

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

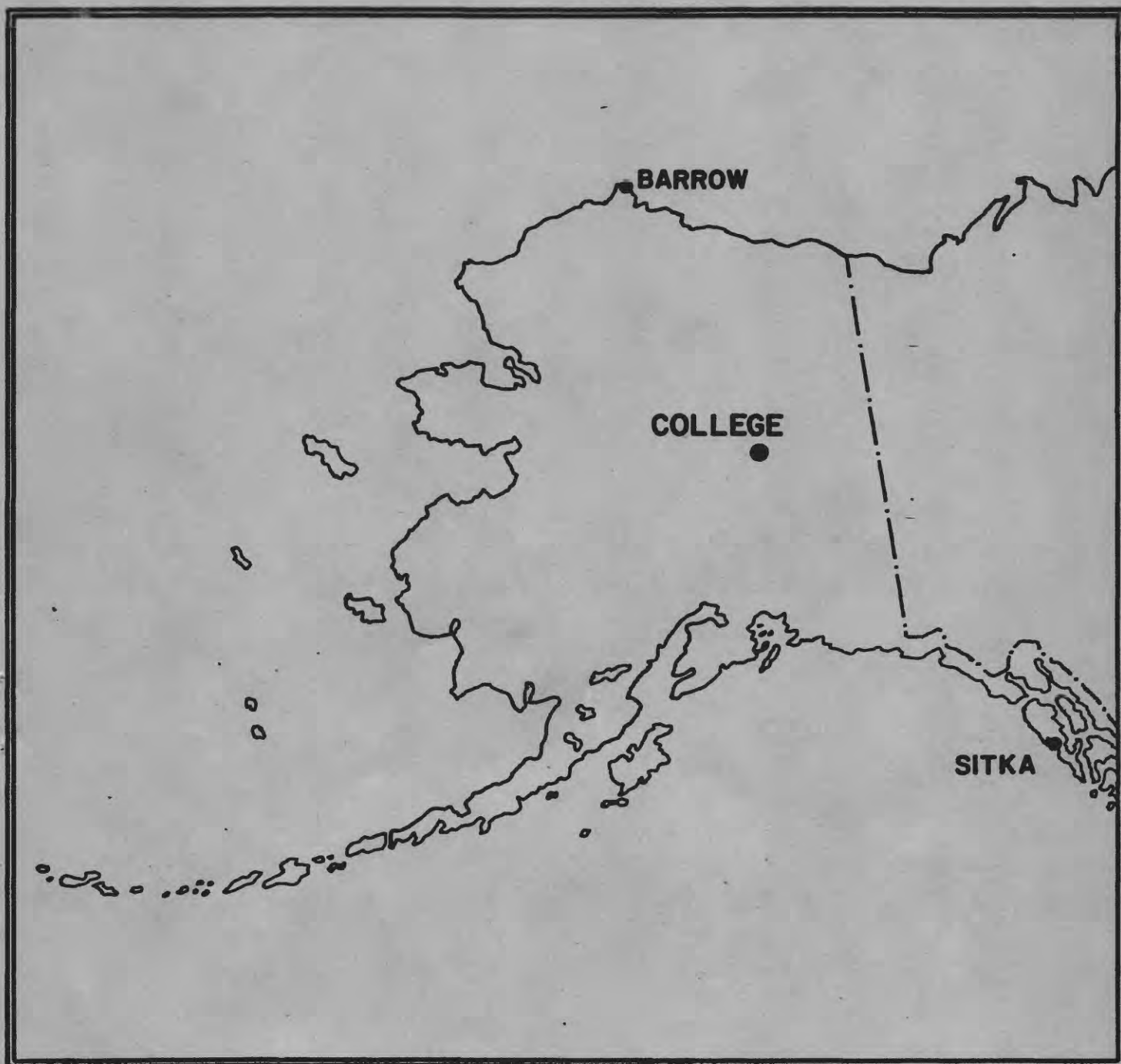
PRELIMINARY GEOMAGNETIC DATA

COLLEGE OBSERVATORY

FAIRBANKS, ALASKA

NOVEMBER 1986

OPEN FILE REPORT 86-0300K



THIS REPORT WAS PREPARED UNDER THE DIRECTION OF JOHN B. TOWNSHEND, CHIEF OF THE COLLEGE OBSERVATORY, WITH THE ASSISTANCE OF THE OBSERVATORY STAFF MEMBERS: R.V. O'CONNELL, H.K. REX, AND L.Y. TORRENCE AND IN COOPERATION WITH THE GEOPHYSICAL INSTITUTE OF THE UNIVERSITY OF ALASKA. THE COLLEGE OBSERVATORY IS PART OF THE BRANCH OF GLOBAL SEISMOLOGY AND GEOMAGNETISM OF THE U.S. GEOLOGICAL SURVEY.

Explanation of Data and Reports

Magnetic Activity Report

Principal Magnetic Storms

Preliminary Calibration Data and Monthly Mean Absolute Values

Magnetogram Hourly Scalings - Five Quietest Days

Sample Format for Normal and Storm Magnetograms

Normal Magnetograms

Storm Magnetograms (When Normal is too disturbed to read)

COLLEGE OBSERVATORY PRELIMINARY GEOMAGNETIC DATA

EXPLANATION OF DATA AND REPORTS

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
800 Yukon Drive
Fairbanks, Alaska 99775-5160

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

World Data Center A
NOAA D63, 325 Broadway
Boulder, Colorado 80303

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..... $+256.9^{\circ}$
Elevation.....200 meters

GEOMAGNETIC DATA

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

Magnetic Activity

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

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

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

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

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

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

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

Selected Phenomena & Outstanding Magnetic Effects

Prior to January 1, 1976, the Normal and 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.

MAGNETIC ACTIVITY

(Greenwich civil time, counted from midnight to midnight)

College, Alaska

MONTH AND YEAR

November, 1986

DATE	K-INDICES								AK	TIME SCALE ON MAGNETOGRAMS
	00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24		
1	3	3	4	4	2	1	0	0	17	12
2	0	0	1	2	1	1	2	1	08	03
3	1	1	4	3	1	2	2	3	17	10
4	5	7	5	7	7	7	6	3	47	94
5	4	5	6	6	3	1	2	2	29	33
6	2	1	2	1	3	3	3	2	17	09
7	2	2	0	0	1	2	1	1	09	04
8	1	0	2	2	1	1	1	0	08	03
9	1	0	1	2	1	0	1	0	06	02
10	0	0	0	0	0	0	2	1	03	01
11	2	4	5	3	2	2	2	2	22	16
12	3	2	2	1	1	0	0	0	09	04
13	0	0	0	0	4	3	1	0	08	06
14	1	0	0	4	3	0	1	0	09	06
15	1	1	2	4	5	5	2	2	22	19
16	3	2	1	5	3	4	1	2	21	16
17	1	1	1	5	4	2	1	1	16	12
18	2	1	1	2	0	0	1	1	08	03
19	0	0	0	0	0	1	1	1	03	01
20	1	0	0	0	1	0	0	0	02	01
21	0	0	1	0	1	1	1	0	04	02
22	0	0	0	0	0	0	0	0	00	00
23	0	0	0	0	1	1	3	3	08	05
24	3	5	1	4	3	5	6	4	31	33
25	3	5	5	7	7	9	5	4	45	108
26	2	2	6	5	7	5	2	1	30	43
27	1	3	5	5	4	1	0	0	19	18
28	0	1	3	4	4	1	1	1	15	10
29	0	1	4	4	5	6	2	1	23	24
30	1	1	5	6	6	5	2	3	29	36
31										

20 mm/hr

SUDDEN COMMENCEMENTS

d h m

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

675.7

3.71

2510

H

322.2

7.81

2520

Z

(mm)

(γ/mm)

(to nearest 10γ)

SCALINGS AND COMPUTATIONS HAVE BEEN CHECKED.

APPROVED John B. Townshend, Chief, College Observatory
OBSERVER IN CHARGE

PRINCIPAL MAGNETIC STORMS
COLLEGE OBSERVATORY, COLLEGE, ALASKAWDC-A FOR SOLAR-TERRESTRIAL PHYSICS
ENVIRONMENTAL DATA SERVICE, NOAA
BOULDER, COLORADO 80502 U.S.A.

Data from Individual Observatories:

November 1986

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)
C0	64.6 N	03	2352	sc*	-21	-175	..	04	2,4,5,6	7	440	1930	1730	05 12
		24	15xx	..	...	...	...	25	6	9	540	3060	1370	26 19

November

1986

NORMAL MAGNETOGRAPHS

COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASELINE
D	0000 U.T., 11-1-86	2400 U.T., 11-30-86	1.0' / mm	3.7 ⁸ / m	27° 16.6' E
H	(Same as above)		7.8 ⁸ / mm		12.666 ⁸
Z	(Same as above)		7.7 ⁸ / mm		55.183 ⁸

STORM MAGNETOGRAPHS

COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASELINE
D	(Same as above)		7.9' / mm	29.5 ⁸ / mm	23° 45.8' E
H	(Same as above)		43.8 ⁸ / mm		10.698 ⁸
Z	(Same as above)		48.7 ⁸ / mm		54.102 ⁸

RAPID RUN MAGNETOGRAPHS

COMPONENT	PERIOD		CALIBRATION	
	FROM	TO	SCALE VALUE	
D				
H				
Z				

MONTHLY MEAN ABSOLUTE VALUES*

D	H	Z
27° 28.0' E	12.865 ⁸	55.318 ⁸

* COMPUTED FROM FIVE QUIETEST DAYS DURING MONTH.

DAYS USED: NOV 10, 19, 20, 21, 22.

MAGNETOGRAM HOURLY SCALINGS - FIVE QUIETEST DAYS
(UNIVERSAL TIME)

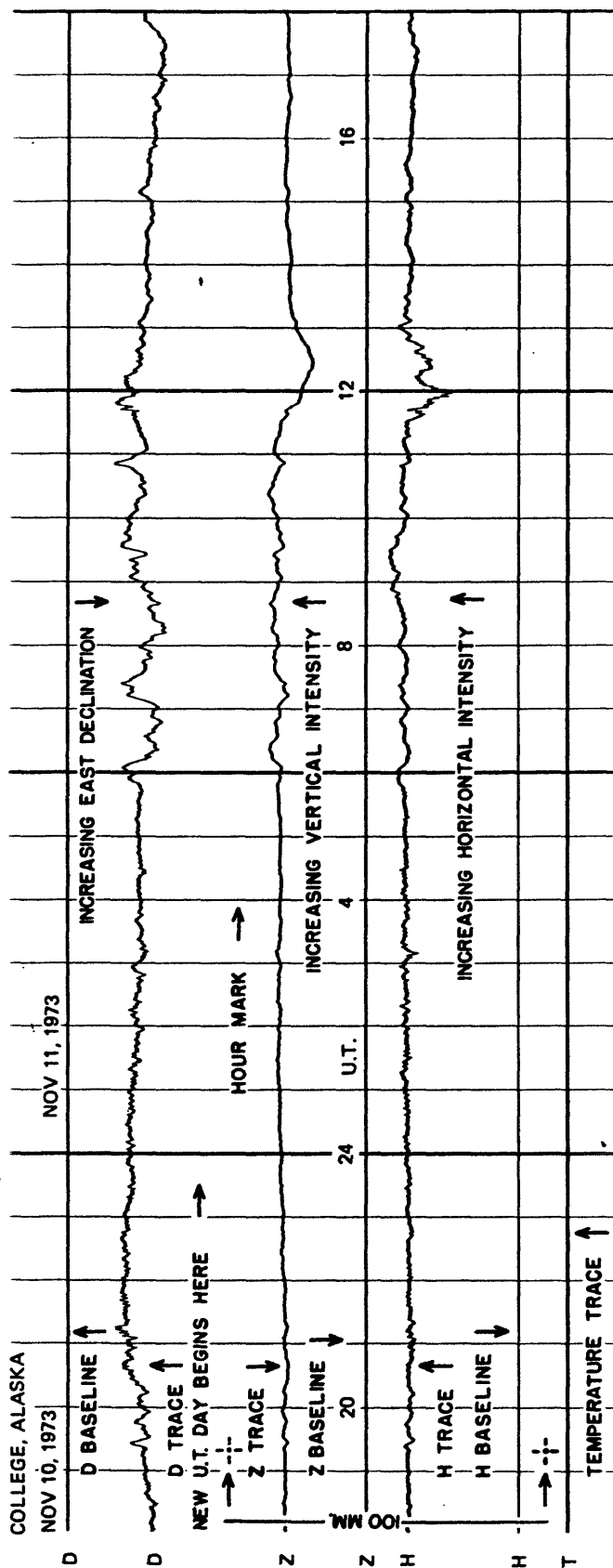
Values are in Tenths of mm and are Averages for Successive Periods of One Hour beginning at Midnight. Shrinkage Corrections have been applied. Negative Values in Red with Minus.

COMPONENT	D					H					Z					COMPONENT				
	DAY	19	20	21	22	19	20	21	22	19	20	21	22	19	20	DAY	19	20	21	22
HOUR	A _k	01	01	02	00	01	01	02	00	01	01	02	00	01	01	A _k	01	02	00	00
	01	106	110	109	090	249	250	251	259	250	188	183	183	189	176	01	175	176	175	175
02	105	114	078	110	103	251	252	251	261	251	188	183	183	198	175	02	178	175	178	178
03	100	114	090	113	103	252	254	268	267	261	190	180	198	198	172	03	176	172	176	176
04	105	113	085	117	107	251	256	264	262	262	192	179	209	209	171	04	174	171	174	174
05	110	111	101	118	111	252	253	259	268	262	192	177	220	220	174	05	172	174	172	172
06	111	111	103	118	111	255	253	266	270	260	191	177	194	194	175	06	172	175	172	172
07	113	113	111	153	112	258	253	257	267	254	190	178	190	190	183	07	172	183	172	172
08	112	112	120	141	116	255	253	257	263	262	189	177	194	194	172	08	172	172	172	172
09	112	111	118	117	113	257	252	260	261	260	190	178	191	191	170	09	173	170	173	173
10	114	112	110	113	112	257	252	259	260	262	198	178	189	189	172	10	180	172	180	180
11	117	115	119	117	114	251	249	252	262	260	197	186	183	183	170	11	177	170	177	177
12	128	121	124	118	115	244	249	249	261	253	191	189	169	169	171	12	175	171	175	175
13	131	120	120	116	117	251	252	246	261	246	185	178	171	171	156	13	173	156	173	173
14	121	121	117	118	120	250	253	252	261	264	189	173	170	170	156	14	170	156	170	170
15	126	123	105	125	121	251	252	258	261	267	188	171	170	170	169	15	170	169	170	170
16	131	129	129	139	126	252	249	259	262	266	187	163	170	170	168	16	171	168	171	171
17	138	129	131	134	128	256	250	254	261	263	184	154	167	167	161	17	172	161	172	172
18	144	149	130	131	130	253	245	252	261	259	182	149	167	167	161	18	170	161	170	170
19	149	120	118	128	130	252	249	251	260	258	180	149	163	163	162	19	170	162	170	170
20	145	137	112	138	130	260	251	251	253	253	176	148	163	163	166	20	174	166	174	174
21	130	120	100	114	129	251	242	252	250	252	172	151	165	165	166	21	176	166	176	176
22	080	059	100	106	111	232	230	251	248	251	172	150	167	167	174	22	173	174	173	173
23	087	079	103	098	101	242	234	250	249	250	174	162	171	171	179	23	173	179	173	173
24	089	088	110	094	097	242	240	251	251	252	185	173	178	178	181	24	172	181	172	172
DAILY SUM	2804	2731	2623	2885	2747	6024	5973	6120	6246	6186	4470	4086	4346	4080	4160	DAILY SUM	4160	4080	4160	4160
DAILY MEAN	117	114	109	120	114	251	249	255	260	258	186	170	181	170	173	DAILY MEAN	173	170	173	173
MEAN			115					255					176			MEAN				

Scaled RVO

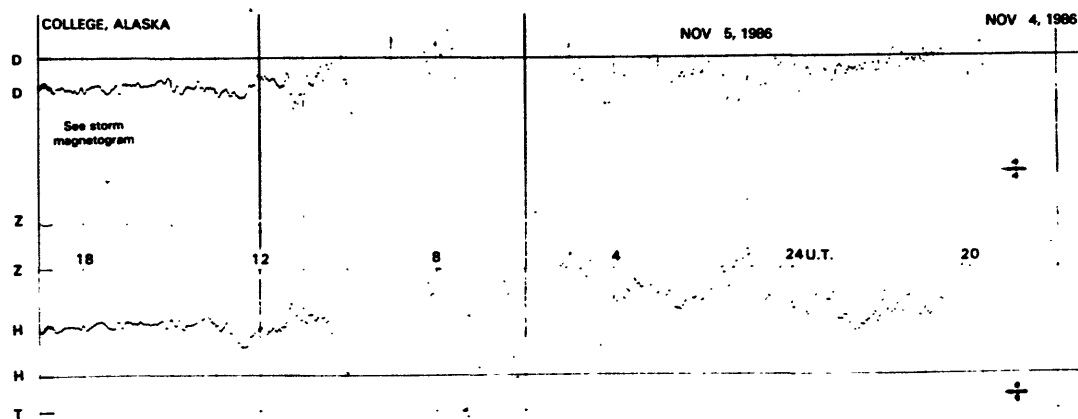
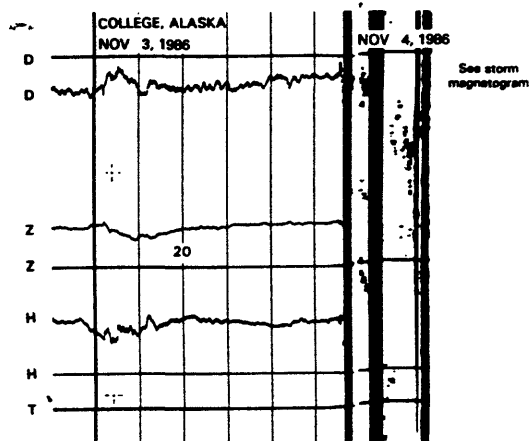
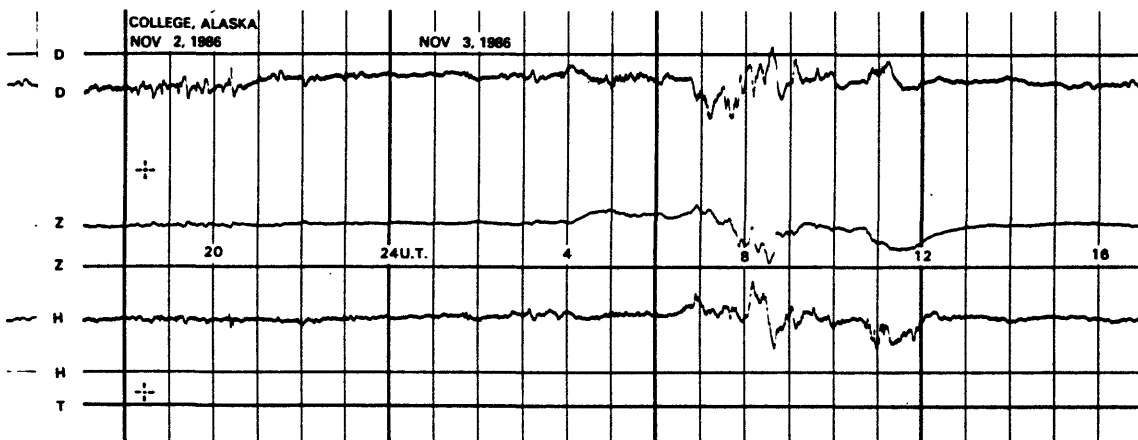
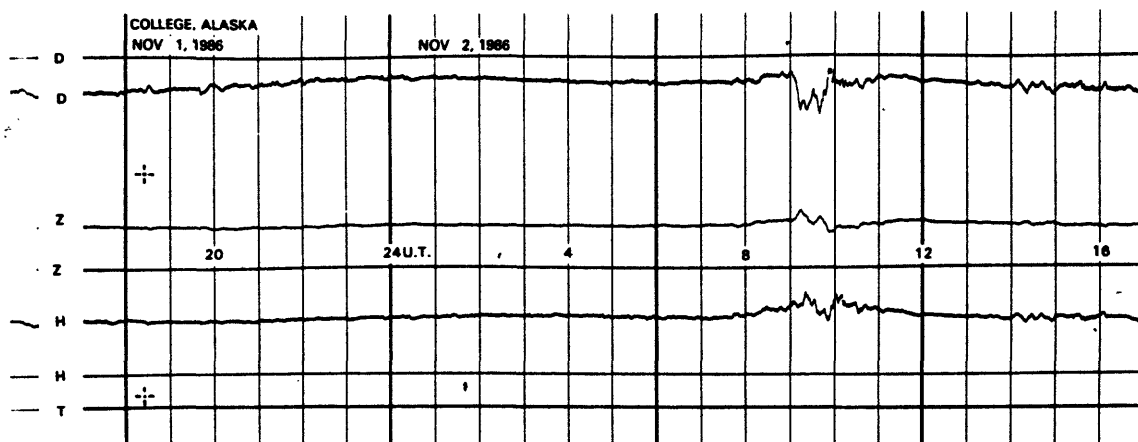
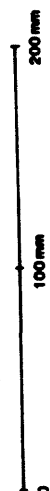
Checked ✓

FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)

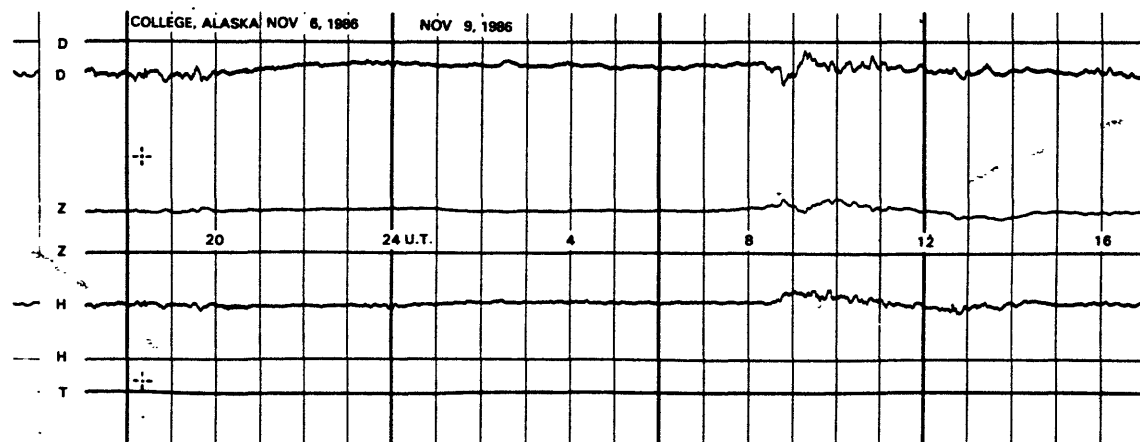
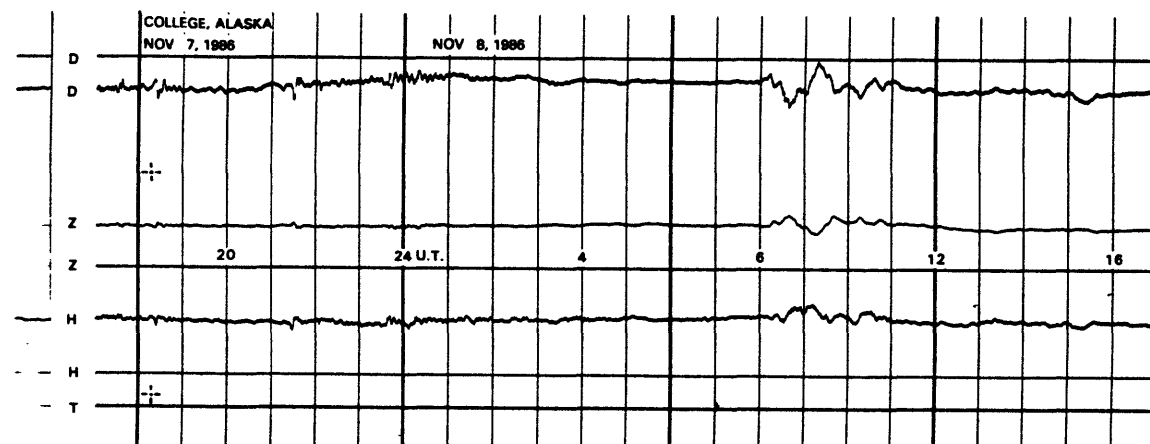
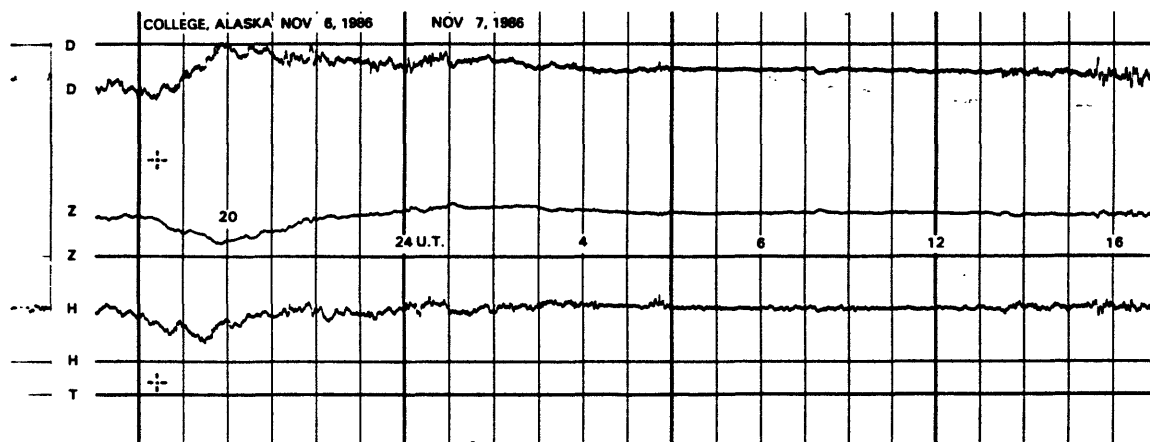
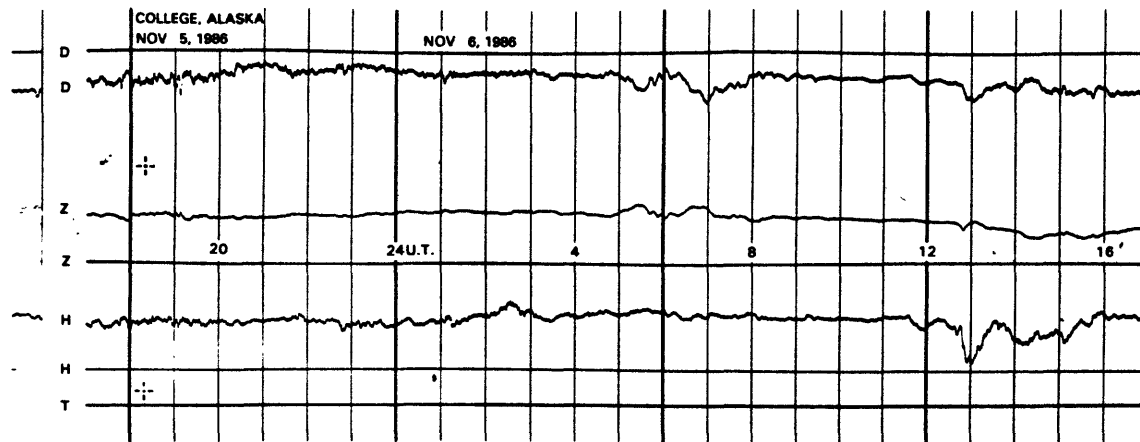


SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES

NORMAL MAGNETOGRAMS

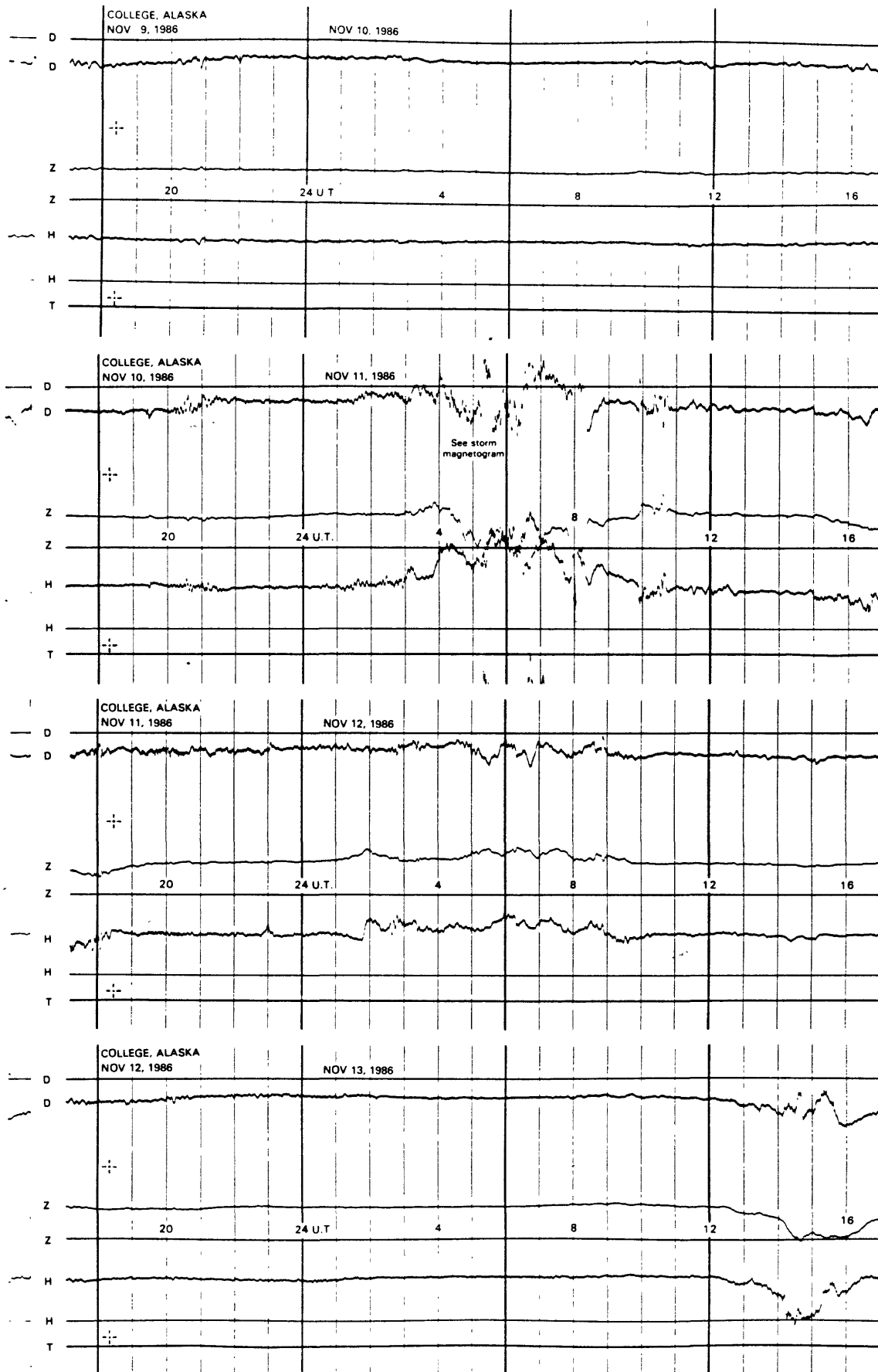


NORMAL MAGNETOGRAMS



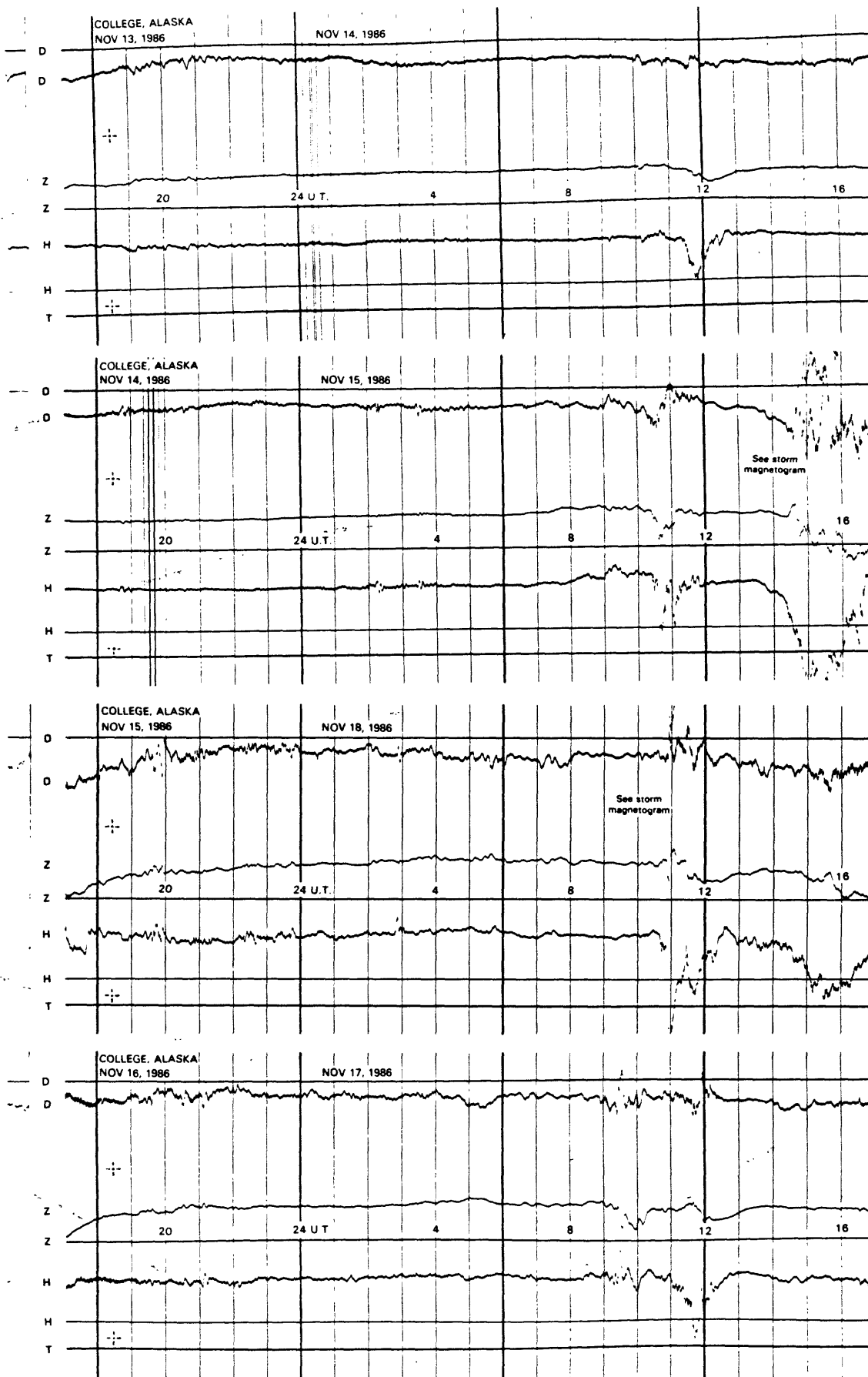
NORMAL MAGNETOGRAMS

200 mm
100 mm
0



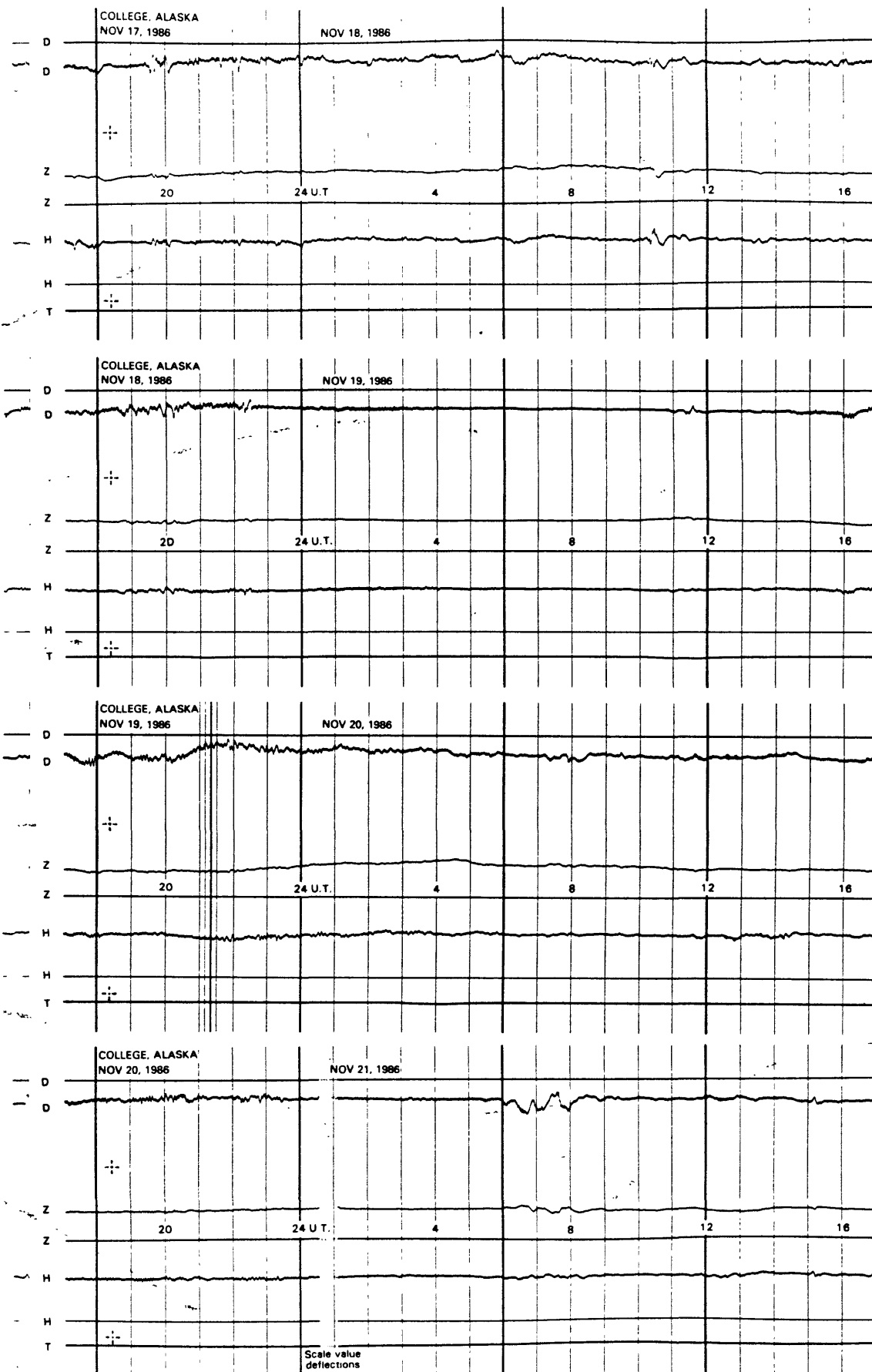
NORMAL MAGNETOGRAMS

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100 mm
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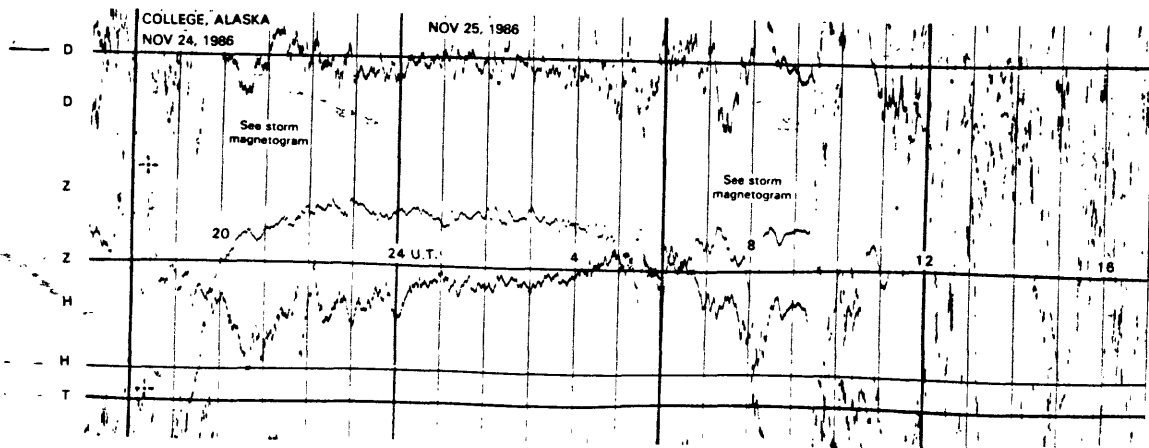
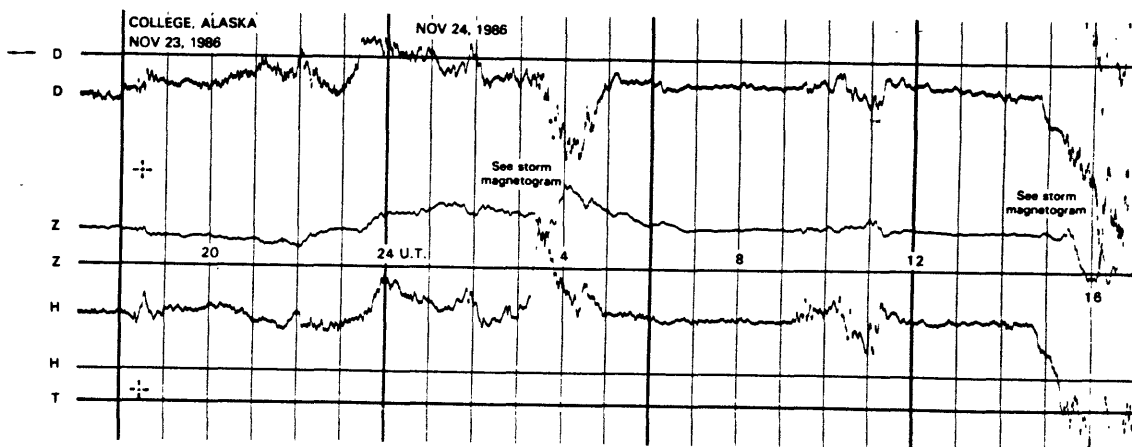
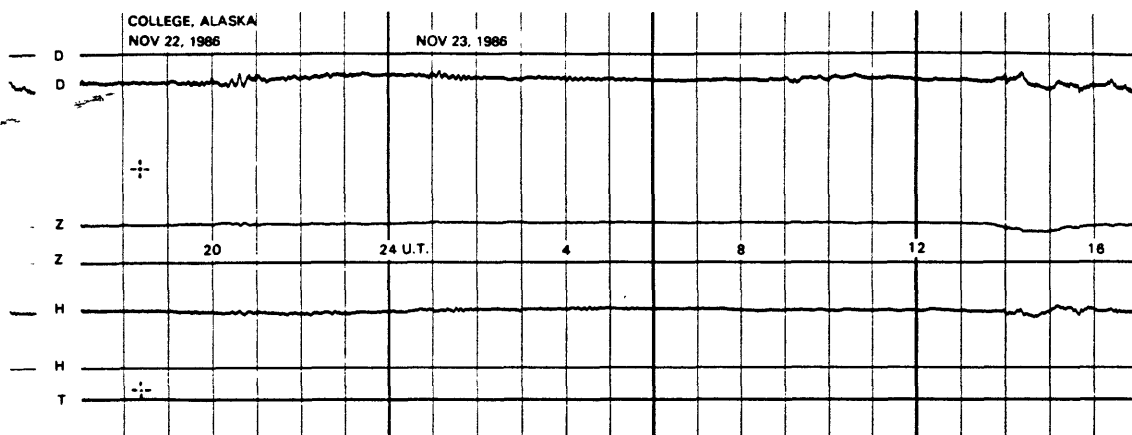
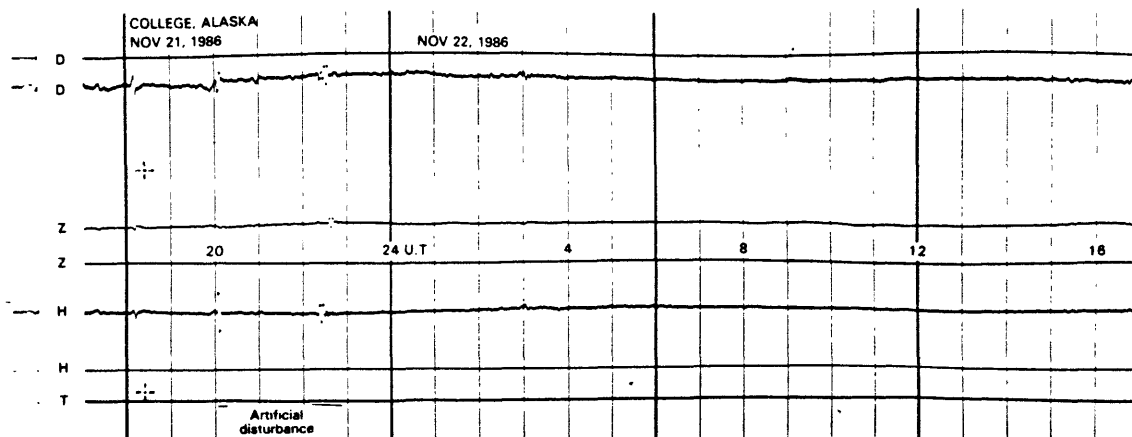
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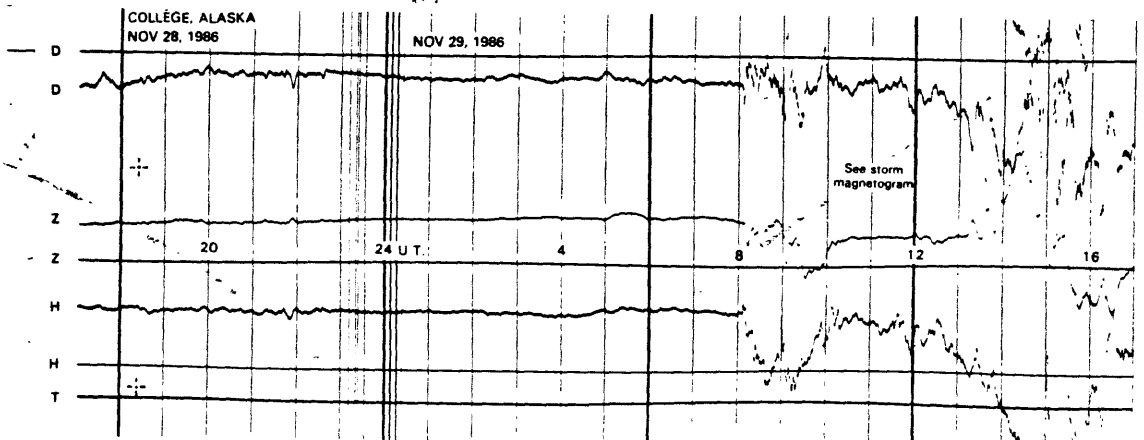
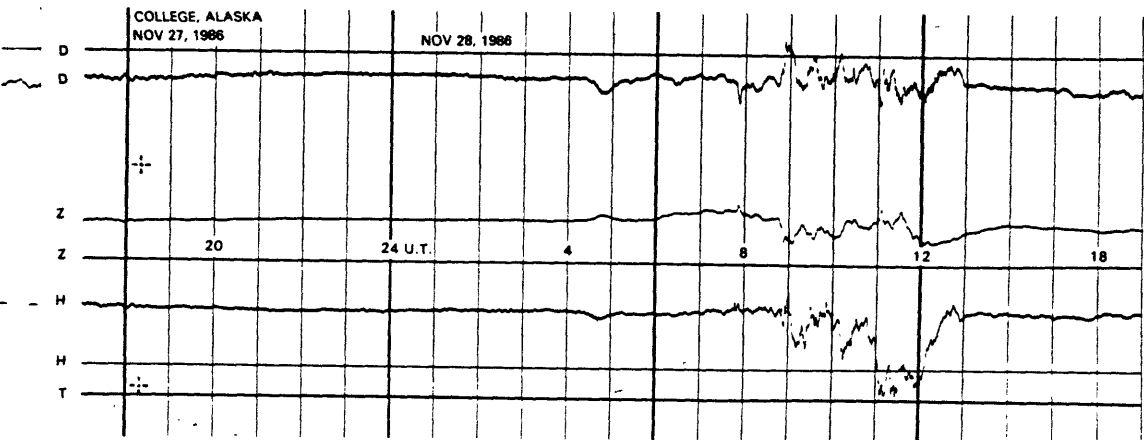
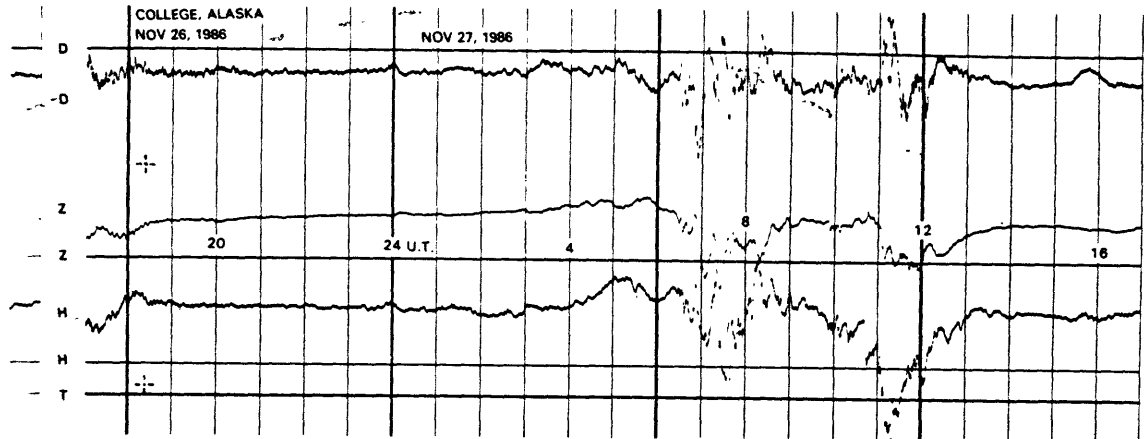
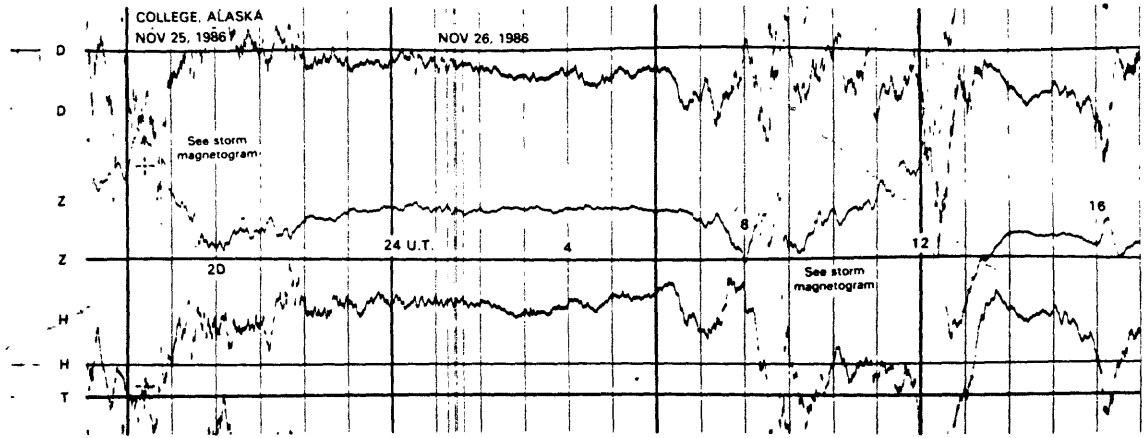
NORMAL MAGNETOGRAMS

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100 mm
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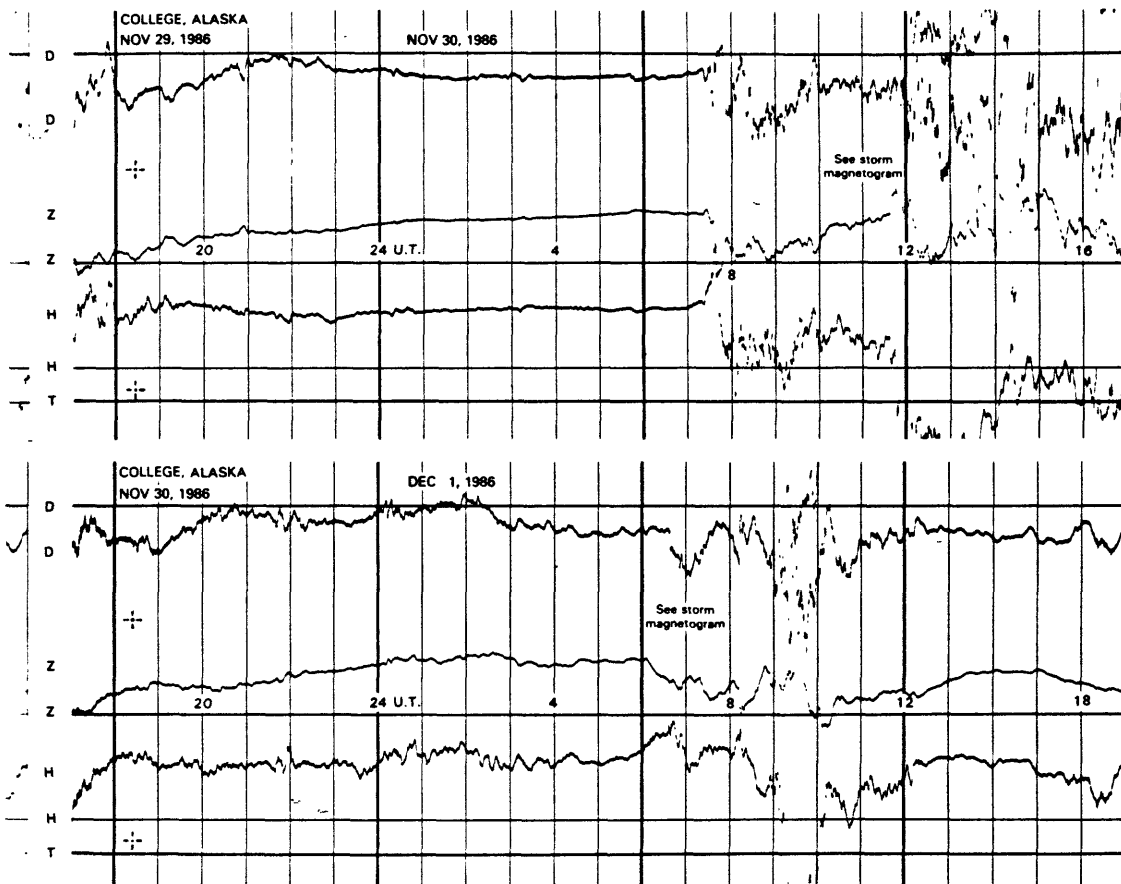
NORMAL MAGNETOGRAMS

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100 mm
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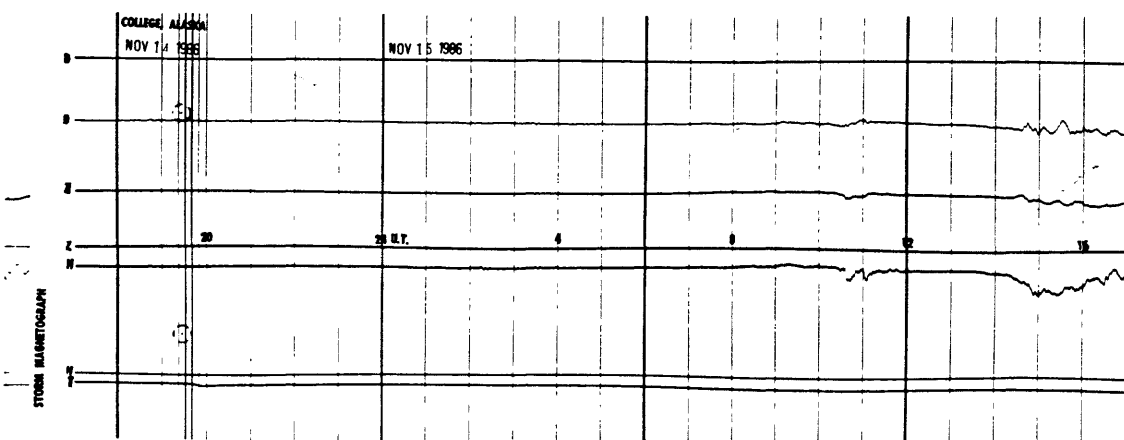
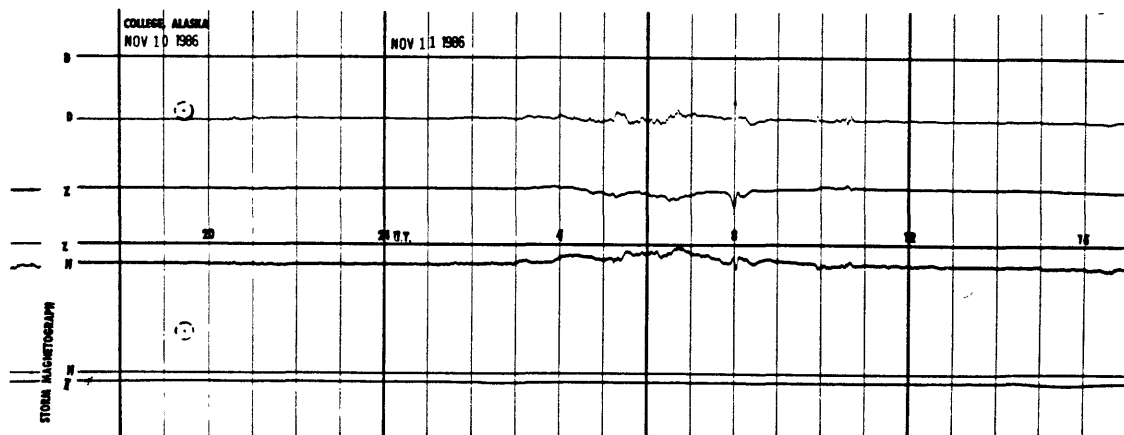
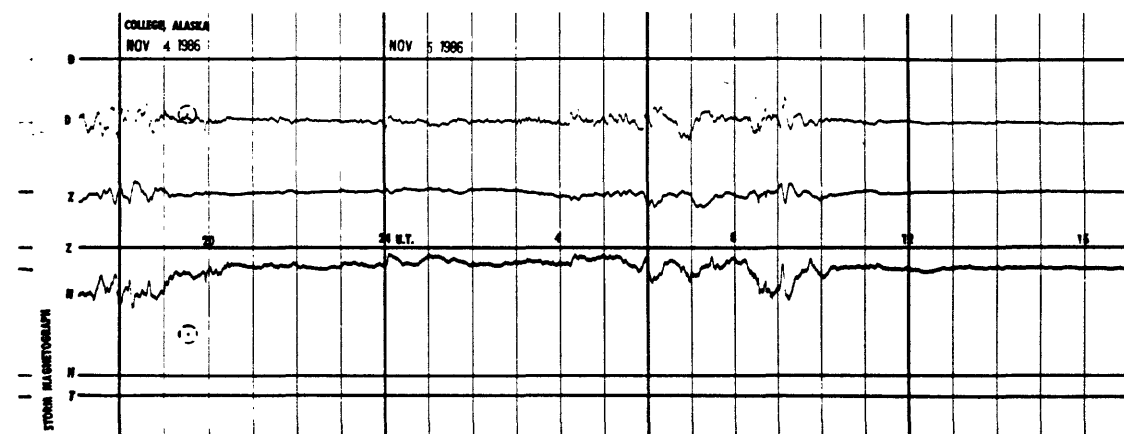
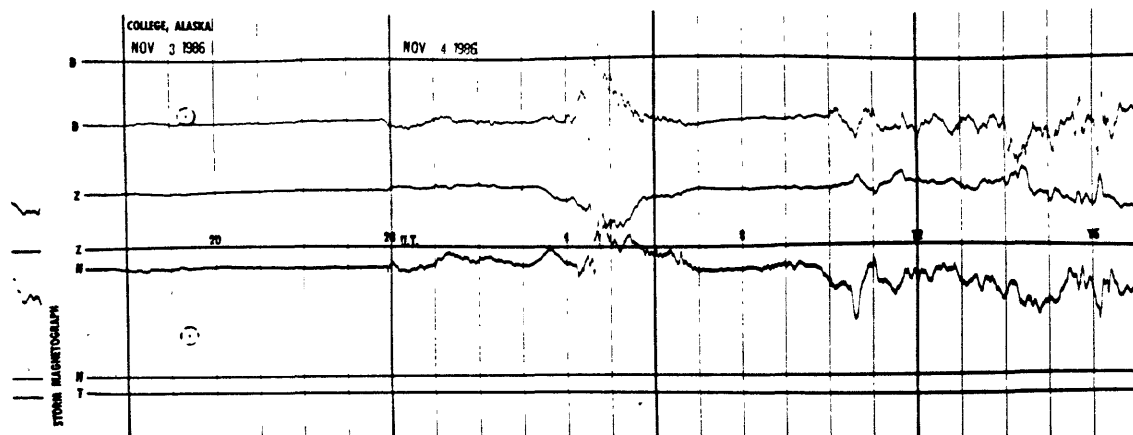


NORMAL MAGNETOGRAMS

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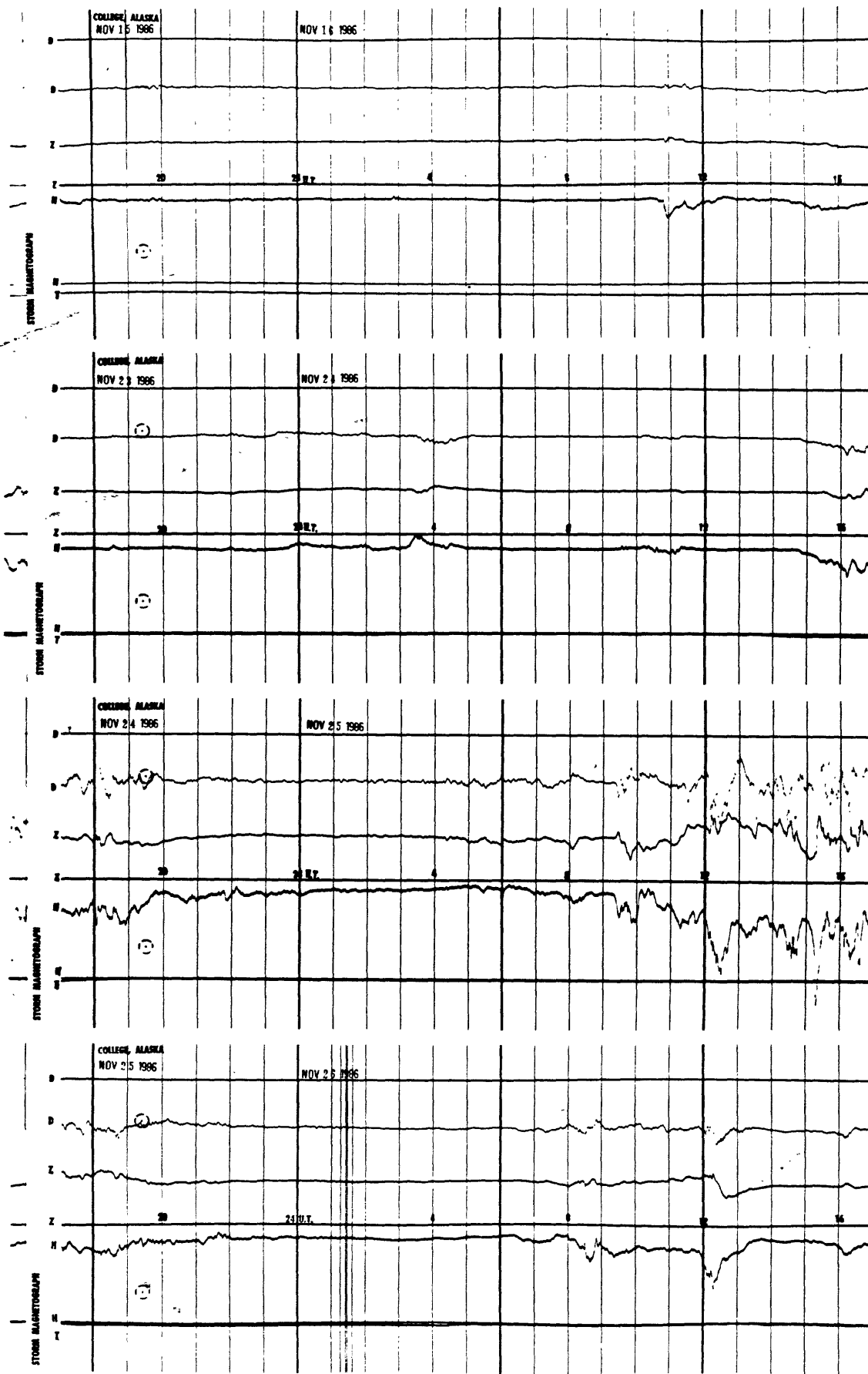


STORM MAGNETOGRAMS



STORM MAGNETOGRAMS

200mm
100mm
0



STORM MAGNETOGRAMS

