THE PROPOSED MAGNETIC RESEARCHES OF THE NOR- WEGIAN POLAR STATIONS IN 1902-1903.

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As leader of the expedition started by the Norwegian government for the study of Earth-magnetism, Boreal Lights, and Cirrus-clouds, I beg to state that during the time from August 1, 1902, until June 30, 1903, four Norwegian Stations will be erected, viz.: at Bossekop (Finmarken), at Dyrafjord (Iceland), at Aksel-Island (Spitzbergen), and Matotschkin-Schar (Novaja-Zemlja).

At these four stations the three magnetic elements will be registered photographically. To this effect registering instruments will be employed like those used by the contemporary Antarctic Expeditions. The three elements will also be determined absolutely. The term observations stipulated by the Antarctic Expedition will also be carried through at these stations.

The special subjects prosecuted by our expedition, and for the fulfillment of which we solicit your kind support, are: The determination of the cause and progress of different magnetic perturbations, as discussed by me in my report: "*Expédition norvégienne de 1899-1900 pour l'étude des aurores boréales. Résultats des recherches magnétiques.*"

For the attainment of this, it is desirable first and foremost that in the usual daily registrations the time be ascertained as exactly as possible, and then that rapid registration take place on the following term-days:

Greenwich time:

1902 December 2, from 9-11 P. M.

"	3,	"	9-11	"
"	4,	"	9-11	"
"	5,	"	9-11	"
"	6,	"	9-11	"
"	7,	"	9-11	"
"	8,	"	9-11	"

1903 January 2, from 11 P. M. to January 3, 1 A. M.

"	3,	"	11	"	"	4, 1	"
"	4,	"	11	"	"	5, 1	"
"	5,	"	11	"	"	6, 1	"
"	6,	"	11	"	"	7, 1	"
"	7,	"	11	"	"	8, 1	"
"	8,	"	11	"	"	9, 1	"

1903 February 3, from 1-3 A. M.

"	4,	"	1-3	"
"	5,	"	1-3	"
"	6,	"	1-3	"
"	7,	"	1-3	"
"	8,	"	1-3	"
"	9,	"	1-3	"

If a station where rapid registration is not possible wishes to take part in these observations, this can be done, by observing with a very sensitive variometer the points and times of reversion.

Single readings at regular intervals would, as a rule, afford no contribution toward the solution of the question.

With rapid registration two time marks controlled by chronometer should be fixed.

I may mention that this appeal for co-operation in magnetical researches has been sent to numerous magnetic observatories.

Concerning the cirrus-observations, the matter of interest is only the "cirrus radiation," formerly quoted as "polar-bands" (P.B.)

In its typical appearance, this phenomenon seems to be limited to the highest clouds, as cirrus, cirro-stratus, and cirro-cumulus.

To obtain a happy solution of this task, it is absolutely necessary to get the requisite facts from the largest number of points of observation distributed as widely as possible over the whole Earth.

In the first place it is most important to fix the direction in which these reciprocally parallel "bands" run. To obtain this result the easiest and surest way is the observation and notation of the two points of convergency, situated on either side of the horizon.¹

If, however, these points of convergency are not developed at all, or only partly developed, the direction may be at once determined by observing bands not more than 20° from the Zenith. Besides, the width of a single band ought to be estimated, in lunar-diameters.

The determination of the direction of propagation and of the absolute or relative speed of the particles of the clouds appears less important to begin with.

Now, concerning the hours of observation, it would, of course, best serve the present object if the different observers would uninterruptedly watch the heavens with regard to cirrus radiation, even a passing apparition being sometimes of importance. But as such an intense observation would incur too great difficulties, it may be generally sufficient for the observers to test the phenomenon in the way described at the ordinary fixed periods.

On the other hand, it would be most useful if all stations would make observations at closer intervals on the so-called magnetic term-days (the 1st and 15th of every month), for instance, every two hours, and also watch as closely as possible the development of the bands. This is especially to be recommended when the cirrus radiation is very clear and brilliant.

I must here mention that a similar application, concerning observation of clouds is also sent to a great number of meteorological stations.

Christiania, May, 1902.

[The Superintendent of the Coast and Geodetic Survey, Mr. O. H. Titmann, has directed that the Coast and Geodetic Survey Magnetic Observatories co-operate with Prof. Birkeland in the plan of magnetic work outlined above.

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¹ Here an accuracy of 5° seems to be satisfactory. The theodolite that may be employed requires no telescope, a dioptr being sufficient.