

1881.

NEW ZEALAND

INTERCOLONIAL METEOROLOGICAL CONFERENCE HELD AT SYDNEY IN 1879

(MINUTES OF PROCEEDINGS OF THE).

Presented to both Houses of the General Assembly by Command of His Excellency

MINUTES OF PROCEEDINGS OF THE INTERCOLONIAL METEOROLOGICAL CONFERENCE.

TUESDAY, 11TH NOVEMBER, 1879.

The Conference met at the Sydney Observatory at 10 a.m.

Present : R. L. J. Ellery, Esq., F.R.S., Government Astronomer, Victoria; James Hector, Esq., M.D., C.M.G., F.R.S., Inspector of Meteorological Stations, New Zealand; H. C. Russell, Esq., B.A., F.R.S.A., Government Astronomer, New South Wales; C. Todd, Esq., C.M.G., F.R.A.S., Government Astronomer, South Australia.

H. C. Russell, Esq., was called to the chair.

The Chairman read the following letter :—

SIR,— Colonial Secretary's Office, Sydney, 8th November, 1879.
I am directed by the Colonial Secretary, at the instance of the Minister of Justice and Public Instruction, to transmit herewith copies of propositions for the consideration of the scientific men nominated by the several Australian Colonies to consider what means should be adopted to improve the system of intercolonial weather signals.

I have, &c.,

CRITCHETT WALKER.

- The Chairman of the meeting of scientific men appointed to consider what means shall be adopted to improve the system of intercolonial weather signals.

Propositions for Meteorological Conference.

1. To consider the meteorology of Australia and New Zealand, with a view to united action in its investigation.
2. To consider whether additional first-class stations shall be established, and, if so, in what localities.
3. To consider the desirability of using the same class of instruments at all stations, and making the observations at the same local hour.
4. To consider the desirability of securing the co-operation of the meteorologists of New Zealand and Tasmania in the system of weather telegrams which now embraces the Colonies of South Australia, Victoria, New South Wales, and Queensland.
5. To consider by what means the weather telegrams may be transmitted and published for public information at an earlier hour than they are at present.
6. To consider whether meteorological stations should be established upon the highest available mountains for the special study of winds.

Observatory, 27th October, 1879.

H. C. RUSSELL.

He said the object for which the Conference had met was to devise some system by means of which more united action might be established in respect to meteorological observations, and especially with regard to weather telegrams. He had experienced great difficulty in obtaining telegrams from the different colonies with sufficient punctuality, and he thought that if the matter were discussed in Conference some suggestions would be made by which the transmission of these telegrams might be greatly facilitated, and earlier information furnished to the public. Holding this opinion, he had suggested the desirability of having a Meteorological Conference, and the Government of New South Wales had sent invitations to the Colonies of South Australia, Victoria, Queensland, Tasmania, and New Zealand. Queensland and Tasmania had not responded to the invitation, or at least they had not sent representatives. He very much regretted the absence of the representatives of the Colonies of Queensland and Tasmania, but thought the Conference should proceed with the business before them.

1. *United Investigation of Meteorology.*—To consider the meteorology of Australia and New Zealand, with a view to united action in its investigation.

Mr. Ellery thought it would be well to start by affirming the desirableness of united action, and he would therefore move formally, before entering upon other questions, the following resolution in reference to the first proposition : “ That, in view of the great importance which a better knowledge of the movement and origin of strong gales and storms on our coast-lines and neighbouring seas is to

the shipping and commercial interest generally, it is desirable to secure, as far as possible, co-operation in all the Australasian Colonies for the investigation of storms, as well as for agricultural and general climatological purposes." It had already been shown that the westerly gales which visit New Zealand, and the easterly gales occurring on the coast of Australia, were marked by premonitory signs; and some co-operative action in the transmission of information could not fail to lead to profitable results.

The resolution, after discussion, was agreed to.

Dr. Hector moved, "That, with a view of giving effect to the foregoing resolution, similar observations and the same form of publication should, as far as possible, be adopted throughout the colonies." He explained that he did not mean that no other form of observations should be published, but that the Government of each colony should be asked to sanction the expense of publishing certain observations taken at the same local hour in the form required by the Conference, so that they could be compared with each other.

The resolution, after discussion, was agreed to.

2. *First-Class Stations*.—To consider whether additional first-class stations shall be established; and, if so, in what localities.

The Chairman thought the Conference should free themselves from the task of defining what constituted a first-class station, as circumstances might arise to alter their opinion on that point.

Mr. Todd: There would in reality be only one first-class station in each colony, which would be the Observatory.

Mr. Ellery did not think it would be desirable to lay down any fixed rule on this point. The different colonies worked under different circumstances; and all that was required was to secure their co-operation.

Dr. Hector thought the number and position of the different stations should be left for each colony to determine. The Conference should not dictate to the colonies what expenditure they should incur; nor did he think they should lay down any expensive or elaborate scheme, which might have the effect of preventing cordial co-operation.

The Chairman said his object in submitting this proposition was to suggest one or two more stations in the western district. It would be seen in the map that there was a scarcity of stations in the interior; and, as most of the atmospheric disturbances came from the west, the establishment of additional stations there would supply valuable information.

Mr. Todd moved, "That, in order effectively to carry out the objects of the Conference as affirmed in the foregoing resolutions, it is desirable to establish first-class meteorological stations in certain well-selected positions in the several Australasian Colonies, including New Zealand, in addition to those now existing."

The resolution, after further discussion, was agreed to.

On motion of Dr. Hector, the Conference adopted the following definition of the work of a first-class station, given in the preface to the New Zealand Meteorological Report for 1873: "The observations taken are limited to those for determining atmospheric pressure; maximum and minimum daily temperature of atmosphere, and of insulation and radiation; the average daily amount of moisture; the rainfall and number of rainy days; the force and direction of wind; and amount and character of cloud."

3. *Similar Instruments*.—To consider the desirableness of using the same class of instruments at all stations, and making the observations at the same local hour.

The Chairman said he was aware that in some cases instruments of different kinds were used, and thus the results were not comparable. He did not think temperature observations could be exact at all stations—a different way of exposing the thermometers made such a difference in the result. With regard to the barometer, it would be sufficient to say that it should be a mercurial barometer and not an aneroid; and with respect to the wet and dry bulb, it should mean an instrument of good class, certified to by a firm of recognized position; and the same with regard to the maximum and minimum thermometers; and the rain-gauges should be used at the same altitude from the ground.

Mr. Ellery moved, "That the instruments at each first-class station consist of a mercurial barometer of either the standard or Board of Trade form; thermometers of Kew or approved patterns, compared with standards as frequently as possible; rain-gauges of 8 inches collecting diameter; and wind-gauges of any approved form. The local hours of observation to be 9 a.m., 3 p.m., and 9 p.m. Beaufort's scale of wind to be adopted; the observations to be recorded in equivalents in velocity and pressure."

The resolution, after discussion, was agreed to.

4. *Desirability of Co-operation*.—To consider the desirableness of securing the co-operation of the Governments of New Zealand and Tasmania in the system of weather telegrams which now embraces the Colonies of South Australia, Victoria, New South Wales, and Queensland.

Mr. Ellery said, with regard to Tasmania, that for the meteorological knowledge of that colony they were indebted to the long and valuable gratuitous services of F. Abbott, Esq., of Hobart Town. But in order to provide for carrying out the proposed scheme, which involved a daily expenditure for telegrams, he would move, "That it is very desirable to obtain the co-operation of the Government of Tasmania, and to persuade them to establish a station at the public expense at Hobart Town." He did not think this would be a difficult matter if the Conference suggested it. At present there was no machinery to co-operate with, and it was very desirable that one or two first-class stations should be established. He thought it would be better not to take Launceston for a second station, which was a long way inland, but rather to take George Town.

The resolution, after discussion, was agreed to.

Dr. Hector moved, "That it is desirable to secure the co-operation of the Governments of Western Australia, New Zealand, and Tasmania in the system of weather telegrams which now

embraces the Colonies of South Australia, Victoria, New South Wales, and Queensland." With regard to New Zealand, on account of the greater expense of communication, the great range of latitude, and the consequent complicated phases of weather which occurred simultaneously in the different coastal areas, it was desirable that, instead of any definite observations or readings of instruments being transmitted, a daily synoptical report of the general conditions of the weather should be prepared at the head office in New Zealand and transmitted, together with immediate telegraphic notice of any important or exceptional phenomenon; and that the return communications to New Zealand should be comprised in a similar synoptical report of the state of the weather in the different coastal areas of Australia, to be prepared and transmitted from the Observatory in Sydney.

The resolution, after discussion, was agreed to.

Mr. Ellery moved, "That, in the opinion of this Conference, it is desirable that weather telegrams and forecasts shall in all cases depend upon the observations used for general meteorological and climatological statistics, and be under the direction of the head of the Meteorological Department in each colony."

Mr. Todd thought such a resolution was essential to prevent conflicting reports, and to insure public confidence.

The resolution, after discussion, was agreed to.

The Conference adjourned at 1 p.m., until Thursday, the 13th instant, at 10 a.m.

THURSDAY, 13TH NOVEMBER, 1879.

The Conference met at the Observatory at 10 a.m.

Present: Mr. Ellery, Dr. Hector, Mr. Russell (Chairman), and Mr. Todd.

The minutes of the previous meeting were read and confirmed.

The Conference resumed their consideration of the fourth proposition, affirming the desirableness of securing the co-operation of the New Zealand and Tasmanian Governments in the system of weather telegrams.

Mr. Todd moved, "(1.) That this Conference, having been informed that the Eastern Extension Telegraph Company will charge half rates for the transmission of weather reports through the cable connecting Australia and Tasmania, and probably also the cable to New Zealand, recommend that the cost of such reports be defrayed by the participating colonies in equal proportions; and that, in the opinion of this Conference, such cost need not exceed in the aggregate £350 per annum. (2.) That, in the opinion of the Conference, this expenditure is justified by the extreme importance to the shipping interest of early information of the approach of dangerous easterly and westerly gales." He said that, as these reports transmitted through the cable would be merely synoptical reports of the state of the weather in Australia on the one hand, and in New Zealand and Tasmania on the other, they need not be of great length. Messages comprising ten or twelve words would probably, by means of the code adopted, convey all the information that would be required. A message of ten words would cost—to or from New Zealand—at the reduced rate, about five shillings. The amount named in the resolution would therefore, in his opinion, be ample.

The Chairman said that, from the experience in reference to gales which he had obtained during a number of years, it was quite evident that from the observations taken in New Zealand and the southern colonies valuable warnings might be given. A short warning of the approach of a gale in many instances would be the means of saving a large amount of property, as the vessels could take refuge in the coast harbours. Warnings of dangerous gales might be given several days in advance, and considerable importance was attached to such information by the shipping interest. For instance, in the severe gale in which the "Dandenong" was wrecked, it had subsequently appeared that valuable information might have been given sufficiently in advance to prevent the great loss of property which took place if that information could have been furnished to the shipping interest at the different ports along the coast.

Mr. Todd entirely concurred with the Chairman as to the importance and value of this information, and especially of the reports from western stations. His observations tended to show a great regularity in the easterly march of disturbances from the westward; and the stations in South Australia, and especially in Western Australia, should be able to give the easterly colonies timely warning of approaching gales, because they would be able to report the effect of a gale which had already reached one of these stations. The information would therefore not be hypothetical, but an actual fact of which timely notice could be given.

Dr. Hector said that from a New Zealand point of view he thought it would be very advantageous that Queensland should join in this co-operation, as it would be from that quarter they would receive early notice of the origin and progress of the dangerous and suddenly-occurring cyclones that crossed the northern part of New Zealand. On the other hand, the southerly gales could not, of course, be directly predicted in Australia for New Zealand, but New Zealand could give early information to Australia of the occurrence of such gales, and probably Queensland would receive the greatest benefit from such predictions.

Mr. Ellery said that in that view of the case great advantage would be derived from the establishment of a station at Hobart Town, because if Hobart Town observations were discussed in connection with this movement on the western coast of Australia and the subsequent weather on the east coast, it would be found that those observations would often determine whether that easterly movement had become deflected by any other current. The observations at Hobart Town would indicate a considerable time beforehand whether the disturbance would become a serious one on the eastern coast of Australia. For instance, it was a fact that the gale in which the "Dandenong" was wrecked was indicated at Hobart Town thirty hours before it reached Sydney.

Mr. Todd called the attention of the Conference to the hurricane which struck the Lacipede Islands and the north-west coast of Australia on the 24th and 25th of December, 1878, as a case in point. The barometer fell to 29.50 and 28.94; at Alice Springs, in the centre of the continent, it began to fall on the 30th, reaching 29.6 on the morning of the 2nd January; at Eucla, the barometer

fell from 30·2 on the 29th December to 29·50 on the 1st January; at Cape Borda, it fell from 30·23 on the 30th December to 29·53 at midnight on the 1st January; at Cape Northumberland, it fell from 30·2 on the morning of the 30th December to 29·35 at six p.m. on the 2nd January, or six hours after Cape Borda; and the barometer fell to 29·30 at Hobart Town in the afternoon of the 2nd January, or about twenty-four hours after passing the Great Bight. The storm between the Great Bight and Hobart Town was probably identical with, or the subsequent effect of, the hurricane on the north-west coast, in which case it must have had a slow progressive motion over the Australian Continent, between the north-west coast and the Australian Bight, emerging from the coast at about the Great Bight, and occupying twenty-four hours in passing from the Great Bight to Hobart Town.

The resolution was then agreed to.

5. *Weather Telegrams.*—To consider by what means the weather telegrams may be transmitted and published for public information at an earlier hour than they are at present.

The Chairman said the idea which was present to his mind in submitting this proposition was to suggest that the weather telegrams should, in Australasia, as in Europe, take precedence of all other telegrams. This arrangement would not add in any appreciable respect to the time occupied in transmission, and the delay of five or six minutes caused by sending these messages first could not be any serious detriment to business. He thought it probable that, if the matter were represented by the Conference to the several Governments, the general principle would be adopted, and weather telegrams would take precedence of all other messages, Government telegrams of course excepted.

Mr. Todd entirely concurred with the Chairman in thinking it highly desirable that weather telegrams should have the precedence, and he saw no practical difficulty in giving effect to the resolution. No doubt the hour which had been agreed to—9 o'clock—might appear at first sight to clash with the ordinary routine business at the telegraph offices; but as a matter of fact, with the exception of the transmission of messages from the different stations to the central office at 9 o'clock, there would be no reports sent at that hour. It would probably be 11 o'clock before all these messages would be received at the central office. In his case it was generally a quarter-past 10 before he could send any weather reports to the other colonies. In the case of Western Australia it was still later, on account of the difference in longitude. So that the sending of these weather reports would not really clash with the office reports, and there was no reason why they should not be transmitted immediately, and take precedence of all private messages. He thought it only required to be properly represented to the different Governments, so that the Telegraphic Departments might be instructed that the weather reports were to take precedence, and the Telegraph Superintendents in the different colonies be relieved from any responsibility in the matter. It should be borne in mind that by the adoption of the cypher code the messages were reduced to the minimum in point of length. He would now move, "That the several Governments be requested to cause precedence to be given to the regular weather telegrams and special storm reports."

Dr. Hector said that in New Zealand they had three kinds of telegrams—*urgent*, *ordinary*, and *delayed*. The public could take advantage of this scale, and by paying 2s. could make a telegram *urgent*. Messages arriving in the evening could be sent as *delayed* telegrams in sufficient time for the morning post.

Mr. Ellery said the value of weather information was lost in many cases by delay, while it was increased in proportion to the punctuality with which it was furnished. He might state that in his last annual report he had made reference to the procedure in America and several European States who had at first to be coaxed into allowing weather telegrams to take precedence, but they now generally accorded it. Weather telegrams were of no value to the shipping and commercial interest unless they were transmitted punctually. In Victoria the Chief Secretary had entered into correspondence with the Telegraph Department of that colony on the subject, and precedence had always been accorded. He thought it would only be necessary to bring the matter before the several Colonial Governments. The only difficulty would lie with the Telegraph Departments themselves.

The resolution was agreed to.

6. *Mountain Stations.*—To consider whether meteorological stations should be established upon the highest available mountains, for the special study of winds.

The Chairman said his object in putting this proposition before the Conference was to obtain if possible records of the winds that pass over-head, and were therefore lost to the records of the lower stations. From observations made years ago by Strzelecki, it appeared that at the top of Mount Wellington he had noticed a hot wind which was not felt at all 3,000 feet lower on the same mountain; and, from similar observations in this colony, it appeared that hot winds were frequently felt at the high stations and not at those which are at a lower level. Similar facts might be stated with regard to the south-east gales, which frequently appeared first at lofty stations. He thought these facts were a sufficient reason for the establishment of stations on high mountain-peaks—the only means which appeared to him available to secure the desired information.

Mr. Ellery moved, "That, in the opinion of this Conference, there should be established in each of the colonies, upon a high mountain-peak, a meteorological observatory for the special study of winds and other meteorological phenomena; and that the most desirable positions for them would be the following:—

	About
"South Australia—Mount Lofty	2,500 feet above the sea level.
New South Wales—Kiandra	.. 4,600 feet above the sea level.
New Zealand—Tauhara, Taupo	4,600 feet above the sea level.
New Zealand—Mount Herbert	.. 4,000 feet above the sea level.
Tasmania—Mount Wellington.	4,000 feet above the sea level.
Victoria—Mount Macedon	3,500 feet above the sea level."

The resolution, after discussion, was agreed to.

The Conference adjourned at 1.15 p.m., until to-morrow, Friday, 14th instant, at 9 o'clock a.m.

FRIDAY, 14TH NOVEMBER, 1879.

The Conference met at the Observatory at 9 a.m.

Present: Mr. Ellery, Dr. Hector, Mr. Russell (Chairman), Mr. Todd.

The minutes of the previous meeting were read and confirmed.

Mr. Todd moved, "That the revision of the present telegraph weather code be referred to Messrs. Russell and Ellery, with a view to its simplification and extension."

The resolution, after discussion, was agreed to.

Dr. Hector moved, "That the interchange of weather statistics, in carrying out the suggestions of this Conference, between the different Australasian stations, should be in the form of a diagram; and that this should not interfere with the printing of statistics by the different colonies in any way they like." He would, at the same time, strongly recommend that some uniform system of publication should be gradually approximated.

The resolution, after discussion, was agreed to.

Mr. Ellery moved, "(1.) That the monthly graphic records for interchange consist of curves, showing barometer, velocity and direction of wind, temperature, humidity, rainfall; with remarks upon weather, especially with reference to storms and atmospheric disturbances; and that specific forms be prepared and distributed to the co-operating colonies. (1.) That the mean humidity curve be derived from the means of maximum and minimum of wet and dry bulb thermometers. (3.) The barometer curve to be constructed from barographic records, so as to depict the turning points. (4.) The temperature curve to represent maximum and minimum and mean for each day (5.) The velocity and direction of the wind to be deduced from the anemometer."

The resolution was, after discussion, agreed to.

Dr. Hector moved, "That, in the transmission of cablegrams, the reports be generalized from the local weather reports. For New Zealand the following subdivision into districts is recommended for conveyance of reporting:—

A.	N.E. aspect	..	North Cape to East Cape.
B.	N W aspect	..	Cape Maria to West Cape (exclusive of Cook Straits).
C.	S. aspect	...	West Cape to Moeraki.
D.	S.E. aspect	...	Moeraki to East Cape (exclusive of Cook Straits).
E.	..	Cook Straits	..
Comprising Wanganui, Wellington, Cape Campbell, and Cape Farewell, Nelson.			

A code to be framed to express the weather in each of the above aspects in general terms, according to the judgment of the reporter, thus: Aspect. Wind and Weather. | Rain. | Sea. No remark to indicate absence of marked phenomena."

The resolution, after discussion, was agreed to.

Mr. Ellery moved, "That the cablegrams furnished to Melbourne by Tasmania should conform with those between the Australian Colonies."

The resolution was, after discussion, agreed to.

Mr. Todd moved, "That weather telegrams from the Australian Colonies shall comprise—(1) Barometer reduced to 32° and sea-level; (2) dry bulb; (3) humidity; (4) maximum and minimum; (5) direction and velocity of wind; (6) state of weather; (7) rainfall; (8) sea disturbances; with a synoptical report of the weather generally: and that within New Zealand the same system should be adopted."

The resolution, after discussion, was agreed to.

Mr. Ellery moved, "That the extreme importance of the weather system proposed be strongly urged upon the Queensland Government, with a view to obtain their more active co-operation."

The resolution was, after discussion, agreed to.

It was further resolved, "That Australia be divided into six meteorological areas for transmission of reports to New Zealand—namely, Western Australia, South Australia, Victoria, New South Wales, and Queensland; South Australia being divided into two districts, tropical and extra-tropical."

The Conference adjourned at 11.30 a.m., until 7.30 p.m. the same day

The Conference met again at 7.30 p.m.

Present: Mr. Ellery, Dr. Hector, Mr. Russell (Chairman), and Mr. Todd.

The minutes of the previous meeting were read and confirmed.

It was resolved, "That weather telegrams be written on paper of a special colour, so as to be readily distinguishable in the offices."

Mr. Todd moved, "(1.) That the solar radiation thermometers should be blackened-bulb thermometers *in vacuo*, and should be exposed on an open space at an elevation of 4 feet 6 inches from the surface of the ground, supported by a post carrying two light arms. (2.) And that radiation thermometers be placed over grass."

The resolution, after discussion, was agreed to.

Mr. Ellery moved, "That the following subjects for experiment be referred to each member of the Conference, for future consideration and report: (1.) Shade temperature. (2.) Swinging thermometer, and thermometer sheds in use. (3.) Standards to be swung with 2 feet 6 inches string during sunshine and after sunset. (4.) Observations to determine the difference in humidity by self-registering maximum and minimum thermometers, and by other methods. (5.) The best method of measuring the velocity and pressure of wind. (6.) Whether any better method than the black-bulb thermometer can be devised for measuring the direct effect of the sun. (7.) As to the best method of determining spontaneous evaporation."

The resolution was discussed and agreed to.

Mr. Ellery moved, "That, as investigation of the Newcastle tide-gauges has shown that such instruments give valuable indications of distant earthquakes, gales, and sea disturbances, it is desirable, in the opinion of the Conference, that self-registering tide-gauges be established in as many convenient places as possible on the coast in connection with the Meteorological Departments of the different colonies."

The resolution was, after discussion, agreed to.

Dr Hector moved, "That the foregoing minutes be adopted as the report of this Conference on the various matters referred to it, and that the Chairman be requested to report to the Government of New South Wales."

H. C. RUSSELL.
ROBT. J. ELLERY.
CHARLES TODD.
JAMES HECTOR.

By Authority: GEORGE DIDSBURY, Government Printer, Wellington.—1881.