

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

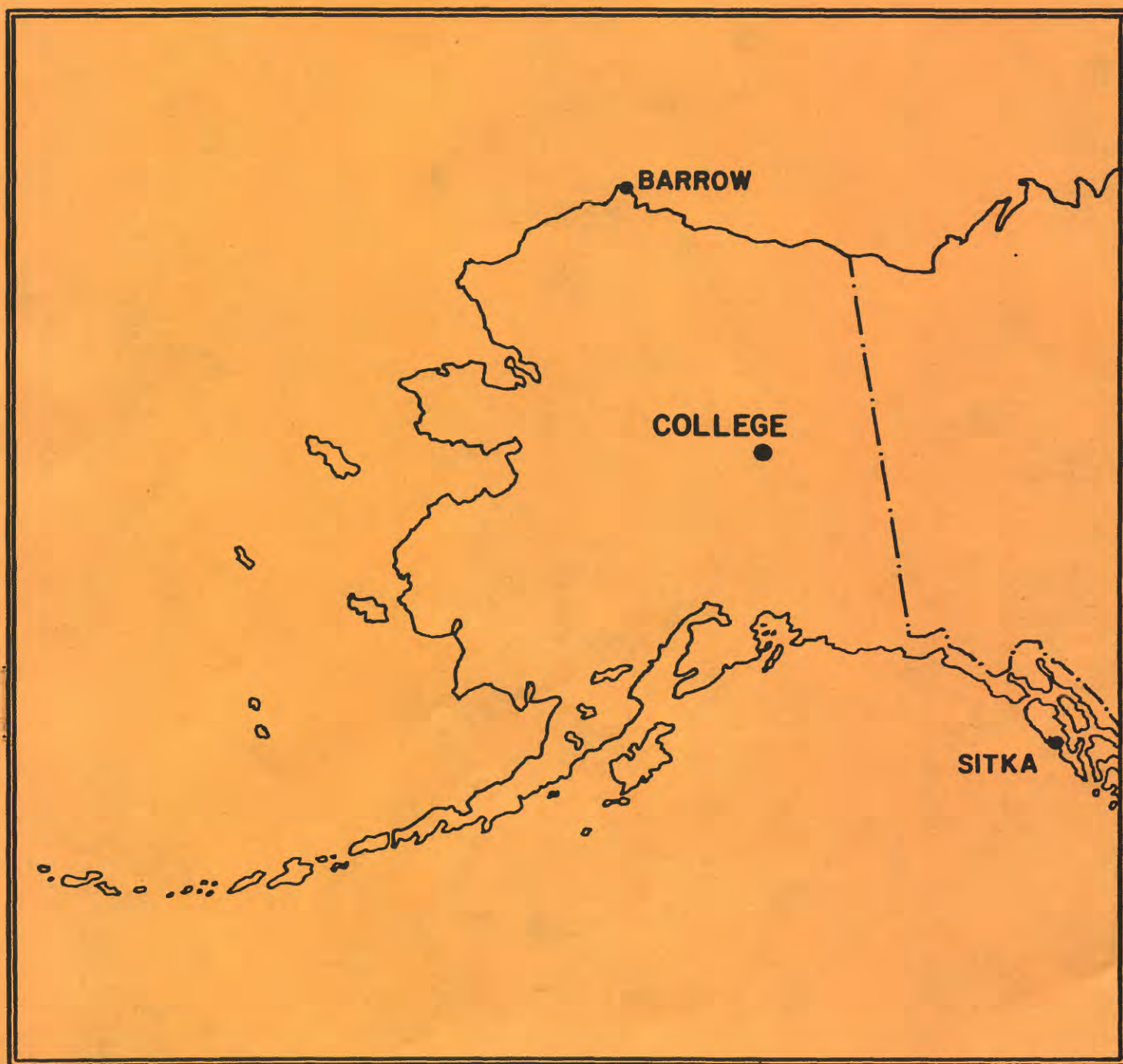
PRELIMINARY GEOMAGNETIC DATA

COLLEGE OBSERVATORY

FAIRBANKS, ALASKA

JUNE 1989

OPEN FILE REPORT 89-0300F



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 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:

| <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 (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.

College, Alaska

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

MONTH AND YEAR

June 1989

| DATE | K-INDICES | | | | | | | | | A _k | TIME SCALE ON MAGNETOGRAMS | | |
|------|-----------|-------|-------|-------|-------|-------|-------|-------|-----|----------------|--|-------|----|
| | 00-03 | 03-06 | 06-09 | 09-12 | 12-15 | 15-18 | 18-21 | 21-24 | SUM | | 20 mm/hr | | |
| 1 | 3 | 4 | 2 | 2 | 3 | 2 | 2 | 2 | 20 | 12 | SUDDEN COMMENCEMENTS | | |
| 2 | 3 | 3 | 5 | 5 | 5 | 4 | 2 | 3 | 30 | 28 | d | h | m |
| 3 | 4 | 4 | 2 | 1 | 2 | 6 | 3 | 2 | 24 | 22 | | | |
| 4 | 3 | 5 | 2 | 0 | 1 | 2 | 1 | 1 | 15 | 11 | | | |
| 5 | 2 | 1 | 1 | 2 | 1 | 3 | 2 | 2 | 14 | 07 | | | |
| 6 | 3 | 4 | 2 | 3 | 2 | 1 | 1 | 3 | 19 | 12 | 06 | 23 | 14 |
| 7 | 5 | 4 | 5 | 6 | 4 | 0 | 3 | 3 | 30 | 33 | | | |
| 8 | 4 | 3 | 3 | 1 | 2 | 0 | 4 | 4 | 21 | 15 | 08 | 19 | 52 |
| 9 | 5 | 4 | 3 | 2 | 4 | 3 | 3 | 5 | 29 | 25 | | | |
| 10 | 5 | 5 | 5 | 6 | 6 | 6 | 5 | 4 | 42 | 57 | | | |
| 11 | 4 | 4 | 6 | 4 | 3 | 3 | 3 | 3 | 30 | 28 | | | |
| 12 | 3 | 4 | 4 | 4 | 3 | 4 | 2 | 2 | 26 | 19 | | | |
| 13 | 2 | 2 | 2 | 4 | 4 | 5 | 3 | 2 | 24 | 18 | 13 | 17 | 41 |
| 14 | 4 | 4 | 6 | 5 | 6 | 5 | 5 | 4 | 39 | 48 | | | |
| 15 | 5 | 5 | 5 | 6 | 5 | 6 | 6 | 3 | 41 | 56 | | | |
| 16 | 3 | 2 | 5 | 3 | 2 | 3 | 1 | 0 | 19 | 14 | | | |
| 17 | 1 | 0 | 0 | 1 | 2 | 3 | 1 | 2 | 10 | 05 | POSSIBLE SOLAR-FLARE EFFECTS BASED ON INSPECTION OF GRAMS ALONE (WITHOUT REFERENCE TO DATA FROM OTHER SOURCES) | | |
| 18 | 2 | 2 | 0 | 3 | 2 | 1 | 2 | 0 | 12 | 06 | | | |
| 19 | 1 | 3 | 3 | 4 | 3 | 1 | 2 | 3 | 20 | 13 | | | |
| 20 | 3 | 2 | 3 | 6 | 4 | 5 | 5 | 3 | 31 | 32 | | | |
| 21 | 2 | 1 | 2 | 1 | 2 | 2 | 0 | 2 | 12 | 05 | | | |
| 22 | 2 | 1 | 2 | 0 | 2 | 1 | 2 | 2 | 12 | 05 | | | |
| 23 | 1 | 1 | 2 | 1 | 2 | 3 | 2 | 1 | 13 | 06 | | | |
| 24 | 2 | 1 | 4 | 4 | 4 | 1 | 1 | 1 | 18 | 13 | BEGIN | END | |
| 25 | 3 | 3 | 2 | 3 | 4 | 1 | 1 | 1 | 18 | 11 | d h m | d h m | |
| 26 | 2 | 2 | 3 | 4 | 4 | 3 | 2 | 2 | 22 | 14 | | | |
| 27 | 2 | 2 | 1 | 3 | 2 | 1 | 2 | 2 | 15 | 07 | | | |
| 28 | 2 | 2 | 2 | 2 | 1 | 3 | 1 | 2 | 15 | 07 | | | |
| 29 | 4 | 4 | 4 | 5 | 5 | 5 | 3 | 2 | 32 | 31 | | | |
| 30 | 4 | 5 | 4 | 3 | 2 | 1 | 1 | 1 | 21 | 17 | | | |
| 31 | | | | | | | | | | | | | |

| | | | | |
|---|-------|-------|---|------------------------------------|
| K SCALE USED: LOWER LIMIT FOR K = 9..... CURRENT SCALE VALUE..... LOWER LIMIT FOR K = 9..... | D | H | Z | (mm) (γ/mm) (to nearest 10γ) |
| | 675.7 | 322.2 | | |
| | 3.69 | 7.77 | | |
| | 2490 | 2500 | | |

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:

JUNE 19 89

| Obs. 2 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 | 6 | 2314 | SC | +24 | +31 | +28 | 7 | 4 | 6 | 134 | 1280 | 690 | 07 13 |
| | | 8 | 1952 | SC | -21 | +113 | -21 | 9 | 1 | 5 | 127 | 785 | 665 | 09 07 |
| | | 9 | 22XX | .. | | | | 10 | 4, 5, 6 | 6 | 183 | 1250 | 1180 | 11 10 |
| | | 13 | 1741 | SC | +9 | +171 | +5 | 14 | 3, 5 | 6 | 142 | 1390 | 800 | 15 20 |

NORMAL MAGNETOGRAPH

| COMPONENT | PERIOD | | CALIBRATION | | |
|-----------|--------------------|--------------------|-------------|----------|-------------|
| | FROM | TO | SCALE VALUE | | BASELINE |
| D | 0001 U.T., 6/1/89 | 2400 U.T., 6/30/89 | 1.0' /mm | 3.7 γ/mm | 26° 51.1' E |
| | | | | | |
| | | | | | |
| H | (SAME) | 2400 U.T., 6/15/89 | 7.8 γ/mm | | 12631 γ |
| | 0001 U.T., 6/16/89 | 2400 U.T., 6/28/89 | (SAME) | | 12635 γ |
| | 0001 U.T., 6/29/89 | 2400 U.T., 6/30/89 | (SAME) | | 12639 γ |
| Z | (SAME) | (SAME) | 7.7 γ/mm | | 55194 γ |
| | (SAME) | (SAME) | (SAME) | | 55199 γ |
| | (SAME) | (SAME) | (SAME) | | 55196 γ |

STORM MAGNETOGRAPH

| COMPONENT | PERIOD | | CALIBRATION | | |
|-----------|-------------------|--------------------|-------------|-----------|----------|
| | FROM | TO | SCALE VALUE | | BASELINE |
| D | 0001 U.T., 6/1/89 | 2400 U.T., 6/30/89 | 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 |
|-------------|---------|---------|
| 27° 02.2' E | 12792 γ | 55348 γ |

* COMPUTED FROM FIVE QUIETEST DAYS DURING MONTH.

DAYS USED: JUNE 17, 18, 21, 22, 23

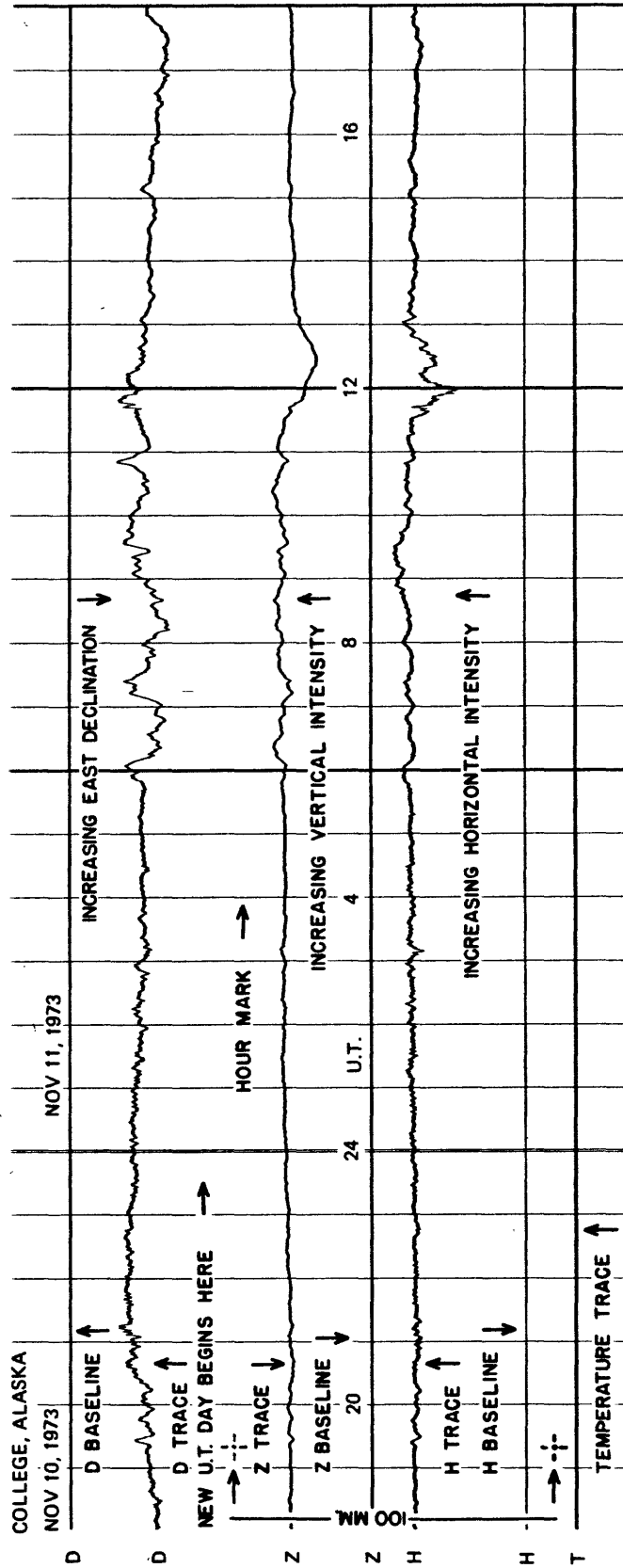
MAGNETOGRAM HOURLY SCALINGS - FIVE QUIETEST DAYS
(UNIVERSAL TIME)

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 | Z | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | D | | | | | | H | | | | | | Z | | | | | | Z | | | | | | | |
| | DAY | 17 | 18 | 19 | 20 | 21 | DAY | 17 | 18 | 19 | 20 | 21 | DAY | 17 | 18 | 19 | 20 | 21 | DAY | 17 | 18 | 19 | 20 | 21 | | |
| 01 | 55 | 21 | 22 | 23 | 24 | 25 | 169 | 182 | 188 | 199 | 210 | 210 | 209 | 210 | 211 | 211 | 210 | 209 | 210 | 211 | 211 | 210 | 209 | 210 | 211 | 211 |
| 02 | 79 | 13 | 16 | 2 | 6 | 20 | 180 | 210 | 188 | 199 | 177 | 210 | 209 | 210 | 211 | 211 | 210 | 209 | 210 | 211 | 211 | 210 | 209 | 210 | 211 | 211 |
| 03 | 72 | 7 | 20 | 45 | 30 | 51 | 191 | 180 | 177 | 199 | 199 | 227 | 207 | 213 | 203 | 203 | 227 | 207 | 213 | 203 | 203 | 227 | 207 | 213 | 203 | 203 |
| 04 | 81 | 33 | 30 | 50 | 69 | 90 | 193 | 196 | 190 | 199 | 199 | 254 | 210 | 211 | 200 | 200 | 254 | 210 | 211 | 200 | 200 | 254 | 210 | 211 | 200 | 200 |
| 05 | 81 | 65 | 80 | 101 | 80 | 110 | 189 | 218 | 191 | 210 | 210 | 259 | 211 | 217 | 211 | 211 | 259 | 211 | 217 | 211 | 211 | 259 | 211 | 217 | 211 | 211 |
| 06 | 84 | 92 | 80 | 101 | 80 | 110 | 181 | 200 | 190 | 220 | 220 | 259 | 209 | 221 | 211 | 211 | 259 | 209 | 221 | 211 | 211 | 259 | 209 | 221 | 211 | 211 |
| 07 | 90 | 91 | 81 | 143 | 79 | 141 | 182 | 210 | 206 | 236 | 236 | 300 | 207 | 214 | 209 | 209 | 300 | 207 | 214 | 209 | 209 | 300 | 207 | 214 | 209 | 209 |
| 08 | 102 | 89 | 79 | 125 | 90 | 127 | 190 | 220 | 207 | 272 | 272 | 310 | 211 | 210 | 205 | 205 | 310 | 211 | 210 | 205 | 205 | 310 | 211 | 210 | 205 | 205 |
| 09 | 98 | 70 | 90 | 96 | 82 | 81 | 201 | 229 | 217 | 258 | 258 | 281 | 208 | 202 | 208 | 208 | 281 | 208 | 202 | 208 | 208 | 281 | 208 | 202 | 208 | 208 |
| 10 | 91 | 74 | 82 | 37 | 88 | 61 | 219 | 252 | 218 | 230 | 230 | 262 | 205 | 204 | 204 | 204 | 262 | 205 | 204 | 204 | 204 | 262 | 205 | 204 | 204 | 204 |
| 11 | 92 | 30 | 88 | 41 | 90 | 62 | 230 | 232 | 229 | 211 | 211 | 240 | 205 | 158 | 202 | 187 | 240 | 205 | 158 | 202 | 187 | 240 | 205 | 158 | 202 | 187 |
| 12 | 80 | 71 | 90 | 59 | 90 | 62 | 240 | 133 | 226 | 210 | 210 | 212 | 210 | 146 | 197 | 185 | 212 | 210 | 146 | 197 | 185 | 212 | 210 | 146 | 197 | 185 |
| 13 | 85 | 99 | 126 | 70 | 83 | 83 | 230 | 211 | 219 | 210 | 210 | 221 | 217 | 152 | 209 | 188 | 221 | 217 | 152 | 209 | 188 | 221 | 217 | 152 | 209 | 188 |
| 14 | 122 | 130 | 133 | 110 | 110 | 110 | 205 | 218 | 218 | 200 | 233 | 233 | 217 | 167 | 200 | 185 | 233 | 217 | 167 | 200 | 185 | 233 | 217 | 167 | 200 | 185 |
| 15 | 171 | 186 | 157 | 125 | 125 | 125 | 187 | 239 | 199 | 241 | 210 | 210 | 200 | 194 | 199 | 178 | 210 | 200 | 194 | 199 | 178 | 210 | 200 | 194 | 199 | 178 |
| 16 | 203 | 230 | 208 | 140 | 139 | 139 | 208 | 239 | 180 | 230 | 141 | 141 | 183 | 206 | 179 | 191 | 141 | 183 | 206 | 179 | 191 | 141 | 183 | 206 | 179 | 191 |
| 17 | 270 | 261 | 219 | 287 | 190 | 190 | 220 | 231 | 220 | 220 | 86 | 86 | 202 | 197 | 176 | 195 | 86 | 202 | 197 | 176 | 195 | 86 | 202 | 197 | 176 | 195 |
| 18 | 271 | 269 | 240 | 339 | 229 | 229 | 168 | 222 | 212 | 210 | 122 | 122 | 200 | 196 | 195 | 197 | 122 | 200 | 196 | 195 | 197 | 122 | 200 | 196 | 195 | 197 |
| 19 | 250 | 255 | 238 | 309 | 243 | 243 | 221 | 219 | 200 | 210 | 247 | 247 | 180 | 190 | 199 | 194 | 247 | 180 | 190 | 199 | 194 | 247 | 180 | 190 | 199 | 194 |
| 20 | 199 | 237 | 210 | 239 | 200 | 200 | 220 | 180 | 176 | 211 | 228 | 228 | 187 | 184 | 189 | 188 | 228 | 187 | 184 | 189 | 188 | 228 | 187 | 184 | 189 | 188 |
| 21 | 157 | 171 | 162 | 149 | 149 | 149 | 180 | 200 | 162 | 196 | 200 | 200 | 199 | 162 | 186 | 186 | 200 | 199 | 162 | 186 | 186 | 200 | 199 | 162 | 186 | 186 |
| 22 | 112 | 117 | 100 | 126 | 90 | 90 | 154 | 181 | 149 | 171 | 170 | 170 | 197 | 168 | 186 | 185 | 170 | 197 | 168 | 186 | 185 | 170 | 197 | 168 | 186 | 185 |
| 23 | 61 | 60 | 70 | 55 | 50 | 50 | 179 | 171 | 150 | 181 | 160 | 160 | 191 | 171 | 179 | 188 | 160 | 191 | 171 | 179 | 188 | 160 | 191 | 171 | 179 | 188 |
| 24 | 41 | 26 | 20 | 22 | 22 | 22 | 146 | 178 | 160 | 158 | 165 | 165 | 188 | 176 | 180 | 192 | 165 | 188 | 176 | 180 | 192 | 165 | 188 | 176 | 180 | 192 |
| DAILY SUM | 2947 | 2697 | 2524 | 2539 | 2748 | 2539 | 4683 | 4951 | 4651 | 5040 | 5209 | 5209 | 4863 | 4560 | 4711 | 4756 | 5209 | 4863 | 4560 | 4711 | 4756 | 5209 | 4863 | 4560 | 4711 | 4756 |
| DAILY MEAN | 123 | 112 | 105 | 106 | 114 | 106 | 195 | 206 | 194 | 210 | 217 | 217 | 203 | 190 | 196 | 198 | 217 | 203 | 190 | 196 | 198 | 217 | 203 | 190 | 196 | 198 |
| MEAN | 112 | | | | | | 204 | | | | | | 197 | | | | | | 197 | | | | | | | |

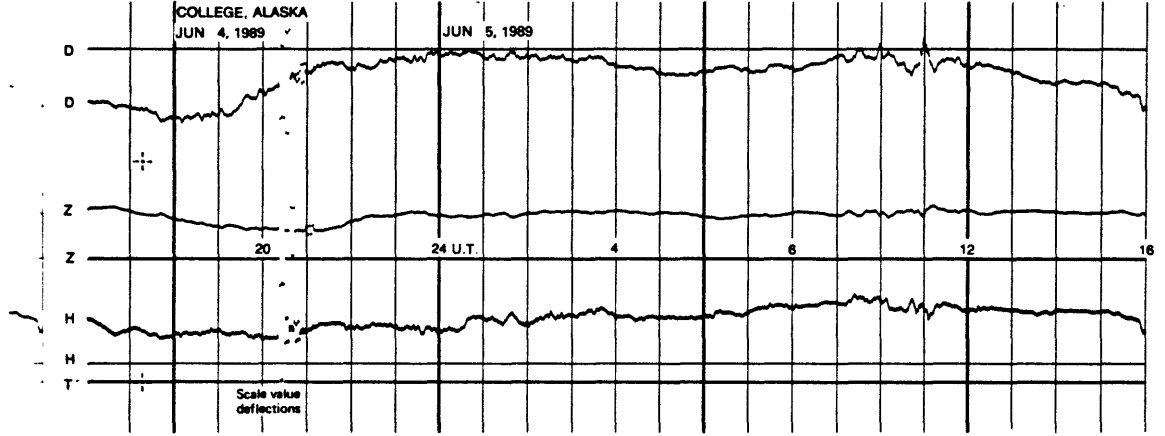
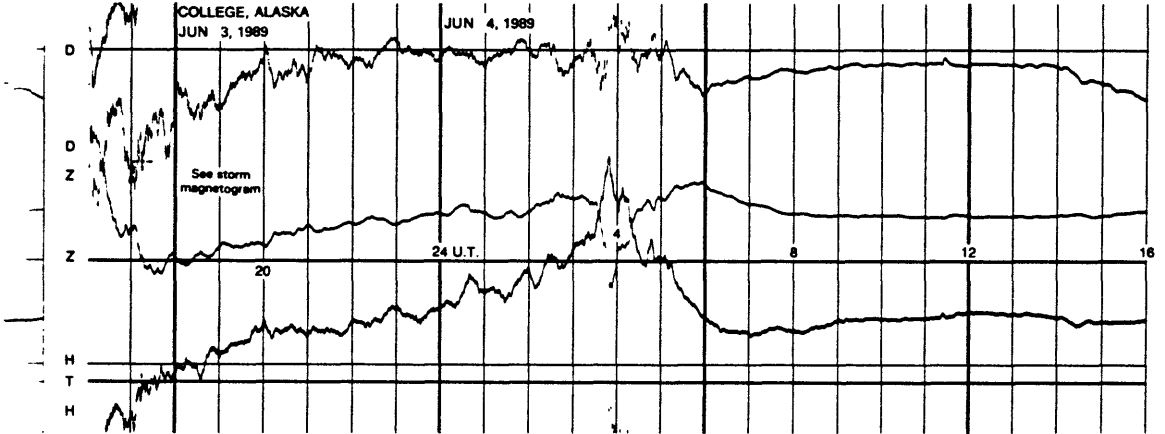
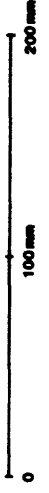
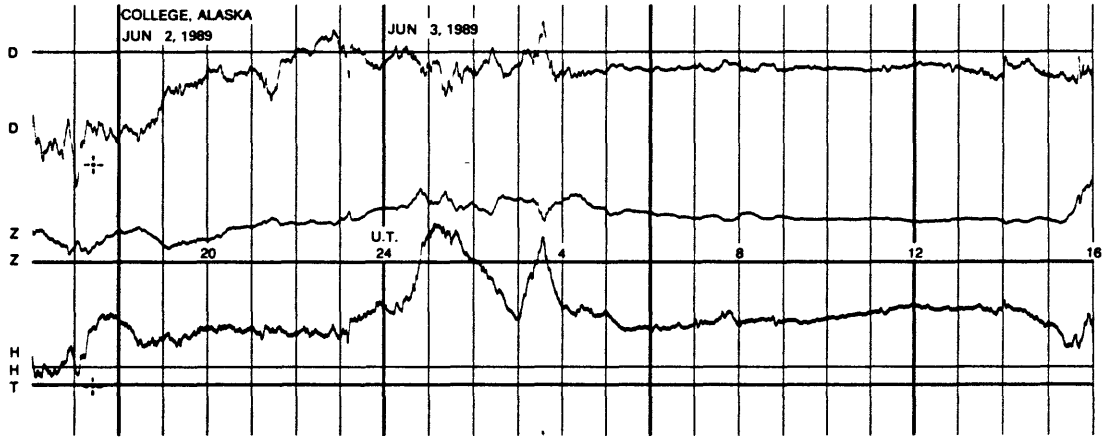
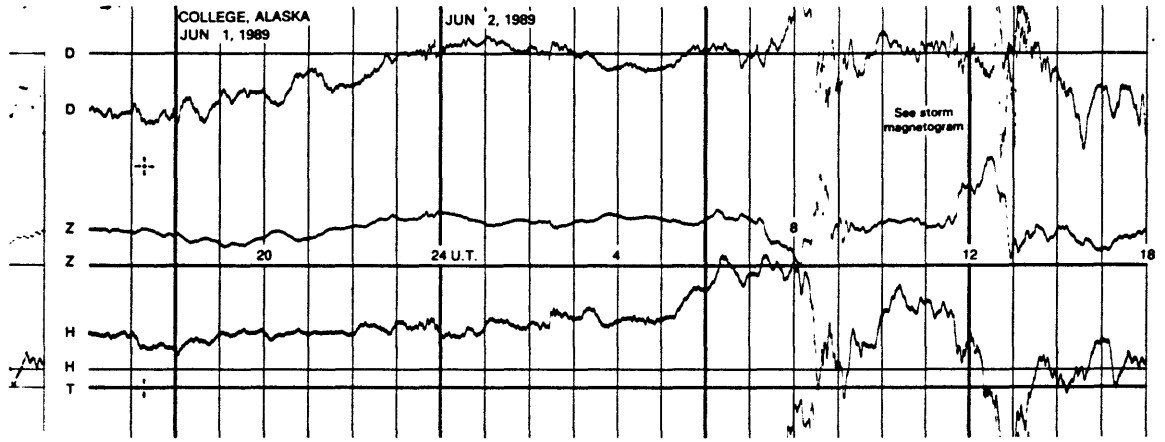
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FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)

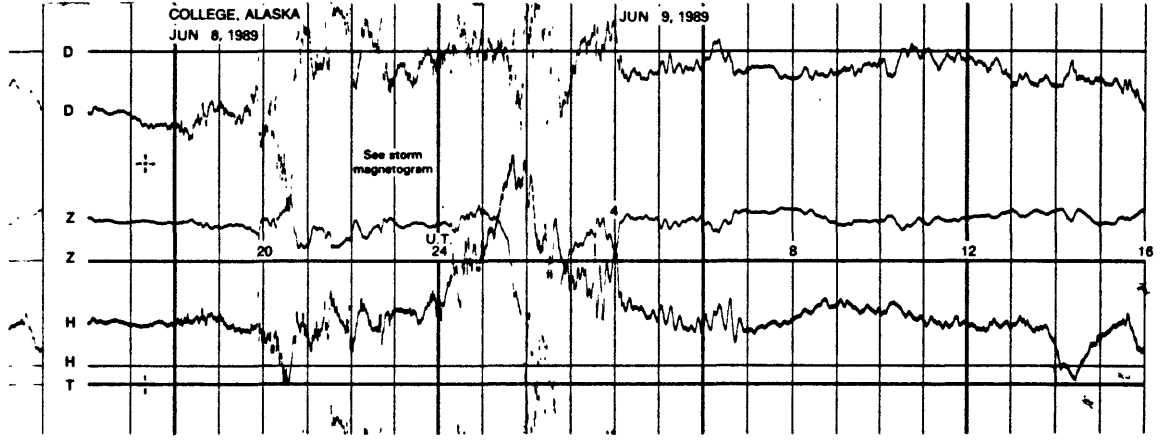
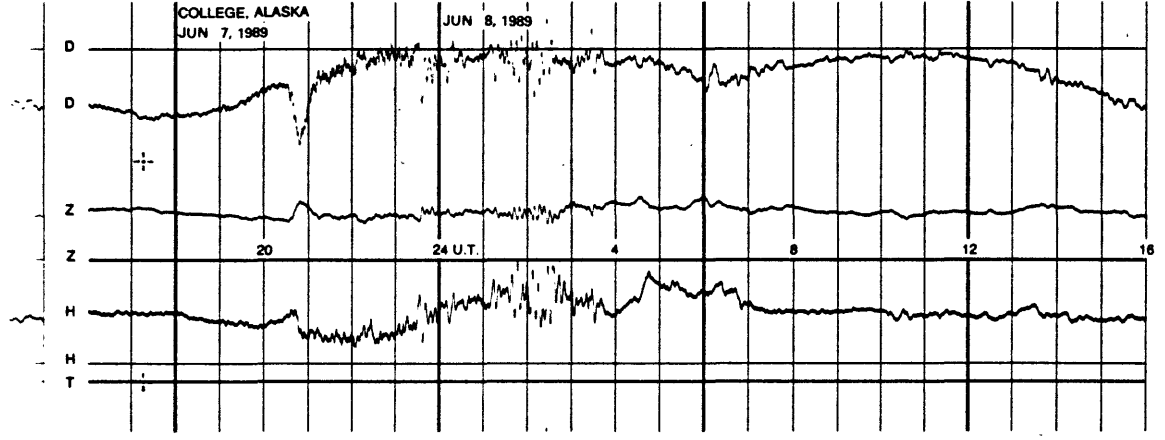
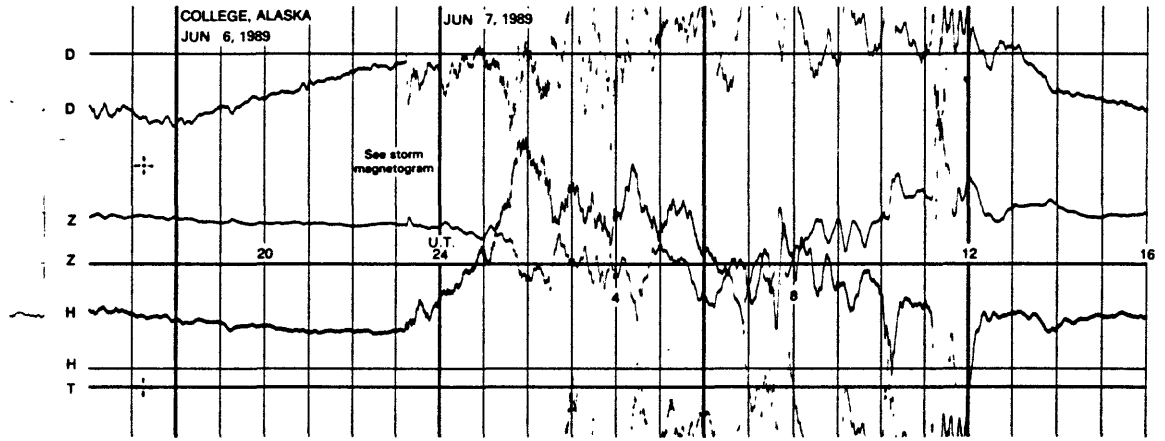
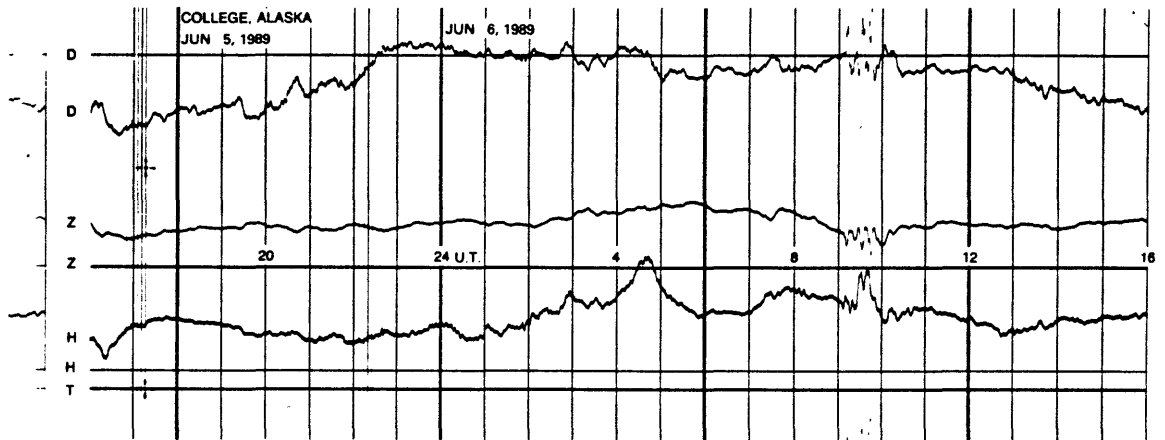


SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES

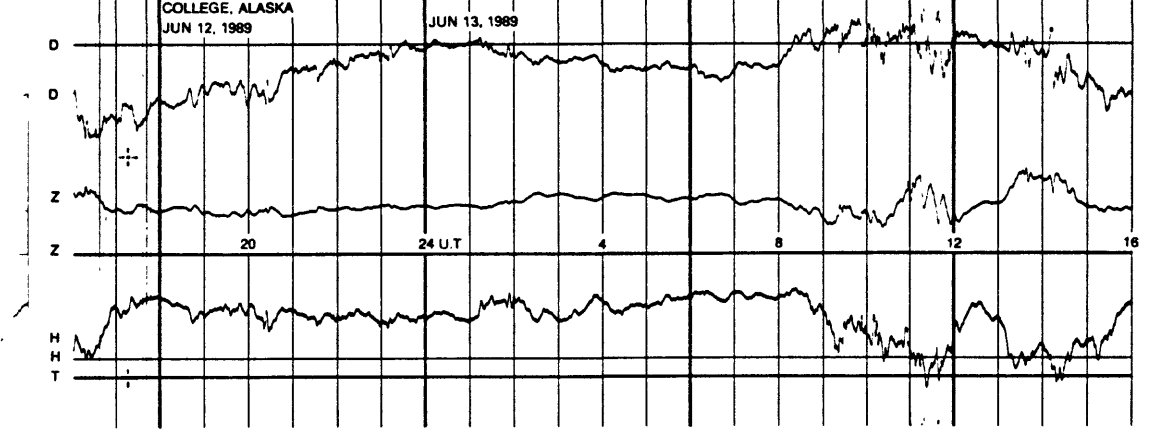
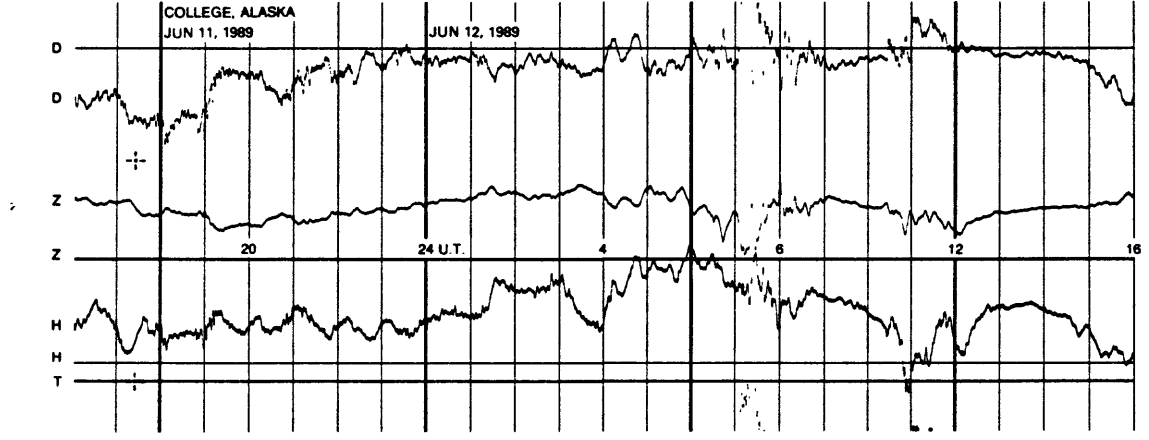
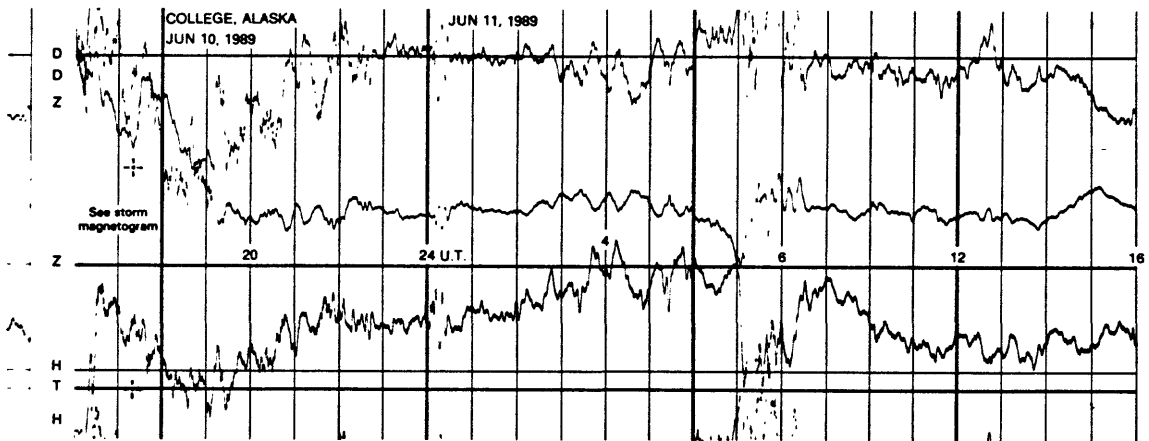
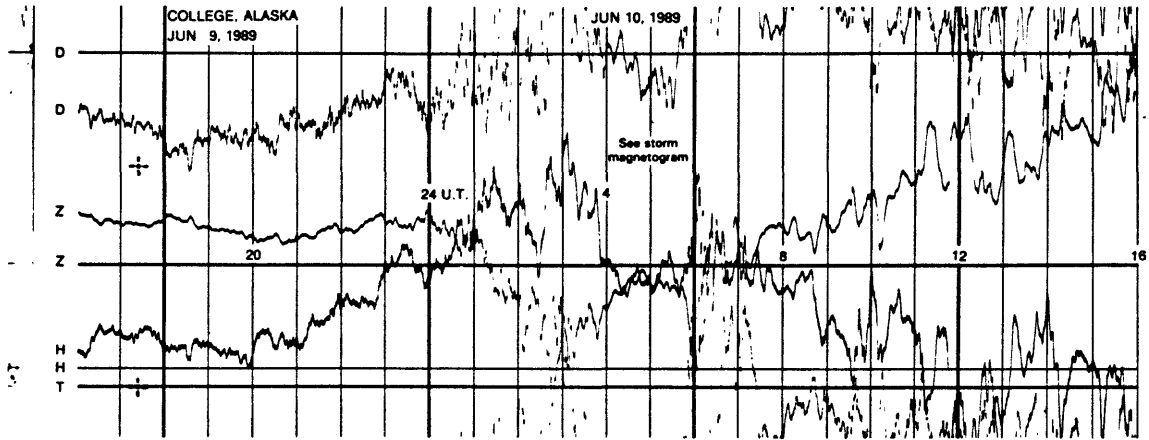
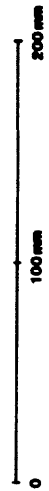
NORMAL MAGNETOGRAMS



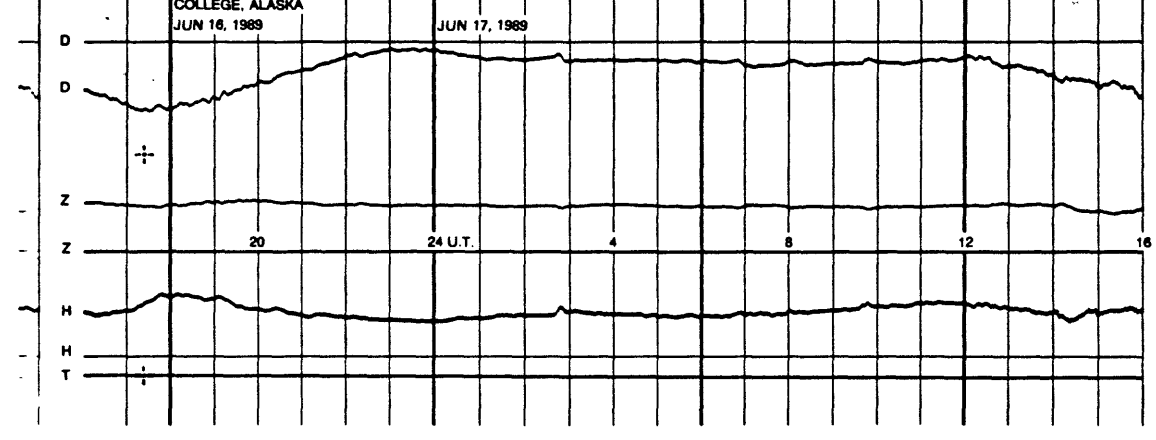
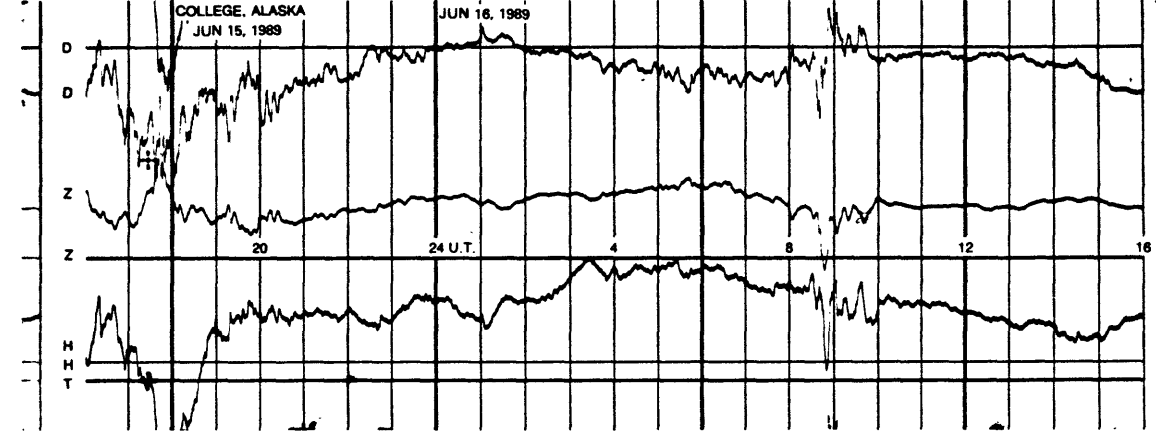
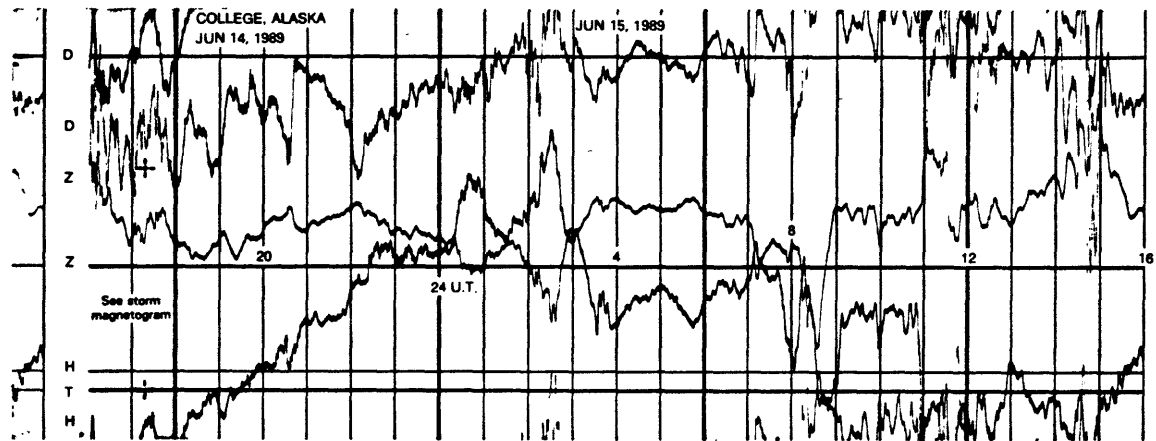
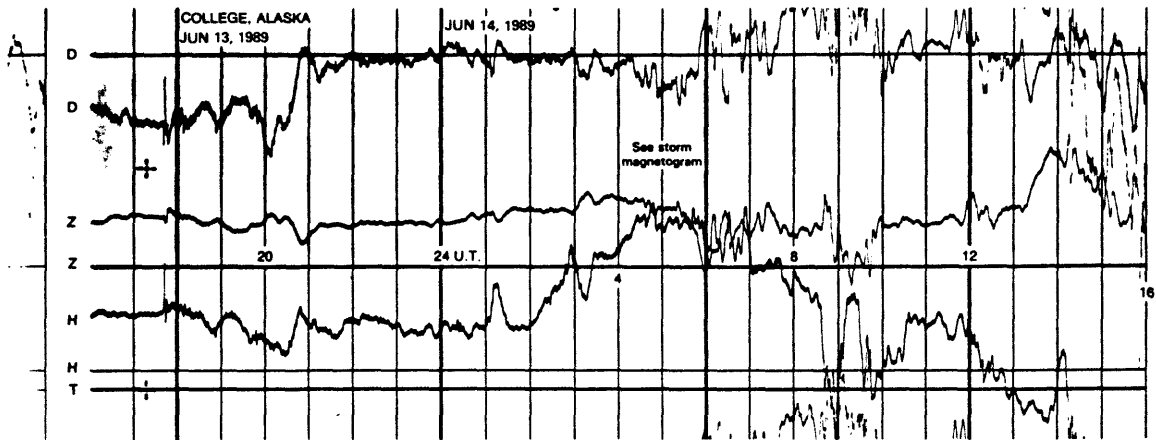
NORMAL MAGNETOGRAMS



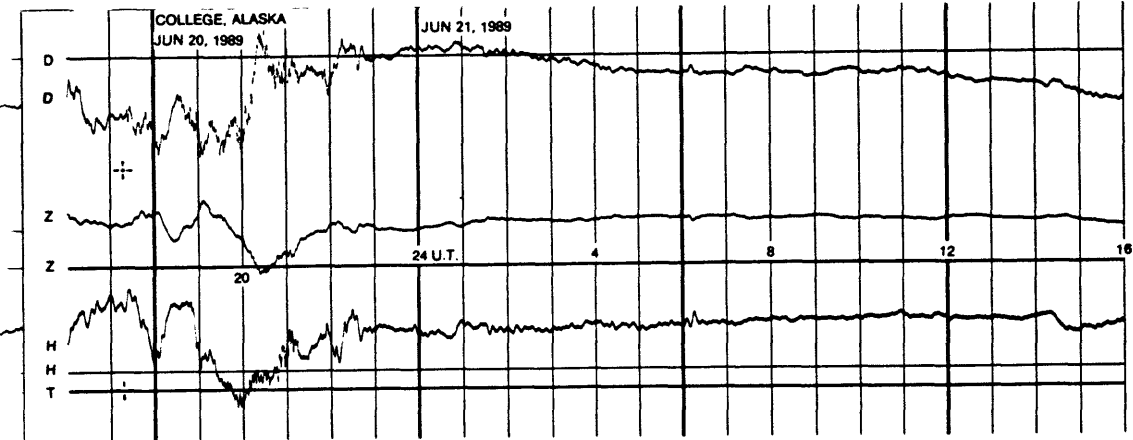
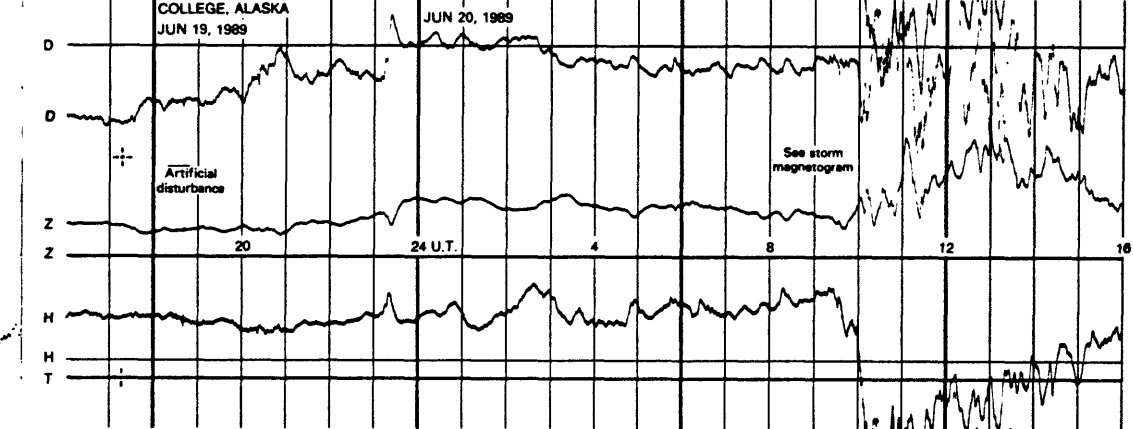
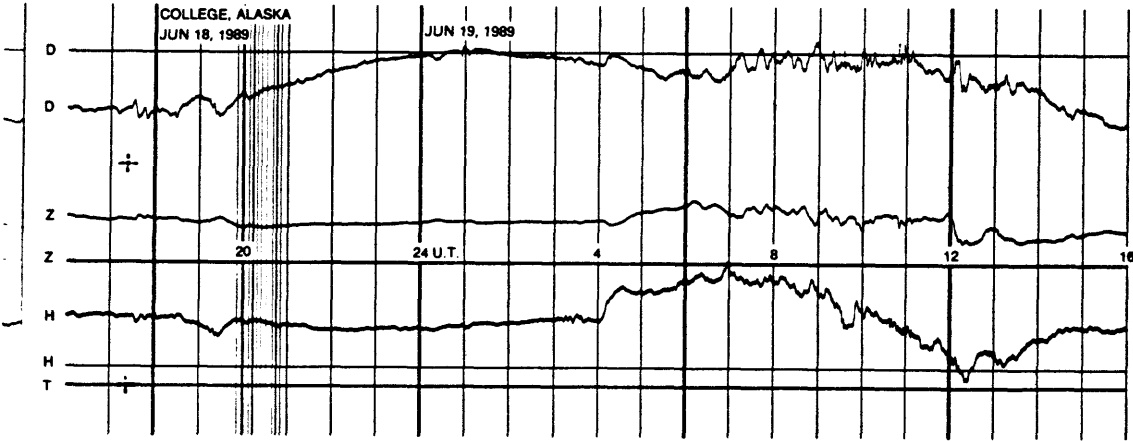
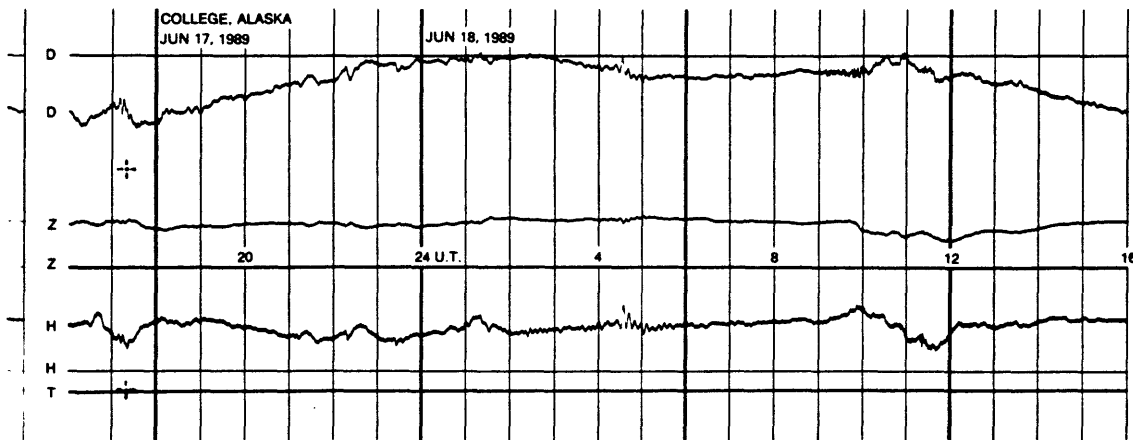
NORMAL MAGNETOGRAMS



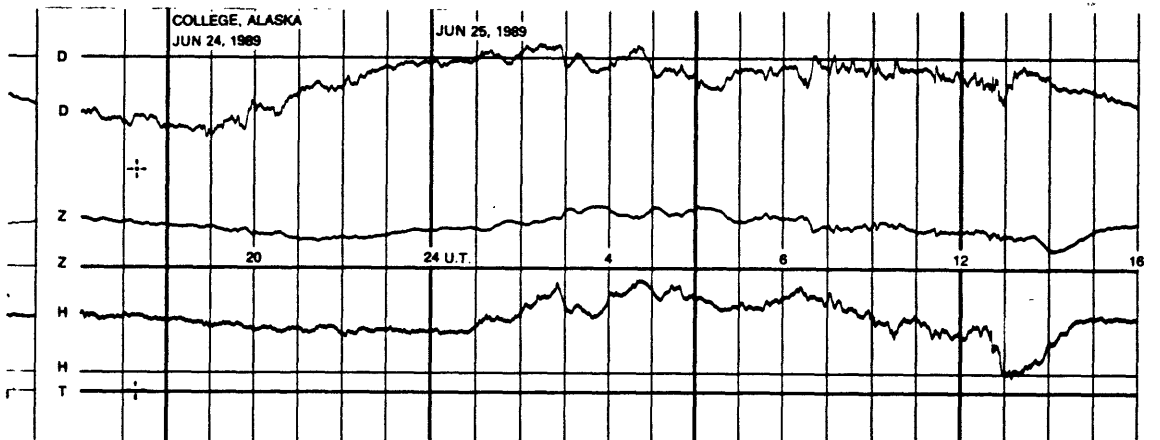
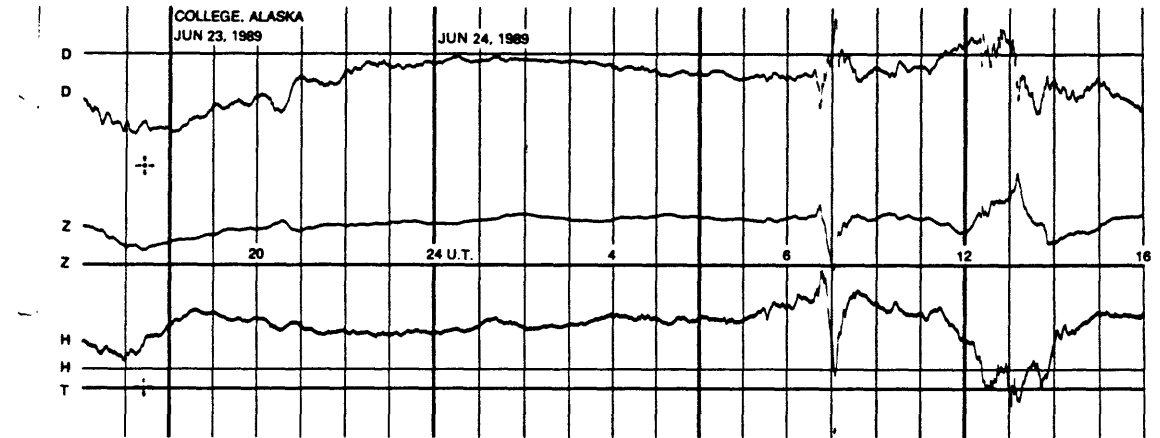
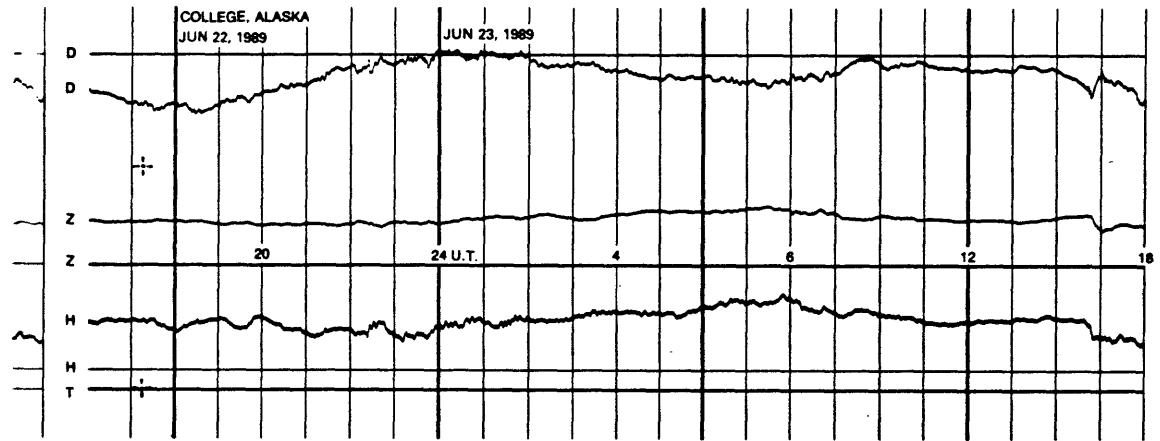
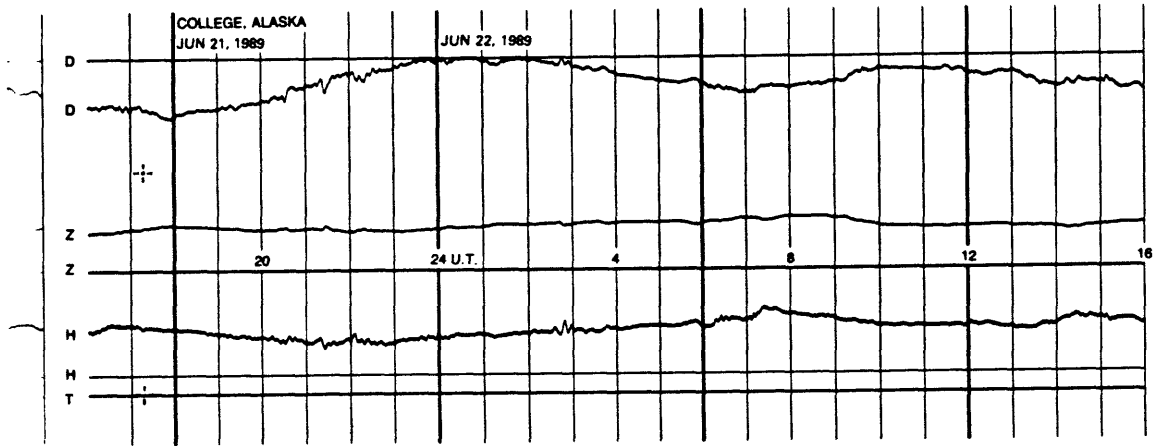
NORMAL MAGNETOGRAMS



NORMAL MAGNETOGRAMS

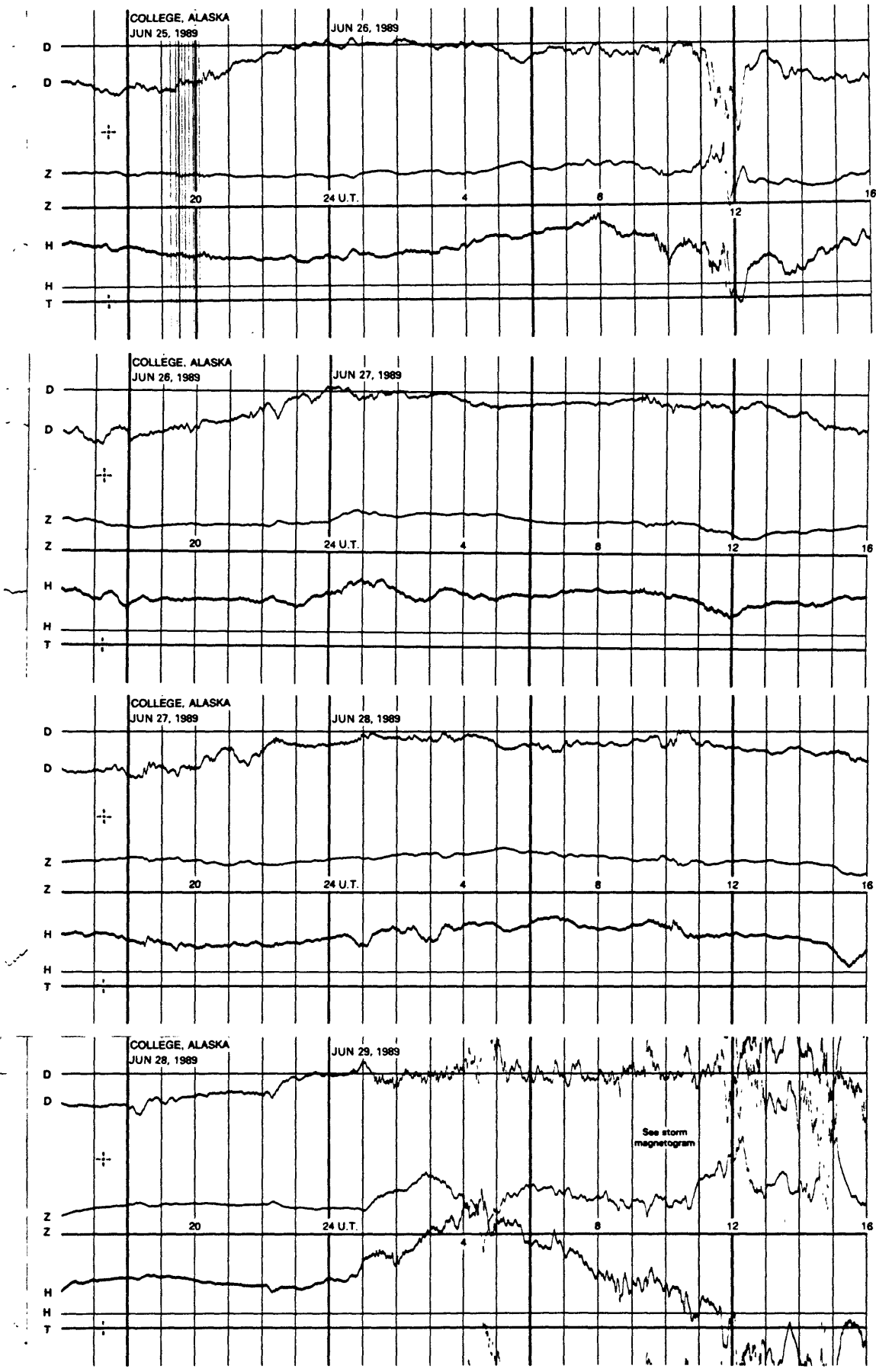


NORMAL MAGNETOGRAMS

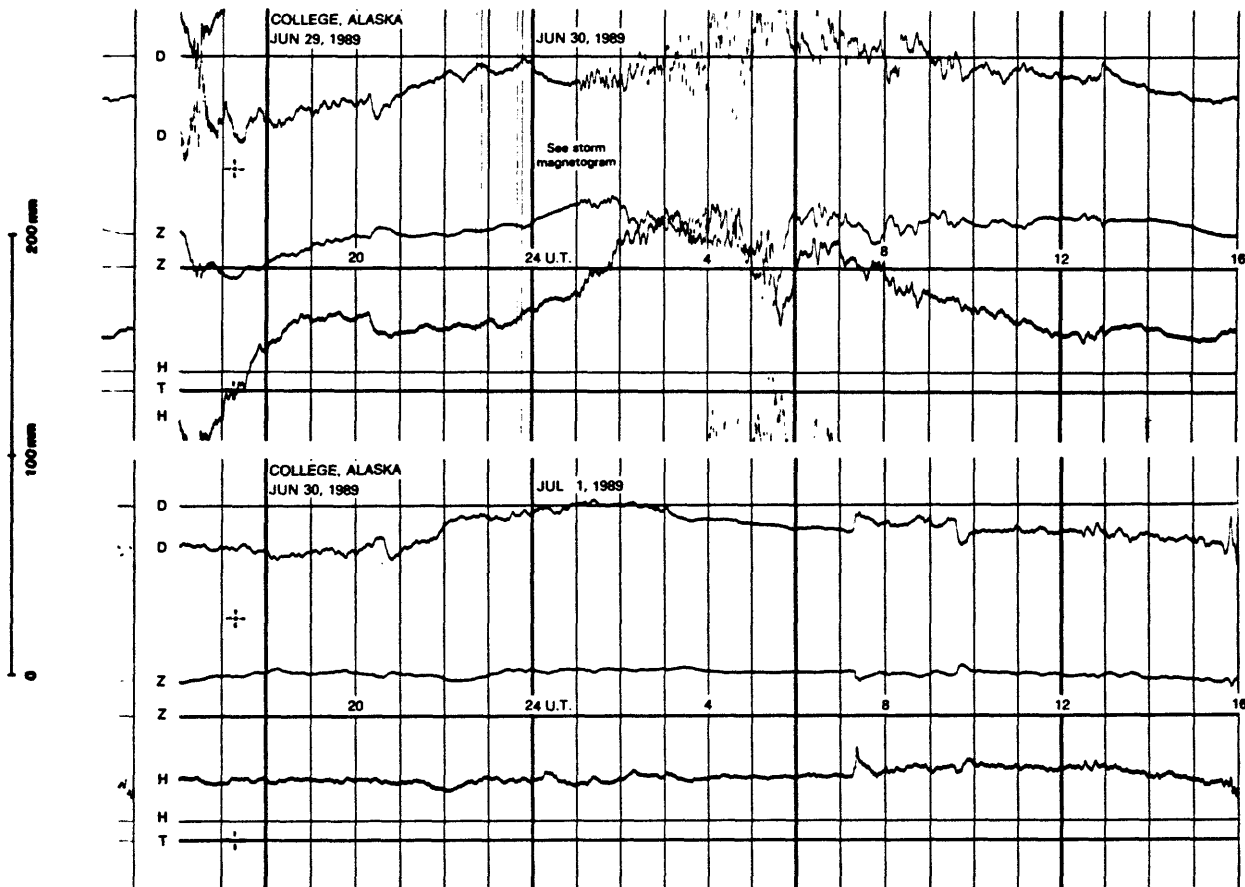


NORMAL MAGNETOGRAMS

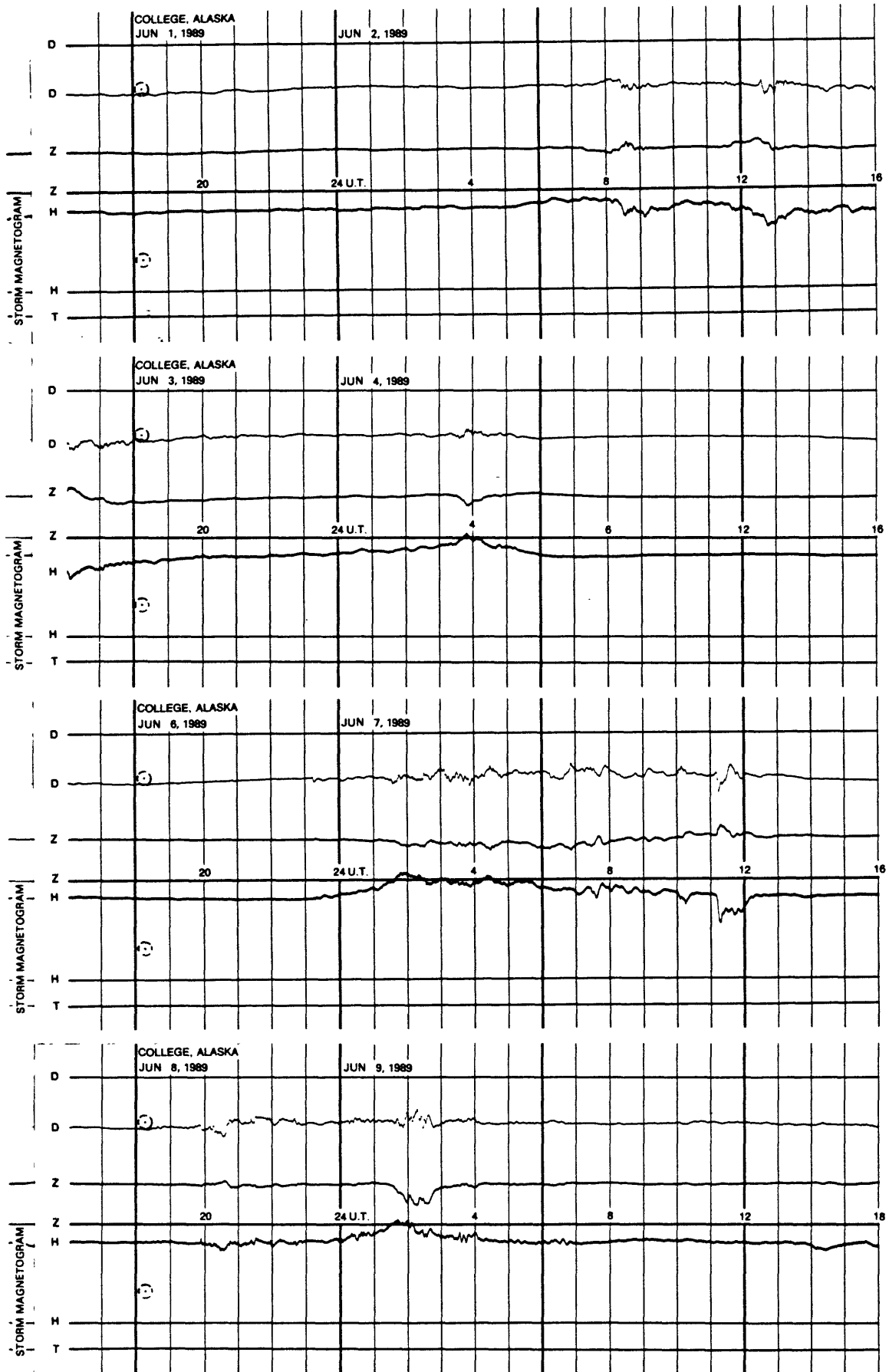
200 mm
100 mm
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NORMAL MAGNETOGRAMS



STORM MAGNETOGRAMS



STORM MAGNETOGRAMS

