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DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS

17 DEC 1956

GEOPHYSICAL OBSERVATORY REPORT

VOL. 4 No. 9

SEPTEMBER

1956

Issued under the authority of Senator The Hon. W. H. Spooner,
Minister for National Development

DEPARTMENT OF NATIONAL DEVELOPMENT

Minister - SENATOR The HON. W. H. SPOONER

Secretary - H. G. RAGGATT

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Unless otherwise stated all times are given in Greenwich Mean Time.

The terminology used in this report is that accepted by international convention. Should further information be required, explanation can be obtained by applying to:-

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Bureau of Mineral Resources,
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485 Bourke Street,
Melbourne, C.1.
AUSTRALIA.

CONTRIBUTING OBSERVATORIES

WATHEROO MAGNETIC OBSERVATORY A.F. TILLOTT, Observer-in-Charge.

Geographic Latitude 30°19'S Longitude 115°53'E
Geomagnetic Latitude -41.8° Longitude 185.6°

Instruments

Magnetic Equipment - Askania pattern Magnetometer No.508810.
D.T.M. C.I.W. Earth Inductor No.2.
Eschenhagen pattern D,H,Z, recording variometers, normal sensitivity, 20mm/hour recorder.
La Cour pattern D,H,Z, recording variometers, normal sensitivity quick run (180mm/hour) recorder.

Ionospheric Equipment - C.S.I.R.O. pattern 1-16Mc/s Sweeptime 2 minutes.

TOOLANGI MAGNETIC OBSERVATORY I.B. EVERINGHAM, Observer-in-Charge.

Geographic Latitude 37°32'S Longitude 145°28'E
Geomagnetic Latitude -46.7° Longitude 220.8°

Instruments

Ruska pattern Magnetometer No.4813.
La Cour pattern QHMs Nos.288,289,290.
La Cour pattern BMZ No.119.
Schulze Earth Inductor No.49.
La Cour pattern D,H,Z, recording variometers, normal sensitivity 15mm/hour recorder.

MACQUARIE ISLAND MAGNETIC OBSERVATORY B.G. COOK, Observer-in-Charge.

Geographic Latitude 54°30'S Longitude 158°57'E
Geomagnetic Latitude -61° Longitude 243°

Instruments

La Cour pattern QHMs Nos.177,178,179.
La Cour pattern BMZ No.64.
La Cour pattern D,H,Z, recording variometers low sensitivity 15mm/hour recorder.

MAWSON MAGNETIC OBSERVATORY P.M. McGREGOR, Observer-in-Charge.

Geographic Latitude 67°35.7'S Longitude 62°54.0'E
Geomagnetic Latitude -73.1° Longitude 103.4°

Instruments

La Cour pattern QHMs Nos.300,301,302.
La Cour pattern BMZ No.115.
La Cour pattern D,H,Z, recording variometers low sensitivity 15mm/hour recorder.

MAGNETIC K-INDICES FOR SEPTEMBER - WATHEROO

Range for lower limit of K=9 is 350 gammas

Day	K-Indices								K-Sum
1	3	3	1	3	3	2	3	2	20
2	4	6	5	6	5	4	2	2	34
3	5	5	4	4	6	3	3	1	31
4	1	1	2	1	2	1	1	2	11
5	X	X	X	X	X	X	X	X	XX
6	X	X	X	X	X	X	X	X	XX
7	X	X	X	X	X	1	1	3	XX
8	3	3	4	5	6	6	5	3	35
9	4	4	4	3	3	4	3	4	29
10	4	3	1	2	1	2	2	2	17
11	3	3	2	2	3	1	1	2	17
12	3	2	1	0	0	0	2	4	12
13	4	3	2	2	1	2	2	0	16
14	2	1	2	1	0	0	0	2	08
15	4	3	2	1	0	0	0	2	12
16	3	2	2	1	1	3	1	2	15
17	1	3	3	1	0	1	1	1	11
18	2	1	1	0	0	0	0	1	05
19	3	3	1	0	0	0	0	2	09
20	2	4	3	3	4	5	3	4	28
21	5	4	3	3	4	2	3	2	26
22	3	4	4	4	3	4	3	1	26
23	2	3	3	2	2	2	0	2	16
24	2	1	2	0	3	0	1	2	11
25	2	2	1	1	3	2	2	2	15
26	3	2	1	3	1	2	1	2	15
27	3	3	2	2	3	1	3	2	19
28	2	2	2	1	2	2	0	2	13
29	2	3	1	2	1	1	2	1	13
30	3	3	3	1	1	0	1	2	14

PRELIMINARY MEAN VALUES OF THE MAGNETIC ELEMENTS FOR SEPTEMBER

WATHEROO -	Declination	2° 43.1' west.
	Horizontal Intensity	24840 gammas.
	Vertical Intensity	-52223 gammas.

SOLAR FLARE EFFECTS

Day	Began h	Began m	
14	01	28	Confirmed by ionospheric observations.

MAGNETIC K-INDICES FOR SEPTEMBER - TOOLANGI

Range for lower limit of K=9 is 500 gammas

Day	K-Indices								K-Sum
1	2	2	3	4	3	2	3	3	22
2	5	6	6	6	4	3	2	2	34
3	5	5	5	5	4	3	2	2	31
4	2	2	3	3	2	0	1	2	15
5	3	3	2	1	1	1	1	2	14
6	3	3	3	4	3	3	2	2	23
7	3	1	3	1	2	2	1	2	15
8	2	2	3	4	7	6.	3	3	30
9	3	3	4	3	4	4	3	3	27
10	3	2	3	2	2	2	2	2	18
11	3	2	2	3	3	2	2	2	19
12	1	2	2	1	1	1	3	4	15
13	3	3	3	2	2	2	2	3	20
14	X	2	1	1	0	1	1	3	XX
15	3	3	2	1	1	1	2	3	16
16	3	3	1	1	1	3	1	3	16
17	3	3	2	2	1	2	2	3	18
18	3	3	1	0	1	1	1	3	13
19	3	3	1	1	0	1	1	2	12
20	4	5	4	4	4	4	3	3	31
21	4	3	3	3	4	3	2	3	25
22	3	4	4	5	3	4	4	3	30
23	2	3	3	4	2	2	2	1	19
24	3	3	2	2	3	1	1	2	17
25	3	3	1	1	3	3	2	2	18
26	3	2	3	4	3	3	1	2	21
27	2	2	2	3	3	1	3	2	18
28	3	2	3	2	3	3	1	2	19
29	2	2	2	2	2	2	2	1	15
30	2	2	3	3	1	1	2	3	17

PRELIMINARY MEAN VALUES OF THE MAGNETIC ELEMENTS FOR SEPTEMBER

TOOLANGI	- Declination	10°04.2'	east.
	Horizontal Intensity	22724	gammas.
	Vertical Intensity	-56446	gammas.

MAGNETIC K-INDICES FOR SEPTEMBER - MACQUARIE ISLAND

Range for lower limit of K=9 is 1500 gammas

Day	K-Indices								K-Sum
1	2	3	3	6	5	4	3	2	28
2	4	(8)	(7)	(6)	(6)	5	5	3	44
3	5	5	7	7	5	4	2	2	37
4	2	3	4	5	4	1	1	2	22
5	2	3	1	1	0	0	1	2	10
6	3	3	3	6	5	5	3	3	31
7	2	2	2	1	2	2	1	1	13
8	1	1	4	6	7	7	5	3	34
9	2	1	4	5	6	5	3	2	28
10	2	2	2	3	5	2	3	2	21
11	0	3	4	4	4	3	1	1	20
12	1	1	1	0	0	0	2	3	08
13	4	6	3	3	3	3	3	1	26
14	0	1	0	0	0	1	1	0	03
15	1	1	0	0	0	1	0	2	05
16	1	1	0	0	2	5	2	2	13
17	1	2	2	2	1	2	1	0	11
18	0	1	0	0	0	0	0	0	01
19	1	(1)	0	0	0	0	1	1	04
20	2	(4)	4	2	4	6	3	3	28
21	3	5	5	6	5	5	4	3	36
22	4	6	5	7	4	6	5	2	39
23	3	3	3	6	4	4	1	1	25
24	1	2	2	2	5	1	1	1	15
25	3	3	1	0	4	5	2	2	20
26	3	4	4	5	4	3	1	1	25
27	1	1	0	4	5	3	3	3	20
28	3	4	5	5	4	4	1	1	27
29	0	0	0	0	0	2	2	1	05
30	1	2	1	4	2	1	1	2	14

PRELIMINARY MEAN VALUES OF THE MAGNETIC ELEMENTS FOR SEPTEMBER

MACQUARIE ISLAND - Declination 24°56.1' east.
Horizontal Intensity 13316 gammas.
Vertical Intensity -64505 gammas.

MAGNETIC K-INDICES FOR SEPTEMBER - MAWSON

Range for lower limit of K=9 is 1500 gammas

Day	K-Indices								K-Sum
1	4	4	4	5	4	4	6	4	35
2	6	8	8	7	6	5	5	3	48
3	5	7	6	5	4	6	5	7	45
4	5	4	4	3	3	2	4	4	29
5	4	4	3	2	0	1	4	4	22
6	5	5	4	4	5	4	6	5	38
7	5	3	3	1	2	4	2	2	22
8	2	2	4	5	8	7	5	4	37
9	4	4	4	4	3	5	7	5	36
10	5	4	2	1	2	4	4	5	27
11	3	6	6	4	3	2	3	5	32
12	2	3	2	1	0	1	5	6	20
13	6	6	4	2	2	5	5	4	34
14	3	4	2	1	1	0	0	2	13
15	5	4	1	0	0	0	0	6	16
16	4	3	2	1	1	5	3	6	25
17	2	4	3	2	1	1	4	3	20
18	4	2	0	0	0	0	0	0	06
19	1	1	0	0	0	0	0	2	04
20	3	7	6	3	3	4	5	5	36
21	6	5	6	5	4	5	4	5	40
22	4	5	6	5	4	4	7	4	39
23	5	4	5	4	3	3	1	4	29
24	3	2	1	2	2	0	5	5	20
25	5	5	2	1	3	3	6	6	31
26	4	6	5	4	2	3	3	1	28
27	3	3	2	3	3	3	5	3	25
28	3	5	4	2	3	3	1	5	26
29	4	1	1	0	1	3	3	3	16
30	4	4	3	2	1	1	0	5	20

PRELIMINARY MEAN VALUES OF THE MAGNETIC ELEMENTS FOR SEPTEMBER

MAWSON -	Declination	59°06.2'	west.
	Horizontal Intensity	18260	gammas.
	Vertical Intensity	-49006	gammas.

PRINCIPAL MAGNETIC STORMS AT WATHEROO DURING SEPTEMBER

Began at d h m	Ended at d h	Intensity	Maximum K-Index
02 02 30	03 16	Moderately severe	6

08 10 07 Followed by activity lasting 10 hours with moderately severe movements from 14 30 to 16 30 and accompanied by auroral display.

Aurora seen from 14 43 to about 15 25, brightest about 14 45. It was predominantly a diffuse glow, with some rays between 14 43 and 14 55.

SUDDEN COMMENCEMENTS AT WATHEROO DURING SEPTEMBER

Day	Time h m	Type
2	02 30	Storm Sudden Commencement
8	10 07	Storm Sudden Commencement*
16	21 06	Polar Sudden Commencement
20	04 37	Storm Sudden Commencement
25	14 36	Polar Sudden Commencement

PRINCIPAL MAGNETIC STORMS AT TOOLANGI DURING SEPTEMBER

Began at d h m	Ended at d h	Intensity	Maximum K-Index
02 01 11	03 17	Moderately severe	6
08 10 06	10 04	Moderately severe	7
20 01 43	23 17	Moderate	5

SUDDEN COMMENCEMENTS AT TOOLANGI DURING SEPTEMBER

Day	Time h m	Type
8	10 06	Storm Sudden Commencement*

IONOSPHERIC DATA - WATHEROO

MEDIAN HOURLY VALUES

120° Mean Time	h'F1 Km	hpF2 Km	h'F2 Km	foE Mc/s	foF1 Mc/s	foF2 Mc/s	fEs Mc/s	MUF 3000 Mc/s	M3000
00		350	250	*		6.7	1.1	19.4	2.9
01		350	250	*		6.0	1.4	17.0	2.8
02		350	250			6.0	1.6	16.3	2.8
03		350	240			5.4	E	15.4	2.8
04		370	250			5.4	E	13.8	2.8
05		360	250			5.2	E	14.6	2.8
06		330	260	1.5		6.0	G	17.4	3.0
07		270	230	2.5		(9.2)	G	26.0	(3.4)
08	220	290	240	3.1	4.5	10.6	G	35.0	3.3
09	220	300	240	3.5	5.0	11.5	3.8	35.6	3.1
10	210	320	250	3.7	5.0	11.8	3.8	36.5	3.1
11	210	330	260	3.8	5.4	12.0	3.8	36.4	3.0
12	210	350	260	3.9	5.4	12.0	3.9	35.0	2.9
13	210	360	260	3.9	5.3	12.0	4.0	33.4	2.8
14	210	370	260	3.8	5.0	11.8	4.0	32.5	2.8
15	210	370	250	3.6	4.8	11.5	3.8	31.6	2.8
16	220	360	250	3.3	4.5	11.5	3.8	32.2	2.8
17	*	350	240	2.7	*	10.8	3.2	31.4	2.9
18		350	240	2.0		10.7	G	31.3	2.8
19		355	230			10.0	>1.4	28.2	2.8
20		350	235			8.8	E	24.3	2.8
21		340	245			7.7	E	23.0	2.9
22		330	240			7.0	E	20.4	2.9
23		350	250	*		6.9	E	20.0	2.8

() Indicates doubtful.
* Denotes insufficient numerical values.
E Denotes frequency below 1.0 Mc/s.
G Denotes fEs $\leq$ foE.

IONOSPHERIC DATA - WATHEROO

SUMMARY SPORADIC E

120° Mean Time	Percentage of time above 7 Mc/s	5 Mc/s	3 Mc/s	Median in Mc/s	No. of Obs.
00	-	-	-	1.1	29
01	-	-	10	1.4	29
02	-	4	18	1.6	28
03	-	-	14	E	28
04	-	-	4	E	28
05	-	-	7	E	27
06	-	4	15	G	27
07	-	-	8	G	26
08	-	-	(43)	G	28 (4G)
09	-	-	(86)	3.8	28 (4G)
10	-	3	(60)	3.8	30 (12G)
11	-	7	(53)	3.8	30 (14G)
12	-	3	(60)	3.9	30 (12G)
13	-	-	(63)	4.0	30 (11G)
14	-	3	(63)	4.0	30 (11G)
15	-	-	(60)	3.8	30 (12G)
16	-	3	(87)	3.8	30 (3G)
17	-	-	53	3.2	30
18	-	-	13	G	30
19	-	-	13	1.4	30
20	-	-	3	E	30
21	-	-	-	E	30
22	-	-	10	E	30
23	-	-	3	E	29

- Indicates zero percentage.
() Indicates doubtful.
E Signifies frequency below 1.0 Mc/s
(G) Signifies $fEs \leq foE \geq 3.0$ Mc/s

PROVISIONAL SUMMARY OF AURORAE FOR SEPTEMBER

Reported by and published through the courtesy of the Australian National Antarctic Research Expedition

MACQUARIE ISLAND

Day	Began	First Seen	Minimum Geomagnetic Latitude		Intensity and Form	Last Seen	Ended
			Degrees	Time			
	h m	h m		h m		h m	h m
2		11 40	61	11 40	2 C	11 40*	
11	09 30		61	12 30	1 HA	13 00	
22	08 30		58	10 40	1 HA	16 00	
23		08 40	60	08 50	1 PA	08 50	
24		09 00	64	13 00	1 HA	13 50	
27		12 10	61	12 10	2 HB	13 00	
29	09 10		64	09 30	1 D	16 00	

* Due to cloud Aurora was seen only once.