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IONOSPHERIC DATA IN JAPAN

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CONTENTS

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MINISTRY OF POSTS AND TELECOMMUNICATIONS
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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 and X-ray flares, and solar radio burst 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

MAY 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	72	A	54	49	53	62	65	62	A	A	75	80	87	91	89	91	92	91	87	90	69	73	66	66
2	66	65	65	62	57	66	73	64	73	80	72	85	89	98	100	106	96	97	88	96	87	88	66	67
3	79	68	67	71	58	63	63	56	67	65	62	78	72	81	74	84	81	84	85	90	84	71	74	76
4	74	71	66	66	61	74	77	76	83	83	92	92	100	102	100	98	96	95	93	97	86	87	73	75
5	74	67	71	72	68	86	90	104	102	99	100	108	111	108	107	109	109	108	90	97	90	96	85	86
6	84	76	79	72	69	72	87	90	91	97	97	92	92	97	103	97	96	97	89	96	72	86	82	83
7	80	80	78	77	79	89	101	108	103	112	111	100	102	101	98	95	91	87	98	96	87	91	71	86
8	84	83	80	70	67	71	63	71	55	68	59	53	59	A	84	70	77	77	80	82	68	74	66	62
9	66	71	66	58	61	66	73	78	72	A	A		70	75	70	80	78	75	74	76	78	66	A	66
10	74	71	67	63	60	60	72	71	A	56	69		64	73	75	73	71	71	72	66	66	69	71	66
11	N	73	66	62	62	82	85	87	N	84	82	85	91	90	89	91	91	90	87	85	84	79	78	76
12	77	77	77	64	76	83	84	94	94	95	88	93	91	N	90	91	88	96	97	94	82	73	82	79
13	80	83	80	71	81	87	91	91	96	89	91	B	91	90	91	91	91	84	85	87	91	84	90	84
14	86	65	66	61	64	39	54	64	A	71	64	80	62	74	79	81	83	86	86	91	70	66	64	60
15	73	67	63	56	60	64	66	66	A	51	A	A		A	A	54	62	62	63	72	66	63	65	68
16	73	66	69	66	66	79	90	92	100	83	66	A	78	78	83	88		87	90	90	89	85	86	86
17	86	79	77	67	63	66	72	56	68	71	81	73	81	92	97	87	70	87	90	87	74	67	71	66
18	65	61	57	54	53	60	55	59	A	A		A		86	B	B	B	67	66	68	67	71	66	70
19	65	67	66	64	67	67	73	76	75	76	A	80	83	78	81	84	79	81	82	83	81	85	A	86
20	85	84	78	67	76	85	102	97	98	100	98	90	94	94	90	90	85	86	90	94	87	86	81	83
21	86	83	78	84	86	87	90	102	97	92	88	94	91	91	91	91	82	90	91	91	73	87	91	90
22	86	80	84	74	81	87	99	100	79	72	63		55	62	65	66	65	71	74	66	70	62	63	64
23	72	64	65	66	61	72	63	68	86	A	86	A	91	68	83	74	84	79	86	83	87	83	73	68
24	66	63	62	58	69	60	56	63	A	73	84	85	87	85	A	86		A	A	74	83	82	81	66
25	68	73	64	69	60	67	A	73	95	82	82	83	87	92	94	96	91	92	A	81	79	82	86	85
26	87	82	63	66	72	70	78	87	82	A	69	83	87	91	88	91	A	88		97	92	87	91	88
27	77	77	66	67	74	70	72	80	78	81	82	85	88	86	89	85	80	84	91	90	91	85	87	85
28	86	86	73	83	71	79	83	85	82	82	58	72	74	72	83	81	80	83	81	86	62	85	74	74
29	81	78	70	73	68	84	86	86	65	66	68	80	82	78	87	86	85	86	84	87	88	A	81	66
30	49	74	65	65	64	64	65	61	49		B		68	67	72	70	64	68	73	80	76	74	73	71
31	77	73	71	66	65	77	77	75	70	75	A	62	A	73	74	80	80	82	84	84	71	58	85	86
	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	30	30	31	31	31	31	30	31	24	25	25	22	28	28	28	30	27	30	28	31	31	30	29	31
MED	77	73	67	66	66	71	75	76	82	81	82	84	87	86	88	86	83	86	86	87	81	82	74	75
U Q	84	80	77	71	72	83	87	91	95	90	89	92	91	92	92	91	91	90	90	94	87	86	85	85
L Q	72	67	65	62	61	64	65	64	71	71	67	80	73	74	80	80	78	79	80	81	70	71	68	66

HOURLY VALUES OF FES AT WAKKANAI

MAY 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	71	60	G	G	26	42	51	50	57	64	69	G	G	G	G	52	47	47	33	29	29	28	44	G
2	G	G	G	G	G	G	34	47	42	45	53	G	G	G	G	G	G	G	G	28	G	G	G	G
3	G	G	G	G	G	G	40	G	47	G	G	45	G	G	G	G	G	46	68	G	G	38	30	31
4	26	28	29	27	28	G	G	G	G	59	56	60	G	G	G	66	G	G	47	33	G	G	G	G
5	G	G	G	G	G	G	G	G	G	G	G	G	G	G	66	G	75	89	44	36	41	58	G	G
6	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	41	64	38	26	G	G	G
7	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	44	36	29	29	59	32	40
8	49	28	G	30	G	33	39	70	G	G	G	G	56	96	86	55	45	50	42	35	45	G	G	G
9	G	G	30	G	29	G	35	G	46	70	58	G	G	G	G	G	39	44	46	38	45	40	68	45
10	G	G	G	26	30	G	G	41	59	57	59		63	G	G	G	48	47	G	28	40	43	31	34
11	G	G	G	G	G	G	G	47	61	64	63	G	G	49	48	55	45	73	56	38	G	G	G	38
12	32	G	30	32	32	G	G	G	G	G	G	G	G	G	G	G	52	62	46	G	G	G	G	G
13	28	29	G	G	G	G	G	G	45	45	G	B	G	G	G	G	44	G	40	44	G	G	G	G
14	G	G	23	G	G	36	G	41	65	72	G	G	G	G	G	G	G	G	41	38	G	G	G	G
15	30	40	31	27	G	G	43	48	63	55	60	62	G	46	74	G	54	47	55	58	37	27	G	G
16	G	G	G	G	G	G	G	49	58	45	45	79	G	G	G	G	G	46	54	38	48	G	G	G
17	G	G	G	G	G	G	46	45	54	57	G	G	G	G	G	G	66	G	G	29	37	45	46	33
18	32	G	G	G	20	32	59	G	64	59		57	G	98	B	B	B	G	42	40	47	G	33	G
19	G	G	G	G	G	39	58	66	67	57	58	G	57	G	G	G	54	59	50	71	60	59	95	91
20	66	82	46	45	G	52	47	65	92	G	60	G	G	G	G	42	G	G	36	43	64	41	58	38
21	28	32	G	G	G	35	41	50	65	53	65	G	G	G	G	68	90	74	36	38	39	91	G	G
22	G	G	G	G	G	37	43	49	42	G	G	G	G	G	G	G	65	58	49	G	30	36	36	G
23	G	G	G	G	G	G	G	69	58	78	60	92	73	65	72	125	46	74	44	41	38	26	G	G
24	G	G	G	G	30	G	42	58	73	G	46	G	45	G	84	65	148	101	73	42	39	71	58	45
25	33	27	G	G	31	72	73	74	70	55	54	47	60	56	55	62	67	69	88	99	48	G	36	42
26	58	36	45	G	32	38	46	G	61	136	78	74	51	60	59	78	97	118	167	104	92	69	44	44
27	35	31	30	30	41	44	62	56	64	70	46	G	G	G	G	G	40	46	36	G	24	G	26	25
28	G	G	G	G	G	31	44	46	42	53	54	G	G	G	G	G	G	G	31	G	G	G	G	G
29	G	G	G	G	G	G	G	40	54	52	G	G	G	G	G	46	G	G	G	32	30	59	G	G
30	42	26	G	G	G	38	42	58	46	G	B	G	G	G	G	G	G	G	50	46	32	G	27	26
31	G	G	G	G	G	G	48	52	51	72	66	46	69	G	G	60	G	57	55	G	G	G	G	G
	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	31	31	31	31	31	31	31	31	31	31	29	29	31	31	30	30	30	31	31	31	31	31	31	31
MED	G	G	G	G	G	G	40	47	54	53	53	G	G	G	G	G	44	46	44	38	32	26	G	G
U Q	32	28	23	G	28	37	46	56	64	64	60	46	45	G	48	55	54	62	55	42	45	45	36	38
L Q	G	G	G	G	G	G	G	G	42	G	G	G	G	G	G	G	G	G	36	28	G	G	G	G

HOURLY VALUES OF FMIN AT WAKKANAI

MAY 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	17	17	18	17	17	18	24	22	34	36	40	52	52	52	34	32	22	23	20	20	18	18	16	16
2	22	21	21	18	17	23	22	22	33	36	38	51	38	54	43	40	21	20	23	20	17	16	16	16
3	16	18	17	18	18	23	26	20	34	42	58	42	55	49	42	34	24	24	18	16	18	18	15	15
4	17	17	16	20	17	23	29	22	43	38	40	40	52	40	28	26	23	20	18	15	17	15	15	16
5	18	16	15	18	16	23	26	28	30	41	49	48	43	45	36	38	26	20	18	16	16	16	16	17
6	17	15	16	16	18	24	33	23	40	39	43	48	45	42	45	42	26	18	18	16	17	17	16	16
7	16	15	16	17	20	24	21	35	26	44	52	46	54	56	45	39	24	22	18	20	16	20	17	17
8	17	16	15	17	23	18	24	24	57				40	43	39	29	23	20	21	17	14	17	16	17
9	16	15	15	18	18	24	28	24	36	39	40				45	41	34	28	18	16	17	16	17	18
10	17	16	14	17	17	24	20	24	24	39	42		45	101	44	41	26	22	28	18	14	15	16	17
11	16	15	16	17	18	26	22	20	36	39	42	42	54	43	40	39	23	27	20	17	18	17	16	14
12	16	16	15	15	18	27	34	42	52	52	49	53	47	47	53	51	26	32	20	20	18	20	18	16
13	16	17	15	15	18	26	33	36	38	39	57	B	64	55	53	43	35	33	20	16	18	16	18	18
14	17	16	15	16	22	18	21	23	24	39			42	43	44	39	24	30	20	18	17	17	17	18
15	16	16	16	16	20	20	21	32	35	38	40	40	81	40	35	29	21	21	18	17	17	17	17	17
16	17	16	16	16	18	23	26	38	34	38	39	40	53	52	52	23	71	34	23	17	18	17	17	15
17	16	17	15	22	17	26	20	32	35	36	55		42	49	52	40	21	22	24	20	17	17	17	18
18	15	17	16	16	18	21	18	23	34	36		40		30	B	B	B	42	21	17	16	17	17	16
19	18	18	16	16	20	21	22	21	34	40	38	55	38	45	48	48	22	24	20	18	16	16	17	15
20	14	17	16	16	20	20	20	21	33	41	40	48	55	42	42	42	21	20	21	17	15	15	16	18
21	17	16	17	18	18	20	20	21	24	38	38	33	43	49	40	22	23	24	18	18	16	16	16	15
22	16	17	18	17	21	21	20	24	26	38						38	23	20	20	27	17	14	21	18
23	18	21	17	17	20	29	32	21	35	39	38	39	39	39	36	28	21	23	17	16	18	15	23	23
24	24	22	15	23	24	33	22	30	35	51	39	52	55	36	38	27	29	22	18	21	17	17	17	20
25	15	20	20	22	16	26	23	23	26	36	36	38	42	39	38	35	27	24	21	22	14	22	21	18
26	16	16	17	16	16	22	24	24	28	35	39	38	39	33	39	28	24	21	18	18	17	16	16	17
27	16	18	16	17	16	18	22	32	35	36	49	62	52	55	51	43	27	20	18	18	16	17	17	17
28	15	15	23	18	38	18	24	30	35	38	38				40	39	33	37	23	24	21	24	23	28
29	21	17	18	22	30	40	42	32	27	38	47				55	37	38	22	29	17	17	22	24	15
30	17	18	16	22	20	18	30	23	33	91	B	101	91	91	71	52	39	38	26	26	18	22	16	18
31	22	28	17	20	21	38	21	24	36	27	39	38	39	91	71	36	28	30	24	29	24	27	18	18
	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	31	31	31	31	31	31	31	31	31	30	26	22	26	27	29	30	30	31	31	31	31	31	31	31
MED	17	17	16	17	18	23	23	24	34	38	40	44	46	45	43	38	24	23	20	18	17	17	17	17
U Q	17	18	17	18	20	26	28	32	36	40	49	52	54	54	51	41	28	30	23	20	18	18	18	18
L Q	16	16	15	16	17	20	21	22	28	36	39	40	42	40	38	29	23	20	18	17	16	16	16	16

HOURLY VALUES OF FOF2 AT AKITA

MAY 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		51	50				65		A	80	A	85	102	112	114	90		98	86		A	65		A
2	51	A			68	65	78	80	83	97	111	91	113	117	115	121	114	103	112			A		
3		56		35			68	A	86		80	95	93	92	86	93	94	93	86		A	A	85	A
4		71	A		A	65	78		94	113		110	115	118	124	116	109	110	A	A	A	A		75
5				N	52	74	92	101	101	A	114	113	115	115	124	125	110	113	110	84	90			87
6			86			87	89	87	94	94	110	111	115	120	116	114	112	90	91		A		49	
7			54		72	86	90	108	110	111	114	112	111	97	98	109		100	90		86	52	84	
8	A		51		53	52	70	79	A	78	90		94			90	86	86	90		31			
9		67	47	50		52	86	88	88	79			88	75	90	A	90	A	84		84		79	
10		76					84	76	74	A				86	85	86	77	86	86		62	52		
11		79			67	79	88	88	97	91	97	108	113	111	104	104	88	88	96			70	82	52
12					70		84		90	97	90	91	88	87	88	108	81	A	83		82		58	68
13				74	66	86	86	N	90	86	A	B	87	109	91		101	88	91	87	49	88	86	85
14	87	86	78	56	N	52	54	70	66	A	86	A	91	90	87	90	90	88	A	86	54	56	49	62
15	52	70	62	40	53	53	69	A	A	A	A	A	A	A	A	A	A	A	72	A	32	A	A	
16	A		69	54	64	63	85	90	88	91	84	87	90	76	96	91	B	90	91	90	52	84	79	65
17	N	86	52	52	65	66	79	A	86	90	90	95	85	94	118	98	86	90	90	91	52	A	A	A
18	63	54	53	54	50	63	54	A	A	A	A	A		A	B	B	B	A	A	59	A	A	69	79
19	37	47	52	56	72	73	A	A	81	A	91	85	A	A	119	97	88	88	87	86	49	A	A	78
20	57																							
21																								
22																	79		79	47	31	A	A	A
23	A	A	A	54	62	51	80	87	80	A	86	89	79	88		88	89	88	91	A	A	N	A	37
24											A	75	86			90	86	A	A	42	49	A	A	A
25																								
26																								
27										92	87	91	91	90	90	90	90	86	90	103	38	69	85	84
28	87	85	82	85	82	80	84	88	88	80	91	91	89		90	90	90	83	84	83	51	78	84	80
29	79	72	64	74	77	86	88	86	73	87	85	81	91	87	87	90	88	90	91	87	88	88	83	56
30	77	80	66	25	56	54	54	A	54	A	A	B		A	73	A	74	74	A	86	85	52	72	58
31	75	76	80	75	78	77	79	A	A	86	A	A	A	A	83	90	88	91	85	84	79	87	90	87
	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	15	15	14	17	20	23	13	19	16	16	17	20	18	21	21	22	21	22	14	19	12	15	15
MED	69	72	62	54	66	66	80	87	88	90	90	91	91	93	91	91	88	90	90	86	52	70	82	75
U Q	79	80	78	74	72	79	86	89	94	95	103	109	112	112	115	108	94	95	91	87	84	85	85	84
L Q	52	56	52	50	54	53	69	79	80	83	86	86	88	87	87	90	86	87	85	83	49	54	69	58

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT AKITA

MAY 1991

LAT. 39.7N LON. 140.1E 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		43		72	56	46	G	61	54	59	48		54	48		37	144		135
2	31	38			G	32	39	61	G	57	G	51	52	66	55	G	G	48	57			50		
3		27		G		G	G	52	G		G	52	G	G	51	G	G	G	36		93	47	38	25
4		32	38		32	G	G		60	45		G	52	148	86	61	G	44	140	84	127	92		G
5				G	G	G	G	51	52	112	92	52	51	G	G	G	50	56	74	30	33			G
6			G			G	G	G	55	48	51	53	G	G	G	72	G	54	37		50		G	
7			G		G	G	G	G	52	G	G	G	G	G	G	G		73	36		32	28	29	
8	37		26		25	33	40	51	52	55	56		51			G	51	48	46		35			
9		G	G	G		G	35	48	70	52	G	G	G	G	55	95	60	95	76		38		50	
10		43					G	G	56	69		G		G	G	G	G	G	G		G	G		
11		G			G	G	G	46	43	G	46	57	G	G	G	50	48	39	36			G	40	26
12					26		G		G	51	73	69	75	74	46	51	58	117	77		49		G	G
13				G	G	G	G	46	62	57	55	B	G	G	G		G	37	38	40	45	34	31	G
14	G	G	G	G	G	G	43	51	54	61	77	60	83	45	G	G	54	72	104	60	43	26	G	27
15	G	34	G	24	G	33	50	61	73	74	56	91	93	58	51	52	54	51	42	105	57	64	33	33
16	43	32	G	G	G	G	53	58	52	57	56	57	G	50	48	54	B	48	60	51	51	34	28	G
17	27	G	G	G	G	G	G	56	61	54	48	73	74	65	58	52	54	37	G	57	40	40	116	81
18	25	28	25	24	G	G	45	58	51	57	57	46	G	57	B	B	B	67	118	86	57	92	53	32
19	26	G	71	37	40	37	54	61	59	115	62	61	62	127	124	68	53	46	33	46	45	40	33	41
20	38																							
21																								
22																	G	G	G	34	32	40	52	44
23	41	58	38	34	25	G	48	66	101	66	58	G	G	50		46	46	54	48	36	50	40	45	24
24											57	G	53			G	51	86	54	46	57	54	33	58
25																								
26																								
27										62	73	58	61	53	54	44	47	70	55	44	41	32	29	G
28	G	24	24	29	25	G	40	54	50	G	G	G	G	G	G	45	59	56	64	45	37	G	G	27
29	G	G	G	G	G	G	G	54	50	G	46	G	G	57	49	G	54	56	56	50	34	52	39	51
30	G	G	27	34	26	35	50	70	61	56	51	B	G	62	57	51	49	61	118	51	57	28	30	35
31	27	72	57	38	31	G	46	56	67	59	122	123	91	78	82	G	G	G	G	G	G	G	G	G
	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	14	18	17	15	20	21	24	21	24	24	24	23	25	24	22	24	23	27	27	17	25	22	21	21
MED	26	26	G	G	G	G	37	54	54	56	56	52	51	52	50	46	49	54	48	46	43	40	33	27
U Q	37	34	32	34	25	16	45	59	61	61	60	60	61	63	57	52	54	67	74	58	54	52	42	42
L Q	G	G	G	G	G	G	G	47	50	49	46	G	G	G	G	G	G	39	36	38	34	28	14	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT AKITA

MAY 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	18		16		17		26	38	39		29	27	28	26		21	17		16	15		15
2	21	16			16	17	18	21	26	24	42	36	34	34	33	26	22	17	20			16		
3		16		16		26	28	22	27			36			39		26	21	17		17	18	17	17
4		17	18		16	24	29		36	38		68	35	37	36	35	24	20	18	20	17	17		17
5				17	17	26	20	26	27	35	35	34	38				24	18	16	16	17			17
6			15			26	30	23	27	36	38	36		35	35	27	23	18	17		16		16	
7			16		18	24	20	37	26	46				56	50	36		26	18		15	16	16	
8	15		16		18	16	20	20	27	37	42		38				36	21	17		15			
9		17	16	16		24	18	21	27	38					45	26	22	22	16		16		17	
10		16					18	21	24	28		65		101	67	40	22	32	27		18	18		
11		17			16	23	18	22	35		39	39	64	63	66	24	23	29	17			17	20	16
12					18		20		47		45	42	46	45	36	43	36	29	20		16		17	17
13				16	16	26	33	23	38	39	46	B	72	68	66		45	34	21	15	16	16	16	18
14	15	20	18	18	16	18	27	22	38	38	43	45	44		34	54	23	28	18	15	16	16	17	17
15	17	16	18	17	17	18	17	32	35	38	40	28	35	38	35	28	27	20	20	16	15	15	15	15
16	17	17	16	20	16	24	20	20	23	23	38	38	39	35	34	23	B	28	17	16	16	16	18	21
17	18	20	18	16	20	18	20	22	24	26	29	26	29	29	34	33	27	21	22	16	16	16	16	16
18	16	16	21	18	15	18	17	21	23	35	35	36	34	33	B	B	B	33	17	16	16	16	16	15
19	18	16	15	16	16	16	20	33	26	35	39	37	36	38	28	24	21	21	16	17	16	17	15	16
20	16																							
21																								
22																	47	28	20	17	20	17	15	16
23	16	17	15	16	18	20	17	21	36	38	38					38	27	21	20	20	16	16	16	17
24											38	40	39				35	24	17	16	16	16	16	16
25																								
26																								
27										35	36	38	36	34	29	26	22	18	17	15	17	17	16	16
28	16	16	18	16	17	24	21	23	33		37			34	54	38	22	32	20	16	16	16	18	16
29	17	17	18	21	22	24	28	21	23		N		66	46	66	64	27	22	20	17	16	17	15	15
30	17	17	18	15	18	18	18	22	36	46	45	B	36	38	33	28	24	22	18	17	16	16	18	15
31	17	16	18	16	16	24	20	24	35	38	39	39	38	42	49	62	26	20	28	18	17	22	17	18
	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	14	18	17	15	20	21	24	21	24	20	20	17	19	19	21	20	23	27	27	17	25	22	21	21
MED	17	16	18	16	16	24	20	22	27	38	39	38	38	38	36	30	24	22	18	16	16	16	16	16
U Q	17	17	18	18	18	24	24	23	35	38	42	41	44	46	52	39	27	28	20	17	17	17	17	17
L Q	16	16	16	16	16	18	18	21	26	35	37	36	35	34	33	26	22	20	17	16	16	16	16	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

MAY 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	80	77	54	62	63	66	71	A	83	79	90	103	A	122	107	124	120	118	114	102	83	79	84	76
2	80	72	75	74	67	76	80	100	102	134	117	112	117	129		129		113	118	103	A	90	102	90
3	87	87	81	77	76	75	81	92	99	96	104	112	111	100	114	112	111	106	110	87	69	77	84	
4	80	81	79	76	64	70	86	94	102	107	113	118	127	135	137	128	123	120	125	A	A	A	91	94
5	86	85	86	80	80	90	101	102	107	107	102	119	130	137	133	118	126	121	127	124	102	105	104	80
6	87	94	87	86	N	87	101	102	90	109	102	116	132	134	135	129	123	122	110	102	52	86	90	88
7	88	87	80	55	77	85	101	111	112	111	118	122	121	115	116	115	111	109	106	105	87	86	94	82
8	89	87	86	80	72	75	87	96	87	95	111	102	118	117	102	114	107	99	106	87	74	81	82	82
9	84	86	74	67	62		87	101	86	97	101	108	114	116	N	110	88	97	96	87	A	54	84	
10	78	A	A	67	A	54	82	88	84	A	A	85	97	89	90		82	98	96	88	81	80	82	A
11	84	83	79	65	68	77	102	105	95	96	94	114	123	122	102	117	111	113	106	98	A	A	87	87
12	92	81	80	78	73	82	87	97	97	98	103	105	114	114	114	120	115	108	106	96	A	87	85	83
13	87	83	75	79	81	86	96	102	95	86	103	B	B	104	104	116	94	100	87	86	89	52	92	103
14	88	89		79	69		76	80	A	81	98	97	91	102	100	108	105	106	102	A	A	54	56	
15	79	63	68	69	64	66	80	67	A	A	A		A	A	A	66	67	66	A				A	A
16		A	55	A	65	70	90	99	97	90	A	91	99	104	107	A	110	106	103	87	54	A	75	85
17	A	88	51	79	A	68	86	85	A	87	106	106	104	113	123	119	95	103	101	96	65	63	56	A
18	A	75	A	63	52	68	80	126	85	59	A		74	78	B	B	88	A	A	87	80	A	74	77
19	60	78	73	A	70	80	76	77	A	92	94	109		89	A	103	98	97	87	90	87	84	83	89
20	86	87	82	78	73	87	94	103	75	98	95	103	101	104	N	109	108	108	104	103	88	91	97	82
21	91	90	90	83	87		90	98	102		110	104		104	110	111		108	103	97	90	87	A	90
22	102	84	87	90	76	86	100	55	115	113	107	110	A	104	106	110	94	91	87	86	82	76	74	54
23	55	78	75	70	68	74	82	95	101	107	92	102	116	117	117	116	103	112	110	105	91	90	87	87
24	81	77	82	73	57	62	68	62	A	75	83	90	98	A	100	105	107	93	91	87	78	A	78	80
25	86	89	90	87	70	63	A		A	A		101	107	108	114	116	105	99	100	90	78	80	80	87
26	85	82	77	70	72	88	88	86	87	94	92	107	107	114	117	110	110	103	103	103	90	102	98	N
27	94	N	80	77	77	81	85	95	98	95	95	104	101	108	114	A	101	106	104	108	80	81	84	87
28	91	86	85	83	84	79	91	107	94	89	102	98	100	N	109	105	101	A	A	76	74	80	87	84
29	86	81	77	70	82	86	90	83	75	87	93	87	102	98	102	103	101	100	101	90	94	90	90	86
30	91	90	86	85	78	71	70	63	57	A	A	A	81	75	81	81	81	80	80	85	A	74	81	78
31	76	76	77	77	83	77	74	75	81	87	89	91	A	97	101	107	108	97	87	87	88	90	104	101
	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	29	28	28	30	29	25	26	25	27	24	28	25	27	29	29	28	28	23	25	29	24
MED	86	84	80	77	72	76	86	95	95	95	102	104	107	108	109	112	105	106	103	90	82	81	84	86
U Q	88	87	85	80	77	85	91	102	101	107	106	112	117	117	116	118	111	110	108	102	89	90	91	88
L Q	80	78	75	69	66	69	80	81	84	87	93	98	99	101	102	107	94	97	96	87	74	76	80	81

HOURLY VALUES OF FES AT KOKUBUNJI

MAY 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	G	G	G	G	G	G	G	122	46	54	59	62	136	78	126	83	78	74	100	80	44	58	56	49
2	39	37	29	40	43	G	57	63	82	57	144	118	111	146		94		G	45	60	108	40	65	33
3	G	G	G	23	G	G	G	44	61	58	60	60	56	56	54	G	46	40	33	43	46	44	60	78
4	49	40	28	30	28	G	G	40	54	60	57	61	75	103	114	77	58	66	118	120	127	106	108	58
5	G	G	29	29	G	G	62	G	48	50	G	G	G	G	G	G	G	43	48	32	49	31	46	85
6	G	G	G	G	G	33	41	50	94	64	63	55	55	53	49	G	71	111	138	39	118	G	59	58
7	40	27	28	G	G	G	G	G	49	G	G	G	54	G	G	56	58	47	40	59	26	49	48	45
8	56	39	26	G	G	G	40	G	51	58	G	51	G	51	50	G	54	47	56	55	58	30	33	G
9	G	40	G	26	G		G	45	53	73	58	53	58	50	61	62	86	79	62	47	92	72	38	G
10	68	79	96	41	60	35	49	52	54	58	61	63	52	G	G	G	G	G	G	G	G	G	G	44
11	39	59	G	24	27	G	40	46	52	61	G	61	58	54	G	49	67	55	66	52	104	73	59	G
12	41	32	24	G	G	G	G	42	57	75	60	56	64	57	G	G	59	80	80	74	87	94	60	26
13	G	G	24	23	28	G	G	156	56	63	50	B	B	G	G	G	G	52	56	28	54	71	30	29
14	25	G	G	G	G	G	43	46	79	65	73	106	77	58	G	G	52	52	55	137	91	59	G	G
15	G	25	38	28	G	G	44	55	78	76	106		59	63	56	G	G	57	62	G		G	61	40
16		50	32	41	27	G	40	80	66	74	61	68	80	107	46	55	G	62	65	95	50	92	34	35
17	33	G	G	44	42	34	56	49	61	61	93	78	90	50	65	49	58	59	83	73	27	G	G	55
18	124	67	60	58	51	38	54	57	77	60	57	G	G	50	B	B	62	114	168	86	96	94	68	70
19	54	G	32	103	79	G	41	56	111	56	72	126	80	74	137	60	43	G	G	G	G	59	49	41
20	27	41	44	26	G	G	G	60	160	80	89	61	98	59	46	G	G	44	43	107	106	59	58	55
21	39	43	44	48	36	G	58	62	80	G	48	52		55	G	55	89	103	61	40	58	40	105	48
22	52	36	34	G	46	30	54	G	51	76	72	82	120	78	48	G	G	56	95	57	57	59	50	54
23	34	29	29	31	27	G	48	51	65	69	58	48	53	64	56	58	50	54	43	40	58	59	58	86
24	30	28	23	37	43	34	G	50	68	60	76	73	92	113	59	61	47	41	30	G	25	95	49	95
25	57	40	44	51	G	34	70	104	130	164	124	94	59	64	75	92	103	84	66	43	G	26	60	61
26	61	60	34	28	G	G	G	49	66	50	61	79	72	72	68	69	101	109	61	38	46	60	92	61
27	61	56	48	26	30	G	57	73	81	78	65	67	56	61	69	109	62	68	72	70	38	58	50	G
28	28	29	29	28	34	37	59	45	60	57	50	46	52	62	G	54	60	97	146	55	31	41	G	G
29	30	58	48	37	30	G	G	48	62	60	53	60	50	G	82	68	82	89	90	50	29	32	25	G
30	72	33	23	24	25	33	44	58	120	84	85	86	G	58	G	53	G	G	57	107	131	59	39	35
31	28	33	58	58	28	G	40	53	61	57	62	69	142	61	61	57	G	43	G	G	G	G	30	G
	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	30	31	31	31	31	30	31	31	31	31	31	29	29	31	29	30	30	31	31	31	30	31	31	31
MED	36	33	29	28	27	G	41	50	62	60	61	61	59	58	50	54	56	56	61	52	52	58	50	44
U Q	54	43	44	41	36	33	54	60	80	74	73	78	85	72	66	62	67	80	83	74	92	71	60	58
L Q	25	G	23	23	G	G	G	45	54	57	53	52	52	50	G	G	G	43	43	38	29	31	33	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT KOKUBUNJI

MAY 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	15	14	14	15	15	18	17	33	22	28	32	29	28	38	24	20	17	16	17	15	15	15	14	14
2	15	15	14	15	15	21	17	22	21	24	29	35	35	34		20		16	15	15	15	15	14	14
3	15	17	14	16	15	16	16	18	18	20	27	32	24	30	23	38	20	16	15	15	16	16	15	14
4	15	15	15	14	14	14	17	22	24	26	29	27	32	39	29	28	20	17	15	14	14	15	17	15
5	15	18	15	14	15	22	17	21	20	34	34	32	43	42	42	22	17	16	16	14	14	15	14	15
6	16	15	15	15	15	17	18	28	20	28	42	35	36	38	32	41	21	16	15	14	14	15	15	14
7	18	15	16	15	17	21	22	21	23	49	27	53	44	44	26	38	17	18	15	20	14	15	15	15
8	14	17	15	18	14	22	21	21	21	24	37	35	49	38	34	21	21	16	16	15	14	14	14	32
9	15	14	17	15	16		18	20	32	29	29	38	35	44	40	30	18	18	16	15	15	14	15	71
10	15	14	15	14	14	17	16	20	26	39	43	44	44	121	54	33	38	18	17	16	16	15	16	
11	15	15	15	15	15	38	17	18	18	39	33	39	36	39	23	22	21	18	17	15	15	16	14	15
12	15	16	15	16	16	23	33	35	44	42	42	43	43	42	38	30	23	17	17	17	16	15	14	16
13	14	14	16	16	14	23	18	16	26	26	69	B	B	74	70	71	47	20	14	17	14	15	15	15
14	18	22		15	17		27	21	40	32	36	34	40	42	42	39	34	20	20	15	15	14	15	32
15	16	16	15	16	15	17	26	20	20	23	32		35	37	35	33	21	20	21	71		21	20	16
16		17	20	17	20	24	27	21	23	40	35	40	38	33	33	23	78	27	18	15	16	16	17	16
17	16	15	20	16	17	20	22		23	26	30	32	32	38	35	41	22	20	20	22	16	16	17	14
18	15	15	15	16	16	16	28	20	22	33	34	28	32	34	B	B	40	20	16	15	15	18	16	16
19	14	17	14	15	15	22	17	20	21	22	23	30	33	38	34	22	20	15	16	23	16	15	15	15
20	16	15	14	16	14	23	20	22	20	28	34	30	30	27	24	21	18	16	17	16	14	14	15	15
21	15	16	15	16	14	40	16	18	21	14	29	36		36	39	27	21	17	16	15	16	15	15	15
22	15	15	15	18	15	18	20	14	21	32	37	35	39	36	30	28	24	17	14	14	15	15	16	16
23	16	15	14	15	14	17	17	16	20	22	34	42	42	40	33	33	22	18	17	14	15	15	15	15
24	15	14	15	15	15	15	18	18	23	29	30	39	39	38	27	28	21	21	17	17	16	15	15	15
25	15	15	14	15	15	16	20	20	21	32	36	35	36	34	38	24	23	18	18	15	15	15	15	15
26	15	15	15	14	15	23	18	18	24	27	32	36	42	41	39	38	22	17	18	15	18	15	15	15
27	16	16	14	15	15	24	17	16	18	37	39	38	36	34	32	29	20	16	17	15	15	15	15	16
28	15	14	15	16	15	16	18	20	22	37	34	34	34	33	62	24	20	22	20	16	16	16	16	16
29	16	14	15	14	18	28	32	18	34	34	39	43	67	42	40	35	27	20	21	15	15	15	16	17
30	14	16	16	14	14	17	21	21	35	43	38	40		44	44	39	24	17	18	15	15	15	15	14
31	15	15	15	15	15	18	21	20	23	32	40	40	43	43	40	34	38	17	22	18	16	15	15	15
	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	30	31	30	31	31	29	31	30	31	31	31	29	28	31	29	30	30	31	31	31	30	31	31	30
MED	15	15	15	15	15	20	18	20	22	29	34	35	36	38	35	30	21	17	17	15	15	15	15	15
U Q	16	16	15	16	16	23	22	21	24	37	38	40	42	42	40	38	24	20	18	17	16	15	16	16
L Q	15	15	14	15	14	17	17	18	20	26	30	32	33	34	29	23	20	16	16	15	15	15	15	15

HOURLY VALUES OF FOF2 AT YAMAGAWA

MAY 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	86	86	84	74	A	66	67	80	88	84	96	113	131	139	147	147	142	135	127	110	88	88	90	88
2	86	87	84	86	64	66	76	90	103	118	124	117	133	149	150	157	144	135	136	124	A	107	115	108
3	109	113	86	88	86	84	87	102	111	118	119	131	137	137	139	141	137	133	134	125	101	88	106	109
4	105	110	110	90	78	74	83	100	108	108	116	121	140	148	151	146	151	146	146	146	146	146	145	138
5	A	109	98	97	86	86	88	98	111	111	111	131	140	146	153	152	146	145	146	138	126	140	151	159
6	170	146	147	131	110	108	109	106	102	112	118	123	138	142	146	147	145	134	122	110	104	109	110	109
7	87	88	87	79	80	76	90	111	112	101	110	122	122	121	122	117	122	112	111	111	100	103	110	107
8	107	107	104	86	76	70	86	113	105	107	114	121	132	135	N	134	128	118	110	104	88	85	98	89
9	104	106	98	78	68	66	86	105	91	90	100	112	125	126	124	123	121	108	111	104	83	86	84	88
10	106	87	86	76	66	54	73	96	91	87	96	106	117	112	108	110	111	112	111	111	86	88	87	86
11	86	101	88	68	66	70	90	91	88	89	97	111	121	120	116	124	124	122	120	105	90	101	104	106
12	103	99	87	82	76	77	87	103	97	97	100	111	120	123	N	133	127	A	111	108	88	88	88	102
13	109	108	90	86	85	92	88	98	104	96	104	113	124	125	125	124	122	120	117	111	113	91	100	108
14	105	98	84	84	80	81	77	81	85	89	108	111	122	126	125	132	125	119	109	111	91	90	A	105
15	124	111	86	80	74	84	90	88	75	65	57	A	A	71	73	68	74	A	76	70	78	85	88	88
16	86	86	78	72	70	70	86	97	90	84	A	90	A	126	135	137	138	140	142	142	A	130	124	116
17	111	109	110	88	85	81	88	98	98	87	98	113	108	122	138	135	121	112	172	111	90	83	76	83
18	82	84	72	66	62	57	70	90	108	106	123	114	123	127	128	B	116	141	A	107	90	84	88	110
19	110	102	97	82	80	78	74	80	91	93	98	100	108	112	117	112	111	116	111	107	105	106	107	107
20	108	91	90	86	84	84	85	98	87	91	88	100	100	100	112	109	115	118	118	104	89	98	105	108
21	112	121	111	103	105	87	86	88	87	A	97	105	101	109	111	110	116	114	110	104	97	89	90	85
22	80	93	81	86	80	75	87	107	106	111	104	111	120	122	129	128	115	107	111	112	90	83	83	85
23	87	102	91	69	66	66	65	88	88	88	84	97	120	123	120	117	104	110	125	120	96	88	91	99
24	108	97	86	87	87	74	75	60	66	76	87	A	111	110	115	126	123	118	111	108	103	88	102	101
25	89	106	110	88	66	67	78	86	85	86	98	107	122	128	114	121	115	109	111	105	89	85	90	89
26	102	86	85	80	82	86	86	78	88	97	90	111	115	120	122	118	115	112	111	111	111	103	90	97
27	107	90	86	86	72	70	80	96	106	100	A	115	125	127	130	124	123	121	118	105	90	87	99	110
28	110	101	100	97	85	77	86	98	73	87	105	108	111	122	135	134	125	118	105	91	90	84	A	74
29	87	101	88	86	86	86	81	85	76	85	97	110	113	117	116	121	114	111	111	111	111	102	78	99
30	87	104	97	96	83	73	66	73	A	65	A	76	83	86	84	92	91	92	98	113	86	A	80	85
31	84	77	80	74	81	70	72	80	96	96	A	94	117	121	128	128	128	122	112	109	111	126	N	125
	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	30	31	31	31	30	31	31	31	30	30	27	29	29	31	29	30	31	29	30	31	29	30	28	31
MED	104	101	88	86	80	75	86	96	91	92	100	111	121	123	125	125	122	118	111	110	90	88	94	102
U Q	109	108	98	88	85	84	87	100	105	106	111	116	128	128	136	135	128	133	125	112	104	103	106	109
L Q	87	88	85	78	70	70	75	85	87	87	96	105	112	117	115	117	115	112	111	105	88	86	88	88

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

MAY 1991

LAT. 31.2N LON. 130.6E 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	68	59	27	G	84	34	34	48	61	53	68	74	74	74	55	66	128	83	84	58	35	92	93	90
2	81	44	58	45	37	26	G	42	50	61	66	128	90	G	G	G	G	G	G	51	93	93	40	48
3	32	36	35	G	G	G	32	G	46	52	77	66	56	56	63	74	65	75	35	28	59	41	40	35
4	28	41	44	32	G	G	G	44	51	56	51	78	94	G	G	44	G	52	45	G	G	G	G	92
5	159	60	29	32	G	G	G	G	G	45	G	G	G	50	56	67	75	98	61	59	169	108	72	48
6	46	32	29	27	38	G	44	54	56	68	64	G	64	56	52	56	82	110	64	81	134	142	54	28
7	43	28	G	G	G	G	33	G	51	54	G	G	51	G	G	48	58	101	43	G	G	G	35	30
8	G	G	G	31	G	G	28	53	55	92	66	58	67	92	64	G	59	61	54	48	40	G	37	25
9	G	G	G	G	G	G	32	46	50	52	G	53	66	62	105	70	42	54	50	48	67	24	44	86
10	39	G	G	G	G	28	G	48	54	92	66	63	51	G	55	63	44	G	48	43	77	69	28	G
11	G	G	43	30	31	G	32	42	55	104	G	46	G	53	56	G	72	49	59	114	39	37	59	84
12	40	33	G	G	G	G	G	G	G	G	54	83	78	G	50	58	99	131	69	34	G	G	G	G
13	40	30	G	G	G	G	G	46	55	73	G	G	G	G	G	G	G	G	62	67	45	43	24	G
14	38	G	G	G	23	G	35	44	56	63	100	59	G	G	G	G	G	G	61	30	48	50	147	58
15	76	32	26	26	G	G	36	56	73	64	58	64	79	77	94	68	66	90	69	68	33	31	28	92
16	91	68	41	24	G	G	34	44	50	56	108	104	146	110	94	66	G	54	56	94	152	81	92	70
17	40	45	28	31	28	G	G	48	53	54	65	54	67	64	76	73	82	75	77	72	92	33	G	32
18	40	G	30	G	G	G	35	45	46	57	132	126	110	92	G	B	94	152	158	82	94	60	92	66
19	31	G	30	G	30	34	G	G	61	50	56	G	68	G	G	G	G	46	48	33	25	36	G	G
20	26	25	25	G	G	G	G	G	G	G	G	G	103	63	53	55	G	G	G	39	33	58	84	61
21	92	43	64	41	42	33	G	60	58	88	69	80	55	57	G	G	68	G	G	45	30	G	G	G
22	92	48	46	G	36	G	39	49	71	72	114	63	53	64	59	52	56	65	46	42	43	31	24	G
23	G	G	G	G	G	G	G	G	61	70	57	90	63	G	G	52	G	42	41	29	28	31	24	82
24	54	56	91	46	40	24	G	45	62	69	63	97	53	G	G	G	G	41	G	G	G	G	G	G
25	48	G	G	G	30	G	G	G	52	G	G	G	74	127	109	57	53	58	54	52	92	83	52	67
26	109	86	68	37	25	G	G	54	66	70	69	G	51	52	68	59	58	56	39	51	83	45	85	92
27	72	72	66	37	24	G	34	59	79	79	102	82	60	56	70	G	72	89	93	93	152	92	38	83
28	81	37	30	26	G	G	36	51	80	G	G	G	64	69	55	G	42	49	62	82	40	34	150	92
29	71	43	45	40	30	28	G	G	G	G	G	G	G	G	G	G	54	G	45	68	93	33	G	G
30	34	58	43	42	39	39	40	45	66	G	64	G	52	G	70	56	52	53	61	78	96	128	50	68
31	G	28	45	36	31	28	G	49	59	83	110	103	G	G	58	76	G	63	55	27	29	33	40	56
	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	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31
MED	40	33	30	26	23	G	G	45	55	57	64	59	63	53	55	54	54	54	54	51	45	37	40	56
U Q	76	48	45	36	31	26	34	49	61	72	69	82	74	64	68	66	72	83	62	72	93	81	72	83
L Q	31	G	G	G	G	G	G	G	50	50	G	G	51	G	G	G	G	41	43	33	30	31	24	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT YAMAGAWA

MAY 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	16	16	21	35	39	35	35	35	45	35	33	17	17	16	15	15	15	15
2	15	15	15	15	15	15	16	18	26	35	38	38	40	49	46	40	38	32	17	15	15	15	15	15
3	15	14	15	15	15	15	16	17	21	36	40	43	43	44	39	39	26	17	16	15	15	16	15	15
4	15	15	15	15	15	15	16	24	34	34	38	38	38	35	34	50	38	18	17	17	15	15	16	15
5	16	15	15	15	15	15	23	18	23	32	44	44	48	44	44	41	24	18	15	16	15	15	15	15
6	15	15	15	16	15	15	16	17	27	37	37	47	42	39	45	39	39	20	16	15	15	15	15	15
7	15	15	15	15	15	15	16	18	26	36	46	49	60	44	45	41	38	34	17	16	15	15	15	16
8	15	15	15	15	15	15	17	17	35	35	39	44	39	45	36	34	38	21	16	15	15	15	15	15
9	15	15	15	15	15	16	17	18	35	39	44	39	45	44	44	40	41	20	16	15	15	15	15	15
10	15	15	15	15	16	15	18	18	24	38	42	45	44	58	42	35	26	17	17	15	15	15	15	15
11	15	15	15	15	15	15	16	16	21	35	36	38	60	39	43	44	38	22	17	16	15	15	15	15
12	15	15	15	15	15	15	17	36	42	46	44	46	51	49	58	43	38	32	21	15	15	15	15	15
13	15	15	15	15	15	15	18	16	36	39	55	82	64	59	58	45	43	26	17	16	15	15	15	15
14	15	16	15	15	15	15	17	18	24	38	43	43	45	55	46	53	42	23	16	15	15	15	15	15
15	15	15	16	15	15	15	16	28	24	36	39	43	44	43	42	45	34	26	16	15	15	15	15	15
16	15	15	15	15	15	15	15	17	22	35	36	40	36	33	28	23	70	36	24	15	15	15	15	15
17	15	15	16	15	15	16	24	16	24	32	39	42	43	44	44	39	35	21	16	15	15	15	15	15
18	15	16	15	15	15	15	15	17	36	38	37	39	38	35	N	B	46	35	16	20	16	17	15	15
19	15	15	15	15	15	15	15	16	23	32	35	54	42	51	42	43	39	17	16	15	15	15	16	15
20	15	15	15	15	15	15	24	16	22	38	44	46	34	35	34	34	24	22	28	16	15	16	15	15
21	15	15	15	16	15	15	15	17	22	35	36	39	35	39	53	44	23	20	16	15	16	15	15	15
22	15	15	15	15	16	15	15	18	22	34	39	40	40	40	39	38	33	21	15	15	15	15	15	17
23	17	15	15	16	15	15	16	17	22	34	36	38	35	53	52	40	23	20	16	15	15	15	15	15
24	15	15	15	15	16	15	24	16	24	30	35	40	47	46	46	39	27	17	17	17	15	16	15	16
25	15	15	15	15	15	15	24	16	22	44	44	44	39	40	36	34	36	26	16	15	15	15	15	15
26	15	15	15	15	15	16	16	20	22	33	34	48	45	45	40	40	36	21	18	15	15	15	15	15
27	15	15	15	15	15	15	16	16	22	35	39	43	35	36	35		36	24	16	15	15	15	15	15
28	15	15	15	15	15	15	16	18	23	42	58	56	36	34	38	51	44	35	23	15	15	15	15	15
29	15	15	15	15	15	15	15	34	38	39	42	58	55	55	46	44	37	35	20	16	15	15	15	15
30	15	15	15	15	15	15	16	18	36		44		45	61	44	39	39	33	17	15	15	15	15	15
31	15	15	15	15	15	14	17	22	35	38	39	43	55	54	45	43	44	34	35	16	15	15	15	16
	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	31	31	31	31	31	31	31	31	31	30	31	30	31	31	30	29	31	31	31	31	31	31	31	31
MED	15	15	15	15	15	15	16	17	24	36	39	43	43	44	44	40	38	22	17	15	15	15	15	15
U Q	15	15	15	15	15	15	17	18	35	38	44	46	47	51	46	44	39	32	17	16	15	15	15	15
L Q	15	15	15	15	15	15	16	16	22	34	37	39	38	39	39	38	33	20	16	15	15	15	15	15

HOURLY VALUES OF FOF2 AT OKINAWA

MAY 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	85	88	86	81	75	67	64	84	88	90	105	128	146	162	170	180	175	170	170	168	163	146	144	142
2	143	145	110	90	63	66	75	85	104	111	123	124	145	166	170	169	171	166	161	146	140	139	A	139
3	138	146	110	85	76	85	85	106	108	112	122	135	145	157	155	159	162	171	164	162	146	79	170	171
4	145	161	163	110	79	66	80	97	104	105	111	A	145	161	168	186	190	189	183	186	176	167	163	165
5	161	125	146	137	111	88	86	89	108	111	99	131	147	162	162	170	168	176	170	161	168	187	188	187
6	191	178	163	128	111	110	108	104	105	108	121	136	145	147	167	169	169	163	145	146	158	144	89	A
7	90	86	88	81	79	81	85	108	107	92	106	121	132	132	131	135	123	121	111	108	110	111	110	128
8	130	141	127	87	80	76	85	97	104	96	112	134	141	145	147	157	157	143	129	A	131	128	144	133
9	146	167	128	86	73	66	73	100	90	90	97	116	128	138	137	134	133	126	128	110	87	85	90	110
10	128	111	104	86	73	A	60	96	90	92	101	113	118	116	118	121	131	141	141	121	98	86	90	85
11	110	125	109	81	70	70	82	88	86	90	96	117	117	132	140	145	146	144	135	130	122	145	N	144
12	130	110	85	86	86	80	87	94	87	91	96	114	121	134	141	143	137	126	121	122	107	131	131	136
13	149	108	85	86	86	86	85	90	98	95	96		131	138	142	138	137	137	128	122	104	85	86	104
14	108	86	86	84	80	73	73	83	88	95	114	123	133	138	146	157	154	141	130	128	125	146	144	143
15	170	140	110	83	87	85	86	87	90	109	86	A	83	91	88	91	89	88	99	90	102	102	110	126
16	83	100	89	86	84	86	88	90	86	81	90	111	133	147	158	176	167	171	170	146	146	145	147	146
17	158	162	146	88	85	86	85	90	88	82	96	111	112	133	145	143	129	122	146	110	A	90	A	86
18	86	86	66	66	66	65	66	87	98	96	97	111	131	139	143	130	139	137	137	126	104	108	142	145
19	166	165	143	91	86	83	82	86	88	104	105	112	120	135	137	132	137	137	129	130	141	157	167	182
20	165	146	141	128	110	88	98	88	91	88	91	98	97	105	112	121	121	133	122	119	90	111	169	178
21	171	169	170	144	130	78	85	86	98	98	105	104	107	112	115	117	111	111	107	103	88	88	86	87
22	87	101	86	86	86	80	85	88	105	97	100	104	120	120	134	136	121	119	122	128	85	88	88	88
23	86	109	86	66	52	54	63	94	90	78	75	90	111	121	118	109	98	113	134	105	87	87	87	87
24	86	87	86	86	84	66	54	66	68	79	95	105	120	139	146	162	160	161	146	146	143	142	147	145
25	144	159	176	110	62	60	66	86	76	90	97	109	111	121	121	117	121	110	111	111	A	87	88	85
26	87	88		85	78	86	72	71	91	90	97	120	136	143	138	131	122	130	127	136	122	122	130	110
27	124	128	110	86	86	80	82	96	97	91	95	124	136	145	147	145	146	136	100	104	91	90	A	A
28	128	108	90	90	104	85	85	82	81	85	A	A	121	138	145	151	141	130	110	122	A	110	143	141
29	128	128	126	84	84	84	80	81	80	85	107	115	121	131	123	138	129	126	130	144	130	108	120	129
30	144	131	138	108	110	85	73	74	A	73	A	87	106	113	107	104	N	121	111	104	86	54	A	A
31	A	72	74	71	73	59	60	84	88	90	90	111	128	140	157	156	156	157	157	157	170	164	162	145
	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	30	31	30	31	31	30	31	31	30	31	29	27	31	31	31	31	30	31	31	30	28	31	26	28
MED	130	125	110	86	84	80	82	88	90	91	97	114	128	138	142	143	138	137	130	127	122	111	136	138
U Q	149	146	141	91	86	85	85	96	104	98	106	124	136	145	155	159	160	161	146	146	144	145	147	145
L Q	90	100	86	84	73	66	72	84	88	88	95	109	117	121	123	130	123	122	121	110	94	88	90	107

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

MAY 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	41	40	38	28	G	G	G	40	58	63	62	63	61	93	83	60	51	72	81	57	49	33	32	58
2	38	G	G	33	30	40	29	36	46	57	61	58	90	G	G	G	G	G	G	30	36	58	151	59
3	33	58	33	35	39	36	33	41	56	48	G	57	G	G	G	59	101	77	58	48	47	59	39	38
4	39	30	G	G	G	G	G	G	60	62	72	93	51	G	48	48	45	42	37	29	34	G	G	G
5	41	91	59	51	33	G	G	43	G	42	G	G	63	G	48	G	G	G	34	27	32	31	38	39
6	40	39	26	G	G	35	32	48	80	78	82	65	58	58	58	48	G	G	G	G	G	128	32	145
7	71	G	G	23	G	G	G	G	51	G	58	G	G	G	G	55	82	54	72	38	39	30	32	31
8	36	G	G	29	31	G	G	39	49	58	80	89	80	72	G	G	G	46	67	149	88	40	40	58
9	42	45	49	26	G	G	32	58	60	72	81	58	G	70	58	60	50	48	66	50	83	40	32	40
10	28	40	28	27	G	36	34	89	50	58	61	80	62	51	54	56	60	41	71	72	48	32	90	66
11	30	29	G	G	G	G	28	43	83	96	93	79	53	80	69	58	50	48	41	G	G	G	33	24
12	G	33	24	29	24	G	G	G	55	80	85	65	G	58	63	84	87	84	67	34	G	G	G	G
13	G	G	G	G	G	G	G	39	46	56	G	G	G	G	G	59	66	71	55	70	38	34	34	30
14	G	G	G	36	G	G	29	40	47	58	G	G	G	G	G	G	G	G	42	50	56	30	34	34
15	92	34	38	32	34	32	39	58	61	144	117	153	G	G	G	G	G	G	33	G	33	G	G	G
16	32	G	25	G	24	G	30	40	60	76	56	48	59	58	G	G	G	G	G	G	G	G	G	G
17	33	33	30	28	G	G	28	40	47	53	62	72	72	62	57	64	82	68	62	62	110	65	59	82
18	34	34	38	30	G	G	30	39	49	G	62	47	59	159	G	G	G	48	56	36	29	48	32	34
19	91	40	32	G	G	G	G	40	144	60	48	59	G	G	60	60	59	62	72	G	33	30	29	25
20	G	G	G	G	G	G	G	G	39	G	G	G	G	G	G	60	60	69	98	62	82	107	66	33
21	33	29	58	84	58	44	36	48	54	47	52	G	G	G	56	72	78	73	95	41	66	58	59	G
22	32	44	G	37	G	28	30	42	61	61	73	90	66	G	46	46	44	40	36	49	45	24	28	G
23	G	G	G	G	G	G	G	G	G	48	56	47	78	75	76	45	43	48	43	50	33	29	25	G
24	G	92	38	45	50	34	30	39	48	62	63	55	72	G	G	G	46	43	39	28	29	G	G	G
25	G	G	G	G	G	50	G	36	43	G	G	57	66	60	60	58	67	61	59	58	109	69	40	39
26	40	88		60	45	50	92	40	45	45	86	57	47	G	48	56	74	64	81	92	34	57	G	G
27	G	G	70	34	32	34	49	59	60	69	104	97	106	75	59	79	53	94	82	91	146	82	33	170
28	115	59	34	G	49	49	50	44	58	95	174	152	102	71	47	76	57	50	39	43	174	48	40	92
29	84	39	38	31	24	G	G	G	G	G	G	G	G	G	50	59	164	90	110	66	62	60	82	39
30	32	34	30	26	32	28	31	60	70	64	76	76	78	50	48	90	57	58	94	33	82	80	91	104
31	144	35	49	41	41	59	39	48	72	69	58	82	G	G	55	G	44	G	G	G	G	G	G	G
	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	31	31	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	33	34	29	28	G	G	29	40	54	58	62	58	58	G	48	56	51	48	58	43	39	34	33	34
U Q	41	40	38	35	33	36	33	48	60	69	81	80	72	70	58	60	67	69	72	62	82	59	40	58
L Q	G	G	G	G	G	G	G	36	46	47	48	47	G	G	G	G	G	40	37	28	32	24	25	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT OKINAWA

MAY 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	15	15	15	15	15	15	18	15	20	27	30	30	33	33	32	29	23	20	15	15	15	15	15	15
2	15	15	15	15	15	15	15	15	22	28	32	33	36	34	33	29	35	24	20	15	15	15	15	16
3	15	15	15	14	15	15	15	15	16	27	28	28	30	29	27	40	24	21	16	16	15	15	15	15
4	15	15	15	15	15	15	20	18	28	27	36	36	34	33	30	29	27	22	17	15	15	17	15	15
5	15	15	15	15	15	15	20	15	23	28	32	35	38	47	36	30	27	21	16	15	14	15	15	16
6	15	15	15	15	15	14	15	21	24	29	33	39	41	48	40	45	40	34	21	21	16	15	15	15
7	15	15	15	15	15	15	23	21	23	29	52	54	52	48	45	32	27	24	16	15	15	15	15	15
8	15	16	16	16	17	17	23	17	26	28	32	39	35	38	43	43	38	26	21	15	15	15	15	15
9	15	15	15	16	15	16	15	16	26	28	32	43	53	46	46	30	28	21	16	15	15	15	15	15
10	15	15	15	14	16	15	15	18	23	24	33	45	38	44	35	35	24	23	18	14	15	15	16	15
11	15	15	16	15	15	15	15	15	21	29	33	33	38	39	33	30	26	24	20	20	15	15	15	15
12	16	15	15	14	16	15	16	32	33	42	35	46	56	50	32	42	27	23	17	17	15	15	16	15
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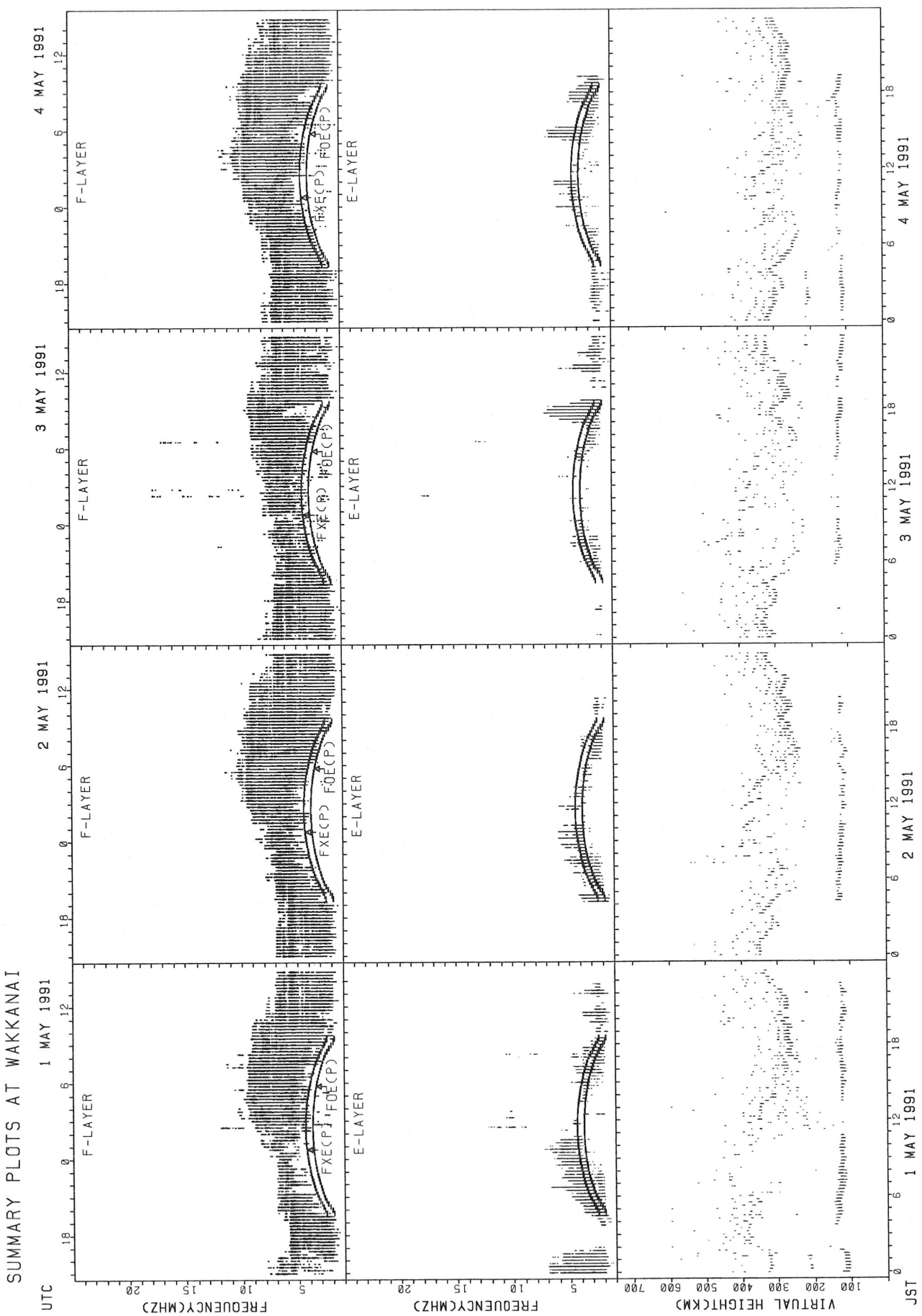
COMMUNICATIONS RESEARCH LABORATORY, JAPAN


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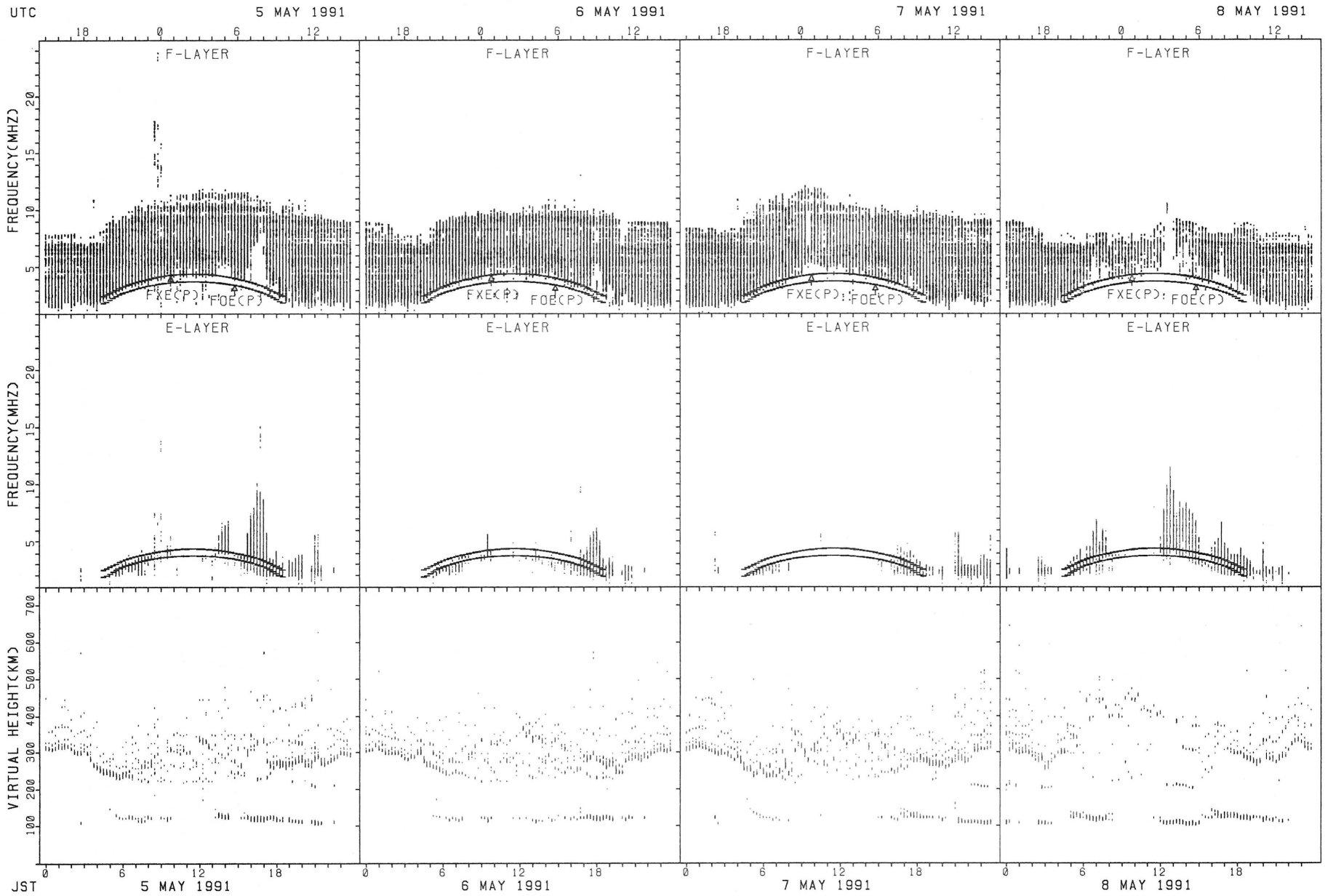
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI



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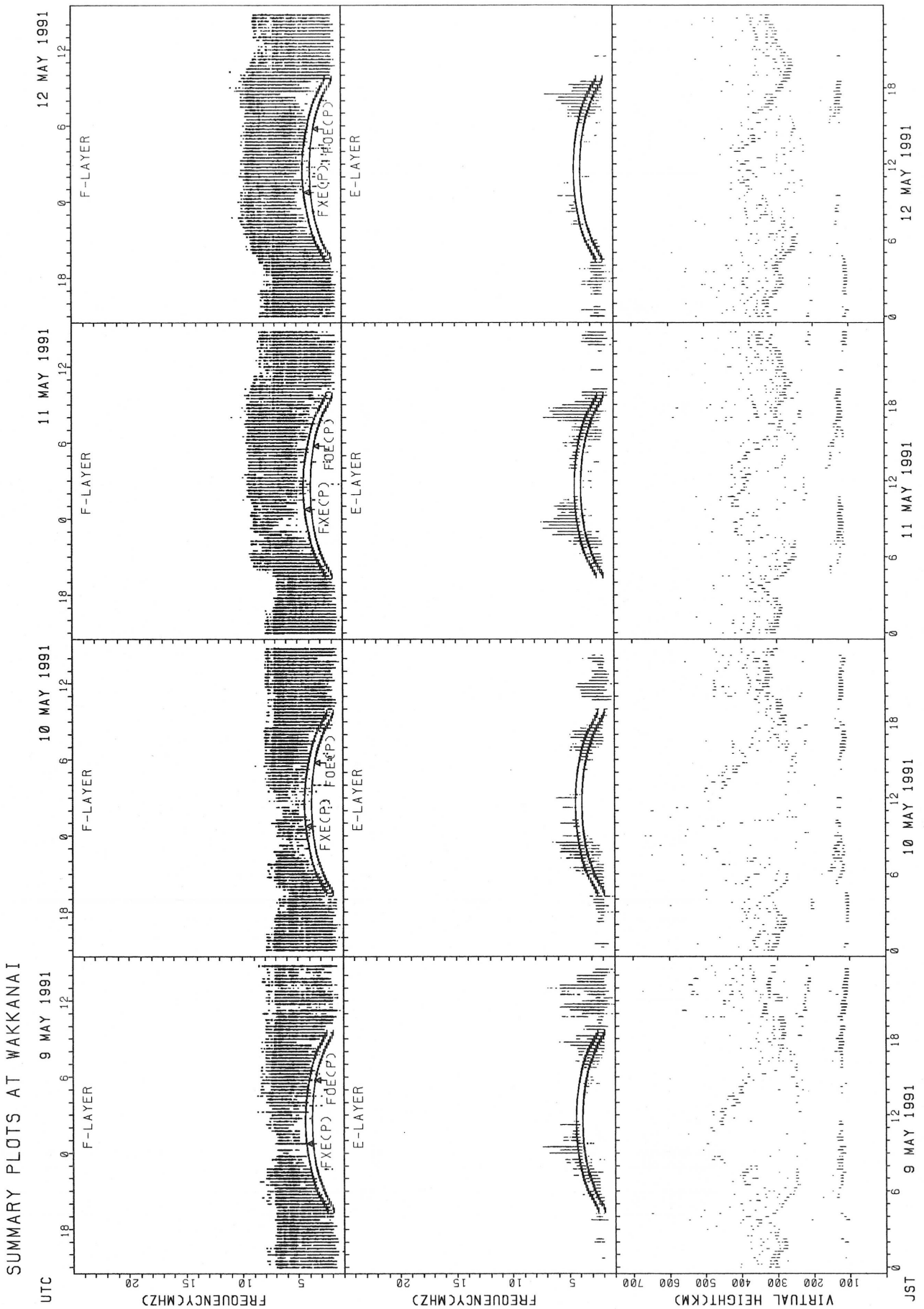
SUMMARY PLOTS AT WAKKANAI
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9 MAY 1991
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FOE(P)
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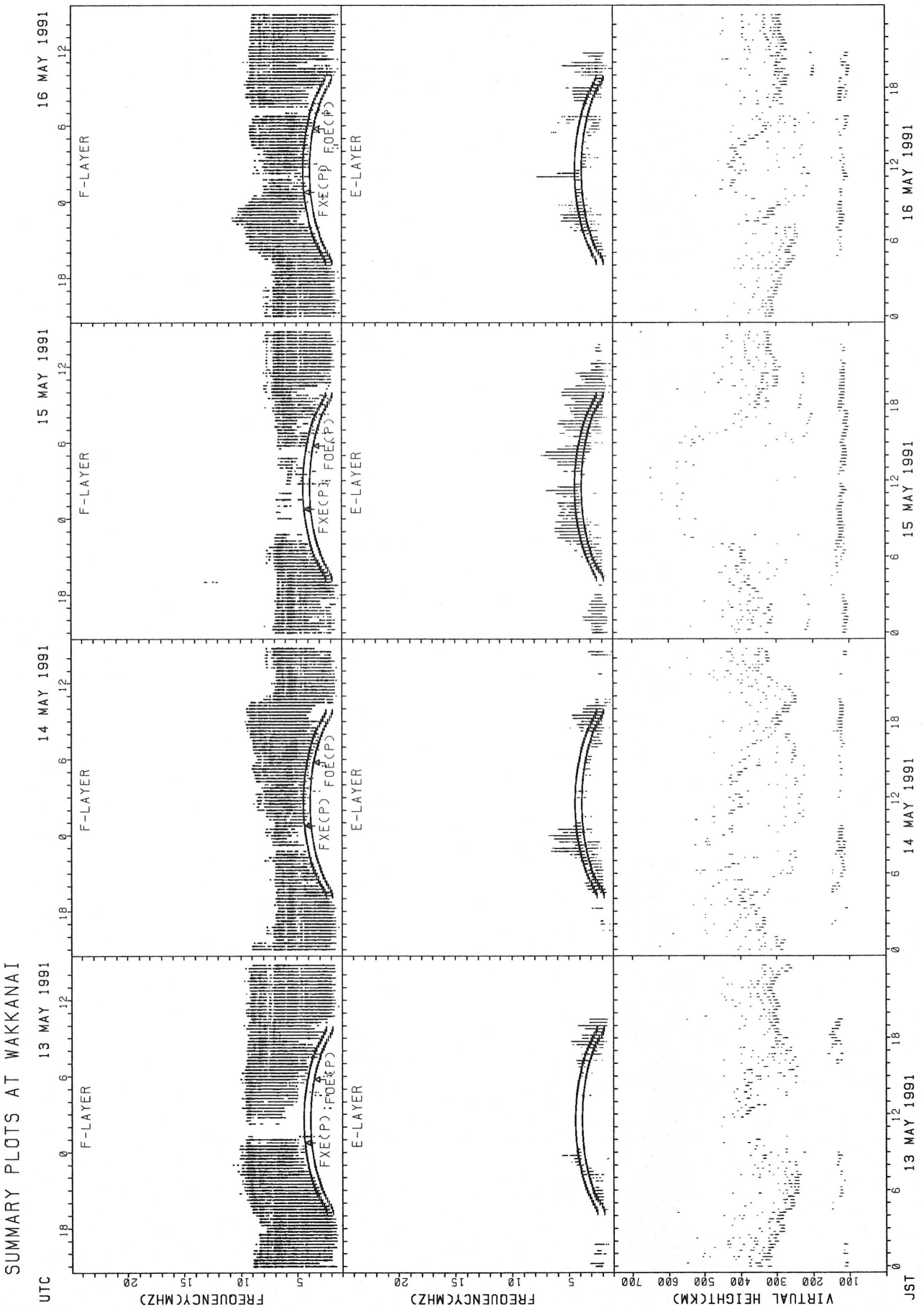
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E-LAYER
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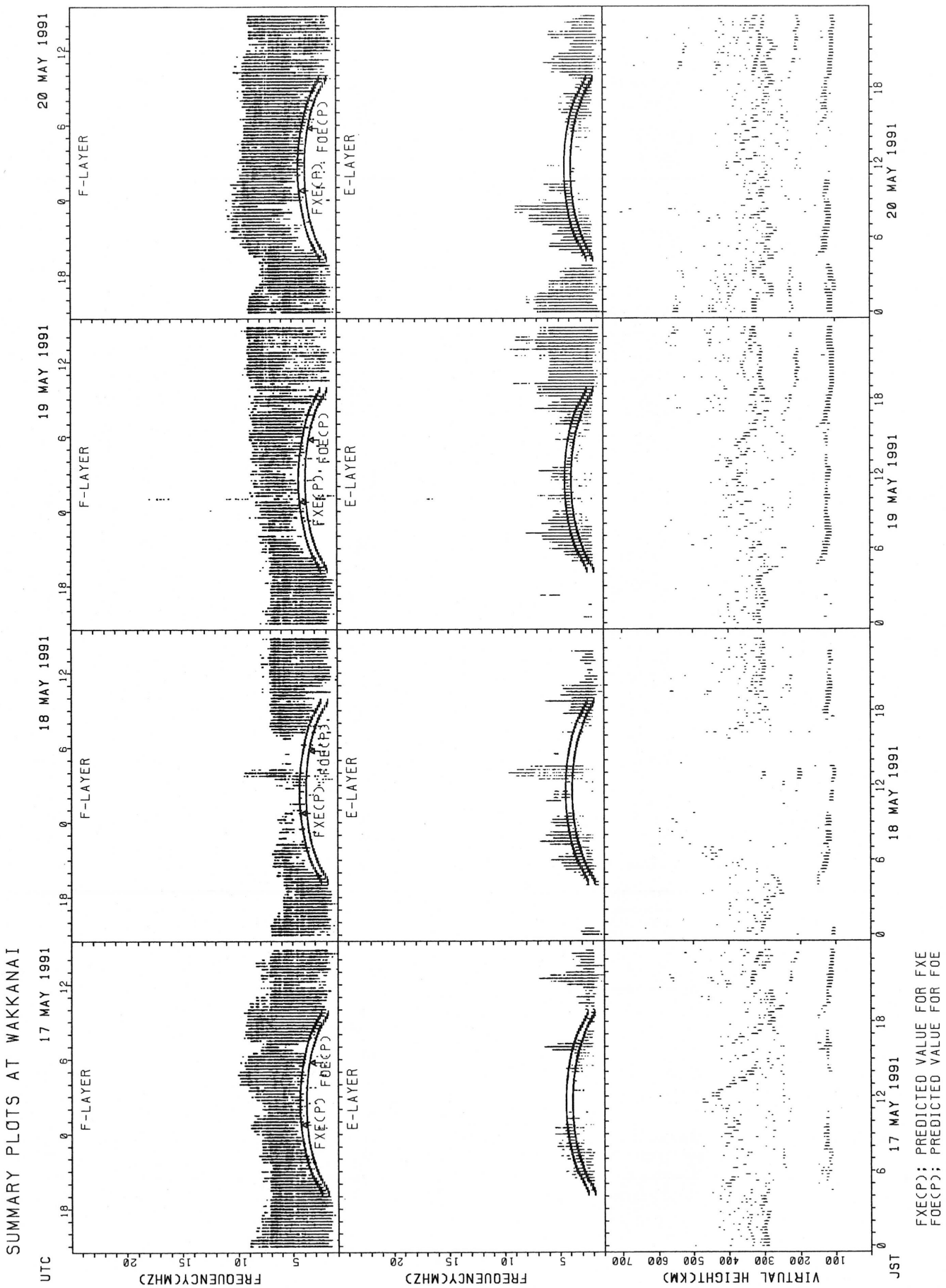
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
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17 MAY 1991
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20 MAY 1991
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E-LAYER
FXE(P), FOE(P)
FREQUENCY(MHZ)
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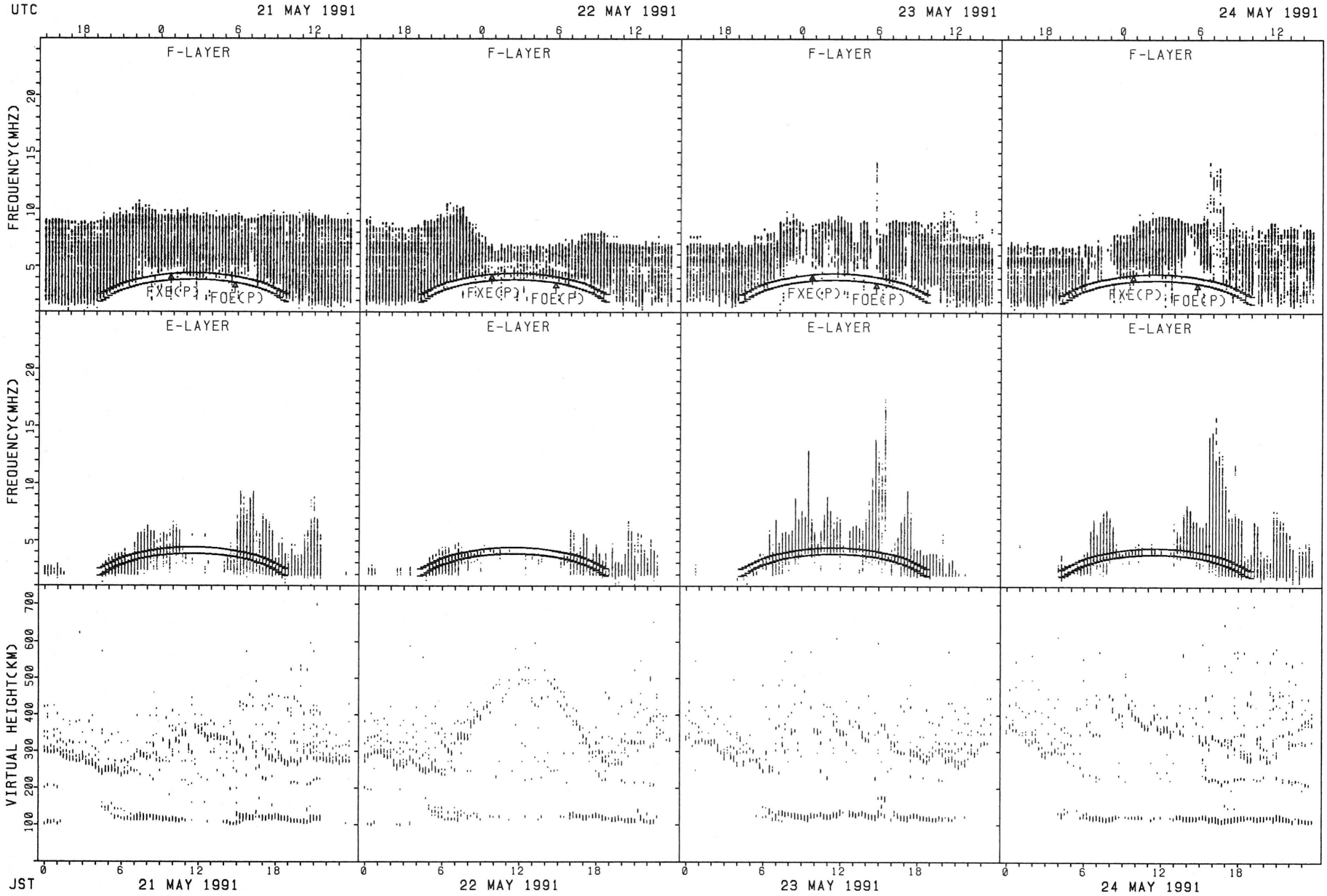
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI



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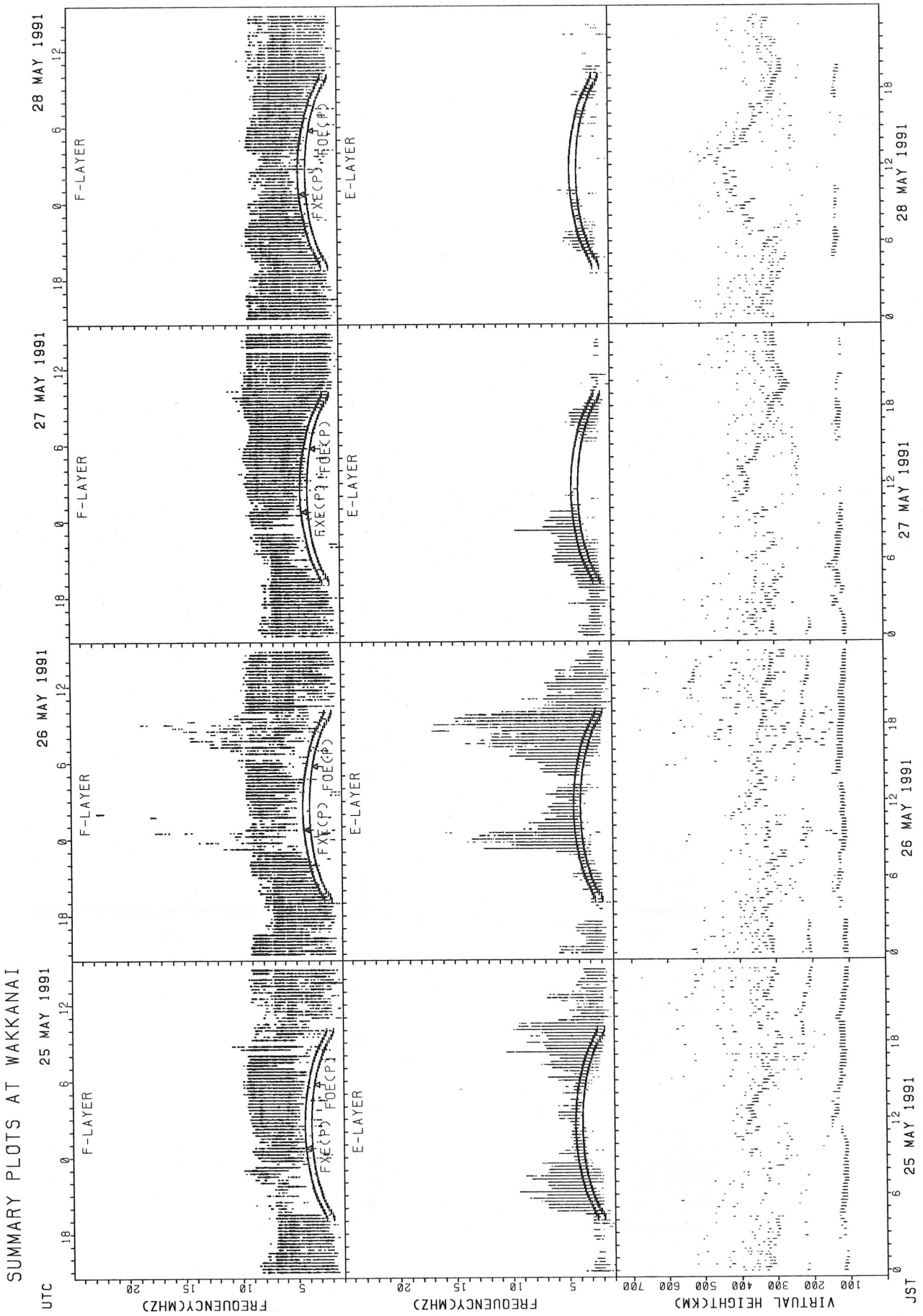
SUMMARY PLOTS AT WAKKANAI
25 MAY 1991
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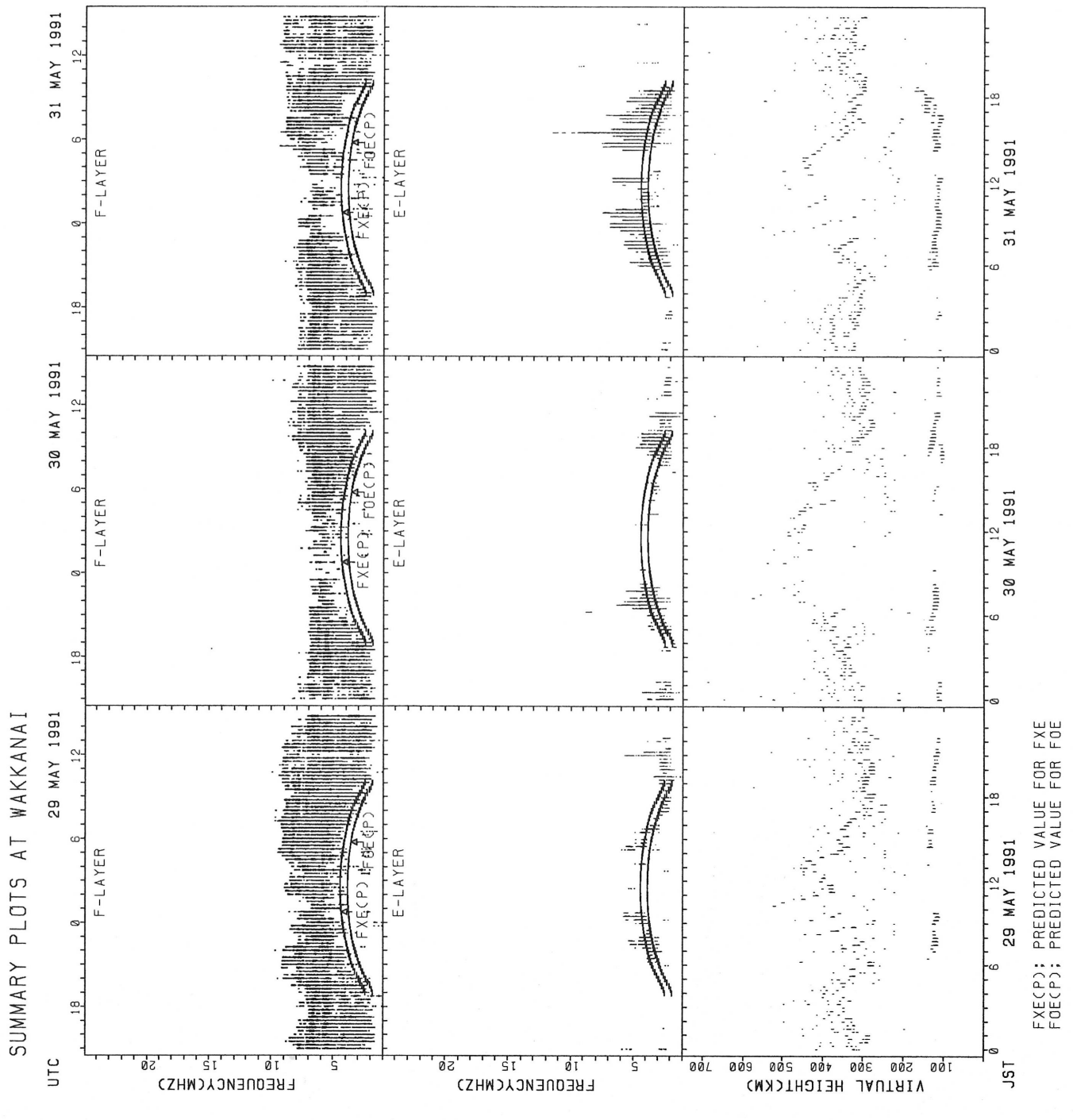
FOE(P); PREDICTED VALUE FOR FOE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29 MAY 1991
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31 MAY 1991
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E-LAYER
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VIRTUAL HEIGHT(KM)
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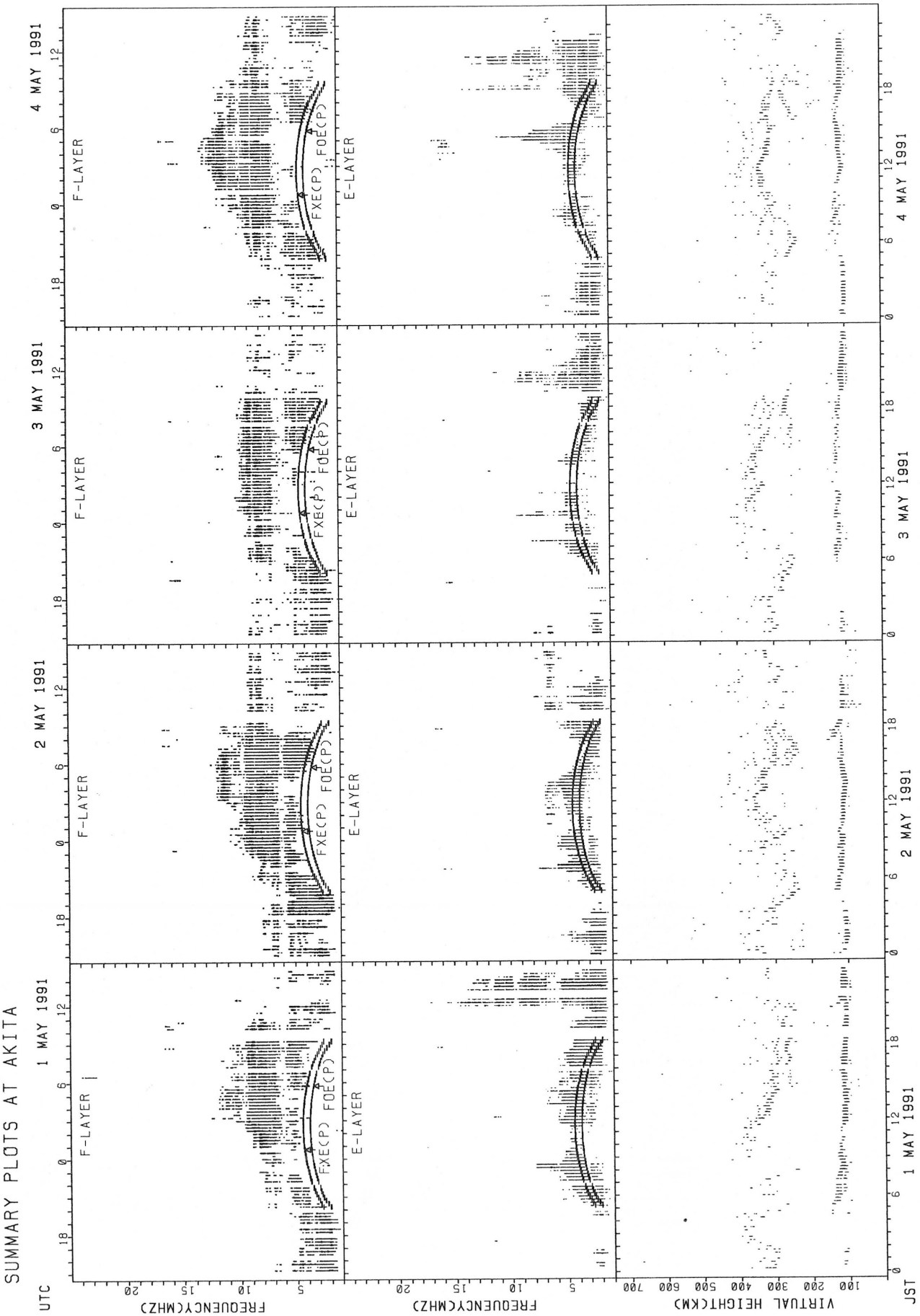
SUMMARY PLOTS AT AKITA
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4 MAY 1991
UTC
JST
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E-LAYER
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VIRTUAL HEIGHT(KM)
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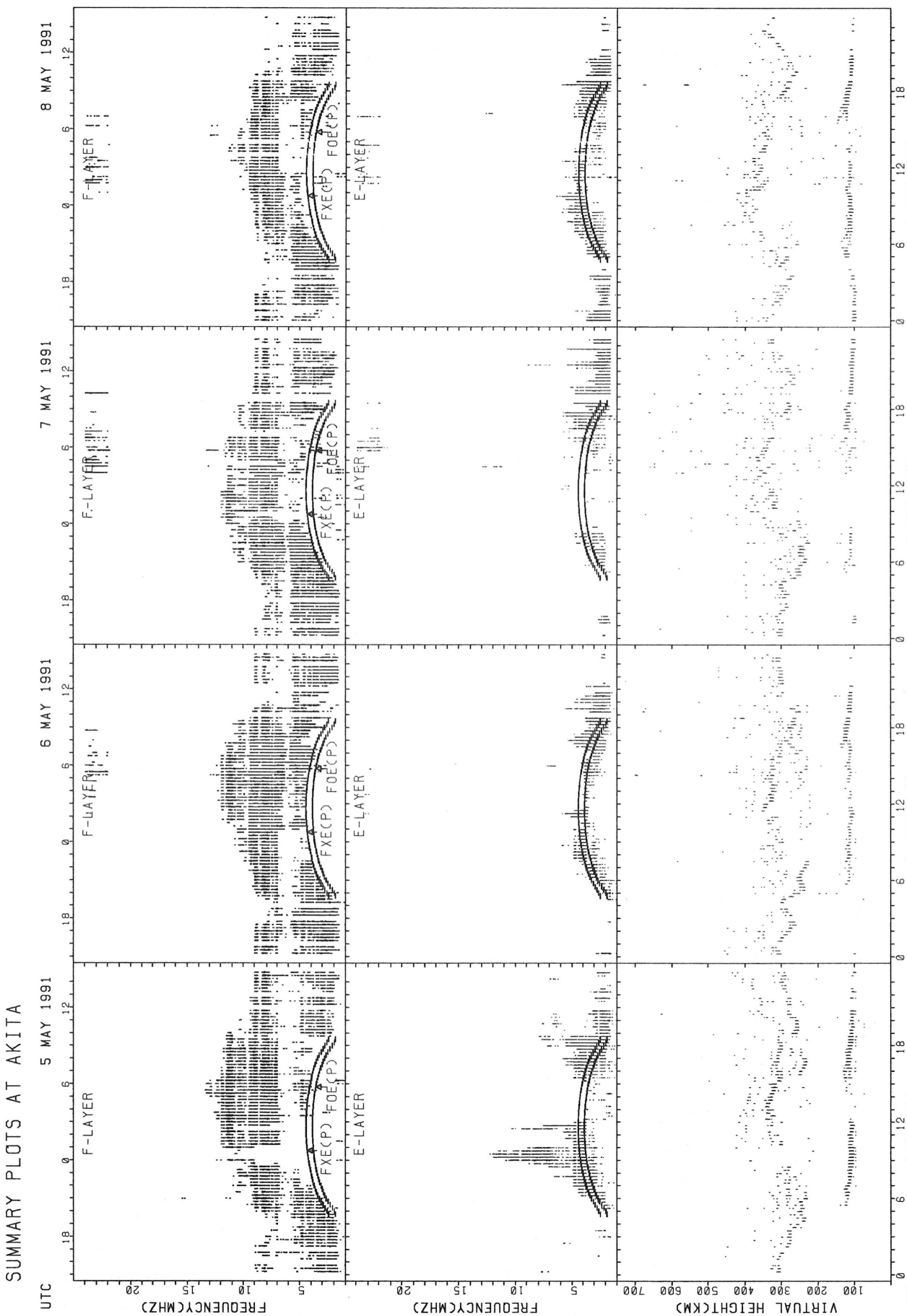
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
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5 MAY 1991
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VIRTUAL HEIGHT(KM)
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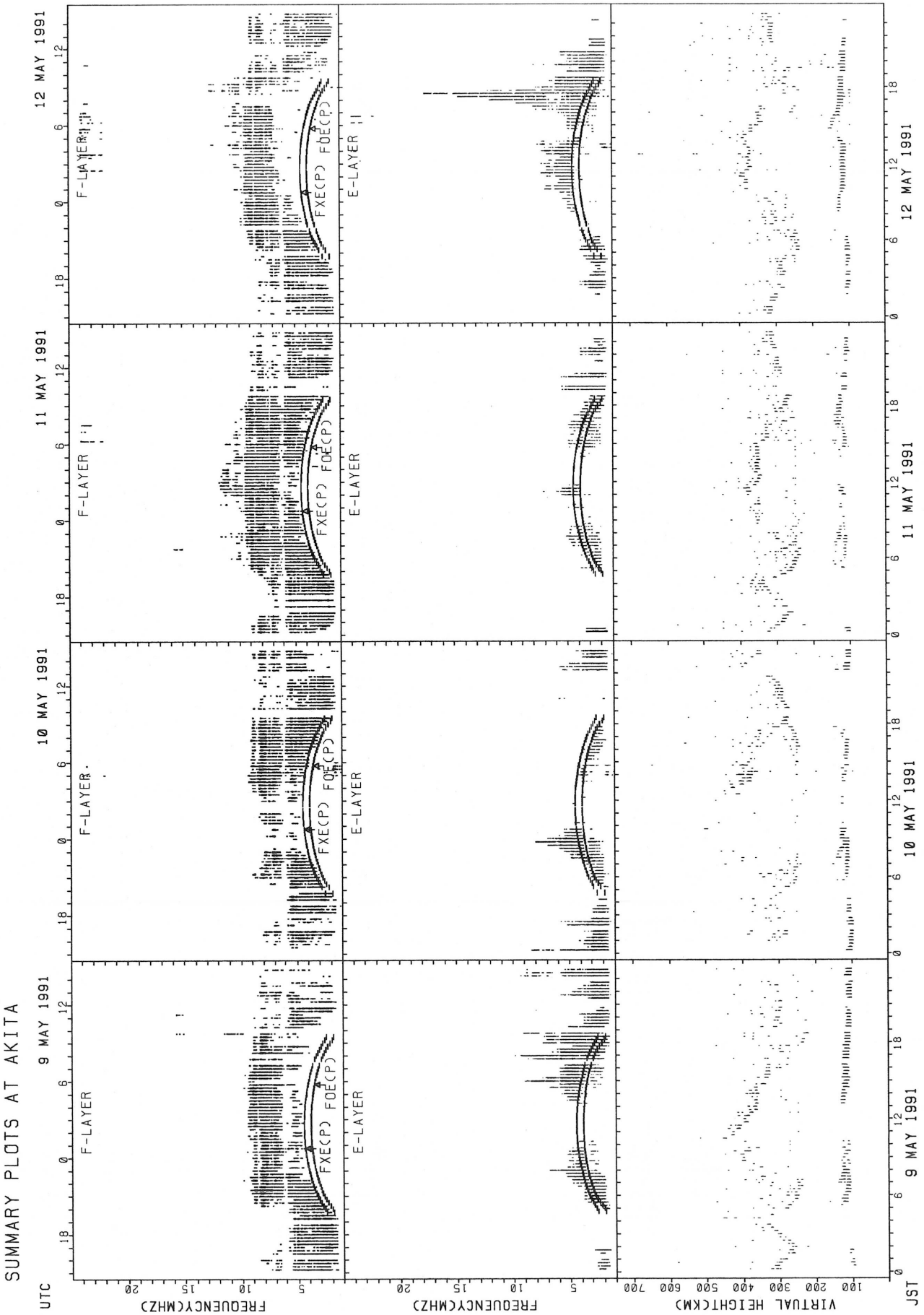
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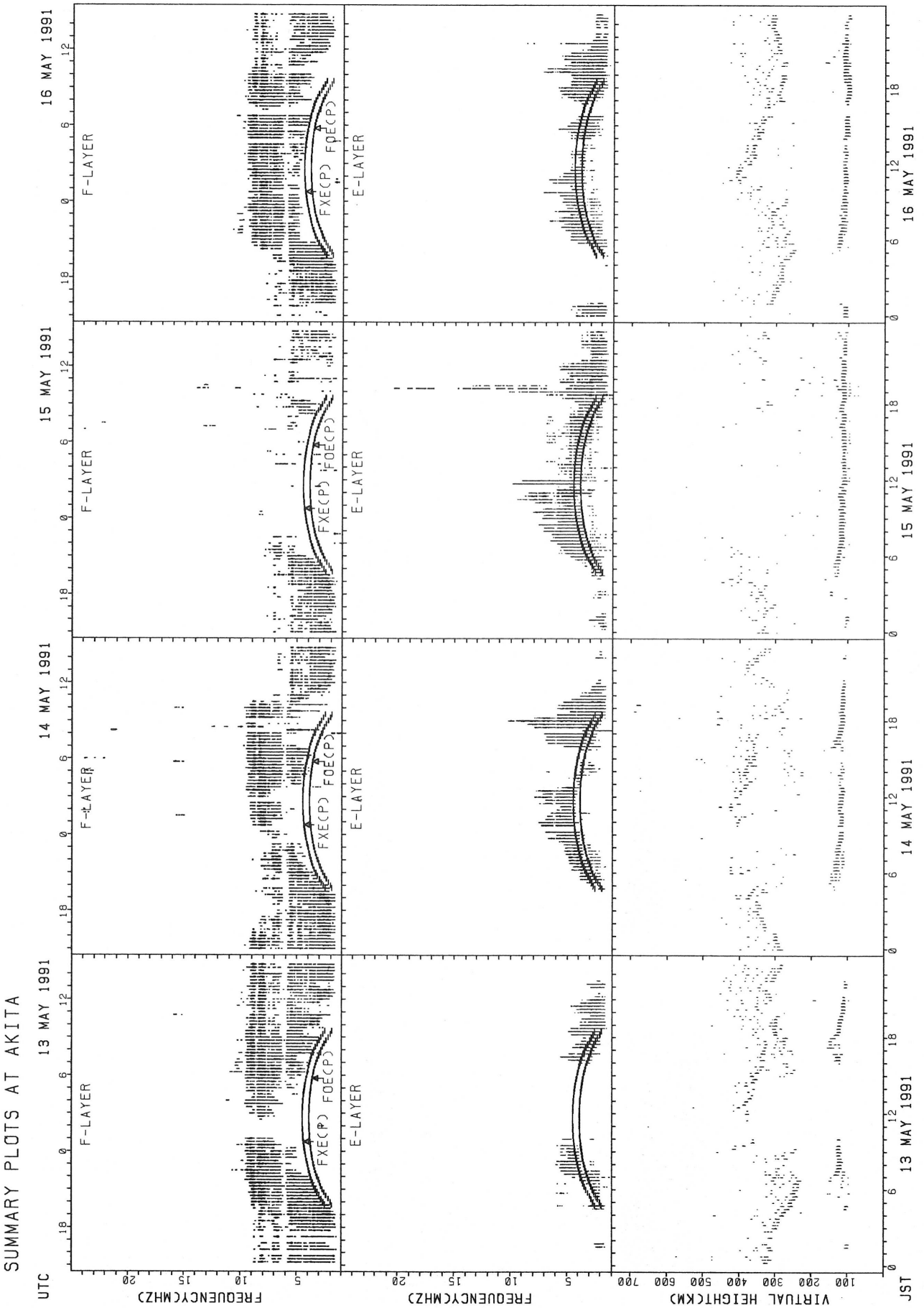
SUMMARY PLOTS AT AKITA
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13 MAY 1991
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FOE(P)
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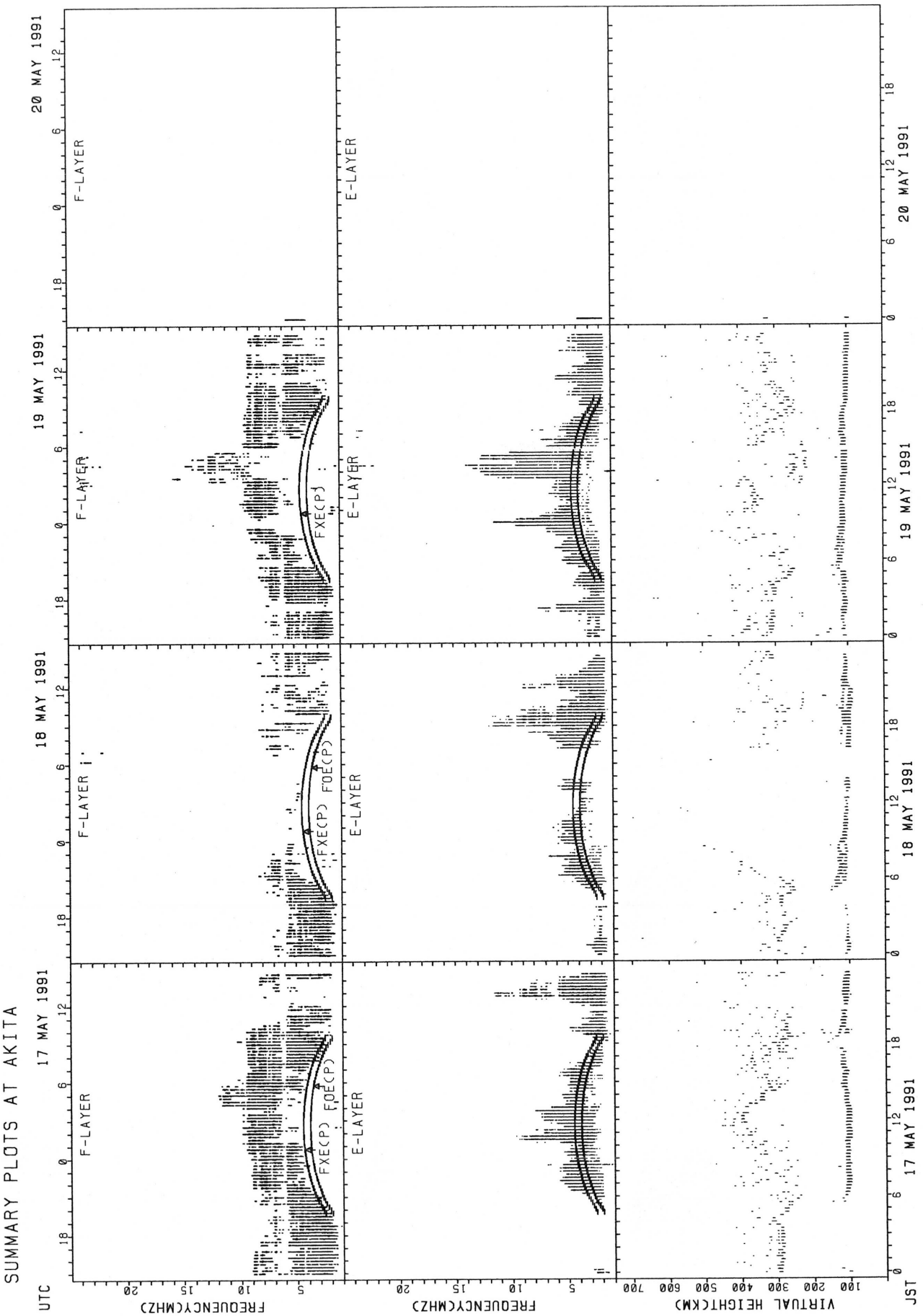
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UTC
JST
17 MAY 1991
18 MAY 1991
19 MAY 1991
20 MAY 1991
F-LAYER
E-LAYER
FXE(P)
FOE(P)
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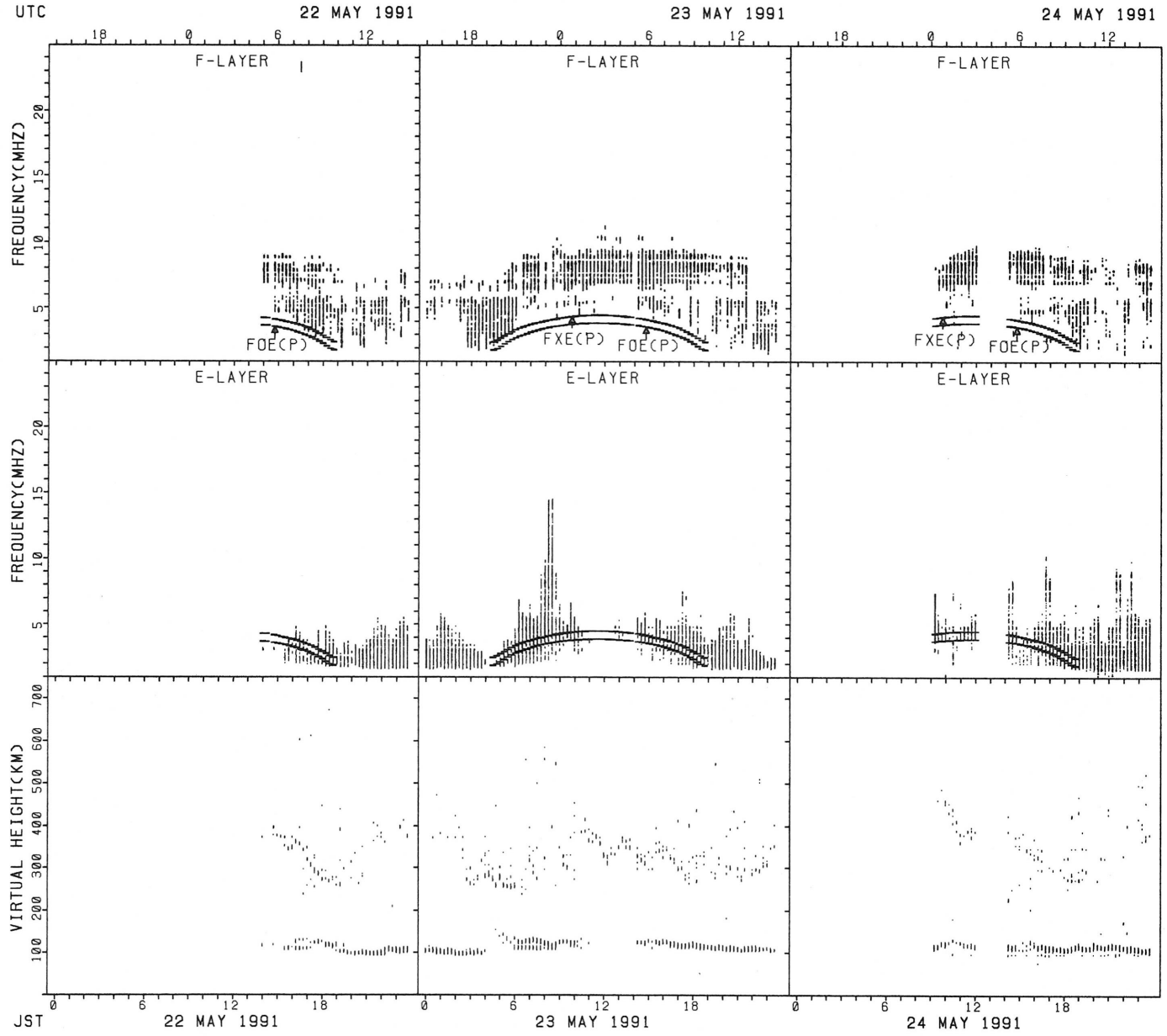
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



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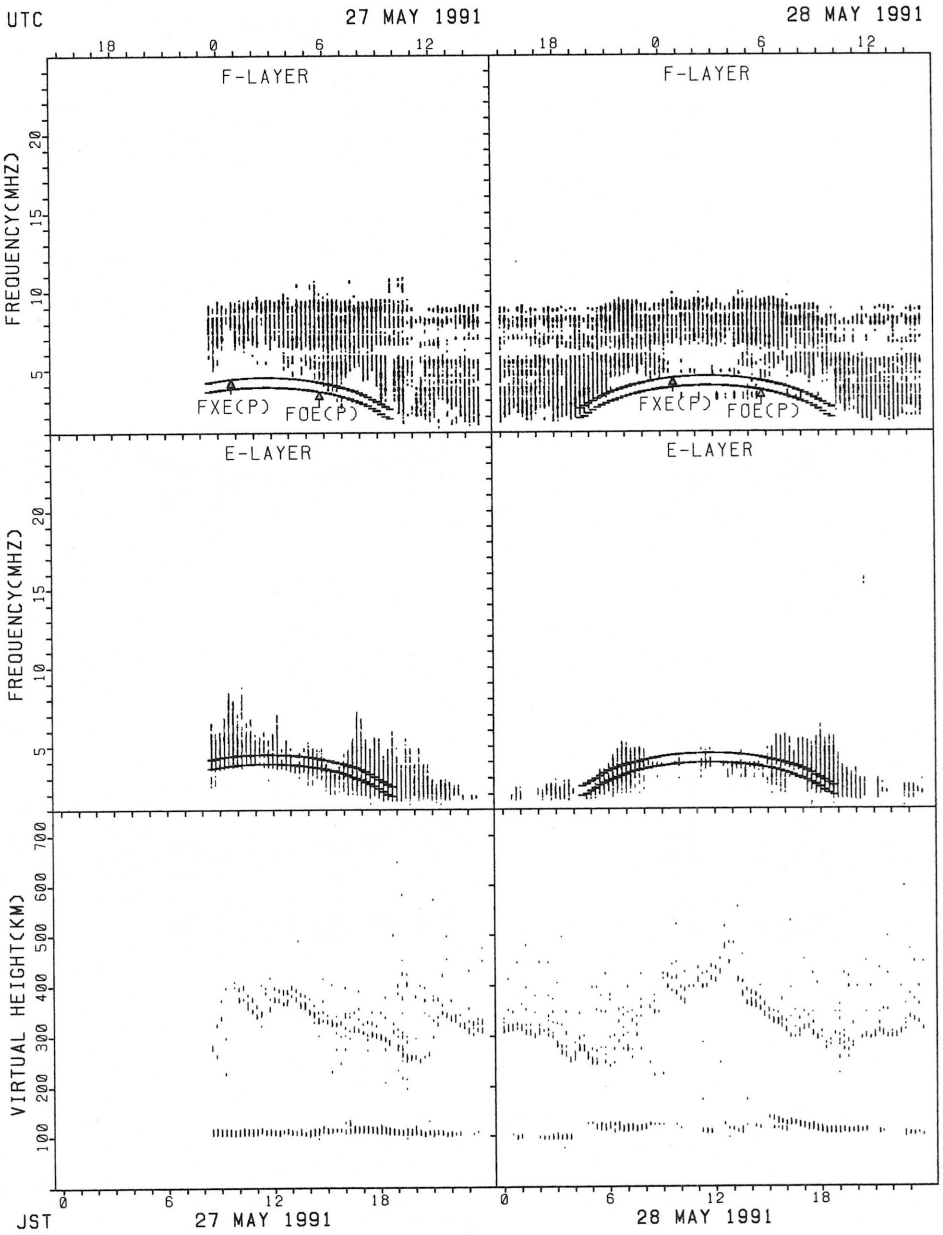
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



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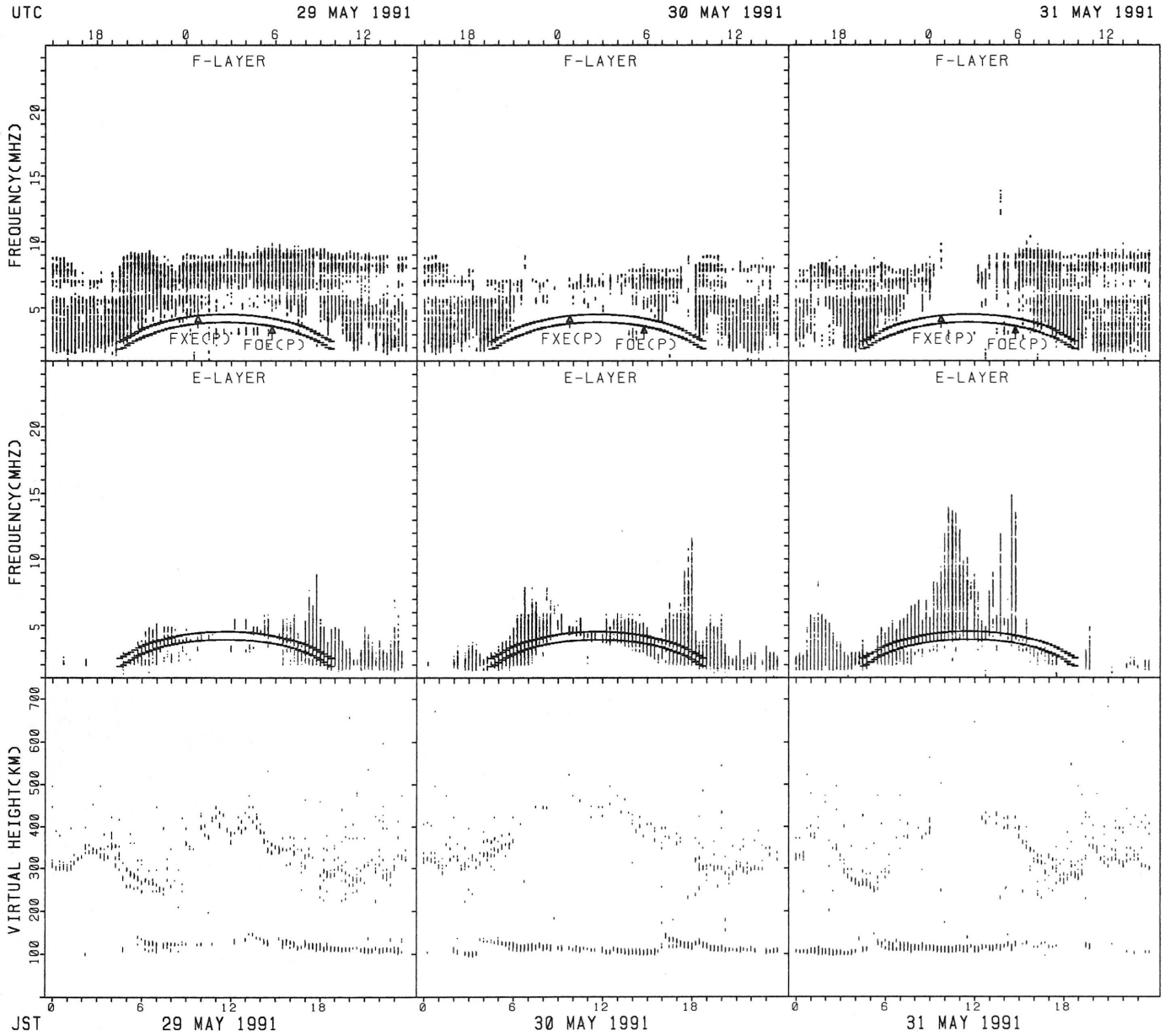
SUMMARY PLOTS AT AKITA



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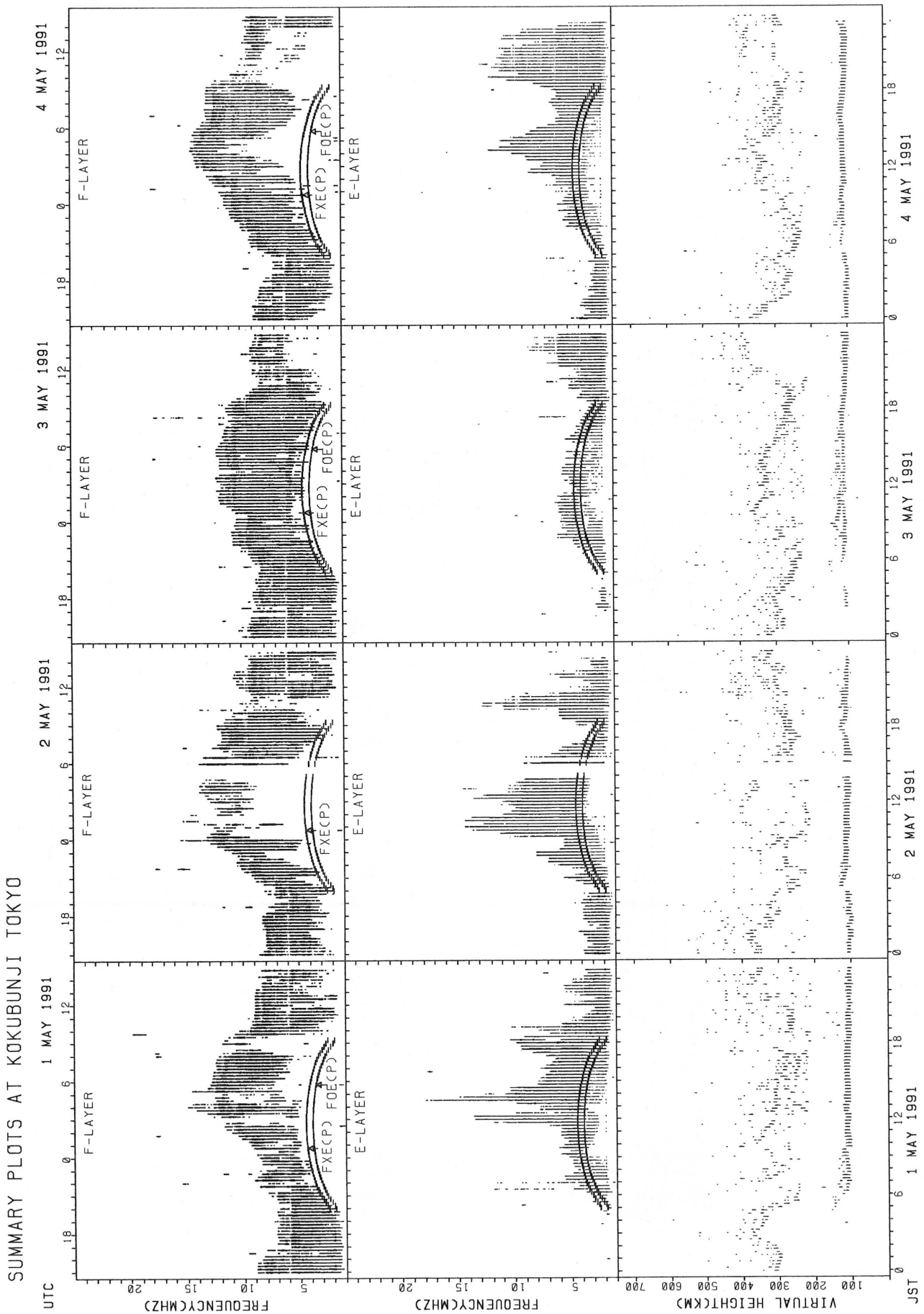
SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
1 MAY 1991
2 MAY 1991
3 MAY 1991
4 MAY 1991
F-LAYER
E-LAYER
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VIRTUAL HEIGHT(KM)
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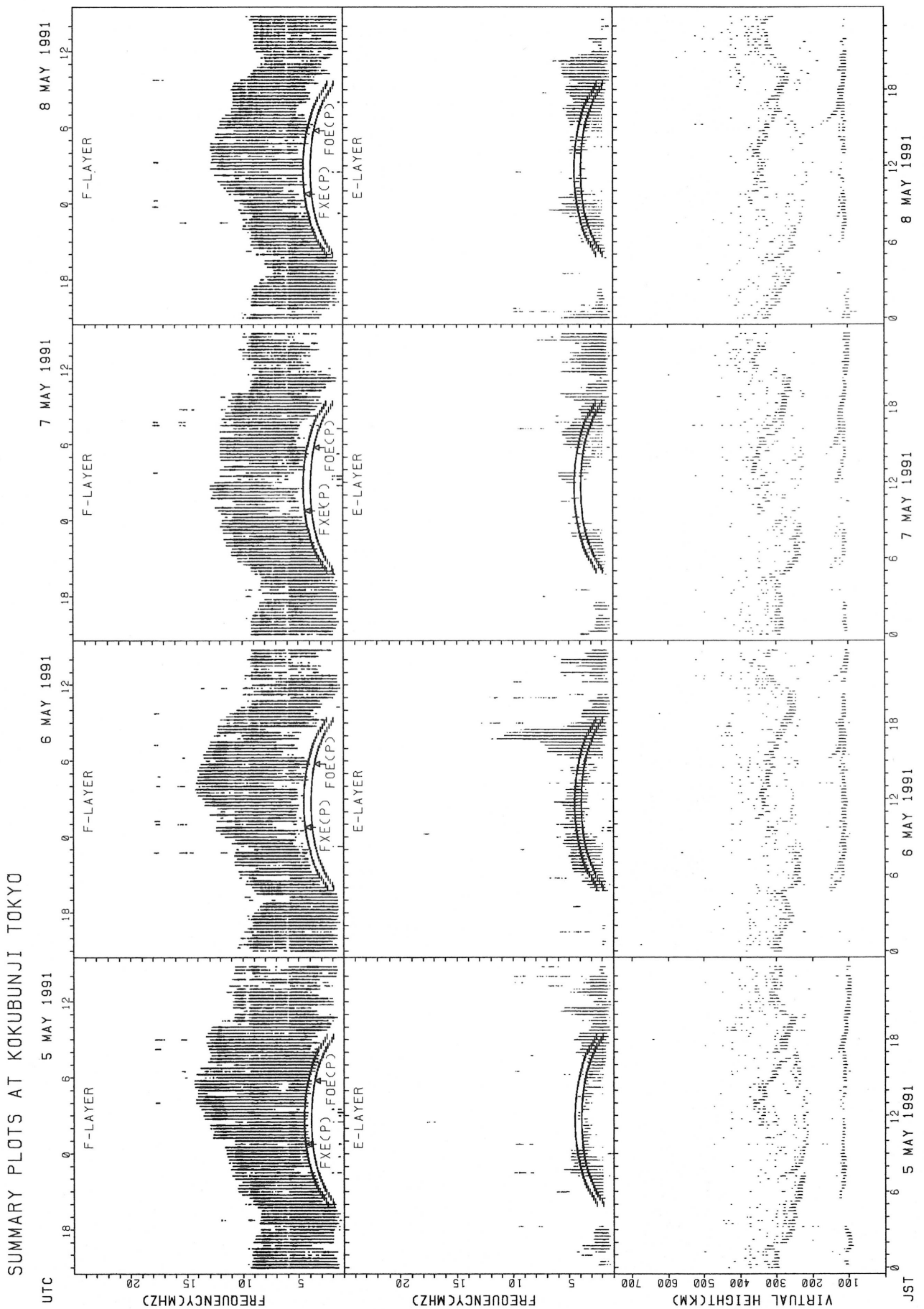
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
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5 MAY 1991
6 MAY 1991
7 MAY 1991
8 MAY 1991
F-LAYER
E-LAYER
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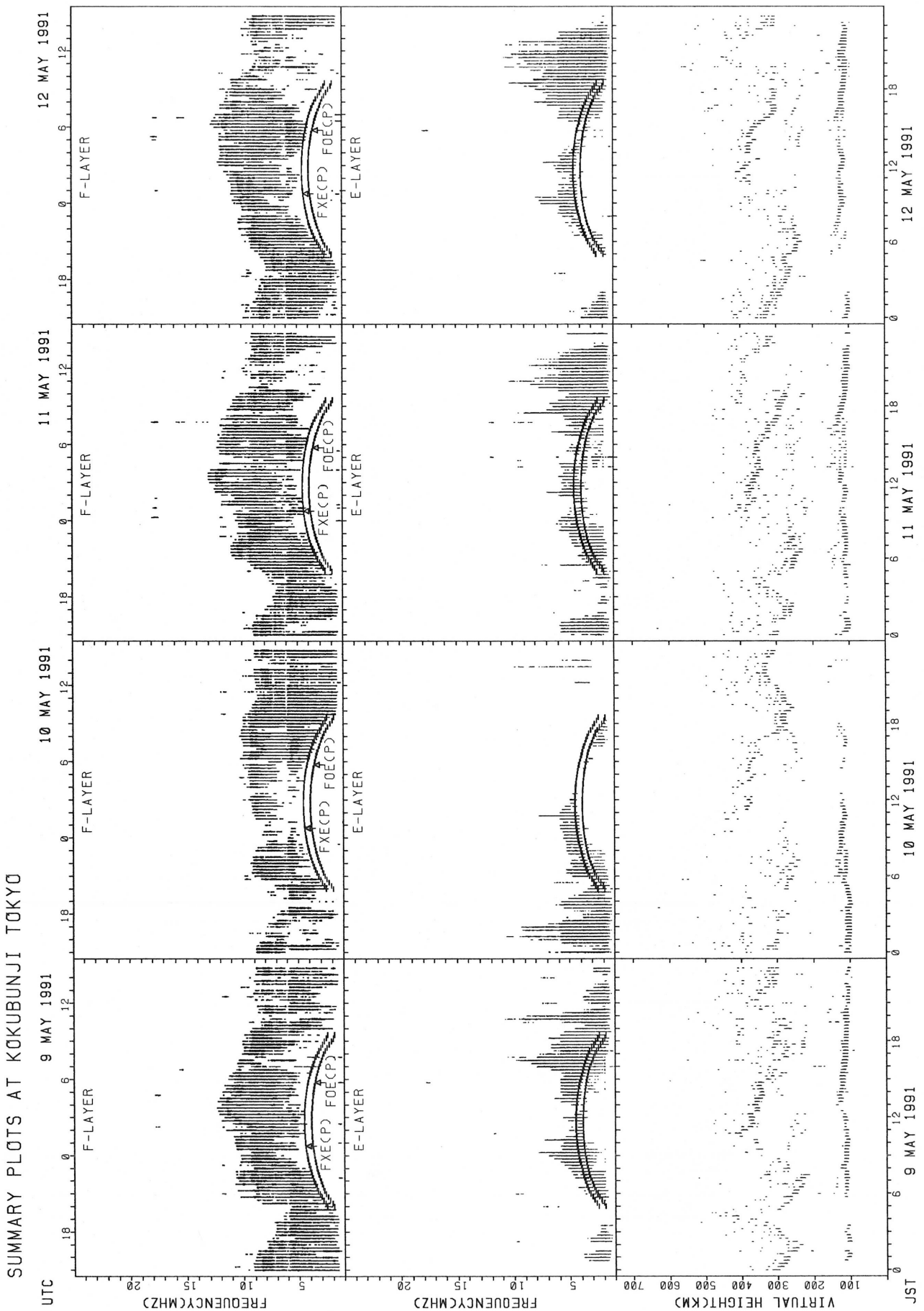
SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
9 MAY 1991
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12 MAY 1991
F-LAYER
E-LAYER
FXE(P)
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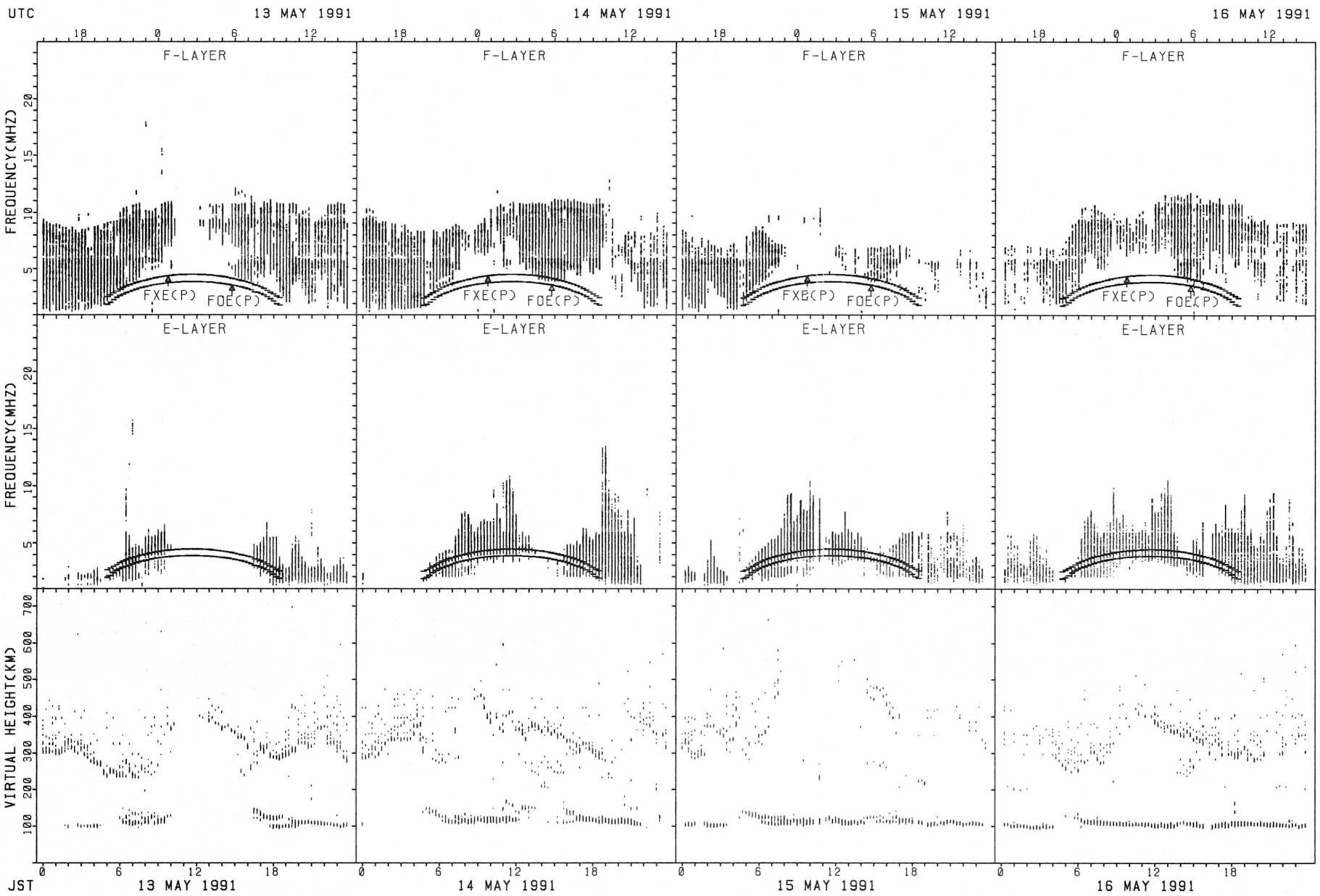

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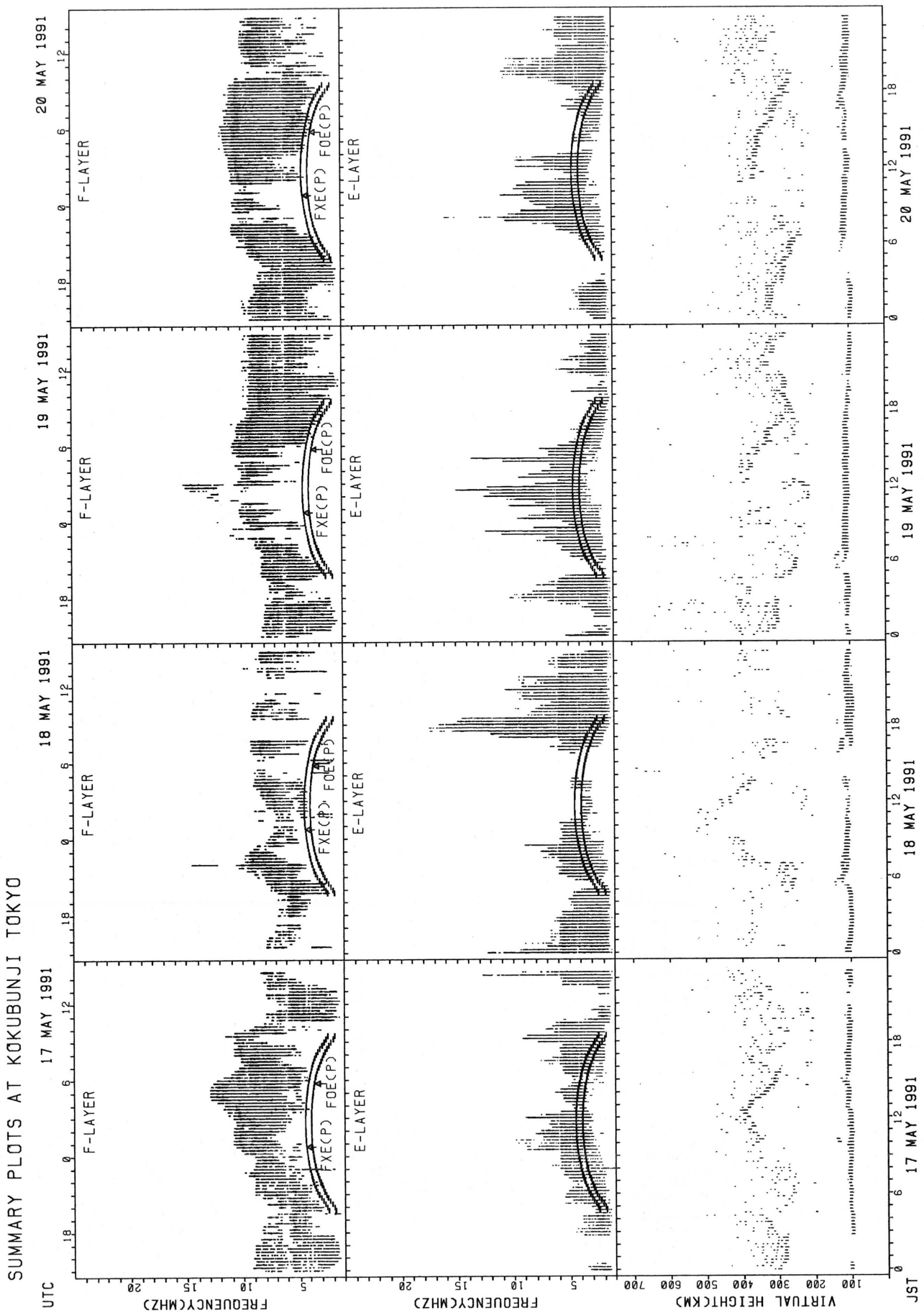
SUMMARY PLOTS AT KOKUBUNJI TOKYO
17 MAY 1991
18 MAY 1991
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FXE(P) FOE(P)
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FXE(P): PREDICTED VALUE FOR FXE
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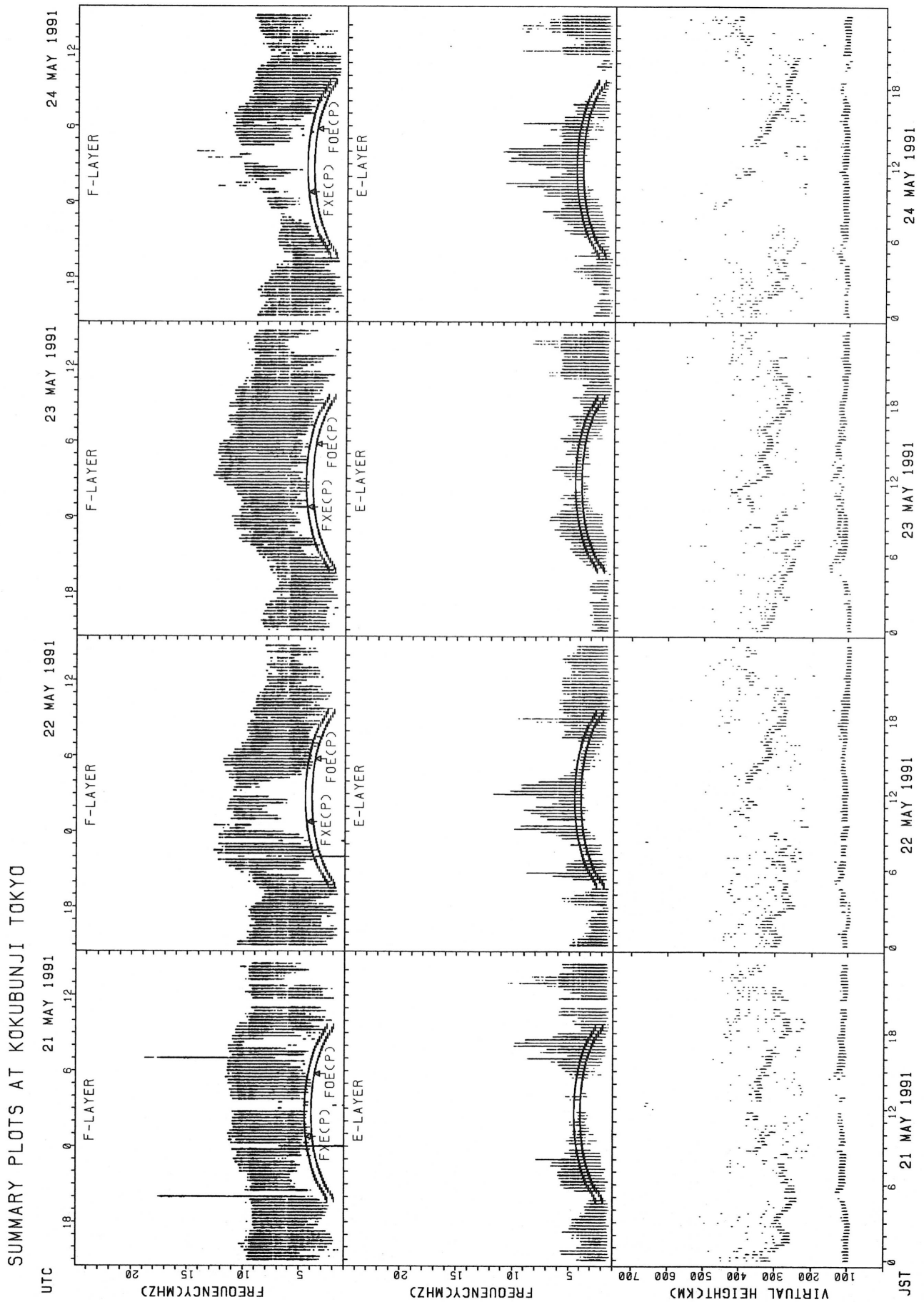
SUMMARY PLOTS AT KOKUBUNJI TOKYO
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21 MAY 1991
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E-LAYER
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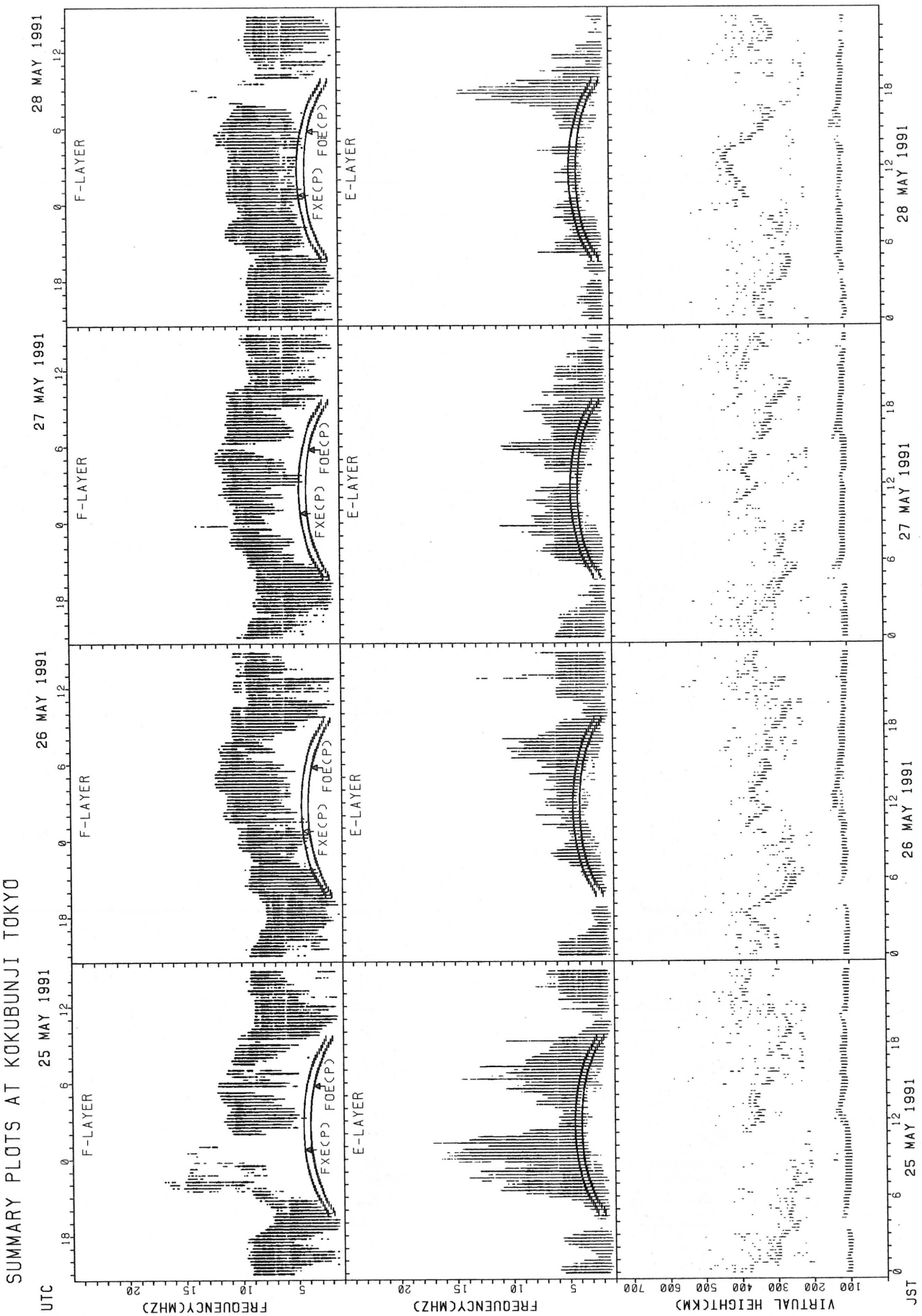
SUMMARY PLOTS AT KOKUBUNJI TOKYO
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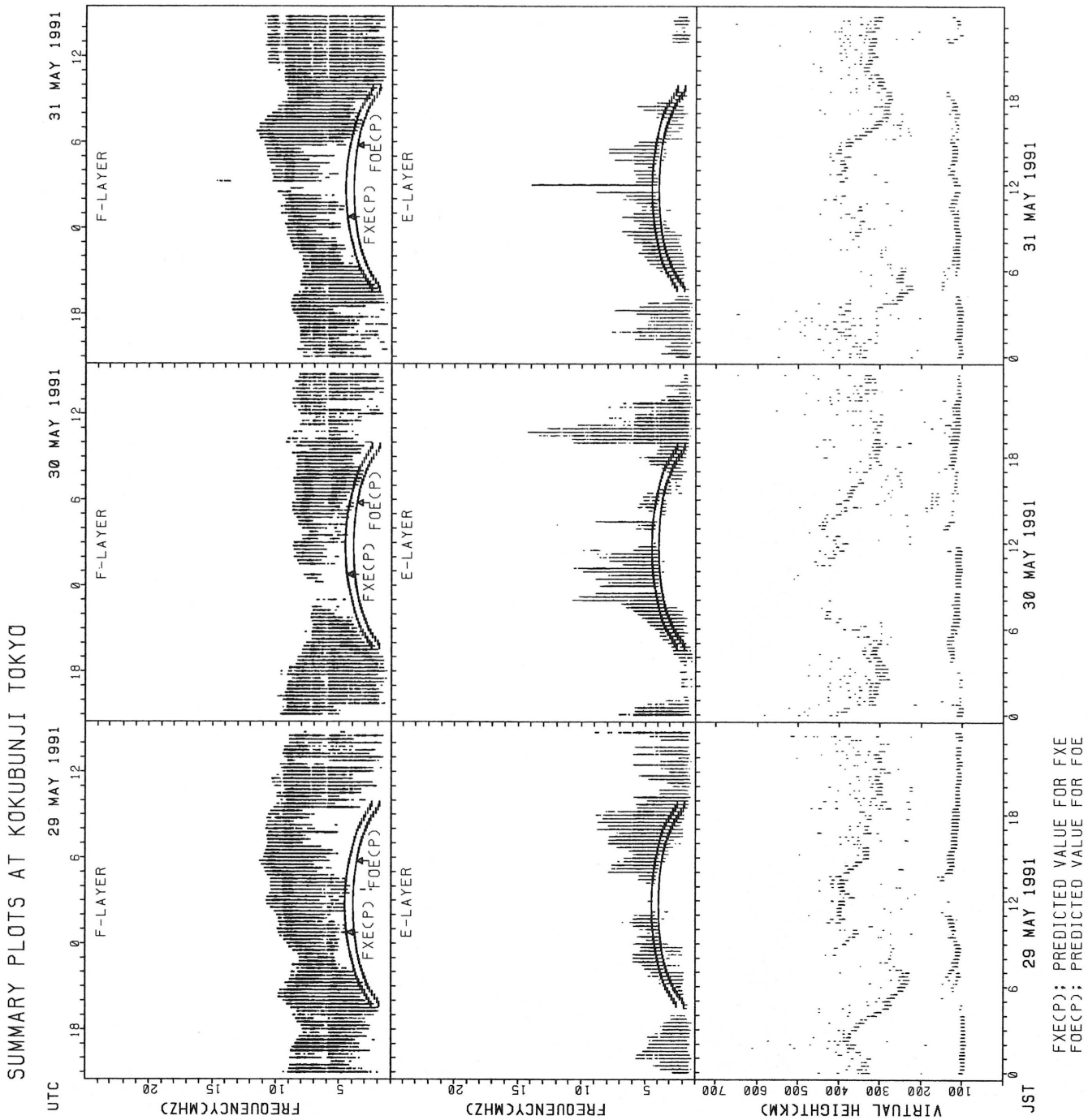
SUMMARY PLOTS AT KOKUBUNJI TOKYO
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29 MAY 1991
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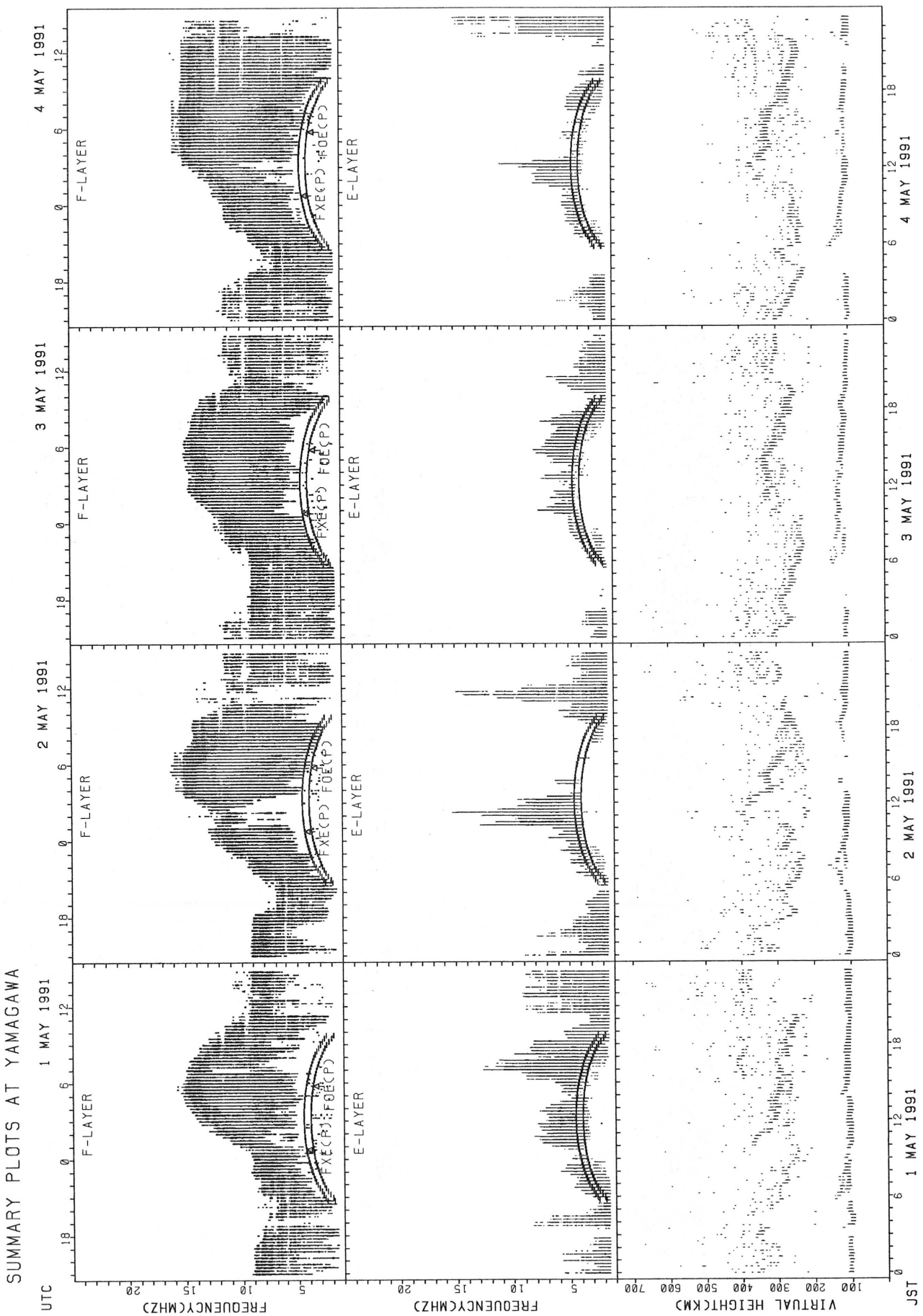
SUMMARY PLOTS AT YAMAGAWA
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FREQUENCY(MHZ)
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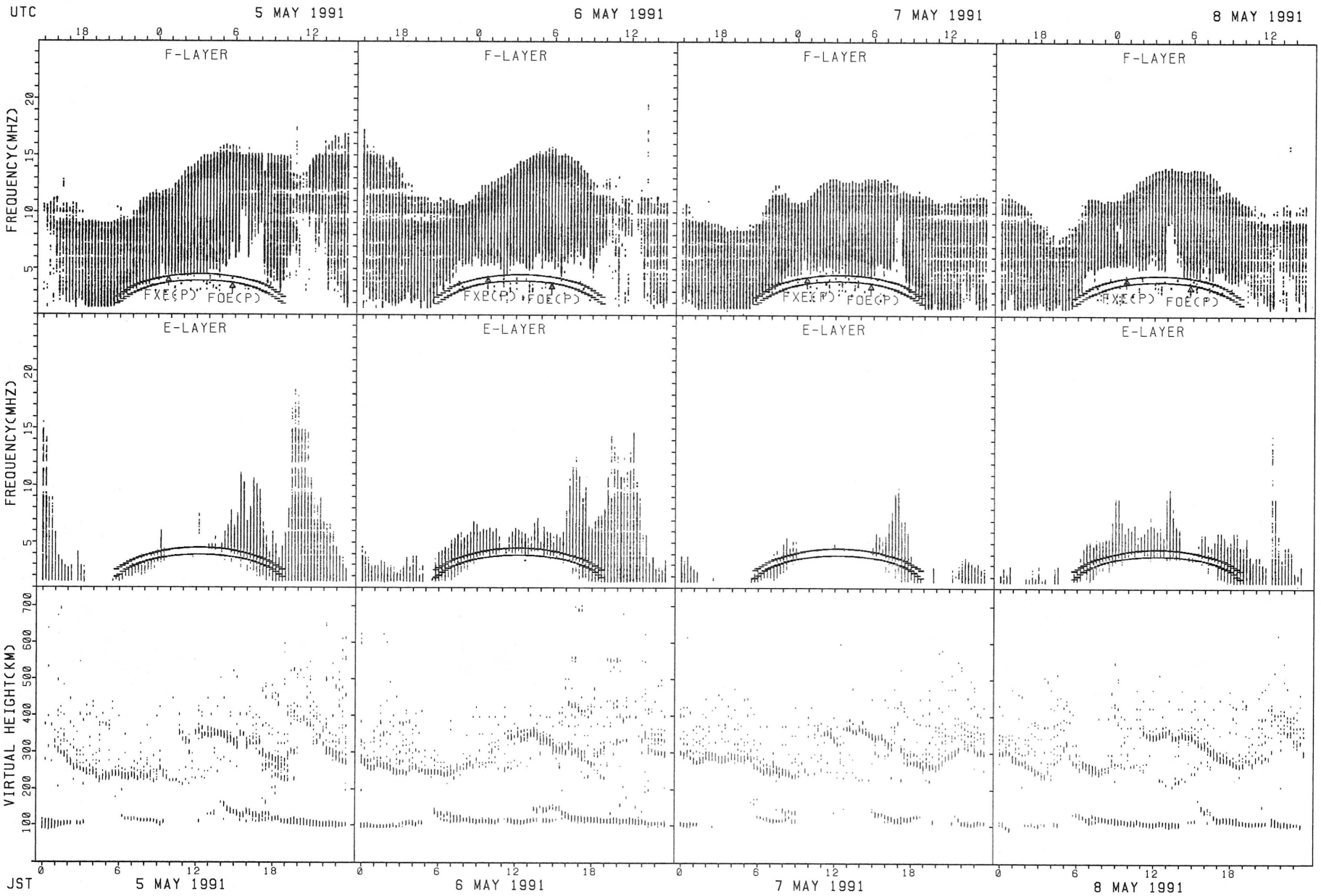
SUMMARY PLOTS AT YAMAGAWA



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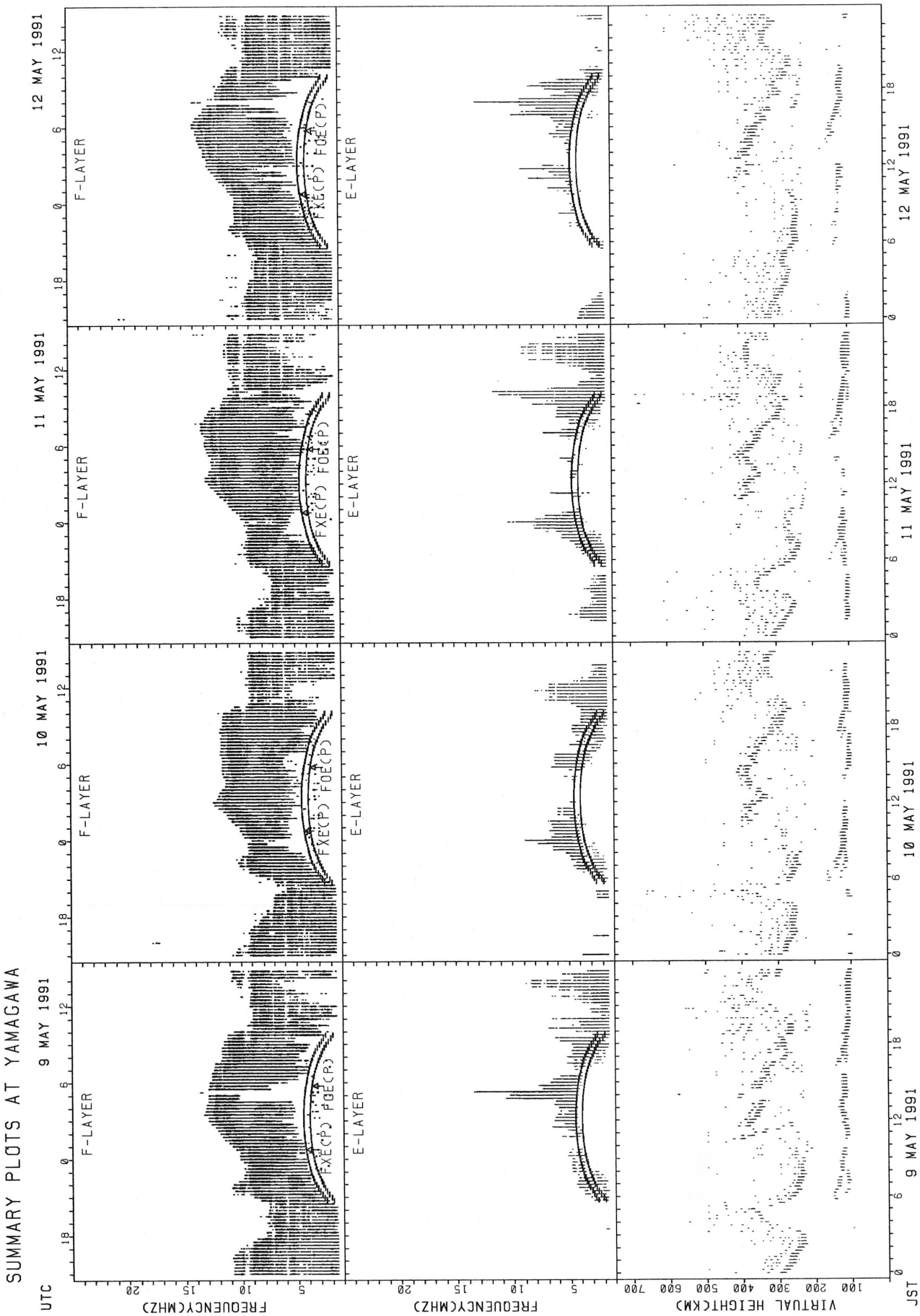
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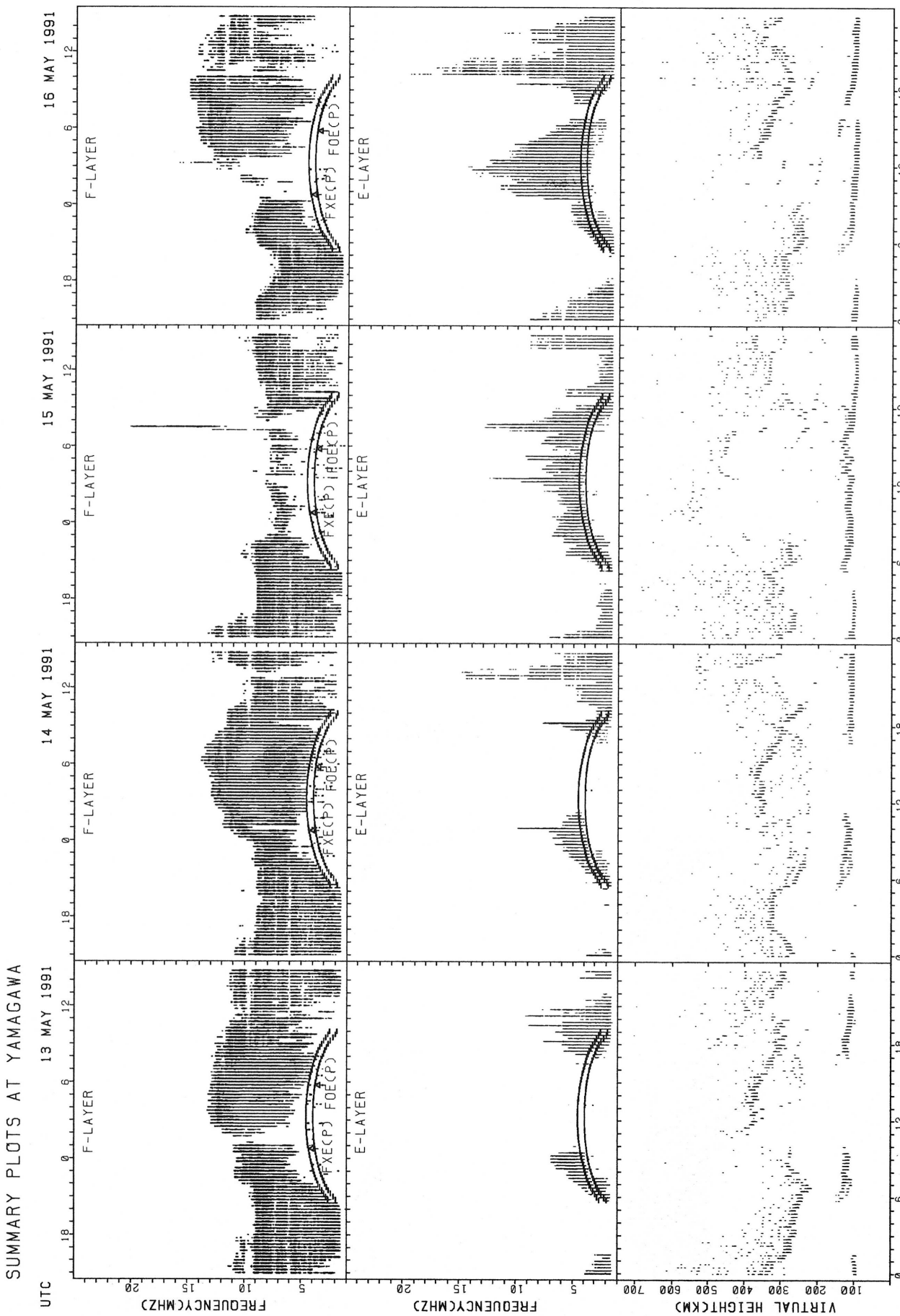
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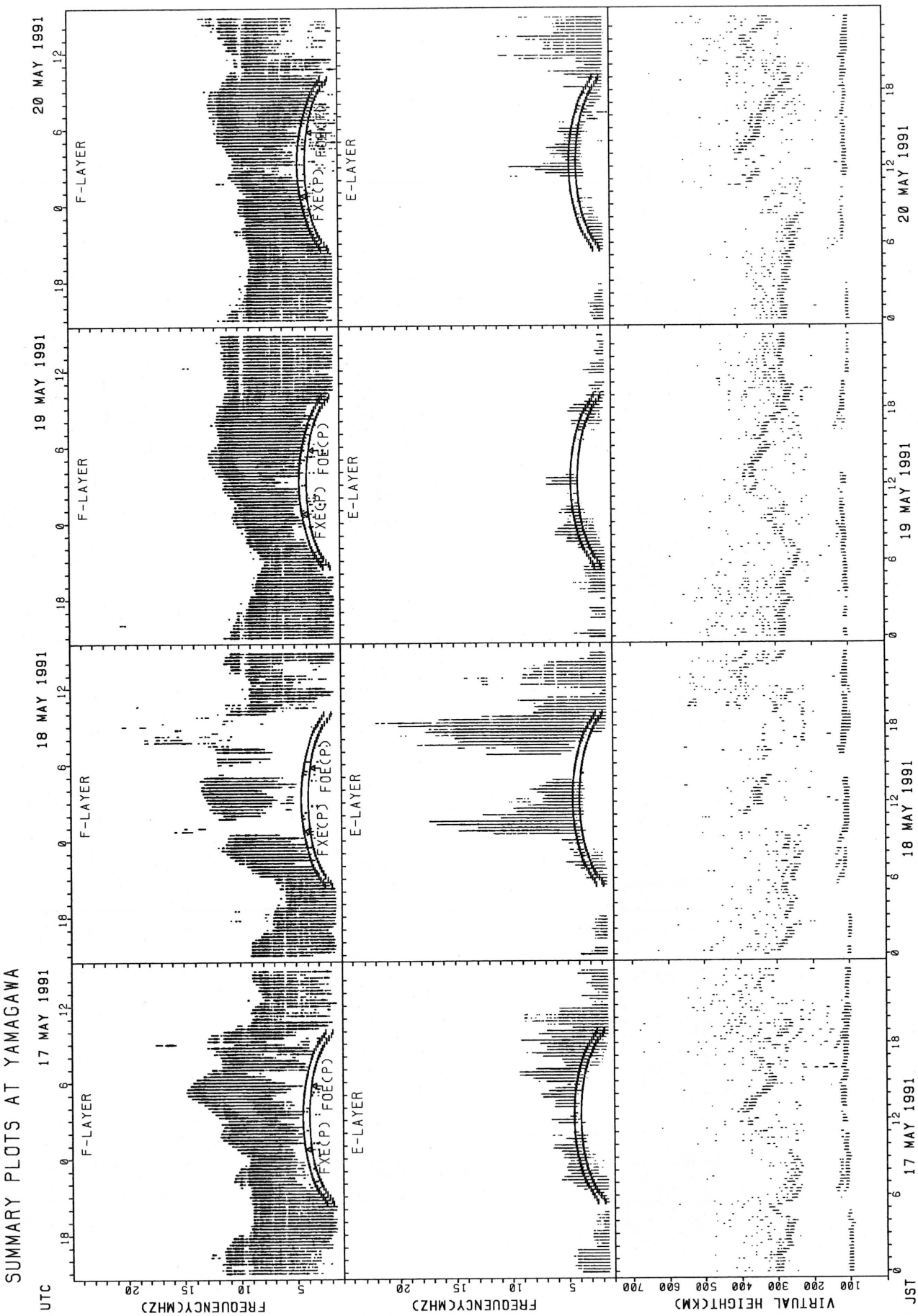
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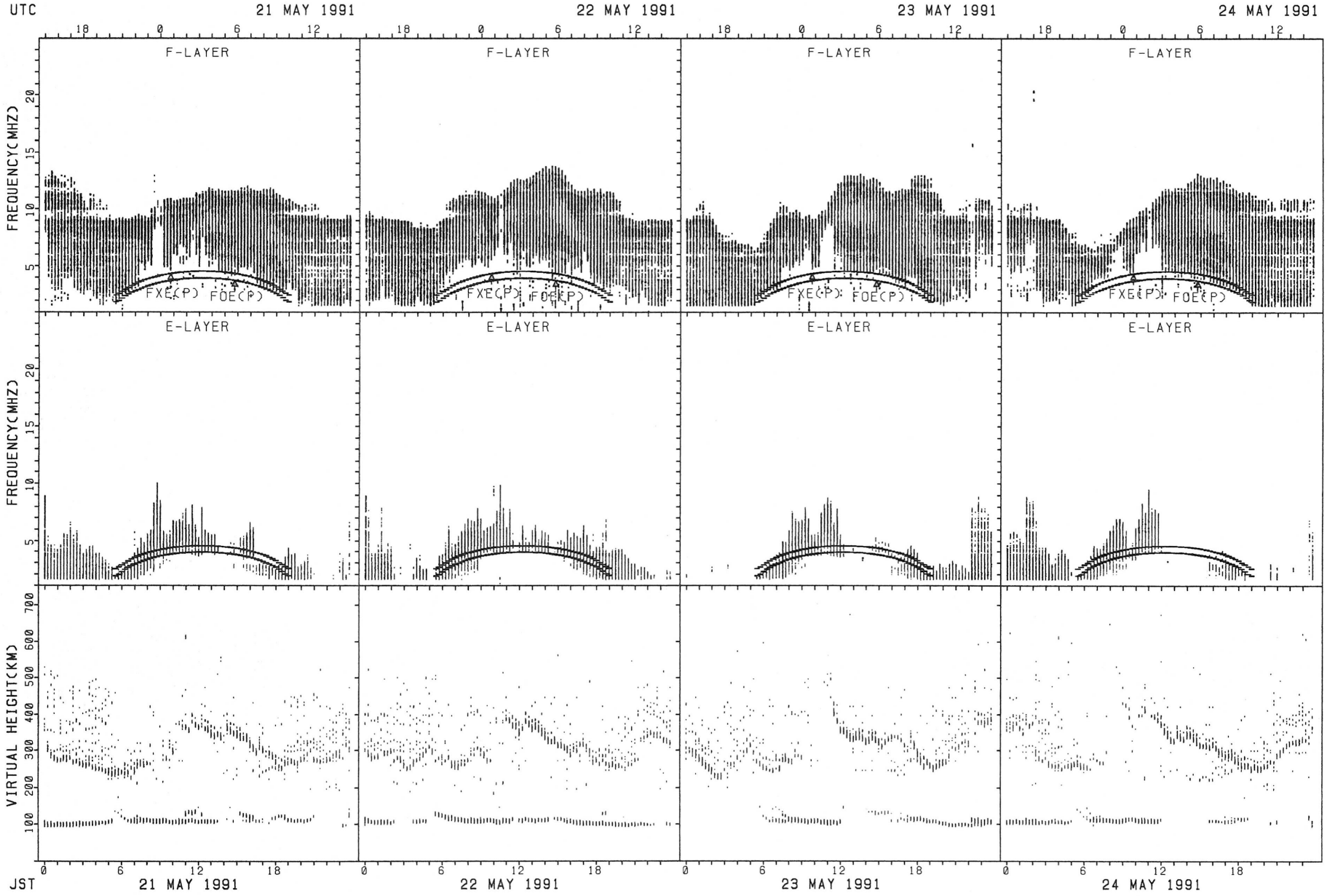
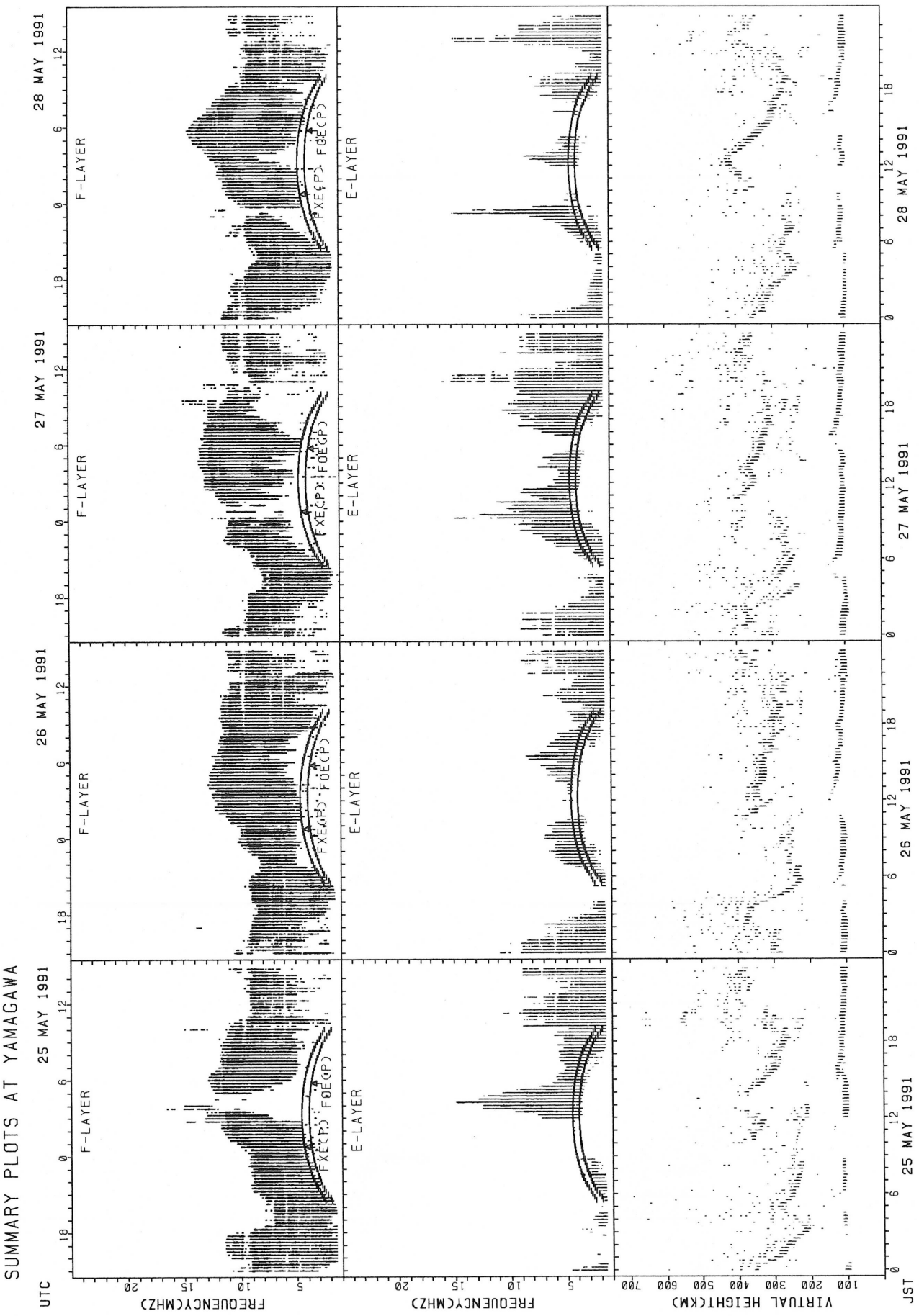
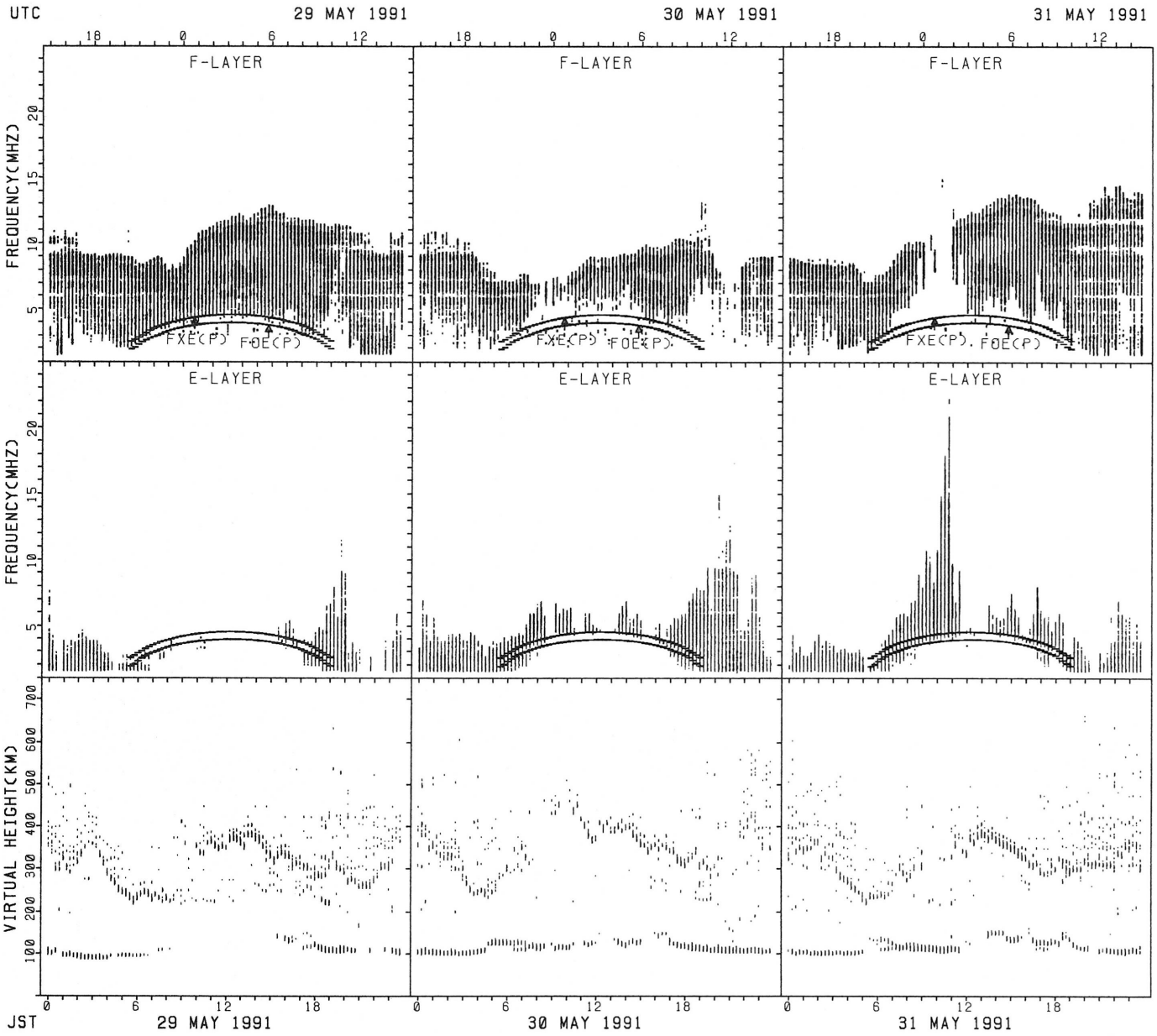
SUMMARY PLOTS AT YAMAGAWA



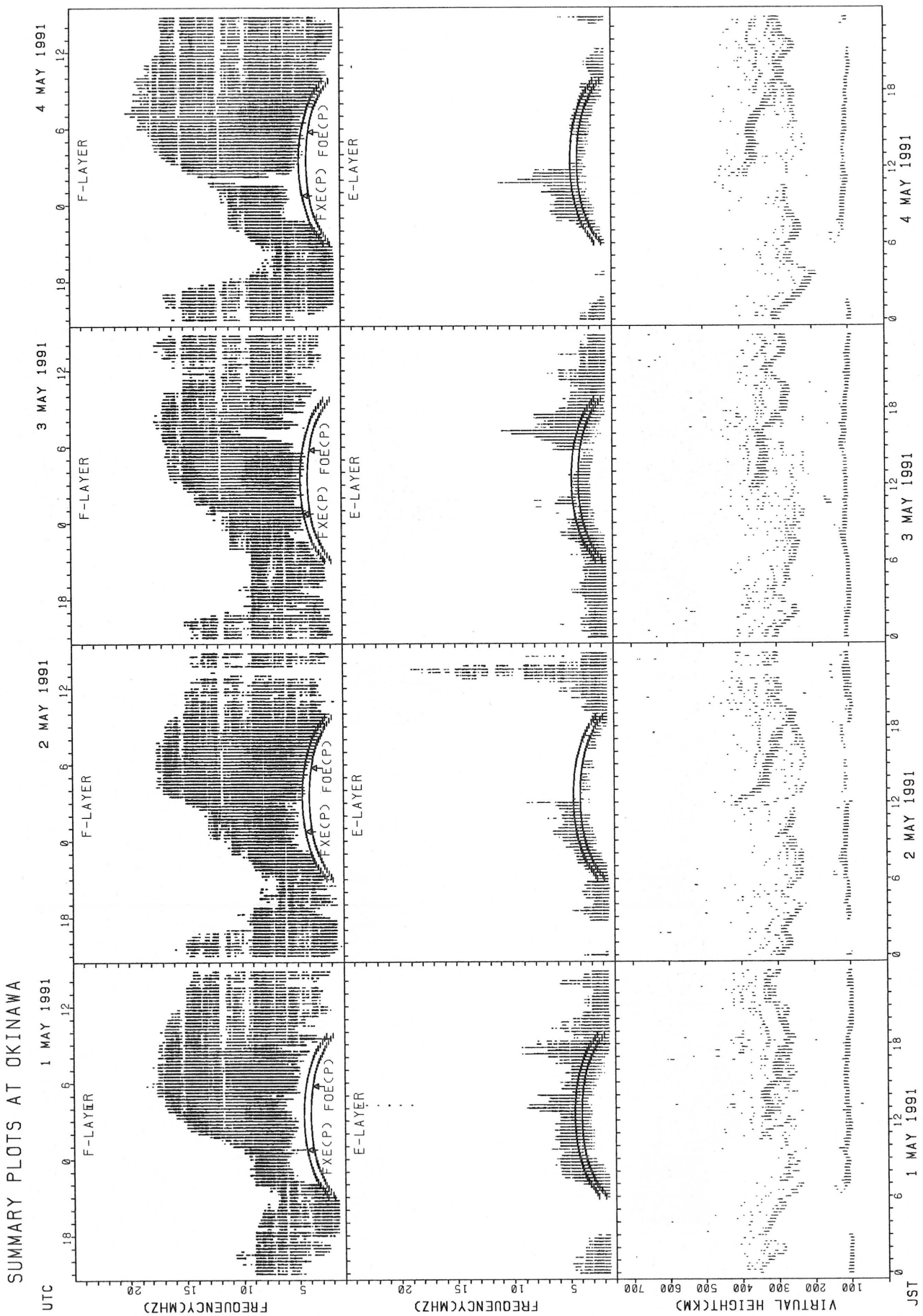
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

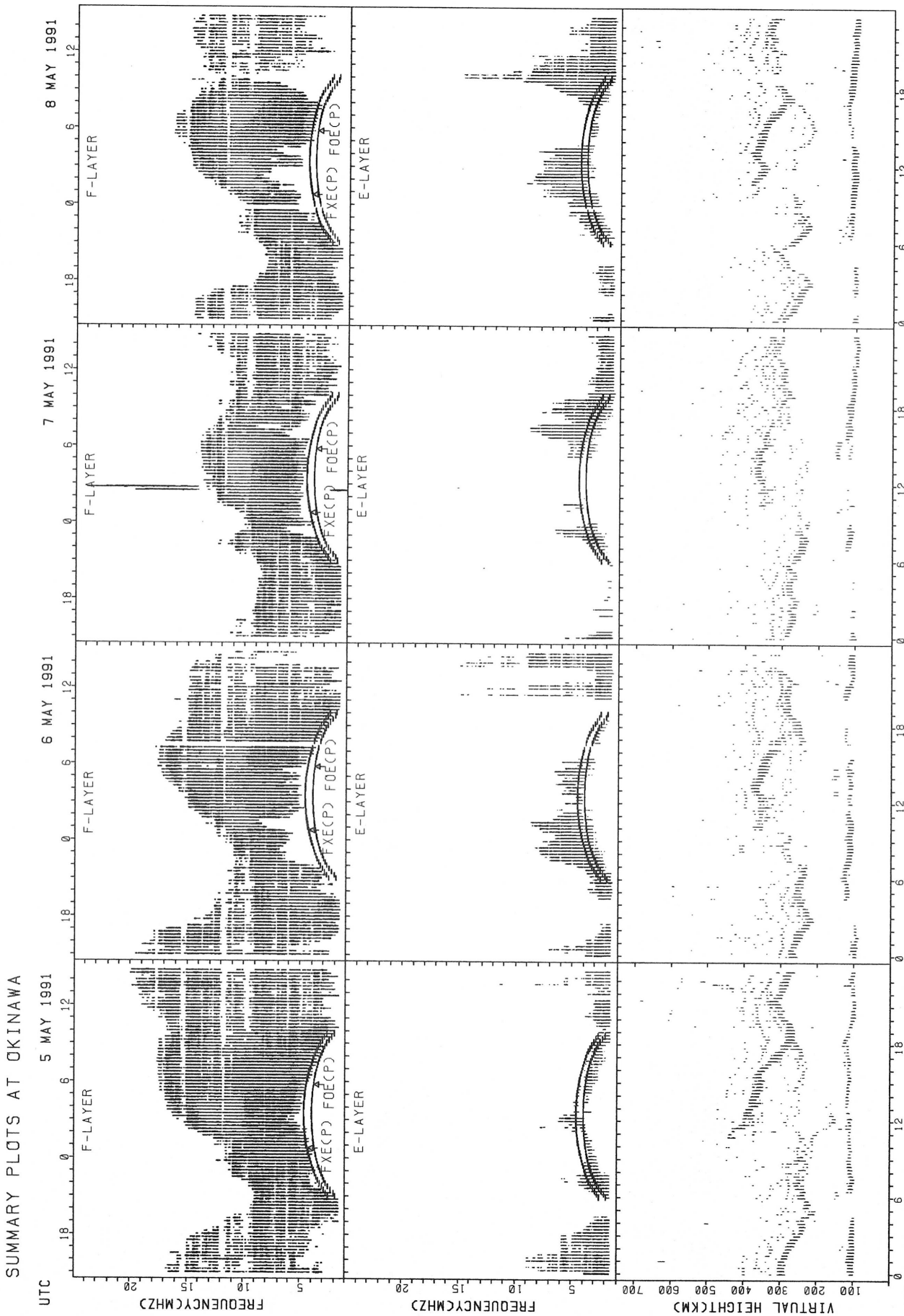

SUMMARY PLOTS AT YAMAGAWA
25 MAY 1991
26 MAY 1991
27 MAY 1991
28 MAY 1991
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

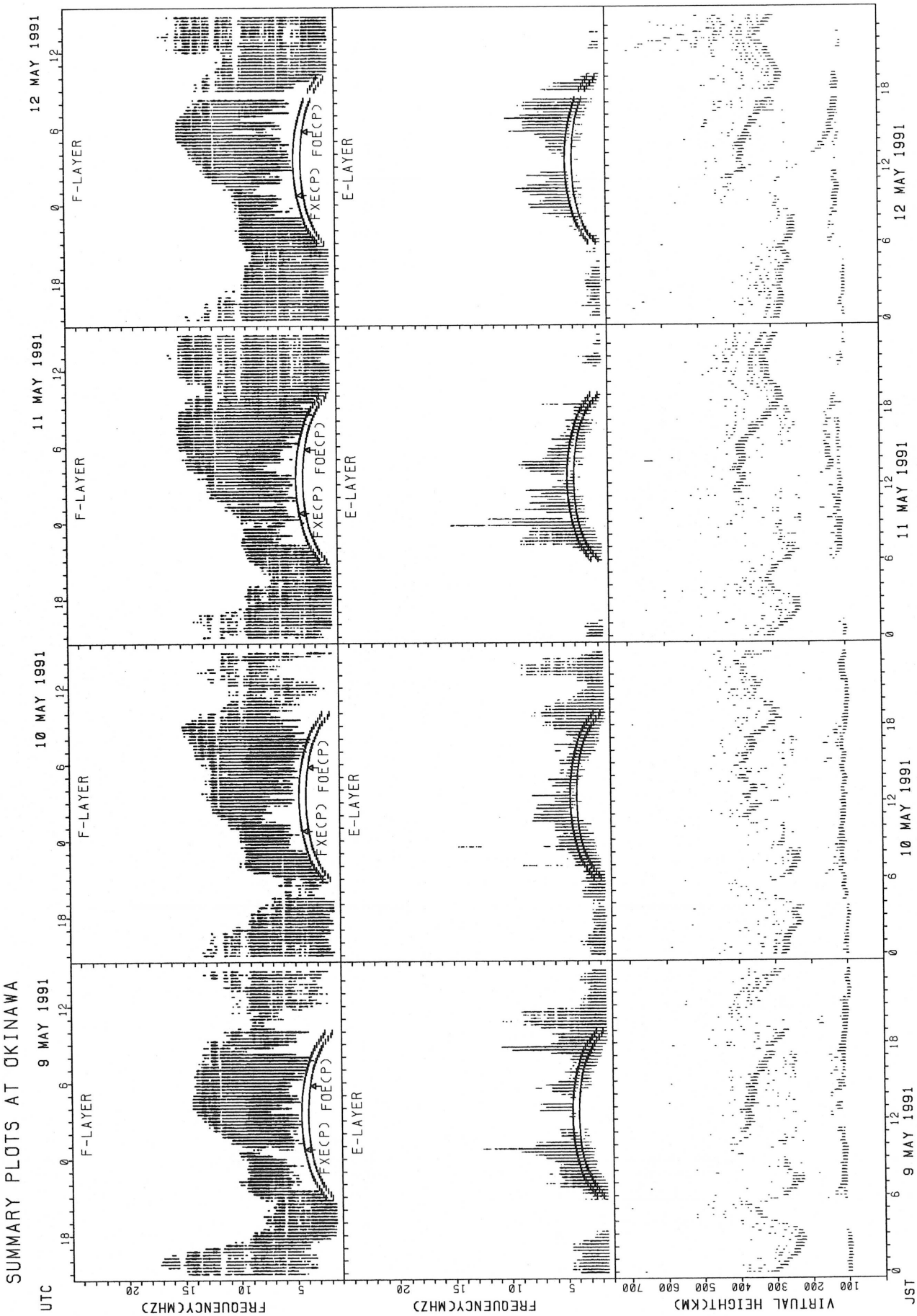
SUMMARY PLOTS AT YAMAGAWA



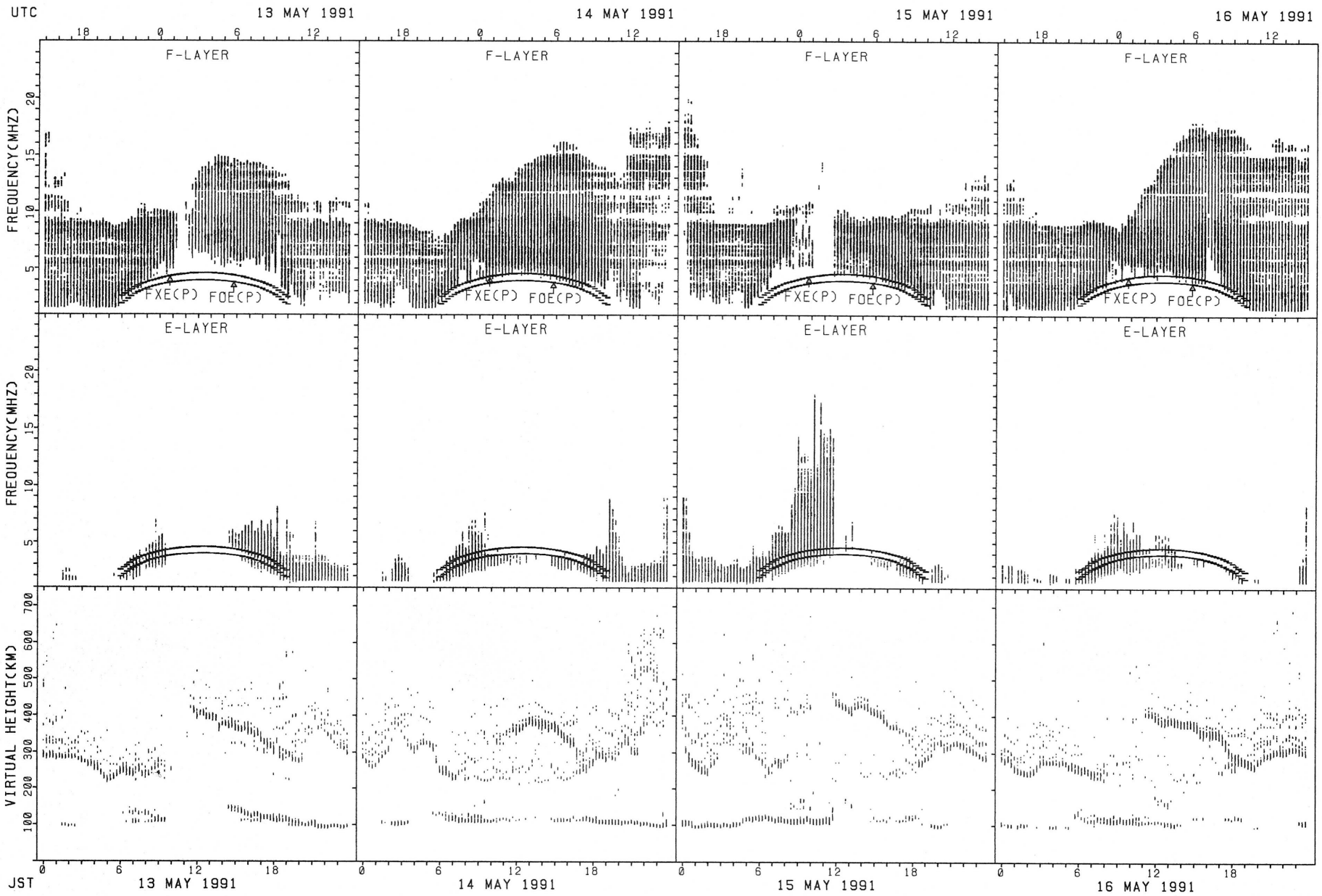
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

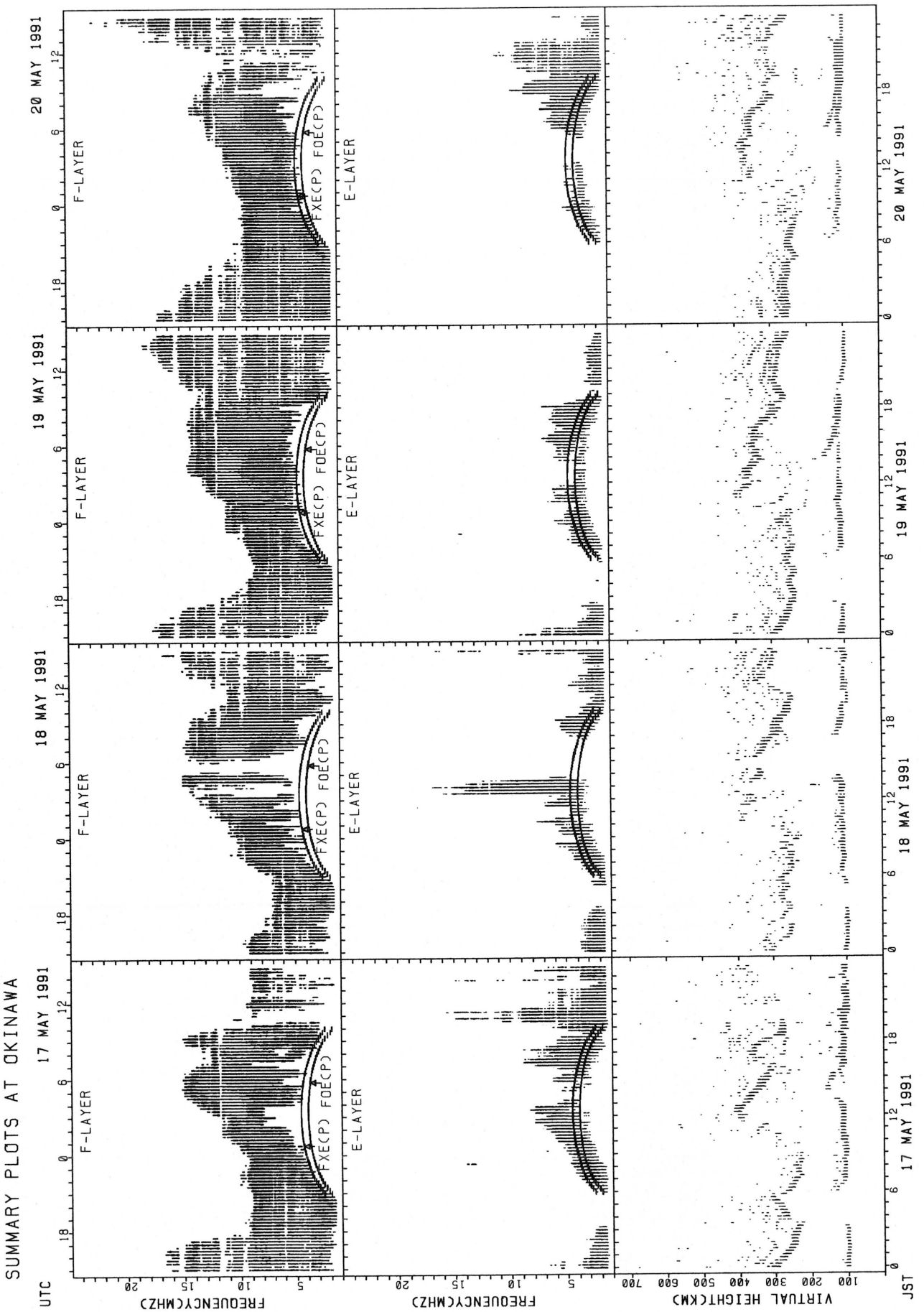

SUMMARY PLOTS AT OKINAWA
UTC
5 MAY 1991
6 MAY 1991
7 MAY 1991
8 MAY 1991
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

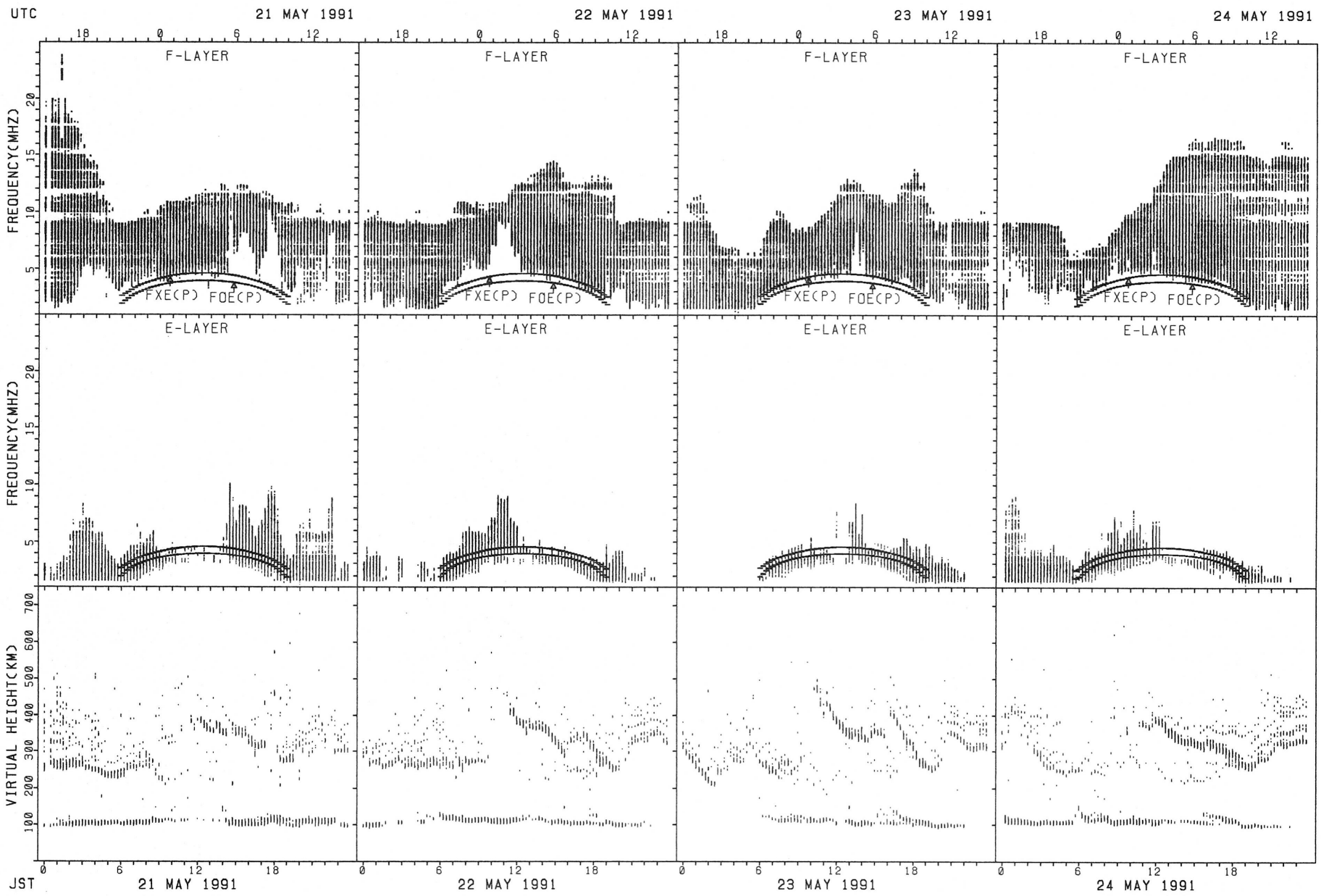

SUMMARY PLOTS AT OKINAWA
UTC
9 MAY 1991
10 MAY 1991
11 MAY 1991
12 MAY 1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

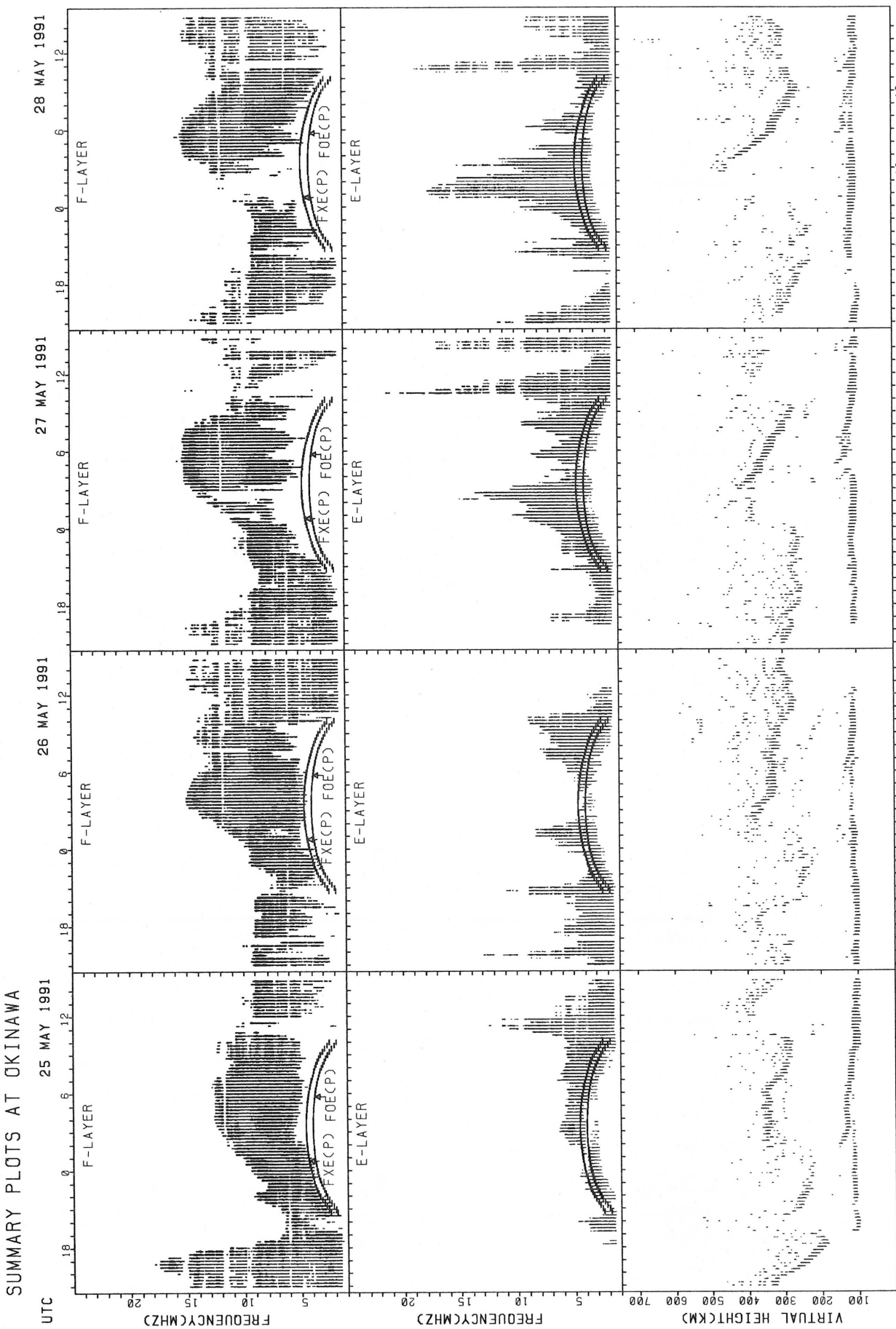
SUMMARY PLOTS AT OKINAWA



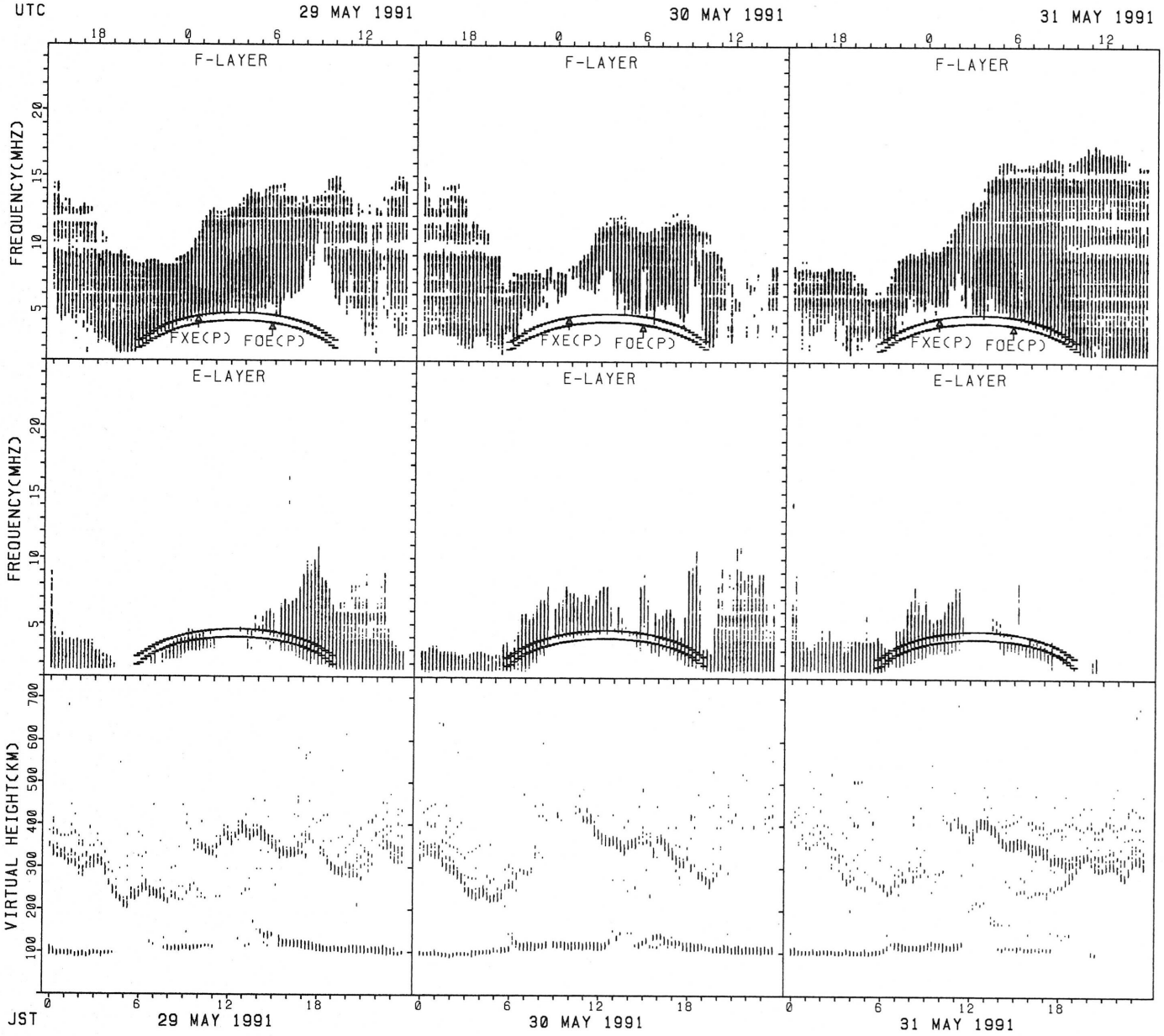
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
17 MAY 1991
18 MAY 1991
19 MAY 1991
20 MAY 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 OKINAWA
UTC
21 MAY 1991
22 MAY 1991
23 MAY 1991
24 MAY 1991
F-LAYER
FXE(P) FOE(P)
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
25 MAY 1991
26 MAY 1991
27 MAY 1991
28 MAY 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 OKINAWA



FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

MONTHLY MEDIANS OF H'F AND H'ES
MAY 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						13	15	10									16	20	23	24	12	16	12	13
MED						306	292	303									339	310	308	299	318	351	386	362
U Q						335	326	324									356	330	326	318	327	370	395	373
L Q						285	278	284									313	300	284	289	304	323	360	347

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	13	11			10	13	19	21	25	21	18					12	18	21	27	25	22	16	15	13
MED	113	111			121	131	131	127	121	123	121					124	123	125	125	121	119	119	117	113
U Q	115	115			141	135	131	131	127	125	125					136	131	130	127	127	123	123	119	116
L Q	109	111			115	127	125	119	119	118	117					120	119	119	119	117	117	115	115	109

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							15	16									22	20	22	15				
MED							276	192									323	314	313	123				
U Q							290	291									344	336	330	302				
L Q							131	129									306	292	252	115				

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	12					20	25	25	21	19	14	13	15	14	14	19	27	27	20	23	18	16	14
MED	107	107					129	123	119	117	117	113	111	113	114	115	129	121	117	114	113	111	111	111
U Q	111	109					136	132	125	123	121	115	115	117	123	129	167	135	123	117	115	115	112	113
L Q	105	104					123	119	117	114	113	109	109	107	111	113	119	115	113	111	109	109	108	107

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	15	16	14	12		13	19	21	16								27	25	25	27	11	10	11	11
MED	360	350	349	362		304	266	274	286								316	296	294	286	340	357	362	366
U Q	372	368	370	371		334	314	293	320								326	318	308	314	360	388	376	378
L Q	348	344	340	344		295	260	252	278								302	286	274	280	328	334	346	360

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	23	23	24	24	18		20	27	30	29	27	26	25	26	19	19	21	27	27	26	26	26	27	23
MED	107	105	103	106	106		125	121	117	115	113	113	113	114	113	121	119	117	115	112	113	109	109	109
U Q	109	111	106	109	111		133	127	121	118	119	119	122	125	123	129	126	121	117	113	115	115	111	115
L Q	103	103	102	102	103		118	117	113	111	109	109	109	109	109	113	117	113	113	111	109	107	107	105

MONTHLY MEDIANS OF H'F AND H'ES

MAY 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	21	28	24	21	16	13	19	27	25								30	27	30	29	21	18	12	18
MED	334	323	326	306	329	290	284	266	260								321	298	285	280	320	343	337	353
U Q	353	339	347	334	340	380	308	278	276								332	314	298	297	346	356	357	362
L Q	324	308	293	292	302	271	264	254	249								298	290	272	268	301	322	328	336

H'ES

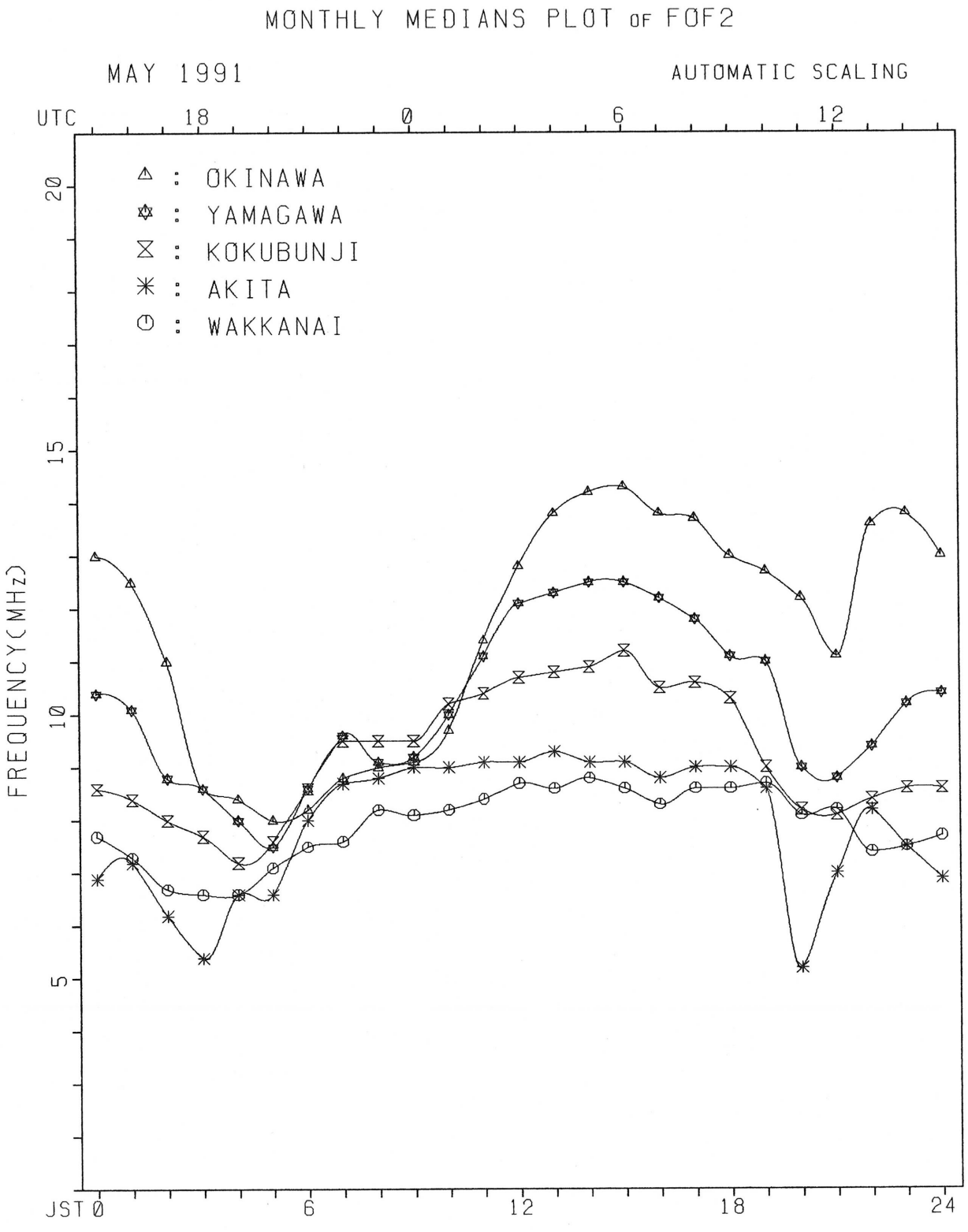
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	22	22	17	16		15	22	27	25	22	20	25	18	20	19	21	24	27	28	27	25	24	23
MED	107	105	105	105	105		129	122	117	115	111	114	109	110	119	127	125	118	117	113	113	107	109	109
U Q	109	107	107	105	107		137	125	121	117	115	120	119	119	131	135	137	123	119	115	113	115	113	113
L Q	105	101	99	100	102		125	119	113	109	109	109	107	103	109	113	119	115	113	109	107	106	107	107

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	28	28	28	24	17	13	16	28	26	16							29	31	29	29	26	23	18	22
MED	321	290	282	293	300	292	275	264	266	295							330	312	304	288	316	344	324	340
U Q	349	308	315	315	325	311	309	289	284	346							344	332	317	312	342	358	358	350
L Q	302	282	257	264	277	264	262	250	252	276							321	294	287	277	304	318	310	322

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	23	21	20	21	15	14	19	25	28	26	24	24	19	15	20	22	23	24	27	25	26	24	24	21
MED	103	101	103	103	103	106	119	119	119	113	115	114	113	129	144	129	119	119	115	109	105	108	106	105
U Q	109	109	107	107	109	119	133	119	123	119	119	119	119	151	153	143	129	125	115	114	113	112	113	111
L Q	101	99	99	99	99	105	109	110	114	111	110	109	109	115	116	121	111	115	111	107	101	103	101	99


MONTHLY MEDIANS PLOT OF FOF2
MAY 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

MAY 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 90	X 87	S	X 75	X 73								A							X 107	X 92	X 91	X 92	X 84
2	X 88	X 81	X 82	X 84	X 75															X 113	X 100	X 105	X 109	X 101
3	X 100	X 99	X 90	X 90	X 87															X 101	X 86	X 91	X 92	X 92
4	X 88	X 91	X 85	X 83	X 74															A	X 107	X 104	X 100	X 97
5	X 96	X 95	X 93	X 87	X 86															X 130	X 112	X 117	X 118	S
6	0 X 105	X 104	X 97	X 92	X 87															X 108	0 X 95	X 94	X 97	X 99
7	X 98	X 96	X 88	X 86	X 86															X 111	X 100	X 97	0 X 102	X 102
8	X 102	X 100	X 95	X 85	X 79															X 100	X 86	X 89	X 91	X 90
9	X 96	X 92	X 81	X 75	X 72															X 95	X 86	X 89	X 93	X 90
10	X 90	X 85	0 X 86	X 73	X 69															X 98	X 90	X 90	X 92	X 87
11	X 91	X 92	X 86	X 77	X 76															X 104	0 X 91	S	X 96	X 95
12	X 95	X 93	X 89	X 85	X 80															X 102	X 92	X 93	X 100	X 101
13	X 97	X 90	X 88	X 88	X 88															X 108	X 107	S	X 107	X 113
14	X 108	X 103	S	X 91	X 86															A	X 82	X 84	X 83	S
15	X 88	0 X 81	X 77	X 78	X 77					A	A	C								X 72	X 73	0 X 75	X 81	X 83
16	S	X 82	X 79	X 76	X 75															X 107	X 102	X 97	X 94	X 96
17	X 97	X 99	X 95	X 90	X 85															X 104	X 84	X 78	X 82	X 85
18	A	X 80	X 73	X 69	X 66					81								A		X 93	X 85	X 82	X 87	X 86
19	X 87	X 85	X 83	X 79	78			88				A			A					X 97	X 96	X 96	X 98	X 99
20	X 93	X 93	X 89	X 86	X 84															X 108	X 97	X 99	X 103	X 101
21	X 99	X 103	X 98	X 91	X 94	C											C			X 103	X 99	X 100	X 97	101
22	X 107	X 99	99	98	X 83				C											X 93	X 88	X 82	X 82	X 81
23	X 82	X 85	X 82	X 76	X 74															X 113	X 103	X 97	X 96	X 95
24	X 90	X 86	X 93	X 81	X 71									A						X 94	X 85	X 81	X 86	X 91
25	X 92	X 98	X 97	94	X 75					A	A									X 101	X 91	X 90	X 93	X 95
26	X 93	X 89	X 84	X 78	X 80															X 111	X 102	X 107	X 105	X 105
27	X 103	X 92	X 87	X 87	X 86															X 117	X 92	X 91	X 94	X 97
28	X 97	X 93	X 92	X 93	X 90													A		X 84	X 87	X 91	X 96	X 92
29	X 91	X 90	X 85	X 83	X 89															X 101	X 104	X 101	X 99	X 94
30	98	X 99	X 94	X 92	X 84					A	A									X 95	X 87	X 84	X 89	X 88
31	X 86	X 84	X 82	X 86	X 88								A							X 99	X 103	X 112	X 118	X 111
	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	29	31	31			1		1										29	31	29	31	29
MED	X 95	X 92	X 88	X 85	X 80			88		81										X 102	X 92	X 91	X 96	X 95
U Q	X 98	X 99	X 94	X 90	X 86															X 108	X 102	X 100	X 100	X 101
L Q	X 90	X 85	X 82	X 78	X 75															X 96	X 86	X 86	X 91	X 89

MAY 1991 FXI (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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	84	81	I S 74	69	67	69	73	S 82	84	83	93	107	A	125	U S 126	126	121	117	U S 110	101	86	85	86	S 78
2	82	75	76	78	69	76	85	99	107	127	119	117	125	135	134	134	S 124	115	119	107	94	98	S 103	95
3	94	93	84	84	81	82	86	97	104	102	105	116	R 117	U S 113	116	116	111	107	109	95	S 80	85	86	86
4	82	85	J S 79	77	68	73	89	96	104	110	114	122	132	138	140	132	127	124	125	A	101	98	94	91
5	90	89	87	81	80	85	100	103	107	111	J R 117	126	132	138	139	S 138	130	126	128	124	106	111	112	I S 106
6	U S 99	98	91	86	J S 81	89	99	103	102	114	I S 119	S 127	132	J S 134	S 136	131	128	122	S 118	102	S 89	88	91	93
7	92	90	82	J S 80	80	89	102	R 111	113	114	121	124	120	117	117	117	116	113	109	106	94	91	U S 96	96
8	96	94	89	79	73	82	91	96	96	100	111	U S 121	124	123	I S 122	117	110	103	106	94	80	83	85	84
9	90	86	75	69	66	S 65	U S 101	101	S 95	99	104	112	117	119	115	112	S 103	97	96	89	80	S 83	87	84
10	84	S 79	80	67	63	67	89	91	87	79	R 82	90	97	R 96	R 99	U S 96	U S 95	98	96	92	84	84	86	J S 81
11	85	86	80	71	70	78	101	106	101	102	U S 107	119	125	124	118	119	116	116	108	98	U S 85	I S 88	90	89
12	89	87	83	79	74	82	93	98	100	102	106	110	117	116	116	120	119	111	109	96	86	87	94	95
13	91	84	82	82	82	86	95	102	99	S 99	109	I B 114	I R 115	J R 116	J R 118	119	I R 114	R 107	I S 107	U S 102	101	I S 101	S 101	107
14	102	97	I S 89	84	80	S 89	81	83	81	84	99	102	U S 105	104	105	109	109	107	108	A	76	78	77	I S 80
15	82	U S 75	71	72	71	78	84	73	67	A	A	C	68	U R 65	I S 65	66	67	68	68	66	67	S 69	75	77
16	I S 76	76	73	70	69	78	97	103	102	97	97	100	108	111	R 113	S 112	111	111	107	S 101	96	91	88	90
17	91	93	89	84	79	78	90	91	95	96	108	109	108	R 116	129	121	101	105	106	98	78	72	J S 76	79
18	A	74	67	63	60	V 69	83	95	88	71	68	70	79	84	84	B	89	A	91	87	79	76	81	80
19	81	79	77	73	F 71	77	77	F 78	84	93	97	A	94	98	I A 102	105	101	96	91	91	90	90	92	93
20	87	87	83	J R 80	78	88	S 98	104	I R 105	103	100	105	106	109	111	113	110	108	109	102	91	93	97	95
21	93	97	92	85	88	I C 93	93	98	105	106	109	106	109	109	109	111	I C 108	109	103	97	93	94	91	F 92
22	101	93	F 89	F 89	77	87	104	119	I C 118	115	110	R 113	R 109	107	111	R 111	98	94	89	87	82	76	76	S 75
23	76	79	76	70	68	74	84	98	103	108	98	105	120	120	119	116	108	112	110	107	97	91	90	89
24	84	80	87	75	65	63	69	64	69	78	84	96	99	A	103	108	107	95	92	88	79	75	80	85
25	86	92	91	83	69	68	86	93	94	A	A	107	112	109	118	117	109	103	100	95	85	84	87	89
26	87	83	78	72	74	87	90	87	91	97	99	111	108	115	119	114	113	104	105	105	96	101	99	99
27	97	86	81	81	80	81	92	100	101	101	100	110	111	110	115	111	105	106	105	R 111	86	85	S 88	91
28	91	87	86	87	84	80	96	107	95	99	105	104	101	104	114	110	100	A	A	78	81	85	90	86
29	85	84	79	77	83	92	91	83	80	89	95	96	105	101	104	108	102	104	102	95	98	95	93	88
30	F 91	93	88	86	78	72	71	69	67	A	A	80	81	78	81	81	82	81	80	89	81	78	83	82
31	80	78	76	80	82	76	75	75	84	90	93	92	A	100	103	108	111	100	90	93	97	106	J R 112	105
	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	30	31	31	31	31	31	31	31	31	28	28	29	29	30	31	30	31	29	30	29	31	31	31	31
MED	88	86	82	79	74	78	90	97	96	100	104	109	109	112	115	114	109	107	106	96	86	87	90	89
U Q	92	93	88	84	80	87	97	103	104	107	110	116	120	120	119	119	116	112	109	102	96	94	94	95
L Q	84	79	76	72	69	73	84	83	84	92	97	101	103	104	104	109	101	99	96	90	80	83	85	82

MAY 1991 FOF2 (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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

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							L	U L 515	U L 565	L 585	L 605	L		L										
2										L							L	L						
3										L	L 625	L 575	L 620	L	U L 610	L	L	L						
4									L	L	L	L	L				L							
5						L		L	L	L	L	L	U L 700	L 685	L	U L 595	L	L						
6									L	L		U L 650	L 655		L	U L 630								
7								L	L	L	U L 690	L	L	U L 690	620	L	L	L						
8							L	L	L	L	655	U L 680	L	L 655	L	L	L	L						
9									L	L	L 625	665	L 660	L 665	U L 635	L								
10										L	605		U R 625	L	U L 560	610	U L 590	L						
11								L	L	L	L	L	640	L 640	L	L 620		L						
12								L		L	L	L 685	655	L 645	L 630	610								
13										U L 635	U L 670				U R 610	L	U L 550	L						
14							L	L		L	U A 635	630		U L 680	610	615	L	L						
15							U L 450	L					525			505	490	L 525						
16											U L 615	U L 670			580	550		L						
17								L		L	L 595	L 640	L 610	610	600	U L 595	L							
18								L		U A 505	520	550	550	560	R 655									
19								L		L						L 560	U L 550	L						
20							L	L	L			580	565	580	L 565	550	U L 580	L						
21								L		575	L 580	L 665	L 615	580	L 555	L								
22							L	L			L				545	520	U L 505	U L 465						
23								L 585	L	L	630	640	L 565	L	570	L 580	U L 560	L						
24							L			550					600	L 505	L 505	L						
25													L 615	L 610										
26						L	L	L	L	L	U L 640			615											
27							L					U A 595	L	590	L 605									
28							L	L	L 520	L 590	590	580	565	550	540	545	L 540							
29							L		L	580	U L 595	595	R 620	580										
30						L	440	495	515				570	575	550	560	535	U L 510						
31						L		L		L	U L 660	L 640		U A 605	570	575	525	L	L					
	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	3	3	7	17	16	17	18	19	17	11	3						
MED							445	L 515	L 520	580	L 625	640	615	610	600	575	U L 540	U L 510						
U Q								L 585	U L 565	L 590	U L 648	L 665	L 648	L 655	610	610	U L 560	L 525						
L Q								495	515	550	L 595	588	565	580	560	548	L 505	U L 465						

MAY 1991 FOF1 (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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						H 170	255	B	345	370	A	A	U A 380	A 390	A	355	A 325	A	A					
2						170	240	310	335	360	A	A	A	A	A	A	A	275	A					
3						155	235	305	350	370	395	A	420	410	385	365	340	A 285	A					
4						A	H 265	335	355	390	400	A	A	A	385	365	345	U A 285	A					
5						170	275	325	355	A	R 400	410	410	400	R 390	365	335	290	185					
6						170	275	340	375	390	I S 395	A	A	A	405	385	355	290	A 200					
7						175	275	R 340	365	B	B	B	430	420	400	385	345	290	A					
8						B	280	335	365	U A 375	A	A	410	A	A	370	345	295	U A 200					
9						195	280	330	380	390	385	A	A	A 420	410	385	350	300	U A 195					
10						B	285	330	370	390	R 415	B	B	B	B	400	R 340	285	A					
11						H 210	270	325	365	395	395	A	410	415	405	385	345	300	U A 220					
12						H 195	285	R 350	B	410	420	425	425	410	395	385	360	305	U A 200					
13						205	285	335	375	390	B	B	B	B	B	U R 380	B	305	A 200					
14						175	270	330	A	390	405	A 410	410	415	R 390	370	345	310	A					
15						A	H 270	325	350	375	400	I C 405	U A 400	A	A	A 365	345	A	A 195					
16						165	275	330	345	375	U A 380	A	A	A	400	A	B	A	A					
17						A	A	A	A	A	A	A	A	A	A	365	A	A	A					
18						A	275	320	A 360	A	A	A	410	A 410	B	B	390	A	A					
19						180	270	320	A 350	365	A	A	A	A	A	A	A	280	A 205					
20						165	265	325	U A 355	U A 365	A	A	A	A	A	360	335	295	A					
21						C	265	325	U A 345	A	A	U A 395	A	385	375	355	I C 325	275	A					
22						185	270	325	C	A	A	A	A	A	A	A 370	335	A 265	A					
23						190	270	330	355	380	400	410	410	395	385	370	335	285	210					
24						190	270	A	340	370	380	395	400	A	375	A	340	A	215					
25						A	U A 240	A	A	A	A	A	A	405	390	360	335	290	U A 220					
26						170	270	A	A	A	A	A	410	400	390	365	340	290	A					
27						205	270	A	345	A	A	A	A	A	A	A	365	U A 300	U A 200					
28						A	A	A	U A 345	A	A	A	A	A	R 395	375	350	305						
29						R	280	325	350	A 370	A	R 425	U R 415	B	405	380	345	300	A 210					
30						200	280	330	365	B	395	B	R 415	430	405	385	345	305	220					
31						B	H 275	330	360	A 385	B	405	410	B	400	375	350	310	230					
	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						20	29	24	25	20	14	9	16	14	19	25	26	25	16					
MED						178	270	330	355	378	398	410	410	410	395	370	345	290	A 202					
U Q						195	278	332	365	390	400	418	415	415	405	385	350	302	218					
L Q						170	268	325	345	370	395	400	410	400	385	365	335	285	A 200					

MAY 1991 FOE (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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 13	20	E B 13	E B 13	E B 13	19	29	41	39	47	J A 54	J A 55	J A 130	J A 72	J A 126	J A 77	J A 72	73	99	J A 74	J A 39	J A 52	J A 49	J A 44
2	J A 33	J A 30	J A 22	J A 35	J A 36	G	J A 51	J A 60	J A 75	J A 51	J A 139	109	J A 103	94	J A 97	J A 92	J A 57	G	26	60	J A 102	27	J A 62	J A 26
3	E B 13	E B 13	E B 13	22	20	20	28	36	J A 55	J A 52	53	J A 54	49	49	48	G	38	35	26	J A 36	50	40	58	J A 72
4	40	J A 34	J A 21	J A 23	J A 21	21	G	40	47	54	J A 49	J A 55	J A 69	100	J A 106	J A 71	J A 51	J A 60	63	121	J A 122	J A 101	J A 102	J A 51
5	E B 13	E B 15	J A 24	J A 23	E B 14	20	G	34	42	43	G	43	44	42	G	G	G	34	J A 41	J A 25	J A 44	J A 24	J A 42	J A 27
6	E B 14	E B 13	21	E B 13	E B 14	25	34	43	45	49	J A 53	48	48	47	44	G	J A 65	J A 106	J A 41	J A 33	J A 20	J A 15	J A 52	J A 53
7	J A 16	J A 21	J A 21	E B 14	E B 16	20	G	G	42	50	E B 50	48	53	45	43	49	J A 51	J A 41	J A 33	J A 53	J A 20	J A 42	J A 43	J A 28
8	J A 49	J A 20	J A 19	E B 17	E B 12	22	32	37	J A 45	50	44	45	G 41	45	43	42	46	39	49	54	J A 52	J A 24	J A 28	E S 17
9	E B 13	J A 31	E S 17	J A 21	E B 13	G	32	38	47	J A 66	J A 52	46	J A 52	50	54	J A 56	J A 74	J A 74	61	J A 40	J A 88	35	J A 31	E S 18
10	J A 59	J A 72	J A 92	J A 27	J A 55	J A 29	J A 43	45	48	51	56	63	51	E B 51	E B 47	G	G	G	23	E B 14	E B 13	E B 13	E B 15	E S 24
11	J A 31	J A 52	21	J A 16	J A 22	22	33	37	46	55	44	J A 55	52	48	G	42	J A 60	J A 49	J A 59	J A 47	J A 99	J A 67	J A 52	E B 13
12	J A 35	J A 25	J A 17	E B 14	E B 14	G	32	42	51	J A 69	55	50	58	50	42	41	J A 53	J A 74	J A 73	J A 67	J A 82	J A 89	J A 54	J A 21
13	E B 13	E B 13	J A 17	J A 16	J A 21	22	30	41	50	57	50	B	E B 85	E B 74	E B 44	G	E B 41	45	56	23	J A 49	J A 26	J A 23	28
14	23	E S 17	E S 17	E B 13	E B 14	G	36	39	J A 73	59	J A 67	J A 85	J A 70	50	G	G	46	J A 46	J A 48	J A 132	J A 86	J A 53	21	E S 20
15	E B 14	24	J A 35	27	E B 13	23	38	48	J A 71	77	J A 100	C	J A 53	64	56	39	39	J A 50	J A 58	J A 54	J A 49	57	J A 65	J A 36
16	E S 20	J A 52	J A 51	J A 54	J A 22	22	34	J A 75	J A 65	76	J A 58	J A 65	J A 73	J A 100	J A 42	J A 50	55	J A 59	J A 58	J A 92	J A 47	J A 101	J A 34	J A 52
17	J A 28	J A 17	J A 17	J A 42	J A 37	34	J A 50	J A 53	J A 55	J A 54	J A 65	J A 74	J A 85	J A 48	J A 58	42	J A 52	J A 53	J A 78	72	26	23	J A 22	55
18	J A 121	J A 61	J A 55	J A 51	J A 46	J A 30	J A 48	J A 50	J A 70	52	J A 50	43	G	45	E B 58	B	62	J A 107	182	J A 85	J A 90	J A 86	J A 54	J A 63
19	J A 48	J A 18	J A 25	J A 98	J A 72	G	35	J A 50	109	J A 50	J A 68	125	80	J A 67	J A 130	59	J A 36	31	24	J A 31	21	J A 52	J A 44	40
20	J A 21	J A 37	J A 42	J A 21	J A 15	G	29	J A 54	114	79	J A 82	J A 55	J A 93	J A 53	J A 40	G	38	36	J A 36	109	J A 101	J A 53	J A 51	J A 50
21	J A 50	J A 39	J A 42	J A 46	J A 30	C	J A 51	J A 56	J A 74	J A 44	43	44	43	48	G	48	C	J A 97	J A 56	J A 36	J A 52	J A 33	J A 99	J A 43
22	J A 45	J A 29	J A 28	J A 22	J A 41	23	J A 48	J A 41	C	J A 69	J A 65	81	J A 113	78	J A 42	41	G 31	J A 50	J A 93	J A 55	J A 49	J A 52	J A 44	J A 50
23	J A 28	28	28	J A 24	J A 20	25	J A 42	J A 44	J A 59	J A 63	50	47	46	J A 59	50	49	43	J A 47	J A 35	38	J A 52	J A 53	J A 52	J A 84
24	28	27	22	J A 26	J A 37	26	31	J A 43	J A 62	J A 54	J A 70	J A 67	91	113	J A 53	J A 55	J A 42	J A 37	23	E B 14	J A 18	J A 90	J A 46	J A 89
25	J A 51	J A 36	J A 37	J A 45	19	27	J A 64	J A 101	J A 123	J A 166	123	94	54	J A 61	J A 69	J A 86	J A 97	83	65	J A 36	22	25	J A 53	J A 56
26	J A 55	J A 54	J A 27	28	J A 16	20	30	J A 42	J A 60	J A 44	J A 55	J A 74	J A 66	J A 66	61	J A 63	J A 101	J A 102	J A 54	J A 32	J A 40	J A 55	J A 87	J A 54
27	J A 56	J A 50	J A 43	26	J A 24	G 20	J A 50	J A 67	J A 75	78	64	J A 61	J A 50	60	68	J A 102	J A 61	J A 61	J A 64	66	J A 32	J A 51	J A 46	20
28	J A 23	J A 23	28	J A 22	J A 27	30	J A 54	43	J A 55	J A 50	J A 44	49	J A 47	J A 57	G	46	J A 53	96	J A 141	J A 51	30	J A 36	21	20
29	J A 26	J A 51	J A 42	J A 32	J A 24	G 20	30	40	J A 55	J A 55	J A 50	55	49	E B 42	J A 76	61	80	J A 83	J A 85	49	21	J A 25	J A 18	19
30	J A 76	J A 31	22	J A 18	17	26	38	J A 51	J A 114	84	84	J A 83	45	53	G	46	37	33	J A 50	J A 101	J A 140	J A 53	J A 23	J A 28
31	26	31	J A 52	J A 53	J A 21	24	32	45	J A 55	50	J A 54	J A 62	141	61	J A 55	J A 50	G	J A 37	27	E B 17	E B 14	E B 13	J A 25	24
	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	31	31	31	31	31	30	31	31	30	31	31	29	31	31	31	30	30	31	31	31	31	31	31	31
MED	J A 28	J A 29	J A 24	J A 23	J A 21	22	34	43	J A 55	54	J A 54	55	53	53	48	47	51	J A 50	J A 56	J A 51	J A 49	J A 51	J A 46	J A 36
U Q	J A 49	J A 39	J A 42	J A 35	J A 30	25	J A 48	J A 51	J A 73	69	J A 67	74	J A 85	67	J A 61	J A 59	J A 61	J A 74	J A 65	72	J A 86	J A 55	J A 54	J A 53
L Q	E B 16	E 20	19	E B 17	E B 14	G	30	40	47	50	50	48	48	48	G 42	G 39	38	37	35	33	22	25	J A 25	21

MAY 1991 FOES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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

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	E B 13	E B 13	E B 13	E B 13	E B 13	G	28	40	38	43	45	53	A A 130	47	66	72	65	61	90	21	17	35	39	26
2	27	24	18	24	29	G	49	42	72	47	81	100	74	70	83	68	46	G	24	45	59	17	17	21
3	E B 13	E B 13	E B 13	E B 15	E B 13	20	27	35	52	45	52	45	45	46	43	G	37	32	24	32	33	32	32	42
4	28	28	17	20	18	19	G	37	45	52	43	51	58	92	91	67	48	56	54	A A 121	63	65	54	E B 14
5	E B 13	E B 15	18	19	E B 14	20	G	34	39	41	G	43	43	42	G	G	G	34	37	24	31	20	20	18
6	E B 14	E B 13	E B 13	E B 13	E B 14	24	33	41	41	43	50	47	48	U S 46	43	G	55	55	36	26	18	E B 13	25	38
7	E B 14	13	17	E B 14	E B 16	20	G	G	41	E B 45	E B 50	47	51	43	43	44	49	38	32	46	16	22	36	21
8	20	E B 16	E B 14	E B 17	E B 12	21	31	35	40	40	43	44	G 41	U G 44	U S 42	41	43	35	42	48	27	19	26	E S 17
9	E B 13	16	E S 17	E B 13	E B 13	G	31	36	43	64	50	45	45	48	52	52	66	64	53	20	64	33	29	E S 18
10	23	18	41	15	39	24	39	43	45	48	55	U Y 62	50	E B 51	E B 47	G	G	G	22	E B 14	E B 13	E B 13	E B 15	E S 24
11	E B 14	40	E B 13	E B 13	15	G 19	32	36	42	51	43	44	50	47	G	41	57	43	57	41	57	48	23	E B 13
12	22	E B 13	E B 13	E B 14	E B 14	G	31	41	48	67	51	48	57	49	42	40	52	69	69	64	33	37	27	16
13	E B 13	E B 13	15	16	18	21	30	39	44	55	47	B	E B 85	E B 74	E B 44	G	E B 41	45	47	20	41	22	20	18
14	20	E S 17	E S 17	E B 13	E B 14	G	34	39	66	59	64	47	63	49	G	G	44	43	45	A A 132	45	28	E B 13	E S 20
15	E B 14	E B 13	19	19	E B 13	22	36	45	57	A A 77	A A 100	C	50	60	U S 56	37	37	46	43	29	17	45	37	24
16	E S 20	24	24	18	17	21	32	62	45	65	54	49	65	66	G 38	42	U Y 54	46	56	66	38	68	23	18
17	20	E B 13	E B 14	21	21	25	43	44	52	49	49	51	49	43	51	39	44	47	72	53	E B 13	E B 14	E B 15	39
18	A A 121	47	41	39	33	24	44	38	61	51	48	43	G	G 41	E B 58	B	62	A A 107	75	48	45	67	23	45
19	24	15	17	17	41	G	34	46	82	44	61	A A 125	70	64	A A 130	45	34	30	23	23	E B 13	29	32	34
20	E B 14	27	30	E B 13	E B 13	G	29	44	51	63	74	44	47	41	U Y 39	G	37	35	34	55	27	21	27	25
21	20	27	20	31	24	C	40	42	71	40	41	42	42	45	G	41	C	94	55	26	27	27	49	24
22	25	18	24	18	17	22	38	33	C	65	60	78	95	68	40	41	G 29	36	33	27	21	30	34	40
23	18	19	18	20	17	21	39	40	50	52	47	45	44	53	47	46	42	42	28	31	27	45	45	47
24	22	19	E B 13	17	27	25	30	36	57	48	67	67	85	A A 113	52	43	40	30	G 20	E B 14	16	35	32	51
25	31	21	29	37	E B 13	25	62	83	82	A A 166	A A 123	75	47	54	68	54	65	71	57	31	E B 14	16	39	34
26	40	44	20	16	E B 13	U Y 20	30	34	49	41	44	74	63	57	58	60	67	64	47	31	35	21	60	38
27	48	30	28	20	17	G 17	40	55	58	64	61	60	47	52	54	100	54	56	61	23	22	17	19	E B 13
28	E B 14	E B 14	18	17	20	27	38	36	42	44	43	45	42	50	G	43	51	A A 96	A A 141	42	21	21	E B 14	E B 14
29	18	27	34	27	23	U G 20	30	40	53	44	44	52	47	E B 42	67	61	71	69	69	36	21	23	16	E B 15
30	25	18	17	E B 13	16	25	34	44	43	A A 84	A A 84	62	45	50	G	45	37	31	41	24	50	16	E B 13	28
31	17	17	32	29	16	23	32	43	53	48	53	60	A A 141	61	54	47	G	35	26	E B 17	E B 14	E B 13	E B 13	E B 13
	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	31	31	31	31	31	30	31	31	30	31	31	29	31	31	31	30	30	31	31	31	31	31	31	31
MED	20	18	18	17	16	20	32	40	50	49	50	49	50	50	46	42	45	45	45	31	27	23	26	24
U Q	25	27	24	20	21	24	39	44	57	64	61	62	65	61	58	52	55	64	57	48	41	35	36	38
L Q	E B 14	E B 13	E B 14	E B 14	E B 13	G	30	36	43	44	44	45	45	45	G 39	G 37	37	35	32	23	E B 17	17	E B 17	E B 17

MAY 1991 FBES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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	13	13	13	13	13	14	17	34	18	26	31	28	27	32	21	20	17	13	14	15	14	13	13	13
2	14	15	13	14	14	15	16	21	20	24	25	33	34	33	29	22	18	16	15	13	14	13	14	13
3	13	13	13	15	13	13	15	18	18	19	25	31	23	25	21	20	20	16	13	13	15	16	14	13
4	13	13	13	13	14	13	17	23	22	25	29	23	30	26	27	25	20	16	13	13	13	12	16	14
5	13	15	13	13	14	14	17	21	20	34	33	32	34	29	31	21	18	16	14	13	13	13	13	14
6	14	13	13	13	14	15	19	27	21	21	E S 41	34	34	E S 34	32	30	20	14	14	13	13	13	14	14
7	14	13	13	14	16	13	17	20	24	45	50	44	34	32	23	23	18	18	14	18	13	13	14	13
8	13	16	14	17	12	17	20	21	22	22	27	34	34	35	29	20	21	17	13	15	14	13	13	E S 17
9	13	12	E S 17	13	13	16	17	19	31	27	24	38	34	37	25	26	18	16	16	13	14	15	14	E S 18
10	13	13	13	13	13	18	16	18	22	35	37	44	44	51	47	33	24	17	17	14	13	13	15	E S 24
11	14	14	13	13	13	15	16	18	19	34	32	36	34	34	21	21	18	18	16	14	13	17	13	13
12	14	13	13	14	14	16	22	28	44	34	34	34	34	33	32	27	22	17	16	16	16	14	13	13
13	13	13	13	13	13	16	18	17	21	25	44	B	85	74	44	36	41	19	13	14	13	13	13	14
14	17	E S 17	E S 17	13	14	14	18	20	24	26	32	33	33	33	29	24	18	19	20	13	13	13	13	E S 20
15	14	13	13	13	13	16	18	17	19	22	25	C	33	34	33	28	17	17	15	13	13	13	15	12
16	E S 20	13	14	13	13	13	21	17	20	21	24	23	38	31	31	23	47	22	17	13	14	14	14	13
17	13	13	14	13	13	14	20	16	18	21	28	31	28	33	33	18	21	18	16	20	13	14	15	12
18	13	15	13	13	16	14	17	18	21	31	30	24	30	31	58	B	37	18	14	15	15	16	15	15
19	13	14	13	14	14	14	17	18	20	21	20	30	33	23	22	19	19	14	13	13	13	14	14	13
20	14	13	13	13	13	14	16	18	18	20	21	30	30	26	22	21	18	16	15	16	14	13	13	13
21	13	13	13	15	13	C	16	16	21	21	27	27	33	27	24	21	C	16	15	14	15	13	13	14
22	14	13	14	13	13	15	20	19	C	31	33	34	32	33	23	27	16	14	13	13	13	13	13	14
23	15	13	13	14	13	14	16	16	17	20	30	33	34	33	31	21	19	16	16	13	14	13	13	13
24	14	13	13	13	14	14	17	17	21	23	25	30	34	36	20	21	19	17	14	14	12	14	14	13
25	13	14	12	14	13	15	15	17	18	26	32	33	35	32	26	23	21	18	17	13	14	12	13	13
26	12	14	13	12	13	13	16	18	19	23	26	33	31	30	28	23	21	17	17	13	16	13	13	13
27	14	14	13	13	13	13	17	16	17	21	38	39	31	34	27	23	17	16	17	13	12	14	13	13
28	14	14	14	14	13	17	17	18	21	27	30	34	33	29	22	23	17	21	17	16	14	13	14	14
29	14	13	14	13	16	18	19	18	22	23	33	33	34	42	36	32	21	18	17	13	13	14	13	15
30	13	15	13	13	13	16	18	19	24	43	34	40	39	34	34	29	22	17	16	13	13	13	13	12
31	13	13	13	14	14	18	19	18	21	25	40	28	40	43	28	21	19	17	18	17	14	13	13	13
	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	31	31	31	31	31	30	31	31	30	31	31	30	31	31	31	31	30	31	31	31	31	31	31	31
MED	13	13	13	13	13	14	17	18	21	25	30	33	34	33	28	23	19	17	15	13	13	13	13	13
U Q	14	14	14	14	14	16	19	20	22	31	34	34	34	34	32	27	21	18	17	15	14	14	14	14
L Q	13	13	13	13	13	14	16	17	19	21	25	30	31	30	23	21	18	16	14	13	13	13	13	13

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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	260	260	I S 250	235	240	260	270	S 280	285	270	265	270	A	275	U S 285	285	285	295	U S 285	290	270	255	255	S 260
2	250	245	260	270	265	280	265	290	270	295	280	270	260	270	270	270	S 280	280	285	275	275	255	S 270	250
3	255	270	250	255	265	265	265	260	270	265	260	275	R 280	U S 275	270	280	285	290	300	295	S 250	260	255	255
4	260	270	J S 275	280	260	270	295	290	280	275	270	270	265	275	275	280	270	275	285	A	270	265	275	270
5	270	265	275	270	275	300	310	290	295	280	J R 265	265	270	265	270	S 280	280	275	285	295	270	260	270	I S 275
6	U S 280	270	275	275	J S 265	280	305	305	275	275	I S 275	S 270	270	J S 285	S 275	275	270	275	S 300	290	S 275	250	260	265
7	275	275	260	J S 260	260	270	300	R 285	285	280	260	265	270	260	260	260	265	275	275	290	260	245	U S 250	255
8	265	270	270	275	255	260	270	270	270	260	265	U S 275	270	265	I S 270	275	280	275	285	285	250	250	250	245
9	270	275	275	255	240	S 265	U S 320	300	S 285	255	260	255	255	265	265	275	S 275	280	280	280	250	S 245	255	260
10	265	S 265	270	265	250	225	260	275	260	240	R 265	260	270	R 260	R 265	U S 265	U S 275	275	275	280	255	250	245	J S 260
11	260	270	275	255	250	275	300	290	270	250	U S 260	250	260	265	J S 270	260	270	280	280	280	U S 255	I S 255	255	255
12	265	265	270	275	260	290	300	295	280	250	260	250	255	260	260	265	270	275	285	295	250	255	255	260
13	265	260	255	255	265	285	295	290	275	S 265	260	I B 260	I R 255	J R 255	J R 260	260	I R 270	R 275	I S 275	U S 275	255	I S 250	S 245	255
14	260	265	I S 255	245	235	S 250	260	250	265	245	265	270	U S 275	265	265	270	270	265	275	A	250	235	230	S
15	255	U S 260	250	245	235	225	250	245	250	A	A	C	245	U R 240	I S 250	260	260	265	270	260	240	S 245	245	255
16	I S 260	260	265	265	255	265	285	285	265	255	260	250	255	265	R 265	S 270	275	270	280	S 310	265	260	260	260
17	275	275	275	265	260	250	265	285	285	250	255	255	245	R 255	270	275	265	255	260	285	250	235	J S 255	260
18	A	260	265	270	255	V 265	275	245	265	245	245	245	245	260	275	B	285	A	310	290	280	255	255	260
19	260	265	265	265	F 260	315	285	F 270	A	260	275	A	260	260	I A 270	275	285	285	285	275	260	260	270	275
20	275	275	275	J R 275	275	280	S 300	280	I R 270	260	265	260	265	265	270	275	275	280	290	290	265	260	265	270
21	275	285	290	275	290	I C 290	295	285	275	260	270	255	265	265	265	270	I C 280	295	290	290	275	270	275	F 260
22	285	270	F 265	F 295	275	265	270	290	I C 280	270	255	R 260	R 255	255	265	R 285	275	275	275	280	275	255	250	S 250
23	260	270	260	270	260	270	270	275	270	290	260	245	265	275	275	280	270	280	295	290	270	265	255	255
24	245	245	265	270	295	275	285	275	230	245	245	255	265	A	270	275	280	280	280	285	285	250	250	240
25	255	270	270	285	280	255	275	A 285	255	A	A	265	265	265	265	280	280	280	285	290	260	240	245	260
26	270	270	260	240	260	290	315	315	275	280	260	275	265	265	280	275	280	280	275	285	265	275	260	260
27	275	250	260	260	270	285	280	275	280	275	260	260	255	255	270	A 275	275	285	280	R 300	265	245	S 255	250
28	265	260	260	275	295	275	260	290	280	245	255	245	250	240	265	275	285	A	A	265	255	250	260	250
29	260	270	250	245	270	290	310	285	240	260	260	255	255	255	255	270	265	275	275	275	265	265	265	250
30	F 250	255	260	270	270	285	280	260	255	A	A	260	275	260	265	270	270	275	275	275	285	245	250	255
31	255	255	265	260	295	285	295	280	265	270	270	255	A	260	260	265	285	280	275	260	240	255	J R 255	255
	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	30	31	31	31	31	31	31	31	30	28	28	29	29	30	31	30	31	29	30	29	31	31	31	30
MED	262	265	265	265	260	275	285	285	270	260	260	260	265	265	270	275	275	275	280	285	265	255	255	258
U Q	270	270	275	275	275	285	300	290	280	275	265	270	270	265	270	275	280	280	285	290	270	260	260	260
L Q	260	260	260	255	255	265	270	275	265	250	260	255	255	260	265	270	270	275	275	275	250	245	250	255

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

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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

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 U L 335	U L 320	L 345	L L 335	L	A	L	A	A	A	A	A					
2									A	L	A	A	A	A	A	A	L	L						
3									A	L	L 340	L 355	L 335	L	U L 330	L	L	L						
4									L	L	L	L	L	A	A	A	L	A						
5							L	L	L	L	L	L	U L 320	L 325	L	U L 345	L	L						
6									L	L		U L 325	L 330	S	L	U L 335	A	A						
7								L	L	L	U L 320	L	L	U L 310	345	L	L	L						
8							L	L	L	L	330	U L 325	L	L 330	L	L	L	L						
9									L	L	L 345	315	L 320	L 315	U L 320	L	A	A	A					
10										L	A 330	A	U R 315	L	U L 350	315	U L 325	L						
11								L	L	L	L	L	340	L 330	L	L 330	A	L						
12								L		L	L	L 320	A 325	L 330	L 320	315	A	A	A					
13										U L 345	U L 315	B	B	B	U R 335	L	U L 325	L						
14							L	L	A	L	A	325	A	U L 310	H 340	H 320	L	L						
15							A 310	L	A	A	A	C	A	A	A	345	335	A	A					
16								A		A	U L 320	U L 305	A	A	340	340	Y	L	A					
17								L		L	L 345	L 320	L 315	315	A 325	U L 340	L	A	A					
18								L	A	A	365	345	355	350	R 390	B	A	A	A					
19								L	A	L	A	A	A	A	A	L 330	U L 315	L						
20							L	L	L	A	A	365	360	335	L 335	330	U L 320	L						
21						C		L	A	360	L 335	L 330	L 330	335	L 335	L	C	A	A					
22							L	L	C	A	L	A	A	A	350	350	U L 330	U L 330						
23								L 360	L	L	340	310	L 335	L	340	L 335	U L 315	L						
24							L		A	A 330	A	A	A	A	A 320	L 360	L 340	L						
25							A	A	A	A	A	A	L 325	A	A	A	A	A	A					
26						L	L	L	L	L	U L 350	A	A	A	A	A	A	A	A					
27							L	A		A	A	A	L	330	A	A	A	A						
28							L	L	L 355	L 340	335	340	350	A 335	345	330	A	A						
29							L		L	350	U L 335	A 335	R 315	335	A	A	A	A	A					
30						L	320	A 315	350		A	A	A	355	350	360	340	325	U L 330	A				
31						L		L	A	L	A 310	A	A	A	A	315	325		L	L				
	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	3	3	6	16	14	16	15	17	17	10	2						
MED							315	L 335	L 350	345	L 335	325	330	330	340	335	U L 325	U L 330						
U Q								L 360	L 355	350	L 342	340	345	335	348	L 342	L 330							
L Q								A 315	U L 320	340	U L 325	320	L 320	L 315	L 328	325	U L 320							

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

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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							360	355	340	H 330	370	350	A	310	315	305	285	270	A					
2									E A 335	305	A 305	A	360	330	A 340	305	305	295						
3									285	L 355	355	315	325	335	330	305	305	275						
4									320	325	320	330	340	A 340	335	305	315	295						
5						285		310	255	L 280	L 350	350	335	355	340	305	300	305						
6									315	320		325	335	325	320	325	295	290						
7								U L 315	305	295	350	355	310	370	355	340	L 335	310						
8							315	350	335	370	355	355	345	345	335	325	310	325						
9									280	410	360	390	370	360	350	330	325	A 315	A 305					
10										L 455	385	Y 420	380	410	350	370	355	335						
11								255	280	L 390	L 370	370	360	345	350	355	325	305						
12								280		L 405	L 355	390	380	380	360	360	305	A 315	310					
13										L 340	370	B	E B 400	390	365	360	320	320						
14							L 320	U L 410	E A 405	L 450	385	360	360	370	360	360	335	320						
15							L 345	415	A 470	A	A	C	510	A	A	450	430	395	A 350					
16								305		E A 350	380	405	385	360	350	335	335	325	A 300					
17								295		L 410	360	380	385	375	335	315	350	325	A					
18								390	370	410	490	490	440	400	385	B	345	A	A 315					
19								L 360	A	310	320	A	A 390	370	A	335	325	285						
20							260	300	305	A 315	E A 355	360	350	350	350	330	325	300						
21						C		300	A 325	350	320	350	360	345	340	350	I C 320	A	270					
22							L 325	275	I C 290	300	L 385	370	A	365	345	315	325	310						
23								345	L 365	300	370	415	345	325	340	315	335	300						
24							320		E A 525	450	A 450	405	A 415	A	355	330	305	275						
25							A 350	A	A	A	A	A 365	355	355	350	315	315	A 310	A 285					
26						290	260	265	335	275	380	340	350	365	330	320	320	E A 300	A 290					
27							L 315	275		A 300	A 325	375	350	385	345	A	320	310						
28							L 330	285	300	405	385	400	410	425	360	330	310	A						
29							250		U L 455	390	365	400	395	395	380	330	A 345	A 330	A 320					
30						300	355	405	425	A	A	435	385	445	400	380	365	340	310					
31						L 300		L 315	A 305	325	380	415	A	390	375	370	310	300	270					
	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						4	13	21	23	28	27	27	28	29	29	29	31	28	11					
MED						295	320	310	315	340	365	370	360	365	350	330	320	310	A 305					
U Q						300	348	358	370	405	380	405	388	388	360	358	335	322	A 315					
L Q						288	288	282	300	308	350	350	348	345	338	315	310	298	285					

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

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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	310	300	315	370	345	300	255	255	235	245	225	E A 275	A	250	A	A	A	A	A	A 260	255	A 330	E A 345	A 345
2	345	360	320	300	315	260	A 255	A 260	A	A	A	A	A	A	A	A	A 255	240	265	A 285	E A 305	300	295	325
3	320	285	285	310	270	255	235	245	A	250	A 260	220	235	240	250	235	240	245	265	255	A 295	335	A 345	E A 355
4	A 340	A 320	260	265	270	265	245	240	230	A 245	220	A 255	A	A	A	A	A	A	A 280	A	E A 315	A	E A 335	280
5	295	305	280	255	245	255	235	225	A 235	220	220	225	225	220	H 220	H 210	240	250	275	265	A 270	295	300	295
6	290	295	275	260	270	260	245	235	225	230	A 255	225	235	I S 235	255	245	A	A	265	250	250	295	330	A 335
7	290	285	295	285	295	265	245	245	230	245	240	H 230	A 245	235	235	A 260	A	A 265	275	A 280	265	315	A 345	320
8	320	305	295	H 270	265	280	260	245	235	H 220	230	215	215	250	S 255	245	265	A 255	A 285	A 275	290	320	340	340
9	305	275	240	295	365	290	255	240	A 240	A	A 245	230	230	255	A	A	A	A	A	A 265	A	E A 355	340	315
10	315	300	A 310	275	A	275	A 260	255	A 255	A 250	A	A	A	E B 265	B 250	240	250	255	280	275	285	300	335	350
11	305	A 310	265	290	330	280	250	240	220	A 245	220	225	250	255	245	H 255	A	A	A	A 275	A	E A 330	330	305
12	325	305	295	275	260	265	235	255	A 255	A	A 260	255	A	A 260	240	230	A	A	A	A	A 325	A 360	350	310
13	305	305	315	305	275	235	235	235	250	A 260	245	B	B	B	225	H 220	B 255	A	A 285	295	E A 325	315	345	305
14	285	290	335	335	350	E S 310	A 270	250	A	A	A	235	A	A 270	H 210	H 230	A 275	A	A 305	A	A	A 345	365	355
15	315	290	325	335	335	295	A	A	A	A	A	C	A	A	A	A 250	245	A	A	A 310	320	A	E A 385	345
16	315	325	A 315	305	290	260	255	A	E A 265	A	A	A 265	A	A	H 210	240	A	A	A	A	A 285	A	305	315
17	300	285	285	295	310	280	A 255	E A 255	E A 265	A 245	A 255	E A 275	E A 275	245	A	245	E A 270	A	A	E A 280	280	325	325	E A 335
18	A	E A 355	A 335	A 325	A 320	265	A 255	A 255	A	A	E A 275	235	230	235	225	B	A	A	A	A 285	E A 305	A	335	E A 360
19	325	295	305	305	E A 350	260	245	E A 260	A	A 250	A	A	A	A	A	A	225	255	260	280	275	A 315	A 325	A 305
20	270	A 305	A 300	285	275	260	245	A 260	A	A	A	225	240	215	220	225	240	265	275	A 285	275	310	A 315	305
21	310	295	265	285	270	I C 245	240	A 245	A	210	205	235	210	A 240	230	245	C	A	A	265	290	280	A 335	330
22	300	300	310	255	265	270	A 250	225	I C 235	A	A	A	A	A	225	250	235	A 275	A 260	260	265	A 335	E A 375	E A 375
23	320	300	295	280	280	260	255	235	A 250	A	240	250	A 250	A	A 255	E A 270	E A 270	A	275	260	285	A 300	E A 335	E A 365
24	345	350	290	280	275	A 270	240	230	A	A	A	A	A	A	A	240	H 240	A 250	270	260	250	E A 360	380	E A 395
25	A 365	300	305	A 275	245	265	A	A	A	A	A	A	A 250	A	A	A	A	A	A	265	270	320	A 375	350
26	A 325	A 320	320	365	320	260	245	230	E A 275	205	230	A	A	A	A	A	A	A	A	270	A 300	290	A	A 330
27	A 315	A 350	A 325	300	285	255	A 245	A	E A 270	A	A	A	A 270	A	A	A	A	A	A	270	240	315	345	320
28	305	310	305	280	250	255	A 255	230	235	235	230	A 250	A 230	A	240	A 265	A	A	A	E A 290	300	330	305	310
29	320	310	A 365	360	315	280	250	235	E A 260	220	225	A	250	250	A	A	A	A	A	A 280	300	275	305	275
30	370	320	310	285	305	285	E A 265	A	A 250	A	A	A	H 230	255	H 205	A 260	250	250	A	285	A 310	295	320	A 330
31	325	320	A 350	A 345	250	225	240	A 260	A	E A 270	A	A	A	A	A	E A 285	230	A 265	275	300	330	310	315	310
	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	30	31	31	31	30	31	29	26	20	17	18	18	17	17	18	21	16	12	16	27	28	27	30	31
MED	315	305	305	290	280	265	248	242	A 240	245	232	232	235	248	232	242	244	255	275	272	283	312	334	320
U Q	325	320	320	310	320	280	A 255	A 255	E A 258	A 250	A 255	A 255	A 250	255	250	A 258	A 260	A 265	A 280	A 285	A 305	A 330	A 345	E A 350
L Q	305	295	285	275	270	260	242	235	235	220	225	225	230	235	H 220	232	240	250	265	265	270	300	320	310

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

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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						E B 145	125	B	115	115	A	115	115	120	115	115	115	A	A					
2						B 140	115	115	115	115	115	A	A	A	115	A	A	115	A					
3						E B 155	120	115	110	115	115	A	A 120	115	115	115	115	115	A					
4						A	115	115	115	115	115	A	115	115	115	120	120	115	A					
5						E B 145	120	115	115	A	120	120	120	120	120	115	115	115	B 125					
6						B	120	120	115	115	I S 120	B 120	B 120	A	115	120	115	115	125					
7						E B 145	120	115	115	B	B	B	125	120	115	115	115	115	A					
8						B	120	115	110	115	115	A	A	115	A	115	115	115	125					
9						E B 160	115	115	115	115	115	A	B 125	A	115	120	115	115	125					
10						B	115	115	115	B 135	B 130	B	B	B	B	120	120	115	A					
11						A 140	A 135	115	110	B 125	120	A	120	125	115	115	115	115	B 130					
12						E B 145	130	A	B	115	120	120	125	115	120	115	115	115	B 125					
13						E B 150	120	A 135	115	115	B	B	B	B	B	E B 140	B	110	A					
14						125	125	115	A	115	120	115	120	125	115	115	115	115	A					
15						140	120	115	110	110	115	I C 115	B 125	B 125	A	125	115	A	A					
16						115	120	115	110	110	110	A	A	A	A	A	B	A	A					
17						A	A	A	A	A	A	A	A	A	A	115	115	115	A					
18						A	115	110	110	110	A	115	110	A	B	B	B 135	A	A					
19						135	115	115	110	110	115	115	115	115	115	115	A	A 125	A					
20						120	115	115	110	110	A	A	A	A	A	110	A 120	110	A					
21						C	115	110	110	110	110	115	A	115	110	110	I C 110	110	120					
22						B 135	115	110	I C 110	A	120	B 120	B 120	B 120	110	110	A 120	A	A					
23						B 145	115	110	110	110	115	120	120	120	125	120	115	115	B 125					
24						125	115	110	110	110	115	115	B 130	B 130	110	A	110	A	A					
25						A	110	110	A	A	A	120	A	120	115	110	110	115	120					
26						130	115		110	110	A	A	115	115	115	115	115	115	A					
27						E A 140	110	105	110	110	A	A	A	A	A	A	110	110	120					
28						A	110	110	110	115	A	A	A	A	110	115	115	115						
29						A	120	110	115	115	115	115	B 130	B	B 130	130	115	115	125					
30						135	120	110	115	B	B 115	B	A	120	B 120	120	115	115	125					
31						B	120	110	110	110	B	110	B	B	120	115	115	115	125					
	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						20	30	27	27	25	20	15	18	18	22	26	27	25	13					
MED						132	118	115	110	115	115	115	120	120	115	115	115	115	125					
U Q						E B 145	120	115	115	115	120	120	B 125	B 120	120	120	115	115	B 125					
L Q						132	115	110	110	110	115	115	115	115	115	115	115	115	122					

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

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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

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 115		B	B	B	150	155	130	130	120	110	115	110	115	110	115	115	110	110	105	105	105	110	115
2	110	105	110	105	110	G	120	115	110	115	110	110	110	105	105	105	105	G	120	115	115	115	110	110
3	B	B	B	110	115	155	150	135	120	125	125	125	130	130	125	G	120	120	115	110	110	110	105	105
4	105	105	110	100	105	110	G	140	120	115	120	115	115	115	115	115	120	115	110	110	110	110	110	115
5	B	B	100	110	B	E G 205	G	E G 150	120	115	G	155	150	E G 170	G	G	G	130	115	110	105	105	110	105
6	B	B	105	B	B	145	145	125	120	120	115	115	110	115	E G 170	G	130	120	115	115	115	115	110	105
7	115	115	115	B	B	160	G	G	130	135	B	125	135	155	E G 165	135	125	125	115	115	115	110	105	105
8	115	105	105	B	B	165	150	155	130	115	115	115	120	115	115	E G 190	135	125	115	115	110	110	110	S
9	B 105		S	115	B	G	150	135	125	115	115	115	115	140	125	125	115	115	115	115	115	110	105	S
10	105	105	105	110	105	110	135	125	125	125	120	115	125	B	B	G	G	G	135	B	B	B	B	S
11	125	105	115	110	115	115	145	140	120	115	120	115	125	120	G	150	135	130	115	115	120	110	105	B
12	110	105	105	B	B	G	E G 160	135	125	115	120	125	120	115	130	E G 175	130	120	115	115	110	115	110	110
13	B	B	105	105	105	E G 175	E G 155	135	120	120	130	B	B	B	B	G	B	135	120	125	115	115	110	105
14	110	S	S	B	B	G	130	135	120	115	115	115	115	145	G	G	135	125	120	115	115	110	115	S
15	B	110	105	105	B	135	125	120	115	115	115	C	115	110	115	125	140	120	110	110	125	115	105	110
16	S	105	110	115	105	130	130	115	115	110	110	110	105	105	115	105	110	105	115	110	110	105	110	120
17	105	110	105	100	100	105	105	105	105	105	105	105	105	115	110	125	110	110	105	105	125	110	115	105
18	105	105	105	100	105	105	125	125	115	115	110	115	G	115	B	B	125	105	110	110	110	110	110	105
19	105	110	110	105	105	G	140	120	115	120	110	105	110	110	110	105	110	130	150	110	105	100	100	100
20	100	95	95	105	105	G	140	115	110	110	105	115	120	110	110	G	135	120	115	120	115	120	115	105
21	120	105	105	100	105	C	120	110	110	115	115	115	120	110	G	125	C	115	115	115	110	105	105	110
22	110	110	100	105	115	135	115	130	C	110	110	110	105	105	110	120	110	115	110	110	110	100	100	95
23	95	100	100	105	110	150	130	130	125	120	130	140	145	125	130	120	125	115	115	115	110	105	110	110
24	110	110	110	110	110	130	130	120	110	110	110	110	115	110	110	125	115	110	120	B	110	110	110	110
25	105	105	100	105	100	115	105	105	100	105	105	105	130	125	120	115	115	115	115	115	120	110	110	110
26	105	105	105	105	110	130	130	115	105	110	110	110	130	130	125	120	115	110	110	110	110	110	105	105
27	105	105	105	105	105	110	115	105	110	110	110	110	110	105	100	95	120	115	110	110	110	110	110	115
28	105	105	100	110	105	115	110	120	110	110	115	110	110	100	G	140	120	115	110	110	110	120	110	110
29	105	110	100	100	100	105	E G 155	130	110	115	120	130	140	B	130	125	115	115	110	110	110	110	110	115
30	105	150	105	110	125	130	120	115	115	110	105	110	E G 175	140	G	160	E G 185	160	120	120	110	110	110	105
31	110	110	105	110	110	145	140	120	115	115	115	120	110	125	120	120	G	130	125	B	B	B	130	115
	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	26	27	25	22	24	28	30	30	31	29	29	29	28	22	23	26	29	31	28	29	29	30	26
MED	105	105	105	105	105	130	130	124	115	115	115	115	115	115	115	122	120	115	115	112	110	110	110	110
U Q	110	110	110	110	110	150	148	135	120	120	120	118	130	128	125	135	130	125	120	115	115	112	110	110
L Q	105	105	100	105	105	112	120	115	110	110	110	110	110	110	110	115	115	115	110	110	110	108	105	105

IONOSPHERIC DATA STATION KOKUBUNJI

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

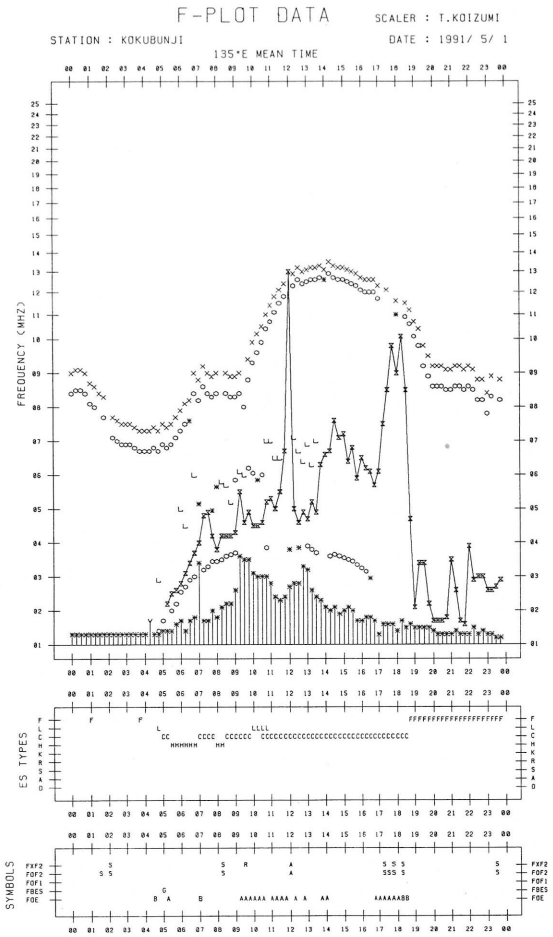
LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

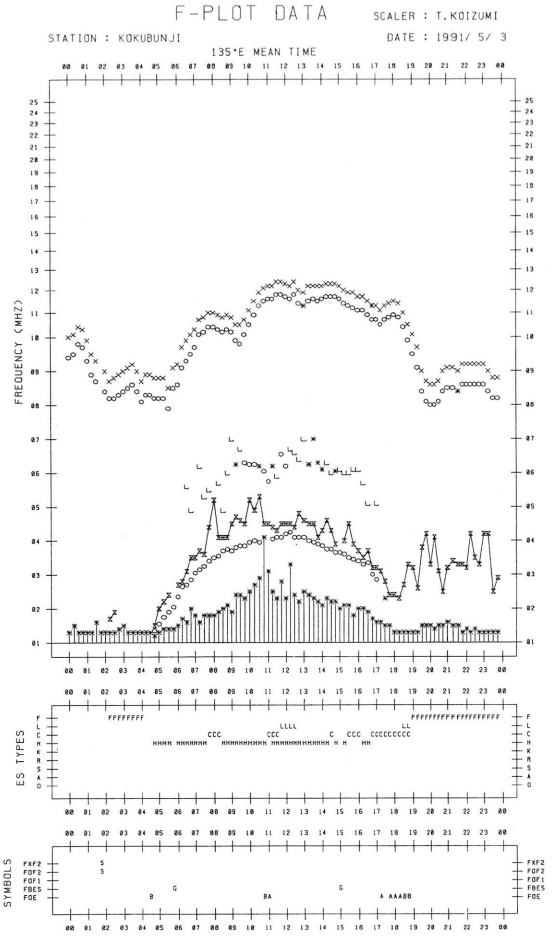
HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		F 1				C 1	H 1	C 1	H 2	C 2	L 2	C 2	C 3	C 2	C 2	C 3	C 4	C 4	C 4	F 4	F 3	F 4	F 5	FF 14
2	F 5	F 3	F 2	F 3	FF 32		C 2	C 2	C 3	C 2	C 3	C 3	C 3	L 2	C 3	C 3	L 3		L 3	F 5	F 5	F 2	F 2	F 4
3				F 2	F 1	H 1	H 1	H 1	C 3	H 1	H 1	C 1	HL 11	H 2	H 1		C 2	C 1	C 2	F 4	F 3	F 4	F 4	F 4
4	F 5	F 4	F 2	F 3	F 2	L 1		H 1	C 2	C 2	C 1	L 2	L 3	C 3	C 2	C 2	C 2	C 4	C 5	F 5	F 4	F 4	F 4	F 2
5			F 2	F 3		H 1		H 1	C 1	C 1		H 1	H 1	H 1				H 2	C 4	F 4	F 5	F 2	FF 13	F 2
6			F 1			H 3	H 1	C 2	C 2	CL 21	C 1	C 1	C 2	C 1	H 1		H 2	C 5	C 4	F 4	F 2	F 2	F 3	F 5
7	F 1	F 1	F 1			H 1			H 2	H 1		C 1	H 1	H 1	H 1	H 1	H 3	C 2	C 2	F 4	F 3	F 3	F 4	F 2
8	FF 13	F 1	F 1			H 1	H 1	H 1	H 2	C 1	C 1	L 1	L 1	L 1	L 1	H 1	H 2	H 2	C 4	F 2	F 4	F 2	F 4	
9		F 2		F 2			H 1	H 1	C 1	C 2	C 2	C 1	L 1	HL 11	H 2	H 2	C 2	C 4	C 5	F 3	F 5	F 3	F 4	
10	F 2	F 3	F 3	F 2	F 4	L 2	H 2	H 2	H 2	C 1	C 1	C 1	C 1						C 1					
11	F 2	F 2	F 1	F 1	F 1	L 1	HL 11	H 2	C 1	C 2	C 1	C 1	C 1	C 1		H 1	H 2	H 3	C 4	F 5	FF 14	F 3	F 3	
12	F 3	F 2	F 1				H 1	HL 11	C 1	C 2	C 1	C 1	C 2	C 1	H 1	H 1	H 2	C 3	C 4	F 6	F 2	F 4	F 3	F 2
13			F 2	F 2	F 2	H 1	H 1	HL 22	C 1	C 2	C 1							HL 31	CL 32	FF 22	FF 31	F 2	F 4	F 2
14	F 2						H 2	H 1	C 2	C 2	C 2	C 2	C 2	H 1			H 2	H 3	C 3	F 6	F 3	F 4	F 1	
15		F 2	F 4	F 3		C 2	C 2	C 3	C 3	C 2	C 2		C 2	C 2	C 2	C 1	H 2	CL 32	CL 41	F 5	FF 22	F 3	F 3	F 4
16		F 4	FF 24	FF 12	F 1	H 1	H 2	C 4	C 2	C 2	C 2	C 2	L 2	L 2	L 1	L 2	L 1	L 2	CL 43	FF 62	F 4	F 5	F 4	FF 22
17	F 4	F 1	F 1	F 2	F 5	L 2	L 3	L 3	L 3	L 3	L 2	L 2	L 2	L 1	C 2	C 1	C 3	C 3	C 4	F 5	FF 22	F 1	F 2	F 6
18	F 4	F 5	F 3	F 4	F 4	L 2	C 3	C 2	C 3	C 2	C 2	C 1		CH 11			H 1	CL 32	CL 32	FF 33	FF 33	FF 31	F 2	F 4
19	F 4	F 1	F 3	F 3	F 5		H 1	C 3	C 4	C 2	C 2	C 3	C 2	C 2	C 2	C 3	L 2	HL 22	HL 12	F 2	F 1	F 3	F 4	F 4
20	F 2	F 4	F 3	F 1	F 1		H 1	C 4	C 4	C 3	C 3	CL 22	CL 12	L 1	L 2		HL 11	C 2	C 2	FF 23	FF 13	FF 14	FF 24	F 4
21	FF 13	F 4	F 3	F 3	F 3		C 3	C 3	C 3	C 1	C 1	C 1	C 1	C 2		H 1		C 4	C 3	F 4	F 3	F 4	F 4	F 3
22	F 4	F 2	F 2	FF 11	F 1	C 1	C 3	C 1		C 2	C 2	C 2	C 3	C 3	C 1	C 1	L 1	CL 22	CL 22	FF 23	FF 23	F 4	F 4	F 5
23	F 3	F 3	F 2	F 3	F 2	H 1	H 2	H 2	H 2	C 2	H 1	H 1	H 1	H 2	H 1	CL 21	C 2	C 2	C 2	F 4	F 5	F 5	F 5	F 4
24	F 4	F 3	F 2	F 3	F 4	C 1	H 1	C 2	C 3	C 2	C 3	C 2	C 2	C 3	C 2	CC 12	C 2	C 2	L 1		F 2	F 3	F 5	F 4
25	F 4	F 4	F 4	F 5	F 1	C 3	C 4	C 3	C 3	L 3	L 3	C 3	HC 11	C 2	C 2	C 2	C 3	C 4	C 5	F 3	F 1	F 2	F 4	F 4
26	F 4	F 5	F 4	F 3	F 1	C 1	H 1	C 1	C 3	C 2	C 2	C 2	H 2	H 2	H 2	C 3	C 3	C 4	C 4	F 3	F 3	F 2	F 5	F 4
27	F 6	F 4	F 4	F 2	F 2	L 1	C 3	C 4	C 3	C 3	C 2	C 2	C 2	C 2	L 3	L 3	H 3	C 5	C 5	F 3	F 5	F 2	F 3	F 2
28	F 2	F 2	F 2	F 1	F 4	L 2	C 2	C 2	C 2	C 2	C 1	C 1	C 1	L 2		H 1	C 3	C 3	C 3	C 4	F 2	FF 22	F 1	F 1
29	F 2	FF 12	F 3	F 3	F 1	L 1	H 1	H 2	C 3	C 2	C 1	H 1	H 1		H 2	H 2	C 3	C 4	C 4	F 4	F 2	F 3	F 2	F 1
30	F 4	FF 11	F 2	F 1	F 2	C 2	C 2	C 3	C 2	C 1	C 2	C 2	HL 11	H 1		H 1	H 1	H 1	C 3	F 3	F 3	F 2	F 2	F 4
31	F 3	F 4	F 4	FF 24	F 2	H 1	H 1	C 2	C 3	C 2	C 2	C 2	C 2	C 2	C 2	C 2		H 2	C 1				F 2	F 1
	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																								

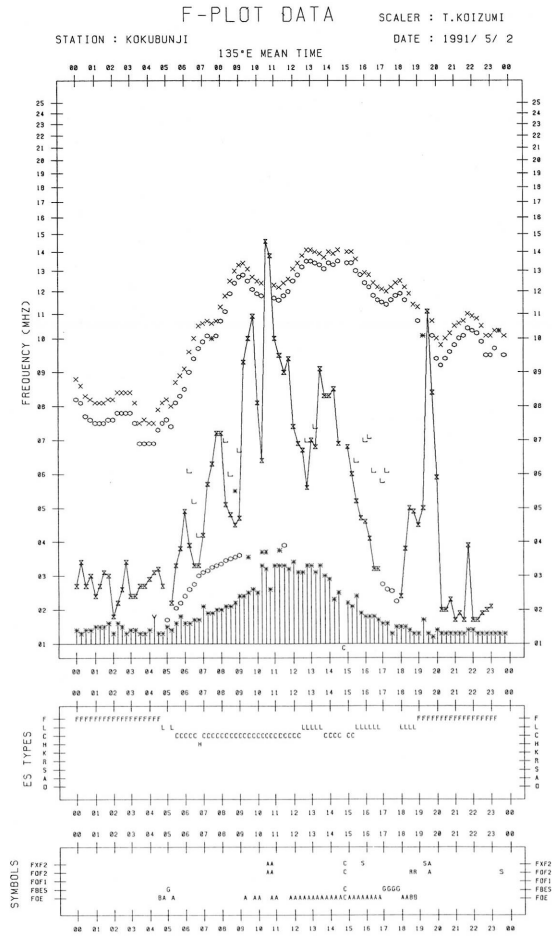
MAY 1991 TYPES OF ES COMMUNICATIONS RESEARCH LABORATORY, JAPAN

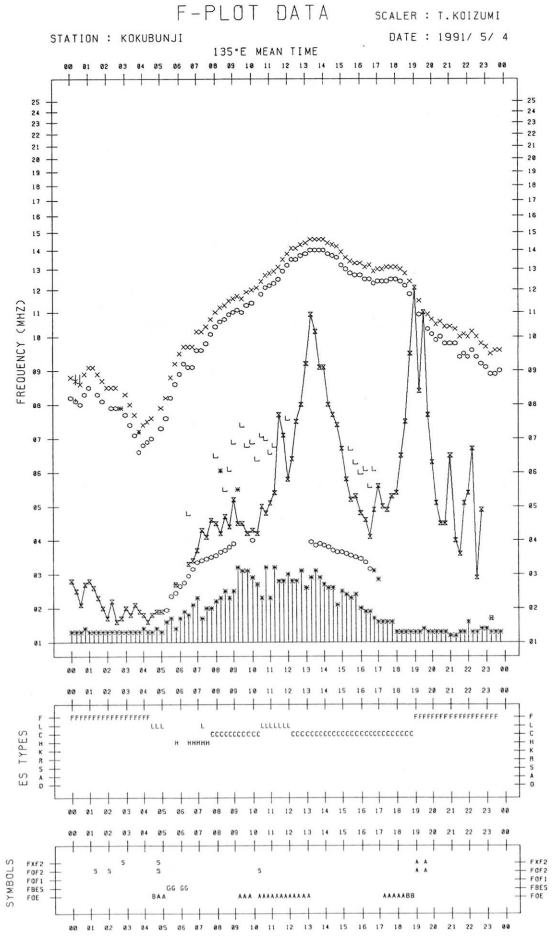
f-PLOTS OF IONOSPHERIC DATA

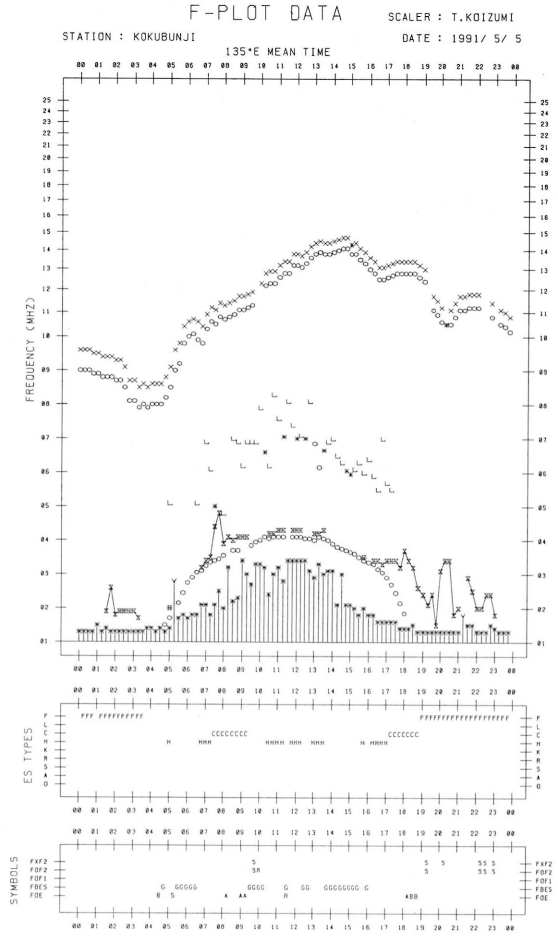
KEY OF F-PLOT	
I	SPREAD
○	FOF2, FOF1, FOE
×	FXF2
✳	DOUBTFUL FOF2, FOF1, FOE
⧖	FBES
⌊	ESTIMATED FOF1
↑, Y	FMIN
∧	GREATER THAN
∨	LESS THAN


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


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


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


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


F-PLOT DATA
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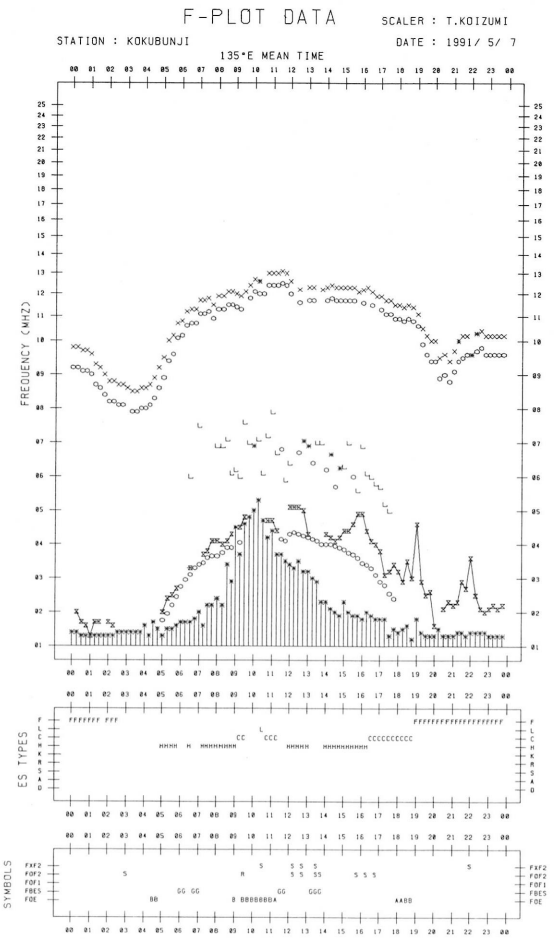
STATION : KOKUBUNJI
DATE : 1991/ 5/ 5
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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STATION : KOKUBUNJI
DATE : 1991/ 5/ 7
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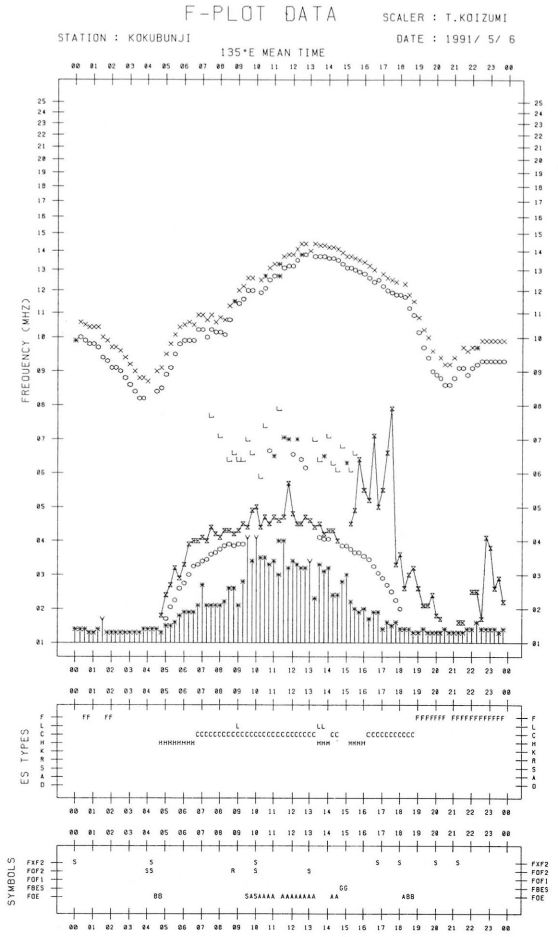
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
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STATION : KOKUBUNJI
DATE : 1991/ 5/ 6
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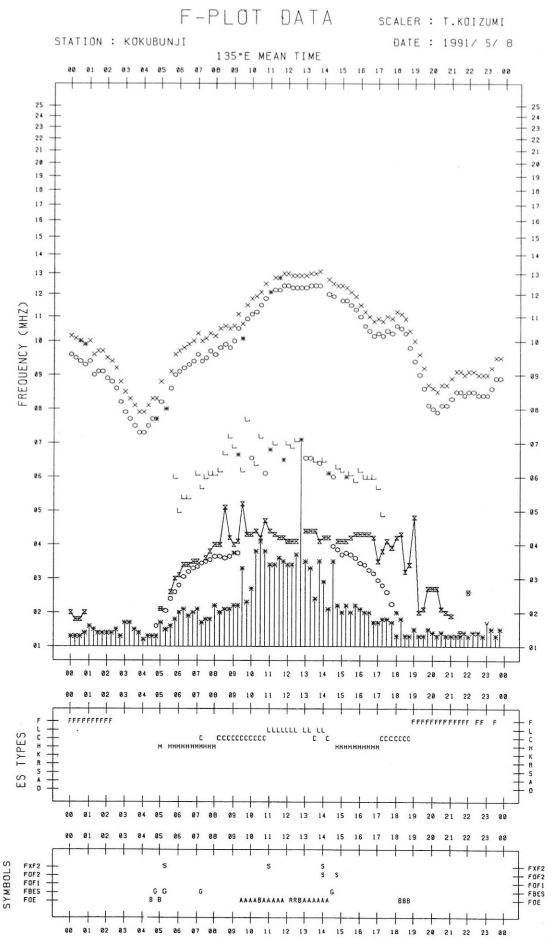
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
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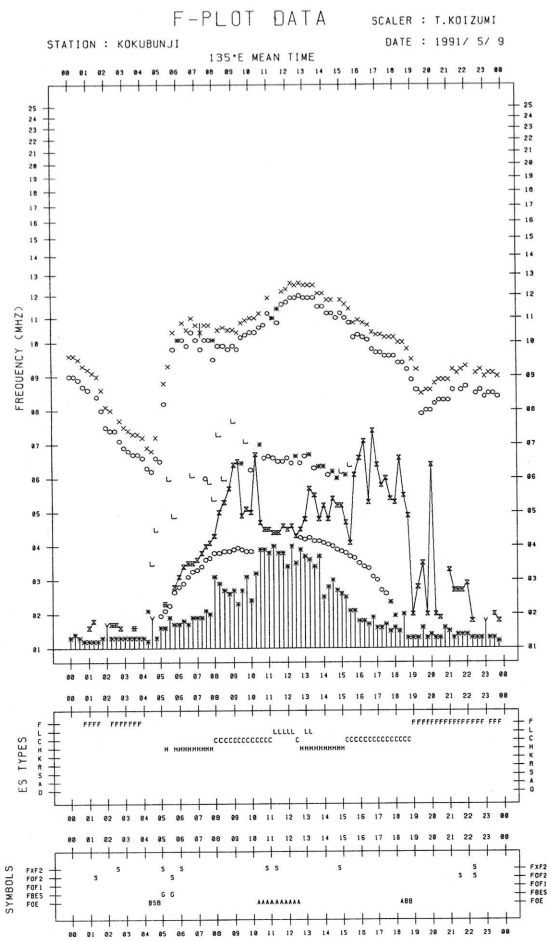
STATION : KOKUBUNJI
DATE : 1991/ 5/ 8
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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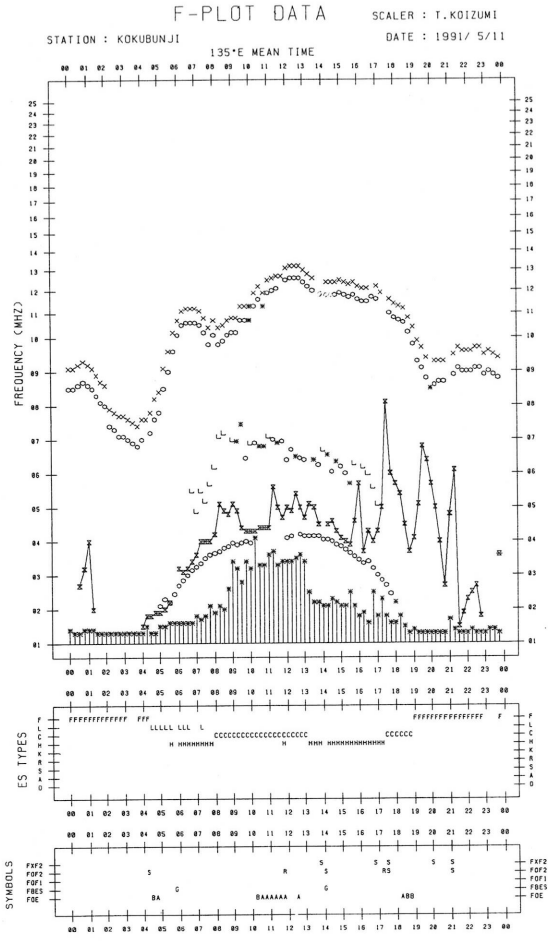
STATION : KOKUBUNJI
DATE : 1991/ 5/ 9
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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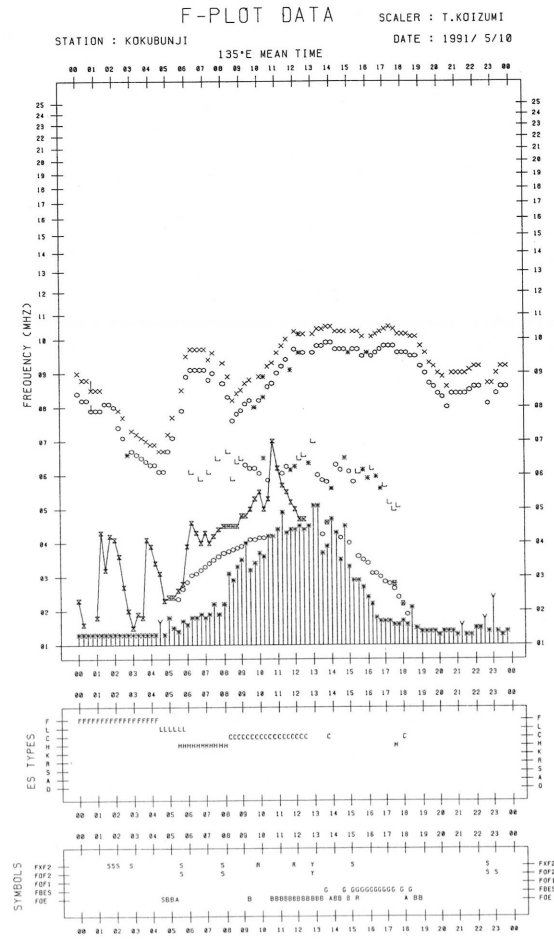
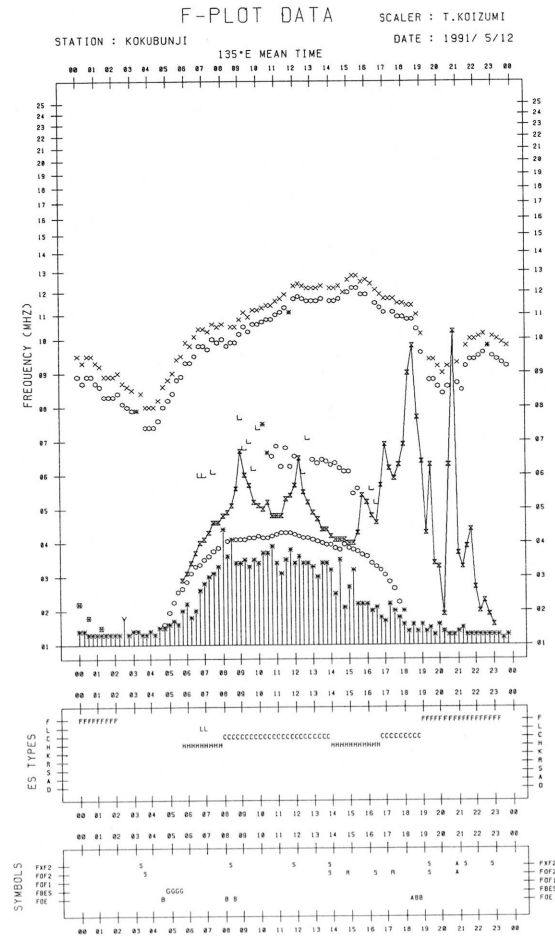
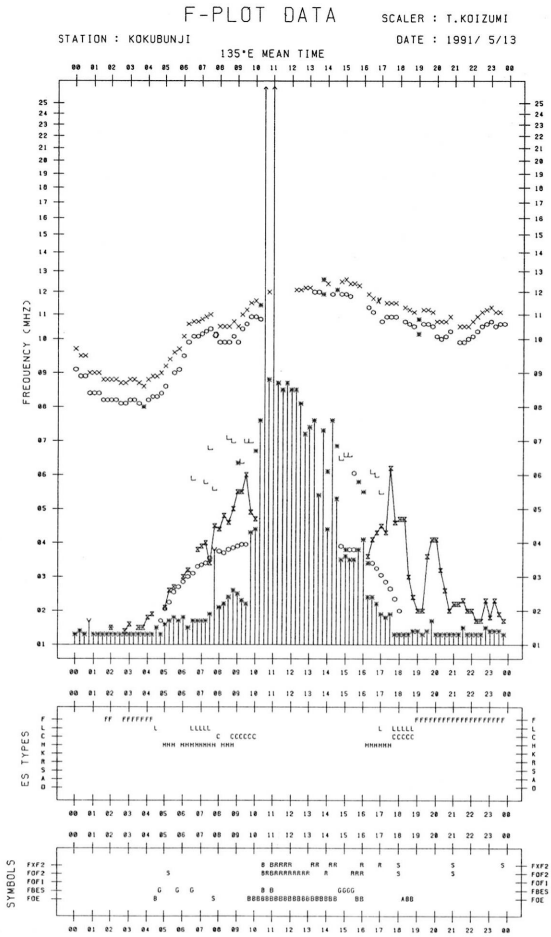
STATION : KOKUBUNJI
DATE : 1991/ 5/11
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/10
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/12
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
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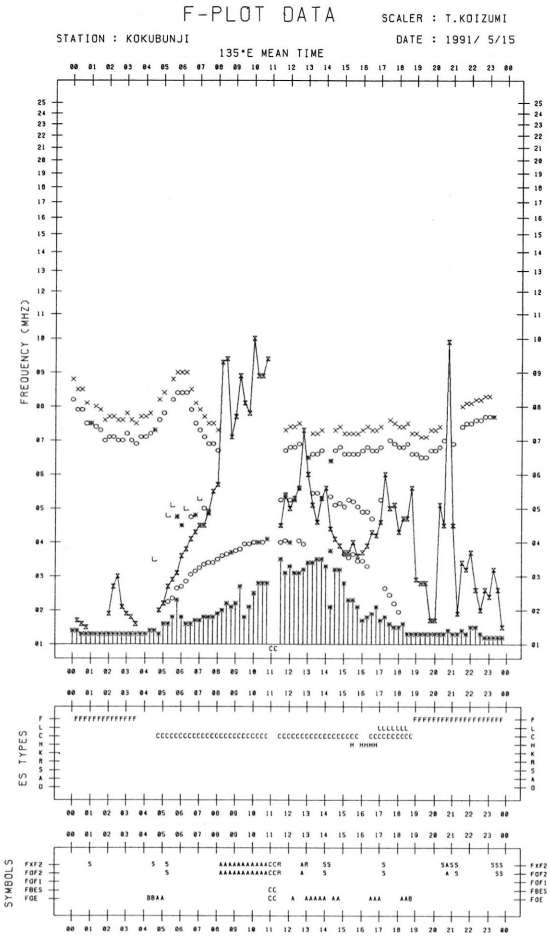
STATION : KOKUBUNJI
DATE : 1991/ 5/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
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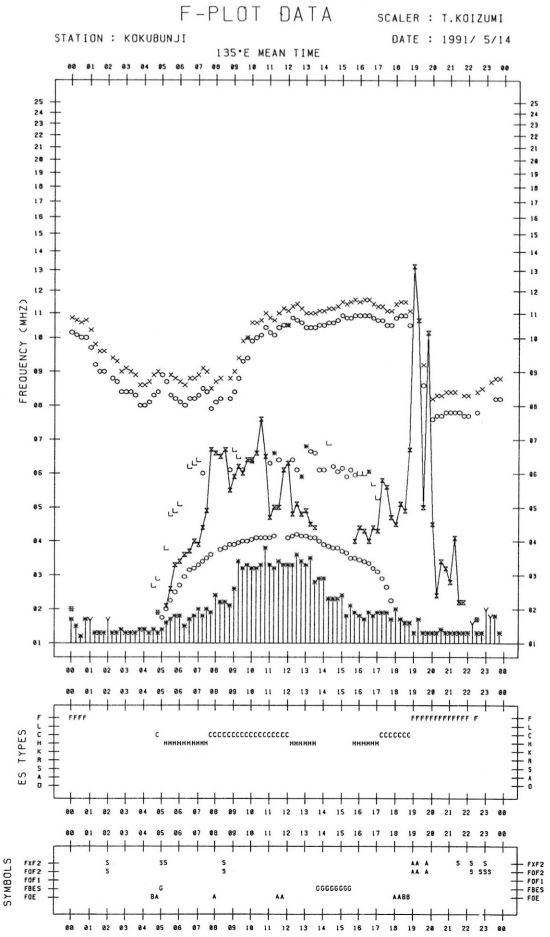
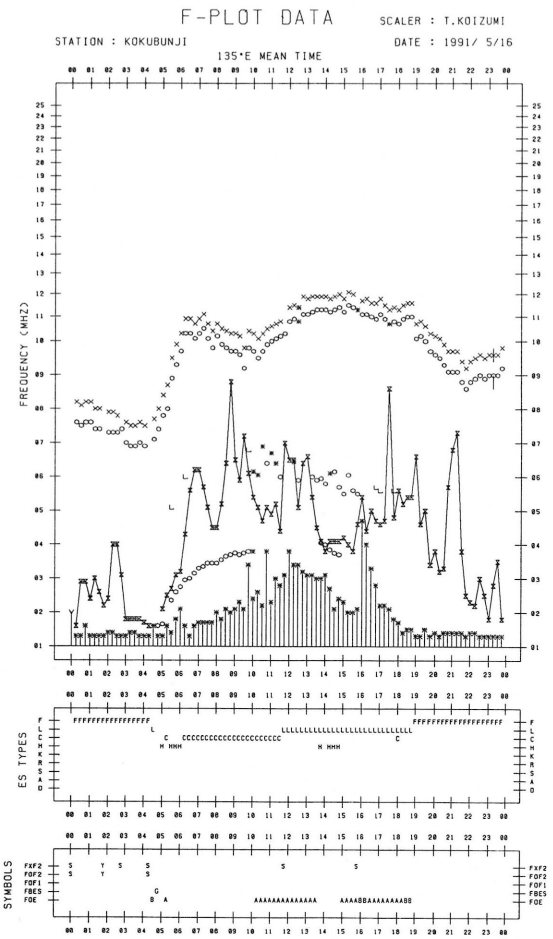
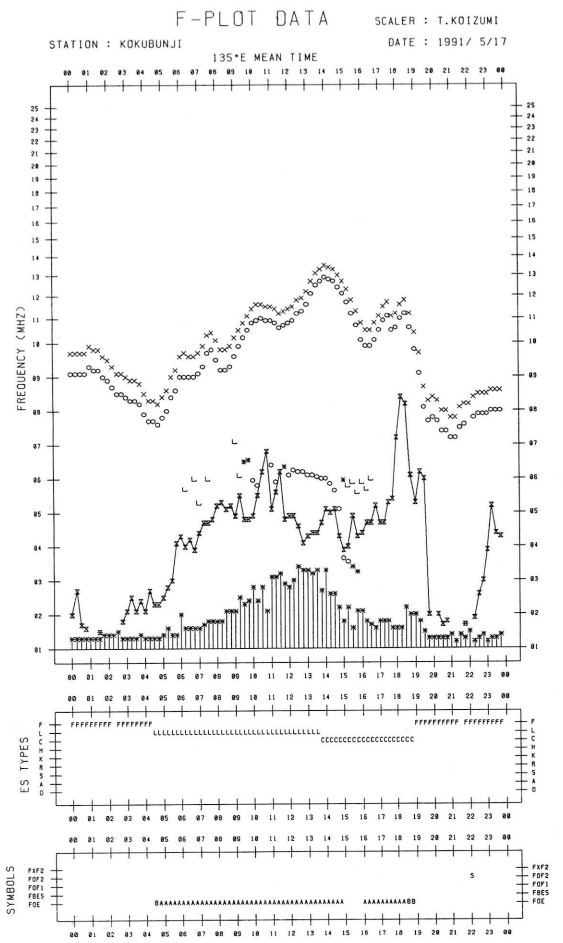
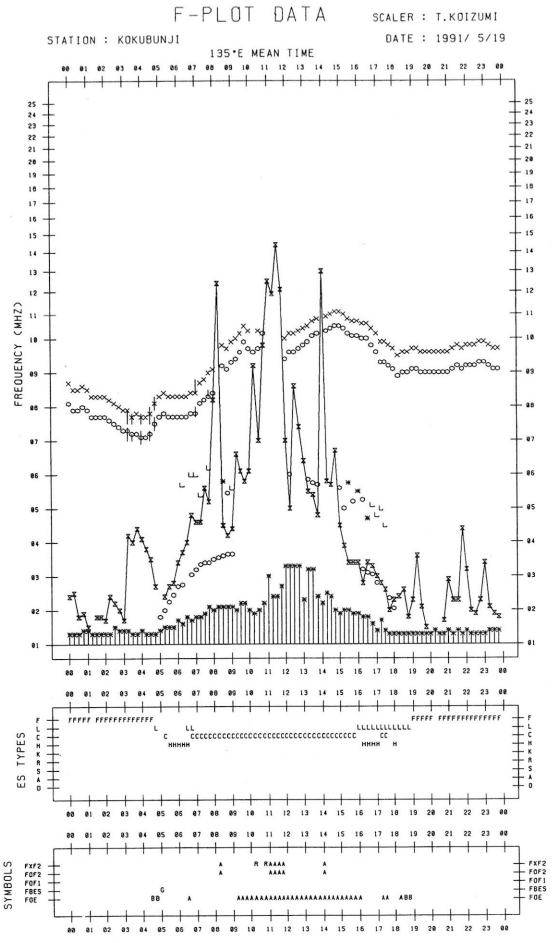
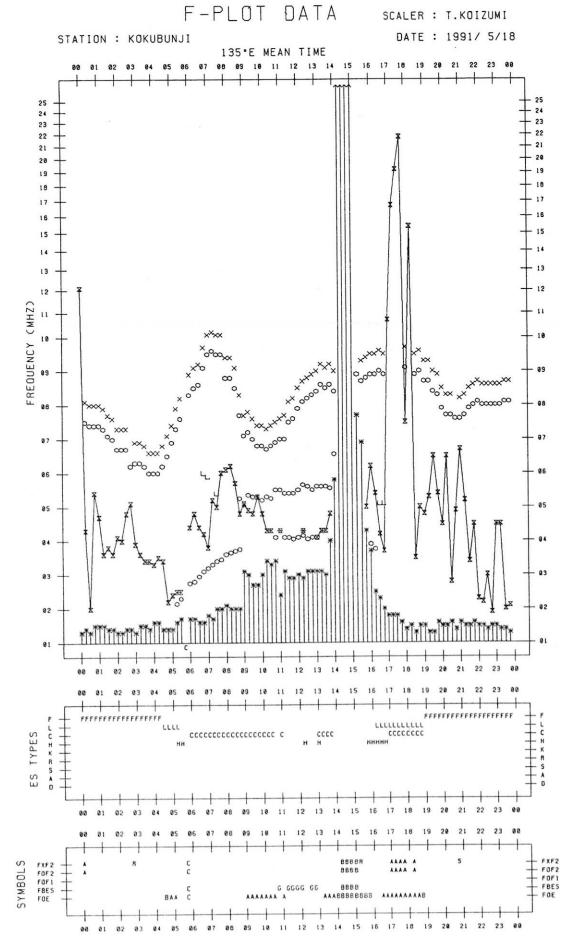
STATION : KOKUBUNJI
DATE : 1991/ 5/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

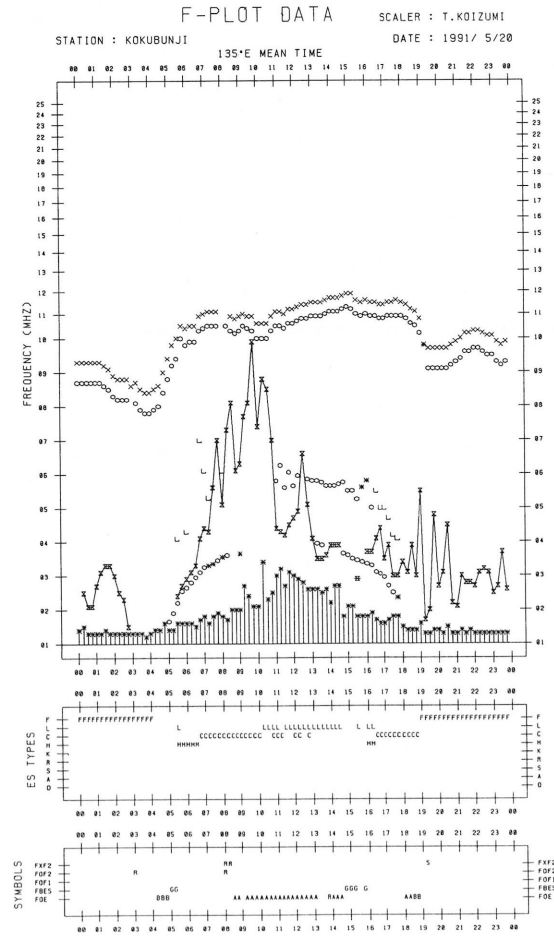

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

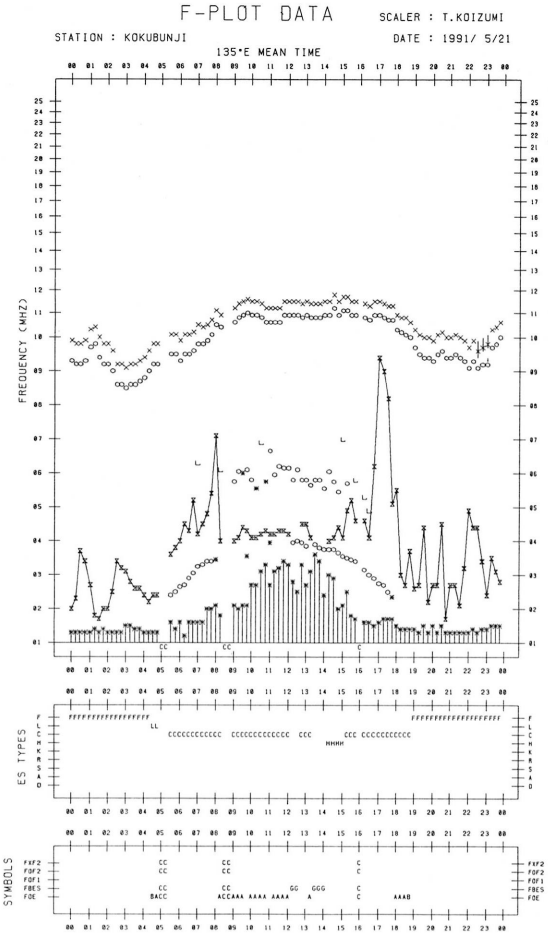

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

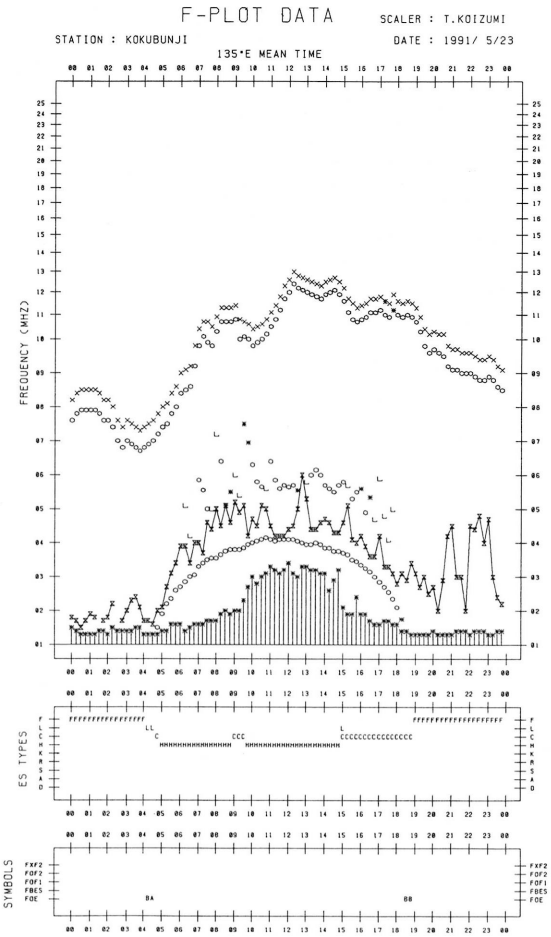

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

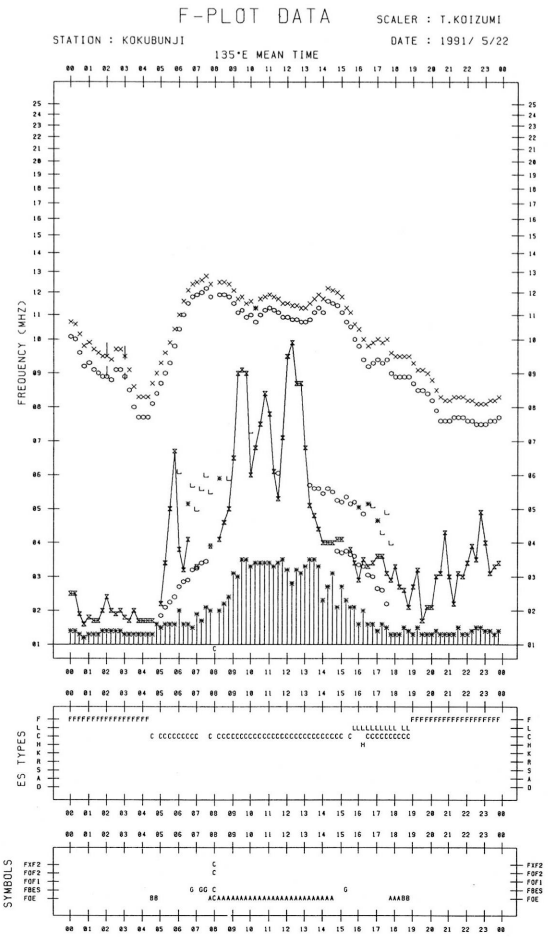

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

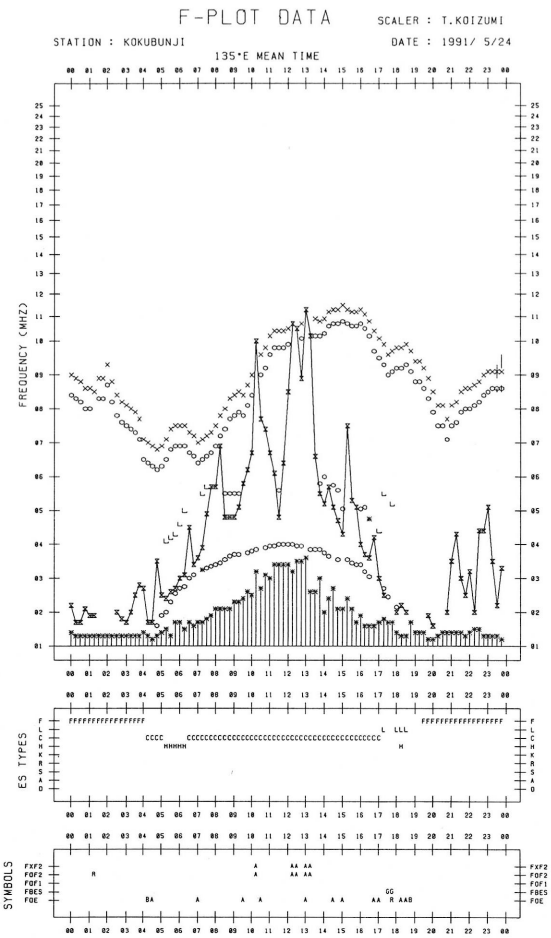

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

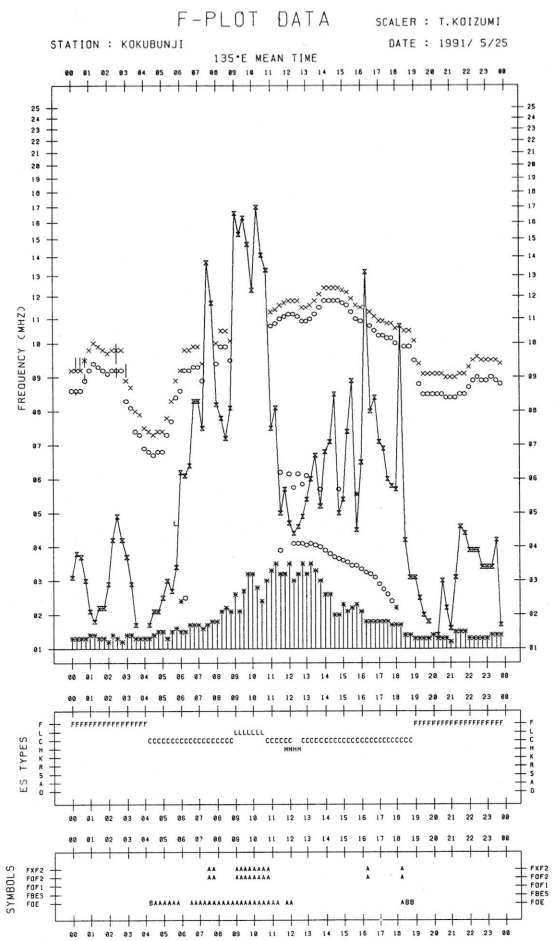

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

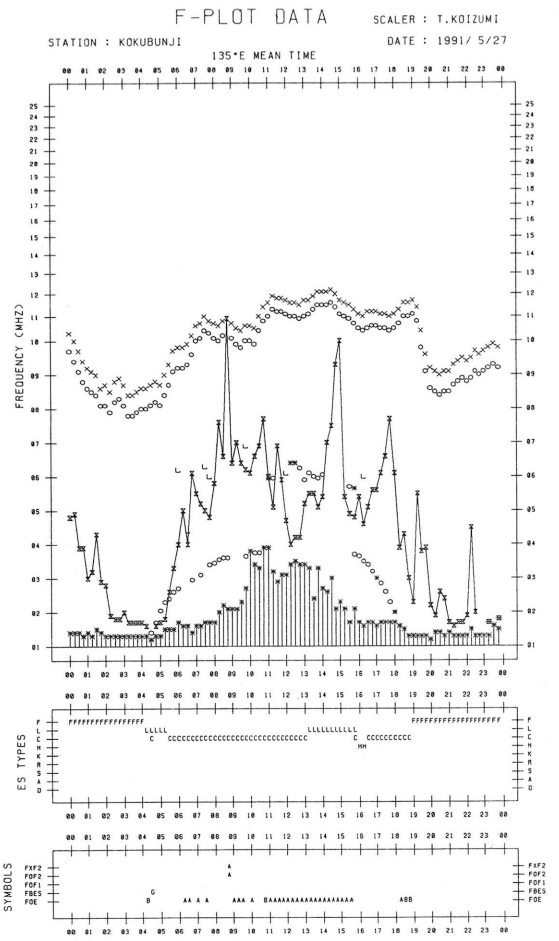

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/21
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

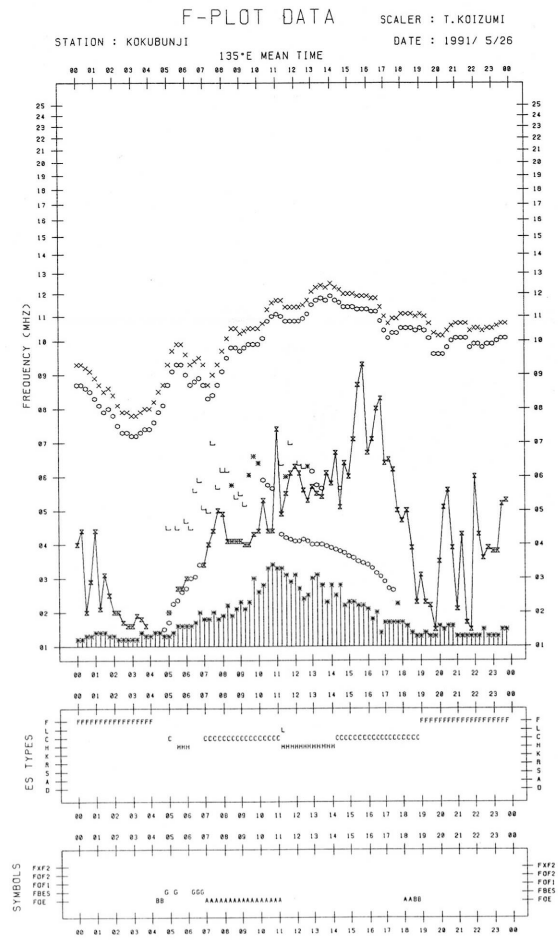

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/23
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

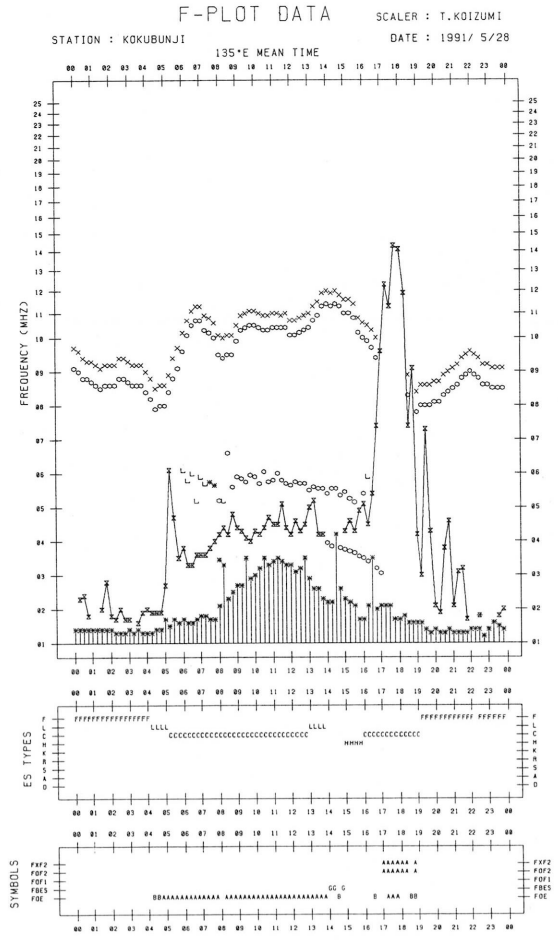

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/22
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

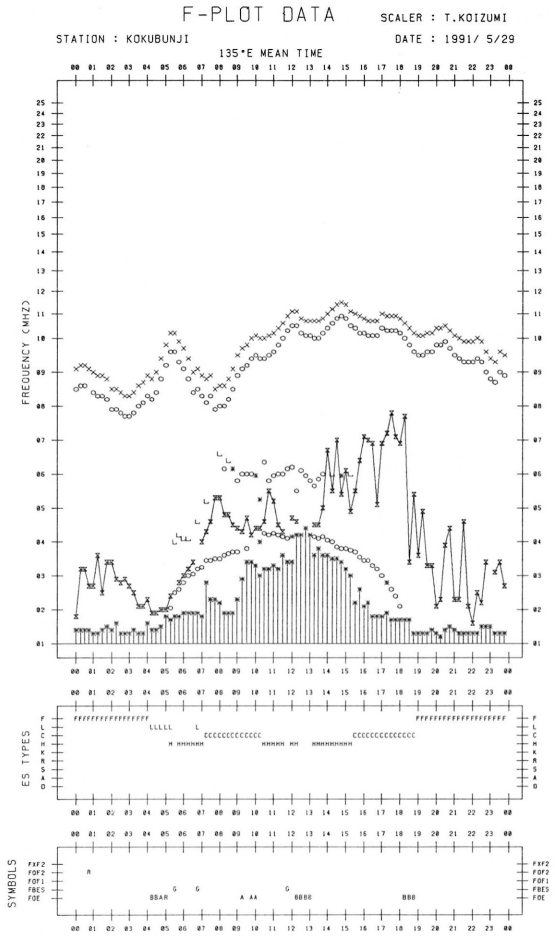

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/24
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

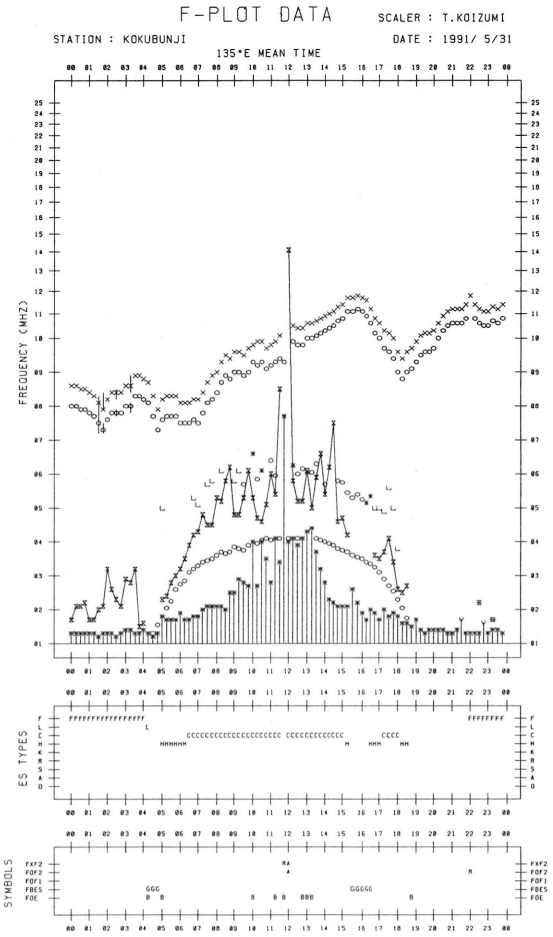

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/25
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

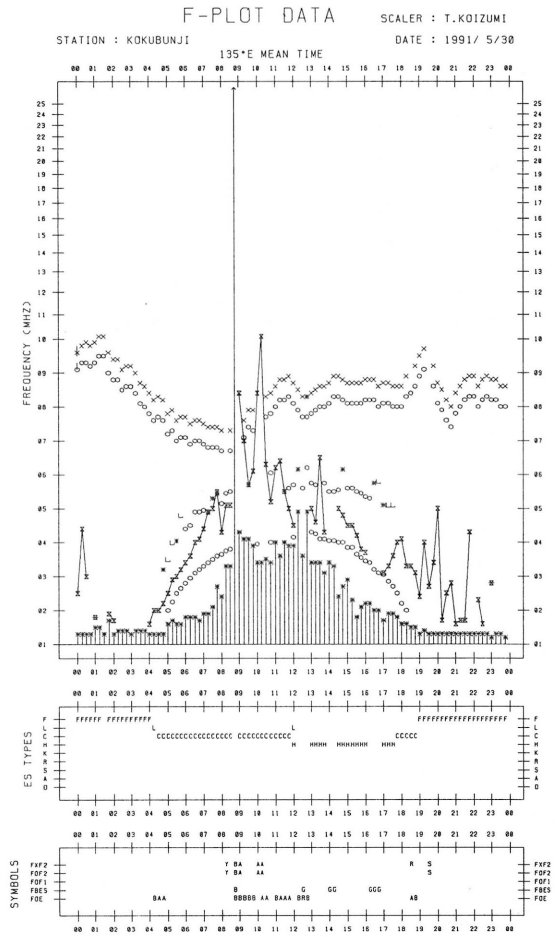

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/27
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/26
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/28
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/29
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/31
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 5/30
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 May 1991

Single-frequency total flux observations at 200 MHz

	Flux density: 10^{-22}Wm^{-2}Hz^{-1}					Variability: 0 to 3				
UT Date	00-03	03-06	06-09	21-24	Day	00-03	03-06	06-09	21-24	Day
1	12	12	12	12	12	0	0	0	0	0
2	11	11	11	11	11	0	0	0	0	0
3	11	11	11	12	11	0	0	0	0	0
4	12	11	11	11	12	0	0	0	0	0
5	11	11	11	12	11	0	0	0	0	0
6	12	13	B	13	B	0	0	1	0	0
7	B	14	13	14	15	2	0	*	*	1
8	14	*	*	B	14	0	*	*	1	*
9	B	B	B	B	B	1	1	2	2	2
10	B	B	B	B	B	3	3	2	1	3
11	B	B	B	B	B	1	2	3	3	2
12	B	25	21	B	B	2	1	1	1	2
13	B	B	B	14	B	2	2	1	0	2
14	14	14	14	*	14	0	0	0	*	0
15	*	*	*	B	*	*	*	*	1	*
16	13	12	B	12	B	0	0	0	0	0
17	12	12	12	12	12	0	0	0	0	0
18	12	19	15	14	14	0	1	*	*	0
19	16	12	*	14	14	*	*	*	0	*
20	14	14	13	17	14	0	0	0	0	0
21	24	23	18	14	20	1	1	0	0	1
22	*	*	*	14	14	*	*	*	0	*
23	14	15	*	13	14	0	0	*	0	0
24	13	12	13	14	13	0	0	0	0	0
25	*	*	*	13	14	*	*	*	0	*
26	*	*	13	14	13	*	*	*	1	*
27	*	*	*	B	14	*	*	*	1	*
28	B	B	B	B	B	1	1	2	2	1
29	B	B	B	B	B	3	2	3	1	3
30	*	*	*	B	B	*	*	*	2	*
31	B	B	B	20	B	2	2	2	0	2

B. Solar Radio Emission

B1. Daily Data at Hiraiso

500 MHz

Hiraiso May 1991

Single-frequency total flux observations at 500 MHz

Flux density: 10^{-22}Wm^{-2}Hz^{-1}

UT Date	00-03	03-06	06-09	21-24	Day
1	51	51	51	-	51
2	51	51	50	51	51
3	51	51	51	-	51
4	53	53	52	52	53
5	54	55	54	62	54
6	61	65	67	-	63
7	66	62	60	60	63
8	61	62	62	61	61
9	63	63	B	-	B
10	B	B	-	65	B
11	64	68	67	-	66
12	B	B	B	61	B
13	62	B	58	-	B
14	58	58	56	56	57
15	57	56	B	55	B
16	53	52	B	54	B
17	55	54	57	-	55
18	58	B	54	51	B
19	*	*	49	48	50
20	49	49	49	-	49
21	52	53	52	51	52
22	51	51	52	-	51
23	50	51	49	49	50
24	49	48	48	49	49
25	50	49	48	51	49
26	53	54	54	55	53
27	53	55	53	57	54
28	56	59	60	56	58
29	55	56	56	66	56
30	68	61	60	59	64
31	60	69	61	60	63

Note: No observations during the following periods.

1st 2025 - 2354
3rd 2025 - 2359
6th 2028 - 2348
9th 2028 - 2348
10th 0600 - 0810
11th 2028 - 12th 0020
13th 2028 - 2351
17th 2028 - 2352
20th 2028 - 21st 0005
22nd 2028 - 2345

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso May 1991

Single-frequency observations

Normal observing period: 2010 - 0920 U.T. (sunrise to sunset)

MAY 1991	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) PEAK	MEAN	POLARIZATION REMARKS
2	500	6 S	0212.0	0212.2	1.0	54	8	0
4	500	45 C	0620.1	0621.0	6.0	5	2	0
5	500	42 SER	0713.4	0714.0	3.5	250	-	WL
	500	46 C	2028.0U	2031.0	6.0	90U	15U	WL,SUNRISE
6	200	46 C	0430.0	0433.3	4.6	11	6	WR
	500	46 C	0430.0	0435.1	11.0	1600	100	MR
	200	27 RF	0453	0641	275D	45	30	WR
	500	27 RF	0504	0531	148	20	8	WR
7	500	46 C	0000.3	0000.7	1.0	60	10	0
	500	27 RF	0016.7	0047.1	61	10	5	WL
	500	46 C	0026.5	0027.4	4.5	1500	150	WR
	200	43 NS	0040	0103	160	30	23	WL
	500	42 SER	2032.4	2034.8	3.0	250	-	WL
	500	42 SER	2153.4	2156.0	3.7	70	-	WR
	500	46 C	2237.1	2237.8	2.0	20	8	0
8	500	42 SER	0051.4	0055.4	7.5	17	-	WR
	200	46 C	0137.3	0138.0	3.0	800	200	MR
	100	46 C	0137.3	0139.0	4.0	1000D	400	ML
	500	42 SER	0137.6	0138.0	6.5	210	-	WR
	200	44 NS	2030E	0818	750D	400	50	MR
9	500	46 C	0200.3	0201.7	2.0	110	15	0
	500	46 C	0551.0	0558.1	9.5	550	100	SR
	500	42 SER	0603.3	0607.8	8.0	52	-	MR
	500	20 GRF	0614	0658	143	40	10	WR
	500	42 SER	0656.3	0657.0	6.5	70	-	WR
	500	42 SER	0809.7	0810.6	5.7	55	-	MR
	200	44 NS	2030E	0330	750D	900	150	SR
10	500	20 GRF	0124.5	0407.5	275D	470	50	SR
	200	44 NS	2030E	0503	750D	100	30	WR
11	200	44 NS	2030E	2233	270D	600	150	WR
12	500	20 GRF	0041	0209.5	229	30	10	MR
	500	20 GRF	0652	0751.7	104	120	15	MR
	200	44 NS	2030E	0343	750D	30	10	ML
	500	42 SER	2103	2104.2	13	40	-	0
13	500	42 SER	0020.0	0022.2	3.0	100	-	WR
	200	46 C	0119.8	0121.7	15	300	50	WL
	100	42 SER	0120.9	0122.4	27	1000D	-	ML
	500	6 S	0121.5	0122.0	1.5	13	6	0
	500	45 C	0129.6	0132.0	3.0	11	4	0
	500	27 RF	0243.4	0349.5	163	90	25	WR
14	500	8 S	0043.5	0043.6	0.2	40	-	0
	100	46 C	0450.6	0451.6	1.3	1000D	-	SL
	500	8 S	0451.0	0451.4	0.5	85	-	WL
	200	8 S	0451.1	0451.1	0.6	350	-	WL
	200	8 S	2221.9	2221.9	0.2	230	-	0

MAY 1991	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY ($10^{-22}Wm^{-2}Hz^{-1}$) PEAK	MEAN	POLARIZATION REMARKS
14	500	8 S	2222.0	2222.3	0.6	45	-	WL
	500	42 SER	2325.1	2327.8	2.8	30	-	WL
	200	42 SER	2325.3	2327.1	2.6	1000	-	0
15	500	27 RF	0115	0133	66	5	3	0
	500	8 S	0214.3	0214.9	0.7	16	-	0
	200	46 C	0214.5	0214.5	2.3	35	5	WL
	100	8 S	0214.5	0214.6	0.6	1000D	-	ML
	500	27 RF	0612.2	0703	110	30	15	0
	200	43 NS	2113	2215	170	20	6	0
	200	42 SER	2256.3	2256.8	13	18000	-	WL
	500	42 SER	2257.0	2257.1	3.2	200	-	WL
16	500	46 C	0643.0	0653.6	103	830	50	WL
	200	46 C	0648.0	0706.8	136D	450	50	WR,SUNSET
	100	46 C	0701.0	0711.5	140D	850	250	ML
17	200	45 C	2329.3	2344.0	50	30	8	MR
18	500	46 C	0454.7	0515.9	73	370	50	WL
	200	46 C	0504.1	0514.1	33	200	50	0
20	100	46 C	2313.8	2315.3	8	300	50	WR
	200	46 C	2314.0	2315.3	8.6	65	40	WR
22	200	42 SER	0016.0	0022.0	7.0	140	-	-
	500	46 C	0016.0	0028.0	13.5	5	2	WR
24	500	6 S	0307.5	0308.4	1.5	17	8	WR
	500	42 SER	2201.9	2204.3	3.2	17	-	WR
25	200	46 C	0354.8	0356.0	1.4	150	40	-
	100	46 C	0355.4	0355.6	2.0	330	180	WL
	200	42 SER	2240.0	2242.9	5.3	40	-	MR
	200	46 C	2304.0	2307.8	4.0	300	30	0
	500	27 RF	2352	0009.0	75	10	4	WR
26	500	8 S	0851.0	0851.5	0.5	2000	-	0
	500	27 RF	2157.7	2222.5	102	12	6	WR
	200	43 NS	2205	2254	97	100	40	MR
27	200	44 NS	2020E	0727	780D	30	10	MR
28	500	46 C	0117.7	0118.6	2.5	150	20	0
	200	46 C	0118.0	0119.2	1.3	300	50	WL
	500	46 C	0304.5	0305.0	2.0	80	30	WL
	500	42 SER	0530.0	0530.2	3.2	1700	-	WL
	500	42 SER	0658	0701.7	4.5	120	-	0
	500	42 SER	0719.1	0727.5	9.5	180	-	WL
	500	46 C	0751.0	0751.0	1.6	1500	140	WL
	200	44 NS	2020E	0743	780D	300	40	SR
	500	42 SER	2134.5	2135.1	2.0	200	-	WL
29	500	46 C	0037.8	0038.1	1.5	40	20	ML
	500	42 SER	0258.3	0258.5	3.5	140	-	0
	500	46 C	0454.2	0454.3	2.0	140	15	WL
	200	44 NS	2020E	2246	780D	70	20	SR
	500	27 RF	2204	2238	57	23	12	WR
	100	46 C	2340.6	-	4.6	1000D	-	WR
	500	46 C	2340.6	2344.1	8.5	340	40	MR
	200	46 C	2341.0	2342.5	21	15000	130	WR
30	500	27 RF	0052.5	0124	50	30	5	WR
	200	44 NS	20203	2312	780D	100	30	MR
31	500	46 C	0242.0	0242.0	7.0	350	30	WR
	500	45 C	0400.0	0410.5	13	1000	100	MR
	500	46 C	0503.0	0508.3	34	450	60	WL
	200	46 C	0505.3	0514.2	60	700	100	WL
	100	46 C	0507.6	0518.3	96	1000D	-	-

C. RADIO PROPAGATION

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

MAY 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 -23	ES -23	ES -23	4	5	16	8	ES -23	ES -23	-6	-8	3	6	12	11	13	-1	-8	ES -23	ES -23	-10	ES -23	ES -23	ES -23
2	-8	-3	ES -22	-1	2	11	6	ES -22	ES -22	ES -22	ES -24	ES -24	ES -24	ES -24	ES -24	-5	-5	ES -23	ES -23	ES -24	ES -24	ES -24	ES -24	4
3	-10	-11	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	11	9	9	-2	-5	3	9	ES -23	ES -23	ES -23	ES -23	ES -23
4	ES -24	ES -24	ES -24	ES -24	ES -24	-1	10	12	12	17	19	24	20	5	-11	-11	-11	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24
5	ES -24	ES -24	ES -24	ES -24	ES -24	4	5	7	9	15	16	16	13	-9	8	16	1	4	0	ES -24	-11	ES -24	ES -24	ES -24
6	ES -24	ES -24	ES -24	ES -24	-6	2	2	2	2	22	16	8	15	15	12	5	0	ES -24	-3	ES -24	ES -24	ES -24	ES -24	ES -24
7	ES -24	ES -24	ES -24	ES -24	ES -24	2	20	-1	12	15	11	13	14	20	9	-1	3	2	-3	5	-3	ES -24	ES -24	ES -24
8	ES -24	ES -24	ES -24	-9	-2	3	14	ES -24	6	18	13	8	-6	-5	11	2	18	2	2	-12	-9	-9	2	-9
9	ES -24	ES -24	-9	3	-3	-2	6	15	3	10	-4	-3	25	8	1	-11	-12	-11	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24
10	ES -24	ES -24	ES -24	ES -24	ES -24	-1	8	20	12	15	13	3	8	12	3	-3	-3	-12	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
20	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
23	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
26	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
28	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
29	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
31	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
CNT	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
MED	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
UD	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
LD	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C

C. RADIO PROPAGATION

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

MAY 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 -23	ES -23	-11	-4	10	19	23	23	24	29	23	25	28	24	24	28	18	15	17	3	7	-6	ES -23	ES -23
2	ES -22	ES -22	-4	16	12	15	24	31	31	28	27	27	23	17	15	25	-5	26	11	15	0	2	-11	ES -24
3	-2	-11	-10	-10	8	21	23	27	29	32	28	25	26	23	25	20	22	22	11	9	7	-8	ES -23	ES -23
4	ES -24	ES -24	ES -24	-7	-12	15	16	25	21	23	26	25	22	27	20	15	23	20	12	5	6	-11	ES -24	ES -24
5	ES -24	ES -24	ES -24	-3	8	17	20	23	26	27	33	29	31	29	21	21	23	22	15	7	-11	ES -24	ES -24	ES -24
6	ES -24	ES -24	-12	-11	5	19	19	21	22	25	27	18	22	21	19	17	32	17	-3	4	-3	-12	ES -24	ES -24
7	ES -24	ES -24	ES -24	ES -24	1	14	17	23	20	26	26	21	25	21	18	16	12	12	9	-1	-12	ES -24	ES -24	ES -24
8	ES -24	ES -24	ES -24	-9	10	11	17	19	23	26	23	21	19	21	17	22	28	3	ES -24	-1	ES -24	ES -24	ES -24	ES -24
9	ES -24	ES -24	ES -24	ES -24	4	11	16	18	23	26	28	21	24	16	17	13	16	16	16	-11	-9	-9	ES -24	ES -24
10	ES -24	ES -24	ES -24	ES -24	5	3	14	19	26	25	16	21	19	22	13	16	23	8	6	-2	5	ES -24	ES -24	ES -24
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
20	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
23	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
26	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
28	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
29	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
30	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
31	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
CNT	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
MED	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
UD	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
LD	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C

C. Radio Propagation

C2. Radio Propagation Quality Figures at Hiraiso

Hiraiso — Time in U.T.

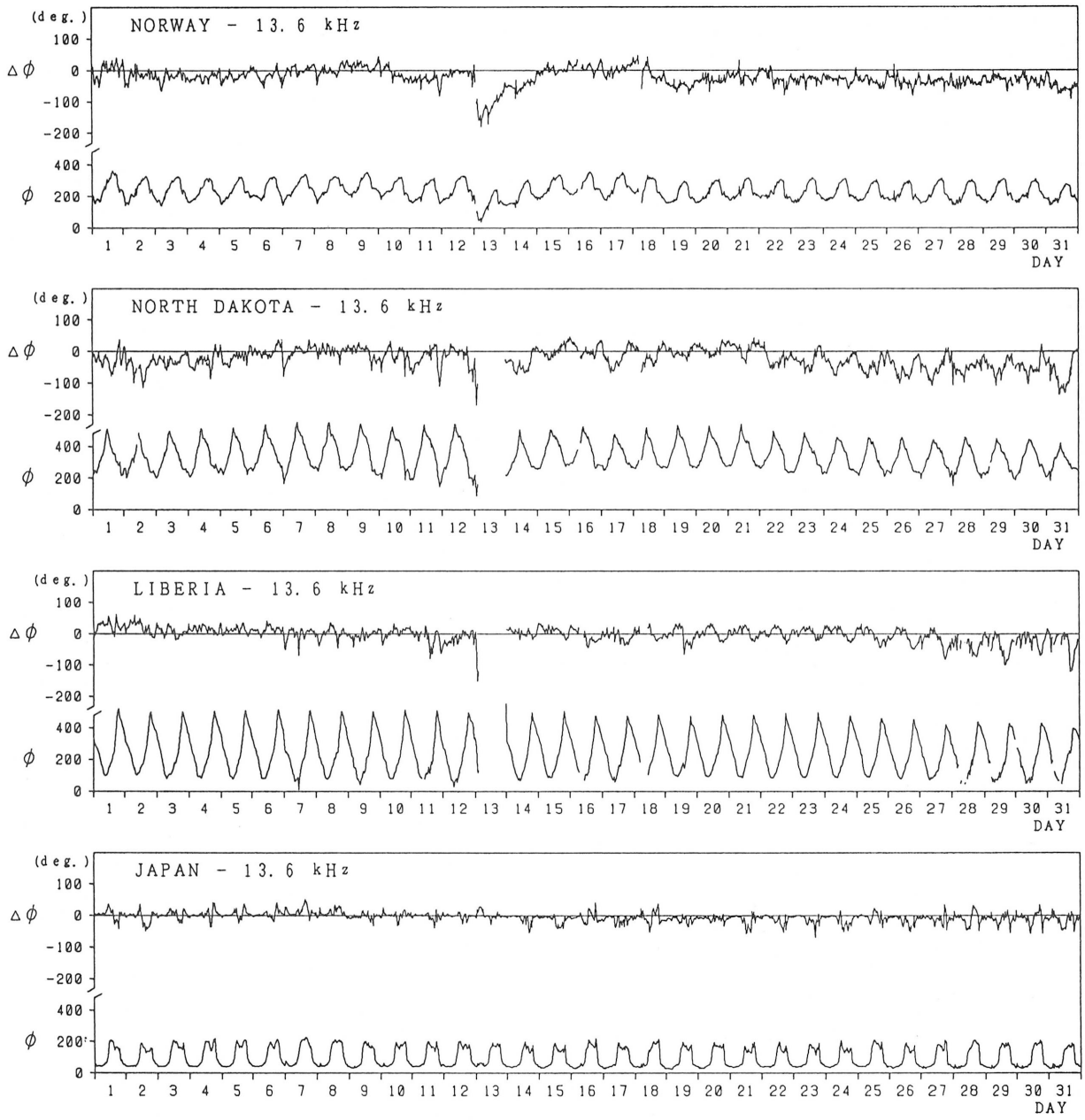
May 1991	Whole Day Figure	W W V 00-06	W W V 06-12	W W V 12-18	W W V 18-24	W W V H 00-06	W W V H 06-12	W W V H 12-18	W W V H 18-24	Conditions 00-06	Conditions 06-12	Conditions 12-18	Conditions 18-24	Principal Geomagnetic Storms Start h m	Principal Geomagnetic Storms End h	Principal Geomagnetic Storms Range nT
1	C	C	C	C	C	C	C	C	C	U	U	U	U			
2	C	C	C	C	C	C	C	C	C	N	N	N	N			
3	C	C	C	C	C	C	C	C	C	U	U	U	U			
4	C	C	C	C	C	C	C	C	C	N	N	N	N			
5	C	C	C	C	C	C	C	C	C	N	N	N	N			
6	C	C	C	C	C	C	C	C	C	N	N	N	N			
7	C	C	C	C	C	C	C	C	C	N	N	N	N			
8	C	C	C	C	C	C	C	C	C	N	N	N	N			
9	C	C	C	C	C	C	C	C	C	N	N	N	N			
10	C	C	C	C	C	C	C	C	C	N	N	N	N			
11	C	C	C	C	C	C	C	C	C	N	N	N	N			
12	C	C	C	C	C	C	C	C	C	N	N	N	N			
13	C	C	C	C	C	C	C	C	C	N	N	N	N	0857	---	109
14	C	C	C	C	C	C	C	C	C	N	N	N	N	---	---	
15	C	C	C	C	C	C	C	C	C	N	N	N	N	---	15	
16	C	C	C	C	C	C	C	C	C	N	N	N	N	2041	---	188
17	C	C	C	C	C	C	C	C	C	N	N	N	N	---	21	
18	C	C	C	C	C	C	C	C	C	U	U	U	U			
19	C	C	C	C	C	C	C	C	C	N	N	N	N			
20	C	C	C	C	C	C	C	C	C	N	N	N	N			
21	C	C	C	C	C	C	C	C	C	N	N	N	N			
22	C	C	C	C	C	C	C	C	C	N	N	N	N			
23	C	C	C	C	C	C	C	C	C	N	N	N	N			
24	C	C	C	C	C	C	C	C	C	U	U	U	U			
25	C	C	C	C	C	C	C	C	C	U	U	U	U			
26	C	C	C	C	C	C	C	C	C	U	U	U	U			
27	C	C	C	C	C	C	C	C	C	U	U	U	U			
28	C	C	C	C	C	C	C	C	C	U	U	U	U			
29	C	C	C	C	C	C	C	C	C	N	N	N	N			
30	C	C	C	C	C	C	C	C	C	N	N	N	N			
31	C	C	C	C	C	C	C	C	C	N	N	N	N	06.2	---	141

C: Due to receiver's trouble.

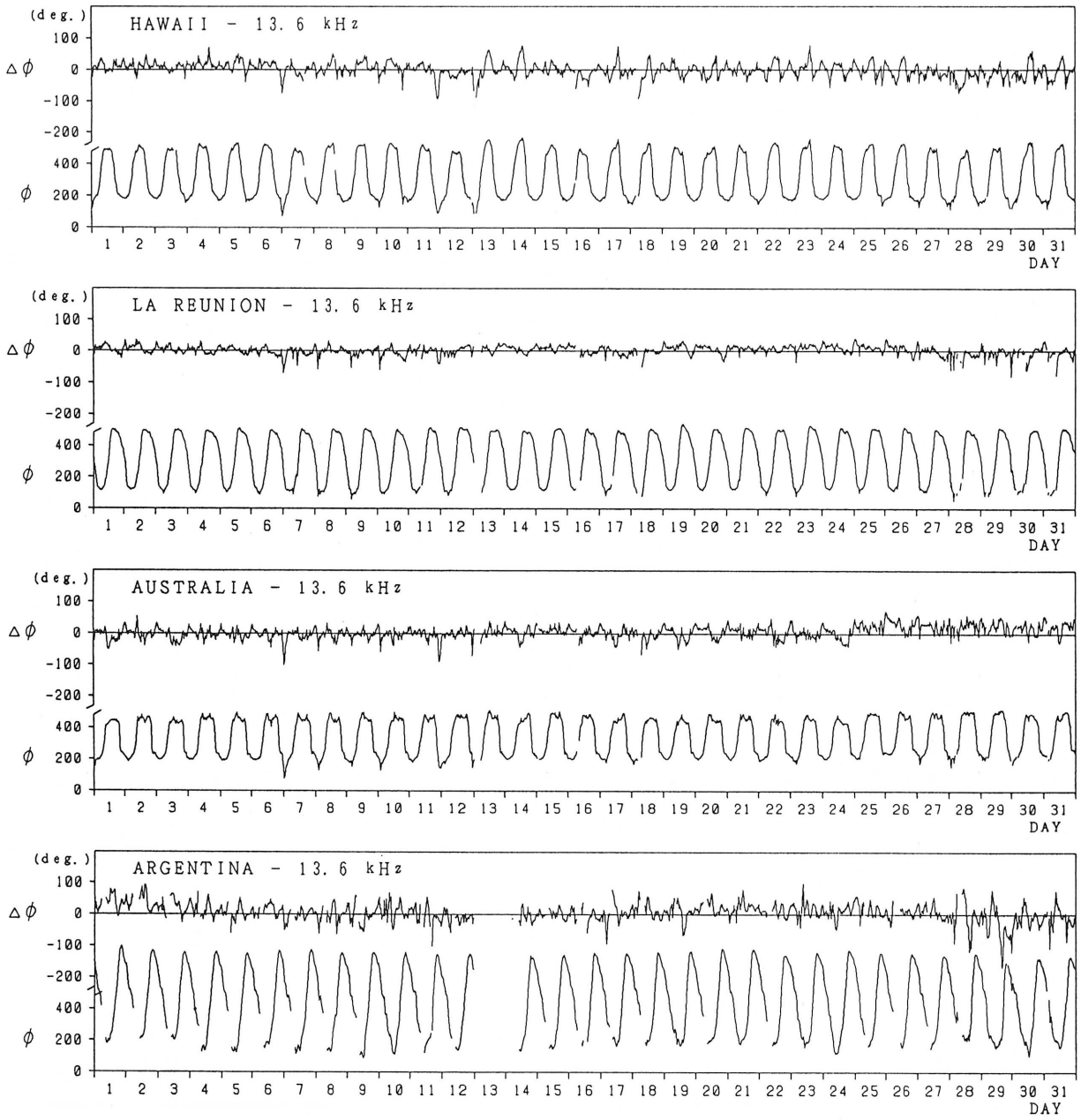
C. Radio Propagation

C3. Phase Variation in OMEGA Radio Waves at Inubo

Inubo May 1991



Inubo May 1991



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

Start (U.T.)	End (U.T.)	Max. (U.T.)	Max. Phase Deviation (negative value, deg.)
May 02/2140	May 07/1700	May 05/0141	70.6
May 10/1000	May 12/1800	May 11/2256	77.4
May 13/0233	May 15/0521	May 13/0608	178.2
May 18/1430	May 20/2120D	May 19/0525	75.6
May 20/2120E	May 22/0800	May 21/1708	46.8
May 22/0957	May 30/0638D	May 23/2221	54.0
May 30/0638E	Jun.02/1430D	Jun.02/0545	106.2

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso Time in U.T.

May 1991	S W F									Correspondence	
	Drop-out Intensities(dB)					Start	Dur.	Type	Imp.	Solar * Flare	Solar Burst
	CO	HA	1)	2)	3)						
1			18	x	5	0010	53	3	1+	x	
2		12	9	x		0211	32	2	1-	x	
6			17		x	2312	33	3	1+	x	
7			17	7		0000	20	2	1+	x	x
7			21	x		0024	37	2	2-	x	x
7				14	16	0734	25	2	1+	x	x
8			12			0024	19	2	1	x	
8			7	x	7	0101	15	2	1-	x	
8			9			0130	26	3	1-	x	x
8			7			0215	25	2	1-	x	
9			6			0119	9	2	1-	x	
9			9			0142	44	3	1-	x	x
9		x	11			0336	20	2	1-	x	x
10			17		8	0131	61	3	1+	x	x
11			x	x	8	0803	28	2	1-	x	x
11					10	1310	45	2	1-	x	
11					15	1405	30	2	1	x	
11					10	1515	25	2	1-	x	
12					8	0200	10	1	1-	x	
12			19	x	14	2232	41	2	1+	x	
13			35	20		0033	24	2	3-	x	
13			20	x		0057E	XX	2	2-	x	x
13			8			0502	40	2	1-	x	
16	35	40	47	x	23	0646	67	3	3+	x	x
17				20	15	0902	14	2	1	x	x
18		32	31	15	10	0438	192	3	2+	x	x
19					11	1347	60	3	1-	x	
22			10	x		0003	23	2	1-	x	
22			7			0024	11	2	1-	x	
23			15			0121	23	2	1	x	
23			7			0420	23	2	1-	x	
27			27	13		0140	16	2	2	x	x
27			9	11		0156	15	2	1-	x	x
28			16		7	0010	13	2	1+	x	
28			16			0116	17	2	1+	x	x
28		x	15	10		0330	21	2	1	x	x
28			16	x	11	0524	17	2	1+	x	x
28			10	x	26	0725	23	1	2-	x	x
28				x	23	1018	22	1	2-	x	
28					13	1205	30	3	1	x	
28					11	1309	16	1	1-	x	
28					10	1509	23	2	1-	x	
28			17		7	2203	18	2	1+	x	x
29			20	x		0301	21	1	2-	x	
29			18	x		0445	12	1	1+	x	
29					17	1207	25	1	1	x	
29			23	29	19	2341	33	2	2	x	x
30		32	13	x	x	0341	10	2	1	x	x
30				x	27	0936	20	1	2-	x	
30				20	10	1126	51	1	1-	x	
31		20	41	18		0239	41	1	3+	x	x
31			12	12		0400	24	2	1	x	x
31					10	0838	34	1	1-	x	

NOTES O:Colorado(WWV) HA:Hawaii(WWVH) :Australia 2):Moscow 3):London
* ptical and X-ray Flares

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

May	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
1			36	59	51	28	0010	0142	0030
1					11		1818	1834	1823
2			20	25	13		0213	0308	0225
3			22	18	6		0548	0628	0557
3			7	4			0712	0739	0720
3	13	13	10	14	30	23	2231	2344D	2250
3				—	6		2344E	0011	2352
4		23	25	22	10		0619	0711	0627
4		13					1540	1558	1551
4				6	8		2317	2346	2325
5				9	6		0055	0120	0105
5			9	8	5		0450	0525	0500
5		12	8	7			0528	0545	0534
5			7	6			0553E	0615	0606
5					39	32	2030	2154	2100
5				5	5		2303	2319	2308
6			14	—	8		0428	0536	0435
6	20	24	40	—	12		0557	0649	0603
6					8		2120	2147	2129
6					7		2151	2213	2159
6	45	32	46	68	75	56	2318	2358D	2333
7	64	70	109	119	112	68	2358E**	0338	0035
7	23		14	14	7		0436	0507	0448
7	28	25	68	31			0741	0913	0752
7			16				0923	0952	0941
7	15	—	51				1004	1036D	1012
7	31	—	84				1036E	1217	1044
7		45					1445	1600	1508
7					10		2054	2134	2105
7		7		9	12		2237	2319	2244
8	15			8	8	14	0020	0042	0027
8				27	13	19	0103	0120D	0113
8				45	18	23	0120E	0140D	0125
8	45			45	30	32	0140E	0216D	0147
8	56	17	58	59	41	43	0216E	0315	0228
8	14		32	30	11		0335	0458	0403
8			17	11			0646	0733	0659
8		13	12				0810	0846	0822
8		46					1549	1655	1613
8					44	36	1834	1947	1855
8					8		2016	2049	2020
8			5		12	14	2143	2221	2157
8	31		18	24	40	38	2236	0022	2309
9					4		0040	0101	0047
9			8	10	5	11	0121	0141	0126
9	16		32	29	13	13	0200	0309	0211
9	36	31	71	52	30	30	0336	0517	0346
9			7	5			0521	0544	0525
9				12			0608	0635	0614
9			12	11			0743	0808	0748
9		23	28*				0839	0946	0849
9			9				0952	1006	0959
9		25	13				1206	1314	1219
10	29	40	71	70	51	43	0138	0304D	0203
10			20	22	15		0301E	0427D	0330

Inubo

May	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
10		20	15	11			0505	0602	0527
10					39	38	1907	1940D	1917
10					82	89	1940E	2117	1954
10				9	14		2336	0111	2355
11		14	27	31	19	18	0209	0305	0217
11		21	29	28	7		0514	0612	0524
11	57	—	148	63	19		0802	0948	0816
11		21	8				1133	1253	1152
11		75					1321	1507	1348
11		57					1516	1620	1540
11					95	121	1956	0124	2200
12	9	15	30	27	28	17	0236	0305D	0240
12		14	24	25	22	13	0305	0331	0311
12	19	31	37	32	10		0552	0704	0604
12	20*	31	48	17			0801	0900	0813
12		42	34				1023	1153	1040
12		13					1318	1346	1329
12		18*					1611	1654	1633
12					14		2012	2045	2023
12	70	43	50	78	100	73	2232	0019	2245
13	61	65	93	116	95	83	0034	0057D	0047
13	77	138	212	182	144	144	0057E	0503D	0132
13	42	—	185	107	66	—	0503E	0758	0518
14				—	4		0044	0120	0048
14					7		2149	2243	2205
15					22	25	2026	2147	2053
15					4		2258	2322	2311
16	178	—	302	181	62	92	0640	1215	0708
17	18	24	48	39	16		0416	0548	0431
17			14	6			0725	0810	0737
17	92	—	182	53			0902	1132	0914
17		31					1345	1457	1422
17					11		2104	2145	2111
17	14			8	19		2218	2252	2228
17	11		13	16	17*	23	2305	0022	2309
18	28	19	38	44	30	25	0101	0220	0118
18	18	—	24	23	8	13	0405	0435D	0416
18	211	—	386	232	170	131	0435E	1011	0528
18					7		2052	2125	2103
19		66					1346	1606	1426
20			10	—			0618	0640	0626
21		16*	26				0942	1041	0957
22	28			26*	28*		0004	0141	0031
22			10	9			0420	0450	0432
22			14	11			0512	0547D	0538
22			33	22			0547E	0638D	0558
22			23*	9			0638E	0721	0646
23	15	15	27	39	26	23	0130	0221	0138
23				7			0245	0257	0250
23			10	9	6	13	0325	0345	0332
23				6			0405	0416	0411
23	15	31	62	51	21	16	0419	0520	0434
23			11	8			0535	0606	0541
23			8	6			0609	0626	0612
24			11	17	6		0312	0339	0314

Inubo

May 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
24					6		2032	2054	2038
24					5		2253	2319	2302
25	15		33	36	10		0354	0513	0425
25	17		12		60	47	2136	2208D	2148
25	18	16	14		47	39	2208E	2302D	2232
25				8	18	17	2302E	0012	2312
26			8	8			0431	0502	0436
26			13	11			0536	0632	0544
26			32	8			0851	1008	0855
26					8		2028	2054	2031
27	37	32	78*	79*	57*	47	0141	0314	0148
27	22	18	26	14			0641	0746	0654
27					18	26	1904	1930	1911
27					11		2009	2054	2024
27					16		2101	2134	2106
27					5		2203	2219D	2207
27					10		2219E	2251	2224
27	33	23	35	55	58	40	2310	0017	2318
28				—	12		0101	0117D	0107
28	29	34	73	—	63*	74	0117E	0240	0126
28	9	13	22	—	12	17	0302	0329D	0309
28	35	64	119	—	63	61	0329E	0436	0339
28	53	82	159	—	55	28	0520	0654D	0534
28	54	—	199*	56*	13	17	0654E	1018D	0736
28	41	—	156				1018E	1218	1024
28		47					1313	1402	1333
28		57					1515	1613D	1534
28		24					1613E	1725	1630
28					19	29	2011	2056	2019
28					23	17	2102	2155	2122
28	33	17	25	—	63	44	2206	2322	2215
29	14	12	39	36	28	20	0116	0156	0124
29	31	44	96	74	50	47	0257	0400	0306
29	53	48	150	93	50	36	0443	0541D	0451
29	25*		59*	45*	22	15	0541E	0708D	0554
29			39	10			0708E	0824	0719
29			12				0933	1012	0938
29		—	43				1208	1301	1215
29		43					1527	1721	1551
29					23	23	1948	2042	2000
29	75	61	90	140	145	146	2213	0313	2348
30	40	48	108	78	50	42	0340	0513	0349
30	37	49	94	56			0712	0839	0720
30	69	—	215	13			0937	1127D	0943
30		—	69				1127E	1256	1132
30					15		2204	2252D	2213
30				10	16		2252E	2336	2301
31	59	65	160	123	91	86	0238	0358D	0247
31	62	71	163	109	72	44	0358E	0504D	0410
31	33		38	32			0504E	0705	0510
31	48	—	140	35			0835	1105	0900
31		21					1234	1323	1247
31		52					1653	1830	1708
31			10	13	13	14	2337	0016D	2354

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