THE NORWEGIAN SERVICE FOR THE SCIENTIFIC EXPLORATION OF THE SVALBARD AND THE POLAR REGION[1]

(NORGES SVALBARD- OG ISHAVS-UNDERSÖKELSER.)

by

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The *Norges Svalbard- og Ishavs-Undersökelser* was founded by the State in the year 1928. This institution, which belongs to the Board of Trade, in addition to geological, zoological, botanical and geophysical investigations, is in charge of all the official Norwegian topographical and hydrographical surveys of the arctic regions. Prior to that time, such expeditions were sent out through private initiative only, although in latter years large subsidies were generally granted by the State.

Scientific exploration of Svalbard was begun in 1827 by Professor B. M. KEILHAU, of the University of Oslo, who obtained important results from a geological, botanical and historical point of view, but topographical and hydrographical surveys were not included in his itinerary.

After the voyage of KEILHAU, a long period elapsed between the really scientific Norwegian expeditions, alhough practical exploration was actively carried on in arctic seas by enterprising captains of Norwegian sealing vessels, from Greenland in the West to Novaja Zemlia and the Kara Sea in the East. Numbers of these old captains and winter sojourners were interested in and qualified for making geographical observations and have contributed largely to the knowledge of the arctic regions. To these sources may be attributed the discovery of King Charles Land (1853), the first circumnavigation of West Spitsbergen and North East Land (1863), the first circumnavigation of Novaja Zemlia (1870) and the exploration of the Kara Sea in the year 1870, and also the discovery of White Island (known through the tragic death of ANDRÉE) (1876), Solitude Island (1878) and Victoria Island (1898).

The year 1906 marks a new era in Norwegian arctic exploration. At this time Norwegian cartographic surveys of Svalbard and the neighbouring seas were begun. From 1906 expeditions have been sent to Svalbard every year, with the exception of the years 1926 and 1927, and since 1929 to Est Greenland. These expeditions have all been sent out with essentially the same object, viz., topographic and hydrographic surveys, oceanographic observations and geological investigations; they were mostly carried out under the direction of the well-known explorer of Svalbard, Adolf HOEL, Professor of Geology at the University of Oslo, who is the present Director of the *Norges Svalbard- og Ishavs-Undersökelser.*

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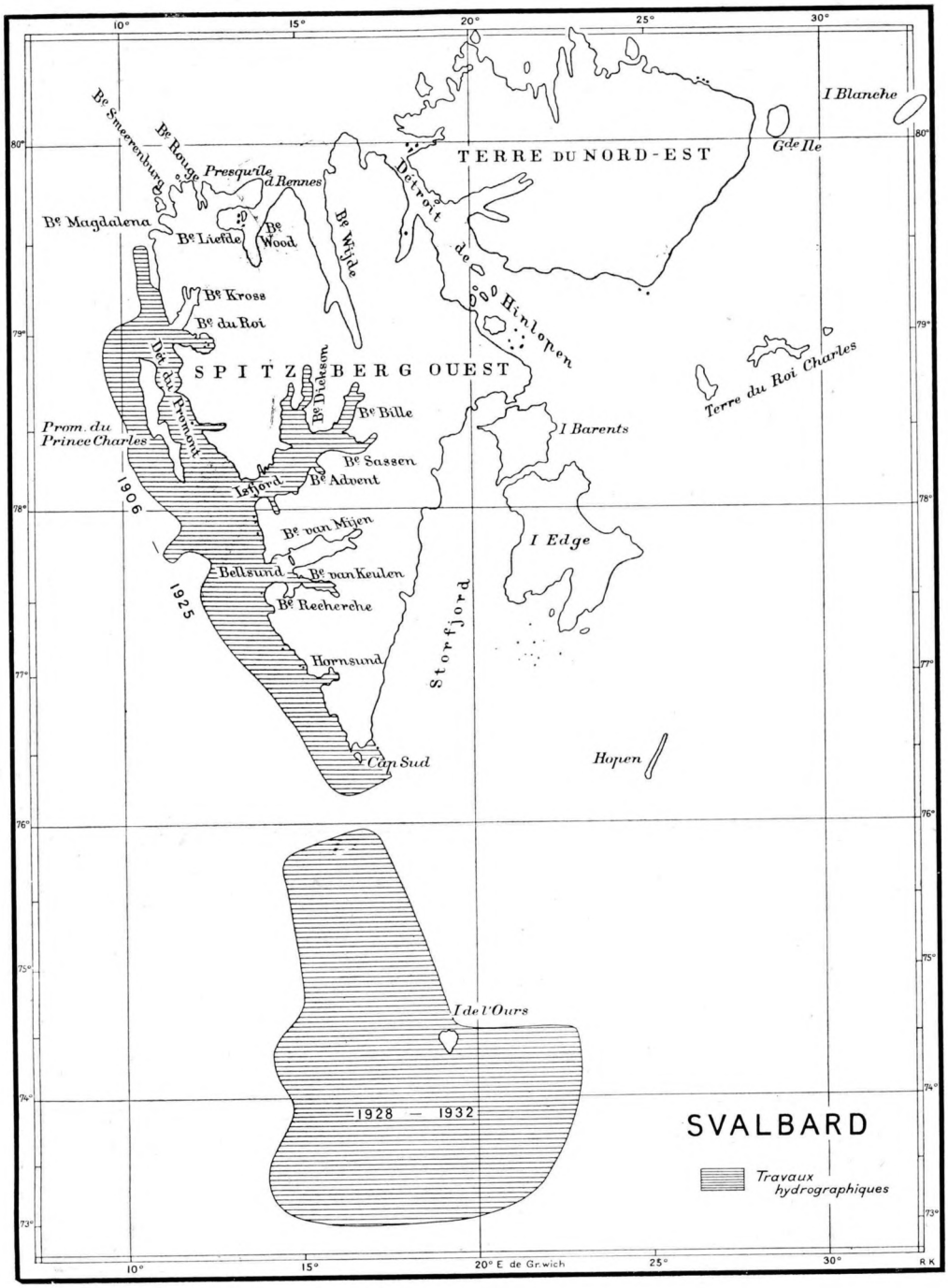
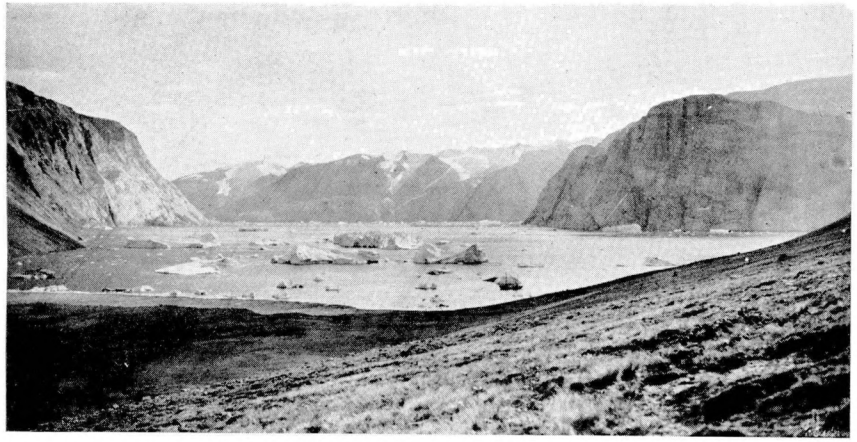
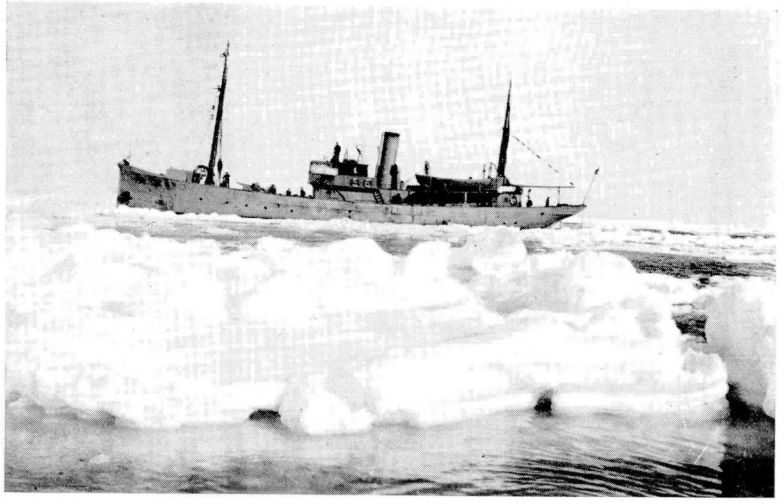
(1) SVALBARD is the Norwegian name given to the group of islands comprising: West Spitsbergen, North-East Land, King Charles Land, Edge Island, White Island, Hope Island and Bear Island.

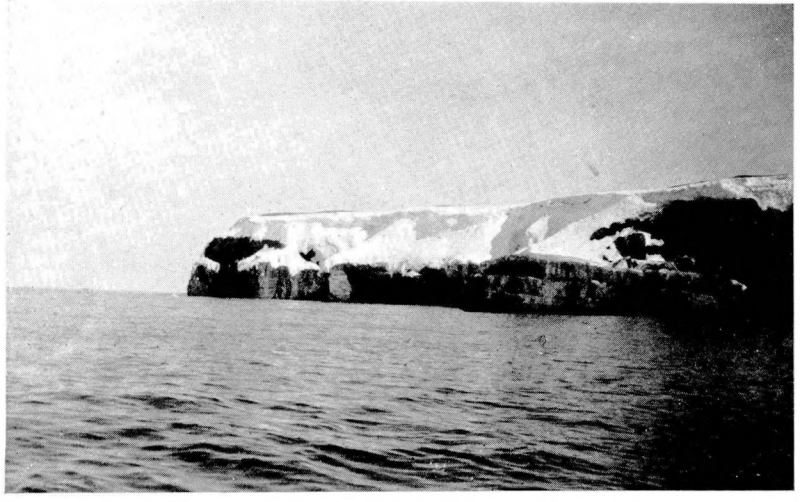

10°
15°
20°
25°
30°
80°
79°
78°
77°
76°
75°
74°
73°
Be Smeerenburg
Be Rouge
Presquile d'Rennes
Be Magdalena
Be Liefde
Be Wood
Be Wijde
Détroit de Hinlopen
TERRE DU NORD-EST
I Blanche
Gde Ile
Be Kross
Be du Roi
SPITZBERG OUEST
Be Dieteson
Be Bille
Prom. du Prince Charles
Be Sassen
Be Advent
Isfjord
1906
I Barents
Terre du Roi Charles
Be van Mijen
I Edge
Bellsund
Be van Keulen
1925
Be Recherche
Hornsund
Storfjord
Cap Sud
Hopen
I de l'Ours
1928 — 1932
SVALBARD
Travaux hydrographiques
10°
15°
20° E de Gr.wich
25°
30°
RK



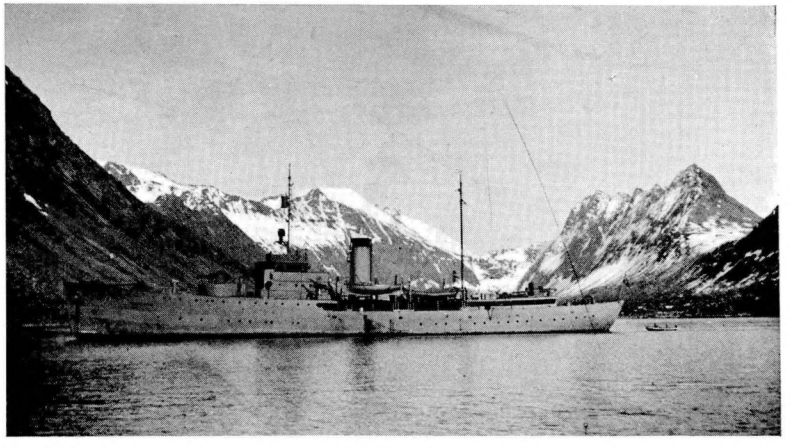
EIRIK RAUDES LAND
Isfjord at the end of Frans Josef's Fjord (in the foreground, the sealer Veslekari*)*
Isfjord au fond du Frans Josef Fjord (au premier plan le phoquier Veslekari*)*



The fish-patrol boat Michael Sars
Le navire garde-pêche Michael Sars



"Flat calm" — North-west coast of Bear Island
"Calme plat" — La côte nord-ouest de l'Ile aux Ours



The fish-patrol boat Fridtjof Nansen
Le navire garde-pêche Fridtjof Nansen

SVALBARD.

With regard to the cartographic surveys of Svalbard and the arctic regions, Norwegian expeditions have not been in a position to follow, under good conditions, a fixed and lengthy itinerary such as those of countries possessing organised cartographic services. As has already been pointed out, the early expeditions after 1906 were equipped and financed by private initiative, and from one year to another it was uncertain whether an expedition would be sent the following year. Without a doubt this fact, when one considers the shortness of the summer season in the arctic regions and the hard climate, must affect all cartographic work carried out in the North. It was found necessary to arrange a programme of work day by day, so to speak.

Our cartographic missions to Svalbard were carried out for each determined area so as to measure a base, make the triangulation and at the same time the detailed topographical surveys, and likewise to determine from the latter the outlines of the coast, which were later used directly by the hydrographer. In this way, the trigonometrical net corresponded to the local system of coordinates. Gradually the local nets along the West coast of West Spitsbergen were linked together and connected with the Russo-Swedish arc of meridian network (1898-1900) on the East coast of West Spitsbergen, and with a few astronomical stations on the West coast. The whole was transformed into a system of coordinates on a conformal cylindrical projection with Longitude 15° E. as the axis of X and Latitude 66° N. as the axis of Y. The international ellipsoid was used.

The cartographic work in Svalbard falls naturally into 5 parts or periods, and covers the West coast of the archipelago (See chart of the Svalbard).

1. PERIOD 1906-1907.

The two first expeditions in 1906-07 were fitted out through the generous support of Prince ALBERT OF MONACO, his yacht *Princesse Alice* and a Norwegian fishing-boat being placed at the disposal of the mission. During each of these years investigations were concentrated at the northern corner of Prince Charles Foreland, the vicinity of King's Bay, Cross Bay and towards the North as far as Smeerenburg and Liefde Bay. The three Norwegian topographers of the mission measured the bases and carried out the triangulation and survey, either by plane-table or by photogrammetry, and the results of the two years' work produced a survey of about 3,520 sq. km., with curves at equal distances of 50 m. on a scale of 1: 100,000. Cross Bay was surveyed by the Frenchman, Lieut. H. BOURRÉE, on board the *Princesse Alice*. Four smaller anchorages were surveyed on a larger scale, partly by M. BOURRÉE and partly by the Norwegians.

2. PERIOD 1909-1910.

After a small geological mission in 1908, the surveys were resumed in 1909. In 1909-10 the personnel consisted of 5 topographers and 2 hydrographers. Improved methods were used, such as the use of invar wire for measuring bases, a phototheodolite, direct depression measurements for coastal

contours. On land, connection was established with the work that had been accomplished during the first period, i.e., from Reindeer Peninsula and Red Bay towards the South along the West coast of Wood Bay, the areas between King's Bay and Ice Fjord eastwards as far as Dickson Bay, followed by the remainder of Prince Charles Foreland. Hydrography was carried out in Foreland (Foul) Sound.

The hydrographers took soundings in several small harbours and anchorages and also carried out considerable oceanographic work in the waters to the North and West of West Spitsbergen and to the South towards Bear Island.

During the years 1909 and 1910 two bases were measured and about 5350 sq. km. were topographically surveyed (scale 1: 200 000). About 1380 sq. km. were covered hydrographically to varying scales.

3. PERIOD 1911-1919.

During these years, a topographical survey was made, by the methods previously employed and by tachometry in addition, and effort being made to obtain greater accuracy. The major part of the peninsula between Ice Fjord and Bell Sound was surveyed and a strip of about 25 km. along the coast from Bell Sound to South Cape. The five topographers participating in these expeditions measured in all three bases and surveyed an area of about 4570 sq. km., mainly on a scale of 1: 50,000. Hydrographic investigations (soundings to 1: 100,000), were carried out at this time around the mouth of the Ice Fjord towards the interior as far as Advent Bay and along the coasts of Ice Fjord as far as Bell Sound by the same hydrographer. Two other hydrographers took deep-sea soundings at Horn Sound off the coast of Bell Sound.

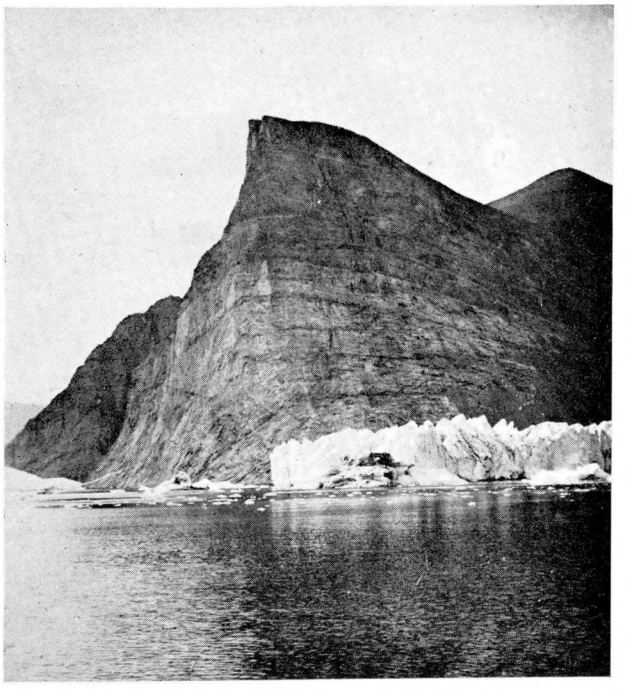
4. PERIOD 1920-1925.

In topographic work the use of larger model theodolites of greater accuracy was gradually introduced and stereophotogrammetry was also used.

During this period nine topographers were at work, some of whom had been on former expeditions and were familiar with cartographic work in the arctic regions. At West Spitsbergen the work was carried out in the areas bordering the inner arms of Ice Fjord, Sassen Bay and Billen Bay, between Ice Fjord and Van Mijen Bay and around Van Keulen Bay in Bell Sound. Two bases were measured and triangulation was carried out over an area of about 4450 sq. km., which was surveyed and drawn to scales of 1: 25,000 and 1: 50,000.

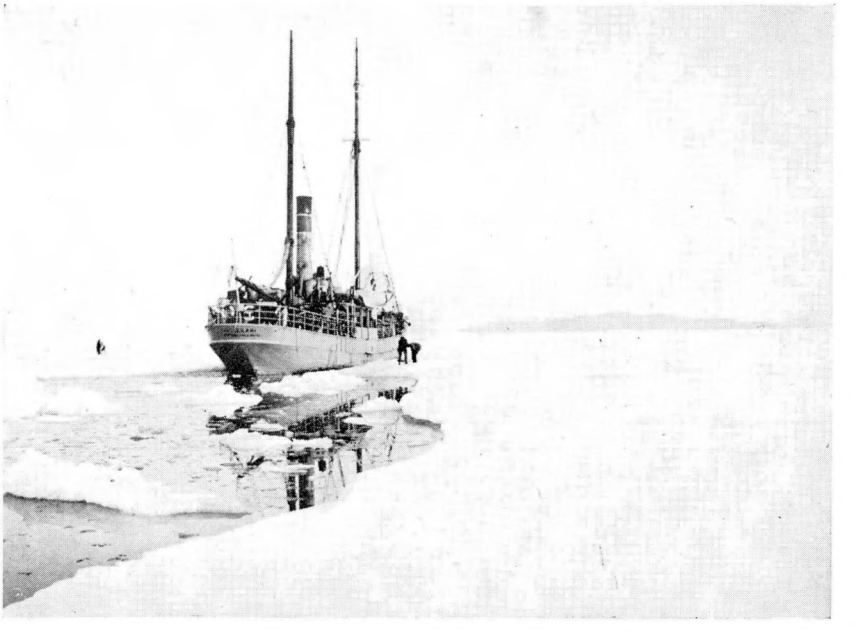
During the years 1922-24, a base was measured on Bear Island, a trigonometrical net was established and the whole island was accurately surveyed by stereophotogrammetry and tachometry (about 178 sq. km.). The position of the island was also determined astronomically.

During this period extensive hydrographic investigations were made, the seven hydrographers working from South Cape to near Magdalena Bay. Soundings consisted partly of deep sea soundings to about 10 to 12 sea Miles from the coast, and partly of detailed hydrographic surveys near the coast and in the fjords. Thus in 1925, the soundings for the whole of central West Spits-



EIRIK RAUDES LAND
Part of Frans Josef's Fjord — Partie du Frans Josef Fjord

"English Peak" (29 m.) *(Bear Island)*
"Le pic anglais" (29 m.) *(Ile aux Ours)*



The sealer Veslekari *breaking a way through the pack-ice towards EIRIK RAUDES LAND*

Le phoquier Veslekari *se frayant un chemin à travers la banquise vers EIRIK RAUDES LAND*

ADOLF HOEL

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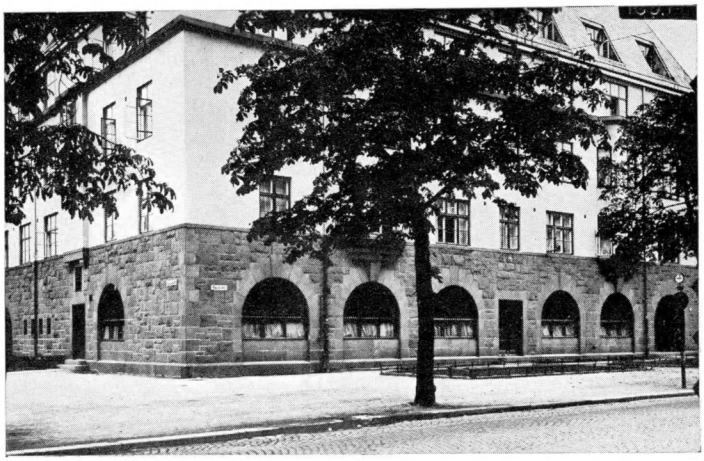
Chef du Service des Explorations Scientifiques Norvégiennes du SVALBARD et des régions polaires

The Norwegian Scientific Exploration Service of the SVALBARD and the Polar Regions, Oslo

Le Service des Explorations Scientifiques Norvégiennes du SVALBARD et des régions polaires, à Oslo



En route for EIRIK RAUDES LAND - *The sealer* Veslekari *getting fresh water from ice*

*En route pour l'*EIRIK RAUDES LAND - *Le phoquier* Veslekari *prenant l'eau douce d'un glaçon*

bergen, i.e., the coast generally free from pack-ice, were completed. Nevertheless, the hydrography of certain localities is due to foreign missions, as, for example, Research Bay (Brit.), Van Mijen Bay (Swedish), Red Bay on the North coast (French) and the seas between Red Bay and Magdalena Bay (Brit. and Swedish).

During the years 1922-25 oceanography was also undertaken in the waters of the North-West Sea and to the South of West Spitsbergen and around Bear Island.

5. PERIOD 1928-1932.

As has already been mentioned, the topography of Bear Island was completed in 1924. In 1928, the hydrography of the coast of Bear Island was begun and also the sounding of the fishing banks situated round the island; the latter being much sought after not only by Norwegians, but also by fishermen of several other nations. A special chart of the coast has been constructed this year. Deep-sea soundings on the banks were begun in 1929 in the sector South-West of the island; in 1930, they were continued in the Nord-West sector, in 1931 in the South-East sector and in 1932 principally to the West of the island.

Deep-sea soundings around Bear Island, which were mainly carried out by the same hydrographer, extend as far as 100 sea Miles off the island. On account of the bad climatic conditions in these vicinities and of the pack-ice, a great deal of time is needed and they are not yet completed.

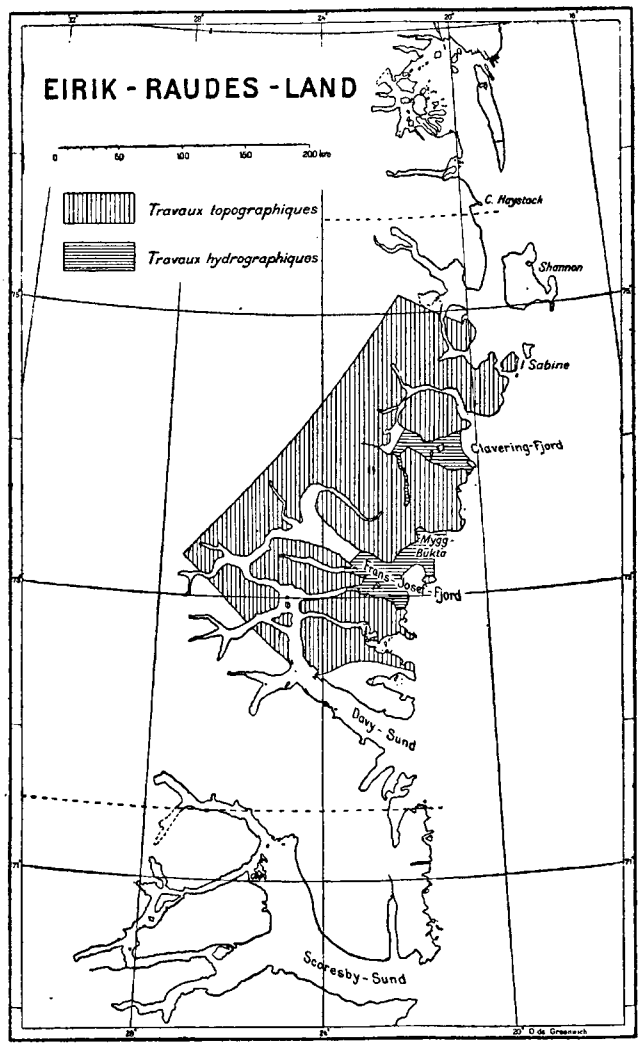
During this period missions also undertook oceanographic investigations in the arctic sea. In 1930, an automatic tide-gauge was established, with great difficulty, on the exposed coast of Bear Island. The tide-gauge functioned for 30 days without interruption.

All the hydrographers who participated in the Norwegian expeditions were Naval officers and several of them served or are still serving in the *Norges Sjökartverk* (Norwegian Hydrographic Service). Methods, instruments and material identical with those employed in hydrographic work on the Norwegian coast were used. Attention is called to the fact that this year, for the first time, occasion arose for the use of echo-sounding (German system *Atlas*) on the shoals of Bear Island (on board the fishery patrol vessel *Fridtjof Nansen*).

EAST GREENLAND.

Since 1929 the *Norges Svalbard- og Ishavs-Undersökelser* has sent cartographic missions each year to East Greenland, access to which, as is known, is far more difficult than to the Svalbard on account of pack-ice.

Norwegian sealers and fishermen have pursued their industries on the coasts of East Greenland for many decades, but it is only during latter years that scientific exploration of the country and cartographic surveys on sea and land have been actively carried out.



In the central part of East Greenland, Eirik Raudes Land (between 71°30' and 75°40'), where a Norwegian W/T station was installed in 1922 at Myggbukta for meteorological service, topographical surveys were begun in 1929 between Franz Josef Fjord and Clavering Fjord (see chart). This year a base was measured and triangulation was made, together with a stereophotogrammetrical survey, by two topographers. In 1930 hydrographic work at the mouth of Franz Josef Fjord was commenced. In 1931 and 1932 topography and hydrography were continued in the same vicinities; at the same time, two points were astronomically determined, one at Myggbukta and the other on Sabine Island. The astronomical observations on Sabine Island were carried out at the spot where CLAVERING, in 1923, and KOLDEWEY, in 1869-70, made their observations. It is hoped that these modern observations may contribute usefully to the investigation of the WEGENER theory relating to the movements of the Greenland continent.

Three topographers, an astronomer and an hydrographer took part in these missions. The expedition of 1932 had airplanes for the purpose of aerial cartographic surveys. Two thousand good photographs of the central parts of Eirik Raudes Land were taken. They are available for use, once the mission is completed.

The Norwegian missions to Svalbard and to East Greenland were carried out partly with hired sealing-boats. A Royal Naval Fishery Patrol vessel was also placed gratuitously at their service. The length of the expeditions averaged two months. Up to the present, no mishap or accident of any kind has been experienced.

The fairly abundant data of the topographic charts obtained since 1906 in Svalbard and in East Greenland are already partly published; others are in preparation and will appear gradually as fair topographical charts.

The data from the hydrographic charts has so far been published in the form of provisional drafts. Since 1928 an hydrographer has been permanently attached to the *Norges Svalbard- og Ishavs-Undersökelser* for the construction of proper arctic charts. According to the itinerary decided upon in 1929, 12 charts (from 1: 40,000 to 1: 2,000,000) have been projected. Of these, three have already been issued, and three others are in preparation and will appear shortly.

With regard to large scale charts (up to 1: 200,000) published by the *Norges Svalbard- og Ishavs-Undersökelser,* it has been found necessary to construct them with complete topographic detail, a precaution of exceptional importance for navigation in these arctic regions where buoyage, lights, habitations and other details which help in reconnoitering do not exist. The Institution's charts also have English texts.

With regard to Sailing Directions, the Institution has published two, one for West Spitsbergen and one for the Bear Island seas.

The *Norges Svalbard- og Ishavs-Undersökelser* has its offices in Oslo, where topographers, an hydrographer, geologists and the usual personnel, making a total of 10, work throughout the year. During each mission, collaborators are attached for short or long periods.

The *Norges Svalbard- og Ishavs-Undersökelser* is an institution which is in course of development. Its charts have been well received by seamen and by professionals who consider them as indicative of true progress in the domaine of Norwegian charts, — the activities of the *Norges Svalbard- og Ishavs-Undersökelser* are, moreover, followed with sympathy and interest by the authorities and by the public. This is to be understood in a country having such great maritime and arctic interests as Norway.

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