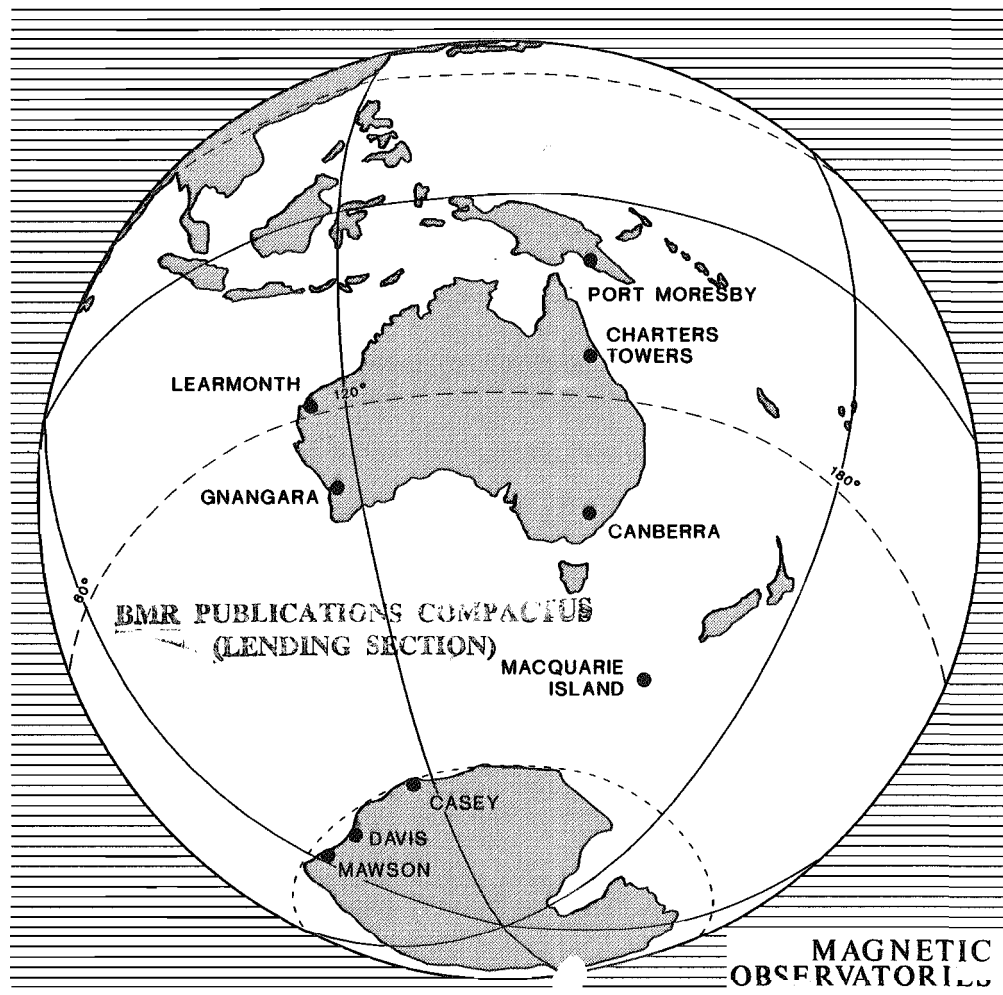




AUSTRALIAN GEOMAGNETISM REPORT



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BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS

DEPARTMENT OF PRIMARY INDUSTRIES AND ENERGY

Minister for Resources:

The Hon. Alan Griffiths MP

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The observers at Casey, Davis and Macquarie Island are officers of the Antarctic Division, The Department of the Arts, Sport, the Environment and Territories. The Division's logistic support and the Observers contributions are gratefully acknowledged. These observers and the Bureau of Mineral Resources' (BMR) geophysicist at Mawson are members of the Australian National Antarctic Research Expeditions (ANARE).

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 the International Association of Geomagnetism and Aeronomy (IAGA). The unit of field intensity is the nanoTesla (nT). All times are in Universal Time (UT).

CONTRIBUTING OBSERVATORIES

OBSERVATORY	OBSERVER IN CHARGE	GEOGRAPHIC		GEOMAGNETIC	
		LAT.	LONG.	LAT.	LONG.
PORT MORESBY	I.D.Ripper	9° 25'S	147° 09'E	-18.1°	219.8°
CHARTERS TOWERS	J.M.Millican	20° 05'S	146° 15'E	-28.7°	220.3°
LEARMONTH	M.W.McMullan	22° 13'S	114° 06'E	-33.2°	185.5°
GNANGARA	P.J.Gregson	31° 47'S	115° 57'E	-42.7°	188.0°
CANBERRA	P.A.Hopgood	35° 19'S	149° 22'E	-43.3°	226.6°
MACQUARIE IS.	P.Crosthwaite	54° 30'S	158° 57'E	-60.4°	244.7°
MAWSON	M.A.DeDeuge	67° 36'S	62° 53'E	-73.2°	106.3°
DAVIS	L. Symons	68° 35'S	77° 58'E	-76.8°	124.0°
CASEY	P.Roberts	66° 17'S	110° 32'E	-77.3°	182.7°

* Geomagnetic co-ordinates based on the 1980 DGRF Geomagnetic North pole position of 78.8°N, 70.9°W

MAGNETOGRAPHS

OBSERVATORY	CODE	MODEL (TYPE/RES.)	ELEMENT/SCALE-VALUE			
PORT MORESBY	PMG	La Cour (A)	H/3	D/5	Z/4	
CHARTERS TOWERS	CTA	EDA/Elsec (D/1)	X	Y	Z	
LEARMONTH	LRM	EDA/Elsec (D/1)	X	Y	Z	
GNANGARA	GNA	Elsec (D/.1)	D	I	F	
CANBERRA	CNB	Elsec (D/.1)	D	I	F	
MACQUARIE IS.	MCQ	PEM (D/.1)	X	Y	Z	
MAWSON	MAW	PEM (D/.1)	X	Y	Z	

A = analogue, 20mm/hr, scale values in nT/mm
D/1 = digital, 1 minute readings, 1 nT resolution
D/.1 = digital, 1 minute readings, 0.1 nT resolution
PEM = BMR Photo-electronic magnetograph

MAGNETOMETERS

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

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

PORT MORESBY

MAGNETIC K-INDICES - DECEMBER 1991

Range for lower limit of K=9 is 300nT

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

Mean of K-Sum is 19.9

Frequency of K-Indices

K :	0	1	2	3	4	5	6	7	8	9	-
f :	0	36	97	80	29	6	0	0	0	0	0

GNANGARA

MAGNETIC K-INDICES - DECEMBER 1991

Range for lower limit of K=9 is 450nT

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

Mean of K-Sum is 20.7

Frequency of K-Indices

K :	0	1	2	3	4	5	6	7	8	9	-
f :	3	37	74	87	40	7	0	0	0	0	0

CANBERRA

MAGNETIC K-INDICES - DECEMBER 1991

Range for lower limit of K=9 is 450nT

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

Mean of K-Sum is 20.2

Frequency of K-Indices

K :	0	1	2	3	4	5	6	7	8	9	-
f :	4	36	81	81	34	7	0	0	0	0	5

MAWSON

MAGNETIC K-INDICES - DECEMBER 1991

Range for lower limit of K=9 is 1500nT

DAY	K-INDICES								K-SUM
01	5	4	4	3	3	3	5	5	32
02	5	4	4	5	5	4	4	4	35
03	4	6	4	4	4	5	5	6	38
04	6	6	5	3	4	4	5	4	37
05	4	5	5	3	3	3	5	3	31
06	4	4	3	3	3	2	2	5	26
07	4	5	4	3	2	2	3	4	27
08	3	5	4	3	5	5	1	3	29
09	4	3	3	3	3	3	3	4	26
10	5	4	5	4	4	5	5	4	36
11	4	4	4	3	4	4	6	6	35
12	4	5	4	4	3	4	5	4	33
13	4	5	5	5	4	5	5	4	37
14	3	6	6	4	4	6	6	5	40
15	4	5	5	3	3	2	3	2	27
16	3	4	5	5	6	6	7	5	41
17	6	6	6	5	5	4	6	5	43
18	4	5	6	5	3	3	2	2	30
19	3	4	4	5	6	4	5	3	34
20	4	6	5	3	5	5	4	3	35
21	5	6	5	5	5	5	4	5	40
22	3	5	3	3	2	2	1	4	23
23	5	5	5	5	4	4	4	5	37
24	5	6	4	4	3	3	3	3	31
25	4	3	4	4	4	3	3	5	30
26	5	5	4	2	2	3	3	4	28
27	5	6	5	6	4	6	6	6	44
28	4	4	3	5	5	5	6	5	37
29	5	7	7	4	4	5	7	6	45
30	4	5	4	2	4	4	3	4	30
31	3	4	4	4	3	4	4	5	31

Mean of K-Sum is 33.8

Frequency of K-Indices

K :	0	1	2	3	4	5	6	7	8	9	-
f :	0	2	13	51	79	71	28	4	0	0	0

PRINCIPAL MAGNETIC STORMS - DECEMBER 1991

OBSERVATORY	Commencement		SSC-amplitude			Max. 3hr K-index		Ranges			UT End
	Day Hr Min	Type	D(')	H(nT)	Z(nT)	Day (3hr-period)	K	D(')	H(nT)	Z(nT)	Day Hr
Port Moresby	26 22 ..	...	..	..	..	27(1,8);28(8); 29(1,2,7)	5	10	150	90	30 16
Gnangara	Nil		Magnetic			Storms		reported			
Canberra	26 16 ..	...	..	..	..	27(4,6)	5	16.6	120	51	28 00
	28 11 ..	...	..	..	..	28(7,8);29(2,7)	5	18.8	145	59	30 09

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PRELIMINARY MONTHLY MEAN VALUES

OBSERVATORY	H	D		Z	F
	nT	deg	min	nT	nT
PORT MORESBY	35926	06°	35.5' E	-23693	43035
CHARTERS TOWERS	31752	07°	46.9' E	-38237	49702
LEARMONTH	29538	00°	25.6' W	-44416	53341
GNANGARA	23193	02°	58.1' W	-53796	58583
CANBERRA	23654	12°	31.4' E	-53636	58621
MACQUARIE IS.	12593	29°	48.1' E	-63467	64703
MAWSON	18519	64°	31.0' W	-45939	49531
DAVIS	16692	78°	03.1' W	-51904	54522
CASEY	9635	91°	49.9' W	-63837	64560

The values are derived from magnetograms over the Quietest 5 International Days, except at Mawson, Davis and Casey, where the locally quietest days are used.

INTERNATIONAL QUIET AND DISTURBED DAYS

Quietest days (1- 5): 06 07 22 15 25
Quietest days (6-10): 08 26 05 31 09
Most Disturbed days : 17 27 29 21 28

SUDDEN STORM COMMENCEMENTS (ssc): DECEMBER 1991

Observatory	Day	Type and Quality	U.T.	Sense and Amplitude of Chief Movement		
				H(nT)	D(nT)	Z(nT)
PORT MORESBY	Nil	ssc's	observed			
GNANGARA	Nil	ssc's	observed			
CANBERRA	Nil	ssc's	observed			

SOLAR FLARE EFFECTS (sfe): DECEMBER 1991

Observatory	----- U.T. of sfe -----				Con- fir- med.	Sense & Amplitude		
	Day	Began	Max.	Ended		H(nT)	D(nT)	Z(nT)
PORT MORESBY	30	2305	2309	2315		+6	0	+4
GNANGARA					Nil	sfe's reported		
CANBERRA					Nil	sfe's reported		

Preliminary Monthly Mean Values for 1991

PORT MORESBY 1991	H (nT)	D deg min	Z (nT)	F (nT)	I deg min
January	35929	06 35.4	-23701	43042	-33 24.7
February	35928	06 35.7	-23699	43040	-33 24.6
March	35915	06 35.7	-23698	43029	-33 25.1
April	35928	06 36.1	-23699	43040	-33 24.6
May	35917	06 35.8	-23697	43030	-33 24.9
June	35892	06 36.2	-23702	43012	-33 26.4
July	35918	06 35.5	-23696	43030	-33 24.8
August	35901	06 35.8	-23693	43014	-33 25.4
September	35921	06 35.9	-23689	43029	-33 24.2
October	35913	06 35.7	-23692	43024	-33 24.8
November	35909	06 35.5	-23695	43022	-33 25.2
December	35926	06 35.5	-23693	43035	-33 24.3
Annual Means	35916	06 35.7	-23696	43029	-33 24.9

CHARTERS TOWERS 1991	H (nT)	D deg min	Z (nT)	F (nT)	I deg min
January	31753	07 46.7	-38246	49709	-50 18.0
February	31745	07 46.8	-38242	49702	-50 18.2
March	31730	07 47.5	-38248	49696	-50 19.3
April	31739	07 47.6	-38244	49699	-50 18.6
May	31731	07 47.8	-38245	49694	-50 19.1
June	31712	07 47.3	-38252	49688	-50 20.5
July	31738	07 47.1	-38242	49697	-50 18.6
August	31722	07 47.6	-38247	49690	-50 19.7
September	31742	07 47.5	-38238	49696	-50 18.2
October	31749	07 47.3	-38239	49702	-50 17.9
November	31732	07 47.1	-38245	49695	-50 19.0
December	31752	07 46.9	-38237	49702	-50 17.7
Annual Means	31737	07 47.3	-38244	49697	-50 18.7

LEARMONTH 1991	H (nT)	D deg min	Z (nT)	F (nT)	I deg min
January	29538	-00 26.9	-44424	53348	-56 22.8
February	29529	-00 26.9	-44424	53343	-56 23.3
March	29517	-00 27.3	-44426	53338	-56 24.0
April	29527	-00 26.7	-44419	53338	-56 23.2
May	29518	-00 26.5	-44418	53332	-56 23.7
June	29500	-00 26.3	-44428	53330	-56 24.9
July	29526	-00 26.1	-44422	53339	-56 23.4
August	29512	-00 26.2	-44427	53336	-56 24.3
September	29535	-00 25.6	-44417	53340	-56 22.7
October	29543	-00 25.1	-44421	53348	-56 22.4
November	29527	-00 25.5	-44428	53345	-56 23.5
December	29547	-00 25.6	-44420	53349	-56 22.2
Annual Means	29526	-00 26.2	-44423	53341	-56 23.4

Preliminary Monthly Mean Values for 1991

GNANGARA 1991	H (nT)	D deg min	Z (nT)	F (nT)	I deg min
January	23213	-03 03.0	-53787	58582	-66 39.4
February	23203	-03 03.2	-53785	58576	-66 39.9
March	23185	-03 02.7	-53787	58571	-66 40.9
April	23193	-03 02.1	-53785	58572	-66 40.4
May	23193	-03 02.0	-53786	58573	-66 40.4
June	23176	-03 01.9	-53795	58575	-66 41.6
July	23193	-03 01.9	-53789	58576	-66 40.5
August	23179	-03 01.9	-53790	58572	-66 41.3
September	23203	-03 01.5	-53783	58575	-66 39.8
October	23206	-03 01.3	-53782	58575	-66 39.4
November	23186	-03 01.0	-53793	58577	-66 41.0
December	23202	-03 01.0	-53784	58575	-66 39.9
Annual Means	23194	-03 02.0	-53787	58575	-66 40.4

CANBERRA 1991	H (nT)	D deg min	Z (nT)	F (nT)	I deg min
January	23660	12 30.3	-53647	58633	-66 12.0
February	23655	12 30.8	-53644	58627	-66 12.3
March	23638	12 31.4	-53650	58626	-66 13.3
April	23644	12 31.7	-53647	58626	-66 12.9
May	23643	12 31.6	-53647	58626	-66 13.0
June	23627	12 31.7	-53656	58628	-66 14.0
July	23644	12 31.7	-53644	58624	-66 12.8
August	23631	12 32.1	-53650	58624	-66 13.7
September	23653	12 31.8	-53640	58624	-66 12.3
October	23653	12 31.8	-53639	58623	-66 12.2
November	23637	12 31.6	-53648	58625	-66 13.3
December	23654	12 31.4	-53636	58621	-66 12.1
Annual Means	23645	12 31.5	-53646	58626	-66 12.8

MACQUARIE IS. 1991	H (nT)	D deg min	Z (nT)	F (nT)	I deg min
January	12593	29 45.0	-63486	64686	-78 46.8
February	12583	29 45.5	-63492	64726	-78 47.4
March	12582	29 45.7	-63501	64735	-78 47.6
April	12580	29 47.6	-63492	64726	-78 47.6
May	12576	29 47.7	-63497	64730	-78 47.8
June	12573	29 47.8	-63511	64744	-78 48.1
July	12566	29 47.9	-63498	64729	-78 48.3
August	12570	29 49.4	-63505	64737	-78 48.3
September	12574	29 48.8	-63494	64727	-78 47.9
October	12577	29 48.8	-63465	64699	-78 47.4
November	12573	29 48.8	-63481	64714	-78 47.8
December	12593	29 48.1	-63467	64703	-78 46.6
Annual Means	12578	29 47.6	-63491	64721	-78 47.6

Preliminary Monthly Mean Values for 1991

MAWSON 1991	H (nT)	D deg min	Z (nT)	F (nT)	I deg min
January	18510	-64 23.3	-45973	49559	-68 04.1
February	18497	-64 25.3	-45971	49553	-68 04.9
March	18491	-64 27.3	-45971	49551	-68 05.3
April	18499	-64 28.5	-45958	49541	-68 04.5
May	18504	-64 28.4	-45951	49537	-68 04.0
June	18495	-64 30.2	-45972	49553	-68 05.0
July	18495	-64 30.0	-45956	49538	-68 04.6
August	18489	-64 30.1	-45956	49536	-68 05.0
September	18501	-64 30.3	-45948	49533	-68 04.1
October	18504	-64 30.2	-45954	49539	-68 04.1
November	18517	-64 30.4	-45940	49531	-68 02.8
December	18519	-64 31.0	-45939	49531	-68 02.6
Annual Means	18502	-64 28.8	-45957	49542	-68 04.3

DAVIS 1991	H (nT)	D deg min	Z (nT)	F (nT)	I deg min
January	16670	-77 28.3	-51960	54569	-72 12.8
February	16667	-77 26.8	-51959	54567	-72 12.9
March	16674	-77 26.7	-51950	54560	-72 12.3
April	16681	-77 13.4	-51940	54553	-72 11.7
May	16691	-77 48.8	-51927	54544	-72 10.9
June	16687	-77 51.8	-51942	54557	-72 11.4
July	16692	-77 50.6	-51927	54544	-72 10.8
August	16676	-77 54.7	-51914	54526	-72 11.5
September	16697	-77 52.9	-51907	54526	-72 10.1
October	16702	-77 55.3	-51908	54529	-72 09.8
November	16690	-78 00.2	-51898	54515	-72 10.4
December	16692	-78 03.1	-51904	54522	-72 10.3
Annual Means	16685	-77 44.4	-51928	54543	-72 11.2

CASEY 1991	H (nT)	D deg min	Z (nT)	F (nT)	I deg min
January	9656	-91 38.7	-63885	64611	-81 24.3
February	9649	-91 56.6	-63885	64610	-81 24.7
March	9662	-92 07.0	-63884	64611	-81 24.0
April	9649	-92 09.2	-63908	64632	-81 24.8
May	9651	-92 05.9	-63901	64626	-81 24.7
June	9625	-92 12.1	-63906	64627	-81 26.1
July	9625	-92 09.0	-63891	64612	-81 26.0
August	9635	-92 05.5	-63886	64608	-81 25.4
September	9636	-92 00.5	-63868	64591	-81 25.2
October	9649	-91 53.3	-63853	64578	-81 24.4
November	9626	-92 06.5	-63871	64593	-81 25.8
December	9635	-91 49.9	-63837	64560	-81 25.0
Annual Means	9642	-92 01.2	-63881	64605	-81 25.0

Preliminary Annual Mean Values of the Magnetic Field Elements - 1991

OBSERVATORY	D Deg Min	I Deg Min	H (nT)	X (nT)	Y (nT)	Z (nT)	F (nT)
Port Moresby #	06 35.7 E	-33 24.9	35916	35679	4125	-23696	43029
Charters Towers	07 47.3 E	-50 18.7	31737	31444	4300	-38244	49697
Learmonth	00 26.2 W	-56 23.4	29526	29526	-225	-44423	53341
Gnangara	03 02.0 W	-66 40.4	23194	23162	-1227	-53787	58575
Canberra	12 31.5 E	-66 12.8	23645	23082	5128	-53646	58626
Macquarie Island	29 47.6 E	-78 47.6	12578	10916	6250	-63491	64721
Mawson *	64 28.8 W	-68 04.3	18502	7971	-16670	-45957	49542
Davis *	77 44.4 W	-72 11.2	16685	3543	-16304	-51928	54543
Casey *	92 01.2 W	-81 25.0	9642	-340	-9635	-63881	64605

Port Moresby results were provided by the PNG Geological Survey

* From January 1991 both Casey and Davis magnetic means were calculated using data from Antarctic Division's fluxgate variometers. The variometers are calibrated using bimonthly absolute magnetic measurements carried out by Antarctic Divisions Personnel. Means for Davis and Casey are calculated by the Mawson observer, using the five local quietest days at Mawson.

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