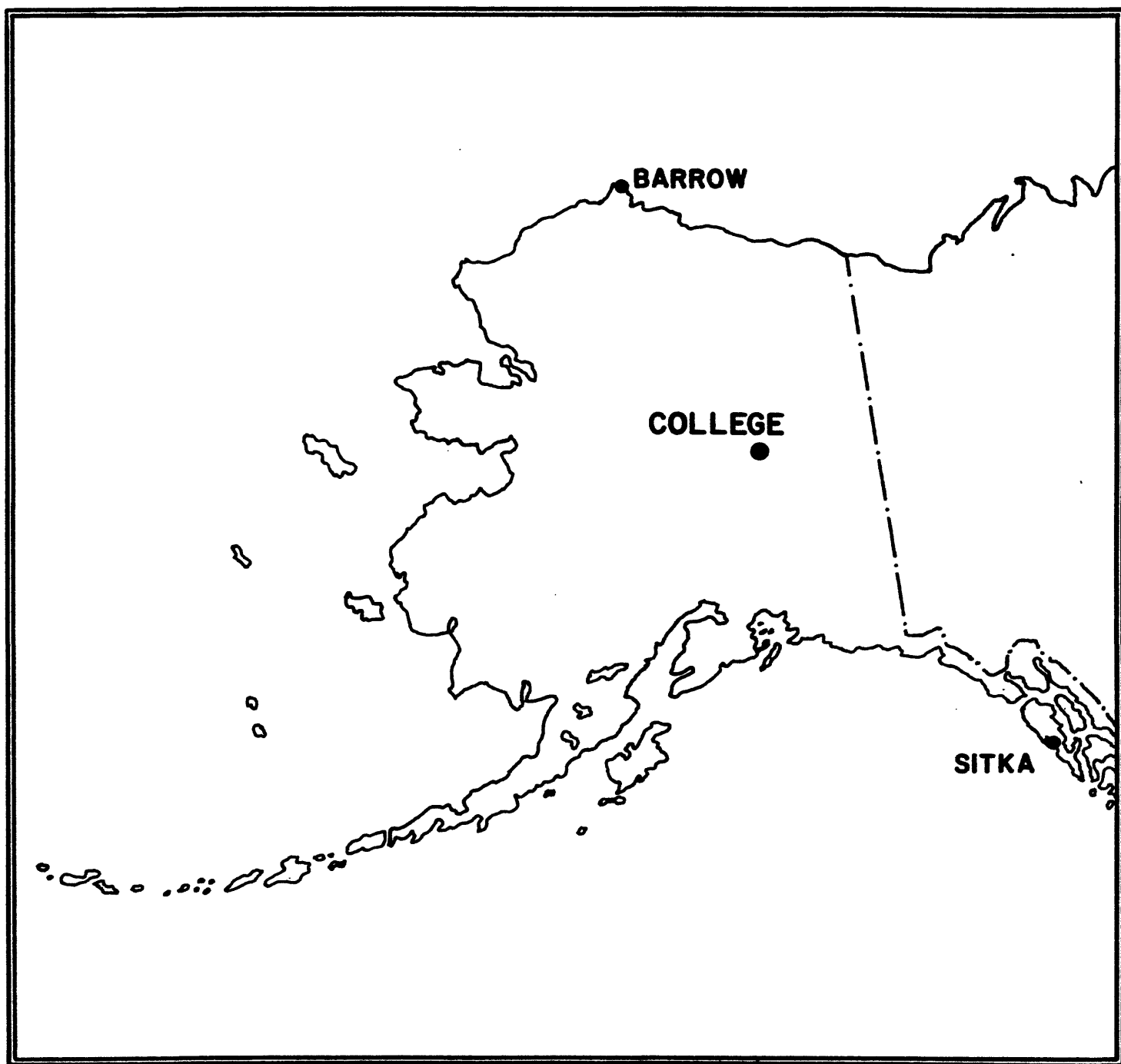


UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

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 D63m 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 10 $\gamma$  has been chosen so as not to give the illusion of a 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 $\gamma$ )

#### 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:

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

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 <b>COLLEGE, ALASKA</b>			
<b>MAGNETIC ACTIVITY</b> (Greenwich civil time, counted from midnight to midnight)										MONTH AND YEAR <b>April 1989</b>			
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	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	POSSIBLE SOLAR-FLARE EFFECTS BASED ON INSPECTION OF GRAMS ALONE (WITHOUT REFERENCE TO DATA FROM OTHER SOURCES)		
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	BEGIN      END d    h    m      d    h    m		
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													

K SCALE USED: LOWER LIMIT FOR K = 9..... CURRENT SCALE VALUE..... LOWER LIMIT FOR K = 9 .....	D	H	Z	(mm) (γ/mm) (to nearest 10γ)
	675.7	322.2		
	3.69	7.77		
	2490	2500		

SCALINGS AND COMPUTATIONS HAVE BEEN CHECKED.

APPROVED John B. Townshend, Chief

OBSERVER IN CHARGE

PRINCIPAL MAGNETIC STORMS  
COLLEGE OBSERVATORY, COLLEGE, ALASKA  
April 19 89WDC-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 min (UT)	type	D(')	H(Y)	Z(Y)	day	(3 hr - period)	K	D(')	H(Y)	Z(Y)	day	hr
C0	64°6 N	3	13XX	..				5	3	7	192	1440	785	6	04
		25	16XX	..				28	3	7	221	1790	975	28	21

## NORMAL MAGNETOGRAPHS

COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASLINE
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 MAGNETOGRAPHS

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

## RAPID RUN MAGNETOGRAPHS

COMPONENT	PERIOD		CALIBRATION	
	FROM	TO	SCALE VALUE	
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

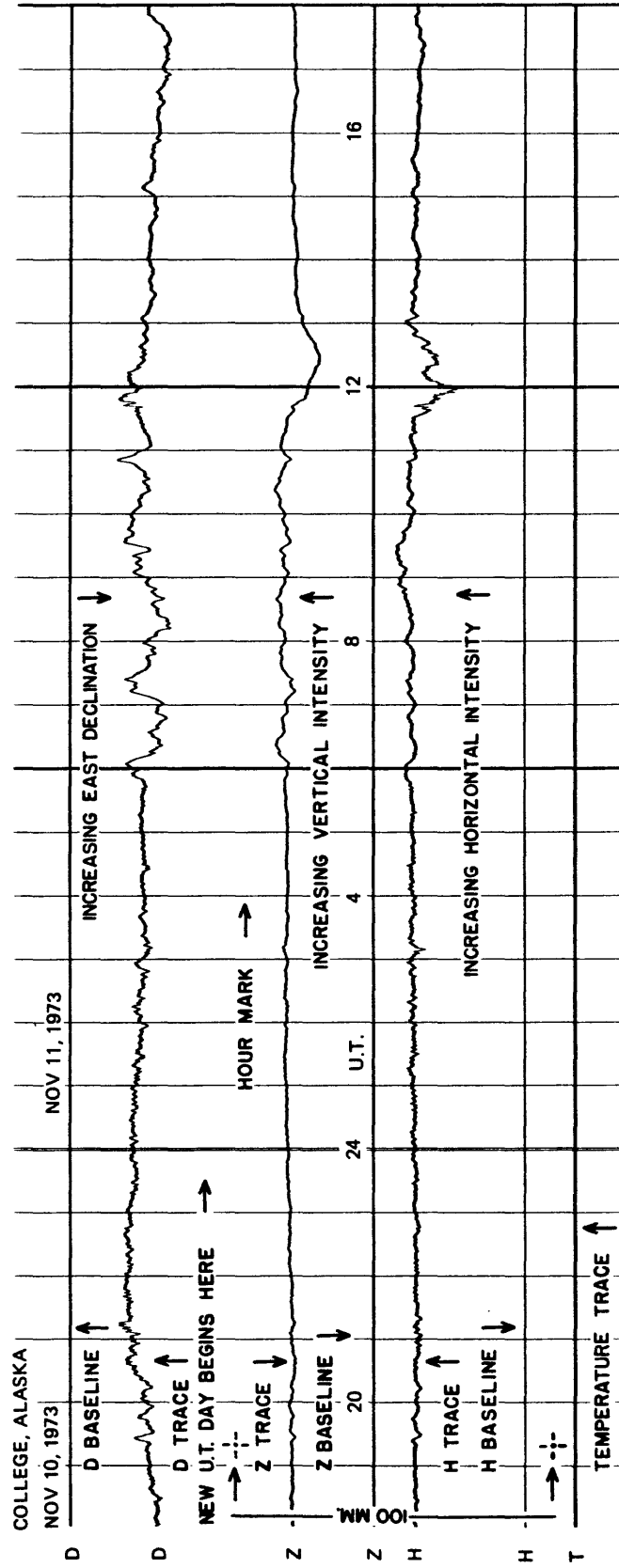
(UNIVERSAL TIME)

Values are in Tenths of 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	A <sub>k</sub>	12	19	21	22	24	04	05	06	21	22	24	04	05	06	21	22	24	04	05	06	21	22	24	DAY	
HOUR	A <sub>k</sub>	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	HOUR
01	98	100	64	74	51	190	189	199	206	212	240	234	216	219	236	216	219	236	192	192	201	241	241	241	241	01
02	82	79	53	79	51	197	192	197	212	234	260	260	223	213	253	223	213	253	219	219	201	264	264	264	264	02
03	70	80	70	58	60	213	199	180	198	260	260	260	225	214	254	225	214	254	201	201	201	275	275	275	275	03
04	71	80	90	88	40	240	208	229	211	264	201	264	230	210	234	230	210	234	205	205	205	263	263	263	263	04
05	99	102	90	98	84	270	217	257	224	201	201	201	252	213	230	252	213	230	203	203	203	256	256	256	256	05
06	120	108	121	109	91	260	220	250	224	200	200	200	253	210	243	253	210	243	203	203	203	226	226	226	226	06
07	111	129	120	113	101	241	220	230	237	212	212	212	224	211	234	224	211	234	202	202	202	215	215	215	215	07
08	117	126	101	122	110	240	226	268	231	220	220	220	213	211	220	213	211	220	200	200	200	213	213	213	213	08
09	111	119	103	118	111	250	230	259	238	240	240	240	208	204	222	208	204	222	195	195	195	213	213	213	213	09
10	120	121	112	121	112	251	249	256	239	251	251	251	204	210	218	204	210	218	194	194	194	225	225	225	225	10
11	129	131	110	119	106	261	240	256	242	250	250	250	214	198	200	214	198	200	190	190	190	208	208	208	208	11
12	131	113	131	119	101	250	246	209	239	240	240	240	206	190	176	206	190	176	194	194	194	197	197	197	197	12
13	140	158	142	135	114	241	170	227	230	201	201	201	196	150	141	196	150	141	183	183	183	206	206	206	206	13
14	150	143	125	141	151	240	219	241	249	237	237	237	199	146	166	199	146	166	185	185	185	195	195	195	195	14
15	162	98	188	178	159	247	240	239	228	259	259	259	203	186	181	203	186	181	199	199	199	206	206	206	206	15
16	169	179	197	242	159	250	171	264	225	240	240	240	205	203	200	205	203	200	193	193	193	210	210	210	210	16
17	182	236	229	239	221	250	150	260	239	240	240	240	200	162	210	200	162	210	190	190	190	216	216	216	216	17
18	208	256	255	241	227	233	251	240	229	230	230	230	199	166	209	199	166	209	189	189	189	203	203	203	203	18
19	219	237	241	220	208	258	240	230	213	240	240	240	198	194	200	198	194	200	192	192	192	199	199	199	199	19
20	219	202	203	244	190	243	245	208	189	227	227	227	204	192	199	204	192	199	206	206	206	198	198	198	198	20
21	207	181	162	223	159	230	223	195	180	230	230	230	203	197	187	203	197	187	191	191	191	190	190	190	190	21
22	175	149	125	121	138	219	210	195	170	208	208	208	202	193	188	202	193	188	175	175	175	200	200	200	200	22
23	150	128	117	97	119	208	196	193	184	220	220	220	204	197	197	204	197	197	176	176	176	210	210	210	210	23
24	103	93	95	59	72	189	216	192	213	224	224	224	209	202	197	209	202	197	174	174	174	222	222	222	222	24
DAILY SUM		3343	3348	3244	3358	2935	5671	5167	5474	5250	5568	5090	4691	4995	4651	5251	5090	4691	4995	4651	5251	5251	5251	5251	5251	DAILY SUM
DAILY MEAN		139	140	135	140	122	236	215	228	219	232	212	212	195	208	194	195	208	194	194	194	219	219	219	219	DAILY MEAN
MEAN		135						226						206						MEAN						

Scaled *W/O*Checked *W*

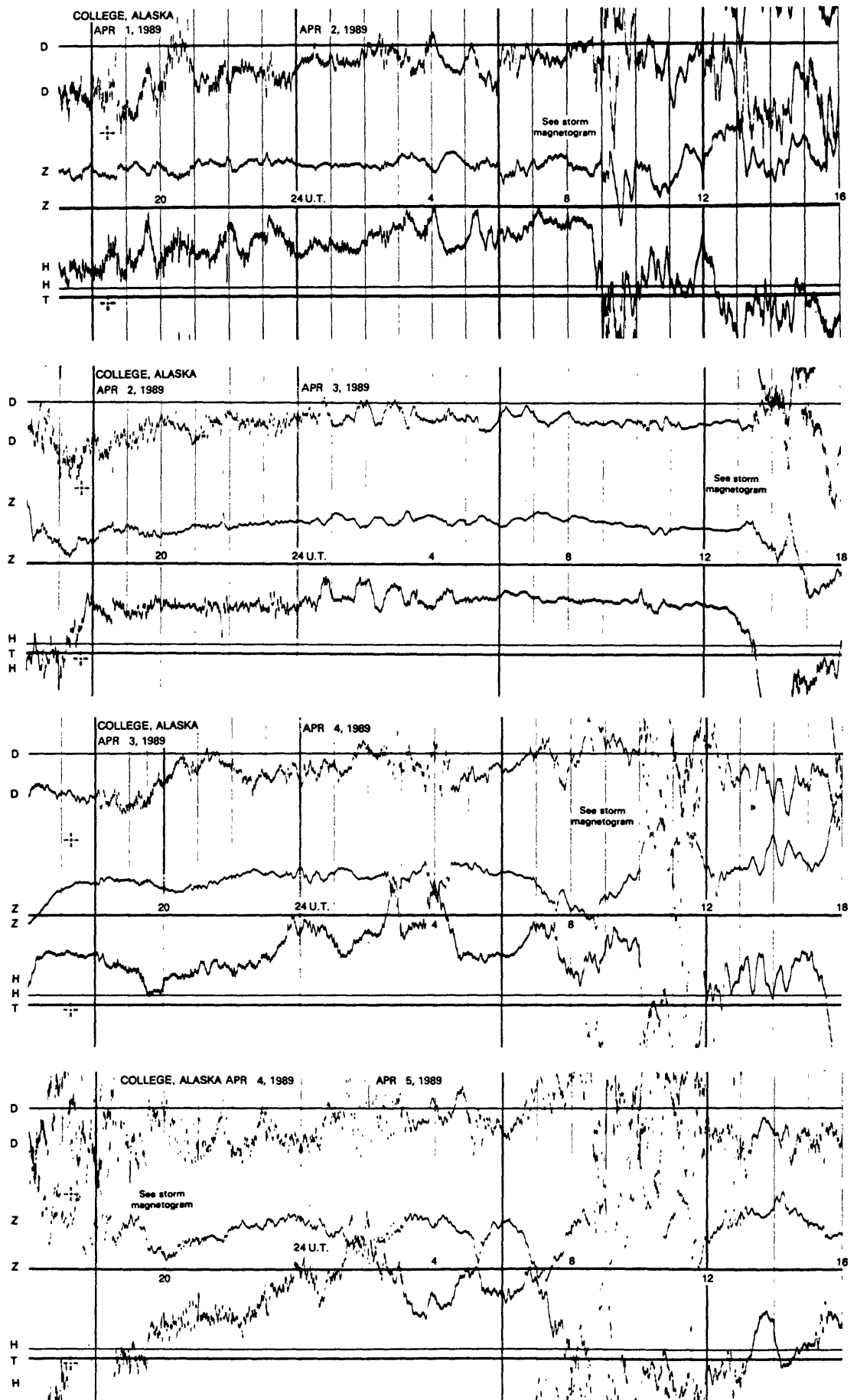
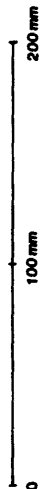
# FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)



SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES

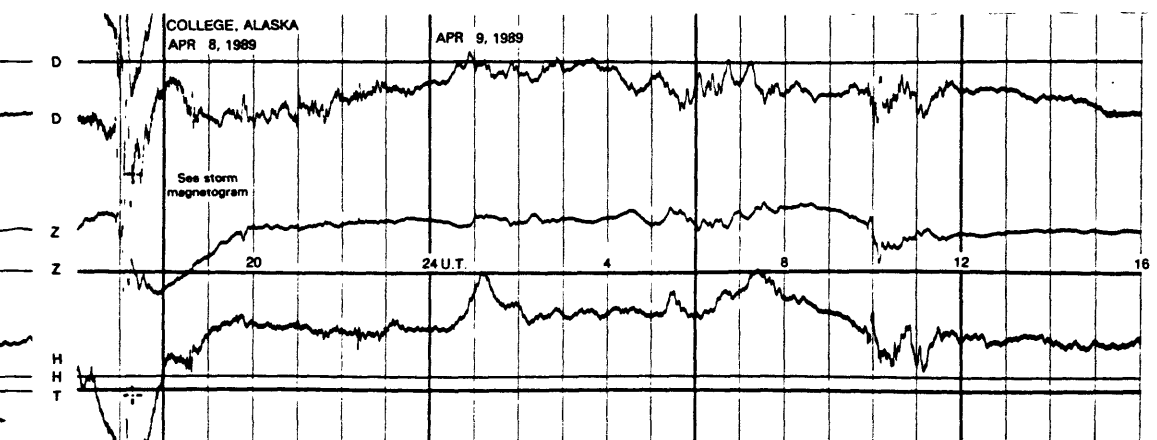
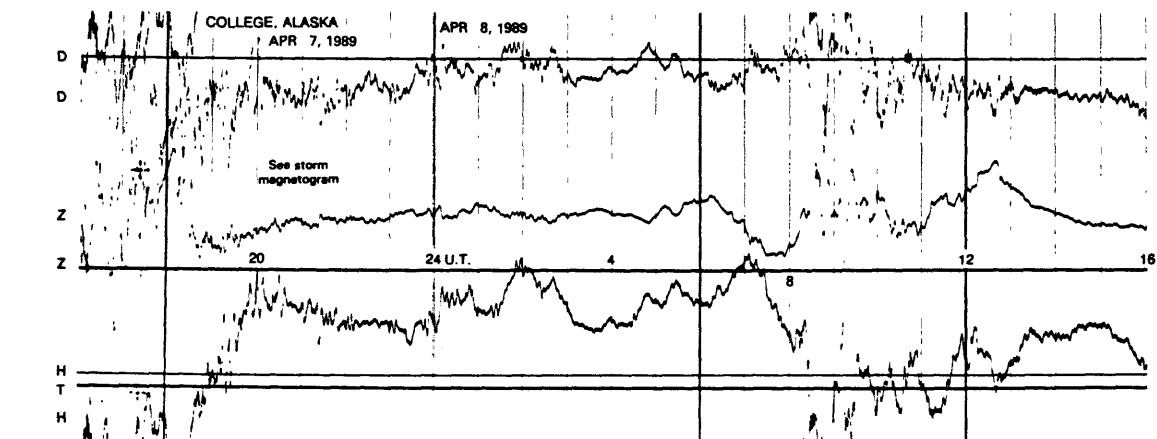
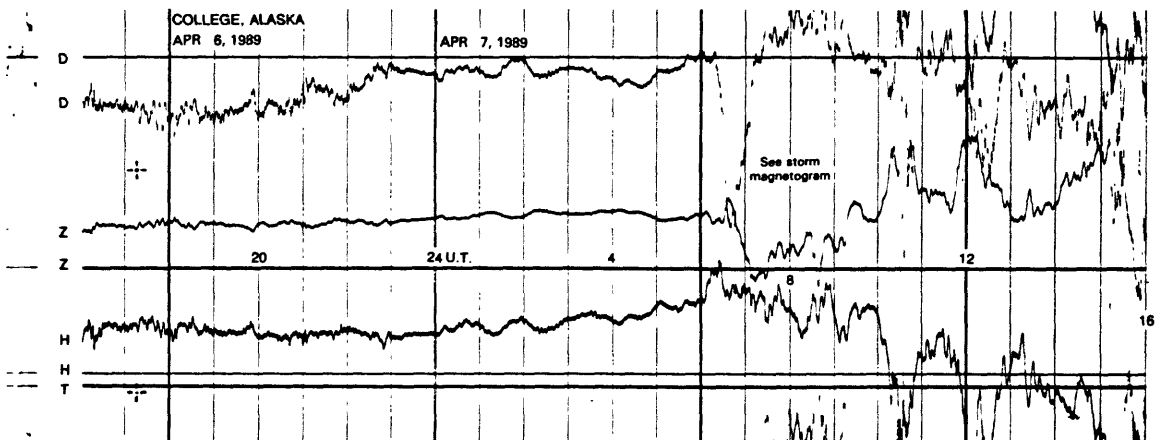
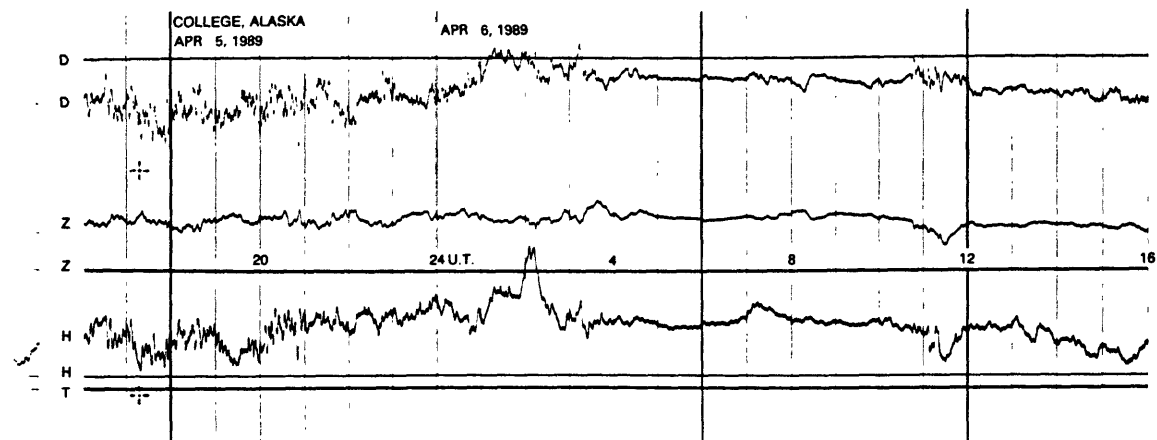


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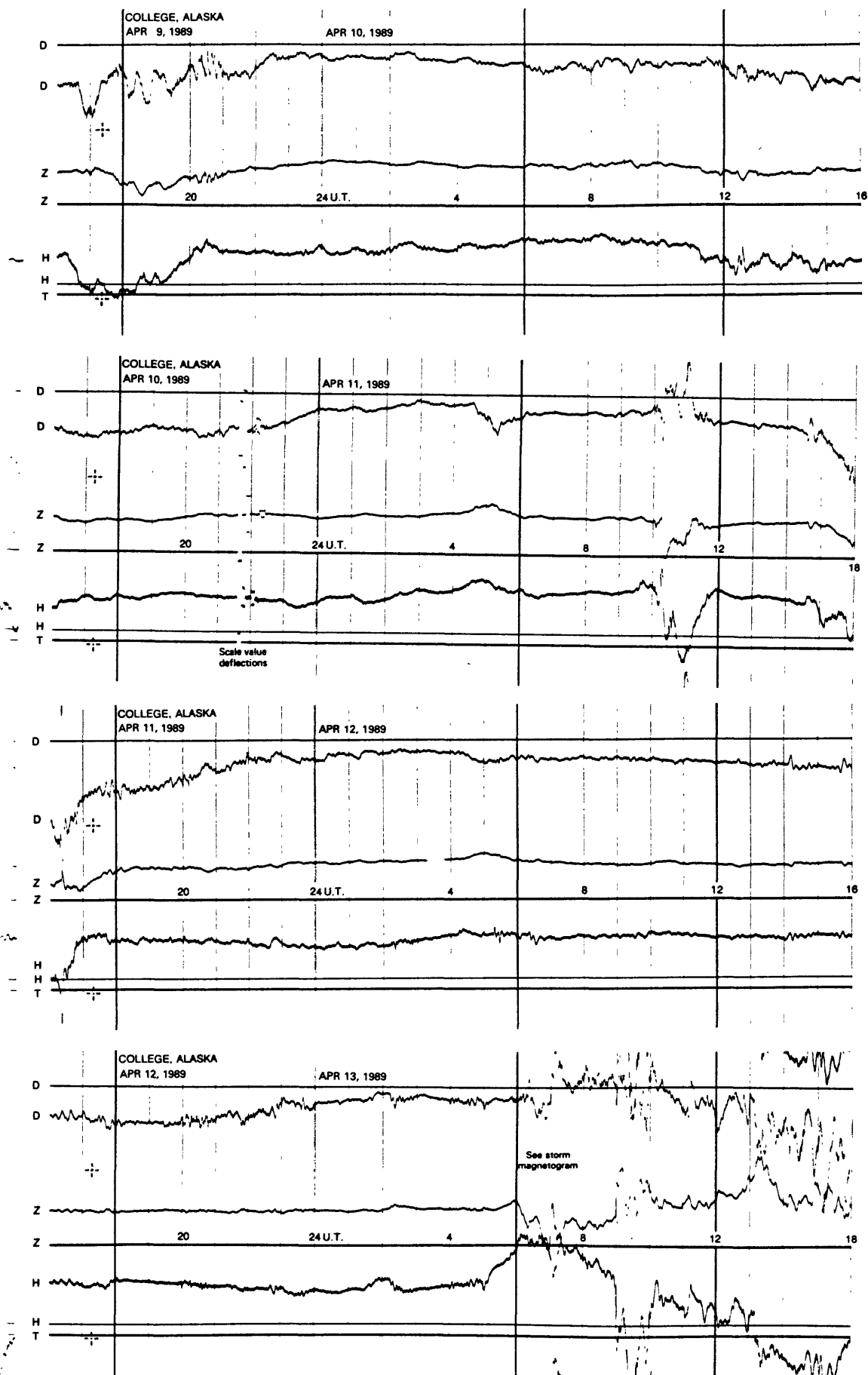


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100 mm  
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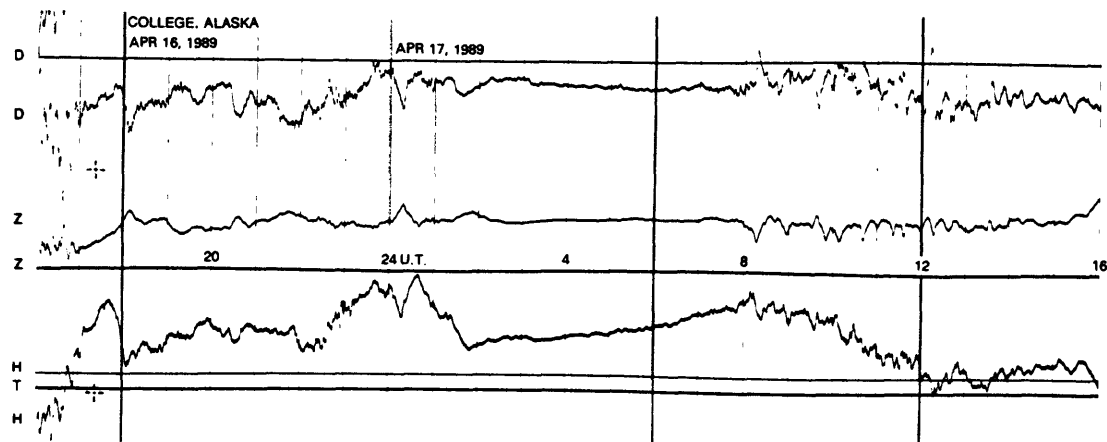
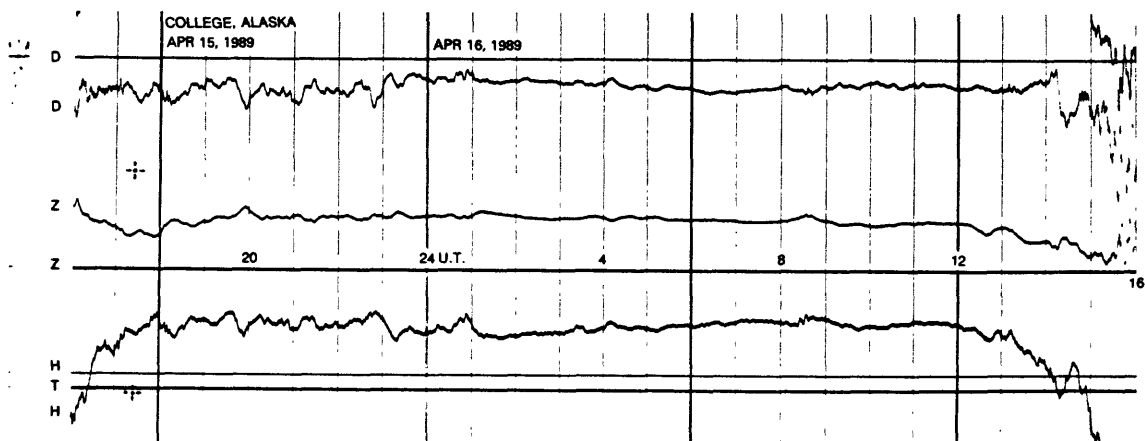
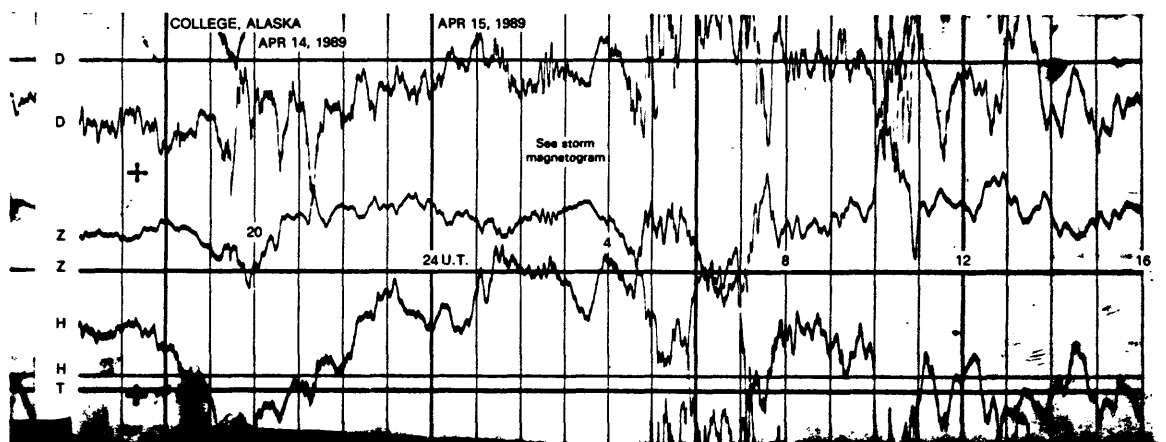
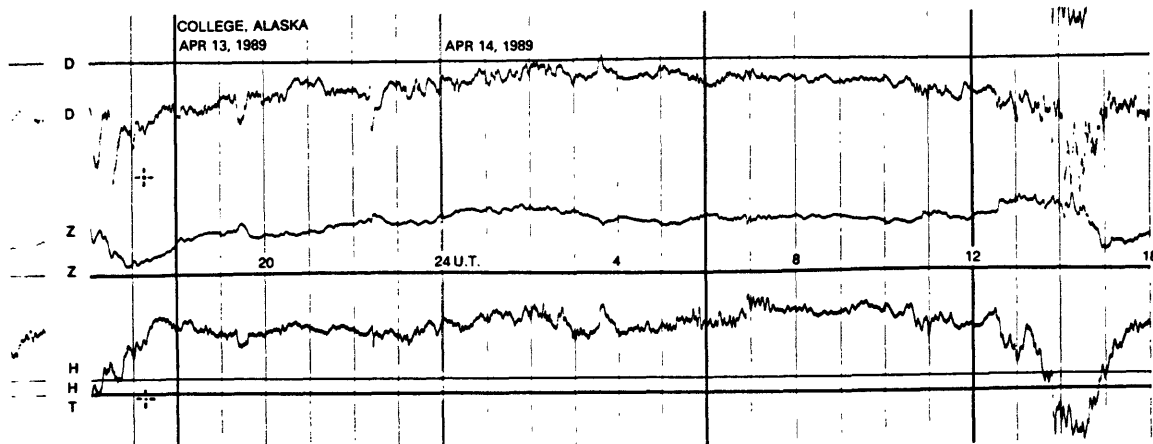


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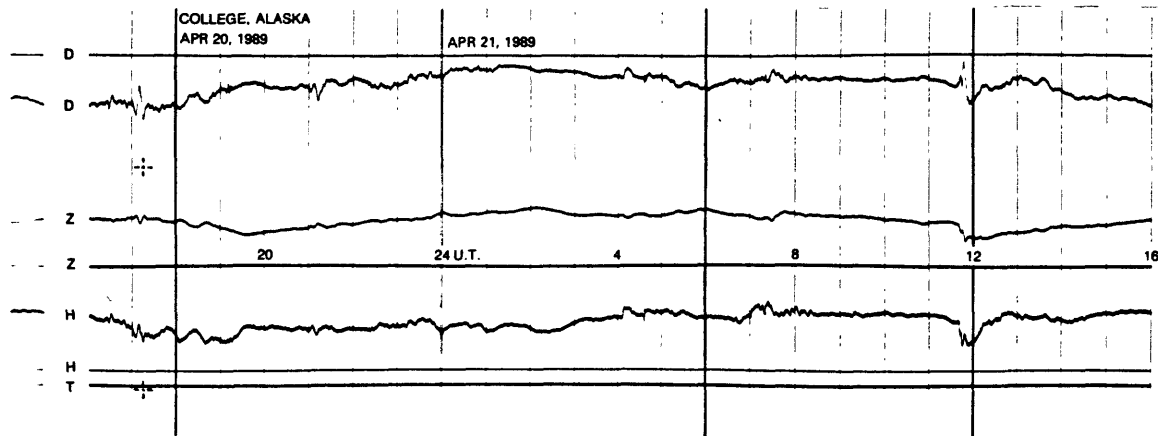
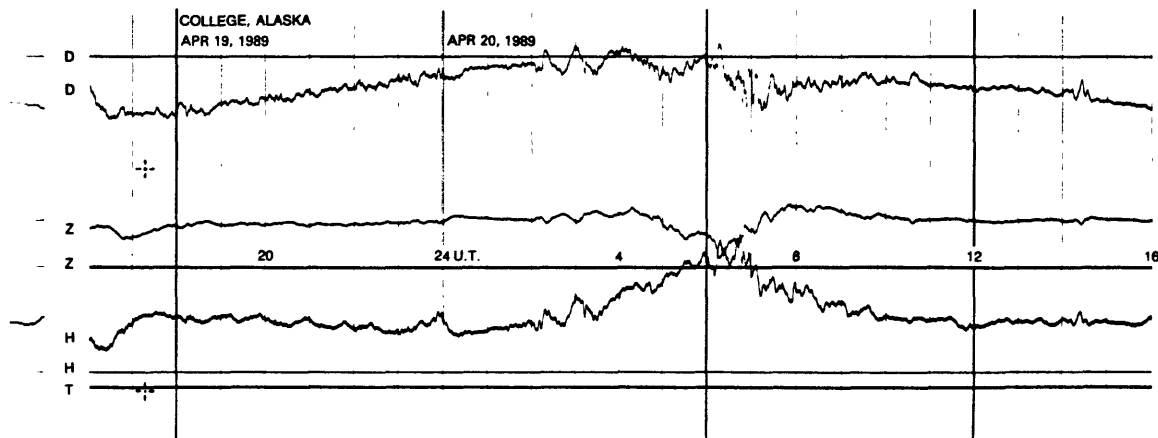
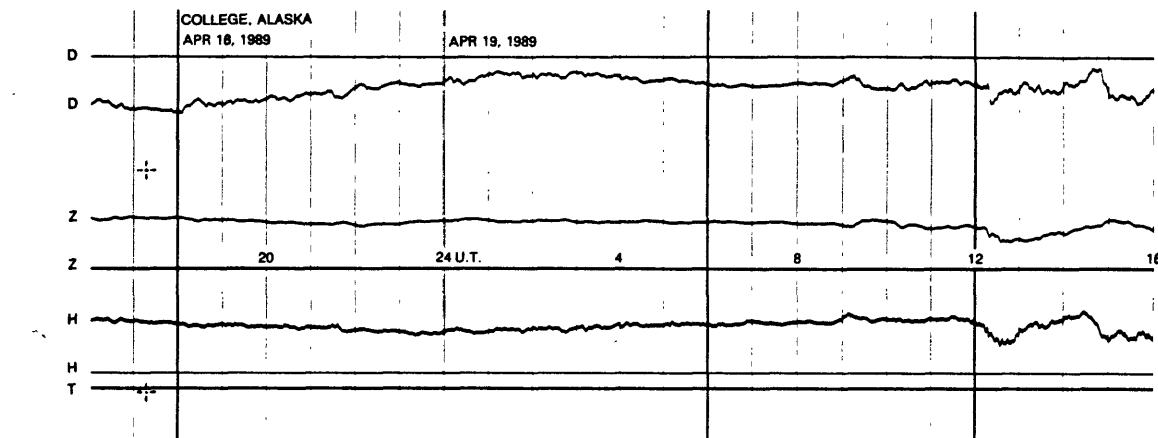
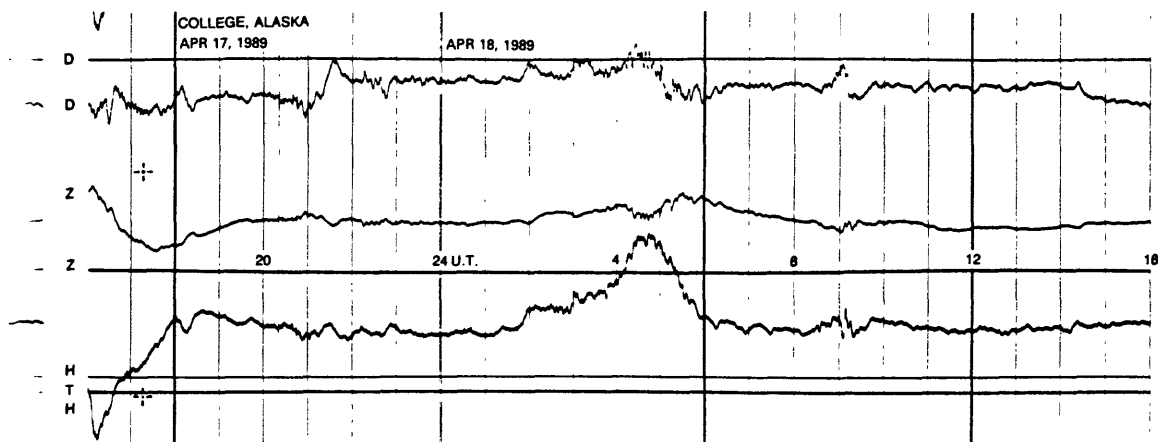
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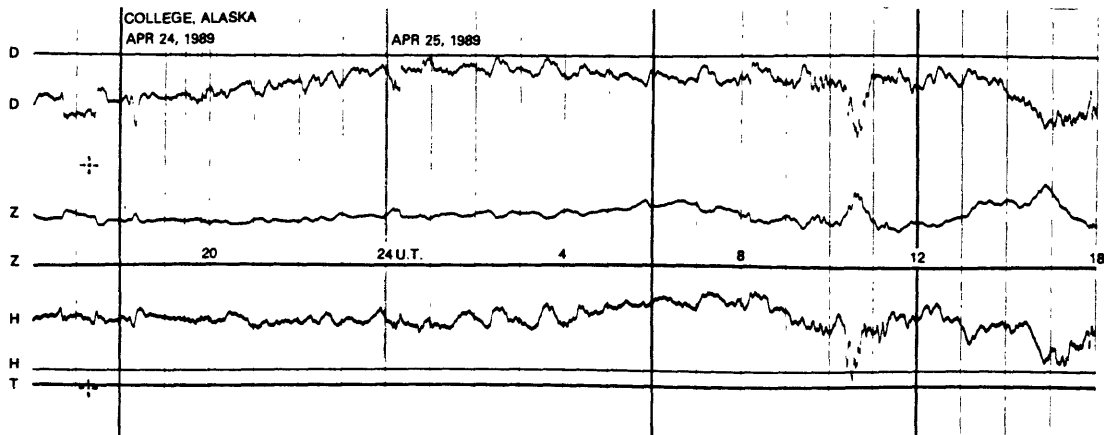
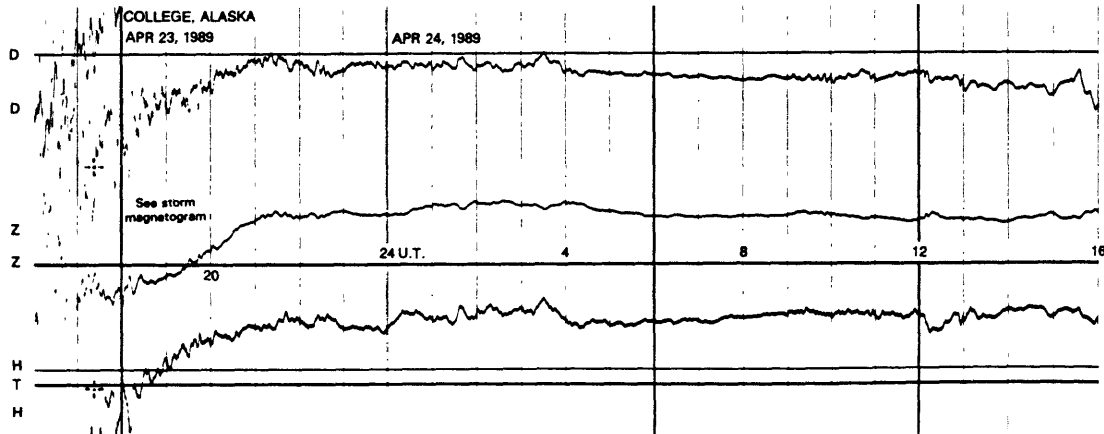
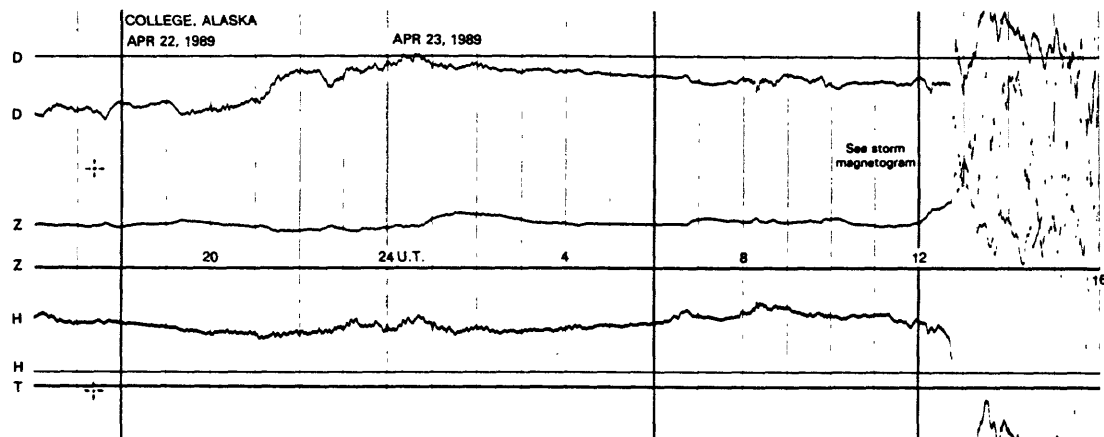
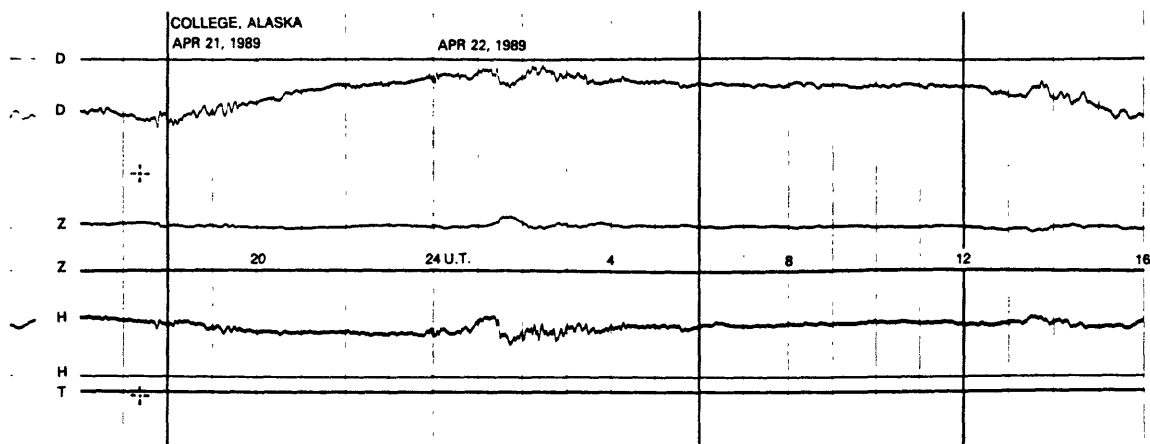
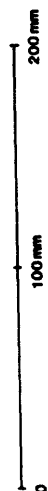


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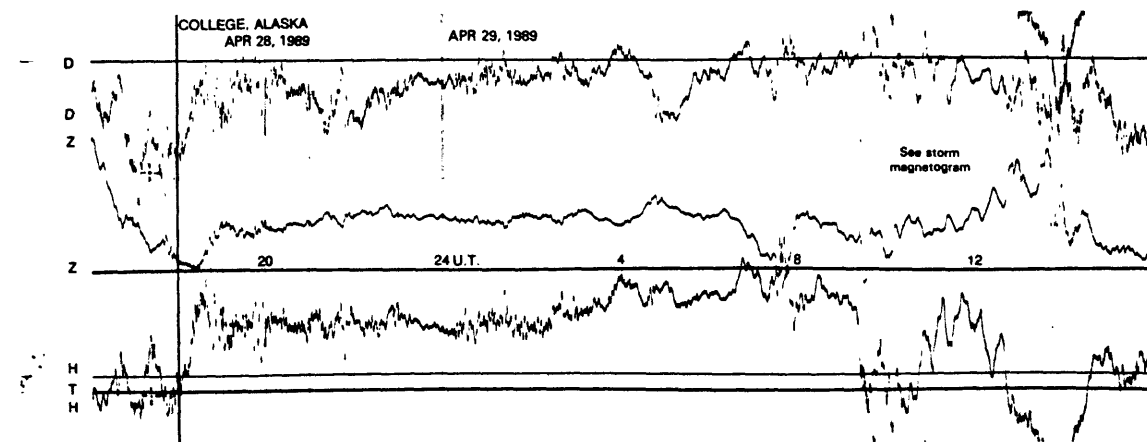
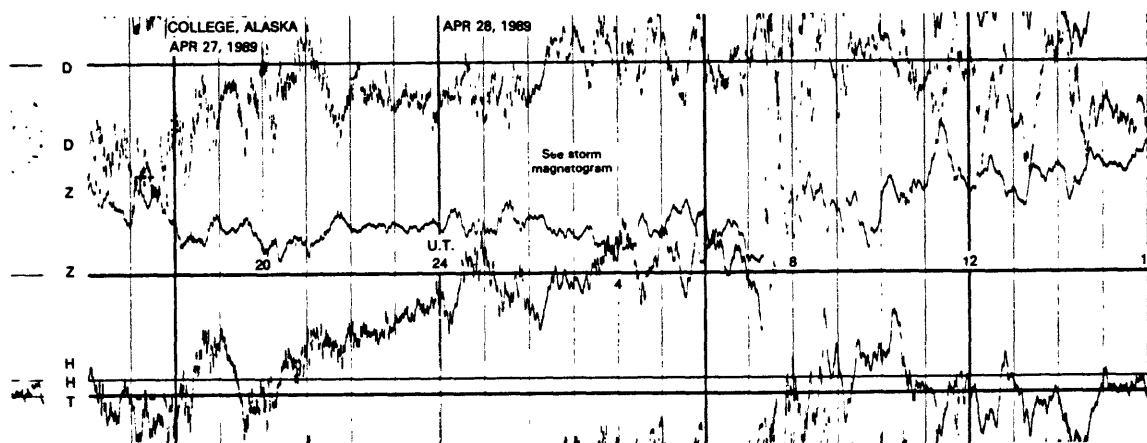
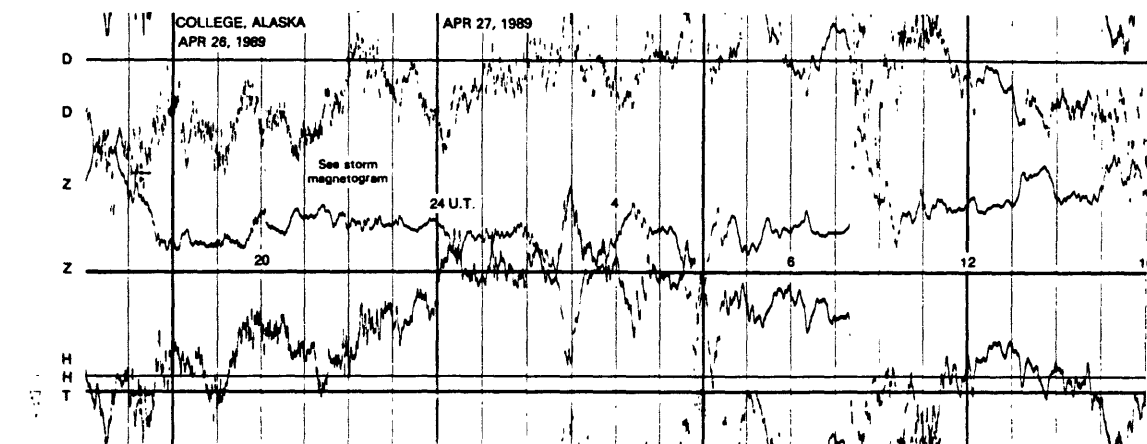
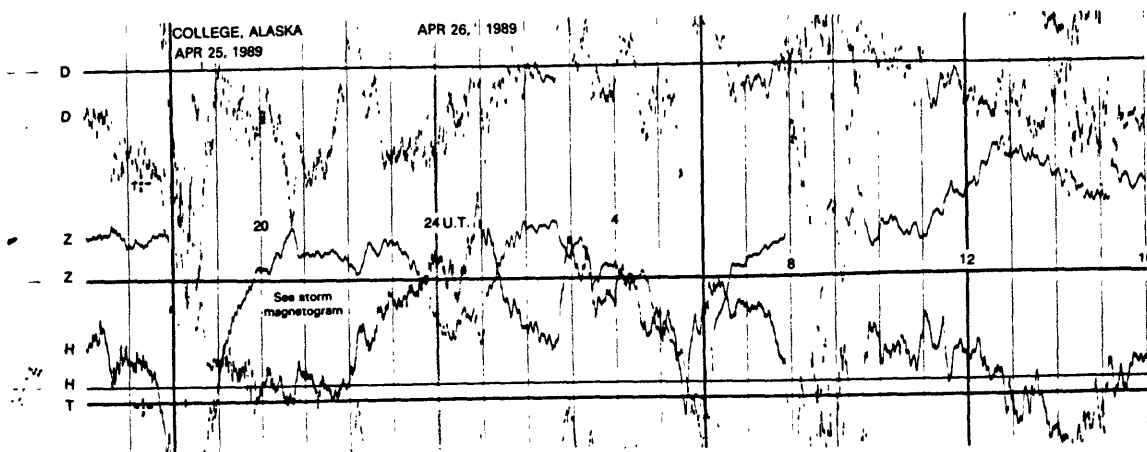
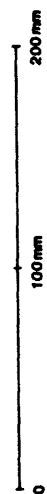
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# NORMAL MAGNETOGRAMS

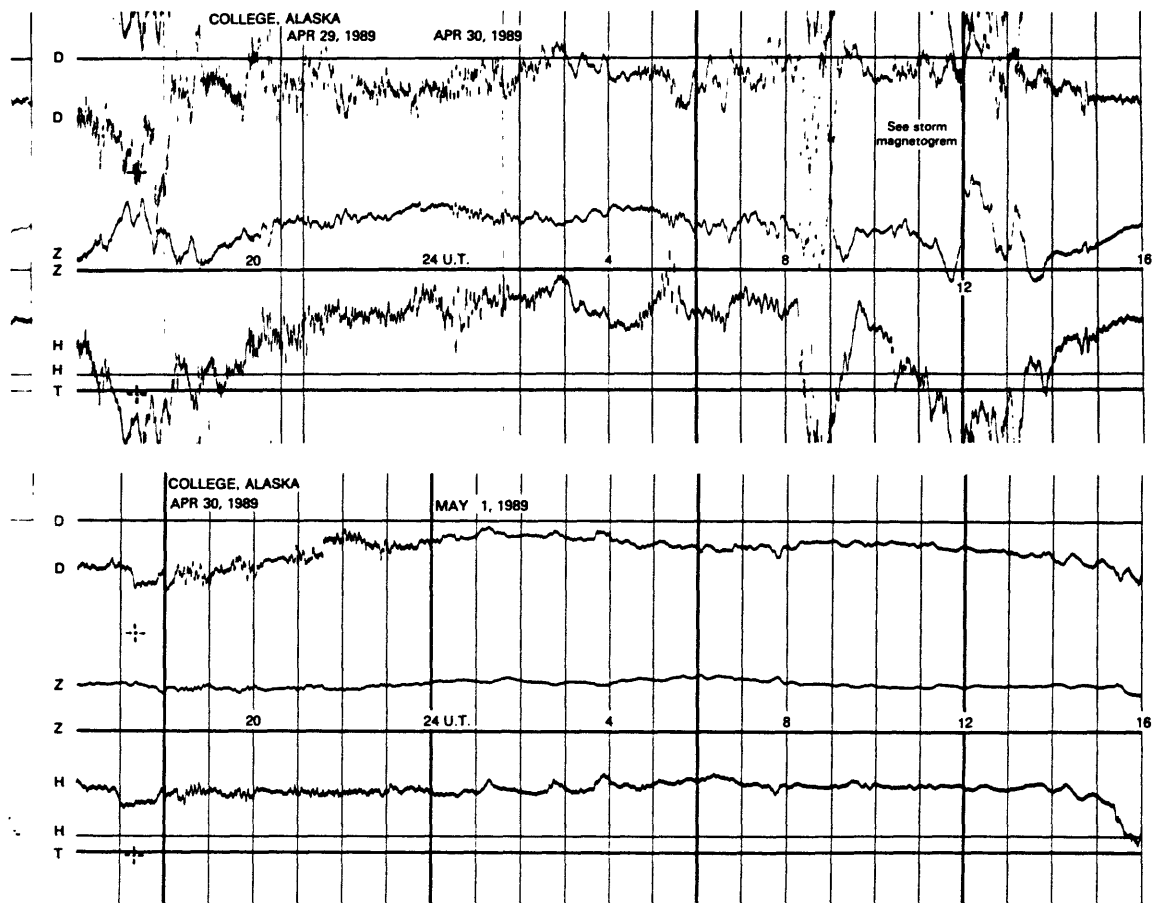


# NORMAL MAGNETOGRAMS



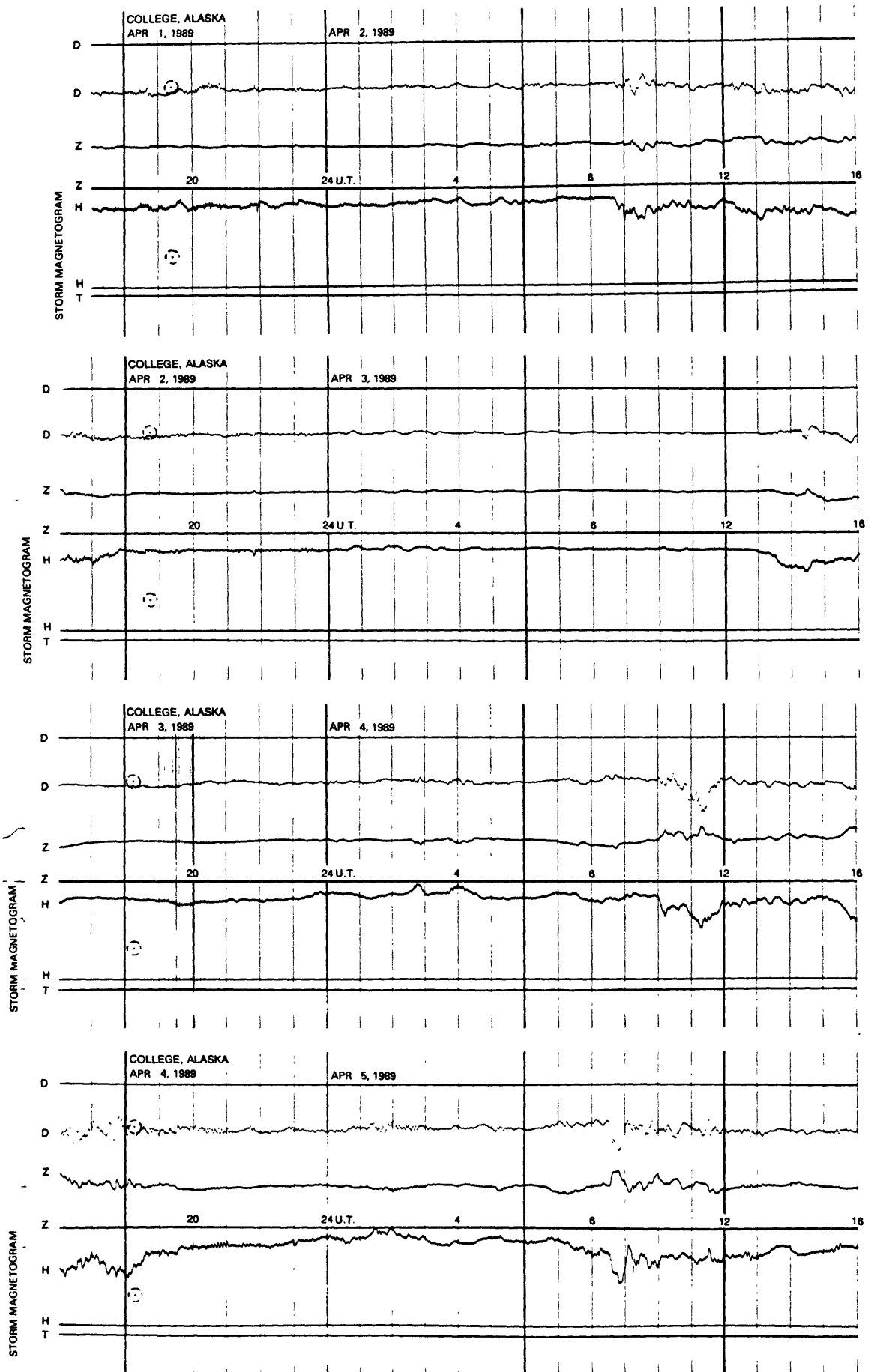
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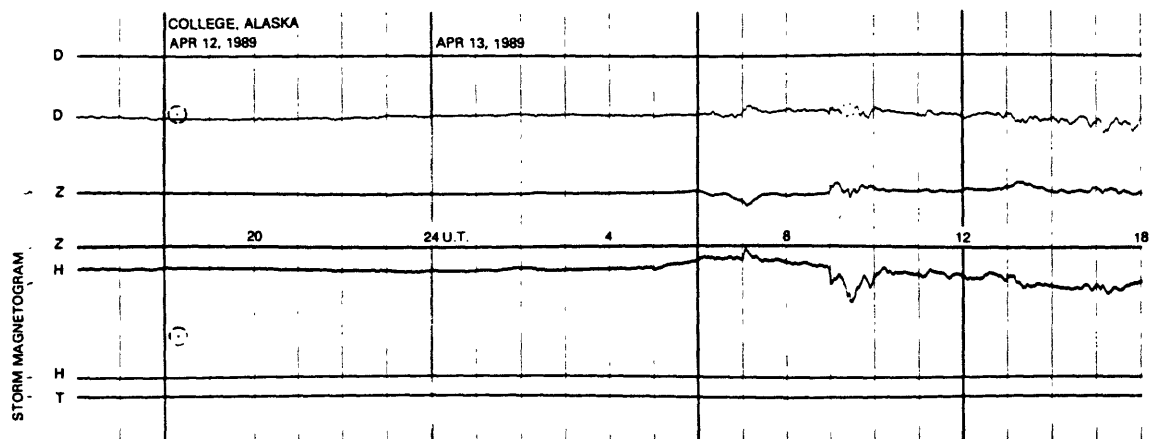
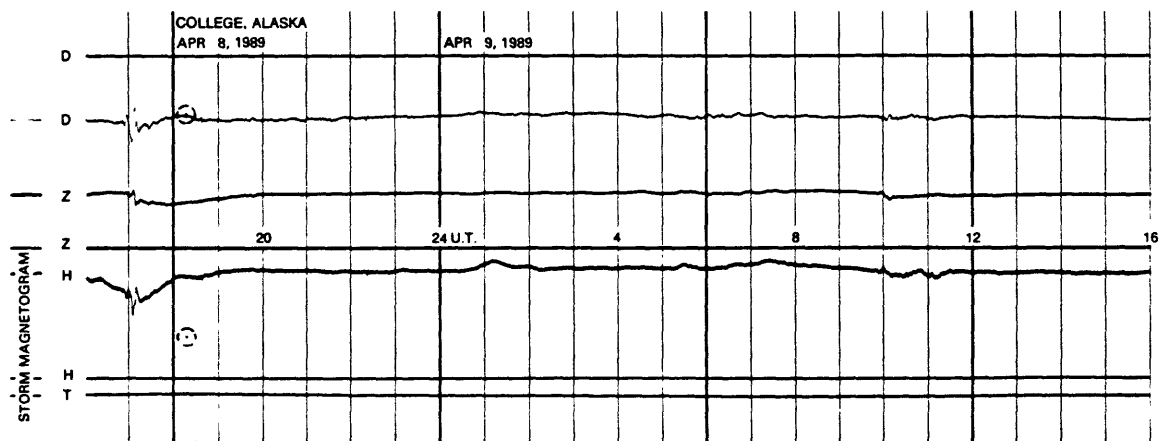
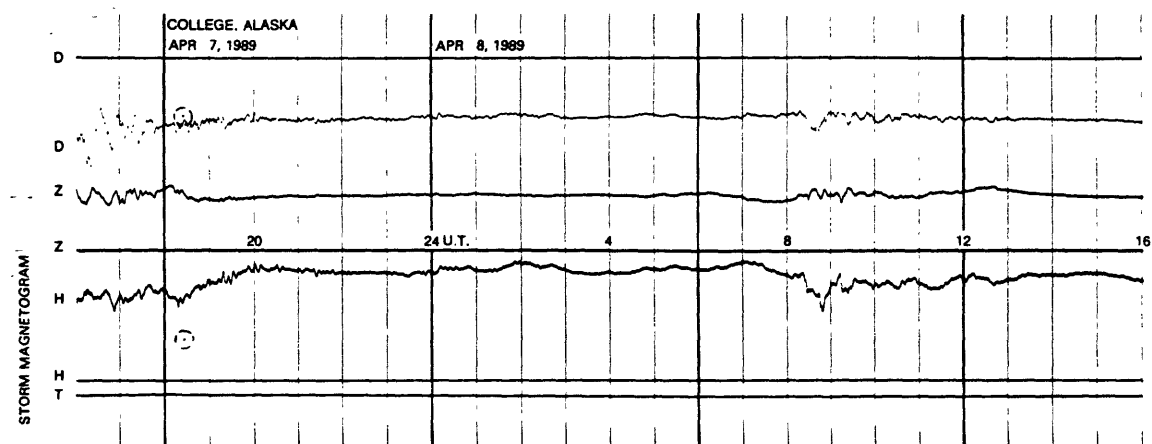
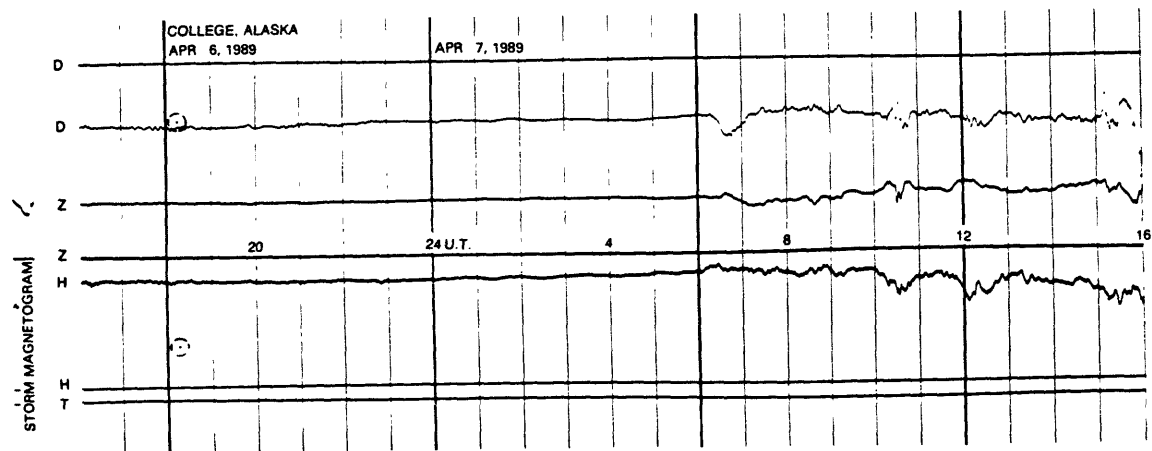
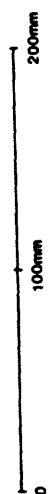




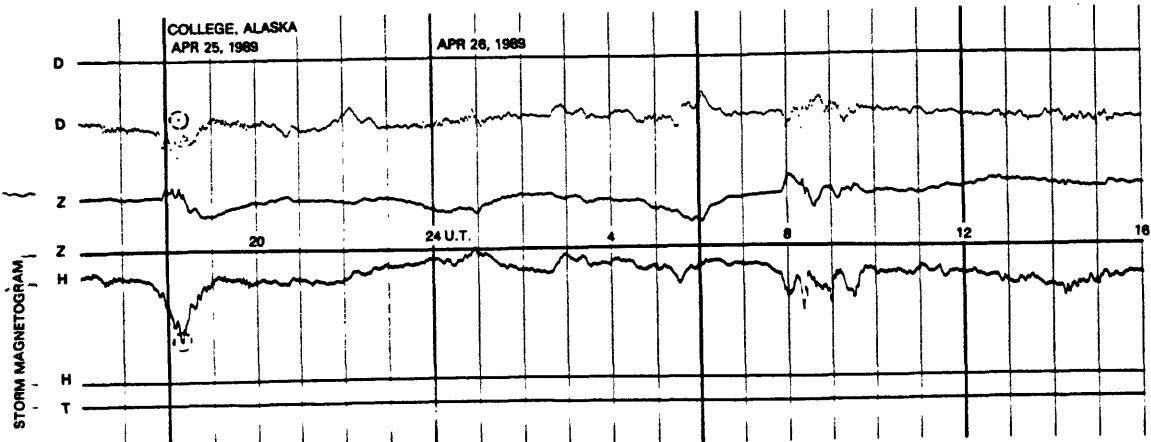
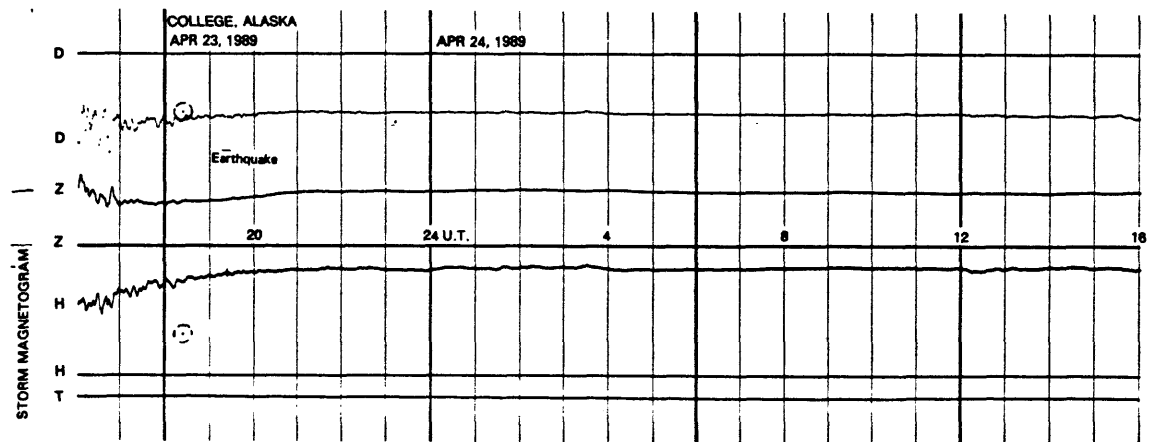
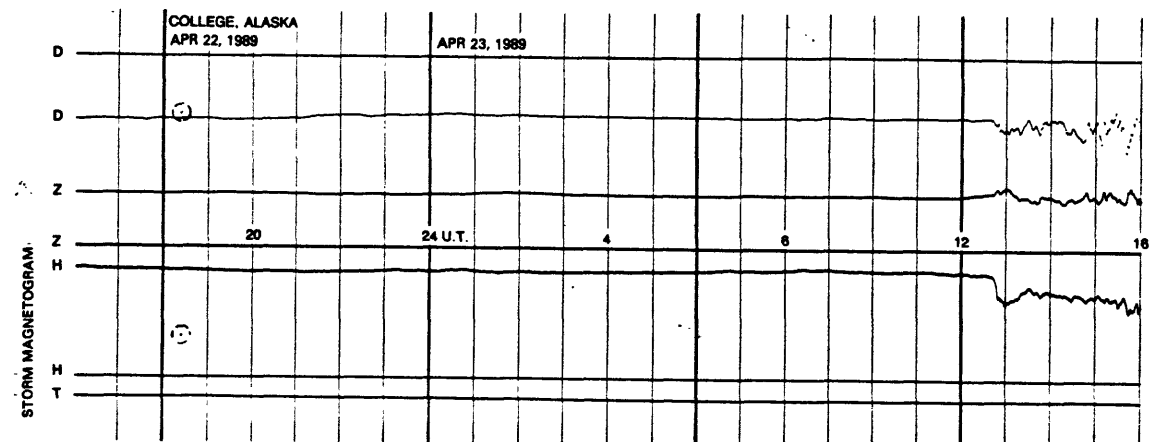
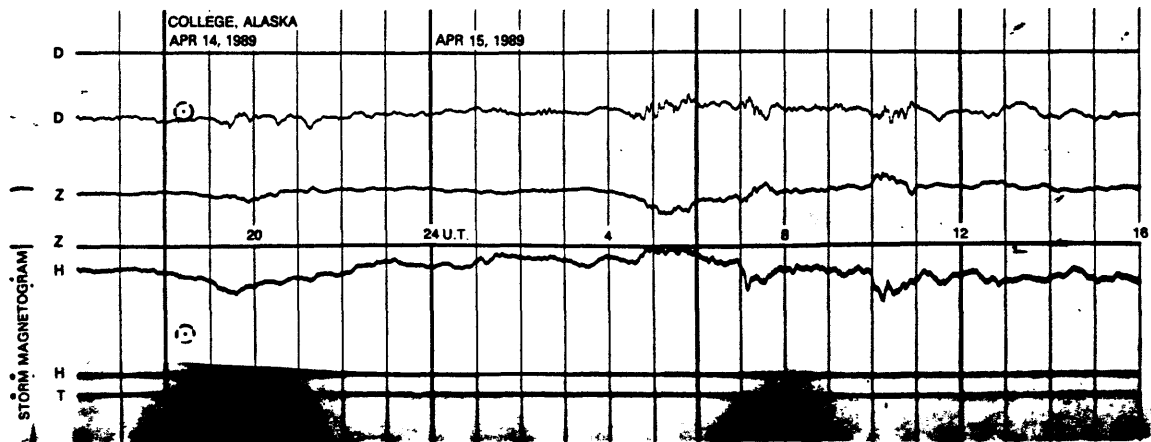
# STORM MAGNETOGRAMS



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