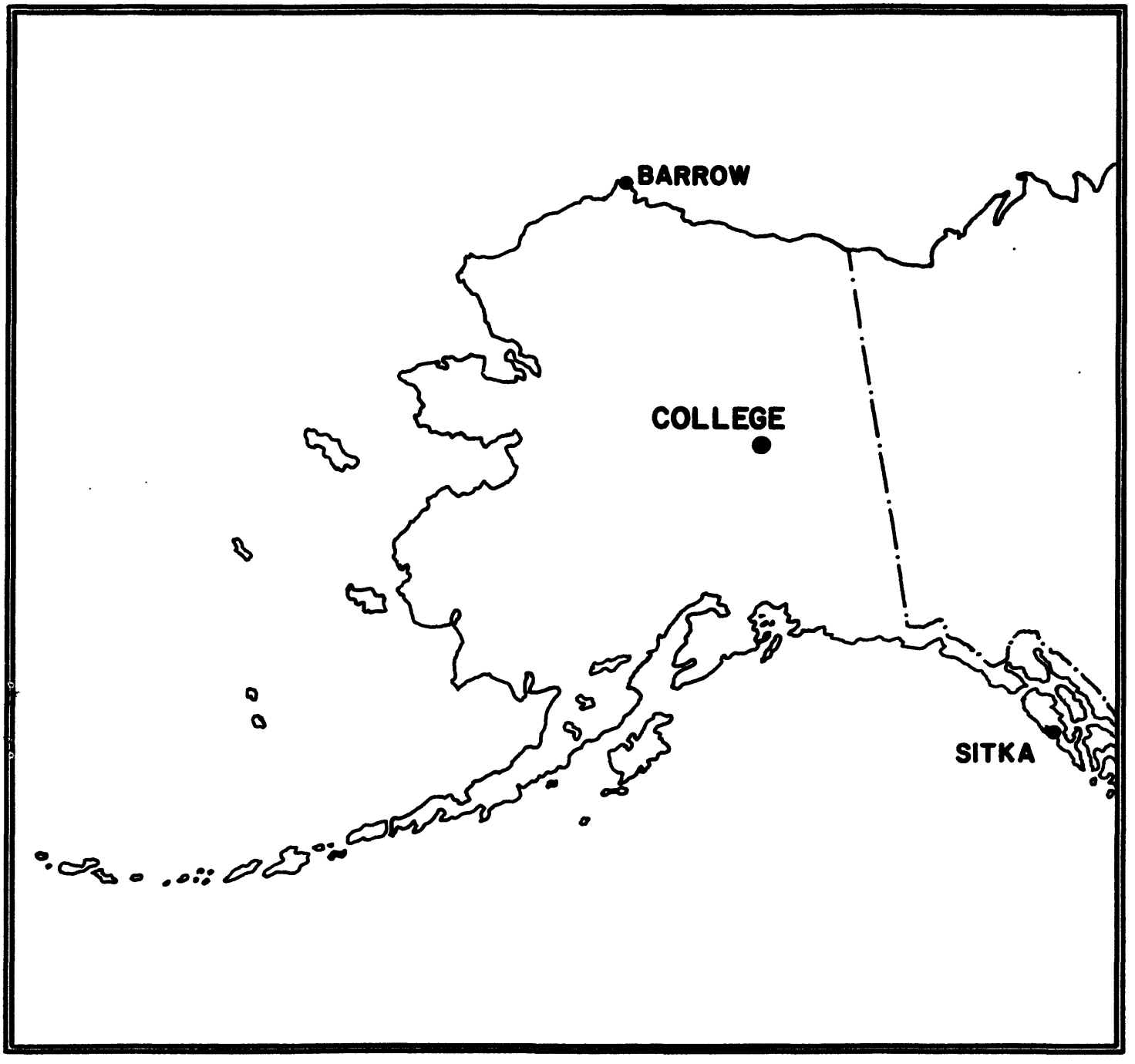
UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

PRELIMINARY GEOMAGNETIC DATA
COLLEGE OBSERVATORY
FAIRBANKS, ALASKA

DECEMBER 1989

OPEN FILE REPORT 89-0300L



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.

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 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 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.

NOAA FORM 76-133 (9-72)

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

MAGNETIC ACTIVITY

(Greenwich civil time, counted from midnight to midnight)

OBSERVATORY: College, Alaska

MONTH AND YEAR: December, 1989

DATE	K-INDICES 00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24	SUM	A_K
1	4	4	4	5	6	7	8	4	42	77
2	4	4	7	4	2	3	2	5	31	37
3	3	4	4	6	6	6	3	4	36	44
4	4	4	5	2	3	3	5	5	31	29
5	4	2	1	4	1	1	1	1	15	10
6	1	0	0	3	2	0	1	0	7	4
7	1	1	2	1	1	2	2	2	12	5
8	0	1	2	2	3	3	1	1	13	7
9	0	0	0	0	0	0	1	0	1	0
10	0	0	0	0	0	0	0	0	0	0
11	0	0	2	5	3	2	1	0	13	10
12	0	1	1	3	3	0	1	3	12	7
13	2	1	0	0	4	3	2	0	12	7
14	0	0	0	6	6	6	2	2	22	32
15	1	2	3	4	5	2	1	1	19	14
16	0	1	4	5	6	5	3	2	26	29
17	1	0	2	6	5	5	2	1	22	25
18	0	1	2	4	2	1	2	1	13	7
19	2	0	0	1	4	1	1	1	10	6
20	0	0	0	0	1	2	1	1	5	2
21	1	2	0	2	3	4	1	0	13	8
22	2	2	1	2	7	5	6	2	27	37
23	2	3	4	4	4	4	1	1	23	17
24	1	1	3	5	6	6	4	3	29	34
25	3	2	3	3	5	2	1	2	21	14
26	2	1	3	4	5	5	5	4	29	28
27	3	3	3	5	6	6	6	4	36	45
28	2	3	1	3	2	1	1	1	14	7
29	3	1	2	7	5	6	6	6	36	57
30	3	3	3	5	5	5	5	4	33	33
31	3	7	6	6	6	5	4	2	39	60

TIME SCALE ON MAGNETOGRAMS: 20 mm/hr

SUDDEN COMMENCEMENTS

d	h	m
29	06	55

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

BEGIN d	BEGIN h	BEGIN m	END d	END h	END m

K SCALE USED:	D	H	Z	
LOWER LIMIT FOR K = 9.....	675.7	322.2		(mm)
CURRENT SCALE VALUE.....	3.67	7.75		(γ/mm)
LOWER LIMIT FOR K = 9	2480	2500		(to nearest 10γ)

SCALINGS AND COMPUTATIONS HAVE BEEN CHECKED.

APPROVED John B. Townshend, Chief

OBSERVER IN CHARGE

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NOAA FORM 86-500
(11/73)

PRINCIPAL MAGNETIC STORMS

WDC-A FOR SOLAR-TERRESTRIAL PHYSICS
ENVIRONMENTAL DATA SERVICE, NOAA
BOULDER, COLORADO 80302 U.S.A.

Data from Individual Observatories: COLLEGE OBSERVATORY, COLLEGE, ALASKA

December 1989

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(γ)	Z(γ)	day	(3 hr - period)	K	D(')	H(γ)	Z(γ)	day	hr
CO	64.6 N	1	11xx	..				1	7	8	588	1920	970	2	10
		29	0655	sc	+5	+60	-10	29	4	7	185	1350	710	30	01
		30	09xx	..				31	2	7	271	1010	980	31	19

U.S. Dept. of Interior
Geological Survey

Observatory	Month	Year
College, Alaska	December	1989

Jep-CO - 1/86

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		6	7	9	10	20	6	7	9	10	20	6	7	9	10	20	DAY
A_k		4	5	0	0	2	4	5	0	0	2	4	5	0	0	2	A_k
HOUR	01	43	61	60	70	40	180	190	194	205	210	184	176	178	167	161	01 HOUR
	02	36	34	54	61	34	200	191	210	211	217	185	174	177	165	166	02
	03	44	42	49	59	27	204	219	219	223	226	197	180	175	162	171	03
	04	45	56	47	54	9	210	219	220	226	230	184	186	174	165	173	04
	05	49	46	44	59	20	210	230	236	230	234	190	189	181	169	189	05
	06	51	21	50	59	56	212	251	239	230	236	185	189	181	170	192	06
	07	60	50	56	69	79	210	266	250	230	239	186	206	180	170	170	07
	08	63	60	56	65	78	212	241	240	229	232	186	193	171	170	166	08
	09	63	37	62	60	69	220	240	230	230	222	191	200	166	169	161	09
	10	57	70	62	58	65	221	234	226	230	222	169	200	166	170	159	10
	11	16	59	63	64	54	184	237	224	228	225	143	194	165	167	163	11
	12	13	90	69	65	67	173	240	220	228	222	129	182	165	166	166	12
	13	72	81	73	70	98	239	225	220	227	188	180	183	165	164	144	13
	14	80	79	73	71	91	230	220	219	229	220	187	183	163	164	139	14
	15	86	113	81	75	92	214	199	218	229	216	186	177	160	164	146	15
	16	81	100	83	81	99	219	193	219	229	217	180	153	160	162	147	16
	17	100	110	88	86	83	211	221	219	229	223	180	144	160	161	147	17
	18	109	161	101	90	99	209	199	223	230	216	175	146	156	162	147	18
	19	99	170	100	95	91	195	187	219	228	229	169	140	160	164	152	19
	20	99	141	104	100	126	195	159	220	220	220	154	123	160	166	159	20
	21	99	130	100	98	110	198	150	219	220	208	157	125	164	165	150	21
	22	91	47	92	96	34	200	160	210	214	190	166	128	169	165	140	22
	23	77	43	87	90	17	200	197	200	210	196	164	150	169	164	129	23
	24	51	50	80	79	22	200	207	200	209	195	169	174	169	165	154	24
DAILY SUM		1584	1851	1734	1774	1560	4946	5075	5294	5374	5233	4196	4095	4034	3976	3791	DAILY SUM
DAILY MEAN		66	77	72	74	65	206	211	221	224	218	175	171	168	166	158	DAILY MEAN
MEAN				71					216					167			MEAN

Scaled RVO | Checked CJ

COLLEGE OBSERVATORY, COLLEGE, ALASKA -- PRELIMINARY CALIBRATION DATA FOR: December 1989

NORMAL MAGNETOGRAPH

COMPONENT	PERIOD FROM	PERIOD TO	CALIBRATION SCALE VALUE		CALIBRATION BASELINE
D	0001 UT, 12/1/89	2400 UT, 12/31/89	1.0'/mm	3.7 γ/mm	26° 51.0' E
H	0001 UT, 12/1/89	2400 UT, 12/9/89	7.8 γ/mm		12618 γ
	0001 UT, 12/10/89	2400 UT, 12/24/89	↓		12620 γ
	0001 UT, 12/25/89	2400 UT, 12/31/89	↓		12618 γ
Z	0001 UT, 12/1/89	2400 UT, 12/4/89	7.7 γ/mm		55215 γ
	0001 UT, 12/5/89	2400 UT, 12/24/89	↓		55211 γ
	0001 UT, 12/25/89	2400 UT, 12/31/89	↓		55215 γ

STORM MAGNETOGRAPH

COMPONENT	PERIOD FROM	PERIOD TO	CALIBRATION SCALE VALUE		CALIBRATION BASELINE
D	0001 UT, 12/1/89	2400 UT, 12/31/89	7.9'/mm	29.4 γ/mm	
H	(SAME)	(SAME)	43.5 γ/mm		
Z	(SAME)	(SAME)	49.0 γ/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.

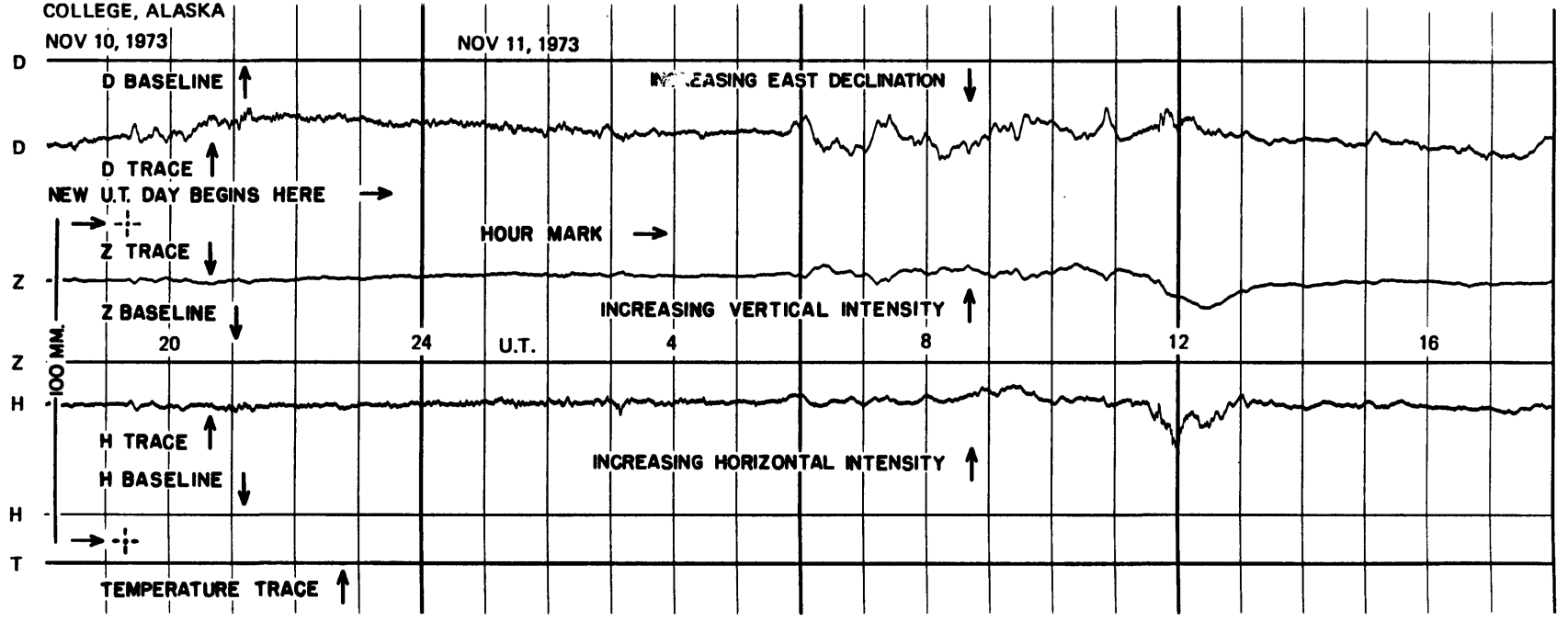
MONTHLY MEAN ABSOLUTE VALUES*

D	H	Z
26° 58.0' E	12786 γ	55341 γ

* COMPUTED FROM FIVE QUIETEST DAYS DURING MONTH.

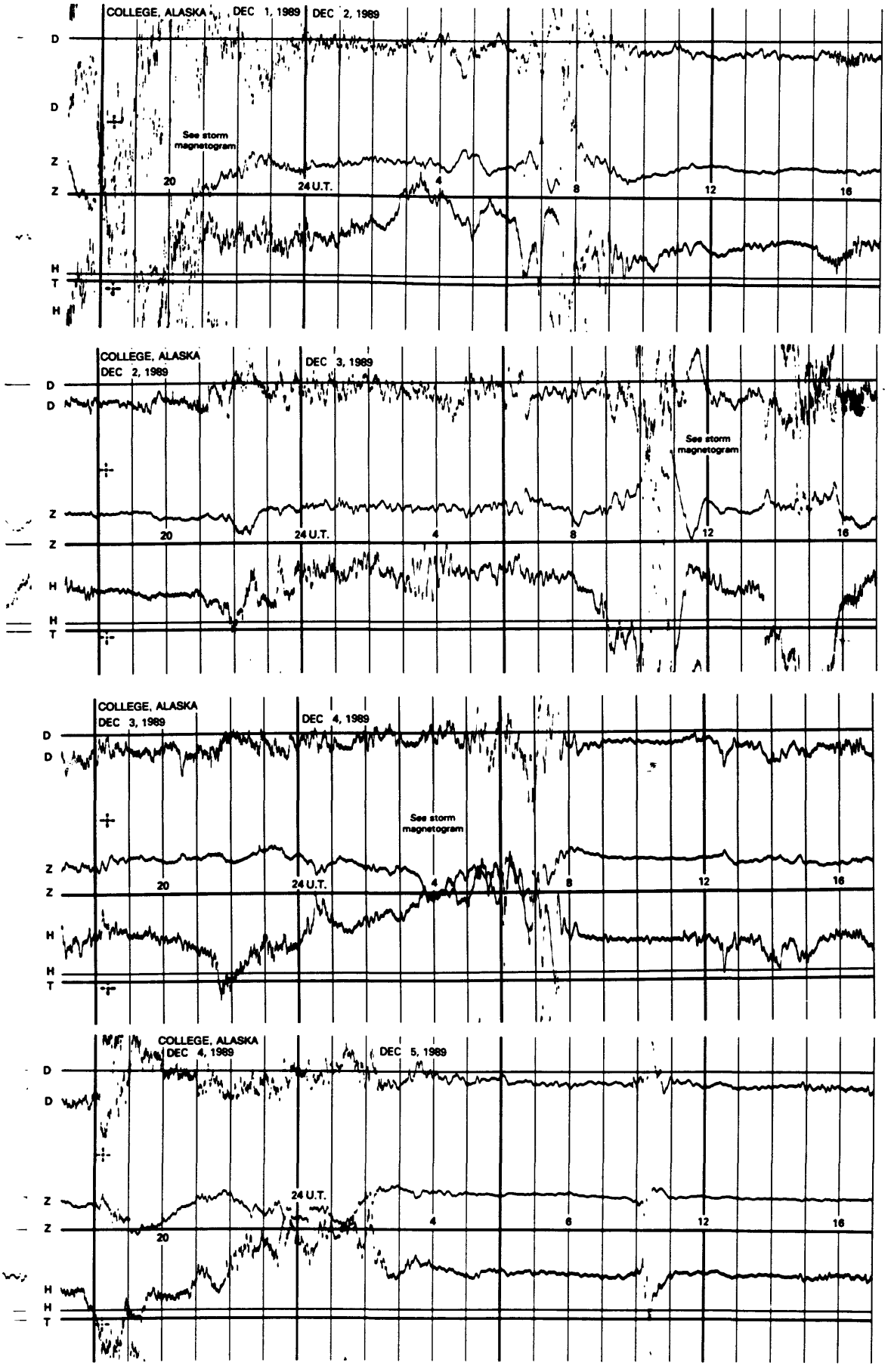
DAYS USED: DEC. 6, 7, 9, 10, 20,

FORMAT FOR NORMAL & STORM MAGNETOGRAMS
(SAMPLE ONLY)



SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES

NORMAL MAGNETOGRAMS



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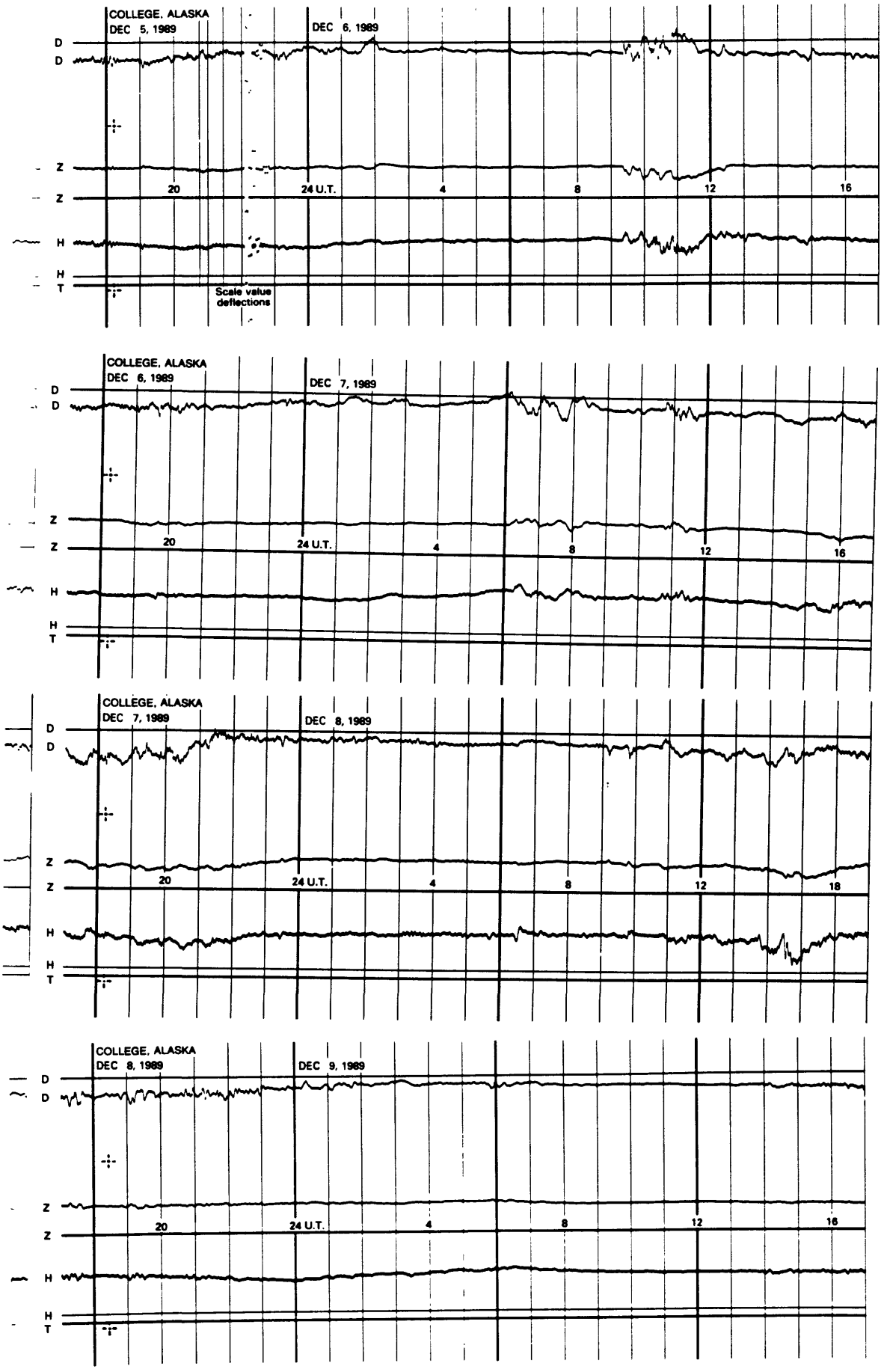

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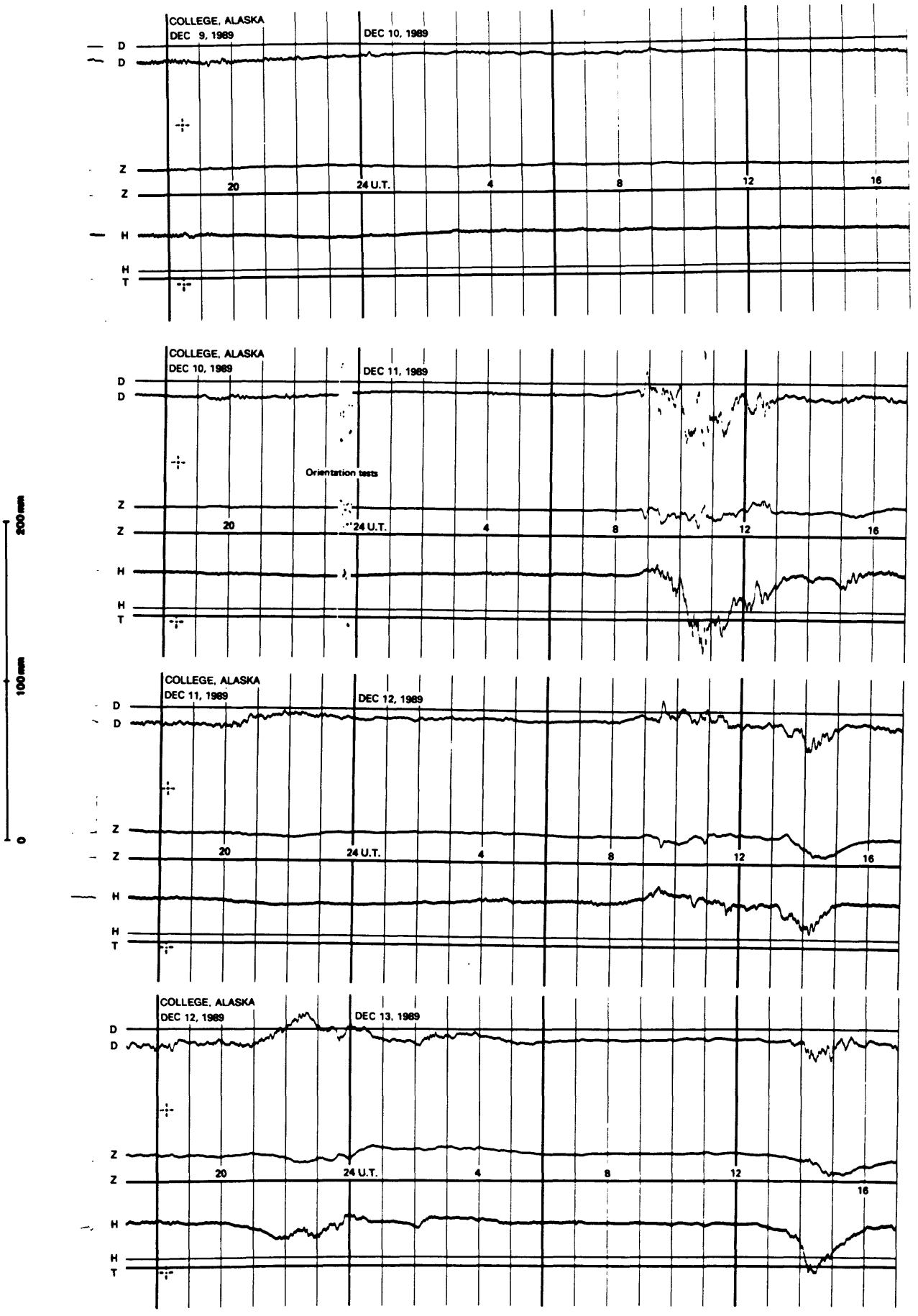

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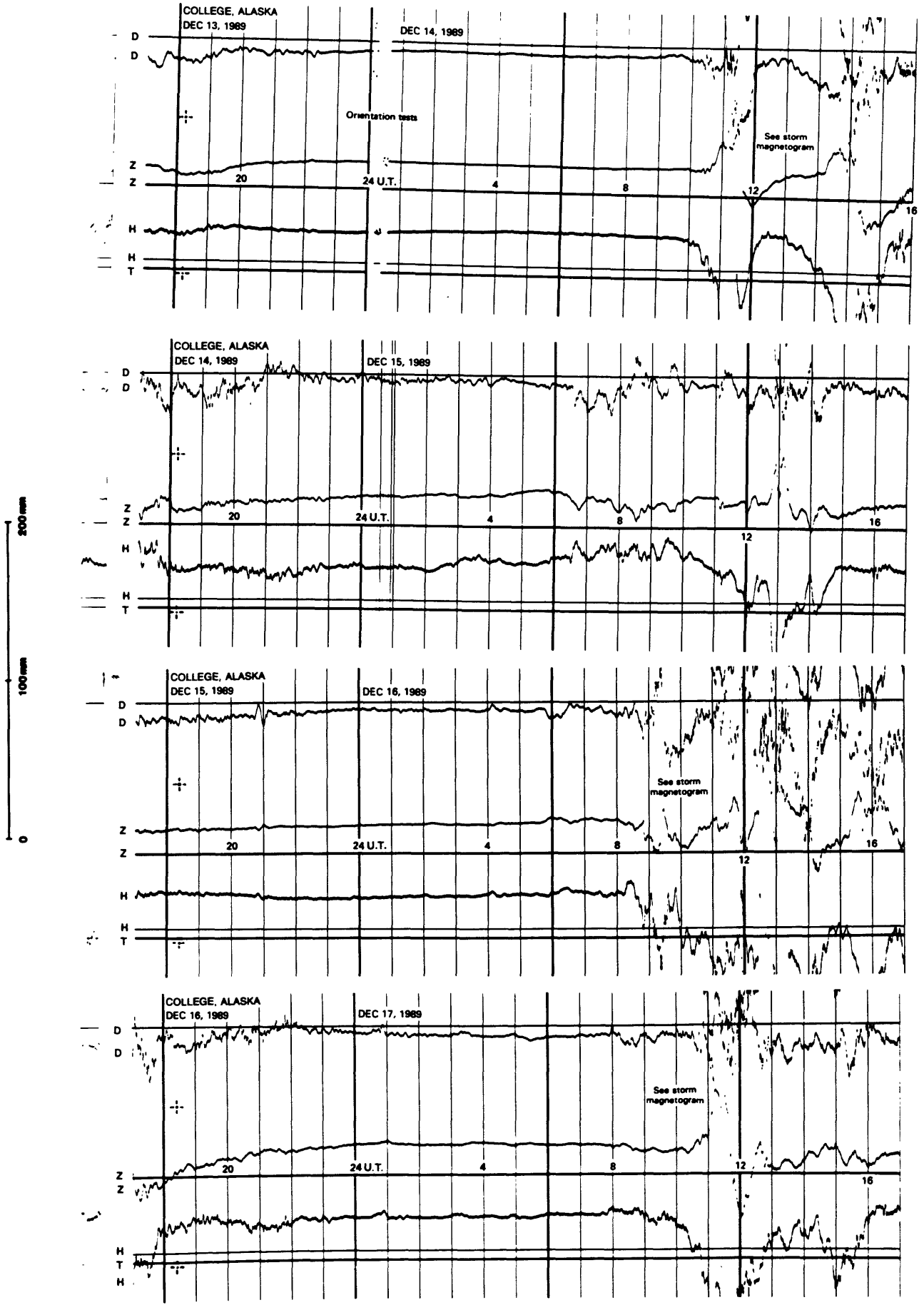

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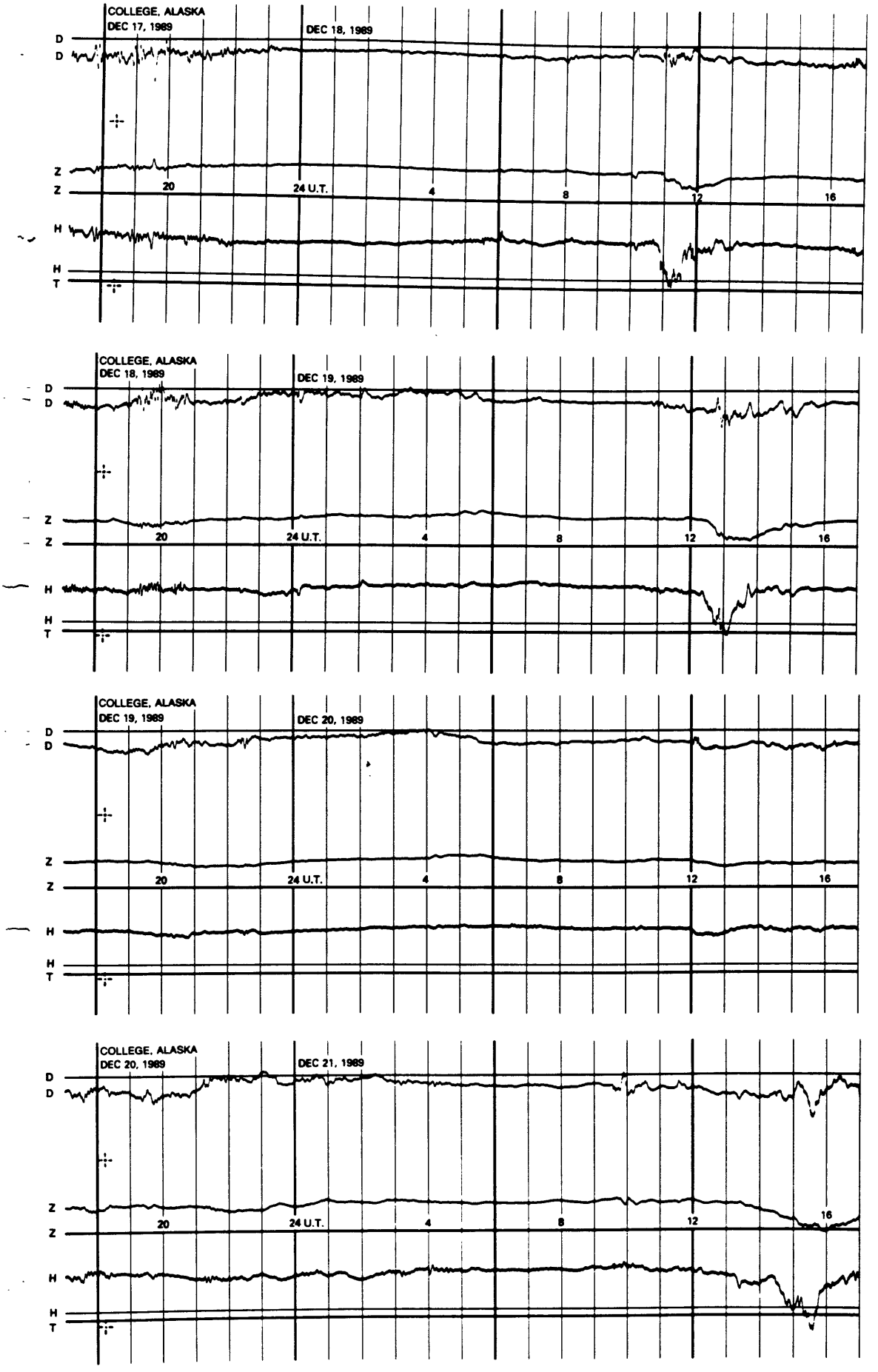

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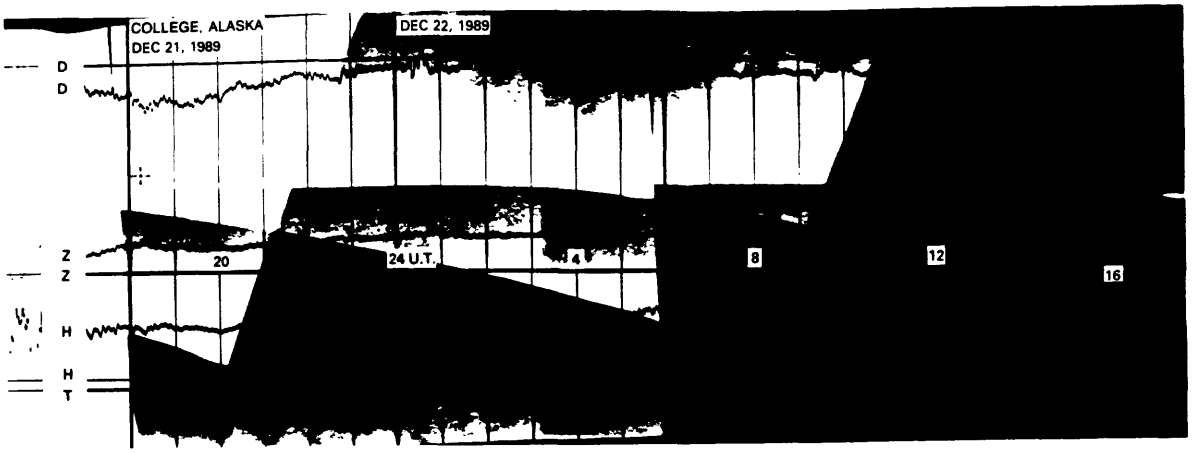

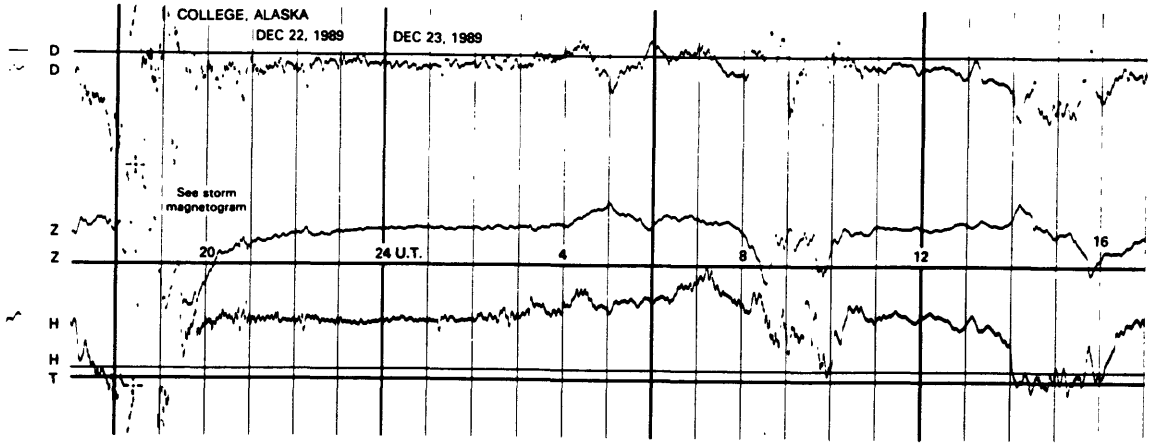

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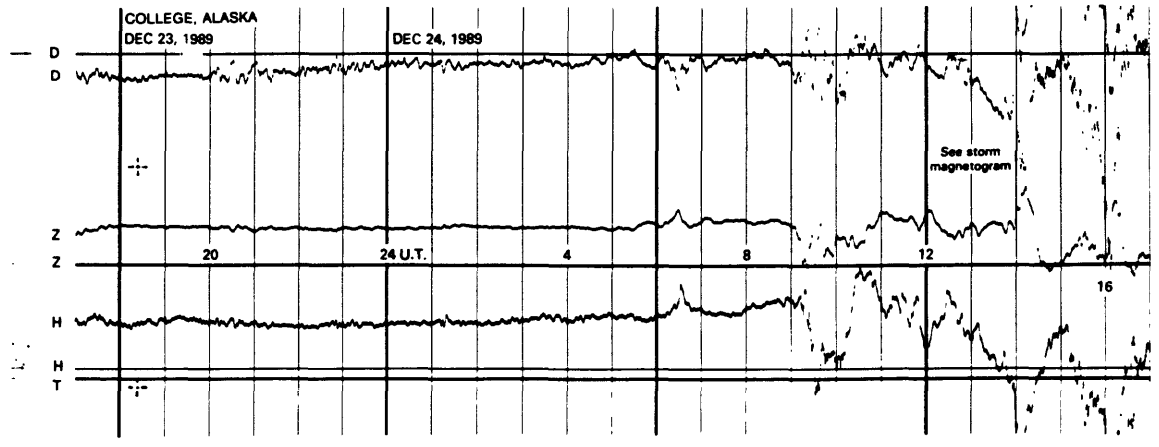

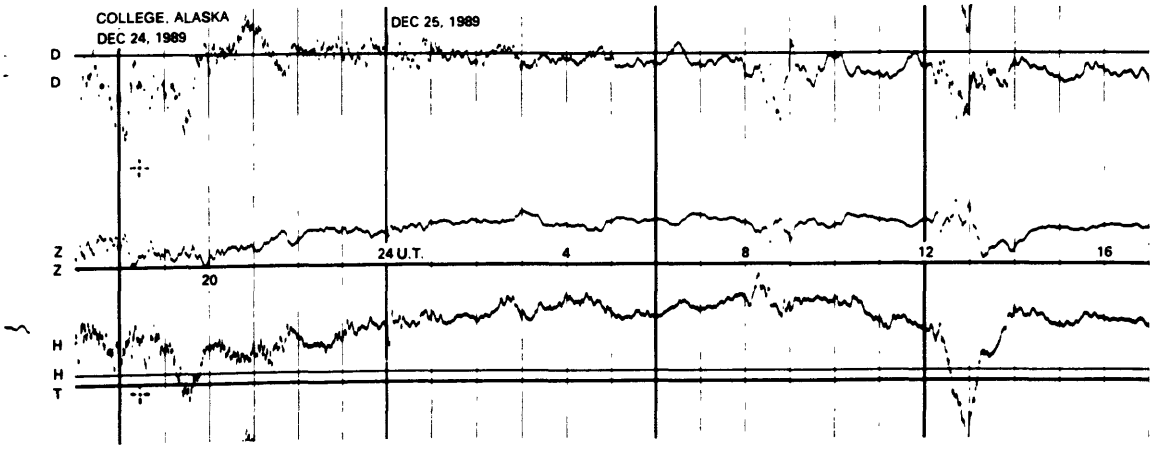

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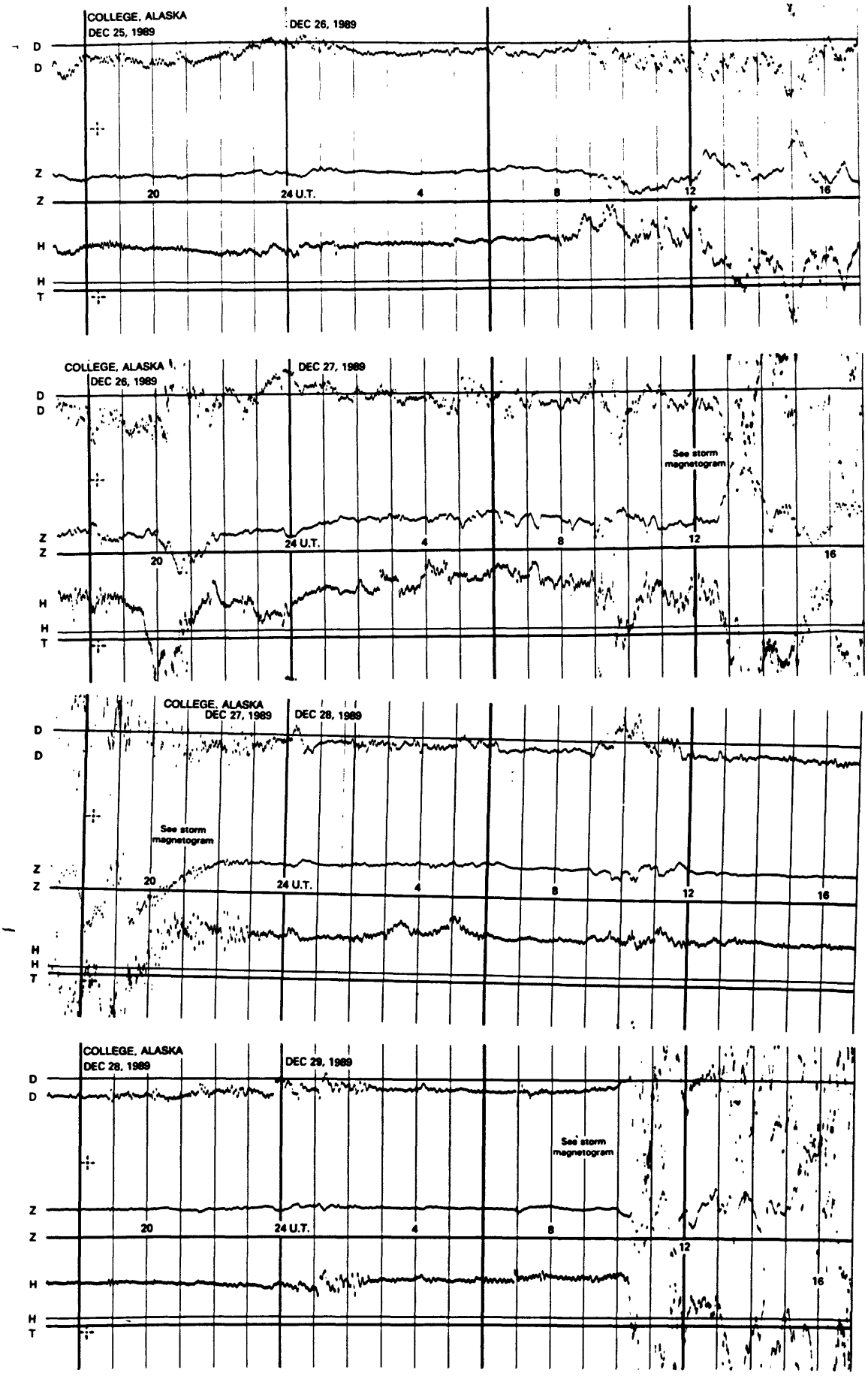

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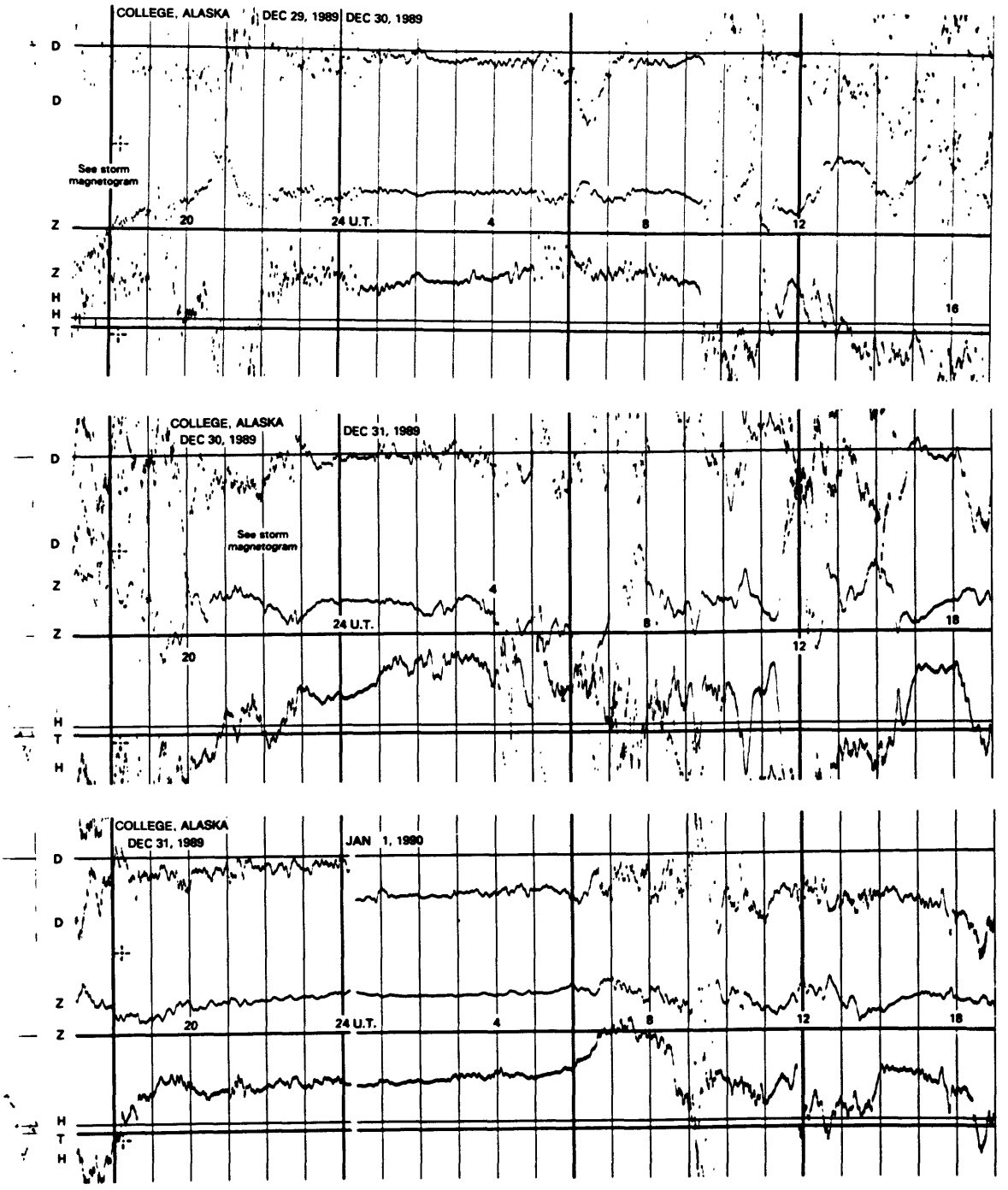

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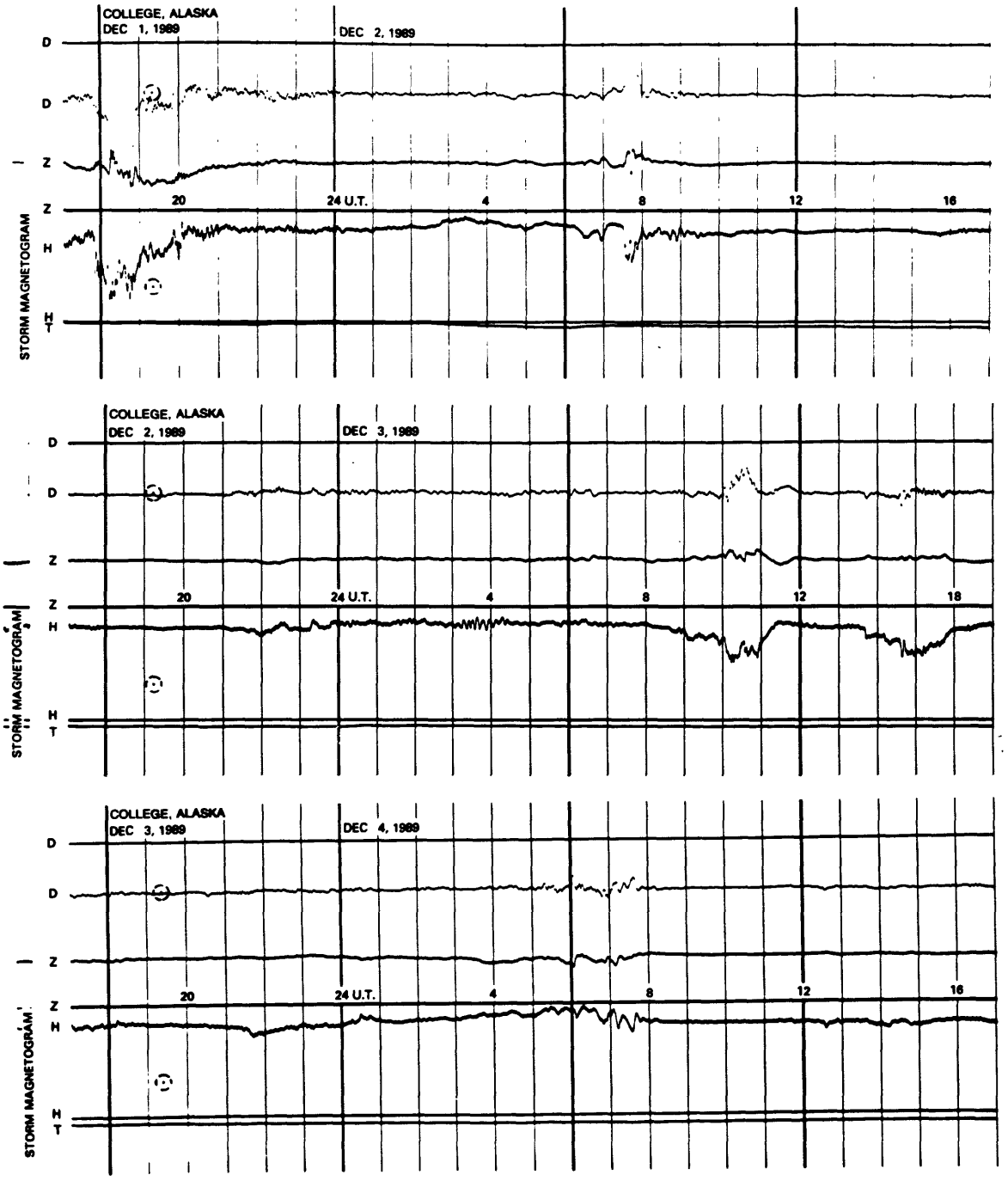
STORM MAGNETOGRAMS



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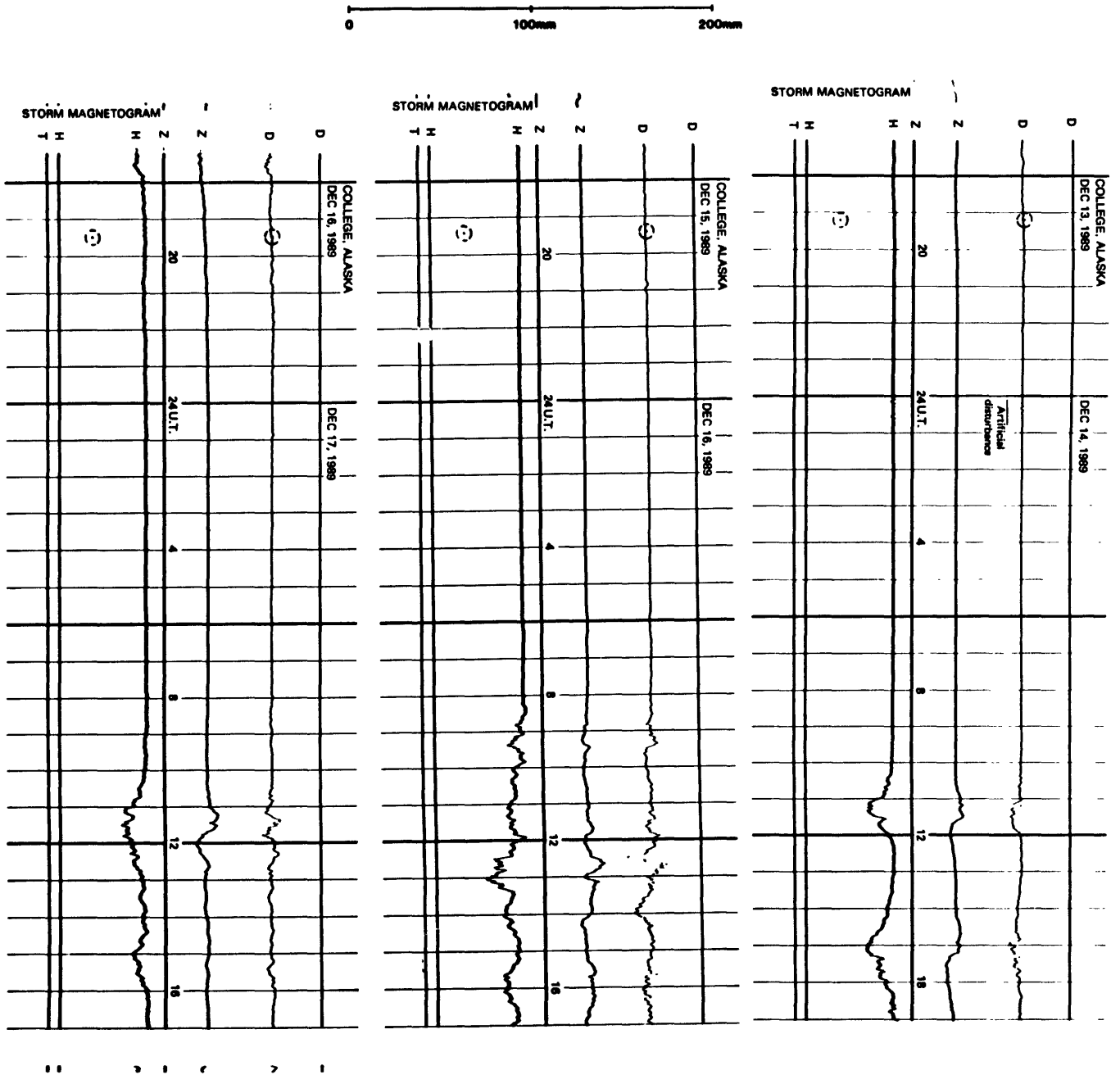
STORM MAGNETOGRAMS



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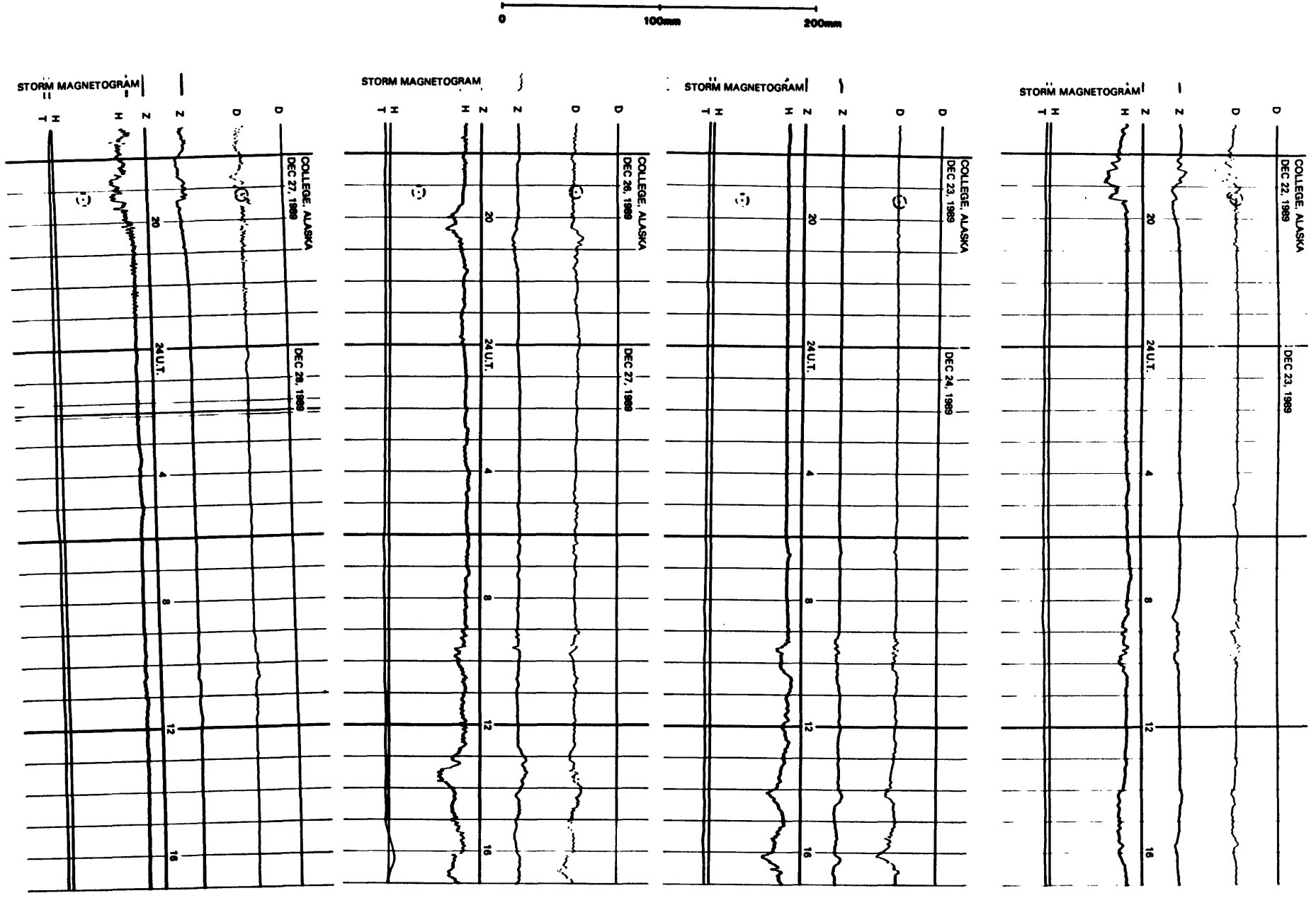

STORM MAGNETOGRAMS