N° 69 May-June 1951

International Scientific Radio Union

U. R. S. I.

INFORMATION BULLETIN

published with the financial help of the United Nations Educational, Scientific and Cultural Organization (U.N.E.S.C.O.)

CONTENTS

Published by the General Secretariat of U. R. S. I.
42, Rue des Minimes, BRUSSELS

INFORMATIONS

Proceedings of the IXth General Assembly

Part I of the Proceedings (vol. VIII) has been sent to the National Committees for distributions to their members.

This part contains the minutes of the meetings of the General Assembly and of the Commissions and also the reports of the National Committees and Commissions.

* * *

In order to allow us the publications of part II of the proceedings which contains the papers submitted to the General Assembly, we beg authors to send us before October 1st the summaries and abstracts which were asked for.

We should be grateful to authors of documents published before or after the General Assembly to kindly inform us of the references.

Meteorological Association (U. C. G. I.)

Father Lejay, Vice-President of U. R. S. I. will represent officially the Union at the General Assembly of the International Meteorological Association which will be held in Brussels from August 26th to September 1st.

RADIO OBSERVATIONS OF THE SOLAR ECLIPSE OF FEBRUARY 25, 1952,

(Second Report of the Special Committee of the Mixed Commission on Ionosphere)

INTRODUCTION

The plan for a network of ionosphere stations to make special observations during the solar eclipse of February 25, 1952 in Africa and Asia has progressed since the first report of the Special Committee (see *U. R. S. I. Information Bulletin*, N° 65, July-October, 1950). The present report includes plans as of June 1 and reports of subcommittees.

OBJECTIVES

As discussed in the first report, this eclipse provides a favorable opportunity for attacking some of the unsolved problems of the ionosphere. The eclipse path is favorably situated for observations since most of the penumbral shadow falls on land areas. Since the path is also in low latitudes the complexities observed near the auroral zone are largely avoided. Further, the eclipse comes in the descending stage of the sunspot cycle when the activity of the sun will be characterized by the stability of the declining cycle without the disadvantage of low F2-layer electron-densities that occur at sunspot minimum.

One problem which can be attacked by coordinated observations at a network of ionosphere stations is the relative contribution to the formation of each of the ionospheric layers of radiation emitted uniformly from the sun's surface and from discrete and active regions of the ionosphere and corona. Data will be needed from a network of stations distributed with reasonable uniformity throughout the partial and total eclipse zones. Thus the probability will be increased of isolating a given eclipse effect in the ionosphere that may arise from a discrete source on the sun, since the effects will be observed at different and predictable times at different stations. The ambiguities introduced by local fluctuations, moreover, can be minimized by a statistical analysis of the observations of the network. The eclipse observations may be expected to be useful for other unsolved problems and the control data should provide much needed information on the behavior of the F-region near the geomagnetic equator, lunar tides, etc.

GENERAL PLAN OF IONOSPHERIC AND SOLAR OBSERVATIONS

The programs at most ionosphere stations will include multifrequency observations of the standard type taken at an accelerated rate and with particular attention to calibration and the suitability of instrument ranges. These 17 stations comprise the main elements of the network and they are distributed with fair uniformity over the eclipse zone. There are several additional locations, listed in table 4, which could profitably be occupied. Special ionospheric absorption measurements will be made at Khartoum. Solar radio noise observations over a wide range of frequencies and extensive astronomical and astrophysical observations will also be carried out at Khartoum. Thus far no plans are known for making solar optical or radio observations at other localities in the total or partial zones.

ECLIPSE DATA AND FORMULAS

The Special Committee requested the assistance of the I. A. U. in obtaining detailed calculations on the eclipse at the earth's surface and in the ionosphere. These have been provided by the U. S. Naval Observatory, Washington, whose prompt and complete cooperation is hereby gratefully acknowledged. Table 1 gives the path of the axis of the shadow-cone, and table 2 some points on curves of equal magnitude of eclipse. These data are plotted in figure 1. The tables also give the altitude of the sun at each computed point.

The following are formulas used in computation of points at surface and in ionosphere for different maximum magnitudes : Refer to central line computation (*Astronomical Journal*, N° 1122) for $\sin \beta$ and γ and $\sin \beta_i = \dfrac{\sin \beta.}{r_i}$

Then :

$$x_i = \sin \beta_i \sin \gamma,$$

$$y_i = \sin \beta \cos \gamma,$$

$$x_i - \Delta \sin Q = \xi_i = \sin \beta_o \sin \gamma_o,$$

$$y_i - \Delta \cos Q = \eta_i = \sin \beta_o \cos \gamma_o,$$

$$\tan \gamma_o = \frac{\xi}{\eta_i},$$

$$\sin \beta_o = \frac{\xi_i}{\sin \gamma_o} \text{ or } \sin \beta_o = \frac{\eta_i}{\sin \gamma_o},$$

$$\tan \theta = \frac{\xi_i}{\cos \beta_o \cos d - \eta_i \sin d},$$

$$u - \theta = w,$$

$$\sin \varphi = \eta_i \cos d + \cos \beta \sin d.$$

(It is convenient to remember that θ is the hour angle of the true sun in finding altitude of sun).

In the above computation $Q_N = 153^o$ and $Q_S = -27^o$, Q_N is used in obtaining points north of central line of total eclipse and Q_S in obtaining points south of central line. These values are constant for each eclipse.

$\Delta = L - D\,(2L - .5459)$ when D is the desired magnitude. Omit the subscripts if points desired are on the earth's surface.

TABLE 1. — TOTAL SOLAR ECLIPSE, FEBRUARY 25, 1952
Path of Axis of the Shadow-cone at Earth's Surface and in the Ionosphere

	Surface			100 km			150 km		
T	φ	ω	Alt. of Sun	φ	ω	Alt. of Sun	φ	ω	Alt. of Sun
7 h. 38,8 (Limit)	+ 0°46.5′	+21°14.4′	—	—	—	—	—	—	—
7 h. 40	— 0°16.0′	+13°28.0′	8°1	— 1° 4.3′	+ 7°44.4′	12°9	— 1°50.9′	+ 4° 1.0′	17°7
45	— 0°41.5′	— 4°13.9′	18°6	— 1° 6.7′	+ 1°47.4′	21°0	— 1°38.7′	— 2°25.4′	24°2
8 h. 00	+ 0°43.8′	— 8°16.8′	34°2	+ 0°27.8′	— 9°31.8′	35°5	+ 0° 5.5′	—11°16.1′	37°3
15	+ 3° 9.9′	—15°42.6′	44°5	+ 2°54.5′	—16°34.0′	45°4	+ 2°32.8′	—17°46.9′	46°7
30	+ 6° 4.1′	—21°15.2′	52°2	+ 5°47.4′	—21°52.8′	52°9	+ 5°23.5′	—22°46.4′	53°9
45	+ 9°18.4′	—25°48.8′	57°8	+ 8°59.3′	—26°16.5′	58°4	+ 8°32.9′	—26°55.9′	59°2
9 h. 00	+12°50.0′	—29°50.8′	61°2	+12°27.8′	—30°10.2′	61°6	+11°55.7′	—30°37.9′	62°3
15	+16°38.8′	—33°39.6′	61°8	+16°12.7′	—33°51.3′	62°3	+15°35.2′	—34° 8.0′	63°0
30	+20°46.5′	—37°31.4′	59°7	+20°15.5′	—37°35.1′	60°1	+19°31.4′	—37°40.4′	60°9
45	+25°16.8′	—41°44.9′	55°1	+24°40.1′	—41°39.2′	55°7	+23°47.7′	—41°31.1′	56°6
10 h. 00	+30°16.6′	—46°47.6′	48°3	+29°32.4′	—46°28.9′	49°1	+28°29 5′	—46° 2.9′	50°2
15	+35°59.8′	—53°31.9′	39°4	+35° 4.9′	—52°51.4′	40°4	+33°47.3′	—51°56 0′	41°9
30	+43° 2.0′	—64°23.8′	26°9	+41°47.8′	—62°50.0′	28°6	+40° 5.4′	—60°48.6′	30°9
40	+49°42.7′	—80° 1.5′	13°1	+47°49.9′	—75°46.0′	16°4	+45°27.6′	—71°12.2′	20°4
43	—	—	—	+50°26.9′	—83°36.9′	10°3	+47°30.5′	—76°18.6′	15°9
43.1 (Limit)	+54°23.7′	—99°11.6′	—	—	—	—	—	—	—

TABLE 2. — TOTAL SOLAR ECLIPSE OF FEBRUARY 25, 1952

Positions on curves of equal magnitudes at earth's surface and in the ionosphere

Mag. 0.9						
	North			South		
U. T.	Lat.	Long.	Alt. of Sun	Lat.	Long.	Alt. of Sun
Surface						
7 h. 45	+ 3°45	+10°43	11°7	— 3°42	+ 0°05	23°1
8 h. 00	+ 4°33	— 5°15	30°4	— 2°78	—10°90	37°5
9 h. 00	+16°33	—27°75	57°2	+ 9°27	—31°82	65°1
10 h. 00	+34°23	—45°42	44°9	+26°17	—48°13	51°6
10 h. 30	+48°03	—65°72	22°6	+38°03	—63°72	30°8
100 km						
7 h. 45	+ 2°90	+ 6°98	15°2	— 4°78	— 1°83	25°2
8 h. 00	+ 4°00	— 6°53	31°8	— 3°07	—12°03	38°7
9 h. 00	+15°98	—28°12	57°7	+ 9°02	—32°07	65°4
10 h. 00	+33°57	—45°13	45°6	+25°65	—47°85	52°2
10 h. 30	+46°92	—63°93	24°3	+37°10	—62°55	32°1
250 km						
7 h. 45	+ 2°18	+ 2°93	19°3	— 5°22	— 4°48	27°8
8 h. 00	+ 3°68	— 8°42	33°7	— 3°37	—13°68	40°3
9 h. 00	+15°50	—28°57	58°3	— 8°45	—32°53	66°2
10 h. 00	+32°50	—44°65	46°7	+24°60	—47°45	53°3
10 h. 30	+44°93	—61°37	26°9	+35°58	—60°82	34°2
Mag. 0.5						
Surface						
8 h. 00	—	—	—	—14°52	—17°38	44°8
8 h. 30	+22°60	— 7°60	32°9	—	—	—
9 h. 00	+29°72	—18°50	41°4	— 1°98	—37°65	77°1
9 h. 30	+38°92	—27°63	40°2	—	—	—
10 h. 00	+51°75	—40°52	28°5	+14°03	—52°92	59°6
10 h. 15	+58°72	—52°90	19°2	—	—	—
10 h. 30	—	—	—	+24°25	—65°35	38°8

Mag. 0.5

100 km

8 h. 00	+19°00	+16°57	6°3	—14°70	—18°38	45°8
8 h. 30	+22°35	— 8°53	33°8	—	—	—
9 h. 00	+29°35	—18°88	41°9	— 2°32	—37°93	77°4
9 h. 30	+38°40	—27°75	40°6	—	—	—
10 h. 00	+50°83	—40°15	29°5	+13°55	—52°68	60°1
10 h. 30	—	—	—	+23°53	—64°52	39°8

250 km

8 h. 00	+17°78	+10°07	12°6	—15°00	—19°85	47°2
8 h. 30	+21°78	— 9°90	35°2	—	—	—
9 h. 00	+28°68	—19°60	42°9	+ 2°82	—38°32	78°0
9 h. 30	+37°43	—28°05	41°6	—	—	—
10 h. 00	+49°23	—39°47	31°1	+12°65	—52°33	61°0
—	—	—	—	+22°27	—63°30	41°5

Mag. 0.1

Surface

8 h. 00	—	—	—	—26°15	—21°43	47°0
8 h. 45	+44°13	+14°03	9°9	—	—	—
9 h. 00	+47°95	+ 3°77	16°5	—12°93	—43°07	83°8
9 h. 15	+53°62	— 2°03	17°4	—	—	—
9 h. 30	+61°57	— 5°82	14°0	—	—	—
9 h. 40	+70°57	— 3°93	6°7	—	—	—
10 h. 00	—	—	—	+ 3°07	—58°27	62°2
10 h. 30	—	—	—	+12°65	—69°73	41°1

100 km

8 h. 00	—	—	—	—26°35	—22°50	47°9
8 h. 45	+43°37	+11°30	12°1	—	—	—
9 h. 00	+47°30	+ 2°27	17°7	—13°20	—43°33	83°8
9 h. 15	+52°80	— 3°28	18°5	—	—	—
9 h. 30	+60°42	— 7°28	15°3	—	—	—
10 h. 00	—	—	—	+ 2°60	—58°07	62°6
10 h. 30	—	—	—	+12°00	—69°03	42°0

250 km

8 h. 00	—	—	—	—26°63	—23°88	49°0
8 h. 45	+42°10	+ 7°55	15°1	—	—	—
9 h. 00	+46°20	0°00	19°6	—13°67	—43°73	83°8
9 h. 15	+52°02	— 6°63	20°5	—	—	—
9 h. 30	+58°48	— 9°53	17°5	—	—	—
10 h. 00	—	—	—	+ 1°75	—57°77	63°2
10 h. 30	—	—	—	+10°87	—68°00	43°4

TABLE 3. — TABLE OF STATIONS (EXISTANT OR PLANNED)

Locality	Lat.	Long.	Expeditionary or Permanent	Types of Observation	Nation	Magn tud of Eclip
Bata, Spanish Guinea .	N 02	E 10	Exp. ?	I	Spain (1)	0.98
Khartoum, Sudan	N 15	E 33	Perm.*	I	Sudan (2)	1.00
			Exp.	R	Gr. Britain (3)	1.00
			Exp.	R, S	U. S. (4)	1.00
			Exp.	R, A	France (5) (7)	1.00
Dakar, Senegal	N 15	W 17	Perm.	I	France (5)	0.60
Ibadan, Br. Nigeria	N 07	E 04	Perm.*	I	Nigeria (6)	0.80
Tamanrasset, Fr. West Africa	N 20	E 08	Perm.*	I	France (7)	0.55
Leopoldville, Belgian Congo	S 04	E 15	Perm.*	I, R	Belgium (8) (8')	0.85
Lwiro, Belgian Congo .	S 03	E 29	Exp.	I, R	Belgium (9)	0.70
Helwan, Egypt	N 30	E 31	Perm.?	I	Egypt (10)	0.75
Nairobi, Kenya	S 01	E 37	Perm.*	I	Kenya (11)	0.55
Djibouti, Fr. Somaliland	N 12	E 43	Perm.*	I	France (5)	0.70
Casablanca, Morocco....	N 34	W 08	Perm.*	I	France (7)	0.20
Rome, Italy	N 42	E 12	Perm.	I	Italy (12)	0.25
Capri, Italy	N 41	E 14	Exp.	I, S	Sweden (13)	0.30
Graz, Austria	N 47	E 15	Perm.	I, S	Austria (14)	0.20
Delhi, India	N 29	E 77	Perm.	I	India (15)	0.45
Bombay, India..........	N 19	E 73	Perm.	I	India (15)	0.20
Slough, England	N 52	W 01	Perm.		Gr. Britain (16)	0.10
Poitiers, France	N 45	E 01	Perm.		France (7)	0.15
Paris, France	N 49	E 02	Perm.		France (7)	0.12
De Bilt, Netherlands....	N 52	E 05	Perm.		Netherlands (17)	0.12
Schwarzenburg, Switzerland	N 47	E 07	Perm.		Switzerland (18)	0.18
Freibourg, Germany ...	N 48	E 08	Perm.		France (5)	0.15
Lindau, Germany	N 52	E 10	Perm.		Germany (19)	0.15
Capetown, South Africa .	S 34	E 18	Perm.		U. of S. Africa (20)	0
Johannesburg, South Africa	S 26	E 28	Perm.		U. of S. Africa (20)	0.05
Tananarive, Madagascar	S 21	E 47	Perm.*		France (5)	0
Tiruchy, India	N 11	E 79	Perm.		India (15)	0
Madras, India	N 13	E 80	Perm.		India (15)	0

* to be installed before January 1, 1952.

Types of Observation :

I — ionospheric (multifrequency).
A — ionospheric absorption.
R — solar radiation at radio frequencies.
S — solar astronomical observations.

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STATIONS TO BE OCCUPIED

From information at hand on June 1, 1951, it is expected that the stations listed in table 3 will be operative at the time of the eclipse and during the control period. The laboratory or agency understood to be responsible for operation of the various stations, and their addresses, are given in the reference notes to the table.

OTHER DESIRABLE SITES FOR OBSERVATIONS

Reference to figure 1 shows a number of gaps in the network of ionospheric stations expected to be operating. For the coordinated experiment to promise success, it is desirable that at least some of the other locations be occupied. Such sites are listed in table 4. Radio noise observations at any of the locations listed in tables 3 and 4 (other than Khartoum) would be useful in interpreting the ionospheric measurements as well as for themselves.

TABLE 4. — TABLE OF DESIRABLE ADDITIONAL SITES

Locality	Lat.	Long.	Magnitude of Eclipse
Bangui, French Eq. Africa	N 04	E 19	1.00
(Unnamed), Sudan	N 10	E 27	1.00
Jidda, Saudi Arabia	N 21	E 39	1.00
Basra, Iraq	N 30	E 48	1.00
Tehran, Iran	N 36	E 51	0.97
Gao, French W. Africa	N 17	00	0.55
Lobito, Portugese Angola	S 12	E 13	0.65
Tobruk, Lybia	N 32	E 23	0.55
Ankara, Turkey	N 39	E 32	0.60
Bierut, Lebanon	N 34	E 36	0.70
Jask, Iran	N 26	E 58	0.75
Karachi, Pakistan	N 25	E 67	0.50

PLANNING OF OBSERVATIONS AND REDUCTION OF DATA

(Report of a subcommittee of the Special Committee, whose active members were W. J. G. Beynon, Chairman, and D. Lepechinsky).

The main interest of the proposed network of ionospheric and solar observatories would appear to be :

a) Stations situated in locations at which the percentage of obscuration of the solar disc is approximately the same, may exhibit different ionospheric variations. Thus there may be different geomagnetic effects, or differences due to local time differences or because of different solar areas eclipsed by the moon.

b) Stations situated such that the percentage of obscuration is different may be classified in such a way that the effect of the obscuration of particular spots or areas on the solar disc (or corona) may be easily detected and examined on their ionospheric records.

c) Stations located outside, but close to the optical eclipse zone, may nevertheless exhibit ionospheric variations, due for instance to a corpuscular eclipse, or to a partial coronal eclipse.

In view of the foregoing it seems highly desirable that :

i) There be as many observing stations as possible, in and near the eclipse zone.

ii) That these stations be equipped with the best possible ionospheric recorders and, if possible, with absorption measuring apparatus, solar noise recorders, etc.

iii) That regular hourly observations be commenced as early as February 1st, 1952 and continue up to 31st March 1952 (control period). For a period of five days before the eclipse to five days after (February 20th to March 3rd) recordings be made every 10 minutes. That throughout the actual eclipse period recordings be made every 5 minutes, or if possible, continuously. It is suggested that all stations in table 3 where the magnitude of the eclipse is less than 0.2 be considered control stations near the eclipse boundary and should also follow this stchedule.

iv) That the first reduction of the observations should be made by the observing stations themselves. (This is suggested because any peculiarities of equipments are best known to the observers themselves). This reduction should be as complete and accurate as possible.

v) That whenever possible, every ionospheric record made during the eclipse period should be accompanied by a photograph of the solar disc. This should facilitate the correlation between ionospheric or solar noise variations and the obscuration of different areas of the solar disc. Where photographs are impossible, a drawing of the sun might be made visually or by projection and the times noted thereon at which the moon's edge begins to occult spots, faculae, or other important features of apparent interest.

vi) That the final study of results obtained by the network be made by a special « Reduction and Analysis Group » appointed by the Special Committee. This would mean that all the observational material could be examined by well qualified workers in the light of astronomical, magnetic, meteorological and other data pertaining to the eclipse period.

vii) That in order to enable this « Reduction and Analysis Group » to fulfill its task, the various observatories of the network should be asked to supply the group with copies of all records and photographs obtained by them during the eclipse period (including the five days on each side) together with the corresponding preliminary reduction sheets and with the other tabulated values of the ionospheric characteristics obtained during the two months control period. This procedure is suggested as one likely to reveal significant worldwide ionospheric irregularities which may occur during the eclipse period. At the same time interpretation of unusual or ambiguous records, which otherwise are liable to be rejected or misunderstood, will thus be better facilitated and may indeed lead to interesting findings.

viii) That multifrequency observations should be extended to all the normal and abnormal layers so that the reduction sheets sent to the « Reduction and Analysis Group » contain the fullest possible information on the ionosphere. The rules to be followed in the preliminary reduction should be those outlined in the latest U. R. S. I. Resolution (Zurich, 1950) on this matter.

ix) It is suggested that hourly measurements (during the control period) should be made on the GMT hour and that the more frequent observations required at other times should be made at « on the hour plus five minutes, plus ten », etc.).

x) Concerning optimum height ranges, it seems that in previous eclipse observations little significant changes have been observed in virtual height. Nevertheless it is not thought advisable to reduce the normal height range of the standard ionospheric recorder with a view to getting more accurate information on lower layer structure.

xi) It is recommended that reflection coefficient measurements should be done in locations near the magnetic equator (near 10° N in Africa) where polarization is almost linear. This would avoid polarization fluctuations.

xii) Where possible, specially accurate $(h'f)$ recordings should be made throughout the eclipse and its control period, these being independent of the regular multifrequency recordings of normal accuracy, for all observing stations.

(If the observations prove unusually successful, the Special Committee will endeavor to make arrangements and obtain subsidies for a small and highly qualified international group to work together at some suitable laboratory to analyze the results for their physical interpretation).

MAGNETIC OBSERVATIONS

The Special Committee has received a communication from Mr. J. Egedahl, Chairman of the Committee to promote observation of daily variation of the horizontal magnetic force between and near the geographic and magnetic equators, of the I. A. T. M. E of the I. U. G. G. Egedahl writes « As the range of the horizontal force is abnormally large at the magnetic equator and in the area within 200 km north and south of this equator, there should be a valuable opportunity to state if an eclipse effect in the daily magnetic variations takes place. The place where the centre of the eclipse and the magnetic equator will coincide is at $\varphi = 10^{\circ}1$ N ; and $\lambda = 26^{\circ}3$ E near the village Shakka $\varphi = 11^{\circ}$ N ; $\lambda = 26^{\circ}6$ E in Sudan ». He says his committee is ready to place 3 QHM's at the committee's disposal for such observations.

Professor Chapman writes that he thinks the project worthwhile and hopes the work can be arranged. « It was, I think, in 1931 that I wrote a short theoretical paper on the expected effect of an eclipse on Sq, and the ideas of that paper can be extended to the case of the « electrojet », as I have called this concentrated ionospheric electric current over the magnetic equator. At least, if the electrojet is due to dynamo emf's like Sq elsewhere, the reduction of conductivity over the eclipsed area should reduce the current flow throught it, thus reducing Sq(H) below the area, and diverting the flow to areas a little north and south, where Sq(H) should be increased. Sq(Z) would also be modified in a way not difficult to infer. I should hope that Z also could be included in the measures, though I realize that this may be more difficult to arrange. The best spacing of the stations may depend on the height of the electrojet, which we do not yet know; perhaps 100 miles N and S of the one on the magnetic equator is as good a guess as any ».

The site which would have to be occupied for this experiment, unfortunately, has not so far been spoken for.

CONCLUSION

This report is the final pre-eclipse report of the Special Committee. The Committee hopes to have its next meeting at the Xth General Assembly of U. R. S. I. in Australia in August 1952. Since this meeting will occur about 4 months after the eclipse and its control interval, it is hoped that preliminary reports will have been received from each cooperating station giving preliminary reductions, graphs, and supplementary observations and comments. At that time, the Committee hopes to determine and recommend the nature and extent of further international collaboration that may be justified, and sources of financing the necessary analysis and interpretation so that the fullest possible benefits may accrue to science from this world collaboration among observers.

The Committee feels that existing plans if carried out should ensure the success of the venture, and encourages all who plan to participate to make every effort to bring their plans to fruition.

Any information concerning additional observations in the eclipse area, changes in plans, or other matters related to observation in or near the eclipse area should communicate with the Secretary of the Committee :

Mr. A. H. Shapley,
C. P. R. L.
National Bureau of Standards
Washington 25, D. C., U. S. A.

The Committee urges that preliminary reductions, graphs, and supplementary observations and comments be forwarded to the Secretary of the Committee to be received not later than June 1, 1952 to permit formulation of further recommendations by the Committee at its Australia meeting.

L. V. Berkner, *Chairman*
Father P. Lejay,
D. F. Martyn,
D. H. Menzel.

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COMMISSIONS

Commission III

IONOSPHERE AND WAVE PROPAGATION

We publish hereunder two abstracts from the *Documentation and Information Bulletin of the European Broadcasting Union,* Vol. II, n° 7, 15 May, 1951.

SWITZERLAND : *Research on Medium-wave Fading.* — Ever since 1936, that is, for nearly 15 years, the Swiss Administration of Telegraphs and Telephones has been carrying out a comprehensive programme of field-strength measurements with the object of determining the laws controlling the variation with time of the signals from broadcasting transmitters.

These observations were made at ranges which corresponded in each case to what has been called the first or near fading zone, that is to say, that zone where the indirect ray and the direct ray have the same order of magnitude :

Transmitter	Frequency	Receiving point	Range
Beromünster	556 kc/s	St. Gall	93 km
Sottens	677 kc/s	Fontenais	89 km
Monte Ceneri	1167 kc/s	Chiasso	34 km

Continuous recordings were made daily from 1700 hrs. to 2200 hrs. From these records an hourly value has been deduced for the fluctuation F, which measures the extent of fading during the hour in question, where :

$$F = \frac{\text{maximum field-strength} - \text{mean field-strength}}{\text{mean field-strength}}$$

The definition of F in these terms may seem at first sight strange, and there will be those who would prefer to work in terms of quasimaxima and the like. However, the authors justify their choice by arguments which seem perfectly sound.

From the value of F thus defined and calculated, a very complete and well organised statistical analysis was made. The object was to discover the manner of variation of F in relation to various parameters : time of day, season of the year, epoch of the solar cycle, transmission frequency, etc. Very full details have been published, including graphs and a most noteworthy study by C. Glinz (1), of Berne, who describes the experiments and offers a provisional interpretation of the observations.

Concerning the influence of the time of day, the results confirmed the well-known general increase in the value of F during the course of the evening. The seasonal variations were different according to the wavelength ; for Beromünster the fluctuations were greatest in spring and autumn and least in summer and winter, and for Sottens the results were roughly similar, except that the summer minima were less marked during the late evening. For Monte Ceneri (257 m), however, the results were reversed, the maxima

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(1) The same author, in the April and June 1950 issues of the *Bulletin Technique des P. T. T. Suisses,* published two interesting papers on radio propagation on wavelengths between 200 and 2000 metres.

In the first he considers Weyrich's theory of a cylindrical wave between two perfectly conducting surfaces and extends it to take account of certain effects (such as the curvature of the earth, the finite conductivity of the earth and the ionosphere layers, etc.), which were neglected in the original, over-simplified hypothesis. In this manner he obtained very good agreement between the calculated values and the Cairo experimental curves.

In the second paper he deals with the reflection coefficient of the ionosphere, as proposed by Vilbig and Appleton. He shows that there is poor agreement between the observed values and Vilbig's rather exaggerated simplification, and stresses that the facts are certainly much more complex. In the same article he gives some important observations based upon results obtained with anti-near-fading aerials in Switzerland. He explains that the direct radiation is improved by the use of such aerials to an extent that falls considerably short of what the theory leads one to expect. He thinks that in the immediate vicinity of the aerial there is considerable dispersion, whereby much energy from the direct ray goes to augment the sky ray.

Those two papers are commended to the careful attention of all those concerned with medium-wave propagation.

being in summer and winter and the minima at the equinoxes.

The influence of the solar cycle was much the same for all three transmitters, the greatest fluctuations corresponding to sunspot minima, and conversely.

The influence of frequency is rather obscure. Its effects are in evidence above, but at present they cannot be expressed with certainty in simple terms.

The author's interpretation of the observations is extremely instructive. One finds oneself in the presence of effects controlled, as he says, by two different causes of which the results are interwoven : the *absorption* in the D layer and the *reflection* in the E and F regions, which may be considered as several layers with different rates of ionisation. He has, consequently, had (using his own observations and other work on the same subject) to separate the causes and to interpret the observations.

As the author admits, it is virtually impossible to come to any convincing conclusions yet. This is in part due to the fact that so far there have not been enough precise measurements of the night-time ionosphere on medium waves, but Glinz's postulation of the problem and his preliminary study of it are a major contribution to knowledge in this field (1).

The author mentions that the observations are now being continued on the frequencies allotted to Switzerland in the Copenhagen Plan. The results will be awaited with great interest. It is very infortunate that the medium waves used for broadcasting have not received anything like the lavish practical and theoretical attention that the short waves have received, and the Swiss Administration is to be congratulated on its past, present and future achievements in this field (*P. T. T. Technische Mitteilungen*, January 51).

GERMANY : *Ionosphere Data Broadcasts.* — With the approval of the Allied High Commissions, the German Federal Post Office is now broadcasting daily from one of its radio stations the results of radio-propagation observations. These observations are collated

(1) General remaks on statistical analysis which conclude the paper are to be read.

and coordinated by an organisation called the Ionosphere Working Party (Arbeitsgemeinschaft Ionosphäre). The information broadcast includes the following :

Solar Activity,

Ionospheric Measurements,

Terrestrial -Magnetism,

Cosmic Rays,

Abnormal noise on very long waves (due to chromospheric eruptions).

Details about the transmission schedule, the code used and the scientific institutions and scientists taking part can be obtained from Ministry of Posts and Telecommunications, Bonn/Frankfurt-am-Main, Germany.

Telecommunications Journal, February 51).

JOINT COMMISSIONS

Joint Commission on Radio Meteorology

PROGRAM

Meeting of Brussels, August 16, 17, 18, 1951

Thursday, August 16.

9.30-12.00. — P. A. Sheppard : Meteorological processes controlling the refractive index of the atmosphere.

14.00-17.00. — E. H. Norinder : « Thunderstorms ».
J. Lugeon : « Sferics ».

Friday, August 17.

9.30-12.00. — J. S. Marshall : « Precipitation Echoes ».

E. G. Bowen : « Radar Observations of Natural Rain ».

14.00-17.00. — L. Anderson : « Attenuation Due to Precipitation and Atmospheric Gases ».

W. E. Gordon : « Statistical Fluctuation in the Atmosphere ».

Saturday, August 18.

9.30-12.00. — Administrative Meeting.

INTERNATIONAL ORGANIZATIONS

C. C. I. R. - U. R. S. I. Cooperation

A small Committee of U. R. S. I. met in Geneva during the Plenary Meeting of C. C. I. R. in order to consider the relations between the two organizations.

The Committee consisted of Messrs. J. H. Dellinger (Chairman), P. David, B. Decaux, P. Lejay, L. Sacco and R. L. Smith-Rose. Prof. Dr. B. van der Pol assisted the committee as adviser.

Good working relations between the two organizations were advanced at this meeting. On the opening day, June 5, the U. R. S. I. delegation had a meeting to consider its role. It was agreed that it should promote the policy of maximum aid by U. R. S. I. to C. C. I. R., particularly by study of the more scientific and basis phases of topics in which the C. C. I. R. is interested. The U. R. S. I. in turn will receive the satisfaction of having its results along certain lines advanced to practical application through the work of the C. C. I. R. It was agreed to promote U. R. S. I.-C. C. I. R. coordination in the various committees working at the Plenary Assembly and in particular to strive to secure clear distinction betweed U. R. S. I. and C. C. I. R. activities on a given topic in order to avoid wasteful duplication.

The Committee prepared the statement of aid the U. R. S. I. is prepared to give the C. C. I. R., of which a copy follows (Doc. 246). The following documents were entered on behalf of U. R. S. I. for circulation and use in the meeting of C. C. I. R. (1).
Doc. 105. — Standard Frequency and Time Signal Transmissions.
Doc. 136. — Comments on the Zurich 1950 General Assembly on :

(1) These documents will be published later.

Non-linear effects in ionosphere,
Ionospheric propagation at frequencies above 30 Mc/s,
Radio noise measurement,
Propagation on frequencies below 3 Mc/s,
Symbols for ionospheric work.

Doc. 185. — Bibliography on information theory.

Doc. 199, 288, 291. — Reservation of frequencies for radio noise measurement.

These contributions have been of value in the C. C. I. R. work. It is believed that the relations between U. R. S. I. and C. C. I. R. have been clarified and advanced.

VIth PLENARY ASSEMBLY
C. C. I. R.
GENEVA, 1951

Doc. 246 —
7 June 1951.

U. R. S. I.

(*Original language : English*)

The U. R. S. I. delegation at the Geneva meeting of the C. C. I. R. met June 5 to consider the mode of co-operation desirable between the two organizations.

It prepared the following list of existing topics on which the U. R. S. I. probably can and should furnish contributions which may facilitate the work of the C. C. I. R. directed toward the improvement of radio services :

Stockholm Recommendation : 6, 9, 10, 15, 18.

Stockholm Question : 5, 6, 7, 8, 9, 12, 44.

Washington Document 108, Non-Linear Effects in the Ionosphere.

The U. R. S. I. is prepared to consider other topics also which may be proposed to it by the C. C. I. R.

Complementary Note. — Recommendation 6 was published in *Bulletin*, nº 56 (March-April, 1949), p. 7-15. The others recommendations and questions 5, 6, 7, 8, 9 and 12 were published in *Bulletin*, nº 59 (Oct.-Nov. 1949), p. 18-29. Document 108 was published in *Bulletin* nº 66 (Nov.-Dec. 1950, p. 33) ; Question 44 will be published later.

World Meteorological Organization

The first plenary assembly of this organization (W. M. O.) which take the place of the O. M. I. and becomes a special agency of the United Nations, took place in Paris during the month of April. One item of the Agenda, the setting up of an International Meteorological Institute is of special interest to the Unions members of I. C. S. U.

The Executive Board of the W. M. O. informs us that it would be pleased to cooperate with U. R. S. I. and on that purpose Prof. Dr. Ing. J. Lugeon, Director of the Central Meteorological Station was appointed to assure the relationship between U. R. S. I. and the W. M. O.

This cooperation had been considered by the Executive Committee of U. R. S. I. in Zurich where it was decided to appoint Prof. Lugeon as delegate of U. R. S. I. to the O. M. I. or to the new organization if this wanted to cooperate with our Union.

The General Secretary of the W. M. O. is Dr. G. Swoboda, rue Etraz, 5, Lausanne.