

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

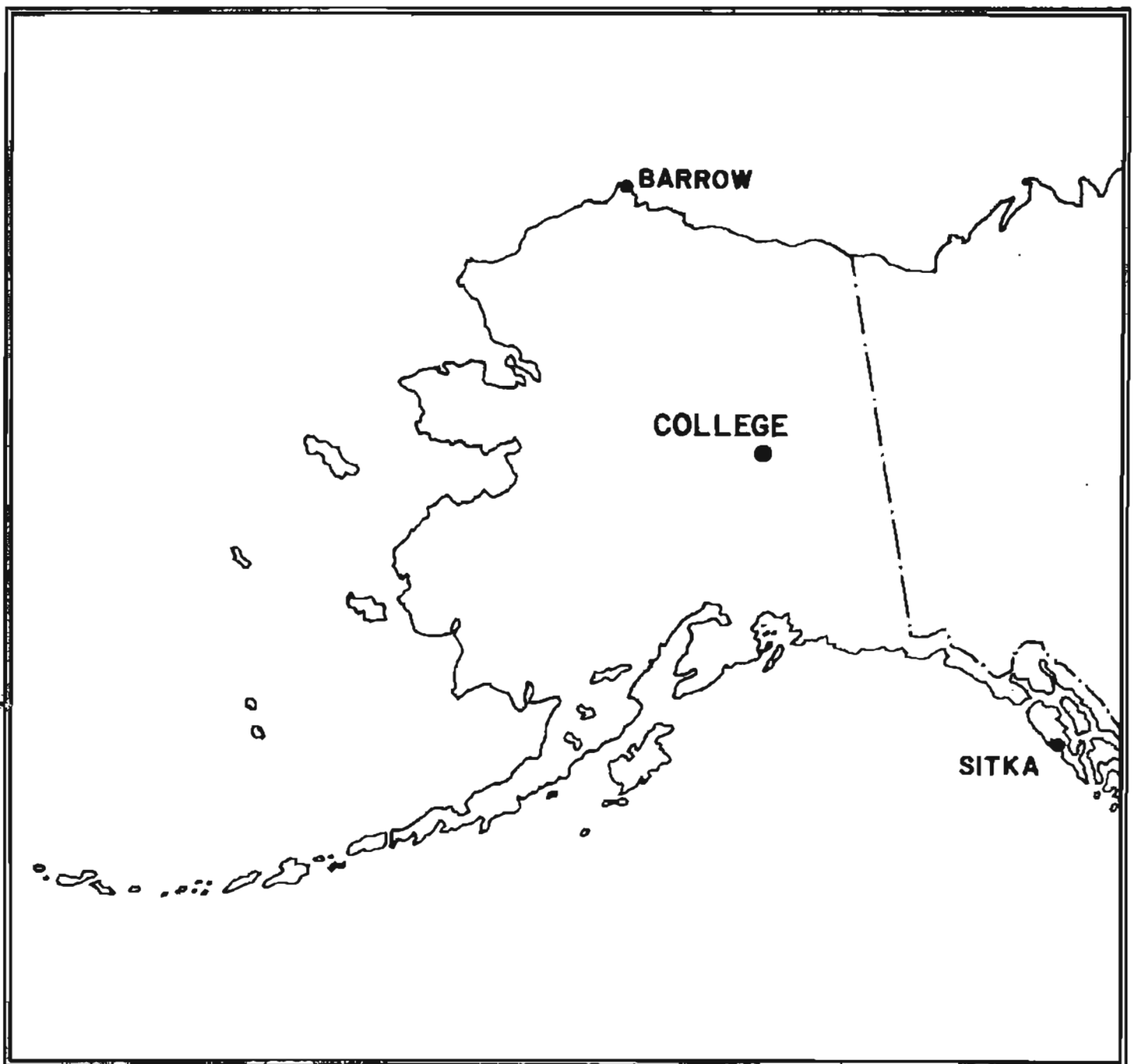
PRELIMINARY GEOMAGNETIC DATA

COLLEGE OBSERVATORY

FAIRBANKS, ALASKA

APRIL 1989

OPEN FILE REPORT 89-0300D



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 063m 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, a_k : The K-Index is converted into an equivalent range, a_k , 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 a_k is as follows:

Gamma Range	K - Index	a_k
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)

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, K, 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.

COLLEGE, ALASKA

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

MONTH AND YEAR
April 1989

DATE	K-INDICES								SUM	Ak	TIME SCALE ON MAGNETOGRAMS 20 mm/hr
	00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24			
1	5	4	7	5	6	5	4	4	40	56	SUDDEN COMMENCEMENTS d h m
2	3	4	6	5	6	5	3	4	36	43	
3	3	2	2	3	6	5	4	4	29	28	
4	5	5	4	6	4	6	6	4	40	52	
5	5	4	7	6	5	4	3	3	37	50	
6	4	3	2	3	3	3	2	2	22	14	
7	2	2	5	5	5	7	6	3	35	49	
8	4	3	7	5	4	6	4	3	36	47	
9	4	2	3	3	2	4	4	2	24	17	
10	2	2	2	3	3	2	1	1	16	08	
11	2	2	1	5	2	5	1	1	19	16	
12	1	2	2	1	1	1	1	1	10	04	
13	2	3	5	6	5	5	2	2	30	33	
14	3	3	3	3	5	4	5	5	31	29	
15	4	5	6	6	4	5	2	2	34	41	
16	2	1	1	1	4	6	3	4	22	21	
17	4	1	3	4	3	5	2	2	24	19	
18	3	4	2	2	1	0	0	0	12	07	
19	0	0	0	1	3	3	1	2	10	05	
20	3	4	4	2	1	2	2	2	20	13	
21	1	2	2	3	2	1	1	1	13	06	
22	2	1	0	0	1	1	1	2	8	03	
23	2	0	2	2	6	6	5	2	25	30	
24	2	3	1	1	2	2	2	2	15	07	
25	2	2	2	4	3	6	7	5	31	41	
26	5	5	6	6	5	5	5	5	42	56	
27	5	5	5	6	4	4	5	4	38	44	
28	4	4	7	5	5	4	5	4	38	49	
29	3	3	4	5	6	5	5	4	35	39	
30	4	4	6	6	6	3	2	2	33	40	
31											

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

3.69

2490

H

322.2

7.77

2500

Z

(mm)

(γ /mm)

(to nearest 10 γ)

SCALINGS AND COMPUTATIONS HAVE BEEN CHECKED.

APPROVED

John B. Townshend, Chief

OBSERVER IN CHARGE

PRINCIPAL MAGNETIC STORMS
COLLEGE OBSERVATORY, COLLEGE, ALASKA

Data from Individual Observatories:

April 19 89

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

Obs. # letter IAGA code	Geomag. lat.	Commencement		SC - amplitudes			Max. 3 hr - index K			Ranges			UT End		
		day	hr min (UT)	type	D(')	H(Y)	Z(Y)	day	(3 hr - period)	K	D(')	H(Y)	Z(Y)	day	hr
C0	64.06 N	3	13XX	..				5	3	7	192	1440	785	6	04
		25	16XX	..				28	3	7	221	1790	975	28	21

NORMAL MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE	BASILINE	
D	0001 UT, 4/1/89	2400 UT, 4/15/89	1.0' /mm	3.7 γ/mm	26° 51.4' E
	0001 UT, 4/16/89	2400 UT, 4/30/89	(SAME)		26° 51.2' E
H	0001 UT, 4/1/89	2400 UT, 4/6/89	7.8 γ/mm		12620 γ
	0001 UT, 4/7/89	2400 UT, 4/13/89	(SAME)		12625 γ
	0001 UT, 4/14/89	2400 UT, 4/30/89	(SAME)		12630 γ
Z	0001 UT, 4/1/89	2400 UT, 4/6/89	7.7 γ/mm		55168 γ
	0001 UT, 4/7/89	2400 UT, 4/13/89	(SAME)		55166 γ
	0001 UT, 4/14/89	2400 UT, 4/30/89	(SAME)		55164 γ

STORM MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE	BASILINE	
D	0001 UT, 4/1/89	2400 UT, 4/30/89	7.9' /mm	29.5 γ/mm	
	(SAME)	(SAME)			
H	(SAME)	(SAME)	43.6 γ/mm		
Z	(SAME)	(SAME)	49.3 γ/mm		

RAPID RUN MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION	
	FROM	TO	SCALE VALUE	BASILINE
D				
H				
Z				

MONTHLY MEAN ABSOLUTE VALUES*

D	H	Z
27° 04.7' E	12802 γ	55325 γ

* COMPUTED FROM FIVE QUIETEST DAYS DURING MONTH.

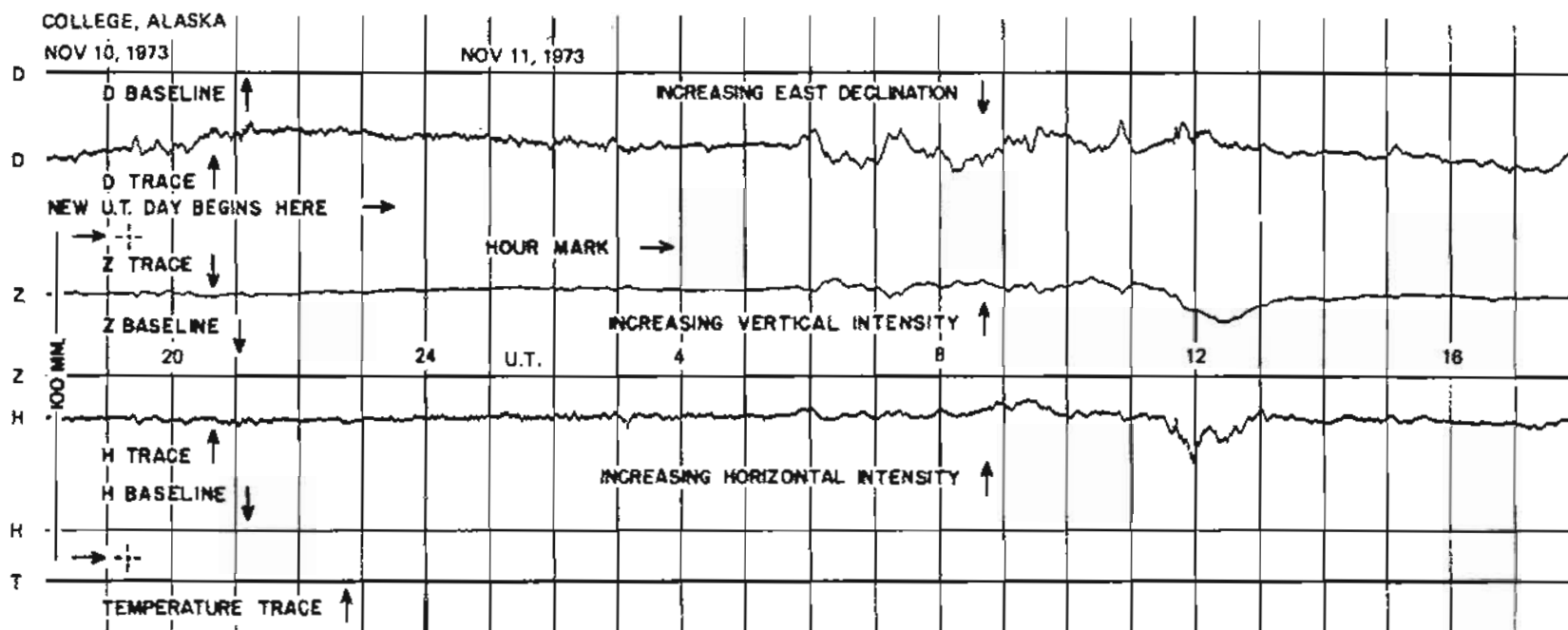
DAYS USED: APR 12, 19, 21, 22, 24.

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

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

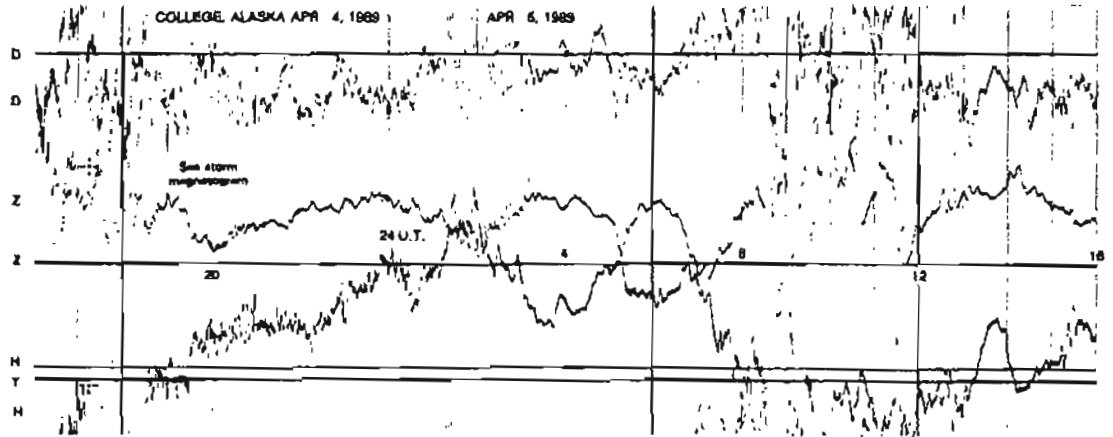
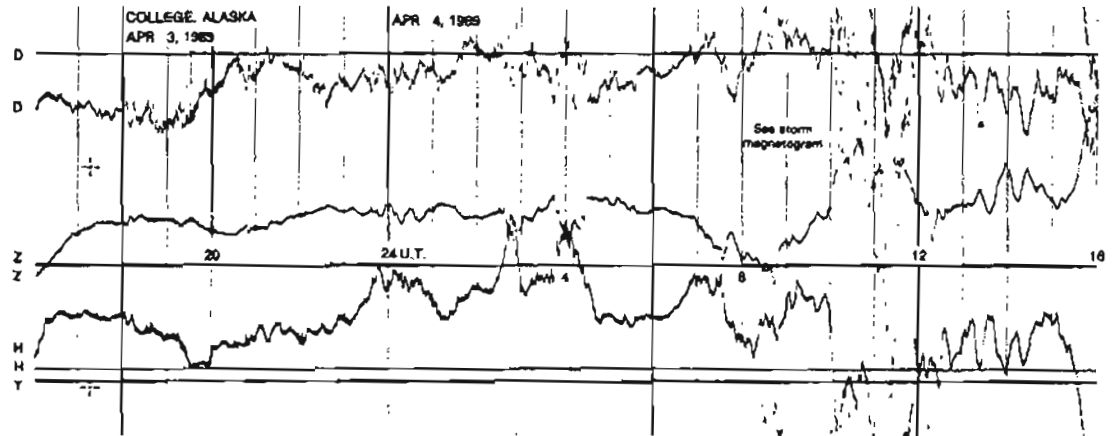
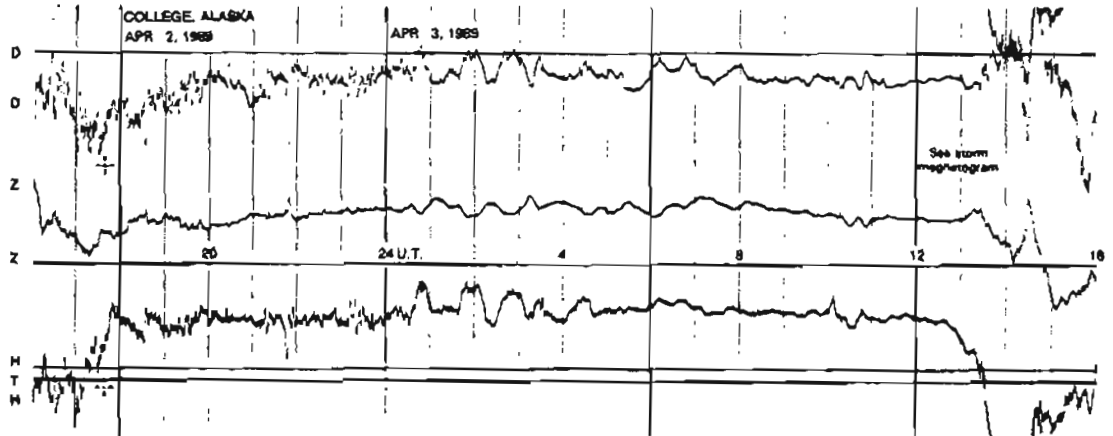
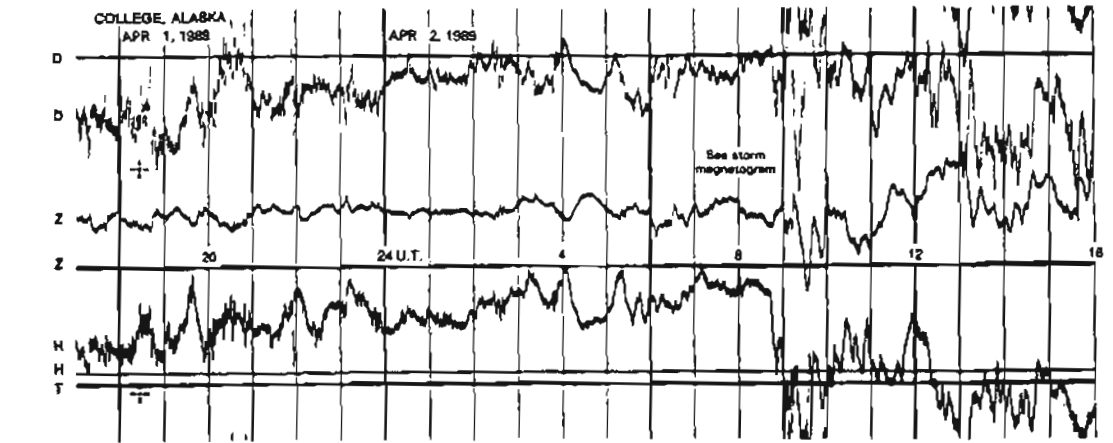
COMPONENT DAY hr	D									H									Z								
	12	19	21	22	24	12	19	21	22	24	12	19	21	22	24	12	19	21	22	24							
	04	05	06	03	07	04	05	06	03	07	04	05	06	03	07	04	05	06	03	07							
01	98	100	64	74	51	190	189	199	206	240	216	219	236	241	230	213	234	202	192	241							
02	82	79	53	79	51	197	192	197	212	234	223	213	253	264	250	204	222	200	219	264							
03	70	80	70	58	60	213	199	180	198	260	225	214	254	275	230	204	222	203	201	275							
04	71	80	90	88	40	240	208	229	211	264	230	210	234	263	252	213	230	203	205	263							
05	99	102	90	98	84	270	217	257	224	201	252	213	230	256	210	210	203	203	203	256							
06	120	108	121	109	91	260	220	250	224	200	253	210	243	226	224	210	243	203	203	226							
07	111	129	120	113	101	241	220	230	237	212	224	211	234	215	224	211	234	202	202	215							
08	117	126	101	122	110	240	226	268	231	220	213	211	220	213	213	211	220	200	200	213							
09	111	119	103	118	111	250	230	259	238	240	208	204	222	213	208	204	222	195	195	213							
10	120	121	112	121	112	251	249	256	239	251	204	210	218	225	204	210	218	194	194	225							
11	129	131	110	119	106	261	240	256	242	250	214	198	200	208	214	198	200	190	190	208							
12	131	113	131	119	101	250	246	209	239	240	206	190	176	197	206	190	176	194	194	197							
13	140	158	142	135	114	241	170	227	230	201	196	150	141	206	196	150	141	183	183	206							
14	150	143	125	141	151	240	219	241	249	237	199	146	166	195	199	146	166	185	185	195							
15	162	98	188	178	159	247	240	239	228	259	203	186	181	206	203	186	181	199	199	206							
16	169	179	197	242	159	250	171	264	225	240	205	203	200	210	205	203	200	193	193	210							
17	182	236	229	239	221	250	150	260	239	240	200	162	210	216	200	162	210	190	190	216							
18	208	256	255	241	227	233	251	240	229	230	199	166	209	203	199	166	209	189	189	203							
19	219	237	241	220	208	258	240	230	213	240	198	194	200	199	198	194	200	192	192	199							
20	219	202	203	244	190	243	245	208	189	227	204	192	199	198	204	192	199	206	206	198							
21	207	181	162	223	159	230	223	195	180	230	203	197	187	190	203	197	187	191	191	190							
22	175	149	125	121	138	219	210	195	170	208	202	193	188	200	202	193	188	175	175	200							
23	150	128	117	97	119	208	196	193	184	220	204	197	197	210	204	197	197	176	176	210							
24	103	93	95	59	92	189	216	192	213	224	209	202	197	222	209	202	197	174	174	222							
DAILY SUM	3343	3348	3244	3358	2935	5671	5167	5474	5250	5568	5090	4691	4995	5251	5090	4691	4995	4651	4651	5251							
DAILY MEAN	139	140	135	140	122	236	215	228	219	232	212	195	208	219	212	195	208	194	194	219							
MEAN	135																		226			206			206		
Scanned 7870																											
Checked CAJ																											

FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)



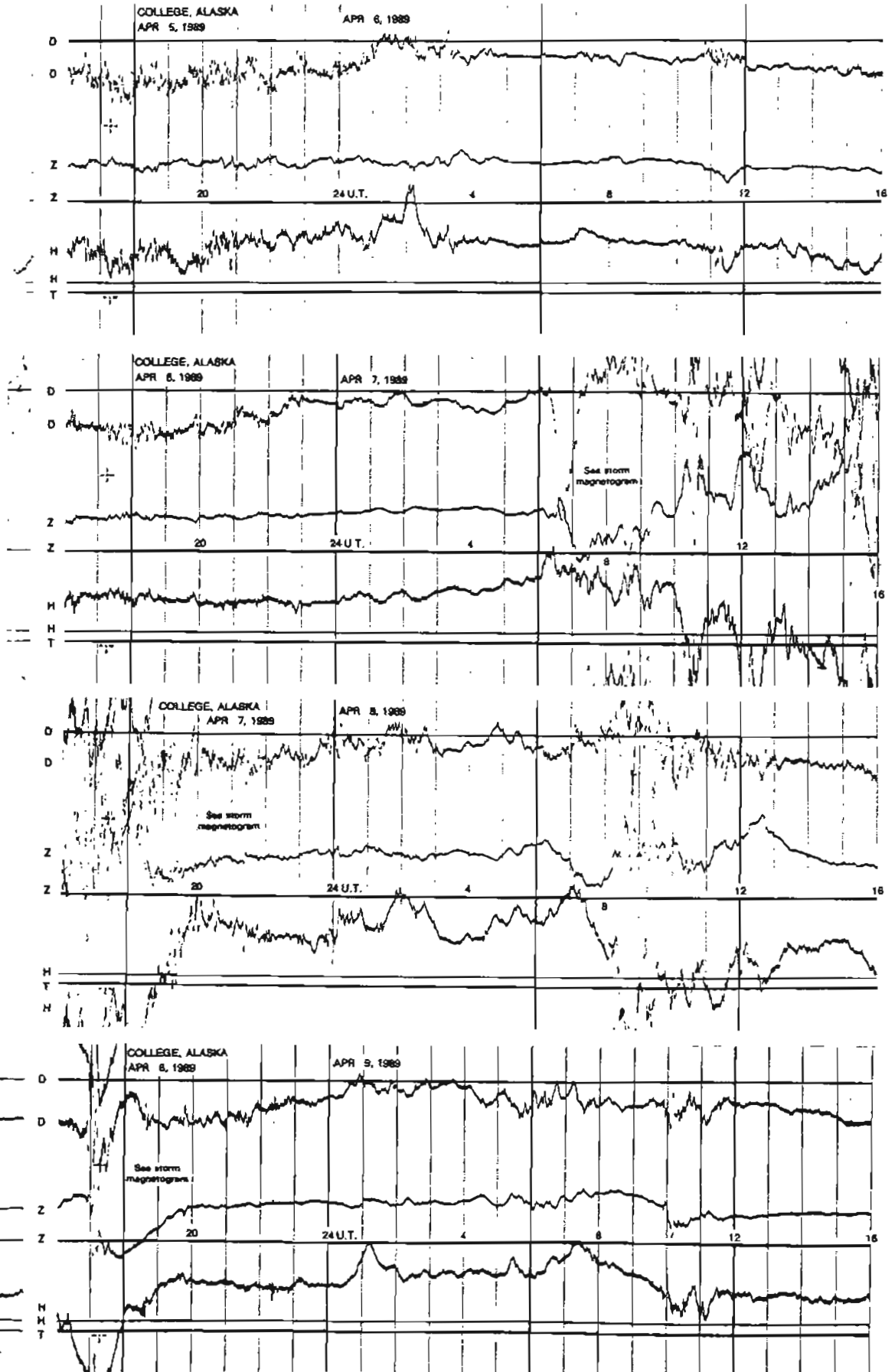
SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES

NORMAL MAGNETOGRAMS

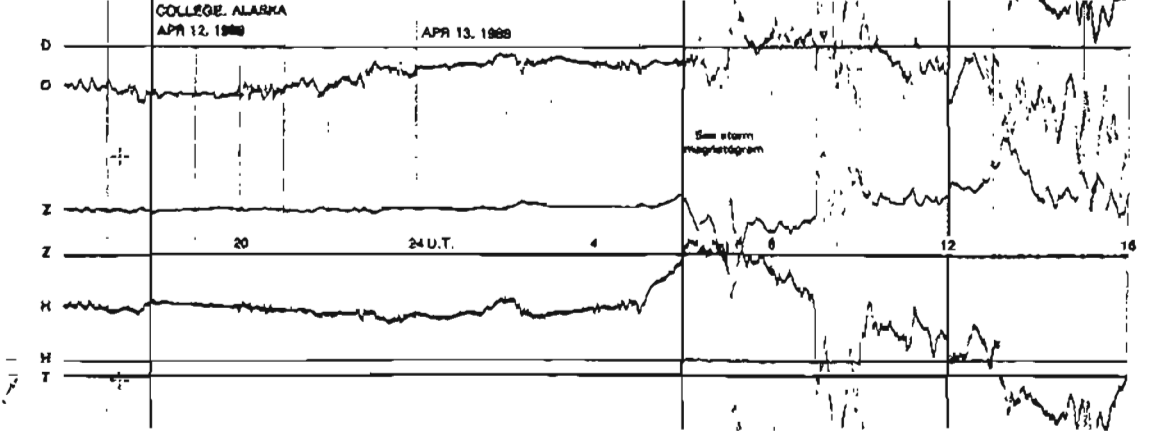
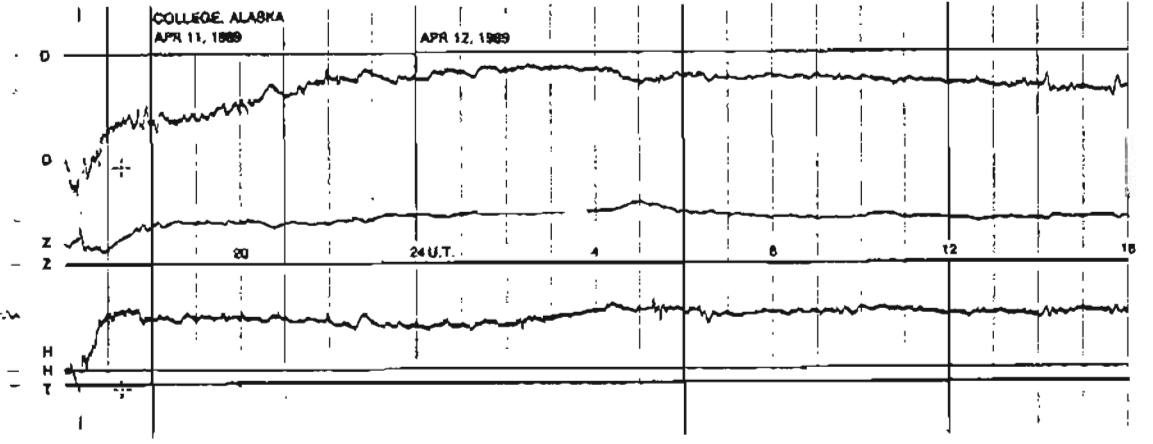
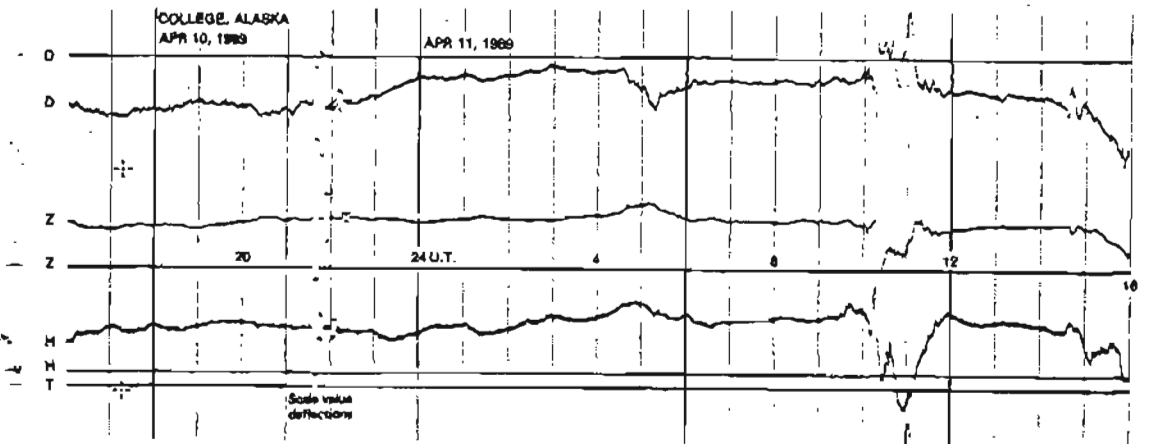
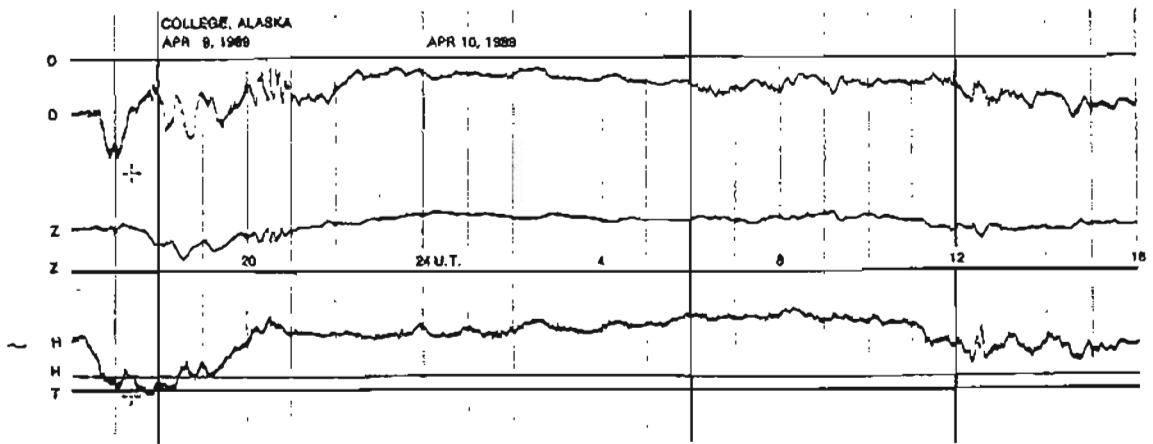


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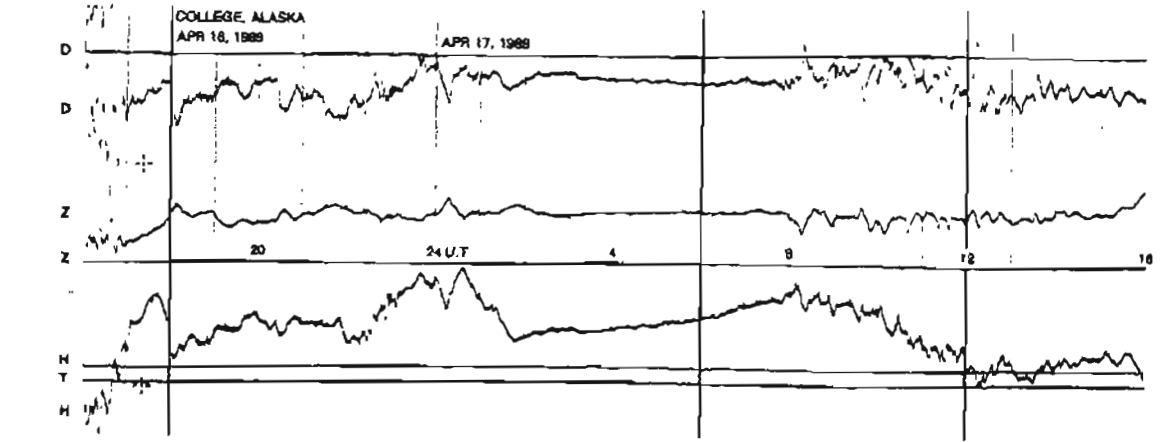
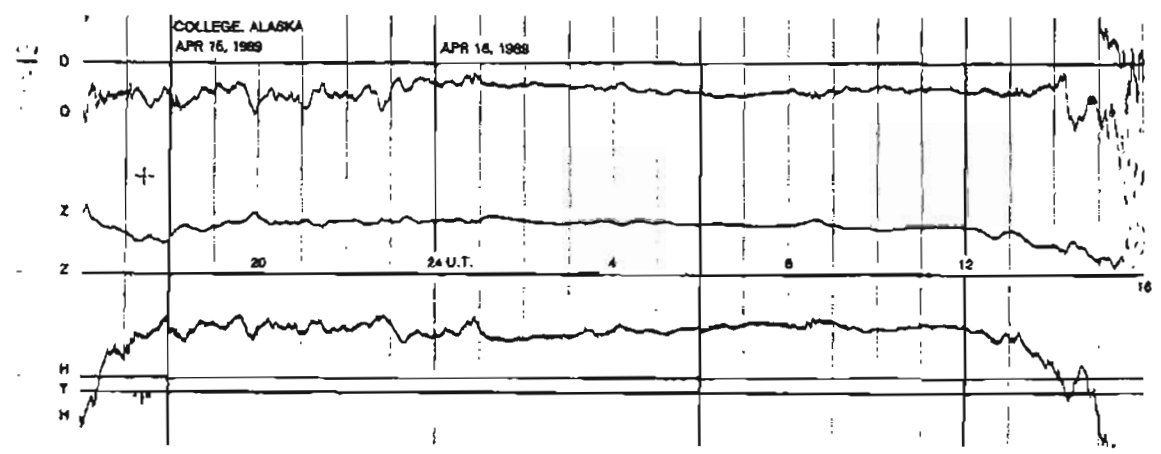
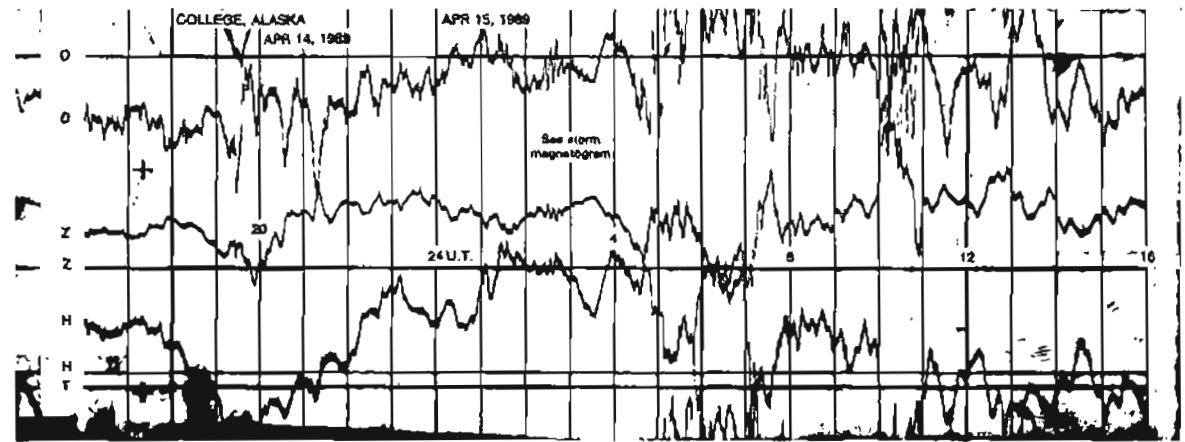
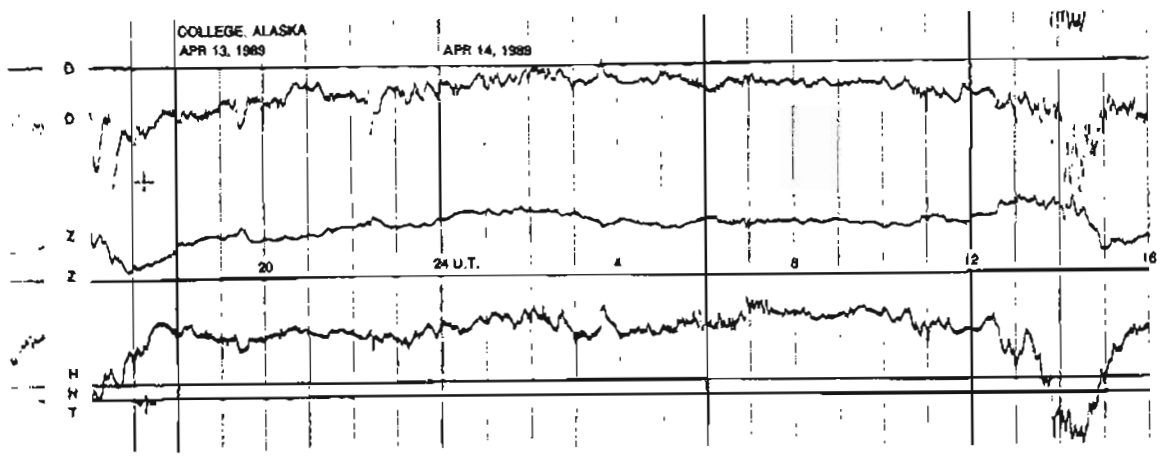
200 mm
100 mm
0



NORMAL MAGNETOGRAMS

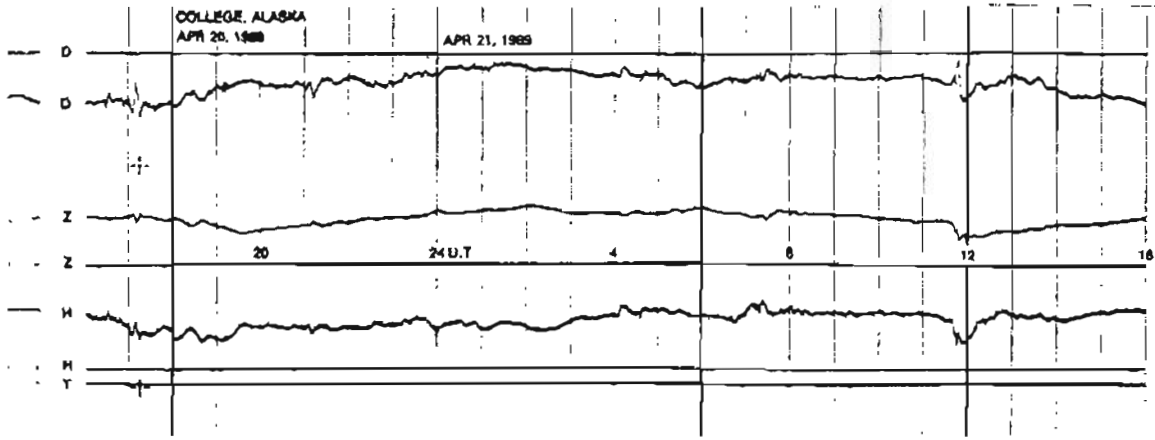
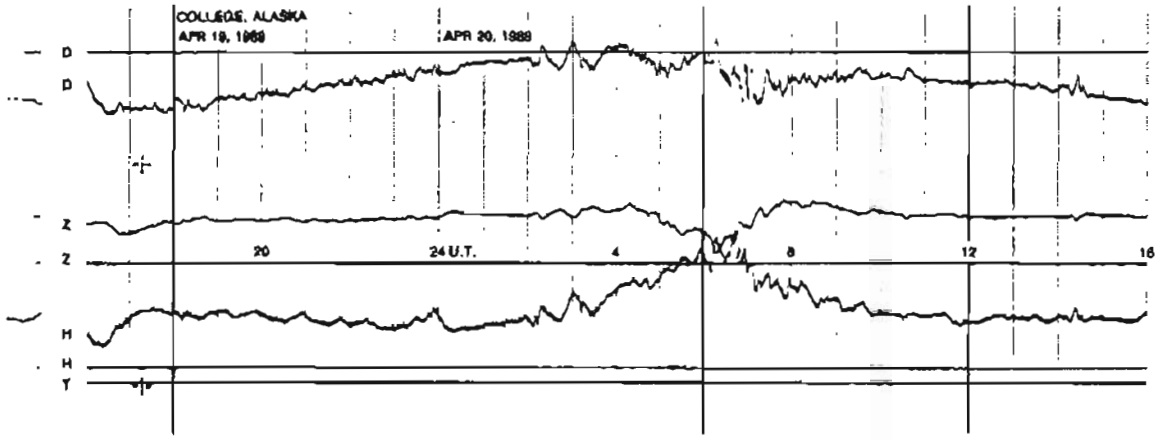
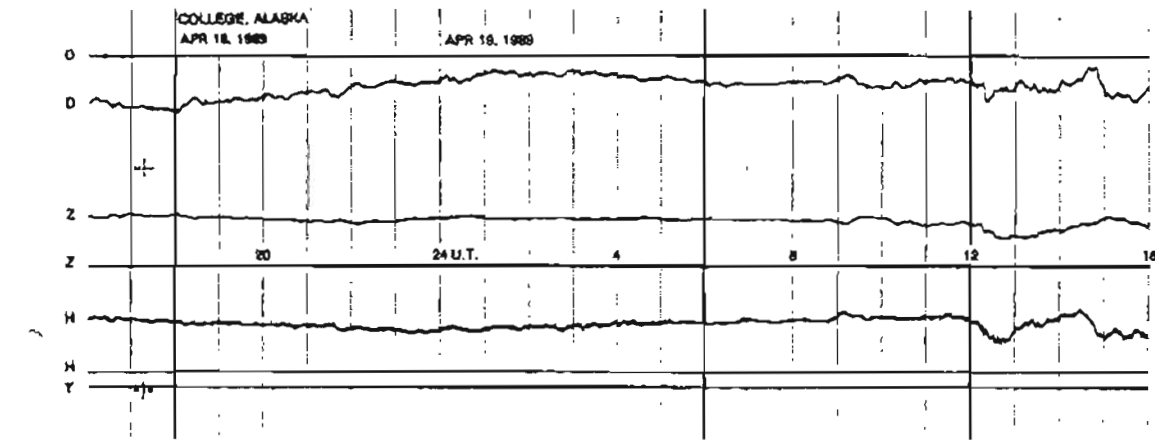
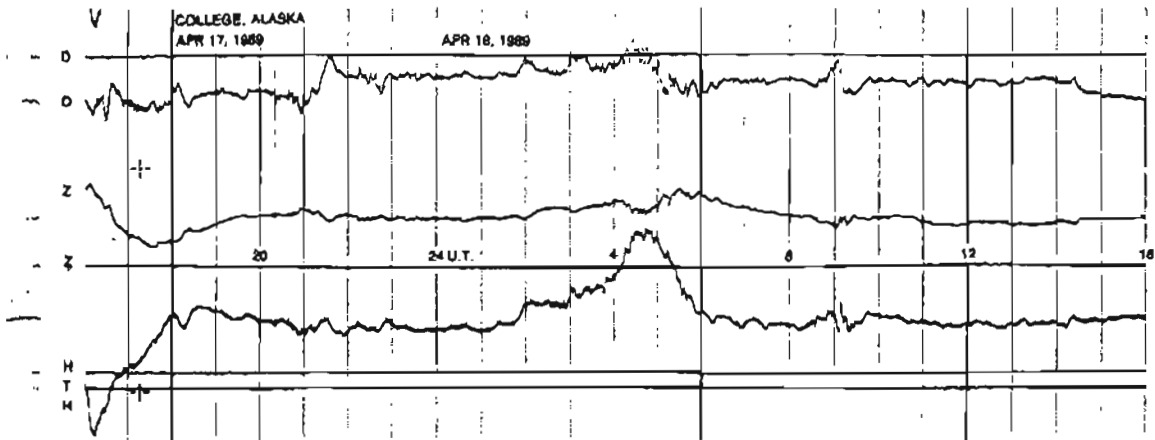


NORMAL MAGNETOGRAMS



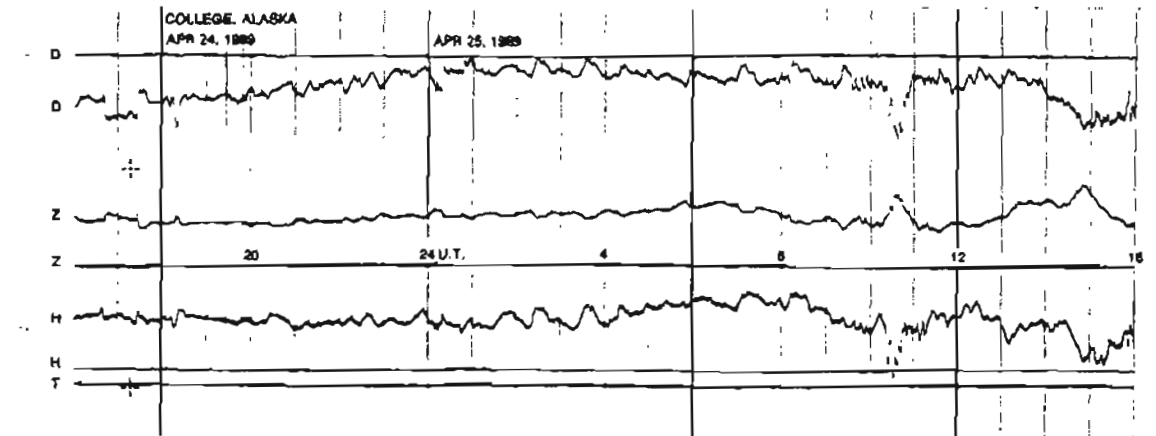
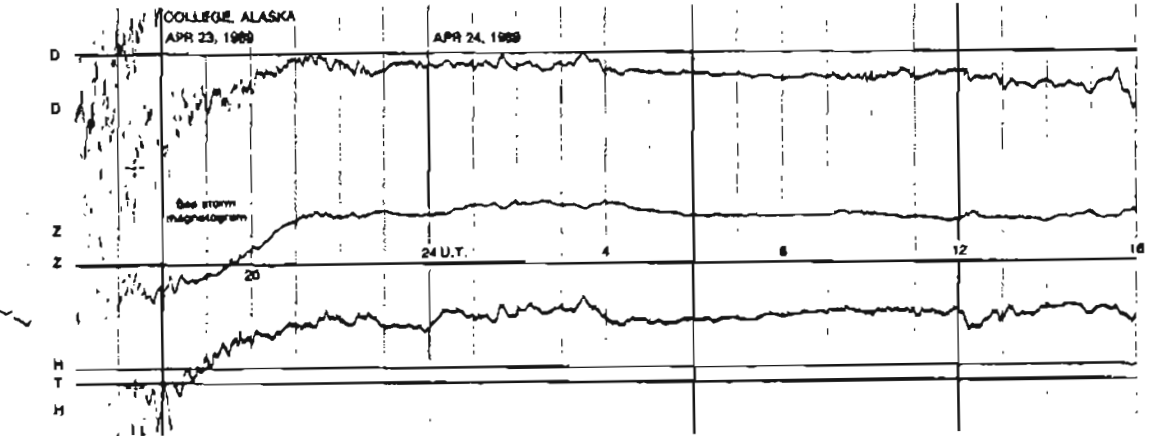
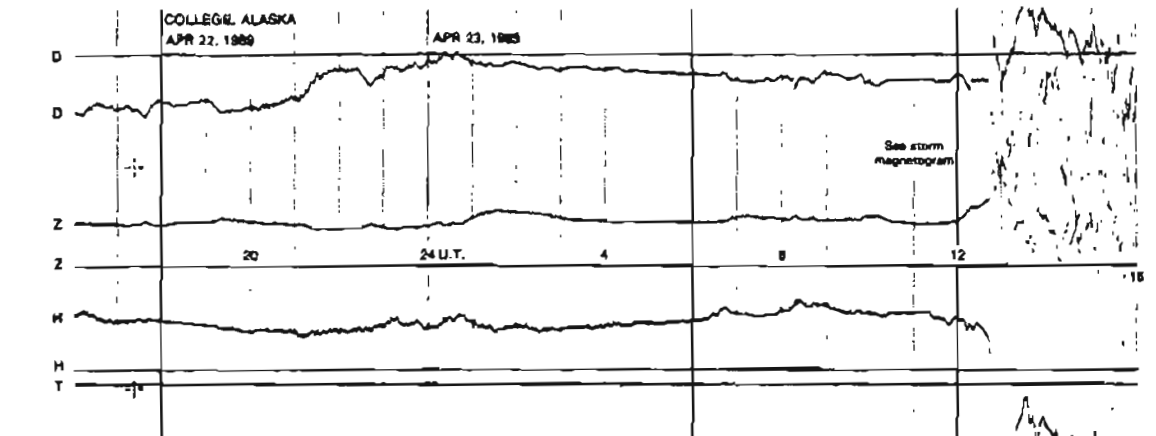
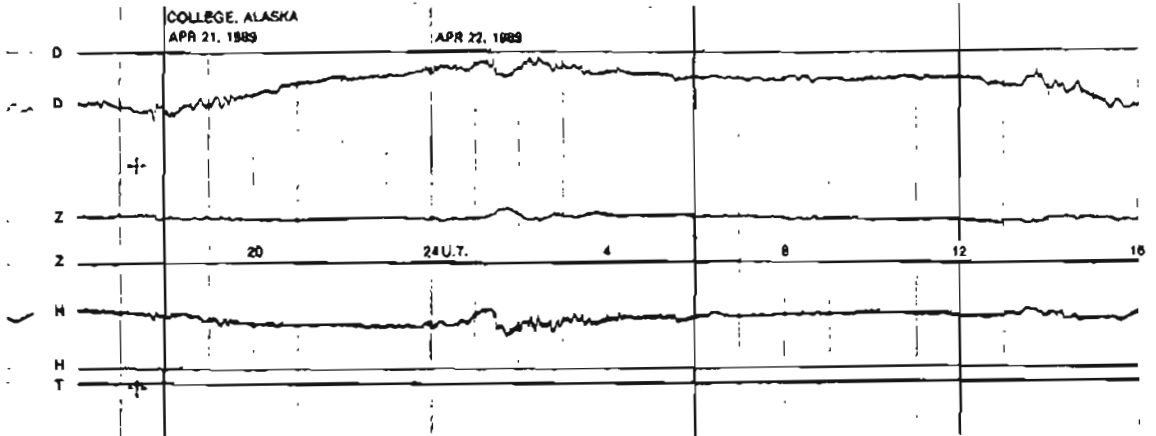
NORMAL MAGNETOGRAMS

200 mm
100 mm
0



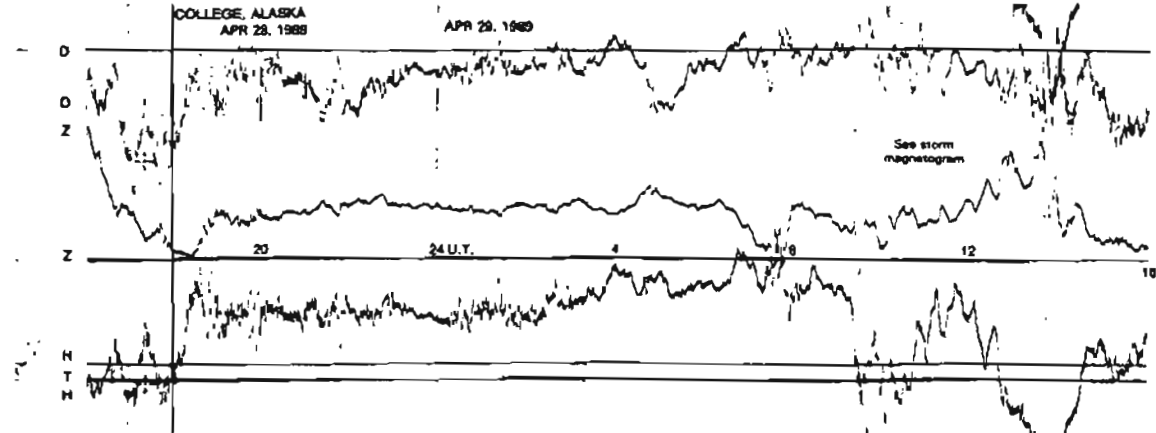
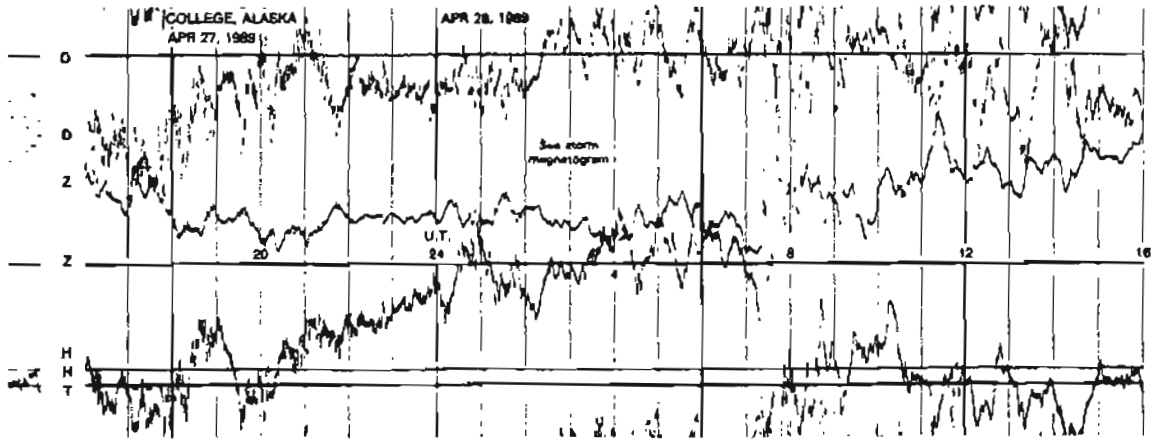
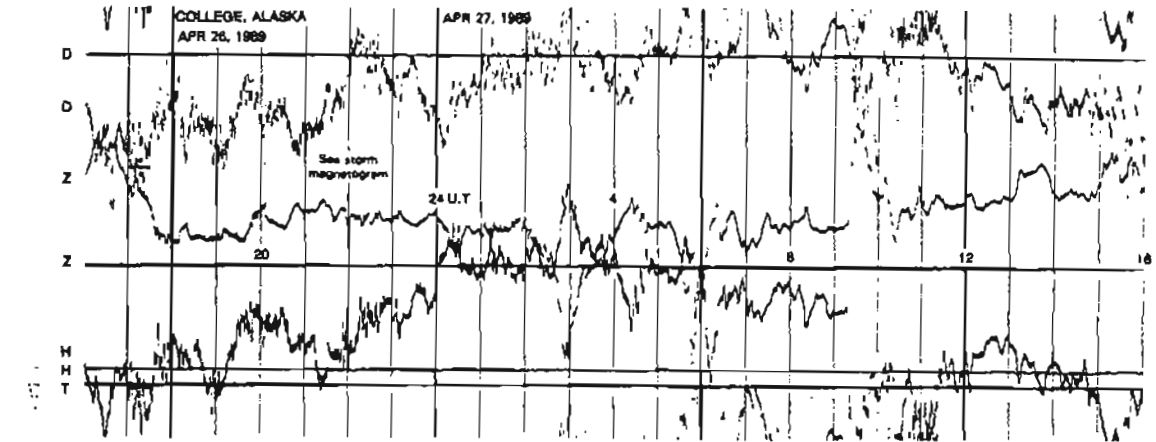
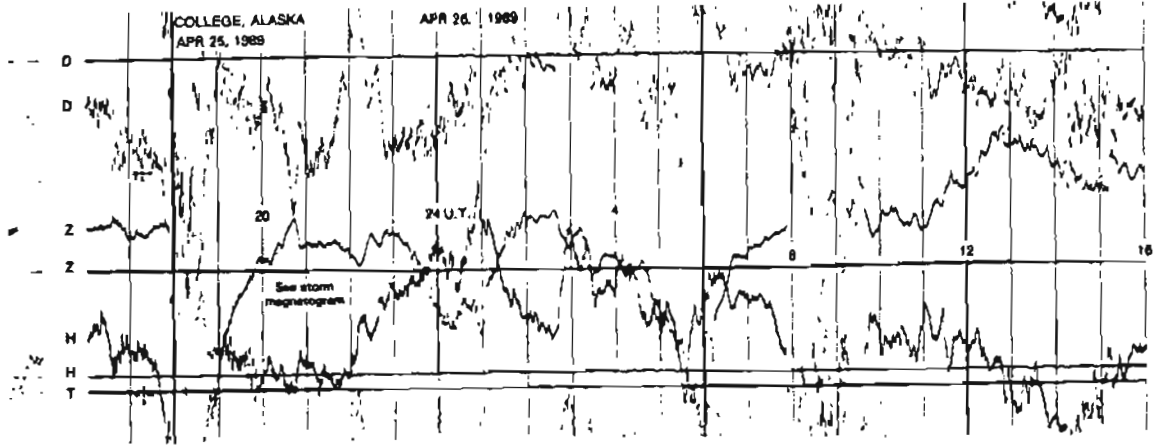
NORMAL MAGNETOGRAMS

200 mV
100 min



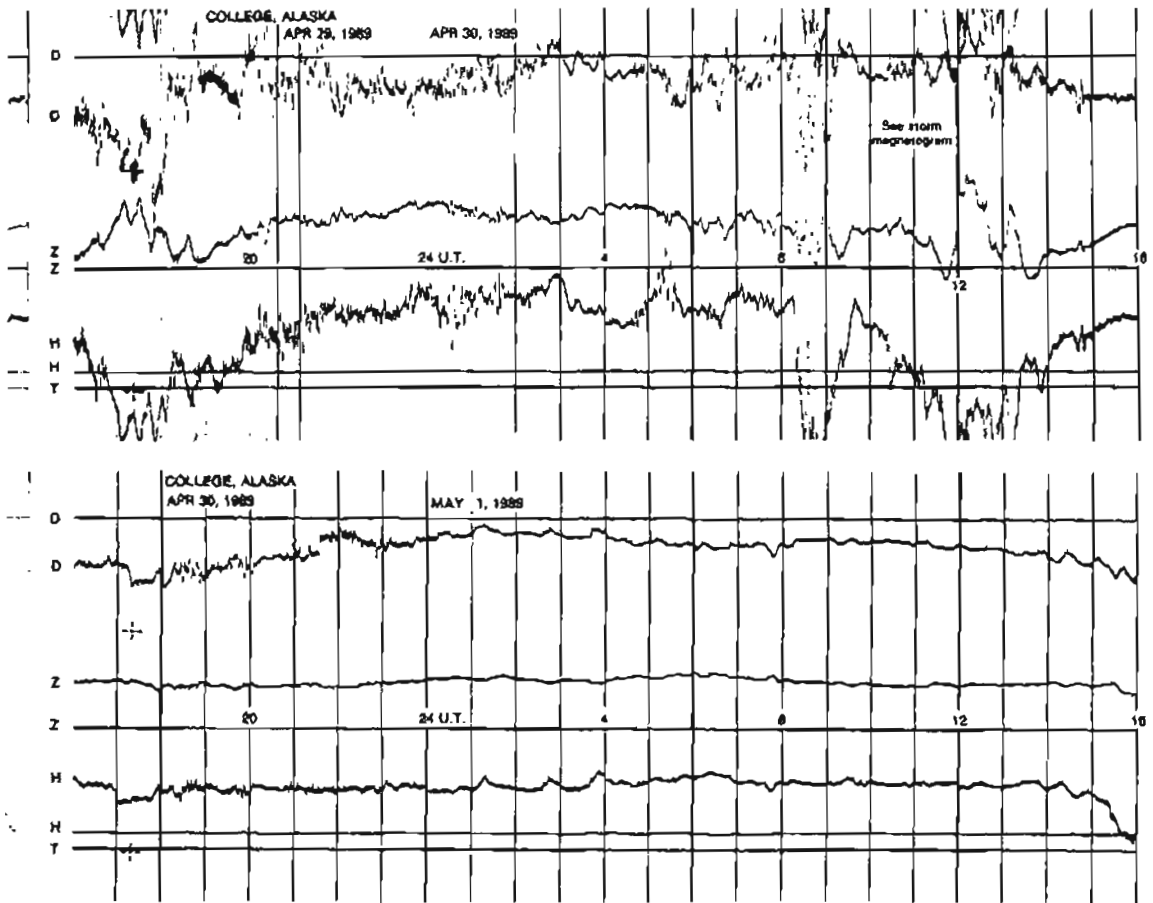
NORMAL MAGNETOGRAMS

100 mV
100 mm
0

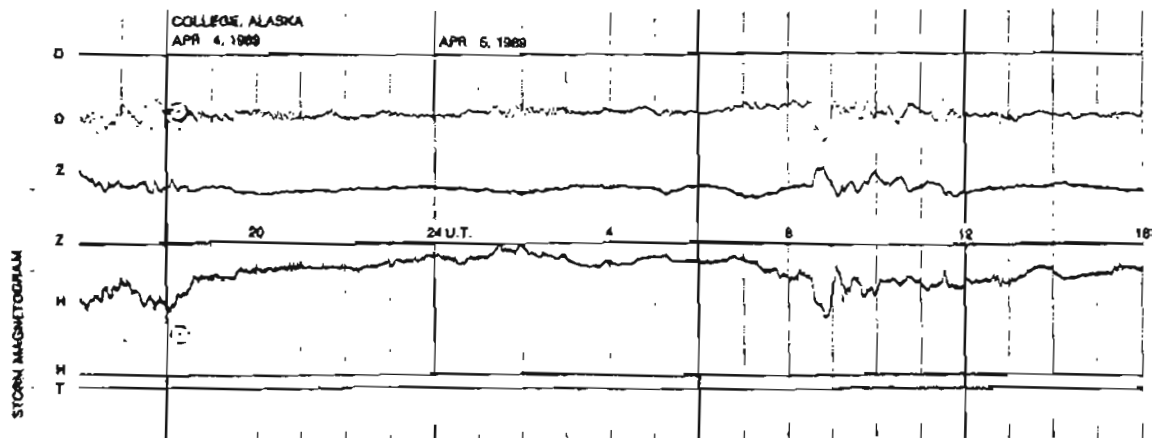
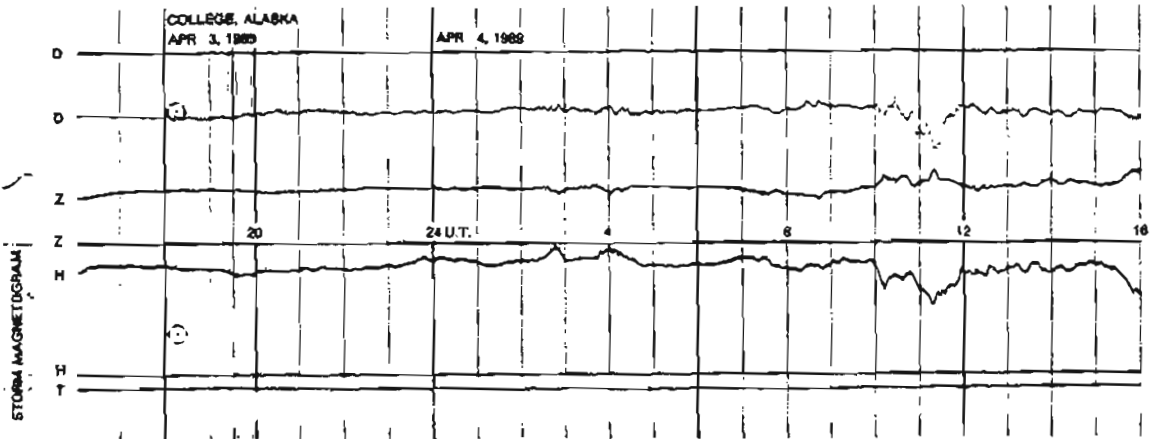
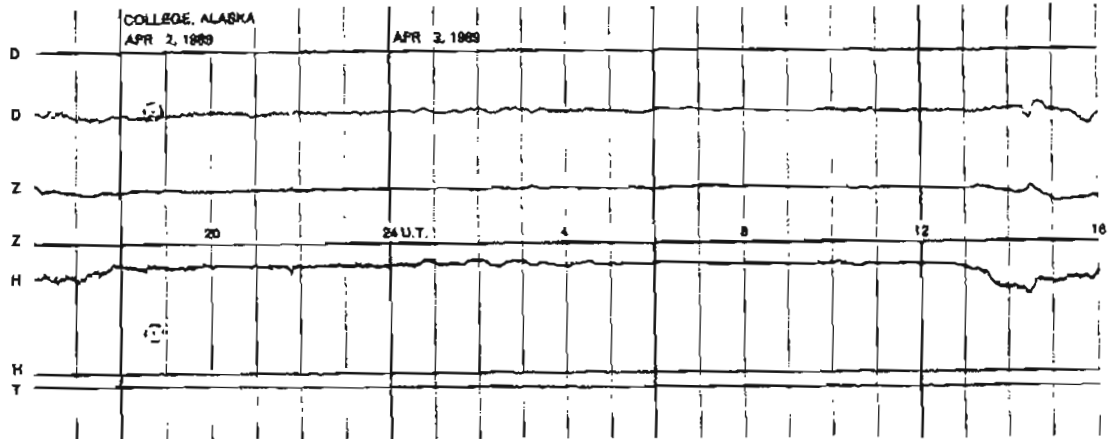
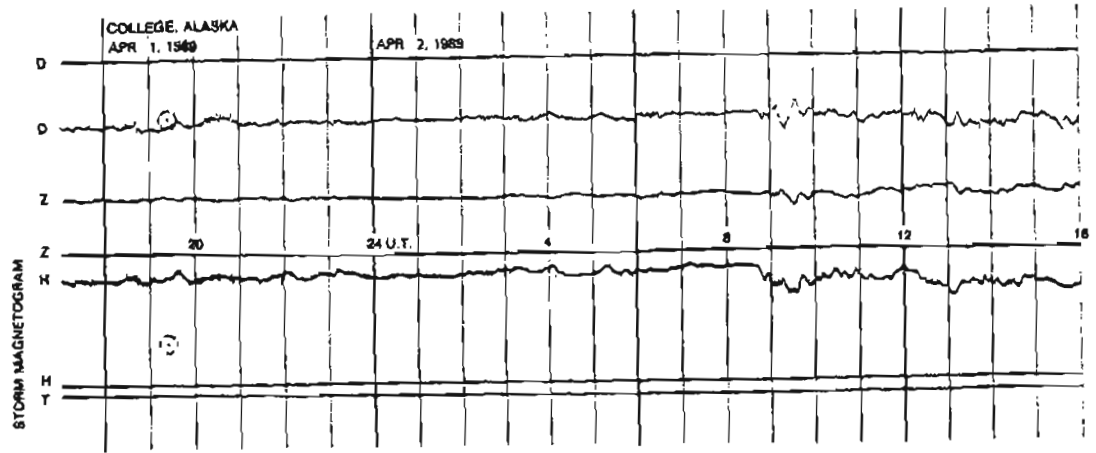


NORMAL MAGNETOGRAMS

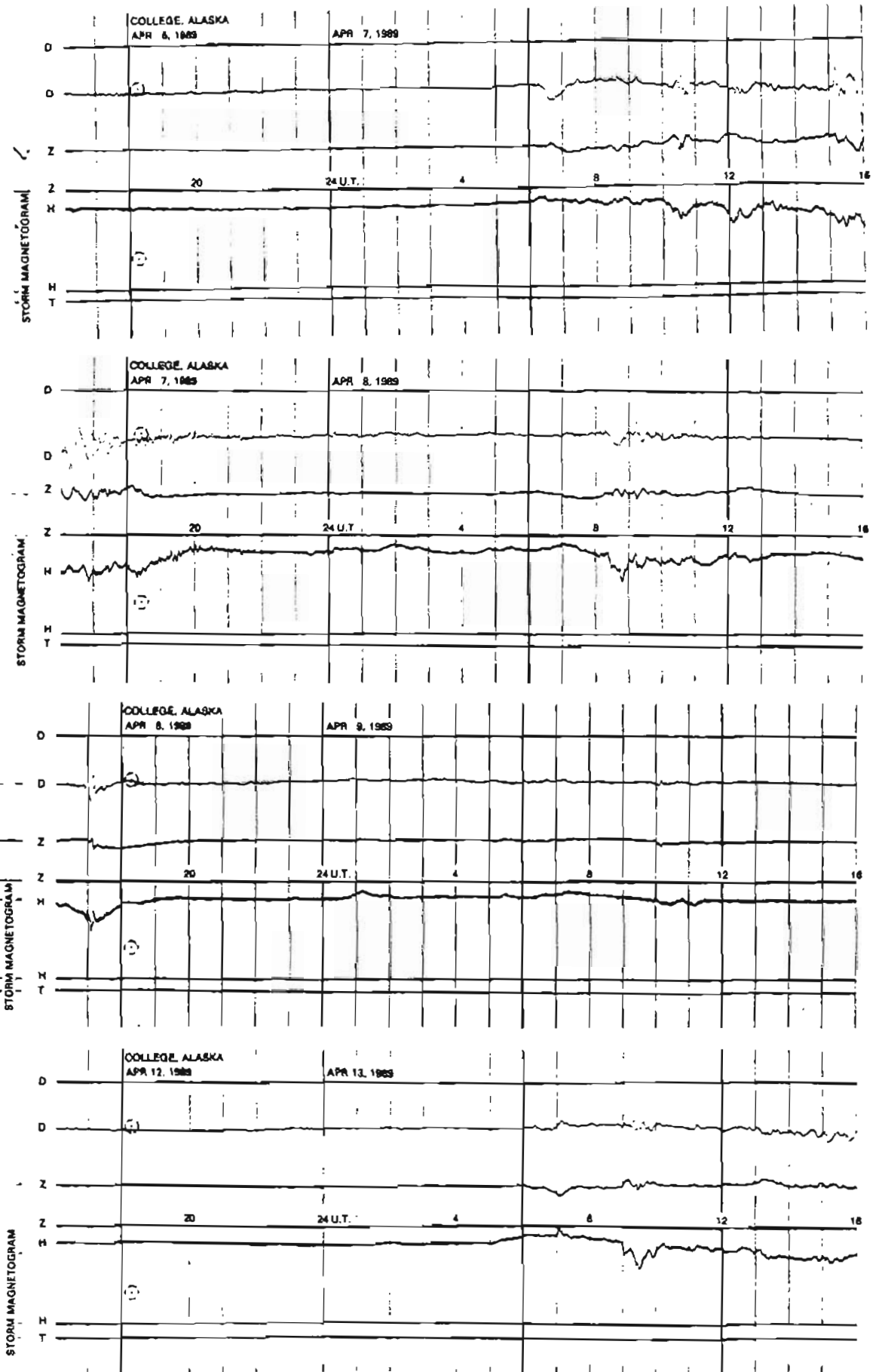
200mm
100mm
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STORM MAGNETOGRAMS

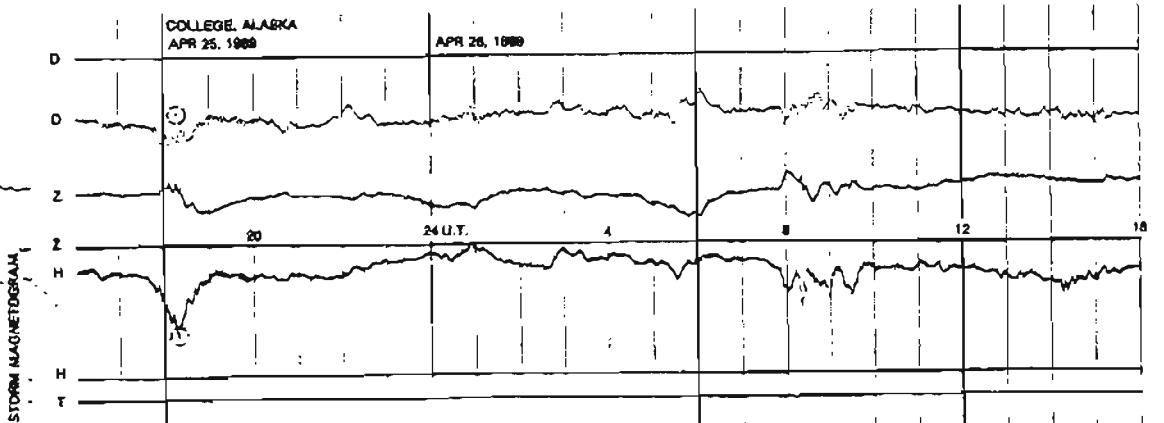
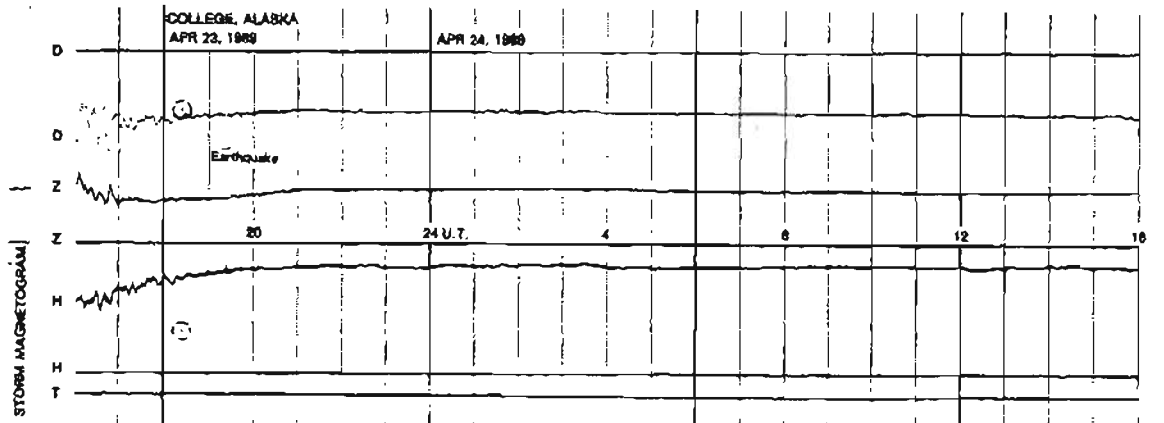
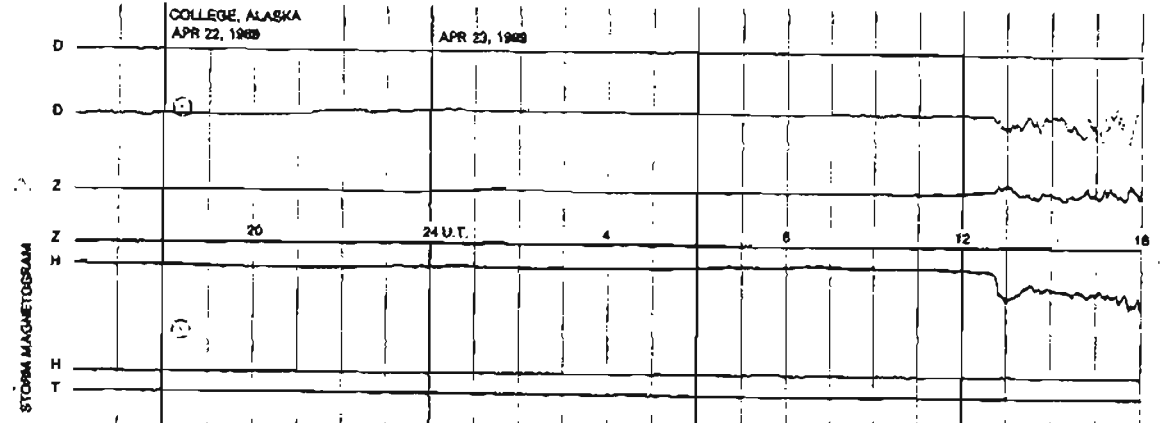
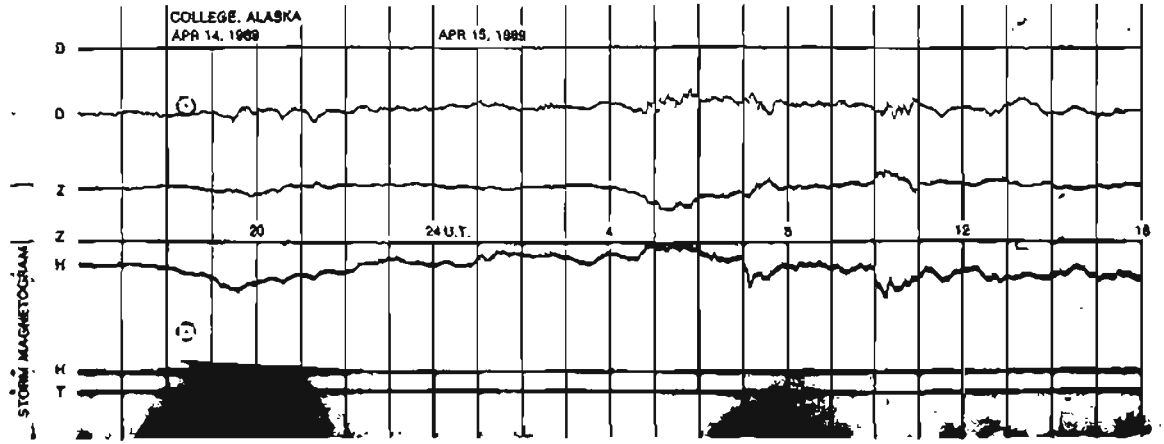


STORM MAGNETOGRAMS



STORM MAGNETOGRAMS

200mm
100mm
0



STORM MAGNETOGRAMS

