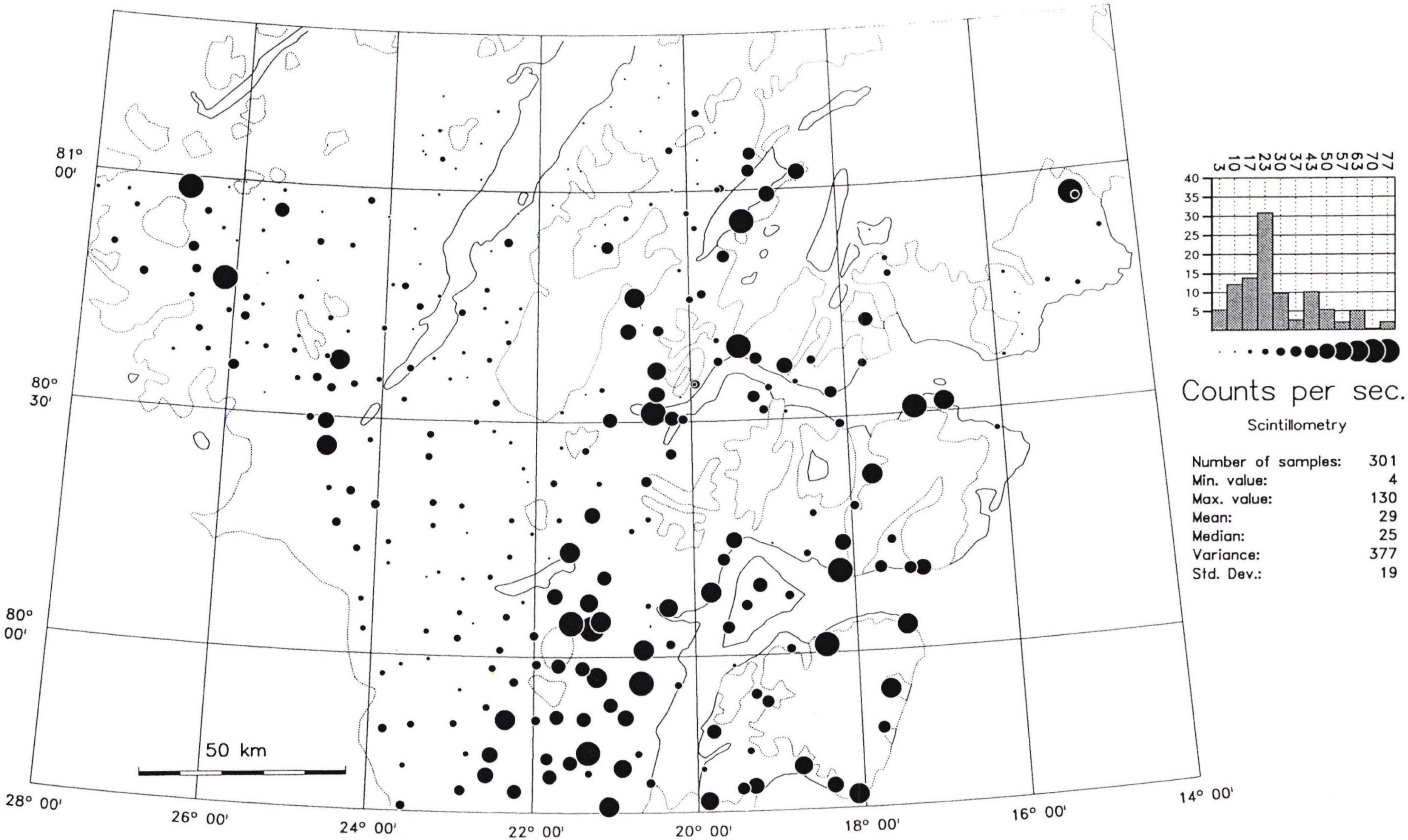


Fig. 39

Grønlands Geologiske Undersøgelse

Conductivity in stream water

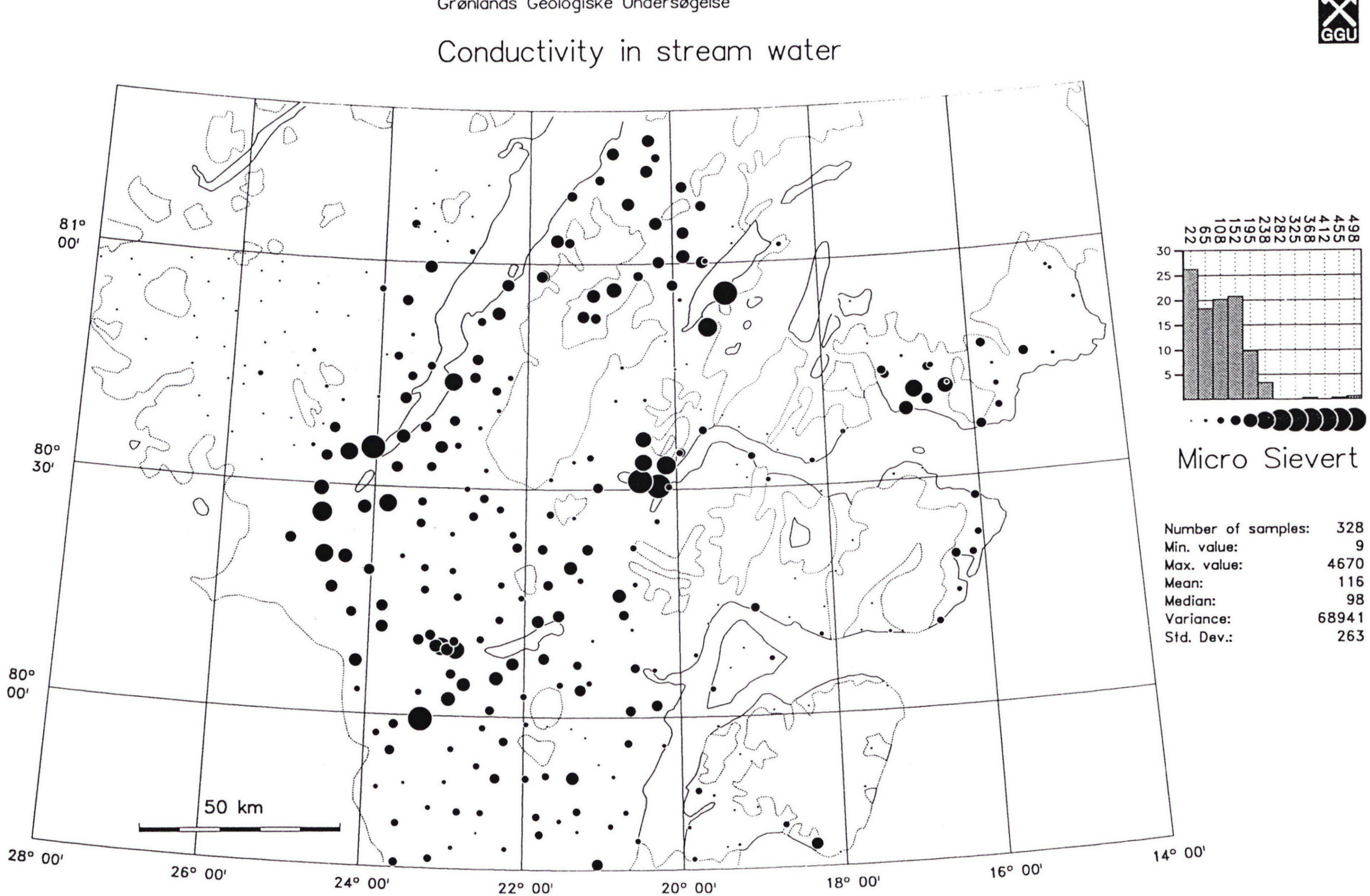


Fig. 40

Grønlands Geologiske Undersøgelse

F in stream water

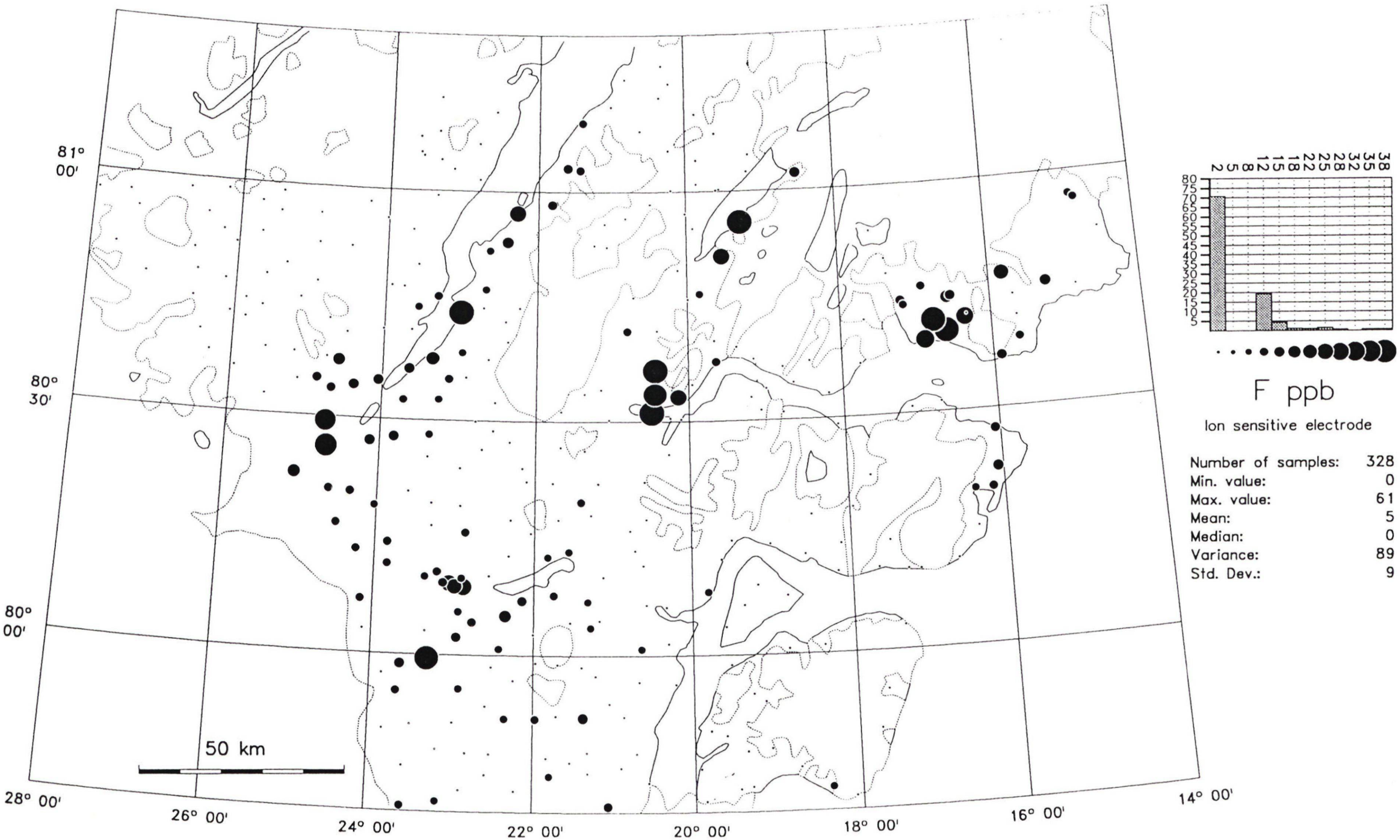


Fig. 41

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