REPORT UAG - 60

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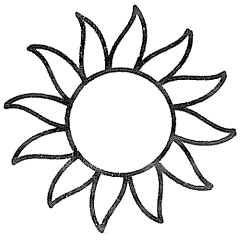
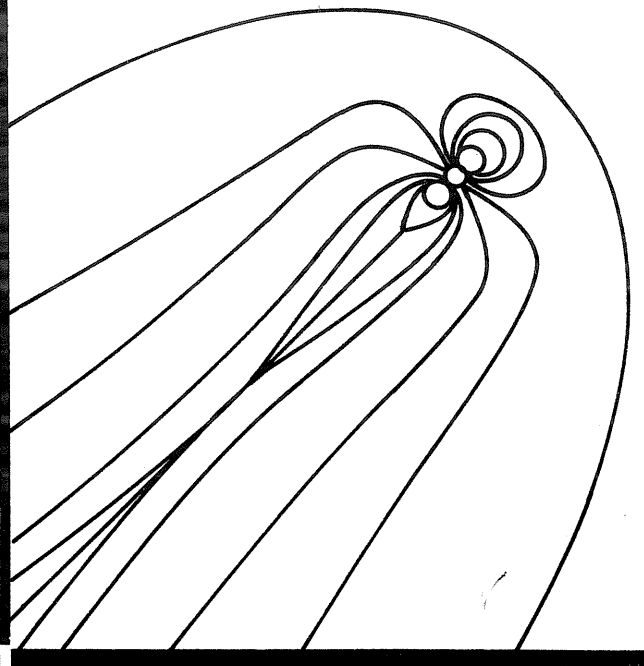
for
Solar-Terrestrial Physics



GEOMAGNETIC DATA FOR JANUARY 1976
(AE (7) INDICES AND STACKED MAGNETOGRAMS)



July 1977

IMS DATA PUBLICATION No. 1

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REPORT UAG - 60

GEOMAGNETIC DATA FOR JANUARY 1976
(AE (7) INDICES AND STACKED MAGNETOGRAMS)

by

J. H. Allen, C. A. Abston and L. R. Morris
National Geophysical and Solar-Terrestrial Data Center
Boulder, Colorado 80302 USA

July 1977

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Asheville, North Carolina, USA 28801

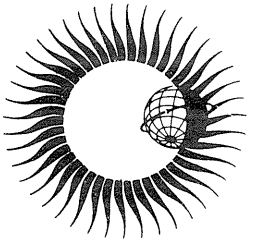

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TABLE OF CONTENTS

Geomagnetic Data for January 1976
(AE(7) Indices and Stacked Magnetograms)

by

J. H. Allen, C. A. Abston and L. R. Morris
NGSDC/EDS/NOAA
Boulder, Colorado 80302 USA

SECTION I. GENERAL DISCUSSION

1. Introduction

This IMS data report presents one of the most used types of ground-based data, i.e., analog records of geomagnetic variations. Also given are tables, graphs, and statistics from the preliminary derivation of AE indices based upon these records. It is anticipated that similar monthly data reports will be made available on an increasingly timely basis for the entire IMS observing period, January 1976-December 1979. As additional station records become available in time for processing, these will be added to later volumes in this series. In particular, we expect to have daily stacked plots of magnetograms from the North American meridional and longitudinal chains as well as the present selected Northern Hemisphere auroral zone station records used in the preliminary AE index derivation.

2. Data Selection and Processing

The seven observatories supplying data for this report are shown in Figure 1. These are Leirvogur (LR), Narssarssuaq (NAS), Fort Churchill (FC), Barrow (BW), Tixie Bay (TI), Dixon Island (DI), and Abisko (AI). These were chosen from among the list of 12 observatories whose records are now routinely used by

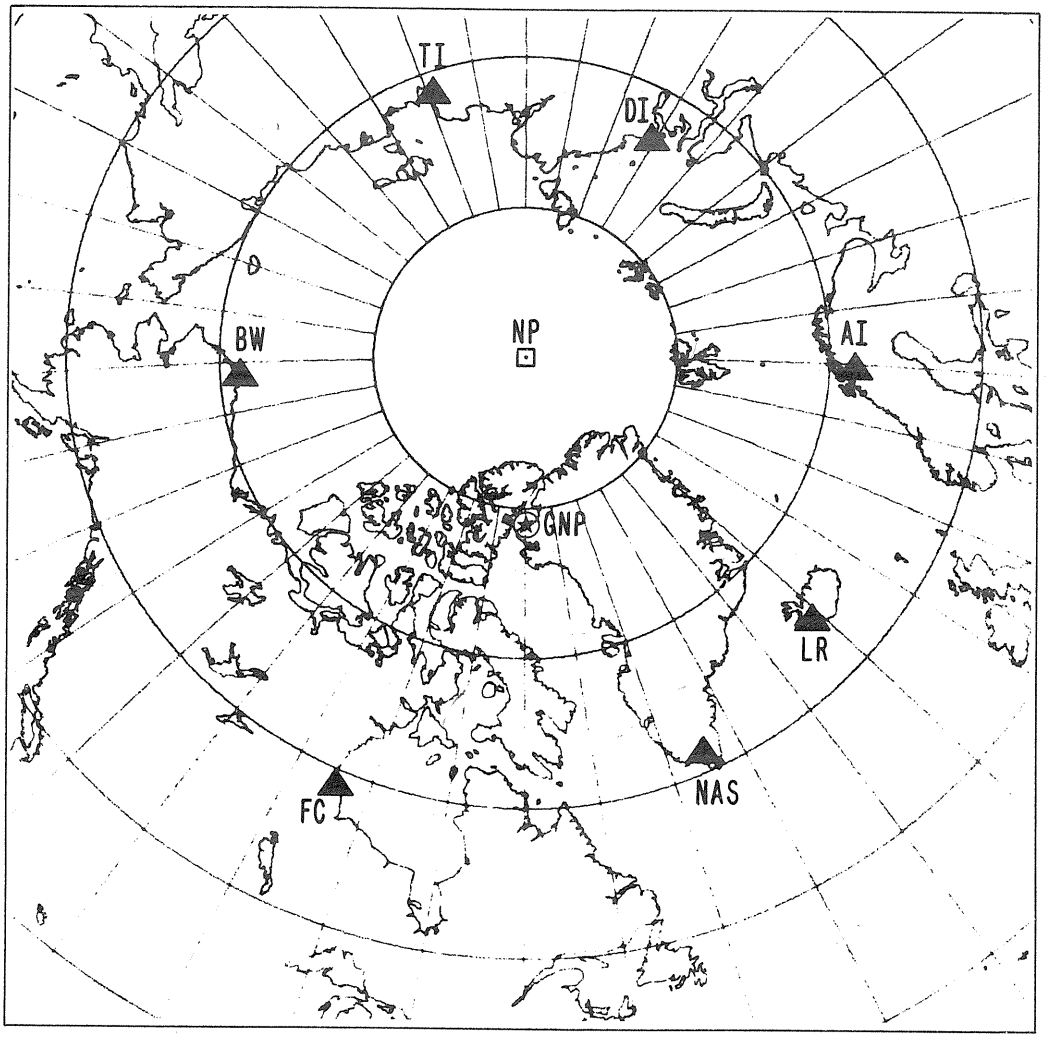

Fig. 1. Provisional AE(7) network.

WDC-A for Solar-Terrestrial Physics in the derivation of Auroral Electrojet (AE) magnetic activity indices. Reasons for their selection were (1) records from these sites are most promptly available, (2) the sites are about evenly spaced in longitude, and (3) each location has demonstrated its importance in the prior derivation of AE indices [Allen and Kroehl, 1975]. We hope that as digital data processing from other observatories becomes more routine the network can be expanded, and we can include data from College, Great Whale River, and Yellowknife to improve the station distribution for these prompt indices.

Among the stations supplying data for this publication, only Fort Churchill and Barrow are presently recording digital variations on-site. Both observatories use flux-gate instruments supplemented by proton precession magnetometers and generate more or less routine absolute observations. Each component's amplitude is recorded every 10 seconds on magnetic tape, and analog chart records are prepared as back up data. These high-time-resolution digital data are processed at central facilities responsible for each observatory. Obvious errors (usually spikes) are corrected and 1-min average values are computed. These preliminary data are sent on tape to WDC-A for Solar-Terrestrial Physics where they are plotted and checked for stability of quiet-time levels (baseline drift), presence of noise, and day-to-day continuity. As necessary, remaining spikes are removed, and "temporary" baselines are adopted to compensate for data problems that would affect derivation of AE indices.

All the other observatories record magnetic variations photographically. Their magnetograms are copied on 35 mm microfilm for transfer to WDC-A for Solar-Terrestrial Physics together with calibration information. Here they are reproduced as almost original size magnetograms and digitized at 1-min intervals using semi-automatic scaling equipment. Resulting digital tapes of component amplitudes relative to baselines are passed through the same plotting and other quality control processes as the original digital data described above.

After completion of quality control checks, all digital records are merged and replotted to common time and amplitude scales. These are the monthly D-, H-, and Z-component and daily H- (or X-) component stacked plots included in this report. For most observatories intervals of missing data are apparent in one or more components. These may arise from (1) loss of on-site digital data, (2) noise in original digital data, (3) movement of traces off magnetograms during large excursions with no secondary trace for that component, (4) lack of low-sensitivity storm magnetograms for disturbed periods, and (5) loss or intermixing of analog traces during large, rapid field fluctuations. Every reasonable effort is made at WDC-A for Solar-Terrestrial Physics to curve-follow disturbed traces. Sometimes, however, this gives improbable results and we choose to suppress some data. An example of this is in the D-Trace at Dixon Island late in the day of 10 January 1977. AE-max was about 1700 gammas (1 gamma = 1 nanoTesla), but the apparent change in D was some 30° east during a time when all three traces were confusingly intermixed. Because of our uncertainty about this variation and of our desire to maintain a reasonable amplitude scale for the common-scale D stack plots, we suppressed digitization of Dixon's D for several hours during this event. Effects of data gaps are seen in AE indices only when they occur at a critically located station and in the H-component. Often they are only apparent in the graphs of AU or AL.

3. Auroral Electrojet Magnetic Activity Indices

The AE index gives a global, quantitative measure of auroral zone magnetic activity resulting from enhanced ionospheric currents associated with magnetospheric substorms. As defined by Davis and Sugiura [1966], AE is the total range of H-component deviations from quiet-time levels of the field at a selected group of high-latitude magnetic observatories. Typically, a constant quiet-time H value is determined for each observatory and subtracted from recorded H values. The resultant deviations for all stations may be plotted to common time and amplitude scales and graphically superposed on a common reference or zero level. Then, the amplitudes of the enclosing upper and lower envelopes from moment-to-moment give the values of AU and AL, respectively. The range between them is AE, i.e., AU-AL=AE. Their average is (AU+AL)/2=Ao (often indicated AO because many computers lack the ability to produce lower case characters).

Complete discussions of AE and associated indices can be found in the two papers referenced above and in the series of WDC-A for Solar-Terrestrial Physics Reports UAG-22, 29, 31, 33, 37, 39, 45, 47, and 59 which cover the years 1966-1974. Each of these contains precautionary notes about the inherent limitations of AE indices, even when derived from a relatively complete station network. Additional notes on AE are given before the daily index graphs (page 40) and the figures based upon minute-to-minute "frequency of index provision" by each station. Given in this report for the first time are figures showing the cumulative amplitude of H-deviation for times when each station was providing AU and AL indices (pages 55 and 57).

4. Acknowledgements

The authors of this IMS data report are on the staff of the National Geophysical and Solar-Terrestrial Data Center (NGSDC) of the Environmental Data Service, National Oceanic and Atmospheric Administration. WDC-A for Solar-Terrestrial Physics is colocated with NGSDC and shares the same staff. We wish to recognize the efforts of those persons who operate the high-latitude magnetic observatories and process the data from them. Recognition is also due the operators who patiently curve-follow, check, and correct the data from which this report is compiled. Mr. W. Paddock has carefully adopted the temporary baseline values and checked each stage of the digitization.

We hope that IMS participants who find this report useful or who can suggest improvements will correspond with the authors. This is very much a prototype publication and we expect to make changes during the months before the dedicated IMS satellites are operational.

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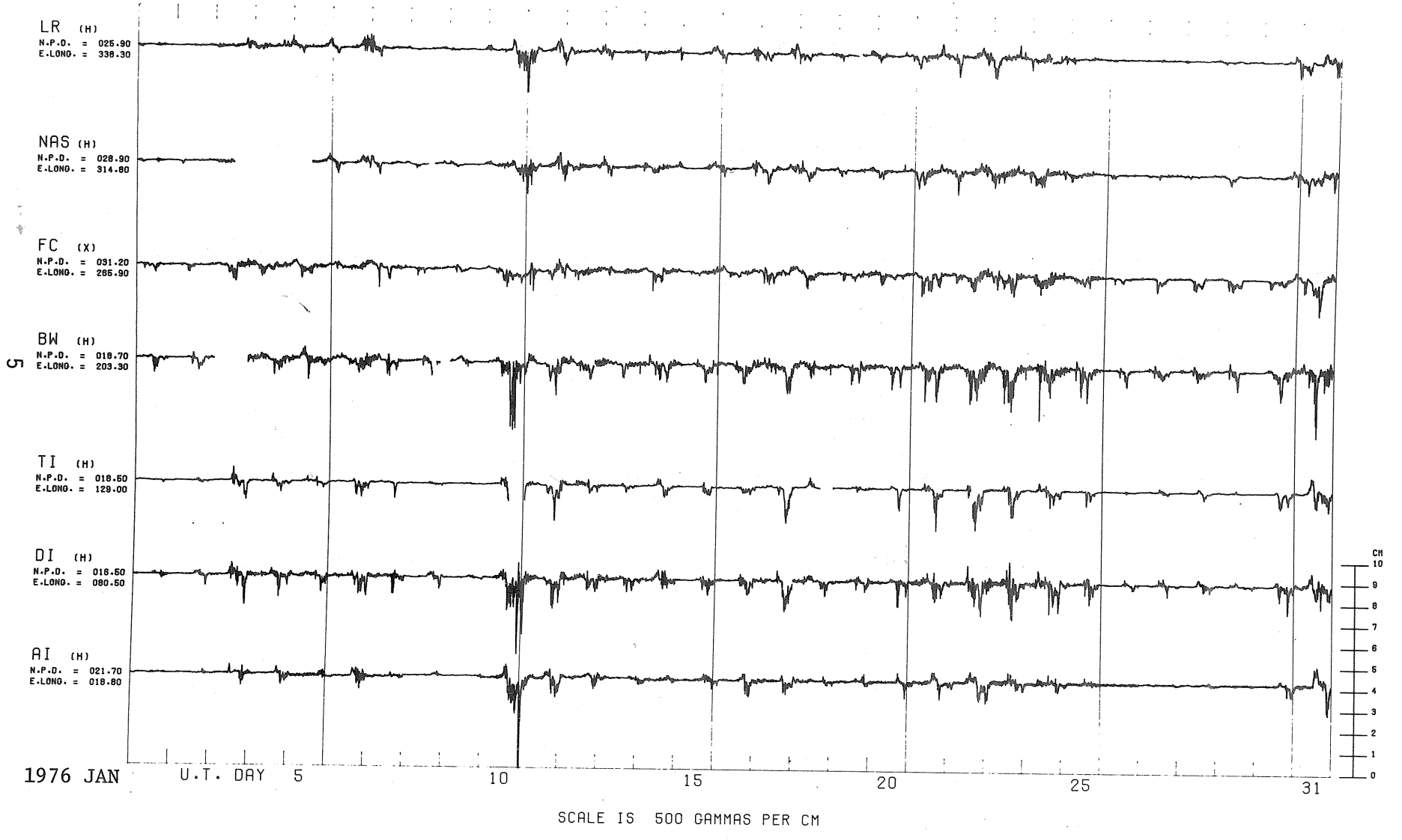
SECTION II. COMMON-SCALE MAGNETOGRAMS

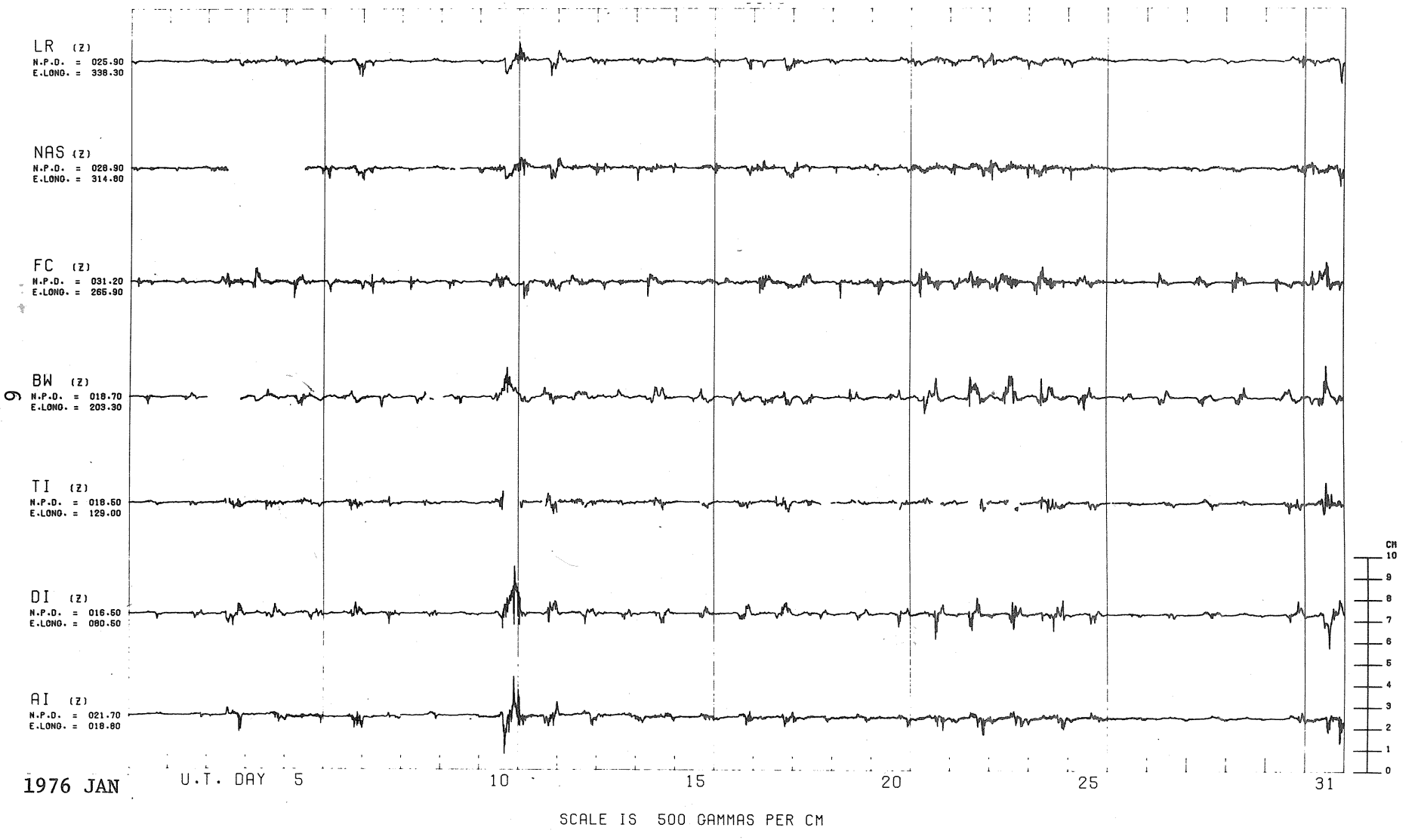
1. Stacked Common-Scale Magnetograms For Whole Month (H, Z and D Variations)

The three following graphs display condensed stacked plots of the H, Z, and D variations, respectively, for seven stations minute-by-minute over the entire month. Component intensities are the nearest 1 gamma, and declination changes are to the nearest 0.1 minute of arc. Positive H, Z, and D changes are north, down, and east, respectively. Amplitude scales given at the bottom of each figure correspond to the original centimeter scale reproduced at lower right. For each station the North Polar Distance (N.P.D.) and East Longitude (E. Long.) are given.


COMMON SCALE MAGNETOGRAMS - H Variations
JANUARY 1976
LR (H)
N.P.D. = 025.90
E.LONG. = 338.30
NAS (H)
N.P.D. = 028.90
E.LONG. = 314.80
FC (X)
N.P.D. = 031.20
E.LONG. = 285.90
BW (H)
N.P.D. = 018.70
E.LONG. = 203.30
TI (H)
N.P.D. = 018.50
E.LONG. = 129.00
DI (H)
N.P.D. = 016.50
E.LONG. = 080.50
AI (H)
N.P.D. = 021.70
E.LONG. = 018.80
CM
10
9
8
7
6
5
4
3
2
1
0
1976 JAN
U.T. DAY 5
10
15
20
25
31
SCALE IS 500 GAMMAS PER CM

COMMON SCALE MAGNETOGRAMS - Z Variations

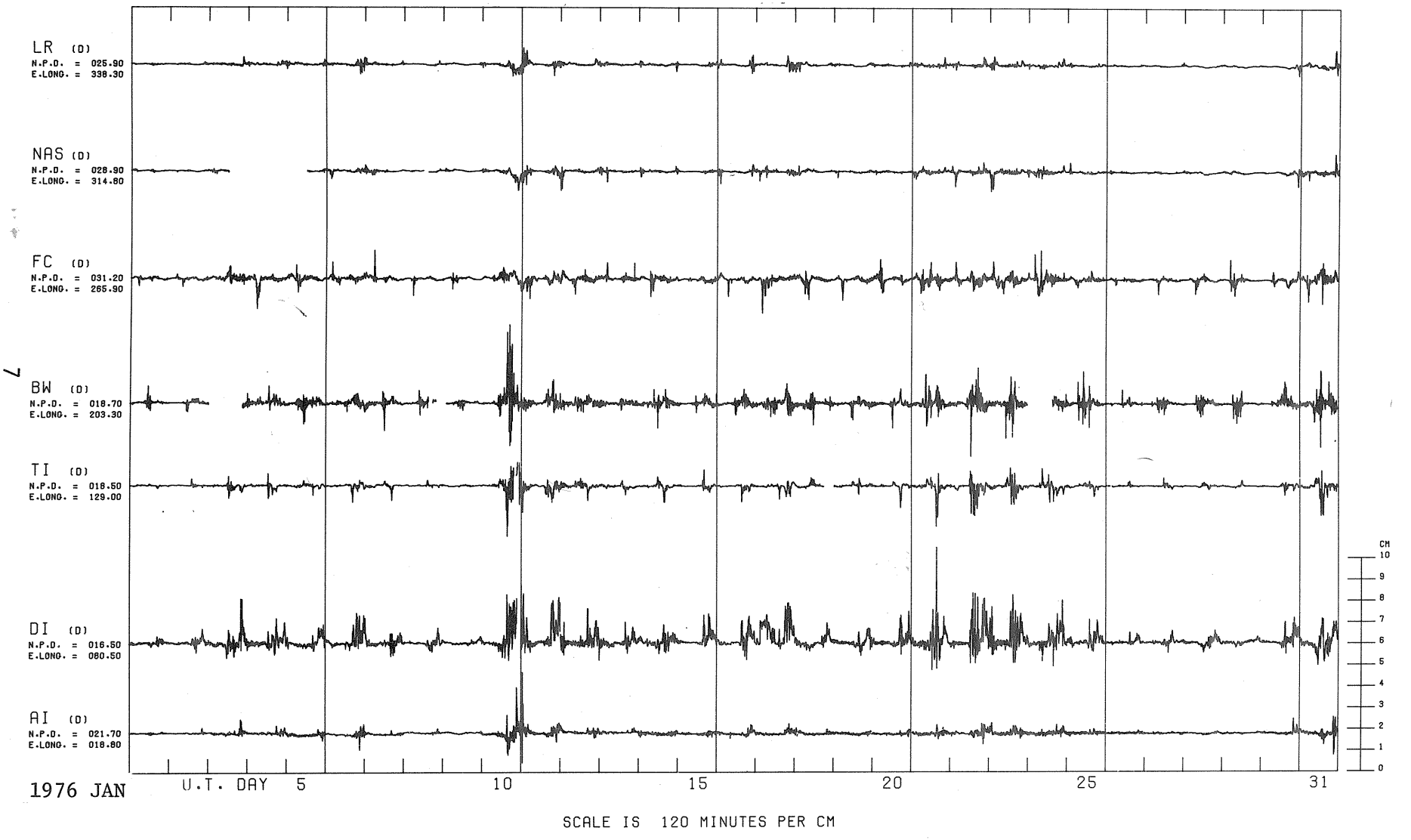
JANUARY 1976



SCALE IS 500 GAMMAS PER CM

COMMON SCALE MAGNETOGRAMS - D Variations

JANUARY 1976



SCALE IS 120 MINUTES PER CM

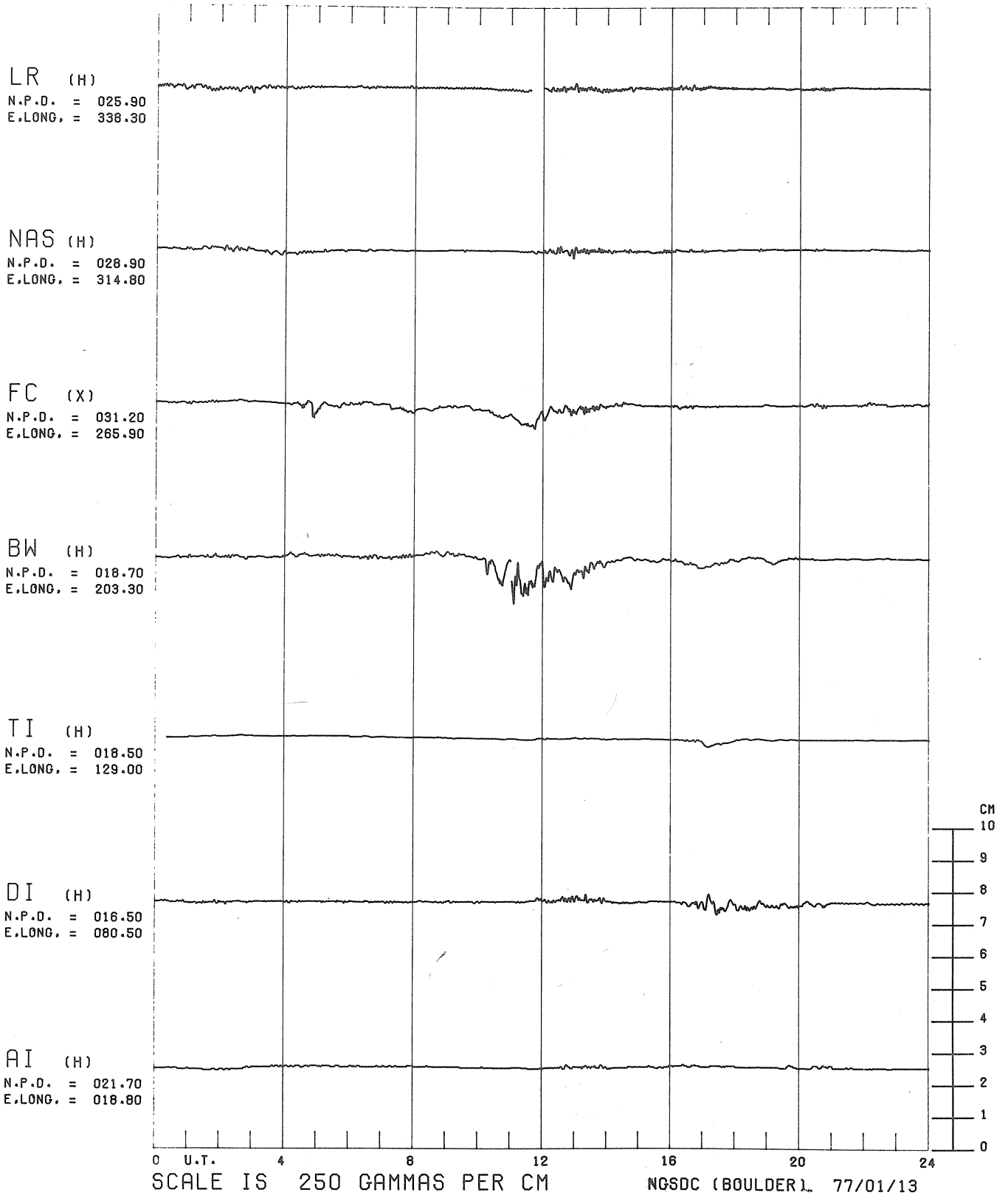
2. Stacked Common-Scale Magnetograms by Station Day (H Variation)

The following stacked plots of H (or X) common-scale magnetograms are reproduced from the digital magnetic variations data obtained as described above. Each station is identified by the abbreviation from Figure 1 and two coordinates: North Polar Distance (N.P.D.) and East Longitude (E. Long.). The amplitude scale is given at lower left of each figure and corresponds to the centimeter scale at lower right. The amplitude scale is the same for each day except when the range of deviation would cause a trace to exceed the space reserved for it. For such days (see 10-11 January 1976) the scale is increased in uniform steps to assure nonoverlapping traces. To call attention to the scale change (similar to switching to storm magnetograms), the new value is enclosed in a box.

The label "NGSDC (BOULDER) yy/mm/dd", at the bottom of first day plot, identifies the source of the published data and the day on which the plots were prepared. The difference between data recording date and its preparation date provides an indication of the time required to collect the records, to initiate program development, and to process the data. We hope by March 1978 to have achieved a minimum steady-state acquisition, processing, and publication schedule with a delay time of 2 or 3 months from the end of data recording to publication for a given month.

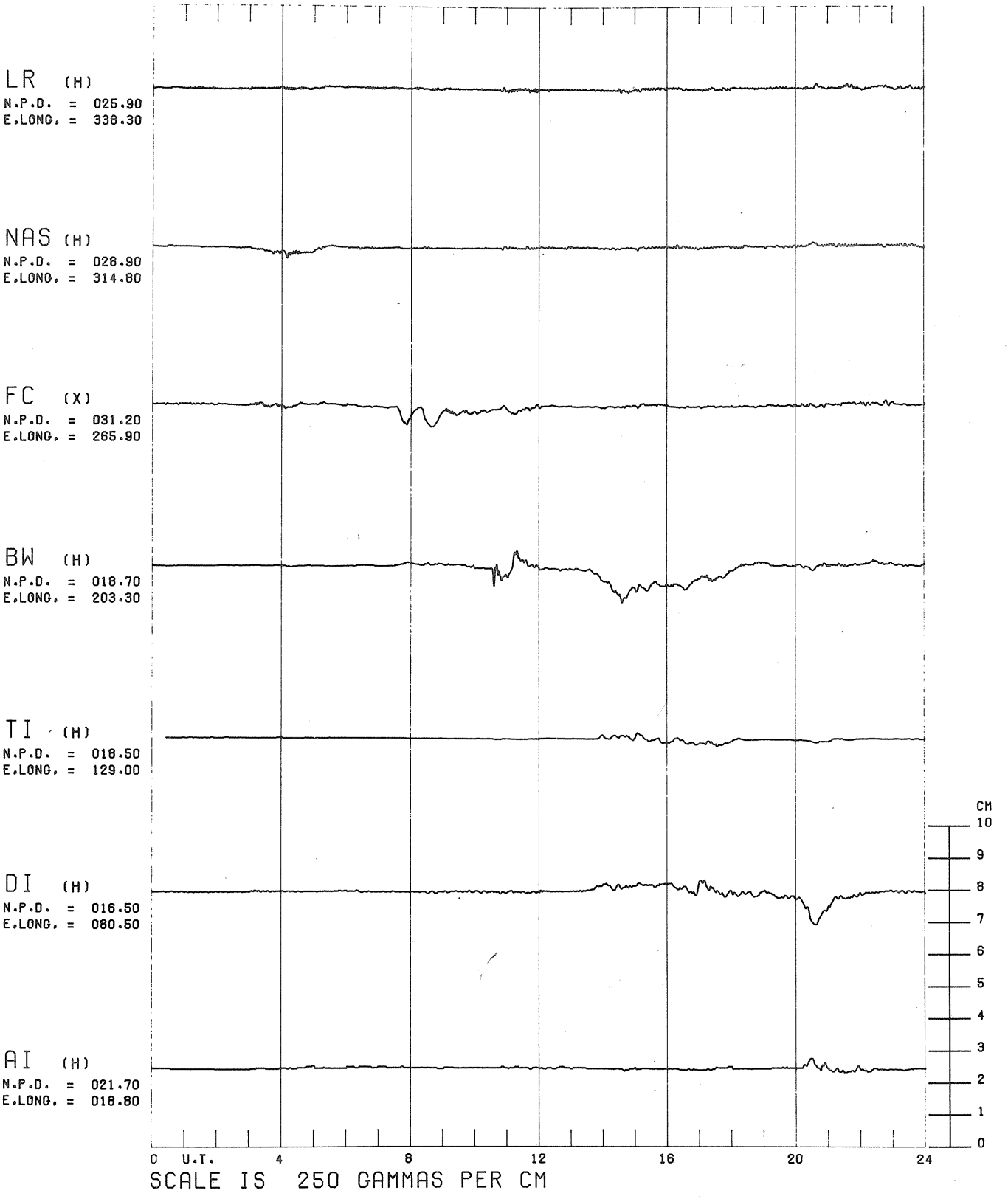
COMMON SCALE MAGNETOGRAMS
BY STATION DAY

1 JANUARY 1976



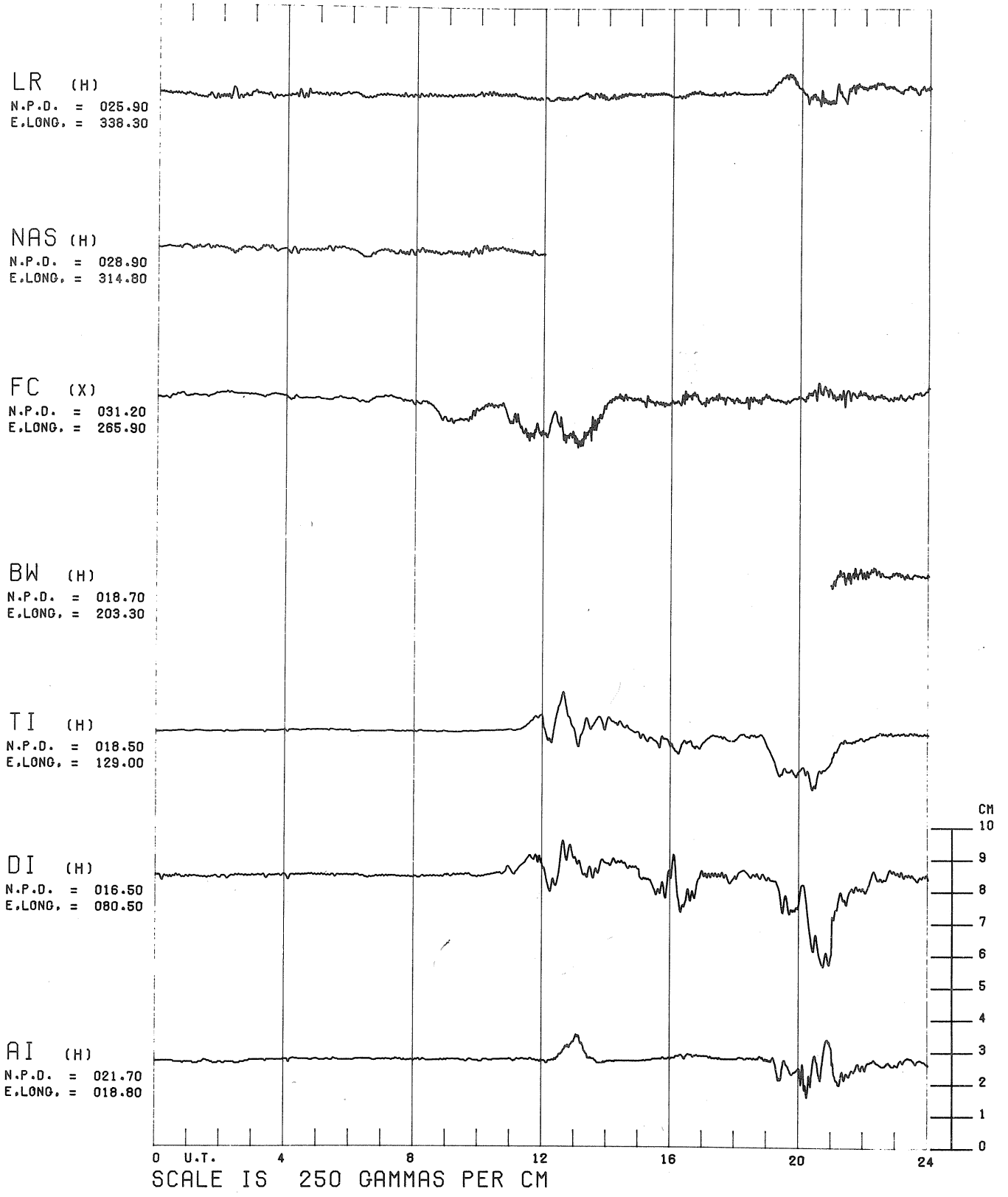
COMMON SCALE MAGNETOGRAMS
BY STATION DAY

2 JANUARY 1976

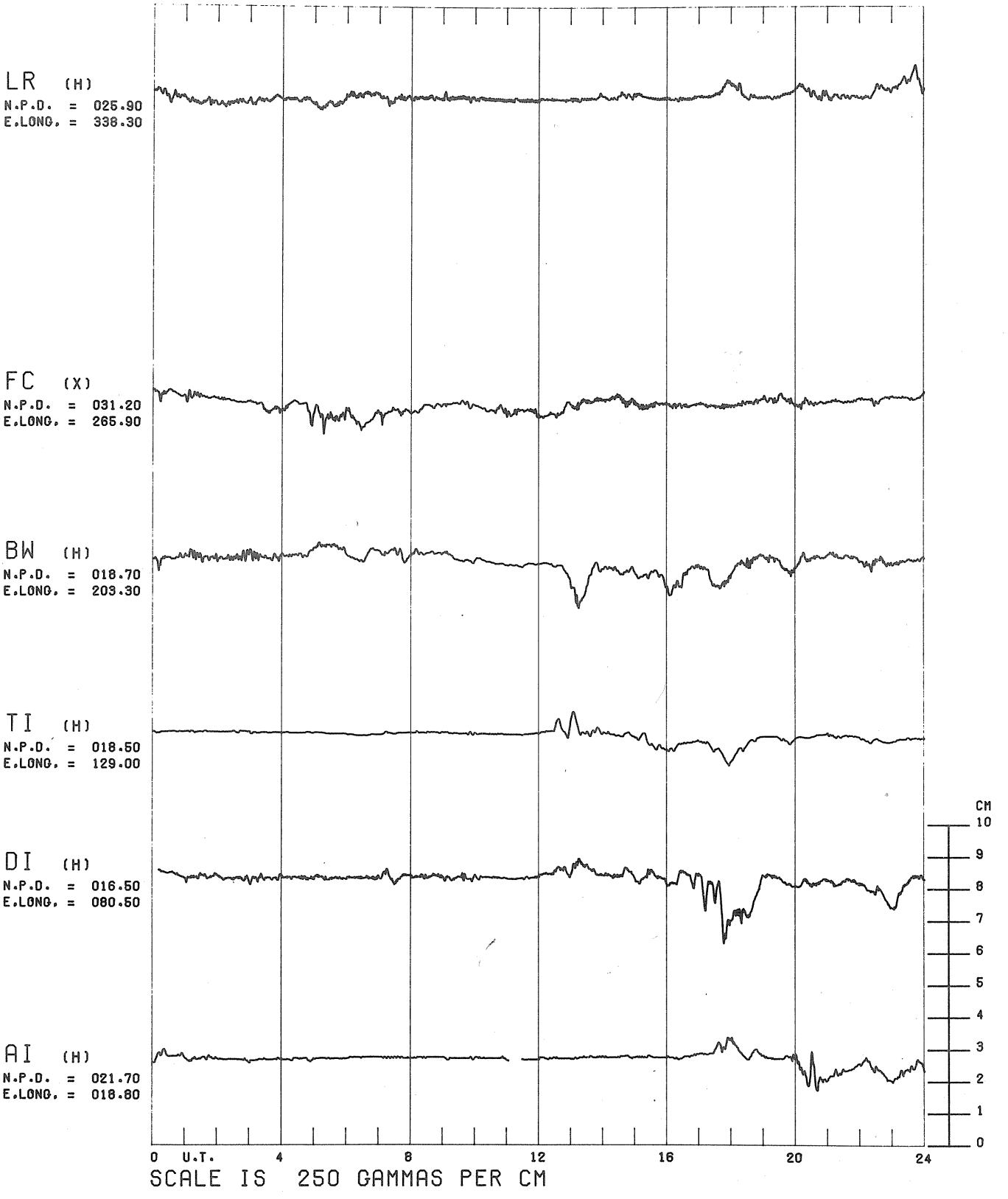


SCALE IS 250 GAMMAS PER CM

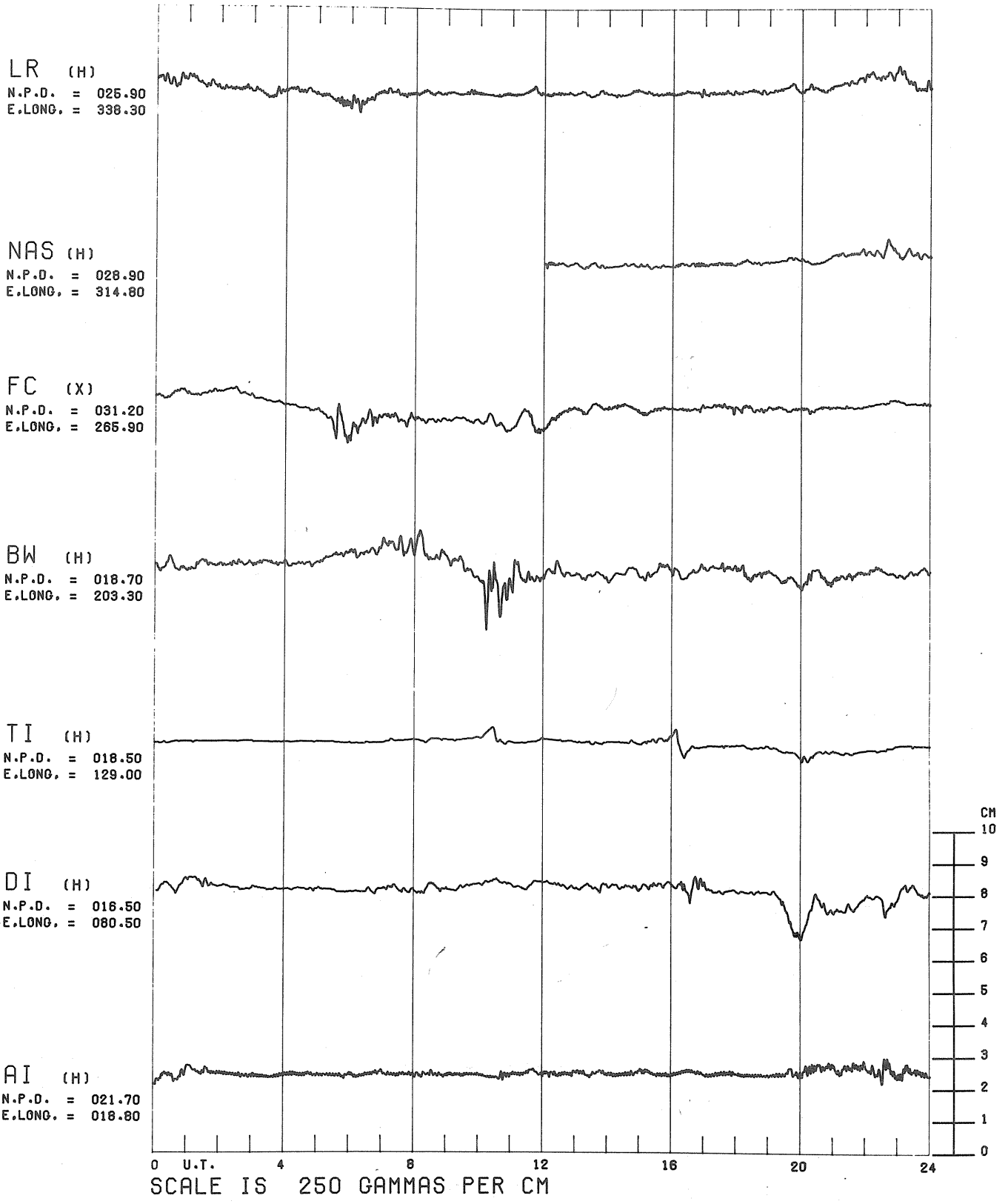
COMMON SCALE MAGNETOGRAMS
BY STATION DAY
3 JANUARY 1976



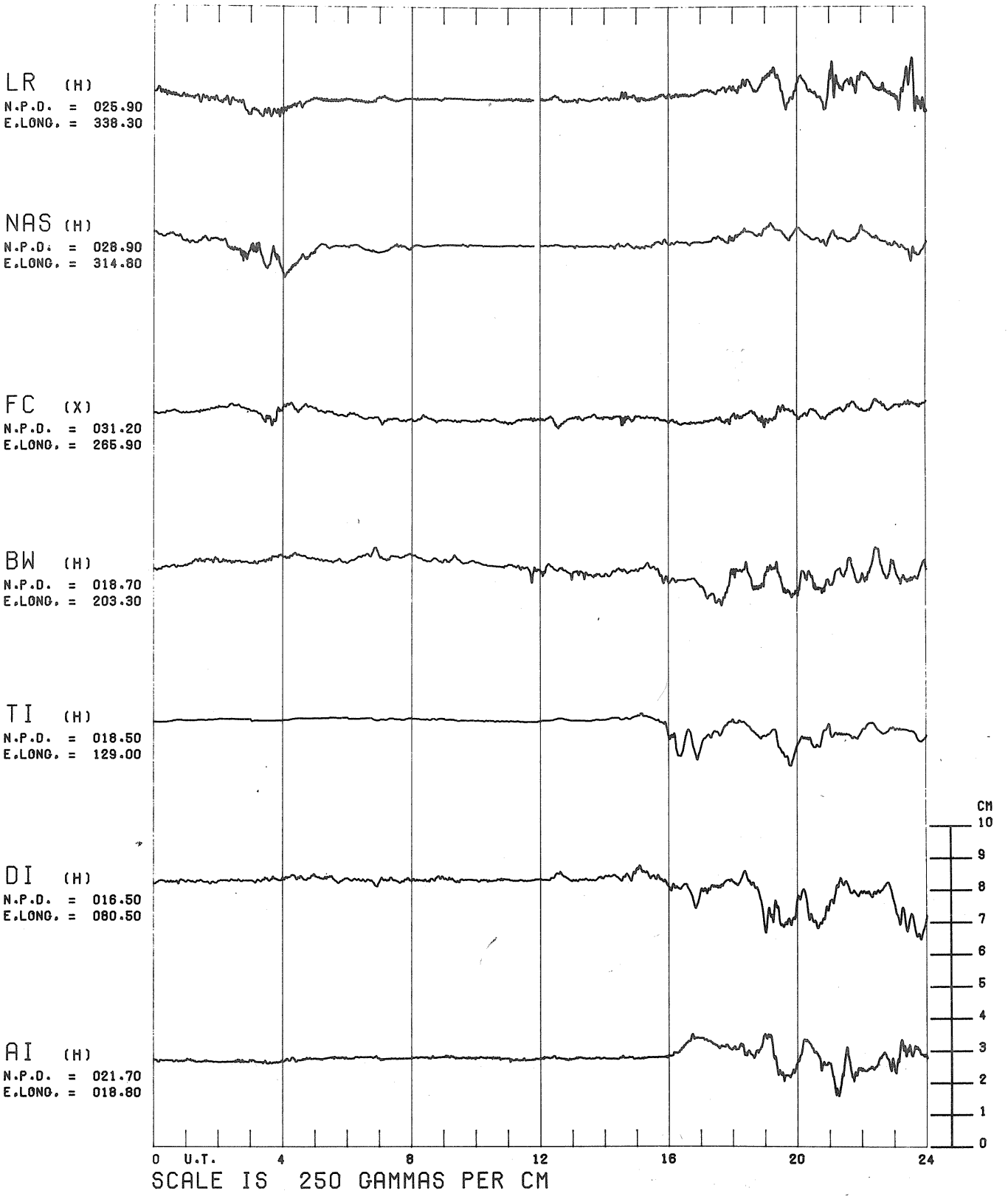
COMMON SCALE MAGNETOGRAMS
BY STATION DAY
4 JANUARY 1976



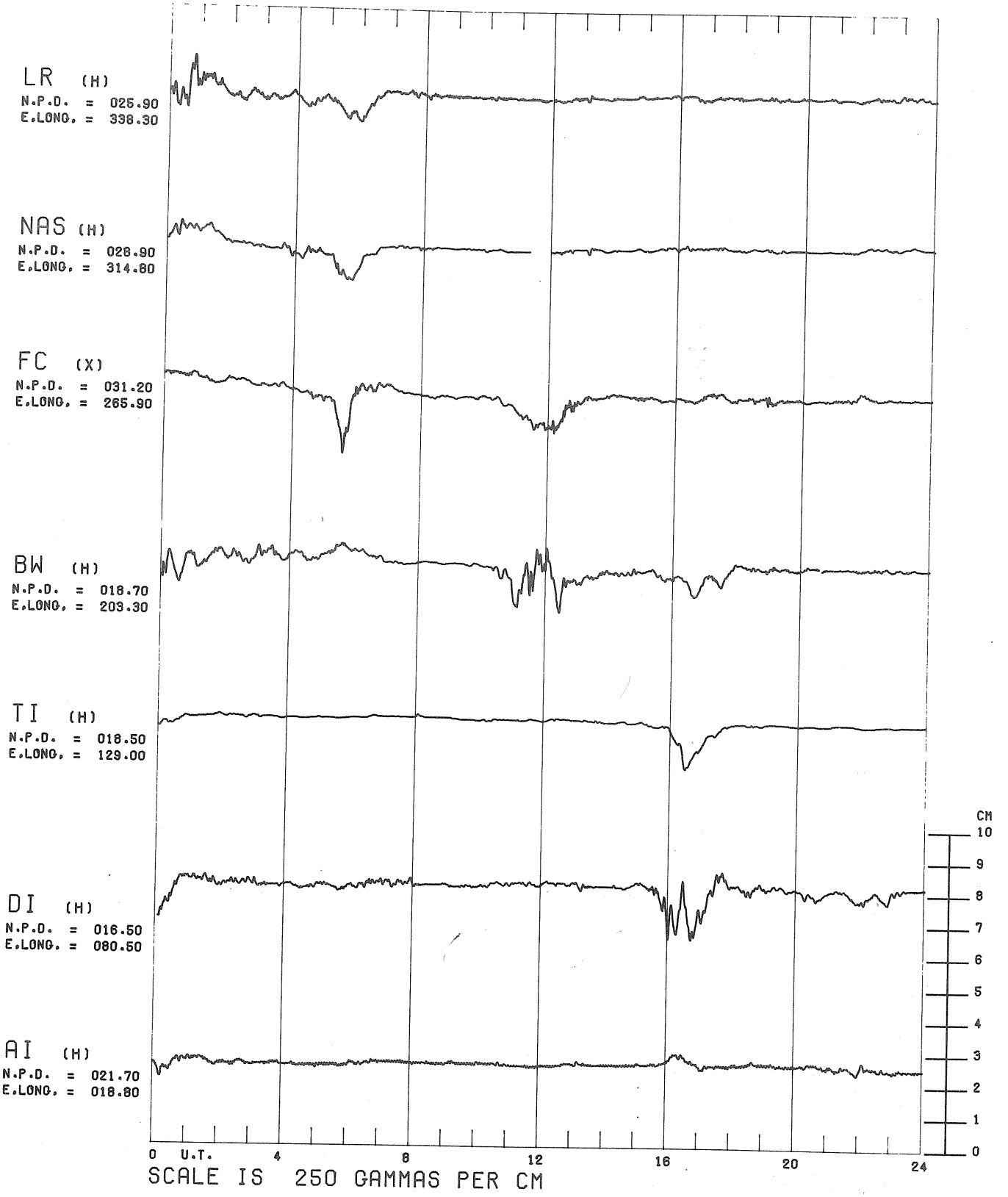
COMMON SCALE MAGNETOGRAMS
BY STATION DAY
5 JANUARY 1976



COMMON SCALE MAGNETOGRAMS
BY STATION DAY
6 JANUARY 1976

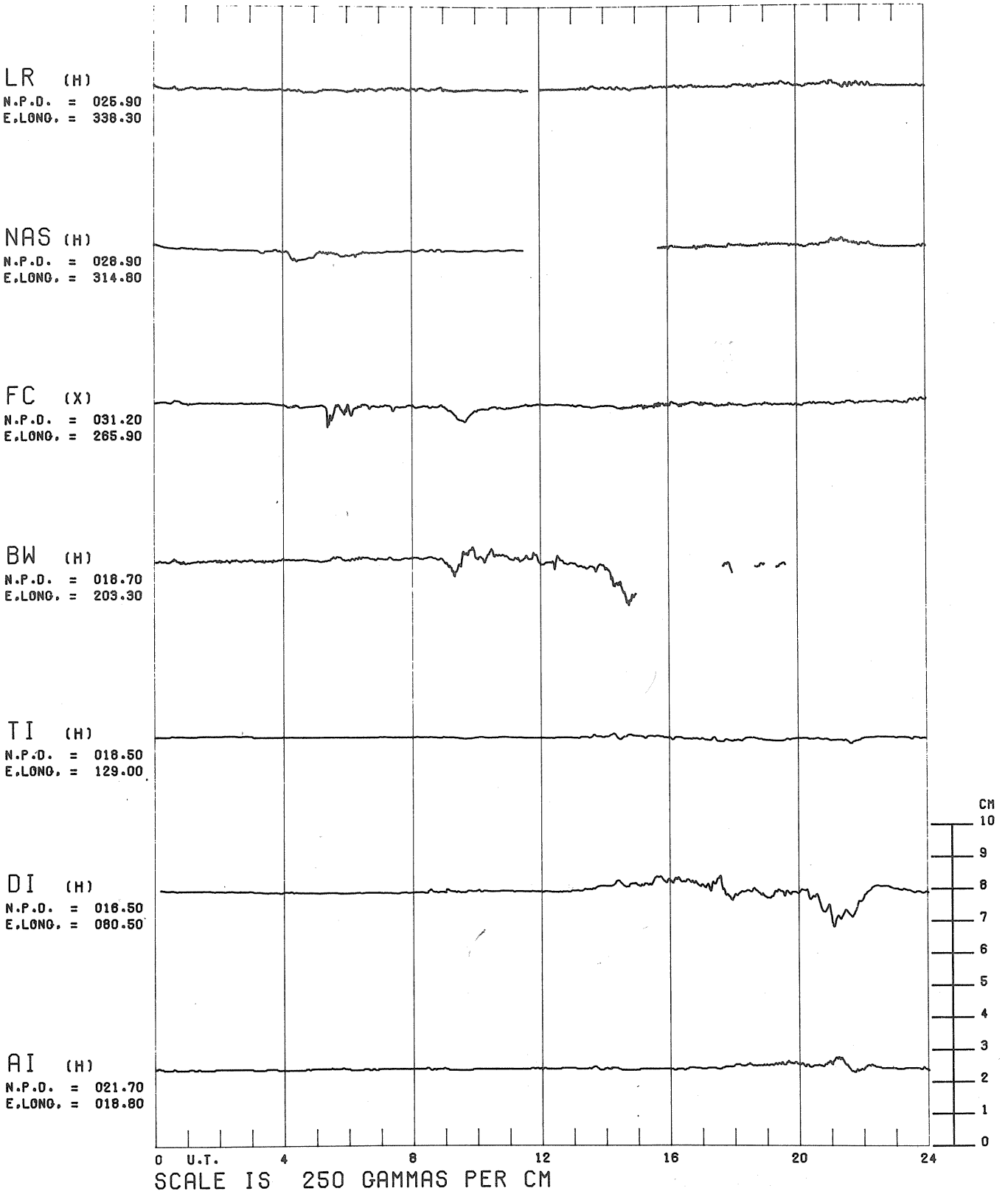


COMMON SCALE MAGNETOGRAMS
BY STATION DAY
7 JANUARY 1976



SCALE IS 250 GAMMAS PER CM

COMMON SCALE MAGNETOGRAMS
BY STATION DAY
8 JANUARY 1976



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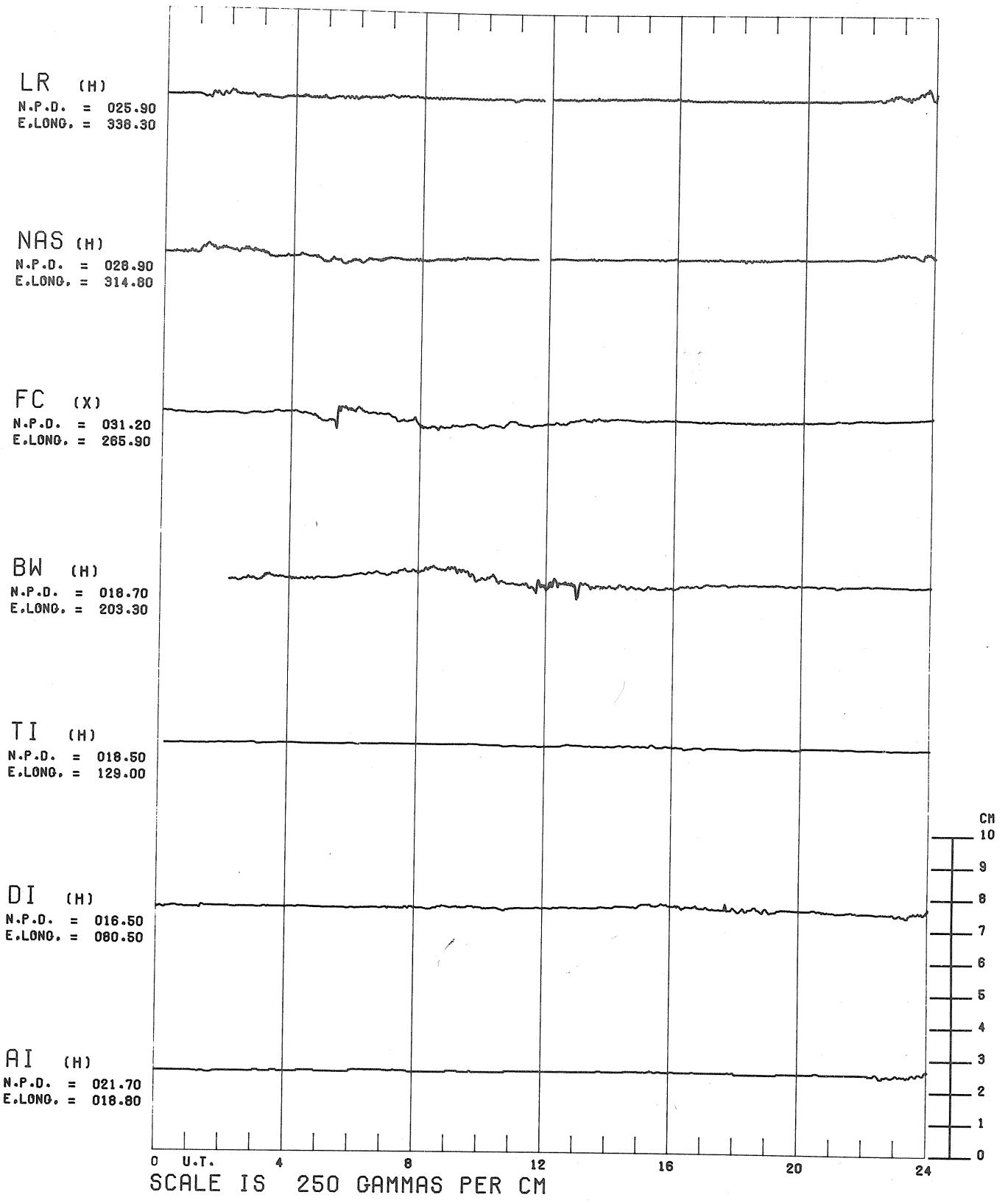
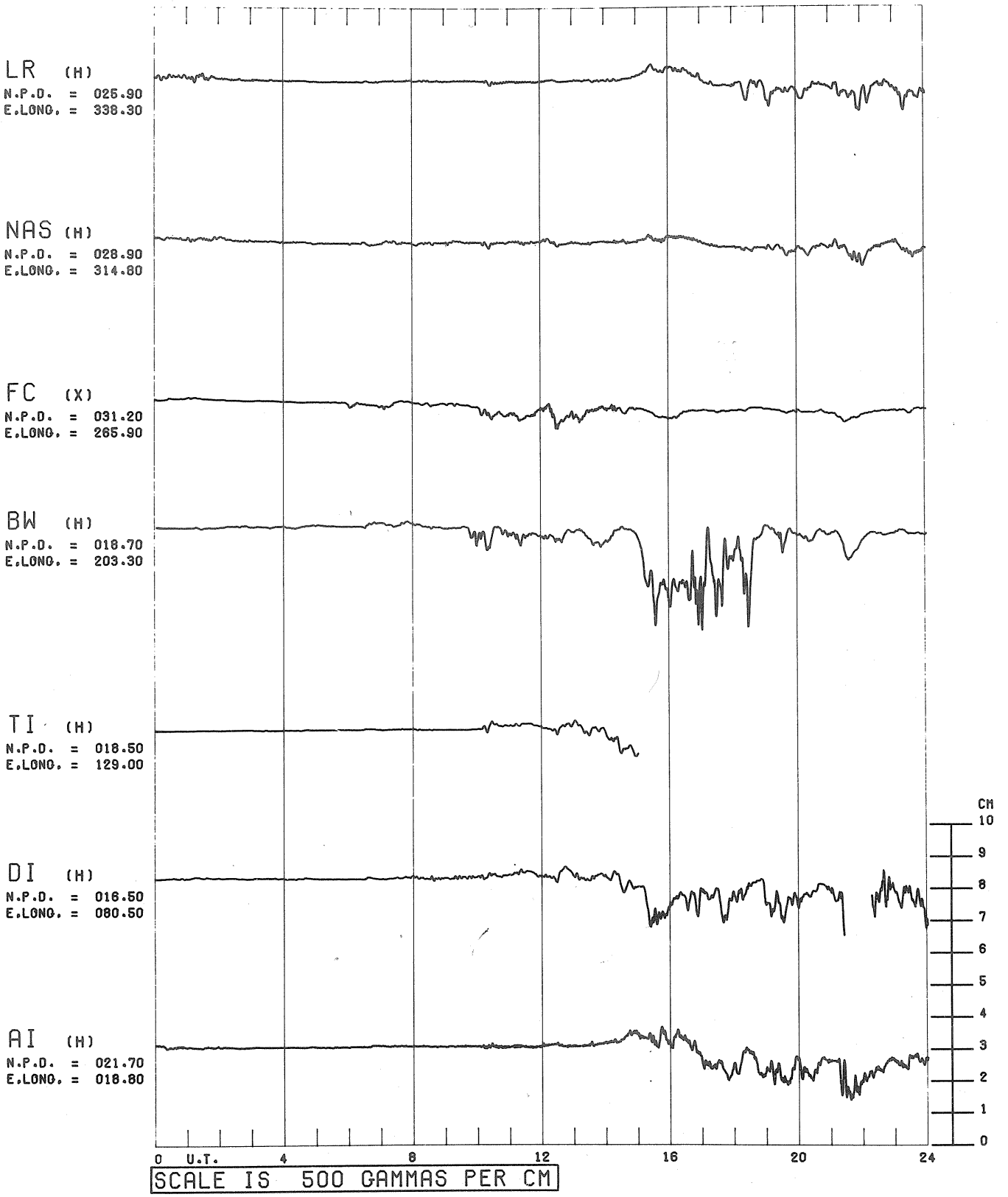
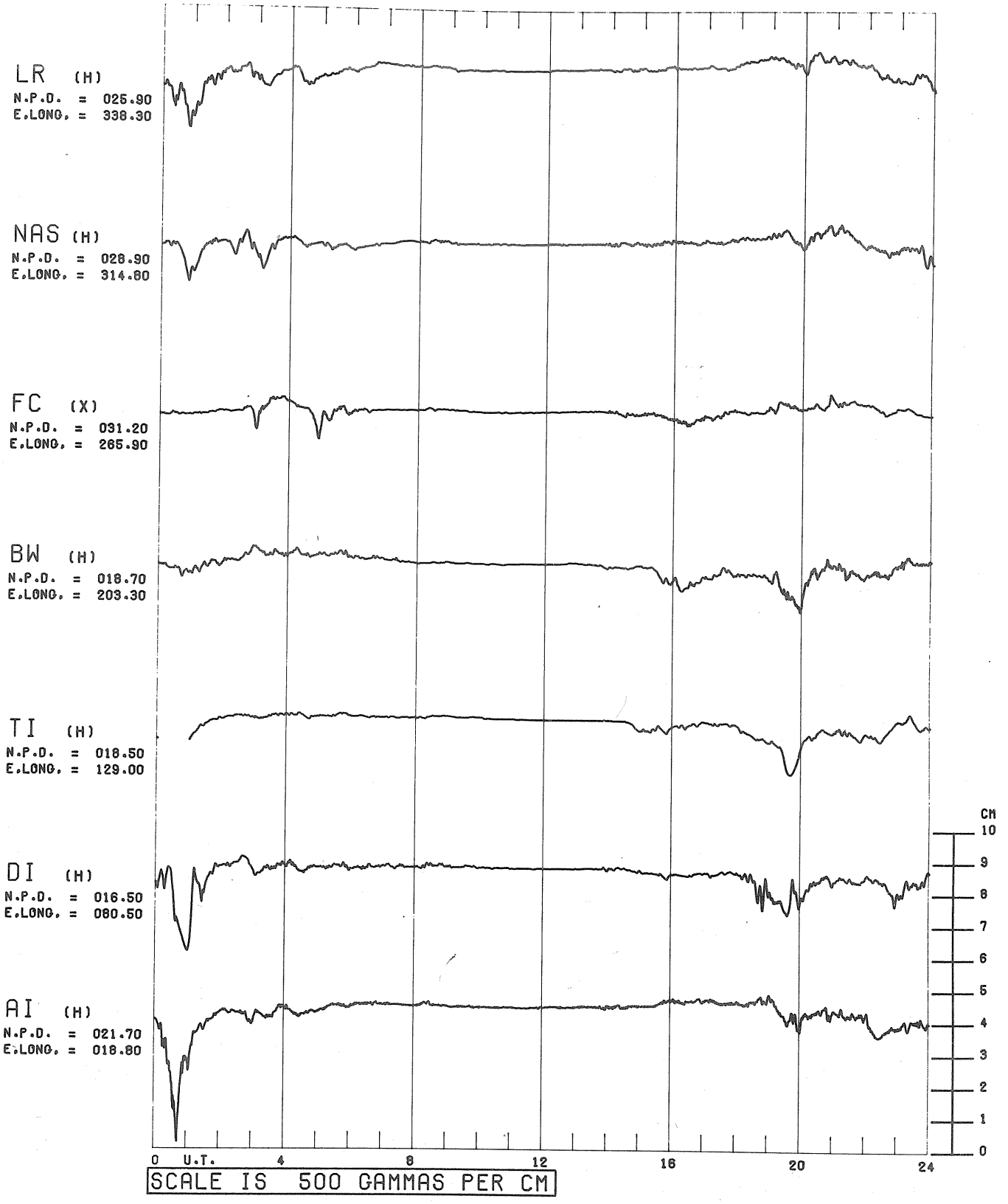
COMMON SCALE MAGNETOGRAMS
BY STATION DAY
9 JANUARY 1976



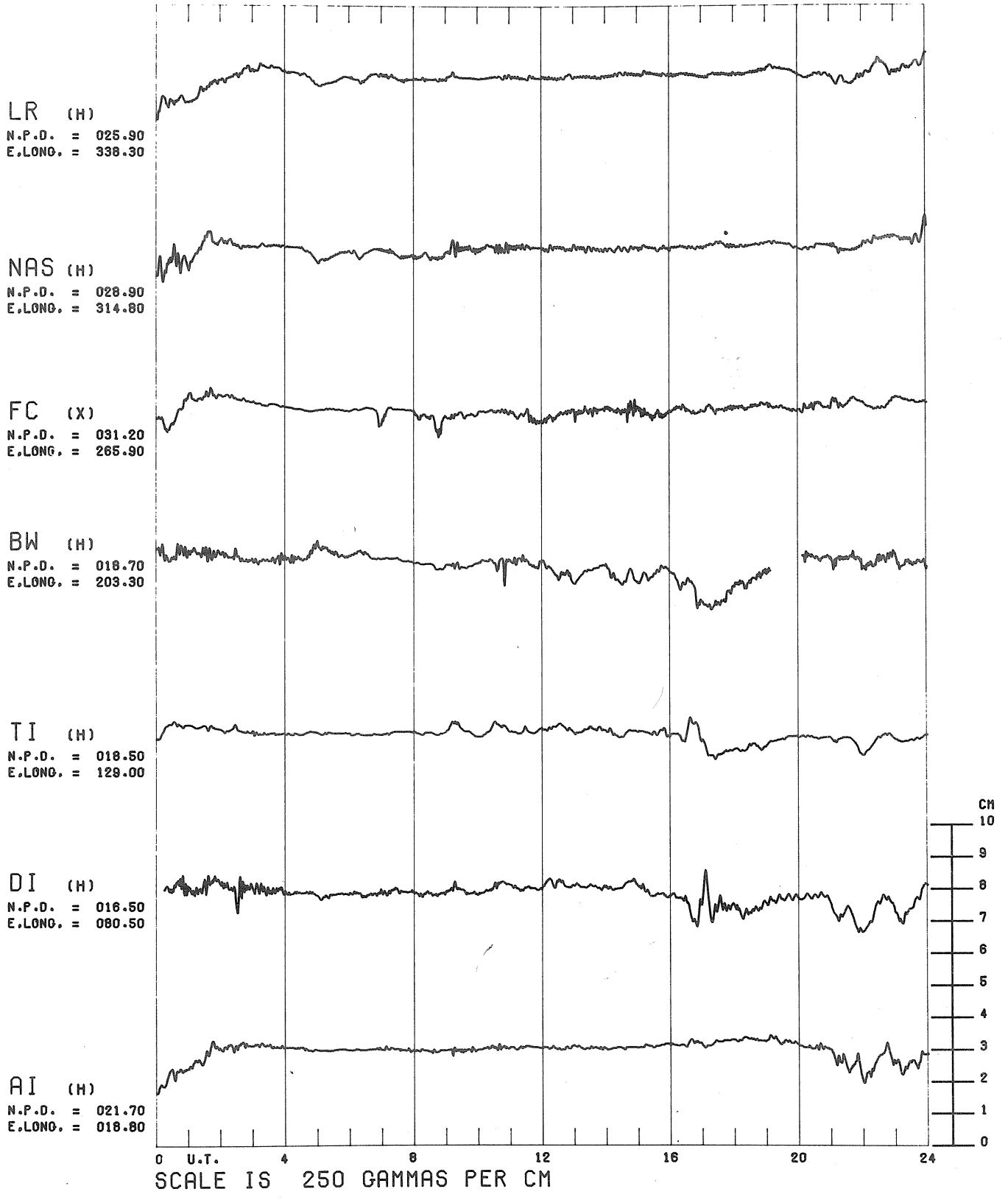
COMMON SCALE MAGNETOGRAMS
BY STATION DAY
10 JANUARY 1976



COMMON SCALE MAGNETOGRAMS
BY STATION DAY
11 JANUARY 1976

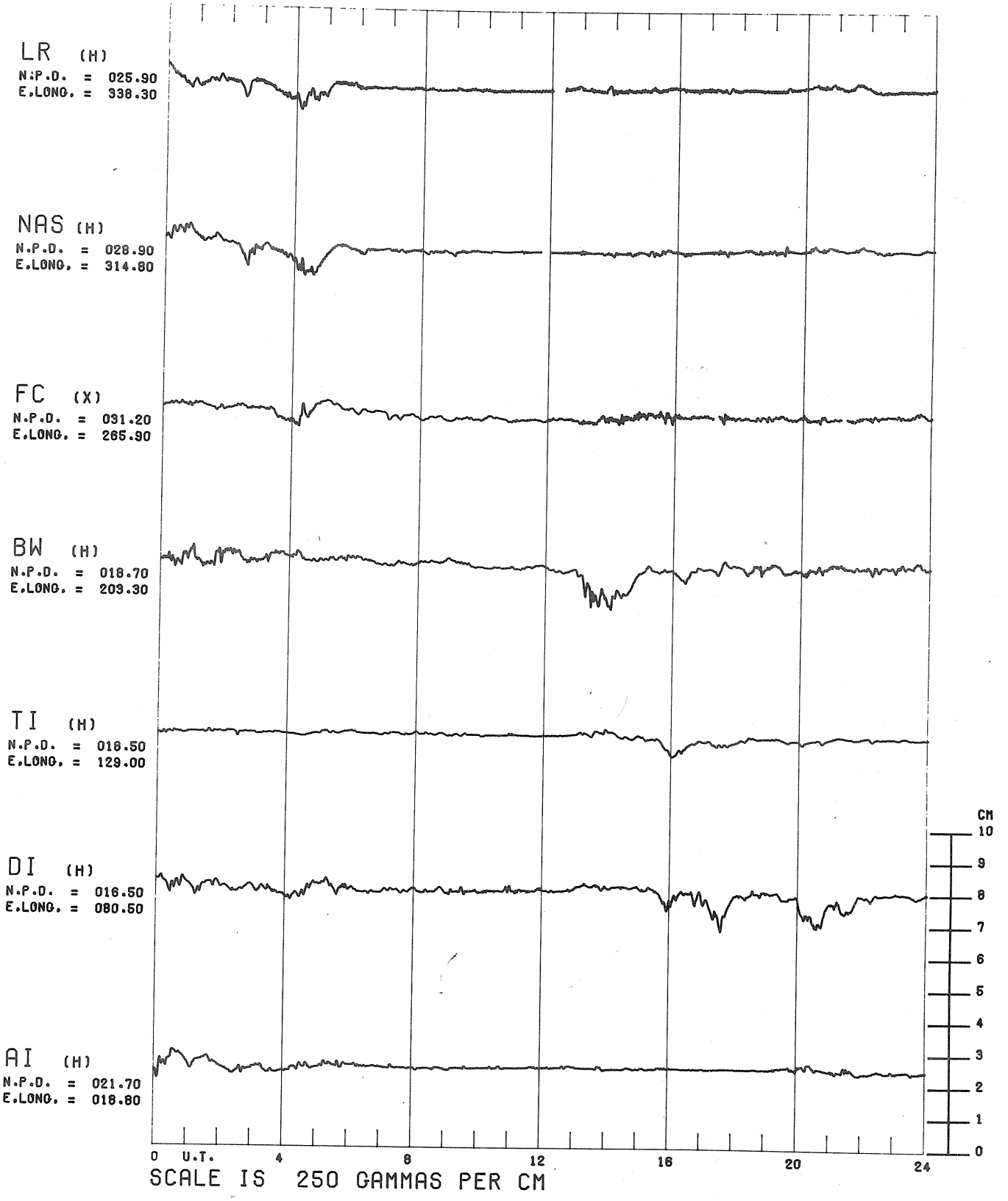


COMMON SCALE MAGNETOGRAMS
BY STATION DAY
12 JANUARY 1976

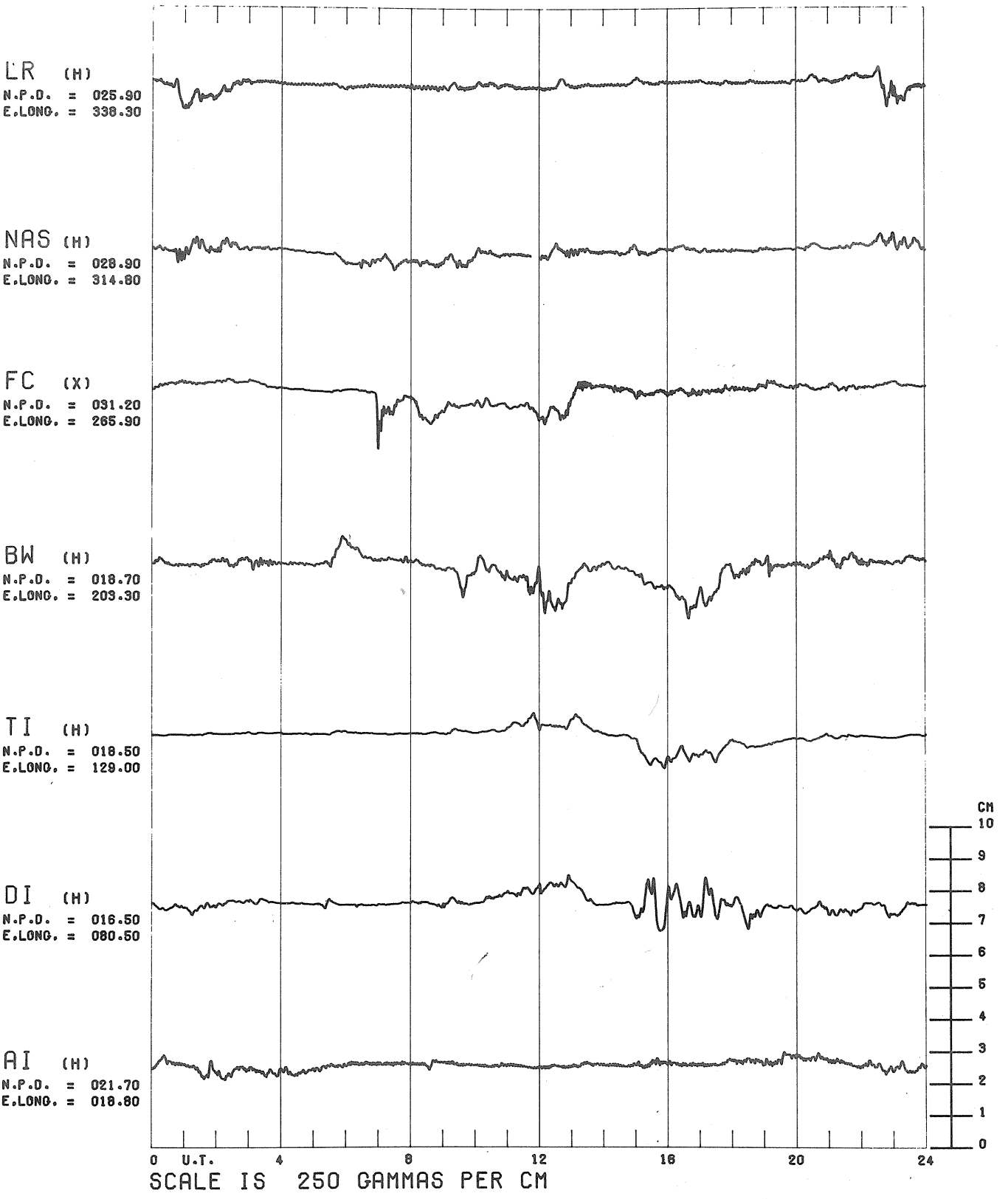


COMMON SCALE MAGNETOGRAMS
BY STATION DAY

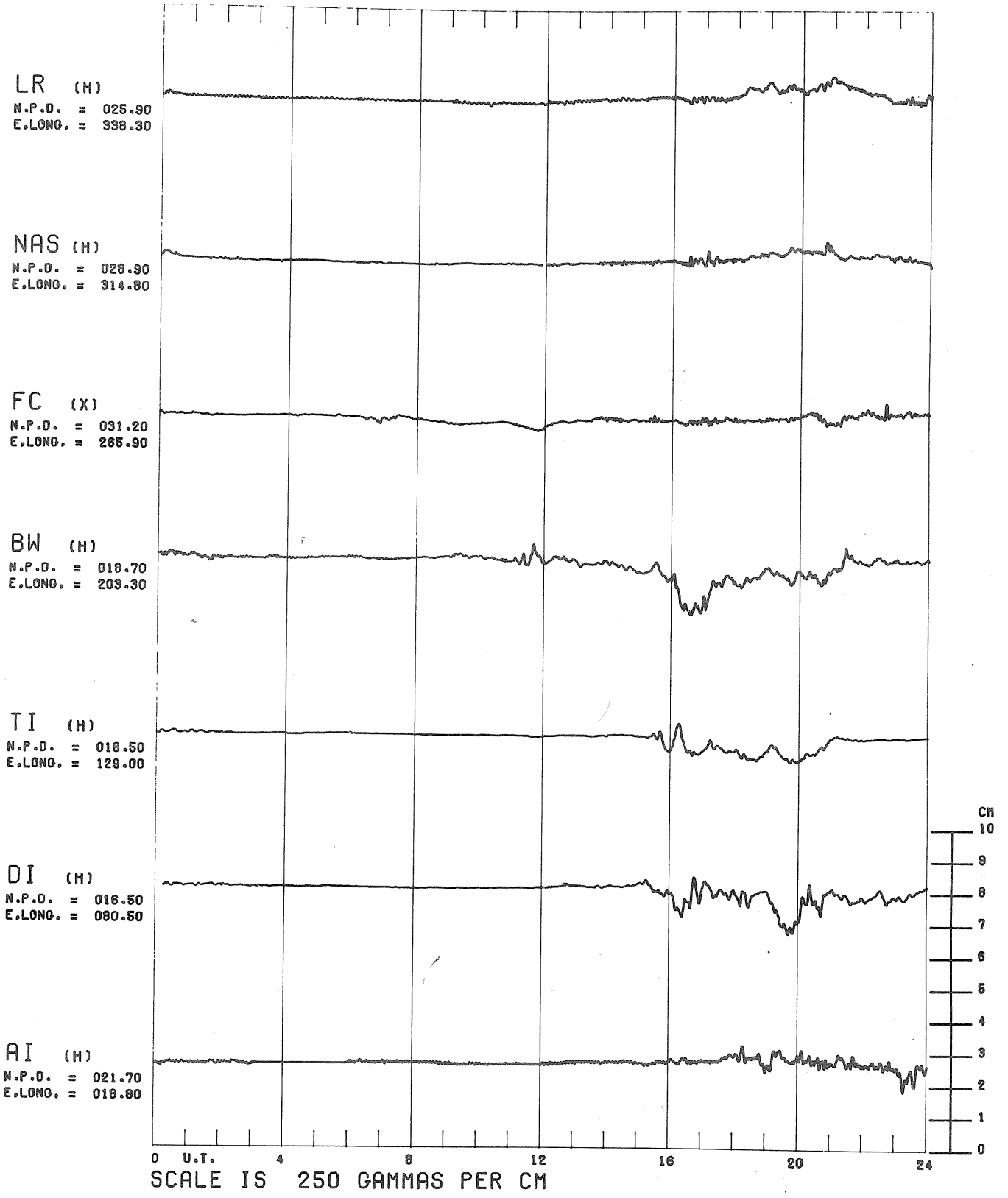
13 JANUARY 1976



COMMON SCALE MAGNETOGRAMS
BY STATION DAY
14 JANUARY 1976

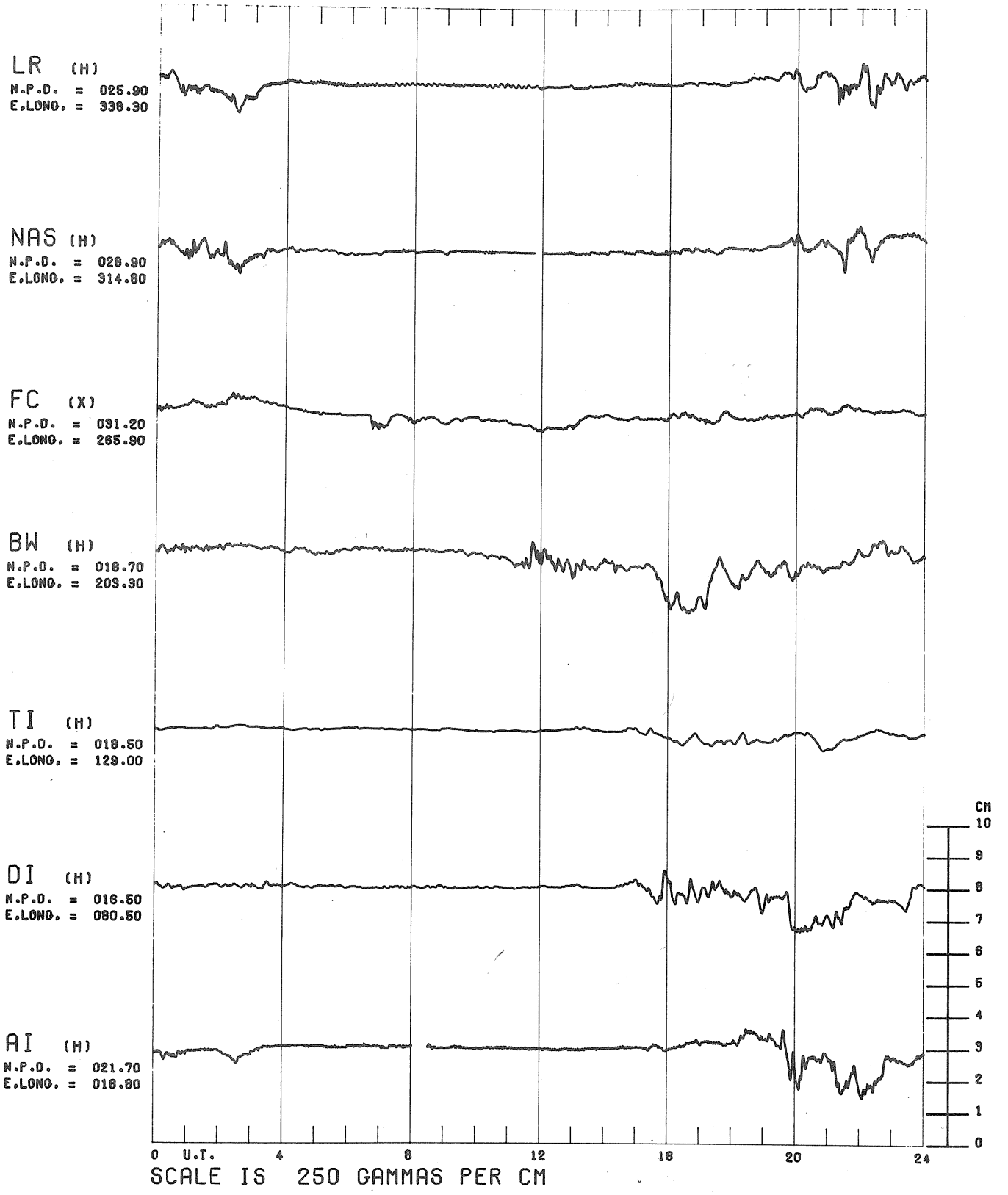


COMMON SCALE MAGNETOGRAMS
BY STATION DAY
15 JANUARY 1976



COMMON SCALE MAGNETOGRAMS
BY STATION DAY

16 JANUARY 1976



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BY STATION DAY
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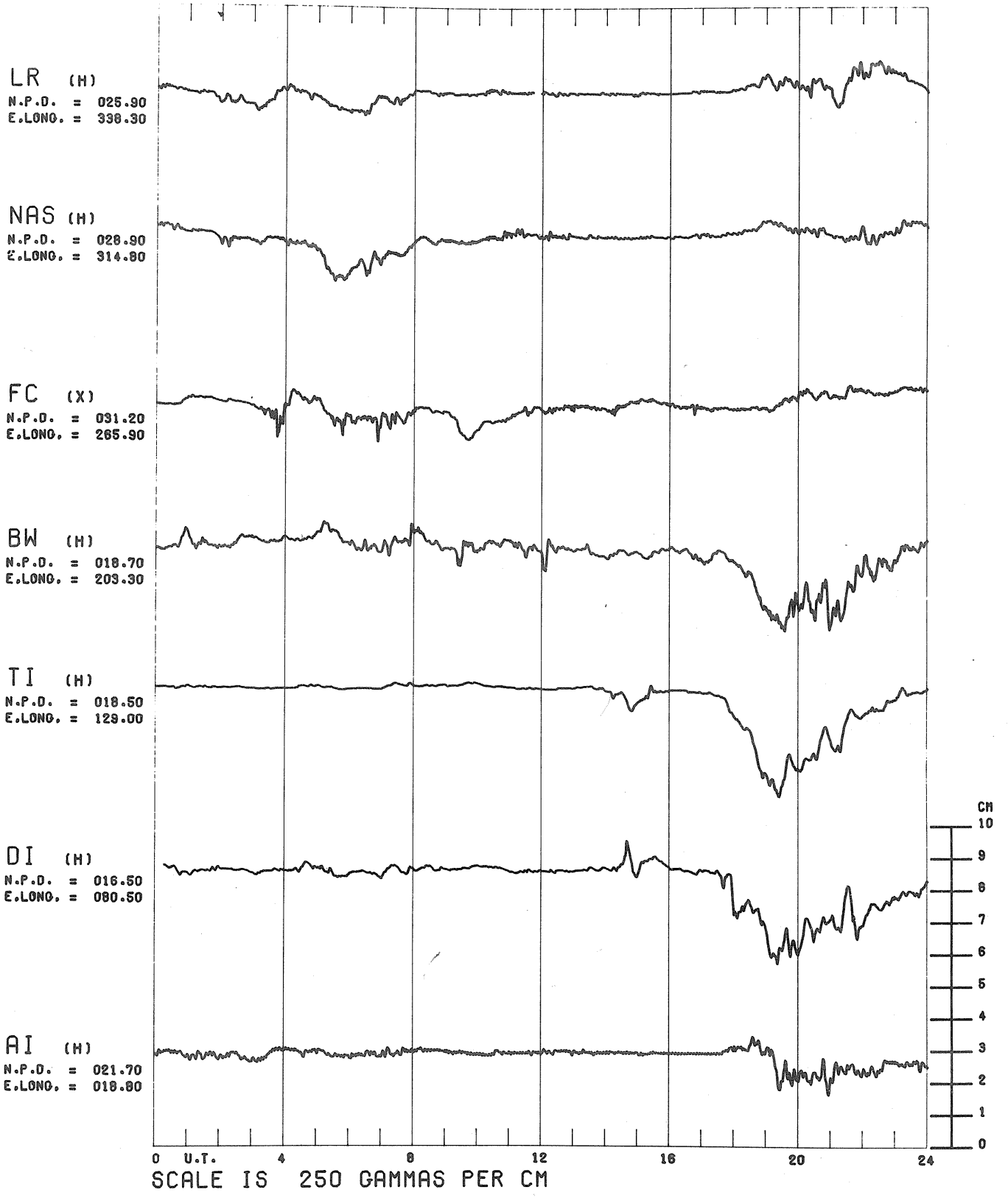

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BY STATION DAY
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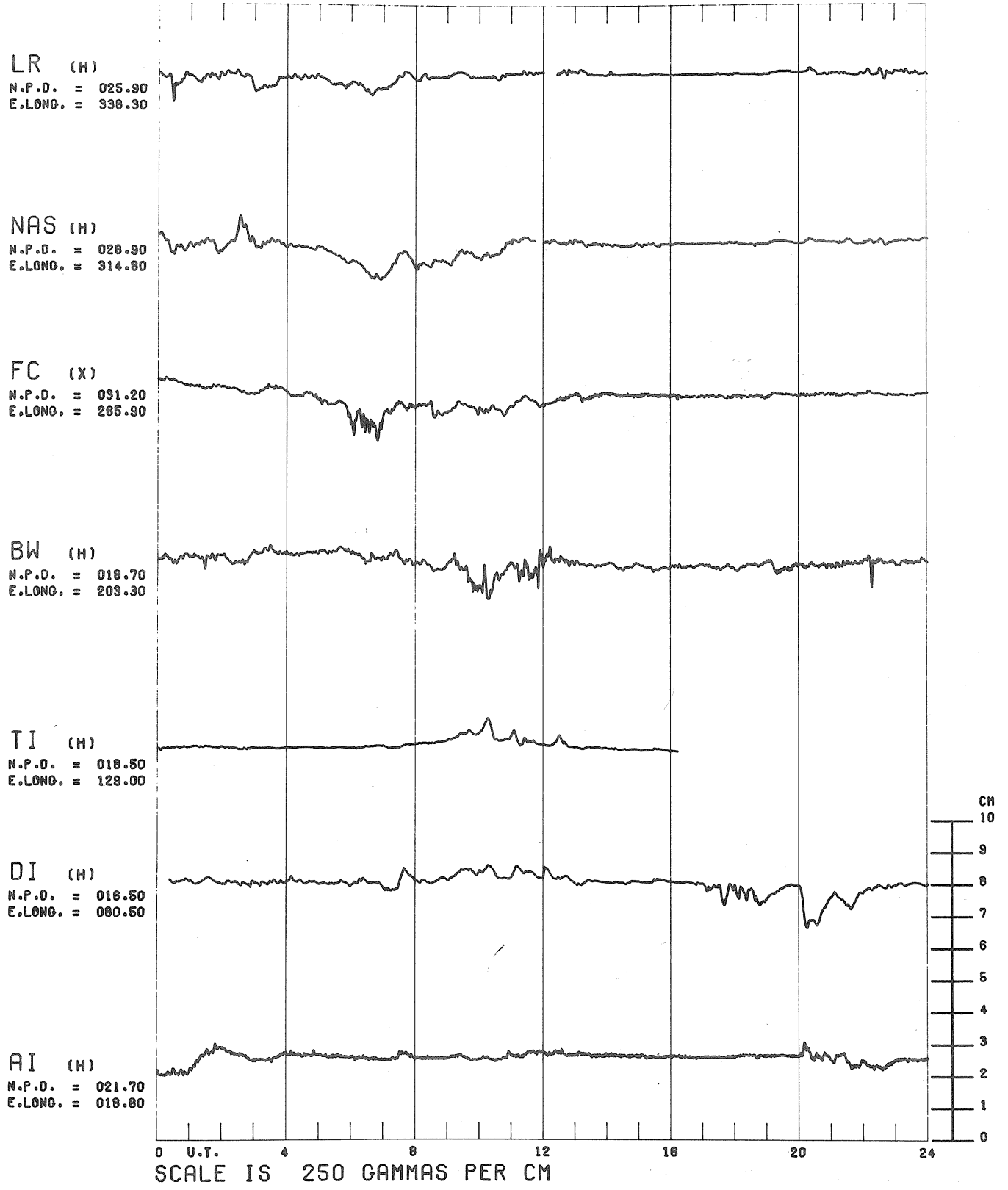
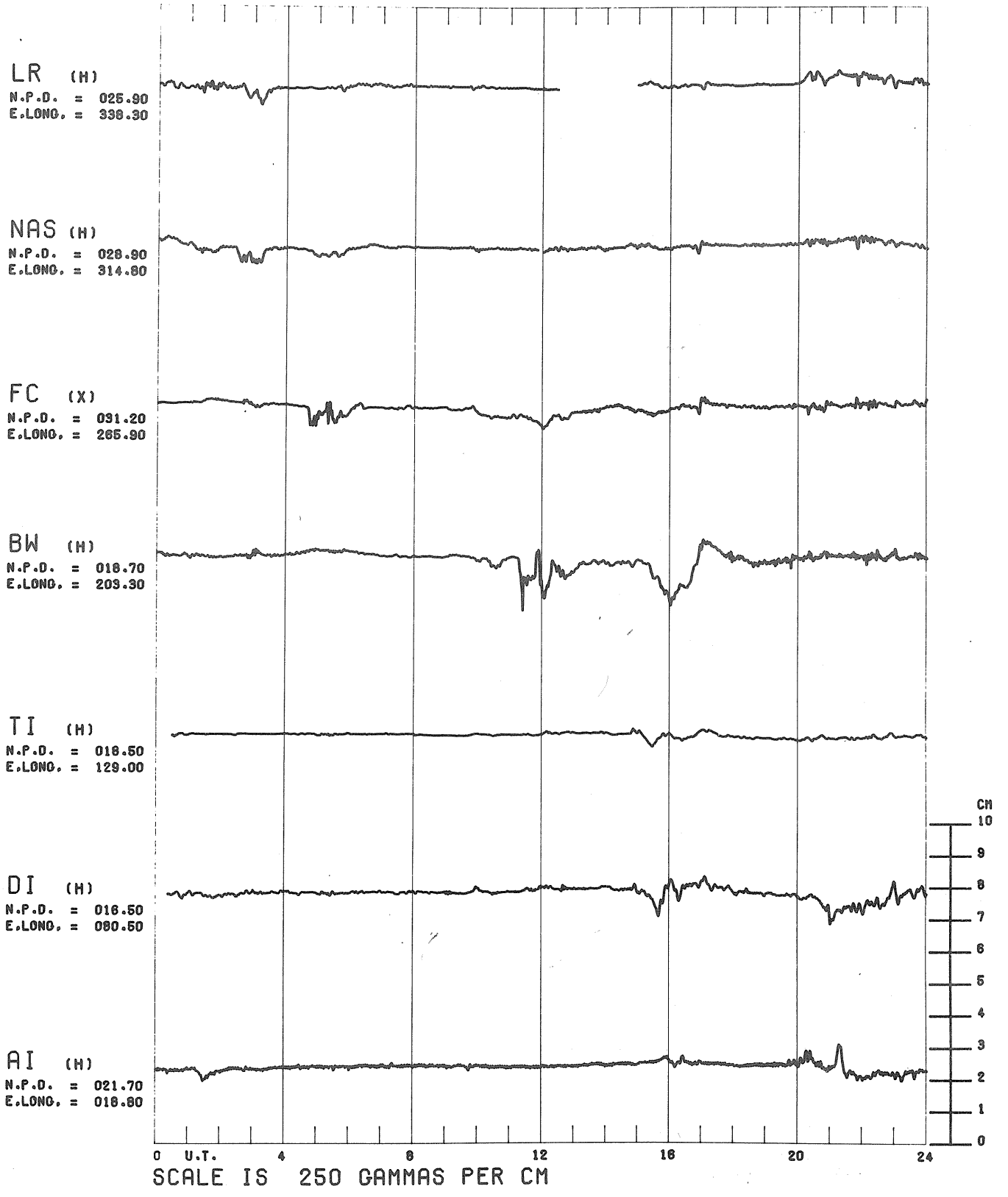


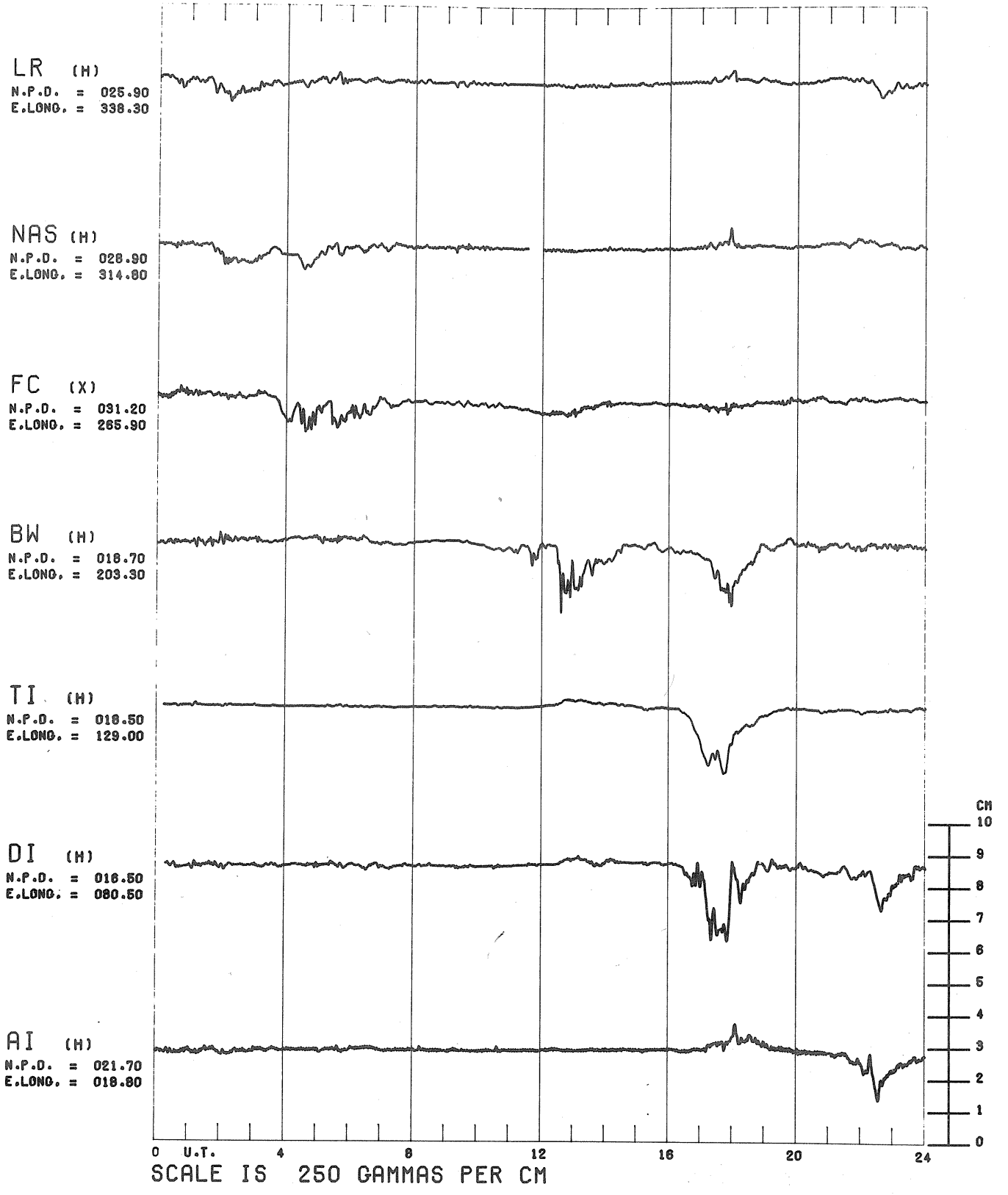
SCALE IS 250 GAMMAS PER CM

COMMON SCALE MAGNETOGRAMS
BY STATION DAY
19 JANUARY 1976



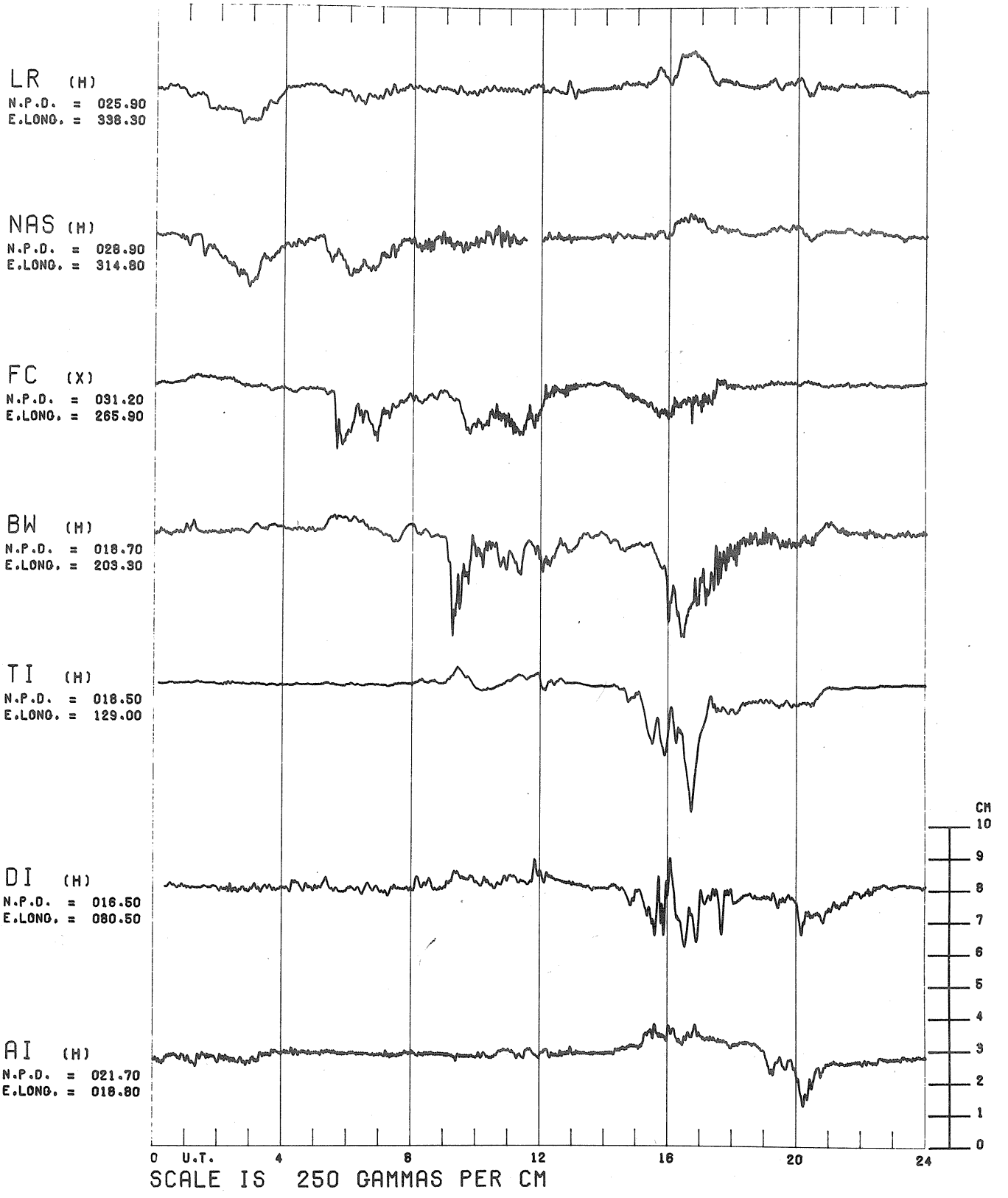
SCALE IS 250 GAMMAS PER CM

COMMON SCALE MAGNETOGRAMS
BY STATION DAY
20 JANUARY 1976

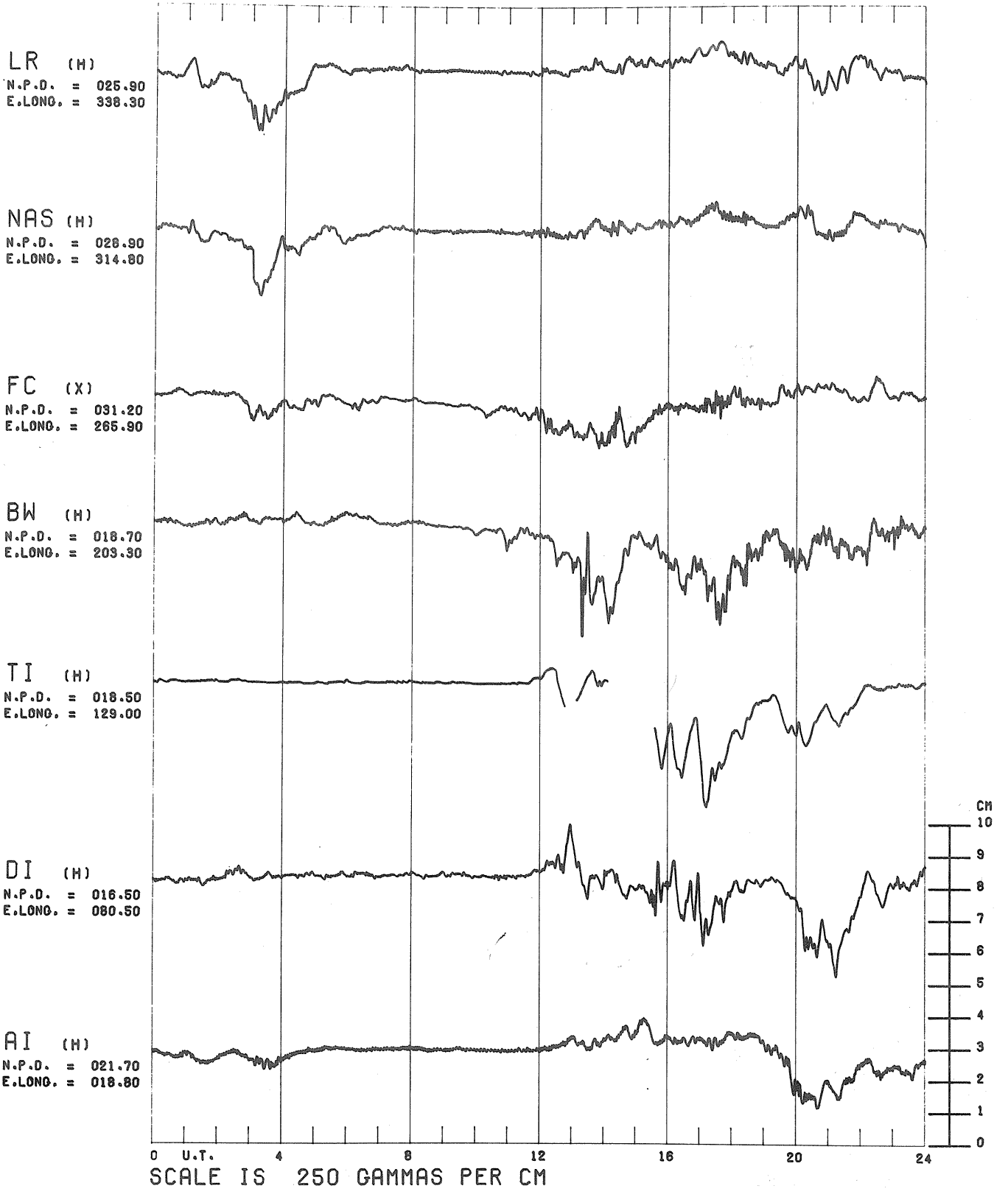


SCALE IS 250 GAMMAS PER CM

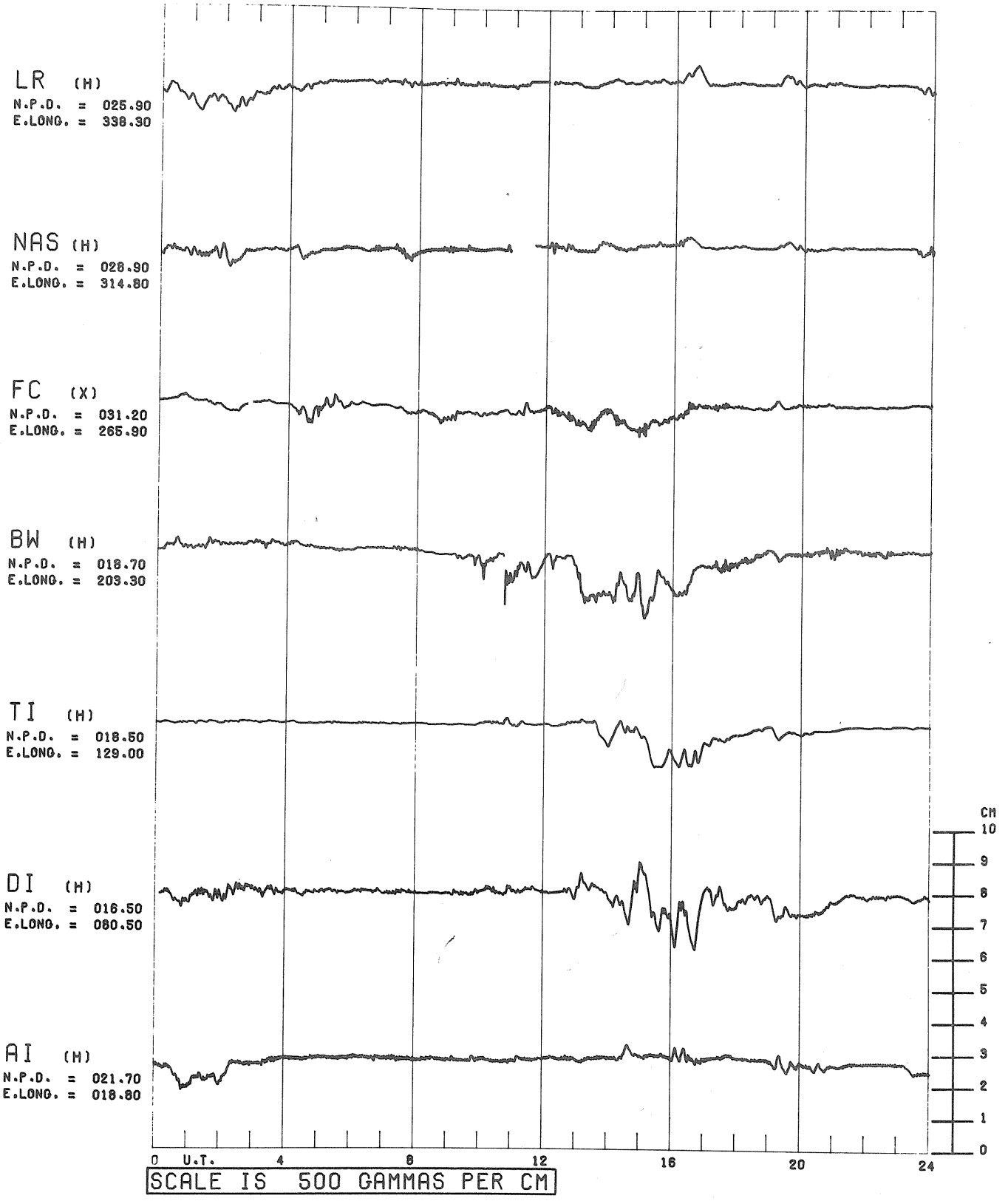
COMMON SCALE MAGNETOGRAMS
BY STATION DAY
21 JANUARY 1976



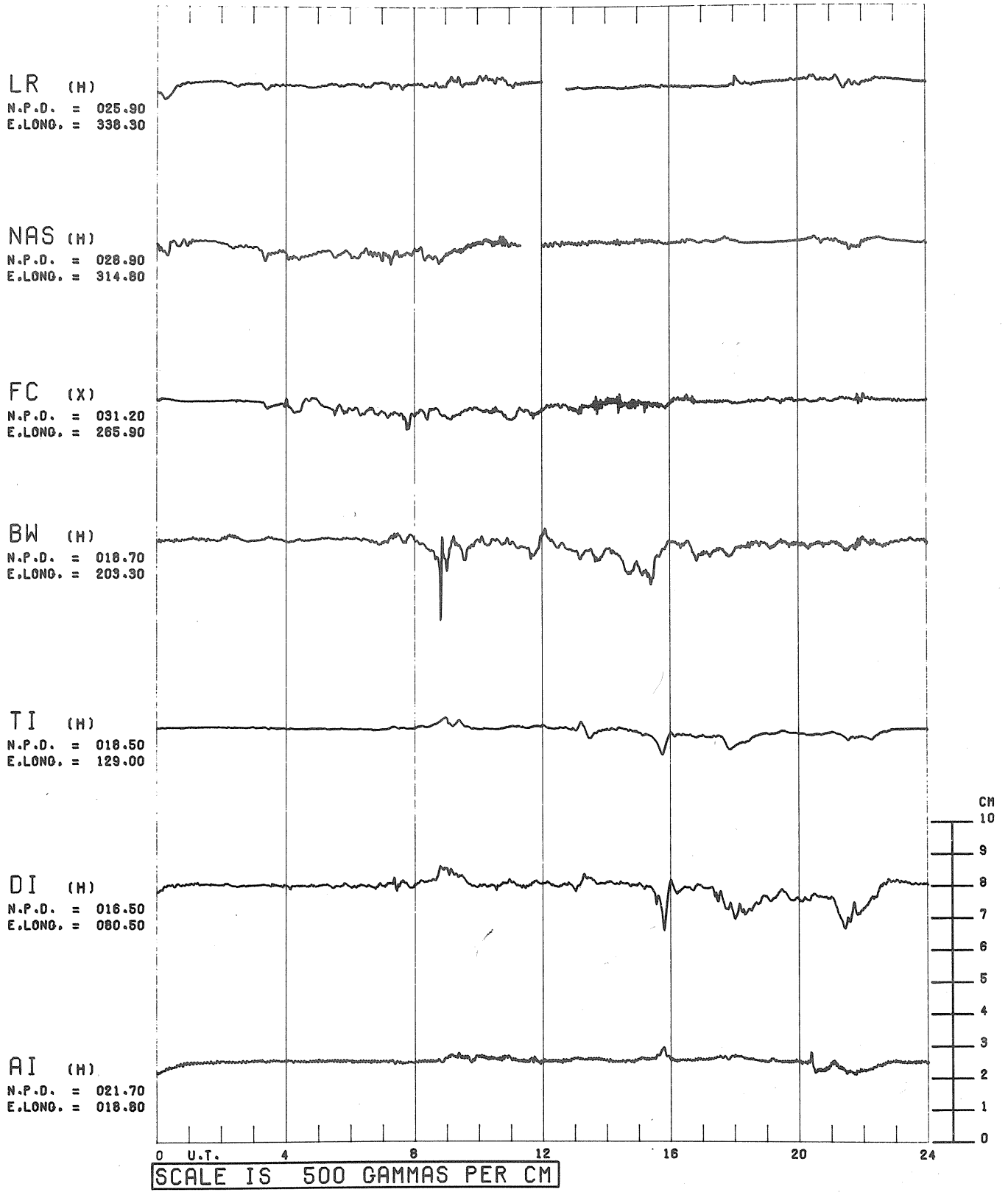
COMMON SCALE MAGNETOGRAMS
BY STATION DAY
22 JANUARY 1976



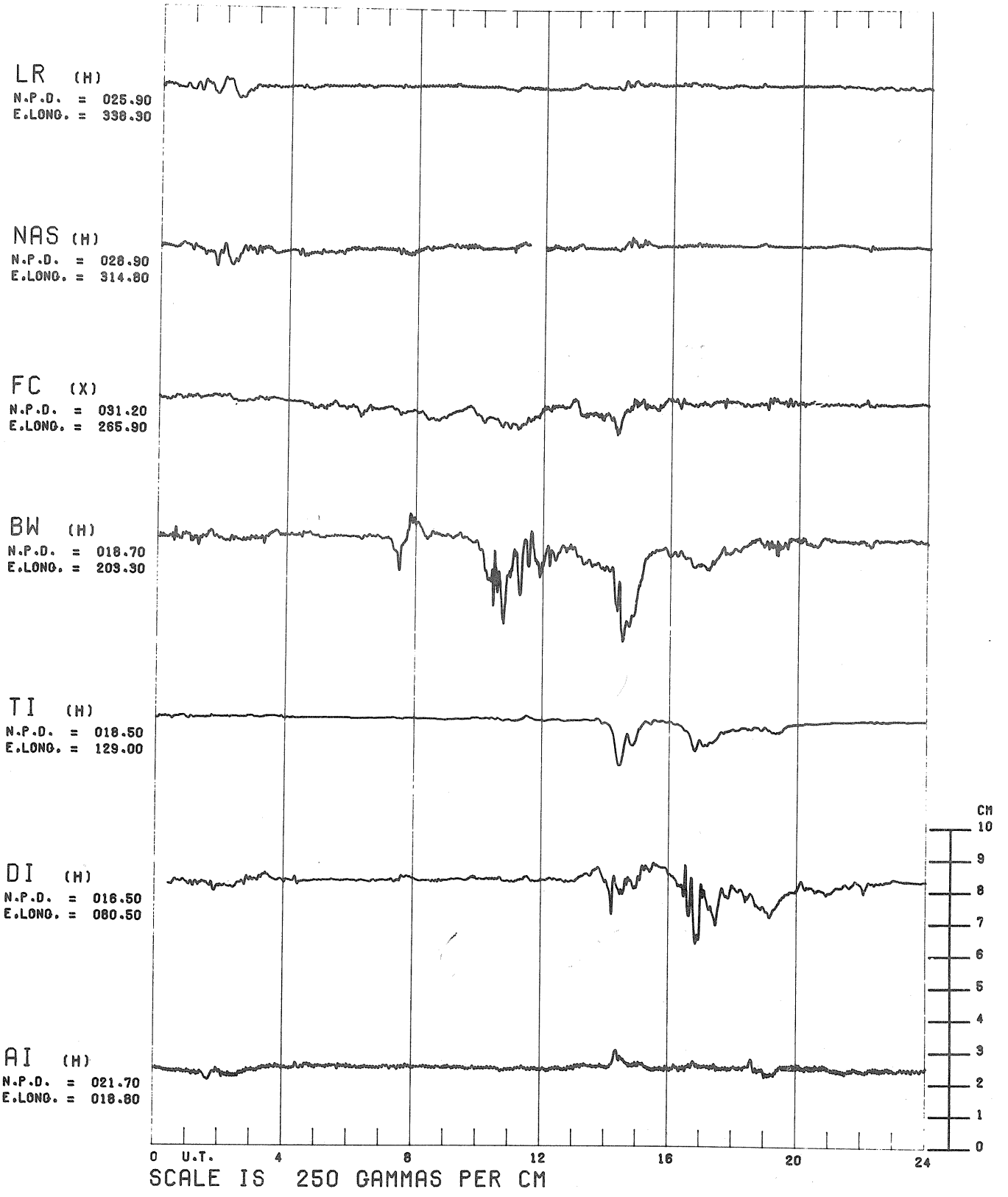
COMMON SCALE MAGNETOGRAMS
BY STATION DAY
23 JANUARY 1976



COMMON SCALE MAGNETOGRAMS
BY STATION DAY
24 JANUARY 1976

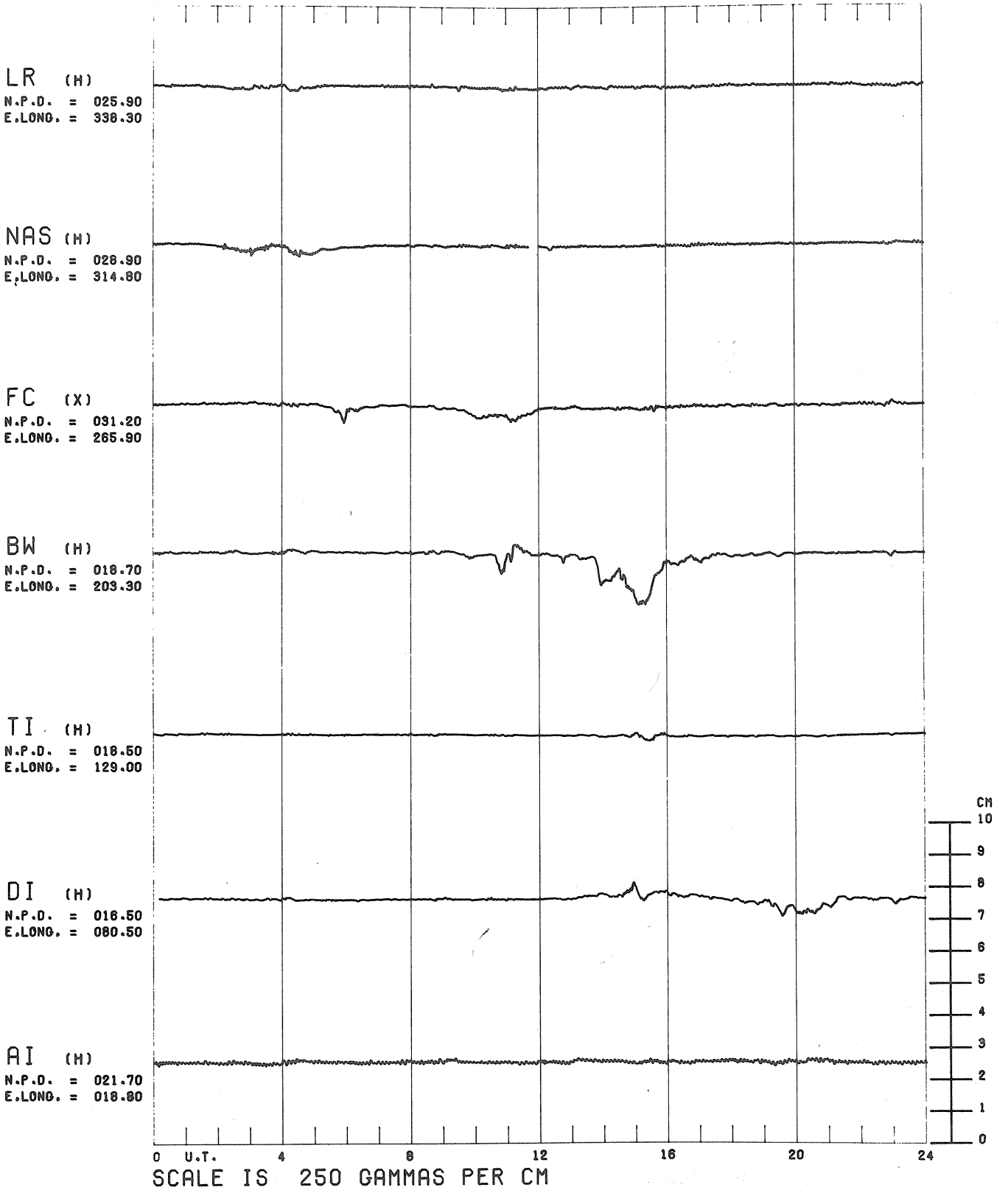


COMMON SCALE MAGNETOGRAMS
BY STATION DAY
25 JANUARY 1976



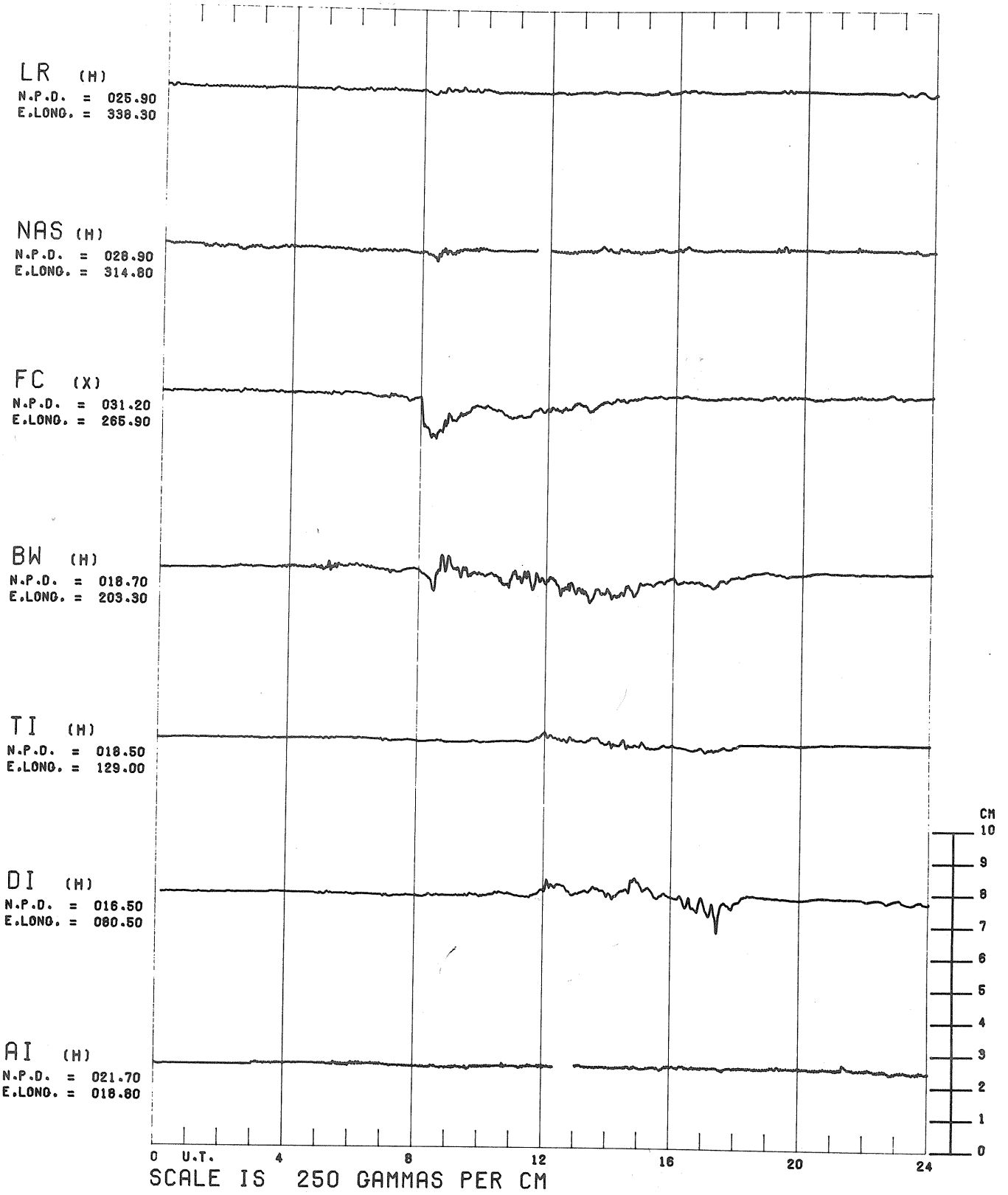
SCALE IS 250 GAMMAS PER CM

COMMON SCALE MAGNETOGRAMS
BY STATION DAY
26 JANUARY 1976

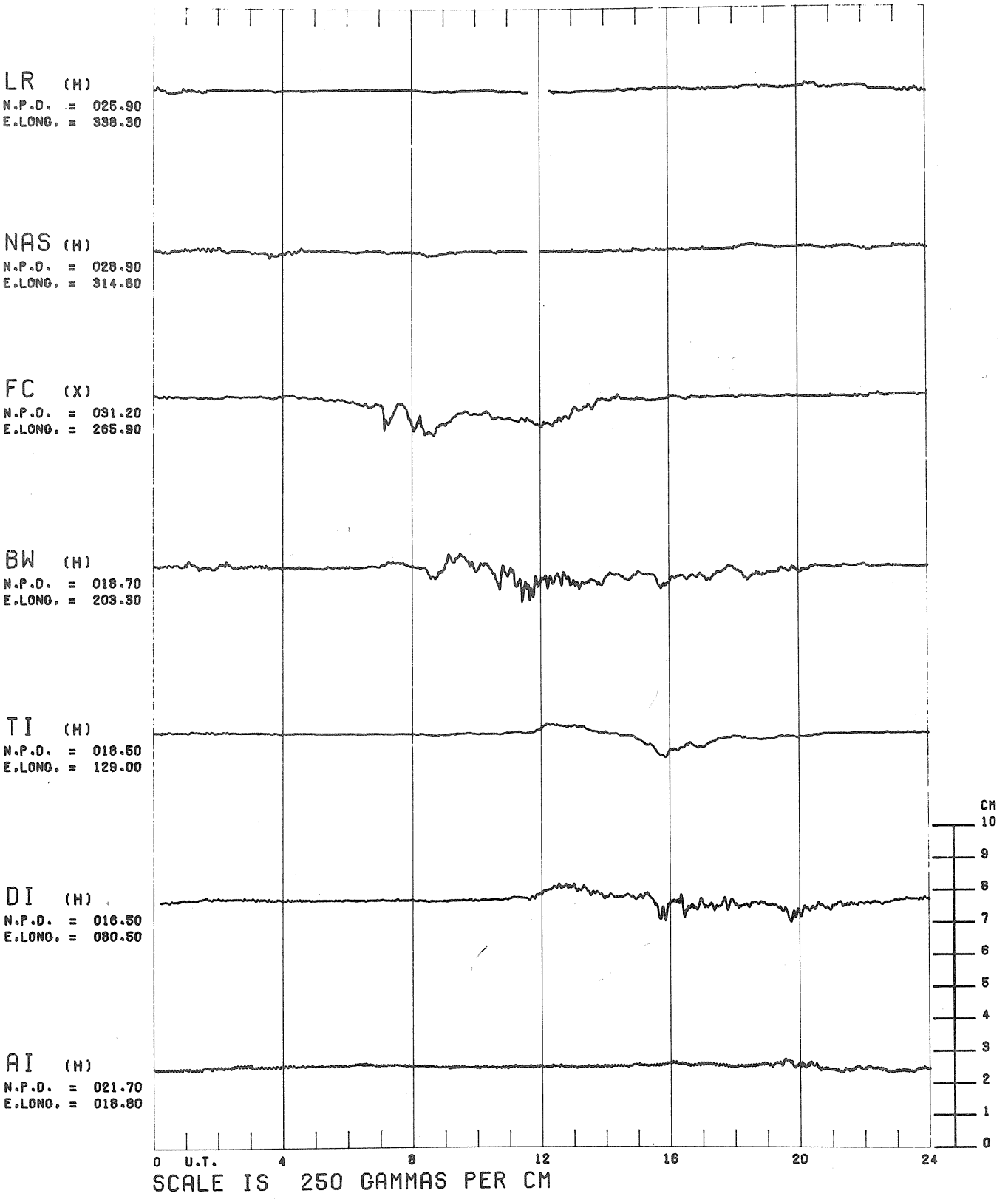


SCALE IS 250 GAMMAS PER CM

COMMON SCALE MAGNETOGRAMS
BY STATION DAY
27 JANUARY 1976

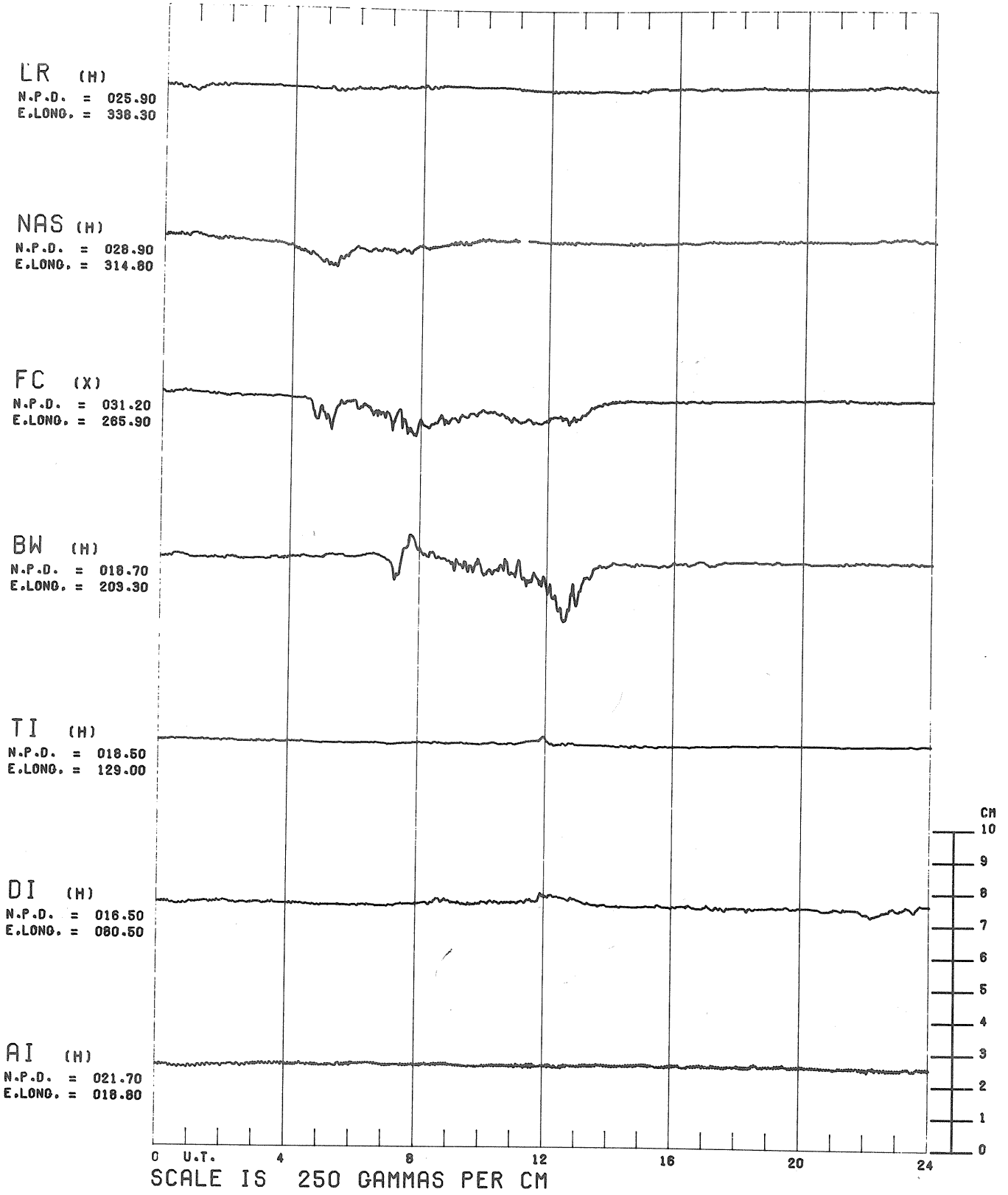


COMMON SCALE MAGNETOGRAMS
BY STATION DAY
28 JANUARY 1976

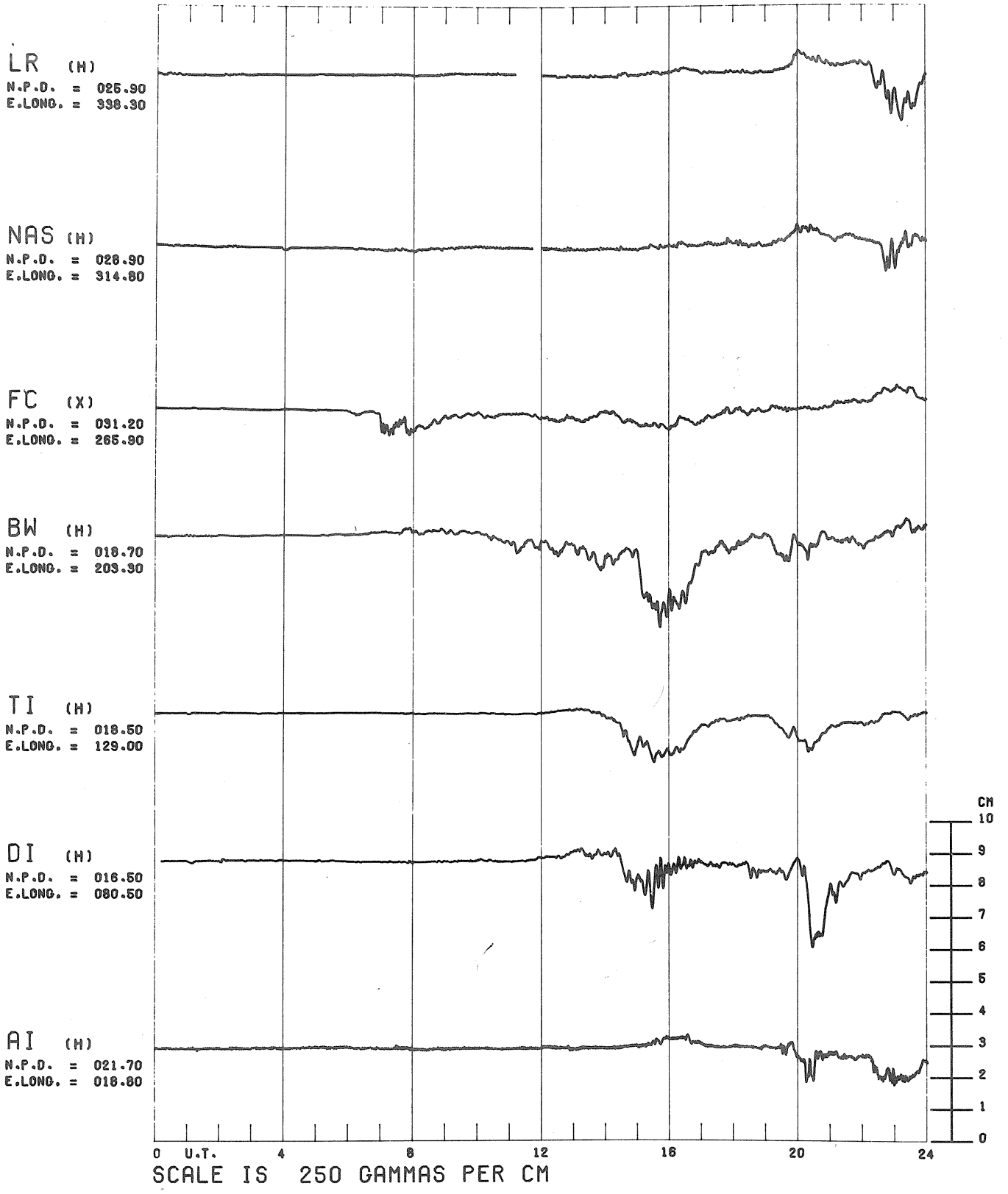


SCALE IS 250 GAMMAS PER CM

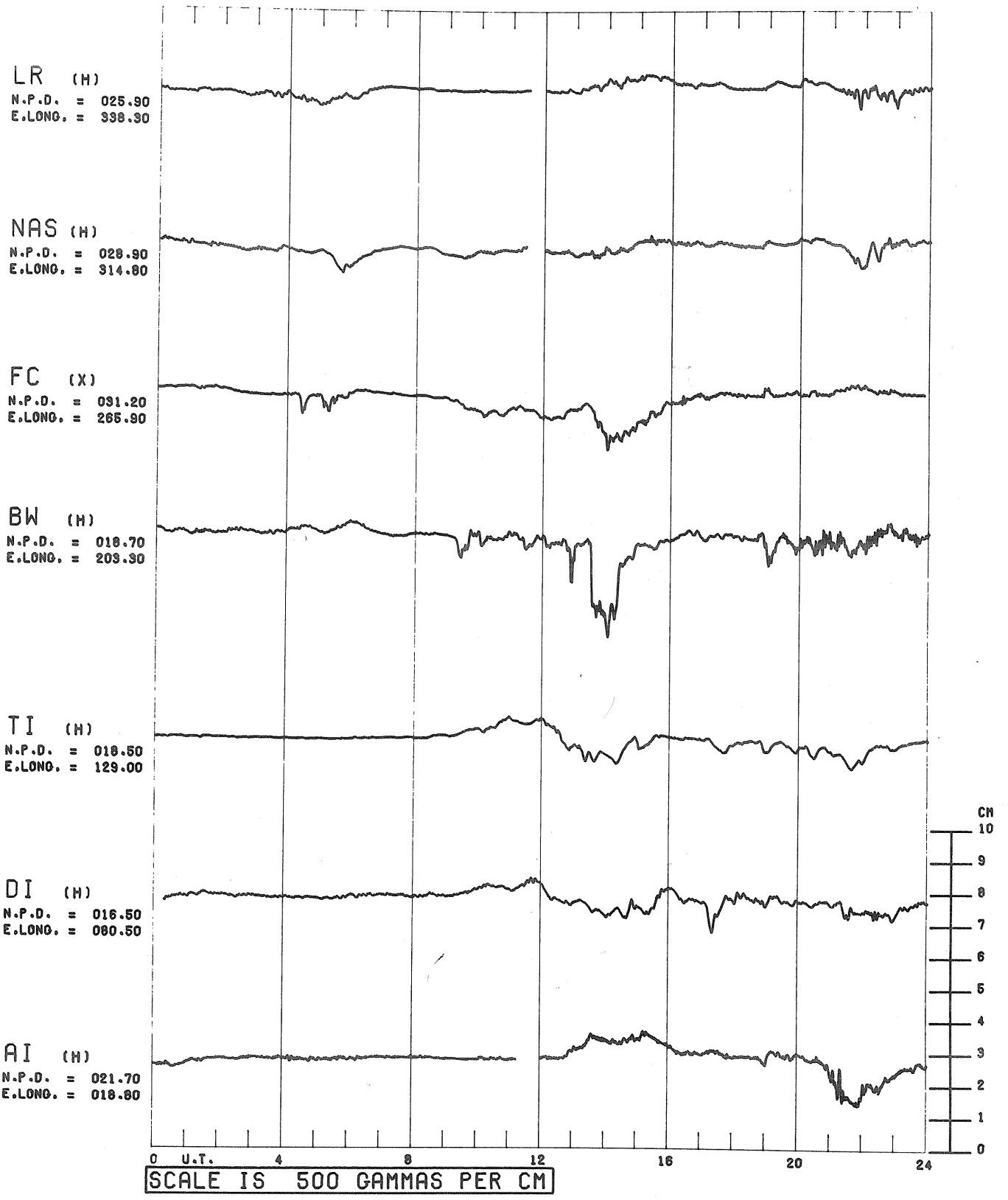
COMMON SCALE MAGNETOGRAMS
BY STATION DAY
29 JANUARY 1976



COMMON SCALE MAGNETOGRAMS
BY STATION DAY
30 JANUARY 1976



COMMON SCALE MAGNETOGRAMS
BY STATION DAY
31 JANUARY 1976



SECTION III. PRELIMINARY AE(7) INDICES, JANUARY 1976

1. Discussion of Graphs, Tables, and Statistical Information

The following figures display the familiar AU, AL, AE, and AO graphs for each day of the month and are based upon 1-min data samples. As indicated at the top of each frame, these indices are derived from data from only seven auroral zone observatories and, as such, are considered "provisional." WDC-A for Solar-Terrestrial Physics intends to update these indices during and after the IMS and to publish "final" graphs and summary tables in the usual UAG Report format for each year.

Following the pages of AE graphs are Tables 1-4 (pages 47-50) containing the index (AE, AO, AU, AL) amplitudes for each hour of each UT day of the month, the monthly averages for each hour and for the hours of the designated 5Q and 5D days, and the average amplitudes for each day and for the whole month. Tables 5-6 (pages 51-52) give the station having the largest hourly average positive and negative deviations (hourly AU and AL) for each hour of each day in the month. These provide a key to the graphs of AU and AL by usually indicating which station's magnetogram provided the extreme deviations giving AU or AL for that hour. Sometimes the most extreme deviation during an hour will have occurred at another station. The general patterns, however, of UT time of AU and AL provision by each station are the same whether based on hourly averages or minute-by-minute extremes.

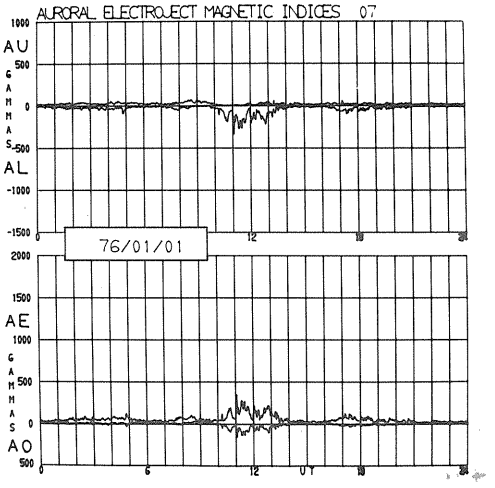
Table 7 (page 53) gives the number of times (1-min intervals) during the month when the indicated station provided the AU and AL index in each hour of the UT day. For the relatively sparse station distribution used in this AE(7) derivation, it is not surprising that each station could produce at least one extreme positive and negative deviation in almost every hour of the day. However, the overall pattern is for the most frequent observation of the maximum positive H-deviation to occur around 6 hours before Local Geomagnetic Midnight (LGM) and the most negative H-deviation to occur around 3 hours after LGM [Allen and Kroehl, 1975]. Individual station deviations from this pattern may be due to the dominant influence of a few isolated large substorms during a relatively quiet month. This should become apparent as more months of data are similarly analyzed.

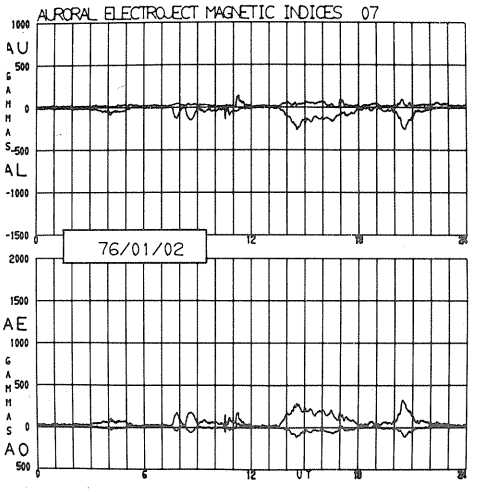
Table 8 (p. 53) gives the monthly average of quiet-time H for each observatory. This is computed from the 1-minute H scalings on the five Q-days of the month, using known or assumed H baselines.

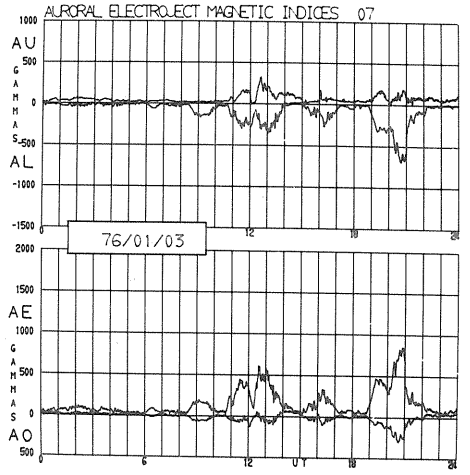
Figures 2-5 (pages 54-57) graphically display the details suggested by the tabulation of hourly ta-
tion frequency of AU and AL contribution. The "frequency of 1-min AU provision by station" (Figure 2) for the month is a smoothed curve showing the number of times that each station contributed the extreme positive deviation from minute-to-minute, N(AU). An 11-point running mean was used on the raw numbers of contributions for the 1440 1-min intervals of the UT day. Data for the UT day are duplicated (0000-2400 UT shown twice) so that the end of the day will not interrupt the regular pattern of progressive index contribution as each station rotates into the critical region (around 1800 LGT). Arrows mark UT times of LGM for each station. Figure 3, on the opposite page, shows the "total amplitude of most positive H-variations." This is a smoothed graph for each station's cumulative amplitude of deviation for each minute when it was providing the AU index. Each scale division on the right side represents +500 gammas. Comparison of these curves with the N(AU) graphs of Figure 2 shows that the largest magnitude positive excursions generally occur at the same time when the stations most often provide AU indices. Post-midnight minor peaks are the result of large positive deviations on only 2 disturbed days and typically result from variations such that one station first supplied AL indices for several minutes and then the H-component at

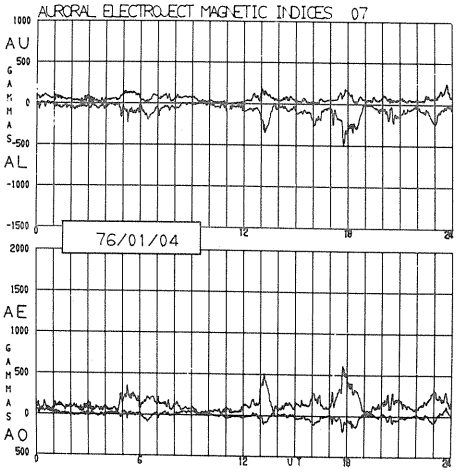
(Text continued on page 46)

2. Graphs of AU,AL,AE, and AO for Each Day of the Month






AURORAL ELECTROJECT MAGNETIC INDICES 07
AU
AL
AE
AO
GAMMAS
76/01/03
UT


AURORAL ELECTROJECT MAGNETIC INDICES 07
AU
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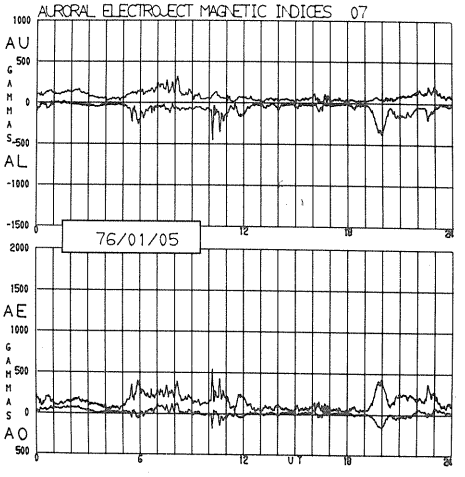
AO
GAMMAS
76/01/04
UT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AU
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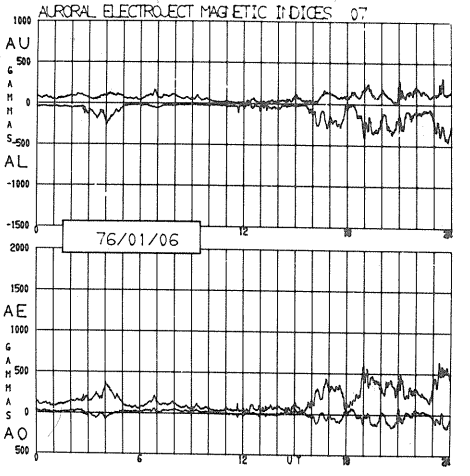
GAMMAS
76/01/05
UT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AU
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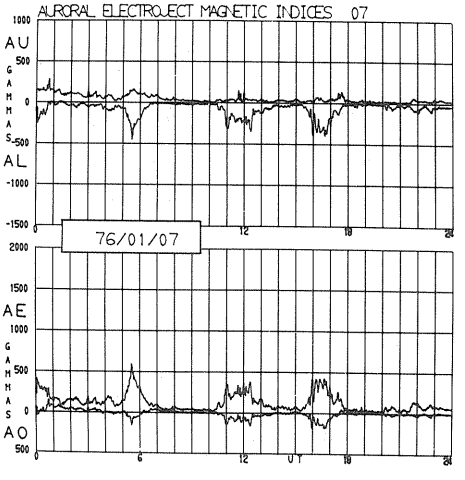
AO
GAMMAS
76/01/06
UT


AURORAL ELECTROJECT MAGNETIC INDICES 07
AU
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AO
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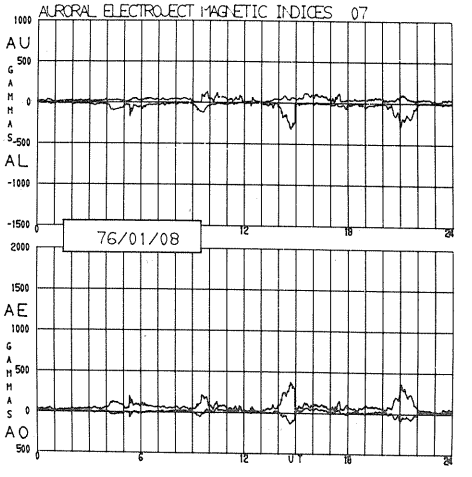
76/01/07
UT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76/01/08
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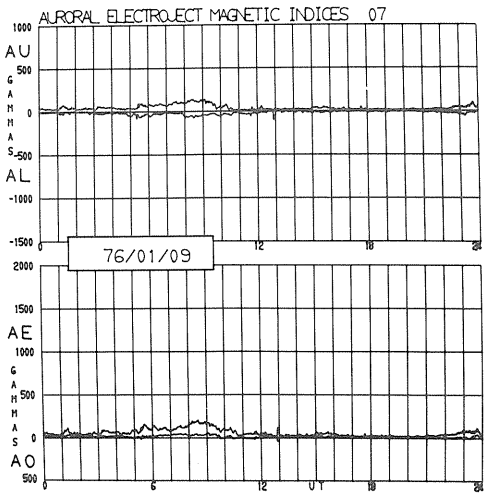
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76/01/09
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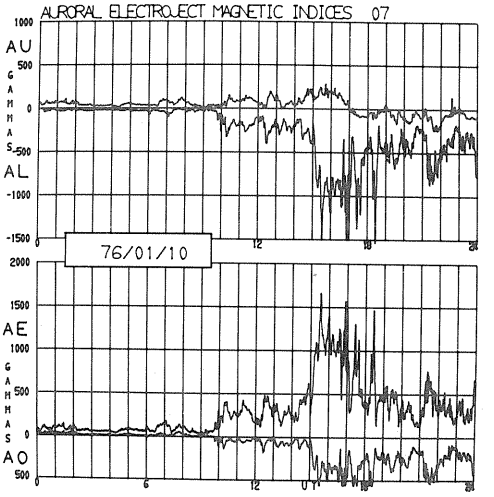
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76/01/10
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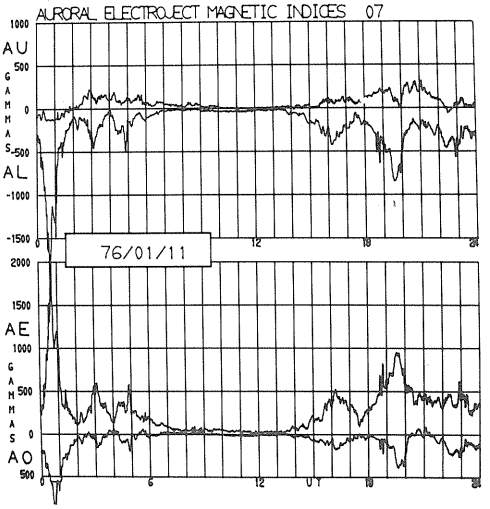
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76/01/11
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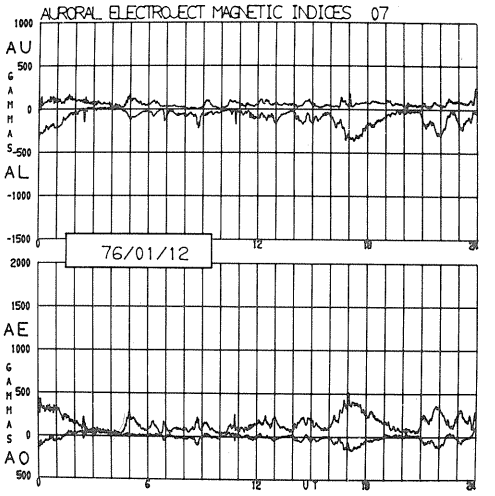
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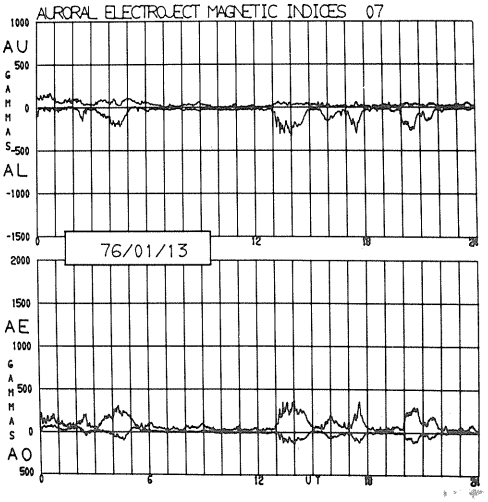
76/01/12
UT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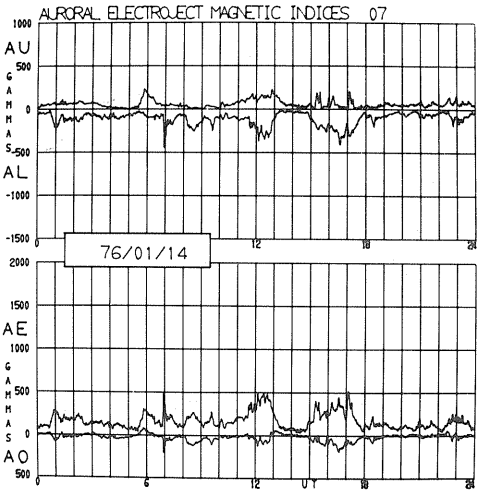
76/01/13
UT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76/01/14
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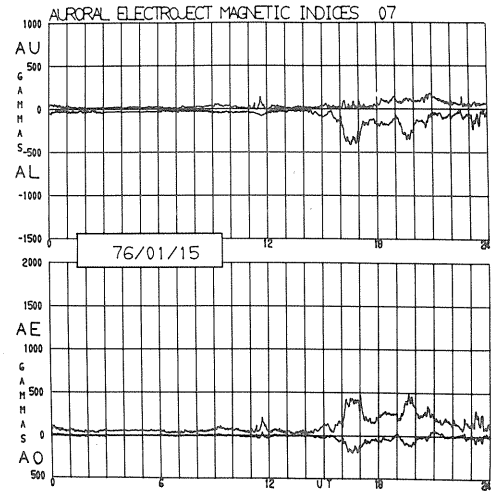
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GAMMAS
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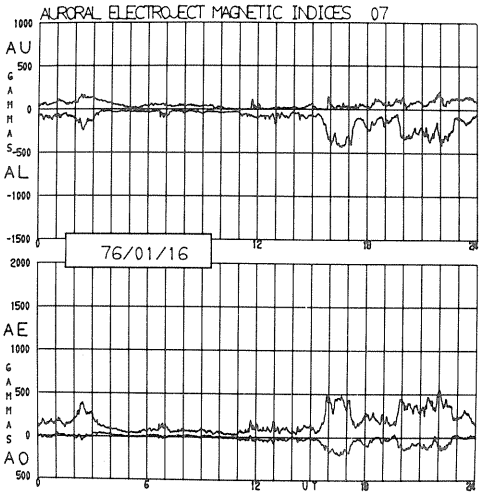
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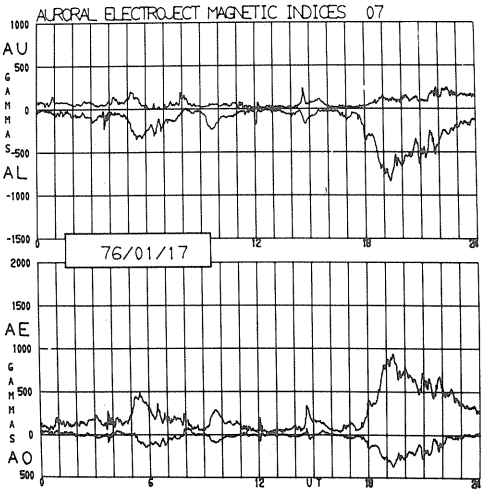
UT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76/01/17
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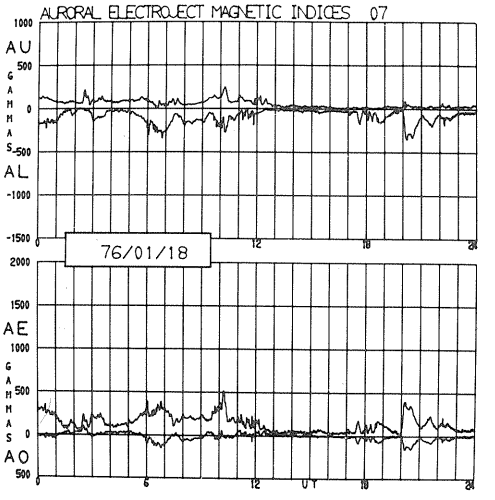
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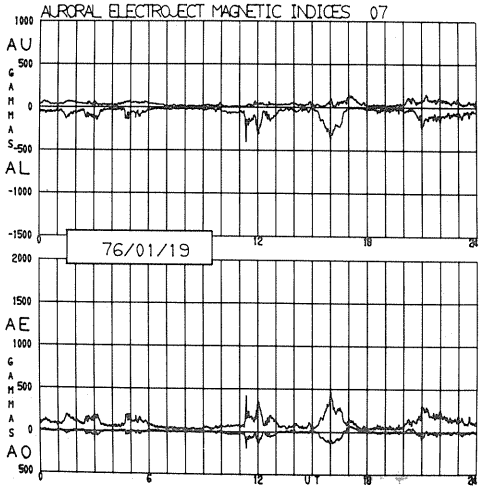
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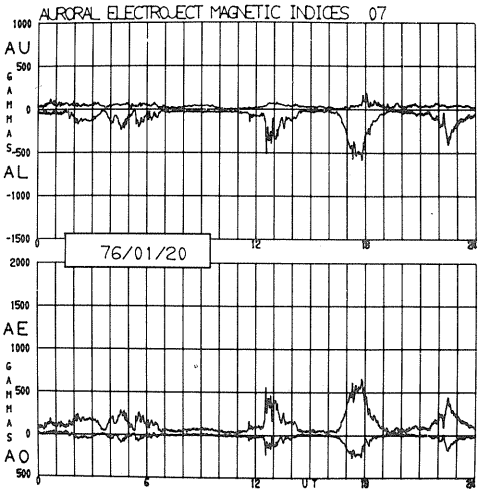
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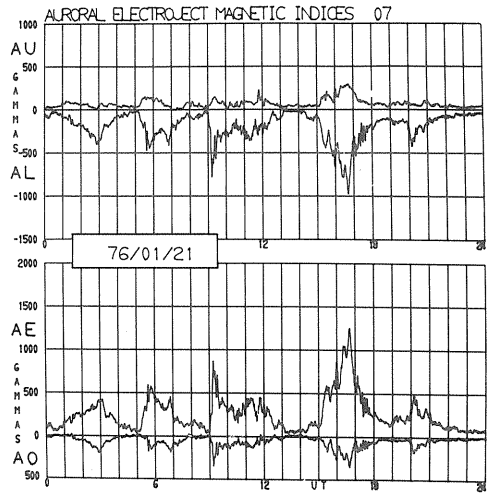
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76/01/21
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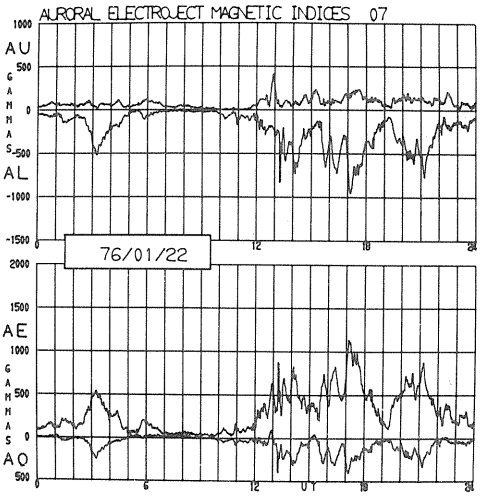
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76/01/22
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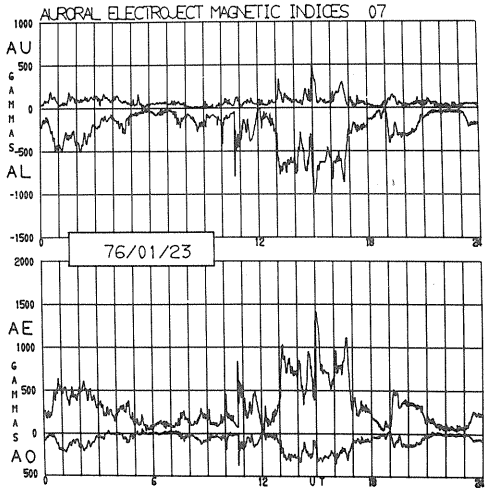
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76/01/23
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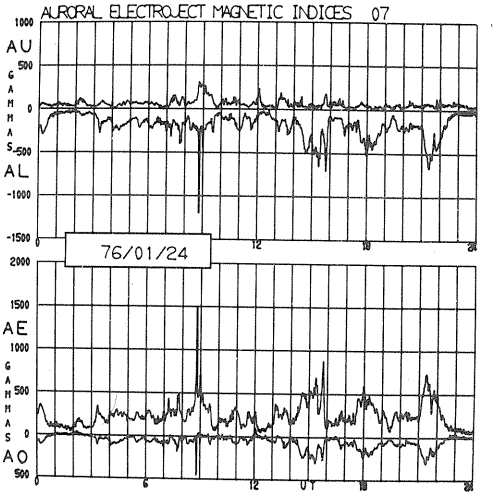
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76/01/24
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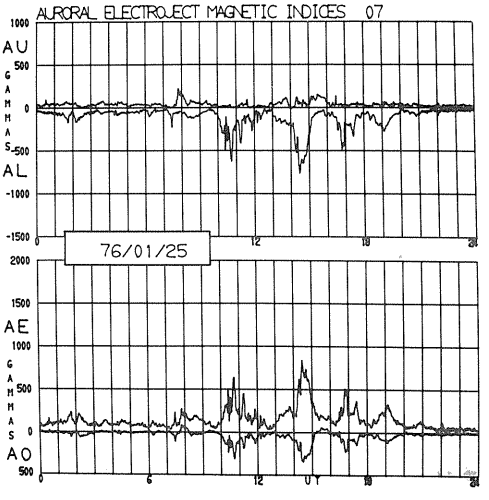
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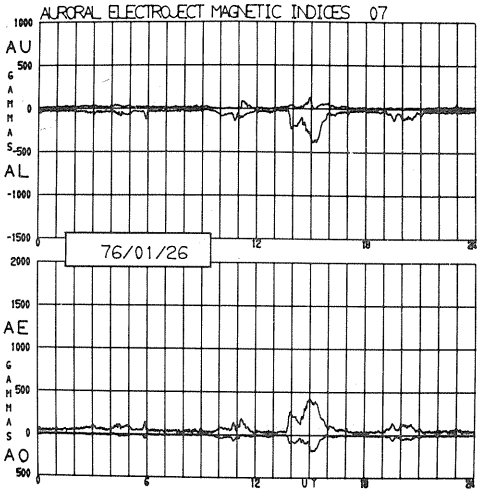
GAMMAS
76/01/25
UT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76/01/26
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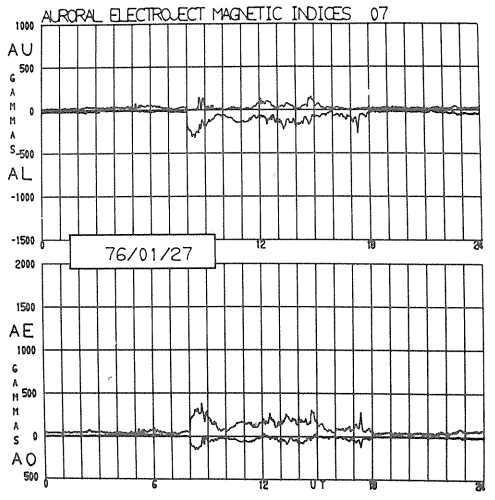
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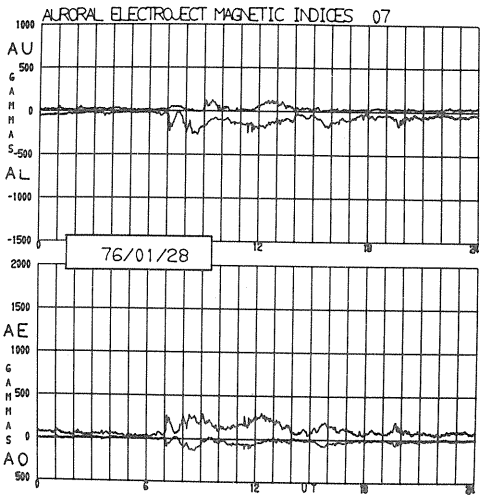
GAMMAS
76/01/27
UT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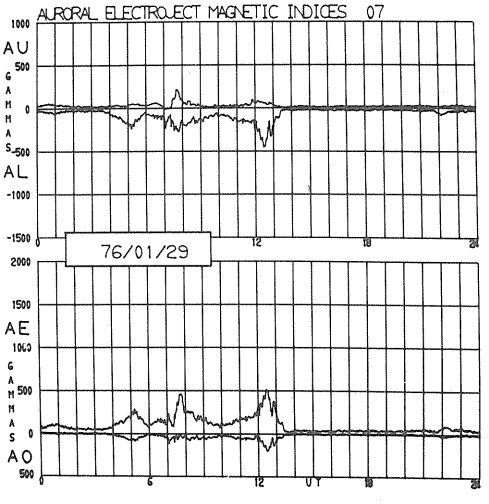
GAMMAS
76/01/28
UT


AURORAL ELECTROJECT MAGNETIC INDICES 07
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GAMMAS
76/01/29
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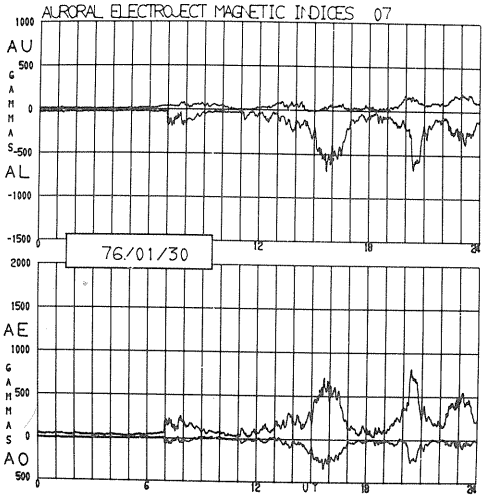
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76/01/30
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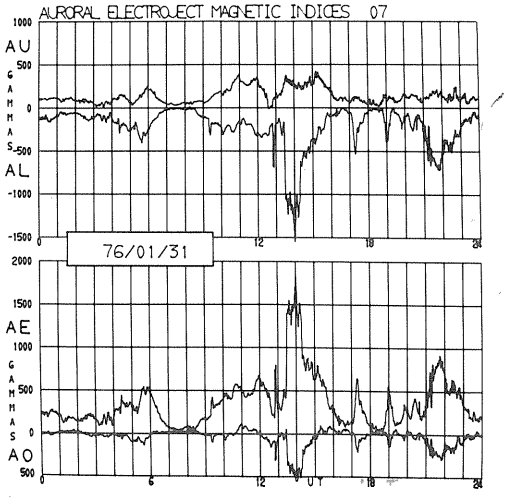
AURORAL ELECTROJECT MAGNETIC INDICES 07
AU
AL
AE
AO
GAMMAS
76/01/31
UT

(Text continued from page 40)
that location swung from extreme negative to extreme positive before recovery. Such events are infrequently observed in AE indices derived from 10 to 12 stations because usually some station is in position to monitor the true eastward electrojet effect rather than having oscillatory variations near LGM providing AU.

The graph "frequency of 1-min AL provision by station" (Figure 4) shows the smoothed curve for the number of times in the month that each station provided AL during each minute of the UT day, N(AL). Evidently, the pattern is for a station to rotate into the most probable region for encountering extreme negative H-deviations some hours after LGM. Unusual, asymmetric peaks in frequency of AL provision by any station may seemingly be attributed to disturbances on only a few days of the month. Barrow shows this for January 1976, when N(AL) reaches a peak about 1340 UT (only 1 hour after LGM). The stacked day plots for 20, 22, 23, and 29 January show Barrow with relatively large negative variations around 1300 UT, while all other stations are much less disturbed or even quiet. Such unevenness due to a few isolated events should average out over the course of a year. Figure 5 shows the corresponding "total Amplitude of most negative H-variations." This is the cumulative amplitude of negative H observed by each station during those minutes when they were providing AL. Each scale division on the right side is -1000 gammas. Again, the comparison of cumulative amplitudes and N(AL) curves can indicate the most probable time of occurrence of larger amplitude events. For example, for January 1976, Barrow had a double peak in total amplitude, but the second, higher peak (around 1630 UT) corresponds to more frequent large events.

For Figures 2-5 slightly elevated levels of the curve for any station during normally quiet hours indicate possible difficulty with the quiet-time level for some days of the month. This information will be used as a quality control check for the final derivations of AE(12) indices at a later date.

3. Tables of AE,AO,AU, and AL Indices

Table 1. AE Indices

JANUARY 1976 VALUES ARE EXPRESSED IN GAMMAS

	UT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	MEAN
Q	01	028	043	054	052	072	044	034	049	065	046	086	178	147	073	030	028	049	074	056	046	037	022	028	022	057
Q	02	024	026	029	052	069	026	028	068	103	061	059	069	021	050	213	192	155	099	045	053	193	074	047	027	074
	03	040	067	075	057	043	028	059	048	078	142	084	319	356	311	096	102	214	074	065	377	595	223	103	072	151
	04	085	099	083	078	092	213	170	123	093	042	051	055	140	254	112	142	165	313	279	087	179	123	170	217	140
	05	153	120	153	101	066	222	236	253	224	133	243	147	095	073	064	072	090	056	059	213	213	224	228	131	149
	06	107	108	158	201	236	078	127	116	082	074	042	048	060	067	069	085	264	283	211	424	332	300	233	479	174
	07	253	130	126	121	128	334	141	051	045	035	081	246	214	085	063	102	328	153	041	029	055	069	089	073	125
	08	029	024	035	043	096	087	076	058	053	117	080	047	025	049	234	083	085	075	059	077	111	222	040	036	077
Q	09	040	056	041	065	056	100	104	113	175	124	065	043	038	024	030	050	029	021	022	020	018	032	052	076	058
D	10	076	089	064	051	055	068	095	104	063	081	270	284	296	272	369	1008	1060	667	527	410	258	444	313	319	302
D	11	935	356	255	337	326	211	120	057	051	050	039	028	026	041	104	249	395	238	447	765	468	391	402	345	277
	12	320	220	104	056	079	136	104	080	100	095	086	106	168	118	172	122	246	365	224	113	076	251	198	217	157
	13	141	082	106	127	222	080	057	034	064	039	033	032	035	238	200	080	098	155	036	053	213	119	042	046	097
	14	121	190	160	128	099	133	196	170	193	148	144	251	400	121	076	249	315	222	130	105	099	123	135	153	169
	15	069	050	045	051	053	053	038	040	053	077	054	083	051	037	060	112	347	213	252	328	257	171	131	156	116
	16	147	156	284	131	068	054	092	075	069	061	037	085	098	089	098	171	405	222	226	226	353	377	358	237	172
	17	103	123	145	153	157	380	224	176	092	187	140	068	060	060	144	127	069	126	504	792	638	573	455	318	242
	18	268	128	121	174	109	195	288	203	202	230	264	151	093	045	045	053	037	069	110	074	260	145	120	073	144
	19	097	125	117	090	094	116	053	036	032	050	068	155	170	068	068	170	232	083	050	051	131	222	160	117	106
	20	098	109	176	115	191	144	100	049	064	064	036	066	221	227	081	050	102	502	219	059	078	110	267	140	136
	21	090	209	315	246	091	322	358	156	115	439	282	357	200	071	112	454	884	404	194	210	319	162	105	083	257
D	22	119	160	209	410	193	110	111	049	050	038	074	104	341	491	509	443	591	360	383	313	601	543	279	209	300
	23	355	451	447	259	257	101	105	146	164	140	269	302	181	755	672	810	766	292	114	352	294	118	068	181	317
D	24	197	084	116	189	243	206	215	289	370	263	207	195	120	257	330	462	187	292	349	214	246	491	194	083	242
	25	086	130	120	094	100	076	079	119	165	088	304	200	083	210	515	204	222	198	150	182	083	065	056	053	149
Q	26	042	047	063	063	085	065	046	043	044	042	079	093	038	075	241	277	074	039	039	080	097	047	049	048	076
	27	039	042	050	041	037	054	050	043	259	123	123	137	168	190	195	093	085	107	042	041	042	043	062	065	089
Q	28	063	054	047	053	044	030	045	137	215	182	135	189	247	163	080	139	128	082	084	109	091	073	078	083	106
	29	084	067	050	056	143	177	131	258	211	120	125	195	364	078	038	033	038	040	041	039	049	051	072	053	105
	30	040	039	037	033	032	035	060	170	139	077	047	063	106	199	211	505	428	115	089	192	531	239	321	384	171
D	31	228	164	179	147	311	402	237	054	102	297	480	501	453	905	1012	532	159	281	115	230	268	677	515	233	353
	MEAN	144	121	128	122	124	138	122	109	120	118	132	155	162	184	201	232	266	217	167	202	232	217	173	153	164
5Q	MEAN	039	045	047	057	065	053	051	082	120	091	085	114	098	077	119	137	087	063	049	062	087	050	051	051	074
5D	MEAN	311	171	165	227	226	199	156	111	127	146	214	222	247	393	465	539	478	468	364	386	368	509	341	238	294

Table 2. A0 Indices

JANUARY 1976 VALUES ARE EXPRESSED IN GAMMAS

	UT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	MEAN
Q	01	008	005	006	000	002	011	012	004	018	018	-031	-075	-051	-010	007	005	002	-009	-003	-001	005	008	008	006	-002
Q	02	007	007	004	-003	-009	012	011	-002	-017	-002	-008	015	008	001	-063	-039	-045	-014	006	-002	-052	-006	020	012	-007
	03	011	007	016	012	005	011	000	006	-016	-045	-004	-045	-027	-028	055	-016	-034	008	014	-072	-199	-035	029	037	-013
	04	040	012	002	001	014	013	-025	008	031	019	-001	-015	-004	-025	006	-033	-040	-058	-063	010	-026	-009	-020	028	-006
	05	040	061	057	017	016	000	029	068	042	001	-040	-023	002	005	009	013	011	013	002	-057	-048	-010	034	041	012
	06	018	015	017	-028	-010	021	033	031	030	025	006	-006	003	-004	011	010	-042	-044	007	-071	-075	-007	018	-087	-005
	07	036	049	031	020	-005	-049	018	018	007	002	-017	-078	-063	-016	001	-021	-119	-009	008	006	-008	-004	-008	000	-008
	08	009	006	005	002	-018	-009	004	012	017	-010	024	020	011	005	-056	040	038	013	012	016	-010	-049	020	015	005
Q	09	016	021	017	016	011	010	026	038	033	024	005	-004	003	010	009	014	010	009	006	004	006	004	005	016	013
D	10	025	024	010	007	007	008	013	026	009	-008	-051	-038	-054	-073	-059	-323	-393	-390	-301	-260	-217	-355	-208	-222	-118
D	11	-563	-229	-037	-036	-057	-003	000	013	016	001	-013	-016	-006	-006	-031	-084	-110	-035	-064	-238	-017	-020	-175	-128	-077
	12	-068	-001	034	035	017	013	007	-006	-034	001	019	-004	-003	000	-021	-020	-062	-109	-030	016	009	-068	-018	-008	-013
	13	054	033	010	002	-044	031	008	000	006	002	-004	-003	-004	-071	-058	-011	-032	-056	-001	000	-068	-025	001	009	-009
	14	-009	-027	-004	-017	-033	014	-005	-037	-076	-046	-015	-009	-053	027	-001	-059	-103	-057	-030	004	007	001	014	-002	-022
	15	003	-005	-007	-004	-003	-002	-002	000	001	002	-008	-012	-001	-001	-009	-024	-137	-071	-037	-065	-009	017	000	-018	-016
	16	-009	005	-009	033	010	002	008	006	007	003	-009	-024	-032	-022	-018	-056	-167	-073	-039	-029	-102	-085	-068	008	-028
	17	028	012	-004	-019	016	-076	-096	-024	025	-051	-019	002	-004	-003	-005	018	-007	-037	-175	-288	-196	-144	-034	001	-045
	18	-018	013	036	010	028	008	-088	-030	-044	002	-003	018	028	010	003	000	-004	-018	-041	-008	-093	-045	-025	-001	-011
	19	000	-009	-014	-013	-003	-003	007	001	000	000	-020	-051	-045	003	004	-051	-055	038	000	002	009	-017	-008	-010	-010
	20	009	006	-039	-009	-040	-023	-006	-001	007	004	-008	-018	-063	-056	000	005	-032	-196	-036	012	006	-005	-085	-027	-025
	21	-008	-025	-113	-061	-003	-054	-099	-046	-009	-130	-086	-077	-028	010	-010	-102	-197	-090	-037	-032	-092	-022	-012	-004	-055
D	22	003	-018	-037	-148	-034	016	022	016	009	-003	-028	-029	-015	-152	-149	-089	-179	-245	-082	-064	-161	-156	-024	-040	-066
	23	-083	-137	-118	-016	-037	000	005	-015	-064	-044	-065	-089	-032	-247	-208	-264	-219	-080	-027	-092	-098	-003	-007	-046	-083
D	24	-052	002	003	-043	-072	-037	-066	-059	-050	-013	-022	-038	-003	-046	-115	-167	-036	-098	-140	-060	-066	-183	-025	009	-057
	25	-004	-016	-033	000	-002	-003	-002	000	-009	-001	-135	-073	-019	-044	-212	007	-070	-064	-045	-049	-008	-007	-002	000	-033
Q	26	-003	000	-004	-005	-011	-010	-003	-002	-001	-004	-034	-013	-010	-013	-074	-098	-009	-004	-008	-024	-033	-005	-002	-002	-016
	27	000	001	004	008	013	016	012	001	-091	-036	-040	-038	-011	-046	-029	-005	-022	-039	000	004	001	001	-002	-008	-013
Q	28	-008	-004	006	000	006	001	-002	-023	-098	-016	-044	-066	-021	-014	-006	-043	-037	-014	-007	-025	-014	-007	-002	-002	-018
	29	003	000	000	-003	-041	-045	-019	-046	-052	-038	-035	-053	-119	-022	000	-001	000	-001	000	002	002	-002	-009	-001	-020
	30	-004	-004	-005	-003	-001	002	002	-033	-016	010	-003	-017	-009	-032	-074	-225	-167	-024	-017	-024	-136	-035	-026	-039	-037
D	31	-005	018	-009	-025	-038	-074	011	019	014	-023	006	049	-081	-210	-238	034	033	-050	007	-014	-008	-188	-125	-011	-038
	MEAN	-017	-006	-006	-009	-010	-006	-006	-002	-010	-011	-022	-026	-023	-035	-043	-051	-072	-058	-036	-045	-055	-047	-024	-015	-026
5Q	MEAN	004	006	006	002	-000	005	009	003	-013	004	-022	-029	-014	-005	-025	-032	-016	-006	-001	-010	-018	-001	006	006	-005
5D	MEAN	-118	-041	-014	-049	-039	-018	-004	003	-000	-009	-022	-014	-032	-097	-118	-126	-137	-164	-116	-127	-094	-180	-111	-078	-071

Table 3. AU Indices

JANUARY 1976 VALUES ARE EXPRESSED IN GAMMAS

	UT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	MEAN
Q	01	022	027	033	027	038	034	029	029	051	041	012	013	021	026	022	019	027	027	025	021	024	019	023	018	026
Q	02	020	020	019	022	024	026	025	031	034	027	020	050	019	026	043	056	031	035	029	024	044	031	044	026	030
	03	032	041	054	042	027	026	030	030	022	025	037	113	150	127	104	034	072	045	047	116	098	076	081	074	063
	04	083	062	043	041	060	120	059	070	078	041	023	011	065	101	062	037	041	097	075	054	063	051	065	136	064
	05	117	121	134	067	049	111	148	195	154	068	081	049	049	042	041	049	057	042	032	049	057	101	148	107	086
	06	072	069	096	072	107	060	097	090	072	062	027	017	033	028	046	053	089	097	112	139	090	142	135	151	082
	07	163	114	094	081	058	117	089	044	030	020	023	044	043	026	032	030	044	067	029	021	019	029	035	037	054
	08	024	018	023	024	030	033	042	041	045	047	064	044	023	030	060	082	081	051	043	055	045	062	041	033	043
Q	09	037	049	038	050	040	060	078	095	121	087	037	017	023	022	025	039	025	020	017	015	016	020	032	055	042
D	10	063	069	043	033	035	043	061	078	041	032	083	103	093	062	125	180	135	-057	-038	-056	-088	-133	-052	-062	033
D	11	-095	-052	090	132	106	102	060	042	042	026	006	-002	005	014	020	039	087	083	158	143	216	175	025	044	061
	12	091	108	086	063	058	081	060	033	015	049	063	048	080	059	064	040	060	072	081	072	047	057	080	099	065
	13	125	075	063	065	067	072	037	017	039	022	011	012	013	047	041	028	016	021	016	025	038	033	023	032	039
	14	051	068	075	046	015	081	092	047	020	027	056	115	146	088	036	065	054	053	034	057	056	063	082	074	063
	15	038	019	014	021	022	023	016	019	028	041	018	029	023	017	020	031	036	035	088	098	119	103	065	059	041
	16	064	084	132	099	044	029	054	043	042	033	008	017	016	022	030	028	035	037	073	083	074	102	110	127	058
	17	080	075	068	056	095	114	015	063	071	041	050	036	025	026	066	082	026	025	076	107	122	142	192	161	076
	18	115	077	097	097	083	105	055	070	056	118	128	094	075	033	026	027	014	016	014	028	035	026	034	035	061
	19	048	053	044	031	044	054	034	019	015	026	013	026	038	038	038	033	060	080	025	028	074	093	071	048	043
	20	059	061	048	048	055	048	043	023	039	036	009	014	046	055	041	031	018	054	072	042	046	049	048	041	043
	21	036	079	044	060	041	106	080	031	048	088	054	101	072	046	045	124	244	110	060	072	066	058	039	037	073
D	22	063	061	066	056	062	072	078	040	035	016	008	022	155	092	104	131	116	184	108	092	139	114	115	064	083
	23	094	087	105	113	090	051	058	058	017	025	068	061	058	129	127	141	163	065	029	083	048	055	026	044	075
D	24	045	045	061	051	048	065	041	084	135	118	080	058	056	082	049	063	057	047	034	046	057	061	071	051	063
	25	038	048	026	048	047	035	036	059	073	042	016	026	022	060	045	109	040	034	029	041	032	024	025	027	041
Q	26	017	022	027	025	030	022	019	018	020	016	004	032	008	024	046	040	027	015	011	015	015	018	022	021	021
	27	020	023	030	029	033	043	037	023	038	025	020	030	073	048	067	041	020	014	021	025	022	023	028	023	032
Q	28	022	022	030	027	028	017	020	045	008	074	023	028	101	066	033	025	026	026	034	029	030	029	036	039	034
	29	045	033	024	024	030	043	045	082	053	021	027	043	063	016	019	015	018	019	021	022	026	023	026	025	032
	30	015	014	013	013	014	020	033	051	053	050	019	013	043	066	031	027	046	033	027	071	128	083	133	152	048
D	31	108	101	079	047	117	126	129	046	066	125	246	300	144	242	267	301	113	090	065	100	125	150	132	105	139
	MEAN	055	055	058	052	052	063	055	052	050	047	043	050	057	057	057	065	061	050	047	055	061	061	062	061	055
5Q	MEAN	024	028	029	030	032	032	034	044	047	049	019	028	034	033	034	036	027	025	023	021	026	023	031	032	030
5D	MEAN	037	045	068	064	074	082	074	058	064	063	085	096	091	098	113	143	102	069	065	065	090	073	058	040	075

Table 4. AL Indices

JANUARY 1976 VALUES ARE EXPRESSED IN GAMMAS

	UT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	MEAN
Q	01	-005	-016	-020	-025	-033	-010	-004	-020	-013	-004	-074	-164	-125	-047	-008	-008	-021	-047	-031	-025	-013	-002	-005	-004	-030
Q	02	-004	-005	-009	-029	-044	000	-002	-036	-069	-033	-038	-018	-001	-023	-170	-135	-123	-064	-015	-029	-149	-043	-002	000	-043
	03	-007	-025	-021	-015	-015	-002	-028	-018	-055	-116	-047	-205	-206	-184	007	-067	-142	-028	-017	-261	-497	-147	-021	001	-088
	04	-001	-036	-039	-037	-031	-092	-110	-053	-015	-001	-027	-043	-074	-152	-050	-105	-123	-215	-203	-033	-115	-071	-105	-080	-075
	05	-036	001	-019	-033	-017	-110	-088	-058	-069	-065	-162	-097	-045	-030	-023	-023	-033	-014	-027	-164	-155	-122	-079	-023	-062
	06	-034	-039	-061	-129	-128	-018	-030	-026	-010	-011	-014	-030	-026	-038	-023	-032	-175	-186	-098	-284	-241	-157	-097	-327	-092
	07	-090	-015	-032	-040	-069	-217	-052	-007	-015	-014	-058	-201	-171	-059	-030	-072	-284	-086	-011	-008	-036	-039	-053	-036	-071
	08	-005	-006	-012	-018	-066	-053	-034	-016	-008	-070	-015	-003	-001	-018	-173	-001	-004	-024	-016	-022	-066	-160	000	-002	-033
Q	09	-003	-007	-002	-015	-016	-039	-026	-018	-054	-037	-027	-026	-015	-001	-005	-010	-003	-001	-005	-005	-002	-011	-020	-021	-015
D	10	-012	-019	-021	-017	-019	-025	-034	-025	-021	-049	-187	-181	-203	-209	-244	-828	-924	-724	-565	-466	-347	-578	-365	-382	-269
D	11	-1030	-408	-165	-205	-220	-109	-059	-014	-009	-024	-032	-031	-020	-027	-083	-209	-308	-154	-288	-621	-251	-216	-377	-300	-215
	12	-228	-111	-017	007	-021	-055	-044	-047	-085	-045	-023	-057	-087	-059	-107	-081	-186	-292	-142	-040	-028	-194	-117	-117	-091
	13	-015	-007	-042	-061	-155	-007	-020	-017	-025	-017	-022	-019	-022	-191	-159	-051	-081	-134	-020	-027	-175	-085	-019	-013	-058
	14	-070	-122	-085	-081	-083	-052	-104	-123	-173	-120	-088	-135	-253	-033	-039	-184	-261	-169	-096	-047	-042	-059	-053	-078	-106
	15	-031	-030	-030	-030	-031	-029	-022	-021	-025	-035	-036	-053	-027	-020	-039	-080	-311	-178	-163	-229	-138	-068	-065	-096	-074
	16	-082	-072	-151	-032	-023	-024	-038	-031	-027	-027	-029	-067	-081	-067	-067	-142	-370	-184	-152	-142	-279	-274	-248	-110	-113
	17	-022	-048	-076	-096	-062	-266	-208	-112	-020	-146	-089	-031	-035	-034	-077	-044	-042	-101	-428	-695	-516	-431	-262	-157	-166
	18	-152	-051	-024	-076	-025	-089	-232	-132	-145	-112	-135	-057	-018	-012	-018	-026	-022	-053	-096	-045	-224	-118	-086	-037	-083
	19	-049	-072	-073	-059	-050	-061	-018	-017	-016	-024	-055	-129	-131	-030	-029	-136	-172	-003	-025	-023	-056	-128	-088	-068	-063
	20	-039	-047	-127	-067	-136	-095	-057	-026	-024	-028	-027	-052	-174	-172	-039	-019	-084	-447	-147	-017	-032	-061	-218	-098	-093
	21	-053	-130	-271	-185	-049	-215	-278	-125	-067	-350	-228	-255	-128	-025	-066	-329	-639	-293	-134	-137	-252	-103	-065	-046	-134
D	22	-055	-098	-142	-354	-131	-038	-033	-008	-015	-022	-066	-082	-186	-398	-405	-311	-475	-676	-274	-221	-462	-428	-164	-144	-216
	23	-261	-363	-342	-146	-166	-049	-047	-088	-147	-114	-200	-240	-123	-625	-545	-669	-602	-227	-084	-269	-246	-062	-042	-137	-241
D	24	-151	-039	-054	-137	-194	-140	-174	-205	-235	-145	-126	-136	-063	-174	-281	-399	-130	-244	-315	-167	-189	-430	-122	-031	-178
	25	-048	-081	-093	-046	-053	-041	-042	-060	-091	-045	-287	-173	-060	-149	-470	-094	-181	-163	-121	-141	-050	-040	-030	-025	-108
Q	26	-024	-024	-035	-037	-054	-043	-027	-024	-023	-025	-074	-060	-029	-051	-195	-236	-046	-024	-028	-064	-082	-029	-027	-026	-054
	27	-018	-018	-020	-011	-004	-011	-012	-020	-220	-093	-102	-106	-095	-141	-127	-052	-065	-093	-021	-015	-020	-019	-033	-041	-057
Q	28	-040	-032	-017	-026	-015	-013	-024	-092	-207	-107	-112	-161	-145	-097	-046	-113	-102	-055	-050	-080	-060	-043	-041	-043	-072
	29	-038	-033	-025	-032	-113	-134	-085	-175	-158	-099	-098	-151	-301	-061	-019	-018	-019	-021	-020	-016	-022	-028	-046	-028	-073
	30	-024	-024	-023	-020	-018	-015	-027	-118	-085	-027	-027	-049	-062	-132	-180	-478	-381	-082	-062	-120	-402	-155	-187	-231	-122
D	31	-120	-063	-099	-099	-194	-275	-107	-008	-036	-172	-234	-201	-308	-663	-744	-231	-046	-191	-049	-129	-143	-527	-383	-128	-215
	MEAN	-089	-066	-069	-069	-072	-075	-067	-056	-070	-070	-088	-104	-104	-127	-144	-167	-205	-167	-119	-146	-171	-156	-110	-091	-108
5Q	MEAN	-015	-017	-017	-026	-032	-021	-017	-038	-073	-041	-065	-086	-063	-044	-085	-100	-059	-038	-026	-041	-061	-026	-019	-019	-042
5D	MEAN	-274	-125	-096	-162	-152	-117	-081	-052	-063	-082	-129	-126	-156	-294	-351	-396	-377	-398	-298	-321	-278	-436	-282	-197	-218

4. Tables of Observatories Supplying Hourly AU and AL

Table 5. Observatories Supplying Hourly AU Based on Mean Values.

JANUARY 1976 AU = MAXIMUM DELTA H

UT	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Q 1	FC	BW	FC	FC	BW	BW	BW	BW	BW	BW	AI	DI	DI	DI	FC	AI	AI	AI	BW	AI	AI	BW	BW	BW
Q 2	FC	FC	BW	BW	AI	FC	AI	BW	BW	BW	AI	BW	AI	DI	DI	DI	DI	DI	BW	BW	AI	FC	BW	BW
3	FC	FC	FC	FC	AI	TI	AI	AI	AI	AI	DI	DI	TI	DI	DI	AI	AI	AI	AI	LR	FC	FC	LR	FC
4	FC	FC	BW	BW	BW	BW	BW	BW	BW	BW	AI	AI	DI	DI	FC	AI	AI	AI	AI	FC	LR	BW	LR	LR
5	FC	FC	FC	FC	BW	BW	BW	BW	BW	TI	DI	DI	DI	DI	FC	DI	DI	FC	NAS	NAS	AI	NAS	LR	NAS
6	NAS	FC	FC	BW	FC	BW	BW	BW	BW	BW	BW	DI	DI	FC	DI	DI	AI	AI	LR	NAS	LR	LR	FC	FC
7	FC	FC	FC	BW	BW	BW	BW	FC	TI	BW	DI	DI	DI	DI	FC	LR	AI	FC	NAS	NAS	BW	FC	NAS	NAS
8	FC	BW	BW	BW	BW	BW	BW	BW	BW	BW	BW	BW	AI	DI	DI	DI	DI	DI	AI	AI	AI	NAS	DI	FC
Q 9	FC	NAS	NAS	FC	BW	BW	BW	BW	BW	BW	BW	AI	AI	FC	DI	DI	DI	AI	BW	BW	AI	FC	NAS	LR
D10	FC	FC	FC	BW	BW	BW	BW	BW	BW	DI	TI	TI	DI	TI	AI	LR	LR	NAS	LR	BW	BW	NAS	BW	BW
D11	FC	FC	BW	BW	BW	BW	BW	LR	DI	TI	DI	DI	LR	LR	LR	AI	AI	AI	LR	LR	LR	FC	FC	BW
12	BW	FC	FC	LR	BW	BW	BW	BW	TI	TI	DI	DI	DI	DI	DI	AI	AI	AI	AI	AI	BW	FC	NAS	NAS
13	NAS	NAS	BW	BW	BW	FC	BW	BW	BW	BW	DI	DI	AI	DI	DI	FC	FC	BW	NAS	AI	NAS	NAS	FC	FC
14	FC	FC	FC	FC	BW	BW	BW	BW	TI	TI	DI	TI	DI	TI	FC	LR	NAS	DI	FC	FC	NAS	BW	NAS	NAS
15	BW	FC	FC	FC	FC	BW	BW	BW	BW	BW	BW	BW	BW	FC	DI	LR	NAS	NAS	LR	NAS	LR	LR	FC	FC
16	FC	FC	FC	FC	FC	BW	BW	BW	BW	BW	BW	DI	DI	DI	DI	LR	FC	AI	AI	NAS	FC	FC	NAS	NAS
17	NAS	FC	BW	BW	FC	BW	BW	BW	BW	TI	BW	NAS	NAS	FC	DI	DI	FC	NAS	LR	NAS	FC	FC	LR	FC
18	FC	FC	NAS	BW	BW	BW	BW	BW	TI	TI	TI	DI	DI	TI	FC	FC	FC	NAS	FC	FC	NAS	FC	FC	NAS
19	NAS	FC	FC	FC	BW	BW	BW	BW	BW	BW	TI	DI	DI	DI	DI	AI	DI	BW	NAS	NAS	LR	LR	LR	FC
20	FC	FC	FC	BW	BW	BW	BW	BW	BW	BW	TI	DI	TI	TI	DI	DI	LR	NAS	AI	FC	FC	NAS	NAS	FC
21	FC	FC	FC	BW	BW	BW	BW	BW	TI	DI	DI	DI	DI	FC	LR	AI	LR	LR	AI	NAS	FC	NAS	NAS	FC
D22	FC	FC	BW	BW	BW	BW	BW	BW	BW	LR	TI	TI	DI	LR	AI	AI	LR	LR	AI	NAS	FC	FC	FC	FC
23	FC	BW	BW	BW	BW	BW	BW	BW	TI	TI	TI	DI	LR	DI	AI	NAS	LR	AI	NAS	LR	FC	BW	BW	FC
D24	FC	BW	BW	BW	BW	BW	BW	BW	DI	DI	LR	TI	TI	DI	DI	AI	FC	NAS	FC	FC	NAS	FC	FC	DI
25	FC	FC	FC	BW	BW	BW	BW	BW	BW	BW	DI	NAS	DI	DI	AI	DI	NAS	FC	NAS	FC	FC	BW	BW	BW
Q26	FC	FC	FC	FC	BW	BW	BW	BW	BW	BW	NAS	BW	DI	DI	DI	DI	DI	FC	FC	FC	BW	FC	FC	FC
27	FC	FC	BW	BW	BW	BW	BW	BW	BW	BW	DI	TI	DI	DI	DI	DI	FC	FC	FC	FC	BW	FC	FC	FC
Q28	FC	FC	FC	FC	FC	BW	BW	BW	LR	BW	DI	DI	DI	DI	DI	FC	FC	FC	NAS	FC	FC	FC	FC	FC
29	FC	FC	FC	FC	BW	BW	BW	BW	BW	LR	DI	DI	DI	DI	FC	FC	FC	FC	FC	FC	FC	FC	NAS	NAS
30	FC	FC	FC	BW	BW	BW	BW	BW	BW	BW	NAS	DI	DI	DI	NAS	AI	AI	NAS	NAS	NAS	NAS	NAS	FC	FC
D31	FC	FC	BW	BW	BW	BW	BW	BW	BW	TI	TI	TI	TI	AI	AI	AI	AI	AI	FC	LR	NAS	FC	FC	NAS

IDENTIFICATION	GEOGRAPHIC LAT	GEOGRAPHIC LONG	GEOMAGNETIC LAT	GEOMAGNETIC LONG
AI = ABISKO	68 21.5	18 49.4	66.0	114.9
BW = BARROW	71 18.2	-156 44.9	68.5	241.1
CC = C.CHELYUSKIN	77 43.0	104 17.0	66.2	176.4
CO = COLLEGE	64 51.6	-147 50.2	64.6	256.5
GWR= GREAT WHALE R.	55 16.0	-77 47.0	66.5	347.4
DI = DIXON ISLAND	73 32.0	80 33.7	63.0	161.5

IDENTIFICATION	GEOGRAPHIC LAT	GEOGRAPHIC LONG	GEOMAGNETIC LAT	GEOMAGNETIC LONG
FC = FT.CHURCHILL	58 48.0	-94 06.0	68.7	322.8
LR = LEIRVOGUR	64 11.0	-21 42.0	70.2	71.0
NAS= NARSSARSSUAQ	61 06.0	-45 12.0	71.0	37.0
TI = TIXIE BAY	71 35.0	129 00.0	60.4	191.4
UE = CAPE WELLEN	66 09.8	-169 50.1	61.7	237.0

Table 6. Observatories Supplying Hourly AL Based on Mean Values.

JANUARY 1976 AL = MINIMUM DELTA H

UT	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Q 1	LR	LR	LR	NAS	NAS	NAS	NAS	FC	FC	FC	BW	BW	BW	BW	LR	NAS	BW	TI	DI	DI	DI	TI	DI	LR
Q 2	LR	LR	LR	NAS	NAS	NAS	NAS	FC	FC	FC	BW	FC	BW	BW	BW	BW	BW	BW	DI	DI	DI	DI	DI	TI
3	DI	LR	LR	LR	NAS	LR	NAS	NAS	FC	FC	FC	FC	FC	FC	LR	DI	TI	TI	TI	TI	DI	DI	TI	TI
4	LR	LR	LR	FC	FC	FC	FC	FC	FC	DI	FC	FC	FC	BW	BW	BW	BW	DI	DI	TI	AI	AI	DI	AI
5	AI	AI	AI	AI	AI	FC	FC	FC	FC	FC	BW	FC	FC	BW	AI	AI	TI	AI	AI	DI	DI	DI	DI	BW
6	AI	AI	AI	LR	NAS	AI	NAS	AI	AI	AI	AI	AI	AI	BW	BW	BW	TI	BW	BW	DI	DI	AI	DI	DI
7	DI	AI	AI	NAS	NAS	NAS	NAS	AI	AI	AI	BW	FC	BW	BW	BW	BW	DI	TI	TI	AI	DI	AI	DI	AI
8	LR	NAS	NAS	NAS	NAS	NAS	NAS	NAS	NAS	FC	FC	LR	LR	BW	BW	FC	TI	TI	BW	TI	DI	DI	TI	TI
Q 9	LR	LR	LR	LR	LR	NAS	NAS	NAS	FC	FC	FC	FC	FC	NAS	BW	BW	TI	LR	TI	TI	DI	DI	DI	DI
D10	AI	AI	AI	AI	AI	AI	FC	AI	AI	FC	FC	FC	FC	FC	TI	BW	BW	BW	BW	AI	AI	AI	AI	DI
D11	AI	AI	AI	LR	LR	NAS	NAS	FC	BW	AI	FC	AI	AI	BW	TI	BW	BW	BW	TI	TI	DI	TI	AI	AI
12	LR	LR	LR	TI	NAS	NAS	NAS	NAS	FC	FC	FC	FC	BW	BW	BW	BW	BW	BW	BW	BW	DI	DI	DI	AI
13	TI	TI	NAS	LR	NAS	NAS	LR	LR	LR	LR	LR	FC	BW	BW	BW	TI	TI	DI	TI	DI	DI	DI	LR	LR
14	LR	LR	AI	AI	AI	AI	NAS	FC	FC	FC	FC	FC	BW	AI	AI	TI	BW	BW	TI	TI	DI	DI	AI	LR
15	AI	AI	AI	AI	AI	AI	AI	AI	AI	AI	AI	FC	AI	AI	BW	BW	BW	BW	TI	DI	BW	DI	DI	AI
16	AI	LR	LR	AI	TI	AI	NAS	AI	AI	AI	TI	FC	FC	BW	BW	BW	BW	BW	BW	BW	DI	DI	AI	AI	AI
17	AI	AI	LR	LR	NAS	NAS	NAS	NAS	NAS	FC	FC	AI	AI	BW	TI	BW	BW	TI	TI	TI	TI	TI	BW	DI	DI
18	AI	LR	LR	LR	NAS	NAS	NAS	NAS	NAS	NAS	BW	BW	FC	AI	AI	BW	AI	DI	DI	DI	DI	DI	AI	AI	AI
19	AI	AI	NAS	LR	AI	FC	AI	AI	AI	AI	FC	BW	BW	BW	BW	BW	AI	BW	TI	DI	DI	AI	AI	AI	AI
20	AI	AI	NAS	NAS	FC	FC	FC	AI	AI	AI	AI	FC	BW	BW	BW	AI	TI	TI	TI	TI	AI	AI	AI	AI	AI
21	AI	LR	NAS	NAS	NAS	FC	FC	FC	FC	BW	FC	FC	BW	AI	BW	TI	BW	BW	TI	TI	AI	DI	AI	AI	AI
D22	AI	AI	LR	LR	NAS	NAS	NAS	AI	AI	FC	FC	FC	FC	BW	BW	TI	TI	TI	TI	TI	DI	DI	AI	AI	AI
23	AI	LR	LR	LR	FC	NAS	NAS	NAS	FC	FC	BW	BW	FC	BW	BW	BW	TI	TI	TI	DI	DI	AI	AI	AI	AI
D24	LR	AI	NAS	NAS	NAS	NAS	NAS	FC	NAS	FC	FC	FC	LR	BW	BW	BW	TI	DI	DI	DI	DI	DI	AI	AI	AI
25	AI	AI	AI	NAS	NAS	NAS	FC	FC	FC	FC	BW	BW	BW	BW	BW	BW	BW	DI	DI	DI	DI	AI	AI	AI	AI
Q26	AI	AI	NAS	AI	NAS	NAS	AI	AI	AI	FC	FC	FC	AI	BW	BW	BW	BW	AI	AI	DI	DI	AI	AI	AI	AI
27	AI	AI	AI	NAS	AI	AI	NAS	AI	FC	FC	FC	FC	BW	BW	BW	BW	BW	DI	AI	AI	AI	AI	AI	AI	AI
Q28	AI	AI	AI	NAS	AI	AI	FC	FC	FC	FC	FC	FC	FC	BW	BW	TI	TI	TI	BW	DI	DI	AI	AI	AI	AI
29	AI	AI	AI	NAS	NAS	NAS	FC	FC	FC	FC	FC	FC	BW	BW	AI	AI	AI	AI	AI	AI	AI	AI	DI	AI	AI
30	AI	AI	AI	AI	AI	AI	AI	FC	FC	AI	AI	BW	BW	BW	TI	BW	BW	BW	DI	TI	DI	DI	AI	AI	AI
D31	AI	LR	LR	LR	LR	NAS	NAS	AI	NAS	FC	FC	FC	FC	BW	BW	FC	FC	DI	TI	BW	TI	AI	AI	AI	AI

IDENTIFICATION	GEOGRAPHIC LAT	GEOGRAPHIC LONG	GEOMAGNETIC LAT	GEOMAGNETIC LONG
AI = ABISKO	68 21.5	18 49.4	66.0	114.9
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CO = COLLEGE	64 51.6	-147 50.2	64.6	256.5
GWR= GREAT WHALE R.	55 16.0	-77 47.0	66.5	347.4
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IDENTIFICATION	GEOGRAPHIC LAT	GEOGRAPHIC LONG	GEOMAGNETIC LAT	GEOMAGNETIC LONG
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TI = TIXIE BAY	71 35.0	129 00.0	60.4	191.4
UE = CAPE WELLEN	66 09.8	-169 50.1	61.7	237.0

5. Statistical Information

Table 7. Station Frequency of AU and AL Contribution.

JANUARY 1976

STA	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24 UT
AU- LR	74	35	7	42	18	20	50	110	66	87	78	28	91	103	143	231	284	181	278	344	337	301	330	200
AL- LR	411	604	659	552	290	145	92	68	64	70	100	68	92	50	81	23	43	33	29	26	71	8	59	170
AU- NAS	245	151	85	10	15	1	0	25	7	68	150	110	81	50	103	174	192	400	334	421	329	370	405	405
AL- NAS	66	118	435	627	881	872	926	561	283	89	10	5	19	36	32	68	14	10	8	4	0	0	4	15
AU- FC	1167	1262	1079	749	392	267	132	180	14	25	12	32	76	345	425	202	400	398	352	505	549	735	687	796
AL- FC	0	0	5	70	142	325	464	646	905	1013	1126	1126	664	124	92	141	39	4	20	13	6	0	0	0
AU- BW	287	336	601	1018	1322	1507	1512	1239	1223	864	458	366	198	13	20	26	37	129	313	260	345	383	332	345
AL- BW	54	57	8	9	1	0	0	33	53	150	315	446	792	1348	1187	919	848	653	374	192	48	56	31	32
AU- TI	26	11	19	4	18	33	47	112	348	475	403	435	342	227	70	40	42	0	0	0	0	0	0	8
AL- TI	56	36	1	62	60	44	0	24	30	24	31	20	8	32	157	364	496	495	569	558	265	130	158	157
AU- DI	26	47	68	17	12	15	13	128	139	251	573	769	886	931	850	703	434	217	100	34	5	13	89	91
AL- DI	125	62	44	24	21	41	45	35	27	41	8	11	1	9	34	104	247	446	629	808	1146	990	688	425
AU- AI	35	18	1	20	83	17	106	66	63	90	186	120	186	191	249	484	471	535	483	296	295	58	17	15
AL- AI	1148	983	708	516	465	433	333	493	498	473	270	182	284	261	277	241	173	219	231	259	324	676	920	1061

Table 8. Monthly Quiet-Time H Reference Values.

Station	January 1976
LR	12331 gammas
NAS	11939
FC	7313
BW	9842
TI	7948
DI	6493
AI	11845

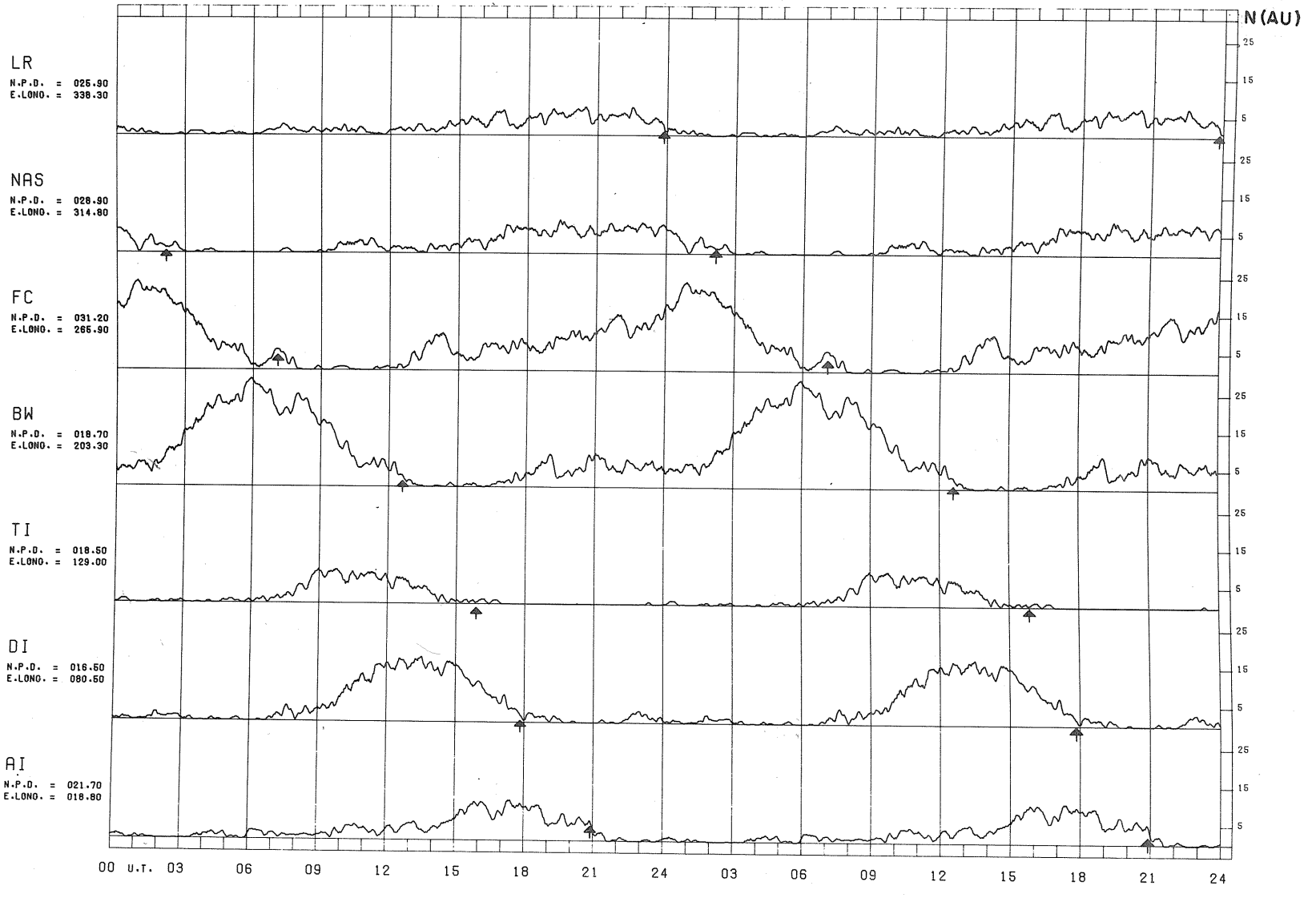

Fig. 2. Frequency of 1-min AU provision by station for January 1976.

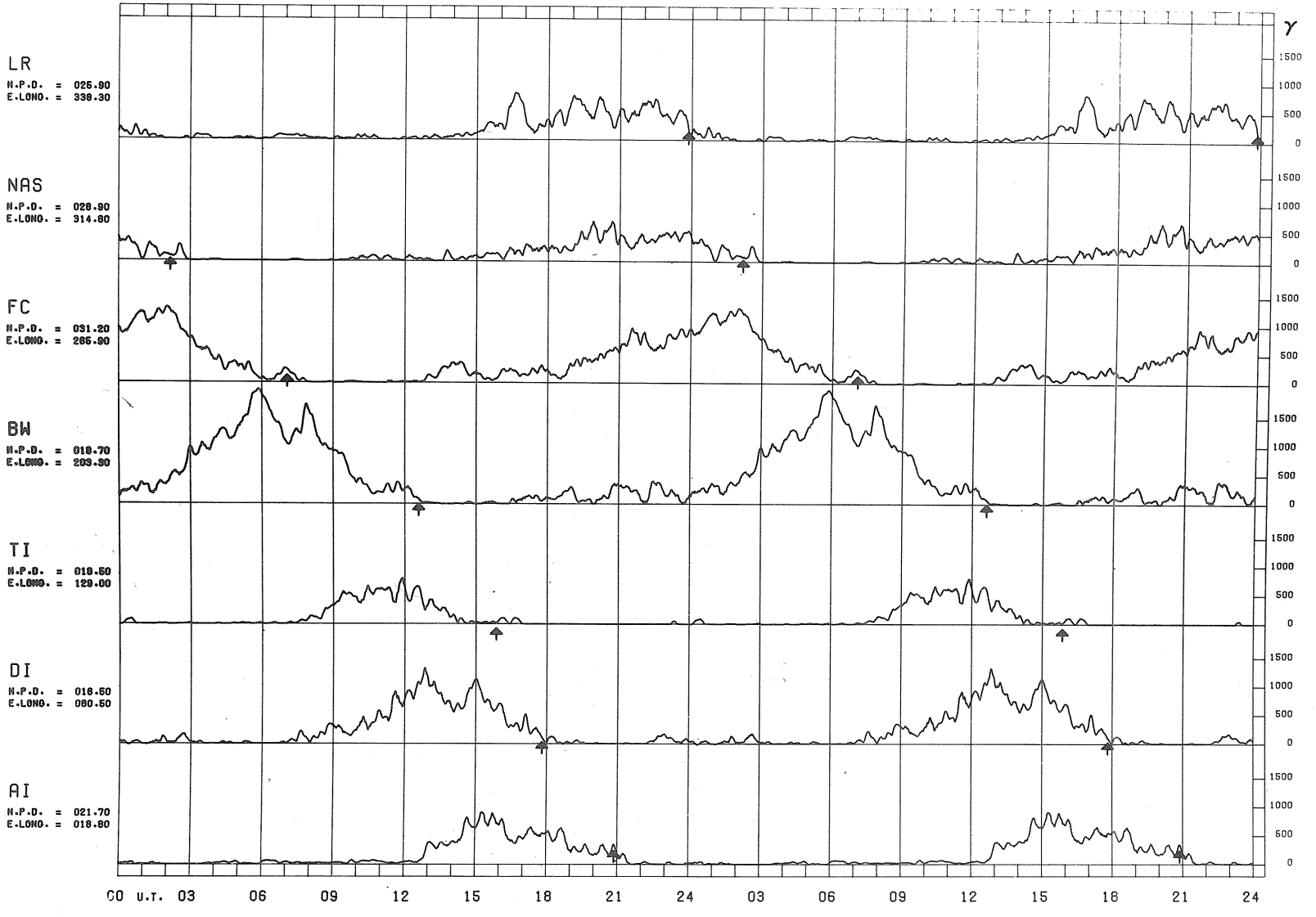

Fig. 3. Total amplitude of most positive H-variations for January 1976.

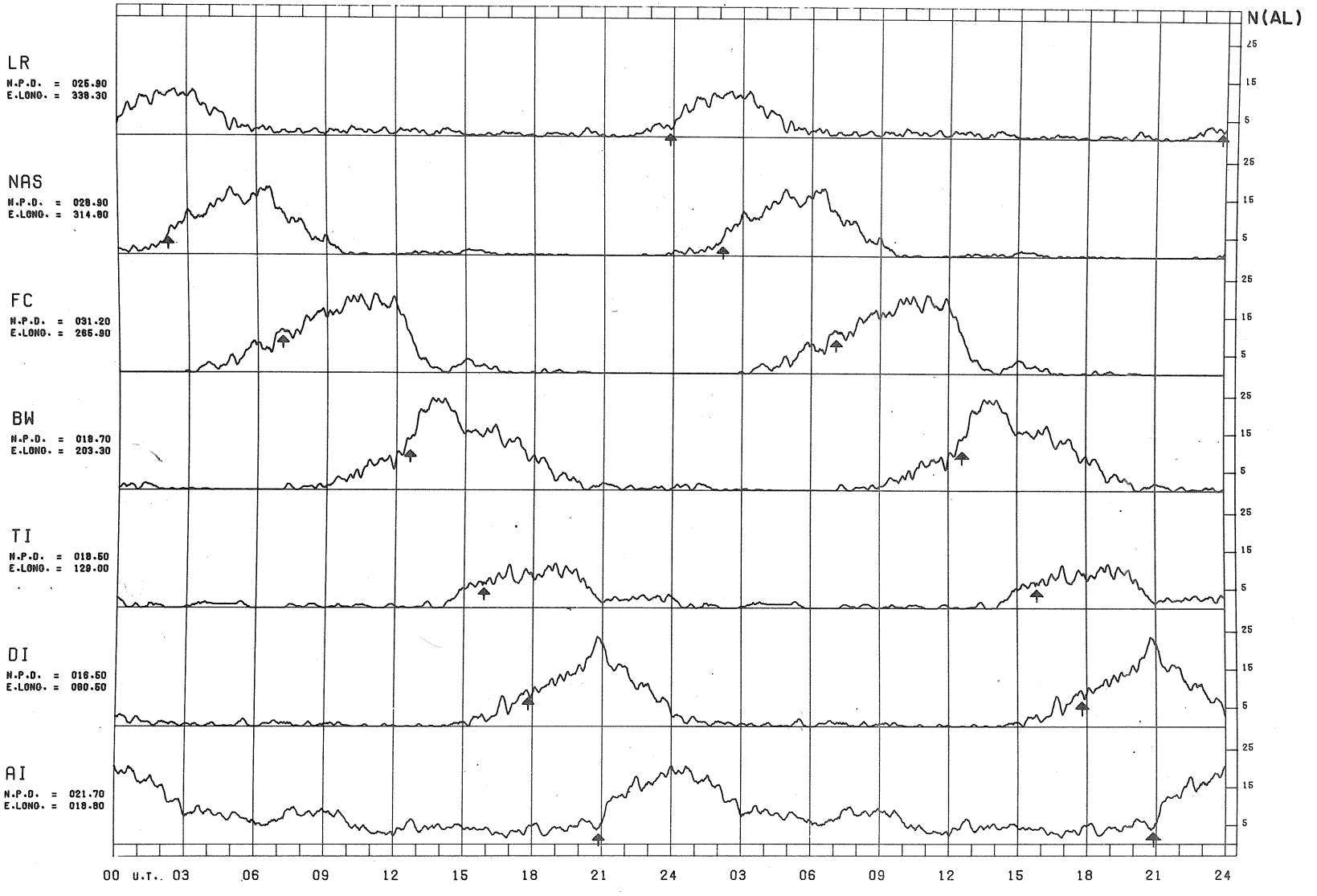

Fig. 4. Frequency of 1-min AL provision by station for January 1976.

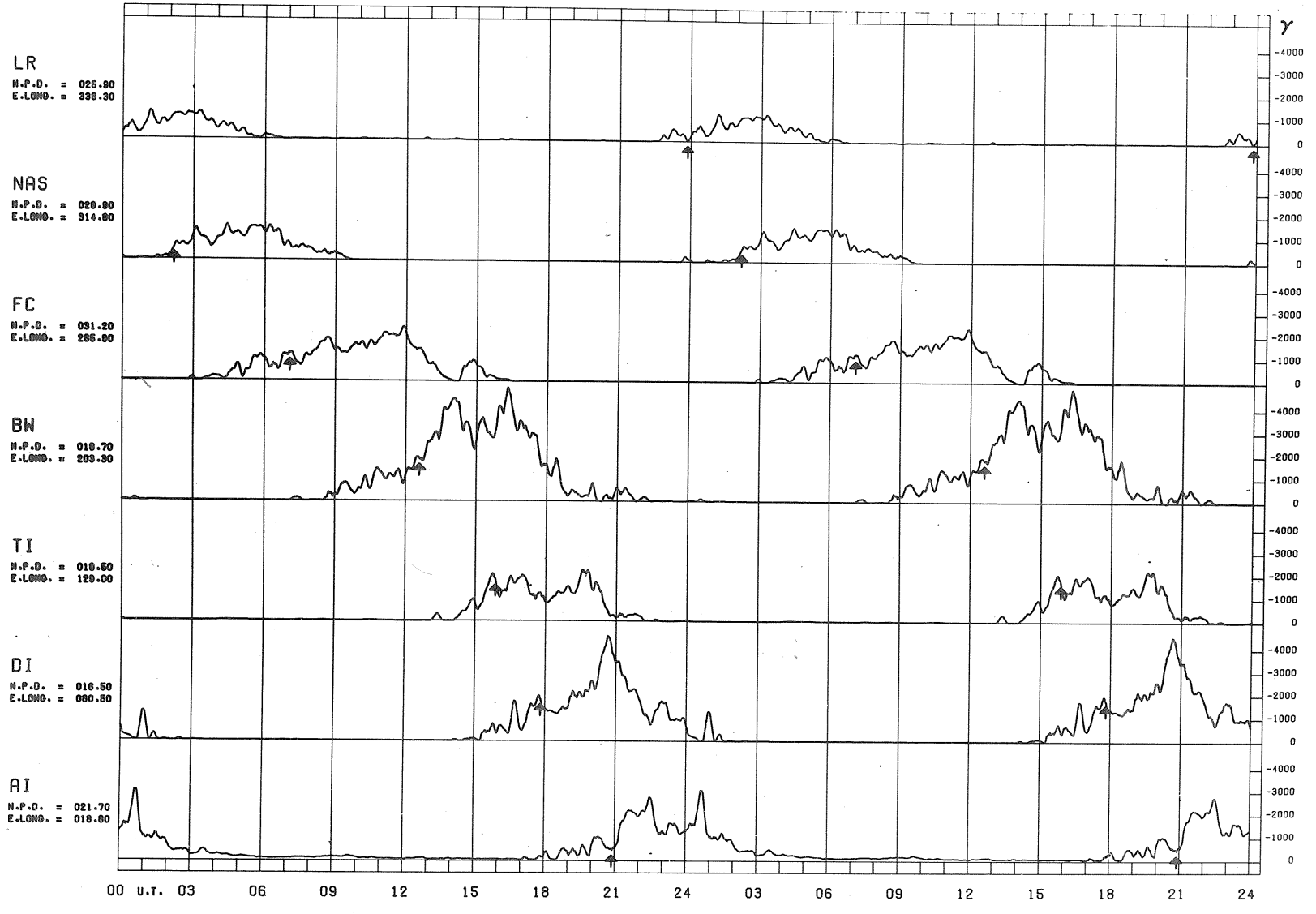

Fig. 5. Total amplitude of most negative H-variations for January 1976.

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UAG-42 "Observations of Jupiter's Sporadic Radio Emission in the Range 7.6-80 MHz 10 December 1971 through 21 March 1975", by James W. Warwick, George A. Dulk, and Anthony C. Riddle, Department of Astro-Geophysics, University of Colorado, Boulder, Colorado 80302, April 1975, 49 pages, price $1.15.

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