

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

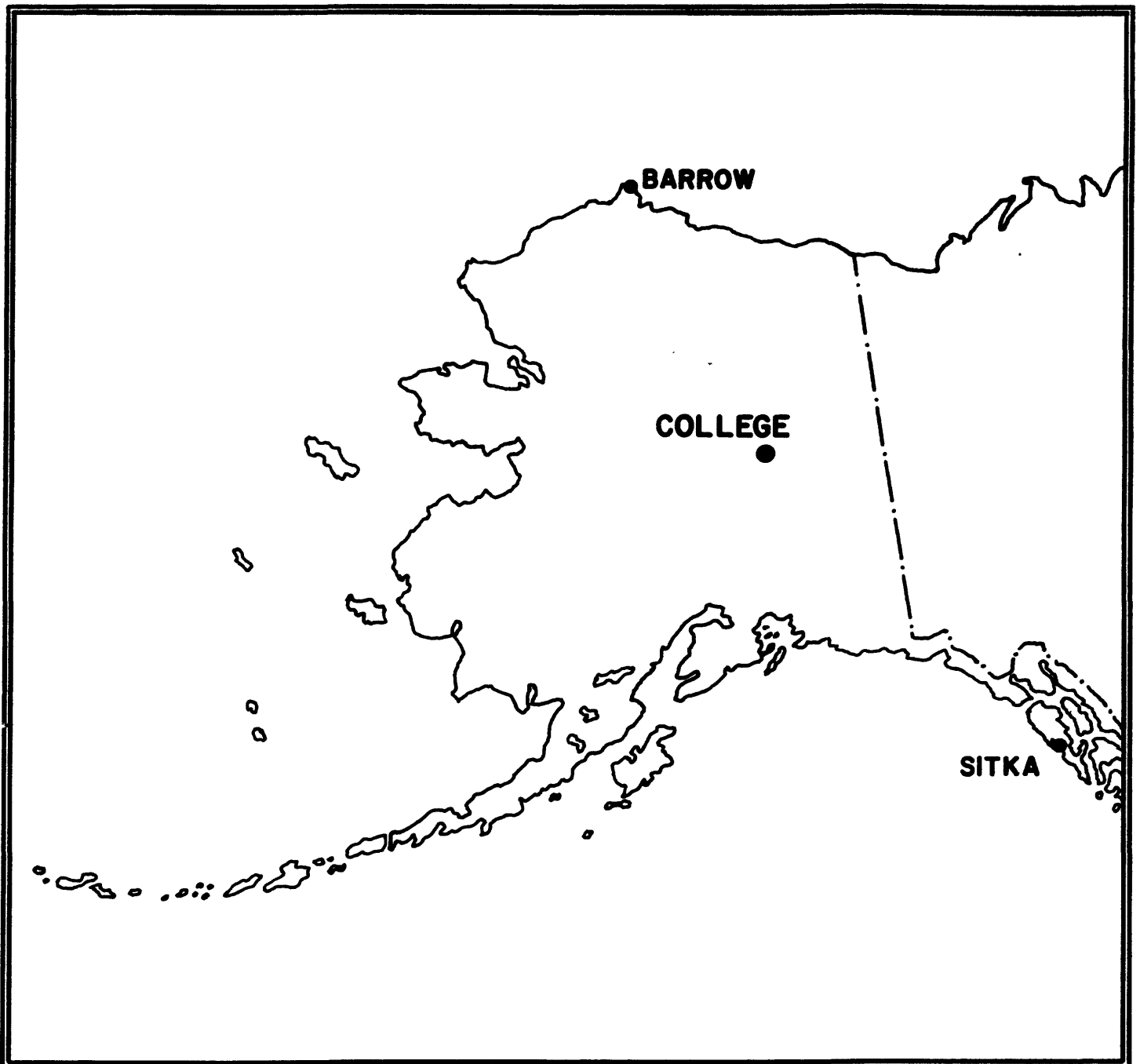
PRELIMINARY GEOMAGNETIC DATA

COLLEGE OBSERVATORY

FAIRBANKS, ALASKA

SEPTEMBER 1991

OPEN FILE REPORT 91-03001



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 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:

<u>Gamma Range</u>	<u>K-Index</u>	<u>ak</u>
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 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

MONTH AND YEAR

SEPTEMBER, 1991

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

DATE	K-INDICES								SUM	A _K	TIME SCALE ON MAGNETOGRAMS 20 mm/hr
	00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24			
1	3	4	6	6	6	6	5	5	41	57	SUDDEN COMMENCEMENTS d h m
2	3	5	8	6	5	3	2	1	33	57	
3	1	2	6	6	4	5	3	3	30	34	
4	2	3	5	5	5	2	2	2	26	23	
5	4	4	6	6	5	4	4	2	35	40	
6	2	3	4	5	3	5	3	2	27	23	
7	3	3	4	4	4	3	2	1	24	17	
8	3	2	3	4	4	4	4	3	27	20	
9	3	3	5	6	6	5	4	4	36	43	
10	4	4	5	2	5	3	3	2	28	24	
11	4	3	2	6	5	4	3	2	29	28	
12	3	2	2	3	3	2	2	1	18	10	
13	2	2	1	3	2	3	3	3	19	11	
14	3	4	4	6	6	6	3	2	34	41	
15	4	2	2	1	2	1	1	2	15	8	
16	2	2	1	2	2	1	2	1	13	6	
17	1	1	0	0	1	3	1	1	8	4	
18	1	0	0	0	0	1	1	2	5	2	
19	2	1	3	6	4	3	2	1	22	20	
20	1	3	2	5	4	2	1	1	19	14	
21	0	2	2	3	1	1	0	1	10	5	
22	1	1	1	3	3	2	1	1	13	7	
23	1	0	0	0	1	0	1	0	3	1	
24	1	1	0	0	1	1	1	1	6	2	
25	2	3	4	3	6	6	5	4	33	37	
26	3	3	6	6	5	4	4	3	34	38	
27	4	5	7	7	5	6	6	3	43	72	
28	3	4	5	6	6	5	6	4	39	51	
29	2	2	1	5	5	4	3	3	25	21	
30	3	4	6	5	5	5	4	3	35	39	
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.....

D

675.7

H

322.2

Z

(mm)

CURRENT SCALE VALUE.....

3.66

7.73

(γ/mm)

LOWER LIMIT FOR K = 9.....

2470

2490

(to nearest 10γ)

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:

SEPTEMBER 1991

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

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
CO	64.6 N	1	05XX	..				2	3	8	219	1940	940	2	17
		25	12XX	..				27	3,4	7	191	1500	1000	27	21

NORMAL MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION	
	FROM	TO	SCALE VALUE	BASELINE
D	0001 U.T., 9-1-91	2400 U.T., 9-30-91	1.0' / mm	3.78 / mm
				25° 59.4' E
H	(SAME)	(SAME)	7.78 / mm	126508
Z	(SAME)	(SAME)	7.88 / mm	552018

STORM MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION	
	FROM	TO	SCALE VALUE	BASELINE
D	0001 U.T., 9-1-91	2400 U.T., 9-30-91	7.9' / mm	29.48 / mm
H	(SAME)	(SAME)	43.48 / mm	
Z	(SAME)	(SAME)	48.98 / 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): -58; i.e., H absolute and baseline values are 58 less than previously reported.
- Vertical Intensity (Z): +338; i.e., Z absolute and baseline values are 338 higher than previously reported.

MONTHLY MEAN ABSOLUTE VALUES*

D	H	Z *
26° 38.9' E	127478	553128

*COMPUTED FROM FIVE QUIETEST DAYS DURING MONTH.

DAYS USED: SEP 17, 18, 21, 23, 24.

* Lost record 9/11 → 9/22

MAGNETOGRAM HOURLY SCALINGS - FIVE QUIETEST DAYS
(UNIVERSAL TIME)

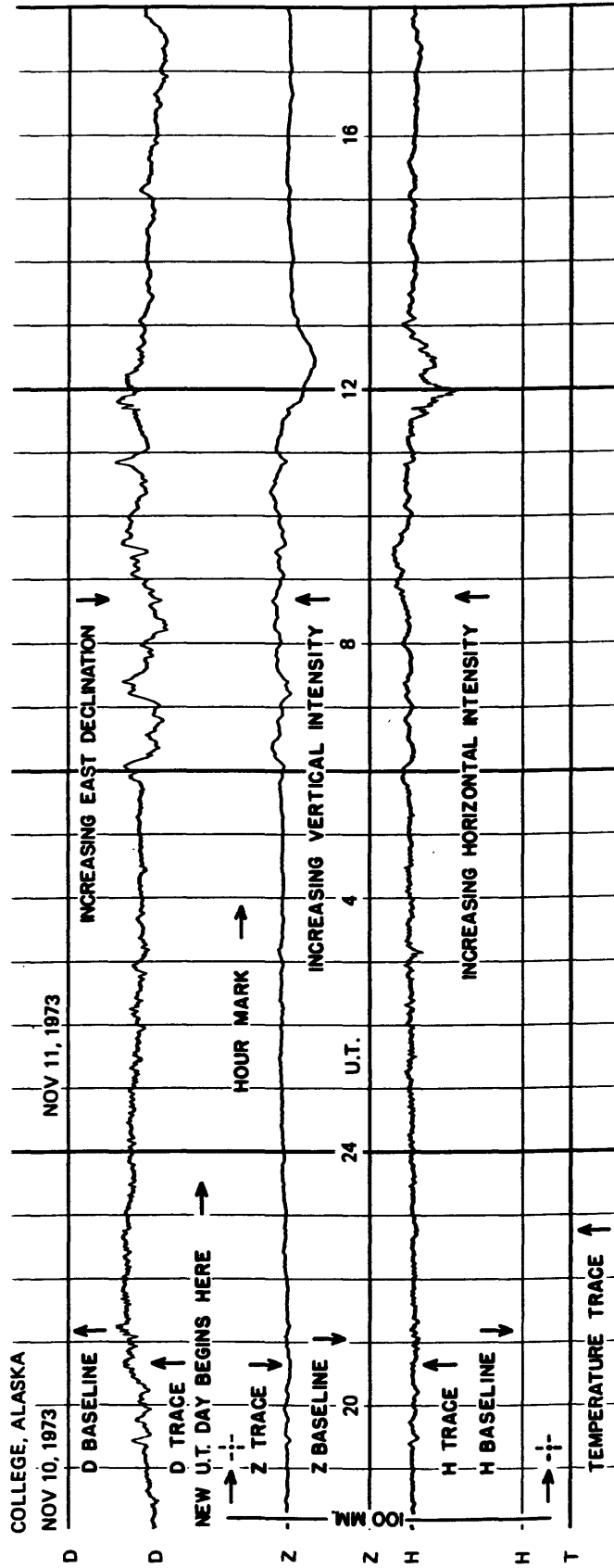
Values are in Tenths of mm and are Averages for Successive Periods of One hour beginning at Midnight. Shrinkage Corrections have been applied. Negative Values in Red with Minus.

COMPONENT	D					H					Z					COMPONENT									
	DAY	17	18	21	23	24	17	18	21	23	24	17	18	21	23		24	DAY							
A _k	4	2	5	1	2	4	2	5	1	2	4	*	2	5	1	2	A _k								
HOURL	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
	350	359	381	343	364	123	116	116	122	118	*	*	*	*	*	156	01								
	360	380	374	363	338	120	109	121	120	141						158	02								
	330	380	360	376	340	133	109	120	121	139						162	03								
	359	370	336	367	340	120	120	126	127	144						170	04								
	334	376	341	372	362	149	123	149	134	141					158	171	05								
	351	379	309	371	377	140	127	202	141	140					158	166	06								
	373	380	368	389	380	138	133	205	140	147					158	157	07								
	380	384	344	391	380	140	134	210	141	148					159	153	08								
	391	385	350	391	382	148	140	217	141	146					157	157	09								
	381	382	376	396	391	146	145	150	143	147					157	157	10								
	400	395	417	397	392	145	147	101	146	148					155	156	11								
	405	396	427	395	397	141	142	82	148	149					153	154	12								
	409	421	401	420	401	140	140	119	136	150					154	153	13								
	410	436	398	448	410	141	139	135	140	146					144	152	14								
	387	453	404	437	412	120	130	124	141	131					154	140	15								
	450	479	438	451	452	34	123	130	134	104					159	126	16								
	497	491	473	477	520	-42	130	121	124	82					159	120	17								
	537	460	481	510	577	86	121	128	110	60					159	79	18								
	509	479	475	533	555	101	110	113	91	90					156	51	19								
	447	469	460	450	437	93	104	110	100	100					130	58	20								
	428	459	411	399	330	86	101	111	103	105					125	70	21								
	350	350	375	350	346	95	114	117	111	90					130	116	22								
	299	380	362	331	321	109	119	119	115	90					138	139	23								
	331	339	377	351	270	117	120	121	111	89					147	155	24								
DAILY SUM	9468	9782	9438	9708	9494	2723	2996	3247	3040	2945					(3010)	3276	DAILY SUM								
DAILY MEAN	394	408	393	404	396	113	125	135	127	123					(150)	136	DAILY MEAN								
MEAN			399					125						143			MEAN								

Scaled 100 Checked ✓

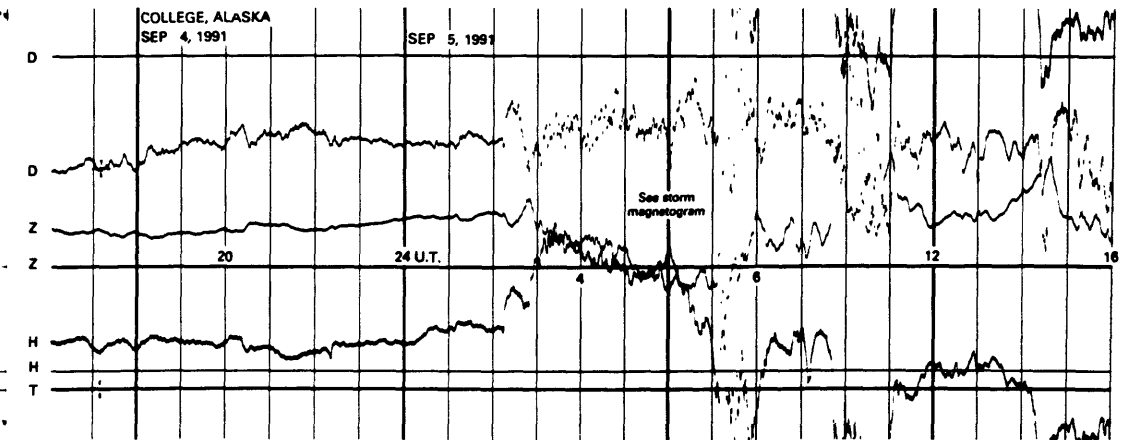
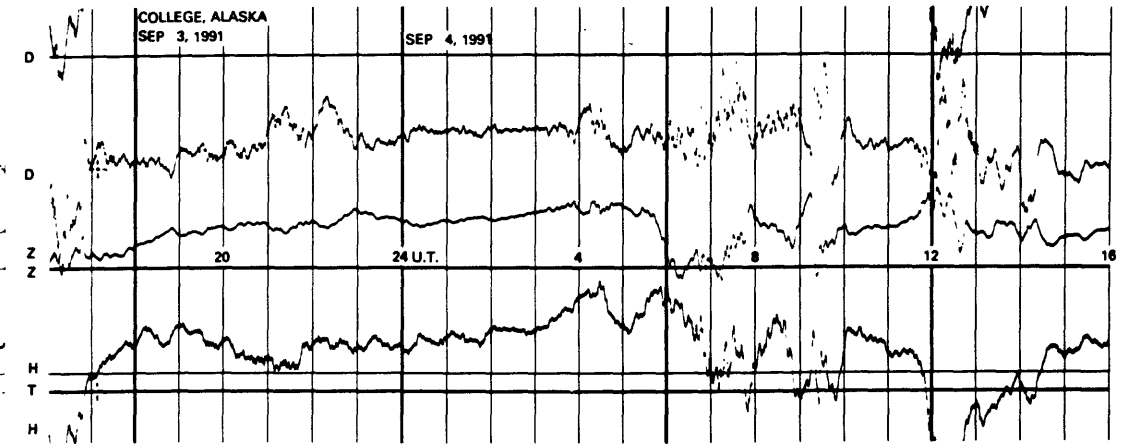
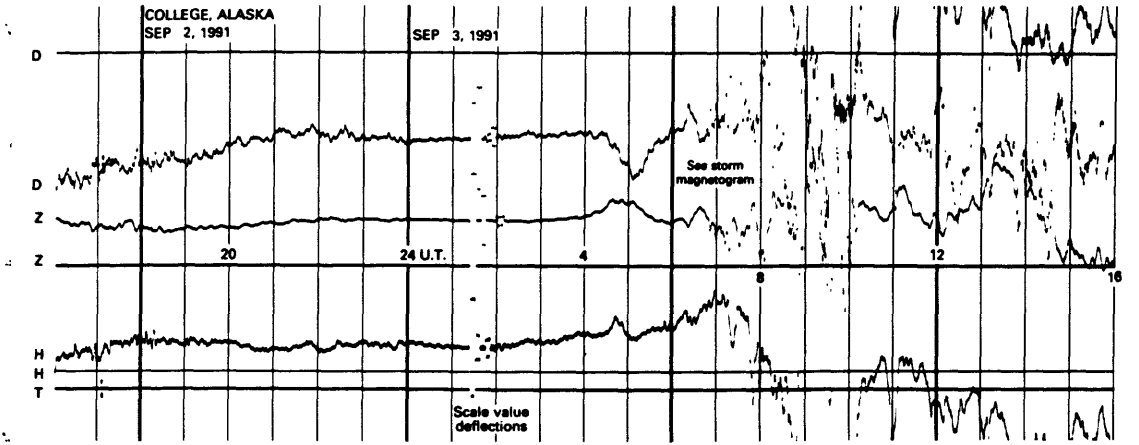
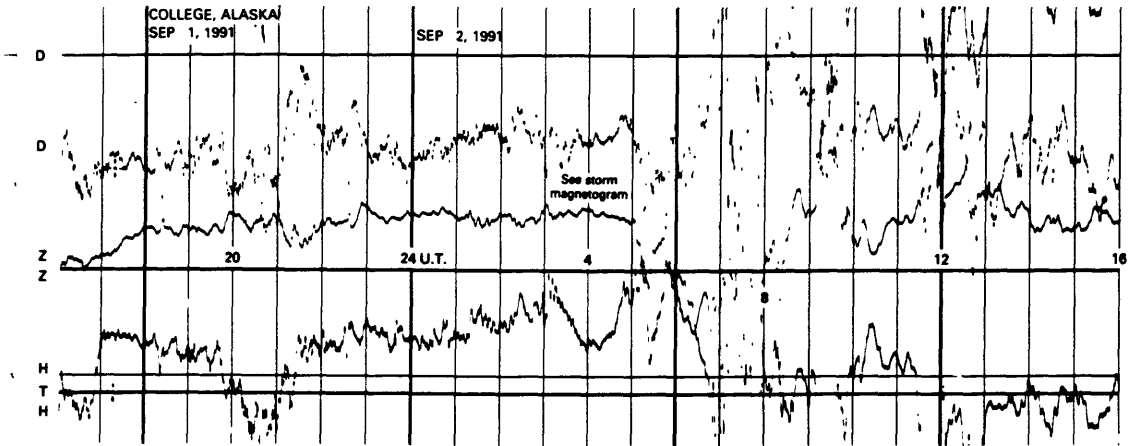
* Z-trace lost 9/11, 16UT - 9/23, 04 UT. Lamp accidentally deflected

FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)

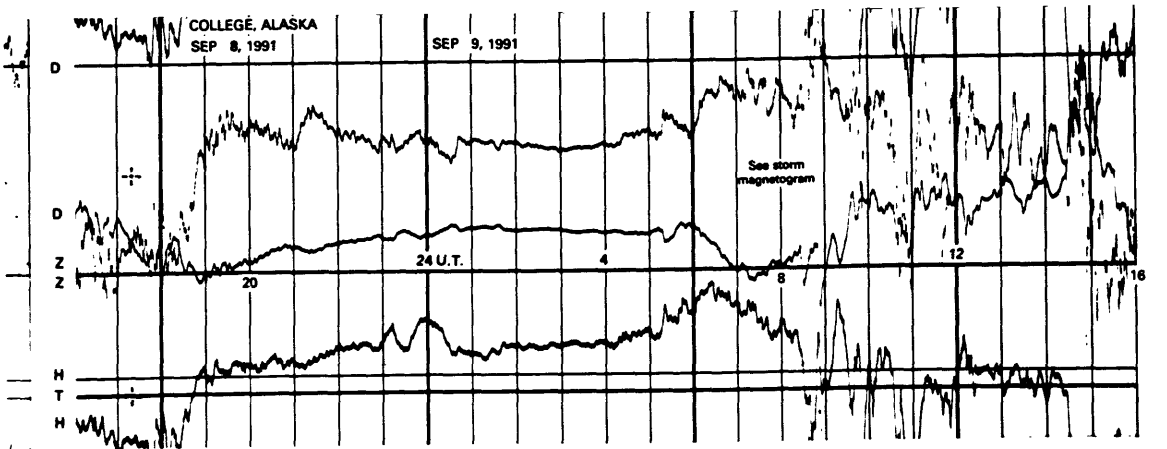
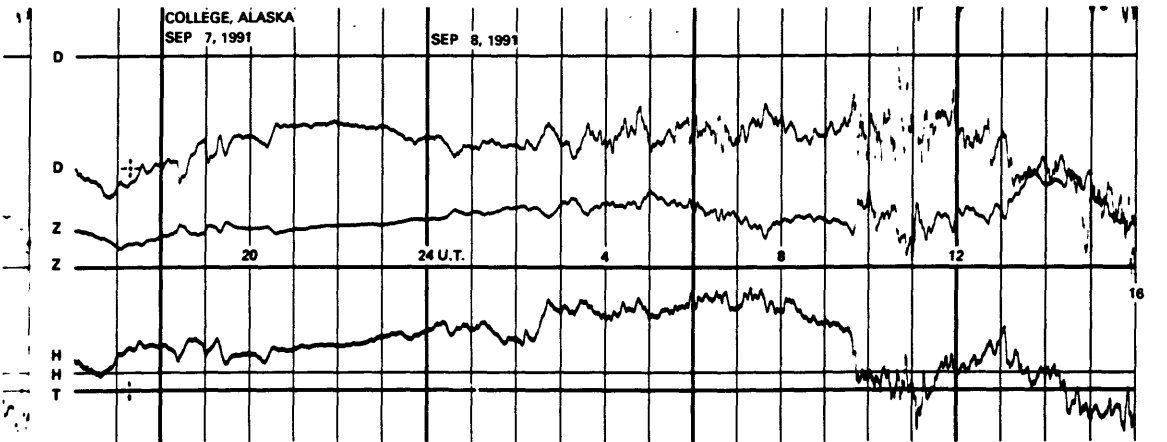
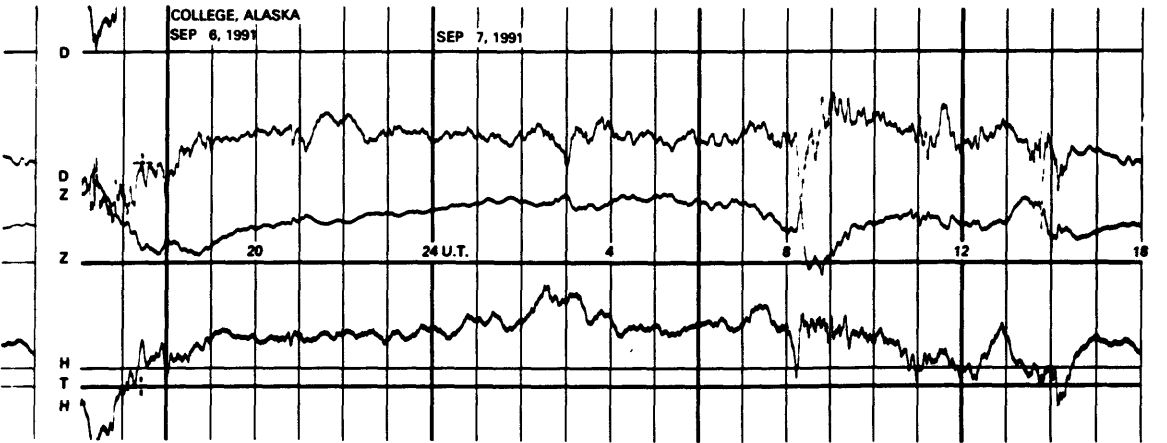
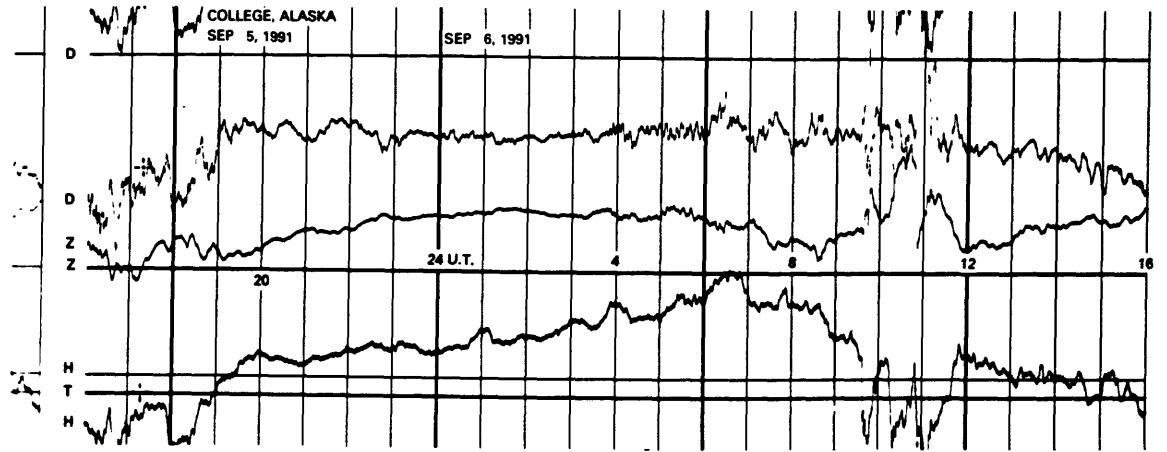


SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES

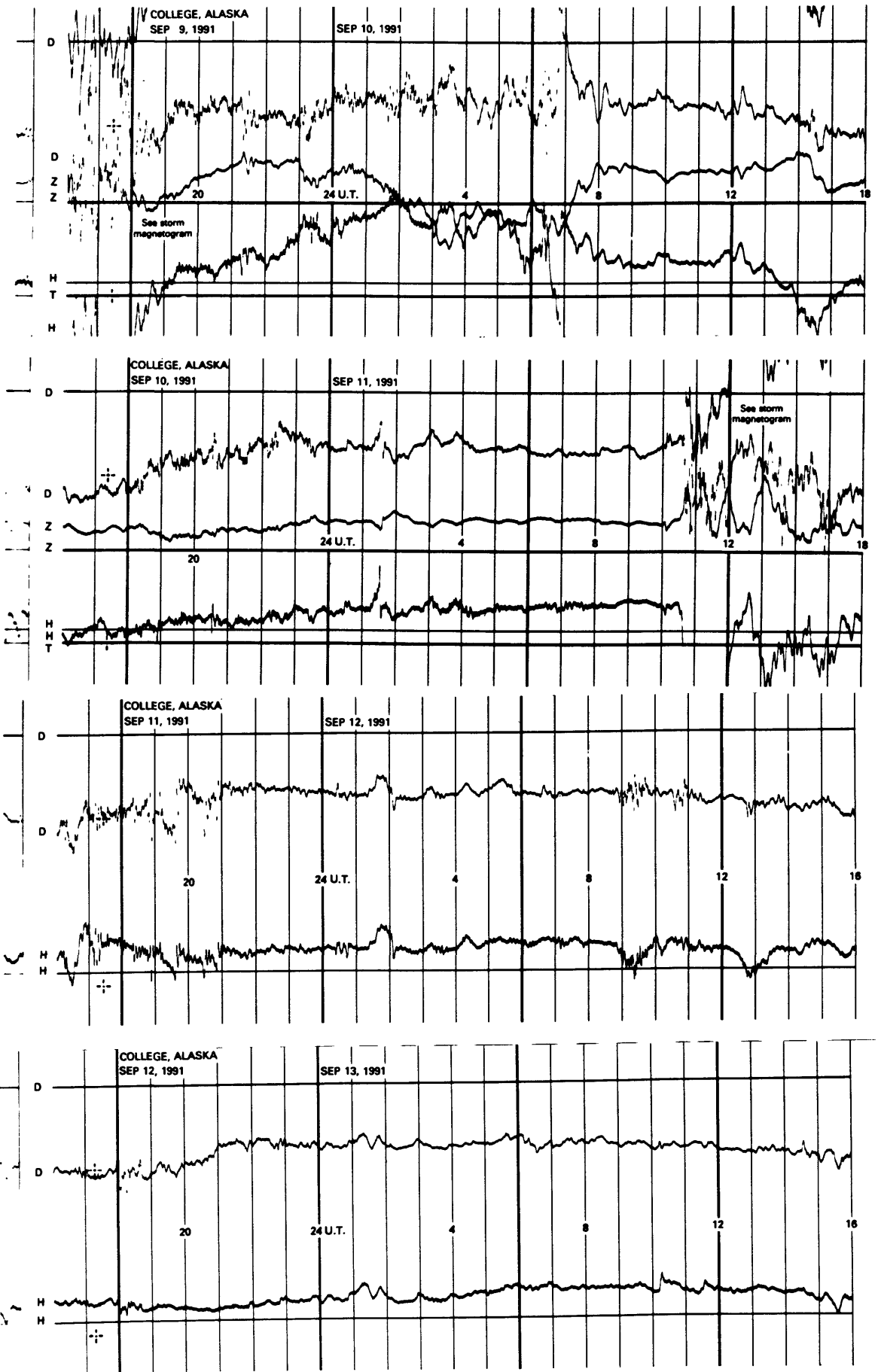
NORMAL MAGNETOGRAMS



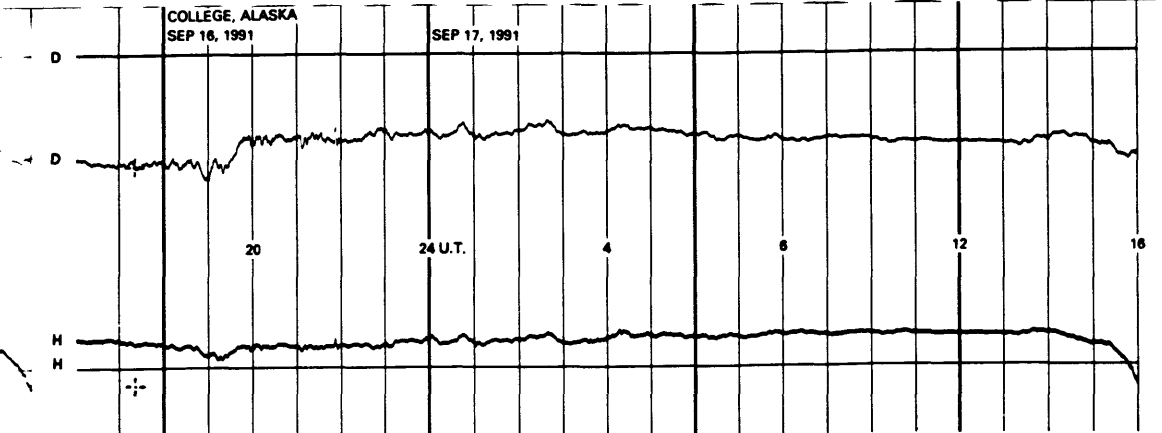
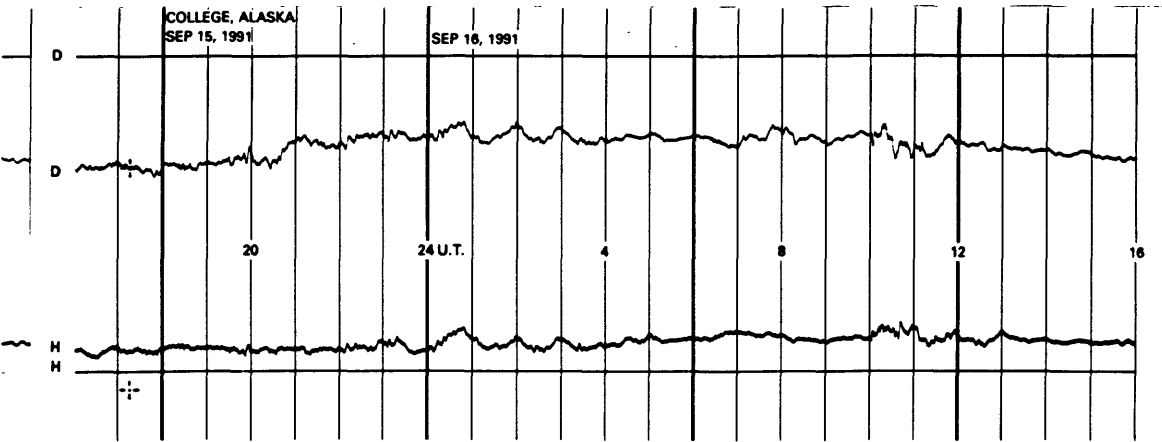
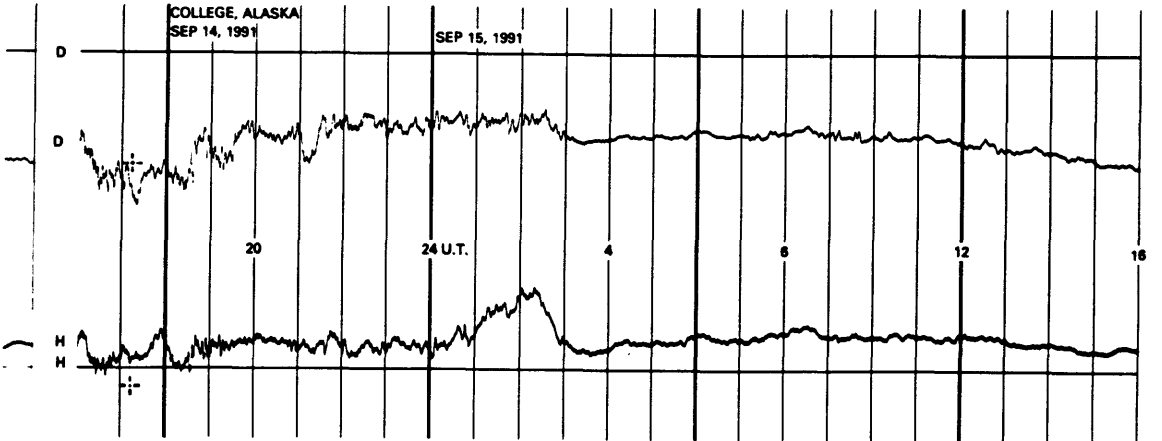
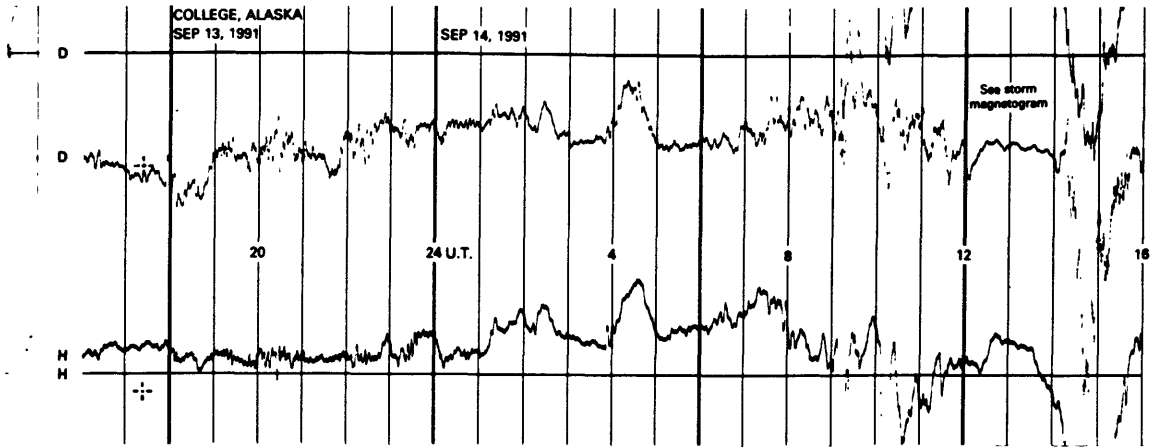
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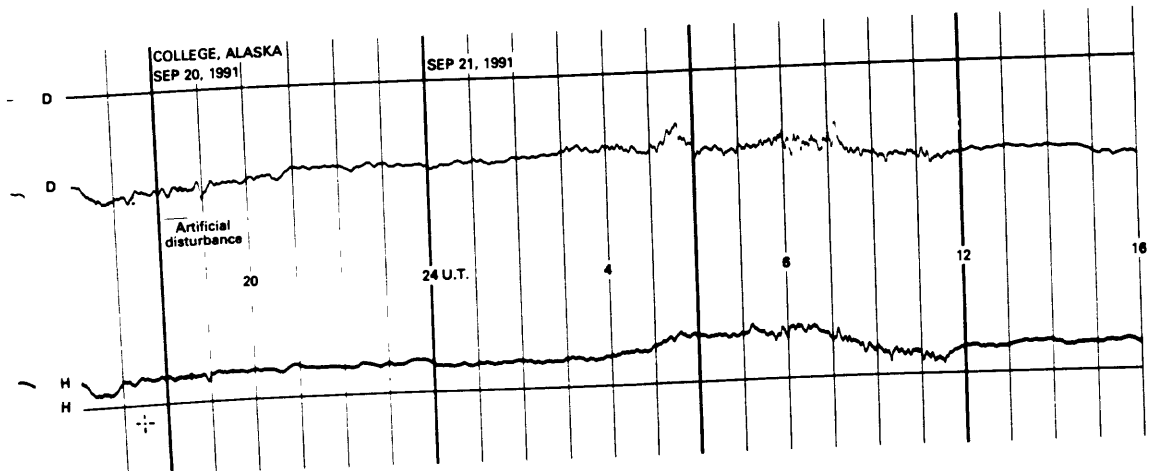
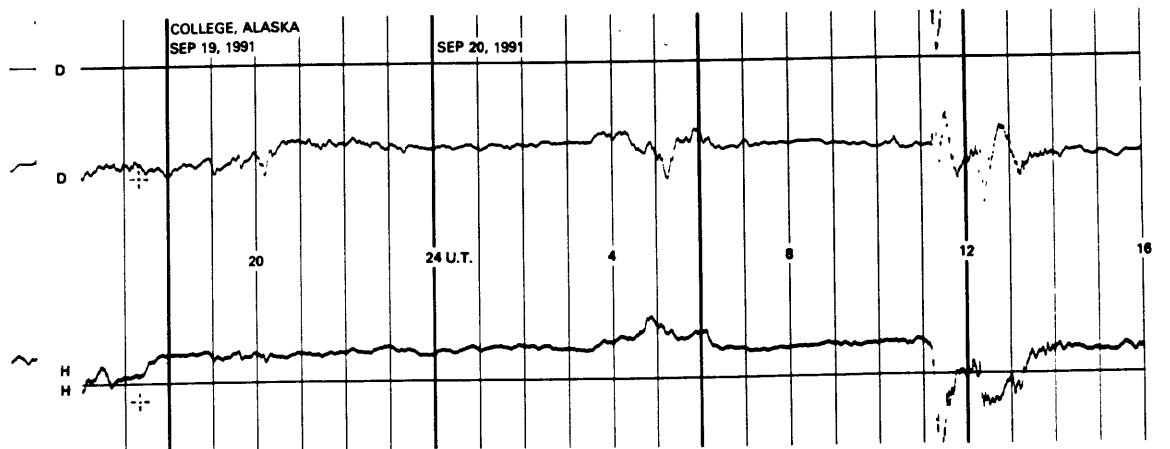
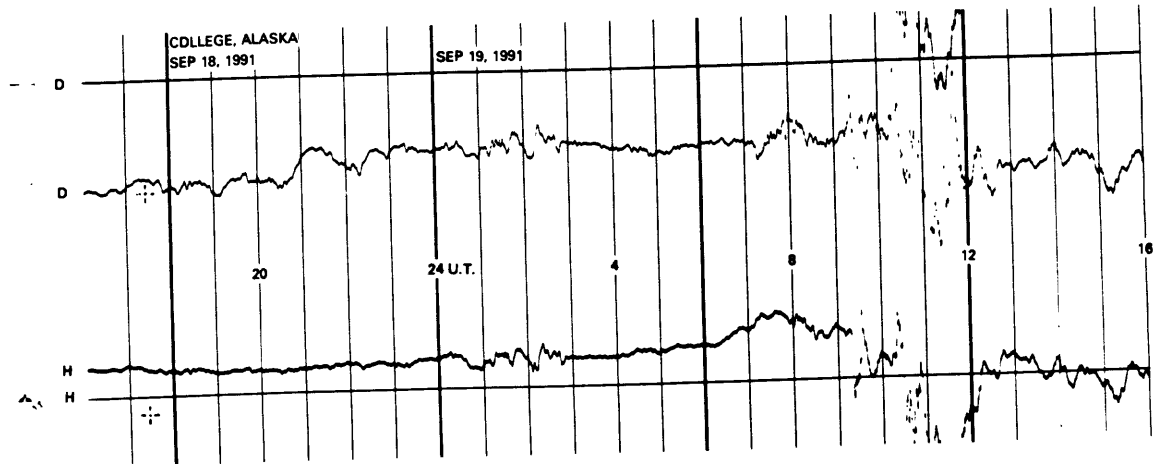
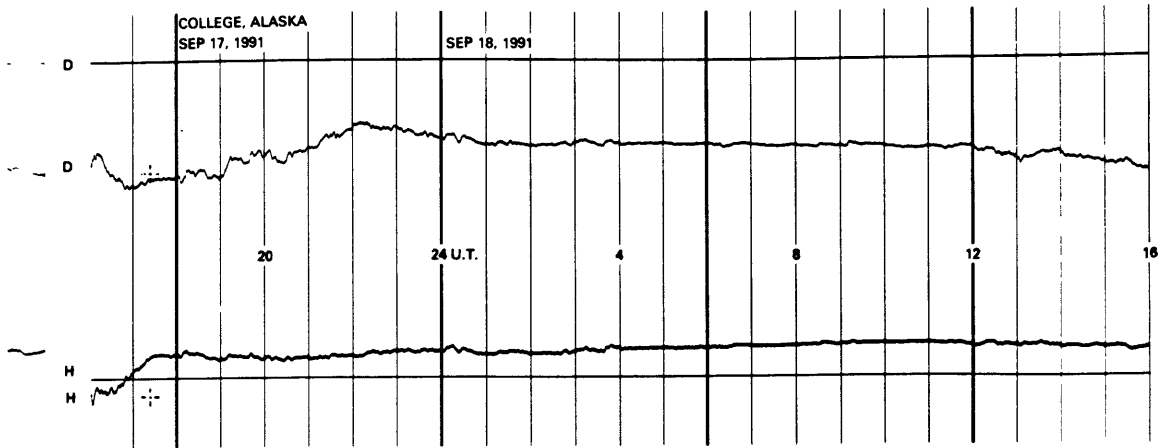
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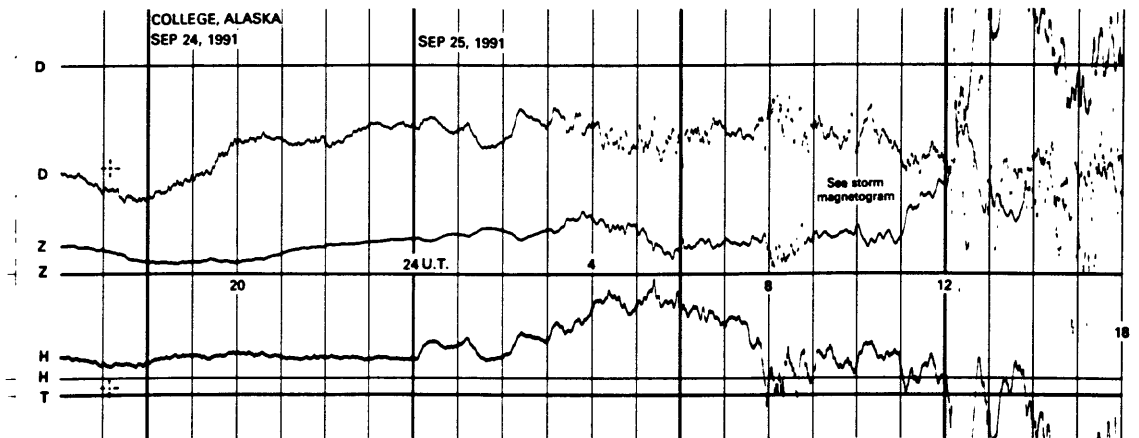
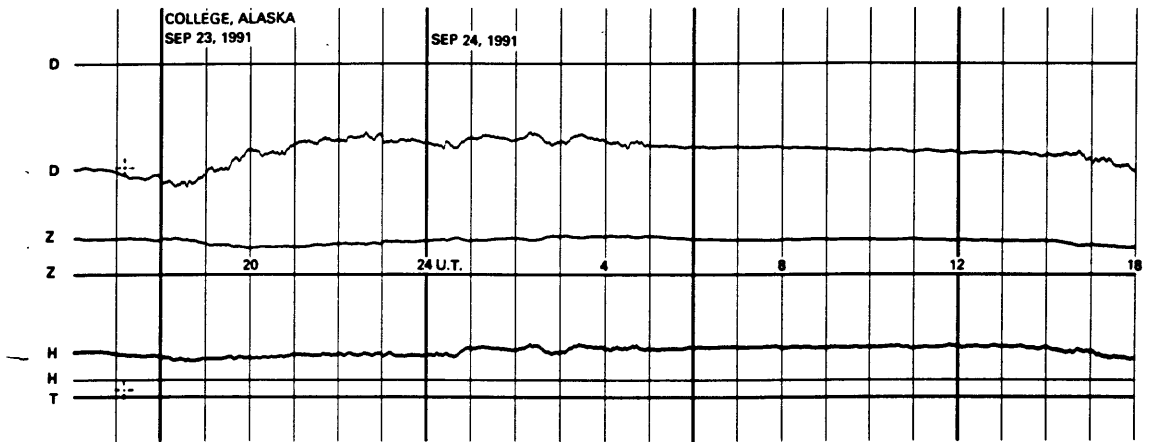
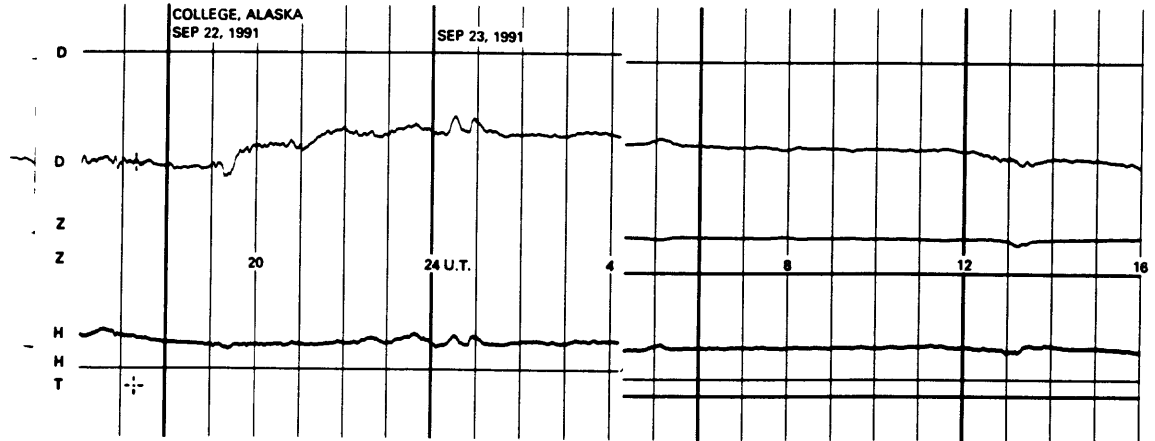
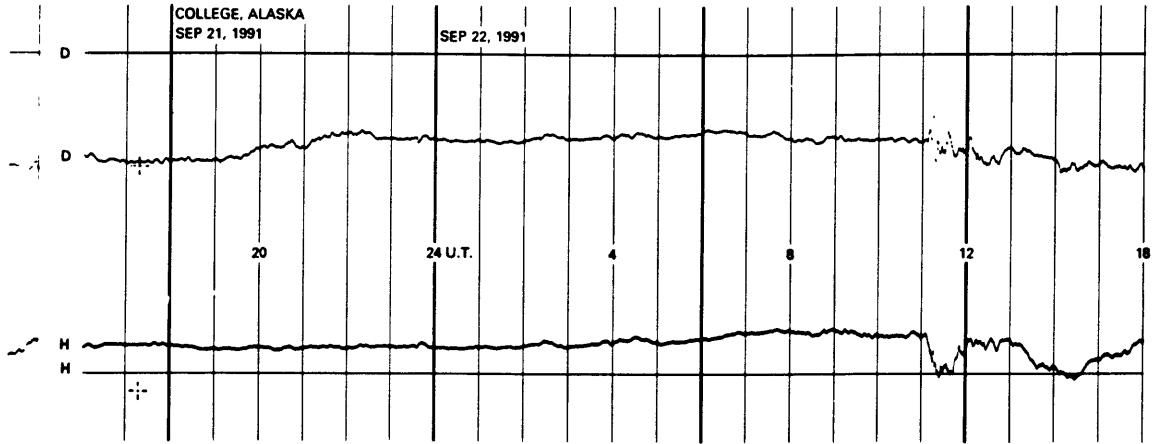
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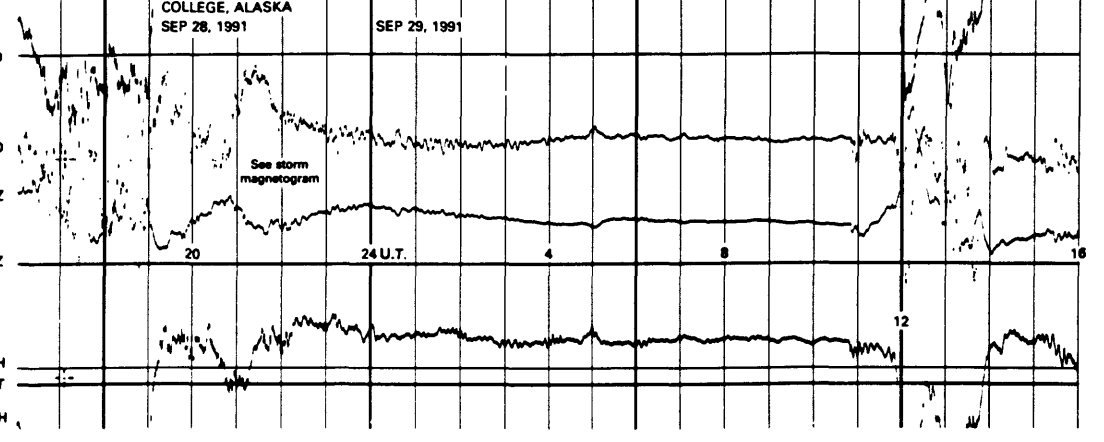
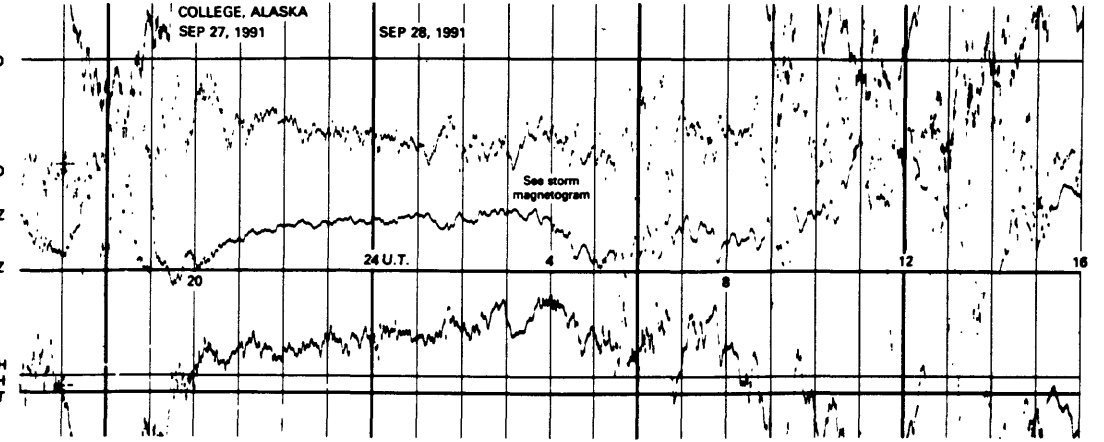
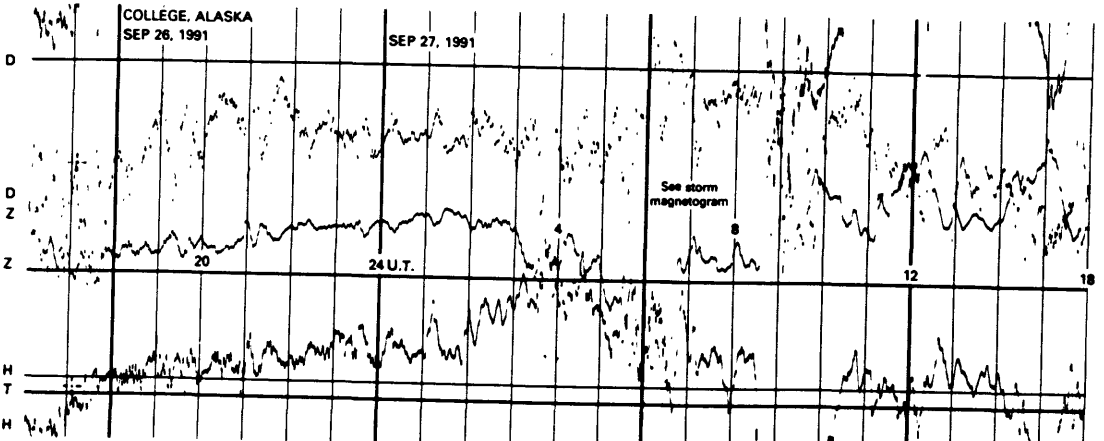
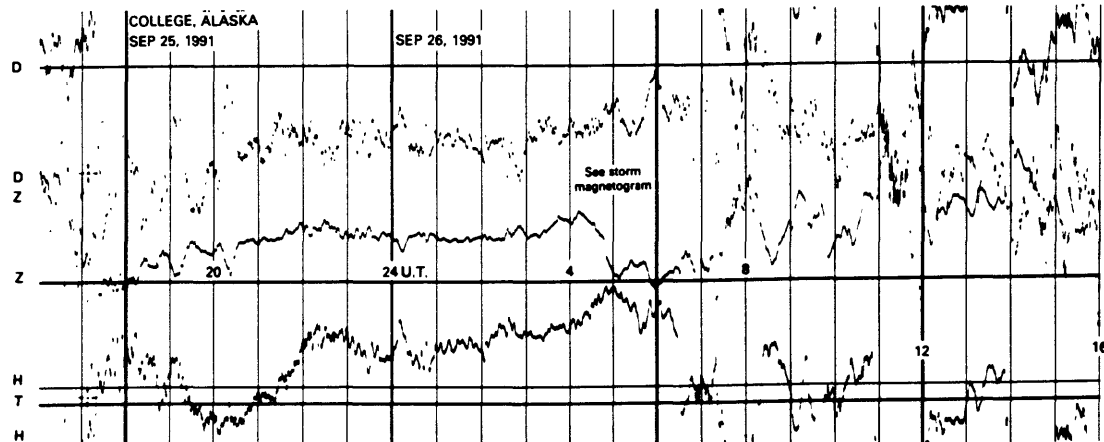
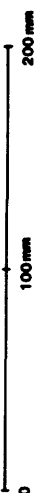
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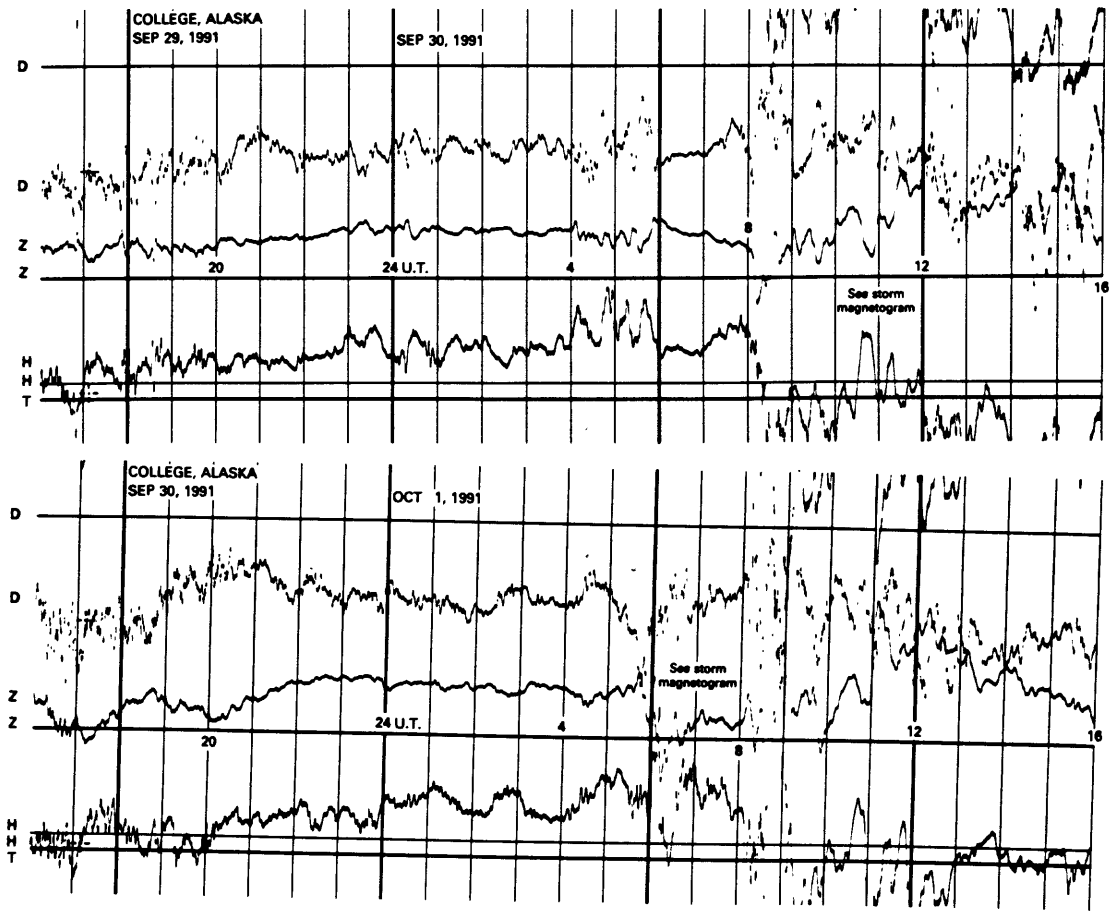
NORMAL MAGNETOGRAMS



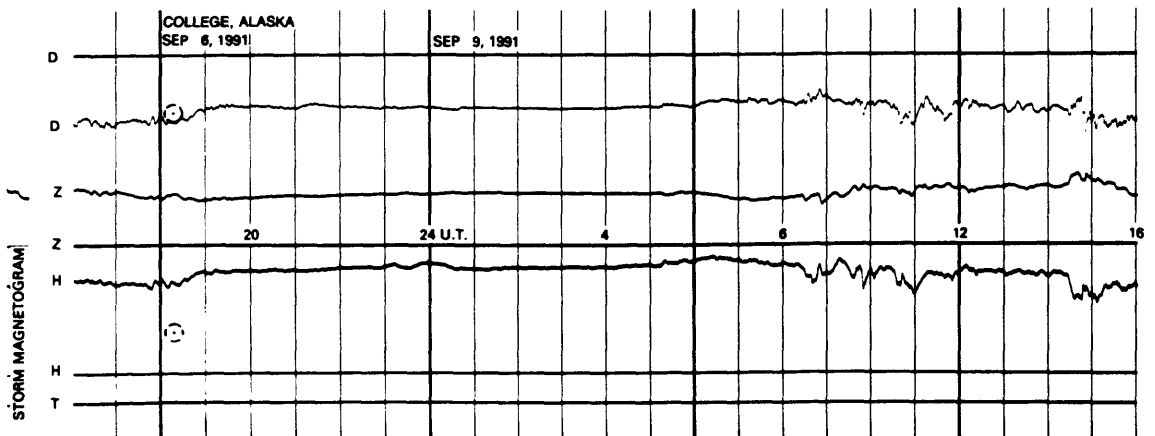
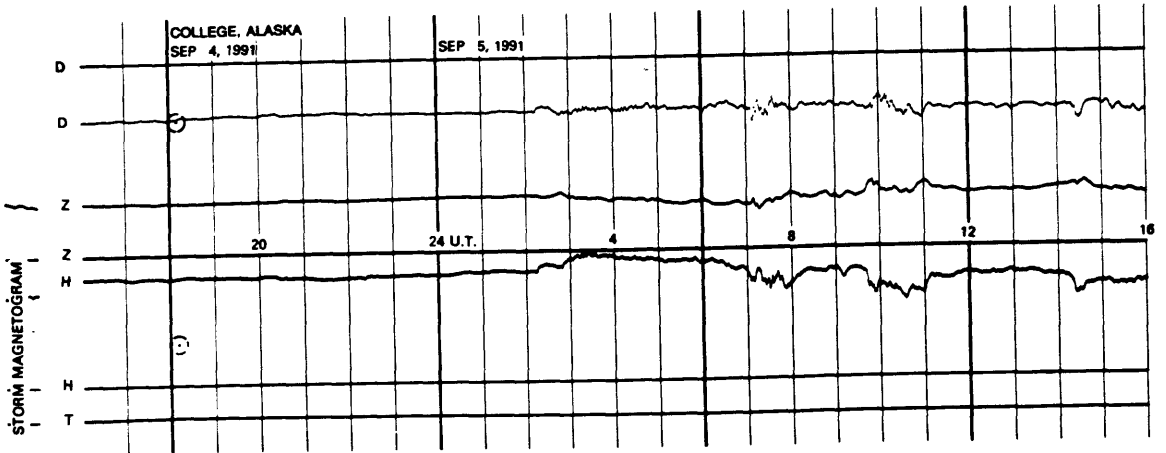
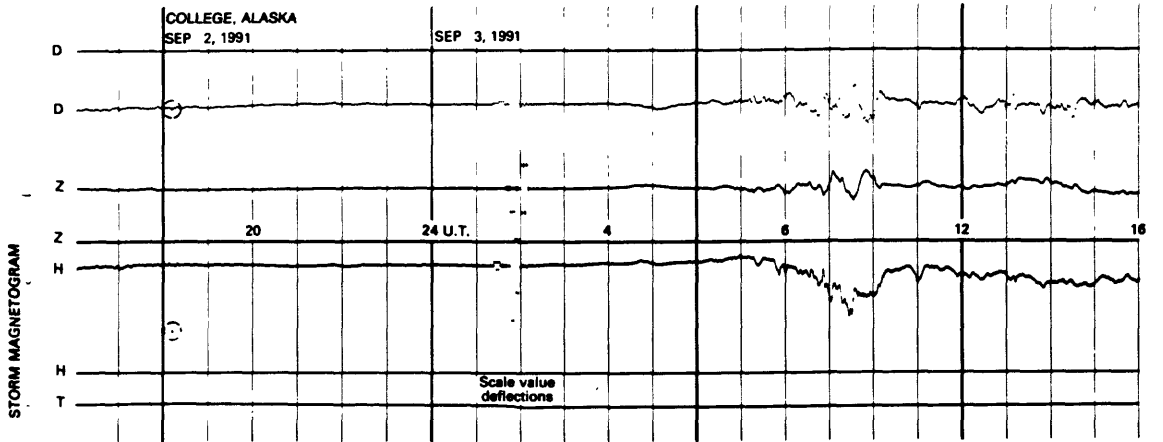
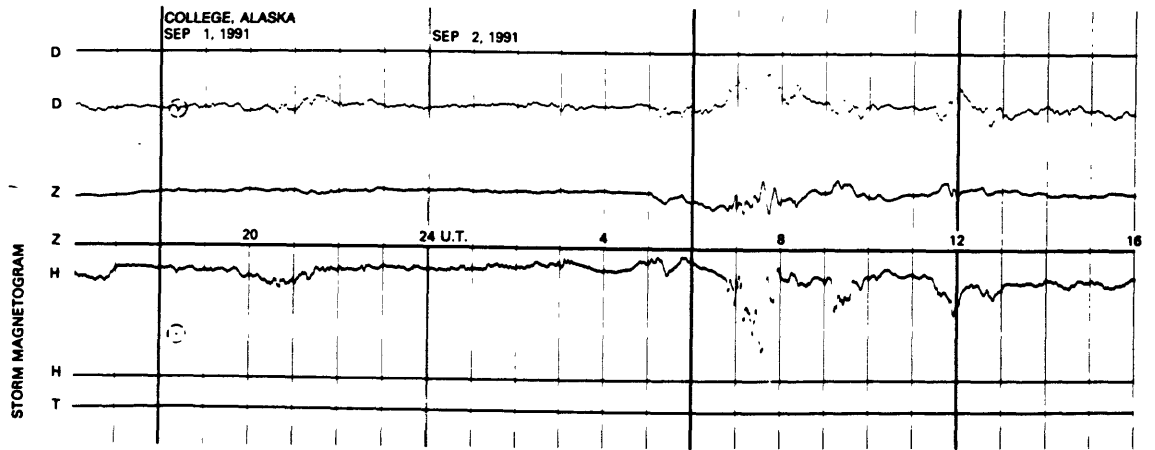
NORMAL MAGNETOGRAMS



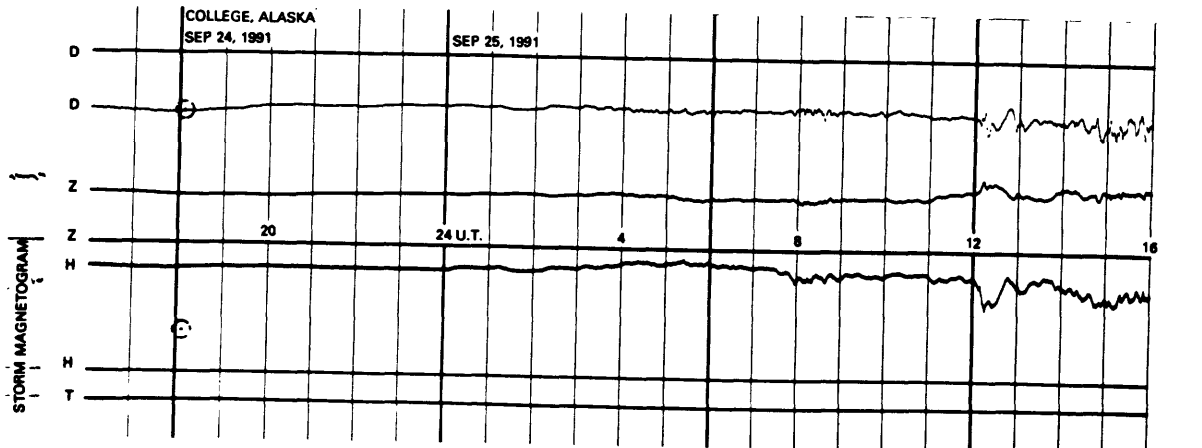
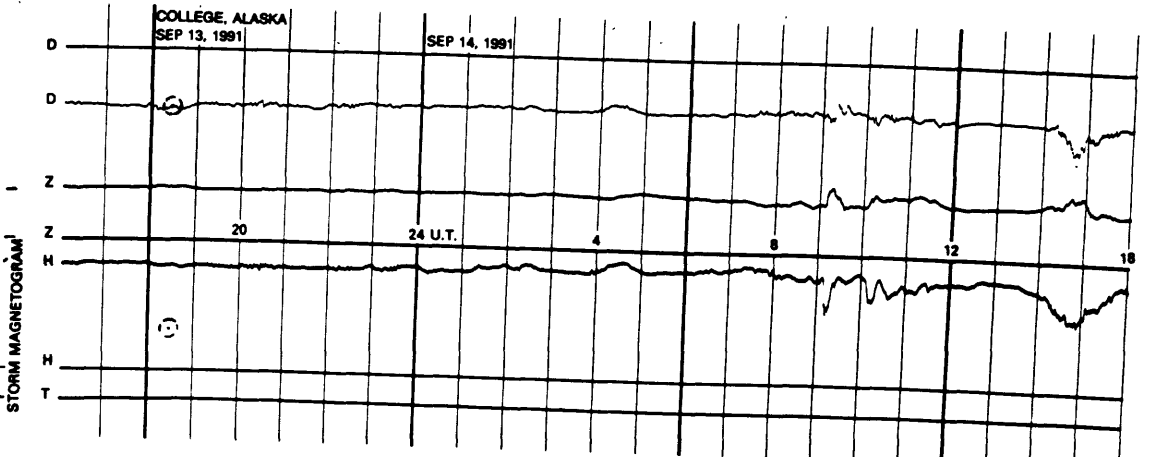
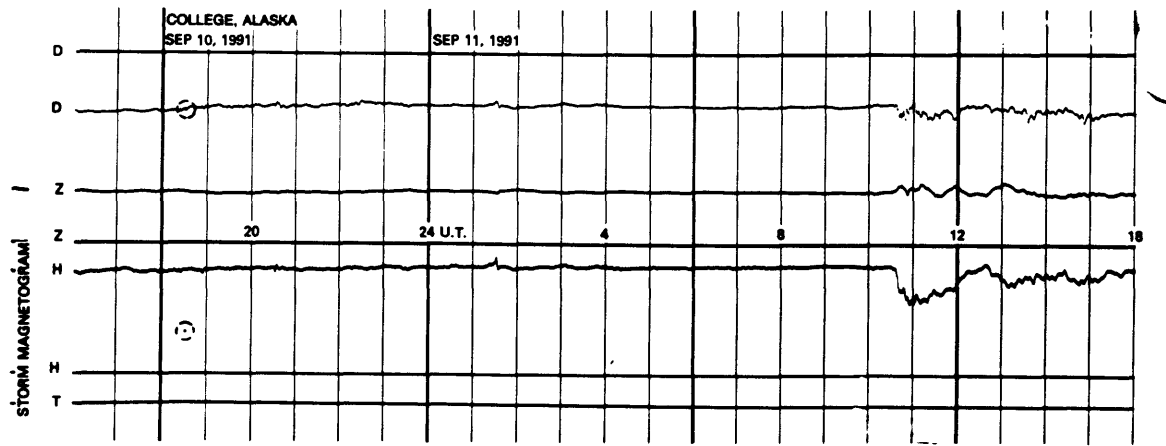
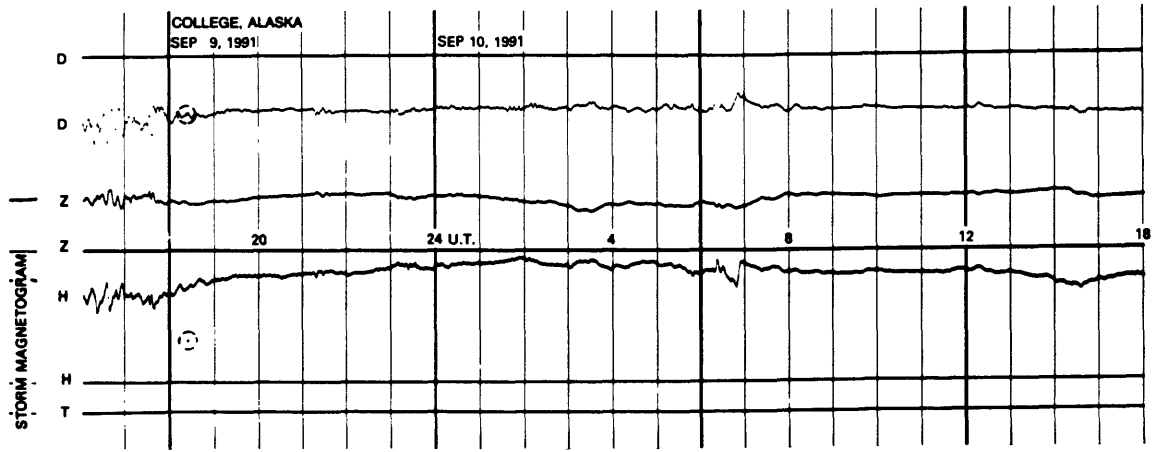
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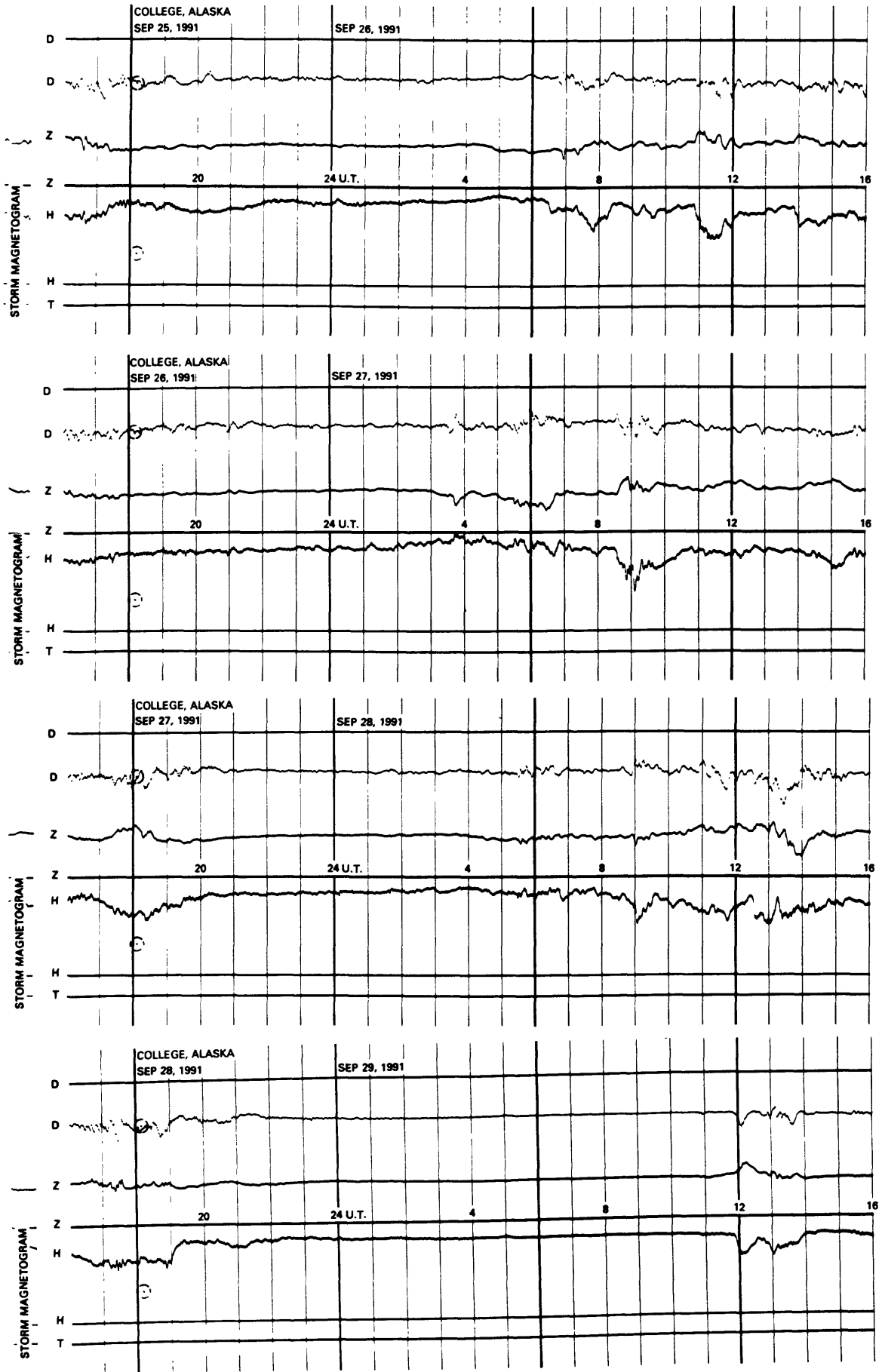
STORM MAGNETOGRAMS



STORM MAGNETOGRAMS



STORM MAGNETOGRAMS



STORM MAGNETOGRAMS

