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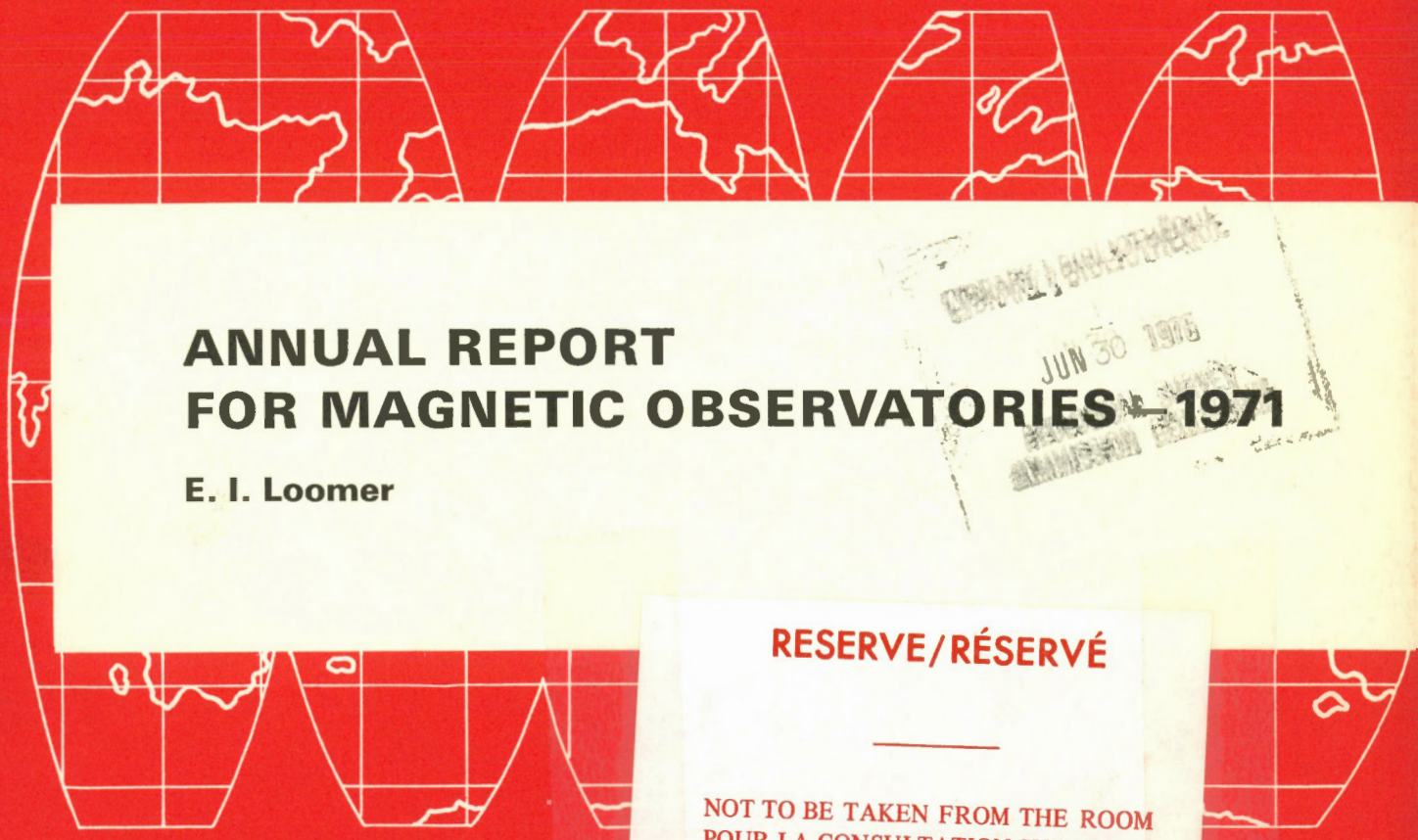

ANNUAL REPORT FOR MAGNETIC OBSERVATORIES — 1971

E. I. Loomer

Geomagnetic Series Number 4
Ottawa, Canada 1976

Energy, Mines and Resources Canada
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1 Observatory Crescent
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ANNUAL REPORT FOR MAGNETIC OBSERVATORIES — 1971

E. I. Loomer

As of 1970 yearbooks are no longer published for each of the Canadian observatories: one report only will be published for each year.

The report is in two sections. An introductory section gives coordinates of the observatories and a general description of the instrumentation and methods of data reduction and distribution applicable throughout the observatory network. This is followed by brief reports for each observatory containing details of instrument changes, baselines, scale values, corrections for temperature and parallax effects, and a summary of mean values of the magnetic field components.

Tables of mean hourly values and hourly ranges are not published. Microfilm copies of these tables and of the K-indices for Victoria, Meanook, Ottawa and St. John's are sent on a yearly basis to World Data Center A. A magnetic tape containing the tabular data for several years is also deposited at World Data Center A. Computer-output copies of mean hourly values and hourly ranges will be distributed on an exchange basis to foreign magnetic observatories.

Details of buildings and sites for all observatories except Meanook were given in the Annual Report for 1970[1]. A brief history of the Meanook observatory buildings and instrumentation from 1916 to 1971 is given in this report.

The standard yearbook for Victoria observatory for 1971 has already been published[2]. For completeness, extracts from this publication have been included in the 1971 annual report.

Introduction

The magnetic observatories in Canada are operated by:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines and Resources
Ottawa, Canada K1A 0Y3

The location, method of recording, and date of commencement of the observatories are given in the following table.

Observatories	Geographic		Geomagnetic*		Elevation	Elements recorded	Date of commencement of continuous recording in three elements	
	Lat. N. ° ′	Long. W. ° ′	Lat. N. °	Long E. °	m		Analogue	Digital
Northern								
Alert	82 30	62 30	85.7	168.7	60	X Y Z	Oct 1961	
Resolute Bay	74 42	94 54	83.1	287.7	25	X Y Z	Nov 1953	
Mould Bay	76 12	119 24	79.1	255.4	40	X Y Z	July 1962	
Baker Lake	64 20	96 02	73.9	314.8	30	H D Z	Mar 1951	
						X Y Z	July 1957	Oct 1971
Fort Churchill	58 48	94 06	68.8	322.5	15	X Y Z	July 1957	Sept 1971
Great Whale River	55 18	77 45	66.8	347.2	25	H D Z	Jan 1965	
Southern								
Meanook	54 37	113 20	61.8	301.0	700	H D Z	Sept 1931	Nov 1970
St. John's	47 36	52 41	58.7	21.4	100	H D Z	Aug 1968	Dec 1969
Ottawa	45 24	75 33	57.0	351.5	75	H D Z	July 1968	Sept 1970
Victoria	48 31	123 25	54.3	292.7	185	H D Z	July 1957	Nov 1970

*Assuming geomagnetic pole is 78.3°N, 291.0°E (Finch and Leaton, 1957).

Observatory instrumentation

Primary photographic recorders

A set of three-component standard-run Ruska variometers recording the North (X) and East (Y) (or Horizontal intensity (H) and Declination (D)) and the Vertical (Z) components of the earth's magnetic field was the primary recorder at all observatories. The time scale of the Ruska magnetograms is 20 mm/hr. Following the replacement at Mould Bay on October 17, 1971, of the Mercer escapement-controlled clock, the hour marks at all observatories are initiated on the hour by a crystal controlled clock and last for approximately 15 to 20 seconds. Scale values were determined 2 or 3 times a month using the Helmholtz coil provided, and are listed with adopted baselines in the brief reports which follow for each observatory.

Thermostatically controlled electric heaters maintained the temperature in the variometer rooms constant to ±1.5° for periods of a few months, except at times of power failure or heater malfunction. The correction for seasonal temperature changes is included in the adopted baseline values. Mean hourly values have been corrected for significant temperature changes occurring over periods of a few hours to a few days.

Tests to determine the temperature and parallax corrections to be applied to the Ruska magnetograms are carried out at regular intervals and the corrections are listed for each observatory. To test for the effect of temperature changes on the elements recorded by the Ruska magnetograph, the heaters in the Ruska variometer room are disconnected for a period of about six hours when magnetic conditions are relatively quiet. Mean hourly values scaled from the Ruska magnetogram for this period are then compared with values from the standby fluxgate chart at stations where the standby instrument is located in a separate room, or with mean hourly values derived from the AMOS.[5] Where a large temperature change persists over periods of several weeks, the temperature coefficient is established from the baseline values observed before and after the temperature shift.

Temperature corrections are to be used with the formula $A_o = A - \alpha (T - T_o)$, where A_o is the component value at the normal variometer room temperature.

A is the uncorrected component value,
α is the temperature coefficient,
T is the instantaneous temperature in °C,
and T_o is the normal temperature in °C.

The sensitivity of the Ruska temperature trace is 1.3°C/mm.

Standby variometers and storm recorders

Continuous traces of X, Y (or H, D) and Z on a strip-chart recorder were provided by a three-component fluxgate magnetometer[3] at all observatories. Full scale chart sensitivity is normally 1000 or 2000 nT, with automatic switching to half sensitivity at times of large magnetic disturbance.

The chart is operated at 20 mm/hr. Chart values are used to interpolate for missing intervals on the Ruska magnetograms. The chart also provides a visual indication of magnetic field conditions. An electronic integrator[4] is used in conjunction with the fluxgate magnetometer at Ottawa observatory.

Additional standby recorders in operation in 1971 were a standard LaCour and a low-sensitivity LaCour magnetograph at Meanook, and a second Ruska standard magnetograph at Ottawa.

Digital magnetometer

A digitally recording magnetometer system (AMOS)[5] was installed in Fort Churchill in September 1971 and in Baker Lake in October 1971, extending the AMOS network to six observatories (see Table). The AMOS records values of D, H (or X, Y), Z and F once a minute on digital magnetic tape in a format which can be read directly by a computer.

The orthogonal elements D, H (or X, Y) and Z are derived from three fluxgate sensors mounted inside a Helmholtz coil system. One pair of coils continuously nulls the principal horizontal component and the second pair, Z, so that the fluxgates operate in essentially zero field at D, H stations. At Fort Churchill and Baker Lake, where X, Y are measured, the minor horizontal component (Y) is 510 nT and 125 nT respectively. A proton procession magnetometer measures F.

Voltages proportional to the values of the three orthogonal components D, H, Z or X, Y, Z are sampled in quick succession by a digital voltmeter each minute. Then follows a measurement of F by the proton magnetometer. The four readings are recorded on digital magnetic tape together with the date, time and station identification. The variations of the three orthogonal components are also recorded continuously by a strip-chart recorder.

Rapid-run recording

Rapid-run records in X and Y were available from the fluxgate sensors at Baker Lake, Resolute Bay, Fort Churchill and Ottawa for selected periods in 1971. These data were used in the study of Pc 4 and Pc 5 pulsations.[6]

Absolute instruments

A proton precession magnetometer[5] is the primary standard for total intensity F.

A portable electrical magnetometer[7] of the saturable core type is the primary standard for determination of declination D and inclination I at the northern observatories and at St. John's. It was also in use at the other observatories as a back-up instrument for declinometers and inclinometers of classical design.

A Quartz Horizontal Intensity Magnetometer (QHM)[7] was the primary standard for H at the observatories in southern Canada.

Absolute observations and baseline calculations

Absolute observations were made on an average of twice a week at Meanook and once a week at the other observatories, during magnetically quiet periods.

From earlier comparisons with the Agincourt observatory standards,[7] the probable error of a single observation using the portable electrical magnetometer and including the error in reading the magnetogram, was 0.3′ in D and 0.2′ in I, equivalent to 3 nT at Agincourt. Assuming the probable error remains at 3 nT in the horizontal components at any site in Canada, the probable error in D will be expected to range from 0.3′ in southern Canada to 14′ at Resolute Bay.

Calculation of baselines

The Z field is derived from the absolute measurement of F using the relation $Z = F \sin I$. The observed value of F is reduced to the times of the I observation by a correction ΔF which is closely approximated by the change in the Z deflection measured on the magnetogram between the times of the I and F observations. Values of the Z field are computed for the times of the D absolute measurements, and the horizontal intensity (H) is calculated from the relation $H = Z \cot I$, where the observed value of I is reduced to the times of the D readings by applying a correction ΔI minutes, given by the ratio

$$\frac{3437.7\ (H\Delta F - F\Delta H)}{F \qquad Z}$$

To the required accuracy this may be written as

$$\Delta I\ (\text{min}) = -3437.7\ \frac{\Delta H}{Z}$$

where $\Delta H = (X_D - X_I) \cos D + (Y_D - Y_I) \sin D$, and X_D, X_I, Y_D, Y_I are the ordinates of the traces measured at the times of the absolute determinations of D or I. X and Y are then derived from the relations $X = H \cos D$, $Y = \sin D$.

Time marks were placed on the Ruska record at the times of the absolute observations. Baseline values were calculated from the measurement of the record ordinates at these points and the values of X, Y and Z obtained from the absolute observations. At observatories recording H, the absolute value of H is measured directly by the QHM or calculated from the relation $H = Z \cot I$. In general each baseline determination was based on the mean of six absolute measurements of D, I, F or D, I, H, F. The final baseline values were adopted by fitting the best straight line to the observed values between known discontinuities. Lists of adopted and observed baselines and scale values are included in the reports for individual observatories.

Data distribution

Microfilm copies of standard-run photographic magnetograms with provisional baselines and scale values are supplied to World Data Center A, Boulder, Colorado, on a monthly basis. Copies of magnetograms may be obtained from the Division of Geomagnetism or from

World Data Center A, Geomagnetism
NOAA
Boulder, Colorado 80302
U.S.A.

With the exception of Victoria and Ottawa all mean hourly values were scaled manually. Magnetograms were scaled at Victoria on a semi-automatic scaling machine.[9] At Ottawa, some mean hourly value data were derived from the output of the electronic integrator. Values were punched on cards and the tables were calculated by computer. All values were rounded off to the nearest nT. Copies of mean hourly value and hourly range tables may be obtained from World Data Center A or from the Division of Geomagnetism. Tabular data on magnetic tape is in the IAGA format. On microfilm, the tables for each observatory are arranged as follows:

Tables 1–36: Mean values of the three recorded elements for each hour of the day, and daily and monthly means for all days and for the international quiet and disturbed days;

Tables 37–45: Summary by month, season, and year of mean hourly values of the three elements for all days and for the international quiet and disturbed days;

Table 46: For the observatories reporting K-indices (Victoria, Meanook, Ottawa, St. John's), three-hour range indices and K-indices.

Tables 46–69: For the northern observatories, hourly ranges in 10-gamma units in the two horizontal components (R Indices).

All times on the tables are universal time (UT).

K indices are sent twice a month from the southern observatories to DeBilt, Netherlands, and Gottingen, Germany, for use in preparation of planetary K indices published by the International Association of Geomagnetism and Aeronomy (IAGA). For lower limit, in nT, for K_9 is

1500 for Meanook
500 for Victoria
750 for Ottawa
750 for St. John's

Magnetograms are read each month at these observatories for magnetic events and the results forwarded to the appropriate IAGA Commission.

Summary of mean values

The summary for 1971 of the mean hourly values of the three elements, and a list of annual mean values, are given in the reports for individual observatories.

ALERT*

Officer-in-charge: W. Piche

In the summer of 1961 the Dominion Observatory (now Earth Physics Branch, Department of Energy, Mines and Resources) established a combined magnetic and seismic observatory at Alert, Ellesmere Island, Northwest Territories. The choice of Alert Meteorological Station as a new magnetic observatory site resulted from studies of magnetic data recorded there during the International Geophysical Year.

The mailing address for Alert Observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines and Resources
Ottawa, Canada K1A 0Y3

Observatory site

The observatory building rests on recent unconsolidated marine sediments that are underlain by metamorphosed sediments of early Paleozoic age. Magnetic field intensity gradients are extremely small: before construction a survey indicated a maximum gradient in the total field intensity of only 10 nT in 300 m. The site is 215 m northwest of the Ministry of Transport Meteorological Station.

Instrument piers

Owing to magnetic contamination of the original instrument piers, an external magnetic station was established in 1961 some 15 m west of the observatory at a location substantially free from artificial field disturbances and marked with a brass plug. The results for all years have been reduced to this reference site for uniformity.

In July 1962, the piers were replaced with nonmagnetic concrete, necessitating the closing of the observatory from July 9 to 14. The corrections applied to the absolute observations made inside the observatory to reduce the data to the external reference point are as follows:

	October 1961 to July 9, 1962	After July 15, 1962
X	− 56 nT	−10 nT
Y	−206 nT	−19 nT
Z	+ 24 nT	+28 nT

Parameters for Ruska data reduction

Corrections for temperature and parallax

Ruska temperature corrections were determined on January 10 using the standby variometer as reference. The temperature in the variometer room was decreased from 14.1°C to 6.8°C over a period of five hours. The temperature at the standby instrument remained constant during this period. The temperature coefficients determined by this comparison were +1.3 ±0.4 nT/°C in X; −0.9 ±0.5 nT/°C in Y; and −3.5 ±0.8 nT/°C in Z.

Parallax determinations were made January 8 and 13, 1971. Corrections to be subtracted from times read on the magnetograms were less than 0.1 minute in X and Y, and 0.2 minute in Z. The correction determined for Z increased from 0.2 minute in January 1971 to 0.4 minute in April 1972, probably as a result of several trace and time lamp adjustments in the period July 1 to November 24, 1971.

Baselines and scale values

Abrupt baseline changes were observed August 1 and 2 in Y and Z, and December 1 in Y, following repositioning of the Y and Z traces.

Following are the adopted and observed baselines and scale values for 1971 (Tables 1–3).

Local quiet days (Alert)

The five local quiet days for each month, selected on the basis of the R indices are listed below. Local quiet days which do not appear also in the list of 10 international quiet days are underlined.

January	7	8	9	10	12
February	3	5	7	13	22
March	1	6	22	28	29
April	2	20	24	25	26
May	4	12	16	27	28
June	14	15	19	20	22
July	7	10	17	20	28
August	6	14	15	20	27
September	2	10	22	23	24
October	17	18	19	26	27
November	3	14	15	16	17
December	6	7	8	27	28

Summary of mean values

The summary by month, season and year of the mean hourly values for all days in 1971, and the list of annual mean values, are given in Tables 4–7.

*Photographic recording was discontinued September 30, 1972.

TABLE 1

Alert 1971

X Baselines nT						X Scale Values nT/mm					
Adopted			Observed			Adopted			Observed		
Jan.	1–3	615	Jan.	7	616	Jan.	1–31	12.40	Jan.	7	12.43
				17	613						
Feb.	1–28	615	Feb.	3	614	Feb.	1–28	12.40			
				23	614						
				28	616						
Mar.	1–27	615	Mar.	20	619	Mar.	1–31	12.40	Mar.	28	12.32
	28–31	615 to 614		28	608						
Apr.	1–30	613 to 608	Apr.	21	608	Apr.	1–30	12.40			
May	1–31	607	May	2	605	May	1–31	12.40	May	31	12.40
				5	609						
				31	609						
June	1–30	606				June	1–30	12.40			
July	1–15	606	July	6	605	July	1–31	12.40	July	10	12.32
	16–31	605 to 595		23	601					31	12.44
				31	594						
Aug.	1–13	594 to 585	Aug.	3	593	Aug.	1–31	12.40	Aug.	3	12.40
				15	584					20	12.38
	14–31	585		30	586						
Sep.	1–30	585	Sep.	4	584	Sep.	1–30	12.40			
Oct.	1–13	585	Oct.	19	590	Oct.	1–31	12.45	Oct.	23	12.45
	14–31	586 to 596		27	598						
Nov.	1–30	596	Nov.	10	596	Nov.	1–30	12.45	Nov.	30	12.45
				20	595						
				30	596						
Dec.	1–31	596	Dec.	2	597	Dec.	1–31	12.45			
				14	594						

TABLE 2

Alert 1971

Y Baselines nT						Y Scale Values nT/mm					
Adopted			Observed			Adopted			Observed		
Jan.	1-31	−3828 to −3831	Jan.	7	−3828	Jan.	1-31	12.67 to 12.65	Jan.	7	12.67
				17	−3831						
Feb.	1-28	−3832 to −3834	Feb.	3	−3830	Feb.	1-28	12.64 to 12.62			
				23	−3838						
				28	−3832						
Mar.	1-31	−3835 to −3838	Mar.	20	−3840	Mar.	1-31	12.62 to 12.60	Mar.	28	12.62
				28	−3835						
Apr.	1-25	−3839 to −3841	Apr.	21	−3844	Apr.	1-30	12.59 to 12.58			
	26-30	−3841 to −3838									
May	1-15	−3837 to −3825	May	2	−3841	May	1-31	12.57 to 12.55	May	31	12.53
	16-31	−3824 to −3820		5	−3828						
				31	−3819						
June		−3819 to −3810				June		12.55			
July		−3810 to −3799	July	6	−3808	July		12.55	July	10	12.49
				23	−3801					31	12.63
				31	−3799						
Aug.	1(0000)-1(1850)	−3799	Aug.	3	−3871	Aug.		12.55	Aug.	6	12.54
	1(1850)-1(1905)	−3749		15	−3886					20	12.56
	1(1905)-1(1920)	No trace		30	− 3884						
	1(1920)-2(0055)	−3566									
	2(0055)-15(0125)	−3871 to −3885									
	15(0125)-31	−3885									
Sep.		−3885 to −3869	Sep.	4	−3882	Sep.		12.55			
Oct.		−3868 to −3842	Oct.	19	−3849	Oct.		12.60	Oct.	23	12.63
				27	−3839						
Nov.		−3843 to −3858	Nov.	10	−3847	Nov.		12.65	Nov.	30	12.64
				20	−3851						
Dec.	1(0000)-1(0606)	−3860	Dec.	2	−3803	Dec.		12.64			
				14	−3806						
	1(0606)-31	−3804 to −3806									

TABLE 3

Alert 1971

Z Baselines nT						Z Scale Values nT/mm					
Adopted			Observed			Adopted			Observed		
Jan.		55545 to 55549	Jan.	7	55546	Jan.		12.57 to 12.62	Jan.	7	12.58
				22	55546						
Feb.	1-28	55550 to 55552	Feb.	3	55552	Feb.		12.63 to 12.68			
				23	55523						
				28	55527						
Mar.		55551 to 55543	Mar.	20	55543	Mar.		12.69 to 12.74	Mar.	29	12.75
				28	55544						
Apr.		55543 to 55542	Apr.	21	55542	Apr.		12.75			
May		55540 to 55525	May	2	55542	May		12.75	May	31	12.76
				5	55534						
				31	55528						
June		55524 to 55510				June		12.75			
July		55510 to 55483	July	7	55505	July		12.75	July	10	12.75
				23	55490					31	12.81
				31	55483						
Aug.	1(0000)-1(1850)	55483	Aug.	3	55599	Aug.	1	12.75	Aug.	6	12.07
	1(1850)-1(1905)	55495		15	55602		2-31	11.96 to 12.37		20	12.34
	1(1905)-1(1920)	No trace		30	55598						
	1(1920)-2(0130)	55531									
	2(0130)-15(0125)	55600									
	15(0125)-31	55600									
Sep.		55600 to 55596	Sep.	4	55594	Sep.		12.38 to 12.55	Sep.		12.43
Oct.		55596 to 55597	Oct.	19	55595	Oct.		12.56 to 12.70	Oct.	23	12.69
				27	55597						
Nov.		55598 to 55611	Nov.	10	55602	Nov.		12.70	Nov.	30	12.68
				20	55606						
				30	55612						
Dec.		55612 to 55619	Dec.	3	55612	Dec.		12.68			
				14	55610						

MEAN VALUES OF MAGNETIC ELEMENTS

NORTH COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 4 ALERT X = 500 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	186	193	196	200	203	206	181	198	213	215	199	192	199	197	206	193
1-2	195	204	201	216	220	218	220	203	220	221	203	199	210	215	215	200
2-3	197	204	211	214	230	220	226	216	234	223	208	207	216	224	221	204
3-4	205	205	213	220	239	224	221	226	226	229	204	205	218	228	222	205
4-5	208	203	211	236	236	231	236	235	226	219	204	214	222	235	223	207
5-6	209	200	212	233	235	256	237	231	221	214	210	213	223	240	220	208
6-7	213	201	215	230	238	264	236	229	236	221	206	208	225	242	226	207
7-8	212	206	214	218	226	253	224	215	228	213	206	204	218	230	218	207
8-9	205	203	215	216	225	245	202	204	225	207	203	207	213	219	216	205
9-10	193	196	205	207	211	235	207	198	211	195	200	197	205	213	205	197
10-11	187	185	190	191	198	222	209	196	196	183	187	189	194	206	190	187
11-12	179	174	168	182	177	226	215	185	176	174	173	182	184	201	175	177
12-13	162	165	159	161	176	200	192	175	165	166	159	171	171	186	163	164
13-14	153	151	149	148	160	183	181	161	156	146	156	163	159	171	150	156
14-15	129	135	143	137	137	154	161	152	140	150	150	160	146	151	143	144
15-16	126	123	133	119	111	116	134	132	140	138	140	150	130	123	133	135
16-17	124	131	121	114	102	115	122	122	129	133	149	143	125	115	124	137
17-18	131	121	104	102	98	100	100	106	125	138	154	129	117	101	117	134
18-19	134	142	129	101	88	94	94	116	116	143	149	150	121	98	122	144
19-20	137	145	132	99	87	101	115	126	129	148	156	153	127	107	127	148
20-21	145	147	142	119	96	104	117	129	146	162	165	161	136	112	142	155
21-22	149	155	163	143	120	120	141	148	166	172	176	169	152	132	161	162
22-23	167	171	176	160	149	160	171	153	184	185	178	180	170	158	176	174
23-24	173	173	184	184	179	187	198	166	192	198	188	183	184	183	190	179
MEANS	172	172	174	173	173	185	181	176	183	183	180	180	178	179	178	176

MEAN VALUES OF MAGNETIC ELEMENTS

EAST COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 5 ALERT Y = -4000 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	253	242	240	213	188	211	231	215	235	260	279	291	238	211	237	266
1-2	260	248	256	227	199	220	242	232	248	268	292	292	249	223	250	273
2-3	271	261	261	240	215	238	243	243	254	282	298	293	258	235	259	281
3-4	273	272	272	246	240	255	265	254	276	291	307	304	271	254	271	289
4-5	279	283	285	258	266	268	279	265	294	309	312	308	284	270	287	296
5-6	286	293	293	278	284	263	286	288	308	324	319	315	295	280	301	303
6-7	300	299	302	301	305	275	301	310	311	331	328	324	307	298	311	313
7-8	314	307	318	315	330	307	327	326	330	340	343	335	324	323	326	325
8-9	329	319	334	326	338	329	346	339	354	351	348	345	338	338	341	335
9-10	343	324	338	341	356	346	354	348	362	356	348	355	348	351	349	343
10-11	338	326	340	351	368	370	365	358	369	363	348	360	355	365	356	343
11-12	340	331	347	358	372	391	389	359	367	362	352	360	361	378	359	346
12-13	338	334	349	363	380	413	400	369	356	361	356	353	364	391	357	345
13-14	337	338	344	366	381	423	409	369	347	357	353	348	364	396	354	344
14-15	344	344	335	354	376	407	396	368	345	341	341	339	358	387	344	342
15-16	333	331	325	344	376	405	392	355	334	336	333	341	350	382	335	335
16-17	321	309	325	327	344	359	376	337	322	326	319	339	334	354	325	322
17-18	303	304	317	312	321	333	359	327	306	310	309	330	319	335	311	312
18-19	286	278	282	278	309	309	353	311	305	293	300	306	301	321	290	293
19-20	278	269	264	267	290	276	310	292	275	281	288	297	282	292	272	283
20-21	264	259	252	245	258	261	299	269	260	273	282	293	268	272	258	275
21-22	258	252	238	228	236	248	265	250	242	260	274	290	253	250	242	269
22-23	247	242	238	211	219	223	246	239	229	256	277	285	243	232	234	263
23-24	247	244	240	200	204	214	229	229	232	261	279	288	239	219	233	265
MEANS	298	292	296	290	298	306	319	302	303	312	316	320	304	306	300	307

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY-ALL DAYS

TABLE 6 ALERT Z = 55000 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	728	733	726	727	717	705	724	718	736	755	757	770	733	716	737	747
1-2	727	733	728	728	714	699	726	714	734	754	756	774	732	713	736	748
2-3	721	732	729	728	710	698	720	720	736	757	754	771	731	712	738	745
3-4	721	732	731	729	708	702	715	721	738	760	755	768	732	712	740	744
4-5	720	729	730	731	708	705	723	723	738	757	753	765	732	715	739	742
5-6	720	727	730	731	710	712	726	725	738	754	753	764	733	718	738	741
6-7	720	724	728	728	711	705	728	724	739	753	753	761	731	717	737	740
7-8	721	724	728	726	711	704	729	725	738	750	752	760	731	717	736	739
8-9	718	722	727	727	709	717	729	727	736	749	753	760	731	721	735	738
9-10	718	721	727	725	705	719	732	729	736	748	754	761	731	721	734	739
10-11	718	722	726	723	699	717	736	726	734	746	751	759	730	720	732	738
11-12	717	720	724	717	708	712	721	721	736	745	749	760	728	716	731	737
12-13	717	720	725	711	709	698	713	717	735	744	748	760	725	709	729	736
13-14	717	720	722	708	693	688	702	720	730	743	750	760	721	701	726	737
14-15	716	719	715	704	691	683	692	711	722	745	749	761	717	694	722	736
15-16	717	722	710	699	688	676	695	696	719	741	750	758	714	689	717	737
16-17	719	721	707	696	681	672	693	692	717	738	750	763	712	685	715	738
17-18	718	720	710	698	685	675	694	694	717	740	750	765	714	687	716	738
18-19	719	722	714	697	688	681	703	699	717	739	749	767	716	693	717	739
19-20	718	722	713	701	694	681	714	705	723	742	753	766	719	699	720	740
20-21	720	724	718	711	700	684	716	708	726	743	753	768	723	702	725	741
21-22	722	727	720	716	711	691	726	709	726	746	755	766	726	709	727	743
22-23	725	729	722	719	715	705	727	706	732	748	758	766	729	713	730	745
23-24	728	731	725	721	721	705	725	712	734	751	757	768	732	716	733	746
MEANS	720	725	722	717	703	697	717	714	731	748	753	764	726	708	729	740

TABLE 7

Annual Mean Values (Alert)

Year	X	Y	Z	D East		I North*		H*	F*
	nT	nT	nT	°	′	°	′	nT	nT
1962.5	720	−3776	55379	280	48	86	01.8	3844	55512
1963.5	722	−3751	55392	280	54	86	03.3	3820	55524
1964.5	728	−3744	55430	281	00	86	03.8	3814	55561
1965.5	743	−3722	55448	281	17	86	05.1	3795	55578
1966.5	724	−3709	55497	281	03	86	06.3	3779	55626
1967.5	717	−3709	55537	280	56	86	06.5	3778	55665
1968.5	707	−3711	55578	280	47	86	06.7	3778	55706
1969.5	697	−3710	55619	280	38	86	07.0	3775	55747
1970.5	680	−3704	55665	280	24	86	07.8	3766	55792
1971.5	678	−3696	55726	280	24	86	08.3	3758	55853

*D,I,H,F are derived from the annual means of X, Y and Z.

RESOLUTE BAY

Officers-in-charge: C. Cummins 1970.5 – 1971.5
P. Fournier 1971.5 – 1972.5

A magnetic observatory was established at Resolute, Cornwallis Island, N.W.T. in 1948. However, photographic variometers capable of recording the geomagnetic field in three components were not in operation until November 1953.

The mailing address for Resolute Bay observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines and Resources
Ottawa, Canada K1A 0Y3

Observatory site

The area consists of Paleozoic limestone. Magnetic field intensity gradients are extremely small; a survey of the area has indicated a very low gradient in total field intensity with no natural anomaly greater than 50 nT within 1.5 km of the observatory.

Parameters for Ruska data reduction

Corrections for temperature and parallax

Temperature corrections to the Ruska data were 1 nT/°C or less in all components. No temperature corrections were applied to the mean hourly values.

The time and trace lamps were adjusted September 3,12; November 21; and December 6. From the parallax determination April 23, 1972, corrections to be added to times read on the magnetograms are 0.5 minute in X; 0.8 minute in Y; and 0.1 minute in Z.

Baselines and scale values

There were abrupt changes in the Z baseline January 11(2055), April 30(2400), June 5(1500), and November 14(1534), following levelling of the Z variometer. Several baseline changes in X and Z followed accidental displacement of the variometers on August 18(1500).

The proton precession magnetometer became unserviceable in July. The initial replacement did not operate properly, and no F readings were obtained in the months July to October. The Z baselines for these months were estimated using the F measurements in May and November together with the changes in baseline measured for the trace discontinuities of August 3(1515); 18(1500); 19(1733); and 20(1845). Owing to the small H/Z ratio at Resolute Bay, the baselines for X and Y were determined for this period with the usual accuracy from the absolute D, I measurements and the estimated Z. The estimated Z baselines are believed to be good to ± 10 nT.

Adopted and observed baselines and scale values for 1971 are given in Tables 8–10.

Local quiet days (Resolute)

The five local quiet days for each month selected on the basis of the R indices are listed below. Local quiet days which do not appear also on the list of 10 international quiet days are underlined.

January	6	7	8	9	12
February	3	5	7	13	22
March	1	6	22	28	29
April	2	8	24	25	26
May	11	12	16	27	28
June	12	14	15	19	20
July	7	10	17	28	29
August	6	19	20	21	27
September	2	10	21	22	23
October	18	19	21	26	27
November	9	14	15	16	17
December	6	7	8	15	28

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1971, and a list of the annual mean values, are given in Tables 11–14.

TABLE 8

Resolute Bay

X Baselines nT						X Scale Values nT/mm			
Adopted			Observed			Adopted		Observed	
Jan.		10 to 4	Jan.	11	(30)	Jan.	12.25	Jan. 14	12.14
				19	8			19	12.25
				27	8				
Feb.		4 to −6	Feb.	9	−1	Feb.	12.25	Feb. 10	12.35
				18	−4				
				25	−3				
Mar.		−7 to −13	Mar.	8	(7)	Mar.	12.20	Mar. 8	12.13
				17	−11			27	12.09
				27	−15				
Apr.		−13 to −19	Apr.	10	−12	Apr.	12.15	Apr. 10	12.13
				27	−20				
May	1-20	−19 to −25	May	9	−20	May	12.10	May 9	12.05
				20	−25			27	12.11
	21-31	−24 to −14		25	−18				
		−13 to +16	June	12	−8	June	12.15	June 12	12.12
June				23	11			30	12.05
				30	18				
July	1-2	17	July	21	9	July	12.20	July 9	12.26
	3-31	17 to −7		28	−10			18	12.28
Aug.	1(0000)-18(1500)	−10				Aug.	12.15	Aug. 10	(11.94)
	18(1500)-19(1800)	No trace						21	12.17
	19(1800)-20(1845)	−335						28	12.11
	20(1845)-31	−50							
Sep.		−51				Sep.	12.20	Sep. 9	12.26
Oct.		−53	Oct.	13	−53	Oct.	12.20	Oct. 13	12.21
				22	−56			27	12.24
				27	−47				
				31	−52				
Nov.		−54	Nov.	14	−52	Nov.	12.25	Nov. 10	12.28
				17	−57			20	12.24
				30	−59				
Dec.		−55	Dec.	8	−53	Dec.	12.20	Dec. 8	12.21
				15	−54				
				26	−55				

TABLE 9

Resolute Bay 1971

Y Baselines nT				Y Scale Values nT/mm			
Adopted		Observed		Adopted		Observed	
Jan.	−557 to −554	Jan. 11	(−536)	Jan.	11.35	Jan. 14	11.36
		19	−554			19	11.41
		25	−558				
Feb.	−554 to −552	Feb. 9	−551	Feb.	11.35	Feb. 9	11.28
		18	−552				
		25	−553				
Mar.	−553	Mar. 8	−555	Mar.	11.35	Mar. 27	11.34
		17	−551				
		27	−554				
Apr.	−554 to −548	Apr. 10	(−561)	Apr.	11.40	Apr. 10	11.36
		19	−548			27	11.42
		27	−543				
May	−547 to −539	May 9	−545	May	11.45	May 9	11.52
		19	−544				
		27	−540			27	11.47
June	−539 to −531	June 12	−536	June	11.50	June 12	11.57
		23	−531			30	11.47
		30	−533				
July	−531	July 21	−532	July	11.45	July 9	11.39
		28	−530			18	11.42
Aug.	−531			Aug.	11.45	Aug. 10	11.28
						21	11.60
						28	11.44
Sep.	−531 to −537			Sep.	11.45	Sep. 9	11.46
Oct.	−537 to −543	Oct. 13	−542	Oct.	11.40	Oct. 13	11.44
		21	−539			25	11.43
		27	−539				
		31	−544				
Nov.	−543 to −549	Nov. 14	−548	Nov.	11.35	Nov. 10	11.30
		17	−544			20	11.29
		30	−548				
Dec.	−549 to −555	Dec. 8	−548	Dec.	11.30	Dec. 8	11.28
		21	−552				
		26	−557				

TABLE 10

Resolute Bay 1971

Z Baselines nT						Z Scale Values nT/mm					
Adopted			Observed			Adopted			Observed		
Jan.	1-11(2055)	58108 to 58100	Jan.	11	58106	Jan.		9.95	Jan.	14	10.01
	11(2055)-27	58148 to 58097		19	58121					19	9.91
	28-31	58098 to 58101		27	58097						
Feb.	1-22	58101 to 58117	Feb.	9	58106	Feb.		9.90	Feb.	9	9.86
	23-28	58116 to 58113		18	58119						
				25	58116						
Mar.	1-8	58111 to 58107	Mar.	8	58107	Mar.		9.90	Mar.	27	9.93
	9-31	58108 to 58122		27	58122						
Apr.	1-30(2400)	58122 to 58125	Apr.	10	58122	Apr.		9.95	Apr.	10	9.87
				19	58138					27	9.86
				27	58128						
May	1(0000)-19	58163 to 58101	May	9	58135	May		10.00	May	9	10.04
	20-31	58100		19	58101					27	10.06
				27	58099						
June	1-5(1500)	58100	June	12	58146	June		10.05	June	11	10.07
	5(1500)-30	58145		28	(58178)					30	10.05
				30	58137						
July		58145				July		10.05	July	9	9.99
										18	10.08
Aug.	1-3(1515)	58145				Aug.	1-3(1515)	10.05	Aug.	10	9.68
	3(1515)-18(1500)	58080					3(1515)-31	9.60 to 9.94		21	9.81
	18(1500)-19(1733)	58100								28	9.89
	19(1733)-20(1845)	No Z trace									
	20(1845)-31	58149 to 58141									
Sep.		58140 to 58117				Sep.		9.96 to 10.09	Sep	9	10.16
Oct.		58116 to 58092				Oct.		10.10 to 10.33	Oct.	13	10.14
										27	10.27
Nov.	1-14(1534)	58090	Nov.	30	58100						
	14(1534)-30	58135 to 58100				Nov.	1-14(1534)	10.34 to 10.46	Nov.	9	10.44
							14(1534)-30	9.82 to 9.95		20	9.87
Dec.		58099 to 58096	Dec.	8	58100						
				20	58098	Dec.		9.95	Dec.	13	9.93
				26	58097						

NORTH COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 11 RESOLUTE BAY X = 0 PLUS TABULAR VALUES IN GAMMAS 1971

G.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	173	170	172	161	161	175	151	152	183	194	196	193	173	160	178	183
1-2	184	179	186	181	178	194	172	170	197	202	207	196	187	179	192	192
2-3	194	187	197	200	205	205	194	189	209	210	214	204	201	198	204	200
3-4	198	196	204	212	230	219	208	204	220	219	217	213	212	215	214	206
4-5	206	205	212	230	244	237	226	223	231	230	222	226	224	233	226	213
5-6	214	211	218	239	249	252	231	236	239	237	228	223	231	242	233	219
6-7	226	216	224	249	269	268	242	247	248	246	236	230	242	257	242	227
7-8	234	226	237	250	270	283	247	245	256	246	245	235	248	261	247	235
8-9	240	232	246	256	274	282	248	242	266	247	238	240	251	262	254	238
9-10	237	227	238	256	274	284	252	243	260	238	242	239	249	263	246	236
10-11	230	220	229	253	275	290	252	248	255	232	231	233	246	266	242	229
11-12	224	212	216	250	255	292	265	246	237	227	222	224	239	265	233	221
12-13	209	206	212	247	254	286	257	236	221	224	214	213	232	258	226	211
13-14	199	197	204	244	248	276	260	218	212	201	204	203	222	251	215	201
14-15	188	191	197	227	229	259	227	203	203	192	195	192	209	230	205	192
15-16	172	175	190	210	212	230	205	193	185	186	181	191	194	210	193	180
16-17	161	161	177	179	191	201	165	166	169	177	177	175	175	181	176	169
17-18	155	154	152	160	152	158	132	131	156	166	173	159	154	143	159	160
18-19	150	150	147	151	138	141	96	117	146	164	167	164	144	123	152	158
19-20	153	148	139	135	117	148	105	119	146	163	173	164	143	122	146	160
20-21	154	148	144	134	107	140	92	125	153	168	175	172	143	116	150	162
21-22	154	149	151	138	112	133	105	140	162	171	175	178	147	123	156	164
22-23	161	154	161	141	120	142	127	137	164	175	183	183	154	132	160	170
23-24	167	161	167	147	140	162	148	135	166	182	192	187	163	146	166	177
MEANS	191	186	192	202	204	219	192	190	204	204	204	201	199	201	201	196

MEAN VALUES OF MAGNETIC ELEMENTS

EAST COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 12 RESOLUTE BAY Y = -1000 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	265	258	257	239	231	250	238	254	259	264	282	288	257	243	255	273
1-2	265	255	260	235	223	237	242	248	250	262	283	286	254	238	252	273
2-3	266	266	257	237	221	238	234	241	244	258	279	283	252	234	249	272
3-4	261	261	257	235	231	239	238	236	252	261	283	284	253	236	251	272
4-5	262	269	262	236	237	243	240	242	264	274	286	280	258	241	259	274
5-6	258	278	271	246	251	242	248	253	273	285	286	281	264	249	269	276
6-7	261	280	277	263	264	248	258	269	277	292	295	289	273	260	277	281
7-8	269	288	285	280	282	261	270	284	290	301	301	298	283	274	289	287
8-9	286	293	297	292	298	271	286	301	309	314	308	306	297	289	303	298
9-10	309	303	307	307	313	285	296	311	323	328	318	320	310	301	316	313
10-11	315	316	316	321	333	311	309	325	336	339	327	330	323	320	328	321
11-12	320	320	330	334	342	323	321	337	346	344	335	337	332	331	339	328
12-13	327	325	339	349	349	347	341	348	352	350	343	335	342	346	348	333
13-14	331	330	346	362	362	362	355	365	355	355	346	335	350	361	355	336
14-15	341	341	355	369	369	382	367	365	360	354	347	335	357	371	360	341
15-16	344	348	361	377	391	405	381	377	363	359	343	341	366	389	365	344
16-17	339	337	355	373	400	402	384	367	353	353	333	337	361	388	359	337
17-18	328	335	355	374	382	384	389	350	344	337	322	338	353	376	353	331
18-19	313	309	334	353	372	363	375	333	337	322	314	317	337	361	337	313
19-20	297	303	308	319	361	346	329	306	323	304	302	308	317	336	314	303
20-21	289	291	296	296	322	313	300	306	307	296	297	298	301	310	299	294
21-22	280	282	279	285	298	299	270	292	289	288	289	295	287	290	285	287
22-23	273	274	271	271	274	274	270	281	277	281	285	292	277	275	275	281
23-24	268	267	264	253	253	262	255	267	268	274	285	292	267	259	265	278
MEANS	294	296	302	300	307	304	300	302	306	308	308	309	303	303	304	302

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY-ALL DAYS

TABLE 13 RESOLUTE BAY Z = 58000 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	397	403	394	402	377	384	380	358	396	429	435	435	399	375	405	418
1-2	396	405	399	405	381	380	386	356	397	433	438	437	401	376	409	419
2-3	397	407	401	406	385	382	380	361	404	440	440	438	403	377	413	421
3-4	399	411	405	409	391	387	380	364	411	447	442	440	407	381	418	423
4-5	402	409	408	415	398	392	389	369	415	448	444	442	411	387	422	424
5-6	405	410	409	421	406	397	390	376	420	450	457	446	416	392	425	430
6-7	414	412	410	427	415	403	394	383	425	455	453	445	420	399	429	431
7-8	428	417	417	428	420	413	399	388	429	457	468	449	426	405	433	441
8-9	425	421	424	428	419	418	402	388	434	459	478	454	429	407	436	445
9-10	431	423	428	432	419	419	404	390	435	458	468	457	430	408	438	445
10-11	429	423	423	435	417	424	410	393	437	458	462	459	431	411	438	443
11-12	426	424	422	430	421	427	417	391	432	458	458	460	431	414	436	442
12-13	420	421	423	427	425	432	427	391	427	458	458	455	430	419	434	439
13-14	418	421	417	428	426	441	431	394	423	450	460	454	430	423	430	438
14-15	421	423	412	428	431	437	426	398	415	449	458	450	429	423	426	438
15-16	418	420	404	419	435	441	428	400	416	444	452	447	427	426	421	434
16-17	415	411	411	413	414	416	432	388	413	443	451	453	422	413	420	433
17-18	411	412	415	396	401	403	422	389	410	438	447	448	416	404	415	430
18-19	401	409	397	370	396	394	422	394	423	427	443	447	410	402	404	425
19-20	399	411	392	393	401	376	390	388	416	429	441	445	407	389	408	424
20-21	397	409	398	405	395	377	397	380	412	434	439	444	407	387	412	422
21-22	397	404	396	411	388	387	401	373	400	427	437	442	405	387	409	420
22-23	394	402	400	406	397	398	409	361	403	427	437	439	406	391	409	418
23-24	397	401	393	404	396	386	395	362	400	429	437	439	403	385	407	419
MEANS	410	413	408	414	406	405	405	381	416	444	450	447	417	399	421	430

TABLE 14

Annual Mean Values (Resolute Bay)

Year	X	Y	Z	D East*		I North*		H*	F*
	nT	nT	nT	°	′	°	′	nT	nT
1954.5	−96	−915	57971	264	01	89	05.4	920	57978
1955.5	−69	−906	57999	265	38	89	06.1	909	58006
1956.5	−41	−904	58020	267	24	89	06.4	905	58027
1957.5	−24	−903	58065	268	29	89	06.5	903	58072
1958.5	9	−884	58035	270	35	89	07.6	884	58042
1959.5	32	−861	58032	272	08	89	08.9	862	58038
1960.5	54	−850	58052	273	38	89	09.5	852	58058
1961.5	72	−844	58076	274	53	89	09.9	847	58082
1962.5	85	−827	58103	275	52	89	10.8	831	58109
1963.5	108	−815	58120	277	33	89	11.4	822	58126
1964.5	117	−800	58144	278	19	89	12.2	809	58150
1965.5	132	−791	58170	279	28	89	12.6	802	58175
1966.5	141	−780	58208	280	15	89	13.2	793	58213
1967.5	153	−766	58250	281	18	89	13.9	781	58255
1968.5	166	−751	58291	282	28	89	14.7	769	58296
1669.5	179	−732	58320	283	16	89	15.6	754	58325
1970.5	193	−715	58374	285	06	89	16.4	741	58379
1971.5	199	−697	58417	285	56	89	17.3	725	58421

*D, I, H, F are derived from the annual means of X, Y, Z.

MOULD BAY

Officer-in-charge: D. Weston 1970.5 – 1972.5

Introduction

A combined magnetic and seismic observatory was established at Mould Bay, Prince Patrick Island, N.W.T., in the summer of 1961.

The mailing address for Mould Bay observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines and Resources
Ottawa, Canada K1A 0Y3

Observatory site

The station is in a permafrost area and is underlain by sandstones, siltstones and shales of the Devonian Melville Island formation. Using a Varian portable proton precession magnetometer, small magnetic field intensity gradients of the order of a few nanoteslas in 30 m were found to exist at the site. The magnetic-seismic observatory is north of the weather station and about 70 m from the nearest building.

Parameters for Ruska data reduction

Corrections for temperature and parallax

Following a break-down of the electric heater February 29, 1972, the temperature in the variometer room decreased from 17°C to 4.5°C. The temperature at the fluxgate sensor remained constant during this time. Temperature coefficients determined by comparison between the mean hourly values scaled from the Ruska and fluxgate recordings were +0.5 nT/°C in X; -1.0 nT/°C in Y; and +4.0 nT/°C in Z.

Parallax between the Ruska traces and the magnetogram time lines was determined on March 30, 1972 as 0.3 minute in X; 0.2 minute in Y; and 0.0 minute in Z, to be subtracted from times read on the magnetograms. The change in parallax since September 18, 1970 is assumed to have occurred May 7, 1971, following adjustment of the time mirror.

Baselines and scale values

F measurements were not useable from August 13 to November 30. The Z baselines calculated for August 13 and November 30 indicated no baseline change greater than 2 nT during this interval, and the baseline for August was adopted for September and October. Abrupt baseline changes occurred in May (Z), July (X,Y,Z) and December (X,Y,Z), following variometer adjustments.

The adopted and observed Ruska baselines and scale values for 1971 are given in Tables 15-17.

Local quiet days (Mould Bay)

The five local quiet days for each month, selected on the basis of the R indices are listed below. Local quiet days which do not appear also in the list of 10 international quiet days are underlined.

January	6	7	8	9	12
February	3	5	7	13	22
March	1	2	6	22	29
April	8	20	24	25	26
May[1]	4	16	27	28	31
June	14	15	19	20	22
July[2]	7	10	17	25	29
August	6	7	14	19	27
September[3]	2	22	23	24	29
October	18	19	21	26	27
November	9	14	15	16	17
December	7	8	14	27	28

[1] Data missing for May 7, 8, 9, 10.
[2] Partial data for July 18.
[3] Partial data for September 10 and 11.

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1971, and a list of the annual mean values, are given in Tables 18-21.

TABLE 15

Mould Bay 1971

X Baselines nT					X Scale Values nT/mm			
Adopted			Observed		Adopted		Observed	
Jan.	1-31	1027 to 1034	Jan. 17	1021	Jan.	12.25	Jan. 17	12.30
Feb.		1034 to 1040	Feb. 5	1035	Feb.	12.25	Feb. 5	12.28
			14	1045				
			20	1038				
Mar.	1-24	1041 to 1057	Mar. 7	1041	Mar.	12.25	Mar. 5	12.25
	25-31	1056	18	1050			24	12.27
			25	1058				
			30	1058				
Apr.		1055 to 1048	Apr. 6	1053	Apr.	12.25	Apr. 6	12.22
			16	1045			25	12.25
			25	1049				
May		1047 to 1040	May 17	1044	May	12.20		
			25	1041				
			31	1042				
June		1040 to 1037	June 8	1038	June	12.15	June 15	12.09
			15	1037			30	12.10
			22	1043				
			30	1031				
July	1-18(0815)	1037			July	12.20	July 17	12.19
	18(0815)-31	721 to 710	July 17	1039				
			29	713				
Aug.		710 to 687	Aug. 5	684	Aug.	12.25	Aug. 26	12.25
			13	683				
			25	701				
Sep.		687 to 660	Sep. 5	686	Sep.	12.30	Sep. 5	12.38
			15	676			15	12.30
			24	668			24	12.40
			30	661				
Oct.		660 to 688	Oct. 31	685	Oct.	12.35	Oct. 31	12.24
Nov.		690 to 737	Nov. 30	739	Nov.	12.40		
Dec.	1-7	737 to 748	Dec. 7	738	Dec.	12.45	Dec. 13	12.48
	8-31		14	734			30	12.32
			22	739				
			30	745				

TABLE 16

Mould Bay 1971

Y Baselines nT						Y Scale Values nT/mm				
Adopted			Observed			Adopted		Observed		
Jan.		2107	Jan.	17	2107	Jan.	12.40			
Feb.		2107	Feb.	5	2103	Feb.	12.40	Feb.	20	12.43
				14	2109					
				20	2108					
Mar.		2107 to 2125	Mar.	7	2110	Mar.	12.40			
				18	2123					
				24	2125					
				30	2126					
Apr.		2126 to 2146	Apr.	6	2123	Apr.	12.40			
				16	2130					
				25	2140					
May		2147 to 2180	May	17	2156	May	12.40			
				25	2169					
				31	2178					
June		2181 to 2201	June	8	2191	June	12.35			
				15	2205					
				22	2200					
				30	2202					
July	1-18(0815)	2200	July	8	2195	July	12.30			
	18(0815)-31	2130		17	2200					
				29	2129					
Aug.		2130	Aug.	5	2135	Aug.	12.25	Aug.	22	12.25
				13	(2120)					
				25	2134					
Sep.		2129 to 2108	Sep.	5	2126	Sep.	12.25	Sep.	24	12.26
				15	2124					
				24	2112					
				31	2107					
Oct.		2107 to 2121	Oct.	31	2121	Oct.	12.25			
Nov.		2122 to 2096	Nov.	30	2096	Nov.	12.25			
Dec.	1-20(1945)	2094 to 2065	Dec.	7	2087	Dec.	12.25	Dec.	30	12.27
				14	2072				31	12.26
				22	2178					
	20(1945)-31	2176 to 2167		30	2168					

TABLE 17

Mould Bay 1971

Z Baselines nT						Z Scale Values nT/mm					
Adopted			Observed			Adopted			Observed		
Jan.		57923 to 57927	Jan.	1	(57934)	Jan.		11.40	Jan.	17	11.41
				13	57924						
				17	57920						
				26	57928						
Feb.	1-28(2300)	57928 to 57932	Feb.	5	57928	Feb.		11.40	Feb.	5	11.40
	28(2300-2400)	57921		14	57930					20	11.37
				20	57932						
				27	57927						
Mar.		57922	Mar.	7	57922	Mar.		11.40	Mar.	7	11.37
				18	57922					24	11.40
				24	57928						
				31	57926						
Apr.		57924	Apr.	6	57921	Apr.		11.40	Apr.	6	11.32
				16	57923					25	11.40
				25	(57954)[1]						
May	1-7(0800)	57925	May	17	58003	May		11.40	May	25	(11.30)
	7(0800)-12(1230)	No trace		25	57977						
	12(1230)-18(1800)	58003		31	57987						
	18(1800)-31	57980									
June		57980				June		11.40	June	15	11.45
									June	30	11.51
July	1-11(0020)	57980	July	8	57980	July		11.40	July	17	11.28
	11(0020)-31	57970		17	57972						
Aug.		57970	Aug.	13	57973	Aug.		11.40	Aug.	26	11.41
Sep.		57970				Sep.		11.40	Sep.	5	11.39
										15	11.41
										25	11.41
Oct.		57970				Oct.		11.35	Oct.	31	11.29
Nov.		57972 to 57975	Nov.	30	57974	Nov.		11.30			
Dec.	1(0000)-21(1015)	57975	Dec.	7	57970	Dec.	1-25(0000)	11.30	Dec.	13	11.41
	21(1015)-21(1550)	57985		14	57976		25(0000)-31	11.65		31	11.62
	21(1550)-22(0600)	57975		22	57975						
	22(0600)-25(0000)	No trace		30	57946						
	25(0000)-25(0350)	58015									
	25(0350)-30(0530)	57946									
	30(0530)-31	57936 to 57946									

MEAN VALUES OF MAGNETIC ELEMENTS

NORTH COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 18 MOULD BAY X = 500 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	592	592	597	572	581	573	562	579	603	614	613	609	591	574	597	602
1-2	604	600	610	586	588	586	582	592	605	618	620	613	600	587	605	609
2-3	609	609	619	605	607	590	599	605	617	621	622	619	610	600	616	615
3-4	612	616	627	621	632	608	617	618	627	629	625	624	621	619	626	619
4-5	619	623	632	639	643	626	636	640	641	640	628	628	633	636	638	625
5-6	620	631	640	650	657	646	646	655	649	647	635	629	642	651	647	629
6-7	629	637	649	664	677	667	657	670	660	659	640	636	654	668	658	636
7-8	638	642	659	674	683	679	663	672	673	665	622	643	659	674	668	636
8-9	650	655	673	682	693	683	667	677	690	671	643	654	670	680	679	651
9-10	659	656	673	689	698	688	673	683	691	670	659	654	674	686	681	657
10-11	656	652	667	686	699	698	683	685	690	667	648	655	674	691	678	653
11-12	650	645	656	683	689	699	695	684	673	659	644	651	669	692	668	648
12-13	638	641	649	683	689	700	692	675	660	653	633	636	662	689	661	637
13-14	629	631	643	684	683	694	694	668	647	632	627	625	655	685	652	628
14-15	619	626	643	673	666	685	672	659	638	628	621	618	646	671	646	621
15-16	609	616	644	657	658	667	658	647	632	628	607	618	637	658	640	613
16-17	598	606	629	640	649	641	630	627	618	620	604	603	622	637	627	603
17-18	593	602	606	624	610	605	602	600	603	608	600	590	604	604	610	596
18-19	583	593	598	609	594	577	555	581	585	603	589	589	588	577	599	589
19-20	575	588	587	580	555	568	540	567	576	590	588	585	575	558	583	584
20-21	575	579	580	569	551	545	514	567	580	594	587	587	569	544	581	562
21-22	574	578	583	572	551	544	539	581	589	600	589	591	574	554	586	583
22-23	579	582	591	570	551	566	567	582	589	596	595	600	581	567	587	589
23-24	586	585	594	577	563	570	579	566	589	601	604	605	585	570	590	595
MEANS	612	616	627	633	632	629	622	628	630	630	618	619	625	628	630	617

MEAN VALUES OF MAGNETIC ELEMENTS

EAST COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 19 MOULD BAY Y = 2000 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	296	278	277	264	284	274	247	277	285	297	308	304	283	271	281	297
1-2	297	278	277	255	265	273	244	267	276	297	309	302	278	262	276	297
2-3	301	285	272	254	262	265	245	257	265	291	307	299	275	257	271	298
3-4	293	284	274	249	264	263	253	253	274	292	310	302	276	258	272	297
4-5	293	290	276	250	266	257	246	255	280	302	311	295	277	256	277	297
5-6	286	296	285	257	273	251	256	261	285	307	308	296	280	260	284	297
6-7	284	295	286	268	274	260	263	270	279	303	304	301	282	267	284	296
7-8	282	289	284	282	291	258	269	286	291	311	290	303	286	276	292	291
8-9	297	296	288	294	311	271	284	306	302	327	300	309	299	293	303	301
9-10	309	306	300	311	326	293	294	312	319	345	320	316	313	306	319	313
10-11	322	318	317	326	342	313	303	324	336	360	333	330	327	321	335	326
11-12	333	330	340	345	352	328	314	337	354	362	352	341	341	333	350	339
12-13	349	340	346	357	358	354	325	352	362	368	362	346	352	347	358	349
13-14	354	347	355	367	374	368	340	369	363	380	363	350	361	363	366	354
14-15	366	357	360	377	380	386	354	369	373	378	364	349	368	372	372	359
15-16	367	360	368	389	405	407	369	383	385	383	366	354	378	391	381	362
16-17	369	356	370	401	418	419	370	389	383	387	359	357	382	399	385	360
17-18	361	364	379	410	412	417	385	382	377	381	356	365	382	399	387	362
18-19	354	345	371	407	402	407	376	367	372	381	349	341	373	388	383	347
19-20	344	337	355	392	384	396	357	353	355	365	335	334	359	373	367	338
20-21	337	326	341	357	366	369	309	347	336	351	330	319	341	348	346	328
21-22	320	318	314	329	335	330	301	332	311	329	319	313	321	325	321	318
22-23	309	298	292	296	293	299	280	308	297	310	311	306	300	295	299	306
23-24	299	288	287	283	287	279	265	284	281	301	310	306	289	279	288	301
MEANS	322	316	317	322	330	322	302	318	323	338	328	322	322	318	325	322

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY-ALL DAYS

TABLE 20 MOULD BAY Z = 57500 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	627	622	619	626	573	593	572	585	596	609	644	665	611	581	613	640
1-2	626	625	624	627	579	580	581	580	594	610	644	661	611	580	614	639
2-3	625	629	621	620	580	585	582	579	595	618	645	655	611	582	614	639
3-4	622	629	623	615	584	583	577	580	600	625	646	655	612	581	616	638
4-5	624	631	627	619	593	585	581	584	610	628	649	655	616	586	621	640
5-6	625	634	631	628	603	589	591	592	618	635	658	660	622	594	628	644
6-7	630	638	635	639	618	600	599	604	620	642	663	662	629	605	634	648
7-8	648	641	642	648	631	615	608	621	630	650	683	669	641	619	643	660
8-9	658	651	655	655	640	624	618	629	648	658	694	683	651	628	654	672
9-10	678	663	666	667	645	631	625	633	659	664	695	698	660	634	664	684
10-11	683	665	665	675	650	642	632	640	661	670	693	707	665	641	668	687
11-12	677	671	671	676	653	649	640	644	659	669	690	707	667	647	669	686
12-13	673	670	674	678	654	659	651	644	657	670	690	697	668	652	670	683
13-14	671	671	673	678	659	666	661	653	651	670	693	695	670	660	668	683
14-15	673	680	674	680	663	674	668	655	645	665	692	691	672	665	666	684
15-16	679	683	671	684	678	687	673	663	654	667	687	691	676	675	669	685
16-17	679	676	675	691	682	693	676	664	656	671	684	699	679	679	673	685
17-18	676	682	687	696	677	688	683	662	655	672	677	703	680	678	678	685
18-19	664	672	683	678	686	689	710	665	663	658	673	690	678	688	671	675
19-20	655	663	658	668	689	679	692	658	654	645	662	681	667	680	656	665
20-21	644	651	646	636	645	645	640	631	637	629	657	674	645	640	637	657
21-22	635	638	621	622	614	624	595	601	602	606	654	671	624	609	613	650
22-23	630	632	612	615	601	604	588	575	587	605	648	664	613	592	605	644
23-24	625	628	615	614	595	596	584	578	596	611	648	664	613	588	609	641
MEANS	651	652	649	651	633	633	626	622	631	644	670	679	645	628	644	663

TABLE 21

Annual Mean Values (Mould Bay)

Year	X	Y	Z	D East*		I North*		H*	F*
	nT	nT	nT	°	′	°	′	nT	nT
1962.8	983	2203	57951	65	57	87	37.0	2412	58001
1963.5	1001	2208	57940	65	37	87	36.3	2424	57991
1964.5	1015	2212	57948	65	21	87	35.7	2434	57999
1965.5	1034	2220	57960	65	02	87	34.8	2449	58012
1966.5	1053	2233	57991	64	45	87	33.7	2469	58044
1967.5	1067	2247	58019	64	36	87	32.7	2487	58072
1968.5	1078	2258	58053	64	29	87	31.9	2502	58107
1969.5	1092	2276	58081	64	22	87	30.8	2524	58136
1970.5	1115	2306	58120	64	12	87	28.6	2561	58176
1971.5	1125	2322	58145	64	09	87	27.6	2580	58202

*D, I, H, F are derived from the annual means of X, Y, Z.

BAKER LAKE

Officer-in-charge: O. Jensen

The Dominion Observatory (now Earth Physics Branch) began a program of magnetic field observations at Baker Lake, N.W.T., in 1947. Continuous photographic recording of the field using standard LaCour variometers began in January 1951.

The mailing address of Baker Lake observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines and Resources
Ottawa, Canada K1A 0Y3

The area is one of granitic rocks of the Precambrian Shield.

Magnetic equipment

As discussed in the introductory section of the report, an AMOS was installed at Baker Lake in October 1971.

Parameters for Ruska data reduction

Temperature and parallax corrections

Ruska temperature coefficients, determined from the baseline changes which followed the increase in ambient temperature on February 14, were as follows:

X	−1.0 nT/°C
Y	0.0 nT/°C
Z	+4.0 nT/°C

The Z coefficient was given incorrectly as −4.0 nT/°C in the 1970 Annual Report; it should have read +4.0 nT/°C.

Parallax corrections to be added to times read on the magnetograms were determined January 9, 1971, as 0.7 min in X, 0.5 min in Y and 0.4 min in Z.

Baselines and scale values

Baseline changes were observed in all elements January 9(0500) following levelling of the Ruska variometers. The Z baseline changed abruptly February 14(2200) when the temperature level in the variometer room increased by 7°C.

The installation of an AMOS October 16–18 introduced an effect of −10 nT in X; +10 nT in Y and +32 nT in Z. Baselines following the AMOS installation have been corrected for this effect.

The large baseline drifts observed during the months September to December result from movement of the concrete slab floor.

Adopted and observed baselines and scale values for 1971 are given in Tables 22-24.

Local quiet days (Baker Lake)

The five local quiet days for each month, selected on the basis of the R index, are listed below. Local quiet days which do not appear also in the list of 10 international quiet days are underlined.

January	7	8	9	12	26
February	3	4	5	13	22
March	21	22	23	28	29
April	19	20	24	25	26
May	16	21	27	28	31
June	7	10	15	19	20
July	7	10	17	24	25
August	6	7	19	20	27
September	2	10	22	23	24
October	16	17	19	26	27
November	6	14	15	16	17
December	7	9	10	14	20

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1971, and a list of the annual mean values, are given in Tables 25-28.

TABLE 22

Baker Lake 1971

X Baselines nT						X Scale Values nT/mm				
Adopted			Observed			Adopted		Observed		
Jan.	1-9(0500)	3960 to 3954	Jan.	9	3954	Jan.	13.00	Jan.	9	12.98
	9(0500)-31	3981		9	3981					
				18	(3971)					
Feb.	1-14(2200)	3981	Feb.	4	3981	Feb.	13.00	Feb.		12.90
	14(2200)-28	3987 to 3986		13	3980					
				21	3988					
				28	3984					
Mar.		3985 to 3981	Mar.	9	3985	Mar.	13.00	Mar.		13.06
				30	3981					
Apr.	1-23(2340)	3982 to 3987	Apr.	13	3985	Apr.	13.00	Apr.	13	12.97
	23(2340)-30	3977		22	3988					
				29	3977					
May		3975	May	10	3975	May	13.00	May	11	13.08
				19	3975					
June		3975				June	13.00	June	29	13.01
July		3975	July	2	3978	July	13.00	July	28	13.02
				29	3972					
Aug.	1-19	3975	Aug.	6	3977	Aug.	12.90	Aug.	1	12.84
	20-31	3975 to 3980		15	3976					
				24	3975					
Sep.		3981 to 3994	Sep.	1	3978	Sep.	12.90			
				8	3985					
				14	3990					
				22	3994					
				29	3993					
Oct.	1-26	3995 to 4007	Oct.	9	3997	Oct.	12.95			
				18	4002					
				19	4003					
	27-31	4006 to 4002		26	4003					
Nov.		4000 to 3970	Nov.	3	3999	Nov.	13.00			
				10	3990					
				19	3981					
				30	3970					
Dec.		3970 to 3949	Dec.	8	3968	Dec.	13.00	Dec.	15	13.01
				15	3964					
				22	3956					

TABLE 23

Baker Lake 1971

Y Baselines nT						Y Scale Values nT/mm				
Adopted			Observed			Adopted		Observed		
Jan.	1-9(0500)	72 to 70	Jan.	9	71	Jan.	13.42 to 1345	Jan.	9	13.48
	9(0500)-31	10 to −1		9	10					
				17	(−12)					
Feb.		−1 to −15	Feb.	4	−2	Feb.	13.45	Feb.	4	13.44
				13	−7					
				21	−10					
				28	−18					
Mar.		−16 to −18	Mar.	9	−18	Mar.	13.45	Mar.	9	13.58
			Mar.	30	−18					
Apr.		−18 to −11	Apr.	13	−15	Apr.	13.40	Apr.	13	13.37
				22	−14					
				29	−11					
May	1-27	−10 to −2	May	11	−3	May	13.40	May	11	13.55
				19	−1					
	28-31	−3 to −5								
June		−5 to −27				June	13.40	June	29	13.39
July		−28 to −43	July	2	−31	July	13.40	July	28	13.39
				29	−47					
Aug.		−43 to −55	Aug.	6	−41	Aug.	13.35	Aug.	1	13.37
				15	−44					
				24	−51					
Sep.		−57 to −80	Sep.	1	−52	Sep.	13.40			
				8	−61					
				19	−65					
				22	−73					
				29	−82					
Oct.	1-19	−81 to −99	Oct.	9	−88	Oct.	13.45			
	20-31	−98 to −95		18	−97					
				19	−101					
				26	−95					
Nov.		−94 to −27	Nov.	3	−94	Nov.	13.50			
				10	−85					
				19	−54					
				30	−27					
Dec.		−26 to +23	Dec.	8	−13	Dec.	13.55	Dec.	15	13.55
				15	− 2					
				22	+13					

TABLE 24

Baker Lake 1971

Z Baselines nT						Z Scale Values nT/mm					
Adopted			Observed			Adopted			Observed		
Jan.	1-9(0500)	60379	Jan.	9	60378	Jan.	1-9(0500)	13.14 to 13.13	Jan.	9	13.08
				9	60301		9(0500)-31	13.13 to 13.25			
				18	60300						
	9(0500)-31	60301 to 60299									
Feb.	1-14(2200)	60298 to 60276	Feb.	4	60297	Feb.		13.26 to 13.38	Feb.	4	13.28
				13	60298						
				21	60278						
	14(2200)-28	60276		28	60274						
Mar.		60276	Mar.	9	60276	Mar.		13.38	Mar.	9	13.46
				30	60277						
Apr.	1-17	60276 to 60271	Apr.	13	60270	Apr.		13.38	Apr.	14	13.41
				22	60273						
				29	60274						
	18-30	60272 to 60275									
May		60275 to 60283	May	11	60278	May		13.38	May	11	13.47
				19	60283						
June		60283 to 60251				June		13.35	June	29	13.31
July		60251 to 60246	July	2	60256	July		13.35	July	28	13.33
				29	60246						
Aug.		60246 to 60240	Aug.	11	60246	Aug.		13.30	Aug.	1	13.30
				15	60246						
				24	60243						
Sep.		60238 to 60230	Sep.	1	60238	Sep.		13.35			
				9	60237						
				14	60236						
				22	60232						
				29	60231						
Oct.	1-17	60229 to 60216	Oct.	9	60223	Oct.		13.40			
	17-31	60217 to 60221		18	60215						
				19	60217						
				26	60219						
Nov.		60222 to 60245	Nov.	3	60223	Nov.		13.45			
				10	60232						
				19	60242						
				30	60245						
Dec.		60247 to 60275	Dec.	8	60258	Dec.		13.45	Dec.	15	13.47
				15	60266						
				22	60267						

MEAN VALUES OF MAGNETIC ELEMENTS

NORTH COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 25 BAKER LAKE X = 3900 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	420	423	426	422	449	478	468	464	455	443	441	448	445	465	437	433
1-2	421	413	426	427	443	469	462	451	439	433	442	443	439	456	431	430
2-3	414	412	421	436	443	462	452	447	425	413	427	440	433	451	424	423
3-4	396	409	413	429	453	458	457	444	428	412	424	428	429	453	421	414
4-5	414	413	406	434	442	460	447	455	439	420	424	421	431	451	425	418
5-6	400	426	421	436	451	468	456	460	447	440	423	428	438	459	436	419
6-7	403	427	433	433	456	472	455	462	445	440	435	422	440	461	438	422
7-8	404	422	436	453	457	468	456	457	462	449	420	432	443	460	450	420
8-9	420	420	424	450	463	467	461	463	463	453	425	437	446	464	448	426
9-10	413	427	424	438	468	467	459	457	454	447	425	438	443	463	441	426
10-11	412	424	425	432	465	467	453	450	448	441	434	434	440	459	437	426
11-12	401	414	419	433	452	445	444	449	437	424	428	423	431	448	428	417
12-13	403	404	404	420	440	438	416	437	425	412	415	419	419	433	415	410
13-14	394	394	393	388	408	406	397	404	408	415	392	410	401	404	401	398
14-15	379	361	359	357	379	372	364	371	388	400	396	407	378	372	376	386
15-16	360	359	333	349	365	356	351	370	369	394	396	383	365	361	361	375
16-17	366	364	355	370	401	364	371	382	392	392	401	379	378	380	377	378
17-18	375	367	372	375	415	412	401	405	420	417	420	398	398	408	396	390
18-19	400	400	409	398	443	435	422	438	441	448	438	419	424	435	424	414
19-20	419	416	417	428	471	456	459	460	465	465	452	434	445	462	444	430
20-21	427	430	430	453	472	465	478	486	478	469	454	446	457	475	458	439
21-22	427	440	441	440	473	478	487	489	483	475	459	445	461	482	460	443
22-23	425	433	439	436	457	486	478	499	465	470	455	447	458	480	453	440
23-24	423	433	439	424	457	479	479	481	459	454	449	451	452	474	444	439
MEANS	405	410	411	419	443	447	441	445	439	434	428	426	429	444	426	417

MEAN VALUES OF MAGNETIC ELEMENTS

EAST COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 26 BAKER LAKE Y = 0 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	212	200	195	178	176	206	188	195	206	213	221	225	201	191	198	215
1-2	213	195	198	170	160	192	184	185	185	205	218	225	194	180	190	213
2-3	208	200	188	174	150	182	168	175	174	193	215	223	188	169	182	212
3-4	202	193	189	164	150	177	172	159	170	193	212	215	183	165	179	206
4-5	203	188	178	156	155	173	162	164	175	189	205	203	179	164	175	200
5-6	185	194	183	162	172	176	175	170	182	198	197	195	182	173	181	193
6-7	180	194	192	172	185	183	178	187	184	205	209	196	189	183	188	195
7-8	182	193	198	202	200	190	193	200	212	223	205	214	201	196	209	199
8-9	211	210	210	215	214	200	202	219	232	242	217	223	216	209	225	215
9-10	231	225	224	222	226	208	212	225	240	250	235	236	228	218	234	232
10-11	233	230	230	228	237	229	221	229	248	258	243	241	236	229	241	237
11-12	243	235	237	235	246	235	229	239	255	254	247	253	242	237	245	245
12-13	250	237	241	249	256	258	249	253	258	260	253	249	251	254	252	247
13-14	251	238	247	260	270	276	262	274	267	270	258	249	260	271	261	249
14-15	262	246	253	272	276	292	278	276	267	269	260	250	267	281	265	255
15-16	259	255	259	278	284	291	277	265	264	266	257	251	267	279	267	256
16-17	255	243	249	263	267	280	254	245	248	259	245	243	254	262	255	247
17-18	243	236	247	263	254	259	246	232	237	245	238	244	245	248	248	240
18-19	240	228	240	256	264	258	259	232	248	246	233	241	245	253	248	236
19-20	233	229	239	257	287	265	253	235	247	244	229	237	246	260	247	232
20-21	230	224	231	251	278	258	247	255	253	242	224	226	243	260	244	226
21-22	222	220	222	231	250	244	231	247	242	239	224	221	233	243	234	222
22-23	220	216	209	212	218	230	217	239	226	232	223	225	222	226	220	221
23-24	218	208	200	199	203	212	207	215	217	222	220	225	212	209	210	218
MEANS	224	218	219	220	224	228	219	221	227	234	229	230	224	223	225	225

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY-ALL DAYS

TABLE 27 BAKER LAKE Z = 60000 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	555	561	560	543	517	522	517	529	563	585	601	599	554	521	563	579
1-2	559	568	569	560	539	534	530	548	589	602	609	603	568	538	580	585
2-3	568	569	586	580	568	561	549	566	606	634	617	612	585	561	602	592
3-4	569	585	595	603	612	584	571	601	626	639	623	618	602	592	616	599
4-5	584	593	614	626	630	607	604	623	644	657	642	633	621	616	635	613
5-6	598	607	615	648	636	634	609	640	671	670	648	640	635	630	651	623
6-7	617	615	625	669	671	648	626	658	681	685	673	651	652	651	665	639
7-8	642	644	669	658	673	675	636	660	688	685	688	668	666	661	675	661
8-9	646	659	688	668	667	675	632	651	699	685	687	685	670	656	685	669
9-10	668	652	681	680	662	678	631	657	706	681	695	697	674	657	687	678
10-11	666	646	663	684	671	697	646	674	702	679	686	700	676	672	682	675
11-12	670	646	654	690	673	715	675	692	697	688	683	692	681	689	682	673
12-13	659	655	674	712	687	715	696	707	696	705	686	684	690	701	697	671
13-14	660	658	677	734	689	714	698	707	695	697	685	674	691	702	701	669
14-15	655	675	692	719	682	717	676	690	685	680	672	663	684	691	694	666
15-16	643	658	666	685	657	681	641	662	664	671	641	656	660	660	672	650
16-17	624	616	628	649	634	625	604	643	642	657	629	644	633	627	644	628
17-18	598	607	606	620	604	594	587	622	620	639	625	629	613	602	621	615
18-19	588	593	597	605	585	599	574	609	607	622	614	612	600	592	608	602
19-20	571	579	577	570	557	568	559	599	595	607	608	601	583	571	587	590
20-21	556	563	549	550	513	540	535	572	572	590	596	599	561	540	565	579
21-22	547	554	541	522	485	511	516	545	551	584	593	597	546	514	550	573
22-23	553	554	543	517	486	501	510	517	555	569	594	597	541	504	546	575
23-24	551	555	549	532	506	517	523	514	561	577	597	595	548	515	555	575
MEANS	606	609	617	626	608	617	598	620	638	645	641	639	622	611	632	624

TABLE 28

Annual Means Values (Baker Lake)

Year	X	Y	Z	D East*		I North*		H*	F*
	nT	nT	nT	°	′	°	′	nT	nT
1951.6	3730	74	60229	1	8	86	27.3	3731	60344
1952.5	3744	79	60216	1	13	86	26.5	3745	60332
1953.5	3767	87	60224	1	19	86	25.2	3768	60342
1954.5	3799	80	60230	1	12	86	23.4	3800	60350
1955.5	3834	80	60291	1	12	86	21.6	3835	60413
1956.5	3896	76	60314	1	7	86	18.2	3897	60440
1957.5	3933	84	60333	1	13	86	16.2	3934	60461
1958.5	3968	91	60338	1	19	86	14.2	3969	60468
1959.5	4009	109	60371	1	33	86	12.0	4010	60504
1960.5	4030	120	60394	1	42	86	10.8	4032	60528
1961.5	4056	125	60407	1	46	86	9.4	4058	60543
1962.5	4089	134	60412	1	53	86	7.5	4091	60550
1963.5	4115	145	60400	2	1	86	6.0	4118	60540
1964.5	4138	151	60390	2	5	86	4.7	4141	60532
1965.5	4174	144	60386	1	59	86	2.6	4176	60530
1966.5	4199	158	60396	2	9	86	1.2	4202	60542
1967.5	4223	178	60433	2	25	86	0.0	4227	60581
1968.5	4252	191	60492	2	34	85	58.5	4256	60642
1969.5	4277	201	60532	2	41	85	57.2	4282	60683
1970.5	4302	214	60587	2	51	85	55.9	4307	60740
1971.5	4329	224	60622	2	58	85	54.6	4335	60777

*D, I, H, F are derived from the annual means of X, Y, Z. All values corrected to the pier in the new magnetic observatory building.

FORT CHURCHILL

Officer-in-charge: Operated by National Research Council under Contract.

Photographic recording of magnetic field variations was begun at Fort Churchill in 1957 by the Defence Research Northern Laboratory (DRNL) of the Defence Research Board, primarily to provide information for the Fort Churchill Rocket Program. In July 1965 the operation of the Churchill Research Range, including the magnetic observatory, was taken over by the National Research Council of Canada, with funds for the magnetic observatory provided by the Earth Physics Branch, Department of Energy, Mines and Resources.

Until 1965 there were no facilities for regular absolute observations; baselines and scale values of the magnetograms were determined by personnel of the Division of Geomagnetism on an average of once or twice a year. Owing to inadequate absolute control, no data were published for the years 1957 to 1963.

The mailing address for Fort Churchill observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines and Resources
Ottawa, Ontario K1A 0Y3

Observatory site

The observatory is in a region characterized by sedimentary and volcanic rocks of Precambrian age.

A total force survey carried out in 1963 had shown that the area was reasonably flat magnetically with no total force anomalies greater than 30 nT within 45 m of the proposed site.

Parameters for Ruska data reduction

Temperature and parallax corrections

From tests carried out February 12, 13, 1971 and April 11, 1972, the Ruska temperature coefficients were calculated to be −2 nT/°C in X; less than 1 nT/°C in Y; +2nT/ °C in Z.

Temperature corrections were applied to the X and Z mean hourly values on January 7, 19–20, 28–31; February 1; March 18–19; May 8–9; 23–25, and December 21–22, 30. Insufficient thermostatting of heaters resulted in significant temperature changes in the period January to May. The temperature fluctuations in December were caused by the breakdown of an electric heater.

Parallax corrections to be added to the times read on the magnetograms were determined March 11, 1971 as 0.6 min in X; 0.0 min in Y; and −0.4 min in Z.

Baselines and scale values

An unexplained shift of about 110 nT was observed in the X trace March 19 from 0000 to 1700 U.T. From April 17 to 21 the Z baseline increased by about 30 nT a day. A similar increase occurred on May 11. The reason for these rapid and apparently linear changes in the Z baseline is not known. The mean hourly values were calculated using a mean baseline for the day, thus introducing an uncertainty which reached a maximum of 15 nT in the first and last Z values for these days. Further abrupt baseline changes were observed in X on April 28(1615); May 4(1735), 8(1745), and 12(1821); and in Z on May 12(1821).

The adopted and observed baselines and scale values for 1971 are given in Tables 29–31.

Local quiet days (Fort Churchill)

The five local quiet days for each month, selected on the basis of the R index, are listed below. Local quiet days which do not appear also in the list of 10 international quiet days are underlined.

January	7	8	9	12	26
February	3	4	5	11	13
March	2	22	23	28	29
April	20	24	25	26	<u>29</u>
May	12	16	27	28	<u>29</u>
June	7	10	15	19	24
July	7	10	20	24	25
August	6	20	27	28	<u>29</u>
September	2	21	22	23	24
October	18	19	23	26	27
November	<u>10</u>	14	15	16	17
December	7	8	10	20	28

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1971, and a list of the annual mean values, are given in Tables 32–35.

TABLE 29

Fort Churchill 1971

X Baselines nT						X Scale Values nT/mm					
Adopted			Observed			Adopted			Observed		
Jan.	1-31	7136	Jan.	13	7137	Jan.	1-31	7.80	Jan.	13	7.73
				26	7135						
Feb.	1-28	7136				Feb.	1-28	7.80	Feb.	5	7.85
Mar.	1-18	7137									
	19(0000)-19(1700)	7033	Mar.	5	7138	Mar.	1-31	7.85			
	19(1700)-31	7149		29	7148				Mar.	29	7.84
Apr.	1-28(1615)	7150 to 7163	Apr.	17	7150	Apr.	1-30	7.90			
	28(1615)-30	7279		24	7161				Apr.	24	7.91
May	1-4(1735)	7279				May	1-31	7.95	May	20	7.98
	4(1735)-8(1745)	7231	May	13	7149						
	8(1745)-12(1821)	7255		20	7142						
	12-31	7147 to 7138		22	7143						
				27	7140						
June		7138	June	7	7136	June	1-30	7.95	June	21	7.99
				15	7139						
				27	7137						
July	1-31	7139	July	1	7138	July	1-31	7.95	July	15	7.95
				5	7141						
				8	7139						
				9	7139						
Aug.	1-31	7139	Aug.	13	7143	Aug.	1-31	7.95	Aug.	19	7.92
				16	7138						
				18	7140						
				19	7137						
Sep.	1-30	7138 to 7136	Sep.	17	7139	Sep.	1-30	7.95	Sep.	21	7.91
				28	7136					28	7.92
				28	7138						
				29	7136						
Oct.	1-31	7136 to 7127	Oct.	6	7134	Oct.	1-31	7.95	Oct.	15	7.99
				18	7133						
				27	7129						
Nov.	1-30	7126 to 7116	Nov.	9	7121	Nov.	1-30	7.90	Nov.	1	7.90
				12	(7134)						
				15	7122						
				16	7119						
Dec.	1-31	7115 to 7106	Dec.	6	7114	Dec.	1-31	7.85	Dec.	7	7.82
				7	7114						
				28	7107						
				31	7117						

TABLE 30

Fort Churchill 1971

Y Baselines nT						Y Scale Values nT/mm					
Adopted			Observed			Adopted			Observed		
Jan.	1-31	334 to 341	Jan.	13	337	Jan.	1-31	7.85	Jan.	13	7.86
				26	335						
Feb.	1-28	341 to 347				Feb.	1-28	7.85			
Mar.	1-11	347 to 349	Mar.	5	353	Mar.	1-31	7.85	Mar.	29	7.77
	12-31	349 to 337		29	336						
Apr.	1-30	336 to 319	Apr.	17	335	Apr.	1-30	7.90	Apr.	24	7.94
				24	316						
May	1-15	320 to 326	May	11	322	May	1-31	7.90	May	20	7.94
	16-31	326		13	321						
				20	332						
				22	331						
				27	323						
June	1-30	327	June	7	327	June	1-30	7.90	June	21	7.89
				15	332						
				27	327						
July	1-31	328	July	1	332	July	1-31	7.90	July	15	7.82
				5	328						
				8	325						
				9	327						
Aug.	1-31	329 to 333	Aug.	13	333	Aug.	1-31	7.90	Aug.	20	7.94
				16	329						
				18	325						
				19	331						
Sep.	1-30	333 to 337	Sep.	17	342	Sep.	1-30	7.90	Sep.	21	7.89
				28	342						
				29	332						
Oct.	1-31	338 to 340	Oct.	6	341	Oct.	1-31	7.90	Oct.	15	7.90
				18	338						
				27	342						
Nov.	1-30	340 to 343	Nov.	9	355	Nov.	1-30	7.95	Nov.	1	7.98
				12	335						
				15	338						
				16	341						
Dec.	1-31	343 to 346	Dec.	6	344	Dec.	1-31	7.95	Dec.	7	7.91
				7	344						

TABLE 31

Fort Churchill 1971

Z Baselines nT						Z Scale Values nT/mm					
Adopted			Observed			Adopted			Observed		
Jan.	1-31	60572	Jan.	13	60572	Jan.	1-31	8.50	Jan.	13	8.43
				26	60573						
Feb.	1-28	60572				Feb.	1-28	8.45	Feb.	3	8.43
Mar.	1-31	60573 to 60575	Mar.	5	60578	Mar.	1-31	8.50			
				29	60570				Mar.	29	8.54
Apr.	1-16	60575 to 60580	Apr.	17	60583	Apr.	1-30	8.50	Apr.	17	8.53
	17-21	60580 to 60730		24	60701						
	22-26	60730 to 60680									
	27-30	60680									
May	1-10	60680	May	11	60652	May	1-31	8.50	May	20	8.50
	11-12(1820)	60680 to 60653		13	60674						
	12(1821)-23	60675 to 60663		20	60668						
	24-31	60662 to 60692		22	60664						
				27	60691						
June	1-15	60692	June	7	60691	June	1-30	8.50	June	21	8.49
	16-27	60693 to 60704		15	60692						
	28-30	60704		27	60703						
July	1-31	60705 to 60709	July	1	60707	July	1-31	8.50	July	15	8.52
				5	60706						
				8	60704						
				9	60701						
				28	(60718)						
Aug.	1-17	60710	Aug.	13	(60722)	Aug.	1-30	8.45	Aug.	19	8.36
	18-30	60711 to 60703		18	60705						
				19	60710						
Sep.	1-30	60703 to 60687	Sep.	17	60701	Sep.	1-30	8.50	Sep.	21	8.48
				28	60682						
				28	60684						
				29	60685						
Oct.	1-31	60686 to 60670	Oct.	6	60684	Oct.	1-31	8.50	Oct.	15	8.48
				18	60671						
				27	60681						
Nov.	1-30	60670 to 60659	Nov.	9	60664	Nov.	1-30	8.50	Nov.	1	8.50
				12	60654						
				15	60665						
				16	60672						
Dec.	1-31	60658 to 60635	Dec.	6	60657	Dec.	1-31	8.45	Dec.	6	8.44
				7	60654						
				28	60637						
				31	60637						

MEAN VALUES OF MAGNETIC ELEMENTS

NORTH COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 32 FORT CHURCHILL X = 6500 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	595	593	606	622	664	673	671	668	639	631	629	637	636	669	625	614
1-2	595	590	603	612	633	656	652	642	622	603	616	633	621	646	610	609
2-3	584	583	580	593	612	630	639	619	594	561	610	628	603	625	582	601
3-4	584	569	567	580	570	603	610	582	574	581	605	620	587	591	576	595
4-5	557	568	553	546	562	582	579	576	571	574	590	599	571	575	561	579
5-6	543	562	557	528	570	562	585	563	548	567	579	595	563	570	550	570
6-7	524	550	539	497	527	560	560	547	551	549	563	586	546	549	534	556
7-8	511	524	506	539	544	533	565	555	546	555	546	570	541	549	537	538
8-9	512	508	484	529	543	531	575	572	527	548	535	543	534	555	522	525
9-10	480	515	483	509	560	535	571	560	512	545	529	538	528	557	512	516
10-11	475	516	512	501	548	504	552	537	512	546	552	524	523	535	518	517
11-12	467	510	515	494	537	482	514	513	521	524	549	534	513	512	514	515
12-13	489	498	498	469	524	500	501	503	535	516	546	554	511	507	505	522
13-14	497	505	505	456	524	496	517	519	533	540	554	581	519	514	509	534
14-15	497	506	520	489	531	512	546	542	545	570	568	600	536	533	531	543
15-16	526	520	542	529	544	543	566	554	546	574	584	598	552	552	548	557
16-17	543	547	547	550	563	579	570	571	567	577	594	590	567	571	560	569
17-18	556	554	558	565	587	588	583	585	588	589	601	598	579	586	575	577
18-19	558	563	574	594	611	610	607	603	608	605	607	604	595	608	595	583
19-20	571	577	594	612	645	637	621	618	626	620	616	613	613	630	613	594
20-21	583	588	613	623	676	653	644	647	650	634	628	616	630	655	630	604
21-22	590	597	617	641	690	674	666	662	657	637	631	627	641	673	638	611
22-23	586	596	617	646	688	685	672	681	650	648	631	635	645	682	640	612
23-24	593	598	617	629	668	677	665	685	645	642	631	641	641	674	633	616
MEANS	542	551	554	556	588	584	593	588	578	581	587	594	575	588	567	569

MEAN VALUES OF MAGNETIC ELEMENTS

EAST COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 33 FORT CHURCHILL Y = 0 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	504	509	508	490	486	502	504	507	511	516	519	513	506	500	506	511
1-2	509	503	510	481	474	496	504	501	499	518	515	517	502	494	502	511
2-3	501	512	503	482	462	487	492	495	499	497	511	519	497	484	495	511
3-4	496	505	502	478	454	481	482	481	488	497	512	516	491	475	491	507
4-5	491	495	497	460	454	462	475	475	479	483	503	505	482	467	480	499
5-6	481	494	492	461	457	460	483	469	470	475	490	493	477	467	475	490
6-7	470	493	491	452	468	472	477	485	471	487	498	493	480	476	475	489
7-8	475	496	488	490	484	478	491	498	499	503	489	498	491	488	495	490
8-9	495	505	504	501	500	486	501	512	517	517	507	507	504	500	510	504
9-10	504	515	523	513	509	504	511	519	531	526	528	518	517	511	523	516
10-11	514	524	527	528	522	517	522	530	541	540	529	531	527	523	534	525
11-12	525	529	533	533	539	544	542	552	554	543	537	533	539	544	541	531
12-13	529	535	542	550	552	559	561	567	560	547	539	530	548	560	550	533
13-14	530	531	545	559	562	565	567	571	560	543	535	524	549	566	552	530
14-15	532	531	543	555	554	563	559	559	549	537	528	523	544	559	546	529
15-16	521	530	535	538	539	552	547	541	531	529	529	523	535	545	533	526
16-17	511	518	525	527	523	527	529	518	513	521	518	515	520	524	522	516
17-18	502	510	516	521	507	516	516	503	503	503	511	513	510	511	511	509
18-19	501	503	510	514	510	507	511	493	501	499	505	510	505	505	506	505
19-20	495	504	511	513	514	507	497	493	500	500	503	504	503	503	506	502
20-21	498	505	508	507	518	507	500	504	508	503	505	500	505	507	507	502
21-22	498	504	503	505	512	506	499	507	512	509	509	501	505	506	507	503
22-23	499	507	504	501	504	506	504	515	514	511	511	508	507	507	508	506
23-24	501	507	501	503	497	498	506	512	514	513	513	510	506	503	508	508
MEANS	503	511	513	507	504	508	512	513	513	513	514	513	510	509	512	510

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY-ALL DAYS

TABLE 34 FORT CHURCHILL Z = 60500 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	308	319	316	298	278	310	290	292	311	311	328	338	308	293	309	323
1-2	306	315	322	305	286	304	295	281	310	310	336	337	309	292	312	324
2-3	302	308	315	324	294	305	288	295	297	301	324	332	307	296	309	317
3-4	305	310	290	325	321	317	307	294	291	308	316	318	309	310	304	312
4-5	314	306	298	352	348	334	333	319	334	319	321	323	325	334	326	316
5-6	314	327	326	354	382	370	340	341	358	366	349	337	347	358	351	332
6-7	335	339	355	395	421	399	358	379	384	395	374	353	374	389	382	350
7-8	364	356	399	412	424	419	367	382	413	398	392	378	392	398	406	373
8-9	393	380	422	422	430	415	372	391	434	420	390	406	406	402	425	392
9-10	407	385	425	432	428	422	370	389	436	406	391	417	409	402	425	400
10-11	385	375	409	428	430	432	374	398	421	395	383	405	403	409	413	387
11-12	375	360	392	432	420	429	380	396	399	375	373	379	393	406	400	372
12-13	358	344	365	415	395	400	356	373	367	355	358	360	371	381	376	355
13-14	333	333	339	371	371	391	329	336	341	341	343	342	348	357	348	338
14-15	325	327	319	337	345	343	317	312	326	328	342	336	330	329	328	333
15-16	314	329	314	326	344	321	317	308	328	331	345	329	326	323	325	329
16-17	321	330	324	339	345	327	321	314	326	339	344	334	330	327	332	332
17-18	330	338	338	340	344	335	321	324	337	349	349	344	337	331	341	340
18-19	332	345	345	337	354	339	323	335	343	358	354	350	343	338	346	345
19-20	340	343	346	336	352	340	332	341	350	361	359	351	346	341	348	348
20-21	335	340	341	343	342	331	337	340	349	357	355	357	344	338	348	347
21-22	330	337	338	330	334	321	327	339	340	352	345	351	337	330	340	341
22-23	319	325	335	318	309	320	311	335	329	342	344	346	328	319	331	334
23-24	319	320	329	300	297	316	298	313	312	334	338	347	319	306	319	331
MEANS	336	337	346	357	358	356	332	338	352	352	352	353	347	346	352	345

TABLE 35

Annual Mean Values (Fort Churchill)

Year	X	Y	Z	D East*		I North*		H*	F*
	nT	nT	nT	°	′	°	′	nT	nT
1957.7	6648	320	60649	2	45	83	44.2	6656	61013
1958.5	6650	329	60641	2	50	83	44.1	6658	61006
1964.5	6826	459	60646	3	51	83	33.1	6841	61031
1965.5	6866	437	60683	3	39	83	41.1	6880	61072
1966.5	6881	452	60701	3	46	83	31.1	6896	61092
1967.5	6917	462	60736	3	49	83	29.3	6932	61130
1968.5	6941	469	60756	3	52	83	28.1	6957	61153
1969.5	6982	479	60781	3	55	83	25.9	6998	61182
1970.5	7030	497	60816	4	03	83	23.4	7048	61223
1971.5	7075	510	60847	4	07	83	21.1	7093	61259

*D, I, H, F are derived from annual means of X, Y, Z.

GREAT WHALE RIVER

Officers-in-charge: P. Fournier 1970.5 – 1971.2
R. Groulx 1971.2 – 1971.5
L. Newitt 1971.5 – 1972.5

The Division of Geomagnetism of the Earth Physics Branch established the Great Whale River magnetic observatory in January 1965 at Poste-de-la-Baleine, Quebec. The observatory was designed to assist in conjugate point studies: its location is geomagnetically conjugate to the observatory at Byrd in Antarctica,* operated by the United States, and its instrumentation is similar, including both standard and rapid-run photographic variometers. For two years prior to the installation of photographic recorders a three-component electrical recording magnetometer had been in operation in Great Whale River.

From September 1965, when a seismic observatory was established, until September 1972, a combined magnetic-seismic observatory was operated jointly by the Divisions of Seismology and Geomagnetism. Following September 1972 the magnetic operation has been carried out by contract with the National Research Council of Canada.

The mailing address for the observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines and Resources
Ottawa, Canada K1A 0Y3

Observatory site

Poste-de-la-Baleine is located on a broad sandy spit at the mouth of Great Whale River on the east shore of Hudson Bay. The area consists of Archean granites largely overlain with a thick layer of sand. The sand was tested for magnetic properties and found to contain significant quantities of magnetite.

The observatory was built on a rock ridge 25 m above sea level about 2 km north of the east-west runway. Because of its magnetic properties, the local sand was not used in the construction.

Magnetic equipment

In addition to the standard observatory instrumentation, a rapid-run Ruska magnetograph, recording D, H, Z at a time scale of 240 mm/hr, has been in operation at Great Whale River for the period 1 January to 31 March, 1965, and 24 August, 1965 to 10 June, 1972.

Scale values adopted for the rapid-run magnetograms for 1971 were as follows:

*Byrd observatory was closed October 1971.

Scale values for rapid-run magnetograms (Great Whale River)

	D '/mm	H nT/mm	Z nT/mm
January	1.72	4.88	6.11
February	1.80	4.90	6.10
March	1.80	4.90	6.10
April	1.70	4.86	5.93
May	1.71	4.80	5.87
June	1.69	4.81	5.85
July	1.69	4.87	5.96
August	1.72	4.83	5.58
September	1.72	4.80	5.70
October	1.74	4.90	5.90
November	1.70	4.80	5.90
December	1.70	4.80	6.00

Parameters for Ruska data reduction

Temperature and parallax corrections

Ruska temperature coefficients determined January 17, 1971 and March 26, 28, 1972, were zero for D and H, and −4 nT/°C for Z.

Parallax corrections to be subtracted from times read on the magnetograms were determined January 17 and January 28, 1971 and March 25, 1972, as 1.0 min in D and H, and 0.8 min in Z. The change in the parallax correction from 1.5 min in all elements reported for 1970, was assumed to occur on July 1, 1971, following baseline adjustments.

Baselines and scale values

The Z baseline was adjusted April 18(1500), and July 1(1650).

The D baseline was adjusted July 1(1650), 7(1500), and September 23(1515) and 24(1900).

The H baseline was adjusted July 1(1650).

A large linear drift was observed in the Z scale value from January to April 18 (13.8 nT/mm to 14.8 nT/mm). The Ruska Z system was reset April 18(1500).

The adopted and observed baselines and scale values for 1971 for the standard Ruska magnetograms are given in Tables 36–38.

Local quiet days (Great Whale River)

The five local quiet days for each month, selected on the basis of the R index, are listed below. Local quiet days which do not appear also in the list of 10 international quiet days are underlined.

January	7	8	9	12	26
February	3	4	5	11	13
March	21	22	23	28	29
April	2	24	25	26	29
May	16	21	27	28	29
June	7	10	19	20	24
July	7	10	20	24	25
August	6	20	27	28	29
September	2	21	22	23	24
October	17	18	19	26	27
November	2	14	15	16	17
December	7	8	10	14	20

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1971, and a list of the annual mean values, are given in Tables 39--42.

TABLE 36

Great Whale River 1971

H Baselines nT						H Scale Values nT/mm					
Adopted			Observed			Adopted			Observed		
Jan.	1-31	9292 to 9286	Jan.	8	9290	Jan.	1-31	13.5	Jan.	7	13.52
				18	9291						
				25	9293						
				31	9299						
Feb.	1-28	9285 to 9287	Feb.	8	9282	Feb.	1-28	13.5	Feb.	8	13.28
				17	9287					17	13.64
				28	9288						
Mar.	1-31	9288 to 9290	Mar.	17	9285	Mar.	1-31	13.5	Mar.	17	13.52
				22	9296						
Apr.	1-18	9291	Apr.	5	(9306)	Apr.	1-30	13.6	Apr.	1	13.56
	19-30	9290 to 9288		16	9288						
				24	9292						
				29	9292						
May	1-31	9288 to 9282	May	13	9283	May	1-31	13.7	May	5	13.77
				16	9280					23	13.62
				20	9285						
				22	9284						
				26	9282						
June	1-30	9282 to 9277	June	4	9279	June	1-30	13.7			
				10	9282						
				19	9278						
				26	9280						
July	1(0000-1650)	No trace	July	9	9901	July	1-31	13.7	July	5	13.73
				17	9902					9	13.68
	1(1650)-31	9900		23	9900						
Aug.	1-31	9899	Aug.	3	9896	Aug.	1-31		Aug.	5	13.71
				12	9901						
				19	9900						
				27	9897						
Sep.	1-17	9898	Sep.	4	9903	Sep.	1-30	13.65	Sep.		13.57
	18-30	9899 to 9900		11	9890						
				21	9891						
Oct.	1-31	9900 to 9907	Oct.	7	9902	Oct.	1-31	13.65	Oct.	7	13.70
				15	9902					21	13.54
				21	9902						
				31	9906						
Nov.	1-15	9908 to 9915	Nov.	6	9909	Nov.	1-10	13.60	Nov.	6	13.58
				12	9916					19	(13.50)
	16-30	9914 to 9909		20	9911						
				29	9908						
Dec.	1-5	9908	Dec.	7	9909	Dec.	1-31	13.65	Dec.	6	13.62
				14	9913					24	13.71
	6-31	9908 to 9919		24	9920						
				31	9918						

TABLE 37

Great Whale River 1971

D Baselines								D Scale Values '/mm					
	Adopted	°	'	Observed		°	'	Adopted			Observed		
Jan.	1-29	336	54.0 to 56.5	Jan.	8	336	52.6	Jan.	1-31	4.65	Jan.	8	4.65
					18	336	56.4						
					25	336	55.6						
	30-31	336	56.0		31	336	56.5						
Feb.	1-8	336	56.0 to 55.0	Feb.	8	336	54.0	Feb.	1-28	4.66	Feb.	8	4.66
	9-28	336	55.0 to 57.5		17	336	56.7					17	4.65
					28	336	57.7						
Mar.	1-31	336	57.5 to 56.5	Mar.	17	336	56.3	Mar.	1-31	4.68	Mar.	18	4.68
					22	336	55.9						
Apr.	1-30	336	56.5 to 56.0	Apr.	5	336	56.7	Apr.	1-30	4.68	Apr.	1	4.67
					16	336	55.7						
					24	336	56.1						
					29	336	56.4						
May	1-13	336	56.0 to 58.5	May	13	336	56.9	May	1-31	4.70	May	5	4.70
	13-31	336	58.5		16	336	58.0					26	4.69
					20	337	00.5						
					22	336	59.1						
					26	336	55.6						
June	1-30	336	58.5	June	4	336	56.0	June	1-30	4.70			
					10	336	58.4						
					19	336	58.8						
					26	(336	54.9)						
July	1(0000)-(1650)	No trace		July	6	338	56.4	July	1-31	4.66	July	5	4.65
					9	338	13.7					9	4.67
					17	338	13.6						
	1(1650)-7(1500)	338	56.5		23	338	14.4						
	8-31	338	14.0										
Aug.	1(0000)-23	339	08.0	Aug.	3	339	08.3	Aug.	1-31	4.68	Aug.	5	4.69
	24-31	339	08.0 to 06.0		12	339	07.5					19	4.70
					19	339	08.3						
					27	339	07.7						
Sep.	1-16	339	05.5 to 03.5	Sep.	4	339	04.1	Sep.	1-30	4.70	Sep.	4	4.71
					11	339	03.9						
					21	339	02.7						
	17-23(1515)	339	03.5										
	23(1515)-24(1900)	339	13.0										
	24(1900)-30	339	03.5										
Oct.	1-9	339	03.5	Oct.	7	339	03.4	Oct.	1-31	4.70	Oct.	7	4.70
	10-31	339	04.0 to 05.0		15	339	04.2					21	4.70
					21	339	04.8						
					31	339	04.9						
Nov.	1-30	339	05.0 to 07.5	Nov.	6	339	06.5	Nov.	1-30	4.68	Nov.	6	4.66
					12	339	05.5						
					20	339	07.9						
					29	339	07.1						
Dec.	1-19	339	07.5	Dec.	7	359	07.0	Dec.	1-31	4.66	Dec.	6	4.66
	20-31	339	07.5 to 09.5		14	339	08.4					24	4.67
					24	339	07.5						
					31	339	10.0						

TABLE 38

Great Whale River 1971

Z Baselines nT						Z Scale Values nT/mm					
Adopted			Observed			Adopted			Observed		
Jan.	1-31	58917-58899	Jan.	8	58907	Jan.	1-31	13.81 to 14.08	Jan.	7	13.87
				18	58909						
				25	58902						
				31	58890						
Feb.	1-28	58898-58881	Feb.	8	58894	Feb.	1-28	14.09 to 14.34	Feb.	8	14.08
				17	58886					17	14.24
				28							
Mar.	1-23	58880-58867	Mar.	17	58865	Mar.	1-31	14.35 to 14.63	Mar.	17	14.44
	23-31	58868									
Apr.	1-18(1500)	58869-58872	Apr.	5	58867	Apr.	1-18(1500)	14.64 to 14.78	Apr.	1	14.68
	18(1500)-30	59018-59029		16	58872		18(1500)-30	13.60			
				24	59023						
				27	59029						
May	1-18	59028-59025	May	13	59024	May	1-31	13.60	May	5	13.64
	18-31	59026-59029		16	59027					18	13.54
				20	59023						
				22	59026						
				26	59028						
June	1-10	59030-59043	June	4	59032	June	1-30	13.70			
	11-30	59042-59036		10	59043						
				19	59042						
				26	59037						
July	1(0000-1650)	No trace	July	6	59283	July	1-31	13.80	July	5	13.74
	1(1650)-13	59289-59280		9	59276					9	13.83
	14-31	59282		17	59282						
				23	59283						
Aug.	1-23	59283-59287	Aug.	3	59289	Aug.	1-12	13.80	Aug.	5	13.77
				12	59281		13-30	13.81 to 13.92		19	13.85
				19	59287						
	24-31	59287-59291		27	59286						
Sep.	1-15	59292-59295	Sep.	4	59294	Sep.	1-30	13.93 to 14.10	Sep.	9	13.97
	16-31	59294		11	59298					21	14.06
				21	59294						
Oct.	1-31	59293-59291	Oct.	7	59293	Oct.	1-31	14.10	Oct.	7	14.06
				15	59294						
				21	59289					21	14.14
				31	59293						
Nov.	1-30	59290-59273	Nov.	6	59288	Nov.	1-30	14.10	Nov.	6	14.14
				12	59280					19	14.04
				20	59279						
				29	59274						
Dec.	1-31	59272-59255	Dec.	7	59272	Dec.	1-12	14.10	Dec.	6	14.04
				14	59268		13-31	14.10 to 14.19		24	14.23
				24	59257						
				31	59255						

MEAN VALUES OF MAGNETIC ELEMENTS

HORIZONTAL INTENSITY-ALL DAYS

TABLE 39 GREAT WHALE RIVER H = 9500 PLUS TABULAR VALUES IN GAMMAS 1971

L.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	524	530	540	558	593	605	606	602	594	583	599	599	578	602	569	563
1-2	522	513	538	544	563	585	585	583	568	569	574	593	561	579	555	551
2-3	511	519	520	526	534	560	567	554	541	528	569	588	543	554	529	547
3-4	506	494	517	514	485	528	542	520	522	534	560	580	525	519	522	535
4-5	485	493	484	468	483	495	498	493	513	512	543	550	502	492	494	518
5-6	459	484	479	456	484	469	503	478	491	499	517	539	488	484	481	500
6-7	432	473	459	451	448	448	481	474	475	478	514	527	472	463	466	487
7-8	415	437	421	436	448	423	491	483	464	484	494	512	459	461	451	464
8-9	404	434	409	433	455	442	502	487	446	478	498	487	456	471	441	456
9-10	400	444	425	419	462	447	510	491	454	494	501	496	462	477	448	460
10-11	430	459	451	436	466	434	510	480	456	522	532	513	474	473	466	484
11-12	447	480	477	441	480	445	506	489	490	527	545	538	489	480	484	502
12-13	470	487	489	466	499	483	514	509	529	535	550	557	507	501	505	516
13-14	476	488	493	489	509	499	518	526	540	545	554	567	517	513	516	521
14-15	478	479	491	500	514	515	524	530	535	547	549	569	519	521	518	519
15-16	484	480	496	510	525	533	529	534	541	542	553	562	524	530	522	520
16-17	490	493	498	520	536	546	539	544	551	549	557	556	532	541	529	524
17-18	500	499	514	535	562	563	560	558	568	558	564	564	546	561	544	532
18-19	504	508	530	563	585	581	585	575	587	573	573	567	561	581	563	538
19-20	509	523	550	582	616	605	592	592	601	584	582	575	576	601	579	547
20-21	515	531	560	587	637	621	611	613	620	591	591	578	588	620	590	554
21-22	517	533	556	591	635	628	622	615	615	591	598	589	591	625	588	559
22-23	518	535	555	593	629	631	624	619	603	600	597	596	592	626	588	561
23-24	525	538	552	589	612	610	610	619	598	590	593	601	587	613	582	565
MEANS	480	494	500	509	532	529	547	540	538	542	554	559	527	537	522	522

MEAN VALUES OF MAGNETIC ELEMENTS

DECLINATION-ALL DAYS

TABLE 40 GREAT WHALE RIVERD = 340.0 DEGREES EAST PLUS TABULAR VALUES IN MINUTES 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	4.5	5.4	6.5	-1.3	3.6	9.9	11.9	14.3	12.3	11.4	15.5	14.8	9.1	9.9	7.2	10.1
1-2	4.9	2.5	6.7	-.5	-.1	8.5	8.7	10.1	6.3	11.2	12.1	16.2	7.2	6.8	5.9	8.9
2-3	1.4	5.7	3.8	-.1	-.9	2.5	3.6	7.1	2.7	-.5	9.1	16.9	4.3	3.1	1.5	8.3
3-4	1.3	1.7	1.0	-3.1	-5.5	1.5	3.9	-.1	-5.5	-.8	8.9	13.3	1.4	-.0	-2.1	6.3
4-5	-2.5	-.5	-4.8	-8.2	-3.9	1.0	.4	1.1	.9	-1.3	7.6	6.1	-.3	-.4	-3.3	2.7
5-6	-4.8	.3	.8	-4.3	2.4	.6	2.4	2.5	1.1	5.1	5.7	7.5	1.6	2.0	.7	2.2
6-7	-6.4	.4	2.0	-2.6	.6	3.5	1.7	5.1	4.4	3.4	5.1	7.5	2.1	2.7	1.8	1.6
7-8	-3.8	.8	1.7	3.5	7.3	2.8	4.6	11.2	9.5	8.7	5.2	8.0	5.0	6.5	5.8	2.6
8-9	3.2	2.5	4.8	6.4	9.1	6.6	9.4	14.5	12.5	11.4	8.0	8.0	8.0	9.9	8.8	5.4
9-10	3.5	5.9	6.1	8.4	15.4	15.3	14.2	17.6	15.7	13.9	12.0	11.4	11.6	15.6	11.0	8.2
10-11	3.6	7.8	10.6	10.7	19.5	18.2	18.7	20.7	18.9	14.8	12.8	11.0	13.9	19.3	13.7	8.8
11-12	5.1	7.3	11.0	11.3	20.9	18.6	20.6	23.0	20.6	12.5	15.0	11.1	14.7	20.8	13.8	9.6
12-13	5.9	6.5	12.1	12.3	21.3	18.7	21.6	24.7	20.1	12.8	14.1	12.0	15.2	21.6	14.3	9.7
13-14	4.7	7.0	11.3	11.0	17.8	18.3	19.5	21.8	16.8	13.9	13.4	14.6	14.2	19.4	13.3	9.9
14-15	2.3	4.7	8.1	7.5	12.6	14.1	15.7	17.0	11.7	12.6	12.6	14.6	11.1	14.8	10.0	8.5
15-16	.8	2.1	5.5	5.8	8.7	10.1	11.2	10.2	5.1	8.6	11.2	11.6	7.6	10.1	6.3	6.4
16-17	.3	.7	1.7	2.1	5.3	4.9	5.9	4.7	1.7	5.7	7.5	8.4	4.1	5.2	2.8	4.2
17-18	-.9	-.4	.8	2.0	3.9	3.9	3.9	2.6	1.8	3.1	6.2	8.0	2.9	3.6	1.9	3.2
18-19	-1.1	-.7	.2	3.8	7.7	4.5	4.9	3.4	4.8	4.1	6.8	7.6	3.8	5.1	3.2	3.2
19-20	.4	.7	2.3	5.3	11.5	6.6	5.1	7.2	8.7	6.8	8.4	6.7	5.8	7.6	5.8	4.1
20-21	.8	2.2	3.0	4.6	13.4	8.0	10.7	13.9	13.5	8.9	10.3	8.2	8.1	11.5	7.5	5.4
21-22	1.5	3.6	4.3	4.8	13.2	9.4	12.1	16.1	14.7	11.5	12.9	9.8	9.5	12.7	8.8	7.0
22-23	2.3	4.6	5.3	4.1	10.6	11.5	13.5	18.4	15.3	13.5	14.4	13.3	10.6	13.5	9.5	8.7
23-24	4.2	4.9	6.8	-1.6	8.8	9.6	12.9	17.7	13.2	12.9	14.1	14.6	9.8	12.3	7.8	9.4
MEANS	1.3	3.2	4.6	3.4	8.5	8.7	9.9	11.9	9.5	8.5	10.4	10.9	7.6	9.7	6.5	6.4

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY-ALL DAYS

TABLE 41 GREAT WHALE RIVER Z = 59000 PLUS TABULAR VALUES IN GAMMAS 1971

L.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	439	446	444	442	431	449	440	441	455	457	456	471	448	440	450	453
1-2	437	453	444	450	455	444	447	438	464	444	463	471	451	446	451	456
2-3	443	436	441	456	460	452	451	445	444	463	467	464	452	452	451	452
3-4	448	441	453	458	500	463	459	443	467	476	467	463	461	466	463	455
4-5	446	451	465	493	505	493	486	475	494	502	472	470	479	490	488	460
5-6	459	466	480	505	519	500	477	495	511	518	478	476	490	498	503	470
6-7	479	469	501	515	536	504	486	511	527	514	496	469	501	509	514	478
7-8	472	479	503	503	522	502	480	499	516	505	499	484	497	501	507	484
8-9	479	469	487	506	502	486	475	494	503	497	482	487	489	489	498	479
9-10	471	461	463	504	512	467	475	475	489	472	460	476	477	482	482	467
10-11	441	446	454	482	493	473	459	461	462	458	463	457	462	472	464	452
11-12	419	439	445	469	480	448	447	435	450	453	458	458	450	453	454	443
12-13	426	442	445	450	462	447	442	433	451	456	458	462	448	446	450	447
13-14	429	449	446	445	449	452	448	442	457	465	462	471	451	448	453	453
14-15	445	455	451	454	454	453	453	448	466	472	471	475	458	452	461	461
15-16	453	457	459	465	462	459	460	455	469	478	474	475	464	459	468	465
16-17	458	466	465	472	468	466	464	462	476	482	478	476	469	465	474	469
17-18	457	469	471	468	476	467	463	468	483	489	480	477	472	469	478	471
18-19	458	467	469	468	477	469	458	476	485	492	483	477	473	470	478	471
19-20	458	464	465	461	478	470	469	477	489	493	487	482	474	473	477	473
20-21	455	461	464	463	471	458	471	474	484	489	482	484	471	468	475	470
21-22	452	463	463	461	468	457	463	474	474	478	472	481	467	465	469	467
22-23	439	444	465	463	454	459	454	475	462	475	474	479	462	460	466	459
23-24	444	441	453	446	437	455	452	459	446	469	467	482	454	451	453	458
MEANS	450	456	462	471	478	466	462	465	476	479	473	474	468	468	472	463

TABLE 42

Annual Mean Values (Great Whale River)

Year	X*	Y*	Z	D East		I North*		H	F*
	nT	nT	nT	°	′	°	′	nT	nT
1967.6	9201	−3401	59302	339	43	80	36.4	9809	60108
1968.5	9246	−3399	59333	339	49	80	34.4	9850	60145
1969.5	9319	−3405	59379	339	56	80	30.8	9922	60202
1970.5	9357	−3407	59430	339	59.6	80	29.3	9958	60259
1971.5	9430	−3409	59468	340	07.6	80	25.8	10027	60307

*Values for X, Y, I and F derived from monthly means of D, H, Z.

MEANOOK

Officer-in-charge: Ann B. Cook

Introduction

Meanook magnetic observatory was established in July 1916, 136 km north of the city of Edmonton, Alberta and 18 km south of the town of Athabasca.

The mailing address of Meanook observatory is:

Meanook Magnetic Observatory
Box 89
Athabasca, Alberta T0G 0B0

Buildings and site

The observatory is located on the top of the plain to the west of the Tawatinaw valley. The site is underlain by Upper Cretaceous sedimentary deposits to a depth of 2 km. The nearest railway passes through the bottom of the valley about 5 km southeast of the observatory.

A recording basement to house Kew-type variometers was added to the original absolute building in 1927. The absolute building and the heating system were renovated during 1940. In 1941 an annex to the basement recording room was constructed to house the two sets of LaCour variometers which had been located in a temporary hut since the second International Polar Year (1932–1933). In 1951 the absolute instruments and LaCour variometers were transferred to a new magnetic observatory building. In 1955 the Department purchased an additional 530 acres of land adjacent to the observatory. Electrodes were established one mile apart in a N–S and E–W direction in preparation for the study of telluric currents.

Meanook observatory was considerably expanded for the International Geophysical Year (1957–1958). In addition to the standard magnetic observatory, an auroral all-sky camera, an auroral intensity recorder, a patrol spectrograph, a vertical incidence ionosphere sounder, a fixed inosphere backscatter sounder, a riometer and telluric recorder were also in operation at the station. During the second International Polar Year the station consisted of two buildings on a two-acre site; in 1957 the station possessed 15 buildings situated on a protected area of 540 acres.

Magnetic equipment

Variometers

Declination only was recorded to August 1927, at which time horizontal force and declination differential photographic recorders of the Kew-type were installed. A vertical force magnetometer was installed in September 1931. Standard and low sensitivity recorders of the LaCour type replaced the Kew instruments as standard recorders in 1933. Ruska variometers were installed in May 1961 in the basement of the old magnetic observatory. The Ruska variometers were adopted as standard recorders on October 1, 1963.

In 1971 three sets of photographic variometers were in continuous operation at Meanook: standard-sensitivity Ruska variometers, and standard-sensitivity LaCour and low-sensitivity LaCour variometers. The paper speed is 20 mm/hr for the Ruska and 15 mm/hr for the LaCour.

The scale values per mm adopted for the LaCour variometers were constant throughout the year, and are as follows:

	H	D	Z
LaCour Standard	7.18 nT	0.93′	10.36 nT
LaCour low-sensitivity	21.67 nT	2.35′	37.47 nT

Absolute instruments

The absolute instruments used at Meanook during 1971 were: Cooke magnetometer No. 15 (with correction -3′) for declination; quartz horizontal magnetometer No. 259 (with correction -0.00013H) for horizontal intensity; Ruska earth inductor No. 6540 (with correction 0.0′) for inclination; a proton precession magnetometer (4.25760 x 10^7 Hz/tesla) for total intensity. A portable fluxgate magnetometer was used as a standby instrument for determing declination and inclination.

A three-component recording fluxgate magnetometer and a digital magnetometer were also in operation at Meanook in 1971. These are described in the introductory section to the Annual Report.

Ruska magnetogram baselines and scale values

There were abrupt baseline shifts in all elements January 12(2320) and 13(2330). In addition, the D and Z baselines changed abruptly January 14(2305).

The baselines and scale values adopted for 1971 are given in Tables 43–45.

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1971, and a list of the annual mean values, are given in Tables 46–49.

TABLE 43

Meanook 1971

H Baselines nT			H Scale Values nT/mm	
Adopted			Adopted	
Jan.	1-12(2320)	13035	Jan. 1-Dec.31	10.29
	12(2320)-13(2330)	12762		
	13(2330)-31	13066		
Feb.	1-17	13066		
	18-28	13065		
Mar.	1-12	13064		
	13-17	13063		
	18-26	13064		
	27-31	13065		
Apr.	1-30	13065 to 13068		
May	1-31	13069 to 13071		
June	1-30	13071 to 13072		
July		13071		
Aug.		13071		
Sep.	1-19	13071		
	20-30	13065		
Oct.	1-31	13064 to 13060		
Nov.	1-30	13060 to 13057		
Dec.	1-13	13057		
	14-31	13058 to 13075		

TABLE 44

Meanook 1971

D Baselines				Scale Values '/mm	
	Adopted	°	'	Adopted	
Jan.	1-12(2320)	23	12.1	Jan. 1 - Dec. 31	1.61
	12(2320)-13(2330)	23	08.5		
	13(2330)-14(2305)	23	09.3		
	14(2305)-31	22	55.4 to 55.2		
Feb.	1-15	22	55.2 to 54.9		
	16-28	22	55.0 to 55.1		
Mar.	1-31	22	55.1 to 56.0		
Apr.	1-13	22	56.1 to 56.7		
	14-30	22	56.8		
May	1-12	22	56.8		
	13-31	22	56.7		
June	1-30	22	56.7 to 57.1		
July	1-31	22	57.1 to 57.8		
Aug.	1-31	22	57.6		
Sep.	1-30	22	57.6		
Oct.	1-31	22	57.6 to 57.1		
Nov.	1-30	22	57.0 to 56.3		
Dec.	1-31	22	56.3 to 55.6		

TABLE 45

Meanook 1971

Z Baselines nT			Scale Values nT/mm	
Adopted			Adopted	
Jan.	1-12(2320)	58472	Jan. 1-Dec.31	9.42
	12(2320)-13(2330)	58453		
	13(2330)-14(2305)	58442		
	14(2305)-31	58426		
Feb.	1-28	58426		
Mar.	1-31	58425 to 58423		
Apr.	1-30	58423 to 58420		
May	1-8	58420		
	9-18	58419		
	19-25	58420		
	26-31	58421		
June	1-8	58422		
	9-30	58423		
July	1-31	58423 to 58420		
Aug.	1-31	58419 to 58415		
Sep.	1-30	58415 to 58413		
Oct.	1-31	58413 to 58408		
Nov.	1-30	58408		
Dec.	1-12	58409		
	13-31	58410 to 58428		

MEAN VALUES OF MAGNETIC ELEMENTS

HORIZONTAL INTENSITY-ALL DAYS

TABLE 46 MEANOOK H = 13000 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	301	300	307	335	338	343	345	340	319	326	327	327	326	341	322	314
1-2	303	319	306	341	341	348	342	339	323	330	333	330	329	343	325	321
2-3	308	306	316	333	338	345	341	348	324	334	339	329	330	343	327	320
3-4	312	310	324	327	330	339	332	351	323	333	334	328	329	338	327	321
4-5	307	314	319	326	319	337	330	342	313	327	331	327	324	332	321	320
5-6	305	307	313	327	317	332	330	335	323	316	323	327	321	328	320	315
6-7	293	302	304	307	268	316	324	305	307	314	309	324	306	303	308	307
7-8	281	297	293	285	265	290	318	306	292	303	294	307	294	295	293	295
8-9	244	279	269	274	271	293	319	281	271	286	296	275	280	291	275	273
9-10	231	271	255	244	246	277	317	295	264	288	292	274	271	284	263	267
10-11	261	278	276	255	243	258	313	290	256	281	298	277	274	276	267	279
11-12	265	281	274	245	252	263	308	293	265	293	301	284	277	279	269	283
12-13	275	285	278	262	284	278	313	306	298	300	301	302	290	295	284	291
13-14	283	290	286	278	287	275	318	315	308	306	313	315	298	299	294	300
14-15	272	271	295	288	277	297	323	320	309	315	317	325	301	304	302	296
15-16	272	280	299	292	285	295	314	315	304	309	317	323	300	302	301	298
16-17	284	286	292	286	295	299	308	304	299	304	315	317	299	302	295	300
17-18	284	280	282	279	291	305	301	294	294	298	312	299	293	298	288	294
18-19	279	275	276	282	289	303	295	289	292	296	306	303	290	294	287	291
19-20	277	275	272	287	296	303	295	292	295	299	304	305	292	296	288	290
20-21	279	279	276	291	304	308	303	302	307	306	308	305	297	304	295	292
21-22	288	286	284	301	314	315	317	310	315	316	313	310	306	314	304	299
22-23	297	293	296	318	322	323	326	321	326	322	321	314	315	323	316	306
23-24	301	299	304	331	335	334	333	331	329	322	323	321	322	333	322	311
MEANS	283	290	292	296	296	307	319	314	302	309	314	310	303	309	300	299

MEAN VALUES OF MAGNETIC ELEMENTS

DECLINATION-ALL DAYS

TABLE 47 MEANOOK D = 23.0 DEGREES EAST PLUS TABULAR VALUES IN MINUTES 1971

L.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	36.5	35.3	34.0	32.1	31.4	30.7	30.2	30.5	32.6	33.6	32.8	32.4	32.7	30.7	33.1	34.3
1-2	37.4	36.1	34.8	32.7	32.7	31.7	32.5	31.8	33.6	34.4	34.1	33.3	33.8	32.2	33.9	35.2
2-3	38.5	36.7	35.5	33.7	33.2	32.8	32.8	32.3	33.5	37.0	35.1	34.0	34.6	32.8	34.9	36.1
3-4	39.2	37.9	36.6	34.1	35.0	33.8	33.1	33.7	34.1	35.9	35.4	35.0	35.3	33.9	35.2	36.9
4-5	39.3	37.8	37.5	35.3	35.5	35.0	34.4	34.4	34.6	35.7	36.1	35.8	36.0	34.8	35.8	37.3
5-6	39.3	37.9	38.3	36.8	34.7	35.2	33.9	34.5	35.8	35.0	35.4	35.3	36.0	34.6	36.5	37.0
6-7	39.7	37.4	37.8	38.0	35.5	35.1	35.1	35.0	34.8	35.0	34.7	35.0	36.1	35.2	36.4	36.7
7-8	38.4	37.6	38.8	36.8	35.5	35.2	34.4	35.1	34.2	33.9	33.3	35.0	35.7	35.1	35.9	36.1
8-9	37.6	37.8	41.2	37.2	37.0	35.6	34.1	35.4	33.4	34.8	35.6	35.5	36.3	35.5	36.7	36.6
9-10	38.0	38.6	40.6	36.7	36.5	36.1	34.0	35.3	37.1	35.5	36.5	34.6	36.6	35.5	37.5	36.9
10-11	40.3	39.5	40.3	38.8	36.1	38.7	34.1	35.8	38.0	35.9	34.3	35.2	37.3	36.2	38.3	37.3
11-12	42.3	39.1	39.2	39.7	38.9	40.4	35.6	37.4	40.0	36.8	35.6	35.8	38.4	38.1	38.9	38.2
12-13	41.2	39.5	39.8	39.5	41.6	41.6	39.3	38.9	39.7	37.3	35.7	35.6	39.1	40.3	39.1	38.0
13-14	40.6	39.0	39.4	41.5	43.1	42.2	40.9	40.5	40.6	36.4	36.0	34.1	39.5	41.7	39.5	37.4
14-15	41.0	39.9	40.6	42.9	44.6	44.3	43.3	43.2	41.2	37.4	35.9	34.2	40.7	43.9	40.5	37.7
15-16	41.7	39.4	42.5	43.1	44.2	44.4	44.3	43.7	41.2	38.6	37.0	35.7	41.3	44.2	41.3	38.4
16-17	41.6	40.2	43.2	41.9	43.3	43.7	44.4	42.3	40.5	38.5	37.3	37.0	41.2	43.4	41.0	39.0
17-18	40.4	39.7	41.9	41.1	40.3	41.1	42.0	39.6	38.0	36.2	37.0	36.4	39.5	40.7	39.3	38.4
18-19	39.5	37.3	39.2	38.5	37.2	37.5	37.6	34.6	34.7	33.5	35.0	35.3	36.6	36.7	36.4	36.8
19-20	37.9	35.8	37.3	35.9	34.0	34.4	32.4	30.9	31.3	31.0	32.9	33.5	33.9	32.9	33.9	35.0
20-21	36.7	35.0	34.9	33.8	31.6	31.8	29.4	29.1	30.0	30.7	31.9	32.0	32.2	30.5	32.4	33.9
21-22	36.3	34.3	33.9	33.1	30.9	29.8	28.0	28.3	30.1	31.3	31.5	31.0	31.6	29.3	32.1	33.3
22-23	36.6	34.0	33.7	32.5	30.5	29.4	28.1	28.9	31.4	32.0	32.1	31.2	31.7	29.2	32.4	33.5
23-24	36.5	34.4	33.4	32.5	31.1	29.8	29.4	29.7	32.1	32.4	32.2	31.7	32.1	30.0	32.6	33.7
MEANS	39.0	37.5	38.1	37.0	36.4	36.3	35.1	35.0	35.5	34.9	34.7	34.4	36.2	35.7	36.4	36.4

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY-ALL DAYS

TABLE 48 MEANOOK Z = 58000 PLUS TABULAR VALLES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	691	693	689	691	707	695	694	697	688	688	683	680	691	698	689	687
1-2	691	690	687	687	701	695	694	699	678	693	683	682	690	697	686	686
2-3	691	694	691	688	705	693	693	699	676	690	682	683	690	698	686	687
3-4	690	692	693	686	691	690	693	700	680	683	680	682	688	693	685	686
4-5	690	692	693	687	685	686	683	695	675	678	680	679	685	687	683	685
5-6	686	686	688	683	678	680	682	688	657	669	669	676	678	682	674	679
6-7	676	683	678	660	646	665	672	662	653	658	656	673	665	661	662	672
7-8	659	676	658	659	644	648	663	657	646	651	640	658	655	653	653	658
8-9	648	660	647	647	659	641	659	652	637	634	648	641	648	653	641	649
9-10	637	655	639	634	660	639	655	643	624	635	647	634	642	649	633	643
10-11	655	658	640	629	661	636	652	636	634	636	645	635	643	646	635	648
11-12	645	659	639	629	656	643	649	639	640	638	647	636	643	647	637	647
12-13	649	654	639	638	663	641	652	647	649	637	651	644	647	651	641	650
13-14	654	653	651	639	655	642	656	656	657	649	653	657	652	652	649	654
14-15	654	655	656	649	665	649	659	663	658	660	653	663	657	659	656	656
15-16	664	660	664	660	661	655	662	664	658	663	663	665	662	661	661	663
16-17	670	669	666	665	665	663	664	666	664	665	668	662	666	664	665	667
17-18	674	671	669	670	671	666	664	667	668	667	671	669	669	667	668	671
18-19	679	675	672	679	675	667	667	668	670	668	671	674	672	669	672	675
19-20	683	680	676	683	679	672	670	669	674	669	674	674	675	672	675	678
20-21	686	684	682	687	686	677	674	675	677	674	678	674	680	678	680	681
21-22	690	689	684	692	693	685	679	680	682	679	682	676	684	684	684	684
22-23	687	689	688	693	697	689	683	683	684	681	684	677	686	688	687	684
23-24	689	691	687	684	699	690	688	689	688	682	681	679	687	691	685	685
MEANS	672	675	670	667	675	667	671	671	663	664	666	666	669	671	666	670

TABLE 49

Mean Annual Values (Meanook)

Year	D(E)		H	Z	X*	Y*(E)	I*(N)		F*
	°	′	nT	nT	nT	nT	°	′	nT
1957.5	24	23.1	12921	58801	11768	5335	77	36.4	60204
1958.5		15.0	12943	58819	11801	5316		35.4	60226
1959.5		13.0	12960	58787	11819	5316		34.1	60198
1960.5		09.7	12985	58774	11848	5316		32.5	60192
1961.5		06.1	13022	58748	11887	5318		30.1	60175
1962.5		02.7	13054	58723	11921	5318		28.1	60156
1963.5	23	58.7	13076	58711	11949	5314		26.5	60150
1964.5		54.9	13103	58694	11978	5312		24.9	60139
1965.5		51.7	13130	58672	12008	5312		23.1	60123
1966.5		49.6	13150	58663	12029	5312		21.9	60119
1967.5		47.2	13170	58663	12051	5312		20.8	60123
1968.5		45.0	13197	58659	12079	5315		19.4	60125
1969.5		42.1	13234	58662	12118	5320		17.2	60136
1970.5		39.8	13265	58672	12150	5324		15.6	60153
1971.5	23	36.2	13303	58669	12190	5327	77	13.5	60158

* X, Y, I, F are derived from annual means, D, H, Z.

OTTAWA

Officer-in-charge: W.R. Darker
Assistant: R. Groulx

Ottawa magnetic observatory was established in 1968 as part of the new complex of magnetic laboratories in the Department of Energy, Mines and Resources, located immediately east of the city of Ottawa, near the village of Blackburn. The new observatory was fully operational on July 1, 1968, and is the replacement for Agincourt observatory which had to be closed March 31, 1969, owing to industrial development and highway construction in the vicinity of the observatory. Agincourt observatory had been in continuous operation since 1898, and was itself a replacement for the Toronto observatory, established in 1843, which had to be relocated following electrification of the Toronto tramway system.

The mailing address for the Ottawa observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines and Resources
Ottawa, Canada K1A 0Y3

Observatory site

The observatory is located on the east-west ridge of land known as Dolman Ridge, bounded on the north by the swamps and marshes of Mer Bleue, and on the south by the Borthwick Creek swampland. Dolman Ridge is a feature of the recent geological period, and was at one time an island in the Champlain Sea.

Magnetic equipment

In addition to magnetic equipment described in the introductory section of the annual report, the electronic integrator designed by W.R. Darker (1971)[4] was in operation at the Ottawa observatory in 1971.

Absolute instruments

Declination: Ruska magnetometer No. 6513; portable D, I electrical magnetometer. Inclination: Ruska Earth Inductor No. 11650; portable D, I electrical magnetometer. Total intensity: Proton precession magnetometer (Division of Geomagnetism design). Horizontal intensity: Quartz horizontal magnetometer (QHM) Nos. 258, 571, 572, 573.

Ruska magnetogram baselines and scale values

The adopted baselines and scale values for 1971 are given in Tables 50–52.

Summary of mean values (Ottawa)

A summary by month, season and year of the mean hourly values for all days in 1971, and a list of the annual mean values, are given in Tables 53–56.

TABLE 50

Ottawa 1971

	H Baselines γ		H Scale Values γ/mm	
	Adopted		Adopted	
Jan.	1-15	15719 to 15716	Jan.	6.25
	16-31	15716 to 15719		
Feb.	1-18	15719 to 15720	Feb.	6.29
	19-28	15719 to 15718		
Mar.	1-14	15718 to 15717	Mar.	6.31
	15-31	15718 to 15715		
Apr.	1-20(1955)	15715	Apr.	6.27
	20(1955)-22(1415)	15691		
	22(1415)-30	15846		
May	1-15	15846 to 15851	May	6.23
	16-31	15851 to 15850		
June	1-8	15850	June	6.27
	9-23	15851 to 15858		
	24-30	15858 to 15854		
July		15854	July	6.29
Aug.	1-7	15854 to 15856	Aug.	6.28
	8-20	15841 to 15845		
	21-31	15854		
Sep.	1-15	15845 to 15847	Sep.	6.19
	16-30	15847 to 15844		
Oct.	1-15	15844 to 15840	Oct.	6.27
	16-31	15840 to 15842		
Nov.	1-30	15842	Nov.	6.15
Dec.	1-15	15843 to 15842	Dec.	6.15
	16-31	15842 to 15844		

TABLE 51

Ottawa 1971

D Baselines			D Scale Values	
Adopted		° ′	Adopted ′/mm	
Jan.		346°42.4′	Jan.	1.07
Feb.		346°42.3′	Feb.	1.07
Mar.	1-31	346°42.2′ to 346°41.9′	Mar.	1.07
Apr.	1-20(1955)	346°41.9′	Apr.	1.07
	20(1955)-30	346°28.8′ to 346°29.1′		
May	1-20	346°29.1′	May	1.07
	21-31	346°29.0′ to 346° 28.6′		
June	1-15	346°28.6′	June	1.07
	16-30	346°28.1′ to 346°30.3′		
July		346°30.4′ to 346°29.5′	July	1.09
Aug.	1-10	346°29.4′ to 346°28.9′	Aug.	1.07
	11-31	346°28.9′ to 346°29.3′		
Sep.	1-25	346°29.2′ to 346°28.5′	Sep.	1.09
	26-30	346°28.6′		
Oct.	1-20	346°28.6′ to 346°28.1′	Oct.	1.06
	21-31	346°28.1′ to 346°28.5′		
Nov.	1-14	346°28.5′	Nov.	1.06
	15-30	346°28.6′ to 346°28.3′		
Dec.	1-10	346°28.3′ to 346°28.1′	Dec.	1.06
	11-20	346°28.1′ to 346°28.4′		
	21-31	346°28.4′		

TABLE 52

Ottawa 1971

Z Baselines γ			Z Scale Values γ/mm	
Adopted			Adopted	
Jan.	1-31	56333 to 56335	Jan.	6.80
Feb.	1-28	56335	Feb.	6.83
Mar.	1-14	56334	Mar.	6.80
	15-31	56335		
Apr.	1-15	56335 to 56333	Apr.	6.89
	16-30	56333 to 56324		
May	1-31	56330 to 56317	May	6.51
June	1-30	56316 to 56290	June	6.66
July	1-31	56290 to 56281	July	6.61
Aug.	1-7	56280 to 56278	Aug.	6.50
	7-11	56279 to 56280		
	12-14(1500)	56280 to 56286		
	14(1500)-31	56263 to 56279		
Sep.	1-10	56270	Sep.	6.92
	11-30	56271 to 56281		
Oct.	1-31	56282 to 56297	Oct.	6.83
Nov.	1-30	56297 to 56310	Nov.	6.88
Dec.	1-27	56310 to 56320	Dec.	6.91
	27(1500)-31	56343		

MEAN VALUES OF MAGNETIC ELEMENTS

HORIZONTAL INTENSITY-ALL DAYS

TABLE 53 OTTAWA H = 15500 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	418	427	440	453	464	481	485	488	486	490	494	502	469	479	467	460
1-2	418	425	438	445	454	476	481	486	477	489	494	500	465	474	462	459
2-3	417	424	438	444	451	473	479	486	480	487	493	498	464	472	462	458
3-4	416	425	438	441	448	473	476	485	479	485	493	499	463	471	461	458
4-5	416	424	438	435	447	471	476	483	472	484	493	499	461	469	457	458
5-6	414	424	438	436	446	470	478	481	477	482	492	498	461	469	458	457
6-7	413	425	436	431	440	468	477	477	475	486	489	500	460	466	457	457
7-8	412	426	434	436	446	463	476	481	473	488	487	499	460	467	458	456
8-9	411	426	432	431	452	466	475	480	475	488	494	497	461	468	457	457
9-10	415	427	433	430	448	467	475	480	479	492	498	501	462	468	458	460
10-11	420	429	438	436	450	467	475	480	480	493	500	504	464	468	462	463
11-12	421	431	437	435	446	466	471	477	478	491	500	505	463	465	460	464
12-13	418	428	432	434	445	460	465	467	470	483	495	504	458	459	455	461
13-14	411	419	424	426	438	450	455	458	459	470	487	500	450	450	445	454
14-15	397	408	414	418	430	444	450	450	448	461	476	493	441	443	435	444
15-16	388	400	407	414	431	442	446	448	446	456	468	485	436	442	431	435
16-17	388	401	407	416	439	449	453	455	455	460	469	479	439	449	434	434
17-18	394	402	412	425	451	462	468	467	469	469	474	479	448	462	443	437
18-19	401	411	422	437	461	473	484	481	483	480	484	489	459	475	456	446
19-20	408	422	433	449	471	484	491	493	491	488	489	502	468	485	465	455
20-21	416	427	441	456	476	492	497	501	496	493	496	502	474	491	471	460
21-22	422	430	444	464	475	494	499	500	494	494	497	505	476	492	474	463
22-23	420	430	444	467	474	489	497	497	490	493	497	506	475	489	473	463
23-24	418	429	443	455	470	484	488	491	488	491	496	504	472	484	469	462
MEANS	411	422	432	438	452	469	476	479	476	483	490	498	460	469	457	455

MEAN VALUES OF MAGNETIC ELEMENTS

DECLINATION-ALL DAYS

TABLE 54 OTTAWA D = 346.0 DEGREES EAST PLUS TABULAR VALUES IN MINUTES 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	19.4	18.9	18.9	19.9	20.2	20.2	20.5	20.0	19.5	20.3	19.5	19.0	19.7	20.2	19.6	19.2
1-2	19.7	19.9	19.2	20.0	20.8	20.8	20.3	20.0	19.3	21.4	20.4	19.9	20.1	20.5	20.0	20.0
2-3	19.6	20.2	19.9	19.3	21.2	20.7	20.4	20.3	19.8	20.1	20.4	20.4	20.2	20.7	19.8	20.2
3-4	19.2	19.6	19.5	19.3	19.2	20.5	20.6	20.6	19.1	19.8	20.6	20.1	19.9	20.3	19.5	19.9
4-5	19.2	19.6	19.8	19.9	19.3	20.2	20.7	20.6	18.2	19.5	20.0	19.1	19.7	20.2	19.4	19.5
5-6	18.6	18.8	19.6	19.7	19.4	20.2	20.9	20.8	18.1	19.6	18.8	18.9	19.4	20.3	19.3	18.8
6-7	18.7	18.9	19.7	18.3	17.3	20.4	20.1	19.4	19.4	19.1	18.2	18.7	19.0	19.3	19.1	18.6
7-8	19.1	19.4	19.1	20.7	19.8	19.9	20.5	20.4	21.0	20.2	17.2	18.5	19.6	20.1	20.2	18.5
8-9	19.3	19.3	19.1	20.8	20.2	20.8	21.3	20.6	21.6	19.8	18.9	18.4	20.0	20.7	20.3	19.0
9-10	18.4	19.8	19.8	20.9	21.4	22.5	22.7	21.7	21.7	20.2	20.0	18.8	20.7	22.1	20.6	19.3
10-11	19.1	20.2	20.8	21.7	23.0	24.1	24.8	23.5	22.8	19.9	19.9	18.7	21.5	23.8	21.3	19.5
11-12	19.8	20.0	20.8	21.6	24.1	25.3	26.4	25.9	23.8	20.2	20.1	18.6	22.2	25.4	21.6	19.6
12-13	20.7	20.5	22.2	22.4	24.8	25.4	27.0	26.6	24.3	21.5	20.7	19.4	23.0	26.0	22.6	20.4
13-14	21.0	21.3	22.5	22.0	23.2	23.8	26.0	24.9	22.8	21.7	20.9	20.8	22.6	24.5	22.3	21.0
14-15	19.6	20.1	20.8	20.4	19.9	21.6	23.0	21.2	19.5	20.5	20.3	21.1	20.7	21.4	20.3	20.3
15-16	17.1	18.0	18.2	18.0	16.4	18.3	19.2	16.5	14.9	17.6	18.5	19.4	17.7	17.6	17.2	18.2
16-17	15.3	15.4	14.9	15.0	14.1	15.1	15.2	12.5	12.1	14.7	15.7	16.8	14.7	14.2	14.2	15.8
17-18	13.8	13.5	12.2	13.2	13.0	13.8	13.2	10.8	11.0	13.1	14.1	14.7	13.0	12.7	12.3	14.0
18-19	13.6	13.0	11.6	12.6	14.0	13.7	13.1	11.0	11.9	13.5	13.7	14.6	13.0	12.9	12.4	13.7
19-20	14.6	13.9	11.9	13.1	15.2	14.5	13.8	12.8	13.8	14.7	14.8	15.0	14.0	14.1	13.4	14.6
20-21	15.8	15.3	13.0	14.1	16.3	15.8	15.8	15.5	16.1	16.1	16.1	15.6	15.5	15.9	14.8	15.7
21-22	17.2	16.2	15.0	15.9	17.3	17.3	17.4	17.5	17.8	17.4	17.3	16.5	16.9	17.4	16.5	16.8
22-23	17.5	16.8	17.4	17.3	18.6	18.7	18.9	19.0	19.1	18.1	18.5	17.7	18.1	18.8	18.0	17.6
23-24	18.2	17.6	17.6	16.0	19.0	19.3	20.0	19.3	19.1	19.0	18.8	18.4	18.7	19.4	18.4	16.3
MEANS	18.1	18.2	18.1	18.5	19.1	19.7	20.1	19.2	18.6	18.7	18.5	18.3	18.8	19.5	18.5	18.3

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY-ALL DAYS

TABLE 55 OTTAWA Z = 56000 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	456	458	451	459	456	445	439	436	435	426	419	420	442	444	443	438
1-2	453	454	448	446	442	440	435	433	417	422	417	418	436	438	433	436
2-3	451	453	446	444	436	434	429	430	414	415	413	417	432	432	430	433
3-4	448	446	442	441	424	430	428	420	410	410	410	414	427	425	426	430
4-5	446	445	438	428	426	423	421	414	410	407	406	408	423	421	421	427
5-6	443	443	436	426	421	420	424	411	409	405	402	409	421	419	419	424
6-7	439	442	431	421	410	416	421	409	404	405	399	407	417	414	415	422
7-8	436	439	425	426	417	413	422	413	406	407	393	405	417	416	416	418
8-9	433	438	421	426	422	419	426	416	407	408	397	400	418	421	416	417
9-10	432	438	425	422	423	423	429	421	405	410	399	401	419	424	416	418
10-11	435	440	430	429	429	422	429	422	408	412	403	404	422	426	420	420
11-12	438	442	437	429	429	421	427	422	411	414	406	406	423	425	423	423
12-13	442	443	438	431	434	424	426	421	415	415	407	408	425	426	425	425
13-14	442	443	438	433	437	426	425	422	418	417	408	410	426	427	426	426
14-15	441	441	436	435	436	427	424	422	418	417	405	408	426	427	426	424
15-16	445	438	434	432	436	429	423	421	419	414	404	405	425	427	425	423
16-17	449	438	435	435	438	430	424	422	422	415	406	407	427	428	427	425
17-18	451	443	438	439	442	432	426	425	425	419	409	412	430	431	430	429
18-19	454	448	444	448	446	436	429	427	429	422	414	420	435	435	436	434
19-20	456	453	447	454	454	440	432	431	432	424	417	424	439	439	439	437
20-21	457	454	451	459	460	447	437	436	434	425	418	421	442	445	442	437
21-22	457	455	455	462	462	452	441	437	436	426	420	420	444	448	445	438
22-23	457	458	453	461	462	451	442	436	436	427	418	419	443	448	444	438
23-24	457	456	450	457	458	448	441	435	439	427	418	418	442	445	443	438
MEANS	446	446	440	439	437	431	429	424	419	416	409	412	429	431	429	428

TABLE 56

Annual Mean Values (Ottawa)

Year	D(E)		H	Z	X	Y	I(N)		F
	°	′	nT	nT	nT	nT	°	′	nT
1968.5	346	18.4	15684	56478	15238	−3713	74	28.8	58615
1969.5	346	18.9	15760	56467	15313	−3729	74	24.3	58625
1970.5	346	17.6	15858	56455	15406	−3758	74	18.6	58640
1971.5	346	18.8	15960	56429	15507	−3776	74	12.4	58643

Values of X, Y, I and F are derived from means of D, H, Z.

ST. JOHN'S

Officer-in-charge: G. A. Brown

The magnetic observatory at St. John's, Newfoundland, began operation on August 1, 1968. A location in southeastern Newfoundland was chosen to reduce one of the largest gaps in the geographical distribution of the magnetic observatories of the northern hemisphere. In addition to contributing data for studies of worldwide geomagnetic variations and secular change, the St. John's observatory provides control for the many marine and airborne magnetic surveys conducted over the broad continental shelf east of Canada.

The mailing address of St. John's observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines and Resources
Ottawa, Canada K1A 0Y3

Observatory site

The St. John's magnetic observatory occupies a site of 135,000 m^2 (33 acres), 3 km northeast of the centre of the city and 1.5 km from the sea. The area is magnetically flat, and the total intensity varies less than 15 nT within the site. A preliminary survey of geomagnetic time variations throughout Newfoundland revealed no gross anomalies of electromagnetic induction in the St. John's region, but some coastal induction effects must be expected and have in fact been found.

Magnetic equipment

Absolute instruments

A portable fluxgate magnetometer (Serson and Hannaford, 1956)[7] is used to determine the declination and inclination. A Barringer nuclear proton precession magnetometer (4.25760 x 10^7 Hz/tesla) is the primary standard of total intensity (F). A set of three quartz horizontal magnetometers Nos. 680, 681, 682 is the standard for horizontal intensity. A second portable (D, I) fluxgate was used for comparisons and for the St. John's magnetic repeat station program. The analogue and digital variometers in operation at St. John's observatory are described in the introductory section of the Annual Report.

In August 1971 the original glass-block instrument piers were replaced by solid marble piers, and a rug was laid on the floor of the observatory.

Ruska magnetogram baselines and scale values

Following installation of new piers and rug the Ruska variometers were readjusted, leading to abrupt baseline changes in all elements on August 20(1430).

Baseline and scale values adopted for 1971 are given in Tables 57–59.

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1971, and a list of the annual mean values, are given in Tables 60–63.

TABLE 57

St. John's

H Baselines nT			H Scale Values nT/mm	
Adopted			Adopted	
Jan.		17388	Jan. 1-Aug.20(1300)	6.50
Feb.		387		
Mar.		386		
Apr.		385	Aug.20(1430)-Dec.31	6.50
May		384		
June		17383 to 17377		
July		17377 to 17372		
Aug.	1-20(1300)	17370		
	18(2300)-19(1500)	No trace		
	20(1300-1430)	No trace		
	29(1200)-30(1200)	No trace		
	20(1430)-31	17615 to 17610		
Sep.		17610 to 17607		
Oct.		17606		
Nov.		17605 to 17603		
Dec.		17602		

TABLE 58

St. John's 1971

D Baselines				D Scale Values	
	Adopted	°		Adopted ′/mm	
Jan.	1-19	332	56.4	Jan. 1-Dec.31	0.97
	20-31	332	56.5		
Feb.	1-14	332	56.6 to 56.8		
	15-28	332	56.9 to 57.8		
Mar.	1-31	332	57.8 to 59.1		
Apr.	1-15	332	59.2 to 59.9		
	16-30	333	00.1		
May	1-17	333	00.3		
	18-31	333	00.5 to 01.1		
June	1-14	333	01.2 to 01.8		
	15-30	333	01.9		
July	1-31	333	01.8		
Aug.	1-20(1300)	333	02.0 to 02.4		
Aug.	18(2300)-19(1500);		No trace		
	20(1300-1430);		No trace		
	29(1200)-30(1200)		No trace		
	20(1430)-31	333	06.0 to 05.6		
Sep.	1-15	333	05.5 to 05.0		
	16-30	333	05.1		
Oct.		333	05.2		
Nov.	333		05.4 to 05.8		
Dec.	333		05.9 to 07.0		

TABLE 59

St. John's 1971

	Z Baselines nT		Z Scale Values nT/mm	
	Adopted		Adopted	
		50,000 nT+		
Jan.	1-15	621	Jan.1-Aug.20(1300)	8.00
	16-31	620 to 617		
Feb.	1-28	617 to 612	Aug.20(1430)-Dec.31	8.30
Mar.	1-31	612 to 606		
Apr.	1-14	606 to 604		
	15-30	603		
May		604		
June	1-22	605		
	23-30	604		
July	1-9	603		
	10-31	602		
Aug.	1-19(1800)	601		
	18(2300)-19(1500)	No trace		
	29(1200)-30(1200)	No trace		
	19(1800)-20(1430)	Z trace inoperative		
	20(1430)-31	608		
Sep.		608		
Oct.	1-21	608 to 610		
	22-31	610 to 608		
Nov.	1-10	607 to 606		
	11-30	605		
Dec.	1-19	605		
	20-31	604		

MEAN VALUES OF MAGNETIC ELEMENTS

HORIZONTAL INTENSITY-ALL DAYS

TABLE 60 ST JOHNS H = 17000 PLUS TABULAR VALUES IN GAMMAS 1971

L.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	645	652	668	670	690	702	706	711	709	715	718	721	692	702	690	684
1-2	646	651	667	663	682	699	702	708	702	716	717	720	689	698	687	683
2-3	644	652	666	665	682	696	700	708	702	710	716	720	688	696	686	683
3-4	644	649	665	668	676	695	699	705	701	707	718	720	687	694	685	683
4-5	643	651	664	662	679	693	698	704	701	710	718	719	687	694	684	683
5-6	642	652	665	665	677	692	698	704	703	711	717	721	687	693	686	683
6-7	644	653	663	663	673	691	698	702	703	713	718	723	687	691	686	684
7-8	646	654	663	666	681	689	697	704	706	718	717	724	689	692	688	685
8-9	648	655	665	668	683	691	698	703	709	718	723	725	690	694	690	688
9-10	649	657	665	666	680	690	694	699	707	718	726	728	690	691	689	690
10-11	649	657	664	663	676	684	685	689	701	712	724	727	686	684	685	689
11-12	644	652	654	655	667	678	677	681	690	703	717	724	679	676	676	684
12-13	635	644	645	649	663	671	670	672	678	692	708	719	671	669	666	677
13-14	627	636	636	639	659	665	667	668	670	682	699	713	663	665	657	668
14-15	621	630	632	639	659	667	672	673	670	682	695	709	662	668	656	664
15-16	623	633	639	646	668	675	679	681	679	687	698	709	668	676	663	666
16-17	631	640	648	655	680	685	692	693	693	697	706	712	678	688	673	672
17-18	638	649	658	671	691	699	705	707	709	707	715	717	689	701	686	680
18-19	643	655	669	685	703	709	719	717	721	716	722	730	699	712	697	687
19-20	645	659	674	691	710	717	722	724	723	719	722	735	703	718	702	690
20-21	648	659	673	692	710	721	725	727	721	720	723	729	704	721	702	690
21-22	649	659	672	690	705	717	720	722	717	719	721	728	702	716	700	689
22-23	646	655	670	682	700	710	714	718	714	717	720	726	698	711	696	687
23-24	645	653	670	673	695	705	707	714	712	716	719	723	694	705	693	685
MEANS	641	650	661	666	683	693	698	701	702	708	716	722	687	694	684	682

MEAN VALUES OF MAGNETIC ELEMENTS

DECLINATION-ALL DAYS

TABLE 61 ST JOHNS D = 333.0 DEGREES EAST PLUS TABULAR VALUES IN MINUTES 1971

L.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	23.4	24.5	26.0	28.1	28.5	29.8	30.5	32.1	32.4	33.0	33.7	34.6	29.7	30.2	29.9	29.0
1-2	23.3	25.0	26.1	28.0	29.9	30.4	30.8	32.3	31.8	33.1	33.5	34.9	29.9	30.9	29.8	29.2
2-3	23.1	24.5	26.2	27.4	29.4	30.4	30.9	32.6	32.2	32.6	33.5	34.9	29.8	30.8	29.6	29.0
3-4	22.8	23.5	26.2	27.9	28.7	30.3	31.5	32.2	31.9	32.5	33.1	34.2	29.6	30.7	29.6	28.4
4-5	22.8	23.9	25.8	28.2	29.2	29.9	30.9	32.7	32.6	32.2	32.5	33.3	29.5	30.7	29.7	28.1
5-6	23.0	23.4	26.0	28.7	29.6	30.2	31.3	33.1	32.5	32.3	32.0	33.5	29.6	31.1	29.9	28.0
6-7	23.2	23.7	26.4	28.8	28.3	30.4	31.1	33.2	33.8	32.3	32.3	33.5	29.7	30.7	30.3	28.2
7-8	23.1	24.0	26.3	29.3	29.5	31.1	31.9	34.0	34.2	32.8	31.9	33.8	30.2	31.6	30.7	28.2
8-9	23.0	24.5	26.4	29.7	30.7	33.2	33.6	34.9	34.4	32.6	32.3	33.8	30.8	33.1	30.8	28.4
9-10	22.2	24.6	26.7	29.8	32.4	34.8	35.5	36.7	34.5	32.5	32.5	33.5	31.3	34.8	30.9	28.2
10-11	22.4	24.5	27.8	30.3	33.5	35.5	36.5	37.7	35.0	33.2	32.8	33.5	31.9	35.8	31.6	28.3
11-12	23.1	24.9	28.7	30.5	33.5	35.1	36.4	37.4	35.1	33.8	33.4	33.9	32.1	35.6	32.0	28.8
12-13	23.2	25.2	28.4	29.7	32.6	34.3	35.1	35.8	34.5	34.1	33.6	34.5	31.7	34.5	31.7	29.1
13-14	21.6	24.4	26.7	28.5	29.9	32.2	32.8	32.8	31.9	32.3	32.4	33.9	30.0	31.9	29.9	28.1
14-15	20.1	21.9	23.7	25.5	27.0	29.1	29.4	29.6	28.9	29.6	30.1	32.2	27.2	28.8	26.9	26.1
15-16	18.6	19.1	20.9	22.6	24.3	26.3	26.5	26.3	25.9	27.1	28.1	30.7	24.7	25.8	24.1	24.1
16-17	17.5	17.7	18.5	20.5	22.4	23.8	24.2	24.3	24.9	25.7	26.9	29.1	23.0	23.7	22.4	22.8
17-18	17.7	17.2	17.5	19.8	22.2	23.0	23.3	24.2	25.5	26.0	27.2	28.7	22.7	23.2	22.2	22.7
18-19	18.5	18.4	18.6	20.9	23.3	23.7	24.1	25.6	27.0	27.1	28.3	29.6	23.7	24.2	23.4	23.7
19-20	19.9	19.7	20.1	22.2	24.5	25.2	25.2	27.5	28.8	28.7	29.8	30.9	25.2	25.6	25.0	25.1
20-21	20.6	21.2	21.9	23.8	26.0	26.8	27.1	29.6	30.3	29.9	30.9	31.5	26.6	27.4	26.5	26.0
21-22	21.1	21.7	23.8	25.0	26.8	28.2	28.7	30.8	31.0	31.0	31.9	31.9	27.7	28.6	27.7	26.6
22-23	22.0	22.7	25.1	26.1	27.6	29.2	29.6	31.2	31.4	31.8	32.5	33.0	28.5	29.4	28.6	27.6
23-24	22.8	23.5	25.0	27.2	27.5	29.4	30.1	31.5	32.1	32.7	33.0	33.6	29.0	29.6	29.2	28.2
MEANS	21.6	22.7	24.5	26.6	28.2	29.7	30.3	31.6	31.4	31.2	31.6	32.8	28.5	29.9	28.4	27.2

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY-ALL DAYS

TABLE 62 ST JOHNS Z = 50500 PLUS TABULAR VALUES IN GAMMAS 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	283	280	272	260	262	261	255	251	249	247	250	254	260	257	257	267
1-2	282	272	270	254	244	252	250	248	236	241	247	253	254	248	250	263
2-3	279	275	266	258	246	248	246	243	231	235	242	250	252	246	248	262
3-4	278	273	263	257	246	247	245	237	234	233	244	250	251	244	247	262
4-5	276	272	262	245	250	248	243	234	235	237	243	247	249	244	245	260
5-6	272	277	267	249	250	247	247	236	241	240	243	248	251	245	249	260
6-7	270	277	263	249	247	246	250	240	235	242	242	250	251	246	247	260
7-8	271	274	261	254	250	245	250	243	236	245	241	249	252	247	249	259
8-9	275	273	261	256	257	248	251	247	240	248	243	246	254	251	251	259
9-10	277	275	262	253	255	246	250	246	241	250	243	247	254	249	251	260
10-11	277	275	264	255	256	244	246	241	239	249	245	247	253	247	252	261
11-12	275	273	262	254	255	246	244	239	238	245	243	247	252	246	250	260
12-13	272	268	258	256	259	248	246	241	240	242	240	243	251	249	249	256
13-14	272	264	259	259	266	256	250	248	245	243	241	242	254	255	251	255
14-15	276	268	265	267	275	265	260	256	253	249	244	245	260	264	258	258
15-16	285	277	274	276	284	274	268	265	265	255	254	253	269	273	268	267
16-17	291	286	282	283	288	283	273	273	271	263	261	258	276	279	274	274
17-18	295	290	290	292	291	284	276	277	273	265	264	267	280	282	280	279
18-19	295	292	293	298	291	282	277	276	274	267	264	270	282	281	283	280
19-20	292	292	293	296	292	280	276	273	269	264	259	267	279	280	280	277
20-21	292	290	290	293	291	280	274	271	265	261	258	263	277	279	277	276
21-22	290	291	286	290	287	276	268	264	262	258	256	261	274	274	274	274
22-23	288	289	278	280	280	271	265	260	256	256	253	257	269	269	268	272
23-24	287	286	277	265	274	266	261	257	254	252	253	255	266	264	262	270
MEANS	281	279	271	267	267	260	257	253	249	249	249	253	261	259	259	265

TABLE 63

Annual Mean Values (St. John's)

Year	D		H	Z	X*	Y*	I(North)*		F*
	°	′	nT	nT	nT	nT	°	′	nT
1968.5	333	02.2	17436	50769	15541	−7906	71	02.7	53680
1969.5	333	09.9	17503	50777	15619	−7901	70	58.8	53709
1970.5	333	16.7	17598	50788	15719	−7913	70	53.3	53750
1971.5	333	28.5	17687	50761	15825	−7899	70	47.4	53754

*X, Y, I and F are derived from annual means of D, H, Z.

VICTORIA

Officer-in-charge: B. Caner
Assistant: D.R. Auld

The Victoria magnetic observatory was established in 1957 on the grounds of the Dominion astrophysical observatory (now National Research Council of Canada) on Little Saanich Mountain about 16 km north of Victoria, British Columbia. The observatory is pleasantly situated some 185 m above mean sea level, in a wooded area about 120 m northeast of the Dominion astrophysical observatory office building. The site was chosen in 1956 for convenience to observatory facilities and power, while maintaining adequate separation from buildings and pipelines.

The mailing address of Victoria magnetic observatory is:

Victoria Magnetic Observatory
R.R. #7
5071 West Saanich Road
Victoria, British Columbia V8X 3X3

Observatory site

The area is one of acid intrusive rocks of Mesozoic age. A survey was made in 1956, using a 7.5 m grid separation of stations, to determine the vertical magnetic field intensity gradients. This revealed an average station difference, independent of sign, of 25 nT ±20 nT standard deviation in any one difference. No large anomalies exceeding 25 nT were found within 30 m of the building site and the distribution of small anomalies was apparently random. Beyond this distance to the southeast a decrease of 50 nT was noted. The building site was therefore chosen for its flatness and convenience. To the east the ground falls rather steeply.

Magnetic equipment

Absolute instruments

In March 1968 a GSI precise (first order) magnetometer, following the rotating coil design of Dr. I. Tsubokawa and manufactured by Sokkisha Limited, Japan, replaced the portable fluxgate magnetometer for the determination of declination and inclination.

Additional magnetic equipment in operation at Victoria is described in the introductory section of the Annual Report.

Magnetic reductions

As of 1962 data has been processed on the semi-automatic magnetogram reader,[9] with output directly to computer cards. Direct photo-offset reproduction of the computer output sheets was used for the observatory yearbooks. The data are available on tab cards, and duplicate decks can be supplied to interested agencies.

Baselines and scale values

The adopted scale values for Ruska magnetograms are as follows:

D:	Jan. 1	to	Dec. 31	0.94 min/mm or 5.15 ±0.02 nT/mm
H:	Jan. 1	to	May 10	2.37 ±0.02 nT/mm
	May 10	to	Nov. 4	2.30 ±0.02
	Nov. 4	to	Dec. 31	2.33 ±0.02
Z	Jan. 1	to	May 10	4.02 ±0.02 nT/mm
	May 10	to	July 31	4.04 ±0.03
	Aug. 1	to	Aug. 31	4.08 ±0.03
	Sep. 1	to	Dec. 31	4.12 ±0.03

Baseline drift in all three components was negligible. The rms value of the observed minus adopted baselines is ±0.3 minute for declination, ±2 nT for the horizontal component, and ±2 nT for the vertical component.

1971 Ruska Baseline Values (Victoria)

Declination D	Jan. 1(0000) – Aug. 8(0004)	22°9.2′	East
	Aug. 8(0004) – Dec. 31(2400)	22°8.9′	
			nT
Horizontal intensity H	Jan. 1(0000) – May 10(1557)	18874	
	May 10(1557) – July 10(1633)	18926	
	July 10(1663) – Nov. 4(1812)	18921	
	Nov. 4(1812) – Nov. 18(1933)	18860	
	Nov. 18(1933) – Dec. 31(2400)	18917	
Temperature correction (nT/mm T)	+9 when temperature is greater than reference level −7 when temperature is less than reference level		
Vertical intensity Z	Jan. 1(0000) – May 10(1557)	53050	
	May 10(1557) – Nov. 4(1812)	53038	
	Nov. 4(1812) – Dec. 31(2400)	53022	
Temperature correction	−2nT/mm T		
			(mm)
Temperature reference levels	Jan. 1(0000) – May 10(1557)	5.8	
	May 10(1557) – Nov. 4(1812)	12.0	
	Nov. 4(1812) – Dec. 31(2400)	5.0	

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1971, and a list of the annual mean values, are given in Tables 64–67.

MEAN VALUES OF MAGNETIC ELEMENTS

HORIZONTAL INTENSITY (GAMMAS) (ALL DAYS)

TABLE 64 VICTORIA H = 18,500 GAMMA + 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0- 1	461	459	467	475	478	479	481	487	481	477	479	480	475	481	475	470
1- 2	464	462	469	474	473	480	479	480	475	474	480	480	474	478	473	472
2- 3	465	462	472	471	472	480	481	480	473	474	481	479	474	478	473	472
3- 4	465	463	471	469	471	479	478	478	472	476	480	479	473	477	472	472
4- 5	463	464	470	467	472	479	479	478	474	476	479	478	473	477	472	471
5- 6	463	467	471	466	472	479	480	478	477	477	480	477	474	477	473	472
6- 7	461	465	471	471	476	480	482	481	476	478	478	476	475	480	474	470
7- 8	460	465	472	469	476	479	483	482	477	477	480	475	474	480	474	470
8- 9	458	466	471	472	477	481	484	483	479	481	479	474	475	481	476	469
9-10	460	466	473	473	479	481	486	486	479	481	478	477	477	483	477	470
10-11	461	468	476	474	481	481	486	487	481	483	482	478	478	484	479	472
11-12	464	470	477	473	477	482	486	486	481	485	482	480	479	483	479	474
12-13	466	471	478	476	480	484	487	486	484	486	484	481	480	484	481	476
13-14	467	472	478	477	482	485	490	489	486	485	485	483	481	487	482	477
14-15	466	470	479	475	478	485	491	489	482	484	485	484	481	486	480	476
15-16	466	469	477	474	476	481	486	483	476	479	481	485	478	482	477	475
16-17	464	466	471	466	468	476	478	473	465	472	478	482	472	474	469	473
17-18	457	461	461	455	462	470	469	462	457	465	473	476	464	466	460	467
18-19	448	453	454	449	456	465	460	456	452	462	465	468	457	459	454	459
19-20	442	448	444	449	456	461	459	457	453	462	459	461	454	458	452	453
20-21	440	442	442	449	459	460	462	460	460	466	459	459	455	460	454	450
21-22	445	446	444	451	464	462	467	466	467	471	461	463	459	465	458	454
22-23	452	451	452	455	468	467	472	474	473	476	469	469	465	470	464	460
23-24	457	456	462	462	473	475	476	480	477	477	474	476	470	476	470	466
MEAN	459	462	467	466	472	476	479	477	473	476	476	476	472	476	471	468

MEAN VALUES OF MAGNETIC ELEMENTS

DECLINATION (MINUTES) (ALL DAYS)

TABLE 65 VICTORIA D = 22 DEG 00.0 MIN EAST + 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0- 1	21.8	21.1	19.8	18.8	18.0	17.4	17.6	18.0	19.5	20.0	19.3	19.1	19.2	17.7	19.5	20.3
1- 2	22.5	21.6	20.4	19.3	19.3	18.5	19.1	19.0	20.3	20.2	19.9	19.8	20.0	19.0	20.1	21.0
2- 3	23.2	22.2	21.0	20.5	20.3	19.7	20.2	19.7	20.7	21.4	20.6	20.5	20.8	20.0	20.9	21.6
3- 4	23.8	23.2	21.8	21.2	22.0	20.8	20.7	20.5	20.9	21.2	21.0	21.0	21.5	21.0	21.3	22.2
4- 5	23.9	23.2	22.7	22.3	21.9	21.5	21.4	21.1	21.1	21.4	21.6	21.5	22.0	21.5	21.9	22.5
5- 6	24.1	23.4	22.8	22.6	21.8	21.7	21.0	21.3	21.5	21.4	21.4	21.3	22.0	21.4	22.1	22.5
6- 7	24.3	23.2	23.1	23.4	22.9	21.7	21.4	21.8	21.4	21.4	21.2	21.2	22.2	21.9	22.3	22.5
7- 8	24.0	23.6	24.0	22.9	22.3	21.9	21.2	21.3	21.4	20.5	20.7	21.2	22.1	21.7	22.2	22.4
8- 9	23.2	23.5	24.5	23.3	22.4	21.7	21.1	21.1	20.6	20.8	21.1	20.9	22.0	21.6	22.3	22.2
9-10	22.9	23.4	24.0	23.0	22.3	21.8	21.0	21.4	21.5	20.7	21.2	20.7	22.0	21.6	22.3	22.0
10-11	23.6	23.1	24.2	23.1	22.1	22.4	20.9	21.7	22.6	20.6	20.2	20.3	22.1	21.8	22.6	21.8
11-12	24.3	23.4	23.1	23.5	22.8	23.2	21.6	22.5	22.7	21.4	20.4	20.3	22.4	22.5	22.7	22.1
12-13	24.1	23.5	23.6	23.5	23.7	23.2	23.1	22.7	22.7	21.5	20.2	20.3	22.7	23.2	22.8	22.0
13-14	23.9	23.6	23.1	24.3	24.8	24.3	24.2	23.6	23.5	20.9	20.7	19.9	23.1	24.2	22.9	22.0
14-15	23.3	22.6	23.8	25.4	25.7	25.9	26.0	25.8	24.3	21.9	21.0	20.1	23.8	25.8	23.9	21.7
15-16	24.0	23.8	25.2	26.1	27.0	27.0	27.5	27.4	25.5	22.9	21.4	20.8	24.9	27.2	24.9	22.5
16-17	25.5	24.7	26.8	26.4	27.3	27.1	28.3	28.0	26.3	23.7	22.5	21.7	25.7	27.6	25.8	23.6
17-18	26.1	25.3	26.7	26.4	25.9	26.4	27.2	26.5	24.7	22.9	23.1	21.5	25.2	26.5	25.2	24.0
18-19	25.7	24.5	25.5	24.7	23.7	23.8	24.0	22.5	21.8	21.1	22.3	21.8	23.5	23.5	23.3	23.6
19-20	24.4	23.3	23.9	22.7	21.0	21.4	20.0	19.0	19.0	18.8	20.7	20.9	21.3	20.4	21.1	22.3
20-21	22.9	21.8	21.7	20.9	19.1	19.1	17.3	17.0	17.5	17.9	19.3	20.0	19.5	18.1	19.5	21.0
21-22	21.8	20.7	20.1	19.8	18.1	17.5	16.1	16.0	17.0	17.8	18.3	18.7	18.5	16.9	18.7	19.9
22-23	21.5	20.2	19.3	18.6	17.2	16.7	15.9	16.0	17.6	18.3	18.3	18.3	18.2	16.4	18.5	19.6
23-24	21.5	20.4	18.7	18.3	17.3	16.5	16.5	16.6	18.4	18.9	18.5	18.3	18.3	16.7	18.6	19.7
MEAN	23.6	22.9	22.9	22.5	22.0	21.7	21.4	21.3	21.4	20.7	20.6	20.4	21.8	21.6	21.9	21.9

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY (GAMMAS) (ALL DAYS)

TABLE 66 VICTORIA Z = 53,000 GAMMA + 1971

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0- 1	115	115	110	119	119	113	110	107	104	98	97	100	109	112	108	107
1- 2	114	115	111	122	124	116	112	107	103	98	97	100	110	115	109	107
2- 3	115	115	113	125	126	118	114	108	105	101	98	100	111	117	111	107
3- 4	115	116	114	121	124	116	110	108	104	100	98	101	111	115	110	108
4- 5	114	116	115	120	118	114	107	107	103	100	97	101	109	112	110	107
5- 6	115	116	114	119	116	111	105	106	100	97	96	100	108	110	108	107
6- 7	113	113	113	116	110	109	104	102	98	96	94	100	106	106	106	105
7- 8	111	113	110	112	105	105	102	100	96	94	89	98	103	103	103	103
8- 9	108	111	107	110	104	103	101	96	91	91	89	92	100	101	100	100
9-10	102	108	102	104	102	100	99	95	87	88	87	90	97	99	95	97
10-11	102	107	101	100	96	96	98	93	87	86	87	88	95	96	94	96
11-12	103	106	99	97	95	95	96	92	84	85	86	86	94	95	91	95
12-13	104	104	96	97	101	96	97	93	88	84	86	88	94	97	91	96
13-14	103	104	97	97	103	96	99	94	91	84	85	90	95	98	92	96
14-15	101	99	99	99	100	96	99	97	92	88	86	92	96	98	95	95
15-16	101	100	102	101	99	96	98	97	91	90	88	94	97	98	96	96
16-17	105	104	103	101	98	95	94	94	90	91	91	94	97	95	96	99
17-18	106	102	100	97	95	92	87	86	85	88	90	91	93	90	93	97
18-19	106	99	96	95	91	87	81	79	82	84	88	91	90	85	89	96
19-20	106	97	92	95	90	86	78	77	82	83	87	92	89	83	88	96
20-21	106	99	93	97	94	87	80	80	86	85	88	93	91	85	90	97
21-22	108	103	96	100	100	90	84	86	90	89	90	94	94	90	94	99
22-23	111	106	101	105	104	96	91	92	95	93	93	95	99	96	99	101
23-24	112	110	105	112	111	104	99	99	98	94	94	97	103	103	102	103
MEAN	108	107	104	107	105	101	98	96	93	91	91	94	100	100	99	100

TABLE 67

Summary of Annual Mean Values (Victoria)

Year	D East		H	Z	X	Y		I	F
	°	′	nT	nT	nT	nT	°	′	nT
1956.6	23	00.2	18689	53427	17203	7303	70	43.2	56601
1957.75	22	57.1	18703	53408	17224	7294	70	41.9	56589
1958.5	22	55.2	18713	53396	17236	7288	70	41.2	56580
1959.5	22	52.8	18736	53377	17262	7284	70	39.5	56570
1960.5	22	50.3	18748	53362	17278	7277	70	38.5	56560
1961.5	22	47.8	18787	53322	17319	7279	70	35.5	56535
1962.5	22	44.4	18804	53288	17342	7268	70	33.8	56508
1963.5	22	41.4	18814	53264	17358	7257	70	32.7	56489
1964.5	22	38.6	18837	53239	17385	7252	70	30.9	56473
1965.5	22	36.0	18860	53205	17412	7248	70	28.9	56449
1966.5	22	34.2	18873	53179	17428	7244	70	27.6	56429
1967.5	22	31.7	18888	53157	17447	7237	70	26.3	56413
1968.5	22	29.4	18902	53138	17464	7230	70	25.1	56400
1969.5	22	27.4	18923	53127	17488	7228	70	23.7	56396
1970.5	22	24.8	18946	53117	17515	7224	70	22.2	56395
1971.5	22	21.8	18971	53099	17544	7218	70	20.4	56386

X, Y, I, F are derived from annual means of D, H, Z.

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