the mineralisation is suspected to occur over an area of *c.* 40 km^2. Only a minor part of this area can be studied as the layers disappear below surface in the southern part of the intrusion (fig. 2).

Exploration throughout 1987 and 1988 concentrated on the exposed parts of the mineralised horizon. The first step was to collect lines of chip samples (5 and 10 m samples). Once located the mineralised horizon was re-sampled at 1/2 to 1 m intervals. The profiles showing the highest concentrations of gold and platinum group metals were also re-sampled from saw-cut channels and cores collected with hand-held drills.

The investigation of the horizon below sea level by diamond drilling (size BQ) of 9 deep holes began in 1989.

Some information has been made public by Platinova, and since 1989, by a joint venture of Platinova and Corona Corporation. At present average gold values of 2–3 g/t have been found in an upper 2–5 m thick layer of the mineralised horizon. Maximum gold contents are between 5 and 6 g/t. Both the thickness and the concentration of gold seem to increase toward the assumed centre of the intrusion, where the mineralised horizon is projected to occur at a depth of several hundred metres. The horizon also contains up to 3.5 g/t palladium and up the 1.5 g/t platinum. In general the ratio Pd/Pt is close to 10/1. A lower layer in the mineralised horizon is dominated by palladium but this appears at present to be less interesting from an economic point of view.

Even though average grades of gold are rather low compared to other underground mineralisations the deposit may have an economic future due to the large tonnage (probably more than 100 million tons) with possibly more than 150 tons of gold.

The future

Following reports in mining magazines the concessionaires intend to drill 12 000 m of core from the unexposed parts of the intrusion in 1990. Although there is still much exploration work to be carried out, a decision on the feasibility of a mining operation may not be more than a few years ahead. The establishment of such a mine would clearly have a major impact on the Greenland economy.

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Geochemistry in GGU

Feiko Kalsbeek

Chemical analyses are essential for many of GGU's activities, especially in the search and evaluation of mineral resources and in the study of rock units. GGU has a well-equipped laboratory for the analysis of rock material, and has a close cooperation with laboratories belonging to the Department of Geology of the University of Copenhagen and the Risø National Laboratory, Denmark. Special analyses that cannot be done in Copenhagen are carried out abroad under contract. Apart from the staff employed at the geochemical laboratory three geologists and one technician at GGU's Department of Geochemistry are engaged with geo-

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chemical investigations of a more general nature: geochemical mapping using stream sediment and water samples, and detailed geochemical investigations of rock units in cooperation with geologists from other departments.

GGU's geochemical laboratory

The laboratory is equipped with a modern Philips PW 1606 multi-channel X-ray fluorescence spectrometer with 27 fixed channels and one scanning channel. With this instrument most major and minor elements and a range of trace elements can be analysed in a wide range of geological materials. The analyses are performed on sodium tetraborate fused glass discs, and sodium therefore has to be determined by atomic absorption spectrophotometry. FeO is determined by titration, and the proportion of volatiles is calculated from the 'loss on ignition'.

With an X-ray spectrometer with fixed channels it is not possible to measure the background radiation associated with the characteristic peak radiation used in the analysis of the various elements. For trace element analysis this is a major problem, and a method has been developed at the laboratory to calculate background values from the count rates measured (i.e. from the peak values). The analysis of trace elements is also performed on the glass discs, simultaneously with the major elements. In this way the difficulties encountered in X-ray analysis of powder tablets are prevented, and because of the very high count rates obtained with a multi-channel instrument the dilution caused by the tetraborate fusion is not a problem.

Geochemical mapping

Geochemical mapping by means of stream sediment and stream water sampled at very low density (1 sample per 30 km^2) is carried out with the purpose of providing 'base line' geochemical information for use in mineral province characterisation and environmental research. The geochemical mapping programme started in 1974 with sampling of a small area in northern East Greenland. Since then the areas shown in fig. 1 have been covered.

Sampling. At each field locality a stream sediment and stream water sample are collected and the gamma-ray activity is measured at the surface (preferably rock exposure; otherwise overburden).

Sample preparation and analysis. Stream sediment samples are dried and sieved and the less than 0.1 mm grain size fractions are submitted to analysis for a large number of major and trace elements. The present analytical routine, which was introduced in 1986, is shown in fig. 2. It is intended to analyse a major proportion of the samples collected before 1986 by the same routine, because they were previously only analysed for a limited number of elements. Stream water samples are analysed at GGU for U and F, and the conductivity of the samples is measured (fig. 2).

Presentation and interpretation. The analytical results are stored in the GGU database from which they are extracted and used for statistical treatment and production of element distribution maps. For each of the sampled areas it is planned to produce a set of so-called 'single element dot plot maps' at the scale of 1:500 000 and 1:1 000 000. In addition various contoured distribution maps for single elements or statistically derived multi-element signatures will be produced for specific interpretation purposes. Examples of the use of re-

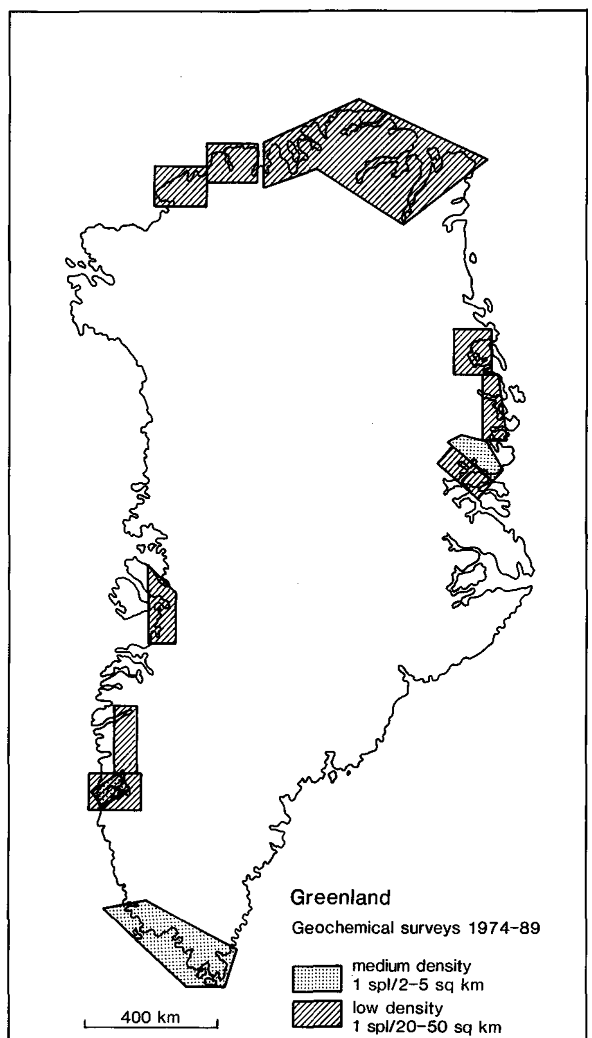

Fig. 1. Areas covered by geochemical surveys, 1974–1989.

	Laboratory	Method	Elements
< 0.1 mm fraction of stream sediment	GGU	X-ray fluorescence	Al, Ba, Ca, Ce, Cr, Cu, Fe, K, La, Mg, Mn, Mo, Na, Nb, Ni, P, Rb, Si, Sn, Sr, Ti, V, Y, Zn, Zr
	External	Instrumental neutron activation	Ag, As, Au, Ba, Br, Cd, Ce, Co, Cr, Cs, Eu, Fe, Hf, Ir, La, Lu, Mo, Na, Ni, Rb, Sb, Sc, Se, Sm, Sn, Ta, Tb, Te, Th, U, W, Y, Zn, Zr
	Risø National Laboratory	Delayed neutron counting	U
Stream water		Laser induced scintillometry	U
		Ion sensitive electrode	F
		'Conductivity meter'	Conductivity

Fig. 2. Outline of the analytical treatment of samples for geochemical mapping.

gional geochemical data have been published, e.g. by Steenfelt (1987).

General geochemical investigations

Only a few of these general studies will be mentioned here.

Tertiary Plateau basalts in East and West Greenland. Large numbers of chemical analyses are needed to study the stratigraphy of these basalt provinces, and to unravel their volcanic history. A detailed study of the basalts in the Scoresby Sund region in East Greenland has recently been published (Larsen *et al.*, 1989), and the investigations are being continued into more southerly areas. Similar studies are being carried out in West Greenland within the framework of the 'Disko Bugt Project' (see Kalsbeek, 1990), as part of a modern analysis of the West Greenland basin.

Geochemistry of the Motzfeldt Centre in South Greenland. This centre, with its Nb-Ta mineralisation (Tukiainen, 1988; Thomassen, 1989), has been the subject of an integrated project of geological mapping and geochemical, geophysical and ore mineralogical investigations involving several geological institutions in Denmark and abroad. The data are now in the process of being written up for publication. All data are in a data base at GGU.

Regional age dating programme. Radiometric age determinations are important for the study of the Precambrian terraines that occupy more than 75% of the exposed bedrock of Greenland. GGU does not have the facilities to carry out the necessary analyses, but GGU personnel have access to laboratories in Denmark and abroad, and in this way it has been possible to supply mapping teams with valuable chronological information.

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