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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. 1

No. 9

SEPTEMBER

1953

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

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DEPARTMENT OF NATIONAL DEVELOPMENT

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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

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

Instruments

Magnetic Equipment - D.T.M. C.I.W. Magnetometer No.7.  
 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

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

Instruments

Askania pattern Magnetometer No.508813.  
 Schulze Earth Inductor No.49.  
 La Cour pattern D,H,Z, recording variometers, normal  
 sensitivity 15mm/hour recorder.

MACQUARIE ISLAND MAGNETIC OBSERVATORY

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.

HEARD ISLAND MAGNETIC OBSERVATORY

Geographic Latitude 53°02'S Longitude 73°22'E  
 Geomagnetic Latitude -61° Longitude 129°

Instruments

La Cour pattern QHMs Nos.172,173,174.  
 La Cour pattern BMZ No.62.  
 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

<u>Day</u>	<u>K-Indices</u>				<u>K-Sum</u>				
1	3	3	3	3	4	3	1	3	23
2	3	4	3	3	3	4	3	2	25
3	3	3	3	3	2	5	4	7	30
4	6	4	4	5	3	4	4	4	34
5	4	3	3	2	1	2	3	2	20
6	2	3	5	2	3	1	3	1	20
7	1	3	3	3	3	3	1	2	19
8	3	3	1	3	1	2	2	1	16
9	1	3	1	1	0	0	1	2	09
10	3	2	3	1	2	2	1	3	17
11	4	4	4	2	3	1	2	2	22
12	4	2	3	2	2	1	2	2	18
13	3	2	4	2	0	0	0	2	13
14	3	1	2	1	0	0	0	2	09
15	3	3	3	3	4	4	5	3	28
16	3	3	3	3	2	3	4	2	23
17	3	3	2	2	3	2	3	1	19
18	2	3	3	1	0	2	3	5	19
19	5	4	5	6	5	6	5	2	38
20	3	3	3	3	5	4	5	3	29
21	4	2	3	4	3	4	3	3	26
22	4	2	4	3	1	2	3	3	22
23	3	5	5	4	5	3	4	2	31
24	3	3	4	5	5	3	4	0	27
25	2	2	3	2	4	2	2	1	18
26	2	2	3	1	2	1	1	3	15
27	3	2	3	3	4	3	2	1	21
28	1	1	1	1	1	1	2	1	09
29	2	2	1	1	2	2	1	1	12
30	1	2	1	1	1	1	3	2	12

PRELIMINARY MEAN VALUES OF THE MAGNETIC ELEMENTS FOR SEPTEMBER

WATHEROO - Declination 2° 46.9' west.  
Horizontal Intensity 24837 gammas.  
Vertical Intensity -52152 gammas.

MAGNETIC K-INDICES FOR SEPTEMBER - 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	4	3	5	4	2	3	26
2	3	4	5	3	4	4	3	3	29
3	2	3	2	3	3	3	4	6	26
4	6	4	5	5	4	4	4	4	36
5	4	3	3	3	2	2	3	3	23
6	1	2	4	2	3	1	1	2	16
7	2	3	3	3	4	3	2	2	22
8	1	2	2	3	2	2	2	1	15
9	2	3	3	1	1	1	0	1	12
10	2	2	2	2	3	2	2	3	18
11	3	3	3	2	4	2	1	2	20
12	2	2	3	3	3	2	2	3	20
13	3	3	3	2	2	1	1	1	16
14	1	1	1	2	1	1	1	2	10
15	1	3	3	3	3	5	5	3	26
16	2	4	3	3	3	3	3	2	23
17	4	4	2	3	3	3	3	2	24
18	2	2	3	1	1	2	3	5	19
19	4	4	4	6	5	5	4	3	35
20	3	5	4	3	4	4	3	4	30
21	4	3	4	5	3	3	3	3	28
22	4	3	5	4	2	2	2	3	25
23	4	4	5	5	4	3	5	3	33
24	3	3	5	5	5	3	3	2	29
25	3	2	3	2	4	3	2	1	20
26	2	3	2	2	3	1	2	3	18
27	3	3	3	3	4	3	2	2	23
28	3	3	1	2	2	2	2	2	17
29	2	1	1	2	2	1	1	1	11
30	2	2	1	2	2	2	2	2	15

PRELIMINARY MEAN VALUES OF THE MAGNETIC ELEMENTS FOR SEPTEMBER

TOOLANGI - Declination                    9° 50.3' east.  
Horizontal Intensity            22768 gammas.  
Vertical Intensity            -56442 gammas.

MAGNETIC K-INDICES FOR SEPTEMBER - MACQUARIE ISLANDRange for lower limit of K=9 is 1500 gammas

<u>Day</u>	<u>K-Indices</u>				<u>K-Sum</u>				
1	2	2	5	5	6	4	2	1	27
2	2	3	5	5	5	4	3	1	28
3	2	3	3	5	5	5	5	6	34
4	5	5	7	7	6	5	5	3	43
5	5	5	4	5	4	2	3	2	30
6	1	3	5	2	6	1	1	1	20
7	1	3	3	5	5	4	3	1	25
8	1	2	3	4	3	3	2	1	19
9	0	3	1	0	1	1	1	1	08
10	1	2	2	4	4	3	0	1	17
11	4	2	4	4	4	1	1	1	21
12	1	1	3	6	5	1	1	2	20
13	2	3	3	X	X	X	X	X	XX
14	0	1	1	X	X	X	X	X	XX
15	2	3	2	5	5	5	7	2	31
16	2	3	3	1	1	5	4	3	22
17	1	2	2	3	5	4	2	1	20
18	1	2	2	2	1	0	3	4	15
19	6	6	6	8	7	7	4	3	47
20	4	5	5	5	6	6	4	3	38
21	3	3	6	6	6	5	3	3	35
22	4	4	6	6	3	3	2	3	31
23	3	5	5	6	6	6	5	2	38
24	3	4	5	7	7	4	2	2	34
25	2	1	3	3	5	4	3	2	23
26	1	1	2	1	3	2	1	2	13
27	3	4	4	6	5	4	2	1	29
28	0	2	2	1	1	2	1	0	09
29	0	2	1	1	1	2	1	1	09
30	1	1	1	0	1	3	2	1	10

PRELIMINARY MEAN VALUES OF THE MAGNETIC ELEMENTS FOR SEPTEMBER

MACQUARIE ISLAND - Declination 24°17.1' east.  
Horizontal Intensity 13332 gammas.  
Vertical Intensity -64534 gammas.

MAGNETIC K-INDICES FOR SEPTEMBER - HEARD ISLAND

Range for lower limit of K=9 is 1000 gammas

<u>Day</u>	<u>K-Indices</u>				<u>K-Sum</u>			
1	2	1	3	3	3	3	2	20
2	5	2	3	2	2	5	5	28
3	3	2	1	2	2	7	6	32
4	8	7	4	4	5	6	6	47
5	8	5	2	2	2	1	6	30
6	1	1	3	2	2	1	4	17
7	3	3	3	3	2	5	1	23
8	4	1	1	2	1	3	3	16
9	1	2	1	0	0	0	1	07
10	1	1	1	1	1	2	3	15
11	6	2	2	2	2	0	3	19
12	2	1	2	3	2	1	3	17
13	4	3	2	2	1	0	1	16
14	0	1	1	1	0	0	0	03
15	0	1	2	2	2	5	7	22
16	2	2	2	2	2	4	5	22
17	3	4	2	1	2	2	4	20
18	2	2	2	1	0	1	5	20
19	6	6	5	6	6	8	7	50
20	5	5	4	3	6	6	7	42
21	5	3	3	3	4	5	4	31
22	7	3	4	3	2	2	5	31
23	5	4	4	3	6	6	6	39
24	4	2	3	4	6	4	5	31
25	3	2	3	2	3	2	4	21
26	1	2	1	1	1	2	3	15
27	4	3	3	3	4	3	3	25
28	3	2	1	1	1	2	3	14
29	1	1	1	0	1	1	0	06
30	1	2	2	1	1	3	3	16

PRELIMINARY MEAN VALUES OF THE MAGNETIC ELEMENTS FOR SEPTEMBER

HEARD ISLAND - Declination           50°12.1' west.  
Horizontal Intensity   18470   gammas.  
Vertical Intensity     -47210   gammas.



PRINCIPAL MAGNETIC STORMS AT WATHEROO DURING SEPTEMBER

<u>Began at</u> d h m	<u>Ended at</u> d h	<u>Intensity</u>	<u>Maximum</u> <u>K-Index</u>
03 11 50	05 10	Moderately severe	7
15 02 59	16 23	Moderate	5
18 15 30	22 16	Moderately severe	6
23 00 00	24 24	Moderate	5

SUDDEN COMMENCEMENTS AT WATHEROO DURING SEPTEMBER

<u>Day</u>	<u>Time</u> h m	<u>Type</u>
15	02 59	Storm Sudden Commencement

PRINCIPAL MAGNETIC STORMS AT TOOLANGI DURING SEPTEMBER

<u>Began at</u> d h m	<u>Ended at</u> d h	<u>Intensity</u>	<u>Maximum</u> <u>K-Index</u>
Storm commencement in previous month	05 12	Moderately severe	6
15 02 58	17 21	Moderate	5
18 16 10	24 20	Moderately severe	6

SUDDEN COMMENCEMENTS AT TOOLANGI DURING SEPTEMBER

<u>Day</u>	<u>Time</u> h m	<u>Type</u>
15	02 58	Storm Sudden Commencement
18	16 10	Storm Sudden Commencement

IONOSPHERIC DATA - WATHEROOMEDIAN HOURLY VALUES

120° Mean Time	<u>h'F1</u> Km	<u>hpF2</u> Km	<u>h'F2</u> Km	<u>foE</u> Mc/s	<u>foF1</u> Mc/s	<u>foF2</u> Mc/s	<u>fEs</u> Mc/s	<u>MUF</u> <u>3000</u> Mc/s	<u>M3000</u>
00		320	260			3.2	2.3	9.8	3.0
01		300	250			3.2	2.0	10.0	3.1
02		300	250			3.2	2.4	10.3	3.2
03		300	250			3.0	+	9.2	3.1
04		320	255			2.8	1.4	8.4	3.0
05		320	255			2.8	1.4	8.4	3.0
06		300	250			3.2	+	10.0	3.1
07	230	280	250	1.9	3.5	4.3	+	14.7	3.4
08	240	290	290	2.5	3.8	5.0	3.0	17.3	3.4
09	220	300	300	2.8	4.2	5.4	3.2	17.5	3.3
10	220	300	330	3.0	4.4	5.7	3.3	17.5	3.2
11	210	300	300	3.2	4.4	6.2	3.5	20.0	3.2
12	220	310	320	3.2	4.5	6.2	3.6	19.7	3.1
13	220	320	310	3.2	4.5	6.5	3.6	20.9	3.2
14	210	300	300	3.2	4.4	6.4	3.6	21.1	3.3
15	230	300	295	3.0	4.2	6.1	3.5	20.0	3.3
16	230	290	280	2.7	3.9	6.0	3.2	19.9	3.3
17	240	270	250	2.3	3.3	5.4	3.1	18.2	3.4
18		270	240			4.8	1.7	16.4	3.3
19		290	240			4.1	2.3	14.1	3.3
20		300	250			4.0	+	11.7	3.1
21		315	260			3.6	+	10.6	3.0
22		320	255			3.5	+	10.9	3.0
23		320	260			3.3	+	10.1	3.0

+ Indicates fEs median below lowest frequency recorded.

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	-	-	29	2.3	28
01	-	-	23	2.0	30
02	-	-	29	2.4	28
03	-	-	34	+	29
04	-	-	21	1.4	29
05	-	-	24	1.4	29
06	-	-	7	+	29
07	-	-	7	+	28
08	-	-	57	3.0	23
09	-	-	75	3.2	24
10	-	-	(73)	3.3	22 (5G)
11	-	4	(74)	3.5	23 (5G)
12	-	-	(72)	3.6	25 (5G)
13	-	-	(92)	3.6	24 (1G)
14	-	4	(88)	3.6	26 (3G)
15	-	4	(92)	3.5	25 (1G)
16	-	4	85	3.2	26
17	-	-	52	3.1	25
18	-	-	38	1.7	26
19	-	-	36	2.3	25
20	-	-	19	+	27
21	-	-	19	+	27
22	-	-	18	+	28
23	-	-	11	+	28

G Signifies  $fEs < foE \geq 3.0$  Mc/s.

+ Indicates  $fEs$  median below lowest frequency recorded.

- Indicates zero percentage.

PROVISIONAL SUMMARY OF AURORAE FOR SEPTEMBER

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

MACQUARIE ISLAND

<u>Day</u>	<u>Cloud Cover</u>	<u>First Seen</u> h m	<u>Time of Maximum</u> h m	<u>Last Seen</u> h m	<u>Time End</u> h m	<u>Intensity</u>	<u>Remarks</u>
03	8	10 45	unknown	14 30	unknown	1	
04	8	11 15	11 15		18 30	4	Additional maximum at 18h 00m.
06	8	11 45	12 45		18 50	3	
07	8	10 00	11 00		13 50	3	Additional maximum at 13h 15m.
08	0	12 45	12 45		16 50	2	Additional maximum at 15h 00m.
09	0	10 00	11 15		17 00	2	Additional maximum at 16h 15m.
10	5	11 15	11 45		11 50	3	
12	7	14 15	unknown	17 20	unknown	2	
15	8	08 30	11 30	18 40*	unknown	3	* Dawn. Additional maximum at 15h 30m.
19	7	09 30	09 45		15 50	4	Additional maxima at 12h 30m, 15h 45m.
22	3	09 15	unknown		10 20	3	
23	3	11 30	11 50	13 30	unknown	2	Additional maximum at 13h 30m.
27	8	09 00	10 30	11 20	unknown	3	

HEARD ISLAND

<u>Day</u>	<u>Cloud Cover</u>	<u>First Seen</u> h m	<u>Time of Maximum</u> h m	<u>Last Seen</u> h m	<u>Time End</u> h m	<u>Intensity</u>	<u>Remarks</u>
05	6	00 05	00 20	00 40		3	