

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

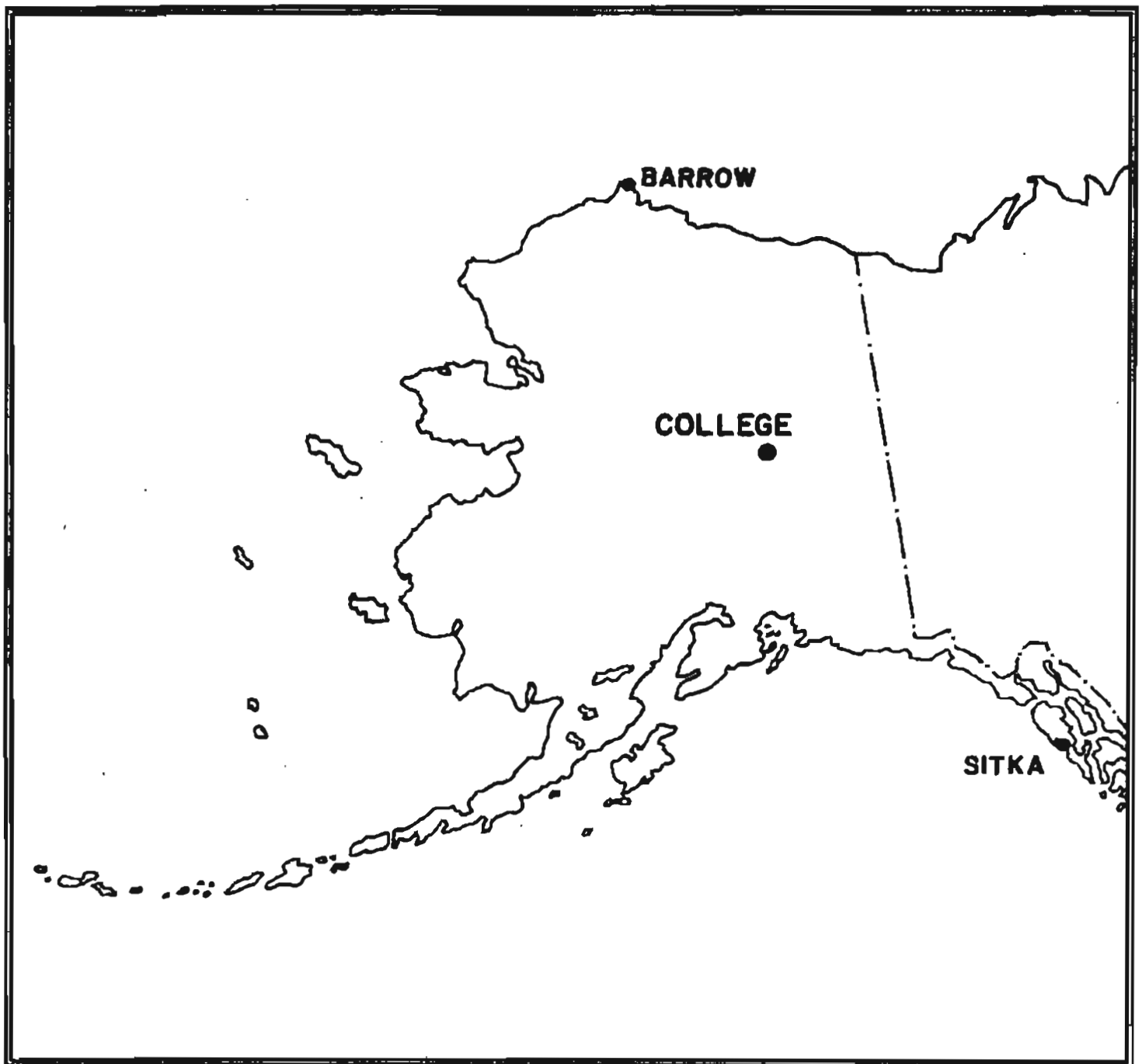
PRELIMINARY GEOMAGNETIC DATA

COLLEGE OBSERVATORY

FAIRBANKS, ALASKA

MARCH 1989

OPEN FILE REPORT 89-0300C



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 AND CAROL ANN VARNER AND IN COOPERATION WITH THE GEOPHYSICAL INSTITUTE OF THE UNIVERSITY OF ALASKA FAIRBANKS. 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 D63a 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..... $+256.5^{\circ}$   
Elevation.....200 meters

### GEOMAGNETIC DATA

Normal and storm magnetograms and appropriate calibration data are processed at the observatory and are available for analysis or copying. Also available are mean hourly scalings for the five quietest days for the month and K-indices.

#### 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 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)

#### Principal Magnetic Storms

Gradual and sudden commencement magnetic disturbances with at least one K-Index of 5 or greater, which are believed to be part of a world-wide disturbance, are classified as principal magnetic storms. The time of the storm beginning and ending; direction and amplitude of sudden commencements; period of maximum activity; and storm range are reported. Monthly reports of these data are forwarded to the World Data Center A in Boulder, Colorado.

#### Magnetogram Hourly Scalings

Magnetogram hourly scalings are averaged for successive periods of one hour for the D, H, and Z elements. The Value in the column headed "01" is the average for the hour beginning 0000 and ending 0100. Note that the values on the scaling sheet 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 one is interested in the detailed morphology of the magnetic field, 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:

$$D = B_D + d \cdot S_D; \quad H = B_H + h \cdot S_H; \quad Z = B_Z + z \cdot S_Z$$

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)

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			20 mm/hr
1	2	3	3	4	5	4	2	2	25	19	SUDDEN COMMENCEMENTS d h m 8 17 54 13 01 27 16 05 34 19 04 23
2	3	5	4	4	6	5	4	3	34	36	
3	2	5	6	6	6	6	5	3	39	55	
4	3	1	4	6	6	3	1	1	25	28	
5	2	4	6	7	7	5	3	3	37	59	
6	3	3	5	6	5	5	4	3	34	37	
7	4	4	3	3	4	2	2	1	23	16	
8	2	2	2	1	0	2	4	4	17	11	
9	3	5	4	7	5	5	4	4	37	48	
10	3	3	5	4	3	4	4	3	29	24	
11	2	4	4	6	5	3	3	3	30	29	
12	4	2	3	5	4	6	5	2	31	32	
13	5	7	8	8	7	9	8	8	60	211	
14	7	6	7	6	5	4	7	5	47	88	
15	5	4	7	7	5	5	4	2	39	61	
16	2	4	3	7	5	5	4	4	34	42	
17	3	6	6	7	5	4	5	2	38	56	
18	1	2	2	5	7	7	3	2	29	46	
19	1	5	6	5	7	7	5	2	38	64	
20	2	3	3	4	3	3	2	2	22	14	
21	2	3	5	4	3	3	3	3	26	20	
22	3	4	6	5	5	6	5	5	39	49	
23	4	2	2	6	6	6	5	4	35	45	
24	5	4	3	3	2	2	2	1	22	16	
25	1	0	0	3	2	3	4	2	15	09	
26	2	2	1	5	5	3	2	3	23	19	
27	4	2	3	3	4	5	4	5	30	27	
28	3	4	4	6	6	5	4	3	35	40	
29	5	4	7	6	6	5	5	5	43	65	
30	4	4	6	5	5	4	6	5	39	48	
31	5	5	6	5	5	6	5	4	41	53	

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

H

Z

675.7

322.2

3.67

7.77

2480

2500

(mm)

(γ/mm)

(to nearest 10γ)

SCALINGS AND COMPUTATIONS HAVE BEEN CHECKED.

APPROVED

John B. Townshend, Chief

OBSERVER IN CHARGE

PRINCIPAL MAGNETIC STORMS  
COLLEGE OBSERVATORY, COLLEGE, ALASKA  
MARCH 1989

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

Data from Individual Observatories:

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(Y)	Z(Y)	day	(3 hr - period)	K	D(')		H(Y)	Z(Y)	
CO	64.06 N	3	05xx	.				3	3,4,5,6	6	224	1165	760	3	20
		5	04xx	.				5	4,5	7	276	1835	830	5	17
		8	1754	SC*	-23	+72	-23	9	4	7	135	1440	660	9	24
		13	0127	SC*	-36	+358	-77	13	6	9	642	3590	2945	15	21
		16	0534	SC	-22	+89	-216	16/17	4/4	7	399	1750	1185	17	23
		19	0423	SC*	-12	+498	-78	19	5,6	7	276	1450	1175	19	23

NORMAL MAGNETOGRAPH					
COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASELINE
D	0001 U.T., 3/1/89	2400 U.T., 3/31/89	1.0' /mm	3.7 γ /mm	26° 51.2' E
H	0001 U.T., 3/1/89	2400 U.T., 3/31/89	7.8 γ /mm		12620 γ
Z	0001 U.T., 3/1/89	2400 U.T., 3/11/89	7.7 γ /mm		55173 γ
	0001 U.T., 3/12/89	2400 U.T., 3/25/89	(SAME)		55171 γ
	0001 U.T., 3/26/89	2400 U.T., 3/31/89	(SAME)		55168 γ

STORM MAGNETOGRAPH					
COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASELINE
D	0001 U.T., 3/1/89	2400 U.T., 3/31/89	7.9' /mm	29.5 γ /mm	
H	(SAME)	(SAME)	43.6 γ /mm		
Z	(SAME)	(SAME)	49.4 γ /mm		

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

MONTHLY MEAN ABSOLUTE VALUES*					
D		H		Z	
27° 06.6' E		12790 γ		55329 γ	

\* COMPUTED FROM FIVE QUIETEST DAYS DURING MONTH.

DAYS USED: MARCH 7, 8, 20, 24, 25,

U.S. Dept. of Interior  
Geological Survey

Observatory  
**ALABAMA**

Month  
**MARCH**

Year  
**1989**

Dep-CD - 1/R6

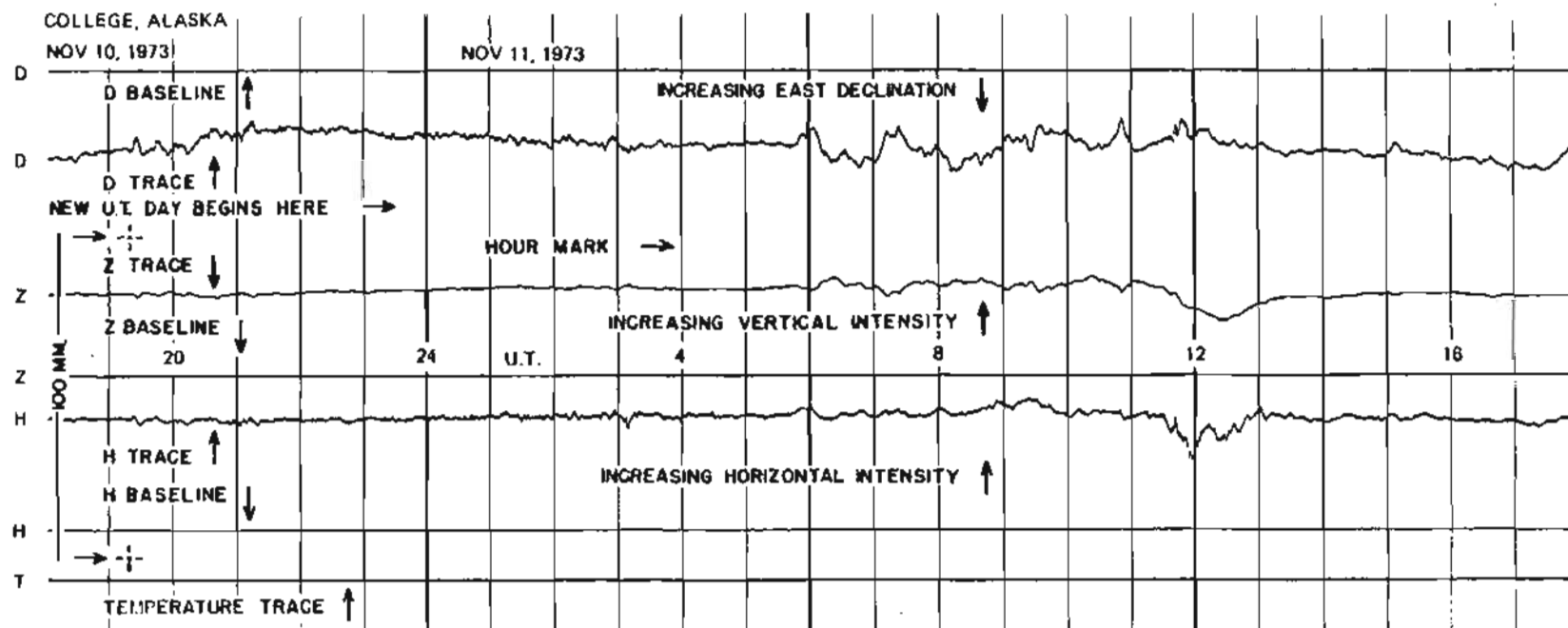
**MAGNETOGRAM HOURLY SCALINGS - FIVE QUIETEST DAYS**  
(UNIVERSAL TIME)

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			DAY			DAY				DAY		
	7	8	20	7	8	20	7	8	20				
01	122	110	120	190	199	210	220	205	244	25	24	20	25
02	119	99	120	218	240	230	218	208	246	226	264	246	226
03	95	120	110	282	236	257	222	210	266	220	240	266	220
04	80	93	129	292	260	241	204	209	283	220	250	283	220
05	86	127	122	337	259	277	241	220	280	215	319	280	215
06	202	160	101	464	277	289	220	230	264	215	304	264	215
07	100	198	178	342	267	291	277	201	227	215	257	227	215
08	142	137	114	289	255	250	252	199	273	215	219	273	215
09	244	141	118	285	251	240	157	200	258	216	121	258	216
10	72	143	119	261	251	230	99	191	241	206	140	241	206
11	123	140	127	235	242	219	160	180	237	165	243	237	165
12	168	152	136	190	258	129	210	182	244	184	229	244	184
13	183	151	139	-10	254	69	181	184	225	155	189	225	155
14	104	152	150	165	251	167	120	184	199	194	194	199	194
15	165	168	160	178	250	211	132	184	214	207	180	214	207
16	199	180	195	219	248	151	143	186	203	192	197	203	192
17	210	201	270	229	242	77	165	191	196	146	223	196	146
18	201	230	275	241	237	95	194	198	178	82	240	178	82
19	209	290	262	199	96	198	164	182	175	99	233	175	99
20	182	328	228	230	-21	219	170	76	213	54	230	213	54
21	167	356	216	223	50	218	177	64	231	135	230	231	135
22	179	187	240	219	190	208	189	69	245	213	224	245	213
23	138	238	170	201	171	171	195	156	229	220	220	229	220
24	130	102	142	219	213	204	210	223	226	216	223	226	216
DAILY SUM	3580	4209	3941	5778	5176	4851	4520	4332	5597	4440	5456	5597	4440
DAILY MEAN	149	175	164	241	216	202	188	180	233	185	227	233	185
MEAN	156			217			203			MEAN			

Scaled XVO Checked CBV

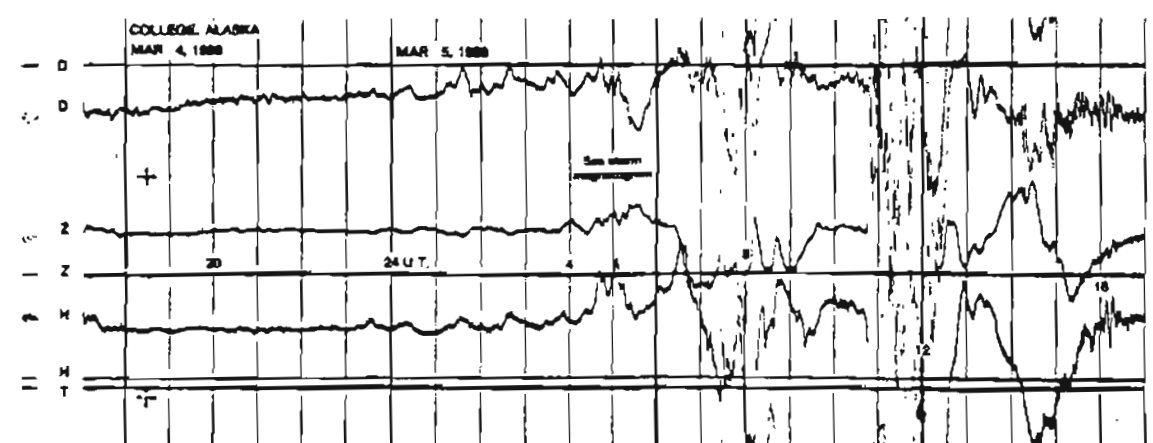
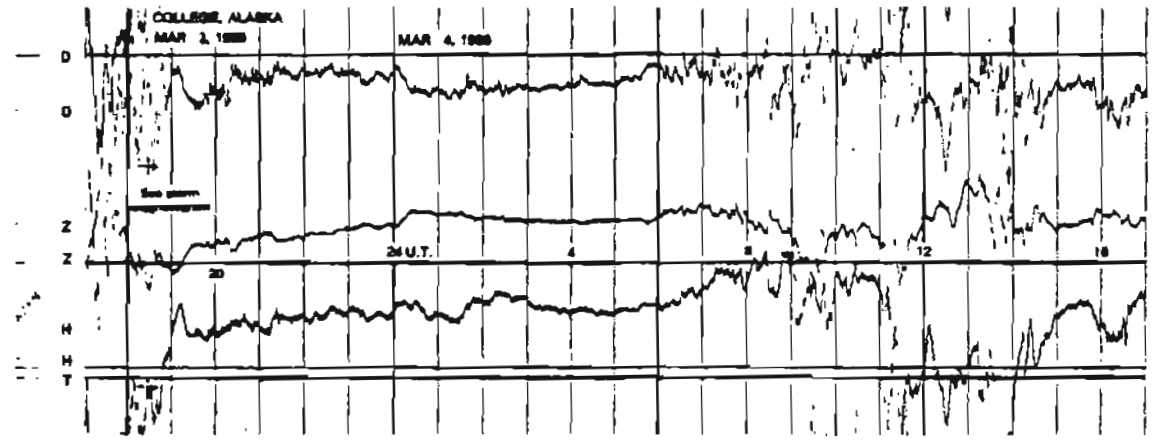
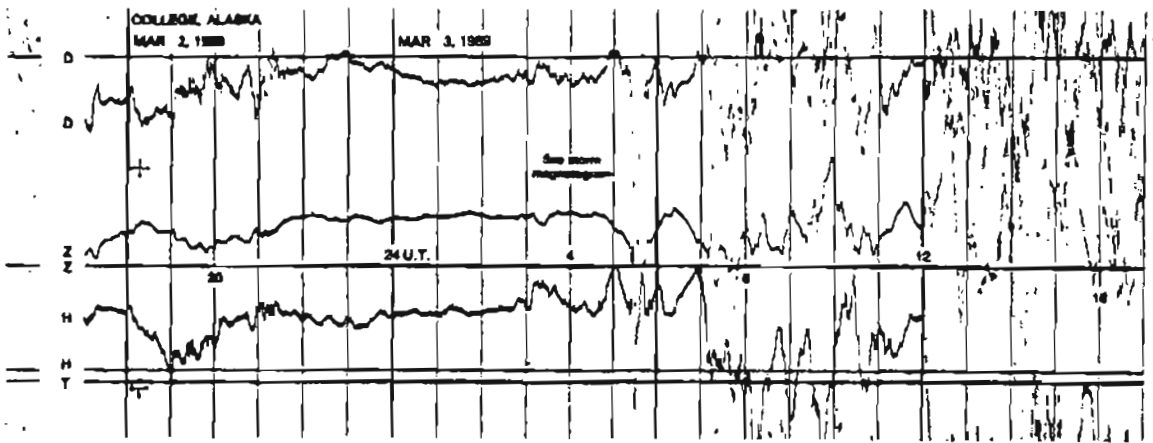
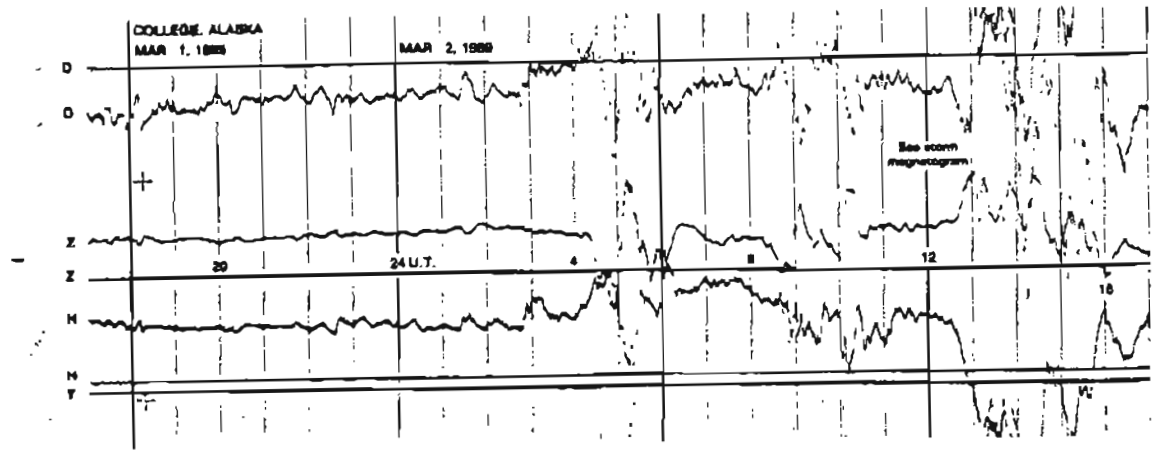
# FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)



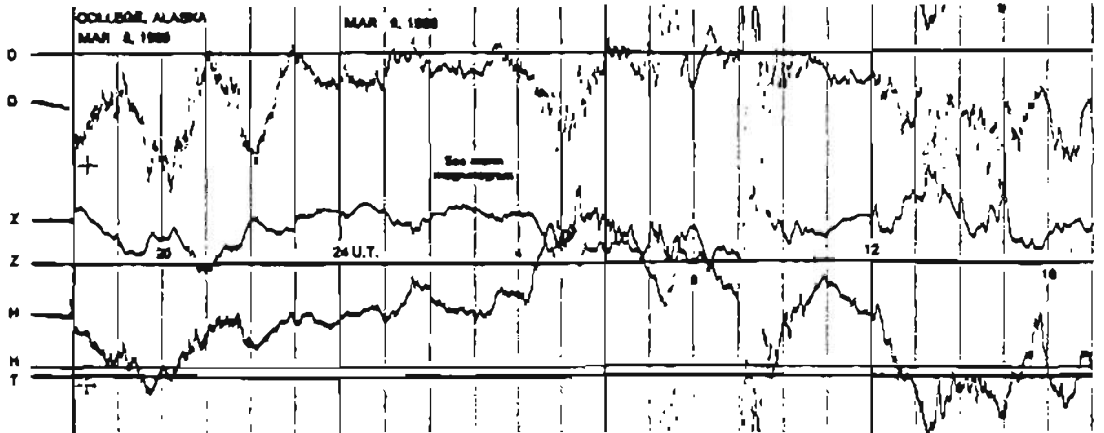
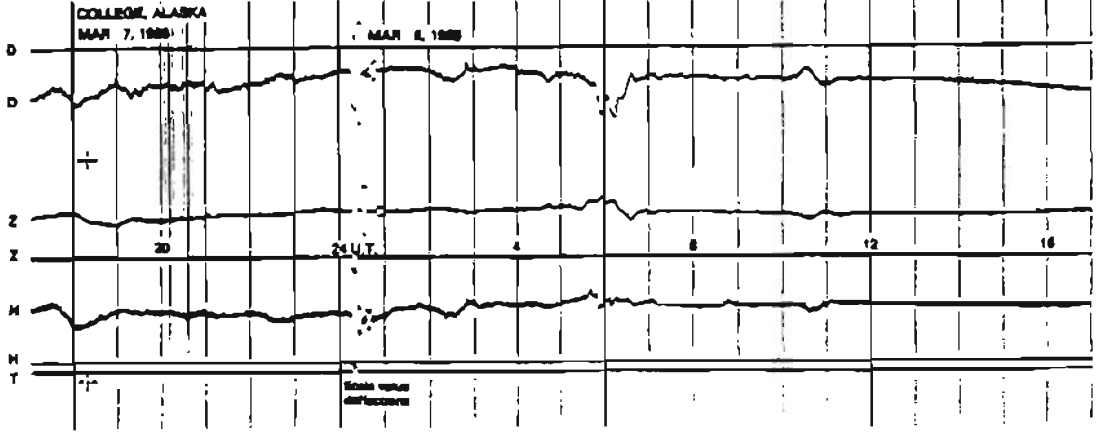
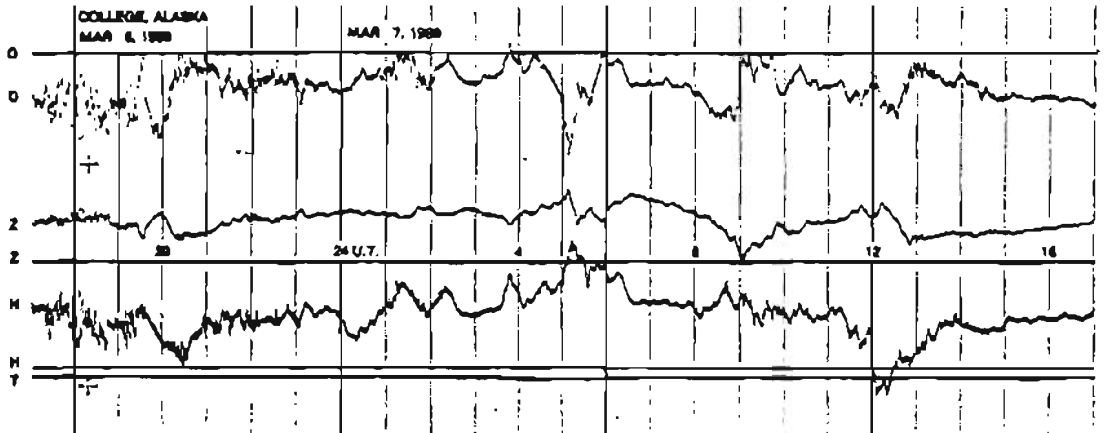
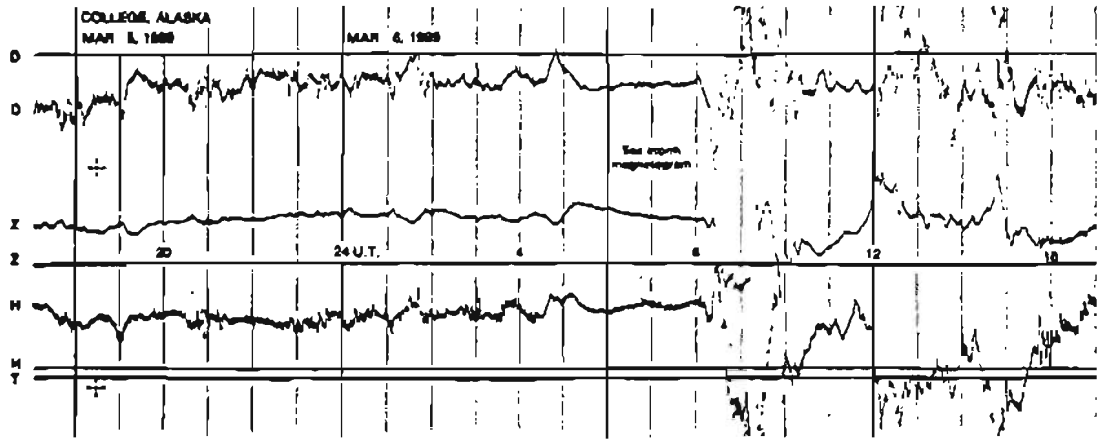
SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES



NORMAL MAGNETOGRAMS

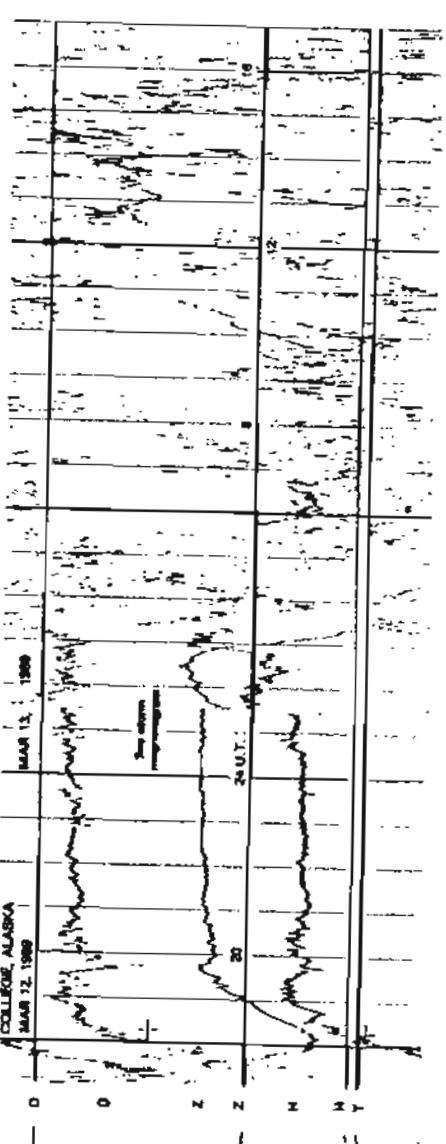
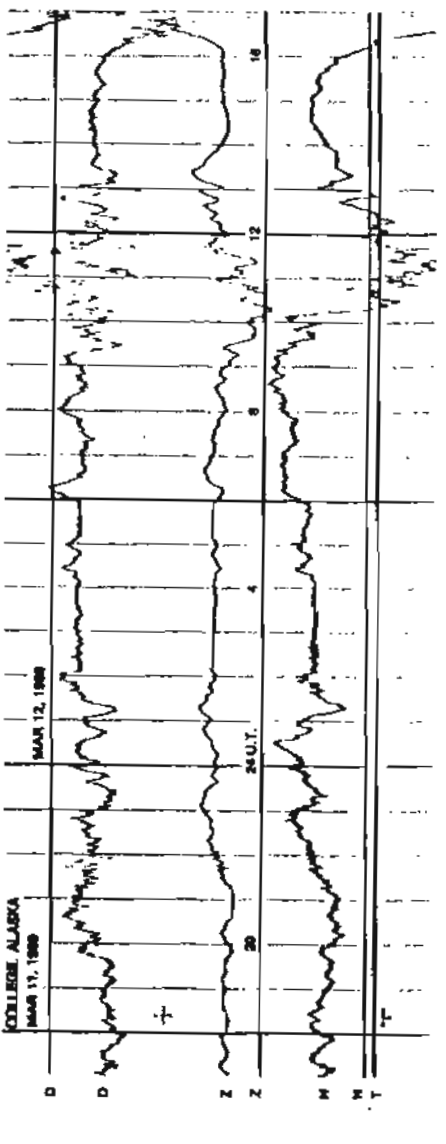
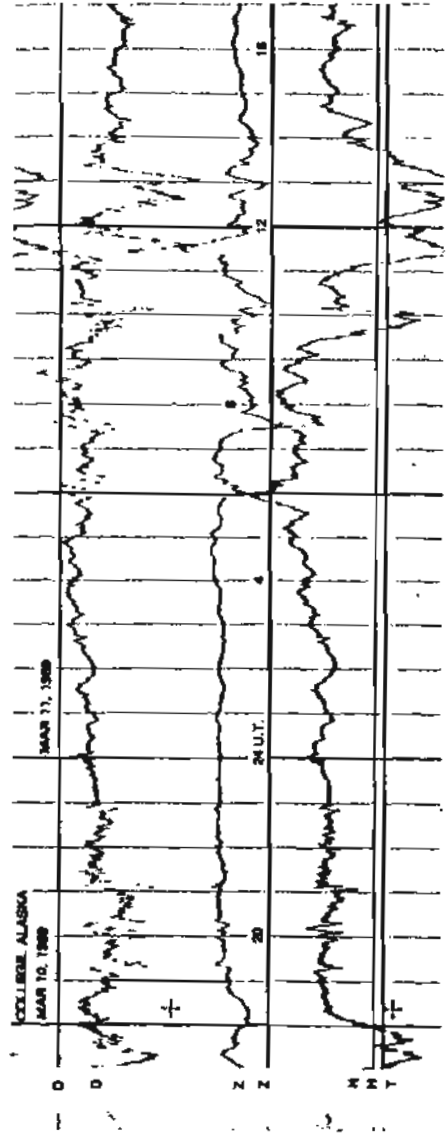
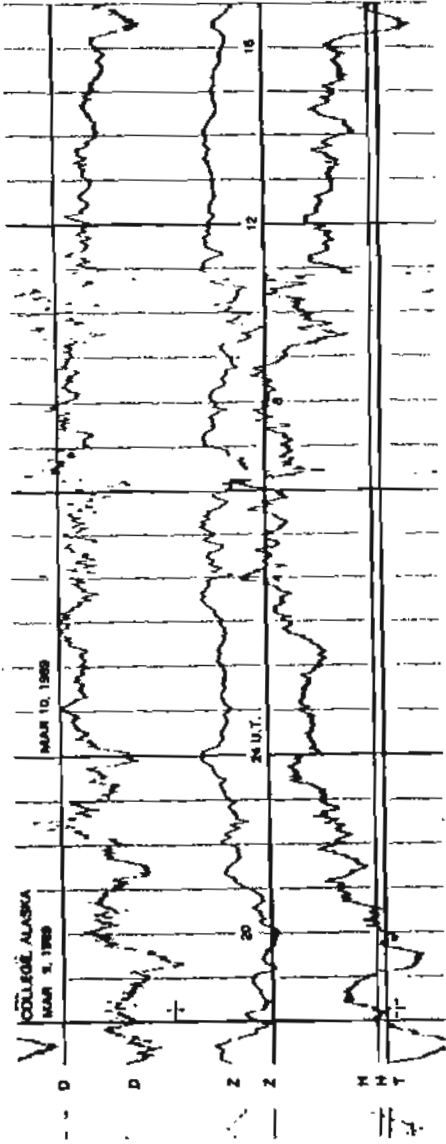


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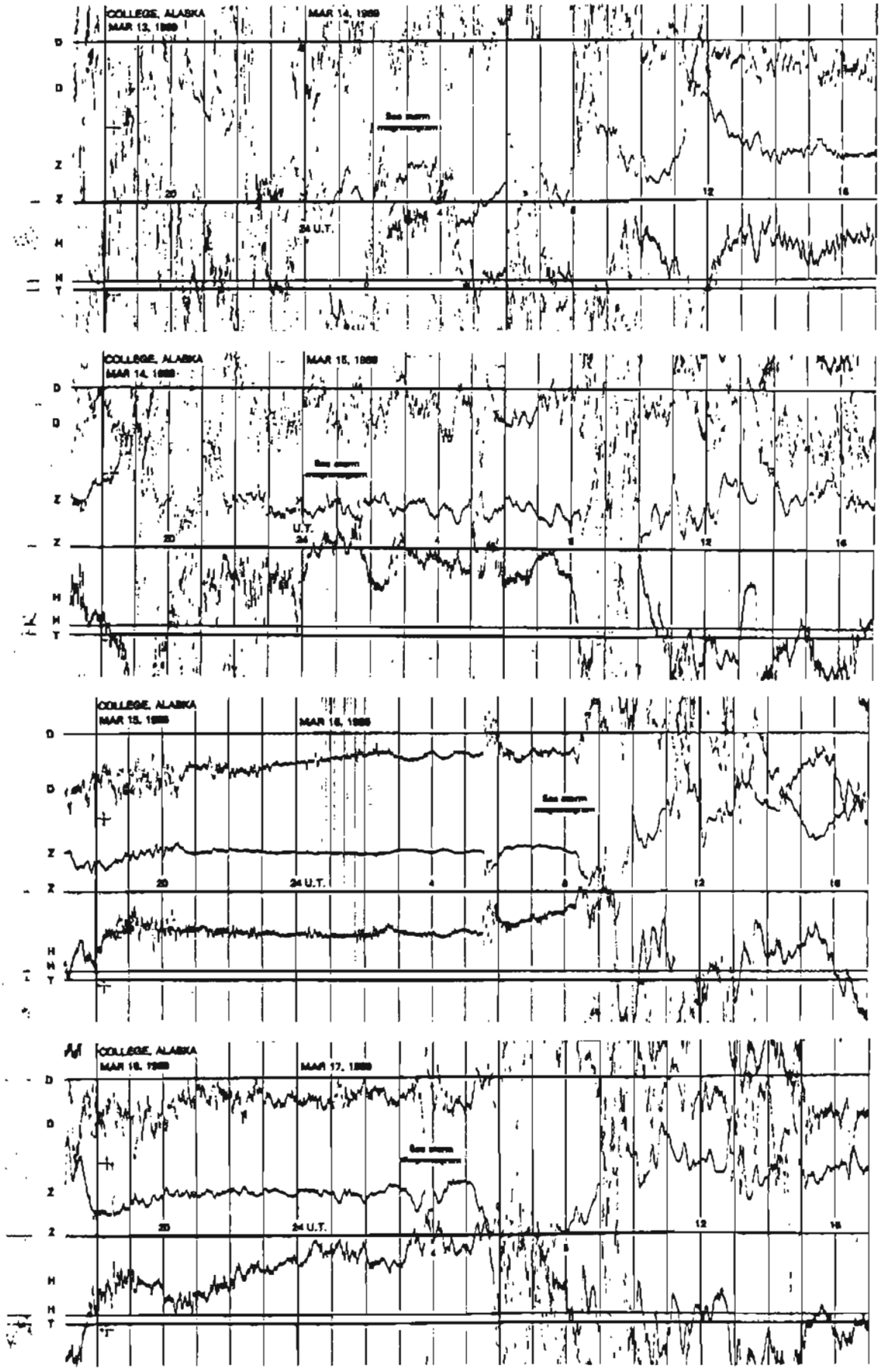


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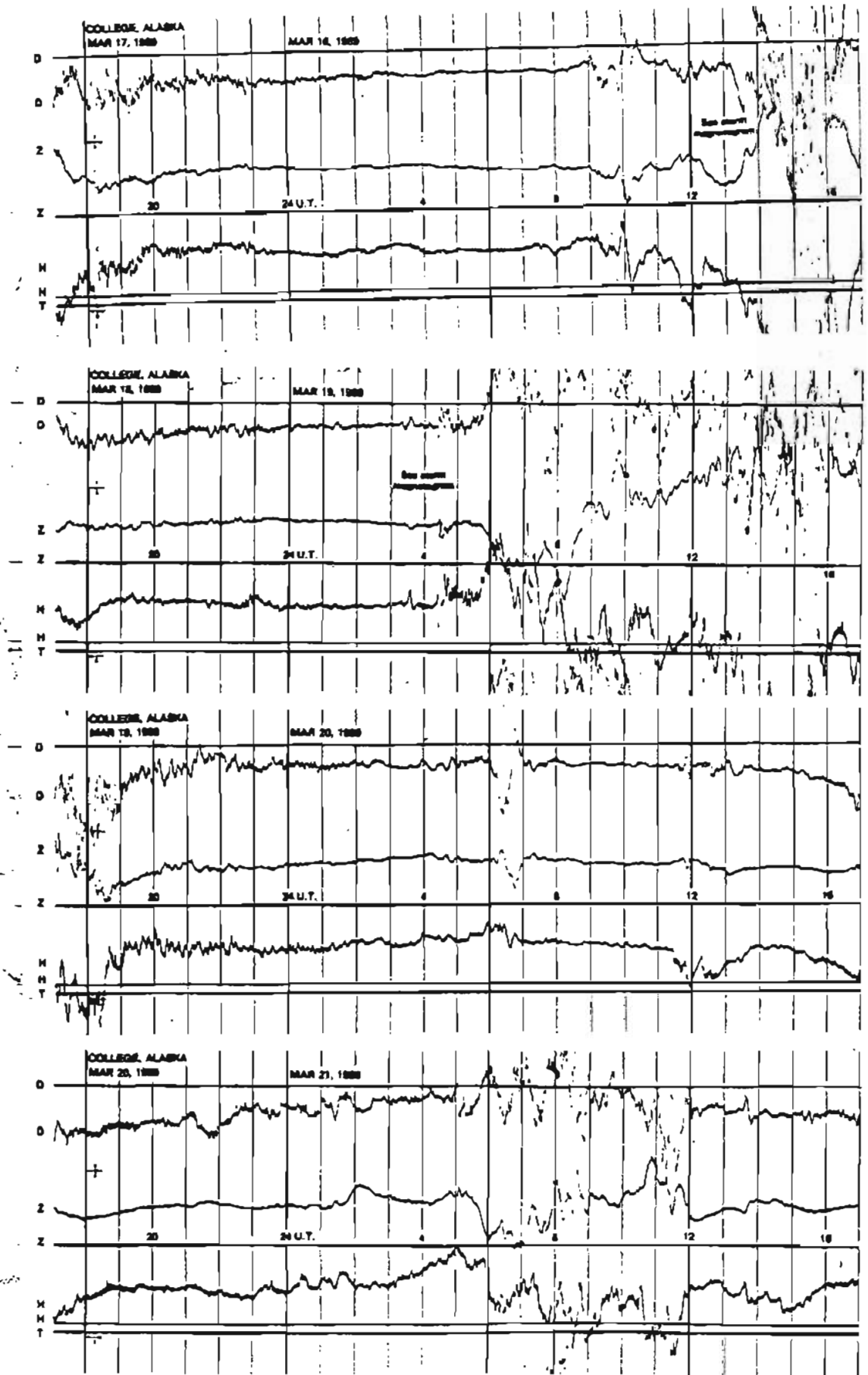
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100MM  
200MM



NORMAL MAGNETOGRAMS

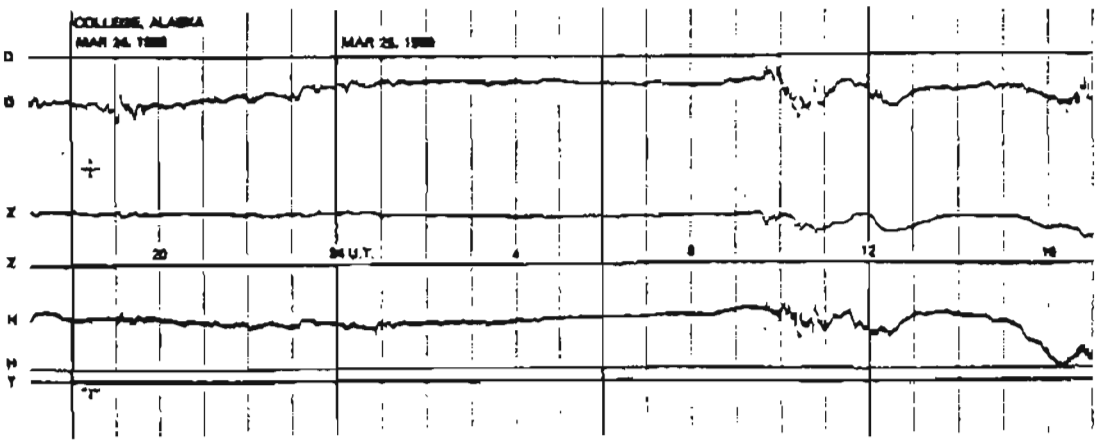
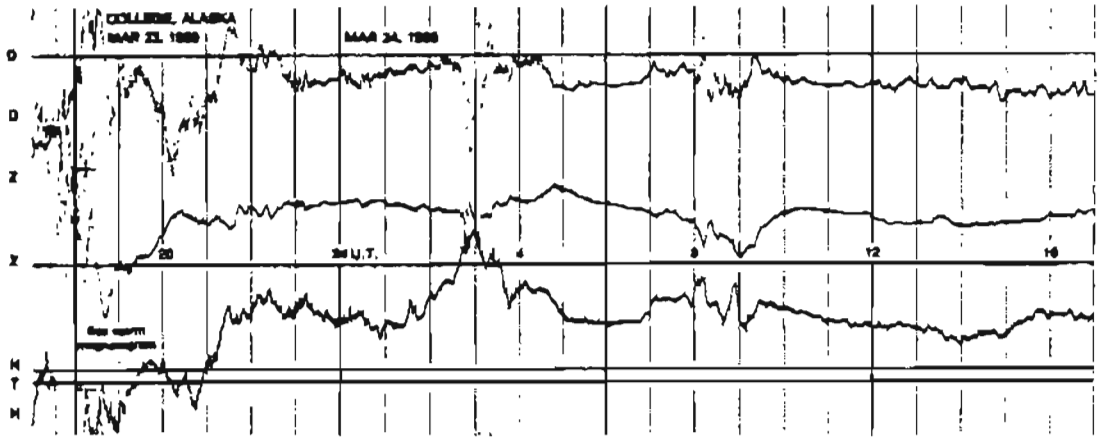
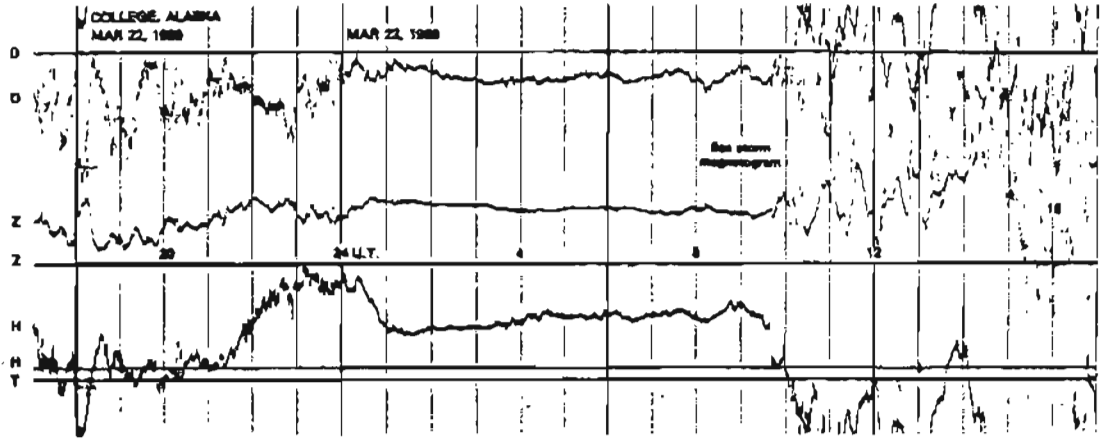
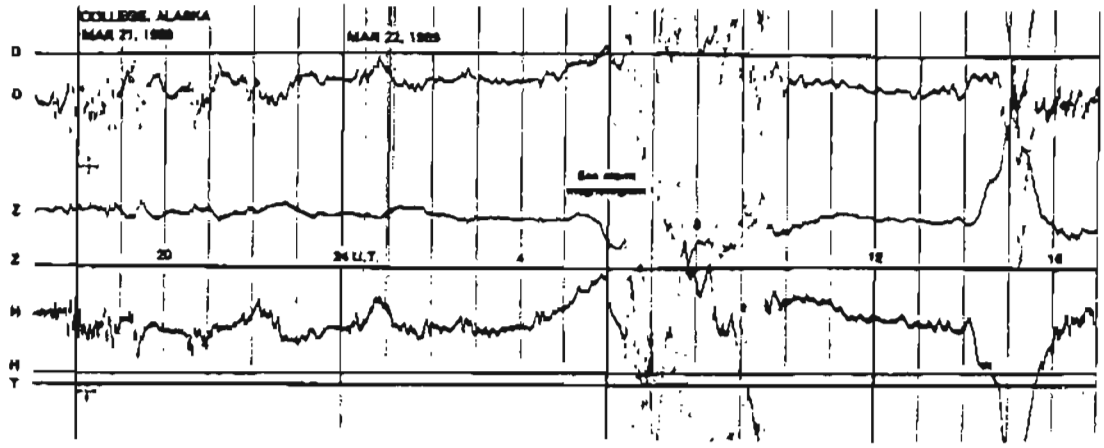


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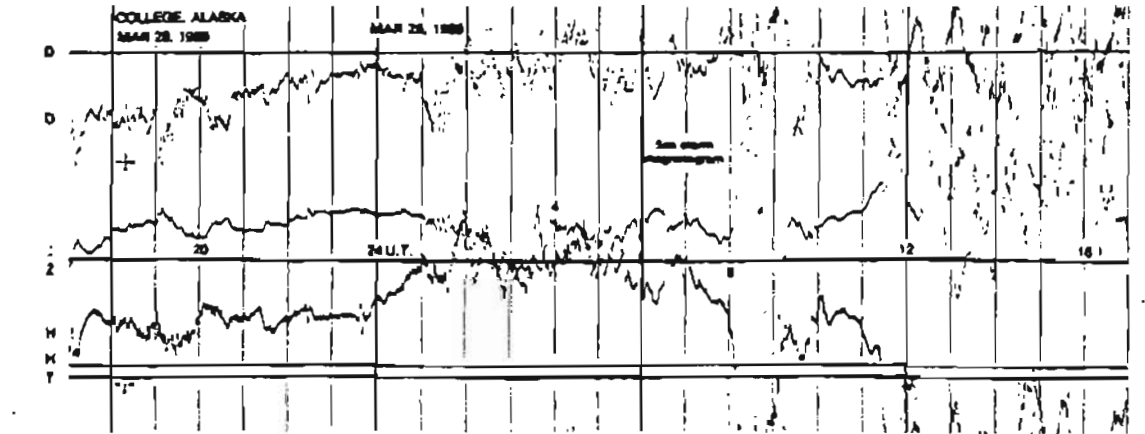
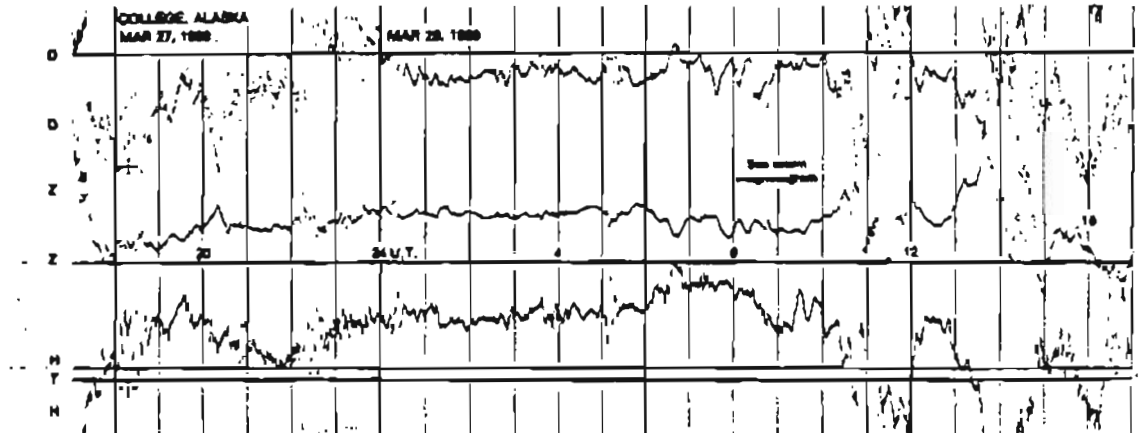
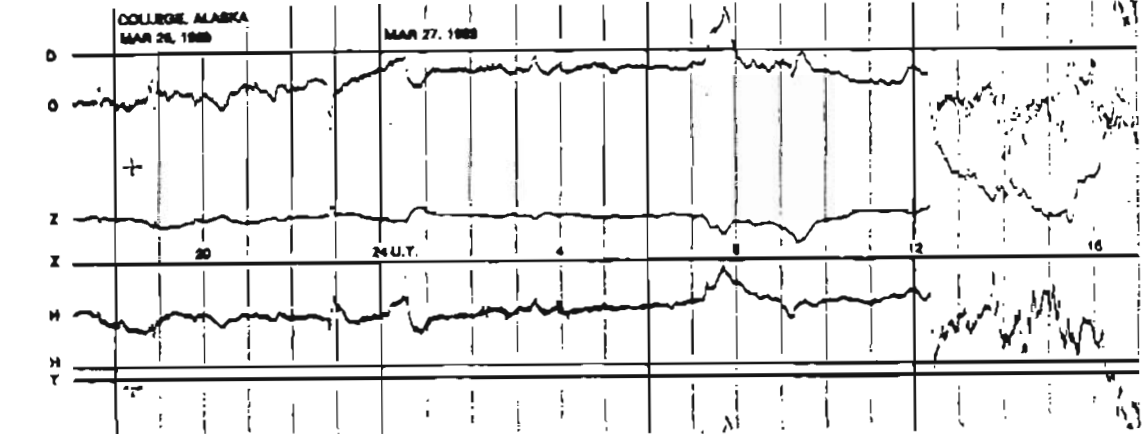
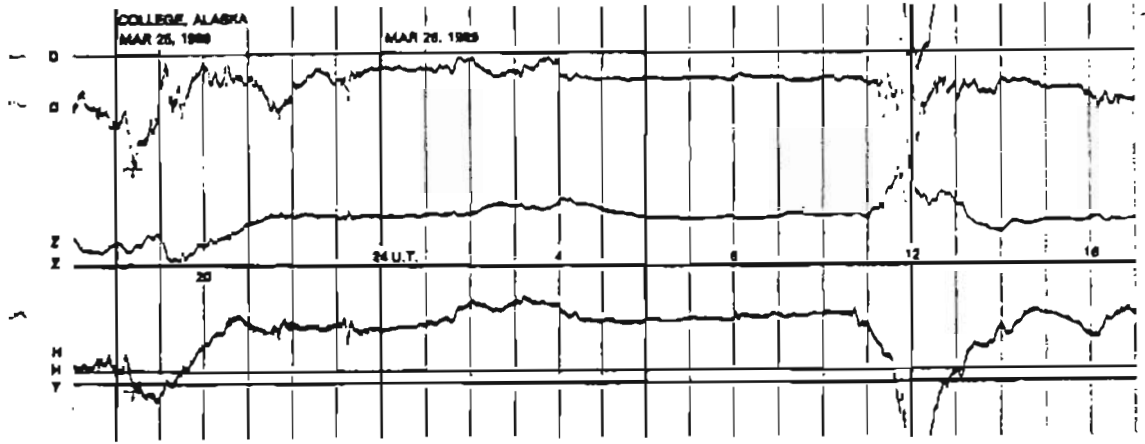


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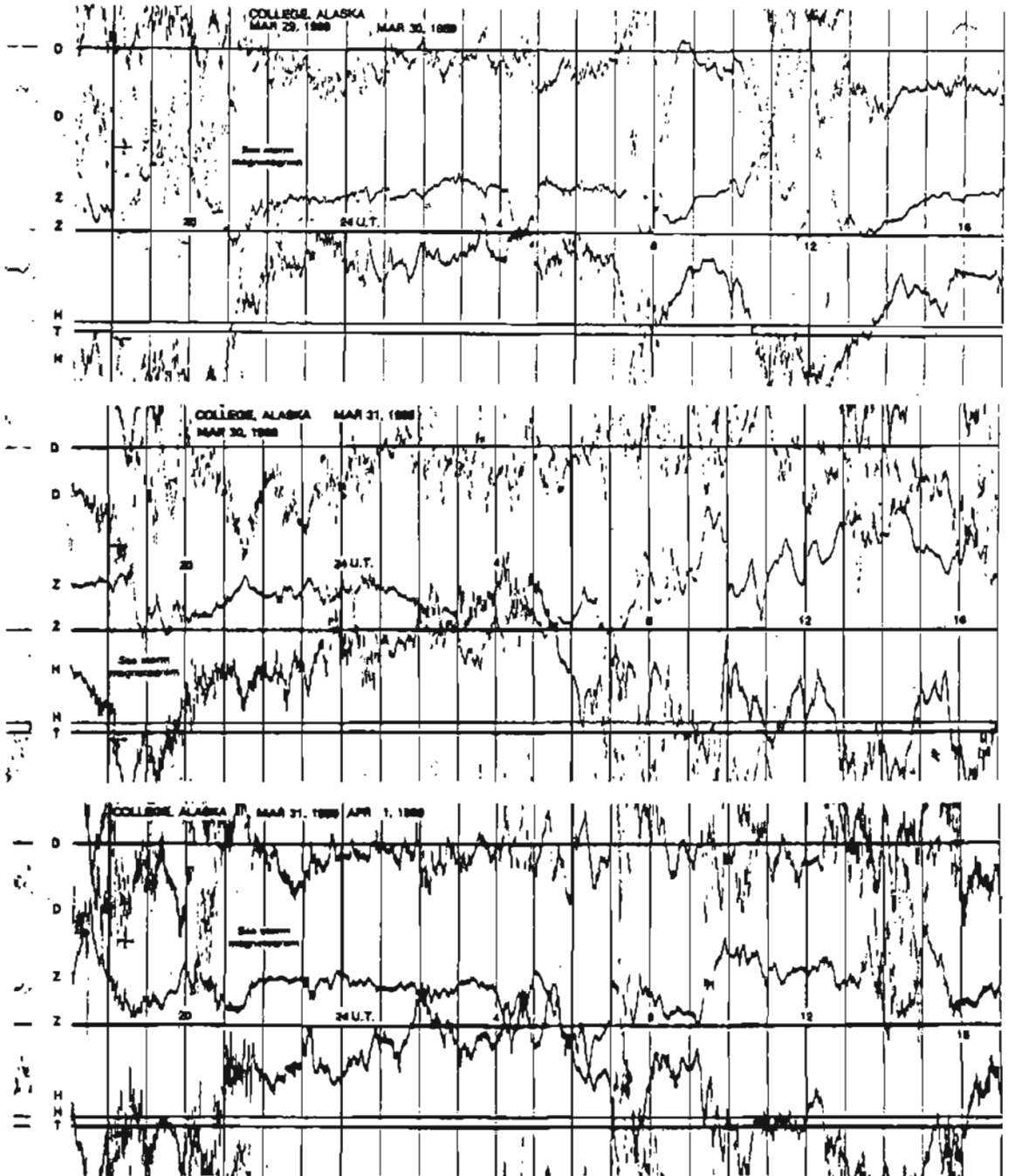
200mm  
100mm  
0



NORMAL MAGNETOGRAMS

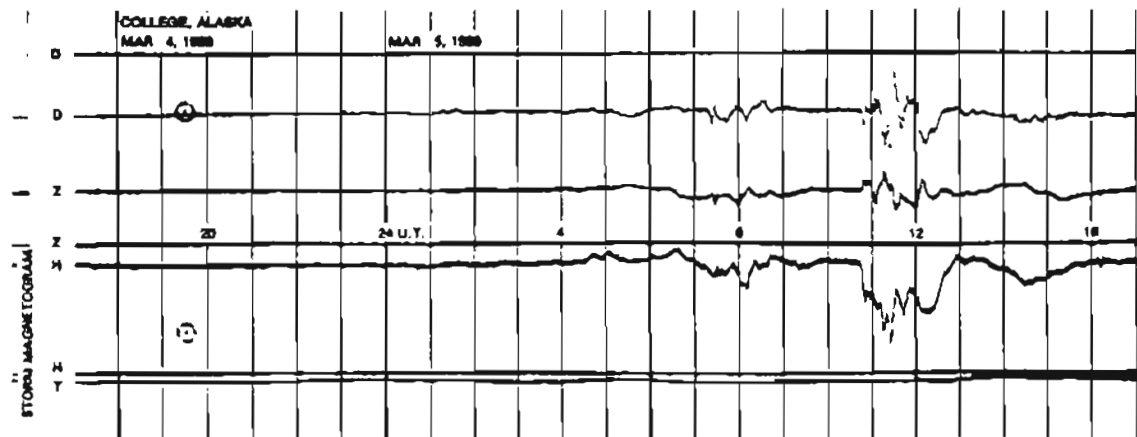
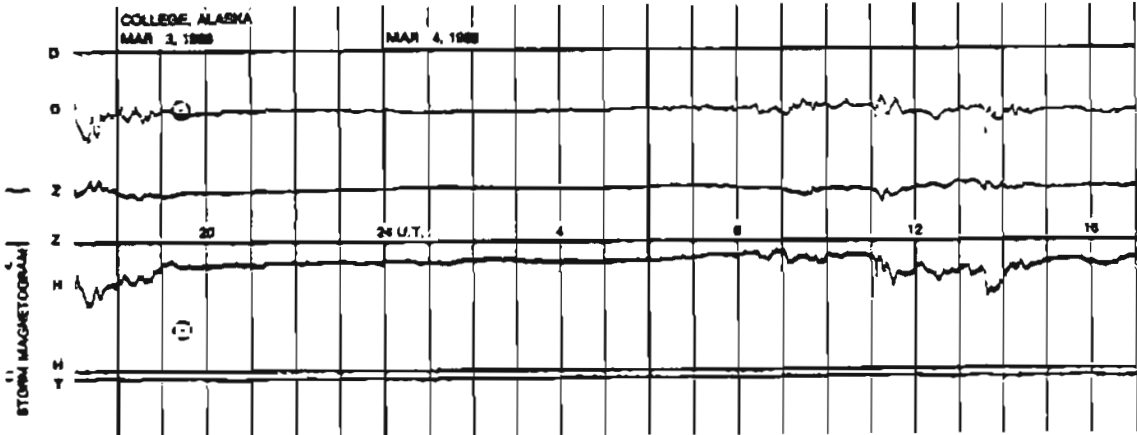
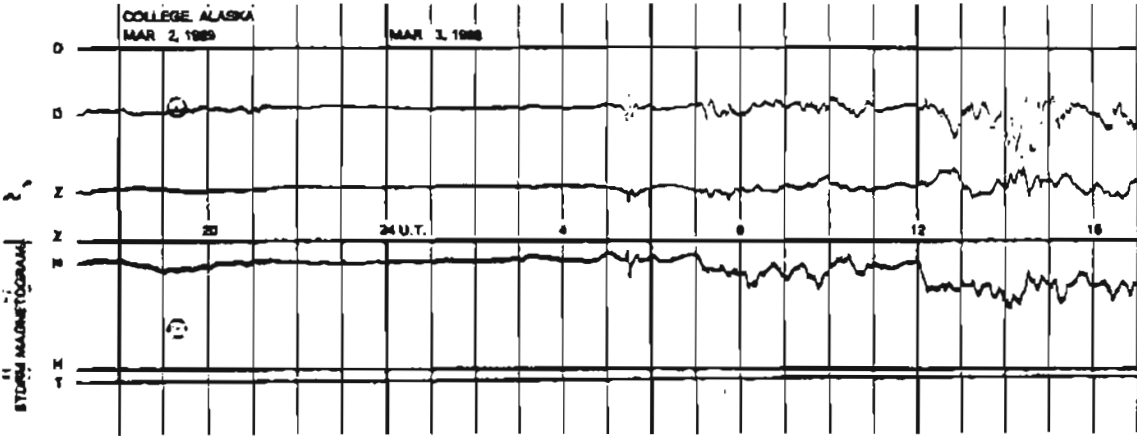
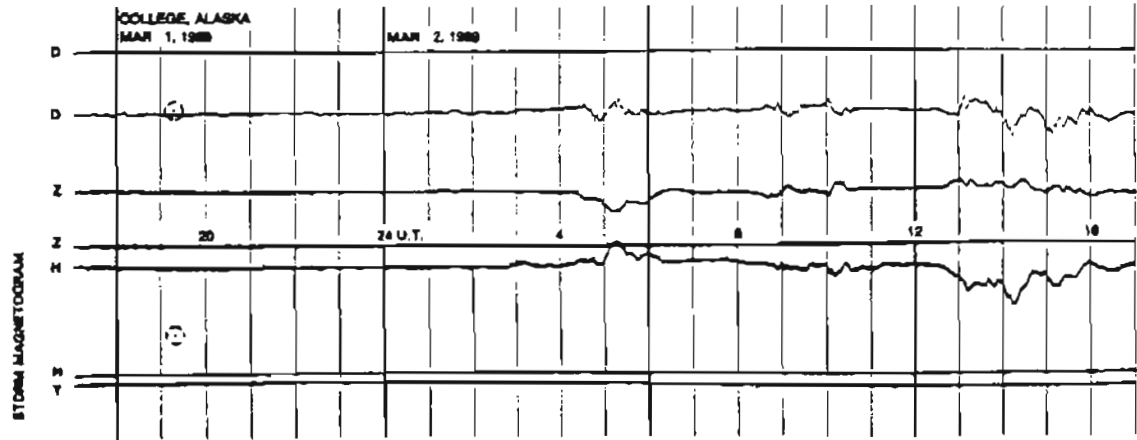


NORMAL MAGNETOGRAMS

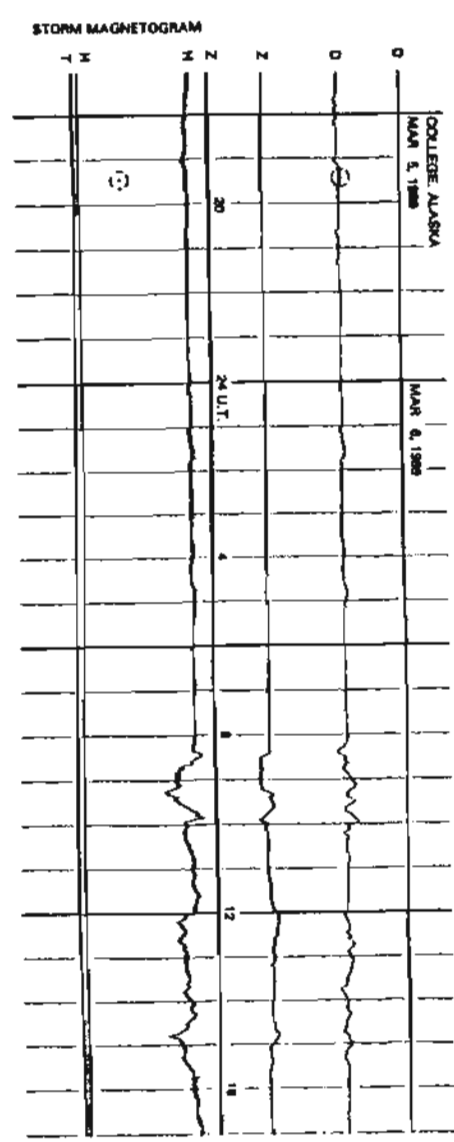
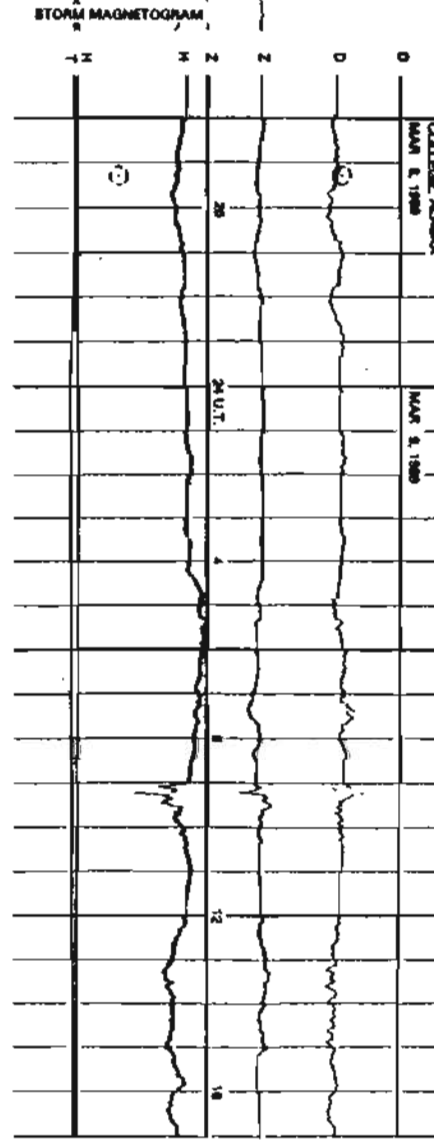
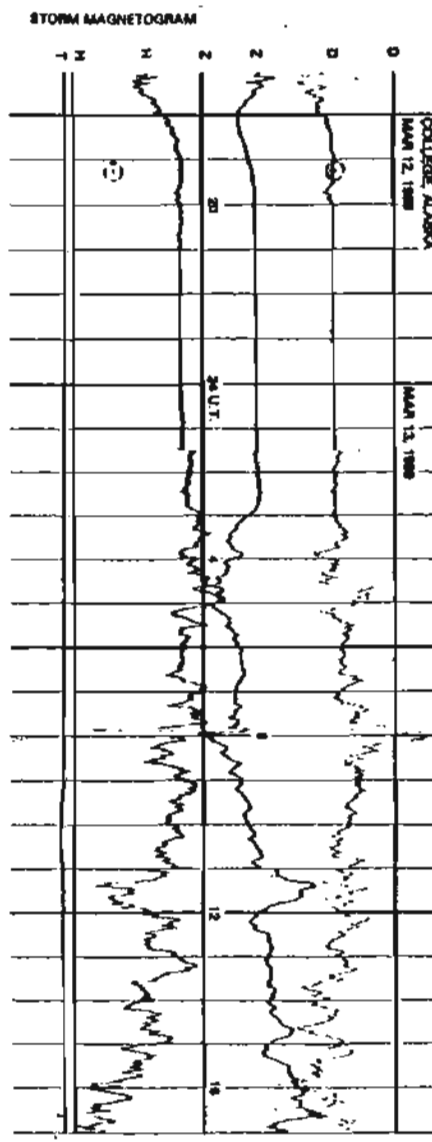
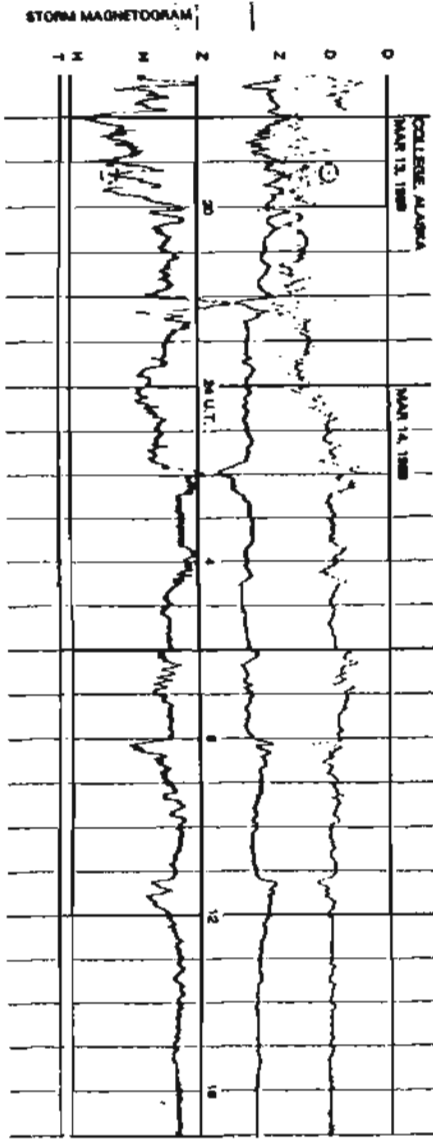




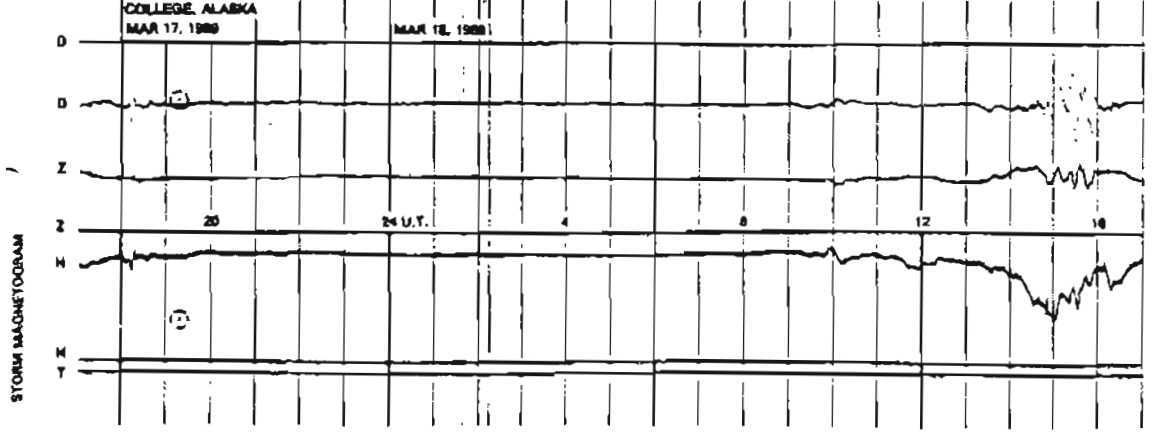
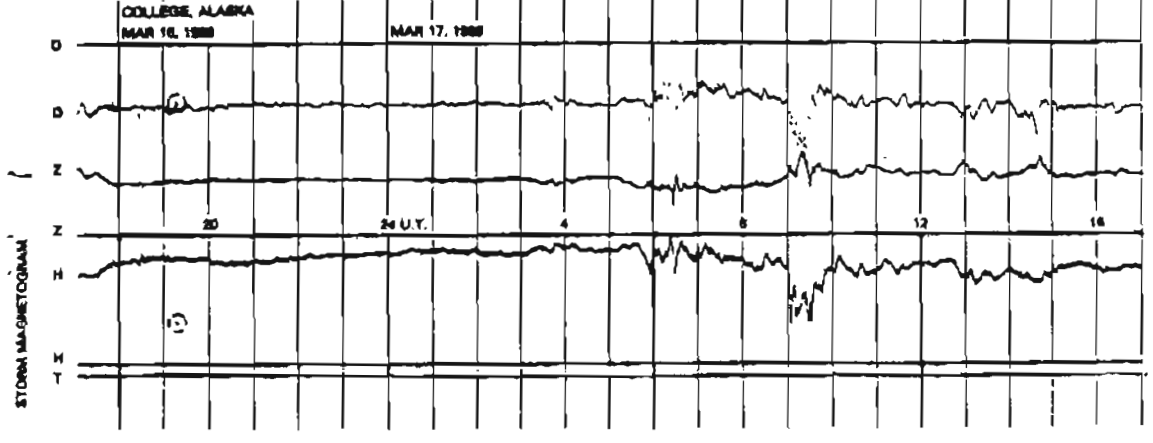
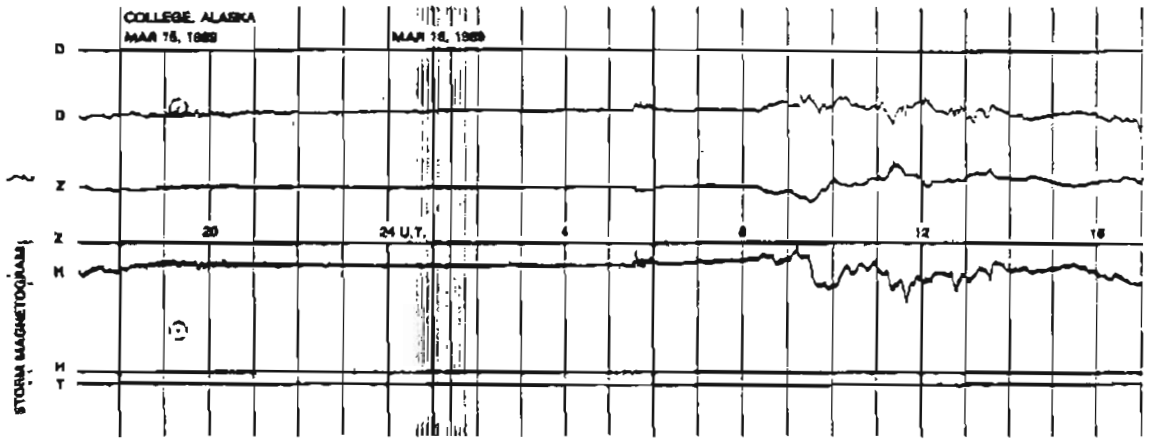
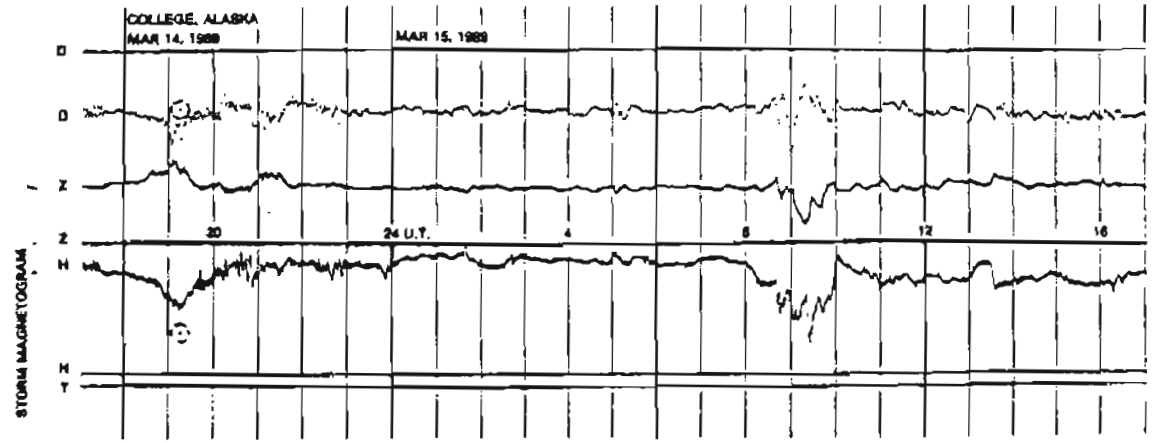
# STORM MAGNETOGRAMS



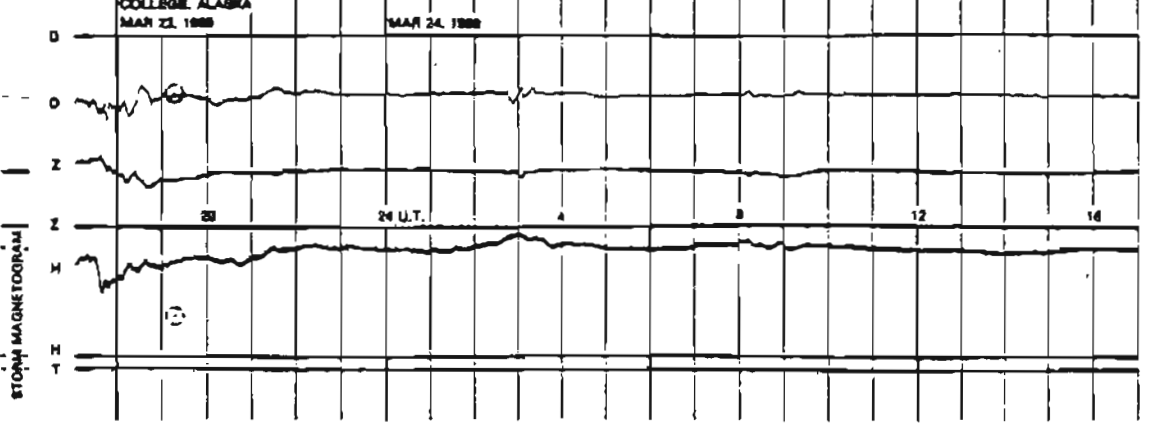
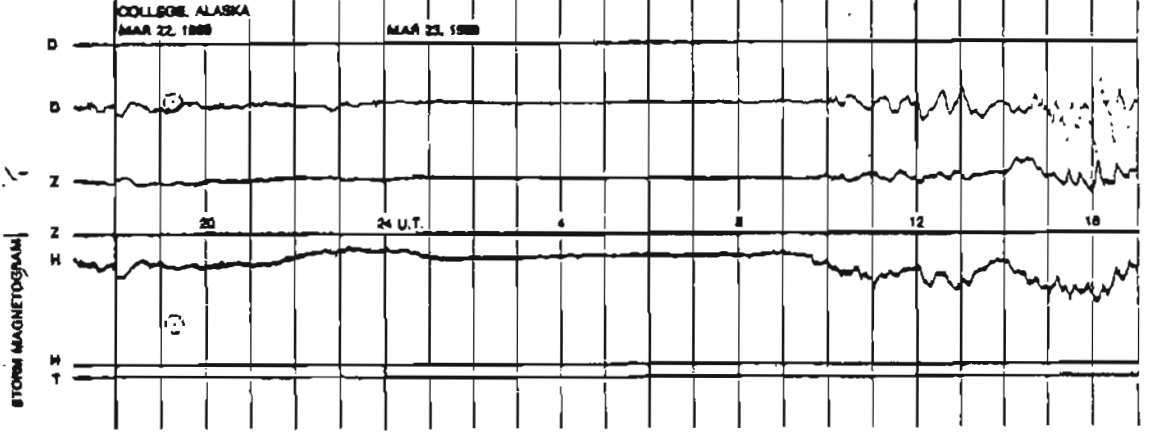
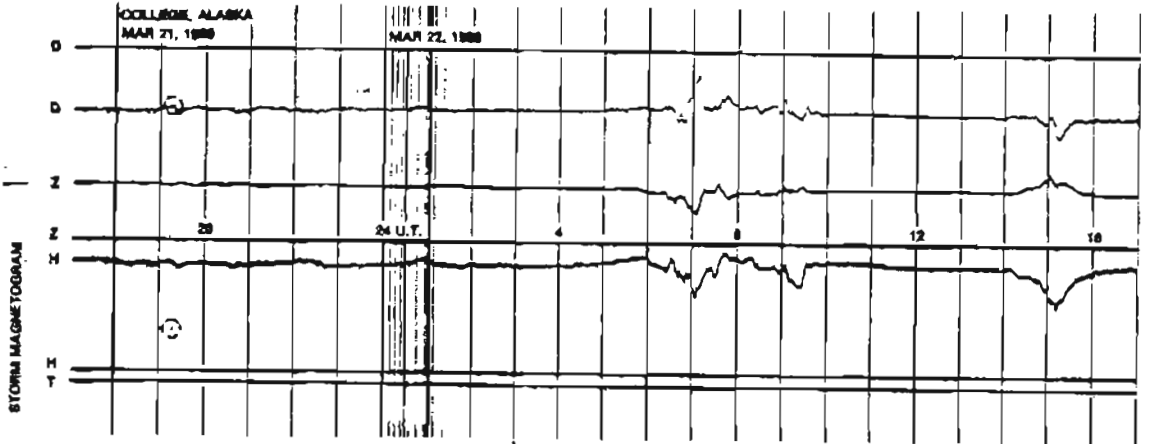
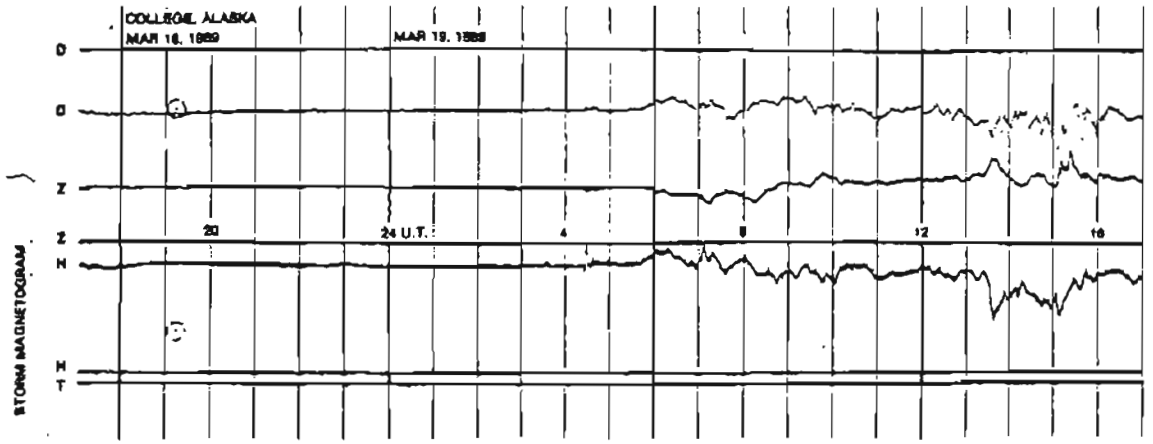
# STORM MAGNETOGRAMS



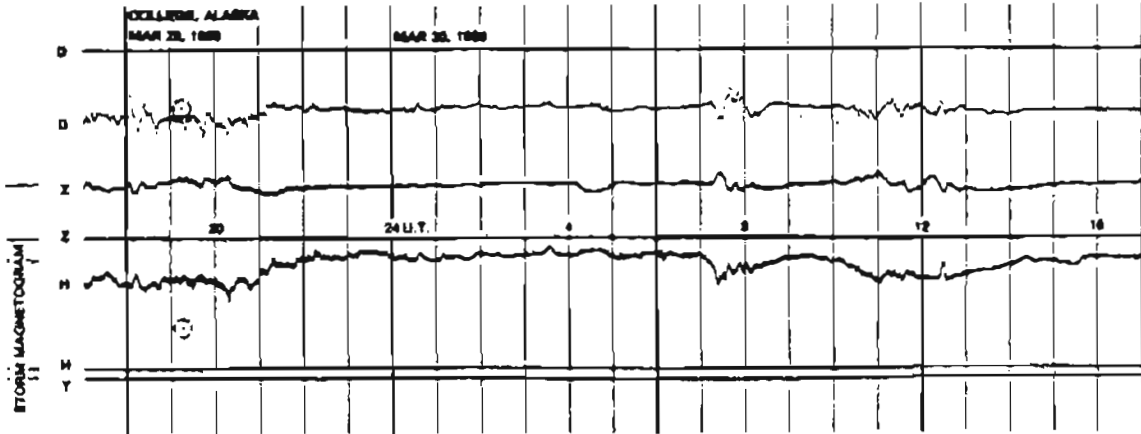
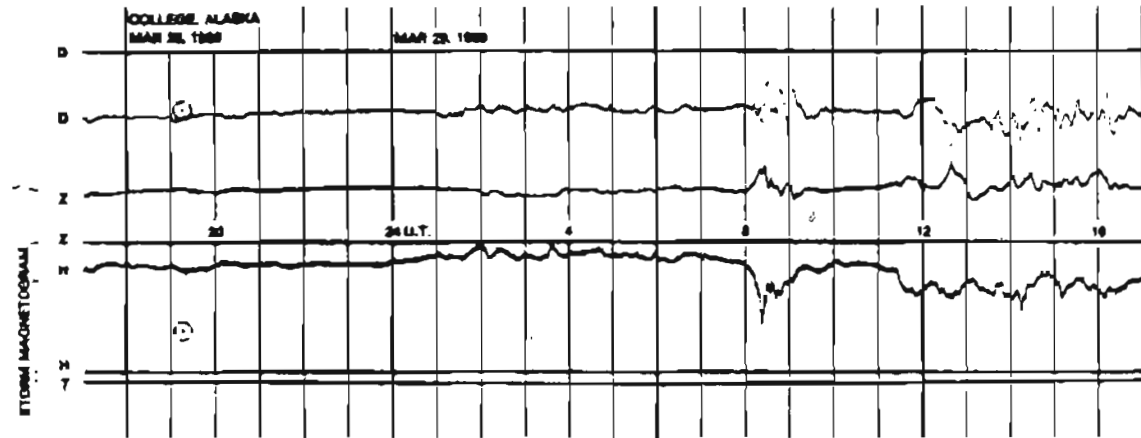
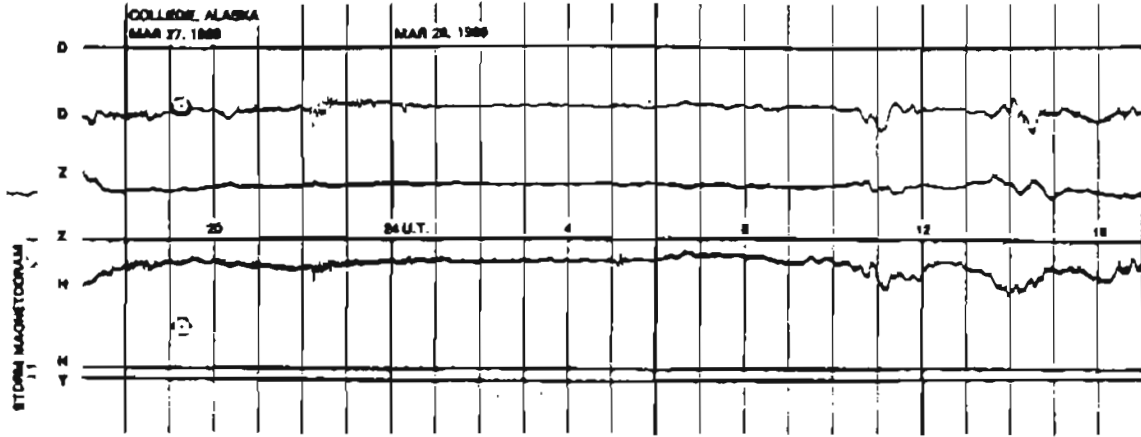
# STORM MAGNETOGRAMS



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