

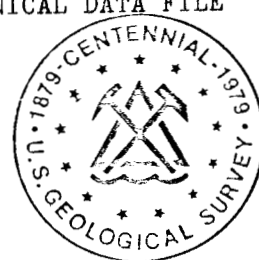
UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

ALASKAN GEOLOGY BRANCH
TECHNICAL DATA FILE



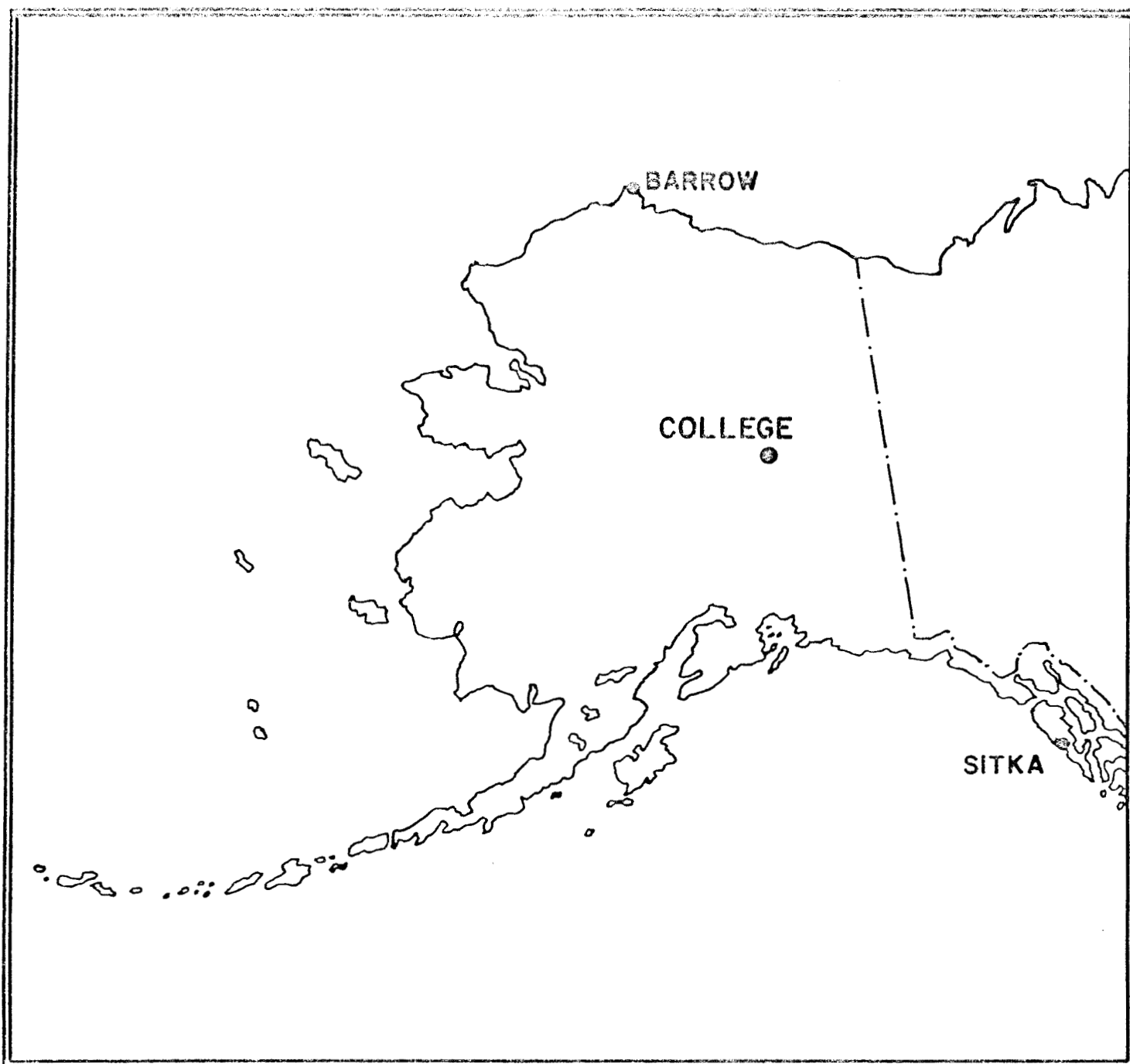
PRELIMINARY GEOMAGNETIC DATA COLLEGE OBSERVATORY FAIRBANKS, ALASKA



OCTOBER 1979

OPEN FILE REPORT

79-300J



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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, E.A. SAUTER, 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 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 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 (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.

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 OCTOBER 1979														
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	2	2	2	5	5	5	1	1	23	21	SUDDEN COMMENCEMENTS d h m																		
2	0	0	0	3	3	4	4	2	16	11																			
3	3	3	3	3	4	4	3	2	25	17																			
4	2	2	6	6	2	1	0	0	19	23																			
5	0	0	0	0	3	4	1	0	08	06																			
6	3	3	5	4	6	5	4	2	32	33																			
7	2	3	5	4	6	6	3	4	33	37																			
8	5	5	5	5	5	4	4	4	37	40																			
9	3	4	6	7	4	5	3	2	34	45																			
10	3	3	3	4	6	2	3	1	25	22																			
11	0	0	3	5	4	5	2	1	20	19	POSSIBLE SOLAR-FLARE EFFECTS BASED ON INSPECTION OF GRAMS ALONE (WITHOUT REFERENCE TO DATA FROM OTHER SOURCES)																		
12	0	1	0	5	5	4	2	1	18	17																			
13	2	2	3	3	0	2	2	1	15	08																			
14	2	1	1	1	2	2	1	0	10	04																			
15	0	0	3	5	5	4	2	2	21	19																			
16	2	2	3	1	3	1	1	1	14	07																			
17	0	0	0	0	0	0	1	0	01	00																			
18	0	0	1	0	0	0	0	0	01	00																			
19	0	0	0	0	0	1	0	1	02	01																			
20	1	0	2	4	3	1	0	0	11	07																			
21	0	0	1	3	3	4	1	1	13	08	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="3" style="text-align: center;">BEGIN</th> <th colspan="3" style="text-align: center;">END</th> </tr> <tr> <td style="width: 3%;">d</td><td style="width: 3%;">h</td><td style="width: 3%;">m</td> <td style="width: 3%;">d</td><td style="width: 3%;">h</td><td style="width: 3%;">m</td> </tr> </table>						BEGIN			END			d	h	m	d	h	m	
BEGIN			END																										
d	h	m	d	h	m																								
22	2	2	5	3	4	3	2	1	22	16																			
23	1	2	2	3	4	3	1	1	17	10																			
24	1	3	3	4	5	4	1	0	21	17																			
25	1	4	7	4	4	4	2	2	28	33																			
26	1	2	1	3	4	2	1	1	15	09																			
27	0	0	4	4	3	2	1	0	14	10																			
28	1	1	3	5	5	1	1	2	19	10																			
29	3	1	0	2	3	2	2	1	14	07																			
30	1	2	2	4	4	1	0	0	14	09																			
31	0	0	0	3	4	3	1	0	11	08																			

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

SCALINGS AND COMPUTATIONS HAVE BEEN CHECKED.

APPROVED JOHN B. TOWNSEND, CHIEF, COLLEGE OBSERVATORY
 OBSERVER IN CHARGE

OUTSTANDING MAGNETIC EFFECTS			OBSERVATORY	
			COLLEGE, ALASKA	
			MONTH	YEAR
			OCTOBER	1979
DATE	TIME U.T.	NATURE OF PHENOMENON ¹	REMARKS	
10	19XX	pcl		
12	10XX	pi2		
22	17XX	pcl		
IDENTIFIED BY: JBT			VERIFIED BY: JEP	

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

PRINCIPAL MAGNETIC STORMS
Data from Individual Observatories: COLLEGE OBSERVATORY, COLLEGE, ALASKA
OCTOBER 1979

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
		day	hr min (UT)	type	D(')	H(γ)	Z(γ)	day	(3 hr - period)	K	D(')	H(γ)	Z(γ)	
CO	64°6 N	06	00XX	..	..	..	..	09	4	7	226	1610	760	09 18

OCTOBER

1979

NORMAL MAGNETOGRAPH					
COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASLINE
D	0000 U.T., 10-1-79	2400 U.T., 10-31-79	1.0/mm	3.88/mm	27° 47.4 E
H	0000 U.T., 10-1-79	2400 U.T., 10-8-79	7.88/mm		127728
	0000 U.T., 10-9-79	2400 U.T., 10-20-79	"		127688
	0000 U.T., 10-21-79	2400 U.T., 10-31-79	"		127628
Z	0000 U.T., 10-1-79	2400 U.T., 10-31-79	7.38/mm		551668

STORM MAGNETOGRAPH					
COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASLINE
D	0000 U.T., 10-1-79	2400 U.T., 10-31-79	7.8/mm	29.78/mm	23° 50.5 E
H	0000 U.T., 10-1-79	2400 U.T., 10-31-79	44.08/mm		115228
Z	0000 U.T., 10-1-79	2400 U.T., 10-31-79	48.68/mm		540288

RAPID RUN MAGNETOGRAPH					
COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		
D					
H					
Z					

MONTHLY MEAN ABSOLUTE VALUES*					
D		H		Z	
28° 10.8 E		130108		553778	

* COMPUTED FROM TEN QUIETEST DAYS DURING MONTH.

DAYS USED: OCT 5, 13, 14, 16, 17, 18, 19, 20, 21, 29

NOA FORM 76-106 (1-72)		MAGNETOGRAM HOURLY SCALINGS (UNIVERSAL TIME)		U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION		OBSY.		YEAR		MONTH		CLF - MENT															
				1500 M.T. is hour 11 of the		00		79		OCT		1)															
Values 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 universal day.																											
Shrinkage corrections have been applied. Negative values are in red, with minus signs shown.																											
C	0 ⁰⁰	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	203	202	198	211	222	240	242	201	203	212	391	328	01	258	301	319	290	291	281	267	253	241	251	223	6032	
	02	222	227	212	210	211	220	221	220	211	198	222	261	02	322	351	278	343	241	252	186	222	241	222	208	5890	
	03	194	167	151	178	158	142	212	216	212	231	257	221	03	248	251	250	298	312	269	272	277	259	249	247	5550	
	04	220	228	208	204	207	191	189	193	205	212	240	226	04	248	260	261	271	301	300	281	277	261	238	228	5778	
	05	220	216	211	209	211	216	220	220	220	222	228	232	05	240	242	211	278	310	363	312	289	232	200	179	5840	
	06	167	156	156	142	133	135	292	149	171	189	186	196	06	442	377	461	667	410	247	230	251	238	182	179	6279	
	07	169	132	181	170	151	11	63	229	178	189	287	349	07	326	388	25	561	332	291	347	242	169	167	198	5384	
	08	191	151	218	125	198	197	199	154	78	70	129	462	08	442	243	240	257	291	228	178	290	283	192	181	5400	
	09	203	198	139	103	161	200	94	109	133	150	205	466	09	232	221	303	232	342	266	278	290	231	189	198	5296	
	10	199	181	187	116	188	139	179	221	229	188	313	320	10	258	276	387	248	287	307	261	231	242	229	236	5725	
	11	228	221	209	203	209	211	211	199	241	211	249	387	11	312	353	321	278	301	288	301	257	251	247	241	6418	
	12	241	238	216	203	210	212	209	217	220	221	271	328	12	398	299	283	241	269	350	296	219	236	229	194	6199	
	13	191	201	198	187	190	203	208	191	211	211	241	242	13	249	250	259	241	280	308	271	254	267	229	182	5662	
	14	169	192	179	199	209	211	207	201	211	217	221	233	14	241	251	261	288	349	343	298	251	218	208	211	5699	
	15	219	220	217	214	209	209	203	200	189	241	261	371	15	451	727	301	380	397	331	338	212	162	194	192	6821	
	16	191	191	180	156	139	169	221	216	218	229	231	261	16	256	258	238	238	274	300	281	248	252	221	212	5519	
	17	215	198	201	191	211	217	200	219	211	227	229	231	17	238	240	247	259	262	301	300	291	287	262	219	5708	
	18	207	191	211	210	201	201	219	188	207	219	228	231	18	238	241	251	261	278	301	297	291	281	249	201	5619	
	19	199	203	207	205	205	209	222	221	221	208	220	224	19	231	242	258	262	291	303	298	278	248	231	220	5709	
	20	210	208	212	218	210	211	206	205	239	189	247	277	20	232	259	258	262	291	301	328	271	237	229	219	5890	
	21	211	201	201	187	203	191	189	169	199	221	271	276	21	256	289	284	297	331	339	327	270	271	208	188	5861	
	22	171	169	111	149	200	162	147	70	241	229	249	258	22	240	247	250	220	271	271	297	228	198	232	231	5127	
	23	221	188	198	196	200	201	186	172	200	129	229	241	23	334	291	316	271	311	281	281	230	192	186	182	5585	
	24	180	391	201	181	142	191	170	221	181	230	209	239	24	326	545	442	477	220	302	251	226	241	247	248	351	6412
	25	241	201	189	171	178	128	70	-17	177	223	231	289	25	348	474	458	342	300	278	310	271	178	91	169	191	5499
	26	211	218	189	180	199	220	219	210	210	203	231	237	26	401	361	274	250	287	281	298	301	289	271	241	241	6027
	27	231	219	218	209	198	199	188	203	175	208	243	277	27	279	241	251	250	261	279	308	306	259	228	238	221	5687
	28	212	208	211	198	205	198	182	219	178	173	228	249	28	371	387	258	232	257	262	271	278	289	247	191	188	5740
	29	180	161	171	178	197	202	212	216	222	272	261	232	29	232	231	232	221	217	151	191	249	231	238	226	210	5133
	30	191	182	199	184	199	217	203	209	251	258	289	257	30	258	231	336	228	249	269	288	291	284	279	255	240	5844
	31	225	219	217	210	215	218	221	220	220	218	240	289	31	311	249	243	341	281	319	304	289	268	248	232	211	6008
SCALED BY	SPT, EAS																								MONTHLY SUM		179133
CHECKED BY	EAS, JBT																								MONTHLY MEAN		241
SIGNS RE- VIEWED BY	JEP																								DATES WITH GAPS:		
PUNCHED BY																											

☐ Interpolated

☐ Significant portion of hour interpolated.

☐ No record; or no values available because of faulty record.

☐ Sealing uncertain because of magnetic storm.

☐ Record all sheet for part or all of hour; if value is given, curve was estimated for missing part.

• Derived from Storm Meph., converted to Normal Meph.

U.S. G.P.O. 1973-769-371/932 MFG. 66

MAGNETOGRAM HOURLY SCALINGS
(UNIVERSAL TIME)Values are in tenths of mm. and are averages for successive periods of one hour beginning at midnight. Hour 01 of local day (1500A.T.) is hour 11 of the same universal day.
Shrinkage corrections have been applied. Negative values are in red, with minus signs shown.

CO

79

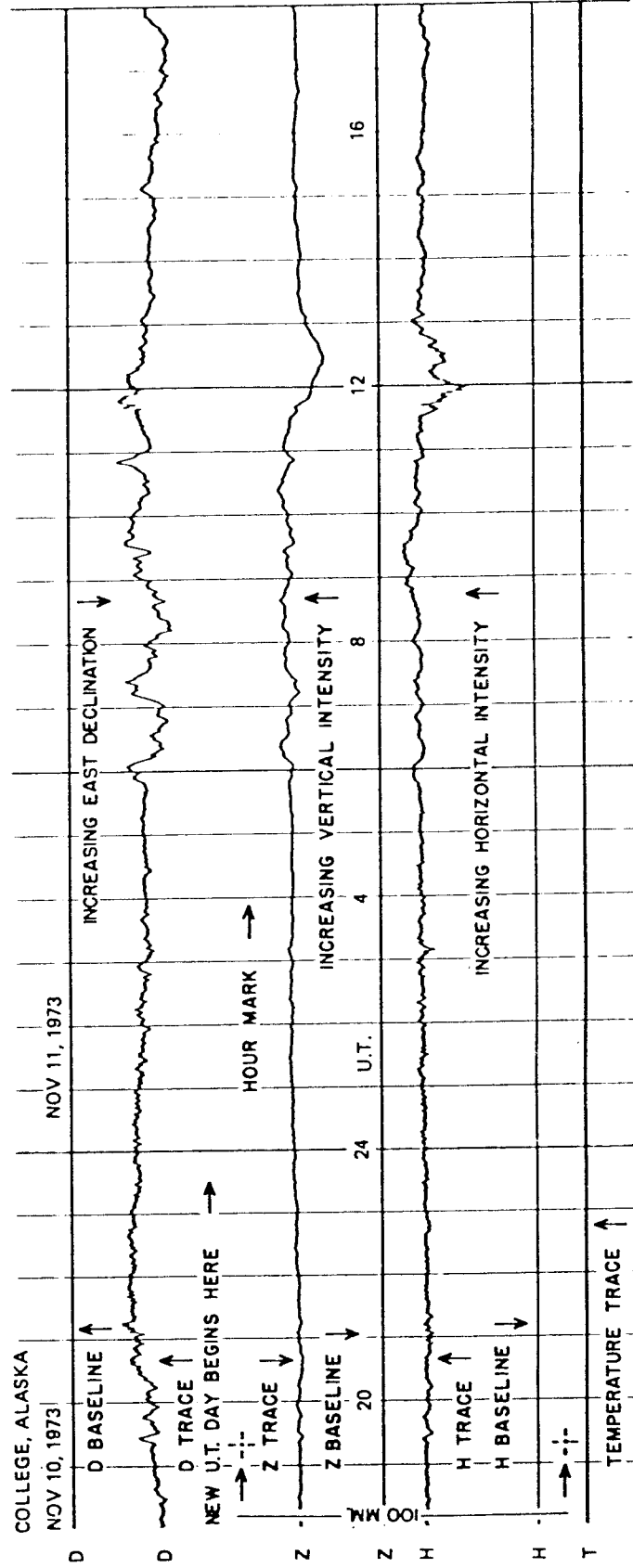
OCT

H

C	Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	SUM
01	332	309	329	331	331	339	341	330	320	291	169	-125	01	36	103	32	-26	327	339	342	330	331	328	314	293	6051
02	297	299	301	311	319	320	322	324	331	338	343	281	02	239	227	254	107	49	150	171	316	351	333	322	286	6571
03	296	329	416	382	401	428	418	380	361	349	281	282	03	232	312	329	309	261	209	288	318	309	300	301	297	7788
04	319	391	310	330	320	334	347	374	139	-19	281	394	04	350	327	319	317	311	319	320	320	312	301	300	299	7315
05	299	300	303	316	321	323	324	326	328	327	329	330	05	339	331	282	121	166	287	300	289	280	271	276	277	71047
06	389	348	359	407	476	509	454	392	451	418	367	263	06	-236	163	161	21	48	292	386	343	303	310	312	322	7162
07	318	340	333	369	379	444	498	349	313	119	120	99	07	211	-19	-458	-19	347	350	367	289	252	221	309	423	5970
08	421	513	572	691	413	344	356	325	76	-88	124	-48	08	-9	226	310	319	251	79	171	259	260	202	286	338	6391
09	391	427	396	427	477	597	264	151	169	349	-377	48	09	368	331	167	-44	19	223	293	299	280	270	267	299	6093
10	299	351	391	421	330	361	396	383	311	337	141	172	10	53	-189	37	304	306	311	300	215	269	270	282	271	6344
11	299	280	292	309	311	320	320	337	393	289	253	21	11	107	133	9	109	91	330	324	320	326	304	299	301	6059
12	290	291	300	309	321	323	329	328	330	333	291	46	12	11	121	28	69	136	222	291	297	279	273	269	264	5771
13	330	295	303	320	333	339	331	409	410	379	343	319	13	310	313	311	299	299	241	258	271	281	291	280	279	7544
14	311	296	321	319	320	319	329	341	327	341	333	320	14	326	323	289	267	309	327	306	299	276	278	309	300	7535
15	299	298	300	311	320	329	331	354	410	409	171	-76	15	7	-133	50	173	190	331	320	300	261	294	314	319	5882
16	313	310	331	389	389	419	389	330	329	330	328	321	16	320	259	271	339	316	311	289	271	276	279	300	301	7750
17	290	300	307	323	321	327	334	335	331	329	327	330	17	329	323	321	320	320	309	309	303	309	306	309	309	7627
18	310	316	303	311	329	329	329	340	330	331	330	331	18	330	329	323	323	322	313	300	290	289	300	310	303	7621
19	299	300	310	320	329	339	339	340	340	346	340	334	19	336	337	339	337	331	322	313	301	301	310	319	314	7796
20	289	299	318	321	330	331	337	349	374	327	251	219	20	229	267	301	309	331	329	319	309	297	296	300	305	7377
21	311	314	320	316	321	328	330	351	349	323	299	389	21	321	280	280	117	201	312	319	302	273	260	270	301	7187
22	336	335	356	360	347	406	411	354	299	321	300	310	22	311	261	161	258	292	191	321	291	281	290	306	289	7387
23	292	317	310	311	329	359	381	413	419	379	329	290	23	198	163	199	253	301	349	322	301	288	276	217	289	7365
24	309	288	300	329	379	398	384	409	366	343	297	217	24	136	-299	-100	43	89	234	340	349	330	313	307	303	6064
25	309	315	319	321	311	540	430	69	451	309	289	150	25	56	-106	81	148	271	359	339	281	271	283	324	321	6529
26	309	301	323	337	338	356	353	340	337	341	344	252	26	69	131	228	359	333	321	329	327	319	310	300	314	7279
27	309	313	316	330	332	341	371	379	376	396	306	208	27	267	339	336	300	289	339	339	320	301	300	306	306	7719
28	310	327	324	324	339	350	351	403	439	274	88	61	28	-1	46	224	353	350	349	334	329	303	289	280	323	6769
29	280	339	379	351	350	351	330	336	328	330	327	321	29	313	261	217	226	221	179	229	287	303	284	300	309	7151
30	324	329	300	339	357	351	360	343	328	174	259	316	30	181	269	301	329	349	349	341	328	317	308	309	309	7470
31	304	309	315	322	329	331	339	338	339	340	349	295	31	261	115	110	235	239	305	332	339	331	313	311	314	7115

SCALED BY	SPT, EAS	Preliminary base-line and scale values:	() Interpolated	() Scaling uncertain because of magnetic storm.	MONTHLY SUM	215749
CHECKED BY	EAS, JBT	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	290
SIGNS REVIEWED BY	JEP	Base-line Value	() No record; or no values available because of faulty record.		DATES WITH GAPS:	
PUNCHED BY		Scale Value	* Derived from Storm Mph., converted to Normal Mph.			

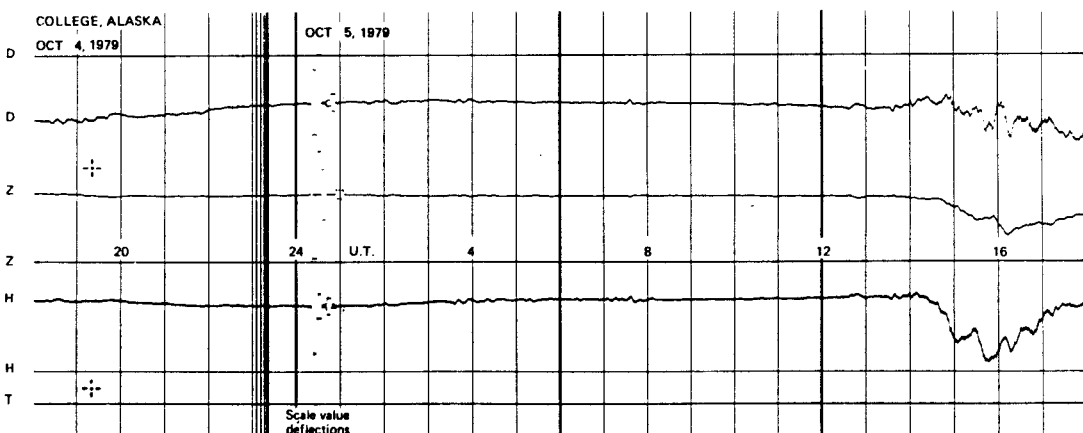
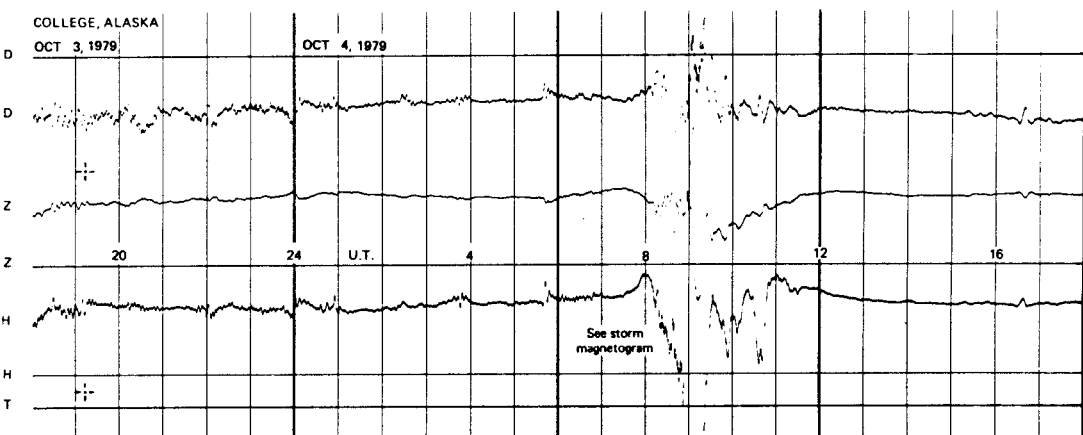
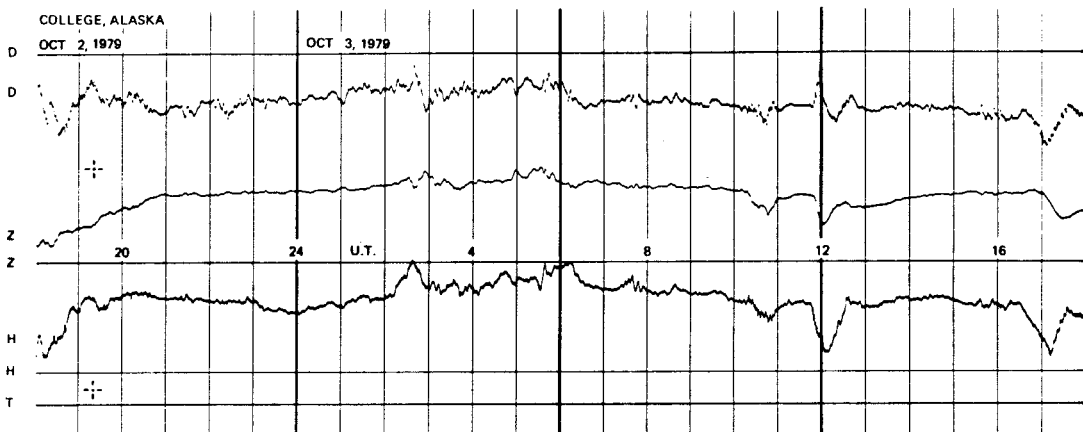
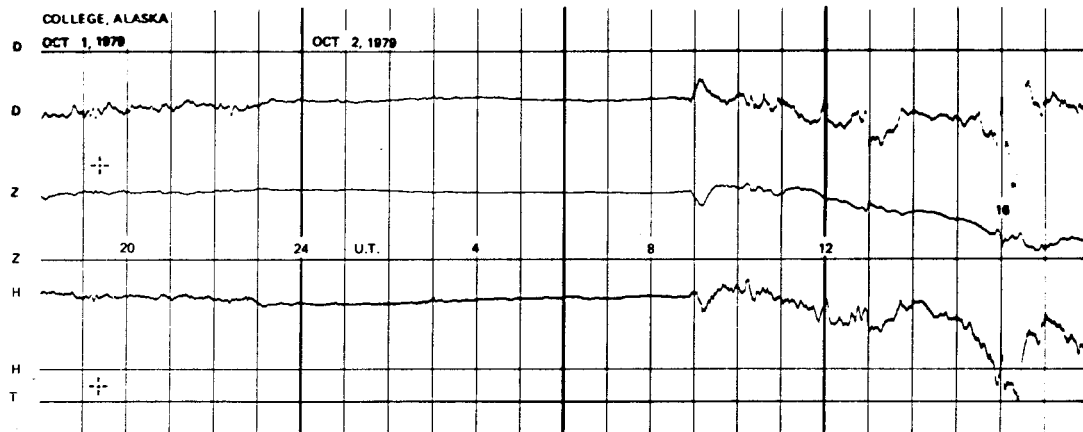
FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)



SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES

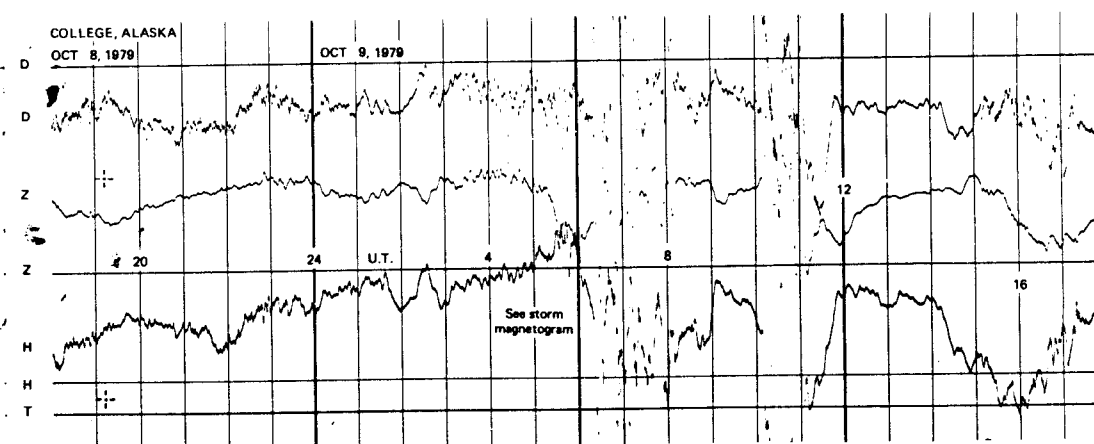
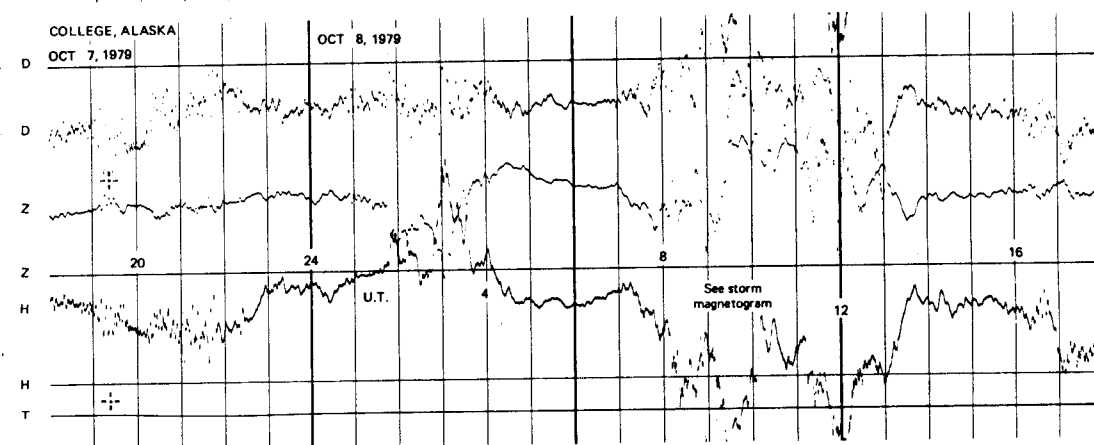
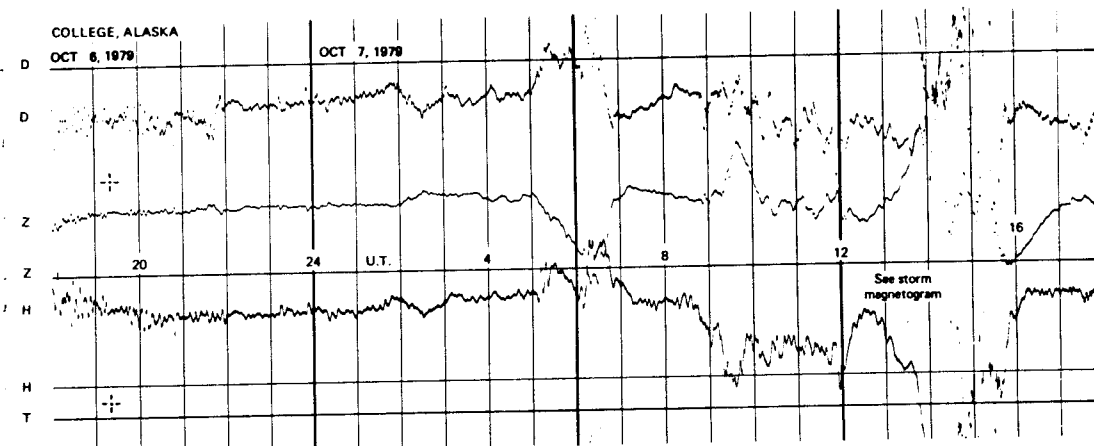
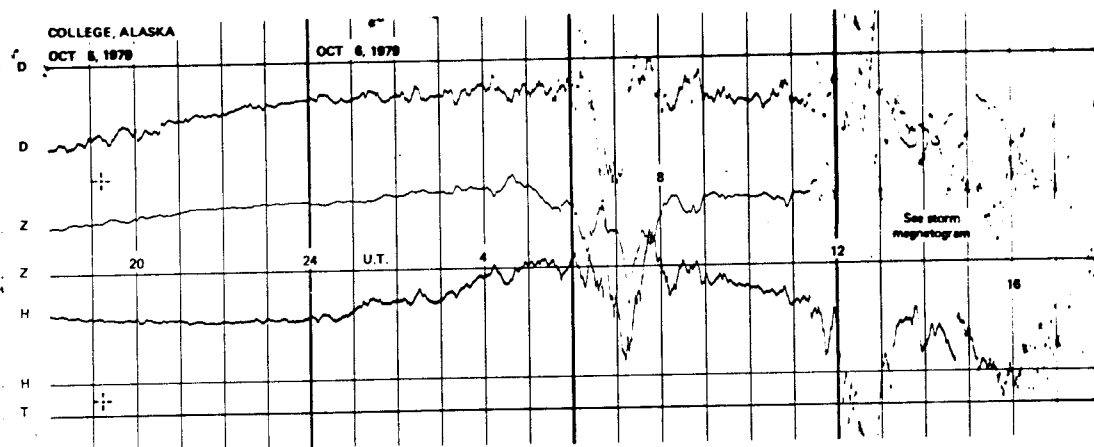
NORMAL MAGNETOGRAMS

200 mm
100 mm
0

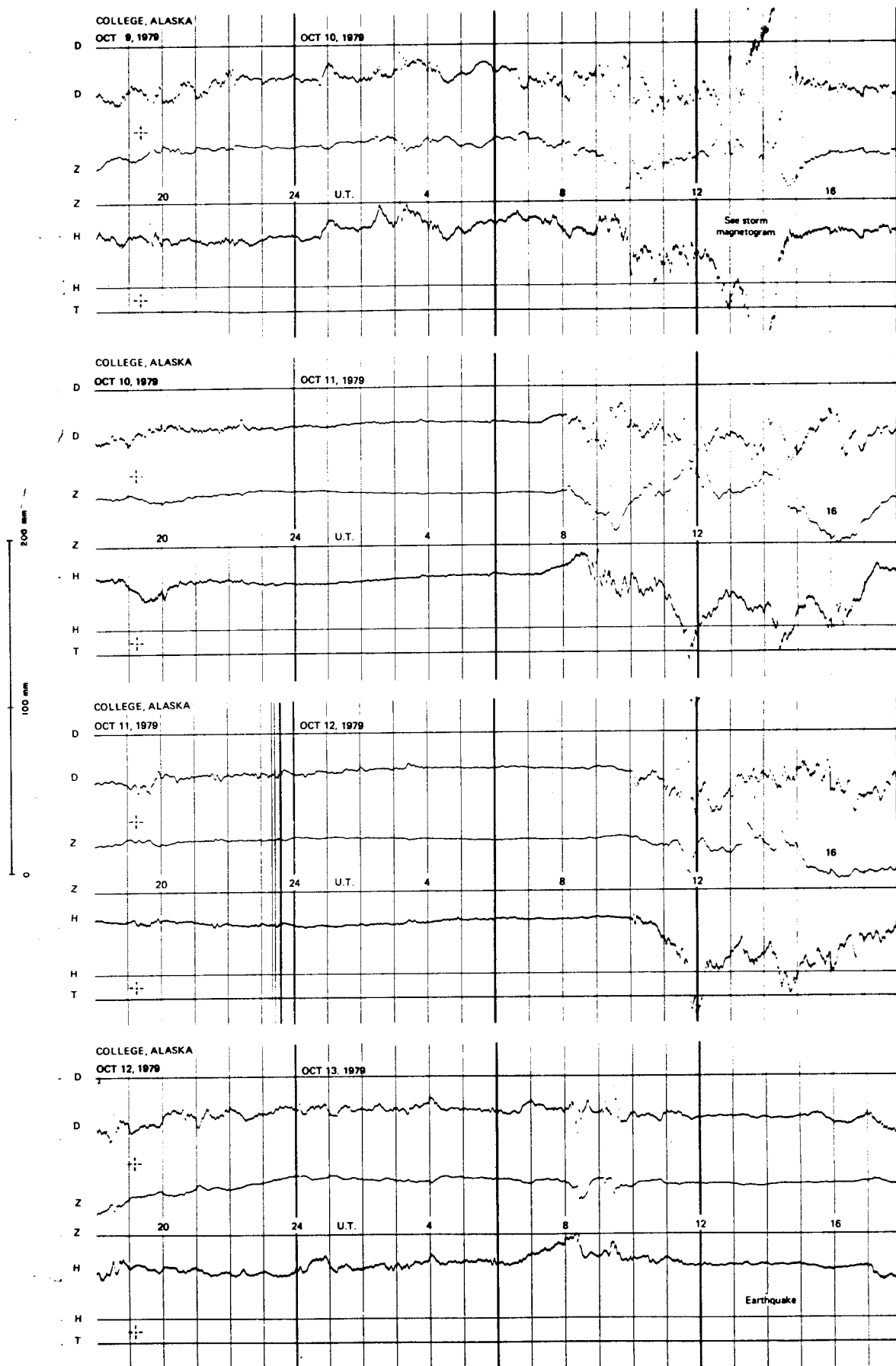


NORMAL MAGNETOGRAMS

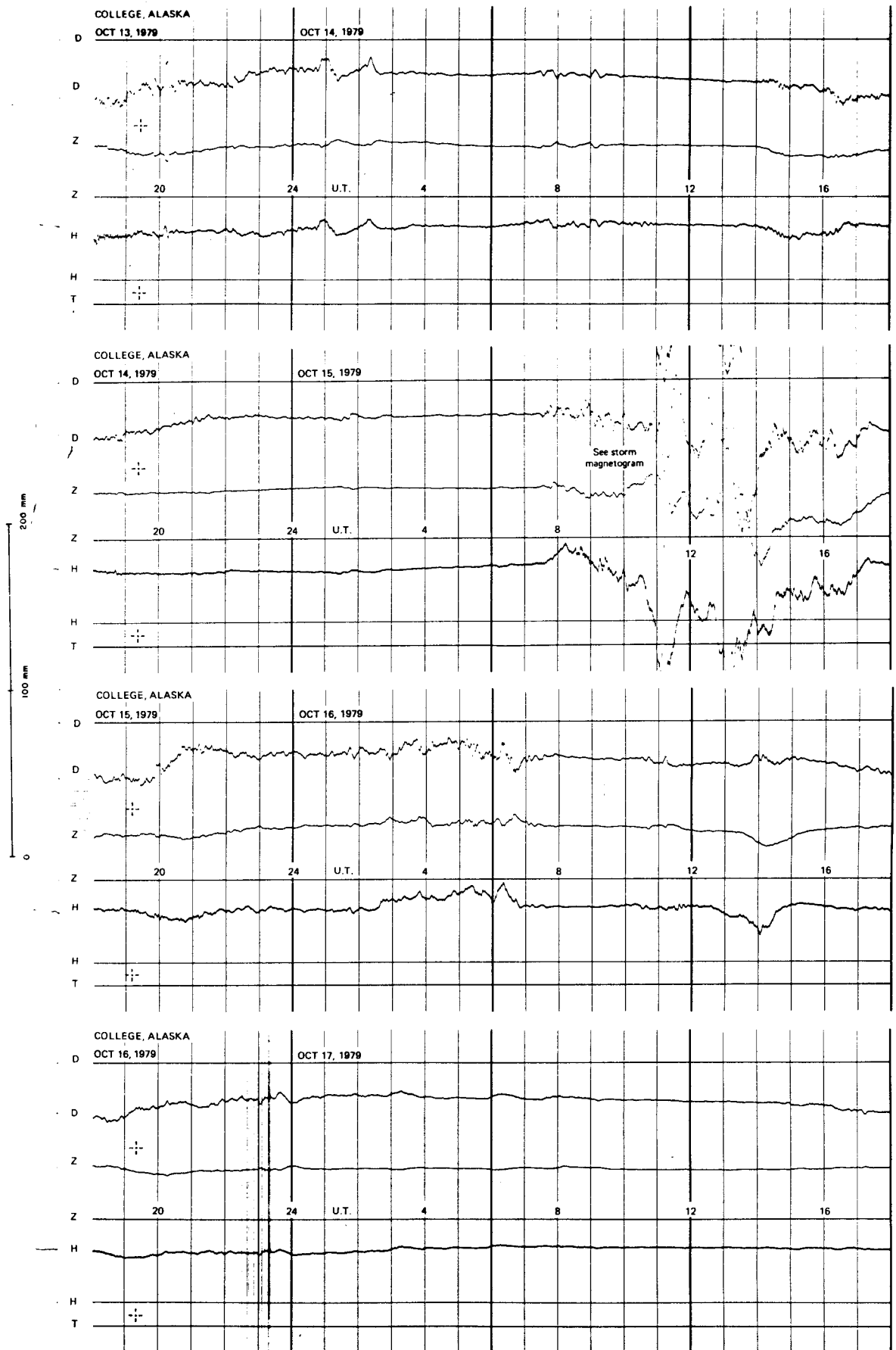
200 mm
100 mm
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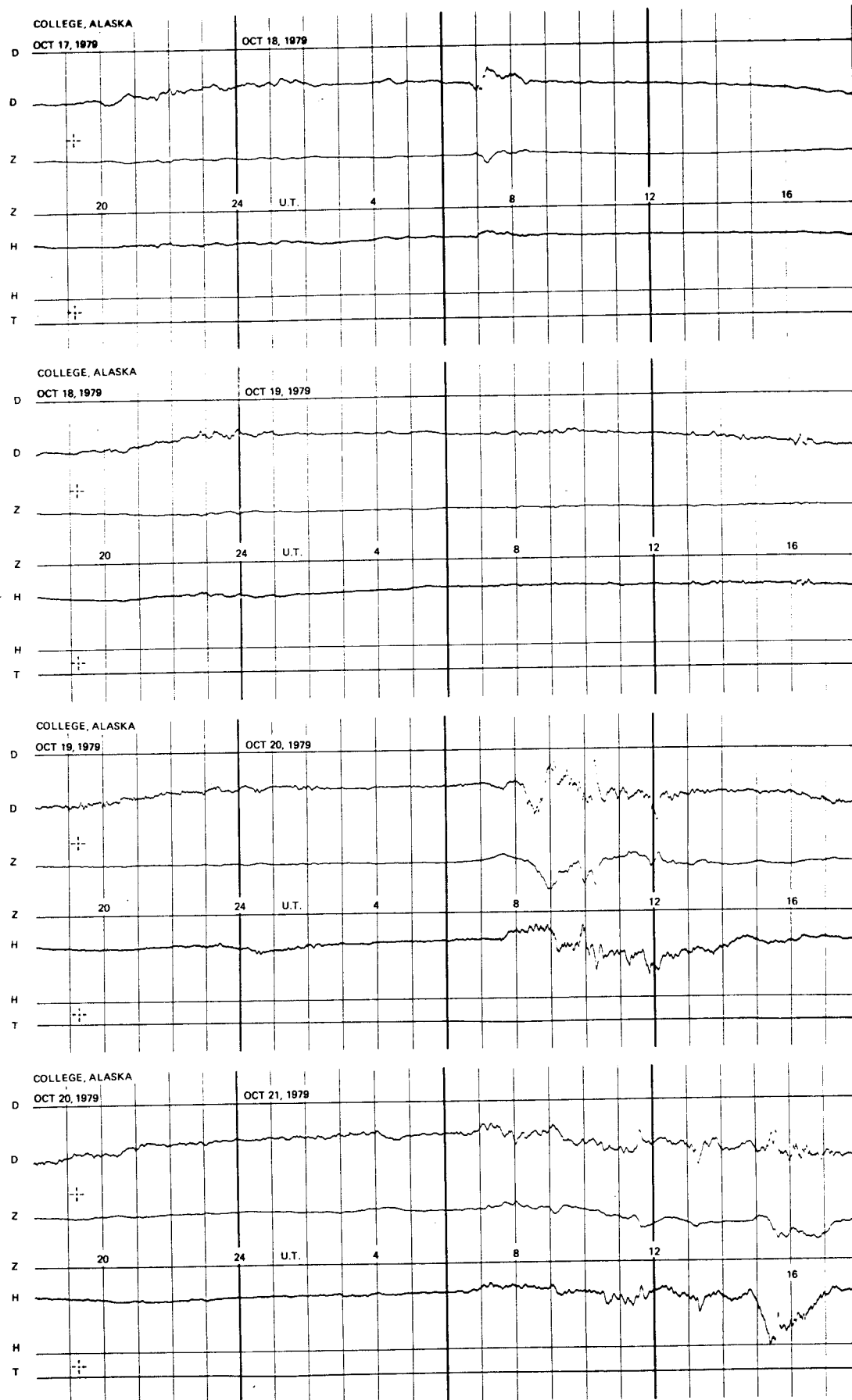
NORMAL MAGNETOGRAMS



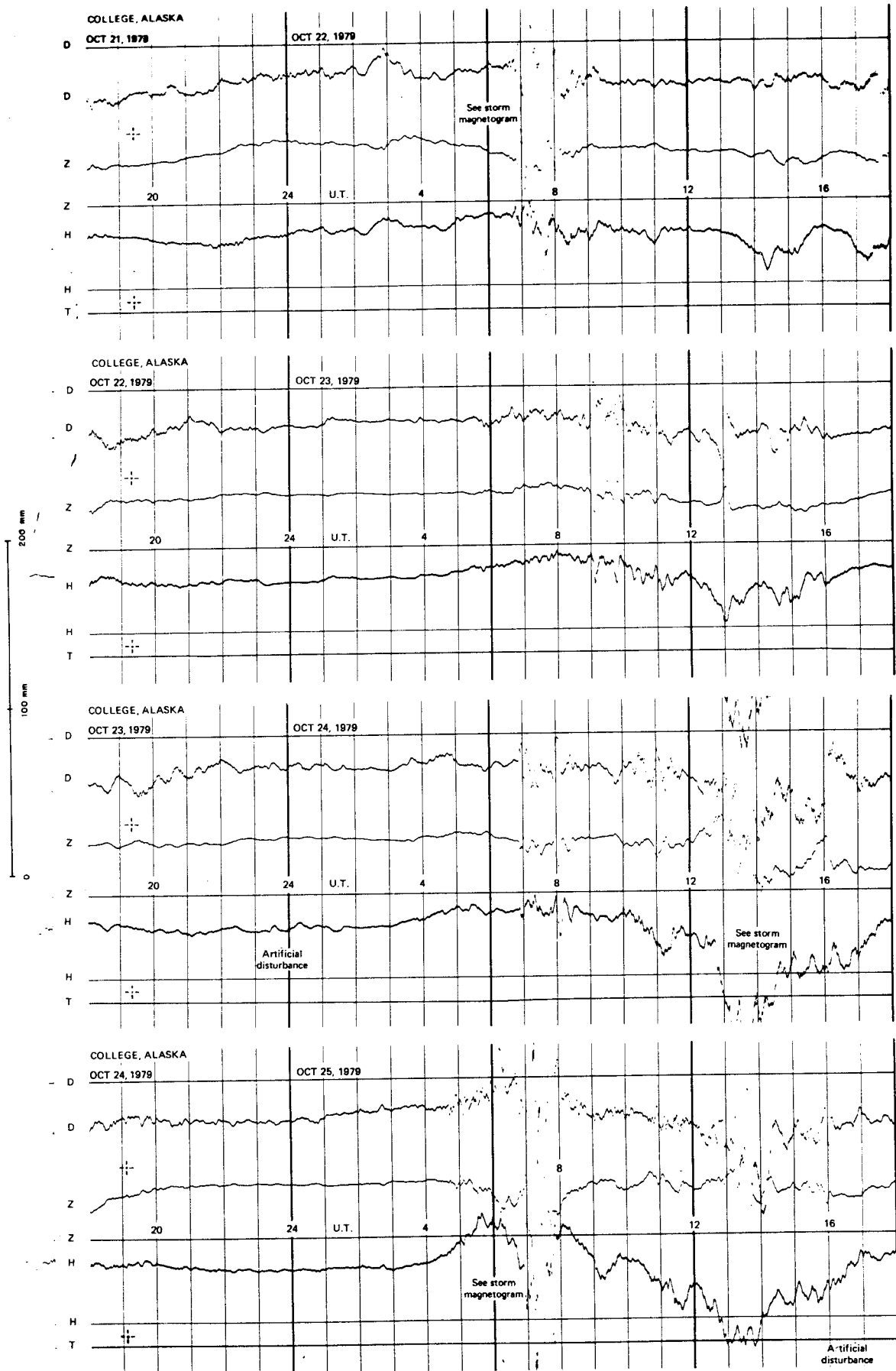
NORMAL MAGNETOGRAMS



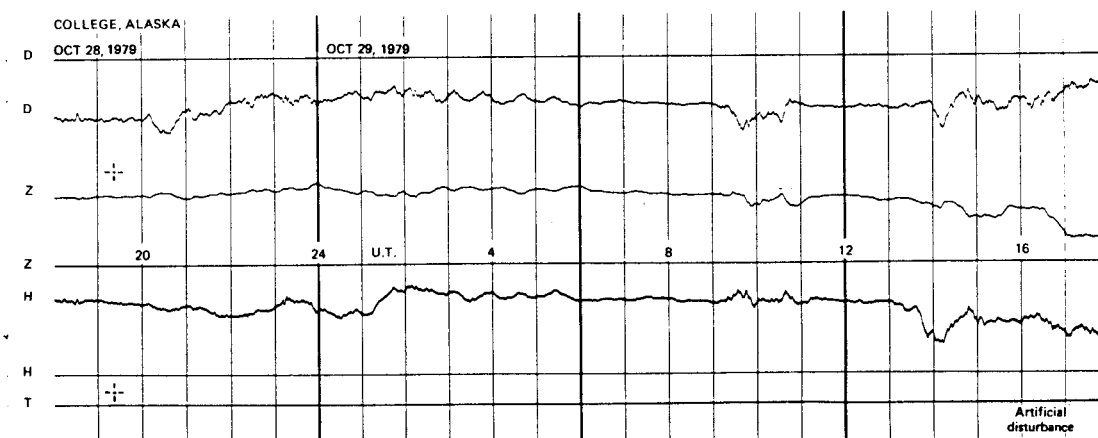
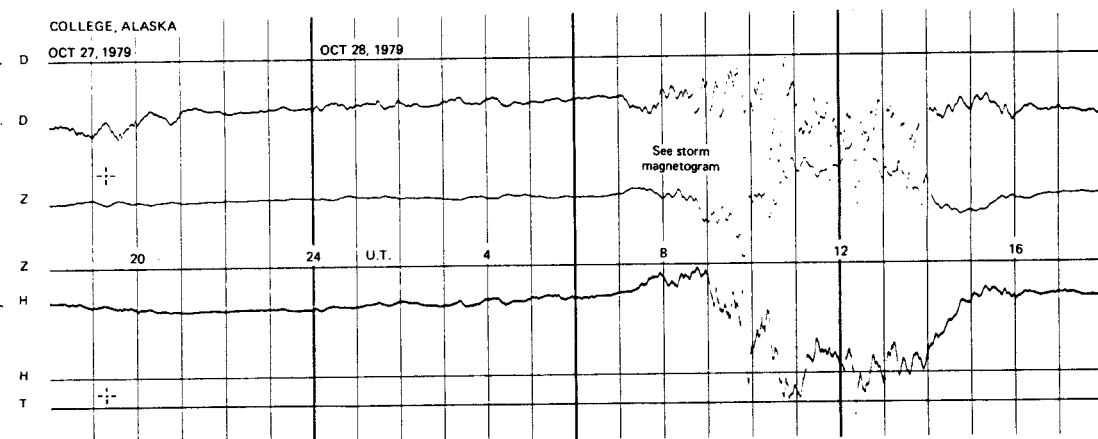
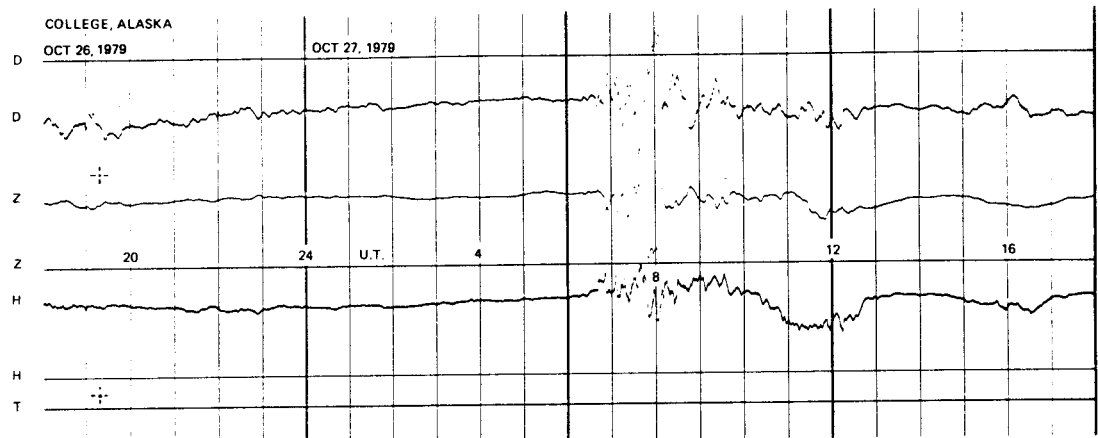
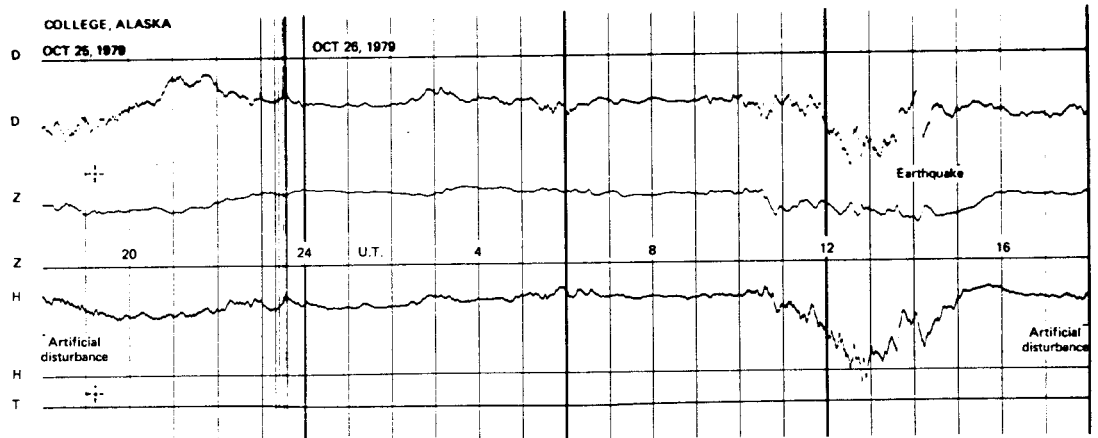
NORMAL MAGNETOGRAMS



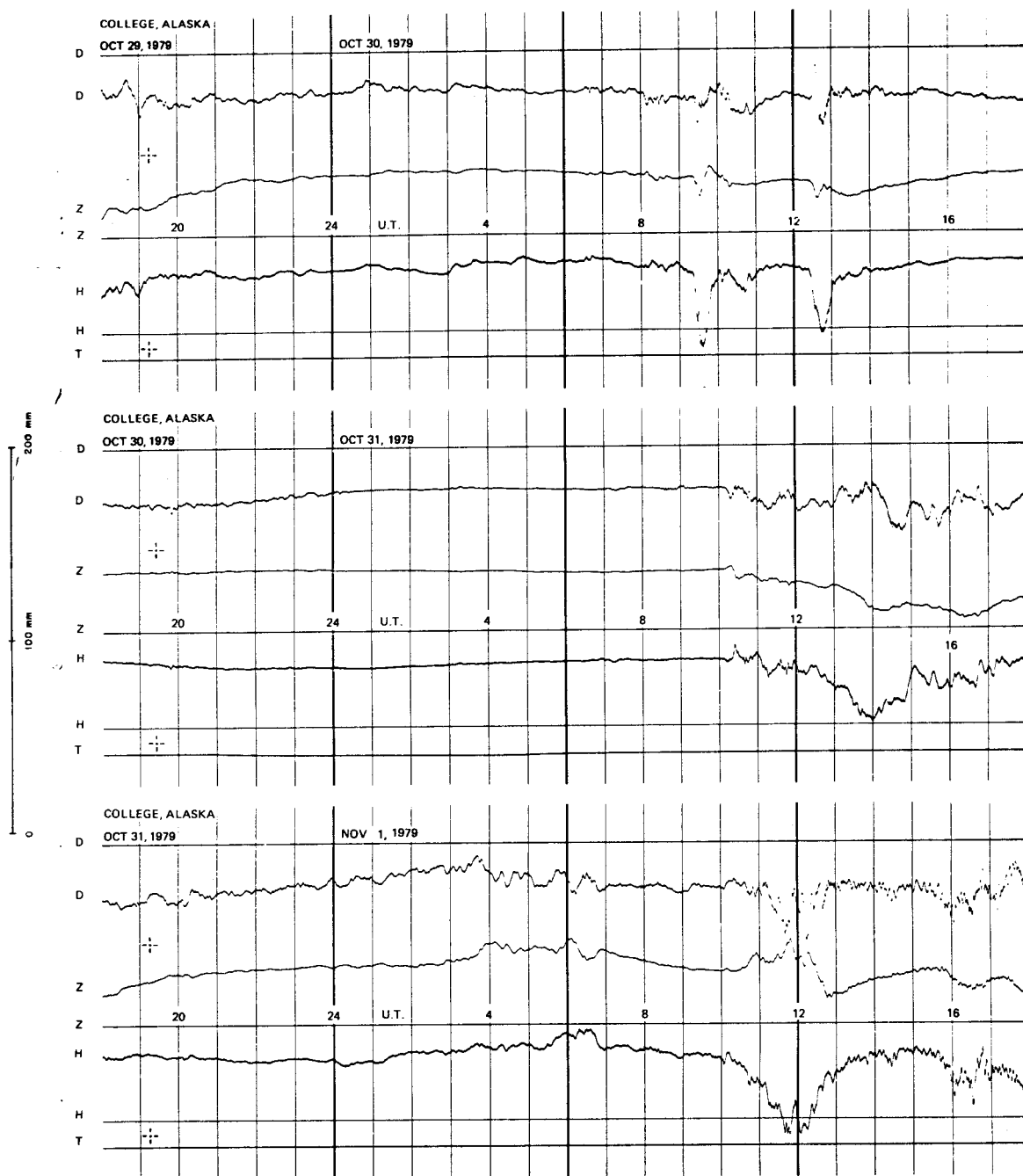
NORMAL MAGNETOGRAMS



NORMAL MAGNETOGRAMS

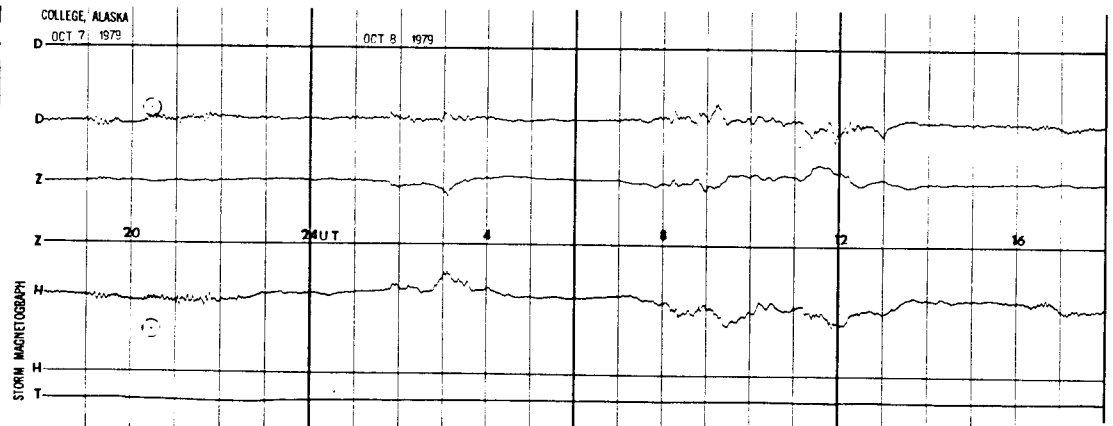
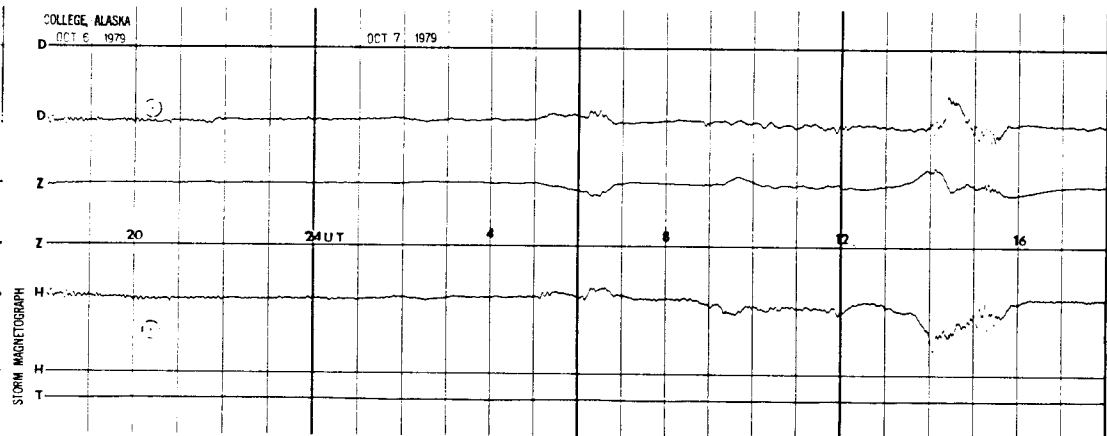
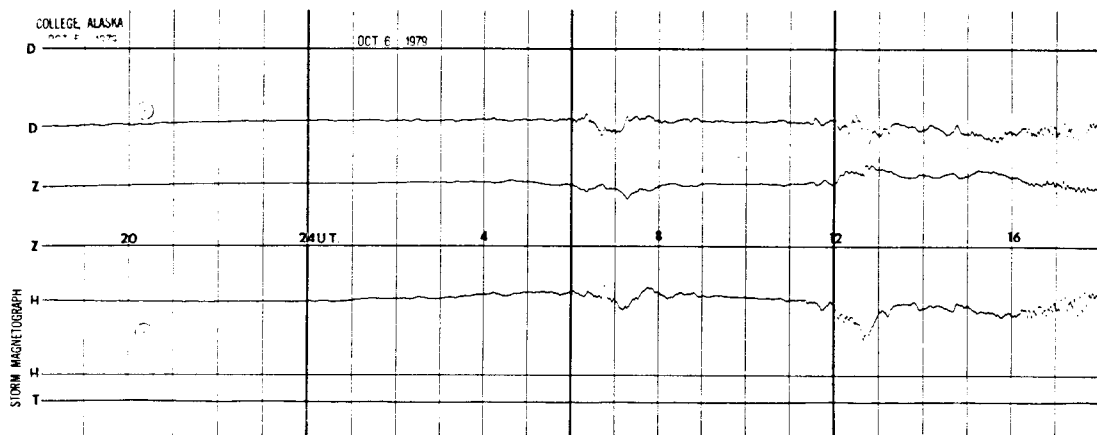
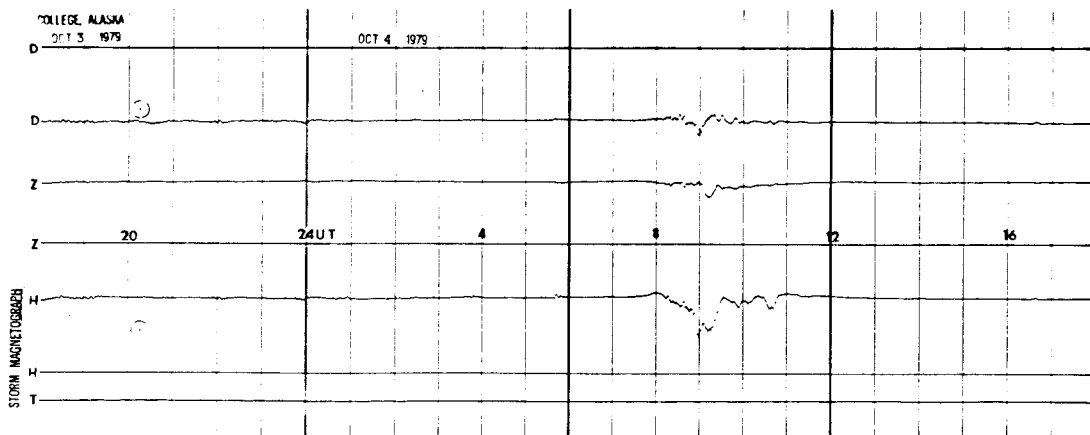


NORMAL MAGNETOGRAMS

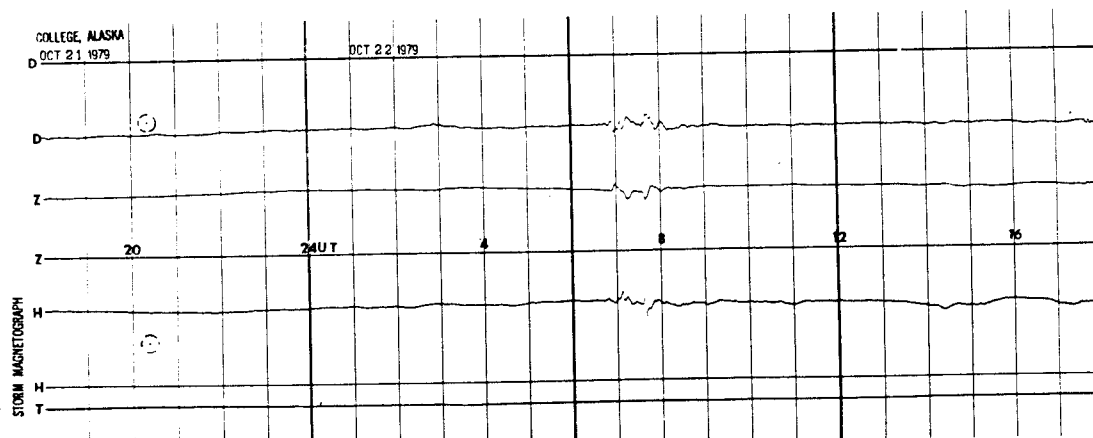
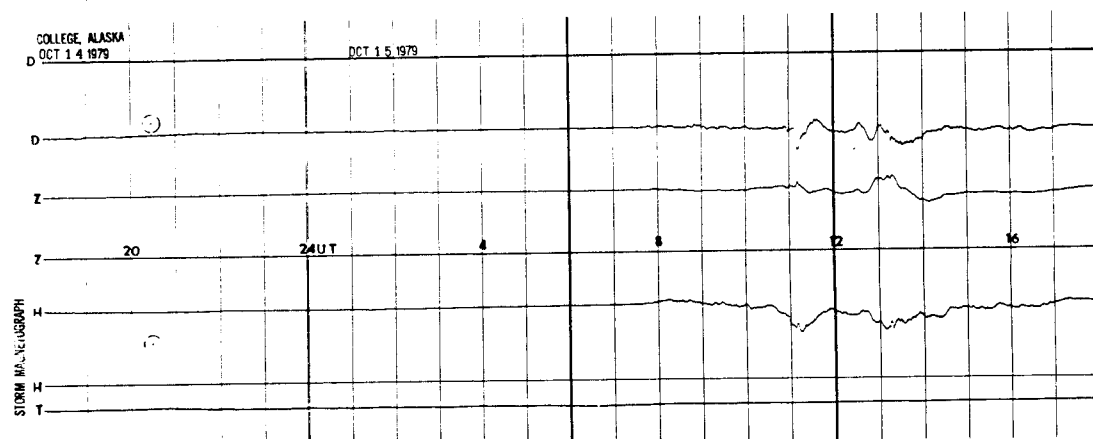
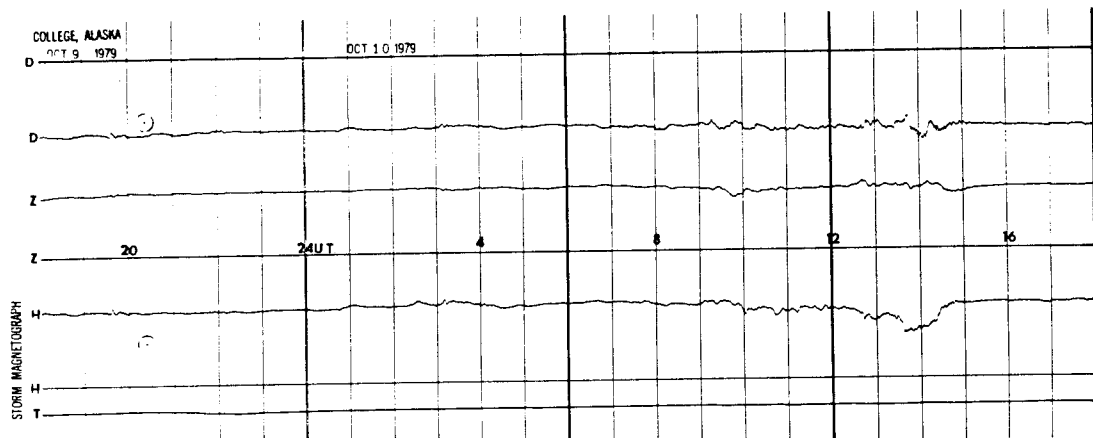
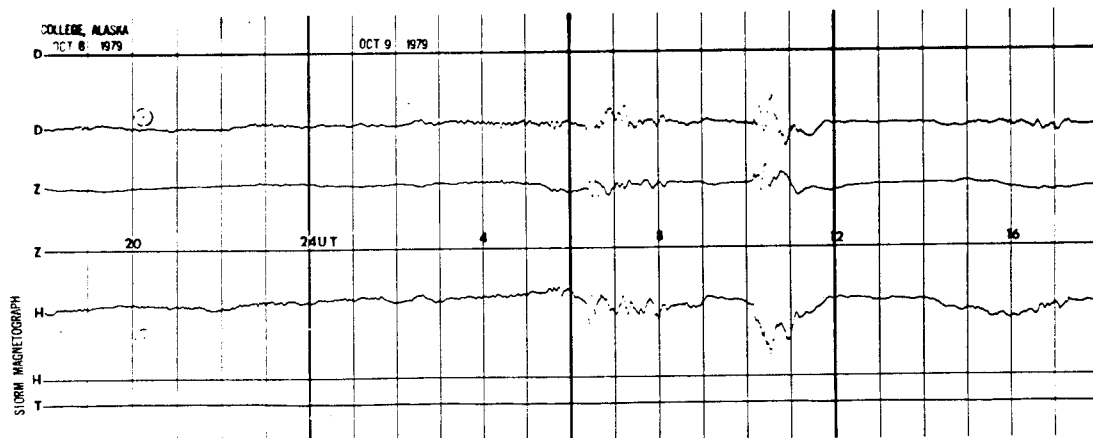
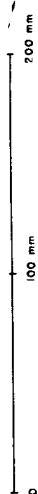


STORM MAGNETOGRAMS

200 mm
100 mm
0



STORM MAGNETOGRAMS



STORM MAGNETOGRAMS

200 mm
100 mm
0

