

M.O. 251.

FOR OFFICIAL USE.

AIR MINISTRY.

METEOROLOGICAL OFFICE.

REPORT OF PROCEEDINGS  
OF THE  
FOURTH MEETING  
OF THE  
INTERNATIONAL COMMISSION FOR  
WEATHER TELEGRAPHY,  
HELD AT THE  
AIR MINISTRY, LONDON.

*September 8th—10th, 1921.*

(Appendix VI. of the Report of the Eleventh Ordinary Meeting of  
the International Meteorological Committee.)

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*Published by the Authority of the Meteorological Committee.*

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## APPENDIX VI.

PROCEEDINGS OF THE FOURTH MEETING OF THE  
INTERNATIONAL COMMISSION FOR WEATHER TELEGRAPHY,

LONDON, SEPTEMBER 8-10, 1921.

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MEETING OF THE INTERNATIONAL COMMISSION FOR WEATHER TELEGRAPHY,  
LONDON, 1921.*Introduction.*

The report to the International Meteorological Committee of the President of the Commission on the proceedings of the International Commission for Weather Telegraphy at the meetings in 1920 and 1921 is printed on page 80. The minutes of the meetings of 1921 follow the report. An example of a set of observations at a land station and a coastal station and their encoding in the new form is given herewith. The example is followed by a specimen page of a form of observer's register designed for the simple entry of the observations.



EXAMPLE OF A TELEGRAPHIC REPORT OF OBSERVATIONS AT 0700 G.M.T.  
AT AN INLAND STATION.

Element.	Abbreviation used.	Reading.	Figures for Telegram.	Remarks.
Barometer - - -	(BBB)	1012.9 mb.	129	Corrected and reduced to mean sea-level.
Wind direction - -	(DD)	South	49	<i>i.e.</i> , 33 + 16 Barometric tendency greater than 9 and less than 20.
Wind force (Beaufort)	(F)	5	5	Fresh wind.
Present weather -	(ww)	o/r	16	Overcast, after rain.
Temperature, dry bulb	(TT)	39.2° F.	39	
Temperature, wet bulb		37.6° F.		Not telegraphed.
Characteristic of barometric tendency -	(c)	Falling	5	
Barometric tendency -	(b)	12	2	Fall of twelve half millibars since 0400 G.M.T.
Weather since last report - - -	(W)	r	6	
Visibility - - -	(V)	4	4	Objects visible at 1,000 metres but not at 2,000 metres.
Relative humidity -	(H)	87 per cent.	8	
Form of low cloud -	(A)	St.	0	
Amount of low cloud -	(L)	6/10	6	Six-tenths of sky covered by stratus.
Form of high cloud -	(a)	Ci. St.	2	
Total amount of cloud	(N)	9/10	9	Nine-tenths of sky covered by cloud.
Height of low cloud -	(h)	1400 m.	6	Measured by pilot-balloon.
Rainfall during night	(RR)	4 mm.	04	
Minimum temperature during night - -	(mm)	35° F.	35	
Time of commencement of precipitation	(r)	0330 G.M.T.	4	

The observations given in detail above are put into five-figure groups according to the scheme below. The *letters* are given merely to assist the observer in realising the actual position in the message where the figures are to be inserted, *e.g.*, TT are the last two *letters* of the second group, so that the observer realises immediately that the temperature (for which TT is an abbreviation) is reported by the last two *figures* of the second group.

After some time, an observer will know by heart the order of the letters, and the clerk at Headquarters will do the same, so that both coding and decoding are done without books or cards of instructions.

Letters: BBBDD FwwTT cbWVH ALaNH RRmmr (not telegraphed).

Figures: 12949 51639 52648 06296 04354 (telegraphed).

EXAMPLE OF A TELEGRAPHIC REPORT OF OBSERVATIONS AT 0700 G.M.T.  
AT A COAST STATION.

Element.	Abbreviation used.	Reading.	Figures for Telegram.	Remarks.
Barometer - - -	(BBB)	1002.6 mb.	026	Corrected and reduced to mean sea level.
Wind direction - -	(DD)	NW	28	
Wind force (Beaufort)	(F)	6	6	Strong wind.
Present weather -	(ww)	c	10	Cloudy, cloud decreasing.
Temperature, dry bulb	(TT)	46.7° F.	47	
Temperature, wet bulb		43.4° F.		Not telegraphed.
Characteristic of barometric tendency -	(c)	Steady, now rising	3	
Barometric tendency -	(b)	6	6	Rise of six half millibars since 0400 G.M.T.
Weather since last report - - -	(W)	p	5	Passing showers.
Visibility - - -	(V)	8	8	Objects visible at 20,000 m. but not 50,000 m.
Relative humidity -	(H)	77 per cent.	7	
Form of low cloud -	(A)	Cu.	8	
Amount of low cloud -	(L)	8/10	8	Eight-tenths of sky covered with cumulus.
Form of high cloud -	(a)	None visible	8	Cumulus cloud (no higher cloud visible).
Total amount of cloud	(N)	8/10	8	Eight-tenths of sky covered.
Height of low cloud -	(h)	800 m	5	Estimated.
Rainfall during night	(RR)	4 mm.	04	
Sea disturbance - -	(S)	4	4	Moderate swell with moderate sea.
Sea visibility - -	(V <sub>s</sub> )	6	6	Objects visible at 4,000 m. but not at 10,000 m.
Time of commencement of precipitation -	(r)	0515 G.M.T.	2	Showers began 1½ hours before 0700 G.M.T.

The following is the coded report (*see* note of explanation on page 76):—

Letter: BBBDD FwwTT cbWVH ALaNH RRSV<sub>r</sub>

02628 61047 36587 88885 04462



## SPECIMEN PAGE OF A FORM OF OBSERVER'S REGISTER USED IN GREAT

Tuesday,  
28th February 1922.

Raingauge { 7h. 3.4 mm.  
18h. 0.8 mm.

Earth Temp.\* (1 ft.) at 9h. 40.2° F.

Hour, G.M.T. (1)	BAROMETER.		WIND.		THERMOMETERS.		CLOUD.	
	Attd. Ther. Ten- dency.†	As read. Corrd. to M.S.L. mb.	Direction. Beaufort Force,	Anemo- meter m.p.h.	Dry, °F. Wet, °F.	Relative Humid- ity. %	First Form. Second Form.	Amount First Type. Total Amount (9)
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
0100	277	987.1	S.W.	16	40.7	98	Nb	10
	514	1001.6	4		40.5		...	10
0700	279	989.7	W. by S.	23	41.2	96	Fr-St	7
	302	1003.9	5		40.7		...	7
0900	281	990.6	W. by N.	23	43.3	89	Fr-Nb	7
	002	1004.5	5		41.9		...	7
1100	282	992.0	W.N.W.	26	43.9	85	Fr-St	3
	003	1005.6	6		42.0		Ci	5
1300	285	994.0	N.W. by W.	25	46.2	80	Cu	3
	004	1007.1	6		43.3		Ci-St	6
1500	286	994.1	W.N.W.	22	46.1	78	Cu	4
	200	1007.0	5		43.0		Ci-St	7
1800	284	993.5	W. by N.	16	44.7	85	...	...
	501	1006.8	4		42.7		Ci-St	3
2100	283	992.6	W.S.W.	10	40.9	89	St-Cu	4
	501	1006.2	3		39.5		...	4
	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—

\* These are national entries and are not essential to the International Scheme.

† Half-millibars.

Space reserved for telegrams

## BRITAIN AT STATIONS REPORTING IN THE INTERNATIONAL CODE OF 1920-1921.

Max. { read at 7h.\* 45° F.  
Temp. { „ 18h. 47° F.

Min. { read at 7h. 39° F.  
Temp. { „ 18h.\* 41° F.

Grass Min.\* read at 7h. 38° F.

Sunshine\* 4.8 hrs.

Height of Lowest Cloud. feet. (10)	VISIB.	WEATHER.		Charac- ter of Swell and Sea Disturb- ance. (14)	NEPHOSCOPE.		REMARKS.
	Land. — Sea.	Since last Observ- ation.	At Time.		Type observed. — Direction.	Relative Speed. VV (16)	
	(11)	(12)	(13)		(15)	(16)	
1500 (E)†	5	rr	or	1	...	—	Rain ceased at 0230 and sky began to clear slightly, wind became gusty.
	5				...	—	
2000 (M)	7	orcpq	cq	1	...	—	
	8				...	—	
2500 (E)	7	cpqbce	ceq	5	Fr-Nb	84	
	7				294		
2500 (M)	7	cpoqbc	bcq	5	Ci	16	Wind squally.
	8				250		
3500 (M)	6	bcqz	bcqz	5	Ci-St	18	
	8				248		
3500 (E)	6	bez	cz	5	Ci-St	21	
	8				260		
—	7	cbebz	bz	1	Ci-St	24	
	8				258		
4000 (E)	7	b <sub>1</sub> bc	bc	0	St-Cu	40	
	8				272		
	—	—	—	—	—	—	—
	—	—	—	—	—	—	—

† E=Estimated. M=Measured.

transmitted to Central Office.



REPORT OF THE PRESIDENT OF THE COMMISSION FOR  
WEATHER TELEGRAPHY, SEPTEMBER, 1921, TO THE  
INTERNATIONAL METEOROLOGICAL COMMITTEE.

1. A special Commission on Weather Telegraphy was appointed during the Conference at Paris in 1919, and three meetings of this special Commission were held during the meeting of the Conference at Paris. An account of the proceedings is given in Appendix III. to the Report of the Proceedings of the Fourth International Conference. The conclusions of this special Commission were, briefly, as follows:—

(a) That greater use should be made of radiotelegraphy in the collection and distribution of meteorological reports.

(b) That the code for the International exchange of meteorological observations should be modified.

(c) That the existing hours of observation—1h, 7h, 13h, and 18h. G.M.T.—should not be changed.

2. At the eighth meeting of the Conference at Paris, a permanent Commission for Weather Telegraphy was nominated. This Commission met in London in November 1920, and a report of the proceedings of that meeting has been printed and circulated (M.O. 242—Report of the Proceedings of the Third Meeting of the Commission for Weather Telegraphy). The code for the International exchange of reports from land stations, recommended at this meeting, has been put into operation by the following countries from the dates shown:—

Belgium (July 1, 1921).

Great Britain (March 1, 1921).

Norway (July 1, 1921).

Roumania (July 15, 1921).

Sweden (July 1, 1921).

Czecho-Slovakia will adopt it either from September 1, 1921, or from June 1, 1922.

Italy, as soon as modification of observing instructions can be completed.

Spain, as soon as modification of observing instructions can be completed.

It will be put into operation by the following countries after approval by the International Meteorological Committee:—

Holland.

Poland.

Finland.

Iceland (with modifications).

The code for reports from ships at sea has been put into operation by—

Great Britain.

Spain.

3. The Commission met again in September 1921, and the minutes of this meeting have been circulated.

4. The members of the Commission appointed at Paris were:—

Lieut.-Colonel E. Gold (President).

Professor A. Angot.

Colonel L. F. Blandy.

Professor E. van Everdingen.

General Ferrié.

Captain P. Franck.

Señor J. Galbis.

M. C. Goutereau.

Lieutenant H. D. Grant.  
Professor T. Hesselberg.  
Lieut.-Colonel L. Matteuzzi.  
Professor C. F. Marvin.  
Professor A. de Quervain.  
Captain C. Ryder.  
Dr. G. T. Walker.  
M. A. Wallén.

5. Professor F. Eredia, nominated by Professor Palazzo, was co-opted a member in 1920. Colonel E. Delcambre, M. C. Gain, Dr. W. van Bemmel and M. Rey, were co-opted members at the meeting in London in November 1920. Lieutenant Kerguistel, Commandant Jaumotte and Colonel F. A. Chaves were co-opted members at the meeting held in London in September 1921. Captain Franck, Señor Galbis and Lieutenant Grant have resigned.

6. **Code for Reports from Land Stations.**—At the meeting in London in November 1920, a form of message was agreed upon for reports from individual stations, and the form was unchanged after the meeting of the Commission in 1921, though some minor alterations were made in the specification of scales as explained in paragraph 9 below.

(a) The standard form of messages is represented symbolically by the following letters:—

BBBDD FwwTT cbWVH ALaNh

To these four groups, an additional group is added twice daily, as follows:—

Inland stations —RRmmr for reports at 0700 G.M.T.

—RRMMr for reports at 1800 G.M.T.

Coast stations —RRSV,r for reports at 0700 and 1800 G.M.T.

(b) Further, from certain selected stations, groups reporting the direction of motion and relative speed of the clouds are added in the following symbolic form:—

C<sub>1</sub>ddVV

This form of message was unchanged after the meeting of the Commission in 1921.

(c) Forms were also agreed upon at the meeting in 1920 for reports of upper air observations. The symbolic form of the reports of upper wind is:—

h<sub>1</sub>ddvv,

and the symbolic form of the reports of upper air temperature and humidity is\*:—

BBTTH.

For both wind and temperature in the upper air, the Commission agreed that the reports should be for definite heights given on pages 33 and 34 of M.O. 242.

(d) In September 1921, the Commission agreed upon an abbreviated form for use in the issue of collective messages, giving a synopsis of the meteorological situation over a whole continent by means of the data for selected stations. This form of message is given in the minutes of the second meeting (paragraph 6), and is as follows:—

BBDDF w<sub>1</sub>TTK'R for the observations at 0700 G.M.T.

BBDDF w<sub>1</sub>TTK'W for the observations at other hours.†

\* It was agreed that inversions should be reported at the end of the message by the addition of the groups 00000 B<sub>1</sub>B<sub>1</sub>B<sub>1</sub>t<sub>1</sub>t<sub>1</sub> where B<sub>1</sub>B<sub>1</sub>B<sub>1</sub> is the pressure in millibars at the level of the inversion, and t<sub>1</sub>t<sub>1</sub> is the increase of temperature at the inversion in degrees.

† For specification of w<sub>1</sub>, K', R, see Minutes of Meetings, pp. 87 and 88.



7. **Code for Reports from Ships at Sea.**—(a) The Commission agreed, in 1920, upon a form of code for reports from ships at sea. The fundamental message is represented symbolically by the following figures:—

QLLX<sub>1</sub> lllx<sub>2</sub> BBDDx<sub>3</sub> FVKdx<sub>4</sub> wwGGx<sub>5</sub> y<sub>1</sub>y<sub>2</sub>y<sub>3</sub>y<sub>4</sub>z.

This applies to ships from which temperature and cloud are not reported. If these elements are reported the type of message is symbolically:—

QLLX<sub>1</sub> lllx<sub>2</sub> BBDDx<sub>3</sub> FVKdx<sub>4</sub> wwGGx<sub>5</sub> TTtx<sub>6</sub> CNWrx<sub>7</sub>.  
y<sub>1</sub>y<sub>2</sub>y<sub>3</sub>y<sub>4</sub>z.

This code was referred to the Commission for Maritime Meteorology for its consideration. That Commission has recommended slight modifications which the Weather Telegraphy Commission accepts. The modified form is represented symbolically by:—

QLLX<sub>1</sub> Plllx<sub>2</sub> BBDDx<sub>3</sub> FVKdx<sub>4</sub> wwGGx<sub>5</sub> y<sub>1</sub>y<sub>2</sub>y<sub>3</sub>y<sub>4</sub>z  
CNTTd<sub>6</sub> WrtdK' (Fahrenheit)  
or CNTTT Wrtdt (Centigrade).

An alternative form of message for use without check figures is:—

PQLLL lllGG BBDDF wwVKd CNTTd<sub>6</sub> WrtdK' (Fahrenheit).  
CNTTT Wrtdt (Centigrade).

The Commission agrees with the recommendation of the Commission for Maritime Meteorology that the two forms of message should be circulated to Directors of Institutes who arrange for reports from ships at sea by wireless telegraphy, with a view to the adoption of a single code for these reports.

8. **Code for Reports for Aviation.**—At the meeting in November 1920, the Commission adopted the following forms for hourly reports for aviation, on the understanding that the forms would be further considered by the Commission for the Application of Meteorology to Aerial Navigation:—

(a) DDfD<sub>1</sub>F<sub>1</sub> ALaNH wwWVV<sub>5</sub> BBBS—

for reports at 0100, 0400, 0700, 1300, 1600, 1800, 2100 G.M.T.

(b) DDfD<sub>1</sub>F<sub>1</sub> ALaNH wwWVV<sub>5</sub>—

for reports at all other hours than those specified in (a).

The latter Commission considered the form at the meeting in September 1921, and recommended the following forms, which the Weather Telegraphy Commission accepts:—

(a) Hourly reports.

I<sub>n</sub>I<sub>n</sub>(V<sub>s</sub>\*) wwVhL NDDFW (†C<sub>s</sub>ddF<sub>1</sub>S)

I<sub>n</sub>I<sub>n</sub> = index figures of stations.

C<sub>s</sub> = form of cloud to which ddF<sub>1</sub> refer.

This form of message, with the addition of the last group, also applies to 3-hourly reports from observation posts not fully equipped with instruments.

(b) 3-hourly or 6-hourly reports from fully-equipped synoptic stations.

I<sub>n</sub>I<sub>n</sub>(V<sub>s</sub>) BBBDD FwwTT cbWVH ALaNH C<sub>s</sub>ddF<sub>1</sub>S.

9. **Specification of Scales.**—The Commission agreed in November 1920 upon the specifications of the code figures:—

(a) For the form of cloud (M.O. 242, page 27).

(b) For the visibility on land and at sea (M.O. 242, pages 26 and 27).

\* For sea stations only.

† Every three hours only.

(c) For the height of the base of cloud (M.O. 242, page 28).

(d) For the relative humidity (M.O. 242, page 28).

(e) For the revised specification for barometric tendency (M.O. 242, page 29). An abbreviated specification of the barometric tendency where no figure is available for the characteristic is given in the minutes of the first meeting, held in September 1921 (paragraph 14).

(f) Upon two specifications for the state of the sea and swell for use at coast stations and on the open sea respectively (M.O. 242, pages 29 and 36).

(g) For the amount of rainfall (M.O. 242, page 30). An abbreviated specification of the amount of rainfall when only one figure is available, is given in the minutes of the second meeting held in September 1921 (paragraph 6).

(h) For the time of commencement of rain (M.O. 242, page 30).

(i) For the heights to be used in reports of upper wind (M.O. 242, page 33).

(j) For the heights to be used in reports of upper air temperature and humidity (M.O. 242, page 34).

(k) For reports of weather at the time of observation (M.O. 242, page 39).

(l) For reports of past weather (M.O. 242, page 42).

No alteration has been made in these specifications except in the code for visibility, for which the new specification is given in the minutes of the second meeting, held in September 1921 (paragraph 8), one alteration in the specification of cloud by the deletion of the words "mammato-cumulus" for figure 6, and two minor alterations in the code for present weather which are also specified in the minutes of the meetings held in September 1921 (1st meeting, paragraph 7; 2nd meeting, paragraph 9). The specification of F<sub>1</sub> (speed of low cloud) requires to be added in the following form:—

Code Number.	Corresponding mean speed in kilometres per hour.	Limits of speed in kilometres per hour.
0	less than 5	0-7
1	15	8-22
2	30	23-37
3	45	38-52
4	60	53-67
5	75	68-82
6	90	83-97
7	105	98-112
8	120	113-127
9	135	128-142

10. The Commission further agreed that the scale of 0-32 should be retained for reports of surface wind direction, but that the scale of 0-36 should be used for reports of direction of upper wind and of cloud motion.

11. The Commission had also under consideration the National issue of collective messages by radiotelegraphy for International purposes. A table indicating the times at which the issues in different European countries should commence was drawn up in November 1920 (M.O. 242, page 44). The table was revised in September 1921, and the revised table is given in paragraph 14 of the minutes of the second meeting of September 1921. With the exception of the alteration of this table and



the modification of paragraph (h), page 44, of M.O. 242, by the substitution of continuous wave instead of spark, the report of the sub-committee on the Organisation of the Transmission of Reports by Radiotelegraphy is unchanged. It is, however, noted that the list of stations for inclusion in the European collective message has not yet been completed, as the Directors of the Institutes in some countries have not yet furnished the information.

12. The Commission invited Captain Ryder, the Director of the Danish Meteorological Institute, to negotiate a new agreement with the Great Northern Telegraphy Company, for the transmission of the Icelandic reports to London, whence the British Meteorological Office undertook to have them transmitted by radiotelegraphy at the end of the British synoptic messages issued one hour after the standard times of observation. The resolutions of the Commission on this subject are given in paragraph 6 of the minutes of the first meeting, held in September 1921.

13. The Commission has had under consideration the necessary modification of the code for use in the transmission of the reports from Iceland, and recommends the modification represented in detail in paragraph 10 of the minutes of the second meeting, September 1921.

14. The Commission has had under consideration the question of reports from Greenland and decided that the establishment, at the earliest possible date, of a high-power radiotelegraphic station in Greenland is of the utmost importance to the meteorology of Western Europe, and, further, it is of such importance as to warrant the International provision of funds for maintaining it. It has since been ascertained that a small-power radiotelegraphic station in Greenland would be sufficient to transmit reports from Greenland to Iceland and the Commission was of opinion that the establishment of such a small-power station ought not to be delayed by their desire to see a high-power station established.

15. The Commission appointed a sub-committee to consider the question of a code for the International exchange of forecasts for which the use of plain language messages has obvious disadvantages. The report of the sub-committee was adopted.

16. The Commission appointed a sub-committee to consider the preparation of an International cloud atlas for the use of observers at telegraphic reporting stations. The report of the sub-committee has been circulated. The Commission adopted paragraph A.1, with the modification shown by the slip attached to the copies circulated. It also recommends circulation of the report to those interested in cloud classification, but the Commission could not adopt the report without modification owing to the divergence of opinion on some of the recommendations included in it.

September 16, 1921.

#### MINUTES OF MEETINGS.

##### FIRST MEETING, THURSDAY, SEPTEMBER 8, 1921,

in the Council Chamber of the Air Ministry, Kingsway, London, W.C.2.

Members present: Lt.-Col. Gold (President); Col. Delcambre, Prof. van Everdingen, Lieut. Grant, Dr. Hesselberg, Col. Matteuzzi, Prof. de Quervain, Capt. Ryder, M. Wallén.

There were also present: Commandant Jaumotte, Lieut. Kerguistel, Capt. Mackenzie (Acting Secretary), Dr. Simpson, Mr. Rikiehi Sekigouchi.

1. The opening speech of the President (Appendix to the Minutes of the first meeting) was circulated later.

2. The resignation of Captain Franck was accepted, and the following were co-opted members of the Commission:—

Lieut. Kerguistel  
Commandant Jaumotte,  
Col. Chaves.

3. It was decided to appoint sub-committees to consider the details relating to items 6 (transmission of reports by radiotelegraphy) and 7 (codes for international exchange of forecasts) and for the consideration of a cloud atlas for the use of observers. The committees were appointed as follows:—

##### Cloud Atlas.

Sir Napier Shaw.  
Dr. Cannegieter.  
Capt. Douglas.  
Commandant Jaumotte,  
Col. Matteuzzi.  
Prof. de Quervain.

##### Radio-telegraphy.

Col. Gold.  
Col. Blandy.  
Col. Delcambre.  
Dr. Dellinger.  
Lieut. Kerguistel.  
Capt. Ryder.  
M. Wallén.

##### Code for Forecasts.

Col. Gold.  
Dr. Hesselberg  
Commandant Jaumotte.  
Prof. de Quervain.

4. Some discussion took place on the procedure for giving effect to the tenth paragraph of the minutes of the 6th meeting, page 37 of M.O. 242. Further consideration of this question was postponed until a later meeting, the President having reported that he had distributed copies of M.O. 242 and circulated the papers relating to the present meeting to the following Directors of Institutes:—

Zentralanstalt für Meteorologie und Geodynamik, Vienna.  
Osten Gesellschaft für Meteorologie, Vienna.  
Central Meteorological Institute, Sofia.  
Bayerische Landeswetterwarte, Munich.  
Deutsche Seewarte, Hamburg.  
Meteorologisches Institut, Berlin.  
Sächs Landeswetterwarte, Dresden.  
Meteorologisches Observatorium, Aachen.  
Central Bureau für Meteorologie und Hydrographie, Karlsruhe.  
Meteorologische Geophysikalisches Institut, Frankfurt a/m.  
Meteorological and Magnetic Institute, Budapest.

5. The President reported that he had had correspondence with Capt. Ryder with regard to a note from Mr. Thorkelsson indicating that it might be necessary to make the morning hour of observation in Iceland 9 a.m. instead of 7 a.m. He stated that he had asked Mr. Thorkelsson to postpone any change of this kind until there had been an opportunity of discussing the situation at the meeting in London. Mr. Thorkelsson had expressed his intention of maintaining the observations at 7 a.m. unless the expenses of doing so should eventually prove too great. The following resolution was then passed unanimously:—

“The Commission recognises the difficulty of making observations in Iceland at so early an hour in the morning as 0700 G.M.T., and expresses its appreciation of the manner in which Director



Thorkelsson is meeting the needs of European meteorologists in regard to the reports from Iceland. In view, however, of the importance of those observations in International Meteorology, the Commission considers that it is undesirable either to reduce the number of stations or to change the morning hour of observation from 0700 to 0900 G.M.T."

6. Captain Ryder then reported the result of his negotiations relating to the proposed new agreement with the Great Northern Telegraph Company for the despatch of the Iceland reports to England, and their issue from England with the collective British synoptic reports. He gave an account of the replies which had been received from the countries participating in the present reports and from countries likely to be interested in the reports if they were distributed by radiotelegraphy. The following resolution was passed unanimously:—

"The Commission considers that the arrangements with the Great Northern Telegraph Company, negotiated by Captain Ryder, offer a satisfactory solution of the problem of the distribution to European Meteorological Services of the reports from Iceland, and recommends that the arrangements be put into operation as early as possible."

It was also unanimously agreed:—

"That an arrangement by which the agreement with the Great Northern Telegraph Company was terminable at six months' notice would best meet the requirements of the Meteorological Services."

Captain Ryder undertook to continue the negotiations, with a view to beginning the new plan by about April 1922, and to negotiate with countries which are not at present participating.

7. It was agreed unanimously:—

"That the present weather scale, M.O. 242, page 39, should be amended so that the figures 07 and 17 should have the following meaning:—

07 — after snow, sleet or hail.

17 — after snow, sleet or hail."

8. It was agreed unanimously:—

"That the characteristic of barometric tendency, M.O. 242, page 29, should be amended by deleting the words 'or the same as' in the sentence 'the barometer is now lower than or the same as 3 hours ago.' The words 'or the same as' in the sentence 'the barometer is now higher than or the same as 3 hours ago' stand unaltered."

9. A long discussion ensued upon the proposal to add the figure 10 to the scale of visibility, to indicate that objects were visible at a distance of more than 50 kilometres, and to substitute for figures 03 and 13 in the scale of present weather, the meaning "with or after precipitation within sight."

The meeting adjourned at 1 p.m.

10. The afternoon session opened at 2.45 p.m.

The discussion of the proposed modification of the visibility scale was resumed. On a vote being taken, the proposal to add the figure 10 to the visibility scale was lost by 5 votes against 3.

11. A further proposal to substitute "precipitation within sight" instead of the words "with solar or lunar halo" for the numbers 04 and 14 of the present weather code, was lost by 7 votes against 2.

12. Colonel Delcambre then explained the memoranda which he had circulated to members of the Commission. He expressed the opinion that considerable freedom ought to be left to National Services to

develop codes for National purposes based on the new principles which were gradually being introduced into meteorology by Bjerknes in Norway and by the National Meteorological Office in France. It was not his intention to propose that the International code should undergo complete modification, but he considered that a rigid insistence upon the application of the codes to the exclusion of National developments, would not be in the best interests of meteorological progress.

Director Hesselberg explained that he had similar views in Norway and he had found it necessary to supplement the International code by special groups giving additional information which they required for National purposes. He added that, in a few years' time, it might be possible—he hoped it would be possible—to make such alterations in the International code as would permit of the inclusion of the additional information which the National Meteorological Services of different countries found necessary, and that he and Colonel Delcambre might then unite in securing the necessary reforms.

13. The suggestion to include information about the time of beginning and ending of rainfall as supplementary figures to the index groups to stations was then discussed. The Commission considered\*:—

"That it was undesirable to include in the index groups any information beyond that necessary for the specification of the station."

14. The code for the messages to be included in the collective issue of European reports, M.O. 242, page 44, paragraph (h), was then considered, and it was suggested that two groups for each station might be of the form:—

BBDDE  $w_1$ TTK'W

where  $w_1$  is the initial figure of the present weather code and so indicates the general state of the weather;

and K' is a single figure indicating the manner in which the barometer is changing.

*Suggested Code for K'.*

					Change in last three hours in half-millibars.
0	Barometer steady	-	-	-	- 0 or 1
1	" rising slowly	-	-	-	- 2 or 3
2	" rising	-	-	-	- 4 to 7
3	" rising quickly	-	-	-	- 8 to 12
4	" rising very rapidly	-	-	-	- more than 12
5	" falling slowly	-	-	-	- 2 or 3
6	" falling	-	-	-	- 4 to 7
7	" falling quickly	-	-	-	- 8 to 12
8	" falling very rapidly	-	-	-	- more than 12

15. The meeting adjourned at 5 p.m.

(Signed) E. GOLD.

September 8th, 1921.

SECOND MEETING, FRIDAY, 9TH SEPTEMBER, 1921,

in the Council Chamber of the Air Ministry, Kingsway, London, W.C.2.

Members present: Lt.-Col. Gold (President), Col. Delcambre, Prof. van Everdingen, Dr. Hesselberg, Commandant Jaumotte, Col. Matteuzzi, Prof. de Quervain, Capt. Ryder, M. Wallén.

There were also present: Capt. Mackenzie (Acting Secretary), Dr. Simpson, Mr. Rikichi Sekigouchi.

1. The minutes of the first meeting were circulated and read, and the President outlined the programme for the day.

\* Col. Delcambre notified the President after the meeting that he dissented from this resolution.



2. After a lengthy discussion the proposal of Professor de Quervain that messages by ordinary telegraphy should not be discontinued until after the complete service by wireless telegraphy has been introduced was withdrawn on the understanding that messages would be sent by ordinary telegraphy on request on occasions of atmospheric disturbance which prevent the reception of the radiotelegraphic signals.

3. The meeting then proceeded to a discussion of Mr. Wallén's proposal for an alternative method of reporting barometric tendency. It was pointed out that an examination of the reports from observers in Great Britain showed that the system of adding 33 or 67 to the wind direction number, in accordance with the decision on page 29 of M.O. 242, has been successful; in all cases of tendencies of 10 or more, the necessary addition to the number reporting wind direction had been made by the observers. In view of this the proposal was withdrawn.

4. In connection with paragraph 3, the question of comparing the radiotelegraphic messages received by different Institutes with the corresponding messages issued, was considered and the following resolution was passed unanimously:—

“That the Commission requests the British Meteorological Office to arrange for a return for selected days of the messages received by radiotelegraphy by the different Institutes and for their comparison with the corresponding messages issued and for their return after examination with a note of the discrepancies revealed.”

5. A proposal for a new code for visibility to permit of the reporting of visibility greater than 50 kilometres was discussed. It was decided to leave the decision until the opinion of the Commission for Aerial Navigation had been ascertained.

6. The discussion of the form of the proposed code for the European issue (M.O. 242, page 44, paragraph (h)) was resumed. It was eventually decided unanimously that the form of the code should be as follows:—

BBDFF w<sub>1</sub>TTK'R for the observations at 0700 G.M.T.

BBDFF w<sub>1</sub>TTK'W for the observations at other hours

where w<sub>1</sub> and K' have the meaning given in paragraph 14 of the minutes of the first meeting, and R denotes the amount of rainfall for the preceding 24 hours according to the following code:—

Code Number.	Amount of Rainfall (24 hours).
0	0
1	Trace or 0.1 mm.
2	0.2 to 2 mm.
3	3 to 5 mm.
4	6 to 10 mm.
5	11 to 15 mm.
6	16 to 20 mm.
7	21 to 30 mm.
8	31 to 50 mm.
9	above 50 mm.

7. After a discussion of the unit to be adopted in reporting the speed of the cloud in the group C<sub>1</sub>ddVV, it was decided, *nemine contradicente*, that:—

The relative speed of the cloud should be expressed in the units used on page 12 of M.O. 242, i.e., VV is expressed by a number such that the actual speed of the cloud will be given in kilometres per hour by the equation:—

$$vv = \frac{h}{1000} \times VV$$

if “h,” the height of the cloud, is expressed in metres. This unit is the “radian per hour.”

The meeting adjourned at 11.45 a.m. in order to allow the Radiotelegraphic Sub-Committee to meet.

8. The afternoon session commenced at 5.45 p.m. The discussion of a change in the code for visibility to permit of reports of visibility greater than 50 kilometres, was resumed. It was reported that the Commission for the Application of Meteorology to Aerial Navigation saw no objection to the proposed change. On a vote being taken it was decided by 6 votes against 1, that:—

The visibility code should be as follows:—\*

Code Number.	Objects.	Previous Distances.
0	Not visible at 50 metres	50 m.
1	200	200 m.
2	500	500 m.
3	1,000	1,000 m.
4	2,000	2,000 m.
5	4,000	4,000 m.
6	10,000	7,000 m.
7	20,000	12,000 m.
8	50,000	30,000 m.
9	Visible at 50,000 or more	30,000 m. or more.

9. In view of the resolution of paragraph 8, it was decided unanimously that:—

“the figures 03 and 13 of the code for present weather M.O. 242, page 39, should have the meaning ‘precipitation within sight.’”

10. The Committee then proceeded to consider the proposal for a code for the reports from Iceland. It was decided unanimously to recommend:—

that the following should be the forms of the messages in the telegrams from Iceland:—

(a) For all stations except Reykjavik and Thorshavn.

Reports at 7 a.m.

B<sub>2</sub>B<sub>2</sub>cb'b' BBBDD FwwTT cbWAN

where B<sub>2</sub>B<sub>2</sub> gives the barometer reading at 1 a.m. in whole millimetres or whole millibars.

cb'b' gives the barometric characteristic and barometric tendency for the three hours preceding 1 a.m. The barometric tendency is to be expressed in half-millimetres or half-millibars.

The remaining figures have the same significance as in M.O. 242.

For reports from these stations at hours other than 7 a.m. the same form should be adopted with the omission of the first group.

(b) For Reykjavik and Thorshavn.

B<sub>2</sub>B<sub>2</sub>cb'b' BBBDD FwwTT cbWVH ALaNH RRSV<sub>r</sub>

For reports at 1 p.m. the messages from these two stations should be in the form:—

BBBDD FwwTT cbWVH ALaNH.

For reports at 6 p.m. the messages should be in the form:—

BBBDD FwwTT cbWVH ALaNH RRSV<sub>r</sub>

\* The distance for figure 7 was given originally as 30,000 m. but 20,000 m. was agreed subsequently to be preferable by those members of the Commission who were present at the meeting and this value has therefore been inserted.



It was further considered that the group for direction and speed of upper cloud, viz., C<sub>1</sub>ddVV, should be added to the messages from Reykjavik and Thorshavn twice daily when the observations could be made.

11. The Commission sees no objection to the observations in Iceland for the European messages being made half an hour before the usual hours of synoptic reports if that is necessary to secure their arrival in London in time for inclusion in the British synoptic messages.

12. The report of the sub-committee on the cloud atlas was received and section A, paragraph 1, was adopted after amendment. The Commission recommends :—

the circulation of this report of the sub-committee to all interested in the classification of cloud forms.

13. The report of the sub-committee on the code for the transmission of forecasts was received and adopted.

14. Colonel Delcambre made a statement on the proceedings of the sub-committee appointed to consider the transmission of reports by radiotelegraphy, and the following table for the times of transmission for the reports of the different countries was adopted unanimously to replace the table on page 44 of M.O. 242 :—

Time after Standard Hour of Observation.	Country.	Time after Standard Hour of Observation.	Country.
Transmission* begins.		Transmission* begins.	
0h. 30m.	Holland (de Bilt only).	5 mins. before 0h. 20m.	Bulgaria.†
0h. 35m.	Denmark.	0h. 20m.	Serbia.
0h. 40m.	Sweden.	0h. 30m.	Azores.
0h. 50m.	Norway.	0h. 40m.	Malta (ships observations from Mediterranean).
1h. 00m.	Great Britain.		
1h. 20m.	{ France. Belgium. Switzerland.	0h. 50m.	Roumania.
1h. 40m.	Germany. Holland additional stations.	1h. 00m.	North Africa.
		1h. 20m.	Estonia.
		1h. 30m.	Greece.
1h. 55m.	Finland.	1h. 40m.	Italy.
2h. 00m.	Poland.	2h. 00m.	Spain.
2h. 10m.	Hungary.	2h. 10m.	Portugal.
2h. 20m.	Austria.	2h. 20m.	Constantinople.
2h. 25m.	Czecho-Slovakia.		

15. The Commission received a letter from Colonel Blandy forwarding a note of certain decisions of the Technical Committee on International Radio Communications, Paris, June, July and August, 1921. The Commission noted that :—

The Technical Committee considered the proposals of M.O. 242, pages 42-54, quite feasible so far as radiotelegraphy is concerned, with the exception of recommendation (h), page 44.

\* The transmission from each country should cease at or before the time given for the commencement of the transmission by the next country in the column.

† Observations made at 0527 and 1227 G.M.T.

Colonel Delcambre informed the Commission that he would take up the question of arranging for the transmission of these collective messages on continuous wave instead of on spark. The President undertook to communicate to the Technical Committee that arrangements would be made to ensure the issue of the collective message in accordance with the International Radiotelegraphic requirements.

16. The suggestion that an official list of the meteorological reports issued by radiotelegraphy should be prepared by the Commission was considered to have been met for the present by the lists published by the various national offices.

17. The President of the Commission for Maritime Meteorology described briefly the conclusions of his Commission with reference to the code for reports from ships at sea. It had been agreed that the fundamental messages should contain information expressed symbolically by the following groups :—

PQLLL III GG BBDDF wwVKd

where P refers to the day of the week.

If further groups were added to these fundamental groups, which would consist either of four groups without check figures or six groups with check figures, it was recommended that the first two of these further groups should be of the following form :—

Countries using Fahrenheit degrees - CNTTd, WrttK'  
Countries using Centigrade degrees - CNTTT Wrttt

where K' represents the barometric tendency in the same code as that used for the European Collective Issue, paragraph 14 of the Minutes of the first meeting (p. 87), and d, represents the direction of motion of the ship.

18. In accordance with the resolution of paragraph 10, page 37 of M.O. 242, it was proposed :—

That, as Austria had now been admitted to the League of Nations, Professor F. M. Exner of Vienna, should be co-opted a member of the Commission.

This proposal was carried unanimously.

(Signed) E. GOLD.

September 9th, 1921.

THIRD MEETING, SATURDAY MORNING, SEPTEMBER 10th, 1921.

1. The minutes of the second meeting were read, corrected and confirmed.

2. The President reported the receipt of a letter of resignation from Lieutenant H. D. Grant, which was accepted.

(Signed) E. GOLD.

September 10th, 1921.

REPORT OF THE SUB-COMMITTEE ON FORECAST CODE.

Addendum to the Minutes of the First Meeting, Thursday, September 8th, 1921.

1. The sub-committee, consisting of :—

Colonel Gold,  
Dr. Hesselberg,  
Commandant Jaumotte,

met at 5 p.m. on September 8th, 1921.

2. M.O. 244 is based on a good principle but it contains elements of purely national importance which render it unsuitable in its present form for international use; and the code will gain in simplicity by the separation of the national details from the international part.



3. The time at the disposal of the sub-committee was insufficient to make the necessary modifications in the details of M.O. 244.

4. The sub-committee considered that the British Meteorological Office should be asked to prepare a code on the following basis for circulation to the members of the Commission for consideration before the next meeting:—

(a) An index group of three figures should indicate the day of the week and time of the reports on which the forecast is based.

(b) The first figure of each five-figure group should indicate the nature of the information according to the following scheme:—

First Figure of Group.	Information in Group.
0	Position (latitude and longitude of centre of degree square).*
1	Pressure Distribution.
2	Wind Direction.
3	Wind Velocity.
4	Upper Wind.
5	Temperature.
6	Visibility.
7	Clouds.
8	Precipitation.
9	Group reserved for national purposes.

September 8th, 1921.

#### REPORT OF SUB-COMMITTEE FOR CLOUD OBSERVATIONS.

The sub-committee, consisting of Professor de Quervain (President), Captain Douglas, Commandant Jaumotte, and Colonel Matteuzzi, met on Thursday from 4.30 to 6.30 p.m., and on Friday at 9.30 a.m.

Two questions were dealt with: the possible modification of the cloud observation code proposed in November 1920 (see M.O. 242, page 27), and the suggestions to be made to the International Committee in view of a revision of the international classification and of a new cloud atlas.

##### A. 1920 Code.

Colonel Delcambre's very incisive proposals, as their author himself states, are not intended for immediate application.

1. With regard to certain other suggestions already submitted to the President of the Commission, the sub-committee agrees that the addition "*or mammato-cumulus*" to figure 6 should be *deleted* as not defining a type of cloud, but only a detail found with several types, and which, as such, is not more important for the object in view than many others which cannot all be represented in this code. "Mammato-cumulus cloud should be reported by the figure for the type with which the mammato form corresponds." †

2. The sub-committee would have preferred not to follow the more or less fortuitous enumeration of the classification in the figures of the code, but for the purposes of forecast here involved, to have united certain forms under one figure, to admit of more detailed representation of other forms. In particular, it would have preferred, in these weather telegrams, to have put cirro-cumulus and alto-cumulus together in order to give more detail in the case of cloud "with ascending current," distinguishing fine weather cumulus from the dynamic cumulus which is the forerunner of cumulo-nimbus.

\* West longitude to be indicated by adding 50 to the hour of report in the index group.

† Amendment added in accordance with decision of Commission.

If the Commission does not consider it possible to accept this modification, the sub-committee suggests that at least competent observers should be allowed in their reports to imply certain forms of special interest for forecasting without in any way prejudicing the *general* signification of the figure. Thus, for example, figure 3 in these observations might stand for alto-cumulus castellatus, heralding storm, and similarly figure 8 might be reserved for heavy cumulus, while fine weather cumulus could be reported by the same figure as the strato-cumulus, which has a similar favourable significance for forecasts.

The sub-committee recommends that the designation cumulo-nimbus be reserved for the cloud with a *certain* tendency to the formation of storm cirro-stratus (anvil), and that the forms reported be selected in such a way that Cu-Nb, if present, shall always be included. If the direction of cumulo-nimbus is indicated, it should refer to the highest part of this cloud: if the Cu-Nb figure is repeated with different speeds and directions the first indication should refer to the base and the second to the summit.

##### B. Revision of the Classification Atlas.

The sub-committee finds that there is universal need for revision of the classification and a new cloud atlas. It believes itself to be acting in accordance with the wishes of the Commission in merely forwarding to the International Committee a certain number of suggestions emanating from our Commission itself, leaving to the Committee the task of forming a special committee of a few competent persons to go into the matter more carefully.

1. The sub-committee considers that a complete revision of the classification and of the atlas is necessary in view of the important progress made since the first edition, and starting from the international year for cloud measurements. It does not, however, suggest a complete change of the present system of classification which is the fruit of wide experience. It would be necessary to retain the principle of connecting certain forms with certain relative altitudes as the basis of all cloud observation and classification which is to be utilised in the study of the general circulation. On the other hand, in as far as the conditions of formation are known, it will be necessary in the nomenclature to emphasise the fact of this *genesis* rather than a detail of form which may be fortuitous and passing.

2. The *new atlas* should include not only one or two, but several different varieties of each type of cloud, which would give about 40 to 50 figures in all.

We should also like to insist that observers should be trained in such a way as to be independent of the figures and to draw their conclusions especially from the principles of the relative altitude of the cloud forms, the method of formation and the natural relation between them.

We must arrange for *collaboration* between all the meteorological services which should be in a position to supply the future Commission with all the material and characteristic observations for their region. Indeed, in spite of the relative identity of cloud forms all over the globe observed by Abercromby, it is also necessary to take into consideration certain varieties which depend on the latitude and on other conditions varying from one region to another. The Commission must make a careful study of the numerous atlases published during the last few years and should benefit by these examples.

From the technical point of view, and after examination of some specimens of these, the sub-committee recommends the style of reproduction in which the sky is shown in blue and where the cloud, if necessary, is shown brownish-grey on the blue background. These are the indispensable but quite sufficient conditions as regards colour. The question of zincographic or lithographic reproduction must be left till later. The size should not be less than 9 × 12 cm.: an even larger size would be very desirable in order to obtain a nearer approach to actual angular conditions.



at the usual distance: these angular conditions must be added together with all the indications necessary to characterise the situation (direction of lighting, time, general date). The atlas should also include photographs of clouds taken from aeroplanes.\*

The sub-committee recommends that the atlas be completed by the addition of wide-base stereoscopic views, such as those in the Meteorological Office, London, or those which have been prepared lately at the Institutes of Brussels, Paris and Zurich.

The sub-committee is of opinion that the publication in question should consist of two more or less distinct parts; a first part acting as an immediate introduction to the atlas, and a supplement for use in more thorough investigation, including different detail classification: this latter part should contain as well as other points of view, the idea of classification by families, and everything already known about the genesis of clouds.

The sub-committee is aware that these suggestions are incomplete. It will be for the future Commission to lay more sound foundation for this long and delicate work.

September 8th, 1921.

#### ANNEX 1.

Letter from Captain C. RYDER, Director of the Meteorological Institute, Copenhagen, Denmark.

DEAR SIR,

THE three Scandinavian Meteorological Institutes are of the opinion that reports from Iceland after the new international code will not give so good information as the code used for these reports now.

The night observations of the barometer in the morning report now for 10 p.m., 1 a.m., 4 a.m., and 7 a.m. Grw. time, are for us of so great an importance, that we should consider it as a step backwards if these observations in future should not be included in the reports, the intervals between the evening and the morning observation being too large by rapid weather changes.

At a meeting in Stockholm in May this year, we have discussed the matter and agreed to propose that a special code should be used for the Icelandic reports, in which night observations of the barometer should be included.

On the behalf of Directors Wallén, Hesselberg and myself, I therefore ask you to put on the programme for the meeting, in September, of the Commission for Weather Telegraphy the discussion of a special code for Icelandic reports, and we propose the following:—

Morning report	-	BBB BB	B BBBW	BBBDD	FwwTT
		10 p.m.	1 a.m.	4 a.m.	7 a.m. (Grw. time.)
Afternoon and evening reports	-	...	BBBW	BBBDD	FwwTT
			3 hours		
			before observation.		

As regards the morning reports, our proposed code will be very near the same as the code used now. The only alterations are that on the vacant place in the second group is put W (past weather), and in the fourth group we take two figures for ww (present weather) and give the temperature in full degrees only.

Regarding the afternoon and evening reports, there is the same alteration in the last group, and there is placed a first new group with the barometer 3 hours before observation and "past weather."

\* See also p. 28.

The total amount of groups after this code from five stations in Iceland and from Thorshavn will then be:—

Morning	-	4 groups from 6 stations	-	24 groups.
Afternoon	-	3 " " 6 "	-	18 "
Evening	-	3 " " 6 "	-	18 "
sum				- 60 groups.

As the draft of agreement with the Telegraph Company allows us up to 74 groups a day, there will be plenty of room for extra groups.

We think that the proposed code will give all information necessary and gives us more than the International Code, and we hope it will meet the demands of all the Institutes interested.

I have sent Mr. Thorkelsson the proposed code, but cannot await his answer before writing you. I am therefore not acquainted with his opinion.

I am, dear Sir, &c.,

(Signed) CARL RYDER.

Meteorological Institute,  
Copenhagen.

June 20th, 1921.

#### ANNEX 2.

#### NOTE ON PROPOSALS FOR MODIFICATION IN THE CODE FOR ICELAND REPORTS.

By Lt.-Col. E. GOLD.

1. If the Iceland reports come in the International Code, then the tendency in the reports at 7 a.m. will give effectively the height of the barometer at 4 a.m. If, therefore, it is possible to arrange for the inclusion in the 7 a.m. message of a single five-figure group, giving the barometer and tendency at 1 a.m., the whole of the information asked for by the Scandinavian Meteorological Institutes would be provided. When this question of the modification of the code for reports from Iceland was raised at the meeting of the Commission in November, Mr. Thorkelsson, the Director of the Meteorological Service of Iceland, stated that it was essential that the new International Code should be brought into use there. It is therefore extremely desirable that no steps should be taken which would discourage the important advance in the meteorology of Iceland which the adoption of a new code would effect.

2. Provision of an extra group could perhaps be made by omitting the cloud group from the reports from Iceland stations other than Reykjavik.

3. If, however, any appreciable modification is to be made in the code for the reports from Iceland, then it would seem to be better to reduce the reading of the barometer to 2 figures only; to report only one form of cloud and the total amount; and to omit the cloud height. This would save 4 figures, which are all that are required to give the barometer at 1 a.m. and the tendency. In evening reports, the figures might be utilised for reporting the amount of rainfall.

London,

June 29th, 1921.

#### ANNEX 3.

#### NOTE ON PROPOSALS FOR MODIFICATION IN THE CODE FOR ICELAND REPORTS.

By Mr. T. THORKELSSON, Director of the Meteorological Office, Iceland

I am now arranging for double observations in the morning, viz., at 7 a.m., G.M.T., for external reports, and 9 a.m. for national reports.



If I, as I hope, succeed in getting satisfactory arrangements in this way, I have, from Icelandic point of view, no objection to Captain Ryder's proposal regarding the code for the morning reports. On the other hand, it is essential for avoiding belated or confused reports, that the afternoon and evening reports are common, but the code proposed by Captain Ryder does not meet the national demands; therefore, some modifications in this code will be desirable.

The barometer 3 hours before observation is of less value than the characteristic and amount of barometric tendency during these three hours, and information about clouds is also required.

For national purposes the following code would be acceptable:—

Morning report, 7 a.m. -  $B_1B_1B_1B_2B_2$   $B_2B_3B_3B_3W$  BBBDD FwwTT

Afternoon (1 p.m.) and evening (6 p.m.) report - BBBDD FwwTT cbWaN.

Lieut.-Col. E. Gold, in his note on Captain Ryder's proposals (annex 2, art. 3), suggests some modifications that, from my point of view, are preferable, excepting the reduction of the reading of the barometer to two figures only. At least for national purposes, the tenths of mm. in the barometer readings are indispensable. The place lost in this way may be gained by omitting the humidity. At present the Icelandic stations are not equipped with hygrometers; therefore, they will be unable to report the humidity at least next year. The omission of humidity is, consequently, no serious loss.

Perhaps the following code might serve the purposes:—

Morning Reports:  $B_2B_2c_2b_2V$  BBBDD FwwTT cbWaN.

The suffix 2 refers to barometer readings at 1 a.m. G.M.T. The afternoon and evening reports would be composed of the three last groups of the morning report. In my opinion, it is an advantage to use the same code in the morning and evening reports.

The above-mentioned codes are based upon the assumption that the code for present weather, as given in M.O. 242, pages 39-41, will be used; but I should prefer the following modifications in the code for present weather for the Icelandic reports.

Instead of readings 00-19, I suggest the following:—

No precipitation at the station nor visible in its neighbourhood.	Cloudiness 10 or 0	-	-	-	00
	" 1	-	-	-	01
	" 2	-	-	-	02
	" 3	-	-	-	03
	" 4	-	-	-	04
	" 5	-	-	-	05
	" 6	-	-	-	06
	" 7	-	-	-	07
	" 8	-	-	-	08
No precipitation at the station but visible in its neighbourhood.	" 9	-	-	-	09
	Cloudiness 10	-	-	-	10
	" 1	-	-	-	11
	" 2	-	-	-	12
	" 3	-	-	-	13
	" 4	-	-	-	14
	" 5	-	-	-	15
	" 6	-	-	-	16
	" 7	-	-	-	17
	" 8	-	-	-	18
	" 9	-	-	-	19

In this code, 00 signifies sky covered with cloud as well as absolutely cloudless, but the latter case is easily discernible in that no cloud is observed, which is reported as a hyphen (-) in the place of "a." When the sky is covered with cloud, the form of cloud is always reported. When cloud is observed, the cloudiness being below 1, either 01 or 11 should be reported.

If this modification of the code for present weather could be introduced into the Iceland reports, I could dispense with N in the reports, the normal Iceland report might then be composed of the following three groups:—

BBBDD FwwTT cbWVa

ww being the modified code for present weather. The extra group in the morning reports might then either be

$B_2B_2B_2c_2b_2$  or  $B_2B_2c_2b_2H$

the suffix 2 referring to the barometer and tendency at 1 a.m. G.M.T.

Reykjavik,

August 12th, 1921.

#### ANNEX 4.

### MEMORANDUM ON WIRELESS WEATHER REPORTS FROM SHIPS.

By Professor V. BJERKNES, Director of the Geophysical Institute, Bergen, Norway.

April, 1921.

A/S John Griegs,

Boktsykkeri

M. Nilssen & Son,

Bergen.

[This Memorandum has already been circulated by the Bergen Institute.]

#### ANNEX 5.

### NOTE ON PROFESSOR BJERKNES' MEMORANDUM ON WIRELESS REPORTS FROM SHIPS AT SEA.

By Lieut.-Colonel E. GOLD.

1.—(a) A uniform system of meteorological reports is even more desirable in the case of ships at sea than in the case of stations on land. The reports from land stations are collected at a central office and transmitted to other central offices, and although variations in the codes are certainly inconvenient, it is relatively simple at a central office to keep a note of such variations and to interpret the reports which are received regularly every day. In the case of ships at sea, however, the reports may be sent from one ship to another or from any ship to any local meteorological office. The development of meteorology at sea depends very largely upon the application of the synoptic method on board ship. It will greatly facilitate this application if all reports from ships of all nationalities are made according to a uniform international code.

(b) Limitations in the number of ships at sea and in the funds available for transmitting meteorological reports, make a ship practically an isolated meteorological station in a way in which very few fixed stations are isolated. Comparison with neighbouring reports is not usually possible in the case of ships at sea, especially in regions far distant from land and where the density of shipping is very much less than it is on certain routes in the North Atlantic. It is, therefore, essential to the best use of ships' reports, that the meteorologist should be able to assure himself that errors of transmission do not exist. It is true, as Professor Bjerknès remarks, that telegraphic errors are not more numerous in wireless messages from ships than in wireless messages ashore, but (1) telegraphic errors are more numerous in wireless messages ashore than they are in land-line messages, and (2) if there were no check by means of neighbouring stations, it would be essential, even in wireless messages on land, to have some method of correcting errors of transmission.



2. It is true that a ship at sea is in a particularly favourable situation for meteorological observations; but in the case of a moving steamship, there remain serious difficulties to be surmounted before the precise accuracy, which Professor Bjerknes demands, can be achieved. The movement of the ship introduces a difficulty in the exact measurement of the direction and speed of the wind. This difficulty is largely overcome by observation of the effect of the wind upon the surface of the sea. Further, a steamship, even more than a sailing ship, affects the temperature of the air surrounding it, and the exact measurement of the air temperature, when a ship is almost at rest relative to the air, is a matter of considerable difficulty. Appreciable errors certainly exist in all cases where the thermometers are placed in a screen in a fixed position on the ship.

It is much easier to get an accurate measurement of the temperature of the surface water of the sea than to get an accurate measurement of the temperature of the air. I would, therefore, suggest if any modification appears desirable in the code for reports from ships at sea, the practice of leaving the temperature of the air in whole degrees should be maintained and provision should be taken for obtaining the temperature of the sea to the nearest tenth of a degree. (It may be added that reports from ships at so small a distance apart as 100 kilometres will occur very infrequently, even in the North Atlantic. In other parts of the world they will be still less frequent.) The requisite figure for giving the temperature of the sea to the nearest tenth of a degree might be provided for in the code by the omission of "r"—time of beginning of rainfall.

3. Professor Bjerknes' principal objection is to the use of check figures in these reports. The code, with check figures, has been in operation for some time in reports from ships in the Atlantic to the British Meteorological Office. The check figures proved most valuable. Errors in transmission occur in about one message out of every four, and in practically every case the check figures enable the error to be corrected. An individual case may be quoted of a wireless message received on May 2, in which a whole group of five figures was lost in the reception. The check figures enabled the missing group (which contained the height of the barometer and the direction of the wind) to be replaced, and the message utilised with confidence in its accuracy. One of the principal advantages derived from the check figures depends upon the importance of *unexpected variations* in the weather map. When only one report comes from a large area and the report indicates conditions very different from those which would be anticipated from the synoptic charts based on the reports from land stations, the ship's report can be used with confidence and the forecast made in accordance with it, if the report includes check figures; otherwise the forecaster does not know whether or not he should reject the report. Without the check figures, the report can only be accepted with confidence when it agrees with the preconceived idea of the forecaster as to the distribution at sea, *i.e.*, when it has little or no influence in modifying a forecast based upon the land reports. This advantage of check figures is one on which too great stress cannot be laid. It would be a definitely retrograde step to give up accuracy and confidence in the simple reports of the principal elements, for the hypothetical advantage of obtaining the temperature of the air to a tenth of a degree and of securing the non-meteorological information about the course of the ship.

Progress in forecasting is not achieved by throwing upon the forecaster the onus of discarding observations which appear to be doubtful owing to the risk of telegraphic errors. The fundamental information required from ships at sea is the height of the barometer, the direction and force of the wind, temperature of the air, and the state of the weather. It would be better to sacrifice everything else to secure accuracy in these five, if that accuracy could not otherwise be achieved. Actually,

by Dr. Simpson's code, this accuracy is achieved and a considerable amount of extremely useful additional information is also provided.

London,

June 29th, 1921.

#### ANNEX 6.

#### SUMMARY OF W/T WEATHER REPORTS FROM SHIPS.

From W/T Registers received up to August 25th, 1921.

Ship.	No. of messages sent.	No. relayed through other ships.	Number correctly transmitted.	Errors found by check.	Not corrected by check.
Adriatic -	45	4	37	7	1
Aquitania -	25	3	19	6	—
Berengaria -	16	1	14	1	1
Cedric -	77	1	61	14	2
Celtic -	64	1	56	7	1
Lapland -	18	1	16	2	—
Mauretania -	62	4	51	11	—
Olympic -	68	4	60	7	1
Orbita -	23	2	15	8	—
Orduna -	28	4	19	7	2
Saturnia -	29	4	25	3	1
Totals -	455	29	373	73	9

London,

August 25th, 1921.

#### ANNEX 7.

#### NOTES ON THE PROPOSED CODES OF M.O. 242.

By Dr. HESSELBERG, Director of the Meteorological Institute, Norway.

##### 1. On the Use of Check Figures in the Code for Reports from Ships at Sea.

As Colonel Gold states in his memorandum, a uniform system of meteorological reports is even more desirable in the case of ships at sea than in the case of stations on land. It is, therefore, necessary to come to a compromise as to the check figures. I therefore propose:—

- (a) that check figures are given only for the obligatory part of the reports from ships at sea.
- (b) That the check figures are given in two special groups.
- (c) That these groups of check figures might be omitted.

To take concrete example:—

If the ship code be

GLLLL 1111Q BBDDF wwVSd ANTTT tttWr

the first four groups contain all the obligatory reports. Writing these groups in vertical order, we have

GLLLL  
1111Q  
BBDDF  
wwVSd

Vertical addition gives  $y_1y_2y_3y_4y_5$ .

Horizontal addition gives the second groups of check figures:  $x_1x_2x_3x_4x_5$



2. *About the Code proposed by V. Bjerknes for Ships at Sea.*

(a) It might be advantageous to change the order of the observation in the following way:—

GGLLL 1111Q BBVDD FwwSd ANTTT tttWr

We have then the wind direction, wind force and weather, in the places where we are accustomed to find them in the land code.

(b) If it is desirable to save a figure, it can be done in the following way:—

Instead of Q, we introduce O, the octant of the globe according to the code:

1	0-90 W.	} Northern Hemisphere.
2	90-180 W.	
3	180-90 E.	
4	90-0 E.	
5	0-90 W.	} Southern Hemisphere.
6	90-180 W.	
7	180-90 E.	
8	90-0 W.	

At the same time, 50 is added to GG for ships giving temperatures in degrees Celsius.

We then can spare a figure and have the code:—

GGLLL 111Op BBVDD FwwSd ANTTT tttWr

where p is that observation which it is desirable to introduce, *i.e.*, the humidity H.

3. *On the Code for Land Reports.*

(a) In the proposed code for the visibility, there are not sufficient numbers for the great visibilities. In the code for the weather, therefore, the numbers 03 and 13 give "visibility over 50 kilometres." This is not convenient. I therefore propose that visibility is given in a scale 0-10, where the numbers 0-8 have the same meaning as in the present code, and,

9 Objects not visible at 30,000 metres (20 miles).

10 Objects visible at above 50,000 metres (35 miles).

The number 10 can be telegraphed as 0, as we, by means of ww and h can see if the number 0 in the telegram means 0 or 10.

In the code for the weather, the numbers 03 and 13 might give "precipitation within sight," that it is most desirable to have in the code for present weather.

(b) As several countries have introduced the new code, it might seem inconvenient to make greater changes of it. I will, however, mention that it is possible to put two figures into the group giving the number nn of the station. That should presumably be figures, the use of which is not generally acknowledged, so that countries which will not give these might omit them without difficulty.

Without proposing anything, I will mention the following code:—

mm  
nnrs BBBDD FwwTT cbbWH ALaNH RRSV.V  
MM

Here not only the hour of the beginning, but also the hours of the cessation of the precipitation is given. Further, we have two figures for the amount of barometric tendency. A disadvantage is that the visibility only is given in the morning and the evening reports.

4. *On the Code for Reports from Iceland and the Faero Islands.*

In addition to the memorandum of Director Ryder, I propose that the following additional groups are given from Thorshavn and one Icelandic station:—

In the morning report - - ALaNH RRSV,r C<sub>1</sub>ddVV  
In the afternoon report - - ALaNH C<sub>1</sub>ddVV  
In the evening report - - ALaNH RRSV,r

The total amount of groups in the proposal of Director Ryder is 60. The groups given above from two stations give 14 groups more, or in all 74 groups.

Bergen,

August 6th, 1921.

## ANNEX 8.

MEMORANDUM BY HEAD OF BRITISH DELEGATION TO THE  
TECHNICAL COMMITTEE ON INTERNATIONAL RADIO-  
COMMUNICATIONS.—Paris, June, July and August, 1921.

6th September 1921.

To the President,

International Commission for Weather Telegraphy.

The Technical Committee, consisting of representatives from the United States, France, Great Britain, Italy and Japan, was convened by the French Government, at the request of the Conference on Electrical Communications held at Washington in October 1920, in order to consider certain technical Radio questions for which the latter conference had been unable to find satisfactory solutions.

The result of the work of the Committee is contained in a document, the final edition of which will be circulated to all nations by the French Government. Certain portions of the document deal with the transmission and reception of meteorological radio-telegrams, and, as head of the British delegation, I have been requested by the Committee to communicate to you these particular portions for the information of the forthcoming meeting of the International Committee for Weather Telegraphy.

Accordingly the particular portions of the document which concern meteorological telegrams are given as enclosures to this memorandum.

I am further to inform you that the French Government will communicate the above information to you officially in due course.

(Signed) L. F. BLANDY,

Group Capt. R.A.F.

Head of British Delegation.

## QUESTION No. 4.

*Time-Signals, Meteorological, &c.*

To ascertain whether time-signals, meteorological telegrams, &c., should be transmitted on specified standard wave lengths, or whether they should be transmitted on any wave between definite limits.

*Answer to Question No. 4.*

1. In principle, stations shall transmit time-signals, meteorological bulletins and warnings to navigators, on those frequencies and classes of waves on which they are allowed, by Appendix II. of the draft regulations, to transmit their regular traffic.

2. Stations which at present transmit the signals indicated above on damped waves, shall be allowed to continue transmission on their present waves, until a date to be fixed by the next International Conference on Electrical Communications.

3. After the date so fixed the 500 kc/s (600 m.) wave shall not be employed for such signals, except that it may be used by mobile and land stations for telegrams of an urgent character involving the safety of navigation.

4. In addition to the frequencies and classes of waves indicated in paragraph 1, above, the damped wave of 113 kc/s (2,650 m.) is specially allotted for the signals therein mentioned.

5. Messages giving the observations made by the stations of the meteorological network, or by maritime meteorological stations, which do



not include either storm warnings, or information of interest to navigators, shall be transmitted on frequencies and classes of waves ordinarily permitted to the stations for handling their regular traffic.

6. The exact times of transmission for each station should be decided upon by international agreement.

#### QUESTION No. 14 (c).

##### *Meteorological Service.*

1. The Technical Committee on International Radio-communication desires to notify the International Commission of Weather Telegraphy, that their proposals have been considered and have been found quite feasible so far as Radio-Telegraphy is concerned, except as regards the recommendation (h) concerning the issue of collective reports by the Eiffel Tower (spark). The Committee is of opinion that this service should be conducted in accordance with art. CX\* of the Washington Draft, also paragraphs 1 and 5 of the Committee's answer to Question No. 4 in this document.

#### \* Art. CX. :

1. The Administrations of neighbouring countries will arrange to organize a sufficiently complete service of routine transmissions, giving to mobile stations time, meteorological bulletins, and warnings to mariners.

2. The times of transmissions of these three categories of signals shall be fixed in such a manner as to enable them to be received by ships at sea having only one certificated telegraphist.

As a general rule time signals should terminate at an exact hour or half hour, Greenwich time; meteorological bulletins and warnings to mariners should commence at an exact hour, Greenwich, and the total duration transmission must not exceed 12 minutes. The daily number of transmissions from each station shall not exceed two for time signals and four for meteorological bulletins and warnings to mariners.

3. As a general rule, during this transmission all radio-telegraph stations whose transmission might disturb the reception of these signals and telegrams shall keep silence, so as to allow all stations which desire to do so to receive these telegrams and signals. An exception shall be made in the case of distress messages and state telegrams.

4. Radio-telegraph stations which have to transmit to mobile stations information involving safety of navigation and being of an urgent character (icebergs, derelicts, cyclones, typhoons, sudden changes in the position or form of fixed obstructions or of land marks) shall transmit such information on 600 metres.

5. The Governments of the contracting states will select the stations which are to send out to mariners safety information of an urgent character. When the information in question has been sent out by stations performing the time service, it shall be again sent out after the transmission of the time signal, and the meteorological bulletin.

6. In addition to the routine transmission mentioned in paragraph 1, the administrations may make, in agreement with the meteorological services, and with the services of maritime information, such arrangements as are necessary to furnish meteorological bulletins and warnings to mariners to certain specified fixed stations, such messages containing information affecting the region of these stations. These telegrams, the text of which shall be as short as possible, shall be sent to such mobile stations as ask for them.

#### *Meteorological Data Messages from Mobile Stations.*

7. The Meteorological data messages made by certain mobile stations appointed for that purpose by the country to which they belong, may be sent to the fixed stations authorised by the administrations concerned to receive them, who shall also appoint the meteorological offices to which these observations shall be addressed by the fixed stations.

#### *Time Signals, Meteorological Bulletins and Messages for the service other than that of ships.*

8. In addition to the signals specified in paragraphs 1 and 6 above, the administrations shall be at liberty to organize national or international services of time signals and of meteorological bulletins or synoptic messages for the benefit of services other than that of ships.

2. The wave lengths used by the Meteorological Service should be those which the Radio-Telegraph stations normally employ. It is recommended that a copy of the restrictions on this subject, passed by the Technical Committee on International Radio-communication, should be forwarded to the International Commission of Weather Telegraphy, for information.

3. An extract\* from the report of the International Commission on Weather Telegraphy has been drawn up for the information of those interested in Radio-communication, and is appended hereto.

4. It is recommended that this subject be given special consideration at the next International Conference on Electrical Communications, and that the Meteorological Bureaux of the various Administrations be represented during the discussion on this subject.

#### ANNEX 9.

#### NOTE BY COL. E. DELCAMBRE SUR LE MAINTIEN DES TELEGRAMMES METEOROLOGIQUES PAR FIL

(Proposition de Monsieur de Quervain—Circulaire No. 5),†

5th September 1921.

#### A.—*Propositions Générales de l'Office National Météorologique de France.*

I.—L'échange de certains télégrammes par fil doit être maintenu—Mais il faut l'organiser.

II.—Il faut déterminer *quels télégrammes sont utiles*. L'échange actuel repose sur des conventions très anciennes. Il est désirable que chaque pays dresse la liste de ce qu'il reçoit et de ce qu'il envoie, et qu'il fasse éventuellement des propositions de modifications.

III.—Il faut que ces télégrammes arrivent *en temps voulu*. Ce n'est que très rarement le cas actuellement. Les différents Offices doivent échanger les heures de dépôt des télégrammes envoyés et les heures de réception des télégrammes reçus. Connaissant les retards, ils doivent se mettre en relation avec leurs services télégraphiques respectifs pour les diminuer (Exemple du résultat remarquable obtenu entre Zurich et Paris. Les observations suisses ne manquent pour ainsi dire jamais dans le radiogramme de la Tour Eiffel)—(Moyens : éviter adresses multiples, employer fil direct—Envoi des télégrammes à heures à peu près fixes).

IV.—Il faut baser l'organisation télégraphique sur l'organisation radio, c'est-à-dire concentrer par fil près de postes T.S.F. très puissants et diffuser à partir de postes recevant facilement.

#### B.—*Propositions particulières de l'Office National Météorologique de France.*

I.—L'Espagne peut-elle envoyer aussitôt après 18 heures des télégrammes d'observations de 18 h. (pour 4 ou 5 stations au moins) (et non plus le lendemain avec les télégrammes d'observations de 7 heures) ?

II.—L'Espagne peut-elle envoyer des télégrammes d'observations de 18 heures à Météo. Rabat ?

III.—Mêmes demandes pour le Portugal.

IV.—Mêmes demandes pour l'Italie.

V.—Les télégrammes des Iles de l'Atlantique (Açores, Canaries, Madère) peuvent-ils être acheminés plus rapidement (en employant au besoin la transmission mixte T.S.F. et télégraphe comme il est prévu pour l'Islande—M. O. 242, page 36) ?

Des télégrammes de ces Iles peuvent-ils être envoyés rapidement à Météo. Rabat ?

\* Extract—Page 37 para. 14 and pages 42, 43, 44 and 45 (para. 2 (a) to (k))—Report of Sub-Committee on the organization of the transmission of Reports by Radio-Telegraphy.

† "The messages by ordinary telegraphy should not be discontinued until after the complete service by wireless telegraphy has been introduced."



## ANNEX 10.

## MEMORANDUM BY COL. E. DELCAMBRE.

PROJET D'ORGANISATION MÉTÉOROLOGIQUE INTERNATIONALE DANS  
L'ATLANTIQUE NORD.

3rd September, 1921.

I.—*La Solution est Urgente.*

A.—La réception en Europe d'un réseau suffisant d'observations atlantiques ferait passer la portée des prévisions du temps sur le continent de 1 jour à 3 jours. Nous n'insisterons pas sur cet avantage capital, qui est, croyons-nous, universellement reconnu.

B.—Une autre nécessité a été moins bien mise en évidence : celle d'établir une prévision pour l'Atlantique même, et de la communiquer aux bateaux en cours de traversée.

Cette nécessité s'impose pourtant au premier examen :

1°.—Les statistiques indiquent la présence simultanée, sur les routes de l'Atlantique entre l'Amérique du Nord et l'Europe Occidentale, d'une moyenne de 300 navires de plus de 5,000 tonnes de déplacement. Les prévisions météorologiques intéresseraient évidemment tous les marins, surtout ceux qui font route sur l'Ouest†, et détermineraient très fréquemment, pour ceux qui pratiquent la navigation à voile, d'opportuns changements de route.

2°.—Le trafic transatlantique aérien sera sans doute réalisé dans un avenir prochain. Mais un service de prévision pour l'Atlantique en est évidemment une condition de possibilité essentielle. Nous rappellerons simplement que lorsque le dirigeable R 34 accomplit cette traversée, la Grande-Bretagne a établi un service météorologique à l'aide de navires échelonnés sur la route et communiquant avec l'Aéronef. C'est grâce à cette organisation que le R 34 évita dans le voisinage de l'Amérique un orage violent qui aurait pu lui être fatal.

II.—*Elle ne peut consister en une simple liaison entre les Navires et le Continent. La Solution qui s'impose.*

A.—Il est impossible de prendre d'Europe les radiogrammes de navires à une distance suffisante parce que :

1°.—La portée d'émission du poste radio d'un navire ne dépasse pas actuellement 300 à 500 kilomètres, et l'expérience a montré que la retransmission de navire à navire est extrêmement pénible, au moins dans le voisinage du continent, où le trafic radio devient considérable. Quand bien même les navires seraient dotés de poste émetteur à arc (2,000 kilomètres environ), les renseignements qui pourraient être ainsi rassemblés en Europe s'étendraient jusque sur le 30° W. de Greenwich. Cette amélioration serait à la rigueur suffisante pour la prévision sur le continent, elle ne résoudrait pas le problème de la prévision pour les routes atlantiques.

2°.—La communication entre de multiples navires et les postes d'écoute continentaux serait difficile et très lente, à cause de l'encombrement du trafic radio qui, dans la zone comprise entre le 15° W. de Greenwich et le continent, s'établit quand les navires arrivent à portée des postes côtiers. Notons de plus qu'il est très difficile d'assurer l'écoute en Europe des météo américains nécessaires à l'établissement des prévisions pour l'Atlantique. Cette écoute sera beaucoup plus facile sur l'Atlantique (Distance moins grande; postes brouilleurs plus éloignés).

† En effet; 1°.—les phénomènes météorologiques progressant très généralement vers l'est, un navire qui va d'Europe en Amérique marche vers l'inconnu, il croisera un beaucoup plus grand nombre de phénomènes que celui qui fait route vers l'Est et qui accompagne le mouvement général de l'atmosphère.

2°.—les mauvais temps, sont généralement de S.W. ou de N.W., le vent et la houle d'avant sont plus mauvais que d'arrière.

3°.—les navires de commerce sont toujours moins chargés dans le sens Europe-Amérique que dans l'autre, donc plus sensibles au gros temps.

B.—Une station collectrice située sur l'Atlantique même (nous en discuterons plus loin le mode de réalisation) s'impose donc d'autant plus que la raréfaction relative du trafic radio en plein Atlantique permettra à cette station de faire elle-même sa discipline radio, de choisir les observations à écouter pour une bonne répartition dans l'espace, d'utiliser enfin des navires comme relais pour étendre son rayon d'action. Ajoutons tout de suite que la Station Atlantique ne devra pas seulement jouer le rôle de central collecteur et réexpéditeur, mais même élaborer elle-même la prévision pour les routes atlantiques. Cette opération ne doit pas en effet être réalisée sur le continent parce que :

1°.—L'envoi des renseignements à la station de prévision du continent et le retour à la Station Atlantique, pour y être diffusée, de la prévision élaborée sur le continent constituent une perte de temps importante;

2°.—Surtout l'élaboration de la prévision pour l'Atlantique par la Station Atlantique elle-même présente tous les avantages de la prévision régionale sur la prévision à grande distance. La Station Atlantique pourra converser avec les navires observateurs. Elle pourra enquêter, le cas échéant, en les attaquant; inversement elle pourra être attaquée par eux et leur fournir des renseignements complémentaires. Elle pourra enfin, beaucoup mieux qu'une station éloignée, sélectionner les observations, filtrer celles qui sont douteuses.

3°.—Le point de vue spécial des possibilités radio. montre que l'émission amortie puissante nécessaire pour communiquer la prévision aux navires en mer, serait très difficile à caser sur le continent où elle troublerait tout le trafic radio. Sur l'Atlantique le trafic étant bien moins dense, elle sera beaucoup moins gênante, du reste la Station Atlantique étant plus à portée des intéressés, cette émission amortie n'aura pas besoin d'être aussi puissante que si elle était faite à terre; de ce fait le trouble apporté à l'ensemble du trafic sera encore diminué.

Enfin s'il était nécessaire de réduire le trafic radio-météo. entre l'Atlantique et le continent, il serait possible, si la Station Atlantique est équipée en station de prévision, de lui faire envoyer en Europe non pas le relevé brut et complet des observations recueillies, mais une première élaboration synthétique de ces observations, une direction de prévision en quelque sorte.

4°.—L'élévation de la Station Atlantique au rang de station "intelligente," c'est-à-dire sa dotation en outillage au complet et en personnel véritablement compétent, permettra d'en faire un merveilleux laboratoire de recherches météorologiques d'autant que les phénomènes météorologiques se présentent constamment sur l'Océan avec une régularité et une pureté tout autre que sur le continent où ils viennent se briser.

III.—*Comment réaliser la Station Atlantique.*

Les Açores sont trop au sud des routes directes à gros trafic. Il n'y a pas de fonds suffisamment élevés pour ancrer un navire. Il existe bien un projet de "l'île flottante," sorte de ponton doté de moteur pour se maintenir dans une zone fixe, et destinée à servir d'escale dans le trafic aérien futur. Sans vouloir décider de la possibilité technique de cette entreprise colossale, il est évident que les difficultés et son prix très élevé en reportent l'application à une échéance assez éloignée. Une autre solution doit donc être envisagée au moins à titre provisoire. On pourrait évidemment imaginer plusieurs stations installées sur des bateaux-navettes et entrant en action dans une zone déterminée (ces bateaux étant assez nombreux (au moins 4) pour que l'utilisation de la zone ainsi choisie soit continue). Cette solution définitive présenterait réduite du fait que les navires au point de vue financier, la dépense étant réduite du fait que les navires pourraient être utilisés commercialement. Mais la complication présente de multiples inconvénients : immobilisation d'un personnel technique nombreux, non spécialisation des navires, &c. . . Il ne reste qu'une solution, la seule logique : l'équipement d'un stationnaire ou plutôt d'un navire croisant sur place, ou du moins dans une zone de faible diamètre.



Le diamètre minimum est déterminé par la condition que le navire puisse se maintenir, le cap au vent, pendant tout le passage d'un gros temps; à raison d'une vitesse de quelques nœuds à l'heure, cette condition donne un diamètre de 200 milles environ.

Quant aux caractéristiques du navire elles devront, semble-t-il, s'approcher des suivantes :

Tonnage : 2,500 tonnes de déplacement pour présenter une résistance suffisante au gros temps.

Type : Voilier à moteur auxiliaire pour réduire au minimum la dépense de charbon.\*

Bien entendu, il faudrait deux navires de ce type se relayant tous les cinquante jours par exemple.

La dépense totale résultante peut être évaluée, au grand maximum, à 7,500 francs papier par jour, soit : 2,700,000 francs papier par an—se décomposant ainsi : (amortissement des navires, assurances, intérêts du capital, charges obligatoires, frais généraux, équipage de 30 hommes), 6,000 francs ; Personnel technique (20 météorologistes et radios), 1,200 francs ; Matériel radio (amortissement et fonctionnement) 300 francs.—(Poste émetteur puissant, 2 récepteurs).

Les observations simultanées des navires pouvant être recueillies par la Station Atlantique, pourront d'autre part être évaluées à 40, et à raison de 4 heures fixées par jour. On voit que l'observation reviendrait au total à un peu plus de 60 francs papier† ce qui n'est pas cher si l'on songe que toutes les puissances européennes (et même les Etats-Unis d'Amérique, non pour la prévision sur leur continent, le mouvement général de l'atmosphère étant d'Ouest, mais pour la prévision à destination de leur marine marchande) étant intéressées au fonctionnement de la Station Atlantique, une coopération doit pouvoir être réalisée et la dépense répartie.

Nous avons réservé jusqu'ici le choix de la zone de stationnement. Elle nous paraît s'imposer entre le 25 et le 35° W. Greenwich, et 47-49° Nord parce que :—

(a) elle est située sur la route du trafic maximum ;

(b) les trajectoires de baisses américaines qui traversent l'Atlantique suivent généralement deux routes qui abordent l'Europe, l'une sur l'Irlande, l'autre vers l'Islande (cas où les hautes pressions des Açores remontent vers le Nord et y rejettent les variations). La divergence de ces routes est suffisamment nette vers le 30° W. pour qu'elles puissent y être distinguées.

(c) elle est au voisinage de régions de formation des baisses océaniques.

(d) Cette position est suffisamment centrale pour que la communication radio soit faite avec les deux continents et suffisamment éloignée de la zone tropicale pour que les réceptions ne soient pas gênées par les parasites atmosphériques.

#### IV.—La Leçon des Essais du "Jacques Cartier."

Sur le "Jacques Cartier," navire école de la marine marchande de la Compagnie Générale Transatlantique de France, il a été procédé cette année par les soins de MM. Adeline et Coyecque, professeurs sur ce navire-école, à des essais du plus haut intérêt.

Le "Jacques Cartier" prenait le météo. américain et les météo. Europe émis par la Tour Eiffel; d'autre part il attaquait les navires, passant à sa portée, pour leur demander un message d'observations de 7 heures du matin. Une prévision était élaborée chaque jour à bord suivant les méthodes de l'Office National Météorologique (étude de l'évolution de

\* Types bien définis qui pourront être utilisés : garde-pêche, navire scientifique (modèle "Princesse Alice" ou "Pourquoi-Pas") Bateau câble, bateau de la flotte d'Etat français ou schooner américain qui seraient cédés à bon compte.

† Encore convient-il de remarquer que les frais à payer pourront être allégés au titre des budgets météorologiques, du fait que la Station Atlantique servirait sans doute à d'autres travaux, par exemple océanographiques.

noyaux de variation de pression et étude directe de l'évolution des systèmes nuageux); cette prévision qui a donné de très bons résultats était diffusée par radio, en Français et en Anglais, à destination des navires en route. En outre quand le "Jacques Cartier" était suffisamment près de l'Europe il transmettait ses observations en France.

En somme le "Jacques Cartier" a réalisé une première ébauche de la Station Atlantique de centralisation, de prévision et de diffusion—Station qui n'était malheureusement pas maintenue dans une zone fixe.

Malgré la faible portée de son poste émetteur, qui ne lui permettait pas d'interroger les navires au delà de 150 milles, le "Jacques Cartier" arrivait à recueillir en moyenne 5 à 6 observations pour une heure donnée. Ce résultat est remarquable quand on songe que les navires n'étaient pas prévenus, qu'aucune entente préalable n'avait été établie avec les compagnies, ni même aucun avis donné. L'initiative du "Jacques Cartier" a rencontré le meilleur accueil : les navires interrogés ont répondu avec beaucoup de bonne volonté, se pliant d'eux-mêmes à la discipline radio., servant bénévolement de relai avec des navires plus éloignés (cette opération pratiquement impossible au voisinage du continent où le trafic radio. est trop considérable est par contre facile en plein Océan) et ils se sont intéressés à la prévision fournie, demandant même parfois des renseignements complémentaires. On peut donc conclure de cette expérience :

1° qu'un service de centralisation de renseignements et de diffusion de prévision vraiment organisé réussirait d'emblée, et jouirait très vite d'une "popularité" considérable sur l'Atlantique.

2° qu'en plein Océan où le trafic est relativement faible, la centralisation des renseignements, même avec relai, ne présente pas de difficulté, s'organisant pour ainsi dire automatiquement par l'entente des opérateurs.

Les études pour la prévision faites par le "Jacques Cartier" ouvrent d'autre part des perspectives très intéressantes sur la météorologie dynamique de l'Atlantique. Ce n'est pas ici le lieu de développer ce côté de la question; nous tenons néanmoins à signaler que l'application aux noyaux américains et océaniques de la méthode des variations semble montrer :

1° que presque tous les noyaux américains traversent l'Atlantique, soit qu'ils viennent aborder l'Europe vers l'Irlande, soit que, rejetés par les hautes pressions des Açores, remontées vers le Nord, ils passent à hauteur de l'Islande. Ce phénomène de la traversée complète de l'Atlantique par les mouvements atmosphériques a été contesté jadis parce qu'on a fait porter l'examen sur les dépressions dont on perd la trace quand le champ isobarique est un peu accidenté; mais il apparaît clairement si on isole le phénomène actif, c'est-à-dire le noyau de variation.

2° que vers le 30 ou 35° W. Greenwich se trouve un nid de formation de baisses océaniques.

3° que sur l'Océan les noyaux de variation de pression et les systèmes nuageux se déplacent plus régulièrement que sur le continent où ils viennent en quelque sorte se briser. Ce dernier résultat, s'il est confirmé, est fort intéressant, car il permet d'espérer que la prévision sur le continent, portée de 1 jour à 3 jours grâce à la Station Atlantique, ne sera pas moins précise qu'à un jour parce que les phénomènes dont le passage aura été signalé par la Station Atlantique se conserveront suffisamment pendant les deux premiers jours.

Terminons en disant que le Chef du Service des Avertissements de l'Office National Météorologique embarquera en décembre sur le "Jacques Cartier"; au cours de cette traversée, la question de la prévision sur l'Atlantique pourra être définitivement mise au point.

Il sera fait part aux divers Services Météorologiques Européens des résultats obtenus par une note qui leur sera adressée au cours du premier semestre de 1922.



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