

recommend that standard barometers and other accurate instruments should be, as soon as possible, placed at the stations, so as to insure that all the material for forecasting shall be unimpeachable; and I have no hesitation in stating my belief that when such is the case, public intimation of approaching gales may be made by signal with nearly as much success (*viz.* about 80 per cent.) as is now the case in older and more populous countries. I say *nearly*, because the following are apparently the principal causes why, in my opinion, an equal proportion of success cannot be expected, at all events for some time to come:—

- 1st. The distance of New Zealand from any extended land area.
- 2nd. Its peculiar shape, being of great extent in length, but of only about one-third of that amount in breadth between the extreme points of Cape Egmont and the East Cape.
- 3rd. The remarkable rapidity with which the barometer moves.
- 4th. The want of accumulated and reliable data for studying the routes and preliminary symptoms of coming changes in the weather.
- 5th. The want of a well-organized system of observations made at sea. These should all be made at New Zealand mean time, so as to insure all observations being synchronous.
- 6th. The hour at which the daily report of the weather is generally received for discussion, and the insufficiency of the material it contains.

The first of these causes will to a great extent detract from the value of the information we may be able to obtain by telegraphic communication; for the distance to Australia is such as to permit storms which pass over that country expending their violence before reaching this colony, and it will also admit of the possibility of storms being generated at sea and then travelling in upon our coasts. The great extent of the American continent affords their Storm Signal Department immense facilities in the way of anticipating the approach of bad weather, and in tracing out both the shape and routes of these disturbances; and the short distance between England and the Continent is found to be of great use to the English system, as the reports received from France more especially frequently give timely warning of the changes preceding some of their most violent gales. The value of telegraphic communication with Australia will be found when a united series of synchronous observations are made in that country.

The second prevents the lateral extension of our weather-reporting system, and necessitates the stations being closer together than would otherwise be required, and when any rapidly moving storm comes in, renders it a matter of great difficulty to issue warnings in time to be of real value, as the gale may have already visited several places before telegrams can be received from the central office.

The third will always be one of the greatest difficulties with which any storm-signal service in this colony will have to contend, and can only partially be met by vigilant observation and attention to all kinds of signs of a change of weather. It is, however, probable that when information relative to humidity can be added to that given by the barometer, and a greater amount of matter can be included in the daily report, a good deal of this difficulty may be overcome; but this will never lessen the necessity for vigilant observation, and it is now only by making notes at all hours from near sunrise to late in the evening, and at times before daylight, that any fairly reliable warnings can be issued. In this frequent note-making, I am very ably assisted by several of the observers, who telegraph such matter as may be useful as soon as they can, whether early or late in the day.

The fourth, will, no doubt, be lessened as the records of the office accumulate, and it is hoped that the note books kept by the weather reporting officers will prove very useful in this respect, for there are many matters in connection with storms, in all stages of their existence, which are most requisite in this branch of the subject, and without which mere mechanical registration of instruments is of very little value.

The fifth would, in a great measure, overcome the difficulties caused by the peculiar shape of the country, so far as the compilation of data and study is concerned; and would, above all, tend to show in what shape, or more properly what form, the gales move, an essential point with reference to the rules which may possibly be laid down for enabling vessels to avoid the most dangerous winds. There are now three steam services connecting New Zealand with Australia, *viz.*—One from Sydney to Auckland, one from Sydney to Wellington, and the third from Melbourne to the Bluff and Hokitika, each of which could, by careful observation made at stated hours of New Zealand time, afford a mass of information which cannot be obtained by any other means, and would therefore be proportionately valuable, as the vessels are commanded by tried seamen who are all well known to us, and who I believe would willingly make the necessary observations, even though the remuneration were more honorary than substantial. Observations of a similar nature, made by vessels trading to Fiji, would, I am sure, soon give very valuable results.

The sixth cause arises from the report being published in so many places; but there are also several other delays, amongst which must be mentioned the absence of Harbour Masters on duties connected with tidal work, which at times prevents them from attending at the telegraph office at 9 a.m., the hour appointed for supplying the report. In a previous memorandum, I have already dealt fully with this subject, and have proposed a plan which, while it will insure each place obtaining all necessary information, will yet enable the Telegraph Department to place the report in the hands of the officers in charge of the storm-signal service at a much earlier hour than is at present possible.

In all other countries where weather telegraphy is in use, no information on this subject is *made public* until it has been revised at the principal office; but under the present system this is impossible; and I am therefore of opinion that the weather report, as now published, should be done away with, and the whole of the necessary information telegraphed direct to the central office by means of the elaborate cypher code now in use in the Signal Department of the United States. This will become a matter of necessity; but if it be decided to keep the report as it is now published, the information for the central office should have precedence of it, so that there may be nothing in the way of making the weather forecast as early in the day as possible. This information should be received by the officer in charge of the work not later than 9 a.m., which is the hour at which the telegraphing of the reports is now commenced. The present publication might still be carried out, but if efficiency in the storm-signal work is to be considered, its information must be supplied direct, and without reference to any other matter of