

UNITED STATES (DEPARTMENT OF THE INTERIOR)

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no. 76-300-J

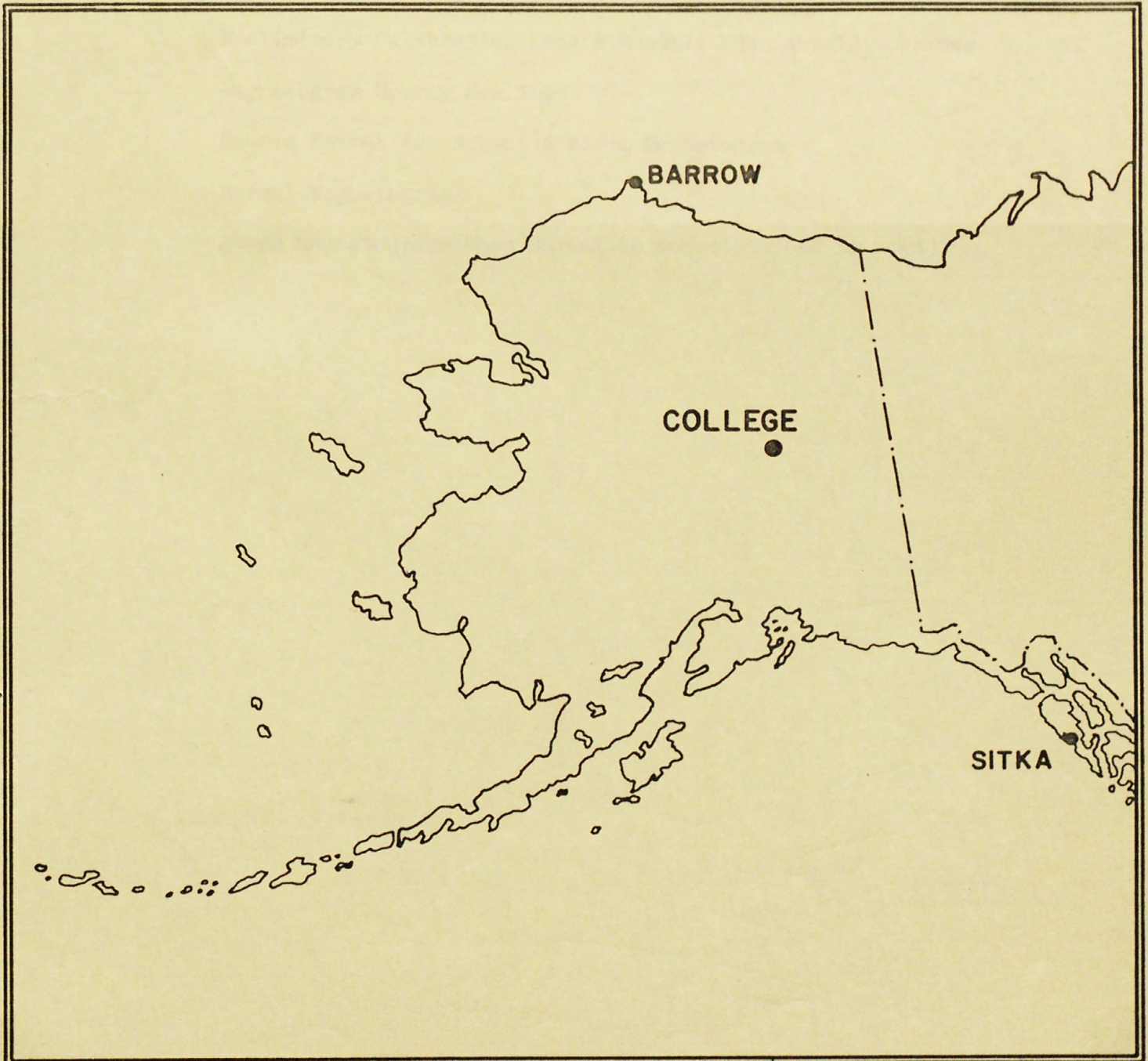
GEOLOGICAL SURVEY. [Report - Open file series]

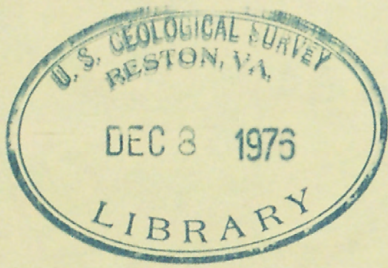
PRELIMINARY GEOMAGNETIC DATA
COLLEGE OBSERVATORY
FAIRBANKS, ALASKA

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OCTOBER 1976

OPEN FILE REPORT 76-300J





U.S. GEOLOGICAL SURVEY
RESTON, VA.

DEC 8 1976

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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, M. J. MOORMAN, C. E. DEADMON, 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.

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 (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
$0 \approx 11$	0
$11 \approx 50$	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.

COLLEGE, ALASKA

MONTH AND YEAR

OCTOBER, 1976

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

DATE	K-INDICES									AK	TIME SCALE ON MAGNETOGRAMS 20mm/hr
	00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24	SUM		
1	2	1	5	7	5	2	1	1	24	32	SUDDEN COMMENCEMENTS d h m
2	2	5	5	7	5	4	1	0	29	40	
3	1	1	2	5	3	3	0	0	15	11	
4	0	1	1	3	1	1	1	0	08	04	
5	2	2	2	5	0	1	0	1	13	09	
6	0	2	5	5	3	1	2	1	19	16	
7	1	1	0	1	2	2	1	0	08	03	
8	0	0	2	3	2	2	1	2	12	06	
9	1	1	1	3	4	0	1	0	11	07	
10	0	1	2	4	3	3	1	1	15	09	
11	2	1	0	1	3	3	1	1	12	06	
12	1	1	0	0	1	1	3	3	10	05	
13	2	3	4	4	3	2	2	1	21	14	
14	0	0	1	3	1	0	1	2	08	04	
15	2	3	4	6	6	5	3	4	33	37	
16	5	5	5	6	5	2	3	3	34	39	
17	3	3	6	7	7	3	3	2	34	53	
18	5	3	4	6	5	3	2	2	30	31	
19	0	0	1	3	4	5	1	1	15	12	
20	1	1	2	4	2	1	1	0	12	07	
21	1	1	1	4	2	1	1	1	12	07	
22	0	1	3	5	4	1	0	0	14	12	
23	0	0	2	4	2	2	0	0	10	06	
24	0	0	0	2	0	2	1	1	06	03	
25	1	1	0	0	1	0	0	0	03	01	
26	0	0	0	1	0	0	0	0	01	00	
27	0	0	2	3	2	2	2	1	12	06	
28	2	0	0	2	3	2	0	0	09	05	
29	0	0	0	1	0	0	0	0	01	00	
30	0	0	2	4	5	3	3	3	20	16	
31	3	4	6	6	6	6	3	3	37	49	

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

SUM

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 10 γ)

SCALINGS AND COMPUTATIONS HAVE BEEN CHECKED.

APPROVED John B. Townshend, Chief, College Observatory

OBSERVER IN CHARGE

OUTSTANDING MAGNETIC EFFECTS

OBSERVATORY
COLLEGE, ALASKA

MONTH
OCTOBER

YEAR
1976

DATE	TIME U.T.	NATURE OF PHENOMENON ¹	REMARKS
08	21XX	pc4	
12	23XX	pc5	
14	22XX	pc5	
19	08XX	pi2	
21	12XX	pg	
21	17XX	pg	
25	12XX	pi2	
IDENTIFIED BY: MJM, 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

WDC-A FOR SOLAR-TERRESTRIAL PHYSICS
ENVIRONMENTAL DATA SERVICE, NOAA
BOULDER, COLORADO 80502 U.S.A.Data from Individual Observatories:

COLLEGE OBSERVATORY, COLLEGE, ALASKA

OCTOBER 1976

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	02	00XX	..	..	..	..	02	4	7	160	1250	630	02	20
		15	05XX	..	..	..	..	17	4,5	7	229	1920	1070	18	21
		30	08XX	..	..	..	..	31	3,4,5,6	6	303	1200	760	NOV 01	12

NORMAL MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASELINE
D	0000 uT, 10-1-76	2400 uT, 10-31-76	1.0/mm	3.8 γ /mm	28°07.2 E
H	0000 uT, 10-1-76	2400 uT, 10-10-76	7.8 γ /mm		12769 γ
	0000 uT, 10-11-76	2400 uT, 10-31-76	7.8 γ /mm		12758 γ
Z	0000 uT, 10-1-76	2400 uT, 10-31-76	7.6 γ /mm		55130 γ

STORM MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASELINE
D	0000 uT, 10-1-76	2400 uT, 10-31-76	7.9'/mm	29.8 γ /mm	24° 21.7 E
H	0000 uT, 10-1-76	2400 uT, 10-31-76	44.1 γ /mm		11505 γ
Z	0000 uT, 10-1-76	2400 uT, 10-31-76	48.6 γ /mm		54001 γ

RAPID RUN MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION	
	FROM	TO	SCALE VALUE	
D	0000 uT, 10-1-76	2400 uT, 10-31-76	0.3'/mm	1.0 γ /mm
H	0000 uT, 10-1-76	2400 uT, 10-31-76	1.0 γ /mm	
Z	0000 uT, 10-1-76	2400 uT, 10-31-76	2.4 γ /mm	

MONTHLY MEAN ABSOLUTE VALUES*

D	H	Z
28° 22.0 E	13048 γ	55356 γ

* COMPUTED FROM TEN QUIETEST DAYS DURING MONTH.

DAYS USED: OCT. 4, 7, 8, 12, 14, 24, 25, 26, 28, 29

MAGNETOGRAM HOURLY SCALINGS
(UNIVERSAL TIME)

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

OBSY.	YEAR	MONTH	ELE- MENT
CO	76	OCT	D

Values are in tenths of mm. 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 same universal day.
Shrinkage corrections have been applied. Negative values are in red, with minus signs shown.

C	Q or S	Teo Q	U ₁	01	02	03	04	05	06	07	08	09	10	11	12	U ₂	13	14	15	16	17	18	19	20	21	22	23	24	SUM	
				01	109	115	132	137	133	124	130	109	224	307*	276*	148	01	151	160	172	204	205	198	183	159	160	123	107	105	3869
				02	95	85	102	74	243*	155	274	188	104	-41*	315*	482*	02	304	203	246	355	184	170	160	158	138	123	119	118	4354
				03	119	138	143	133	143	158	138	142	173	156	216	159	03	145	159	190	152	174	205	183	174	154	133	128	127	3742
				04	129	132	138	139	142	150	123	163	148	130	160	152	04	172	174	177	196	198	192	184	173	163	98	114	102	3649
				05	112	102	59	50	68	127	113	136	102	403	94	153	05	143	158	157	156	192	212	184	162	129	130	102	119	3363
				06	138	139	143	144	132	120	123	5	140	155	152	220	06	208	178	204	192	182	188	173	172	72	57	94	110	3441
				07	118	117	139	148	143	143	143	142	140	150	144	160	07	161	172	167	181	201	221	188	158	138	133	128	124	3659
				08	131	138	142	143	144	143	142	158	148	141	109	148	08	172	160	170	181	204	204	183	163	130	100	109	104	3567
				09	115	128	122	118	142	142	128	137	130	139	158	192	09	208	321	289	226	202	204	155	119	128	121	128	119	3871
				10	119	124	122	108	122	97	130	179	128	121	138	169	10	176	212	258	270	217	193	174	160	124	120	104	192	3757
				11	90	99	110	128	138	142	143	144	143	147	156	155	11	214	182	229	269	220	63	190	182	157	111	50	60	3622
				12	91	118	114	151	143	120	127	133	143	143	145	160	12	162	174	173	182	191	201	214	149	139	48	17	85	3323
				13	119	140	133	120	92	111	206	168	111	135	128	155	13	170	179	167	152	186	192	193	176	162	145	127	114	3581
				14	122	134	141	137	137	135	152	128	132	149	120	125	14	160	171	175	177	181	180	198	178	131	125	33	63	3384
				15	80	129	132	137	119	93	122	123	114	22*	174*	357*	15	388*	102*	452*	359	231	192	149	137	67	46	58	101	3884
				16	121	178	89	153	137	122	196	123	171	324	30*	240	16	112	179	172	157	166	163	154	112	81	109	108	113	3510
				17	139	140	140	187	202	299	277*	-73*	78*	-40*	475*	117	17	348*	22*	251	122	152	122	47	122	124	129	112	121	3613
				18	123	128	140	137	160	124	203	383	101	161	178	277*	18	104	167	168	162	152	133	161	97	78	102	133	149	3721
				19	151	150	144	144	144	143	142	140	160	152	148	182	19	191	239	280	171	260	213	150	124	120	130	134	118	3930
				20	122	112	132	123	107	132	140	212	142	102	154	140	20	165	170	173	188	182	144	158	154	148	118	109	107	3434
				21	124	143	142	133	122	133	107	132	152	155	152	143	21	159	161	182	193	191	192	180	172	128	104	113	122	3536
				22	138	152	142	144	143	132	123	213	158	104	159	206	22	198	236	240	213	219	198	165	143	129	123	124	133	3914
				23	134	130	130	129	122	109	107	130	141	195	236	153	23	152	168	162	194	158	182	158	152	119	113	107	119	3500
				24	132	134	141	143	149	148	142	149	138	132	148	164	24	172	183	184	202	176	159	173	184	134	100	117	119	3623
				25	128	110	108	133	143	139	141	140	144	145	164	168	25	153	164	162	174	177	188	173	166	148	129	121	128	3546
				26	132	129	134	142	142	132	134	133	136	156	159	153	26	158	159	178	175	177	185	177	169	155	138	133	135	3621
				27	133	132	132	132	130	122	138	122	130	124	131	160	27	162	204	233	249	233	197	184	178	162	117	81	99	3687
				28	130	133	139	142	142	143	142	148	140	140	144	164	28	268	228	203	242	261	211	185	183	157	118	108	112	3983
				29	129	133	138	132	122	132	142	151	151	154	159	158	29	155	150	158	163	163	175	172	157	143	133	130	131	3531
				30	135	136	140	142	144	143	142	148	194	172	123	173	30	183	225	319	244	202	122	123	143	139	109	141	81	3823
				31	82	114	148	150	122	54	274	5	98	31*	351	102	31	212	333*	492*	157*	238*	191	169	152	93	98	77	109	3854

SCALED BY	SPT, MTM
CHECKED BY	MTM, CED
SIGNS REVIEWED BY	MTM
PUNCHED BY	

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

- () Interpolated
- [] Scaling uncertain because of magnetic storm.
- [] Significant portion of hour interpolated.
- [] No record; or no values available because of faulty record.
- * Derived from Storm Mghp., converted to Normal Mghp.

MONTHLY SUM	113891
MONTHLY MEAN	153
DATES WITH GAPS:	

U.S. DEPARTMENT OF COMMERCE
 ENVIRONMENTAL SERVICE ADMINISTRATION
 COAST AND GEODETIC SURVEY
 BROMWATER DIVISION

MAGNETOGRAM HOURLY SCALINGS
 (UNIVERSAL TIME)

Values are in tenths of mm. and are averages for periods of one hour beginning at midnight; Hour 01 of local day (150MM.T.) is hour 11 of the GMT. Universal day.

Shrinkage corrections have been applied. Negative values are in red, with minus signs shown.

C 0	5	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	SUM	SCALED BY		CHECKED BY		SIGNS RE- PUNCHED BY		PUNCHED BY					
																		SPT, MN	MTH, CD	MTH	BY	BY	BY	BY					
01																		342	355	358	367	360	352	671					
02																			381	371	381	470	571	562	702				
03																			354	359	374	375	365	372	8255				
04																			362	364	363	351	353	351	8279				
05																			360	376	398	413	368	395	8597				
06																			356	353	361	352	383	352	8597				
07																			357	357	359	358	355	356	8399				
08																			362	362	363	362	353	353	8615				
09																			369	372	363	351	345	342	8455				
10																			362	352	359	361	363	361	8416				
11																			354	364	373	368	365	363	8246				
12																			362	366	372	384	393	384	8246				
13																			350	362	373	426	408	419	8900				
14																			384	382	383	378	376	376	8749				
15																			376	376	376	376	376	376	8749				
16																			375	368	373	373	373	373	7804				
17																			374	358	374	374	374	374	6101				
18																			371	371	371	371	371	371	8649				
19																			372	372	372	372	372	372	7845				
20																			373	373	373	373	373	373	8445				
21																			373	373	373	373	373	373	9047				
22																			375	375	375	375	375	375	8404				
23																			375	375	375	375	375	375	8841				
24																			375	375	375	375	375	375	8941				
25																			375	375	375	375	375	375	8858				
26																			375	375	375	375	375	375	9068				
27																			379	379	379	379	379	379	8946				
28																			382	382	382	382	382	382	8946				
29																			382	382	382	382	382	382	8946				
30																			382	382	382	382	382	382	8946				
31																			382	382	382	382	382	382	8946				
32																			382	382	382	382	382	382	8946				
33																			382	382	382	382	382	382	8946				
34																			382	382	382	382	382	382	8946				
35																			382	382	382	382	382	382	8946				
36																			382	382	382	382	382	382	8946				
37																			382	382	382	382	382	382	8946				
38																			382	382	382	382	382	382	8946				
39																			382	382	382	382	382	382	8946				
40																			382	382	382	382	382	382	8946				
41																			382	382	382	382	382	382	8946				
42																			382	382	382	382	382	382	8946				
43																			382	382	382	382	382	382	8946				
44																			382	382	382	382	382	382	8946				
45																			382	382	382	382	382	382	8946				
46																			382	382	382	382	382	382	8946				
47																			382	382	382	382	382	382	8946				
48																			382	382	382	382	382	382	8946				
49																			382	382	382	382	382	382	8946				
50																			382	382	382	382	382	382	8946				
51																			382	382	382	382	382	382	8946				

MAGNETOGRAM HOURLY SCALINGS
(UNIVERSAL TIME)

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

OBSY. CO 60
YEAR 76
MONTH OCT
ELEMENT 2

Values are in tenths of mm. 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 same universal day.
Shrinkage corrections have been applied. Negative values are in red, with minus signs shown.

C	Q	Ten	1/10	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	309	312	313	317	322	332	333	327	303	332*	243*	163	01	242	241	188	247	282	293	295	293	304	303	310	318	6922	
				02	319	321	358	357	256*	212*	221	268	261	111	421*	154*	02	177	284	197	196	247	262	291	302	301	305	314	316	6451	
				03	324	334	334	332	352	343	324	315	294	218	46	195	03	291	292	281	260	268	277	285	295	298	300	307	311	6876	
				04	313	312	312	311	315	326	328	334	311	299	174	260	04	292	285	292	288	299	303	296	295	299	288	296	298	7126	
				05	308	318	357	385	398	373	339	348	310	194	240	286	05	313	313	305	297	282	261	269	275	271	283	298	311	7334	
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SCALED BY SPT, MIM
CHECKED BY MIM, CED
SIGNS REVIEWED BY MIM
PUNCHED BY

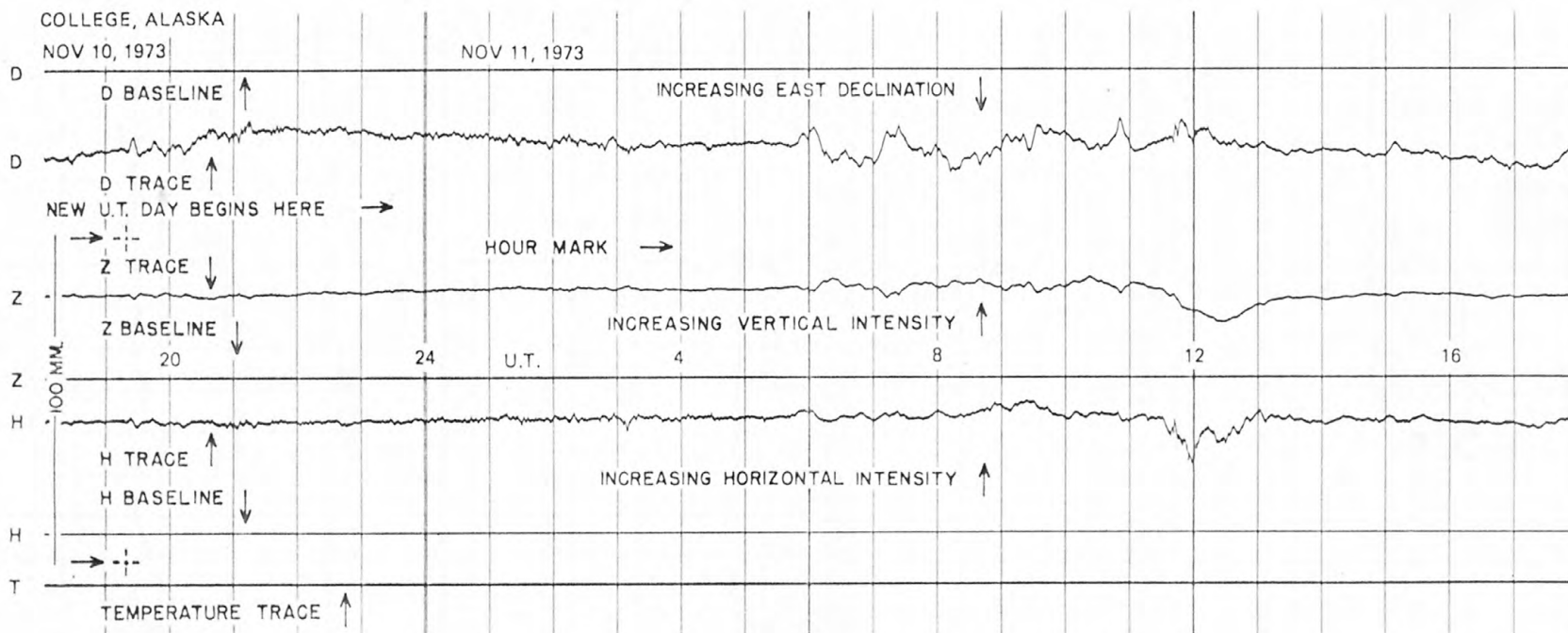
Preliminary base-line and scale values:
Interval Beginning Base-line Value Scale Value

() Interpolated
() Significant portion of hour interpolated.
() No record; or no values available because of faulty record.
* Derived from Storm Mgb., converted to Normal Mgb.

() 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.

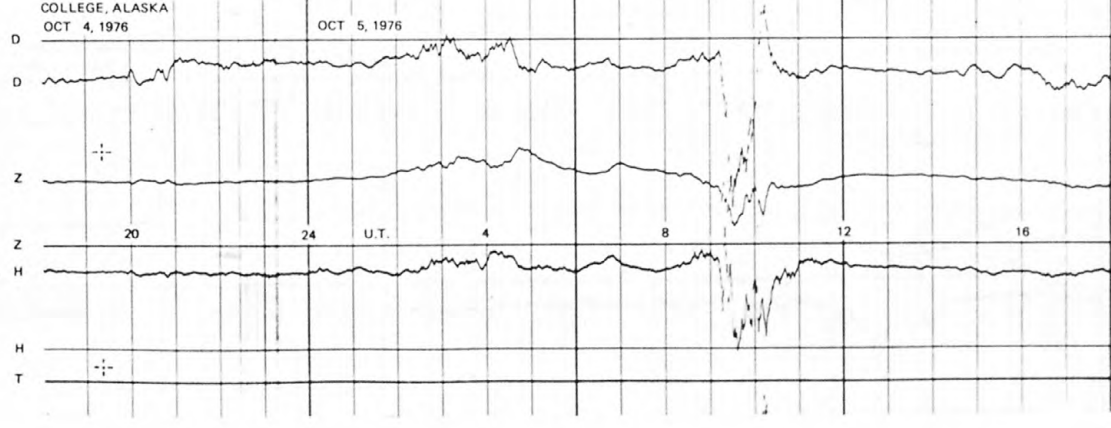
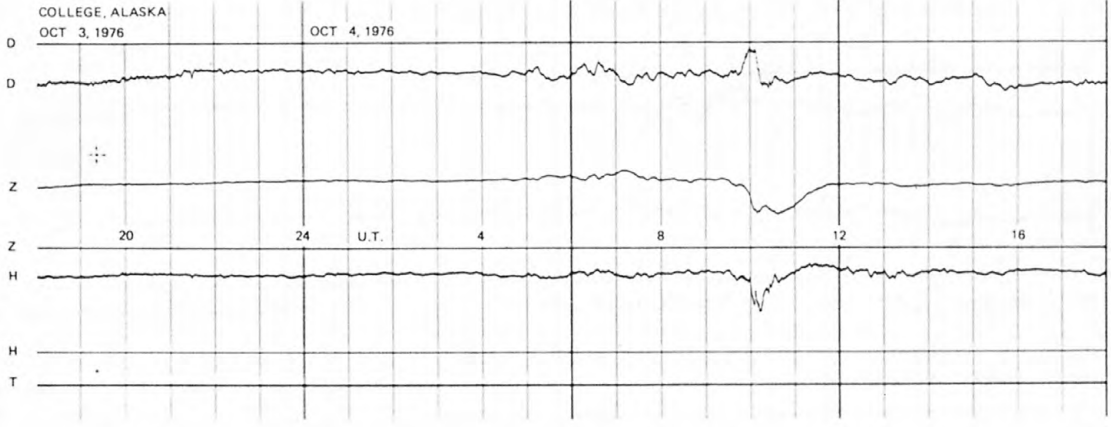
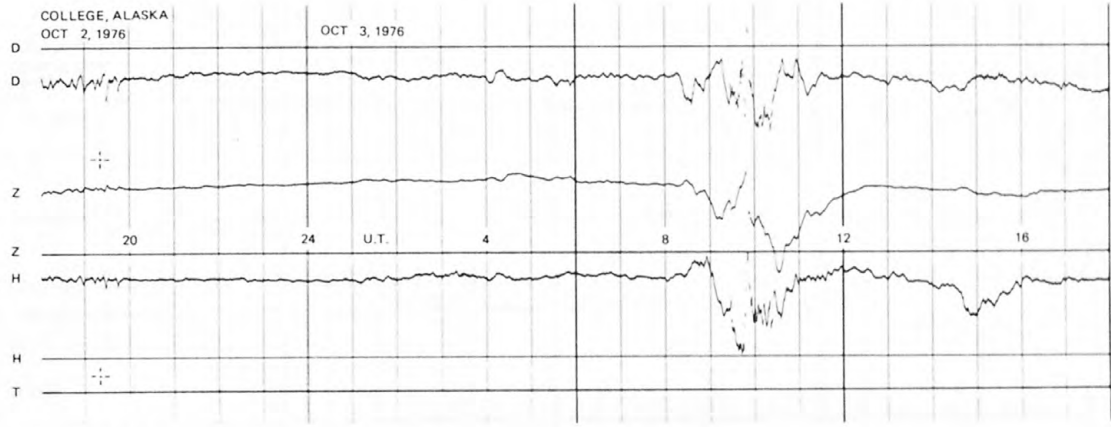
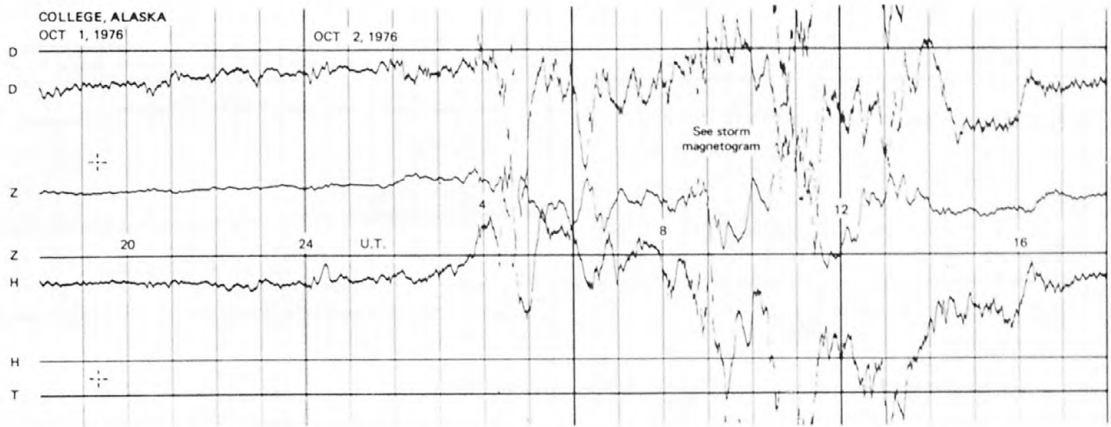
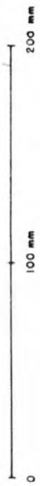
MONTHLY SUM 213681
MONTHLY MEAN 287
DATES WITH GAPS:

FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)

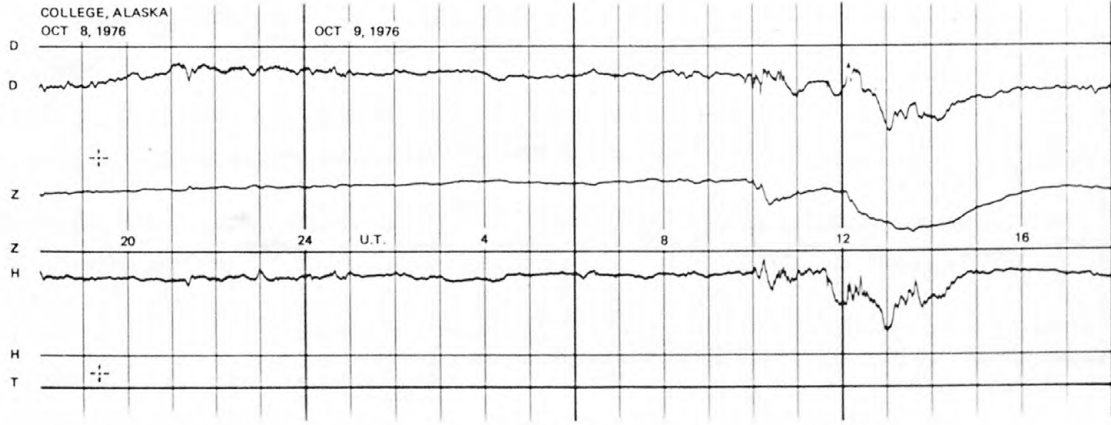
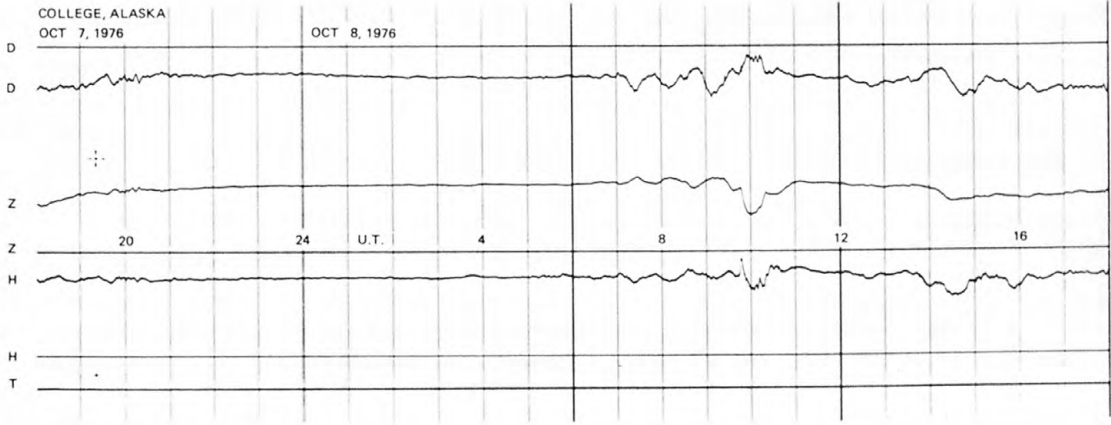
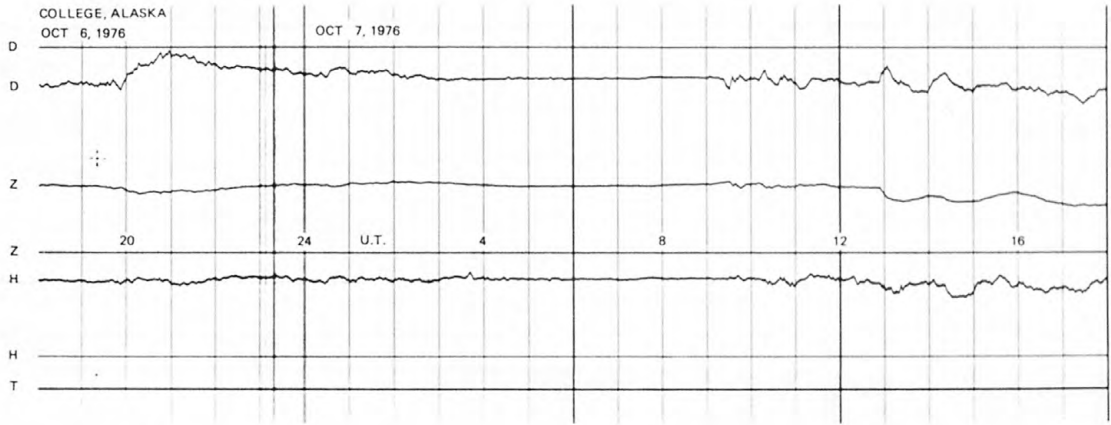
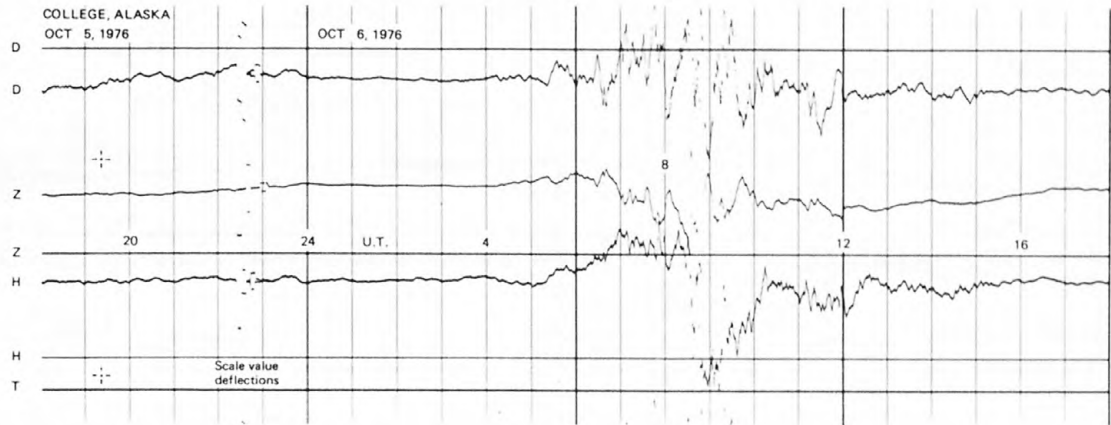
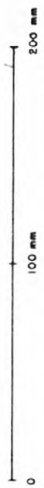


SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES

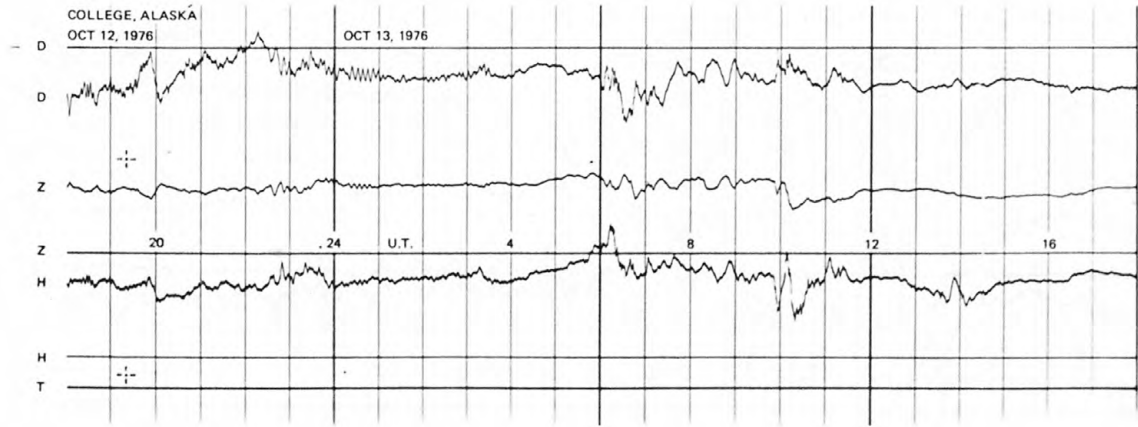
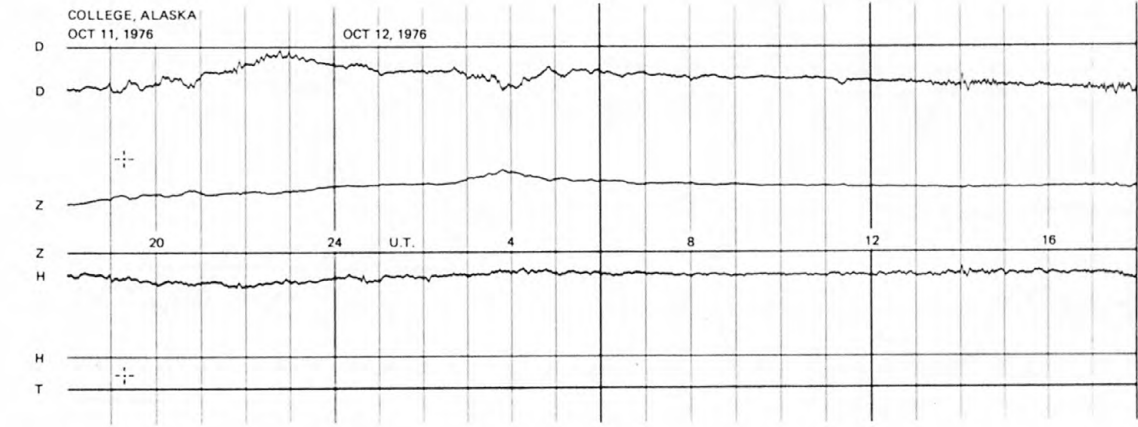
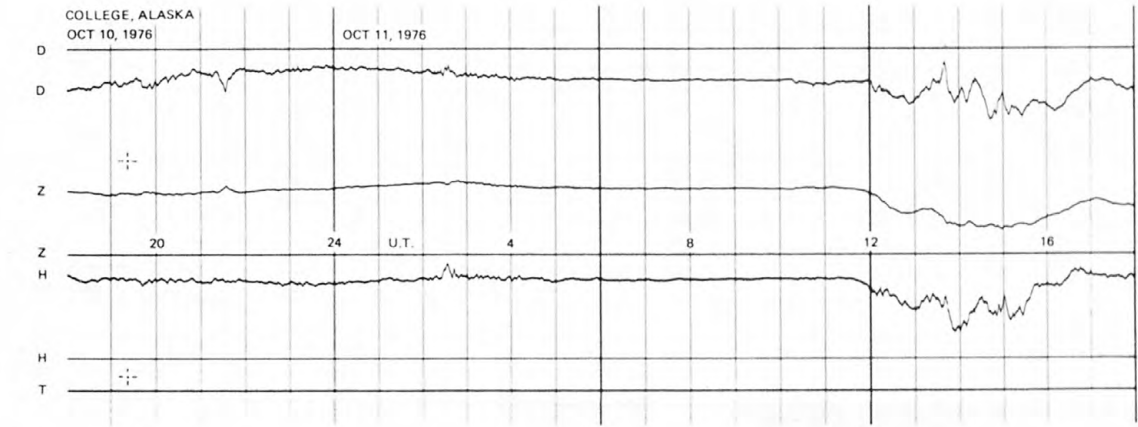
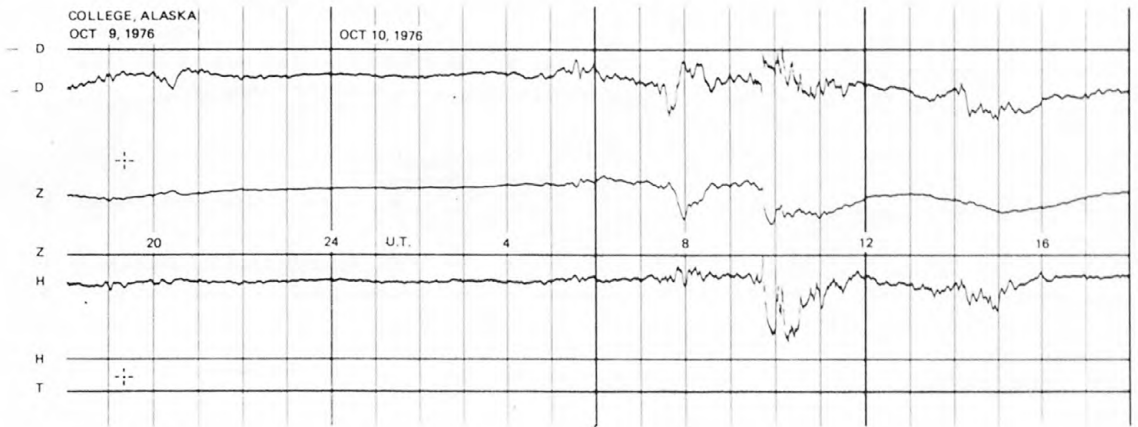
NORMAL MAGNETOGRAMS



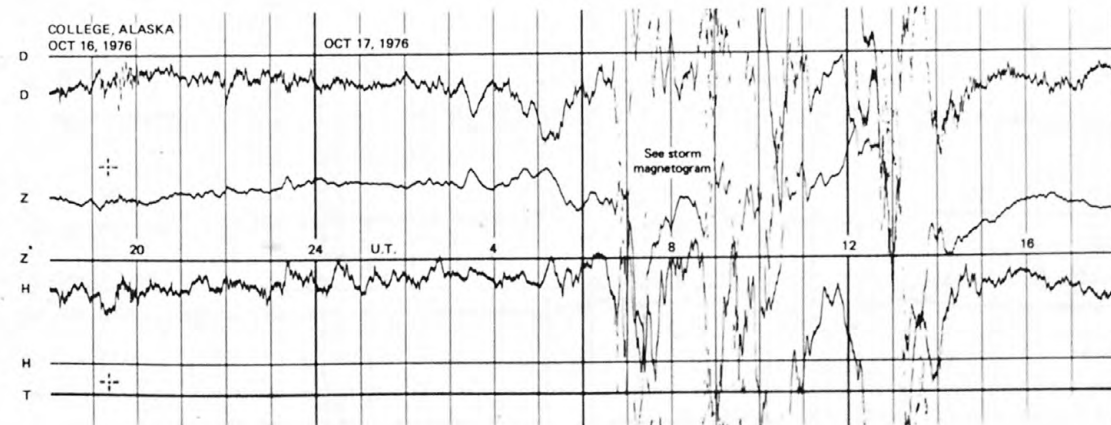
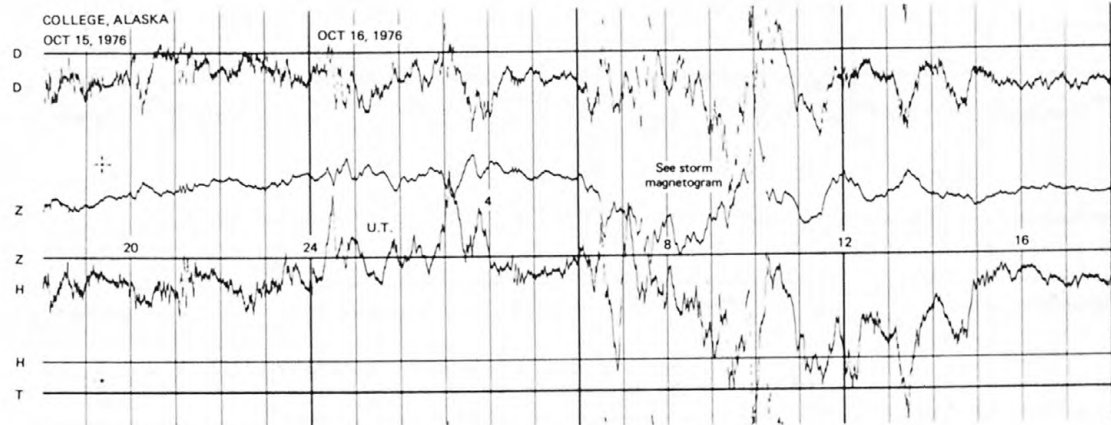
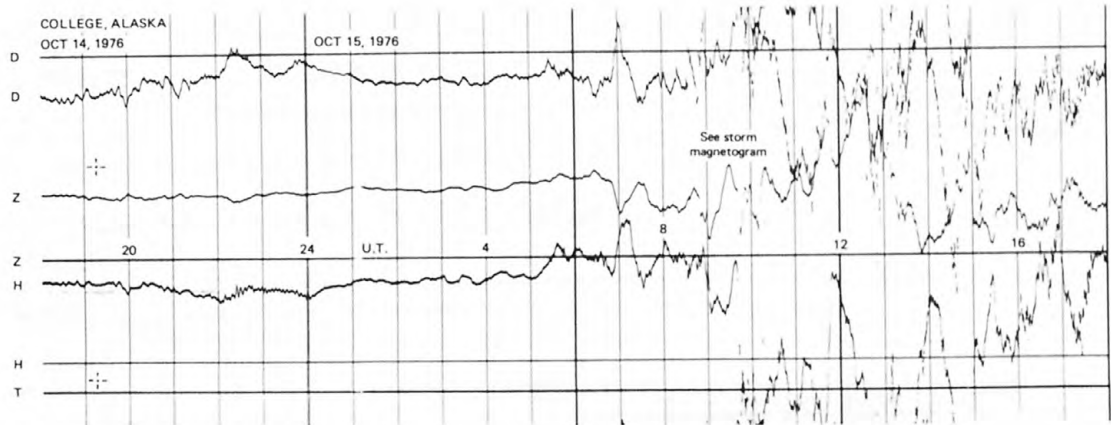
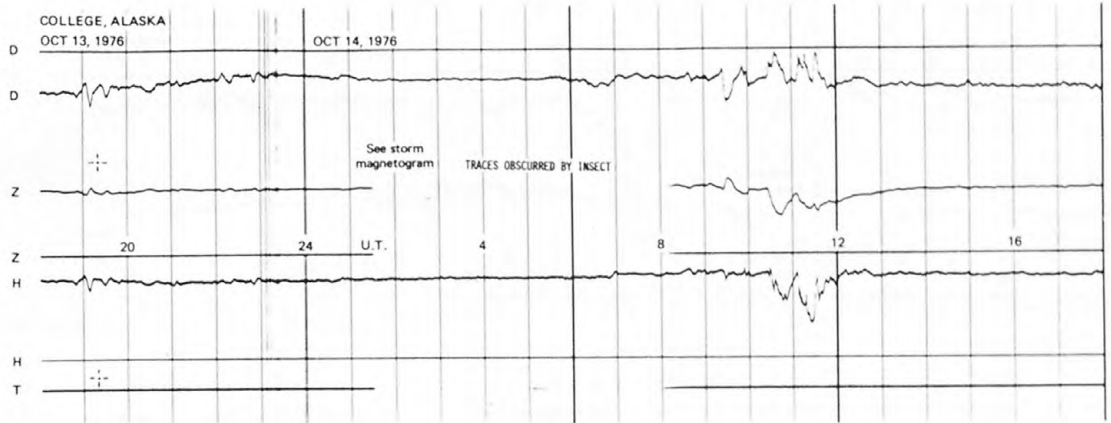
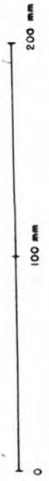
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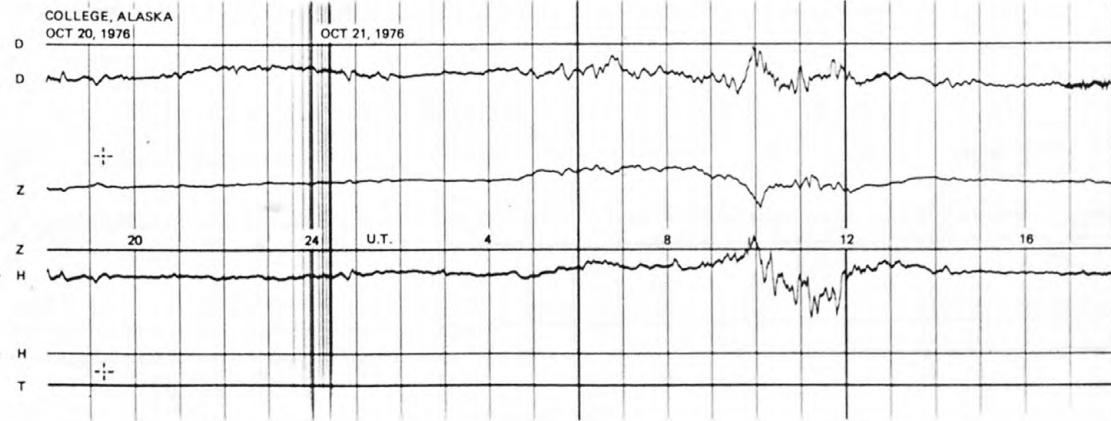
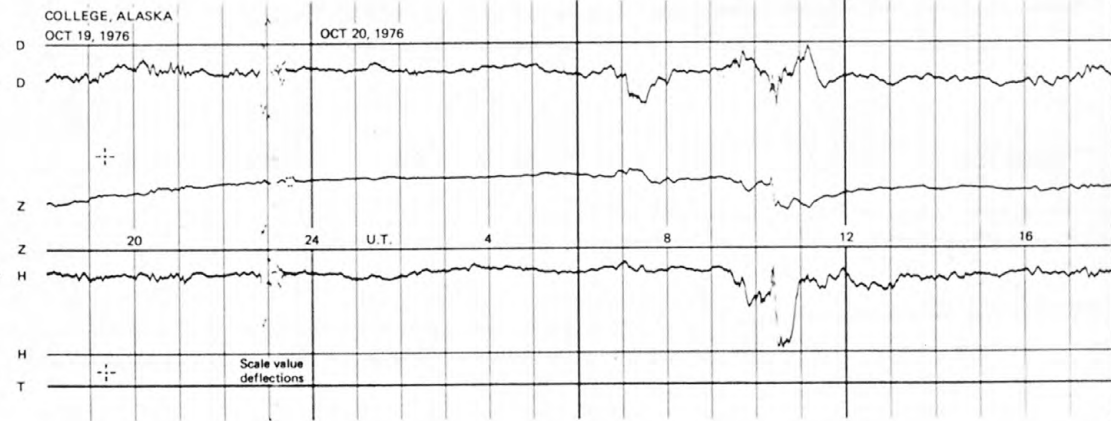
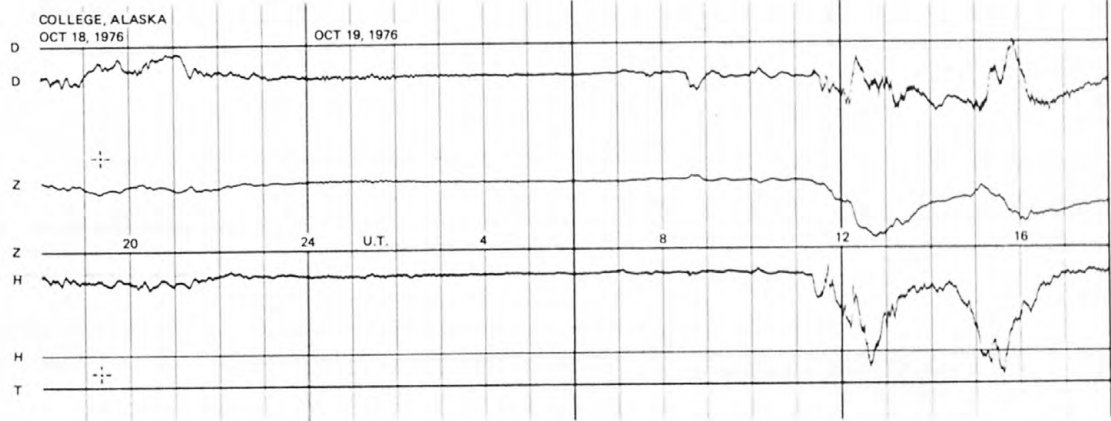
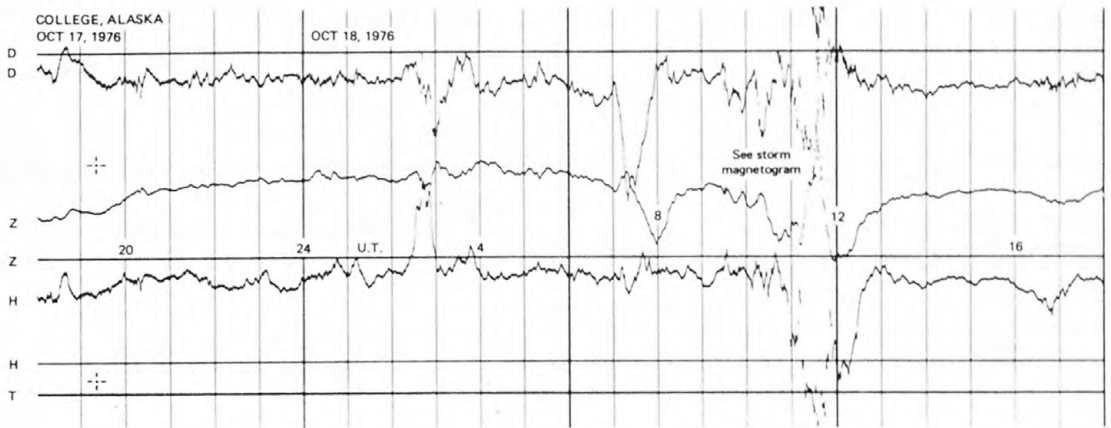
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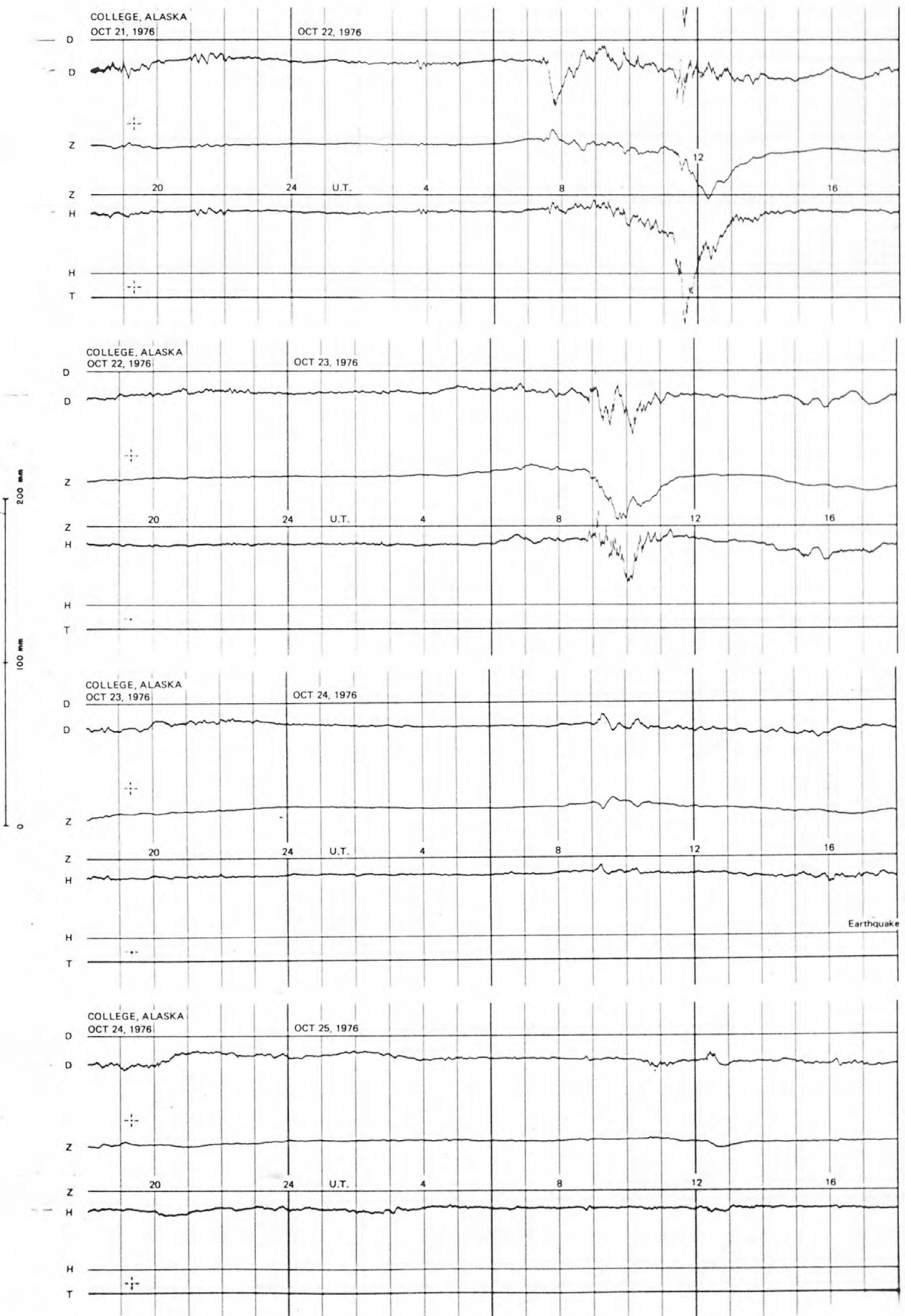
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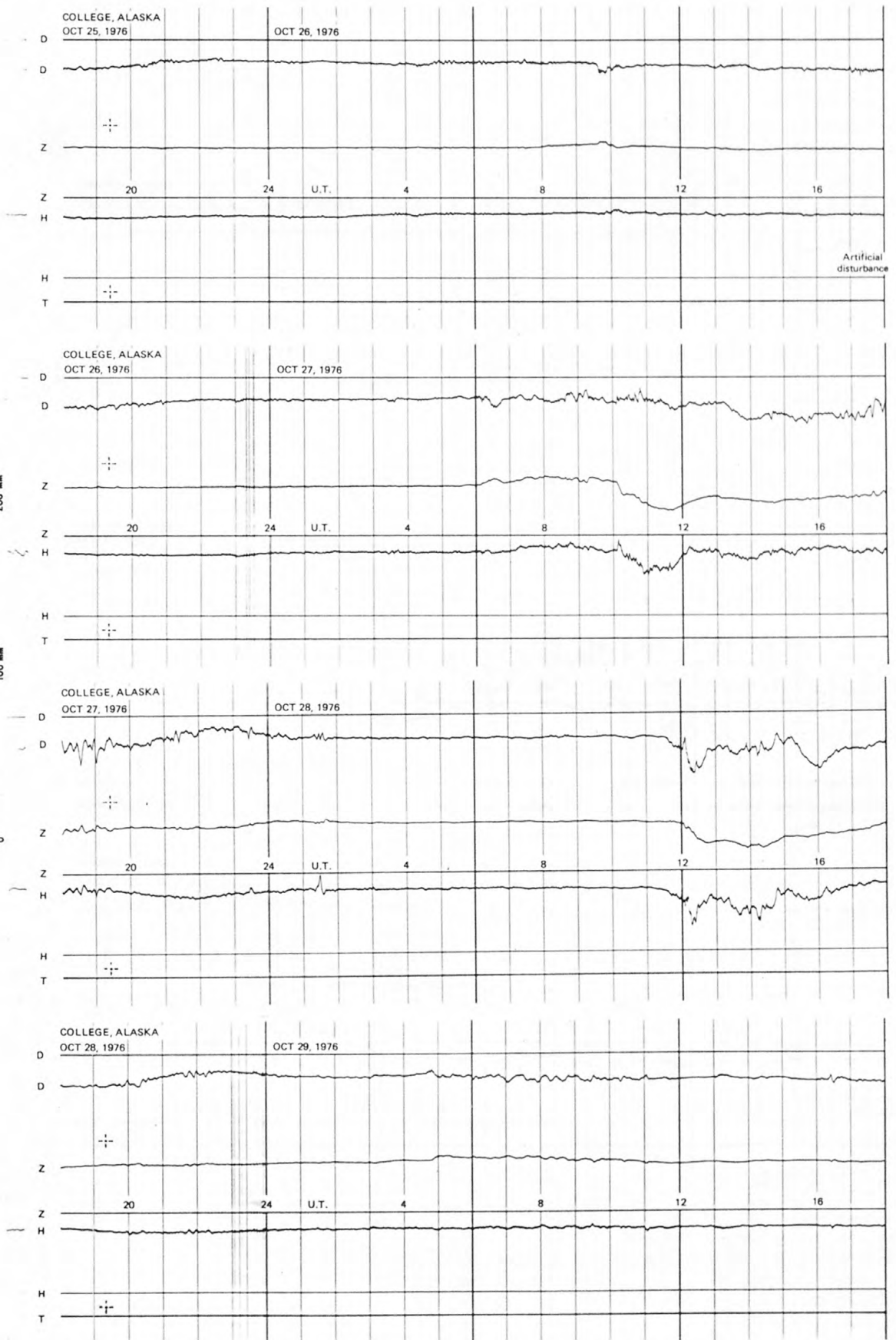
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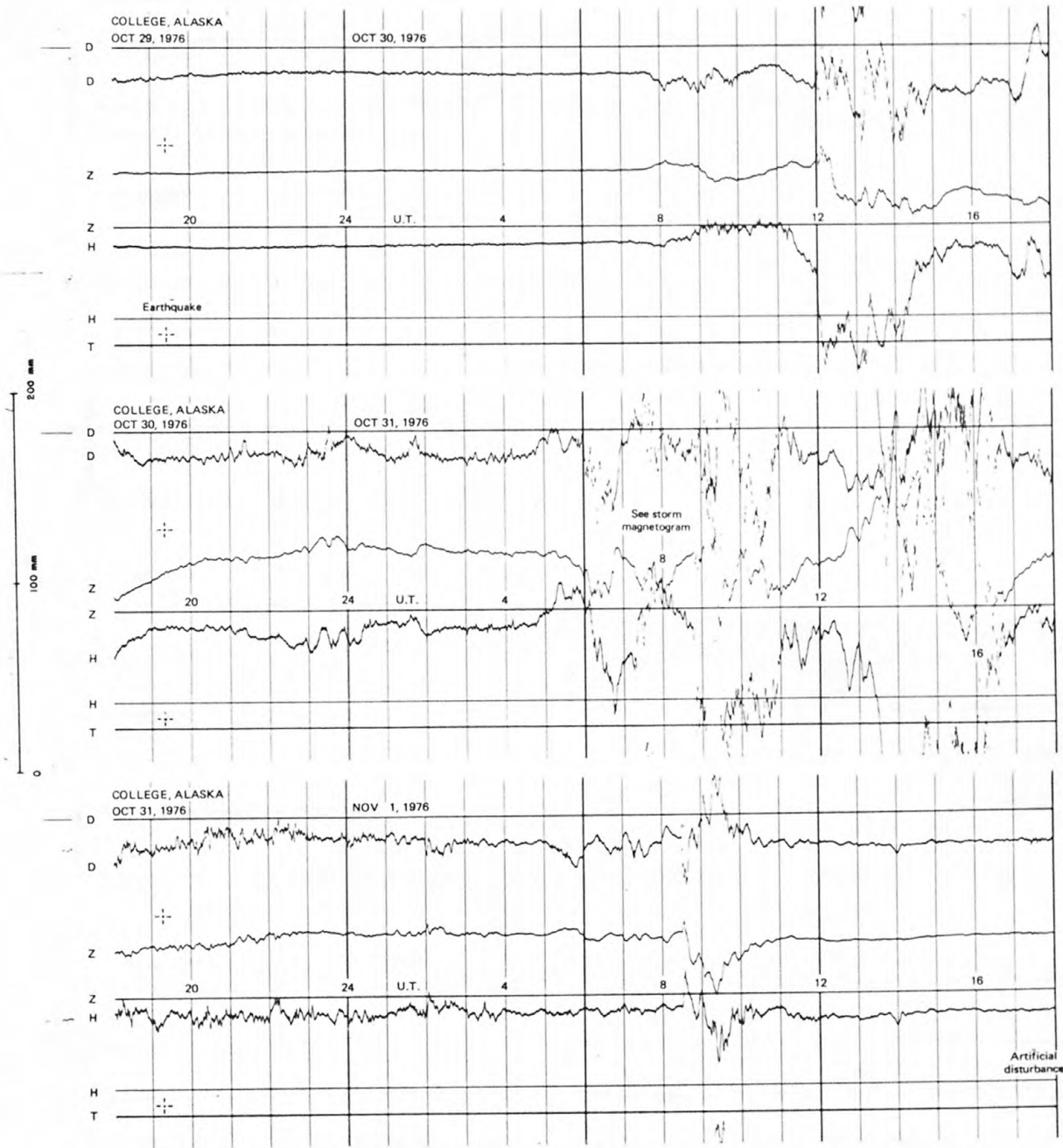
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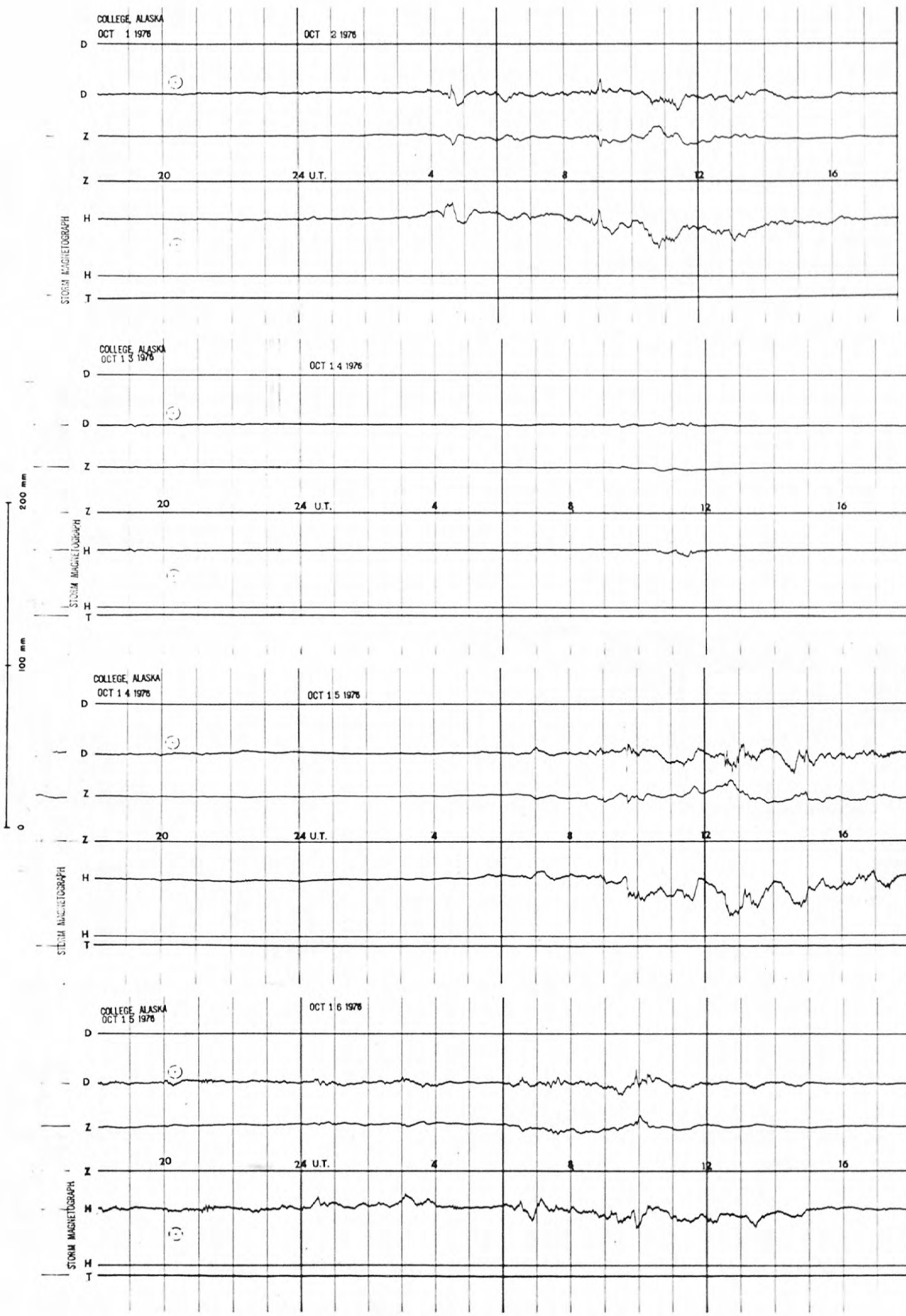
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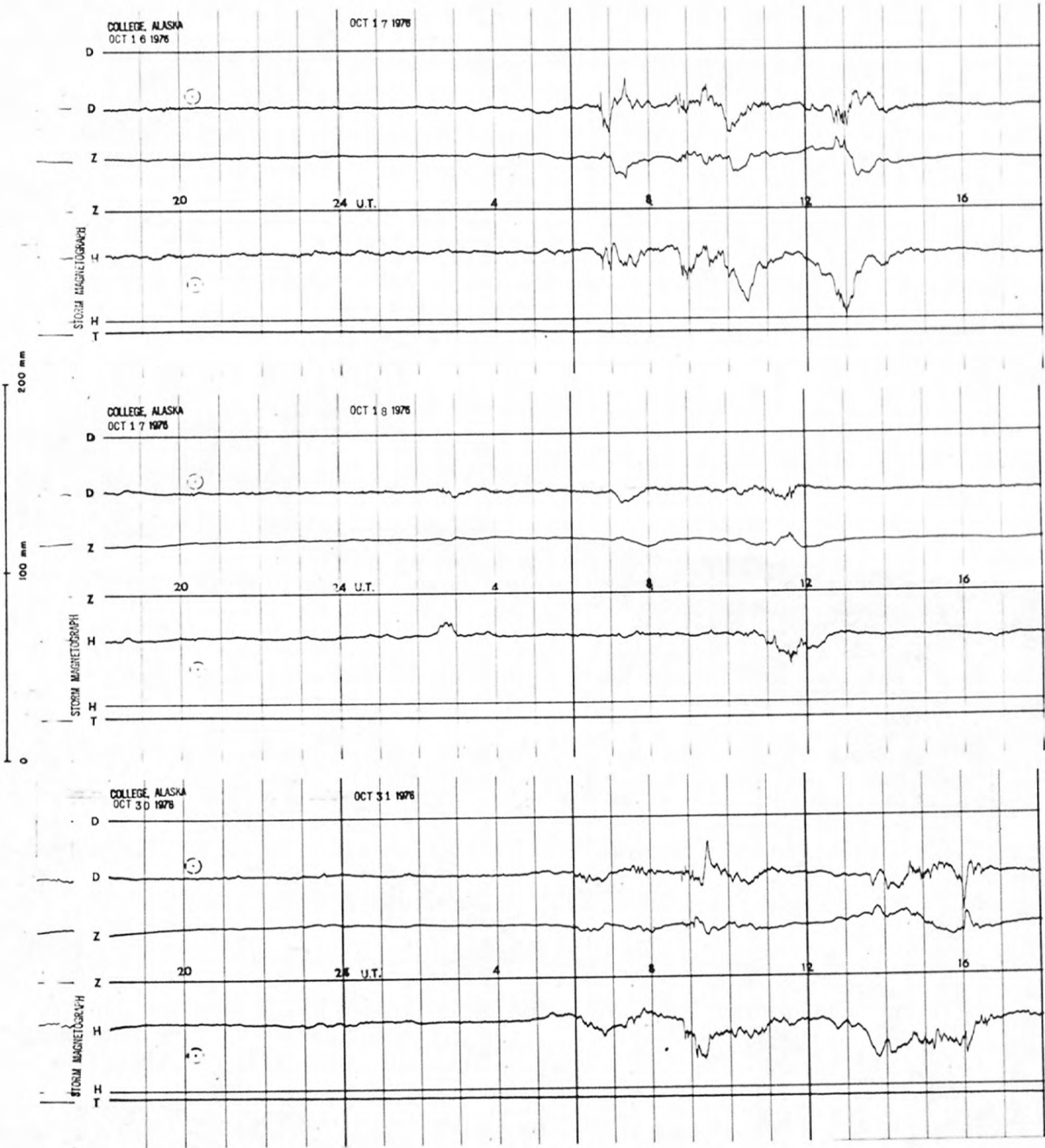
NORMAL MAGNETOGRAMS



STORM MAGNETOGRAMS



STORM MAGNETOGRAMS



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