CORRESPONDENCE

IN RELATION TO

A UNIVERSAL SYSTEM

OF

METEOROLOGICAL OBSERVATIONS,

FOR THE

SEA AS WELL AS FOR THE LAND.

BRITISH LEGATION,

Washington, Nov. 13, 1851.

SIR:—I have been instructed by Her Majesty's Government to present to the United States Government the printed volume which I have the honor to enclose herewith, which has been drawn up by Major General Sir John Burgoyne, Inspector General of Fortifications, for the purpose of enabling the officers of the Royal Engineers at foreign stations to take meteorological observations upon an uniform plan; and I am directed to say, that her Majesty's Government would be glad to obtain such co-operation in regard to the objects to which those instructions relate, as the proper department of the United States Government may be willing to afford.

I avail myself of this opportunity to renew to you, Sir, the assurances of my highest consideration.

(Signed) JOHN F. CRAMPTON.

The Honorable DANIEL WEBSTER, &c., &c., &c.

DEPARTMENT OF STATE,

Washington, Nov. 14, 1851.

SIR:—I have the honor to transmit to you, herewith, the copy of a note just received from Her Britannic Majesty's Chargé d'Affaires in this city, together with the printed volume which accompanied it, relative to the co-operation of the Government of the United States with that of Her Britannic Majesty, in carrying out a plan which it has adopted, for the taking of uniform meteorological observations at foreign stations, and to invite your attention to the subject.

I am, Sir, very respectfully,

Your obedient servant,

DANIEL WEBSTER.

Hon. WILLIAM A. GRAHAM,

Secretary of the Navy.

BUREAU OF ORDNANCE AND HYDROGRAPHY,

Nov. 19, 1851.

SIR:—With this you will receive a communication from the Chargé d'Affaires of Great Britain to the Secretary of State of the United States, covering a printed pamphlet in relation to meteorological observations, and proposing a coöperation by the officers of our Government in making similar observations.

After perusing them you will please state whether such coöperation could be made at the Naval Observatory without interference with other duties, or making any material changes in any arrangements which may now be in use there, for similar purposes. You will also give your views whether any useful coöperation, direct or indirect,

could be furnished by our vessels at sea, with the instruments usually furnished to them, or at any of our Navy Yards, either with their present instruments or by the aid of others to be furnished for that purpose; and if so, at what yards such observations would be most desirable, having regard to the observations of this kind which are known to be made at different places in connection with the Smithsonian Institute, and public observatories.

Return all the enclosures after perusal.

Respectfully, your obedient servant,

C. MORRIS,
Chief of Bureau.

LIEUT. M. F. MAURY,
Supt'dt. &c., &c., Washington.

NATIONAL OBSERVATORY,
Washington, Nov. 21, 1851.

SIR:—I have the honor to acknowledge the receipt of yours of the 19th inst., inclosing a communication from the Chargé d'Affaires of Great Britain to the Secretary of State of the United States, with certain other papers and documents, relative to a proposition by the British government, to the effect that the government of the United States will cause its officers who are engaged in making meteorological observations, to cooperate with the Royal Engineers engaged upon like duties on foreign stations, according to the plan set forth in the "Instructions for taking meteorological observations at the principal foreign stations of the Royal Engineers," drawn up by Major General Sir John Burgoyne, Inspector General of Fortifications.

I am directed by you to state "whether such coöperation could be made at the Naval Observatory without interference with other duties, or making any material changes in any arrangements which may now be in use there for similar purposes," also, to give my "views whether any useful cooperation, direct or indirect, could be furnished by our vessels at sea, with the instruments usually furnished to them, or at any of our Navy Yards, either with their present instruments, or by the aid of others to be furnished for that purpose, and if so, at what yards such observations would be most desirable, having regard to the observations of this kind which are known to be made at different places, in connection with the Smithsonian Institute and public observatories."

In reply, it gives me pleasure to state that the desired cooperation can be made at this Observatory, and at the naval stations generally, without interference with other duties, and with very slight changes in fixtures and arrangements now in use for like purposes.

This is an important subject. Many of the great interests of state, and the well-being of the human family are to be advanced by increase of knowledge touching the dynamical laws of the atmosphere, and the distribution through it, over the surface of our planet, of electricity, heat and moisture.

For the fruits of his labor the husbandman is dependent upon atmospherical conditions, and commerce is controlled by the course of the winds. The subject, therefore, is one of high scientific interest, and of great national, industrial, and practical import. The step proposed by the British Government is in the right direction: wherefore, to make myself the more clearly understood, I may

be excused for referring to the meteorological system of the United States, and for offering a few suggestions amendatory of the British proposition.

The government of the United States has its own system of meteorological observations; one for the sea, another for the land.

Some of the States, as New York and Massachusetts, have, on their own account, established their system of meteorological observations also.

Also, some of the institutions of the country, as the "Smithsonian," and many of our fellow-citizens, are likewise actively engaged in meteorological researches.

The meteorological observatories that are under the control of the different States, of the institutions, and of the private citizens of the United States, amount to several hundred. These extend from the shores of the Atlantic to those of the Pacific, and from the farthest northern boundary to the extreme southern limits of the United States.

Over these widely scattered observatories, and over this large corps of observers, their time for observation, their mode and means of observing, and their methods of recording the results of their labors, the government of the United States has no control whatever; nor can it exercise any, except such as may flow from precept and example.

Nevertheless, these observatories, both national, state and private, for the most part, act in concert. They mostly employ the same instruments, refer to the same standards; many of them observe at the same hours, use the same methods, and record by the same forms, most of which differ more or less from those recommended by Major General Sir John Burgoyne for the nineteen "foreign stations of the Royal Engineers."

I do not mean to draw comparisons, or to imply that, of the American and English systems, one is better than the other; far from it. Each is good; and if either be adopted, and made common to the two countries, the science of meteorology would be vastly benefitted and advanced thereby.

If the government of the United States, therefore, without proposing amendments to the English system, were to direct its officers, who are engaged with meteorological observations, to adopt the plan, modes and methods of that system, it would create confusion among our observatories, and be as likely to retard as to advance the progress of meteorological research in the United States.

For this reason I beg leave to suggest a meteorological conference.

By authority of the government, I have been permitted to invite the cooperation of American shipmasters in making daily, in all parts of the ocean, as they pursue their voyages to and fro, a series of meteorological observations.

By an act of Congress, authority has been given for all the vessels of the Navy to do the same.

The object of this cooperation is not only to improve, for the benefit of commerce and navigation, our knowledge with regard to the winds and currents of the sea, but to investigate the laws of atmospherical and oceanic circulation, and to advance the science of meteorology generally.

Under this invitation, more than a thousand American merchant vessels are engaged in making and recording their observations according to a prescribed form. At the end of the voyage their journals are regularly returned to this office.

They constitute the materials from which the "wind and current" charts are constructed. These charts, on account of the meteorological information they afford, have led to the developments of new and shorter routes across the seas, and to several other results of interest and value. I beg leave to send a set of them, the explanations which accompany them, &c., for the inspection of Her Majesty's officers.

About five-sevenths of our planet is covered with water.

It will be perceived, therefore, that in studying the course of the "wind in his circuits," and investigating the laws which govern the general circulation of the atmosphere, we must look to the sea for the rule—to the land for the exceptions. Therefore, no general system of meteorological observations can be considered complete unless it embrace the sea as well as the land.

The value of the researches conducted at this office with regard to the meteorology of the sea, would be greatly enhanced by cooperation from the observatories on the land.

Observers with the requisite instruments for this purpose, are already at the principal stations. It is as convenient for them to observe in, as without, concert; for to observe in concert, and according to a uniform plan, would be attended neither by an increase of time, labor or expense; but on the contrary, be a saving of all.

Hence, another reason for suggesting a conference upon the subject of a uniform system of meteorological observations on board British and American ships, as well as at British and American posts, stations and observatories. On board of every properly appointed ship of both nations, all, or nearly all, the observations which would probably be recommended for this universal system, are already

made. It is the custom to keep a log-book on board of every ship, and to enter in that log-book remarks and observations upon the winds, the weather, and the sea; and all that is requisite to impart a new and a greater value to these observations, is that they should be made all at the same time, recorded in a stated journal—the "abstract log" kept for the purpose—and then be made available by being returned to the office appointed to receive them.

The atmosphere envelopes the earth, and all nations are equally interested in the investigations of those laws by which it is governed. There is Russia, upon whose territories the Sun, except in the long night of the Polar winter, never sets, perhaps she, of all nations, has gone to the greatest expense in establishing meteorological observatories on the land, in collecting and publishing results, &c.

From what has already passed between Kupffer, the Russian meteorologist, (also in charge of the mines,) and myself upon the subject, I am induced to believe that he is already authorized, by the proper authorities in that country, to confer with the proper authorities in this, as to the establishment of a uniform system of meteorological observations on the land, for the two countries.

The achievements of France and Germany, in the paths of science, and the monuments they have erected in its name, do not admit us to doubt but that they too, would readily and most heartily second any move which has for its object the great good of establishing, among civilized nations throughout the world, a uniform and universal system of meteorological observations.

There are other nations of Europe not a whit behind Germany and France in their devotion to science, their love of the useful.

For these reasons I therefore respectfully suggest that as an amendment to the British proposition, a more general system be proposed. That England, France, Russia, and other nations be invited to cooperate with their ships, by causing them to keep an abstract log, according to a form to be agreed upon, and that authority be given to confer with the most distinguished navigators and meteorologists, both at home and abroad, for the purpose of devising, adopting, and establishing a universal system of meteorological observations for the sea as well as for the land.

Respectfully, &c.;

(Signed) M. F. MAURY,
Lieut. U. S. N.

Com. CHAS. MORRIS,
Chief of Bureau of Ord. and Hyd., Present.

BUREAU OF ORDNANCE AND HYDROGRAPHY,
Dec. 5, 1851.

SIR:—I have the honor to acknowledge the receipt of your letter of the 17th ultimo, which covered a note to the Secretary of the Navy, from the Secretary of State, transmitting a communication from Her Britannic Majesty's Chargé d'Affaires in this city, and a printed volume relative to the cooperation of the Government of the United States with that of Her Britannic Majesty, in carrying out a plan which it has adopted for the taking of uniform meteorological observations at foreign stations.

To enable me to state more fully the extent to which the Navy is prepared to unite in the proposed cooperation, than my recent connection with this Bureau enabled me to do from personal knowledge, a letter was addressed to the

Superintendent of the Observatory—a copy of this letter, and of Lieut. Maury's reply, are herewith enclosed.

With a set of Wind and Current Charts, and explanations of them, which have been furnished by Lieut. Maury, I forward Professor Espy's Third Report on Meteorology, and a communication received from Professor Henry, of the Smithsonian Institution, on the same subject.

Collectively, they show the general character and extent of the meteorological observations which have been made in the United States; and the practical and useful application which has been made of these observations, that have been collected under the direction of the Navy Department. The transmission of these, for the inspection of the officers of Her Britannic Majesty, who are engaged or interested in similar observations, is respectfully suggested and submitted for your decision.

Although I concur in the opinion of Lieut. Maury, that it would be inexpedient to substitute, at this time, the plan for observations proposed by General Burgoyne, for that now followed in establishments and vessels under the direction of the Navy Department: changes and additions could probably be made, which could secure a nearer approach to uniformity in our shore establishments, without producing confusion, and they are respectfully recommended to that extent.

The suggestions for a more general and widely extended coöperation upon some uniform plan, promises so many advantages, that hopes may be reasonably indulged for its eventual adoption.

Notwithstanding strict uniformity cannot be yet secured between the observations made by our officers and the British Sovereign's, an interchange of such observations or

of the deductions drawn from them, seem to be very desirable, and a proposal for such exchange is respectfully suggested.

With much respect, I am,

Your obedient servant,

CHARLES MORRIS,

Chief of Bureau.

To the Hon. WM. A GRAHAM,

Secretary of the Navy.

NAVY DEPARTMENT,

December 6th, 1851.

SIR:—The communication from the State Department of the 14th ultimo, transmitting a copy of a note from Her Britannic Majesty's Chargé d'Affaires in the city of Washington, together with the printed volume which accompanied it, relative to the cooperation of the government of the United States with that of Her Britannic Majesty, in carrying out a plan which it has adopted for the taking of uniform meteorological observations at foreign stations, and inviting the attention of this Department to the subject, was duly received, and referred to the proper bureau for a report as to the extent to which the Navy of the United States is prepared to unite in the proposed cooperation.

This Department, appreciating the importance of cooperation in the meteorological researches between the officers of the Royal Engineers of Her Britannic Majesty's Army, and the officers of the United States, acting under the authority of the Navy Department, cordially reciprocates

the spirit in which the proposition of the British government is made.

Concurring in the opinions and approving the suggestions contained in the accompanying letters from the Chief of the Bureau of Ordnance and Hydrography, and from the Superintendent of the Naval Observatory, as to the importance of a system of meteorological observations which shall harmonize and be a guide and rule among observers generally, both at sea and on land, I beg you will assure Her Britannic Majesty's Chargé d'Affaires that it would afford not only this Department, but the institutions of our country, great satisfaction to see British and American ships, American and British meteorologists, coöperating with others in establishing a general and comprehensive system of observations, and of carrying it out in such a manner that an observation in one part of the world may be readily referred to and compared with like observations made in other parts of the world, and that for the purpose of giving practical effect to these views, the Superintendent of the Naval Observatory is authorized to confer as to such an uniform plan, with Her Majesty's officers, and others of proper jurisdiction, at home and abroad, and, in concert with them, to agree upon a system of observations both for the sea and the land, and which, by being common, effective, and of easy execution, may be followed by meteorologists and navigators generally.

And in connection with this subject, I have the honor to transmit with this communication, a letter from the Chief of the Bureau of Ordnance and Hydrography, with one from the Superintendent of the Naval Observatory, and one from Professor Henry, of the Smithsonian Institution, also, Lieutenant Maury's sailing instructions, with

his wind and current charts, and Professor Espy's second and third Reports on Meteorology.

With very great respect,

I have the honor to be your obedient servant,

(Signed) WM A. GRAHAM

DANIEL WEBSTER, *Secretary of State.*

NAVY DEPARTMENT,

December 6th, 1851.

SIR:—Enclosed with this you will receive a copy of a letter from the Honorable Secretary of State to this Department, and the reply thereto, as well as a copy of one from the Chief of the Bureau of Ordnance and Hydrography, relative to the cooperation of the government of the United States with that of Her Britannic Majesty, in carrying out a plan which it has adopted for the taking of uniform meteorological observations at foreign stations.

In furtherance of the views expressed in the letter from this Department to the Secretary of State, you are hereby authorized to confer with Her Britannic Majesty's officers, and others of proper jurisdiction, at home and abroad, and, in concert with them, to agree upon a system of observations, both for the sea and the land, which may be followed by meteorologists and navigators generally.

And you will report to this Department, from time to time, the progress made and the results reached in the adoption of such uniform system of observations.

I am, very respectfully,

Your obedient servant,

WM. A. GRAHAM.

Lieut. M. F. MAURY,

Sup't U. S. Naval Observatory, Washington, D. C.

*Extracts from "Instructions for Taking Meteorological Observations,—Drawn up by Order of the Inspector General of Fortifications, by Captain Henry James, R. E., F. R. S. &c."**

"A 'notice' of the arrangements which have been made for having Meteorological Observations taken at the principal foreign stations of the Royal Engineers, has been published in the corps papers for this year. this "notice," with some alterations and additions, is now printed as a separate paper, as instructions for the observers.

Since the publication of the "notice," Major General Sir J. Burgoyne has, with the sanction of the Master General of the Ordnance, invited the co-operation of the Honorable Board of Directors of the East India Company, and the Board of Admiralty, for having similar observations taken in India, and at those places where the Admiralty have officers competent for the duty, and where there are no other meteorological observatories; and, in consequence, the Board of Directors have ordered twenty sets of instruments to be sent to India, and the Admiralty have ordered four sets to be sent to Ascension, Rio de Janeiro, Callao and Valparaiso. All the instruments are of a similar construction, and will be compared with the standards at the Royal Observatory at Greenwich, thus, with the observations taken at the different Government observatories, both at home and abroad, and by the members of the Meteorological Society of London, who have provided themselves with similar instruments, and have many zealous observers amongst their number—and with the observations taken in the different States of Europe and America, under the patronage of their respective Governments—and by Her Majesty's Consuls abroad, who have been instructed by Lord Palmerston

*Circulated by order of Major General Sir John Burgoyne, K. C B., Inspector General of Fortifications, &c., &c.

to carefully observe and accurately record atmospheric phenomena; to determine the laws, by which storms and variable winds are generated (see his Lordship's letter and inclosures in the appendix*) that a greater combination has been effected for collecting accurate data connected with the science of meteorology, than was ever before attempted. The observers, therefore, are earnestly requested zealously to perform their several parts, by regularly and carefully registering their observations, so as to make each set of observations as complete as possible, and thus to furnish accurate data for determining the laws of atmospheric phenomena, and the peculiarities of the climate of the different parts of the world.

The following memorandum from the Inspector General of Fortifications has been addressed to the commanding officers of Royal Engineers;

'It having been suggested to the Master-General that it might be highly useful to science if a series of meteorological observations were recorded in different parts of the world, on one uniform system, under instructions and by authority, his Lordship has consented that the object should be carried out at the nineteen stations as enumerated below by or under the immediate directions of the Commanding Royal Engineers at each.

Names of Stations.

1 Bahama,	7 Demerara,
2 Barbadoes,	8 Gibraltar,
3 Bermuda,	9 Guernsey,
4 Cape,	10 Halifax.
5 Ceylon,	11 Hong Kong,
6 Corfu,	12 Jamaica,

*P. P. 16–25.

13 Malta,
14 Mauritius,
15 Newfoundland,
16 New South Wales,
17 St. Helena,
18 Toronto,
19 Quebec.

'Instruments, instructions and books of reference of an uniform description will be forwarded to each station.

'The endeavor, in the arrangements, has been to commence, upon a system that shall be compatible with the acquirements of any officer of Engineers, and that shall enable him without difficulty to take measures for a due record being kept, of every matter required, and, at the same time, not call upon any exertions or unnecessary attendance that shall interfere with the more regular necessary duties of the Department.

'The Inspector General of Fortifications attaches very great importance to this measure and trusts to meet with the zealous co-operation of the several commanding Royal Engineers, to carry it out in the most perfect manner.

'He requests an early communication from the Commanding Royal Engineers of the first measures taken by them in the matter, with any remarks they may have to offer, and subsequently he would be glad of information, from time to time, of the mode and regularity of the proceedings, with any circumstance worthy of observation."

From the Appendix to the same.

"FOREIGN OFFICE,
April 30, 1851.

'SIR: I transmit to you copies of a letter, with its inclosures, which I have received from Colonel Reid, of the Royal Engineers, who for many years has devoted his attention to the theory of storms, and whose object has

been to investigate, with a view to practical use in navigation, the laws by which storms and variable winds are governed.

In order that an investigation of this nature may be practically useful, it is essential that facts connected with the atmospherical phenomena in question should be carefully observed and accurately recorded over as large a portion as possible of the surface of the globe by persons of education, and whose scientific attainments or professional avocations qualify them for making such observations.

Colonel Reid has suggested that such observations could be most easily made and recorded by captains of ports, masters of light-houses, harbor masters, and others, whose professional pursuits naturally lead them to be constant observers of atmospherical phenomena.

The inclosures in Colonel Reid's letter will more fully point out the manner in which information on the subject of storms may be collected.

I have accordingly to instruct you to use your best endeavors to procure such information on this important subject; and you will transmit to me half yearly an abstract of the information you may have obtained, with such remarks as may suggest themselves to you. If you can add diagrams to show the tracks of any remarkable storms, it would greatly add to the value of your reports. As it is of importance to circulate as widely as possible information as to storm tracks, you should encourage the publication of such information in newspapers and periodical works.

I am, sir, your most obedient,

Humble servant,

(Signed) PALMERSTON.

HER MAJESTY'S CONSUL,

At———

[Inclosure—1.]

Lieutenant Colonel Reid to Viscount Palmerston.

14 KENSINGTON GORE,
April 15, 1851.

MY LORD: I have the honor to acknowledge the receipt of your Lordship's letter, dated 20th March, 1851, transmitting to me certain documents on the subject of storms. I have sent copies of the whole of them to Mr. Redfield, of New York, having asked the favor of the American Minister to transmit them for me, I inclose herewith a copy of a letter, which I wrote to Mr. Lawrence on transmitting the second set of documents, with the answer which I have received in return.

I have no doubt that the representations of Mr. Lawrence will have the effect of extending these combined Meteorological Observations, hitherto confined to the North Atlantic ocean, to all other parts of the world where American and British officers meet.

I venture to suggest to your Lordship, that a copy of the letter which Mr. Lawrence has addressed to me be circulated amongst the British Consuls. I inclose also a copy of a circular letter, which was addressed by Lord Glenelg, in 1838, to the Governors of all the British Colonies, which circular letter describes the manner in which information on the subject of storms may be collected; and which if your Lordship should think fit also to transmit it to the consuls, it would serve as a very useful guide to them.

I must apologize to your Lordship for proposing to give so much trouble, but I do so from a conviction that further knowledge of the atmospheric laws can only be obtained

by interesting very many individuals in the inquiry over extended portions of the globe.

I have, &c.

(Signed) WM. REID,
Lieut. Colonel Royal Engineers.

[Inclosure—2]

Lieutenant Colonel Reid to Mr. Abbott Lawrence.

11 KENSINGTON GORE,
April 10, 1851.

SIR:—After I had sent to your Excellency, on the 3d instant, some documents on the subject of Atlantic storms, I received the enclosed papers from the Foreign Office, sent to me by the direction of Lord Palmerston. As these particularly relate to a storm which Mr W. C. Redfield has been tracing, I beg you will do me the honor of transmitting them for that gentleman.

I take the liberty of informing your Excellency that the attention of the Governors of all British Colonies has been long ago directed to the furtherance of the study of storms, and that Lord Palmerston has directed the attention of British Consuls to the same subject. More recently, an order has been given by the Ordnance Department, to send Meteorological instruments to the commanding engineers at all the British Colonial stations. The American and British people have an immense advantage in using the same language, which has enabled us to trace the storm tracks from the West Indies to Labrador, and thus to make a great step in advance in Meteorological science.

My object in entering into this explanation to your Excellency, is respectfully to suggest for your consideration, whether great benefit might not result if your Government

would invite your Consuls and Naval Officers, wherever stationed, to join their efforts to those of British Consuls and Officers, in investigating the laws of the winds. A notice published in India by the Governor General, by desire of the Court of Directors, has led to the most important practical results. It is by the combined efforts of American and British, that the knowledge we now possess of Atlantic storms has become of great practical use in navigation, and the unlimited extension of similar efforts to other seas, would, I trust, be of benefit to mankind generally.

I have, &c.

(Signed) WM. REID.

[Notification.]

CALCUTTA,

Wednesday, September 11, 1839.

The importance of investigating the course and phenomena of storms, has been brought to the notice of Government by the Honorable Court of Directors, and the Honorable the President in Council, is in consequence desirous of obtaining local registers of these phenomenas, taken simultaneously at as many stations of India as may be found possible. The public officers of the different settlements and stations of India, are accordingly invited and requested, upon the occurrence of any hurricane, gale, or other storm of more violence than usual, to note accurately the time of its commencement, the direction from which the wind first blows, whether in gusts or regular, and whether accompanied with rain, thunder and lightning, or other phenomena. Also, to note, with as much accuracy as possible, the changes of direction in the wind, and the time of oc-

currence of each, and lastly, the duration of the gale, and in what quarter the wind is when it ceases. The variations of the thermometer and barometer at each period noticed, will also be of importance, if the means are forthcoming of making such observations.

The President of the Council refrains from making it the business of any particular officer to note the above circumstances, but relies on the known desire of all enlightened persons to promote objects of scientific and useful enquiry that the public officers will arrange in such a manner as to insure that the observations will be taken by some one in the vicinity of each station.

Reports upon matters of the description comprehended in this order may be forwarded to the Secretary to Government in the General Department, free of postage (superscribed "Storm Report.")

A scientific gentleman* in Calcutta has obligingly undertaken to combine all reports, that may be so received into a synopsis for exhibition of the results, in the manner adopted and recommended by Colonel Reid, R. E.

By order of the honorable the President of the Council of India in Council.

(Signed) H. T. PRINSEP,
Secretary to the Government of India

[Inclosure—3.]

Mr. Abbott Lawrence to Lieutenant Colonel Reid.

LEGATION OF THE UNITED STATES,
London, April 11, 1851.

SIR:—I have the honor to acknowledge the receipt of your letter of yesterday, inclosing for Mr. Redfield a report

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"*Mr. Piddington"

from Her Majesty's Consul at St Michael's, of a storm in the Atlantic. I shall have great pleasure in forwarding these to Mr. Redfield, as before, through the Government at Washington, and I shall, in compliance with your suggestion, invite its continued attention to this subject, as I am fully sensible of the important results that may flow from observations vigorously prosecuted with the extended means the Mercantile and Naval Marines and the Consular force of Great Britain and the United States afford.

I have, &c

(Signed) ABBOTT LAWRENCE.

[Inclosure—4.]

Circular to Governors of British Colonies.

DOWNING STREET,

November 29, 1838.

SIR:—I transmit to you a copy of a work lately published by Lieut. Col. Reid of the Royal Engineers, entitled "The law of Storms." The object of the work is to develope, with a view to practical uses in navigation, the laws by which storms and variable winds are governed. In order to make an inquiry of this nature truly useful, it is essential that the facts connected with such phenomena should be collected and arranged over an extended surface, and that accurate records of them should be kept by persons whose education and scientific or professional avocations enable them to estimate the value of such records.

It has been suggested to me that such records could be most easily obtained, and the inquiries on which Colonel Reid has entered be most advantageously followed up, by inviting the cooperation of captains of ports, masters of light-houses, harbor masters, and others, whose profes-

sional pursuits naturally lead to the observation of atmospheric phenomena.

A perusal of the inclosed work will convince you of the interest and importance of this inquiry, and I feel assured that you will be anxious to do all in your power for its promotion.

I would, therefore, request you to communicate with such officers or private individuals in the colony under your Government, as may appear to you best qualified to furnish information on the subject, pointing out to them the service which they would render to science, by keeping journals of such phenomena as may come under their respective observations.

The form in which such journals should be kept is suggested in the memorandum herewith inclosed.

If you should succeed in setting on foot a system of observations, you will have the goodness to transmit to Her Majesty's Government, half yearly, an abstract of the journals at your command; and I would suggest that you should endeavor, as much as possible, to obtain authentic information of the same nature from the foreign countries in your neighborhood.

I have, &c.,

(Signed) GLENELG.

Memorandum respecting the records to be kept of the state of weather in the British Colonies.

The Captains of ports, harbor masters, and keepers of light-houses, or where those officers do not exist, some other competent public functionary should be requested to keep journals of the weather, on the principle of the Log-

books of ships. A column should be specially reserved for inserting the height of the barometer.

Under the head of "Remarks," should be entered all Meteorological Observations considered worthy of particular notice.

When a keeper of a journal may hear that a vessel has encountered a storm, he will enter in it any information on the subject which he can rely on, together with the name of the ship, of her owner, and of the port to which she may belong.

With the view of tracing the course of storms, the Trinity Board of London have given directions for the adoption of measures to obtain a more accurate record of the state of the weather, than has hitherto been kept at the light-houses of Great Britain and Ireland.

The keepers of these lights having the opportunity of taking their observations, by night as well as by day, great advantage may be derived from employing them in this manner. Officers in charge of colonial light-houses, should be instructed to keep similar journals. In noting the wind's force, both in the harbor masters' journals and in the light-house reports, it is desirable that the officers should adopt the numbers for denoting the strength of the wind in use at Greenwich Observatory, and about to be introduced at the light-houses under the Trinity Board.

In the cases of St. Helena and Ascension, it is desirable that more precise information respecting the "Rollers" at those Islands should be obtained.

As the object of Her Majesty's Government, in instituting these inquiries, is the advancement of knowledge or science generally, the Governors of the several British Colonies will consider how far it may be in their power to

obtain useful information bearing on the subject, from countries adjoining to their Government in the possession of foreign powers, or how far it may be useful to the study of Meteorology, to exchange the observations made within their Governments, for those of other countries in the neighborhood.

If at any time desired, there would be no objection to the publication in the colonial newspapers of extracts from the journals."*

I have deemed the foregoing necessary to a proper understanding of the question herewith submitted to the seafaring, the Meteorological and Scientific communities of the world, and for the information of all others upon whose cooperation and assistance, the successful accomplishment of the important objects in view, depends.

It will be observed that the Meteorologists and Government of Great Britain have already taken steps for enlisting a large corps of laborers in the Meteorological field, and that the American proposition is offered only as an amendment thereto.

To make the system complete, it appeared necessary to spread it out over the sea, as well as the land; and to secure the requisite concert of action among observers in all countries, it was thought advisable to propose a conference of Meteorologists generally, at which the kind and construction of the instruments to be used, the subjects of observation, the time and method of observing, with the form of recording the observations, &c., may be discussed and arranged; and at which, also, all the arrangements for a universal

*See pp. 23--28—Appendix to Instructions for taking Meteorological Observations at the Principal Foreign Stations of the Royal Engineers.

system of observation, including a series for the sea as well as for the land, may be made, and the plans for carrying them out recommended for the approval and adoption of those upon whose co-operation the successful prosecution of the scheme must rely. It is proposed that this conference shall be as general as is the field of research: and, therefore, it is desired that all those who have it in their power to assist, will take part in its proceedings, either by personal representation or written communication, as to them may seem best.

The time and place for holding this conference, have not been agreed upon; but as soon as they are, they will be made known. In the mean time, communications have been addressed to the diplomatic functionaries of the various Governments represented in Washington, requesting them to bring the subject to the notice of their Governments. The replies of these gentlemen are encouraging: they give reason to expect that their Governments will give the proposition a favorable consideration.

After the details of the plan shall have been agreed upon in conference, it is supposed that the parties therein represented will co-operate in giving effect to the plan, by directing the observations to be made according to it, on board public ships, at Military Posts, at Light-Houses, Hospitals, and all other Government establishments and institutions at which it may be convenient or desirable to institute a series of meteorological observations.

But, as important as such a co-operation on the part of Governments would be, and as greatly to be desired as it is, that co-operation would by no means cover the whole ground; nor would the corps of laborers thus brought into the field, though every State in Christendom should unite

in the scheme, be sufficient to gather the harvest that it is proposed to reap.

The plan, though it fully recognises the value of the aid which Governments can give, by no means overlooks the importance of that kind of co-operation and aid which is to be derived from the hearty good will of good men, and from the voluntary co-operation of that powerful corps of Meteorological observers and navigators who labor in the private walks of life.

"Man is a Meteorologist by nature;" and every one who observes the wind and the weather, and who is in the habit of noting the thermometer and the barometer, is already an observer whose services it is desired to secure, and whose labors in the field meteorological, the plan in contemplation proposes to make available. In like manner "all who go down to the sea in ships," are invited to co-operate: for they, too, are observers. That this immense corps of laborers who are already in the field should act in concert and "pull together," is the object of the present plan Therefore, the men of science, the scientific societies, the ship owners and ship masters, the directors of corporations, and the faculties of universities, and the members of the various institutions for the promotion of science, and good men everywhere, are requested to lend this scheme their good will, their influence, their aid, and their co-operation.

The importance of concert among Meteorologists all over the world, and of co-operation between the observer on the shore and the navigator at sea, so that any meteorological phenomenon may be traced throughout its cycle both by sea and land, is too obvious for illustration, too palpable to be made plainer by argument. And therefore

the proposition for a general conference to arrange the details of such a comprehensive system of observations, addresses itself to every friend of science and lover of the useful in all countries.

The domain of this science is the atmosphere: its boundaries embrace the land and cover the sea. To comprehend the laws which govern the movements of a machine so vast as it is, requires that its operations should be observed in all its parts, and watched from all points at the same time. Its motions are freer and less obstructed over the water than they are by the land and across the mountains. Indeed, the ocean itself may, in one sense, be regarded as a grand expression of meteorological agencies; therefore the good-will and friendly co-operation of private ship owners and masters, in all maritime countries, is considered of great importance to the cause in hand.

Many of these in America have already shown their willingness to enter this field as co-laborers. Several hundreds of them are already co-operating with me in a system of observations according to a prescribed form, and from which several highly important results, both practical and scientific, have already been obtained. It is presumed that the ship owners and masters of other countries will be equally as willing, and equally as zealous to second and to take part in such a system of observations as those of America have shown themselves to be.

These observations at sea possess a double value: they help us, as do those on the land, to a right understanding of the meteorological machinery of the earth; and they also help us in the safe navigation of the seas and in the industrial pursuits of commerce.

By how much the commercial marine of every country

is more extensive than its naval, by so much more valuable is the assistance which the former is capable of rendering. How far are the owners and masters of the private ships under the various flags, inclined to furnish their vessels with the necessary instruments—to use them—to record the observations all according to the same form—and at the end of each voyage, to transmit them to the Repository that may be designated to receive them?

Upon the answer which the sea-faring community of each nation, shall give to this question, depend the importance of the aid, and the value of the co-operation which they will render in this undertaking. If they will but unite in one long pull together, the ocean, at their word may be covered with floating observatories, each one without interruption to owners or inconvenience to master, propounding as he goes, the same questions to nature; and all of them may, at the same instant, though scattered over the whole face of the earth, be extracting and recording her answers thereto.—These answers when brought together, compared and sifted, cannot fail to reveal truths and principles of the highest interest to mankind.

The missionaries who are stationed among the islands and in heathen lands form also a class capable of rendering the most valuable assistance in any comprehensive system of meteorological observations. As a corps of observers they are not to be excelled—they visit parts of the world which cannot be brought under the system except through their instrumentality. While teaching savage man the principles of Christianity, and spreading around him the blessings of civilization, these devout men have also rendered most important services to the cause of science; and it is not doubted that when such a subject as this shall be brought to their notice, they will gladly lend it co-operation also.

Such are the classes and the individuals for whose consideration I now submit the proposition for a universal system of meteorological observations, for concert of action between the navigator at sea and the observer on shore, and for a general conference in which all the details connected with such a system shall be discussed and arranged.

As before stated, the subject has been brought officially before the various governments, through the regularly appointed channels of communication. They have been invited to assist and coöperate.

It is proposed, therefore, before taking any definite action either as to the further details, or as to the time and place for holding the conference, to wait for the replies to these communications. In the mean time, however, I avail myself of this means of bringing the subject to the notice of the meteorologists, navigators, and the friends of science generally, with the hope that thereby the cause will be advanced, and that all whose good will, friendly councils, and coöperation are concerned, will take the matter into consideration, and be prepared to lend their support to a scheme which has for its object nothing but universal good.

To prevent misconception, it is proper to state that the plan proposed is based upon the principle of voluntary coöperation, and that I have no authority to pledge the Government of the United States for any expense whatever.

All of which is respectfully submitted,

M. F. MAURY,
Lt. U. S. N.

U. S. N. Observatory,
December 13, 1851.