

World Data Center C2 for Geomagnetism

DATA BOOK No. 7

Auroral electrojet indices (AE)
for January-June 1980



APRIL 1983

Data Analysis Center for
Geomagnetism and Spacemagnetism
FACULTY OF SCIENCE
KYOTO UNIVERSITY

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1. Introduction

The Auroral Electrojet index (AE) was originally introduced by Davis and Sugiura in 1966 as a measure of global electrojet activity in the auroral zone, and it is now widely used for studying geomagnetism, aeronomy and solar-terrestrial physics. The index was first derived at the Geophysical Institute of the University of Alaska, and hourly values were published for the years 1957 to 1964. The production of 2.5 min values was then tried at the Goddard Space Flight Center of NASA, and the results from September 1964 to June 1968 were published.

After that, the index was regularly published at the World Data Center A (WDC-A) in Boulder, Colorado and the Center published 2.5 min values for the years 1966 to 1974 and 1.0 min values for 1975 and a half of 1976.

When it became difficult to continue the production of the AE-index by a budgetary problem of the WDC-A, it was requested that the index be produced at the WDC-C2 for Geomagnetism in Kyoto. We decided to produce the index for two years (1978-1979) during the International Magnetospheric Study (IMS) and have published 1.0 min values as a part of "WDC-C2 for Geomagnetism Data Book" series (No.3 and 4 for 1978, and No.5 and 6 for 1979).

Although the International Association of Geomagnetism and Aeronomy (IAGA) recommended the continuation of the production of the AE-index at the WDC-C2, we could not extend it to periods after IMS because the available man-power and computing facilities were not sufficient for the continuous derivation.

Increasing demands for the index and a possible partial financial support from international academic societies, however, moved us to resume the production of the index. This Data Book No.7 which contains the index for the first half of 1980 is the first issue after the resumption.

Since the most time consuming portion in the derivation of the AE-index is digitization from analogue magnetograms, we do hope much more efforts be made to install digital magnetometers at AE-observatories.

2. Derivation and Representation

The AE index is derived from the horizontal component of geomagnetic variations observed at some (10-13) observatories along the auroral zone in the northern hemisphere. To normalize the data from each station, a base value of each station for each month is first calculated by averaging all the data of the station on the five international quiet days, and this base value is subtracted from every-day data of the station in that month. Then the largest and smallest values are selected from all the stations. The largest value is called the AU index and the smallest value is called the AL index. These names came from the upper and lower envelopes of the overlapped figure of the data from these stations. The difference between the AU and AL indices gives the AE index, and the mean value of the AU and AL indices gives the AO index. The term "AE indices" is usually used to describe those four indices (AU, AL, AE and AO) in all.

The AU and AL indices are understood to express the strongest current

density of the eastward and westward auroral electrojet, respectively. The AE index is understood to represent the overall activity of the electrojets, and the AO index is regarded as a measure of the equivalent zonal current.

In this report we shall present every-day diagrams and hourly values of the AE indices and "Contributing stations plot" of the AE indices which may give more information about the indices. That is, we named stations which give the AU and AL indices "the contributing stations of the AU and the AL index, respectively, and a pair of these AU and AL contributing stations "the contributing stations of AE indices". The plot gives these AE contributing stations on a plane whose coordinates are UT in abscissa and LT in ordinate at the stations. For users who want to check the AE indices precisely, this plot gives information about data availability of each station. Thus the plot will give us an idea which data are to be checked. For these users, we would like to suggest to check our way of derivation of the AE indices and our estimation of errors. Please see Data Book No.3 or No.4 for the estimation of errors of our AE data.

3. Selection of Observatories

To obtain good AE indices, we must use as many observatories as possible, but we meet two big difficulties: One is that the distribution of observatories in operation are not uniform over the auroral zone, and the other is that the digitization of analogue data (magnetograms) is a heavy job.

We selected 12 observatories listed in Table 1. Of these, only 5 stations are taking digital data directly (called digital stations). Our selection is almost the same as that of the WDC-A (see Fig. 1).

Three of the stations (Fortchurchill, Great Whale River, and Yellowknife) are the digital stations which give data in the X, Y, Z coordinate system. To make these data more compatible to other stations, we converted the X and Y components to H component by $H=(X^2+Y^2)^{1/2}$, and we treated the resulted H component to be missing for the period either X or Y is missing. For other two digital stations (Barrow and College), we used the original digital H-component data.

4. Digitizing Machine

Our digitizing machine is made of a semi-automatic sonic digitizer, a large size microfilm reader and a mini computer system.

The sonic digitizer has a pointing pen and two microphone arrays. The pen emits a small sonic pulse from a small electric spark at the top of it. The position of the pen is detected by time lags between the spark and signals received by the microphone arrays. One of the microphone arrays is placed on the upper side of a microfilm reader and detects Y position of the pen, and another array is placed on the left side of the reader and detects X position of the pen.

The operator traces the projected figure (magnetogram) on the screen of the microfilm reader. The effective size of the screen is about 60 cm in width and about 40 cm in height. This screen is divided into 4000 x 3000 digital points. The emitting speed of the sparks can be controlled either by the computer or by the operator. Although the emitting speed can be as fast as 100 points per second, available speed is limited to 20 points per second, because of the speed of the CPU of computer and the

Table 1. List of AE(12) stations.

Observatory	Abbreviations		Geographic		Geomagnetic	
	LAGA	WDC-A	Lat. ($^{\circ}$ N)	Long. ($^{\circ}$ E)	Lat. ($^{\circ}$ N)	Long. ($^{\circ}$ E)
Abisko	ABK	AI	68.36	18.82	66.04	115.08
Dixon Island	DIK	DI	73.55	80.57	63.02	161.57
Cape Chelyuskin	CCS	CC	77.72	104.28	66.26	176.46
Tixie Bay	TIK	TI	71.58	129.00	60.44	191.41
Cape Wellen	CWE	UE	66.17	190.17	61.79	237.10
Barrow	BRW	BW	71.30	203.25	68.54	241.15
College	CMO	CO	64.87	212.17	64.63	256.52
Yellowknife	YKC	YEK	62.40	245.60	69.00	292.80
Fort Churchill	FCC	FC	58.80	265.90	68.70	322.77
Great Whale River	GWC	GWR	55.27	282.22	66.58	347.36
Narssarssuaq	NAQ	NAS	61.20	314.16	71.21	36.79
Leirvogur	LRV	LR	64.18	338.30	70.22	71.04

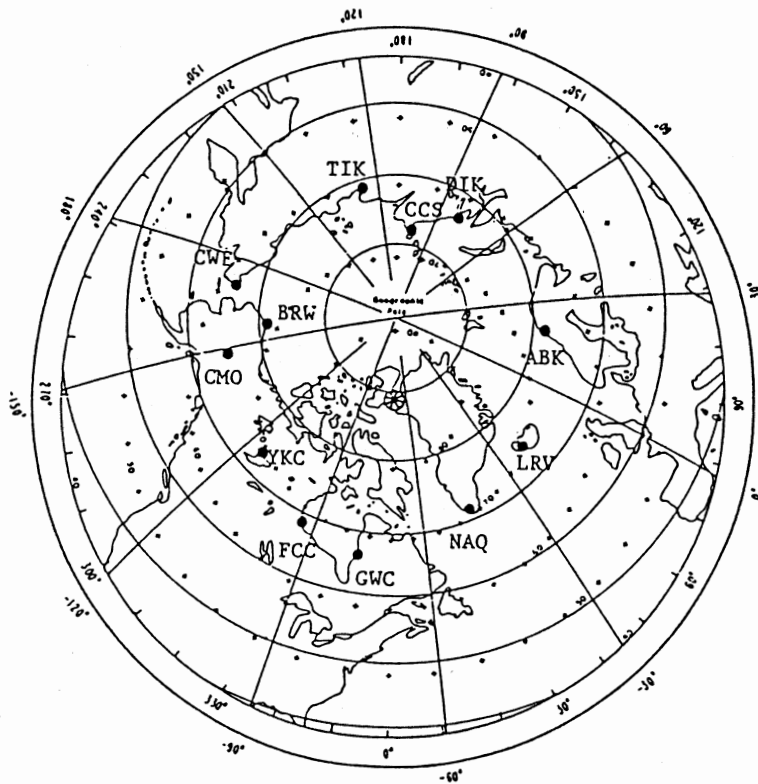


Fig. 1. Distribution of AE(12) stations.

Geographic latitude is indicated by the concentric circles of solid lines. Geomagnetic latitude is indicated by the numbered concentric circles formed by + signs. Geographic longitude is given by the outer circle of numerical values with meridians shown as solid lines every 30° . Geomagnetic longitude is given by the inner circle of numbers and the border of hash-marks at 10° intervals.

recording media.

5. Digitization of Analogue Data

The magnetogram on 35 mm microfilm is projected directly on our microfilm reader. The projected figure is almost the same size as the original magnetogram whose size is about 2 cm/hour or 48 cm/day.

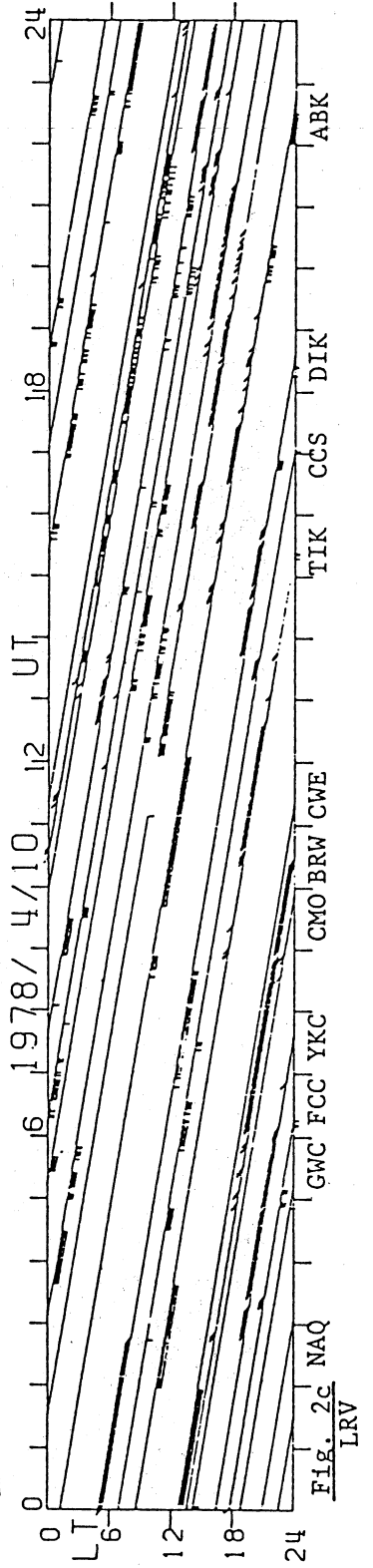
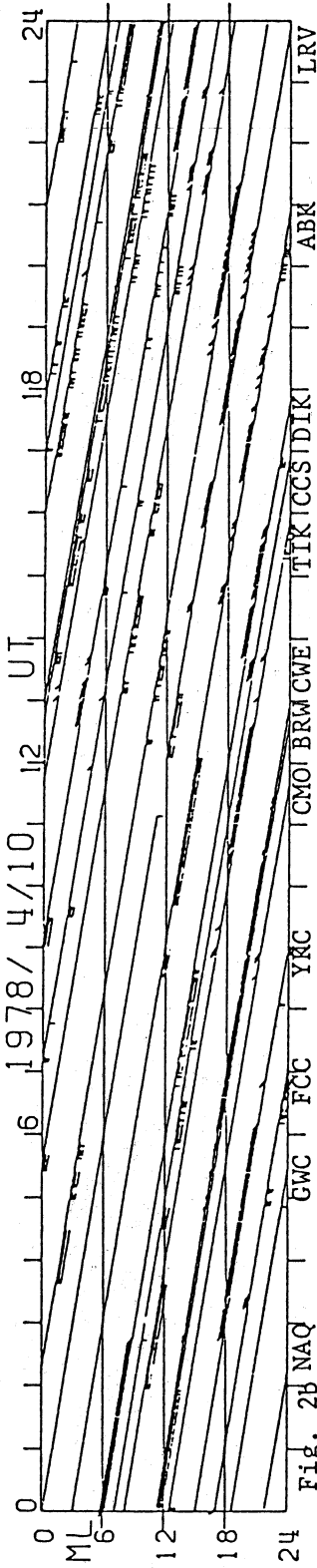
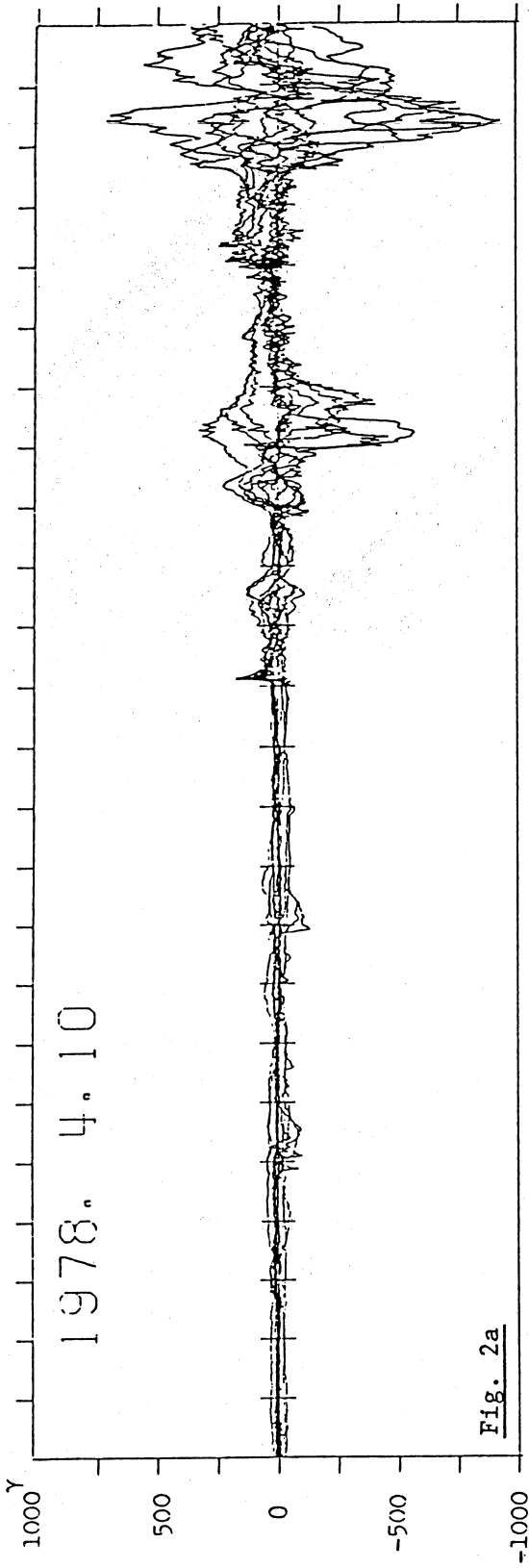
Usually, the magnetograms are digitized day by day. When the time marks on the magnetogram are not spaced uniformly or base lines are not straight enough, one magnetogram is divided into several uniform parts and then digitized. We tried to use the ordinary magnetogram for all days. When the H trace crosses other traces, we tried to identify the H trace by referring to the insensitive or storm magnetogram. When we trace the H component on magnetograms, we also feed three basic points to define the time and the absolute value of the digitized data, and feed other necessary information like the station identification and observation date.

In digitizing analogue data, we could have trouble from the digitizer noise. To be free from such a noise, we digitized as many points as possible to get one value. In determining the three basic points we digitized each point as more than 20 times, and we picked the point only when these consecutive 20 readings are all within a limited area. The traced digital data are logically checked by a quality control program to reject spikes caused by the noise. After cleaned by the quality control program, the data are averaged to get the final one minute value. Usually, a one-min value is determined from an average of 3 or 4 digital readings. We checked all the digitized data visually by the plot on a monitoring graphic display at the reading stage and by the finer common scale plot made by a X-Y plotter after processed by the quality control program. Please see Data Book No.6 for further detail of our digitizing process.

6. The Overlapped Plot and the Plot of the Contributing Stations of the AE indices

Fig. 2a shows an example of the overlapped plot of the H traces from the AE station on April 10, 1978. The upper envelope gives the AU index and the lower envelope gives the AL index, Figs. 2b and 2c show example plots of the contributing stations for the same day as in Fig. 2a, in the geomagnetic (2b) and geographic (2c) local times, where the upper and lower plumes on a diagonal line for each station show the contribution to the AU and AL indices of this station. In Fig. 2b, for example, the data of Dixon Island (DIK) give the AU index from 0000 to 0240 UT and again from 1330 to 1530 UT, and the AL index from 0640 to 0830 UT. It is seen that from 1100 to 1200 UT Leirvogur (LRV) offers no data. Since this is a key station for the AL index at that time, the exact AL values at that time have been lost.

We think some explanations are necessary for our trial plots of the contributing stations. On the plots hereafter, the ordinate is the geomagnetic local time (MLT). The MLT is defined by the difference of the geomagnetic longitude of the station and the geomagnetic longitude of the Sun, and it is a function of the geomagnetic longitude of the station, season, and universal time. Figs. 3a, 3b, 3c show the difference between the GLT and the MLT of the stations used to derive AE indices for winter, summer and equinox, respectively. In these figures the GLT is shown by



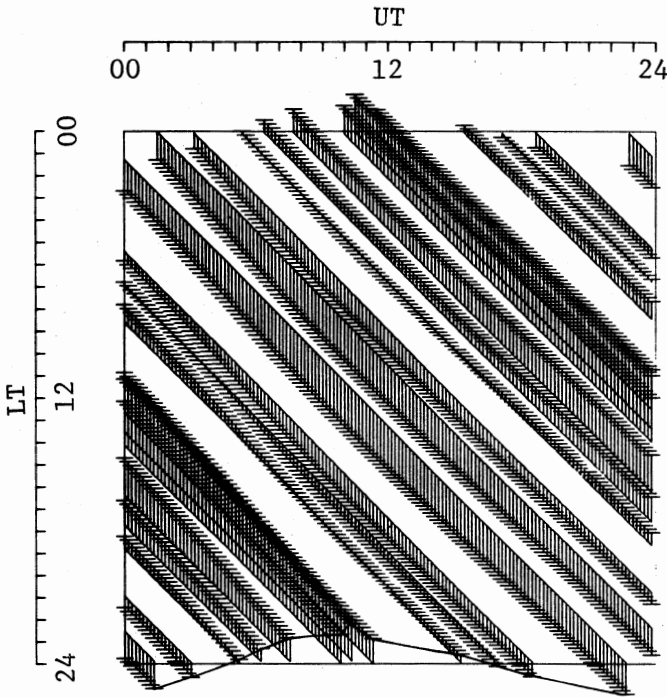


Fig. 3a Difference between GLT and MLT in winter.

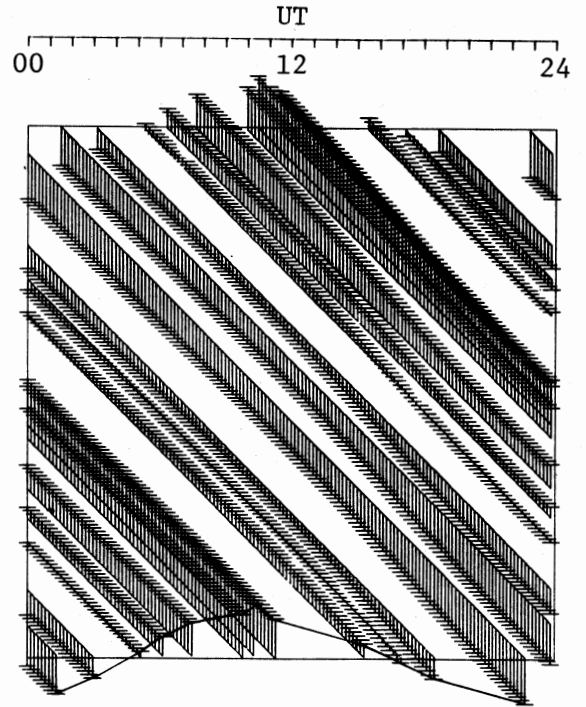


Fig. 3b Difference between GLT and MLT in summer.

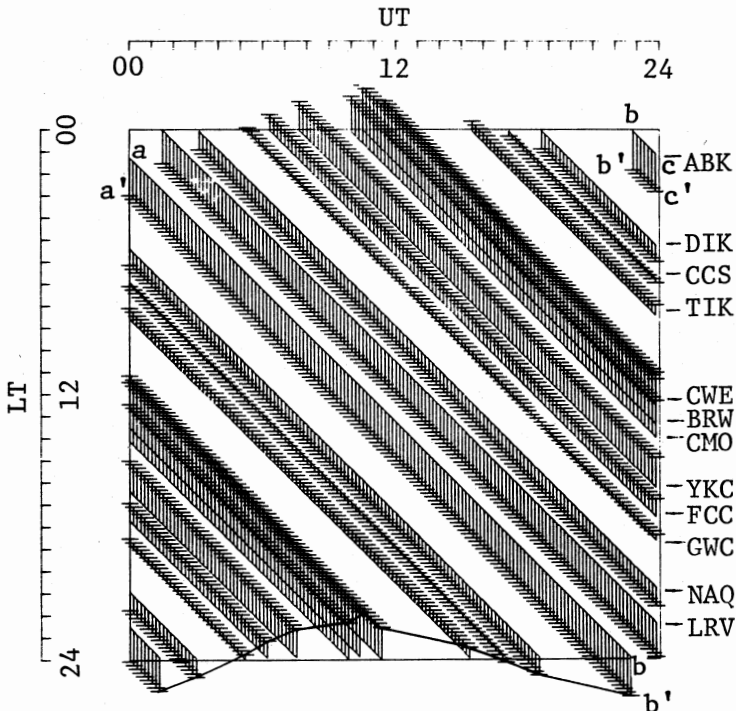


Fig. 3c Difference between GLT and MLT in equinox.

Fig. 3a, 3b and 3c show the difference between the geographic local time (GLT) and the geomagnetic local time (MLT) for winter, summer and equinox, where a-b-c (full line on the top or bottom of the vertical lines) shows the relation between UT and GLT, and a'-b'-c' (crossing of the vertical and horizontal lines) shows the relation between UT and MLT for each of the AE(12) stations.

the straight line which runs diagonally, and the MLT is shown by the T (or inverted T) shaped mark. The length of the vertical line between the T (or inverted T) shaped mark and the diagonal line is the difference between GLT and MLT. Note that for some stations the difference between GLT and MLT is as much as 2 hours. The geomagnetic longitude of Cape Wellen (CWE) and Barrow (BRW) are very close, and so it is difficult to separate these two stations on the contributing stations plot. Sometimes, Cape Wellen gives AU and Barrow gives AL, and vice versa. This is thought to be an effect of local current system between the high latitude station and the low latitude station.

7. Results

Monthly quiet-time H reference values for January-June 1980 are listed in Table 2, where for four stations only deviation (H0+) from the H base line are given, because we did not find out any base values. Unfortunately, from January to March, the microfilm copy of the ordinary magnetograms from Cape Chelyuskin were distorted too much and we were forced to use insensitive magnetograms for most of this period. We listed deviation from the base line of insensitive (storm) magnetogram for Cape Chelyuskin. Table 3 gives the hourly average of AE indices on every day from January to June 1980.

Daily graphs of 1.0-min AE indices (AU, AL, AE and AO) are shown in Fig. 4, and corresponding plots of the contributing stations are given in Fig. 5. Fig. 6 shows the H-traces of magnetograms from AE(12) stations in every month from January to June 1980. Finally, Fig. 7 shows a half year of hourly mean values of each index in one page.

8. Acknowledgements

This volume has been accomplished by the data supply from the AE stations through the World Data Centers. Acknowledgement is due to Ms. Yohko Yamamoto and Mr. Shinji Yokoyama for their assistance in digitizing magnetograms.

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Table 2. MONTHLY QUIET-TIME H REFERENCE VALUES (UNITS : NT = GAMMAS)
(YEAR 1980)

STATION	JAN.	FEB.	MAR.	APR.	MAY	JUN.	
ABISKO	11810	11809	11811	11804	11806	11806	
DIXON ISLAND	-406	-402	-401	-404	-406	-400	(H0+)
CAPE CHELYUSKIN	-1779*	489	484	502	509	508	(H0+)
TIXIE BAY	221	226	223	221	227	225	(H0+)
CAPE WELLEN	174	174	171	163	174	171	(H0+)
BARROW	9807	9809	9816	9804	9826	9821	
COLLEGE	13015	13015	13015	13002	13018	13016	
YELLOWKNIFE	8717	8717	8728	8714	8736	8744	
FORT CHURCHILL	7531	7523	7553	7559	7557	7565	
GREAT WHALE RIVER	10619	10622	10636	10638	10648	10661	
NARSSARSSUA@	12077	12078	12080	12093	12097	12101	
LEIRVOGUR	12399	12401	12405	12407	12408	12413	

(H0+) : DEVIATION FROM THE H BASE LINE
ON THE ORDINARY MAGNETOGRAM
*(H0+) : DEVIATION FROM THE H BASE LINE
ON THE INSENSITIVE MAGNETOGRAM

TABLE 3

**Hourly average AE indices (AU, AL, AE and AO) for
January–June 1980.**

DATE	AU INDEX (HOURLY VALUES)																				JANUARY 1980												MEAN
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23									
D 1	53	34	30	53	49	56	57	60	94	118	161	178	126	150	222	213	172	79	30	51	-25	-18	49	80									
2	21	57	89	60	60	54	57	49	66	43	40	99	147	150	84	59	36	24	22	14	13	25	47	55									
3	61	49	91	38	141	138	63	35	30	49	51	163	225	159	101	57	40	53	94	111	155	98	74	55									
4	65	85	110	98	107	85	116	80	53	73	38	45	25	28	32	84	61	121	93	88	117	77	80	77									
5	68	86	71	49	51	49	49	44	39	18	35	26	83	69	65	60	45	45	42	72	110	81	108	85									
6	75	91	104	93	75	55	44	44	37	36	35	44	30	20	14	55	60	42	19	15	21	31	25	20									
7	14	17	30	33	33	40	31	33	32	22	25	26	19	28	30	29	42	24	23	17	21	24	50	69									
8	66	54	36	50	57	63	54	66	45	29	38	25	23	23	31	29	26	21	21	16	17	15	13	16									
9	18	18	19	17	18	27	26	29	34	33	29	31	42	27	9	25	32	24	16	16	11	13	18	23									
0 10	21	16	13	17	23	26	27	27	42	33	23	22	28	45	13	15	16	26	18	19	27	18	19	21									
11	19	27	40	41	33	47	50	23	67	62	98	86	76	23	26	41	100	140	91	57	94	88	72	42									
12	37	29	21	22	21	24	23	21	18	22	21	16	19	17	18	19	15	16	17	16	17	14	17	15									
13	17	18	16	17	17	30	25	49	36	57	82	146	75	129	135	247	132	133	118	141	183	207	135	43									
14	52	46	38	25	37	29	37	39	34	65	66	77	62	66	52	31	35	18	21	30	33	24	30	25									
15	26	26	21	21	17	20	15	28	21	10	5	14	58	67	34	33	23	30	57	23	28	33	35	31									
16	52	28	86	112	51	66	70	66	67	40	12	20	21	15	25	18	12	9	15	12	11	11	11	16									
17	17	18	19	21	16	17	31	44	49	44	43	48	26	34	31	105	53	30	31	29	33	20	23	34									
18	31	32	44	34	27	23	27	28	39	42	35	9	15	11	39	24	18	14	11	14	21	22	34	27									
0 19	51	43	31	29	28	24	28	42	44	31	28	34	23	30	26	36	26	23	23	36	37	29	35	30									
20	79	79	73	77	83	61	36	27	33	27	23	30	34	26	31	24	22	15	17	25	19	24	35	41									
21	62	62	58	47	29	34	39	52	28	23	10	10	12	34	33	26	28	20	29	23	20	15	19	31									
22	28	24	23	20	24	26	36	45	46	69	80	53	24	41	39	36	34	21	37	86	68	106	73	57									
23	63	66	45	44	56	72	60	103	66	53	59	27	28	38	39	40	31	27	24	25	20	22	25	44									
24	31	26	27	24	25	27	31	26	39	37	36	59	46	38	44	83	55	61	67	57	43	30	34	21									
25	22	24	23	23	25	24	29	29	26	23	22	31	33	46	86	82	37	37	125	71	33	40	78	90									
26	54	51	58	75	61	45	35	26	26	21	21	19	25	34	32	23	27	25	24	24	27	19	18	25									
D 27	35	54	95	161	55	30	25	49	80	76	136	265	99	87	132	262	250	218	180	105	96	90	227	200									
D 28	169	153	130	135	205	225	86	41	41	50	38	86	139	130	92	211	229	260	195	162	56	76	53	73									
D 29	-12	148	165	123	79	29	33	37	15	14	25	19	25	36	79	122	117	140	141	147	96	92	91	101									
30	156	97	136	87	48	30	32	31	71	80	105	143	58	17	23	30	28	20	20	28	36	32	61	80									
31	50	54	51	34	28	28	24	22	27	28	38	16	15	19	18	29	24	21	24	28	33	74	103	109									
MEAN	48	52	57	54	50	48	41	41	43	42	47	60	52	52	52	69	58	56	53	50	47	45	53	52									
50 MEAN	31	27	25	23	23	24	26	29	35	32	27	22	25	26	21	23	21	20	17	20	22	19	24	24									
50 MEAN	52	81	87	97	81	74	45	47	53	63	88	138	92	106	132	211	180	166	132	121	81	89	111	99									

FEBRUARY 1980

AU INDEX (HOURLY VALUES)

DATE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
1	88	120	107	69	46	59	71	95	48	46	34	47	47	31	33	30	19	26	37	110	97	121	113	75	65
2	77	76	66	88	75	89	87	100	92	114	113	77	79	42	53	42	55	37	29	28	25	16	27	30	63
3	31	47	45	59	82	71	45	37	41	27	19	21	25	17	23	20	17	21	17	17	11	17	15	11	31
4	14	16	24	36	34	53	80	34	45	52	49	45	33	49	41	40	35	34	34	26	25	24	19	34	37
5	31	27	22	23	22	23	25	26	26	38	74	49	59	43	60	30	19	25	22	24	19	24	19	21	31
6	24	20	22	50	53	67	68	132	206	215	176	207	188	121	129	78	229	303	154	82	94	67	39	45	115
7	29	33	20	42	28	50	88	91	49	27	18	16	67	23	24	21	16	20	80	90	70	52	80	109	48
8	77	62	56	78	142	173	126	157	147	193	315	129	136	95	105	120	123	99	100	53	21	49	74	17	113
9	35	22	43	51	61	78	80	55	51	52	41	48	48	99	98	101	103	99	98	62	55	58	40	22	63
10	31	36	17	20	38	40	52	65	30	17	14	12	17	17	15	15	16	13	11	10	9	11	13	15	22
11	12	12	13	25	26	19	23	23	35	18	7	9	9	16	17	25	25	16	12	12	14	24	28	29	19
12	29	27	24	11	15	20	16	24	30	51	20	10	16	19	18	32	24	18	17	14	11	10	8	16	20
13	18	22	19	18	16	17	16	16	15	13	8	11	18	23	26	27	24	22	24	22	18	18	17	19	18
14	23	22	25	55	65	58	77	55	77	205	349	296	150	89	88	206	238	254	135	159	100	25	23	14	116
15	17	36	57	47	52	78	74	96	142	118	56	60	66	66	46	31	16	37	25	105	107	16	59	244	69
16	91	67	89	270	165	176	157	177	227	104	133	111	140	164	147	114	78	114	114	94	75	53	38	17	121
17	6	7	4	6	9	7	10	3	5	6	8	10	9	17	20	20	4	4	5	9	9	4	7	31	9
18	28	54	71	49	23	25	24	47	54	172	229	121	131	68	30	17	52	80	183	215	169	134	89	82	89
19	134	80	65	82	129	65	52	30	19	17	15	4	8	12	23	19	28	8	8	6	4	4	26	38	37
20	54	67	81	57	28	26	22	13	21	39	49	17	23	42	42	53	40	39	25	16	11	11	17	29	34
21	51	116	84	36	29	25	32	35	33	33	46	27	25	24	22	24	20	18	15	15	22	39	51	23	35
22	18	22	26	26	26	34	33	30	26	21	32	37	30	31	27	44	21	25	17	27	36	32	24	22	28
23	30	32	28	31	29	28	28	33	45	93	119	111	70	40	63	80	218	196	229	287	242	153	95	99	99
24	101	83	69	63	51	37	55	38	24	24	36	46	56	38	37	44	44	40	22	25	22	28	31	33	44
25	40	50	52	46	40	37	36	43	42	29	20	23	29	33	47	58	34	82	220	301	230	160	104	143	79
26	65	50	58	106	70	51	44	48	47	50	74	109	79	59	72	78	78	51	106	90	62	55	65	38	67
27	44	52	71	65	61	70	78	88	80	93	100	116	138	78	80	55	84	85	87	107	141	115	117	137	89
28	142	130	98	71	113	90	85	92	91	87	122	118	91	43	30	24	25	27	26	42	78	103	74	63	78
29	135	154	107	73	85	76	55	49	64	69	62	58	57	47	53	32	39	41	42	42	71	72	70	47	67
MEAN	50	53	50	57	55	55	55	61	62	69	82	67	63	49	50	51	59	63	65	72	63	51	47	51	58
50 MEAN	28	31	25	26	34	34	30	33	28	29	27	20	27	23	28	25	20	19	19	17	13	16	14	16	24
5D MEAN	46	41	49	100	95	110	100	123	159	167	217	160	136	107	103	109	136	161	105	98	79	42	46	67	106

AU INDEX (HOURLY VALUES)

MARCH

1980

DATE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
0 1	39	24	18	42	42	26	25	24	30	26	23	16	12	13	10	11	9	10	8	10	6	8	12	15	19
0 2	16	15	19	28	51	46	38	32	24	21	17	18	16	14	17	15	15	10	10	14	17	29	23	32	22
0 3	54	39	31	33	42	42	32	21	28	36	28	17	16	18	22	27	51	44	14	19	27	28	17	19	29
0 4	13	12	11	8	12	15	14	16	17	39	56	75	44	17	13	10	7	15	12	16	30	55	76	42	26
0 5	29	46	50	50	56	37	45	47	54	66	117	146	69	33	16	19	19	8	10	19	8	14	18	19	41
0 6	35	30	19	16	23	22	21	22	15	31	62	27	28	26	26	20	48	42	35	31	32	33	32	35	30
0 7	20	33	44	51	32	22	33	16	27	43	58	44	54	34	39	36	41	42	33	36	41	52	50	34	38
0 8	29	21	29	49	36	44	105	70	33	78	47	17	13	13	16	21	21	15	20	18	18	20	15	22	36
0 9	26	31	25	17	10	29	52	50	60	41	25	28	42	46	46	30	25	16	11	14	19	25	32	23	30
0 10	17	13	13	10	17	26	23	16	22	45	102	88	89	61	40	31	29	32	37	24	24	27	37	35	36
0 11	25	16	12	11	12	12	13	19	23	54	70	91	56	42	40	32	36	45	39	36	36	41	34	33	34
0 12	35	32	27	21	17	16	16	13	12	11	11	12	11	11	11	10	12	15	32	16	16	14	14	19	17
0 13	26	25	24	18	20	21	22	25	36	26	59	45	65	105	49	25	25	24	35	52	47	45	74	93	41
0 14	49	28	19	36	31	35	47	31	20	45	45	59	51	51	27	19	21	47	35	23	17	20	21	34	34
0 15	18	16	15	16	16	20	23	23	24	31	33	54	57	56	40	27	19	28	14	18	15	15	20	18	26
0 16	17	18	22	21	25	29	23	23	31	48	125	109	40	25	27	33	26	34	27	29	31	37	47	34	37
0 17	40	42	29	22	16	21	21	25	29	35	80	65	33	25	37	34	41	36	30	24	27	21	26	22	33
0 18	23	23	22	19	22	19	19	22	30	38	41	27	38	45	48	66	66	53	43	48	40	46	29	24	35
0 19	30	19	18	18	16	18	44	84	130	113	58	76	102	59	38	33	34	26	22	13	20	16	18	17	43
0 20	18	17	17	17	16	18	18	19	20	22	24	27	29	29	19	27	22	22	28	26	30	41	36	30	24
D 21	32	51	70	94	164	169	165	221	158	134	255	205	145	143	217	215	216	266	321	287	236	210	183	145	179
D 22	120	97	80	144	147	156	144	106	111	87	105	127	145	121	126	204	129	81	49	48	64	78	101	69	110
D 23	54	50	53	39	47	29	22	16	24	52	70	61	71	46	25	22	13	22	24	21	31	35	42	36	38
D 24	34	32	31	37	24	27	50	30	30	72	98	64	37	53	58	55	32	24	32	37	42	59	60	47	44
D 25	34	30	25	25	24	24	24	24	21	22	21	51	41	45	40	48	41	54	52	49	55	126	231	354	61
D 26	245	177	133	211	263	179	231	331	311	160	121	120	201	215	17	20	22	46	129	162	96	179	165	204	164
D 27	134	56	32	11	15	18	13	25	71	74	93	62	49	42	38	27	15	17	27	22	38	41	78	70	44
D 28	51	46	77	77	52	106	63	49	47	34	48	59	49	37	26	35	27	37	36	40	32	32	49	36	48
D 29	44	42	35	33	43	93	80	74	39	64	47	42	28	41	33	38	26	38	44	67	90	108	164	70	58
D 30	124	121	133	140	246	312	268	231	104	91	50	44	61	54	26	29	31	35	35	38	34	27	32	45	96
D 31	44	42	117	86	132	165	218	259	193	164	131	208	98	30	41	41	32	37	31	30	35	96	119	87	102
MEAN	47	40	40	45	53	57	61	64	58	56	69	68	57	50	39	40	37	39	41	41	40	50	60	56	50
50 MEAN	26	22	20	25	29	25	24	22	24	25	25	26	27	27	25	25	24	23	21	21	18	22	19	21	23
5D MEAN	113	97	106	135	190	196	205	229	175	127	132	140	130	112	85	101	86	93	113	113	93	118	120	110	130

DATE	AU INDEX (HOURLY VALUES)																				APRIL					MEAN
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0 2	33	63	67	77	70	39	25	17	14	18	21	26	37	48	31	31	30	30	20	12	19	29	31	35	34	
0 3	37	32	28	31	82	54	39	39	39	41	27	22	51	61	39	37	36	114	81	36	43	35	27	28	44	
0 4	27	26	21	24	27	34	25	78	133	56	75	78	41	33	60	94	131	87	110	161	83	56	36	31	64	
0 5	23	30	38	41	44	27	22	38	27	39	22	27	26	32	25	70	111	123	68	44	42	34	26	29	42	
D 6	24	24	33	86	74	47	54	31	26	31	36	79	73	126	212	330	409	263	193	132	120	81	54	101	110	
0 7	82	40	26	22	98	47	36	92	46	46	39	27	43	106	114	29	19	35	99	188	72	179	248	210	81	
0 8	131	136	149	123	60	52	36	29	65	88	111	178	209	86	37	27	72	57	27	46	42	54	36	45	79	
0 9	83	112	200	156	127	223	291	297	201	375	495	210	238	211	52	124	146	54	47	48	43	49	32	51	161	
D 10	37	82	168	162	207	298	147	234	278	345	246	184	58	42	40	26	27	26	32	22	28	31	34	181	122	
D 11	154	107	60	40	25	49	129	139	110	150	119	147	151	105	82	119	186	354	247	118	113	150	249	284	145	
D 12	187	114	158	175	108	200	203	130	71	138	136	80	63	41	26	70	150	166	121	51	56	49	224	152	120	
0 13	204	146	130	135	159	154	149	179	145	177	115	40	33	45	27	37	18	145	200	147	82	56	37	41	108	
0 14	36	28	45	66	77	87	93	80	98	70	50	37	45	30	56	85	107	100	119	168	181	140	228	257	95	
D 15	177	182	128	209	164	151	184	146	72	60	45	42	34	39	41	140	212	274	199	297	167	191	158	93	142	
0 16	99	58	60	133	161	166	174	172	54	36	39	61	47	68	73	82	123	244	162	87	31	64	53	130	99	
0 17	133	123	162	123	152	178	116	103	49	64	39	35	36	25	41	56	32	69	55	77	81	81	72	70	82	
0 18	41	26	67	70	35	33	26	42	56	39	57	52	62	36	24	24	35	43	36	31	32	58	36	44	42	
0 19	37	25	21	25	36	45	51	89	88	80	62	67	52	66	68	37	51	73	106	121	116	104	100	62	66	
0 20	70	111	114	96	50	34	34	28	39	44	60	55	66	44	40	28	25	55	90	140	146	166	138	76	76	
0 21	121	103	79	61	50	62	57	48	48	50	58	64	65	61	65	54	42	40	42	53	75	61	44	49	61	
0 22	68	92	81	65	62	39	40	35	37	40	35	52	60	103	83	87	83	81	87	108	121	118	116	129	76	
0 23	122	99	50	73	43	39	43	52	44	42	44	47	64	53	47	39	38	48	47	36	54	60	95	146	59	
0 24	124	123	126	205	207	161	129	96	104	129	111	103	72	82	89	76	112	108	58	68	44	38	46	77	104	
0 25	105	96	104	107	175	141	111	82	65	85	173	237	168	36	33	38	43	26	30	25	20	21	32	33	83	
0 26	27	22	48	116	152	137	47	30	27	33	34	30	40	77	102	44	47	44	48	41	35	60	39	39	55	
0 27	33	22	21	37	41	45	40	34	38	47	62	63	55	52	62	66	53	53	49	49	44	101	114	144	55	
0 28	78	37	33	71	66	44	34	26	45	49	76	117	117	81	44	44	59	40	53	37	36	30	26	26	53	
0 29	44	22	37	35	46	66	113	65	86	68	50	58	69	79	54	39	41	39	42	46	48	34	26	29	52	
0 30	31	32	83	111	73	61	30	30	33	45	81	90	151	159	98	56	41	53	45	94	97	67	62	39	69	
MEAN	81	72	80	90	89	90	83	82	71	83	87	77	75	69	61	69	85	98	87	85	71	74	82	90	80	
50 MEAN	59	57	61	53	40	38	34	41	44	41	43	45	48	54	55	46	48	57	65	57	61	60	49	42	50	
50 MEAN	115	101	109	134	115	149	143	136	111	144	136	106	75	70	80	137	196	216	158	124	96	100	143	162	127	

		AU INDEX (HOURLY VALUES)																									
		MAY												1980													
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2	@	25	23	19	18	27	63	121	113	63	46	69	44	25	33	35	30	33	28	31	40	30	24	31	33	42	
3	@	34	31	21	21	20	29	23	24	41	34	43	28	37	26	23	23	19	23	27	32	27	33	23	39	28	
4		28	28	24	29	49	27	32	22	19	47	46	71	75	87	85	33	24	29	47	30	24	23	24	28	39	
5		27	20	20	24	25	33	30	33	43	37	40	35	39	50	82	71	43	57	88	119	180	272	247	292	79	
6		271	94	141	162	99	27	172	165	150	160	127	164	181	171	113	67	62	107	195	174	155	123	77	45	133	
7		41	32	26	23	19	17	20	20	51	42	41	41	50	43	68	109	72	175	288	267	144	88	42	98	76	
8		232	173	144	167	265	167	112	16	8	21	23	31	38	51	74	72	40	31	27	29	23	21	29	62	77	
9	D	120	85	215	316	259	192	145	87	34	77	234	241	196	150	191	154	157	186	197	153	249	221	243	182	179	
10		311	144	58	37	29	14	18	22	37	41	39	38	29	39	38	27	26	27	43	42	43	52	52	53	52	
11	D	52	56	47	34	28	34	176	182	285	311	377	255	238	144	77	93	189	260	324	317	294	260	347	287	194	
12	D	177	332	330	288	239	105	110	168	202	187	128	159	121	114	75	112	65	100	153	103	128	121	107	56	153	
13		37	60	53	98	80	67	91	105	73	44	39	35	30	17	15	17	23	76	52	177	205	276	207	134	84	
14	D	162	165	332	283	90	48	64	83	49	40	61	88	69	46	41	36	70	147	329	235	205	176	128	68	125	
15		39	27	12	12	10	91	124	51	36	34	27	30	73	48	12	13	15	24	37	52	58	92	106	87	46	
16	@	99	61	32	29	30	81	100	84	62	87	42	24	42	38	17	14	25	41	37	26	25	21	27	25	45	
17	@	20	18	19	20	23	22	25	12	13	18	25	21	16	20	28	38	43	56	63	78	69	107	124	93	40	
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19		31	28	28	28	20	18	29	120	155	145	160	107	82	110	191	166	140	241	313	222	91	52	52	101	110	
20		205	152	108	85	64	58	41	50	131	118	79	33	38	50	53	35	34	45	59	55	51	37	35	38	69	
21		33	29	26	25	23	21	28	19	29	30	46	57	83	68	61	40	36	35	38	38	36	41	44	43	39	
22		35	36	36	37	43	46	83	81	90	72	48	52	83	90	140	112	86	59	55	66	71	58	50	49	66	
23		48	98	111	83	61	51	86	76	33	42	41	39	108	137	199	228	204	240	191	111	80	140	206	189	117	
24		236	212	134	84	83	101	91	131	164	171	214	306	203	183	157	256	394	483	406	313	410	349	404	302	241	
25	D	158	79	64	56	56	139	162	350	545	502	256	428	482	344	366	271	168	94	63	58	74	96	128	163	213	
26		155	90	76	68	33	0	-4	10	39	49	104	91	47	2	6	12	14	22	27	62	119	151	79	58	55	
27	@	50	30	18	51	14	7	3	16	65	58	45	34	30	27	52	29	33	37	40	39	38	33	29	30	34	
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29		27	30	33	34	28	32	45	31	69	89	91	119	83	38	48	38	38	52	87	87	121	94	66	59	60	
30		42	55	83	129	199	139	101	60	29	28	42	42	44	67	37	27	40	56	45	49	44	38	36	88	63	
31		126	138	188	343	322	269	231	135	205	175	215	227	205	327	320	366	195	46	62	104	124	193	306	362	216	
MEAN		96	80	81	85	75	65	75	76	92	93	96	100	94	87	89	85	79	96	112	103	104	106	107	101	91	
50 MEAN		45	32	21	27	22	40	54	49	48	48	44	30	30	28	31	26	30	37	39	43	37	43	46	44	37	
50 MEAN		133	143	197	195	134	103	131	174	223	223	211	234	221	159	150	193	129	157	213	171	190	174	190	151	172	

1980

JUNE

AU INDEX (HOURLY VALUES)

DATE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
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2	265	176	184	153	51	20	27	68	104	156	132	119	94	55	43	46	24	35	77	92	81	82	92	135	96
3	140	116	89	79	60	111	172	178	168	212	183	229	207	105	45	28	34	46	128	155	121	81	79	83	119
4	51	33	29	25	20	22	28	29	43	85	37	37	35	49	90	94	98	65	58	57	58	68	71	43	51
5	28	20	20	21	15	17	26	60	222	236	131	38	30	54	40	52	48	48	58	52	39	42	34	22	56
6	27	24	28	26	26	25	31	29	57	132	199	226	82	53	64	56	75	76	84	65	110	120	131	187	81
D 7	161	136	119	231	359	208	210	153	83	64	149	184	180	197	197	70	137	153	228	362	251	345	306	315	202
8	195	318	250	237	239	174	226	193	156	143	242	304	168	105	80	62	58	59	114	131	93	69	44	46	154
9	44	65	134	82	50	51	29	56	121	219	205	148	141	100	79	32	33	62	49	111	224	360	360	328	129
D 10	339	228	105	62	135	222	165	169	238	312	251	253	228	75	127	175	305	285	382	151	165	197	376	175	213
D 11	233	237	204	157	228	219	280	316	542	461	225	223	484	494	403	440	406	332	295	250	327	281	240	265	314
D 12	193	389	263	199	272	120	207	206	359	372	426	504	449	218	156	227	223	314	349	205	337	221	175	320	271
D 13	246	202	214	214	229	175	339	312	423	380	315	203	234	146	125	217	348	469	367	401	284	342	154	109	269
14	91	65	38	23	9	0	6	18	22	25	41	30	68	56	101	72	132	93	60	78	139	158	81	49	61
15	38	23	17	55	38	40	30	16	28	35	36	75	74	63	38	33	21	29	67	46	36	52	65	40	41
16	49	41	73	65	72	45	45	20	39	82	60	118	112	172	179	296	345	258	231	204	123	127	121	90	124
17	67	57	54	77	65	44	30	23	25	35	53	78	71	65	42	40	26	31	42	47	42	46	59	41	48
18	28	20	14	22	24	23	27	22	26	32	26	26	29	32	27	20	23	42	51	58	73	86	69	54	36
19	43	37	36	52	90	194	165	149	95	64	59	89	82	80	60	42	126	206	247	166	145	70	48	71	101
20	41	34	23	21	27	49	119	74	48	44	64	111	81	52	72	54	70	67	69	94	81	57	45	46	60
21	37	58	56	27	19	55	110	97	101	73	142	126	92	48	51	97	111	128	113	63	42	36	27	84	75
22	136	145	166	142	64	75	70	84	82	53	40	49	82	92	75	53	46	44	53	94	163	153	160	243	99
23	271	105	55	44	51	120	119	68	59	39	60	69	129	133	97	62	44	37	70	107	153	132	57	55	89
24	44	25	38	113	107	178	166	209	254	216	288	289	196	154	124	152	175	164	121	148	212	260	286	278	175
25	267	202	90	105	181	282	199	86	46	29	33	55	45	48	44	38	51	48	55	48	47	72	133	196	100
26	244	212	126	40	26	16	81	28	36	87	187	116	234	179	321	322	358	386	434	514	502	264	159	98	207
27	62	38	30	13	7	2	4	13	22	22	19	16	10	7	1	10	20	22	23	19	19	13	27	54	20
28	69	78	89	32	19	20	21	22	14	10	19	23	11	12	24	22	16	18	22	20	17	29	18	46	28
29	60	35	22	26	17	16	27	51	18	29	53	118	50	33	59	65	71	64	87	89	80	90	140	235	64
30	259	204	73	54	32	24	48	65	42	44	77	181	199	142	124	103	95	67	105	114	139	183	229	214	117
MEAN	133	115	91	86	93	96	109	103	127	135	136	142	145	114	110	111	129	132	146	143	148	143	133	137	123
50 MEAN	50	42	41	33	26	21	21	28	61	67	49	36	30	34	26	28	26	32	39	39	38	43	41	43	37
5D MEAN	234	238	181	184	244	188	240	231	329	317	273	293	315	226	201	225	283	310	324	273	272	277	250	236	253

JANUARY 1980

AL INDEX (HOURLY VALUES)

DATE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
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2	-324	-114	-85	-118	-65	-40	-30	-17	-31	-28	-57	-207	-344	-146	-52	-36	-67	-92	-48	-13	-14	-15	-23	-41	-84
3	-32	-33	-57	-197	-100	-19	2	-7	-19	-38	-39	-394	-323	-107	-34	-17	-35	-128	-204	-428	-159	-287	-318	-85	-128
4	-59	-53	-49	-30	-39	-82	-151	-23	-15	-59	-70	-135	-87	-43	-149	-493	-336	-346	-240	-316	-98	-67	-106	-68	-130
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MEAN	-65	-65	-64	-54	-43	-36	-41	-44	-63	-76	-107	-133	-124	-114	-137	-159	-151	-142	-141	-148	-137	-110	-83	-70	-96
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AL INDEX (HOURLY VALUES)

MARCH 1980

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D 22	-154	-124	-135	-173	-254	-337	-259	-63	-41	-30	-35	-195	-452	-453	-275	-388	-193	-136	-60	-15	-21	-45	-237	-142	
D 23	-61	-44	-40	-207	-88	-9	-17	-18	-17	-67	-151	-166	-111	-63	-34	-49	-50	-36	-114	-56	-35	-27	-33	-36	
D 24	-35	-35	-33	-46	-31	-57	-70	-27	-22	-85	-119	-65	-26	-25	-111	-152	-31	-23	-16	-21	-26	-45	-71	-32	
D 25	-35	-33	-27	-25	-22	-16	-18	-19	-22	-32	-38	-45	-41	-35	-24	-19	-25	-19	-22	-25	-36	-167	-284	-234	
D 26	-221	-170	-343	-511	-214	-233	-274	-335	-313	-285	-250	-235	-469	-372	-63	-37	-46	-68	-152	-219	-128	-126	-230	-387	
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D 28	-52	-36	-89	-152	-34	-64	-118	-163	-28	-34	-38	-32	-73	-69	-51	-39	-35	-22	-20	-22	-21	-23	-39	-46	
D 29	-43	-64	-44	-33	-38	-188	-159	-80	-46	-43	-51	-45	-40	-36	-50	-180	-73	-16	-42	-99	-90	-153	-170	-96	
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AL INDEX (HOURLY VALUES)		APRIL 1980																								
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0	5	-25	-26	-41	-69	-54	-30	-34	-35	-34	-44	-49	-48	-50	-52	-39	-68	-205	-377	-109	-1	0	-6	-13	-18	-59
D	6	-27	-29	-26	-149	-109	-33	-47	-68	-62	-45	-63	-46	-94	-297	-334	-657	-810	-398	-229	-95	-59	-48	-52	-61	-160
D	7	-262	-104	-26	-19	-77	-154	-52	-207	-136	-43	-38	-36	-40	-125	-225	-84	-30	-23	-96	-492	-156	-245	-345	-178	-133
D	8	-176	-187	-159	-107	-38	-37	-33	-31	-19	-30	-43	-149	-371	-128	-43	-33	-122	-121	-30	-28	-32	-28	-12	-32	-85
D	9	-71	-138	-245	-178	-201	-483	-373	-172	-166	-198	-594	-543	-521	-351	-119	-141	-172	-19	-11	-12	-4	-3	-11	-35	-198
D	10	-41	-58	-258	-455	-454	-347	-246	-444	-494	-185	-425	-299	-78	-28	-21	-32	-38	-61	-19	-4	-3	-5	-14	-74	-170
D	11	-186	-111	-44	-34	-40	-39	-162	-327	-101	-288	-389	-173	-210	-97	-113	-222	-237	-379	-593	-796	-697	-583	-364	-235	-267
D	12	-189	-561	-238	-195	-310	-220	-169	-127	-66	-221	-186	-112	-287	-160	-129	-110	-431	-410	-215	-29	-39	-37	-395	-810	-235
D	13	-818	-459	-309	-87	-103	-233	-343	-188	-191	-152	-107	-28	-30	-67	-54	-67	-83	-166	-314	-178	-81	-105	-33	-27	-175
D	14	-36	-33	-58	-108	-89	-103	-138	-138	-79	-51	-56	-51	-41	-35	-68	-186	-213	-198	-178	-172	-159	-151	-526	-462	-139
D	15	-261	-310	-476	-233	-173	-82	-149	-282	-68	-37	-35	-28	-20	-19	-33	-141	-385	-358	-362	-317	-136	-155	-326	-86	-186
0	16	-174	-72	-53	-93	-161	-166	-233	-155	-18	-21	-26	-134	-89	-86	-195	-258	-144	-191	-153	-71	-22	-42	-41	-202	-117
0	17	-391	-209	-258	-351	-289	-95	-52	-77	-44	-35	-28	-29	-25	-16	-18	-68	-115	-146	-43	-43	-71	-77	-43	-68	-108
0	18	-47	-35	-34	-117	-31	-17	-31	-24	-56	-111	-109	-72	-87	-43	-30	-33	-87	-38	-26	-20	-63	-34	-26	-50	-20
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0	20	-44	-219	-138	-101	-27	-16	-41	-24	-23	-25	-38	-51	-98	-58	-59	-57	-29	-38	-77	-91	-198	-135	-127	-100	-76
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0	23	-175	-165	-36	-26	-17	-23	-25	-25	-26	-27	-25	-27	-24	-24	-17	-12	-72	-111	-48	-32	-32	-38	-49	-96	-48
0	24	-107	-74	-132	-165	-111	-69	-49	-34	-37	-63	-63	-77	-74	-71	-110	-165	-202	-175	-63	5	-2	-13	-20	-72	-81
0	25	-184	-119	-97	-95	-128	-104	-98	-81	-54	-27	-87	-319	-242	-60	-21	-16	-3	1	3	2	3	-7	-22	-20	-74
0	26	-24	-28	-35	-100	-194	-165	-53	-22	-25	-36	-37	-31	-23	-38	-123	-52	-13	-9	-14	-2	-3	-28	-26	-14	-46
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0	MEAN	-123	-111	-105	-103	-103	-93	-92	-95	-79	-73	-97	-95	-101	-84	-85	-111	-148	-138	-108	-94	-71	-70	-93	-106	-99
50	MEAN	-48	-48	-50	-59	-39	-30	-37	-39	-59	-75	-58	-47	-49	-46	-72	-74	-105	-90	-74	-42	-47	-43	-32	-36	-54
50	MEAN	-140	-213	-208	-213	-217	-144	-154	-249	-158	-155	-219	-131	-137	-120	-126	-232	-380	-321	-283	-248	-186	-165	-230	-253	-203

AL INDEX (HOURLY VALUES)

DATE	MAY														1980										
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4	-25	-25	-32	-36	-49	-51	-19	-23	-36	-51	-53	-48	-46	-103	-223	-90	-22	-10	-19	-5	-9	-20	-21	-24	-43
5	-32	-36	-44	-42	-34	-31	-36	-33	-24	-44	-45	-46	-38	-52	-149	-165	-54	-55	-60	-121	-116	-126	-215	-207	-75
6	-239	-108	-144	-281	-128	-28	-104	-251	-191	-36	-39	-103	-302	-232	-206	-186	-183	-168	-233	-119	-159	-167	-58	-41	-154
7	-43	-33	-23	-20	-21	-24	-26	-20	-35	-42	-41	-40	-40	-31	-39	-84	-171	-190	-272	-244	-71	-48	-37	-72	-69
8	-137	-244	-303	-158	-139	-194	-126	-39	-40	-36	-37	-30	-24	-33	-64	-42	-51	-20	-1	-8	-15	-18	-43	-40	-77
9	-89	-71	-139	-221	-240	-228	-163	-80	-37	-45	-215	-319	-312	-259	-315	-344	-181	-305	-278	-160	-205	-183	-174	-215	-199
10	-140	-69	-36	-34	-22	-14	-18	-22	-24	-37	-35	-37	-44	-71	-25	-24	-25	-30	-32	-43	-89	-122	-143	-124	-60
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12	-404	-233	-371	-378	-371	-179	-53	-94	-172	-152	-128	-164	-163	-172	-135	-80	-97	-180	-358	-141	-99	-155	-190	-48	-188
13	-30	-46	-95	-184	-144	-84	-75	-174	-74	-25	-25	-32	-35	-30	-30	-25	-24	-78	-31	-136	-241	-509	-494	-478	-129
14	-258	-434	-304	-404	-221	-83	-77	-141	-88	-27	-25	-32	-62	-41	-44	-27	-40	-128	-567	-336	-193	-146	-177	-40	-162
15	-40	-41	-41	-37	-27	-52	-195	-87	-40	-37	-39	-36	-44	-71	-25	-24	-25	-30	-32	-43	-89	-122	-143	-124	-60
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20	-156	-162	-116	-61	-45	-30	-33	-33	-33	-69	-75	-26	-18	-17	-22	-35	-79	-54	-10	0	-9	-23	-17	-24	-48
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23	-18	-30	-35	-52	-23	-21	-26	-37	-37	-38	-43	-45	-64	-89	-209	-418	-355	-459	-200	-54	-34	-65	-131	-138	-109
24	-157	-86	-42	-38	-40	-68	-57	-60	-90	-176	-197	-198	-205	-146	-161	-185	-298	-342	-486	-425	-352	-442	-279	-97	-193
25	-76	-58	-20	-24	-46	-33	-84	-53	-449	-575	-329	-552	-321	-224	-348	-303	-196	-114	-86	-74	-55	-66	-78	-210	-182
26	-216	-145	-80	-75	-54	-59	-54	-51	-49	-55	-87	-66	-56	-28	-29	-20	-26	-19	-28	-63	-88	-185	-143	-53	-72
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29	-22	-32	-27	-22	-29	-27	-35	-43	-33	-50	-45	-55	-58	-50	-37	-19	-58	-24	-51	-25	-46	-28	-24	-28	-36
30	-32	-37	-50	-124	-150	-102	-47	-41	-32	-23	-23	-31	-40	-83	-35	-29	-12	-20	-15	-17	-14	-18	-37	-66	-45
31	-87	-92	-141	-201	-200	-326	-169	-82	-156	-49	-109	-149	-178	-230	-337	-338	-196	-61	-40	-84	-93	-157	-465	-655	-191
MEAN	-86	-79	-83	-89	-76	-70	-64	-68	-85	-89	-83	-97	-92	-84	-106	-109	-98	-106	-124	-91	-80	-101	-119	-108	-91
5Q MEAN	-47	-43	-42	-37	-38	-56	-73	-54	-38	-51	-56	-49	-37	-44	-38	-32	-40	-33	-22	-23	-30	-49	-33	-34	-42
5D MEAN	-169	-165	-174	-209	-179	-107	-86	-134	-248	-280	-219	-278	-243	-171	-188	-185	-132	-212	-338	-233	-174	-167	-247	-184	-197

AL INDEX (HOURLY VALUES)

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1980

DATE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
1	-303	-53	-47	-86	-133	-323	-367	-283	-541	-548	-421	-461	-590	-388	-463	-550	-467	-386	-269	-344	-356	-312	-301	-219	-342
2	-335	-117	-88	-122	-50	-32	-24	-38	-82	-67	-35	-27	-24	-29	-27	-22	-40	-52	-91	-61	-86	-61	-42	-68	-67
3	-194	-164	-110	-96	-82	-75	-134	-230	-181	-244	-143	-108	-217	-156	-113	-71	-27	-34	-93	-93	-54	-37	-51	-52	-115
4	-36	-37	-44	-30	-20	-26	-32	-33	-26	-26	-34	-35	-21	-20	-29	-44	-68	-36	-2	-1	0	-12	-20	-19	-27
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6	-12	-15	-11	-17	-33	-42	-38	-31	-35	-43	-119	-176	-117	-13	-19	-34	-116	-145	-80	-36	-33	-28	-71	-345	-67
7	-242	-104	-65	-137	-163	-144	-136	-216	-51	-34	-84	-165	-207	-306	-468	-166	-78	-145	-256	-303	-245	-296	-570	-571	-215
8	-500	-532	-462	-387	-190	-140	-187	-372	-151	-100	-227	-374	-316	-107	-87	-27	-89	-96	-207	-216	-144	-49	-34	-35	-209
9	-37	-58	-142	-78	-38	-23	-31	-46	-48	-268	-395	-300	-266	-239	-204	-88	-45	-54	-51	-187	-286	-251	-287	-406	-160
10	-550	-234	-85	-57	-66	-215	-420	-340	-338	-267	-397	-510	-281	-114	-275	-299	-483	-301	-478	-305	-231	-181	-446	-198	-295
11	-302	-409	-299	-215	-230	-359	-387	-477	-671	-804	-776	-671	-525	-444	-604	-636	-597	-416	-347	-610	-535	-416	-524	-507	-490
12	-577	-369	-292	-289	-268	-96	-236	-332	-409	-484	-511	-452	-455	-262	-237	-433	-474	-306	-492	-638	-599	-526	-549	-429	-405
13	-251	-119	-310	-331	-333	-464	-383	-365	-368	-464	-592	-441	-310	-300	-339	-343	-415	-362	-410	-401	-278	-405	-388	-94	-353
14	-58	-58	-51	-63	-40	-38	-45	-53	-30	-42	-37	-27	-49	-52	-159	-157	-105	-48	-20	-38	-118	-177	-43	-24	-63
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20	-44	-41	-38	-27	-31	-29	-21	-33	-15	-11	-18	-60	-71	-74	-61	-6	-13	-26	-34	-45	-37	-7	-21	-30	-33
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22	-103	-144	-133	-79	-45	-47	-44	-68	-74	-58	-31	-33	-39	-26	-56	-119	-27	-14	-31	-57	-119	-141	-219	-227	-81
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25	-180	-295	-92	-54	-89	-182	-115	-37	-39	-34	-28	-21	-13	-2	-15	-29	-31	-16	-14	-8	-19	-32	-110	-189	-68
26	-308	-245	-153	-47	-33	-35	-35	-53	-30	-60	-165	-160	-273	-413	-450	-430	-504	-591	-381	-541	-558	-405	-128	-57	-252
27	-40	-91	-90	-32	-24	-34	-34	-29	-25	-27	-37	-35	-31	-40	-57	-71	-56	-24	-31	-42	-35	-37	-39	-55	-42
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29	-47	-40	-33	-32	-21	-25	-29	-45	-61	-43	-47	-77	-55	-36	-69	-117	-151	-156	-82	-50	-71	-67	-120	-189	-69
30	-336	-205	-71	-37	-37	-35	-29	-28	-43	-23	-36	-102	-264	-193	-112	-171	-107	-116	-148	-67	-82	-82	-84	-127	-106
MEAN	-167	-127	-101	-90	-81	-99	-108	-119	-122	-137	-151	-163	-159	-138	-159	-163	-163	-149	-152	-154	-150	-132	-151	-147	-137
50 MEAN	-42	-57	-58	-40	-38	-36	-27	-27	-31	-36	-34	-36	-35	-45	-44	-42	-30	-28	-20	-33	-38	-34	-36	-37	-37
50 MEAN	-384	-247	-210	-205	-212	-255	-312	-346	-367	-410	-472	-447	-355	-285	-384	-375	-409	-306	-396	-451	-377	-364	-495	-359	-351

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AE INDEX (HOURLY VALUES)

DATE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
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2	345	172	175	179	127	96	88	67	98	72	97	307	492	298	138	97	104	117	71	28	28	30	49	90	140
3	94	84	149	236	242	158	65	44	50	87	91	559	549	267	136	75	76	182	300	541	316	386	393	140	218
4	125	138	160	129	147	168	268	103	69	132	109	181	112	72	183	579	399	468	334	404	217	144	186	149	207
5	125	188	134	62	72	75	73	62	58	49	211	130	321	404	361	316	230	210	149	133	279	196	206	169	176
6	158	139	176	217	114	60	50	87	116	65	79	95	58	35	170	300	145	87	144	126	135	94	81	39	115
7	28	27	41	49	40	43	35	61	45	36	36	42	39	143	81	68	71	51	40	123	191	134	138	278	77
8	224	127	67	93	162	201	171	142	105	79	129	142	35	36	50	53	58	52	45	32	27	25	28	33	88
9	35	30	26	29	64	100	73	89	112	92	114	104	131	68	77	57	50	46	32	32	50	30	33	37	63
0 10	43	34	31	34	36	33	38	41	111	74	71	63	60	136	160	165	56	64	126	32	30	31	41	42	65
11	43	46	52	54	43	62	88	39	153	203	438	413	273	123	122	370	441	417	241	130	359	390	134	56	195
12	55	44	37	36	29	31	30	31	37	36	47	42	42	37	38	38	58	37	37	35	33	33	32	31	37
13	39	38	34	27	36	46	37	116	269	142	243	784	777	548	426	701	758	643	544	675	581	622	384	376	369
14	220	276	279	194	140	90	87	108	122	178	166	139	98	98	77	91	291	115	46	86	85	46	64	75	132
15	48	48	51	55	65	60	37	55	52	32	88	65	281	246	61	50	47	168	312	94	80	58	43	46	89
16	134	233	342	322	179	230	265	244	178	116	104	128	93	113	50	34	31	27	28	19	21	25	28	33	124
17	33	37	29	47	36	31	154	376	128	157	345	233	90	130	417	339	151	147	169	72	84	47	47	38	139
18	49	55	64	41	33	32	64	62	165	149	115	67	82	117	84	54	84	71	67	61	115	92	77	57	77
19	82	60	34	36	32	30	32	50	47	42	78	60	36	52	51	66	48	157	195	159	100	51	45	39	66
20	107	116	154	105	93	66	40	31	36	34	34	59	101	79	69	44	46	35	33	173	52	49	47	130	72
21	131	120	85	68	40	56	66	115	94	162	119	79	99	252	284	151	114	102	88	100	53	58	48	57	106
22	44	39	28	20	23	23	32	52	102	166	134	77	41	150	107	90	65	42	223	441	251	183	100	79	105
23	81	93	61	45	64	112	258	198	111	114	204	71	57	46	71	49	39	32	31	27	24	35	41	36	79
24	44	32	29	40	42	36	36	30	48	49	174	113	65	55	69	180	146	244	315	118	54	38	40	35	85
25	34	34	30	28	33	29	34	34	31	33	40	50	52	67	244	153	54	86	314	174	43	46	91	149	78
26	72	59	62	94	74	43	35	29	35	34	53	80	133	204	110	98	64	62	70	115	130	79	138	163	85
D 27	100	165	383	386	123	45	37	64	286	480	437	624	187	231	730	841	736	706	536	540	701	539	720	354	415
D 28	271	286	340	376	467	394	122	53	55	105	75	172	582	492	217	640	831	597	527	347	75	105	105	206	310
D 29	413	667	479	175	129	73	61	56	33	39	74	168	53	99	574	524	490	472	389	525	494	331	299	330	289
30	230	128	169	96	70	48	56	61	213	298	378	406	54	36	60	169	110	66	51	85	154	135	147	125	139
31	80	110	86	46	37	33	35	33	43	79	73	40	41	40	37	69	54	45	65	153	124	163	181	225	79
MEAN	115	118	123	109	95	86	83	87	107	120	156	194	178	168	191	230	211	199	195	199	185	157	138	124	149
50 MEAN	52	44	38	35	38	45	47	54	94	78	85	67	70	82	82	76	55	75	91	63	65	47	45	41	61
5D MEAN	182	241	237	208	182	146	78	95	194	230	262	456	421	385	525	676	706	609	508	536	544	454	365	302	357

AE INDEX (HOURLY VALUES) FEBRUARY 1980

DATE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
1	123	135	114	74	54	64	89	153	54	57	52	103	122	44	43	41	37	86	140	389	335	214	200	191	121
2	124	90	73	129	199	216	116	221	266	250	197	187	150	140	78	75	77	52	119	84	59	27	52	55	126
3	55	66	59	76	90	83	61	58	60	45	46	53	52	59	63	47	52	43	40	29	21	39	48	44	54
4	44	39	42	53	46	50	81	162	128	114	71	109	130	106	67	57	59	58	56	42	39	43	41	52	70
5	48	43	38	32	30	33	36	34	57	172	243	115	153	171	207	173	118	76	68	65	33	37	39	41	86
6	46	38	36	67	55	75	130	327	763	486	336	494	526	586	949	1151	1262	696	417	735	235	119	64	71	403
7	75	84	54	85	67	183	245	188	81	57	50	110	313	104	51	50	44	125	452	384	276	261	137	317	158
8	384	225	114	383	449	481	371	411	413	529	650	520	479	459	527	438	417	300	276	168	91	116	260	146	359
9	72	55	166	138	82	145	248	312	208	237	168	280	299	386	572	418	325	389	509	222	132	180	189	123	244
10	59	58	38	38	52	96	112	69	48	40	42	45	44	40	38	40	50	49	43	44	30	31	38	41	49
11	45	48	43	71	74	36	43	50	112	83	44	69	39	42	64	61	56	48	42	34	30	37	52	58	53
12	62	60	50	30	34	55	41	71	74	182	69	44	68	164	50	50	45	39	40	45	31	44	38	38	59
13	44	44	44	37	40	35	32	43	42	27	58	45	37	42	43	52	50	43	45	56	82	67	41	35	45
14	47	76	88	151	150	167	242	144	273	688	974	765	357	325	315	695	778	504	297	414	260	58	47	42	327
15	43	158	244	159	149	148	142	198	267	177	96	77	106	100	53	56	34	55	43	206	781	772	530	724	222
16	154	300	797	859	612	486	324	663	641	677	465	510	678	668	605	470	323	433	475	539	425	140	98	103	477
17	79	51	44	75	59	34	43	45	58	41	44	32	31	55	67	77	36	30	24	31	23	20	24	77	46
18	304	279	232	140	67	82	127	266	338	479	487	290	354	228	169	98	149	261	628	640	453	297	258	339	290
19	416	174	294	429	414	96	91	197	96	65	53	57	51	59	110	76	101	69	67	59	52	36	72	110	135
20	194	169	147	107	50	37	42	29	50	80	345	151	81	101	177	197	177	80	43	42	30	41	53	94	105
21	128	200	130	53	50	37	39	44	44	64	55	39	41	38	38	48	45	35	30	25	45	120	95	36	62
22	28	29	29	28	25	33	29	26	24	30	41	56	51	58	49	122	115	48	32	36	40	32	27	31	43
23	40	41	35	59	45	34	35	44	75	174	227	129	90	75	198	261	437	427	490	624	477	270	163	198	194
24	294	211	144	140	101	183	163	76	58	91	73	131	143	75	141	349	78	68	47	38	33	49	57	58	117
25	66	70	68	73	48	48	39	52	51	43	74	42	51	71	85	141	153	225	638	788	594	369	276	288	181
26	200	94	99	140	88	59	59	65	57	71	105	193	197	249	286	223	142	86	298	272	153	69	98	61	140
27	65	69	110	91	143	144	111	128	254	373	319	457	563	734	367	169	355	243	287	317	317	356	179	218	265
28	209	226	181	138	214	148	102	148	385	384	440	488	183	69	55	49	56	121	134	134	236	366	231	139	202
29	264	266	136	124	108	82	60	58	152	182	111	71	93	146	89	58	82	172	188	154	171	111	107	82	128
MEAN	128	117	125	137	123	116	112	147	176	203	204	195	188	186	191	198	194	167	205	228	189	149	121	131	164
50 MEAN	53	54	44	44	48	59	56	55	56	93	91	60	70	95	79	72	63	50	47	47	39	43	40	39	58
50 MEAN	134	159	255	323	283	271	241	348	471	511	504	473	429	427	489	562	562	397	301	412	358	241	199	217	357

AE INDEX (HOURLY VALUES) MARCH 1980

DATE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
0 1	76	54	41	85	99	64	45	45	75	63	47	45	31	35	40	42	46	37	24	34	30	36	47	53	50
0 2	52	47	44	65	79	63	57	60	44	45	41	45	49	46	48	47	45	44	135	62	40	82	91	87	59
0 3	105	63	55	55	68	80	78	55	72	86	68	44	47	53	105	82	194	299	89	51	64	99	57	35	84
0 4	31	37	33	29	34	42	35	30	70	195	185	185	124	75	53	50	41	43	31	37	57	201	244	111	82
0 5	77	133	242	209	212	150	68	76	167	230	409	342	195	120	69	64	57	43	36	55	48	63	64	44	132
0 6	82	52	32	23	35	65	64	63	46	55	222	161	66	59	72	69	117	129	75	67	49	55	58	61	74
0 7	33	179	229	168	56	46	57	41	49	64	82	88	103	69	75	77	79	71	142	228	199	194	134	59	105
0 8	56	47	96	167	137	143	348	231	117	77	148	183	55	41	39	35	76	47	73	86	63	67	52	63	102
0 9	94	61	52	38	30	46	127	261	220	87	40	45	66	195	201	70	205	72	35	33	46	79	63	93	93
0 10	45	41	32	24	27	47	42	34	45	60	206	235	220	195	99	62	59	58	55	40	43	55	69	68	77
0 11	79	48	31	22	25	24	27	34	38	114	298	194	122	112	96	50	49	66	59	54	54	64	66	70	75
0 12	74	70	66	60	46	33	41	47	37	44	46	44	44	43	35	39	39	41	68	36	44	32	30	38	46
0 13	51	48	46	38	35	31	56	59	83	63	112	69	105	178	68	40	46	45	62	158	204	95	165	234	87
0 14	103	61	40	73	72	76	72	48	36	72	115	120	87	129	89	113	111	120	112	62	27	36	48	42	78
0 15	46	43	40	43	40	40	42	46	49	62	67	95	104	87	70	60	44	47	38	40	29	27	38	67	53
0 16	57	47	40	40	39	44	47	53	60	89	272	257	80	58	53	60	60	54	43	47	46	62	99	63	74
0 17	64	63	55	56	47	50	74	59	56	66	175	193	66	60	74	83	79	58	46	38	45	42	54	53	69
0 18	57	53	53	50	45	73	59	48	53	69	73	63	78	83	79	101	101	90	82	79	74	80	62	61	69
0 19	59	43	42	42	45	37	60	175	297	226	120	167	232	178	70	58	65	55	53	38	42	40	46	45	93
0 20	51	47	44	43	41	39	42	47	74	57	84	116	92	84	48	64	49	49	46	75	50	62	65	65	60
D 21	59	144	229	306	358	465	447	552	463	333	550	436	339	403	556	507	481	458	656	599	610	559	348	488	431
D 22	275	221	216	318	403	494	403	169	153	119	141	323	598	575	401	593	324	218	111	64	87	125	339	212	287
D 23	116	95	94	246	135	39	41	35	42	121	222	228	183	110	60	71	63	59	139	79	68	64	77	73	102
D 24	70	67	65	83	56	85	121	58	54	159	219	131	64	79	170	207	64	48	49	60	69	106	132	80	96
D 25	70	63	54	51	47	42	43	45	45	55	61	97	83	80	65	68	68	74	75	75	93	294	516	589	115
D 26	467	348	478	724	478	414	506	666	625	446	372	355	670	587	81	58	70	116	282	383	225	306	396	592	402
D 27	299	111	83	58	98	58	47	77	217	228	229	131	86	71	74	112	124	51	61	65	82	106	205	190	119
D 28	105	83	167	229	87	171	183	213	77	70	87	93	124	107	78	76	64	61	57	64	54	57	89	83	103
D 29	87	107	80	67	82	282	240	156	86	108	100	89	69	78	85	219	100	55	87	168	181	262	335	168	137
D 30	366	470	435	442	543	512	439	370	222	143	95	89	128	141	57	57	55	55	48	54	68	62	70	89	209
D 31	82	77	181	379	343	300	447	577	476	368	234	519	276	68	96	142	120	53	39	39	63	173	275	155	228
MEAN	106	97	109	136	123	130	140	142	133	128	165	167	147	135	103	108	99	87	93	95	92	115	140	132	122
50 MEAN	61	53	48	60	61	54	48	49	51	56	54	58	61	58	54	57	55	51	69	50	43	51	53	61	55
5D MEAN	249	252	307	433	425	437	448	466	387	281	278	344	402	354	238	271	210	180	227	227	210	245	285	307	311

AE INDEX (HOURLY VALUES) APRIL 1980

DATE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
0 1	112	127	136	72	51	59	59	49	53	65	62	63	83	148	309	323	335	378	344	168	134	86	61	52	139
0 2	65	110	125	162	149	74	73	58	48	58	61	70	79	94	70	79	64	60	39	22	27	42	49	56	72
0 3	65	63	60	63	205	152	62	53	56	82	81	60	89	127	75	55	61	235	265	77	41	46	45	48	90
0 4	54	54	58	73	71	72	61	119	391	152	130	250	117	67	124	261	409	241	174	314	193	91	53	51	149
0 5	49	57	80	111	100	59	57	74	63	85	72	77	77	86	65	139	316	500	177	47	43	40	40	47	103
D 6	52	54	60	236	185	82	102	101	89	77	100	127	168	424	547	988	1219	661	422	228	180	130	106	163	271
D 7	346	146	53	42	176	202	89	300	182	90	78	65	84	231	340	114	50	60	197	680	229	424	594	389	215
D 8	308	325	309	231	99	90	71	62	85	119	198	329	581	215	81	61	194	178	58	75	75	83	49	78	165
D 9	155	251	447	335	330	707	666	470	368	574	1090	754	760	563	172	266	319	74	60	62	49	53	45	87	361
D 10	79	141	428	619	662	646	394	680	773	531	672	483	137	72	62	58	66	88	53	28	32	37	49	256	294
D 11	341	219	105	75	67	89	292	467	213	438	608	321	362	203	196	342	423	734	841	914	811	734	614	521	414
D 12	377	676	397	371	420	421	373	258	138	359	322	193	350	201	155	181	581	577	396	81	96	87	620	964	356
D 13	1023	606	440	193	264	389	493	368	337	330	223	69	64	113	81	105	101	312	515	325	164	162	71	69	284
D 14	72	62	105	175	167	192	231	219	178	122	107	89	87	66	125	272	320	299	297	341	340	291	755	720	235
D 15	440	493	606	443	339	234	334	428	141	98	81	71	56	59	74	282	598	632	561	615	304	347	486	179	329
0 16	274	131	114	228	324	333	408	328	74	59	66	195	137	155	269	340	268	435	316	159	53	107	94	333	217
0 17	525	333	422	476	442	275	170	181	94	101	68	65	63	43	60	125	148	215	99	120	153	159	116	139	191
0 18	90	61	102	189	67	52	58	67	113	151	166	125	150	81	55	57	123	82	64	51	52	121	71	70	92
0 19	70	57	46	48	60	74	78	159	233	227	128	117	95	102	110	63	163	131	159	192	227	162	159	105	124
0 20	114	332	253	198	79	51	76	54	63	71	100	107	165	104	100	86	55	93	167	231	344	281	294	238	152
0 21	209	175	157	97	78	96	96	76	78	91	97	96	91	89	94	84	86	91	101	72	109	111	73	118	103
0 22	149	142	203	104	86	55	57	55	62	65	70	87	92	161	186	248	254	268	181	154	152	164	190	244	143
0 23	299	266	88	100	61	63	69	78	71	71	70	75	93	79	65	51	110	160	96	69	86	98	145	243	109
0 24	232	198	260	371	319	232	179	131	143	193	175	182	148	154	200	241	314	284	121	63	47	52	67	149	186
0 25	290	216	203	204	304	247	209	164	121	114	261	556	412	97	55	55	47	24	27	22	16	29	54	53	157
0 26	51	50	85	217	348	304	101	54	53	71	73	63	64	116	226	96	60	54	63	44	39	88	66	54	102
0 27	54	47	47	64	71	67	69	60	66	82	97	100	90	75	82	163	108	53	44	39	26	141	187	373	92
0 28	165	62	50	93	104	74	66	62	69	83	119	196	232	171	80	66	106	50	50	36	27	30	31	43	86
0 29	66	45	61	50	61	80	252	147	150	113	95	95	101	138	93	75	65	58	53	45	53	48	45	41	85
0 30	45	58	119	208	133	91	65	66	72	93	137	146	300	438	299	158	79	77	47	147	197	105	71	58	134
MEAN	205	185	187	194	194	185	177	179	152	158	186	174	177	155	148	181	234	236	197	180	143	144	176	198	181
50 MEAN	109	106	113	113	81	71	72	81	105	118	102	94	99	102	127	121	154	148	141	101	109	104	82	80	105
5D MEAN	257	316	319	348	334	294	299	386	270	300	356	239	214	191	206	370	577	538	442	373	284	267	375	416	332

DATE	AE INDEX (HOURLY VALUES)																			MAY												MEAN
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23								
0 1	123	185	212	58	79	189	73	46	43	66	130	177	108	87	99	71	96	214	296	87	71	62	66	76								
0 2	68	57	50	46	60	166	226	192	108	87	129	99	67	69	69	53	59	43	35	55	43	38	51	61								
0 3	70	64	51	49	60	59	113	74	69	80	90	48	73	63	53	48	53	38	40	40	39	67	52	79								
4	54	53	56	66	99	79	53	46	56	99	99	119	121	190	308	124	48	40	67	36	34	44	46	52								
5	59	56	65	68	61	65	67	67	68	81	86	81	78	103	233	238	98	113	150	241	297	399	464	500								
6	510	202	286	444	227	56	276	417	343	197	166	268	485	405	320	254	247	277	429	294	315	290	136	87								
7	85	65	50	44	41	40	45	48	72	77	84	84	91	75	107	194	245	366	561	512	217	137	79	172								
8	370	418	448	325	404	362	239	55	49	58	61	61	62	85	139	115	92	53	29	37	39	40	73	103								
9	210	157	355	537	500	421	309	168	72	122	449	562	509	410	508	500	399	492	477	315	456	406	418	399								
10	453	208	94	72	53	29	37	45	62	77	76	70	51	51	47	48	41	34	52	56	58	67	73	68								
D 11	74	86	83	53	49	50	229	484	784	912	777	583	597	307	180	268	341	597	729	775	615	548	964	449								
D 12	582	565	701	667	611	285	163	263	374	340	256	324	286	287	211	193	163	281	513	245	228	277	298	342								
13	68	107	149	282	225	151	167	280	148	70	65	68	65	48	46	43	48	155	84	315	447	787	702	214								
D 14	421	600	636	688	312	132	142	224	137	67	87	121	132	88	86	65	111	277	897	562	399	324	305	109								
15	80	69	54	50	39	144	319	140	77	72	66	66	117	120	38	38	41	56	71	96	149	215	251	107								
0 16	172	127	90	72	69	148	189	134	91	145	99	63	80	144	95	66	72	66	60	60	58	56	65	61								
0 17	59	59	65	66	66	66	66	65	58	68	82	75	59	50	55	74	123	149	122	116	139	249	186	141								
18	91	67	56	59	66	60	57	85	120	222	237	175	121	91	99	129	192	123	46	39	55	80	72	73								
19	71	59	58	55	53	57	56	159	289	249	262	251	178	277	542	449	352	563	653	379	126	70	87	170								
20	362	316	226	147	109	89	74	83	201	193	105	52	55	73	90	116	89	56	59	65	76	55	60	73								
21	79	78	69	55	56	59	64	66	69	67	83	85	100	79	68	46	42	39	44	46	47	57	64	64								
22	56	56	55	60	70	72	101	97	113	108	91	95	122	118	208	238	255	86	56	64	79	73	63	61								
23	67	128	147	135	85	73	113	113	71	80	85	84	172	228	409	646	560	700	392	166	115	205	338	227								
24	394	300	177	122	124	169	149	191	255	347	411	505	408	330	320	442	692	826	894	739	763	793	684	400								
D 25	235	137	85	81	103	172	247	403	995	1077	586	982	804	569	715	576	364	209	150	134	130	163	207	373								
26	371	236	157	143	88	59	50	61	89	105	192	157	103	32	37	34	42	42	56	127	208	338	224	113								
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31	215	232	330	544	523	595	400	218	362	225	324	376	383	558	659	705	392	109	104	190	218	350	772	1018								
MEAN	183	161	165	176	153	137	141	146	178	184	180	198	187	172	196	196	179	205	238	196	186	208	227	211								
50 MEAN	93	77	65	66	62	97	128	104	87	101	101	80	68	74	70	59	72	72	62	67	69	93	81	80								
5D MEAN	304	309	372	405	315	212	218	308	472	503	431	514	465	332	340	320	263	371	553	406	365	343	438	337								

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JUNE

AE INDEX (HOURLY VALUES)

DATE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
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3	336	281	200	177	144	186	307	408	350	456	327	337	424	261	159	100	62	81	222	249	176	119	131	136	235
4	89	71	74	56	41	49	62	63	71	112	71	73	57	70	120	139	167	102	61	58	58	80	92	63	79
5	50	59	63	55	46	52	58	90	273	319	183	78	64	91	56	76	82	113	83	80	70	57	45	34	91
6	40	40	40	44	61	68	70	61	93	176	318	403	200	67	84	90	192	223	165	102	144	150	204	533	149
7	404	241	185	429	524	353	346	370	135	98	233	349	388	504	665	238	215	299	485	666	497	642	878	888	418
8	696	852	713	625	430	315	414	565	307	244	469	679	484	212	167	90	148	156	322	349	239	119	79	83	365
9	82	124	278	162	89	75	61	104	170	488	600	448	407	339	284	127	79	117	101	299	511	613	649	736	289
10	891	463	191	120	202	439	586	510	577	580	648	763	510	189	403	475	788	588	861	457	396	379	824	375	509
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12	771	759	556	490	541	216	443	540	769	856	938	757	904	481	394	660	697	621	842	844	938	748	725	751	677
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16	85	86	129	176	146	96	94	73	120	144	100	202	218	506	517	674	589	439	455	440	211	179	232	188	254
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19	87	77	67	81	120	333	330	246	149	120	93	116	119	139	168	168	355	496	616	229	169	84	73	121	190
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24	72	54	72	178	145	228	260	322	390	328	378	474	342	318	258	340	337	446	295	207	347	355	395	443	291
25	448	498	183	160	270	464	314	124	86	65	62	77	58	50	60	68	82	65	69	57	67	105	245	387	169
26	553	458	281	88	60	53	117	83	68	147	352	276	507	593	772	752	862	977	816	1056	1061	670	288	157	460
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28	139	168	167	64	38	35	45	47	48	48	55	56	35	39	77	111	62	52	39	47	41	63	57	92	68
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30	597	410	145	92	71	60	78	93	86	68	114	283	463	335	236	274	203	185	254	182	222	266	315	343	224
MEAN	302	244	194	177	175	197	219	223	250	273	288	307	306	254	270	274	294	283	300	298	299	276	286	286	261
50 MEAN	94	101	100	74	65	59	50	56	94	104	84	73	66	79	70	72	58	61	60	73	77	79	79	82	75
5D MEAN	620	486	392	391	458	445	553	578	697	728	745	681	671	512	586	601	693	617	721	726	651	643	747	598	606

JANUARY 1980

AO INDEX (HOURLY VALUES)

DATE	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
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D 28	33	10	-39	-52	-27	27	24	14	12	-1	0	-151	0	-114	-15	-107	-185	-38	-67	-11	18	23	0	-29	-28
D 29	-218	-184	-73	35	14	-6	2	9	0	-4	-11	-63	0	-12	-206	-138	-126	-94	-52	-115	-150	-72	-57	-62	-66
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5Q MEAN	5	5	6	5	3	1	2	2	-11	-6	-13	-10	-9	-14	-19	-13	-5	-16	-27	-11	-9	-4	2	3	-5
5D MEAN	-38	-38	-40	-6	-9	1	5	0	-43	-50	-41	-88	-116	-84	-128	-125	-171	-137	-120	-146	-190	-137	-70	-50	-76

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AO INDEX (HOURLY VALUES)

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5Q MEAN	1	4	3	4	10	4	2	5	0	-16	-17	-8	-7	-22	-10	-10	-10	-5	-4	-5	-5	-5	-5	-5	-2	-4
5D MEAN	-20	-37	-77	-61	-45	-25	-20	-49	-74	-87	-33	-75	-77	-105	-141	-170	-143	-37	-44	-106	-98	-77	-52	-40	-70	

MARCH 1980

AO INDEX (HOURLY VALUES)

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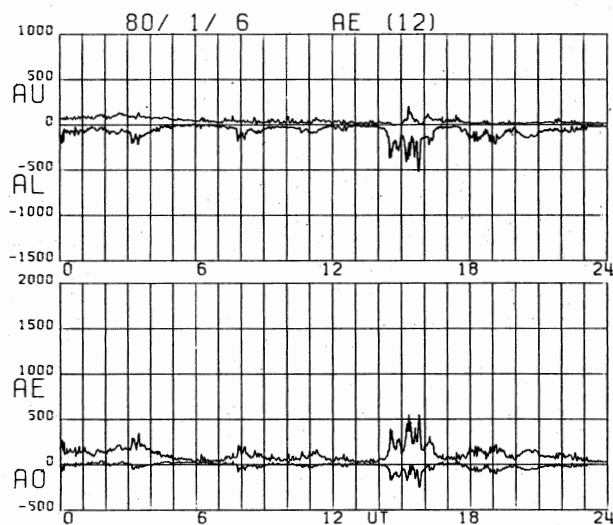
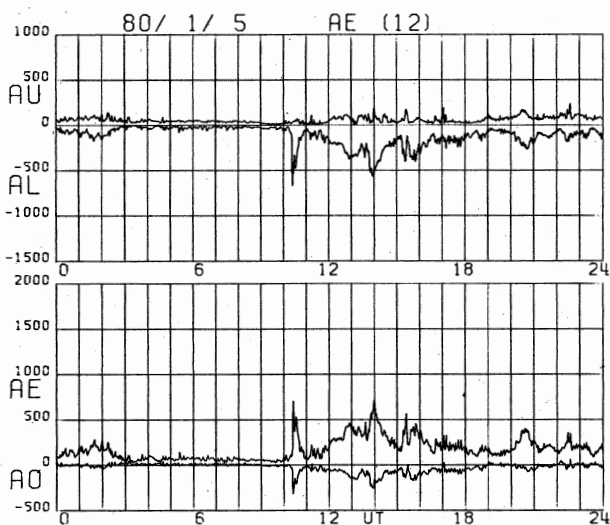
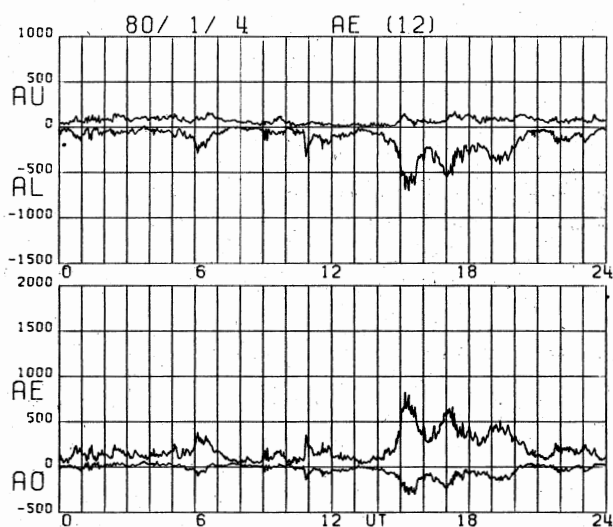
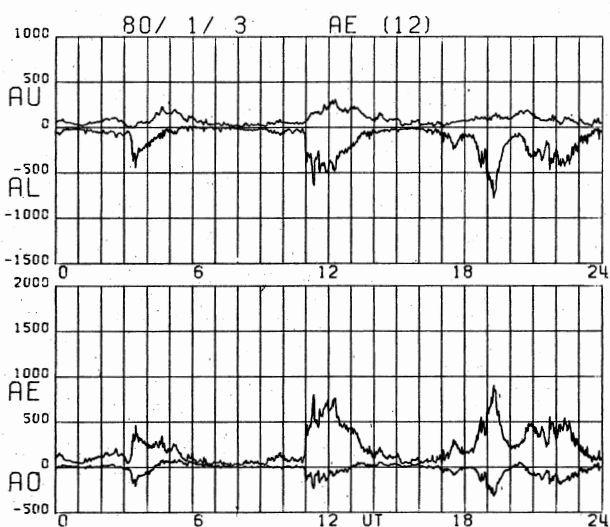
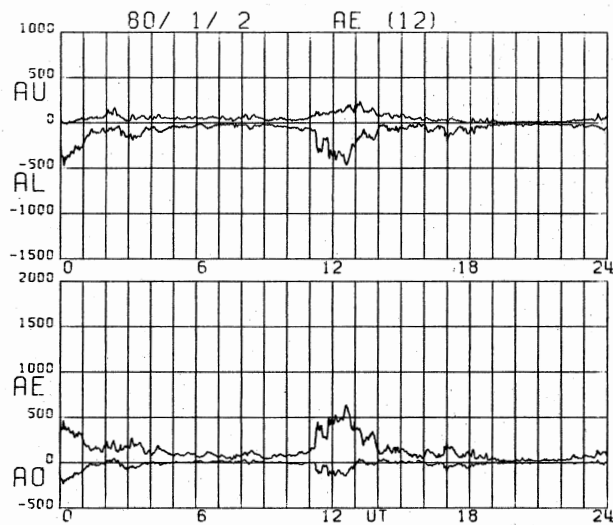
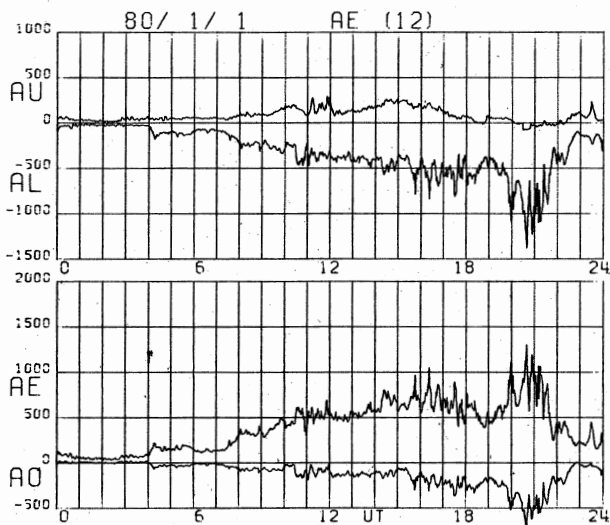
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Q	13	-1	40	-48	-58	-51	-143	-21	-25	27	-42	-137	-118	-37	-76	-106	-62	-32	53	-21	0	3	-31	-116	7	-41
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Q	15	3	-5	-7	3	-29	-41	-15	-9	1	3	1	22	21	19	-4	-26	-5	-1	11	12	0	8	8	2	-1
Q	16	7	0	9	-21	0	-1	-1	-14	-19	10	10	17	3	-79	-78	-39	50	37	3	-15	18	37	5	-2	-2
D	17	8	9	4	4	-8	-7	8	4	2	9	14	18	7	-10	-13	13	8	11	16	17	16	16	7	2	6
Q	18	-2	-4	-10	-6	-5	-9	-4	-8	-1	5	1	-4	-2	-1	0	0	0	6	13	15	0	4	7	6	0
D	19	0	-1	3	12	30	27	0	26	20	4	12	31	22	10	-23	-40	-51	-41	-59	51	60	28	11	10	6
Q	20	0	-2	-6	-2	-1	9	48	19	15	15	22	25	5	-10	5	24	27	19	16	23	21	24	11	7	13
D	21	3	7	8	-3	-6	14	44	33	41	19	39	-11	-13	-7	7	0	-56	-59	-13	28	13	4	0	1	4
Q	22	16	0	16	31	10	14	13	8	3	-2	4	7	20	32	9	-32	9	14	10	17	21	5	-29	7	8
D	23	17	0	5	2	-12	10	36	5	16	1	13	3	21	1	-2	0	6	15	9	16	-6	21	5	14	8
Q	24	7	-1	3	25	34	64	35	48	59	51	98	51	25	-3	-4	-17	6	-58	-25	44	38	83	89	56	29
D	25	43	-45	0	25	46	50	41	24	3	-2	2	16	15	22	14	4	9	14	20	19	13	19	11	3	15
Q	26	-31	-15	-12	-3	-3	-9	22	-12	2	13	11	-20	-19	-116	-63	-53	-72	-101	26	-12	-27	-69	15	19	-22
D	27	10	-26	-29	-8	-8	-15	-14	-7	-1	-2	-8	-8	-9	-15	-27	-30	-17	0	-2	-11	-7	-11	-5	0	-10
Q	28	0	-4	5	0	0	2	-1	0	-9	-12	-7	-4	-5	-5	-13	-32	-14	-7	2	-2	-2	-1	-8	0	-5
D	29	6	-2	-4	-2	-1	-3	0	2	-21	-6	3	20	-1	-1	-4	-25	-39	-45	2	18	4	11	10	22	-2
Q	30	-37	0	1	8	-2	-5	9	17	0	10	20	38	-31	-24	6	-33	-6	-23	-21	22	28	50	72	43	5
MEAN		-16	-5	-4	-1	6	-1	0	-7	1	-1	-8	-10	-6	-11	-23	-25	-16	-8	-3	-5	0	5	-9	-5	-6
50 MEAN		3	-6	-8	-3	-5	-7	-2	0	15	15	7	0	-2	-4	-8	-7	-2	2	2	9	3	4	2	2	0
5D MEAN		-73	-4	-14	-10	16	-33	-35	-56	-18	-46	-98	-106	-19	-28	-90	-73	-62	-62	-35	-88	-51	-43	-121	-60	-48

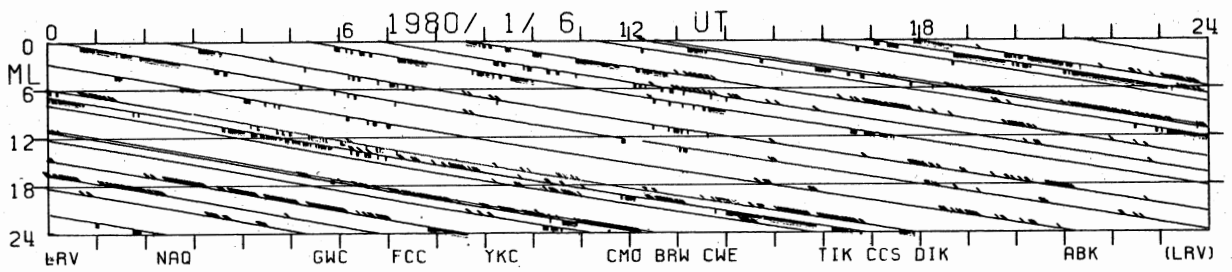
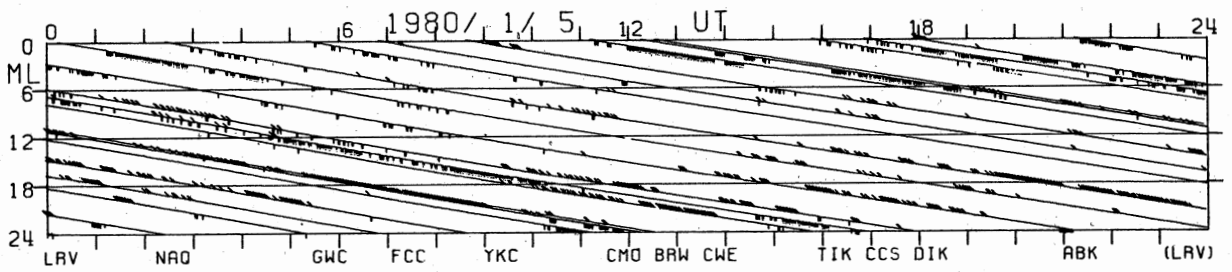
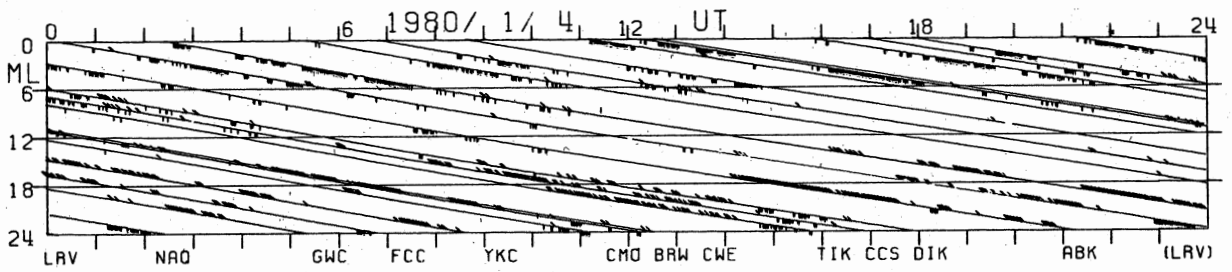
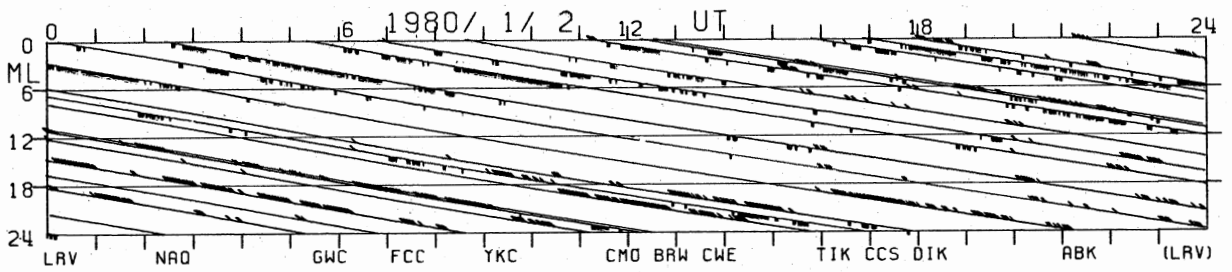
FIGURE 4 (on even pages)

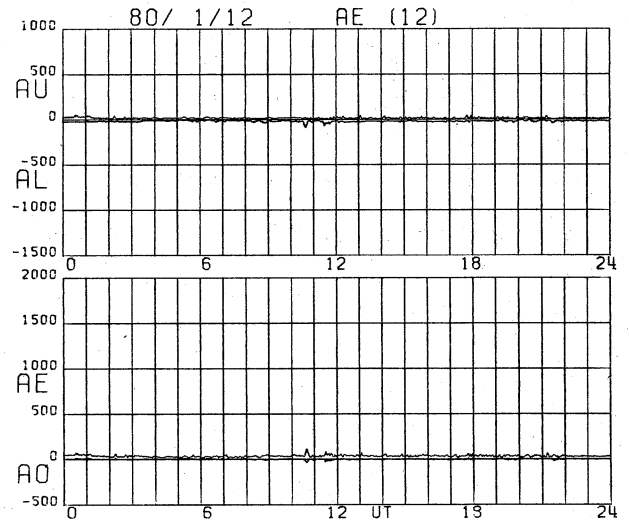
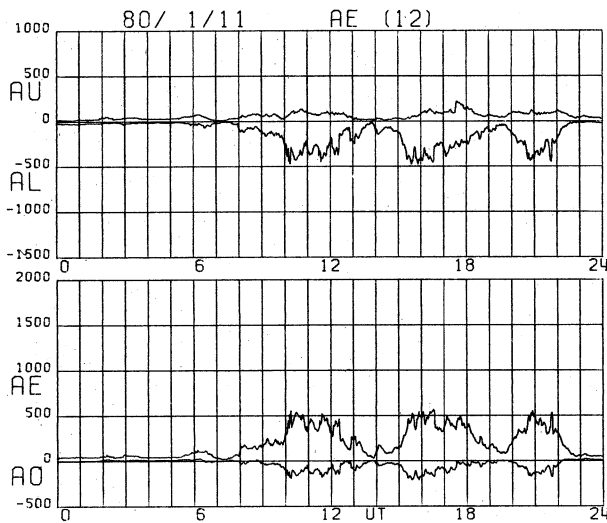
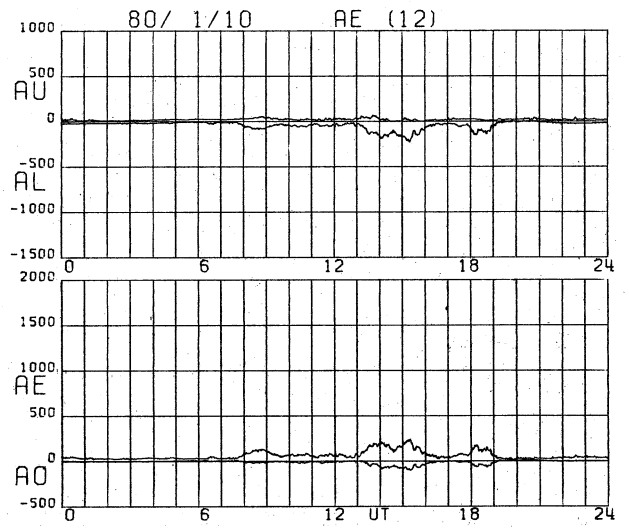
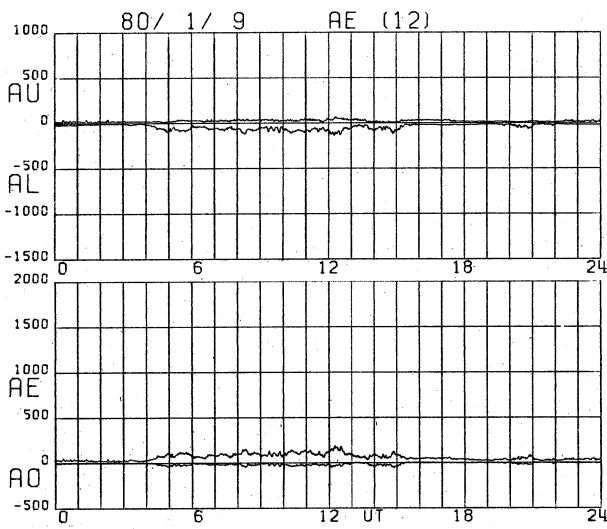
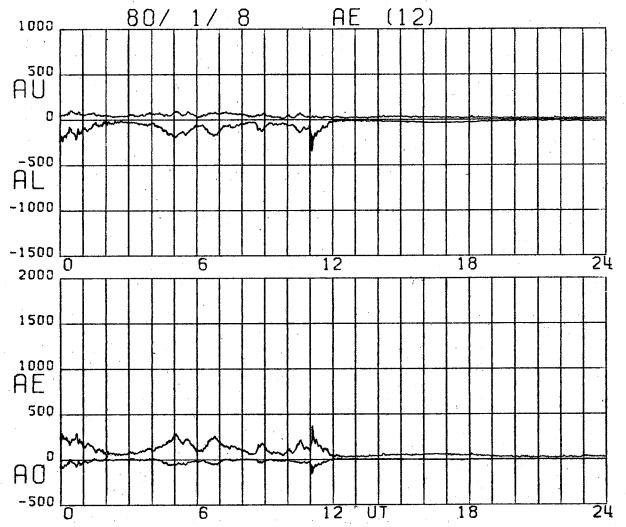
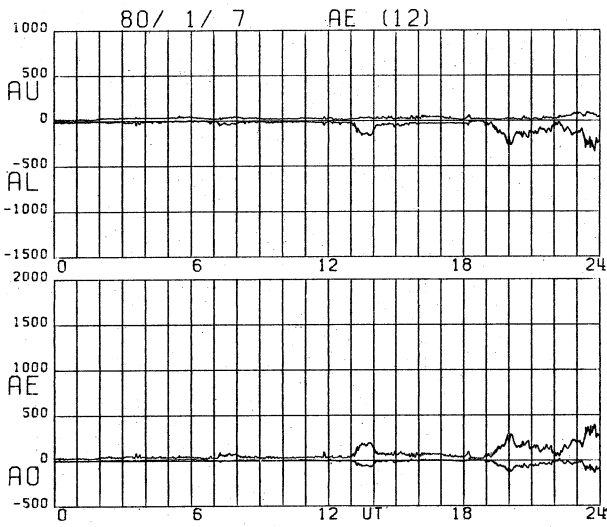
Daily graphs of 1.0-min AE indices (AU, AL, AE and AO) for January–June 1980. Graph on a very disturbed day (February 6, 1980) is reproduced on page 96.

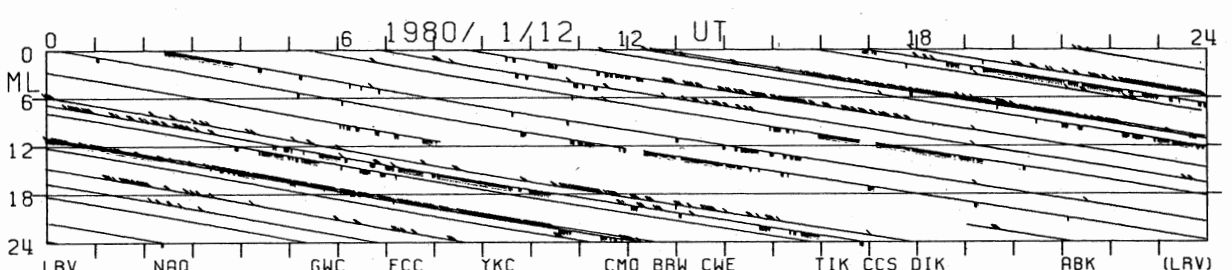
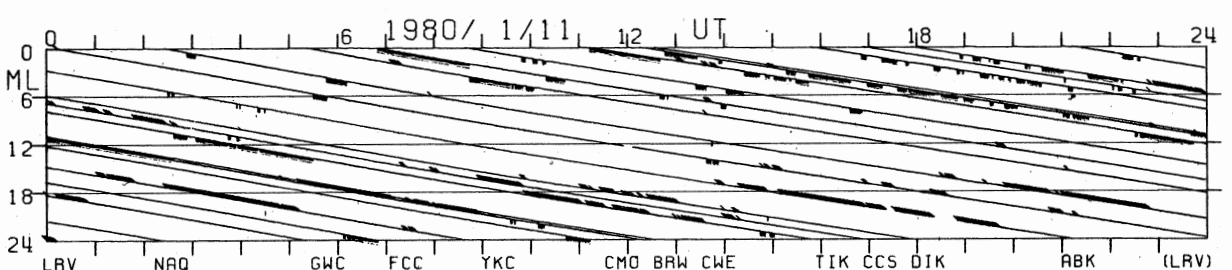
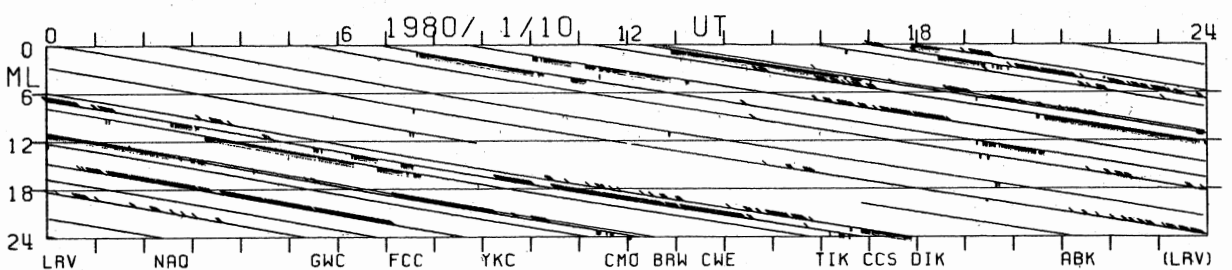
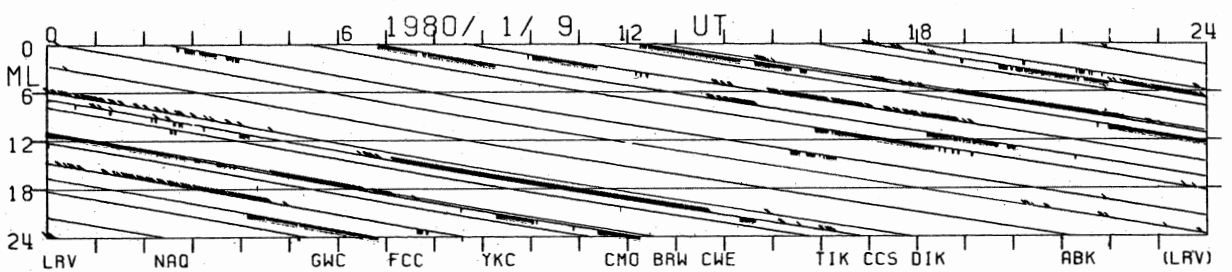
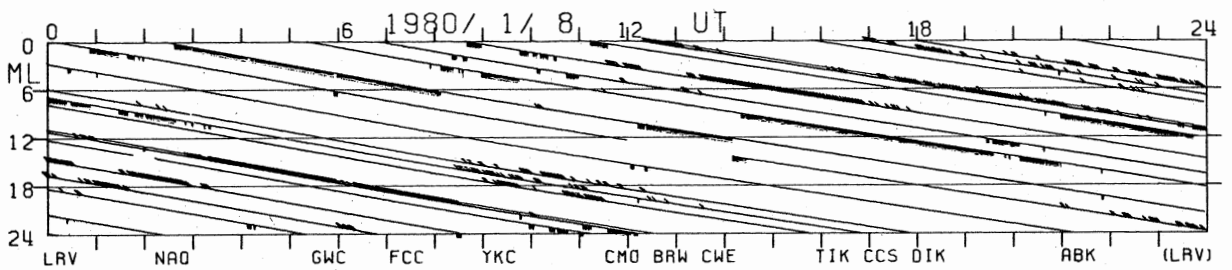
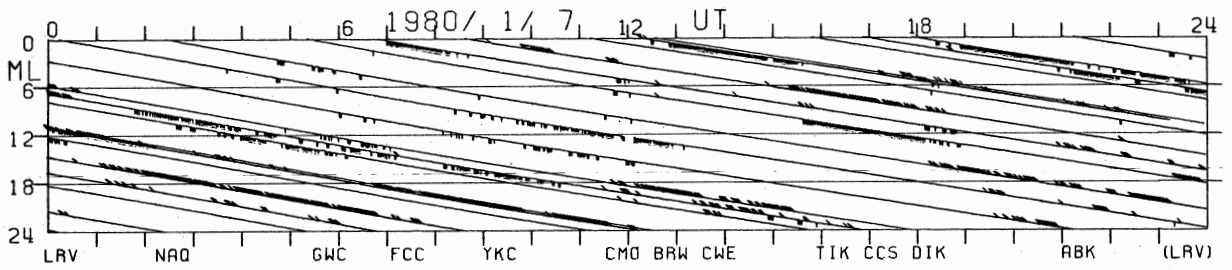
FIGURE 5 (on odd pages)

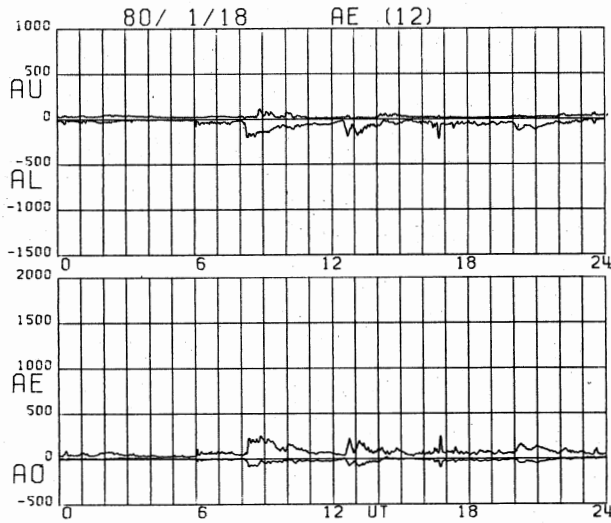
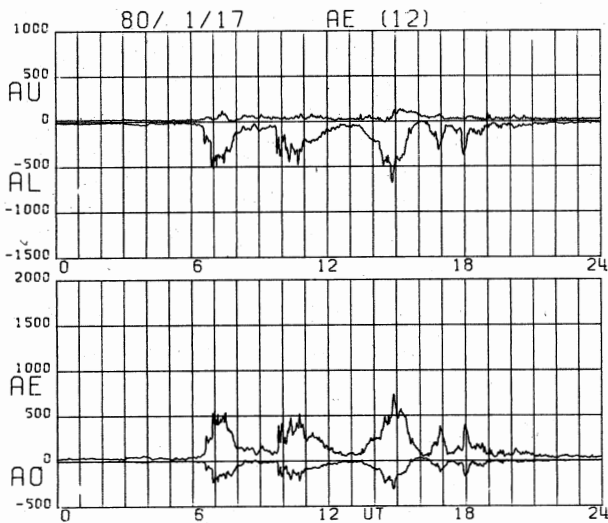
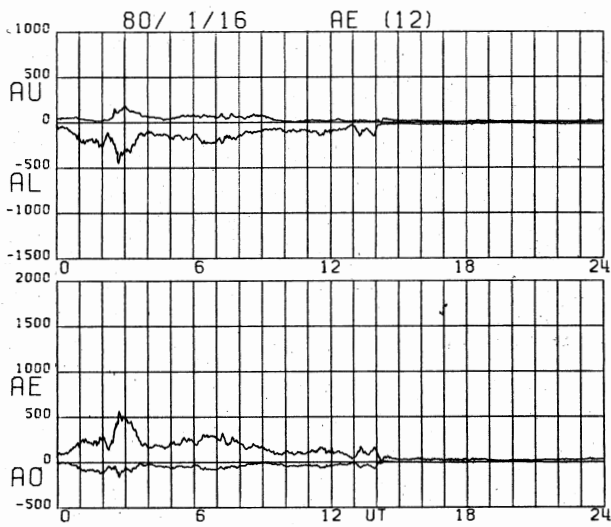
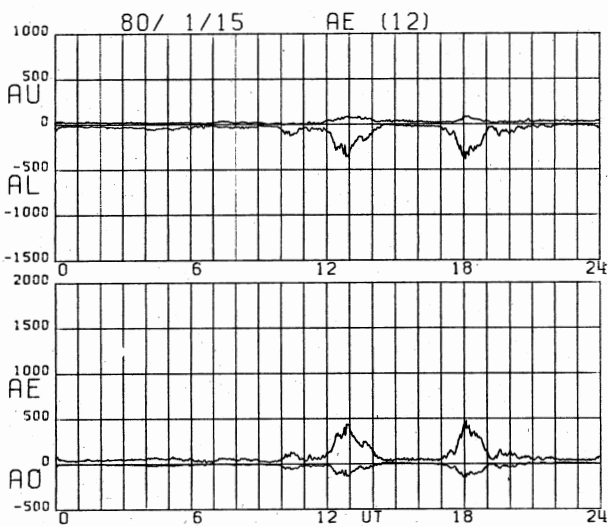
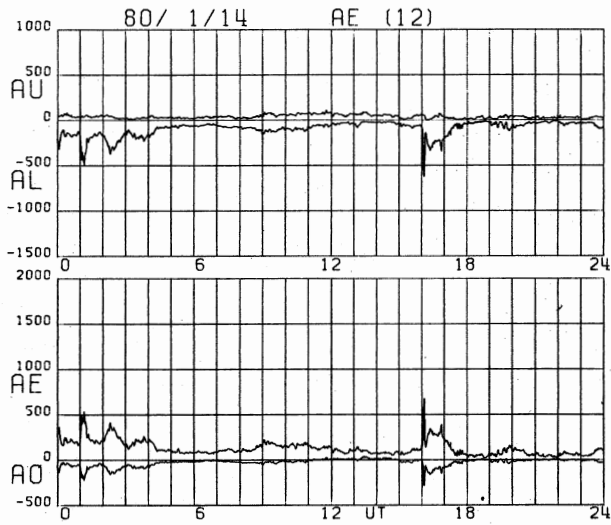
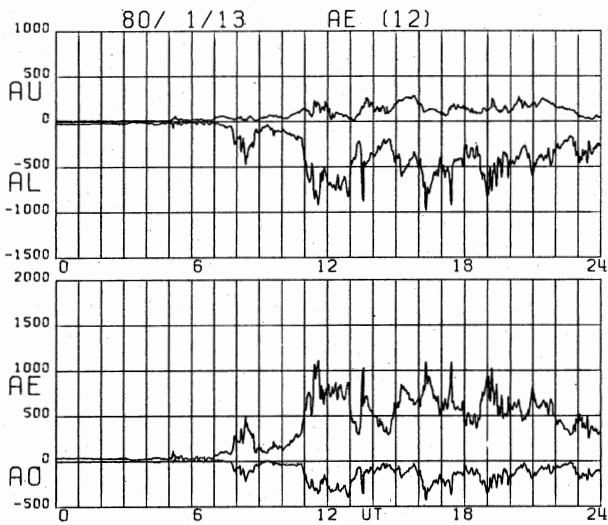
Plots of the contributing stations to the AU (upper plumes) and AL (lower plumes) indices, where you can see which station contributes to these indices at each UT minute.

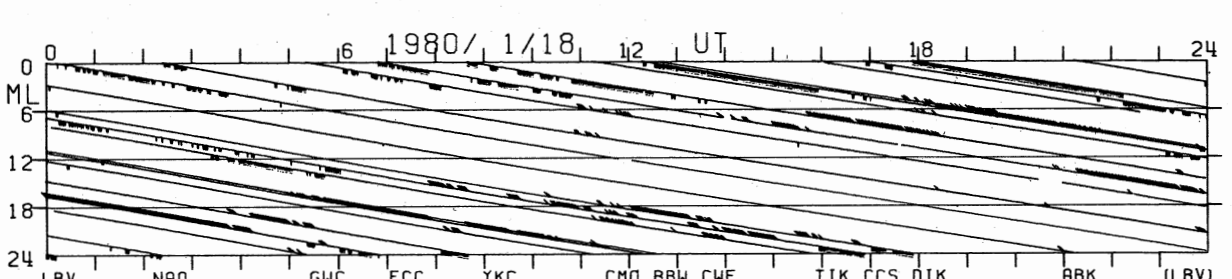
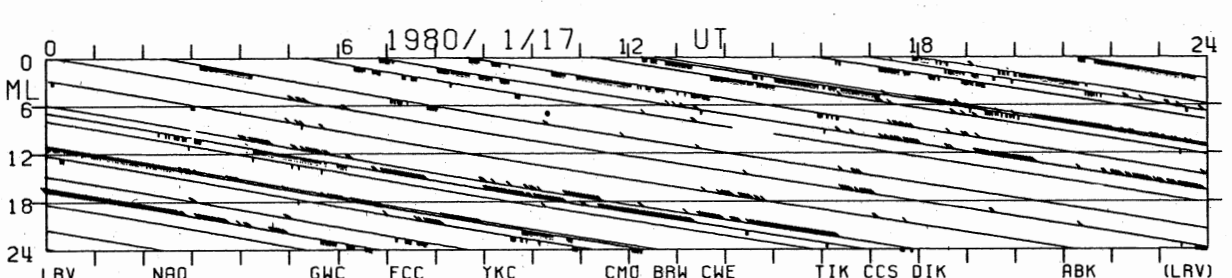
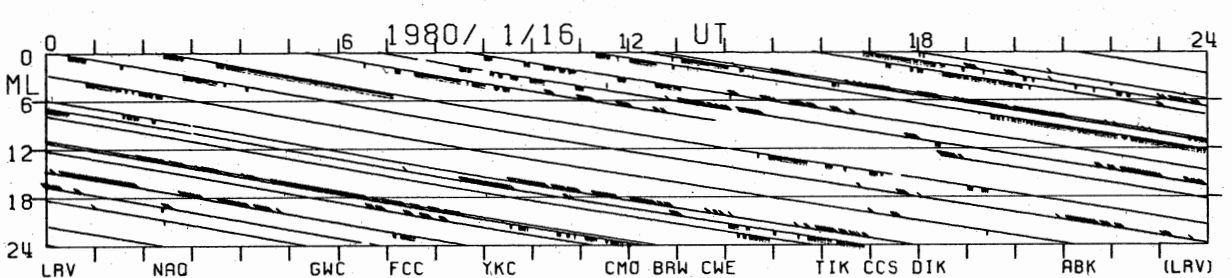
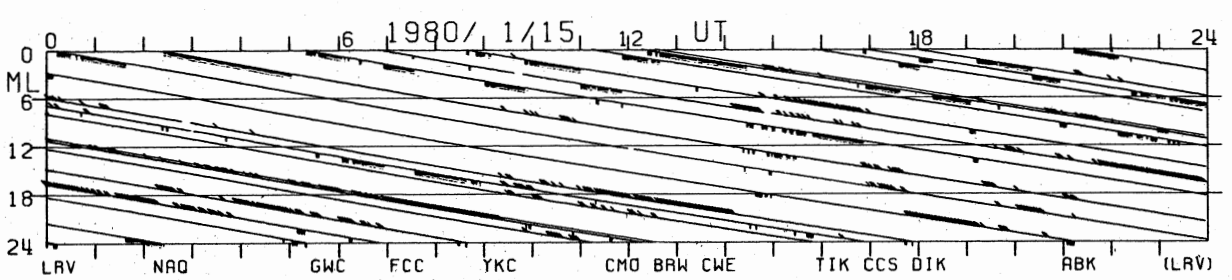
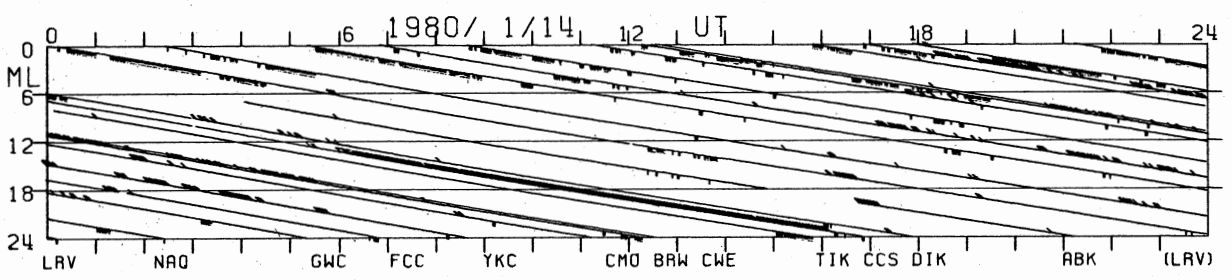
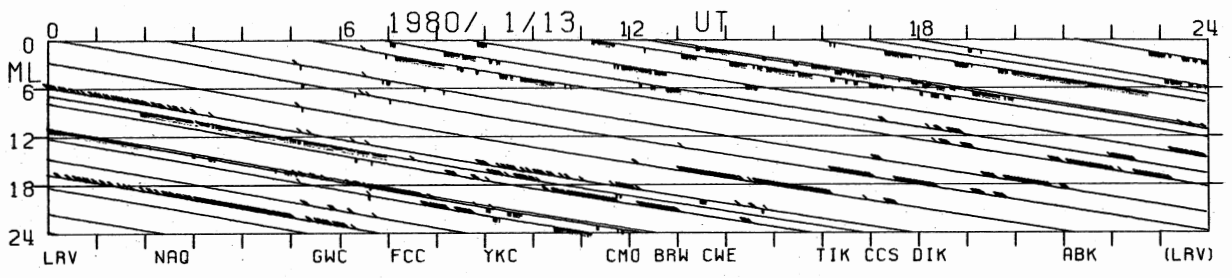


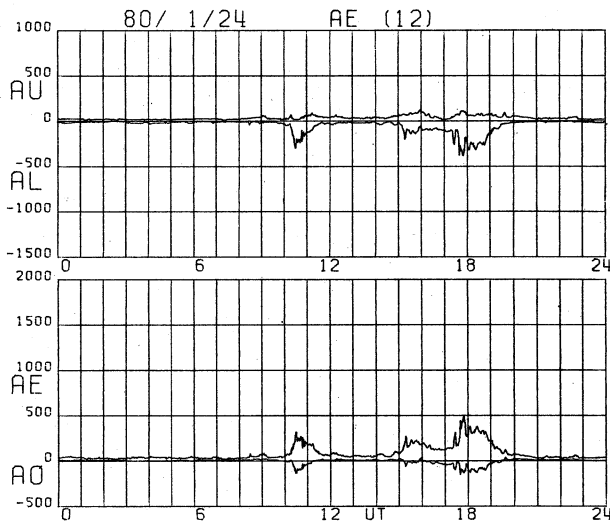
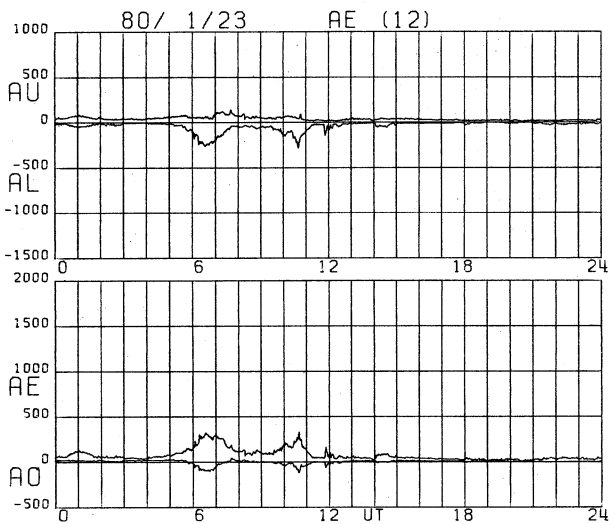
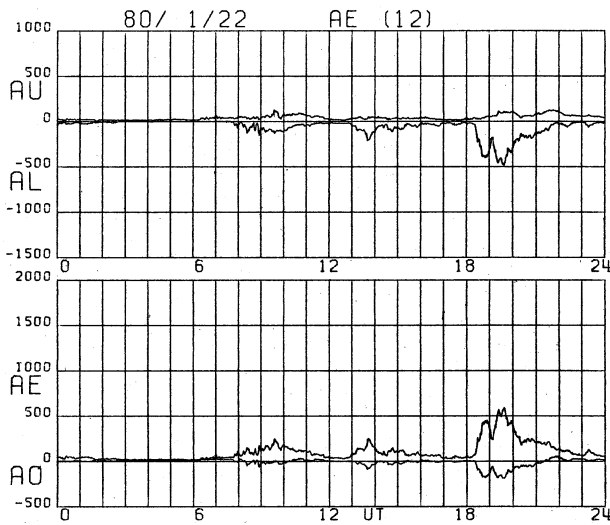
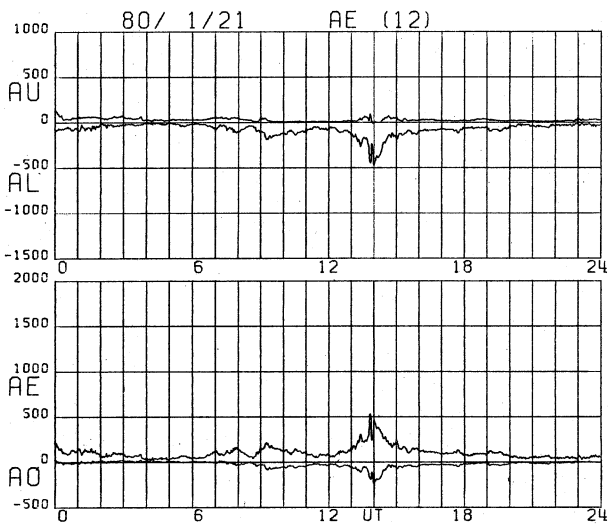
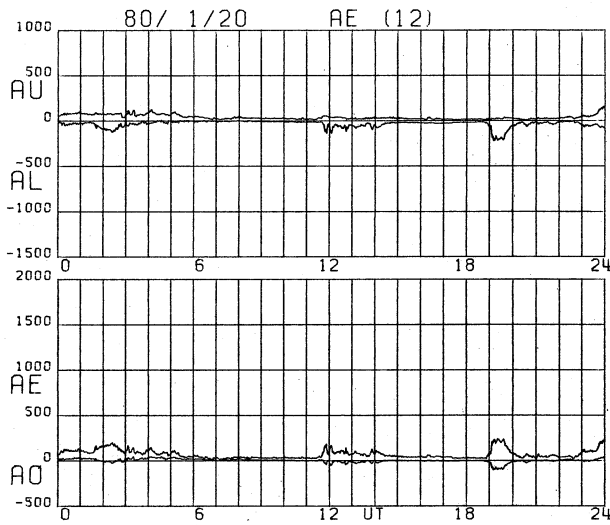
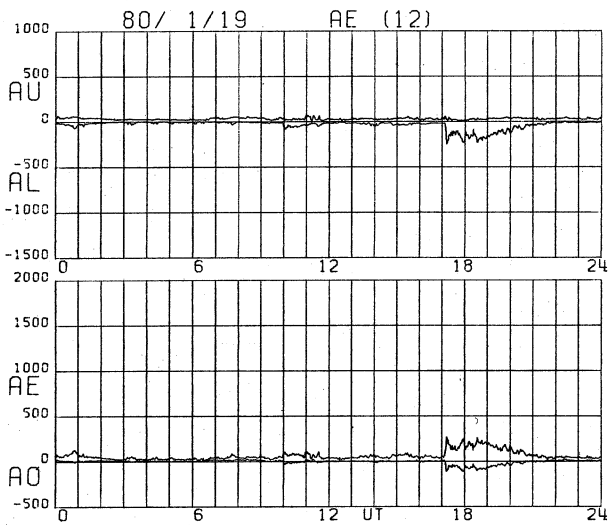


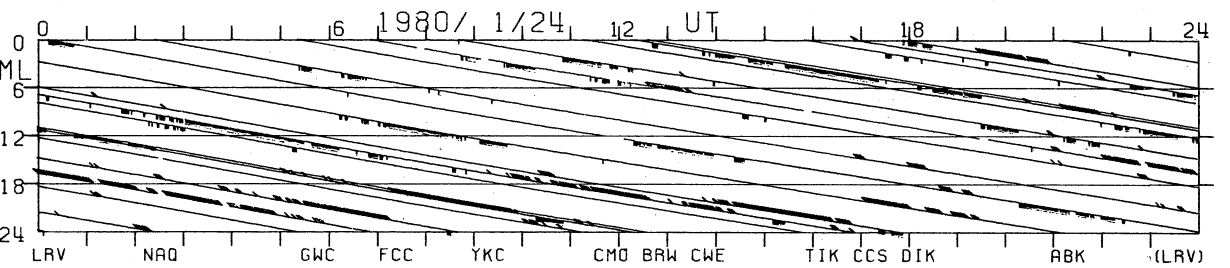
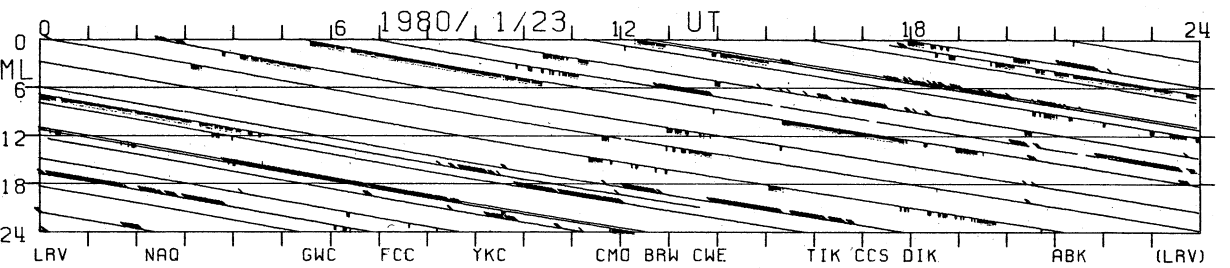
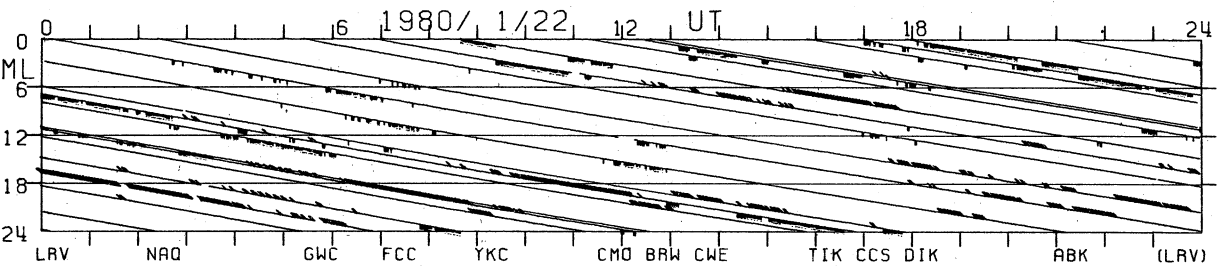
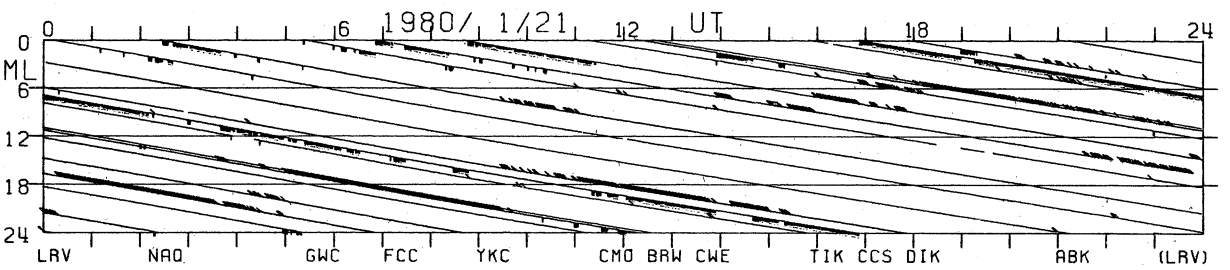
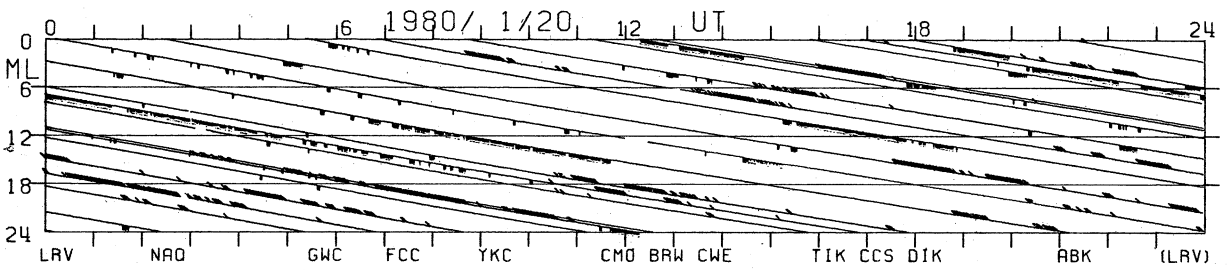
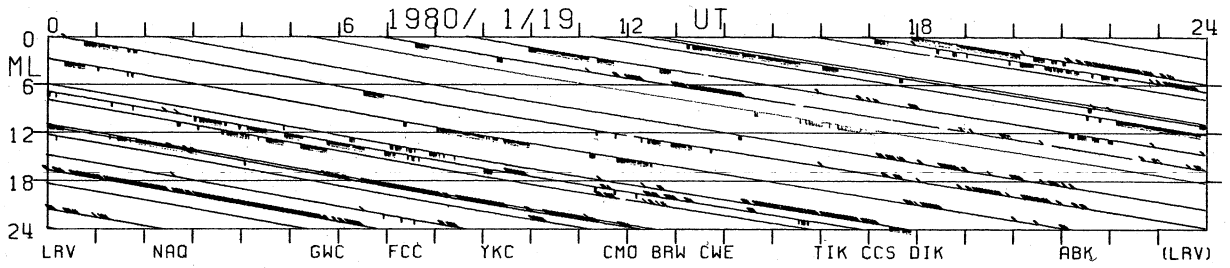


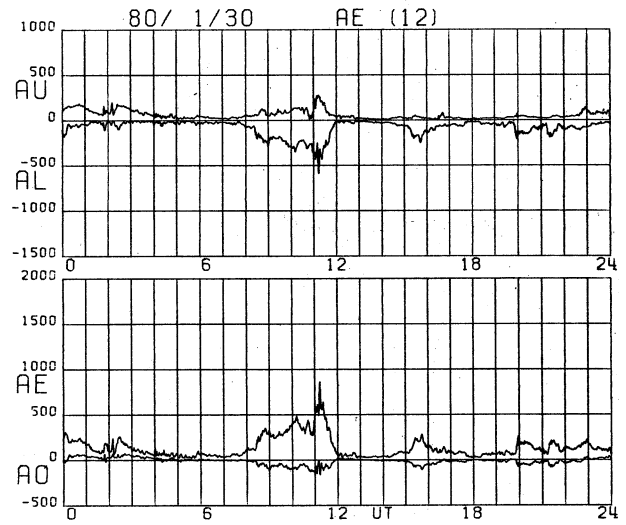
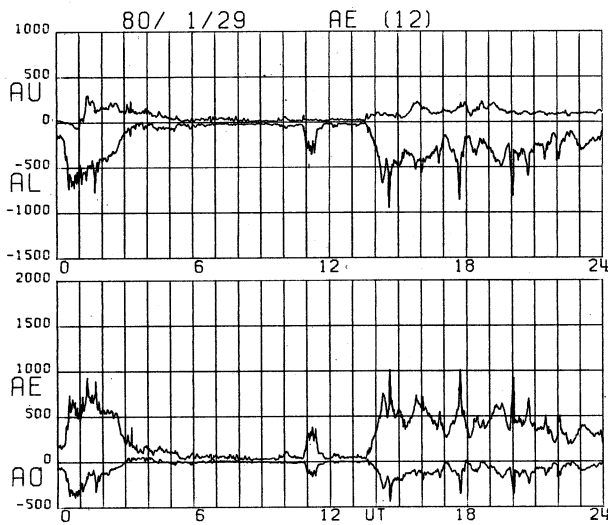
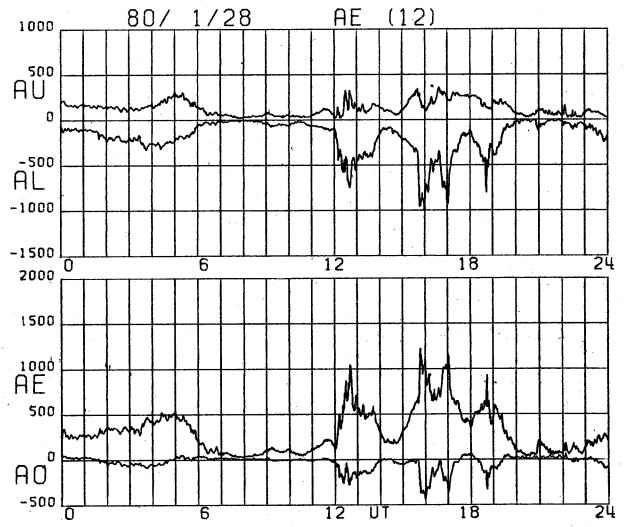
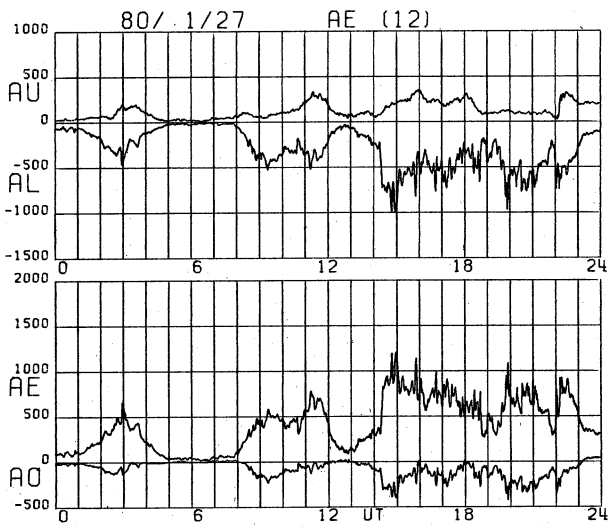
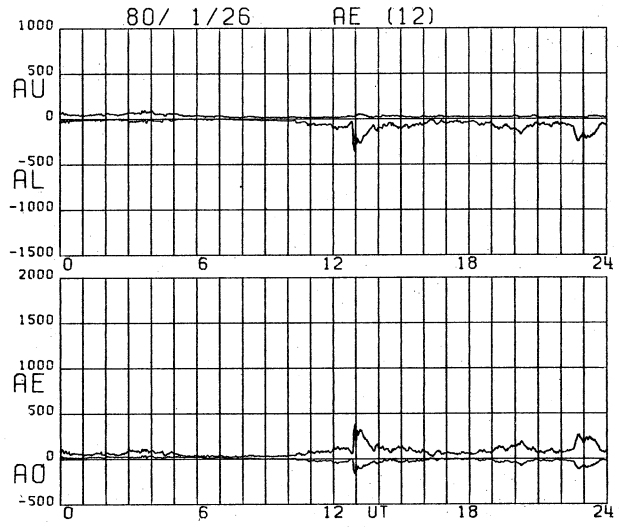
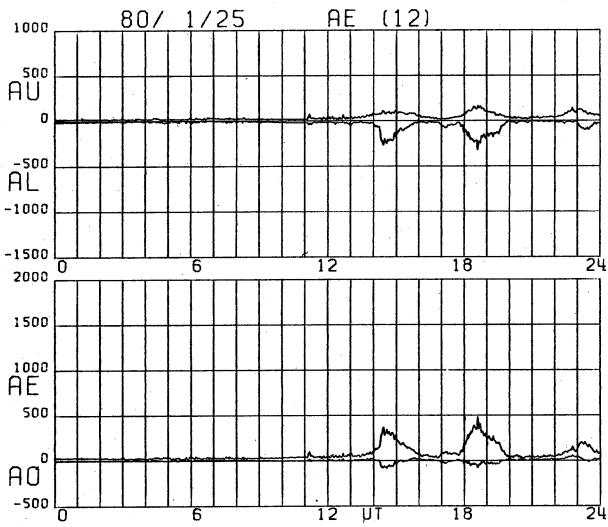


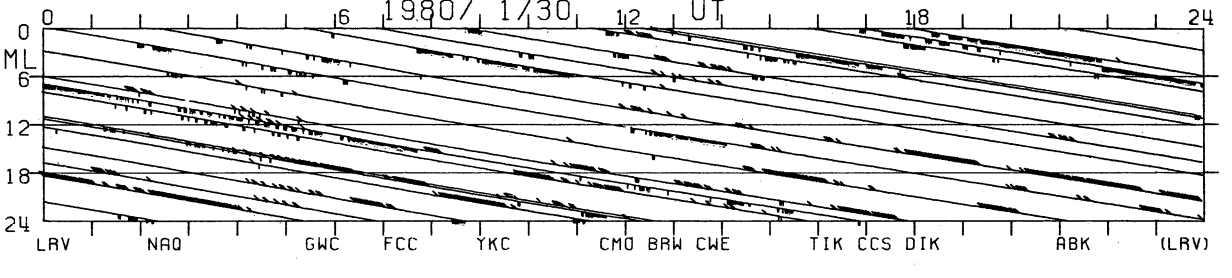
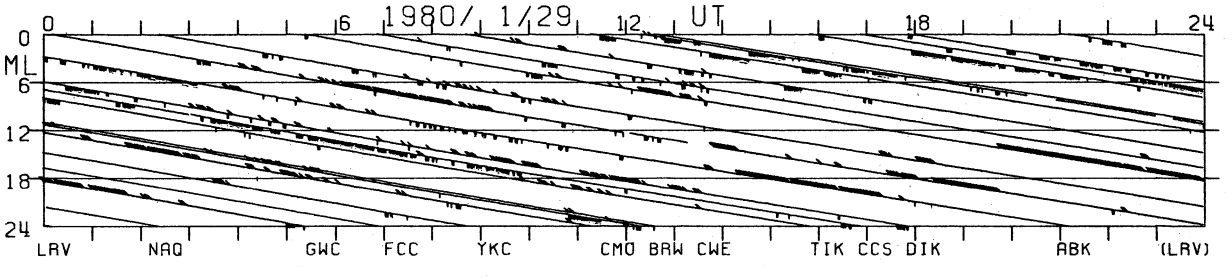
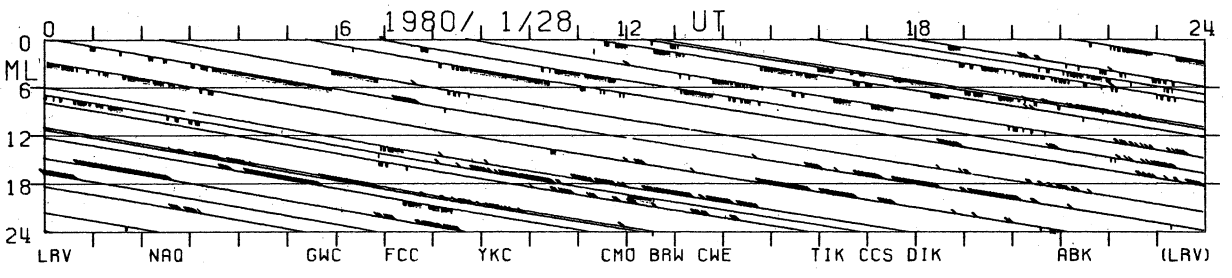
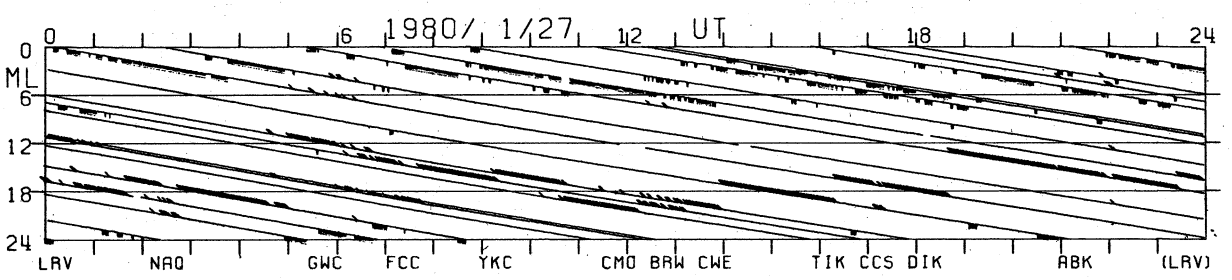
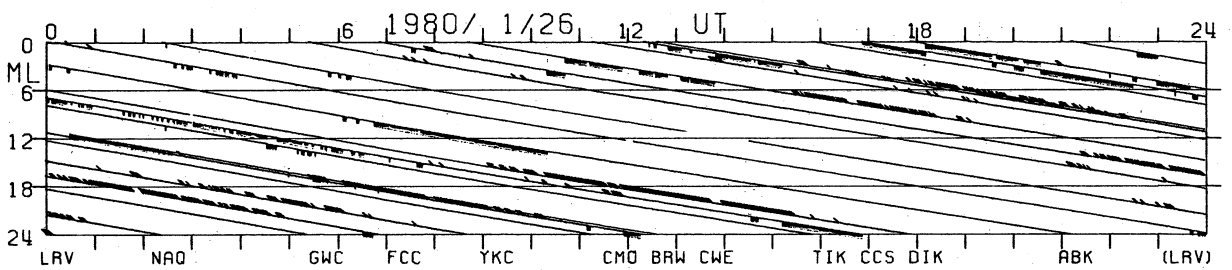
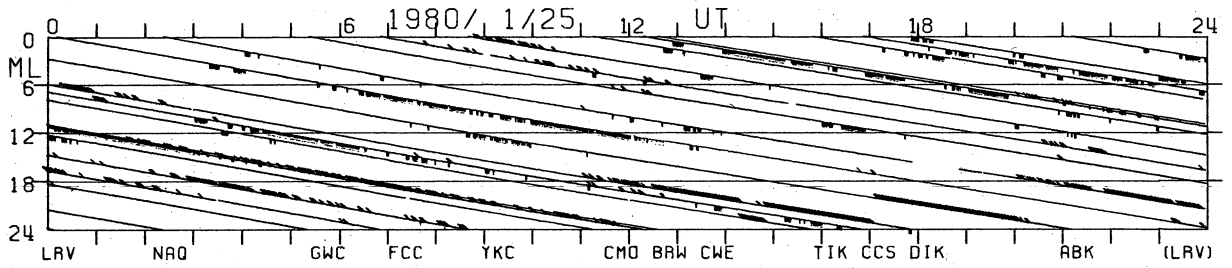


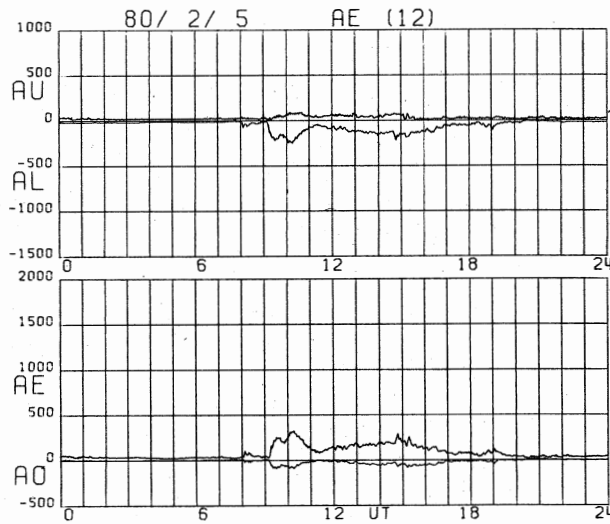
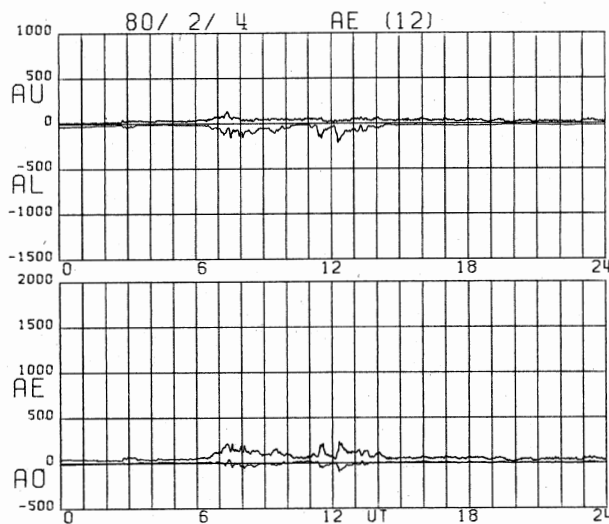
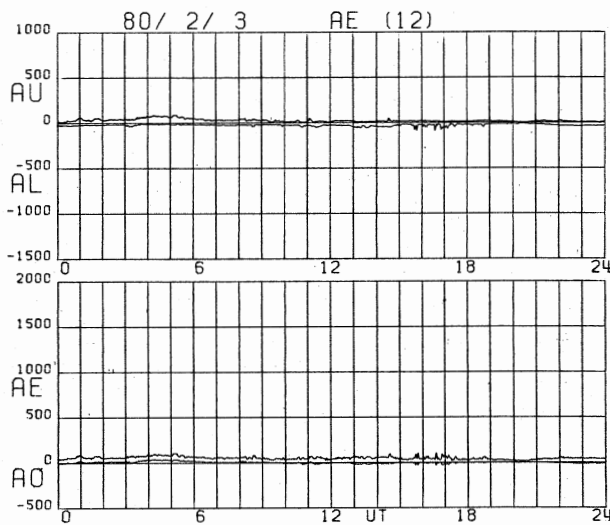
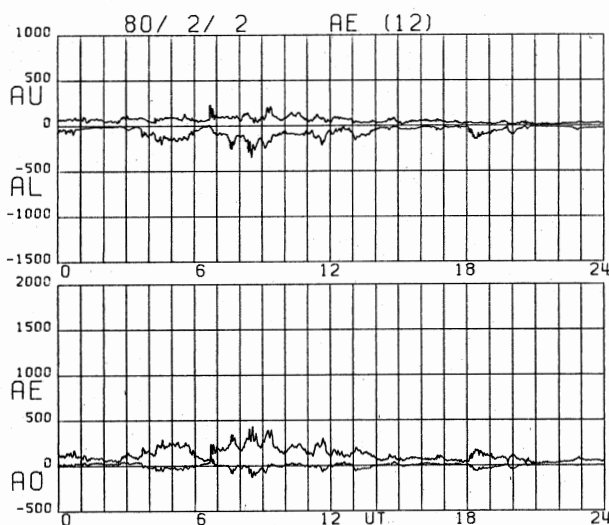
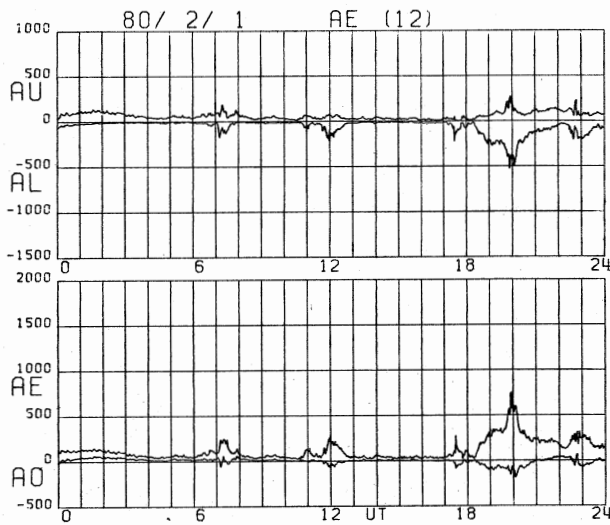
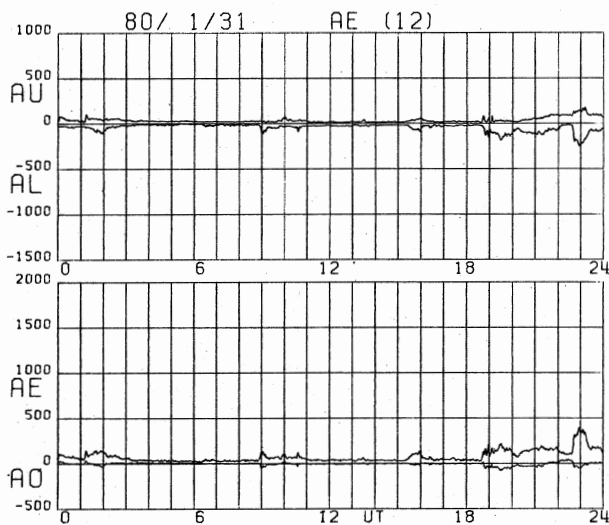


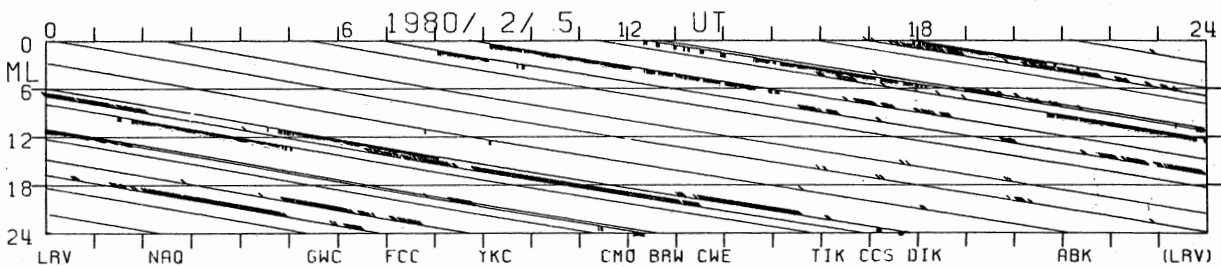
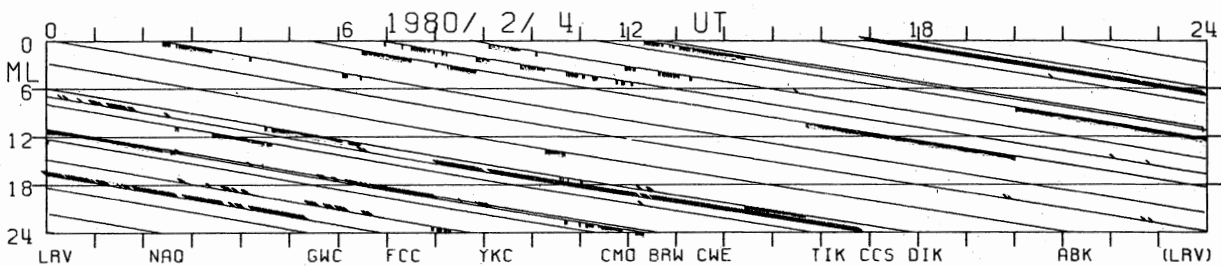
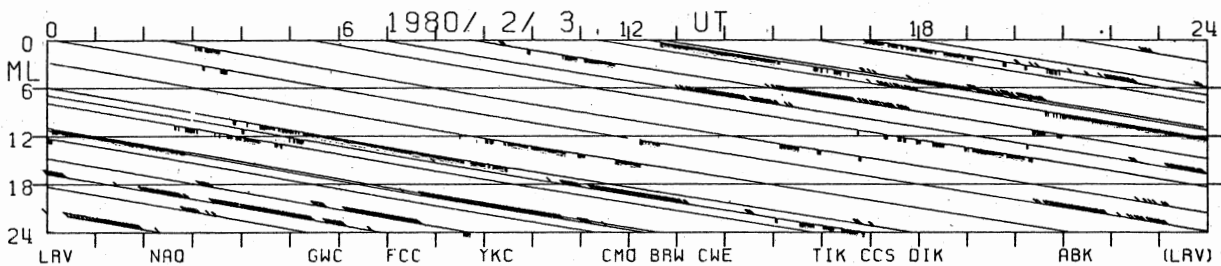
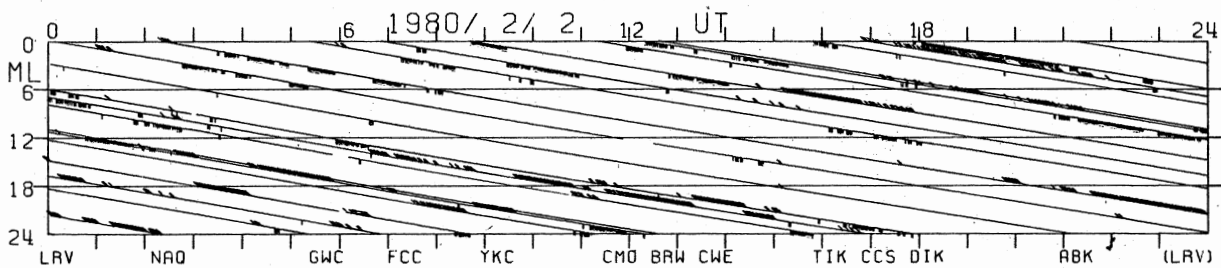
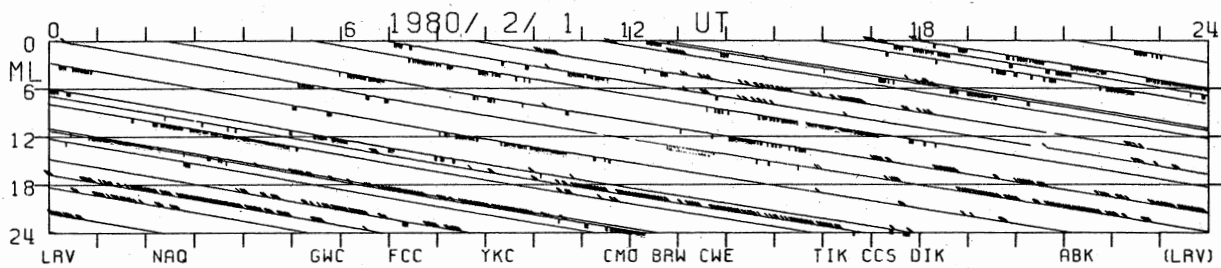
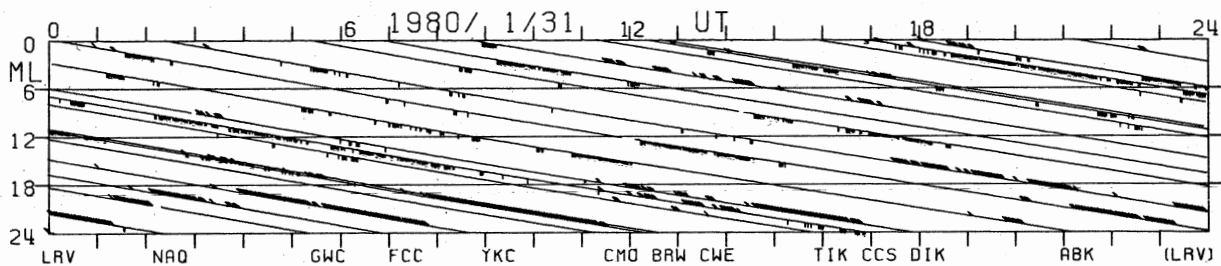


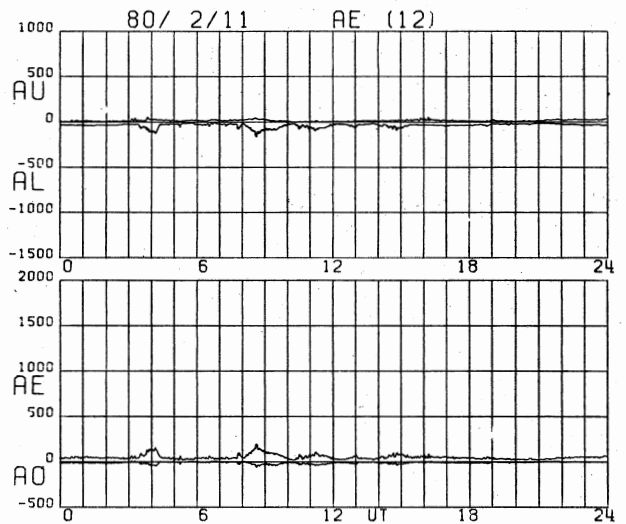
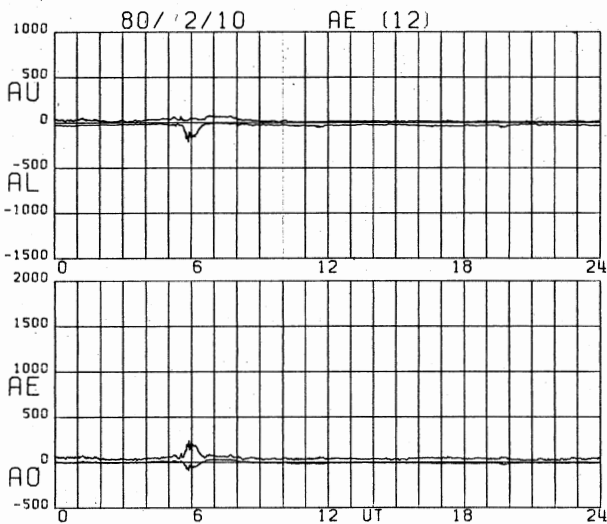
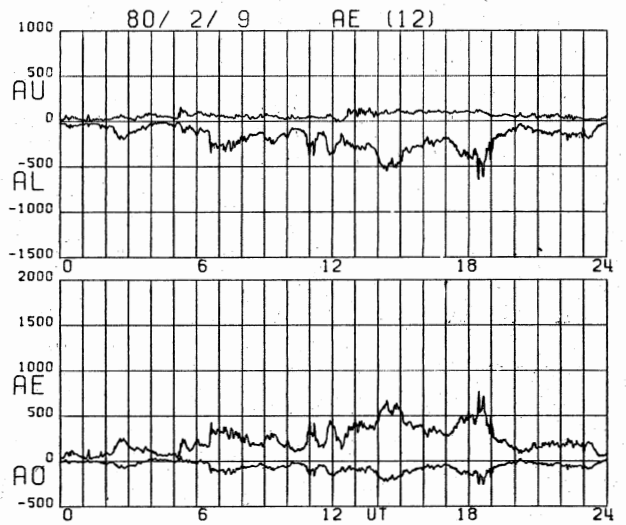
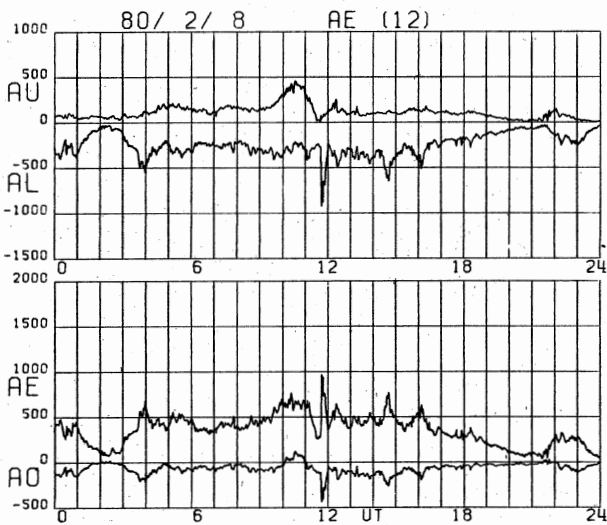
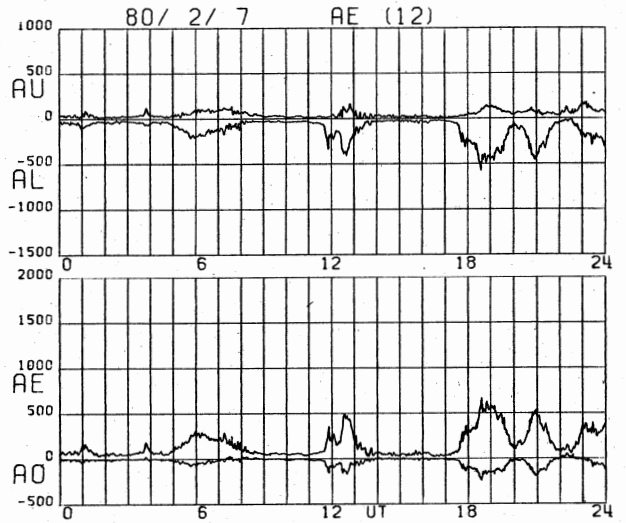
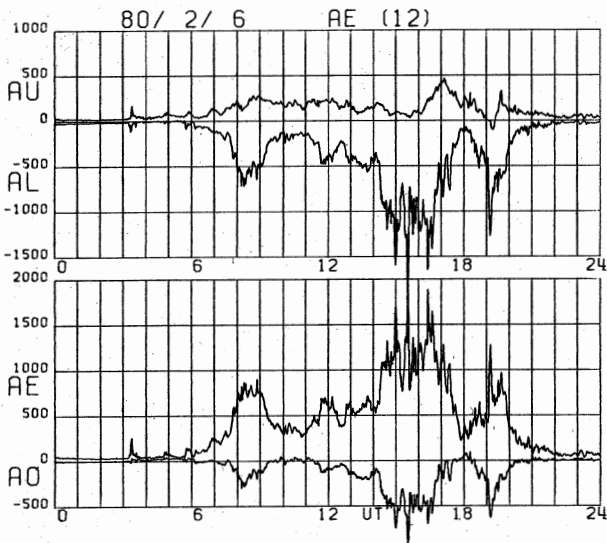


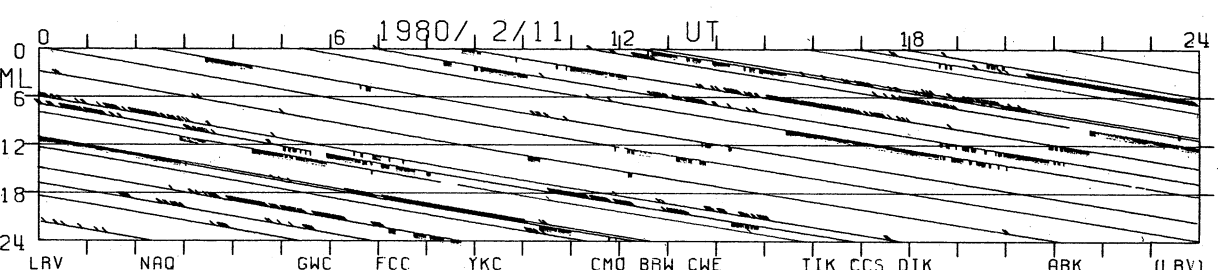
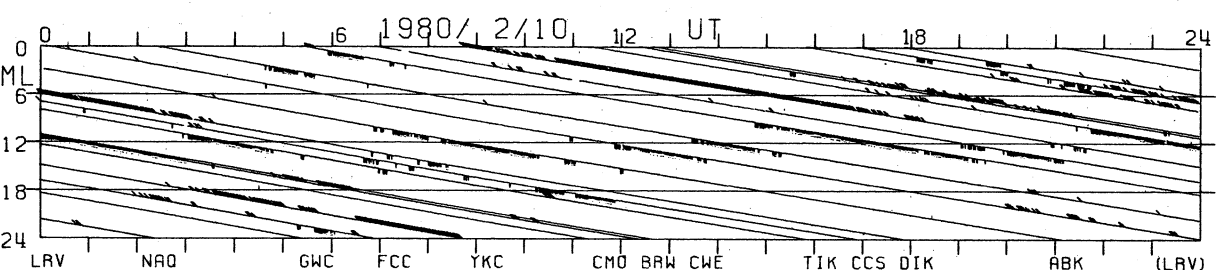
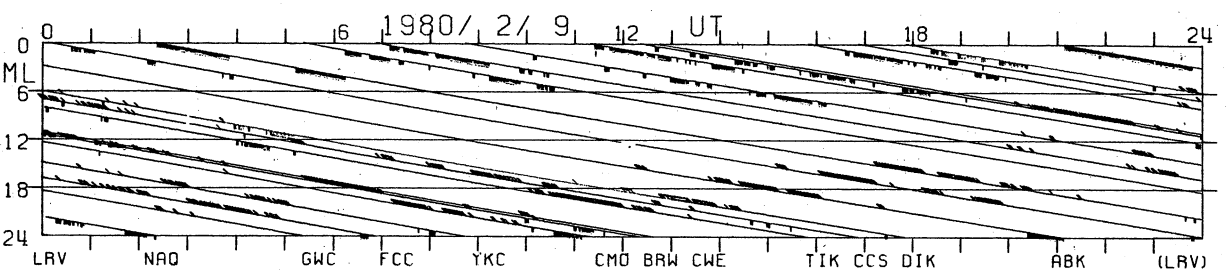
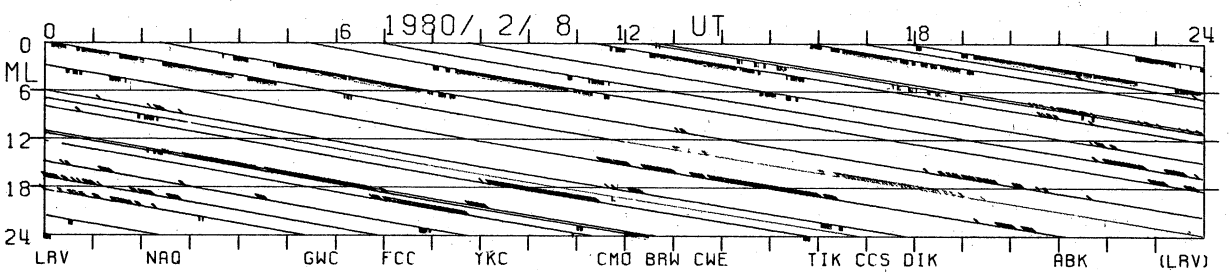
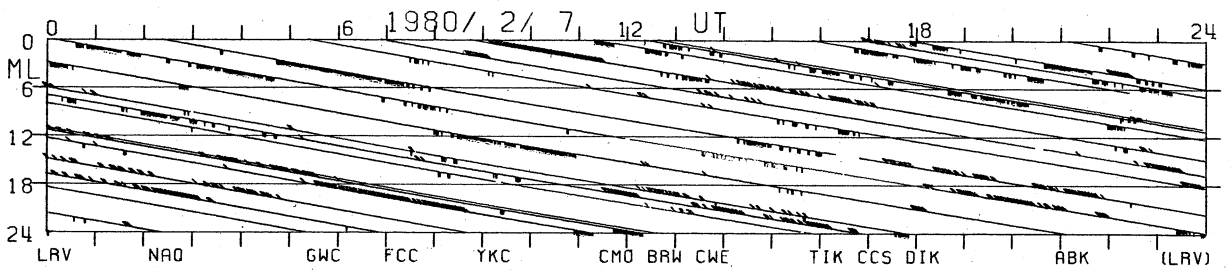
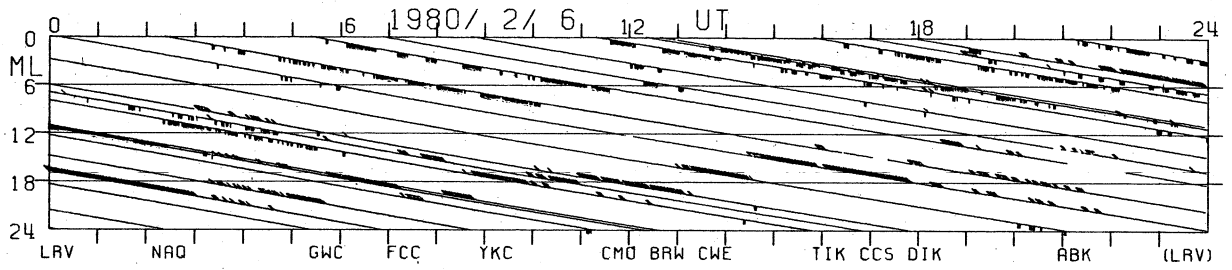


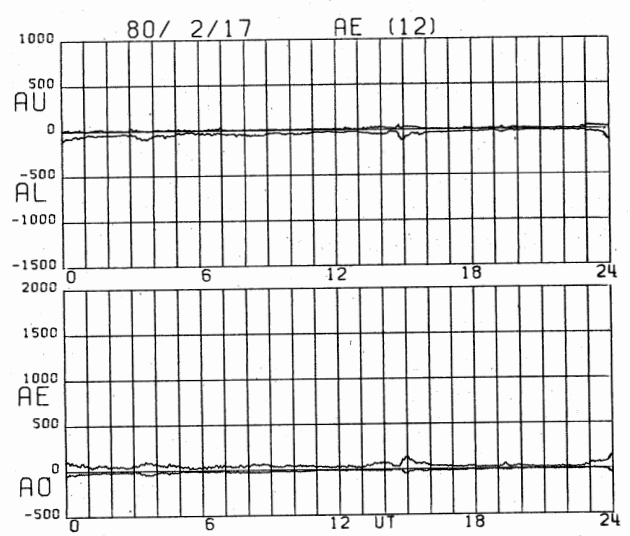
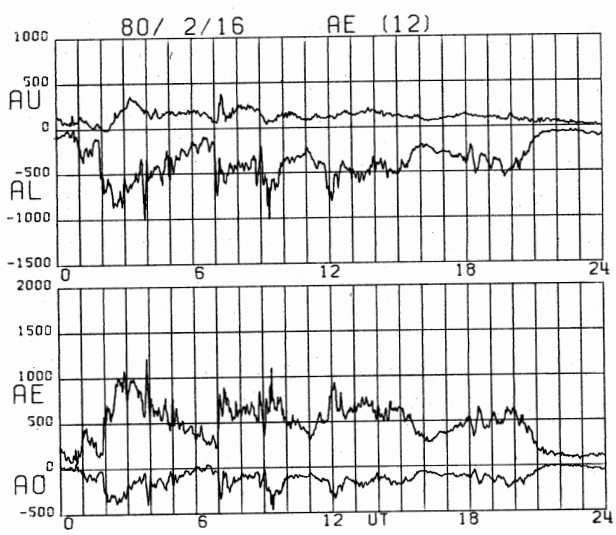
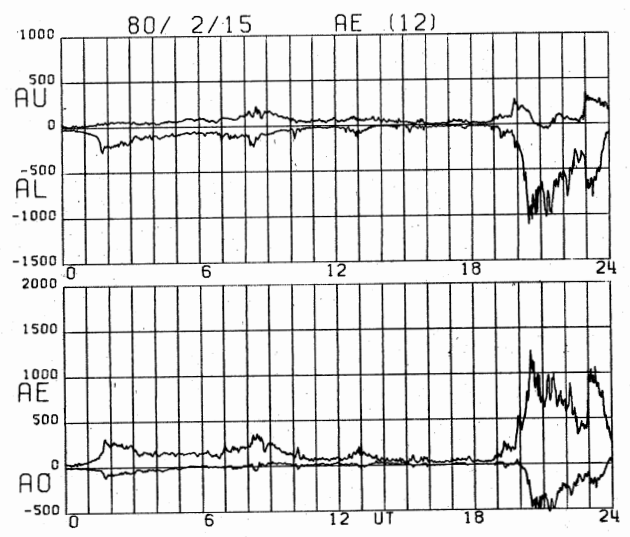
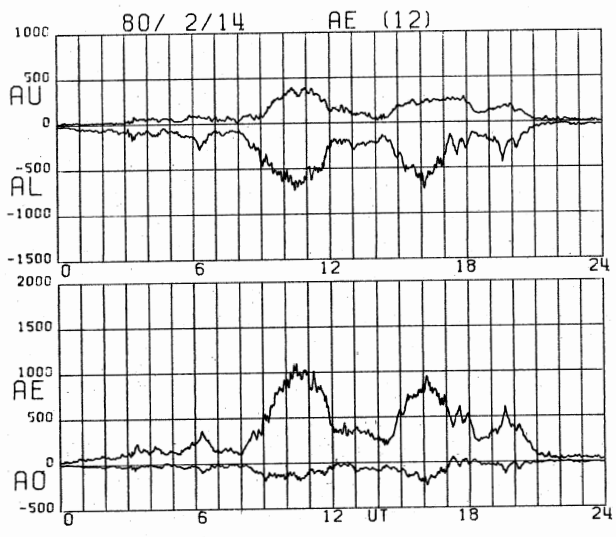
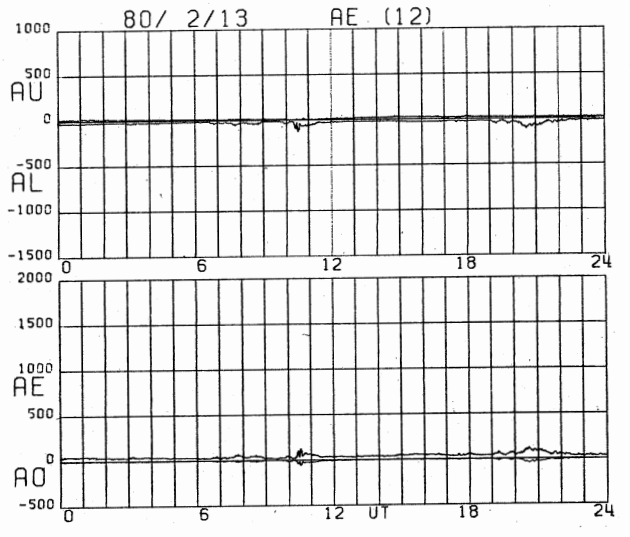
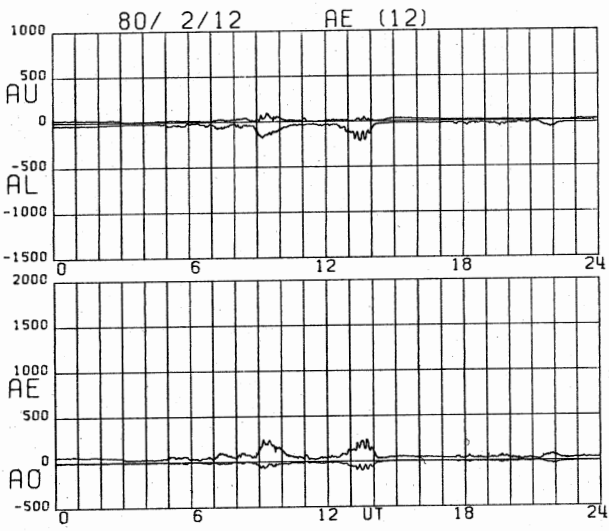


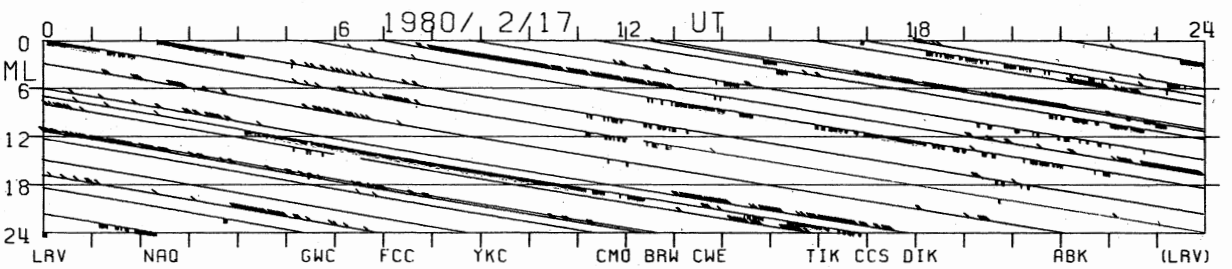
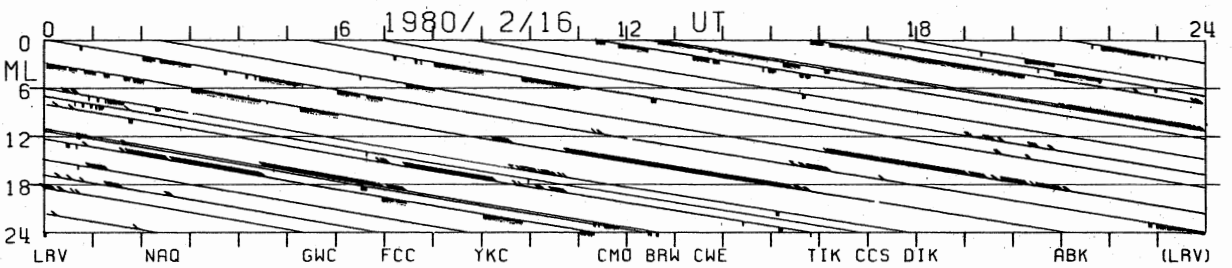
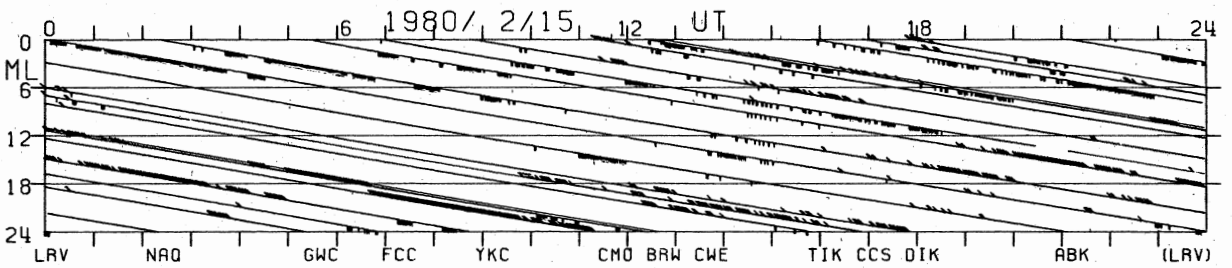
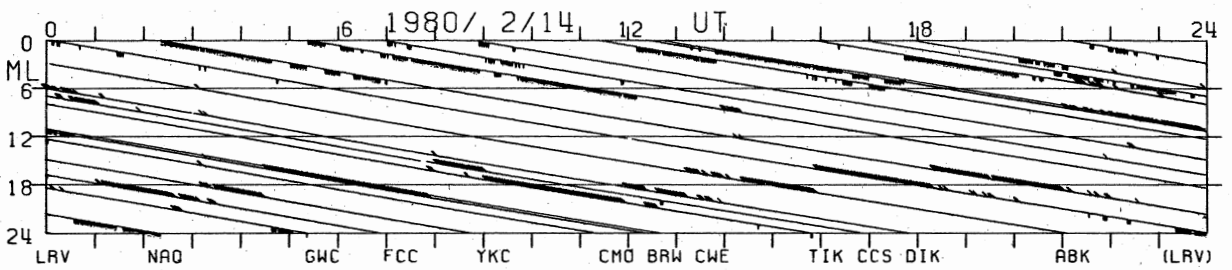
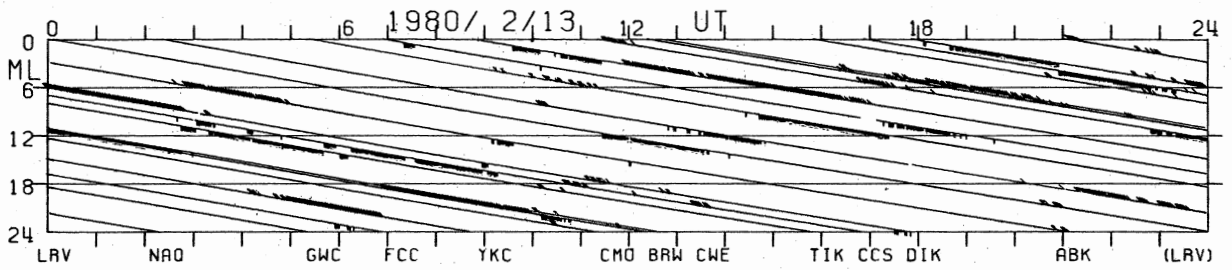
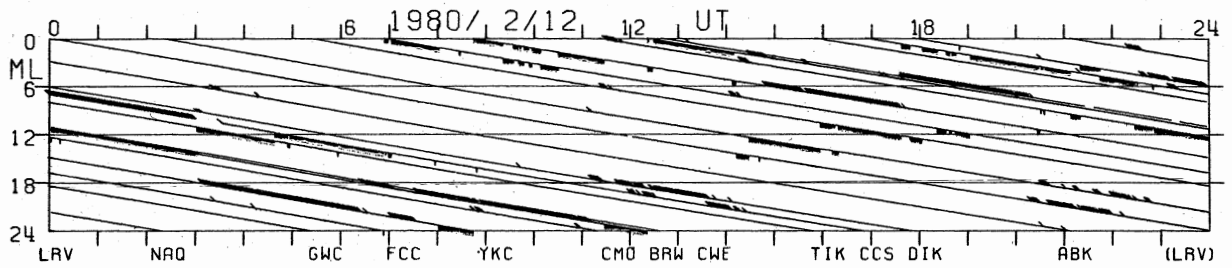


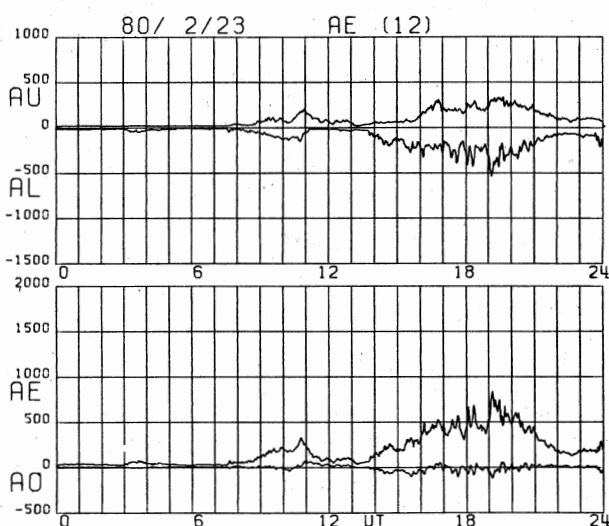
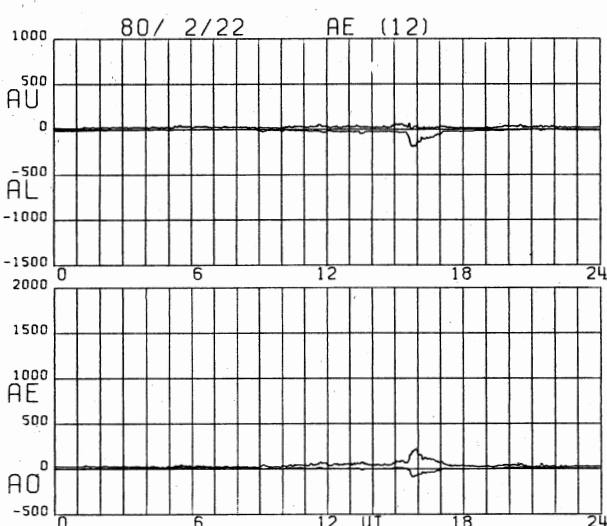
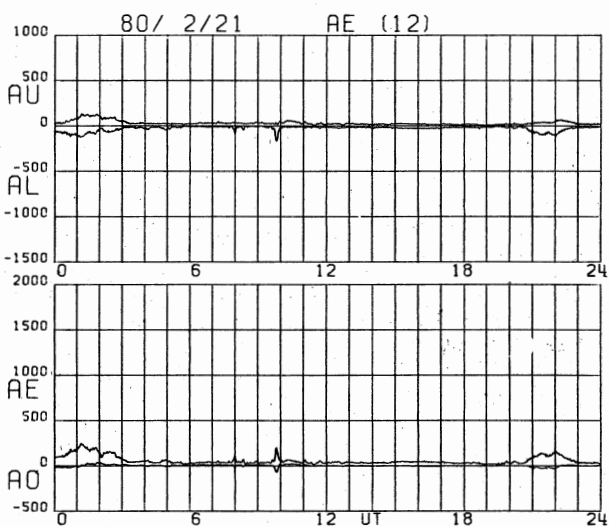
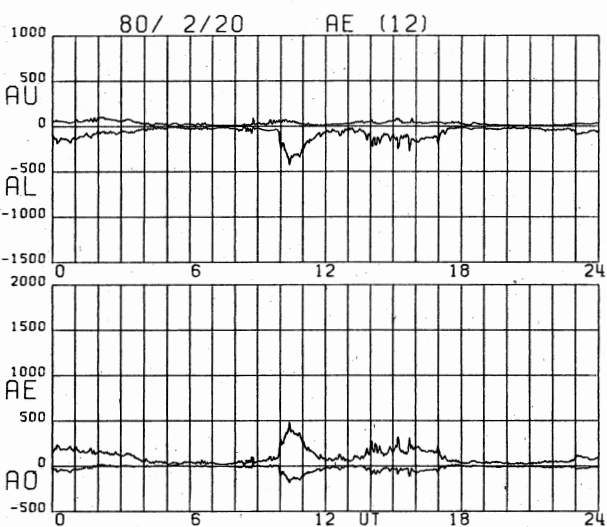
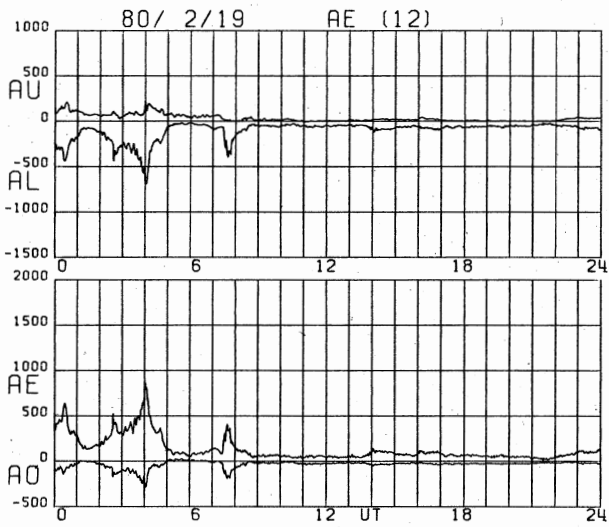
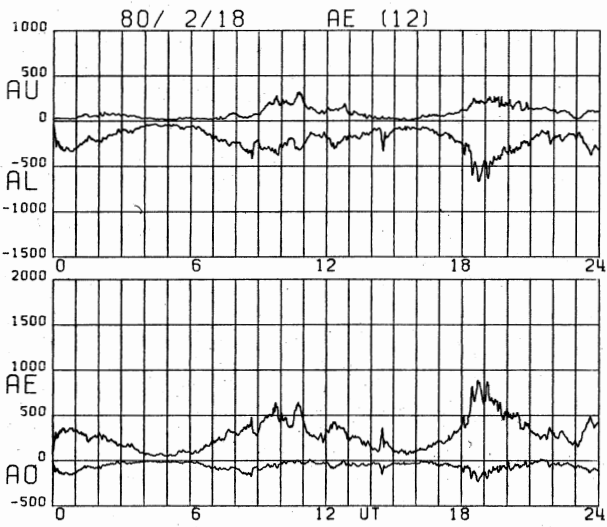


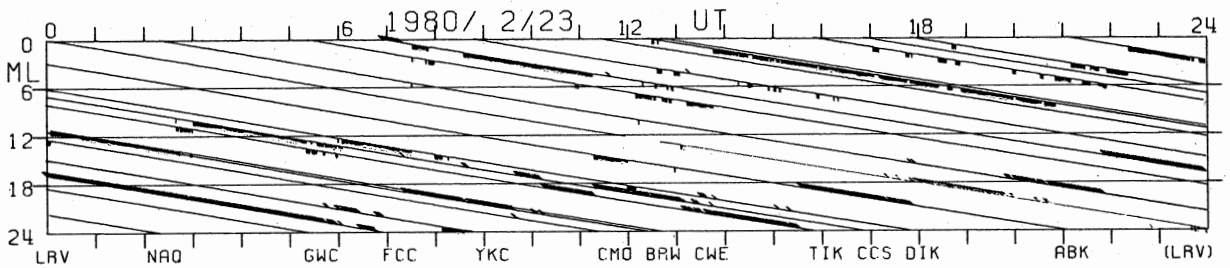
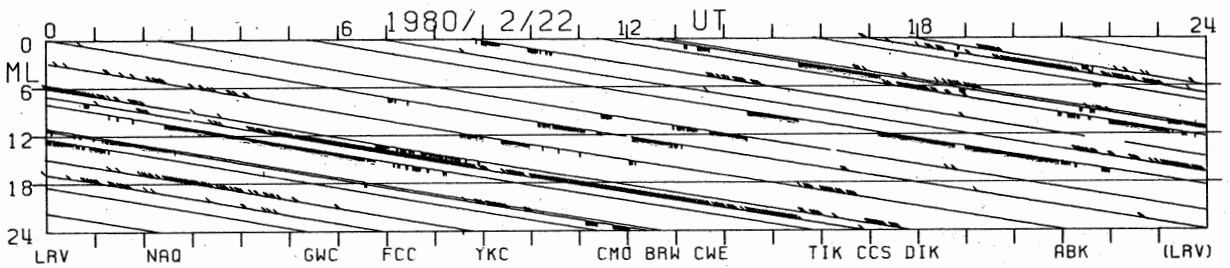
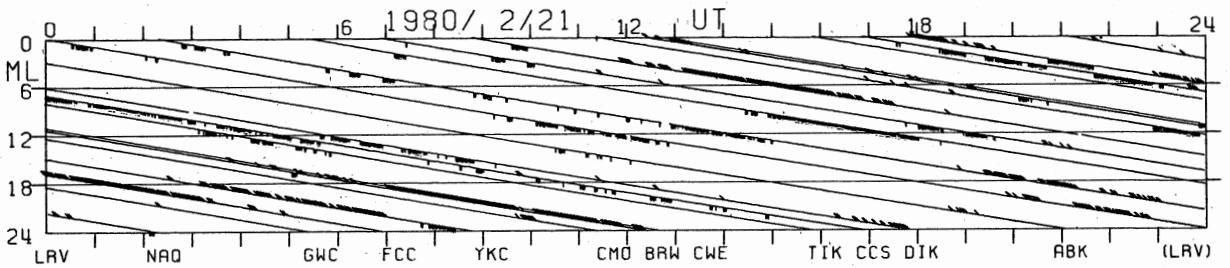
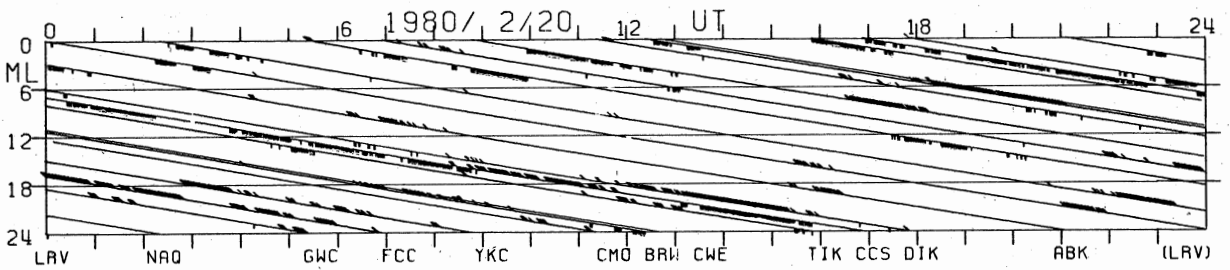
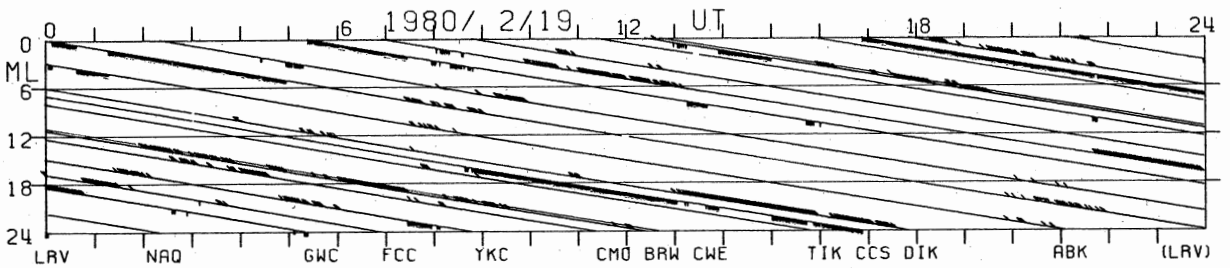
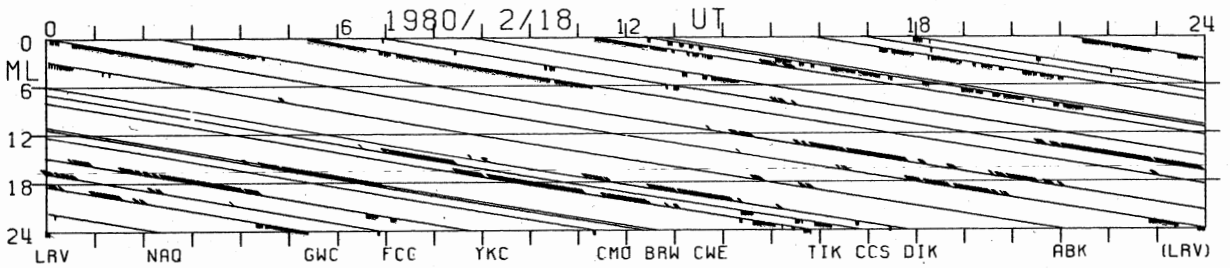


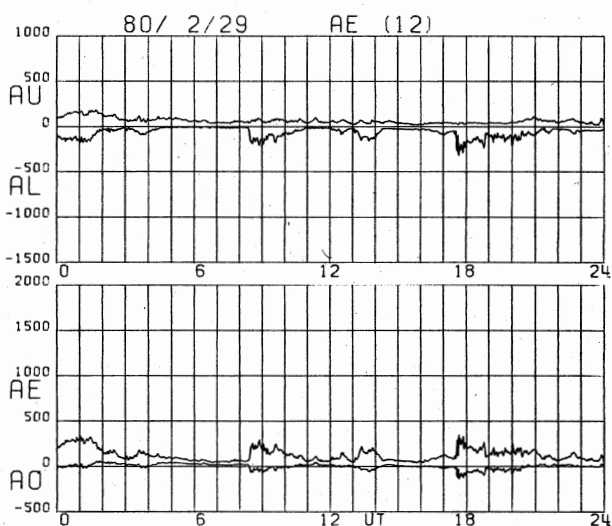
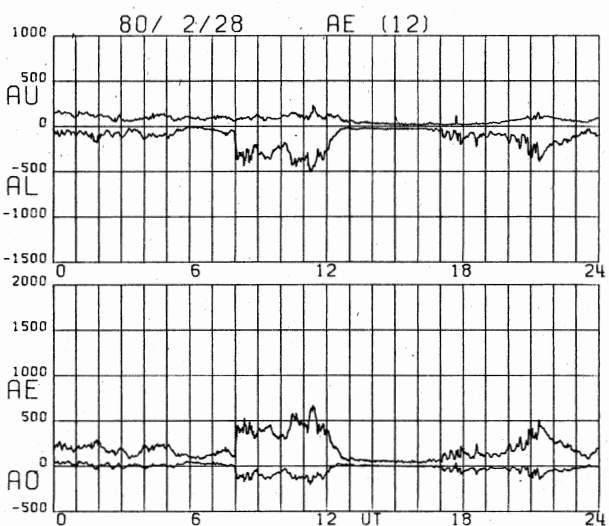
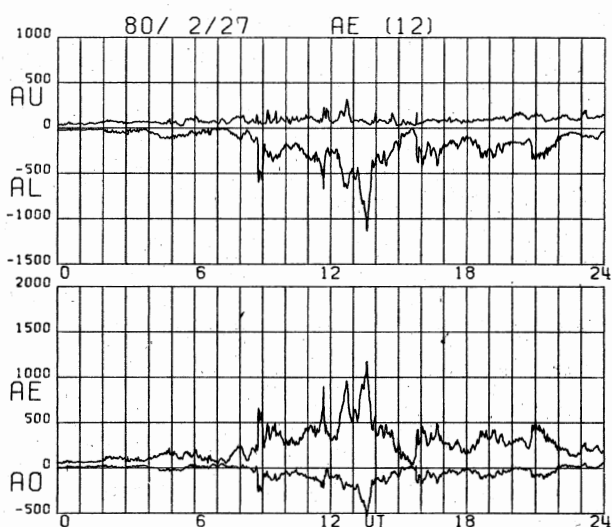
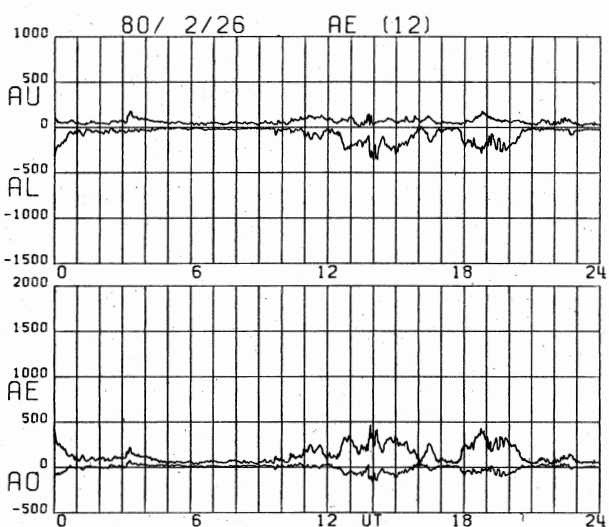
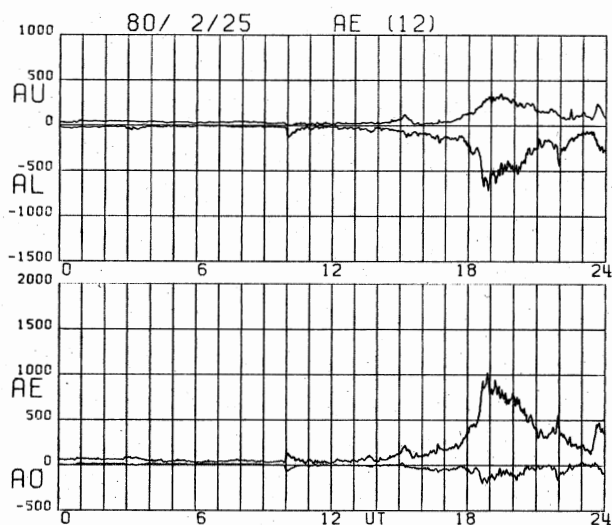
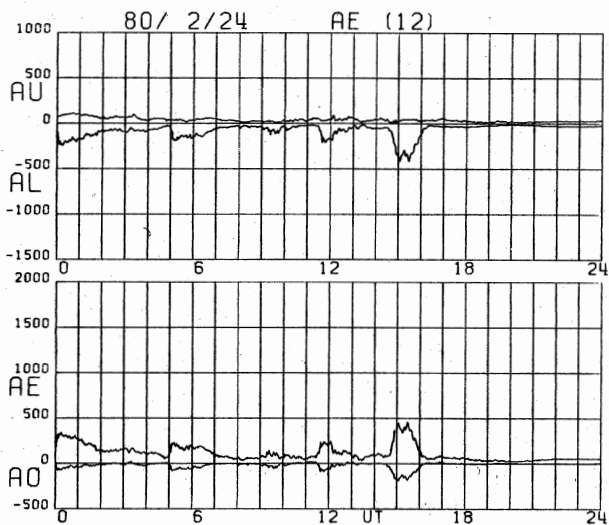


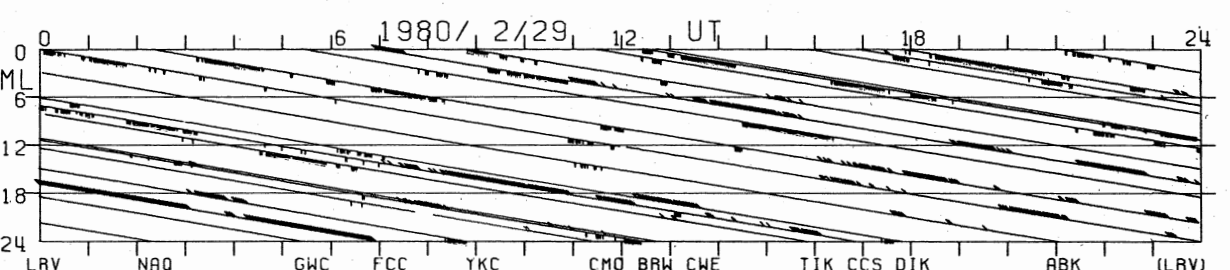
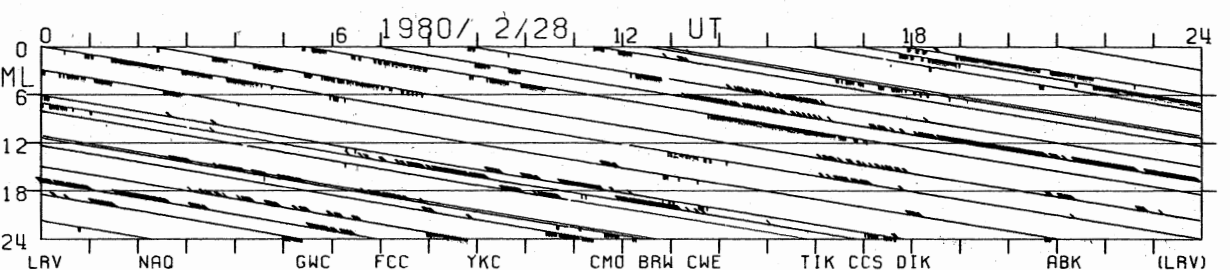
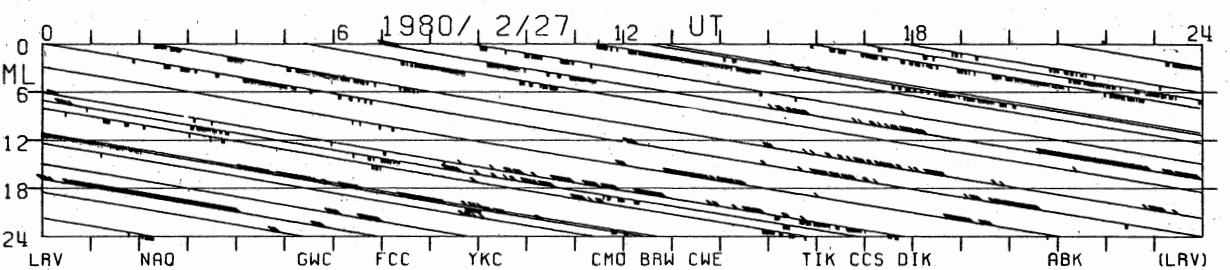
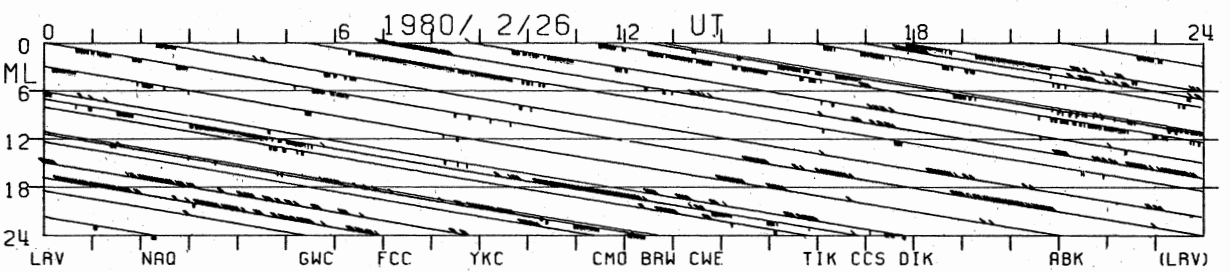
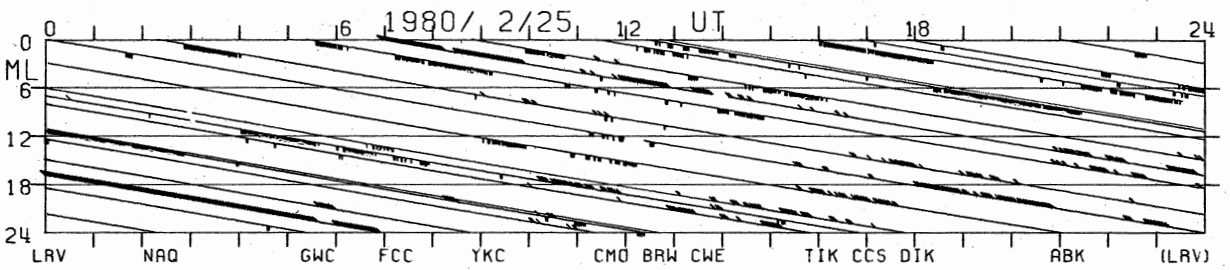
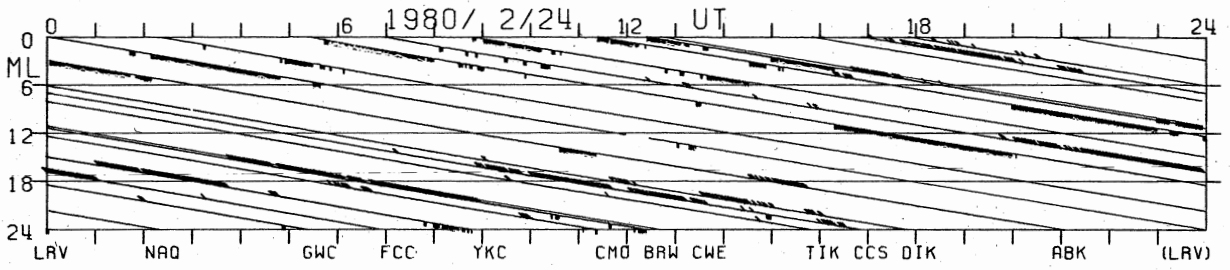


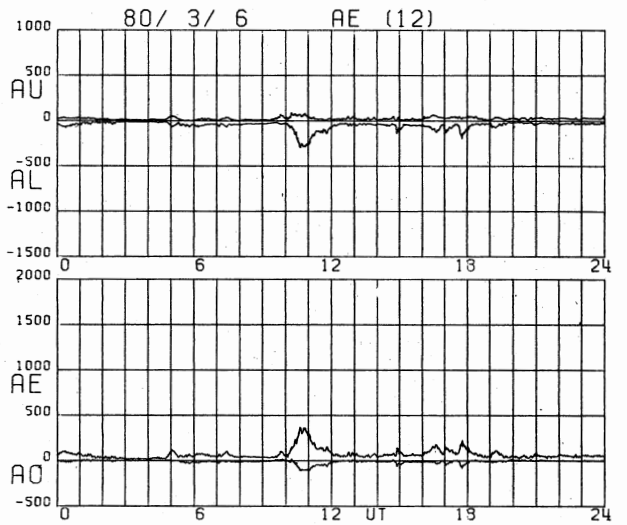
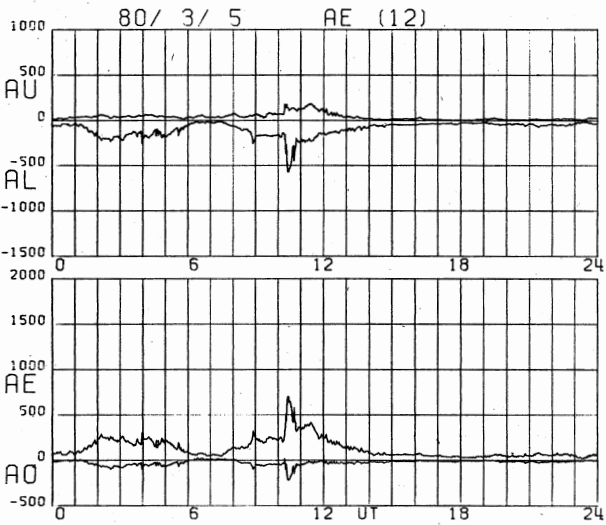
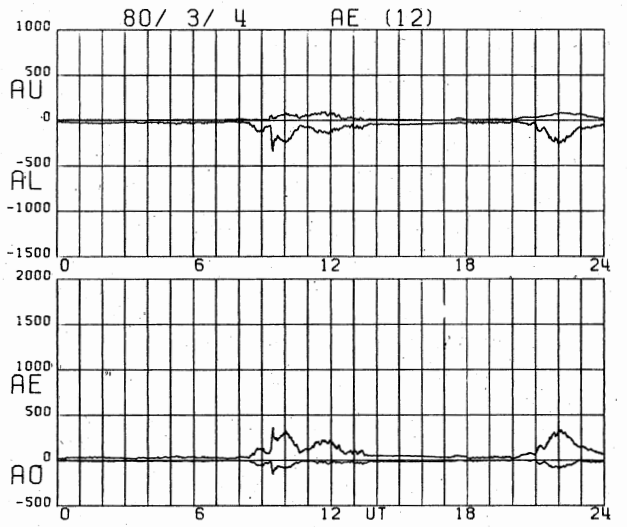
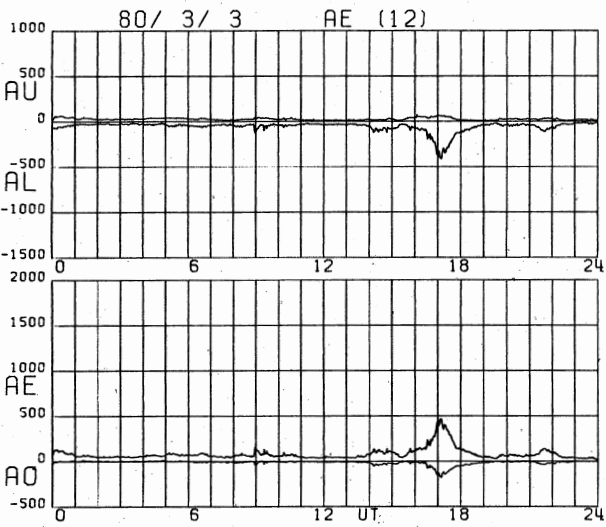
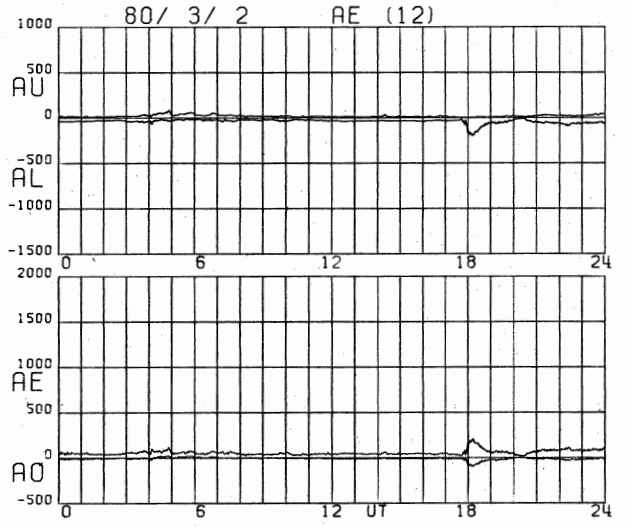
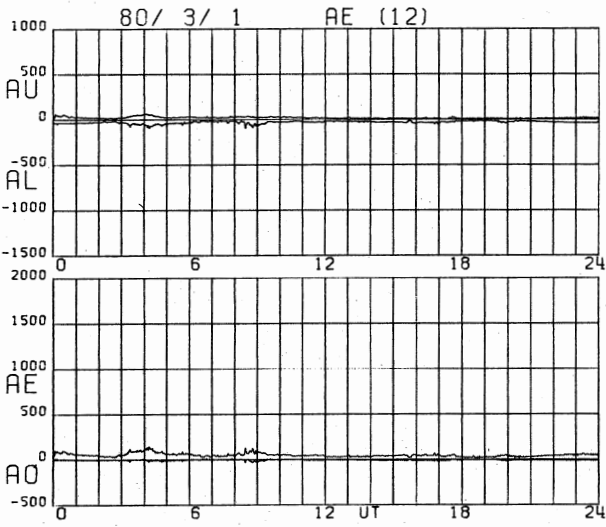


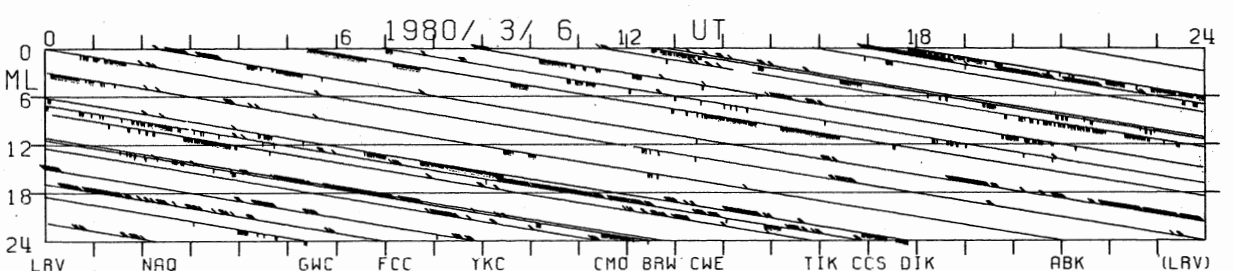
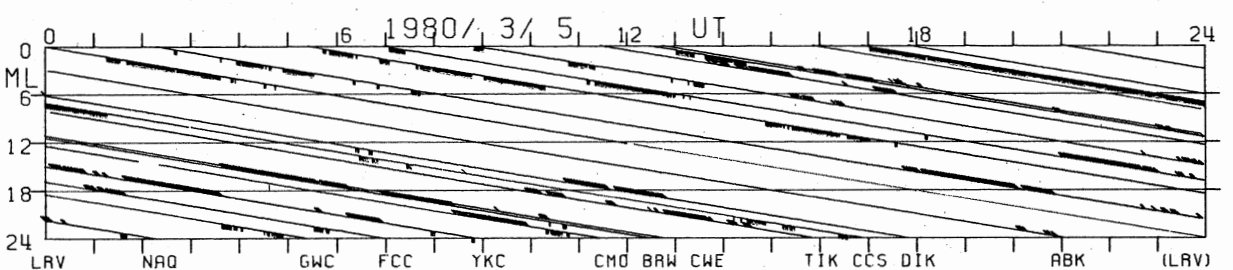
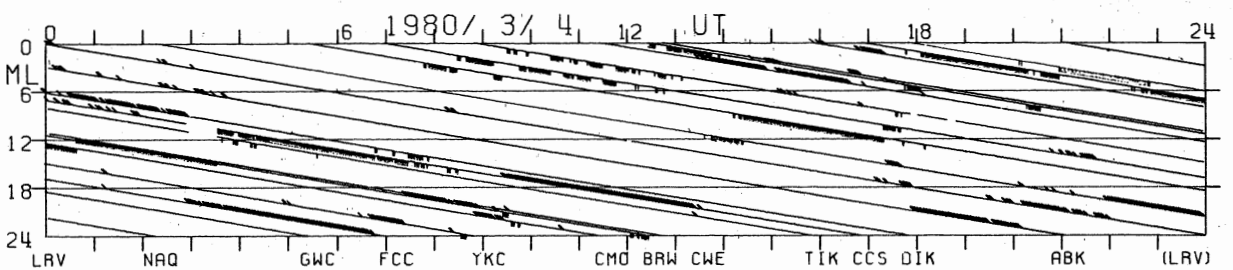
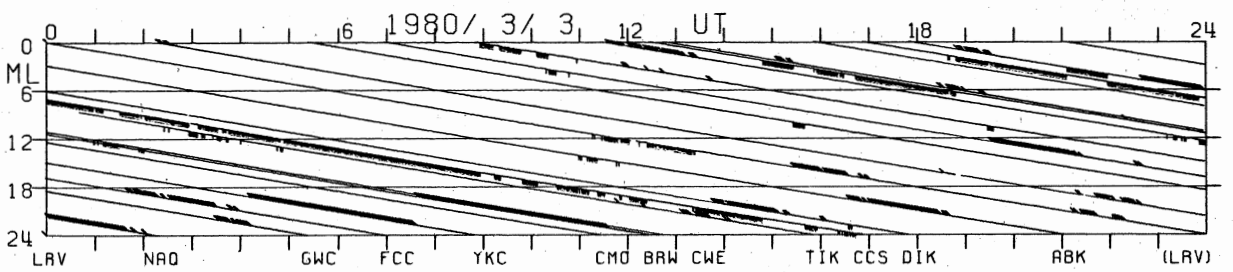
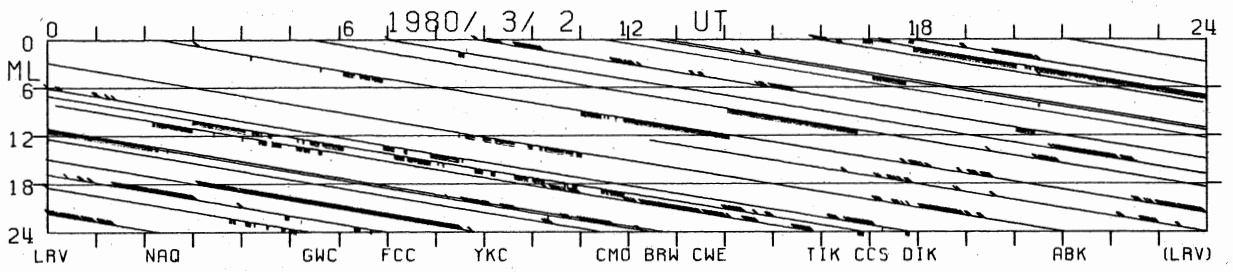
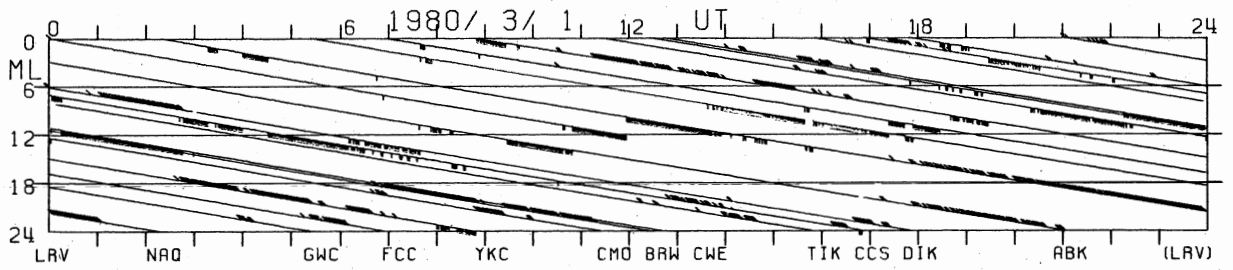


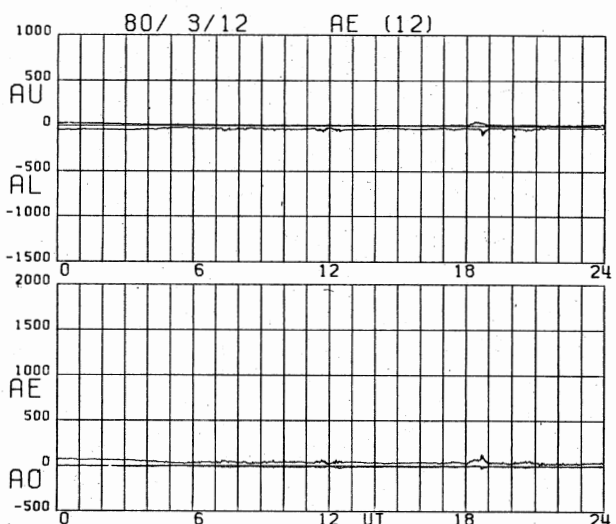
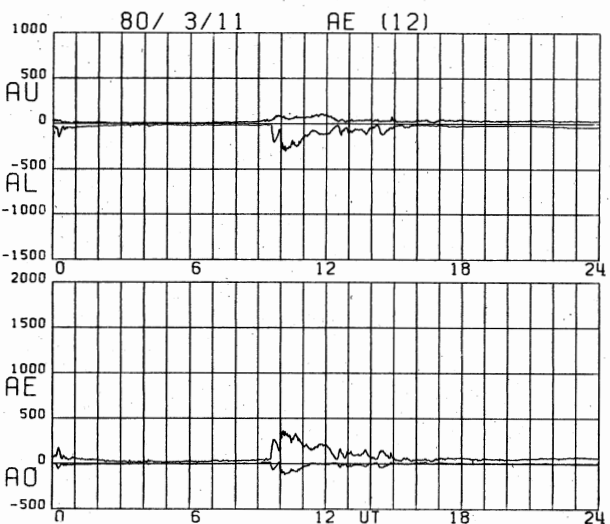
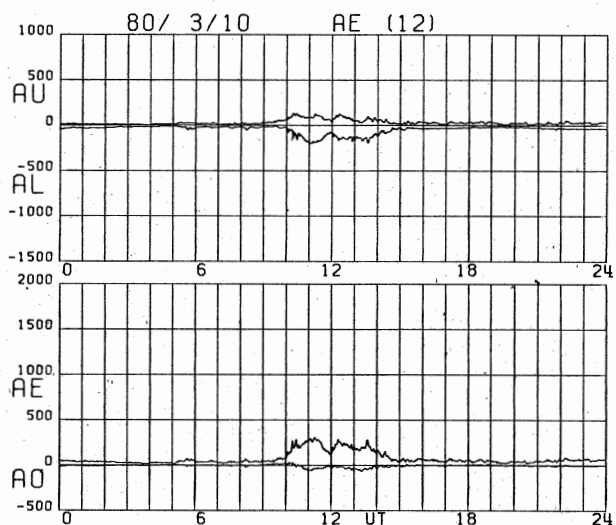
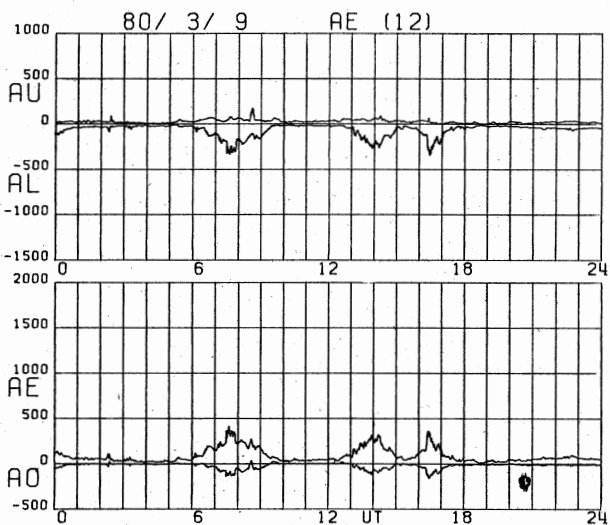
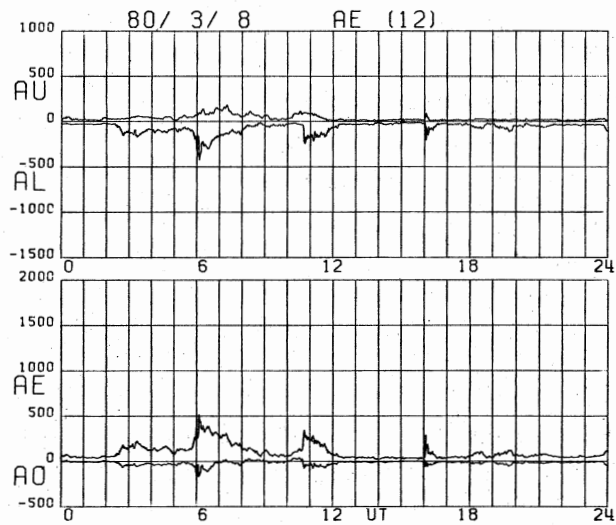
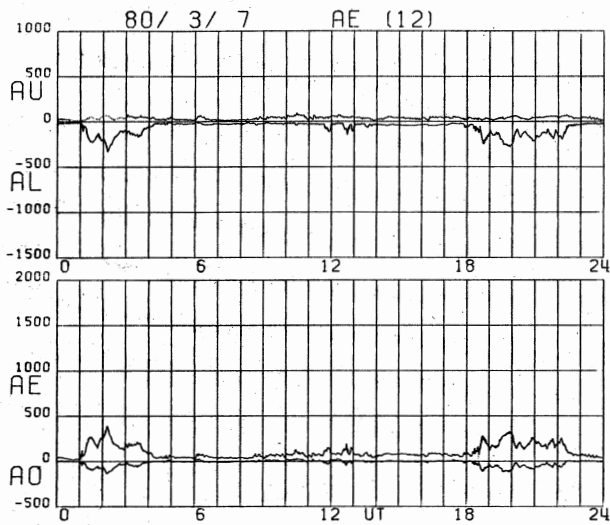


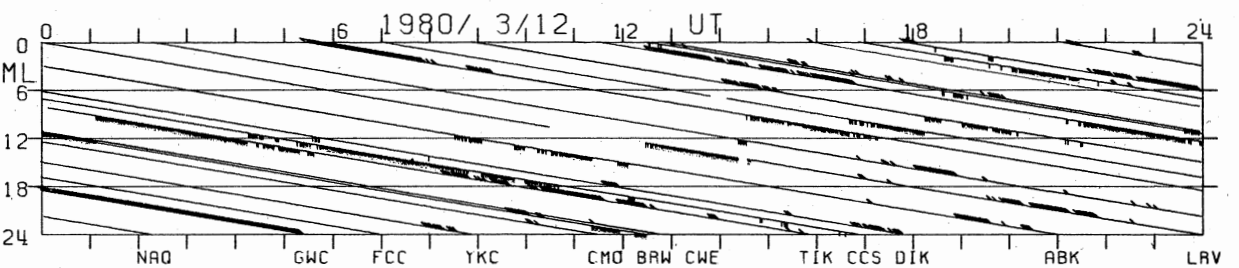
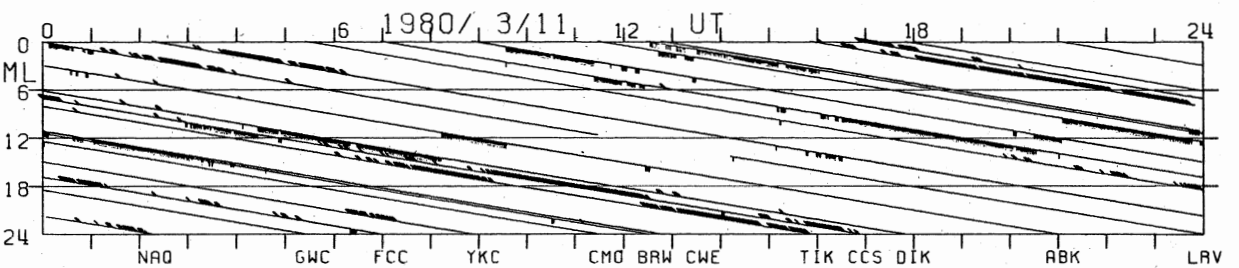
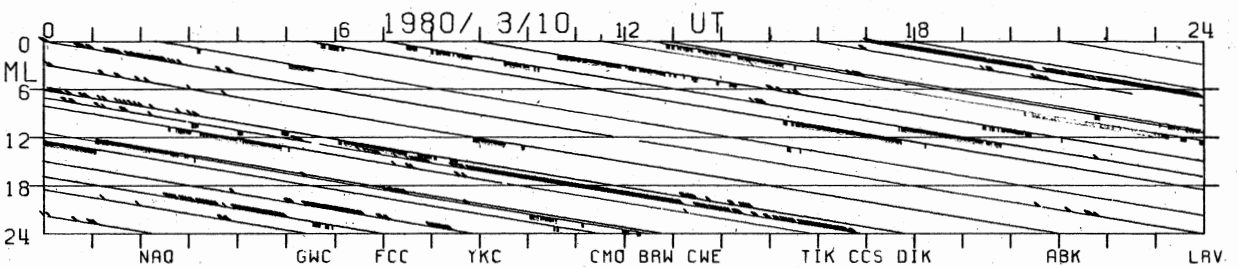
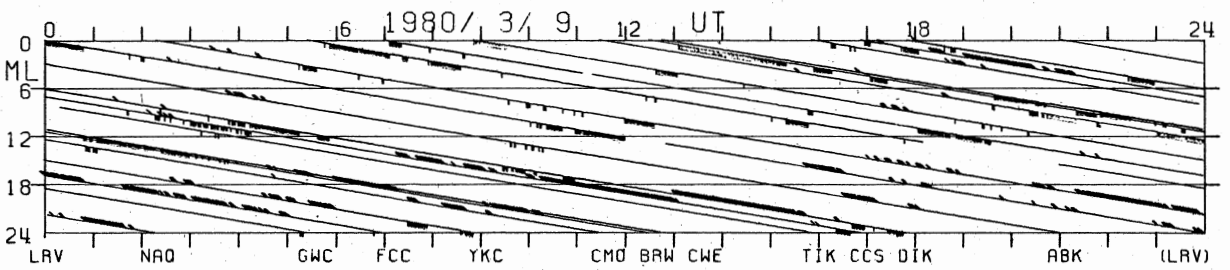
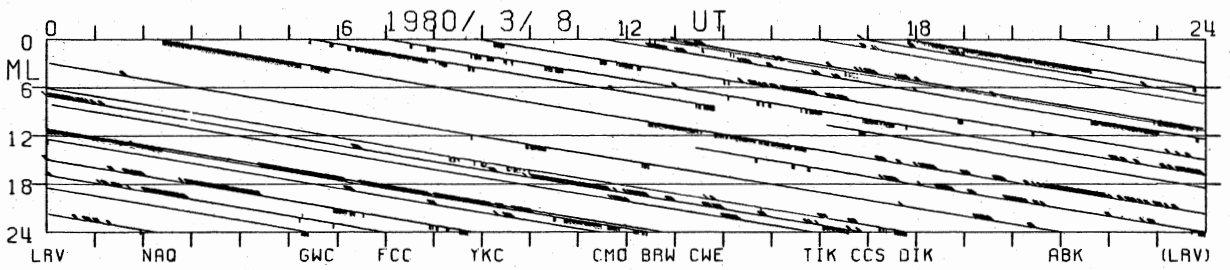
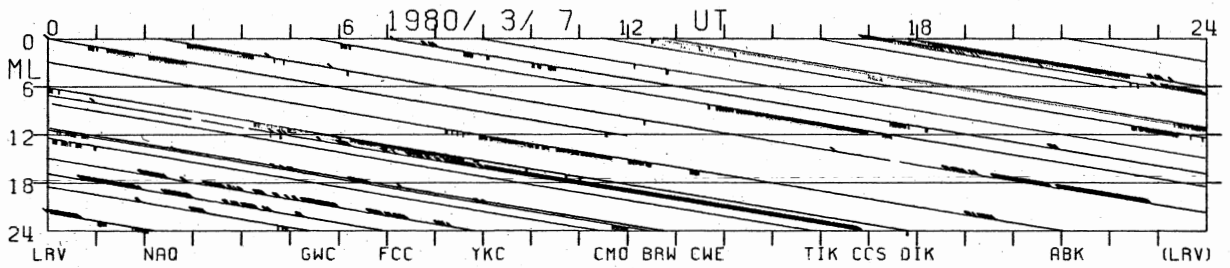


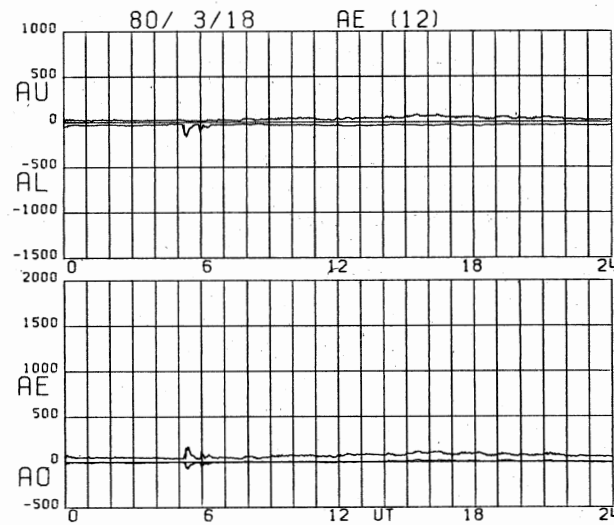
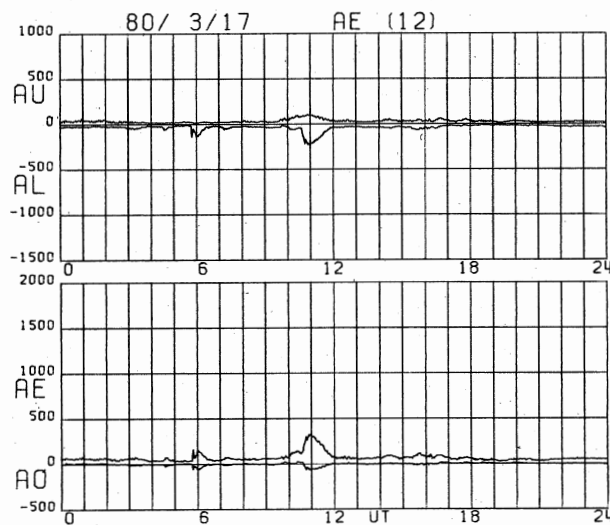
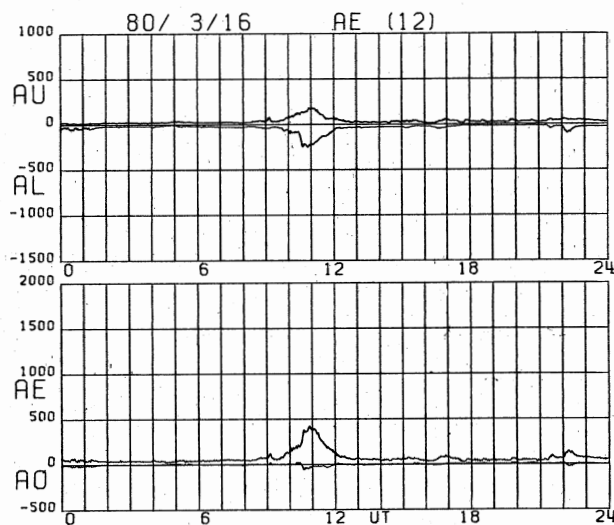
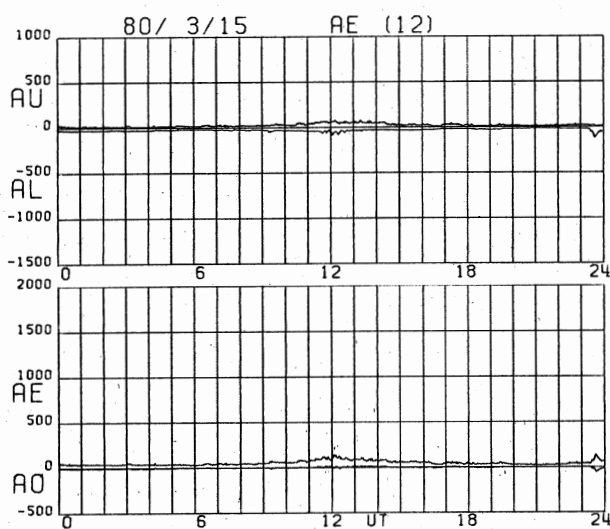
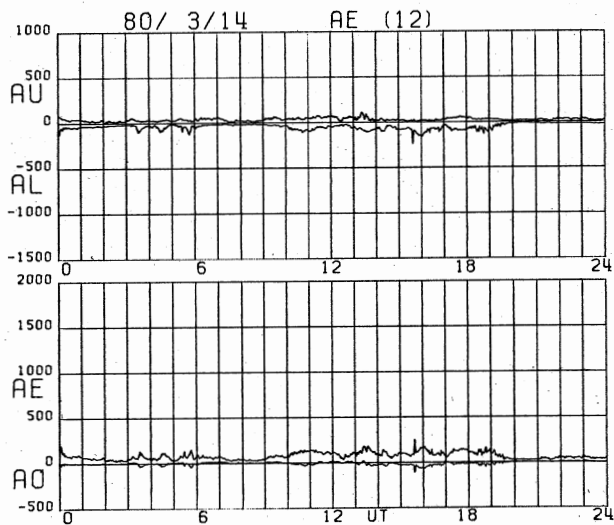
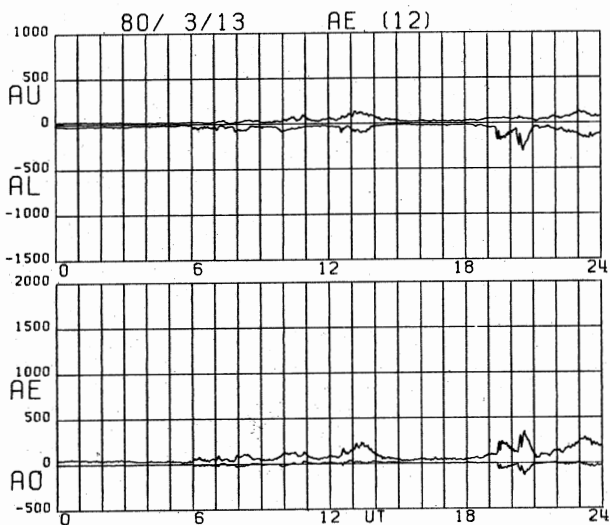


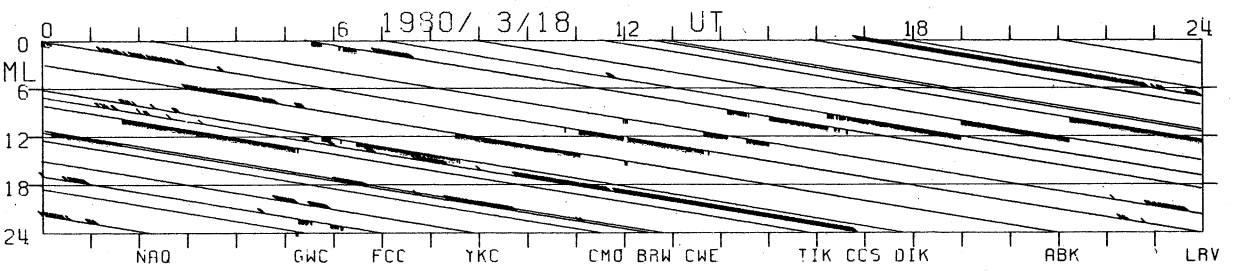
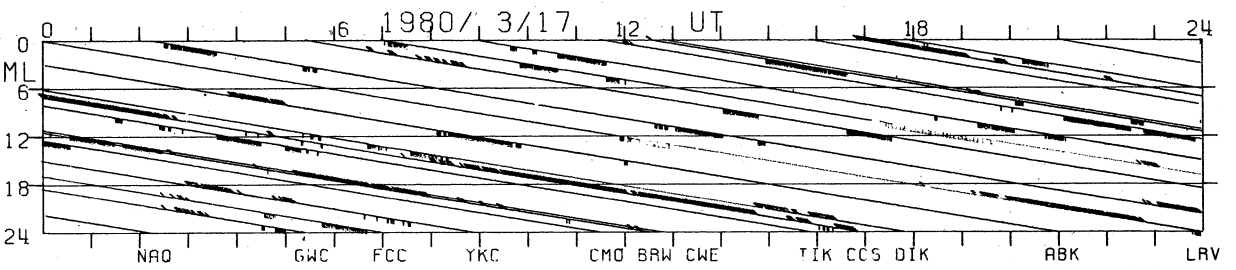
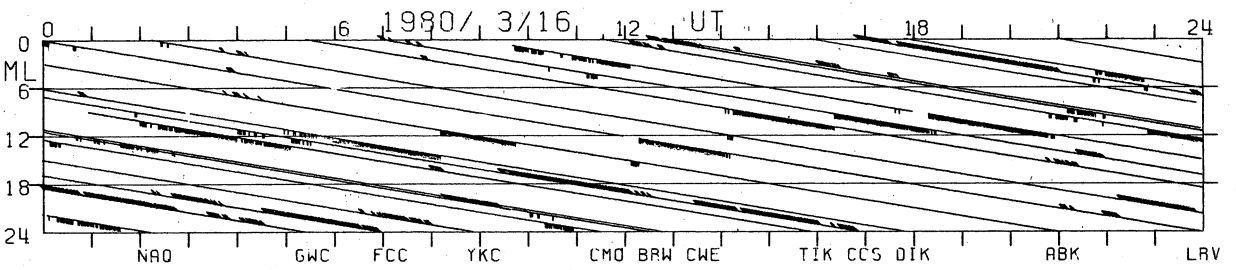
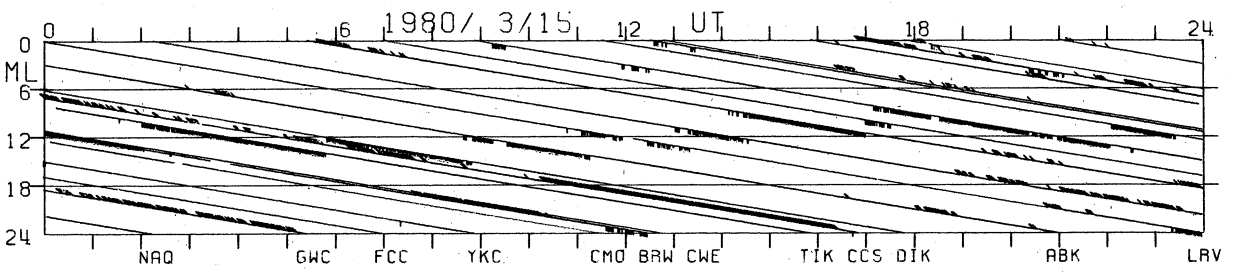
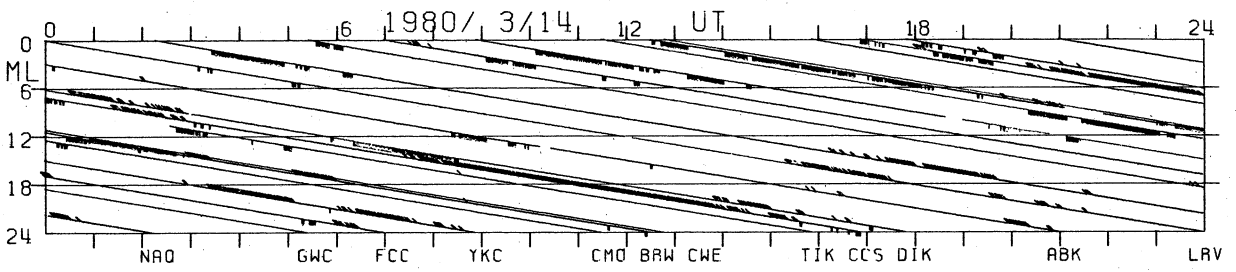
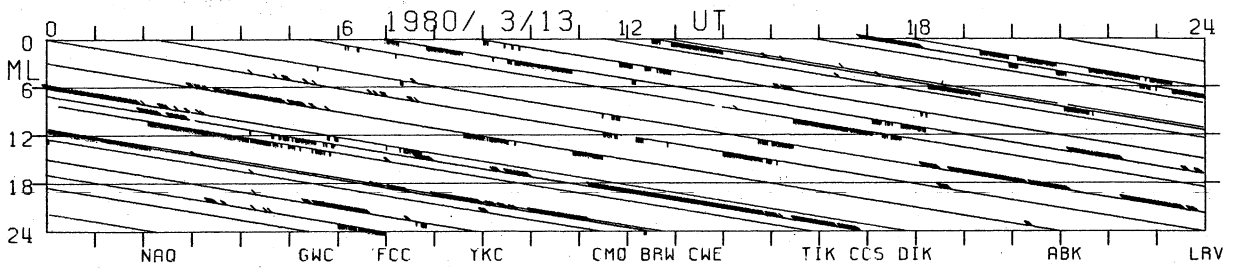


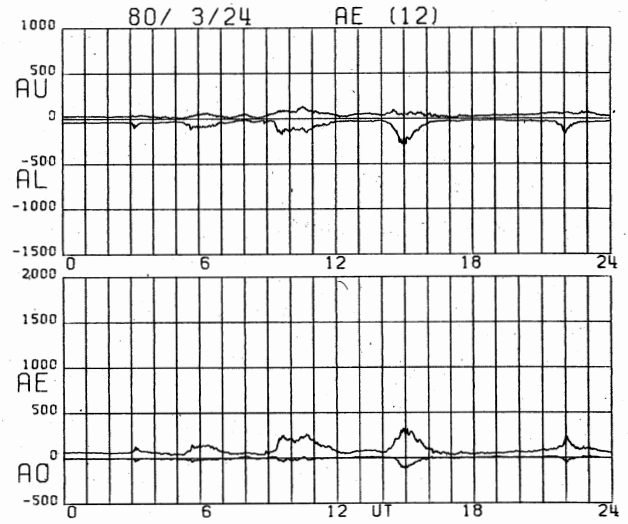
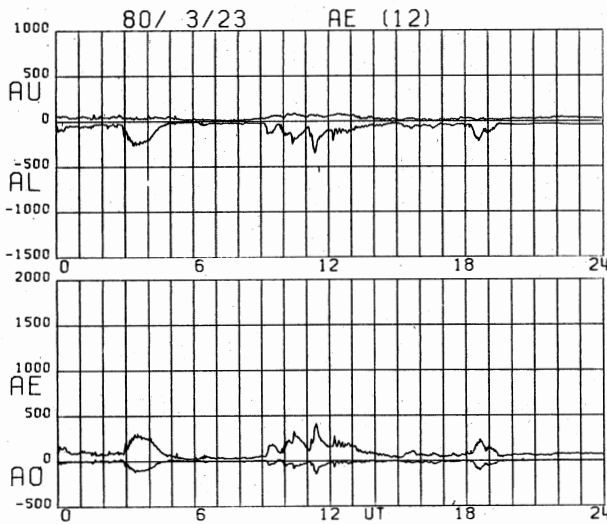
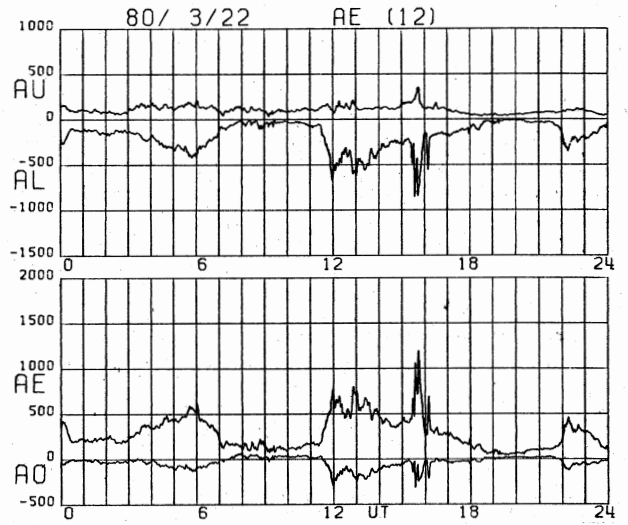
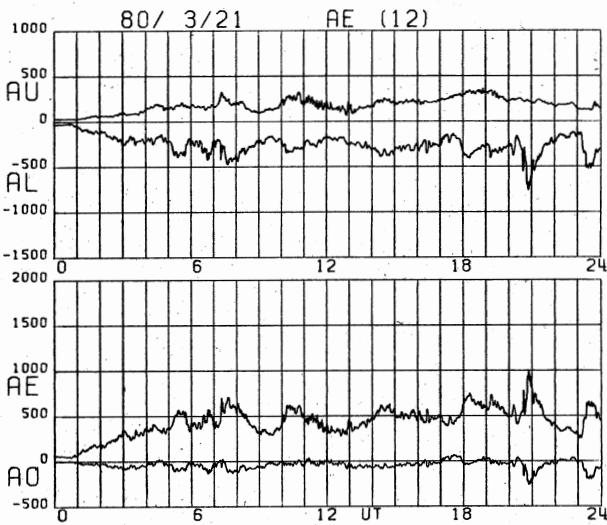
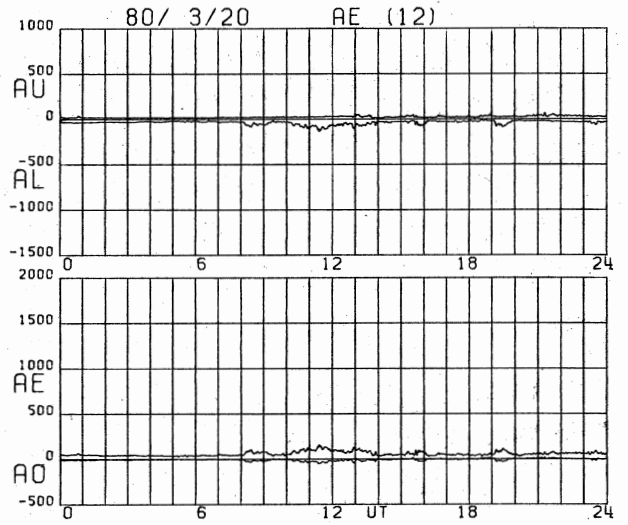
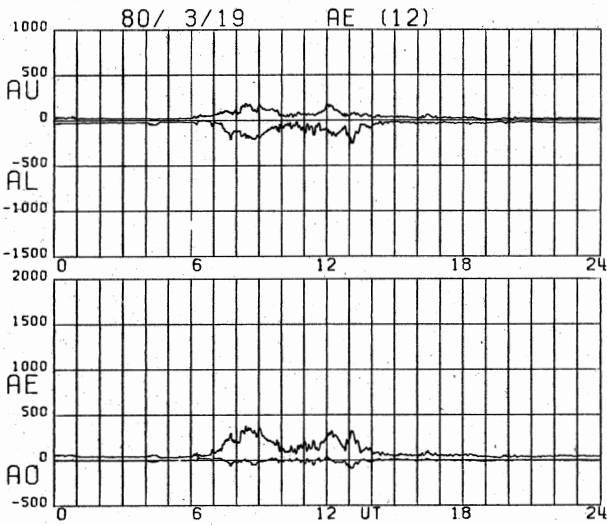


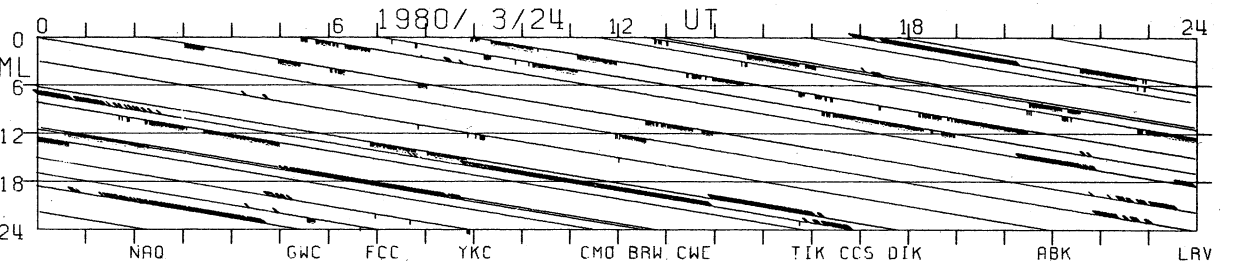
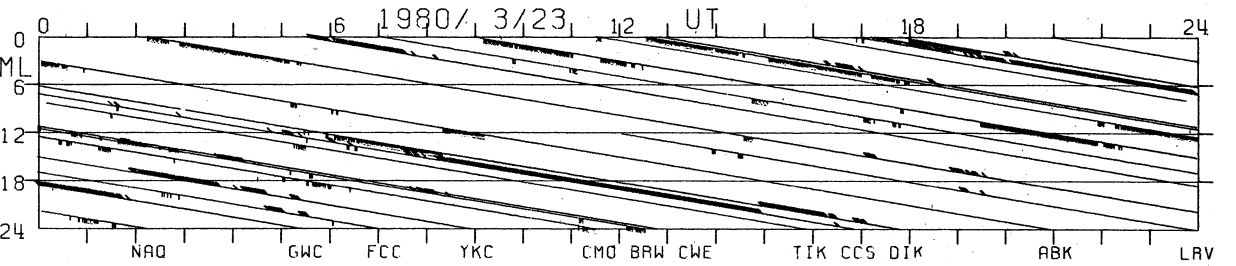
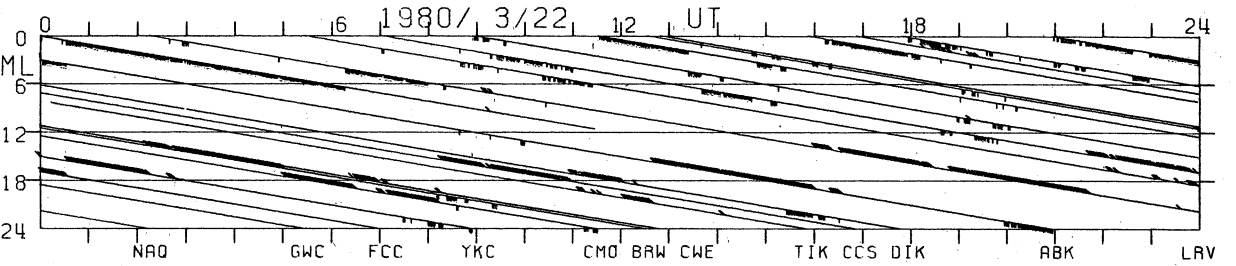
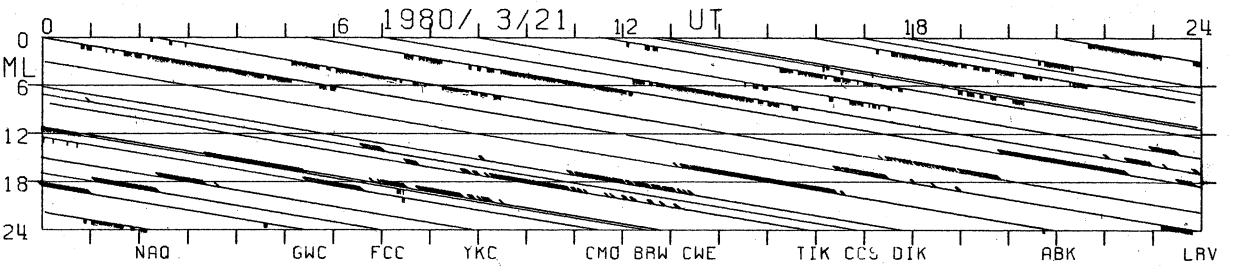
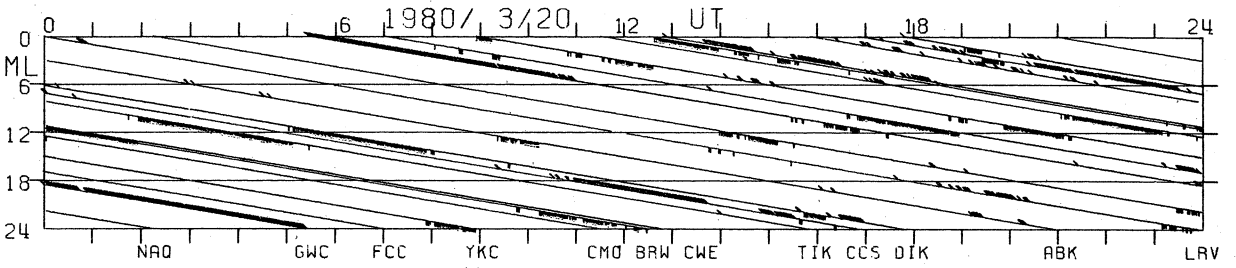
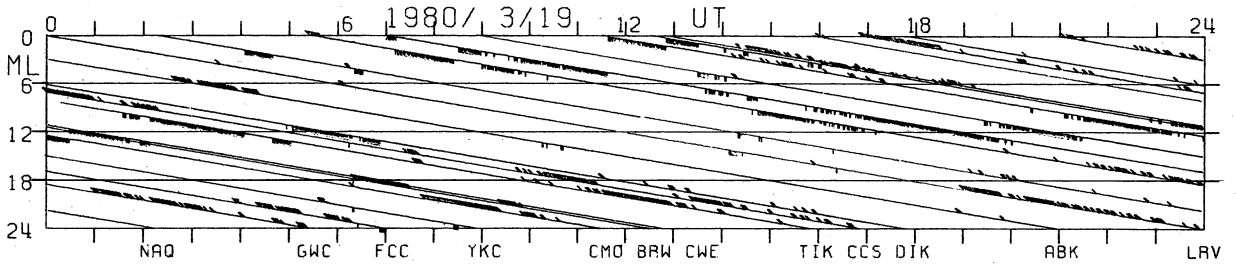


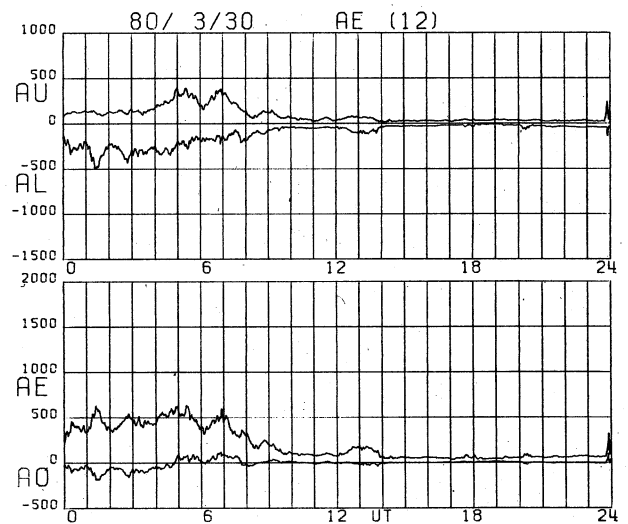
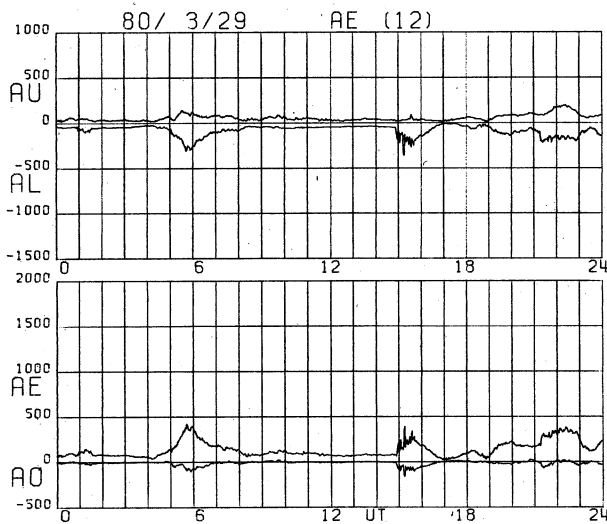
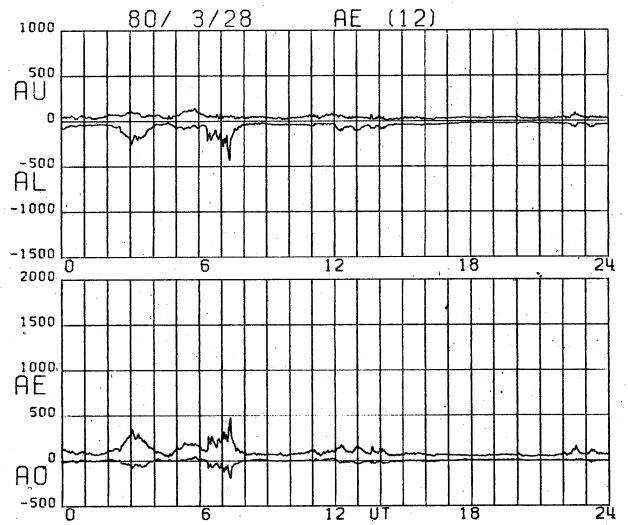
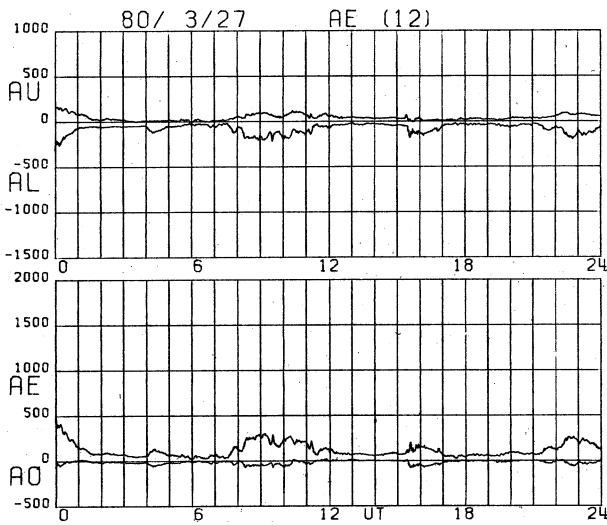
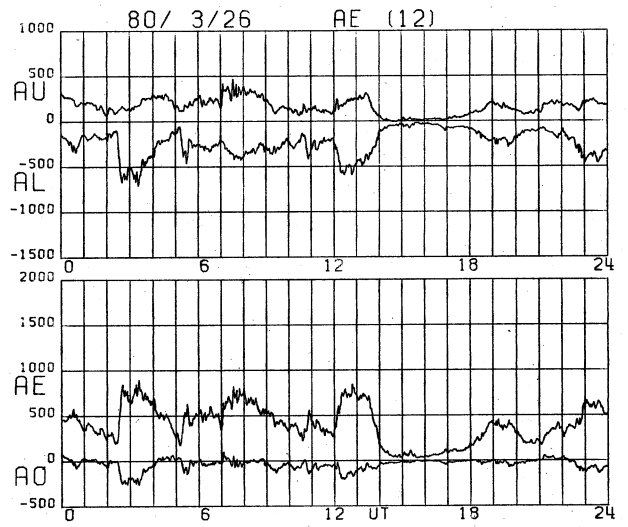
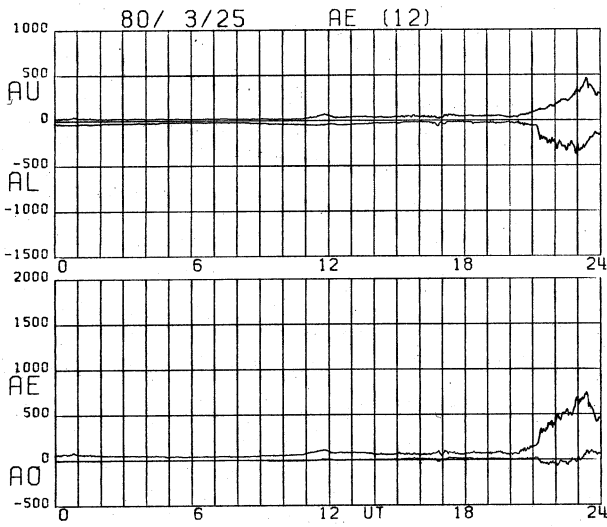


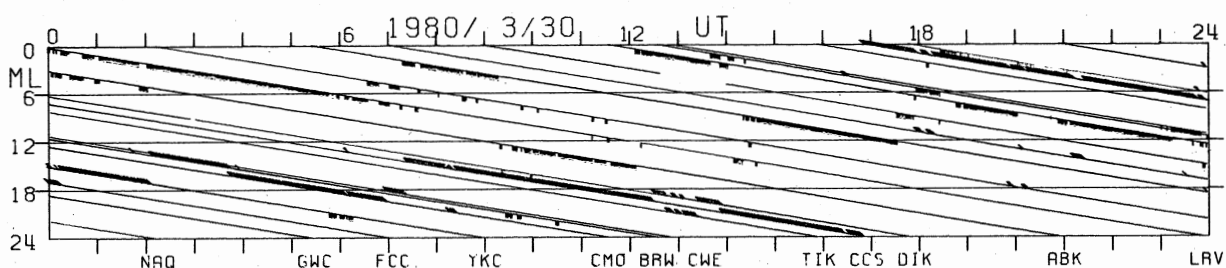
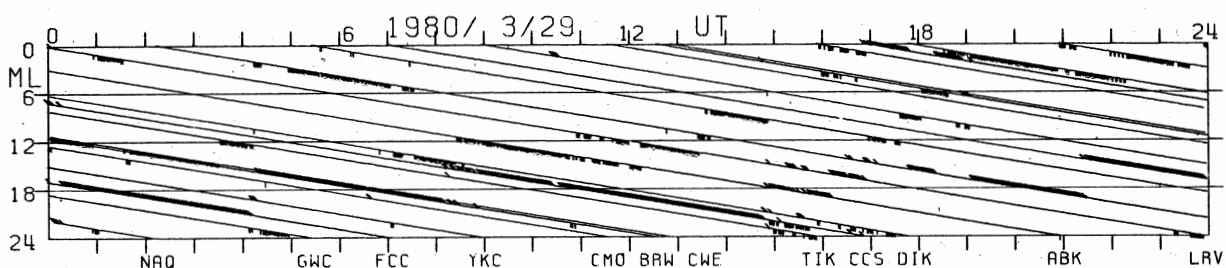
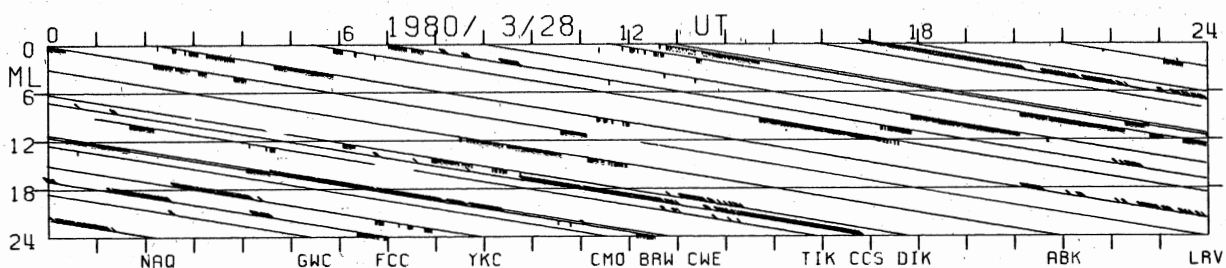
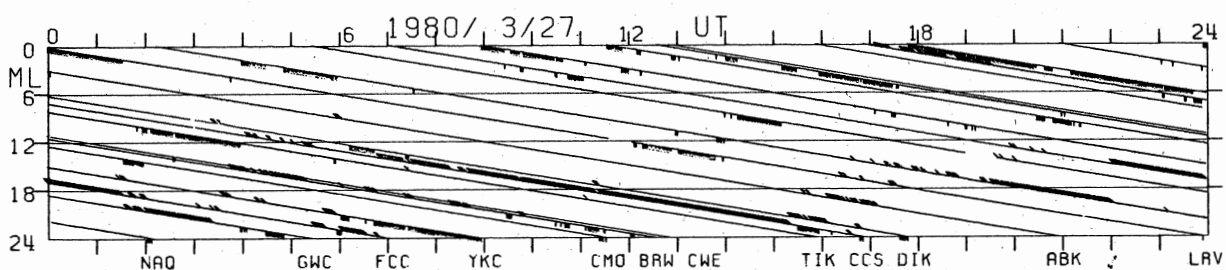
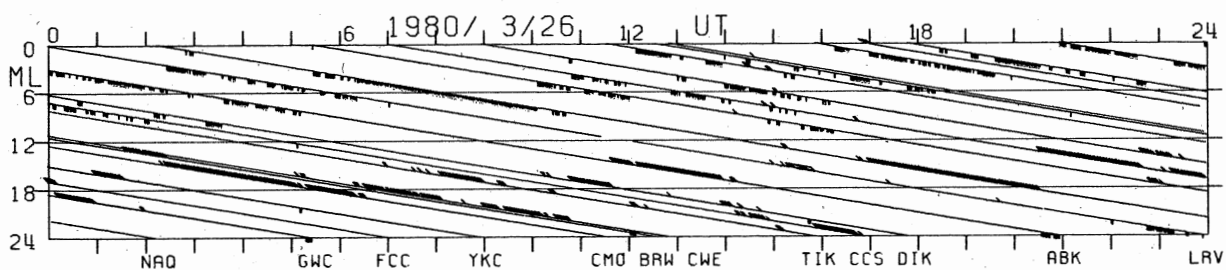
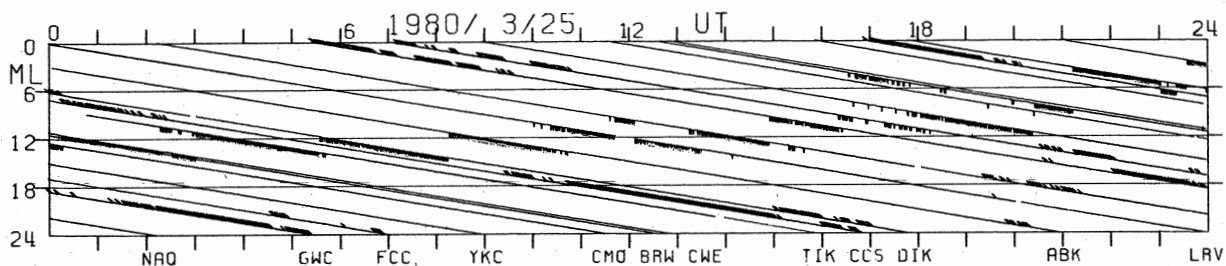


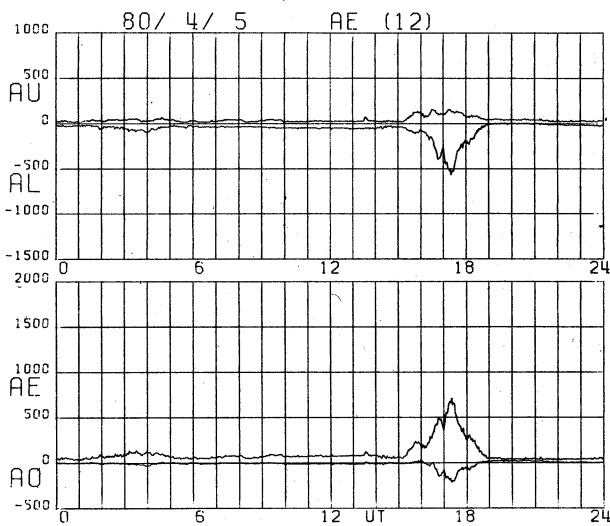
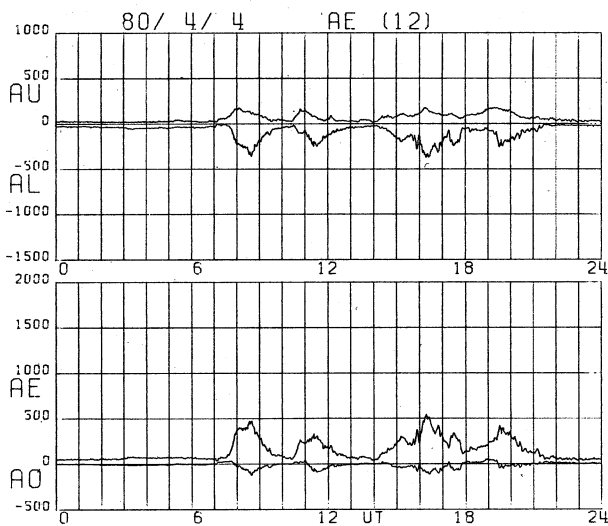
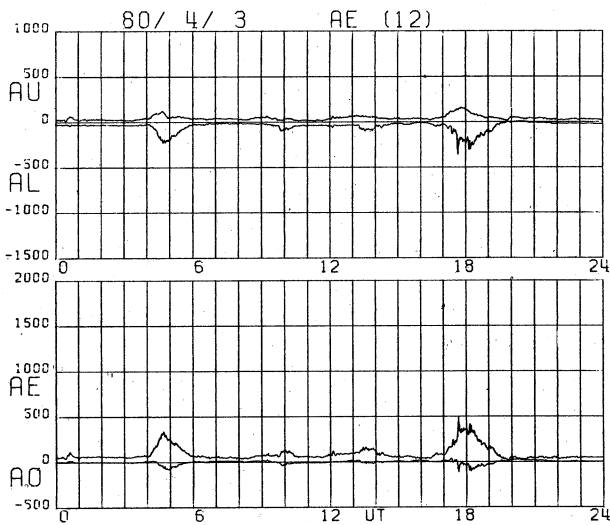
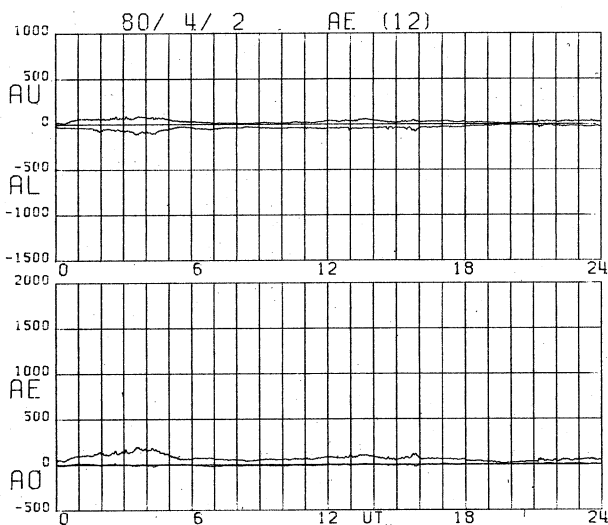
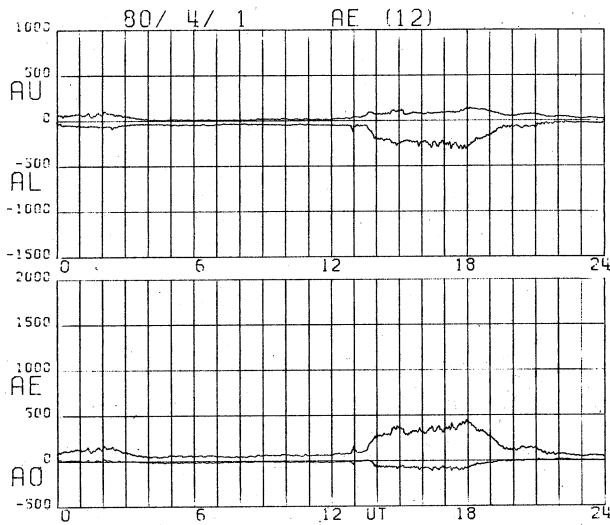
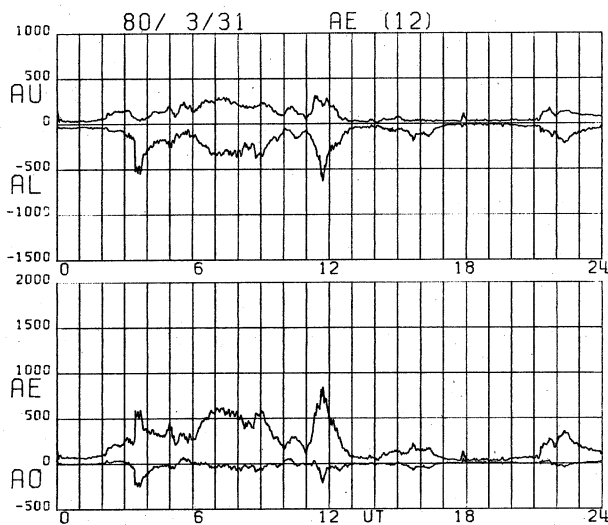


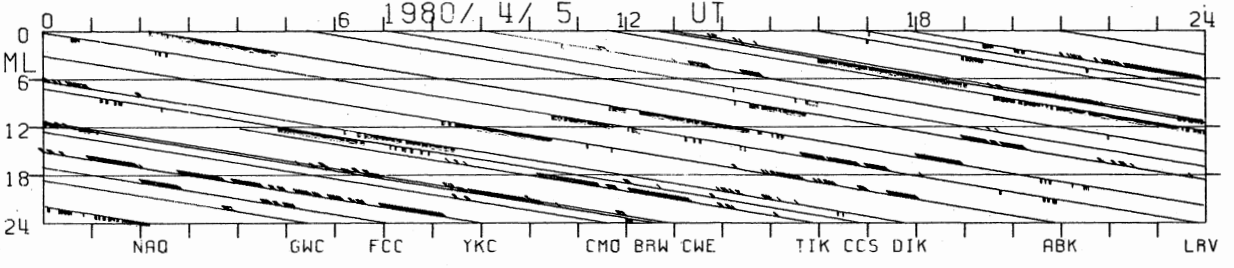
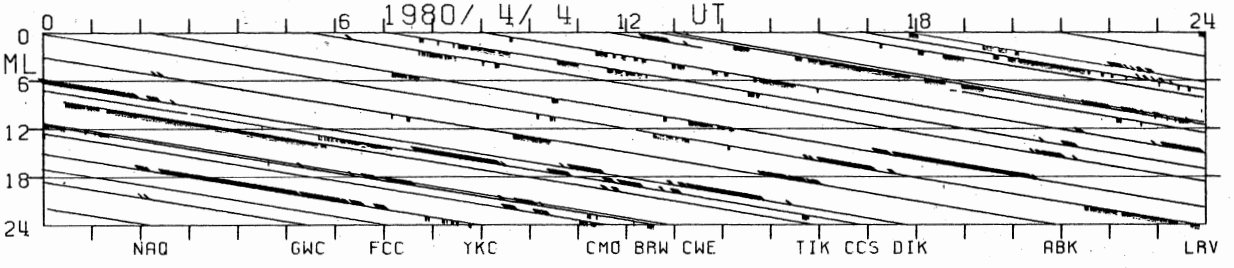
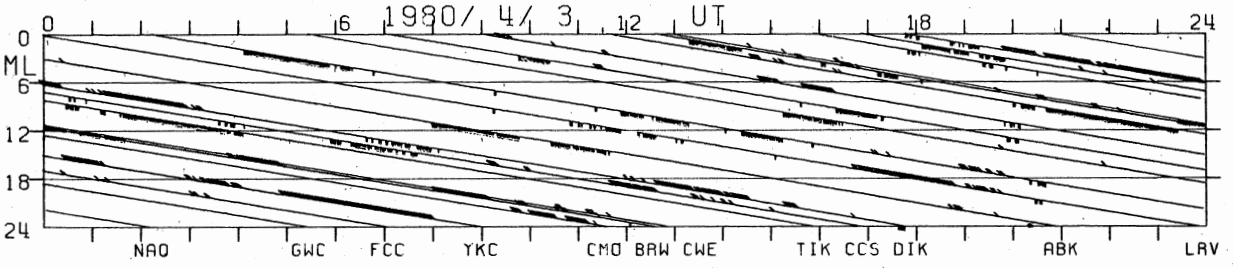
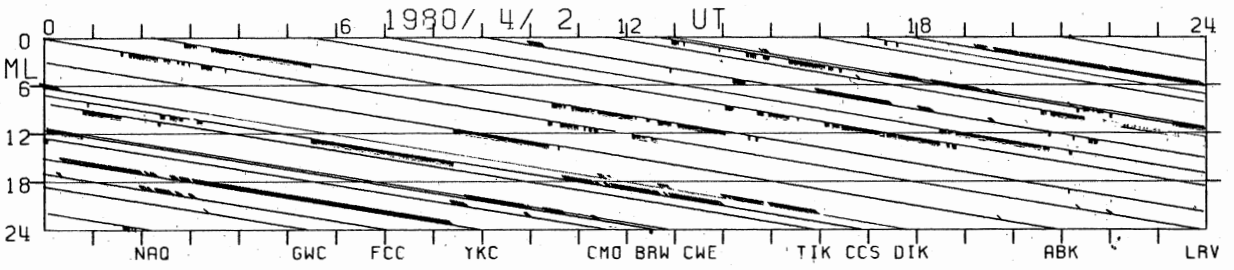
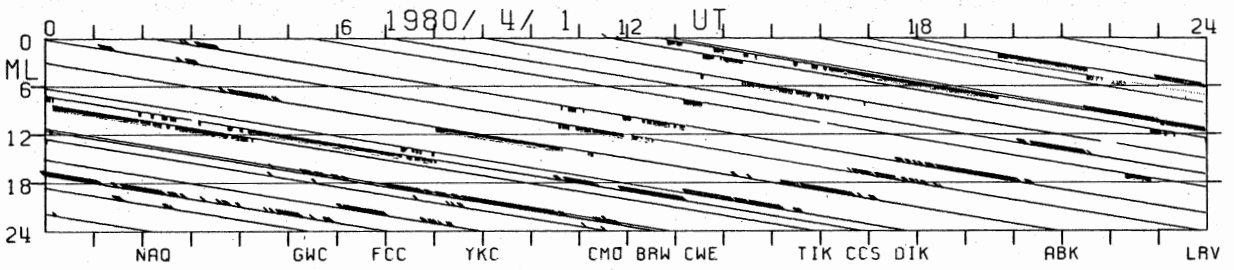
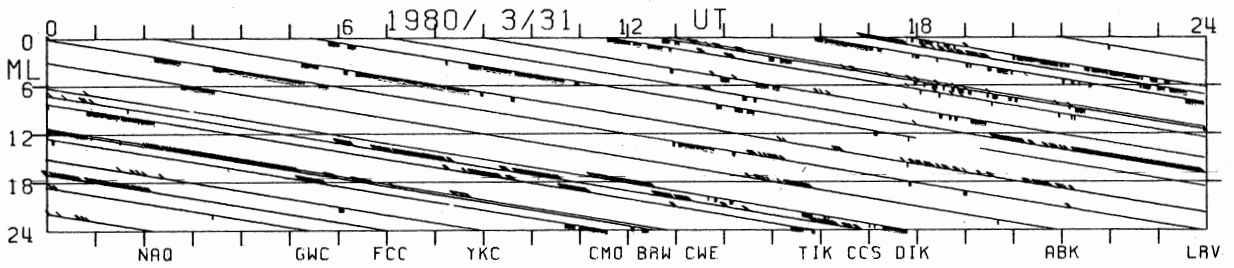


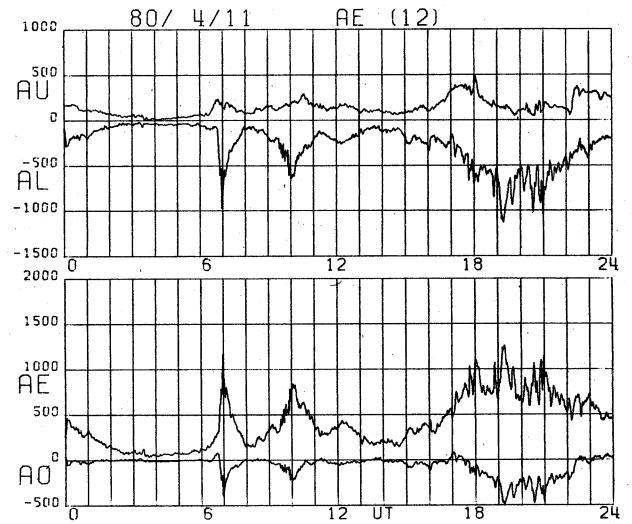
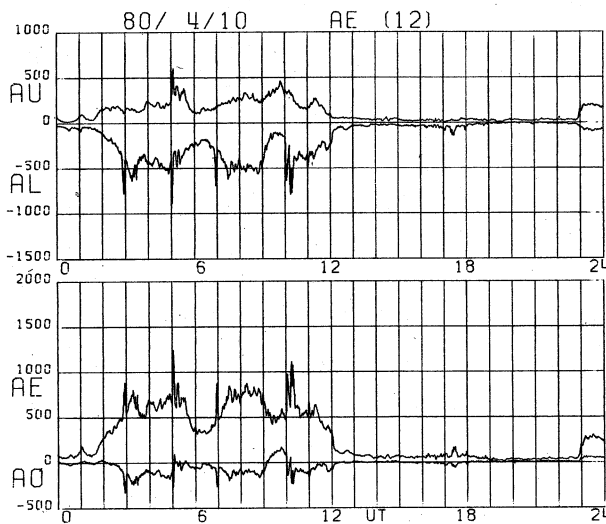
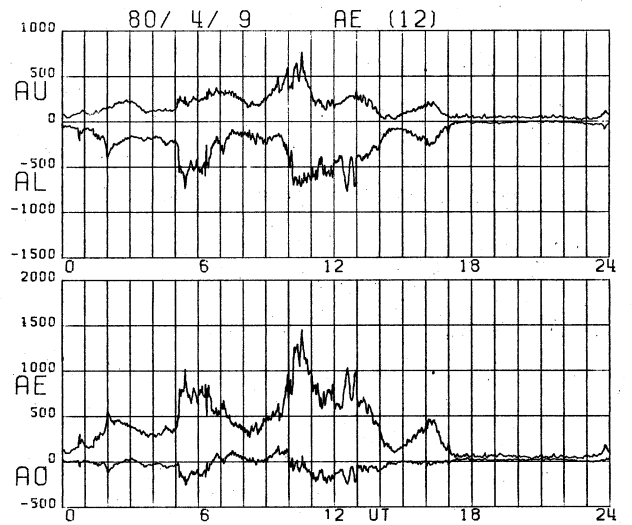
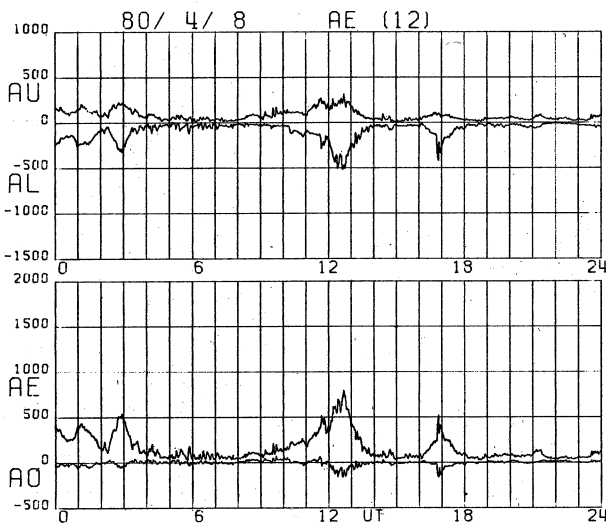
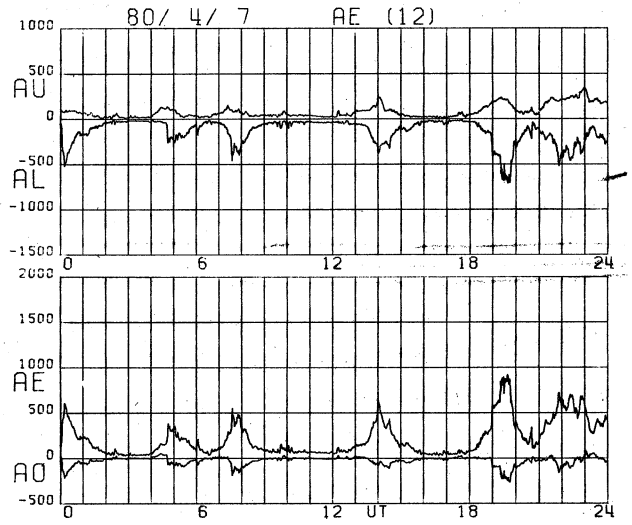
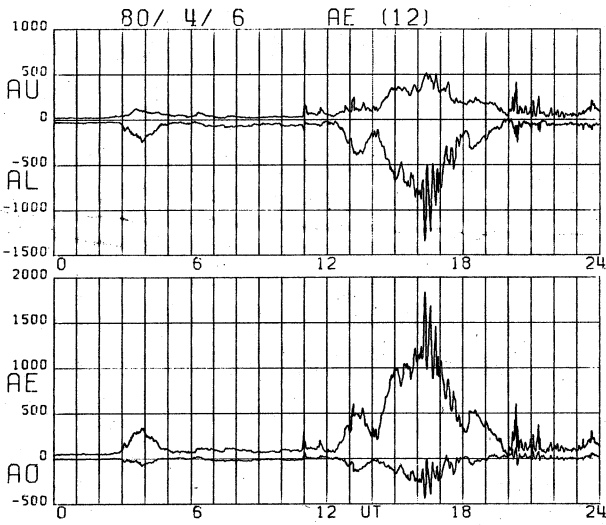


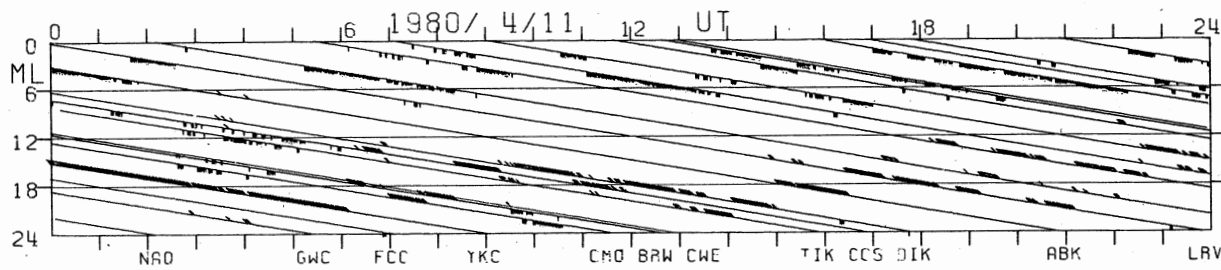
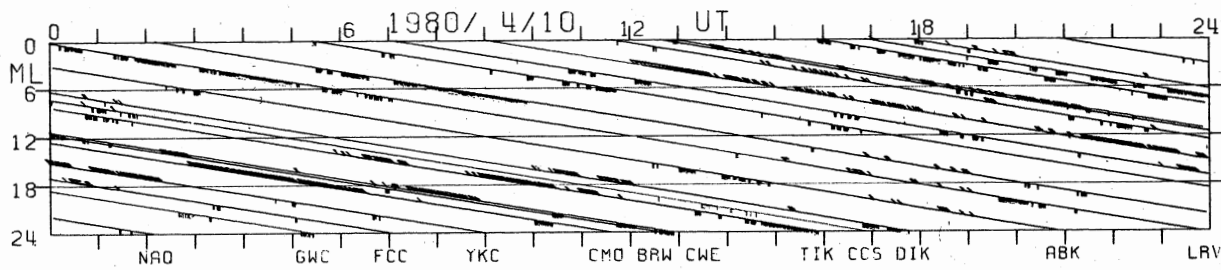
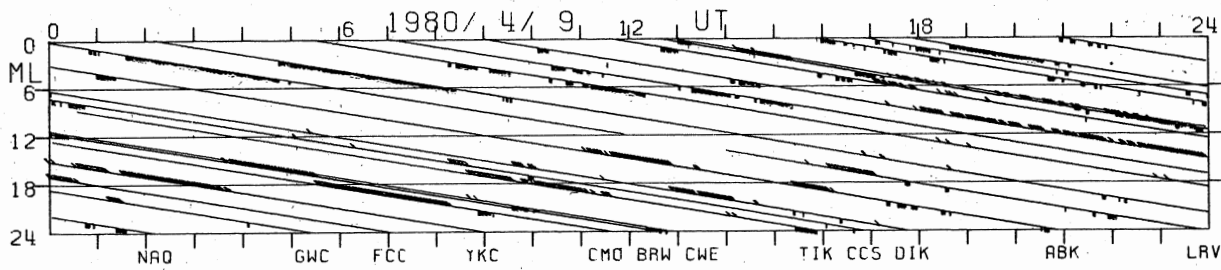
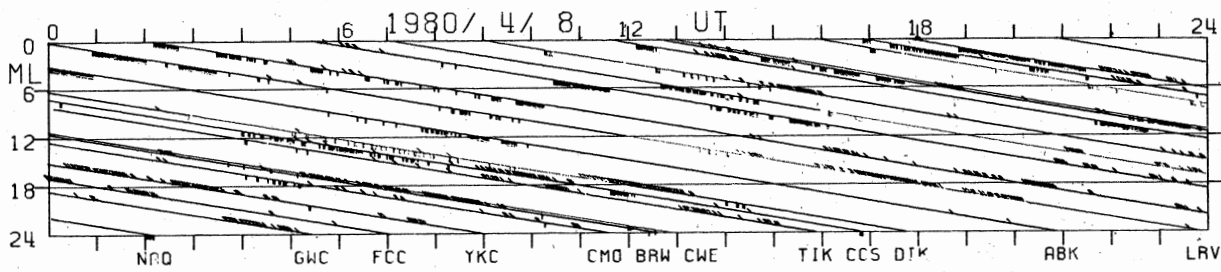
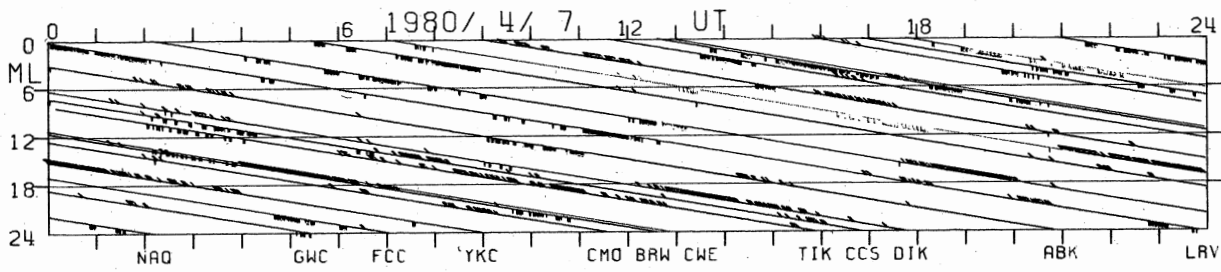
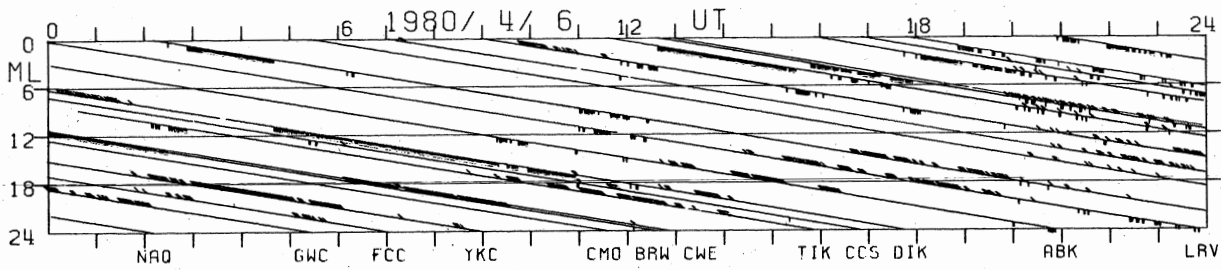


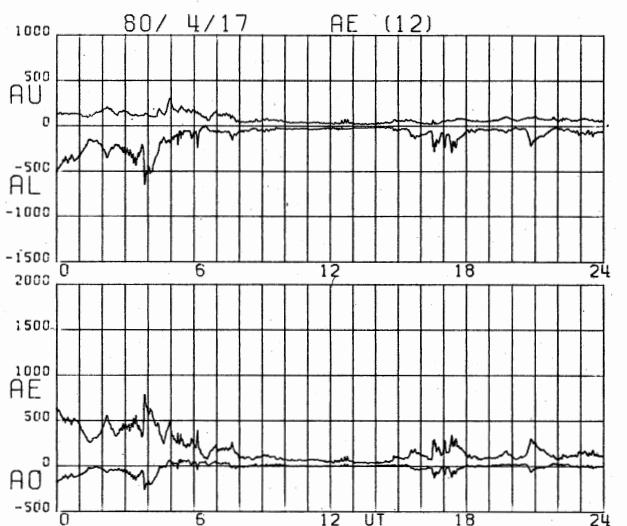
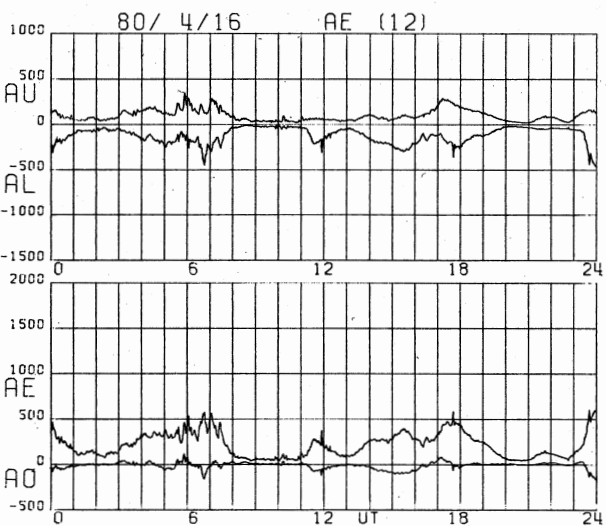
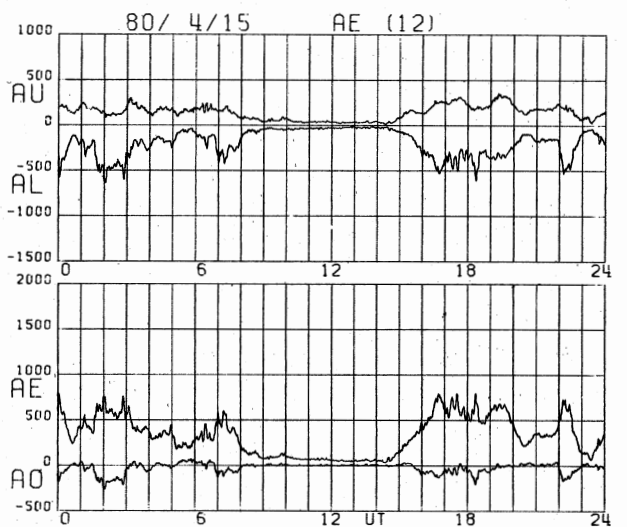
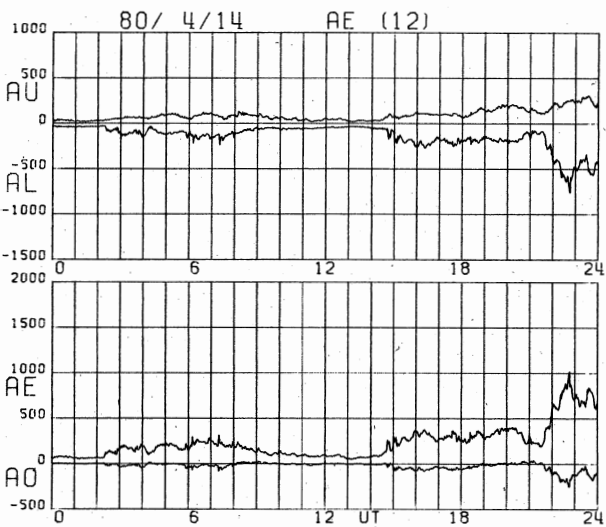
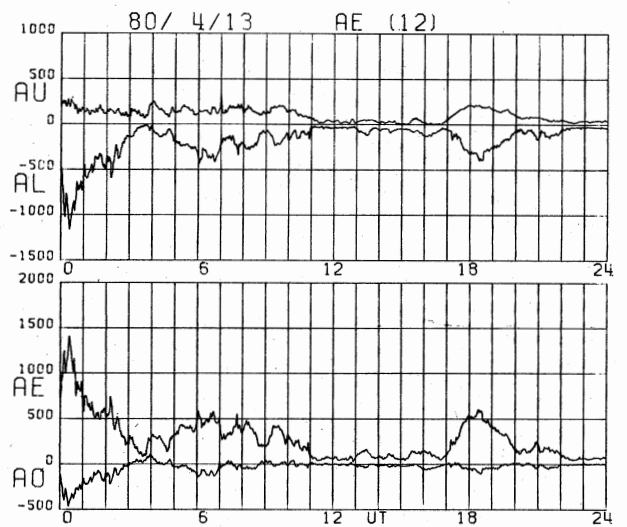
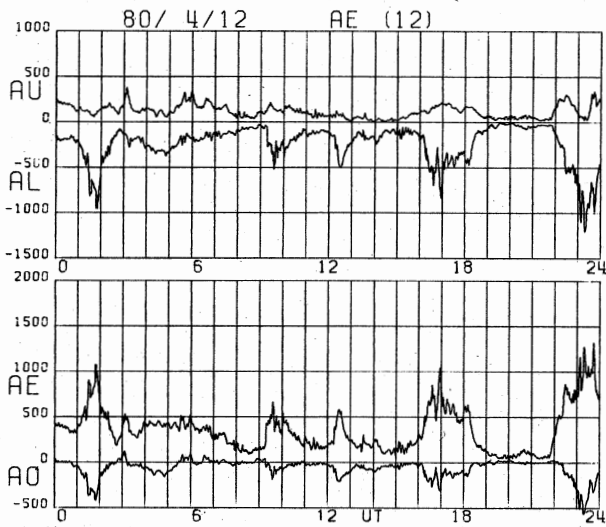


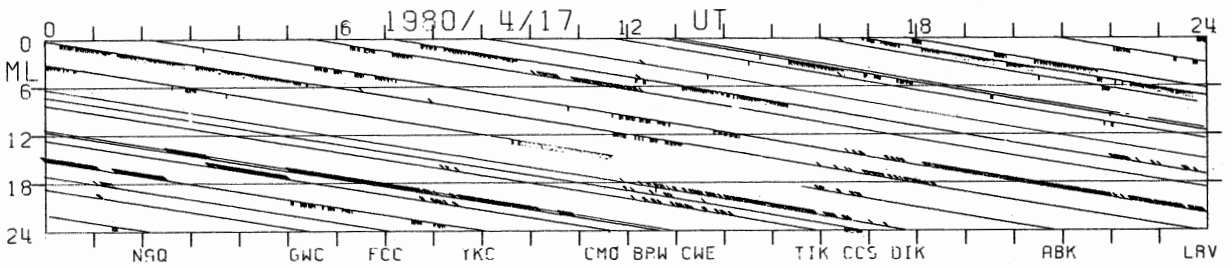
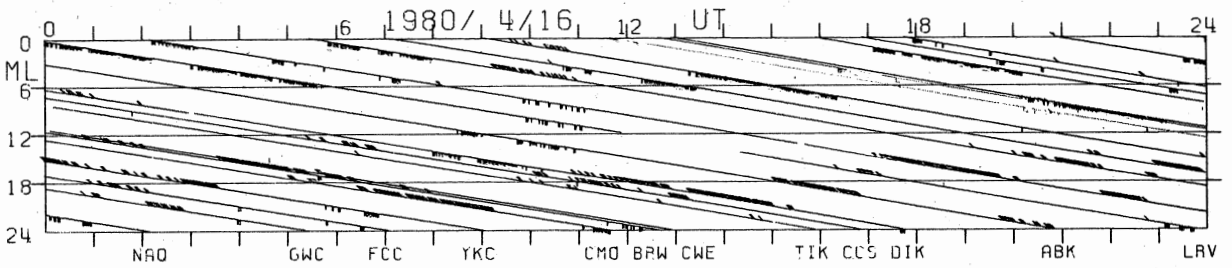
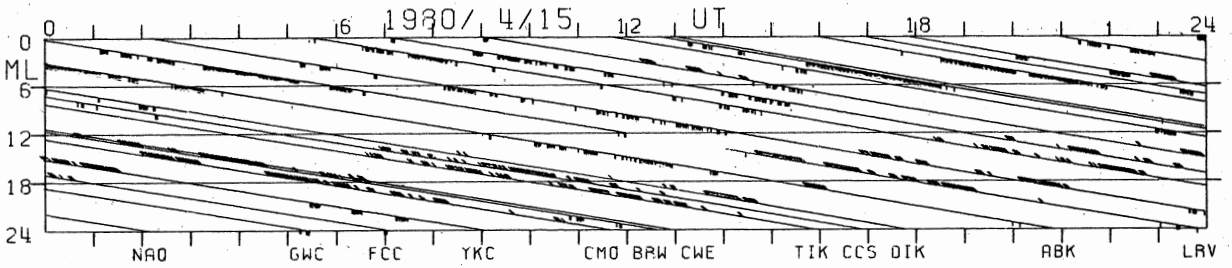
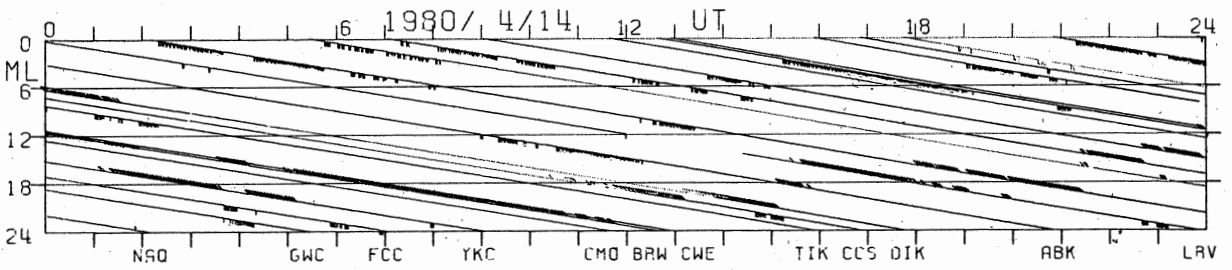
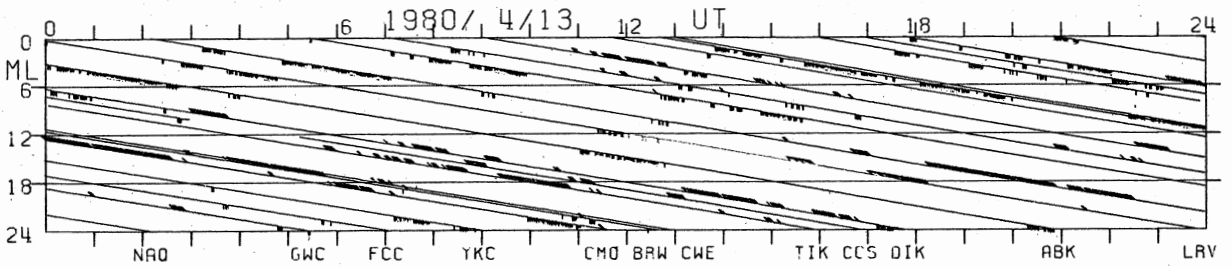
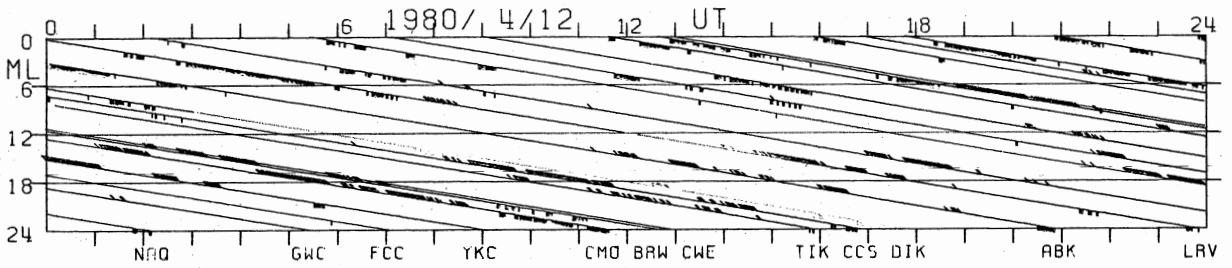


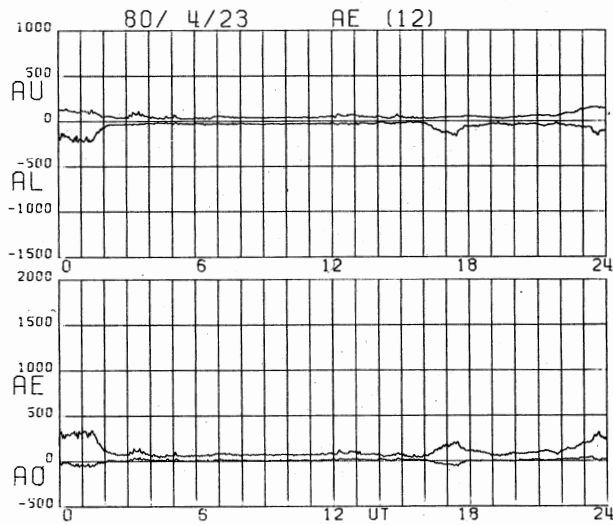
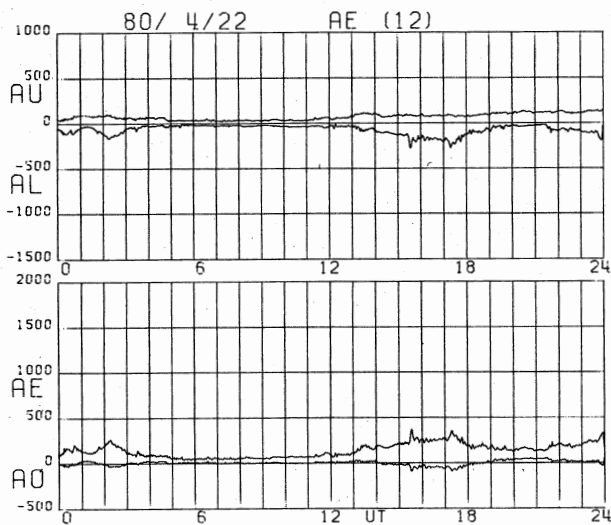
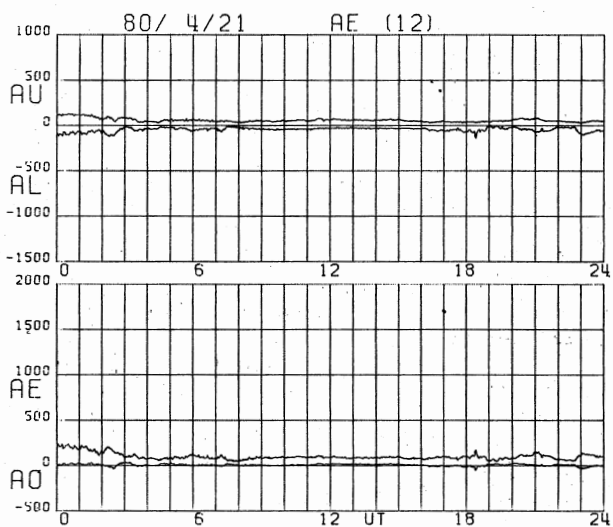
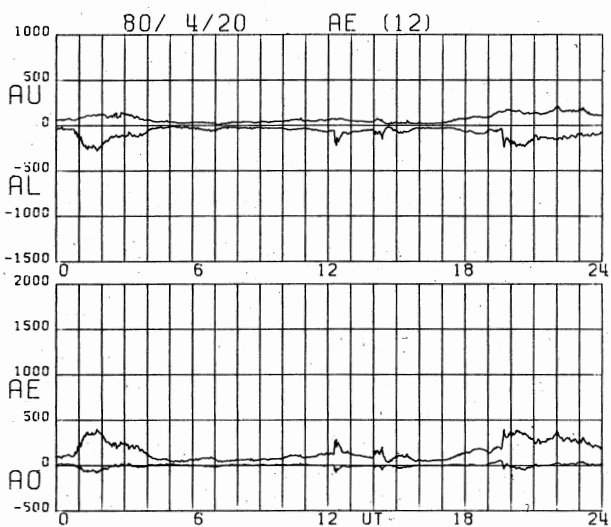
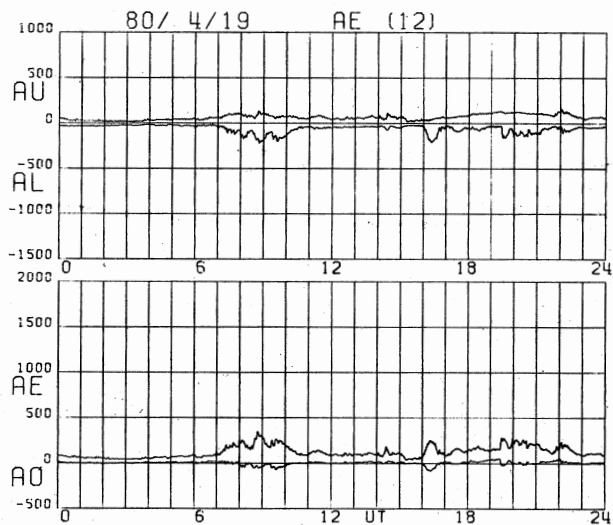
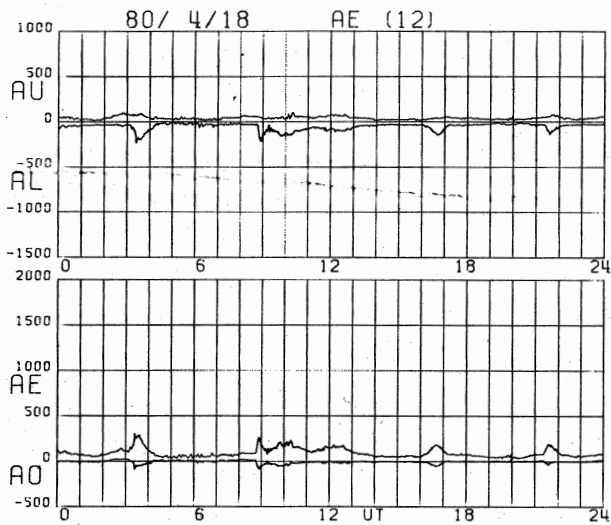


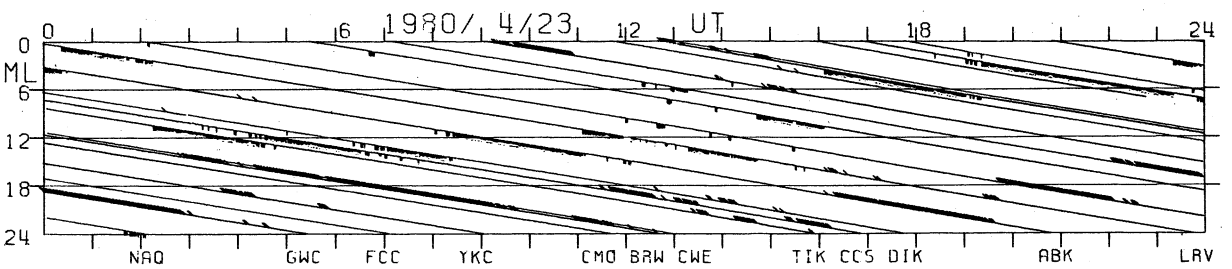
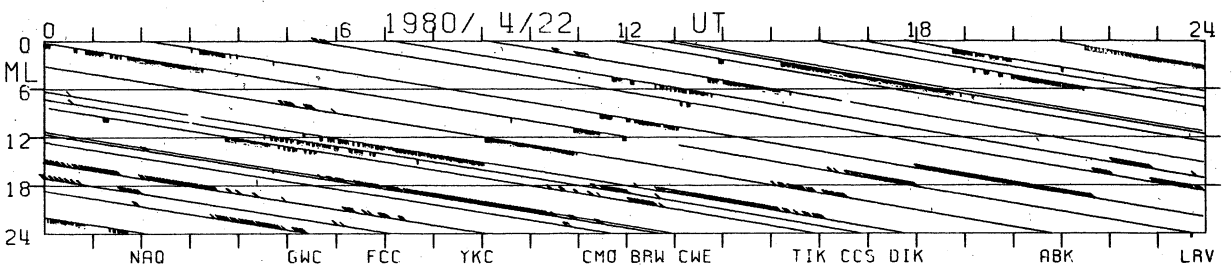
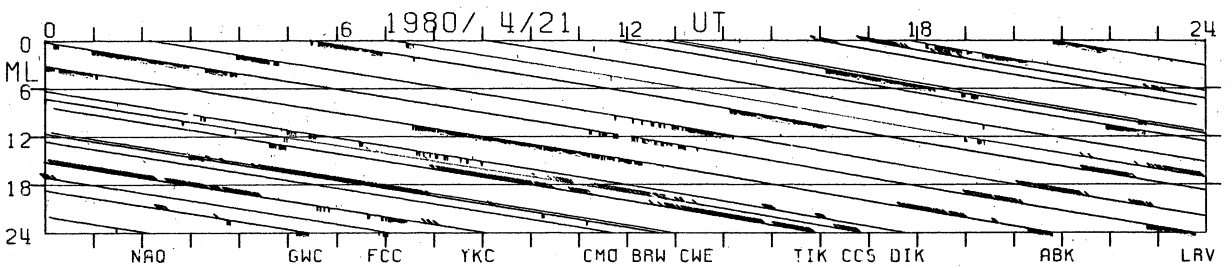
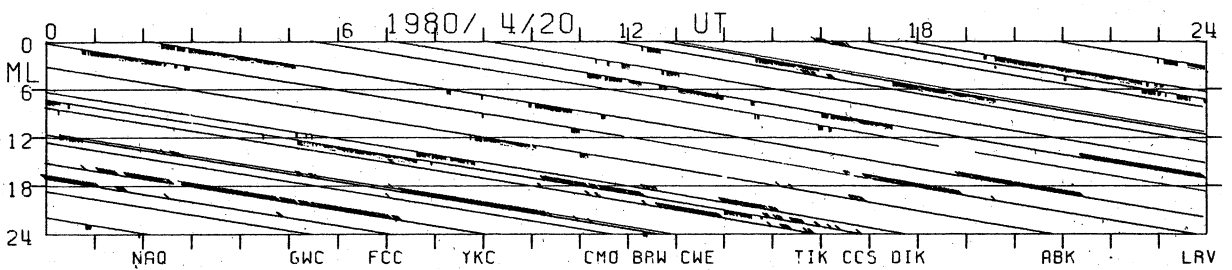
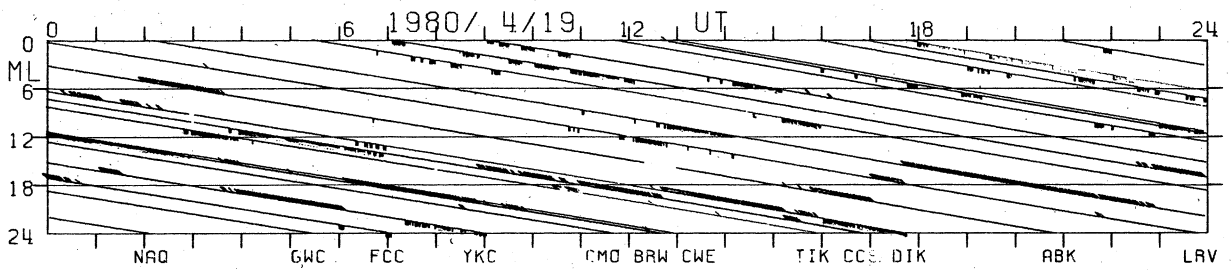
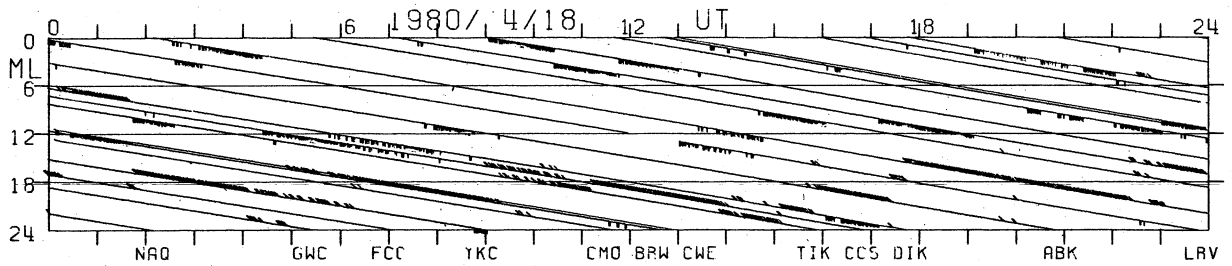


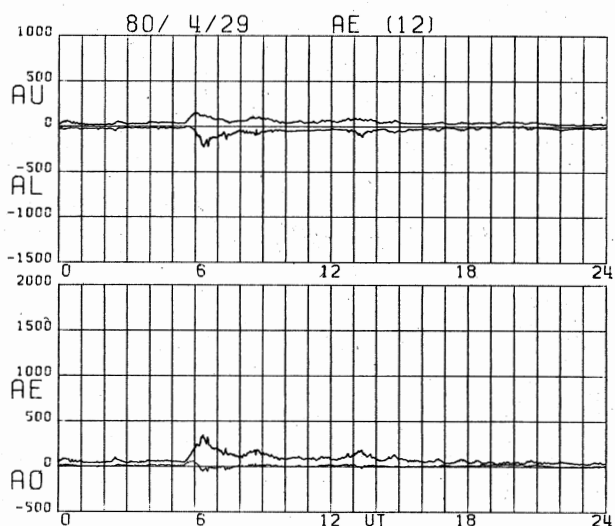
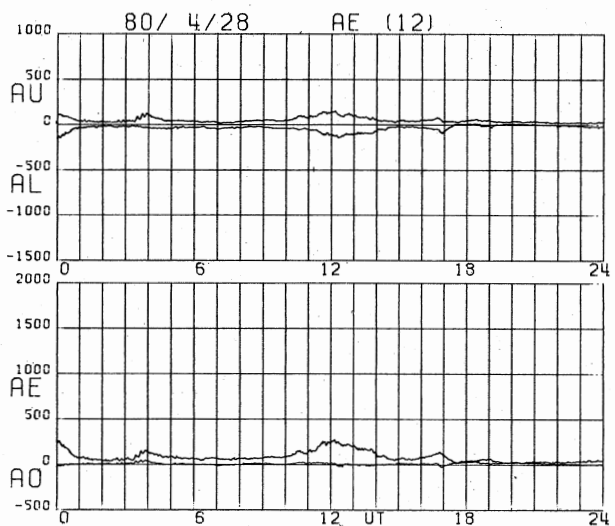
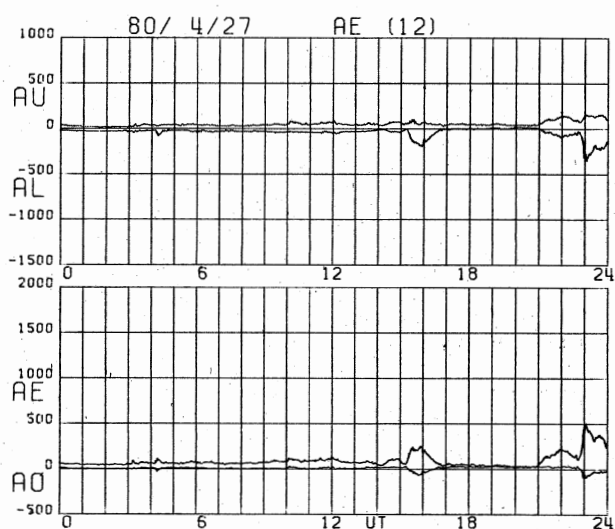
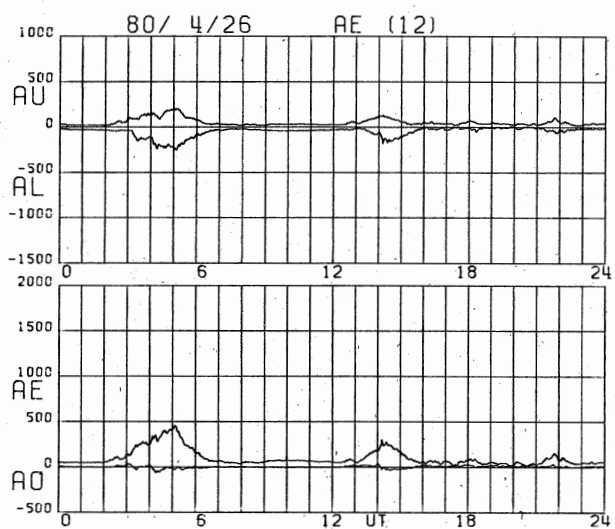
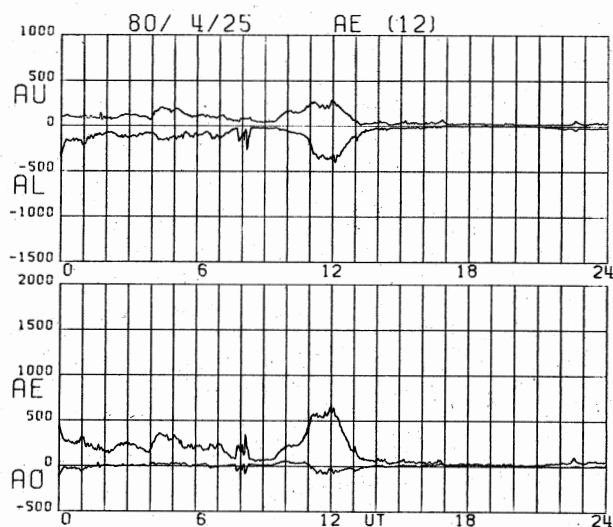
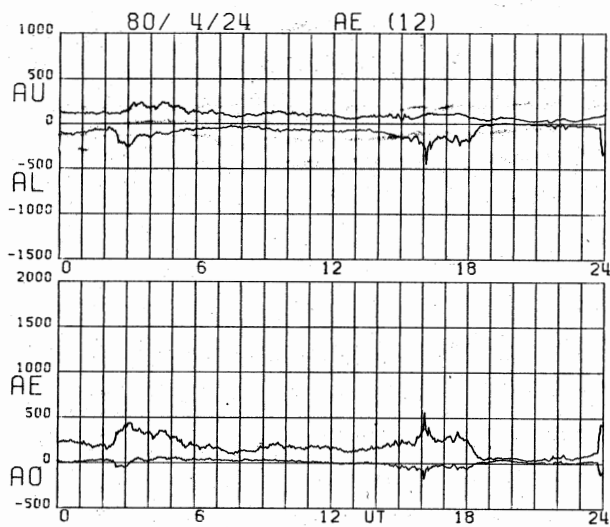


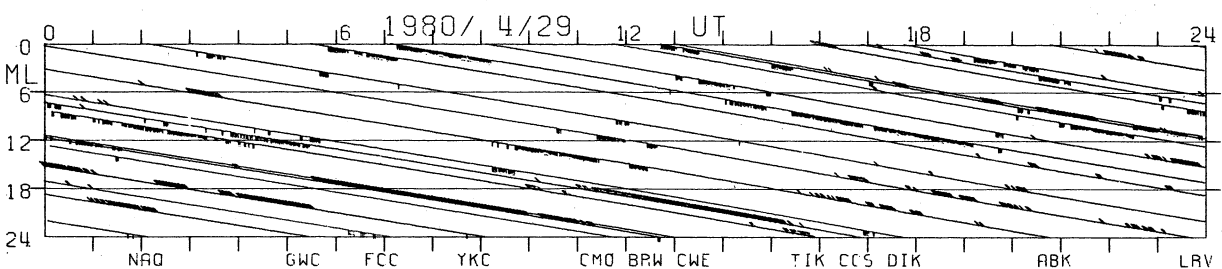
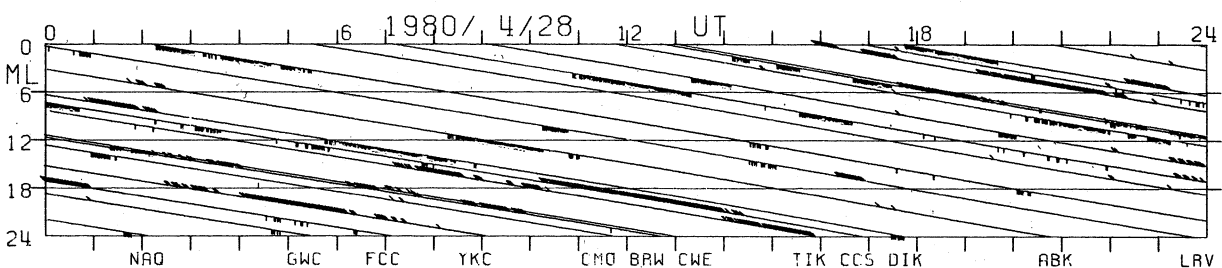
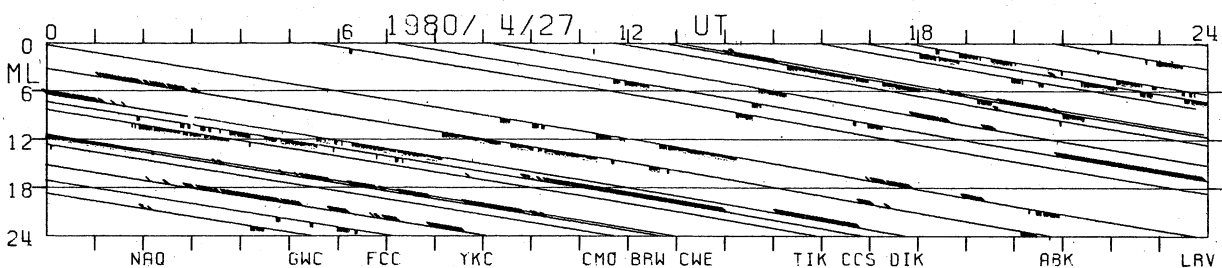
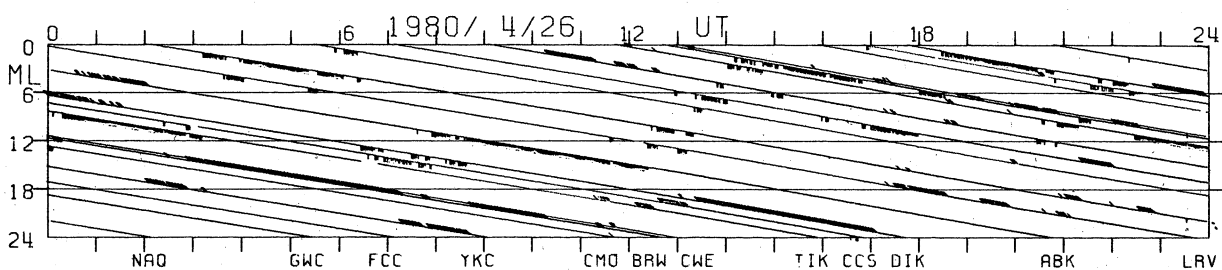
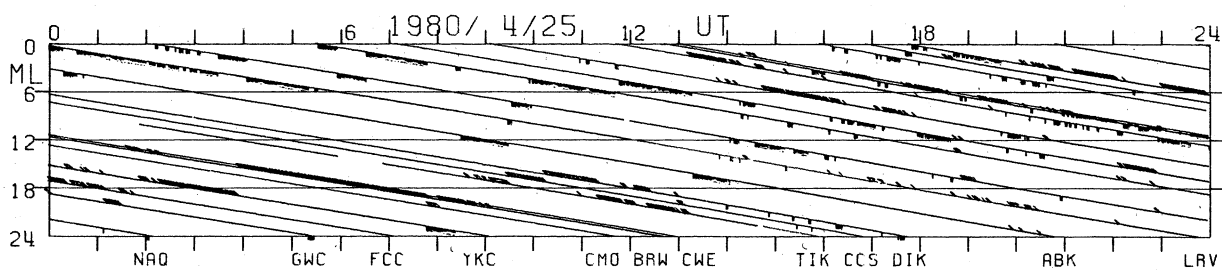
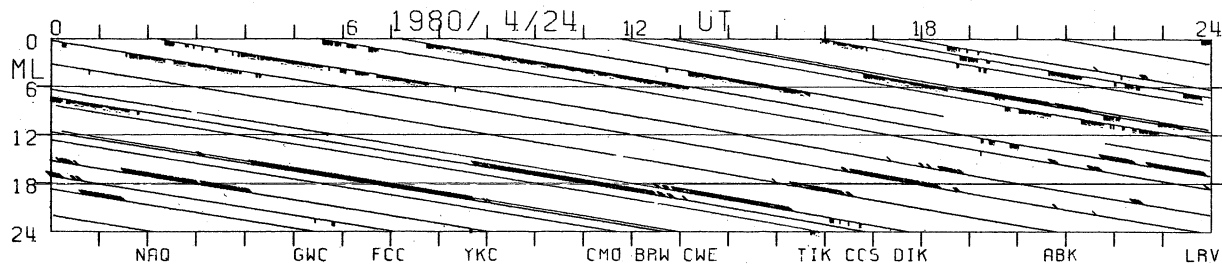


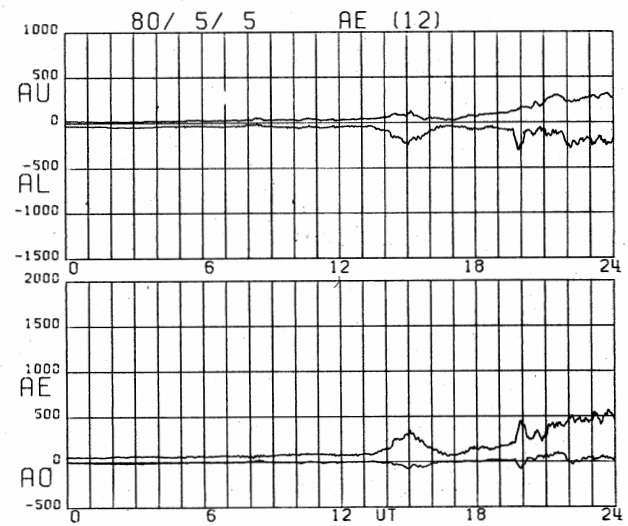
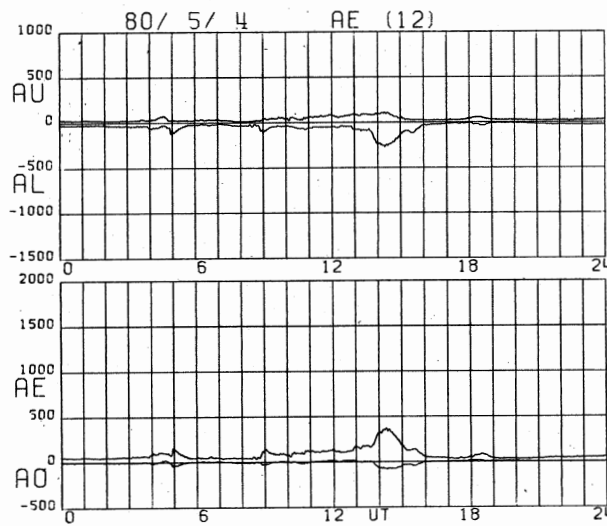
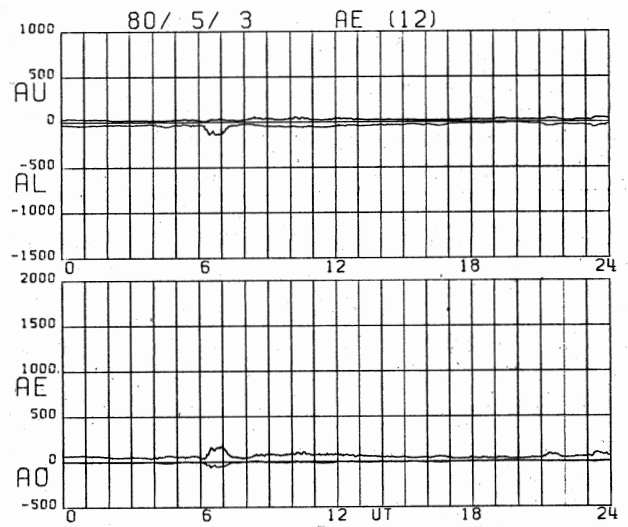
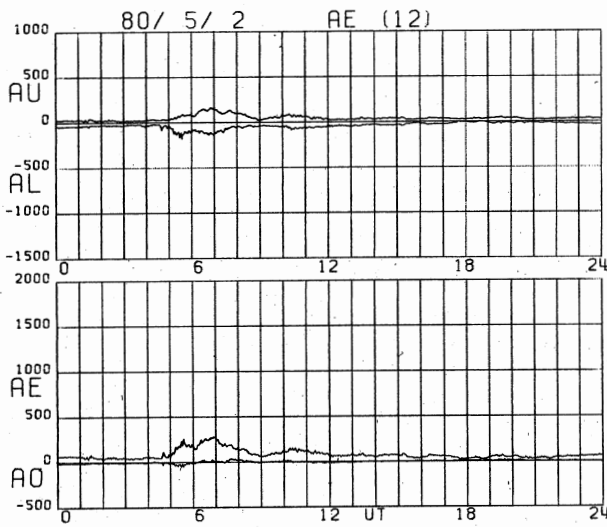
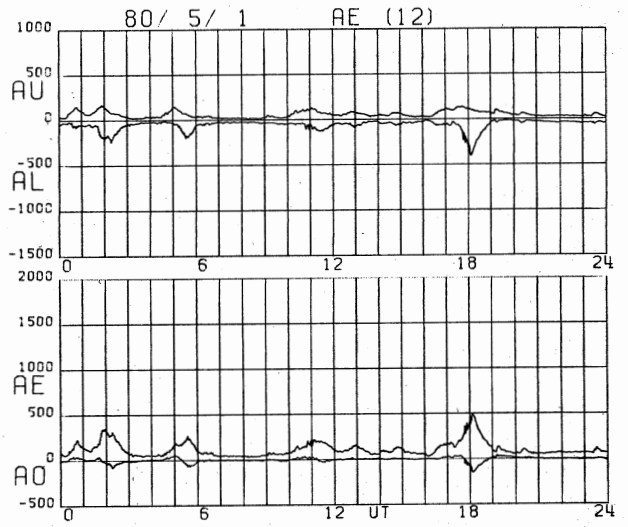
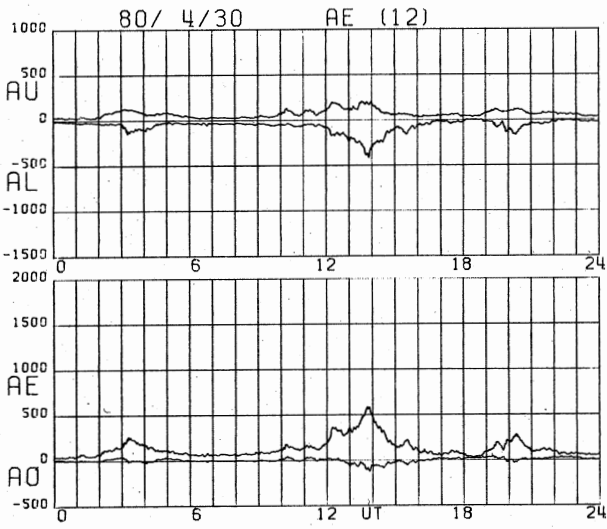


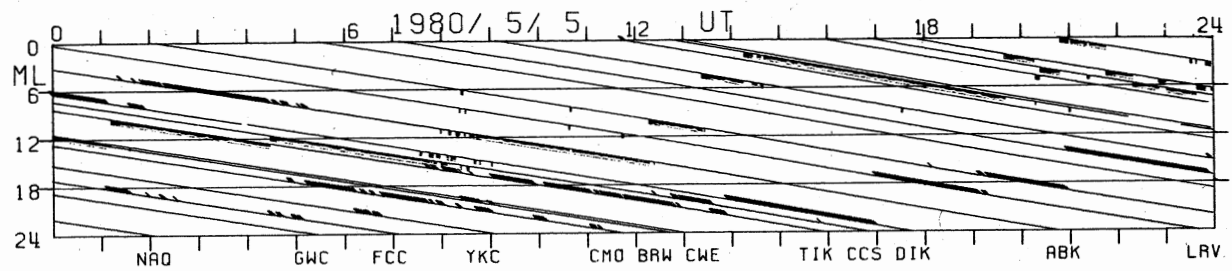
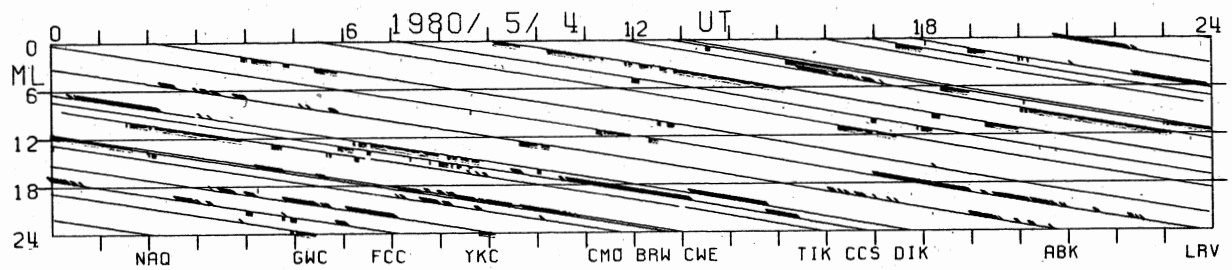
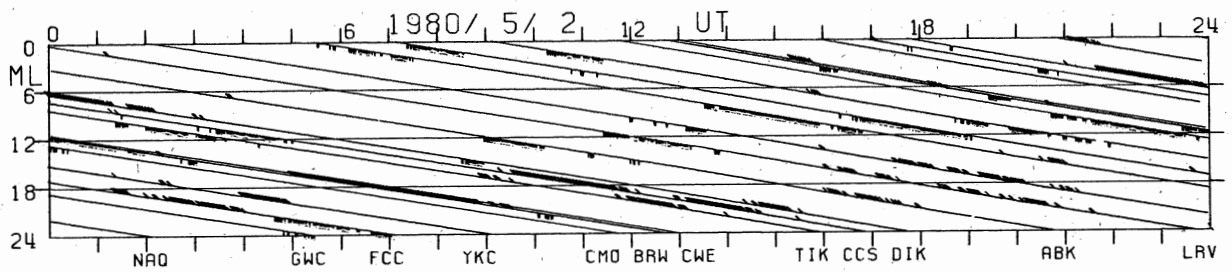
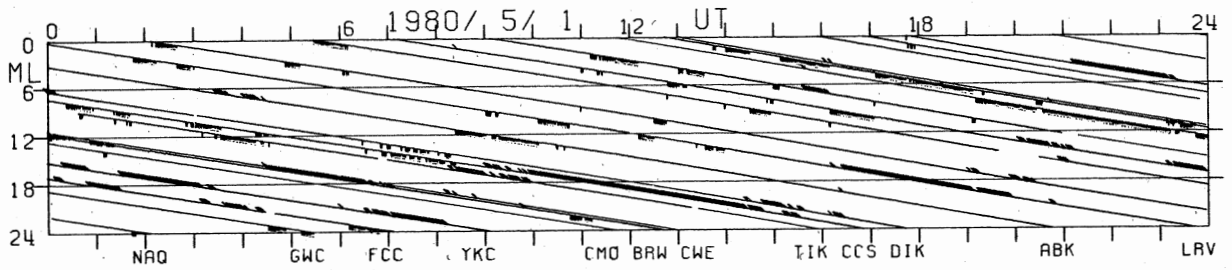
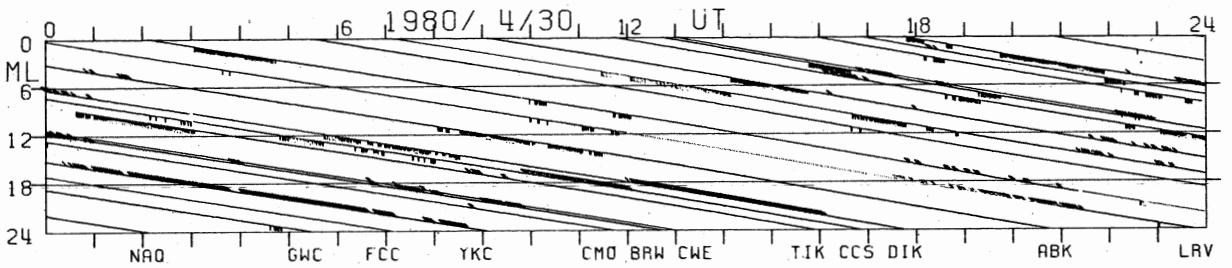


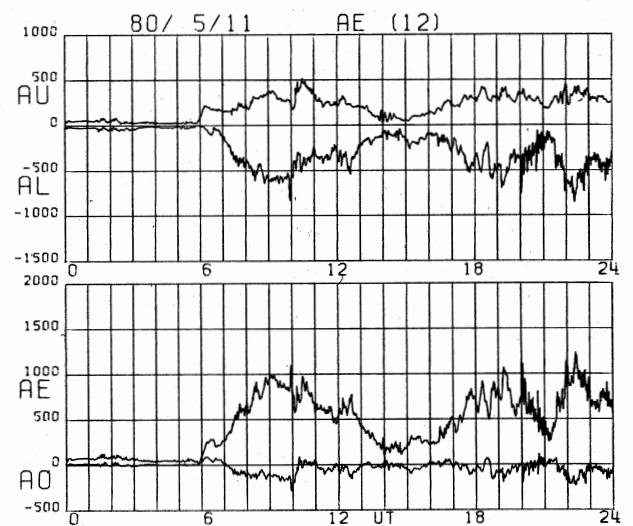
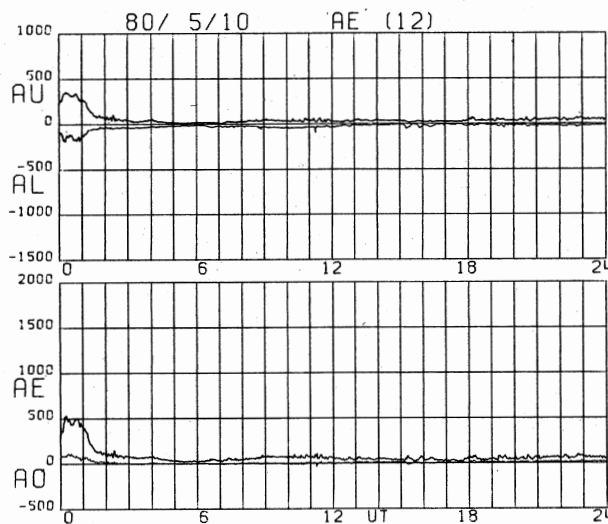
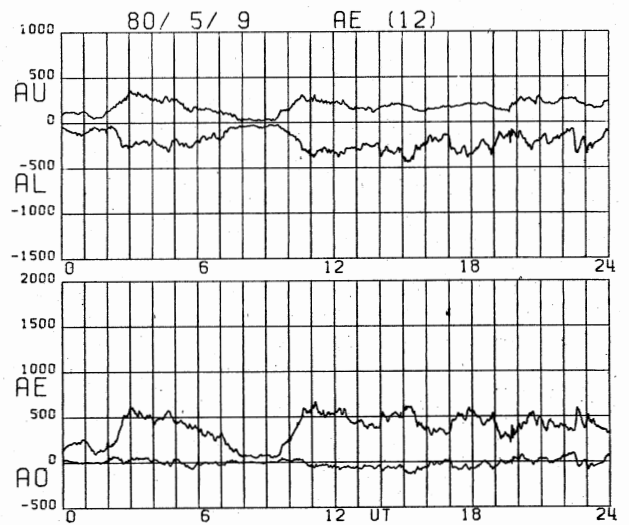
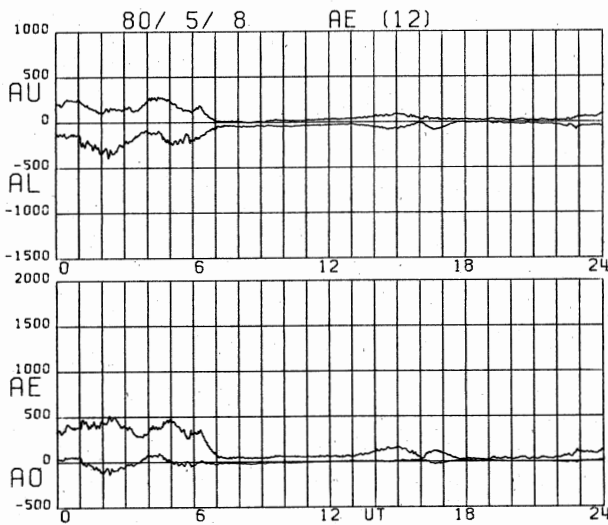
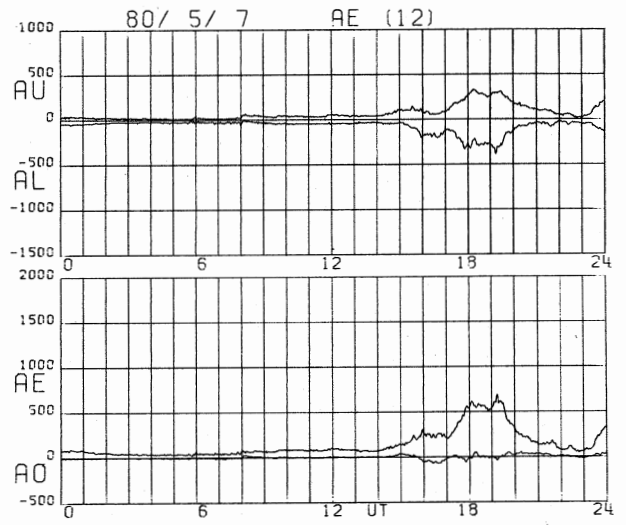
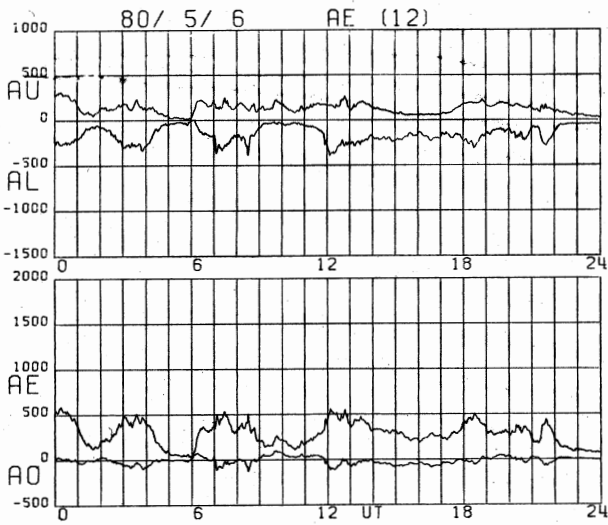


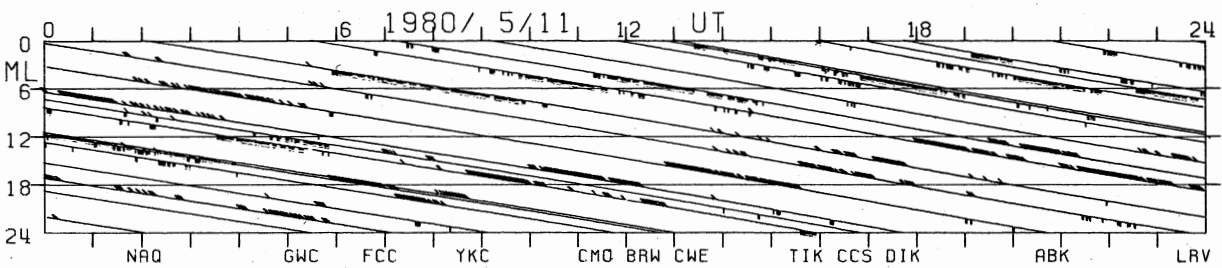
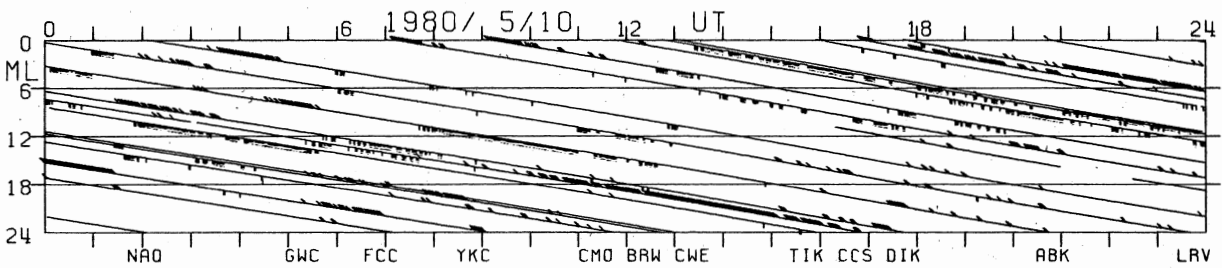
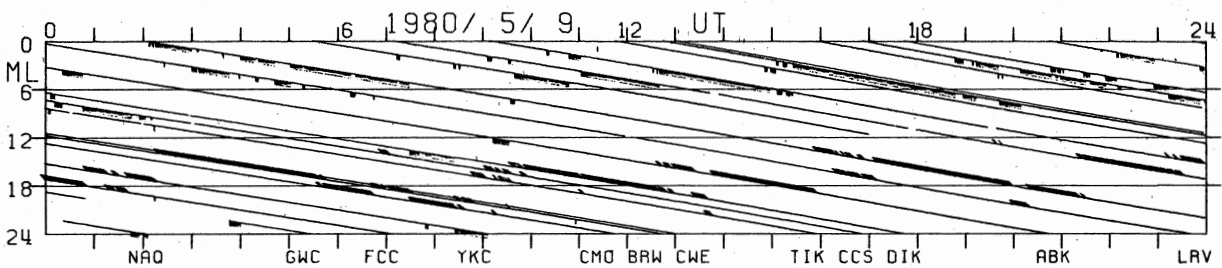
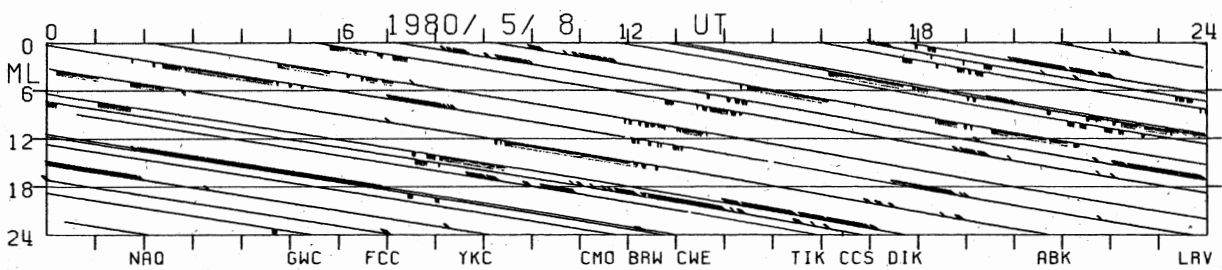
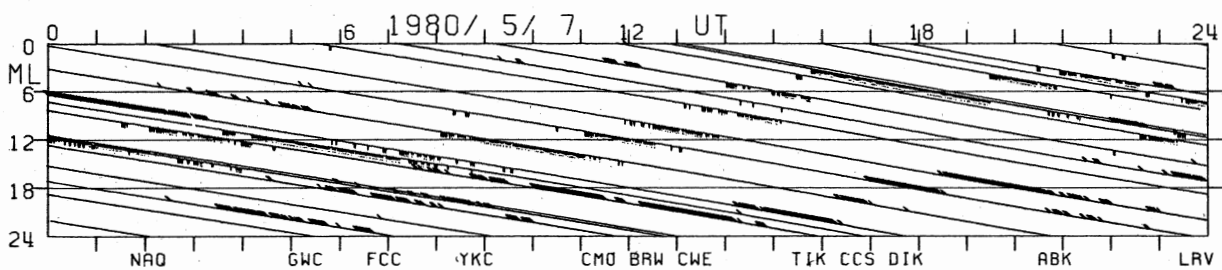
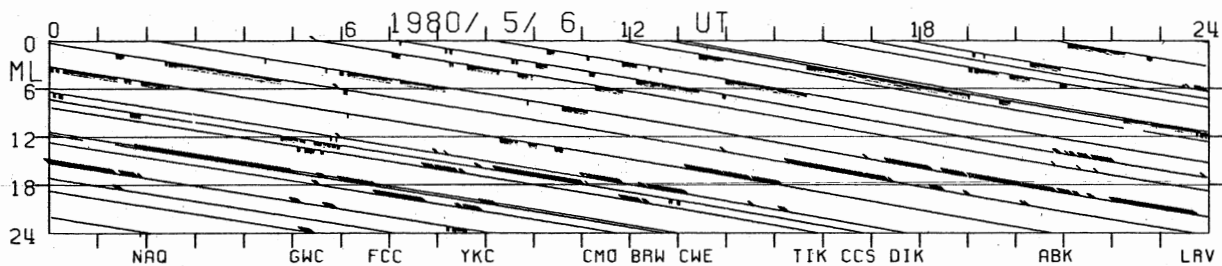


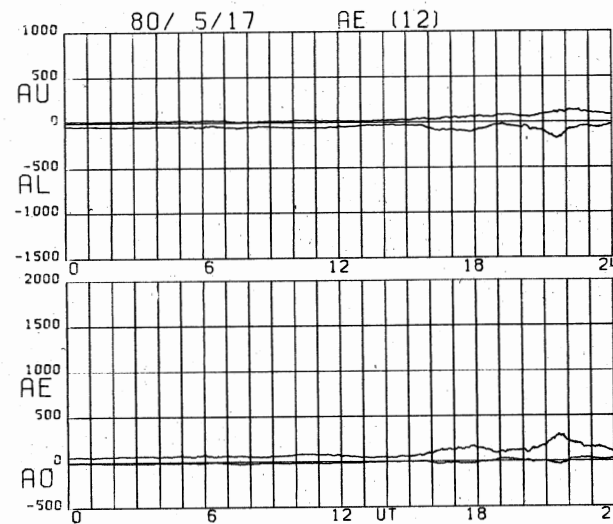
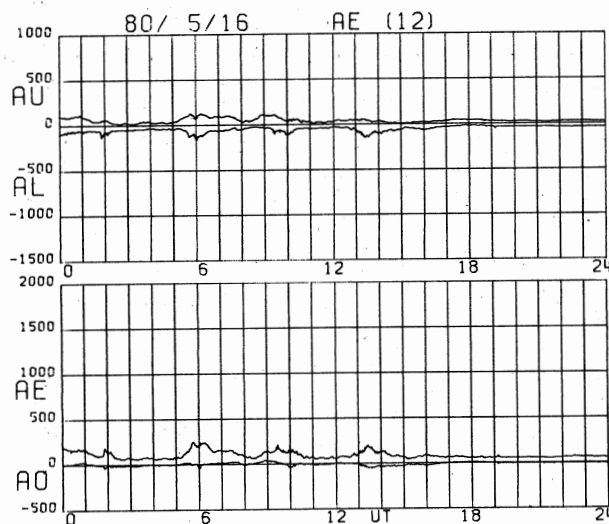
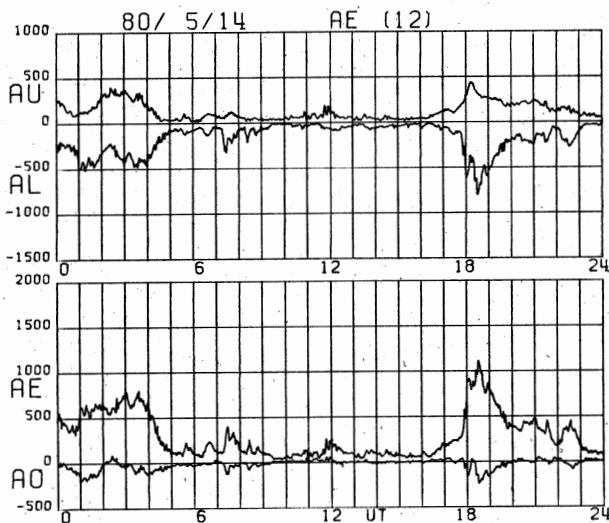
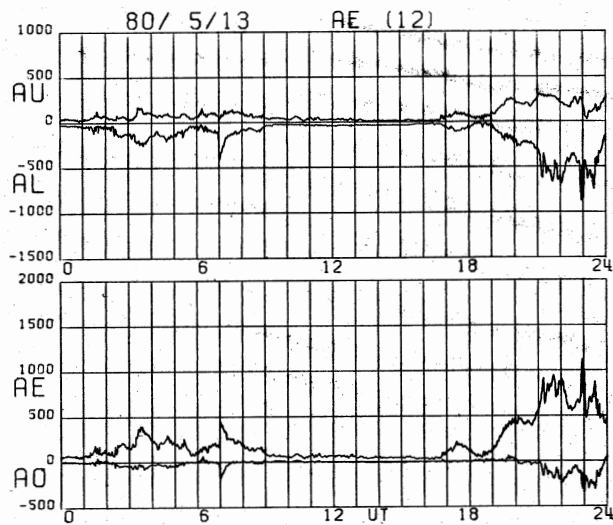
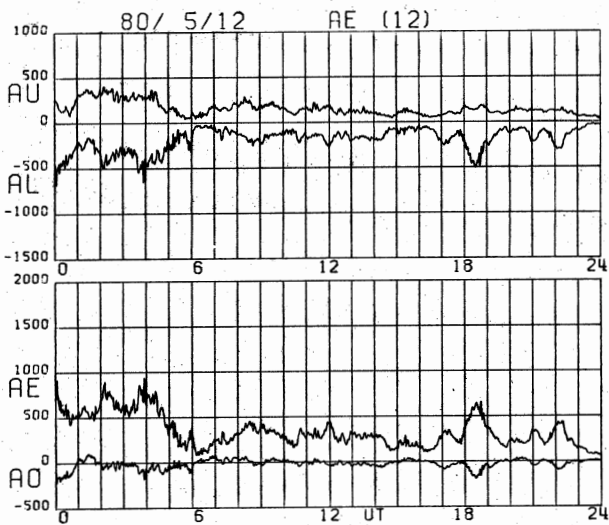


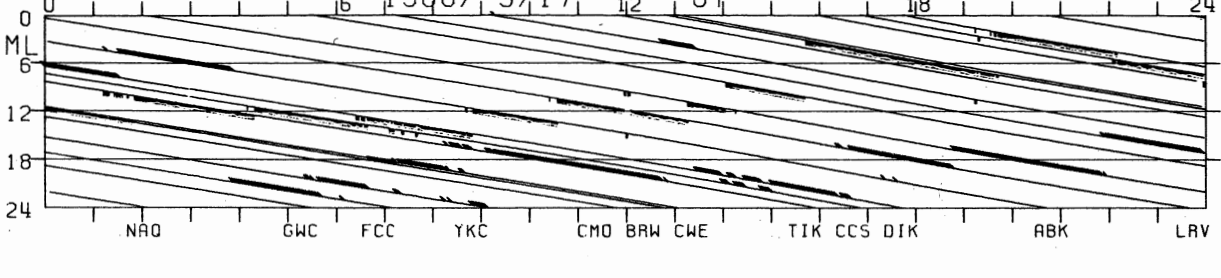
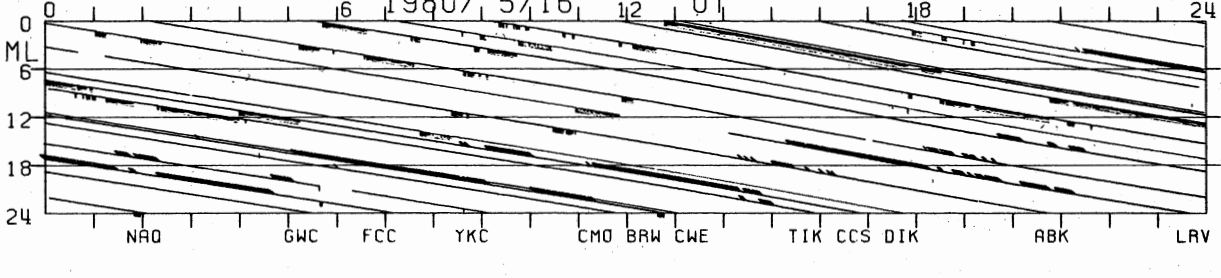
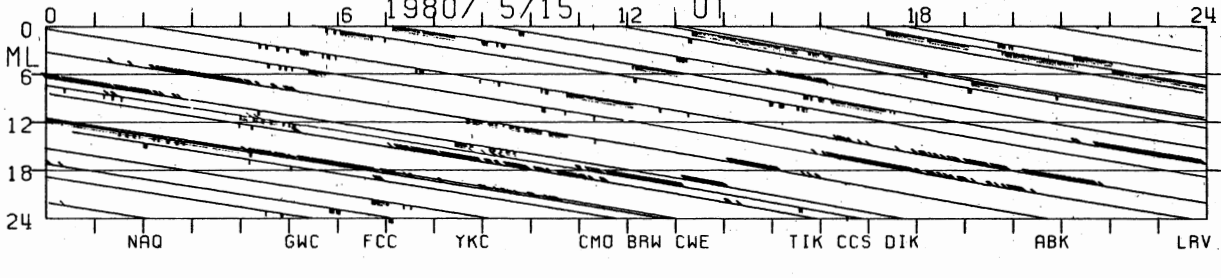
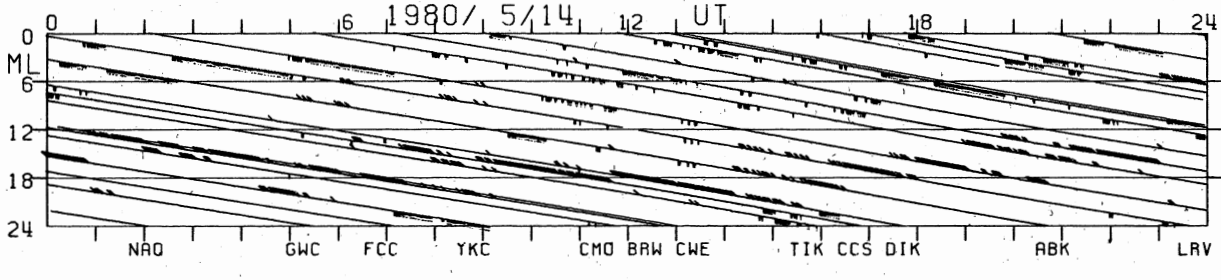
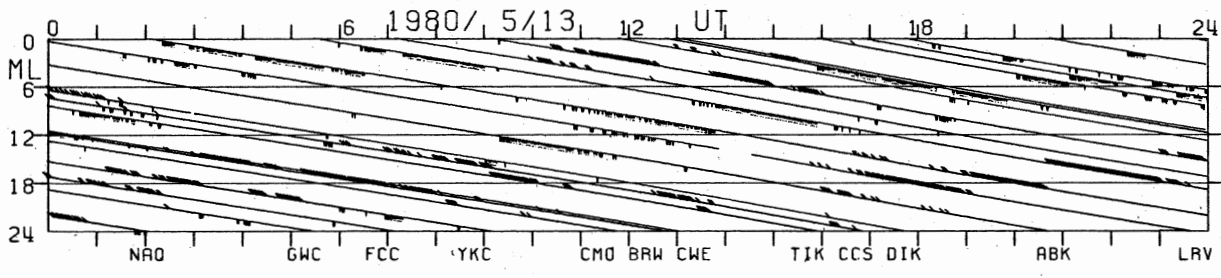
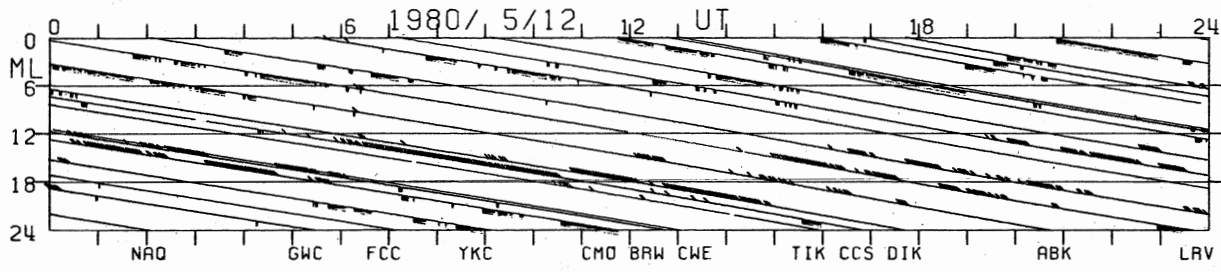


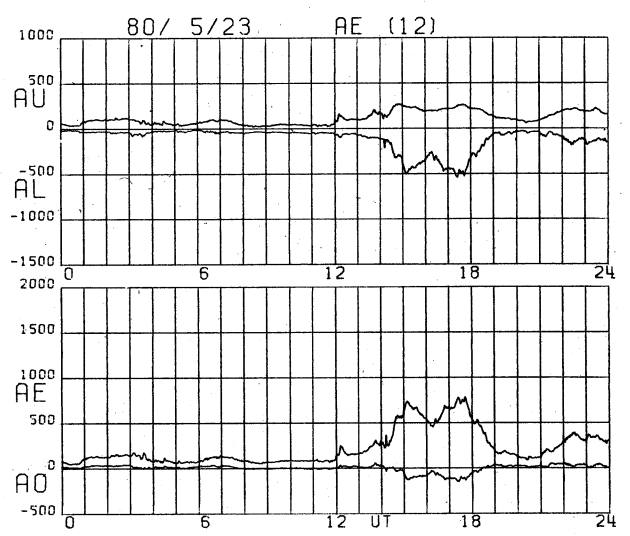
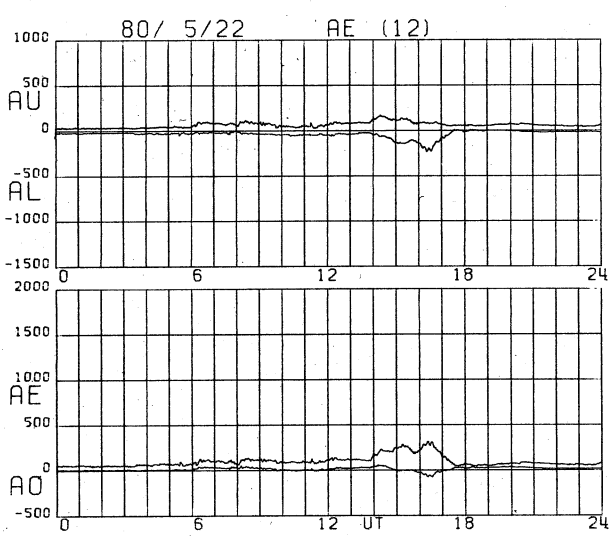
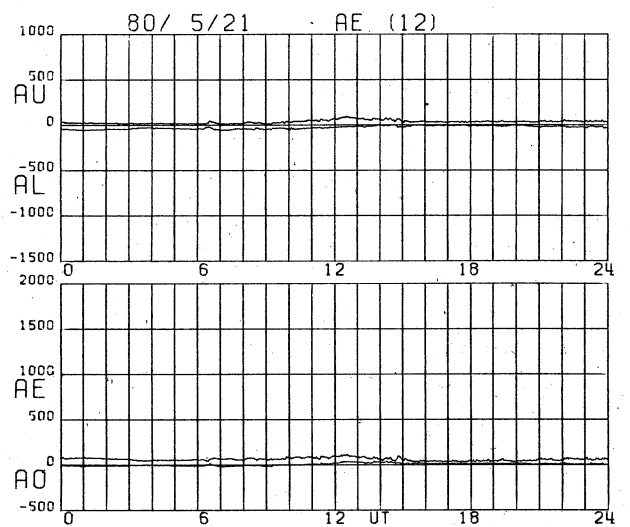
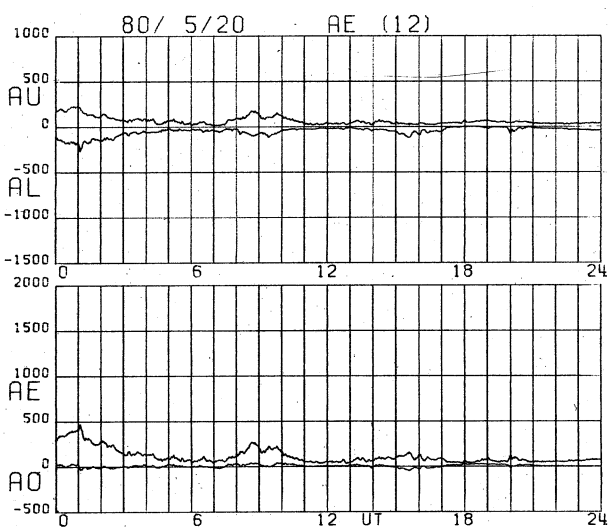
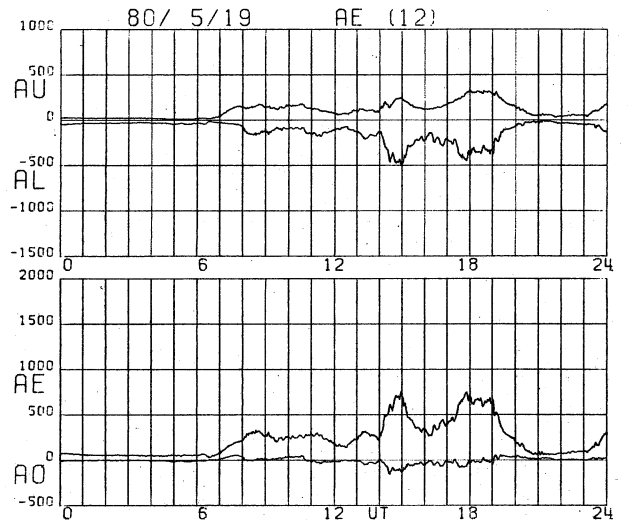
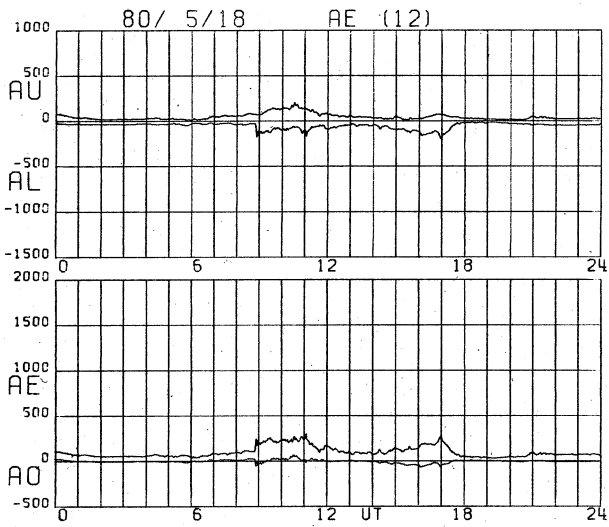


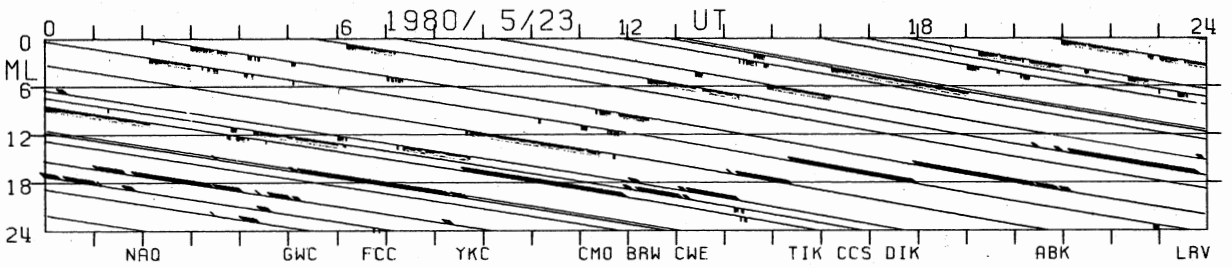
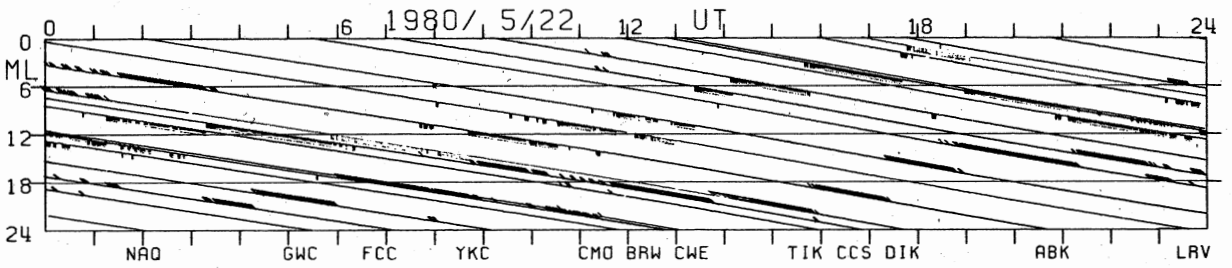
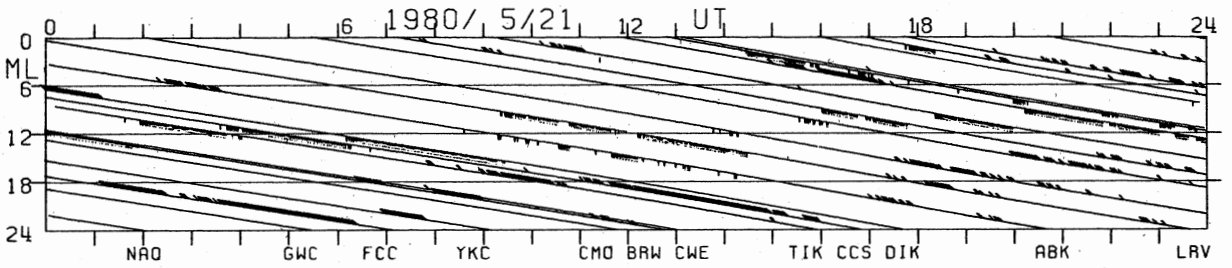
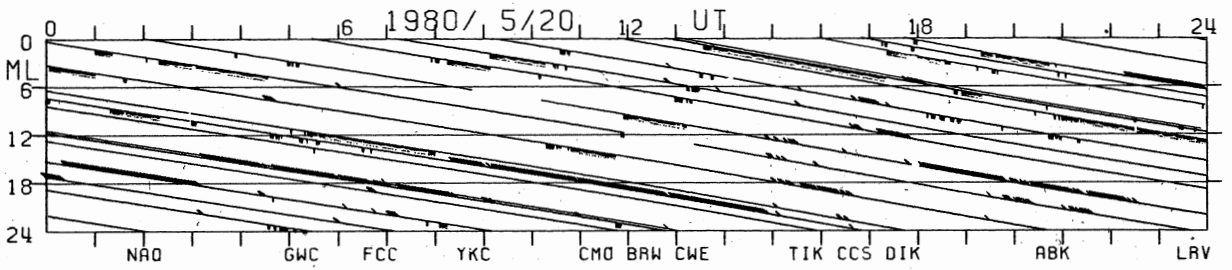
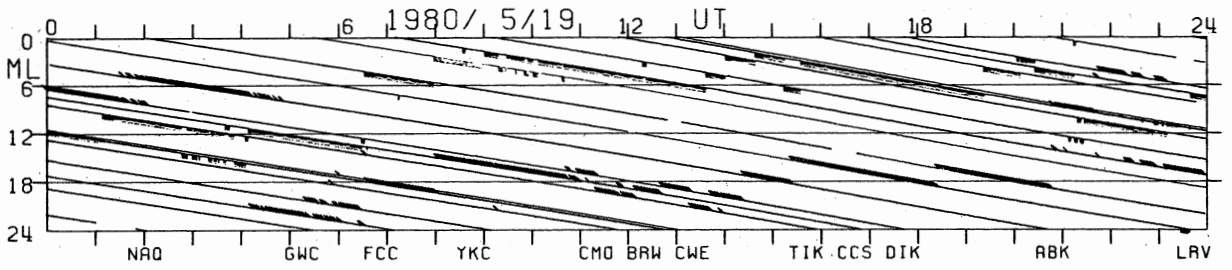
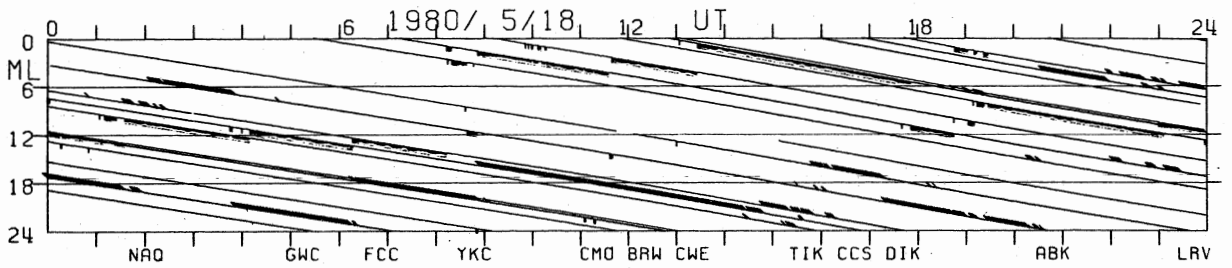


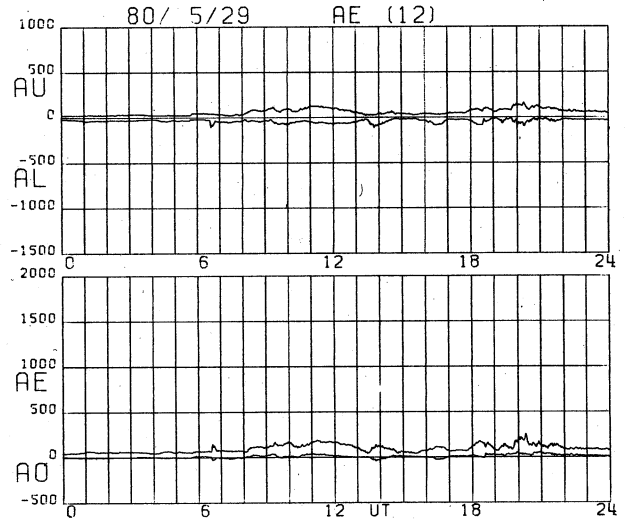
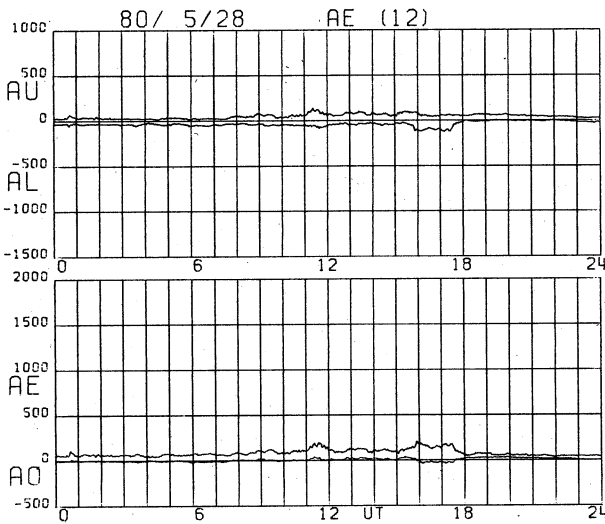
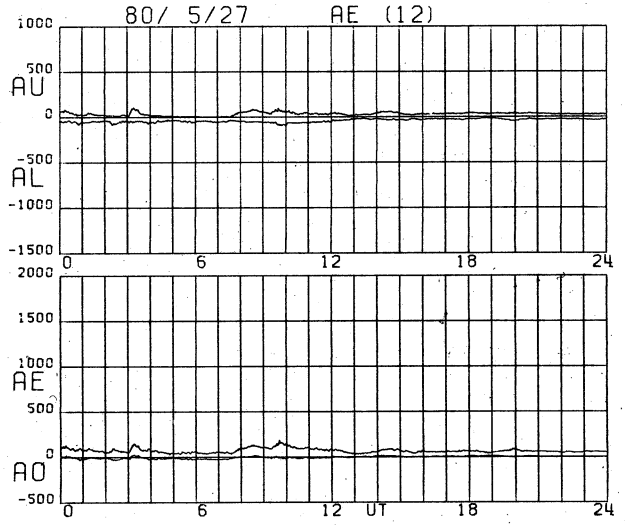
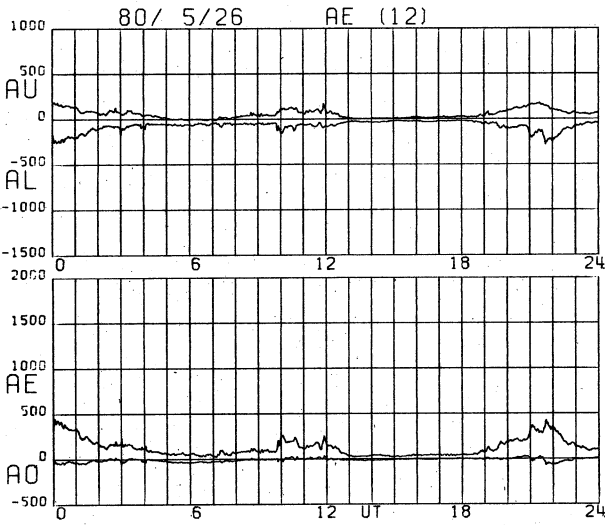
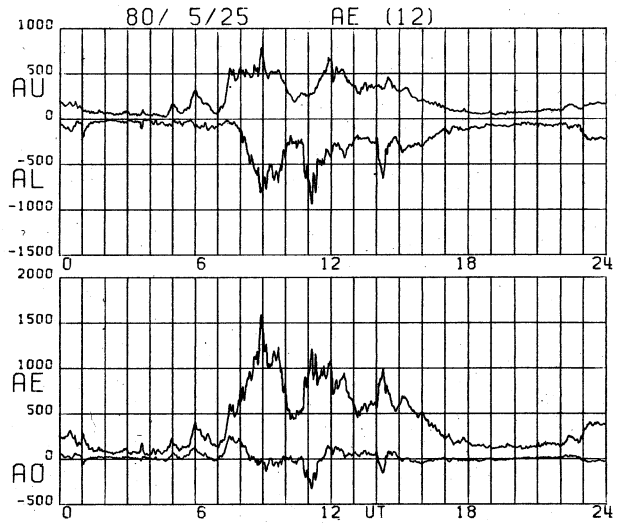
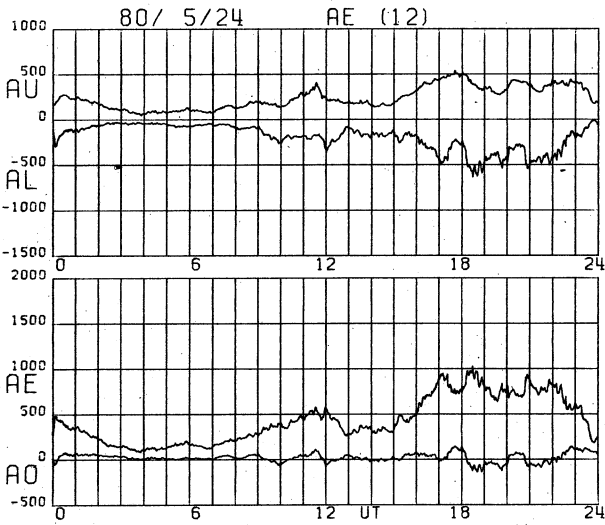


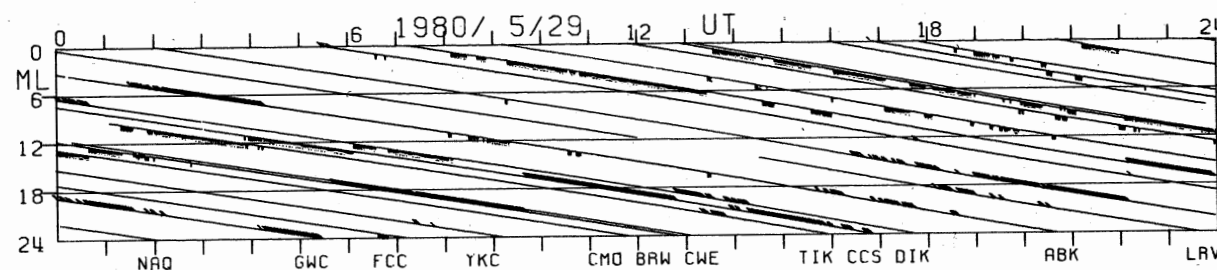
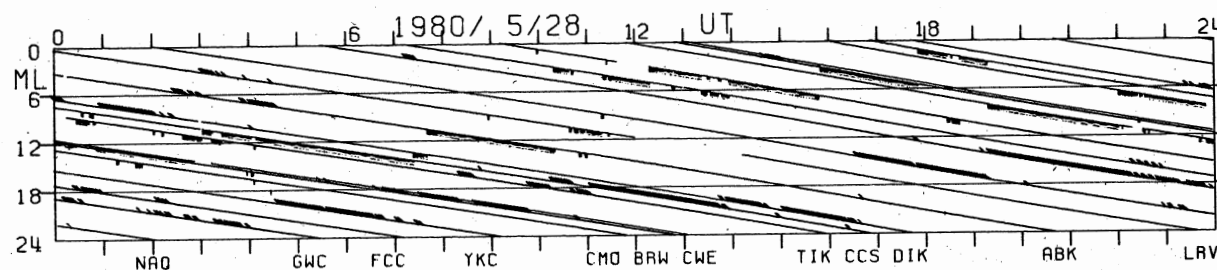
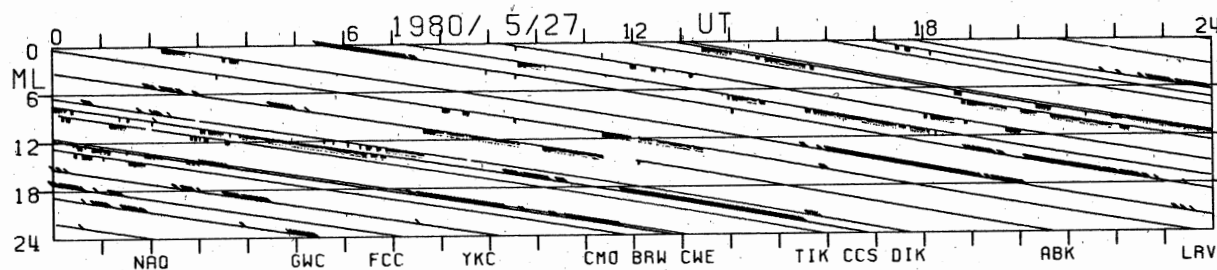
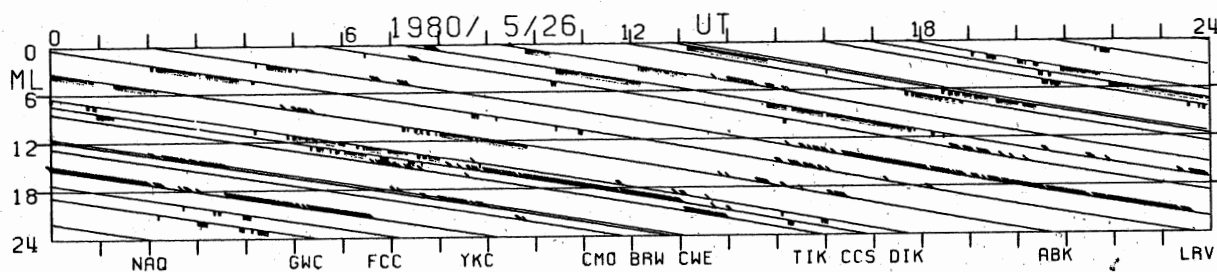
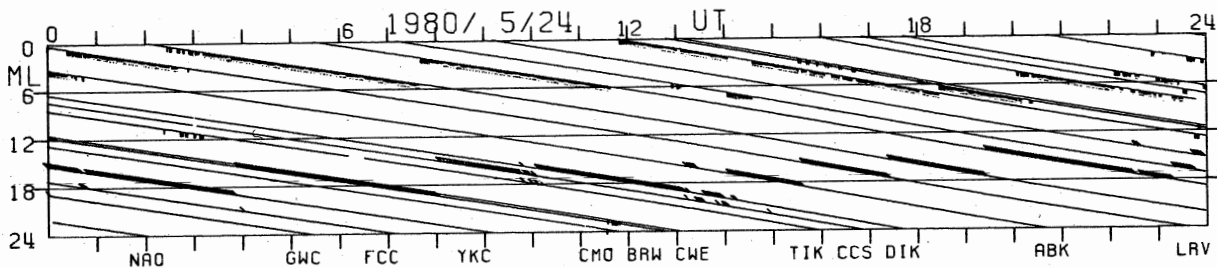


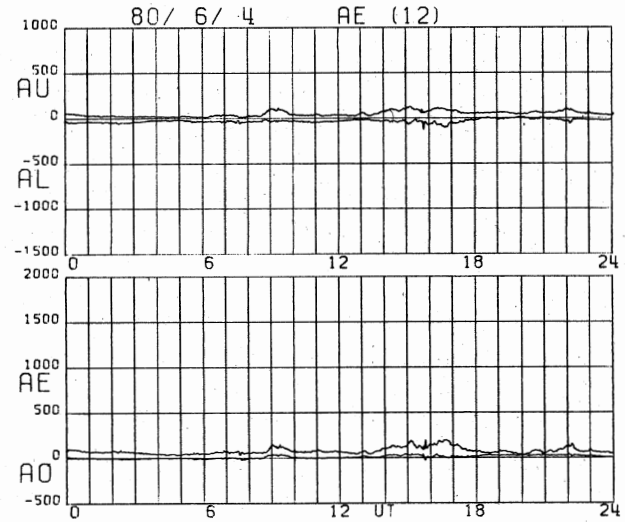
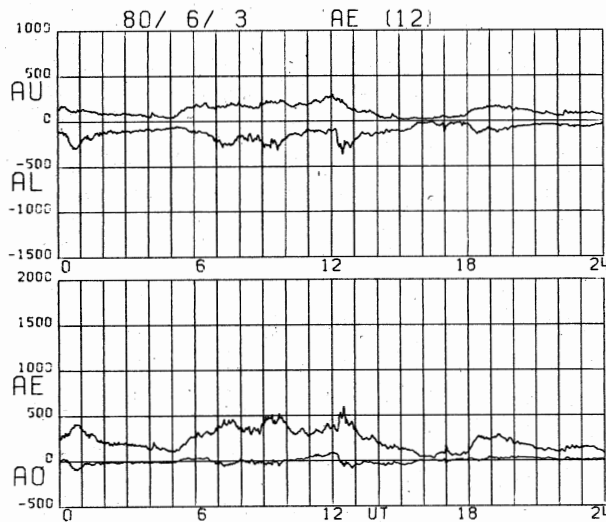
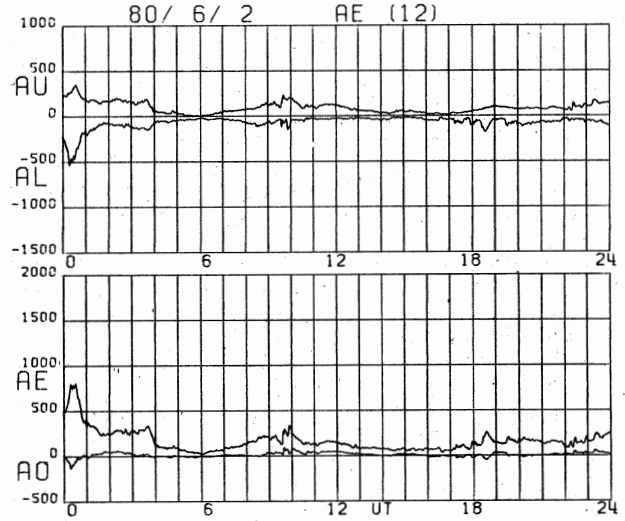
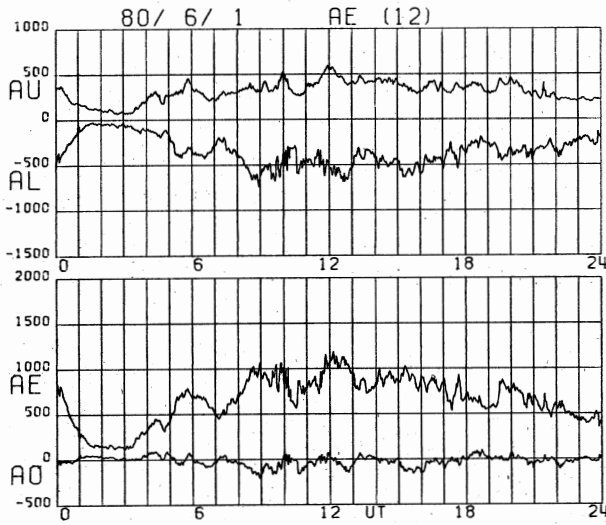
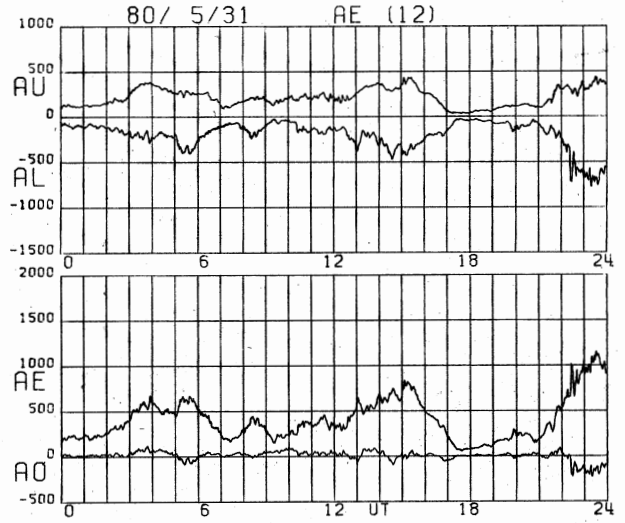
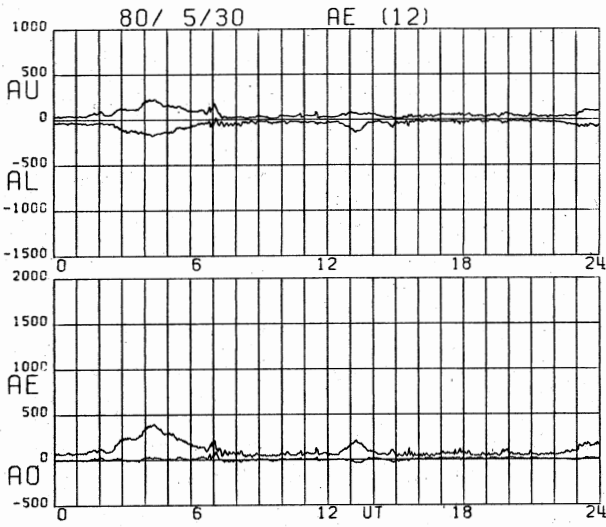


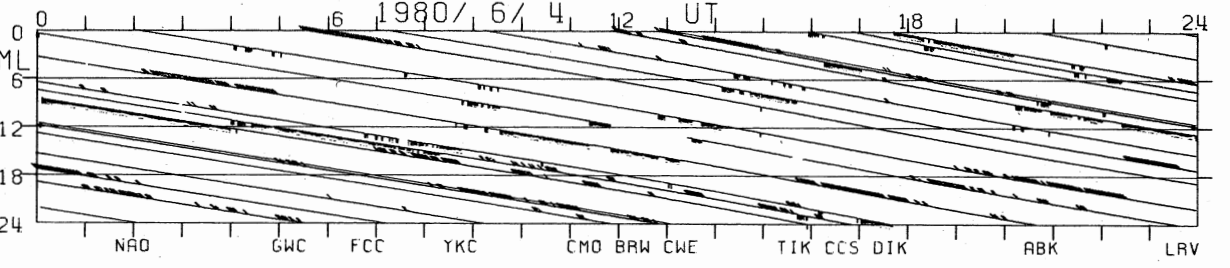
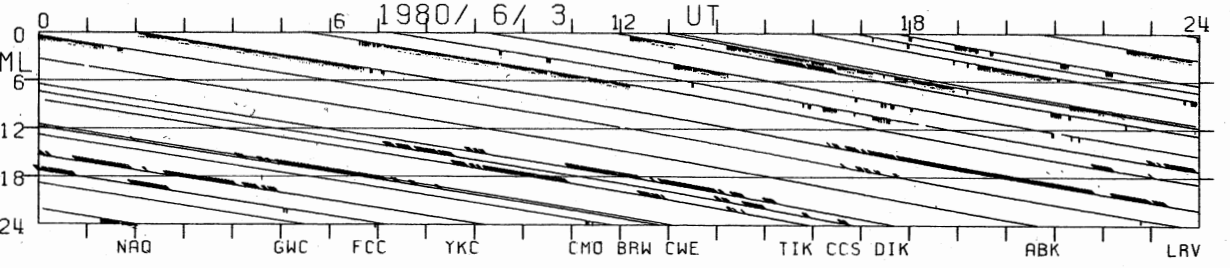
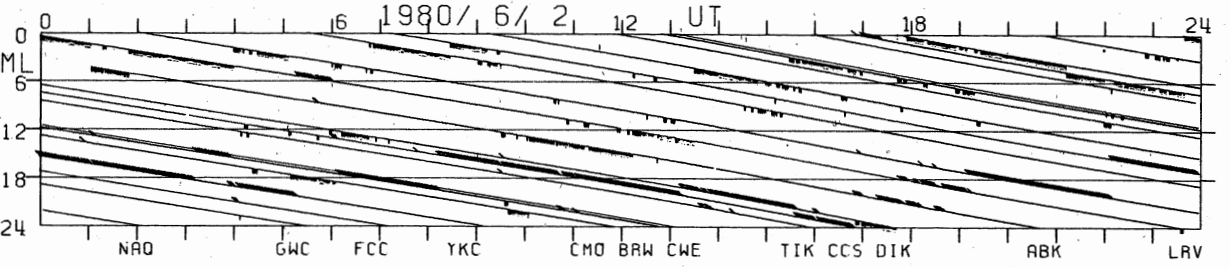
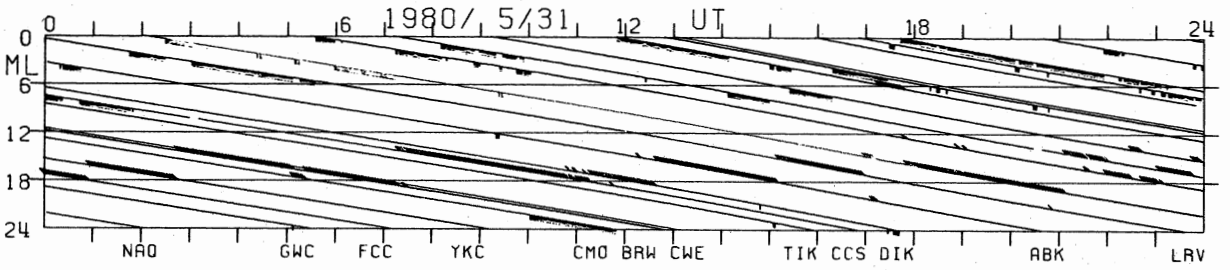
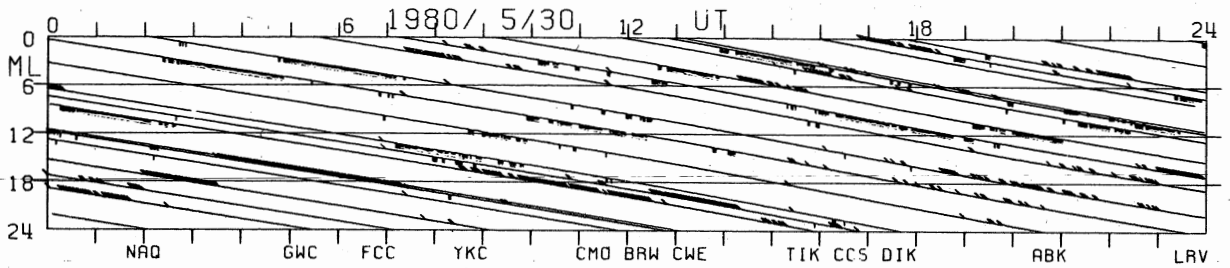


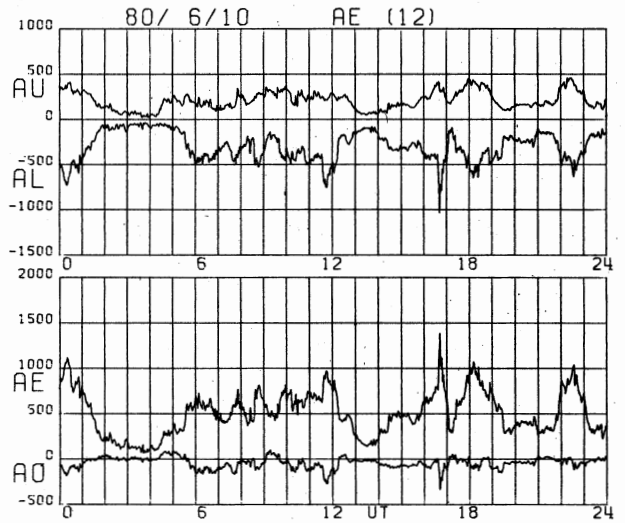
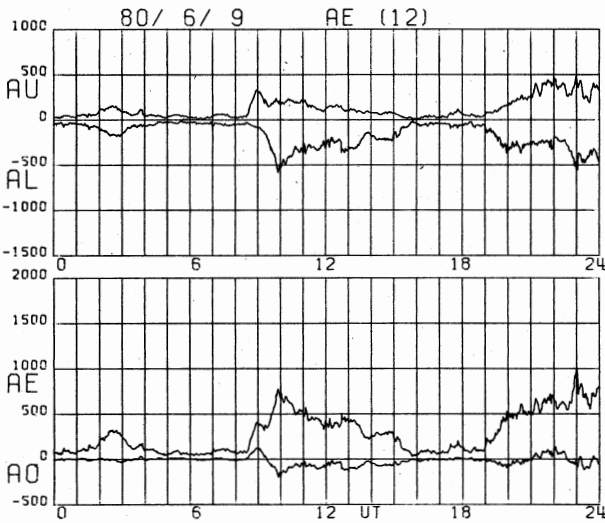
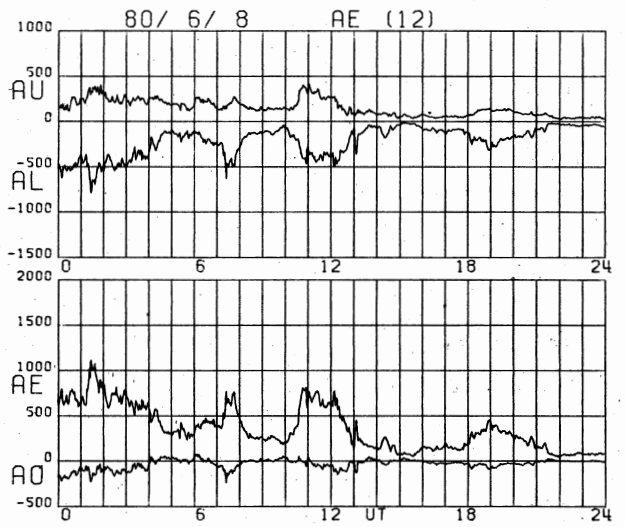
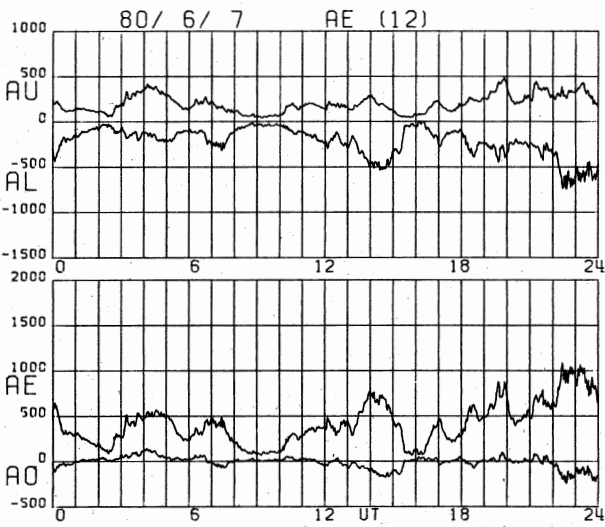
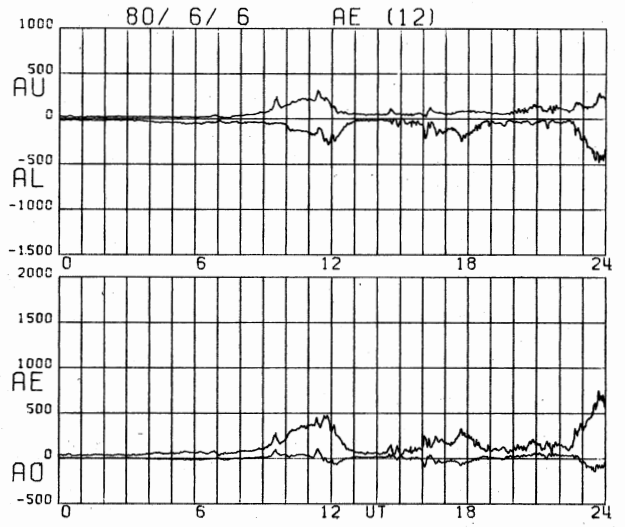
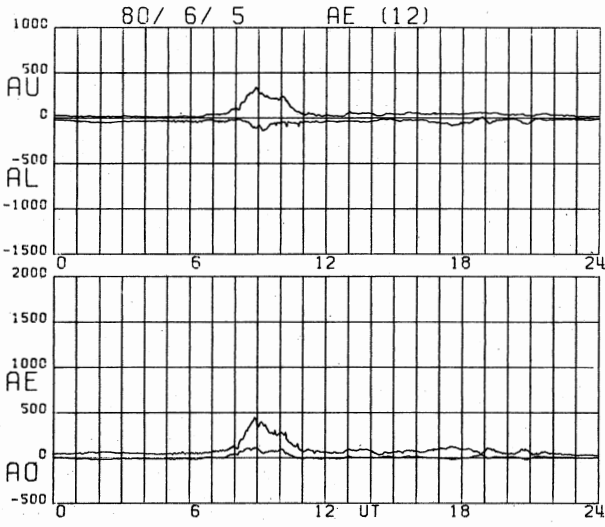


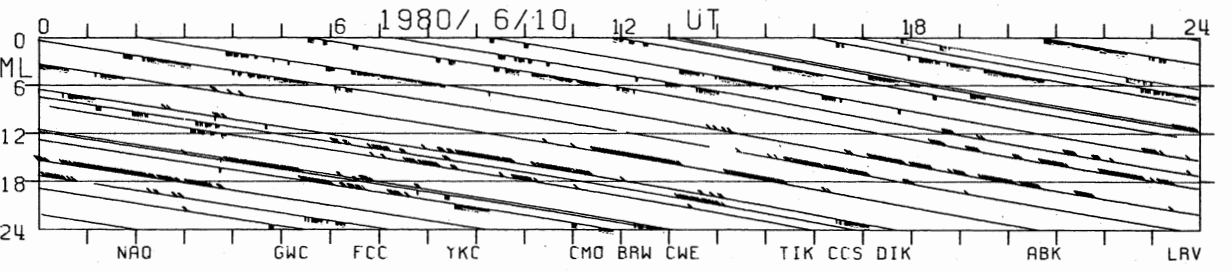
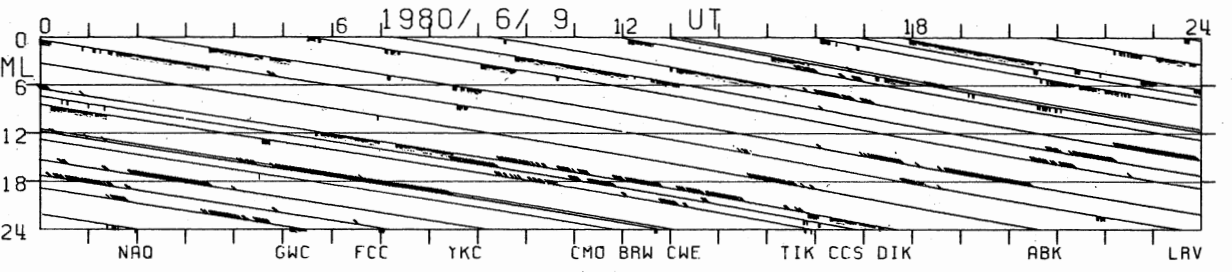
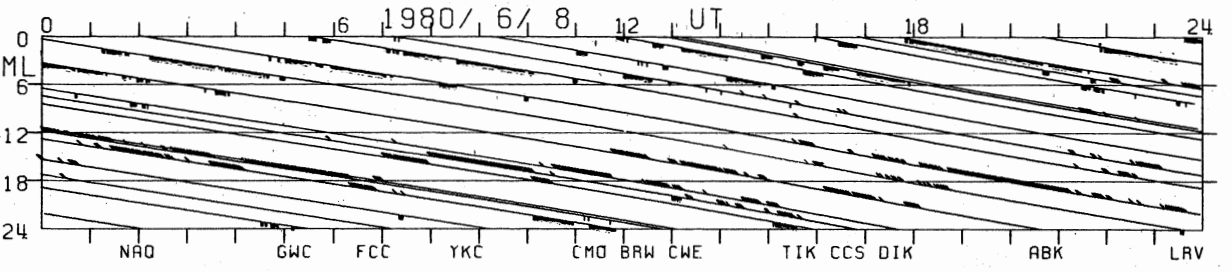
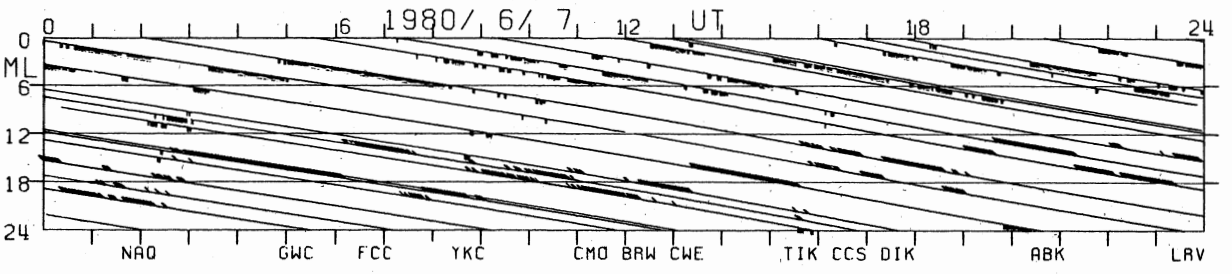
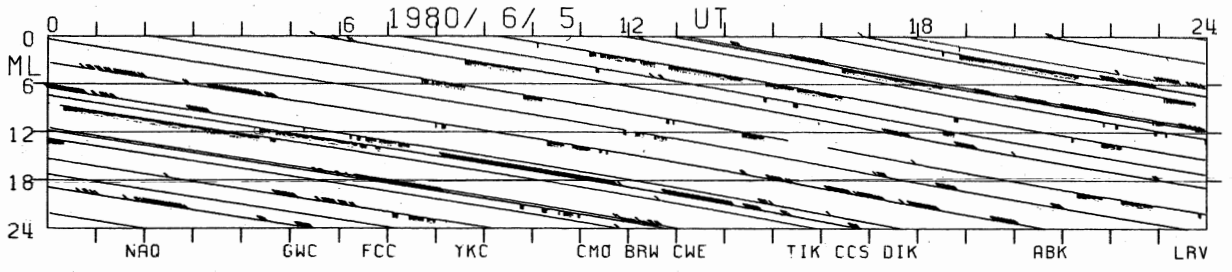


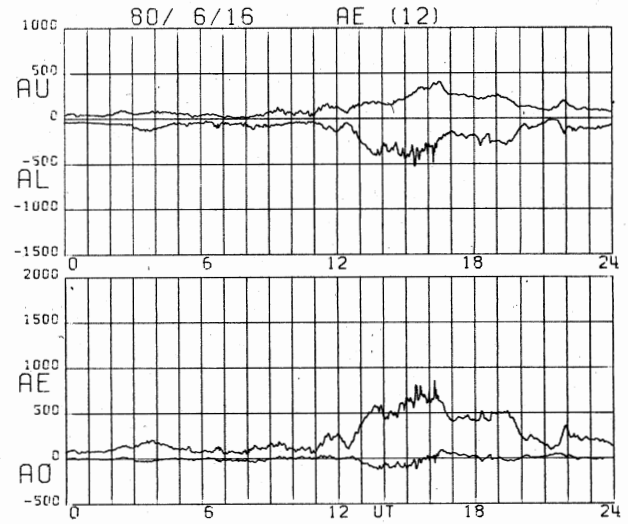
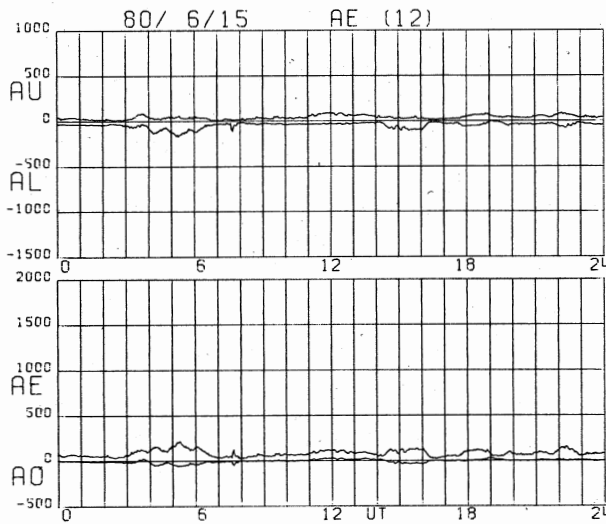
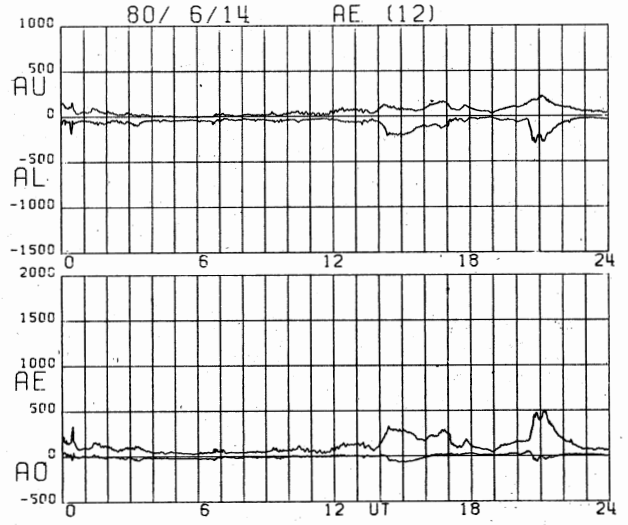
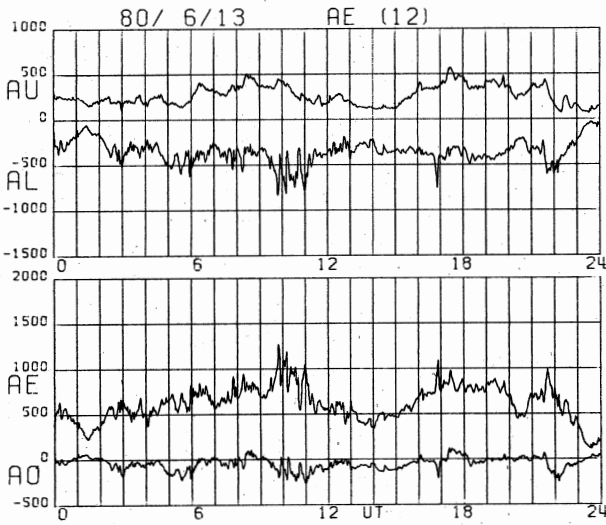
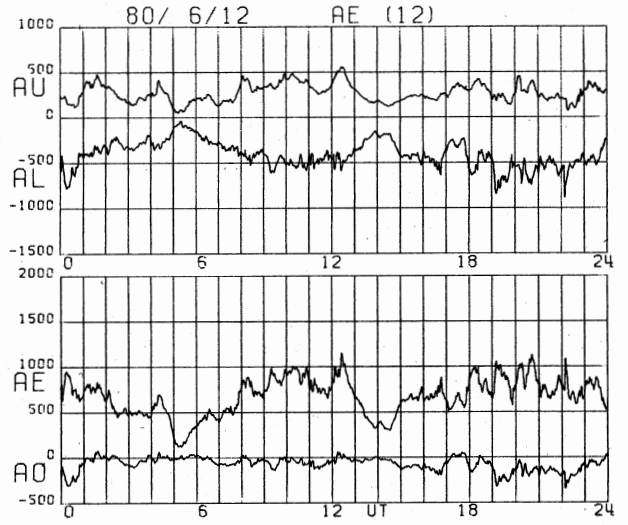
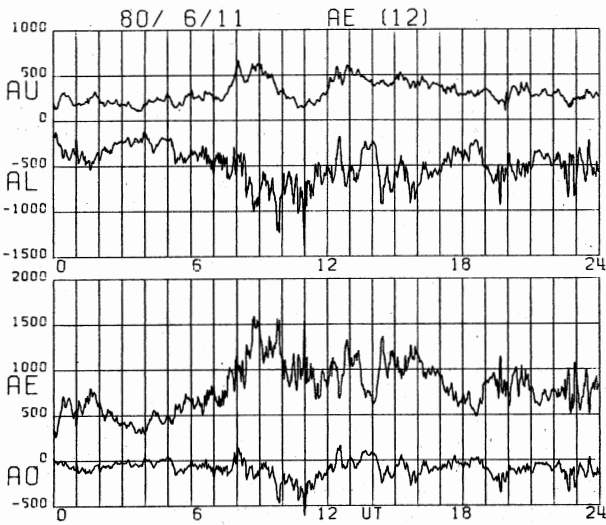


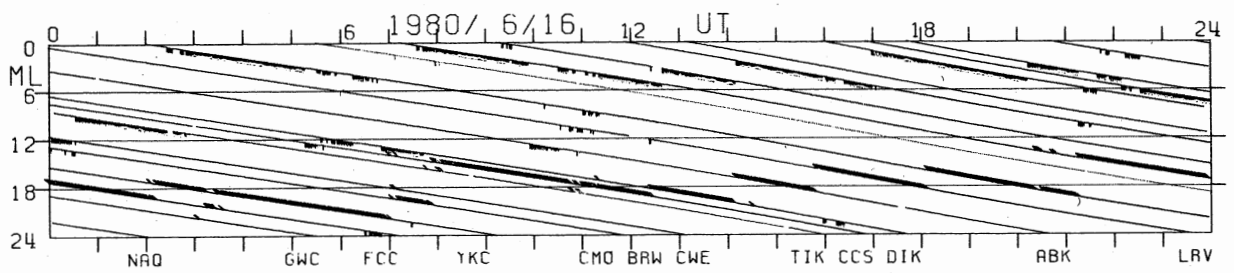
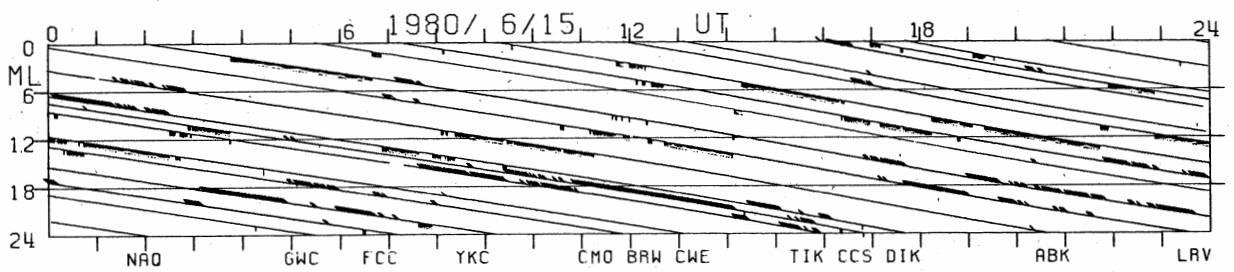
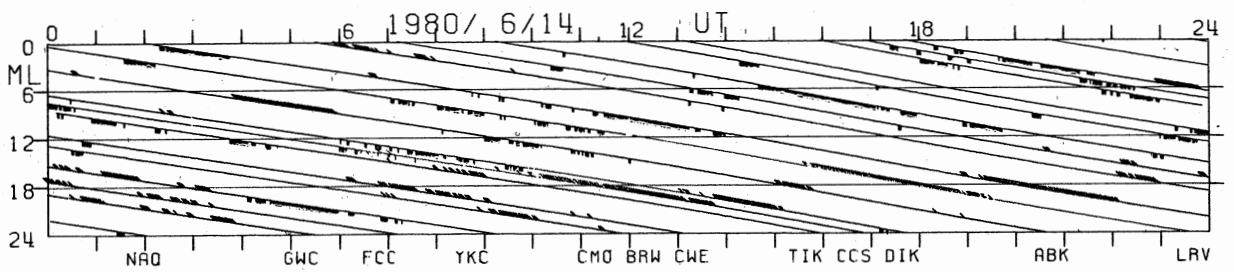
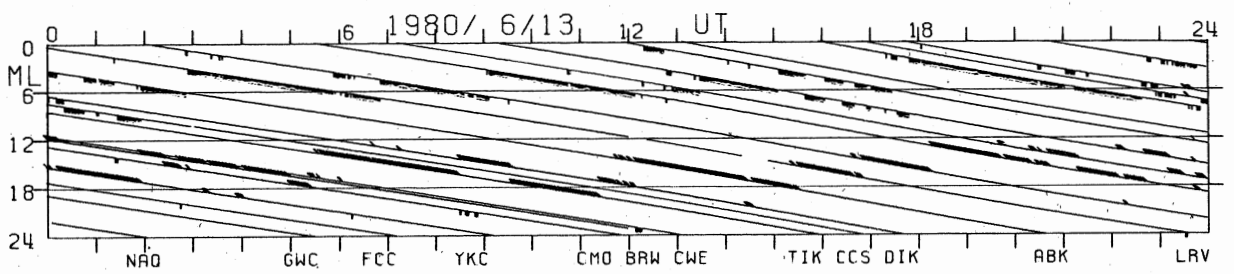
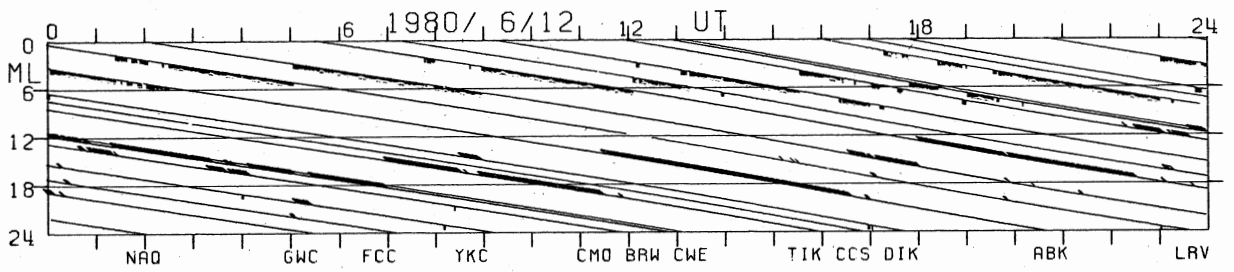
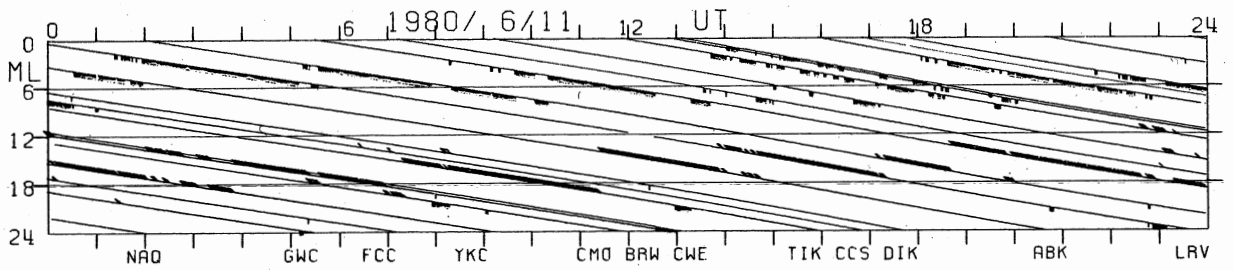


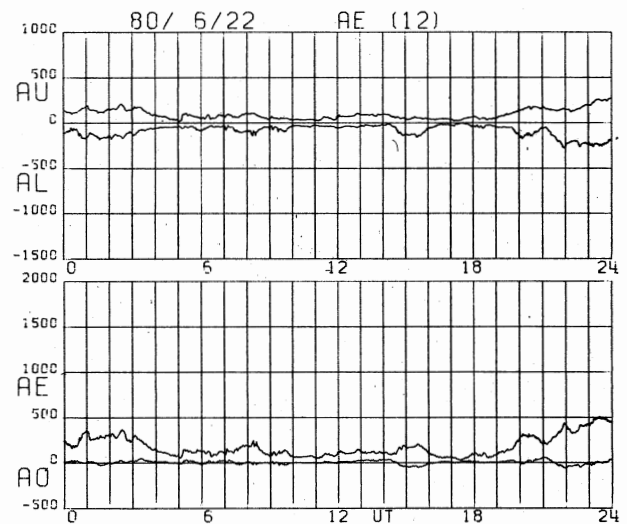
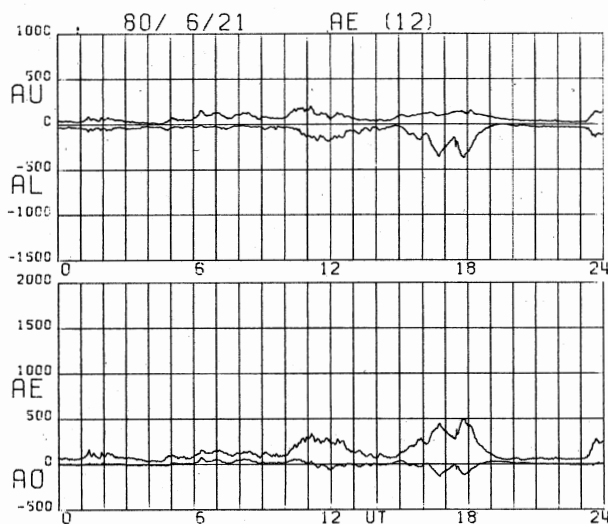
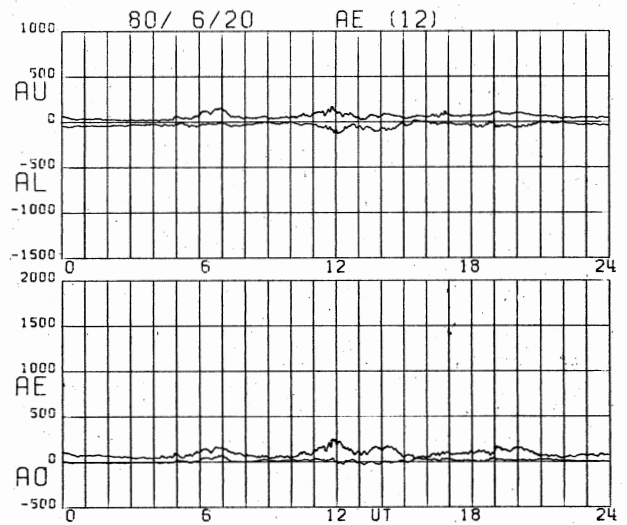
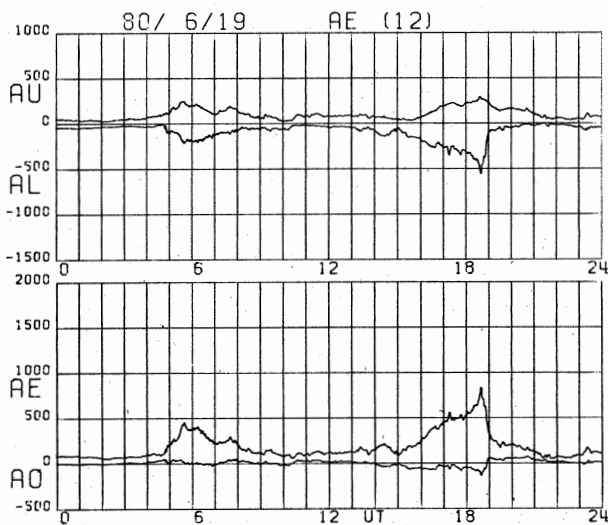
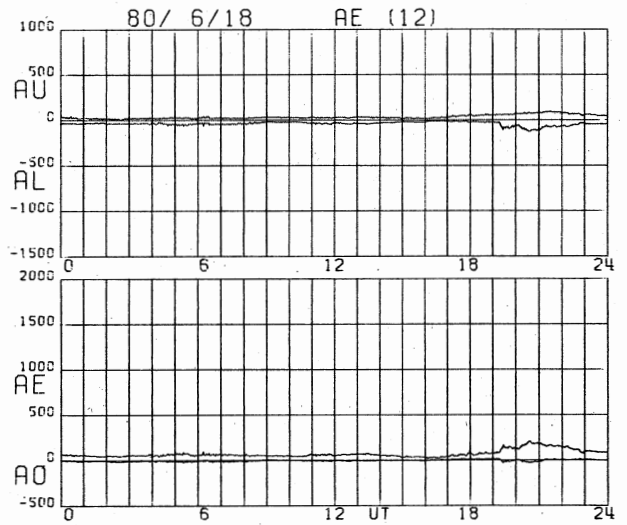


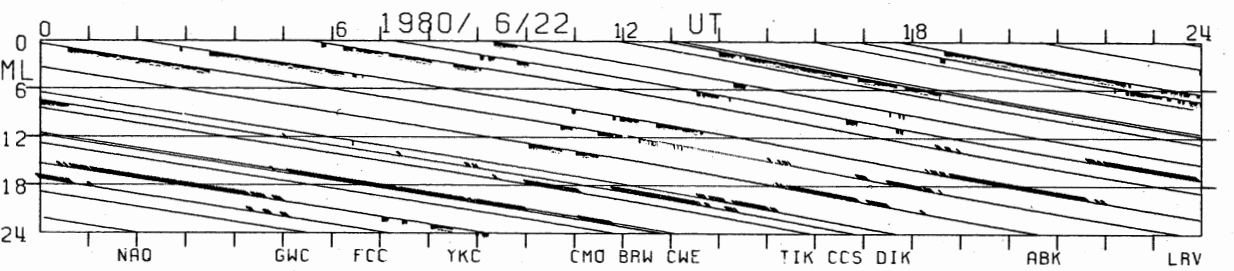
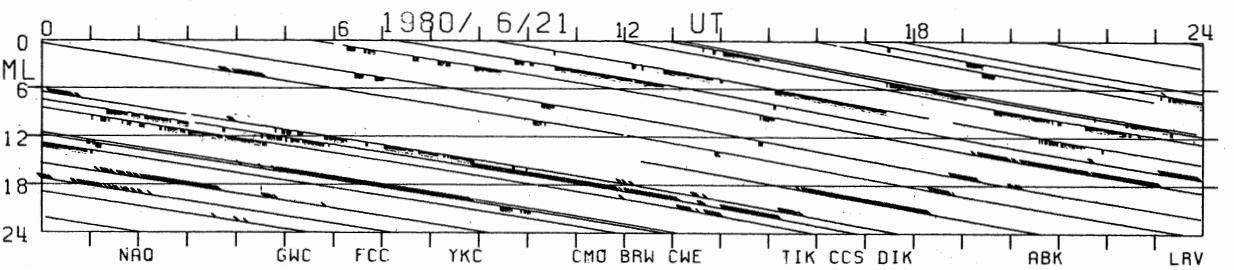
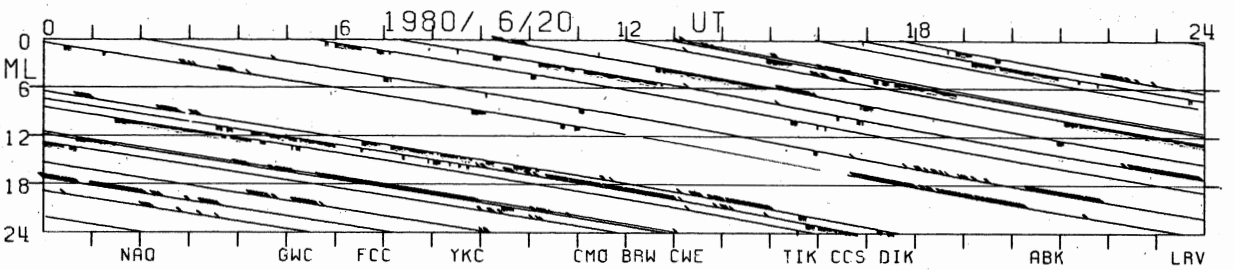
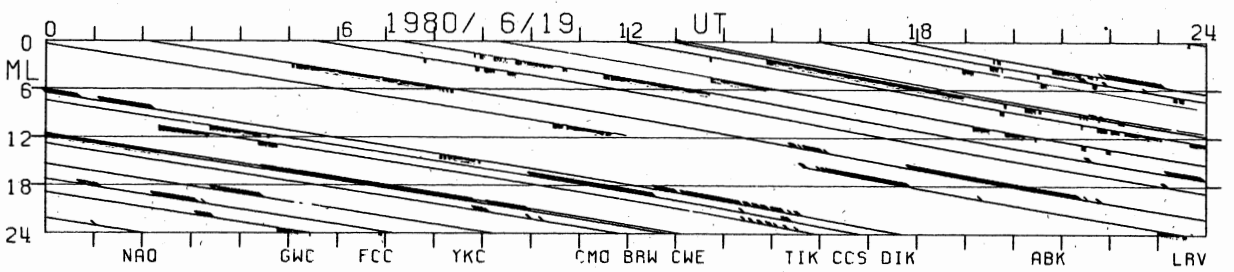
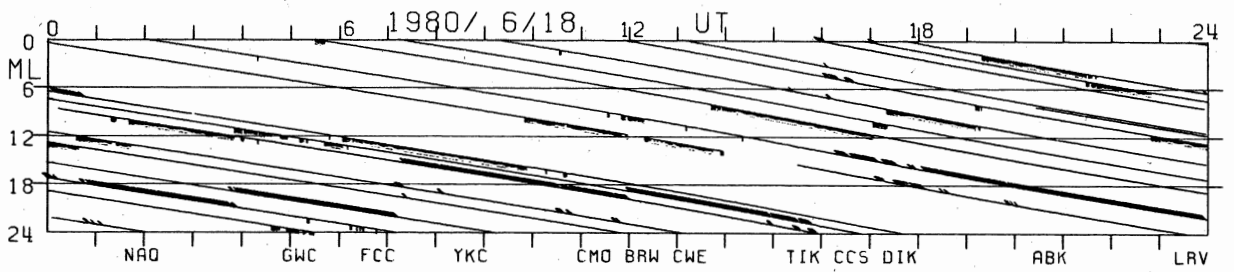
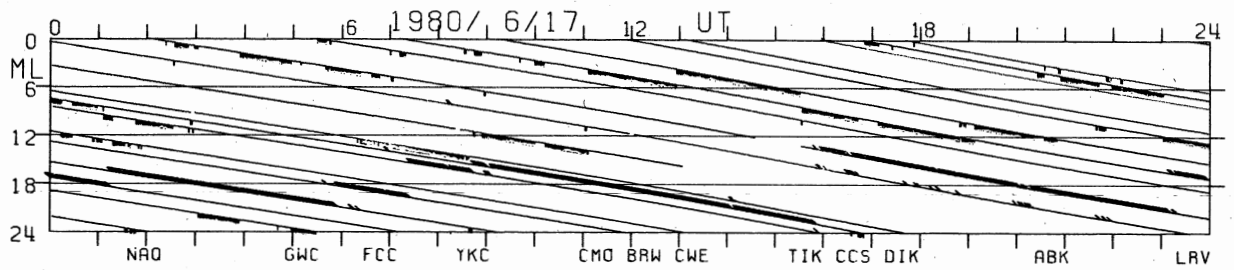


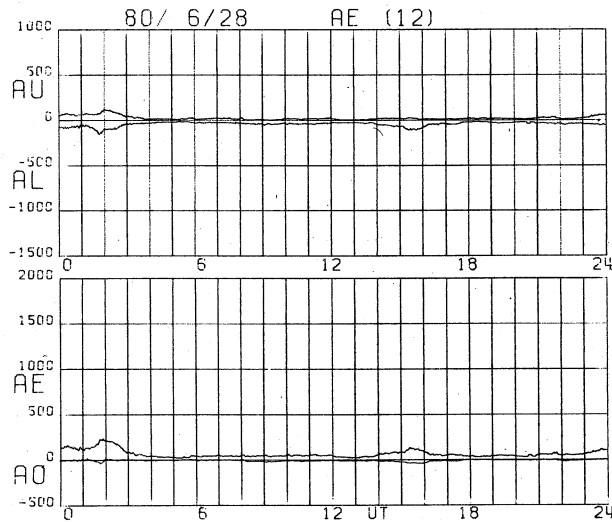
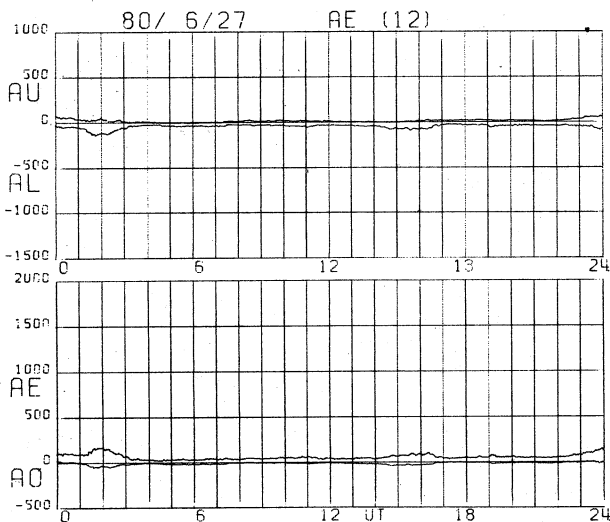
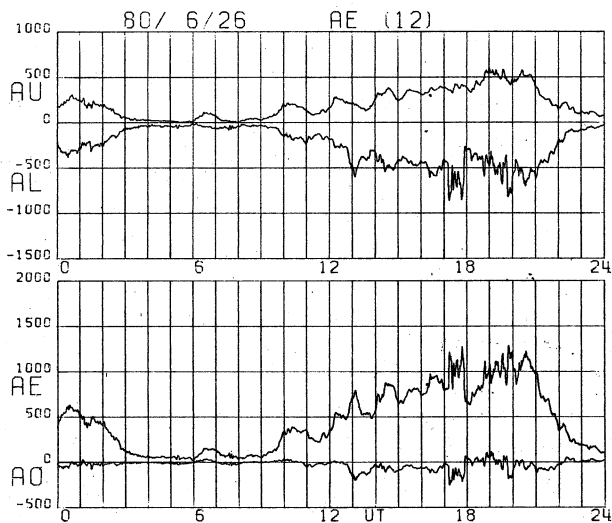
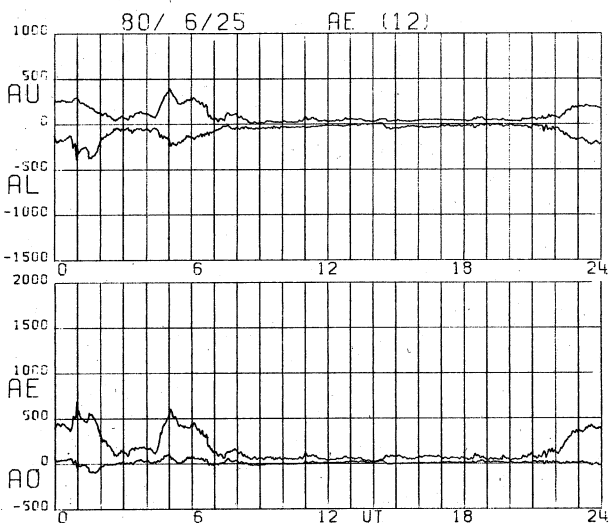
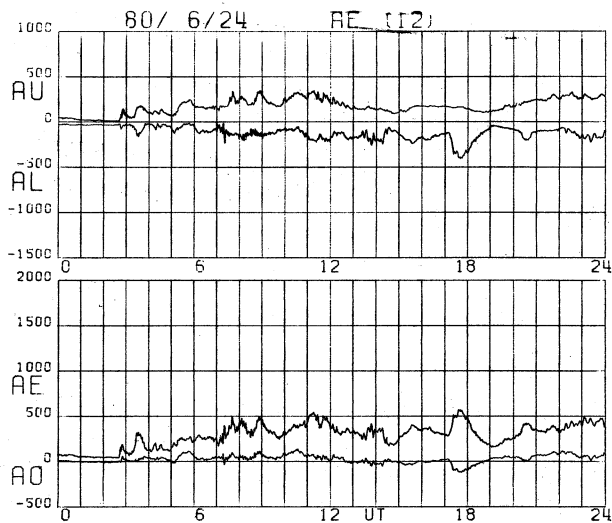
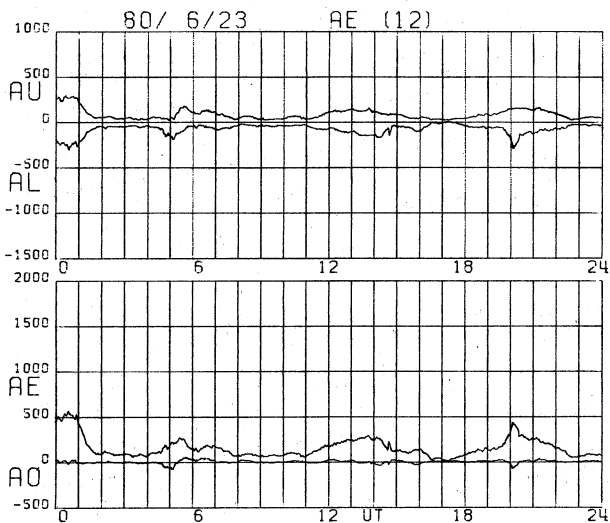


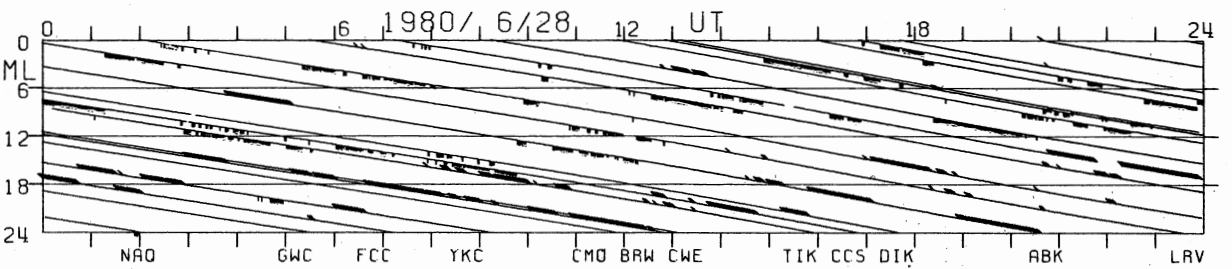
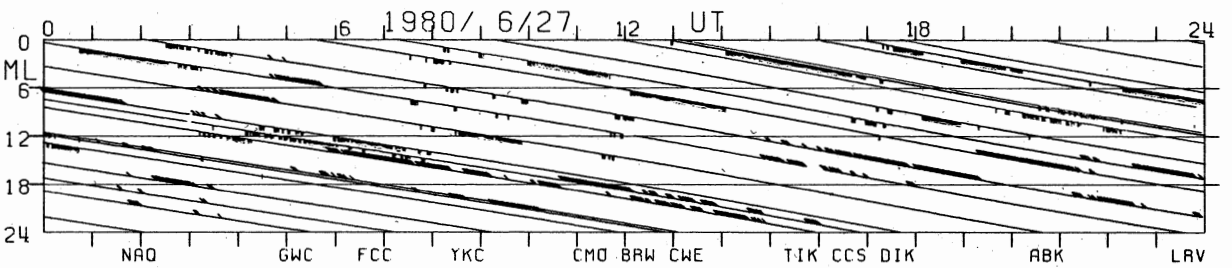
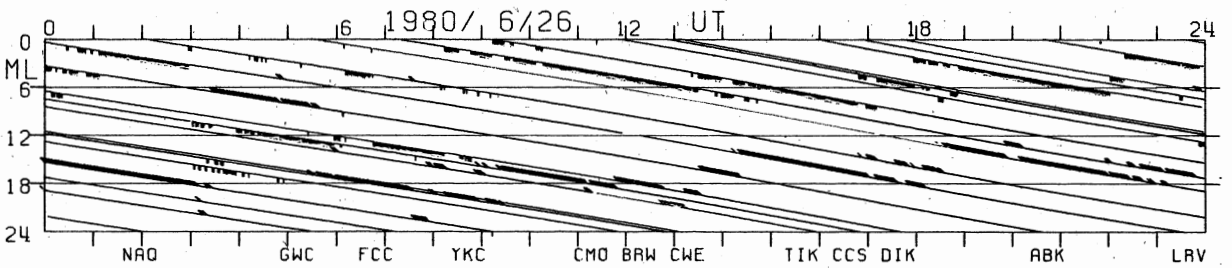
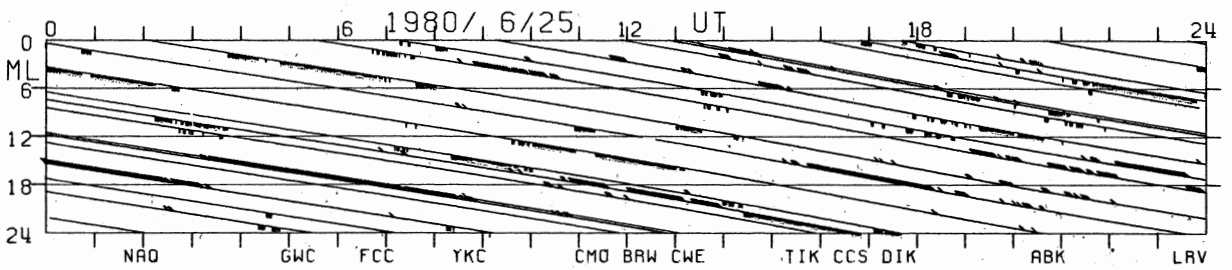
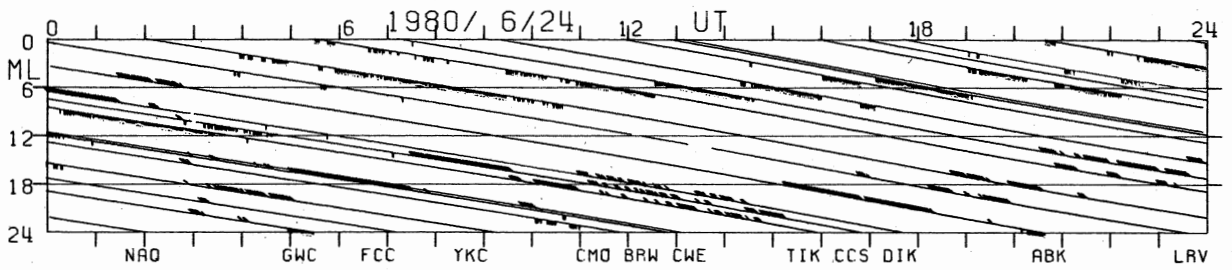
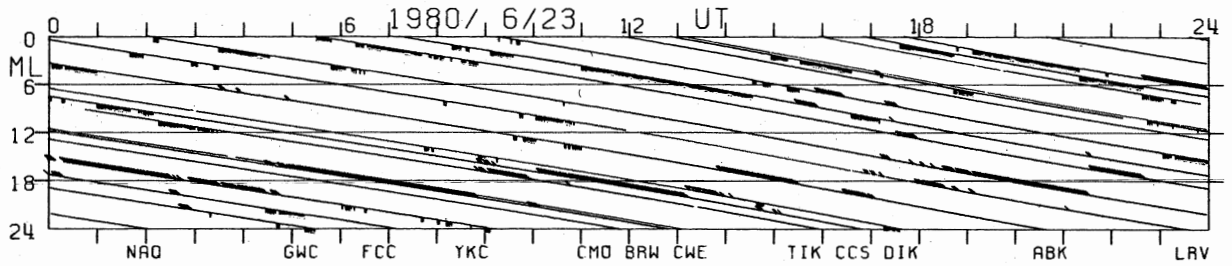


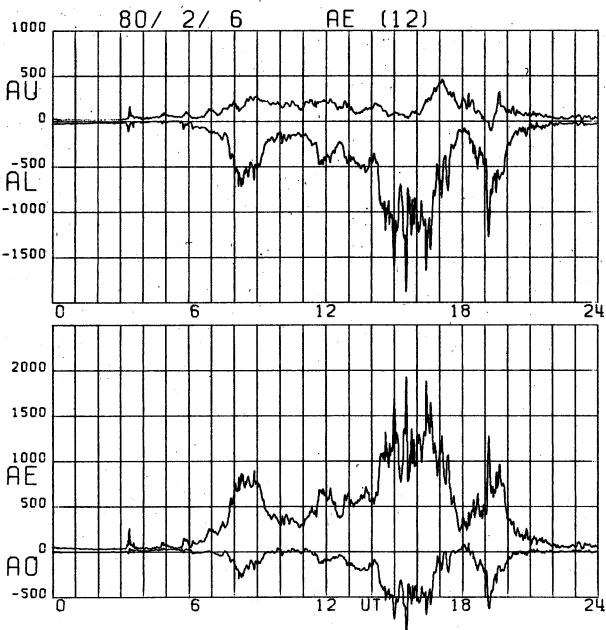
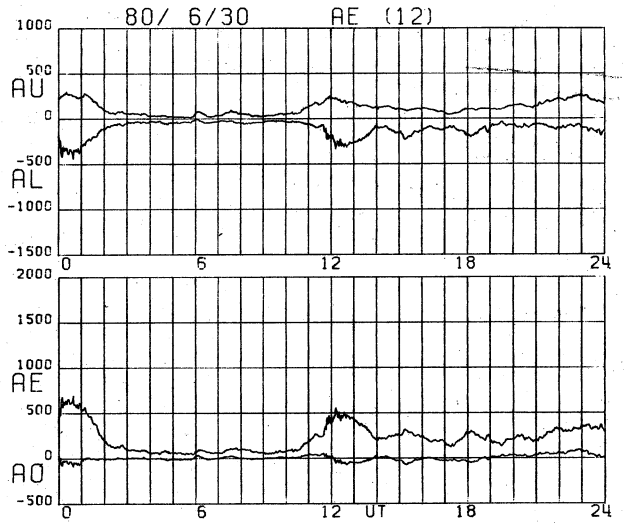
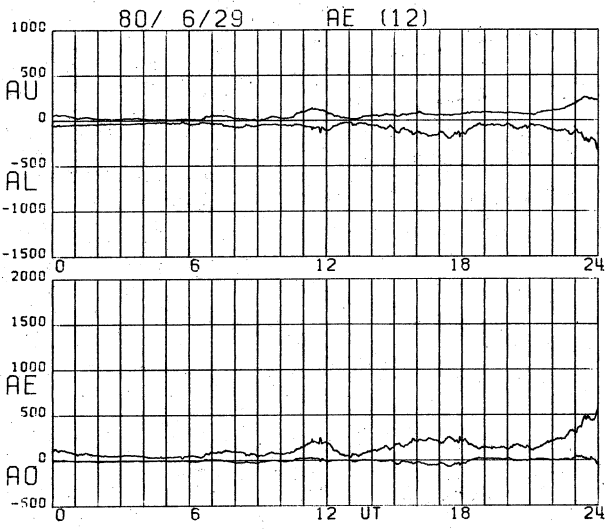












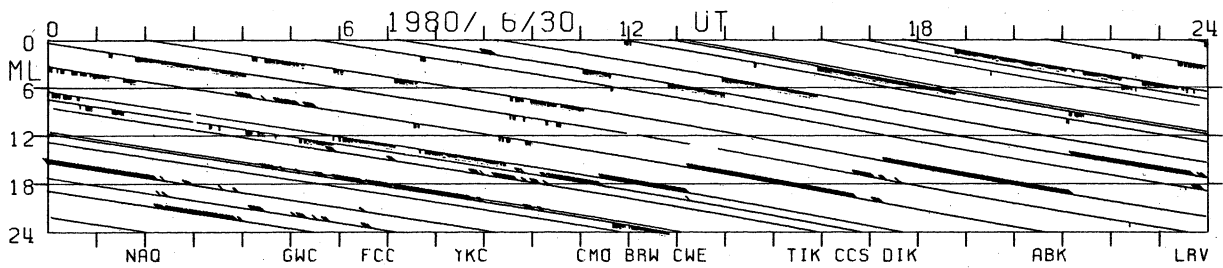
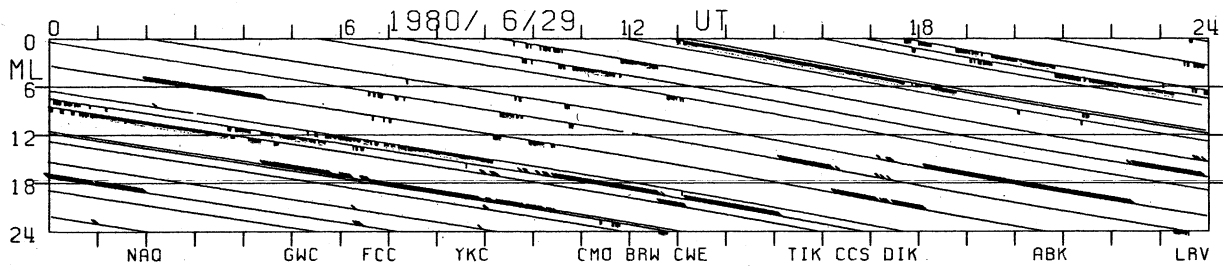
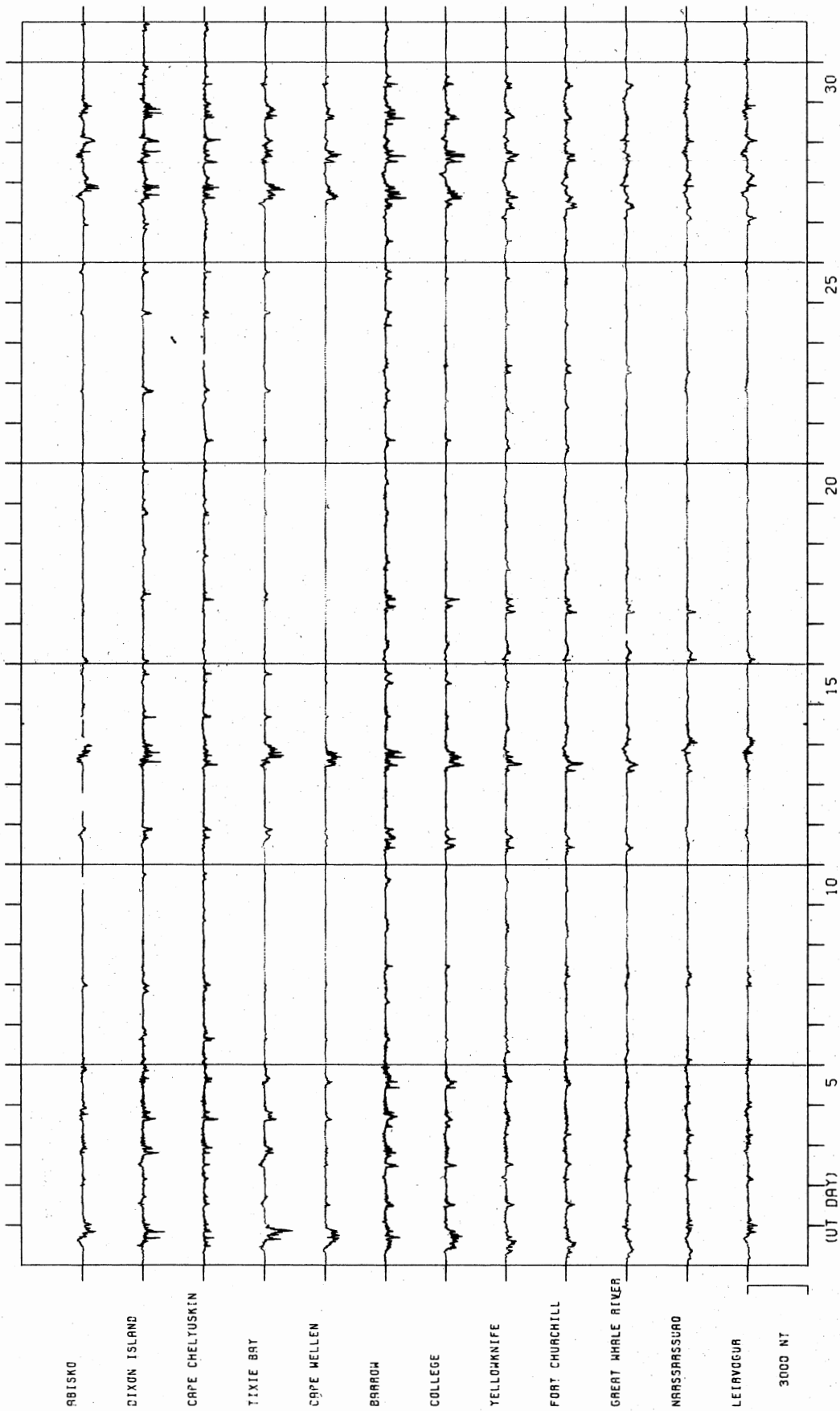


FIGURE 6

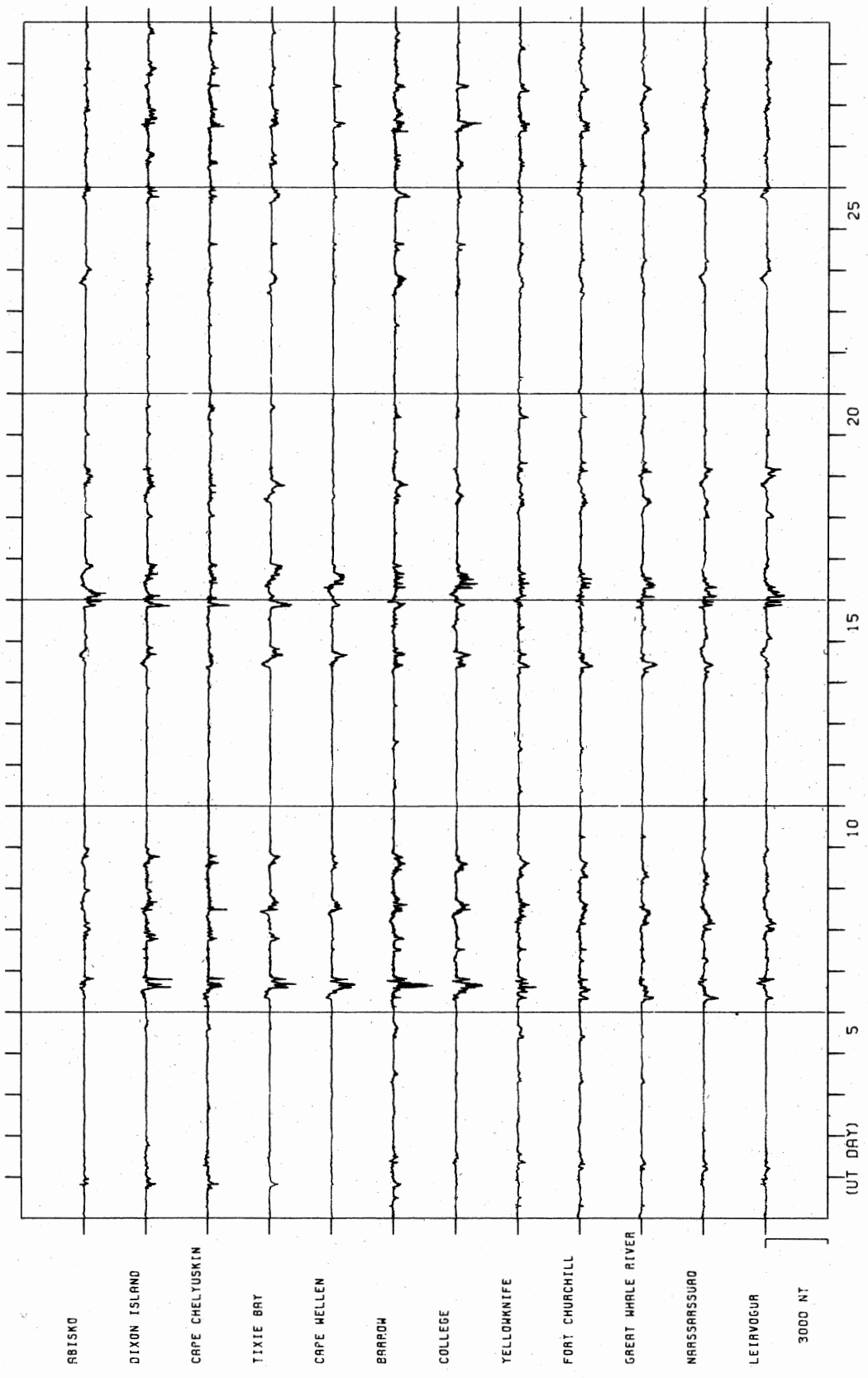
The H traces of magnetograms from AE(12) stations in every month from January to June 1980.

FIGURE 7

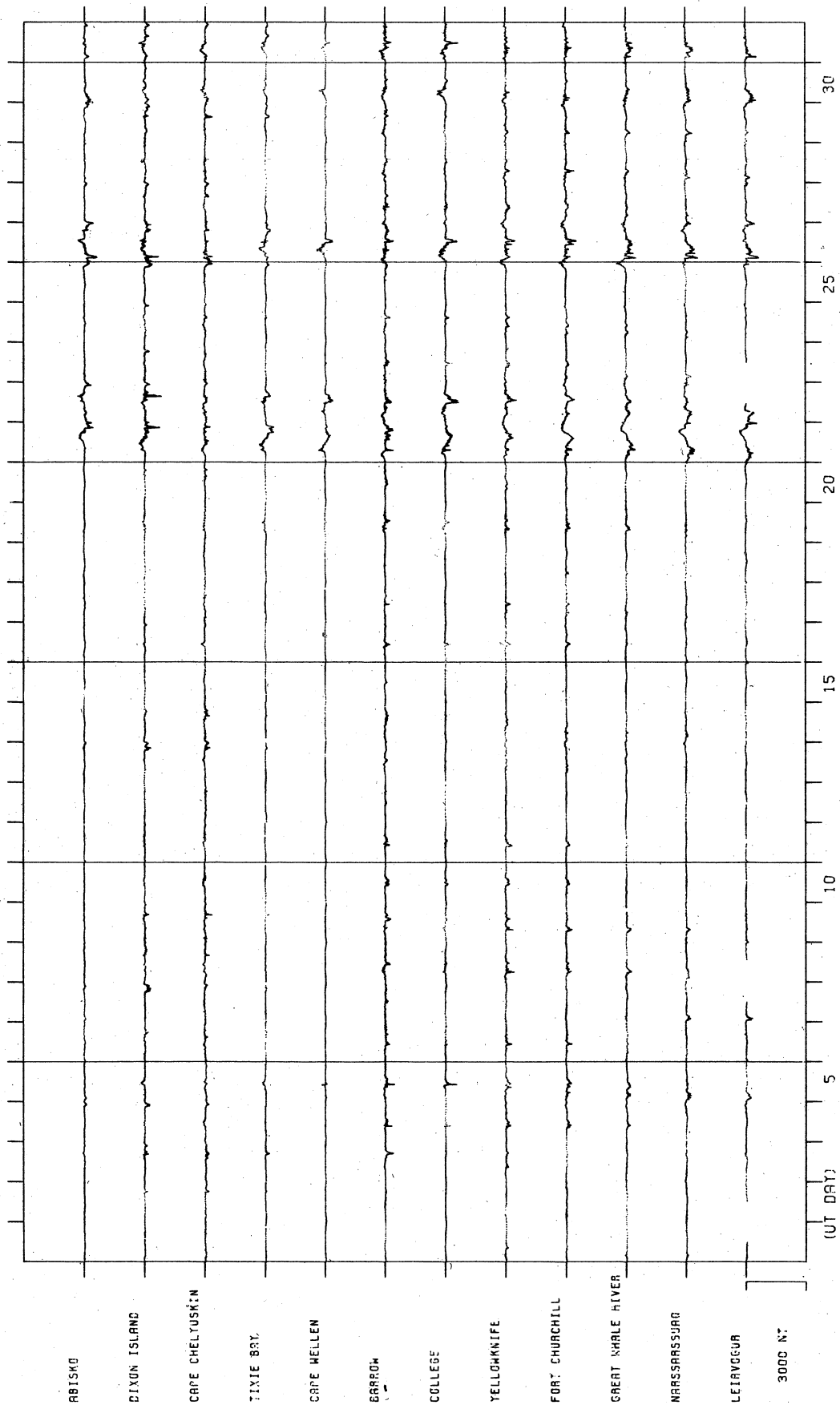
Plots of hourly values for each index from January to June 1980.



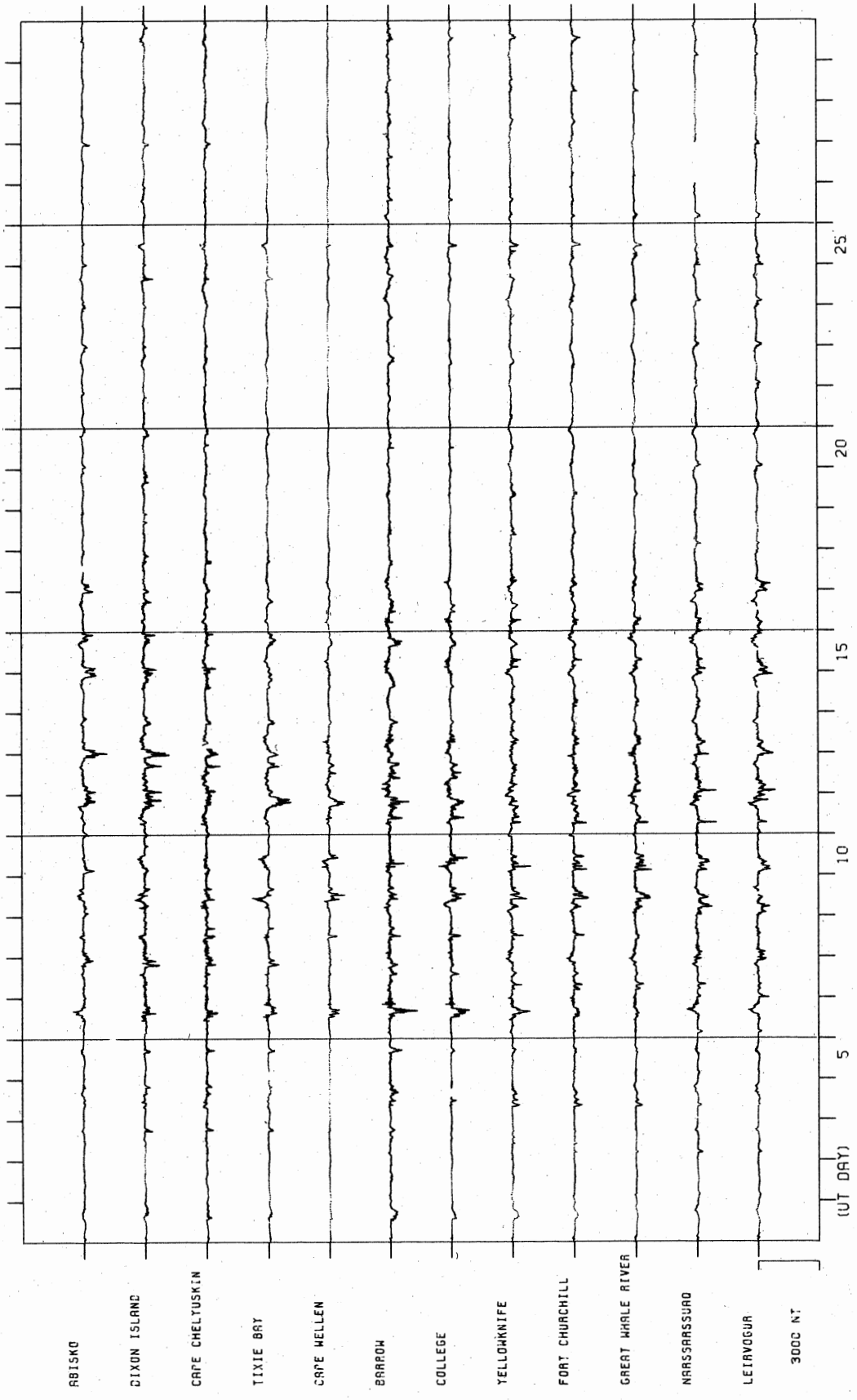
STACKED COMMON SCALE MAGNETOGRAMS FOR JANUARY 1980



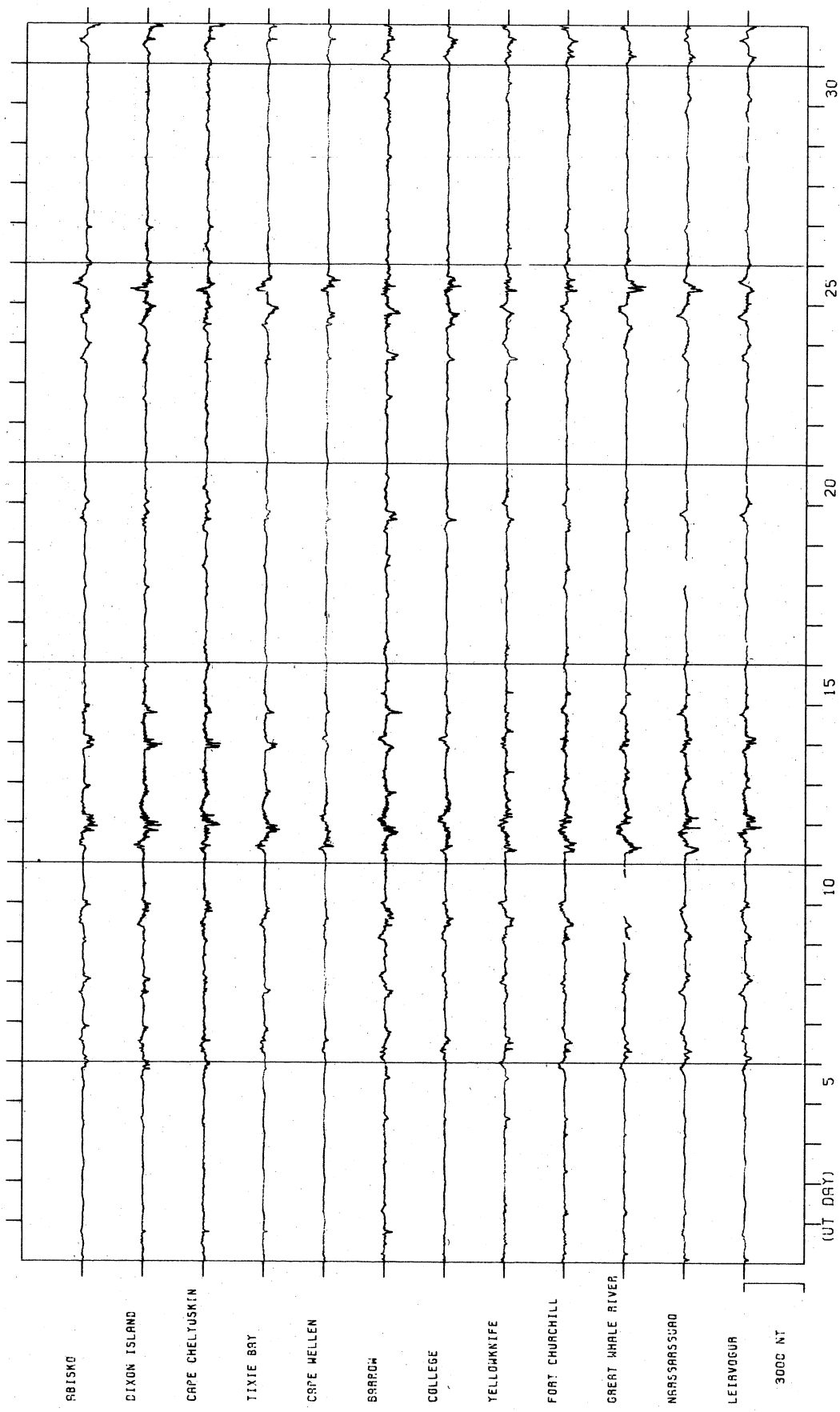
STACKED COMMON SCALE MAGNETOGRAMS FOR FEBRUARY 1980



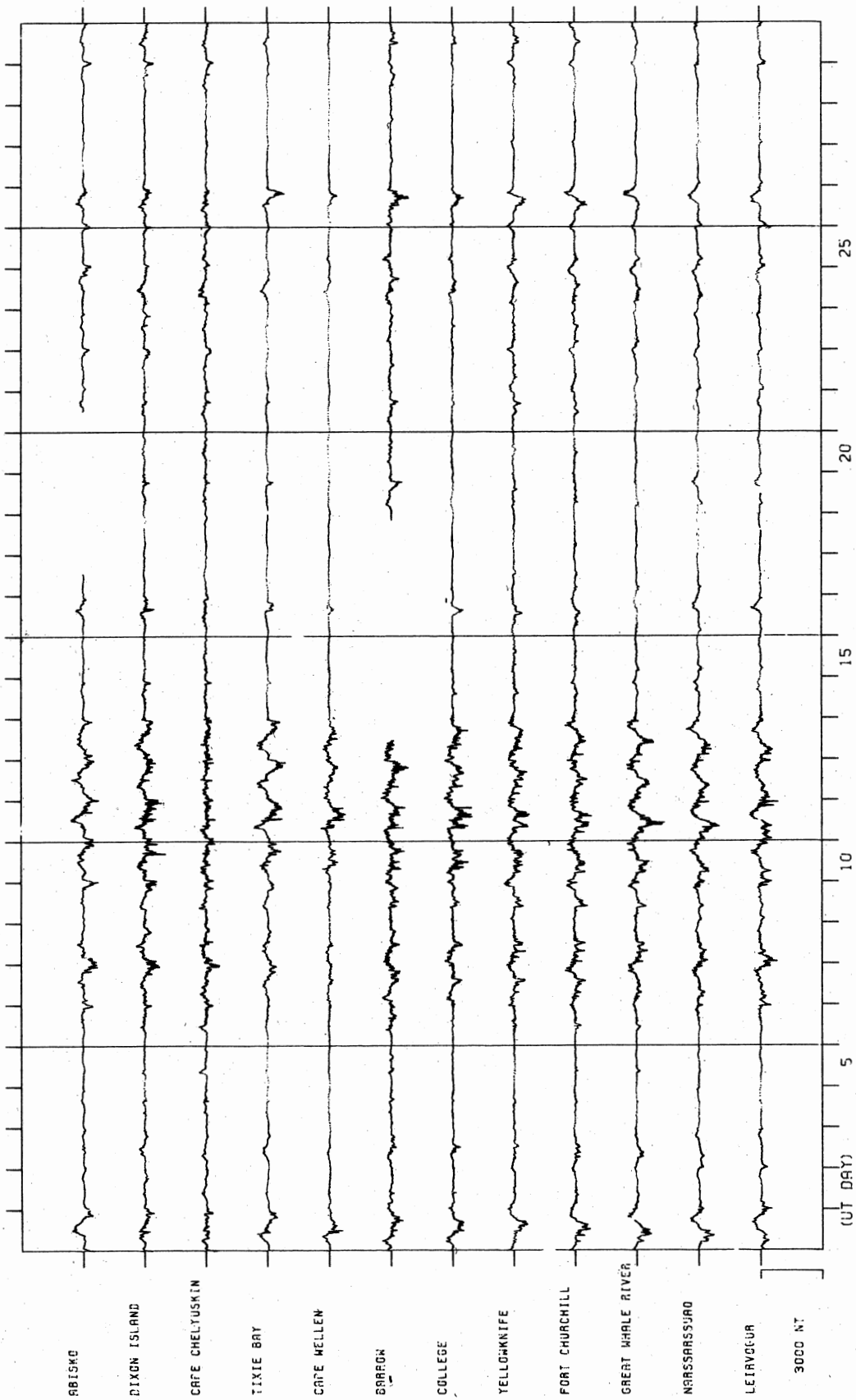
STACKED COMMON SCALE MAGNETOGRAMS FOR MARCH 1980



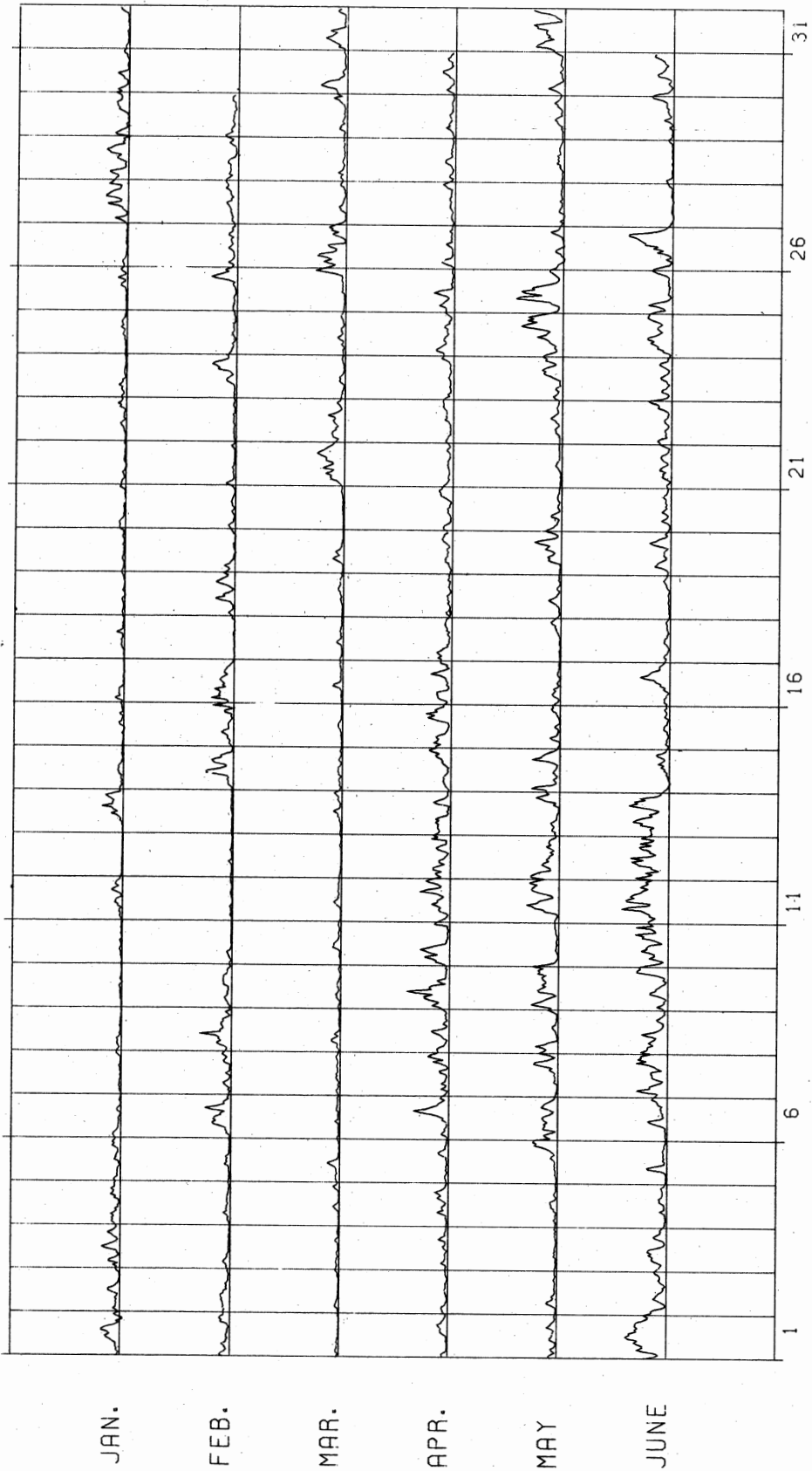
STACKED COMMON SCALE MAGNETOGRAMS FOR APRIL 1980



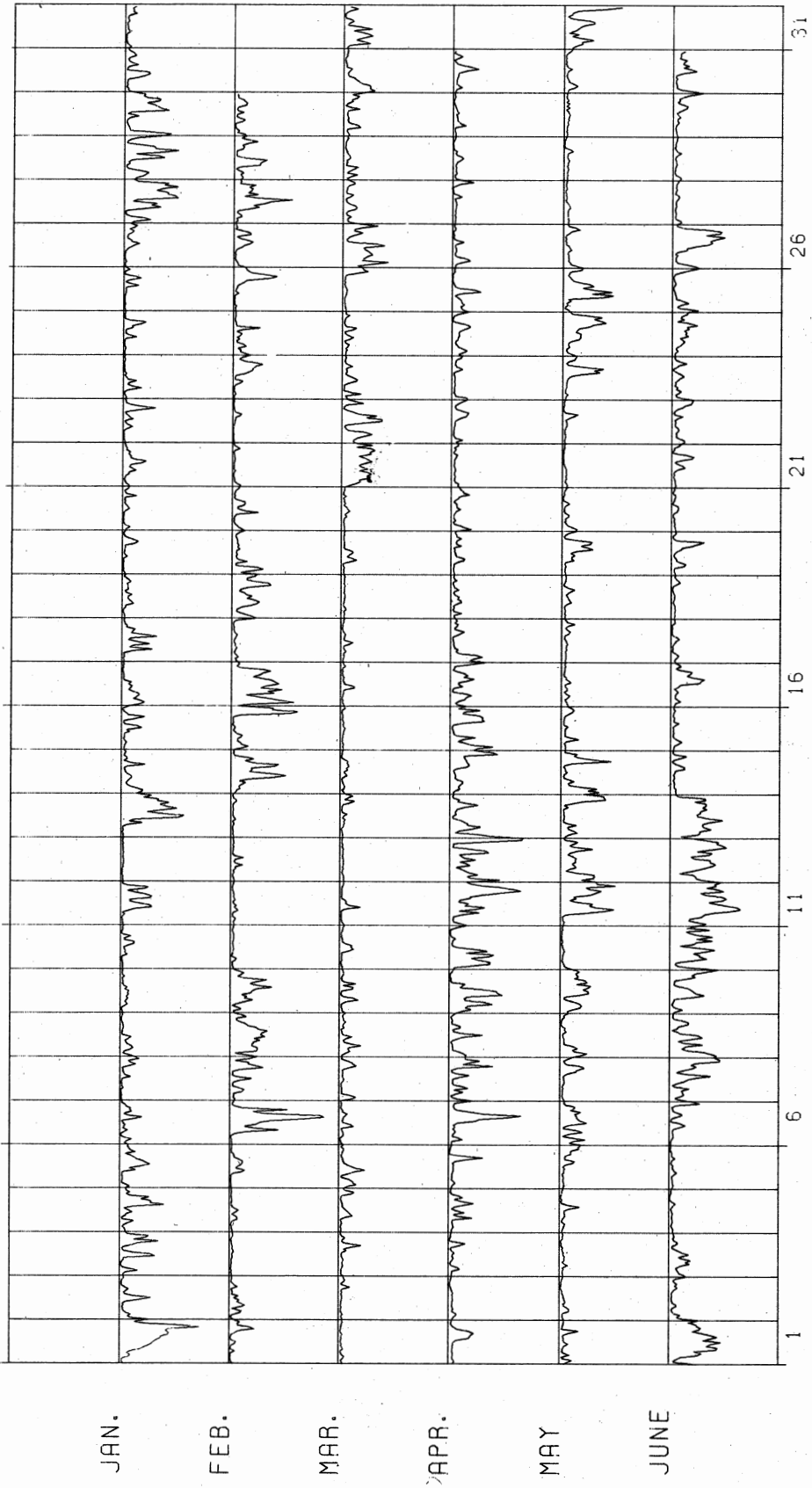
STACKED COMMON SCALE MAGNETOGRAMS FOR MAY 1980



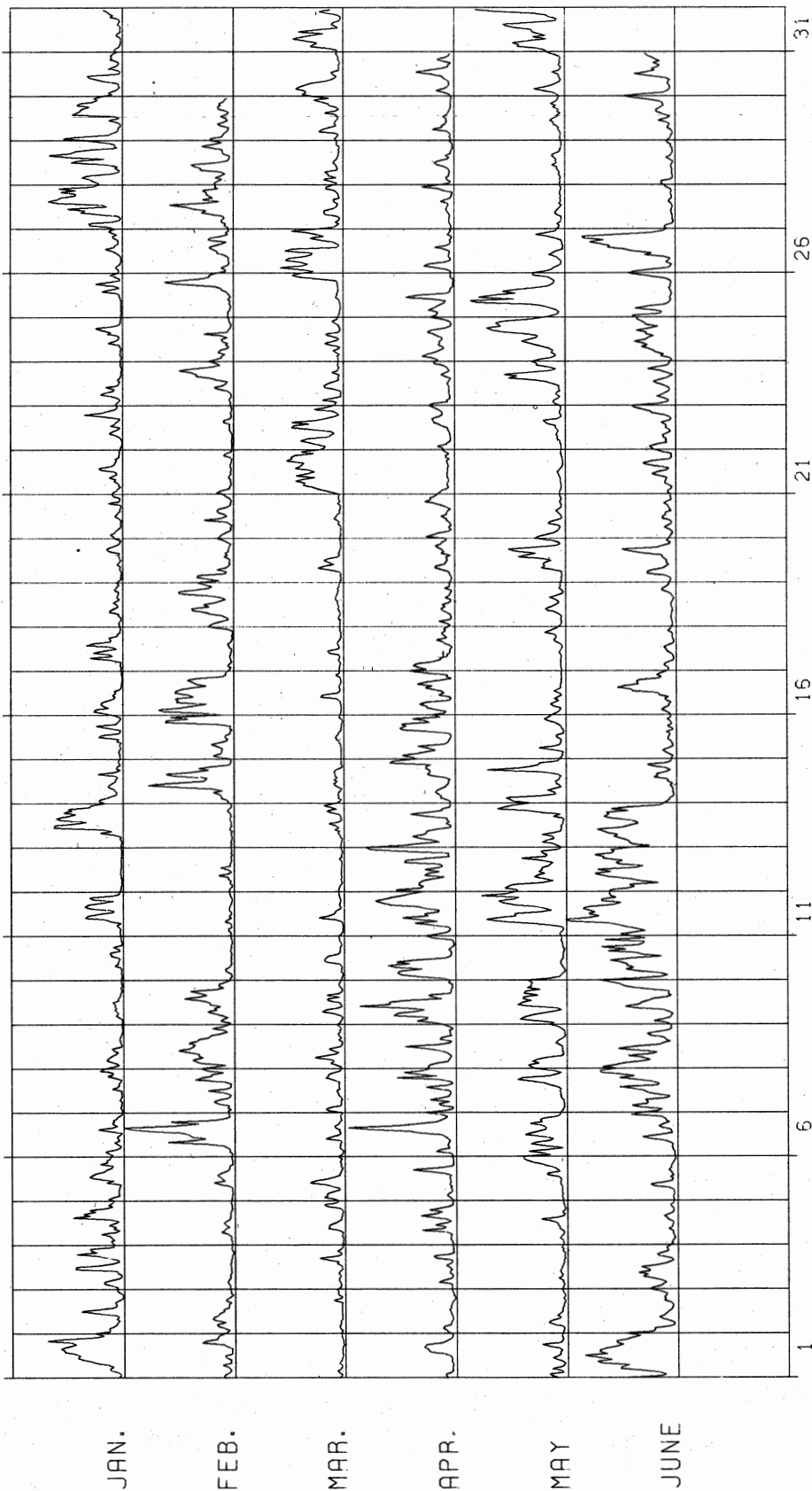
STACKED COMMON SCALE MAGNETOGRAMS FOR JUNE 1980



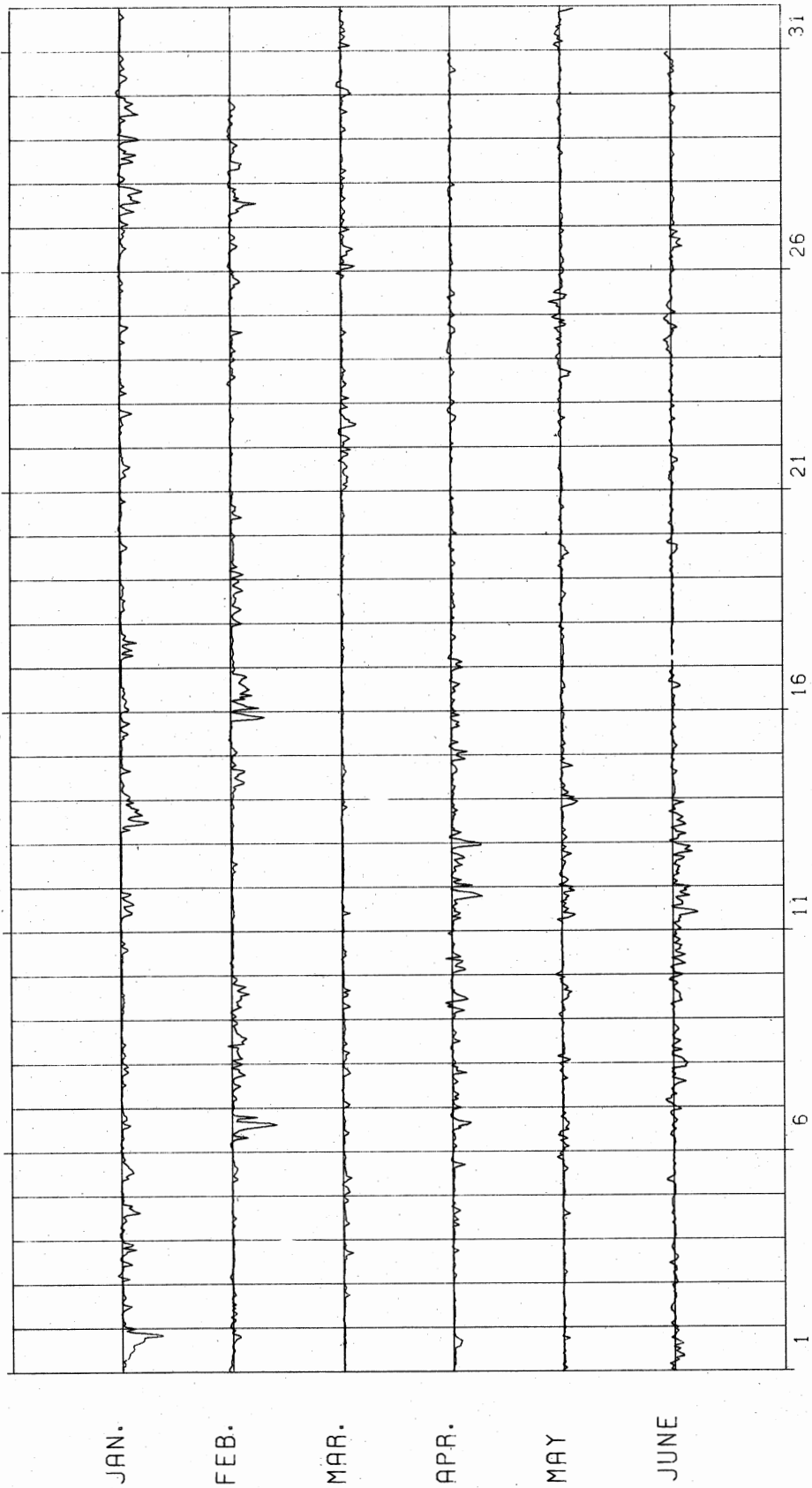
AU HOURLY VALUES FOR THE FIRST HALF OF 1980 (1250NT/DIV)



AL HOURLY VALUES FOR THE FIRST HALF OF 1980 (1250NT/DIV)



AE HOURLY VALUES FOR THE FIRST HALF OF 1980 (1250NT/DIV)



AO HOURLY VALUES FOR THE FIRST HALF OF 1980 (1250NT/DIV)

