UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PRELIMINARY GEOMAGNETIC DATA
COLLEGE OBSERVATORY
FAIRBANKS, ALASKA

MARCH 1981

OPEN FILE REPORT

81-300C

ORDER OF CONTENTS

Explanation of Data & Reports

Magnetic Activity Report

Outstanding Magnetic Effects

Principal Magnetic Storms

Preliminary Calibration Data & Monthly Mean Absolute Values

Magnetogram Hourly Scalings

Sample Format for Normal & Storm Magnetograms

Normal Magnetograms

Storm Magnetograms (When Normal is too disturbed to read)

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 AND E.A. SAUTER, 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

OBSERVATORY LOCATION

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

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 10γ has been chosen so as not to give the illusion of an accuracy not justified.

The schedule for converting gamma ranges 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	120
1650 < 2500	8	240
2500+	9	400 (10γ)

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.

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°37.6'N
Geographic longitude....147°50.2'W
Geomagnetic latitude.....+64.6°
Geomagnetic longitude.....+356.5°
Elevation.....200 meters

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 averaged for successive periods of one hour for the D, H, and Z elements. The value in the column headed "OI" is the average for the hour beginning 0000 and ending 0100. Note that the values on the scaling sheets are in tenths of cm 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:

$D = B_0 + d \cdot S_D$; $H = B_0 + h \cdot S_H$; $Z = B_0 + z \cdot S_Z$
where D, H, and Z are absolute values;
 B_0 , B_H and B_Z are base-line values;
 S_D , S_H and S_Z are scaling values;
and d, h, and z are scalings in millimeters.

COLLEGE, ALASKA

MAGNETIC ACTIVITY

(Greenwich civil time, counted from midnight to midnight)

MONTH AND YEAR

MARCH 1981

DATE	K-INDICES								AK	TIME SCALE ON MAGNETOGRAMS
	00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24		
								SUM		20 mm/hr
1	3	2	3	6	5	5	3	3	30	SUDDEN COMMENCEMENTS d h m
2	2	2	6	6	6	3	2	1	28	
3	1	0	0	0	1	2	1	1	06	
4	2	3	6	5	1	0	0	1	18	
5	2	5	5	7	7	7	6	3	42	
6	3	1	3	2	2	1	2	1	15	
7	2	2	3	6	5	7	6	2	33	
8	2	1	4	5	5	2	1	0	20	
9	1	0	0	3	3	0	0	1	08	
10	1	1	0	6	5	3	1	0	17	
11	1	0	1	5	3	1	1	1	13	POSSIBLE SOLAR-FLARE EFFECTS BASED ON INSPECTION OF GRAMS ALONE (WITHOUT REFERENCE TO DATA FROM OTHER SOURCES)
12	0	0	2	4	4	4	2	3	19	
13	2	2	2	4	5	6	5	4	30	
14	3	4	4	7	7	6	4	3	38	
15	3	3	2	3	5	5	4	2	27	
16	2	3	3	3	4	3	2	2	22	
17	3	2	3	3	5	4	3	2	25	
18	2	3	5	6	4	5	5	2	32	
19	2	1	2	3	1	5	4	1	19	
20	1	1	4	4	5	5	1	0	21	
21	0	0	0	1	0	0	3	2	06	BEGIN
22	1	1	1	0	0	1	1	0	05	
23	0	0	0	5	3	0	0	0	08	END
24	0	0	0	1	1	0	1	1	04	
25	1	4	4	3	6	6	4	3	31	
26	5	3	3	4	6	5	3	3	32	d h m
27	2	2	3	3	5	5	2	2	24	
28	1	2	2	3	5	4	2	2	21	d h m
29	2	3	5	6	4	5	2	1	28	
30	3	2	2	4	5	5	3	3	27	d h m
31	4	4	3	4	5	4	4	3	31	

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

7.81

2510

Z

(mm)

(γ/mm)

(to nearest 10γ)

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
1981

DATE	TIME U.T.	NATURE OF PHENOMENON ¹	REMARKS
04	2033	ssc	
05	0535	si*	
05	19XX	pc5	
07	19XX	pc5	
12	09XX	pi2	With bps
12	1823	ssc*	
IDENTIFIED BY: JBT			VERIFIED BY: JEP

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

NOAA FORM 86-500
(11/73)

PRINCIPAL MAGNETIC STORMS

Data from Individual Observatories:

COLLEGE OBSERVATORY, COLLEGE, ALASKA
MARCH 1981

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

Obs. 2 letter IAGA code	Geomag. lat.	Commencement			SC - amplitudes			Max. 3 hr - index K			Ranges			UT End	
		day	hr min (UT)	type	D(')	H(γ)	Z(γ)	day	(3 hr - period)	K	D(')	H(γ)	Z(γ)	day	hr
CO	64.6 N	01	0738	s.c.*	-4	+116	-18	01 02	4 3, 4, 5	6 6	170	1190	960	03	01
		04	2033	s.c.*	..	..	..	05	4, 5, 6	7	396	1830	1330	06	01
		07	07XX	..	..	..	..	07	6	7	341	1310	720	08	02
		12	1823	s.c.*	-12	+59	+23	14	4, 5	7	266	1620	1330	16	08
		25	05XX	..	..	..	..	25 26	5, 6 5	6 6	215	1320	790	26	23

MARCH

1981

NORMAL MAGNETOGRAPHS					
COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASELINE
D	0000 U.T. 3-1-81	2400 U.T. 3-31-81	1.0/mm	3.78/mm	27° 46.8 E
B	0000 U.T. 3-1-81	2400 U.T. 3-12-81	7.88/mm		127538
	0000 U.T. 3-13-81	2400 U.T. 3-20-81	"		127628
	0000 U.T. 3-21-81	2400 U.T. 3-31-81	"		127548
Z	0000 U.T. 3-1-81	2400 U.T. 3-12-81	7.78/mm		551368
	0000 U.T. 3-13-81	2400 U.T. 3-20-81	"		551318
	0000 U.T. 3-21-81	2400 U.T. 3-31-81	"		551438

STORM MAGNETOGRAPHS					
COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASELINE
D	0000 U.T. 3-1-81	2400 U.T. 3-31-81	7.8/mm	29.78/mm	23° 47.6 E
B	0000 U.T. 3-1-81	2400 U.T. 3-31-81	44.08/mm		115178
Z	0000 U.T. 3-1-81	2400 U.T. 3-31-81	48.68/mm		540438

RAPID RUN MAGNETOGRAPHS					
COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		
D					
B					
Z					

MONTHLY MEAN ABSOLUTE VALUES*		
D	B	Z
28° 05.6 E	129838	553908
* COMPUTED FROM TEN QUIETEST DAYS DURING MONTH.		
DAYS USED:	MAR 3 6 9 11 12 16 21 22 23 24	

MAGNETOGRAM HOURLY SCALINGS

(UNIVERSAL TIME)

Values are in tenths of gauss. Read the averages for successive periods of one hour beginning at midnight, Hour 01 of each day (1-24) M.T. is hour 11 of the universal day.

Small age corrections have been applied. Negative values are in italics, with minus signs shown.

FORM 74-106

MAGNETOGRAM HOURLY SCALINGS
(UNIVERSAL TIME)

U.S. DEPARTMENT OF INTERIOR Geological Survey, Biological Station Barrow, Federal Center Barrow, Alaska 99555		OBSY.		YEAR		MONTH		ELEVATION																			
Geological Station		CO		81		JULI		D																			
of the		2000		Universal day																							
C	S	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	142	108	104	86	157	146	155	145	70	149	-34	63	01	218	236	262	299	321	384	359	218	231	274	156	66	4315	
02	138	116	108	117	135	140	138	232	-10	121	363	333	02	252	196	238	202	222	260	269	199	185	187	177	170	3773	
03	147	152	140	153	165	171	165	164	162	160	173	180	03	195	208	203	215	209	233	215	224	191	181	180	173	4359	
04	127	108	113	81	74	131	21	29	330	69	139	175	04	178	180	191	183	195	211	227	235	228	212	182	190	3809	
05	170	167	146	130	149	110	161	90	129	185	46	418	05	371	544	806	600	624	101	600	234	228	250	175	154	5780	
06	148	146	166	166	172	160	155	163	171	177	182	189	06	182	192	197	208	218	234	249	260	234	233	216	202	4620	
07	189	170	133	143	162	167	165	180	180	158	172	573	07	536	320	311	371	711	386	281	183	194	233	211	182	6251	
08	175	134	159	148	147	160	141	111	127	154	144	218	08	265	324	179	194	212	208	238	247	240	215	191	176	4199	
09	159	155	152	153	160	161	166	171	169	180	189	217	09	227	188	186	204	205	213	220	246	230	230	189	166	4539	
10	178	151	131	134	150	160	153	167	166	134	196	322	10	181	297	269	205	223	180	212	227	224	207	171	164	4602	
11	152	155	152	146	149	151	199	157	169	172	130	183	11	275	231	193	202	205	234	218	251	239	215	188	171	4537	
12	161	151	150	145	152	156	159	148	133	53	242	191	12	221	260	170	228	215	245	262	267	222	270	118	109	4428	
13	131	143	136	150	159	160	147	129	160	165	131	199	13	200	198	213	513	180	426	354	292	208	268	181	144	5027	
14	142	176	157	146	119	120	190	127	71	50	15	314	14	600	458	307	370	225	244	233	254	251	222	185	188	5172	
15	167	153	154	129	141	167	143	224	167	170	161	195	15	194	231	317	271	240	381	168	186	197	232	209	190	4787	
16	162	176	174	140	147	134	201	215	162	183	175	201	16	210	256	192	202	225	240	253	176	193	212	229	201	4659	
17	131	91	92	123	135	140	151	155	152	184	217	191	17	269	232	301	153	214	211	211	233	208	119	157	161	4231	
18	141	113	109	118	157	102	93	299	184	145	225	349	18	248	247	217	345	281	178	204	188	181	132	139	151	4566	
19	164	149	155	160	167	170	161	177	151	164	186	221	19	193	187	178	163	295	248	259	205	190	167	163	4418		
20	165	158	155	148	150	149	150	186	147	102	187	159	20	283	285	363	213	199	241	251	241	179	160	157	4638		
21	159	156	153	157	152	159	160	164	159	157	177	208	21	180	171	186	212	233	268	295	245	177	200	186	173	4517	
22	154	147	152	131	153	164	177	167	168	177	189	200	22	191	180	182	189	210	229	256	271	278	239	209	192	4605	
23	165	142	140	139	150	158	160	161	152	151	187	238	23	243	205	201	221	232	257	273	272	269	243	211	180	4745	
24	154	138	130	137	142	151	159	158	152	165	179	198	24	237	191	182	195	208	247	262	258	286	241	229	173	4572	
25	135	107	101	90	39	52	345	162	138	169	173	204	25	202	669	581	478	336	227	282	344	150	248	62	75	4709	
26	102	120	117	102	115	79	82	96	134	156	153	163	26	204	581	803	256	361	252	207	222	240	212	161	192	5110	
27	130	126	61	92	108	104	89	185	121	126	159	201	27	178	187	151	238	193	250	249	284	189	130	165	188	3907	
28	126	99	92	108	66	119	125	140	153	129	213	190	28	202	200	238	325	289	305	280	305	249	200	164	153	4470	
29	143	78	97	68	38	55	93	26	167	124	163	280	29	306	315	314	246	268	413	266	142	157	191	159	148	4205	
30	115	74	79	130	131	109	109	102	83	143	147	192	30	207	437	247	270	302	226	384	201	326	232	226	174	4646	
31	60	68	73	7	121	180	159	147	126	187	92	172	31	177	248	217	244	341	330	292	199	236	231	204	166	4277	
SCALED BY	EAS LLS JEP																									MONTHLY SUM	142473
CHECKED BY	JEP ENS																									MONTHLY MEAN	191
SHOWN BY	JEP																									DATE OF READING	
PUNCHED BY																										MAGPH., converted to Normal Magph.	

() Interpolated
() Significant portion of low magnetic storm.
() No record, or no value available because of faulty record.
() Derived from STORM Magph., converted to Normal Magph.

() Interpolated
() Significant portion of hour interpolated.
() No record or no values available because of faulty record.
() Derived from STORM Mapsh., converted to Normal Magph.

FORM 71-114										MAGNETOGRAM HOURLY SCALINGS										U.S. DEPARTMENT OF INTERIOR										Geological Survey, Geological Division										Bureau of Land Management										Wash., D.C. 20245										Universal Day										YEAR												MONTH												ELEM.														MENT																Z																MAR																81																00																24																23																22																21																20																19																18																17																16																15																14																13																12																11																10																09																08																07																06																05																04																03																02																01																00																24																23																22																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
Values are in tenths of mm. and are averages for successive periods of one hour beginning at midnight. Hours 01 of local day (LST) at T-1 is known. Hours 01 of local day (LST) at T-1 is known. Hours 01 of local day (LST) at T-1 is known.										Shrinkage corrections have been applied. (Reproduce values, see in ref., with minus signs above.)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)

SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES

NORMAL MAGNETOGRAMS

NORMAL MAGNETOGRAMS

NORMAL MAGNETOGRAMS

NORMAL MAGNETOGRAMS

NORMAL MAGNETOGRAMS

NORMAL MAGNETOGRAMS

NORMAL MAGNETOGRAMS

NORMAL MAGNETOGRAMS

STORM MAGNETOGRAMS

200 mm
100 mm
0

STORM MAGNETOGRAMS

200 mV
100 mV
0

STORM MAGNETOGRAMS

200 mm
100 mm
0

STORM MAGNETOGRAMS

200 nT
100 nT
0