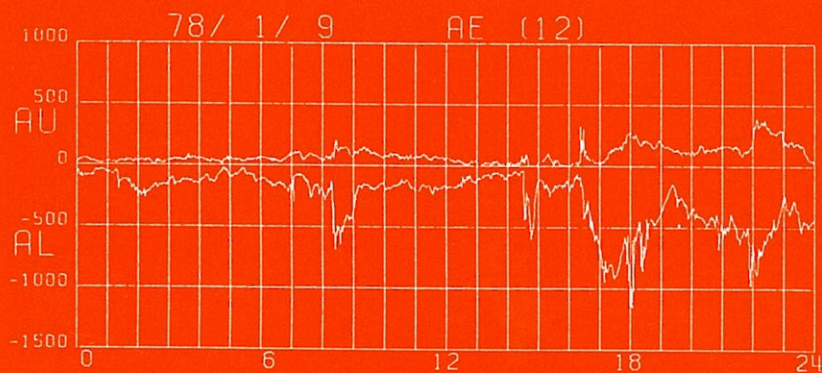
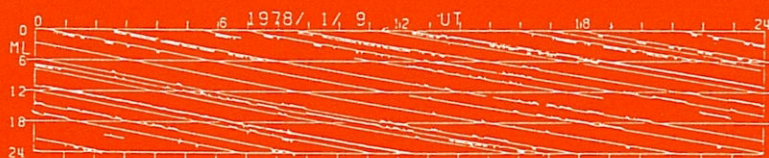


World Data Center C2 for Geomagnetism

# DATA BOOK

No. 3

Auroral electrojet indices (AE)  
for January-June 1978



APRIL 1981

Data Analysis Center for  
Geomagnetism and Spacemagnetism  
FACULTY OF SCIENCE  
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# Auroral Electrojet Indices (AE)

for January - June 1978

by

T. Kamei and H. Maeda

## 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 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. Because of manpower and other reasons, it became difficult to continue the production of the AE index at the WDC-A, and it was requested that the index be produced at the WDC-C2 for Geomagnetism in Kyoto. Upon such a request we discussed the possibility and agreed to cooperate in producing the index during the IMS at least.

## 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 also a trial plot named "contributing stations plot" of the AE indices which may give more information about the indices. That is, we named the 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 an 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.

### 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 active observatories 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 (Fort Churchill, 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. However, the digital data from College were missing from January to March 1978, so we digitized College analogue data in this period.

### 4. Digitizing Machine

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

Table 1. List of AE(12) stations.

Observatory	Abbreviations		Geographic		Geomagnetic	
	IAGA	WDC-A	Lat. (°N)	Long.(°E)	Lat. (°N)	Long.(°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

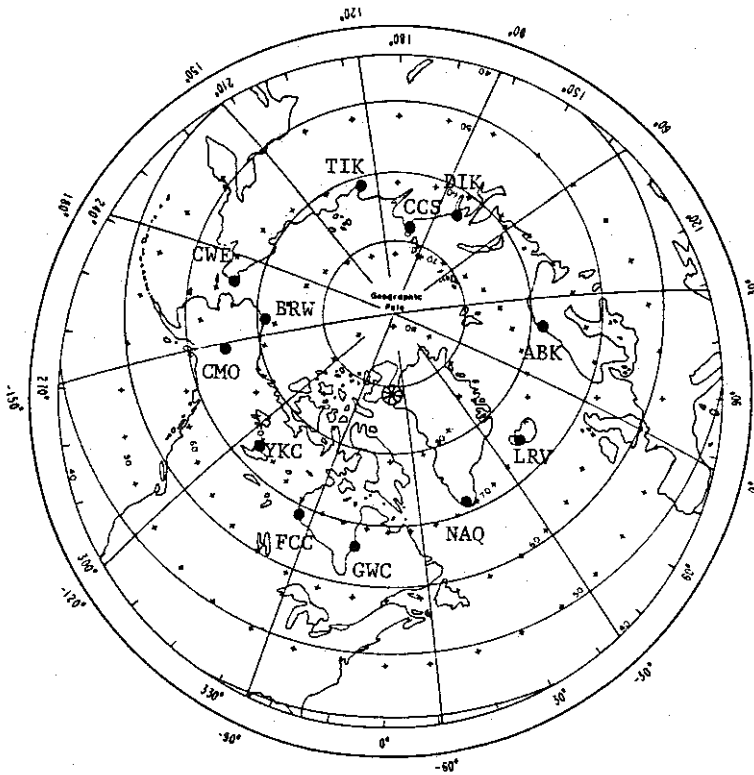


Fig. 1. Distribution of AE(12) stations.

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.

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 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 used the ordinary magnetogram for all days. When the H trace crosses other traces, we tried to identify the H trace by referring 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 analog 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 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 cleaning by the quality program, the data are averaged to get the final one minute value. Usually, 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.

## 6. Estimation of Errors

Although we are very careful to read magnetogram, there can be some errors. Users should be aware of these possible errors.

First, a magnetogram is recorded on a photographic paper, and the recorded line is sometimes too wide and sometimes too faint. The wide line causes an ambiguity of the reading. Error by such a wide line is usually less than 1.5 nT (standard deviation), but in some cases it can be about 5 nT. The faint line is not readable in a disturbed condition and may cause a missing period or tracing mistakes whose error cannot be estimated.

Second, when the original magnetograms are photographed on the 35 mm microfilms, some distortions come about and make the base lines and time marks round lines. In some stations this may result in errors of about 5 nT and/or 2 min. Also, when the magnetogram is photographed the paper moves or shrinks which make double images resulting in errors of up to 5 nT and/or 2 min.

Third, though we are very careful to trace the data, it is very difficult to be free from parallax and to trace the data smoothly. This may cause 5 nT and/or 2 min errors.

Fourth, when recording the magnetogram, chart speed sometimes fluctuates, resulting in non-uniform spacing of the time marks. In this case we divided one magnetogram into several parts, but we neglected small changes which cause a temporal error less than 2 minutes.

Fifth, in calculating a base value for one station every month, we average the data on 5 quiet days, but the year 1978 was a quite disturbed year and so the quiet days contained a number of disturbed periods. This may result in errors from 1 to 3 nT.

The last most severe problem is the missing data of the contributing stations. It is suggested to users that if they use the one minute AE value for precise studies the availability of the possible contributing stations by the contributing stations plot is checked.

As a whole we estimate that the error in the one-minute AE indices is about 5 nT to 20 nT in quiet periods. For disturbed periods, however, it is difficult to estimate the error in the indices, and we will only be able to say



that most of the error are resulted from the error in the time scale (about 1.5 to 3.0 min).

For the hourly values of AE indices, the random errors are reduced by  $1/(60)^{1/2}$ . However, the base line error and errors caused by the distortion of magnetograms are still included in the hourly values. We may estimate that the total error in the hourly values is in the range between 4 and 15 nT.

#### 7. 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 stations 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 explanation 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 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.

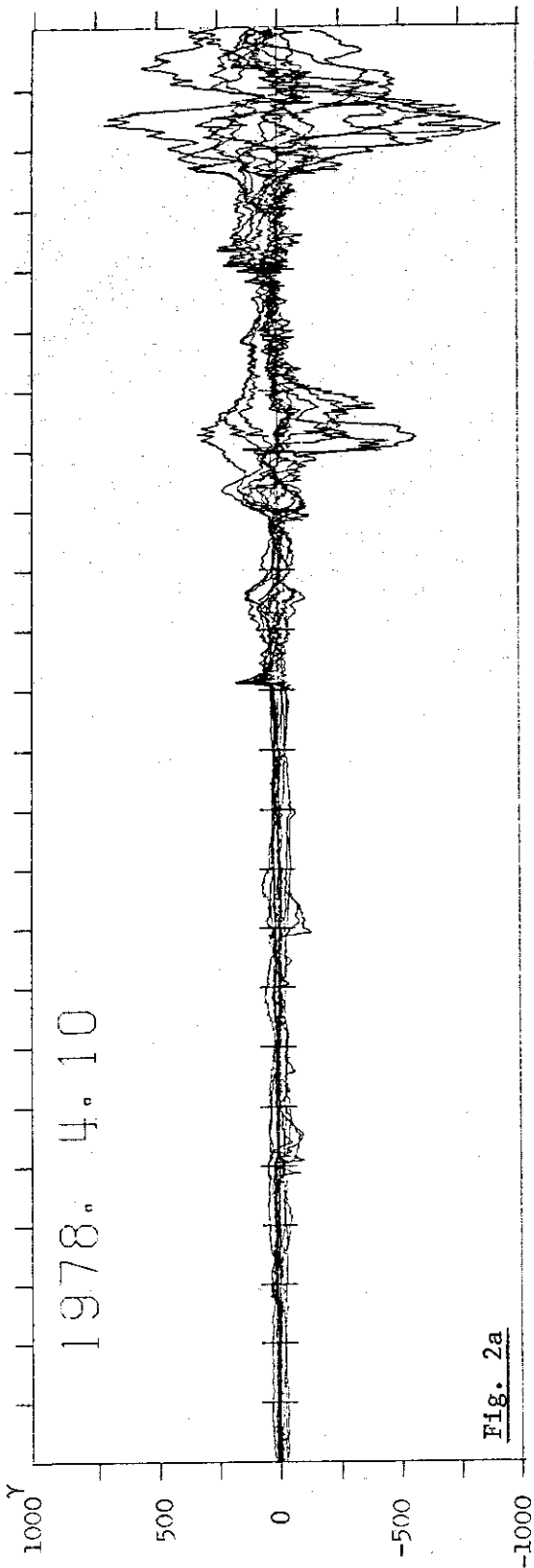


Fig. 2a

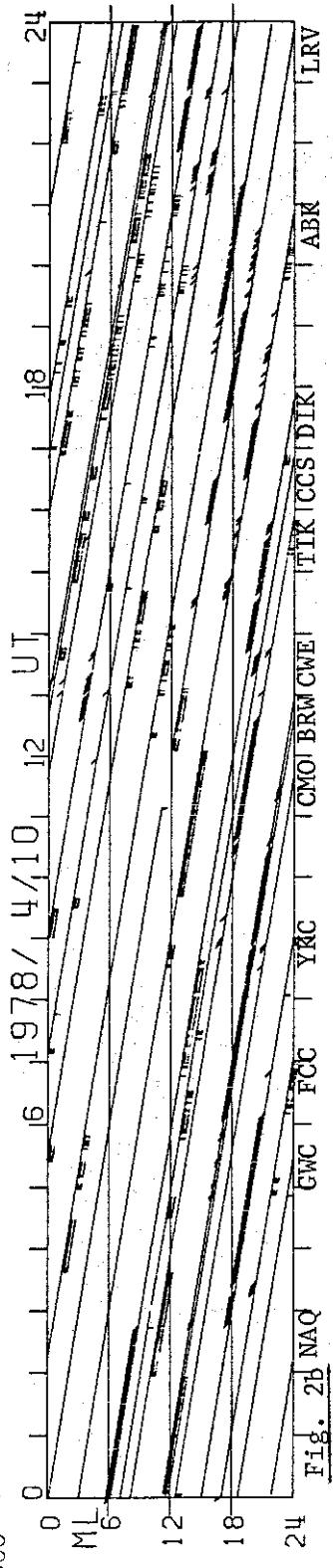


Fig. 2b

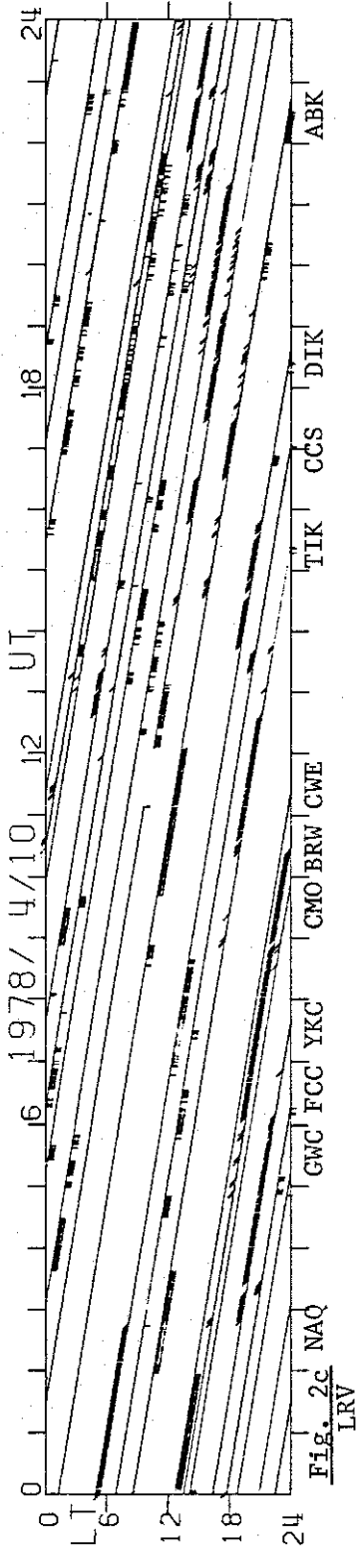


Fig. 2c

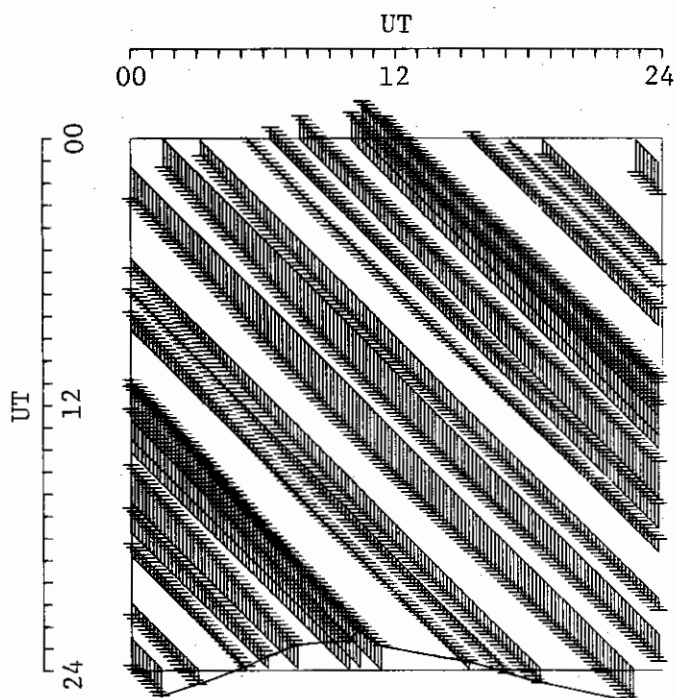


Fig. 3a Difference between GLT and MLT in winter.

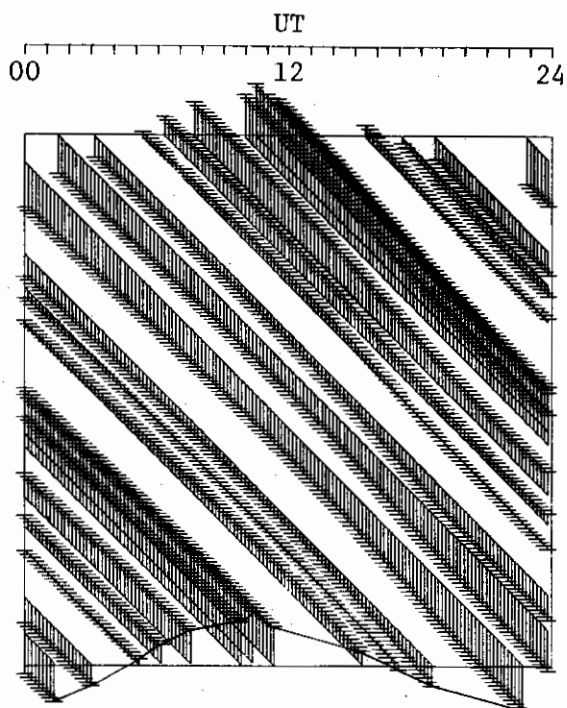


Fig. 3b Difference between GLT and MLT in summer.

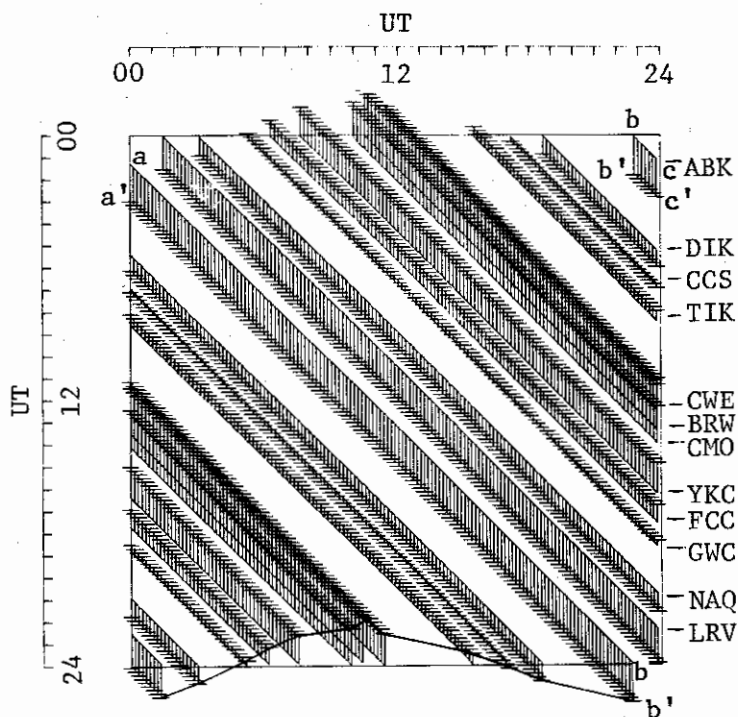


Fig. 3c Difference between GLT and MLT in equinox.

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.

When we assume that the observed geomagnetic H component is a result of a simple combination of some simple current systems, this plot of the contributing stations can be regarded as an index of dominant current system at a certain time, though the current system in the auroral zone is not very simple, and users must be very careful to check if local current systems may give a false impression of different current systems.

Although we have such limitation of the plot of the contributing stations, and we need more precise analyses, we can point out some characteristics from the plot, most of them confirm our previous knowledge.

(1) In quiet periods, the geomagnetic local time of the contributing stations to the AL index (called here AL time, shortly) is around noon. This is seen best in equinox. This may come from the low latitude Sq current system or from the field-aligned current system connected to the cusp region, or from both of them.

(2) In disturbed periods, the AL time is between midnight and morning.

(3) In some transition periods between quiet and disturbed states, the AL time moves gradually from noon to morning. Then, very sharp and short period AL spikes are seen and the AL time goes pre-midnight. Afterward, the AL time comes back to early morning.

(4) The geomagnetic local time of the AU contributing station (called AU time) is confined in the evening in disturbed periods. But in quiet periods, the AU time is distributed widely and it can be seen at midnight or in the morning.

## 8. Results

Monthly quiet-time H reference values for January-June 1978 are listed in Table 2, where for four stations only deviations ( $HO^+$ ) from the H base line are given, because we did not find out any base values. Table 3 gives the hourly average of AE indices on every day from January to June 1978.

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. Finally, Fig. 6 shows the H-traces of magnetograms from AE(12) stations in every month from January to June 1978.

### Acknowledgments

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Table 2. MONTHLY QUIET-TIME H REFERENCE VALUES (UNITS : NT = GAMMAS)  
(YEAR 1978)

STATION	JAN.	FEB.	MAR.	APR.	MAY	JUNE	
ABISKO	11831	11831	11830	11823	11831	11840	
DIXON ISLAND	-370	-373	-368	-382	-373	-373	(H0+)
CAPE CHELYUSKIN	544	534	538	544	552	557	(H0+)
TIXIE BAY	264	266	261	255	263	277	(H0+)
CAPE WELLEN	199	193	185	190	193	202	(H0+)
BARROW	9842	9835	9842	9837	9850	9864	
COLLEGE	13049	13051	13038	13036	13038	13045	
YELLOWKNIFE	8722	8722	8719	8724	8722	8738	
GREAT WHALE RIVER	10503	10503	10501	10513	10524	10538	
FORT CHURCHILL	7441	7438	7437	7456	7470	7485	
NARSSARSSUAQ	12021	12025	12028	12029	12032	12030	
LEIRVOGUR	12377	12378	12384	12382	12391	12395	

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



TABLE 3

Hourly average AE indices (AU, AL, AE and AO) for  
January—June 1978.



1978 JANUARY

AU HOURLY INDICES

QD 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 DAILY	
1	41	41	33	45	31	46	38	31	39	49	27	36	31	26	21	20	17	33	32	41	119	115	122	76	46
2	66	94	98	83	103	96	64	27	24	39	29	24	30	31	35	18	10	5	5	10	22	20	22	25	41
3	30	34	26	30	23	18	16	15	15	13	14	17	17	17	20	41	57	67	45	56	117	153	223	172	52
D 4	143	128	155	232	205	264	488	389	257	321	98	119	73	-6	29	-47	-38	-184	-52	-48	133	26	-21	20	112
D 5	-15	118	88	205	195	212	186	236	208	170	109	128	88	49	13	6	47	80	69	40	57	96	44	35	103
D 6	26	117	151	172	131	151	171	98	39	42	14	5	7	24	20	23	10	83	77	112	86	72	33	48	71
7	48	43	30	24	14	1	4	13	23	21	32	31	19	14	14	18	91	16	20	25	17	28	57	67	28
8	82	117	143	62	72	48	31	38	54	50	36	81	87	38	59	113	66	58	27	44	22	39	39	18	59
9	37	36	35	55	43	52	56	85	107	111	79	73	39	23	27	39	64	129	205	137	138	145	304	147	90
10	31	155	205	117	77	132	114	124	96	91	60	27	14	13	29	74	184	187	105	77	118	93	66	25	92
11	13	18	39	17	44	52	57	72	51	46	41	71	115	64	57	90	29	31	20	12	4	15	12	14	41
12	20	20	11	23	17	10	8	2	2	2	7	4	3	4	4	6	4	1	5	10	15	27	23	13	10
13	9	19	32	37	25	22	23	57	57	41	53	66	41	33	52	26	35	23	23	37	54	59	82	54	40
14	37	31	26	19	14	17	32	43	47	31	26	19	5	2	2	4	6	7	5	6	11	13	14	10	18
15	7	12	9	11	12	16	10	11	12	16	17	39	82	19	9	9	13	9	9	8	10	11	12	17	16
16	19	18	19	17	18	23	21	24	26	17	19	26	59	58	197	226	211	243	221	174	150	109	131	102	89
17	92	74	124	127	102	36	17	12	18	15	13	5	6	9	7	14	11	7	7	7	15	19	24	43	33
18	55	62	119	190	173	162	186	194	204	153	142	196	97	88	83	39	36	21	13	16	16	19	19	26	96
19	32	37	46	54	63	50	35	56	62	36	53	26	23	26	32	20	14	19	10	18	21	31	25	14	33
20	15	9	6	10	21	33	47	78	86	65	25	18	14	9	22	29	16	11	16	11	10	13	13	12	25
21	11	10	11	12	13	12	13	13	14	14	15	16	17	15	16	14	14	10	6	8	13	14	16	19	13
22	20	21	21	17	19	17	35	49	42	40	47	28	43	40	31	23	15	14	12	12	14	16	18	19	26
23	18	15	14	12	10	12	11	15	12	12	11	13	14	16	16	13	11	9	7	11	14	20	26	27	14
24	23	29	31	29	25	32	27	54	57	108	53	39	36	35	66	62	143	103	36	24	23	19	17	22	45
25	25	22	23	26	31	34	37	46	61	80	81	141	180	86	33	44	68	96	66	67	39	93	147	84	67
26	113	259	117	91	82	83	67	48	53	66	84	54	25	25	25	10	12	14	32	22	22	38	27	40	59
27	42	54	56	64	59	39	45	32	30	32	45	35	19	17	8	6	4	5	8	11	18	20	20	22	29
28	18	12	12	9	21	31	26	41	18	15	21	37	63	35	31	40	73	52	93	167	142	97	121	65	52
D 29	105	95	82	55	125	324	398	295	154	227	126	245	90	138	163	262	226	172	120	59	65	44	53	20	152
D 30	17	32	46	72	77	155	229	263	235	197	127	144	82	49	15	16	12	2	4	24	28	49	51	84	84
31	72	89	66	84	94	119	123	130	224	198	200	128	198	130	195	162	211	162	159	90	127	126	80	97	136
MEAN	40	58	60	64	62	74	84	83	75	74	54	61	52	36	42	45	53	47	45	41	52	52	58	46	57
50 MEAN	18	17	16	14	13	14	20	26	25	22	23	23	32	18	14	12	11	9	7	9	12	14	17	18	17
50 MEAN	55	98	104	147	146	221	294	256	178	191	94	128	68	50	48	52	51	30	43	37	73	57	32	41	104

1978 FEBRUARY

AU HOURLY INDICES

QD 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	DAILY
1	134	123	89	76	97	106	152	187	83	29	41	43	71	95	130	93	57	56	51	45	43	49	43	97	83
2	112	183	115	88	61	87	76	135	138	122	121	95	43	39	26	20	19	16	7	15	28	70	74	60	73
3	106	110	78	67	89	89	97	144	164	78	72	136	188	221	72	109	94	173	101	90	74	68	66	91	107
4	89	71	136	144	76	21	33	46	67	56	35	32	25	54	62	39	29	22	17	22	19	22	62	63	52
5	47	59	106	82	65	178	186	245	205	143	149	162	148	101	71	156	144	148	172	209	222	198	133	146	145
6	161	162	72	38	31	41	46	58	56	38	57	49	34	53	72	48	94	189	264	120	228	73	31	35	85
7	22	42	38	38	26	19	16	12	11	12	20	40	42	18	14	12	33	44	65	59	44	89	87	47	35
8	54	55	79	109	90	69	79	154	136	109	68	54	103	72	98	80	217	251	183	164	160	134	128	71	114
9	53	50	50	54	39	49	70	153	120	223	290	300	195	272	280	166	137	257	242	209	174	108	87	61	152
10	55	36	33	36	35	25	34	30	20	20	16	20	19	19	22	14	11	28	74	60	23	28	21	21	29
11	21	17	17	18	22	31	42	35	37	61	33	17	16	14	15	17	17	17	18	17	23	21	15	13	23
12	13	14	17	24	24	26	34	37	53	42	33	28	22	21	21	26	32	54	118	93	163	146	192	74	54
13	75	72	109	86	94	86	56	77	71	33	30	21	17	17	23	38	37	82	107	131	72	34	41	27	60
14	70	93	63	48	79	80	60	80	106	37	148	168	141	48	65	93	80	77	25	35	44	92	173	204	88
15	205	207	120	143	203	306	463	499	413	423	378	257	58	24	28	-3	-1	2	1	5	15	20	21	16	158
16	14	47	64	26	27	81	63	66	86	77	151	134	211	122	46	55	98	164	254	259	154	191	212	164	115
17	219	151	203	140	123	74	32	19	15	16	17	25	7	11	25	48	33	8	14	21	23	28	43	65	57
18	87	124	119	122	186	124	72	107	108	89	63	64	49	78	46	50	24	47	36	31	63	23	44	37	75
19	66	82	75	89	161	125	110	34	19	16	45	58	94	115	146	72	76	84	103	162	215	199	150	156	102
20	196	181	148	84	97	130	130	96	164	108	171	244	204	192	92	39	49	115	132	137	82	65	92	85	126
21	94	116	107	90	34	64	71	44	29	24	51	34	63	61	80	81	192	260	263	228	263	260	189	175	122
22	109	87	96	108	166	263	234	58	29	21	24	28	70	68	69	190	236	225	162	110	96	76	132	156	117
23	73	53	31	23	28	36	35	34	30	28	39	29	25	36	19	27	19	12	11	15	15	26	29	25	29
24	18	29	31	22	25	25	16	32	39	47	45	66	75	42	28	43	22	17	23	25	21	15	13	15	31
25	21	21	30	30	44	47	66	78	77	46	62	47	40	46	29	25	21	19	19	50	89	118	153	95	53
26	118	150	119	133	101	178	151	120	102	156	82	89	134	263	219	203	229	175	146	122	183	162	113	74	147
27	86	101	146	89	86	93	109	118	69	152	90	76	132	204	162	298	167	113	167	215	160	130	195	94	135
28	86	91	133	170	95	153	237	131	152	140	177	107	51	148	103	111	191	174	145	165	116	111	127	75	133
MEAN	85	90	86	77	80	93	98	101	92	83	89	86	81	87	73	77	84	101	104	100	100	91	95	80	89
50 MEAN	37	35	30	27	27	27	28	28	27	33	30	34	35	25	19	22	20	23	38	35	25	35	33	24	29
5D MEAN	120	127	122	128	130	198	238	185	153	178	150	111	89	141	116	159	164	137	124	123	114	99	117	83	138

1978 MARCH

AU HOURLY INDICES

QD 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	DAILY
D 1	75	108	107	75	100	96	61	101	105	156	148	97	39	75	182	231	264	253	214	152	207	189	86	102	134
D 2	219	170	129	115	161	147	178	263	235	123	106	66	77	69	69	49	65	56	127	163	131	83	96	109	125
D 3	231	135	106	67	84	210	188	128	65	111	72	48	101	44	80	98	88	127	169	140	141	109	92	75	113
Q 4	50	32	35	33	33	34	23	21	29	25	24	20	20	21	20	19	20	16	14	12	10	10	11	15	23
Q 5	15	17	15	17	20	21	25	51	86	124	126	180	182	111	96	88	126	156	103	40	41	41	19	11	71
6	15	15	11	13	14	16	17	17	22	29	37	111	128	41	40	46	29	35	34	28	18	16	21	17	32
7	19	36	36	38	37	31	39	19	19	47	75	89	64	64	91	119	76	33	23	15	21	35	38	19	45
8	24	23	23	23	24	28	26	25	26	27	31	28	44	41	57	101	70	98	242	135	145	139	50	22	60
9	27	56	55	73	72	91	85	36	78	150	138	65	48	34	32	53	35	18	28	101	121	77	54	30	65
10	23	10	5	11	16	24	60	117	175	223	332	179	192	182	61	65	46	25	29	28	21	24	17	14	78
11	10	9	11	18	19	17	11	29	29	77	106	97	40	25	21	16	23	42	29	34	39	41	31	16	33
12	20	19	19	18	19	17	12	22	36	26	13	13	16	18	18	16	12	12	13	15	11	12	16	24	17
13	48	27	28	32	65	183	243	169	162	257	311	315	146	118	79	49	29	28	89	140	134	126	57	66	121
14	107	90	66	72	82	77	63	42	29	24	47	65	117	136	43	71	36	46	90	62	72	48	43	59	66
15	76	88	132	110	129	278	208	137	136	89	85	92	97	136	78	101	78	47	77	128	130	100	163	252	123
16	260	183	169	97	130	139	210	198	139	83	51	62	94	83	131	216	264	255	263	114	116	103	169	253	158
17	154	123	81	136	162	163	159	146	112	97	105	111	145	91	160	167	101	86	136	161	160	114	69	94	126
18	74	117	109	97	63	101	75	101	108	140	137	195	231	209	259	268	178	275	164	94	80	74	130	140	142
19	137	126	152	153	114	94	74	43	42	42	64	94	161	158	91	164	179	52	51	35	41	50	78	64	94
20	92	93	98	53	48	43	55	63	79	70	45	89	113	100	74	50	35	25	32	79	65	56	61	52	65
21	79	85	65	91	91	95	52	33	65	93	59	66	166	147	69	17	23	17	25	34	28	44	44	45	64
22	45	46	46	64	64	118	131	46	93	141	162	149	109	94	94	84	46	81	186	250	229	209	174	163	118
23	177	101	91	47	89	98	64	66	29	30	39	117	115	136	164	47	51	47	30	35	33	24	21	23	70
24	20	19	16	20	26	27	50	41	20	23	23	21	23	27	28	27	25	26	53	77	104	85	128	61	40
25	36	28	23	23	23	21	21	22	29	24	21	25	23	24	25	24	24	20	22	28	39	43	46	54	28
26	60	80	78	115	204	142	160	159	94	47	50	61	73	112	230	153	312	265	184	173	214	131	148	96	139
27	47	142	313	173	241	275	269	225	212	251	206	103	114	193	168	228	252	204	213	221	203	177	185	93	196
28	136	87	72	60	58	61	44	89	114	104	112	38	45	78	140	129	81	49	52	60	39	34	30	39	73
29	40	42	43	34	40	61	63	75	122	155	157	151	171	135	45	17	108	59	61	37	51	60	90	93	80
30	104	90	91	107	159	125	127	155	213	309	299	242	162	108	92	25	51	34	29	30	39	67	45	29	114
31	23	30	33	39	36	35	41	27	20	24	46	83	160	141	74	143	121	122	76	51	84	80	136	93	72
MEAN	78	71	72	65	78	92	91	86	87	100	104	99	103	95	90	92	91	84	92	86	89	77	75	71	86
5Q MEAN	28	23	21	22	24	24	26	31	40	44	41	51	53	39	37	34	41	46	41	34	41	38	44	33	35
5D MEAN	111	124	141	122	173	164	165	178	151	134	123	87	89	106	161	165	198	172	174	174	183	138	116	98	144



1978 APRIL

AU HOURLY INDICES

00 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	DAILY
D	76	110	185	136	144	172	121	141	103	142	54	11	13	20	26	45	64	72	44	66	88	110	118	136	91
	121	142	143	158	92	33	18	14	19	30	35	65	87	44	19	22	59	76	101	118	99	195	151	80	80
	74	48	46	36	119	168	223	114	130	254	209	244	133	192	106	67	167	297	253	297	208	131	104	125	156
	135	152	179	191	254	142	154	275	165	69	57	31	40	24	35	27	274	157	193	189	120	173	126	160	138
	219	237	249	175	170	92	61	56	33	28	29	22	22	23	45	28	25	26	49	126	126	65	49	56	84
	67	49	57	87	104	43	38	40	49	38	31	72	62	63	65	41	32	23	35	34	33	24	26	39	48
	50	27	13	8	8	10	15	13	19	20	24	22	25	26	39	38	25	15	28	66	34	39	49	39	27
	43	37	25	25	44	37	30	26	24	28	23	30	43	31	26	34	31	67	76	48	33	42	42	41	37
	38	35	38	48	69	22	57	52	73	41	44	18	37	45	44	41	38	45	51	36	24	26	31	31	41
	29	31	29	35	44	39	31	36	35	48	31	24	29	67	95	43	169	228	118	86	169	232	411	404	103
D	320	382	376	221	304	198	271	175	68	61	89	88	53	43	48	50	59	118	217	174	115	205	168	210	167
	75	207	161	64	63	74	128	133	117	123	179	101	52	38	45	104	113	104	182	106	112	92	72	116	107
	83	56	124	120	95	49	65	79	81	122	128	136	97	77	174	203	153	211	178	183	177	254	278	3	130
D	99	205	214	179	247	280	263	259	99	197	370	316	380	353	136	178	167	176	172	210	196	166	144	189	216
	156	155	131	164	123	141	172	116	135	120	114	184	170	146	135	165	66	74	75	67	72	79	55	99	121
	102	110	75	67	91	43	60	56	42	61	103	114	88	37	18	11	22	26	23	65	120	93	45	55	64
	51	42	49	50	54	47	52	87	66	154	154	105	49	25	25	24	17	24	25	27	30	31	27	43	52
	52	67	158	304	276	159	49	64	62	35	46	66	40	43	63	66	41	85	181	163	118	119	74	51	99
	49	46	29	40	89	205	351	407	167	122	108	141	137	332	163	394	288	247	206	260	167	91	83	201	180
	107	196	207	234	148	72	56	63	74	154	142	97	74	87	99	194	190	161	169	95	74	138	241	152	134
	98	70	56	38	67	101	123	59	37	31	32	52	64	98	80	41	50	38	40	66	97	99	74	43	65
	43	49	34	36	58	35	25	26	26	30	42	52	45	47	52	42	26	29	36	37	107	116	98	69	48
	55	114	113	72	58	110	138	164	193	175	133	89	41	45	141	256	156	64	113	190	220	308	360	286	150
	112	257	402	303	279	337	268	156	301	325	178	221	127	104	159	209	222	193	136	67	58	46	135	185	199
D	124	186	187	152	170	108	62	124	104	175	178	140	137	106	70	72	90	150	130	75	55	39	139	68	119
	95	76	178	169	118	179	266	176	142	67	43	89	122	53	37	38	88	158	157	166	174	196	184	200	132
	141	144	184	149	91	119	65	98	57	111	149	130	130	140	128	215	202	180	112	106	162	244	314	299	153
	214	159	162	201	197	40	32	120	156	112	48	95	83	91	51	28	65	78	95	157	224	135	133	144	117
	127	129	93	55	87	85	69	112	169	187	115	81	67	91	63	39	59	128	170	236	246	216	238	213	128
D	174	206	253	235	282	310	285	205	167	154	401	491	393	424	451	723	699	274	118	112	182	391	534	214	320
MEAN	104	124	138	125	131	115	118	114	97	107	109	110	94	97	87	114	121	117	116	120	121	136	150	131	116
50 MEAN	61	54	43	37	52	40	44	58	70	86	72	51	44	43	39	35	34	55	70	82	73	70	77	73	57
5D MEAN	168	240	284	225	273	253	248	214	160	161	219	229	198	189	165	237	284	183	167	150	134	196	221	191	208

1978 MAY

AU HOURLY INDICES

00 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	DAILY
D 1	101	111	194	457	508	588	572	299	283	640	446	378	645	408	256	170	98	105	136	566	357	466	164	533	353
D 2	293	220	258	172	247	284	434	145	59	113	143	373	375	281	366	195	154	161	127	111	123	235	219	207	220
D 3	183	266	230	272	187	357	290	347	295	390	345	350	466	465	464	381	397	231	322	260	383	391	256	169	321
D 4	277	337	306	275	301	213	101	243	129	325	218	276	359	353	297	238	252	210	244	127	139	105	51	47	226
D 5	25	31	30	16	33	17	9	3	-1	-1	2	6	6	9	11	12	0	10	10	10	127	203	78	41	29
0 6	34	19	23	39	26	13	4	5	11	9	13	14	15	21	10	6	4	12	17	23	41	91	89	99	27
0 7	152	80	58	52	58	109	133	56	74	33	20	43	55	51	56	53	92	87	168	136	65	57	96	73	77
0 8	61	54	87	58	29	24	26	15	12	25	118	265	305	160	84	53	86	115	82	93	139	94	87	106	91
D 9	119	108	225	221	349	174	388	485	211	127	307	287	394	307	343	399	415	330	230	162	169	85	97	54	249
0 10	39	44	28	31	22	13	8	6	11	18	49	41	36	11	28	23	37	38	37	26	92	71	176	221	46
11	200	166	231	296	280	374	344	326	259	207	215	166	99	126	100	126	162	256	153	153	109	183	228	200	207
12	181	175	191	193	174	216	286	124	172	178	112	106	170	163	95	105	106	173	226	240	285	149	221	213	177
13	119	295	115	77	33	46	32	53	89	105	88	99	133	92	73	31	22	15	36	61	70	74	134	109	83
14	169	136	149	145	161	179	158	68	48	107	95	55	59	52	27	55	113	151	206	197	174	167	141	120	122
0 15	98	32	16	10	13	15	19	25	32	42	95	68	81	90	81	65	63	75	61	55	63	79	47	53	53
16	51	62	65	67	62	17	21	31	38	38	62	74	63	84	64	92	156	142	106	65	54	64	50	57	66
17	57	31	27	19	79	194	149	122	89	77	97	70	89	77	87	55	33	31	32	65	111	144	243	162	89
0 18	67	58	99	122	177	135	114	64	93	97	108	110	114	91	55	92	150	132	83	97	96	57	40	37	95
0 19	33	29	33	38	22	31	30	61	67	186	112	129	106	69	63	54	25	32	33	28	24	20	34	51	54
0 20	76	54	39	28	37	30	37	66	31	51	52	53	57	46	35	37	52	106	254	304	250	98	57	58	79
21	26	22	54	165	136	44	34	24	32	53	63	67	96	94	105	117	79	63	116	354	208	161	190	152	102
22	271	113	94	126	115	94	133	134	120	110	119	84	168	180	239	384	360	342	282	268	258	204	233	224	194
23	256	258	221	228	169	228	213	193	206	125	133	261	199	66	49	58	208	117	142	158	309	182	184	182	181
24	137	153	128	103	122	188	133	246	337	210	162	162	193	183	126	74	149	130	84	75	152	111	157	239	156
25	246	104	136	101	182	173	65	134	102	58	53	48	74	110	55	51	60	27	30	77	122	195	231	175	109
26	160	190	179	142	87	78	57	33	57	155	158	205	184	135	84	75	78	121	119	119	105	83	38	37	112
0 27	68	56	45	86	77	107	113	111	64	59	78	61	61	43	35	42	51	53	60	52	57	83	91	162	71
28	114	55	66	67	63	56	39	39	93	161	131	127	144	155	105	108	139	164	216	216	135	60	77	93	109
29	104	85	30	34	18	14	26	32	45	43	92	109	106	89	54	29	22	27	50	82	166	197	201	232	79
30	319	309	463	419	451	339	242	343	259	184	96	114	114	88	81	57	38	32	39	89	53	59	93	242	188
31	348	271	241	223	244	136	100	44	91	41	31	58	157	84	65	48	40	36	38	45	43	38	33	52	104
MFAN	141	126	131	138	143	144	139	125	109	127	123	137	165	134	115	105	117	113	120	139	144	135	130	141	131
50 MEAN	60	38	43	59	63	60	56	53	53	78	81	76	75	62	48	47	58	60	50	51	56	66	60	80	60
50 MFAN	194	208	242	279	318	323	357	303	195	319	291	332	447	362	345	276	263	207	211	245	234	256	157	202	274

1978 JUNE

AU HOURLY INDICES

QD 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	DAILY
D 1	38	25	52	154	164	152	203	99	194	138	55	34	31	6	24	31	37	38	34	45	33	36	131	81	76
D 2	46	50	45	60	63	96	332	302	146	406	544	413	243	224	554	378	505	644	568	270	203	140	148	120	271
D 3	160	62	80	214	110	92	95	122	152	221	176	86	46	30	18	26	53	92	140	223	105	41	29	29	100
D 4	47	93	140	152	135	55	25	36	54	60	97	97	133	171	125	51	74	109	137	145	227	324	260	179	122
D 5	222	218	359	390	320	351	278	326	272	339	287	213	63	55	31	36	36	44	57	59	88	114	133	149	185
D 6	149	77	57	42	20	3	39	43	67	118	116	137	114	89	35	34	47	52	72	117	129	168	173	190	87
D 7	208	207	177	74	61	161	109	27	32	125	97	120	119	68	46	39	76	146	232	189	208	241	236	267	136
D 8	164	189	158	146	198	249	233	102	26	17	12	4	28	66	73	91	188	181	170	149	90	47	48	33	111
D 9	23	26	42	97	160	144	41	44	14	36	44	22	14	26	17	18	19	22	21	25	49	39	35	38	42
D 10	49	41	92	59	26	13	13	12	113	237	193	214	171	240	97	82	267	265	228	129	70	101	212	136	128
D 11	155	150	151	260	179	81	140	234	323	302	223	111	60	85	77	48	60	54	54	47	56	48	43	26	124
D 12	25	25	29	18	16	72	8	13	18	122	219	305	164	101	93	100	149	205	208	175	111	43	35	30	95
D 13	59	74	37	18	42	21	11	24	50	203	107	64	87	115	66	47	33	50	40	51	56	96	116	105	65
D 14	78	83	86	44	60	30	19	20	48	52	25	19	18	20	16	32	59	97	92	58	76	66	97	122	55
D 15	142	194	151	84	112	223	190	200	278	249	145	142	126	98	81	75	78	63	53	44	39	32	34	26	119
D 16	33	21	21	45	58	54	55	33	30	61	85	105	102	78	44	44	38	80	91	118	101	112	160	170	72
D 17	145	158	56	121	198	228	109	65	70	86	243	226	130	90	68	50	92	132	181	177	143	68	73	112	126
D 18	126	65	30	36	30	57	171	236	139	139	194	253	244	162	60	93	90	60	100	91	78	84	128	123	116
D 19	184	217	151	116	65	182	239	236	175	191	231	195	127	45	49	108	156	207	165	104	117	153	384	339	172
D 20	288	147	67	84	180	235	191	191	151	149	98	166	131	55	37	57	54	78	99	123	106	142	255	269	140
D 21	204	238	242	447	338	325	265	199	113	67	66	191	118	77	144	273	196	165	262	366	214	129	58	264	207
D 22	219	187	235	199	156	66	132	144	46	82	136	230	128	73	124	118	84	185	211	196	175	139	87	178	147
D 23	217	240	227	123	60	38	28	75	166	218	211	128	62	57	32	56	159	295	318	271	289	298	358	285	175
D 24	221	259	269	243	232	257	274	231	170	156	133	145	82	185	173	75	90	121	135	111	158	174	186	182	178
D 25	205	184	201	221	128	96	110	128	248	142	91	111	156	192	103	106	71	289	364	174	156	185	228	210	171
D 26	239	147	105	148	320	474	406	399	421	281	315	282	166	224	362	447	413	322	458	515	439	274	350	325	324
D 27	299	228	203	218	215	210	222	188	70	73	147	99	201	138	48	52	106	175	193	205	176	98	53	120	156
D 28	157	56	77	100	110	68	65	46	123	269	226	168	185	111	129	188	151	171	137	125	123	199	152	100	135
D 29	52	22	25	30	68	65	99	166	155	104	70	58	79	86	104	51	60	92	106	112	212	304	188	368	111
D 30	292	143	77	63	22	125	249	278	275	463	434	283	210	197	161	130	158	232	284	196	62	46	32	23	185
MEAN	148	127	121	133	128	139	145	140	137	170	167	154	117	105	99	97	119	155	173	153	136	131	147	153	137
50 MEAN	67	79	67	57	86	94	63	64	84	120	81	70	69	67	44	43	45	62	59	59	64	69	88	92	70
50 MEAN	200	159	165	221	212	264	306	300	245	311	329	276	160	155	250	252	261	281	325	281	201	140	144	176	234

AL HOURLY INDICES

1978 JANUARY

00 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	DAILY
1	-10	-9	-10	-7	-8	-11	-23	-32	-24	-9	-13	-20	-33	-18	-21	-32	-112	-171	-14	-28	-231	-294	-117	-76	-55
2	-75	-15	-184	-208	-63	-8	-4	0	-15	-37	-28	-58	-39	-26	-22	-30	-36	-35	-24	-19	-80	-80	-38	-11	-47
3	-12	-11	-15	-21	-15	-17	-39	-19	-16	-12	-13	-44	-56	-119	-244	-351	-165	-132	-127	-104	-256	-611	-255	-77	-114
D 4	-305	-248	-445	-654	-339	-289	-523	-692	-453	-524	-603	-892	-658	-1004	-850	-960	-1051	-1571	-1255	-927	-437	-659	-458	-262	-669
D 5	-967	-638	-353	-318	-484	-345	-196	-286	-205	-139	-120	-117	-61	-59	-39	-39	-201	-179	-22	-36	-44	-110	-46	-48	-211
D 6	-44	-130	-586	-470	-302	-80	-32	-22	-22	-30	-28	-25	-34	-59	-61	-76	-101	-284	-474	-444	-105	-121	-271	-278	-170
7	-83	-19	-19	-21	-23	-21	-26	-33	-115	-145	-111	-121	-118	-138	-155	-448	-414	-59	-21	-23	-51	-91	-416	-261	-122
8	-220	-432	-174	-24	-29	-15	-15	-11	-8	-41	-178	-149	-130	-335	-419	-313	-57	-14	-56	-33	-117	-279	-111	-132	-132
9	-63	-116	-191	-129	-89	-75	-147	-147	-391	-186	-156	-180	-139	-79	-195	-156	-301	-784	-603	-278	-433	-552	-587	-395	-265
10	-473	-414	-414	-353	-282	-191	-199	-108	-116	-221	-49	-47	-29	-55	-125	-338	-555	-333	-152	-73	-139	-201	-44	-23	-206
11	-14	-15	-22	-11	-75	-161	-113	-42	-23	-15	-101	-187	-248	-68	-184	-154	-113	-66	-54	-43	-22	-26	-41	-20	-76
12	-14	-31	-33	-105	-7	-5	-9	-14	-17	-15	-17	-15	-14	-19	-17	-23	-28	-41	-37	-66	-129	-95	-92	-63	-38
13	-22	-23	-73	-203	-53	-85	-218	-196	-106	-68	-273	-178	-110	-174	-256	-175	-116	-36	-40	-87	-248	-176	-252	-88	-136
14	-20	-31	-75	-25	-18	-44	-106	-123	-83	-70	-41	-57	-32	-29	-24	-22	-21	-63	-29	-31	-29	-67	-42	-35	-47
15	-9	-11	-13	-20	-12	-10	-6	-6	-7	-7	-107	-159	-51	-8	-15	-20	-17	-20	-28	-27	-23	-12	-13	-10	-25
16	-5	-5	-3	-2	0	-9	-18	-30	-5	-11	-11	-45	-84	-527	-712	-580	-380	-313	-383	-388	-271	-101	-187	-433	-188
17	-423	-231	-181	-203	-184	-73	-77	-46	-32	-27	-29	-17	-18	-22	-184	-68	-33	-92	-134	-116	-93	-59	-160	-256	-115
18	-324	-307	-505	-338	-197	-165	-122	-115	-148	-99	-152	-128	-119	-187	-101	-61	-19	-12	-12	-13	-18	-22	-11	-20	-133
19	-59	-148	-183	-132	-30	-1	-9	-44	-115	-142	-121	-51	-73	-196	-262	-103	-123	-114	-88	-31	-60	-134	-81	-39	-98
20	-30	-37	-17	-7	-3	-13	-126	-81	-56	-26	-7	-10	-10	-15	-61	-191	-63	-23	-17	-9	-7	-8	-9	-11	-33
21	-8	-5	-2	-2	0	0	-4	-5	-7	-5	-14	-23	-12	-3	-3	-5	-7	-9	-8	-4	-4	-10	-18	-13	-7
22	-10	-8	-7	-3	0	0	-58	-67	-76	-64	-47	-43	-49	-49	-7	-3	-1	-1	-4	-3	-7	-7	-4	-3	-22
23	-6	-5	-2	-3	-4	-3	-1	-1	-5	-6	-9	-11	-9	-6	-6	-8	-17	-142	-101	-40	-25	-12	-8	-10	-18
24	-13	-8	-6	-6	-3	-6	-38	-17	-28	-13	-5	-8	-26	-14	-13	-57	-353	-182	-57	-10	-3	-6	-3	-36	-36
25	-7	-12	-21	-11	-26	-116	-158	-92	-98	-118	-132	-156	-180	-113	-102	-156	-170	-199	-190	-113	-42	-69	-65	-129	-103
26	-453	-147	4	-9	-41	-97	-100	-54	-52	-268	-174	-50	-31	-18	-44	-79	-65	-39	-127	-48	-18	-36	-52	-78	-86
27	-36	-27	-17	-13	-24	-58	-13	-11	-14	-16	-47	-23	-9	-20	-28	-29	-44	-26	-79	-58	-87	-72	-76	-44	-36
28	-29	-34	-35	-22	-20	-23	-55	-67	-32	-132	-34	-36	-36	-25	-23	-114	-526	-365	-363	-325	-40	-136	-186	-16	-111
29	-108	-195	-45	-12	-154	-274	-329	-267	-185	-368	-638	-289	-162	-749	-1255	-831	-440	-498	-174	-35	-39	-105	-131	-43	-304
30	-56	-47	-28	-40	-71	-216	-403	-765	-633	-1120	-762	-446	-222	-72	-74	-78	-73	-43	-42	-64	-73	-274	-200	-306	-235
31	-433	-172	-138	-186	-37	-34	-180	-227	-309	-151	-186	-309	-373	-326	-404	-229	-346	-571	-547	-528	-416	-170	-77	-129	-270
MEAN	-139	-113	-122	-114	-83	-78	-107	-116	-109	-130	-131	-126	-102	-139	-187	-186	-200	-208	-168	-129	-111	-143	-136	-106	-133
50 MEAN	-10	-12	-19	-10	-6	-11	-35	-40	-35	-30	-43	-58	-30	-19	-11	-11	-12	-47	-34	-21	-17	-21	-17	-14	-23
50 MEAN	-296	-251	-291	-298	-270	-240	-296	-406	-299	-432	-430	-353	-227	-388	-455	-396	-373	-515	-393	-301	-139	-253	-221	-187	-321

1978 FEBRUARY

AL HOURLY INDICES

GD 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	DAILY
1	-360	-99	-78	-98	-129	-57	-136	-124	-42	-32	-44	-69	-252	-141	-185	-61	-119	-340	-342	-105	-9	-29	-116	-413	-141
2	-345	-99	-31	-76	-136	-144	-57	-93	-98	-86	-164	-213	-27	-7	-21	-17	-18	-26	-99	-38	-19	-226	-295	-176	-105
3	-317	-133	-28	-129	-140	-129	-122	-100	-128	-88	-82	-222	-339	-155	-93	-502	-264	-372	-154	-40	-151	-122	-108	-264	-174
4	-229	-183	-108	-32	-68	-87	-64	-38	-63	-75	-14	-10	-17	-54	-24	-88	-18	-17	-24	-22	-96	-12	-30	-35	-59
5	-45	-84	-328	-368	-354	-300	-216	-170	-142	-223	-156	-334	-303	-268	-241	-485	-352	-247	-407	-536	-209	-139	-160	-127	-258
6	-136	-89	-4	-7	-18	-48	-133	-33	-17	-8	-35	-38	-36	-80	-431	-257	-125	-322	-330	-379	-151	-9	-17	-25	-114
7	-21	-16	-8	-6	-5	-9	-9	-9	-9	-17	-20	-20	-15	-17	-17	-10	-88	-136	-160	-64	-35	-91	-33	-5	-34
8	-32	-38	-53	-12	-3	-14	-89	-127	-76	-15	-38	-97	-281	-338	-246	-274	-373	-235	-230	-214	-107	-259	-176	-139	-139
9	-41	-117	-23	-3	0	-12	-88	-251	-345	-362	-474	-505	-447	-425	-314	-249	-180	-228	-262	-324	-334	-271	-180	-171	-234
10	-230	-114	-34	-5	-12	-8	-11	-19	-41	-39	-43	-33	-32	-9	-12	-3	-9	-37	-242	-149	-32	-11	-2	-5	-47
11	-38	-27	-9	-6	-3	-2	-25	-49	-70	-250	-41	-11	-15	-6	-7	-35	-122	-44	-3	-3	-3	0	-2	-7	-32
12	-10	-6	-2	-4	-3	-3	-3	-21	-164	-88	-8	-11	-8	-10	-7	-13	-17	-140	-326	-299	-191	-114	-175	-187	-4
13	-25	-29	-232	-159	-29	-7	3	-16	-24	-33	-19	-14	-20	-20	-23	-75	-204	-281	-217	-148	-122	-32	-17	-16	-73
14	-43	-187	-44	-47	-54	-43	-22	-34	-84	-115	-127	-336	-208	-55	-62	-128	-243	-198	-58	-30	-57	-110	-148	-216	-110
15	-295	-287	-185	-159	-161	-212	-132	-367	-656	-281	-1296	-934	-93	-164	-115	-74	-85	-54	-59	-41	-47	-44	-47	-38	-243
16	-40	-44	-32	-29	-27	-35	-38	-45	-82	-224	-249	-308	-118	-230	-165	-194	-248	-321	-388	-258	-190	-304	-281	-251	-171
17	-216	-143	-248	-160	-13	-4	-16	-18	-20	-20	-21	-21	-23	-20	-46	-133	-93	-52	-101	-50	-95	-120	-103	-83	-76
18	-101	-63	-41	-38	-38	-33	-36	-174	-68	-38	-43	-71	-61	-197	-227	-116	-91	-179	-229	-77	-208	-37	-80	-100	-98
19	-97	-177	-143	-233	-232	-83	-40	-45	-18	-23	-30	-115	-191	-214	-191	-184	-197	-188	-199	-193	-173	-191	-157	-220	-149
20	-148	-117	-58	-92	-111	-119	-171	-281	-124	-85	-123	-113	-526	-196	-82	-37	-106	-262	-255	-181	-113	-59	-229	-114	-154
21	-51	-61	-34	-70	-16	-18	-41	-8	-2	-6	-33	-82	-93	-126	-153	-232	-559	-606	-374	-430	-429	-340	-289	-192	-177
22	-193	-278	-303	-248	-362	-351	-254	-57	-36	-33	-34	-56	-280	-236	-165	-380	-400	-399	-260	-78	-89	-183	-297	-486	-228
23	-52	-15	-11	-4	-4	-23	-13	-10	-11	-13	-31	-54	-36	-76	-21	-17	-21	-30	-19	-17	-37	-31	-66	-71	-28
24	-69	-42	-23	-39	-28	-12	-47	-76	-54	-65	-164	-184	-142	-86	-92	-137	-99	-52	-40	-8	-11	-15	-17	-13	-63
25	-11	-13	-11	-7	-15	-35	-136	-52	-42	-15	-24	-197	-123	-42	-11	-11	-11	-4	-2	-15	-74	-176	-218	-119	-57
26	-193	-267	-157	-159	-118	-173	-50	-77	-46	-217	-102	-58	-283	-506	-532	-372	-426	-511	-586	-459	-469	-285	-160	-204	-267
27	-205	-390	-362	-82	-272	-397	-305	-218	-77	-338	-273	-113	-717	-1091	-469	-792	-976	-613	-389	-496	-437	-401	-493	-154	-419
28	-78	-59	-230	-542	-387	-416	-486	-420	-288	-293	-206	-283	-422	-372	-191	-275	-660	-812	-812	-375	-876	-512	-175	-46	-384
MEAN	-129	-113	-102	-100	-97	-98	-98	-109	-98	-107	-138	-158	-175	-181	-151	-183	-218	-250	-233	-176	-171	-144	-148	-133	-146
50 MEAN	-82	-42	-17	-12	-10	-10	-21	-32	-37	-76	-59	-60	-48	-38	-29	-40	-67	-57	-92	-48	-23	-29	-24	-20	-40
50 MEAN	-192	-256	-247	-238	-260	-309	-245	-227	-220	-232	-382	-288	-359	-473	-294	-378	-509	-477	-421	-289	-383	-285	-234	-185	-308



1978 MARCH

AL HOURLY INDICES

00 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	DAILY
D 1	-160	-301	-358	-255	-15	-51	-59	-81	-129	-528	-333	-154	-37	-263	-708	-707	-498	-600	-565	-563	-315	-459	-479	-237	-327
D 2	-278	-246	-93	-53	-149	-311	-162	-446	-555	-167	-71	-47	-163	-119	-53	-190	-275	-181	-193	-487	-283	-107	-84	-116	-201
D 3	-240	-379	-125	-57	-38	-167	-170	-64	-49	-137	-231	-308	-360	-176	-190	-184	-291	-250	-488	-255	-241	-344	-243	-130	-213
0 4	-13	-8	-12	-19	-27	-19	-15	-16	-13	-46	-38	-25	-23	-25	-22	-24	-25	-20	-21	-14	-9	-7	-4	-4	-19
0 5	-6	-7	-11	-9	-8	-13	-23	-65	-139	-137	-126	-132	-351	-285	-251	-123	-299	-257	-147	-29	-8	-10	-9	-10	-102
6	-15	-21	-18	-9	-9	-11	-17	-24	-20	-19	-32	-365	-298	-71	-111	-299	-103	-42	-15	-5	-8	-1	-4	-8	-64
7	-15	-23	-27	-22	-16	-146	-16	-20	-28	-44	-151	-176	-122	-307	-300	-267	-189	-60	-24	-17	-27	-11	-77	-15	-87
8	-13	-8	-7	-8	-6	-10	-21	-26	-25	-23	-24	-32	-32	-32	-30	-37	-24	-55	-23	-579	-741	-222	-48	-41	-96
9	-79	-155	-246	-331	-217	-173	-141	-78	-115	-321	-321	-104	-72	-48	-64	-160	-162	-77	-93	-313	-439	-147	-28	-21	-163
10	-23	-29	-31	-37	-29	-27	-129	-178	-380	-378	-436	-417	-464	-548	-337	-67	-71	-129	-87	-47	-87	-22	-10	-12	-166
11	-15	-23	-61	-41	-32	-29	-32	-94	-60	-143	-212	-141	-57	-57	-94	-129	-186	-205	-72	-29	-24	-20	-29	-32	-76
12	-24	-11	-12	-16	-15	-15	-62	-44	-61	-33	-28	-30	-58	-43	-27	-18	-16	-15	-36	-32	-14	-7	-14	-15	-27
13	-94	-39	-16	-31	-233	-308	-285	-271	-278	-316	-252	-193	-144	-201	-220	-43	-22	-21	-120	-318	-328	-94	-34	-50	-163
14	-79	-157	-154	-107	-72	-110	-117	-134	-23	-17	-19	-121	-212	-242	-71	-106	-73	-21	-214	-215	-42	-6	-3	-35	-98
15	-71	-317	-110	-111	-342	-376	-168	-108	-107	-234	-161	-88	-71	-64	-57	-222	-93	-67	-78	-315	-333	-196	-112	-267	-170
16	-464	-253	-179	-302	-465	-151	-288	-216	-137	-21	-27	-98	-135	-161	-402	-384	-413	-343	-205	-234	-137	-112	-176	-487	-240
17	-257	-335	-169	-158	-303	-370	-171	-306	-321	-21	-28	-125	-377	-395	-480	-639	-383	-188	-223	-509	-578	-210	-72	-92	-280
18	-70	-483	-591	-425	-53	-38	-70	-172	-103	-415	-448	-313	-499	-564	-524	-556	-291	-341	-234	-80	-42	-96	-350	-387	-398
19	-373	-223	-206	-426	-306	-80	-54	-52	-22	-11	-46	-298	-457	-321	-314	-353	-365	-48	-63	-52	-18	-20	-115	-71	-179
20	-77	-94	-74	-36	-27	-26	-25	-50	-89	-61	-18	-97	-177	-199	-179	-37	-46	-18	-27	-66	-137	-63	-90	-91	-75
21	-98	-138	-93	-104	-104	-215	-44	-8	-80	-160	-183	-134	-164	-152	-97	-27	-35	-47	-27	-28	-25	-32	-47	-58	-88
22	-32	-18	-18	-19	-55	-188	-100	-16	-56	-234	-227	-73	-53	-144	-158	-72	-74	-218	-329	-367	-411	-487	-466	-169	-166
23	-105	-294	-289	-46	-50	-198	-161	-39	-24	-22	-30	-224	-360	-388	-379	-151	-75	-169	-18	-12	-9	-13	-20	-24	-129
24	-20	-27	-28	-26	-17	-29	-136	-46	-22	-26	-31	-26	-21	-22	-19	-14	-8	-36	-99	-101	-105	-52	-84	-264	-52
25	-20	-15	-19	-20	-13	-14	-13	-17	-23	-25	-29	-27	-44	-42	-33	-23	-21	-17	-8	-7	-2	-1	-6	-11	-19
26	-12	-67	-404	-432	-140	-67	-65	-116	-34	-20	-29	-37	-32	-148	-403	-213	-195	-538	-756	-781	-548	-101	-117	-185	-227
D 27	-481	-451	-411	-391	-322	-459	-382	-556	-351	-531	-303	-81	-343	-641	-711	-737	-544	-440	-658	-567	-277	-170	-390	-565	-448
28	-173	-77	-298	-339	-140	-46	-34	-87	-328	-237	-137	-56	-90	-477	-659	-504	-132	-97	-98	-93	-18	-18	-17	-29	-174
29	-35	-41	-62	-212	-104	-82	-194	-157	-216	-497	-318	-294	-304	-209	-170	-70	-392	-161	-25	-12	-53	-38	-94	-152	-162
30	-182	-295	-235	-212	-356	-338	-281	-319	-347	-425	-485	-359	-222	-444	-175	-47	-123	-121	-50	-7	-24	-81	-114	-33	-220
31	-27	-29	-34	-37	-55	-28	-34	-36	-30	-29	-31	-229	-201	-188	-188	-333	-330	-267	-109	-36	-101	-158	-186	-94	-116
MEAN	-113	-147	-141	-138	-119	-132	-111	-123	-134	-170	-155	-154	-191	-225	-239	-217	-185	-162	-172	-199	-173	-106	-113	-119	-156
50 MEAN	-16	-13	-16	-18	-16	-18	-49	-37	-51	-53	-50	-48	-99	-83	-70	-40	-73	-69	-62	-36	-27	-15	-23	-60	-43
5D MEAN	-237	-280	-287	-257	-185	-251	-167	-301	-278	-253	-152	-88	-190	-313	-471	-497	-379	-389	-479	-581	-400	-209	-228	-239	-296

AL HOURLY INDICES

1978 APRIL

QD 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 DAILY	
	-71	-131	-407	-272	-422	-325	-228	-216	-97	-137	73	-31	-27	-28	-29	-43	-167	-257	-131	-58	-78	-161	-90	-170	-152
	-239	-140	-286	-281	-42	-44	-36	-45	-26	-20	-40	-154	-280	-169	-24	-22	-56	-212	-236	-327	-138	-206	-273	-31	-139
	-14	-31	-24	-23	-73	-503	-480	-269	-96	-315	-265	-257	-370	-373	-162	-151	-203	-522	-480	-614	-598	-643	-587	-367	-309
D	-551	-462	-339	-252	-336	-454	-344	-148	-36	-20	-30	-17	-39	-16	-29	-15	-222	-800	-646	-519	-705	-634	-519	-786	-330
	-495	-96	-248	-137	-404	-395	-85	-108	-49	-45	-24	-22	-22	-16	-26	-48	-57	-24	-32	-156	-310	-115	-57	-74	-127
	-107	-52	-85	-116	-249	-55	-39	-47	-126	-115	-61	-84	-163	-102	-96	-65	-71	-28	-14	-26	-9	-16	-17	-35	-74
Q	-55	-25	-32	-31	-30	-37	-48	-36	-30	-30	-43	-39	-38	-32	-40	-71	-57	-29	-20	-37	-32	-29	-68	-31	-38
Q	-33	-33	-39	-41	-81	-64	-41	-33	-31	-18	-27	-48	-45	-34	-42	-29	-50	-124	-178	-59	-75	-15	-35	-25	-50
Q	-29	-32	-75	-66	-175	-60	-84	-87	-55	-93	-72	-35	-33	-38	-65	-43	-39	-30	-17	-37	-36	-20	-24	-25	-53
Q	-29	-25	-25	-31	-34	-65	-37	-29	-40	-66	-35	-24	-35	-30	-56	-54	-96	-383	-57	-15	-33	-122	-588	-314	-93
D	-458	-622	-395	-341	-407	-597	-253	-302	-157	-132	-270	-119	-41	-25	-62	-58	-132	-110	-234	-194	-108	-348	-291	-301	-248
	-366	-330	-108	-49	-64	-47	-110	-321	-244	-137	-283	-154	-49	-34	-41	-173	-203	-237	-282	-105	-178	-120	-127	-199	-165
	-138	-40	-223	-158	-54	-39	-25	-51	-130	-195	-117	-102	-130	-91	-257	-346	-415	-398	-204	-404	-296	-301	-566	-839	-230
D	-472	-261	-205	-201	-316	-337	-282	-224	-26	-127	-593	-962	-734	-417	-159	-196	-237	-129	-178	-319	-285	-143	-74	-101	-291
	-531	-461	-196	-127	-236	-121	-109	-245	-248	-124	-86	-212	-274	-248	-284	-226	-41	-109	-90	-52	-44	-103	-25	-95	-179
	-280	-273	-210	-139	-165	-62	-51	-87	-48	-54	-140	-195	-118	-44	-27	-30	-28	-31	-32	-96	-135	-131	-46	-35	-102
Q	-109	-49	-27	-28	-41	-87	-80	-128	-170	-169	-157	-144	-64	-25	-17	-11	-13	0	4	-3	-7	-10	-23	-29	-58
	-25	-34	-306	-646	-452	-257	-90	-53	-131	-69	-26	-62	-52	-11	-28	-45	-57	-68	-141	-199	-152	-93	-21	-11	-126
	-14	-17	-16	-17	-27	-73	-186	-396	-195	-95	-86	-140	-190	-580	-182	-494	-380	-338	-306	-579	-241	-34	-47	-107	-198
	-560	-442	-365	-269	-102	-40	-38	-26	-113	-196	-193	-99	-35	-83	-157	-298	-241	-119	-189	-122	-107	-166	-403	-322	-195
	-328	-136	-118	-57	-125	-117	-173	-110	-69	-27	-27	-31	-134	-242	-270	-46	-81	-43	-71	-73	-212	-114	-79	-37	-113
	-33	-74	-57	-66	-108	-46	-57	-20	-15	-14	-24	-22	-19	-18	-34	-43	-46	-26	-18	-18	-78	-297	-222	-88	-60
	-47	-123	-395	-137	-33	-140	-126	-99	-251	-338	-138	-115	-47	-17	-147	-608	-330	-62	-115	-285	-222	-268	-430	-363	-202
D	-397	-294	-447	-647	-357	-347	-366	-133	-327	-297	-155	-449	-314	-229	-311	-455	-465	-502	-164	-18	-25	-33	-60	-556	-306
	-296	-236	-573	-146	-235	-140	-42	-77	-247	-406	-263	-121	-276	-183	-112	-87	-88	-214	-235	-30	-19	-25	-88	-83	-176
	-168	-79	-343	-490	-252	-206	-453	-357	-369	-24	-38	-91	-203	-137	-61	-3	-89	-434	-290	-162	-111	-195	-253	-282	-213
	-231	-261	-301	-203	-134	-145	-51	-66	-28	-20	-304	-220	-280	-258	-238	-239	-287	-313	-197	-141	-107	-193	-272	-328	-201
	-232	-245	-264	-171	-114	-29	-27	-105	-194	-117	-22	-81	-167	-116	-101	-59	-107	-139	-113	-141	-161	-132	-121	-91	-127
Q	-87	-88	-46	-20	-28	-71	-37	-46	-76	-101	-72	-61	-79	-187	-94	-59	-74	-215	-293	-224	-202	-173	-176	-235	-114
D	-229	-270	-276	-278	-277	-197	-212	-248	-163	-154	-652	-342	-590	-474	-595	-770	-1148	-244	-22	11	-80	-246	-524	-155	-339
MEAN	-220	-178	-215	-181	-179	-170	-139	-137	-126	-121	-143	-147	-161	-142	-124	-159	-182	-204	-166	-166	-159	-169	-203	-203	-166
50 MEAN	-62	-45	-43	-37	-71	-63	-56	-66	-72	-82	-74	-65	-51	-65	-51	-42	-46	-79	-100	-72	-70	-49	-65	-69	-62
50 MEAN	-421	-381	-332	-343	-336	-386	-291	-211	-141	-146	-340	-377	-343	-232	-231	-298	-440	-357	-248	-207	-240	-280	-293	-379	-302

## AL HOURLY INDICES

1978 MAY

QD 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	DAILY
D 1	-84	-80	-84	-188	-582	-585	-377	-271	-200	-299	-357	-271	-922	-1345	-535	-243	-86	-71	-77	-355	-340	-539	-929	-343	-382
D 2	-402	-449	-286	-117	-225	-260	-1006	-835	-959	-791	-714	-486	-621	-690	-582	-326	-273	-210	-182	-124	-138	-351	-323	-363	-446
D 3	-140	-209	-379	-516	-430	-459	-389	-557	-719	-635	-669	-690	-486	-592	-703	-879	-872	-762	-629	-610	-490	-728	-924	-717	-591
D 4	-461	-621	-683	-719	-478	-1278	-863	-683	-738	-453	-657	-483	-567	-684	-488	-372	-306	-332	-332	-137	-120	-114	-61	-37	-478
D 5	-31	-49	-43	-31	-46	-41	-37	-33	-33	-43	-42	-35	-42	-29	-27	-24	-33	-26	-26	-30	-129	-298	-121	-45	-54
D 6	-46	-46	-48	-39	-40	-37	-40	-44	-34	-33	-34	-34	-35	-36	-26	-34	-32	-33	-45	-48	-53	-121	-157	-83	-49
D 7	-173	-96	-56	-72	-68	-118	-117	-58	-79	-106	-41	-36	-41	-50	-104	-133	-83	-109	-263	-190	-28	-34	-39	-33	-89
D 8	-34	-40	-50	-86	-42	-39	-45	-37	-33	-26	-39	-367	-483	-461	-271	-137	-159	-152	-44	-19	-24	-33	-18	-55	-112
D 9	-70	-215	-339	-222	-337	-121	-390	-752	-370	-266	-1007	-735	-709	-924	-758	-530	-355	-341	-199	-191	-208	-55	-55	-49	-383
D 10	-35	-46	-33	-51	-47	-49	-48	-49	-41	-44	-43	-50	-68	-40	-53	-97	-88	-79	-70	-37	-78	-92	-206	-237	-70
D 11	-156	-162	-277	-622	-849	-597	-476	-617	-397	-160	-288	-160	-124	-213	-165	-147	-148	-321	-318	-139	-83	-134	-283	-279	-296
D 12	-269	-174	-148	-195	-289	-350	-368	-262	-305	-193	-91	-92	-275	-356	-297	-146	-163	-232	-338	-443	-292	-123	-162	-289	-244
D 13	-448	-428	-107	-35	-41	-43	-38	-36	-40	-54	-72	-114	-169	-129	-142	-104	-71	-27	-30	-60	-71	-42	-150	-68	-105
D 14	-157	-168	-145	-118	-215	-167	-110	-68	-44	-106	-149	-100	-58	-124	-98	-135	-205	-285	-268	-152	-107	-124	-78	-75	-136
D 15	-61	-53	-46	-38	-33	-31	-31	-26	-18	-15	-29	-22	-43	-34	-31	-116	-70	-63	-23	-12	-11	-45	-12	-23	-37
D 16	-21	-31	-112	-88	-47	-35	-28	-23	-19	-10	-12	-36	-76	-160	-124	-109	-174	-132	-55	-10	-7	-24	-32	-31	-58
D 17	-63	-32	-31	-23	-21	-136	-375	-168	-37	-25	-80	-114	-182	-130	-113	-130	-67	-30	-11	-48	-81	-289	-206	-170	-107
D 18	-44	-30	-67	-176	-195	-117	-58	-34	-31	-44	-74	-67	-154	-123	-112	-69	-201	-296	-67	-71	-54	-42	-43	-34	-92
D 19	-25	-22	-22	-37	-26	-34	-25	-24	-83	-148	-106	-108	-98	-84	-50	-76	-59	-15	-18	-8	-15	-25	-25	-26	-48
D 20	-47	-45	-26	-21	-28	-29	-19	-38	-32	-24	-20	-22	-18	-19	-19	-12	-17	-69	-488	-461	-209	-38	-28	-26	-73
D 21	-32	-43	-40	-87	-189	-31	-33	-40	-30	-23	-18	-33	-60	-58	-33	-27	-24	-55	-46	-331	-721	-684	-601	-560	-158
D 22	-255	-53	-85	-148	-213	-113	-67	-42	-76	-37	-260	-143	-350	-297	-359	-523	-617	-466	-447	-503	-496	-336	-264	-195	-264
D 23	-142	-251	-242	-238	-355	-293	-226	-268	-208	-60	-96	-244	-199	-88	-84	-130	-187	-247	-212	-108	-280	-248	-140	-295	-202
D 24	-467	-297	-76	-54	-75	-182	-289	-261	-381	-357	-193	-192	-306	-521	-273	-120	-256	-201	-47	-93	-115	-93	-105	-294	-225
D 25	-276	-33	-113	-139	-191	-223	-119	-102	-104	-14	-25	-9	-50	-196	-75	-54	-83	-78	-49	-90	-145	-121	-421	-263	-123
D 26	-212	-158	-238	-147	-85	-81	-150	-32	-18	-82	-206	-401	-391	-255	-194	-179	-171	-203	-166	-137	-192	-56	-41	-40	-160
D 27	-37	-62	-39	-48	-96	-99	-169	-132	-35	-62	-110	-47	-36	-43	-71	-110	-143	-106	-55	-53	-69	-54	-88	-222	-83
D 28	-95	-36	-44	-49	-49	-46	-28	-25	-19	-87	-267	-223	-241	-222	-206	-199	-140	-174	-303	-257	-87	-32	-34	-45	-121
D 29	-81	-64	-25	-29	-29	-23	-14	-17	-16	-40	-38	-105	-124	-109	-114	-67	-33	-13	-15	-56	-83	-206	-220	-160	-70
D 30	-179	-682	-528	-461	-404	-283	-165	-212	-186	-64	-61	-65	-71	-53	-148	-137	-69	-54	-42	-122	-52	-18	-79	-92	-176
D 31	-236	-273	-216	-93	-280	-102	-44	-57	-85	-54	-19	3	-85	-111	-45	-42	-29	-19	-14	-11	-12	-6	-13	-34	-78
MFAN	-154	-159	-149	-157	-193	-193	-198	-180	-173	-140	-187	-176	-234	-263	-203	-174	-167	-168	-157	-156	-154	-164	-188	-167	-177
50 MEAN	-42	-42	-44	-67	-78	-63	-64	-52	-60	-60	-70	-55	-73	-64	-58	-81	-101	-102	-41	-38	-40	-57	-65	-77	-61
5D MEAN	-231	-314	-354	-352	-410	-540	-605	-579	-597	-488	-680	-533	-661	-847	-613	-470	-378	-343	-283	-283	-259	-357	-458	-301	-456

1978 JUNE

AL HOURLY INDICES

00 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	DAILY	
D	-40	-43	-56	-167	-127	-96	-157	-88	-156	-227	-85	-57	-33	-33	-61	-35	-35	-32	-21	-49	-32	-34	-127	-70	-78	
D	-30	-56	-45	-43	-87	-108	-304	-353	-246	-275	-619	-358	-110	-86	-311	-654	-473	-534	-557	-708	-262	-65	-92	-111	-270	
D	-327	-350	-119	-149	-92	-54	-94	-90	-263	-186	-327	-224	-67	-30	-39	-93	-108	-168	-257	-392	-119	-43	-39	-50	-153	
D	-73	-169	-286	-242	-255	-124	-51	-56	-118	-116	-92	-161	-315	-459	-145	-47	-176	-175	-145	-165	-254	-497	-803	-583	-230	
D	-366	-402	-759	-750	-890	-558	-582	-508	-310	-402	-332	-193	-161	-49	-36	-22	-38	-66	-33	-29	-37	-76	-222	-224	-293	
D	-189	-80	-72	-55	-46	-46	-42	-50	-65	-123	-163	-258	-213	-217	-132	-111	-140	-104	-80	-100	-238	-280	-225	-275	-138	
D	-305	-305	-239	-56	-65	-228	-230	-33	-29	-68	-113	-132	-153	-144	-131	-147	-161	-263	-430	-340	-285	-283	-201	-219	-190	
D	-124	-142	-374	-364	-223	-444	-161	-66	-47	-33	-34	-29	-42	-161	-153	-137	-233	-271	-201	-122	-77	-49	-39	-37	-148	
D	-42	-42	-43	-85	-242	-195	-80	-45	-48	-41	-34	-43	-32	-34	-39	-37	-51	-38	-35	-32	-62	-47	-47	-47	-60	
D	-50	-48	-50	-89	-32	-27	-29	-27	-75	-197	-182	-199	-81	-202	-111	-159	-327	-403	-127	-42	-31	-82	-140	-277	-124	
D	-188	-124	-214	-358	-443	-169	-81	-382	-596	-380	-289	-321	-54	-67	-131	-63	-38	-30	-21	-28	-19	-34	-37	-28	-171	
D	-40	-47	-59	-55	-36	-41	-47	-43	-31	-46	-172	-359	-347	-186	-84	-74	-158	-227	-233	-233	-163	-70	-38	-44	-118	
D	-65	-70	-81	-43	-43	-58	-51	-44	-29	-179	-145	-80	-103	-122	-197	-114	-31	-22	-35	-44	-48	-48	-52	-43	-73	
D	-28	-28	-34	-80	-36	-36	-36	-33	-32	-73	-66	-34	-26	-27	-38	-31	-57	-178	-225	-50	-73	-56	-44	-74	-58	
D	-143	-137	-138	-37	-60	-266	-269	-195	-211	-150	-65	-102	-132	-146	-123	-116	-141	-111	-52	-27	-15	-15	-27	-34	-113	
D	-34	-41	-38	-56	-44	-94	-34	-32	-36	-44	-47	-126	-147	-81	-14	-18	-25	-51	-66	-81	-125	-91	-111	-105	-64	
D	-81	-97	-68	-89	-156	-212	-139	-81	-54	-50	-169	-275	-110	-103	-130	-53	-67	-107	-92	-78	-65	-22	-42	-84	-101	
D	-178	-322	-55	-51	-77	-98	-163	-196	-176	-55	-93	-161	-402	-364	-77	-122	-58	-85	-66	-19	-15	-43	-89	-110	-116	
D	-92	-144	-179	-207	-48	-127	-377	-431	-208	-149	-252	-361	-157	-38	-43	-105	-151	-364	-243	-51	-37	-64	-354	-399	-191	
D	-358	-160	-68	-41	-100	-238	-156	-149	-152	-137	-74	-155	-188	-106	-71	-101	-86	-132	-133	-118	-82	-107	-213	-246	-140	
D	-151	-146	-346	-477	-565	-490	-276	-242	-73	-27	-44	-254	-234	-158	-195	-465	-367	-289	-375	-392	-344	-140	-80	-324	-269	
D	-406	-276	-320	-391	-288	-70	-170	-226	-76	-36	-68	-385	-298	-86	-242	-219	-166	-207	-239	-275	-84	-47	-64	-231	-203	
D	-304	-376	-352	-188	-48	-63	-60	-57	-115	-343	-322	-203	-103	-74	-30	-63	-264	-556	-456	-429	-458	-467	-379	-454	-257	
D	-389	-419	-485	-300	-204	-241	-316	-254	-185	-98	-131	-109	-112	-352	-459	-143	-143	-170	-212	-145	-91	-124	-186	-197	-228	
D	-195	-263	-412	-286	-141	-85	-54	-137	-280	-307	-90	-102	-133	-225	-148	-228	-125	-269	-374	-152	-85	-123	-243	-226	-195	
D	-269	-161	-111	-158	-188	-639	-850	-485	-484	-415	-359	-435	-396	-542	-515	-665	-647	-631	-642	-464	-438	-626	-501	-311	-456	
D	-213	-162	-239	-288	-222	-81	-198	-256	-39	-36	-39	-45	-195	-391	-126	-69	-81	-143	-255	-245	-155	-98	-34	-94	-154	
D	-160	-135	-65	-123	-165	-146	-76	-50	-60	-272	-280	-127	-240	-223	-163	-228	-100	-99	-50	-47	-95	-152	-158	-61	-137	
D	-38	-45	-45	-48	-56	-126	-116	-160	-109	-67	-39	-24	-19	-36	-93	-58	-41	-15	-55	-55	-51	-48	-681	-969	-745	
D	-330	-172	-99	-147	-86	-146	-485	-399	-206	-314	-254	-171	-361	-184	-233	-175	-143	-151	-251	-173	-43	-20	-26	-38	-192	
MEAN	-173	-158	-181	-180	-168	-174	-189	-172	-149	-161	-164	-182	-165	-164	-142	-152	-154	-196	-198	-198	-129	-149	-186	-186	-191	-169
50 MEAN	-62	-63	-66	-60	-85	-129	-94	-69	-71	-97	-71	-77	-88	-82	-82	-67	-61	-80	-82	-46	-62	-51	-56	-60	-73	
50 MEAN	-229	-187	-272	-315	-363	-388	-499	-397	-263	-286	-321	-282	-252	-203	-258	-396	-333	-334	-371	-353	-224	-185	-184	-201	-296	

1978 JANUARY

AE HOURLY INDICES

QD 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	DAILY
1	52	51	45	53	41	59	62	65	65	60	42	57	65	45	44	53	129	205	47	70	351	411	240	153	103
2	143	110	283	293	170	105	69	28	40	78	58	83	71	58	58	49	47	41	31	30	103	101	61	97	89
3	43	46	42	51	39	37	57	35	32	27	28	62	74	137	266	393	223	199	173	161	374	765	479	251	166
D 4	449	377	602	887	544	554	1011	1082	711	846	702	1012	731	997	879	913	1012	1386	1202	878	570	686	436	282	781
D 5	950	757	442	524	679	558	383	523	414	311	231	246	150	109	53	47	249	260	93	77	102	207	91	84	314
D 6	71	248	738	642	434	232	204	121	63	74	43	31	42	84	82	100	111	367	552	556	191	194	305	327	242
7	133	64	49	46	38	24	31	48	140	167	144	153	138	152	169	467	505	76	42	49	68	120	473	329	151
8	303	549	317	87	103	64	48	51	67	59	78	260	237	169	395	533	379	117	42	100	56	158	320	130	192
9	102	152	226	185	132	128	204	233	499	298	237	254	180	105	223	197	366	914	809	415	571	697	892	542	357
10	505	570	620	471	360	324	313	233	213	314	110	74	44	69	155	413	738	521	257	151	257	295	112	49	299
11	29	34	62	29	121	215	172	116	75	62	143	260	364	133	243	245	143	98	76	56	27	42	54	35	118
12	35	52	45	129	26	16	18	17	21	19	26	20	17	23	192	82	44	100	141	124	109	79	185	301	149
13	33	42	105	241	79	108	243	255	164	110	327	245	152	208	308	202	152	60	64	124	303	236	335	142	177
14	58	64	102	46	33	62	139	167	132	102	69	77	38	31	26	27	28	71	35	39	41	80	57	47	65
15	17	24	23	31	25	27	16	17	21	25	124	199	134	28	25	30	32	30	38	36	34	23	26	27	42
16	25	25	22	19	19	33	41	56	32	30	31	72	145	586	910	807	592	557	604	563	422	211	320	536	277
17	516	306	306	331	280	111	95	59	52	43	43	23	25	32	192	82	44	100	141	124	109	79	185	301	149
18	380	369	625	529	372	329	310	311	354	254	295	325	217	276	185	102	56	34	27	30	35	43	31	46	231
19	93	187	230	186	94	51	45	101	179	179	176	78	97	222	295	123	139	134	99	51	81	166	107	55	132
20	46	46	24	18	26	47	174	160	144	93	32	29	25	25	85	180	79	34	34	21	18	21	23	24	59
21	20	16	14	15	14	13	18	19	23	21	29	41	29	19	20	21	21	20	15	12	17	25	35	33	21
22	31	30	29	21	19	18	94	118	119	105	95	72	94	90	38	26	16	16	16	15	22	24	24	22	48
23	24	20	17	16	14	16	13	17	18	20	21	26	24	23	22	22	28	151	110	52	40	33	35	38	33
24	38	39	38	37	30	38	66	73	86	122	58	48	62	50	80	120	496	285	94	35	26	26	21	26	83
25	33	35	44	37	57	151	197	139	161	199	214	298	361	200	136	201	238	295	257	180	82	163	212	214	171
26	567	406	111	101	124	181	167	103	106	335	260	105	56	44	70	90	78	55	159	71	41	76	81	119	146
27	79	82	75	78	83	98	59	44	45	49	93	59	29	38	37	36	49	33	87	69	105	93	97	68	66
28	48	48	48	32	41	54	83	109	50	148	56	73	100	61	56	155	599	418	457	492	183	233	309	82	164
D 29	214	290	128	68	280	599	728	563	339	576	765	535	254	889	1420	1094	667	671	295	94	106	151	185	64	457
D 30	75	81	75	112	149	372	633	1029	868	1318	891	592	505	123	90	94	85	46	47	90	103	324	252	391	339
31	505	262	204	270	132	153	304	359	534	351	387	438	572	458	600	393	558	733	706	619	544	297	158	227	407
MEAN	181	173	183	180	147	154	193	201	185	206	187	188	155	176	231	233	254	257	214	172	165	196	195	153	191
50 MEAN	30	30	37	25	21	27	56	67	62	54	67	83	63	38	26	25	25	57	42	30	30	37	35	33	42
5D MEAN	351	350	397	446	417	463	591	663	479	625	526	483	296	440	504	449	424	546	437	339	214	312	253	229	426

1978 FEBRUARY

AE HOURLY INDICES

00 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	DAILY
1	495	223	168	175	227	165	289	312	126	61	86	113	323	237	315	155	177	397	395	151	52	79	161	511	225
2	458	283	147	166	197	232	134	229	237	209	286	309	71	47	47	38	38	43	107	54	49	297	370	237	179
3	424	244	107	197	229	219	219	245	292	167	156	359	528	377	166	612	359	547	257	130	226	191	174	355	283
4	319	256	245	177	146	109	98	86	132	132	49	43	42	108	86	128	48	40	42	45	116	35	93	99	111
5	93	144	435	451	420	478	402	416	349	367	305	497	452	371	313	643	498	397	581	746	431	338	294	274	404
6	298	251	76	46	50	91	181	92	75	48	93	88	71	134	504	306	220	512	595	501	380	84	49	61	200
7	44	59	47	44	31	25	26	22	22	31	40	60	57	36	32	22	122	181	227	124	80	181	121	52	70
8	87	94	133	122	94	84	169	283	213	126	85	93	201	354	438	336	492	625	419	394	375	242	387	248	254
9	94	168	74	58	40	62	159	405	466	586	765	805	643	698	596	416	317	486	505	534	509	380	267	233	386
0 10	285	152	67	42	47	34	46	50	62	59	60	54	53	28	35	19	21	66	317	210	55	40	24	27	77
0 11	60	44	27	25	26	34	68	85	108	311	75	29	32	21	23	54	140	61	22	20	26	21	18	21	56
12	25	21	21	29	27	29	56	202	141	50	45	37	33	29	35	43	173	381	418	286	278	323	381	79	131
13	101	102	343	247	124	94	51	94	96	67	50	36	38	37	47	114	243	364	325	281	195	66	59	43	134
14	114	281	108	97	134	125	84	115	191	153	275	505	350	105	128	222	324	277	84	65	102	203	321	421	199
15	502	496	306	303	364	519	596	867	1069	705	1675	1191	153	188	144	70	84	56	61	47	63	64	69	55	402
16	55	93	97	56	55	116	103	111	168	302	401	443	330	353	212	250	347	486	644	519	345	496	495	415	287
17	436	295	452	300	137	78	48	39	36	37	39	46	30	32	71	181	126	61	116	72	119	150	147	149	133
18	189	188	161	162	226	157	109	282	177	128	108	136	111	276	274	167	116	227	266	110	273	61	125	138	174
19	164	259	258	324	394	209	151	80	38	41	77	174	286	330	338	257	275	274	304	357	389	392	309	378	252
20	344	299	207	178	209	249	302	378	289	194	295	359	731	389	174	78	156	379	388	320	196	125	322	200	282
21	145	177	143	161	101	83	113	53	32	31	85	117	157	187	233	315	752	867	639	659	694	602	479	369	300
22	304	366	400	356	528	615	489	117	67	56	58	84	351	305	235	571	638	626	423	189	186	260	430	643	346
0 23	126	68	43	28	33	60	48	46	42	43	72	84	62	113	40	45	42	33	32	33	54	58	96	97	58
0 24	89	72	56	63	54	38	65	109	94	112	210	250	217	129	121	181	122	71	64	34	33	31	31	28	95
25	33	35	41	38	61	83	202	130	120	62	87	246	163	90	41	38	32	24	21	66	165	295	373	215	111
D 26	312	417	277	292	221	351	202	199	150	373	185	149	418	770	752	576	656	687	734	582	654	449	273	280	415
D 27	292	492	509	172	359	491	415	337	148	491	364	190	849	1296	631	1091	1145	727	557	712	599	532	689	249	556
D 28	165	151	363	713	483	570	724	552	441	433	393	391	474	521	295	387	853	987	958	541	993	624	302	121	518
MEAN	216	204	189	179	179	192	198	212	192	191	228	246	258	270	225	261	304	352	339	277	272	236	244	214	237
50 MEAN	120	79	48	40	38	38	50	62	65	111	91	95	84	65	50	64	89	82	132	84	49	66	58	45	71
50 MEAN	315	384	371	367	391	509	485	414	375	411	533	401	449	616	411	539	675	616	546	414	499	385	352	269	447

1978 MARCH

AE HOURLY INDICES

00 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 DAILY	
D 1	237	410	466	332	116	148	122	183	235	684	482	253	77	340	891	939	763	853	779	716	522	649	565	340	463
D 2	498	417	223	169	312	459	341	710	792	291	178	115	241	189	123	240	340	237	321	650	414	191	180	226	327
D 3	472	515	232	125	124	378	360	193	116	249	303	357	461	220	270	282	379	377	657	395	383	454	336	207	327
@ 4	65	42	49	53	61	55	40	38	43	72	63	45	44	47	43	44	46	36	36	27	19	18	16	20	43
@ 5	22	26	27	27	29	35	50	117	226	263	254	313	534	397	349	212	427	414	251	70	51	52	29	22	175
6	31	37	30	23	25	28	36	42	43	49	71	478	428	114	152	345	132	79	51	35	27	19	26	26	97
7	35	60	64	61	54	179	56	39	48	92	227	266	187	373	392	387	266	90	48	33	50	53	115	35	134
8	39	32	32	32	31	39	48	51	51	51	56	62	77	74	89	140	95	159	496	715	886	362	99	64	157
9	108	213	303	405	290	266	227	114	195	473	460	170	121	84	96	214	198	96	122	415	560	224	84	52	229
10	47	40	38	49	46	52	190	296	556	602	769	597	658	732	399	133	118	154	117	76	109	47	28	28	245
11	26	33	74	60	53	48	43	124	91	222	318	239	98	83	116	146	210	247	101	63	64	62	61	49	110
12	45	32	32	35	35	32	75	67	98	61	42	44	75	58	47	36	29	28	50	47	25	20	32	40	45
13	143	66	44	65	300	493	529	441	441	575	564	510	291	321	300	92	52	50	209	459	462	221	92	116	285
14	186	249	221	180	156	189	182	178	53	42	67	186	330	378	115	177	109	67	304	278	115	55	47	95	165
15	148	406	244	222	473	656	377	246	244	323	247	181	170	201	135	324	171	114	156	443	463	296	275	520	293
16	706	438	349	400	596	291	499	415	277	105	80	161	231	246	534	601	677	598	469	349	254	215	346	741	399
D 17	413	459	251	295	466	535	331	453	434	119	134	237	524	488	641	807	485	275	360	670	739	325	142	186	407
18	145	602	701	523	117	140	146	274	212	556	585	509	731	774	784	825	470	617	399	175	123	171	481	528	441
19	512	350	359	581	421	175	128	96	66	54	112	393	618	479	406	518	545	100	114	88	60	70	194	136	274
20	171	188	173	90	76	70	82	115	170	132	65	187	291	300	253	87	81	43	60	145	202	120	151	143	141
21	178	225	160	197	197	312	97	43	146	254	244	202	331	299	167	45	59	65	53	64	53	76	92	104	153
22	78	64	64	84	120	305	233	64	150	376	391	224	163	240	252	156	120	300	515	617	640	697	640	332	284
23	284	396	382	95	141	298	226	107	54	53	70	342	476	525	544	199	127	217	249	48	44	39	42	48	200
@ 24	41	47	45	47	46	58	188	88	42	50	54	47	45	50	48	42	34	63	153	178	209	138	213	327	94
@ 25	58	44	43	43	37	35	35	40	53	50	51	52	74	68	59	48	46	38	30	35	41	44	53	66	48
D 26	73	148	483	549	346	210	226	275	130	68	81	100	107	261	634	367	508	804	940	955	763	233	267	282	367
D 27	530	593	724	565	564	736	652	781	564	783	510	185	459	836	880	966	797	645	871	788	481	348	576	658	645
28	310	165	371	401	199	108	79	177	442	342	250	96	136	557	801	633	214	147	150	154	58	53	47	69	248
29	77	84	106	247	145	144	258	234	339	653	476	446	476	345	216	87	501	220	87	51	105	98	185	245	243
30	287	386	327	321	517	464	410	475	561	735	785	602	385	553	268	72	175	155	80	38	63	149	159	63	335
31	51	59	68	77	92	64	75	63	51	55	79	313	362	330	263	477	452	389	186	88	186	239	322	188	189
MEAN	194	220	215	204	199	225	204	210	223	272	260	255	296	321	331	311	278	247	264	285	263	185	190	192	243
50 MEAN	46	38	39	41	41	43	77	70	92	99	92	100	154	124	109	76	116	115	104	71	69	54	68	95	80
50 MEAN	350	405	429	382	360	417	334	480	431	389	277	178	281	422	633	663	578	562	654	755	583	349	346	338	441

1978 APRIL

AE HOURLY INDICES

00 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	DAILY
1	147	241	592	409	566	497	351	358	201	281	129	43	41	50	56	90	232	330	175	125	166	271	208	306	244
2	361	283	429	440	135	78	55	61	46	51	75	220	369	215	45	46	117	288	338	446	208	402	425	111	220
3	89	80	70	60	193	672	705	385	227	570	475	503	505	567	269	219	372	820	734	911	806	774	692	492	466
D 4	687	615	518	443	591	596	500	424	203	89	89	49	81	42	66	43	498	959	840	708	825	808	645	947	469
5	714	334	498	314	574	488	147	166	83	75	54	45	46	41	72	77	82	51	81	283	436	180	108	131	212
6	174	101	143	205	354	99	77	88	177	154	94	156	227	166	162	107	104	52	50	61	43	41	44	74	123
@ 7	106	53	47	40	39	47	53	50	50	51	67	61	64	59	81	110	84	45	48	103	67	69	118	71	66
@ 8	78	71	65	67	126	102	72	59	56	46	51	78	89	66	69	65	83	193	255	107	108	58	78	68	88
@ 9	68	69	114	114	245	83	142	140	128	136	117	53	71	94	110	85	78	77	69	73	60	47	56	57	95
10	60	57	55	66	79	104	69	65	75	116	66	50	64	97	152	98	266	613	177	102	203	355	999	719	196
D 11	778	1005	772	562	712	795	524	478	226	194	361	208	95	70	111	109	192	229	452	369	224	553	459	512	416
12	443	538	270	115	127	122	238	455	362	241	464	256	101	73	86	278	318	342	465	211	290	213	200	315	273
13	222	97	348	279	150	89	91	131	213	318	246	239	229	170	432	551	570	611	384	588	474	556	845	842	361
D 14	572	467	419	381	563	617	547	483	127	326	965	1280	1116	772	236	375	405	306	351	529	481	310	218	291	508
15	688	617	328	292	359	263	282	362	384	245	200	398	446	395	420	392	108	183	165	119	116	182	80	194	301
16	383	384	286	207	258	105	113	144	91	116	244	311	207	82	46	42	52	59	57	162	256	224	92	91	167
@ 17	160	92	76	79	95	135	133	215	237	324	312	250	115	52	43	35	30	24	20	30	38	41	51	74	111
18	77	101	465	951	728	416	140	118	194	105	72	129	93	55	92	113	100	154	324	363	272	212	96	64	226
19	64	64	46	57	117	279	537	804	363	218	195	282	328	913	346	890	670	586	512	840	409	125	131	308	379
20	667	638	573	504	251	114	95	90	188	352	336	197	110	171	258	494	433	281	359	218	182	305	645	474	331
21	427	207	175	96	192	219	297	170	107	59	60	84	199	342	351	88	132	82	112	139	309	213	153	81	179
22	77	124	92	102	167	81	83	47	41	45	67	75	64	67	87	86	73	57	55	56	187	414	321	158	109
23	103	238	508	210	92	231	265	263	445	515	272	206	88	62	290	865	487	128	229	476	442	577	791	650	352
D 24	509	552	850	951	637	685	635	291	630	623	335	672	442	334	471	665	688	696	301	86	83	80	196	742	506
25	421	422	761	298	406	250	105	203	353	583	442	262	415	291	184	161	179	365	366	106	74	64	228	151	235
26	264	155	542	660	372	386	721	534	512	91	82	182	327	191	100	42	178	593	448	329	286	392	437	482	346
27	372	406	486	353	226	266	117	166	86	132	454	351	412	399	368	456	490	494	310	247	269	437	586	627	355
28	447	404	426	372	312	70	61	226	350	230	71	177	252	208	153	87	174	217	209	298	386	268	254	236	245
@ 29	214	217	140	76	117	156	106	159	246	289	188	144	147	279	158	99	134	344	464	460	448	390	414	449	243
D 30	404	477	530	514	560	508	498	454	330	309	1055	835	984	899	1048	1494	1849	519	140	100	262	637	1059	370	660
MEAN	325	303	354	307	311	285	258	252	224	230	254	259	257	240	214	275	305	323	283	288	281	306	354	336	284
50 MEAN	125	100	88	75	124	104	101	124	143	169	147	117	97	110	92	78	81	136	171	154	144	121	143	143	120
50 MEAN	590	623	617	570	612	640	540	426	303	308	561	608	543	423	398	537	726	541	416	358	375	477	515	572	512



1978 MAY

AE HOURLY INDICES

00 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 DAILY	
D 1	185	191	279	646	1091	1173	950	571	484	941	805	650	1568	1755	792	414	185	176	214	921	697	1006	1093	876	736
D 2	696	670	545	289	472	545	1441	981	1019	905	858	850	997	972	949	522	428	372	310	236	262	586	542	570	668
D 3	324	476	609	789	618	817	679	905	1015	1026	1015	1042	953	1059	1168	1262	1271	945	871	873	1120	1181	887	913	
D 4	738	958	989	994	781	1492	964	726	867	780	877	761	927	1039	786	610	559	543	576	265	260	220	114	85	705
5	57	81	74	48	80	59	47	37	32	41	44	41	49	38	39	41	24	44	38	40	257	502	200	88	83
6	82	65	71	78	67	50	45	49	46	43	48	49	50	58	37	42	37	47	63	72	96	213	246	182	76
7	325	176	115	125	128	229	250	115	155	140	62	80	97	103	161	187	177	198	433	328	95	93	137	107	167
8	96	94	137	144	71	64	72	53	46	52	158	632	789	622	357	191	246	268	127	113	164	129	106	161	204
D 9	189	324	564	444	687	296	778	1237	582	394	1316	1023	1104	1232	1103	930	771	672	430	354	378	140	153	103	634
10	74	90	62	83	70	63	57	57	53	63	92	91	104	52	82	121	127	119	108	64	172	165	382	459	117
11	356	329	509	918	1130	972	822	944	657	369	503	327	225	341	266	274	311	578	472	292	193	317	512	480	504
12	451	350	340	389	463	567	655	387	478	372	204	199	446	520	393	252	272	406	565	684	577	274	383	504	422
13	567	723	223	113	75	90	71	91	130	160	161	215	303	221	216	135	93	43	67	122	142	117	285	177	189
14	326	304	295	264	377	346	268	136	94	215	245	156	119	177	127	192	319	437	476	349	281	292	220	196	259
15	160	86	63	49	47	48	51	53	52	58	125	91	126	125	113	182	135	140	85	69	75	126	60	77	91
16	73	94	177	156	110	54	51	56	59	49	75	111	141	245	188	203	332	275	162	77	61	88	83	89	125
17	121	64	59	44	101	331	526	291	127	102	177	186	273	207	201	187	101	63	44	115	193	433	449	333	197
18	112	89	166	299	372	252	173	99	126	142	184	178	269	215	168	162	352	430	152	169	152	100	85	73	188
19	59	52	55	76	49	67	56	86	151	336	220	238	205	154	114	111	85	49	53	37	39	45	60	77	103
20	123	99	66	50	66	60	57	106	64	75	73	76	76	66	55	50	70	176	743	766	459	136	86	85	154
21	59	66	95	253	326	76	68	65	64	77	82	101	157	153	139	145	104	119	163	686	930	845	792	713	261
22	528	167	179	275	328	208	201	176	197	149	380	228	519	479	599	908	978	810	730	772	755	541	498	420	459
23	398	511	464	467	524	521	440	461	415	186	231	507	399	155	134	189	396	365	355	267	590	431	324	478	384
24	605	451	204	158	197	370	424	507	719	568	357	355	701	705	400	195	405	332	132	109	268	205	262	533	382
25	522	139	250	240	365	397	185	237	208	73	79	57	126	306	131	107	145	107	81	169	268	316	653	438	233
26	373	349	417	289	173	160	208	67	76	238	365	607	577	391	279	255	250	325	286	257	297	140	80	79	272
27	106	120	84	134	174	207	283	244	101	122	188	108	98	87	107	153	195	160	117	106	128	138	180	384	155
28	210	92	111	116	113	103	68	65	112	249	400	351	387	378	312	308	281	339	521	475	233	93	111	138	231
29	185	150	55	64	48	39	41	51	62	83	131	216	232	199	168	98	57	42	66	139	250	404	422	392	150
30	499	992	992	881	855	623	408	556	446	249	158	181	187	142	230	195	109	88	82	212	106	78	173	334	366
31	584	545	458	316	525	238	144	102	177	96	51	54	243	196	111	91	71	56	53	56	55	45	47	88	183
MEAN	296	287	280	296	338	339	338	306	284	269	311	315	401	399	320	281	286	283	279	296	299	301	319	309	310
50 MEAN	103	82	87	127	141	124	121	106	95	140	153	132	149	127	107	130	160	165	94	90	98	124	126	158	122
50 MEAN	426	523	597	632	729	864	962	884	793	809	974	867	1109	1211	959	747	642	551	496	529	494	614	616	504	730

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AE HOURLY INDICES

QD 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	DAILY
D	79	69	109	322	291	249	361	187	351	367	141	92	65	40	86	67	73	71	55	95	66	71	259	151	155
	77	108	91	105	151	204	636	656	392	682	1164	773	355	312	866	1033	979	1179	1126	979	466	205	241	232	542
	488	413	201	364	203	147	190	212	417	408	504	310	114	61	59	120	162	282	398	616	224	85	68	79	254
	121	263	427	395	391	179	77	93	173	177	190	258	449	631	271	99	252	286	284	311	481	822	1064	763	352
D	589	621	1120	1141	1211	909	862	836	583	743	620	407	226	105	68	59	76	111	90	88	126	191	355	373	480
	339	158	130	98	66	49	82	94	133	243	281	396	327	306	168	146	188	158	153	218	367	448	399	466	226
	514	513	417	131	127	390	340	61	63	194	211	253	274	212	179	187	239	411	663	530	493	524	438	486	327
	289	333	533	510	421	695	394	168	64	51	48	34	71	227	226	228	423	454	373	272	167	97	89	72	260
	66	69	86	183	403	339	121	90	63	77	79	67	47	61	57	77	71	61	56	58	103	87	83	85	104
	99	90	144	150	58	42	43	40	189	435	377	414	253	444	209	242	596	670	356	172	102	184	353	414	253
	344	275	366	618	623	251	222	617	921	683	514	433	115	153	208	112	99	85	76	76	76	82	81	55	295
	66	73	89	75	52	114	56	57	49	169	393	665	512	288	178	175	308	432	442	409	274	114	74	75	214
	125	145	119	62	86	79	63	70	80	383	253	144	191	238	264	162	64	72	76	96	105	145	169	148	139
	106	112	121	125	97	67	56	53	81	126	92	54	44	48	56	65	118	276	318	108	150	122	141	197	114
	286	332	290	122	172	490	459	396	491	401	211	246	259	246	204	191	220	176	107	71	55	48	62	60	233
	68	62	59	101	104	149	90	66	67	106	133	233	251	159	60	64	64	132	158	200	227	204	271	275	138
	227	236	126	211	355	441	248	147	125	137	414	503	241	194	199	104	160	240	275	256	209	91	117	197	228
	305	188	85	88	108	96	334	432	316	194	248	415	647	527	137	215	149	146	166	111	93	127	217	233	233
	277	362	331	324	114	310	616	668	385	342	484	556	286	85	93	214	307	572	410	155	154	217	739	740	364
	648	308	137	126	280	474	347	342	304	288	174	322	320	162	110	160	142	211	233	242	188	249	469	516	281
	357	385	589	924	904	816	543	443	187	95	111	446	353	236	340	739	564	456	638	760	559	270	138	589	477
	626	464	555	591	445	137	302	372	123	118	204	615	427	160	367	339	252	394	450	471	260	187	151	409	351
	523	617	580	313	109	102	89	133	282	563	535	332	166	132	63	121	424	852	775	701	748	765	738	740	433
	612	678	755	543	436	498	591	487	357	255	266	255	196	538	634	219	234	292	348	256	250	298	373	380	406
	400	448	615	508	271	181	165	266	530	450	172	215	291	418	252	335	197	559	739	327	241	309	471	436	367
D	509	309	217	307	509	1065	1258	886	906	697	676	719	563	768	879	1113	1061	954	1101	979	878	900	851	637	781
	513	392	442	507	438	292	422	445	110	110	187	146	397	531	175	122	188	319	449	451	331	197	87	215	311
	318	192	143	224	276	215	143	97	184	542	508	297	426	336	293	418	251	271	187	172	219	352	310	162	272
	90	68	70	79	125	193	217	327	265	173	110	83	99	123	198	110	102	107	163	164	260	986	1158	1114	266
D	624	316	178	212	109	272	735	679	483	779	689	455	572	383	396	306	302	384	535	369	106	67	60	62	378
	322	287	304	315	297	314	335	314	289	332	332	337	284	270	243	251	275	353	373	323	265	281	334	345	307
50 MEAN	130	144	135	118	172	224	157	135	156	218	133	148	158	150	128	111	107	143	143	106	128	121	145	153	145
5D MEAN	431	347	439	537	576	653	806	700	510	599	652	560	413	360	509	650	596	616	698	635	427	326	329	378	531

1978 JANUARY

AO HOURLY INDICES

MO 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	DAILY
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3	8	11	4	4	3	0	-11	-1	0	0	0	-12	-19	-50	-111	-154	-53	-31	-40	-22	-68	-228	-15	47	-30
4	-80	-59	-144	-210	-66	-12	-17	-150	-97	-100	-252	-385	-291	-505	-409	-504	-544	-877	-653	-487	-151	-315	-239	-120	-278
5	-491	-259	-132	-56	-143	-66	-4	-24	1	15	-5	5	13	-4	-12	-16	-76	-49	-22	2	6	-6	0	-5	-553
6	-8	-5	-216	-148	-85	95	69	37	8	6	-6	-9	-12	-17	-19	-26	-44	-99	-197	-165	-9	-24	-117	-114	-48
7	-17	11	5	1	-4	-9	-10	-9	-45	-61	-38	-43	-48	-61	-69	-214	-161	-20	0	0	-16	-30	-178	-96	-46
8	-68	-157	-15	18	21	15	7	13	22	21	-1	-47	-30	-45	-137	-152	-122	0	6	-5	-4	-38	-119	-46	-36
9	-12	-39	-77	-36	-22	-11	-44	-30	-141	-36	-37	-53	-49	-25	-82	-57	-117	-326	-198	-69	-147	-203	-140	-123	-86
10	-220	-128	-104	-117	-101	-29	-41	7	-9	-64	5	-9	-6	-20	-47	-131	-183	-72	-22	2	-10	-53	11	1	-56
11	0	1	8	2	-15	-53	-27	15	13	15	-29	-57	-65	-1	-62	-31	-41	-16	-16	-14	-8	-4	-13	-2	-17
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13	-5	-1	-19	-82	-13	-30	-96	-68	-24	-12	-108	-55	-33	-69	-101	-73	-39	-6	-7	-24	-96	-57	-84	-16	-47
14	8	0	-23	-2	-1	-12	-36	-38	-17	-18	-6	-18	-12	-12	-10	-8	-6	-27	-11	-11	-8	-26	-13	-12	-13
15	0	0	-1	-4	0	2	1	2	2	4	-44	-59	15	5	-2	-4	-1	-4	-9	-8	-5	0	0	3	-4
16	6	6	7	6	8	6	1	-2	10	3	3	-8	-11	-233	-256	-176	-84	-34	-80	-106	-59	3	-27	-164	-49
17	-165	-77	-28	-37	-40	-18	-29	-16	-6	-5	-7	-5	-5	-6	-87	-26	-10	-42	-63	-53	-37	-19	-67	-105	-40
18	-133	-122	-192	-73	-11	-1	31	39	27	26	-4	33	-10	-48	-8	-10	8	4	0	1	0	-1	3	2	-18
19	-13	-55	-68	-38	16	24	12	5	-26	-52	-33	-12	-23	-84	-114	-40	-53	-46	-38	-5	-18	-50	-27	-11	-31
20	-7	-13	-4	1	8	9	-39	-1	14	19	8	4	2	-2	-18	-60	-22	-5	0	1	0	2	1	0	-4
21	1	2	4	4	5	5	3	3	3	4	0	-3	2	5	6	3	2	0	0	1	4	1	0	2	2
22	4	6	6	7	9	8	-11	-8	-16	-11	0	-7	-2	-4	11	9	7	6	3	3	3	3	6	7	1
23	5	5	5	4	2	3	4	6	3	3	0	0	2	4	4	2	-2	-65	-46	-13	-4	3	8	8	-2
24	5	10	12	11	11	12	-5	18	14	47	23	15	4	10	26	2	-104	-38	-9	6	9	6	6	9	4
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26	-169	55	61	40	20	-7	-16	-2	0	-100	-44	1	-2	3	-8	-33	-26	-11	-46	-12	2	1	-12	-18	-13
27	3	13	19	25	17	-8	15	9	7	7	-1	6	4	-1	-9	-11	-19	-9	-34	-22	-34	-25	-26	-10	-3
28	-5	-10	-10	-6	0	3	-13	-12	-6	-57	-6	0	13	4	4	-36	-225	-155	-134	-78	50	-19	-32	24	-29
29	-1	-49	18	21	-14	24	34	14	-15	-59	-255	-21	-35	-304	-545	-283	-106	-162	-26	12	12	-29	-38	-11	-76
30	-19	-7	8	15	2	-30	-86	-250	-197	-460	-316	-150	-69	-11	-28	-30	-29	-19	-18	-19	-21	-111	-73	-110	-84
31	-180	-41	-35	-50	-27	42	-28	-47	-42	23	6	-89	-86	-97	-103	-33	-67	-204	-192	-217	-143	-21	1	-16	-66
MEAN	-49	-27	-30	-25	-10	-2	-11	-16	-17	-27	-37	-32	-24	-51	-71	-69	-72	-79	-60	-43	-28	-44	-38	-29	-37
50 MFAN	3	2	-1	1	3	1	-7	-7	-5	-3	-10	-17	1	0	1	0	0	-18	-12	-5	-2	-3	0	1	-3
50 MEAN	-119	-75	-93	-75	-61	-9	0	-74	-60	-119	-166	-112	-78	-168	-202	-171	-159	-241	-174	-131	-32	-97	-93	-72	-108

AO HOURLY INDICES

1978 FEBRUARY

QD 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	DAILY
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2	-116	41	5	-37	-27	9	20	20	18	-21	-58	8	15	2	2	1	0	-4	-45	-10	4	-78	-109	-57	-15
3	-104	-11	24	-30	-25	-19	-11	22	17	-4	-42	-75	32	-9	-195	-84	-98	-26	25	-37	-26	-20	-85	-32	
4	-69	-55	14	55	4	-31	-14	4	2	-8	10	10	3	0	18	-24	5	2	-3	0	-37	4	15	13	-3
5	1	-12	-110	-142	-143	-60	-14	37	31	-40	-3	-85	-76	-82	-84	-163	-103	-48	-116	-162	6	28	-13	9	-56
6	12	36	33	14	6	-3	-42	12	19	14	11	5	-1	-13	-178	-103	-14	-65	-32	-128	38	31	6	5	-13
7	0	12	14	16	10	6	3	1	0	-1	0	9	13	0	-1	0	-26	-45	-46	-1	4	0	26	20	0
8	10	8	12	48	43	27	-4	13	29	46	26	7	-103	-119	-77	-27	-60	-25	-32	-26	13	-64	-51	-12	-12
9	6	-32	13	25	19	18	-8	-48	-111	-68	-91	-101	-125	-75	-16	-40	-20	14	-9	-56	-79	-80	-45	-54	-40
10	-86	-38	0	15	11	8	11	5	-9	-9	-12	-6	-6	5	4	5	1	-4	-83	-44	-3	8	8	7	-8
11	-7	-4	3	5	9	14	8	-6	-15	-93	-3	2	0	4	4	-8	-51	-13	7	6	9	10	6	2	-4
12	1	3	7	9	10	11	6	-62	-17	16	10	9	5	6	3	4	-53	-134	-90	-48	24	-14	2	34	-10
13	24	21	-60	-36	32	39	30	30	23	0	5	3	-1	0	0	-18	-82	-98	-54	-8	-24	1	11	5	-6
14	13	-45	9	0	12	18	18	22	10	-38	10	-83	-32	-3	1	-17	-80	-59	-15	2	-6	-8	12	-6	-11
15	-44	-39	-32	-7	20	46	165	65	-120	70	-458	-338	-17	-69	-43	-39	-43	-25	-28	-17	-15	-11	-11	-10	-41
16	-12	1	15	-1	0	22	12	10	2	-72	-48	-86	46	-53	-58	-68	-74	-77	-66	0	-17	-55	-33	-42	-27
17	1	3	-22	-9	54	34	7	0	-1	-1	-1	-7	-3	-9	-42	-29	-21	-42	-13	-35	-45	-29	-8	-9	
18	-6	30	39	41	73	45	17	-32	19	25	10	-2	-5	-58	-89	-32	-32	-65	-95	-22	-72	-6	-17	-30	-11
19	-14	-46	-53	-71	-34	21	34	-5	0	-3	7	-28	-47	-48	-22	-54	-59	-51	-47	-15	20	3	-3	-31	-22
20	24	31	44	-3	-6	5	-20	-91	20	11	24	65	-160	-2	4	0	-28	-72	-60	-21	-15	2	-68	-14	-13
21	20	27	36	10	33	22	14	17	13	8	8	-23	-14	-31	-35	-74	-182	-172	-54	-100	-82	-39	-49	-8	-27
22	-41	-94	-102	-69	-97	-43	-9	0	-3	-5	-4	-13	-104	-83	-47	-94	-81	-86	-47	15	3	-53	-82	-164	-54
23	10	18	9	9	11	6	10	11	9	7	4	-12	-5	-19	0	4	-1	-3	-3	0	-10	-2	-17	-22	0
24	-24	-5	3	-7	-1	5	-14	-21	-6	-8	-58	-58	-32	-21	-31	-46	-38	-16	-8	8	5	0	-1	1	-15
25	4	4	9	11	14	5	-34	12	17	14	18	-74	-40	2	8	6	5	6	8	17	7	-28	-31	-11	-1
26	-37	-58	-18	-12	-8	2	50	21	27	-30	-9	15	-73	-120	-155	-83	-97	-167	-219	-167	-142	-61	-22	-64	-59
27	-58	-143	-107	3	-92	-151	-97	-49	-3	-92	-90	-18	-291	-443	-152	-246	-403	-249	-110	-139	-137	-135	-148	-29	-141
28	3	15	-47	-185	-145	-130	-123	-144	-67	-75	-13	-87	-184	-111	-43	-81	-233	-318	-332	-104	-379	-199	-23	14	-124
MEAN	-21	-11	-7	-11	-8	-3	0	-4	-2	-11	-24	-35	-46	-46	-38	-52	-66	-73	-63	-37	-34	-26	-26	-26	-28
50 MEAN	-21	-3	5	7	8	7	3	-2	-4	-20	-13	-13	-6	-6	-4	-9	-23	-16	-26	-6	1	3	4	1	-5
50 MEAN	-35	-63	-61	-54	-64	-55	-2	-21	-33	-26	-114	-88	-133	-165	-88	-108	-171	-169	-147	-82	-134	-91	-57	-50	-84

AO HOURLY INDICES

1978 MARCH

MO 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	DAILY
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D 2	-28	-37	18	30	6	-81	7	-90	-159	-21	16	9	-42	-24	8	-69	-104	-62	-32	-161	-75	-11	5	-3	-37
D 3	-4	-121	-9	5	22	21	7	31	7	-13	-79	-129	-129	-65	-53	-42	-100	-60	-158	-57	-49	-117	-75	-27	-49
D 4	17	11	11	6	2	7	4	2	7	-10	-6	-2	-1	-1	0	-2	-1	-1	-3	-1	0	1	2	4	1
D 5	3	4	1	3	5	4	0	-6	-26	-6	0	23	-84	-86	-77	-17	-86	-49	-21	5	15	15	4	0	-15
D 6	0	-2	-3	1	2	2	0	-2	0	4	2	-126	-84	-14	-34	-125	-36	-3	9	11	4	7	8	4	-15
D 7	1	5	4	7	9	-56	11	0	-4	1	-37	-42	-28	-120	-103	-73	-55	-11	0	0	-2	8	-19	1	-21
D 8	5	7	7	6	8	8	1	0	0	1	3	-1	5	3	12	31	22	18	-5	-221	-297	-40	0	-9	-17
D 9	-25	-48	-94	-128	-72	-40	-27	-20	-107	-85	-91	-18	-11	-6	-15	-53	-63	-28	-31	-105	-158	-34	12	3	-48
D 10	0	-8	-12	-12	-6	-33	-30	-30	-102	-77	-51	-118	-135	-182	-137	-1	-12	-51	-28	-8	-32	1	2	0	-43
D 11	-2	-6	-24	-11	-5	-5	-9	-31	-15	-32	-52	-21	-7	-15	-35	-55	-80	-80	-20	1	7	9	0	-7	-20
D 12	-2	3	2	0	1	0	-24	-10	-11	-2	-7	-7	-20	-13	-4	-1	-1	-1	-11	-8	-1	1	0	3	-4
D 13	-22	-5	5	0	-63	-61	-20	-50	-57	-29	29	60	1	-41	-69	2	2	2	-15	-89	-96	15	10	7	-21
D 14	13	-33	-43	-17	4	-15	-26	-44	2	2	13	-27	-46	-52	-13	-17	-18	11	-61	-76	14	20	19	10	-15
D 15	2	-114	10	0	-106	-49	19	14	14	-72	-37	2	12	35	10	-59	-7	-9	0	-93	-101	-48	24	-7	-23
D 16	-91	-34	-4	-101	-167	-5	-39	-9	0	30	11	-17	-20	-39	-135	-83	-74	-43	28	-59	-10	-4	-3	-116	-41
D 17	-51	-105	-43	-90	-70	-103	-5	-79	-104	37	38	-7	-115	-151	-159	-235	-140	-50	-43	-173	-208	-47	-1	0	-76
D 18	1	-182	-240	-163	4	31	2	-34	2	-137	-154	-58	-133	-177	-132	-143	-56	-32	-95	6	18	-11	-109	-123	-77
D 19	-117	-48	-26	-135	-95	6	9	-4	9	15	8	-101	-147	-80	-110	-93	-92	2	-5	-8	11	14	-18	-3	-42
D 20	7	0	11	7	9	8	14	6	-4	4	12	-4	-31	-48	-52	6	-5	3	2	6	-35	-5	-14	-18	-4
D 21	-9	-25	-13	-6	-6	-59	3	11	-7	-32	-62	-33	1	-2	-13	-4	-5	-14	0	2	1	5	-1	-6	-11
D 22	6	13	13	22	3	-34	15	14	18	-45	-31	37	27	-24	-30	6	13	-67	-70	-57	-90	-138	-145	-3	-24
D 23	35	-95	-98	0	19	-49	-47	13	2	3	4	-52	-122	-126	-106	-51	-11	-60	5	10	11	4	0	0	-29
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D 25	6	5	1	1	4	2	3	2	2	0	-3	0	-7	-8	-4	0	0	0	6	10	18	21	19	21	4
D 26	23	6	-162	-158	31	37	47	21	29	13	9	11	19	-18	-86	-29	57	-136	-285	-303	-166	14	15	-44	-43
D 27	-216	-154	-48	-108	-40	-91	-56	-165	-69	-139	-48	10	-114	-223	-271	-254	-145	-117	-222	-172	-36	3	-101	-235	-125
D 28	-18	5	-112	-138	-40	7	5	0	-106	-66	-12	-9	-22	-199	-259	-187	-25	-23	-22	-16	9	7	6	4	-50
D 29	2	0	-9	-88	-31	-10	-64	-40	-46	-170	-79	-71	-66	-36	-61	-26	-141	-51	17	12	-1	10	-2	-29	-41
D 30	-39	-102	-71	-52	-97	-106	-76	-81	-66	-57	-92	-58	-30	-167	-40	-10	-35	-43	-10	11	6	-7	-34	-1	-52
D 31	-2	0	0	0	-9	2	3	-4	-4	-1	7	-73	-20	-23	-56	-94	-103	-71	-16	7	-8	-38	-24	0	-22
MEAN	-17	-37	-34	-36	-21	-19	-10	-18	-23	-34	-25	-27	-43	-64	-73	-61	-46	-38	-39	-56	-42	-14	-19	-23	-34
50 MFAN	4	3	2	1	3	2	-11	-2	-5	-3	-3	2	-22	-21	-16	-3	-16	-11	-10	-1	6	10	9	-14	-4
5D MEAN	-62	-77	-72	-67	-6	-43	-1	-60	-62	-59	-15	-1	-50	-101	-154	-164	-89	-107	-151	-202	-107	-35	-55	-69	-75

1978 APRIL

AO HOURLY INDICES

QD 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	DAILY
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2	-58	1	-70	24	-5	-8	-14	-3	4	-27	-43	-95	-62	-2	0	1	-67	-104	-19	-19	-5	-60	23	-28	
3	29	8	10	6	22	-166	-128	-76	16	-30	-27	-6	-117	-89	-27	-41	-18	-111	-112	-158	-194	-255	-240	-120	-76
D	-207	-154	-79	-29	-40	-155	-94	63	64	24	13	6	0	3	3	5	25	-320	-226	-164	-291	-229	-195	-312	-95
4	-137	70	0	18	-116	-150	-11	-25	-7	-7	2	0	0	3	9	-9	-15	0	8	-15	-91	-24	-3	-8	-21
5	-19	-1	-13	-14	-71	-6	0	-3	-38	-38	-15	-5	-50	-18	-14	-11	-18	-2	9	3	11	3	4	1	-12
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7	4	2	-6	-7	-18	-13	-5	-2	-2	4	-1	-8	0	-1	-7	2	-9	-28	-50	-5	-20	13	3	7	-6
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13	-185	-27	4	-10	-33	-27	-9	16	36	34	-111	-322	-176	-32	-11	-9	-34	23	-2	-54	-44	11	34	43	-37
14	-187	-151	-32	18	-56	9	31	-64	-55	-1	14	-13	-51	-50	-74	-30	12	-17	-7	7	13	-11	14	2	-28
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24	-85	-24	-192	2	-32	-15	9	23	-71	-114	-41	9	-68	-37	-20	-6	1	-31	-52	21	17	6	25	-7	-28
25	-36	-1	-92	-160	-66	-12	-93	-90	-112	21	2	0	39	-41	-11	17	0	-137	-66	2	31	0	-33	-40	-40
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50 MEAN	0	4	0	0	-9	-11	-5	-3	0	2	0	-6	-3	-10	-5	-3	-5	-11	-15	5	1	9	5	1	-2
50 MEAN	-125	-69	-23	-57	-32	-66	-21	1	9	7	-60	-74	-72	-21	-32	-30	-77	-86	-40	-28	-53	-42	-36	-93	-46

AO HOURLY INDICES

1978 MAY

QD 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	DAILY
D 1	8	15	54	134	-36	1	96	13	41	169	44	53	-138	-468	-139	-35	6	16	29	105	8	-36	-381	95	-14
D 2	-54	-114	-14	27	10	11	-285	-344	-449	-338	-285	-56	-122	-204	-107	-64	-58	-24	-27	-6	-7	-57	-51	-77	-112
D 3	21	27	-74	-120	-120	-50	-49	-104	-211	-122	-161	-169	-9	-63	-118	-248	-236	-264	-153	-174	-52	-168	-333	-273	-134
D 4	-91	-141	-187	-221	-88	-531	-380	-119	-304	-63	-218	-103	-103	-165	-94	-66	-26	-60	-43	-4	9	-4	-4	4	-125
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D 9	23	-52	-55	0	5	26	0	-133	-78	-68	-349	-224	-156	-308	-206	-64	30	-5	15	-14	-19	14	20	1	-66
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50 MEAN	8	-1	0	-4	-7	-1	-4	0	6	8	5	9	0	0	-4	-16	-20	-20	4	6	7	4	-2	0	0
50 MEAN	-18	-53	-55	-36	-45	-108	-123	-137	-200	-84	-193	-99	-105	-241	-132	-95	-56	-67	-35	-18	-12	-50	-149	-50	-90

1978 JUNE

AO HOURLY INDICES

MO 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	DAILY
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D 2	7	-3	0	8	-11	-5	13	-25	-49	65	-37	27	65	68	121	-137	15	54	5	-218	-29	37	27	4	0
D 3	-83	-143	-18	32	8	18	0	15	-55	17	-74	-68	-9	0	-9	-33	-27	-37	-58	-83	-7	0	-4	-9	-26
D 4	-12	-37	-72	-44	-59	-34	-12	-9	-31	-27	1	-31	-90	-143	-9	1	-50	-32	-4	-10	-13	-86	-270	-201	-53
D 5	-71	-91	-199	-178	-284	-102	-151	-90	-18	-30	-22	9	-48	2	-2	6	-1	-11	11	14	24	18	-43	-37	-54
D 6	-19	-1	-7	-6	-12	-21	-1	-3	0	-2	-22	-60	-49	-63	-47	-37	-46	-25	-4	7	-54	-55	-25	-42	-25
D 7	-47	-47	-30	8	-1	-33	-60	-2	1	28	-7	-6	-16	-37	-42	-53	-42	-58	-98	-74	-37	-21	17	23	-26
D 8	19	23	-107	-108	-12	-96	35	17	-5	-6	-10	-11	-6	-47	-39	-22	-22	-44	-15	13	5	0	4	-1	-18
D 9	-8	-7	0	5	-40	-25	-18	0	-16	-2	4	-10	-8	-3	-10	-19	-15	-7	-6	-2	-1	-3	-5	-4	-8
D 10	0	-2	20	-14	-2	-6	-7	-7	18	19	5	7	44	18	-7	-37	-29	-68	50	43	19	9	35	-69	1
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D 12	-6	-10	-14	-17	-9	15	-19	-14	-6	37	23	-26	-90	-41	4	12	-4	-11	-12	-28	-25	-13	-1	-6	-11
D 13	-2	1	-22	-12	0	-18	-19	-9	9	11	-18	-7	-7	-3	-64	-32	0	13	2	3	3	22	31	30	-3
D 14	23	26	25	-17	11	-3	-8	-6	7	-10	-20	-6	-3	-3	-10	0	0	-40	-66	3	0	4	25	23	-1
D 15	0	28	6	23	25	-21	-39	2	33	48	39	19	-2	-23	-20	-20	-30	-23	0	8	11	8	3	-3	2
D 16	0	-9	-7	-5	6	-19	10	0	-2	8	18	-10	-22	-1	14	12	6	14	12	18	-12	10	23	32	4
D 17	31	30	-5	16	20	7	-14	-7	7	17	36	-24	9	-6	-30	-1	11	12	43	49	38	22	14	13	12
D 18	-25	-27	-11	-7	-23	9	4	19	-18	41	69	45	-78	-100	-7	-13	15	-11	16	35	30	19	18	6	0
D 19	45	36	-14	-44	7	26	-68	-97	-16	20	-10	-82	-15	3	2	1	2	-78	-38	25	39	44	15	-29	-9
D 20	-34	-6	0	21	39	-2	16	20	0	5	11	5	-27	-24	-16	-21	-15	-26	-17	2	11	17	20	11	0
D 21	26	45	-51	-14	-112	-81	-5	-21	19	19	10	-31	-57	-40	-25	-95	-85	-61	-56	-13	-65	-5	-10	-29	-30
D 22	-92	-44	-42	-95	-65	-1	-18	-40	-14	22	33	-76	-84	-6	-57	-50	-40	-10	-14	-39	44	45	11	-26	-27
D 23	-42	-67	-61	-31	6	-11	-15	8	25	-61	-54	-37	-20	-8	1	-4	-52	-130	-68	-78	-84	-83	-10	-83	-40
D 24	-83	-79	-107	-28	13	8	-21	-11	-7	28	0	17	-14	-83	-142	-33	-26	-24	-38	-16	32	24	0	-6	-24
D 25	4	-39	-105	-32	-6	5	27	-4	-15	-82	5	4	11	-16	-21	-60	-27	9	-5	10	34	30	-7	-8	-11
D 26	-14	-7	-3	-5	65	-106	-221	-42	-31	-66	-22	-76	-114	-158	-75	-108	-116	-154	-91	25	0	-175	-75	7	-65
D 27	42	32	-18	-34	-3	64	11	-33	14	17	53	26	2	-126	-38	-8	11	16	-31	-19	10	0	9	12	0
D 28	-1	-39	6	-10	-26	-38	-4	-1	30	-2	-26	20	-27	-56	-16	-19	25	35	43	38	13	22	-3	18	0
D 29	6	-10	-9	-7	6	-29	-8	2	22	17	15	16	29	24	4	-2	9	37	24	30	81	-188	-390	-187	-21
D 30	-18	-13	-10	-41	-31	-10	-117	-59	33	74	89	55	-74	6	-35	-21	7	40	16	11	9	12	2	-6	-3
MEAN	-12	-15	-29	-23	-20	-17	-21	-15	-6	4	1	-14	-23	-28	-20	-26	-17	-20	-12	-8	3	-9	-19	-18	-15
50 MEAN	2	7	0	-1	0	-17	-14	-2	6	11	4	-2	-8	-6	-18	-11	-7	-8	-11	6	0	8	15	15	-1
5D MEAN	-14	-13	-52	-46	-74	-60	-96	-47	-9	12	3	-3	-45	-24	-3	-71	-36	-26	-23	-36	-12	-22	-19	-12	-30

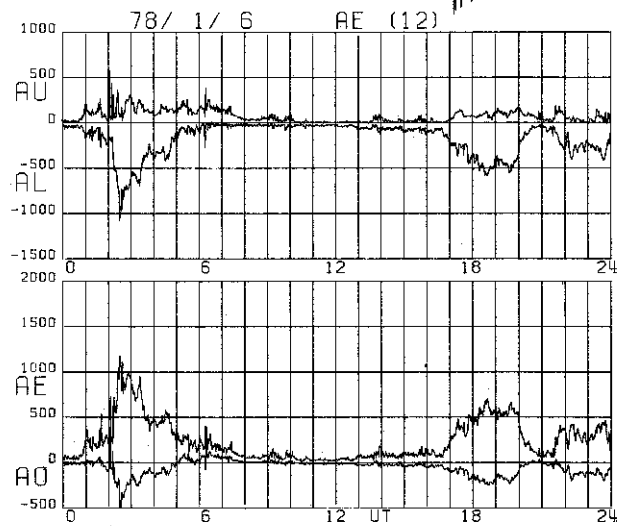
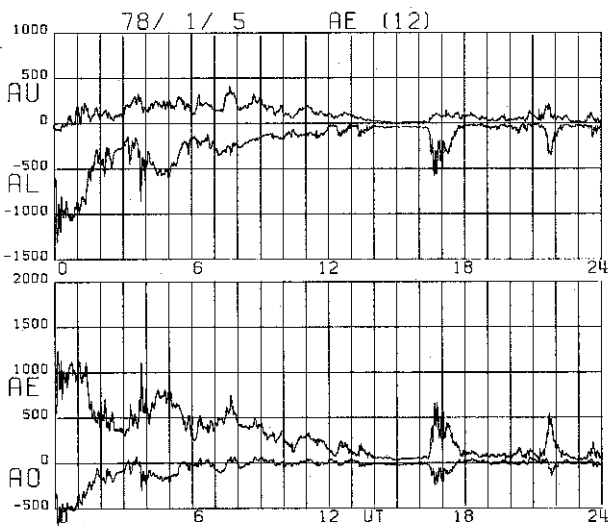
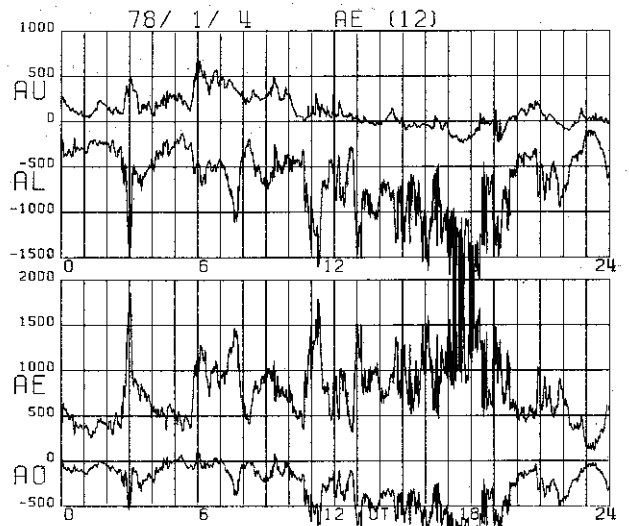
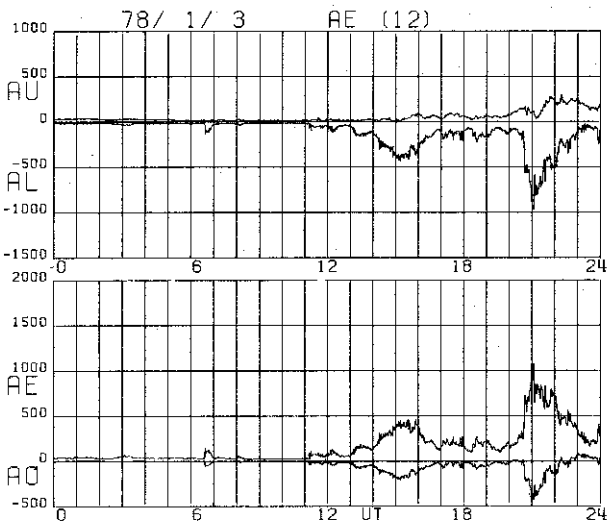
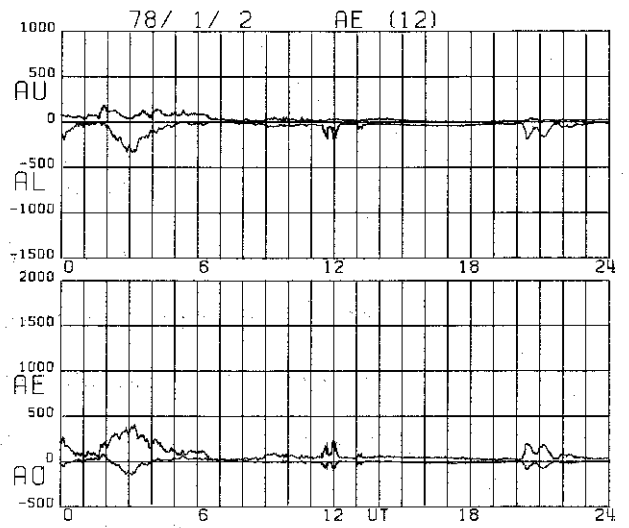
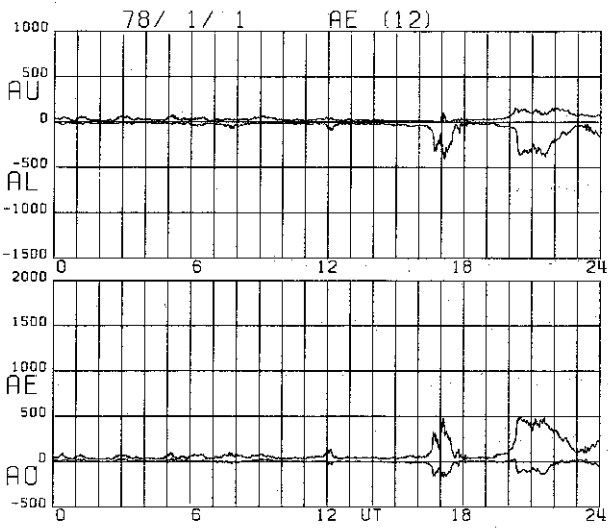


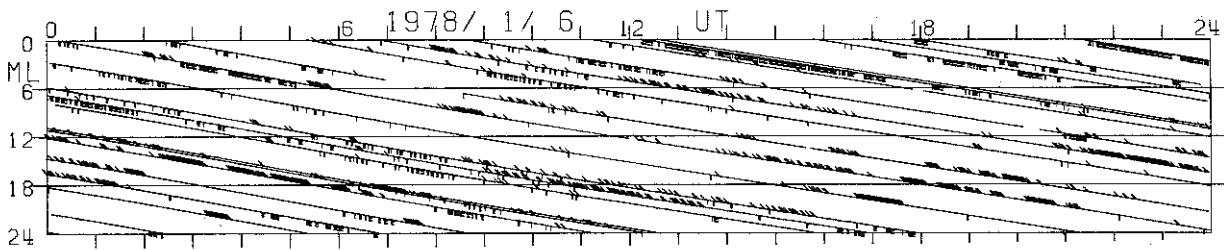
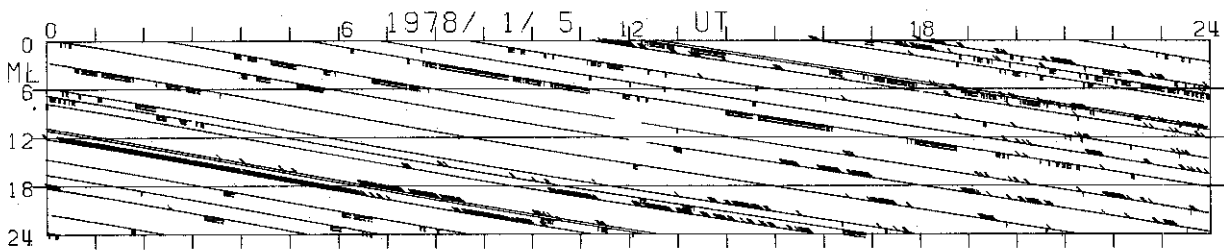
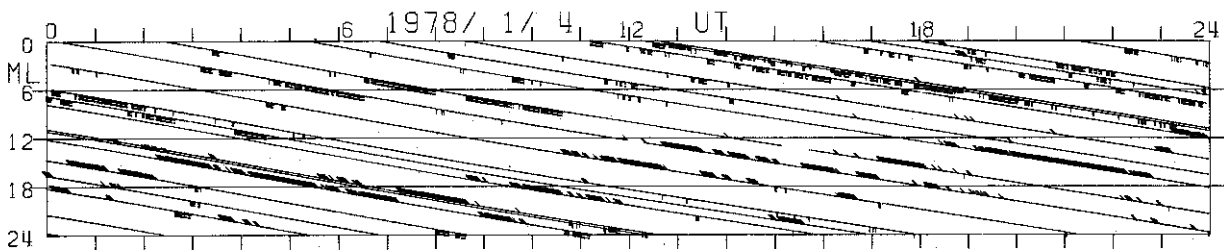
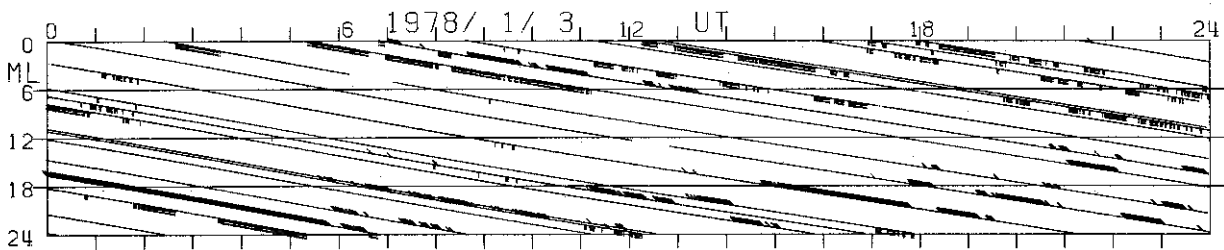
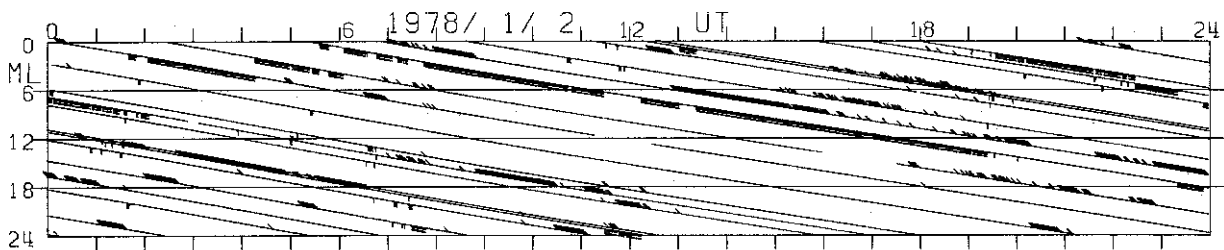
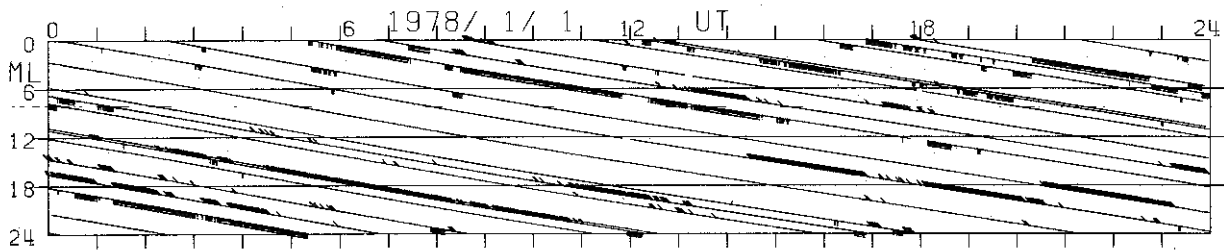
FIGURE 4 (on even pages)

Daily graphs of 1.0-min AE indices (AU, AL, AE and AO) for January–June 1978. Graphs on very disturbed days (January 4 and 30, February 15, April 30, May 1, 4 and 9) are reproduced on pages 100 and 101.

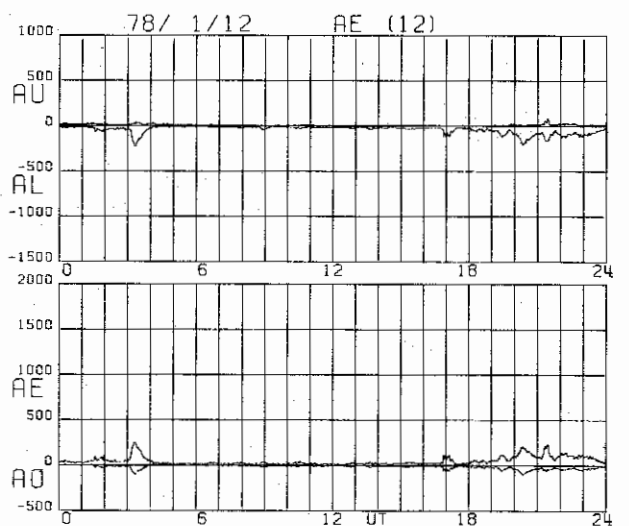
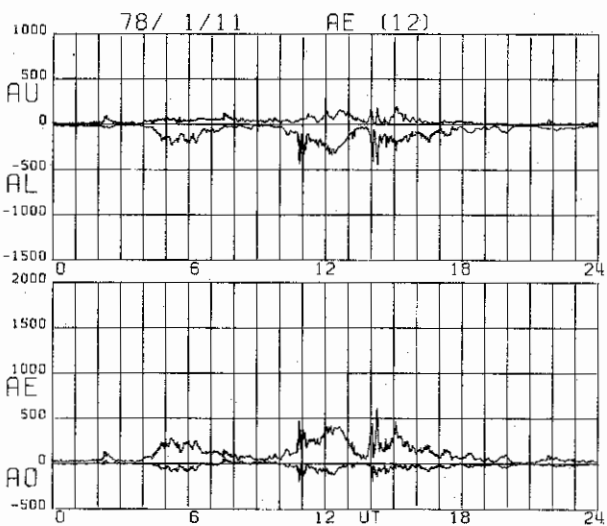
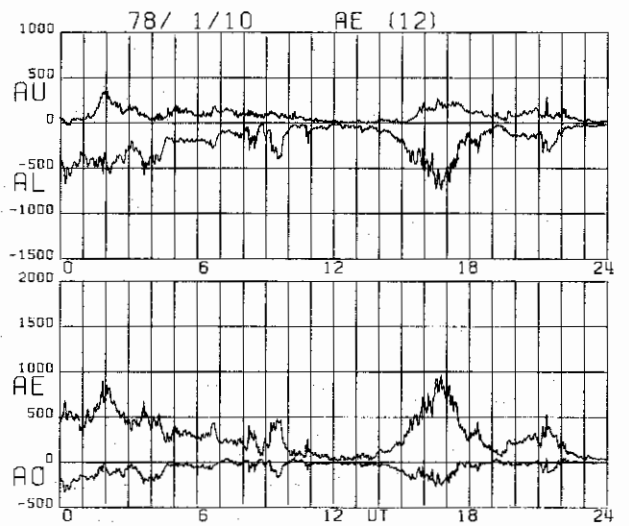
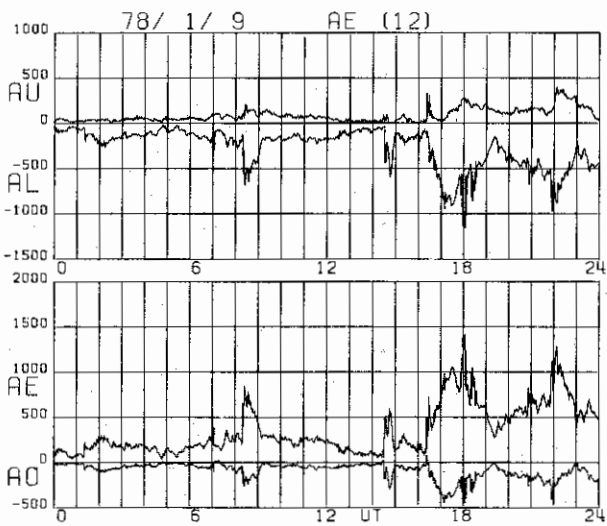
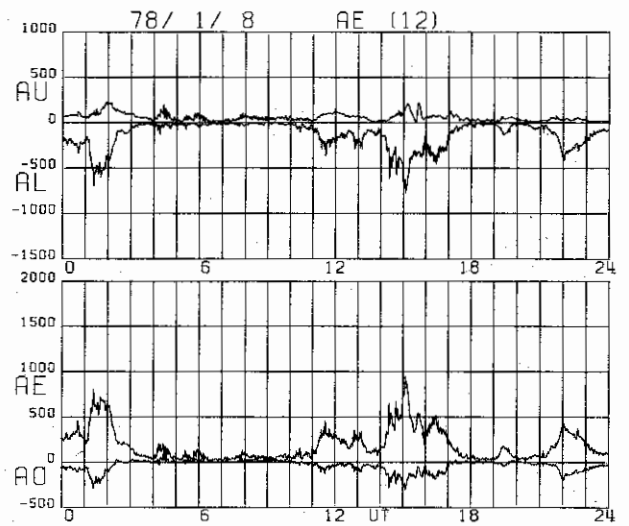
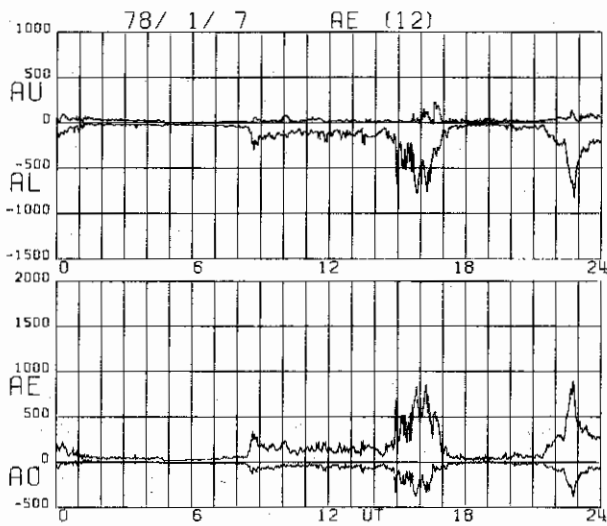
FIGURE 5 (on odd pages)

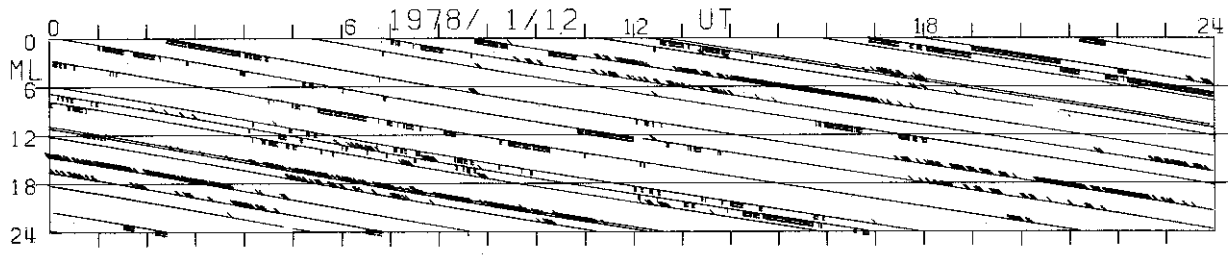
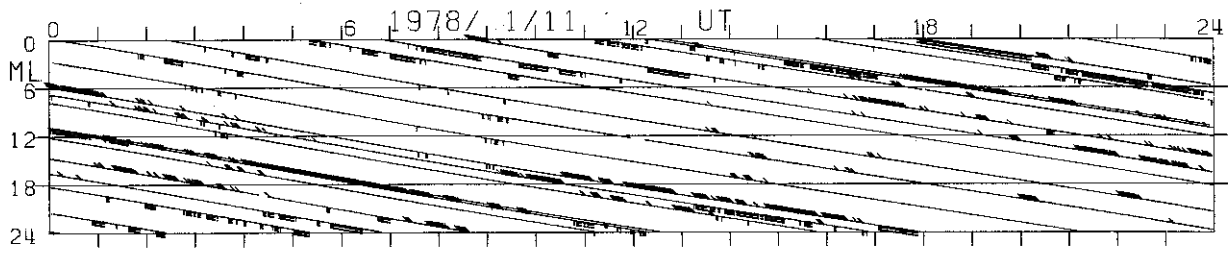
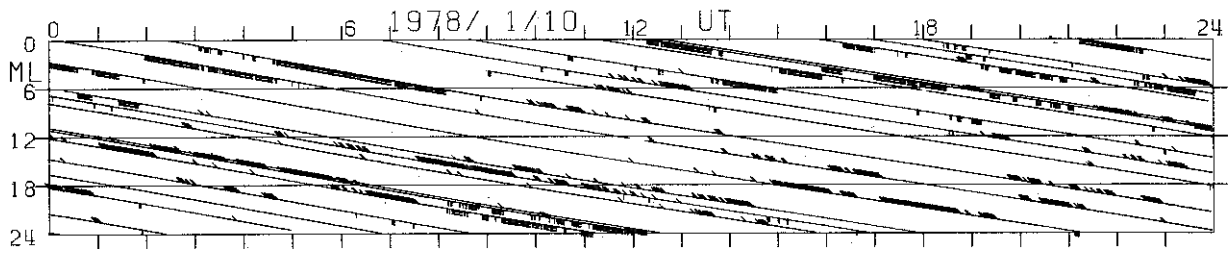
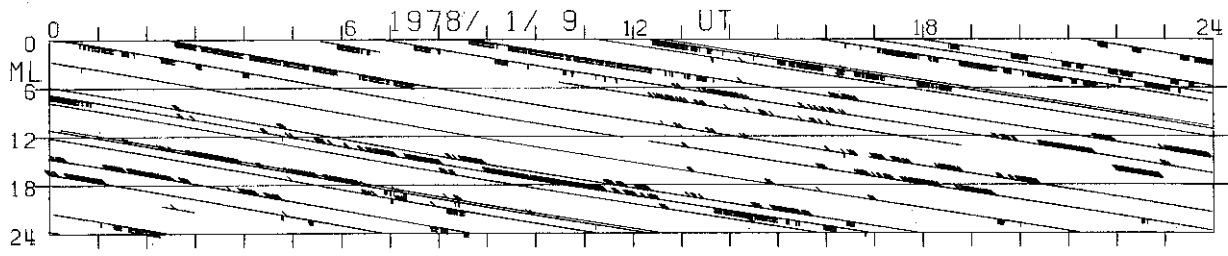
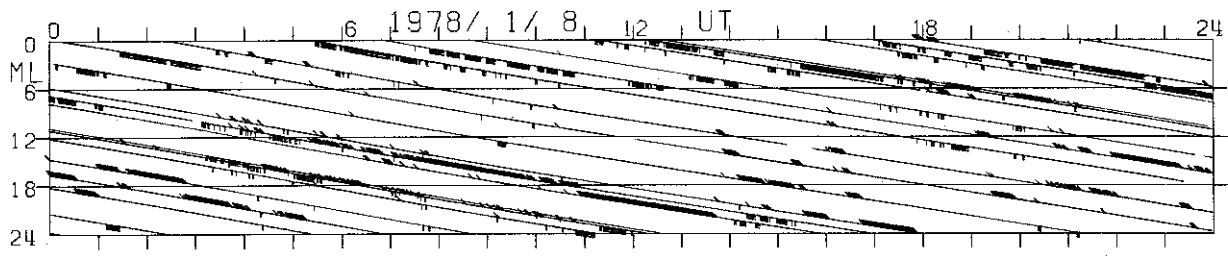
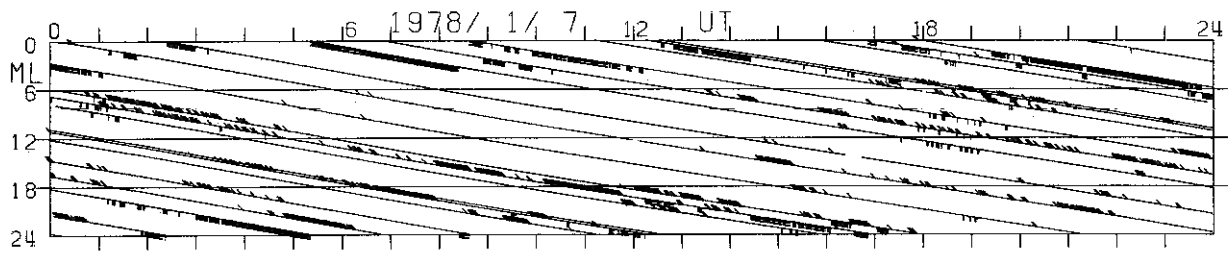
Plots of the contributing stations to the AU (upper plumes) and AL (lower plumes) indices, where you can see which station contributes to these indices at every UT hour.



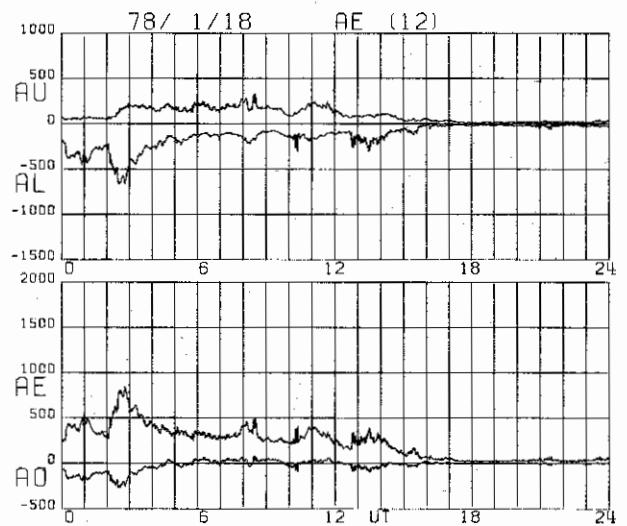
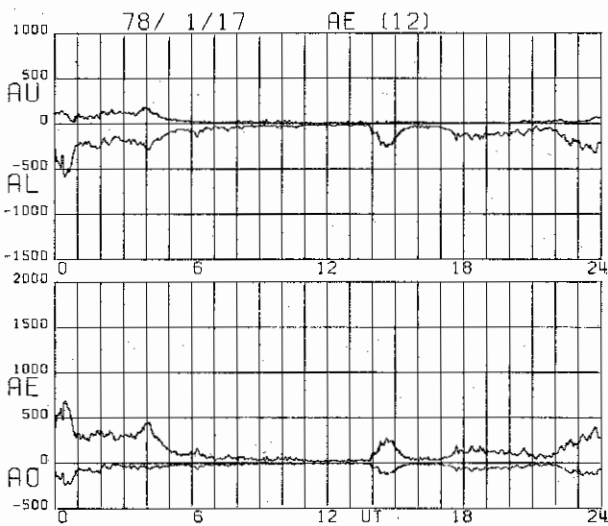
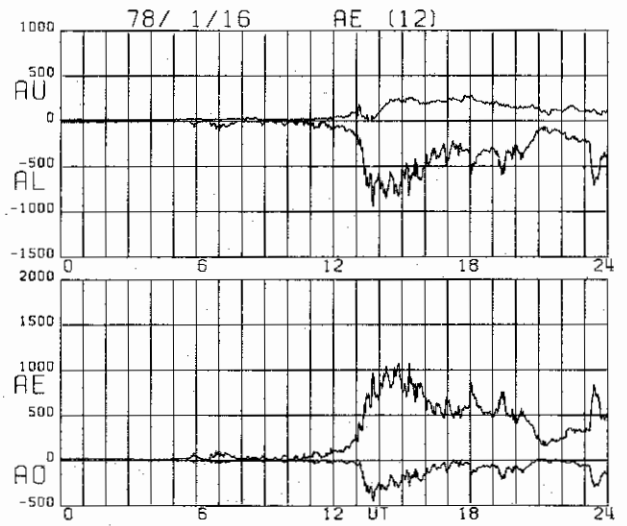
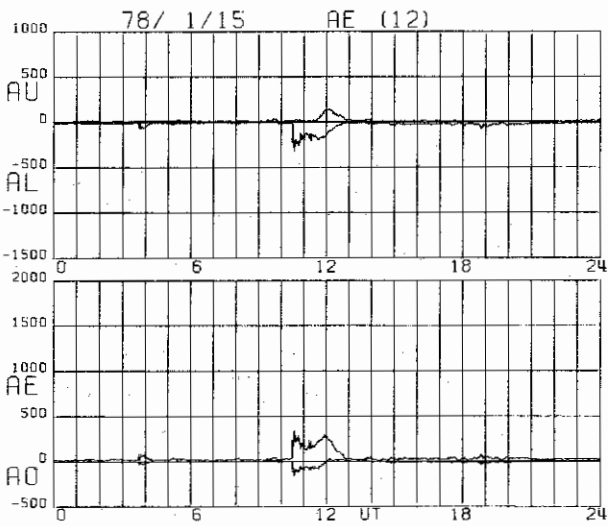
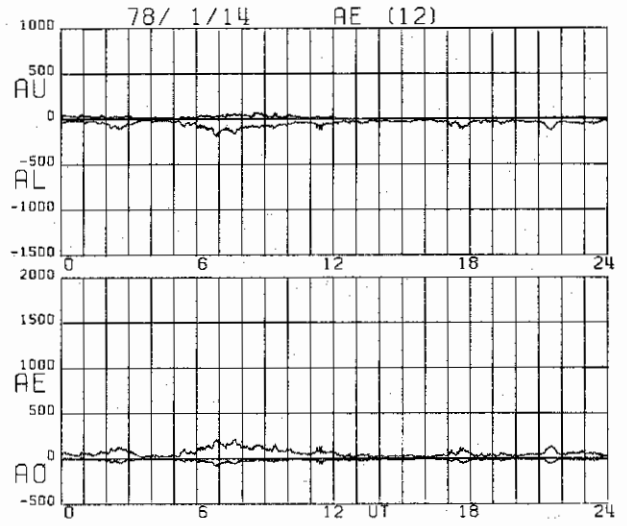
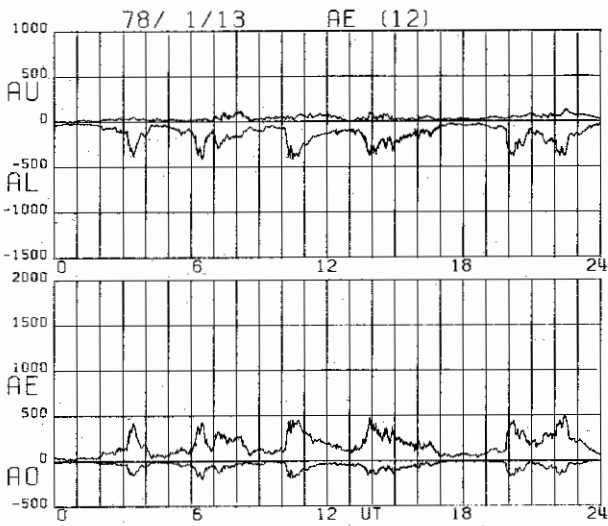


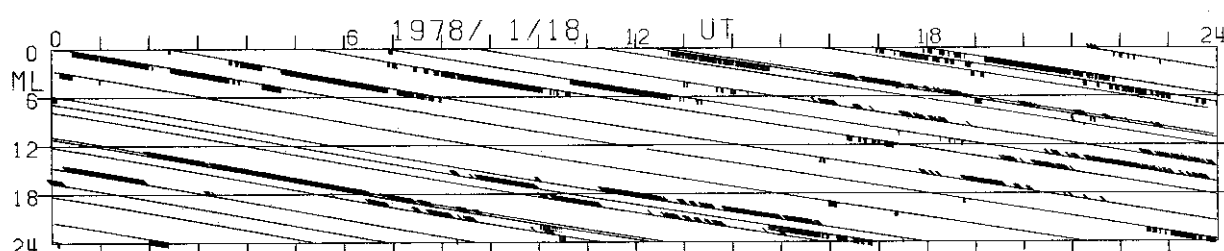
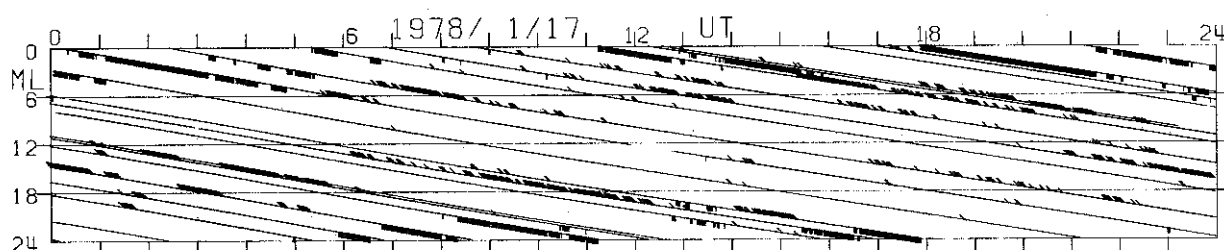
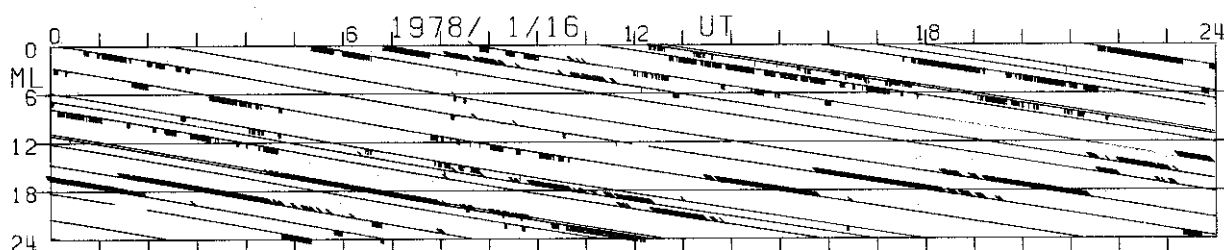
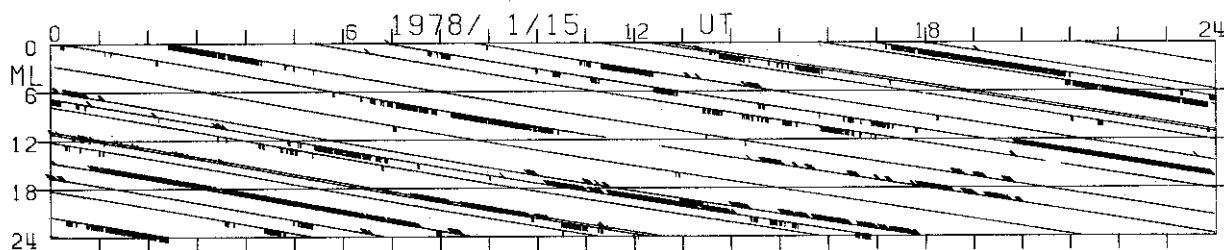
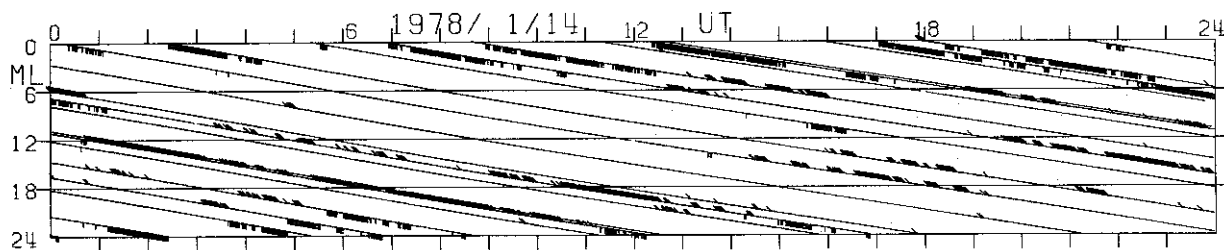
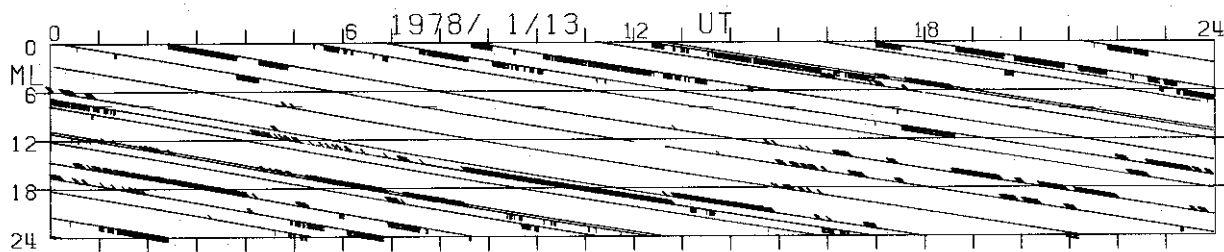
LRV NAQ GWR FCC YKC CMO BRW CWE TIK CCS DIK ABK (LRV)



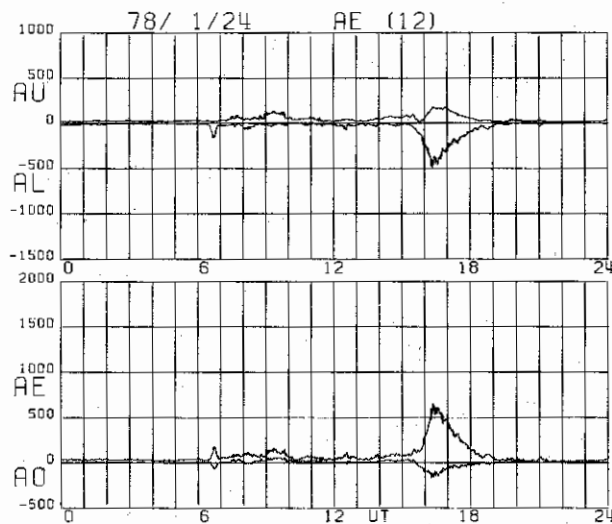
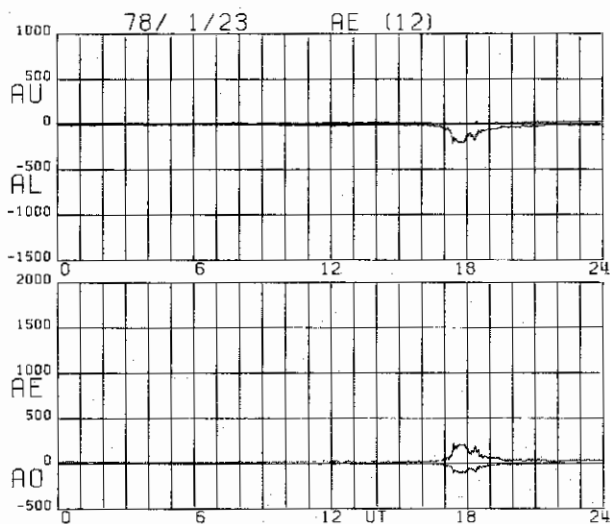
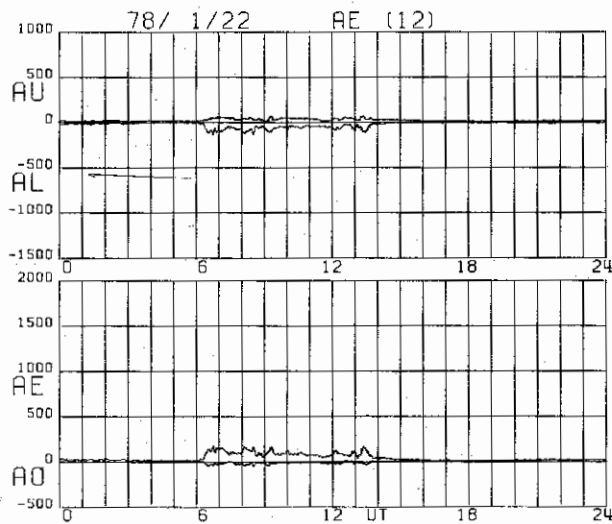
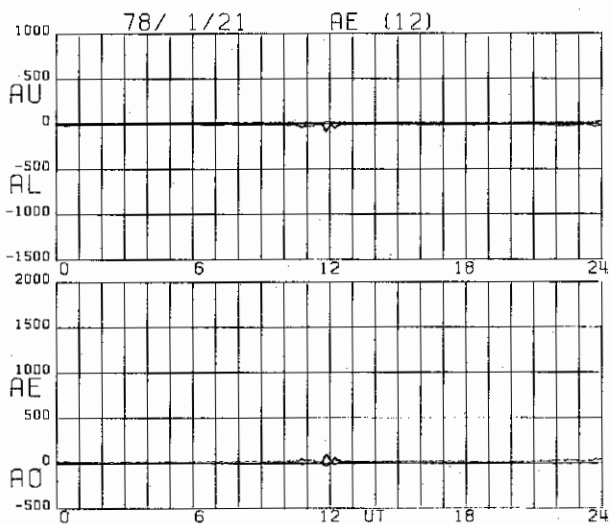
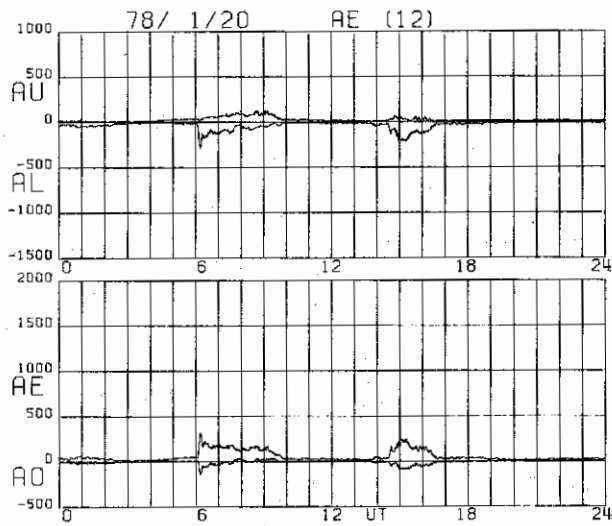
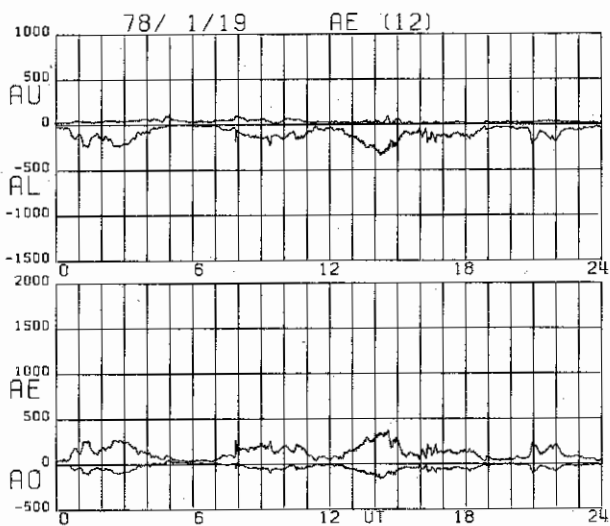


LRV NAQ GWR FCC YKC CMO BRW CWE TIK CCS DIK ABK (LRV)

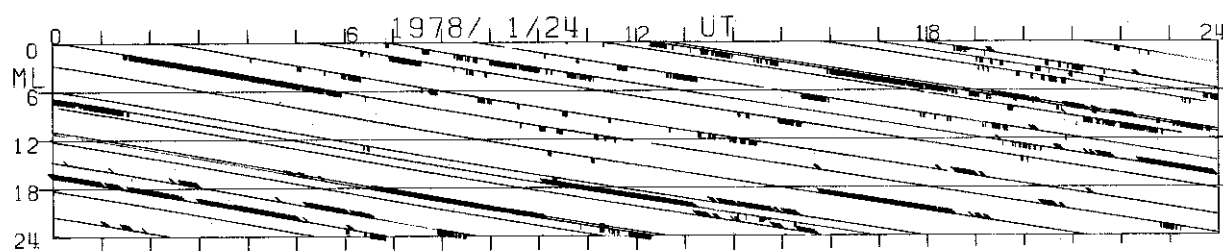
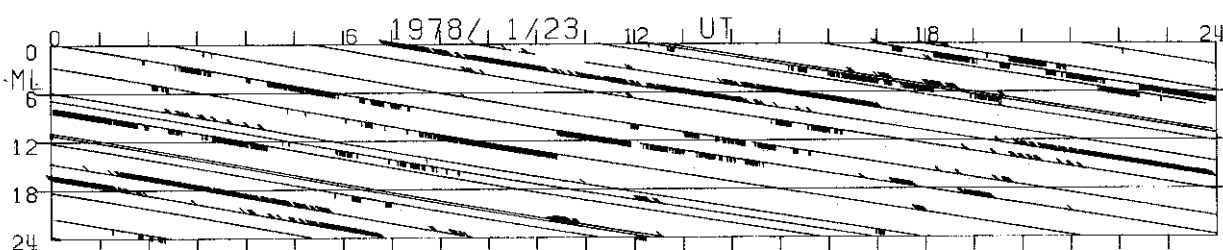
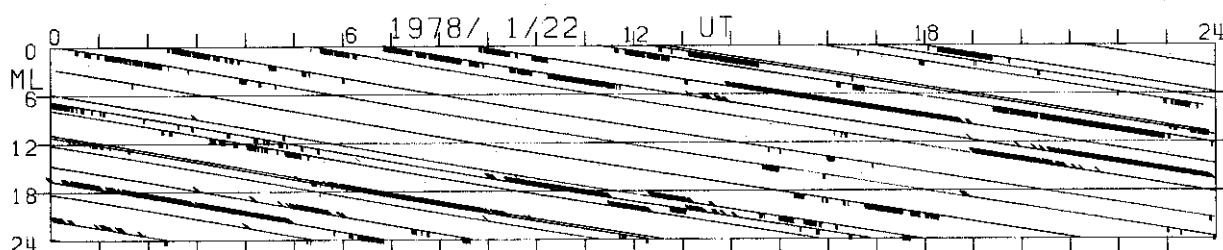
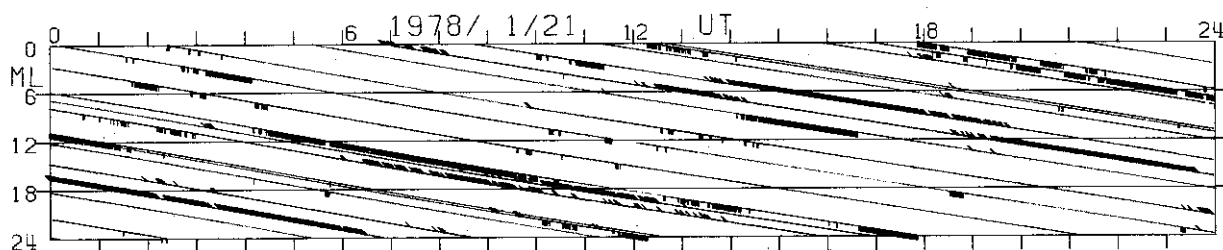
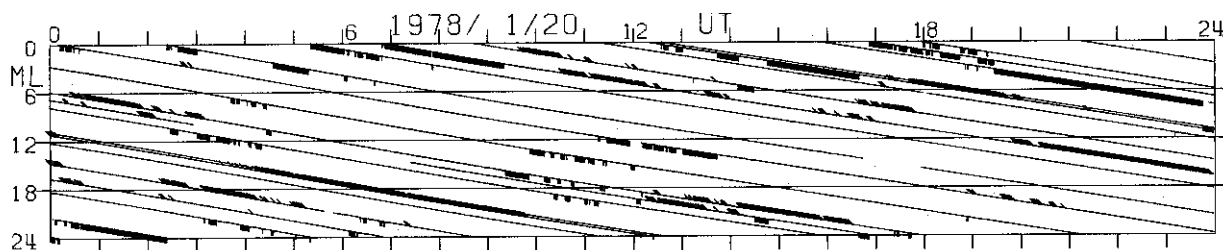
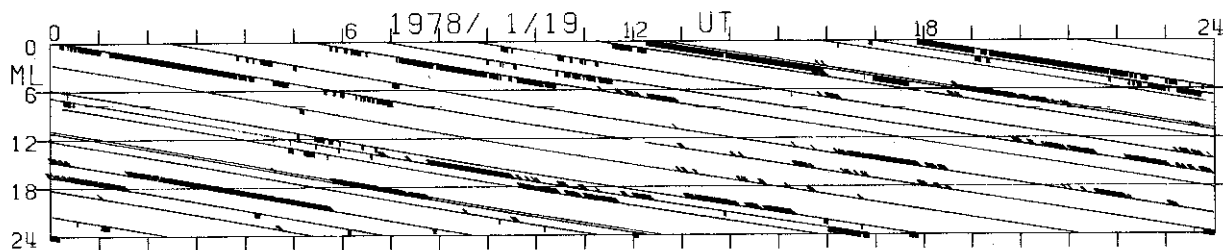




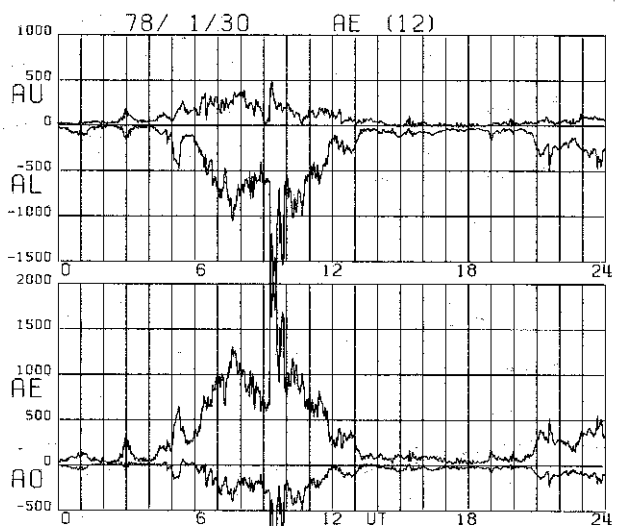
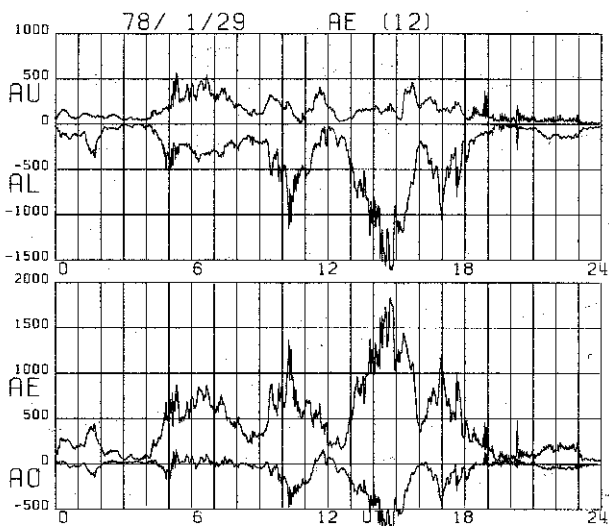
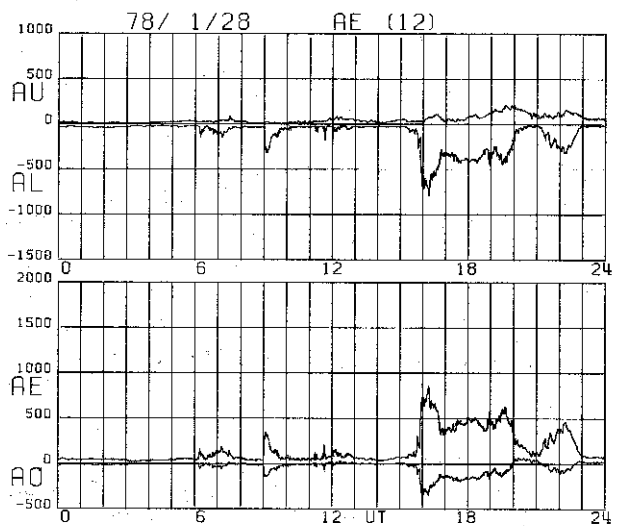
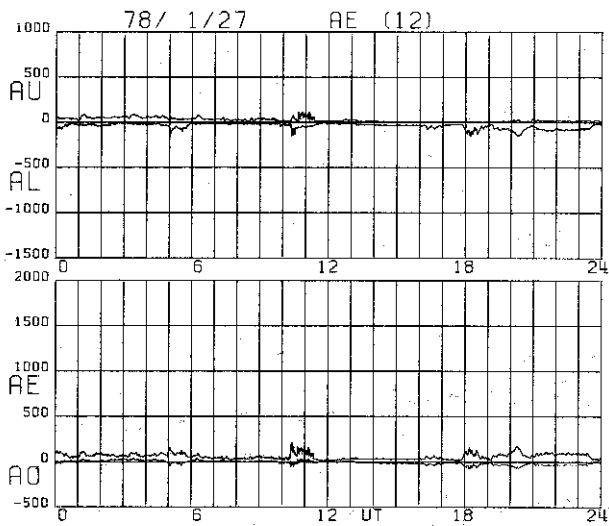
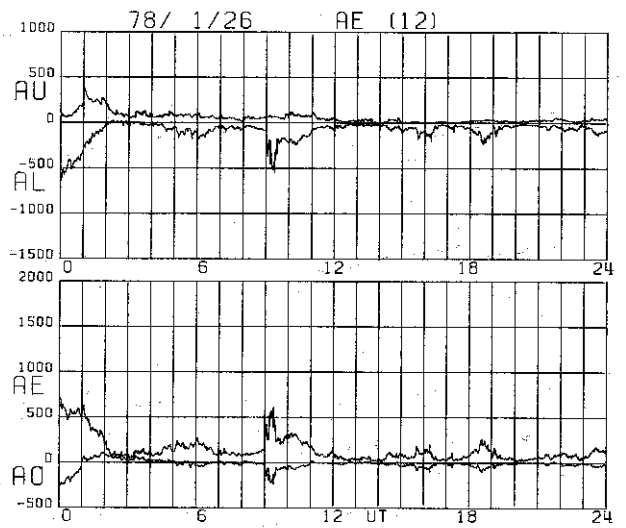
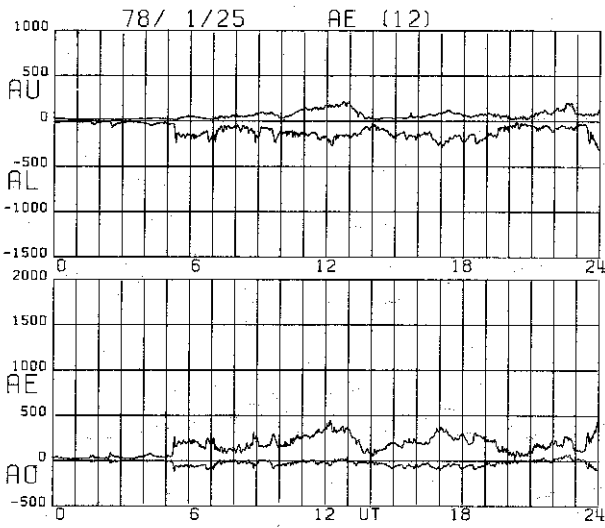
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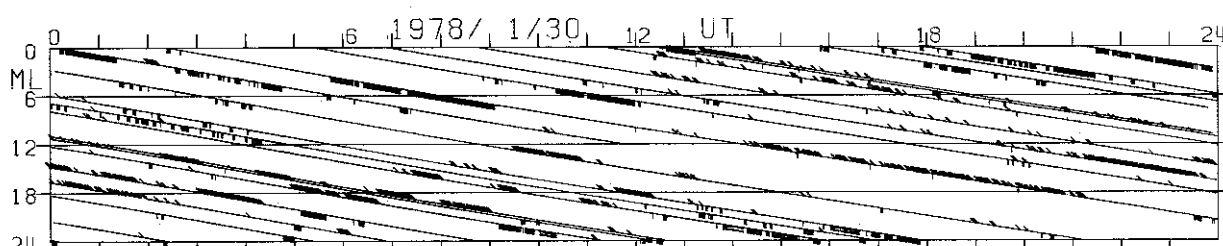
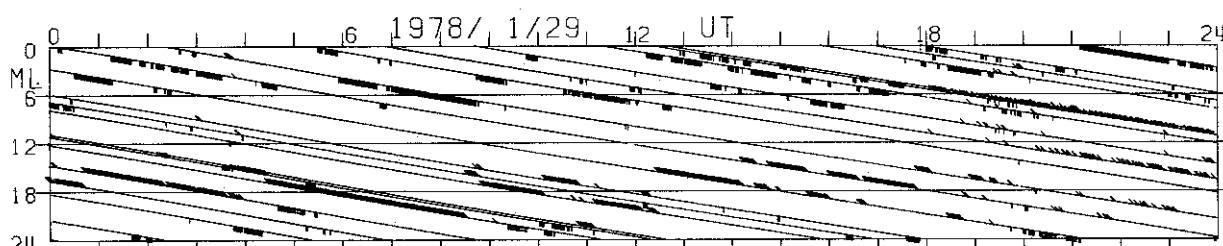
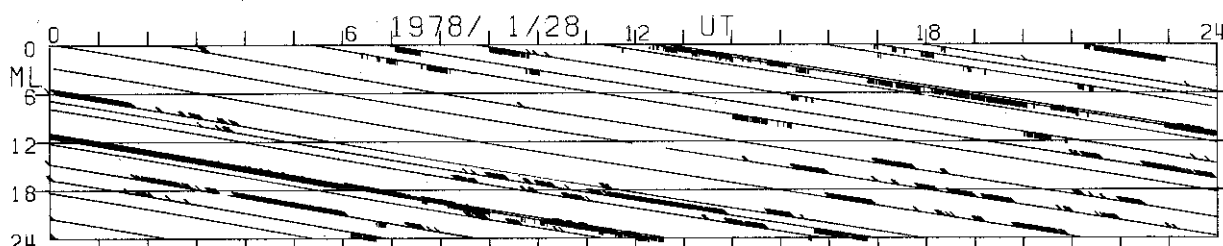
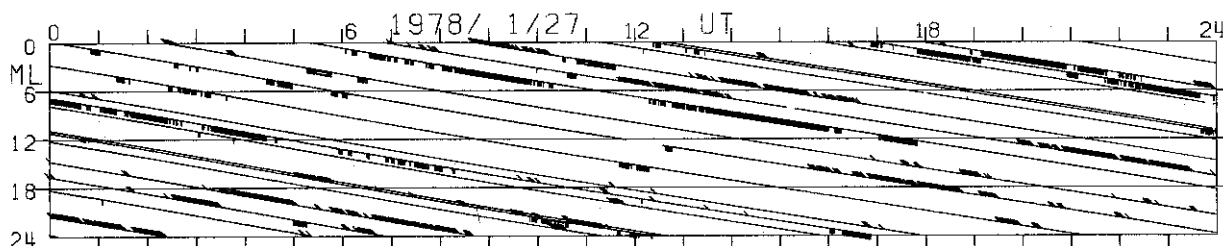
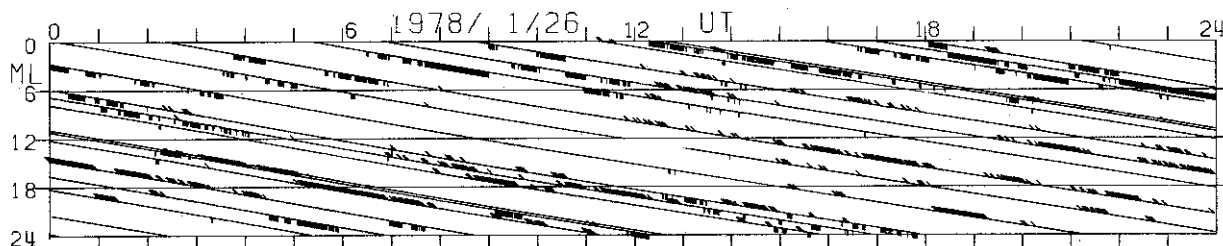
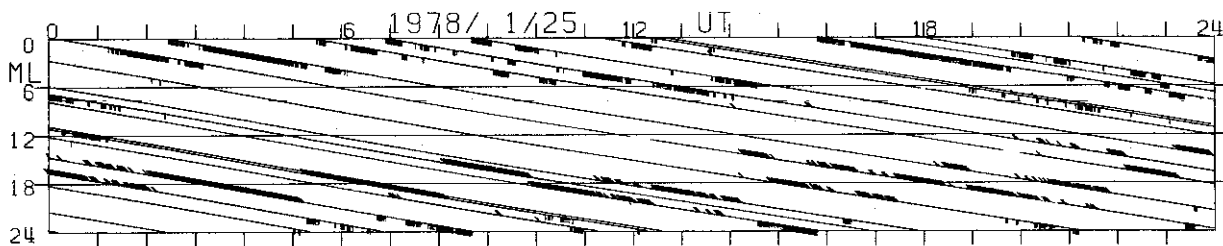




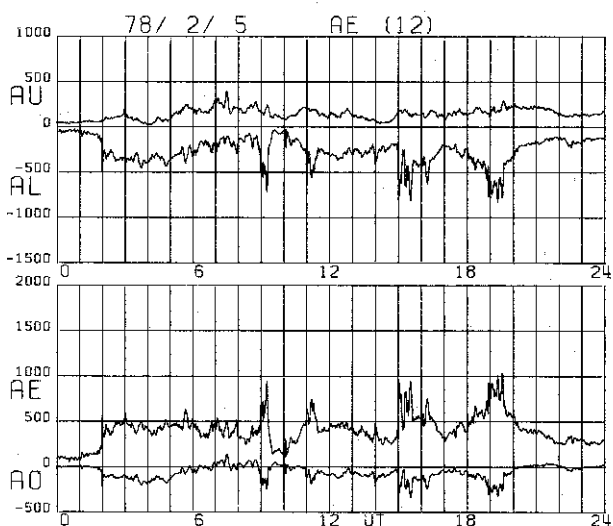
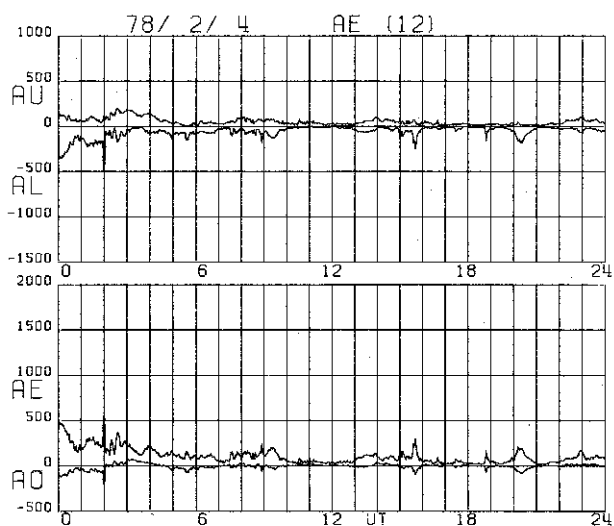
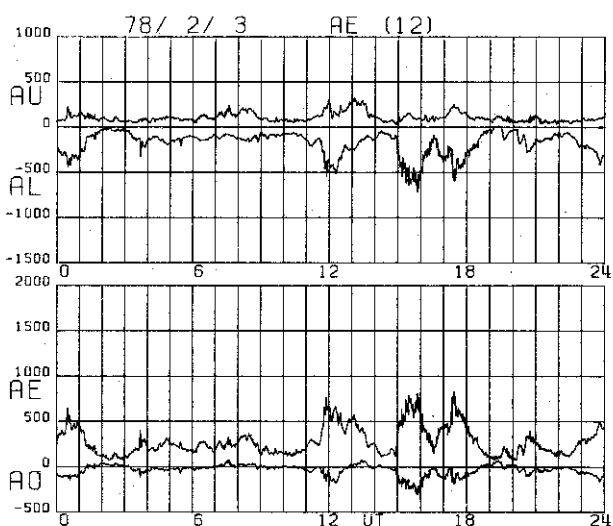
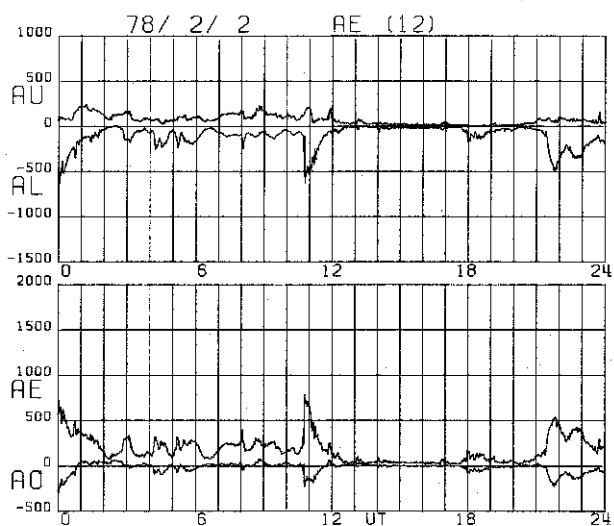
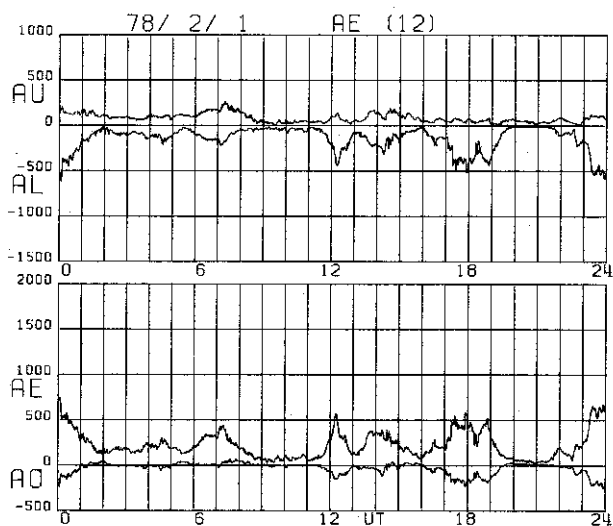
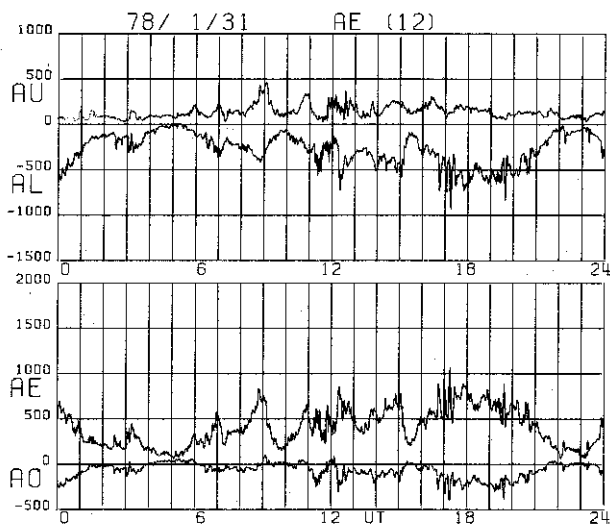


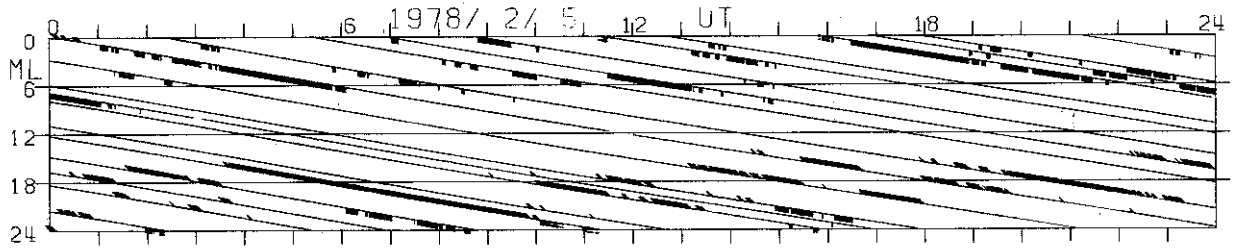
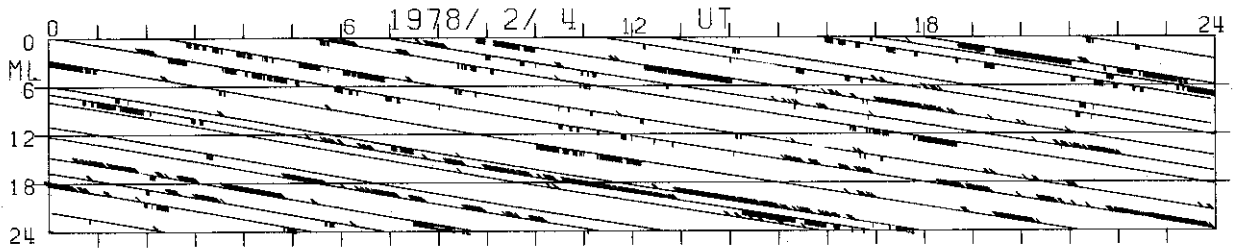
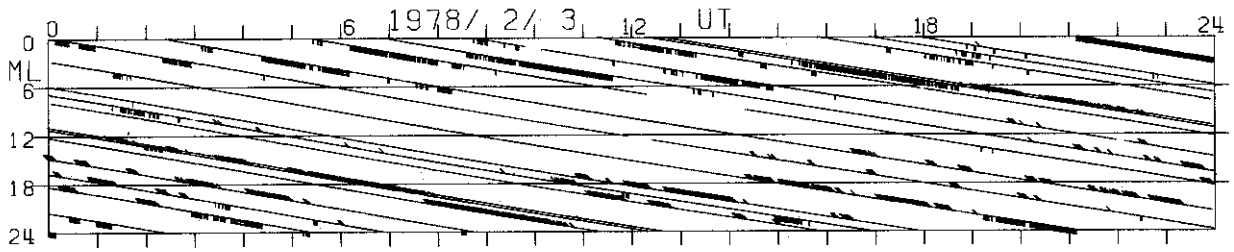
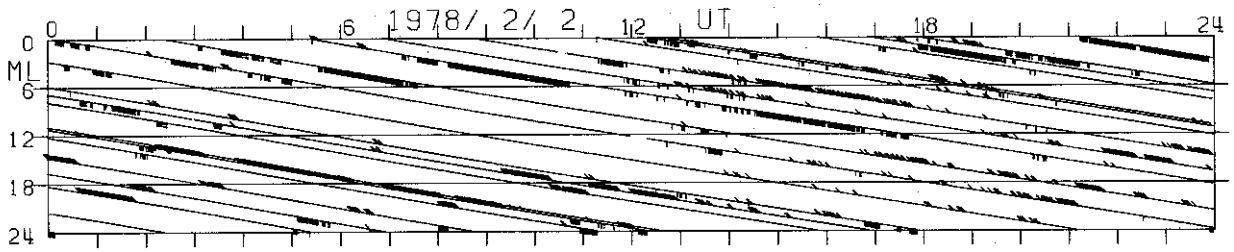
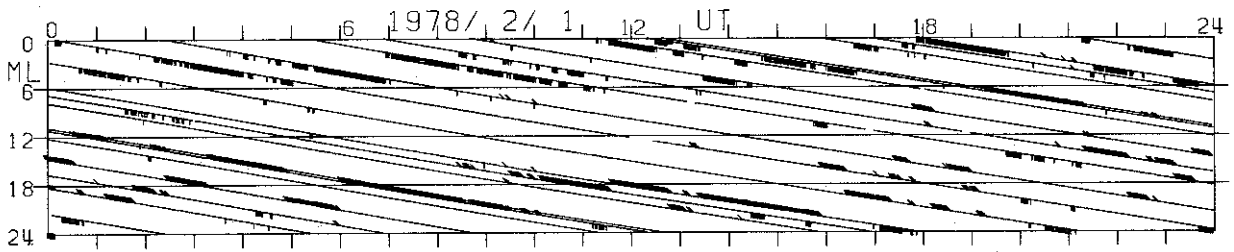
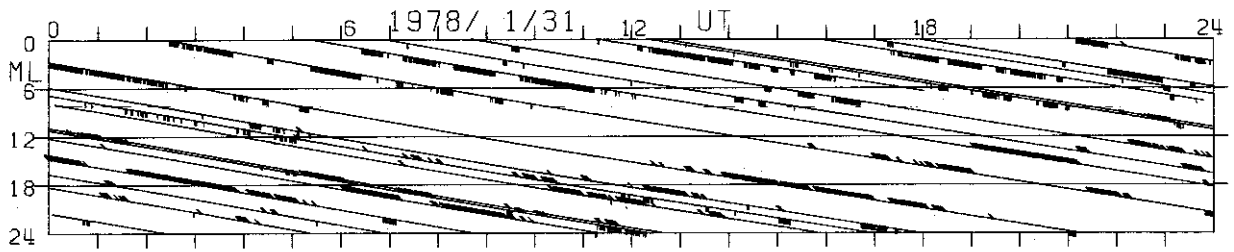
LRV NAQ GWR FCC YKC CMO BRW CWE TIK CCS DIK ABK (LRV)



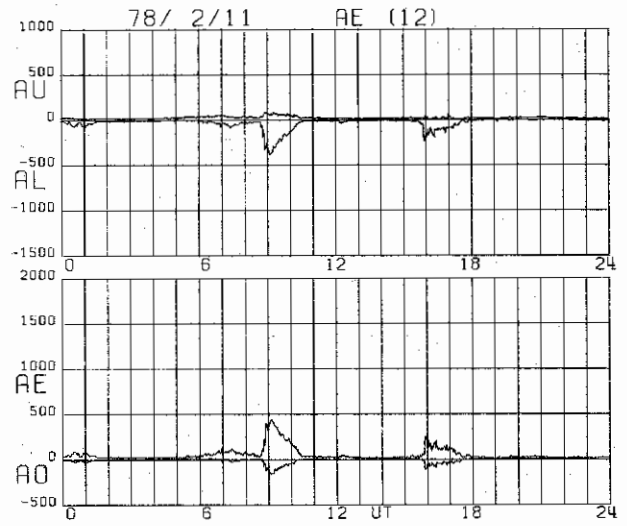
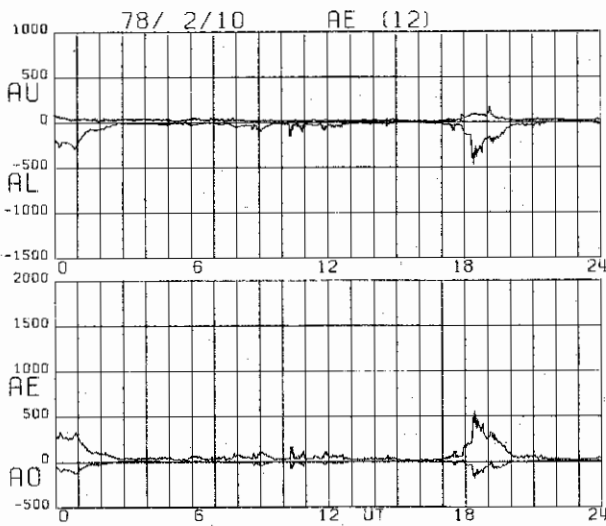
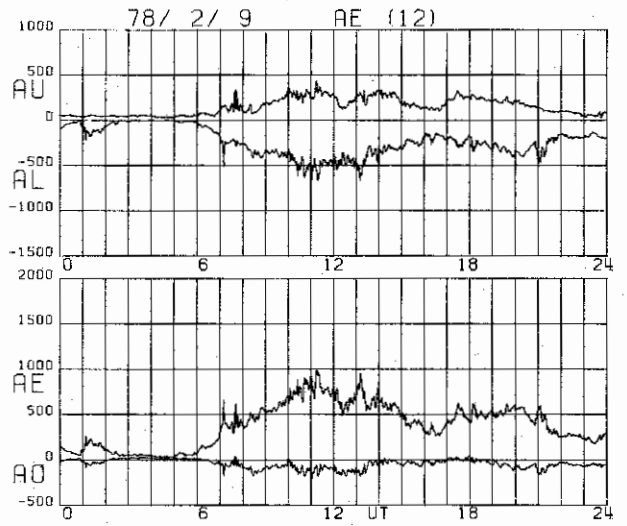
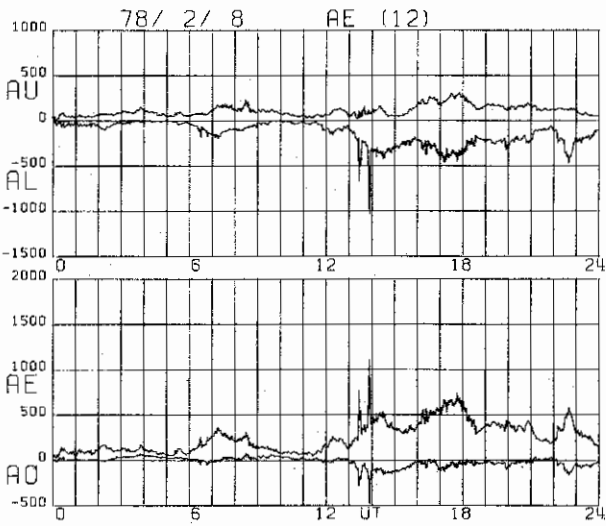
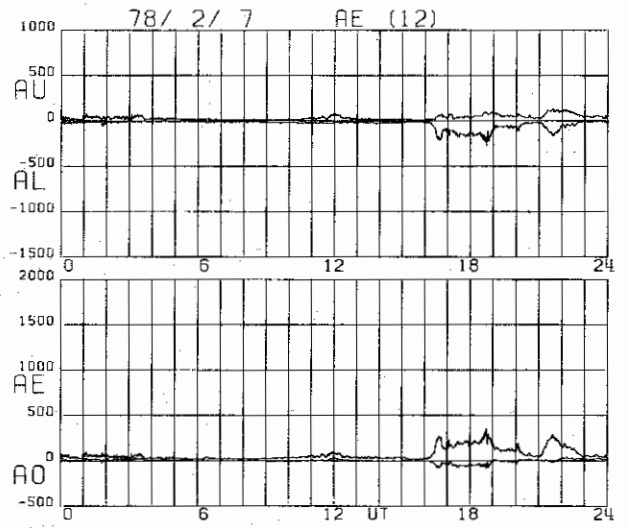
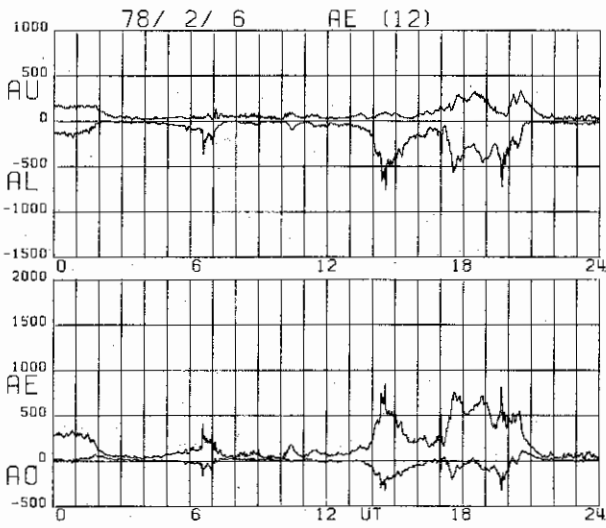


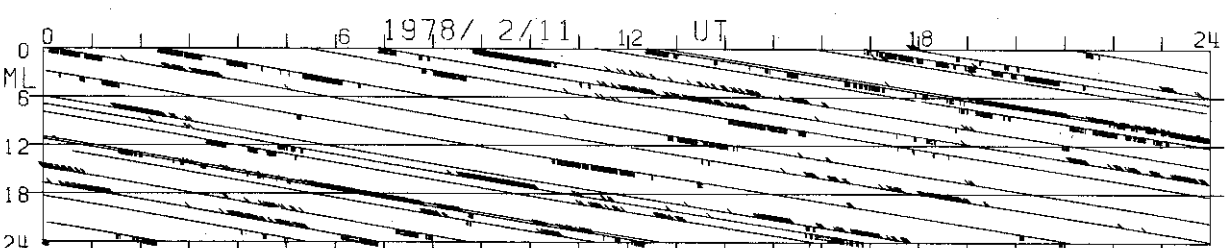
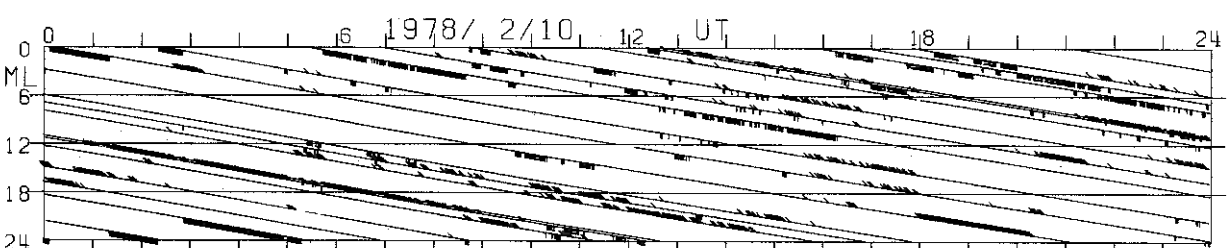
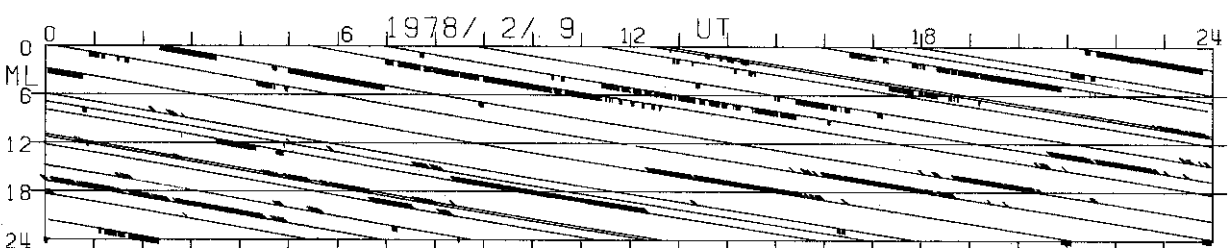
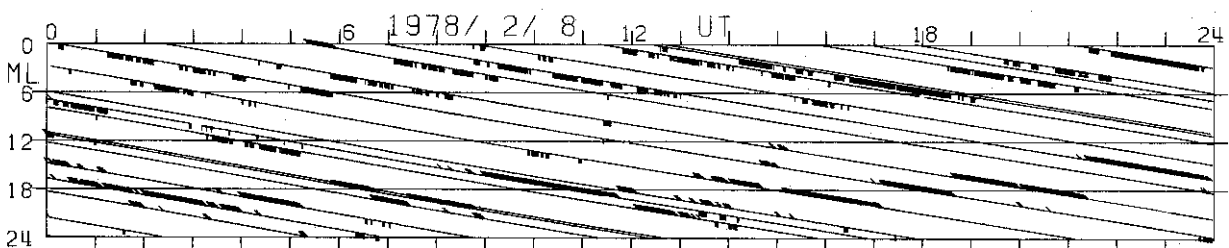
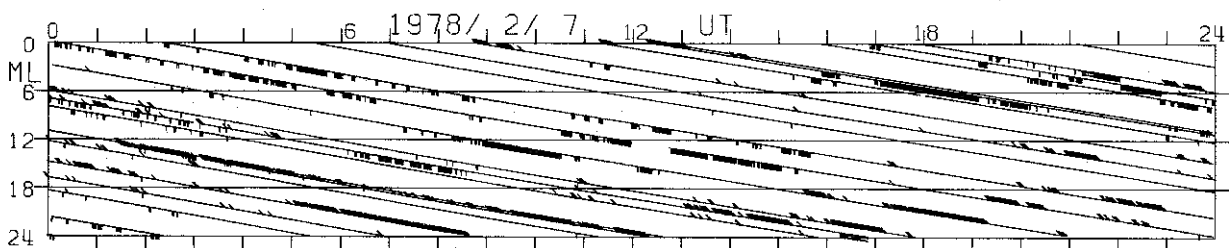
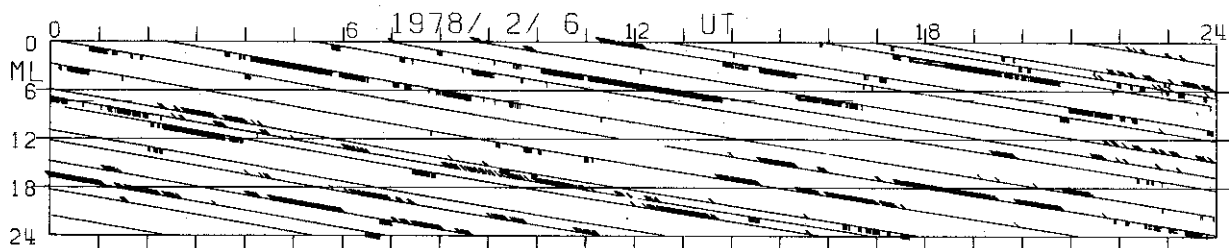
LRV NAQ GWR FCC YKC CMO BRW CWE TIK CCS DIK ABK (LRV)



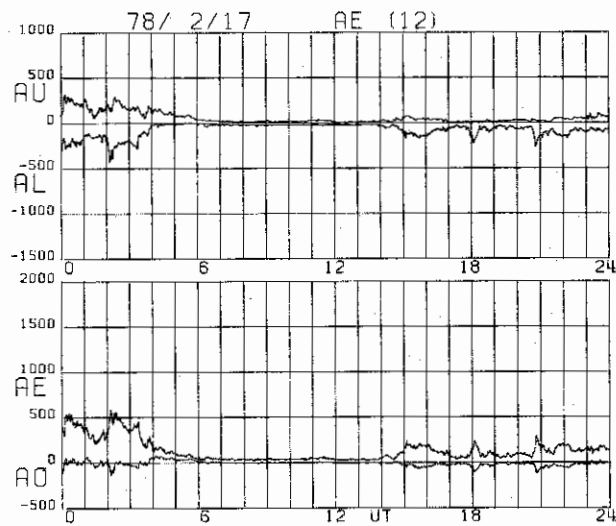
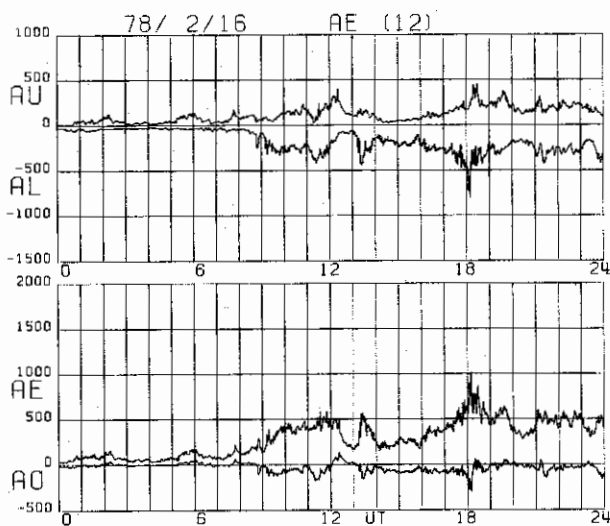
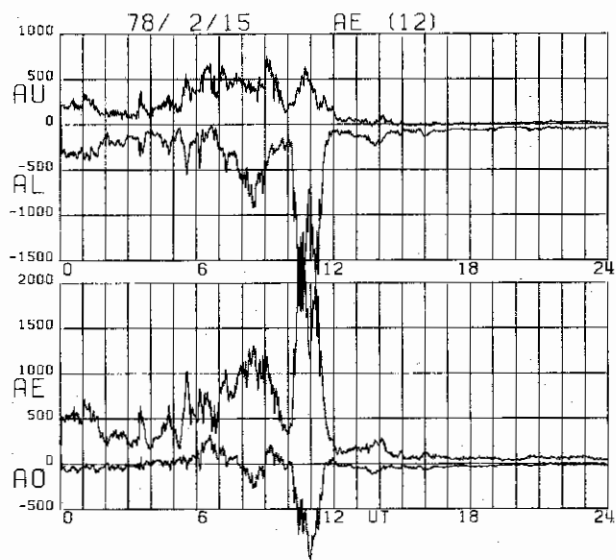
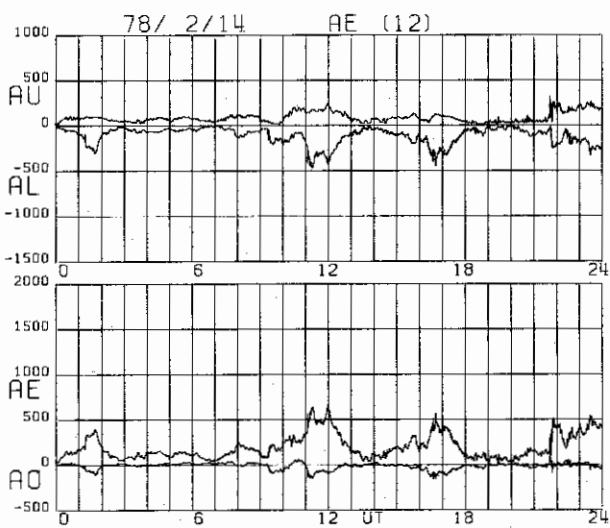
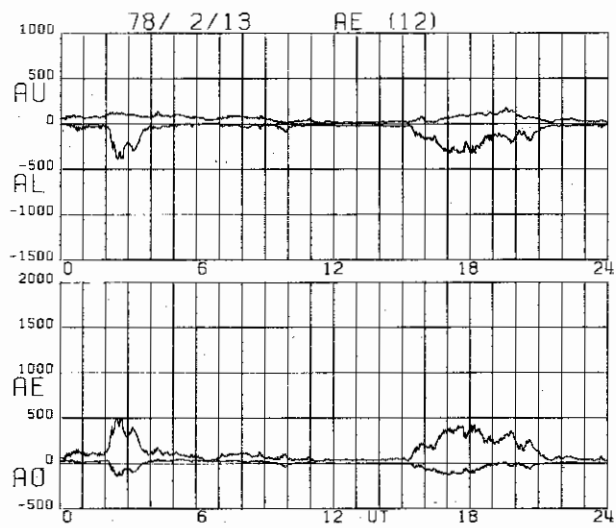
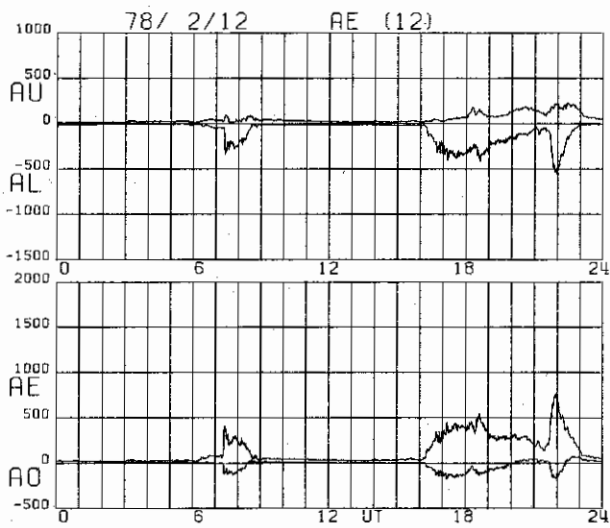


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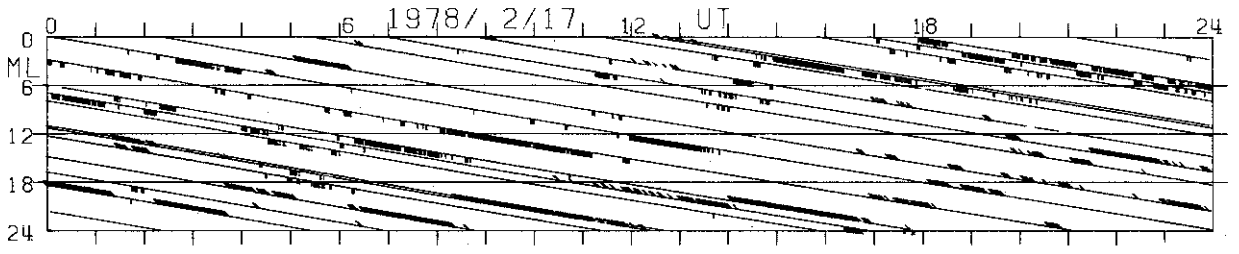
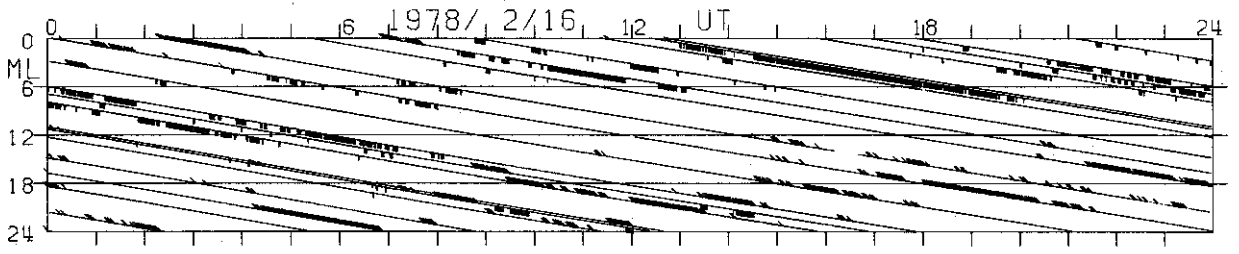
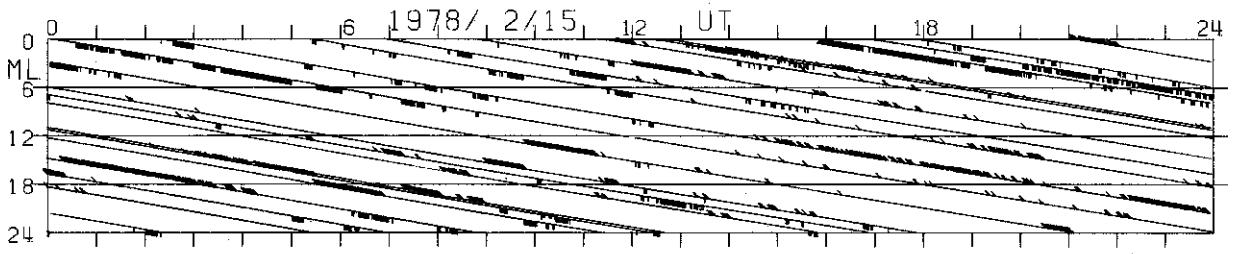
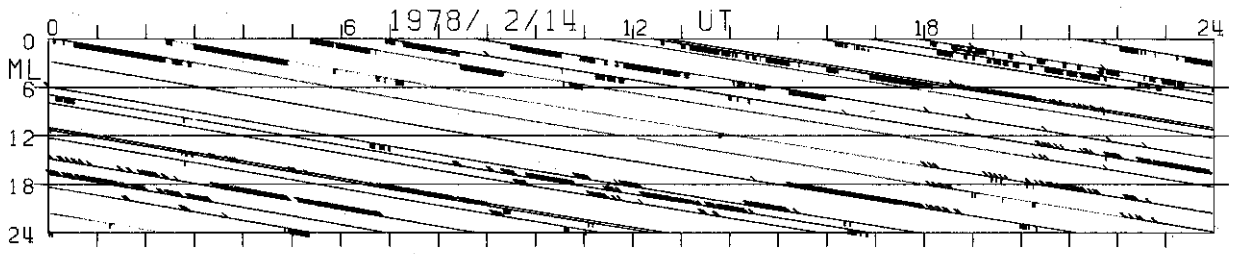
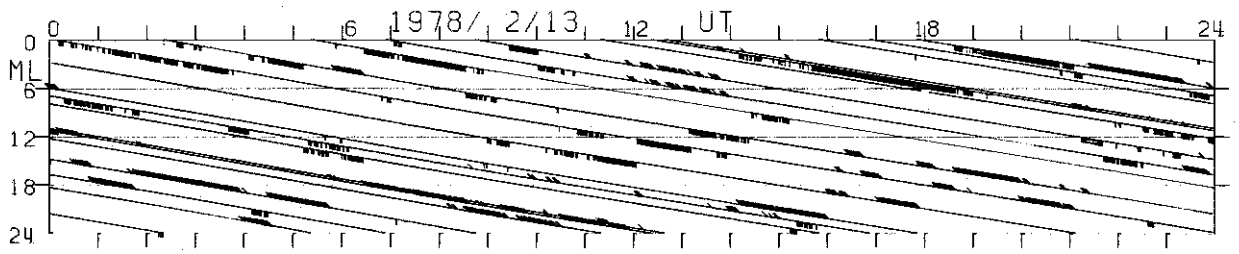
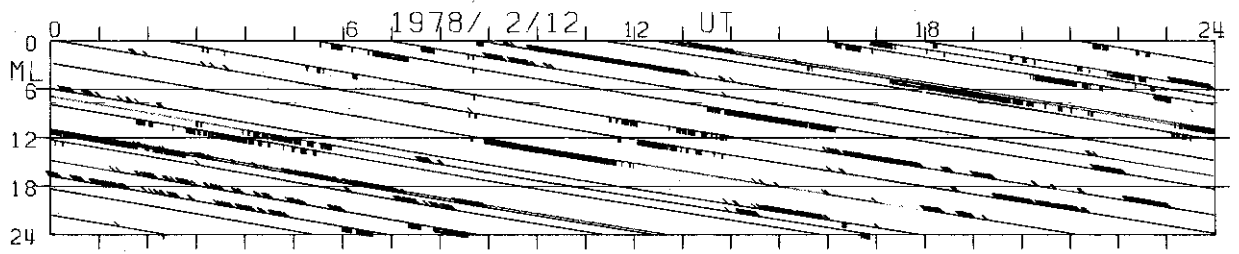




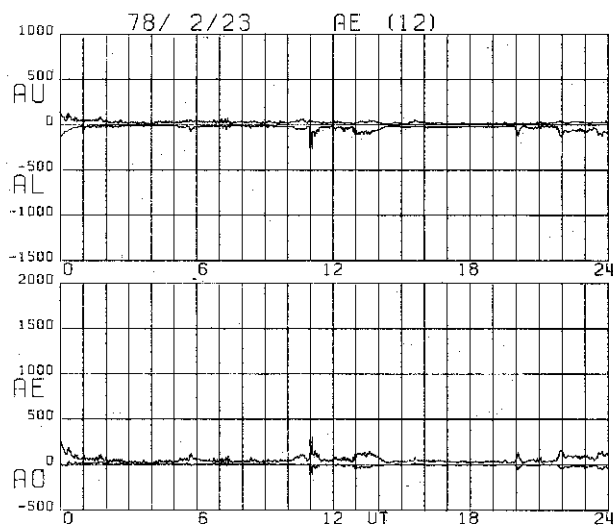
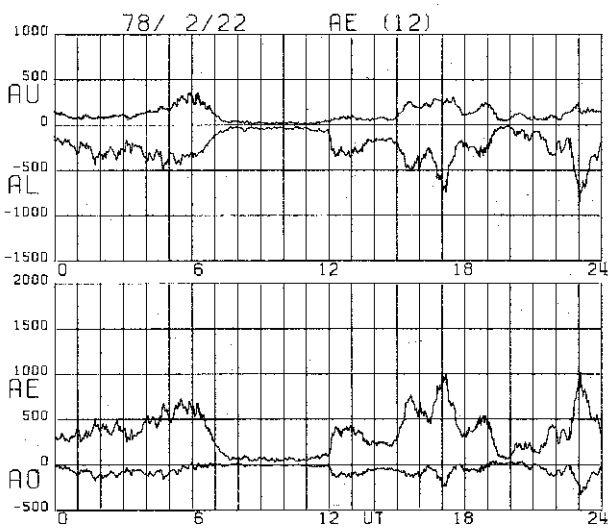
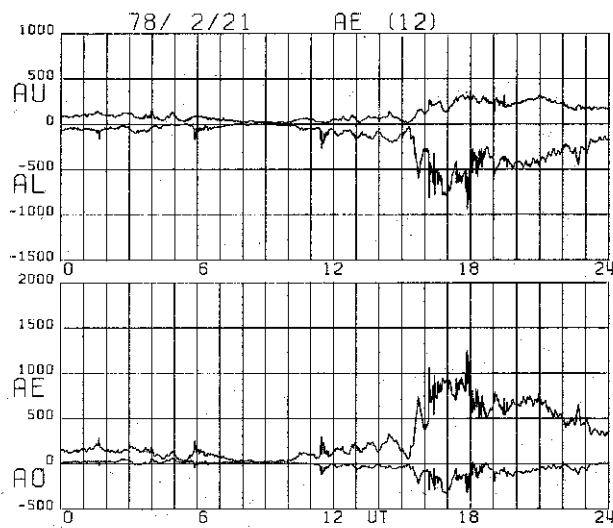
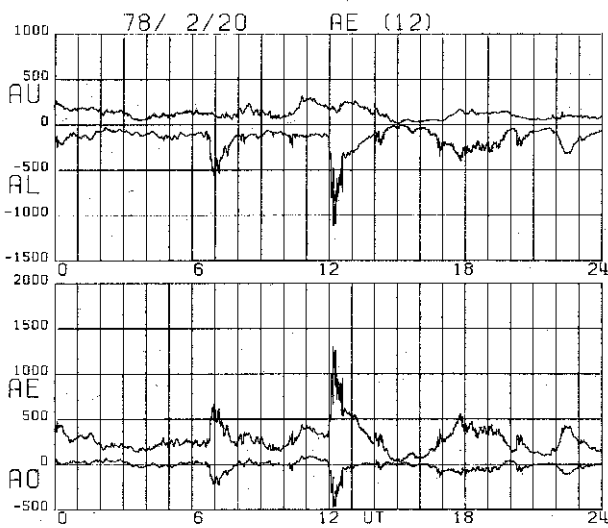
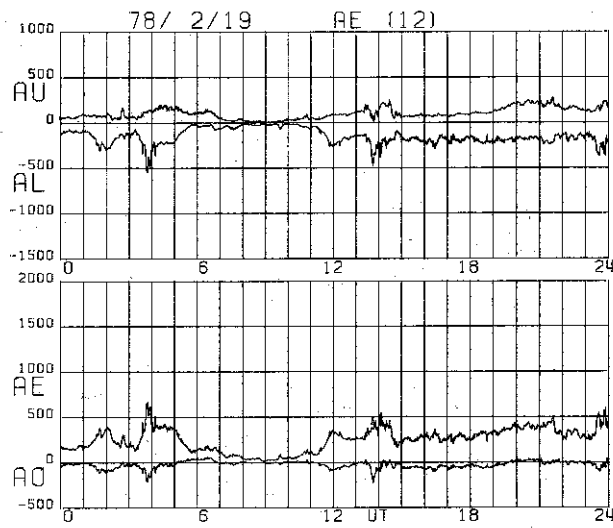
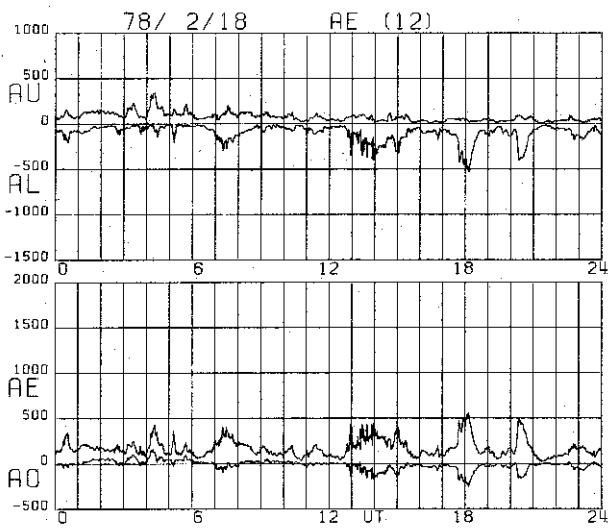
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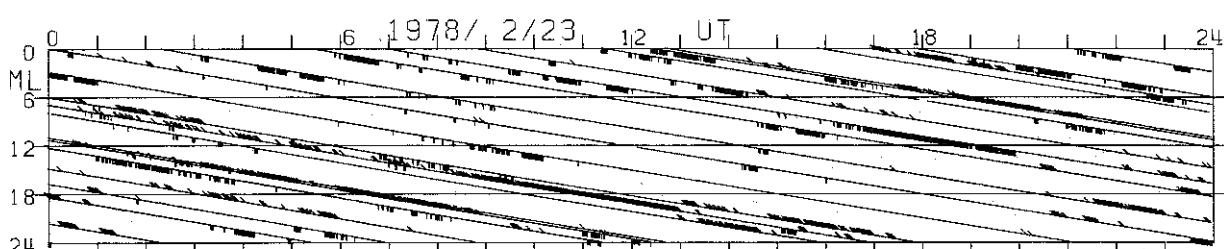
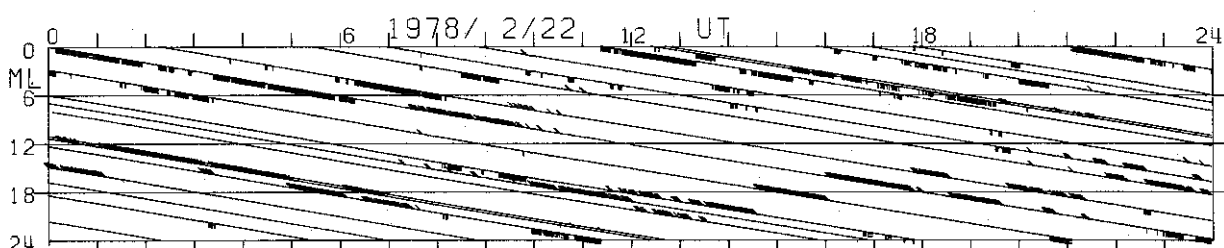
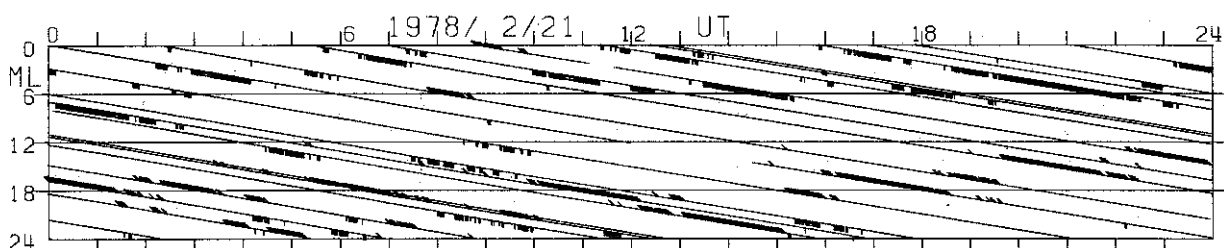
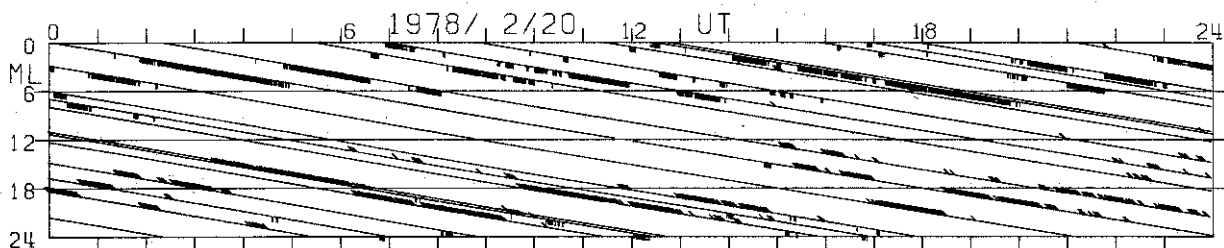
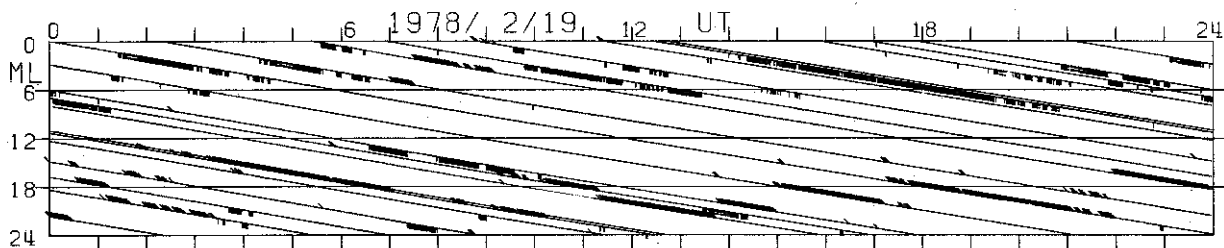
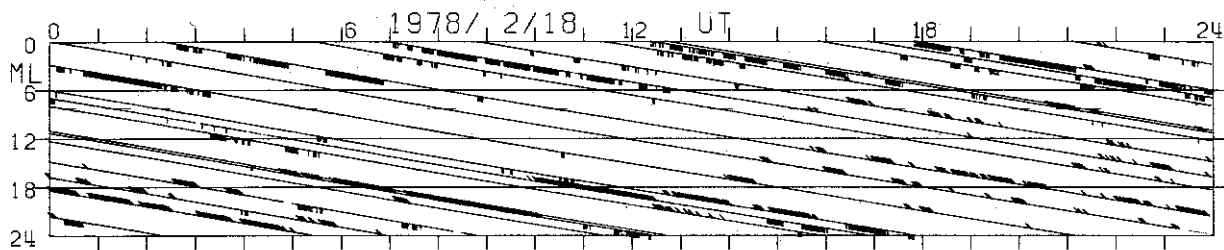




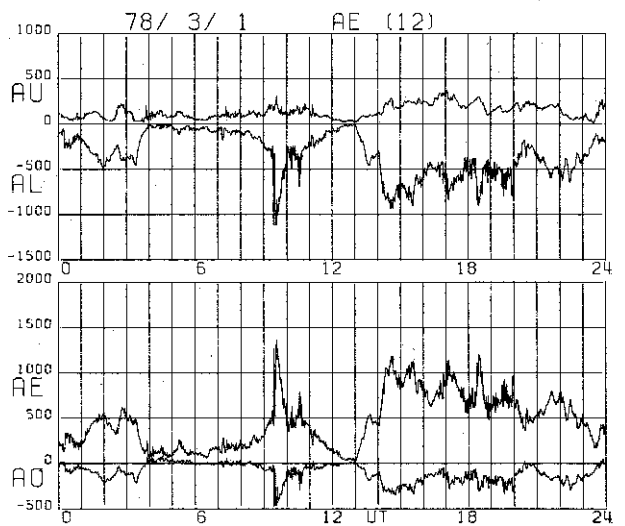
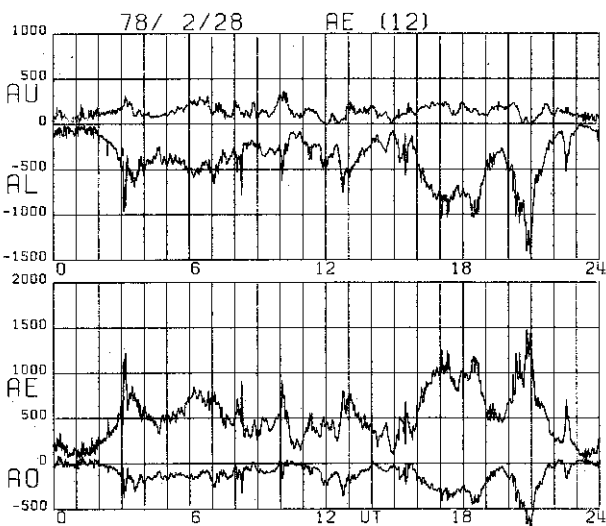
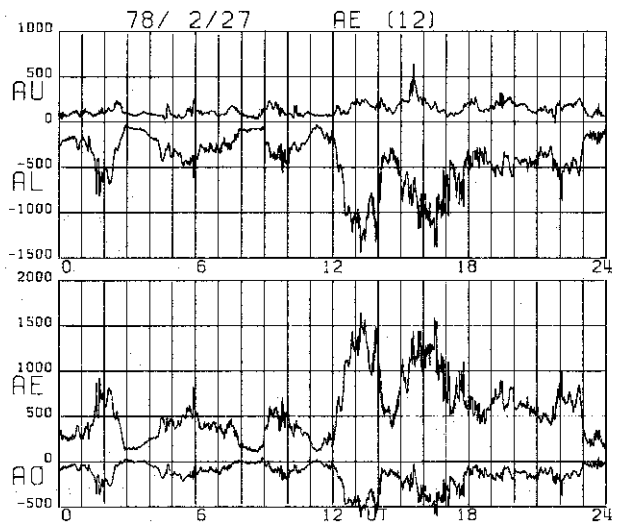
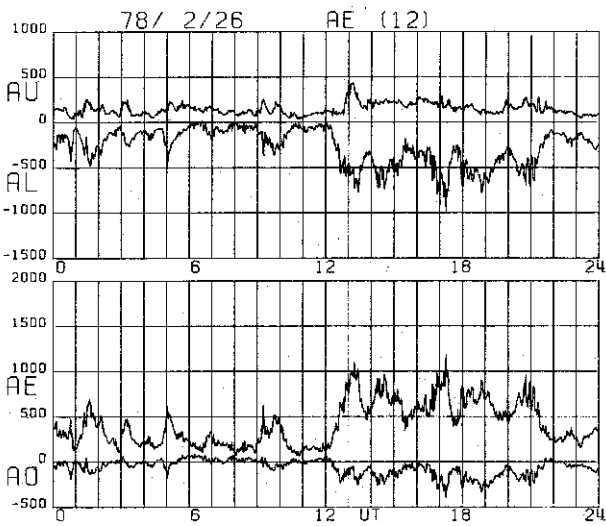
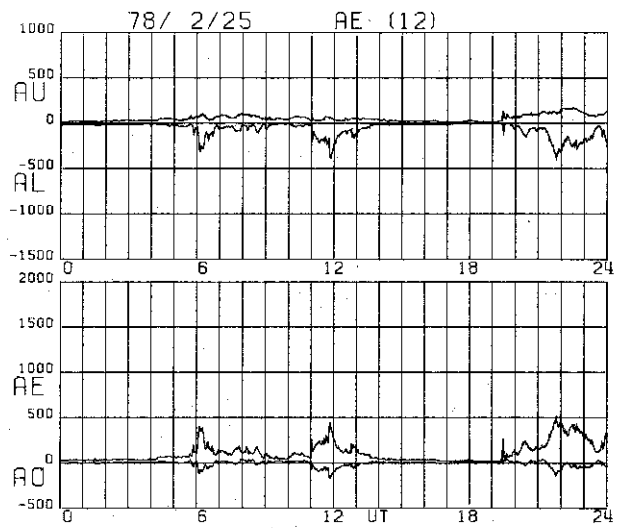
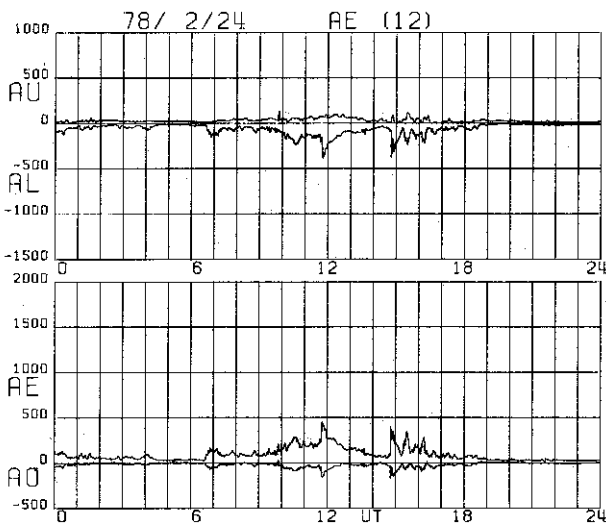


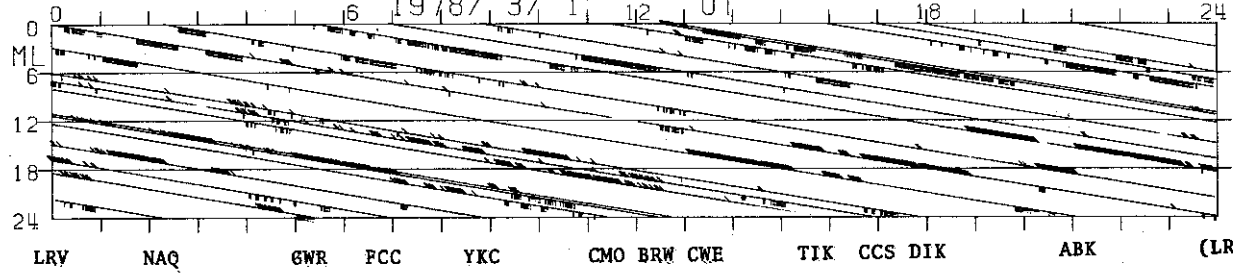
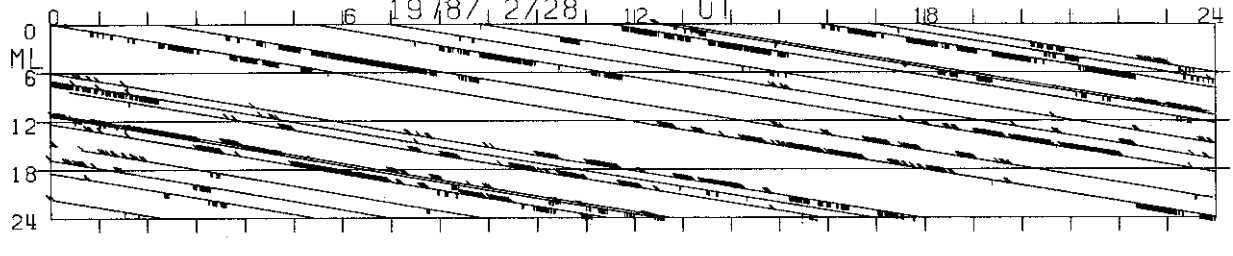
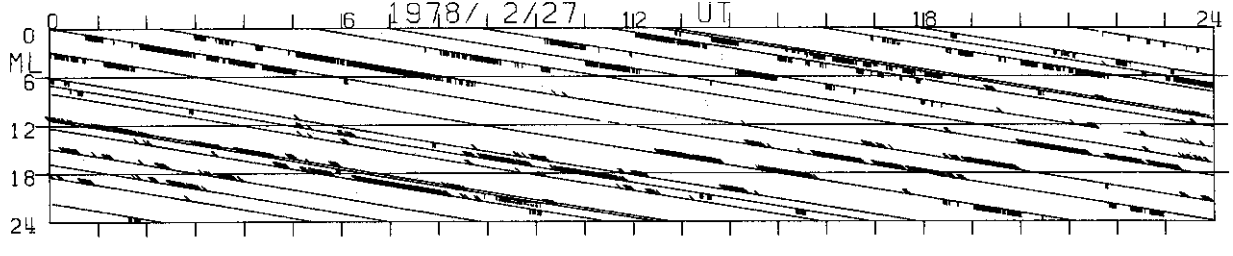
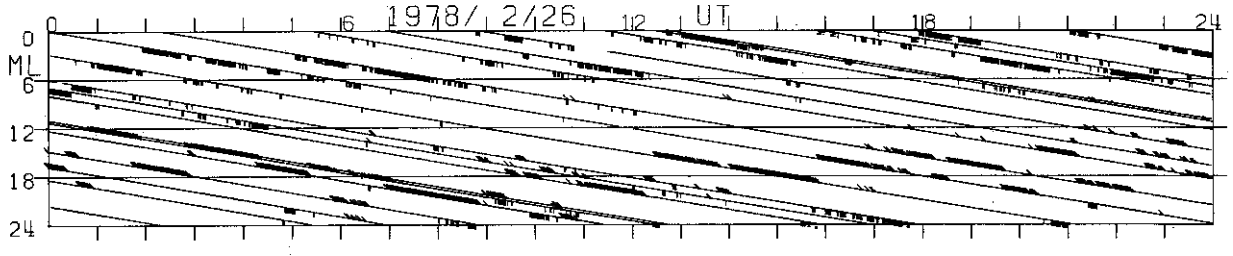
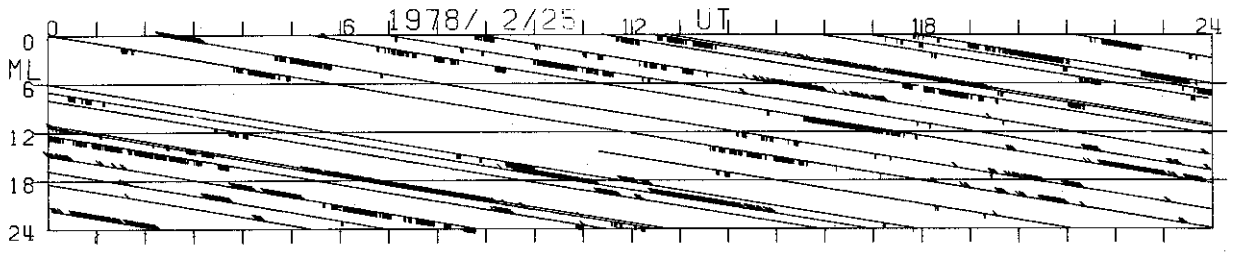
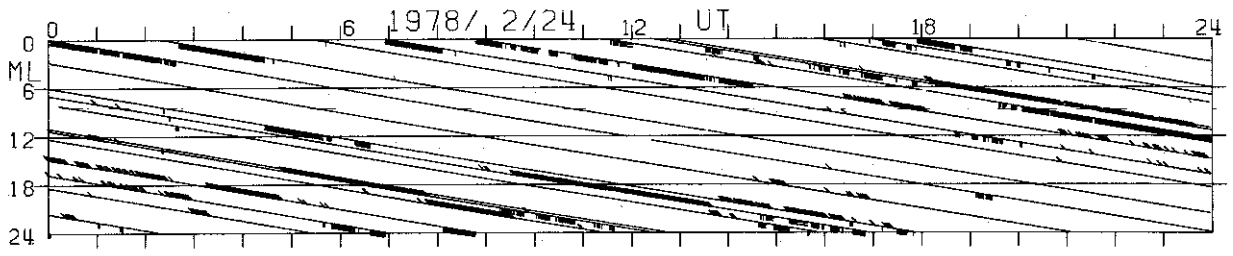
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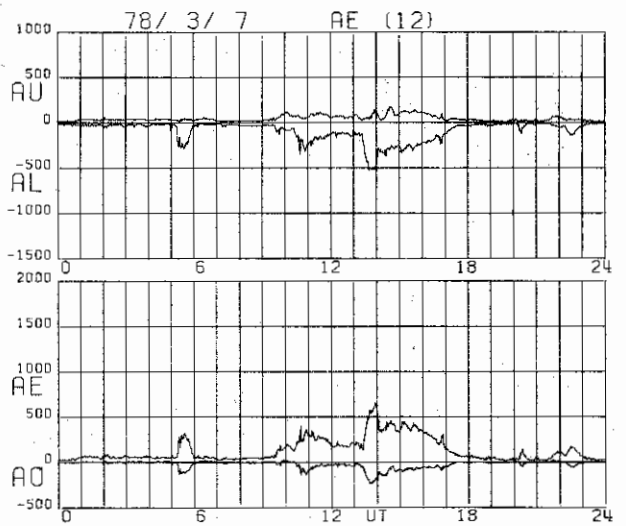
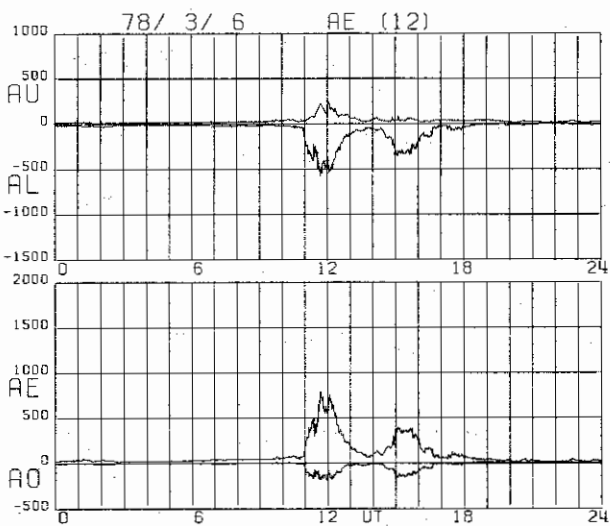
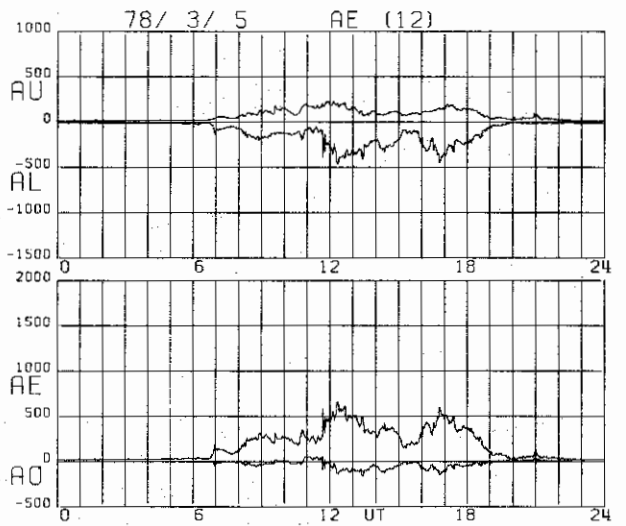
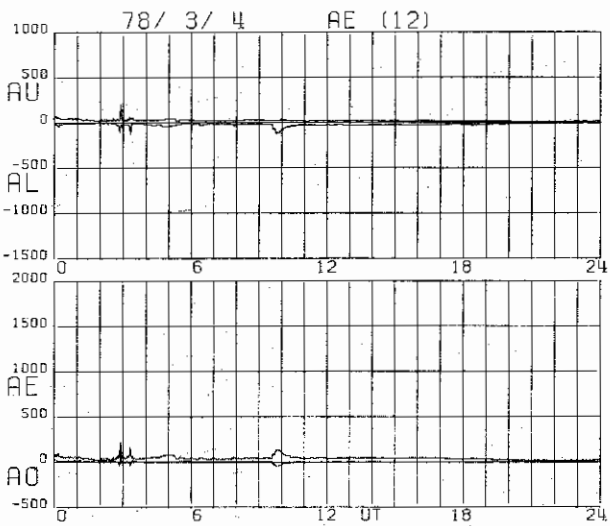
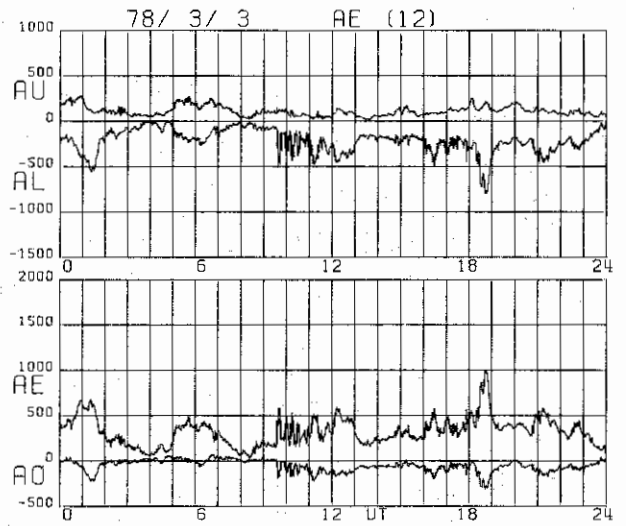
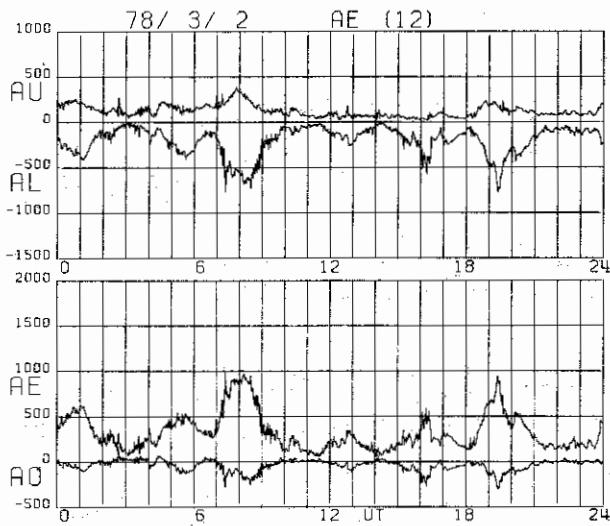


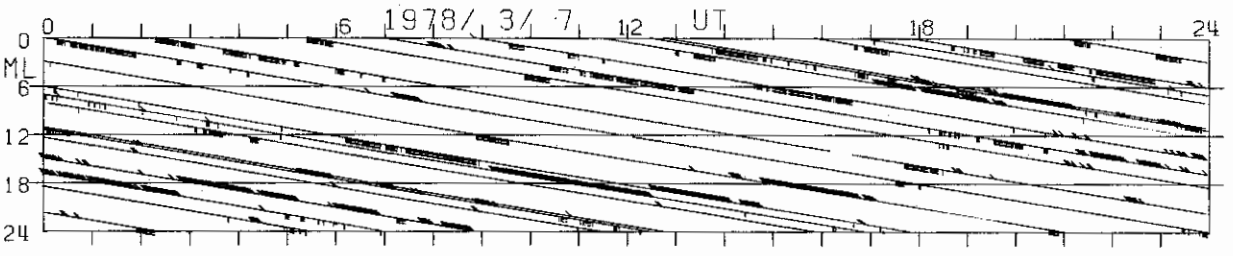
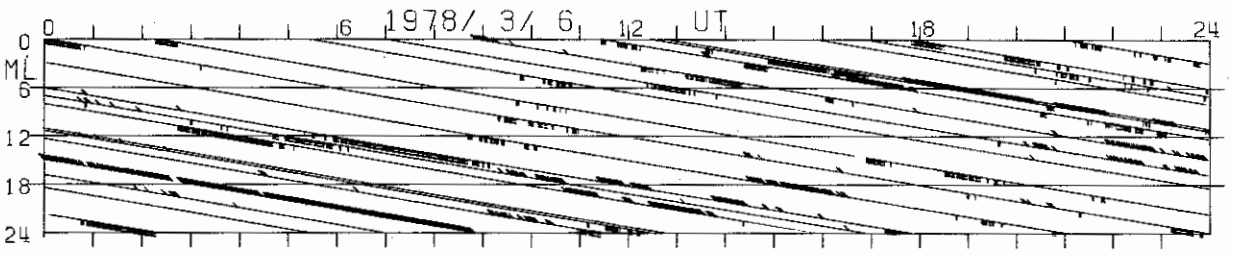
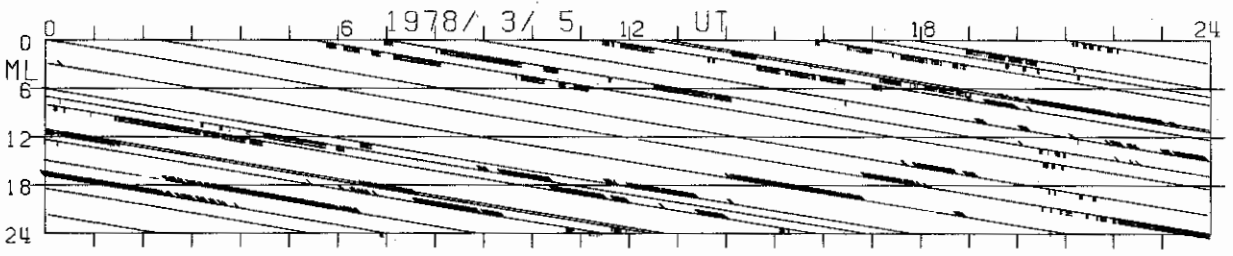
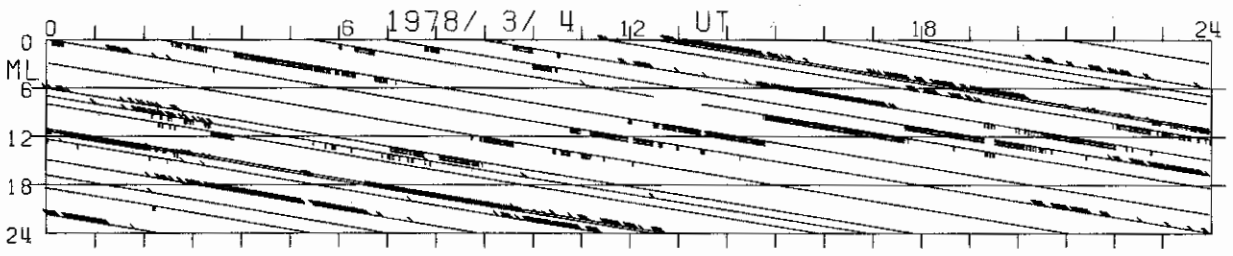
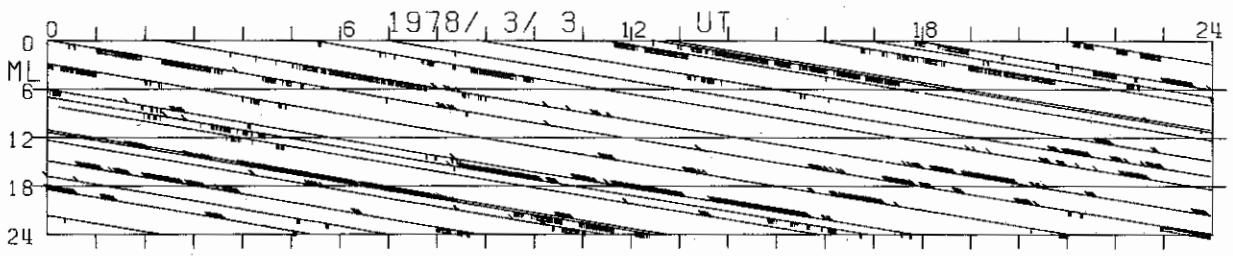
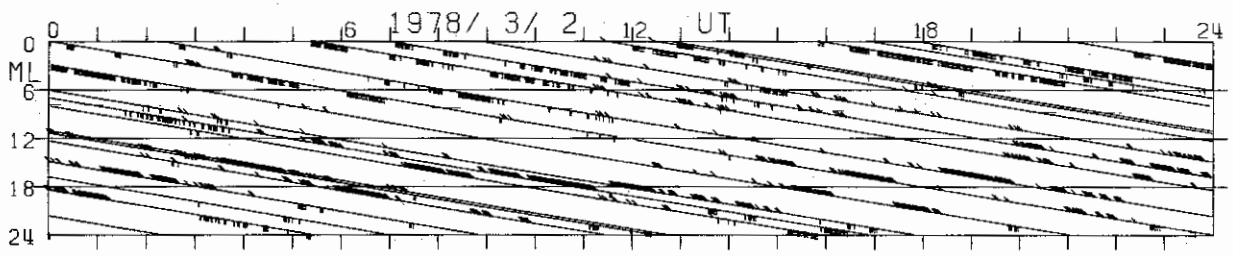
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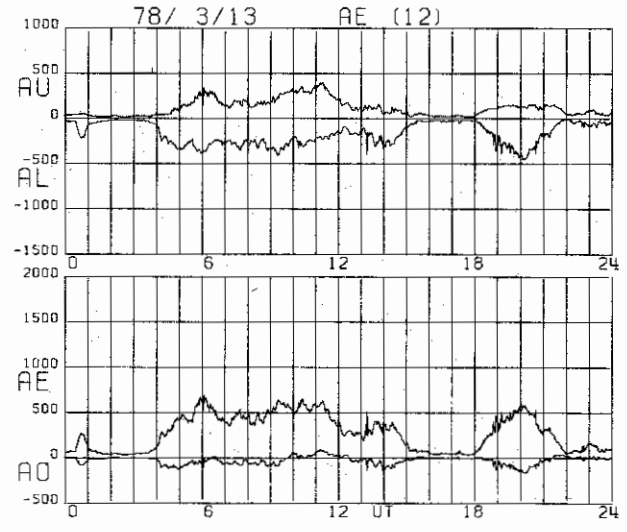
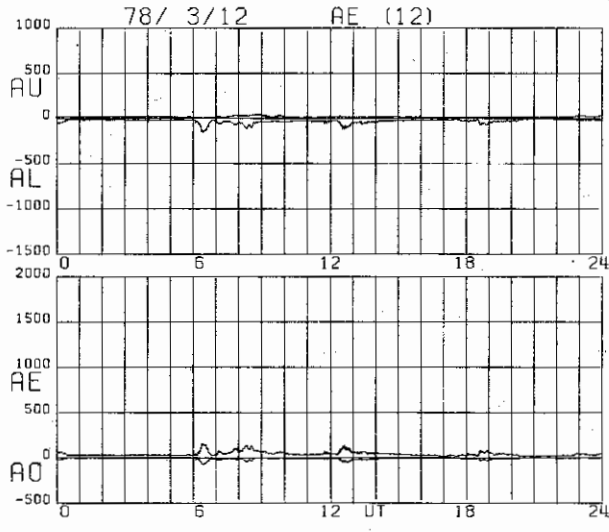
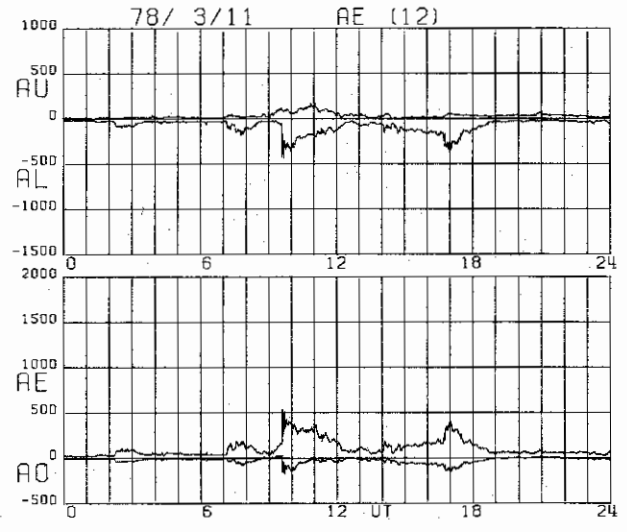
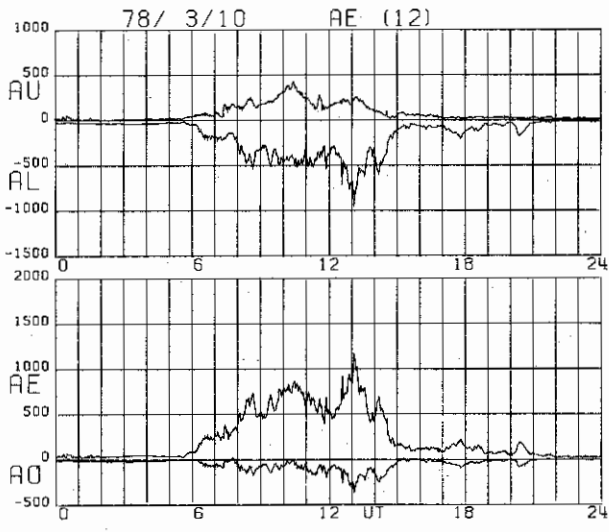
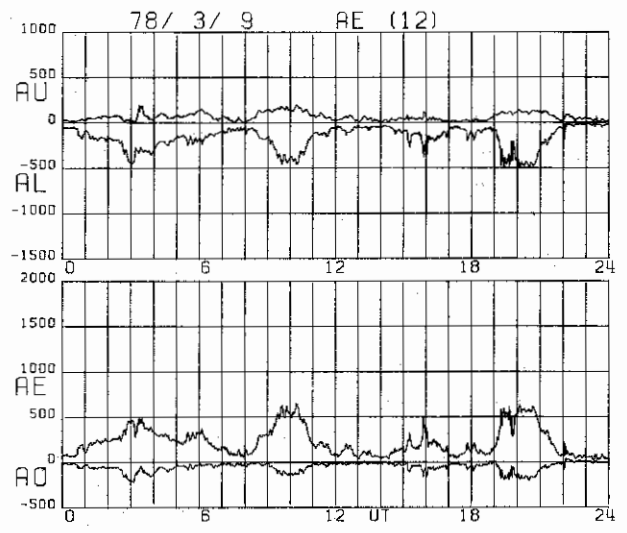
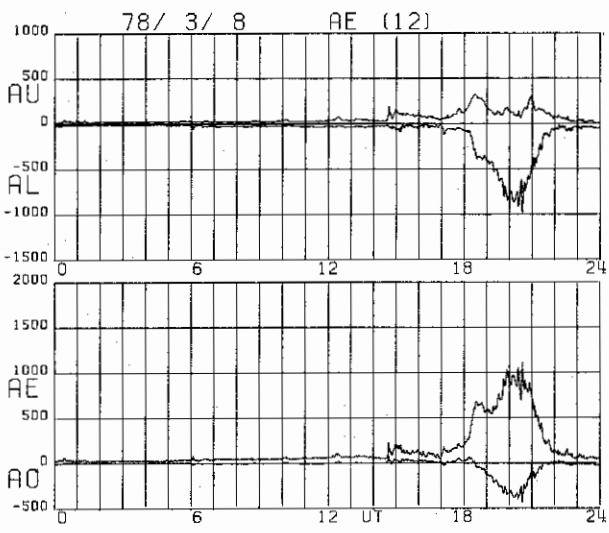


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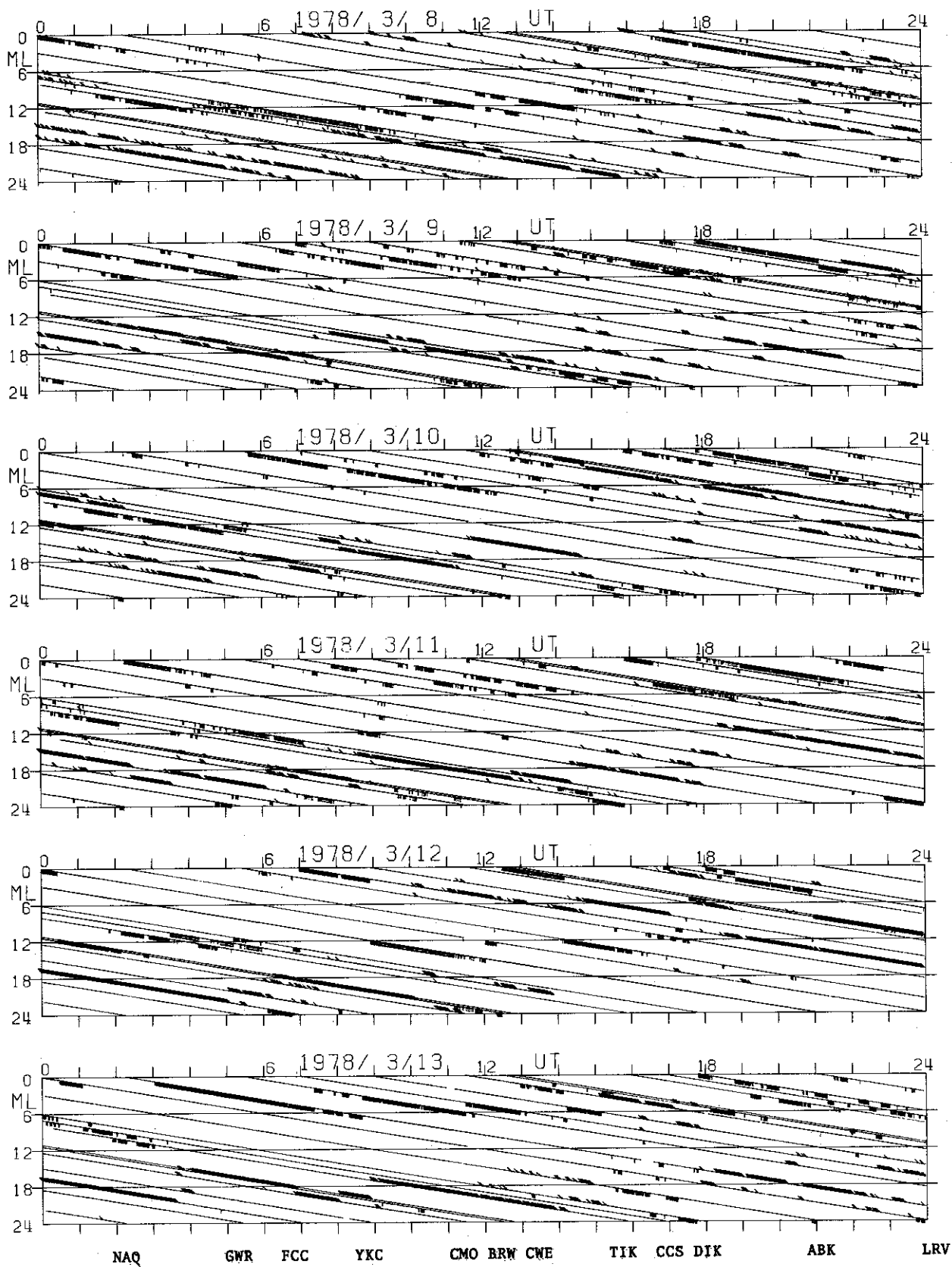


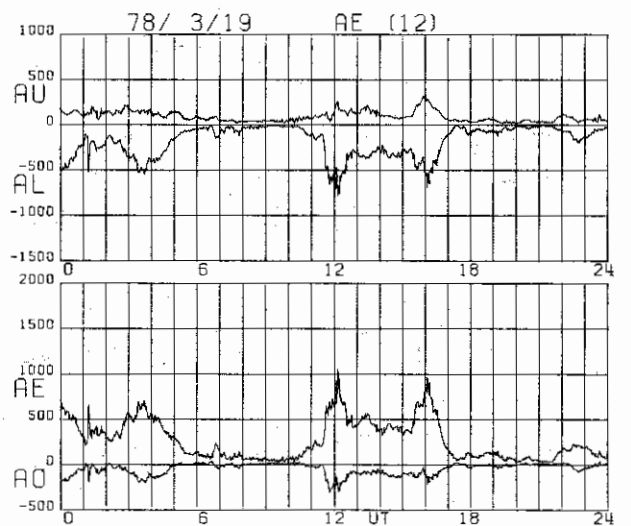
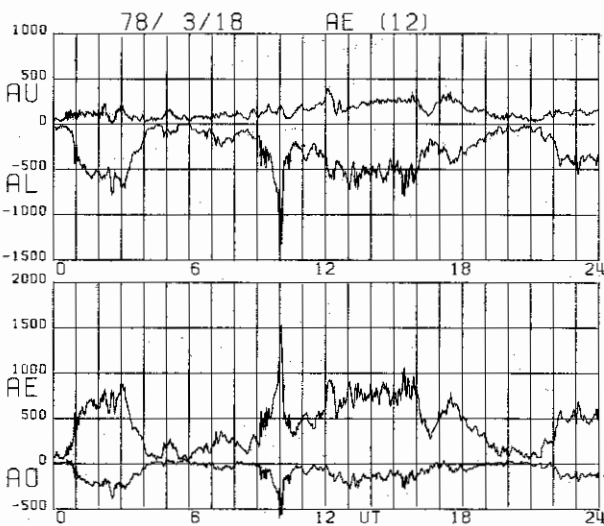
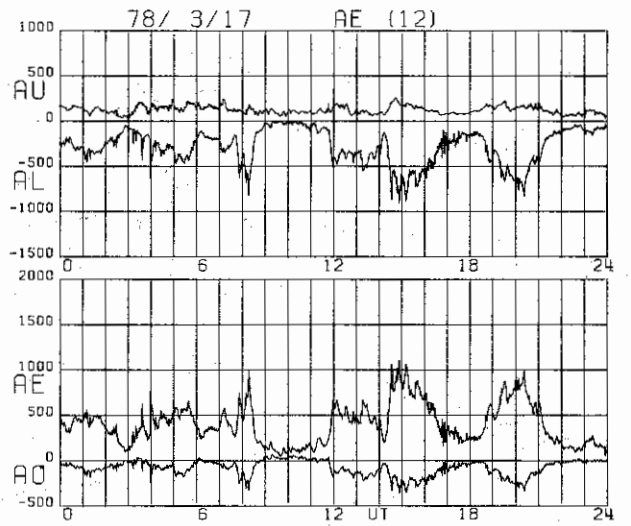
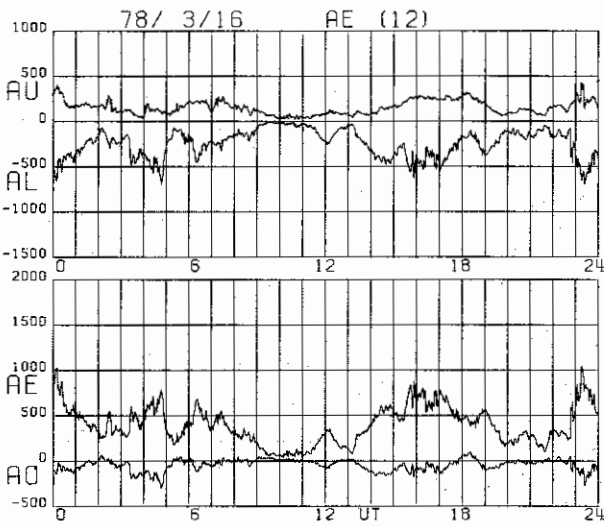
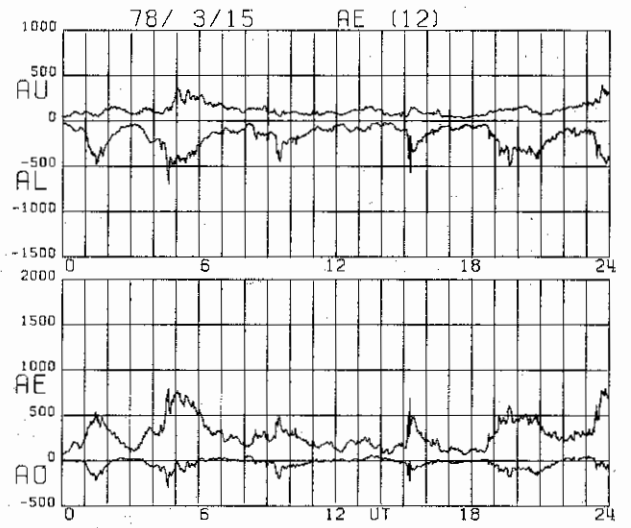
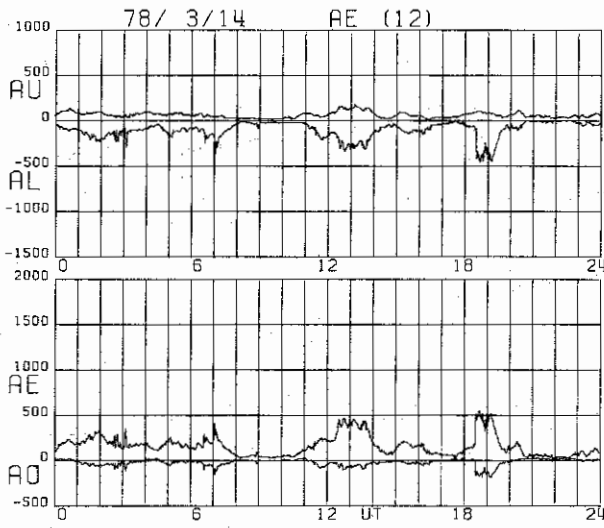


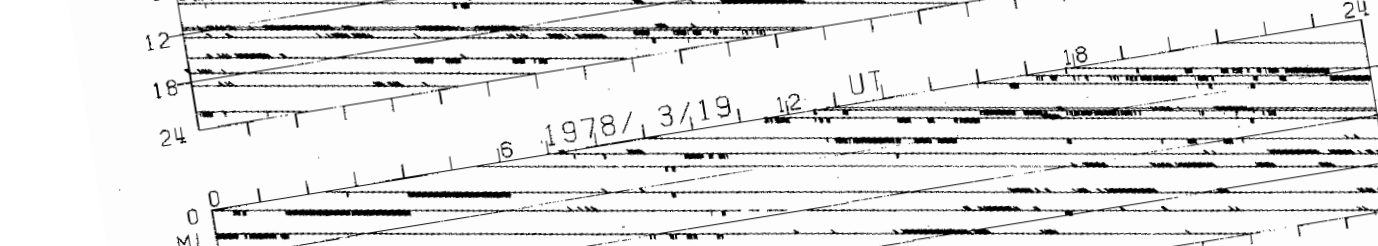
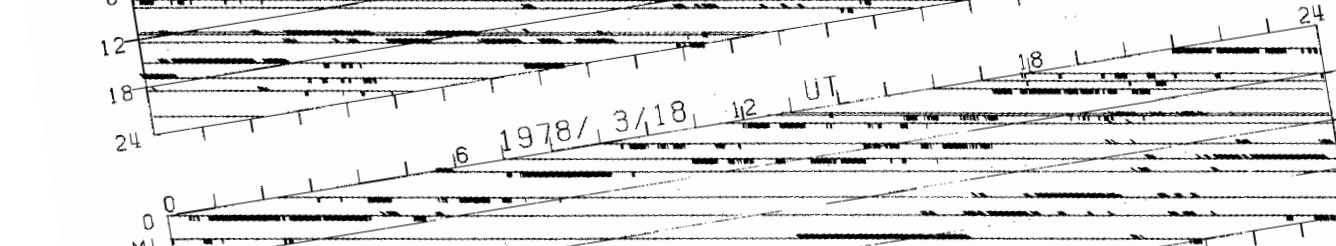
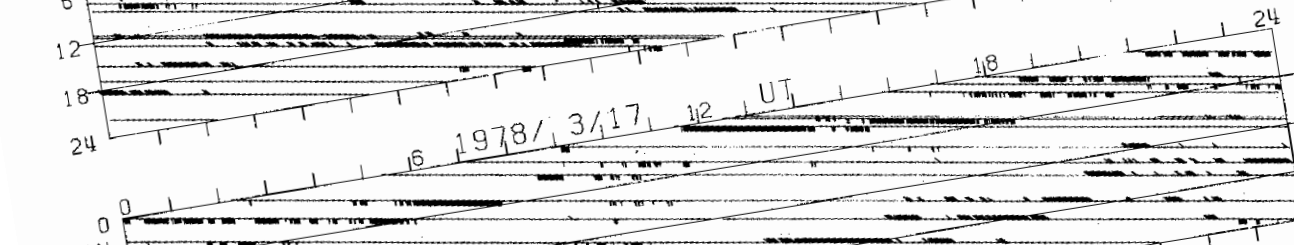
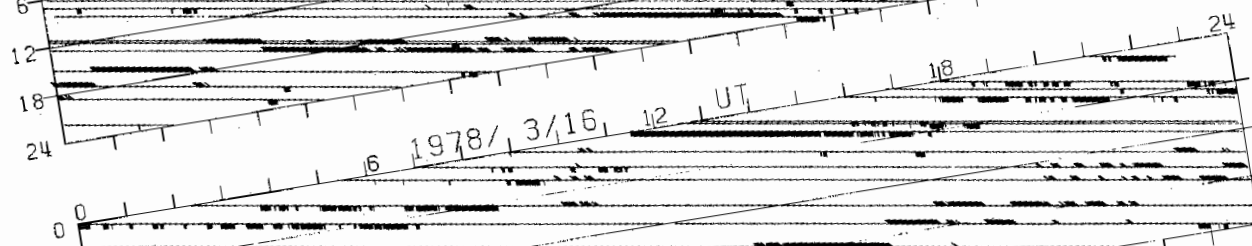
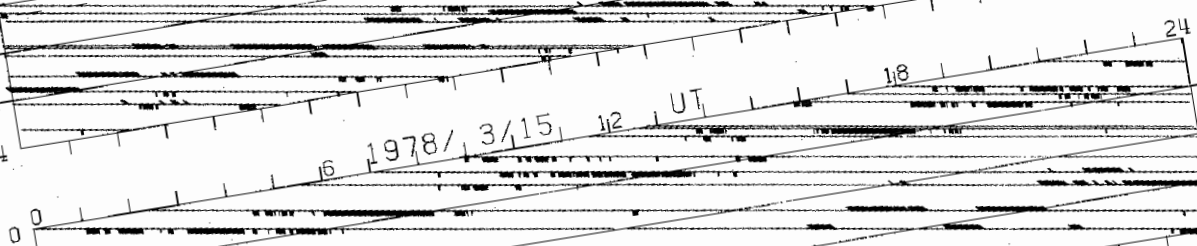
LRV NAQ GWR FCC YKC CMO BRW CWE TIK CCS DIK ABK (LRV)











NAQ

GWR

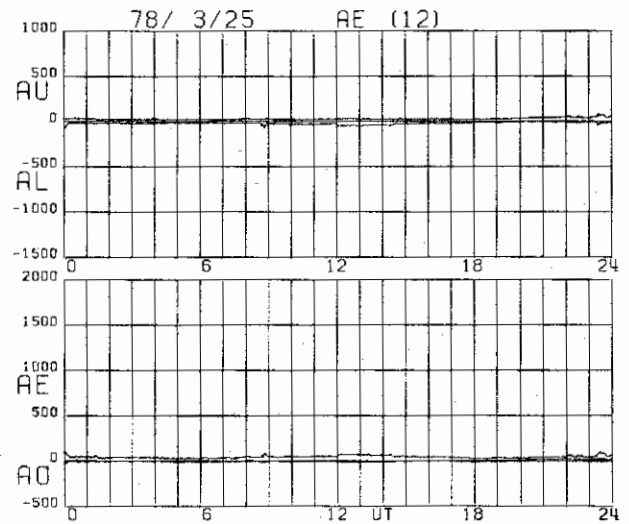
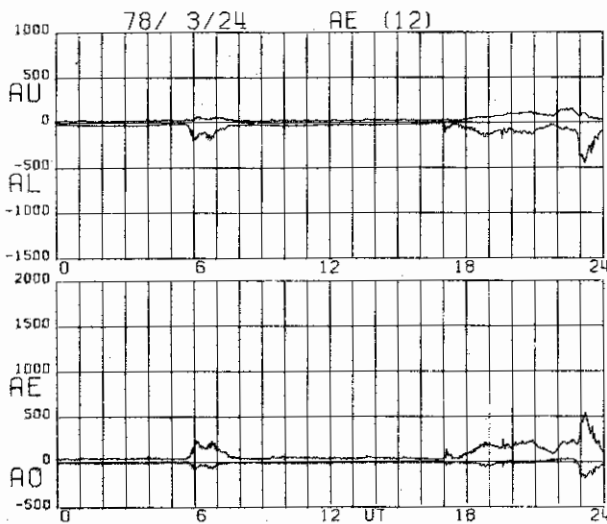
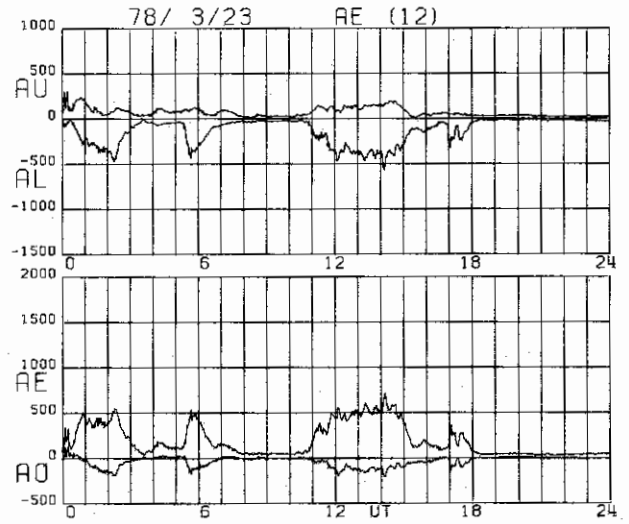
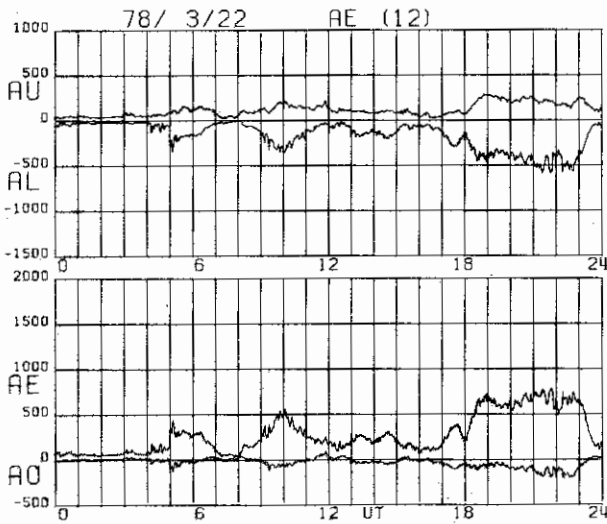
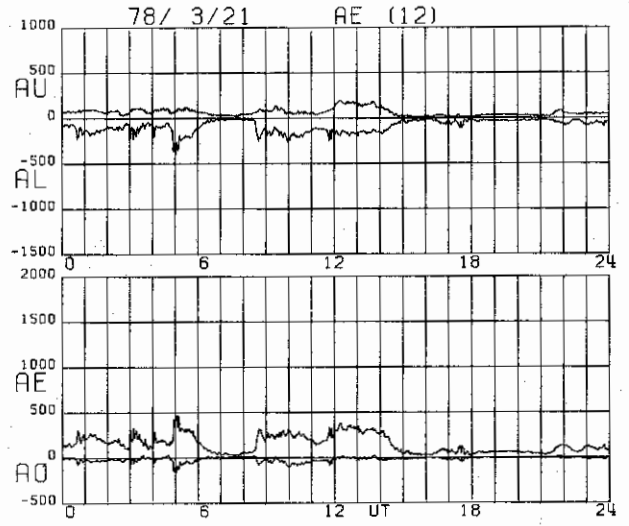
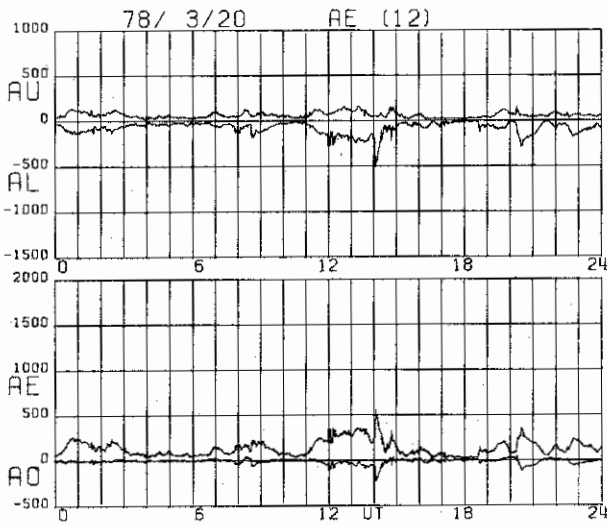
FCC

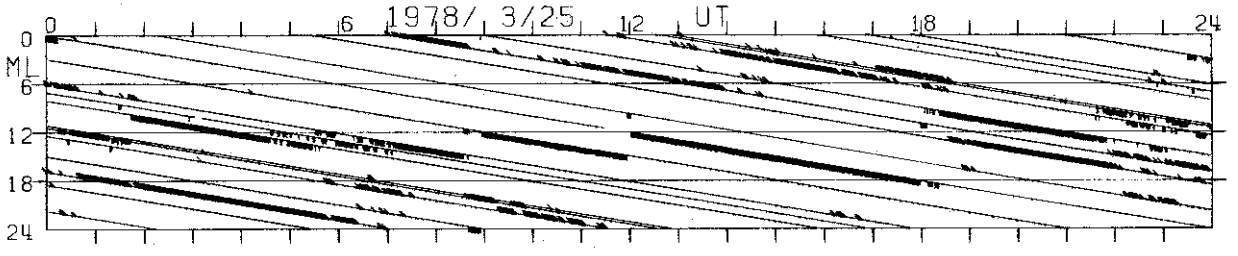
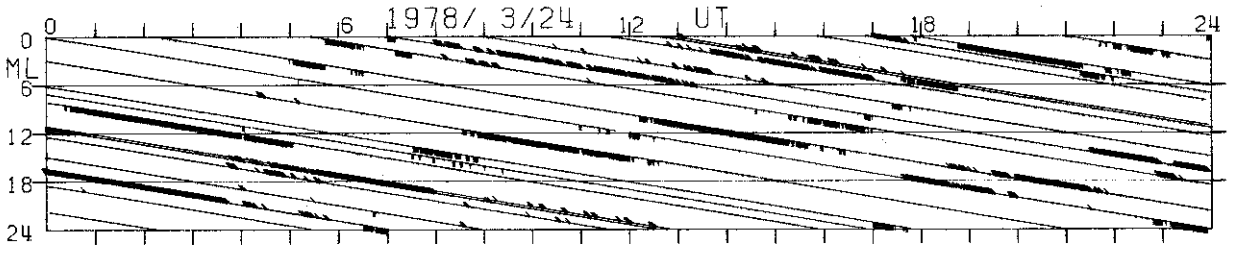
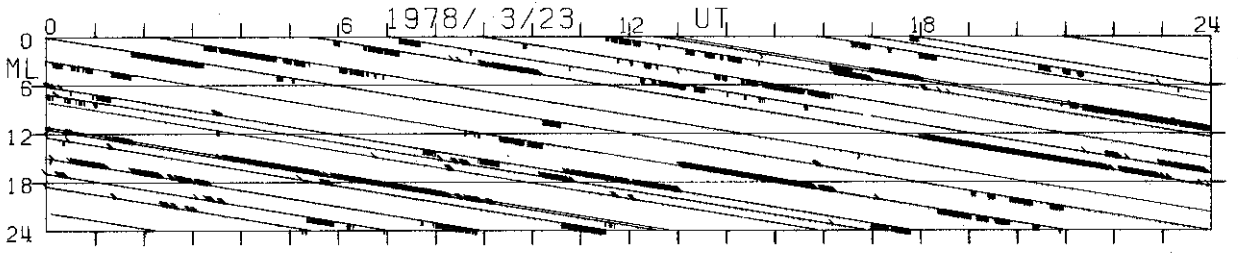
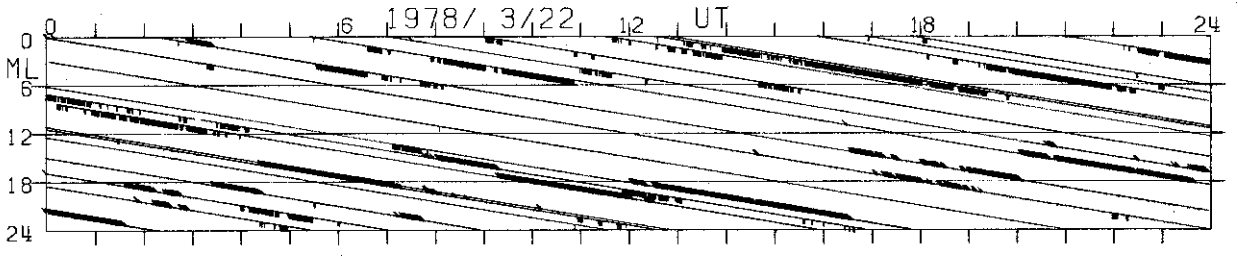
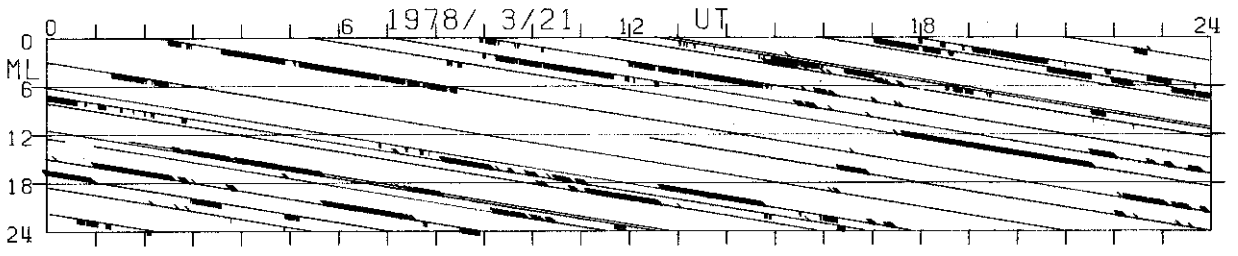
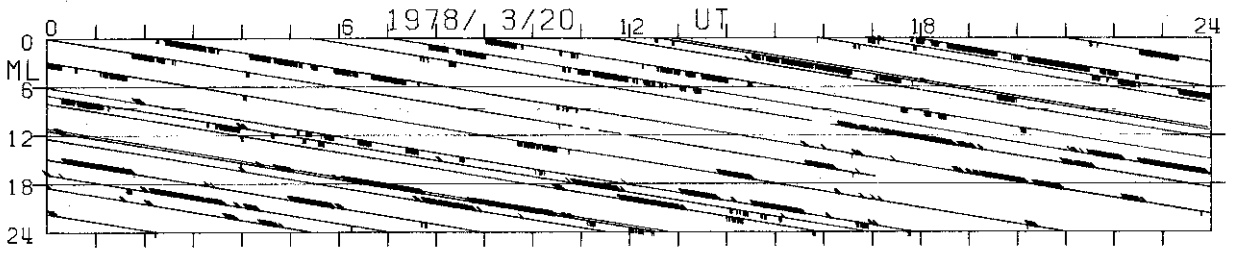
YKC

CMO BRW CWE

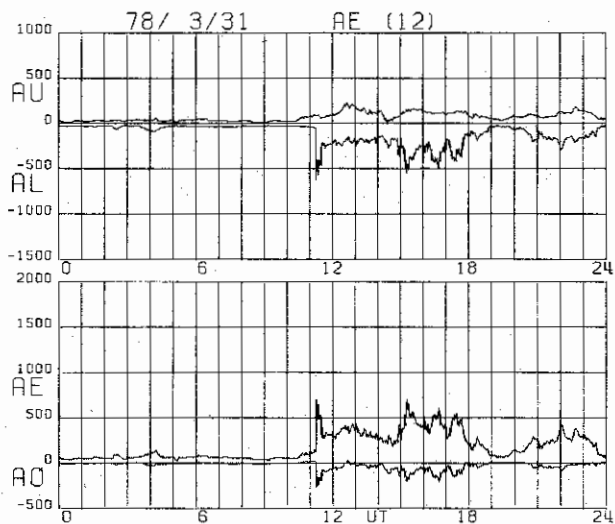
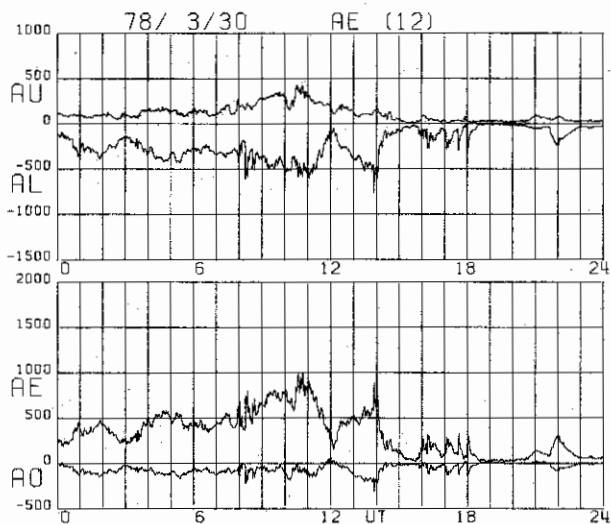
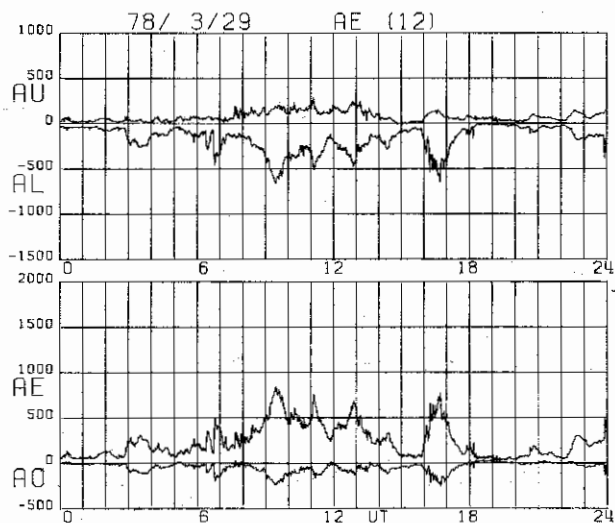
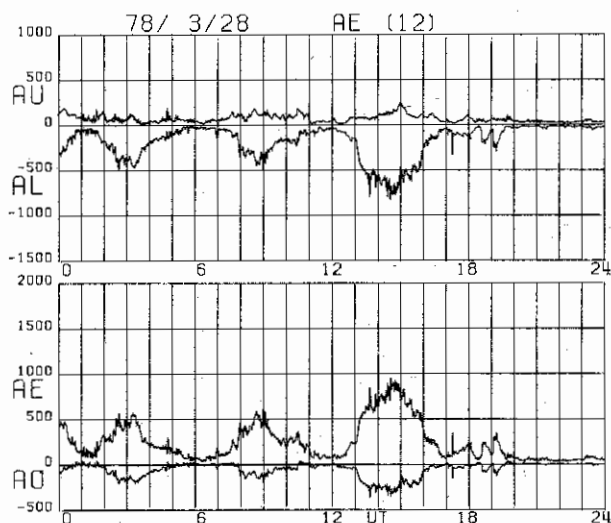
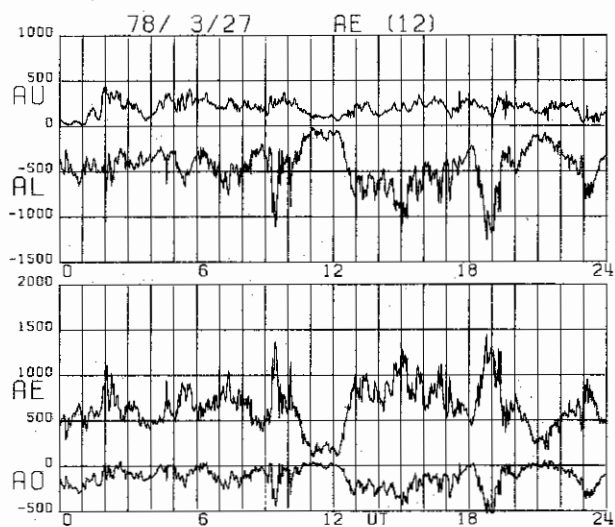
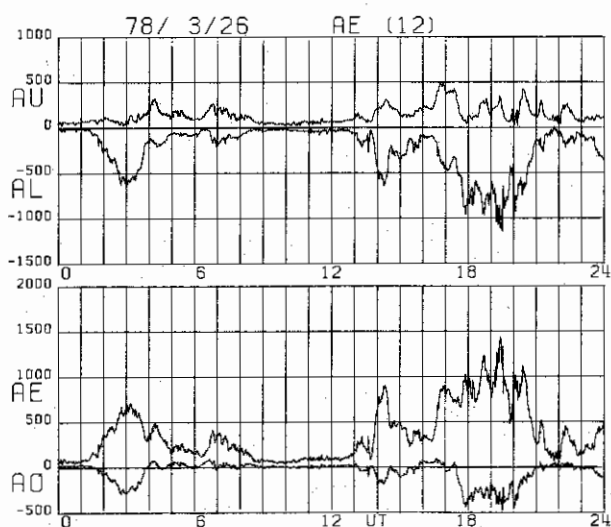
TIX CCS DIK

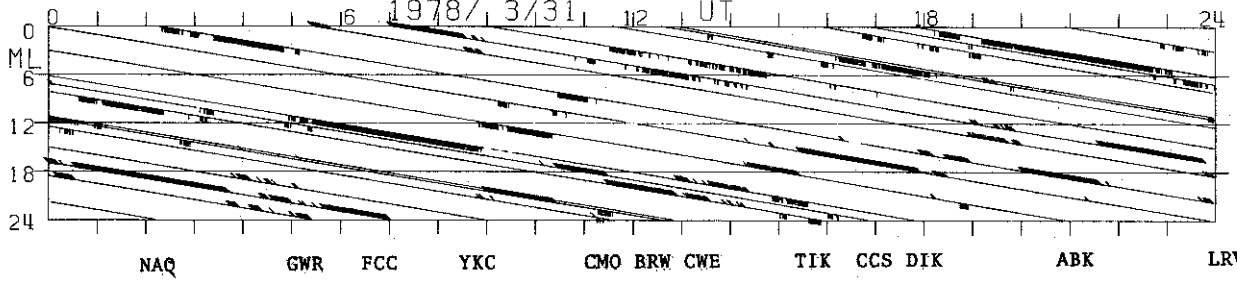
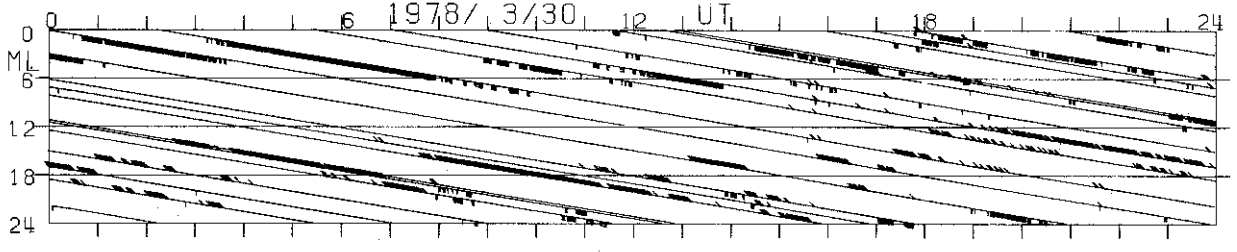
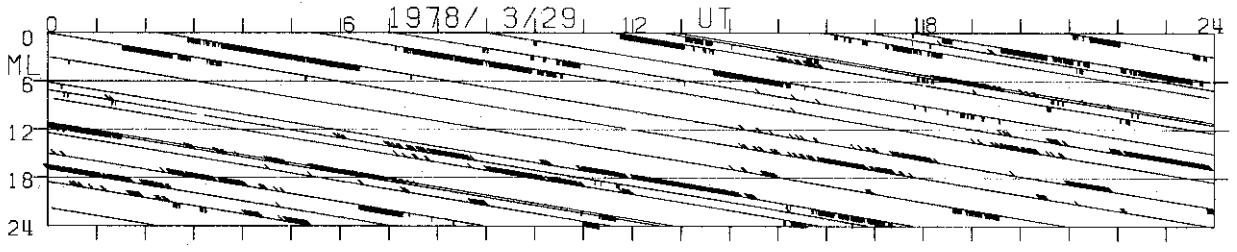
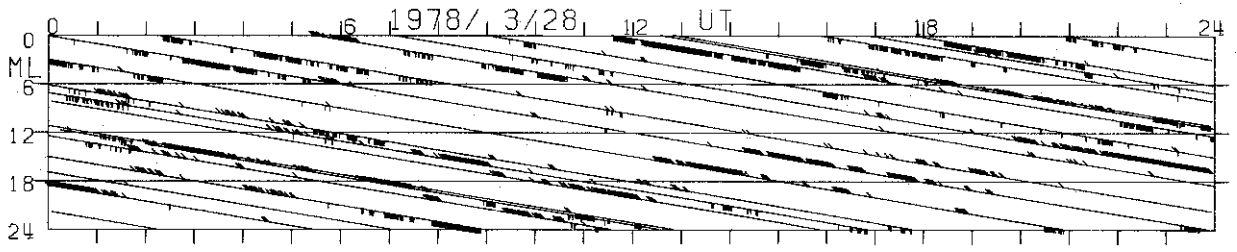
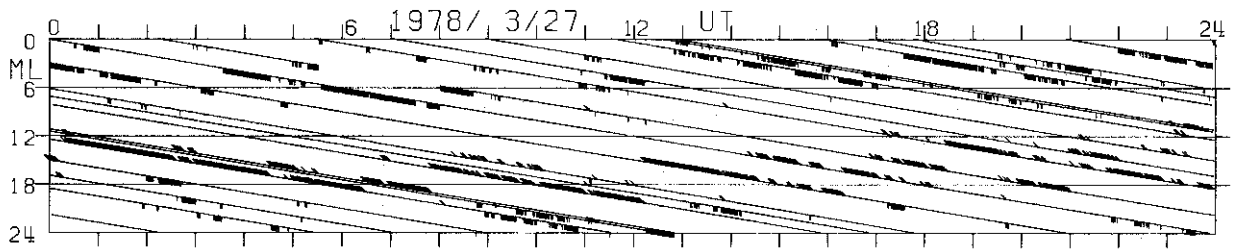
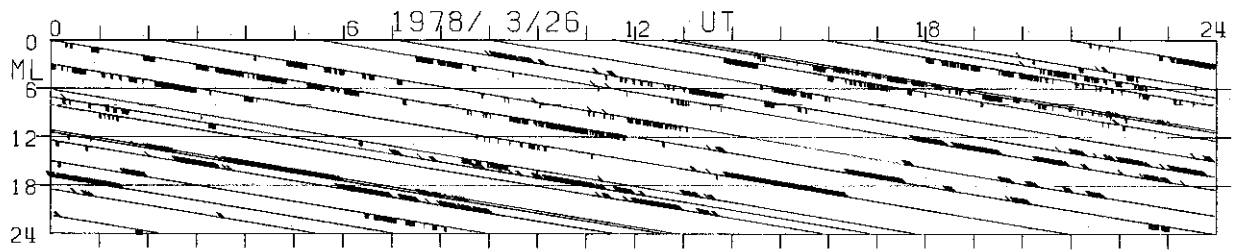
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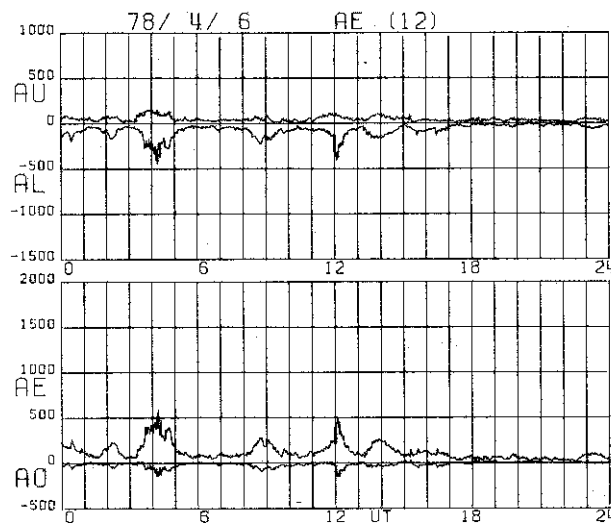
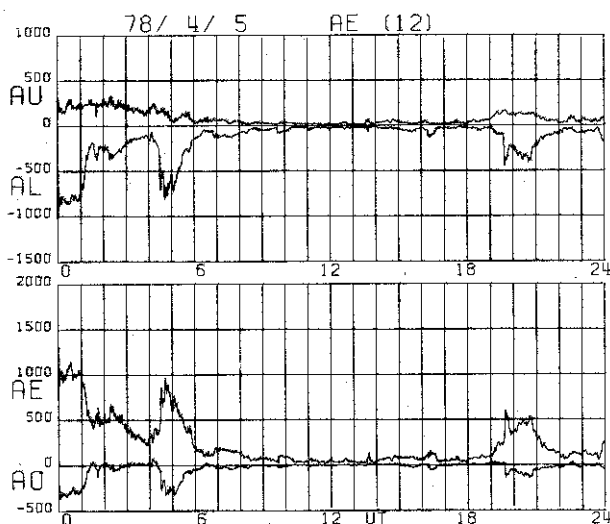
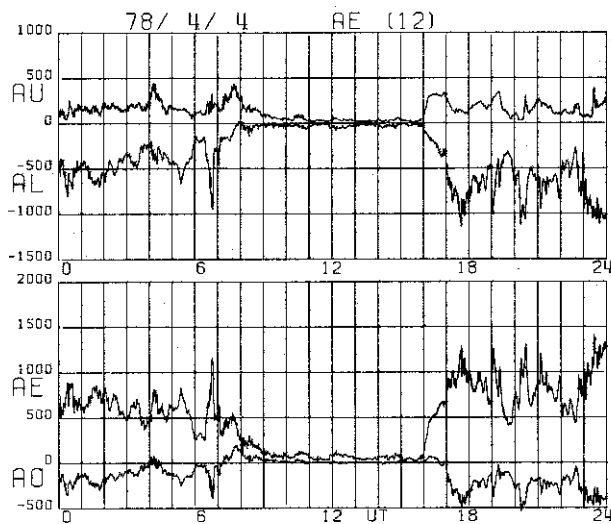
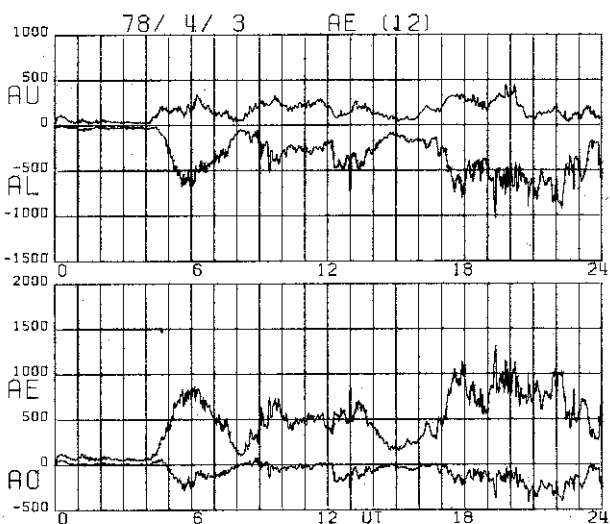
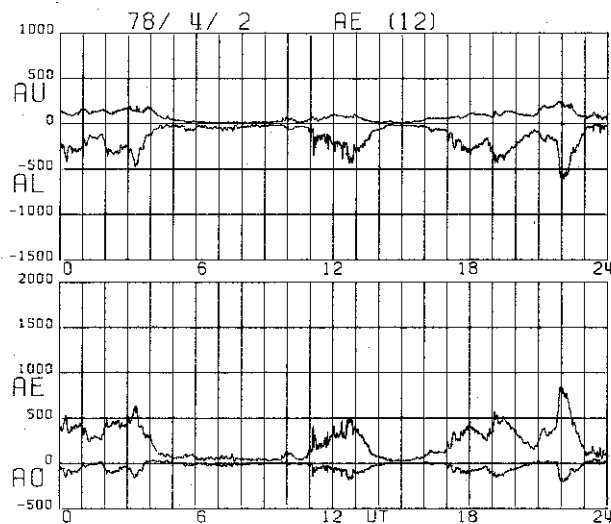
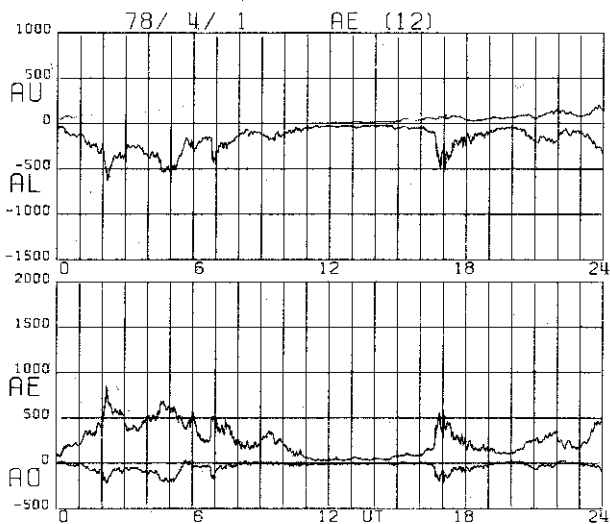




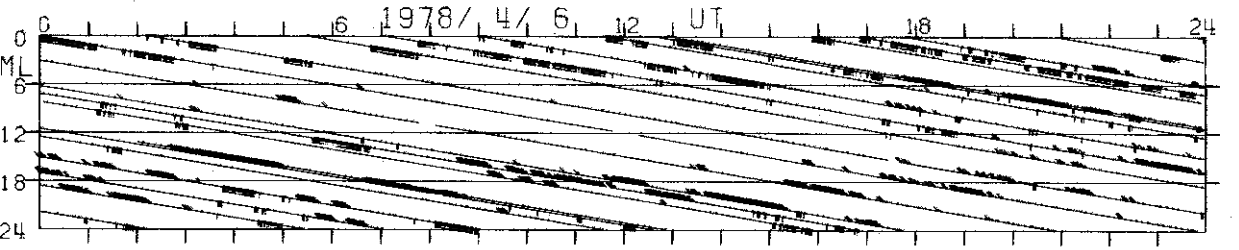
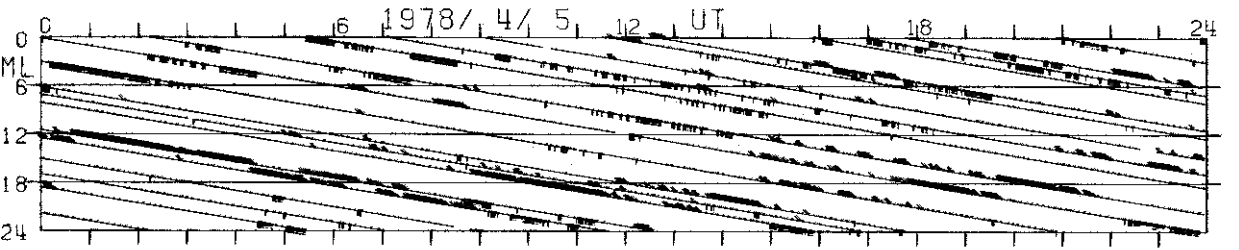
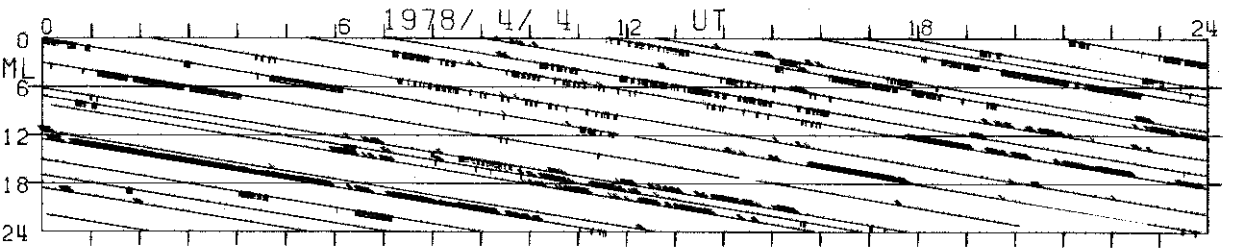
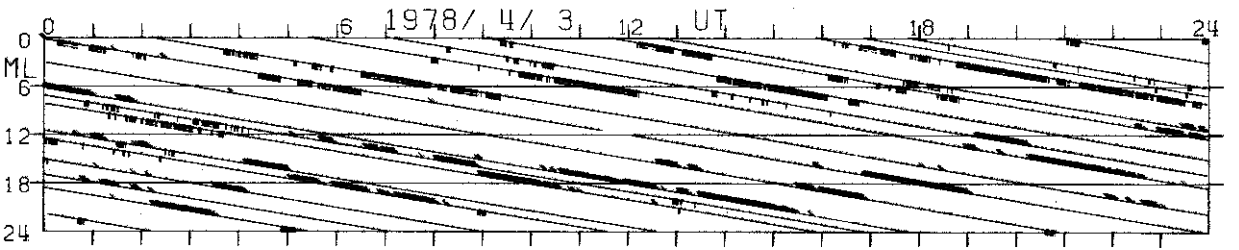
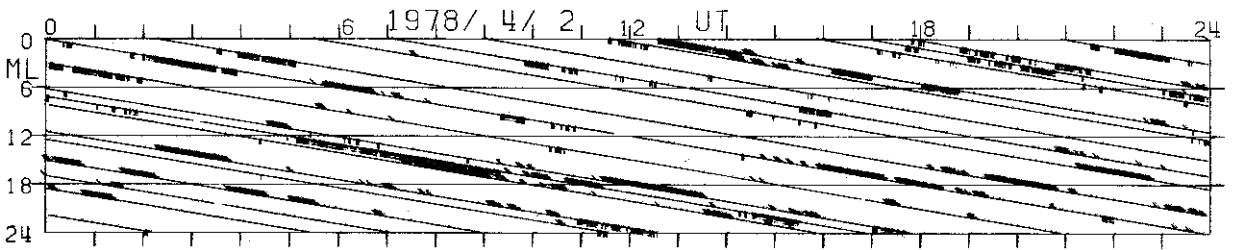
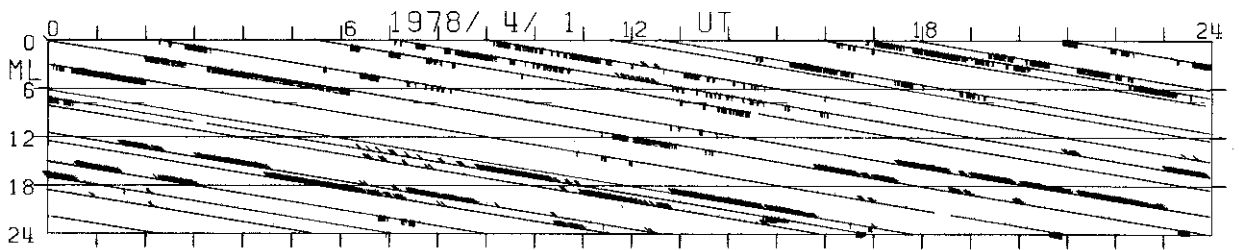
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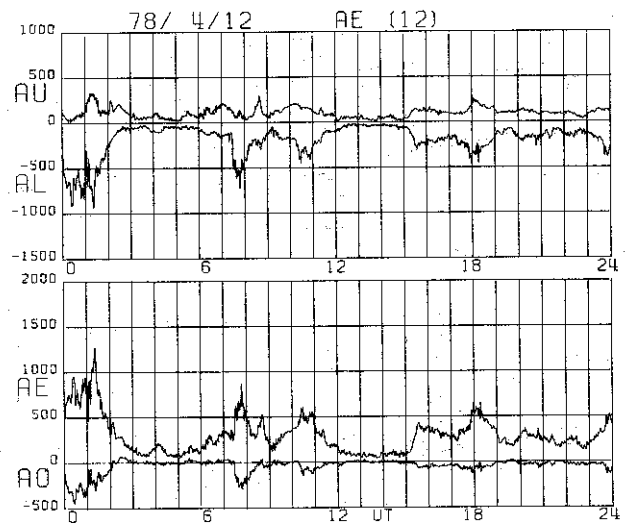
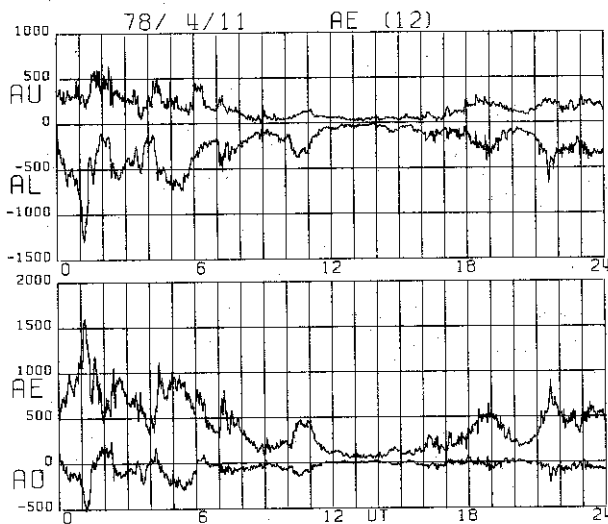
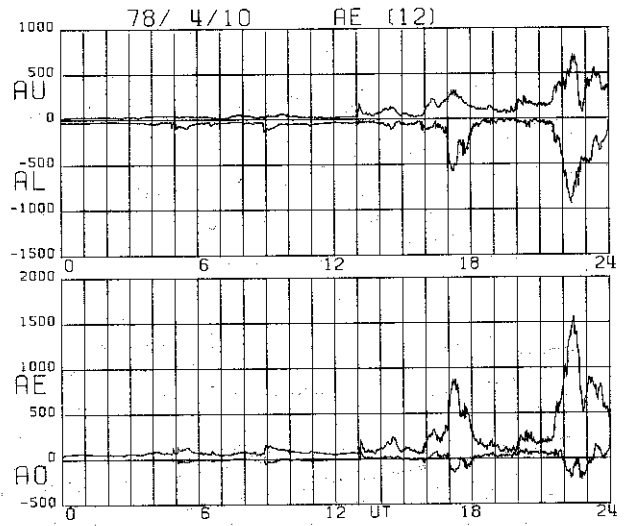
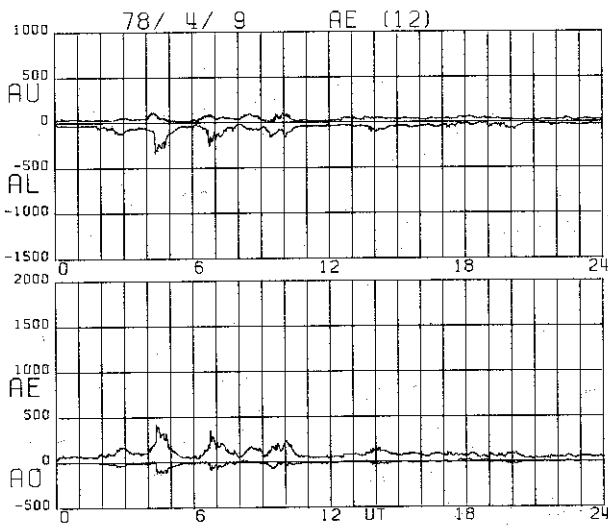
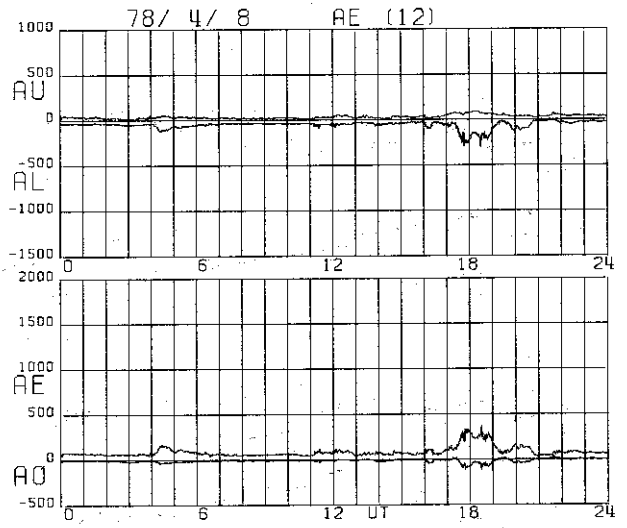
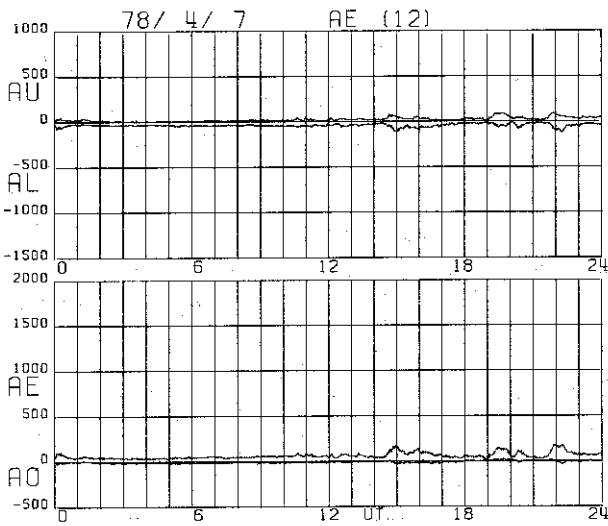


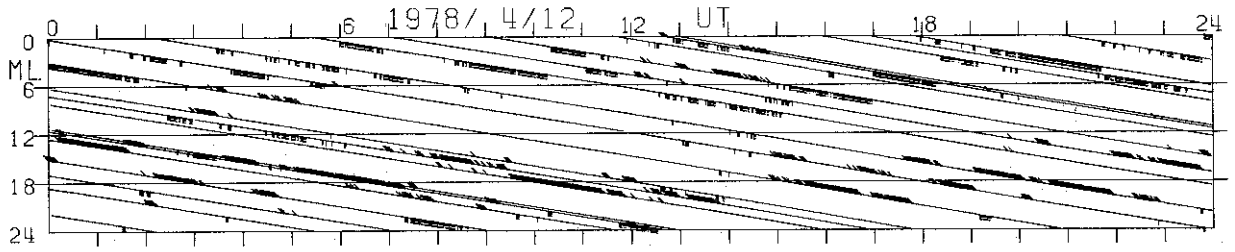
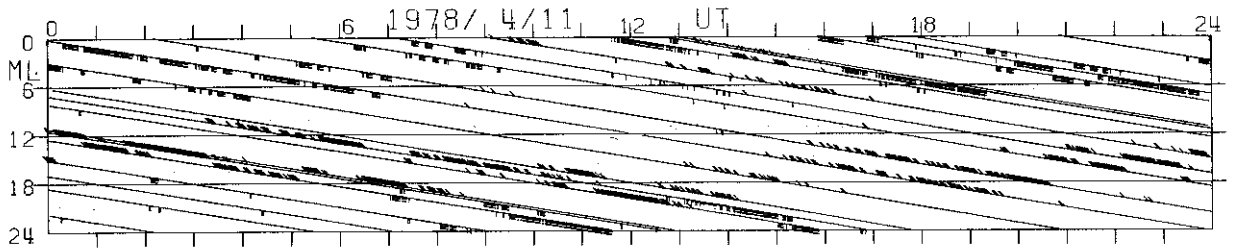
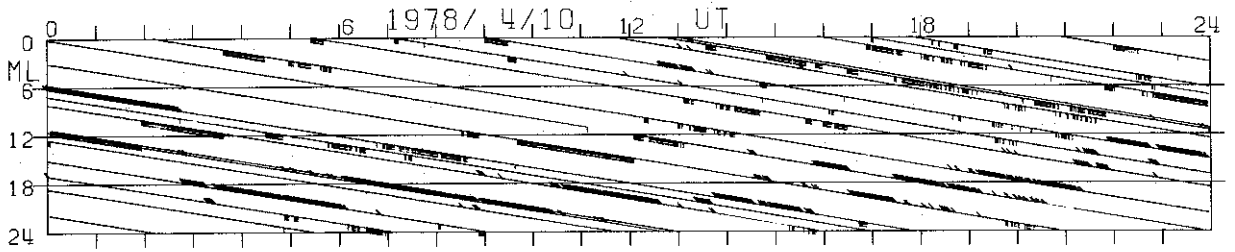
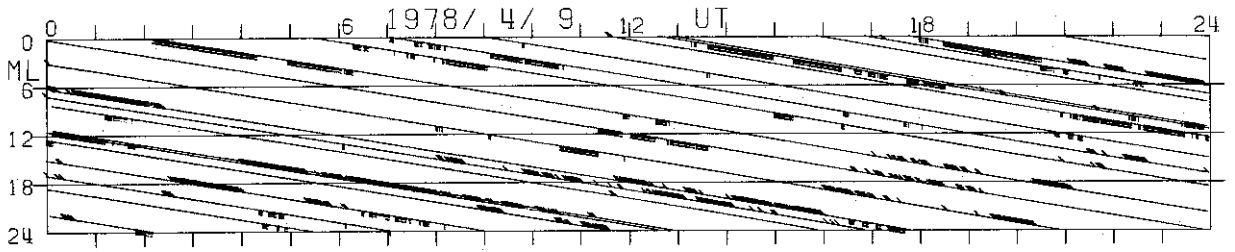
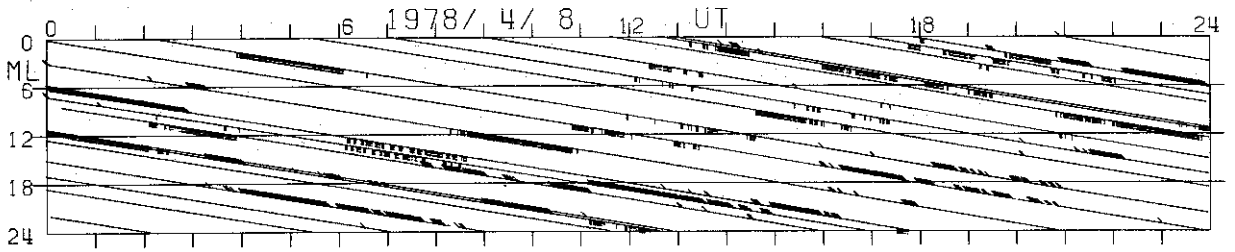
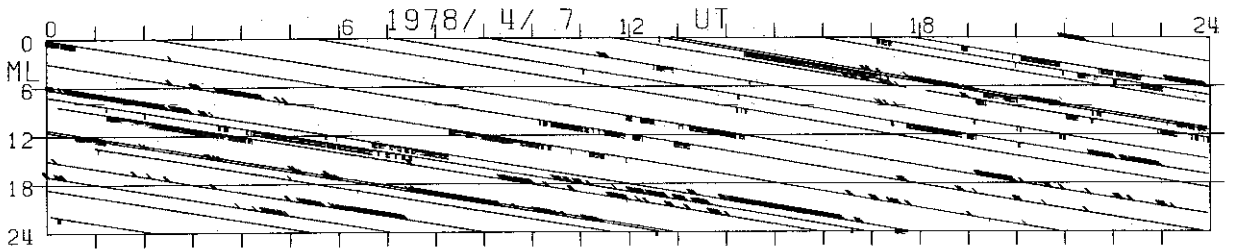




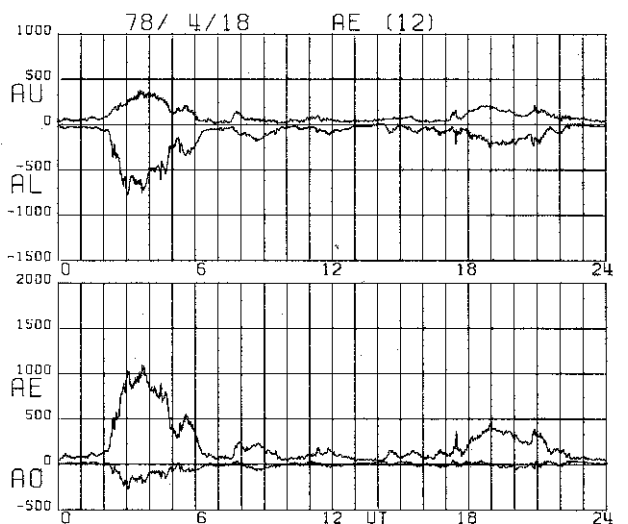
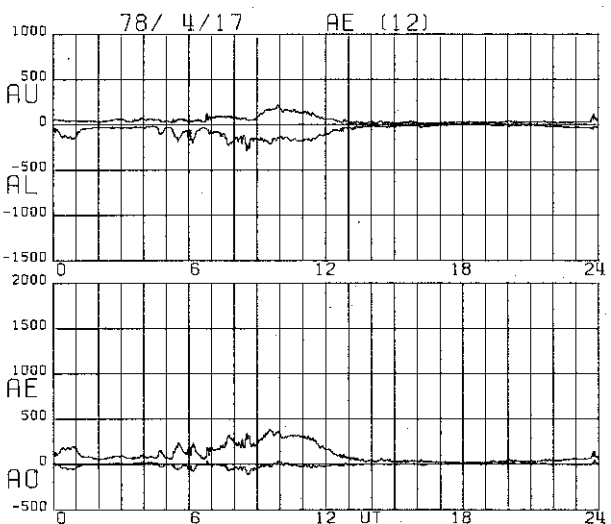
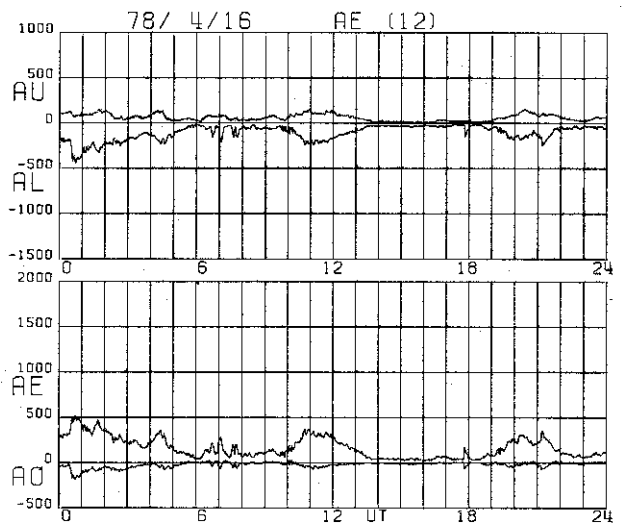
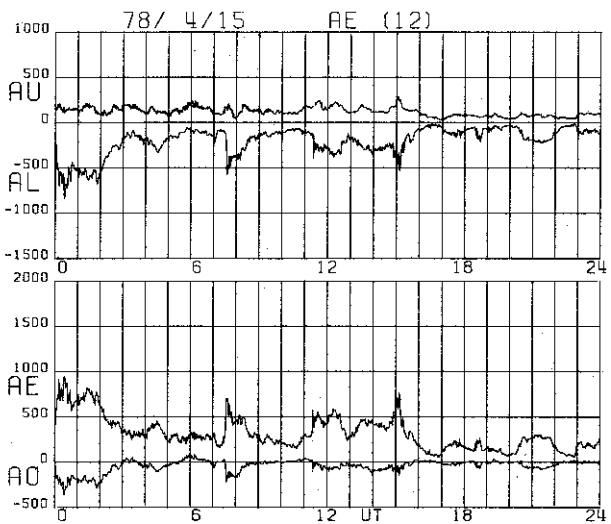
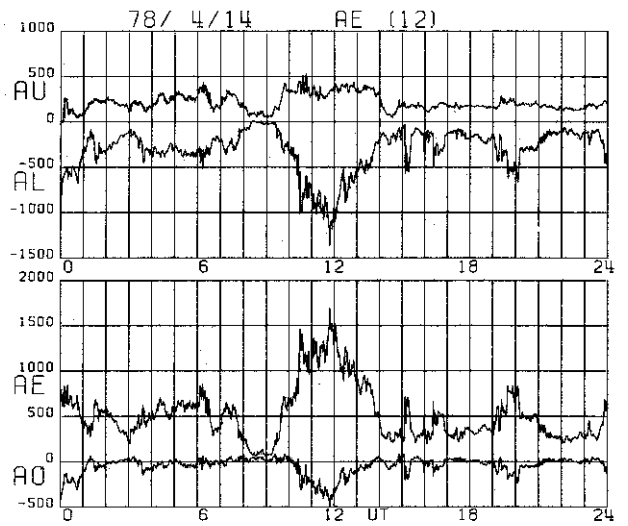
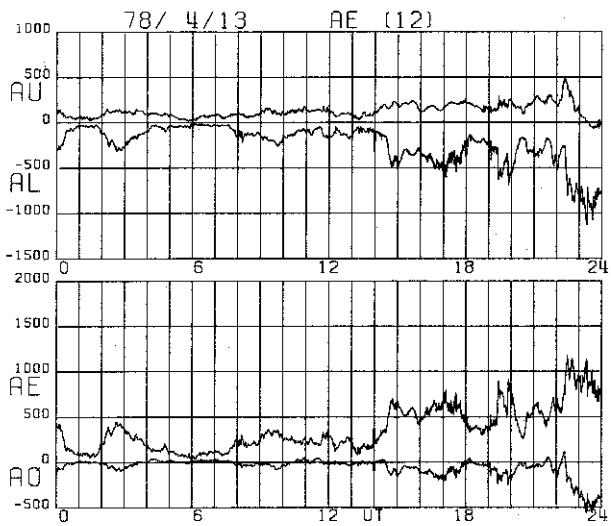


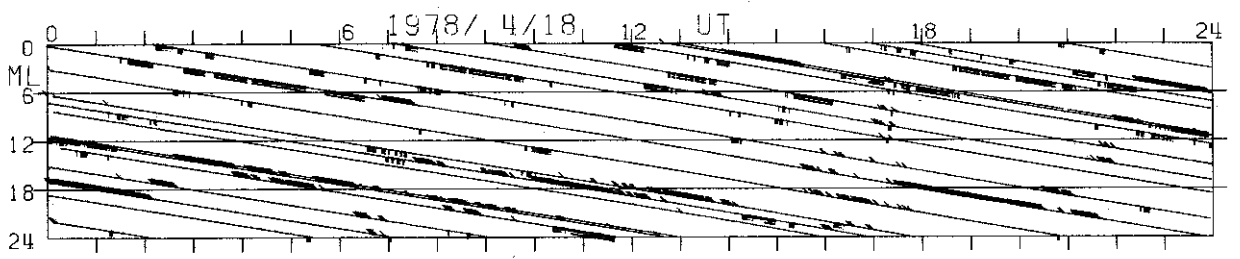
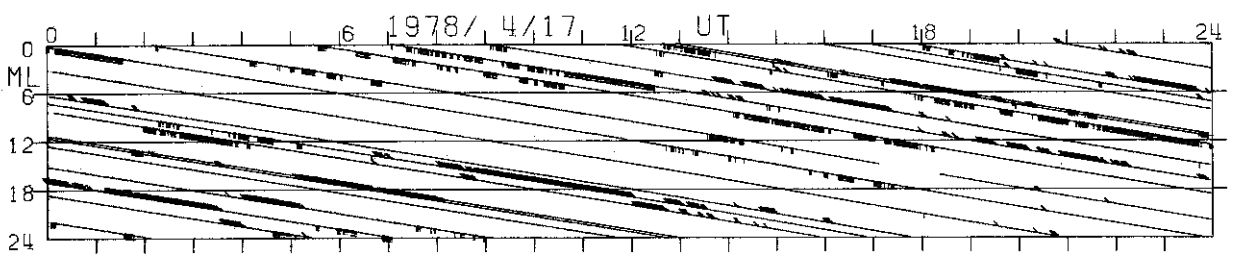
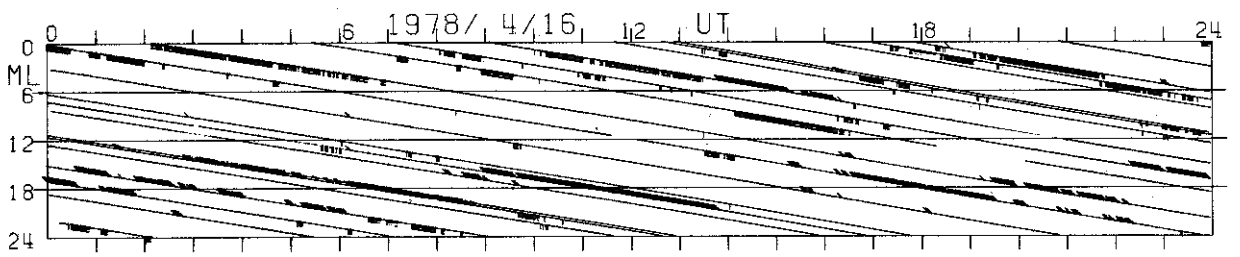
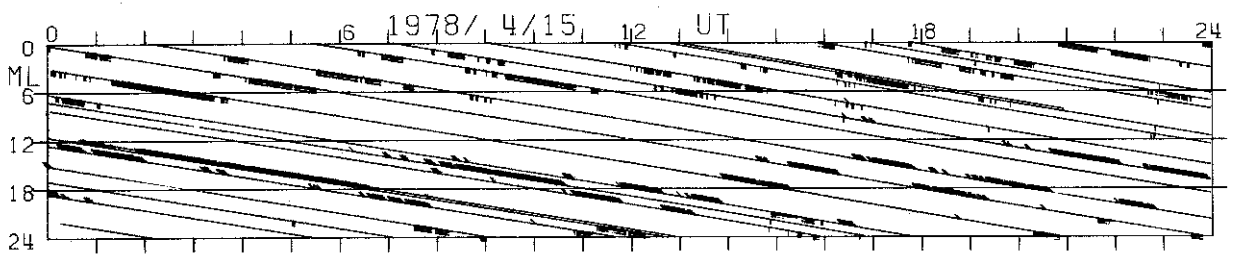
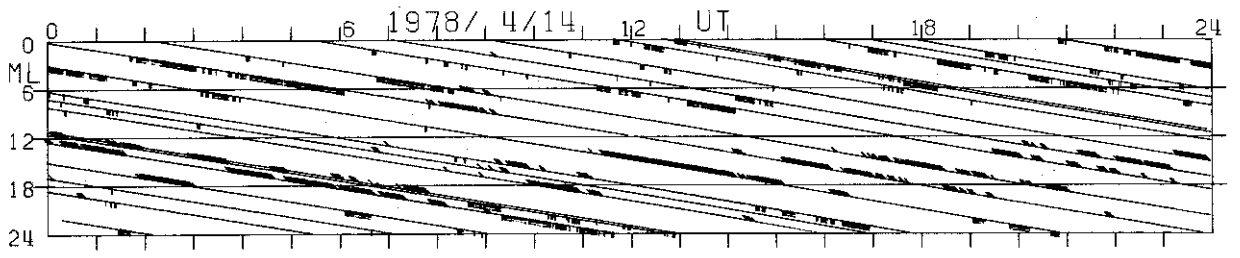
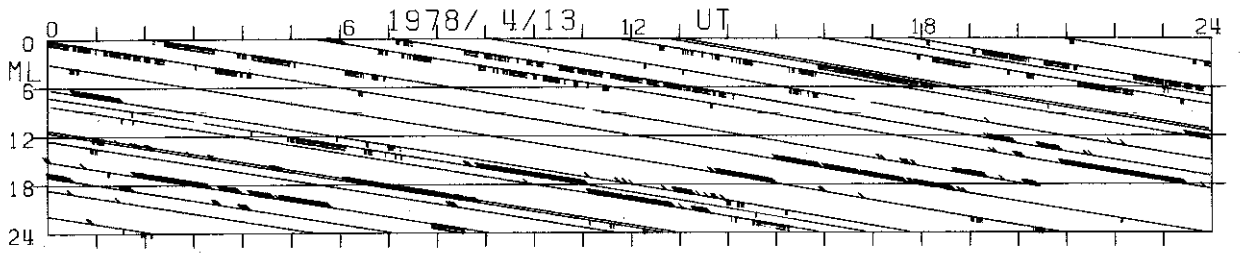
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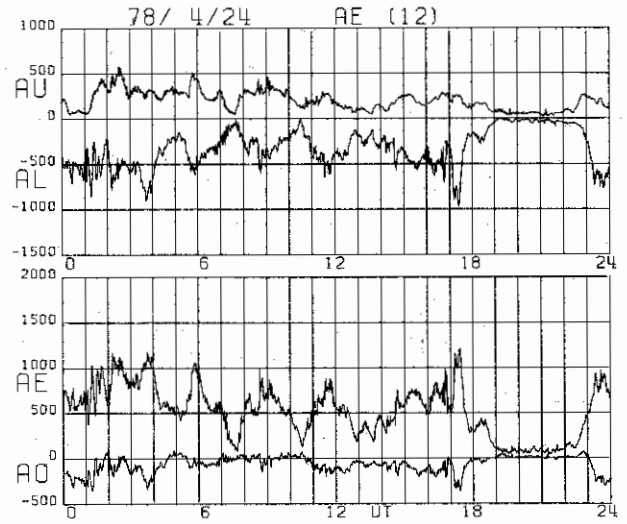
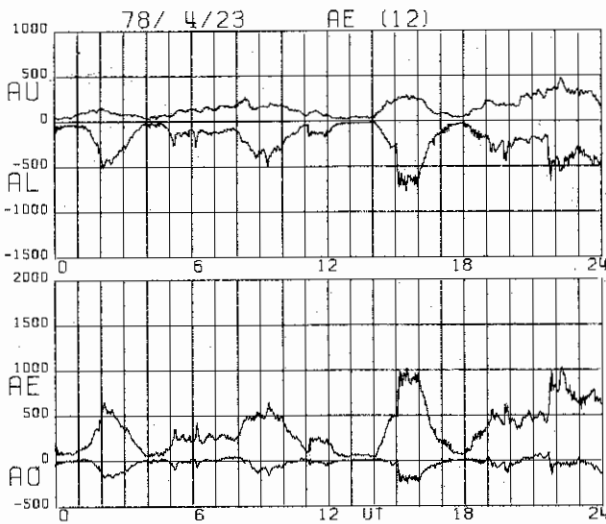
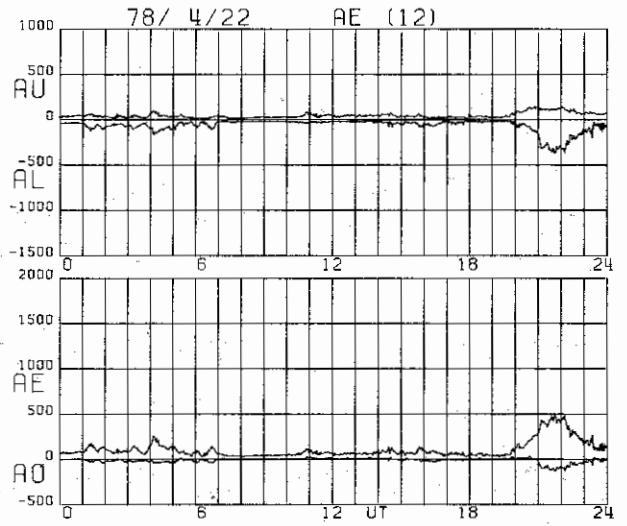
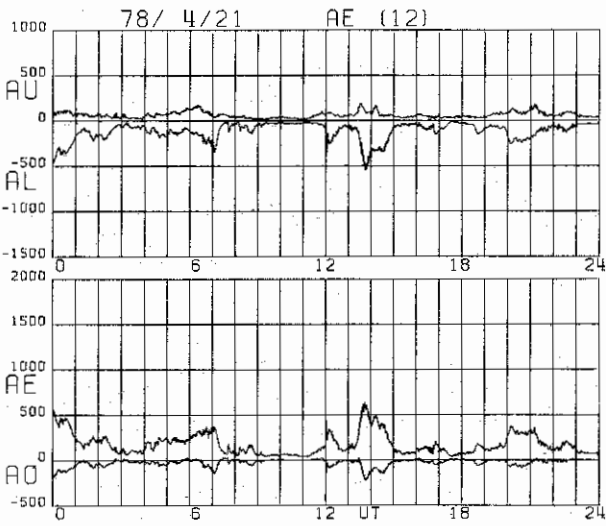
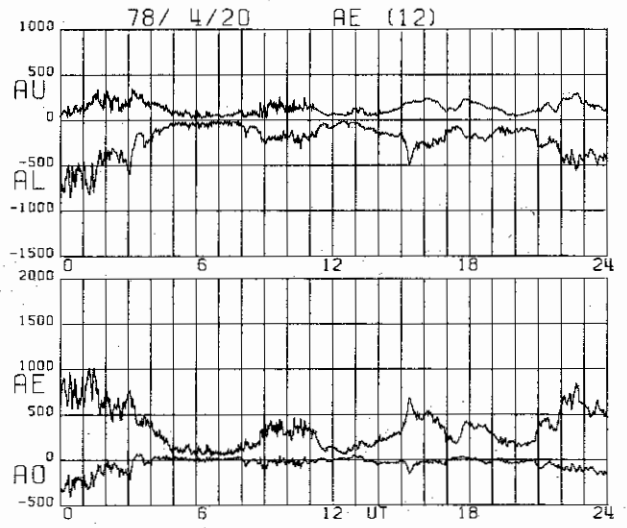
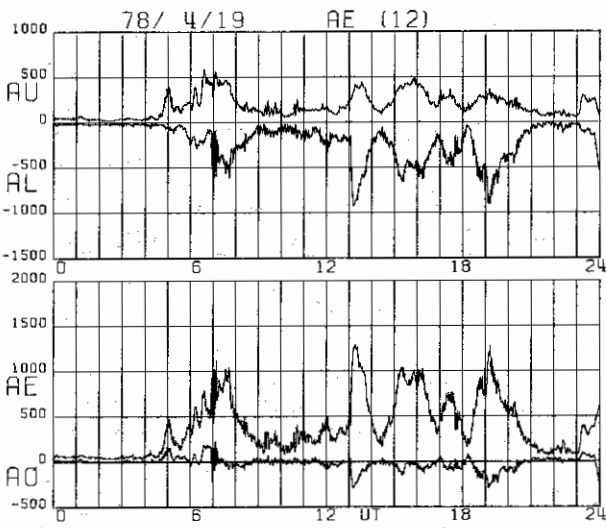


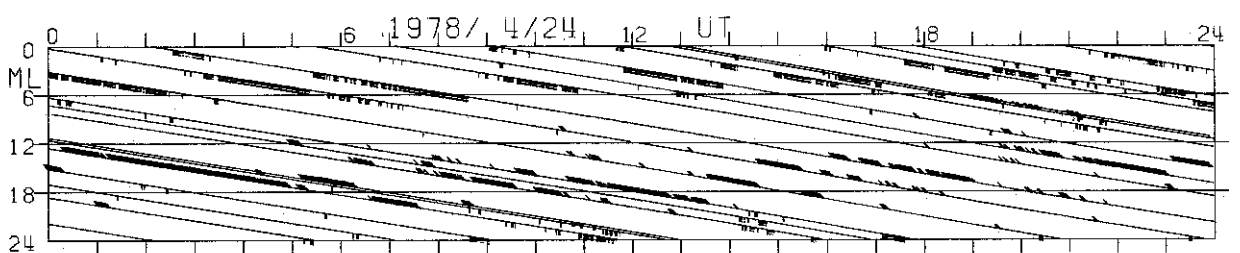
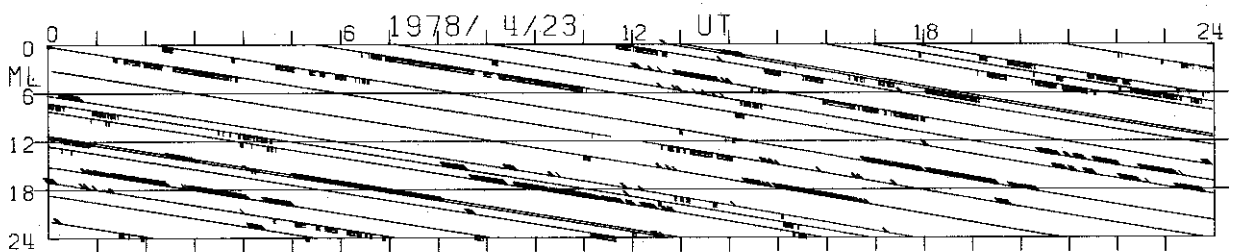
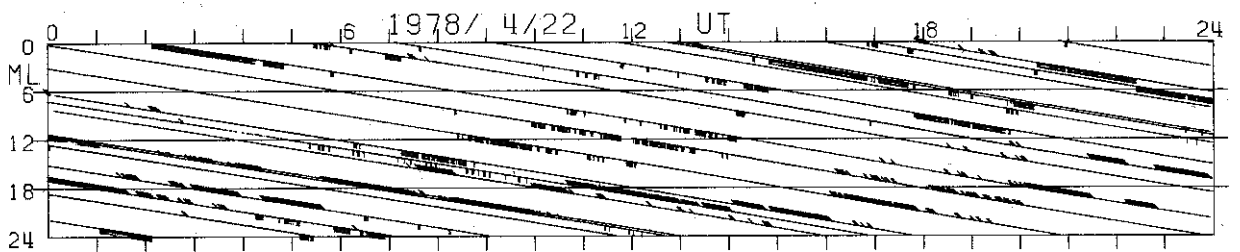
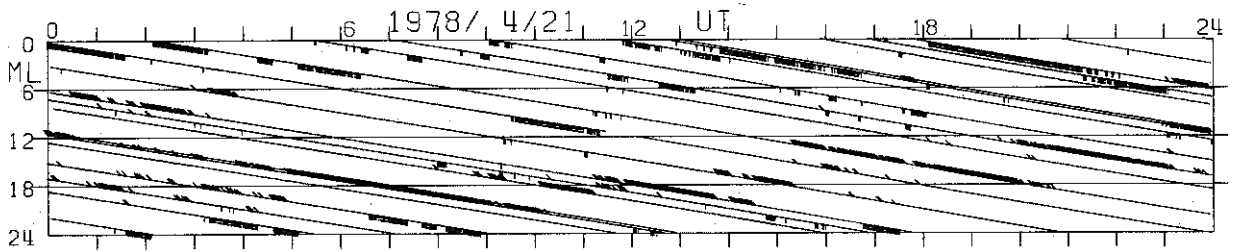
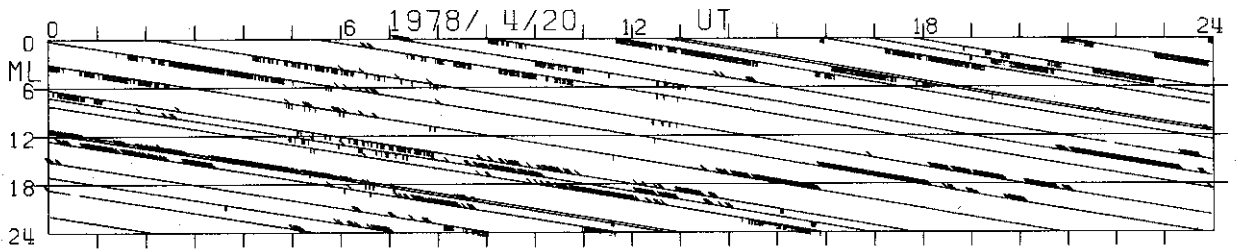
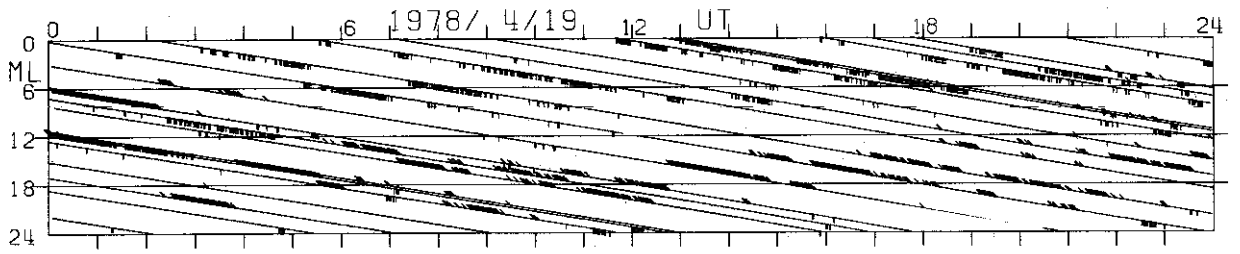
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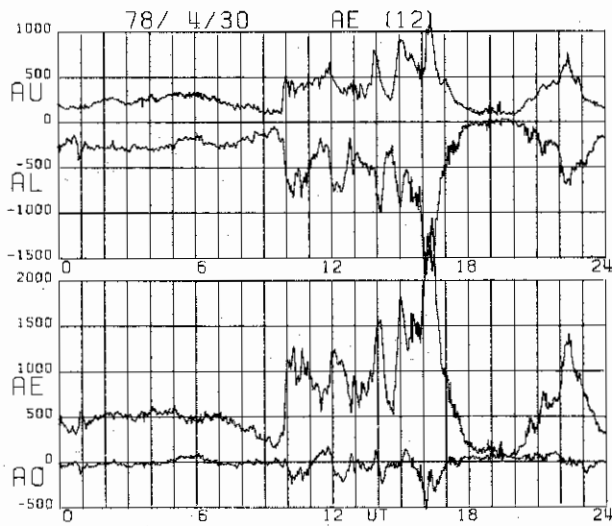
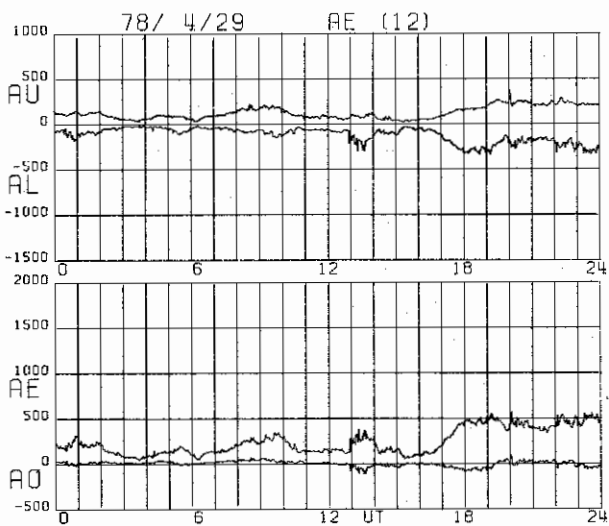
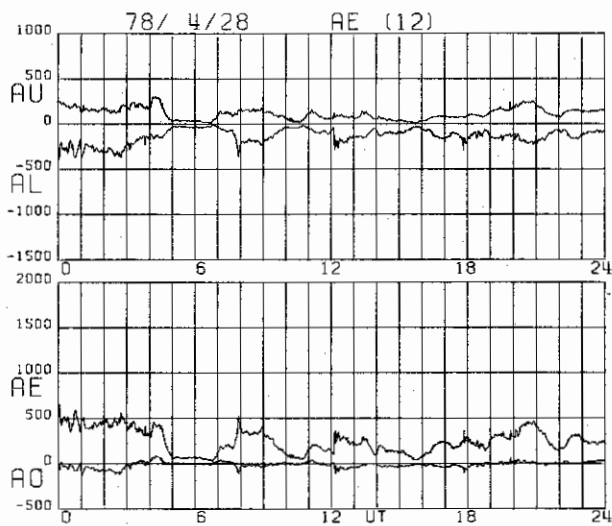
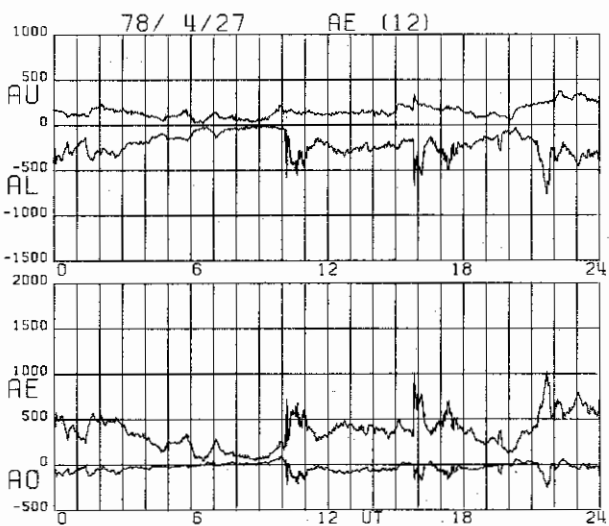
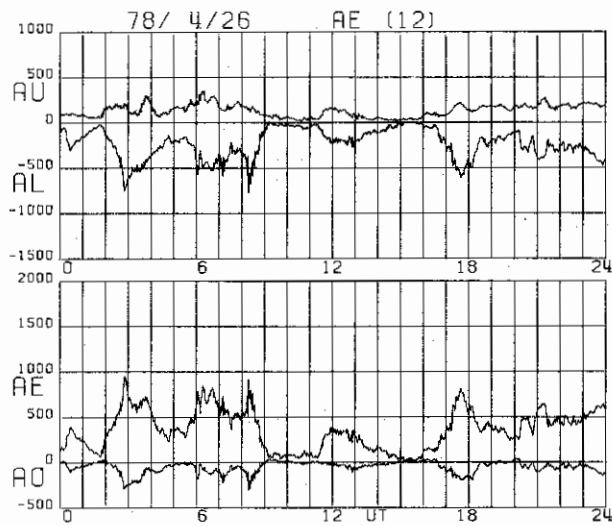
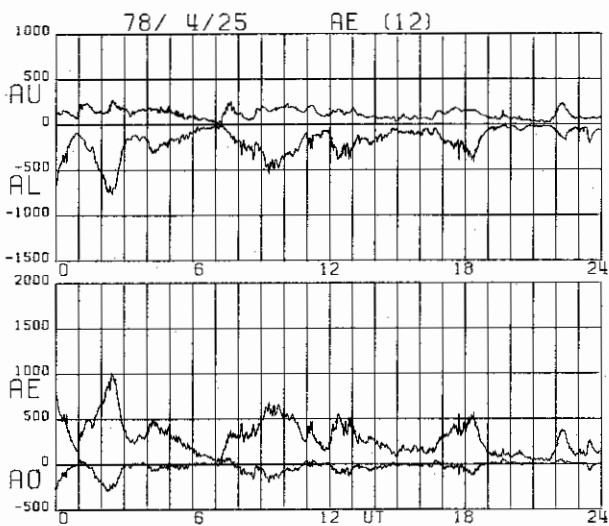


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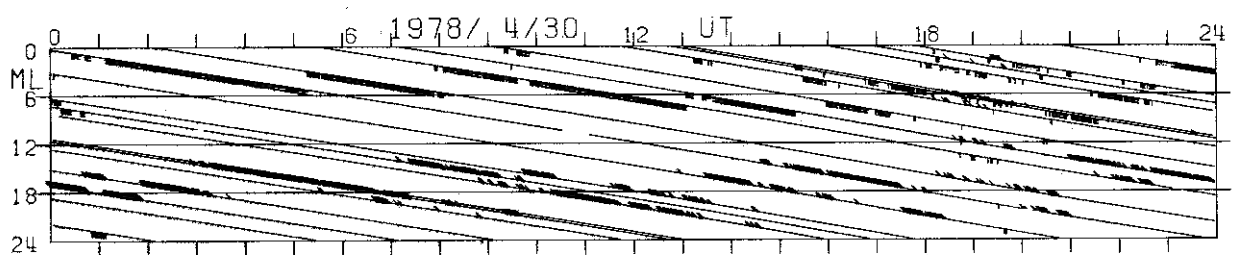
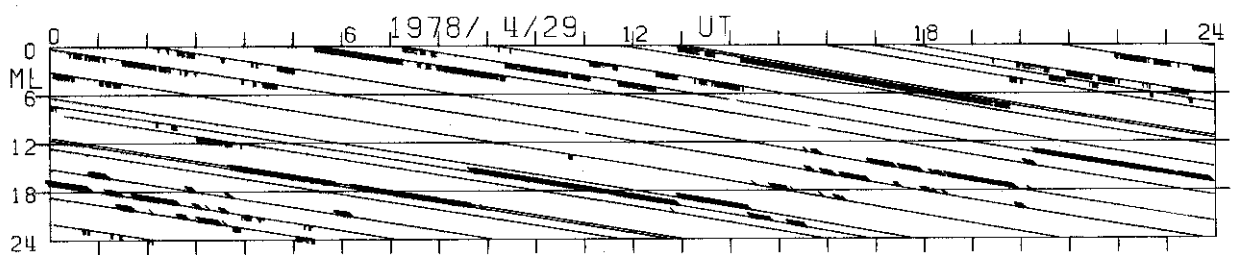
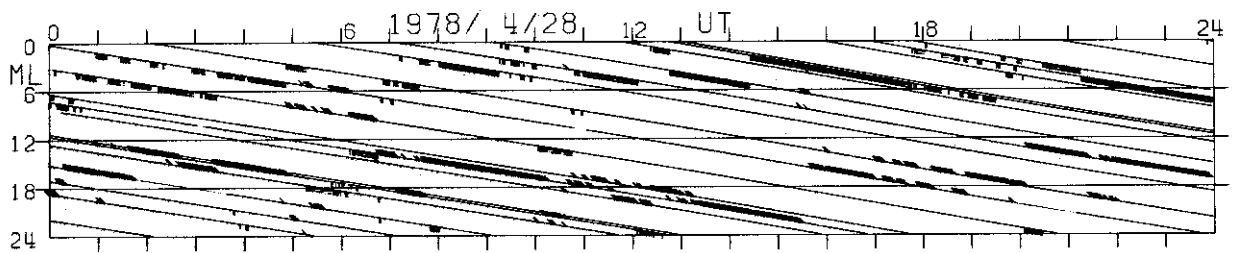
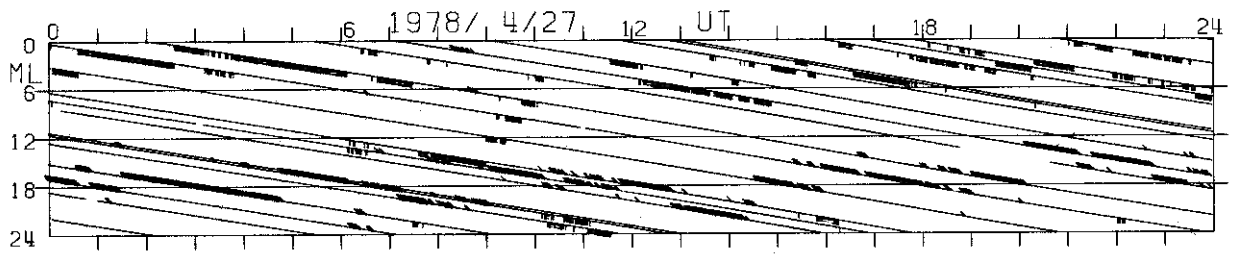
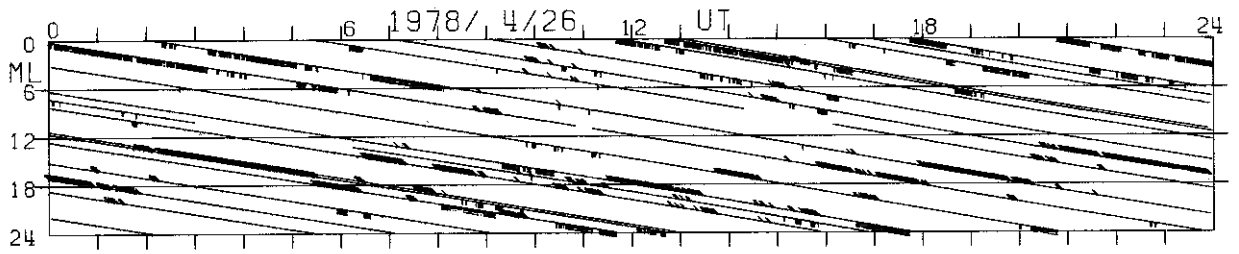
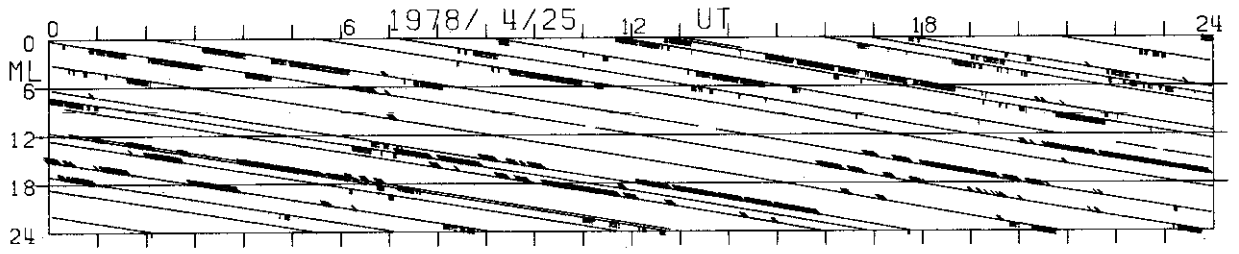




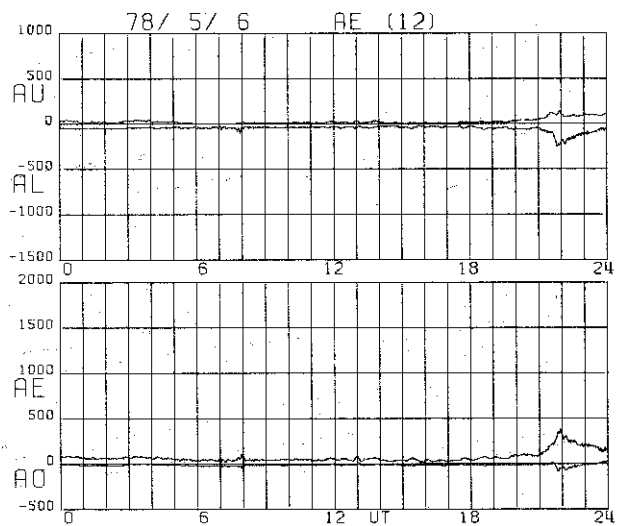
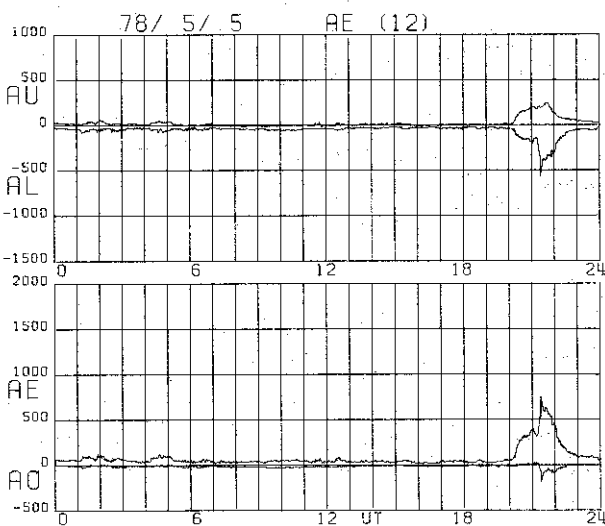
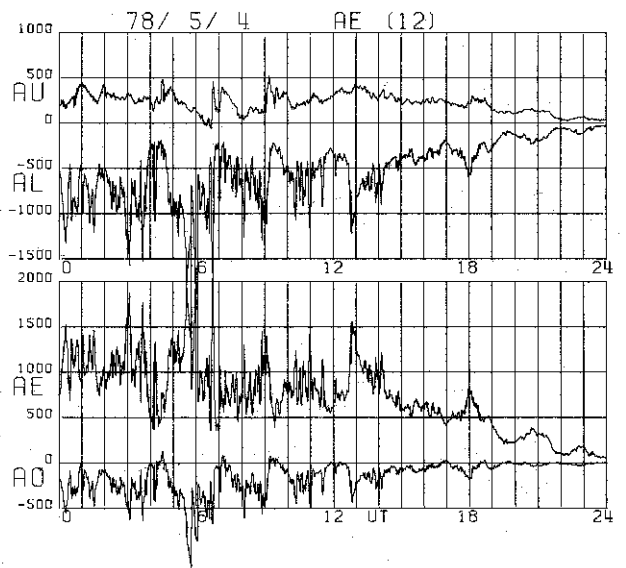
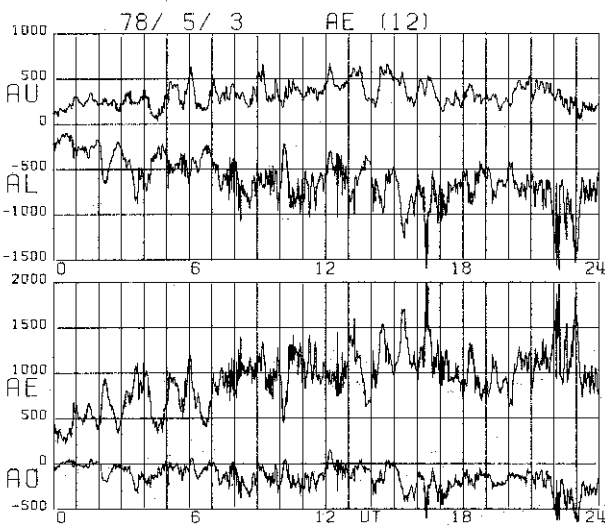
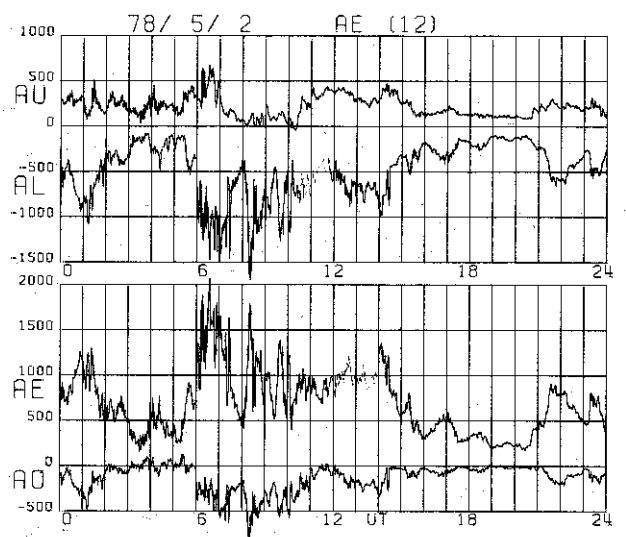
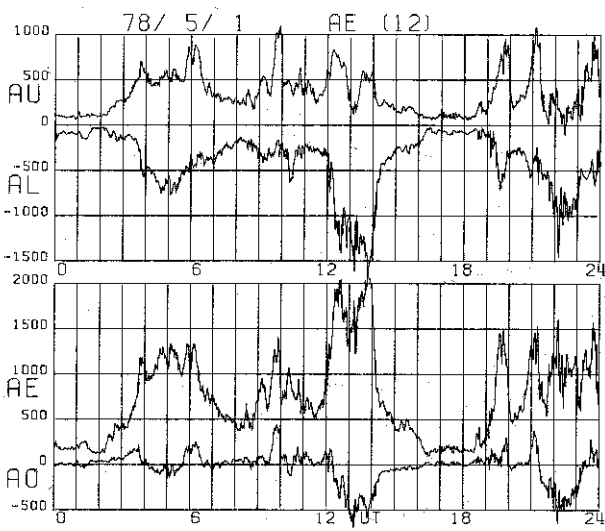
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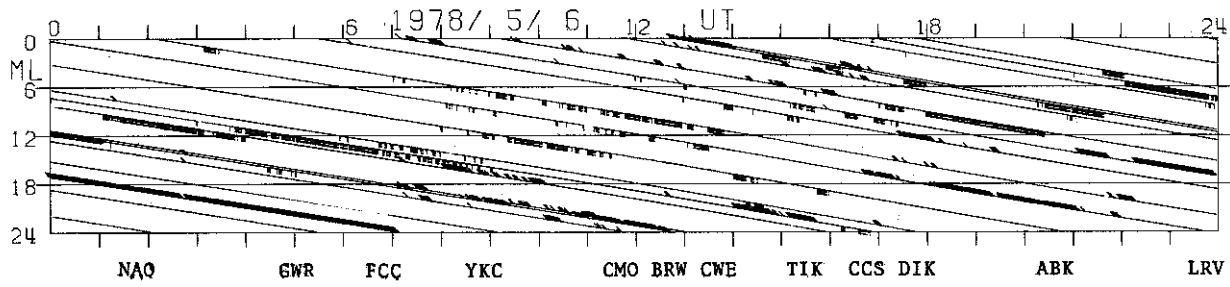
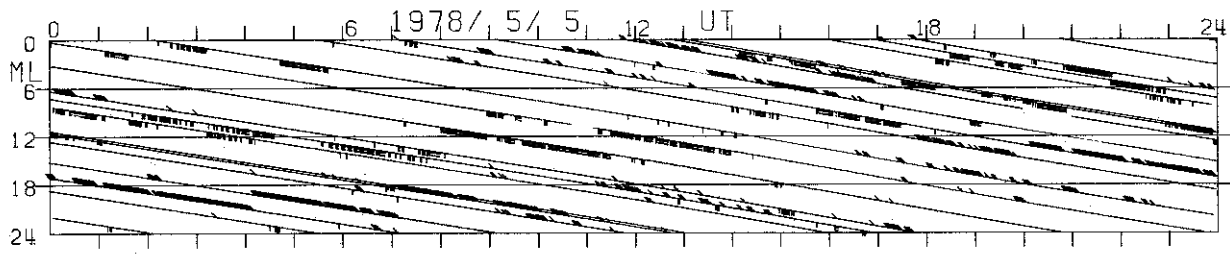
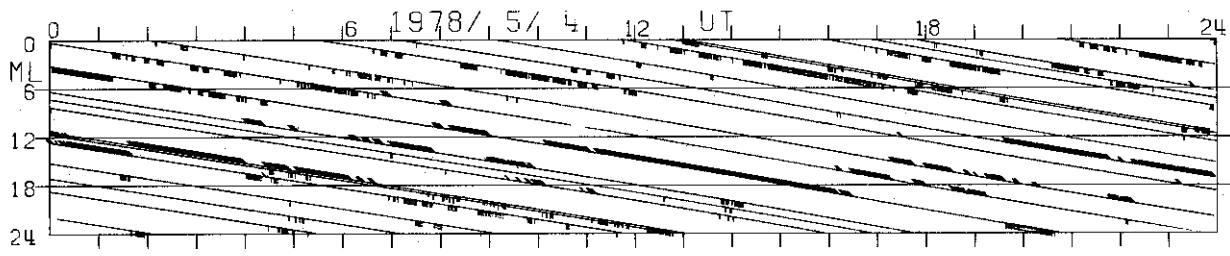
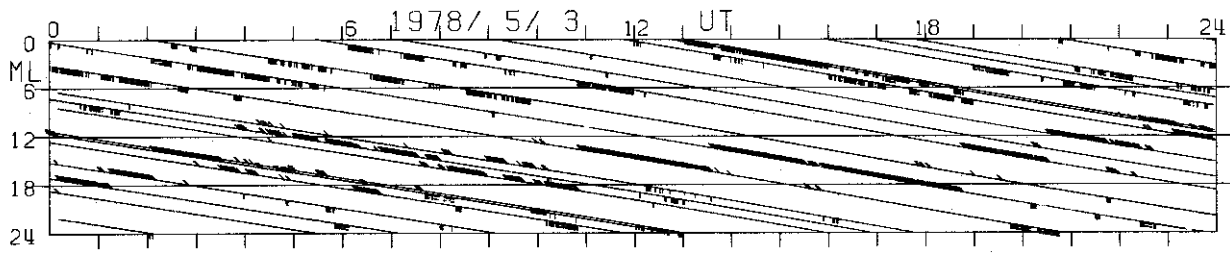
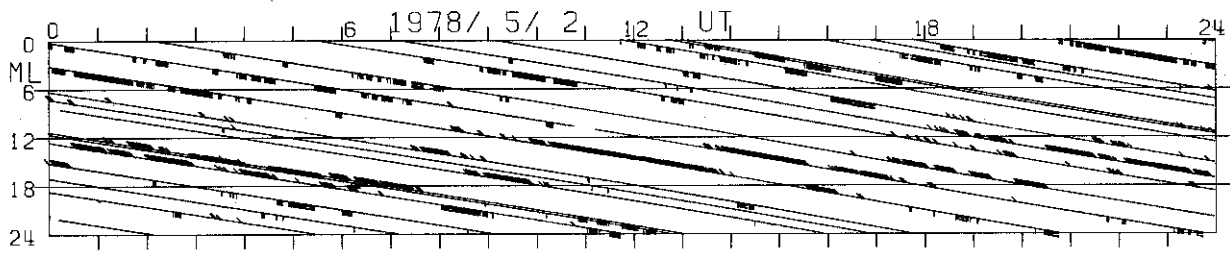
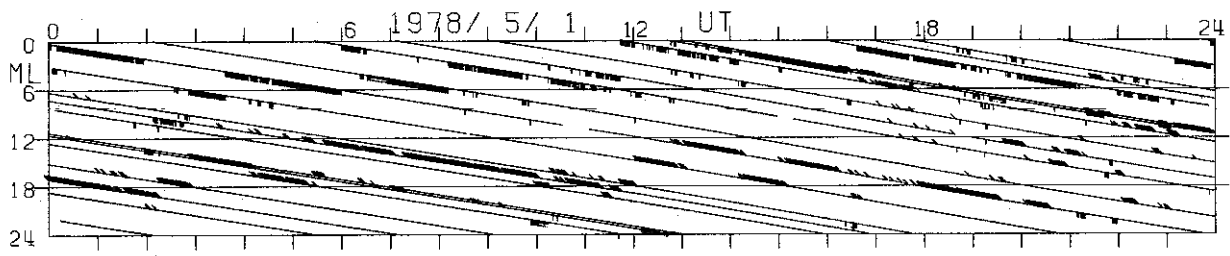


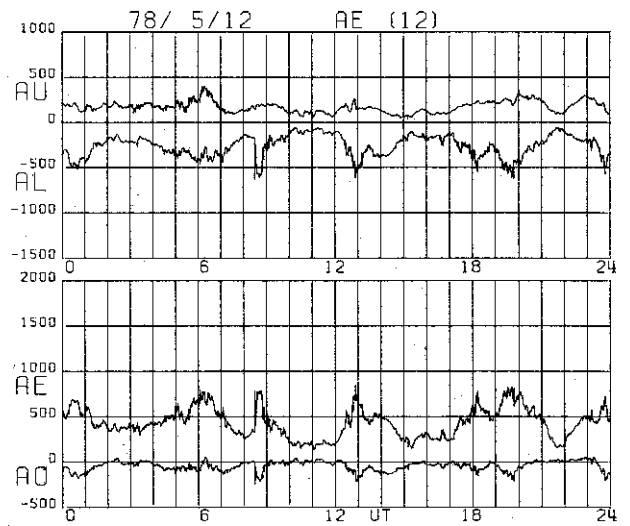
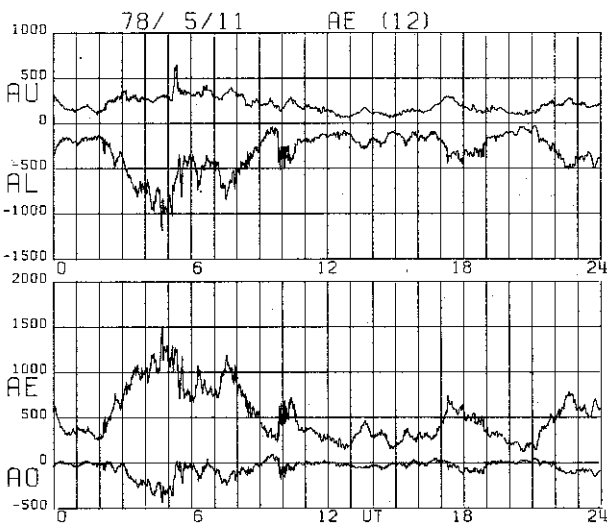
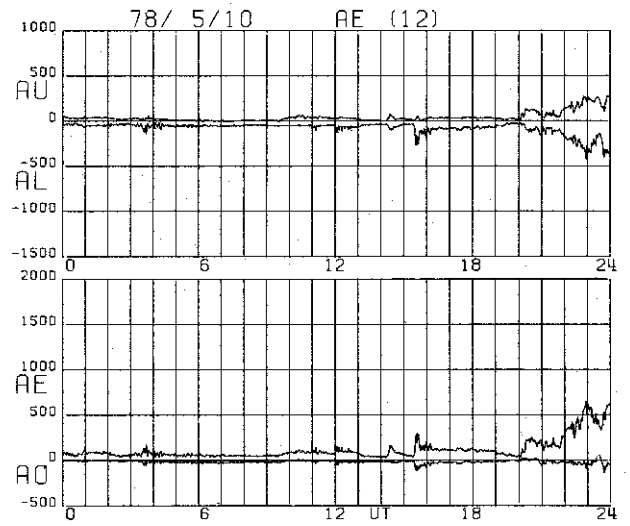
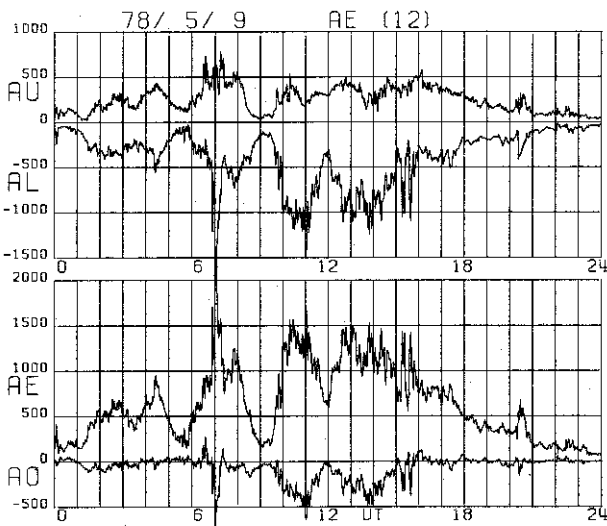
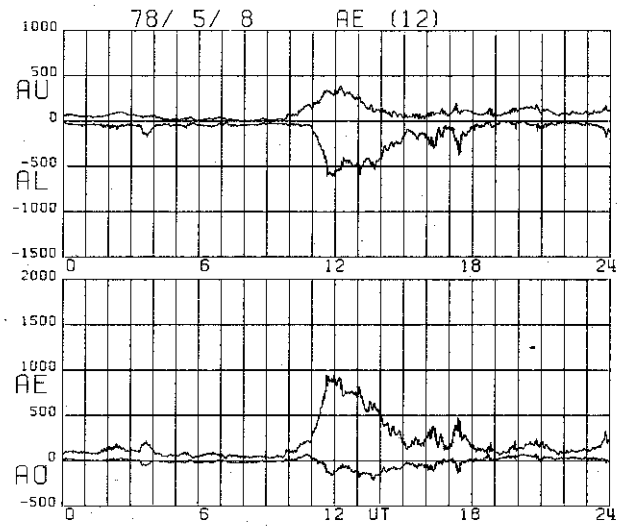
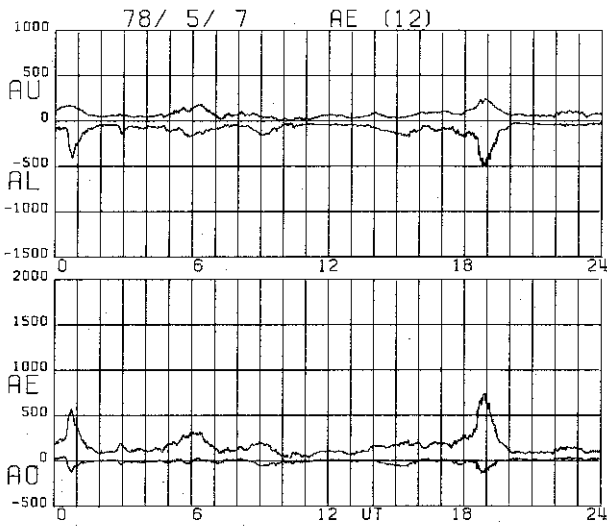


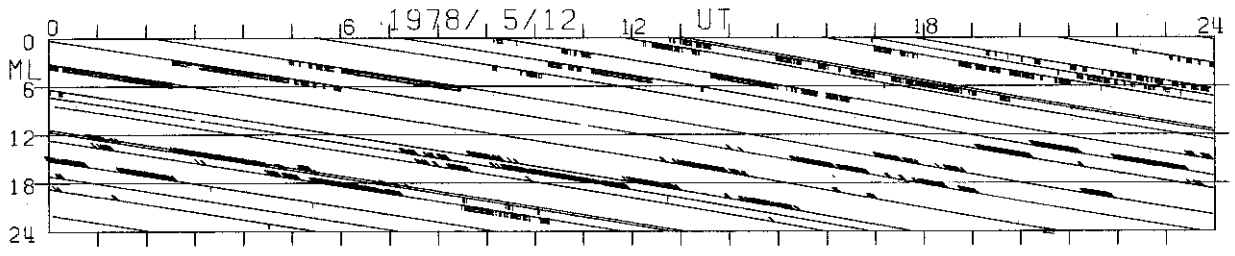
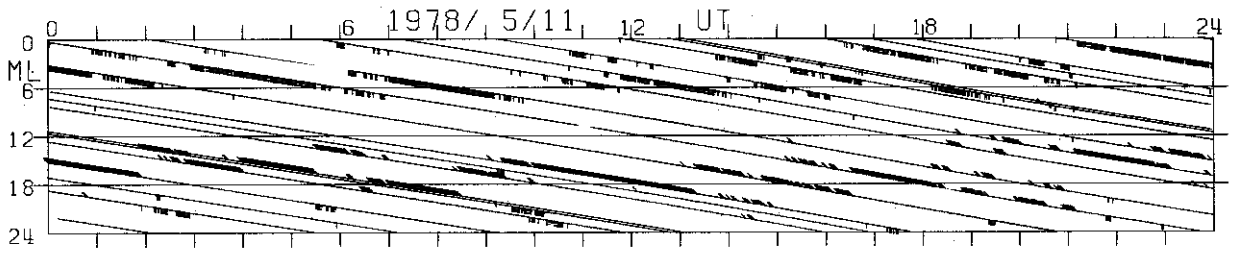
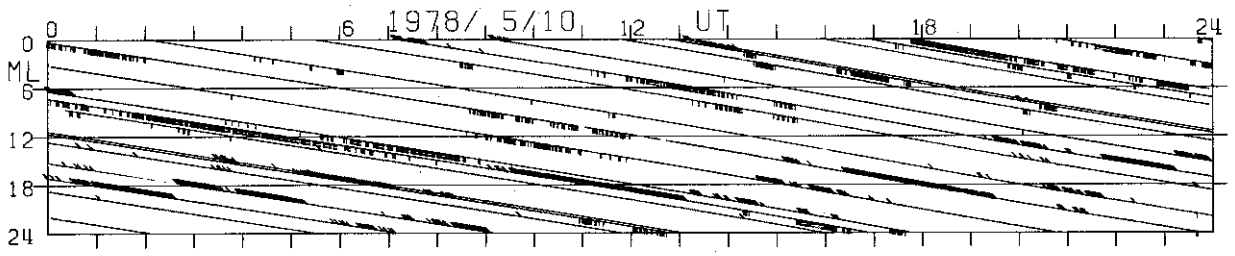
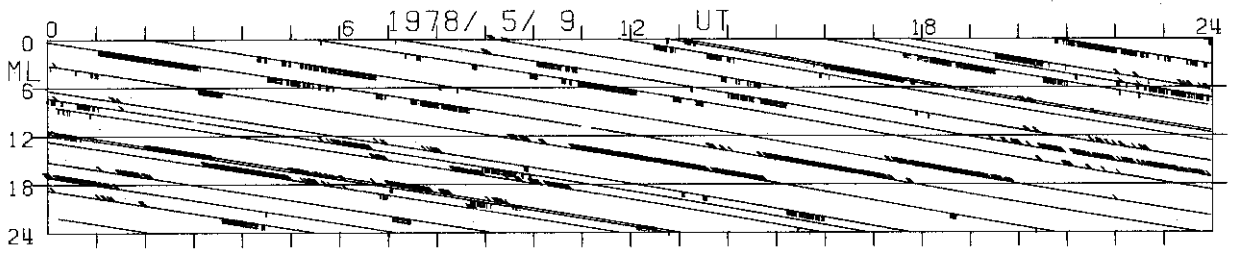
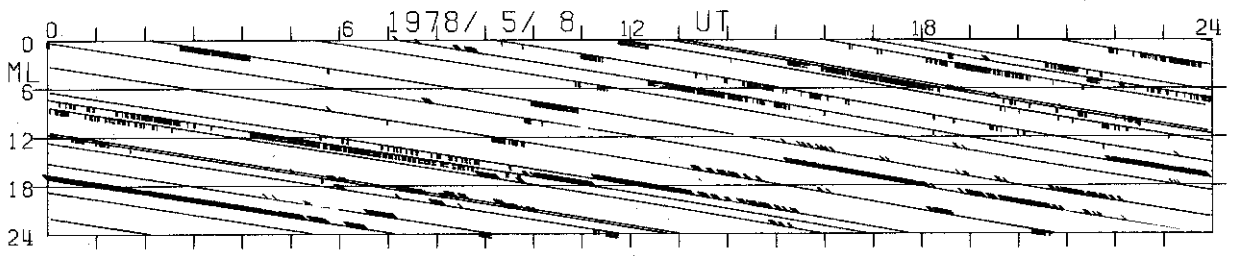
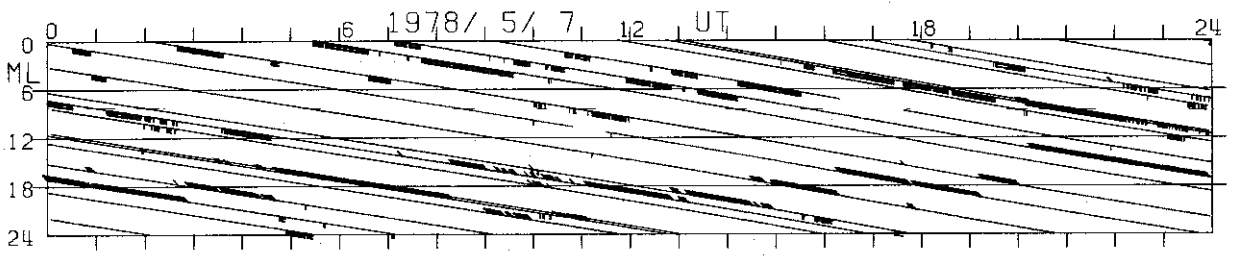


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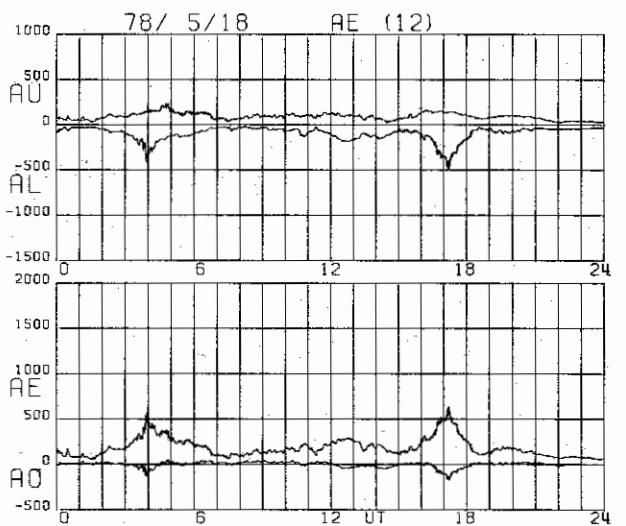
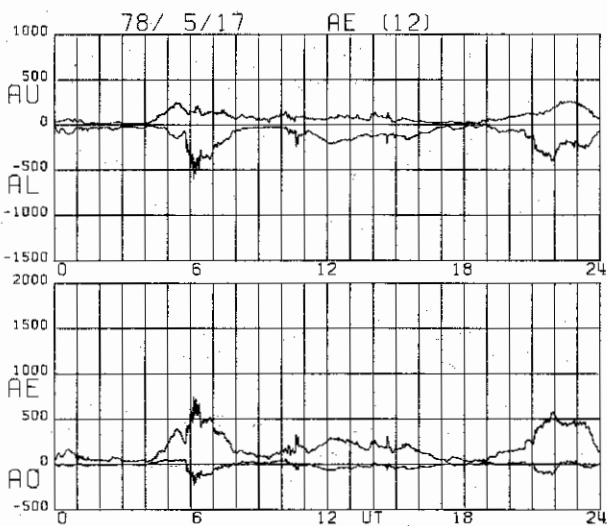
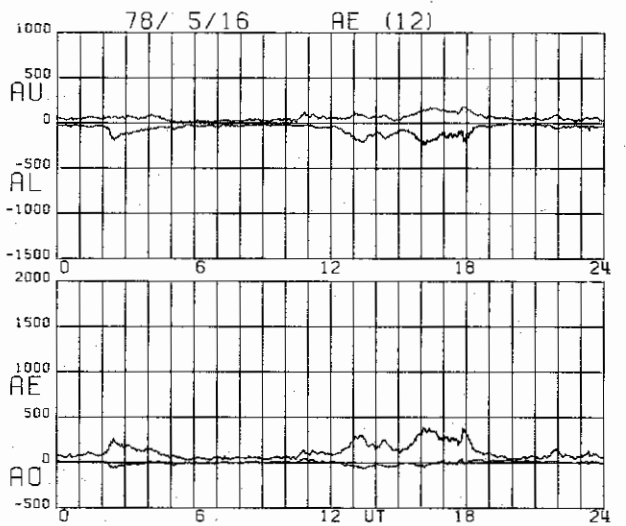
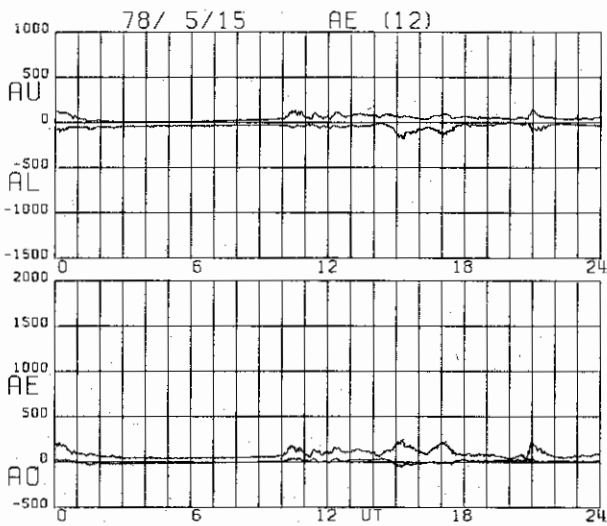
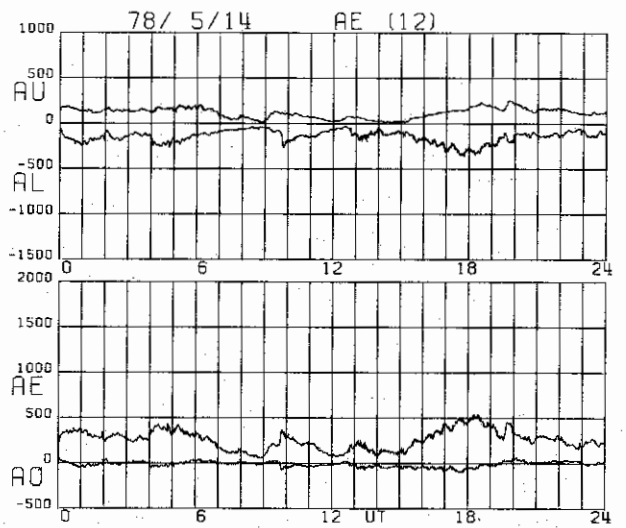
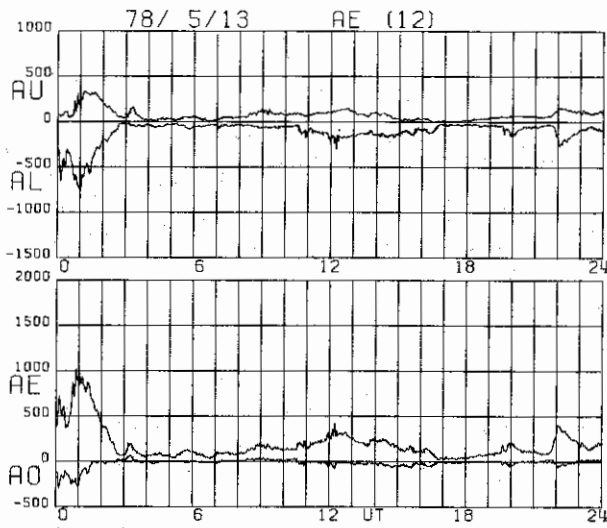


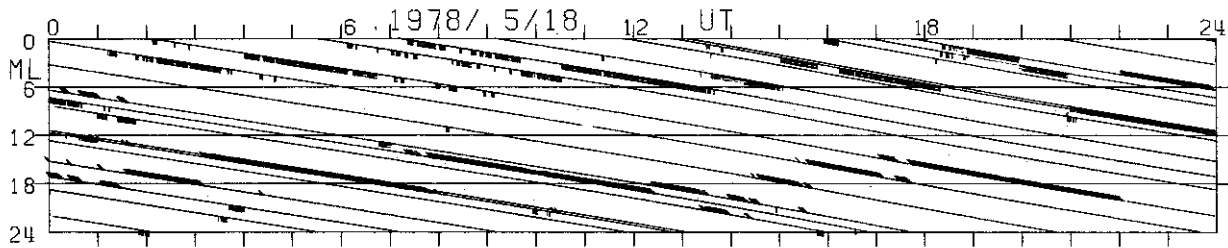
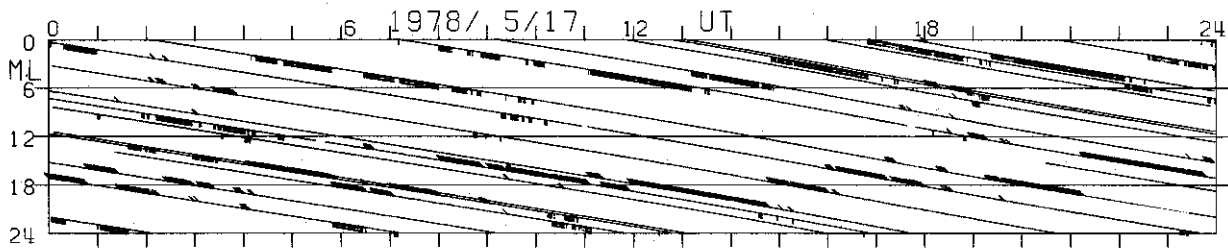
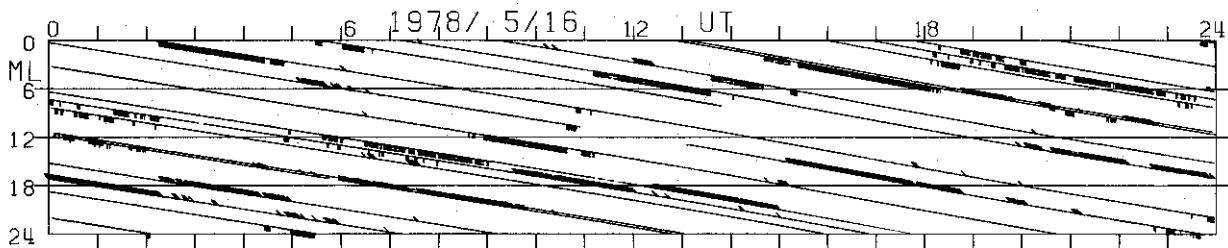
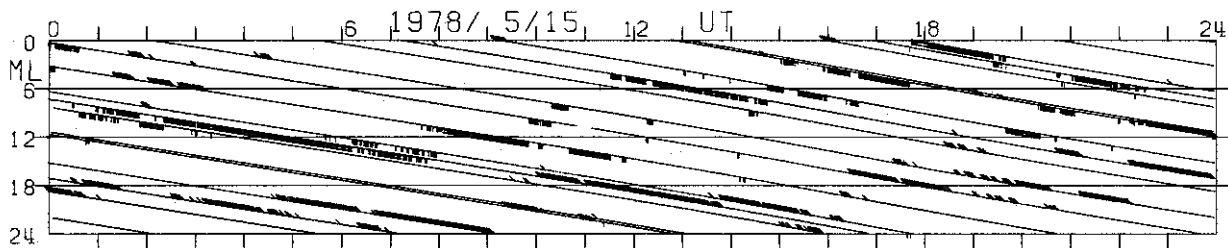
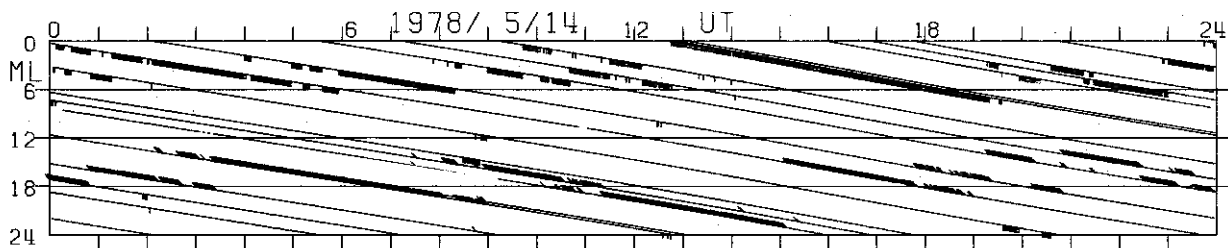
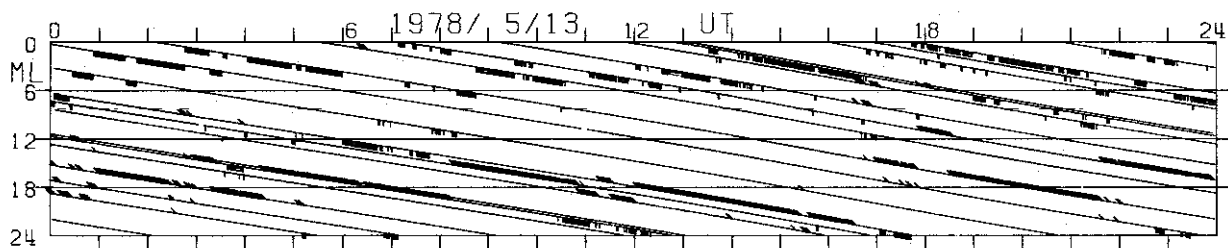




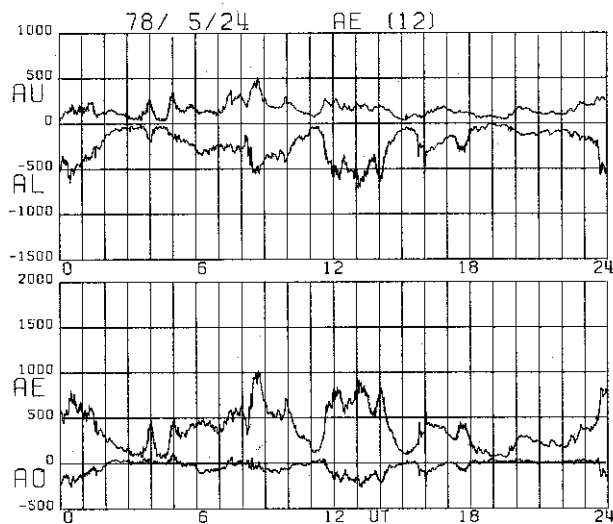
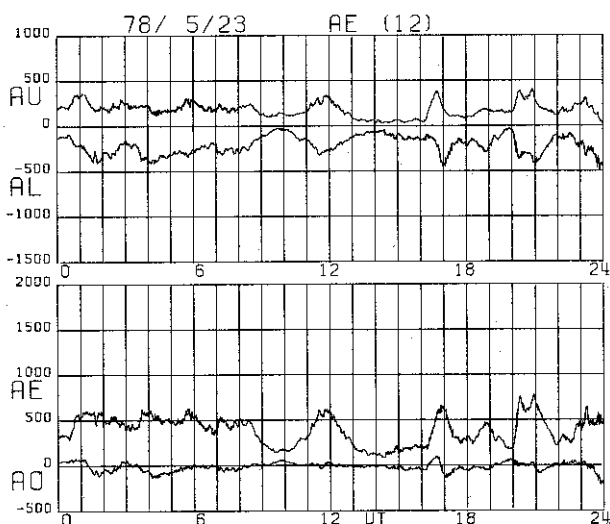
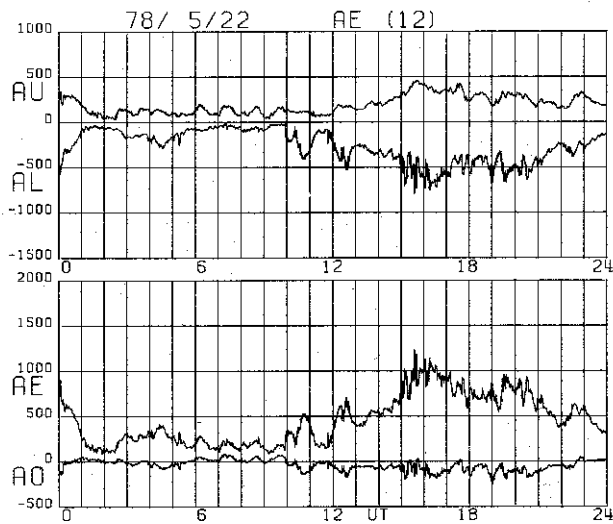
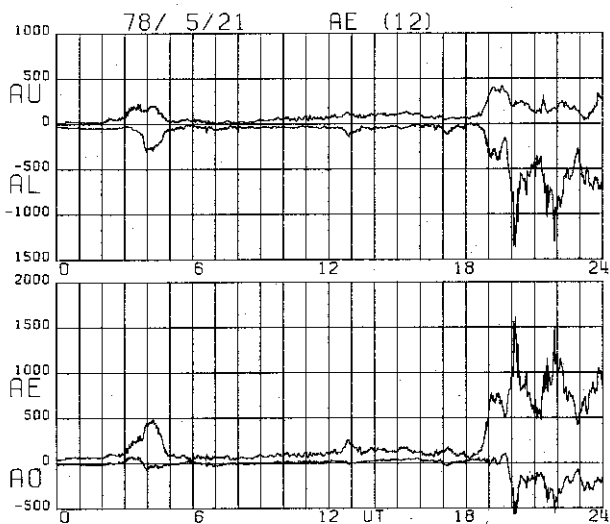
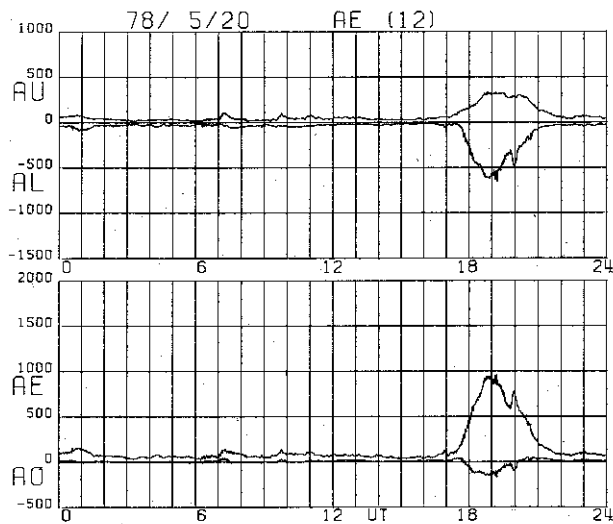
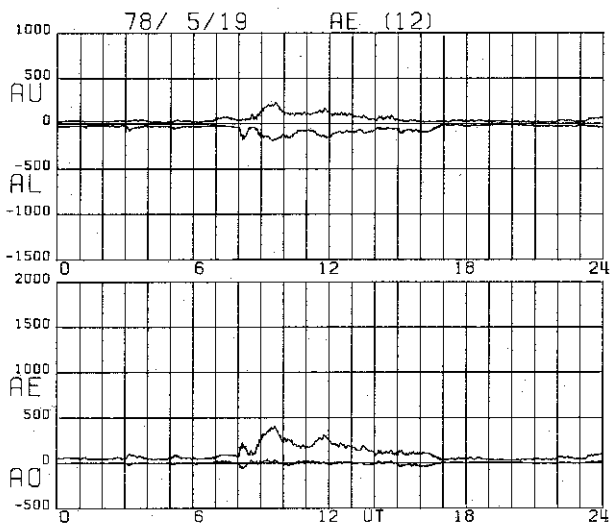


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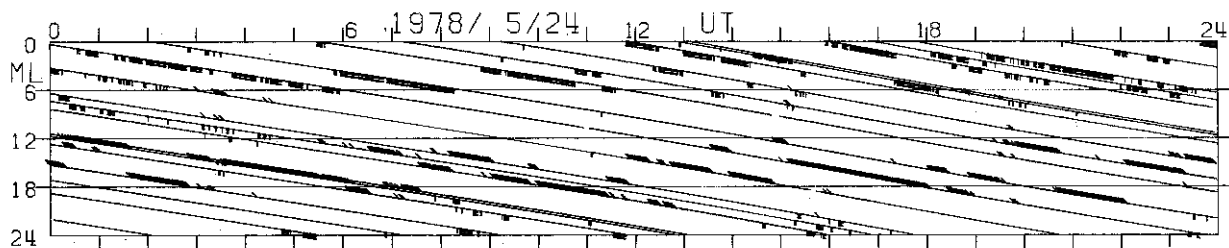
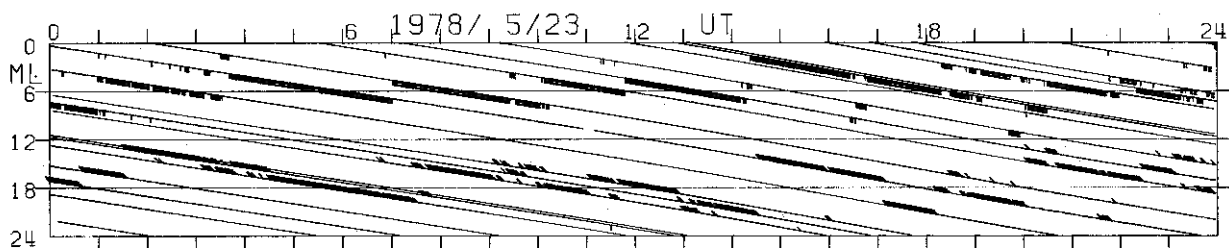
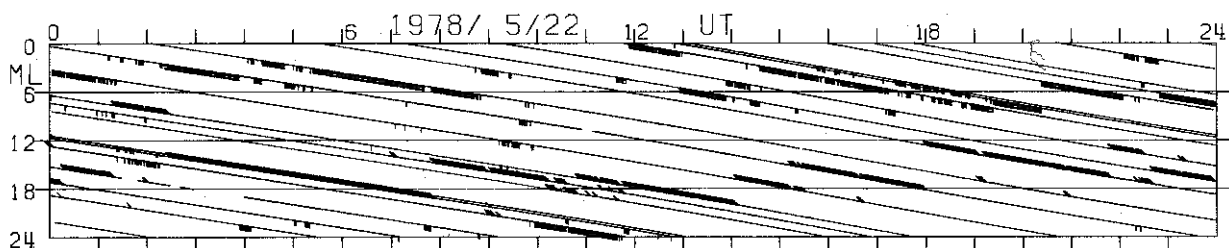
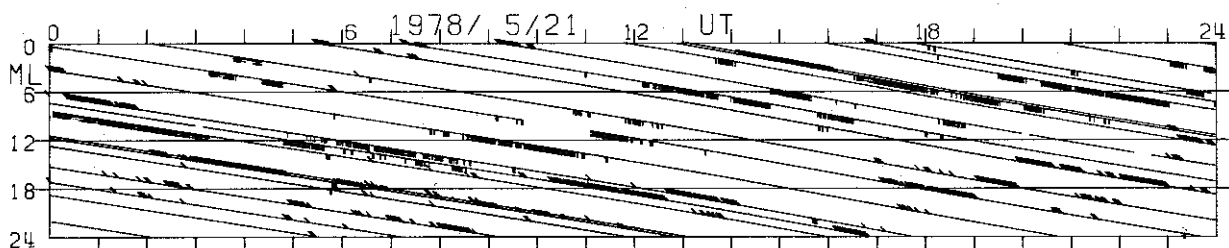
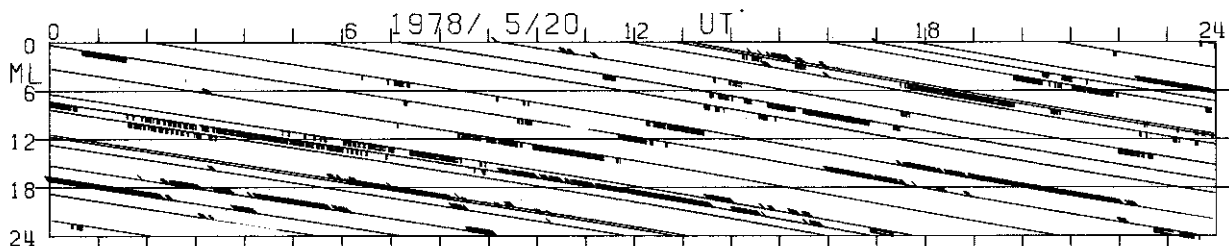
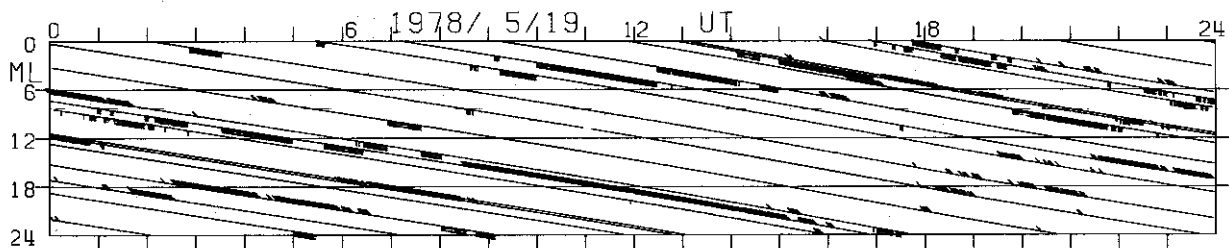




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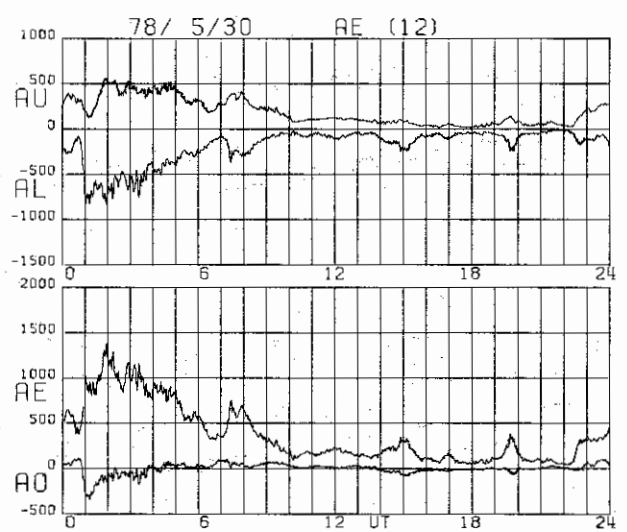
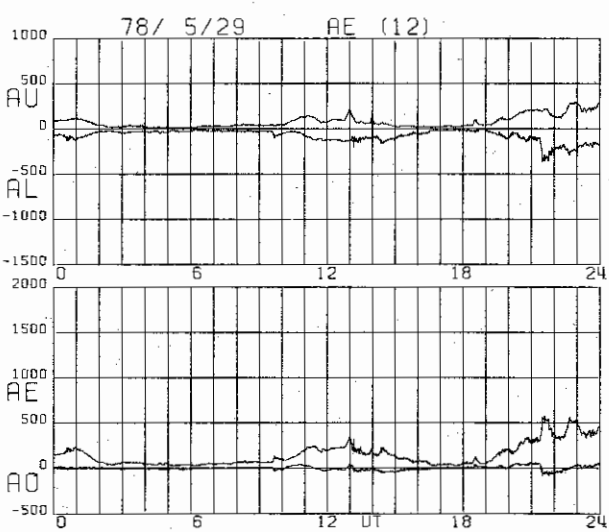
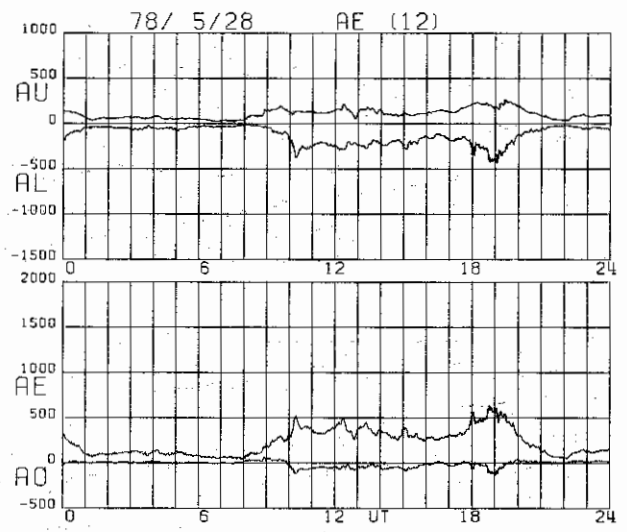
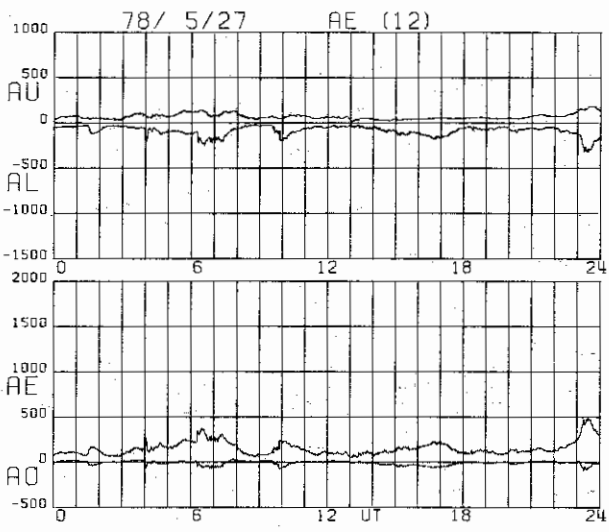
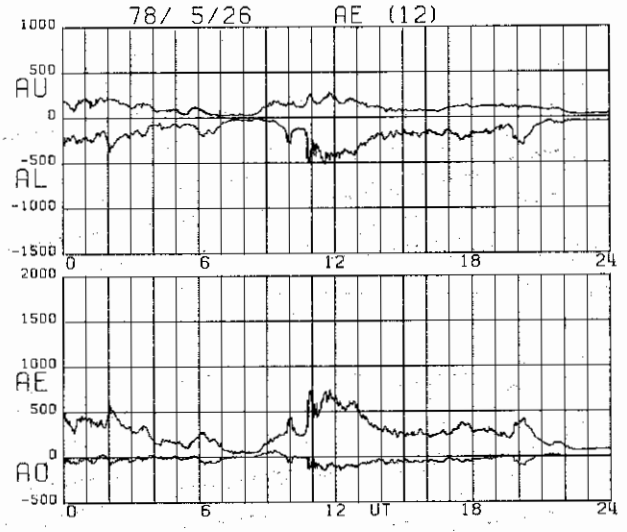
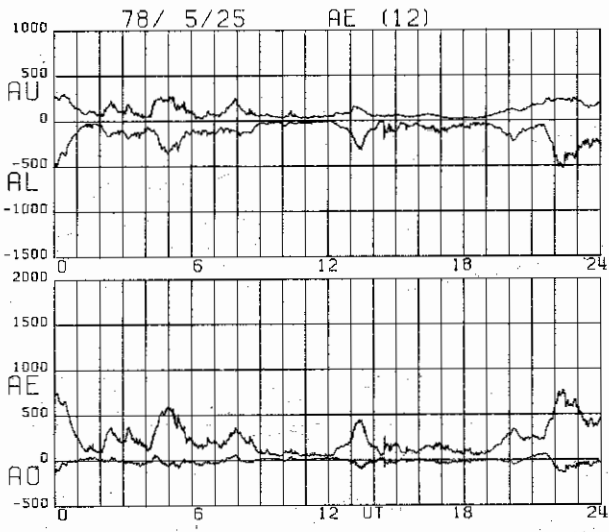
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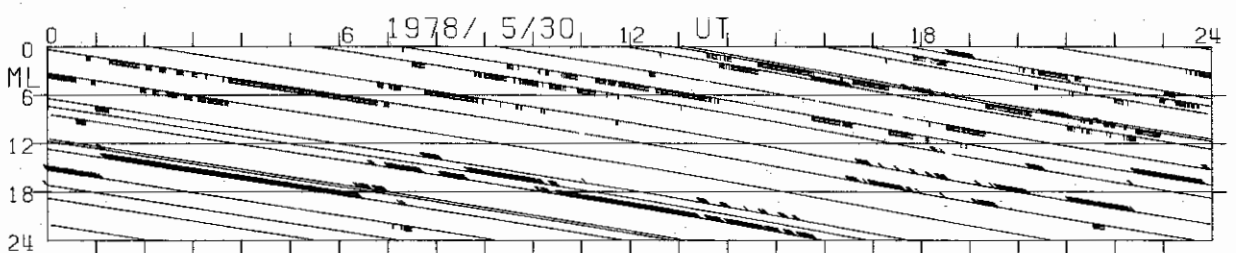
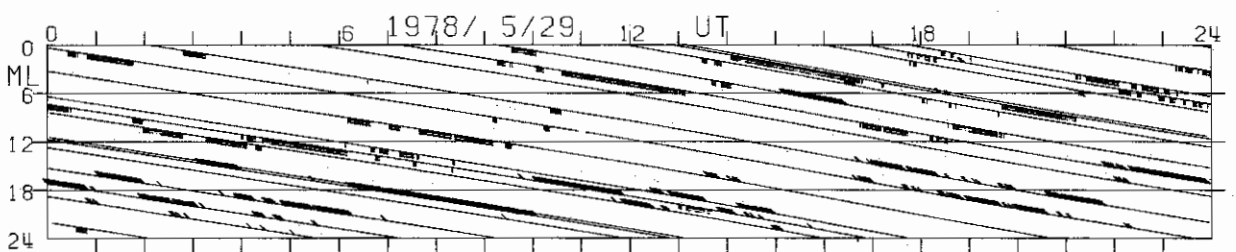
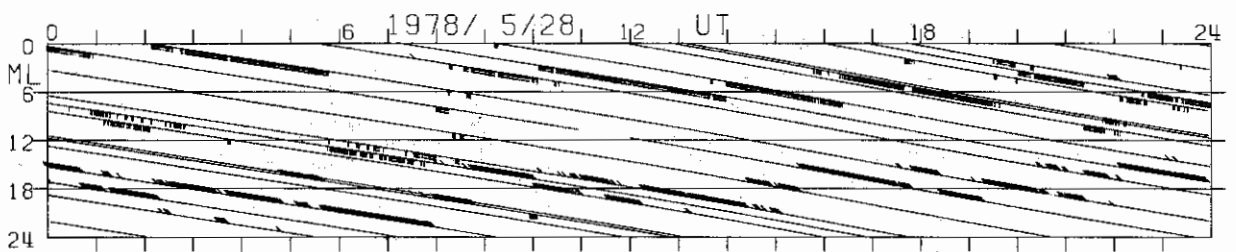
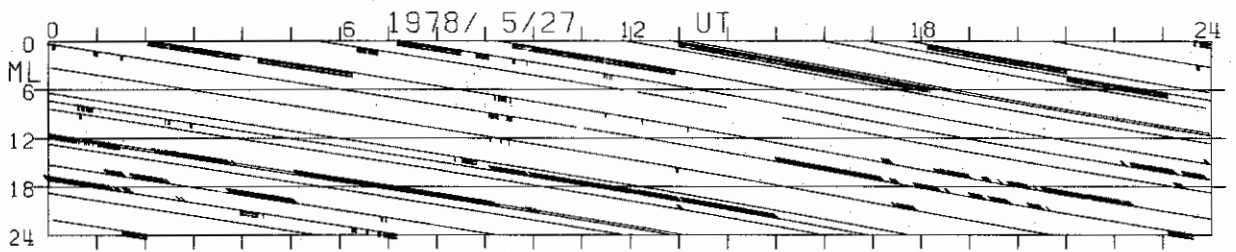
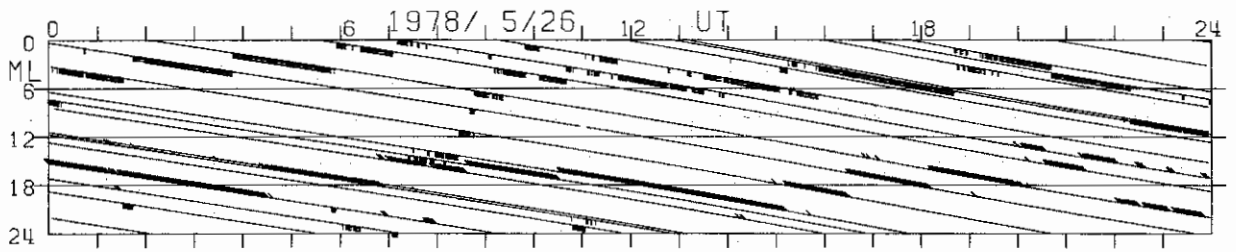
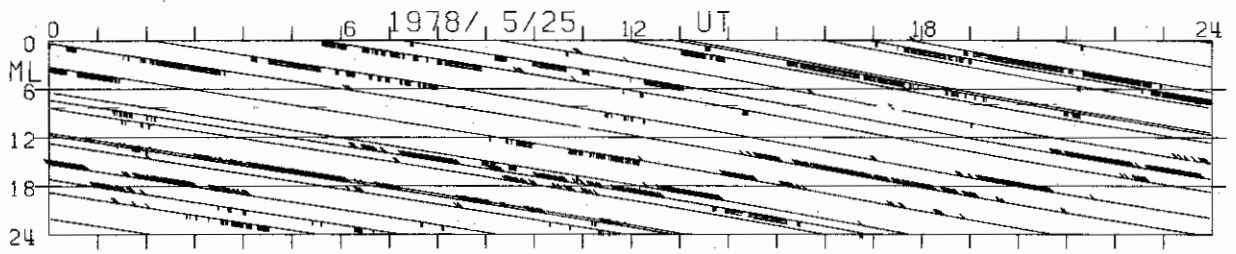
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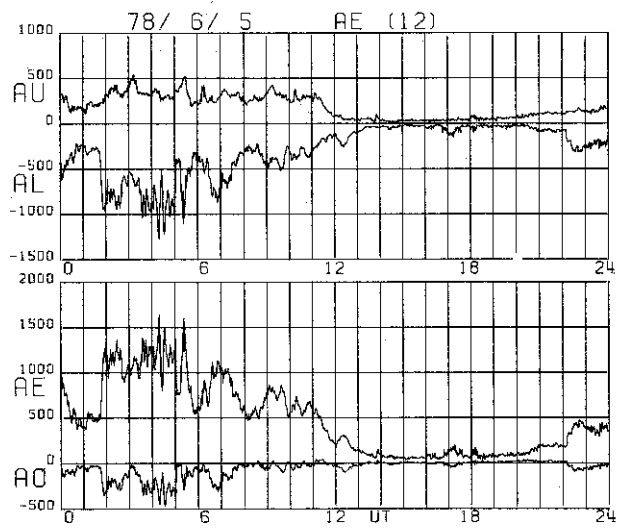
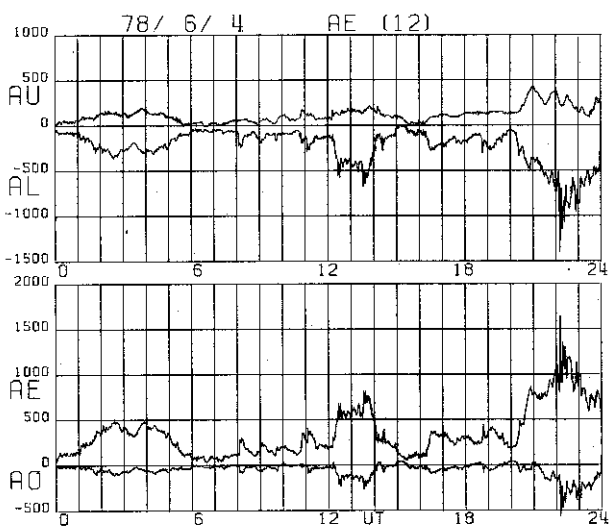
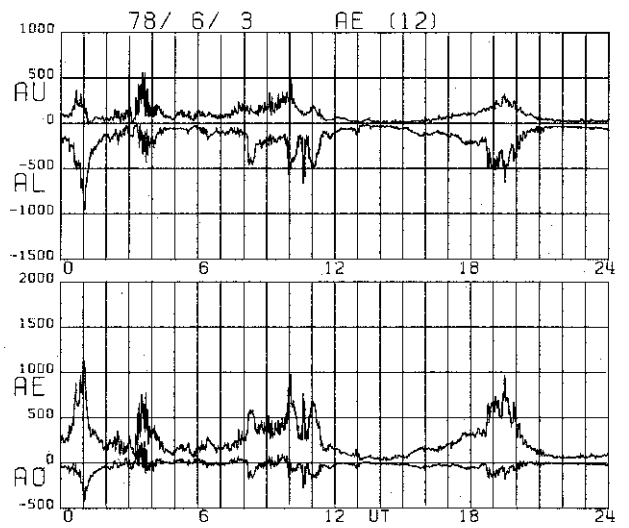
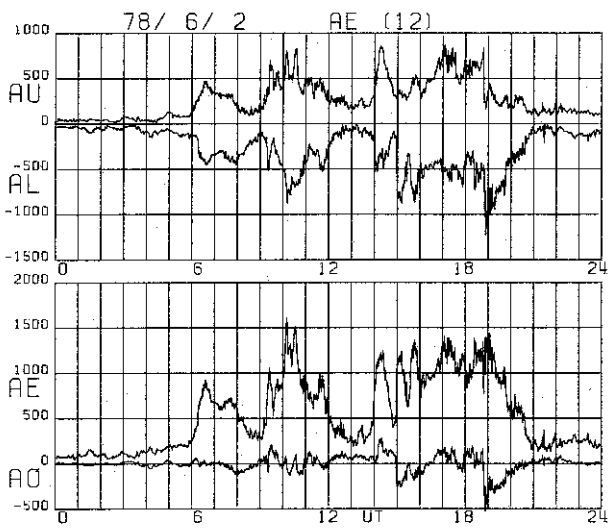
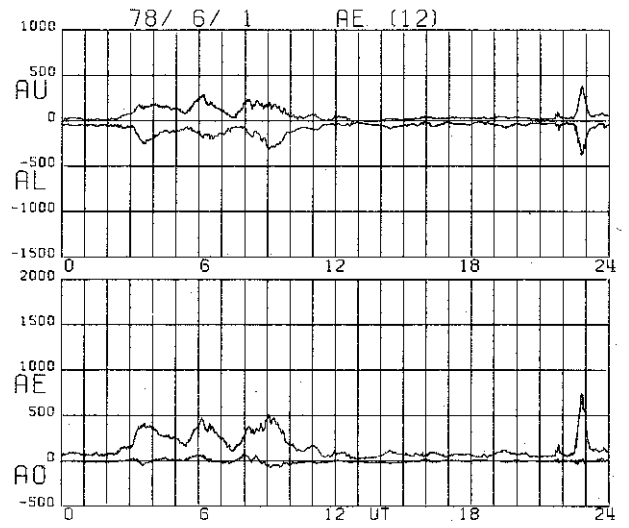
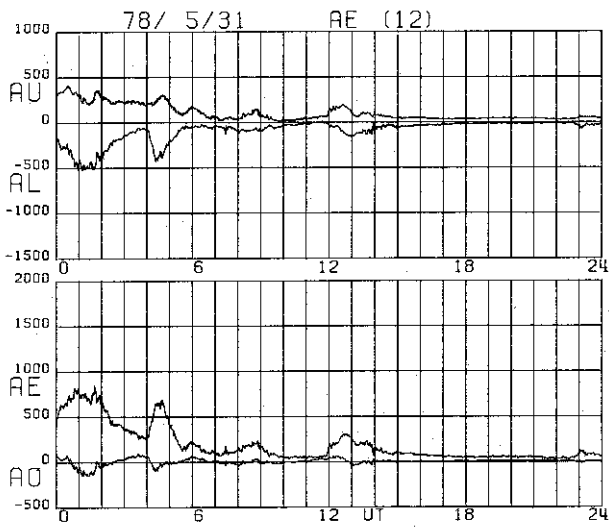
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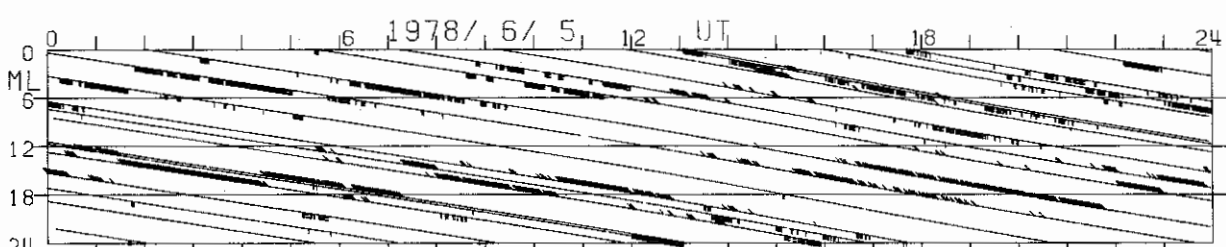
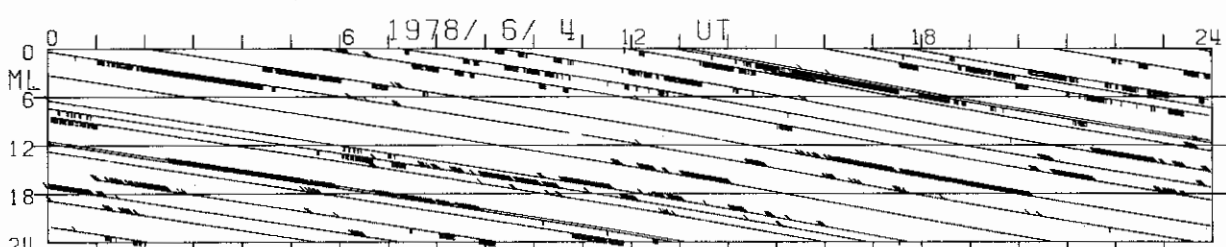
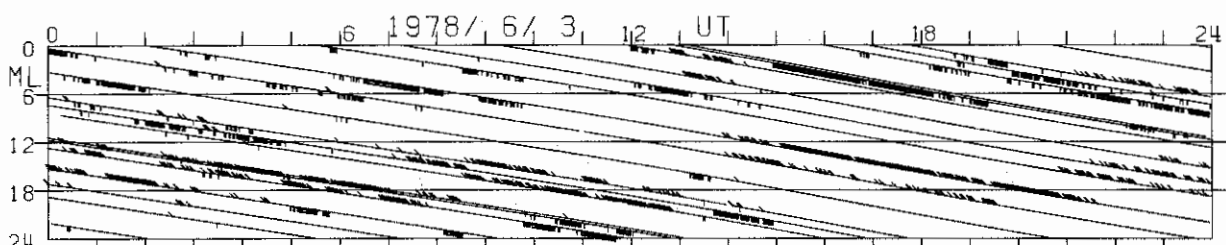
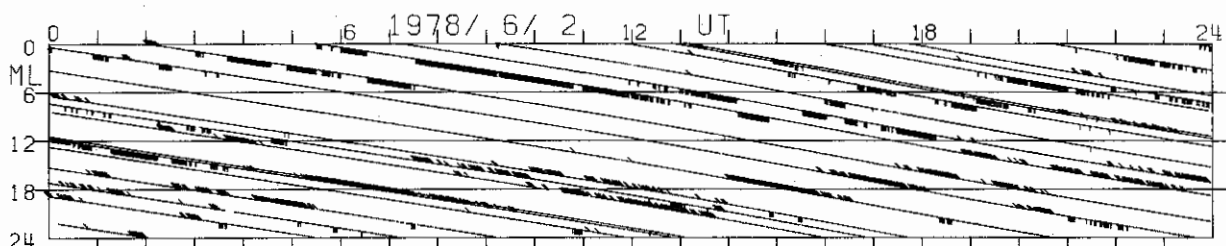
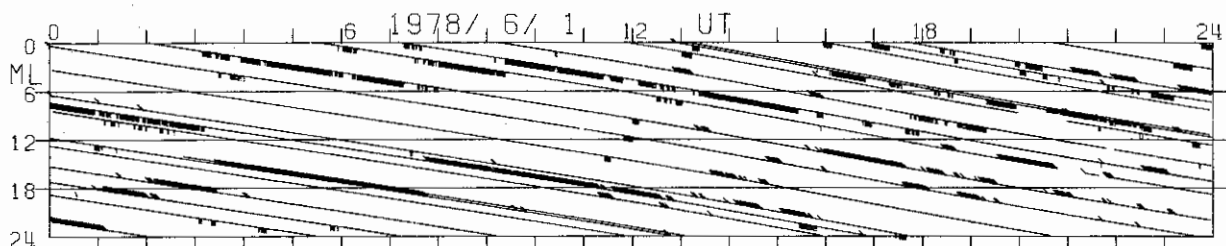
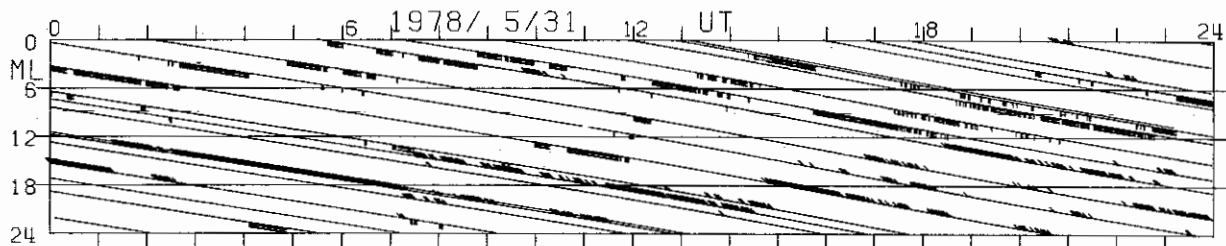
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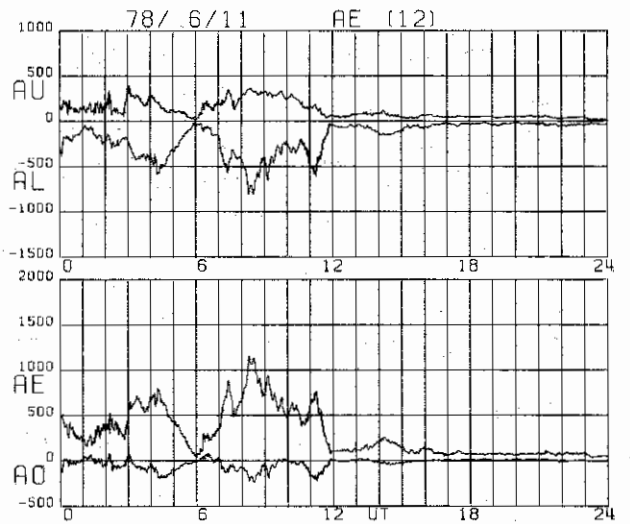
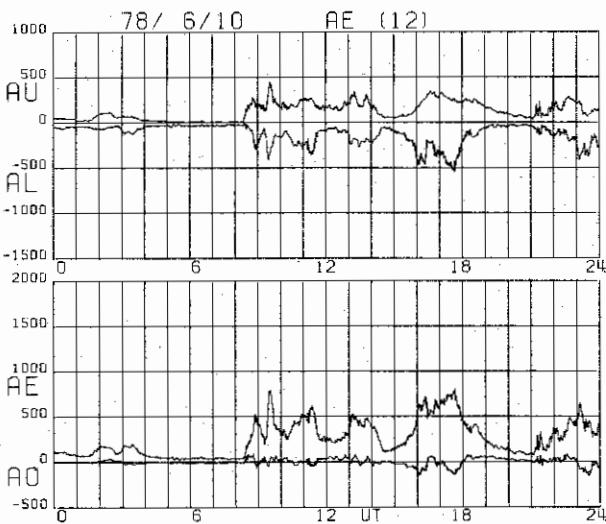
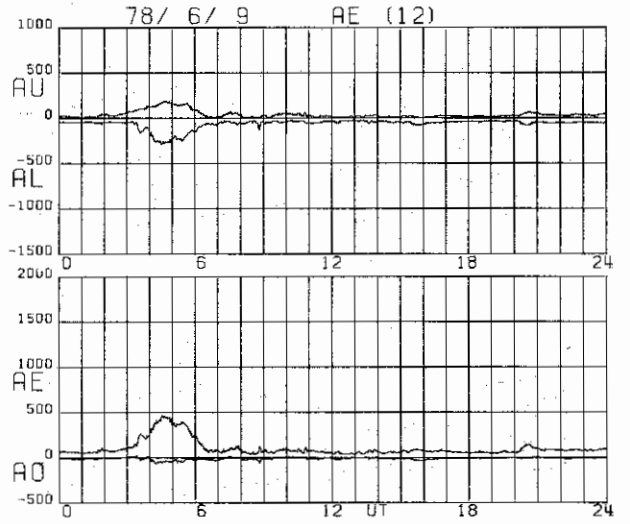
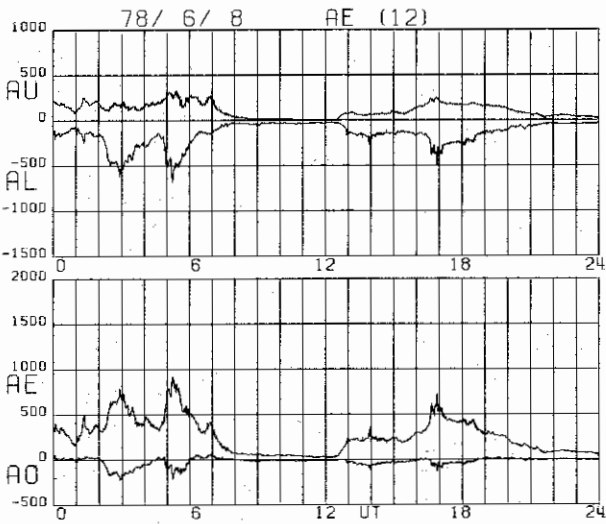
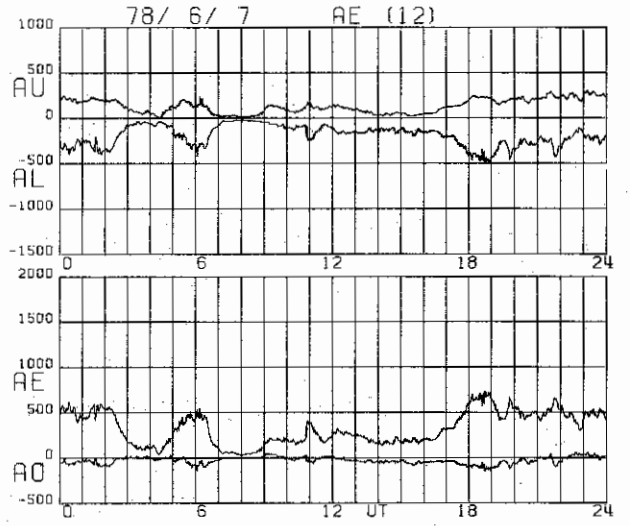
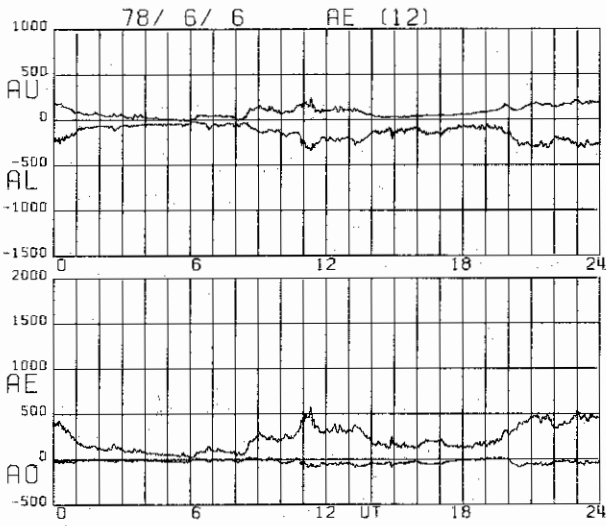


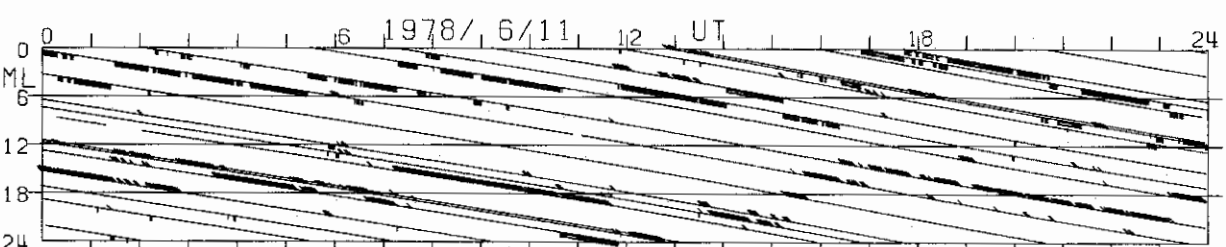
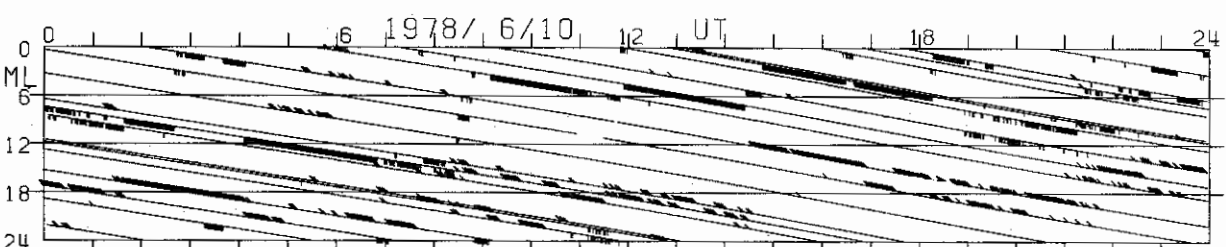
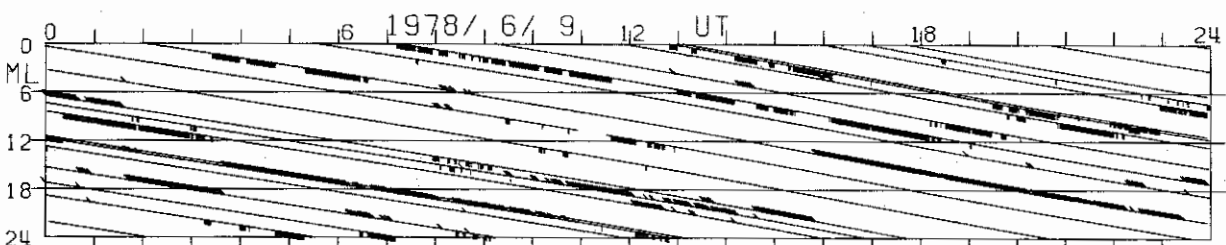
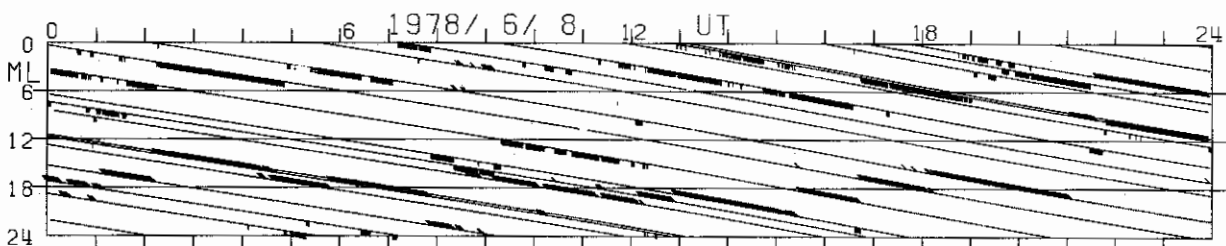
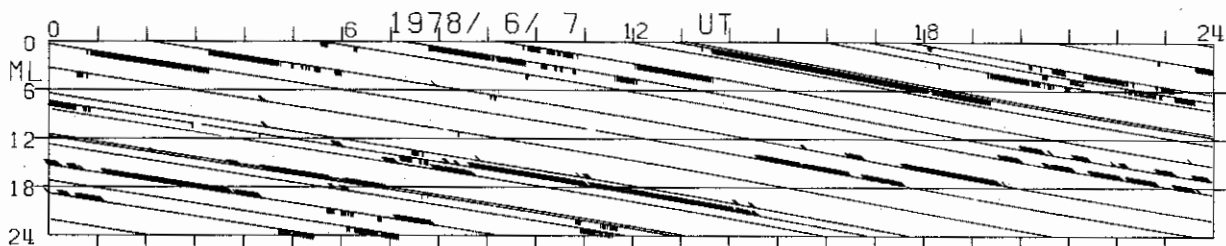
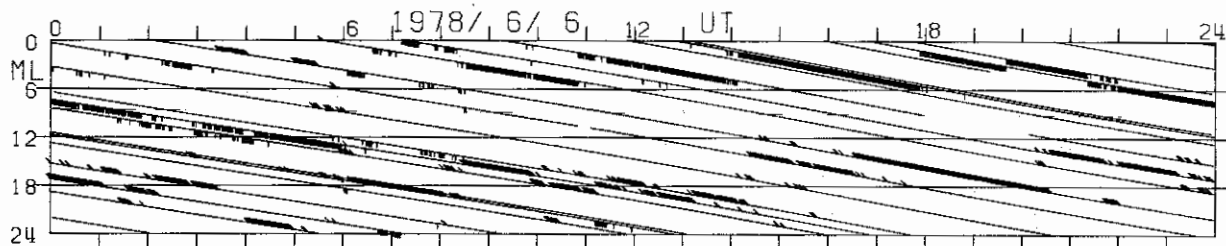
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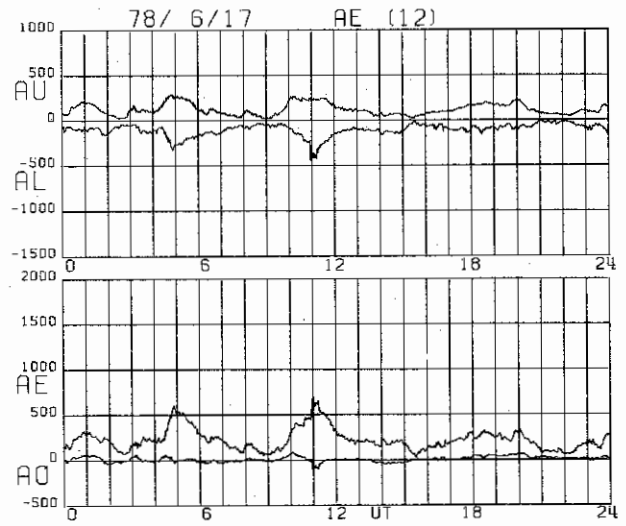
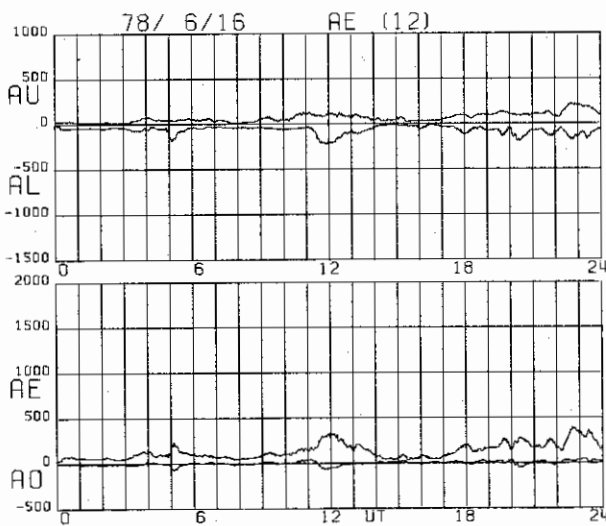
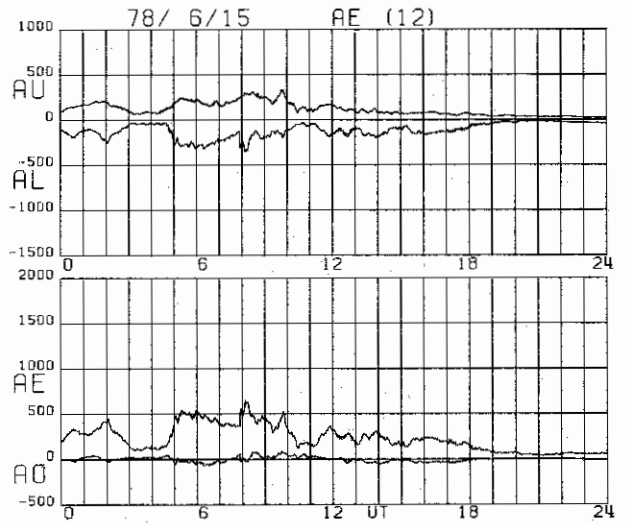
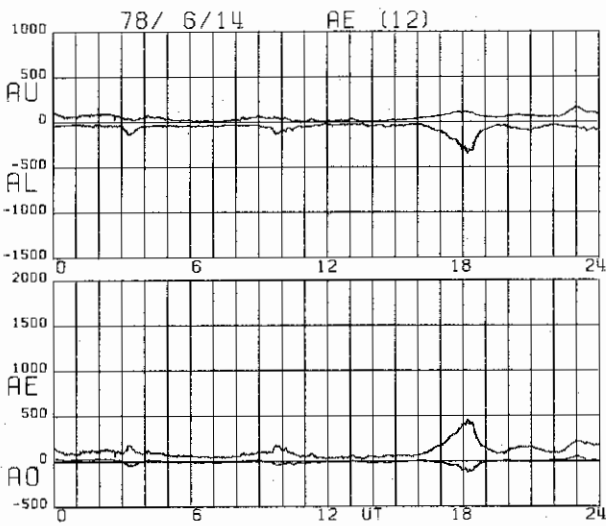
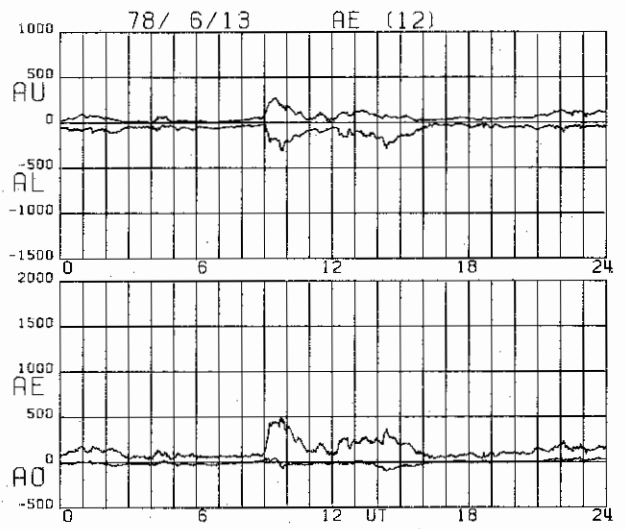
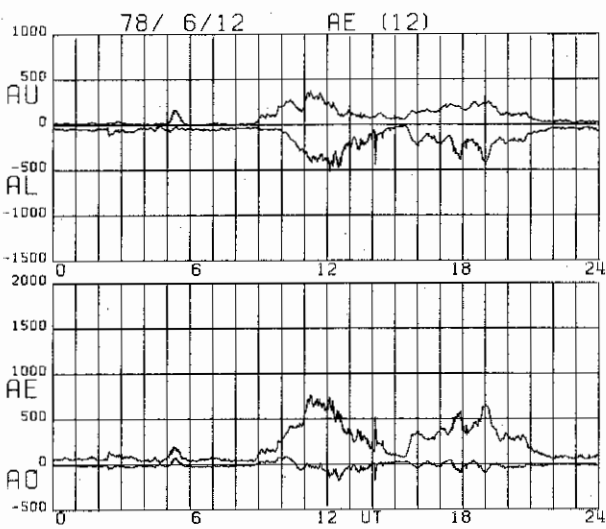


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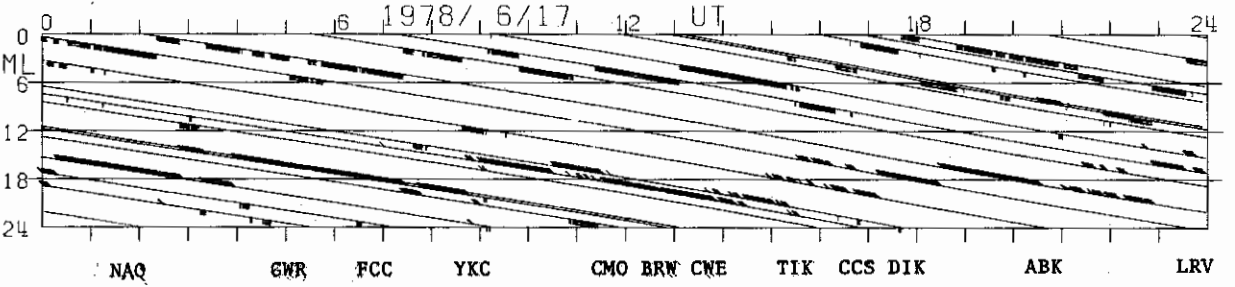
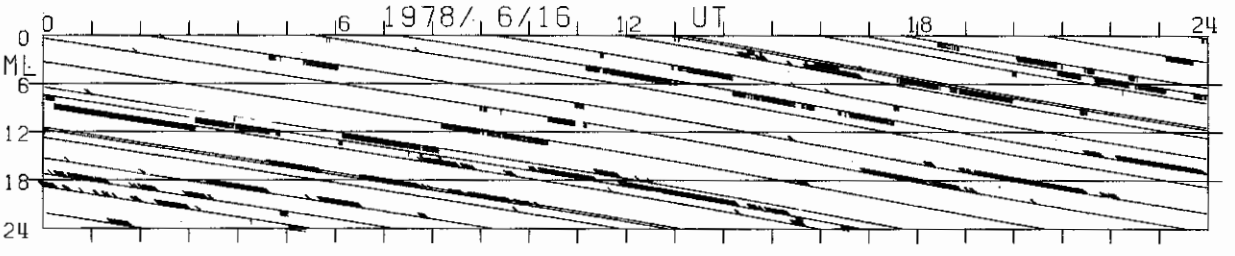
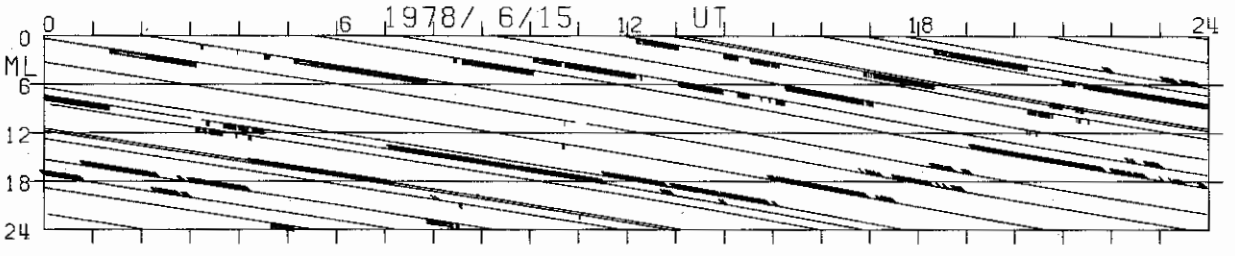
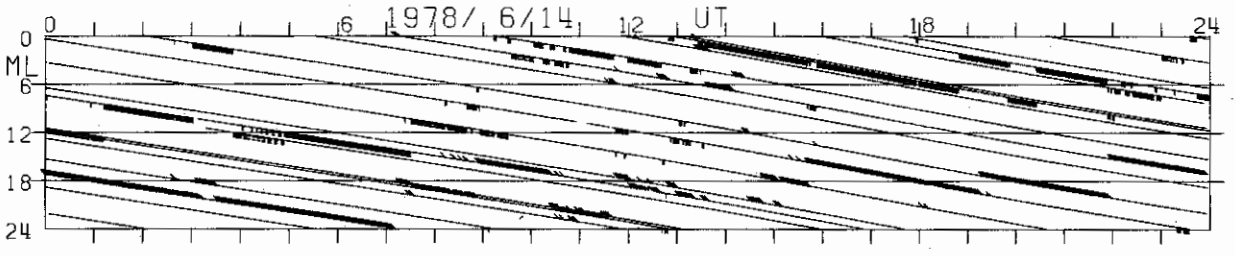
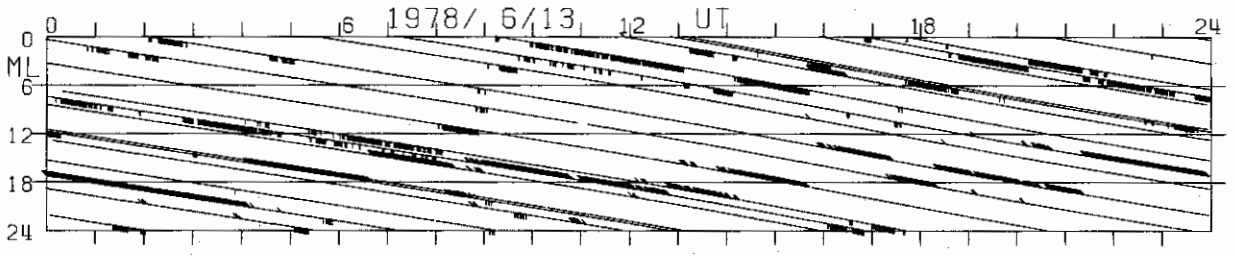
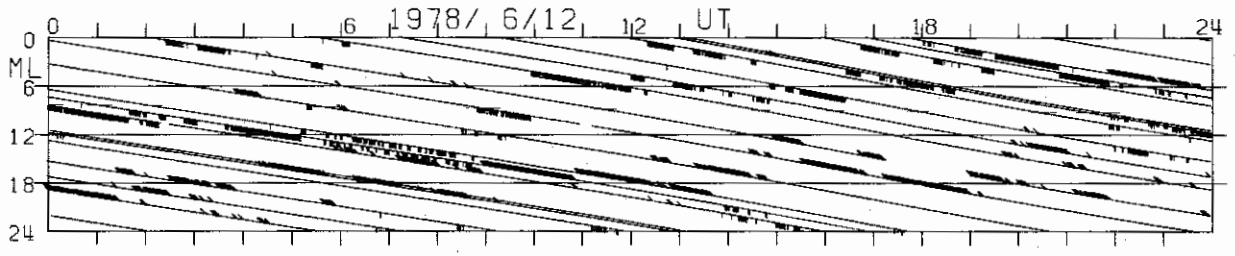


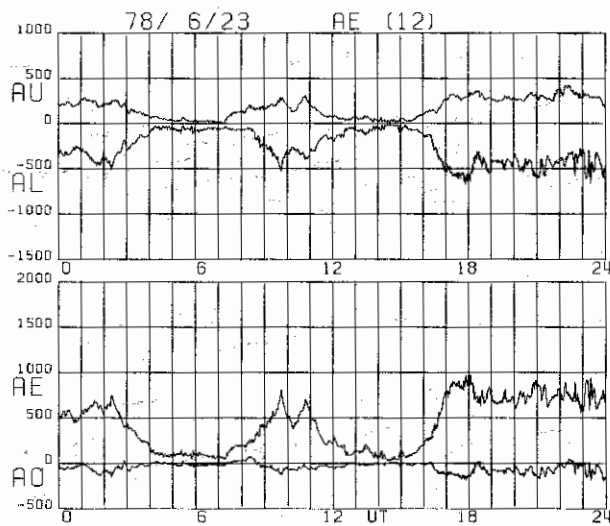
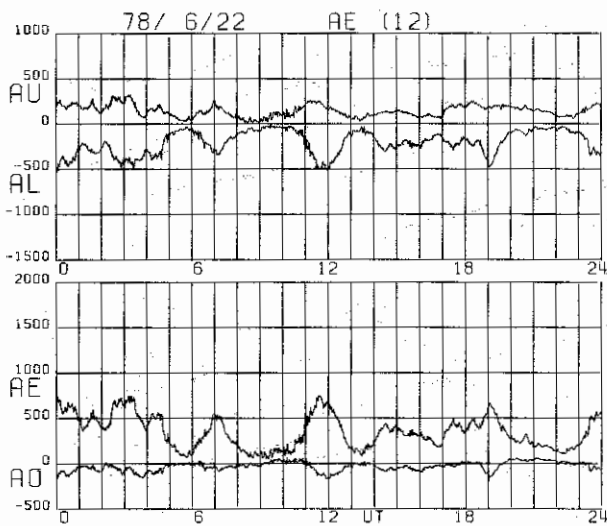
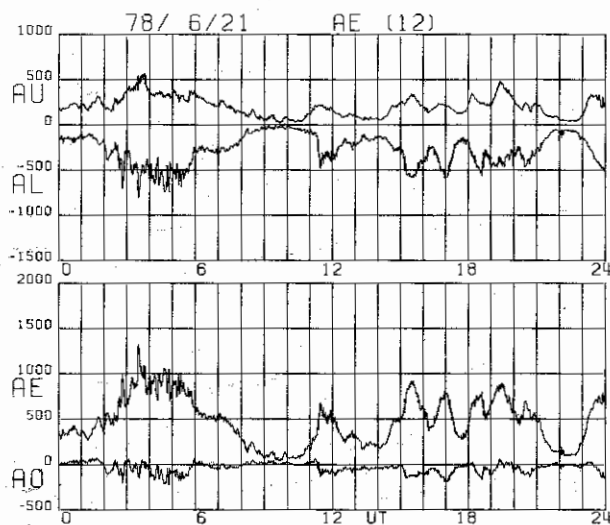
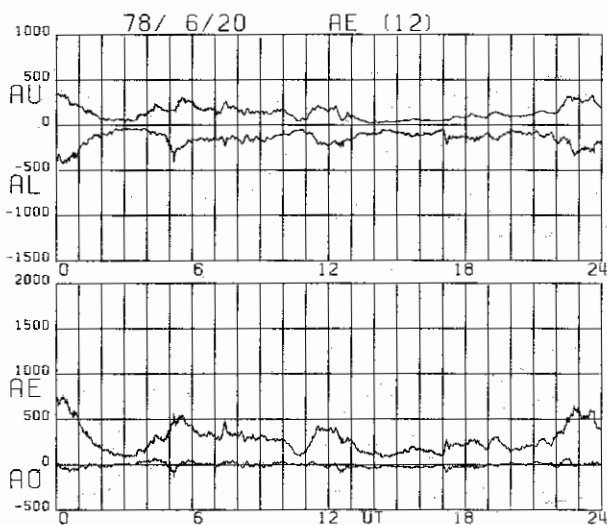
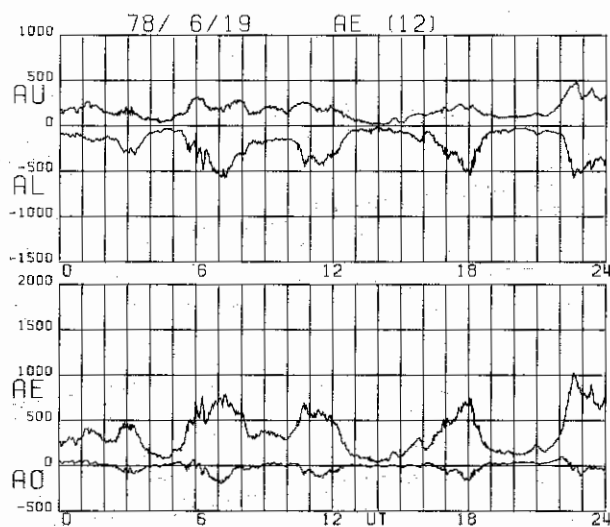
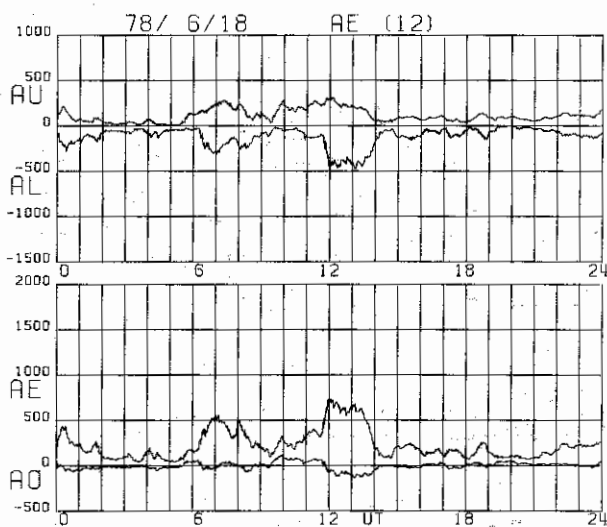


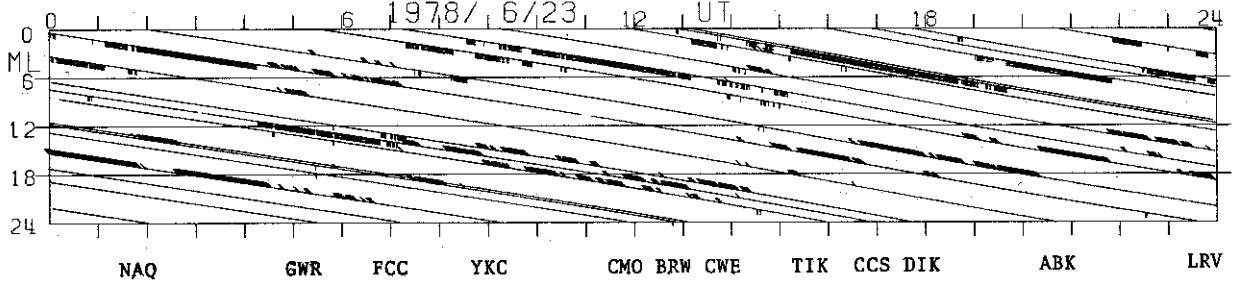
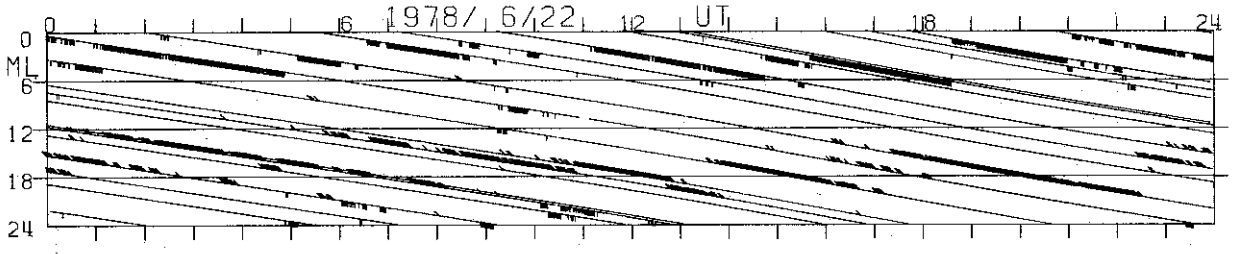
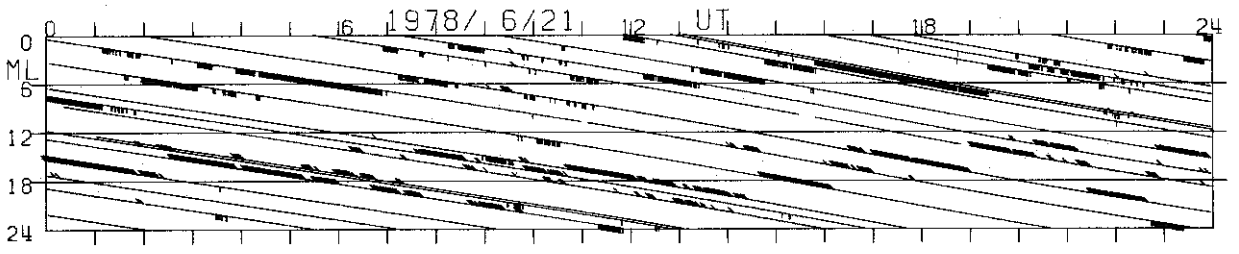
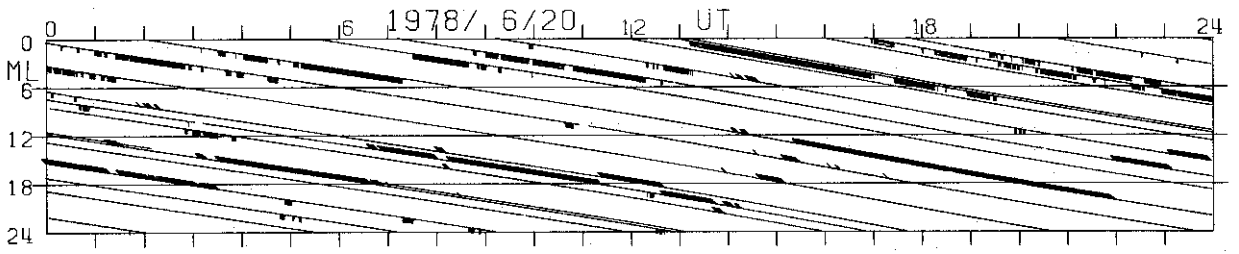
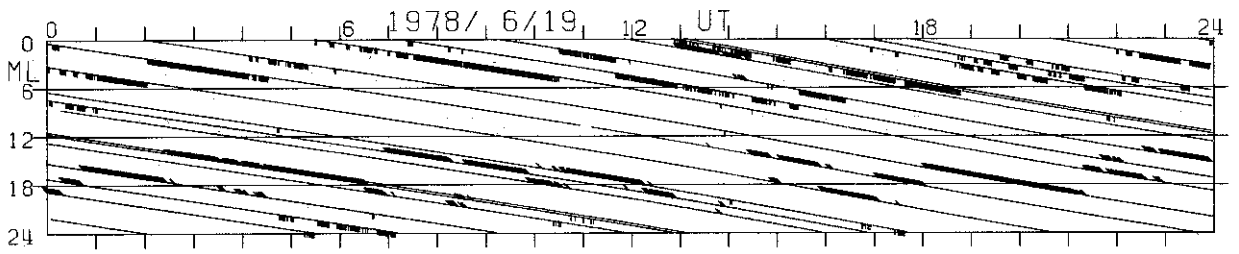
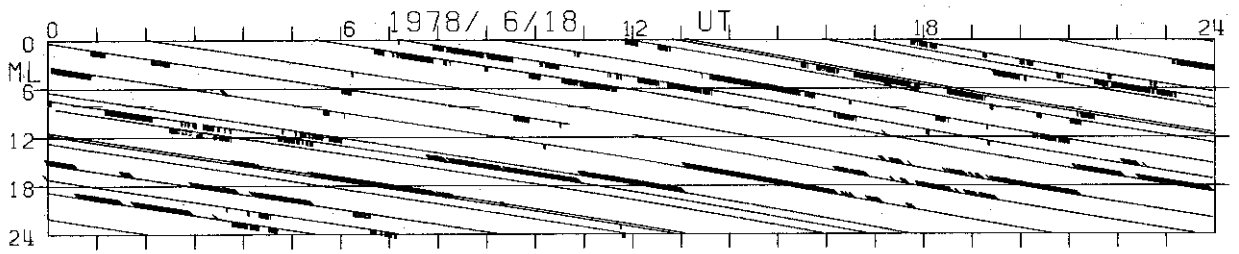
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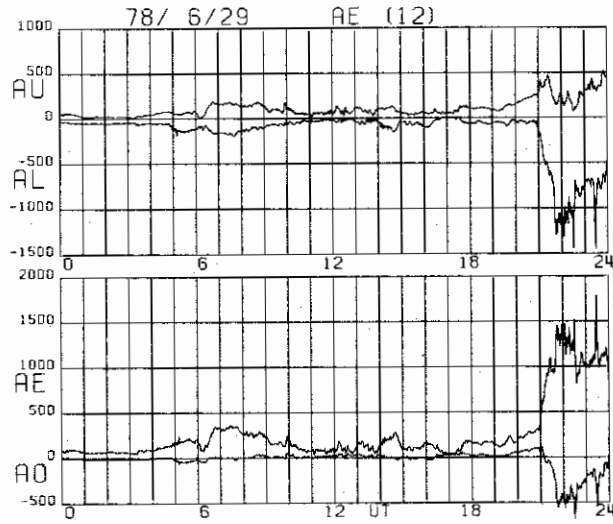
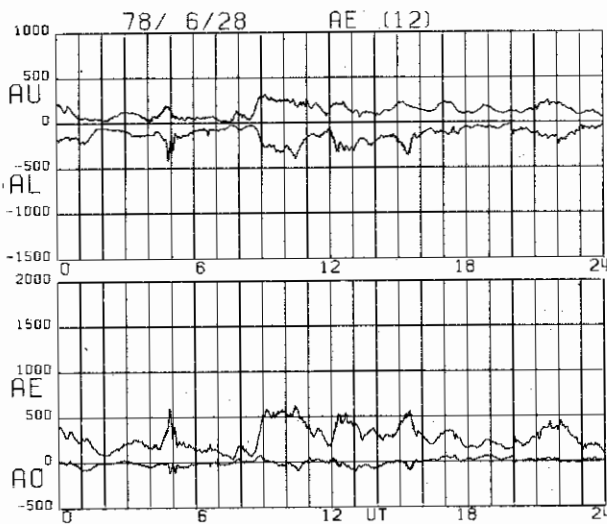
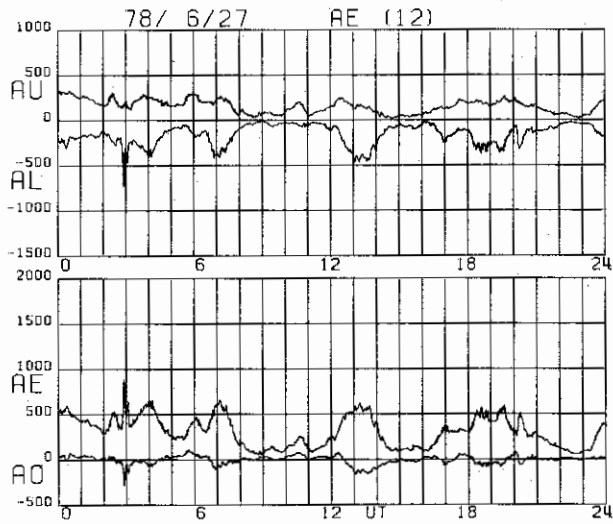
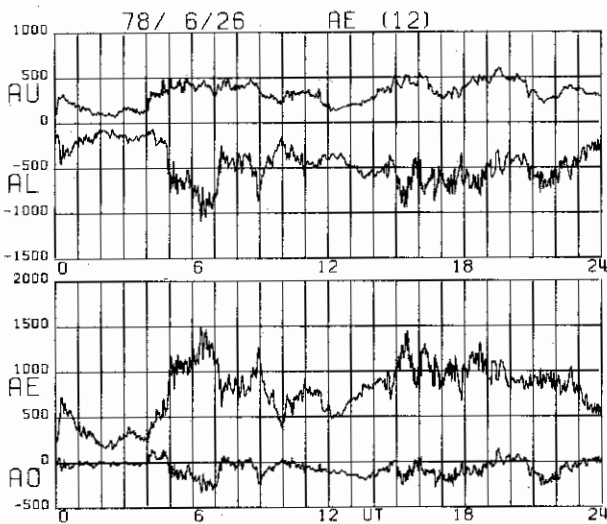
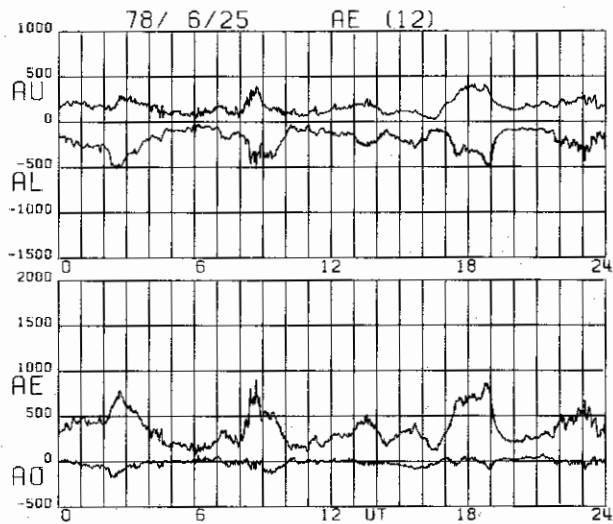
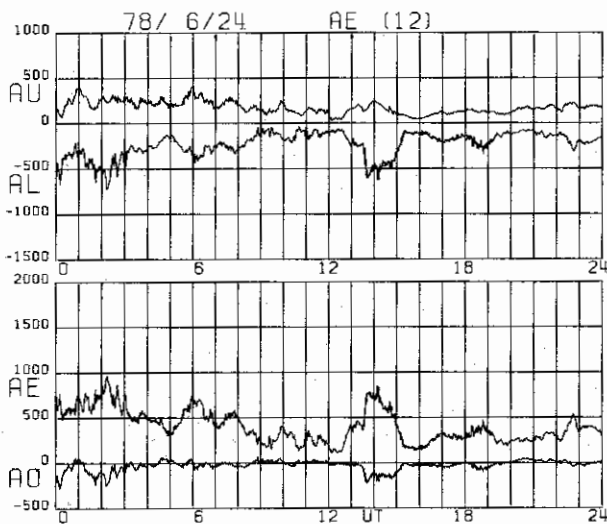


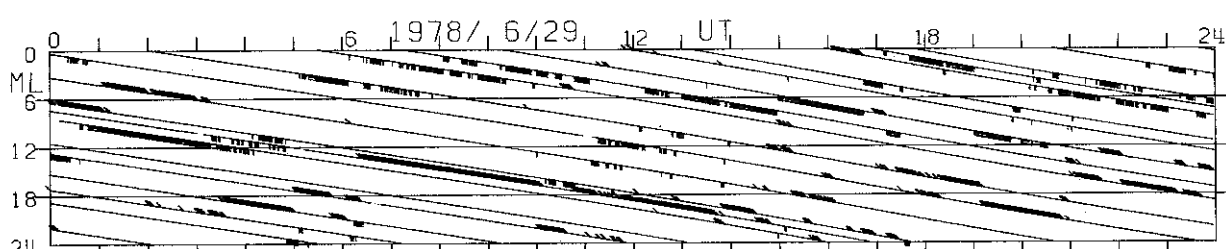
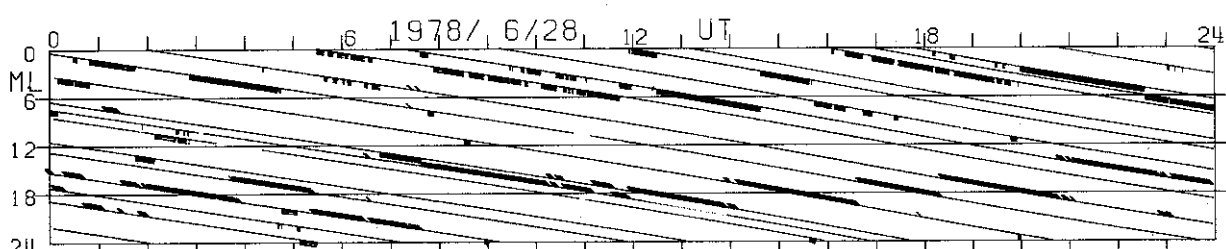
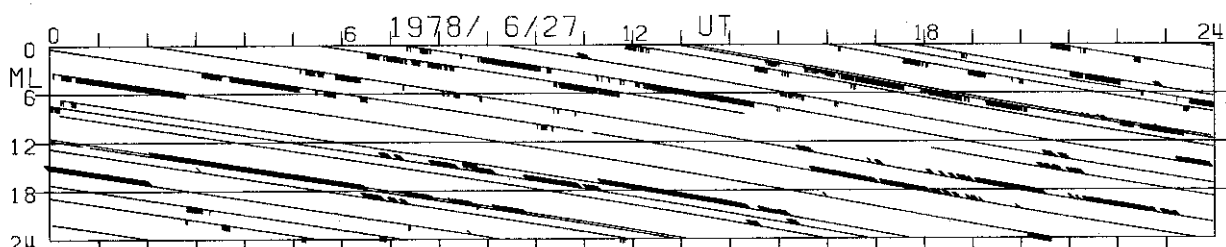
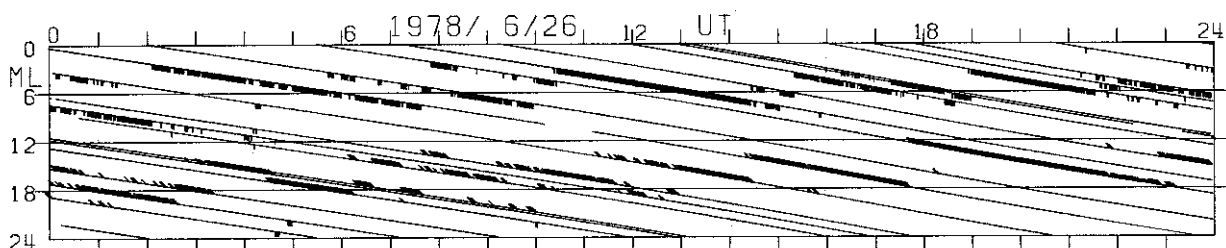
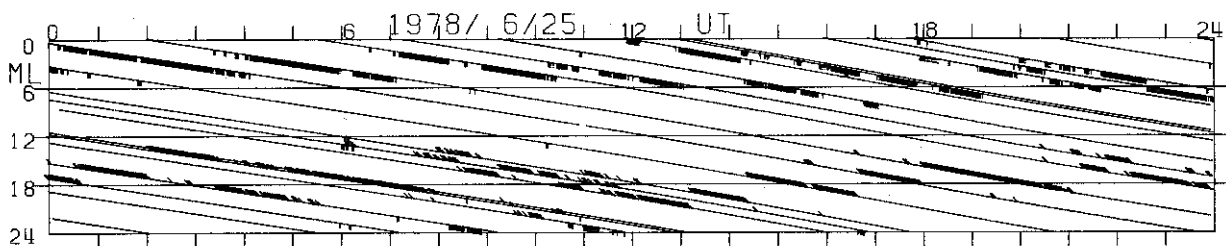
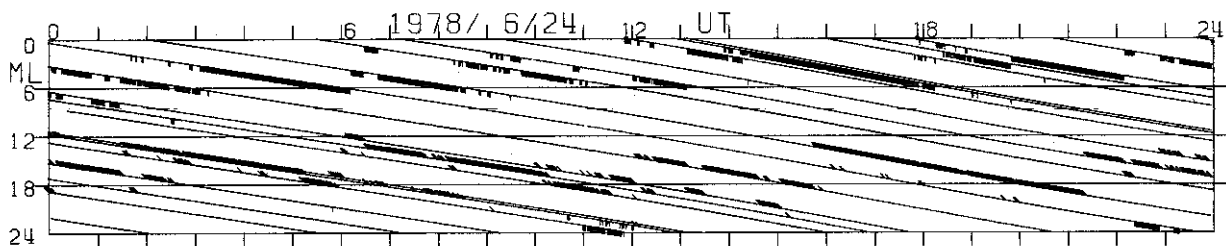




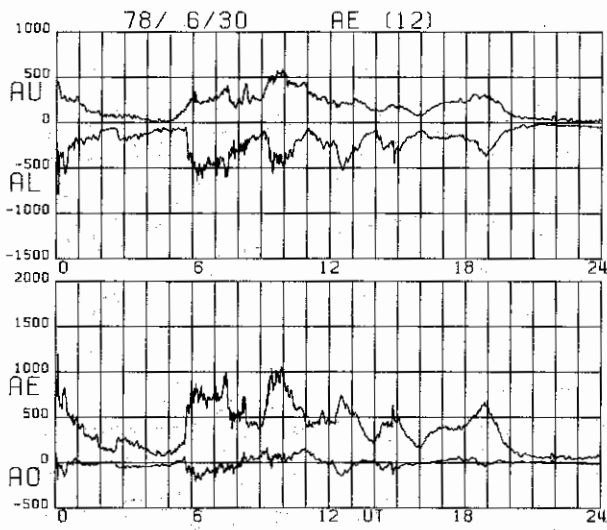


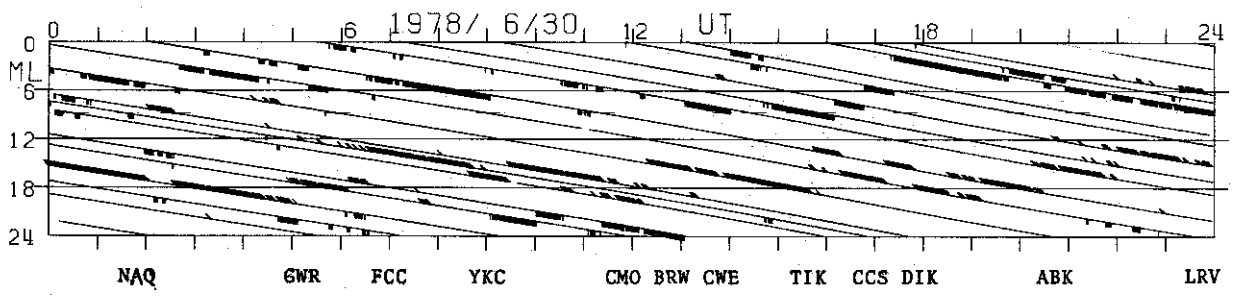


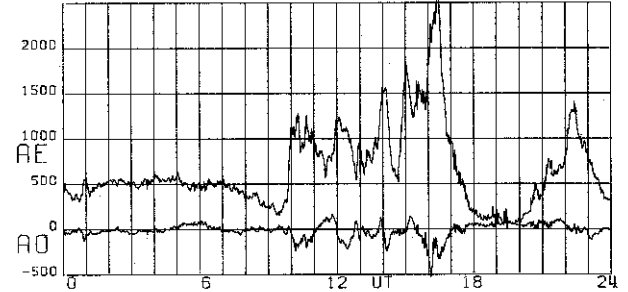
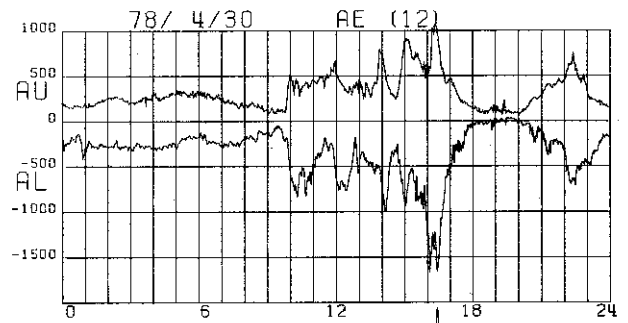
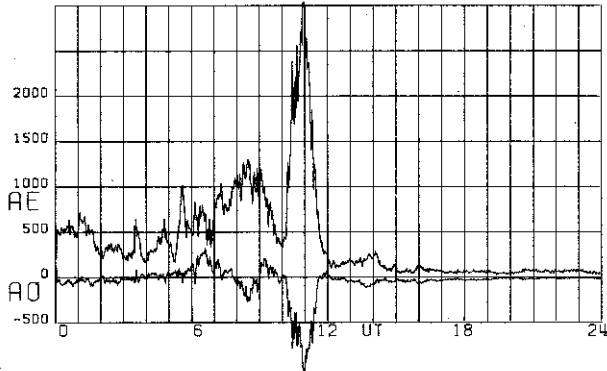
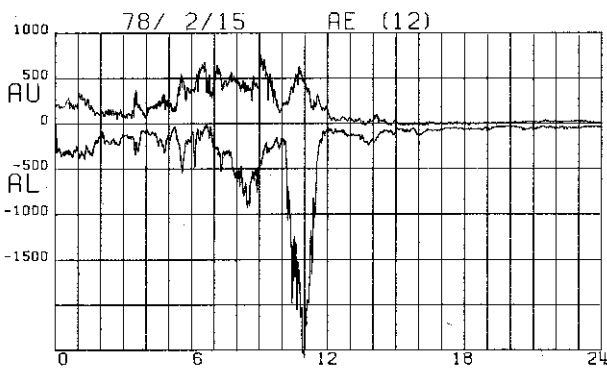
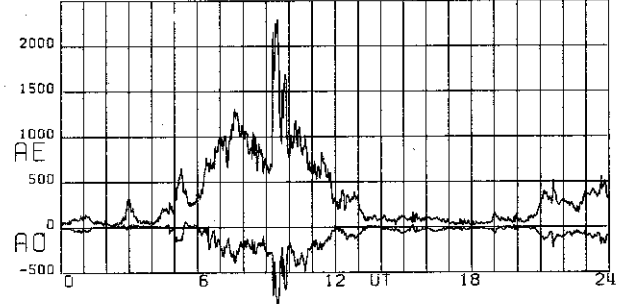
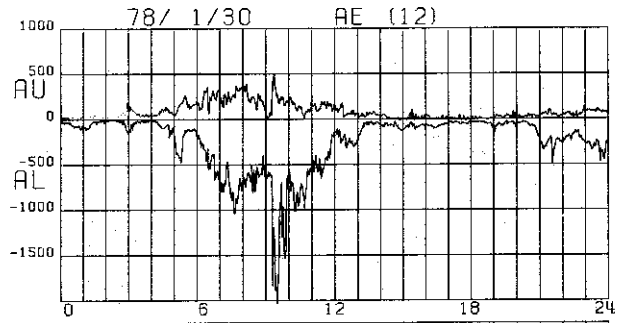
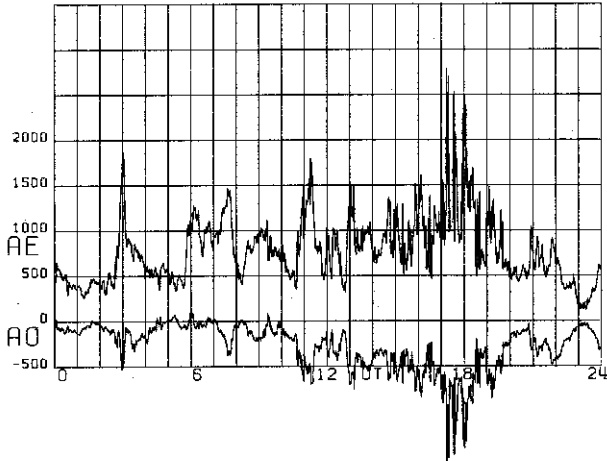
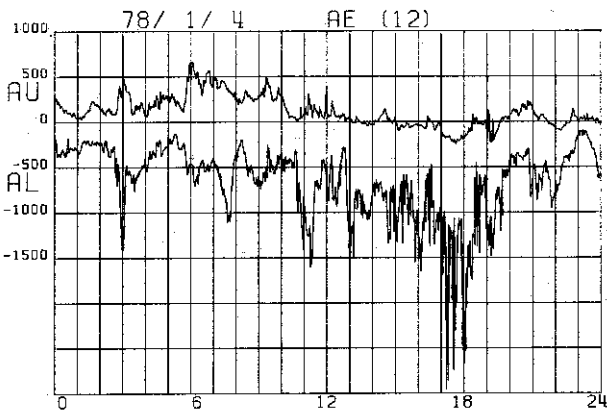




NAQ GWR FCC YKC CMO BRW CWE TIK CCS DIK ABK LRV









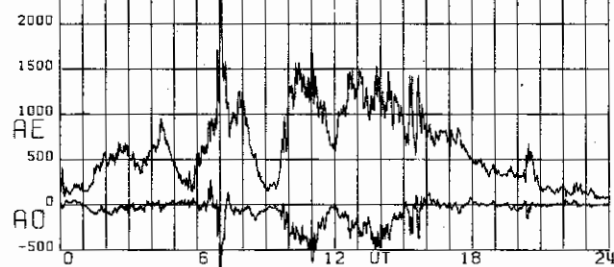
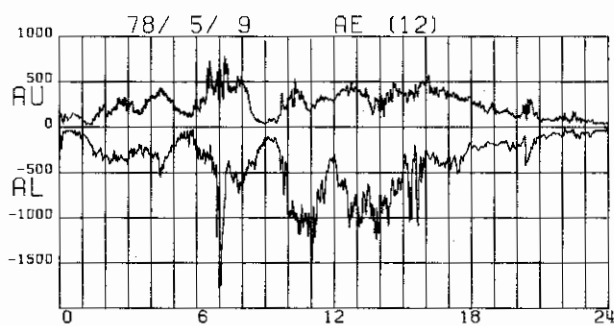
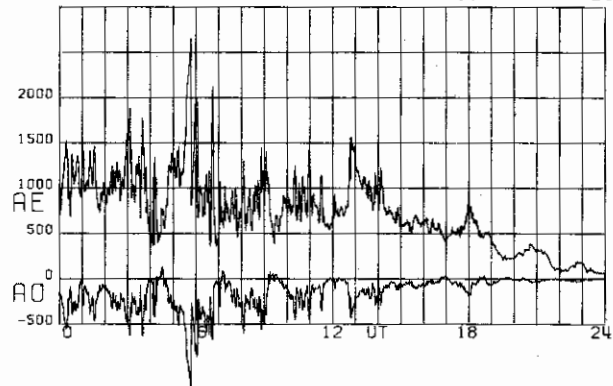
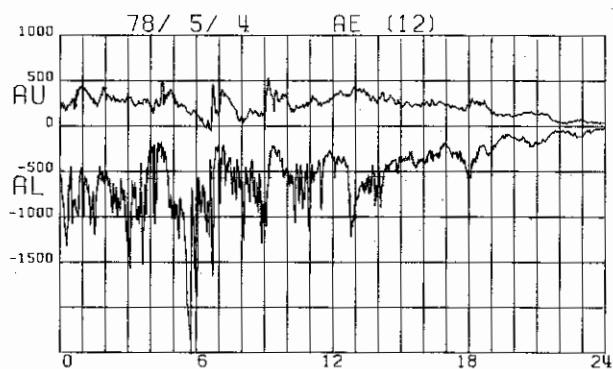
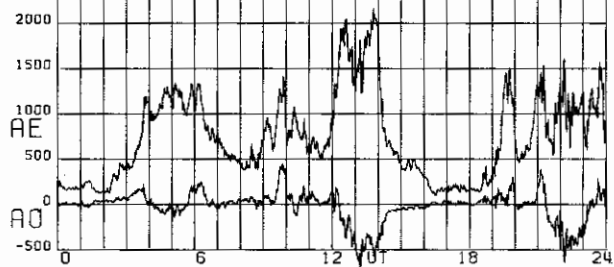
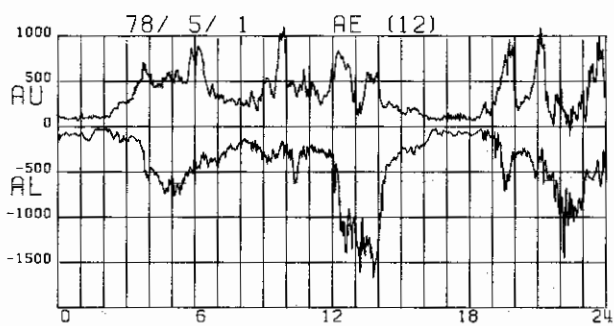
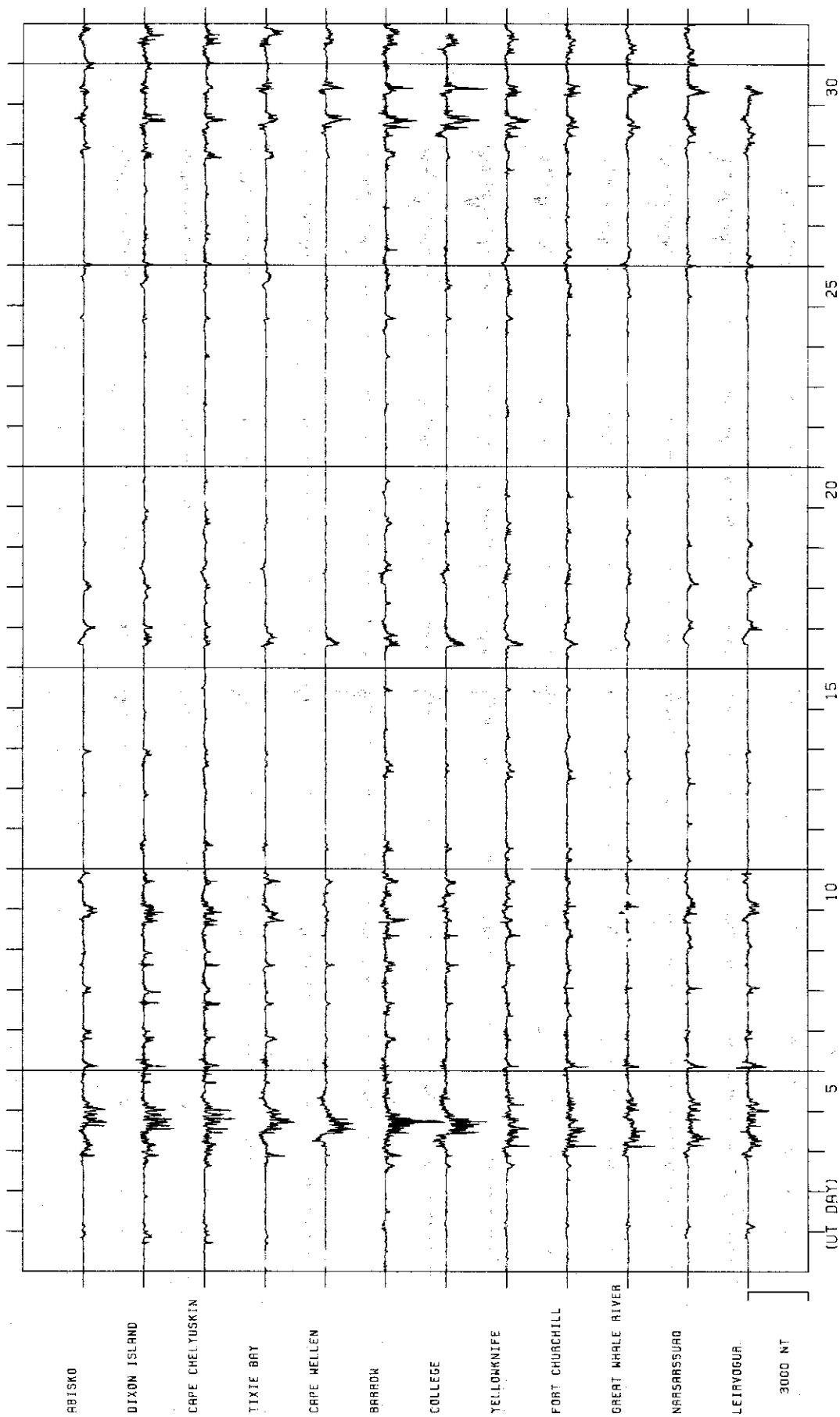
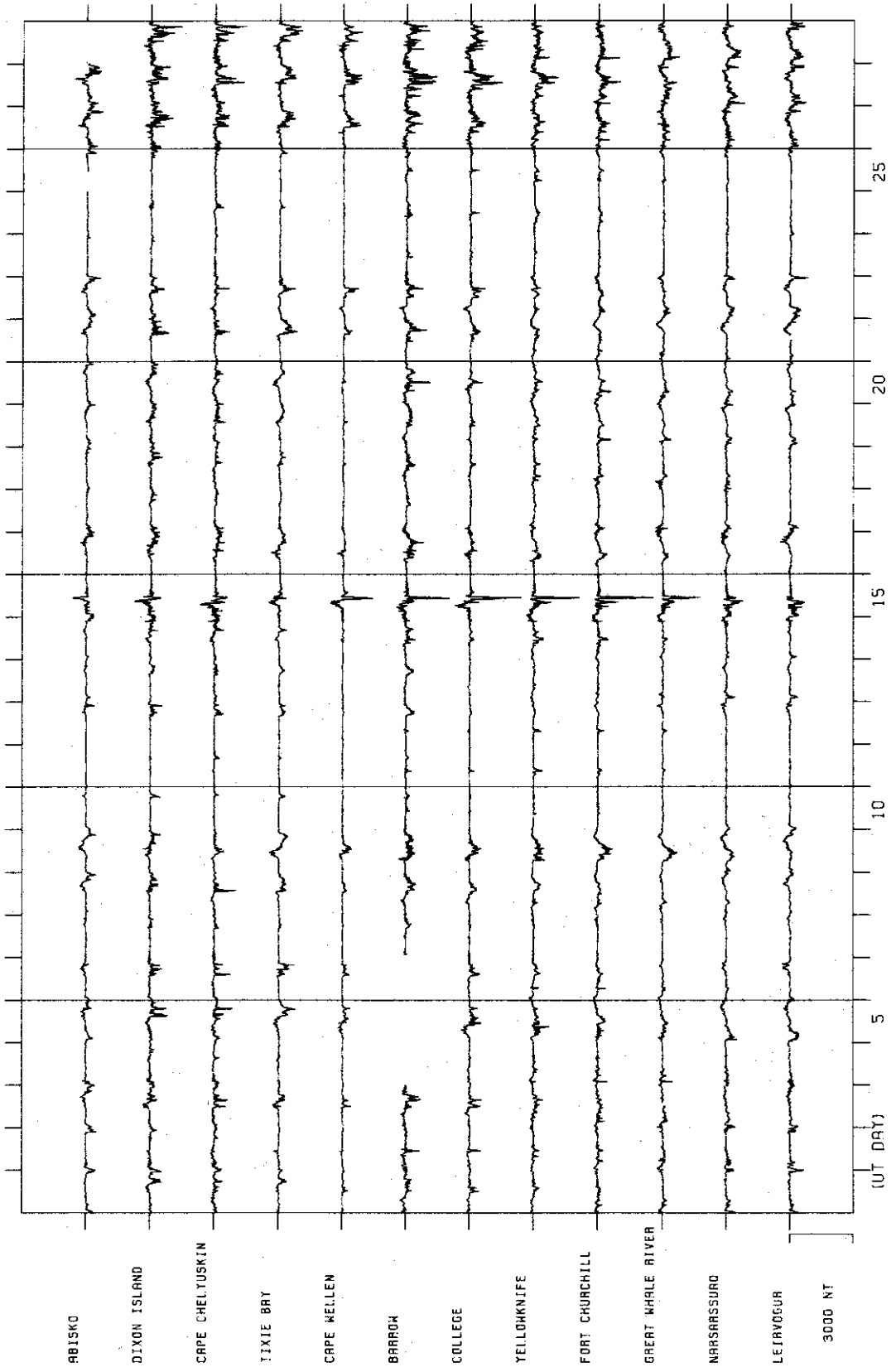


FIGURE 6

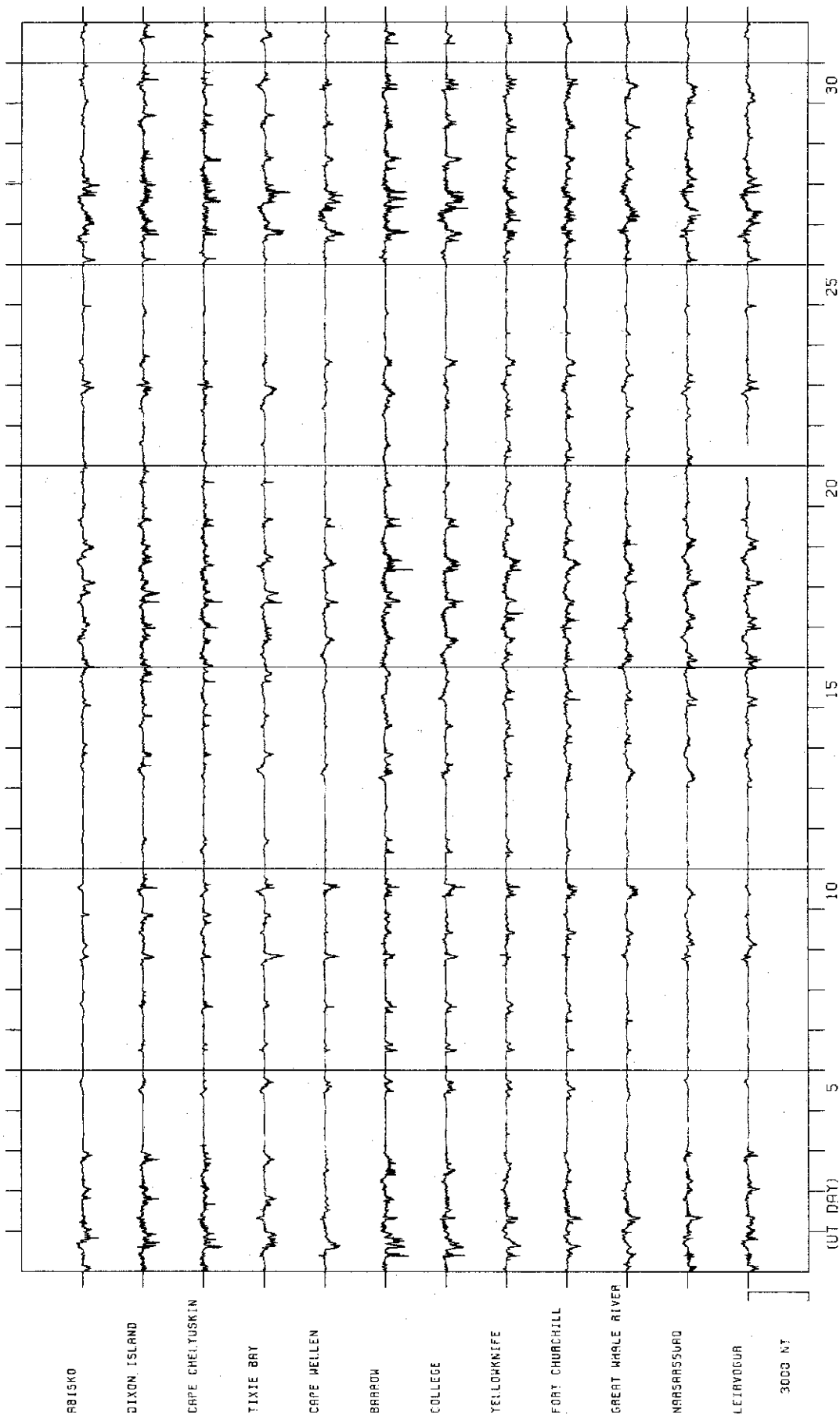
The H traces of magnetograms from AE(12) stations  
in every month from January to June 1978.



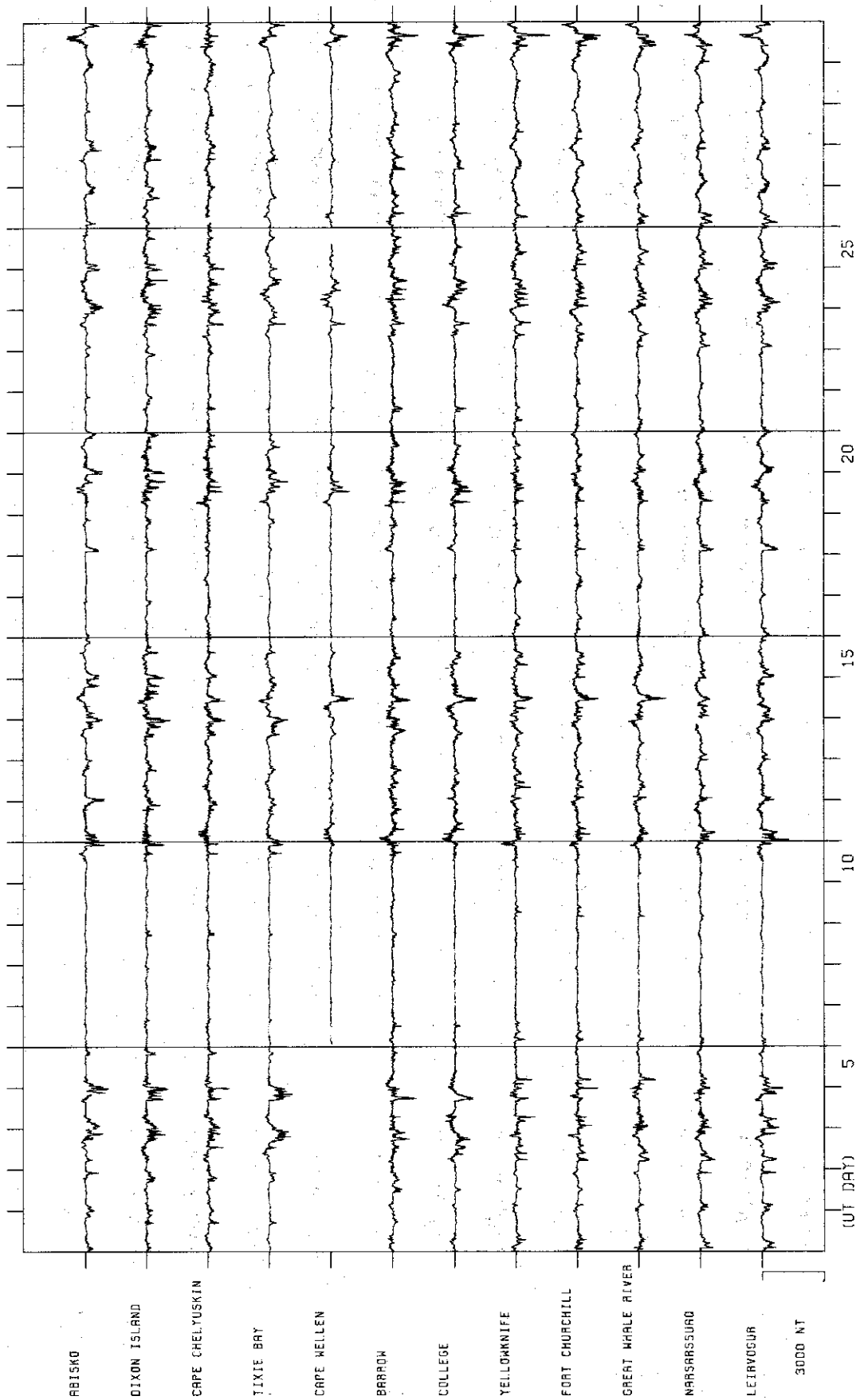
STACKED COMMON SCALE MAGNETOGRAMS FOR JANUARY 1978



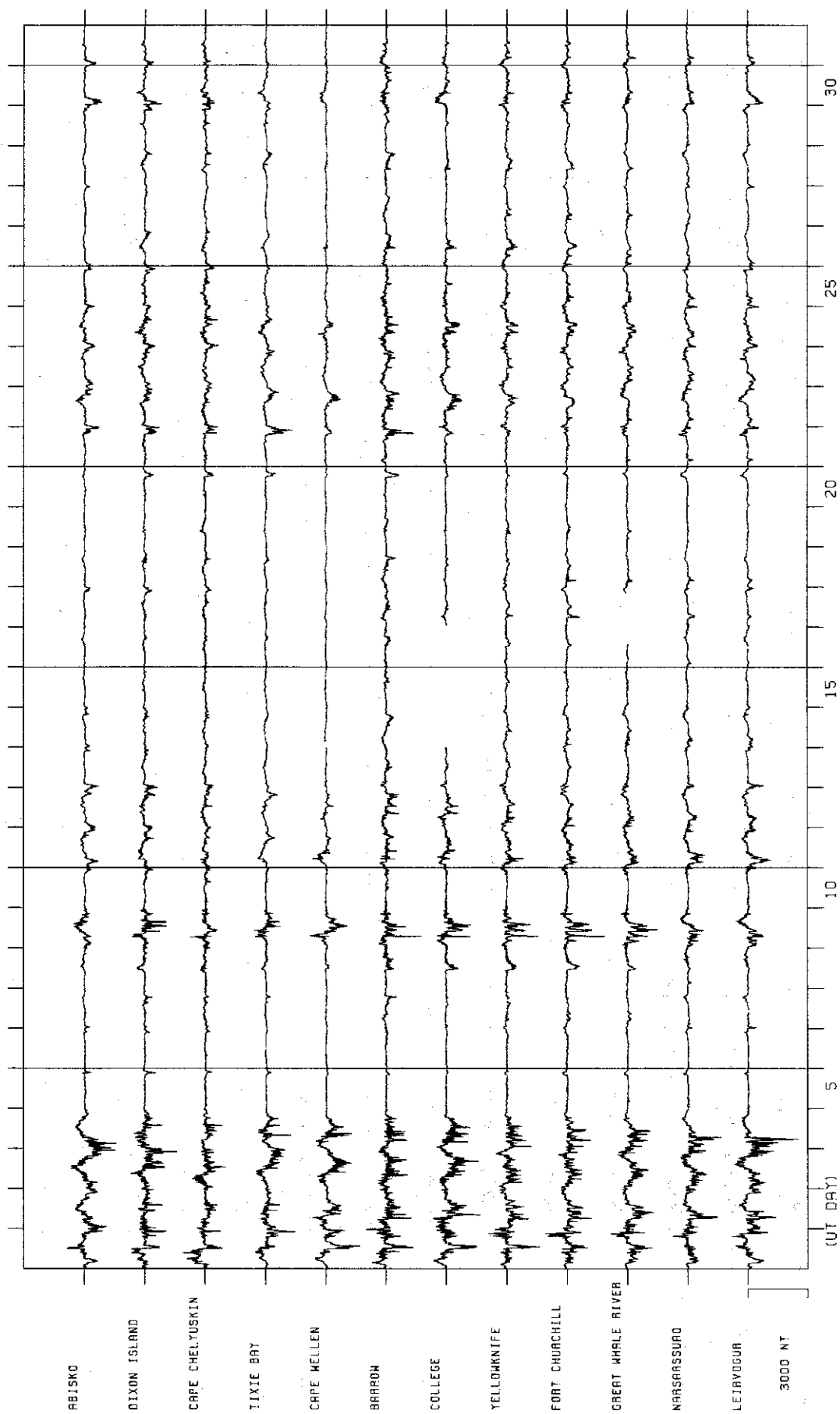
STACKED COMMON SCALE MAGNETOGRAMS FOR FEBRUARY 1978



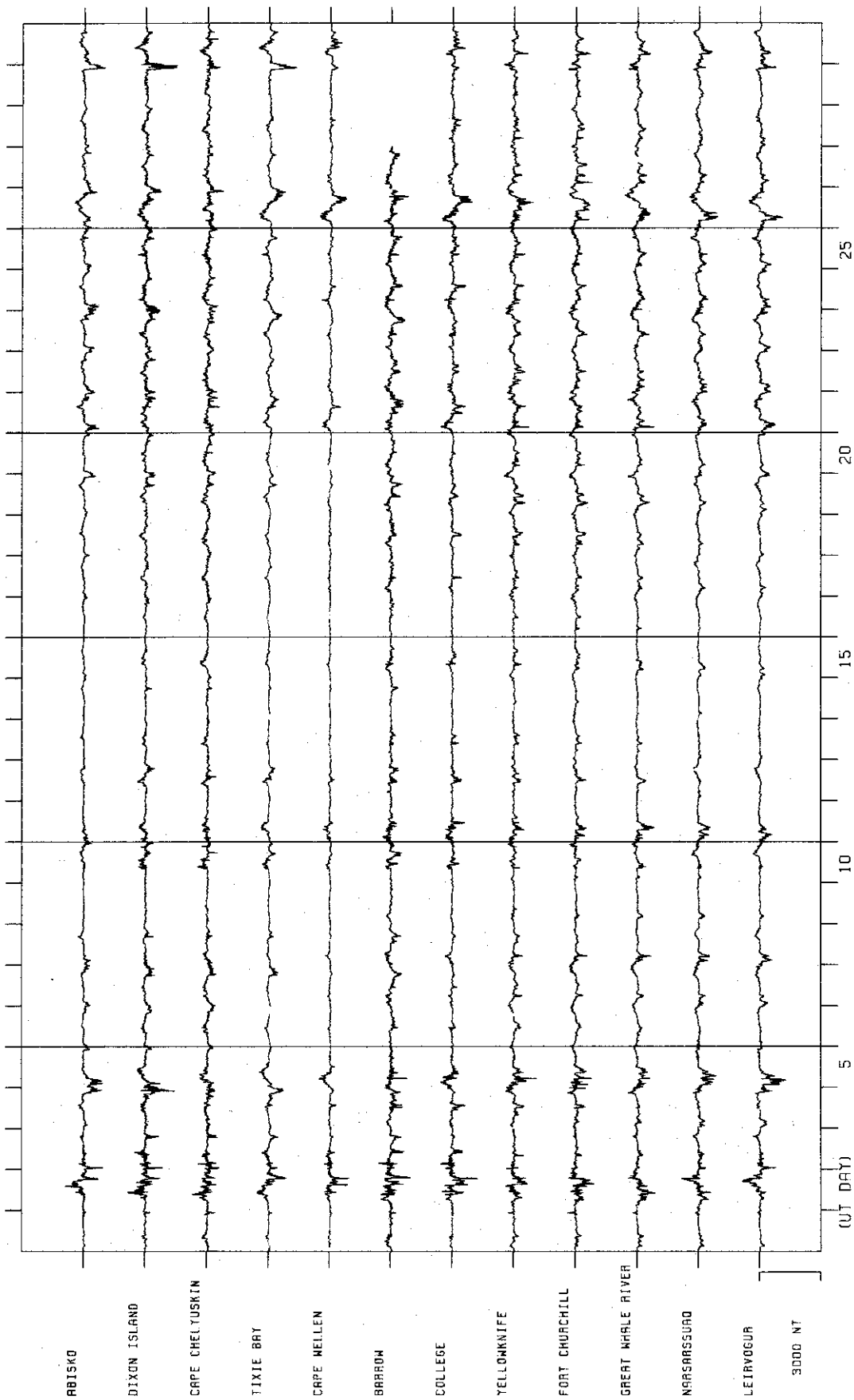
STACKED COMMON SCALE MAGNETOGRAMS FOR MARCH 1978



STACKED COMMON SCALE MAGNETOGRAMS FOR APRIL 1978



STACKED COMMON SCALE MAGNETOGRAMS FOR MAY 1978



STACKED COMMON SCALE MAGNETOGRAMS FOR JUNE 1978









