ISSN 0021–0382

F—506

IONOSPHERIC DATA IN JAPAN

FOR FEBRUARY 1991

VOL. 43 NO. 2

CONTENTS

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MINISTRY OF POSTS AND TELECOMMUNICATIONS
TOKYO, JAPAN

INTRODUCTION

This Series contains data on ionosphere (I), solar radio emission (S) and radio propagation (P) obtained at the following stations under the Communications Research Laboratory, Ministry of Posts and Telecommunications of Japan.

Station	Geographic		Geomagnetic		Technical Method
	Latitude	Longitude	Latitude	Longitude	
Wakkanai	45°23.5'N	141°41.2'E	35.3°N	206.5°	Vertical Sounding (I)
Akita	39°43.5'N	140°08.0'E	29.5°N	205.9°	" (I)
Kokubunji	35°42.4'N	139°29.3'E	25.5°N	205.8°	" (I)
Yamagawa	31°12.1'N	130°37.1'E	20.4°N	198.3°	" (I)
Okinawa	26°16.9'N	127°48.4'E	15.3°N	196.0°	" (I)
Hiraiso	36°22.0'N	140°37.5'E	26.3°N	206.8°	Radio Receiving (S, P)
Inubo	35°42.2'N	140°51.5'E	25.6°N	207.0°	" (P)

A. IONOSPHERE

Ionospheric observations are carried out at the above five stations in Japan by means of vertical sounding using ionosondes. The ionosonde produces ionograms, which are recorded digitally on computer storage medium as well as graphically on 35 mm photographic film. The digitally-recorded ionograms are collected from each station by the central computer and reduced to numerical values and Summary Plots by the automatic processing system. The ionograms obtained at Kokubunji are manually scaled as well by experienced specialists to supplement automatically-scaled parameters.

A1. Automatic Scaling

Digital ionograms are automatically scaled by the pattern recognition method. The following five factors of ionospheric characteristics are published for the present. The reliability of these factors has been ascertained by comparison of the automatically-scaled parameters with the manually-scaled values of large amounts of test ionograms.

The published data consist of tabulations of hourly values of three factors (*foF2, fEs, fmin*) and monthly medians of two factors (*h'Es, h'F*), daily Summary Plots and monthly medians plot of *foF2*.

a. Characteristics of Ionosphere

foF2	Ordinary wave critical frequency for the *F2* layer
fEs	Highest frequency of the *Es* layer whether it may be ordinary or extraordinary
fmin	Lowest frequency which shows vertical ionospheric reflections
h'Es *h'F*	Minimum virtual height on the ordinary wave for the *Es* and *F* layers, respectively

b. Descriptive Letters

The following descriptive letters are used in the tables.

- A Impossible measurement because of the presence of a lower thin layer, for example *Es* (for *foF2*).
- B Impossible measurement because of absorption in the vicinity of *fmin*.
- C Impossible measurement because of any failure in observation.
- G Impossible automatic scaling because of too small ionization density of the layer (for *fEs*).
- N Impossible automatic scaling because of complex echoes.
- Blank No digital record because of trouble in the automatic data processing system, but existence of film record.

c. Definitions of the CNT, MED, UQ and LQ

Median count (CNT) is the number of numerical values from which the median has been computed. In addition to numerical values, the count may include a descriptive letter G.

Median (MED) is defined as the middle value when the numerical values are arranged in order of magnitude, or the average of the two middle values if there is an even number of values.

Upper quartile (UQ) is the median value of the upper half of the values when they are ranked according to magnitude; the *lower quartile* (LQ) is the median value of the lower half.

If CNT is less than 10, there are blank spaces left.

d. Reliability of Automatic Scaling

The results of the comparison between automatically-scaled values and manually-scaled ones showed that hourly values of *foF2*, *fEs* and *fmin* were scaled within a difference of 1 MHz from about 90, 90 and 99 %, respectively of the test ionograms.

e. Summary Plot

Daily Summary Plots which are made from quarter-hourly digital ionograms are published to present general ionosphere conditions. The upper and middle parts of a Summary Plot show the diurnal variation of the frequency range of the echoes reflected from the *F* and *E* regions, respectively. The two solid arcing lines indicate the predicted values of *fxE* and *foE* calculated by the method described in the CCIR report 340. The lower part shows the diurnal variation of the virtual height where the echo traces become horizontal.

A2. Manual Scaling

The published data consist of tabulations of hourly values of the ionospheric characteristics and figures of daily *f*-plot.

All symbols and terminology in the tables or figures of ionospheric data are used in accordance with the "URSI Handbook of Ionogram Interpretation and Reduction (Second Edition) 1972" and its revision of chapters 1-4, published in July 1978.

a. Characteristics of Ionosphere

fxI	Top frequency of spread *F* trace
foF2 *foF1* *foE* *foEs*	Ordinary wave critical frequency for the *F2*, *F1*, *E* and *Es* including particle *E* layers, respectively.
fbEs	Blanketing frequency of the *Es* layer, e.g. the lowest ordinary wave frequency visible through *Es*
fmin	Lowest frequency which shows vertical ionospheric reflections
M(3000)F2 *M(3000)F1*	Maximum usable frequency factor for a path of 3000 km for transmission by *F2* and *F1* layers, respectively
h'F2 *h'F* *h'E* *h'Es*	Minimum virtual height on the ordinary wave for the *F2*, whole *F*, *E* and *Es* layers, respectively
Types of *Es*	See below b. (iii)

b. Symbols

(i) Descriptive Letters

The following letters are entered after, or used to replaced a numerical value on the monthly tabulation sheets, if necessary.

A Measurement influenced by, or impossible because of, the presence of a lower thin layer, for example *Es*.
B Measurement influenced by, or impossible because of, absorption in the vicinity of *fmin*.
C Measurement influenced by, or impossible because of, any non-ionospheric reason.
D Measurement influenced by, or impossible because of, the upper limit of the normal frequency range in use.
E Measurement influenced by, or impossible because of, the lower limit of the normal frequency range in use.
F Measurement influenced by, or impossible because of, the presence of spread echoes.
G Measurement influenced or impossible because the ionization density of the layer is too small to enable it to be made accurately.
H Measurement influenced by, or impossible because of, the presence of a stratification.
K Presence of particle *E* layer.
L Measurement influenced or impossible because the trace has no sufficiently definite cusp between layers.
M Interpretation of measurement questionable because the ordinary and extraordinary components are not distinguishable.
N Conditions are such that the measurement cannot be interpreted.
O Measurement refers to the ordinary component.
P Man-made perturbations of the observed parameter; or spur type spread *F* present.
Q Range spread present.
R Measurement influenced by, or impossible because of, attenuation in the vicinity of a critical frequency.
S Measurement influenced by, or impossible because of, interference or atmospherics.
T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
V Forked trace which may influence the measurement.
W Measurement influenced or impossible because the echo lies outside the height range recorded.
X Measurement refers to the extraordinary component.
Y Lacuna phenomena, severe layer tilt.
Z Third magneto-electronic component present.

(ii) Qualifying Letters

The following letters are entered in the first column before a numerical value on the monthly tabulation sheets, if necessary.

A Less than. Used only when *fbEs* is deduced from *foEs* because total blanketing of higher layer is present.
D Greater than.
E Less than.
I Missing value has been replaced by an interpolated value.
J Ordinary component characteristic deduced from the extraordinary component.
M Mode interpretation uncertain.
O Extraordinary component characteristic deduced from the ordinary component. (Used for x-characteristics only.)
T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
U Uncertain or doubtful numerical value.
Z Measurement deduced from the third magneto-electronic component.

(iii) Description of Types of *Es*

When more than one type of *Es* trace are present on the ionogram, the type for the trace used to determine *foEs* must be written first. The number of multiple trace is indicated after the type letter.

The types are:

f An *Es* trace which shows no appreciable increase of height with frequency.
l A flat *Es* trace at or below the normal *E* layer minimum virtual height or below the particle *E* layer minimum virtual height.
c An *Es* trace showing a relatively symmetrical cusp at or below *foE*. (Usually a daytime type.)
h An *Es* trace showing a discontinuity in height with the normal *E* layer trace at or above *foE*. The cusp is not symmetrical, the low frequency end of the *Es* trace lying clearly above the high frequency end of the normal *E* trace. (Usually a daytime type.)
q An *Es* trace which is diffuse and non-blanketing over a wide frequency range.
r An *Es* trace showing an increase in virtual height at the high frequency end similar to group retardation.
a An *Es* trace having a well-defined flat or gradually rising lower edge with stratified and diffuse traces present above it.
s A diffuse *Es* trace which rises steadily with frequency and usually emerges from another type *Es* trace.
d A weak diffuse trace at heights below 95 km associated with high absorption and large *fmin*.
n The designation 'n' is used to denote an *Es* trace which cannot be classified into one of the standard types.
k The designation 'k' is used to show the presence of particle *E*. When *foEs* > *foE* (particle *E*) the *Es* type precedes k.

c. Definitions of the CNT, MED, UQ and LQ

Median count (CND) is the number of values from which the median has been computed. In addition to numerical values, the count may include certain descriptive letters.

Median (MED) is the middle value when the numerical values are arranged in order of magnitude, or the average of the two middle values if there is an even number of values.

Upper quartile (UQ) is the median value of the upper half of the values when they are ranked according to magnitude; the *lower quartile* (LQ) is the median value of the lower half.

B. SOLAR RADIO EMISSION

Solar radio observations at 100, 200 and 500 MHz are carried out at Hiraiso. The observation equipment consists of two parabolic antennas, one with 10-meter diameter for 100 and 200 MHz measurements and one with 6-meter diameter for 500 MHz measurements, each being equipped with a pair of crossed doublet antennas as a primary radiator, and three appropriate receivers. Each pair of the crossed doublet antennas is used as a polarimeter. Observations are continuously carried out almost from sunrise to sunset.

B1. Daily Data at Hiraiso

The three-hourly mean and daily mean values of the solar radio emission intensities at the base-level are tabulated separately for 200 and 500 MHz measurements. Here, the base-level intensity is defined as the intensity recorded during the time when no radio emission burst is taking place. The intensities are expressed by the flux density in 10^{-22} Wm^{-2} Hz^{-1} unit.

The table for 200 MHz measurements also presents the variability indices defined by the number of impulsive radio bursts within the three-hour intervals as follows:

0 quiet or no burst,
1 a few bursts,
2 many bursts,
3 very many bursts.

The daily variability index is defined as the daily mean of three-hourly indices.

The following symbols are used in the tables, when interference or radio bursts prevented measuring the base-level flux densities or determining the variability indices:

* Measurement impossible because of interference.
B Measurement impossible because of bursts.

Daily data within parentheses mean that the observation time does not exceed one third of the period.

B2. Outstanding Occurrences at Hiraiso

The table is a list of outstanding occurrences of solar radio emission bursts observed at Hiraiso during a month. Listed in the table are the date, frequencies, the type of event, the start time and the time of maximum, both in U.T. expressed in hours, minutes and tenths of a minute, the duration in minutes, the peak and mean flux densities in 10^{-22} Wm^{-2} Hz^{-1} unit, and the polarization.

The type of event is expressed by a combination of a numerical code and a letter symbol in accordance with the "Descriptive Text of Solar Geophysical Data, NOAA" as defined by H. Tanaka in the "Instruction Manual for Monthly Report of Solar Radio Emission, WDC-C2" in January 1975:

SGD Code	Letter Symbol	Morphological Classification
1	S	Simple 1
2	S/F	Simple 1F
3	S	Simple 2
4	S/F	Simple 2F
5	S	Simple
6	S	Minor
7	C	Minor+
8	S	Spike
20	GRF	Simple 3
21	GRF	Simple 3A
22	GRF	Simple 3F
23	GRF	Simple 3AF
24	R	Rise
25	R	Rise A
26	FAL	Fall
27	RF	Rise and Fall
28	PRE	Precursor
29	PBI	Post Burst Increase
30	PBI	Post Burst Increase A
31	ABS	Post Burst Decrease
32	ABS	Absorption
40	F	Fluctuations
41	F	Group of Bursts
42	SER	Series of Bursts
43	NS	Onset of Noise Storm
44	NS	Noise Storm in progress
45	C	Complex
46	C	Complex F
47	GB	Great Burst
48	C	Major
49	GB	Major+

The polarization is expressed by the polarization degree and sense as follows:

R or L	right- or left-handed polarization,
W, M or S	weak, moderate or strong polarization,
0	almost zero or unable to detect polarization due to small increase of flux,
00	polarization degree of less than 1 percent.

One of the following symbols may be attached after numerical values, if necessary.

D	greater than, or later than,
E	less than or earlier than,
U	approximate, or uncertain.

C. RADIO PROPAGATION

C1. H.F. Field Strength at Hiraiso

Field strength observation of 15 MHz standard waves transmitted from WWV and WWVH stations which are located respectively at Fort Collins, Colorado and Kauai, Hawaii, is carried out at Hiraiso. In order to avoid interference among the same frequency waves, the upper sideband of WWV or WWVH with the audio tone 660 Hz is picked up by the use of a narrow band-pass filter with 80 Hz bandwidth. Particulars of the transmitters and the receiver are summarized in the following table.

The tabulated *field strength* expressed in dB above one microvolt per meter is the average of quasi-peak values of the incident upper sideband field intensity in 45 seconds after the universal time indicated on the table. Abbreviated symbols are as follows:

CNT	number of observed values,
MED	median,
UD	value of the uppermost decile when they are ranked according to magnitude,
LD	value of the lowest decile when they are ranked according to magnitude,
U	uncertain,
E	less than,
C	influenced by, or impossible because of, any artificial accident,
S	influenced by, or impossible because of, interferences or atmospherics.

C2. Radio Propagation Quality Figures at Hiraiso

The tabulated six-hourly quality figures are calculated for standard waves WWV transmitted from Fort Collins and WWVH transmitted from Kauai.

Quality figures expressing radio propagation conditions range over five grades as follows:

1	very poor (very disturbed),
2	poor (disturbed),
3	rather poor (unstable),
4	normal,
5	good.

Whole day quality figure ranged in grades of 1o, 1+, 2–, 2o, 2+, 3–, 3o, 3+, 4–, 4o, 4+, 5–, 5o stands for an average of six-hourly quality figures of the two circuits. Abbreviated symbols are as follows:

C	artificial accident,
S	propagational accident,
U	inaccurate.

The column of conditions presents a record of the forecast of *radio propagation conditions* which is applicable to forthcoming 12 hours and broadcast six times per hour from JJY (Japan Standard Wave) station. The conditions are denoted as follows:

N	normal,
U	unstable,
W	disturbed.

Characteristics	Transmitter		Receiver
Station Call	WWV	WWVH	
Location	Fort Collins, Colorado	Kauai, Hawaii	Hiraiso, Ibaraki
latitude	40°41′N	22°00′N	36°22′N
longitude	105°02′W	159°46′W	140°38′E
Distance	9150 km	5910 km	—
Carrier Power	10 kW	10 kW	—
Power in each sideband	625 W	625 W	—
Modulation	50 %	50 %	—
Antenna	λ/2 vertical	λ/2 vertical	4.5 m vertical rod
Bandwidth	—	—	80 Hz for upper sideband
Calibration	—	—	Every hour

Data on *geomagnetic storms* which are often correlated with radio propagation disturbances are tabulated based on reports from observation at Kakioka Magnetic Observatory, Japan Meteorological Agency. *Time* (U.T.) is expressed in hours and minutes (or tenths of an hour), and *range* in nanotesla. When they are uncertain quantitatively, /'s are used to replace the numerical values. Continuation of a geomagnetic storm is denoted by ---.

C3. Phase Variation in OMEGA Radio Waves at Inubo

The phase values of eight OMEGA radio signals as received at Inubo are depicted for an interval of one month, along with the phase deviation defined as a deviation from a value averaged over the six quietest day within the month. Particulars of the received signals are given in the table below.

In each of the four panels of the figure, the phase (ϕ) is shown in the lower part and the phase deviation ($\triangle\phi$) is shown in the upper part. The phase data are sampled every 30 min, so the curves of the phase and phase deviation are composed of 48 data points per day. The phase delay is measured as a positive value.

The polar cap phase anomaly (PCPA) caused by the solar protons are well detected on the Norway signal. The start, end and maximum times of the PCPA are listed in the table next to the figure, where the times are expressed as day/hour & minute in U.T.. The maximum phase deviation in the list is defined as a phase advance (negative values in the figure) in degrees.

C4. Sudden Ionospheric Disturbances

a. Short Wave Fade-out (SWF) at Hiraiso

The table of short wave fade-out (SWF) is prepared from the record of field intensities measured at Hiraiso.

Drop-out intensities of the 10 MHz, the 20 MHz, and the 25 MHz waves are respectively distinguished by marks ', '', and ''' from those of the 15 MHz wave for WWV and WWVH. Values of *start, duration, type,* and *importance* are obtained from data of the circuit whose drop-out intensity in dB is underlined as xx. When these quantities could not be determined accurately, they are accompanied by one of the following symbols.

D greater than,
E less than,
U uncertain or doubtful.

Types of fade-out are as follows:

S sudden drop-out and gradual recovery,
SL slow drop-out taking 5 to 15 minutes and gradual recovery,
G gradual and irregular in both drop-out and recovery.

Importance of fade-out is scaled according to its amplitude into nine ascending grades as 1–, 1, 1+, 2–, 2, 2+, 3–, 3, 3+.

Correspondence of solar optical flare, solar radio burst, and geomagnetic crochet to SWF is marked by X, being determined with data from interchange messages of IUWDS and observations at Hiraiso.

In table (a) SWF, *date* indicates the day to which the *start-time* of the event belongs.

b. Sudden Phase Anomaly (SPA) at Inubo

Data of sudden phase anomaly (SPA) are prepared from the records of phase measurement of VLF radio waves received at Inubo. The transmitting stations are listed in the following table.

Phase advance is shown in unit of degree at its maximum stage. No transmission or no reception during the period is indicated by —, an indistinguishable record is spaced out, and a multi-peak event is marked by *. The most remarkable or distinct phase advance is underlined and listed in the column of *Time*.

In table (b) SPA, *date* indicates the day to which the *start-time* of the event belongs.

The following letters may be attached to the value, if necessary.

D greater than,
E less than,
U uncertain or doubtful.

Transmitting Stations						
Name	Location (Geographic Coordinates)		Call Sign	Frequency (kHz)	Radiation Power (kW)	Arc Distance from Inubo (km)
Norway	66°25'N	013°08'E	Ω/N	13.6	10	7820
Liberia	06°18'N	010°40'W	Ω/L	13.6	10	14480
Hawaii	21°24'N	157°50'W	Ω/H	13.6	10	6100
North Dakota	46°22'N	098°20'W	Ω/ND	13.6	10	9140
La Reunion	20°58'S	055°17'E	Ω/LR	13.6	10	10970
Argentina	43°03'S	065°11'W	Ω/AR	13.6	10	17640
Australia	38°29'S	146°56'E	Ω/AU	13.6	10	8270
Japan	34°37'N	129°27'E	Ω/J	13.6	10	1040
North West Cape	21°49'S	114°10'E	NWC	22.3	1000	6990

HOURLY VALUES OF FOF2 AT WAKKANAI

FEB. 1991

LAT. 45.4N LON. 141.7E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	66	54	50	41	48	48	45	73	105	132	138	136	117	123	113	110	106	108	90	64	66	63	57	58
2	54	52	52	44	38	25	A	80	106	130	161	170	147	145	137	132	122	128	102	86	66	64	64	62
3	58	51	55	45	51	50	62	96	138	145	142	134	121	117	120	109	101	98	86	70	58	53	38	40
4			43	39	38	34		65	126	140	145	138	131	122	120	117	N	94	77	66	58	58	59	54
5	43	40	40	44	41	40	65	79	118	132	141	142	131	125	123	123	116	102	90	70	50	53	54	57
6	54	50	50	66	43	38	48	83	121	137	152	156	145	135	131	125	116	101	84	71	66	62	54	46
7	47	47	42	38	41	42	42	94	118	136	138	142	136	126	128	128	116	111	95	84	66	64	58	
8	48	46	40	48	51	56	42	66	111	134	148	148	140	125	120	121	116	111	88	72	65	62	58	60
9	62	58	64	55	51	51	52	88	131	134	138	148	142	125	120	110	111	101	86	83	66	66	53	47
10	50	52	43	43	41	40	51	71	110	110	126	140	134	130	122	128	118	102	90	75	73	62	62	58
11	62	63	61	56	53	48	38	71	110	117	122	121	130	124	121	120	107	85	77	66	58	54	50	42
12	53	52	44	37	40	42	52	80	82	100	128	138	131	124	122	118	110	96	74	74	58	58	51	52
13		54	58	54	48	49	44	83	110	131	138	140	130	121	118	114	118	99	88	76	58	53	45	46
14	48	52	44	42	45	46	42	66	117	138	138	138	132	130	124	127	117	103	87	72	62	58	53	42
15	50	44	43	42	46	42	43	91	111	128	140	140	145	138	125	123	118	109	97	66	64	53	58	54
16	54	53	53	52	54	47	52	100	111	119	136	145	142	140	133	125	124	118	86	84	74	71	63	60
17	58	58	52	51	54	54	62	94	122	138	144	146	144	140	129	134	127	118	96	86	73	72	63	67
18	66	60	62	64	66	60	63	86	127	141	144	144	141	136	128	128	124	118	108	86	78	73	66	66
19	66	62	64	64	60	57	64	108	141	146	149	148	134	130	124	121	121	111	98	90	90	64	66	65
20	65	73	60	52	52	49	54	122	107	141	150	160	154	150	141	136	129	121	103	86	77	72	66	59
21	62	62	53	52	47	47	54	90	132	144	147	158	157	143	139	140	130	123	110	91	74	76	73	64
22	65	64	57	63	63	62	67	121	142	142	145	150	146	142	140	136	130	123	112	87	91	84	72	63
23	72	64	64	63	58	60	66	88	140	140	160	153	144	142	138	136	131	124	111	99	88	86	66	65
24	52	50	66	58	57	62	72	108	143	158	168	161	146	145	138	138	133	123	101	90	86	80	79	66
25	62	64	62	54	52	N	63	110	146	157	147	148	145	138	137	132	130	118	111	98	90	66	70	66
26	65	58	51	62	58	53	63	110	145	161	161	148	157	145	135	136	131	120	108	96	85	86	84	72
27	62	64	64	60	64	64	66	108	138	144	146	145	146	139	138	133	132	120	111	91	90	84	74	73
28	67	66	54	63	65	61	78	119	131	144	145	146	146	140	142	138	131	130	115	90	87	85	86	66
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	27	28	28	28	27	26	28	28	28	28	28	28	28	28	28	27	28	28	28	28	28	28	27
MED	60	54	53	52	51	49	54	89	122	138	144	146	142	136	128	128	121	111	96	84	70	64	62	60
U Q	65	63	61	61	57	57	64	108	138	144	148	149	146	141	137	135	130	120	108	90	85	74	68	66
L Q	52	51	44	43	44	42	45	79	110	131	138	140	131	125	121	120	116	101	86	71	63	58	54	52

HOURLY VALUES OF FES AT WAKKANAI

FEB. 1991

LAT. 45.4N LON. 141.7E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	31	G	G	G	G	G	G	G	58	61	G	G	51	49	45	G	29	46	64	47	G	G	25	G
2	G	G	G	G	G	32	38	30	G	G	G	G	G	G	G	41	36	G	G	33	28	33	28	G
3	G	G	G	G	G	G	32	35	G	G	G	G	G	G	G	G	G	G	G	G	G	26	G	G
4	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
5	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
6	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	32	38	G	G	G	G
7	G	G	G	G	G	G	G	32	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
8	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
9	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
10	G	33	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	30
11	G	26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
12	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	44	47	40	50	26	G	G	G	G
13	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	28	G	25	G	G	G
14	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	39	34	34	30	33	29	G
15	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
16	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
17	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
18	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
19	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
20	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
21	G	28	28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	26	30	33	38
22	30	G	24	26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
23	26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
27	G	G	G	G	G	G	G	G	35	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
28	G	G	G	G	G	G	G	G	G	G	G	G	G	69	G	G	G	G	G	36	G	G	46	G
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
U Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT WAKKANAI

FEB. 1991

LAT. 45.4N LON. 141.7E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	15	15	16	15	16	16	20	26	36	38	38	29	32	33	30	22	20	18	17	17	18	17	17
2	16	15	15	15	16	16	18	21	21	22	24	24	39	38	36	23	20	17	15	18	17	16	18	16
3	18	17	16	15	24	22	17	18	28	34	36	26	38	38	36	35	28	17	17	21	26	18	16	16
4	66	38	29	15	14	15	26	22	30	39	39	45	39	40	39	35	27	17	22	16	16	23	17	15
5	38	18	16	21	17	15	22	22	29	34	27	38	39	38	36	32	26	17	14	22	20	22	16	32
6	17	17	16	16	23	24	16	21	35	34	39	40	40	41	40	33	26	17	16	18	17	16	18	20
7	21	17	16	16	16	16	17	18	32	34	39	43	40	42	40	41	26	18	16	17	18	18	17	81
8	16	17	16	15	17	15	16	22	30	39	40	42	45	46	42	36	30	20	18	18	17	16	16	15
9	16	15	16	15	16	16	16	22	34	35	39	42	41	40	36	35	27	17	16	15	16	16	18	18
10	18	18	18	17	15	15	15	22	30	33	38	39	39	34	38	33	26	20	17	16	15	15	16	18
11	16	16	16	15	16	15	15	22	20	33	34	45	36	35	23	22	23	21	18	16	17	16	15	16
12	17	16	15	16	16	15	16	21	28	20	24	26	38	35	35	21	18	16	17	16	15	16	17	17
13	20	16	16	15	15	15	16	23	18	21	24	35	38	34	33	21	24	17	16	15	16	18	17	18
14	16	16	20	15	15	15	16	23	32	34	35	36	38	36	22	35	20	20	18	20	15	17	16	16
15	18	16	14	18	17	16	16	23	30	39	36	39	40	38	35	34	27	20	16	15	15	16	17	15
16	16	16	16	17	16	15	15	23	18	36	36	38	38	36	35	35	28	22	20	16	20	15	16	15
17	17	17	16	18	15	15	15	23	21	34	36	40	38	38	36	35	30	20	15	16	17	15	20	15
18	17	15	15	16	14	14	16	23	21	22	38	40	40	26	24	22	28	21	16	16	15	15	16	17
19	18	16	16	15	16	17	17	26	21	37	38	42	39	28	26	23	20	21	16	16	16	16	16	15
20	16	17	15	17	16	17	16	24	22	38	40	40	40	30	38	36	33	21	16	16	16	17	15	16
21	18	16	18	17	16	17	16	24	21	22	23	39	41	26	36	24	29	22	16	17	17	16	17	17
22	17	17	18	18	15	16	16	26	21	21	24	40	40	39	27	33	20	23	16	16	17	16	15	17
23	16	15	16	15	16	17	17	27	21	26	22	39	42	40	39	35	20	22	16	16	15	16	15	18
24	16	17	16	15	16	15	18	27	33	23	40	39	40	39	39	23	21	23	15	15	16	16	16	16
25	15	16	16	16	15	16	16	23	18	35	39	40	39	38	36	34	30	22	16	16	17	16	16	16
26	17	15	16	16	16	16	17	26	21	22	38	40	38	40	39	22	20	23	17	17	16	18	16	16
27	15	15	16	15	16	15	17	24	20	23	24	39	29	38	39	21	20	23	16	15	15	16	15	16
28	17	16	16	17	16	15	18	26	18	23	36	26	40	39	35	34	21	23	16	16	17	16	16	15
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
MED	17	16	16	16	16	16	16	23	22	34	36	39	39	38	36	33	26	20	16	16	16	16	16	16
U Q	18	17	16	17	16	16	17	24	30	35	39	40	40	39	39	35	28	22	17	17	17	17	17	17
L Q	16	15	16	15	15	15	16	22	21	22	25	38	38	34	34	23	20	17	16	16	15	16	16	15

HOURLY VALUES OF FOF2 AT AKITA

FEB. 1991

LAT. 39.7N LON. 140.1E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	52	52	44	31	41			72	102	126	140	133	111	111	102	89	90	86						
2					C	C		80	122	128	138	138	131	130	119	111	117	110						
3								88	123	136	138	138	135	119	118	111	86	88						
4								74	118	136	133	121	110	114	112	100	100	85	86	80	56	63	63	58
5	64	55	34	46	50	44	48	85	106	128	130	132	114	118	118	111	111	88	53	58	51	35	46	A
6	53	64	62	59	50	64	60	49	115	126	140	141	134	133	120	124	116	90	88	54	54	A	66	63
7	46	52	50	64	62	51	51	84	112	121	133	134	129	123	116	121	113	86	86	87	52	52	56	52
8	50	46	49	43	40	44	61	66	104	127	135	136	117	122	112	112	89	100	86	70	51	53	50	52
9	A	54	62	63	61	61	52	86	121	135	130	122	132	118	117	115	109	109	90	85	63	51	52	44
10	62	43	64	37	51	51	64	83	105	120	118	121	126	124	112	112	110	90	87	84	79	54	51	62
11	43	67	66	64	64	64	61	74	108	118	118	126	N	131	126	N	111	88	87	67	56	53	53	58
12	54	65	37	31	34	32	40	77	86	99	112	136	118	117	117	112	113	88	66	52	27	39	44	N
13	52	65	63	63	40	38	43	79	85	120	136	138	130	118	116	113	110	112	A	61	51	54	41	42
14	35	46	44	44	45	64	62	75	111	128	128	131	133	126	123	116	115	103	92	56	A	55	50	37
15	43	35	26	31	46	41	57	86	111	129	129	131	136	131	121	111	110	110	88	65	56	36	52	41
16		51	52	44	44	35	46	85	117	124	131	141	134	134	127	115	89	110	88	A	52	55	57	53
17	53	52	53	48	48	37	58	90	121	124	136	136	138	137	133	124	120	112	87	67	67	63	46	68
18	58	54	52	53	60	59	56	88	126	131	135	136	120	126	130	122	123	113	82	90	71	76	66	67
19	59	66	63	64	57	48	58	90	126	121	134	136	133	126	116	108	110	106	97	87	87	75	66	65
20	53	66	52	46	52	46	67	112	130	138	140	137	138	138	134	133	142	116	82	A	85	29	67	67
21	54	63	53	64		50	58	90	136	137	138	140	136	140	137	117	137	136	109	87	49	85	70	76
22	71	A	63	64	64	60	64	108	137	146	141	141	140	138	134	133	120	118	118	90	90	79	53	66
23	66	75	A	56	56	62	77	105	131	138	138	137	138	134	133	114	120	119	109	106	N	81	79	72
24	66	53	64	58	62	63	72	109	136	146	138	138	136	136	132	124	117	118	110	90	89	86	63	83
25	66	63	65	57	48	50	71	111	140	138	138	137	133	133		125	118	118	90	89	89	86	70	53
26	51	63	53	57	64	63	68	110	137	141	144	137	138	137	133	132	122	116	112	86	87	66	87	52
27	58	58	52	55	52	54	70	111	112	136	137	142	136	131	120	124	111	118	110	91	90	79	58	67
28	60	62	52	51	N	52	72	118	126	110	137	138	138	131	133	131	A	120	89	82	90	90	70	80
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	23	24	24	25	23	24	24	28	28	28	28	28	27	28	27	27	27	28	24	23	23	24	25	23
MED	54	56	52	55	51	51	60	86	120	128	136	136	133	130	120	115	113	110	88	84	63	59	57	62
U Q	62	64	63	63	61	61	67	106	128	136	138	138	136	134	133	124	120	117	103	89	87	79	66	67
L Q	51	52	49	44	45	44	54	78	109	122	130	132	126	120	116	111	110	89	86	65	52	52	50	52

HOURLY VALUES OF FES AT AKITA

FEB. 1991

LAT. 39.7N LON. 140.1E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G			26	G	G	G	G	51	42	50	49	G	G						
2					C	C		33	40	53	47	G	G	G	G	G	41	39						
3								G	51	G	41	G	G	G	G	G	G	G						
4								30	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
5	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	33
6	G	G	G	G	G	G	G	40	40	G	G	G	G	G	G	G	G	G	28	36	34	69	40	28
7	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
8	G	G	27	G	G	G	26	G	G	G	G	G	G	G	G	G	G	G	G	33	G	28	28	G
9	28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	34	28	30	G	G	G	G	G
10	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	32	G	G	G	G	G	G
11	G	G	G	25	26	G	G	G	G	41	G	G	42	G	G	G	G	G	G	G	G	G	G	G
12	G	G	G	G	G	G	G	43	G	38	41	G	G	44	43	38	35	G	G	G	36	31	G	G
13	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	47	69	G	G	G	39	G
14	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	35	G	G	G	40	24	G	G
15	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
16	G	G	G	G	G	G	G	G	G	G	G	G	G	G	43	G	G	39	32	40	G	G	G	G
17	24	G	G	G	G	G	G	29	G	39	G	G	G	G	G	G	G	G	G	G	G	G	G	G
18	G	G	G	G	G	G	G	G	G	40	G	G	G	G	G	42	43	41	36	51	40	G	G	G
19	G	G	G	G	G	G	G	G	G	G	G	G	43	42	42	G	34	G	24	G	G	G	G	G
20	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	37	31	38	38	31	32	28
21	27	G	G	30	G	G	G	G	G	41	G	G	G	G	G	44	41	G	G	27	G	G	G	G
22	30	56	42	33	G	G	G	G	41	40	G	G	G	G	G	G	G	G	G	G	G	26	24	24
23	G	25	32	G	G	G	G	G	G	39	G	G	59	69	58	42	36	29	28	G	33	G	G	G
24	G	G	G	G	G	G	G	G	G	G	G	G	58	G	G	G	G	G	G	G	G	G	G	G
25	G	G	G	G	G	G	G	G	G	G	42	G	51	G		G	G	G	G	G	G	G	G	G
26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
27	G	G	G	G	G	G	G	30	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	179	G	G	G	G	G	32	33
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	25	25	25	25	24	24	28	28	28	28	28	28	28	27	28	28	28	25	25	25	25	25	25
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
U Q	G	G	G	G	G	G	G	13	G	38	G	G	G	G	G	G	34	28	28	14	17	12	12	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT AKITA

FEB. 1991

LAT. 39.7N LON. 140.1E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	16	15	16	16			22	29	22	36	22	38	22	22	21	18	21						
2					C	C		15	16	17	18	28	29	27	36	22	20	16						
3								21	15	17	20	21	22	26	38	23	28	21						
4								20	21	23	45	45	41	27	28	23	20	20	16	16	18	16	17	18
5	16	22	22	21	16	17	15	23	21	22	22	24	26	26	24	21	17	20	16	16	16	16	16	16
6	16	17	15	16	16	15	17	17	20	20	21	39	29	27	26	34	28	20	18	16	16	18	16	18
7	16	16	16	15	16	17	20	23	18	21	26	39	38	40	36	35	28	26	17	16	17	16	17	16
8	15	16	20	20	18	16	18	23	33	35	39	48	69	40	50	36	28	24	16	20	18	17	18	20
9	18	18	15	16	18	21	16	23	28	34	35	26	43	40	23	32	18	20	17	17	17	17	16	16
10	17	20	17	18	18		16	23	18	22	23	24	20	40	22	18	17	16	17	16	16	15	17	15
11	17	15	15	15	17	20	16	22	18	18	21	45	23	23	20	20	27	21	18	16	17	16	16	17
12	16	16	15	15	20	16	16	21	17	21	18	22	24	26	23	23	18	20	17	17	15	16	16	17
13	16	16	16	15	16	17	16	23	17	21	22	21	22	26	38	24	28	17	16	17	16	17	16	16
14	20	16	16	16	16	16	16	23	28	16	23	21	23	38	28	38	20	22	17	16	16	16	17	16
15	16	16	20	17	15	16	16	24	18	21	23	40	42	26	39	22	38	23	18	18	17	21	16	18
16	21	21	16	16	17	17	17	22	20	22	24	26	45		24	35	32	16	16	16	16	16	16	16
17	16	18	17	15	16	16	16	15	20	22	26	24	46	24	24	23	20	22	16	16	16	16	18	18
18	18	16	16	18	16	16	16	24	18	22	22	44	28	28	27	44	20	18	17	16	18	16	16	16
19	16	17	16	16	15	15	16	27	23	22	26	42	33	24	26	22	18	24	16	17	16	17	16	16
20	17	16	16	21	66	18	16	20	18	22	26	44		46	23	21	28	18	16	17	16	16	16	17
21	15	16	17	16	20	66	17	26	20	22	45	29		21	22	21	18	39	18	16	18	16	16	15
22	16	16	16	16	15	16	16	24	17	21	22	27	24	21	26	21	20	24	16	16	16	16	17	16
23	16	16	16	18	17	16	16	27	20	22	24	26	22	21	17	20	16	24	16	18	15	17	17	16
24	16	16	16	16	16	16	16	26	16	18	21	23	21	44	40	45	21	24	16	16	16	16	16	16
25	16	16	16	18	15	16	18	26	16	18	21	29	23	22		22	18	26	16	17	17	16	16	16
26	18	16	16	16	15	16	17	27	18	18	21	22	29	47	28	22	18	26	16	16	17	17	16	16
27	16	16	17	16	15	15	16	16	16	20	22	45	28	23	24	21	17	24	16	17	16	16	16	17
28	16	16	16	16	16	16	18	27	17	18	23	30	30	46	28	23	14	26	17	17	16	17	16	16
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	25	25	25	25	23	24	28	28	28	28	28	26	27	27	28	28	28	25	25	25	25	25	25
MED	16	16	16	16	16	16	16	23	18	21	23	28	28	26	26	22	20	22	16	16	16	16	16	16
U Q	17	17	17	18	17	17	17	25	20	22	26	41	38	40	36	33	28	24	17	17	17	17	17	17
L Q	16	16	16	16	15	16	16	21	17	18	21	23	23	23	23	21	18	20	16	16	16	16	16	16

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

FEB. 1991

LAT. 35.7N LON. 139.5E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	67	67	50	37	36	45	47	72	103	128	137	130	115	111	113	111	106	98	87	87	78	80	71	58
2	55	54	52	46	42	44	52	86	121	128	144	135	125	124	127	121	109	104	101	90	88	82	70	58
3	50	55	53	53	53	52	54	96	118	132	144	146	146	146	145	146	130	118	115	104	76	52	52	54
4	51	52	52	51	41	40	46	88	102	125	133	124	117	115	113	104	105	92	87	83	80	68	58	57
5	57	43	43	46	46	43	52	88	110	112	126	124	125	136	127	120	109	101	90	83	73	52	58	58
6	53	47	48	50	45	44	48	86	107	122	140	145	144	141	142	138	133	123	104	91	86	86	81	77
7	67	58	54	48	43	40	45	87	117	120	127	141	135	130	126	124	117	111	101	92	78	57	68	62
8	52	52	50	48	46	46	50	90	115	128	128	133	132	127	112	113	108	104	98	84	82	67	67	62
9	63	60	63	57	45	42	48	90	117	138	141	140	140	133	131	120	121	120	108	91	80	74	66	51
10	54	54	52	40	30	27	37	77	105	121	130	135	127	120	108	104	108	104	87	86	84	77	54	60
11	62	75	66	56	29	31	41	76	117	120	122	137	141	138	136	131	120	111	104	90	82	67	66	63
12	55	45	40	30	29	34	44	86	100	106	115	132	132	122	121	122	112	104	86	80	77	60	63	57
13	54	51	56	56	43	34	43	76	104	125	137	140	140	131	126	121	117	108	84	71	66	58	51	48
14	47	46	43	43	44	41	44	77	108	128	130	131	136	130	130	117	113	113	98	86	70	58	55	57
15	50	43	47	48	48	44	51	90	111	136	137	140	140	141	129	124	118	114	102	76	81	54	52	58
16	60	57	54	51	48	45	54	100	125	136	131	138	140	140	142	127	117	111	103	86	80	76	72	66
17	60	54	57	51	45	44	53	97	125	130	134	143	146	145	138	128	124	118	104	81	77	76	74	64
18	57	55	54	53	52	51	52	87	118	131	136	136	138	136	132	126	118	120	110	98	84	81	80	78
19	73	67	69	54	44	38	48	97	115	128	131	138	137	131	123	112	109	108	102	90	87	84	66	70
20	54	66	60	48	49	44	61	102	130	141	140	141	145	140	138	138	127	124	111	101	83	84	83	80
21	74	72	63	60	54	52	60	108	141	144	146	146	147	146	145	142	141	137	124	110	98	87	86	83
22	74	76	74	73	66	54	66	115	145	146	140	144	141	138	137		131	122	121	105	87	83	72	74
23	71	78	73	66	55	54	78	105	124	141	144	141	140	136	136	132	130	121	117	108	103	85	85	79
24	78	74	63	68	55	67	84	112	138	145	142	139	140	138	137	131	124	119	113	A	103	88	90	88
25	81	71	68	60	48	51	66	108	135	136	140	142	140	136	132	126	121	117	106	102	102	87	84	81
26	83	74	61	55	64	62	72	117	138	144	142	142	140	141	140	129	137	124	117	108	102	97	90	87
27	77	67	68	64	60	58	73	110	130	132	137	140	140	138	131	130	127	121	117	112	103	88	86	84
28	76	77	61	64	65	61	73	114	127	132	131	142	139	137	140	134	128	127	122	104	90	86	84	86
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	27	28	28	28	28
MED	60	58	55	52	46	44	52	90	118	130	137	140	140	136	132	126	119	116	104	90	82	78	70	64
U Q	73	71	63	58	53	52	63	106	128	137	140	142	140	140	138	131	127	121	114	104	89	85	83	79
L Q	54	52	51	48	43	40	46	86	109	125	130	135	133	130	126	120	110	106	98	84	78	63	60	58

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT KOKUBUNJI

FEB. 1991

LAT. 35.7N LON. 139.5E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	34	40	G	G	46	G	43	50	54	44	56	40	G	G	G	G
2	G	G	24	G	G	G	G	30	36	G	43	43	48	49	G	40	53	34	58	58	55	58	28	28
3	G	G	G	G	G	G	33	35	37	45	43	43	G	44	G	G	34	G	32	G	G	G	32	41
4	30	27	G	G	G	G	G	29	36	G	G	G	52	G	43	G	G	34	54	G	G	24	G	G
5	26	26	G	G	G	G	G	G	37	G	G	G	G	G	41	G	G	28	31	28	49	G	G	G
6	30	27	G	G	G	G	G	32	G	G	G	G	G	G	G	G	G	31	32	49	G	24	48	36
7	32	28	24	G	G	G	G	29	36	40	54	49	G	G	G	G	G	G	24	G	25	44	32	G
8	G	G	G	G	G	G	G	G	G	G	G	G	G	G	57	G	G	31	31	G	G	G	G	G
9	28	28	29	G	G	G	G	G	G	G	G	61	G	G	G	G	56	27	G	G	G	G	G	G
10	G	G	G	G	G	G	G	28	G	G	G	50	G	G	80	44	35	G	G	G	G	30	28	G
11	G	G	G	G	G	G	G	G	G	G	44	G	44	43	43	40	G	G	G	G	G	G	G	G
12	G	G	G	G	G	G	G	G	G	43	G	44	G	47	46	42	39	29	27	37	30	30	24	26
13	G	G	G	G	27	G	G	32	39	G	G	G	48	44	50	40	44	34	30	33	32	G	G	G
14	G	G	G	G	24	G	G	G	G	G	G	44	46	45	44	40	46	37	40	G	34	G	G	G
15	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	39	G	G	G	G	G	G	G	G
16	G	G	G	G	G	G	G	28	36	42	46	46	44	44	G	G	G	59	52	G	25	G	27	G
17	26	G	24	G	G	G	G	30	38	47	G	G	G	44	G	40	G	G	G	G	G	G	G	G
18	G	G	G	G	G	G	G	G	37	48	48	46	49	44	G	54	48	29	G	26	25	33	38	G
19	G	G	G	G	G	G	G	G	G	40	G	G	48	50	54	61	41	35	36	41	G	39	G	30
20	G	G	G	28	G	G	G	48	G	44	46	G	46	G	50	44	43	50	40	26	27	23	G	G
21	26	G	G	G	G	G	G	G	58	40	50	G	G	57	45	G	54	30	G	30	G	28	G	G
22	G	G	32	49	33	G	G	30	40	50	108	47	G	G	43		G	G	G	G	G	23	25	31
23	G	G	29	25	G	G	G	G	G	G	49	48	48	61	52	58	48	55	60	G	G	59	28	25
24	G	G	G	G	G	G	G	G	46	43	44	45	44	G	44	43	50	40	64	114	57	34	32	G
25	25	26	G	G	G	G	G	30	G	G	G	G	G	45	43	43	36	34	26	G	G	G	G	G
26	G	G	G	G	G	G	G	G	G	44	G	46	G	G	44	41	37	29	G	G	G	G	31	G
27	G	G	G	G	G	G	G	G	37	G	G	G	G	44	G	40	G	33	30	33	G	24	G	G
28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	40	G	30	G	G	G	G	G	G
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	28	28	28	28	28
MED	G	G	G	G	G	G	G	G	18	G	G	G	G	22	43	40	36	30	30	G	G	12	G	G
U O	25	G	G	G	G	G	G	30	37	43	45	46	46	44	45	43	47	34	40	33	26	30	28	13
L O	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	14	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT KOKUBUNJI

FEB. 1991

LAT. 35.7N LON. 139.5E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	15	15	16	16	15	15	15	15	18	26	23	33	39	21	18	16	16	14	15	15	15	15	16
2	15	14	16	15	16	15	15	15	15	17	20	23	26	15	22	20	16	14	16	15	15	15	15	15
3	15	15	14	15	15	15	15	15	15	15	16	23	22	26	21	17	16	21	16	15	15	16	16	15
4	15	17	20	16	15	14	15	15	16	23	26	42	22	20	17	18	17	16	16	15	16	15	15	16
5	15	15	16	15	15	15	14	16	15	16	18	26	41	22	20	16	16	16	14	15	15	15	15	15
6	15	16	18	16	16	14	15	15	15	18	21	20	29	27	23	22	29	16	15	15	15	16	15	15
7	15	16	16	16	15	16	15	15	16	18	18	20	24	29	26	18	18	22	17	17	15	14	16	16
8	15	15	16	15	14	16	15	24	18	21	38	39	42	28	20	16	18	16	14	15	16	16	14	14
9	15	16	15	16	14	16	15	23	15	17	38	20	42	21	17	15	14	16	16	16	15	15	16	15
10	16	15	16	15			15	16	16	20	21	23	23	28	16	18	17	21	16	16	15	16	15	18
11	15	15	14	14	15	20	16	21	17	15	17	32	22	20	20	17	16	20	15	16	16	15	16	15
12	15	15	14	15	15	16	16	18	15	16	18	20	24	22	21	18	15	15	15	15	15	15	15	17
13	20	18	15	14	15	16	15	15	16	18	21	22	21	21	20	16	15	15	15	15	15	15	15	15
14	16	15	15	16	15	15	15	23	15	16	18	21	21	21	18	18	16	15	15	15	16	15	15	16
15	16	16	15	15	16	15	16	15	17	17	20	26	23	28	24	17	20	15	16	17	15	18	15	15
16	15	15	14	14	15	15	16	15	16	17	23	22	29	24	26	39	20	16	14	16	14	15	15	17
17	17	16	16	15	16	16	15	15	17	18	21	29	42	23	21	16	18	15	15	15	15	15	17	15
18	16	15	16	14	14	15	15	16	16	18	18	26	29	24	22	20	16	15	15	15	17	15	15	15
19	15	15	15	15	15	15	15	27	16	16	26	30	20	22	22	20	16	16	17	15	16	17	16	16
20	15	15	15	15	66	15	16	26	18	20	20	28	29	24	22	20	18	16	14	15	15	15	16	15
21	15	15	15	15	15	16	16	16	18	17	18	21	21	24	22	21	17	15	15	15	15	16	17	16
22	15	15	15	14	15	15	15	16	15	18	21	22	27	27	27		15	17	16	15	15	15	16	14
23	15	16	16	15	15	16	16	24	16	18	18	22	21	20	29	15	15	17	16	16	15	15	15	15
24	15	15	14	15	15	15	15	15	15	17	17	21	24	27	20	20	16	15	15	16	15	15	15	16
25	16	15	14	14	15	15	16	15	16	18	20	42	23	18	24	20	17	20	18	16	15	15	15	16
26	16	15	16	15	15	15	15	15	15	21	21	20	22	22	24	18	16	16	16	15	15	15	14	15
27	15	15	15	15	15	15	16	15	16	17	20	20	21	21	18	16	17	16	15	15	16	17	16	15
28	15	14	15	15	15	16	17	16	16	18	21	20	26	41	20	18	18	15	17	16	15	15	15	15
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	27	27	28	28	28	28	28	28	28	28	28	27	28	28	28	28	28	28	28	28
MED	15	15	15	15	15	15	15	16	16	18	20	22	24	24	21	18	16	16	15	15	15	15	15	15
U Q	16	16	16	15	15	16	16	19	16	18	21	27	29	27	23	20	18	16	16	16	15	16	16	16
L Q	15	15	15	15	15	15	15	15	15	17	18	20	22	21	20	16	16	15	15	15	15	15	15	15

HOURLY VALUES OF FOF2 AT YAMAGAWA

FEB. 1991

LAT. 31.2N LON. 130.6E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	84	74	63	44	37	40	50	62	88	122	133	122	124	116	122	117	121	114	99	103	97	87	83	82
2	59	63	31	52	70	51	50	62	90	118	144	132	125	136	148	145	132	122	120	111	118	110	82	86
3	66	62	60	58	58	53	55	83	122	127	145	162	168	170	163	158	150	138	118	125	112	109	87	85
4	83	78	76	78	48	38	51	66	104	111	122	135	141	146	146	132	131	119	107	93	86	86	76	66
5	61	60	A	40	32	38	34	62	120	126	122	135	150	162	169	163	146	137	126	109	108	108	85	83
6	73	60	54	47	47	42	37	54	100	108	131	147	140	143	150	150	146	137	130	110	108	107	108	87
7	85	66	52	42	41	37	38	64	117	122	128	142	144	153	149	146	147	141	137	110	108	89	87	87
8	85	64	50	48	42	41	44	63	117	135	138	136	142	139	129	117	114	A	111	108	101	110	86	86
9	78	77	58	54	43	38	46	66	108	132	147	150	159	157	158	154	147	143	145	144	130	106	107	86
10	83	59	58	48	31	30	31	62	88	120	146	131	137	126	124	116	115	118	111	97	88	90	66	62
11	64	77	73	47	36	46	31	53	101	124	126	135	151	157	158	153	147	146	145	148	131	110	82	85
12	83	54	41	51	32	51	70	61	105	112	125	138	128	129	141	143	132	129	124	124	110	90	85	84
13	51	60	58	54	48	46	32	54	87	124	140	145	147	146	146	146	133	131	127	111	106	105	86	86
14	68	65	54	42	29	37	51	62	98	127	128	135	142	144	139	137	129	135						
15										126	142	152	153	161	154	141	135	129	124	111	111	103	85	77
16	74	64	74	64	51	48	49	66	111	128	135	137	138	148	156	156	142	137	134	125	104	97	88	85
17	73	76	63	60	50	38	34	66	105	117	135	146	156	158	160	144	138	133	126	110	107	90	88	85
18	67	75	58	54	64	63	65	66	108	124	134	131	139	142	145	137	125	125	127	118	104	104	86	86
19	85	84	63	54	46	44	42	72	108	128	137	142	145	147	150	146	140	130	125	111	130	102	107	103
20	86	87	84	52	37	38	38	88	111	131	137	141	146	148	147	146	140	132	126	111	102	90	86	84
21	79	87	84	64	52	53	44	88	118	137	148	151	156	158	161	158	160	154	145	145	134	110	106	87
22	86	84	86	82	77	58	53	78	117	137	141	138	145	142	142	142	142	135	134	126	111	103	97	86
23	86	86	78	78	63	31	54	87	111	130	145	139	137	146	147	N	151	146	146	164	180	189	170	167
24	164	138	119	111	87	79	85	106	122	144	135	138	148	152	147	139	131	135	130	134	133	144	110	112
25	102	86	78	71	58	71	53	84	122	134	144	146	147	146	141	137	135	132	124	107	111	110	105	86
26	85	84	66	60	64	54	52	87	128	138	139	145	150	154	158	155	148	143	141	146	143	125	110	107
27	86	85	78	67	64	60	52	81	111	130	136	143	146	146	142	136	136	130	140	144	142	134	107	106
28	86	85	72	64	72	64	58	87	122	128	137	150	158	152	146	146	140	137	137	130	101	104	87	88
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	26	27	27	27	27	27	27	28	28	28	28	28	28	27	28	27	27	27	27	27	27	27
MED	83	76	63	54	48	46	50	66	111	127	137	140	146	146	147	145	139	135	127	111	110	105	87	86
U Q	86	85	78	64	64	54	53	84	118	131	143	146	150	155	157	153	146	138	137	134	130	110	107	87
L Q	68	63	58	48	37	38	38	62	101	122	132	135	139	142	142	137	131	129	124	110	104	90	85	84

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

FEB. 1991

LAT. 31.2N LON. 130.6E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

DAY \ HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	36	25	G	G	G	G	G	G	34	40	G	43	G	G	G	43	G	G	G	69	26	G	G	G
2	27	G	G	26	G	27	G	32	32	42	48	50	G	G	G	44	40	G	30	30	G	G	70	32
3	G	G	G	G	G	G	G	G	G	69	62	55	G	G	G	G	G	G	G	29	G	G	25	G
4	G	G	G	G	G	G	G	G	37	38	G	G	G	G	G	G	G	56	G	G	32	32	38	29
5	G	30	38	G	G	G	G	G	35	41	41	43	G	G	G	G	38	G	23	G	31	24	G	G
6	G	27	G	G	G	G	G	G	G	G	42	G	G	G	G	G	G	G	32	40	24	G	G	G
7	G	G	G	G	G	25	G	25	33	42	43	47	G	G	G	G	G	G	G	G	G	G	G	G
8	G	G	G	G	G	G	G	G	G	G	G	G	G	54	55	56	102	139	31	54	46	29	G	G
9	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	28	G	G	G	G	G
10	G	G	G	G	G	G	G	G	G	G	G	48	G	47	43	43	G	G	G	G	G	G	25	G
11	26	23	G	G	G	G	G	24	G	G	G	G	G	G	G	G	G	34	30	26	G	G	G	G
12	G	G	G	G	G	G	G	G	G	G	G	G	51	45	G	44	38	34	G	G	G	G	G	G
13	G	G	G	G	G	G	25	G	G	38	G	G	G	52	G	43	39	G	G	G	G	32	G	G
14	G	G	G	G	G	G	G	G	G	G	G	49	51	50	50	46	45	37						
15										40	G	G	G	45	G	42	40	G	G	G	G	G	G	G
16	G	G	G	G	G	G	G	G	G	G	43	G	G	G	48	G	G	G	G	G	30	G	G	G
17	G	G	G	G	G	27	G	G	G	G	G	G	50	G	48	G	39	G	G	G	G	G	G	G
18	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	53	48	44	31	32	39	G	G	G
19	G	G	G	G	G	G	G	21	G	G	G	G	G	G	G	G	G	40	37	30	G	33	28	G
20	G	G	G	G	G	G	G	29	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
21	G	G	G	G	G	G	G	G	G	G	G	52	51	G	G	G	41	G	G	G	29	G	G	G
22	G	G	G	G	G	G	G	28	35	42	48	53	50	G	44	44	41	34	G	31	G	G	G	G
23	G	G	38	30	26	26	G	G	G	G	48	53	60	44	44	51	48	40	G	G	G	G	G	G
24	G	28	G	G	G	G	G	28	G	G	G	54	G	G	G	53	48	40	G	G	G	G	G	G
25	28	24	G	25	G	G	G	G	G	G	G	G	G	G	G	48	47	45	44	33	G	G	G	G
26	G	G	G	G	G	G	G	G	G	G	45	G	G	G	G	G	G	G	30	G	G	G	G	G
27	G	G	G	G	G	G	G	G	G	39	G	G	G	G	G	G	G	G	G	G	G	G	G	G
28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	27	27	27	27	27	27	27	28	28	28	28	28	28	28	28	28	27	27	27	27	27	27
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	20	G	G	G	G	G	G	G
U Q	G	G	G	G	G	G	G	21	G	39	42	48	G	22	22	44	41	38	30	30	26	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT YAMAGAWA

FEB. 1991

LAT. 31.2N LON. 130.6E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	15	15	15	15	15	15	16	15	15	29	32	30	33	32	26	21	16	16	15	15	15	15	15
2	15	15	15	15	16	15	15	15	17	16	26	26	34	35	22	22	16	18	15	15	15	15	15	15
3	15	15	15	15	15	15	15	17	15	15	17	18	18	20	17	24	21	18	17	15	15	15	15	15
4	15	15	15	15	15	15	15	16	16	22	26	44	44	44	40	38	23	17	16	15	15	15	15	15
5	15	15	15	15	15	15	15	20	15	17	16	22	44	33	24	22	18	16	17	15	15	15	15	15
6	15	15	15	15	15	15	15	16	15	15	16	38	40	39	38	26	24	16	15	15	15	16	15	15
7	15	15	15	15	15	15	15	16	15	18	23	26	44	41	44	36	22	29	18	16	15	15	15	15
8	15	15	15	15	15	15	15	18	17	24	36	39	43	38	36	35	33	26	15	15	15	15	15	15
9	15	16	15	15	15	15	15	16	16	16	38	39	45	43	39	24	17	15	15	16	15	15	15	15
10	15	15	15	15	15		15	17	18	17	23	24	32	35	23	26	18	17	20	15	15	15	15	15
11	15	15	15	15	15	15	15	16	16	33	22	41	34	29	39	23	16	15	15	15	15	15	15	15
12	15	15	15	15	15	15	15	17	16	16	17	29	35	34	38	20	18	16	15	15	15	15	15	15
13	15	15	15	15	15	15	15	18	16	16	36	36	39	36	39	16	17	15	15	15	15	15	16	15
14	15	15	16	15	15	15	15	18	16	16	17	30	28	32	24	20	18	17						
15										17	18	41	35	38	42	24	21	15	20	15	16	15	15	15
16	15	15	15	15	15	15	15	20	17	20	24	26	42	40	34	40	24	16	20	15	15	15	15	16
17	15	15	15	15	15	15	15	20	15	18	23	41	46	40	40	36	22	16	21	15	15	15	15	15
18	15	15	15	15	15	15	15	18	15	18	20	33	34	36	41	28	21	20	15	15	15	15	15	15
19	15	15	15	15	15	15	15	15	17	17	38	35	35	48	42	24	23	18	15	15	15	15	15	15
20	15	15	15	15	15	15	15	15	15	20	34	43	44	44	34	40	21	17	21	15	15	15	15	15
21	15	15	15	15	15	15	15	22	15	24	22	38	35	44	42	39	27	17	21	15	15	15	15	15
22	15	15	15	15	15	15	15	15	16	16	36	36	36	36	35	32	21	17	23	15	15	15	15	15
23	16	15	15	15	15	15	15	15	18	22	39	40	35	35	36	33	22	16	22	15	15	15	15	15
24	15	15	15	15	15	15	15	15	15	16	23	35	36	35	35	27	22	17	21	15	15	15	15	15
25	15	15	15	15	15	15	15	22	16	17	23	44	44	44	36	26	22	16	15	15	15	15	15	15
26	15	15	15	15	15	15	15	22	16	16	21	35	35	36	42	39	23	17	16	16	15	15	15	15
27	15	15	15	15	15	15	15	23	17	20	23	42	43	40	45	24	15	16	15	15	15	15	15	15
28	15	15	15	15	15	15	15	16	16	17	39	40	43	44	42	40	35	17	22	15	15	15	15	15
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	27	27	27	26	27	27	27	28	28	28	28	28	28	28	28	28	27	27	27	27	27	27
MED	15	15	15	15	15	15	15	17	16	17	23	36	36	37	38	26	21	17	16	15	15	15	15	15
U Q	15	15	15	15	15	15	15	20	17	20	35	40	43	42	41	36	23	17	21	15	15	15	15	15
L Q	15	15	15	15	15	15	15	16	15	16	20	29	34	35	34	24	18	16	15	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT OKINAWA

FEB. 1991

LAT. 26.3N LON. 127.8E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	88	85	81	66	34	32	38	54	87	107	121	121	121	132	131	130	130	121	119	110	122	111	90	82
2	74	66	54	40	28	29	42	57	86	127	119	120	121	154	160	146	141	145	144	146	142	146	161	141
3	87	84	77	72	62	44	43	62	108	136	146	161	151	154	144	146	146	144	130	135	145	145	145	134
4	110	110	102	84	66	44	38	58	108	120	124	140	162	165	165	162	154	154	146	131	130	136	103	85
5	87	84	66	70	63	22	26	54	108	132	138	155	167	166	165	162	162	164	161	161	145	146	138	104
6	86	88	85	80	54	38	32	54	90	111	132	144	147	161	163	164	160	163	164	162	159	164	162	154
7	108									135	137	137	163	172	172	172	169	177	165	146	146	146	146	146
8	137	108	83	66	58	44	43	65	124	145	146	144										177	161	142
9	130	109	85	55	43	32	38	62	111	137	145	155	162	169	169	165	162	164	164	163	146	145	163	163
10	110	85	83	53	37									136	132	135	120	126	130	119	105	92	90	86
11	84	85	76									148	164	177	171	166	164	164	170	168	163	146	145	142
12	121	87	59	38	32	37	31	42	108	131	136	146	122	137	160	165	164	163	168	171	168	162	145	108
13	87	81	80	60	37	28	34	42	86	129	144		161			173	189	160			163	178		141
14	108	105	66	44		44		43	90	134		145	146	158	167	164	166	164	164	164	164	146	144	109
15	87	81	66	66	63	44	38	52	110	120	145	161	170	186	171	162	162	166	145	145	145	145	144	
16		N			N				69			144	144	163	185	177	168	164	167	162	163	145	142	144
17	111	66	86	66	32				86	108	140	161	171	187	192	186	170	165	163	160	144	146	146	144
18	66	66		N		N		N	66	100	135	138	142	159	162	145	143	143	145	146	163	170	145	139
19	146								88	120	143	144	154	163	171	170	N	161	164	162	168	170	163	162
20	145	145	135	84					109	141	144	140	138	138	139	146	145	138	78					
21										99	144	146	144	146	164			188	183	161	N	199	198	170
22				104	66				88	129	144	141	144		145	145	156			146				66
23		N		69	66			71	84	83	108	108	118		162			176	171	164	167	161	169	177
24	196	197	164	136	86	86	87	100	122	146	142	141	146	162	160	156	146	146	159	169	183	199	198	186
25	165	130	110	103	66	42	42	81	108	142	145	152	153	155	152	146	146	145	138	138	146	169	127	108
26	108	86	76	63	53	53	38	76	121	136	141	144	161	165	175	169			165	171	171	172	171	164
27	130	110	109	87	80	62	43	66	108	137	145	149	148	162	164	164	167	164	164	171	176	176	176	162
28	145									135	144	158	167	161	164	163	162	164	160	162	146	160	146	144
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	24	21	20	21	19	16	15	17	23	25	24	26	26	24	26	25	23	25	25	25	24	26	25	26
MED	109	86	82	66	58	43	38	58	108	131	142	144	150	162	164	163	162	163	163	161	152	153	146	142
U Q	133	109	94	84	66	44	43	68	109	136	144	152	162	165	171	167	166	164	165	164	165	170	163	162
L Q	87	82	71	57	37	32	34	53	86	115	135	140	144	154	160	146	146	145	144	145	145	145	143	108

HOURLY VALUES OF FES AT OKINAWA

FEB. 1991

LAT. 26.3N LON. 127.8E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	23	24	22	G	G	G	G	G	33	40	44	44	58	52	45	44	47	50	44	G	G	G	G	26
2	G	G	G	G	G	28	32	G	33	45	45	46	48	51	G	44	57	38	G	28	26	G	G	G
3	G	G	40	32	28	G	G	G	32	38	41	G	G	G	77	64	42	G	33	29	G	G	G	G
4	G	G	G	38	38	36	G	G	G	45	44	G	G	G	G	44	42	36	38	27	32	29	G	G
5	G	G	G	36	33	32	22	G	32	42	45	44	G	45	80	67	40	G	29	G	G	G	G	G
6	G	G	G	G	G	G	G	24	32	38	42	44	G	44	G	G	42	36	32	G	G	G	G	G
7	G									42	49	46	G	45	G	G	G	G	32	G	G	G	G	G
8	G	G	G	G	G	G	G	G	35	39	42	G										40	32	31
9	32	24	29	32	29	G	G	G	G	38	42	44	G	G	G	G	G	35	G	G	G	G	G	G
10	G	G	G	G	G									47	45	45	44	38	28	30	32	G	G	G
11	G	G	G									G	98	50	48	44	42	36	G	G	G	32	23	26
12	G	G	G	G	G	G	G	G	32	39	42	44	G	48	61	77	42	36	G	G	24	G	G	G
13	G	G	G	G	G	G	G	G	G	38	42		G			46	43	G			34	G		G
14	G	G	G	G		G		G	G	G		49	63	58	65	61	48	36	G	30	24	G	26	G
15	G	G	G	G	G	29	G	G	32	57	44	47	G	G	G	G	G	G	36	G	G	G	G	
16	G	G	G	G	G	G			G			G	G	G	G	G	G	38	G	32	G	G	G	G
17	G	G	G	G	G	G			G	G	G	G	G	G	G	45	G	G	G	G	G	G	G	G
18	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	54	62	51	32	26	G	G	G	G
19	G								G	G	G	G	G	G	G	G	G	40	G	G	G	G	G	G
20	G	G	G	G					G	G	G	G	G	G	G	G	G	G	G	G		G	G	
21	G	G	G	G	G				G	G	G	G	G	G	G			G	G	G	G	G	G	G
22	G	G	G	G	G	G	G		G	G	G	G	G	G	G	43	44			G	G	G	G	G
23	G	G	G	G	G	G	G	G	G	G	G	46	57	G	G			41	30	25	G	G	G	G
24	G	G	G	G	G	G	G	G	34	38	48	G	58	63	60	55	50	47	29	23	G	G	G	G
25	G	G	26	G	G	G	G	G	G	G	42	52	53	45	53	49	G	46	32	24	G	G	G	G
26	G	G	G	G	G	G	G	G	33	G	G	G	48	G	45	G			34	31	27	25	G	G
27	G	G	G	G	G	G	G	G	G	G	43	G	68	G	G	62	42	36	G	28	G	G	G	G
28	G									G	G	50	G	G	G	G	41	37	G	30	G	28	G	G
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	25	25	24	22	21	18	18	24	25	24	26	26	26	26	25	24	25	25	26	26	28	27	26
MED	G	G	G	G	G	G	G	G	G	38	42	G	G	G	G	44	42	36	28	12	G	G	G	G
U Q	G	G	G	G	G	G	G	G	32	39	44	46	53	47	48	54	44	39	32	28	24	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

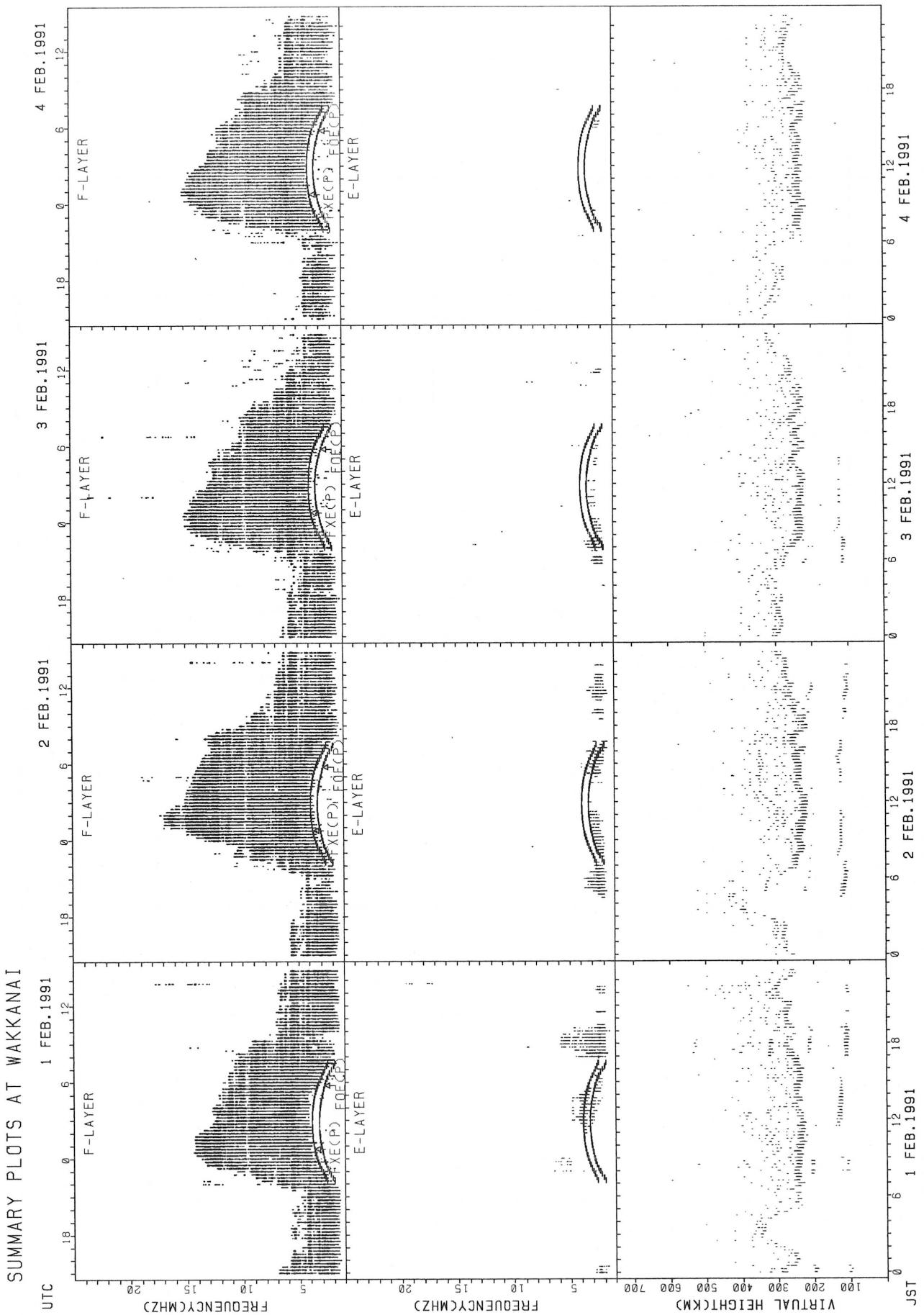
COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT OKINAWA

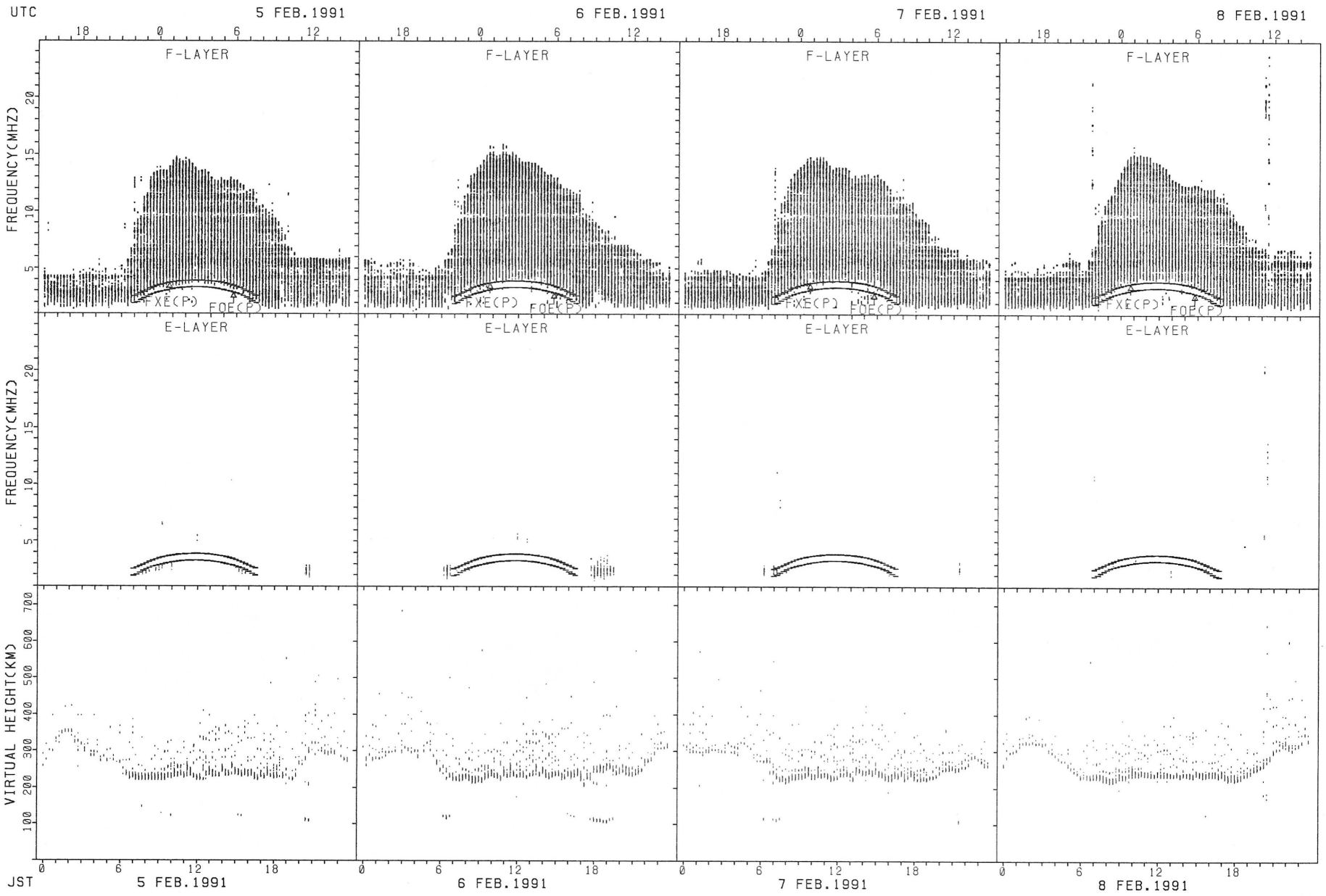
FEB. 1991

LAT. 26.3N LON. 127.8E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	15	15	15	15	15	15	15	15	16	26	24	27	27	23	23	16	16	15	15	15	15	15	15
2	14	15	15	15	17	15	15	15	14	14	23	26	28	27	26	23	16	21	23	14	15	15	15	15
3	14	15	14	14	15	15	15	17	15	15	16	22	24	28	16	15	23	15	15	15	15	15	15	15
4	15	15	14	15	15	15	16	16	21	22	26	30	28	27	27	24	22	16	15	15	15	15	15	15
5	15	15	15	15	15	15	15	15	15	16	17	24	24	21	21	22	16	15	15	15	15	15	15	15
6	15	15	15	15	14	15	15	15	14	14	17	26	28	29	27	26	23	17	15	15	15	15	15	15
7	15									16	23	24	27	23	26	20	20	17	15	15	15	15	15	15
8	15	15	15	15	14	15	15	16	15	15	23	32										14	15	15
9	15	15	15	14	15	15	16	15	16	15	21	26	39	30	24	23	17	14	20	15	15	15	15	15
10	15	14	15	14	15									26	24	27	20	15	15	15	15	15	15	15
11	15	15	15									41	27	26	22	24	17	15	22	15	15	15	15	14
12	15	15	15	15	15	15	15	16	16	16	16	18	24	26	26	21	17	16	22	15	15	15	15	15
13	15	15	15	15	14	15	15	16	15	18	23		24			24	23	15			15	15		79
14	16	18	14	15		16		16	15	16		24	26	26	24	22	20	15	16	15	15	15	15	15
15	15	15	15	15	15	15	15	17	15	16	17	24	51	50	44	46	27	32	16	16	78	101	135	
16	66	16	66	16	16				29			50	47	50	50	50	39	23	23	17	22	27	16	16
17	15	16	16	16	16				30	34	39	46	49	49	50	35	28	23	27	18	15	15	17	16
18	16	16	17	16	16	16	18	21	30	36	43	47	48	49	48	35	29	27	16	15	16	17	18	84
19	21								14	40	43	44	52	50	49	46	39	26	27	23	66	24	21	16
20	17	21	16	16					33	40	43	50	50	54	62	50	43	33	28	24		66	21	
21	18	66	21	21	24				34	38	50	49	53	53	46			34	27	17	66	66	17	21
22	21	111	121	16	17	17	66		32	35	47	32	49	49	46	38	29			16	16	21	66	16
23	21	16	18	16	18	20	66	63	33	38	44	45	45	48	48			20	15	15	15	15	15	15
24	15	15	15	15	15	15	15	22	15	17	20	55	28	44	27	48	23	17	16	15	15	48	15	15
25	15	15	15	15	15	15	15	58	15	17	23	28	27	27	28	27	55	14	16	15	50	15	15	15
26	15	15	15	46	14	15	15	21	15	44	21	24	27	44	27	27			15	15	15	15	50	15
27	15	15	15	15	15	15	15	21	58	85	23	26	47	28	26	21	23	15	15	15	15	15	15	15
28	15									17	20	24	27	43	29	26	23	20	17	15	16	15	15	15
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	25	25	24	22	19	18	18	24	25	24	26	26	26	26	25	24	25	25	26	26	28	27	26
MED	15	15	15	15	15	15	15	16	15	17	23	27	28	30	27	26	23	17	16	15	15	15	15	15
U Q	16	16	16	16	16	15	16	21	30	37	41	45	48	49	46	36	28	23	22	16	16	19	17	16
L Q	15	15	15	15	15	15	15	15	15	16	20	24	27	27	24	22	18	15	15	15	15	15	15	15


SUMMARY PLOTS AT WAKKANAI
UTC
1 FEB.1991
2 FEB.1991
3 FEB.1991
4 FEB.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI



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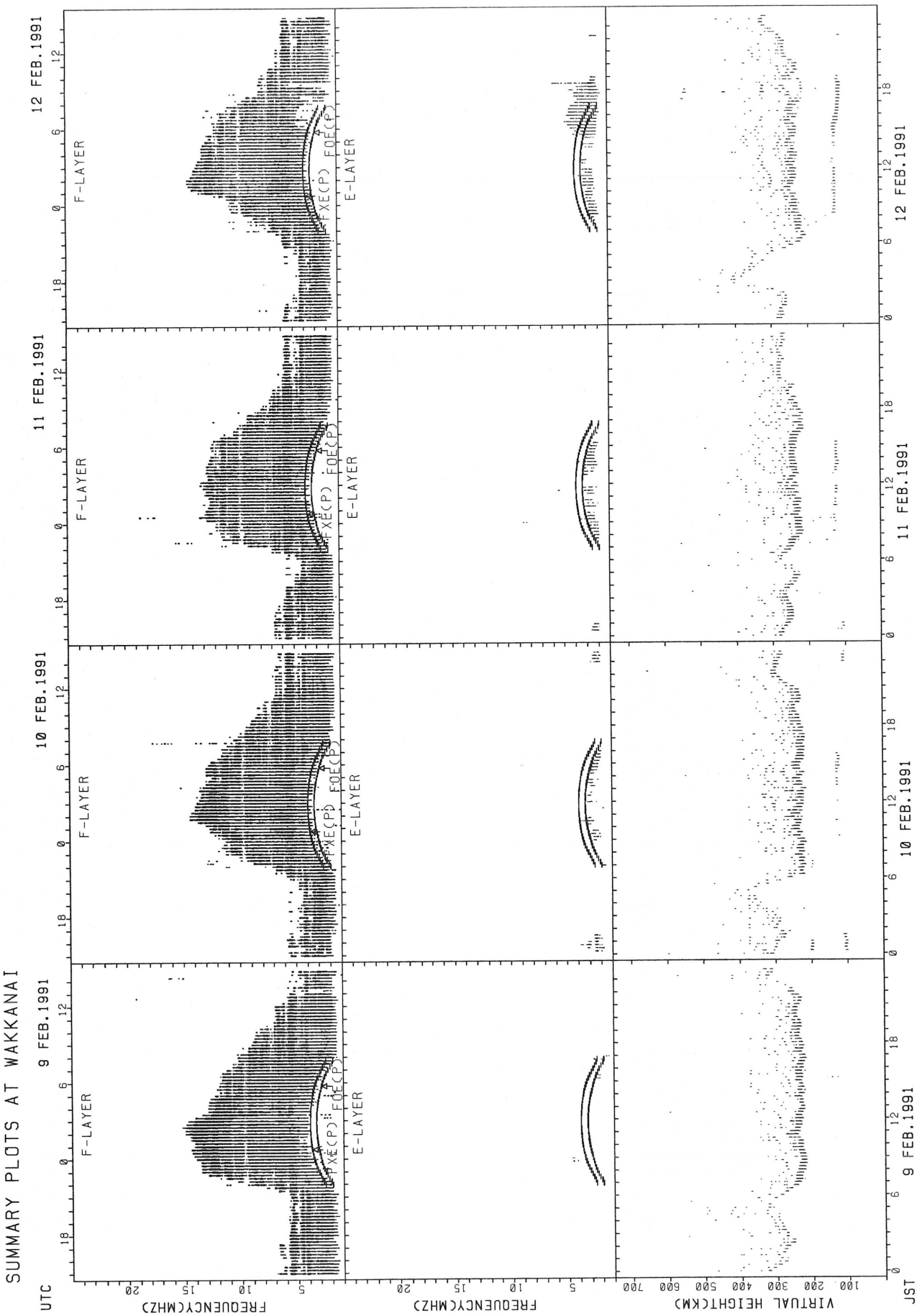
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
9 FEB.1991
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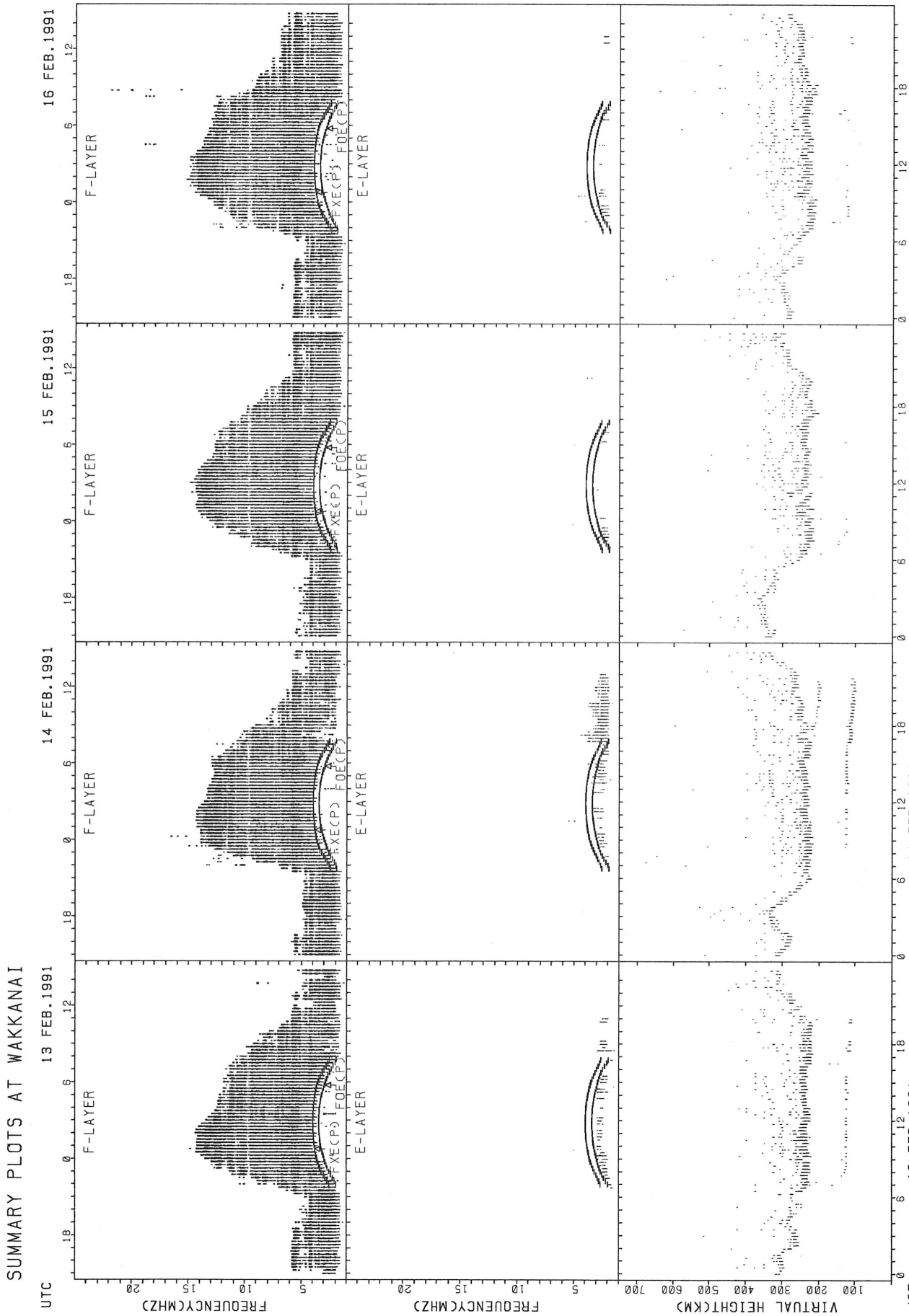
12 FEB.1991
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
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FOE(P)
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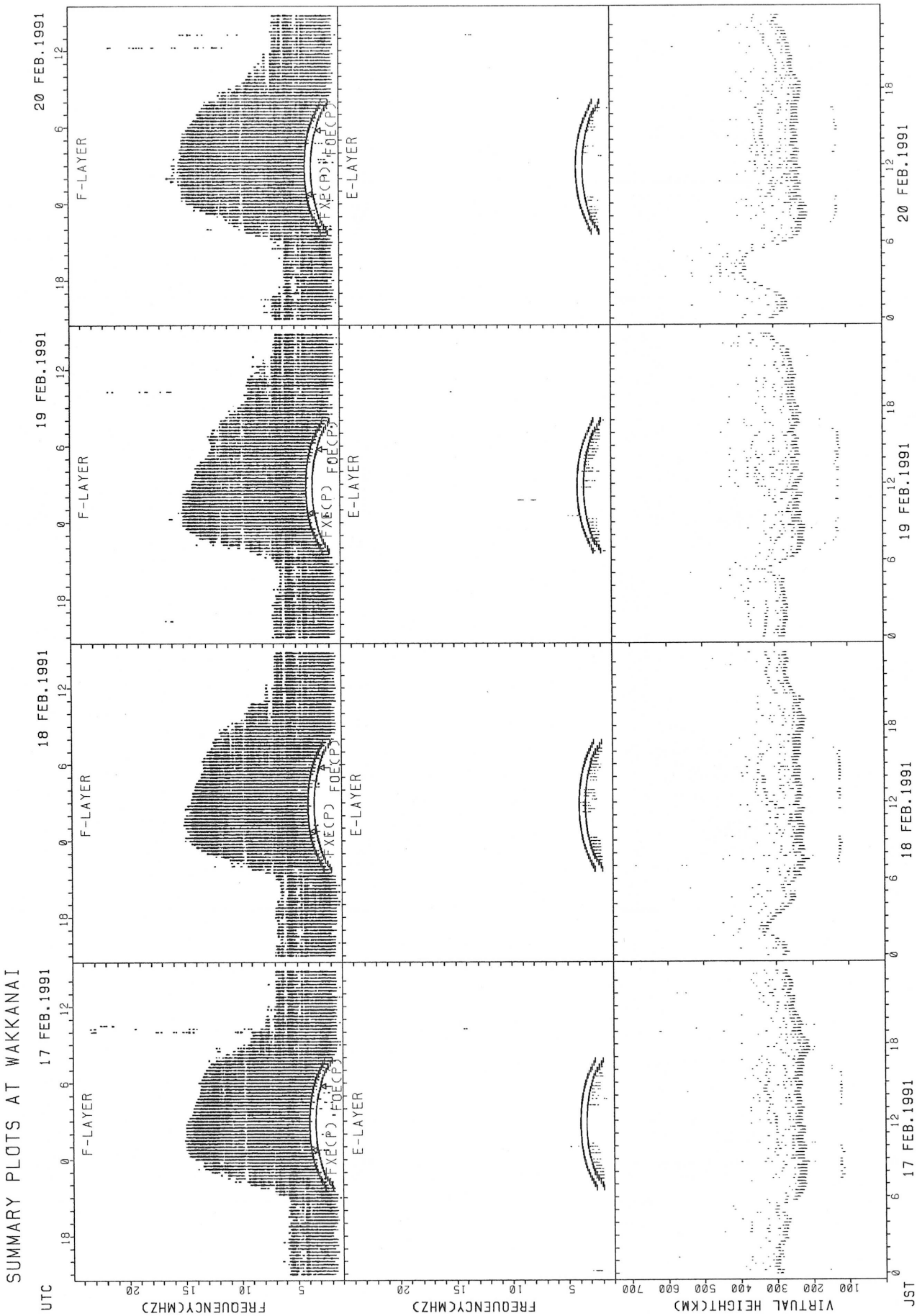
FOE(P): PREDICTED VALUE FOR FOE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E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
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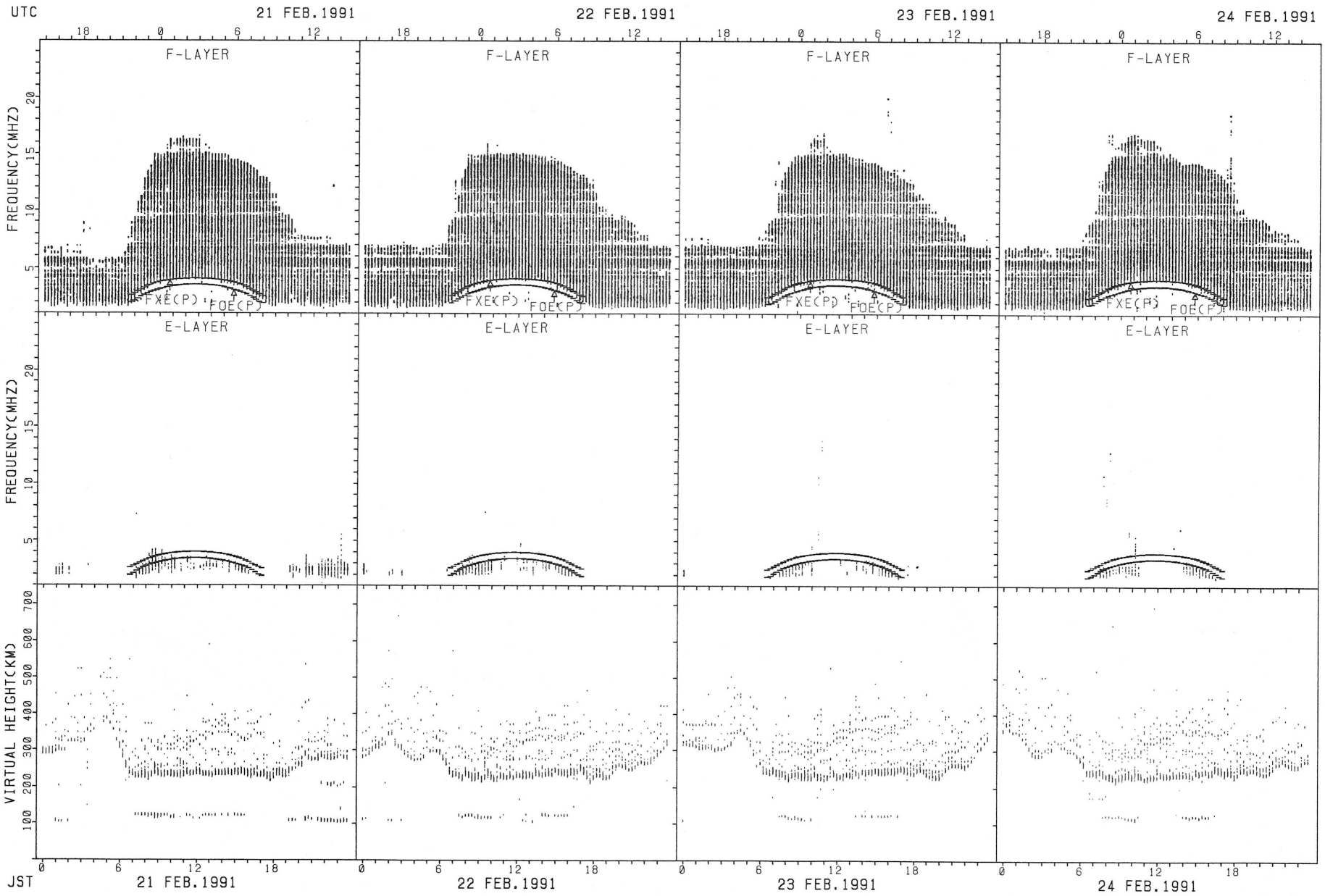
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI



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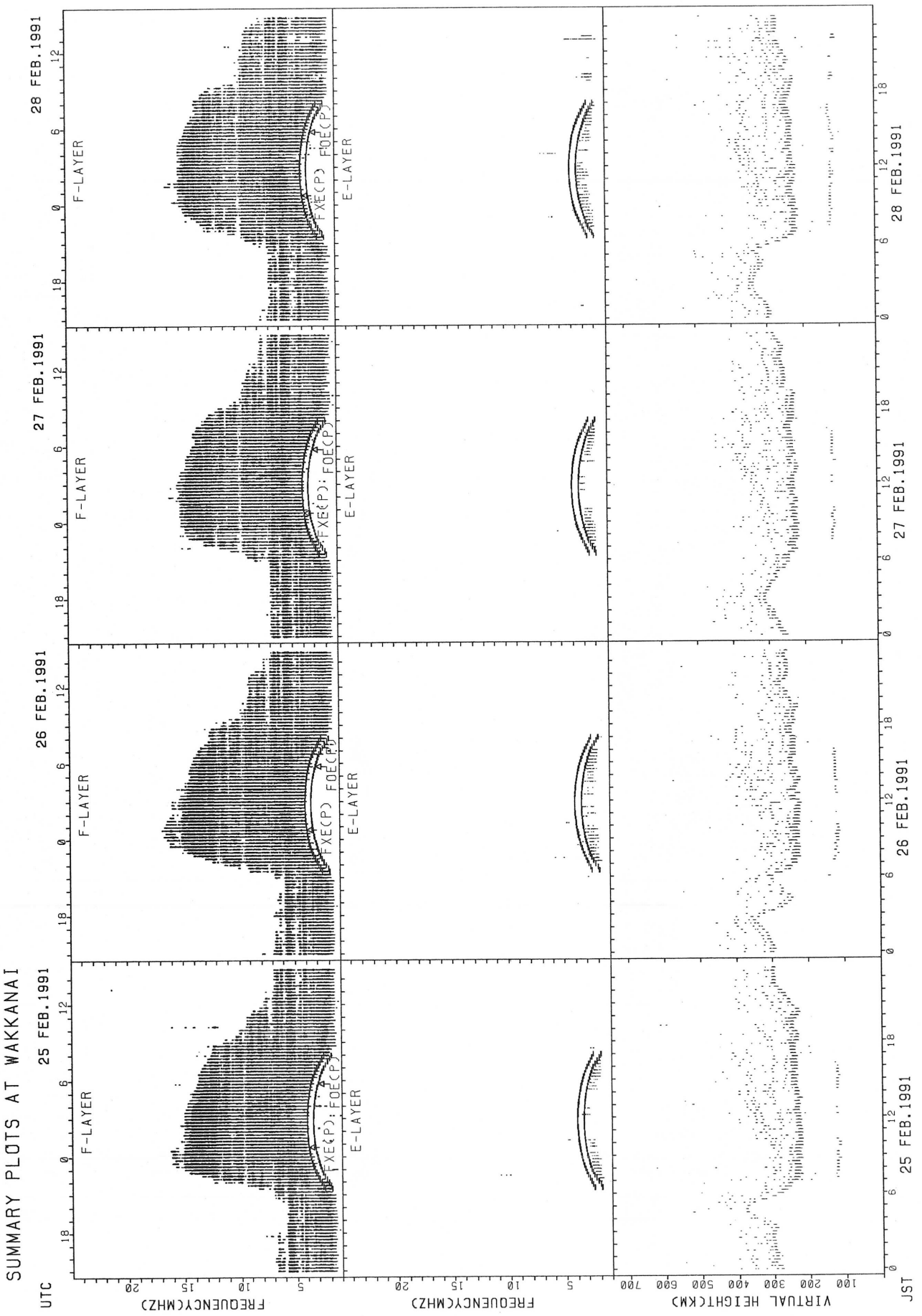
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F-LAYER
E-LAYER
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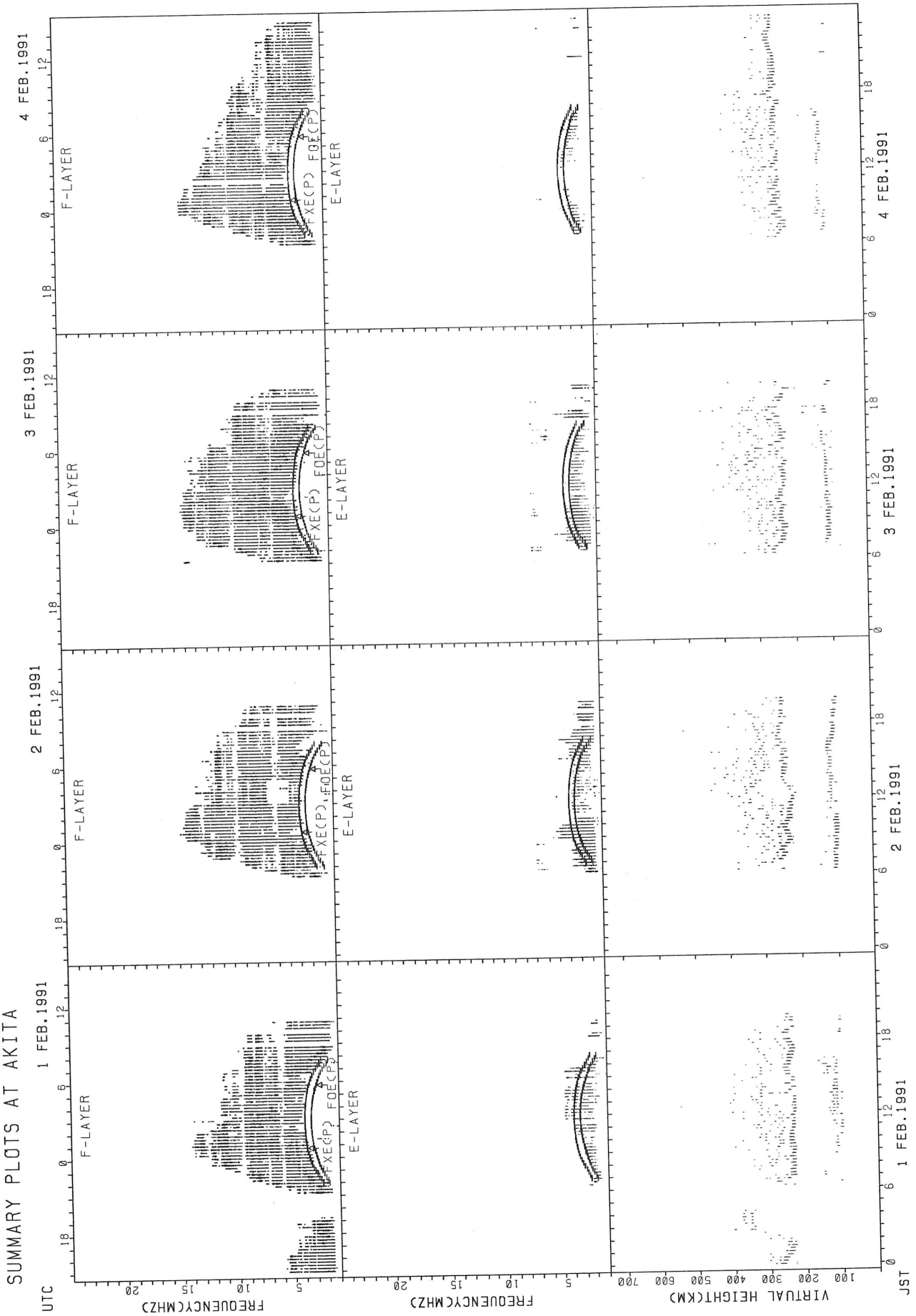
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VIRTUAL HEIGHT(KM)
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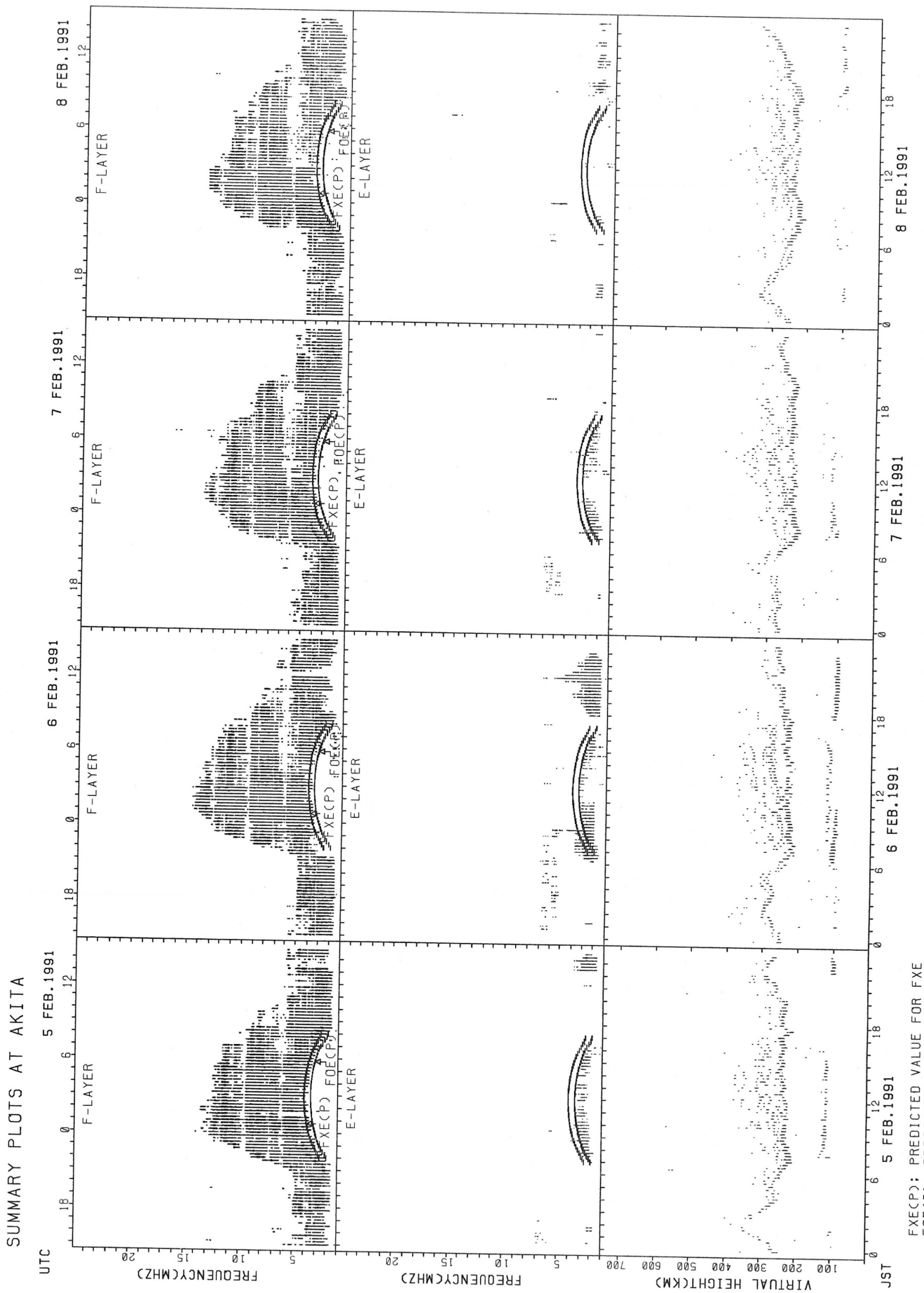
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VIRTUAL HEIGHT(KM)
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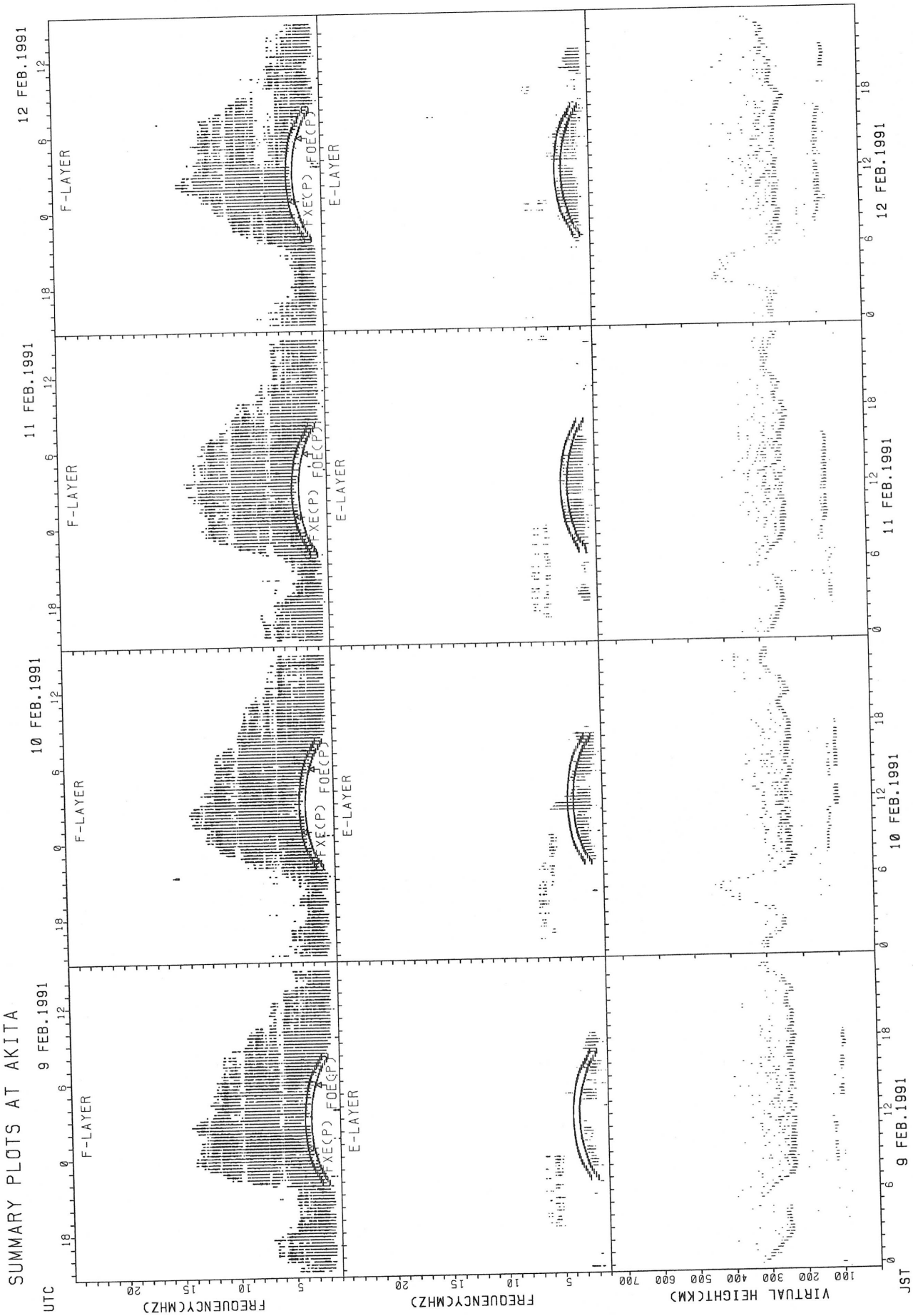
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FOE(P)
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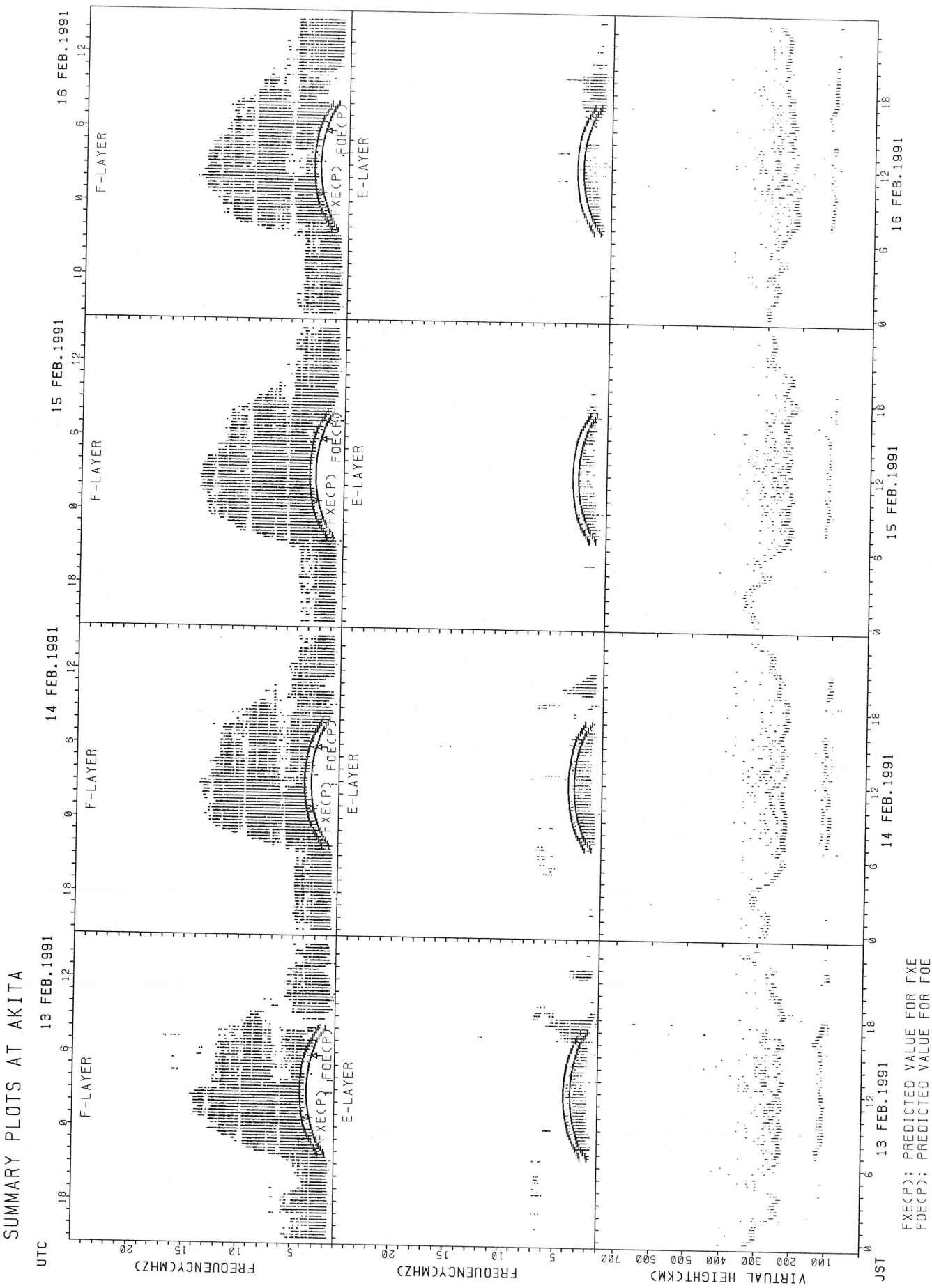
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FOE(P)
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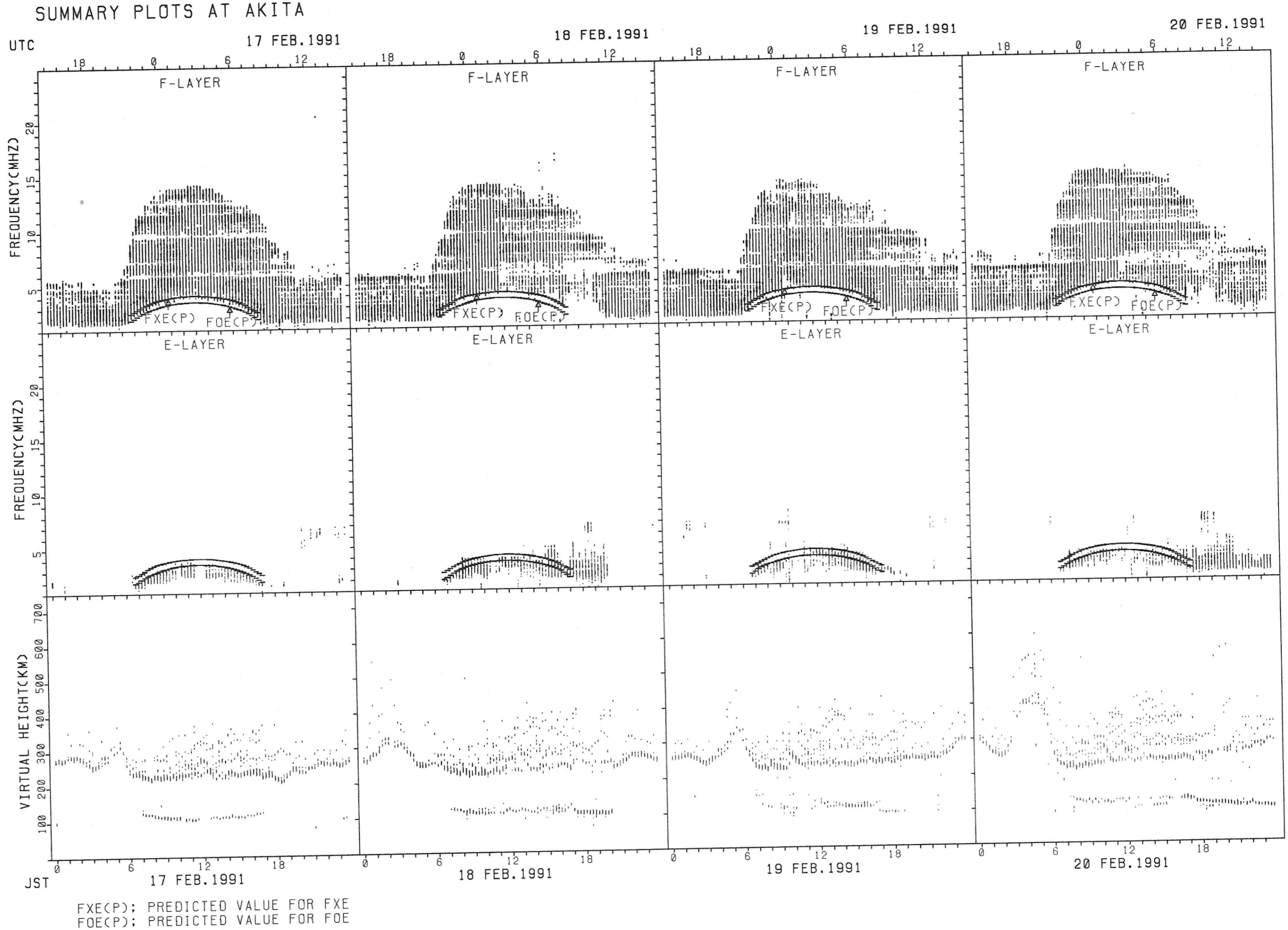
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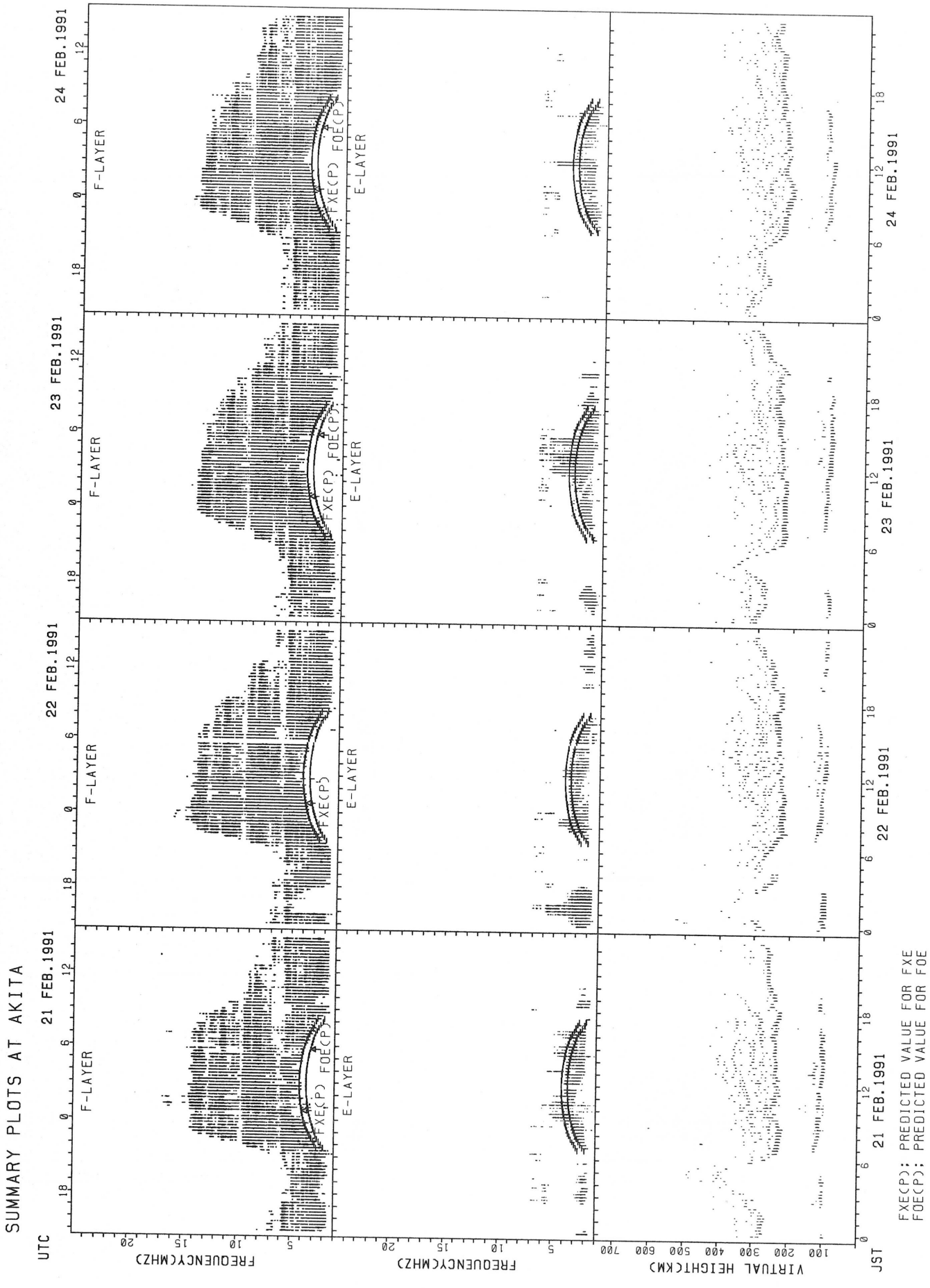
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FOE(P)
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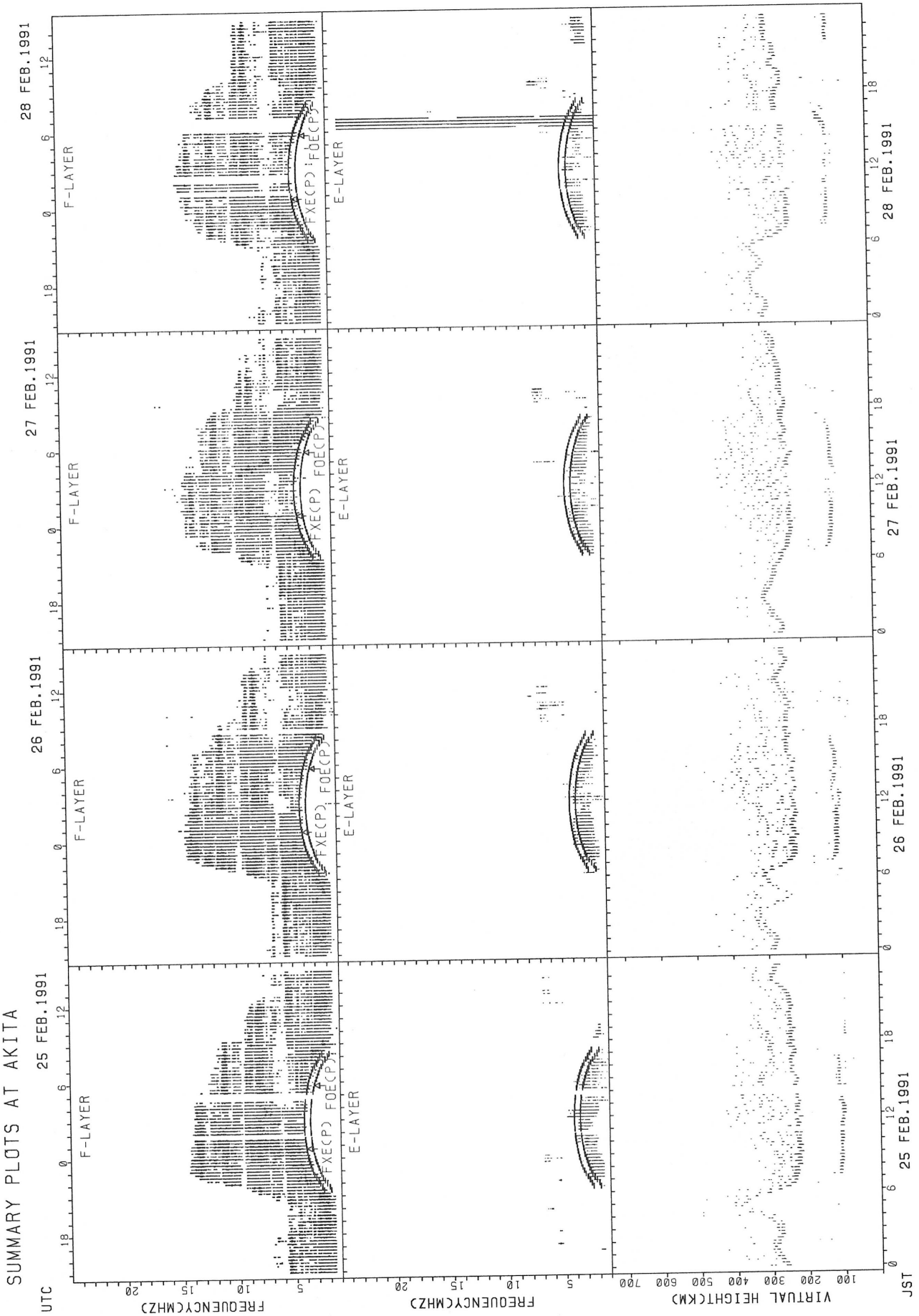
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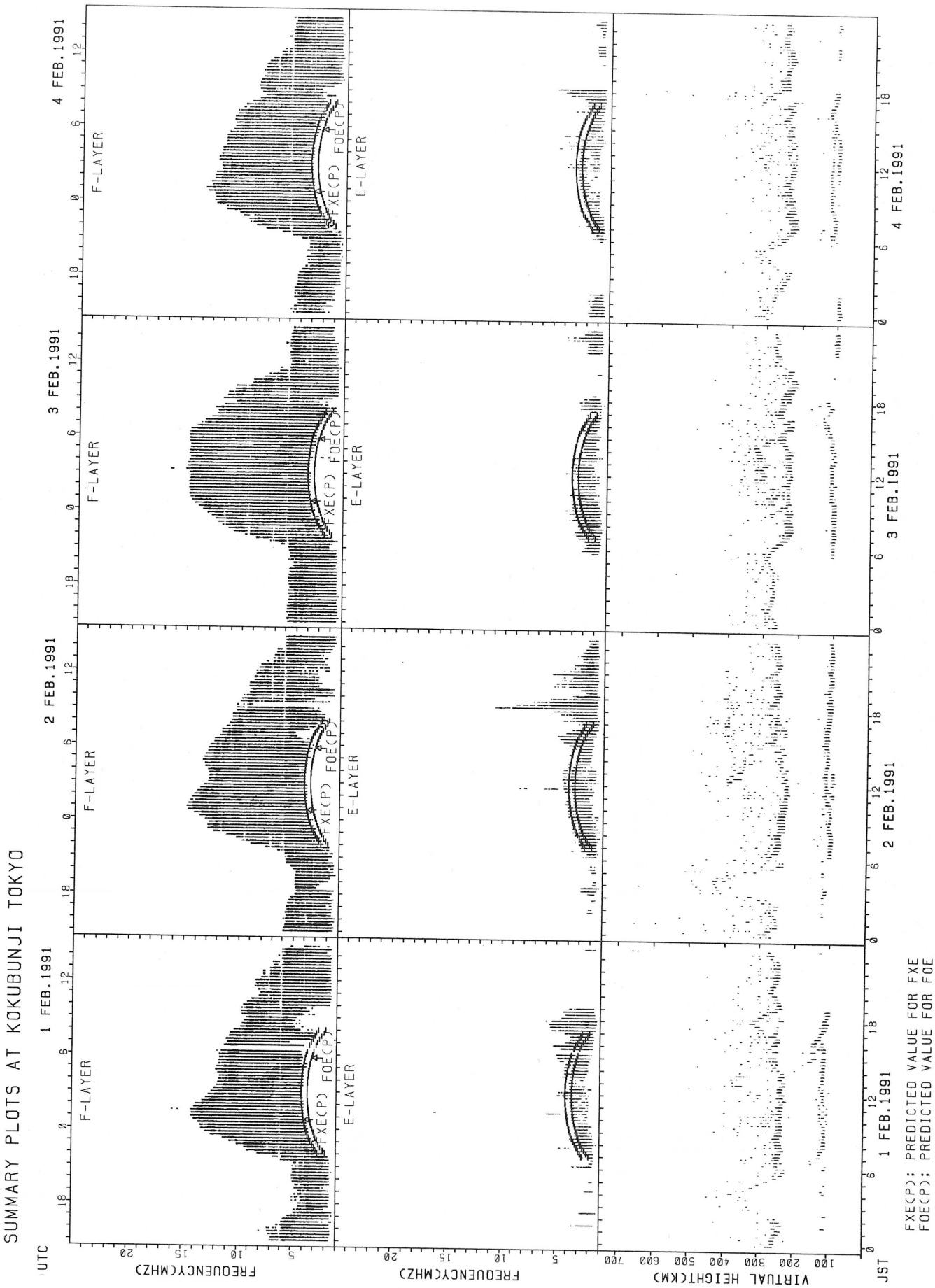
SUMMARY PLOTS AT KOKUBUNJI TOKYO
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FOE(P)
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VIRTUAL HEIGHT(KM)
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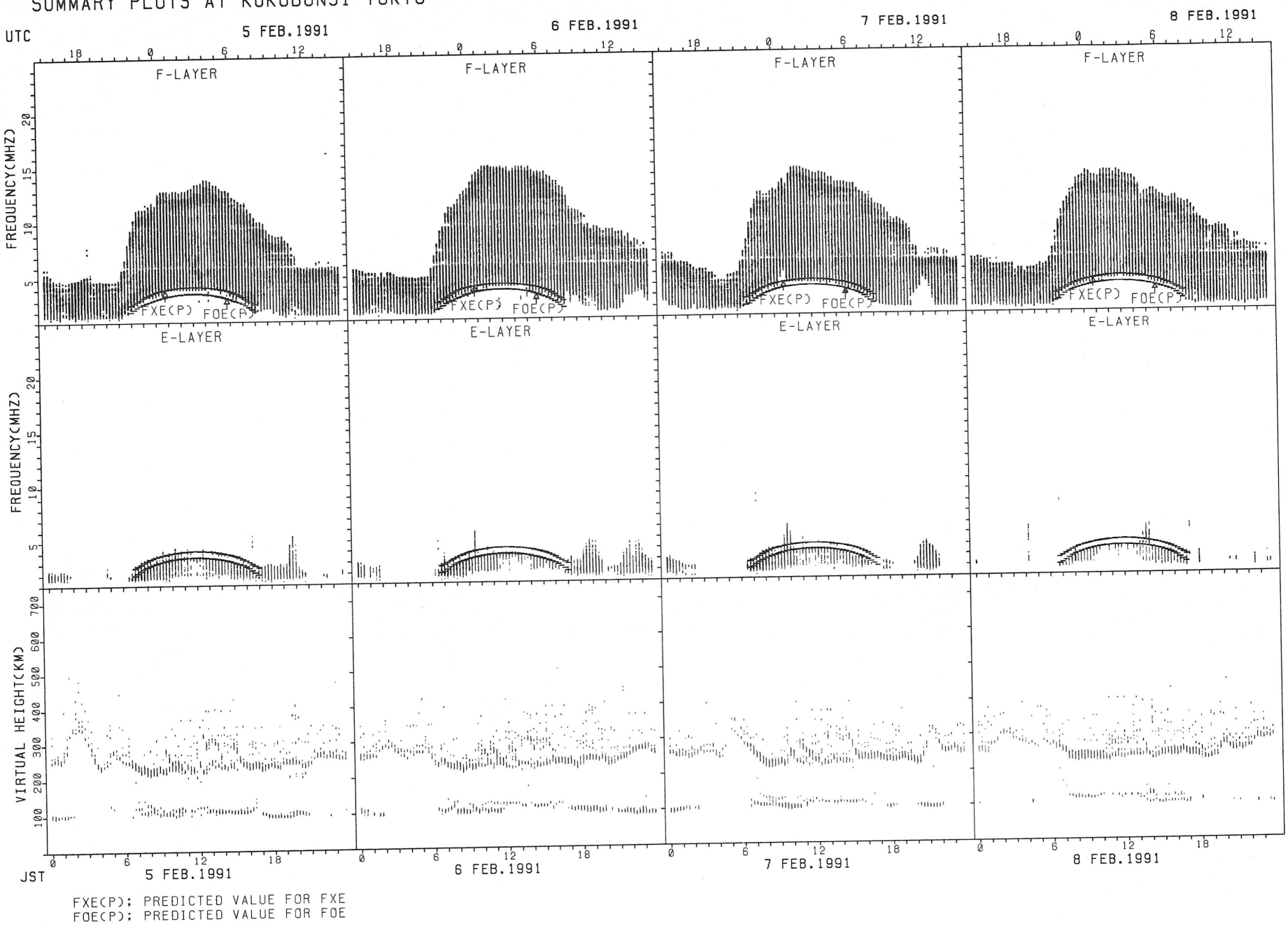
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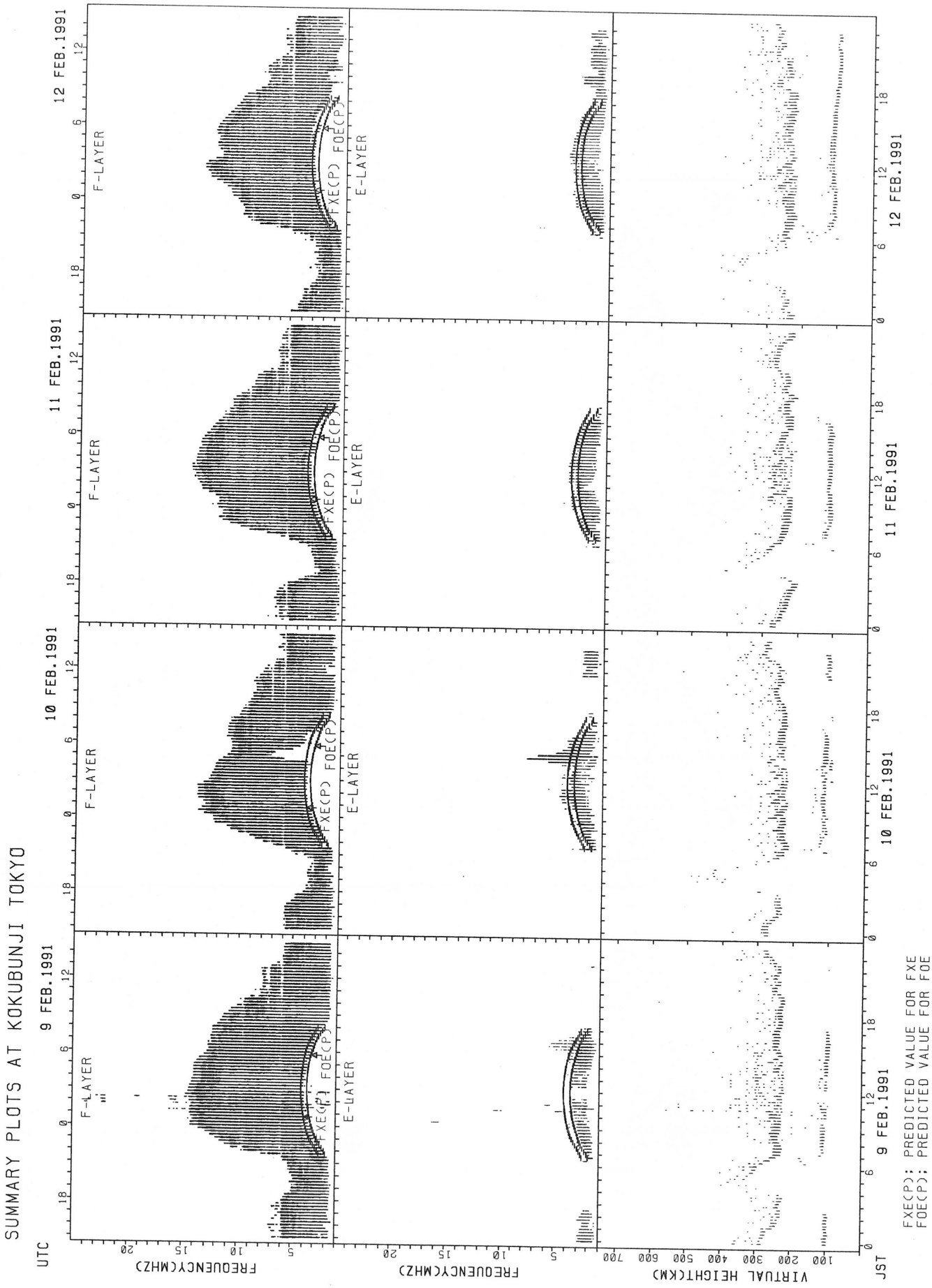
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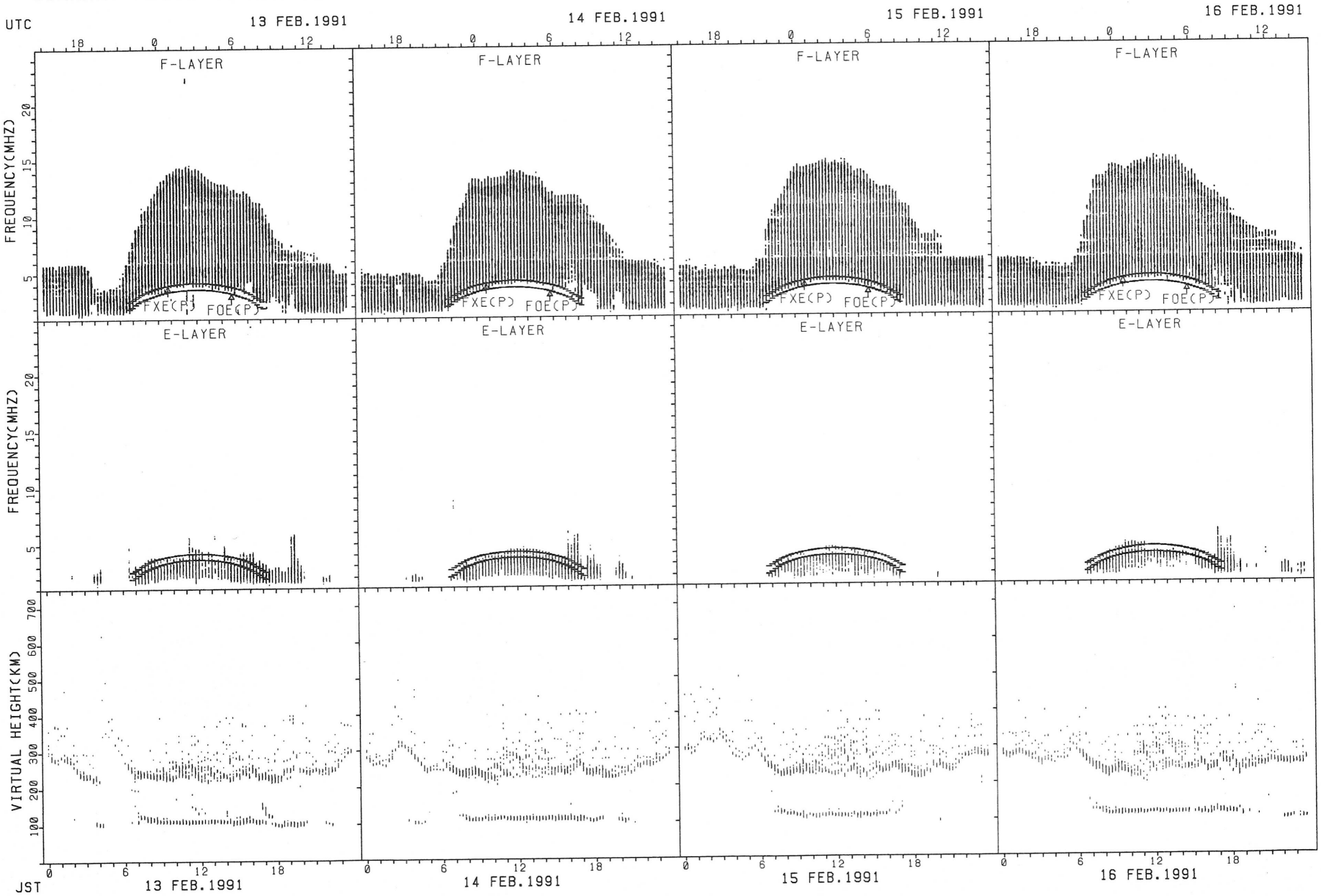

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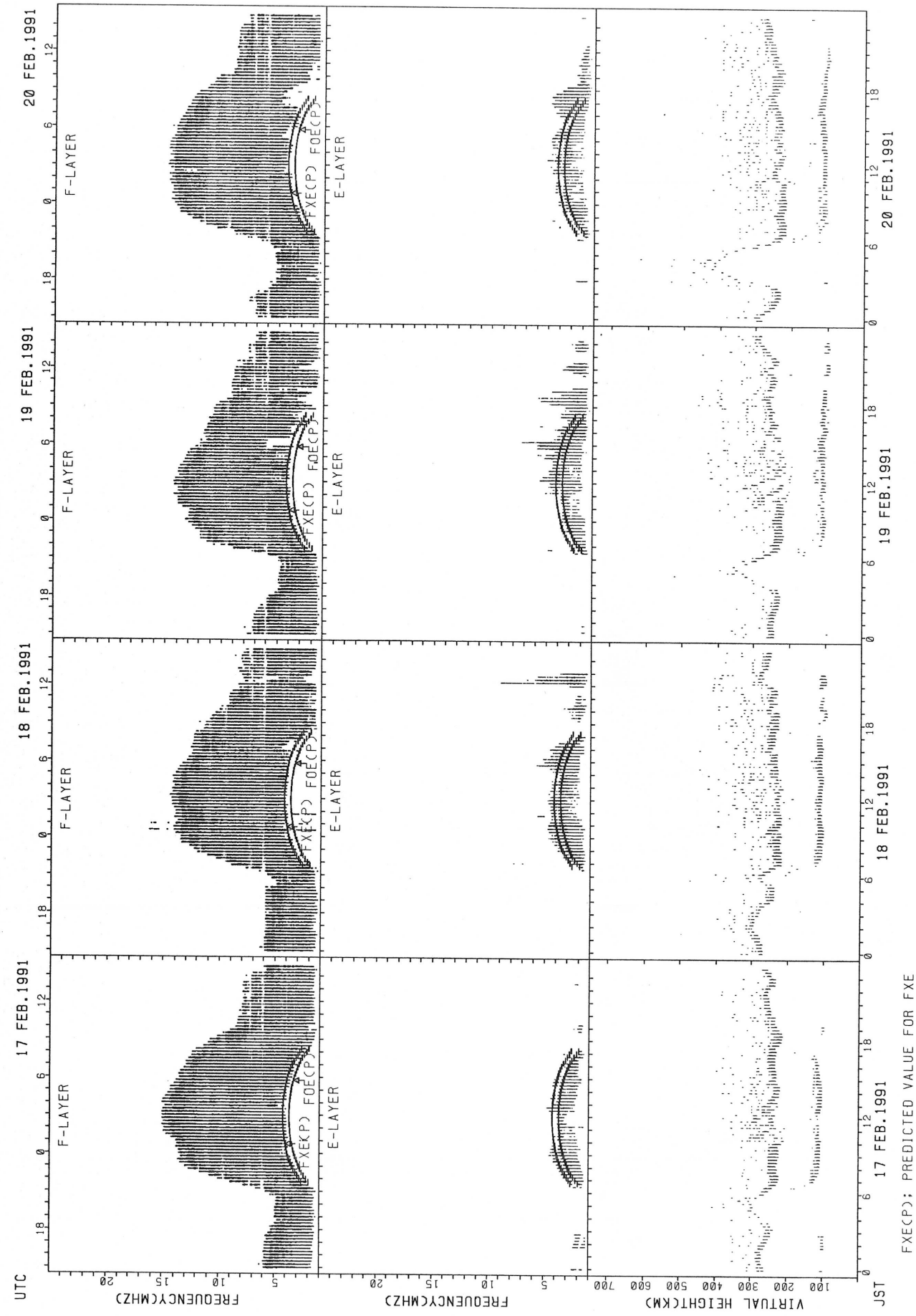
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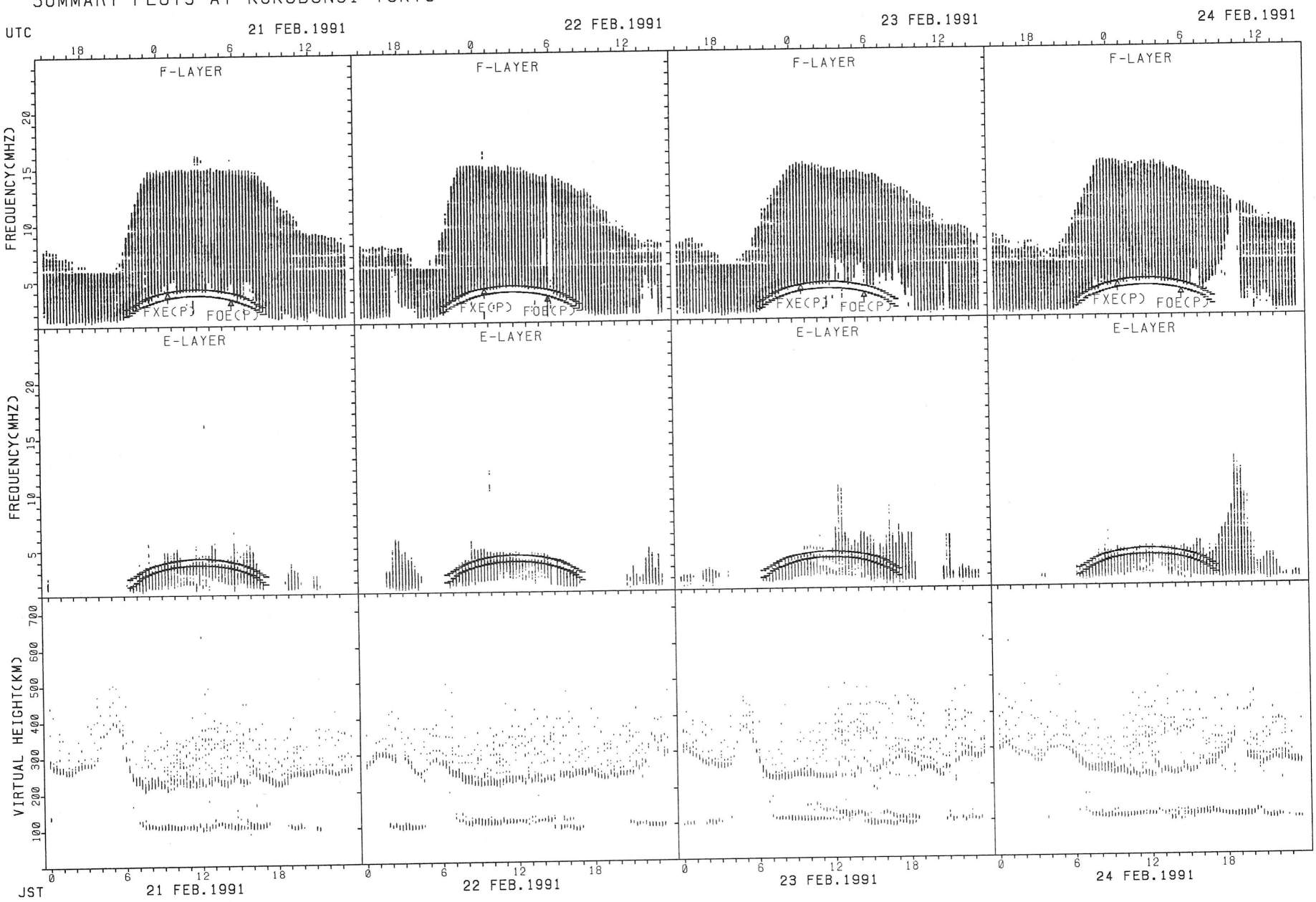
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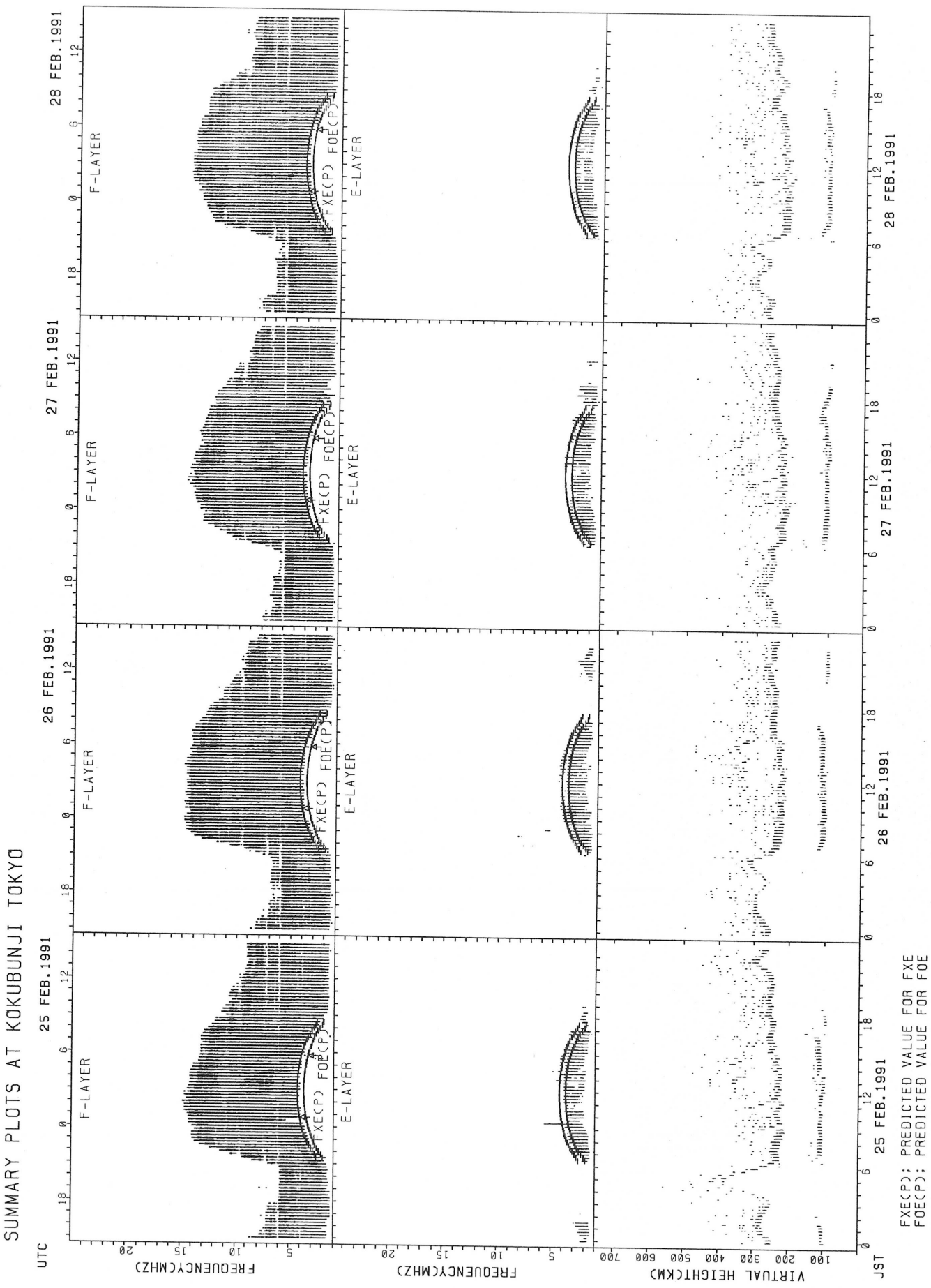
SUMMARY PLOTS AT KOKUBUNJI TOKYO
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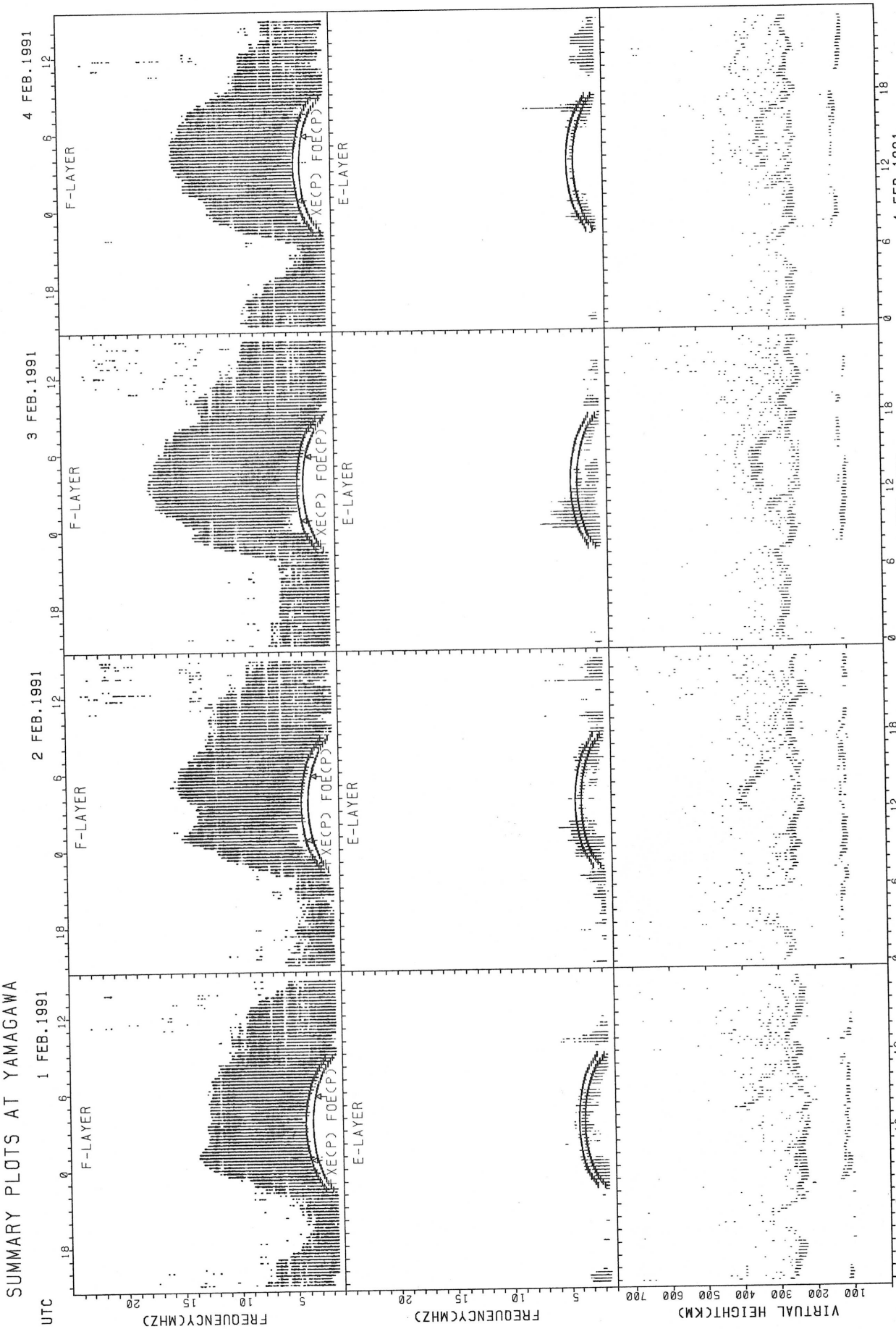
SUMMARY PLOTS AT YAMAGAWA
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3 FEB.1991
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VIRTUAL HEIGHT(KM)
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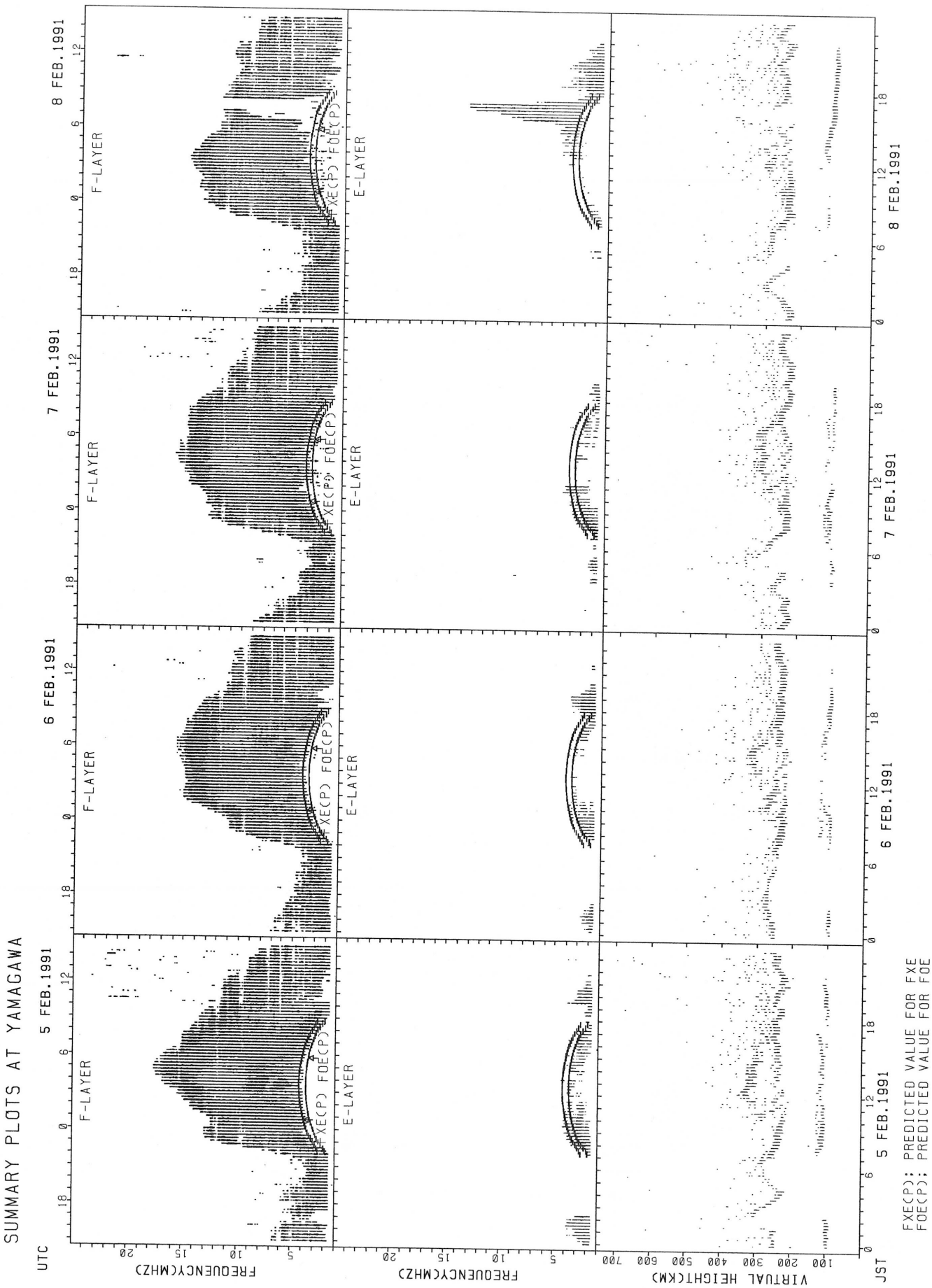
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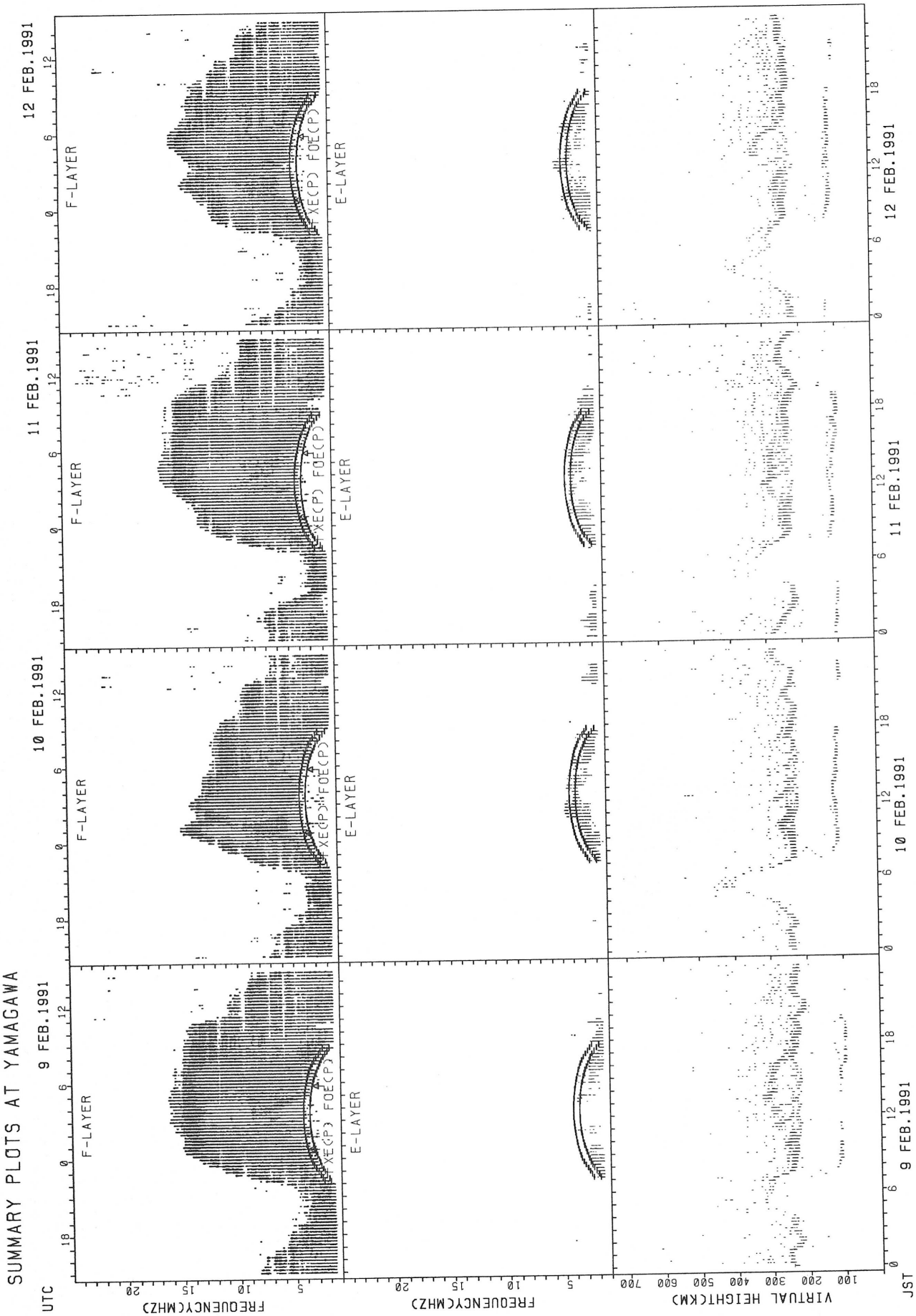
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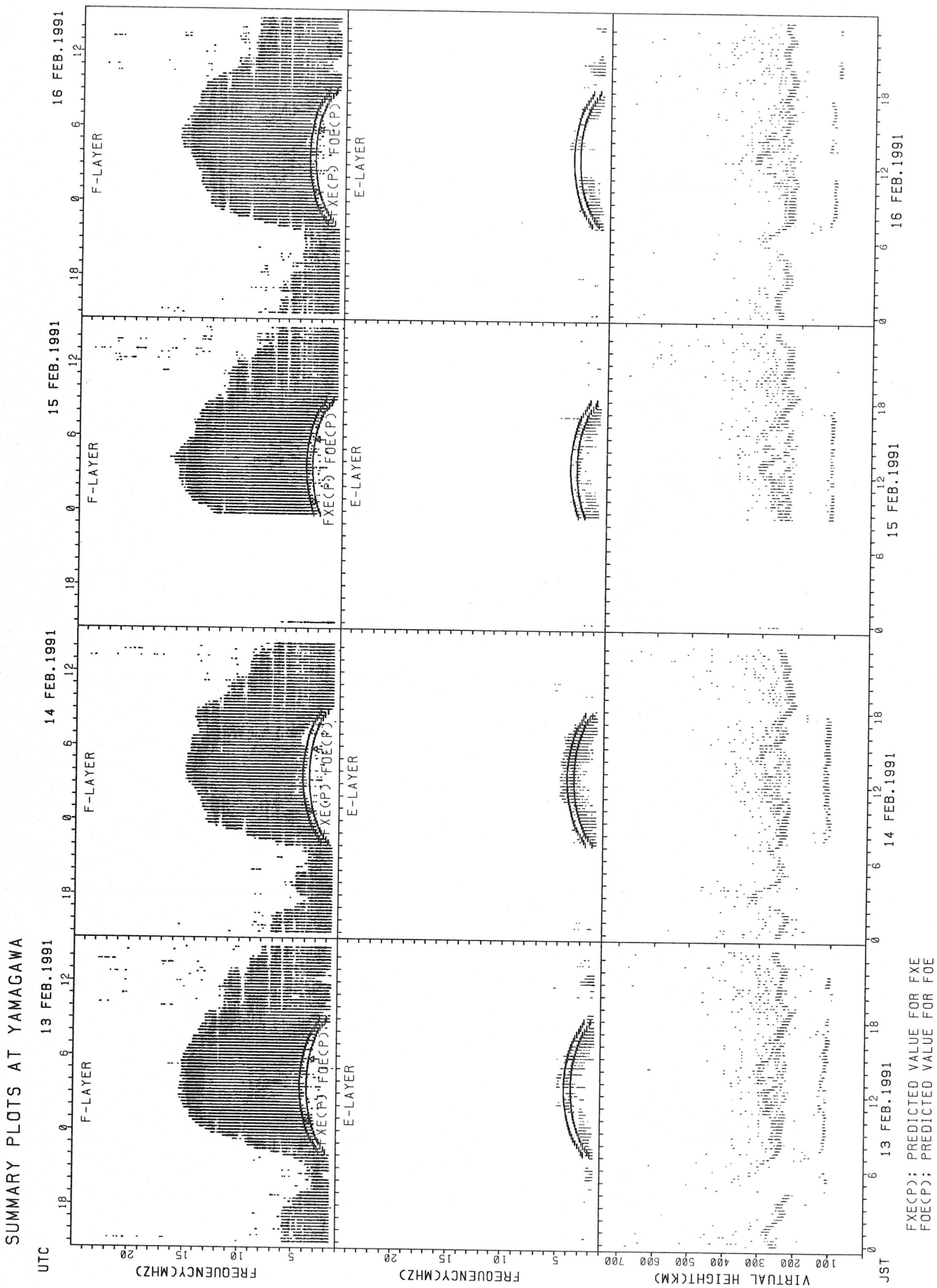
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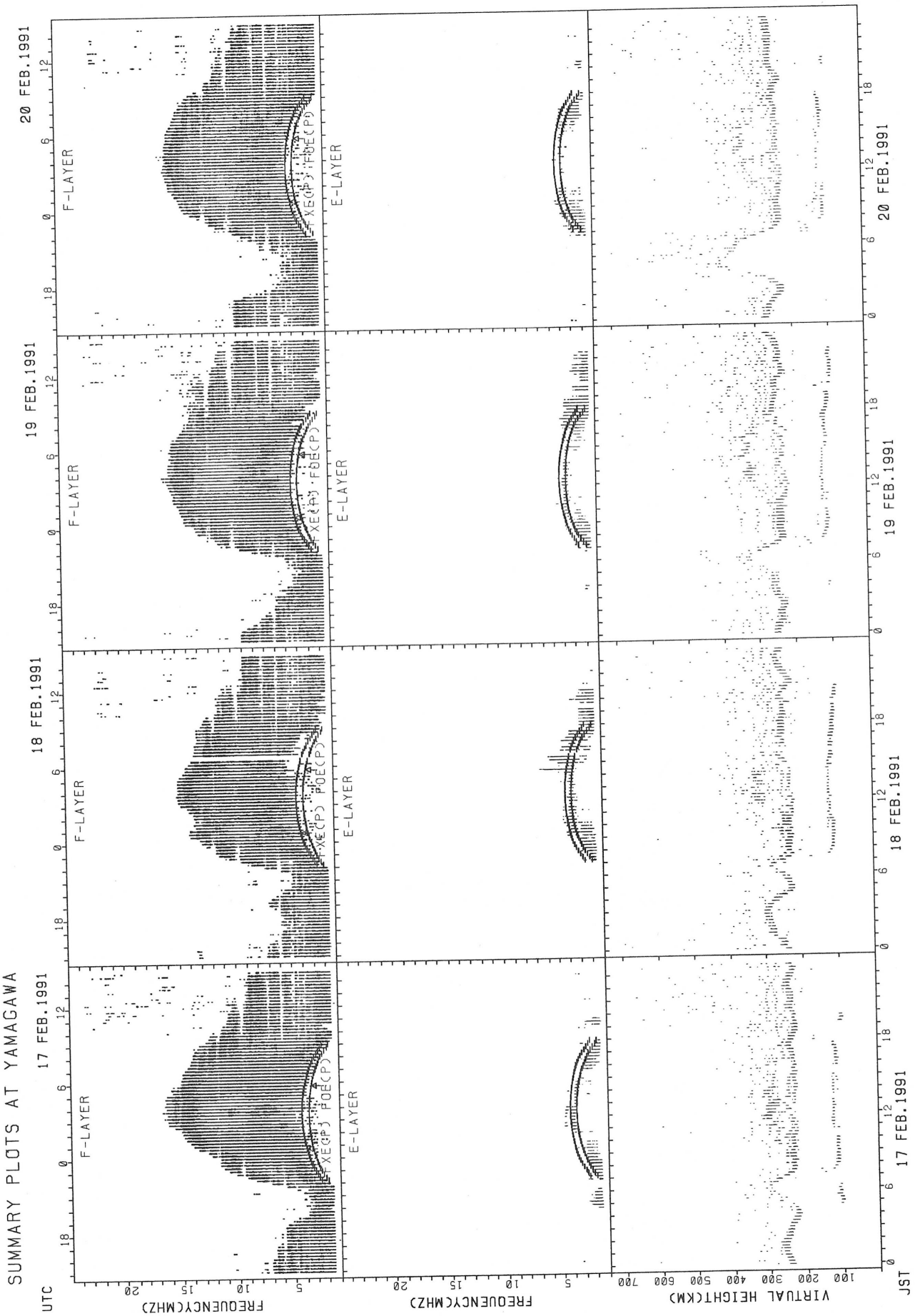
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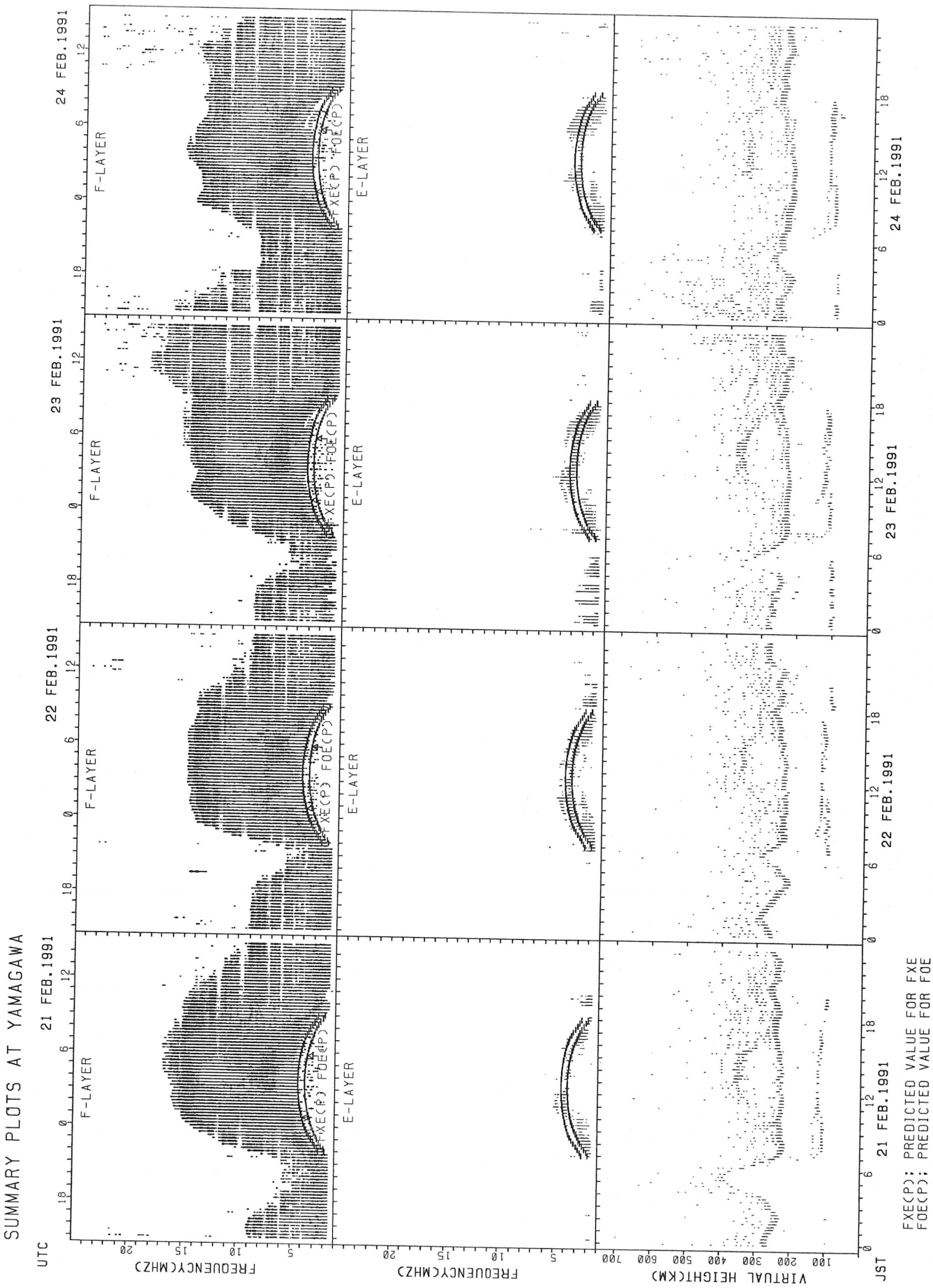
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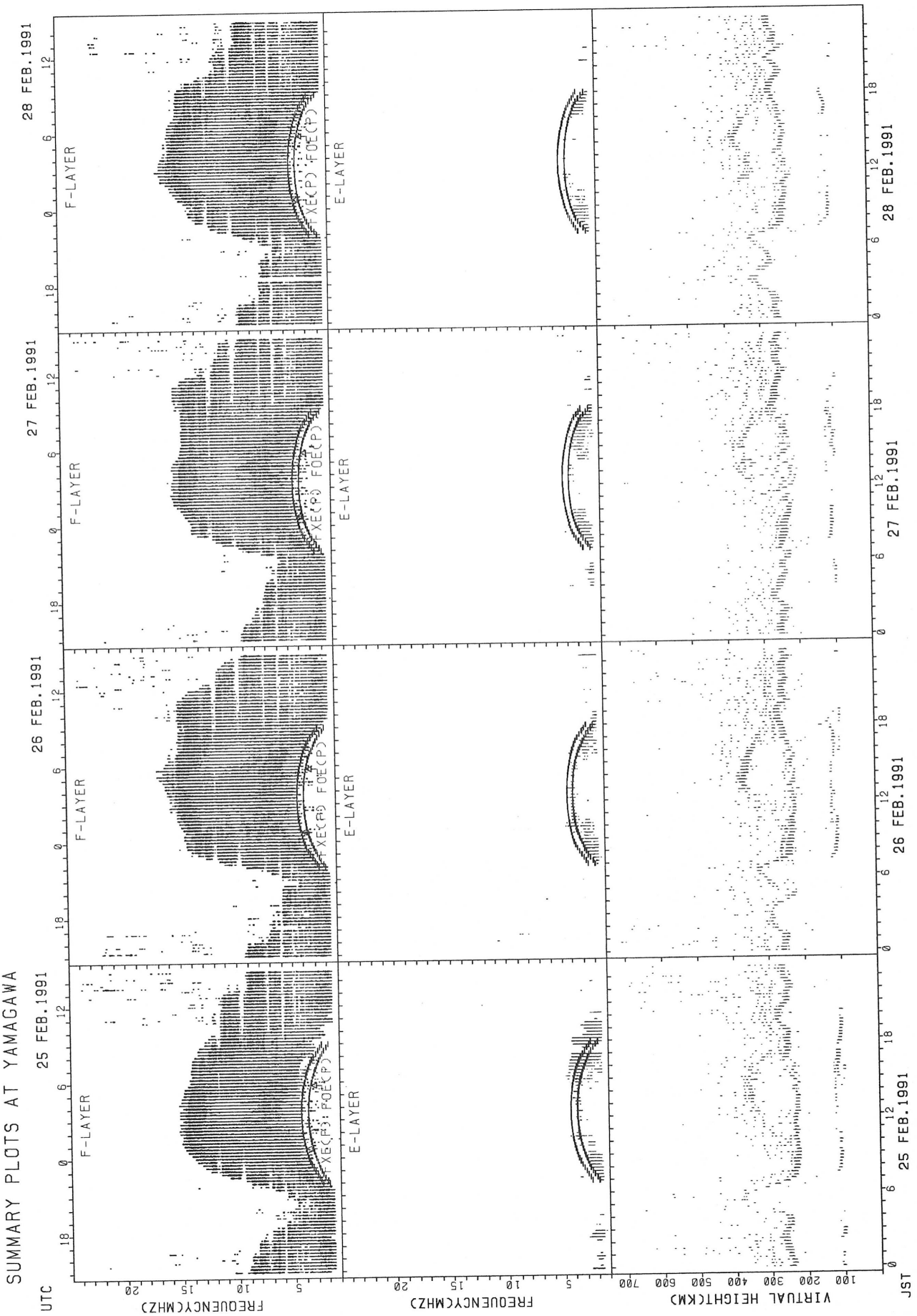
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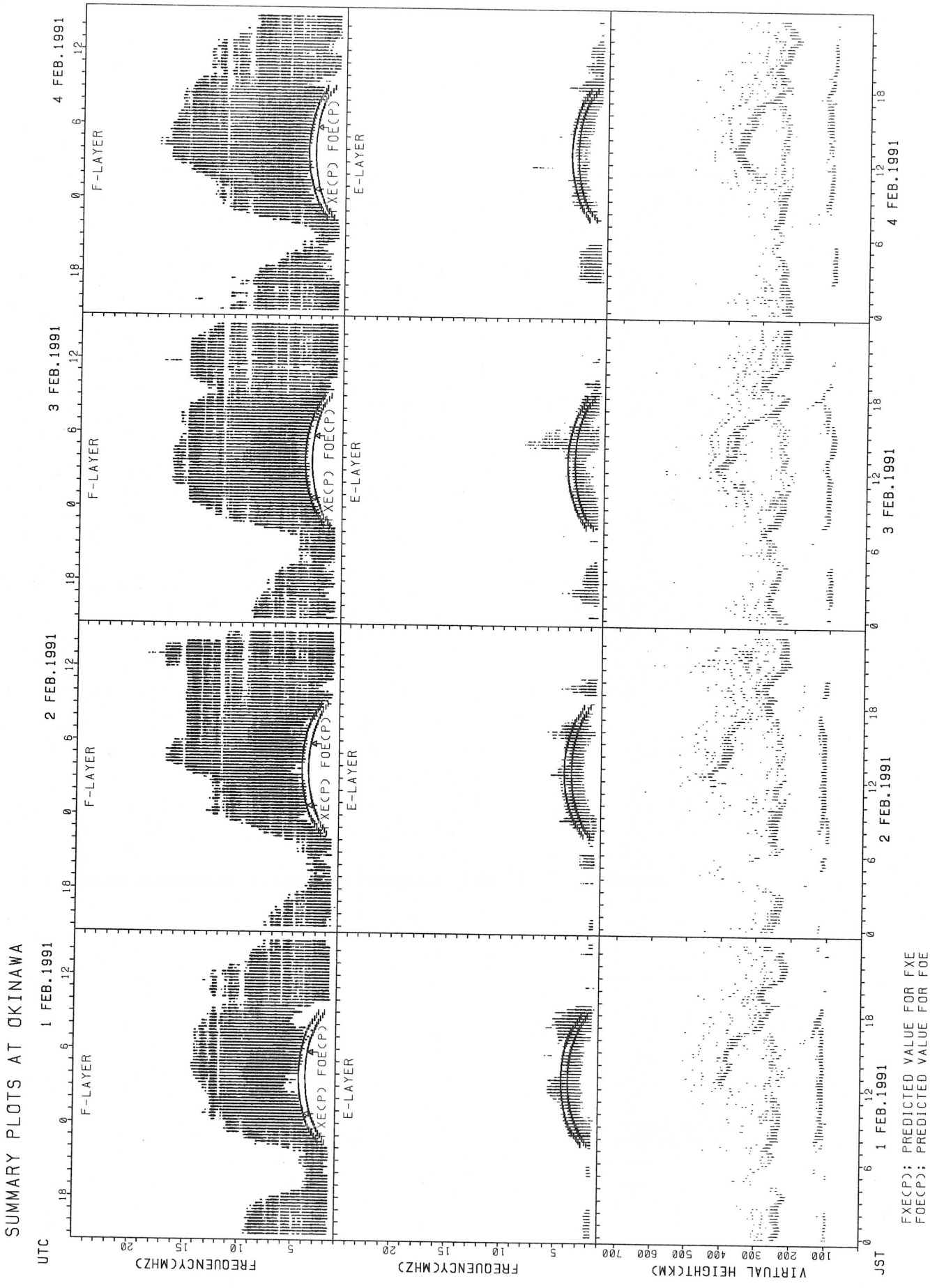
SUMMARY PLOTS AT OKINAWA
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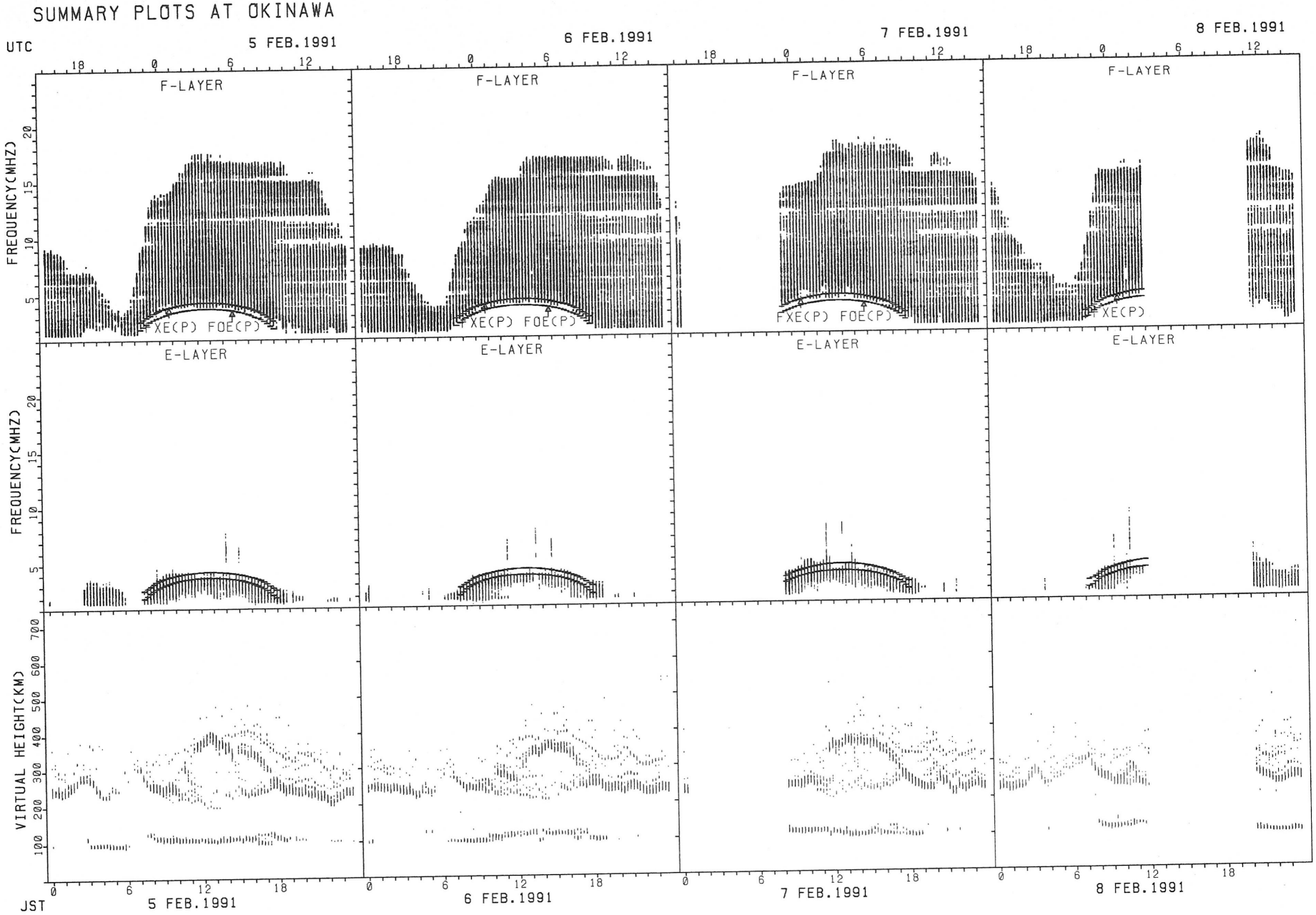
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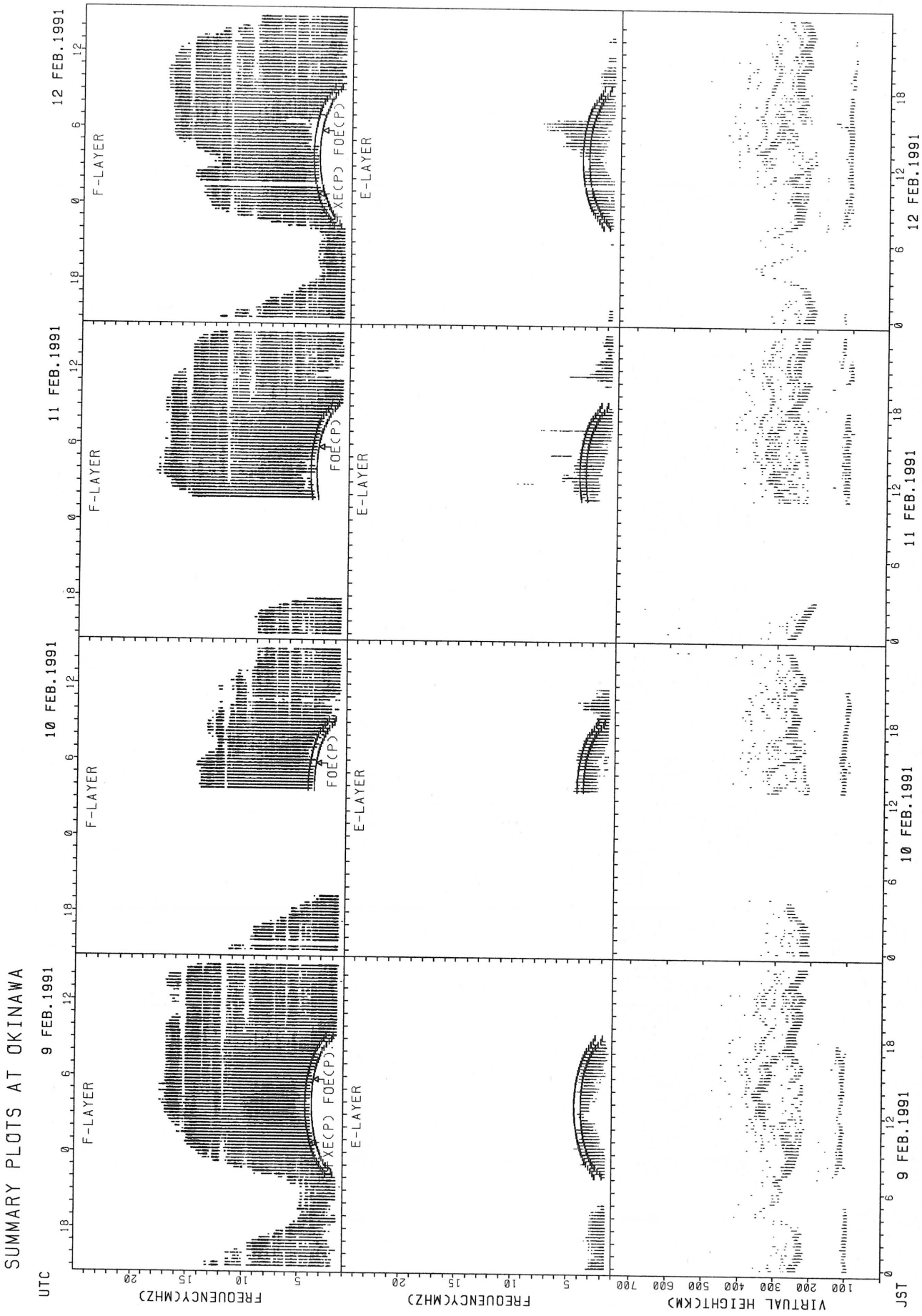
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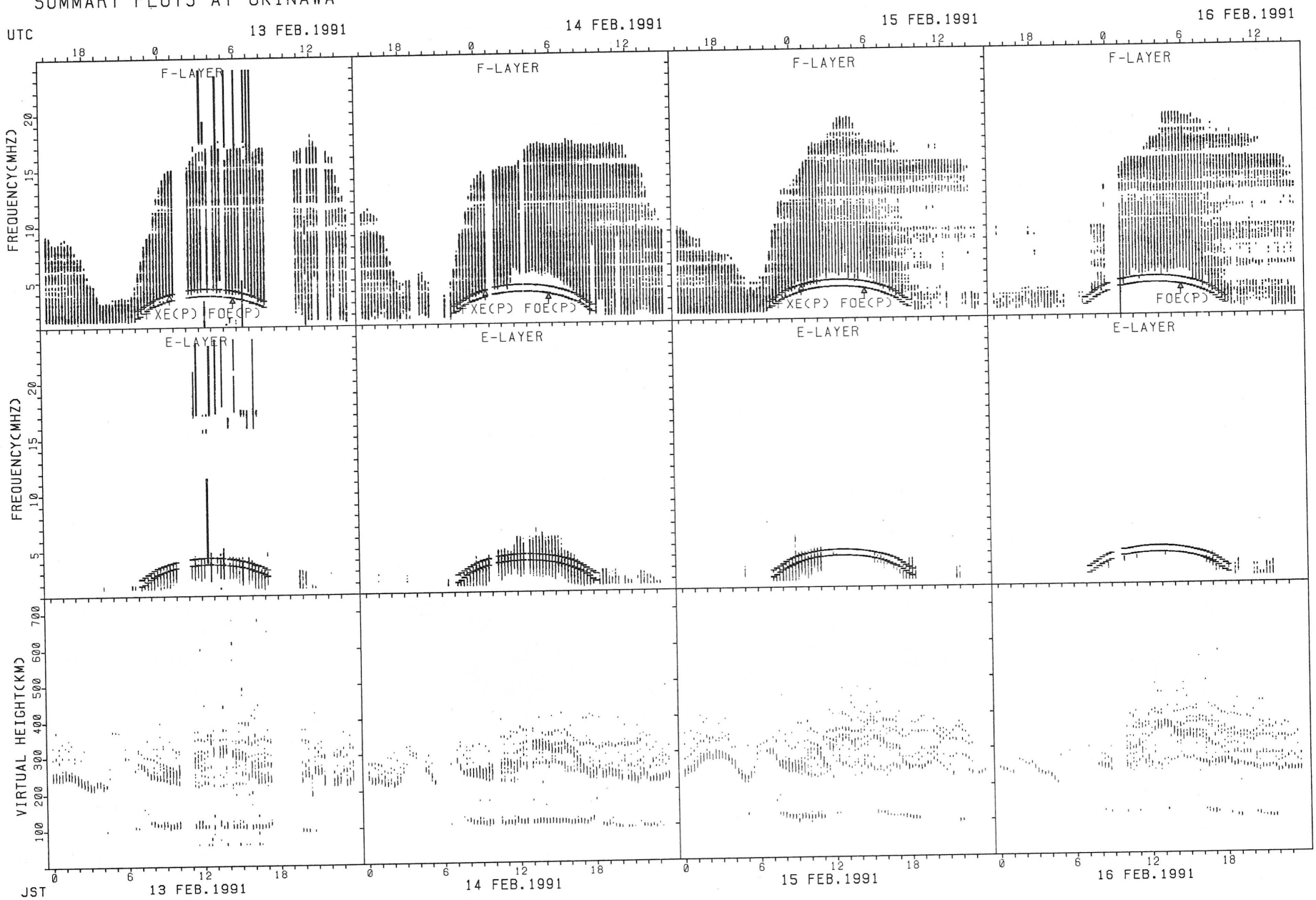

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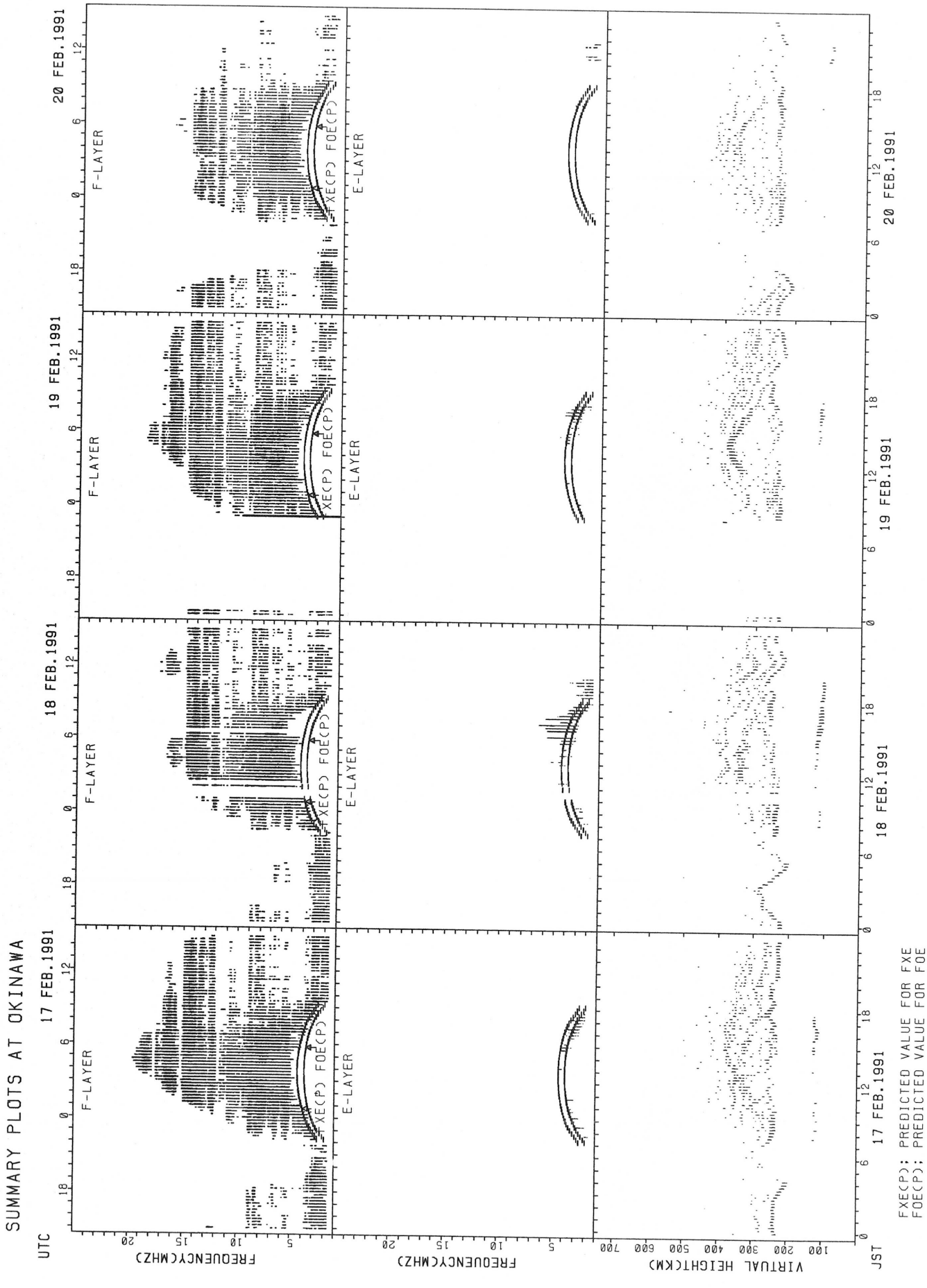
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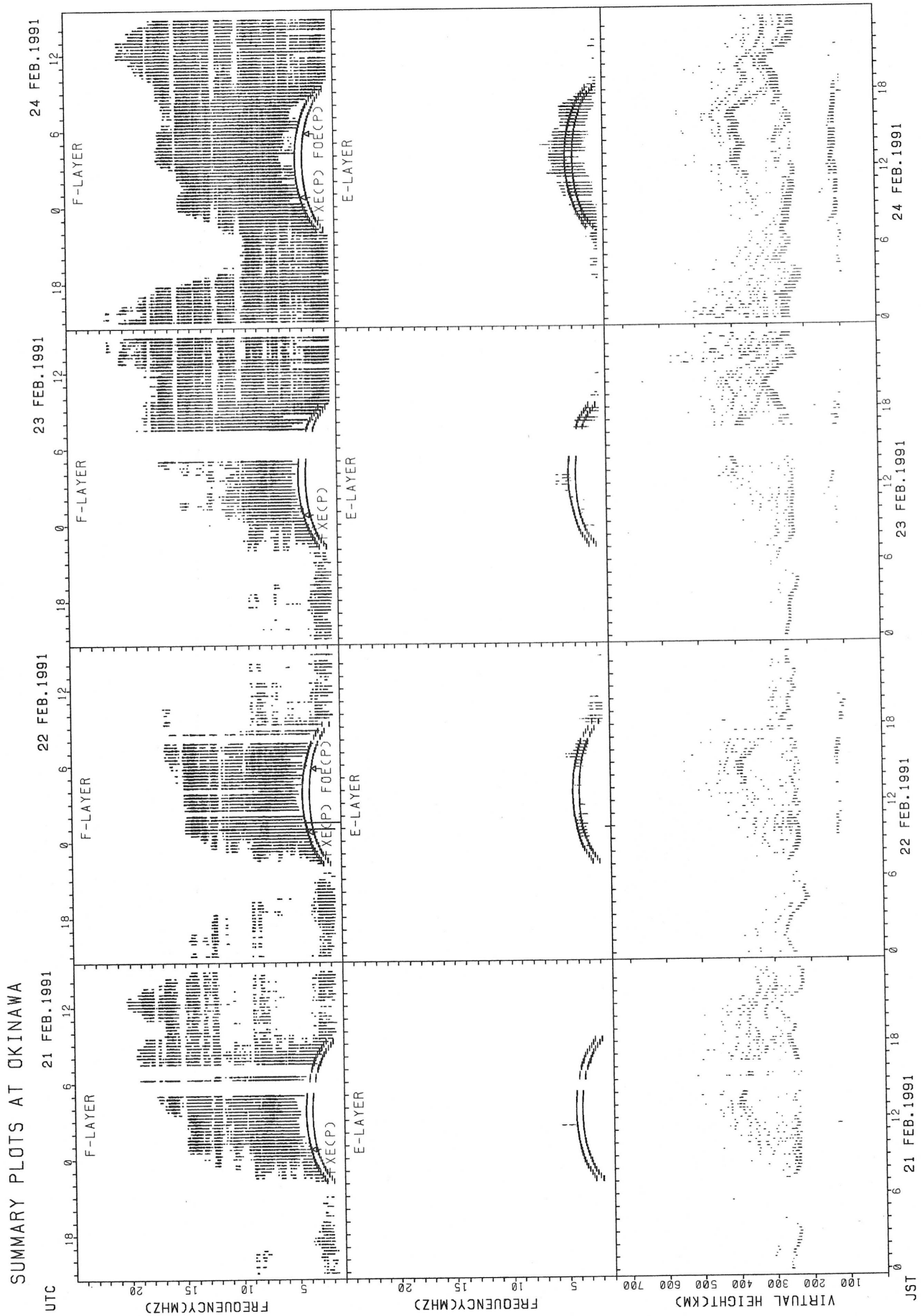
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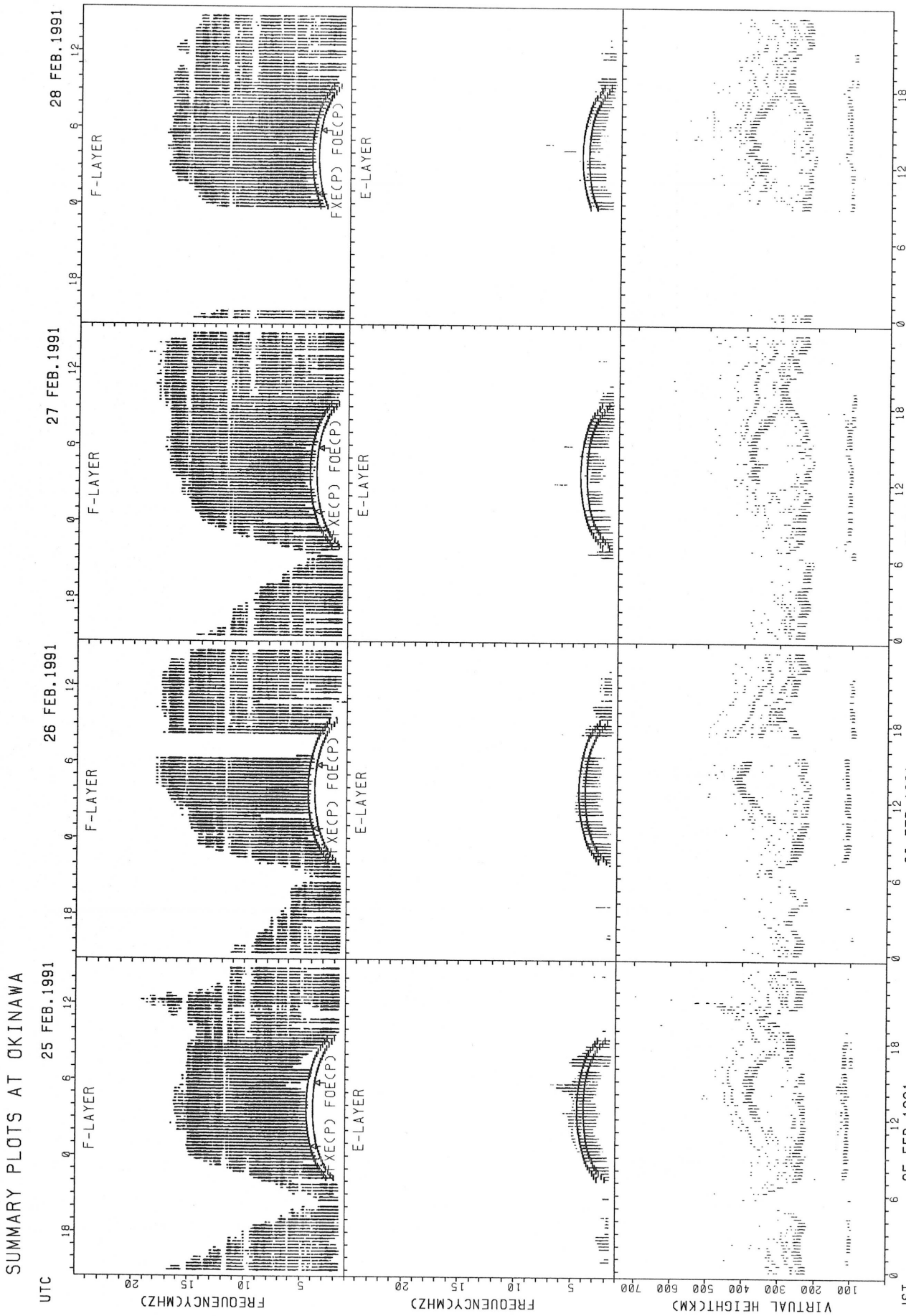
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
25 FEB.1991
26 FEB.1991
27 FEB.1991
28 FEB.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

MONTHLY MEDIANS OF H'F AND H'ES
FEB. 1991 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

H'F STATION WAKKANAI LAT. 45.4N LON. 141.7E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								27	31	31	31	29	26	31	31	31	31	31	30	25	13			
MED								258	230	230	236	234	240	244	248	254	250	268	275	284	284			
U Q								274	240	240	240	241	250	284	258	256	258	282	296	294	304			
L Q								246	226	226	228	226	232	236	244	248	246	248	260	269	174			

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
U Q																								
L Q																								

H'F STATION AKITA LAT. 39.7N LON. 140.1E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								25	31	31	31	24	19	25	30	31	29	25	18	13				
MED								270	244	246	254	260	266	280	286	286	284	288	307	316				
U Q								283	262	254	270	265	298	315	304	298	292	307	320	336				
L Q								253	232	232	238	250	250	263	270	272	270	280	292	312				

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								10		11							12	11	11					
MED								124		115							119	117	113					
U Q								304		272							221	316	322					
L Q								109		113							117	103	97					

H'F STATION KOKUBUNJI LAT. 35.7N LON. 139.5E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								29	31	31	31	19	13	20	31	30	31	31	30	26	22	17	12	10
MED								252	236	238	256	262	314	279	288	289	280	272	278	300	309	336	332	333
U Q								271	254	248	266	270	320	332	340	332	296	290	292	314	326	345	355	348
L Q								246	228	234	240	250	259	265	268	268	270	264	270	274	294	306	310	113

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	11							15	17	16	14	16	15	17	20	21	19	24	21	15	13	17	15	10
MED	107							137	119	118	116	115	125	115	122	115	121	117	109	109	111	107	107	104
U Q	378							177	128	143	163	131	167	128	127	120	131	128	117	117	237	118	109	348
L Q	103							113	114	113	113	114	115	113	116	112	113	111	105	103	106	101	103	101

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

MONTHLY MEDIANS OF H'F AND H'ES

FEB. 1991 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

H'F STATION YAMAGAWA LAT. 31.2N LON. 130.6E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	18	14	11					16	31	31	31	25	10		23	31	31	30	31	30	30	30	28	26
MED	309	312	306					296	244	240	246	256	324		314	328	308	283	268	281	295	285	304	300
U Q	340	334	328					313	252	244	256	275	354		348	350	334	306	290	298	320	304	321	314
L Q	286	298	125					288	238	234	240	247	256		276	278	284	264	252	266	268	274	288	282

H'ES

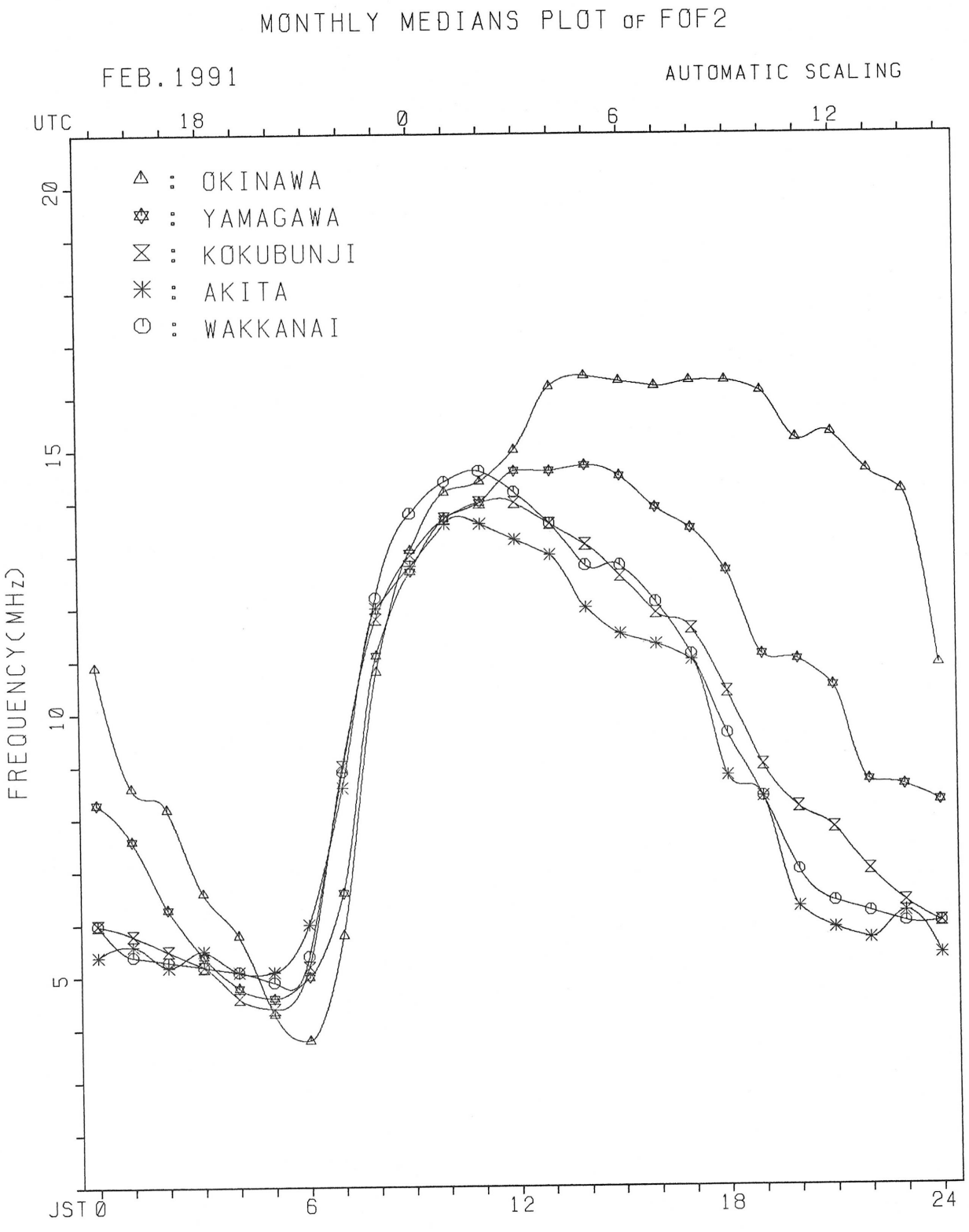
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								10	10	13	12	14		10	10	16	17	14	14	14	12			
MED								162	127	117	117	120		125	124	120	119	117	110	110	105			
U Q								324	282	210	242	133		376	360	122	123	119	262	272	322			
L Q								119	115	113	113	113		119	119	115	115	113	103	105	102			

H'F STATION OKINAWA LAT. 26.3N LON. 127.8E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	24	20	17	10					26	28	27	23			12	30	27	29	29	26	27	29	28	28
MED	278	280	278	279					265	254	278	274			360	360	342	320	290	297	302	276	272	276
U Q	296	302	316	298					278	272	328	320			370	380	364	343	308	330	354	313	294	310
L Q	256	265	252	266					258	246	254	262			352	326	320	291	268	262	272	262	256	263

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									17	18	22	17	12	14	13	22	21	22	19	18	11			
MED									137	119	119	119	122	115	115	122	119	116	113	110	105			
U Q									271	244	254	253	258	121	244	318	231	125	270	258	374			
L Q									115	113	115	113	115	115	113	113	115	113	109	105	103			


MONTHLY MEDIANS PLOT OF FOF2
FEB. 1991
AUTOMATIC SCALING
UTC
18
0
6
12
△ : OKINAWA
✡ : YAMAGAWA
⧖ : KOKUBUNJI
✳ : AKITA
◷ : WAKKANAI
FREQUENCY(MHz)
20
15
10
5
JST 0
6
12
18
24

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1991 FXI (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	X 73	X 71	X 54	X 47	X 48	X 50	X 47												X 97	X 98	X 84	X 84	X 77	X 65
2	X 61	X 61	X 57	X 51	X 50	X 51	X 56												X 107	X 101	X 93	X 88	X 71	X 66
3	X 61	X 61	X 60	X 59	X 57	X 57	X 63												X 123	X 111	X 80	X 65	X 65	X 62
4	X 56	X 57	X 57	X 55	X 46	X 46	X 51												X 93	X 90	X 85	X 72	X 65	X 63
5	X 57	X 50	X 48	X 52	X 52	X 49	X 52												X 96	X 88	X 78	X 63	X 65	X 63
6	X 60	X 54	X 54	X 55	X 51	X 49	X 53												X 112	X 99	X 91	X 91	X 87	X 82
7	X 74	X 66	X 59	X 54	X 47	X 47	X 52												X 106	X 99	X 84	X 66	X 69	X 68
8	X 64	X 58	X 56	X 54	X 53	X 52	X 55												X 104	X 90	X 88	X 84	X 73	X 71
9	X 68	X 73	X 68	X 66	X 52	X 52	X 55												X 114	X 100	X 80	X 79	X 72	X 63
10	X 58	X 58	X 58	X 44	X 41	X 38	X 42												X 99	X 91	X 89	X 82	X 66	X 68
11	X 68	X 73	X 75	X 60	X 39	X 39	X 44												X 111	X 96	X 88	X 74	X 72	X 70
12	X 60	X 52	X 46	X 38	X 40	X 40	X 44												X 91	X 86	X 82	X 67	X 69	X 66
13	X 60	X 59	X 62	X 60	X 41	X 41	X 44												X 89	X 78	X 73	X 69	X 63	X 52
14	X 51	X 52	X 49	X 49	X 48	X 46	X 47												X 104	X 91	X 76	X 64	X 61	X 58
15	X 55	X 53	X 52	X 52	X 53	X 51	X 57												X 106	X 83	X 85	X 66	X 63	X 64
16	X 64	X 62	X 60	X 56	X 55	X 53	X 59												X 108	X 92	X 84	X 80	X 77	X 71
17	X 65	X 62	X 60	X 56	X 51	X 52	X 60												X 110	X 87	X 82	X 81	X 80	X 75
18	X 67	X 65	X 61	X 60	X 63	X 56	X 59												X 116	X 104	X 95	X 86	X 85	X 82
19	X 78	X 74	X 69	X 59	X 50	X 50	X 54												X 108	X 96	X 95	X 90	X 78	X 76
20	X 73	X 76	X 71	X 55	X 54	X 55	X 67												X 122	X 105	X 90	X 89	X 88	X 85
21	X 80	X 76	X 72	X 68	X 63	X 64													X 132	X 117	X 104	X 95	X 91	X 89
22	X 80	X 80	X 81	X 78	X 70	X 66													X 129	X 114	X 99	X 91	X 84	X 82
23	X 81	X 84	X 77	X 71	X 65	X 69													X 128	X 116	X 108	X 97	X 95	X 90
24	X 85	X 82	X 76	X 77	X 71	X 74													X 123	X 112	X 111	X 101	X 99	X 96
25	X 85	X 76	X 74	X 67	X 62	X 61													X 118	X 108	X 107	X 99	X 91	X 90
26	X 89	X 80	X 73	X 67	X 71	X 71													X 129	X 118	X 108	X 102	X 100	X 94
27	X 82	X 74	X 73	X 69	X 67	X 65													X 128	X 119	X 110	X 101	X 91	X 89
28	X 83	X 82	X 72	X 71	X 73	X 70													X 132	X 113	X 99	X 96	X 94	X 93
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	20												28	28	28	28	28	28
MED	X 68	X 66	X 60	X 58	X 52	X 52	X 54												X 110	X 99	X 88	X 84	X 77	X 71
U Q	X 80	X 76	X 72	X 67	X 63	X 62	X 58												X 123	X 112	X 99	X 93	X 90	X 87
L Q	X 60	X 58	X 56	X 53	X 48	X 48	X 47												X 104	X 90	X 83	X 70	X 68	X 64

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1991 FOF2 (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	67	65	48	41	42	44	41	76	102	128	138	133	119	113	115	112	108	99	91	93	78	78	71	59
2	55	55	52	45	44	45	50	85	121	128	148	141	128	127	129	124	116	106	101	95	87	82	U S 64	60
3	56	55	55	53	53	51	57	96	118	133	147	155	U S 155	U R 158	S 154	U S 156	136	123	117	105	S 73	59	59	56
4	50	51	51	49	40	40	45	87	102	126	133	125	120	119	116	108	105	93	87	84	79	66	59	57
5	51	44	R 42	46	46	43	46	90	110	114	126	126	129	135	130	124	114	100	90	82	72	57	59	57
6	54	48	48	49	45	43	48	84	107	123	140	152	149	147	145	142	133	124	106	93	85	85	81	76
7	68	60	53	48	41	41	46	89	116	120	128	141	135	133	127	124	116	110	99	93	77	60	63	62
8	58	52	50	48	47	46	49	88	113	127	128	133	131	127	113	113	108	105	98	84	82	U S 78	67	65
9	62	67	62	60	47	46	49	91	117	137	140	139	141	137	135	124	122	118	108	94	74	73	66	57
10	52	52	52	38	35	32	36	75	105	120	129	134	127	120	109	105	108	102	93	85	83	76	61	62
11	62	67	69	54	33	33	38	75	116	119	121	137	144	140	137	131	119	109	106	90	82	68	66	64
12	54	46	40	32	34	34	38	85	99	106	115	131	132	123	122	122	113	102	85	80	76	61	63	61
13	54	53	56	54	35	35	38	75	102	124	137	140	139	131	126	120	118	108	83	71	67	63	57	46
14	45	46	43	43	42	40	41	S 75	108	128	129	130	136	131	129	117	113	112	S 98	85	70	58	55	52
15	49	47	46	46	47	45	51	90	112	136	137	143	146	142	133	125	118	113	100	77	79	60	57	58
16	58	56	54	50	49	47	53	98	125	136	131	141	147	144	143	129	118	111	102	86	78	74	71	65
17	59	56	54	50	45	46	54	95	125	129	133	145	154	149	141	132	125	119	104	81	76	75	74	69
18	61	59	55	54	57	50	53	93	119	130	135	136	139	137	136	127	121	119	110	98	89	80	79	76
19	72	68	64	53	44	44	48	97	114	127	131	140	140	137	128	118	112	109	R 102	90	89	84	72	70
20	67	70	65	49	48	49	61	101	129	141	144	147	149	146	144	139	131	126	116	99	84	83	82	79
21	74	70	66	62	57	58	65	109	141	148	154	R 157	R 156	R 155	R 152	149	146	140	126	111	98	89	85	83
22	74	74	75	72	64	60	69	115	147	R 153	149	147	147	144	138	I C 136	130	126	123	108	93	85	78	76
23	75	78	71	65	59	63	78	103	126	142	149	145	142	139	138	135	131	126	122	R 110	R 102	91	89	S 84
24	79	76	70	71	65	68	84	111	138	S 153	144	144	147	144	140	134	126	123	117	106	105	95	93	90
25	79	70	68	61	56	55	69	108	136	136	141	146	142	138	134	129	127	121	R 112	102	101	93	85	84
26	83	74	67	61	65	65	72	117	144	147	148	149	146	147	146	138	138	129	123	R 112	102	96	94	88
27	76	68	67	63	61	59	74	109	130	132	139	144	141	139	133	131	128	126	122	113	104	95	85	83
28	77	77	67	65	67	64	S 74	114	126	133	136	150	147	144	141	137	130	128	126	107	93	90	88	87
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
MED	62	60	55	52	47	46	50	92	118	130	137	141	142	138	134	128	120	116	105	93	82	78	71	65
U Q	74	70	67	61	57	56	67	106	128	136	144	146	147	144	141	136	130	125	117	106	93	87	84	81
L Q	54	52	50	47	42	42	46	85	109	125	130	135	134	131	128	121	114	107	98	84	76	64	62	58

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1991 FOF1 (0.01MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											L		L	U L 665	L	L								
2													U L 715	L 690	L									
3											L		L	L	U L 685	L								
4										L	L		L	L	L	L								
5												L	L	L	L	L								
6										L	L	L	L	L	L	L								
7											L	L		L	L									
8												L	L	L	L									
9											L		L	L										
10											L	L	L	L	A									
11													L	L	L	L								
12												L	L	L										
13										L	L	L	L	L	L	L								
14									L		L		L	L	L									
15											L		L	L	L	L								
16										L	L	L	L	L	L	L								
17										L		L	L	L	L									
18													L	L										
19										L		L	U L 690	L	L									
20											L	L	L	L	L	L	L							
21									L		L		L	L	L	L	L							
22													L	L	U L 765	C								
23													L	L	U L 765	L								
24										L		U L 690	L	U L 770	L	L	L							
25										L	L	L	L	U L 800	L	L	L							
26										L	L	L	L	U L 845	L 710	L 700	L							
27										L	L	L	L	L	L	L								
28										L	L	U L 655	L	L	U L 755	L	L							
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT												2	2	5	5	1								
MED												U L 672	U L 702	U L 770	U L 755	L 700								
U Q														U L 822	U L 765									
L Q														L 678	L 698									

FEB. 1991 FOF1 (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1991 FOE (0.01MHZ) 135° E MEAN TIME (G.M.T. + 9H)

LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								200	285	335	365	385	395	380	365	340	H 275	165						
2								200	300	340	370	380	390	A	365	330	A 260	A						
3								A	285	340	360	385	385	375	345	330	275	165						
4								175	295	345	370	400	395	380	370	330	275	200						
5								H 195	280	340	370	380	375	360	350	330	H 260	190						
6								200	285	330	350	370	380	370	350	325	270	A						
7								195	290	340	355	370	380	375	345	310	265	190						
8								215	285	325	355	R 375	R 380	365	350	325	265	A						
9								H 210	270	315	340	345	B	360	345	320	265	B						
10								195	275	320	350	365	370	360	345	A	A	A 160						
11								H 205	275	320	350	380	380	370	345	320	255	170						
12								190	275	320	355	U A 365	380	390	A 350	U A 315	A	B						
13								200	A	A	350	370	365	A	355	335	270	195						
14								205	275	320	350	380	390	375	355	330	A	A						
15								H 215	300	340	360	380	380	370	345	325	275	205						
16								220	300	350	A	A	A	A	355	A	300	A						
17								225	305	330	340	380	390	385	365	345	280	200						
18								205	300	A	A	385	395	395	375	365	A	205						
19								H 240	H 310	H 350	385	395	405	400	385	A 350	A	A						
20								240	310	U A 345	U A 370	385	400	400	375	A	300	A						
21							B	220	305	A	A	385	405	400	390	360	A	A						
22							B	235	300	A 340	370	U A 385	405	390	380	I C 355	305	A						
23							B	H 240	300	340	370	370	405	400	390	A	315	A						
24							B	210	A	340	A	385	400	390	375	350	A 310	205						
25							B	235	305	345	370	390	400	395	380	355	305	H 225						
26							B	235	305	350	U A 370	390	400	390	380	345	305	230						
27							B	215	300	340	360	380	395	375	365	335	300	A 185						
28							B	245	310	340	370	385	390	375	370	340	285	A						
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								27	26	25	24	27	26	25	28	24	22	15						
MED								210	300	340	360	380	390	380	365	332	275	195						
U Q								235	305	342	370	385	400	392	375	348	300	205						
L Q								200	285	328	350	370	380	370	350	325	265	170						

FEB. 1991 FOE (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1991 FOES (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 14	E B 14	E B 13	E B 14	E B 15	J A 14	E B 15	G	30	G	G 25	G	45	G	G	43	J A 47	J A 36	J A 49	J A 32	E B 13	E B 14	E B 15	E B 14
2	E B 13	E B 14	J A 17	J A 13	19	J A 14	E B 13	J A 23	G 25	G 26	G 27	G	42	42	G	G	J A 48	J A 27	J A 50	J A 53	J A 47	J A 51	J A 21	J A 21
3	E B 14	E B 13	E B 13	E B 13	E B 14	E B 14	J A 26	J A 28	G 27	J G 31	G 24	G	G 20	G	G 26	35	G	G	J A 24	E B 13	E B 14	20	J A 25	J A 31
4	J A 23	24	E B 16	E B 15	E B 13	E B 13	J A 14	J A 22	G	G 20	G	G 30	J A 39	G 30	J A 40	G 20	G	J A 29	J A 48	E B 14	E B 14	J A 17	J A 15	19
5	J A 19	J A 21	20	19	E B 14	J A 15	E B 13	G	G	G	G 23	G 23	G 23	G	G	G	G	J A 22	J A 24	J A 22	J A 45	E B 14	E B 14	E B 15
6	J A 25	J A 20	E B 16	E B 15	E B 15	E B 14	E B 14	26	G 27	G	G	G 34	G	G	G	G	G	23	J A 25	J A 42	E B 14	J A 17	J A 42	J A 30
7	J A 26	J A 21	J A 18	E B 16	20	E B 13	E B 13	J A 23	G 26	G 28	J A 48	J A 42	G 21	G	G	G	G	G	J A 19	E B 14	J A 17	J A 37	J A 26	E B 15
8	J A 19	E B 14	E B 15	E B 14	E B 13	E B 13	E B 14	G	G	G	G	G	G	39	J A 51	G 22	29	25	J A 25	E B 14	21	J A 18	E B 13	E B 13
9	25	J A 21	J A 21	E B 14	E B 13	E B 14	E B 14	G	G	36	G	G	E B 40	G 25	G 27	G 29	J A 49	J A 23	E B 15	E B 14	E B 14	E B 14	E B 14	E B 14
10	E B 14	E B 13	E B 13	E B 13	E B 15	E B 14	E B 14	G	G	G	38	43	42	38	J A 73	37	J A 30	18	E B 16	E B 14	E B 15	J A 22	J A 22	E B 16
11	E B 13	E B 13	E B 13	E B 14	E B 13	E B 13	E B 14	G	G	G	G	G	G	G	G	G	G	G	E B 13	E B 14	E B 15	E B 13	E B 15	E B 13
12	E B 13	E B 13	E B 14	E B 14	E B 14	E B 14	J A 14	G	31	36	39	39	41	42	38	36	32	21	J A 19	J A 30	J A 23	28	24	J A 20
13	E B 16	E B 16	E B 14	E B 13	J A 21	E B 14	E B 14	J A 28	34	34	38	G	43	38	45	G	J A 39	27	J A 22	J A 26	J A 26	E B 14	21	E B 14
14	E B 14	E B 14	E B 14	E B 16	J A 17	E B 14	E B 15	G	G	G	G	G	G	G	G	G	J A 37	J A 33	J A 33	E B 14	J A 27	18	E B 15	E B 14
15	E B 15	E B 14	E B 13	E B 14	E B 14	E B 14	E B 15	G	G	G	G	G	G	G	G	G	30	G	E B 14	E B 16	J A 16	E B 17	E B 14	E B 14
16	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	G	39	40	39	38	G 36	35	G 29	J A 52	J A 48	E B 15	J A 18	E B 14	J A 19	E B 16
17	J A 19	J A 19	J A 18	E B 13	E B 13	E B 13	E B 13	G	G	J A 41	39	G	G 35	J G 37	G	G	G	G	E B 15	21	E B 14	E B 14	E B 16	E B 13
18	E B 14	E B 13	E B 16	E B 13	E B 13	E B 14	E B 15	G	G	J A 42	J A 42	G	G	G	G	J A 48	J A 40	23	E B 15	J A 19	J A 20	J A 27	J A 31	E B 15
19	E B 13	E B 14	E B 14	E B 13	E B 13	E B 14	E B 13	G	G	G 34	G	G	48	J A 44	J A 51	J A 54	34	J A 28	J A 30	J A 35	E B 14	J A 32	E B 14	J A 22
20	E B 14	E B 14	E B 14	J A 21	E B 15	E B 15	E B 13	G	G	38	39	G 38	45	43	44	36	36	J A 43	39	J A 19	J A 20	21	E B 14	E B 13
21	J A 21	E B 13	E B 14	E B 13	E B 13	E B 14	E B 14	G	J A 53	36	J A 45	G	G	50	G	G 31	J A 49	23	E B 14	J A 27	J A 19	J A 21	E B 17	E B 16
22	E B 14	E B 13	J A 27	J A 42	J A 28	E B 14	E B 14	G	34	J A 43	J A 41	G 38	G	G	G	C	G 21	24	E B 14	E B 14	E B 14	E B 15	24	31
23	J A 15	22	J A 21	J A 19	E B 13	E B 15	E B 14	G	G	G	42	40	48	J A 55	47	J A 51	J A 42	J A 49	J A 54	E B 14	E B 14	J A 22	J A 21	J A 19
24	E B 14	E B 13	E B 14	E B 13	E B 13	E B 14	E B 14	G	J A 41	37	38	G 37	G	G	G 28	G	J A 44	J A 34	65	J A 111	J A 52	J A 27	J A 26	18
25	23	J A 19	E B 13	E B 13	E B 13	E B 15	E B 14	G	G 28	G 34	G	G	G	G 24	G	G	G	27	J A 19	E B 14	E B 13	E B 14	E B 15	E B 14
26	E B 15	E B 13	E B 13	E B 14	E B 14	E B 13	E B 13	G	G	G	G 36	G	G	G 27	G	G	G	G	E B 15	E B 13	E B 15	21	J A 25	20
27	E B 14	E B 13	E B 13	E B 13	E B 14	E B 13	E B 13	G 21	36	G	G	G	G	G	G 26	G 20	32	25	J A 22	J A 26	E B 13	J A 17	E B 14	E B 13
28	E B 15	E B 13	E B 13	E B 13	E B 13	E B 15	E B 14	G	G	G	G	G	G	G	G	G 23	31	23	E B 14	20	19	E B 14	E B 14	E B 14
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	28	28	28	28	28
MED	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14	G	G	G	G	G	G	G	G	G	30	24	J A 22	18	16	18	16	E B 15
U Q	J A 19	J A 19	J A 16	15	15	E B 14	E B 14	G	G	36	39	G	42	38	39	36	J A 40	J A 28	J A 36	J A 26	J A 20	J A 22	J A 24	J A 20
L Q	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G	G	G	G	G	G	G	G	G 20	E B 15	E B 14	E B 14	E B 14	E B 14	E B 14

FEB. 1991 FOES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1991 FBES (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 14	E B 14	E B 13	E B 14	E B 15	E B 14	E B 15	G	29	G	G 24	G	42	G	G	40	43	35	45	17	E B 13	E B 14	E B 15	E B 14
2	E B 13	E B 14	E B 14	E B 13	E B 13	E B 13	E B 13	G 17	G 23	G 26	G 26	G	40	40	G	G	40	20	34	16	15	43	E B 14	E B 13
3	E B 14	E B 13	E B 13	E B 13	E B 14	E B 14	21	22	G 19	G 19	G 23	G	G 20	G	G 26	35	G	G	E B 13	E B 13	E B 14	E B 14	17	16
4	17	18	E B 16	E B 15	E B 13	E B 13	E B 13	G	G	G 20	G	G 30	G 32	G 30	G 26	G 20	G	G 17	29	E B 14	E B 14	E B 13	E B 13	E B 15
5	E B 15	E B 14	E B 14	E B 13	E B 14	E B 14	E B 13	G	G	G	G 23	G 23	G 23	G	G	G	G	G 16	21	17	E B 14	E B 14	E B 14	E B 15
6	E B 14	17	E B 16	E B 15	E B 15	E B 14	E B 14	G	G 21	G	G	G 30	G	G	G	G	G	21	21	18	E B 14	17	27	26
7	23	19	E B 15	E B 16	E B 13	E B 13	E B 13	G 17	G 17	G 26	G 30	G 26	U G 21	G	G	G	G	G	E B 15	E B 14	15	33	16	E B 15
8	E B 14	E B 14	E B 15	E B 14	E B 13	E B 13	E B 14	G	G	G	G	G	G	38	40	G 22	29	20	E B 13	E B 14	E B 15	E B 15	E B 13	E B 13
9	14	16	16	E B 14	E B 13	E B 14	E B 14	G	G	35	G	G	E B 40	G 25	G 24	G 22	G 19	E B 15	E B 15	E B 14	E B 14	E B 14	E B 14	E B 14
10	E B 14	E B 13	E B 13	E B 13	E B 15	E B 14	E B 14	G	G	G	37	40	39	G	69	36	26	G 16	E B 16	E B 14	E B 15	17	E B 13	E B 16
11	E B 13	E B 13	E B 13	E B 14	E B 13	E B 13	E B 14	G	G	G	G	G	G	G	G	G	G	G	E B 13	E B 14	E B 15	E B 13	E B 15	E B 13
12	E B 13	E B 13	E B 14	E B 14	E B 14	E B 14	E B 14	G	30	35	37	G	41	41	38	34	29	21	18	27	17	18	E B 14	17
13	E B 16	E B 16	E B 14	E B 13	15	E B 14	E B 14	G	29	33	37	G	40	37	38	G	32	24	17	E B 14	18	E B 14	E B 14	E B 14
14	E B 14	E B 14	E B 14	E B 16	E B 13	E B 14	E B 15	G	G	G	G	G	G	G	G	G	32	21	20	E B 14	18	E B 13	E B 15	E B 14
15	E B 15	E B 14	E B 13	E B 14	E B 14	E B 14	E B 15	G	G	G	G	G	G	G	G	G	30	G	E B 14	E B 16	E B 13	E B 17	E B 14	E B 14
16	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	G	37	37	38	37	G 33	34	G 26	25	E B 13	E B 15	E B 13	E B 14	17	E B 16
17	17	E B 15	16	E B 13	E B 13	E B 13	E B 13	G	G	35	37	G	G 34	G 34	G	G	G	G	E B 15	E B 14	E B 14	E B 14	E B 16	E B 13
18	E B 14	E B 13	E B 16	E B 13	E B 13	E B 14	E B 15	G	G	35	39	G	G	G	G	G	36	22	E B 15	E B 14	17	E B 13	17	E B 15
19	E B 13	E B 14	E B 14	E B 13	E B 13	E B 14	E B 13	G	G	G	G	G	42	42	40	39	31	24	18	22	E B 14	32	E B 14	E B 14
20	E B 14	E B 14	E B 14	E B 13	E B 15	E B 15	E B 13	G	G	38	39	G 35	44	41	43	35	34	40	30	17	17	E B 13	E B 14	E B 13
21	E B 14	E B 13	E B 14	E B 13	E B 13	E B 14	E B 14	G	G	35	40	G	G	48	G	G 29	34	22	E B 14	18	E B 13	19	E B 17	E B 16
22	E B 14	E B 13	16	26	17	E B 14	E B 14	G	32	40	G 29	G 29	G	G	G	C	G 20	22	E B 14	E B 14	E B 14	E B 13	E B 15	23
23	E B 14	E B 13	E B 15	E B 14	E B 13	E B 15	E B 14	G	G	G	41	40	44	51	44	37	40	42	27	E B 14	E B 14	E B 14	E B 14	E B 14
24	E B 14	E B 13	E B 14	E B 13	E B 13	E B 14	E B 14	G	32	G	37	G 34	G	G	G 27	G	38	30	57	83	E B 14	24	E B 13	E B 13
25	E B 14	E B 14	E B 13	E B 13	E B 13	E B 15	E B 14	G	G 26	G 33	G	G	G	G 24	G	G	G	25	18	E B 14	E B 13	E B 14	E B 15	E B 14
26	E B 15	E B 13	E B 13	E B 14	E B 14	E B 13	E B 13	G	G	G	G 27	G	G	G 27	G	G	G	G	E B 15	E B 13	E B 15	E B 14	16	E B 13
27	E B 14	E B 13	E B 13	E B 13	E B 14	E B 13	E B 13	G 20	G 28	G	G	G	G	G	G 26	G 20	32	23	18	22	E B 13	16	E B 14	E B 13
28	E B 15	E B 13	E B 13	E B 13	E B 13	E B 15	E B 14	G	G	G	G	G	G	G	G	G 22	30	22	E B 14	16	E B 13	E B 14	E B 14	E B 14
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	28	28	28	28	28
MED	E B 14	E B 14	E B 14	E B 13	E B 13	E B 14	E B 14	G	G	G	G	G	G	G	G	G	29	21	16	E B 14	E B 14	E B 14	E B 14	E B 14
U Q	E B 15	14	E B 15	E B 14	E B 14	E B 14	E B 14	G	G	34	37	G	40	38	G	34	33	24	21	17	15	17	16	16
L Q	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G	G	G	G	G	G	G	G	G	E B 14	E B 14	E B 14	E B 14	E B 14	E B 13

FEB. 1991 FBES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1991 FMIN (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT. 35°42.4'N LON. 139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	14	13	14	15	14	15	14	14	17	22	20	18	31	20	17	16	14	12	15	13	14	15	14
2	13	14	14	13	13	13	13	15	15	16	20	23	25	15	21	20	16	13	16	13	13	15	14	13
3	14	13	13	13	14	14	13	14	14	15	14	21	17	24	20	16	16	15	13	13	14	14	14	14
4	13	16	16	15	13	13	13	13	16	19	20	26	20	20	18	17	17	15	15	14	14	13	13	15
5	15	14	14	13	14	14	13	14	15	16	18	20	21	20	17	16	17	13	14	14	14	14	14	15
6	14	14	16	15	15	14	14	14	14	20	20	21	28	25	21	22	20	15	14	13	14	13	13	14
7	14	14	15	16	13	13	13	13	14	18	17	21	19	26	24	17	16	15	15	14	13	13	13	15
8	14	14	15	14	13	13	14	15	17	20	28	27	32	25	18	17	18	15	13	14	15	15	13	13
9	13	13	14	14	13	14	14	16	14	17	18	19	40	21	17	15	13	15	15	14	14	14	14	14
10	14	13	13	13	15	14	14	14	16	16	18	22	22	24	16	17	17	14	16	14	15	15	13	16
11	13	13	13	14	13	13	14	14	16	15	18	30	21	20	18	17	14	13	13	14	15	13	15	13
12	13	13	14	14	14	14	14	14	14	16	17	18	25	22	21	17	16	13	13	12	14	14	14	14
13	16	16	14	13	13	14	14	13	14	16	18	21	20	20	19	16	14	14	14	14	14	14	14	14
14	14	14	14	16	13	14	15	16	13	15	17	21	20	18	18	17	15	13	14	14	13	13	15	14
15	15	14	13	14	14	14	15	15	15	16	19	17	21	18	20	18	16	15	14	16	13	17	14	14
16	13	13	13	13	13	13	14	14	16	17	21	22	28	21	23	30	20	14	13	15	13	14	13	16
17	14	15	13	13	13	13	13	14	16	18	20	22	31	22	21	16	17	14	15	14	14	14	16	13
18	14	13	16	13	13	14	15	14	14	17	17	24	28	23	21	19	16	14	15	14	14	13	13	15
19	13	14	14	13	13	14	13	15	16	17	22	30	17	20	20	18	14	16	14	16	14	17	14	14
20	14	14	14	13	15	15	13	15	16	17	18	26	22	20	20	20	16	15	13	13	13	13	14	13
21	14	13	14	13	13	14	14	14	18	18	18	21	20	24	21	20	17	15	14	14	13	14	17	16
22	14	13	13	13	14	14	14	14	14	17	20	21	22	21	22	C	13	16	14	14	14	13	15	14
23	14	13	15	14	13	15	14	15	16	18	18	21	21	20	26	14	15	16	14	14	14	14	14	14
24	14	13	14	13	13	14	14	14	16	16	17	21	24	23	20	19	16	15	13	16	14	14	13	13
25	14	14	13	13	13	15	14	13	16	18	21	27	25	18	25	20	16	13	14	14	13	14	15	14
26	15	13	13	14	14	13	13	14	14	21	21	20	22	21	24	18	17	15	15	13	15	14	13	13
27	14	13	13	13	14	13	13	15	16	17	18	19	20	21	19	15	17	13	12	12	13	13	14	13
28	15	13	13	13	13	15	14	14	16	18	22	20	21	32	20	18	17	15	14	13	13	14	14	14
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	28	28	28	28	28
MED	14	14	14	13	13	14	14	14	16	17	18	21	22	21	20	17	16	15	14	14	14	14	14	14
U Q	14	14	14	14	14	14	14	15	16	18	20	24	25	24	21	19	17	15	15	14	14	14	14	14
L Q	14	13	13	13	13	13	13	14	14	16	18	20	20	20	18	16	16	14	13	13	13	13	13	13

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1991 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	285	310	300	245	245	275	315	305	300	290	280	285	265	255	250	265	275	285	265	295	275	280	280	280
2	270	275	285	270	235	245	270	300	295	290	285	265	255	240	250	255	260	260	275	285	295	290	U S 325	280
3	270	260	260	270	270	275	280	325	310	295	280	285	U S 280	U R 285	S 270	U S 275	270	270	285	295	S 280	275	270	295
4	285	285	290	305	270	265	280	340	315	310	300	280	275	275	275	275	285	290	280	295	310	300	300	305
5	290	280	R 255	265	280	280	290	320	320	300	305	285	270	275	275	275	285	290	295		315	270	285	295
6	280	290	285	295	285	270	290	330	335	305	290	290	285	275	270	275	280	280	290	305	300	290	295	295
7	290	295	300	280	285	250	280	320	340	310	305	300	285	285	275	275	280	295	290	300	325	280	290	295
8	295	295	260	275	265	270	280	330	325	315	300	295	295	280	280	280	285	295	290	295	295	U S 295	270	270
9	260	280	295	315	265	240	270	325	315	310	300	280	285	275	270	270	280	295	295	315	295	295	315	270
10	285	290	310	315	245	245	295	335	320	310	300	305	295	290	295	285	295	305	295	295	290	290	285	285
11	280	315	310	350	245	250	280	310	335	320	290	295	290	280	285	280	280	290	305	280	295	275	285	300
12	325	310	315	255	240	265	290	325	340	315	290	300	305	270	280	290	295	290	295	280	305	275	290	290
13	275	280	300	310	355	250	280	310	320	315	305	295	295	280	285	290	290	305	305	295	290	290	295	275
14	285	285	270	275	290	295	295	S 325	310	310	310	295	290	290	285	285	280	305	S 305	310	310	285	290	280
15	260	255	265	250	285	270	280	320	325	310	300	280	285	285	270	280	280	295	295	285	290	300	280	290
16	290	275	285	285	275	275	285	325	320	310	305	295	280	270	285	280	280	280	305	295	290	290	305	300
17	290	280	280	290	275	260	280	335	325	315	295	290	290	280	270	270	280	280	290	285	285	280	290	305
18	270	270	265	260	295	305	285	335	325	310	305	285	280	275	275	270	275	280	290	290	280	285	270	295
19	305	310	300	315	260	255	275	320	310	315	280	295	280	275	260	260	275	270	R 285	285	285	290	280	270
20	260	300	315	255	230	235	280	315	315	305	290	285	270	265	265	260	275	275	285	290	275	270	285	280
21	285	285	270	275	230	220	265	315	305	290	295	R 285	R 275	R 275	R 260	R 265	270	280	270	280	285	275	285	270
22	270	265	275	275	280	260	285	300	310	R 305	285	270	275	260	265	I C 265	270	270	280	280	285	270	265	265
23	265	270	285	270	240	230	285	310	300	290	280	275	265	255	255	255	260	265	275	R 270	R 285	260	265	S 265
24	250	240	250	260	245	250	275	300	290	S 305	280	260	265	250	260	250	260	265	275	285	270	285	275	285
25	295	275	275	280	235	235	280	310	300	290	285	275	265	250	250	255	265	270	R 270	270	280	280	270	275
26	280	275	250	245	255	250	265	290	300	295	285	275	265	260	255	255	265	260	275	R 275	275	270	285	295
27	280	285	270	280	275	285	295	325	310	290	285	275	265	265	250	260	265	260	275	285	275	275	270	275
28	260	270	255	255	260	250	S 260	300	305	295	275	275	265	265	255	255	260	260	275	270	260	265	265	275
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	28
MED	280	280	282	275	265	258	280	320	315	308	290	285	280	275	270	270	278	280	288	285	288	280	285	282
U Q	290	292	300	292	280	272	288	325	325	310	300	295	288	280	278	280	280	292	295	295	295	290	290	295
L Q	270	272	265	260	245	248	278	310	305	295	285	275	265	262	258	260	268	270	275	280	280	275	270	275

FEB. 1991 M(3000)F2 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1991 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

H / D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											L		L	U L 350	L	L								
2													U L 330	L 315	L									
3											L		L	L	U L 330	L								
4										L	L		L	L	L	L								
5												L	L	L	L	L								
6										L	L	L	L	L	L	L								
7											L	L		L	L									
8												L	L	L	L									
9											L		L	L										
10											L	L	L	L	A									
11													L	L	L	L								
12												L	L	L										
13										L	L	L	L	L	L	L								
14									L		L		L	L	L									
15											L		L	L	L	L								
16										L	L	L	L	L	L	L								
17										L		L	L	L	L									
18													L	L										
19										L		L	U L 335	L	L									
20											L	L	L	L	L	L	L							
21									L		L		L	L	L	L	L							
22													L	L	U L 315	C								
23													L	L	U L 315	L								
24										L		U L 345	L	U L 330	L	L	L							
25										L	L	L	L	U L 320	L	L	L							
26										L	L	L	L	U L 300	L 325	L 325	L							
27										L	L	L	L	L	L	L								
28										L	L	U L 340	L	L	U L 305	L	L							
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT												2	2	5	5	1								
MED												U L 342	U L 332	U L 320	U L 315	L 325								
U Q														U L 340	L 328									
L Q														L 308	U L 310									

FEB. 1991 M(3000)F1 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1991 H'F2 (KM) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											270		L 355	360	360	L 355								
2													L 350	385	355									
3											300		320	310	320	305								
4										255	270		320	L 320	330	305								
5												240	U L 335	L 320	330	300								
6										235	275	265	300	305	280	310								
7											255	260		L 285	305									
8												270	270	305	310									
9											265		H 255	305										
10											240	255	240	255	A 265									
11													280	275	275	255								
12												250	270	310										
13										260	270	265	260	255	310	290								
14									235		260		280	L 280	305									
15											260		275	305	320	255								
16										245	250	290	300	320	305	L 305								
17										240		260	290	265	300									
18													300	L 320										
19										250		280	300	L 305	L 350									
20											L 285	290	L 300	L 315	320	L 315	L 300							
21									230		300		350	335	325	330	300							
22													L 335	L 335	335	I C 320								
23													355	365	360	360								
24										255		300	305	340	335	330	L 320							
25										305	305	310	L 330	360	350	350	315							
26										265	310	L 325	360	355	340	355	310							
27										305	275	325	L 350	355	360	355								
28										L 290	265	310	L 345	355	360	L 365	L 310							
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									2	11	17	16	27	28	25	18	6							
MED									232	255	270	275	300	318	325	318	310							
U Q										290	292	305	L 345	348	350	355	315							
L Q										245	260	260	280	305	305	305	300							

FEB. 1991 H'F2 (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1991 H'F (KM) 135°E MEAN TIME (G.M.T. + 9H)

LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	260	250	240	315	350	300	225	240	235	235	235	240	235	225	H 205	250	A 255	A 255	E A 310	255	250	260	250	245
2	280	260	265	285	375	365	240	260	255	240	235	H 235	225	235	255	H 250	A 255	250	A 275	255	235	E A 285	235	255
3	270	290	280	275	265	290	290	245	225	225	H 230	230	230	235	230	255	230	255	240	225	215	250	265	270
4	285	290	275	255	255	310	270	235	225	230	H 240	245	225	H 225	230	240	250	240	A 305	250	250	230	250	250
5	255	265	340	305	235	265	255	235	215	225	235	210	H 200	250	240	235	235	230	240	250	225	250	270	265
6	260	270	290	270	275	275	240	H 235	225	220	H 215	235	230	H 220	220	235	245	240	235	235	235	250	265	A 275
7	265	255	260	265	250	310	285	245	220	225	235	225	H 225	225	225	H 235	235	235	230	240	220	A 300	260	265
8	255	270	305	290	270	270	270	255	225	230	H 205	235	235	235	230	240	235	240	230	235	270	255	260	280
9	290	270	245	240	235	345	305	250	235	240	235	235	230	230	H 225	245	250	245	230	235	230	240	235	260
10	280	270	245	245	380	410	280	225	235	230	235	230	225	225	A	235	235	225	230	250	260	230	255	290
11	270	245	235	215	230	340	290	250	235	230	225	240	H 235	H 220	H 220	225	225	225	235	240	235	270	265	245
12	230	250	255	355	385	340	240	245	225	235	230	235	235	225	235	240	230	230	225	270	235	250	260	270
13	295	280	270	235	215	330	280	235	235	235	235	230	225	230	235	235	250	230	215	230	250	250	245	275
14	285	270	280	315	275	250	250	240	225	230	220	230	230	225	235	230	240	240	230	225	225	240	260	270
15	300	310	325	330	280	285	280	235	225	235	230	235	225	235	H 210	220	235	230	220	235	250	235	275	280
16	275	280	270	255	255	265	280	245	220	225	H 215	205	220	H 215	235	235	230	225	225	230	250	260	250	250
17	270	275	265	250	265	300	265	230	235	225	H 220	220	H 230	225	225	235	240	235	225	220	240	255	260	240
18	270	280	305	290	255	245	280	225	225	230	230	230	215	H 200	240	240	245	245	235	230	240	250	280	260
19	245	255	245	235	255	330	300	235	225	230	220	220	225	H 210	230	A 250	H 240	245	250	255	250	A 265	245	280
20	290	255	240	310	415	395	265	225	H 225	225	225	H 210	240	H 220	235	230	240	A 245	A 245	230	235	255	265	265
21	270	265	265	280	330	395	300	235	220	H 220	220	H 225	230	240	225	240	240	240	230	240	250	260	260	260
22	270	300	290	295	230	275	275	245	230	220	225	220	230	225	225	I C 235	235	245	240	235	245	245	275	A 305
23	300	285	265	260	285	370	270	225	225	235	230	225	230	A 240	240	240	A 250	E A 270	A 260	245	230	235	280	275
24	295	300	290	260	300	305	270	240	235	230	225	210	215	230	225	230	240	A 250	A	A	250	250	265	255
25	255	270	275	260	290	385	290	230	225	215	225	220	230	230	235	230	240	250	245	255	250	250	260	290
26	265	275	295	305	265	290	310	240	230	225	225	220	230	225	235	230	250	250	250	250	250	265	265	250
27	240	250	265	290	265	255	260	230	235	220	H 205	H 215	H 230	H 215	H 220	230	250	250	260	255	250	250	255	270
28	270	270	300	310	285	295	305	230	225	H 220	220	215	230	H 230	H 220	240	240	265	260	230	260	250	270	270
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	27	27	28	28	28	28
MED	270	270	270	278	268	302	278	235	225	230	225	228	230	225	230	235	240	241	235	240	248	250	260	268
U Q	285	280	290	305	295	342	290	245	235	232	235	235	230	232	235	240	250	250	A 250	250	250	260	265	275
L Q	260	258	258	255	255	275	262	230	225	225	220	220	225	H 222	H 225	230	235	232	230	230	235	248	252	255

FEB. 1991 H'F (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1991 H'E (KM) 135°E MEAN TIME (G.M.T. + 9H)

LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								B 155	115	115	115	115	115	B 125	120	115	115	E B 140						
2								E A 175	A 130	A 120	A 115	115	115	120	115	115	115	A						
3								A	A 125	A 120	110	110	115	110	A 120	110	120	E B 155						
4								B 135	110	120	115	125	A 125	120	A 120	115	115	E A 160						
5								130	125	110	115	115	120	110	110	115	115	125						
6								E A 145	A 120	115	115	A 125	120	120	115	120	115	A						
7								A 135	125	A 125	E A 125	115	115	120	115	110	120	B 155						
8								140	125	120	125	125	B 130	120	115	120	A 125	A						
9								B 165	115	110	110	115	B	A 115	A 115	A 120	A 120	B						
10								155	120	115	120	115	120	120	115	115		A	A					
11								130	115	110	110	115	115	110	110	110	115	135						
12								135	115	110	110	110	120	120	115	115		A	B					
13								125	115	A	115	110	110	110	110	110	110	B 150						
14								150	110	110	115	115	115	115	110	115		A	A					
15								130	115	110	115	115	115	115	115	115	115	140						
16								125	115	115	115	115	A	A	A 130	A	A 135	A						
17								130	115	115	110	115	A 130	A 130	110	110	115	120						
18								125	115	A	A	115	120	115	115	110	110	E A 140						
19								120	115	110	115	115	110	115	115	110	105	A						
20								130	110	115	110	120	115	A 120	E A 145	115		A	A					
21							B	125	110	110	110	110	105	110	115	A 125	A	A						
22								125	115	115	115	A 120	115	115	120	I C 120	A 120	A						
23								115	115	115	110	110	115	110	120	A	A 135	A						
24							B	120	110	110	110	A 125	115	110	120	110	110	115						
25							B	115	A 130	A 125	110	115	110	115	115	110	110	A 130						
26							B	120	110	115	A 120	110	115	A 115	115	115	115	125						
27							B	E A 145	E A 140	110	110	110	115	110	120	115	115	130						
28							B	125	110	110	110	110	115	B 120	115	120	115	130						
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								27	28	26	27	28	26	27	28	26	23	15						
MED								128	115	115	115	115	115	115	115	115	115	130						
U Q								145	A 122	A 115	115	115	120	120	120	115	A 120	B 150						
L Q								125	112	110	110	110	115	110	115	110	115	125						

FEB. 1991 H'E (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1991 H'ES (KM) 135°E MEAN TIME (G.M.T. + 9H)

LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

H / D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	B	B	B	B	B	110	B	G	E G 165	G	105	G	135	G	G	155	130	125	115	105	B	B	B	B
2	B	B	125	125	125	115	B	105	105	110	110	G	120	125	G	G	115	115	110	110	110	105	110	105
3	B	B	B	B	B	B	110	105	110	105	105	G	105	G	105	E G 215	G	G	125	B	B	105	100	100
4	100	100	B	B	B	B	120	110	G	110	G	105	105	100	100	105	G	120	105	B	B	110	110	105
5	105	110	110	105	B	130	B	G	G	G	110	110	110	G	G	G	G	110	100	100	110	B	B	B
6	110	100	B	B	B	B	B	135	105	G	G	105	G	G	G	G	G	110	110	105	B	100	105	100
7	95	105	105	B	110	B	B	110	110	105	100	110	105	G	G	G	G	G	105	B	105	100	110	B
8	105	B	B	B	B	B	B	G	G	G	G	G	G	E G 165	130	105	125	105	110	B	110	105	B	B
9	105	105	100	B	B	B	B	G	G	E G 190	G	G	B	105	105	100	100	100	B	B	B	B	B	B
10	B	B	B	B	B	B	B	G	G	G	E G 155	130	135	130	115	115	110	105	B	B	B	110	110	B
11	B	B	B	B	B	B	B	G	G	G	G	G	G	G	G	G	G	G	B	B	B	B	B	B
12	B	B	B	B	B	B	110	G	E G 185	155	E G 150	125	E G 180	150	125	120	110	110	105	100	100	100	110	100
13	B	B	B	B	110	B	B	115	125	120	E G 170	G	150	110	130	G	115	135	100	110	105	B	105	B
14	B	B	B	B	105	B	B	G	G	G	G	G	G	G	G	G	120	110	110	B	110	100	B	B
15	B	B	B	B	B	B	B	G	G	G	G	G	G	G	G	G	E G 160	G	B	B	95	B	B	B
16	B	B	B	B	B	B	B	G	G	G	120	120	120	115	115	115	115	120	115	B	115	B	100	B
17	105	110	105	B	B	B	B	G	G	115	145	G	115	110	G	G	G	G	B	100	B	B	B	B
18	B	B	B	B	B	B	B	G	G	115	115	G	G	G	G	130	110	E G 175	B	100	110	110	105	B
19	B	B	B	B	B	B	B	G	G	120	G	G	140	130	120	115	115	115	110	110	B	100	B	100
20	B	B	B	110	B	B	B	G	G	125	130	115	160	160	145	115	140	120	115	115	110	105	B	B
21	135	B	B	B	B	B	B	G	115	120	110	G	G	130	G	110	110	110	B	110	110	105	B	B
22	B	B	110	105	105	B	B	G	135	120	115	120	G	G	G	C	100	100	B	B	B	110	110	105
23	105	105	110	110	B	B	B	G	G	G	145	135	145	120	125	100	125	115	115	B	B	110	110	110
24	B	B	B	B	B	B	B	G	115	120	115	110	G	G	110	G	120	115	110	105	115	105	110	110
25	100	110	B	B	B	B	B	G	110	120	G	G	G	105	G	G	G	140	100	B	B	B	B	B
26	B	B	B	B	B	B	B	G	G	G	110	G	G	110	G	G	G	G	B	B	B	105	105	105
27	B	B	B	B	B	B	B	115	110	G	G	G	G	G	105	110	E G 180	120	115	110	B	110	B	B
28	B	B	B	B	B	B	B	G	G	G	G	G	G	G	G	110	140	130	B	100	100	B	B	B
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	10	8	7	5	5	3	3	7	12	15	17	11	14	15	13	15	19	22	18	14	14	18	14	10
MED	105	105	110	110	110	115	110	110	111	120	112	115	124	118	115	112	115	115	110	105	110	105	110	105
U Q	105	110	110	118	118	130	120	115	130	120	E G 145	125	145	130	128	120	130	120	115	110	110	110	110	105
L Q	100	102	105	105	105	110	110	105	110	110	110	110	110	110	105	105	110	110	105	100	105	100	105	100

IONOSPHERIC DATA STATION KOKUBUNJI

FEB. 1991 TYPES OF ES 135°E MEAN TIME (G.M.T. + 9H)

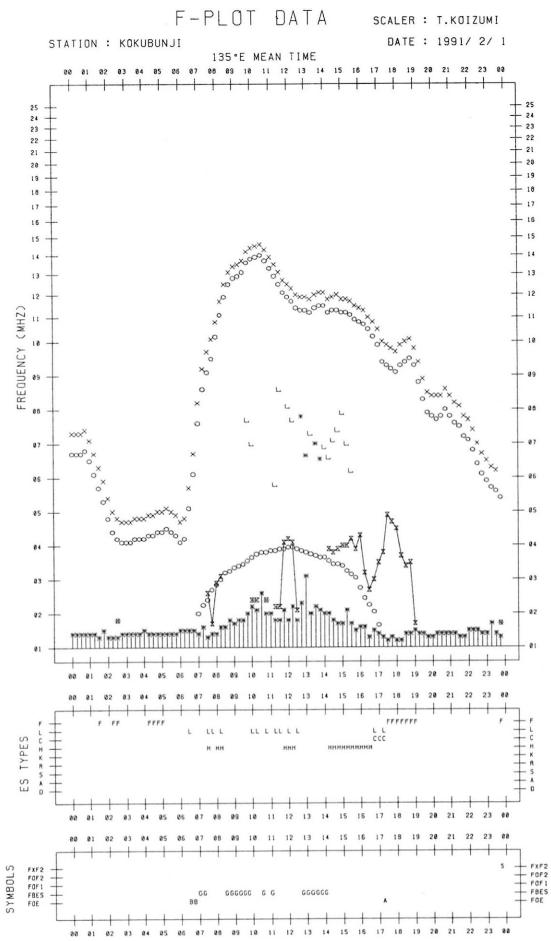
LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

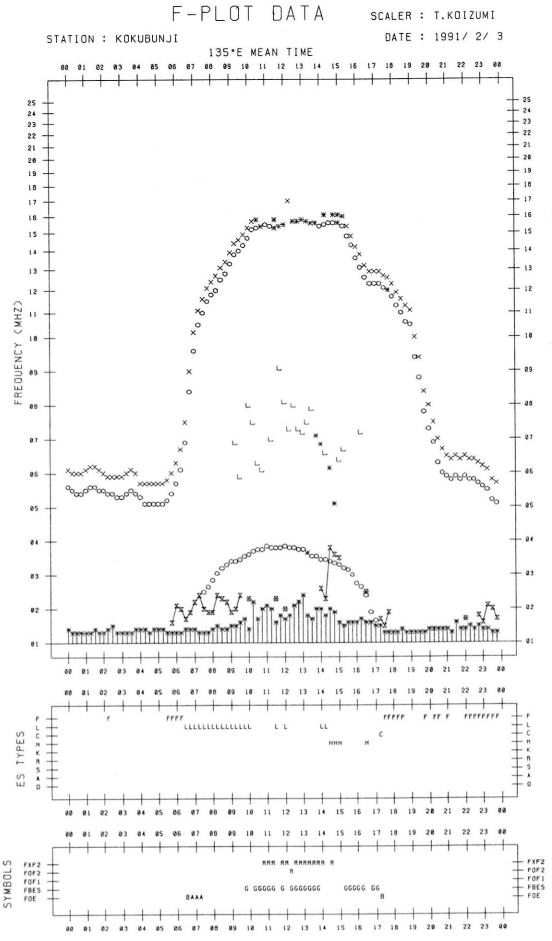
D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1						F 1			H 1		L 1		HL 11			H 2	H 2	C 5	FF 63	F 3				
2			F 1	F 1	F 1	F 1		L 2	L 2	L 1	L 2		C 1	CL 11			C 3	C 2	F 3	F 3	F 2	F 5	F 2	F 2
3							F 2	L 3	L 2	L 1	L 1		L 1		L 1	H 1			F 1			F 1	F 2	F 2
4	F 2	F 1					F 1	L 1		L 1		L 1	L 1	L 1	L 1	L 1		L 1	F 3			F 1	F 1	F 1
5	F 1	FF 11	F 1	F 1		F 1					L 1	L 1	L 1					L 1	F 3	F 2	F 4			
6	F 1	F 1						HL 11	L 1			L 1						L 2	F 3	F 2		F 1	FF 12	F 2
7	F 2	F 1	F 1		F 1			L 1	L 1	L 2	L 2	L 1	L 1						F 1		F 1	F 4	F 2	
8	F 1													H 1	HL 11	L 1	CL 11	L 1	F 1		F 1	F 1		
9	F 1	F 2	F 2							H 1				L 1	L 1	L 1	L 1	L 1						
10											H 1	H 1	H 1	H 1	CL 31	C 2	C 2	L 1				F 2	F 1	
11																								
12							F 1		H 1	H 1	H 1	C 1	H 1	HC 11	C 1	C 1	C 3	C 2	F 2	F 5	F 3	F 2	F 1	F 1
13					F 1			L 1	C 2	C 1	H 1		H 1	C 2	H 1		C 2	HL 22	F 3	FF 21	F 3		F 2	
14					F 2												CL 22	C 2	F 3		F 2	F 1		
15																	H 1				F 1			
16											C 1	C 1	L 1	C 1	L 1	L 1	L 1	C 3	F 1		F 1		F 2	
17	F 1	F 1	F 1							C 1	HC 11		L 1	L 1						F 1				
18										C 1	C 1					H 1	C 3	HL 12		F 1	F 1	F 1	F 2	
19										C 1			H 1	H 1	C 1	C 2	CL 22	L 2	FF 21	F 3		F 3		F 1
20				F 1						C 1	C 1	L 1	HL 11	HL 11	HL 11	L 2	HL 11	C 3	F 5	F 1	F 2	F 2		
21	F 1								L 1	C 1	C 2			H 1		L 1	L 2	L 2		F 1	F 1	F 2		
22			F 1	F 2	F 2				H 1	C 1	L 1	L 1					L 1	L 1				F 1	F 2	F 5
23	F 1	F 1	F 1	F 1							H 1	H 1	H 1	C 2	C 1	L 3	CL 23	CL 22	FF 32			F 2	F 1	F 2
24									CL 11	C 1	C 1	L 1			L 1		C 2	C 5	F 6	F 4	F 2	F 3	F 2	F 1
25	F 2	F 2							L 2	LL 11				L 1				HL 11	F 1					
26											L 1			L 1								F 1	F 3	F 1
27								L 2	L 2						L 1	L 1	H 1	C 2	F 3	F 3		F 1		
28																L 1	H 1	C 2		F 1	F 1			
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
U Q																								
L Q																								

FEB. 1991 TYPES OF ES COMMUNICATIONS RESEARCH LABORATORY, JAPAN

f-PLOTS OF IONOSPHERIC DATA

KEY OF F-PLOT	
I	SPREAD
○	FOF2, FOF1, FOE
×	FXF2
✳	DOUBTFUL FOF2, FOF1, FOE
⧖	FBES
⌊	ESTIMATED FOF1
*, Y	FMIN
∧	GREATER THAN
∨	LESS THAN


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 2/ 1
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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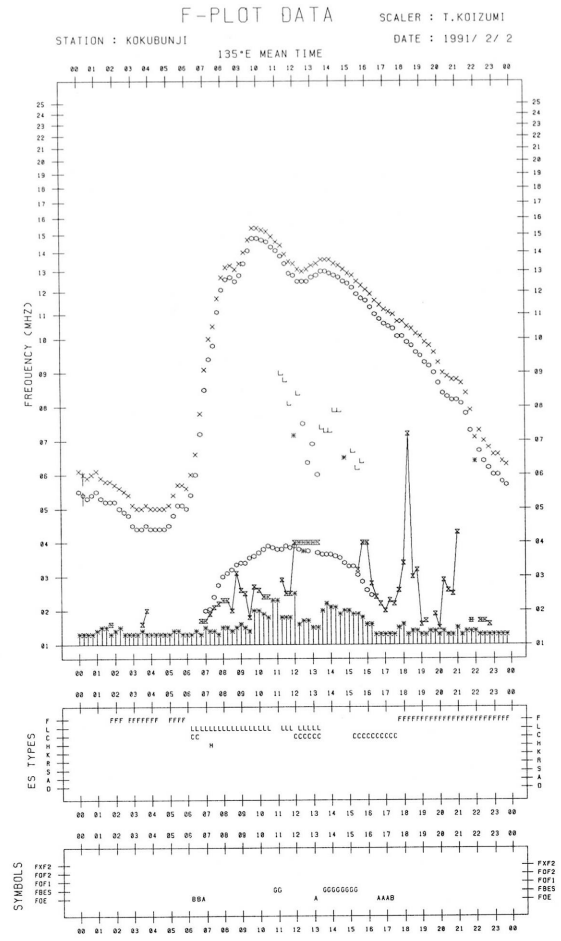
STATION : KOKUBUNJI
DATE : 1991/ 2/ 3
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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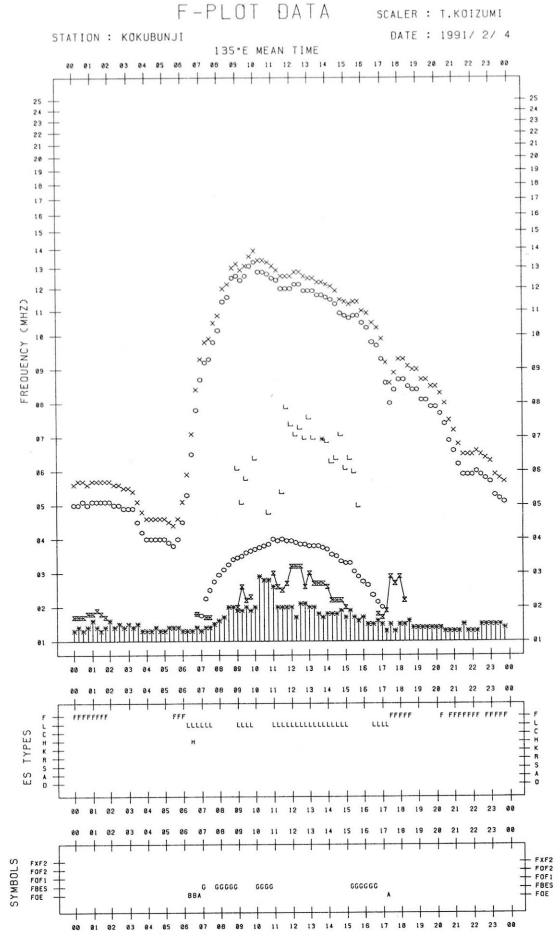
STATION : KOKUBUNJI
DATE : 1991/ 2/ 2
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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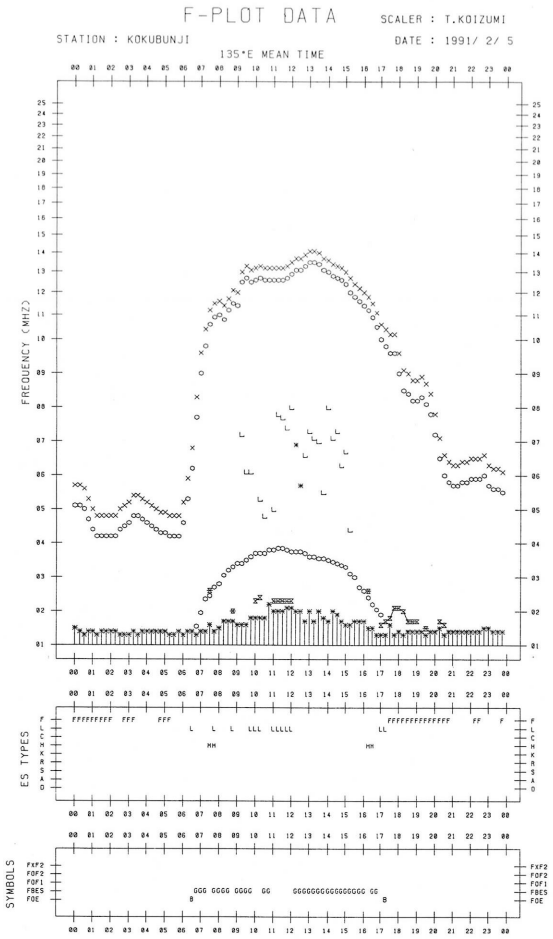
STATION : KOKUBUNJI
DATE : 1991/ 2/ 4
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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STATION : KOKUBUNJI
DATE : 1991/ 2/ 5
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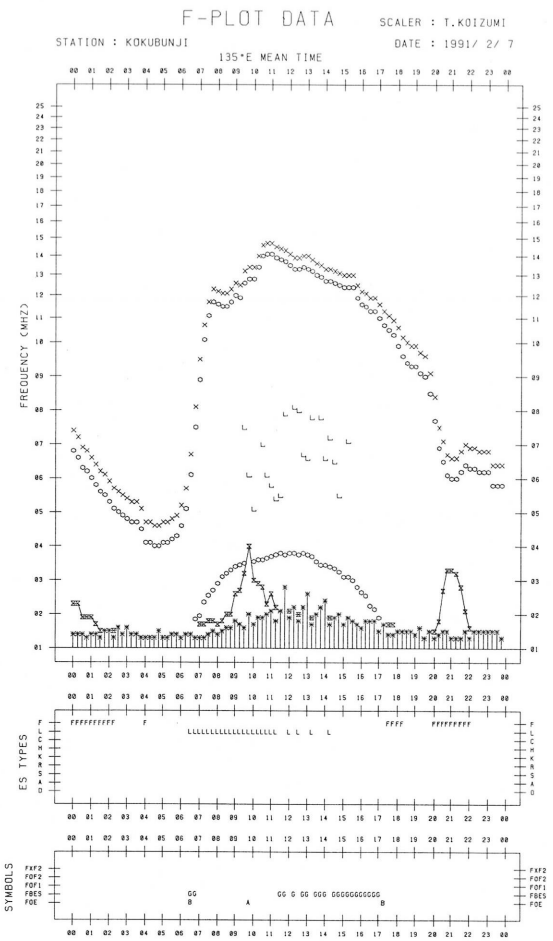
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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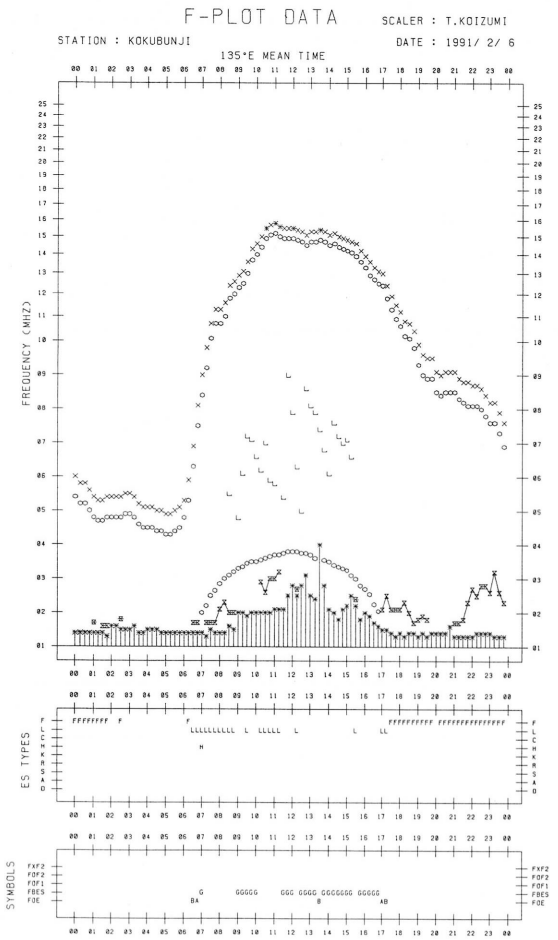
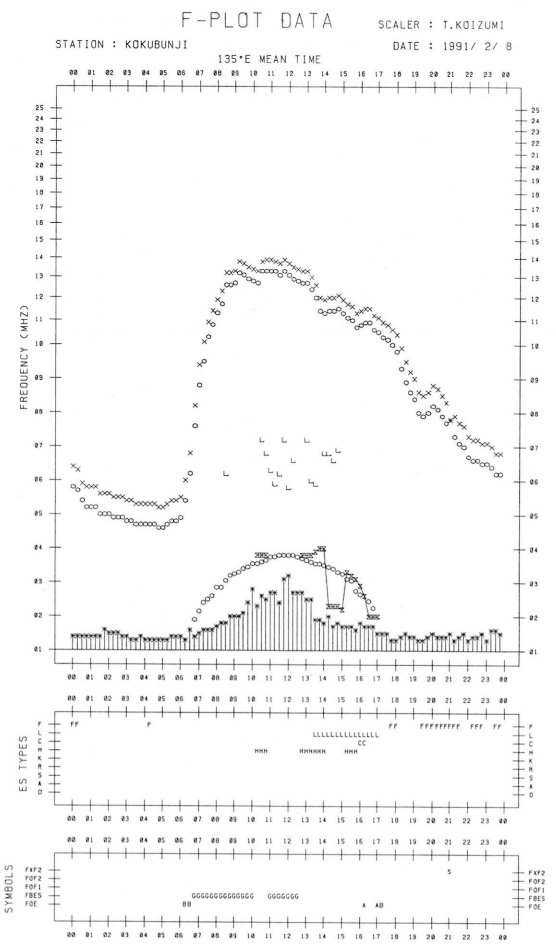
STATION : KOKUBUNJI
DATE : 1991/ 2/ 7
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 2/ 6
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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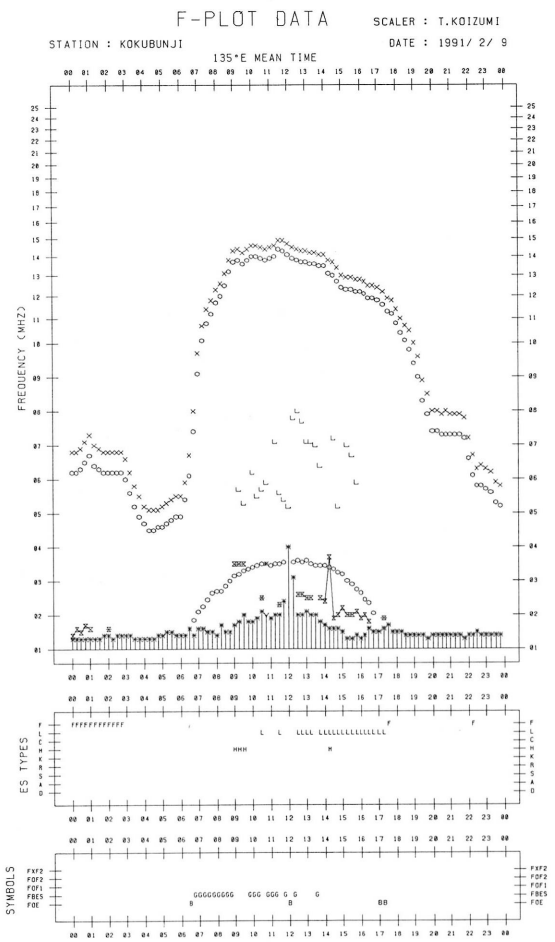
STATION : KOKUBUNJI
DATE : 1991/ 2/ 8
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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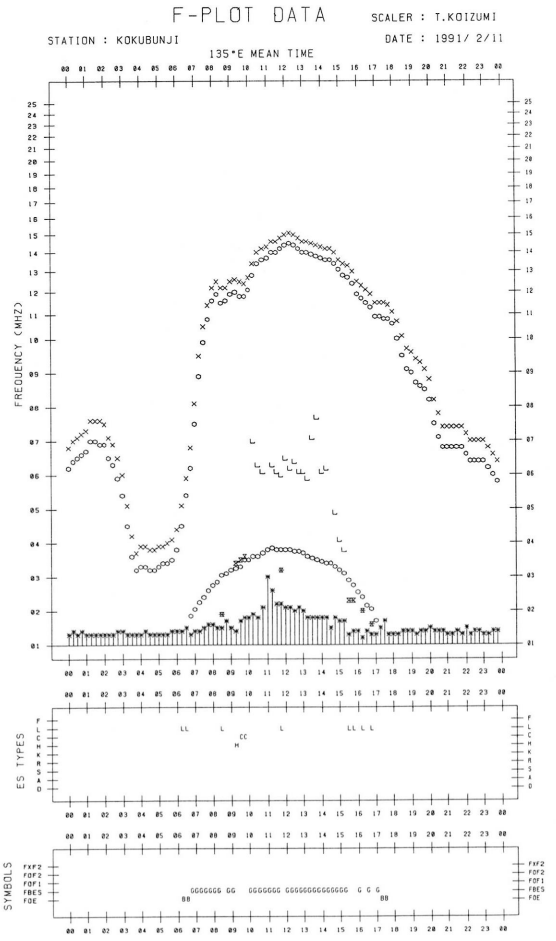
STATION : KOKUBUNJI
DATE : 1991/ 2/ 9
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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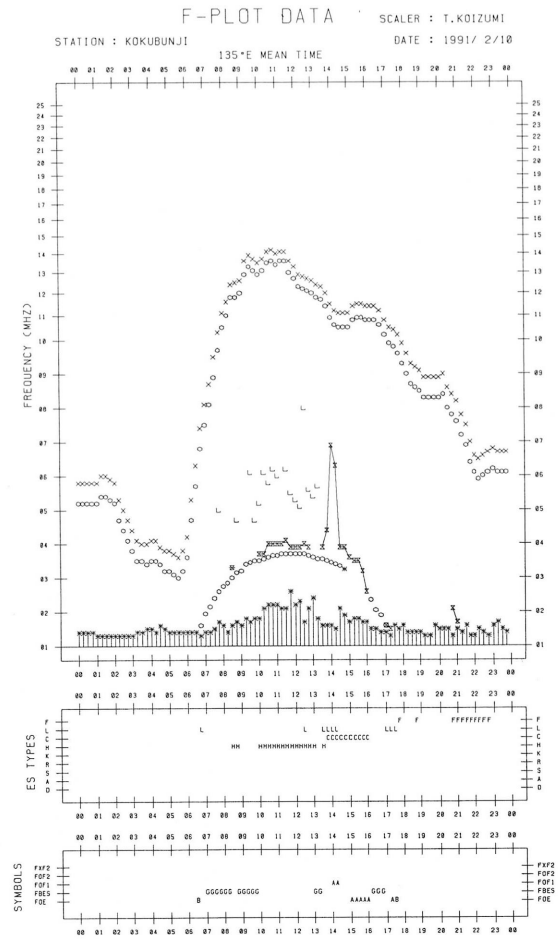
STATION : KOKUBUNJI
DATE : 1991/ 2/11
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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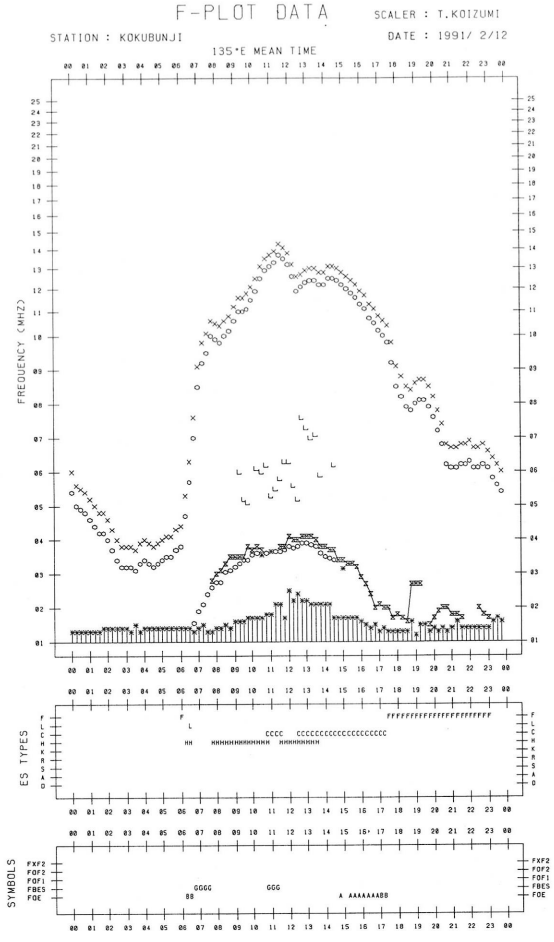
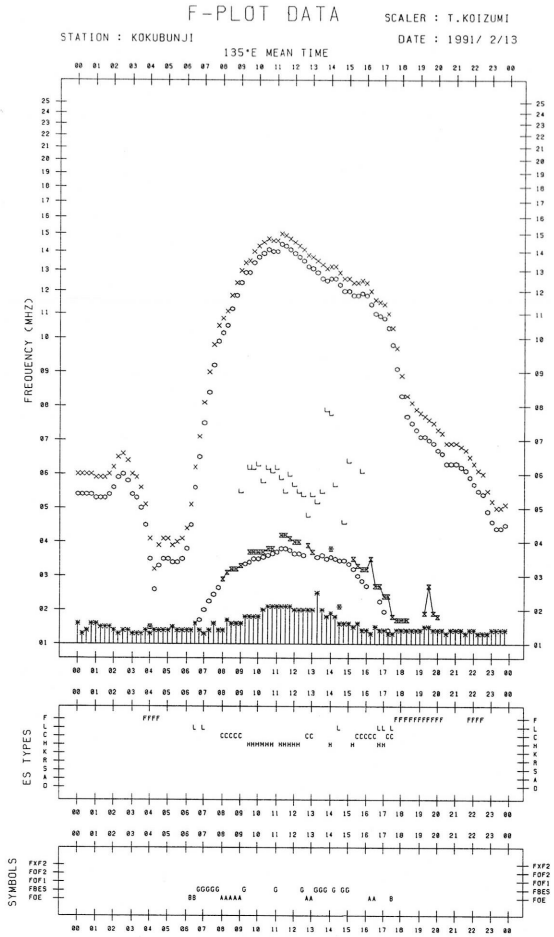
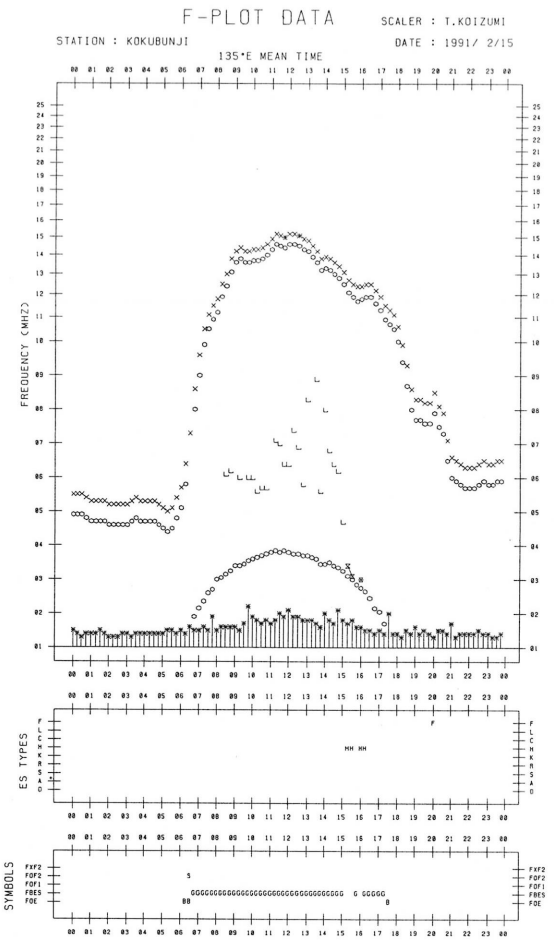
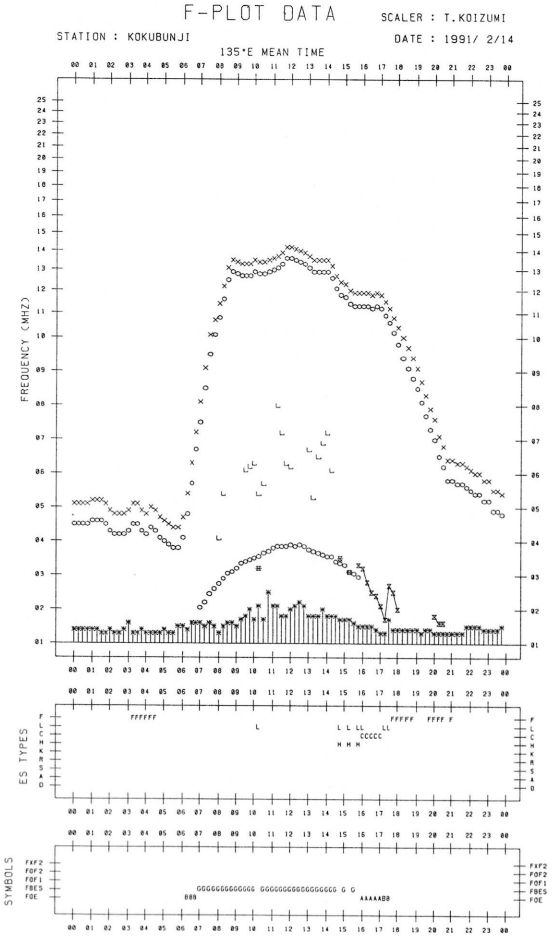
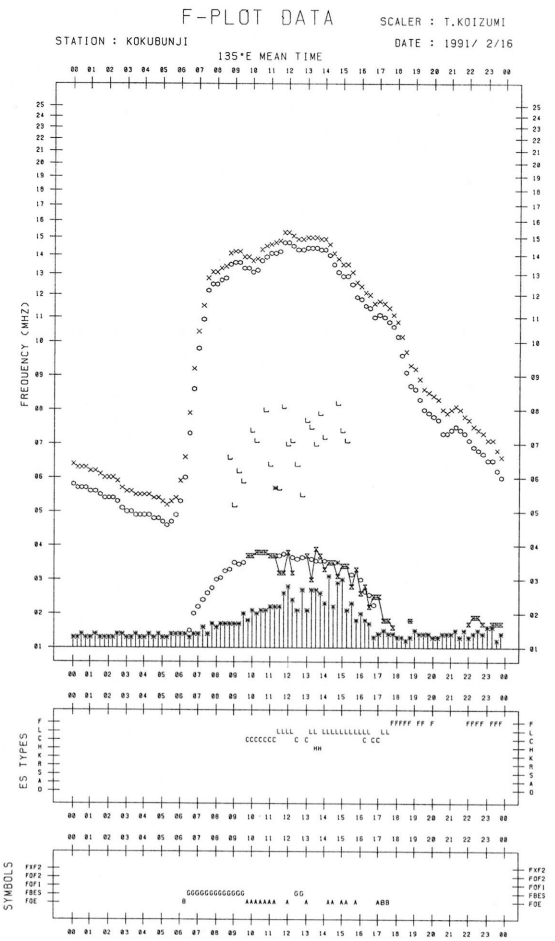
STATION : KOKUBUNJI
DATE : 1991/ 2/10
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

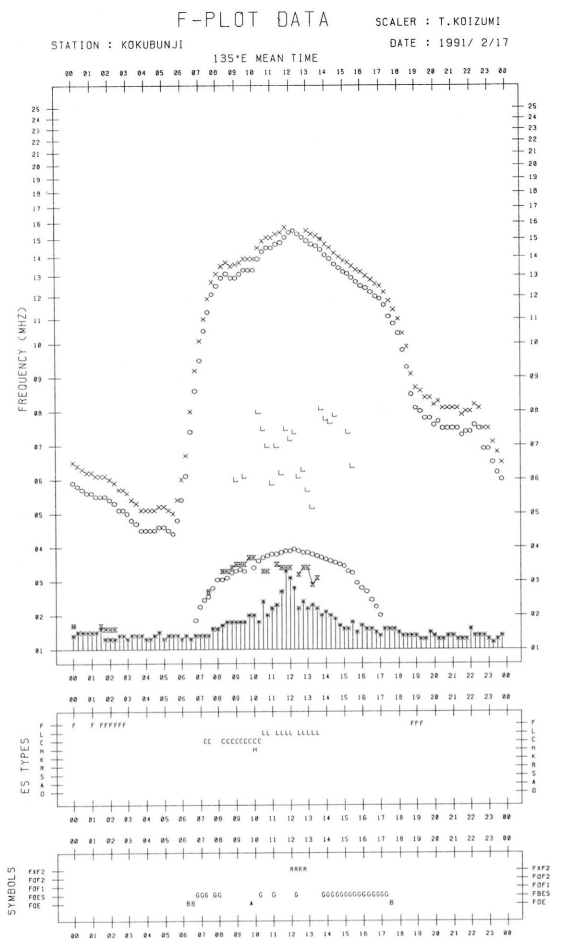

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 2/12
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

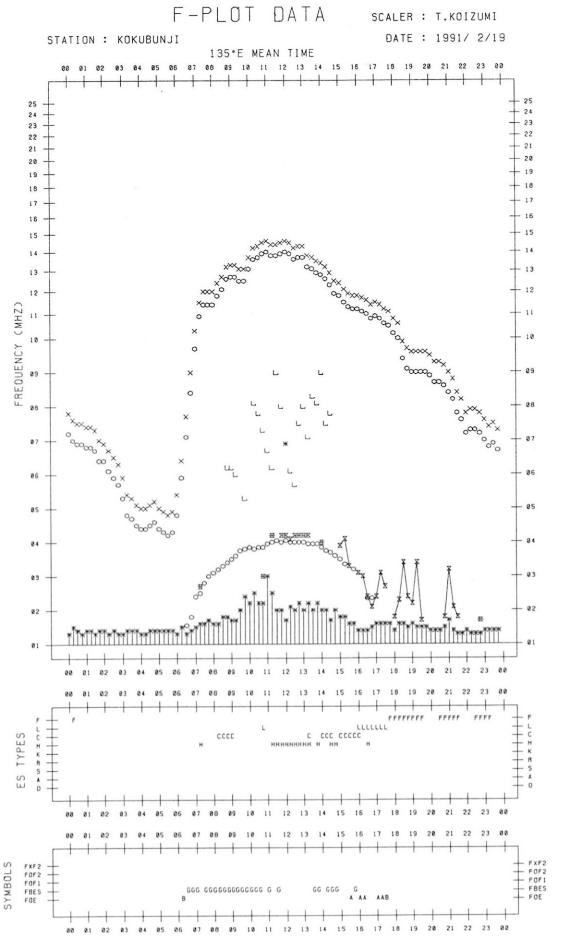

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 2/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

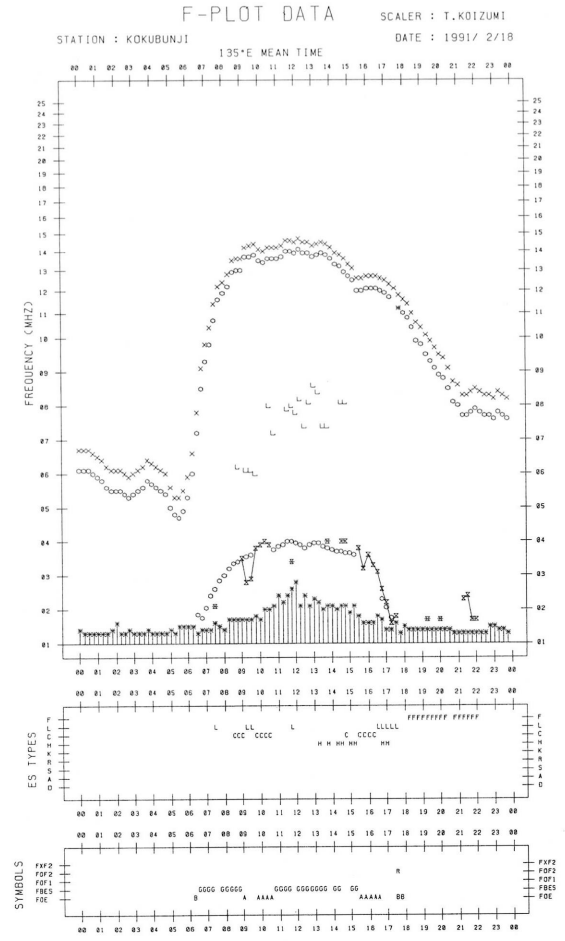

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 2/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

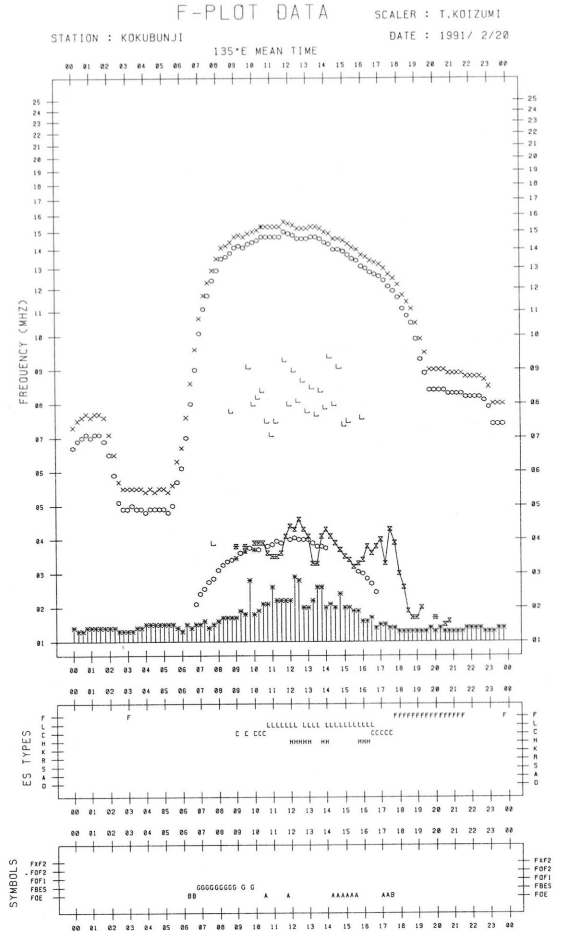

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 2/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

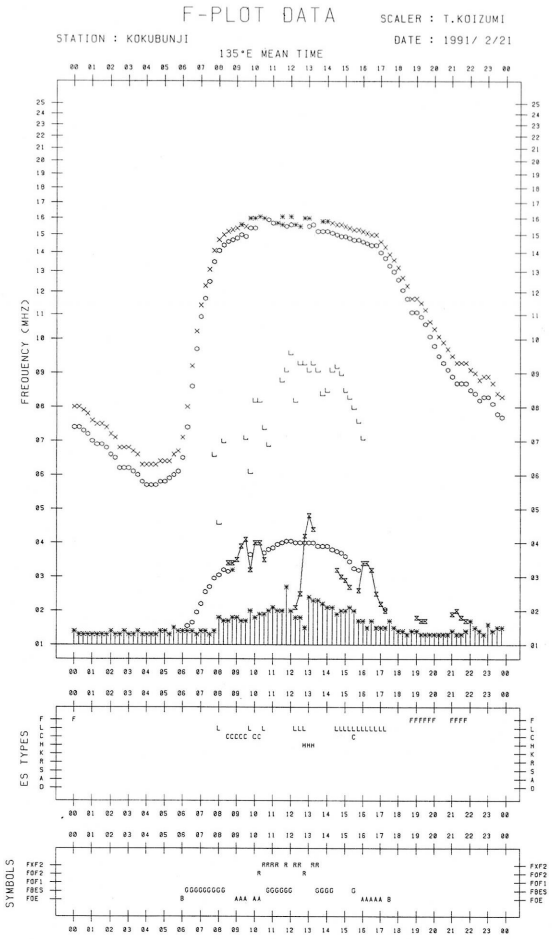

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 2/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

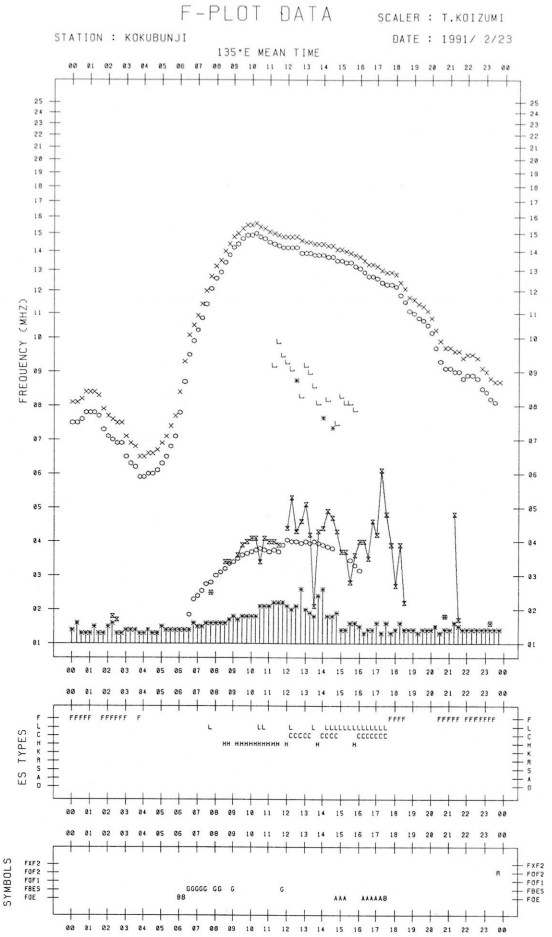

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 2/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

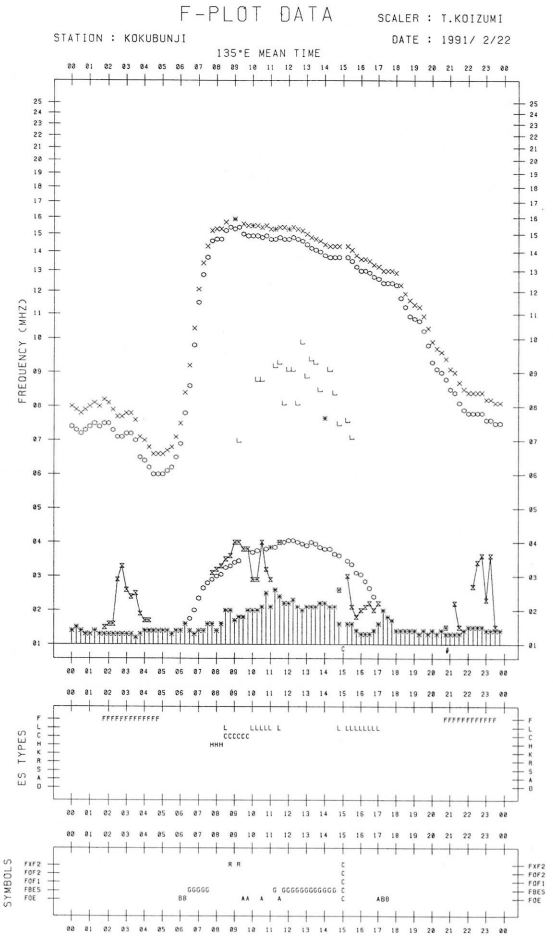

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 2/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

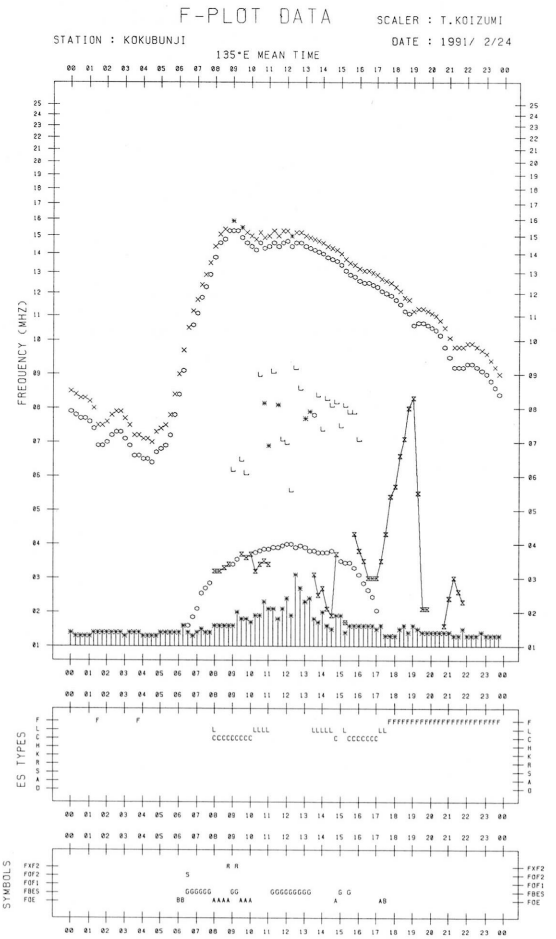

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 2/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 2/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 2/21
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 2/23
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 2/22
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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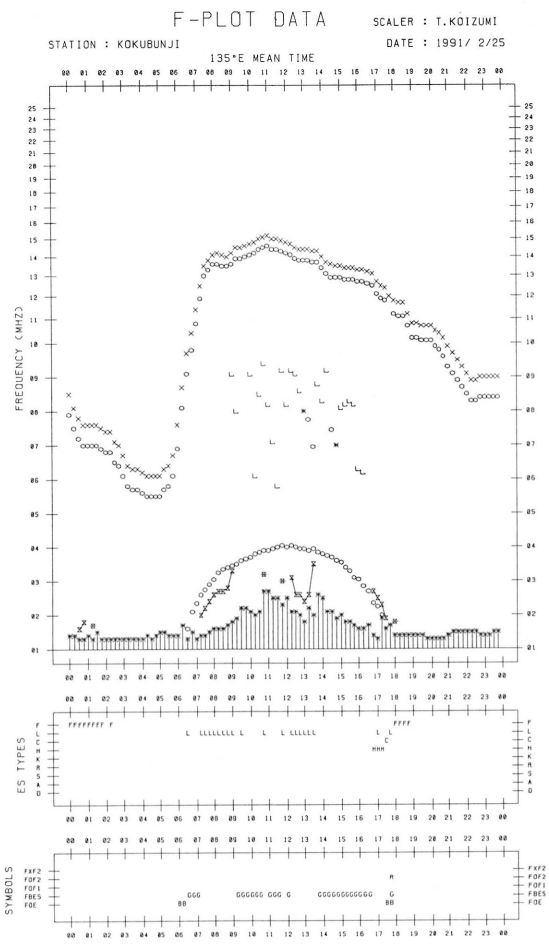
STATION : KOKUBUNJI
DATE : 1991/ 2/24
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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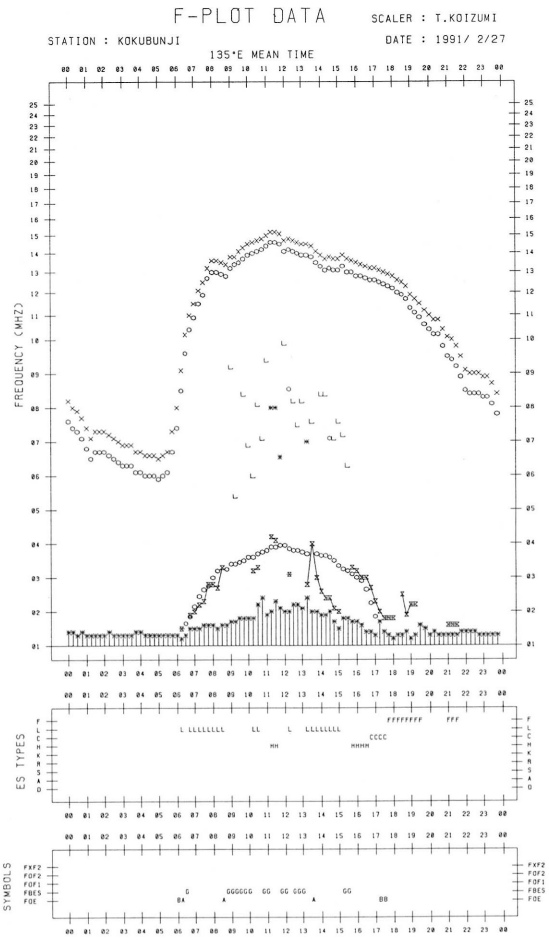
STATION : KOKUBUNJI
DATE : 1991/ 2/25
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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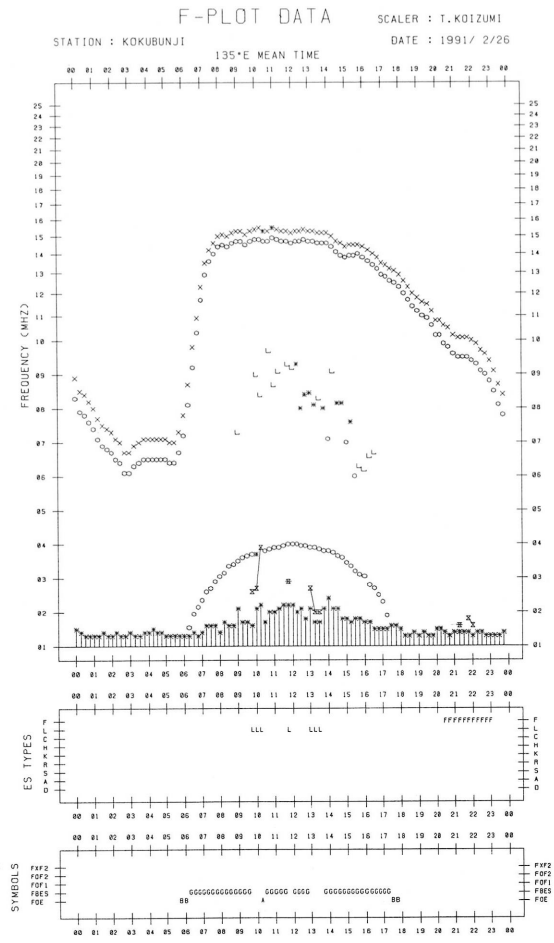
STATION : KOKUBUNJI
DATE : 1991/ 2/27
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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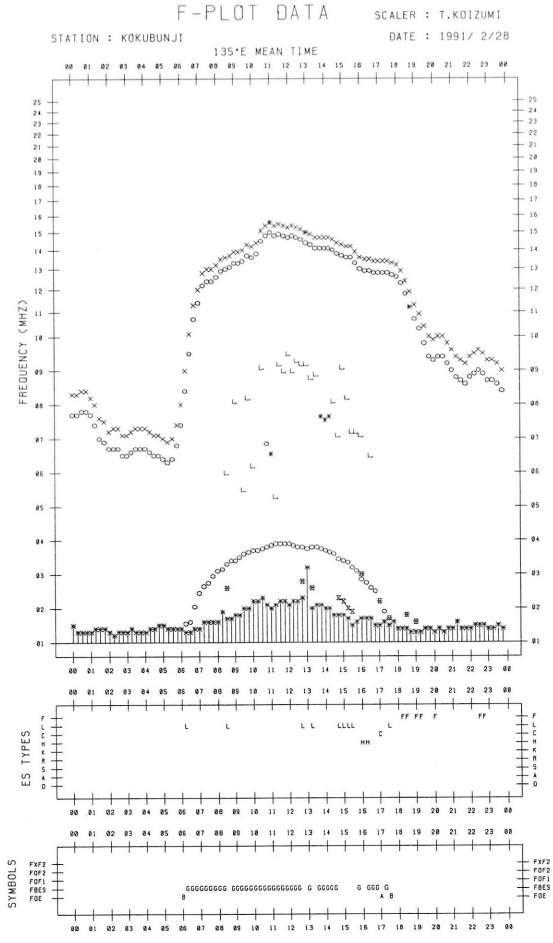
STATION : KOKUBUNJI
DATE : 1991/ 2/26
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 2/28
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

B. Solar Radio Emission

B1. Daily Data at Hiraiso

200 MHz

Hiraiso February 1991

Single-frequency total flux observations at 200 MHz										
	FLUX DENSITY: 10^{-22} Wm^{-2}Hz^{-1}					VARIABILITY: 0 TO 3				
UT	00-03	03-06	06-09	21-24	DAY	00-03	03-06	06-09	21-24	DAY
DATE										
1	B	B	B	B	B	3	3	3	3	3
2	B	B	B	B	B	3	3	3	2	3
3	B	B	B	B	B	2	3	3	1	3
4	B	B	B	B	B	2	3	3	2	2
5	B	B	B	B	B	3	2	2	3	2
6	B	B	B	B	B	3	2	3	3	2
7	B	B	B	14	B	3	3	3	1	3
8	14	15	B	13	B	1	*	*	1	*
9	12	12	12	11	12	0	1	1	*	1
10	*	9	9	*	9	*	*	0	*	*
11	9	8	8	10	8	*	*	0	0	*
12	10	10	10	10	10	0	0	0	0	0
13	10	10	10	11	10	0	0	0	0	0
14	11	11	11	*	11	0	0	0	*	0
15	11	11	11	12	11	0	*	*	0	0
16	12	12	12	12	12	0	*	0	*	0
17	12	11	11	12	12	*	*	*	0	*
18	12	12	12	B	12	1	0	*	3	0
19	B	B	B	B	B	3	3	2	2	3
20	B	B	B	B	B	2	3	3	3	3
21	B	B	B	B	B	2	1	2	3	2
22	B	B	B	B	B	3	3	3	3	3
23	B	B	B	B	B	3	3	3	3	3
24	B	B	B	B	B	3	3	3	2	3
25	B	B	12	*	B	2	1	1	*	2
26	(9)	9	9	*	9	*	*	*	*	*
27	9	10	10	*	10	*	*	*	*	*
28	*	10	10	10	10	*	*	0	0	*

Note: No observations during the following periods.

none.

B. Solar Radio Emission

B1. Daily Data at Hiraiso

500 MHz

Hiraiso February 1991

Single-frequency total flux observations at 500 MHz					
FLUX DENSITY: 10^{-22} Wm^{-2}Hz^{-1}					
UT	00-03	03-06	06-09	21-24	DAY
DATE					
1	B	B	69	B	B
2	B	B	64	B	B
3	B	66	63	66	B
4	B	63	60	65	64
5	65	61	58	-	62
6	60	58	56	-	58
7	58	57	56	56	57
8	56	54	55	52	55
9	53	52	51	-	52
10	(53)	51	49	50	51
11	51	50	47	49	50
12	50	48	47	-	48
13	50	50	50	50	50
14	49	51	51	52	50
15	51	51	51	52	51
16	52	52	53	-	52
17	-	56	55	55	55
18	(55)	(57)	56	56	55
19	57	56	55	59	56
20	59	60	58	60	59
21	58	57	55	61	58
22	62	62	61	60	61
23	61	61	59	62	60
24	62	60	58	61	60
25	59	58	56	59	58
26	59	57	55	58	57
27	58	57	54	57	57
28	57	57	57	57	57

Note: No observations during the following periods.

5th 2134 - 2350. 6th 2134 - 2350.
9th 2130 - 10th 0200. 12th 2130 - 2400.
16th 2126 - 17th 0230. 18th 0010 - 0440.

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso

February 1991

Single-frequency observations

Normal observing period: 2130 - 0820 U.T. (sunrie to sunset)

FEB 1991	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
1	200	46 C	0637.8	0638.0	3.4	327	-	WR
	500	46 C	0638.0	0638.3	4.0	23	-	WL
	100	42 SER	0638.3	-	2.6	1000D	-	-
	200	44 NS	2140E	0253	620D	140	54	0
	500	24 R	2139E	0257	406D	33	15	0
2	100	27 RF	0148	0300	109	76	28	-
	200	43 NS	2220	2300	580D	19	7	ML
	500	20 GRF	2240	2300	95	6	4	WL
	200	42 SER	2253.5	2256.8	13.2	120	-	ML
3	500	27 RF	0245	0308	60	4	2	WL
	200	44 NS	2136E	0628	620D	52	30	ML
	500	27 RF	2307	2344	70	8	5	WL
4	200	44 NS	2136E	0612	620D	12	8	WL
5	200	42 SER	0119.0	0204.3	96	130	-	WL
	200	44 NS	2136E	2313	630D	27	13	WL
	200	42 SER	2203.3	2217.6	48.0	240	-	ML
	200	42 SER	2337.0	0007.3	38.0	85	-	ML
6	200	42 SER	0111.9	0146.9	37.0	180	-	0
	500	41 F	0421.2	0421.2	2.3	53	-	0
	200	8 S	0610.2	0610.2	0.7	4300	-	0
	500	46 C	0610.5	0611.0	6.0	54	-	0
	100	8 S	0610.6	0611.1	1.1	16000D	-	-
	100	42 SER	0644.4	0646.1	11.1	5500	-	-
	200	46 C	0645.2	0645.5	4.8	240	-	0
	500	46 C	0645.5	0646.5	17.0	49	10	0
	200	44 NS	2134E	2346	630D	15	11	WR
8	500	46 C	0014.0	0014.0	16.0	11	3	0
				0021.7		4		0
	200	8 S	0017.2	0017.2	0.5	56	-	0
	200	42 SER	0240.2	0246.9	8.6	630	-	0
	500	46 C	0247.0	0247.5	4.5	95	-	0
	100	24 R	0540.0	0732U	125D	80U	24U	- SUNSET
	200	24 R	0646.0	0743.0U	73D	75U	18U	0 SUNSET
	500	46 C	0725.0U	0748.0	30U	550U	103U	0 SUNSET
11	200	8 S	0652.8	0652.9	0.9	9400	-	0

FEB 1991	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22} Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22} Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
11	100	42 SER	0653.0	0653.5U	5.3	1000D	-	-
	500	41 F	0653.5	0653.6	1.0	152	-	0
14	100	42 SER	0315.8	0317.6	28.0	240	-	-
	200	46 C	0316.6	0317.3	1.1	180	-	0
	100	46 C	0434.0	0435.3	2.8	185	-	-
	500	4 S/F	0613.8	0515.0	3.5	11	-	0
15	500	41 F	0120.5	0120.7	1.5	54	-	0
	200	41 F	0413.6	0414.1	1.5	65	-	0
	200	42 SER	0527.4	0528.4	16.5	270	-	0
17	200	42 SER	0618.8	0622.6	5.3	240	-	WL
	200	41 F	2235.6	2237.2	4.0	97	-	ML
	100	42 SER	2320.5	0006.7U	46.9	1000D	-	-
	200	42 SER	2321.1	2350.5	51.5	860	-	ML
18	200	42 SER	0115.8	0117.8	22.4	34	-	0
	200	44 NS	2122E	0230	655D	19	10	ML
19	100	8 S	0008.6	-	1.0	1000D	-	-
	100	42 SER	0438.7	-	4.6	1000D	-	-
	500	41 F	0439.3	0443.0	10.0	31	-	WL
	200	42 SER	0439.6	0442.0	8.6	150	-	ML
	200	46 C	0804.6	0805.0	2.1	150U	-	SL SUNSET
	200	44 NS	2120E	0612	660D	48	26	ML
	100	44 NS	2120E	0628	660D	140	40	-
20	200	42 SER	0039.3	0040.3	63	55	-	SL
	200	42 SER	0219.8	0220.5	66	280	-	SL
	200	44 NS	2119E	2213	660D	21	7	ML
21	500	41 F	0339.0	0400.5	45	11	-	0
	200	44 NS	2118E	2246	660D	31	18	ML
	500	42 SER	2359.0	0132.5	118	9	-	WL
22	100	43 NS	0000	0626	490D	45	18	-
	200	41 F	0033.7	0037.3	6.6	150	-	SL
	100	46 C	0153.9	0154.3U	1.3	1000D	-	-
	500	42 SER	0517.5	0521.0	3.5	220	-	MR
	200	42 SER	0519.8	0521.1	133.0	440	-	SL
	100	44 NS	2117E	2246	660D	135	62	-
	100	42 SER	2117E	2121.8	99.0	1000D	-	-
	200	44 NS	2117E	2310	660D	130	57	MR
23	100	42 SER	0129.0	0131.7	3.6	410	-	-
	200	42 SER	0236.3	0254.8	19.8	280	-	MR
	100	46 C	0544.9	0548.1	5.3	440	-	-
	100	42 SER	0629.0	0637.0	40.0	360	-	-
	100	42 SER	0738.9	0748.4	22.4	540	-	-
	200	44 NS	2116E	0720	660D	33	22	MR
24	500	8 S	0303.9	0304.0	0.8	430	-	0
	200	44 NS	2115E	0124	600D	10	5	MR
25	500	42 SER	0624.0	0625.8	2.4	49	-	0
	500	45 C	0657.0	0657.5	1.5	14	-	0
	200	48 C	0813.7	0814.2	1.6	41000U	-	0 SUNSET
28	500	46 C	2330.7	2330.8	1.5	53	-	0

C. RADIO PROPAGATION

C1. H.F. FIELD STRENGTH (UPPER SIDE-BAND OF WWV)

FEB 1991 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

UT DAY	00H 17M	01H 17M	02H 17M	03H 17M	04H 17M	05H 17M	06H 17M	07H 17M	08H 17M	09H 17M	10H 17M	11H 17M	12H 17M	13H 17M	14H 17M	15H 17M	16H 17M	17H 17M	18H 17M	19H 17M	20H 17M	21H 17M	22H 17M	23H 17M
1	ES -24	ES -24	-11	-2	3	17	22	18	ES -24	ES -24	ES -24	-2	-9	-2	4	10	-3	ES -24	ES -24	ES -24	ES -24	ES -24	ES -25	ES -25
2	ES -24	ES -24	-11	6	6	ES -24	-4	-2	3	-4	ES -24	ES -25	ES -25	ES -25	ES -25	6	3	ES -24	ES -24	ES -24	ES -24	ES -24	-10	-10
3	-12	ES -24	ES -24	-1	12	12	16	ES -24	-6	ES -24	-11	-9	ES -24	ES -24	ES -24	ES -24	-12	ES -24	ES -24	ES -24	ES -24	ES -24	-11	-9
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	ES -24	-6	1	6	9	7	6	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	-1	-5	ES -24	ES -24	ES -24	ES -24	ES -24	-12	-10	-2
6	ES -24	-3	-9	-2	12	5	-10	ES -24	-11	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	1	2
7	-13	-13	-4	1	1	-1	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-13	ES -25	ES -25	-2
8	ES -25	ES -25	-12	-10	-4	9	-2	ES -25	ES -25	ES -25	ES -25	-13	-2	ES -25	ES -25	-13	-2	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25
9	-10	ES -25	ES -25	-12	-4	7	3	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-13	ES -25	-4	-4	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-7
10	ES -25	ES -25	-4	-3	2	8	6	ES -25	ES -25	ES -25	ES -25	-12	-12	ES -25	-6	-10	-10	ES -25	-4	ES -25	ES -25	-13	-12	-12
11	-11	-6	-3	7	7	7	ES -24	-9	-9	ES -24	ES -24	ES -24	ES -25	ES -25	-6	-4	-4	ES -25	ES -25	ES -25	ES -25	-8	-7	-7
12	0	5	2	8	7	12	18	-7	-7	ES -24	ES -24	-12	ES -25	-7	ES -25	ES -25	-5	-10	ES -25	ES -25	ES -25	-7	-4	-4
13	0	5	6	11	9	10	ES -24	ES -24	-4	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	-9	-9	-2
14	-2	-4	-1	7	11	9	-5	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	-12	-4	-6
15	-4	-4	ES -25	0	5	10	15	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-10	3	-4	ES -25	ES -25	ES -25	ES -25	-12	-13	-3
16	ES -25	-13	-4	-4	6	14	-12	-13	ES -25	ES -25	ES -25	ES -25	ES 5	ES -25	ES -25	-12	-13	1	0	ES -25	ES -25	ES -25	ES -25	-10
17	ES -24	-12	-2	0	7	16	9	12	2	-4	-12	ES -24	ES -24	ES -24	-12	-12	7	-2	-4	-6	ES -24	ES -24	-5	-6
18	ES -25	ES -25	-3	-2	12	14	2	-10	-2	ES -25	ES -25	ES -25	ES -24	ES -24	3	-9	-11	-3	-6	-6	ES -24	ES -24	ES -24	-12
19	ES -25	ES -25	-3	6	9	8	18	-7	ES -25	ES -25	ES -25	ES -25	ES -25	-13	-1	S	S	S	S	S	S	-13	S	7
20	ES -24	ES -24	-2	3	5	14	19	21	-12	ES -24	ES -24	ES -24	ES -24	1	1	1	-12	ES -24	ES -24	ES -24	ES -24	-9	-3	-3
21	-3	1	3	8	7	15	18	19	9	ES -24	ES -24	ES -24	ES -24	-11	2	-1	-3	7	12	0	-11	-6	4	4
22	-1	-1	2	5	9	13	20	ES -24	ES -24	ES -24	ES -24	0	S	-12	2	ES -24	S	2	11	-3	-12	-3	-3	2
23	-3	-2	1	4	10	13	25	ES -25	ES -25	-4	-2	-13	ES -24	ES -24	ES -24	-2	3	5	7	-12	-11	-9	-3	-3
24	-12	-3	3	6	12	14	16	25	10	3	ES -24	ES -24	ES -24	ES -24	ES -24	-12	-12	2	-12	ES -24	ES -24	-7	-2	-2
25	-3	1	1	9	15	12	18	14	6	2	ES -25	ES -25	ES -25	-4	7	-10	-2	-10	1	-1	-13	-10	1	4
26	-4	1	-4	6	11	14	19	19	17	14	29	33	15	9	14	4	0	5	-4	-4	-10	-13	-4	4
27	-2	1	2	10	8	14	21	25	12	9	3	5	ES -24	-3	2	2	0	-3	-3	-3	ES -24	-9	ES 8	5
28	-1	-6	-1	6	7	10	24	12	15	-4	24	12	19	26	9	9	2	-4	-1	-1	-13	-10	6	-10
CNT	27	27	27	27	27	27	27	27	27	27	27	27	26	27	27	26	25	26	26	26	26	27	26	27
MED	-12	-6	-3	5	7	12	15	-10	-11	ES -24	ES -24	ES -24	ES -24	ES -24	-10	-10	-4	US -24	US -24	ES -24	ES -24	-12	US -6	-3
UD	-1	1	3	9	12	15	22	21	12	3	3	5	ES 5	1	7	6	3	5	7	-1	-11	-7	ES 4	4
LD	ES -25	ES -25	ES -24	-4	1	5	ES -24	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -24	ES -24	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-12

C. RADIO PROPAGATION

C1. H.F. FIELD STRENGTH (UPPER SIDE-BAND OF WWVH)

FEB 1991 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

UT DAY	00H 46M	01H 46M	02H 46M	03H 46M	04H 46M	05H 46M	06H 46M	07H 46M	08H 46M	09H 46M	10H 46M	11H 46M	12H 46M	13H 46M	14H 46M	15H 46M	16H 46M	17H 46M	18H 46M	19H 46M	20H 46M	21H 46M	22H 46M	23H 46M
1	ES -24	-9	-9	8	13	17	22	25	23	23	20	21	22	12	-11	ES -24	ES -24	ES -24	ES -24	ES -24	7	-1	4	-1
2	-1	-3	6	12	17	18	28	27	24	28	29	26	29	12	15	ES -24	ES -24	ES -24	ES -24	ES -24	2	6	-10	-10
3	-3	2	2	7	17	17	27	27	20	26	25	18	22	9	-9	ES -24	ES -24	ES -24	ES -24	ES -24	-2	3	ES -24	ES -24
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	-3	-6	-1	10	19	22	24	27	27	21	13	21	21	11	11	ES -24	ES -24	ES -24	ES -24	ES -24	-4	-2	-13	-3
6	0	5	5	13	18	21	27	30	31	28	25	22	20	17	15	15	-1	13	ES -24	ES -24	-11	-12	-11	-3
7	-12	-4	0	10	18	21	24	24	24	18	3	-12	-13	-12	ES -25	ES -25	ES -25	ES -25	ES -25	7	-6	ES -25	-4	-12
8	-11	-7	ES -25	6	16	19	23	23	20	21	23	14	-1	-13	-13	ES -25	-13	-4	ES -25	ES -25	-11	-4	-3	-4
9	4	-4	-12	6	14	17	19	21	31	21	20	18	11	-4	-13	ES -25	ES -25	ES -25	ES -25	ES -25	8	13	0	5
10	-1	3	9	7	17	18	25	26	26	22	19	13	23	4	-4	ES -25	ES -25	ES -25	ES -25	ES -25	1	9	5	5
11	5	0	5	13	15	18	28	32	29	9	4	-3	-7	16	-6	ES -25	ES -25	ES -25	ES -25	ES -25	4	3	-7	-10
12	-5	-9	8	8	17	25	26	25	22	21	12	15	7	9	ES -25	-1	ES -25	-4	-4	ES -25	6	9	-8	-2
13	-1	5	5	11	20	20	23	33	27	26	22	-4	-3	-12	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	8	4	6	3
14	-1	-1	4	10	14	24	25	27	26	20	16	5	2	7	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	11	13	4	-2
15	1	-6	3	7	13	22	26	26	23	15	11	12	-12	-12	ES -25	ES -25	ES -25	ES -25	ES -25	-2	5	0	0	-3
16	-2	-4	3	9	13	17	25	24	26	26	20	18	17	12	ES -25	ES -25	ES -25	-2	ES -25	-2	4	11	-4	-2
17	-5	-5	-4	9	19	17	26	25	25	24	21	7	22	17	ES -24	ES -24	ES -24	2	7	1	15	7	2	-6
18	-12	-7	-6	6	14	13	19	20	20	18	19	17	12	-3	-7	ES -24	ES -24	19	ES -24	ES -24	-3	0	ES -24	-12
19	-13	-6	-3	4	8	15	17	18	18	26	20	20	9	6	ES -25	S	S	S	S	S	-4	2	1	-2
20	-12	-3	-1	10	19	21	27	25	20	24	25	18	15	-9	ES -24	ES -24	ES -24	8	ES -24	ES -24	5	7	-2	-5
21	-3	-6	2	9	16	23	24	30	30	27	22	28	28	27	1	-12	-12	22	22	12	5	8	4	-12
22	-12	-12	-1	13	15	22	27	27	22	28	25	21	19	22	9	-2	S	23	14	13	11	4	-3	-2
23	-2	-4	1	10	17	23	23	24	23	24	24	24	19	1	21	2	-9	25	17	2	7	2	2	-3
24	-11	-3	8	5	27	22	22	26	23	31	25	28	13	20	-9	ES -24	ES -24	31	8	ES -24	4	3	-3	4
25	-13	-13	-1	7	20	18	19	26	24	33	28	18	18	15	10	ES -25	ES -25	4	14	12	5	6	-4	0
26	-10	-10	2	6	12	19	22	29	29	24	22	17	24	20	11	-6	-13	14	19	7	6	2	-2	-10
27	-7	-2	2	10	15	22	25	29	29	28	27	26	27	24	15	13	ES -24	18	17	13	8	7	2	ES -24
28	-4	-4	1	13	9	19	24	29	25	24	24	29	26	31	7	-4	-10	14	21	11	1	7	-4	-4
CNT	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	26	25	26	26	26	27	27	27	27
MED	-4	-4	2	9	16	19	24	26	24	24	22	18	18	11	-9	ES -24	ES -24	-3	ES -24	US -24	5	4	-3	-3
UD	1	3	8	13	20	23	27	30	30	28	27	28	27	24	15	2	-10	23	19	12	11	11	4	4
LD	-13	-10	-9	6	12	17	19	21	20	18	11	-3	-7	-12	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-6	-4	-13	-12

C. Radio Propagation

C2. Radio Propagation Quality Figures at Hiraiso

Hiraiso

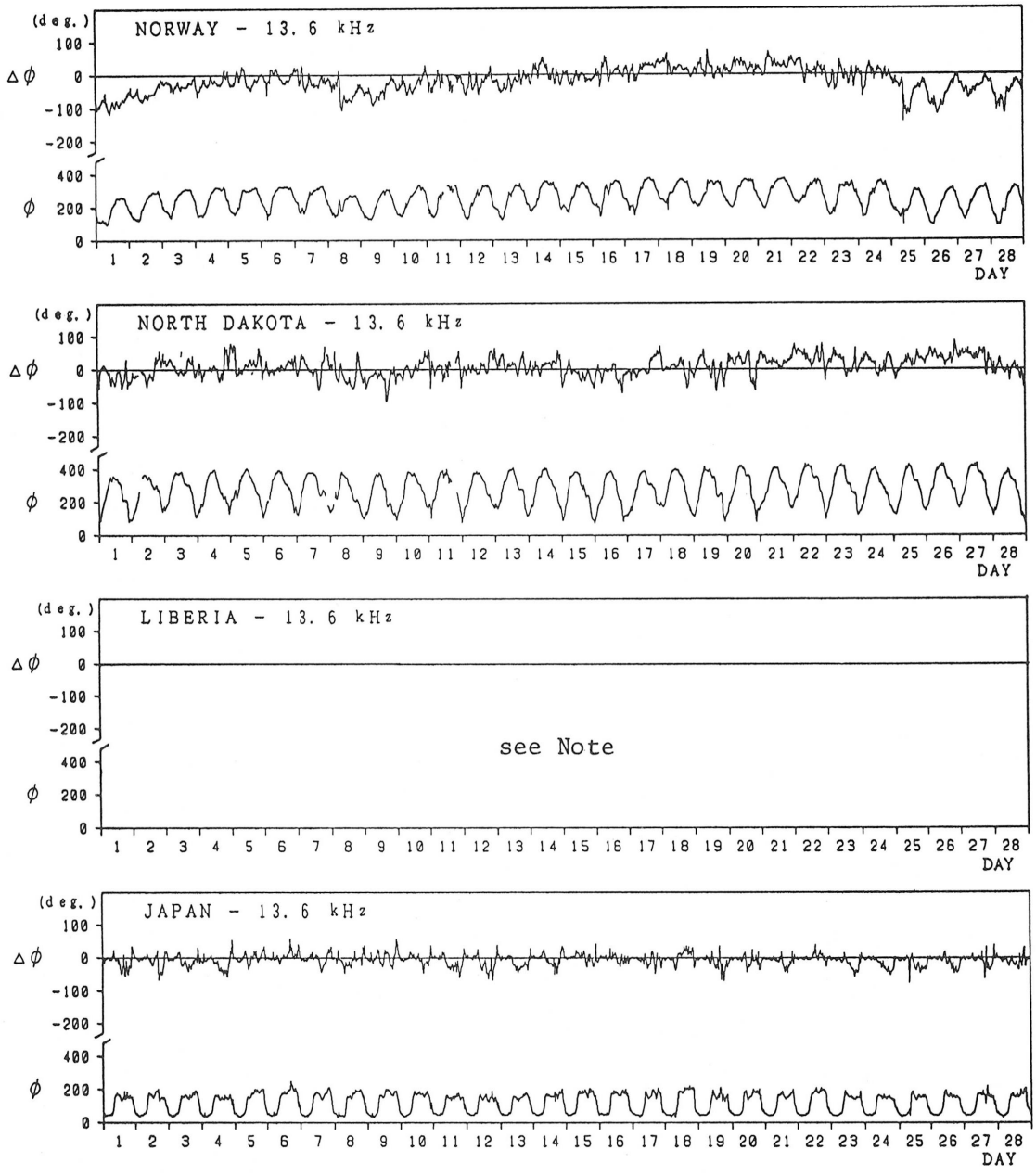
Time in U.T.

Feb. 1991	Whole Day Figure	W W V 00 06 12 18 / 06 12 18 24	W W V H 00 06 12 18 / 06 12 18 24	Conditions 00 06 12 18 / 06 12 18 24	Principal Geomagnetic Storms Start	End	Range
1	4-	3 5U 5U 3U	3 4 3U 4	N N N N	1842	---	80nT
2	4o	3 4U 4U 4U	4 4 4U 4	N N N N	---	12.0	
3	3o	3 4U 3U 3U	4 4 3U 3U	N N N N			
4	C	C C C C	C C C C	N N N N			
5	4o	4 3U 4U 4U	4 4 4U 4	N N N N			
6	4-	3 3 3U 4U	4 4 5 3	N N N N			
7	3o	3 2 3U 3U	4 3 2 3	N N N N			
8	4-	3 3 4U 3U	3 4 3 4	N N N N			
9	3+	3 3 4U 3U	4 4 3U 4	N N N N			
10	4-	3 4 4 4	3 4 3U 4	N N N N			
11	3+	3 3 4U 4	4 3 3U 4	N N N N			
12	4o	4 4 4U 4	4 4 4U 4	N N N N			
13	3+	4 3 3U 4	4 4 2U 4	N N N N			
14	3+	4 3 3U 4	4 3 2U 4	N N N N			
15	3+	4 3 4U 4U	4 3 2U 4	N N N N			
16	3+	3 3 4 3U	4 4 3U 4	N N N N			
17	4o	3 5 5 4U	4 4 4U 4	N N N N			
18	3+	4 4 4 3U	3 3 4 3	N N N N			
19	4-	4 4 5U 4U	3 3 3 4	N N N N			
20	4o	4 4 4U 4	4 4 3U 4	N N N N			
21	4+	4 4 5 5	4 4 5 4	N N N N			
22	4+	4 4 5U 5	4 4 5 4	N N N N			
23	4+	4 4 5 4	4 4 5 4	N N N N			
24	4o	4 5 4 4	4 4 4 4	N N N N			
25	4+	4 5 5 5	4 4 5 4	N N N N			
26	4+	4 5 5 5	4 4 5 4	N N N N			
27	4+	4 5 5 5	4 4 5 4	N N N N			
28	4+	4 5U 5 4	4 4 5 4	N N N N			

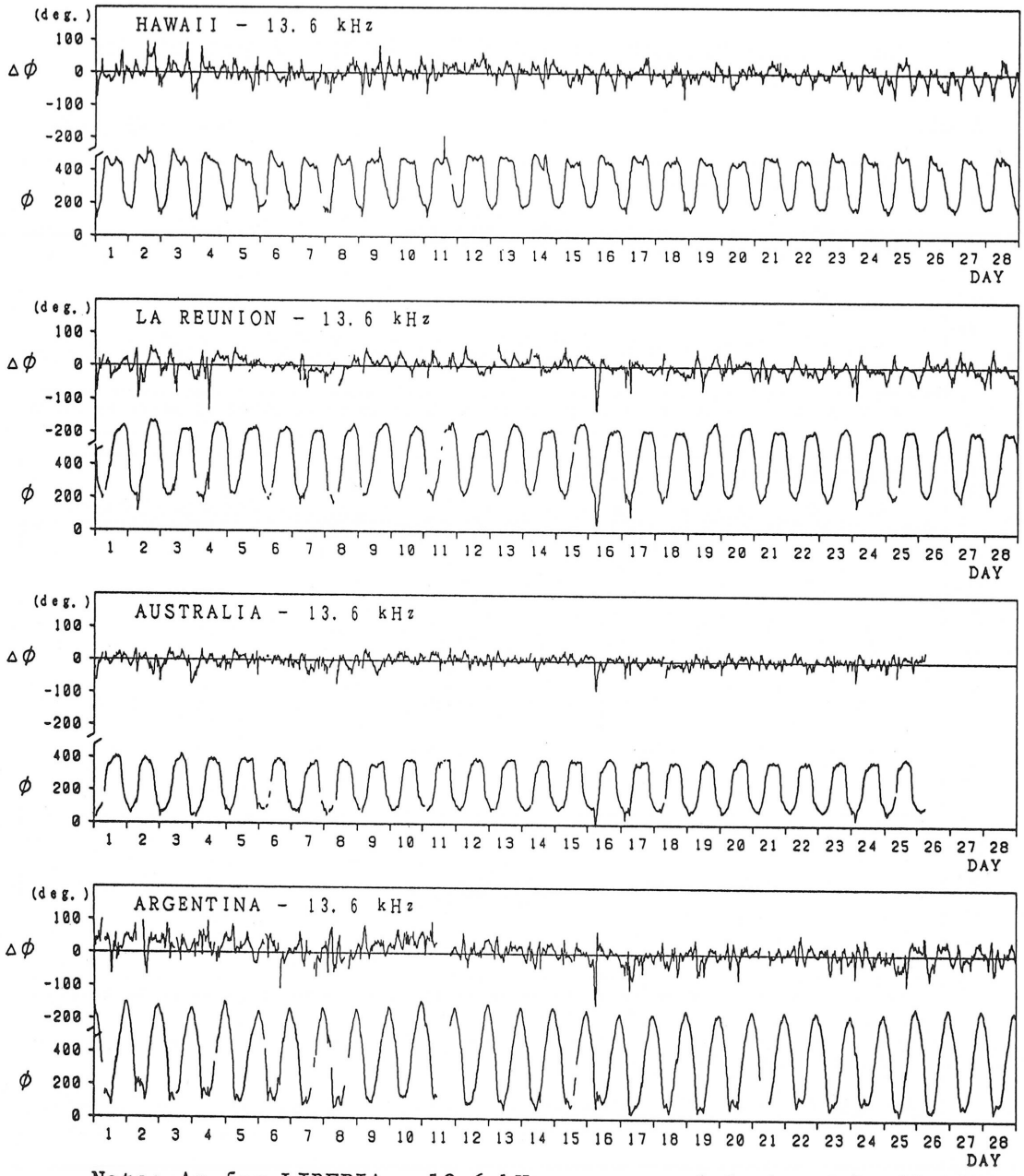
C. Radio Propagation

C3. Phase Variation in OMEGA Radio Waves at Inubo

Inubo February 1991



Inubo February 1991



Note: As for LIBERIA - 13.6 kHz, no record during July 09 1990 - February 28, due to the maintenance of transmitter.

Polar Cap Phase Anomaly (PCPA) on Norway-Inubo Circuit

Start (U.T.)	End (U.T.)	Max. (U.T.)	Max. Phase Deviation (negative value, deg.)
Feb.08/0906	Feb.10/1710	Feb.08/1047	129.6
Feb.25/0916	Feb.28/0000	Feb.25/1309	140.4

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

(a) Short Wave Fade-out (SWF) at Hiraiso

Hiraiso — Time in U.T.

Feb. 1991	S W F								Correspondence	
	Drop-out Intensities(dB)					Start	Dur.	Type	Imp.	Solar Flare	Solar Noise
	CO	HA	1)	2)	3)						
1		x	19	x		0042	43	3	1+		
1			17		x	0605	29	2	1+	x	
2			13			0406	26	1	1	x	x
2			13			0708	13	1	1	x	x
3			10			0017	16	1	1-	x	x
4		20	21			0141	22	2	2-	x	x
5		x	16			0242	16	2	1+		x
6			20	x		0418	25	2	2-	x	x
6			9	x	x	0644	22	2	1-	x	x
7			6			0455	18	2	1-		x
7	25	27	15			2345	95	2	1	x	
8			10	x		0151	19	2	1-	x	
8		36	31	x		0241	37	2	2+	x	
9		20	18	x		0231	48	3	1+		
11			14			0154	15	2	1	x	x
13			11			0406	30	2	1-		
14	18		6			0607	26	2	1-	x	
16	C	C	8			0428	27	2	1-	x	
16			14			0505	141	3	1	x	
17	8		16			0615	34	2	1+		
18			8	x	7	0726	21	1	1-	x	
19			5	x		0003	15	2	1-	x	
19			6	x		0029	20	2	1-		x
19			9	x		0058	27	2	1-	x	
19			11	x		0130	18	2	1-	x	
19			7	x		0328	15	2	1-		x
19			6			1014	11	2	1-	x	
20			13			0029	25	1	1	x	
20			10	x	x	0159	54	2	1-		
21			11			0012	24	2	1-	x	
24			10			0326	21	2	1-	x	x
25			14	x	8	0133	31	3	1		
25				26	15	0808	112	3	2-		
28			8		x	0356	16	1	1-		

NOTES CO: Colorado(WWV) HA: Hawaii(WWVH) 1): Australia 2): Moscow 3): London

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Feb. 1991	S P A								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
1	26	—		88	76	52	0030	0202D	0104
1	8	—	15	31	29	8	0202E	0228D	0208
1	6	—	14	21	22		0228E	0307D	0237
1		—	7	7	8		0307E	0332	0314
1	7	—	8				0435	0512D	0452
1	9	—	38	26	13		0512E	0559D	0524
1	21	—	113	76			0559E	0708D	0616
1	20	—	97	67			0708E	0809	0728
1		—	46				1117	1227D	1132
1		—	11				1227E	1246	1231
1		—	13*				1250	1344	1304
1	8	—		15	15		2330	0002	2343
2		—			5		0115	0142D	0134
2		—		21	11		0145	0240D	0220
2		—	18	29	11		0240E	0350	0255
2	9	—	22	22	5	4	0435	0507D	0441
2		—	16	7			0507E	0618	0525
2		—	30	24		—	0633	0705D	0639
2	19	—	136	92		—	0705E	0751D	0717
2		—	71	46			0751E	0816D	0801
2		—	74	22			0816E	0923	0828
2	11	—	47				1003	1117D	1019
2		—	31				1117E	1146D	1124
2		—	33				1146E	1223	1152
2		—	13				1313	1339	1320

Inubo

Feb.	S				P		A		
1991	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
2		—			25	22	2147	2207D	2151
2		—		14	31	16	2207E	2225D	2217
2		—		22	48	26	2225E	2308D	2229
2	5	—	8	24	27	26	2308E	2342D	2316
2	7	—	20	28	30	15	2342E	0017D	2348
3	14	—	37	68	51	35	0015	0102D	0022
3	7	—	21	31	29	14	0102E	0136	0111
3		—	16	28	11		0200	0249	0220
3		—	8	11	5		0353	0408	0356
3		—	9	7	8		0411E	0444	0425
3		—	21	15			0630	0710	0643
3		—	10				0733	0753	0738
3		—	98	31			0833	0915D	0839
3		—	98	36			0915E	1023D	0923
3		—	30				1023E	1052D	1026
3		—	78				1052E	1153	1059
3		—	5				1208	1222	1211
3		—	9				1313	1338	1324
3		—			15		2058	2121	2108
4		—		—	4		0015	0044	0019
4	32	—	120	—	70	51	0146	0255D	0156
4		—	14	—	9		0255E	0328	0303
4		—	14	—	6		0334	0423	0348
4		—	5	—			0437	0455	0444
4		—	18*	—		14	0506	0603	0516
4	8	—	51	—			0640	0757D	0651
4		—	48	13			0757E	0824D	0811
4		—	67	11			0824E	0859	0833
4		—	28				0941	1032D	0947
4		—	143				1032E	1247	1056
4		—	3				1346	1357	1349
4		—			28	19	1841	1857	1847
4	16	—	16	44	41	30	2318	0013	2328
5		—		6	5		0046	0106	0053
5		—		17	10	21	0112	0135	0120
5		—	7	5	2		0223	0239D	0231
5	13	—	79	66	39	21	0239E	0342	0249
5		—			13		1959	2023	2004
5		—			53		2048	2136	2104
5		—		32	69	57	2216	2335	2228
6		—			3		0156	0209	0201
6	8	—	14	14	8	30*	0302	0327	0311
6	7	—	13	13	7		0338	0404	0346
6	48	—	171	114	81	38	0418	0552D	0432
6	14	—	58*	45			0552E	0646D	0618
6	17	—	106	78	10		0646E	0744D	0653
6		—	26	23			0744E	0758D	0751
6		—	126*	58			0758E	0915D	0834
6		—	14				0915E	0933	0919
6		—	12				0936	0955D	0941
6		—	7				0955E	1014	0959
6		—	10				1129	1158	1133
6		—				55	1834	1905	1846
6		—			36	23	2017	2038	2022
6		—			62	25	2138	2250	2156

Inubo

Feb.	S				P		A		
1991	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
6		—	21	42	36	26	2352	0035D	0000
7	11	—	22	43	37	24	0035E	0130	0044
7		—	18	18	9		0246	0305D	0254
7		—	20	22	15		0305E	0335D	0317
7	10	—	17	18	13		0335E	0410	0341
7	17	—	75	57	34	13	0455	0607D	0508
7		—	27*	22*			0607E	0706D	0622
7		—	18	16			0706E	0750	0718
7		—	70	32			0751	0848D	0802
7		—	67	21			0848E	0928D	0857
7		—	72				0928E	1108D	0943
7		—	19				1108E	1145	1111
7		—			12		2000	2009	2004
7		—			14	17	2024	2035	2027
7		—			129	109	2119	2246	2125
7		—		15	8		2327	2348D	2334
7	9	—	14	49	30	12	2348E	0013D	2354
8	7	—		18	14		0013E	0036	0018
8	9	—		21	12	10	0124	0150D	0132
8	10	—	32	48	30	17	0150E	0240D	0202
8	52	—	184	139	112	67	0239	0421	0252
8		—	23	22			0447	0506D	0454
8	—	—	—	59	—	—	0506E	0552D	0519
8		—	66	42			0553E	0629D	0611
8		—	229	129*			0629E	1216	0750
9		—		17	10		0042	0124	0103
9	28	—	125	95	75	41	0228	0435	0249
9		—	6				0800	0818	0806
9		—			10		2006	2020	2009
9		—		6	6		2320	2330	2322
9		—		10	6		2349	0015	2351
10		—		12	6		0044	0113D	0056
10		—		25	16		0113E	0154	0121
10		—	9				0308	0334	0317
10		—	37	27			0526	0640	0546
10		—			15		1946	2012	1949
10		—			28		2047	2116	2058
11	31	—	90	—	77	72	0149	0248	0201
11		—	4	4	7		0333	0354	0341
11		—	37	25			0553	0657D	0558
11		—	9				0657E	0716	0702
11		—	15				0914	0955	0928
11		—		—	10	22	2323	0008	2338
12		—			3		0145	0212	0152
12	12	—	9	18	10	10	0257	0349	0309
12		—	19	19			0455	0550	0505
12		—			27		2116	2147	2123
12	17	—	12	22	17		2343	0035	2356
13	11	—		27	23		0039	0150	0054
13		—	13	14	9	26	0312	0348	0317
13	26	—	69	59	32	23	0411	0549	0419
13		—			34		2140	2255	2200
13		—		18	14		2319	0003	2328
14		—	15	14	8		0323	0407	0338
14		—	17	13	6		0430	0551	0448

Inubo

Feb.	S				P		A		
1991	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
14		—	94	59			0604	0736	0628
14		—	46				1232	1413	1241
15		—		—	10		0122	0215	0125
15	17	—	38	26			0538	0620	0547
15		—	38	23			0701	0800	0710
15		—	21				0812	0900	0826
15		—	18				1039	1108	1045
15		—	12				1136	1211	1143
15		—			19		2129	2223	2143
16	12	—	31	29	7		0429	0449D	0434
16	58	—	190	124			0449E	0854	0550
16		—			55	28	0501	0618	0523
16		—	14				1001	1026	1003
16		—	5	14	13	15	2338	0000	2341
17		—		7	6		0113	0132	0117
17		—	11	10	5		0153	0212D	0156
17		—	11	16	8	8	0212E	0230D	0217
17	20	—		47	26	24	0230E	0247D	0244
17	32	—	77	67	46	39	0237	0340	0257
17		—	21	15	6		0411	0432D	0421
17		—	22	24	9		0432E	0446	0437
17		—	50	32			0446E	0551D	0506
17	11	—	23	6			0551E	0609D	0558
17	41	—	152	91	21	22	0609E	0741D	0626
17		—	25	7			0741E	0802D	0745
17		—	14				0802E	0825	0806
17		—	10				0848	0909	0853
17		—			8		2131	2153	2137
17		—			4		2314	2339	2320
18		—		6	4		0133	0149	0138
18	5	—	13	16	10	12	0228	0302	0239
18	8	—	47	35	29		0450	0637	0507
18	74	—	176	116	7	11	0716	0854	0734
18		—	28				0919	1004	0924
18		—			71	34	2048	2138	2059
18		—			28	20	2151	2205D	2158
18		—			49	40	2205E	2247	2209
18		—			5		2313	2331	2318
18		—		9	6		2338	0002D	2342
19		—		—	17	18	0002	0027D	0009
19	21	—	21	—	40	23	0027E	0050	0036
19	12	—	17	—	35	19	0110	0133D	0118
19	16	—	28	—	41	24	0133E	0228	0139
19	9	—	37	—	20	14	0328	0425	0342
19		—	14	—			0441	0512D	0447
19		—	23	—	8		0512E	0545D	0516
19		—	19				0545E	0626	0554
19		—	6				0739	0803	0744
19		—	38				0840	0936	0856
19		—	15				1002	1013D	1007
19	24*	—	60				1013E	1050D	1022
19	19	—	41				1050E	1153	1100
19		—	11				1225	1257	1232
19		—			47	44	2156	2256	2210
19	5	—	8	8	8		2335	2355	2343

Inubo

Feb.	S			P		A			
1991	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
20	19	—	39	61	45	48	0034	0143	0047
20	22	—	55	63	42	37	0159	0257	0204
20		—	14	14	10	7	0302	0323	0308
20		—	6	9	5		0430	0450	0434
20	7	—	12	13			0532	0550	0534
20		—	17	10			0736	0754D	0742
20		—	28	10			0754E	0812D	0801
20		—	41	19			0812E	0852	0818
20		—	9				1325	1353	1330
20		—			16		1932	1957	1940
20		—			15		2048	2120	2052
20		—		8	11	17	2326	2358	2332
20		—			9		2355E	0024	0005
21		—	7	7	5		0232	0249	0236
21		—	21	22	9		0403	0446D	0426
21		—	27	25	7		0446E	0532	0452
21		—	10	9			0600	0620	0607
21		—	9	5			0634	0658	0643
21		—	5				0710	0722	0715
21		—	6				0736	0802	0746
21		—	45	25			0810	0851D	0822
21		—	9				0851E	0903	0854
21		—	35				0949	1053D	1017
21		—	31				1053E	1206	1056
21		—		11	17	28	2325	0019	2338
22		—	12	19	8	10	0247	0353	0308
22		—	14	9			0618	0708	0633
22		—			5		2308	2344	2317
23	17	—	5	12	7		0226	0316	0241
23		—	18				1000	1052	1008
23		—		5	8	11	2302	2319	2307
24		—		21	17	13	0004	0106	0021
24	43	—	113	81	49	43	0318	0509	0337
24		—	5				1141	1203	1144
24		—			29	40	2132	2151	2137
25	23	—	22	—	30	28	0012	0114	0024
25	15	—	43	—	24	20	0133	0249	0150
25		—	6	—			0425	0448	0434
25		—	6	—			0454	0513	0503
25	104	—	301	165			0808	1120	0822
26		—	4	6	3		0353	0407	0357
26		—	5				1227	1242	1231
27	23*	—	20	47*	28*	33*	0120	0213	0126
27	10	—	23	21			0528	0605	0533
27		—	25				1034	1141	1055
27		—		8	9		2330	0005	2337
28	15	—	51	45	20	15	0354	0414D	0403
28	35	—	96	72	36	24	0414E	0539	0421
28		—	17				0720	0822	0738
28		—	8				1246	1258	1252
28		—	12	25	28	21	2325	0014	2330

IONOSPHERIC DATA IN JAPAN FOR FEBRUARY 1991

F-506 Vol.43 No.2 (Not for Sale)

電離層月報 (1991年2月)

第43巻 第2号 (非売品)

1991年7月5日 印刷

1991年7月10日 発行

編集兼 郵政省通信総合研究所

発行所 〒184 東京都小金井市貫井北町4丁目2－1

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