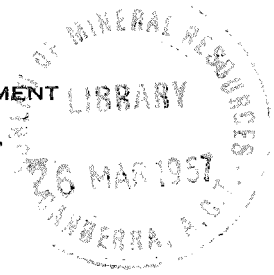


Copy 2

~~NON-LENDING COPY~~

~~NOT TO BE REMOVED
FROM LIBRARY~~

COMMONWEALTH OF AUSTRALIA
DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS



GEOPHYSICAL OBSERVATORY REPORT

VOL. 4

Nº. 12

DECEMBER

1956

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

5551
• 319.5
AUS
COPY

DEPARTMENT OF NATIONAL DEVELOPMENT

Minister - SENATOR The HON. W. H. SPOONER

Secretary - H. G. RAGGATT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

P. B. NYE - Director

J. M. RAYNER - Deputy Director

This Report was prepared in the Geophysical Section:

R. F. THYER - Chief Geophysicist

J. C. DOOLEY - Supervising Geophysicist

C O N T E N T S

<u>Subject</u>	<u>Page</u>
Contributing Observatories	2
Magnetic K-Indices	3
Watheroo	3
Toolangi	4
Macquarie Island	5
Mawson	6
Preliminary Monthly Mean	3
Values of the Magnetic	4
Elements	5
Macquarie Island	6
Mawson	6
Solar Flare Effects	3
Watheroo	3
Toolangi	4
Provisional Annual Mean	7
Values of the Magnetic	7
Elements for 1956	7
Macquarie Island	7
Mawson	7
Principal Magnetic Storms,	8
Sudden Commencements	8
Toolangi	8
Ionospheric Data, Watheroo	9
Median Hourly Values	9
Sporadic E. Summary	10
Provisional Summary of	11
Aurorae	11
Macquarie Island	11

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:-

Chief Geophysicist,
Bureau of Mineral Resources,
Geology and Geophysics,
485 Bourke Street,
Melbourne, C.1.
Australia.

CONTRIBUTING OBSERVATORIESWATHEROO 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 1-16 Mc/s
 Sweeptime 2 minutes.

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

Geographic Latitude 37°32'S Longitude 145°28'E
 Geomagnetic Latitude -45.7° Longitude 220.8°

Instruments

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

MACQUARIE ISLAND MAGNETIC OBSERVATORY J.R. CLEARY,
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 DECEMBER - WATHEROO

Range for lower limit of K=9 is 350 gammas

<u>Day</u>	<u>K-Indices</u>								<u>K-Sum</u>
1	4	4	2	2	3	2	2	5	24
2	5	4	4	3	2	3	3	4	28
3	5	2	2	3	2	3	3	5	25
4	4	3	3	1	2	3	3	3	22
5	5	3	4	3	2	3	1	3	24
6	5	4	3	2	3	3	2	4	26
7	2	3	3	2	2	3	3	1	19
8	3	2	3	4	1	1	3	2	19
9	2	2	3	1	2	1	1	2	14
10	3	4	4	4	3	4	2	4	28
11	2	3	3	1	1	1	2	2	15
12	3	3	3	2	3	4	3	4	25
13	4	4	3	3	4	2	2	4	26
14	5	5	2	3	1	2	3	3	24
15	2	2	2	1	1	1	1	2	12
16	3	2	2	1	0	0	1	1	10
17	2	0	1	2	1	0	1	2	09
18	1	1	2	1	3	2	1	2	13
19	3	1	3	2	0	1	1	4	15
20	2	3	2	3	1	1	1	2	15
21	3	2	1	2	0	0	2	2	12
22	1	2	2	2	3	0	1	2	13
23	2	2	3	3	0	0	1	2	13
24	3	2	3	1	2	0	2	2	15
25	2	2	3	4	4	4	3	4	26
26	4	4	4	3	1	0	0	2	18
27	2	3	2	2	1	4	3	4	21
28	5	4	6	4	5	4	4	4	36
29	5	4	2	3	3	3	1	3	24
30	3	3	5	4	3	1	2	3	24
31	3	3	3	1	2	0	1	2	15

PRELIMINARY MEAN VALUES OF THE MAGNETIC ELEMENTS FOR DECEMBER

WATHEROO - Declination 2°43.1' west.
Horizontal Intensity 24867 gammas.
Vertical Intensity -52223 gammas.

SOLAR FLARE EFFECTS

<u>Day</u>	<u>Began</u>	<u>K</u>	<u>K'</u>	
	h m			
15	05 25	2	2	Confirmed by ionospheric observations.
17	01 24	2	2	Confirmed by ionospheric observations.
17	04 56	1	0	Confirmed by ionospheric observations.
19	06 06	4	3	Confirmed by ionospheric observations.
20	04 46	4	3	Confirmed by ionospheric observations.
20	06 40	4	2	Confirmed by ionospheric observations.
27	06 21	2	2	Confirmed by ionospheric observations.

MAGNETIC K-INDICES FOR DECEMBER - TOOLANGI

Range for lower limit of K=9 is 500 gammas

<u>Day</u>	<u>K-Indices</u>								<u>K-Sum</u>
1	2	2	2	2	2	3	3	4	20
2	4	2	3	3	X	X	X	X	XX
3	3	3	3	3	3	3	3	3	24
4	3	3	3	2	2	2	3	2	20
5	3	4	2	2	2	3	1	1	18
6	2	2	2	2	3	3	3	3	20
7	2	3	3	2	2	3	2	3	20
8	2	3	4	4	3	1	3	3	23
9	2	2	3	1	3	2	2	3	18
10	3	3	4	4	4	3	3	4	28
11	2	2	3	2	2	2	2	3	18
12	2	2	2	2	3	4	4	4	23
13	3	3	4	3	4	3	3	2	25
14	3	3	3	2	2	2	2	3	20
15	4	2	3	0	2	2	2	3	18
16	1	1	1	1	0	0	0	2	06
17	X	X	X	X	X	X	X	X	XX
18	2	2	2	2	3	2	2	2	17
19	3	2	2	3	1	2	2	2	17
20	3	2	2	2	2	2	1	1	15
21	3	3	1	3	0	0	2	2	14
22	2	3	3	2	3	0	1	2	16
23	2	2	2	3	1	1	1	2	14
24	3	3	3	3	2	2	2	2	20
25	3	3	4	4	4	3	3	5	29
26	4	3	3	3	2	1	2	3	21
27	4	2	2	2	2	4	4	4	24
28	4	4	6	4	5	4	3	4	34
29	5	3	3	2	3	3	2	3	24
30	3	3	5	4	3	2	2	2	24
31	3	2	1	3	3	1	2	2	17

PRELIMINARY MEAN VALUES OF THE MAGNETIC ELEMENTS FOR DECEMBER

TOOLANGI - Declination 10°04.3' east.
Horizontal Intensity 22746 gammas.
Vertical Intensity -56447 gammas.

SOLAR FLARE EFFECTS

<u>Day</u>	<u>Began</u>	<u>K</u>	<u>K'</u>	
	h m			
15	05 25	2	2	Confirmed by ionospheric observations.
19	06 06	3	2	Confirmed by ionospheric observations.
20	04 49	3	2	Confirmed by ionospheric observations.
20	06 40	2	2	Confirmed by ionospheric observations.

MAGNETIC K-INDICES FOR DECEMBER - MACQUARIE ISLAND

Range for lower limit of K=9 is 1500 gammas

<u>Day</u>	<u>K-Indices</u>								<u>K-Sum</u>
1	2	3	2	3	5	4	3	3	25
2	4	4	2	5	5	5	3	2	30
3	3	3	4	5	4	4	3	3	29
4	3	4	3	2	3	3	2	2	22
5	4	4	3	2	4	5	2	2	26
6	2	3	4	3	6	5	2	3	28
7	2	3	3	4	4	4	3	2	25
8	3	2	4	6	5	1	2	3	26
9	1	2	3	3	4	3	2	2	20
10	5	4	5	X	X	X	X	X	XX
11	2	2	2	1	0	1	2	3	13
12	1	1	2	3	5	6	5	5	28
13	4	4	5	X	X	X	X	X	XX
14	3	3	3	3	3	3	2	3	23
15	3	3	2	2	3	2	2	2	19
16	2	3	3	3	2	1	1	2	17
17	1	3	3	2	1	0	0	1	11
18	1	2	1	4	5	2	1	0	16
19	1	1	2	2	1	1	1	2	11
20	2	3	2	3	3	2	1	1	17
21	2	1	1	1	0	1	0	0	06
22	2	4	3	3	5	1	1	1	20
23	1	0	1	4	2	1	1	X	XX
24	2	3	3	4	3	1	3	2	21
25	2	4	3	6	5	6	5	5	36
26	4	4	5	3	2	1	1	2	22
27	2	2	3	4	4	6	6	4	31
28	4	3	5	5	7	7	4	3	38
29	4	3	3	3	4	4	2	3	26
30	3	3	6	6	5	3	3	2	31
31	3	3	1	2	4	1	1	1	16

PRELIMINARY MEAN VALUES OF THE MAGNETIC ELEMENTS FOR DECEMBER

MACQUARIE ISLAND - Declination 24°58.3' east.
Horizontal Intensity 13340 gammas.
Vertical Intensity -6482 gammas.

MAGNETIC K-INDICES FOR DECEMBER - MAWSON

Range for lower limit of K=9 is 1500 gammas.

<u>Day</u>	<u>K-Indices</u>								<u>K-Sum</u>
1	3	4	4	3	4	4	5	4	31
2	6	5	4	5	4	5	6	5	40
3	5	5	5	4	4	4	5	4	36
4	5	5	4	4	4	4	5	6	37
5	6	5	3	3	4	4	3	3	31
6	4	5	5	3	5	5	5	6	38
7	4	4	3	3	3	4	4	5	30
8	4	4	4	5	5	2	5	3	32
9	4	3	3	2	4	3	2	X	XX
10	X	6	5	6	6	5	4	(5)	XX
11	X	4	2	2	1	2	2	2	XX
12	3	2	3	3	3	5	4	4	27
13	4	4	5	5	5	5	3	5	36
14	5	6	4	3	4	4	4	3	33
15	4	5	4	5	4	3	2	3	30
16	4	5	6	3	3	2	2	3	28
17	4	4	4	3	2	1	1	2	21
18	3	4	3	4	5	4	3	3	29
19	1	2	3	3	2	3	3	5	22
20	4	5	4	4	4	2	2	3	28
21	3	4	3	2	1	2	3	3	21
22	4	4	4	3	5	3	3	3	29
23	2	3	2	3	3	3	3	3	22
24	5	5	4	3	3	3	4	4	31
25	5	5	4	6	6	6	7	4	43
26	6	7	7	5	3	3	3	3	37
27	3	4	3	4	5	7	6	5	37
28	5	5	6	5	6	6	5	3	41
29	6	5	5	4	4	4	5	5	38
30	4	3	5	6	4	3	5	5	35
31	4	4	2	4	3	3	3	4	27

PRELIMINARY MEAN VALUES OF THE MAGNETIC ELEMENTS FOR DECEMBER

MAWSON - Declination 59°03.8' west.
 Horizontal Intensity 18305 gammas.
 Vertical Intensity -48978 gammas.

PROVISIONAL ANNUAL MEAN VALUES OF THE MAGNETIC ELEMENTS FOR 1956

<u>WATHEROO</u>	-	Declination	2°43.3' west.
		Horizontal Intensity	24846 gammas.
		Vertical Intensity	-52217 gammas.

<u>TOOLANGI</u>	-	Declination	10°03.3' east.
		Horizontal Intensity	22731 gammas.
		Vertical Intensity	-56441 gammas.

<u>MACQUARIE ISLAND</u>	-	Declination	24°53.7' east.
		Horizontal Intensity	13322 gammas.
		Vertical Intensity	-64488 gammas.

<u>MAWSON</u>	-	Declination	59°14.6' west.
		Horizontal Intensity	18261 gammas.
		Vertical Intensity	-49009 gammas.

PRINCIPAL MAGNETIC STORMS AT WATHEROO DURING DECEMBER

<u>Began at</u> d h m	<u>Ended at</u> d h	<u>Intensity</u>	<u>Maximum</u> <u>K-Index</u>
27 15 02	29 04	Moderately severe	6

SUDDEN COMMENCEMENTS AT WATHEROO DURING DECEMBER

<u>Day</u>	<u>Time</u> h m	<u>Type</u>
8	19 50	Polar Sudden Commencement
25	07 56	Storm Sudden Commencement*
27	15 02	Storm Sudden Commencement
30	06 32	Storm Sudden Commencement*

PRINCIPAL MAGNETIC STORMS AT TOOLANGI DURING DECEMBER

<u>Began at</u> d h m	<u>Ended at</u> d h	<u>Intensity</u>	<u>Maximum</u> <u>K-Index</u>
27 15 01	29 04	Moderate	6

SUDDEN COMMENCEMENTS AT TOOLANGI DURING DECEMBER

<u>Day</u>	<u>Time</u> h m	<u>Type</u>
24	01 47	Storm Sudden Commencement*
25	07 54	Storm Sudden Commencement
27	15 01	Storm Sudden Commencement
30	06 32	Storm Sudden Commencement*

IONOSPHERIC DATA - WATHEROOMEDIAN HOURLY VALUES

120° Mean Time	<u>h'F1</u> Km	<u>h_pF2</u> Km	<u>h'F2</u> Km	<u>f_oE</u> Mc/s	<u>f_oF1</u> Mc/s	<u>f_oF2</u> Mc/s	<u>fEs</u> Mc/s	<u>MUF</u> <u>3000</u> Mc/s	<u>M3000</u>
00		430	300			7.2	3.8	17.6	2.4
01		445	290			7.0	4.0	16.6	2.4
02		450	275			6.7	3.2	16.0	2.4
03		460	310			6.4	3.2	15.4	2.4
04		450	300			6.0	3.2	15.0	2.4
05	320	440	320	1.8	3.1	6.0	2.6	15.0	2.4
06	270	410	275	2.6	4.0	6.7	3.3	16.8	2.5
07	250	420	410	3.3	5.0	7.7	4.2	18.6	2.5
08	250	420	460	3.7	5.4	8.1	4.7	20.9	2.5
09	235	440	470	4.0	5.7	8.4	4.8	19.2	2.4
10	235	460	450	4.1	6.0	9.1	5.0	22.2	2.4
11	240	480	450	4.2	6.4	9.8	6.2	23.4	2.3
12	240	470	450	4.3	6.3	10.0	5.4	23.9	2.4
13	235	480	450	4.3	6.2	10.0	4.9	23.7	2.3
14	240	470	450	4.2	6.0	9.8	4.9	22.8	2.3
15	240	470	440	4.1	6.0	9.5	4.8	22.2	2.4
16	240	450	430	3.8	5.8	9.0	4.6	22.0	2.4
17	250	430	400	3.4	5.5	9.0	5.5	21.7	2.4
18	260	420	(340)	2.7	*	8.5	4.0	21.7	2.5
19		410	300	2.4		8.4	3.7	21.2	2.5
20		410	280	*		8.0	3.0	20.6	2.5
21		435	285			7.9	3.6	18.8	2.4
22		430	290			7.4	3.4	18.7	2.5
23		430	E320			7.4	4.0	18.0	2.4

* Denotes insufficient numerical values

E Denotes frequency below 1.0 Mc/s.

IONOSPHERIC DATA - WATHEROOSUMMARY SPORADIC E

120° Mean Time	Percentage of time above			Median in Mc/s	No. of Obs.
	7 Mc/s	5 Mc/s	3 Mc/s		
00	10	30	73	3.8	30
01	7	33	78	4.0	27
02	4	11	63	3.2	27
03	7	11	75	3.2	28
04	4	7	54	3.2	28
05	4	4	25	2.6	28
06	-	10	97	3.3	30
07	-	17	(90)	4.2	29 (3G)
08	10	40	(97)	4.7	30 (1G)
09	8	46	(96)	4.8	26 (1G)
10	13	53	(97)	5.0	30 (1G)
11	40	80	(96)	6.2	25 (1G)
12	23	65	(92)	5.4	26 (2G)
13	14	41	(76)	4.9	29 (7G)
14	4	44	(72)	4.9	25 (7G)
15	12	42	(88)	4.8	26 (3G)
16	4	42	(88)	4.6	26 (3G)
17	13	65	(91)	5.5	23 (2G)
18	4	42	88	4.0	26
19	-	15	93	3.7	27
20	-	15	62	3.0	26
21	-	11	68	3.6	28
22	13	30	67	3.4	30
23	7	30	80	4.0	30

- Indicates zero percentage.

() Indicates doubtful.

(G) Signifies $fEs \leq f_oE \leq 3.0$ Mc/s.

PROVISIONAL SUMMARY OF AURORAE FOR DECEMBER

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

MACQUARIE ISLAND

<u>Day</u>	<u>Began</u>		<u>First Seen</u>		Minimum Geomagnetic <u>Latitude</u>	<u>Time</u>	<u>Intensity and Form</u>	<u>Last Seen</u>	<u>Ended</u>
	h	m	h	m	<u>Degrees</u>	<u>h m</u>		h m	h m
7	11	40			60	11 50	1 D	14 20	
9			13	10	61	13 10	1 HA	13 10*	
10			13	20	59	13 30	1 D		14 30
13	11	20			60	11 20	4 D	13 30	
14	14	00			61	14 00	1 HA	14 30	
20	11	30			61	11 40	2 HB		13 40
27			13	05	64	13 05	4 D	13 05*	
28	11	45			61	12 20	2 D		15 00

* Due to cloud Aurora was seen only once.