

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

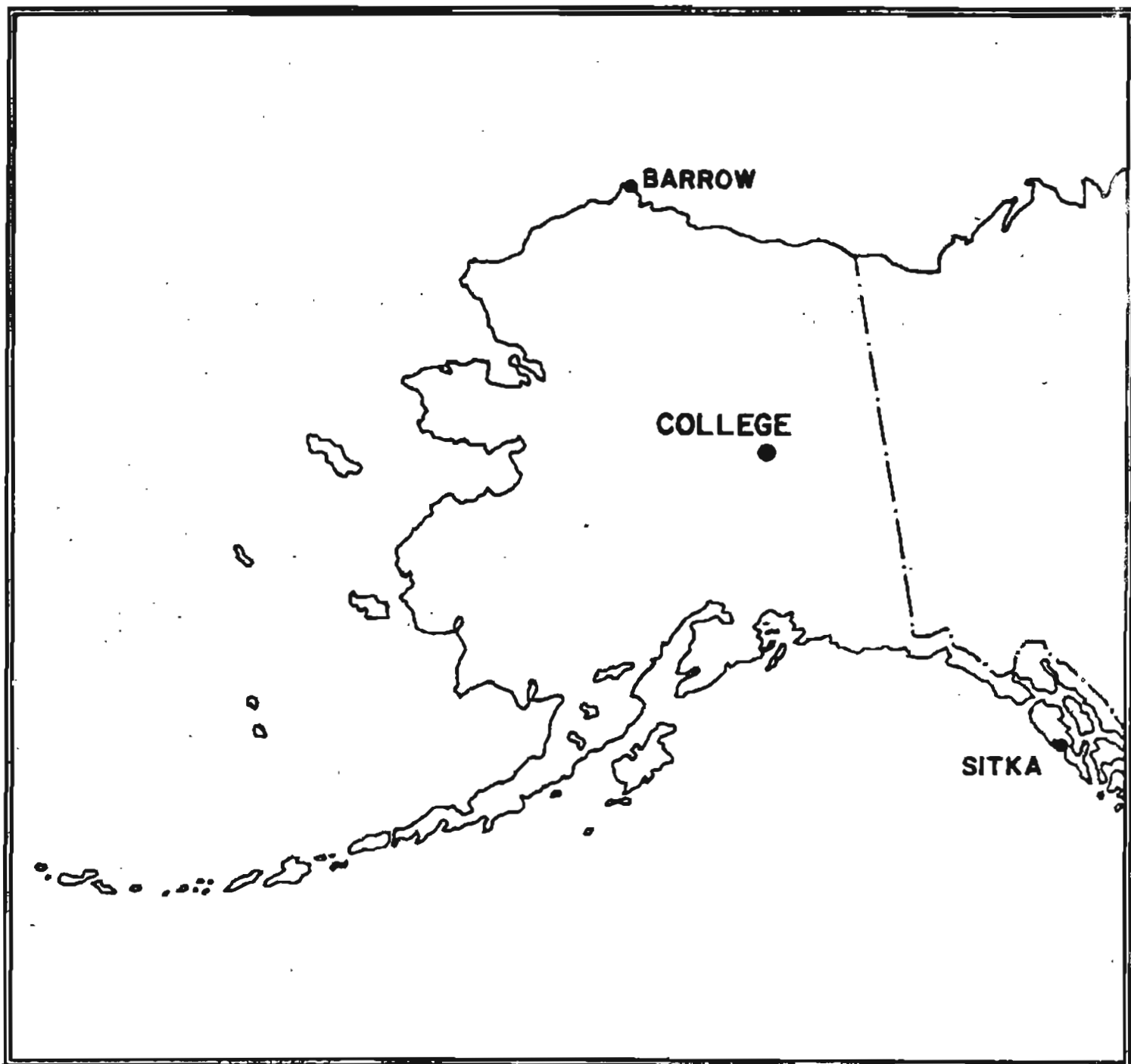
PRELIMINARY GEOMAGNETIC DATA

COLLEGE OBSERVATORY

FAIRBANKS, ALASKA

JANUARY 1989

OPEN FILE REPORT 89-0300A



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
NAA 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 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:

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

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.

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. THE COLLEGE OBSERVATORY IS A 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, ALASKA

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

MONTH AND YEAR
JANUARY, 1989

DATE	K-INDICES								SUM	A k	TIME SCALE ON MAGNETOGRAMS 20 mm/hr
	0-03 K	03-06 K	06-09 K	09-12 K	12-15 K	15-18 K	18-21 K	21-24 K			
1	3	3	4	4	5	4	3	2	28	23	SUDDEN COMMENCEMENTS d h m 4 23 06 11 12 08 15 10 00
2	1	0	2	3	4	1	1	1	13	08	
3	0	0	0	0	1	1	2	0	4	02	
4	0	1	2	0	1	1	2	2	9	04	
5	2	5	5	3	4	7	5	2	33	43	
6	1	2	3	4	3	0	2	2	17	10	
7	3	1	1	3	4	3	3	1	19	12	
8	0	1	1	3	6	6	4	3	24	28	
9	2	2	3	5	5	4	3	3	27	23	
10	3	2	3	3	5	4	2	1	23	17	
11	1	1	0	1	5	6	6	6	26	37	
12	3	3	4	3	3	3	3	1	23	15	
13	1	0	0	2	5	5	4	2	19	18	
14	2	1	0	3	2	3	4	4	19	13	
15	4	3	4	5	6	7	5	5	39	54	
16	4	3	4	6	4	6	5	3	35	40	
17	3	3	5	7	5	5	4	3	35	45	
18	3	2	3	6	4	3	1	1	23	21	
19	1	2	2	3	1	2	1	0	12	06	
20	2	1	0	3	8	8	6	4	32	77	
21	3	2	6	6	5	6	5	4	37	48	
22	3	4	4	5	7	5	5	3	36	46	
23	2	3	4	6	5	5	3	2	30	31	
24	2	2	1	4	5	4	3	2	23	18	
25	2	2	3	4	5	2	3	1	22	16	
26	1	1	2	5	5	3	2	2	21	17	
27	2	2	2	3	5	4	1	0	19	14	
28	0	4	3	1	5	6	4	2	25	26	
29	1	1	1	6	5	6	2	1	23	28	
30	1	3	2	6	6	4	2	1	25	28	
31	1	3	4	5	6	6	6	5	36	48	

POSSIBLE SOLAR-FLARE
EFFECTS BASED ON
INSPECTION OF GRAMS
ALONE (WITHOUT
REFERENCE TO DATA
FROM OTHER SOURCES)

BEGIN			END		
d	b	m	d	b	m

K SCALE USED:	D	H	Z		
	LOWER LIMIT FOR K = 9.....	675.7	322.2		(mm)
	CURRENT SCALE VALUE.....	3.70	7.77		(γ/mm)
	LOWER LIMIT FOR K = 9.....	2500	2500		(to nearest 10γ)

SCALINGS AND COMPUTATIONS HAVE BEEN CHECKED.

APPROVED John B. Townshend Chief, College Observatory
OBSERVER IN CHARGE

PRINCIPAL MAGNETIC STORMS
COLLEGE OBSERVATORY, COLLEGE, ALASKA
JANUARY 1989

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

Data from Individual Observatories:

Obs. ID 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)
00	64.06 N	4	2306	sc*	+12	+54	-	5	6	7	271	1645	830	5 23
		11	1208	sc	-5	+26	-12	11	6,7,8	6	162	1075	595	12 04
		15	1000	sc	+11	-382	+78	15/17	6/4	7	206	1425	890	17 22
		20	09xx	..				20	5,6	8	354	1940	1065	21 03
		21	07xx	..				22	5	7	237	1435	950	23 00
		31	05xx	..				31	5,6,7	6	207	1195	800	1 02

NORMAL MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASLINE
D	0001 U.T., 1/1/89	2400 U.T., 1/31/89	1.0' /mm	3.7 γ/mm	26° 51.1' E
H	0001 U.T., 1/1/89	2400 U.T., 1/14/89	7.8 γ/mm		12624 γ
	0001 U.T., 1/15/89	2400 U.T., 1/17/89	(SAME)		12618 γ
	0001 U.T., 1/18/89	2400 U.T., 1/31/89	(SAME)		12612 γ
Z	0001 U.T., 1/1/89	2400 U.T., 1/14/89	7.7 γ/mm		55172 γ
	0001 U.T., 1/15/89	2400 U.T., 1/17/89	(SAME)		55176 γ
	0001 U.T., 1/18/89	2400 U.T., 1/31/89	(SAME)		55179 γ

STORM MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASLINE
D	0001 U.T., 1/1/89	2400 U.T., 1/31/89	7.9' /mm	29.5 γ/mm	
H	(SAME)	(SAME)	43.5 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° 07.5' E	12809 γ	55318 γ

* COMPUTED FROM FIVE QUIETEST DAYS DURING MONTH.

DAYS USED: JAN 2, 3, 4, 6, 19

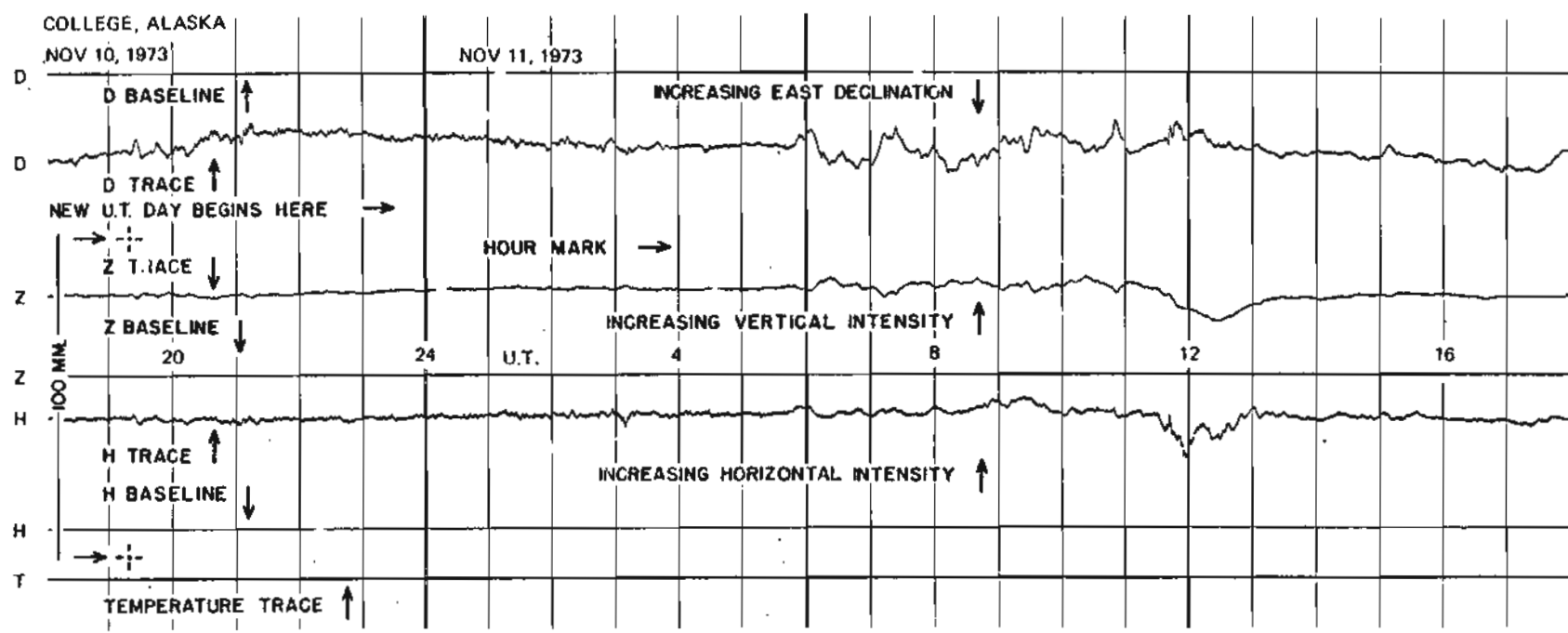
MAGHEJDIRAH INDIRLY SCALINGS - FIVE QUIETEST DAYS
(UNIVERSAL TIME)

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		3		4		6		19		2		3		4		6		10		19		DAY	
A ₁		02		04		10		08		02		04		10		06		04		06		A ₁	
HOUR		01		02		03		04		05		06		07		08		09		10		HOUR	
01	155	146	152	120	126	120	120	232	238	241	242	247	256	260	261	260	300	206	205	189	190	213	213
02	153	160	160	159	150	153	112	238	241	242	247	256	260	261	260	300	286	205	199	193	185	204	211
03	160	160	160	159	150	153	112	238	241	242	247	256	260	261	260	300	286	205	199	193	185	204	211
04	164	160	160	159	150	153	112	238	241	242	247	256	260	261	260	300	286	205	199	193	185	204	211
05	160	160	160	159	150	153	112	238	241	242	247	256	260	261	260	300	286	205	199	193	185	204	211
06	155	160	160	159	150	153	112	238	241	242	247	256	260	261	260	300	286	205	199	193	185	204	211
07	170	161	161	121	122	121	121	255	248	248	249	249	249	249	249	266	251	205	189	187	240	213	213
08	156	160	160	100	139	149	147	256	251	261	260	260	260	260	260	286	301	200	188	188	217	134	240
09	219	160	160	163	162	147	147	249	250	260	260	260	260	260	260	286	301	200	188	188	217	134	240
10	209	160	160	140	162	140	110	247	250	255	260	260	260	260	260	286	301	200	188	188	217	134	240
11	163	169	169	197	160	197	169	226	245	251	211	211	211	211	211	266	320	154	182	186	187	152	200
12	200	171	171	153	170	153	168	170	250	249	111	111	111	111	111	266	320	154	182	186	187	152	200
13	180	171	171	233	194	233	188	102	249	248	154	154	154	154	154	266	320	154	182	186	187	152	200
14	185	182	182	183	183	183	187	150	250	254	288	288	288	288	288	266	320	154	182	186	187	152	200
15	169	177	177	170	170	167	180	240	252	255	260	260	260	260	260	266	320	154	182	186	187	152	200
16	161	170	170	170	170	170	181	260	253	255	241	241	241	241	241	266	320	154	182	186	187	152	200
17	171	177	177	180	180	192	200	264	250	259	234	234	234	234	234	266	320	154	182	186	187	152	200
18	189	160	160	188	188	200	178	251	259	260	231	231	231	231	231	266	320	154	182	186	187	152	200
19	200	181	181	177	177	210	189	246	251	257	230	230	230	230	230	266	320	154	182	186	187	152	200
20	193	199	199	210	210	204	181	222	250	251	223	223	223	223	223	266	320	154	182	186	187	152	200
21	161	200	200	201	201	211	180	209	240	249	220	220	220	220	220	266	320	154	182	186	187	152	200
22	141	199	199	189	189	200	155	221	233	240	223	223	223	223	223	266	320	154	182	186	187	152	200
23	150	180	180	180	180	190	152	232	230	232	222	222	222	222	222	266	320	154	182	186	187	152	200
24	150	161	161	165	165	171	151	228	224	250	222	222	222	222	222	266	320	154	182	186	187	152	200
DAILY SUM	4114	4082	4082	3917	4053	3723	3723	5495	5889	6058	5832	6241	6241	6241	6241	6241	6241	4329	4475	4475	4547	4549	4475
DAILY MEAN	171	170	170	163	169	155	155	229	245	252	243	260	260	260	260	260	260	180	186	186	189	190	186
MEAN				166						246						186							

Scaled TPO Checked

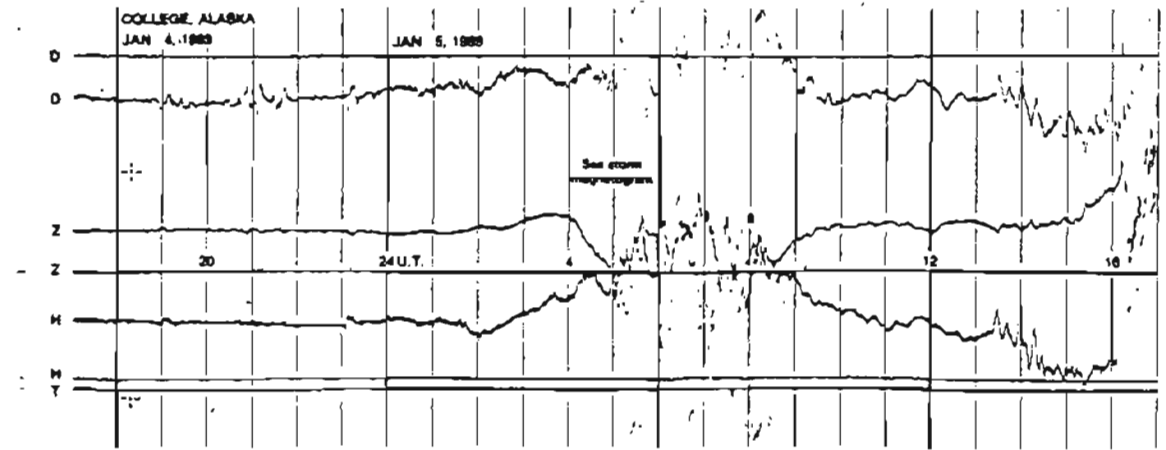
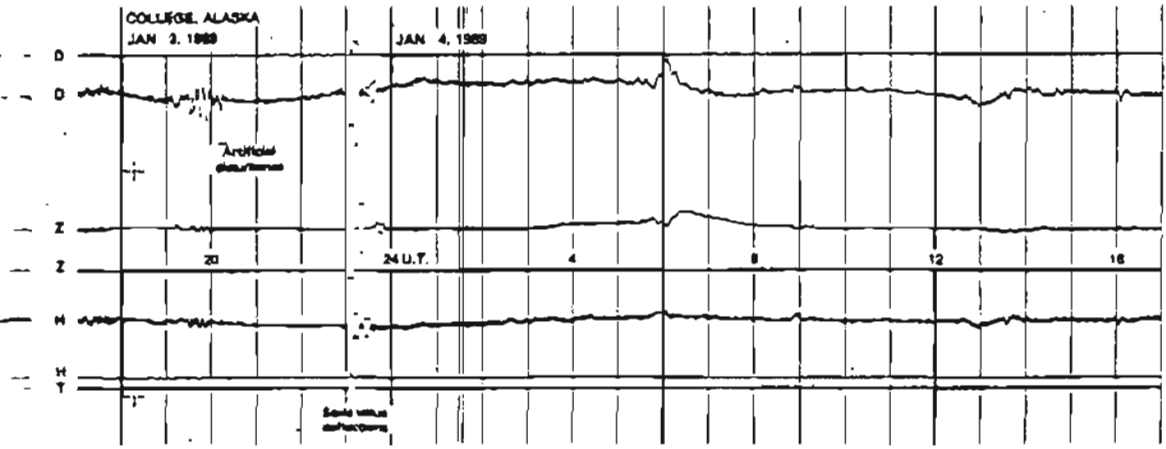
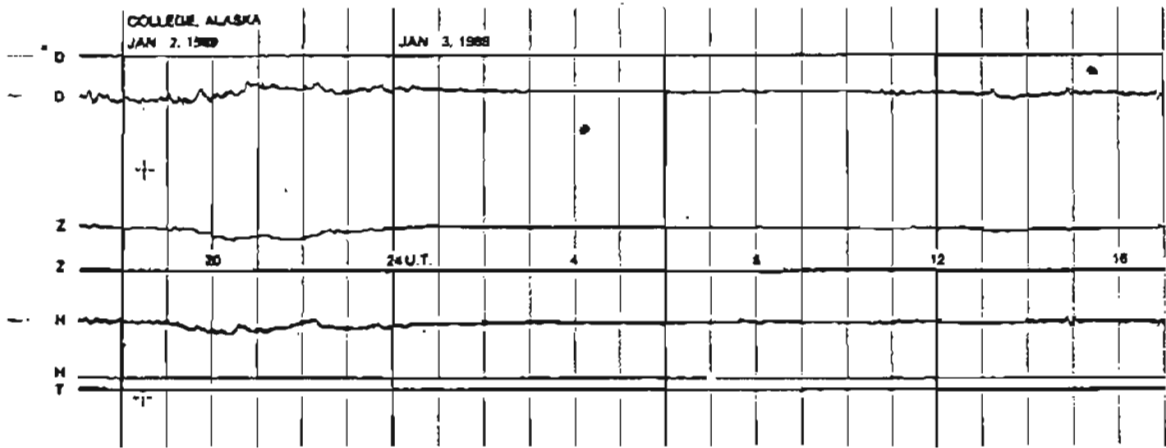
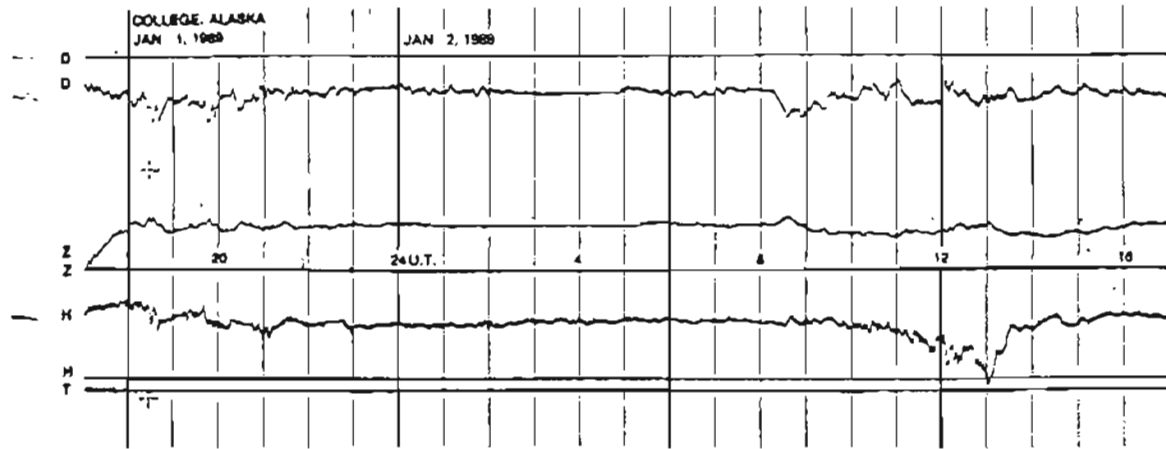
FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)



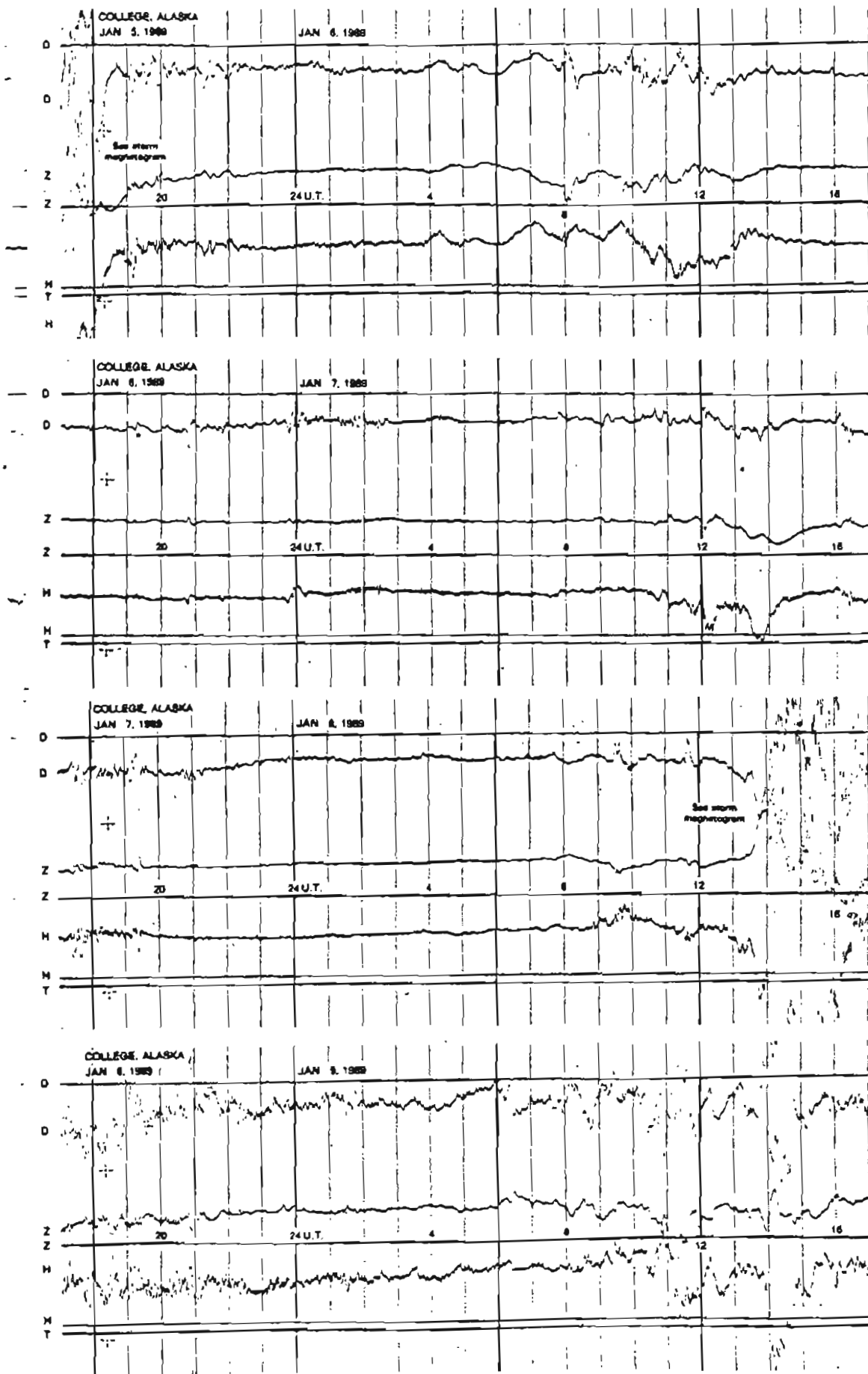
SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES

NORMAL MAGNETOGRAMS

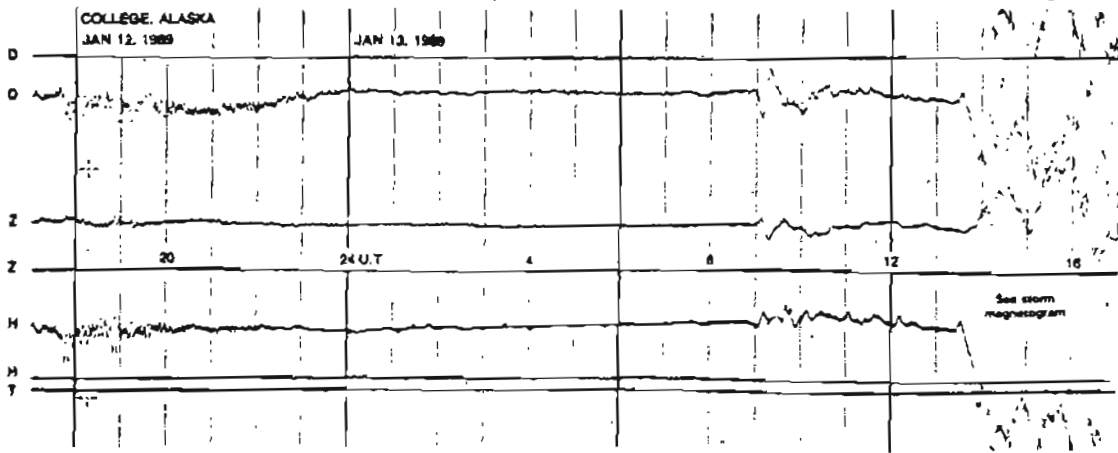
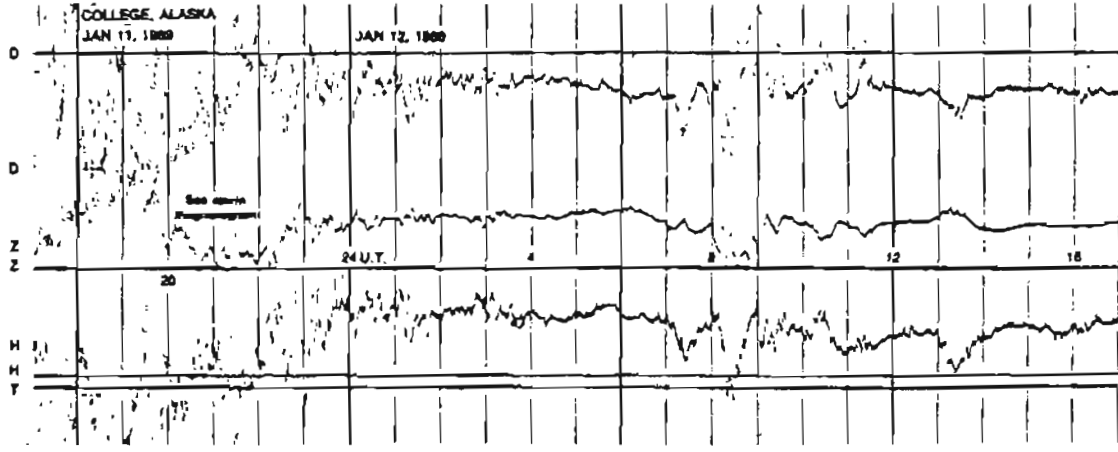
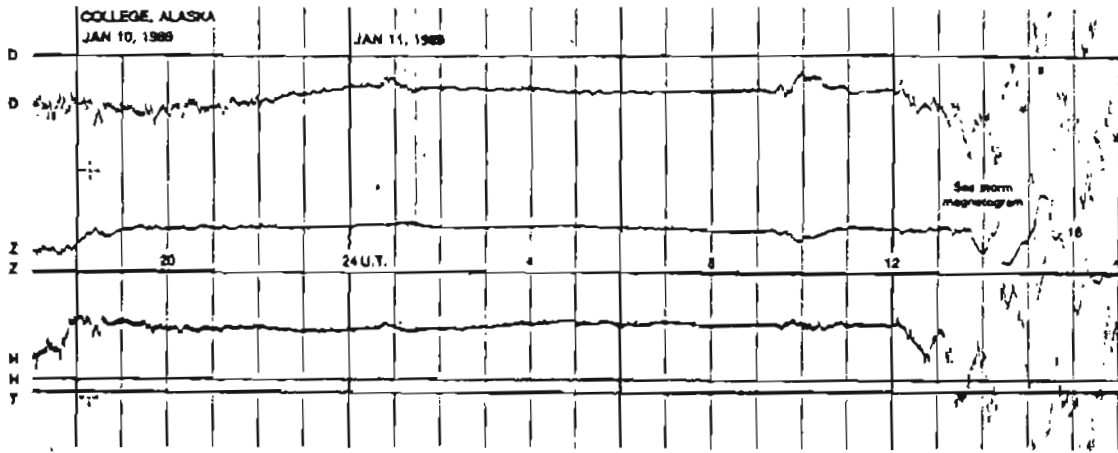
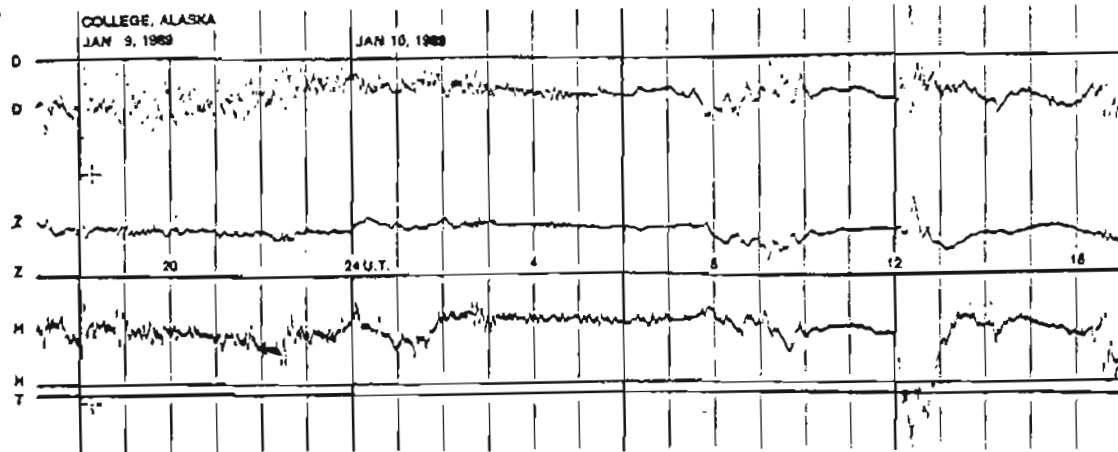
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100 mm
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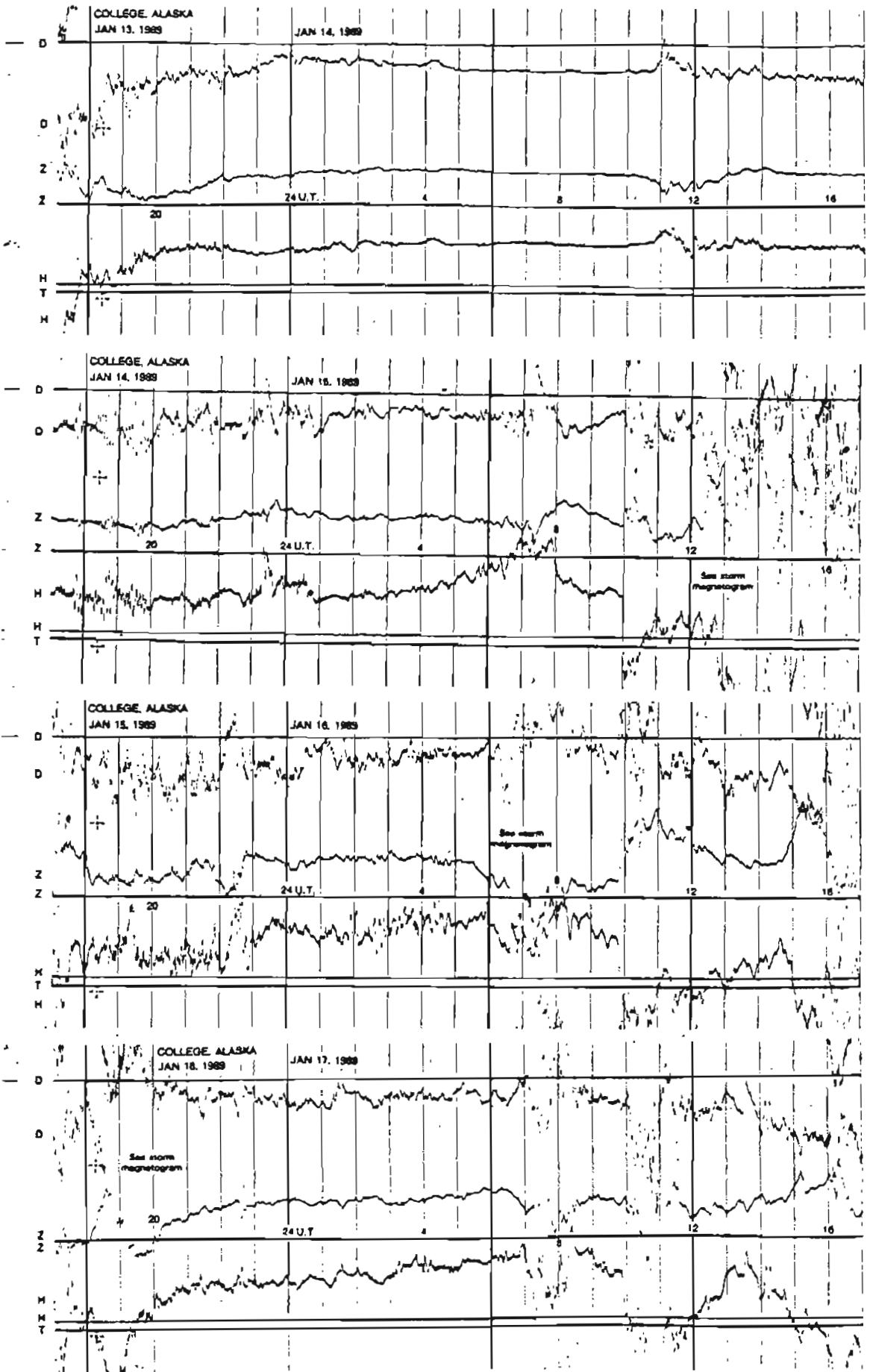
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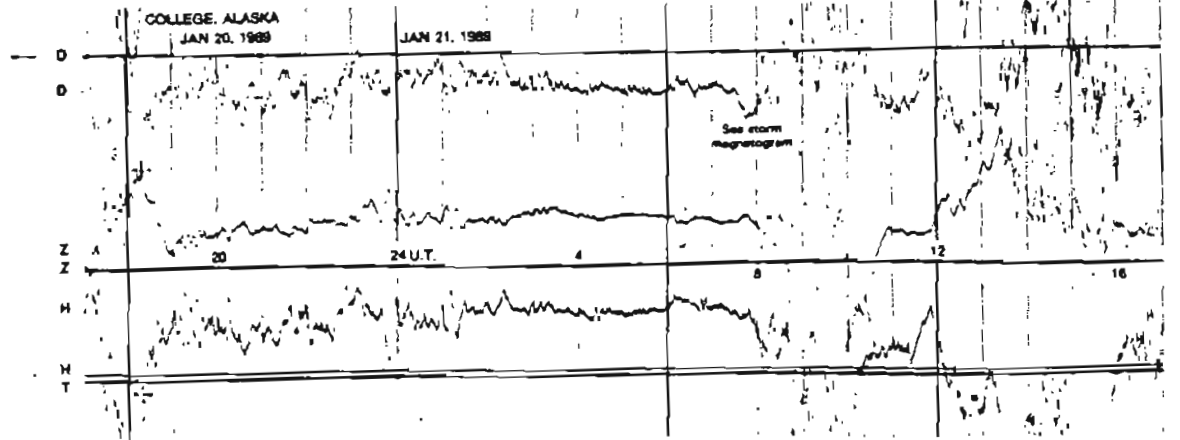
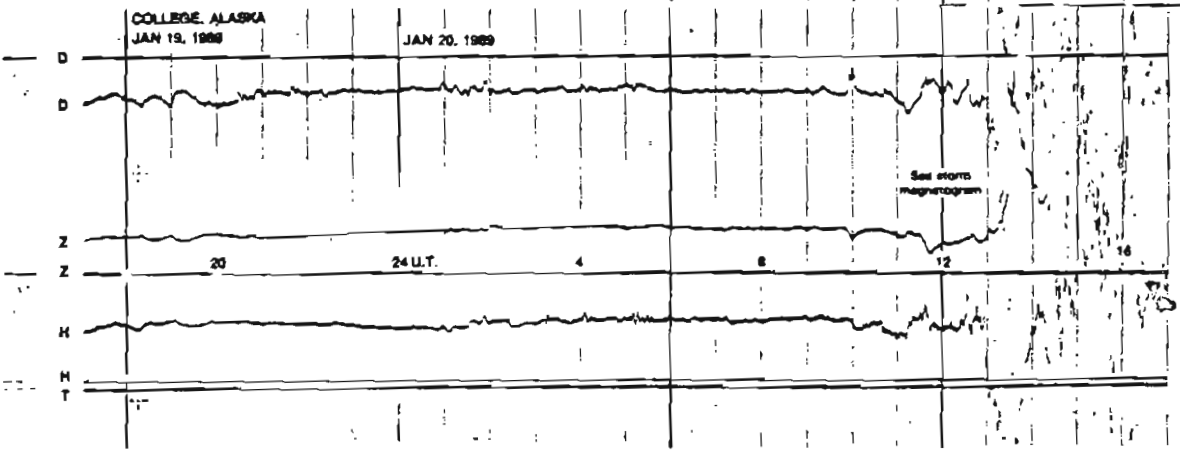
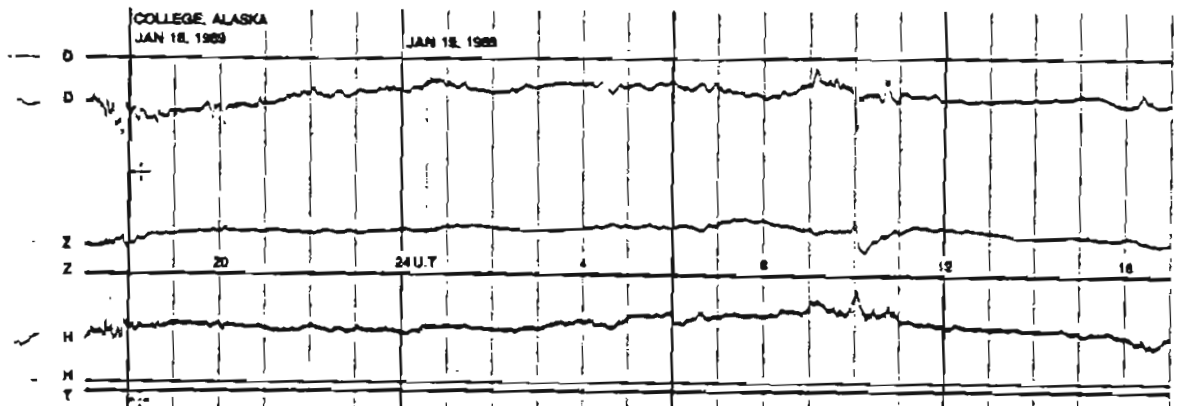
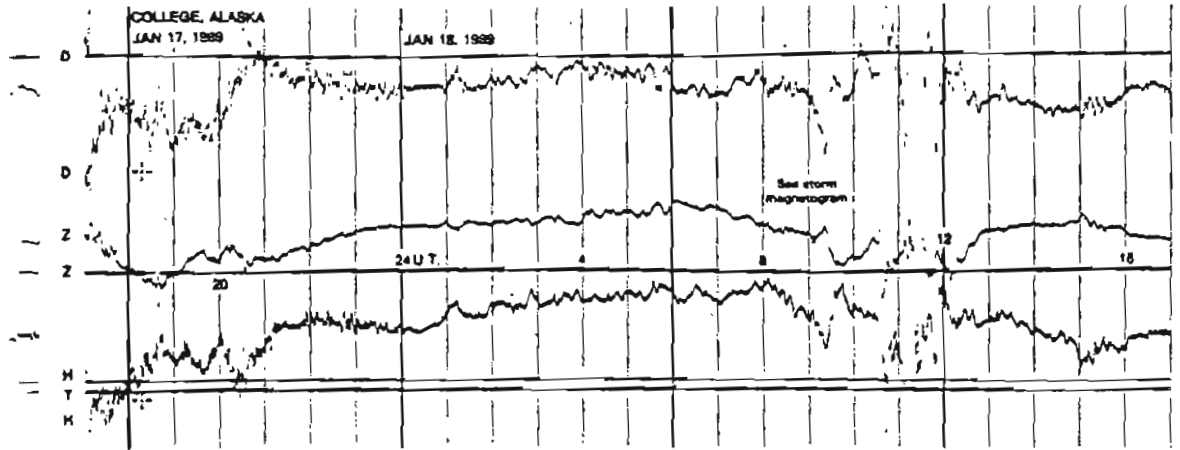
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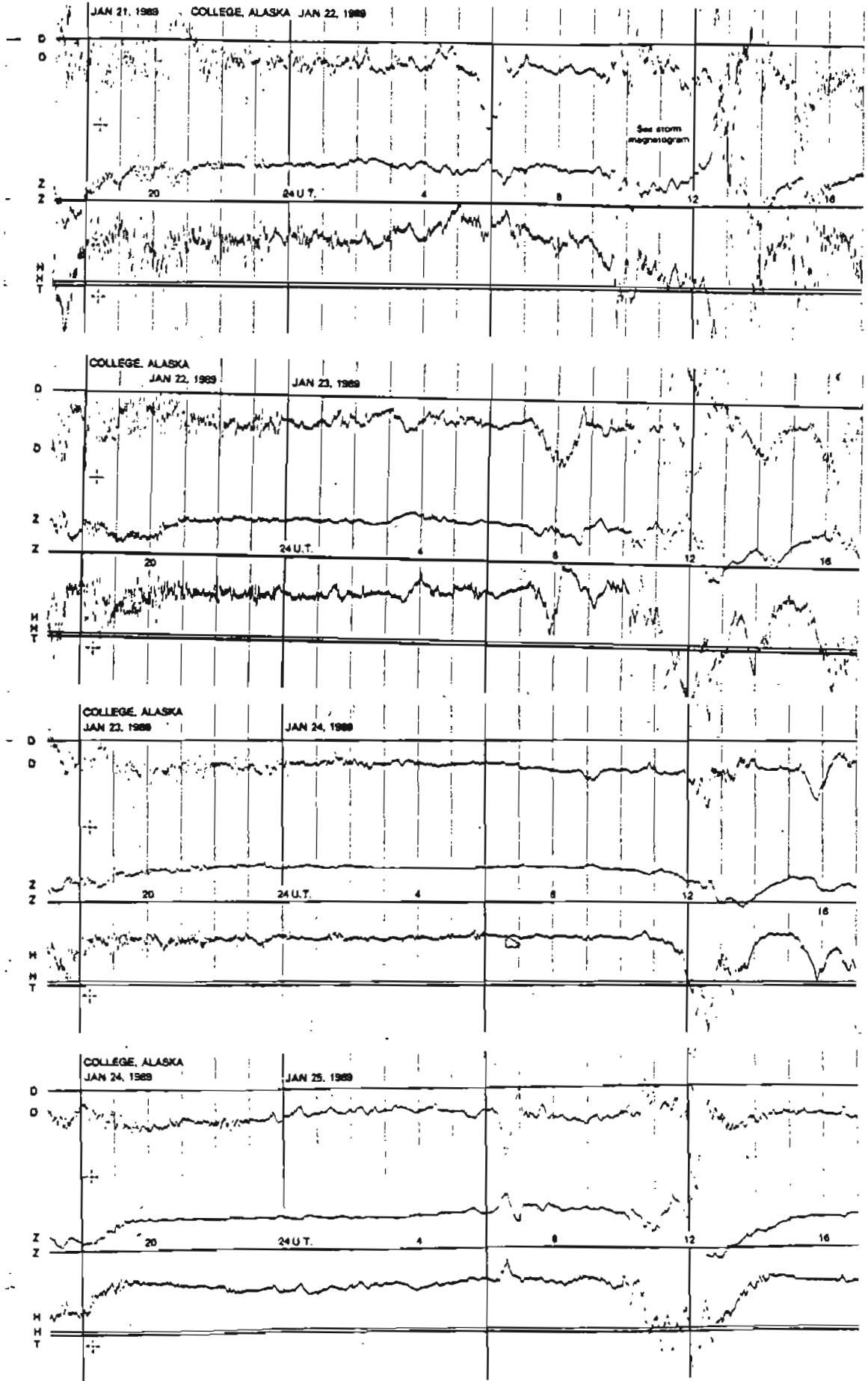
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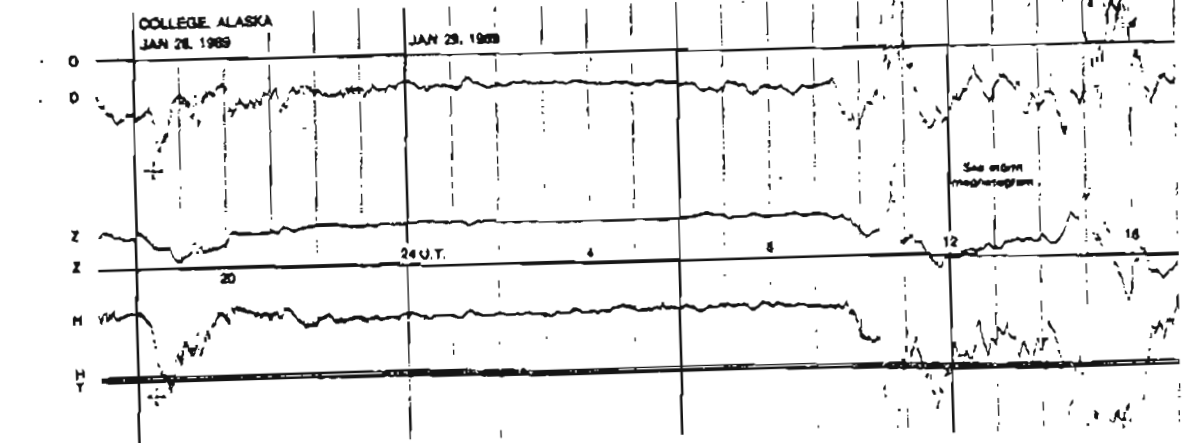
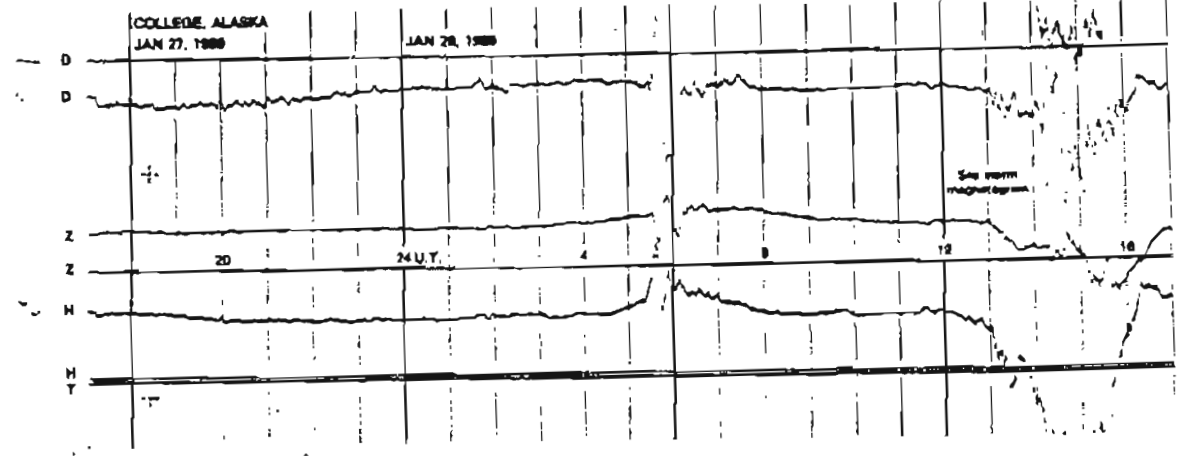
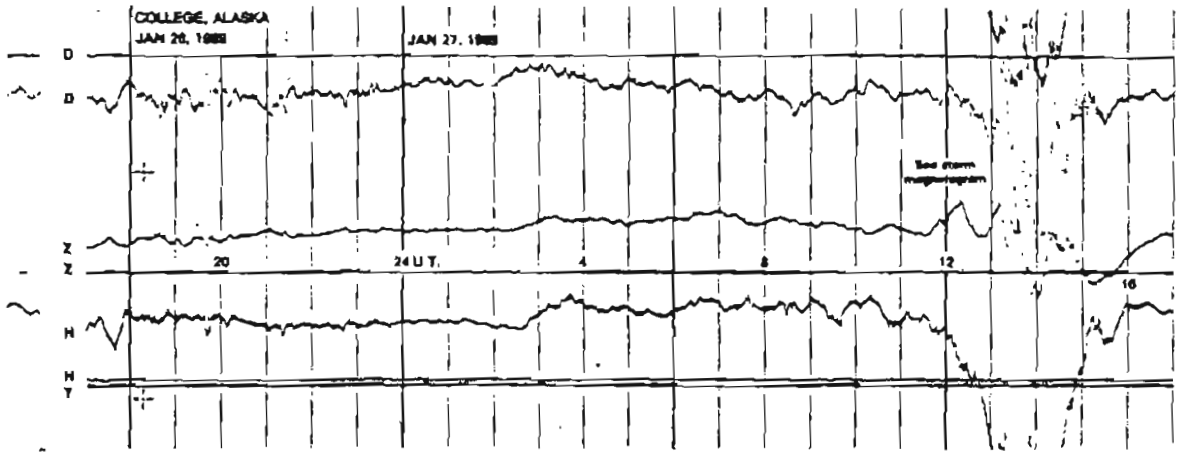
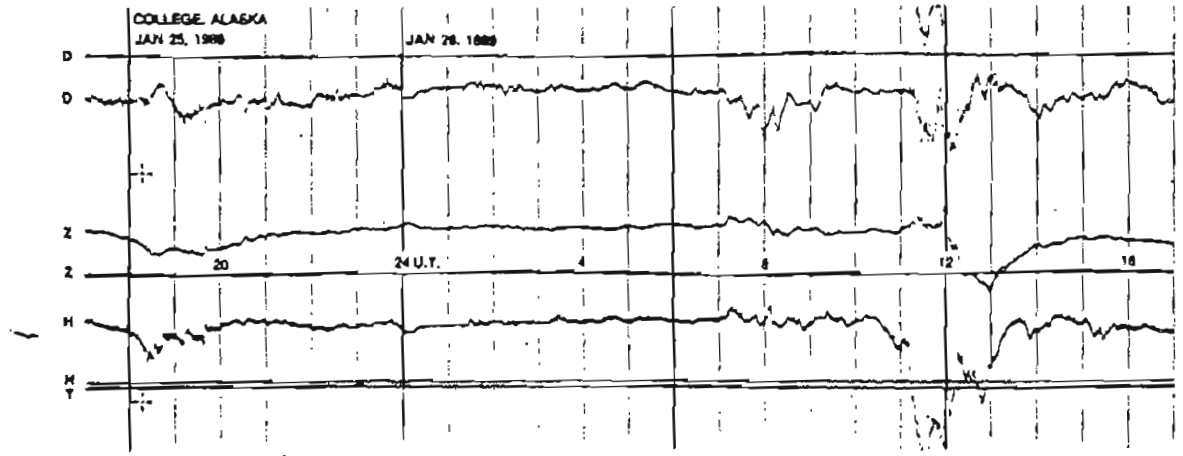
NORMAL MAGNETOGRAMS



NORMAL MAGNETOGRAMS

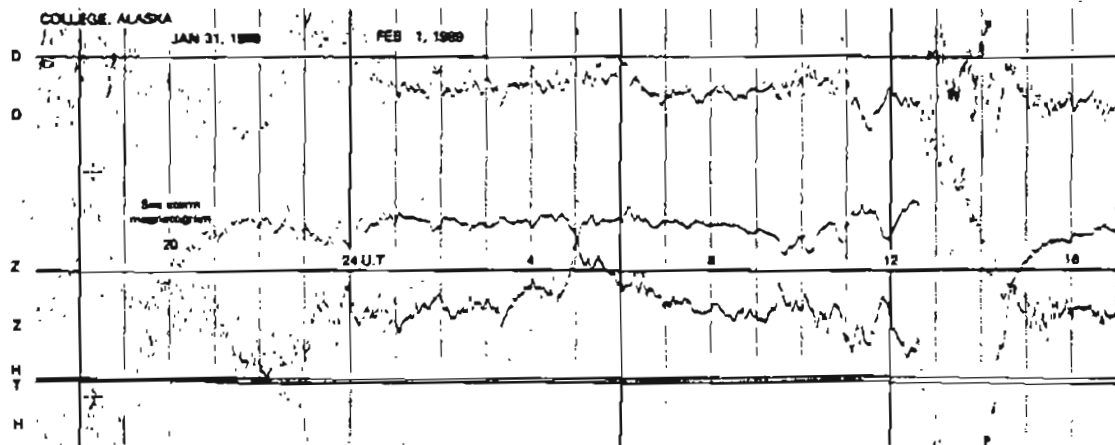
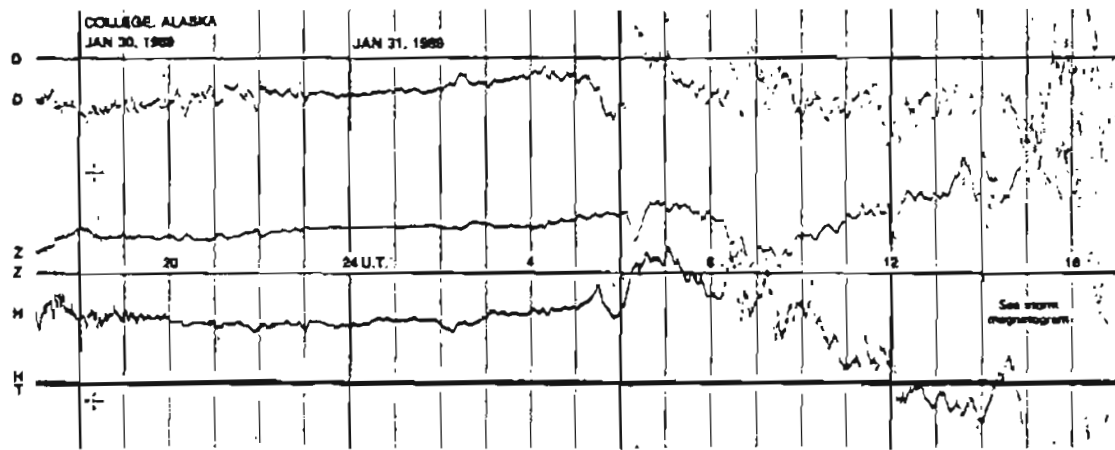
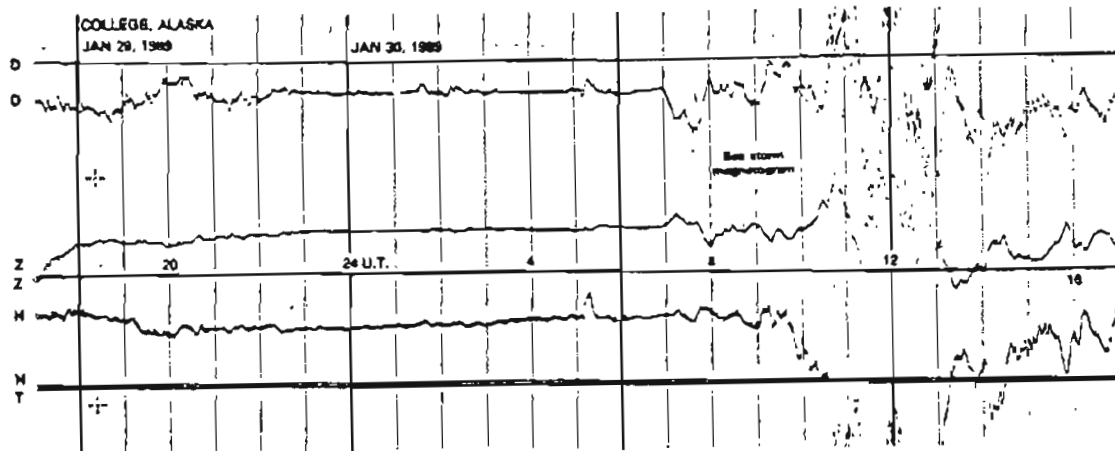


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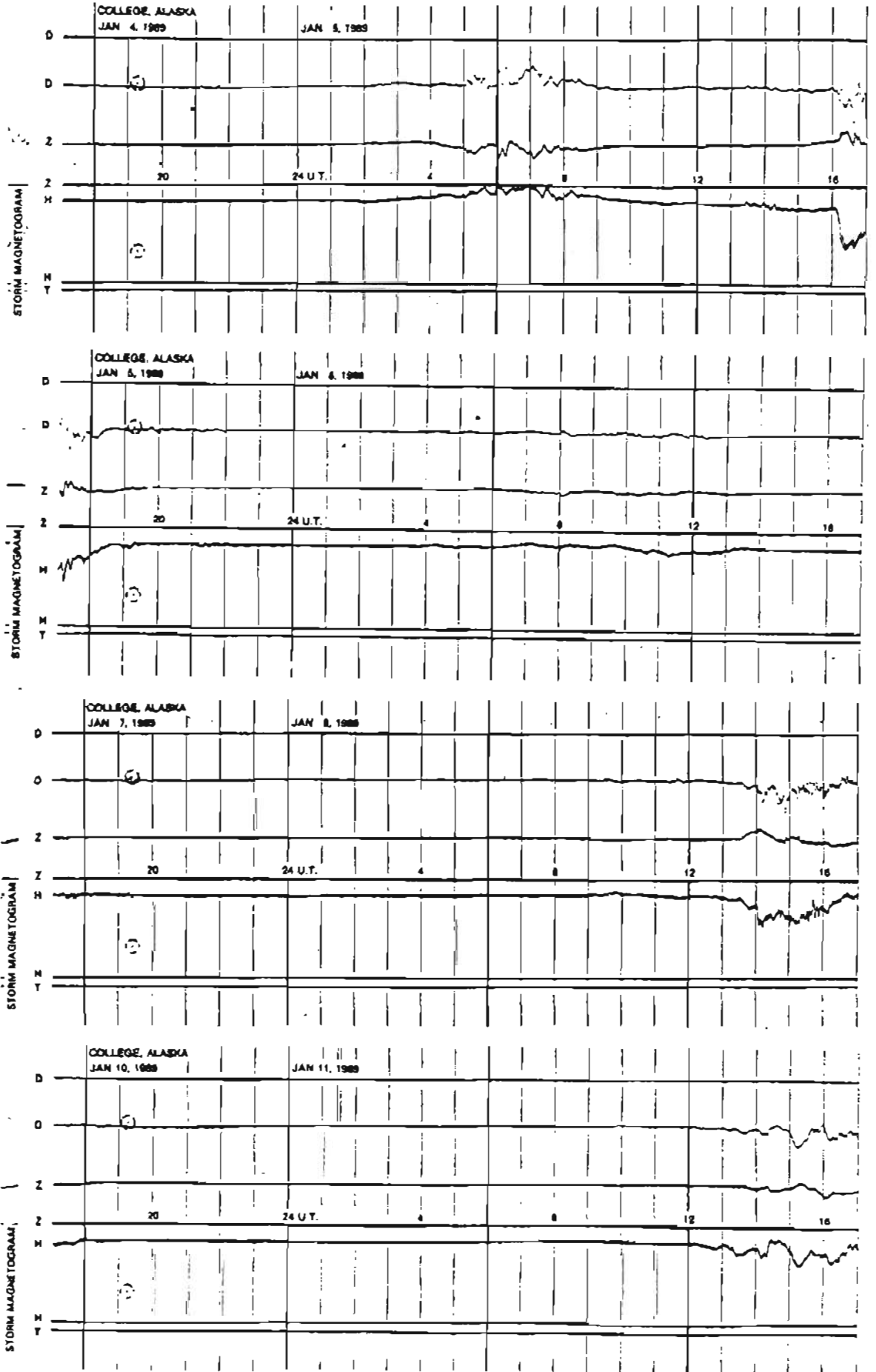


NORMAL MAGNETOGRAMS

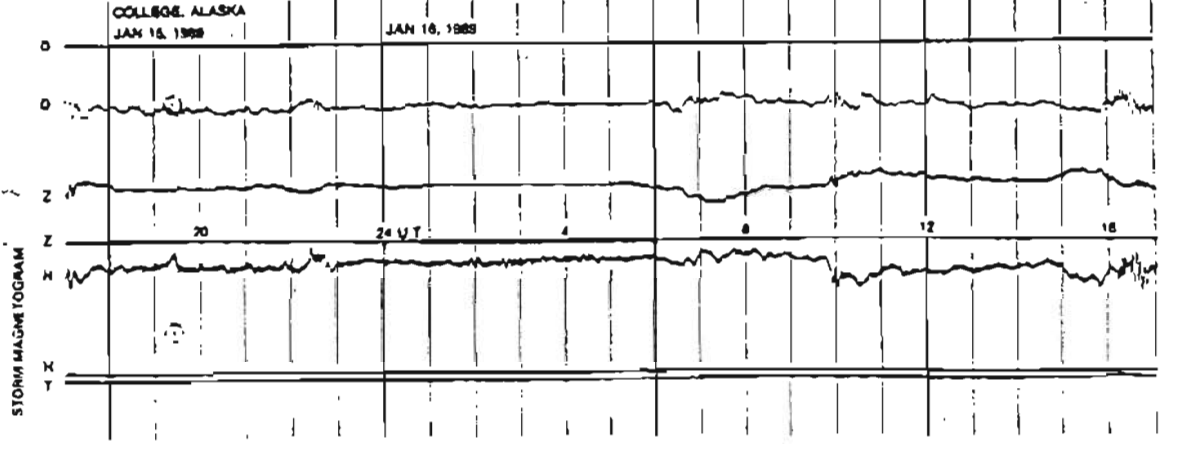
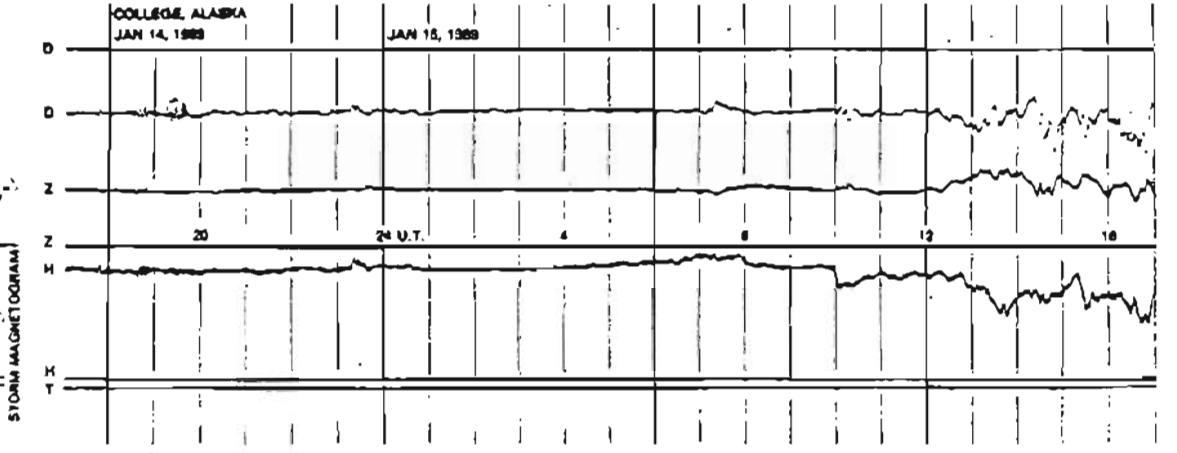
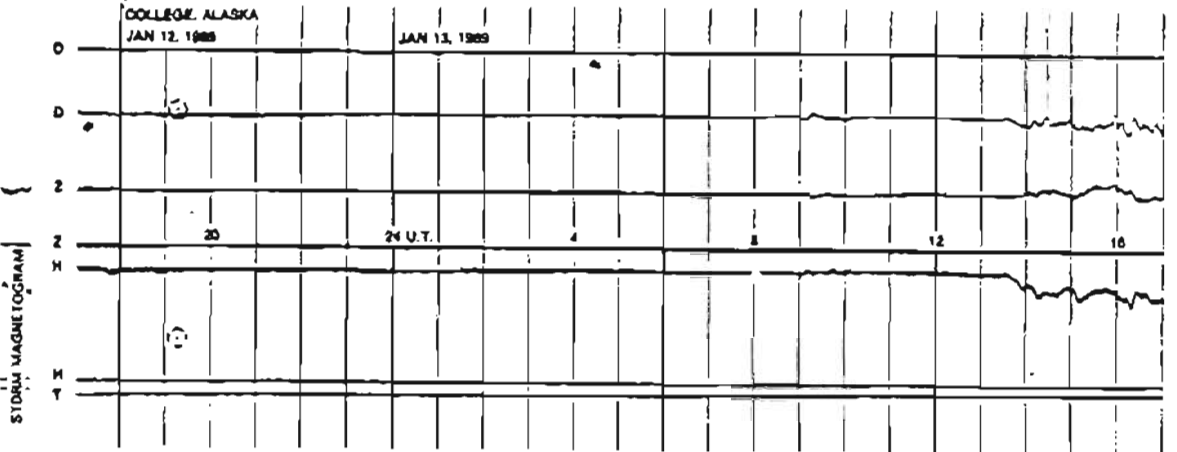
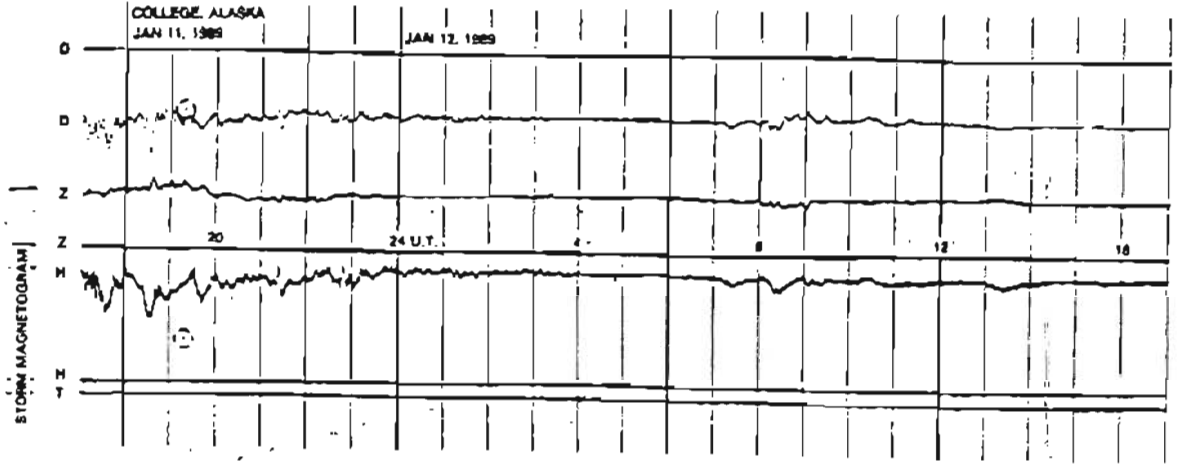
200 mm
100 mm
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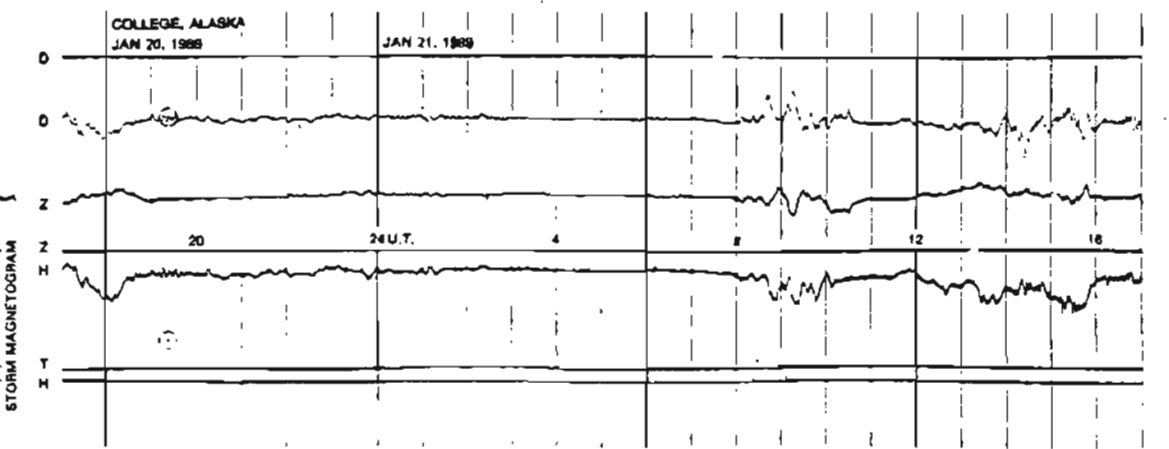
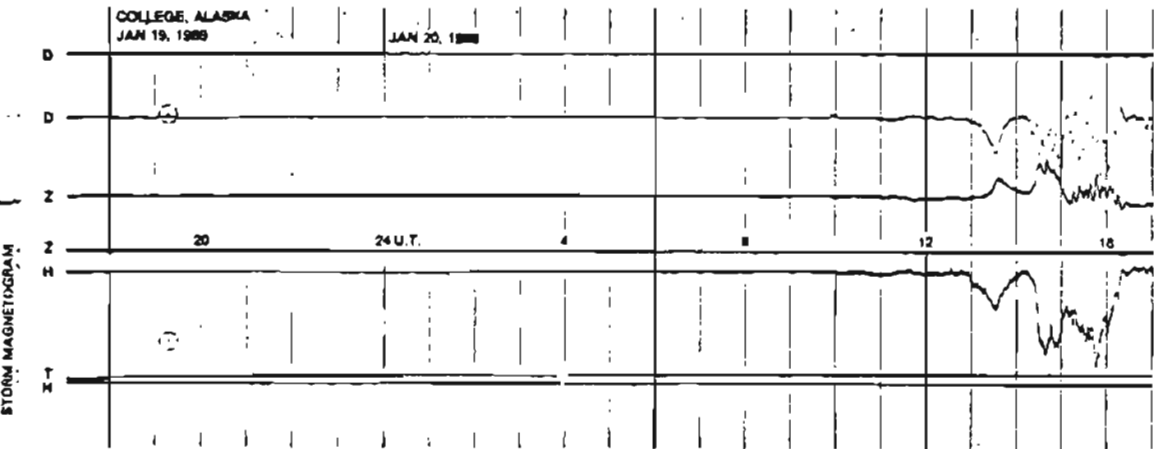
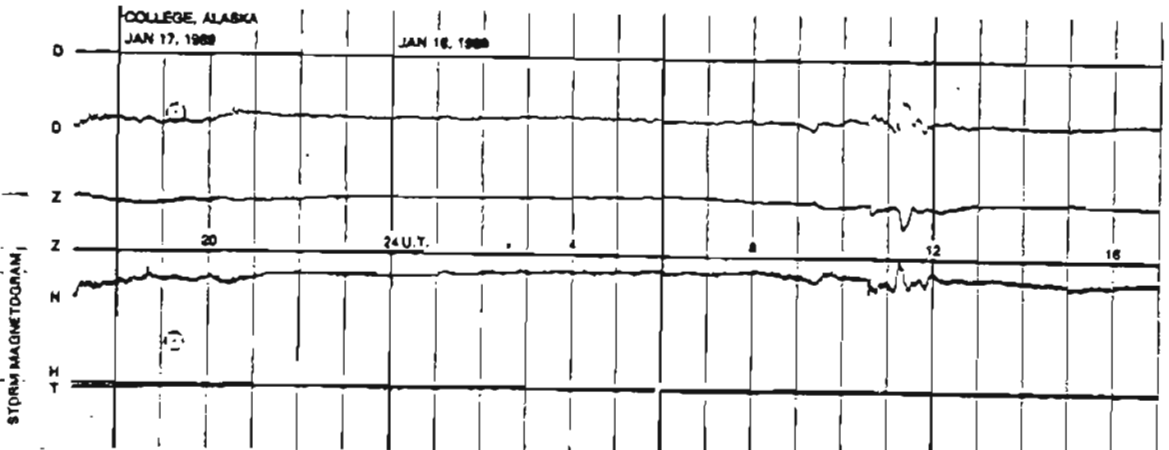
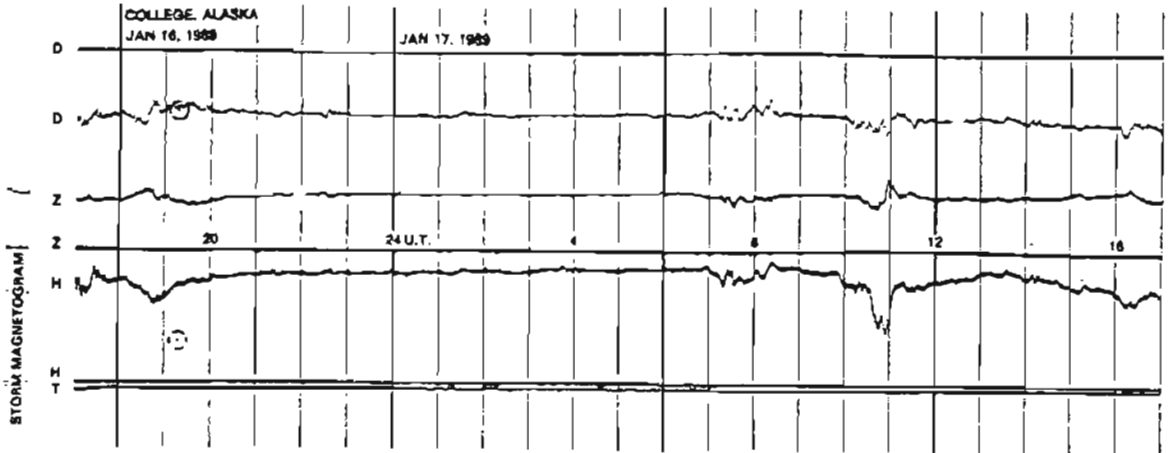
STORM MAGNETOGRAMS



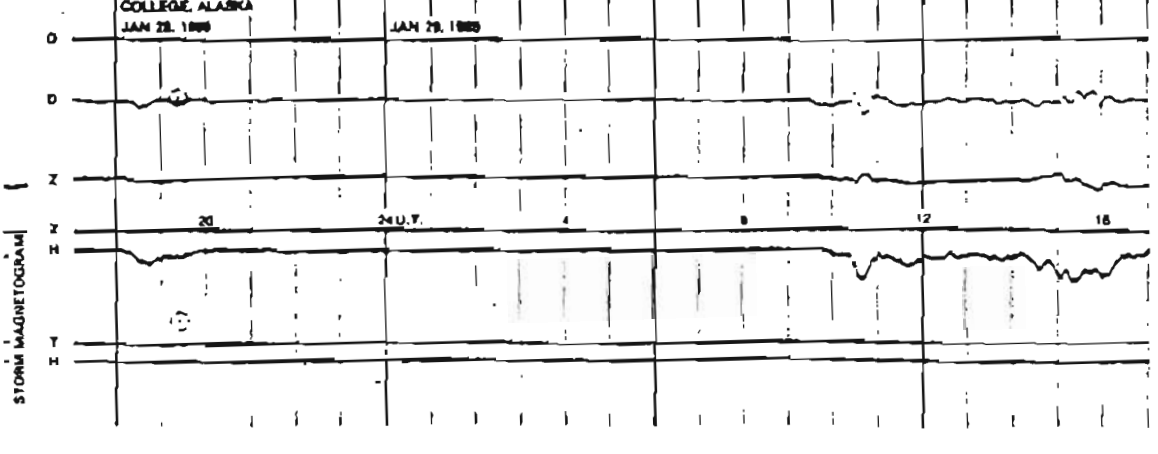
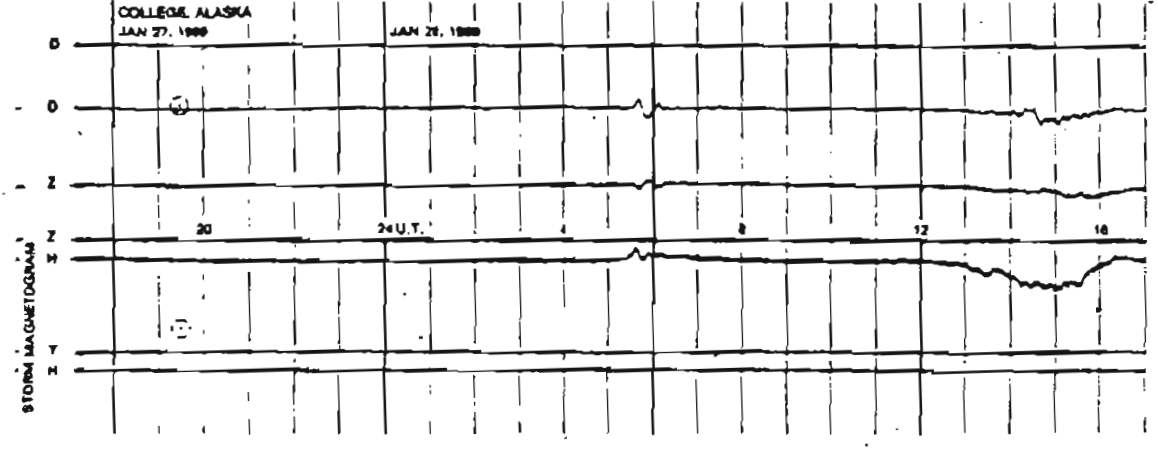
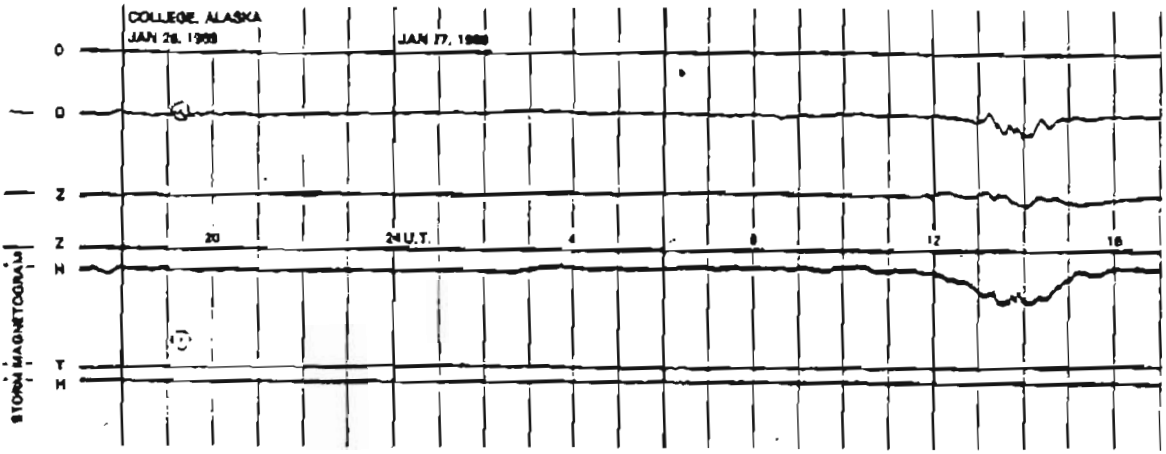
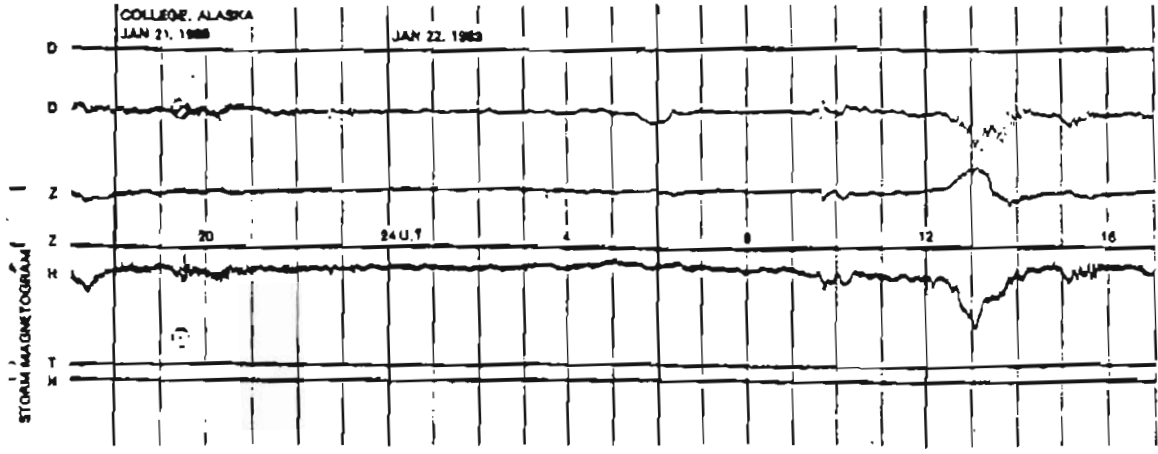
STORM MAGNETOGRAMS



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