UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

ALASKAN GEOLOGY BRANCH
TECHNICAL DATA FILE

PRELIMINARY GEOMAGNETIC DATA COLLEGE OBSERVATORY FAIRBANKS, ALASKA

MARCH 1978

OPEN FILE REPORT 78-300C

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Normal Magnetograms

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THIS REPORT WAS PREPARED UNDER THE DIRECTION OF JOHN B. TOWNSHEND, CHIEF OF THE COLLEGE OBSERVATORY WITH THE ASSISTANCE OF OBSERVATORY STAFF MEMBERS J. E. PAPP, ASST. CHIEF, AND S. P. TILTON, AND IN COOPERATION WITH THE GEOPHYSICAL INSTITUTE OF THE UNIVERSITY OF ALASKA. THE COLLEGE OBSERVATORY IS A PART OF THE BRANCH OF ELECTROMAGNETISM AND GEOMAGNETISM OF THE U.S. GEOLOGICAL SURVEY.

COLLEGE OBSERVATORY PRELIMINARY GEOMAGNETIC DATA

INTRODUCTION

The preliminary geomagnetic data included here is made available to scientific personnel and organizations, as part of a cooperative effort and on a data exchange basis because of the early need by some users. To avoid delay, all of the data is copied from original forms processed at the observatory; therefore it should be regarded as preliminary. Inquiries about this report or about the College Observatory should be addressed to:

Chief, College Observatory
U.S. Geological Survey
Yukon Drive on West Ridge
Fairbanks, Alaska 99701

Requests for copies of the magnetograms except for the current month should be addressed to:

World Data Center A-NOAA
Environmental Data Service
Boulder, Colorado 80302

OBSERVATORY LOCATION

The College Observatory, operated by the U. S. Geological Survey, is located at the University of Alaska, Fairbanks, Alaska. It is near the Auroral Zone and the northern limit of the world's greatest earthquake belt, the circum-Pacific Seismic belt. Although the observatory's basic operation is in geomagnetism and seismology, it cooperates with other scientists and organizations in areas where the facility and personnel can be of service.

The observatory is one of three operated by the USGS in Alaska. The others are located at Barrow and Sitka.

The position of the observatory site is:
Geographic latitude..... $64^{\circ}51.6'N$
Geographic longitude..... $147^{\circ}50.2'W$
Geomagnetic latitude..... $+64.6^{\circ}$
Geomagnetic longitude..... $+256.5^{\circ}$
Elevation.....200 meters

GEOMAGNETIC DATA

Normal, Storm, and Rapid Run magnetograms and appropriate calibration data are processed daily at the observatory and are available for analysis or copying. Also available are mean hourly scalings, K-Indices, selected magnetic phenomena reports, and on a real-time basis are recordings from a 3-component fluxgate magnetometer and F-component proton magnetometer.

Magnetic Activity

The K-Index. The K-Index is a logarithmic measurement of the range of the most disturbed component (D or H) of the geomagnetic field for eight intervals beginning 0000-0300, 0300-0600...2100-2400 UT. It is a measure of the difference between the highest and lowest deviation from a smooth curve to be expected for a component on a magnetically quiet day, within a three hour interval.

The Equivalent Daily Amplitude, AK. The K-Index is converted into an equivalent range, ak, which is near the center of the limiting gamma ranges for a given K. The average of the eight values is called equivalent daily amplitude AK. The unit 10 γ has been chosen so as not to give the illusion of an accuracy not justified.

The schedule for converting gamma range to K, and K to ak is as follows:

Gamma Range	K - Index	ak*
0 < 25	0	0
25 < 50	1	3
50 < 100	2	7
100 < 200	3	15
200 < 350	4	27
350 < 600	5	48
600 < 1000	6	80
1000 < 1650	7	140
1650 < 2500	8	240
2500+	9	400 (10 γ)

The Magnetic Daily Character Figure, C. To each Universal day a character is assigned on the basis C=0, if it is quiet; C=1 if it is moderately disturbed; C=2 if it is greatly disturbed. The method used to assign characters at the College Observatory is based on AK as follows:

AK Range	C
0-11	0
11-50	1
50+	2

Routine assignment of C was discontinued at College on January 1, 1976.

Selected Phenomena & Outstanding Magnetic Effects

Prior to January 1, 1976, the Normal & Rapid Run records were reviewed at the observatory for selected magnetic phenomena and the events identified were forwarded to the IUGG Commission on Magnetic Variations and Disturbances. This was discontinued on January 1, 1976, but a report on Outstanding Magnetic Effects is prepared monthly for this report.

Principal Magnetic Storms

Gradual and sudden commencement magnetic disturbances with at least one K-Index of 5 or greater, which are believed to be part of a world-wide disturbance, are classified as principal magnetic storms. The time of the storm beginning and ending; direction and amplitude of sudden commencements; period of maximum activity; and storm range are reported. Monthly reports of these data are forwarded to the World Data Center A in Boulder, Colorado.

Magnetogram Hourly Scalings

Magnetogram hourly scalings are averages for successive periods of one hour for the D, H, and Z elements. The value in the column headed "01" is the average for the hour beginning 0000 and ending 0100. Note that the values on the scaling sheets are in tenths of mm with the decimal point omitted. The user of these scalings should keep in mind that the tabular values are hourly means and if he is interested in the detailed morphology of the magnetic field, he should refer directly to the magnetograms.

Magnetograms

The normal magnetograms in this report are reproduced at about one-third the size of the originals. Preliminary base-line values and scale values adopted for use with the original magnetograms are included. For days when the magnetic field is too disturbed for the Normal magnetogram to be readable, Storm magnetograms are reproduced.

Absolutes, Base-lines, and Scale Values

To determine the absolute value of the magnetic field from the hourly means or from point scalings the following equations should be used:

$D = B_D + d \cdot S_D$; $H = B_H + h \cdot S_H$; $Z = B_Z + z \cdot S_Z$
where D, H, and Z are absolute values;
 B_D , B_H and B_Z are base-line values;
 S_D , S_H and S_Z are scale values;
and d, h, and z are scalings in millimeters.

NOAA FORM 76-133 (9-72)										U. S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION										OBSERVATORY COLLEGE, ALASKA									
MAGNETIC ACTIVITY (Greenwich civil time, counted from midnight to midnight)																				MONTH AND YEAR MARCH 1978									
DATE		K-INDICES										AK	TIME SCALE ON MAGNETOGRAMS 20 mm/hr																
		00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24	SUM																			
1		3	3	4	7	6	6	5	4	38	54	SUDDEN COMMENCEMENTS d h m																	
2		4	4	6	4	4	4	3	2	31	30																		
3		3	4	3	5	5	4	3	2	29	25																		
4		1	1	0	0	0	0	0	0	02	01																		
5		0	0	3	5	5	5	2	1	21	21																		
6		0	0	0	5	5	4	1	0	15	16																		
7		1	1	0	4	5	4	1	1	17	14																		
8		0	0	0	0	3	2	6	4	15	16																		
9		2	3	3	5	3	3	3	2	24	17																		
10		0	1	5	5	7	3	1	0	22	32																		
11		0	1	1	5	2	4	1	0	14	11	POSSIBLE SOLAR-FLARE EFFECTS BASED ON INSPECTION OF GRAMS ALONE (WITHOUT REFERENCE TO DATA FROM OTHER SOURCES)																	
12		0	0	0	0	1	0	0	0	01	00																		
13		2	3	4	5	5	2	2	2	25	21																		
14		1	1	2	3	5	3	2	2	19	13																		
15		2	5	4	3	3	4	3	2	26	19																		
16		4	3	4	4	5	5	3	3	31	28																		
17		3	4	4	6	5	6	3	3	34	38																		
18		3	3	3	6	5	6	3	2	31	34																		
19		3	3	3	6	5	5	1	1	27	28																		
20		2	2	3	3	4	2	2	1	19	11																		
21		1	2	2	3	3	1	0	1	13	07	BEGIN END d h m d h m																	
22		0	1	2	4	4	3	3	3	20	14																		
23		4	3	3	5	5	4	0	0	24	23																		
24		0	1	0	0	0	1	0	1	03	01																		
25		1	0	0	0	0	0	0	1	02	01																		
26		3	3	4	2	6	6	6	3	33	40																		
27		5	4	6	7	6	6	6	4	44	70																		
28		4	3	4	4	6	6	2	2	31	34																		
29		2	2	3	6	5	4	2	2	26	25																		
30		2	2	6	6	5	3	2	1	27	31																		
31		1	1	0	5	3	4	1	1	16	13																		

K SCALE USED: LOWER LIMIT FOR K = 9..... CURRENT SCALE VALUE..... LOWER LIMIT FOR K = 9.....				D 683.8 3.75 2560	H 321.7 7.80 2510	Z 	(mm) (γ/mm) (to nearest 10γ)
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SCALINGS AND COMPUTATIONS HAVE BEEN CHECKED.

APPROVED JOHN B. TOWNSHEND, CHIEF, COLLEGE OBSERVATORY

OBSERVER IN CHARGE

OUTSTANDING MAGNETIC EFFECTS			OBSERVATORY COLLEGE, ALASKA	
			MONTH MARCH	YEAR 1978
DATE	TIME U.T.	NATURE OF PHENOMENON ¹	REMARKS	
04	09XX	pi2		
06	1101	bps		
08	1439	ssc*		
31	1116	bps		
IDENTIFIED BY: JEP			VERIFIED BY: JBT	

1. NATURE OF PHENOMENON: ssc, ssc*, si, si*, b, bp, bs, bps, pc1, pc2 - - - pc5, pg, pi 1, pi 2, sfe.

PRINCIPAL MAGNETIC STORMS
COLLEGE OBSERVATORY, COLLEGE, ALASKA

WDC-A FOR SOLAR-TERRRESTRIAL PHYSICS
ENVIRONMENTAL DATA SERVICE, NOAA
BOULDER, COLORADO 80502 U.S.A.

Data from Individual Observatories:

MARCH 1978

Obs. 2 letter IAGA code	Geomag. lat.	Commencement			SC - amplitudes			Max. 3 hr - index K			Ranges			UT End day hr
		day	hr min (UT)	type	D(')	H(Y)	Z(Y)	day	(3 hr - period)	K	D(')	H(Y)	Z(Y)	
C0	64.6 N	08	1439	s.c.*	-14	+101	-24	08	7	6	102	760	320	09 23
		10	07XX	..	..	..	..	10	5	7	181	1160	830	10 15
		15	03XX	..	..	..	..	17 18 19	4, 6 4, 6 4	6 6 6	240	1250	780	19 18
		26	00XX	..	..	..	..	27	4	7	211	1560	910	30 17

NORMAL MAGNETOGRAPH					
COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASILINE
D	0000 U.T., 3-1-78	2400 U.T., 3-31-78	1.0/mm	3.88/mm	27° 47.0 E
H	0000 U.T., 3-1-78	2400 U.T., 3-31-78	7.88/mm		127518
Z	0000 U.T., 3-1-78	2400 U.T., 3-31-78	7.88/mm		551338

STORM MAGNETOGRAPH					
COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASILINE
D	0000 U.T., 3-1-78	2400 U.T., 3-31-78	7.9/mm	29.78/mm	24° 20.9 E
H	0000 U.T., 3-1-78	2400 U.T., 3-31-78	44.18/mm		114948
Z	0000 U.T., 3-1-78	2400 U.T., 3-31-78	48.88/mm		540298

RAPID RUN MAGNETOGRAPH				
COMPONENT	PERIOD		CALIBRATION	
	FROM	TO	SCALE VALUE	
D	0000 U.T., 3-1-78	2400 U.T., 3-31-78	0.3 /mm	1.0 x /mm
H	0000 U.T., 3-1-78	2400 U.T., 3-31-78	1.0 x /mm	
Z	0000 U.T., 3-1-78	2400 U.T., 3-31-78	2.4 x /mm	

MONTHLY MEAN ABSOLUTE VALUES*		
D	H	Z
28° 17.0 E	130298	553748

* COMPUTED FROM TEN QUIETEST DAYS DURING MONTH.

DAYS USED: MAR 4, 7, 11, 12, 14, 20, 21, 24, 25, 31

MAGNETOGRAM HOURLY SCALINGS
(UNIVERSAL TIME)U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATIONOBSY. YEAR MONTH ELE-
MENTValues are in tenths of mm. and are averages for successive periods of one hour beginning at midnight. Hour 01 of local day (1500 M.T.) is hour 11 of the same universal day.
Shrinkage corrections have been applied. Negative values are in red, with minus signs shown.

CO 78 MAR D

Smallage correction has been applied. Negative values are in red, and times have been																														
C	Q	S	T	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	SUM		
				01	289	261	250	260	290	270	275	280	252	384*	121*	306	01	320	465	343*	209*	843*	423*	434	362	363	321	253	220	7794
				02	253	273	277	272	206	386	199	386*	263*	269	269	257	02	324	310	320	371	339	338	385	327	313	270	301	295	7223
				03	281	281	271	254	221	222	248	270	300	210	124*	258	03	377	340	311	361	391	399	366	288	270	300	290	291	6924
				04	281	286	278	270	277	277	273	278	281	291	290	304	04	300	302	308	310	321	330	347	351	352	340	321	304	7272
				05	290	283	279	279	281	281	278	261	268	280	251	354	05	521	400	407	351	391	350	292	313	312	330	307	296	7655
				06	288	282	280	280	280	280	281	281	282	271	270	410*	06	341	311	338	310	338	332	347	348	336	309	289	273	7357
				07	269	260	249	257	263	273	279	278	280	291	292	369	07	377	423	470	369	399	351	353	334	320	317	274	271	7618
				08	268	257	258	262	270	274	278	281	281	287	290	294	08	299	314	324	369	380	359	341	442*	373*	95	289	270	7205
				09	273	242	253	242	258	254	286	289	253	405	398	329	09	317	301	317	341	327	331	355	339	322	271	309	287	7299
				10	288	283	283	279	281	280	271	253	234	291	365	460*	10	579*	571*	396*	240	299	317	321	337	321	310	291	290	7840
				11	290	290	280	270	271	278	281	293	288	314	376	407	11	321	320	306	284	272	316	352	381	357	309	297	280	7433
				12	281	280	281	280	284	287	287	284	280	284	300	304	12	293	290	296	303	320	338	337	341	338	330	313	291	7222
				13	277	278	268	267	249	190	187	154	240	216	174*	304	13	347	338	479	306	316	320	343	288	228	271	303	267	6610
				14	249	247	226	231	243	250	289	297	281	269	310	414	14	412	322	272	316	341	353	367	320	317	336	319	281	7282
				15	250	239	188	188	212	157	181	237	251	313	250	294	15	312	321	320	331	304	352	356	360	294	216	240	260	6426
				16	220	204	177	190	166	200	100	226	226	267	295	339	16	330	336	372	571*	531*	526	334	289	274	251	290	250	6984
				17	202	223	226	200	353	240	190	193	348	250	272	278	17	302	516	388*	381*	396*	390	391	320	219	201	230	264	6973
				18	260	246	209	203	280	259	277	279	258	88*	110*	212	18	674*	729*	801*	301*	421	422	380	312	307	310	303	281	7746
				19	279	256	207	214	221	222	279	298	262	288	292	254*	19	285*	314	425	420	323	348	396	348	328	310	290	264	7123
				20	240	262	250	264	252	263	257	250	253	289	282	304	20	361	398	331	343	364	370	361	358	290	310	271	251	7174
				21	240	227	230	229	231	279	274	281	310	271	279	261	21	326	360	339	311	330	350	368	358	343	351	300	276	7124
				22	246	239	230	252	259	284	260	272	256	333	291	273	22	316	348	331	356	373	381	320	289	340	259	155	190	6853
				23	201	291	231	273	253	270	297	281	281	294	301	494	23	562	485	593	371	331	358	375	364	341	326	308	292	8173
				24	278	267	271	271	281	287	271	261	280	280	289	291	24	297	299	301	311	329	342	357	340	308	276	263	237	6987
				25	243	262	267	266	271	279	279	279	279	278	291	290	25	288	296	301	318	340	360	379	378	368	341	316	297	7266
				26	270	226	164	227	181	256	266	261	254	281	280	319	26	305	346	654	484	511	720	593*	426*	212*	267	300	261	8064
				27	252	211	161	234	141	211	156	-59*	204*	148*	299*	301	27	374	434*	346*	466*	561*	474*	505*	156	195	290	337	330	6727
				28	251	237	220	252	254	256	270	277	366	357	262	274	28	302	283*	466*	338*	377	370	355	362	344	340	319	288	7420
				29	267	231	231	238	260	253	316	340	351	338	307	312	29	366	332	420	330	392	329	334	336	345	291	313	260	7492
				30	239	210	185	181	181	199	224	272	78*	168	189*	395*	30	401	641*	322	313	359	355	341	319	310	267	267	271	6687
				31	269	239	260	249	260	271	280	280	282	274	271	236*	31	376	406	403	397	372	396	364	379	337	317	282	241	7431

SCALED BY SPT, JEP

CHECKED BY JEP, SPT

SIGNS RE-
VIEWED BY JEP

PUNCHED BY

Preliminary base-line and scale values:

Interval
BeginningBase-line
ValueScale
Value

() Interpolated

[] Significant portion of
hour interpolated.□ No record; or no values
available because of
faulty record.

* Derived from Storm Mph., converted to Normal Mph.

[] Scaling uncertain because
of magnetic storm.<> Record off sheet for part
or all of hour; if value is
given, curve was estimated
for missing part.

MONTHLY SUM

MONTHLY MEAN

DATES WITH GAPS:

226384

304

2	155	75	(1)
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SCALED BY	SPT, JEP	Preliminary base-line and scale values: Interval Base-line Scale Beginning Value Value	() Interpolated	☐ Scaling uncertain because of magnetic storm. <> Record off sheet for part or all of hour; if value is given, curve was estimated for missing part.	MONTHLY SUM <u>232.533</u> MONTHLY MEAN <u>313</u> DATES WITH GAPS:
CHECKED BY	JEP, SPT		☐ Significant portion of hour interpolated.		
SIGNS REVIEWED BY	JEP		☐ No record; or no values available because of faulty record.		
PUNCHED BY			• Derived from <u>STORM</u> Mph., converted to Normal Mph.		

FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)

SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES

NORMAL MAGNETOGRAMS

NORMAL MAGNETOGRAMS

Scale value
deflections

NORMAL MAGNETOGRAMS

NORMAL MAGNETOGRAMS

NORMAL MAGNETOGRAMS

NORMAL MAGNETOGRAMS

NORMAL MAGNETOGRAMS

200 mm
100 mm
0

NORMAL MAGNETOGRAMS

STORM MAGNETOGRAMS

STORM MAGNETOGRAMS

STORM MAGNETOGRAMS

STORM MAGNETOGRAMS