



## SUMMARY OF DATA ON UNIFORMITY IN STORM WARNING SIGNALS.

by Rear-Admiral A. P. NIBLACK, *Director.*

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### NEED FOR GREATER UNIFORMITY IN ALL AIDS TO NAVIGATION.

When travelling on land many difficulties are encountered through the different languages one has to employ to get the necessary information, but the seafarer not only encounters different languages but also the different sign languages which are provided as aids to navigation, such as the symbols and abbreviations on charts, characteristics of coastal lights, buoys and beacons, buoy lighting, tidal-signals, coastal and port signals, life saving and distress signals, visual signal stations, all types of sound signals and, what we are now considering, storm warning signals. It takes a small library to untangle all the complications encountered. However beset with difficulties may be the question of adopting a universal language, such as Esperanto or Ido, *etc.*, there should be, on the other hand, no great difficulty in agreeing on uniformity in signs and symbols, a sort of international sign language, such, for instance, as that now coming into vogue, on a much smaller scale, along well-marked automobile roads. This Bureau has, as one of its missions, that of aiding in "rendering navigation easier and safer in all the seas of the world", and is constantly endeavouring to bring about, through consultation with its States Members, as much uniformity in all aids to navigation as will minimise the difficulties due to differences in languages. It is, however, not only like the differences in languages; it is like the question of dialects of the same language. Not only are many of the port signals, for instance, different in different countries, but they are different in different ports of the same country. This Bureau, therefore, will not cease its agitation in favour of arriving at as much standardisation or uniformity as can be secured through intelligent appeal and through the expressed wish of its States Members.

## DIFFICULTIES WHICH THIS BUREAU ENCOUNTERS.

International organisations, societies, or associations on every conceivable form of human activity meet, from time to time, for a few days to discuss their special technical subjects of mutual interest, and then adjourn. The difficulty with many of these international associations is that they delegate unsolved questions to small committees for study and proposals, and their reports are not acted upon until the next general conference, usually some years later, and also in each sub-committee there is usually some one person better qualified than the others who is apt to dominate them. The International Hydrographic Conference which met in London, in 1919, tried to overcome some of these difficulties by establishing the International Hydrographic Bureau, whose Directing Committee sits continuously between the full conferences, which take place every five years, and which Committee is in constant communication with the States Members on all questions arising, or which have arisen and are still unsolved. The Directing Committee only makes proposals and has no authority in itself to decide questions except through the votes of the Members of the Bureau. One of the questions which the Conference in London, in 1919, did not definitely settle was that of the "publication by each country of a list of time-signals, time-zones, storm-signals, port-signals, life saving stations, submarine bells, sound signals by W/T, direction-finding by W/T, sound-ranging signals, etc.". Their maintenance and operation are vital to, and exist for the sole benefit of, the mariner, but there is a tendency on the part of technical people who design, instal and maintain them, to tell the mariner what he shall or should have, rather than that the mariner should decide these important matters in co-operation with the technical experts. This has been largely due to the fact that there has been no central organisation for the compilation of data for the consideration of these technical experts at their meetings, and they have been apt to get out of touch with the existing conditions, which they wish to remedy. The organisation of the International Hydrographic Bureau has now created such a centre of information. In doing so, this Bureau usually finds itself in correspondance with one member of one of these special Sub-Committees which meets only occasionally and which has no real means of arriving at any decision, having to wait until the next meeting of the committee and then of the next conference. It results, therefore, that this Bureau can accomplish its laudable purposes only by correspondence with sub-committees and then by petitioning the international association at its next meeting on the subject in question. To bring about uniformity in all of the various

activities which were discussed at the International Hydrographic Conference, in 1919, would, therefore, seem to involve the petitioning of numerous international conferences to consider each particular question. This problem will be considered at the next International Hydrographic Conference at Monaco, in October-November, 1926. Meanwhile, however, Storm Warning Signals are claimed as the province of the International Meteorological Committee, which deals with all meteorological questions, but the International Marine Conference in Washington, in 1888/9, had on its Agenda the discussion of the general question of "Warnings of Approaching Storms", divided into two sub-heads, (a) The transmission of warnings, and (b) Uniformity of signals employed. The following is quoted from the report of the Conference:—

(a) THE TRANSMISSION OF WARNINGS. — The Committee understand that the various Meteorological Offices in Europe are in frequent and intimate communication, and interchange telegraphic information for the purpose of weather forecasting on that side of the Atlantic Ocean; while the Meteorological Offices of the United States and the Dominion of Canada act in concert on the Western side; and also that a similar custom prevails in many Eastern countries.

(b) THE UNIFORMITY OF SIGNALS EMPLOYED. — Storm-warning signals were first introduced in the interests of the shipping or fishing-vessels lying at anchor in harbour or proposing to put to sea. Lately the same warning signals have been freely extended to coast stations, with a view to give information regarding the weather to passing vessels. Inasmuch as these may be local or foreign traders, the Committee are of opinion that such signals should, as far as possible, be in international agreement.

The established signals originally in use in Europe are evidently founded on the seaman's knowledge of the 'law of storms', and, while warning him of an approaching cyclone, indicate whether the northern or southern portion is expected to pass over the district. Experience proves that this was practically sufficient information for the masters of vessels in a neighbouring harbour, who would know whether the cyclone was approaching or had passed, but it is scarcely sufficient for coasting vessels, especially those proceeding on a course at right angles to the direction in which the cyclone is moving.

In the opinion of the Committee it is therefore desirable that storm-signals displayed at coast stations should give to passing vessels some further information as to whether storms are approaching or have passed the station; and in reference to this, the Committee desire to call attention to the fact that this want has been supplied by the system now in use in the United States. The German system indicates four directions from which a storm is expected, and whether its probable course is to the right or to the left.

The Conference invites the various maritime countries to consider the best practical mode of signalling by day, whether by shapes, coloured or black, by flags, or by the two combined, and by night, by means of lights, coloured or white, arranged to represent distinct forms.

It will be well, however, to examine the question of in how far the International Meteorological Committee is solely charged with the determination of this question.

### THE INTERNATIONAL METEOROLOGICAL COMMITTEE.

It was through the initiative of Lieut. M. F. MAURY, U. S. Navy, that the first international meteorological conference was called to meet at Brussels, in 1853, at which sixteen maritime states were represented,

and its results were very marked in stimulating international co-operation, in standardising methods of observation, and in exchanging the results. The next Conference, at Leipzig, in August, 1872, was followed by the first International Meteorological Congress at Vienna, in 1873, which organised a Permanent Committee, of which the well known BUYS BALLOT was President. This Permanent Committee first met at Vienna to organise, in September, 1873, and subsequently met at Utrecht in 1874; at London, 1876; and again at Utrecht in 1878. The Second International Meteorological Congress met at Rome, in 1879, and established the International Meteorological Committee which first met at Berne, in 1880. This Committee had subsequent meetings at Copenhagen, 1882; Paris, 1885; Zurich, 1888; Upsala, 1894; St. Petersburg, 1899; Southport, 1903; Paris, 1907; Berlin, 1910; Rome, 1913; London, 1919 and 1921; and Utrecht, 1923. Meanwhile International Meteorological Conferences, as distinguished from Congresses, have met in Munich, in 1891; in Paris, 1896; Innsbruck, 1905; Paris, 1919; and Utrecht, 1923. These dates of meetings are here mentioned because the action taken at some of them will be referred to subsequently and the sequence is important.

The Conferences are attended by Heads or Directors of Meteorological Institutes and Observatories of the various countries and of all important private organisations or meteorological societies which are interested. The International Meteorological Committee is nominated by each Conference and its authority ends with the next Conference. To be eligible to be a member of the Committee one must be a director of an independent meteorological establishment. Among its important functions is to appoint Commissions (or sub-committees) of its own members to study and make proposals with regard to sub-divisions of meteorology. In many respects this Committee bears the same relation to the Conference of Directors that the International Hydrographic Bureau bears to the Hydrographic Conference, except that it meets only, as a rule, every three years, as does its Commissions (sub-committees), of which there are ten. The Commission for Maritime Meteorology is the one which has to do with the subject considered in the Bureau's Circular Letter No. 15-H. At its meeting in Utrecht, in 1923, it was composed of twenty nine members, of whom two were Germans from the "Deutsche Seewarte", whereas, according to the League of Nations "Handbook of International Organisations, 1923", only twelve States were members of the organisation, unless four from the British Dominions are counted as such, in which case there were sixteen States Members. At the Meeting of the Conference of Directors at Utrecht, in 1923, the repre-

sentatives of nineteen States were present, including the members of the British Empire; of these States only eleven are also Members of the International Hydrographic Bureau, whose total membership, on the other hand, is twenty Maritime States, not counting the British Dominions as separate countries. It may be pointed out that, while various Meteorological Institutes and Observatories may adopt the proposals of the Director's Conference, it is only by the action of Governments that they can be put into legal effect. The following is a summary of the progress of organised meteorologists on the subject in question.

### RESULTS OF CONFERENCES.

The Leipzig Conference, in August, 1872, appointed a Sub-Committee on Maritime Meteorology consisting of Prof. BUYS BALLOT, Dr NEUMAYER, and Mr. R. H. SCOTT, which issued a series of queries in a Circular Letter to the various meteorological authorities inviting their replies to six questions propounded, the first and last of these six questions were as follows:—

1. What are your opinions in respect of the action of the system of Storm Signals hitherto in use, either from your own experience or from a consideration of the Bulletins published in the United States, in England and in France?

6. In what way can it be arranged that intelligence of the conditions of weather can be conveyed to ships at sea by means of semaphore, or by signals from light-houses?

The answers to the first question were favourable to the systems mentioned as being entirely successful, but, when it came to visual signalling from signal stations and lighthouses, many defects were conjured up and impractical solutions proposed. One proposition was that "lights, where fixed, flashing or revolving, might be provided with some extra flashing apparatus, which should give universal storm warnings to vessels in view". Another proposal was "Cannot 100 or 1,000 weather charts for pressure of wind be drawn and published. Each chart should have a number. The number should be hoisted which corresponds to a chart which almost exactly represents the prevailing weather conditions. Each ship should have such an atlas. We might also deduce maxims as to the degree to which the typical chart might differ from the reality." This is quoted because it received the unqualified endorsement of Prof. BUYS BALLOT, the President of the Permanent Committee on Meteorology, and of the Sub-Committee on Storm Warning Signals,

but, as a matter of fact, few meteorologists at that time believed in the possibility of predicting weather with a sufficient percentage of successes to justify any system of previous warnings.

Its report was as follows :—

In the opinion of the Sub-Committee, a considerable difficulty in the practice of storm warnings consists in the careful avoidance of too special indication of probable wind and weather. The objection that the reports would be discredited, owing to non-fulfilment of the 'prophecies', loses its force if only such atmospheric disturbances are communicated as will probably be accompanied by serious results. Accordingly, warnings by signals should not be issued for winds of forces 5 to 7 of Beaufort's scale, but above those numbers.

It is only when from the conditions of pressure, serious storms of 7-8, according to Beaufort's scale and upwards, are to be expected, according to the opinion of the Sub-Committee, that the views of the directors of the central offices on the direction, course, and force of storm should be announced by signal apparatus on prominent points of the coast and in harbours and roadsteads.

The Sub-Committee is further of opinion that complicated apparatus cannot be recommended for this object, and proposes, therefore, the use of the drum and cone by day, and the corresponding signal lanterns by night, and recognizes that an expansion of this system of signals as by the addition of a truncated cone, will be desirable; but under any circumstances the warning signals must be International.

Succeeding Committees sent out numerous queries, but little progress was made until at the meeting of the International Meteorological Committee at Paris, in September, 1907, a new Sub-Committee was appointed to study the proposals made to the Conference at Innsbruck, in September, 1905, by the Rev. LOUIS FROC, S. J., Director of the Observatory of Zi-ka-wei, China, on "the advisability of adopting a form of international storm signals". The Chief of the United States Weather Bureau also proposed, to this same Committee, in Paris, "the advisability of adopting a form of international storm signals". The Commission for Maritime Weather Signals met in London, in June, 1909, and evolved a proposed "International System of Day and Night Storm Signals", the day portion, using cones, being adopted at the Ninth Meeting of the International Meteorological Committee, in Berlin, in 1910. The arguments against the proposed two-lamp system of night signals were based largely on the untenable ground that certain night port-signals had already monopolised some of the proposed storm signals. As nearly all ports have their own port or traffic signals, the real argument should have been that the port signals themselves were in urgent need of standardisation, thereby not interfering with international agreements. One valid objection was raised, however, to the proposed night signal for hurricane, R. W. R., as being that already adopted, *internationally*, as the distinguishing lights of a cable ship, so three red lights were substituted by the Commission to meet this objection, but no system of night signals was then adopted. The question of night Storm Signals therefore went over to a special "Meeting of the Commission for

Maritime Meteorology and Storm Warnings", in London, in September, 1912, whose recommendations were considered at the Tenth Meeting of the International Meteorological Committee, at Rome, in 1913. A summary is given below of the resolutions then adopted, the opinions expressed and the objections made with regard to the proposals of the Commission for Maritime Meteorology and Storm Warnings, which were as follows :—

1. *Proposed International System of Signals for Storm Warnings.*

A. DAY SIGNALS. A proposal for signals by means of one or two cones to indicate the probability of a gale commencing with wind in the four quadrants and for a hurricane was approved at the meeting of the committee at Berlin in 1910 as follows :—

For a gale commencing with wind in the N. W. quadrant.—  
Single cone point upward.

For a gale commencing with wind in the S. W. quadrant.—  
Single cone point downward.

For a gale commencing with wind in the N. E. quadrant.—  
Two cones point upward.

For a gale commencing with wind in the S. E. quadrant.—  
Two cones point downward.

For a hurricane.— Two cones with their bases together.

With regard to this scheme the Commission passed the following resolution :—

2. It was also agreed to accept by way of explanation that the distance between two cones hoisted in vertical line for day signals should be the same as the length of the slant side of the cones.

B. NIGHT SIGNALS. In continuation of the proposals for day signals which was approved at Berlin in 1910, the following resolutions were adopted by the Commission.—

In view of the expressions of opinion of the representatives of various countries as to the difficulty of the manipulation of signals using more than two lanterns on the one hand, and, on the other hand, as to the danger of confusion of weather signals using one lantern, or two, or three lanterns in vertical line, with signals already used for maritime purposes, the Commission find themselves unable to recommend the adoption of a single scheme of night signals for storm warnings applicable to all countries. They are, however, of opinion that any combination of lanterns to form a weather signal should have the same meaning in all countries which adopt a national system of local storm warnings, and they therefore recommend as follows :—

i. That in countries which use signals consisting of one lantern only for storm warnings, one red lantern shall represent any of the day signals.

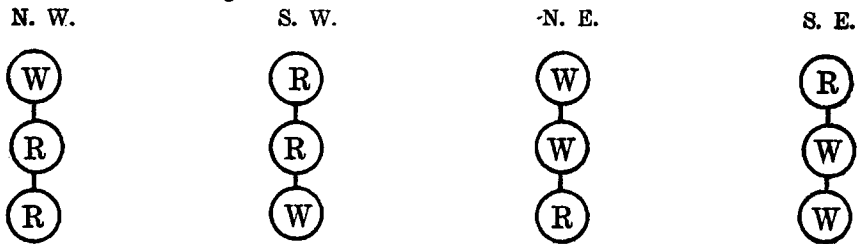
ii. That in countries which use a combination of two lanterns for storm warnings, the two lanterns should be in a vertical line not less than 2 metres apart (generally 4 metres or 15 feet).

iii. That in countries which use a combination of three lanterns in vertical line for storm warnings, the lanterns should be not less than 2 metres apart, 4 metres covering the whole signal.

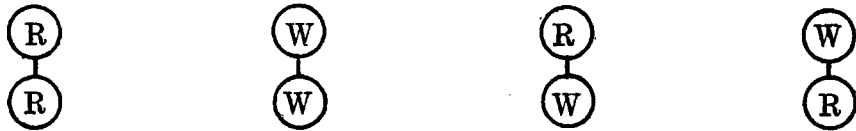
RESOLUTION 11. It was agreed that in order to complete the scheme of night signals three red lanterns in vertical line be recommended as the night signal to correspond with the day signal for a hurricane, but that as the signal for a hurricane would not, as a rule, be hoisted in temperate latitudes, one red lamp may be used as an alternative, signifying the existence of an atmospheric disturbance, which may cause a gale in the locality where the signal is hoisted.

**RESOLUTION 12.** It was therefore agreed that the following be recommended as the system of night signals:—

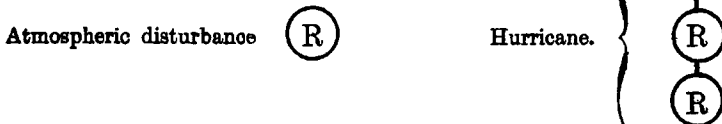
1. For countries using three lanterns:—



2. For countries using two lanterns:—



For use with either of the above:—



3. For countries using one lantern:—



**RESOLUTION 13.** That the opinion of the institutes be taken upon the question of exhibiting, where possible at storm signal stations, a green flag by day and a green lamp by night, or some other signal, to indicate that signals cannot be hoisted, either on account of telegraphic communication being interrupted, or for some other cause.

The resolutions of the International Meteorological Committee on the above proposals were as follows:—

1. That it is not desirable to re-open the question of the scheme of day signals which was approved at the Berlin Meeting in 1910, but it is desirable to place on record that the adoption of a scheme of signals as international does not preclude the adoption by individual organisations of other signals, in addition, which do not form part of the international code.

2. With regard to the code of night signals it appears that the proposal of three red lanterns in a vertical line as a signal for hurricane is open to objection. The Committee, therefore, refer back that proposal for further consideration by the Commission.

3. Objections have also been raised to the use of a single red lamp as a storm signal on the ground that it is liable to be misunderstood. The Committee are therefore unable to adopt it as an international signal though they see no objection to its use in those cases in which no confusion is likely to arise. With these qualifications the Committee adopt and recommend the proposals of the Commission as set out in Resolutions 1, 11, and 12.

4. With regard to Resolution 13 it is evident that the use of a signal at a storm warning station to indicate that the signals for storm warning cannot be hoisted on account of the interruption of telegraphic communication, or for some other cause, would be acceptable in many countries, but the objections raised to the use of a single green lamp for the purpose are so numerous that the Committee desire this proposal to be reconsidered by the Commission.

5. The Committee is not yet in a position to approve of any definite proposals of non-local storm signals as an international scheme.



The following are some of the remarks made during the discussion.—

**GREAT BRITAIN.** — The Hydrographer of the Navy points out that the signal of three red lamps in the vertical proposed to indicate 'hurricane' is already in use at Bermuda, Hong Kong, Jamaica and Mauritius to notify 'Port-closed'. The Board of Trade also notifies that the interpretation of the signal as 'Port-closed' is given in Notices to Mariners, and repeats its objection to signals of two lamps or one lamp as likely to be confused with existing signals. The Board also points out that a green lamp is not admissible for the purpose indicated in Resolution 13, as it is already a common harbour signal.

**HOLLAND.** — Will adopt the scheme of two lanterns of Resolution 12 when it has received the approval of the Committee. As regards Resolution 13, the risk of confusion of a green flag and lamp with other signals has prevented any decision being arrived at with regard to their adoption.

**ITALY.** — Captain MARCHINI, of the Hydrographic Institute of Genoa, reports that the Minister of Italian Marine has no objection to the introduction of the system of three lanterns (Resolution 12, *i.*) or the display of a green flag (Resolution 13) but takes exception to the use of a green lamp as liable to confusion with other maritime signals.

**NORWAY.** — Professor MOHN writes — 'It can scarcely be thought that any of the proposed signals will be confounded with other signals in our harbours and on the coast. In or at a town the signals will probably be hoisted on a hill or high building.'

**UNITED STATES.** — The U. S. Weather Bureau has adopted the two-lantern system and cannot accept three lanterns for the hurricane signal because the method of installation (15 feet between lanterns) does not permit of it. If the resolutions of the Commission are adopted the Bureau will not employ a night hurricane signal at all. In the West Indies one red lamp will probably be used for all disturbances.

The Bureau suggests that no need is felt for the precaution of Resolution 13, and suggests that the signal should be optional.

**CANADA.** — The Director of the Canadian Meteorological Service is in favour of a simple system in which two lanterns only are used. The system recommended is not wholly satisfactory because, as the Canadian lights are largely electric, four lanterns in the vertical would be necessary, 15 feet separating the upper pair from the lower pair.

As regards the green light the signal is not regarded as necessary, but the Director will be guided by the decision of the Committee.

**HONG-KONG.** — Mr. CLAXTON, Director of the Observatory, will support the recommendations of the Commission when the question of abolishing the red signals for typhoons more than 300 miles distant comes up for consideration, but no change will be made in the system of warnings until a radio-telegraphic station is erected on the Pratas Shoal.

**PHILIPPINES.** — The Director of the Weather Bureau is of opinion that the suggestion of Captain RYDER (Resolution 13) is worthy of careful consideration.

The resolutions do not commend themselves to the following countries :—

**PORTUGAL.** — Professor J. M. D'ALMEIDA-LIMA is of opinion that two signals are sufficient, and recommends the continuance of the signals at present adopted by Great Britain and Portugal, *viz.*, the system of the North and South cones.

**INDIA.** — The Director-General of Observatories regrets that the system does not seem appropriate for India, as that country is liable to the occurrence of tropical revolving storms.

The Director-General considers the proposal of Resolution 13 to be most useful, but would prefer a signal made up of cones, drums, *etc.*

**TRINIDAD.** — The Governor is of opinion that Trinidad has no use for the signals as it is outside the hurricane zone. Local storms very seldom occur.

For SWEDEN, M. HAMBERG proposes a revision of the proposals of the Commission, and as an alternative suggests the use of four lanterns arranged in tetrahedron

The World War intervened in 1914 and the International Meteorological Conference met in Paris, in 1919, and reorganised its ten Commissions and considered a number of new subjects. Lieut.-Col. D. C. BATES of New Zealand, Director of the Dominion Meteorological Office, at Wellington, was elected President of the Commission of Marine Meteorology, which passed the following resolution:—

That the consideration of gale warnings for universal adoption be postponed until the next meeting of the Maritime Commission and that, in the meantime, Lieut.-Col. D. C. BATES be invited to correspond with the different Services on the subject.

No further action was taken by the International Meteorological Committee or the Commission on Marine Meteorology until the meeting of the International Meteorological Conference of Directors at Utrecht, in September, 1923. Both the President of the International Meteorological Committee, Sir NAPIER SHAW, and the President of the Commission for Marine Meteorology, Dr. G. C. SIMPSON, referred to a letter from Lieut.-Col. BATES stating that, owing to ill health, little had been accomplished in the way of obtaining universal storm warning signals, "but that the extension of wireless telegraphy appeared to diminish the value of such universal signals."

### PROGRESS MADE BY THE INTERNATIONAL METEOROLOGICAL COMMITTEE

Ten European States have adopted, either wholly or partially, the proposed Uniform Day and Night System of Storm Warning Signals, *viz.* Norway, Russia, Esthonia, Germany, Denmark, Netherlands, France, Belgium, Spain, Italy, also Argentina, in South America, and Egypt in Africa.

Seven countries have adopted the International Day Signals as proposed, *viz.* Russia, Germany, France, Spain, Italy, Egypt, and Argentina, and the following five have adopted them with the exception of the Hurricane signal, *i. e.* Norway, Esthonia, Denmark, Netherlands and Belgium.

(Italy employs this signal but for other purposes).

Germany, Netherlands and Spain are the only countries which have adopted the proposed International Night Signals, and of these they preferred the two-lamp to the three-lamp system.

Norway added a black ball to indicate "Atmospheric disturbance, be alert and look out for further information"; a red flag to indicate "Wind will probably veer to the right (from North through East and South to a westerly direction)"; and two red flags to indicate that

“Wind will probably back to the left (from North through West and South to an easterly direction)”.

*Estonia* adopted a black cylinder to hoist below any of the International signals to indicate a gale of greater intensity than shown by the International signals shown.

*Germany* added a black ball to indicate to fishing vessels and to small craft that the wind is expected to increase in strength to 6-7 Beaufort Scale; a red flag to indicate “Wind may be expected to veer to the right (clockwise) during the gale”; and two red flags to indicate “Wind may be expected to back to the left — (anti-clockwise)”. Also, to the two-lamp International Night signals which Germany had adopted, a single red light was added to denote “Atmospheric disturbance, be alert and look out for further information”. Germany also very successfully flashes Night Storm Warning Signals from certain stations by searchlight. (Helgoland, Ellenbogen, Sylt, Arkona, and Pillau).

*Denmark* and the *Netherlands* have also adopted the black ball to indicate an atmospheric disturbance and the one and two-flags as used by Norway and Germany, but in the Netherlands the flags are black instead of red. The Netherlands also use a red light, in addition to the two-light system of the International Night signals, to indicate an atmospheric disturbance.

#### GENERAL CONSIDERATIONS AS TO STORM WARNING SIGNALS.

It is thought that the reluctance of certain countries to adopt the signal of two cones, base to base, to signify “hurricane” is due to the fact that, in European countries, the hurricane is practically unknown in the form it occurs in the equatorial regions of the Atlantic and Pacific Oceans, but, in those European countries which border on the Atlantic Ocean, it will be noted that, in the scales of wind force, there is a tendency to attach higher velocities to the terms of the Beaufort Scale than in the more sheltered European countries. However, if the velocities adopted in a uniform international scale to correspond with designated winds were materially lowered in accordance with this fact, sea captains, who are used to more violent winds, would be misled by the terms used, whereas everyone cheerfully accepts the violent wind of less velocity than that predicted. This argument will be advanced in considering wind velocities in a further publication. It is brought forward here to urge the acceptance of higher limits in Europe than may be actually encountered. Therefore, to meet world conditions, the Direc-

ting Committee considers that the word "Hurricane" in Europe should be understood to mean a "Storm of great violence". If its use is seldom required by any country, it is all the better, but for the sake of uniformity it should be adopted with the rest of the Code.

For the same reason the Directing Committee favours the practice of Norway, Denmark and the Netherlands in supplementing the proposed International Code of Day Signals by a black ball to indicate an atmospheric disturbance, but of which the direction is not determined, and the one and two flags to indicate that the wind may be expected to veer to the right (clockwise), or back or haul to the left (anti-clockwise). The discussions which have taken place from time to time at the meetings of the International Meteorological Committee, as to the use of the words "veering" and "hauling" in reference to the wind, have proved fruitless because of the reversal of the directions of the wind in circular storms in the Northern and Southern Hemispheres. It is thought therefore, that the use of the words "Right or clockwise", and "left or anti-clockwise" entirely clear up this difficulty, besides giving greater definiteness in any translation of these terms into a foreign language.

As to lights, for night signals, the two-lamp system is usually favoured because of permitting a greater distance between the lights, thereby making them visible at a greater distance. It is thought, however, that the three-lamp system is not objectionable on account of lack of equal visibility, because the use of telescopes or binoculars will enable them to be distinguished clearly at a great distance. The principal arguments against either the two or the three-light systems have been that certain of the displays are already in use as port signals, but there is nothing more in need of greater reform as to uniformity than port signals themselves, which are now very largely everywhere a matter of local option with the result of heterogeneity confounded. The Directing Committee does not regard it as valid argument that a uniform international system of night storm warning signals can be said to interfere with any authorised system of local port signals, because, if an international system is adopted, the local remedy is obvious, *viz.* change the port signals. The Directing Committee favours the use of one red light by night to replace the black ball by day.

#### SOME RESULTS OF CORRESPONDENCE.

A letter from the President of the International Meteorological Committee, dated 10th June, 1925, says :—

The matter of international storm warning signals has been briefly discussed at the meeting of the commission for maritime meteorology at Paris in 1919, and Col. BATES from

New-Zealand promised to correspond on the question before the next meeting. From the report of this meeting at Utrecht in 1923, which you will find on pages 135-143 of the Report of the Utrecht Conference, you will see that one of the reasons why Col. BATES did not carry out his intention, was the decreased importance of coast signals as compared with wireless warnings, which are now being issued from various coast-stations. This circumstance in connection with the geographical and climatological reasons mentioned by Dr SIMPSON, diminishes in my view still further the possibility of a universal system of storm warning signals. On the other hand, a more general acceptance of the system which is in use in Western European countries now would certainly be an advantage for all the ships of those nations which come near British coasts or other countries which have not yet accepted these signals — therefore any action from your part in favour of a general acceptance of the international storm warning signals will be welcomed.

The reasons mentioned by Dr G. C. SIMPSON of the British Meteorological Office and also a member of the International Meteorological Committee, are herewith quoted from his letter to this Bureau, dated January 12th, 1925, as follows:—

Signals required in the temperate zones are entirely different from those in zones where tropical hurricanes occur. I may mention that India has found it necessary to have different storm signals in the Bay of Bengal and the Arabian Sea; similarly the signals on the China coast are different from the Indian signals, and both are different from those of the West Indies. The differences are necessary, being mainly governed by the different meteorological conditions in the respective areas.

The Directing Committee is in disagreement with the opinion expressed by Lieut.-Col. BATES, that “the extension of wireless telegraphy appears to diminish the value of such universal signals”, and believes that this, and what Dr SIMPSON says above, apply only to *Non-local* storm warning signals, and, moreover, that a uniform system of visual local storm warning signals is not only entirely practicable, but that such signals still have the same importance that they have always had, and besides, will continue to have such importance in spite of any further extension of weather reports by radio or other means. Locally even a hurricane has a definite direction of wind, which changes gradually as the storm centre moves. The value of the non-local storm warnings, to any locality in equatorial regions, is in its indication of the position and movement of the storm centre. In China the movement of the storm centre is considered of so much importance that the local storm warning signals have even been abolished, which the Directing Committee considers is a mistake for the above reasons. The adoption of a uniform system of local storm warnings has, in fact, no relation to what systems of non-local storm warnings are used; because local storm warnings have reference only to a given locality, and have equal local importance to each locality anywhere on the surface of the globe. It is thought that the International Meteorological Committee has lost sight of this fact, but the Directing Committee, on the other hand, shares with it the

opinion that a uniform system of non-local storm warnings is both unattainable and undesirable. As to the reference that Great Britain has not adopted the International Code as mentioned above, the Director of the British Meteorological Office, in his letter to this Bureau, dated 22nd May, 1925, says :—

The desirability of adopting International Storm Warning Signals in Great Britain was carefully investigated in 1922, and the decision reached that, in view of the fact that there had been no demand from any interests affected for a change of the present signals, there was no need to change the existing system at British ports, which was thoroughly understood by those who used the signals.

The British Admiralty North Sea Pilot, Parts I, II & III, may be summarised on the subject of Storm Warning Signals in Great Britain as follows :—

Storm Signals are hoisted at various places on the coast on receipt of a warning by telegraph from the Meteorological Office, London. If the gale has commenced before warnings are issued notice to hoist the cone will be sent off if it is expected that the gale will continue or increase in force, but not otherwise. Gales sometimes follow one another in quick succession.

These Storm Signals only refer to the greater and more general disturbances which may appear to be approaching. Local winds of gale force may occur for which no warning can be given, and observers must watch their own barometers and local signs of weather. The hoisting of such a signal is a sign that an atmospheric disturbance is in existence which will probably cause a gale from the quarter indicated by the character of the signal displayed either at or within a distance of (say) 50 miles of the place where the signal is hoisted. This signal is frequently kept shown after a gale is over. This is the case because one gale is often followed by another within a very brief interval, before there would be time to issue a fresh warning. But whenever there is reason to believe that the danger is over, notice is sent from the Meteorological Office to lower the signal. The warning is intended to continue from the time the telegram leaves the Meteorological Office until 10 p. m. the following day; but if it cannot be seen after dusk, it may be lowered during darkness to save wear and tear.

The fact that a storm warning has been received at any place is made known by hoisting a canvas cone, which has the appearance of a black triangle. At night, three lanterns, disposed triangularly and showing lights of the same colour may be hoisted in place of the cone. (Part III says these lights are white, but as night storm signals are

hoisted at only two stations in all of Great Britain and Ireland, this does not seem important.)

A cone hoisted point downwards is known as a "South Cone".

A code hoisted point upwards is known as a "North Cone".

**SOUTHERLY GALE :—** The cone or lights, points down, indicate that gales or strong winds, are probable from the southward; that is, from S. E. round by south to N. W.

**NORTHERLY GALE :—** The cone or lights, points up, indicate that gales, or strong winds, are probable from the northward; that is, from N. W. round by north to S. E.

**WESTERLY GALE :—** Should it appear likely that a gale will begin from between West to N. W. and also that it is likely to shift towards north to N. E., the north cone will be hoisted in preference to the south cone.

**EASTERLY GALE :—** Should it appear likely that a gale will begin from between East and S. E. and also that it is likely to shift towards south or S. W., the south cone will be hoisted in preference to the north cone.

In spite of the statement that this system is thoroughly understood by those who use it, which should be true of any system, it certainly lacks that definitiveness which characterises the proposed International Code, especially where the latter is supplemented by a ball (or a red light) to indicate an indefinite atmospheric disturbance as a caution at least to small craft, and flags to indicate the probable direction of the veering or hauling of the wind. The British system is that practically adopted by the Portuguese Government, and, however satisfactory it may be said to be, the fact that Night Storm Signals are displayed in only two ports in the British Isles indicates a limited utilisation of the splendid facilities of the Meteorological Office for local maritime benefit, but the summary of the British system is really given to show that, owing to the progress in forecasting the weather, the time is now ripe to do away with such indefinitiveness, as is indicated above, in favour of a definite and uniform international system. There will be noted in the quotation from the British Pilot above, and throughout the earlier meetings of the International Meteorological Committee, a hesitancy in claiming too great a reliability in weather forecasting, but the Directing Committee is of the opinion that, especially in winds of such force as to be characterised as gales or storms, the reliability of predictions is now such as to demand universal recognition by the adoption of a uniform system of storm warning signals for the benefit of mariners, locally and otherwise. The International Hydrographic Bureau therefore submits to its States Members the following proposals, based on the recommendations and discussions of the International Meteorological Committee, to meet maritime necessities.

## BUREAU'S PROPOSALS TO THE STATES MEMBERS.

The Directing Committee submits the following proposals to the States Members of the Bureau:—

*I.* The adoption of the International Day Signals for local storm warnings as proposed and adopted at the Ninth Meeting of the International Meteorological Committee in Berlin, in 1910. (*See Plate I.*)

*II.* The adoption of the Night Storm Signals of either two-lamps or three-lamps, as preferred, for local storm warnings, as adopted and recommended at the Tenth Meeting of the International Meteorological Committee held at Rome, in 1913, but with the addition of the three-lamp signal W. R. W. to either code to indicate a hurricane or storm of great violence. (*See Plates I & II.*)

*III.* The adoption of an independent signal consisting of a black ball by day, or a single red light by night, as a cautionary signal to fishing vessels and other small craft to indicate an "Atmospheric disturbance, the direction of which is not determined". (*See Plate II.*)

*IV.* The additional use by day of a single black flag to modify the meaning of the storm signal being displayed to indicate that the wind may be expected to veer to the right (clockwise), and two black flags to indicate that the wind may be expected to back or haul to the left (anti-clockwise) during the gale or storm, but to be hoisted at a separate yardarm. (*See Plate II.*)

*V.* The use of a green flag by day, or a single green lamp by night, to indicate that signals cannot be hoisted, either on account of telegraphic communication being interrupted, or for some other cause.

*VI.* Each country should be left free to adopt such non-local, or such additional local storm warning signals as they may desire.

It has been pointed out that only eleven of the twenty Maritime States which are Members of the International Hydrographic Bureau were represented at the last meeting of the Conference of Directors of Meteorological Institutes and Observatories at Utrecht, in 1923.

The International Meteorological Committee and the Commission for Maritime Meteorology met at the same time and, as previously mentioned, the only action taken on the subject of storm warning signals was to mention Lieut.-Col. BATES' letter about storm-warning signals stating that owing to ill health little had been accomplished in the way of obtaining storm warning signals in Eastern waters, but that the extension of wireless telegraphy appears to diminish the value of such universal signals. The next meeting of the Conference is in 1929, and of the Committee and Commission in 1926. Meanwhile, the twenty States Members of this Bureau have knowledge of all that has been done on the subject in the fifty-four years which have elapsed since the Meteorological Conference in Leipzig in 1872, and are fully qualified to represent their own maritime interests by acting on the proposals of this Bureau without the formality of calling an International Conference. This will leave the Directors of Meteorological Institutes and Observatories free



to resume action in case this Bureau fails to obtain the desired results.

The writer has tabulated the Storm Warning Signals of thirty nine different political sub-divisions of the maritime countries of the world in a series of three charts, which are not reproduced in the *Hydrographic Review*, but which are issued as a separate publication, to be had free on application to this Bureau. They have been gratuitously printed by the U. S. Hydrographic Office, Washington, and issued as a supplement to its Pilot Charts, so as to be given the widest possible circulation amongst seafaring people whose interests are directly involved.

In further explanation of the proposals herewith submitted, the Directing Committee is of the opinion that:—

1 The addition to the Code of the black ball by day, and the red light by night, as a *cautionary*, or "Be on the alert" signal, is necessary as a preliminary warning to fishing vessels and other small craft.

2 The single red light and single green light are not liable to be confused with other lights as storm warning stations are usually high up to secure visibility and their location is usually well known locally.

3 The use of the black flags, instead of red, is advisable for denoting the direction of the changes of wind as being especially distinctive, because red flags are much used for all forms of danger, and black is little used for any purpose, besides being visible at long ranges.

4 Any confusion of signal lights will probably eventually be, or should be, obviated by greater uniformity in port signals.

The accompanying Plates, Nos. I & II, give the complete details of the proposals of the Directing Committee of the International Hydrographic Bureau, but it should not be overlooked that in Circular-Letter No. 15-H of 15th May, 1925, on the subject of Storm Warning Signals, this Bureau has requested the opinion of its States Members as to the adoption of a standard table of wind velocities and descriptions of wind in various languages, with a view to formulating proposals to the International Meteorological Committee on this important subject. This question will be made the subject of a Special Publication, setting forth the views of the States Members as given, together with the history of the progress made by the Conference of Directors of Meteorological Institutes and Observatories, and its Committees and Commissions. The Directing Committee of the Bureau recognises that it is the province of the Conference of Directors to determine this question.

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