

ON THE PROJECTED CO-OPERATION WITH ROALD AMUNDSEN'S NORTH POLAR EXPEDITION

BY

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When in June 1918 Roald Amundsen started his expedition, the war was still going on. Therefore it was not possible to organize any co-operation like that which was planned in 1914 in Copenhagen by the International Polar Commission¹⁾. The only thing we could do was to fix days on which aerological ascents should preferentially be performed.

Then came the cessation of hostilities and with that the possibility of co-operation. The Norwegian Geophysical Commission therefore asked the Norwegian Government to invite the countries around the Arctic Ocean to erect geophysical stations in their Arctic regions. The Norwegian Government was willing to do this. As accompanying paper to the request there was a working programme for the stations.²⁾

The programme is as much as possible in accordance with that which was prepared by the Commission in Copenhagen in 1914¹⁾. However' we found it desirable to extend it by including magnetic observations and photography of northern lights. The reason for this is not only that we wish to make the most of the stations which are to be erected, but chiefly that it is of great importance to get a base for the study of the connection between the northern lights and magnetic disturbances and the atmospheric conditions. They all depend on the solar radiation and the connection can most easily be seen in the Arctic regions.

We know that the solar radiation varies. There are considerable periods, such as the sunspot period, which have long been known and studied, but there are also shorter variations, which we have not been able to study until the last few years. When the solar radiation increases, the earth gets more energy. A part of the increased energy is radiated back, but a part of it makes the atmospheric machinery go faster. When the radiation is great the air movements are more intense than when it is small. It is the same as we see with other machineries; if we give them more energy they will go faster.

¹⁾ Procès verbaux des séances de la Commission Internationale Polaire d'Aérostation Scientifique. Réunion de Copenhague 28 février — 1. mars 1914. St. Pétersbourg 1914.

²⁾ Geophysical Investigations in the Arctic Regions in Co-operation with Roald Amundsen's Polar Expedition. This publication p. 5.

Nansen and Helland-Hansen ¹⁾ have shown in a newly published work that this suggestion is correct. They have for instance found that the difference in pressure between low in Iceland and high in the Azores increases with the radiation. As to the temperature it will increase on the southern side of the mean track of the cyclones, because we there get more intense southern winds, while it will decrease on the northern side because of the intenser northern winds.

Further O. Krogness ²⁾ has found a correlation between the magnetic disturbances and the various meteorological conditions, especially in the North of Norway. Finally may be mentioned, that it is commonly acknowledged that magnetic storms and the northern lights depend upon the solar activity.

For the reasons mentioned above it seems very probable that there exists a correlation between all the geophysical phenomena depending on solar radiation. This correlation can most easily be studied by means of a network of stations in the Polar Regions.

In the northern Atlantic, storms are very frequent and intense. Cyclones very often arise and traverse these Arctic regions. The magnetic storms are of course very much more intense in the Arctic regions than in more southern latitudes, and as to the northern lights they are rare outside the Arctic regions.

We see that all the geophysical phenomena mentioned are more intense in the Polar regions than outside them. The conditions for a study of a connection between them and the solar radiation are therefore most favourable in the Arctic regions.

Besides it is of course favourable to each science to get observations from a network of polar stations.

It will not be necessary to discuss the importance of the meteorological and aerological observations as this is generally acknowledged and was dealt with by the International Commission at the meeting in Copenhagen. I will only mention that it will probably give results regarding the formation of cyclones (especially important for this study is a station on Jan Mayen) and regarding the general movements of the centres of action in the atmosphere.

As to the magnetic observations I refer to a paper by O. Krogness ³⁾. Professor Størmer has in two papers given his opinion about the importance of photographing northern lights and the practical method of doing so ⁴⁾.

For all the geophysical phenomena it is very important to have as close a network of stations as possible for drawing synoptical charts. It is therefore necessary to have rather many stations. On the chart (see fig.) I have marked down the European stations which we hope to get. As to the prospect of getting these stations, the following might be mentioned.

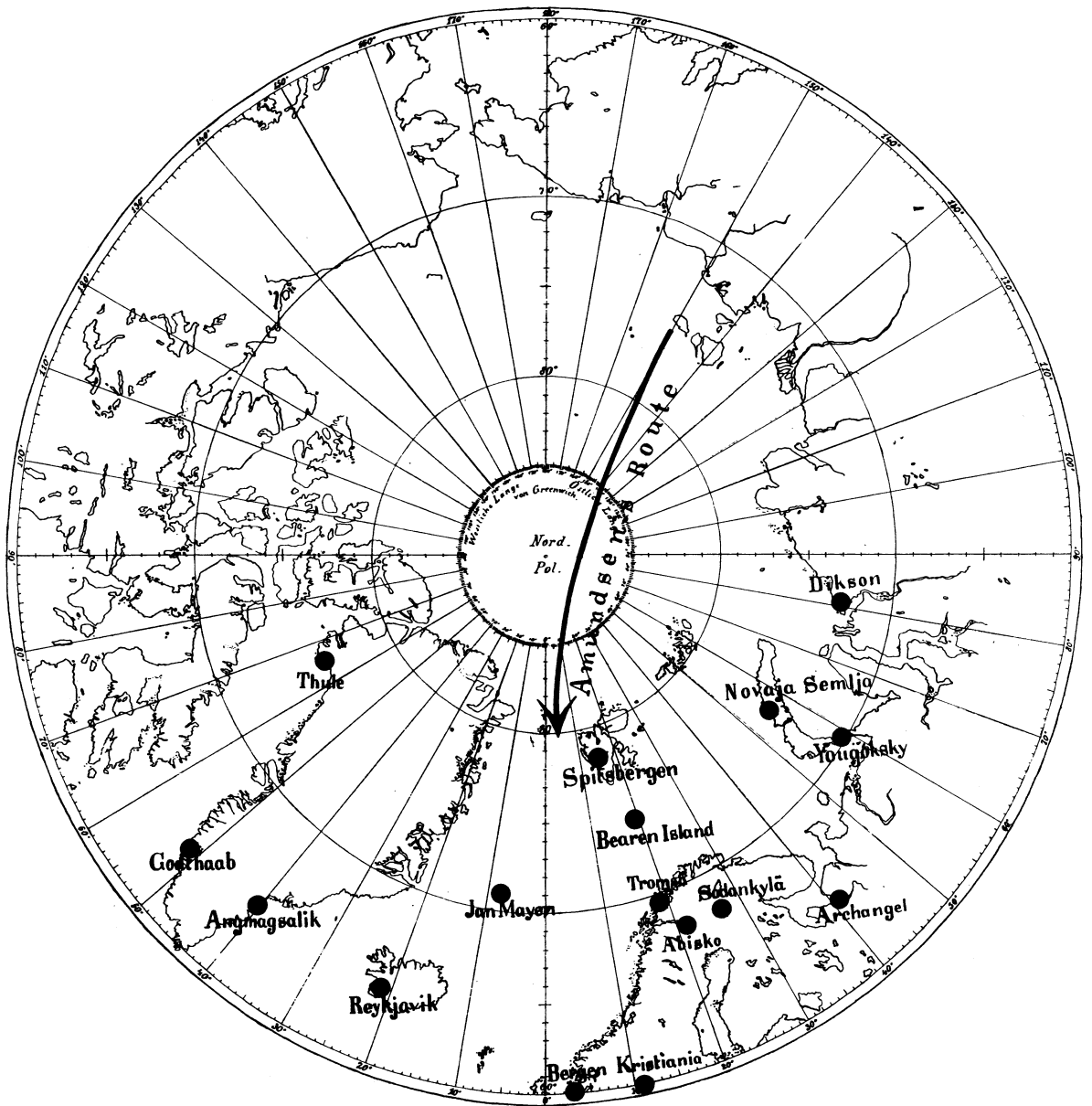
The Norwegian Government has now granted funds for erecting a geophysical station in Spitsbergen and extending the working programme of the observatories in Bergen

¹⁾ B. Helland Hansen and Fridtjof Nansen: *Temperaturschwankungen des Nord-Atlantischen Ozeans*. Videnskabselskabets Skrifter I Math. Naturv. Kl. 1916, No. 9. Kristiania 1919.

²⁾ O. Krogness: *De magnetiske stormes betydning i meteorologien*. Naturen 1917.

³⁾ O. Krogness: *The Importance of obtaining Magnetic Registrations from a comparatively close Net of Stations in the Polar Regions*. This publication p. 8.

⁴⁾ C. Størmer: *The Importance of taking Aurora Photographs from a Network of Stations around the Polar Basin in Collaboration with Roald Amundsen's Expedition*. This publication p. 25. Extract from a Report on Northern Lights Expedition to Bossekop — Store Korsnes in the Spring of 1913. This publication p. 20.



and Aas (near Kristiania) and the Geophysical Institute in Tromsø. We have not succeeded in erecting the station at Spitsbergen this summer because it was impossible to obtain the instruments in time, but it will be established as early as possible in the spring of 1920. Further it is probable that the Norwegian meteorological station on Bear Island will be able to make ascents with pilot balloons.

From the Central Hydrometeorological Station in Archangel we have received a telegram stating that there is an English pilot-balloon station at Murmansk, that ascents with pilot-balloons are now made at Dikson, and that geophysical stations will be erected at Archangel and Yougoksky. These stations will perform ascents with pilot-balloons. Further, we hope that the stations in Yougoksky and Dikson will per-

form magnetic observations and will photograph northern lights. The activity of these stations will however very much depend upon the future political situation in North-Russia.

From Finland we have received information that the necessary means have been granted to extend the working programme of the Sodankylä-Observatory so that it can perform all the geophysical investigations required.

From Denmark director Ryder communicates that there are good prospects for the erection of 3 stations in Greenland, viz. in Godthaab and Angmagsalik by the Danish State, and in Thule by the Kap York Committee. The assumption is, however, that there will be sufficient co-operation from other countries about the Polar Basin.

In Sweden we have good hopes of getting one station, probably at Abisko.

Further we hope, that England will erect a station on Jan Mayen and that Iceland will erect one station¹⁾. These stations are of special importance, firstly because they are the connecting link between the stations on the eastern and western side of the North-Atlantic and secondly because they lie in the great Iceland low, where cyclones are very frequent.

If we get these two stations, the European side of the Arctic Ocean will be well furnished with stations. There is, however, one important place where so far we have no prospect of getting a station, namely in Franz Josephs Land. A station here will be a good connecting link between the above mentioned stations and the station on »Maud«, Amundsen's ship. Further, it would be exceedingly important to get a station on the eastcoast of Greenland at a high latitude.

It would also be important, that stations were erected on the American side of the Polar Basin, and we hope to get a few stations in Canada²⁾.

As the circumstances have made it impossible to get any network of stations in 1919, it must be considered exceedingly desirable that all the stations are in action from the summer of 1920 until the autumn of 1921. If some of the stations cease as early as in 1921, we should have a good network of stations only for one year and for most of the studies that will be too little. We therefore propose that the stations should be in action until the autumn of 1922 even if Amundsen unexpectedly should come back in 1921. On the other hand the observations would cease in 1922 even if Amundsen has not come back by then.

Finally may be stated, that the co-operation with Roald Amundsen's Polar Expedition was discussed at the meeting of the International Meteorological Committee in London in July 1919 and that the following resolution was passed:

»It is agreed, that the members present will do their best to secure favourable consideration of the co-operation of their respective Institutes on the lines laid down in the proposal circulated by the Norwegian Government«.

At the great meteorological meeting in Paris in October 1919 there was established an International Polar Commission to lead the projected co-operation with Roald Amundsen's expedition. At the same meeting the days when Amundsen makes his aerological ascents (see table on page 5 of this publication) were fixed as days for the international aerological ascents all over the world.

¹⁾ From Iceland we have received information regarding the erection of a station at Reykjavik.

²⁾ In Canada the following stations will co-operate: Ft. Good Hope, Ft. Simpson, Dawson, Mc. Pherson, Herschell Island, and Bernard Harbour.