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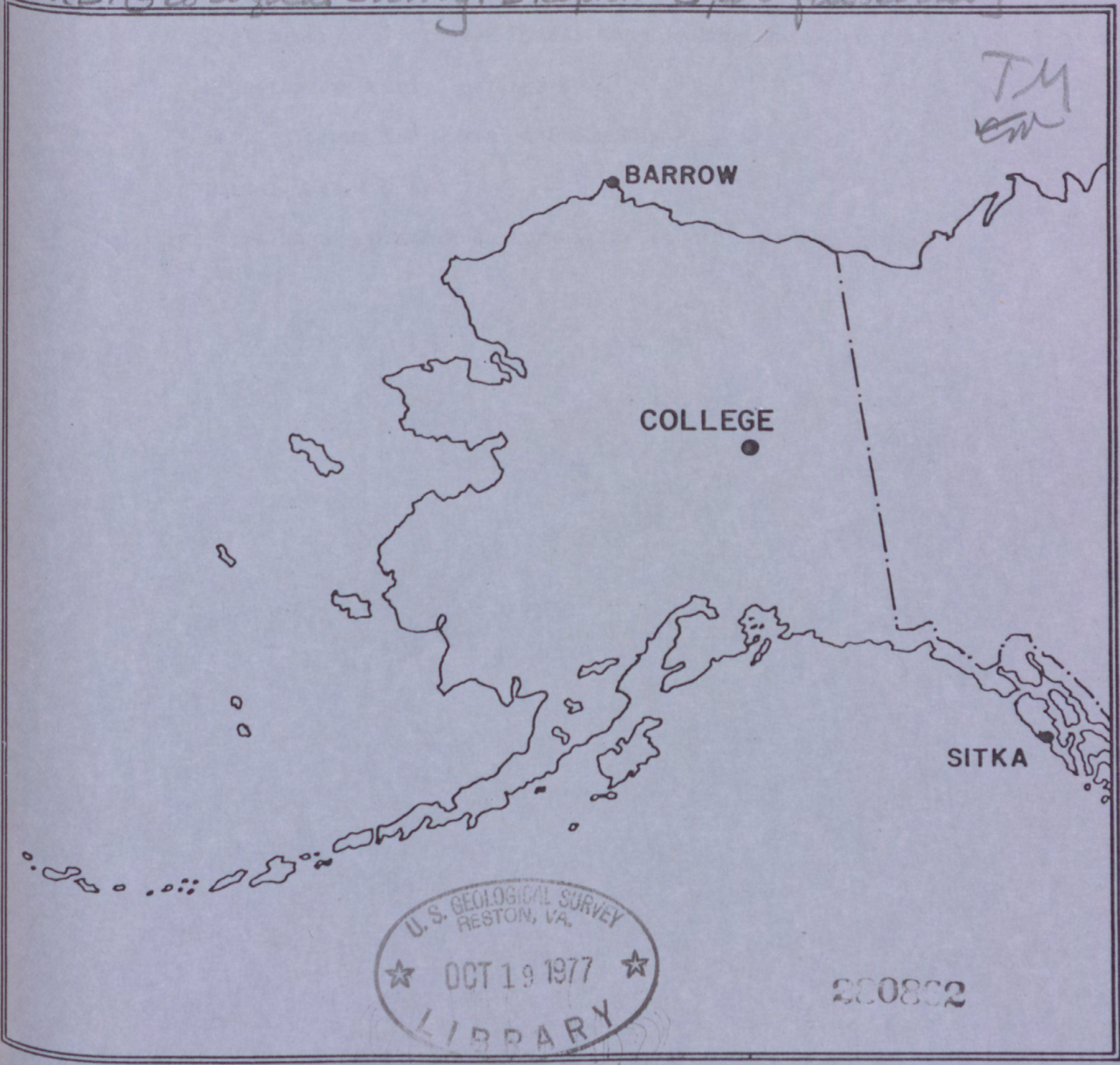
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PRELIMINARY GEOMAGNETIC DATA
COLLEGE OBSERVATORY
FAIRBANKS, ALASKA

JULY 1977

OPEN FILE REPORT 77-300G

U.S. Geological Survey, [Reports - Open file series]



GENERAL SURVEY

PRELIMINARY GEOLOGIC DATA

COLLECTED BY

FRANK B. MANN

WEST VIRGINIA GEOLOGICAL SURVEY

JULY 1977



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Principal Magnetic Storms

Preliminary Calibration Data & Monthly Mean Absolute Values

Magnetogram Hourly Scalings

Sample Format for Normal & Storm Magnetogram

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, M. J. MOORMAN, 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°51.6'N
Geographic longitude.....147°50.2'W
Geomagnetic latitude.....+64.6°
Geomagnetic longitude.....+256.5°
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 10γ has been chosen so as not to give the illusion of an accuracy not justified.

The schedule for converting gamma range to K, and 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 (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.

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.

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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.

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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.

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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.

COLLEGE, ALASKA

MAGNETIC ACTIVITY
(Greenwich civil time, counted from midnight to midnight)

MONTH AND YEAR

JULY 1977

DATE	K-INDICES								SUM	AK	TIME SCALE ON MAGNETOGRAMS
	00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24			
1	2	3	5	4	4	3	3	2	26	20	20 mm/hr SUDDEN COMMENCEMENTS d h m
2	3	2	2	2	2	3	2	2	18	09	
3	1	1	3	2	4	3	1	1	16	10	
4	2	2	3	4	1	1	1	2	16	09	
5	2	2	1	2	5	4	1	1	18	13	
6	1	1	2	2	4	3	3	3	19	12	
7	4	4	4	2	4	2	1	1	22	16	
8	3	4	3	3	3	4	2	2	24	16	
9	4	3	3	3	2	3	2	3	23	15	
10	4	4	2	4	4	3	3	2	26	19	
11	2	3	5	3	4	2	1	1	21	16	
12	1	1	1	1	0	1	1	1	07	03	
13	2	4	3	1	3	3	1	2	19	12	
14	3	4	5	6	4	2	2	1	27	27	
15	3	3	2	5	4	3	2	3	25	19	
16	2	3	5	7	5	5	3	3	33	42	
17	3	3	4	5	3	3	2	2	25	19	
18	2	1	3	4	5	2	1	1	19	14	
19	2	3	5	4	6	5	3	2	30	31	
20	3	4	7	6	6	4	3	2	35	49	
21	4	3	2	3	1	2	1	1	17	10	
22	3	3	5	6	1	2	1	1	22	22	
23	3	2	2	1	0	0	1	0	09	04	
24	2	1	2	4	1	2	1	2	15	08	
25	1	2	1	1	1	1	1	1	09	04	
26	1	1	1	2	1	0	1	0	07	03	
27	0	0	1	0	0	0	0	0	01	00	
28	1	0	0	0	0	1	0	1	03	01	
29	5	5	7	5	7	4	3	2	38	59	
30	4	4	6	5	3	2	2	1	27	27	
31	2	3	2	5	3	2	2	1	20	14	

POSSIBLE SOLAR-FLARE EFFECTS BASED ON INSPECTION OF GRAMS ALONE (WITHOUT REFERENCE TO DATA FROM OTHER SOURCES)

BEGIN

END

d h m

d h m

K SCALE USED:

LOWER LIMIT FOR K = 9.....

CURRENT SCALE VALUE.....

LOWER LIMIT FOR K = 9.....

D

683.8

3.76

2570

H

321.7

7.82

2520

Z

(mm)

(γ/mm)

(to nearest 10γ)

SCALINGS AND COMPUTATIONS HAVE BEEN CHECKED.

NATURE OF PHENOMENON

APPROVED JOHN B. TOWNSHEND, CHIEF, COLLEGE OBSERVATORY

OBSERVER IN CHARGE

OUTSTANDING MAGNETIC EFFECTS

OBSERVATORY
COLLEGE, ALASKA

MONTH
JULY

YEAR
1977

DATE	TIME U.T.	NATURE OF PHENOMENON ¹	REMARKS
06	10XX	pi2	
10	01XX	pc5	
13	22XX	pc1	
25	14XX	pi2	
26	09XX	pi2	
27	13XX	pi2	
29	0027	ssc*	

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.

NOAA FORM 86-500
(11/73)

PRINCIPAL MAGNETIC STORMS

WDC-A FOR SOLAR-TERRSTRIAL PHYSICS
ENVIRONMENTAL DATA SERVICE, NOAA
BOULDER, COLORADO 80302 U.S.A.

Data from Individual Observatories:

COLLEGE OBSERVATORY, COLLEGE, ALASKA

JULY

19 77

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	16	06XX	..	..	..	..	16	4	7	154	1250	900	17	13
		19	05XX	..	..	..	..	20	3	7	178	1450	1120	21	09
		29	0027	s.c.*	+41	+161	-23	29	3, 5	7	200	1680	920	30	13

NORMAL MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION	
	FROM	TO	SCALE VALUE	BASELINE
D	0000 U.T., 7-1-77	2400 U.T., 7-31-77	1.0/mm	3.8 \times /mm
				27° 46.4 E
H	0000 U.T., 7-1-77	2400 U.T., 7-9-77	7.8 \times /mm	12765 \times
	0000 U.T., 7-10-77	2400 U.T., 7-31-77	"	12773 \times
Z	0000 U.T., 7-1-77	2400 U.T., 7-31-77	7.7 \times /mm	55123 \times

STORM MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION	
	FROM	TO	SCALE VALUE	BASELINE
D	0000 U.T., 7-1-77	2400 U.T., 7-31-77	7.9/mm	29.8 \times /mm
				24° 20.6 E
H	0000 U.T., 7-1-77	2400 U.T., 7-9-77	44.1 \times /mm	11509 \times
	0000 U.T., 7-10-77	2400 U.T., 7-31-77	"	11522 \times
Z	0000 U.T., 7-1-77	2400 U.T., 7-31-77	48.9 \times /mm	53991 \times

RAPID RUN MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION	
	FROM	TO	SCALE VALUE	SCALE VALUE
D	0000 U.T., 7-1-77	2400 U.T., 7-31-77	0.3/mm	1.0 \times /mm
H	0000 U.T., 7-1-77	2400 U.T., 7-31-77	1.0 \times /mm	
Z	0000 U.T., 7-1-77	2400 U.T., 7-31-77	2.4 \times /mm	

MONTHLY MEAN ABSOLUTE VALUES*

D	H	Z
28° 18.3 E	13053 \times	55363 \times

* COMPUTED FROM TEN QUIETEST DAYS DURING MONTH.

DAYS USED: JUL 2, 3, 4, 12, 23, 24, 25, 26, 27, 28

MAGNETOGRAM HOURLY SCALINGS
(UNIVERSAL TIME)

U.S. DEPARTMENT OF COMMERCE
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
COAST AND GEODETIC SURVEY
GEOMAGNETISM DIVISION

OBSY. YEAR MONTH ELEMENT
CO 77 JUL D

Values are in units of μm , and are averages for successive periods of one hour beginning at midnight. Hour 01 of local day (150W M.T.) is hour 11 of the 53170 universal day.
Storage corrections have been applied. Negative values are in red, with minus signs shown.

Hour	01	02	03	04	05	06	07	08	09	10	11	12	Sum	13	14	15	16	17	18	19	20	21	22	23	24	Sum
01	169	191	233	227	209	228	230	155	48	152	83	245	01	258	346	365	370	444	451	443	377	308	282	281	244	6339
02	235	243	269	271	283	312	333	281	179	253	272	284	02	321	318	321	388	411	431	429	381	378	311	326	281	7611
03	261	256	269	282	297	320	297	308	303	290	292	282	03	308	356	409	442	410	421	431	387	349	332	273	277	7852
04	253	249	248	254	249	241	272	227	271	301	322	313	04	282	298	321	352	377	410	413	408	381	313	320	288	7363
05	224	229	241	268	294	307	332	321	287	333	292	311	05	322	372	415	356	370	394	441	399	339	288	272	251	7658
06	237	234	250	267	271	286	287	301	300	319	321	311	06	329	369	456	445	409	416	411	331	381	353	297	318	7899
07	221	171	178	192	209	211	262	397	263	307	303	323	07	312	351	377	390	411	387	402	388	389	341	312	293	7390
08	259	209	198	224	163	274	317	303	312	282	309	304	08	353	350	367	383	367	397	412	413	372	307	252	239	7366
09	190	164	216	209	207	276	271	291	303	406	322	293	09	286	308	341	377	353	408	466	458	400	321	277	272	7415
10	261	244	223	236	253	270	287	322	296	281	257	385	10	288	347	347	328	403	383	371	373	339	281	282	272	7329
11	251	233	238	239	301	290	257	336	353	277	281	237	11	326	371	306	357	420	451	455	430	388	310	278	270	7705
12	251	250	271	285	253	300	300	311	310	310	319	315	12	319	320	332	350	388	399	402	399	381	338	300	270	7713
13	240	224	238	224	207	281	285	280	279	287	291	299	13	310	318	370	399	449	444	434	423	381	307	270	223	7453
14	213	191	161	133	276	239	246	233	414	292	259	487*	14	276	294	331	369	392	409	433	408	367	303	288	280	7294
15	270	230	257	279	302	313	297	306	301	267	268	396	15	311	309	319	381	406	446	431	376	382	311	259	239	7656
16	234	251	241	244	283	273	213	313	131	352*	296*	318	16	238	352*	296*	534*	418	459	419	401	349	284	293	293	7485
17	239	227	232	232	277	278	322	311	303	284	288	308	17	307	338	349	347	399	377	354	374	367	322	281	287	7403
18	268	246	258	277	312	322	322	308	296	303	319	391	18	242	358	403	401	437	431	411	378	342	310	278	268	7681
19	258	262	263	282	292	279	346	336	283	162	228	241	19	281	328	301	419	361	439	453	408	356	291	273	267	7409
20	242	241	224	229	320	368	281	292	366*	175*	287	306	20	683*	389*	293	382	419	468	418	391	322	288	331	277	7992
21	251	227	278	271	273	287	338	347	300	309	293	300	21	297	318	338	361	377	401	415	411	387	323	302	282	7686
22	267	248	267	257	302	415	259	315	236	267*	359*	278	22	326	319	346	376	388	404	416	388	339	312	289	273	7666
23	258	236	233	281	306	284	293	310	349	293	291	289	23	298	328	358	377	392	397	402	397	378	337	307	274	7668
24	261	271	271	281	289	287	297	300	327	371	324	307	24	322	330	377	392	418	421	435	369	307	299	281	257	7794
25	253	273	298	308	294	313	314	297	286	302	288	292	25	297	317	341	360	401	422	413	384	361	304	271	251	7640
26	258	276	287	287	296	311	312	307	304	303	298	320	26	328	333	357	390	411	428	427	397	362	312	287	285	7876
27	294	301	292	301	306	311	320	303	301	291	301	311	27	328	341	359	363	387	411	409	401	367	341	301	259	7899
28	254	278	284	284	297	301	301	300	306	309	304	309	28	319	347	369	399	414	434	419	397	369	332	299	277	7902
29	301	186	77	81	89	60	-102*	41*	367*	200	289	271	29	430*	118	306	349	360	426	437	389	342	324	285	265	5891
30	260	303	263	257	260	224	115	152	96	228	295	316	30	269	299	331	370	400	458	444	335	353	314	268	283	6963
31	279	280	299	281	348	282	268	291	284	284	330	297	31	330	340	360	370	408	443	429	397	360	306	279	232	7717

SCALED BY	SPT, JEP, MJM	Preliminary base-line and scale values: Interval Beginning Base-line Value Scale Value	<input type="checkbox"/> Interpolated <input type="checkbox"/> Significant portion of hour interpolated. <input type="checkbox"/> No record; or no values available because of faulty record. * Derived from Storm M μp , converted to Normal M μp .	<input type="checkbox"/> 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	232985
CHECKED BY	JEP, MJM				MONTHLY MEAN	313
SIGNS REVIEWED BY	JEP				DATES WITH GAPS:	
PUNCHED BY						

MAGNETOGRAM HOURLY SCALINGS
(UNIVERSAL TIME)

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C	U	T	U	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	SLM	
			01	380	388	390	424	438	477	594	373*	452	444	333	442	01	424	340	335	420	360	340	320	369	387	386	374	396	9586
			02	353	375	381	383	399	396	418	474	441	401	403	377	02	324	376	370	335	290	279	324	316	349	354	383	351	8852
			03	370	363	366	369	363	364	410	409	377	386	416	384	03	328	216	96	269	363	371	365	350	367	353	356	344	8355
			04	363	381	371	400	413	449	514	582	474	390	306	316	04	376	361	364	389	393	379	401	389	374	359	369	349	9462
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			30	421	473	525	639	524	616	590	445	178	-14	158	132	30	298	370	328	331	337	334	315	342	321	316	316	327	8622
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SCALED BY: SPT, JEP, MJM
CHECKED BY: JEP, MJM
SIGNS REVIEWED BY: JEP
PUNCHED BY:

Preliminary base-line and scale values:
Interval Beginning: []
Base-line Value: []
Scale Value: []

() Interpolated
[] Significant portion of hour interpolated.
[] No record; or no values available because of faulty record.
* Derived from STORM Mgh., converted to Normal Mgh.
[] Scaling uncertain because of magnetic storm.
< > Record off sheet for part or all of hour; if value is given, error was estimated for missing part.

MONTHLY SUM: 260146
MONTHLY MEAN: 350
DATES WITH SIGNS:

FORM CAGS-404a
1967

MAGNETOGRAM HOURLY SCALINGS
(UNIVERSAL TIME)

U.S. DEPARTMENT OF COMMERCE
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
COAST AND GEODETIC SURVEY
GEOMAGNETISM DIVISION

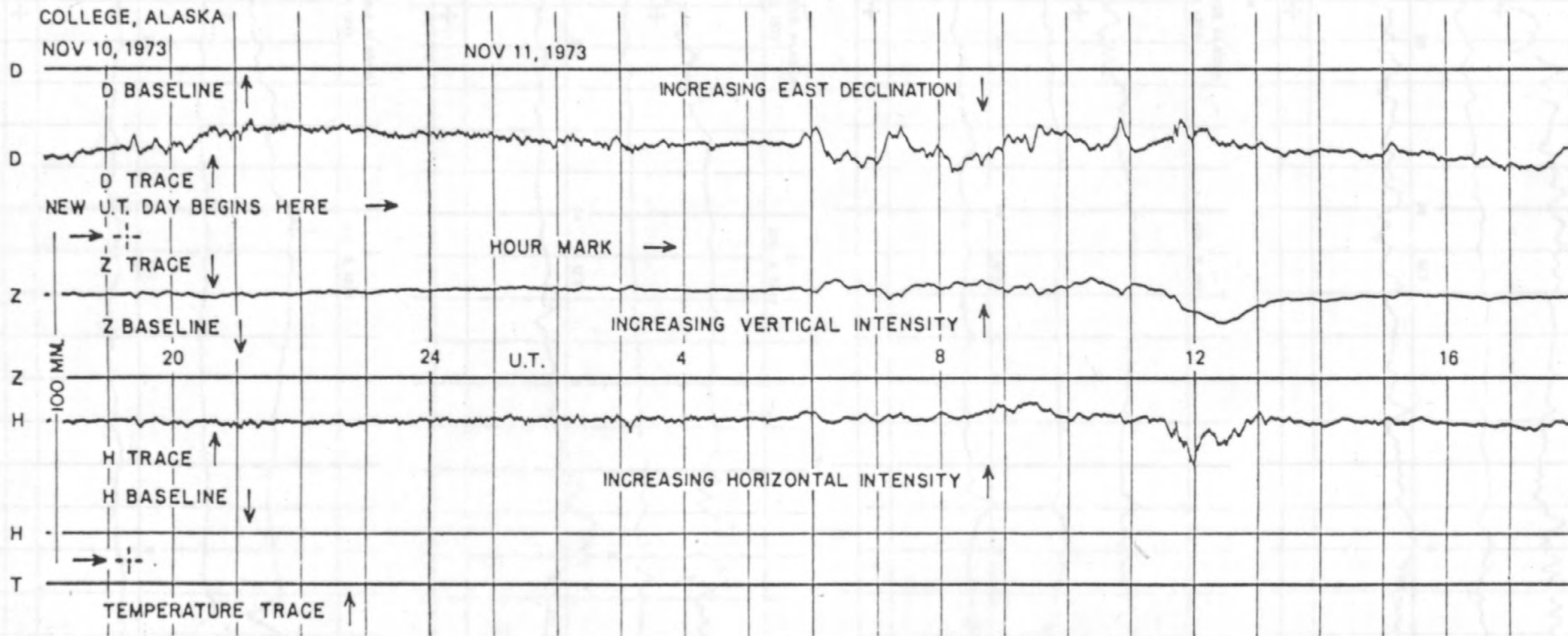
OBSV. YEAR MONTH ELEMENT
00 77 JUL 2

Values are in tenths of mm. and are averages for successive periods of one hour beginning at midnight. Hour 01 of local day (LST M.T.) is hour 11 of the same universal day.
Damage corrections have been applied. Negative values are in red, with minus signs shown.

STATION	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
01	282	330	323	328	342	374	337	163*	298	347	369	370	01	369	352	300	303	311	300	246	241	276	288	306	317	7472
02	341	342	360	357	351	342	362	348	343	336	343	319	02	269	290	319	309	286	242	269	273	290	301	331	328	7651
03	327	324	320	324	321	329	317	346	331	300	327	309	03	299	253	230	201	251	292	294	286	292	302	307	311	7193
04	316	328	332	348	355	367	376	357	367	352	313	237	04	289	301	302	321	329	320	312	309	301	289	301	319	7741
05	329	320	300	296	301	307	323	317	313	322	300	297	05	234	207	288	120	206	280	313	288	283	276	289	295	6804
06	299	307	316	310	307	311	306	313	313	324	311	272	06	266	294	286	281	305	260	256	211	267	257	260	284	6916
07	279	302	388	374	360	346	363	283	313	357	329	283	07	300	231	200	256	259	300	310	293	299	294	294	311	7324
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16	326	336	354	376	383	366	306	286	300	518*	359*	166	16	386	715*	479*	479*	258	188	208	223	265	288	337	366	8268
17	333	339	341	341	364	361	348	341	319	296	241	224	17	252	279	313	327	309	223	247	281	287	301	303	321	7285
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20	381	388	351	347	406	383	354	290	145*	104	272	267	20	552*	647*	303	275	310	293	252	287	280	269	323	344	7823
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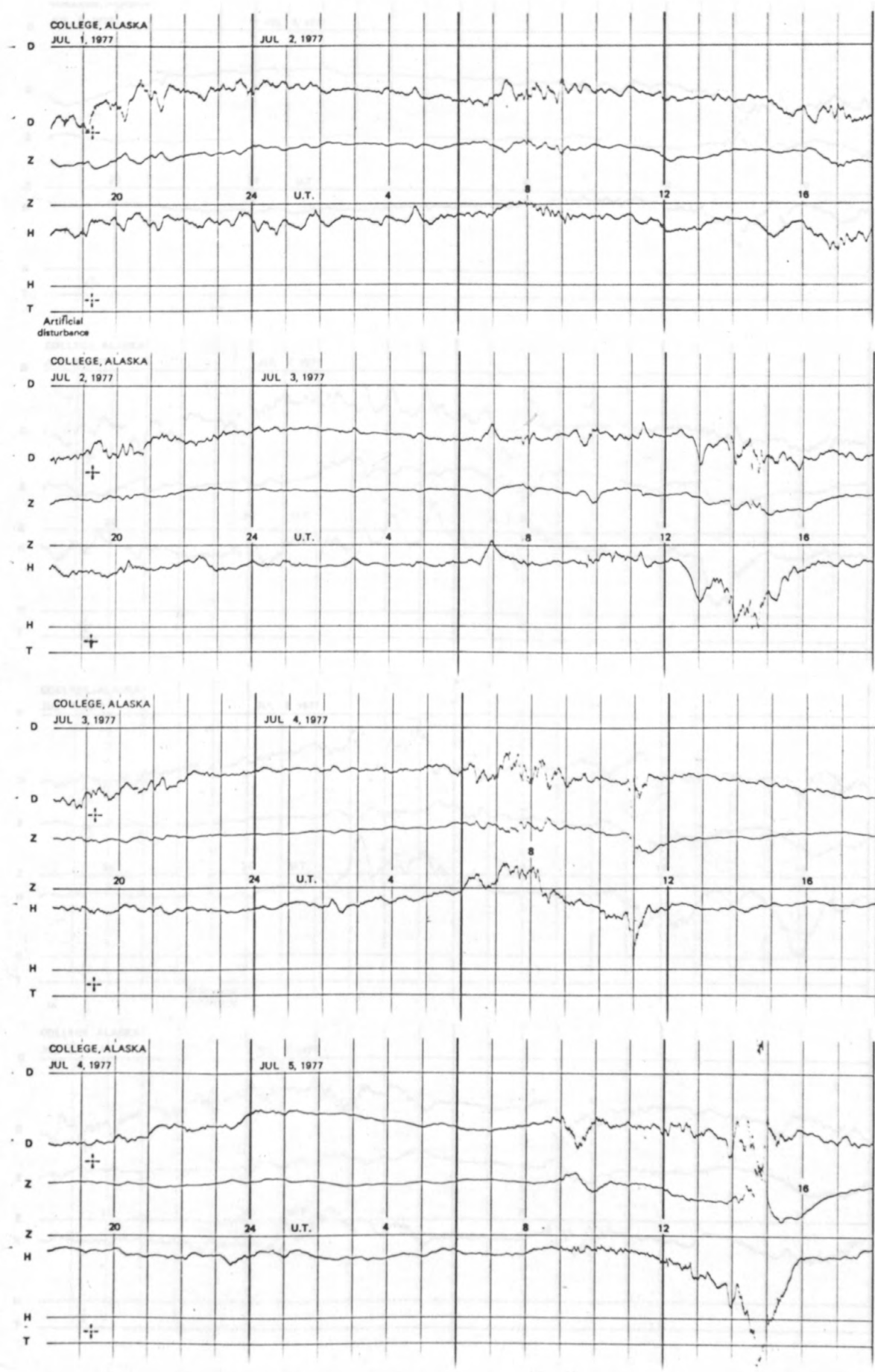
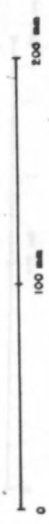
SCALED BY	SPT, JEP, MJM	Preliminary base-line and scale values:	() Interpolated	() Scaling uncertain because of magnetic storm.	MONTHLY SUM	230791
CHECKED BY	JEP, MJM	Interval Beginning	() Significant portion of hour interpolated.	<> Record off sheet for part or all of hour; if value is given, curve was estimated for missing part.	MONTHLY MEAN	310
SIGNS REVIEWED BY	JEP	Base-line Value	() No record; or no values available because of faulty record.		GATES WITH GAPS	
PUNCHED BY		Scale Value	* Derived from Storm Mgh., converted to Normal Mgh.			

FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)

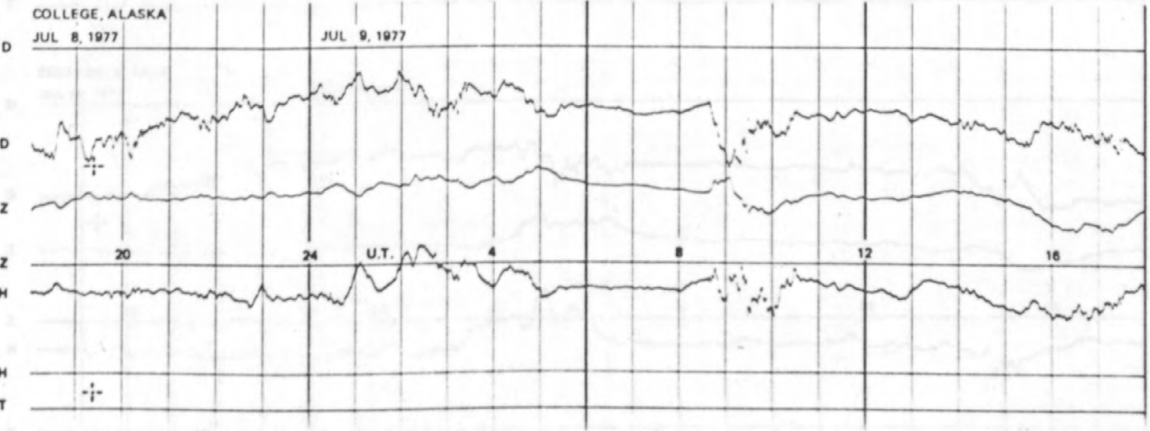
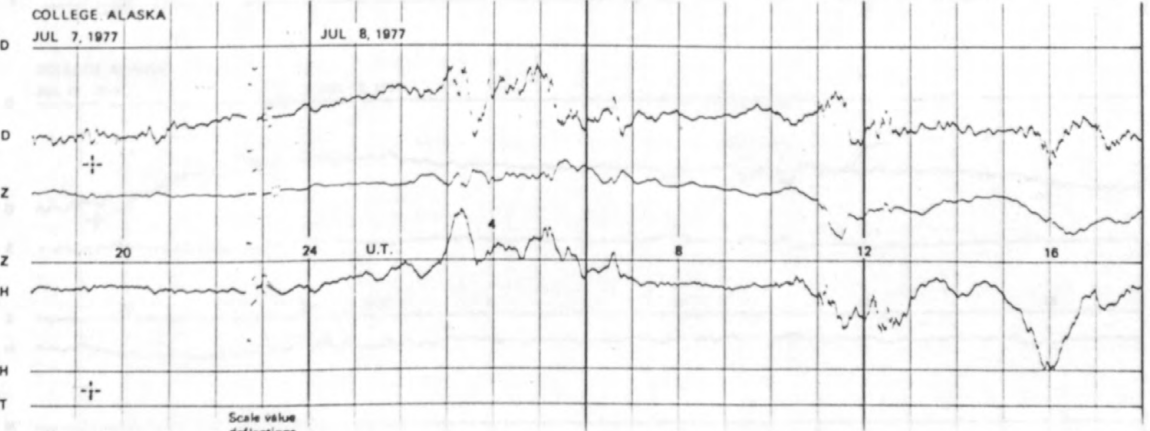
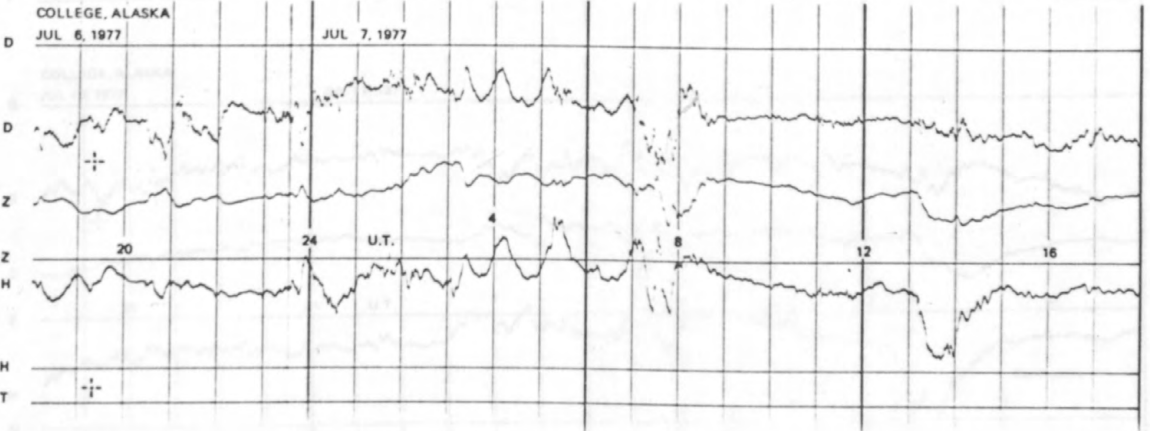
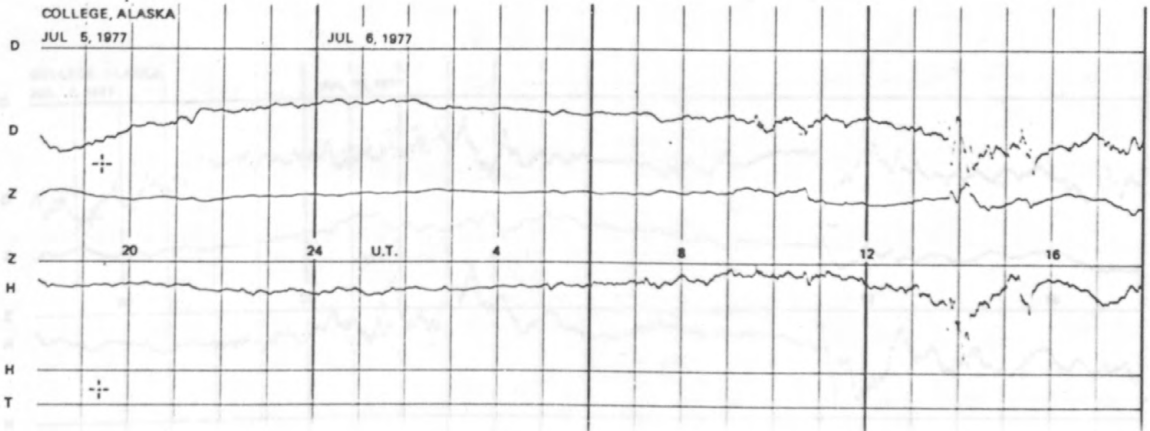
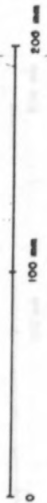


SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES

NORMAL MAGNETOGRAMS

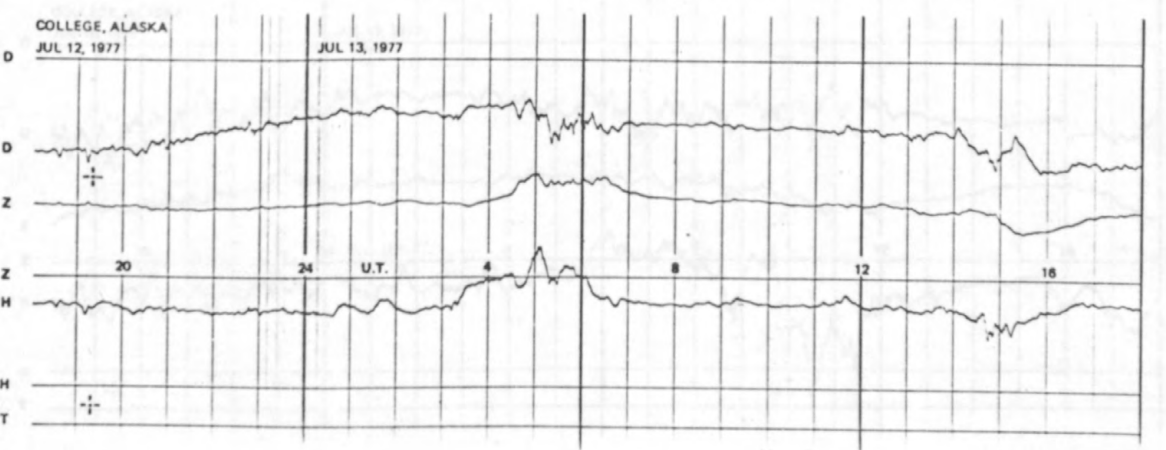
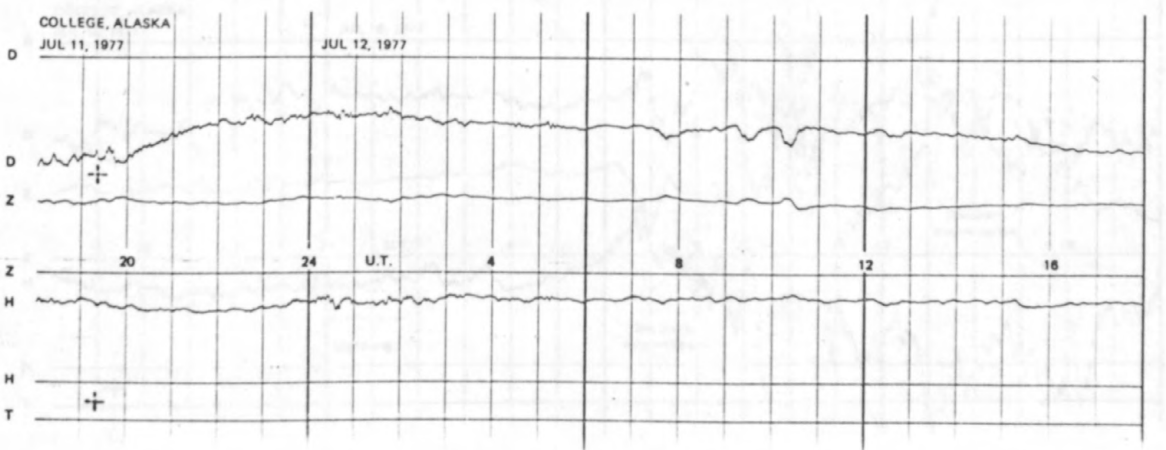
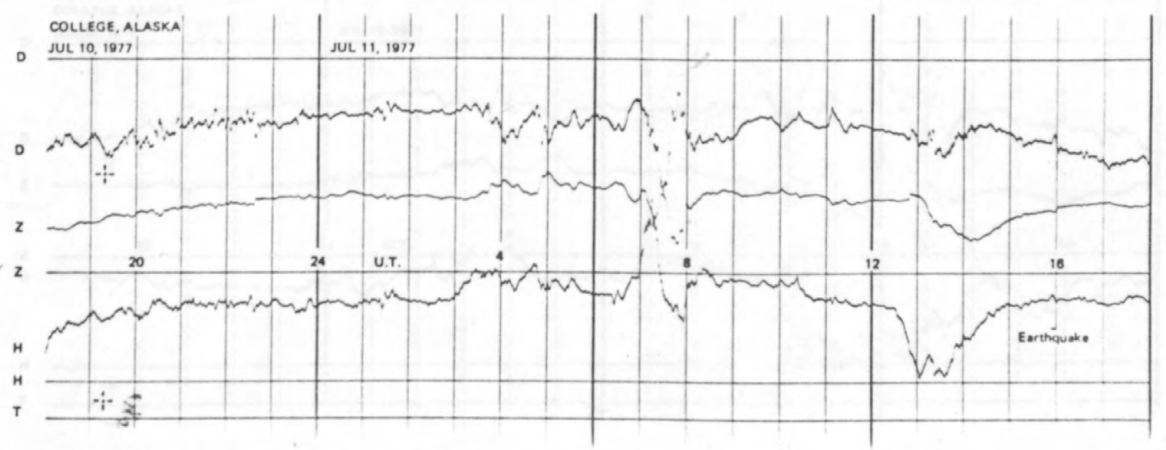
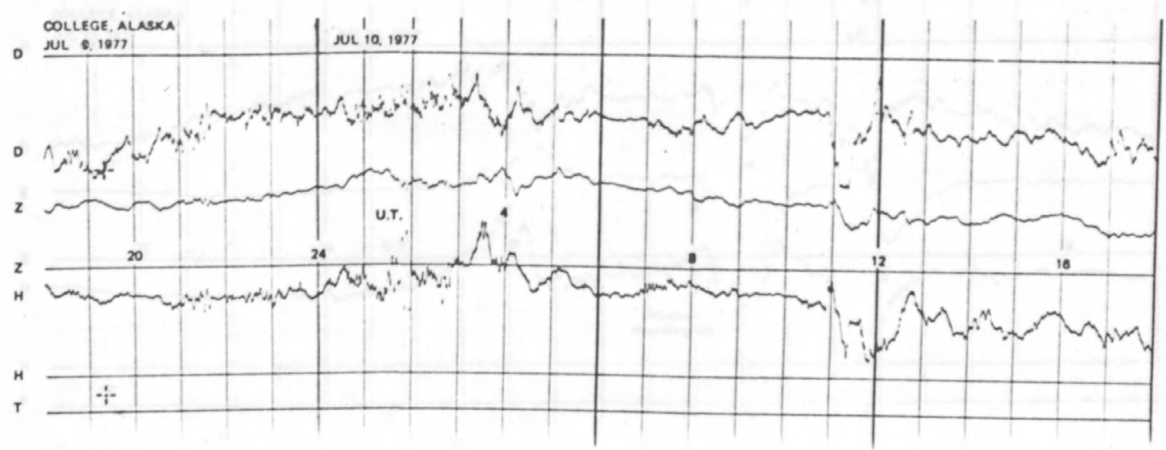
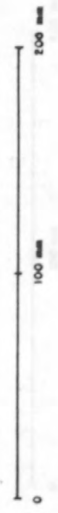


NORMAL MAGNETOGRAMS

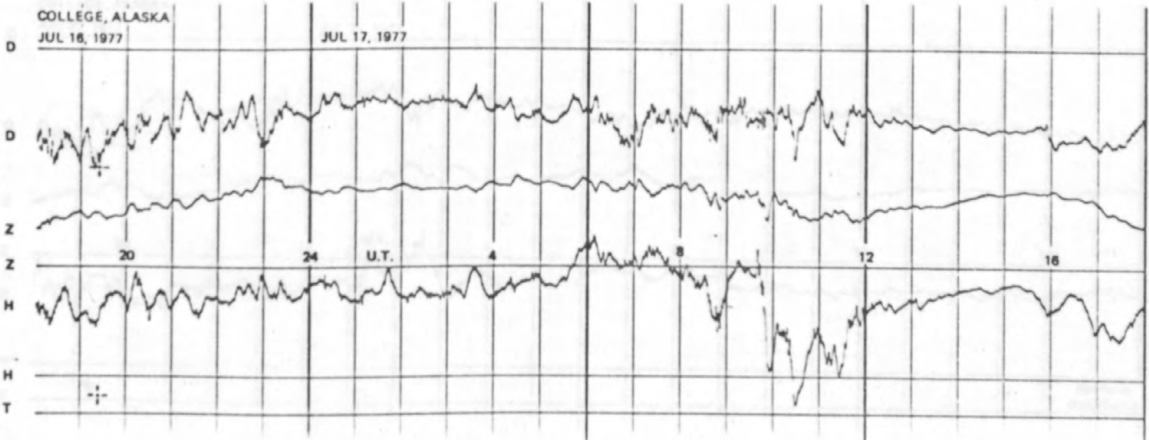
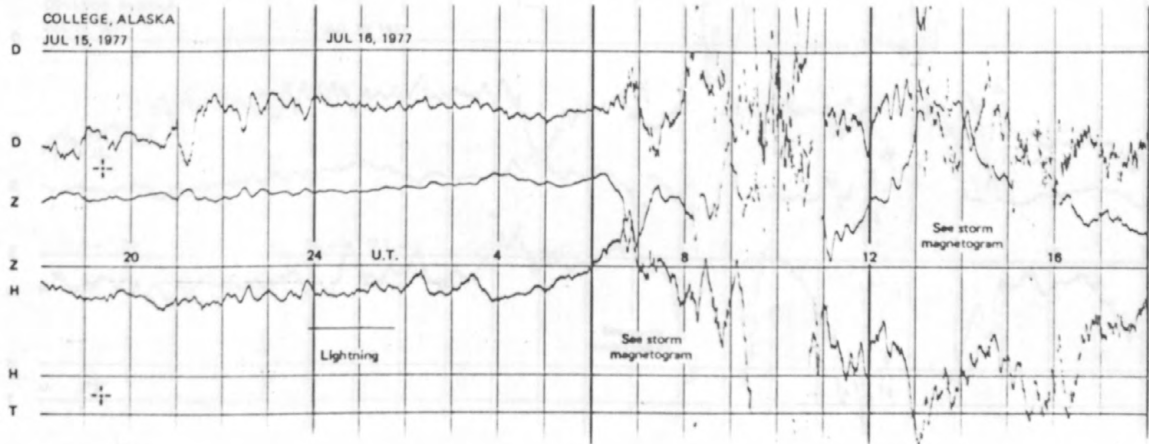
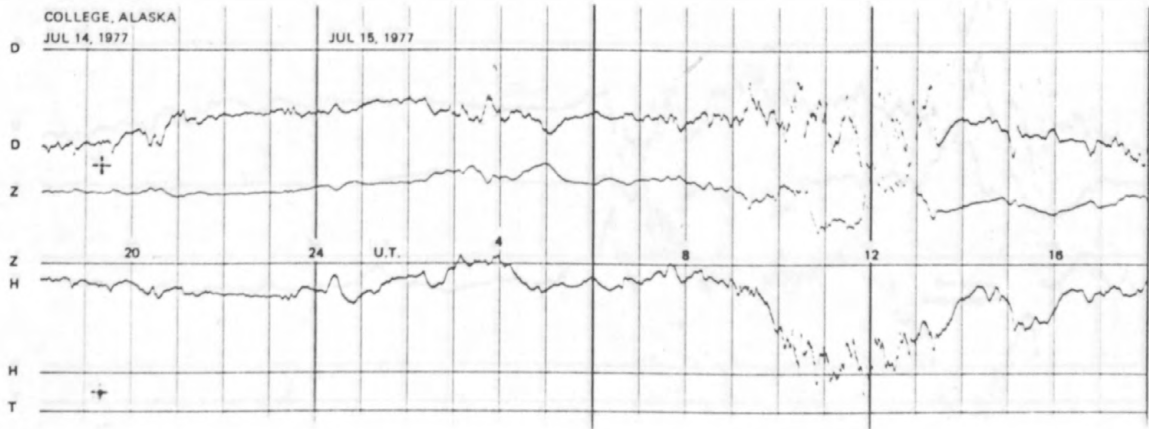
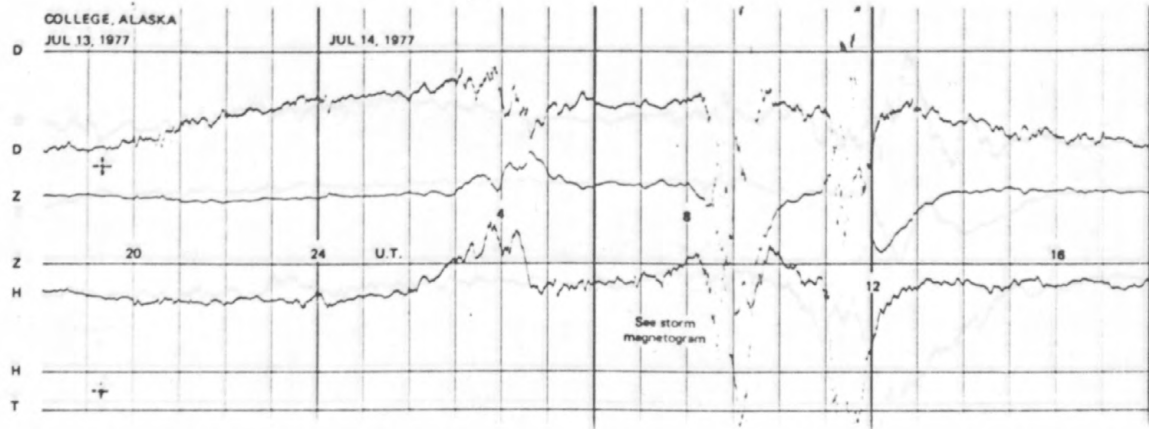


Scale value
deflections

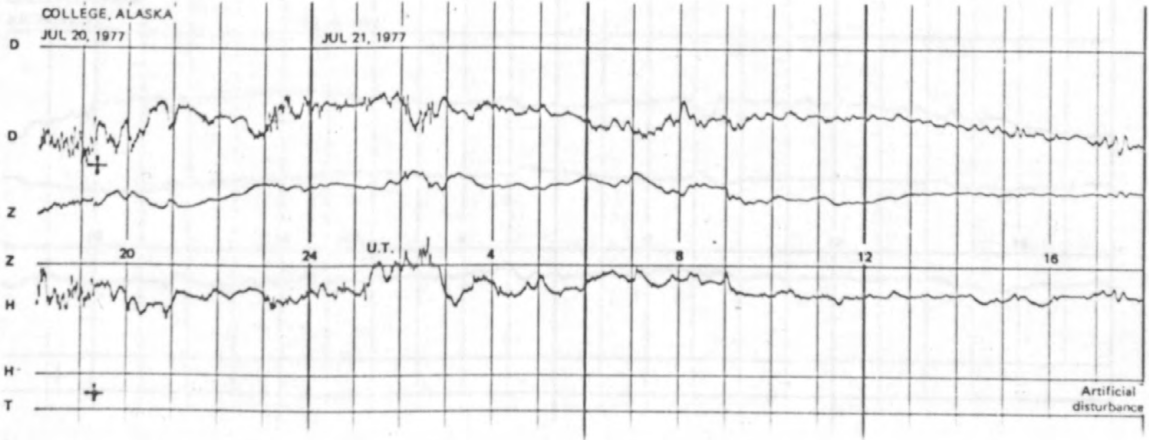
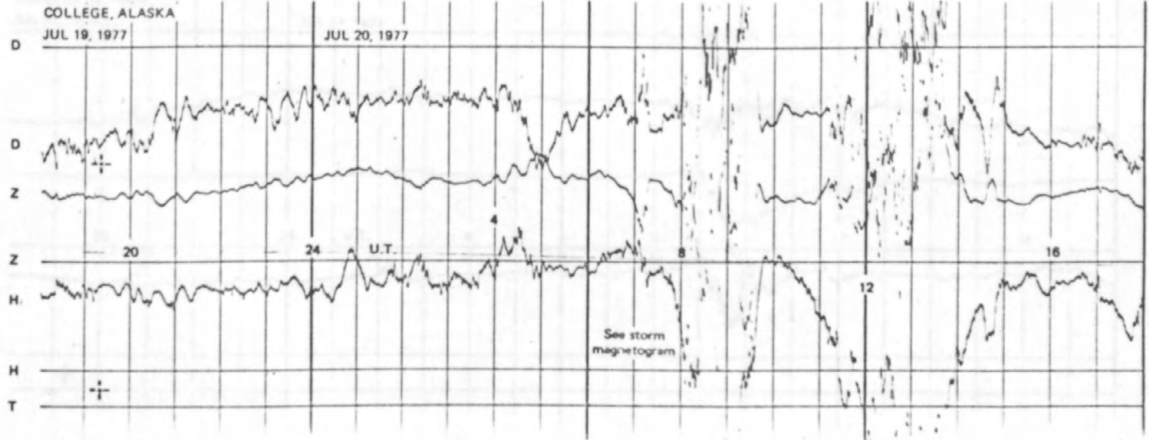
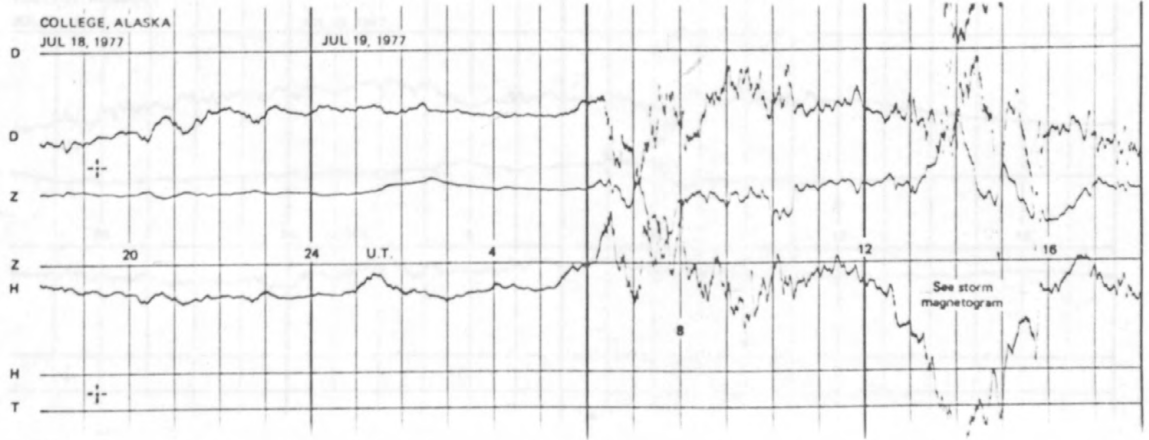
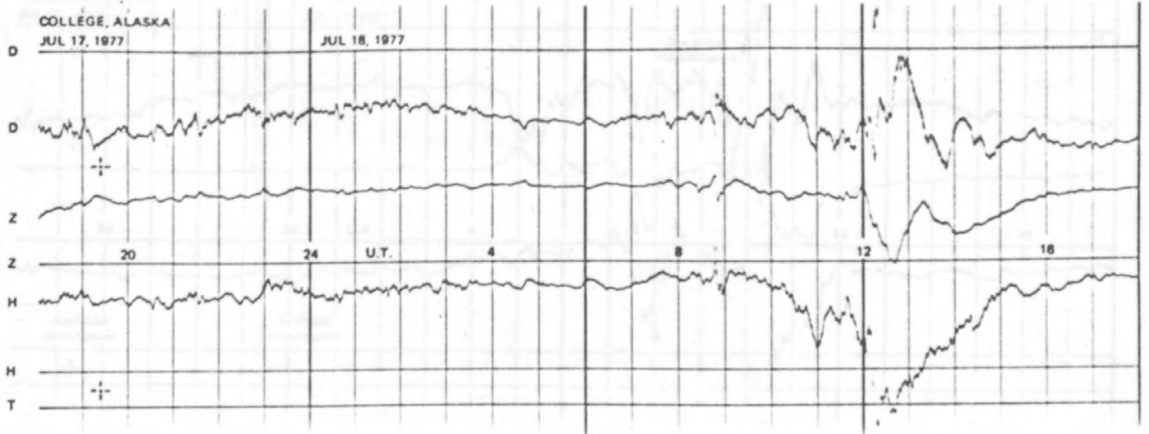
NORMAL MAGNETOGRAMS



NORMAL MAGNETOGRAMS

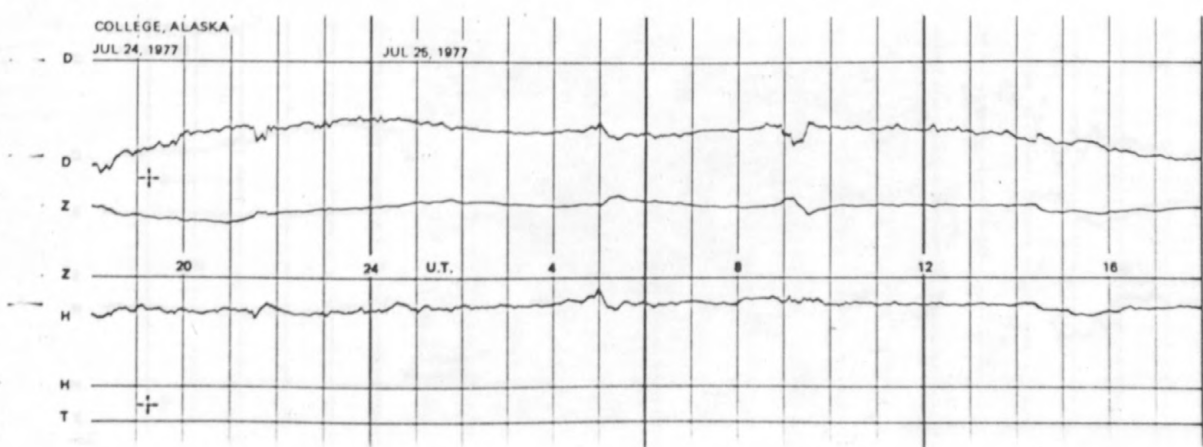
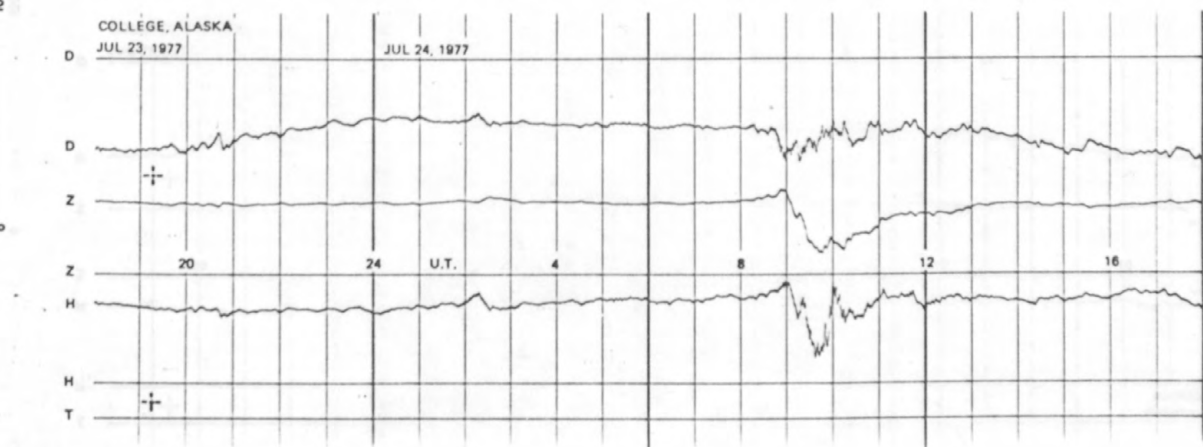
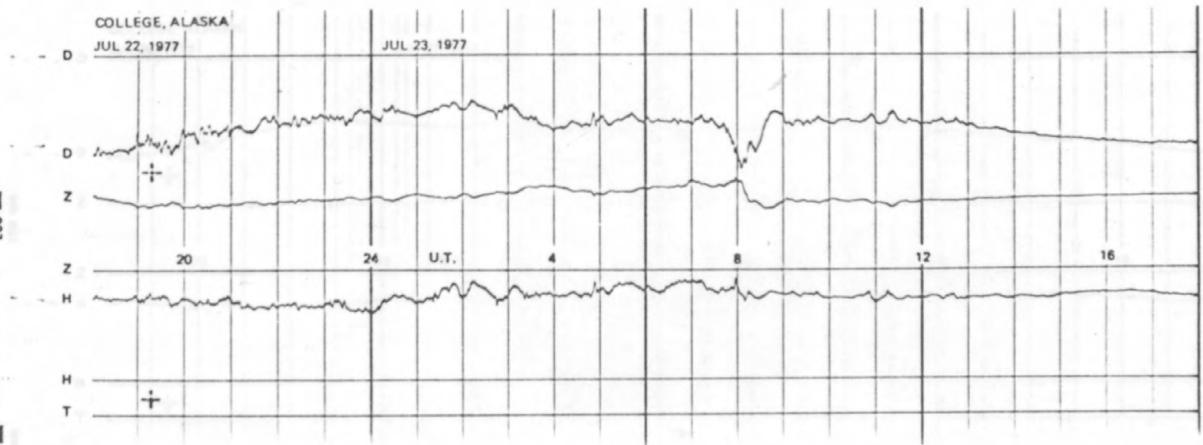
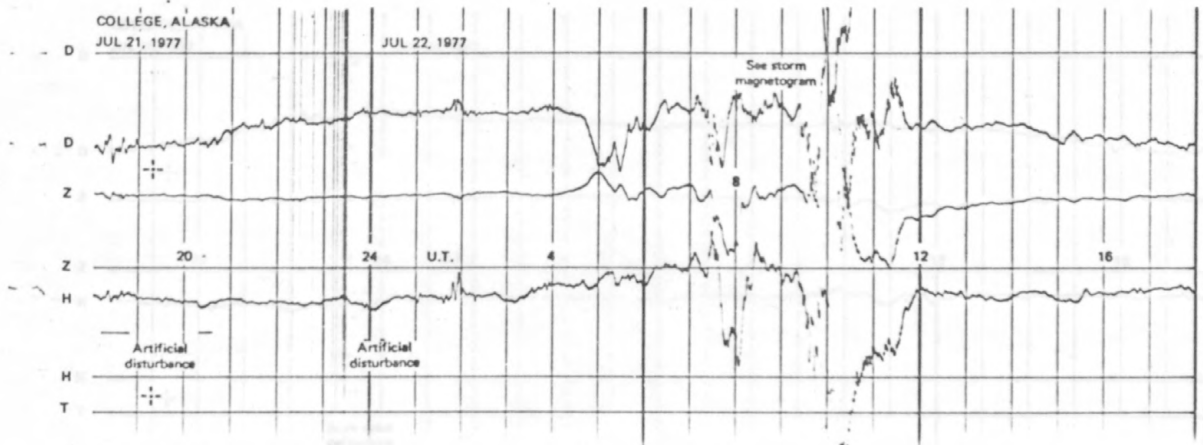


NORMAL MAGNETOGRAMS

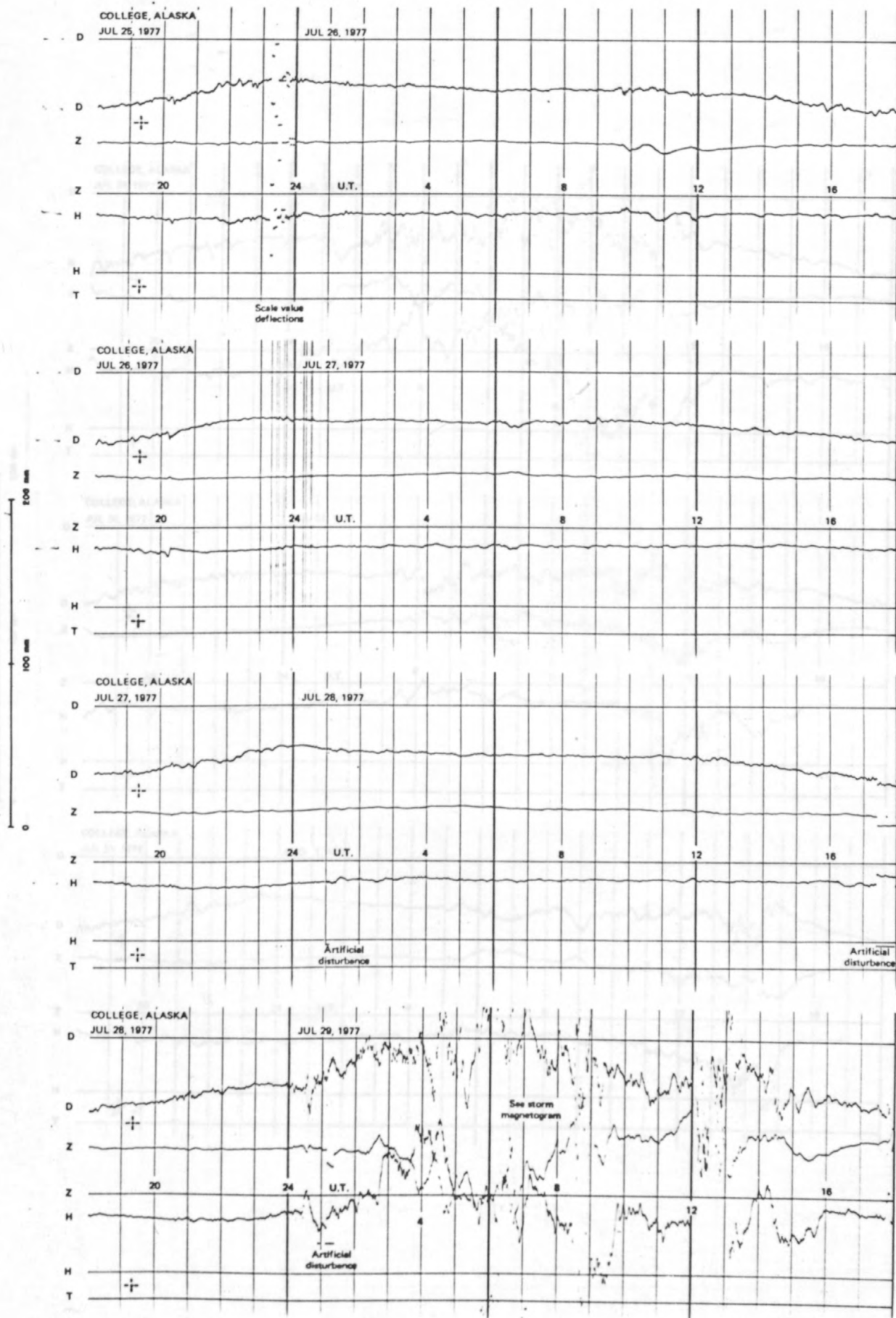


200 mm
100 mm
0

NORMAL MAGNETOGRAMS



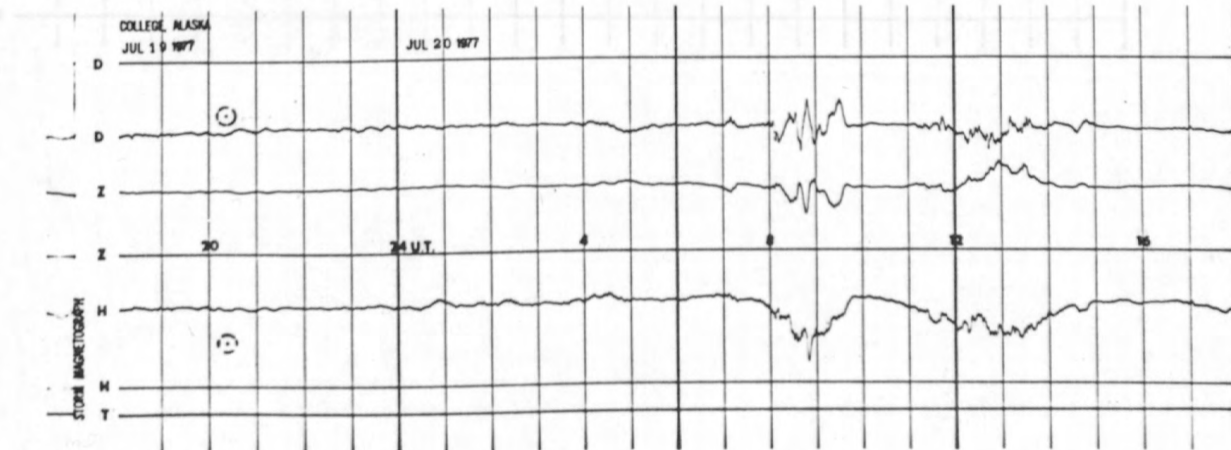
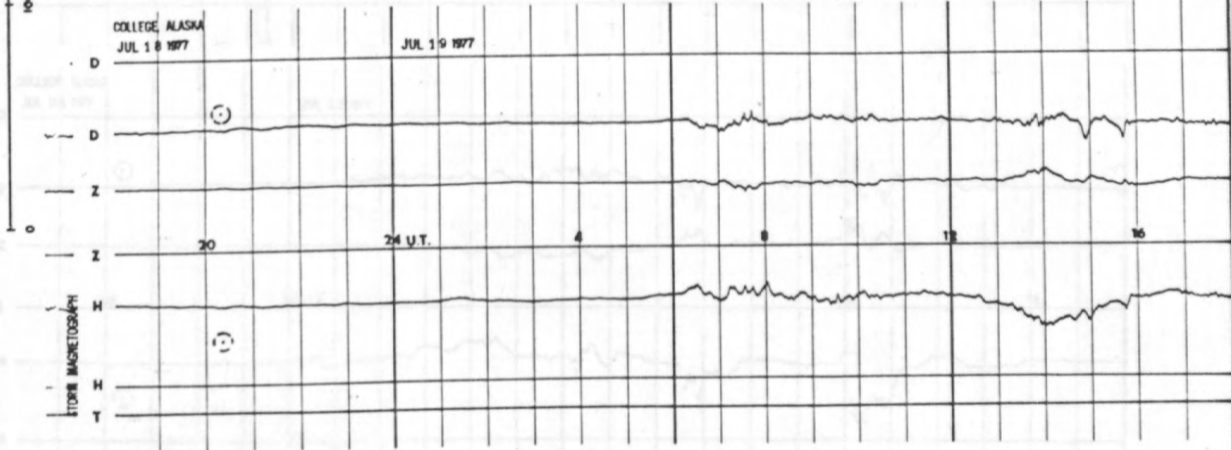
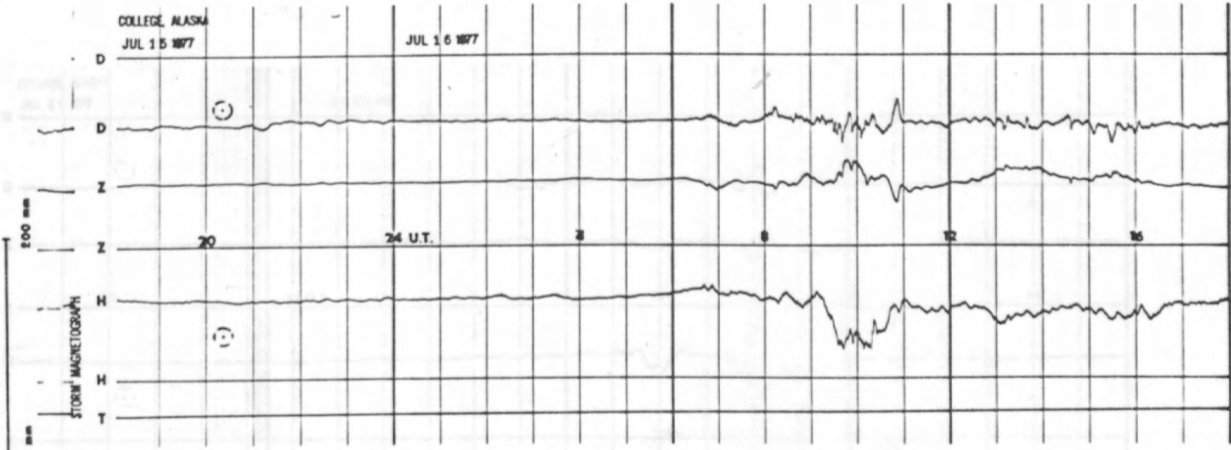
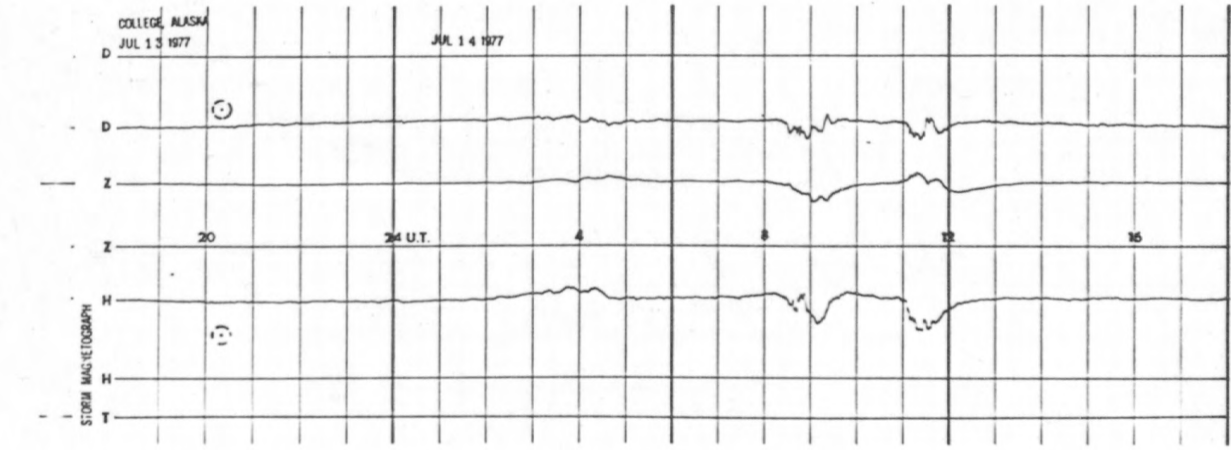
NORMAL MAGNETOGRAMS



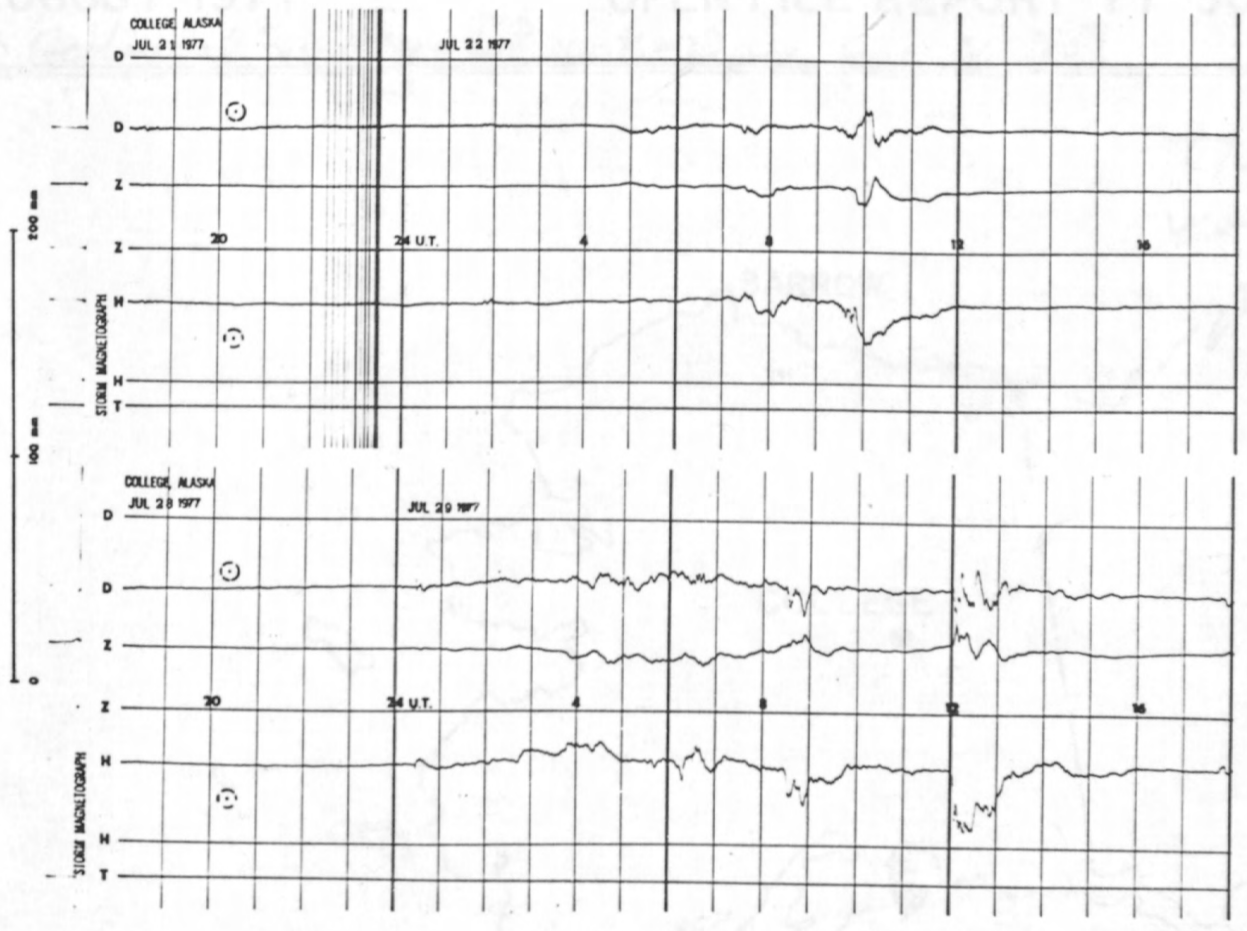
NORMAL MAGNETOGRAMS



STORM MAGNETOGRAMS



STORM MAGNETOGRAMS



AUGUST 1977 OPEN FILE REPORT 77-301

