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



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GEOPHYSICAL OBSERVATORY REPORT

VOL. 2

No. 12

DECEMBER

1954

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

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DEPARTMENT OF NATIONAL DEVELOPMENT

Minister - SENATOR The HON. W. H. SPOONER

Secretary - H. G. RAGGATT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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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:-

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 1-16Mc/s
 Sweeptime 2 minutes.

TOOLANGI MAGNETIC OBSERVATORY J.A. BROOKS, 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.
 Schulze Earth Inductor No.49.
 La Cour pattern D,H,Z, recording variometers, normal
 sensitivity 15mm/hour recorder.

MACQUARIE ISLAND MAGNETIC OBSERVATORY C.S. ROBERTSON,
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.

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	2	1	2	1	0	2	0	1	09
2	1	2	2	3	3	1	2	2	16
3	3	2	1	2	0	0	1	1	10
4	3	2	2	2	1	2	2	2	16
5	2	2	1	1	1	3	1	2	13
6	2	2	3	2	1	1	1	1	13
7	3	3	4	2	3	3	3	1	22
8	2	2	3	0	1	1	1	1	11
9	4	3	3	2	2	1	1	2	18
10	4	1	2	1	0	0	1	1	10
11	3	1	3	0	0	0	1	1	09
12	3	2	3	1	1	2	1	3	16
13	3	2	2	1	0	0	2	2	12
14	2	2	2	1	0	1	0	0	08
15	2	1	1	1	0	0	0	0	05
16	1	2	(1)	1	0	0	0	1	(06)
17	3	3	5	4	3	4	2	3	27
18	4	2	1	2	2	2	1	2	16
19	1	1	2	2	4	2	1	2	15
20	2	2	2	3	3	2	3	3	20
21	3	2	2	2	2	2	2	2	17
22	2	2	2	2	0	0	1	1	10
23	1	2	2	2	1	2	2	2	14
24	2	2	2	1	1	0	2	2	12
25	2	3	2	0	2	2	2	2	15
26	4	3	1	1	0	1	1	4	15
27	6	3	2	3	5	2	2	2	25
28	3	3	1	3	1	2	2	2	17
29	3	2	3	3	2	2	2	2	19
30	3	1	3	3	2	1	0	1	14
31	3	1	2	1	2	1	1	1	12

() Doubtful

PRELIMINARY MEAN VALUES OF THE MAGNETIC ELEMENTS FOR DECEMBER

WATHEROO - Declination 2° 45.0' west.
 Horizontal Intensity 24882 gammas.
 Vertical Intensity -52164 gammas.

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	3	2	2	2	1	2	1	3	16
2	3	2	2	3	3	2	2	2	19
3	3	2	2	2	1	1	1	2	14
4	1	2	2	3	3	1	2	2	16
5	1	3	2	1	2	3	2	1	15
6	2	3	3	2	1	1	1	2	15
7	3	3	4	2	3	2	2	3	22
8	3	3	2	1	2	1	1	3	16
9	3	2	3	3	2	1	1	3	18
10	2	2	2	1	1	1	2	3	14
11	3	3	2	1	1	1	1	2	14
12	2	2	3	2	2	2	2	3	18
13	3	2	2	1	1	1	2	3	15
14	2	3	2	1	1	2	1	1	13
15	2	2	1	1	0	1	1	2	10
16	2	3	1	1	1	2	1	2	13
17	2	4	5	4	3	3	2	3	26
18	4	3	2	3	3	2	1	3	21
19	2	2	2	3	3	3	2	3	20
20	3	3	3	3	3	2	3	3	23
21	3	3	3	3	3	1	2	2	20
22	2	2	2	2	1	1	2	1	13
23	3	3	2	2	2	2	3	3	20
24	1	1	2	1	2	1	1	3	12
25	2	2	2	1	2	3	3	2	17
26	2	3	2	1	1	1	3	3	16
27	4	3	3	3	5	2	3	4	27
28	3	3	2	3	2	2	2	3	20
29	2	3	3	3	3	3	2	1	20
30	3	2	2	3	2	1	2	3	18
31	3	3	2	2	2	2	1	2	17

PRELIMINARY MEAN VALUES OF THE MAGNETIC ELEMENTS FOR DECEMBER

TOOLANGI - Declination 9° 56.7' east.
 Horizontal Intensity 22768 gammas.
 Vertical Intensity -56428 gammas.

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	1	1	1	1	0	0	1	1	6
2	1	1	1	2	3	1	2	1	12
3	1	1	1	1	0	0	1	2	7
4	0	1	1	4	3	1	1	1	12
5	1	1	1	1	1	3	3	0	11
6	1	2	2	2	0	0	0	1	8
7	1	2	2	2	1	1	1	1	11
8	2	2	1	1	2	0	0	1	9
9	2	2	1	2	2	0	0	1	10
10	1	2	2	0	0	0	0	1	6
11	1	1	0	1	1	0	0	0	4
12	1	2	2	2	3	3	2	2	17
13	2	2	1	1	0	1	2	2	11
14	1	1	1	0	0	1	1	0	5
15	0	1	0	0	1	0	0	1	3
16	1	2	0	1	1	1	0	0	6
17	1	3	4	6	6	5	2	2	29
18	3	4	3	6	4	3	1	1	25
19	1	2	2	3	6	4	1	1	20
20	1	3	2	5	5	2	2	1	21
21	2	2	1	4	5	1	1	1	17
22	1	1	1	0	0	1	0	1	5
23	1	2	0	2	3	2	1	1	12
24	1	1	0	1	1	0	1	2	7
25	1	1	1	0	2	2	1	1	9
26	1	1	1	0	0	1	2	2	8
27	3	3	2	3	6	3	2	2	24
28	2	3	1	4	2	2	1	1	16
29	2	2	1	3	3	2	1	1	15
30	1	1	2	2	1	0	1	2	10
31	1	1	0	1	0	1	0	0	4

PRELIMINARY MEAN VALUES OF THE MAGNETIC ELEMENTS FOR DECEMBER

MACQUARIE ISLAND - Declination 24°31.5' east.
Horizontal Intensity 13361 gammas.
Vertical Intensity -64503 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>
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SUDDEN COMMENCEMENTS AT WATHEROO DURING DECEMBER

<u>Day</u>	<u>Time</u> h m	<u>Type</u>
5	15 03	Polar Sudden Commencement.
26	23 39	Sudden impulse.

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>
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SUDDEN COMMENCEMENTS AT TOOLANGI DURING DECEMBER

<u>Day</u>	<u>Time</u> h m	<u>Type</u>
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IONOSPHERIC DATA - WATHEROOMEDIAN HOURLY VALUES

120° Mean Time	$\frac{h'F1}{\text{Km}}$	$\frac{hpF2}{\text{Km}}$	$\frac{h'F2}{\text{Km}}$	$\frac{foE}{\text{Mc/s}}$	$\frac{foF1}{\text{Mc/s}}$	$\frac{foF2}{\text{Mc/s}}$	$\frac{fEs}{\text{Mc/s}}$	$\frac{\text{MUF } 3000}{\text{Mc/s}}$	$\frac{\text{M3000}}{\text{Mc/s}}$
00		(320)	275			4.2	4.0	(12.8)	(3.1)
01		300	260			4.0	3.8	12.0	3.1
02		300	250			3.6	3.8	11.2	3.2
03		310	260			3.7	3.8	11.3	3.1
04		300	260			3.6	1.9	11.2	3.1
05		300	250			3.6	1.9	11.4	3.2
06	230	275	260	*	3.3	4.2	3.6	12.7	3.3
07	235	(300)	290	2.5	3.8	(4.8)	3.8	(15.6)	(3.3)
08	220	*	280	2.8	4.2	(5.3)	3.8	(16.7)	(3.1)
09	210	(310)	310	3.2	4.3	(5.9)	D4.3	(19.1)	(3.1)
10	*	(340)	*	3.3	4.4	5.9	D4.4	(18.0)	(3.0)
11	200	(350)	330	3.4	4.5	(6.0)	D4.4	(18.2)	(3.0)
12	*	365	340	3.4	4.5	6.2	D4.4	18.2	2.9
13	200	340	330	3.5	4.4	6.8	D4.3	20.3	3.0
14	*	(350)	*	3.4	4.2	6.5	D4.3	20.2	3.0
15	215	340	320	3.3	4.5	6.7	4.2	20.0	3.0
16	220	340	320	3.1	4.2	6.6	4.0	19.9	3.1
17	230	(330)	300	2.8	3.9	(6.2)	3.8	*	*
18	240	(300)	285	2.6	3.5	(4.7)	3.8	(14.9)	(3.2)
19		(305)	250			(4.4)	3.7	(13.5)	(3.1)
20		*	260			(4.6)	+	*	*
21		(280)	250			(4.3)	3.5	(14.8)	3.4
22		295	270			4.2	2.0	(13.7)	(3.1)
23		(310)	285			4.1	3.6	(12.4)	(3.1)

() Indicates doubtful

+ Indicates fEs median below lowest frequency recorded.

* Denotes insufficient values

IONOSPHERIC DATA - WATHEROOSUMMARY SPORADIC E

120° Mean Time	<u>Percentage of time above</u>			Median in Mc/s	No. of Obs.
	7 Mc/s	5 Mc/s	3 Mc/s		
00	(8)x	(8)x	79	4.0	24
01	(9)x	(9)x	73	3.8	22
02	(9)x	(9)x	83	3.8	23
03	-	-	67	3.8	24
04	(5)x	(5)x	38	1.9	21
05	-	-	47	1.9	19
06	(10)x	(10)x	57	3.6	21
07	-	5	95	3.8	19
08	(12)x	(21)x	96	3.8	24
09	(20)x	(40)x	(96)	D4.3	25(1G)
10	(27)x	(55)x	(91)	D4.4	22(1G)
11	(29)x	(52)x	(90)	D4.4	21(2G)
12	(27)x	(45)x	(91)	D4.4	22(1G)
13	(32)x	(50)x	95	D4.3	22
14	(33)x	(52)x	100	D4.3	21
15	(17)x	(30)x	(87)	4.2	23(2G)
16	(9)x	(30)x	100	4.0	23
17	(14)x	(24)x	86	3.8	21
18	-	9	96	3.8	23
19	-	-	67	3.7	18
20	-	-	44	E	16
21	(5)x	(5)x	68	3.5	19
22	-	-	48	2.0	25
23	(5)x	(10)x	71	3.6	21

()x Signifies doubtful because of equipment failure above 4.4 Mc/s.

- Indicates zero percentage.

+ Indicates fEs median below lowest frequency recorded.

G Signifies fEs < foE ≥ 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>Cloud</u> <u>Cover</u>	<u>First</u> <u>Seen</u> h m	<u>Time of</u> <u>Maximum</u> h m	<u>Last</u> <u>Seen</u> h m	<u>Time</u> <u>End</u> h m	<u>Intensity</u>	<u>Remarks</u>
17	8	13 45	unknown	14 30	unknown	3	overhead
18	8	14 00	unknown	14 00	unknown	2	