



Energy, Mines and  
Resources Canada

Énergie, Mines et  
Ressources Canada

Earth Physics Branch

Direction de la physique du globe

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Geomagnetic Service of Canada

Do You Have Diurnal Problems?

Free

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For sufferers from POLAR SUBSTORMS, SUDDEN COMMENCEMENTS and other IRREGULARITIES of the magnetic field during magnetic surveys, help may be available from the magnetic variation recording sites labelled on the map. The stations are operated by the Earth Physics branch of the Department of Energy, Mines and Resources. EMR's free brochure on diurnal activity in Canada gives information on the stations, the form in which data are available and an estimate of cost.

CANADIAN MAGNETIC OBSERVATORY DATA

The Division of Geomagnetism, Earth Physics Branch, has available records of geomagnetic field variations with baseline control at eleven observatories and two secondary recording sites (class IV operation) as listed in Table I.

TABLE I

MAGNETIC STATIONS	LAT N°	LONG W°	CLASS OF OPERATION	TYPE OF RECORDING		
				DIGITAL	ANALOGUE	COORDINATE SYSTEM
Alert	82.5	62.5	IV		Fluxgate	X,Y,Z
Mould Bay	76.2	119.4	I		Ruska	X,Y,Z
Resolute Bay	74.7	94.9	I	Amos		X,Y,Z
Cambridge Bay	69.1	105.0	III	Amos		X,Y,Z
Baker Lake	64.3	96.0	I	Amos	Ruska	X,Y,Z
Yellowknife	62.5	114.5	III	Amos		X,Y,Z
Ft. Churchill	58.8	94.1	II	Amos		X,Y,Z
Gt. Whale River	55.3	77.75	II	Amos	Ruska	X,Y,Z
Meanook	54.6	113.3	I		Ruska	D,H,Z
				Amos		X,Y,Z
White Shell	49.8	92.25	IV	Amos		X,Y,Z
Victoria	48.5	123.4	I		Ruska	D,H,Z
St. John's	47.6	52.7	III	Amos		X,Y,Z
Ottawa	45.4	75.55	I		Ruska	D,H,Z
				Amos		X,Y,Z

Co-ordinate Systems

To fully describe the variations in the geomagnetic field, two different co-ordinate systems are in use at Canadian Observatories. The dominant system is the Cartesian defining the vectors as X (positive north), Y (positive east)

and Z (positive downward). The classical observatories use the older Gaussian system defining the elements as H (horizontal force), D (declination, clockwise angle which H makes with geographic north) and Z (vertical force). All units of force are measured in nano-teslas. The variation in declination is usually expressed in units of angle (degrees and/or minutes) but may be converted at any instant to a perturbing force vector using the relation

$$\Delta Z \text{ (nano-teslas)} = H \cdot \tan \Delta D \text{ (minutes of arc)} \quad (\text{for small } D).$$

### Recording Systems

The automatic Magnetic Observatory System (AMOS) records values of X,Y,Z and total force F once a minute on digital magnetic tape. Each record contains ten minutes of real-time data followed by the time, date and station identification. The three orthogonal components are measured by a digital voltmeter on the output of a fluxgate magnetometer. Total force is supplied by a proton precession magnetometer (PPM). The variations in X,Y,Z are also recorded continuously on a strip-chart recorder.

The Ruska system is the classical method of recording variations in the geomagnetic field. The sensors are magnets, supported at right angles to the component being measured. Variations in position of a light beam reflected from mirrors attached to the sensor magnets are recorded on photographic paper. Paper speed is twenty millimeters an hour and one record is produced each day.

The recording site at Alert, has a fluxgate magnetometer and a pen and ink analogue recorder similar to the one used by the Amos. As with the Amos, chart speed is twenty millimeters an hour and chart sensitivity is normally 8 nano-Teslas/mm.

### Class of Operation

Class I observatories are operated by permanent staff of the Earth Physics Branch. Checks on the instruments are made once a day and absolute observations of the geomagnetic field are made twice a week.

The operation at Class II observatories is similar to the Class I operation except that these observatories are operated under contract. The operators are trained at the station by an officer from the Division.

Class III observatories are also operated under contract. Observatories are visited once or twice a week at which time instrument checks and absolute measurements of the magnetic field are made.

Class IV observatories produce variation records from a fluxgate magnetometer or AMOS. The instruments are checked periodically and the charts are annotated for time. The digital data from the Whiteshell site is edited on request.

#### Availability of Data

All the records are removed from the various recorders at the end of the month and sent to Ottawa. Arrival times of these monthly reports at headquarters vary although most of the material is usually available three weeks after the end of the month.

Upon arrival of the monthly reports the following information is immediately available:

- (1) tape copies of the unedited Amos data tapes
- (2) print-outs of the unedited Amos data tapes
- (3) photocopies of fluxgate charts
- (4) photocopies of Ruska magnetograms with preliminary instrument baselines and sensitivities.

Microfilm copies of the analogue records and tape copies or print outs of the edited Amos data are available on request after two or three months.

Costs

Expenses are recovered for the Receiver General of Canada on a cost recoverable basis plus 30% overhead charges. Typical charges without the overhead are as follows:

Tapes	-	\$25.00 per tape
Tape copy	-	\$15.00 per file of unedited data; minimum file size is approximately one month of data;
	-	\$15.00 per file of edited data
Printouts	-	\$1.50 per thousand lines plus computer processing (approx. \$5 to \$10)
Photocopies	-	\$16.00 for one month of fluxgate charts or \$0.15 per 8 x 10" portion of the chart roll
	-	\$0.25 per Ruska magnetogram (one day's record)
Microfilm	-	\$10.00 per 100 feet of film (minimum order).

All charges are subject to change without notice.

Other Services

The Ottawa Observatory issues on request a forecast of geomagnetic activity. Forecast period is four weeks but the forecast is updated every three weeks. Due to the complexity of geomagnetic disturbances in Canada, forecasts are made using the three general terms "quiet" "unsettled" and "active". These terms are redefined for each of the three main geomagnetic activity regions of Canada, (polar cap, auroral zone and middle latitude). For further information write to:

Ottawa Magnetic Observatory  
Earth Physics Branch  
Energy, Mines and Resources  
Ottawa, Ontario  
K1A 0Y3

G. Jansen van Beek  
August, 1976.



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Our file    Notre référence

THE FORECAST OF GEOMAGNETIC ACTIVITY

Ottawa Magnetic Observatory, Earth Physics Branch, EMR, issues two types of the forecast of geomagnetic activity.

These predictions are mainly based on the solar and geomagnetic information, which we receive from the Space Environmental Service Centre, Boulder, USA, and on our observation of the geomagnetic field. The complexity of geomagnetic field -- especially in arctic areas -- does not allow us to describe the geomagnetic field for these purposes in other than very general terms:

"The geomagnetic field is: quiet, unsettled, active:

The absolute definition of these terms depends on the geomagnetic coordinates of the observation site [what is considered "unsettled" in a southern location could be "quiet" near the magnetic pole].

The maximum amplitude (A) of the disturbance [daily variation excluded] during the predicted period is approximately:

Latitude Geomag. field	50°-60°N	60°-70°N	over 70°N
quiet	$A \leq 30\gamma$	$A \leq 50\gamma$	$A \leq 40\gamma$
unsettled	$30\gamma < A \leq 60\gamma$	$50\gamma < A \leq 100\gamma$	$40\gamma < A \leq 90\gamma$
active	$A > 60\gamma$	$A > 100\gamma$	$A > 90\gamma$

The forecasts are:

- I. 27-day forecast of geomagnetic activity: issued at 3-4 week intervals, including also a review of the last month's activity. These forecasts are mailed.
- II. 72-hrs forecast: broadcast twice a week on the northern CBC radio network [detailed information in the memorandum of March 30, 1976].

For information on the "local" field any of the Canadian magnetic observatories could be contacted [See: List of Canadian Magnetic Observatories].

For additional information on the forecast write to:

Ottawa Magnetic Observatory  
Earth Physics Branch, EMR  
Ottawa, Ontario K1A 0Y3

and for other information on the geomagnetic field [magnetic maps, instruments, etc.] to

The Geomagnetic Division  
Earth Physics Branch, EMR  
Ottawa, Ontario K1A 0Y3

JH/es

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Dr. J. Hruska  
Ottawa Magnetic Observatory



May 20, 1976

Your file *Voire référence*

Our file *Notre référence*

**TO: THE USERS OF GEOMAGNETIC PREDICTIONS**

The experimental broadcasting of the 72-hr predictions of geomagnetic activity started on March 2nd. Enclosed is the list of CBC radio stations which broadcast this information every Wednesday and Friday between 06.10 - 06.20 a.m..

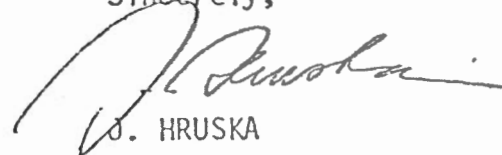
<u>Station</u>	<u>Frequency</u>	<u>Station</u>	<u>Frequency</u>
Elliot Lake	1090	Baie Comeau	1140
Spanish	1400	Chapais	1400
Kapuskasing	1090	Chibougamau	710
Mindemoya	540	Chicoutimi	107.9
Britt	1240	Gagnon	1400
Chapleau	1090	Gaspé	1230
Foleyet	1450	La Tuque	990
Wawa	1440	Lebel-sur-Quevillon	1230
Mattawa	1240	Malartic	1230
Espanola	1240	Megantic	1240
Latchford	1450	Murdochville	1400
Haliburton	1400	Noranda	1450
Hearst	1400	Port Cartier	990
Bancroft	600	Schefferville	570
Fraserdale	1400	Senneterre	540
Moosonee	1340	Sept-Îles	1190
Maynooth	1400	Val d'Or	570
Timagami	1340	Fort George	105.1
Barrie's Bay	1340	Nouveau Comptoir	105.1
Rolphton	1230	Deep River	1110
Maniwaki	1340		

Please, check directly the time, frequencies of broadcasting with the following CBC stations, we do not have this information in Ottawa.

Inuvik - CHIK  
Frobisher Bay - CFFB  
Fort Churchill - CHFC  
Whitehorse - CFWH  
Yellowknife - CFYK

We would appreciate your comments on this action.

Sincerely,



J. HRUSKA

JH/es

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