GEOPHYSICAL INVESTIGATIONS IN THE ARCTIC REGIONS IN CO-OPERATION WITH ROALD AMUNDSEN'S EXPEDITION.

BY
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As Roald Amundsen had decided to start his Arctic voyage in the year 1914, the International Aerological Polar Commission held a meeting in Copenhagen, on February 28th — March 1st 1914, at which was planned an international co-operation with the expedition.¹) They decided to promote the erection of a network of aerological stations round about the Arctic Ocean, where as far as possible, meteorological and aerological observations should be made as long as the expedition lasted. In the meantime the war broke out, international co-operation was impossible, and the expedition was postponed.

In spite of the war, Roald Amundsen managed to start his expedition in June 1918. He took with him a large and first-class meteorological and oceanographical outfit, and instruments for measurements of the terrestrial magnetism and investigations of the northern lights. In addition, he succeeded in engaging the meteorologist Dr. H. U. Sverdrup as leader of the scientific work of the expedition. The latter has therefore the best conditions to be able to make valuable geophysical investigations in the Arctic regions. However, these investigations have much less value when they are performed isolated than when geophysical observations are also made at stations round about the Arctic Ocean. It would therefore be most valuable if as many geophysical stations as possible could be erected to co-operate with the expedition.

For the work of these stations, there has been made out the following plan in close agreement with the determinations in Copenhagen:

1. As long as Roald Amundsen's expedition lasts aerological observations are as far as possible to be made. This will be of greatest importance in the principal year 1920, when Amundsen will be nearest to the North Pole. Later on there shall in any case, even at stations of limited material, be taken observations on the days given in the following table.

TABLE OF FIXED DAYS.

	Jan.	Febr.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1919	2	5-7	6	3	8	4-6	3	4-9	4	8-10	6	4
1920	7—9	5	4	8	5-7	10	5-10	5	8-10	7	4	2
1921	6	3	3	6-8	12	6-11	7	3-5	8	6	3	7 – 9
1922	5	2	8-10	6	8 – 13	8	5-7	3	7	5	1-3	7
1923	4	7-9	8	2-7	3	6-8	5	2	6	3-5	8	6
1924	2-4	7	3-8	3	7—9	5	3	7	3 - 5	2	6	4

Procès-verbaux des séances de la Commission Internationale Polaire d'aérostation scientifique Réunion de Copenhague 28 février — mars 1914. St. Pétersbourg 1914.

By arrangement with Dr. Sverdrup, the expedition will on these days make ascents with registering balloons, kites, captive balloons or pilot balloons.

- 2. The following programme for observations must be considered necessary:
 - a. Meteorological observations such as are performed at a first order station.
 - b. Pilot balloon ascents, which at least in the year 1920 are to be performed daily.
 - c. Observations made as frequently as possible on the direction and velocity of the motion of clouds.
 - d. Kite ascents, ascents of captive balloons, and as far as possible of registering balloons, at the stations intended for the purpose.
- 3. The stations are to perform observations at three fixed hours daily (local time). On the fixed days given in the above Table, there shall be performed at 7 a.m. (Greenwich Time) direct observations of all meteorological elements, and at the same time aerological ascents are to take place.
- 4. As the expedition is taking with it registering apparatus for terrestrial magnetism, it will be of great importance that the stations are also as far as possible equipped with such apparatus.
- 5. The stations are if possible to be equipped with apparatus for the photography of the northern lights.¹) It is especially requisite to secure photographs on the above mentioned fixed days. The best thing would be to perform photography of the northern lights simultaneously at two stations connected by telephone, for the determination of the height and position of the northern lights, the stations being at a distance of about 25 km. from each other. If no basis can be obtained, the northern lights should be photographed from one station. It may then be limited by only photographing coronas and quiet, regular arcs and bands for the determination of their accurate position among the stars. It is especially of importance to obtain photographs of the highest point of the arc and the terminal points on the horizon in speedy succession, in order to get variations with the time.

The usual observations of the northern lights are also required, particularly the hour for the appearance of special forms, e. g. corruscation, corona and drapery formations. These observations should also be made at the stations which are not equipped with apparatus for the photography of northern lights.

Further the following may be emphasized:

- 6. It is essential that possible Arctic expeditions e. g. aeroplane expeditions, should be equipped with instruments so that they can in a scientific respect co-operate with Roald Amundsen's Arctic expedition. It is particularly of importance to perform aerological observations on the fixed days given in the above Table.
- 7. The observations should be published as soon as possible. A collective scientific treatment of the material will be carried out by Dr. Sverdrup.
- 8. Owing to the limited time it is to be foreseen that it may be impossible to establish all the stations in the year 1919. Stations which are established in the summer of 1920, will also be of exceedingly great importance.

As the matter is of great importance it is hoped that the Norwegian Government will grant the necessary funds to establish kite and registering balloon stations at Spitsbergen, Tromsø, Kristiania, and Bergen. In the north of Russia it is likely that there

Terrestrial magnetism 1913, 1915, and 1916.

Astrophysical Journal Nov., 1913, and April, 1916.

Comptes rendues. Paris 16. June, 1913, and 13. March, 1916.

Bulletin de la Soc. astr. de France, Nov. 1913.

Concerning the photographing of northern lights refer to the following papers by C. Størmer:
Sur les trajectoires des corpuscules électrisés dans l'espace. 21 Archives des sciences physiques et naturelles, Genève 1911.

will be established 2 or 4 pilot balloon stations by the «Central Hydrometerological Station» at Archangel. It is hoped that the countries to which the Norwegian Government will send a request to take part in te scheme, will do this as far as is in their power. We have here an exceedingly godd opportunity of extending our knowledge and understanding of the geophysical conditions of the Arctic regions.

Communications concerning the erection of stations and their working programme should be sent to the Norwegian Meteorological Institute, Kristiania.

Kristiania, February 1919.