

**UNITED STATES DEPARTMENT OF THE INTERIOR**

**GEOLOGICAL SURVEY**

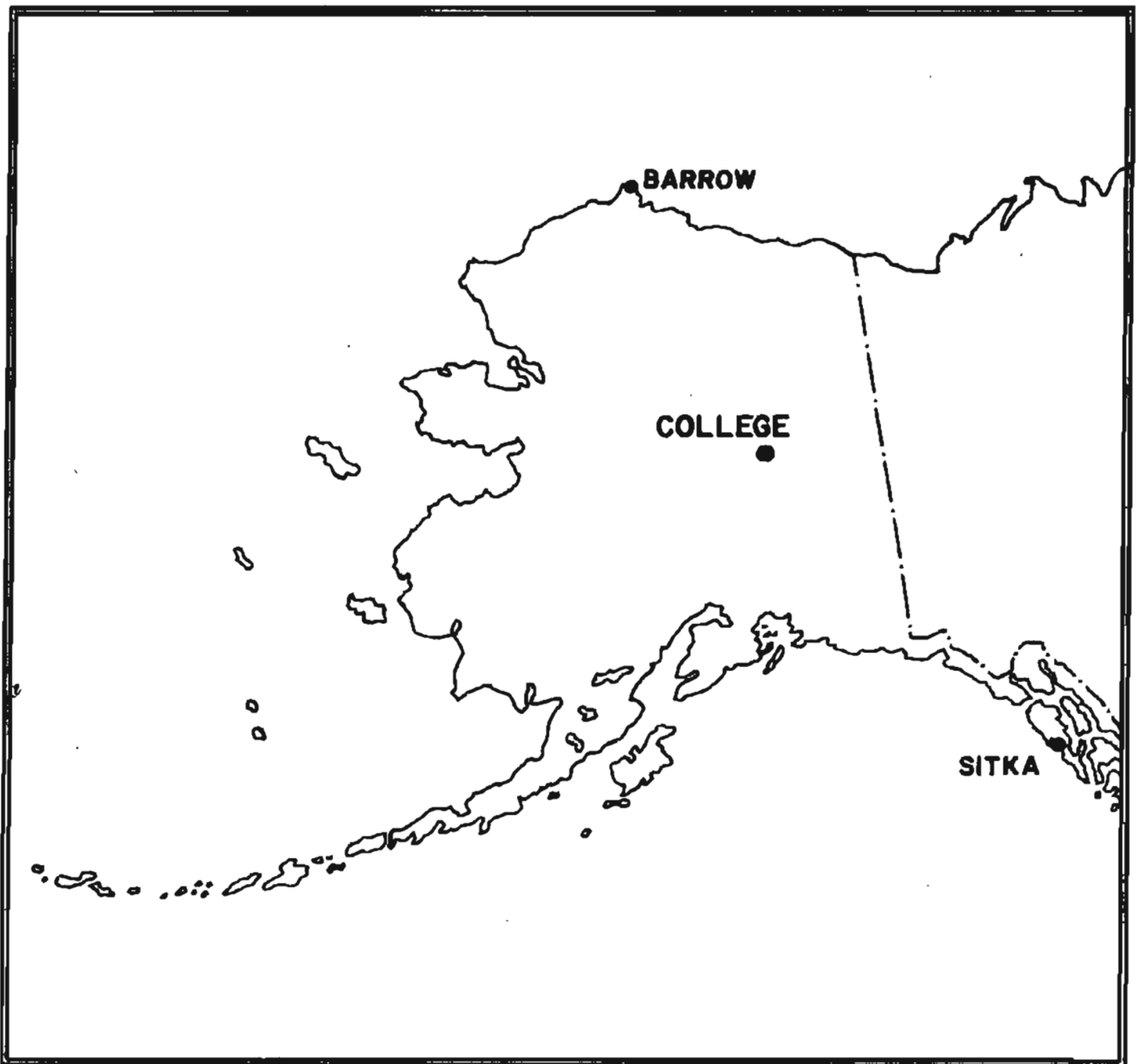
**PRELIMINARY GEOMAGNETIC DATA**

**COLLEGE OBSERVATORY**

**FAIRBANKS, ALASKA**

JUNE 1991

OPEN FILE REPORT 91-0300F



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

## 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. 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 the 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° 51.6'N  
Geographic longitude.....147° 50.2'W  
Geomagnetic latitude.....+64.6°  
Geomagnetic longitude.....+256.5°  
Elevation.....200 meters

## EXPLANATION OF DATA & REPORTS

### Available Data & Reports

Normal and storm magnetograms and appropriate calibration data are processed at the observatory and are available for analysis or copying. Magnetic Activity Report (K-Indices & AK values), Principal Magnetic Storms Report, and Magnetogram Hourly Scalings for the five quietest days of the month are also available.

### 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 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 $\gamma$ )

### Principal Magnetic Storms

Gradual and sudden commencement magnetic disturbances with at least one K-Index of 3 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 commencement; 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 magnetogram.

### 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:

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

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

June, 1991

DATE	K-INDICES								SUM	A <sub>k</sub>	TIME SCALE ON MAGNETOGRAMS		
	00-01	01-02	02-03	03-04	12-15	15-18	18-21	21-24			20 mm/hr		
1	3	5	6	6	4	6	3	3	36	45	SUDDEN COMMENCEMENTS		
2	5	7	7	4	4	7	5	5	44	77	d	h	m
3	3	4	5	4	4	4	3	2	29	24	10	05	04
4	3	2	2	3	4	7	7	5	33	50	17	10	18
5	6	7	6	8	7	9	6	6	55	155			
6	6	5	6	4	4	3	2	3	33	37			
7	3	5	7	5	4	4	3	4	35	43			
8	4	3	3	4	4	6	6	3	33	36			
9	7	5	4	5	5	6	6	3	41	61			
10	4	3	7	6	6	8	7	6	47	100			
11	7	6	8	6	5	6	6	4	48	97			
12	4	5	4	7	6	7	6	5	44	74			
13	6	4	5	6	7	7	8	3	46	96			
14	4	3	3	5	4	1	1	2	23	18			
15	2	2	3	4	5	5	3	2	26	22			
16	1	1	1	3	2	2	2	2	14	7			
17	3	3	3	6	6	6	6	4	37	49			
18	5	4	5	4	3	4	3	3	31	28	POSSIBLE SOLAR-FLARE EFFECTS BASED ON INSPECTION OF GRAMS ALONE (WITHOUT REFERENCE TO DATA FROM OTHER SOURCES)		
19	5	4	5	4	6	5	3	3	35	39			
20	4	4	2	1	2	2	2	3	20	13			
21	4	4	4	4	3	4	3	3	29	23			
22	4	5	4	3	5	3	3	3	30	26			
23	3	4	5	6	6	5	4	5	38	47			
24	5	5	6	5	5	4	3	4	37	43	BEGIN	END	
25	4	4	3	5	4	5	3	3	31	28	d	h	m
26	5	4	5	6	5	5	3	3	36	41			
27	3	3	2	4	3	2	3	3	23	15			
28	3	3	3	5	3	2	2	1	22	16			
29	2	1	1	4	4	1	2	1	16	10			
30	3	4	3	4	5	4	4	3	30	25			
31													

K SCALE USED: LOWER LIMIT FOR K = 9..... CURRENT SCALE VALUE..... LOWER LIMIT FOR K = 9.....	D	H	Z	(mm)
	675.7	322.2		(γ/mm)
	3.68	7.73		(to nearest 10γ)
	2490	2490		

SCALINGS AND COMPUTATIONS HAVE BEEN CHECKED.

APPROVED John B. Townshend, Chief

OBSERVER IN CHARGE

PRINCIPAL MAGNETIC STORMS  
COLLEGE OBSERVATORY, COLLEGE, ALASKA

JUNE 19 91

WFO-A FOR SOLAR-TERRRESTRIAL PHYSICS  
ENVIRONMENTAL DATA SERVICE, NOAA  
BETHELEEM, ALASKA 99508 U.S.A.

Data from Individual Observatories:

Obs. & 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°6 N	1	03XX	..				1	3,4,6	6	238	1040	460	1 18	
		2	02XX	..				2	2,3,6	7	223	1470	860	3 00	
		4	14XX	..				5	6	9	550	3900	2010	6 15	
		7	04XX	..				7	3	7	152	1770	740	7 19	
		9	00XX	..				9	1	7	208	1910	780	9 21	
		10	0504	SC	+16	-180	+45	10	6	8					
		11						11	3	8					
		13						13	7	8	470	2890	2000	13 22	
		17	1018	SC*	-11	-120	-40	17	4,5,6,7	6	196	1290	730	18 10	
		23	03XX	..				23	4,5	6	156	1180	750	24 18	

NORMAL MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASELINE
D	0001 U.T., 6-1-91	2400 U.T., 6-30-91	1.0' / mm	3.7' / mm	26° 34.8' E
H	0001 U.T., 6-1-91	2400 U.T., 6-21-91	7.7' / mm		12642' γ
	0001 U.T., 6-22-91	2400 U.T., 6-25-91			12647' γ
	0001 U.T., 6-26-91	2400 U.T., 6-30-91			12652' γ
Z	0001 U.T., 6-1-91	2400 U.T., 6-30-91	7.8' / mm		55201' γ

STORM MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASELINE
D	0001 U.T., 6-1-91	2400 U.T., 6-30-91	7.9' / mm	29.4' / mm	
H	(SAME)	(SAME)	43.4' / mm		
Z	(SAME)	(SAME)	48.9' / mm		

The College Observatory has used several absolute instruments and different observing piers since it began operations in 1948. To avoid artificial secular shifts in the absolute values published when instruments were changed, corrections were applied to provide continuity in the data from the time the Observatory began operating. For many years the instruments used for observing absolute values have had zero correction. Effective with the May 1989 Preliminary Data Report, in accordance with a directive issued by the USGS Branch of Global Seismology and Geomagnetism analysis personnel, these longstanding corrections are discontinued and all data listed (D, H & Z) are for the position at absolute pier 1a and without any corrections applied. The net effect of these changes is as follows:

- Declination (D): No Change
- Horizontal Intensity (H): -5γ; i.e., H absolute and baseline values are 5γ less than previously reported.
- Vertical Intensity (Z): +33γ; i.e., Z absolute and baseline values are 33γ higher than previously reported.

MONTHLY MEAN ABSOLUTE VALUES\*

D	H	Z
26° 41.5' E	12753' γ	55330' γ

\*COMPUTED FROM FIVE QUIETEST DAYS DURING MONTH.

DAYS USED: JUNE 16, 20, 29, \_\_\_\_\_, \_\_\_\_\_.

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.

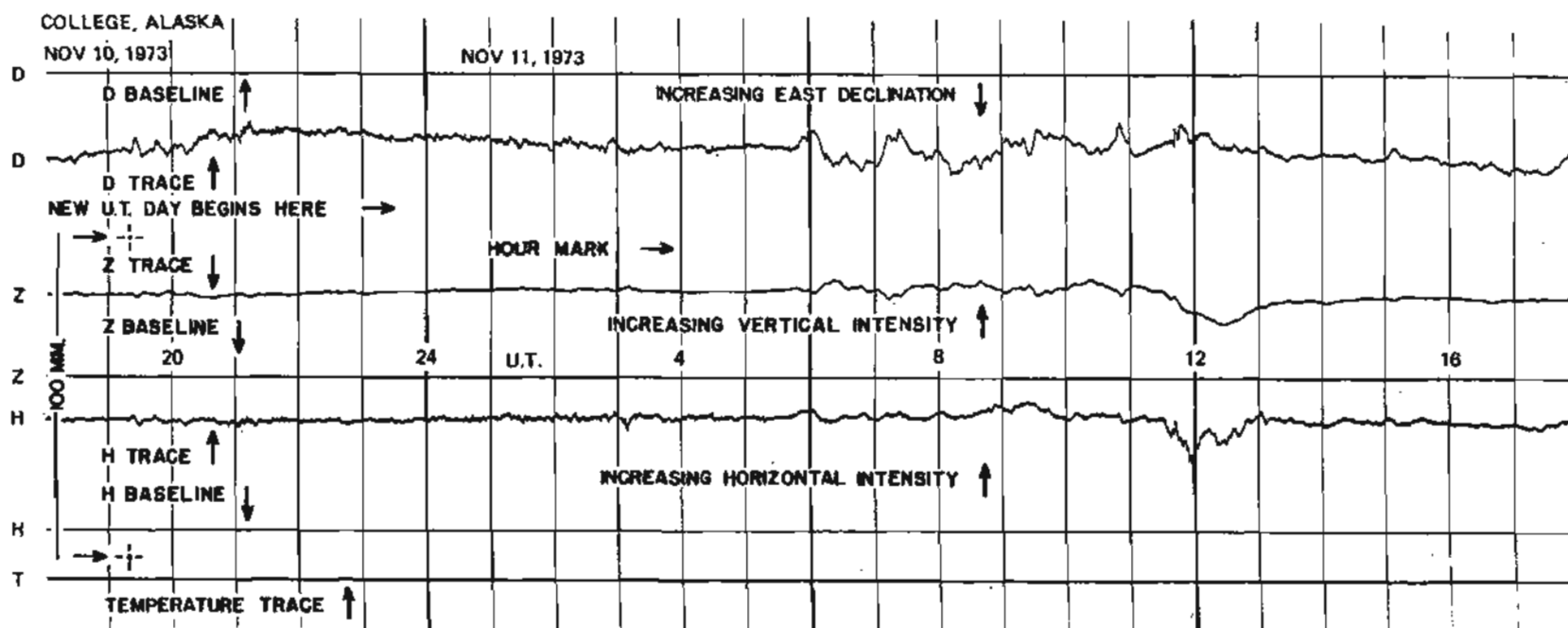
COMPONENT		D			M			Z			COMPONENT	
DAY		16	20	29	16	20	29	16	20	29	DAY	
A <sub>k</sub>											A <sub>k</sub>	
HOUR	01	-37	-30	-51	110	160	94	191	176	165	HOUR	01
	02	-10	-44	-59	130	245	110	191	176	172		02
03	17	-8	-37	141	258	140	192	234	180	03		
04	29	-5	-20	148	150	147	188	182	182	04		
05	49	-42	8	146	303	153	193	189	188	05		
06	62	61	28	145	200	170	200	230	189	06		
07	60	20	40	134	186	190	198	184	192	07		
08	59	21	90	135	188	198	192	181	180	08		
09	50	34	40	152	160	173	193	179	167	09		
10	40	10	17	181	146	177	197	170	166	10		
11	20	23	10	194	140	174	182	170	161	11		
12	16	22	55	95	130	99	147	164	69	12		
13	54	39	70	70	149	31	129	171	21	13		
14	87	39	89	85	114	123	159	150	92	14		
15	130	95	122	80	145	149	170	160	130	15		
16	171	111	164	133	120	173	185	166	155	16		
17	213	221	180	151	122	169	190	161	165	17		
18	200	271	210	186	109	167	188	160	165	18		
19	162	189	195	172	90	156	189	110	165	19		
20	170	178	200	167	102	131	184	83	162	20		
21	140	125	132	113	104	114	190	110	140	21		
22	109	91	121	110	80	82	180	120	136	22		
23	17	-58	9	105	95	76	178	106	120	23		
24	27	0	-38	105	156	82	196	150	130	24		
DAILY SUM		1835	1363	1575	3188	3652	3278	4402	3882	3592	DAILY SUM	
DAILY MEAN		76	57	66	133	152	137	183	162	150	DAILY MEAN	
MEAN			66			141			165		MEAN	

\* Only three days of this month exhibited A ≤ 15.

Scaled *TVO*

Checked *CW*

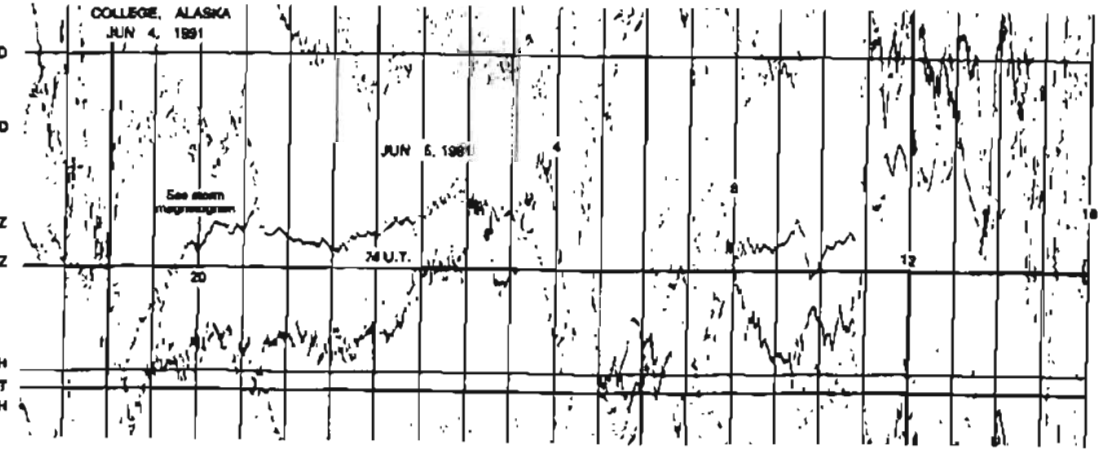
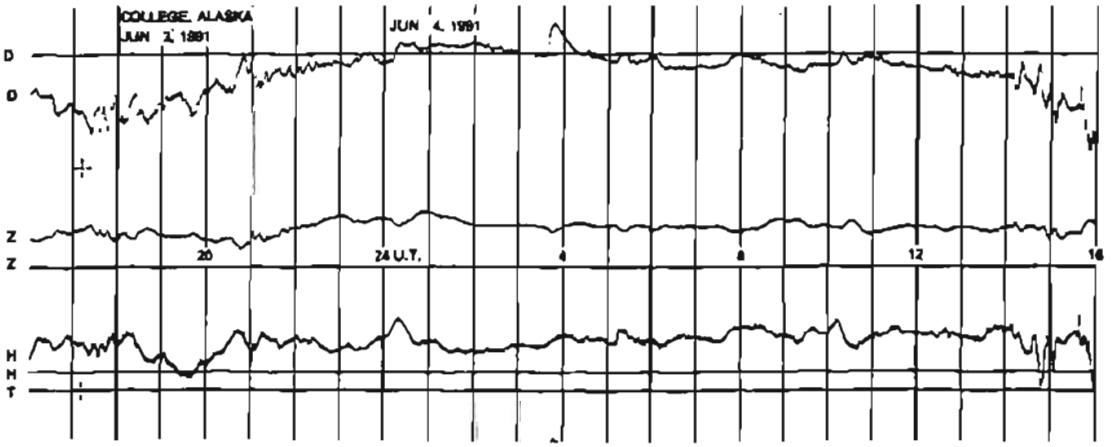
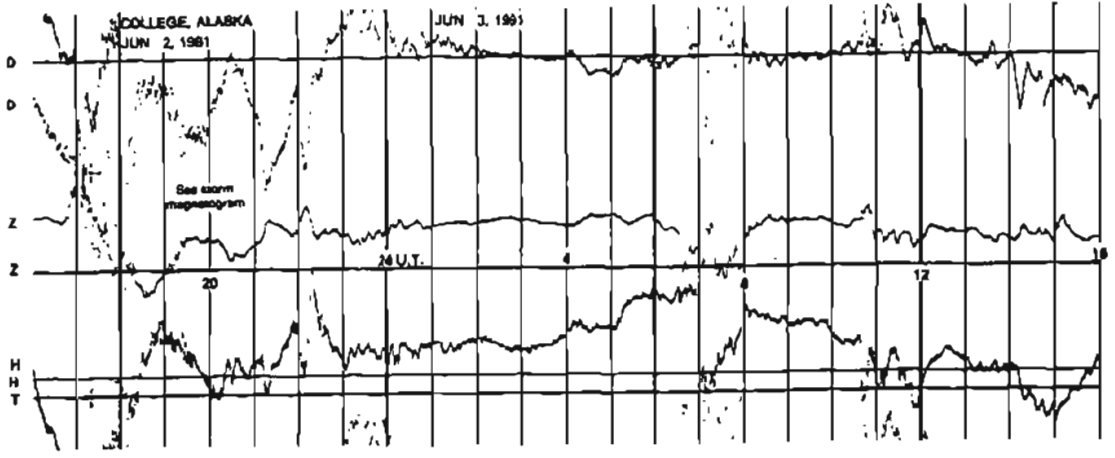
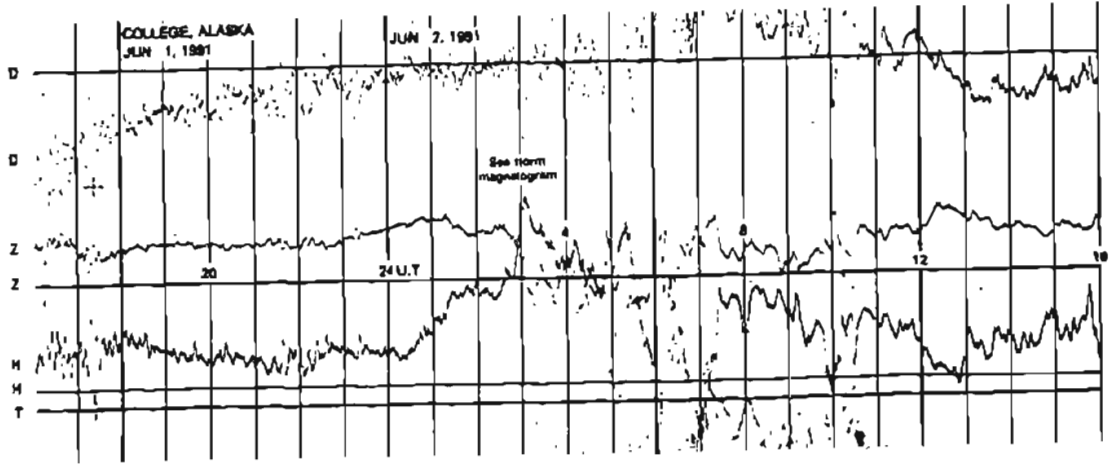
## FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)



SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES

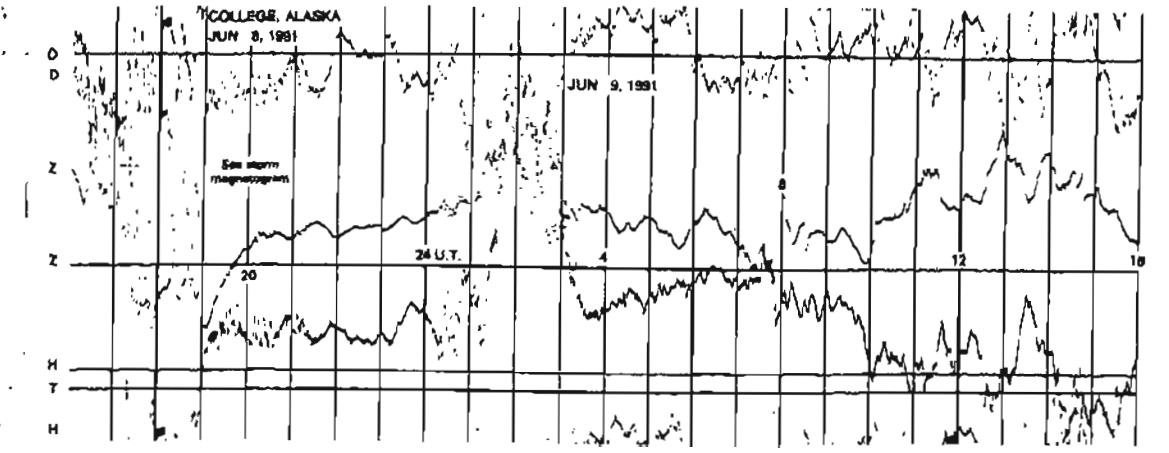
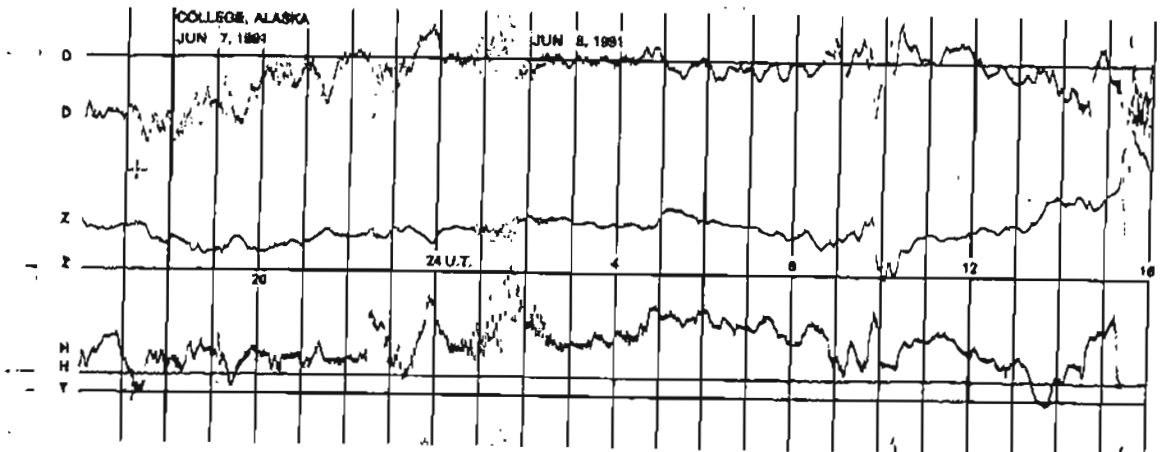
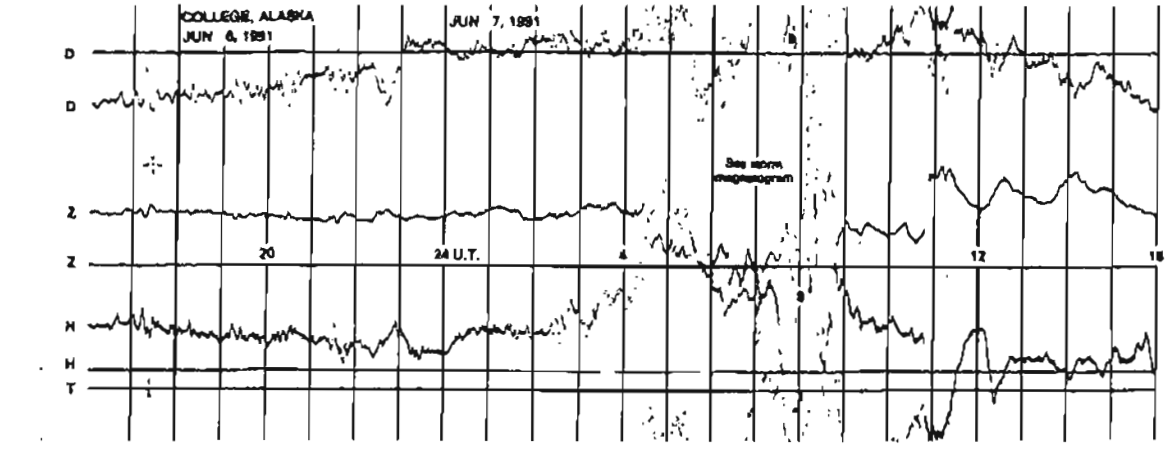
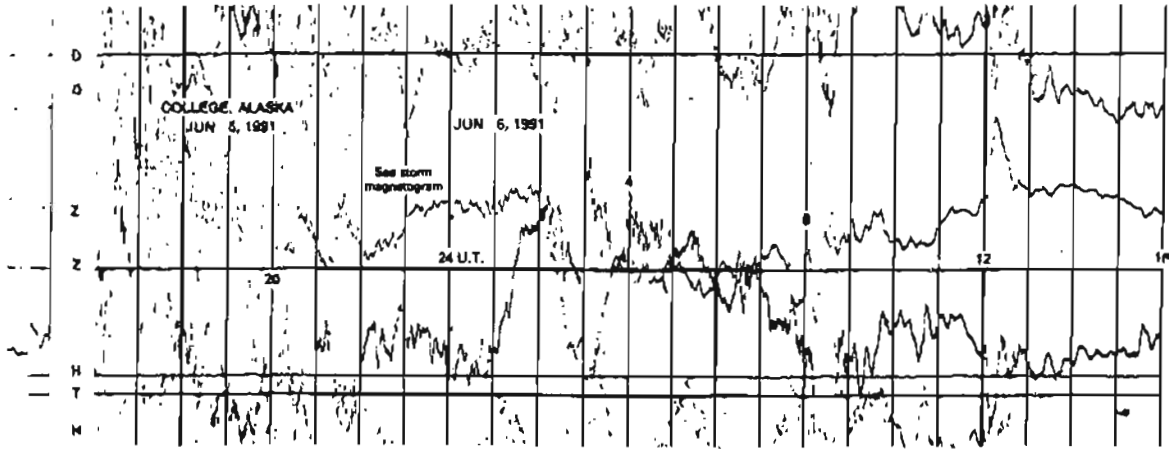


NORMAL MAGNETOGRAMS

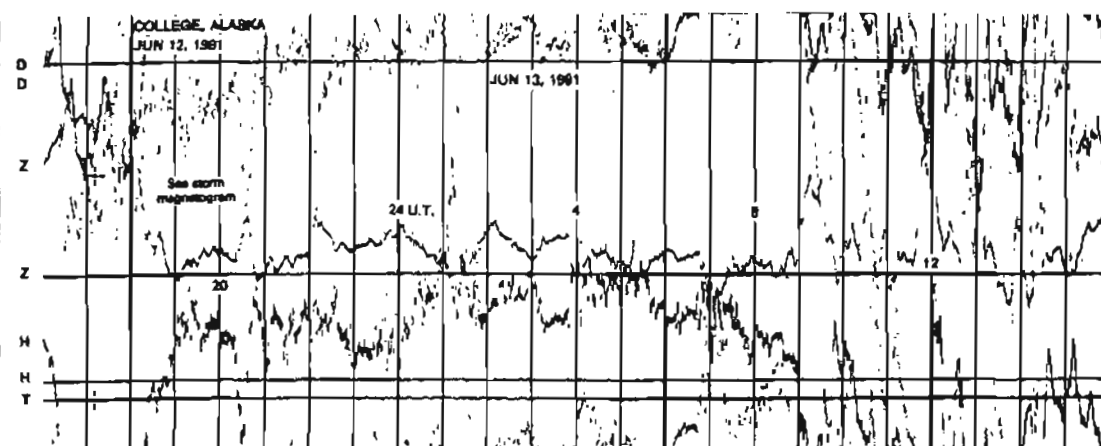
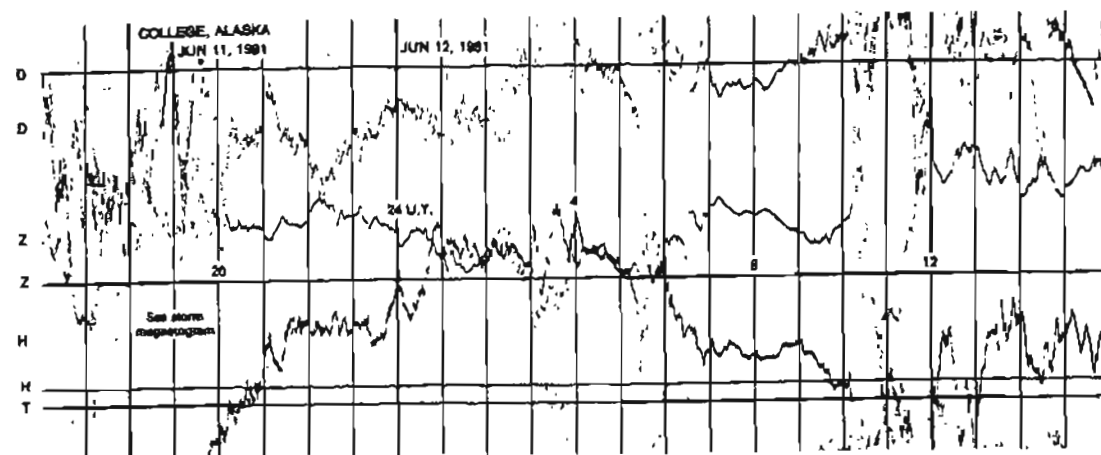
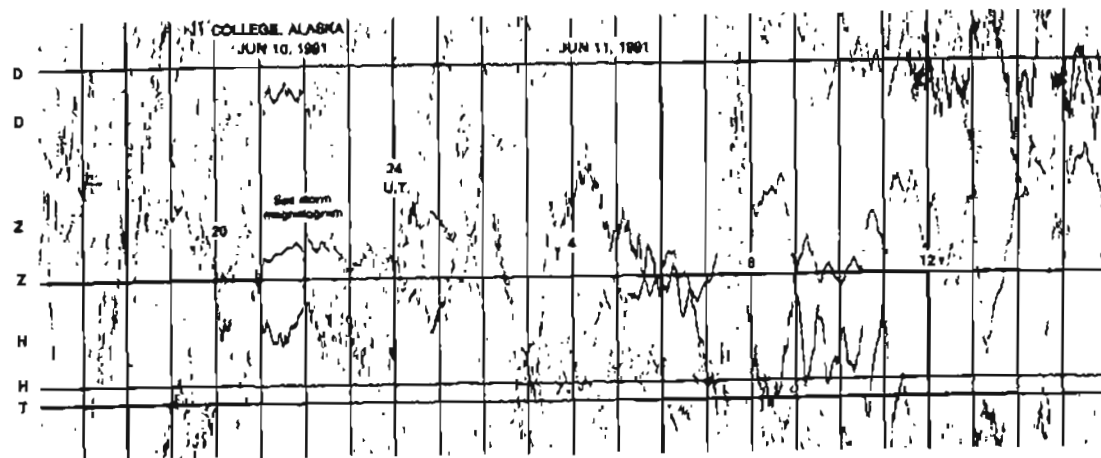
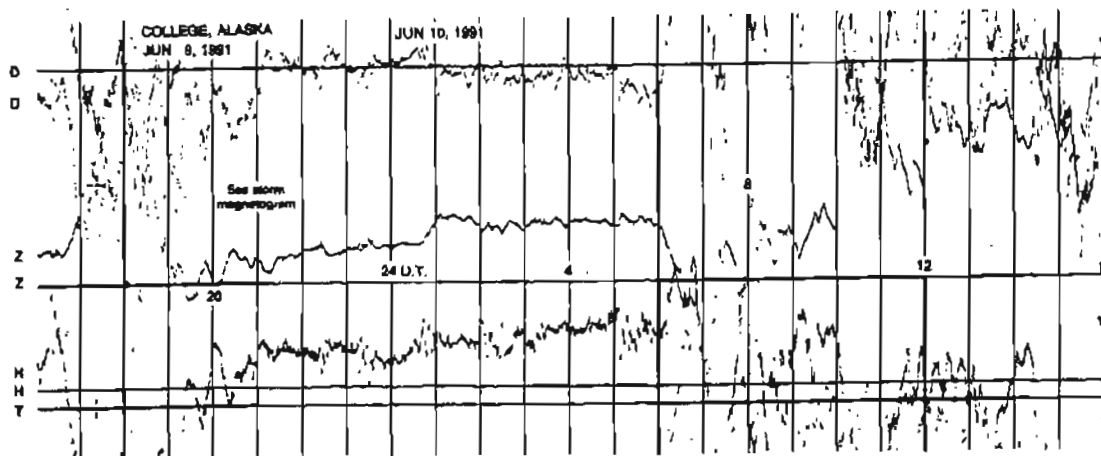


NORMAL MAGNETOGRAMS

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100 mm  
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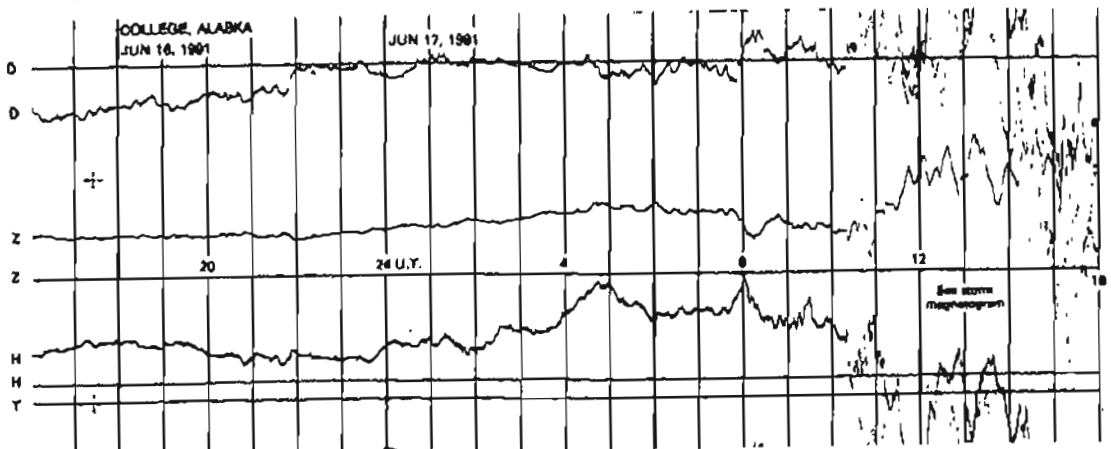
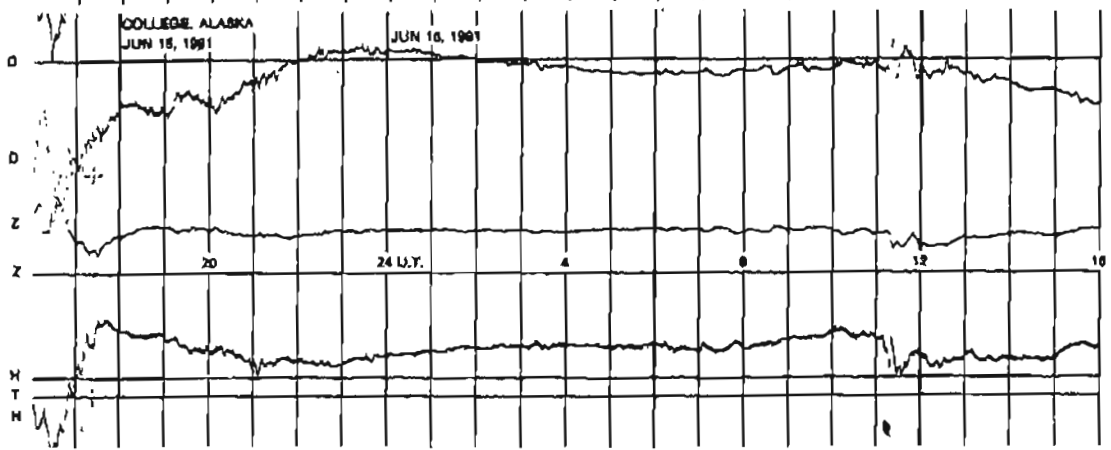
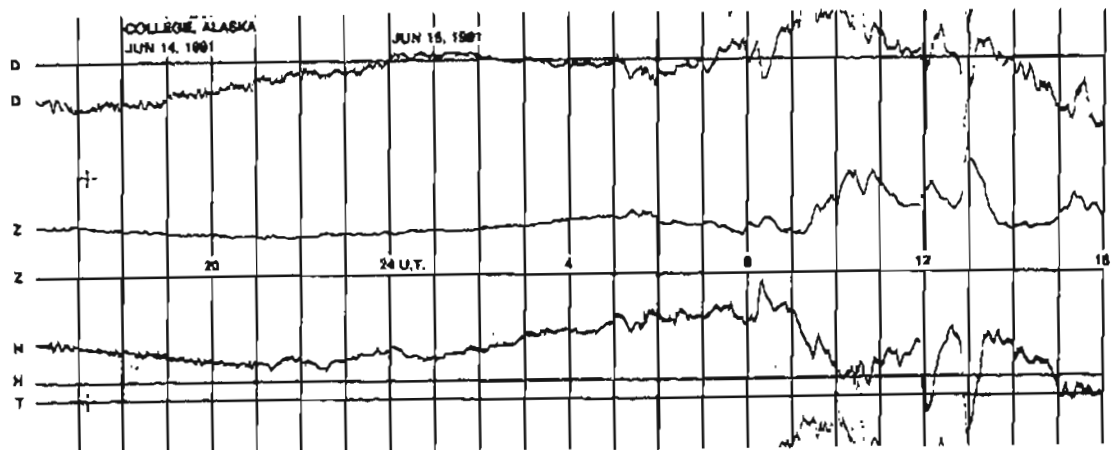
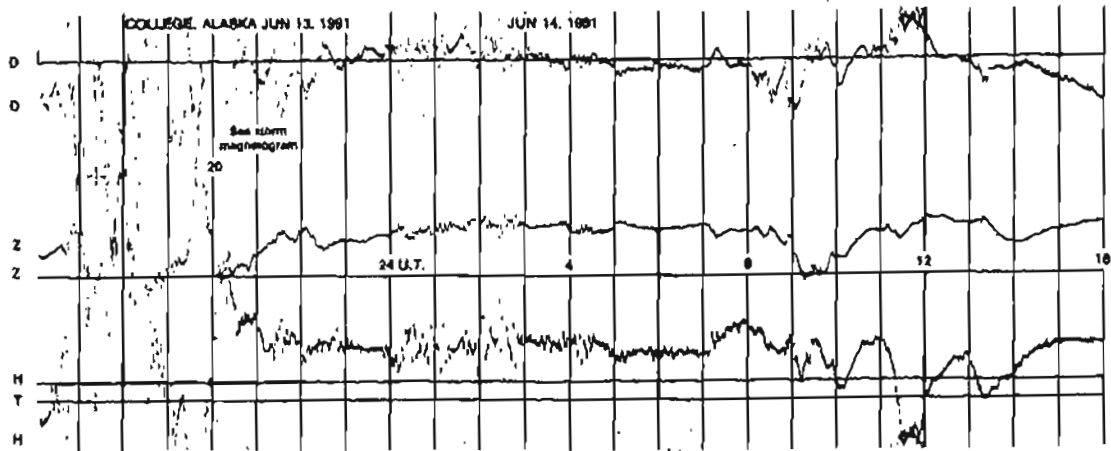


NORMAL MAGNETOGRAMS



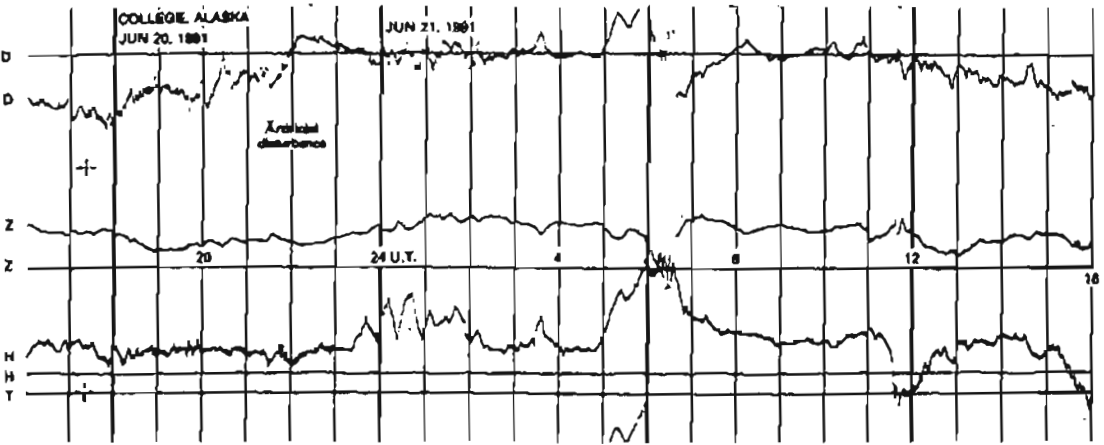
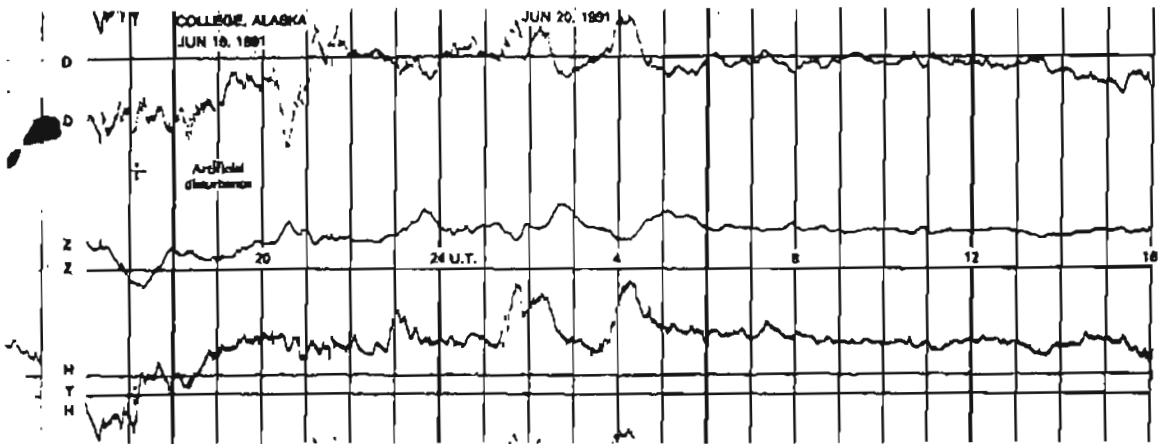
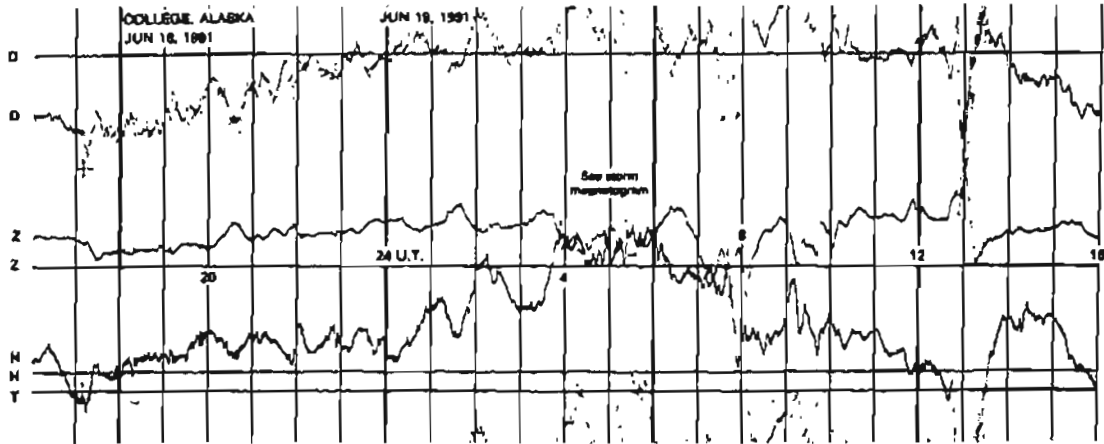
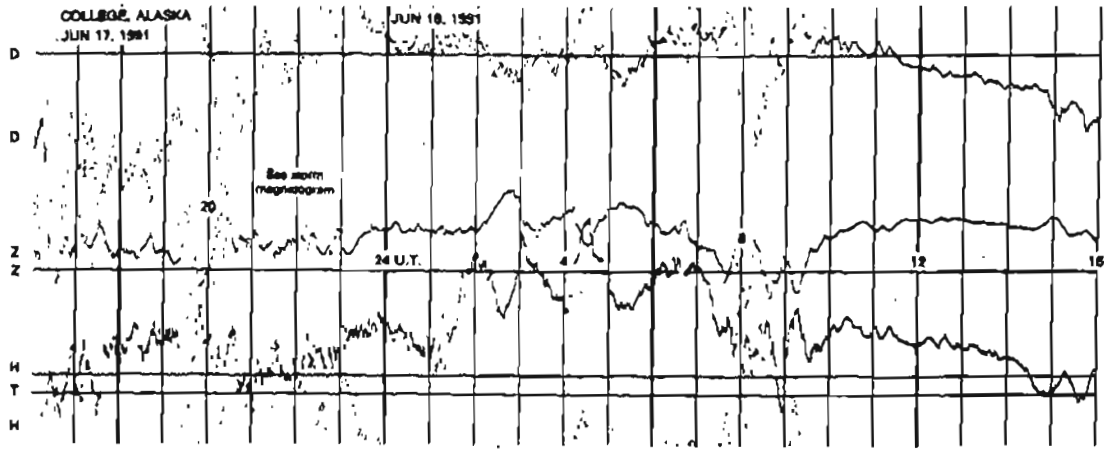
NORMAL MAGNETOGRAMS

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100mm  
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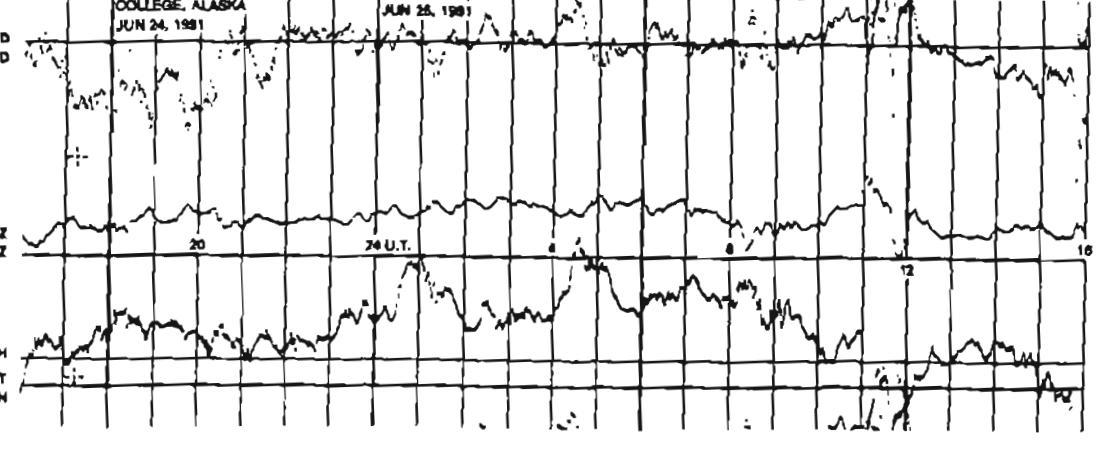
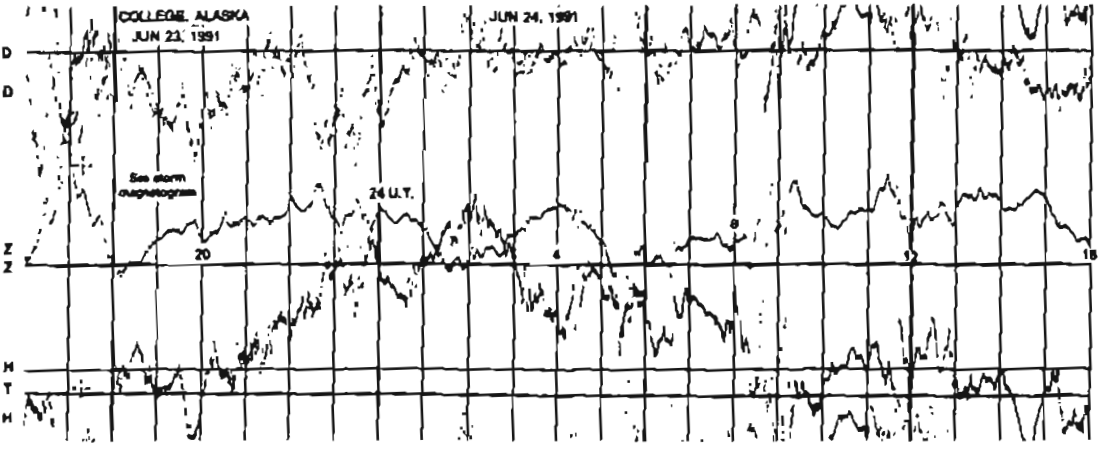
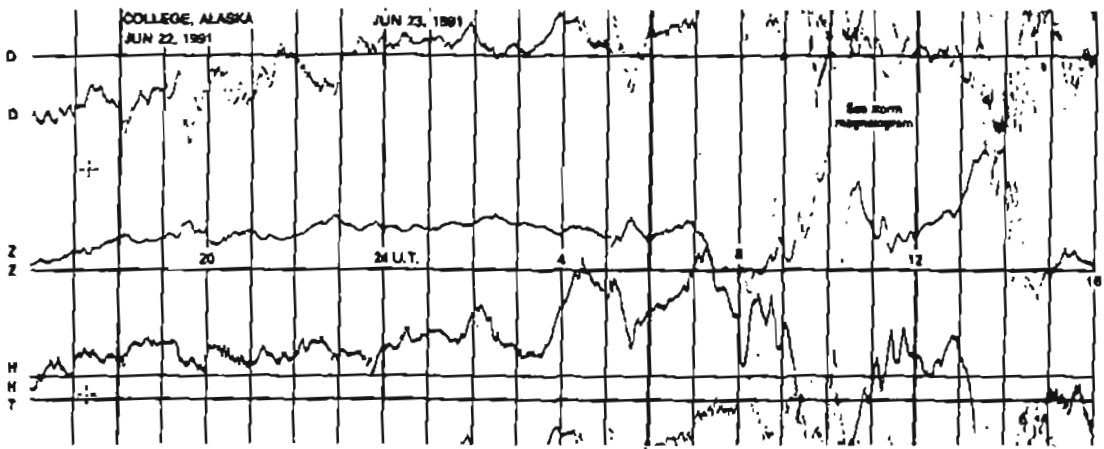
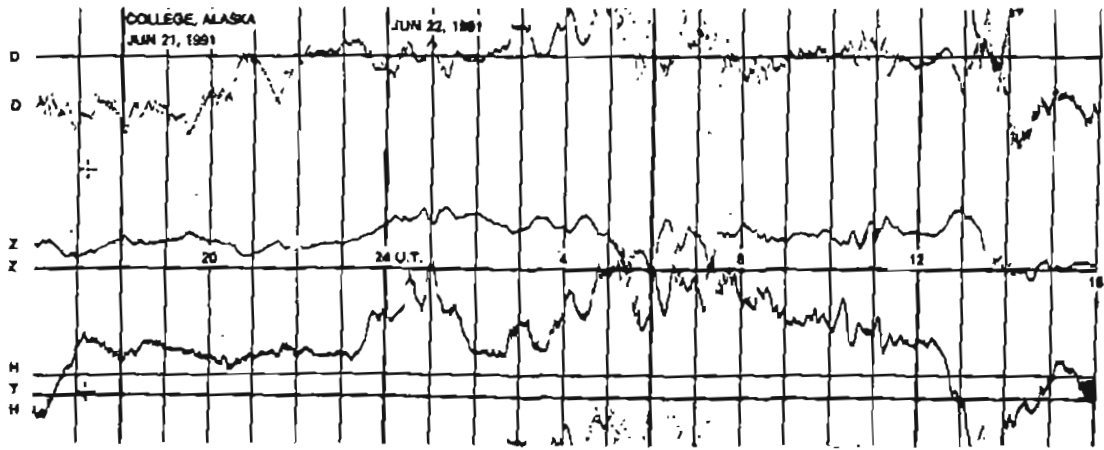
NORMAL MAGNETOGRAMS

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100 mm  
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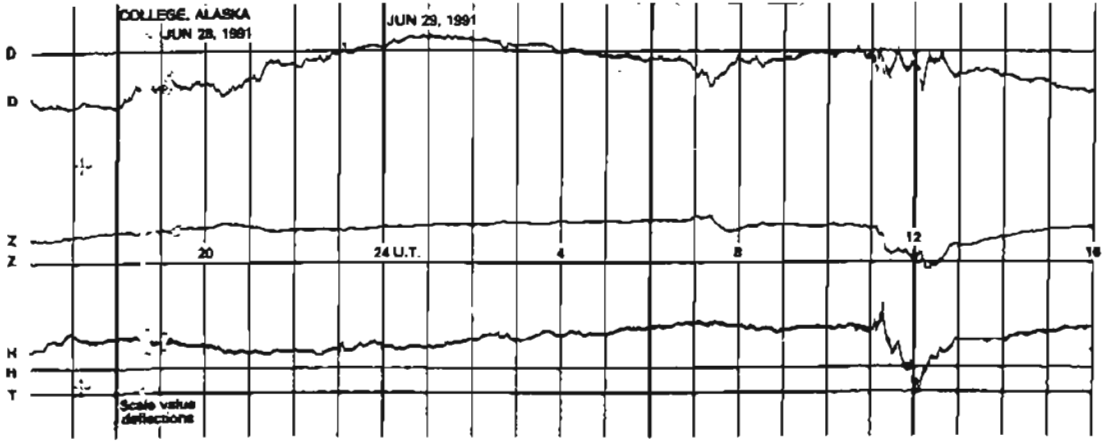
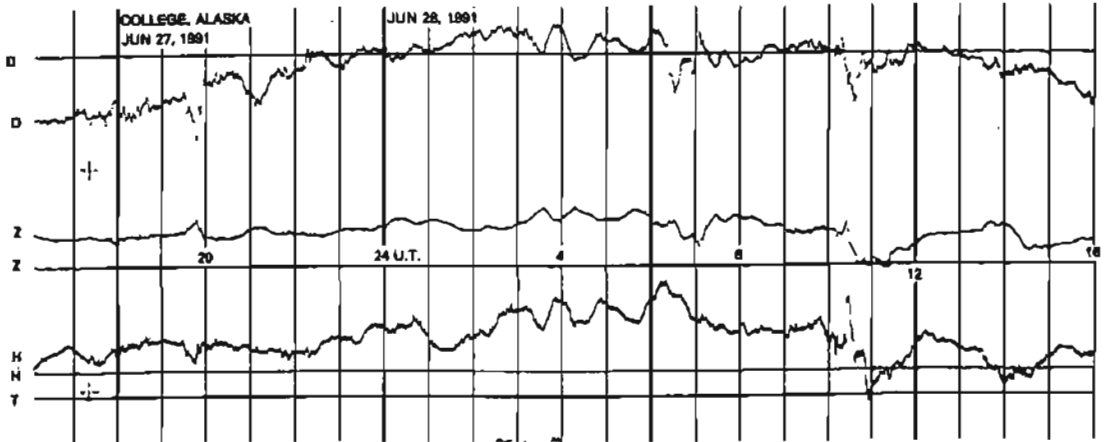
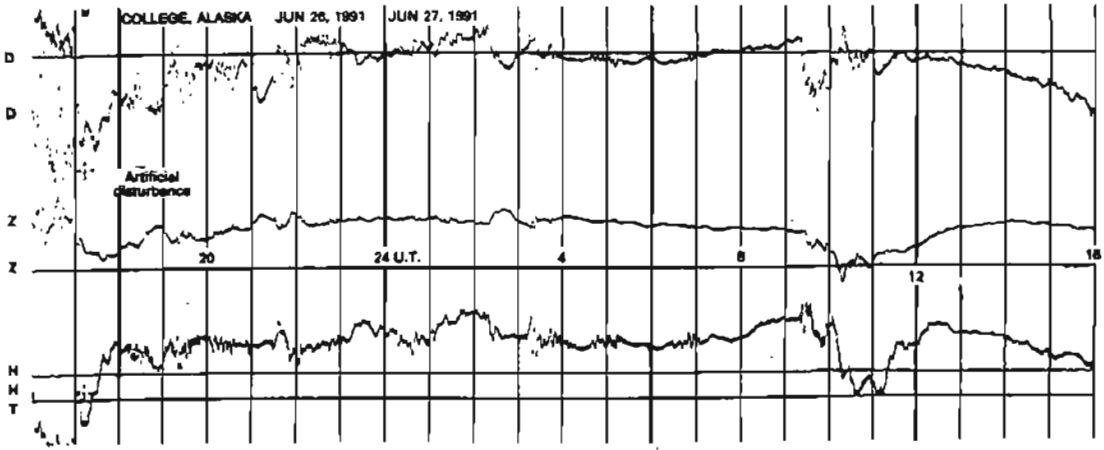
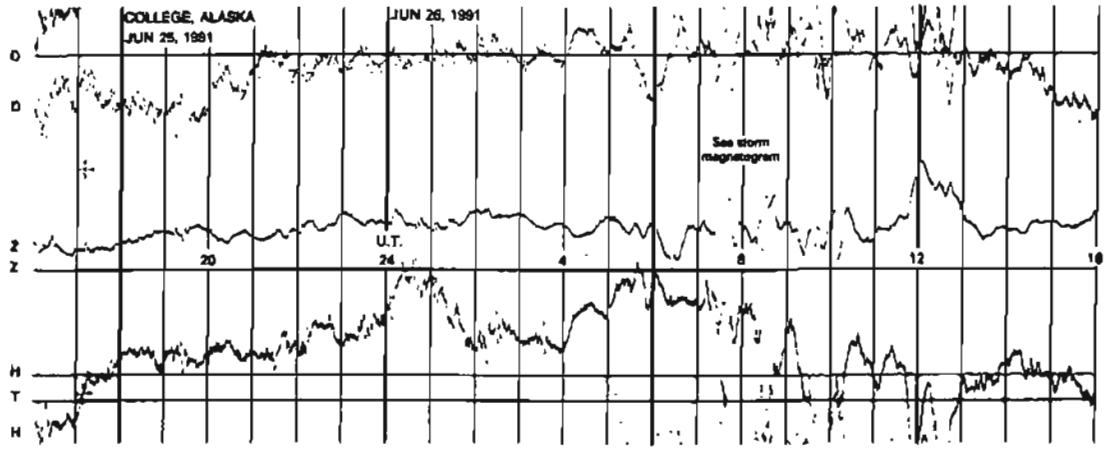


NORMAL MAGNETOGRAMS

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100 mm  
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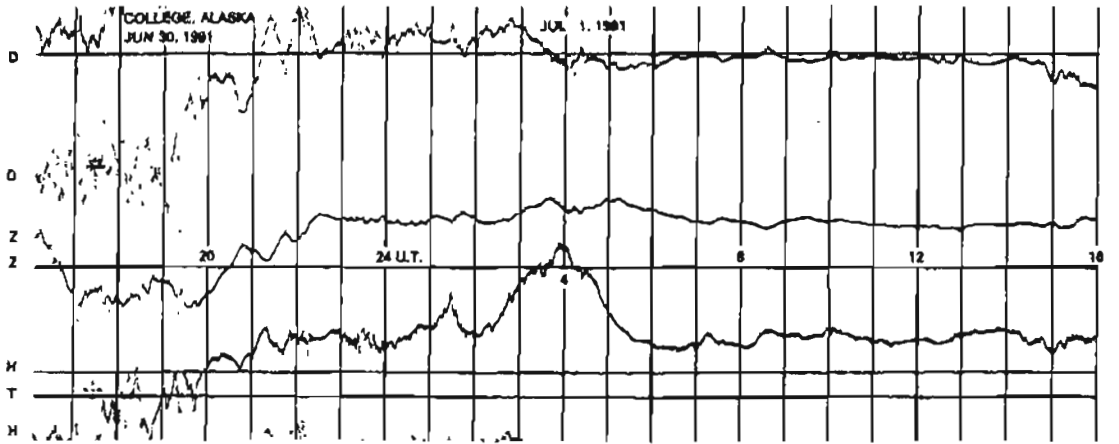
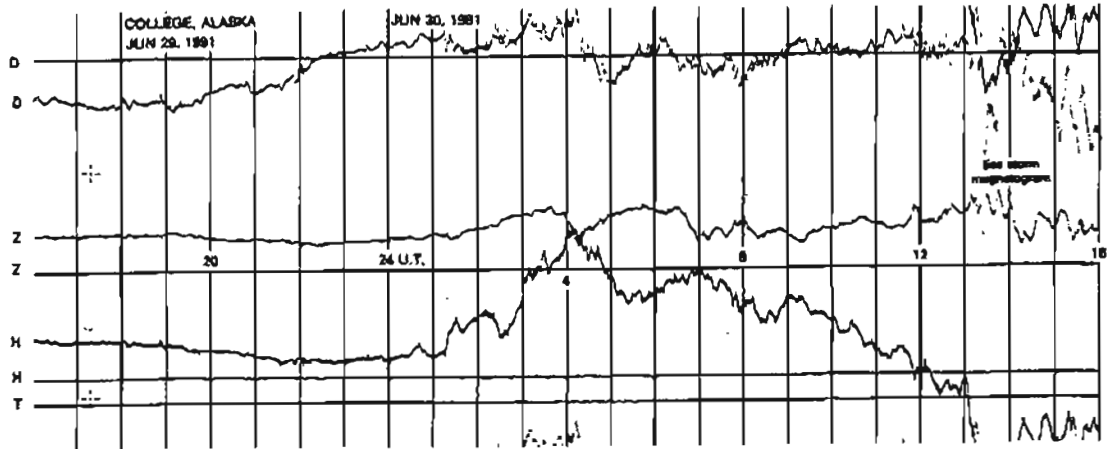


NORMAL MAGNETOGRAMS



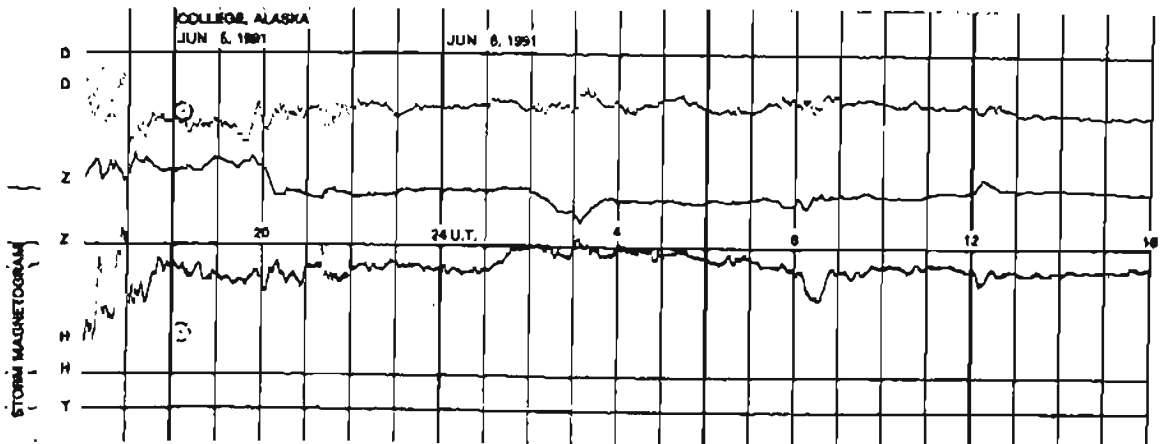
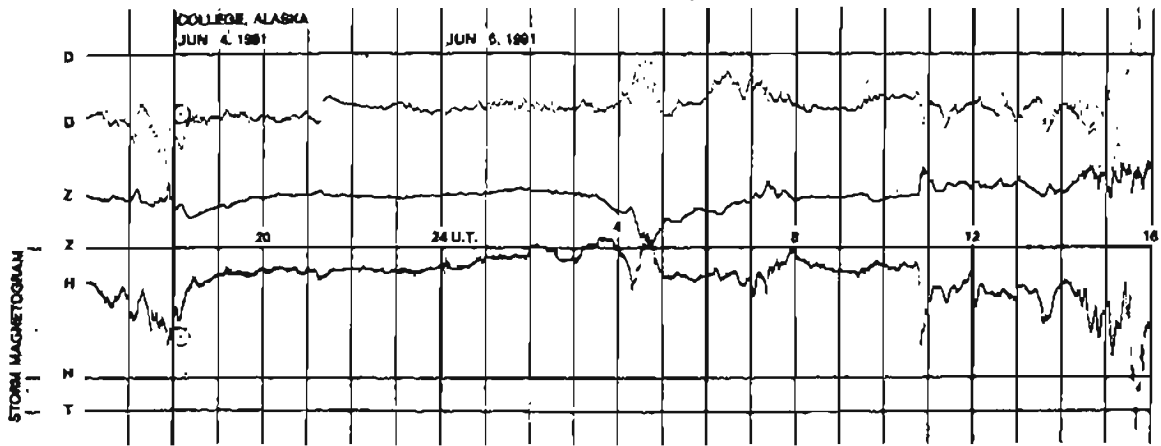
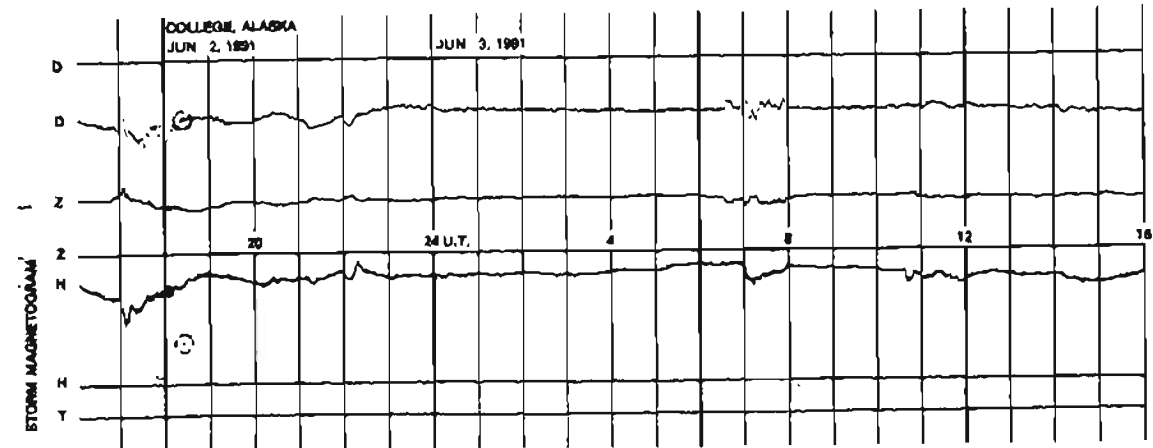
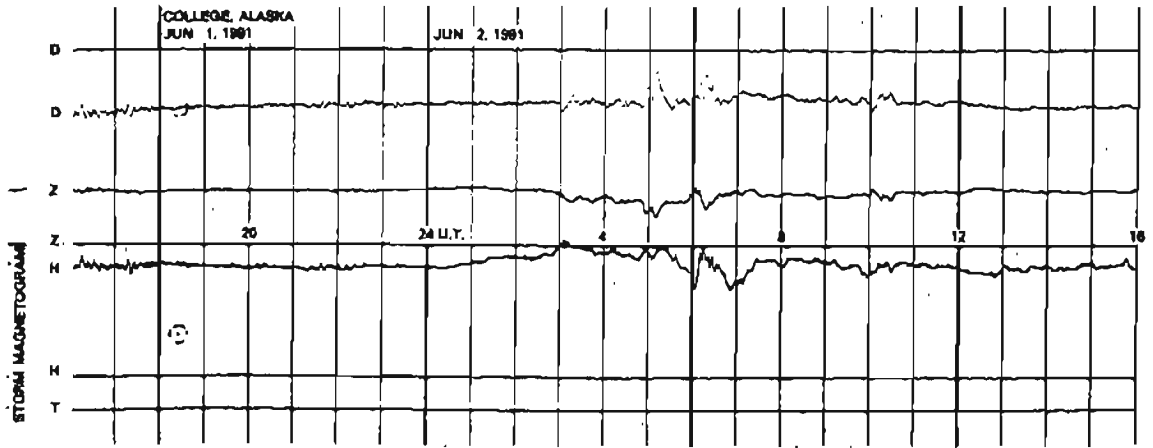
NORMAL MAGNETOGRAMS

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100 mm  
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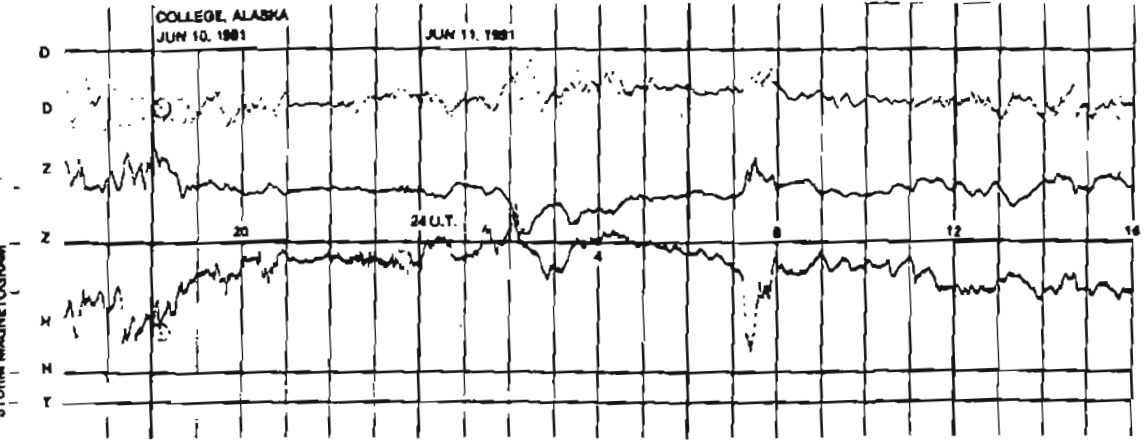
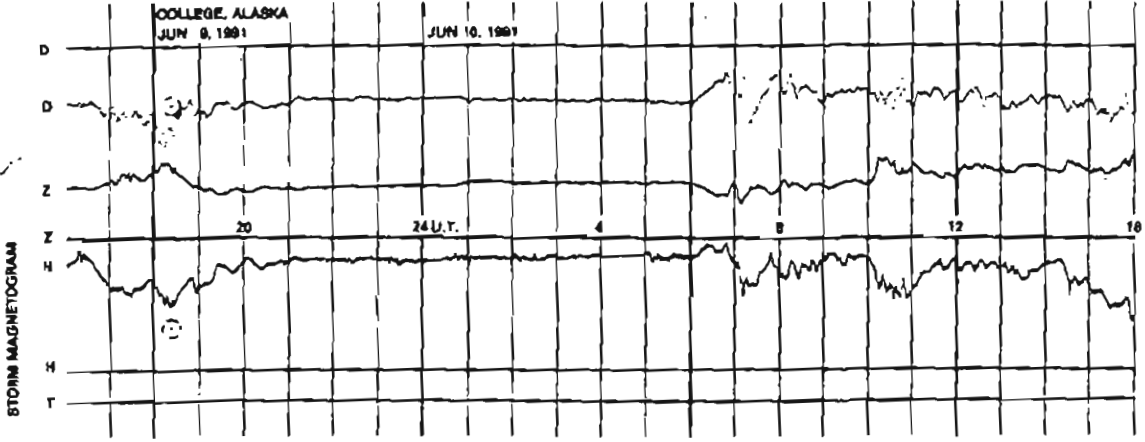
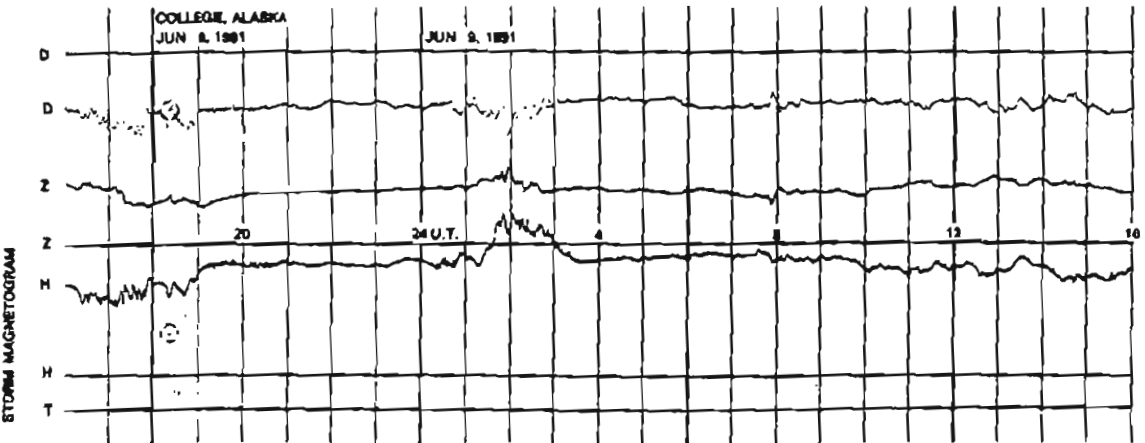
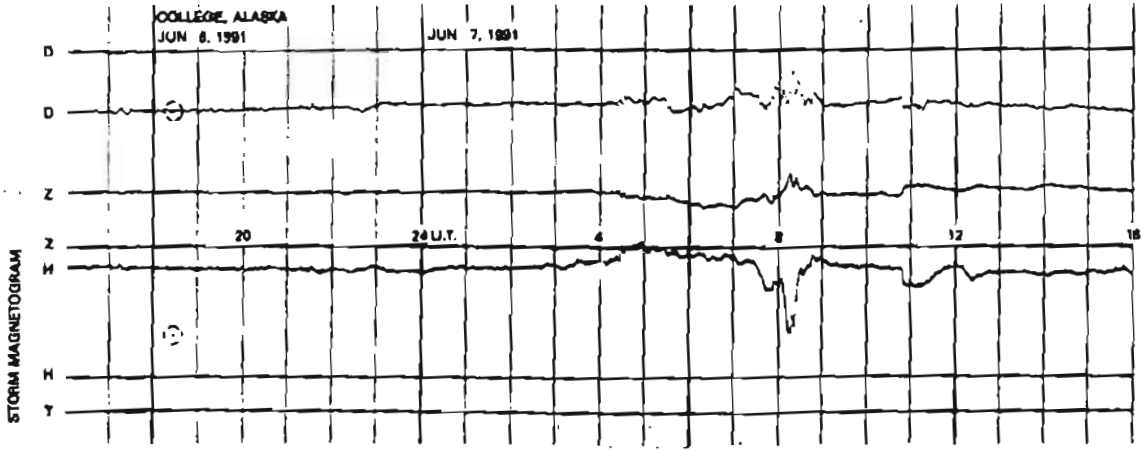




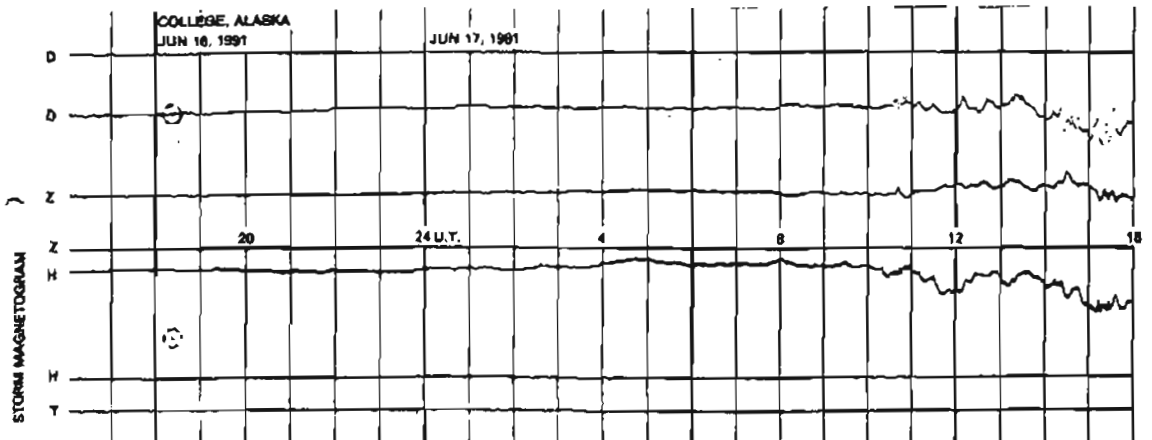
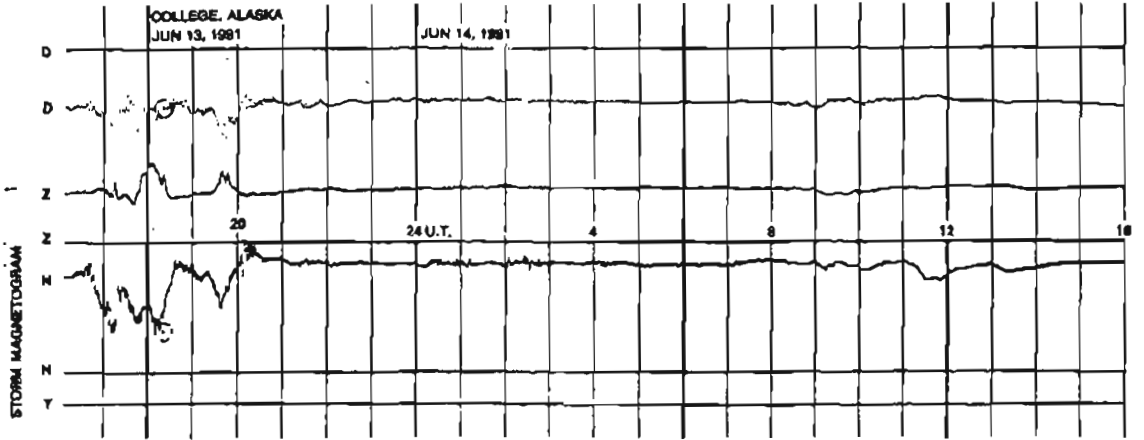
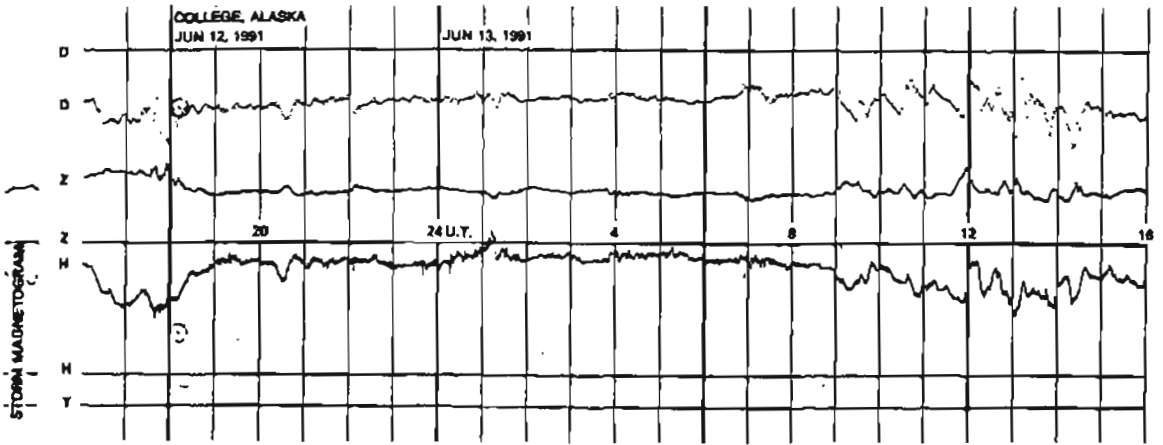
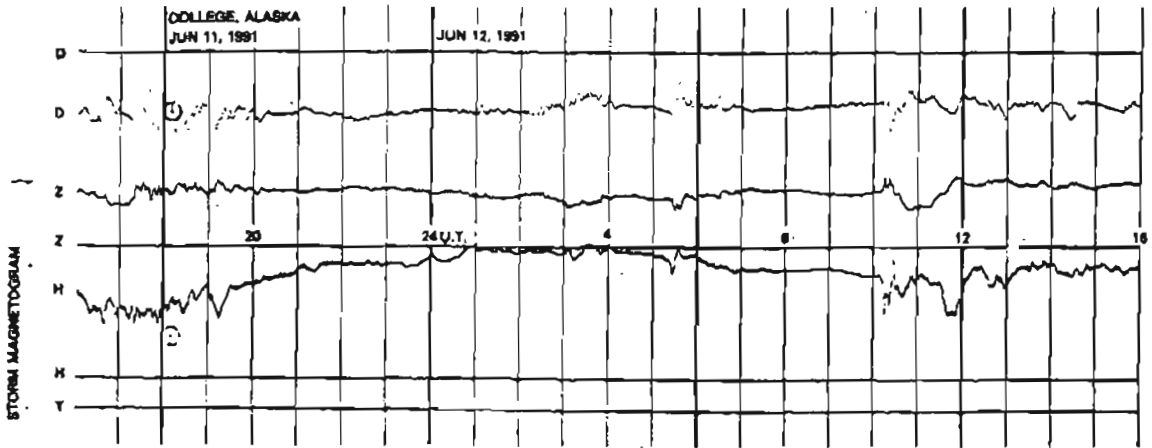
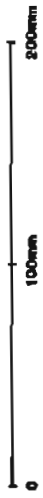
# STORM MAGNETOGRAMS



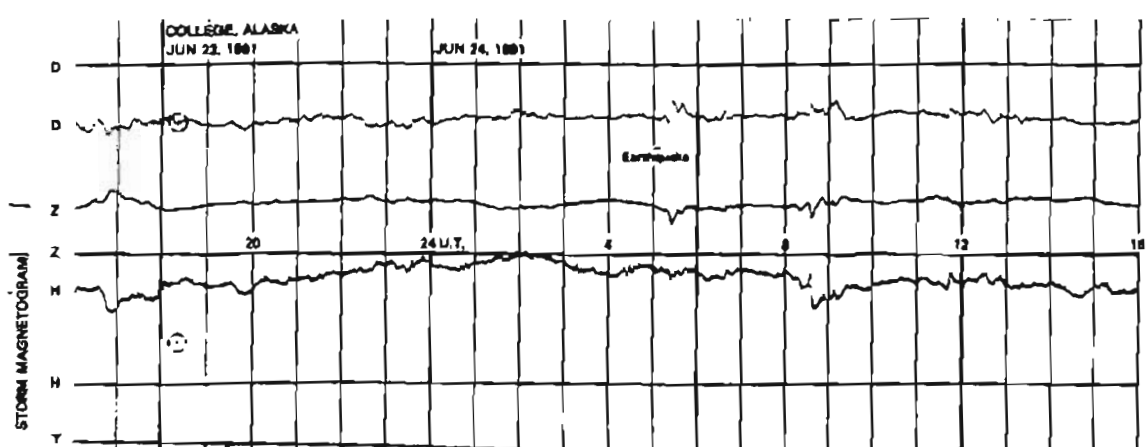
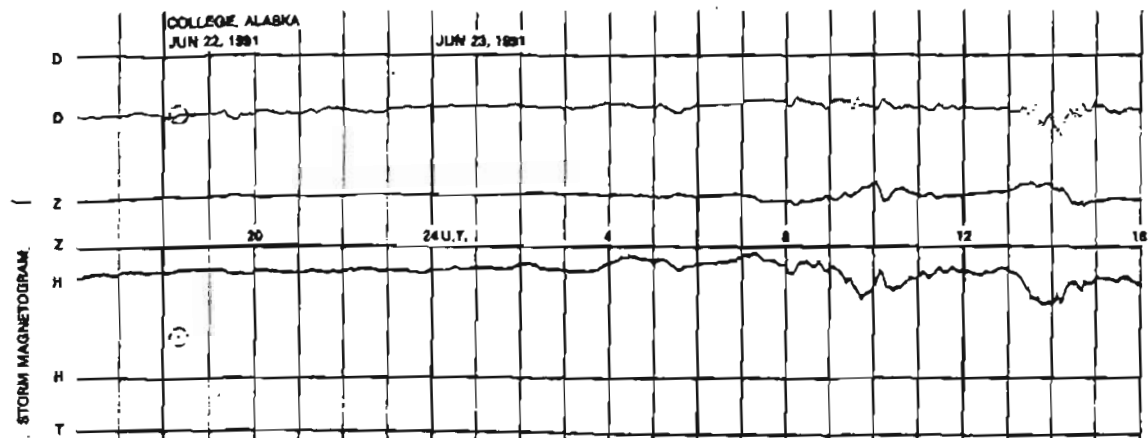
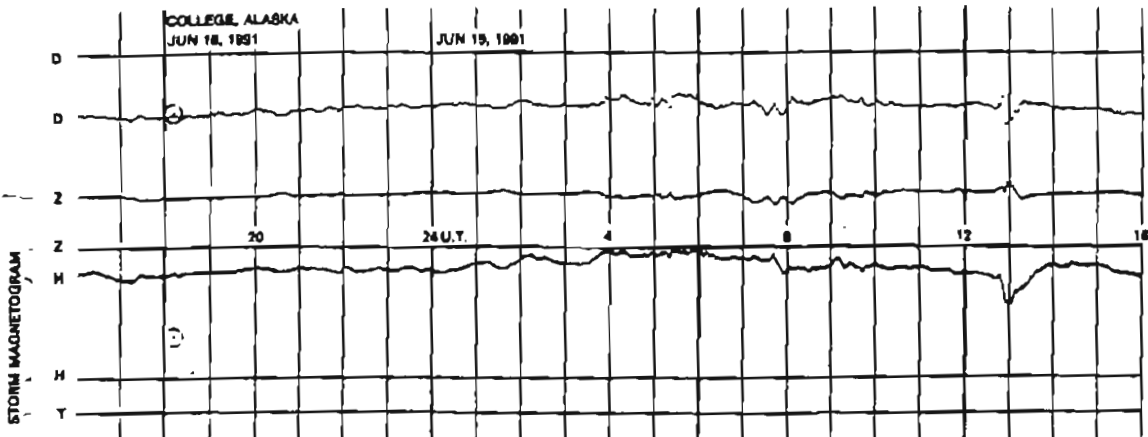
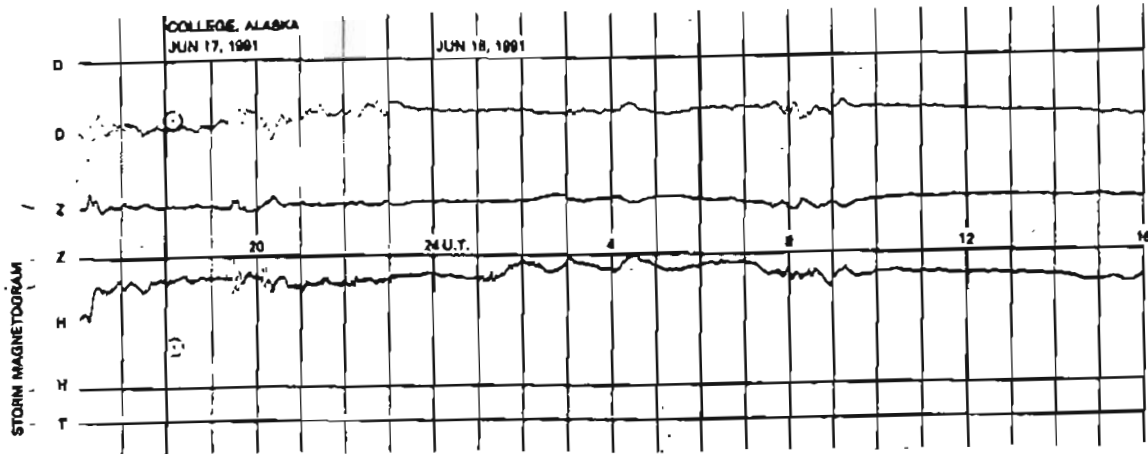
# STORM MAGNETOGRAMS



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