

ART. V. — CANADIAN WEATHER TELEGRAPHY AND STORM SIGNALS. BY FRED. ALLISON, M. A., *Chief Meteorological Agent, N. S.*

(Read March 9, 1874.)

I.—WEATHER TELEGRAPHY.

THE system of the Washington Signal Department, with which that of Canada is in co-operation, consists in collecting by telegraph, three times daily, reports of the state of weather observed at the *same absolute times* at numerous stations, (at present about 70,) and in forming thereon opinions of coming weather, which are sent by telegraph to the points concerned.

The wider the area of observation, the more correct are predictions likely to prove; and hence it is obviously to the advantage of the two countries, that the observations made in one should be placed at the disposal of the other.

Prior to July, 1872, as no pecuniary provision had been made for Weather Telegraphy in Canada, our operations were confined to sending to Washington regular tri-daily telegrams from Toronto and Montreal, and also, during six weeks, from four other stations.

Since 1st July, 1872, by aid of an additional grant of \$5,000, regular tri-daily telegrams have been received at Toronto from six Canadian Stations, and have then been transmitted to Washington, there to be combined with the telegrams from the U. S. Stations, and thus contribute to the efficiency of the system in which we, as well as our neighbours, have so deep an interest.

As \$5,000 is less than a quarter of the sum which I considered necessary for working the system in the present year, and wholly inadequate to procuring from the United States the *regular* tri-daily telegrams necessary for making forecasts at Toronto, the only direct service which I could render to our own ports has been to supply them occasionally with warnings based on *special* telegrams from Washington.

That these warnings, have, on some occasions, reached their destination too late, is due entirely to defects in the transmission. A remedy for these defects will doubtless be found; and as all that

I hoped to effect with \$5,000 was to *lay the foundation* and not to *complete* a system of storm warnings; the delays, though much to be regretted, form no reasonable cause for complaint.

As delays to some extent take place also in transmission from Washington to Toronto, the maximum degree of efficiency in Canadian telegraphy will not be attained till we are in a position to collect at Toronto all or nearly all the regular tri-daily telegrams from the United States, so as to make our own forecasts; but as in a work of such magnitude gradual development is safer than sudden expansion, I propose, during the year 1873-4, to rely chiefly on the Washington forecasts, and to apply our funds to the improvement of those forecasts by increasing the number of the reporting stations in Canada, to the erection of signal apparatus at various points along our coasts, and to perfecting our arrangements for the prompt delivery of warnings.

II.—STORM SIGNALS.

On receipt of a telegram from Toronto to the effect that a storm is apparently approaching the neighbourhood of Halifax, a storm *drum* will be hoisted at the yard arm of the storm signal mast erected on the Citadel by the Dominion Government. Storm notices will also be posted in the Dominion Building and in the Merchants' Exchange Reading Room.

A lantern showing a white light will be placed within the drum when it is hoisted at night.

The "storm" signalled must, for the present, be understood in a general sense, neither force nor direction being specified.

If there be good reasons to expect a heavy gale it will be thus stated in the notices; but the absence of such a statement will not show that a severe gale will *not* occur.

The drum and notices will usually remain up about twirty-six hours, unless ordered down by telegraph, and will remain up longer if a telegram to that effect is received from Toronto.

If through faulty transmission the telegram does not arrive before the commencement of the storm, the drum will nevertheless be hoisted upon the receipt of the warning, in order to show that

the disturbance is not merely local. The display of the signal drum does not convey a distinct *prediction*, but simply indicates the existence of a storm elsewhere, and that the probability of its reaching the neighbourhood of Halifax is sufficient to call for vigilance. It must be understood that the utility of the drum for warning ships about to leave port is not impaired if the storm should be diverted from the immediate vicinity of Halifax.

Taking the above extracts from report and notice, by G. F. Kingston, Meteorological Superintendent, Toronto, as my texts, I propose to read a few notes on the present telegraphic branch of the meteorological system. For better understanding the present, it is advisable to look back briefly at the past. After the branch of climatological statistics, (on which I have here and elsewhere endeavoured from time to time to give some information) had been rooted but a short time in Nova Scotia—and still more briefly in many other portions of the Dominion—some pressure was brought to bear upon the leaders in this department to publish telegraphic reports of weather changes and warnings of approaching storms. This was the hasty action of the mass which always clamours for the so-called “practical results,” never giving time for the truth contained in a theory to prove itself, and consequently falling into error from forgetfulness that Nature’s mills though “they grind very slow, they grind exceeding fine.”

In 1872 I proposed to the Chamber of Commerce in this city, to publish a daily bulletin of the chief characteristics of the weather here and at several stations in Canada and the United States; but there was an opposition in that body, partly from some who wished Government to undertake the whole expense of the enterprise, and partly from others who did not understand the objects to be attained, or the manner of their attainment. At that time Government was not prepared to inaugurate solely on its own account, and without the co-operation of the chief cities, the system which the next year it found itself enabled to begin. A little was however accomplished that Autumn in the way of receiving a daily bulletin from seven

stations, and I feel grateful to those gentleman who deserve the thanks of the community for the assistance they rendered towards taking even that preliminary step.

But last year the greatest strides in telegraphic meteorology were made by the Department of Marine and Fisheries utilizing a portion of the Government grant in erecting storm signal staffs and constructing drums at many points throughout the Dominion.

In addition to the drum warning, a notice of the probable storm is posted in the Merchants Exchange Reading Room, on receipt of a cautionary telegram from the central office at Toronto. As yet it is evident that the public do not recognize the full intent and use of these notices. But that, from experience of other countries, was to be expected; and they will gradually learn, while we must work on in patience, constantly endeavouring to gain knowledge and to improve the system, so as to make its services more useful.

Regarding Nova Scotia at least, that there are grave defects in the present method of transmitting warnings must be allowed. These I am labouring to remove, and have lately communicated my ideas, as to improvement in that branch, to our Representatives in Parliament; that during the approaching Session at Ottawa, they may urge them upon the Department of Marine and Fisheries, under the control of which Canadian meteorology has been placed. I have good hopes of their success.

The present method of giving storm warnings is this, Washington warns Toronto from data collected throughout the Continent; and Toronto, in turn, forwards the Washington forecasts to Halifax. Some of the objections to this mode are obvious, especially the length of time necessary in the first place to collect and arrange observations—many of which are ultimately useless for forecasting in our district—and subsequently the roundabout route pursued by the telegrams to us, subject to the frequent delays and defects which accompany telegraphing on this Continent; and particularly liable to the detentions caused by the scarcity of night offices. I have no hesitation in saying that the forecasts could be better calculated for Halifax and other parts of this Province at this station, were it put in frequent communication directly with the proper points; not from any imperfection in arranging data at

either Washington or Toronto, but simply because those observers are not so favourably placed for this district of observations. But the more obvious hindrances to continued accuracy in this branch, are not all nor even the most grave of those at present encountered.

To give correct opinions as to ensuing weather, it is an essential requisite that not only the temporary conditions of any atmospheric area during the disturbance under consideration be known, but that the normal temperatures and wind directions, the permanent hills and hollows of pressure, and even the geographical configuration, may have been the subjects of long study and intimate acquaintance. In this respect the local observer has an immense advantage. For myself it is nearly twenty-six years since I first gave attention to meteorology. This period has been much broken; and the observations of my earlier years are frequently inaccurate, from faults in instruments and position. But I now have eleven full years of trustworthy records for Halifax; and during the latest eight of these, the observations have been made in many months at bi-hourly, in some at tri-hourly, or at farthest at four hours intervals; so that, in statistical knowledge, the station may claim to be well equipped. Also there have been sent in to me from efficient observers, scattered through Nova Scotia, New Brunswick, P. E. Island and Newfoundland—besides a few in the Upper Provinces—many years of excellent registers. Thus constantly observing myself, and receiving this copious information, I cannot fail to have gained a stock of facts which lay open at my feet the regular conditions and extreme eccentricities of this climate. By no means disparaging the attainments of others at a distance, the office here must then have peculiar facilities for warning our own Province, merely from its position alone. In spite of the present disadvantages above mentioned, the Washington office has been very successful in its anticipations, as I now shall show.

Without going any farther back, that I may not overburden this paper with bare statistics, I merely take the past month of February; premising that the proportion of disturbances expected over this Province, held about the same ratio to the facts in the preceding four months since the storm staff has been erected as in

this under discussion ; while I regret to say that the number of late warning telegrams was also a similar share of the total.

During February then, we had seven storms. By the word "storm" I mean a gale of wind reaching at least a velocity of 20 miles per hour, for any one hour or more, accompanied by rain or snow, or neither—the latter case being very rare. A velocity of 20 miles per hour equals a pressure of 2 lbs. per square foot ; as the square of the velocity in miles per hour, multiplied by .005, gives the pressure in lbs. per square foot, $V^2 \times .005 = P$. With this pressure it is calculated in the Royal Navy that a ship close hauled could just carry close reefs and courses.

On the 3rd. ult., light snow began to fall early. A snow storm began at noon ; wind S. E. 15 miles per hour. Gale began 8 p. m. At 9 p. m. blew 21.5 miles per hour, and at midnight 30.7, having backed to E. At 1½ a. m. of 4th., wind reached its greatest rate of 42 miles per hour ; decreased gradually till 3 a. m., and at 4 o'clock lulled. Snow fell fast till 1 p. m., with slight flurries in evening. From noon to 9 p. m. we had a very high wind from N. W., not quite a gale, but the reverse of the cyclone. A warning was sent from Washington but did not reach me till 4th, 11.35 a. m., 24 hours late.

On the 10th another snow storm began 7.5 p. m., but not so violent in any respect as the last. At midnight a N. E. wind was blowing 14.3 miles per hour. At 3 a. m. of 11th, 20 miles were attained, and at same hour the snow ceased. Generally, after backing a few points, gales veer, lull, and come out from opposite quarter. They are cyclonic as the last mentioned. But in this storm the wind continued moving through N. to N. W., and finally to W. ; blowing strongly from N. W. between noon and 3 p. m. of 11th. Telegram received 11th, 1 p. m., or at least 18 hours late.

At 1 a. m. of 14th, a S. gale was blowing at 20 miles per hour—at 3 a. m., 21.2 per hour—at 6 a. m., 23.7—at 9, 28.6—at 10, 27.1—at 11, 27—at noon, 26.7 from S. S. W., and at 3 p. m., had fallen again to 20 miles and quickly subsided. Light rain fell in showers during the morning, and more heavy and con-

tinuous in the afternoon. Notice was received here at 11.35 a.m., or 11 hours after storm was upon us.

On 16th, at 11.50 a. m., I was warned to hoist the drum; the wind then being S. E. at 15.5 per hour. This rate was not exceeded during this disturbance, but considering the evident proximity of a much heavier blow, the notice would have been prudent if sent from 12 to 20 hours sooner. Heavy snow, sleet, rain, fog, and drizzle were all present here that day.

Between 11 a. m. and 6 p. m. of 20th, we had a short and sharp blow from S. W., at times rising to a gale; and accompanied with violent rain. Of this Washington sent no advice.

A caution was received on the 23rd at 1.30 p.m. I doubt the expediency of sending this telegram at all; but certainly, if sent, it should have been forwarded much earlier. A light snow fell on that day from 7.45 a. m. to 8 p. m.; and a wind, from N. E. to S. E., never exceeded 14 miles per hour. Midnight was calm and foggy.

On the 26th snow began to fall gently at 0.30 a. m. From 1 to 10 a. m., it snowed fast. The wind backed from S. at midnight of 25th, to N. at 2 p. m. of 26th; blowing very unsteadily, and very rapidly at intervals, but never passed 14 miles in one continuous hour. The warning was not delivered here till 9.10 in the morning, when the greatest velocity was being attained; but still it was a fair forecast, and had the telegraph done its duty throughout, would have been in my hands before midnight of 25th.

Of these seven storms, six were foreseen at Washington; but only one warning was sent from Toronto to Halifax in time to be useful here; and that was marred by telegraphic delay. No caution was sent in one instance only that of the 20th. I have thought it unnecessary to dwell here upon the fact that notices, though late, are of use in demonstrating the wide range of storms beyond the locality warned; especially in shewing seamen the path and progress of these atmospheric disturbances; as that discussion would open up a field differing from that immediately under consideration.