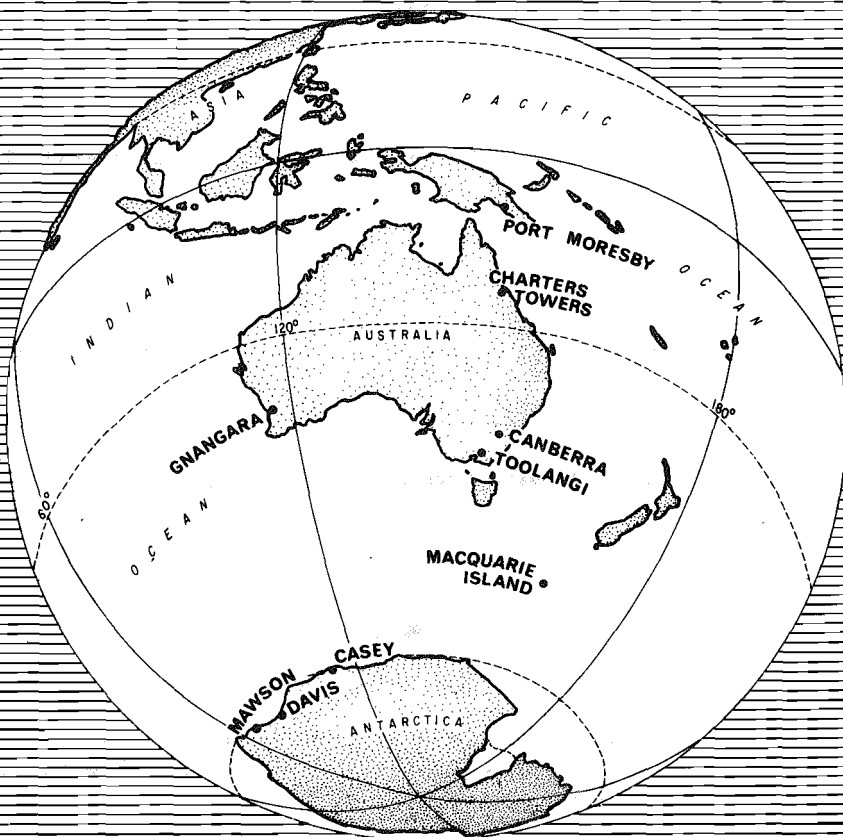




GEOFYSICAL OBSERVATORY REPORT



MAGNETIC OBSERVATORIES

BMR

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VOLUME 33 No. 12

DECEMBER 1985

MINERAL RESOURCES, GEOLOGY & GEOPHYSICS

DEPARTMENT OF RESOURCES AND ENERGY

Minister: Senator The Hon. Gareth Evans

SECRETARY: A J Woods

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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The observers at Casey and Davis are officers of the Antarctic Division (Department of Science and Technology) and their contributions are gratefully acknowledged: they and the BMR geophysicists of Macquarie Island and Mawson are members of the Australian National Antarctic Research Expeditions (ANARE).

The data from the Port Moresby geophysical observatory are contributed by the Geological Survey of Papua New Guinea.

The terminology used in this report is that accepted by IAGA. The units of field intensity, nanotesla (nT), are those of the SI system. All times are in Universal Time. Should further Information be required, apply to:

GEOMAGNETISM SECTION
BUREAU OF MINERAL RESOURCES
G.P.O. Box 378
CANBERRA A.C.T. 2601.

CONTRIBUTING OBSERVATORIES

OBSERVATORY	OBSERVER IN CHARGE	<u>GEOGRAPHIC</u>		<u>GEOMAGNETIC</u>	
		LAT	LONG	LAT	LONG
PORT MORESBY	I.D. Ripper	9 25'S	147 09'E	-18.2	219.6
CHARTERS TOWERS	J.M. Millican	20 05'S	146 15'E	-28.8	220.2
GNANGARA	P.J. Gregson	31 47'S	115 57'E	-42.9	187.8
CANBERRA	P.A. Hopgood	35 19'S	149 22'E	-43.5	226.4
MACQUARIE I	R. Lachal	54 30'S	158 57'E	-60.6	244.6
MAWSON	P.J. Kelsey	67 36'S	62 53'E	-73.3	105.9
DAVIS	R.G. McLoughlin	68 35'S	77 58'E	-76.9	123.5
CASEY	B. Martin	66 17'S	110 32'E	-77.5	182.4

MAGNETOGRAPHS

OBSERVATORY	CODE	TYPE	ELEMENT/SCALE-VALUE		
PORT MORESBY	PMG	La Cour (A)	H/3	D/5	Z/4
CHARTERS TOWERS	CTA	EDA/ELSEC digital (D1/1)			
GNANGARA	GNA	Eschenhagen (A)	H/3	D/7	Z/6
CANBERRA	CNB	Elsec digital (D1/0.1)			
MACQUARIE I	MCQ	Photo-electronic magnetometer (D1/0.1)			
MAWSON	MAW	Photo-electronic magnetometer (D1/0.1)			

Scale values are in nT/mm

A = analogue, 20 mm/hr

D1/0.1,1 = digital/1 min readings/0.1 or 1 nT resolution

MAGNETOMETERS

Absolute data are based on observations made with QHM's BMZ's, fluxgate-theodolites, declinometers and proton precession magnetometers.

Errors in preliminary values obtained from magnetograms are not likely to exceed 5 nT or 0.5 minutes.

The revised geomagnetic coordinates were derived using the 1980 DGRF geomagnetic north pole position: latitude = 78.80 N, longitude = 289.24 E.

NEW MAGNETIC OBSERVATORY AT LEARMONTH, NW AUSTRALIA

A new magnetic observatory is scheduled to come into operation in 1986 at Learmonth on North-West Cape, Western Australia, overlooking Exmouth Gulf. The geographic co-ordinates are latitude $22^{\circ}13'$ south, longitude $114^{\circ}6'$ east. The 3-letter code for the observatory is LRM.

The new observatory is a joint project between the Bureau of Mineral Resources, Geology and Geophysics (BMR) of the Australian Department of Resources and Energy, and the Ionospheric Prediction Service (IPS) of the Australian Department of Science.

The observatory will be situated within the area of the Learmonth Solar Observatory which is jointly operated by the Australian Department of Science and the United States Air Force.

An EDA 3-axis fluxgate magnetometer will be used to measure variations in X, Y and Z which will be recorded digitally each minute. Absolute observations of D, I and F will be performed semi-weekly using a fluxgate theodolite and a proton precession magnetometer.

The data will be reduced by the BMR and published in the Geophysical Observatory Report.

PORT MORESBY

MAGNETIC K-INDICES - DECEMBER 1985

Range for lower limit of K = 9 is 300 nT.

<u>DAY</u>	<u>K-INDICES</u>								<u>K-SUM</u>
01	1	1	2	3	3	2	2	3	17
02	2	2	3	1	2	2	2	2	16
03	1	1	2	2	3	3	2	1	15
04	1	1	2	3	3	3	3	1	17
05	1	1	1	3	2	2	1	2	13
06	2	2	2	1	3	1	1	2	14
07	2	2	2	2	2	1	2	1	14
08	0	1	2	2	2	2	2	1	12
09	2	2	0	0	1	1	3	2	11
10	4	3	4	4	5	4	3	4	31
11	4	3	2	1	2	2	2	2	18
12	1	2	2	1	2	2	2	4	16
13	4	3	3	6	4	3	3	4	30
14	3	2	3	2	2	2	2	4	20
15	3	2	3	1	1	1	2	3	16
16	2	2	3	1	2	2	1	3	16
17	2	3	2	2	3	2	2	2	18
18	2	2	5	3	3	3	2	2	22
19	3	3	4	6	4	3	4	4	31
20	4	4	4	4	2	1	1	2	22
21	2	3	2	2	0	1	0	1	11
22	2	3	2	2	2	2	2	1	16
23	1	1	3	2	1	1	1	2	12
24	3	3	4	3	2	1	2	1	19
25	3	2	2	2	1	1	1	2	14
26	3	1	1	2	1	1	1	1	11
27	2	2	3	2	1	2	3	3	18
28	3	5	4	4	4	3	3	2	28
29	2	2	1	1	0	1	1	2	10
30	3	3	4	3	3	4	3	3	26
31	2	2	2	3	4	3	3	3	22

Mean of K-Sum is 17.9

Frequency of K-indices

K :	0	1	2	3	4	5	6	7	8	9	-
f :	6	56	96	59	26	3	2	0	0	0	0

GNANGARA

MAGNETIC K-INDICES - DECEMBER 1985

Range for lower limit of K = 9 is 450 nT.

<u>DAY</u>	<u>K-INDICES</u>								<u>K-SUM</u>
01	2	2	2	2	3	3	4	3	21
02	2	1	3	1	3	2	3	2	17
03	1	2	2	2	2	3	1	1	14
04	1	1	2	3	2	2	4	2	17
05	3	1	1	2	2	2	2	2	15
06	2	0	2	2	2	1	1	2	12
07	2	2	2	1	1	2	3	1	14
08	2	0	1	0	1	2	1	0	07
09	2	2	0	0	1	1	2	3	11
10	2	2	3	4	4	3	3	3	24
11	4	1	2	1	3	2	2	2	17
12	1	1	0	1	1	2	2	3	11
13	3	3	3	5	5	5	3	3	30
14	3	2	2	1	3	2	2	3	18
15	3	1	1	1	1	2	2	3	14
16	2	2	1	1	1	1	1	2	11
17	2	2	1	2	2	2	1	1	13
18	1	1	4	3	4	3	2	2	20
19	3	2	4	6	5	5	4	4	33
20	4	2	2	3	3	2	1	1	18
21	1	1	1	1	0	0	1	2	07
22	2	2	2	2	1	2	2	1	14
23	1	1	3	1	2	0	2	2	12
24	3	2	3	2	3	2	1	1	17
25	2	1	2	1	2	2	2	3	15
26	3	2	1	3	2	1	1	1	14
27	2	1	2	2	2	2	4	3	18
28	4	4	4	4	5	5	4	2	32
29	2	2	2	2	0	1	2	3	14
30	5	4	5	5	4	5	3	3	34
31	2	2	2	2	4	4	3	3	22

Mean of K-Sum is 17.2

Frequency of K-indices

K :	0	1	2	3	4	5	6	7	8	9	-
f :	11	62	97	45	21	11	1	0	0	0	0

CANBERRA

MAGNETIC K-INDICES - DECEMBER 1985

Range for lower limit of K = 9 is 450 nT.

<u>DAY</u>	<u>K-INDICES</u>								<u>K-SUM</u>
01	1	1	1	2	2	2	3	3	15
02	1	1	3	1	3	2	2	2	15
03	2	2	2	2	2	2	1	0	13
04	1	2	2	3	2	3	2	1	16
05	2	2	2	3	2	2	1	1	15
06	2	2	2	2	2	1	1	1	13
07	1	3	2	2	1	1	1	0	11
08	1	1	2	2	1	1	0	0	08
09	1	2	0	0	1	1	2	1	08
10	2	2	3	4	4	2	2	2	21
11	3	2	2	1	1	1	1	1	12
12	1	1	0	0	1	1	1	3	08
13	3	3	3	5	4	4	2	2	26
14	2	2	2	2	2	2	2	3	17
15	2	2	1	0	0	1	1	2	09
16	1	2	3	0	1	1	0	2	10
17	2	2	1	1	2	2	1	1	12
18	1	1	4	3	4	2	2	1	18
19	3	2	5	5	4	4	4	4	31
20	3	3	3	3	1	0	0	0	13
21	1	1	1	1	0	0	0	0	04
22	1	3	3	1	2	1	1	1	13
23	1	1	3	1	1	1	1	1	10
24	2	3	3	2	3	2	1	0	16
25	1	1	2	1	1	1	1	2	10
26	2	2	1	2	1	1	1	1	11
27	2	2	3	2	2	2	3	3	19
28	3	4	4	3	4	3	3	2	26
29	2	2	1	0	0	0	1	2	08
30	3	3	4	4	3	5	3	3	28
31	2	2	3	2	4	4	3	2	22

Mean of K-Sum is 14.7

Frequency of K-indices

K :	0	1	2	3	4	5	6	7	8	9	-
f :	23	80	82	42	17	4	0	0	0	0	0

MAWSON

MAGNETIC K-INDICES - DECEMBER 1985
Range for lower limit of K = 9 is 1500 nT.

<u>DAY</u>	<u>K-INDICES</u>								<u>K-SUM</u>
01	3	5	3	3	4	3	5	6	32
02	5	5	5	3	3	3	6	4	34
03	3	4	3	3	2	3	4	4	26
04	3	4	3	3	4	5	6	5	33
05	4	5	3	3	4	3	3	4	29
06	3	3	3	3	3	3	3	3	24
07	3	3	2	3	2	3	6	4	26
08	2	2	2	2	2	2	3	3	18
09	5	4	2	1	2	2	3	3	22
10	5	5	5	5	6	4	4	5	39
11	5	4	5	3	3	3	4	5	32
12	3	3	-	-	-	-	-	-	--
12	-	-	2	1	2	3	4	4	--
13	6	5	4	6	6	5	3	6	41
14	5	4	4	3	4	3	3	6	32
15	5	5	3	3	2	3	4	6	31
16	5	3	2	2	2	1	5	4	24
17	5	3	3	2	2	2	2	4	24
18	3	3	3	4	5	3	2	5	28
19	5	7	7	6	4	5	6	4	44
20	4	4	4	3	3	2	2	3	25
21	5	5	3	2	1	2	3	4	25
22	3	5	4	-	-	2	3	3	--
23	3	2	3	2	2	2	4	4	22
24	4	4	5	3	3	2	2	2	25
25	2	3	3	2	2	3	2	6	23
26	5	6	3	3	3	2	2	1	25
27	4	5	3	2	2	2	5	5	28
28	4	7	4	5	6	5	6	4	41
29	4	5	4	3	3	1	2	3	25
30	5	-	-	-	-	-	-	-	--
31	-	-	5	4	5	5	5	5	--

Mean of K-Sum is 28.5

Frequency of K-indices											
K :	0	1	2	3	4	5	6	7	8	9	-
f :	0	6	44	77	44	46	17	3	0	0	11

SEE AMENDMENT PAGE 10

MAWSON K-INDICES

K-Indices up to and including the first two 3-hour periods on Day 12 are from H and D K-index respectively.

After those periods the K-indices obtained are from X and Y K-index.

Hence forth all future K-indices will be derived from the X and Y components.

DECEMBER 1985
PRINCIPAL MAGNETIC STORMS

OBSERVATORY	COMMENCEMENT				SSC AMPLITUDES			MAX 3h K-INDEX		RANGES				UT END	
	d	h	min	TYPE	D(')	H(nT)	Z(nT)	d (3h-PERIOD)	K	D(')	H(nT)	Z(nT)		d	h
Port Moresby	12	21	17	ssc*	-1.4*	+19	+16	13 (4)	6	6	150	60		14	00
	18	06	45	ssc	+0.9	+31	+31	19 (4)	6	8	150	80		20	13
Charters Towers	12	21	19	ssc*	-1.9*	+ 9	..	13 (4)	6	8,3	124	27		13	24
	18	06	47	ssc	+1,0	+38	-6	19 (4)	6	10,6	144	33		20	12
	29	23	..	...	..	..	..	30 (1,3,6)	5	12,4	73	34		30	21
Gnangara	12	21	..	...	..	..	..	13 (4,5,6)	6	18	140	130		14	03
	18	06	47	ssc	+4,0	+33	+25	19 (4)	6	19	120	160		20	05
	30	00	..	...	..	..	..	30 (1,3,4,6)	5	20	100	90		30	23
Canberra	12	21	..	...	..	..		13 (4)	5	18,3	107	31		13	24
	18	06	46	ssc	+1,0	+51	+7	19 (3,4)	5	16,5	139	59		20	12

DECEMBER 1985
PRELIMINARY MONTHLY MEAN VALUES

OBSERVATORY	H nT	D deg min	Z nT	F nT
PORT MORESBY	35934	06° 34.3'E	-23718	43056
CHARTERS TOWERS	31781	07° 43.7'E	-38271	49746
GNANGARA	23257	03° 16.6'W	-53788	58601
CANBERRA	23709	12° 21.2'E	-53720	58720
MACQUARIE I	12618	29° 13 'E	-63584	64824
MAWSON	18475	63° 41.6'W	-46307	49856
DAVIS		NOT AVAILABLE		
CASEY	9740	89° 48 'W	-64055	64791

The values are derived from magnetograms for selected quiet days except at Davis and Casey where they are derived from semi-weekly absolute measurements.

SUDDEN COMMENCEMENTS AND OTHER RAPID VARIATIONS

OBSERVATORY	DAY	TYPE AND QUALITY	TIME	SENSE AND AMPLITUDE OF CHIEF MOVEMENT		
				H(nT)	D(nT)	Z(nT)
PORT MORESBY	12	ssc*B	21 17	+19	-15*	+16
	18	ssc A	06 45	+31	+ 9	+31
CHARTERS TOWERS	09	ssc*B	20 30	- 8	+14*	-
	12	ssc*B	21 19	+ 9	-18*	-
	18	ssc B	06 47	+38	+ 9	-6
GNANGARA	09	ssc*B	20 31	- 9	-17*	-11*
	18	ssc B	06 47	+33	+27	+25
CANBERRA	18	ssc B	06 46	+51	+ 7	+ 7

PRELIMINARY MONTHLY VALUES FOR 1985

OBSERVATORY	H	D		Z	F
	nT	deg	min	nT	nT
Port Moresby					
January	35942	06	33.6E	-23714	43060
February	35942	06	34.1E	-23716	43061
March	35950	06	34.0E	-23712	43066
April	35942	06	34.1E	-23715	43061
May	35953	06	34.3E	-23713	43069
June	35946	06	34.1E	-23713	43063
July	35932	06	34.3E	-23712	43051
August	35934	06	34.1E	-23713	43053
September	35938	06	34.3E	-23715	43057
October	35937	06	34.3E	-23715	43057
November	35940	06	34.5E	-23717	43060
December	35934	06	34.3E	-23718	43056
MEAN	35941	06	34.2E	-23714	43060

Charters Towers

January	31791	07	42.3E	-38278	49758
February	31785	07	42.8E	-38276	49753
March	31789	07	43.0E	-38273	49753
April	31787	07	42.8E	-38273	49752
May	31790	07	43.1E	-38273	49754
June	31785	07	43.0E	-38274	49752
July	31783	07	43.2E	-38273	49749
August	31788	07	43.2E	-38272	49751
September	31788	07	43.7E	-38272	49752
October	31788	07	43.8E	-38273	49752
November	31792	07	43.7E	-38274	49755
December	31781	07	43.7E	-38271	49746
MEAN	31787	07	43.2E	-38274	49752

PRELIMINARY MONTHLY VALUES FOR 1985

OBSERVATORY	H nT	D deg min	Z nT	F nT
Gnangara				
January	23268	03 19.1W	-53767	58586
February	23261	03 18.5W	-53763	58579
March	23262	03 18.7W	-53761	58578
April	23264	03 18.4W	-53769	58586
May	23261	03 18.0W	-53770	58586
June	23258	03 17.8W	-53772	58586
July	23247	03 17.5W	-53771	58581
August	23257	03 17.9W	-53772	58586
September	23254	03 17.5W	-53778	58590
October	23250	03 17.3W	-53779	58590
November	23258	03 17.4W	-53777	58591
December	23257	03 16.6W	-53788	58601
MEAN	23258	03 17.9W	-53772	58587
Canberra				
January	23718	12 19.0E	-53735	58736
February	23713	12 19.7E	-53732	58731
March	23711	12 19.8E	-53728	58728
April	23713	12 19.8E	-53725	58725
May	23715	12 20.2E	-53726	58727
June	23712	12 20.2E	-53725	58726
July	23707	12 20.8E	-53726	58724
August	23710	12 20.8E	-53723	58722
September	23708	12 21.2E	-53724	58722
October	23709	12 21.3E	-53721	58720
November	23716	12 20.9E	-53715	58718
December	23709	12 21.2E	-53720	58720
MEAN	23712	12 20.4E	-53725	58725

PRELIMINARY MONTHLY VALUES FOR 1985

OBSERVATORY	H	D		Z	F
	nT	deg	min	nT	nT
Macquarie Island					
January	12653	29	10E	-63635	64881
February	12647	29	11E	-63650	64894
March	12646	29	13E	-63632	64876
April	12645	29	13E	-63652	64896
May	12613	29	11E	-63633	64871
June	12612	29	10E	-63619	64857
July	12619	29	11E	-63616	64855
August	12584	29	15E	-63607	64840
September	12606	29	10E	-63602	64839
October	12604	29	11E	-63598	64835
November	12590	29	12E	-63596	64830
December	12618	29	13E	-63584	64824
MEAN*	12608	29	12E	-63619	64856
Mawson					
January	18466	63	35.0W	-46368	49910
February	18452	63	38.4W	-46372	49908
March	18456	63	38.6W	-46367	49905
April	18450	63	40.1W	-46362	49898
May	18439	63	39.9W	-46352	49885
June	18439	63	40.0W	-46339	49879
July	18457	63	40.0W	-46336	49877
August	18447	63	41.6W	-46339	49876
September	18460	63	41.9W	-46331	49873
October	18460	63	42.7W	-46319	49862
November	18466	63	42.7W	-46317	49862
December	18475	63	41.6W	-46307	49856
MEAN	18457	63	40.2W	-46342	49882

PRELIMINARY MONTHLY VALUES FOR 1985

OBSERVATORY	H nT	D deg min	Z nT	F nT
Davis				
January	16586	76 41W	-52233	54803
February	16598	76 46W	-52324	54893
March	16622	76 45W	-52291	54869
April	16634	76 42W	-52266	54849
May	16618	76 36W	-52228	54808
June	16602	76 39W	-52246	54820
July	16635	76 36W	-52250	54834
August	16639	76 40W	-52244	54830
September	16626	76 41W	-52237	54819
October	16632	76 41W	-52271	54853
November	16620	76 38W	-52221	54802
December	NOT AVAILABLE			
MEAN*	16620	76 40W	-52260	54839
Casey				
January	9675	90 51W	-63988	64715
February	9624	90 52W	-64085	64804
March	9647	90 47W	-64075	64797
April	9627	90 47W	-64097	64816
May	9618	90 44W	-64066	64784
June	9641	90 49W	-64069	64790
July	9645	90 57W	-64061	64783
August	9674	90 50W	-64050	64776
September	9651	90 46W	-64070	64793
October	9686	90 42W	-64057	64785
November	9649	90 28W	-64066	64789
December	9740	89 48W	-64055	64791
MEAN*	9650	90 50W	-64067	64790

* The annual means for Casey, Davis and Macquarie Island were obtained graphically from the periodic observations; they are better estimates than the arithmetic means.

PRELIMINARY ANNUAL MEAN VALUES OF THE MAGNETIC ELEMENTS 1985

	D	I	H	X	Y	Z	F
	Deg Min	Deg Min	nT	nT	nT	nT	nT
Port Moresby *	06 34.2E	-33 25.0	35941	35705	4112	-23714	43060
Charters Towers	07 43.2E	-50 17.4	31787	31499	4270	-38274	49752
Gnangara	03 17.9W	-66 36.5	23258	23219	-1338	-53772	58587
Canberra	12 20.4E	-66 11.2	23712	23164	5068	-53725	58725
Macquarie Island**	29 12.0E	-78 47.5	12608	11006	6151	-63619	64856
Mawson	63 40.2W	-68 00.1	18457	8186	-16542	-46342	49882
Davis**	76 40.0W	-72 21.5	16620	3833	-16172	-52260	54839
Casey**	90 50.0W	-81 25.9	9650	-140	-9649	-64067	64790

* Port Moresby Results were provided by the PNG Geological Survey.

** The annual means for Casey, Davis and Macquarie Island were obtained graphically from the periodic observations; they are better estimates than the arithmetic means.

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