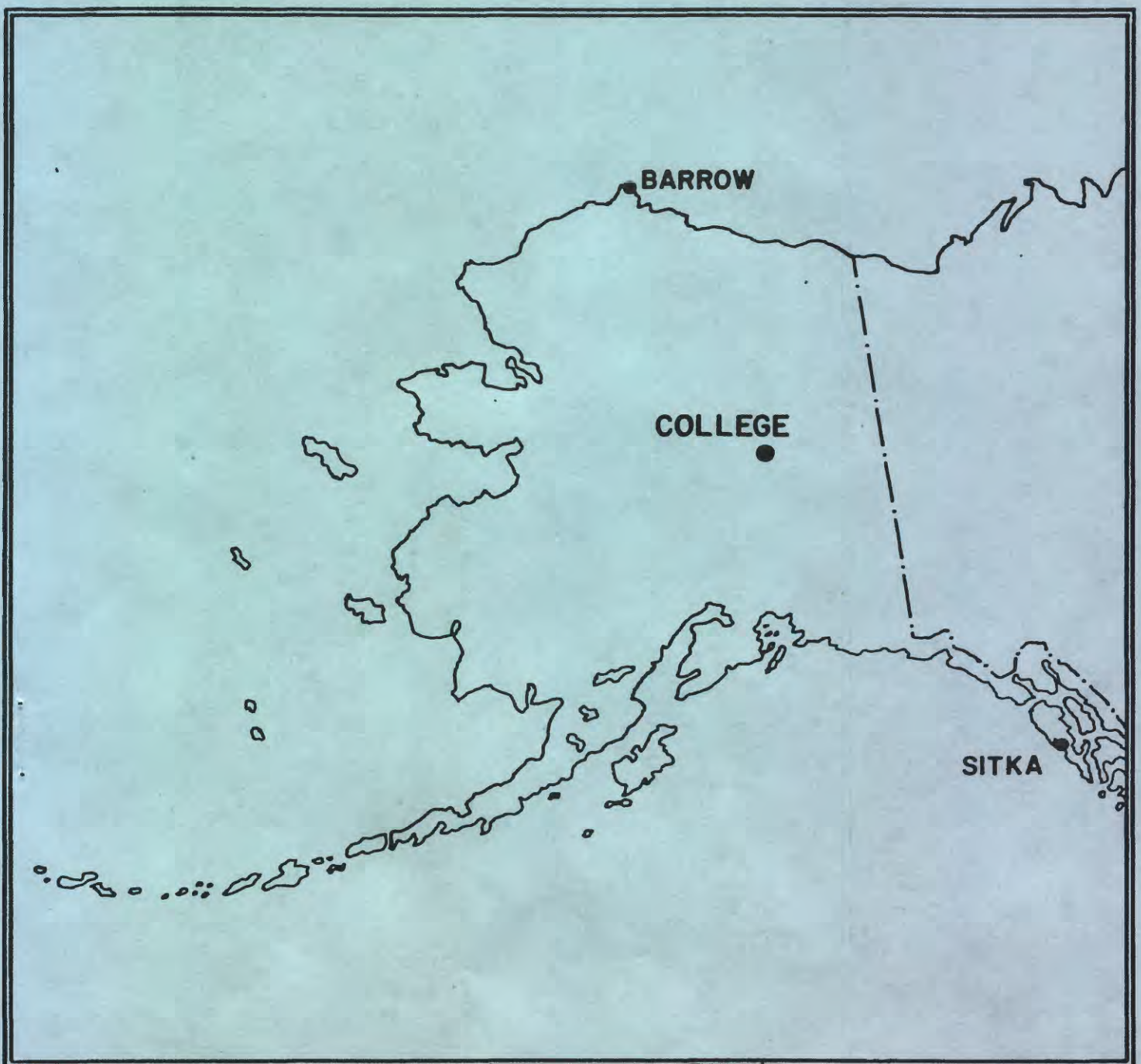


UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

PRELIMINARY GEOMAGNETIC DATA  
COLLEGE OBSERVATORY  
FAIRBANKS, ALASKA

DECEMBER 1982

OPEN FILE REPORT 82-0300L



THIS REPORT WAS PREPARED UNDER THE DIRECTION OF JOHN B. TOWNSHEND, CHIEF OF THE COLLEGE OBSERVATORY, WITH THE ASSISTANCE OF THE OBSERVATORY STAFF MEMBERS: J.E. PAPP, E.A. SAUTER, L.Y. TORRENCE, T.K. CUNNINGHAM AND IN COOPERATION WITH THE GEOPHYSICAL INSTITUTE OF THE UNIVERSITY OF ALASKA. THE COLLEGE OBSERVATORY IS A PART OF THE BRANCH OF ELECTROMAGNETISM AND GEOMAGNETISM OF THE U.S. GEOLOGICAL SURVEY.

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# 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 99701

Requests for copies of the magnetograms except for the current month should be addressed to:

World Data Center A  
NOAA D63, 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..... $+256.9^{\circ}$   
Elevation.....200 meters

### GEOMAGNETIC DATA

Normal, Storm and Rapid Run magnetograms and appropriate calibration data are processed daily at the observatory and are available for analysis or copying. Also available, are mean hourly scalings, K-Indices, selected magnetic phenomena reports and on a real-time basis are recordings from a 3-component fluxgate magnetometer and F-component proton magnetometer.

#### 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 beginning 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 $\gamma$ )

The Magnetic Daily Character Figure, C: To each Universal day a character is assigned on the basis C=0, if it is quiet; C=1, if it is moderately disturbed; C=2, if it is greatly disturbed. The method used to assign characters at the College Observatory is based on AK as follows:

AK Range	C
0 $\approx$ 11	0
11 $\approx$ 50	1
50+	2

Routine assignment of C was discontinued at College on January 1, 1976.

#### Selected Phenomena & Outstanding Magnetic Effects

Prior to January 1, 1976, the Normal and Rapid Run records were reviewed at the observatory for selected magnetic phenomena and the events identified were forwarded to the IUGG Commission on Magnetic Variations and Disturbances. This was discontinued on January 1, 1976, but a report on Outstanding Magnetic Effects is prepared monthly for this report.

#### 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 averages 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 sheets 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 he is interested in the detailed morphology of the magnetic field, he should 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 COLLEGE, ALASKA									
<b>MAGNETIC ACTIVITY</b> (Greenwich civil time, counted from midnight to midnight)										MONTH AND YEAR DECEMBER 1982																			
DATE	K-INDICES									AK	TIME SCALE ON MAGNETOGRAMS  20 mm/hr																		
	00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24	SUM																				
1	0	0	2	1	0	0	0	0	03	01	SUDDEN COMMENCEMENTS d      h      m																		
2	0	0	0	2	3	1	0	0	06	03																			
3	0	0	1	1	5	4	1	1	13	11																			
4	2	3	1	2	1	1	2	3	15	08																			
5	3	3	5	3	2	2	1	0	19	14																			
6	0	0	2	2	1	0	0	0	05	02																			
7	0	3	3	3	7	6	6	3	31	45																			
8	2	3	5	6	6	6	6	2	36	50																			
9	3	3	4	4	7	4	3	2	30	34																			
10	1	3	6	6	5	5	5	3	34	42																			
11	3	4	2	1	3	5	5	4	27	24	POSSIBLE SOLAR-FLARE EFFECTS BASED ON INSPECTION OF GRAMS ALONE (WITHOUT REFERENCE TO DATA FROM OTHER SOURCES)																		
12	2	2	4	7	6	3	3	1	28	37																			
13	1	1	0	3	1	2	2	1	11	05																			
14	1	1	1	3	2	0	2	3	13	07																			
15	2	2	4	5	2	1	1	0	17	13																			
16	0	0	3	5	6	5	5	3	27	32																			
17	5	4	9	7	7	6	5	4	47	114																			
18	3	4	7	8	7	6	5	3	43	88																			
19	6	4	4	6	6	4	3	3	36	44																			
20	3	3	5	6	7	7	6	4	41	68																			
21	3	4	5	6	7	7	5	4	41	66	BEGIN                      END d   h   m                      d   h   m																		
22	5	6	4	4	6	7	3	2	37	53																			
23	1	1	5	7	7	6	4	3	34	57																			
24	3	2	4	5	5	5	3	2	29	27																			
25	2	2	5	4	5	5	2	1	26	24																			
26	1	2	3	3	5	4	1	1	20	15																			
27	1	0	5	6	5	4	2	3	26	29																			
28	3	4	6	5	6	5	4	3	36	43																			
29	4	2	4	5	5	5	4	3	32	31																			
30	3	3	4	6	3	4	3	2	28	25																			
31	3	2	2	3	2	0	0	0	12	06																			
K SCALE USED: LOWER LIMIT FOR K = 9..... CURRENT SCALE VALUE..... LOWER LIMIT FOR K = 9 .....				D 683.8 3.73 2550		H 321.7 7.79 2510		Z    		(mm) (γ/mm) (to nearest 10γ)																			
SCALINGS AND COMPUTATIONS HAVE BEEN CHECKED.																													
APPROVED <u>JOHN B. TOWNSEND, CHIEF, COLLEGE OBSERVATORY</u>																													
OBSERVER IN CHARGE																													

OUTSTANDING MAGNETIC EFFECTS			OBSERVATORY COLLEGE, ALASKA	
			MONTH	YEAR
			DECEMBER	1982
DATE	TIME U.T.	NATURE OF PHENOMENON <sup>1</sup>	REMARKS	
07	0329	ssc*		
19	0255	si*		
27	0714	ssc*		
IDENTIFIED BY: JEP			VERIFIED BY: EAS	

1. NATURE OF PHENOMENON: ssc, ssc\*, si, si\*, b, bp, bs, bps, pc1, pc2 - - - pc5, pg, pi 1, pi 2, sfe.

Obs. 2 letter 1960 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)	
C0	64°6 N	07	0329	S.C.*	-7	+121	..	07 09	5 5	7 7	259	1330	910	09 16
		10	05XX	..	..	..	..	12	4	7	200	1560	1050	12 21
		16	06XX	..	..	..	..	17	3	9	444	3370	1970	22 19
		23	07XX	..	..	..	..	23	4, 5	7	319	1260	1110	25 19
		27	0714	S.C.*	-7	+393	-74	27 28 30	4 3, 5 4	6 6 6	124	1320	490	31 13

## NORMAL MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASELINE
D	0000 U.T., 12-1-82	2400 U.T., 12-31-82	1.6/mm	3.78/mm	27° 47.0 E
H	0000 U.T., 12-1-82	2400 U.T., 12-31-82	7.88/mm		127518
Z	0000 U.T., 12-1-82	2400 U.T., 12-31-82	7.68/mm		551568

## STORM MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASELINE
D	0000 U.T., 12-1-82	2400 U.T., 12-31-82	7.9/mm	29.68/mm	23° 42.2 E
H	0000 U.T., 12-1-82	2400 U.T., 12-31-82	44.08/mm		115028
Z	0000 U.T., 12-1-82	2400 U.T., 12-31-82	48.58/mm		540568

## RAPID RUN MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION	
	FROM	TO	SCALE VALUE	
D				
H				
Z				

## MONTHLY MEAN ABSOLUTE VALUES\*

D	H	Z
27° 55.9 E	129598	553928

\* COMPUTED FROM TEN QUIETEST DAYS DURING MONTH.

DAYS USED: DEC 1, 2, 3, 4, 5, 6, 13, 14, 15, 31



FORM 78-106

**MAGNETOGRAM HOURLY SCALINGS**  
(UNIVERSAL TIME)

Values are in tenths of mm. and are averages for successive periods of one hour beginning at midnight. Hour 01 of local day (150 M.T.) is hour 11 of the 82ME universal day.

Shading corrections have been applied. Negative values are in red, with minus signs shown.

C	Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	SUM	OBSV.	YEAR	MONTH	ELEM- ENT
01	74	75	80	84	89	91	90	84	138	91	85	78	01	84	84	88	98	104	103	103	115	119	108	108	101	227.4				
02	85	81	77	82	83	88	89	88	86	86	85	86	02	140	139	148	114	113	127	118	119	110	104	90	79	241.7				
03	65	66	83	72	82	82	80	81	76	90	93	100	03	111	296	295	364	229	161	112	140	102	81	70	44	297.5				
04	32	14	13	-24	55	88	102	89	93	63	87	98	04	92	108	107	146	154	131	132	112	122	102	83	11	201.0				
05	52	53	-31	-26	29	-15	20	60	54	59	51	70	05	75	106	107	121	109	144	154	116	111	79	69	49	161.6				
06	47	52	57	62	67	80	85	81	76	65	79	82	06	102	96	102	109	115	125	126	129	117	103	84	69	211.0				
07	57	62	69	65	59	71	52	91	85	71	67	97	07	126	473	679	806	266	395	378	84	-83	28	56	26	408.2				
08	12	68	54	82	53	78	-19	-99	-194	-75	306	242	08	171	251	298	437	425	337	290	330	-11	34	67	61	325.8				
09	62	66	69	59	76	93	61	102	36	-4	45	70	09	122	-99	345	173	154	142	123	103	98	88	80	216.2					
10	77	78	73	80	64	4	211	-19	-218	68	-353	-190	10	176	165	172	190	497	393	307	290	163	26	56	242.6					
11	64	68	94	75	60	80	77	66	40	62	69	78	11	93	98	140	322	489	202	139	177	115	106	-2	63	277.5				
12	48	73	74	66	55	30	-11	96	58	71	144	489	12	36	77	94	122	146	84	137	136	102	122	111	80	244.0				
13	66	62	64	64	75	78	77	79	70	71	68	102	13	107	102	103	99	140	135	112	100	111	89	87	85	214.6				
14	74	77	64	60	68	78	77	86	98	87	85	122	14	116	111	115	93	107	109	119	114	159	150	94	90	235.3				
15	80	48	48	49	66	88	54	30	-12	-35	4	62	15	92	113	126	123	131	130	124	118	109	102	101	96	184.7				
16	84	76	76	83	86																									





## MAGNETOGRAM HOURLY SCALINGS

(UNIVERSAL TIME)

Values are in tenths of mm. and are averages for successive periods of one hour beginning at midnight. Hour 01 of local day (150 M.T.) is hour 11 of the SBME universal day.

FORM 74-108

MAGNETOGRAM HOURLY SCALINGS

(UNIVERSAL TIME)

Values are in tenths of mm and are averages for successive periods of one hour beginning at midnight, Hour 01 of local day ( 1950 M.T.) is hour 11 of the 280ME universal day.

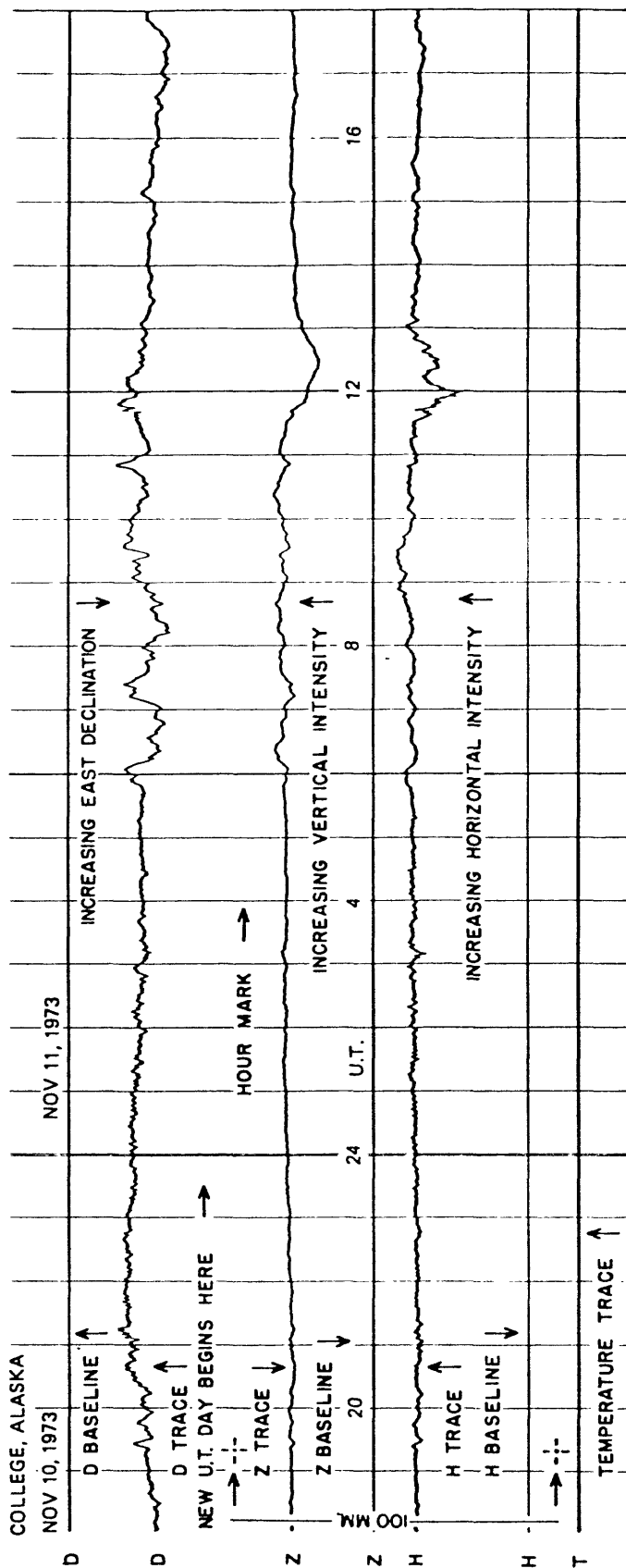
C	Q	S	T	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	SUM	YEAR	MONTH	ELE- MENT
	01	245	250	255	258	258	255	254	252	263	258	254	258	259	266	268	268	266	260	254	248	246	246	246	246	246	6160				
	02	248	254	260	261	259	261	262	267	265	262	262	248	190	122	235	266	276	276	271	270	262	260	254	250	250	6061				
	03	255	268	270	271	269	269	270	273	278	272	267	266	212	190	111	20	170	272	296	282	269	260	250	246	5213					
	04	259	292	311	364	319	294	299	304	291	302	294	286	280	276	264	271	264	266	255	260	262	246	180	221	6660					
	05	291	343	456	414	397	499	367	326	350	261	295	275	272	246	195	260	262	254	246	235	237	235	239	246	7150					
	06	254	261	273	280	279	280	281	282	306	290	276	260	272	276	269	270	266	265	266	260	259	253	250	249	6477					
	07	260	269	274	294	310	313	393	320	292	321	314	255	235	309	490	445	55	114	207	259	191	213	250	241	2946					
	08	298	327	310	290	366	327	370	286	123	166	360	264	185	129	252	360	457	752	207	190	145	276	267	263	658					
	09	262	287	294	352	420	398	356	365	276	264	275	250	128	802	400	160	304	279	280	283	271	256	250	251	5059					
	10	252	254	263	264	284	338	375	387	296	15	308	330	280	156	160	150	111	139	162	162	107	253	293	241	4411					
	11	236	271	288	405	311	246	249	250	275	276	260	251	247	242	170	157	320	103	162	68	139	120	252	241	4055					
	12	260	274	272	276	310	306	290	307	269	205	4	468	88	276	264	218	150	256	256	270	269	252	244	234	5084					
	13	249	263	276	278	266	268	278	279	288	291	266	271	262	265	256	244	225	234	254	258	246	230	238	245	6241					
	14	252	263	277	282	275	281	303	286	278	268	267	256	252	236	256	270	262	262	260	258	249	208	222	256	6279					
	15	246	255	270	273	284	288	339	434	498	494	438	339	276	260	255	260	262	264	266	267	262	257	254	250	7294					
	16	252	258	266	258	258	256	236	229	157	43	90	270	282	232	378	265	225	33	91	43	230	165	243	270	1356					
	17	314	373	501	601	512	638	596	441	958	214	490	386	692	228	239	147	218	135	202	82	124	304	287	283	3795					
	18	300	290	295	422	342	299	282	303	225	867	154	157	27	41	528	250	211	224	26	202	296	308	281	283	2471					
	19	282	301	327	346	314	310	398	384	328	286	46	391	256	124	50	342	275	254	255	258	254	256	260	278	5189					
	20	285	316	260	277	337	411	380	214	298	165	381	386	431	613	341	453	284	35	140	195	159	282	264	260	1062					
	21	292	300	316	411	324	326	423	362	486	39	18	211	381	674	221	211	528	256	171	22	70	361	355	288	1704					
	22	402	559	524	723	503	497	363	246	180	90	51	173	153	77	426	471	54	297	290	288	276	235	234	239	5488					
	23	260	266	259	267	268	275	296	309	261	296	82	465	368	368	326	436	543	12	189	268	271	274	261	238	1644					
	24	263	280	302	315	288	274	269	267	136	80	29	278	187	232	311	56	145	204	264	299	290	290	268	249	3562					
	25	236	275	286	279	296	302	280	292	210	336	256	201	227	391	238	260	271	243	320	300	292	273	262	263	4591					
	26	265	263	252	294	315	301	365	333	302	276	251	205	40	278	28	156	181	276	274	286	275	269	259	262	5394					
	27	269	271	261	270	283	278	275	318	349	353	350	48	64	220	295	235	286	287	279	272	261	220	222	270	6111					
	28	286	296	339	440	328	366	395	334	170	284	313	154	368	448	110	14	312	324	276	188	132	288	249	235	4789					
	29	245	345	294	376	344	327	284	312	272	232	269	244	64	40	215	243	288	273	276	225	201	237	234	248	5618					
	30	283	264	323	382	329	336	377	429	380	287	270	68	269	258	205	134	120	181	276	242	302	272	260	240	6295					
	31	240	242	325	327	295	288	290	294	292	294	304	217	294	260	255	264	249	251	252	257	260	254	238	250	6482					
SCALED BY	LYT, TKC	Preliminary base-line and scale values:																								MONTHLY SUM		145499			
CHECKED BY	EAS, JEP, TKC	Scale Value																							MONTHLY MEAN		196				
SIGNS RE- VIEWED BY	JEP	Base-line Value																							DATES WITH GAPS:						
PUNCHED BY		Interval Beginning																													
		Storm																							Magph., converted to Normal March						

(1) Interpolated  
 (2) Significant portion of how interpolated.  
 (3) No record, or no values available because of faulty record.  
 (4) Derived from

(5) Scaling uncertain because of magnetic storm.  
 (6) Record off sheet for part of storm. If given, curve was estimated for missing part.  
 (7) Storm

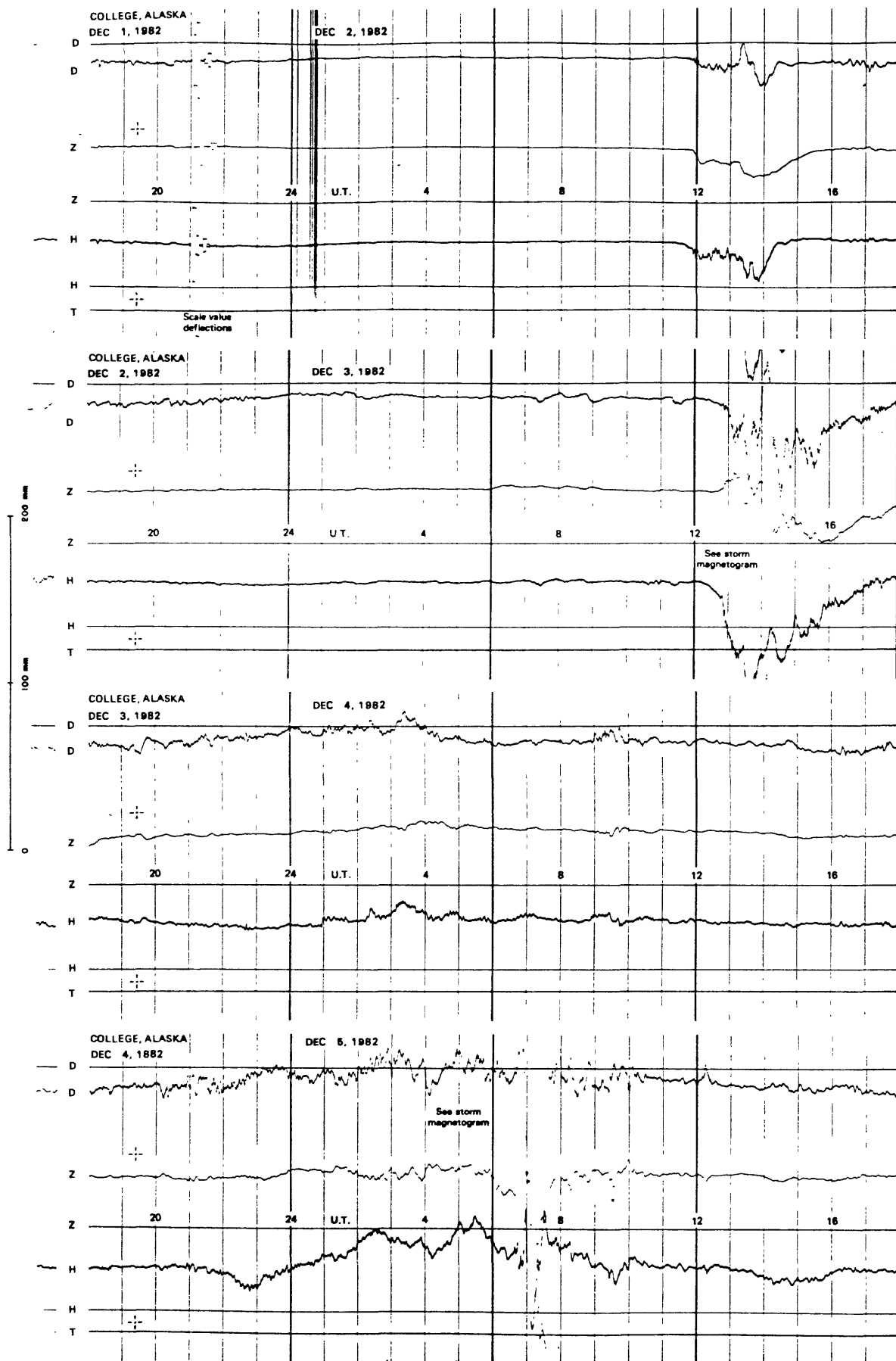
(8) Magn., converted to Normal Magn.

# FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)

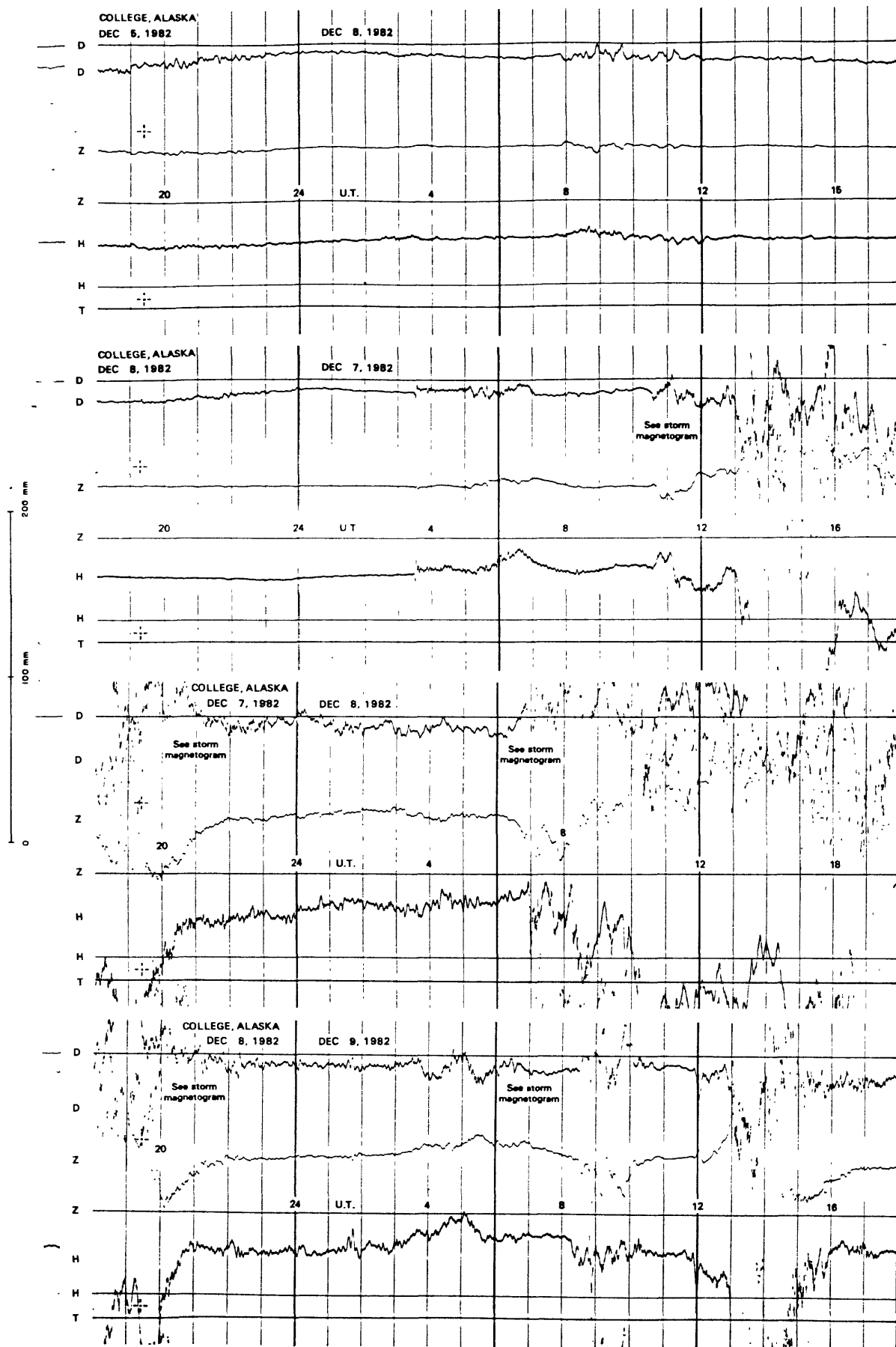


SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES

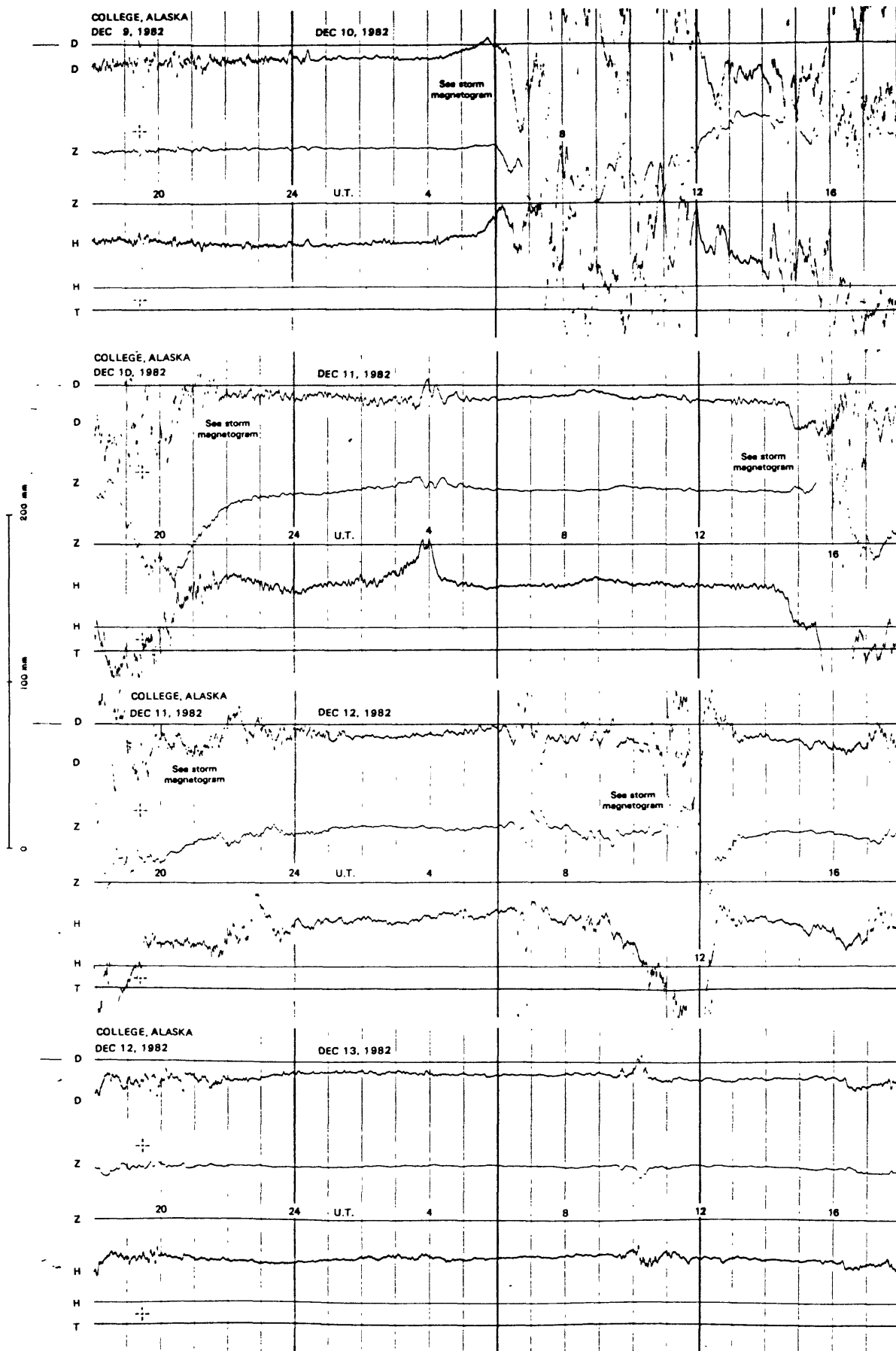
# NORMAL MAGNETOGRAMS



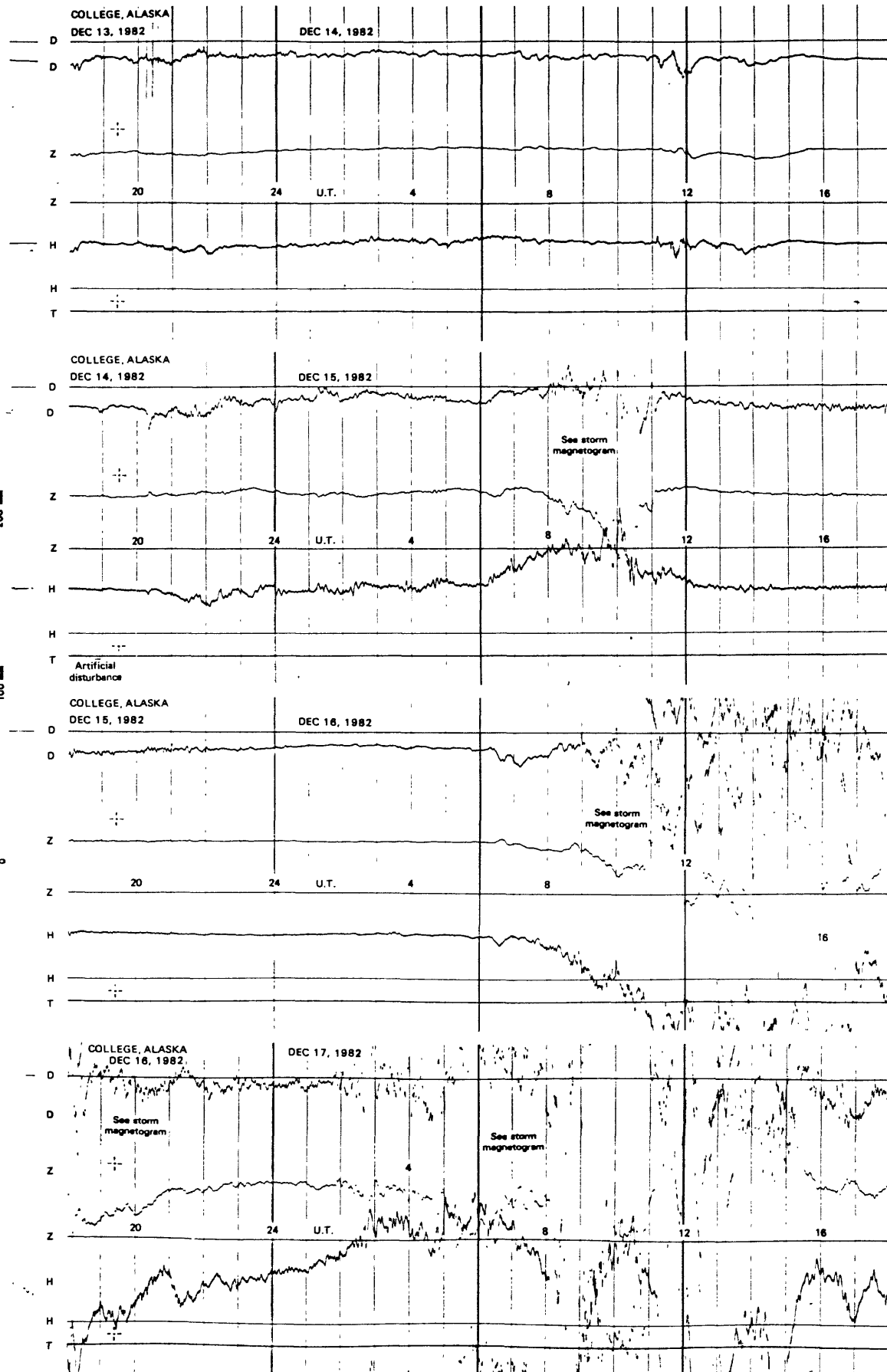
# NORMAL MAGNETOGRAMS



# NORMAL MAGNETOGRAMS



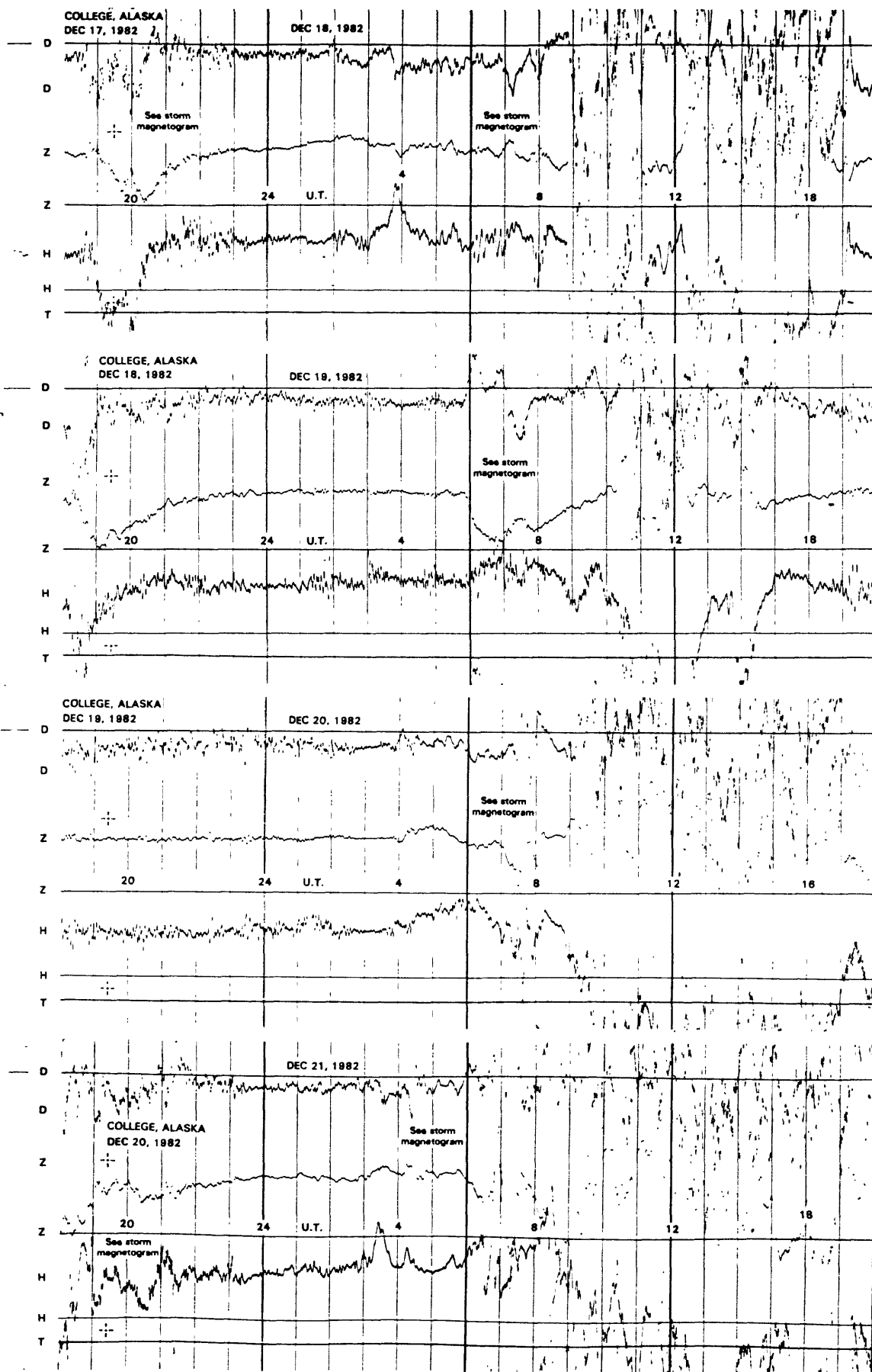
# NORMAL MAGNETOGRAMS





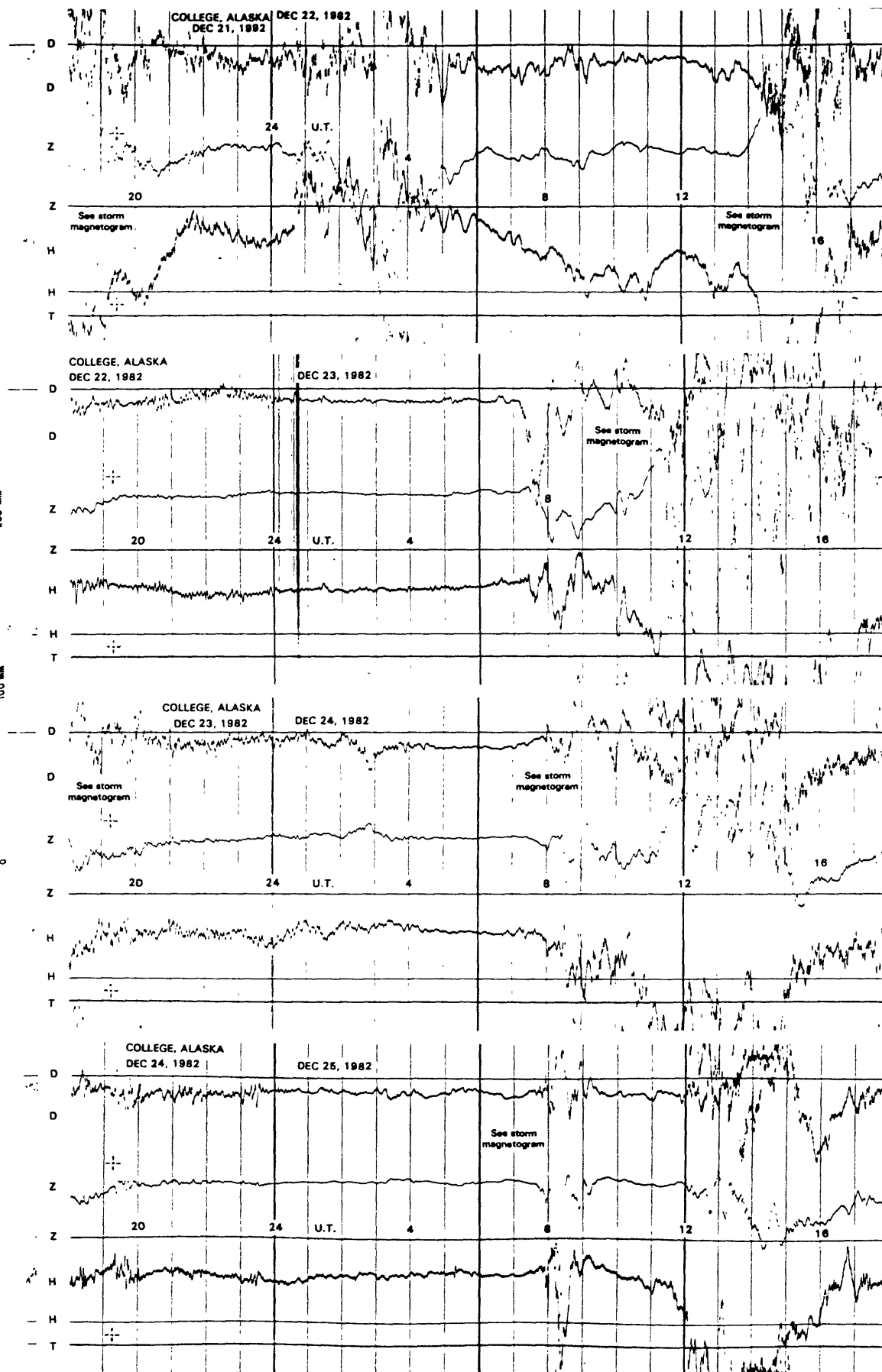
# NORMAL MAGNETOGRAMS

200 mm  
100 mm  
0

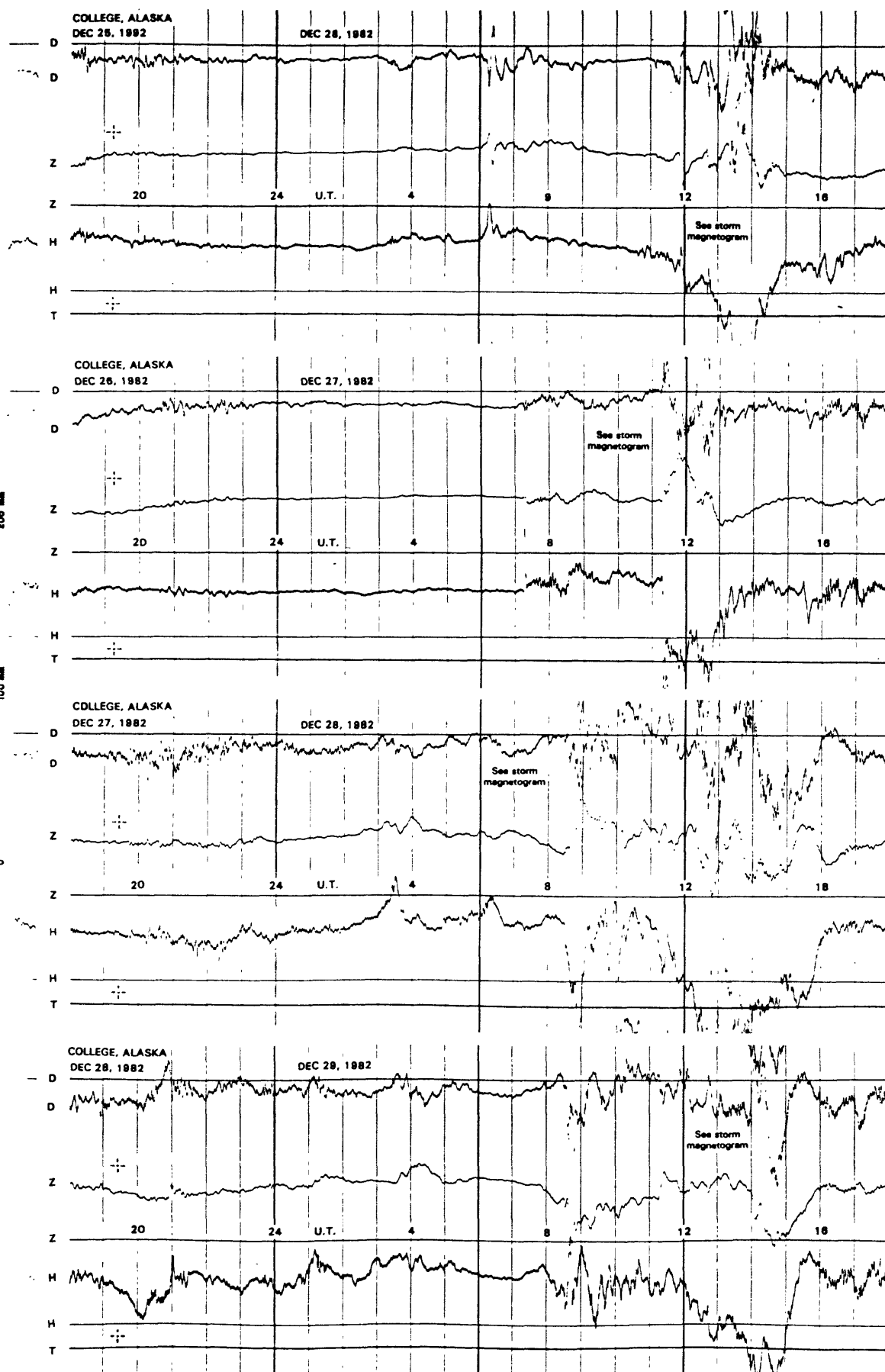


# NORMAL MAGNETOGRAMS

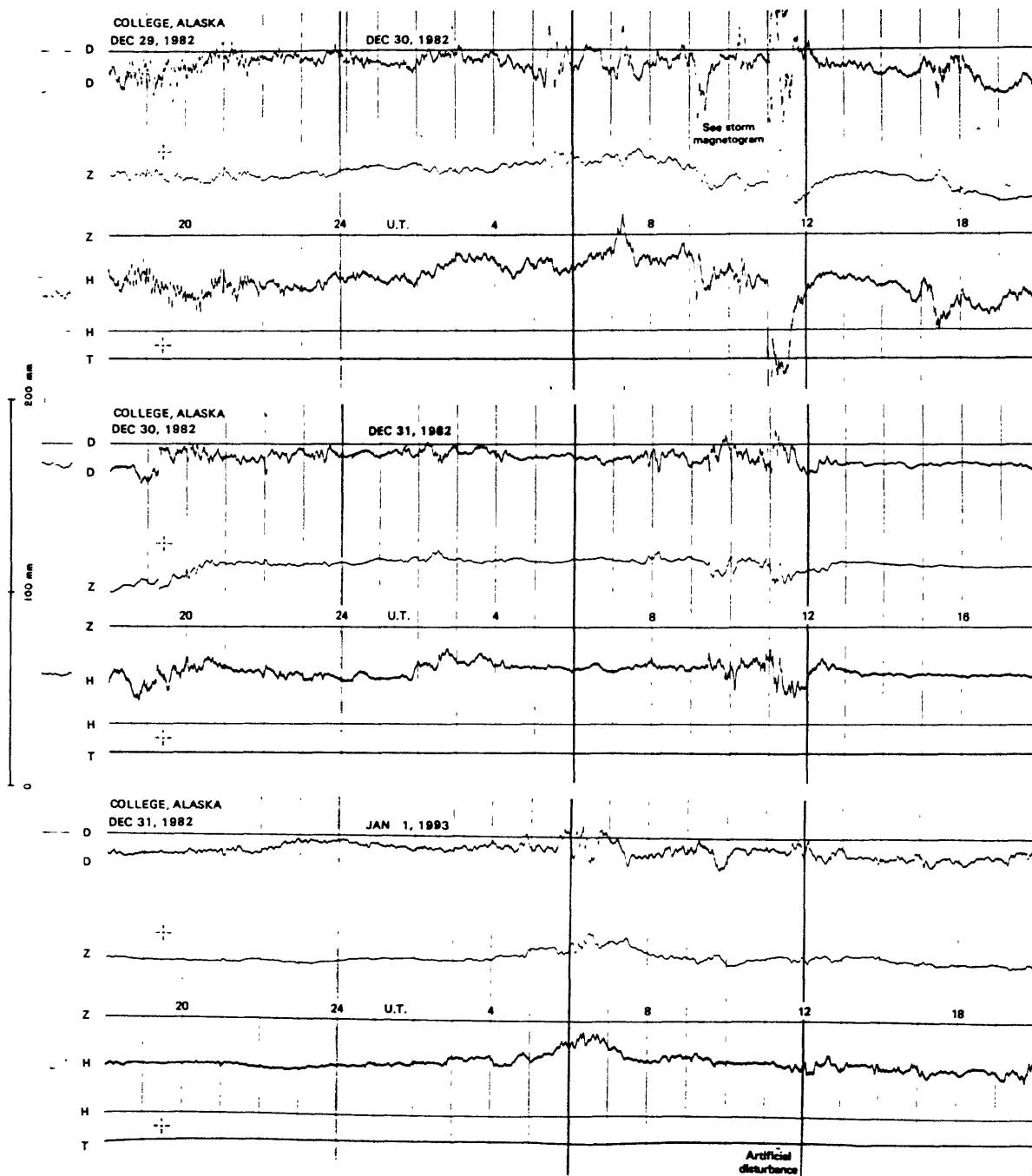
200 mm  
100 mm  
0



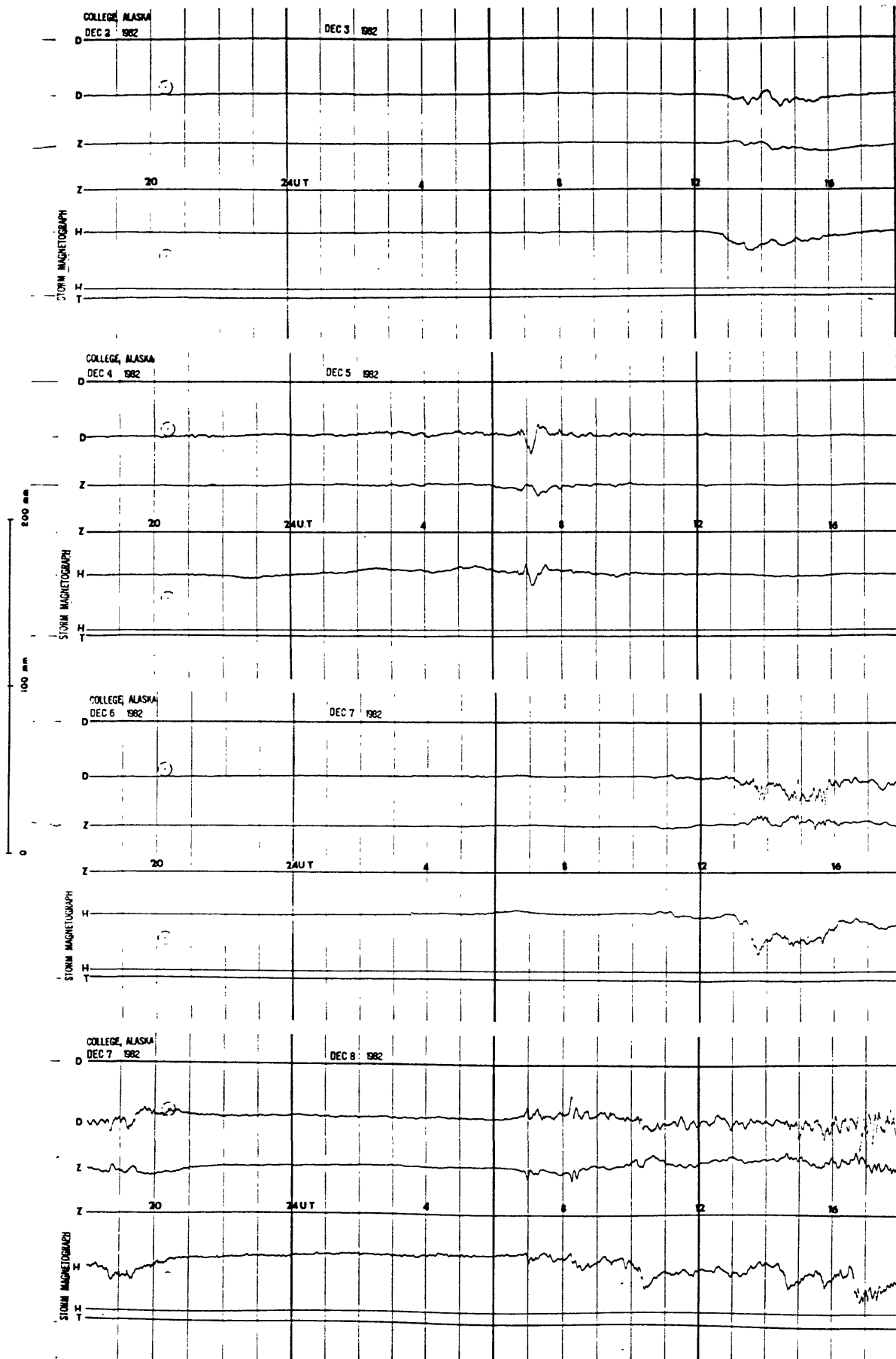
0 100 200 meters



NORMAL MAGNETOGRAMS



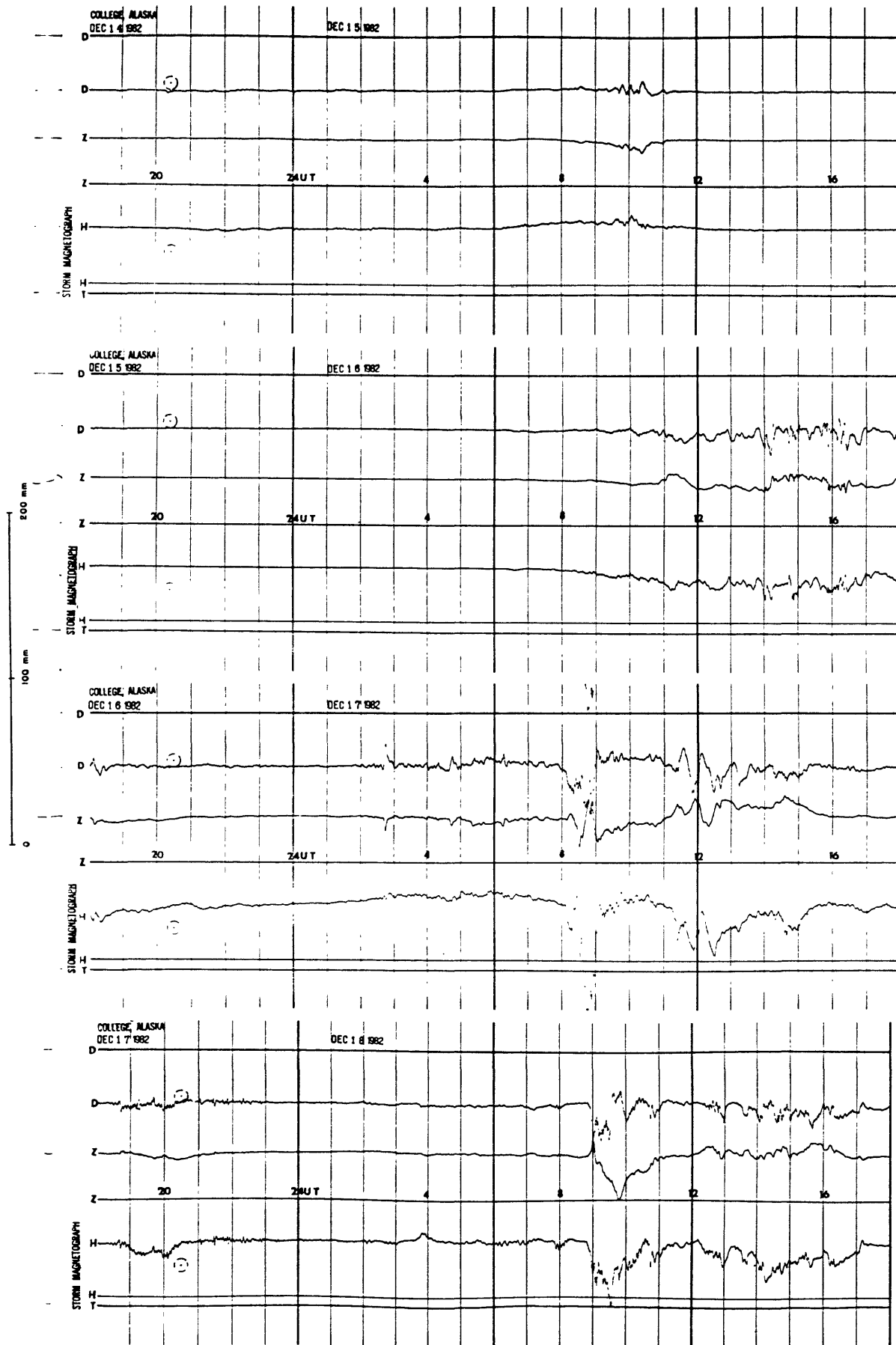
STORM MAGNETOGRAMS



# STORM MAGNETOGRAMS

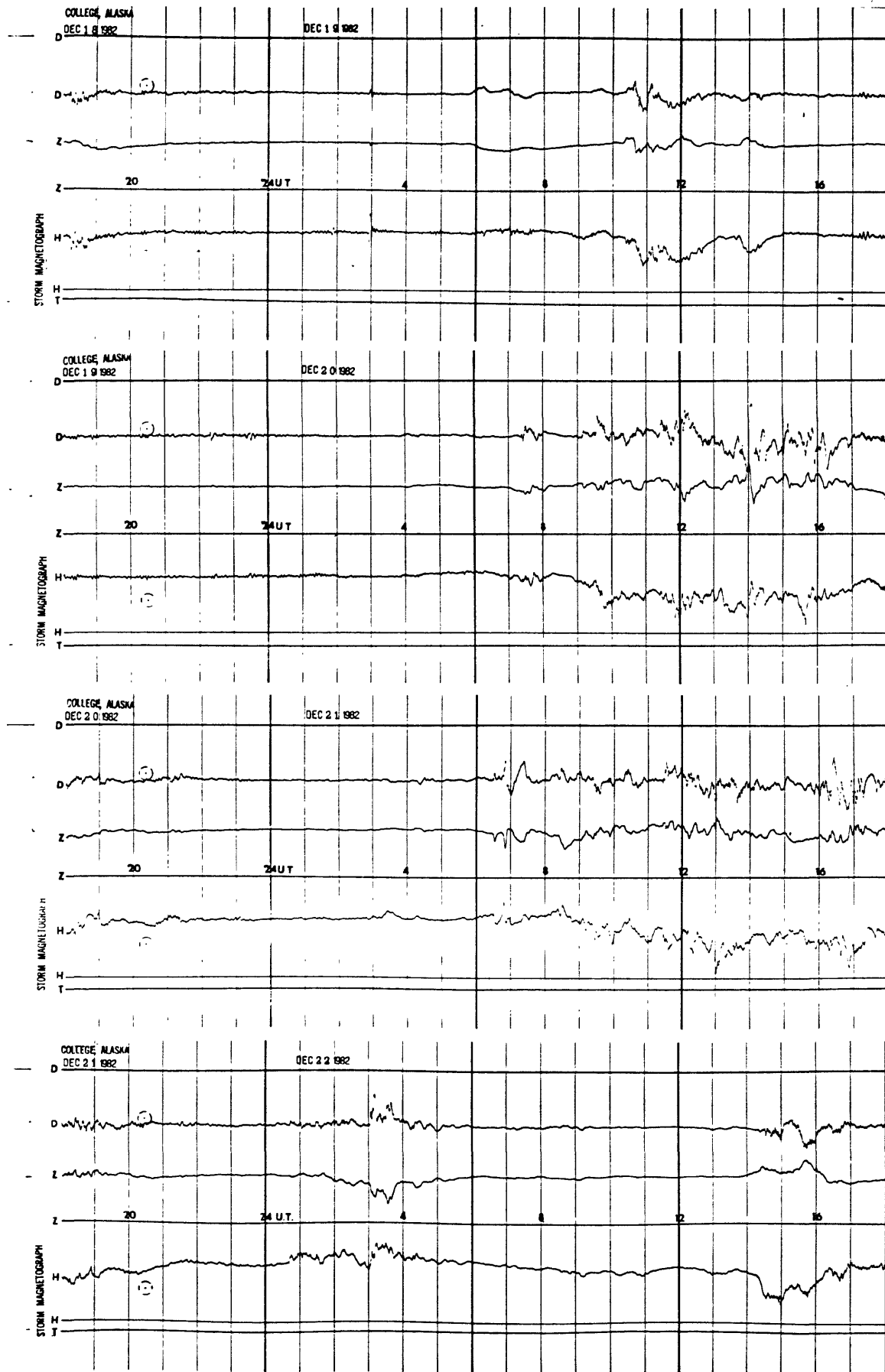
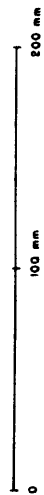


# STORM MAGNETOGRAMS

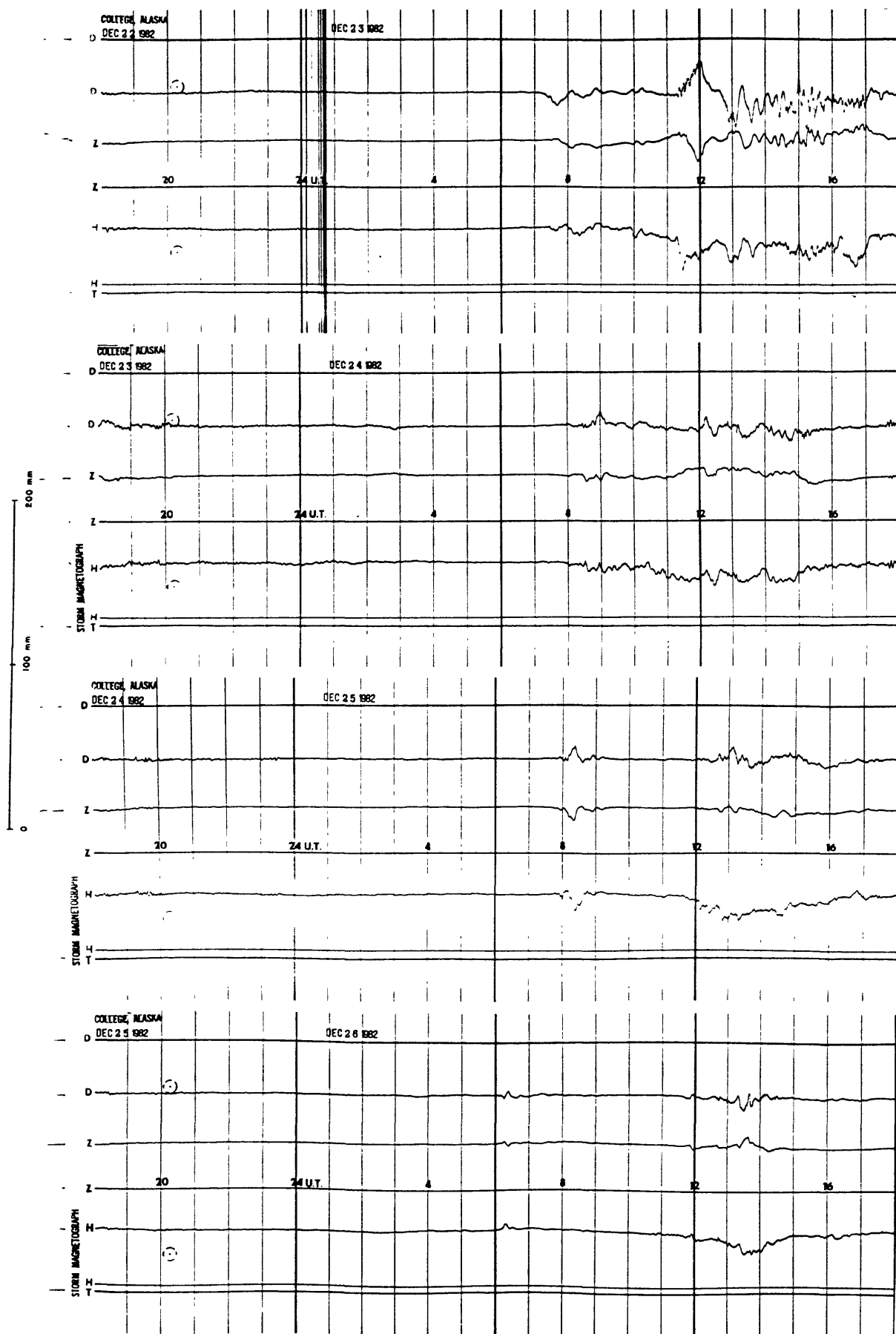




# STORM MAGNETOGRAMS



# STORM MAGNETOGRAMS



STORM MAGNETOGRAMS

