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IONOSPHERIC DATA IN JAPAN

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CONTENTS

COMMUNICATIONS RESEARCH LABORATORY
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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

JUN. 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	73	A	69	58	62	50	60	51	A	50	A	50	A	A	A	A	62	68	63	67	71	N	76	61
2	63	64	57	57	52			A	51	A	A	A	A	A	49	70	76	74	72	A	76	64	63	N
3	59	67	64	55	A	76	77	A	86	A	A	A	A	A	A	49	60	A	66	70	67	64	A	63
4	62	64	61	67	66	66	67	76	68	76	A	A	A	B	B		45	59	64	66	66	68	70	66
5	70	74	68	63	51	69	80	56	A	A	A	A		A	61	73	45	59	58	54	54	A	56	N
6	56	49	44	A	31		48		A	A	A	B	A	A	A	64	58	64	58	66	77	83	75	70
7	64	63	65	73	59	62	45	56	50			B	A	A		66	51	62	64	70	71	71	61	72
8	73	70	73	68	68	62	69	87	78	A	75	A	84	79	61	53	A		75	A	61	91	92	80
9	91	74	66	58	62	72	83	71	A	A	A		B		A	A	69		A	A	70	68	72	61
10	62	58	55	58	40	A	A	A	A	A		A		A		A	59	51	66	66	74	83	63	72
11	A	60	46	54	43			A		B	B	B	B	A		A	A	A	A	61	A	70	74	74
12	54	60	55	54	57	A		A	A	A	A	A	A	A	A	A	A	63	60	55	66	69	64	73
13	78	59	54	37	A	A	A	A	A		A	A	A		N	A		51	A	59	44	58	54	37
14	49	53	35		A	39	60	A	A	70	A	A	A	74	68	82	69	A	68	A	90	90	90	92
15	88	79	75	70	72	82	96	101	94	88	78	74	56	59	82	81	79	85	86	96	92	84	93	84
16	87	86	74	75	75	80	85	A	81	A	A	A	A	54	A	61	65	73	A	79	84	79	A	
17	A	76	74	78	80	90	98	90	91	86	87		87	60	87	83	82	89	88	91	87	83	83	80
18	65	77	68	72	68	61	76	49	66	A	A	A	A	A	A	A	70	64	64	A	66	64	70	55
19	73	67	70	63	67	63	73	72	73	N		60	70	A	79	73	77	77	91	87	88	81	71	68
20	67	76	62	61	60	67	71	A	A	A	A		A	72	A	A	71	71	A	83	74	81	73	87
21	92	85	82	74	74	80	87	88	86	79	85	81	87	91	87	83	78	92	91	91	95	85	82	82
22	91	85	85	74	73	79	79	56	81	89	83	80	A	84	84	A	90	A	A	90	83	86	82	84
23	81	77	72	76	73	63	66	70	80	66	82	77	59	74	69	73	80	A	83	80	90	91	71	90
24	80	65	63	55	50	57	59	60	A	60	A	A	51	50	74	68	61	74	67	65	68	74	80	68
25	73	76	66	61	54	60	55	63	A	52	A	56		63	75	60	67	67	68	70	79	78	83	82
26	81	83	73	68	69	66	67	A	70	74	61	62	84	72	A	68	N	79	94	83	85	92	92	92
27	87	85	69	74	63	72	79	71	A	65	69	64	73	60	77	74	70	70	73	74	86	90	92	82
28	79	76	73	59	65	64	78	76	74	68	70	70	56	66	68		A	75	A	79	79	68	87	91
29	N	87	68	76	76	72	91	88	90	88	87	71	86	82	85	80	80	86	81	82	80	87	84	92
30	86	90	86	68	83	87	81	78	81	73	74	67	B	75	A	82	81	80	71	77	77	68	67	76
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	29	30	28	27	24	25	19	17	15	11	12	11	16	15	19	24	23	23	25	29	28	28	27
MED	73	74	68	65	65	66	76	71	80	73	78	68	73	72	75	73	70	71	68	74	77	80	74	76
U Q	86	81	73	73	73	77	82	87	86	86	85	75	86	77	84	81	78	79	83	83	85	85	83	84
L Q	63	63	61	58	54	62	63	56	69	65	70	61	56	60	68	64	60	63	64	66	67	68	68	68

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT WAKKANAI

JUN. 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	G	31	38	G	G	G	G	G	78	G	93	48	60	74	128	55	G	G	G	G	G	G	G	G
2	34	32	45	60	41	G	G	40	44	69	97	60	72	65	60	G	G	G	G	68	29	81	48	58
3	35	44	29	46	60	70	60	107	100	55	66	73	64	56	128	47	54	64	57	48	41	32	68	34
4	G	G	26	G	32	43	46	63	79	77	60	57	48	B	B	G	G	58	46	40	58	58	68	33
5	32	G	G	G	34	40	58	62	77	95	87	72	G	165	G	G	G	G	G	G	35	68	G	G
6	G	29	31	31	G	G	G	G	46	58	88	B	85	54	72	48	86	37	40	38	G	39	G	33
7	44	30	32	37	35	39	42	G	44	G		B	136	50		G	54	G	G	32	34	25	40	31
8	31	G	26	26	93	43	52	52	55	92	48	48	47	G	G	G	86	140	78	79	69	83	30	G
9	G	G	28	G	34	40	69	58	105	46	129	G	B	G	62	185	114	133	92	98	54	G	34	G
10	G	25	24	26	37	40	59	62	72	57		55		47		58	G	G	46	40	26	G	G	G
11	42	77	45	41	G	G	G	45	G	B	B	B	B	64	G	69	66	44	68	61	65	58	58	28
12	G	G	26	32	46	92	G	54	72	77	93	67	63	59	50	56	64	57	53	53	46	24	G	G
13	G	27	36	30	39	49	46	41	44		52	74	48		85	93		52	80	58	G	G	G	G
14	G	G	23		36	48	58	76	60	66	73	97	71	69	56	G	69	85	73	87	96	91	39	60
15	58	59	35	36	G	39	59	61	71	G	G	G	G	G	G	G	G	72	60	68	60	34	30	39
16	33	44	49	86	G	G	60	106	115	121	93	69	64	61	58	G	G	45	103	60	76	129	97	151
17	138	44	61	36	G	40	74	71	G	70	66	153	73	G	68	G	55	G	44	40	45	55	39	28
18	G	27	G	G	G	G	44	46	54	70	104	63	106	88	74	61	71	68	37	64	35	55	32	59
19	38	72	52	26	33	58	49	57	58	77	84	G	G	53	G	G	42	57	34	48	42	31	35	29
20	G	27	G	G	33	53	60	67	70	95	96	105	114	97	80	94	48	77	83	58	64	91	92	68
21	57	38	42	27	G	41	82	92	64	89	64	G	84	69	64	53	64	60	72	36	69	57	58	67
22	59	72	43	49	58	63	60	53	68	56	65	61	77	70	G	88	75	145	106	57	65	66	G	G
23	35	G	G	G	G	G	46	39	64	70	G	G	77	58	46	58	74	169	40	G	G	G	G	G
24	G	G	G	G	G	37	41	50	54	G	53	56	64	58	G	G	G	42	58	G	G	24	G	24
25	57	G	26	30	30	36	48	46	57	49	58	G	G	G	65	65	43	48	67	52	38	26	G	G
26	26	34	G	G	G	41	51	77	71	G	G	G	62	66	104	82	86	G	72	61	50	39	G	G
27	G	G	G	G	G	38	46	53	56	G	G	G	G	G	G	G	G	G	G	G	G	31	G	28
28	G	G	G	G	G	G	G	G	G	46	61	46	50	46	G	G	68	45	79	61	66	73	72	G
29	G	28	28	40	29	32	70	80	58	65	G	58	47	G	G	G	G	G	G	34	40	38	61	28
30	26	G	29	27	G	G	48	48	G	61	56	56	B	56	97	52	G	39	47	47	G	46	45	50
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	29	30	30	30	30	30	28	27	27	26	28	27	30	29	30	30	30	30	30	30	30
MED	26	27	28	27	30	40	48	54	59	63	65	56	64	57	58	48	54	46	55	50	42	39	33	28
U D	38	38	38	36	36	43	60	67	72	77	93	69	77	67	74	61	70	68	73	61	64	66	58	39
L D	G	G	G	G	G	G	42	45	46	46	52	G	47	23	G	G	G	G	37	36	26	25	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT WAKKANAI

JUN. 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	24	18	17		20	20	26	33	35	40	39	40	40	39	32	27		40	28	20	17	17	17	20
2	16	16	15	15	17					46	44	42	40	40	41	40	26	49	32	18	18	15	14	14
3	17	14	17	16	16	21	22	27	29	35	40	39	40	42	35	29	24	22	21	18	17	17	18	18
4	16	20	17	15	17	22	30	24	38	39	39	39	42	B	B	91	91	32	23	18	17	17	16	18
5	17	16	17	17	18	21	18	23	35	38	39	45		42	39	27		21	17	22	14	15	18	18
6	15	17	14	14	17	18	18	21	32	36	40	B	54	44	43	44	33	29	18	18	17	14	16	16
7	16	16	14	18	17	20	22	26	38			B	49	44		42	28	39	40	20	14	16	15	15
8	16	15	15	15	17	18	21	23	26	32	39		64	45	33	27	24	20	18	18	14	16	14	15
9	15	22	14	18	18	18	21	22	34	36	39	91	B	91	40	42	36	29	18	16	14	16	14	17
10	17	16	16	16	16	20	22	26	33	36		38		91		32	36	23	22	18	16	16	17	17
11	14	14	15	14				33		B	B	B	B	52	91	42	36	27	20	18	17	15	15	20
12	18	16	15	17	17	20		43	40	43	42	40	39	39	40	38	30	22	18	17	16	17	16	15
13	15	18	16	14	17	17	20	26	33		40	37	38		36	34		27	22	18		17	17	
14	17	17	16		17	21	28	32	32	42	40	42	36	39	34	41	26	21	18	20	17	17	15	16
15	16	17	17	17	21	23	23	33	36	52	42			41		49	24	30	48	18	17	20	18	17
16	15	16	16	16	21	20	36	34	34	38	38	39	42	38	35	41	28	21	17	17	16	16	15	15
17	16	15	14	18	20	18	23	28	26	36	38	38	36	63	28	29	23	22	18	18	14	16	14	20
18	16	17	16	16	18	27	18	23	27	38	36	38	38	37	35	29	28	23	20	17	16	16	16	15
19	18	14	17	14	17	21	18	20	34	29	40	41	40	37	54	28	27	21	17	18	17	17	15	15
20	16	16	15	18	18	18	21	29	28	35	28	38	40	34	32	24	24	18	18	18	16	15	14	16
21	15	15	16	16	20	22	20	24	27	32	34	50	34	33	32	30	24	21	16	20	18	18	17	15
22	16	18	15	14	17	18	21	32	27	41	43	42	39	35	52	36	21	20	22	17	16	15	18	16
23	17	16	15	17	18	20	20	26	27	41	43	28	39	28	55	38	24	23	18	20	17	17	17	16
24	17	17	16	17	21	18	18	24	24	40	39	39	42		28	46	36	21	18	23	17	18	18	15
25	16	14	15	14	16	17	18	21	26	36	28				38	28	30	22	21	18	16	17	16	17
26	16	15	16	15	18	22	18	29	33	48			39	38	30	38	27	28	20	17	15	14	16	15
27	15	16	15	16	20	17	18	23	29						42	43	38	32	28	22	16	15	16	15
28	16	16	17	15	20	18	20	24	28	38	39	81	40	42	50	101	51	28	21	18	15	16	16	14
29	16	15	17	17	20	18	20	28	26	35	43	50	40	58	50	33	24	20	20	18	15	15	15	17
30	17	16	15	16	20	22	20	22	23	40	40	42	B	36	35	29	26	21	18	17	17	16	16	18
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	28	29	28	27	29	28	26	25	22	22	25	26	30	27	30	30	30	29	30	30	29
MED	16	16	16	16	18	20	20	26	30	38	39	40	40	40	37	37	27	22	20	18	16	16	16	16
U Q	17	17	17	17	20	21	22	30	34	41	41	42	42	44	43	42	36	29	22	20	17	17	17	17
L Q	16	15	15	15	17	18	18	23	27	36	38	38	39	37	33	29	24	21	18	18	15	15	15	15

HOURLY VALUES OF FOF2 AT AKITA

JUN. 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	90	53	87	70	84	52	52	46	A	A	A	A	A	A	A									
2																								
3												A							69					
4										A	A	A	A	B	B		B							
5																A	A	A	76	51	44	48	A	58
6	51	A	43	A	A	A	A	A	107	A	A	B	B	A	B	80	70	78	A	75	39	53	A	53
7	46	75	A	A	52	74	A	A	A	A	C	B	B	B	B	B	A	72	A	70	55	A	54	66
8	54	A	A		65	47	72	90	90	91	81	A	A	90	87	A	A	A	A	A	A	A	A	A
9	84	79	74	48	52	A	75	A	A	A	A	B	A	A	B		A	69	95	111	A	41		64
10	59	57	59		A	A	A	A	A	A	A	A			A	A		A	A	A	A	A	A	64
11		75	A	37	45	A	A	A	A	A		B	B	B	A	B		A	A	59	50	A	68	A
12	A	30	A	A	49	A	A	A	A			A	A	A	A		54	65	67	A	A	54	54	A
13	86		52			A	A	A	A		A							A	A	54	A	A	56	65
14	42	43	A	A		52	A	A	86	84	86	A		A	81	80	A	76	60	72	88	A	88	A
15	A	78	78	75	74	86	100	107	100	A	81	82	86	91	91	91	90	A	A	91	A	A	89	98
16	97	86	87	77	A	77	86	87	N	A	A	A	102	A	A	A		A	84	87	87		A	A
17	76	71	70	71	71	80	86	100	88	A	80	95	95	88	93	93	90	90	91	90	A	87	90	85
18	52	75	70	86	75	72	78	A	A	A			A	A		A	71	55	64	64	A	49	A	
19	68		A	54	54	76	80	A	A	84	81	71	A	A	81	87	83	87	99	90	86	74	A	78
20	77	65	54	72	54	72	A	71	A	A	A	68	A		74	72	78	77	77	A	70	79	81	86
21	80	83	83	66	72	81	90	94	88	88	91	89	91	100	102	88	88	87	98	86	90	A	87	88
22	88	A	85	A	86	A	A	74	A	88	A	A	85	91	92	85	80	A	90		A	A	82	86
23	78	84	90	80	71	74	66	73	86	90	A	74	81	79	81	79	A	81	91	86	80	87	90	71
24	70	48	44	68	45	63	A	A	A	A	A	A	A	A	A	74	52	74	A	71	77	49	82	72
25	75	85	65	54	53	54	53	A	A	A	A		A	75	76	69	66	73	74	54	60	83	80	81
26	64	85	75	76	71	A	A	A	74	101	75	81	A	85	90	90	86	87	91	102	86	88	87	90
27	90	87	75	51	72	A	70	A	A	A	78	A	82	A	84	87	71	A	80	82	87	86	N	84
28	79	N	74	54	53	75	78	A	A	A	76	75	80	78	80	B	78	86	A	83		A	81	86
29	90	88	84	80	83	86	84	A	88	96	90	86	91	93	95	96	85	86	87	84	56	87	90	A
30	85	84	84	84	83	85	85	94	91	84	A	84	B	A	92	91	94	84	86	A	36	A	84	A
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	23	20	20	18	21	17	15	10	10		10	10		10	15	15	16	17	18	20	16	14	17	18
MED	77	76	74	70	71	74	78	88	88		81	82		89	87	87	79	78	85	82	74	76	82	80
U Q	86	84	84	77	74	80	86	94	91		86	86		91	92	91	87	86	91	88	86	87	88	86
L Q	59	61	62	54	52	58	70	73	86		78	74		79	81	79	70	72	74	67	52	49	74	65

HOURLY VALUES OF FES AT AKITA

JUN. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	24	29	34	40	51	60	53	96	127	78	121	118	G	G	G						
2																								
3												56					G	G	46					
4										59	84	59	72	B	B		B							
5															G	52	50	44	G	G	G	28	39	50
6	33	36	35	51	51	55	66	61	109	108	52	B	B	81	B	52	61	58	64	G	26	33	57	24
7	28	32	52	49	38	29	68	73	79	58	G	B	B	B	B	B	57	57	46	G	G	39	32	33
8	44	34	44		28	35	51	48	43	52	G	96	114	52	52	94	51	51	59	54	107	107	95	131
9	49	30	36	36	33	57	46	54	53	74	93	B	119	148	B	G	96	84	114	93	76	51		32
10	27	28	34	28	40	50	56	72	73	95	142	51			104	140		44	126	125	85	95	114	25
11	24	32	101	28	26	43	44	40	50	67	G	B	B	B	54	B	G	49	50	44	G	48	91	58
12	80	40	104	45	34	42	43	102	104			85	131	54	68		G	G	44	55	56	26	G	31
13	G	G	G	24		32	56	63	58		73						G	53	46	50	29	37	26	27
14	G	30	50	38	G	36	74	74	80	80	91	116	G	113	G	52	85	92	52	51	115	110	133	111
15	106	91	50	44	36	34	56	92	104	92	51	51	G	49	61	56	92	117	94	51	180	168	51	93
16	42	51	53	51	55	73	70	86	115	105	80	68	118	67	158	96	82	114	91	62	49	46	48	40
17	38	32	28	32	24	G	44	54	63	144	73	51	74	G	54	74	44	73	49	55	84	96	50	59
18	27	G	G	G	25	41	51	78	80	66		G	50	71	G	50	51	47	39	40	49	54	72	55
19	73	27	93	48	31	52	56	86	73	62	54	81	142	122	56	47	58	58	47	42	33	28	84	37
20	44	34	40	36	26	43	58	70	73	52	55	51	75	G	51	51	50	73	96	104	33	25	38	50
21	49	27	27	G	G	G	46	82	54	77	63	78	51	52	70	G	50	61	36	60	142	137	58	107
22	96	90	84	114	91	93	69	76	75	53	82	112	96	62	47	44	82	84	81	100	132	103	48	51
23	33	25	33	34	32	40	36	50	G	56	83	84	136	46	51	74	117	44	G	33	36	27	37	27
24	G	G	G	G	27	36	45	50	60	62	60	51	55	77	58	G	G	G	95	50	38	G	30	G
25	G	G	32	32	27	44	47	53	50	50	50	G	52	50	G	G	48	42	32	33	27	44	46	32
26	36	G	33	28	G	57	60	90	53	86	51	56	85	69	51	48	51	46	36	44	33	52	58	G
27	35	25	33	27	G	30	35	51	59	52	G	50	G	46	G	46	G	38	35	32	28	32	26	G
28	27	G	G	G	G	31	38	50	52	50	47	46	G	G	G	B	51	55	53	G	36	107	57	85
29	57	50	38	26	G	32	48	107	85	51	G	62	103	50	50	49	50	37	G	34	33	44	51	54
30	44	44	26	28	35	37	58	41	65	48	61	78	B	92	51	43	42	39	44	57	41	51	46	84
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	26	26	25	25	26	26	26	26	25	25	23	21	22	23	22	27	28	27	26	26	26	25	26
MED	36	30	34	32	28	38	51	66	64	62	60	59	75	58	51	50	50	50	47	50	37	47	50	45
U Q	49	36	50	44	35	50	58	82	80	83	82	84	116	81	61	56	61	67	81	57	84	96	65	59
L Q	27	G	27	25	12	32	44	51	53	52	48	51	50	49	G	43	G	40	36	33	29	32	37	27

HOURLY VALUES OF FMIN AT AKITA

JUN. 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	18	18	16	17	16	20	20	23	38	40	35	39			40			39						
2																								
3												39							24					
4										38	45	45	43	B	B		B							
5																34	35	26	17	20	16	16	15	15
6	16	15	15	16	16	16	17	18	28	38	44	B	B	49	B	42	27	29	18	20	17	16	15	16
7	17	16	16	15	16	18	18	23	24	35	81	B	B	B	B	B	26	18	16	23	16	16	15	15
8	16	16	15		17	17	18	20	22	26	32	38	36	29			29	20	21	17	16	15	15	16
9	16	15	16	15	15	17	21	20	22	37	35	B	69	43	B	81	35	20	17	16	17	17		16
10	16	16	16	14	15	26	18	23	33	35	30	36			43	28		20	18	16	16	17	15	16
11	16	16	14	16	18	17	18	33	26	38	71	B	B	B	48	B	81	28	20	16	16	15	15	15
12	15	15	15	15	15	18	34	39	43			45	42	46	42		27	22	17	17	15	18	16	15
13	16	37	16	18		16	20	26	35		36						23	20	20	16	15	16	17	16
14	21	15	16	16		17	21	21	26	38	37	42		36	44	39	22	21	17	17	15	15	15	15
15	16	15	15	15	15	15	17	20	23	26	39	42	67	64	34	39	35	21	36	16	15	15	15	15
16	17	16	16	16	15	16	34	24	36	36	38	40	40	40	38	28	24	22	16	16	15	15	16	15
17	16	15	15	16	20	18	20	20	23	26	30	38	33	70	32	26	22	18	16	16	16	16	15	15
18	16	16	16	18	16	18	17	18	21	38			39	39		26	23	18	18	15	16	15	15	16
19	15	16	16	15	15	18	16	17	23	21	35	37	38	35	24	23	21	17	17	15	15	15	16	16
20	15	16	15	15	20	17	17	20	22	22	26	28	27	36	33	27	20	17	17	16	16	16	15	16
21	16	16	16	18	17	18	17	18	27	33	36	36	36	26	23	21	20	18	18	16	16	16	15	16
22	16	15	15	15	15	16	17	20	23	36	36	35	34	35	35	36	21	17	16	17	15	16	15	15
23	16	15	15	16	16	16	16	18	23	24	26	38	27	35	21	21	20	18	18	16	16	16	16	15
24	16	15	16	16	16	16	18	18	21	36	38	41	42	39	36	22	21	20	17	16	15	16	16	16
25	16	17	16	15	16	18	16	18	27	28	38		27	29	26	22	18	18	16	20	16	16	16	16
26	16	16	16	16	17	16	16	20	27	27	36	36	34	29	38	26	23	17	17	17	16	16	16	16
27	17	17	15	17	16	16	17	17	23	38	39	66	66	36	30	26	27	15	16	17	16	16	16	16
28	16	16	18	16	17	17	17	18	23	26	39	81	N	81	101	B	45	23	15	16	16	16	16	16
29	17	16	16	16	17	16	17	20	26	29		36	35	35	33	26	21	17	17	16	16	16	16	15
30	16	16	16	17	16	15	16	17	18	35	26	33	B	40	36	27	20	17	17	16	17	16	16	16
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	26	26	25	24	26	26	26	26	25	24	21	18	21	20	20	25	27	27	26	26	26	25	26
MED	16	16	16	16	16	17	17	20	24	35	36	38	37	36	36	26	23	20	17	16	16	16	15	16
U Q	16	16	16	16	17	18	20	23	27	38	39	42	42	44	41	35	28	22	18	17	16	16	16	16
L Q	16	15	15	15	15	16	17	18	23	26	33	36	34	35	31	24	21	17	16	16	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

JUN. 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	110	88	98	52	93	76	73	62	A	73	77	78	76	82	73	74	76	80	80	71	75	72	86	74
2	52	68	77	55	62	56	57	56	61	A	A	A	73	A	A	75	78	85	85	77	69	65	55	55
3	55	65	55	55	55	72	81	71	91	78	A		A	A	72	71	72	75	A	A	49	72	77	74
4	74	68	70	67	62	66	66	76	74	54	51	A	72	B	B	B	68	70	A	A	63	62	54	52
5	55	75	73	57	49	62	80	61	A	90	80	B	A	85	90	54	76	76	77	58	48	54	54	A
6	64	62	52	43	48	A	81	84	97	85	57	B	B	A	80	83	75	84	83	81	81	77	77	A
7	A	74	70	68	66	73	86	80	72	A	A	B	B	A	A	48	99	A		80	55	70	75	
8	77	81	52	77	71	67	78	87	96	95	91	88	100	A	A	93	86	87	90	85	A	88	A	A
9	90	86	76	55	67	67	A	71	72	A	A	B	B	A	A	A	A	A	61	A	A	70	66	55
10	65	68			42	A	A	A	A	A	A	A	A		A	A	41	A	50	64	50	A	A	76
11	72	76	A	69	56	37	43		A		B	B	B	A	B	A	41	A	A	56	54	52	70	A
12	66	A	66	55	52					A	A		A		A	75	70	68	68	67	67	67	A	61
13	80	72	71	46	A	A	A	A	A	A	A	A	A	A	A		35	A	A	53	A	70	A	56
14	58	55	51	A	A	45	47	A	N	A	84	A	88	78	82	82	84	80	82	81	86	92	99	94
15	93	84	81	75	73	83	96	104	114	141	87	86	A	100	102	101		100		91	81	94	91	98
16	90	98	92	78	71	78	95	94	85	82	81	85	N	A	89	86	81	92	93	96	93	71	72	74
17	78	80	71	73	75	78	91	101	87	78	82	A	102	A	104	102	101	101	103	92	A	93	83	93
18	89	73	77		72	76	71	73	67	64	A				70	67	67	74	63	64	70	50	72	73
19	75	A	70	59	70	74	80	83	A	A	90	86	75	84	88	89	93	105	105	104	92	90	97	94
20	92	92	94	76	67	74	83	98	85	68	64	72	A	64	81	78	82	90	81	83	70	82	92	96
21	92	97	90	81	74	82	91	97	92	82	98	96	103	104	106	98	94	93	104	104	93	82	92	95
22	92	92	82	72	74	74	84	98		87	94	A	A	106		92	84	100	93	94	74	82	82	82
23	82	92	92	84	77	77	76	85	92	96	96	91	96	90	93	89	94	92	95	93	82	90	68	94
24	81	82	81	78	74	55	58	68	61	A	A	A	71	A	76	80	72	82	85	80	84	78	94	82
25	82	92	78	76	70	42	71	67	68	68	A	50	75	77	79	73	96			81	A	83	81	92
26	85	93	92	76	78	76	74	77	81	92	79	79	82	95	98	89	83	91	94	96	92	82	81	88
27	97	91	81	74	68	72	75	73	A	77	83	87	90	87	97	94	91	86	91	94	93	93	83	92
28	93	82	72	71	74	80	81	72	56	65	A	78	85	90	90	B	82	87	92	93	A	78	82	83
29	92	92	92	84	86	79	98	100		88	91	93	98	113	102	101	97	96	87	93	83	92	92	92
30	94	96	92	92	91	80	96	106	104	86	85	96	B	101	104	107	96	94	95	92	92	81	80	80
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	28	28	27	28	26	26	25	19	20	18	14	15	15	20	24	28	24	23	27	24	29	26	25
MED	82	82	77	72	70	74	80	80	85	82	84	86	85	90	90	84	82	87	87	83	78	78	81	82
U Q	92	92	91	77	74	78	86	97	92	89	91	91	98	101	100	93	93	93	94	93	89	89	91	93
L Q	69	72	70	55	62	66	71	71	68	70	79	78	75	82	79	74	72	80	80	71	65	70	72	73

HOURLY VALUES OF FES AT KOKUBUNJI

JUN. 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	49	49	62	61	94	66	108	65	61	G	G	92	G	45	G	G	G	43
2	30	46	G	66	49	47	G	50	47	58	50	61	61	80	75	60	54	44	G	41	27	55	85	50
3	55	72	58	41	G	G	48	68	101	91	108	G	68	81	70	60	G	G	78	59	72	59	43	34
4	G	G	G	G	G	34	34	58	56	68	46	60	55	B	B	B	G	39	111	73	27	28	30	58
5	40	73	35	G	G	57	60	58	69	59	46	B	61	G	G	G	G	43	G	G	G	G	36	58
6	38	43	32	32	32	55	60	60	73	69	G	B	B	106	50	61	58	58	58	51	32	40	G	71
7	60	29	48	42	38	35	67	81	54	59	61	B	B	118	61	59	95	115		60	79	G	G	
8	59	60	60	35	28	G	G	49	58	103	77	93	104	104	132	62	51	56	47	62	84	93	115	94
9	61	81	71	G	G	37	81	60	52	58	58	B	B	104	53	64	114	108	54	97	96	58	70	49
10	30	24			44	57	74	61	66	142	106	108	105		96	91	51	72	41	37	56	93	62	96
11	58	58	61	94	26	G	G	G		G	B	B	B	58	B	47	53	76	50	48	40	32	76	79
12	72	72	38	26	24					85	185		50	G	72	G	G	G	G	46	69	34	66	60
13	G	51	58	37	29	40	48	91	83	59	105	83	60	54	60		G	55	58	48	103	44	80	35
14	48	36	50	56	33	38	G	94	95	90	48	80	91	G	G	55	58	49	43	59	96	60	94	94
15	94	95	73	61	58	80	34	61	133	122	65	62	68	87	54	98	124	59	G	43	35	34	66	66
16	71	51	61	55	60	69	43	57	68	156	97	58	78	134	84	59	63	75	68	30	54	28	38	38
17	54	43	57	28	28	G	G	61	56	G	61	152	74	97	89	61	G	38	52	50	62	92	96	61
18	59	60	46	29	G	37	60	82	63	62	58		G		G	G	G	47	38	35	61	54	73	70
19	33	74	41	34	34	G	57	57	86	106	74	G	57	G	86	G	60	59	54	52	61	93	50	33
20	96	25	52	54	28	33	40	89	64	48	54	64	79	64	65	61	G	49	75	134	41	55	35	60
21	40	32	31	40	G	34	35	50	56	87	58	51	53	G	G	55	78	54	77	60	46	73	94	60
22	70	41	34	28	24	44	60	69	78	78	78	139	165	101	122	62	79	71	64	34	57	41	57	70
23	50	57	40	42	41	44	G	44	42	50	49	93	G	G	G	62	57	67	59	G	31	54	44	29
24	G	28	G	G	G	G	40	51	60	84	82	92	76	96	60	G	42	59	47	32	34	62	34	G
25	G	G	27	36	32	38	46	61	56	62	61	G	G	G	G	59	106	152	126	59	89	57	52	52
26	54	50	42	48	G	G	36	44	G	61	G	G	72	G	82	51	49	60	60	37	40	34	59	53
27	114	30	26	G	G	G	G	50	72	69	58	G	52	53	57	53	57	52	51	50	G	26	G	G
28	G	29	G	G	G	G	G	46	62	58	148	54	64	69	60	B	G	54	49	42	59	76	40	60
29	58	57	49	60	29	31	35	44	106	80	88	54	80	84	62	G	G	38	43	38	G	30	58	53
30	41	38	47	28	G	31	42	61	75	70	58	51	B	74	62	G	42	49	43	66	60	53	61	60
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	29	29	30	29	29	29	29	30	29	23	25	27	28	27	30	30	29	30	30	30	30	29
MED	52	44	42	35	27	34	40	58	63	68	61	61	68	69	61	59	51	56	51	48	55	54	58	58
U Q	60	60	57	51	33	44	58	64	76	87	91	92	79	97	78	61	60	71	62	59	69	60	73	68
L Q	30	29	29	13	G	G	G	49	56	59	52	51	54	G	51	G	G	47	42	37	32	32	36	40

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT KOKUBUNJI

JUN. 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	16	16	17	15	15	17	18	20	21	38	43	36	39	39	36	44	39	22	28	15	15	15	15	16
2	15	15	16	15	15	17		29	32	33	44	38	43	40	39	36	23	32	32	14	15	15	16	15
3	16	15	15	15	16	26	20	20	22	32	42		43	43	42	23	21	16	16	16	15	15	15	14
4	16	15	18	15	15	17	33	20	21	30	44	42	43	B	B	B	81	33	21	15	15	17	16	15
5	15	15	14	16		18	21	18	24	39	44	B	42	101	44	28	23	21	20	20	16		15	14
6	15	14	14	14	14	16	18	23	24	39	45	B	B	46	44	35	34	32	18	15	15	16	15	16
7	18	15	15	15	16	18	20	18	29	28	45	B	B	46	44	42	34	26		16	15	15	15	
8	15	15	15	14	14	23	24	23	24	35	38	34	40	38	35	30	28	18	17	14	16	15	15	16
9	16	14	15	16	15	18	22	21	21	35	42	B	B	46	44	40	33	18	21	14	15	15	15	16
10	15	16			14	17	20	21	29	36	35	35	38		43	39	23	21	18	15	15	15	15	14
11	16	14	16	14	15	17		24	24	81	B	B	B	52	B	39	36	21	20	16	15	15	15	16
12	16	16	15	15	18					43	39				40	60	39	23	22	15	14	15	16	16
13	16	15	15	14	14	20	18	21	27	49	33	39	38	35	34			20	18	15	14	15	15	15
14	16	15	15	15	14	17	20	22	28	40	38	43	36	63	43	40	23	22	18	15	15	15	15	14
15	15	15	14	15	15	16	27	20	23	36	36	39	37	34	43	38	35	21		15	15	15	15	14
16	15	15	15	14	14	17	35	27	26	33	40	42	40	42	39	36	23	18	20	15	14	15	15	15
17	15	15	15	15	15	16	20	21	23	42	40	36	37	69	30	38	23	20	18	15	16	17	14	16
18	15	15	15	15	14	17	20	18	24	35	38				40	39	20	18	18	15	15	14	15	15
19	15	15	15	14	14	22	17	18	20	35	29	42	38	44	30	21	26	17	16	15	15	15	14	15
20	15	16	15	15	15	15	18	16	23	21	33	36	34	33	30	30	28	18	16	15	15	14	15	15
21	15	14	14	14	15	17	18	18	20	23	38	38	35	44	33	26	26	20	18	15	15	14	15	14
22	16	15	14	14	15	16	18	18	24	34	34	36	37	38	35	33	18	20	17	15	16	15	15	14
23	15	15	14	15	15	16	16	16	18	23	35	33	33	42	46	23	24	16	16	20	15	14	15	15
24	15	15	15	15	15	16	18	17	23	36	42	39	40	36	32	29	18	17	16	15	14	14	15	17
25	15	15	14	14	14	15	16	16	20	24	28	48	34	33	28	36	22	17	20	16	16	15	15	15
26	15	15	15	16	21	16	20	18	30	30	33	50	35	38	30	26	20	17	17	15	15	15	15	14
27	15	15	14	14	16	23	17	18	21	38	39	61	39	38	34	32	23	20	18	15	15	16	15	15
28	15	14	16	15	15	17	17	18	21	29	34	38	33	36	35	B	91	30	16	16	14	15	15	15
29	15	16	15	15	16	17	18	18	22	29	38	36	35	34	32	32	22	18	16	14	16	15	15	15
30	15	15	14	15	15	18	20	21	36	35	34	34	B	39	33	32	20	18	18	16	14	15	15	14
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	29	29	29	29	27	29	29	30	29	22	23	26	28	27	29	30	28	30	30	29	30	29
MED	15	15	15	15	15	17	20	20	23	35	38	38	38	40	36	35	23	20	18	15	15	15	15	15
U Q	16	15	15	15	15	18	20	21	26	38	42	42	40	46	43	39	34	22	20	16	15	15	15	16
L Q	15	15	14	14	14	16	18	18	21	30	34	36	35	36	32	29	22	18	16	15	15	15	15	14

HOURLY VALUES OF FOF2 AT YAMAGAWA

JUN. 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	130	108	110	86	108	112	98	87	69	86	85	86	89	87	96	88	87	89	92	77	80	71	81	81
2	72	70	76	72	67	65	80	75	A	A	A	A	A	77	68	82	85	90	86	87	70	A	66	54
3	67	67	63	A	52	55	78	72	78	86	91	91	97	101	104	100	95	94	87	87	108	85	86	86
4	86	86	81	78	62	62	77	86	74	A	A	A	A	B	B	B	80	75	77	76	63	66	73	76
5	85	83	80	67	52	54	73	61	A	100	75		72	95	105	71	101	91	88	70	52	52	A	A
6	73	62	A	A	40	A	65	95	111	107	90		A	91	92	101	105	104	105	90	88	83	85	87
7	81	82	85	81	76	67	82	85	85	86	86	81	84	80	76	88	81	88	100	87	87	85	86	85
8	85	86	85	86	75	66	72	90	93	94	A	86	99	102	99	N	100		98	90	85	N	87	87
9	86	87	87	86	80	N	75	79	81	73	60	B	A	B	A	A	47	67	A	A	A	A	69	A
10	A	78	65	57	52	A	A	A	A	A	A	A	A	A		39		46	51	65	A	A	70	66
11	73	67	66	70	65	A	A	A	A	A	A	B	B	B	A	55		44	57	60	66	54	59	A
12	72	67	66	61	60	58	63	A	62	A	A	A	77	71	86	87	82	85	87	87	77	74	75	76
13	86	103	76	60	44	46	A	A	A	A	A	A	A	A	A	A	48	64	51	58	54	61	66	76
14	59	81	87	A	A	A	42	51	A	66	80	91	88	86	83	82	88	85	87	98	90	88	86	86
15	86	A	84	71	78	75	87	105	91	77	84	92	A	113	116	109	105	114	91	90	99	85	103	103
16	106	110	98	80	81	80	86	102	91	87	84	97	103	107	111	111	109	110	111	116	96	87	91	87
17	91	106	104	88	83	88	97	101	88	77	81	85	95	104	105	113	118	124	108	97	82	85	85	86
18	87	85	83	88	80	67	A	101	70	A	81	67	A	A	79	72	75	83	76	71	66	77	72	76
19	78	77	71	67	67	64	71	65	80	87	87	86	83	80	92	103	105	111	112	104	90	90	105	106
20	84	87	102	78	78	81	87	78	52	74	72	73	71	77	87	81	88	94	91	74	A	80	85	85
21	85	80	86	80	82	76	86	103	90	85	74	97	101	111	111	115	125	102	110	110	88	85	86	88
22	87	98	87	80	77	78	77																	
23					C	C	C	C	C	C														
24											A	A	82	82	75	83	81	78	91	87	A	78	81	88
25	85	103	82	80	80	71	71	76	71	A	64	A	76	77	80	81	81	N	97	88	76	84	83	84
26	86	84	86	76	74	72	81	77	82	93	84	86	100	112	107	101	97	107	99	106	90	84	90	84
27	85	104	86	84	78	82	78	71	76	75	84	90	96	108	106	104	103	101	97	90	87	85	83	86
28	86	85	75	77	78	84	85	80	66	75	82	A	81	109	95	89	95	104	101	87	80	77	82	81
29	86	83	76	64	71	84	98	88	81	80	80		A	112	110	107	104	100	97	83	79	78	82	86
30	84	86	87	80	80	80	88	105	96	A	86	89	B	112	A	112	121	127	124	107	99	87	86	87
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	27	25	27	23	24	23	21	18	20	15	17	22	22	24	26	26	27	27	24	24	27	25
MED	85	85	84	78	76	72	79	85	81	86	83	86	88	98	96	88	95	92	92	87	84	84	83	86
U Q	86	98	87	82	80	81	86	101	90	87	85	91	98	109	106	105	105	104	101	97	90	85	86	87
L Q	78	78	76	68	62	64	72	75	70	75	77	85	79	80	83	81	81	83	87	76	73	75	73	78

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

JUN. 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	69	40	103	24	26	23	40	45	55	59	G	G	60	G	G	51	54	48	40	59	48	71	65	69
2	69	54	40	31	37	40	G	47	70	61	64	60	76	76	57	G	G	44	44	30	41	56	34	78
3	84	90	83	66	30	40	39	65	69	66	70	48	67	52	60	60	54	52	58	85	93	108	114	90
4	58	26	34	30	35	38	81	59	80	55	53	94	75	B	B	B	70	56	56	52	44	30	91	92
5	30	59	61	88	44	G	36	44	92	60	68		72	50	G	G	G	G	G	G	G	30	60	48
6	93	58	35	33	G	24	45	55	40	64	82	G	99	62	77	64	66	80	63	51	132	47	58	39
7	38	58	38	24	G	30	43	G	G	G	G	G	G	63	G	107	59	52	44	52	60	58	60	54
8	66	G	70	50	41	44	G	43	44	56	87	60	82	80	67	100	147	143	42	41	38	40	90	92
9	132	133	92	31	40	G	G	G	G	52	G	B	88	B	106	76	G	51	82	82	92	94	82	148
10	92	41	38	33	27	48	61	59	81	73	78	56	58	64		G	G	G	G	39	77	59	23	G
11	G	32	31	G	39	69	52	47	59	107	90	B	B	B	84	G	G	47	64	G	23	G	29	90
12	41	58	44	43	33	28	40	55	62	57	74	90	G	G	G	G	G	G	G	32	31	G	91	82
13	84	59	58	31	39	28	40	51	58	77	68	95	103	112	96	50	G	G	G	G	31	29	28	25
14	30	53	49	70	50	39	G	38	67	83	G	82	G	G	G	G	G	48	44	38	40	83	69	72
15	90	92	34	45	29	31	32	39	50	107	66	151	115	63	G	48	55	49	G	28	59	67	G	G
16	G	83	66	71	72	59	60	37	52	55	62	G	96	152	111	104	67	57	44	50	49	65	58	41
17	38	32	26	G	G	G	32	G	55	81	73	59	98	G	G	G	G	62	93	62	58	81	88	109
18	85	90	41	57	57	36	88	60	62	175	108	G	162	153	G	64	G	47	G	30	31	37	67	85
19	106	70	24	26	36	35	G	54	66	65	98	88	58	G	53	62	93	49	152	128	69	48	40	G
20	G	G	G	G	G	G	32	56	46	64	58	G	81	G	G	G	G	G	G	34	91	72	45	69
21	28	30	30	31	28	24	G	50	72	79	78	54	55	73	54	92	100	47	87	G	26	G	G	G
22	G	26	G	G	G	G	G																	
23					C	C	C	C	C	C														
24											72	108	55	79	57	87	G	G	40	65	68	31	79	84
25	23	G	G	44	37	28	49	92	70	78	53	58	G	79	74	90	G	52	40	54	25	37	38	33
26	32	28	G	G	G	G	G	43	57	43	47	G	52	96	G	44	59	58	90	85	94	71	80	39
27	92	92	44	32	32	38	36	G	53	61	84	81	54	G	G	52	G	50	G	29	40	55	30	25
28	24	G	G	G	G	G	G	G	G	54	66	78	70	153	G	G	G	62	66	71	30	30	G	26
29	48	59	59	32	G	G	G	G	50	44	52	178	134	104	75	G	65	74	69	34	G	28	36	30
30	32	46	28	G	G	G	35	45	57	88	118	64	B	83	123	101	G	G	48	32	32	G	G	33
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	28	28	27	27	27	28	25	26	25	26	27	28	28	28	28	28	28	28	28
MED	44	54	38	31	31	28	36	45	57	64	68	60	71	64	54	51	G	49	44	40	42	48	58	51
U Q	84	64	58	44	39	38	44	55	69	79	80	89	96	89	75	87	62	56	65	60	68	69	79	84
L Q	29	29	27	12	G	G	G	37	50	55	53	G	55	G	G	G	G	22	G	30	31	30	29	28

HOURLY VALUES OF FMIN AT YAMAGAWA

JUN. 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	16	15	17	21	36		58	43	69	64	35	40	35	20	15	15	15	15	15
2	15	15	15	15	15	15	18	24	32	35	46	39	44	44	43	48	39	38	23	16	15	15	15	15
3	15	15	15	15	15	15	20	20	24	39	42	46	44	56	45	42	42	23	15	15	16	15	15	15
4	15	15	15	15	15	15	20	17	34	36	41	44	44	B	B	B	40	33	17	15	15	15	15	15
5	15	15	15	15	15	15	18	16	36	39	42		45		61		46	42	20	16	15	15	15	15
6	15	15	15	15		17	20	22	38	38	42	131	59	49	45	44	39	36	18	16	15	15	15	16
7	15	15	15	15	16	17	17	18	24	43	62	81	101	49	101	44	42	35	23	16	15	15	15	15
8	15	15	15	15	15	15	17	34	27	36	36	42	45	46	44	39	35	34	22	15	15	15	15	15
9	15	15	15	15	15	15	16	17	38	46	48	B	64	B	48	44	91	23	20	15	15	15	15	15
10	15	15	15	15	15	15	20	20	34	38	39	44	45	44				42	16	15	15	15	15	15
11	15	15	15	15	15	15	16	23	34	37	40	B	B	B	52	91	91	35	22	15	16	15	15	15
12	15	15	15	15	15	16	26	36	42	44	45	45				47	43	37	30	16	15	15	15	16
13	15	15	16	15	15	15	16	26	34	48	36	40	39	39	35	36			18	16	15	15	15	16
14	15	15	15	15	15	15	16	23	35	44	52	48	50	54	57	56	46	36	29	16	15	15	15	16
15	15	15	15	15	15	15	16	34	34	36	45	42	42	43	54	54	40	35		18	15	15	15	15
16	16	15	15	15	15	15	22	35	36	42	44	60	44	45	35	43	38	26	20	15	15	15	15	15
17	15	16	15	15	15	15	20	17	36	38	43	44	44	63	65	56	49	34	20	16	15	15	15	15
18	15	15	15	15	15	15	16	18	21	36	42		42	42	58	44	66	33	20	15	15	15	15	15
19	15	15	15	15	15	15	16	17	21	36	36	43	46	48	43	41	36	17	16	15	15	15	15	15
20	15	15	15	15	15	15	16	20	23	34	38		42		36	35	24	21	18	15	15	15	15	15
21	15	15	15	15	15	16	17	16	23	27	37	40	39	43	36	38	28	33	28	17	15	15	15	16
22	15	15	15	16	15	17	27																	
23					C	C	C	C	C	C														
24											42	43	42	42	42	36	42	38	18	15	17	15	15	15
25	15	15	15	15	15	15	15	16	34	37	40	43		39	42	39	55	24	20	15	15	15	15	15
26	15	15	16	15	15	15	20	21	23	45	39	58	43	44	44	34	35	23	16	15	15	16	15	15
27	15	15	15	15	15	15	15	35	35	39	48	44	45	62	56	38	45	29	18	15	15	15	15	15
28	15	15	15	17	17	16	16	16	24	36	40	42	42	39	N	65	91	29	17	16	16	15	15	16
29	16	16	15	17	16	15	26	24	33	35	39	39	38	39	45	52	24	21	16	16	16	15	16	15
30	15	15	15	16	15	16	17	16	24	38	39	39	B	44	44	41	40	26	18	15	15	16	15	15
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	27	28	28	27	27	27	27	23	24	22	24	25	26	27	27	28	28	28	28	28
MED	15	15	15	15	15	15	17	20	34	38	42	44	44	44	45	43	41	33	20	15	15	15	15	15
U Q	15	15	15	15	15	16	20	24	35	42	45	48	45	49	56	50	46	36	22	16	15	15	15	15
L Q	15	15	15	15	15	15	16	17	24	36	39	42	42	42	42	38	38	24	17	15	15	15	15	15

HOURLY VALUES OF FOF2 AT OKINAWA

JUN. 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	146	146	129	145	141	130	86	86	84	101	89	98	102	106	N	118	118	113	108	A	A	A	78	84
2	74	66	66	66	64	66	77	77	70	56	A	A	63	81	90	101	108	111	110	104	74	53	62	51
3	A	A	67	63	38	54	66	66	75	88	89	104	116	125	129	129	122	111	107	108	105	86	104	86
4	86	A	110	77	66	58	70	85	82	77	A	91	A	B	B	91	93	92	91	87	69	66	78	84
5	86	86	86	73	53	44	70	66	A	107	88	A	88	102	112	85	112	103	79	88	63	55	66	A
6	76	66	A	41	A		54	88	107	90	101	B	105	103	95	111	121	126	110	110	103	90	88	87
7	86	84	85	86	68	66	70	81	85	94	85	84	92	92	97	88	96	103	110	90	90	85	85	86
8	103	87									87	90	101	108	106	107	110	119	108	105	86	99	105	110
9	67	124	110	A	A	82	70	90	86	74	72	B	65	74	96	80	64	76	84	86	74	A	A	A
10	A	A	A	62	A	33	A	A	A	A	A	A	A	44	A	52	53	51	44	62	73	52	63	51
11	66	66	80	53	A	A	A	A	A	A	52	B	B	A		A	69	67	71	62	80	66	54	65
12	67	65	64	54	60	50	61	62	A	71	A	91	91	86	96	105	105	104	106	105	86	A	90	86
13	87		87	85	A	30	A	A	A	A	A	A	A		N	55	A	84	77	69	80	A	81	75
14	73	85	100	55	A	A	A	44	65	73	88	105	106	101	101	102	101	95	106	111	87	78	84	85
15	85	87	81	74	78	72	82	89	78	81	80	91	110	123		121	124	98	A	87	101	108	91	110
16	112	120	110	86	85	83	80	96	87	79	97	105	107	113	128	134	137	138	145	128	122	109	104	109
17	110	108	108	85	81	81	88	90	86	76	82	76	92	100	121	138	156	158	130	110	88	85	86	84
18	81	A	81	86	88	76	A		84	83		92	86	102	108	92	82	97	88	85	86	82	78	79
19	A	81	80	78	66	66	66	75	87	87	90	90	88	91	92	105	116	120	122	84	85	103	122	146
20	110	105	109	86	79	67	85	78	76	86	90	85	88	94	93	95	98	112	90	85	85	80	80	84
21	86	81	53	71	68	60	74	90	87	80	74	104	102	116	124	118	111	105	121	111	88	89	84	81
22	82	102	88	76	76	72	86	87	84	80	83	95	106	116	A	A	120	128	A	122	104	87	90	90
23	110	86	86	98	78	66	75	88	86	90	A	95	105	105	121	131	145	143	136	138	111	85	90	108
24	110	91	86	84	68	66	54	53	A	70	62	65	90	88	122	91	105	100						
25										75	A	80		92	112	109	A	131	122	85	87	90	90	86
26	87	87	87	74	66	72	76	76	86	87	82	86	110	121	111	104	110	107	111	107	87	79	A	A
27	86	86	86	84	82	72	66	80	83	85	85	92	106	117	127	126	130	118	121	121	104	85	86	81
28	82	85	74	72	72	77	86	71	73	80	85	92	96	106	105	112	121	122	111	104	90	86	87	85
29	87	87	86	79	77	83	86	80	77	75	84	90	106	113	115	A	146	114	A	A	91	85	83	77
30	77	81	75	79	77	74	86	90	86	80	A	82	90	120	121	128	145	163	155	126	111	N	109	89
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	24	26	27	22	25	23	24	22	26	21	23	25	27	23	27	28	30	26	27	28	24	27	26
MED	86	86	86	77	74	67	75	80	84	80	85	91	101	103	111	105	112	111	109	104	87	85	86	85
U Q	103	96	100	85	79	76	86	88	86	87	89	95	106	116	121	121	123	122	121	111	102	89	90	89
L Q	77	81	80	66	66	59	66	73	77	75	81	85	89	92	96	91	99	98	90	85	82	78	78	81

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

JUN. 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	32	G	G	G	G	38	40	60	58	69	58	96	60	60	54	56	78	73	51	92	179	143	91	69
2	49	40	40	32	28	33	40	40	53	46	62	57	56	G	G	G	G	G	G	33	26	41	48	40
3	86	90	46	36	G	G	29	44	61	76	87	84	G	76	50	67	G	45	43	31	28	33	30	26
4	110	111	72	91	71	40	48	86	83	107	134	107	168	B	B	G	72	80	82	59	40	G	24	36
5	143	91	44	G	26	G	49	67	86	60	58	100	66	G	G	G	G	G	G	30	25	G	40	49
6	41	90	60	30	32		G	G	61	55	70	B	84	67	78	58	64	70	82	84	65	24	G	G
7	G	28	G	G	G	G	G	34	49	48	G	G	G	61	52	67	G	G	42	G	32	90	40	84
8	91	38									56	G	48	78	73	68	54	G	37	31	G	28	29	31
9	85	134	92	122	114	84	33	53	76	60	58	B	G	64	78	G	G	55	48	74	44	67	91	109
10	146	127	86	84	83	30	84	113	60	74	76	79	65	66	50	G	G	G	42	30	28	28	G	43
11	28	29	G	32	32	34	32	41	84	66	G	B	B	60	G	74	61	51	55	66	79	40	32	57
12	59	40	40	39	35	33	34	45	65	117	80	G	64	81	56	G	G	G	G	G	28	32	24	28
13	G	28	G	23	58	39	46	57	72	77	70	95	101	G	60	48	102	83	51	34	38	28	G	G
14	G	40	91	23	39	43	60	82	49	61	64	G	G	G	G	60	52	G	60	54	32	48	40	28
15	134	69	48	32	26	G	G	42	48	55	70	59	G	63		78	81	114	186	72	82	32	36	29
16	30	28	28	G	37	36	33	40	40	47	50	70	63	90	91	82	92	72	58	34	90	84	G	29
17	32	G	G	G	G	G	30	42	42	G	G	49	112	93	94	62	55	41	41	71	35	33	48	G
18	166	91	89	88	90	69	169	148	84	169	177	89	60	59	G	56	G	52	37	28	57	G	28	65
19	90	70	84	67	42	40	46	59	89	64	52	103	136	76	76	G	G	45	103	110	91	34	40	G
20	23	G	G	G	G	G	29	37	59	62	93	63	80	54	56	G	44	47	45	84	32	G	39	57
21	36	29	24	G	G	24	29	43	84	74	81	82	67	G	G	G	G	69	72	50	G	G	34	26
22	24	33	28	G	G	G	G	41	51	73	64	47	84	90	164	145	78	51	128	85	33	40	33	24
23	32	38	32	G	G	G	32	39	54	73	92	100	57	59	56	47	G	45	54	59	72	44	33	40
24	33	70	44	38	55	49	39	55	57	71	62	87	110	134	149	86	95	72						
25										58	126	G	88	80	102	135	175	90	93	152	57	33	37	28
26	28	G	G	G	G	G	G	40	42	56	66	48	61	84	108	72	44	63	62	69	90	34	69	166
27	39	69	44	37	34	24	32	39	50	79	66	81	118	102	82	60	68	93	57	41	32	24	G	32
28	G	32	G	40	33	28	40	41	48	49	45	G	74	53	G	64	G	64	72	83	67	39	23	28
29	G	23	G	G	G	G	G	G	40	47	46	54	G	G	79	122	151	117	151	110	46	33	26	28
30	32	30	24	24	G	G	30	43	65	70	107	70	G	65	74	82	74	42	G	32	26	G	28	G
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	28	28	28	27	28	28	28	29	30	27	29	29	28	30	30	30	29	29	29	29	29	29
MED	33	38	36	27	30	28	32	42	58	64	65	70	64	64	58	60	53	52	54	59	38	33	33	29
U Q	88	80	54	38	40	39	43	58	74	74	81	89	86	80	80	74	78	72	77	83	69	40	40	53
L Q	26	28	G	G	G	G	29	40	49	55	56	47	24	53	25	G	G	41	41	31	28	24	24	26

HOURLY VALUES OF FMIN AT OKINAWA

JUN. 1991

LAT. 26.3N LON. 127.8E 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	15	15	15	15	15	15	16	22	27	28	38	40	45	35	30	39	27	20	16	15	14	15	15
2	15	15	15	15	15	15	15	22	26	29	35	34	36	36	33		27	53	23	17	18	15	15	15
3	15	15	15	15	15	15	16	17	24	29	32	44	49	34	48	33	24	26	18	17	15	15	15	15
4	15	15	15	15	15	15	17	18	27	28	33	35	34	B	B	101	38	27	20	16	15	15	15	15
5	16	15	15	16	15	15	16	18	24	28	33	58	44	91	46	34	28	26	18	15	16		15	15
6	15	15	15	14	14		24	36	23	28	42	B	55	48	48	33	38	35	21	16	15	15	15	15
7	15	15	16	15	15	17	23	22	24	30	54	62	60	49	46	71	32	26	20	24	15	18	15	15
8	15	15									28	33	46	32	43	32	28	27	20	16	15	15	15	15
9	15	15	15	14	14	15	15	16	22	27	28	B	101	50	49	59	29	27	18	16	15	15	15	15
10	15	15	15	14	15	15	16	20	26	28	40	42	45	46				27	18	16	15	15	15	15
11	15	15	17	15	15	15	15	20	23	29	71	B	B	49	101	43	30	32	22	15	15	15	15	15
12	14	15	15	15	15	15	15	30	38	42	44	66	46	45		50	30	24	20	16	15	15	15	15
13	16	14	18	15	14	15	16	21	24	49	33	33	35	30	35	32	29	22	17	15	15	15	18	18
14		14	15	15	15	15	15	18	24	39	43	52	53	49	52	43	30	26	18	16	15	15	15	14
15	15	15	15	15	15	15	16	16	24	26	40	43	51	45		42	28	28	49	23	14	15	15	15
16	15	15	15	15	15	14	26	22	22	26	30	34	35	34	33	33	27	22	24	16	15	15	16	16
17	15	15	16	15	15	15	16	21	30	29	30	51	42	54	46	48	26	20	22	16	15	15	15	15
18	15	15	15	15	14	15	16	17	18	27	27	29	32	43	30	30	24	22	17	15	15	15	15	15
19	15	15	14	15	15	14	15	16	21	26	29	34	41	42	29	50	26	21	15	15	15	15	15	15
20	15	15	15	15	15	15	21	18	21	26	29	36	38	35	32	29	24	20	24	15	15	15	15	15
21	15	15	15	15	17	15	15	17	21	27	26	29	33	38	51	29	26	22	22	15	15	16	15	16
22	17	15	15	15	21	15	17	16	28	30	42	40	42	35	33	32	26	23	16	15	15	15	15	15
23	15	15	15	16	16	15	15	15	24	27	28	29	29	30	30	29	46	27	17	15	14	15	15	15
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U Q	15	15	15	15	15	15	16	21	24	29	40	51	50	47	48	45	30	27	22	16	15	15	15	15
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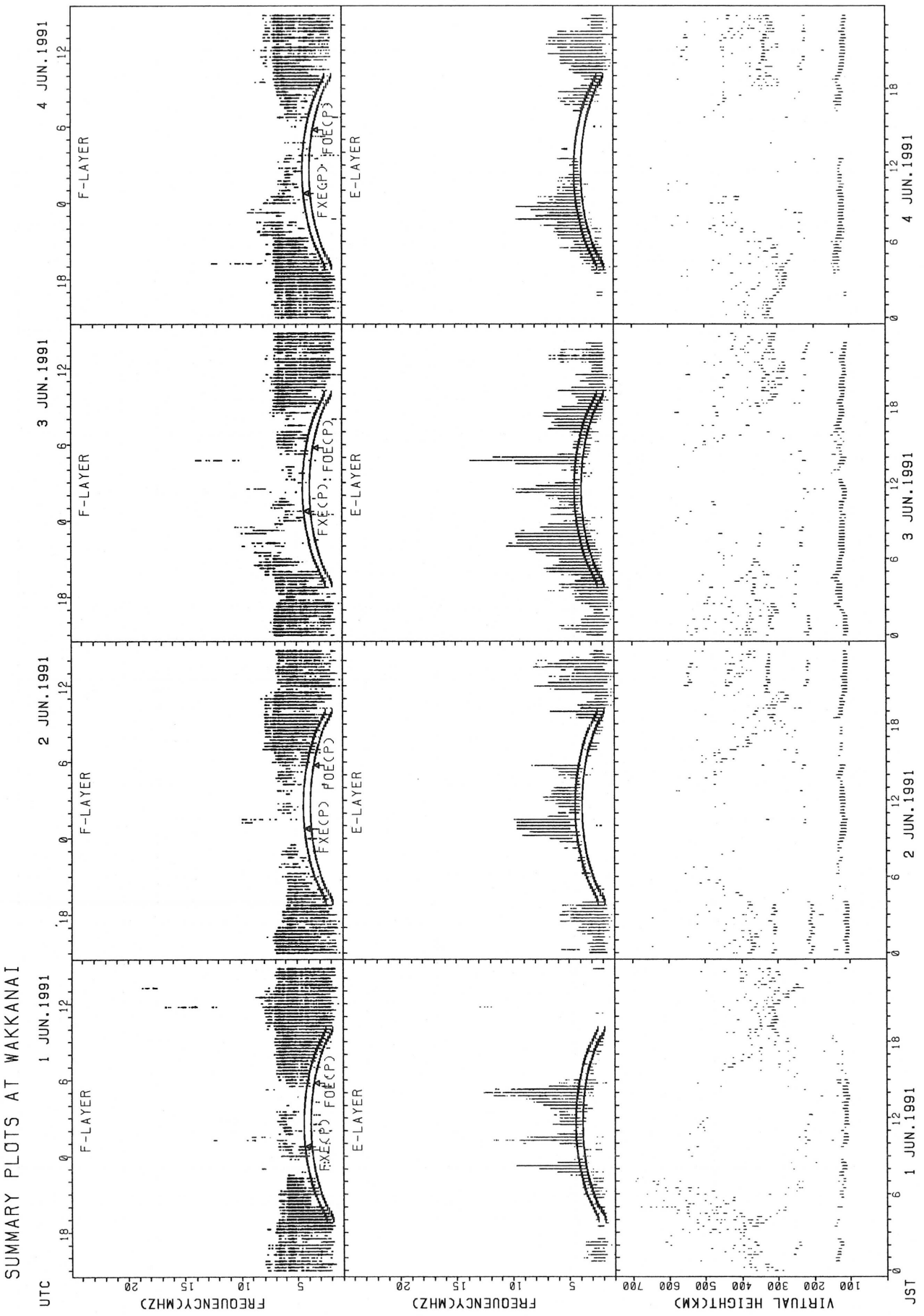
SUMMARY PLOTS AT WAKKANAI
UTC
JST
1 JUN.1991
2 JUN.1991
3 JUN.1991
4 JUN.1991
F-LAYER
E-LAYER
FXE(P); FOE(P)
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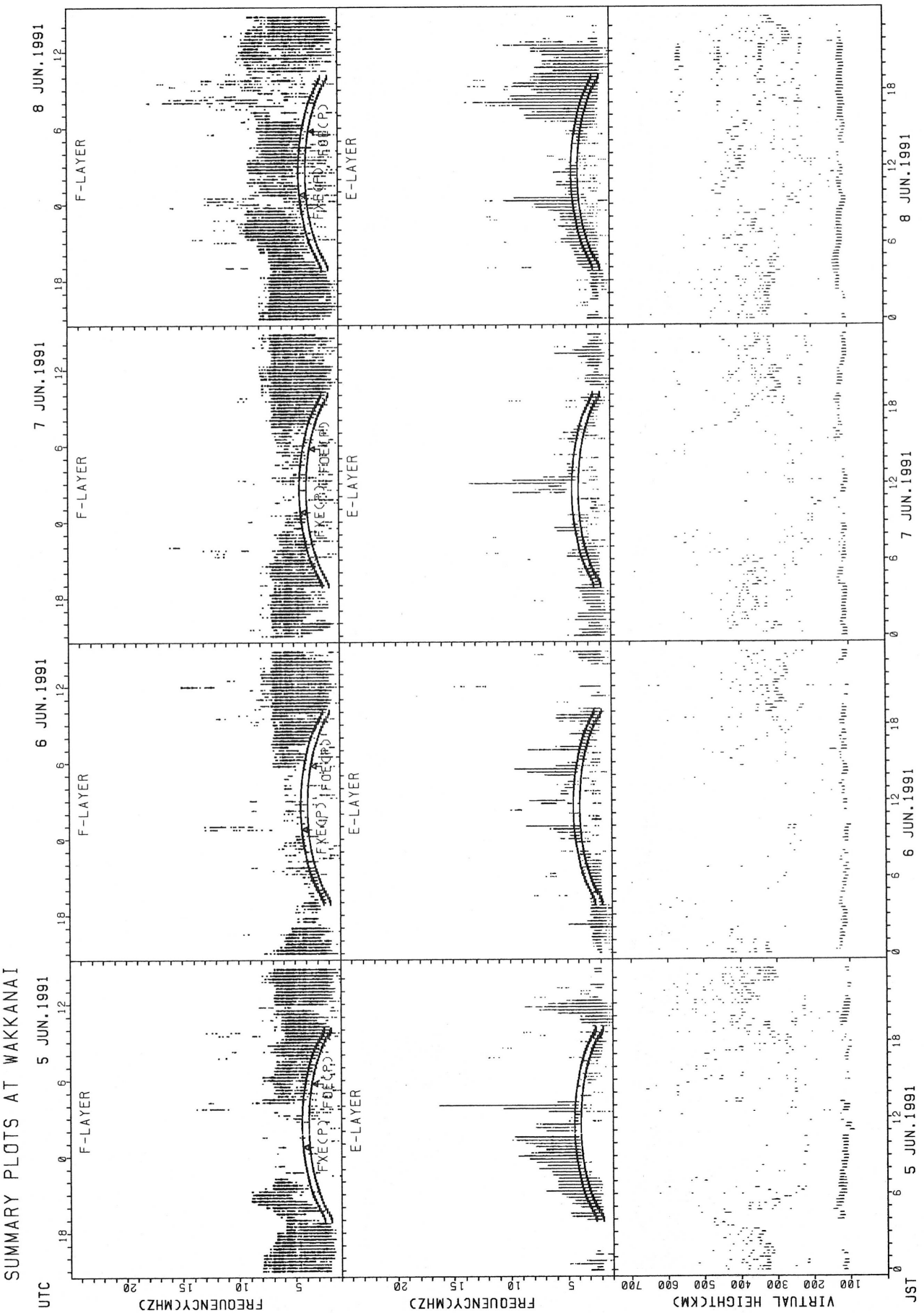
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE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F-LAYER
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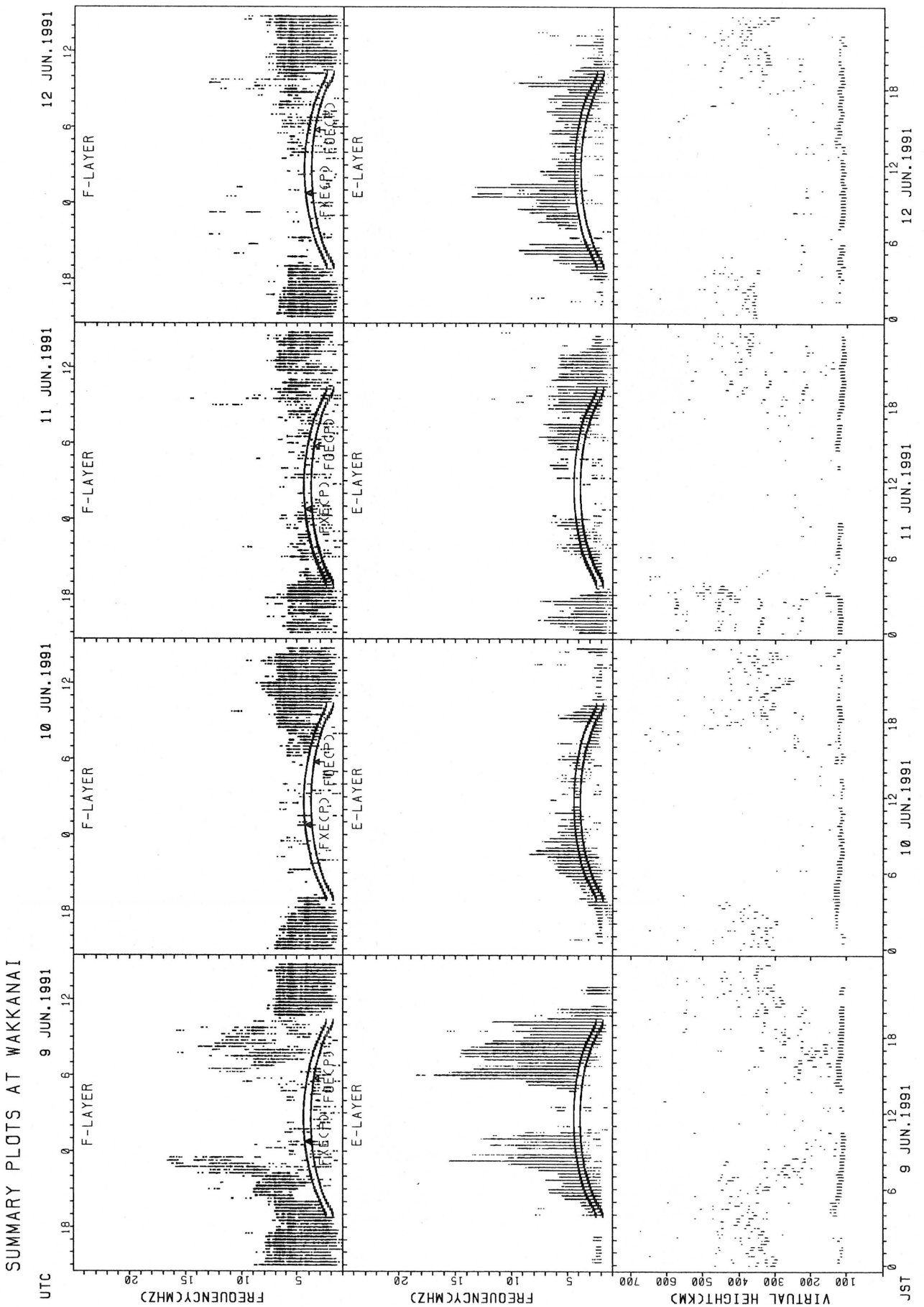
SUMMARY PLOTS AT WAKKANAI
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F-LAYER
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FREQUENCY(MHZ)
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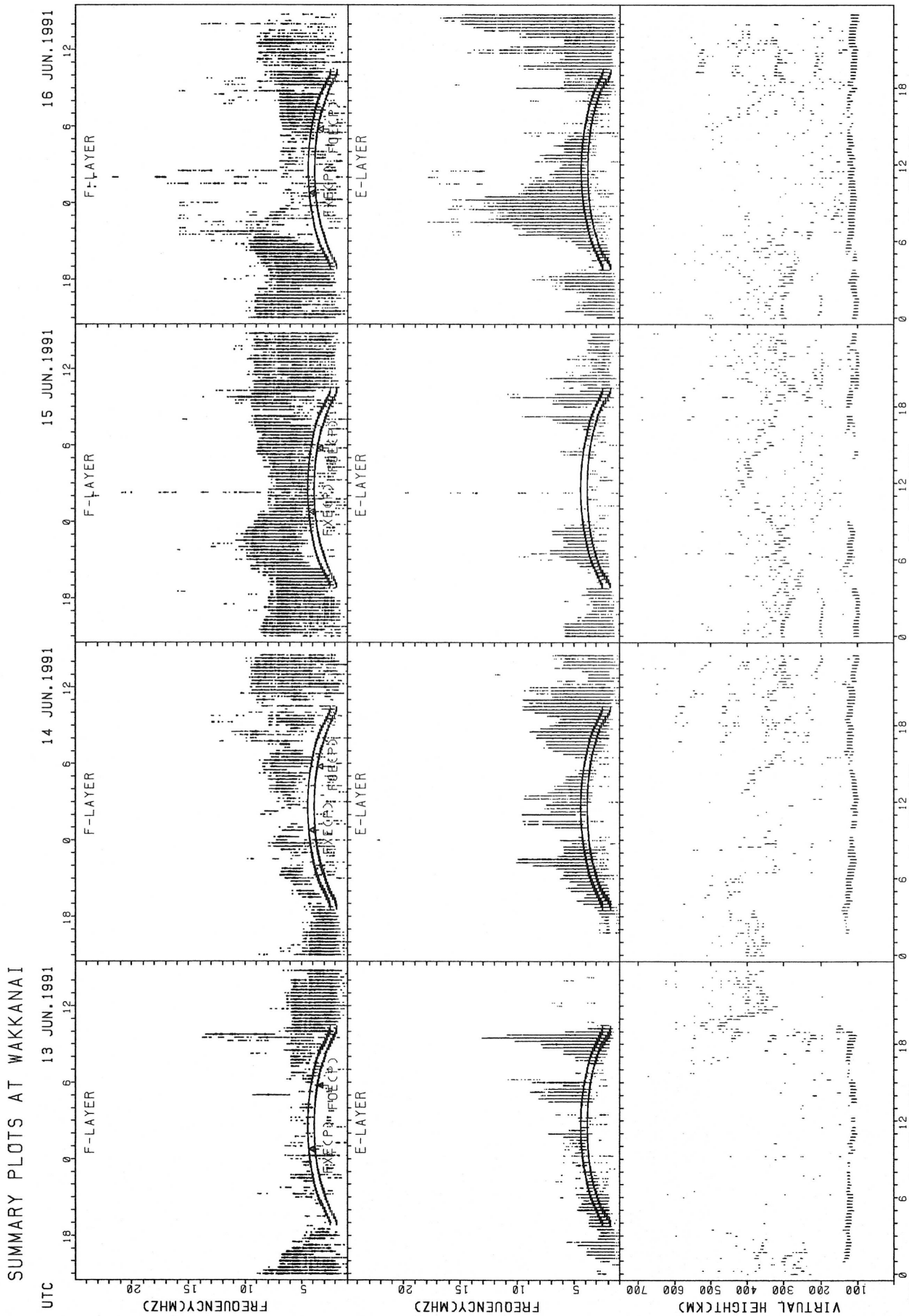
SUMMARY PLOTS AT WAKKANAI
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F-LAYER
E-LAYER
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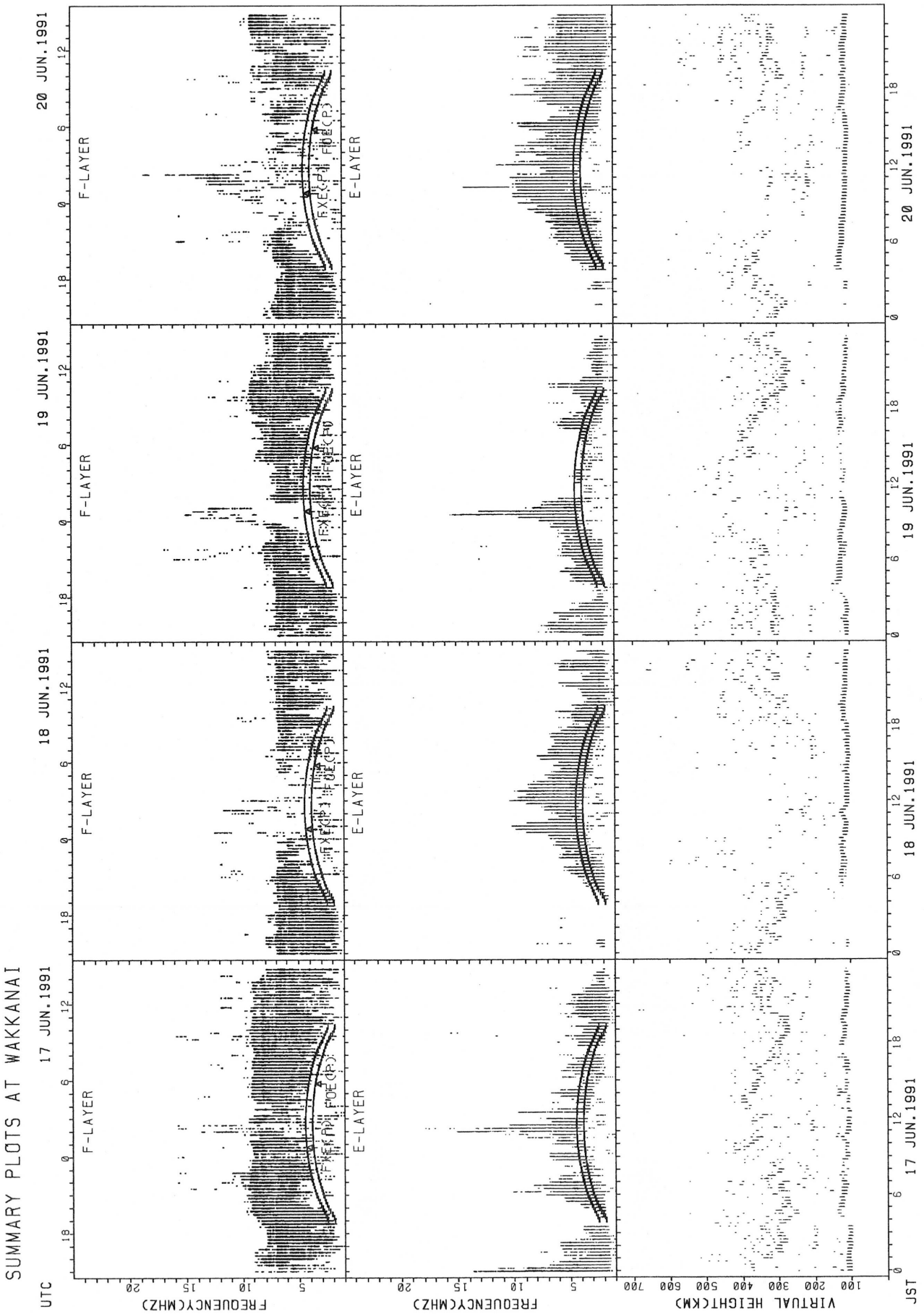
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E-LAYER
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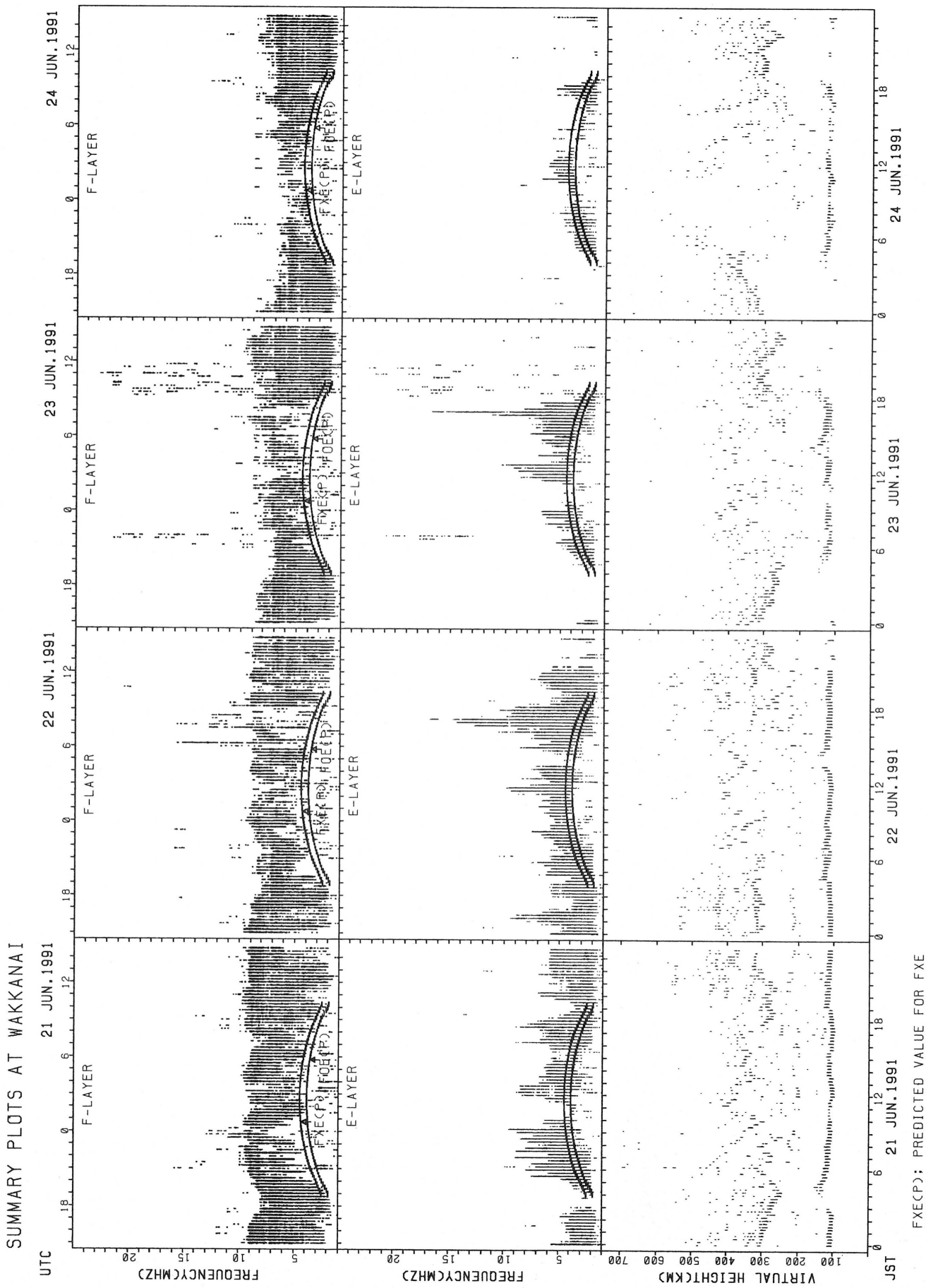
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F-LAYER
E-LAYER
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JST
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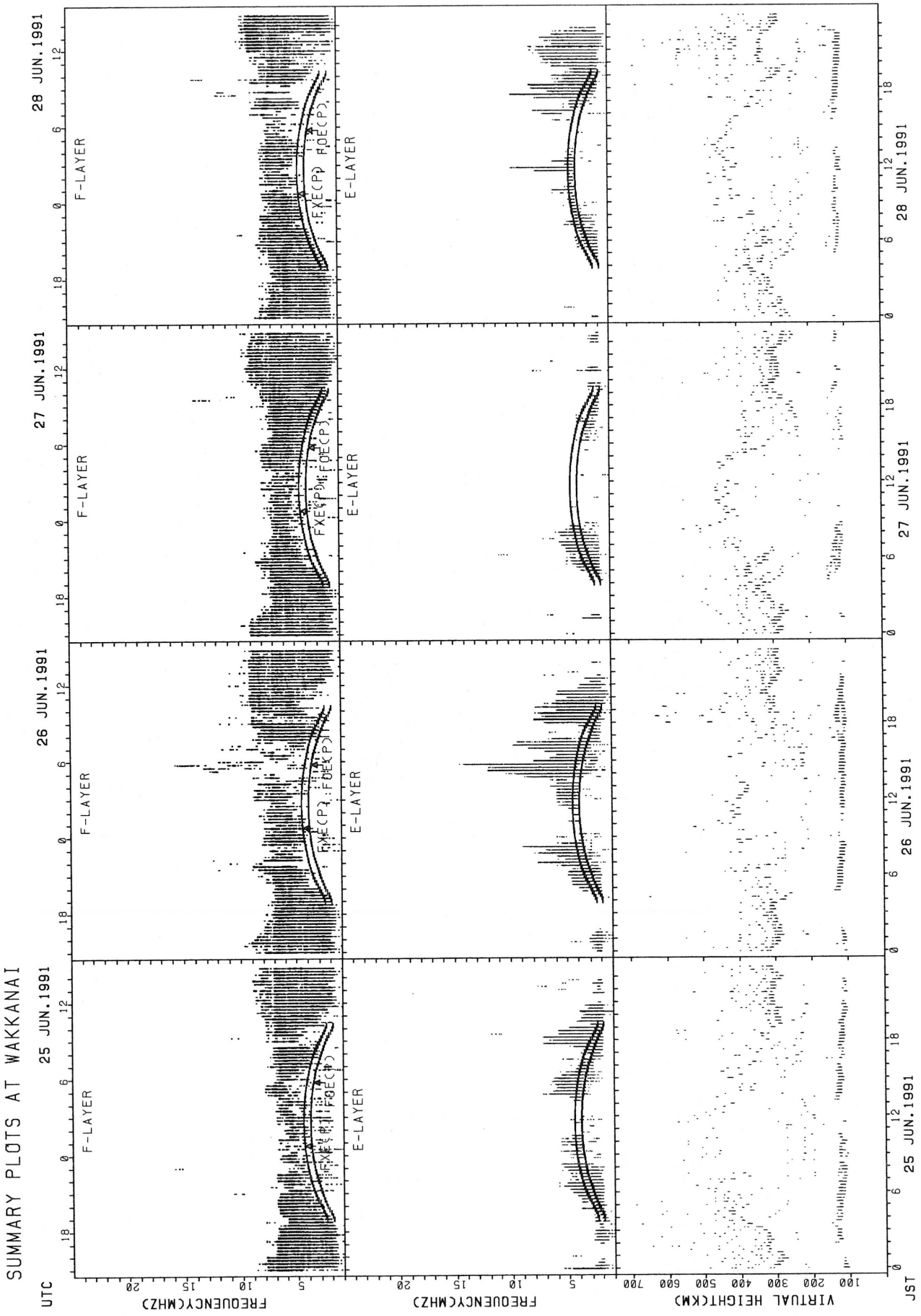
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F-LAYER
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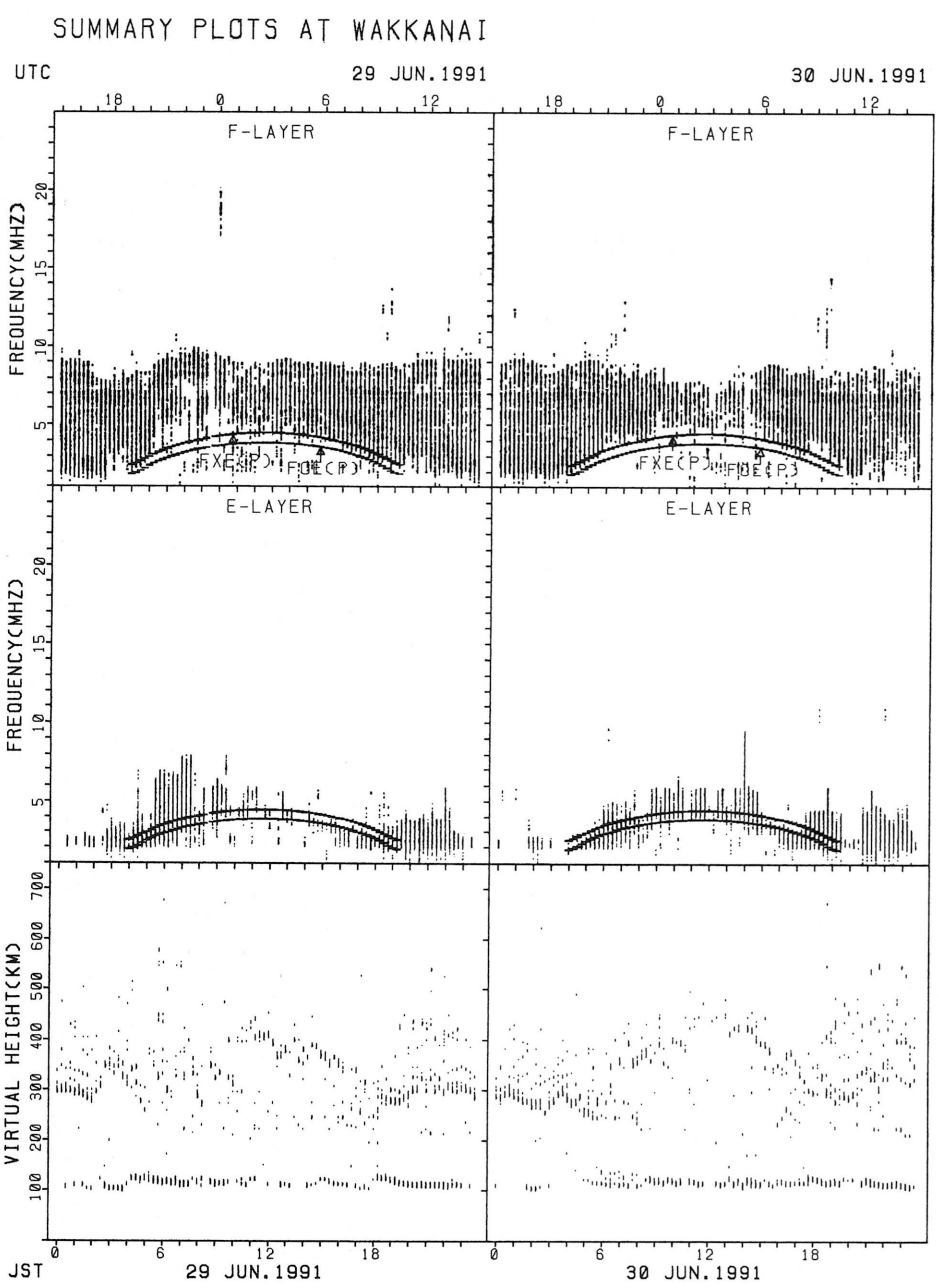

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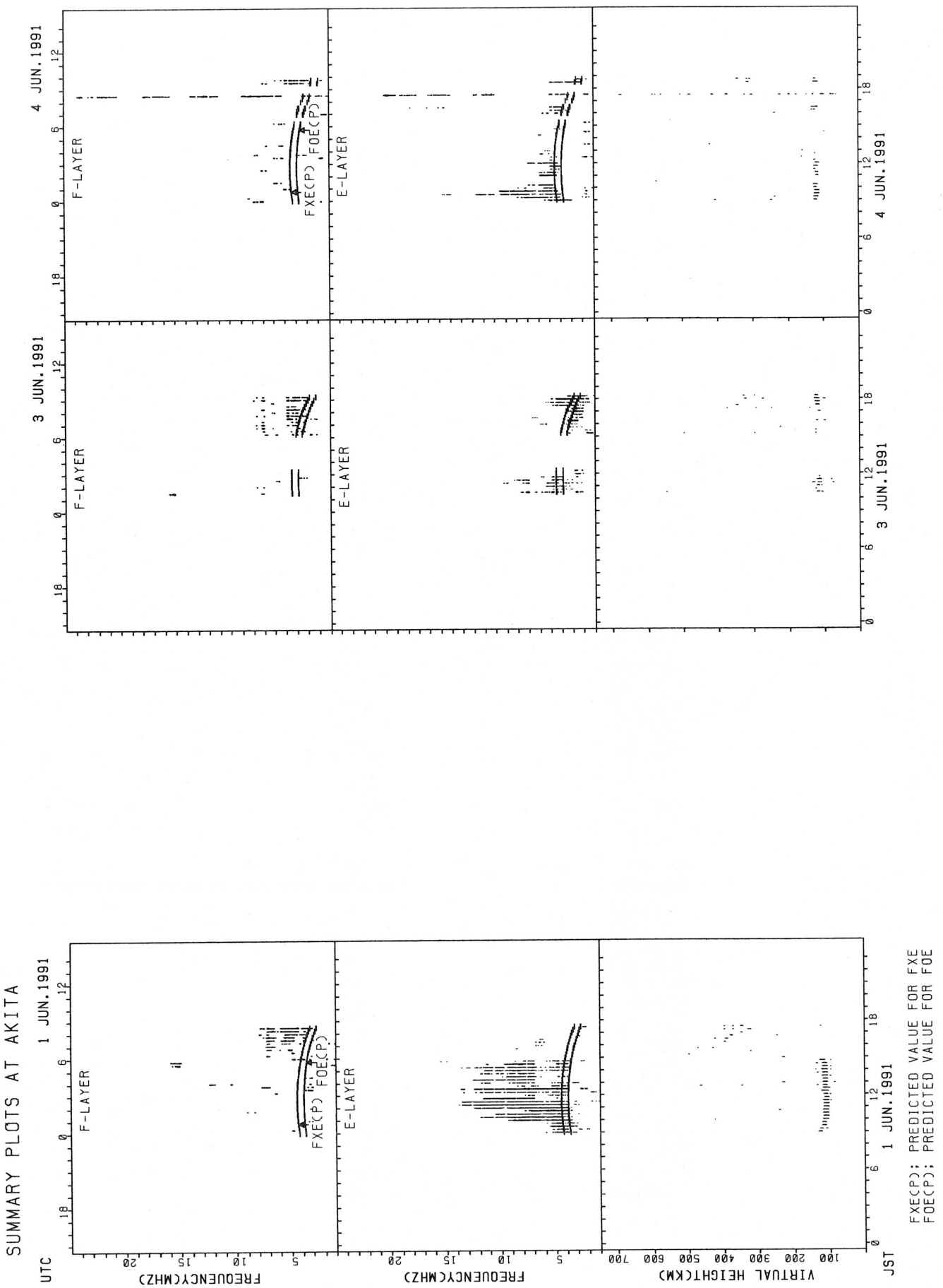
SUMMARY PLOTS AT AKITA
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E-LAYER
FREQUENCY(MHZ)
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JST
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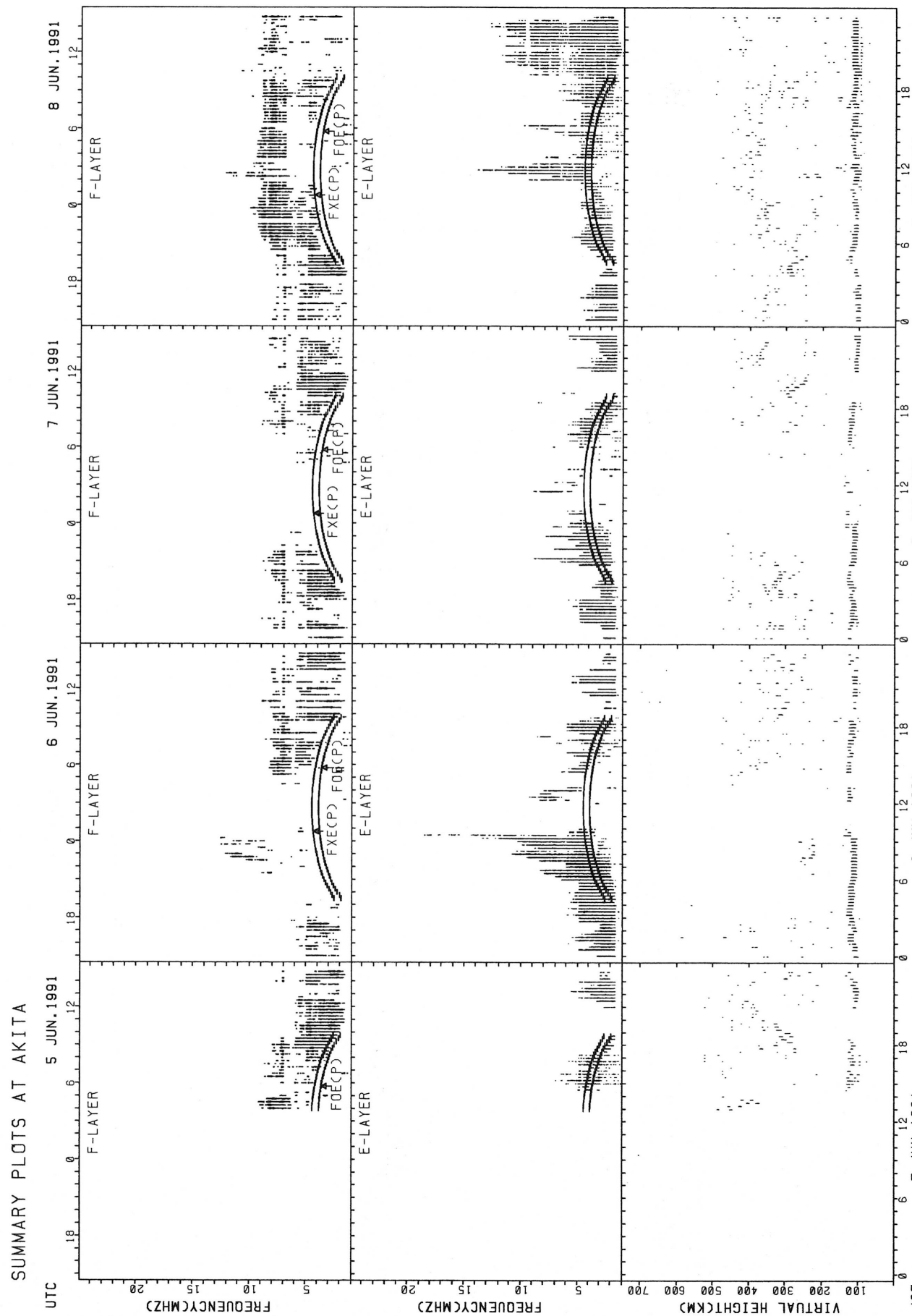
FOE(P); PREDICTED VALUE FOR FOE
3 JUN.1991
4 JUN.1991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E-LAYER
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FOE(P)
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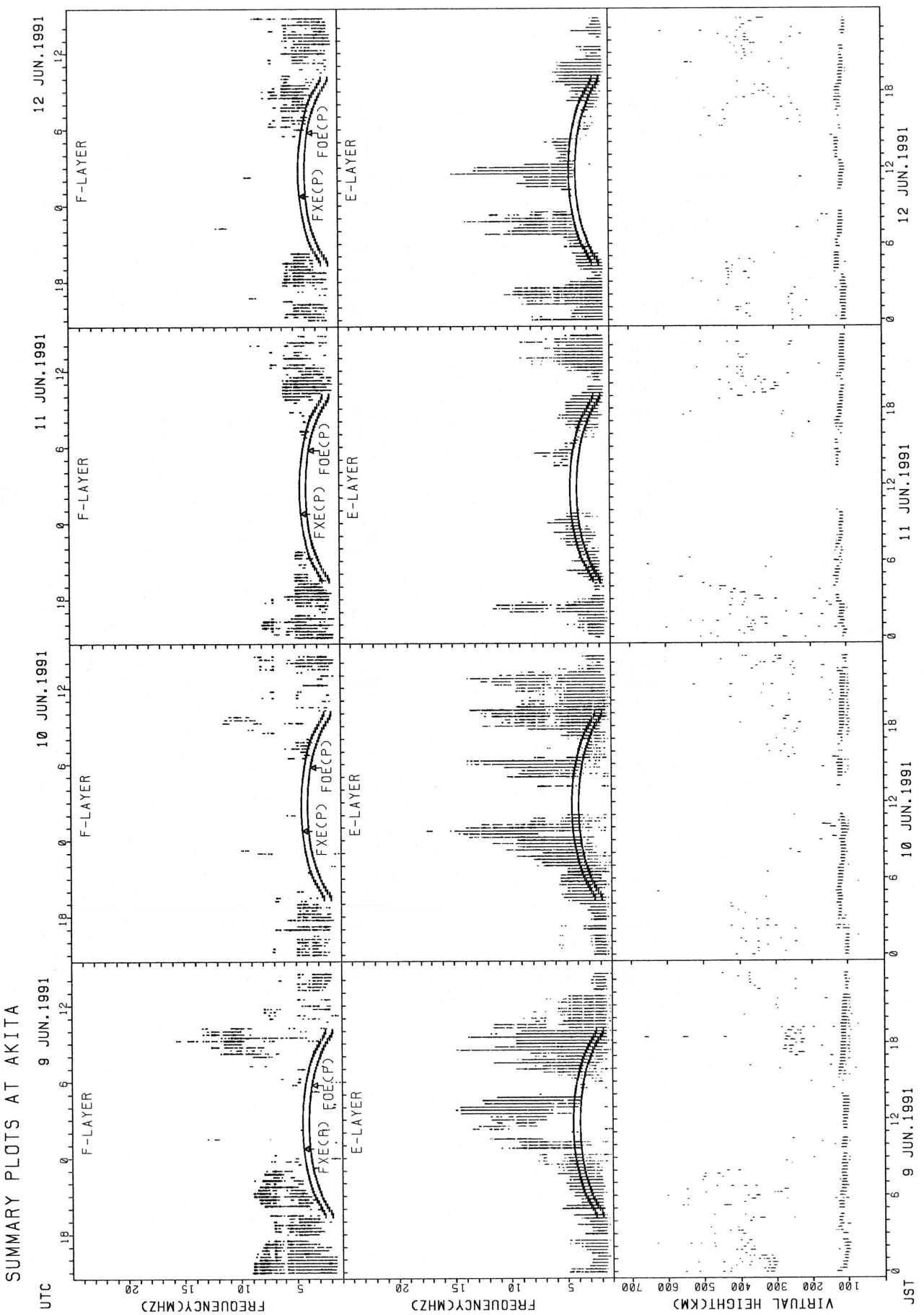
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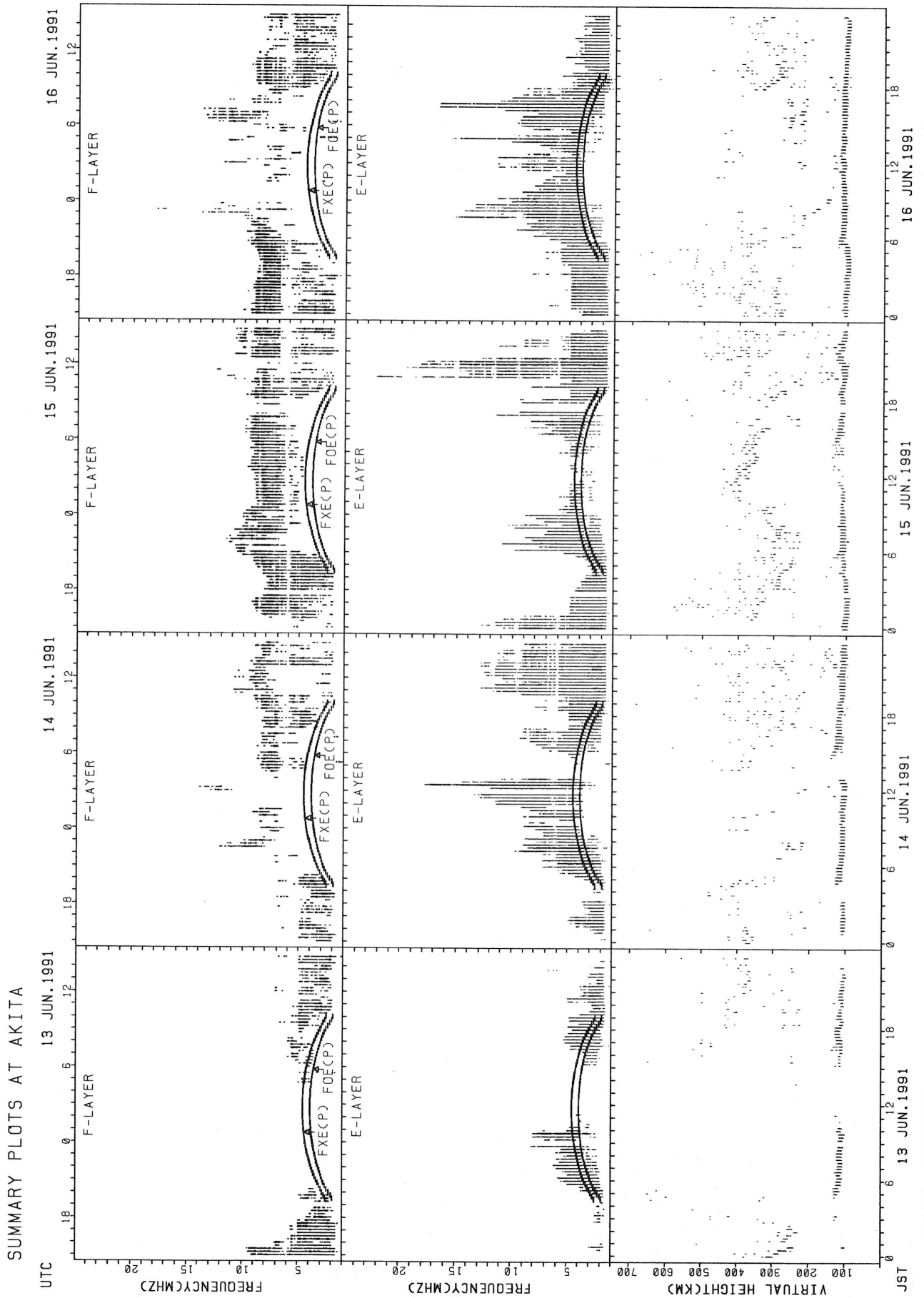
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VIRTUAL HEIGHT(KM)
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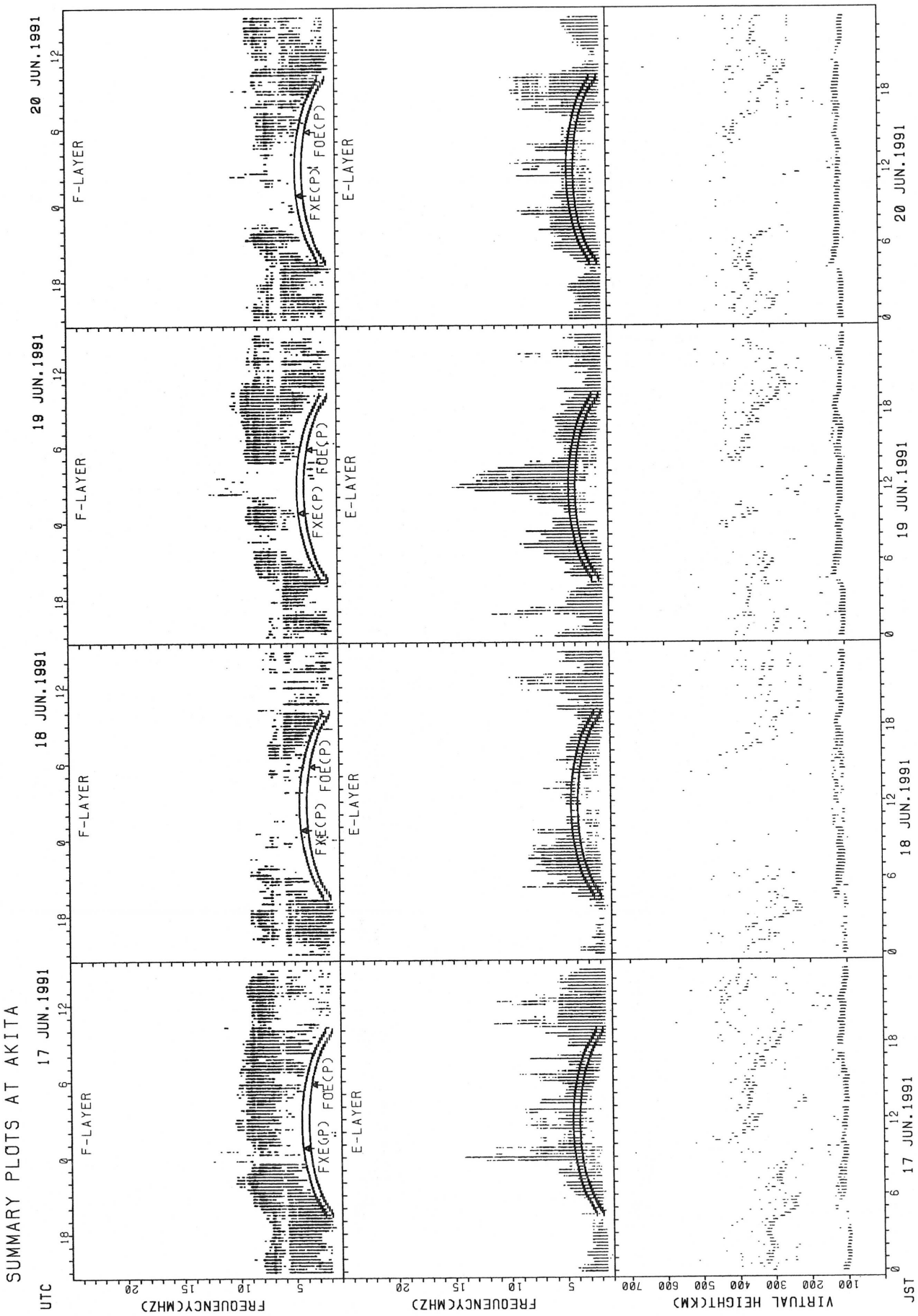
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FOE(P)
FREQUENCY(MHZ)
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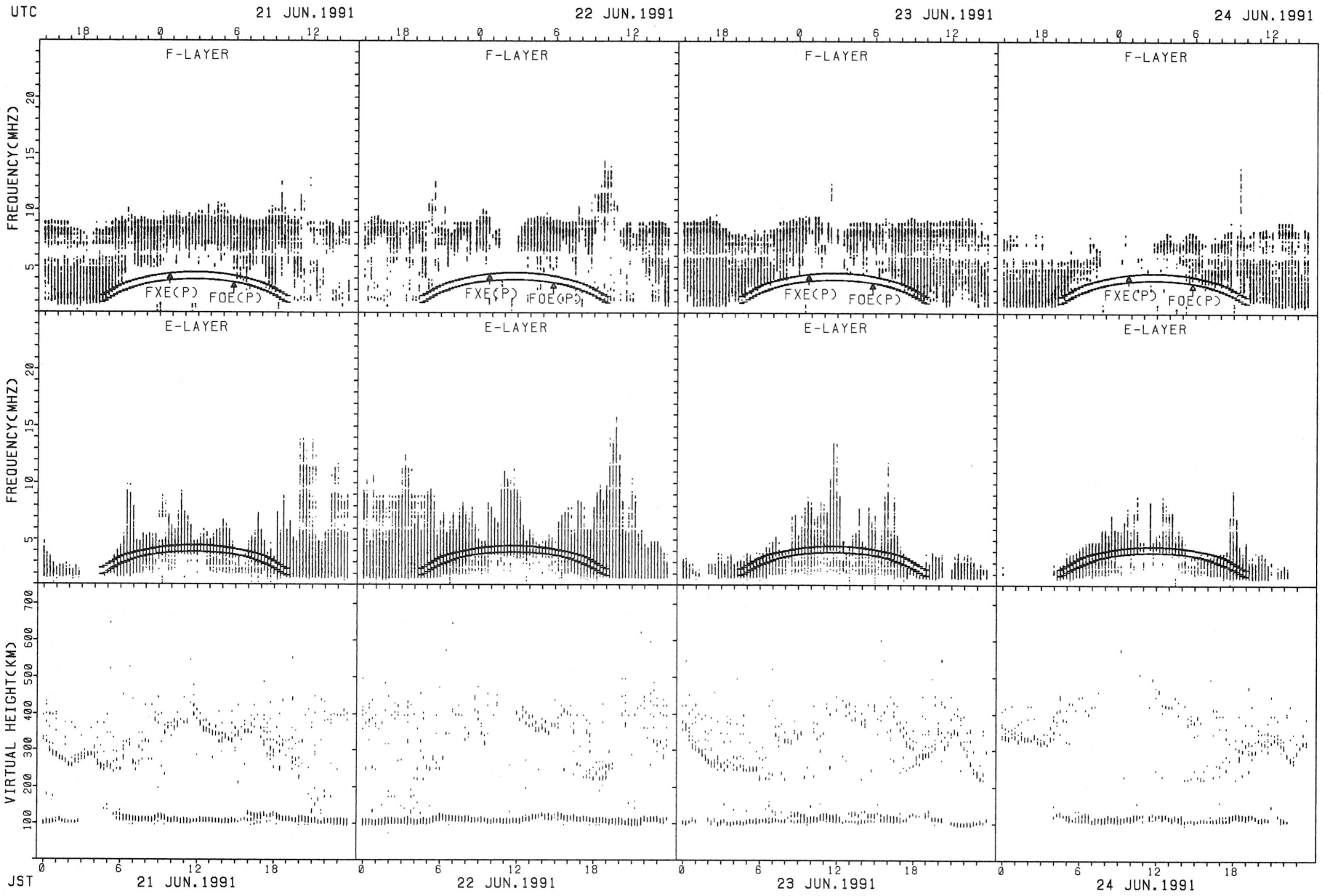
SUMMARY PLOTS AT AKITA



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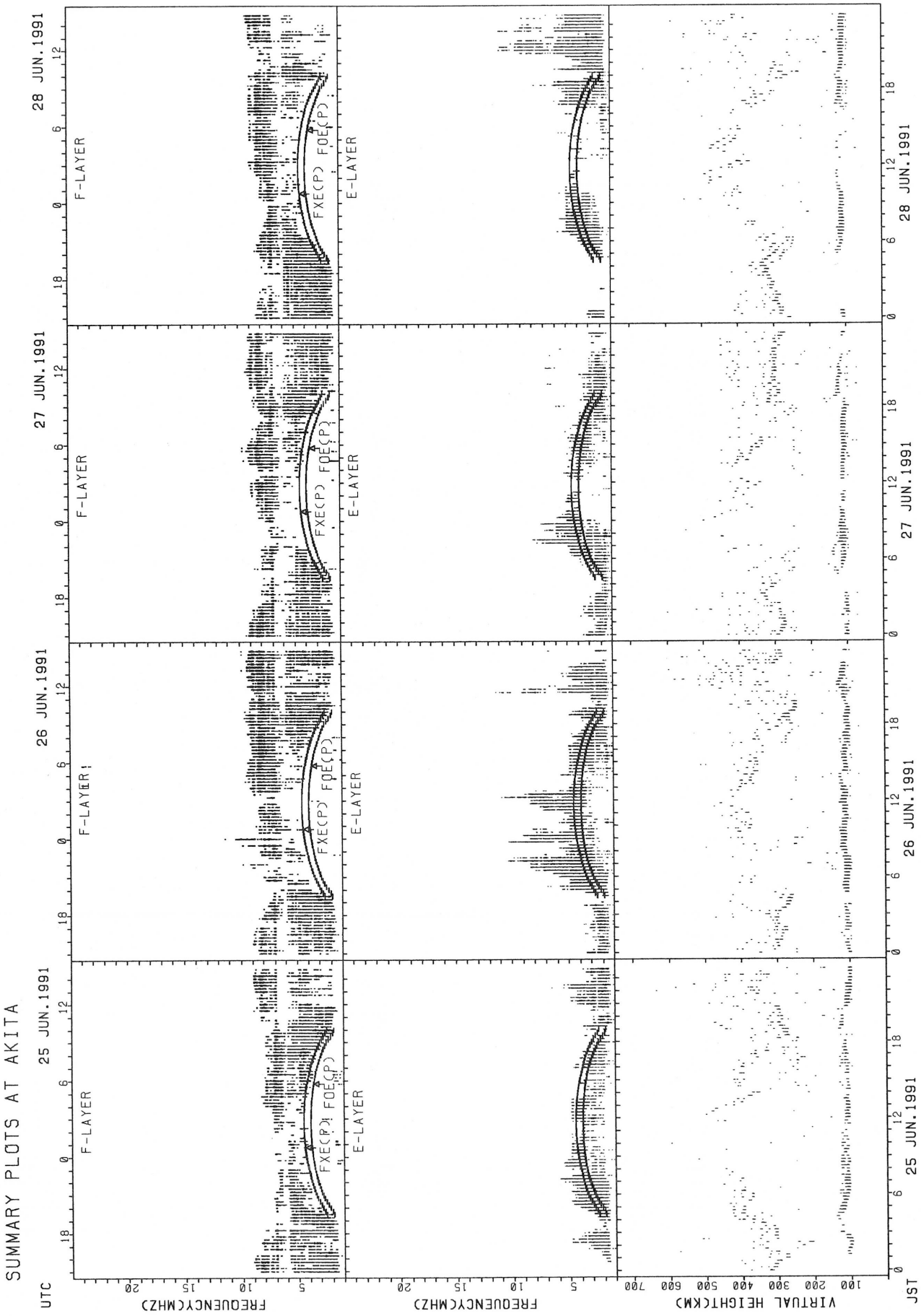
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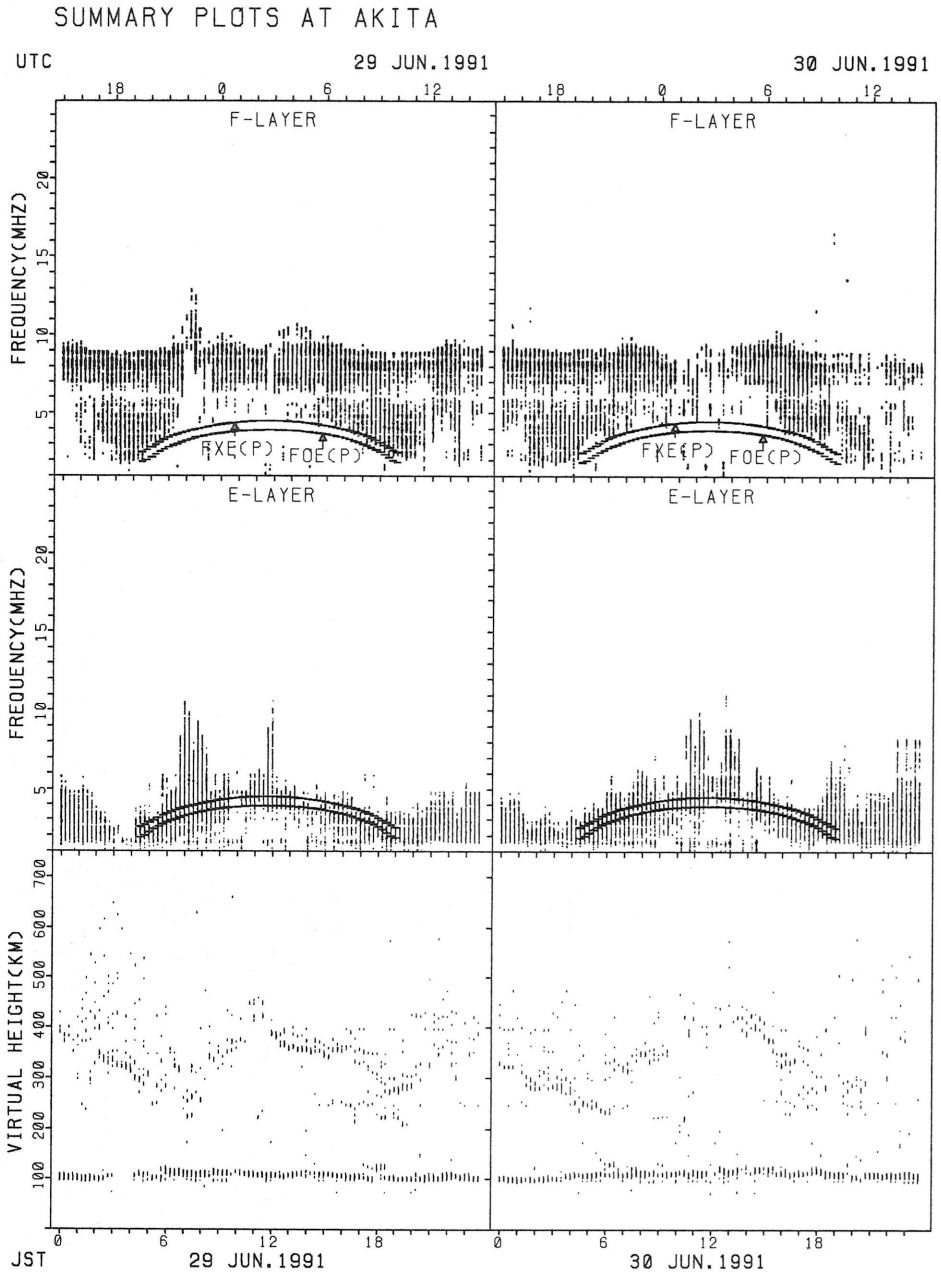

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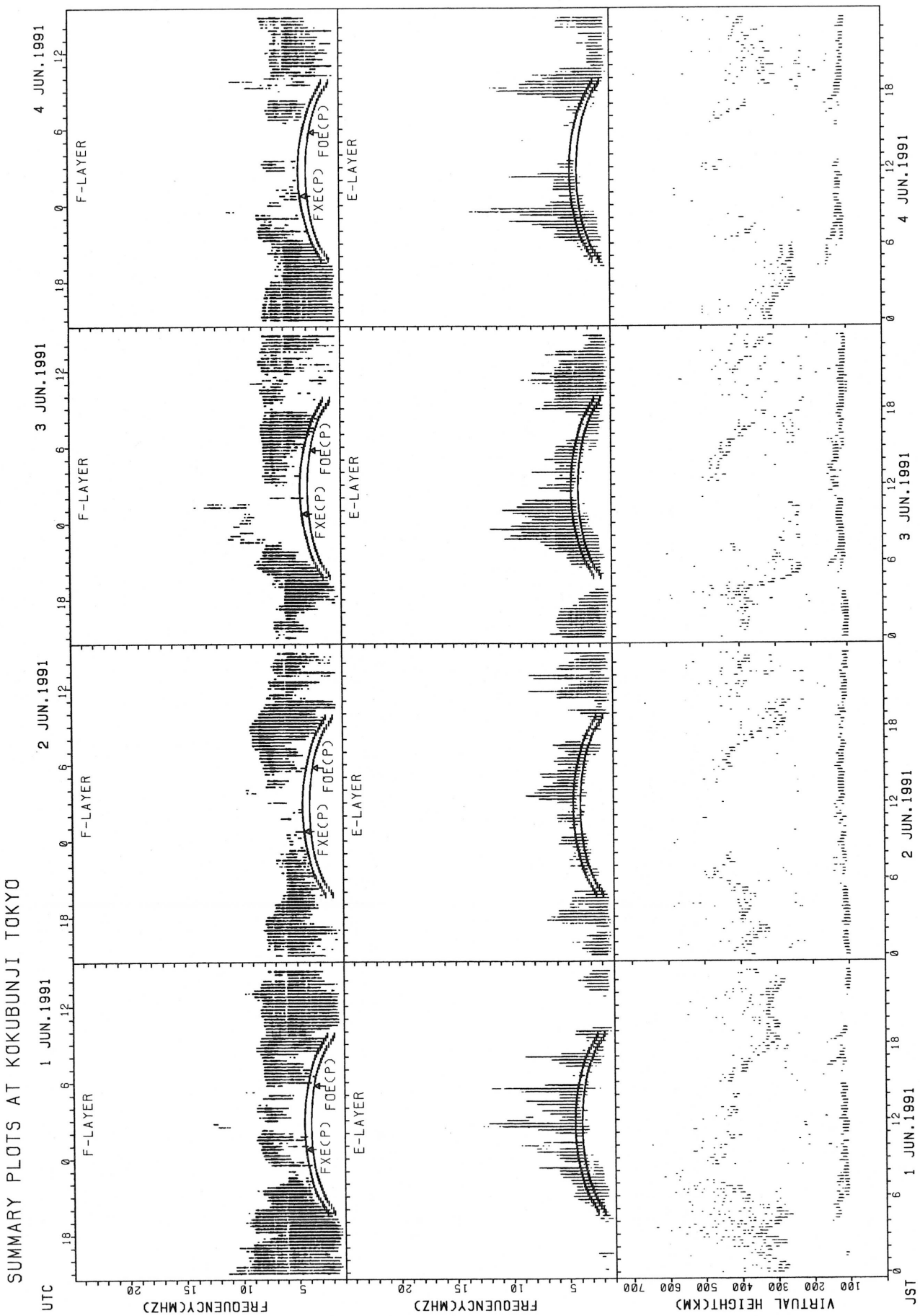
SUMMARY PLOTS AT KOKUBUNJI TOKYO
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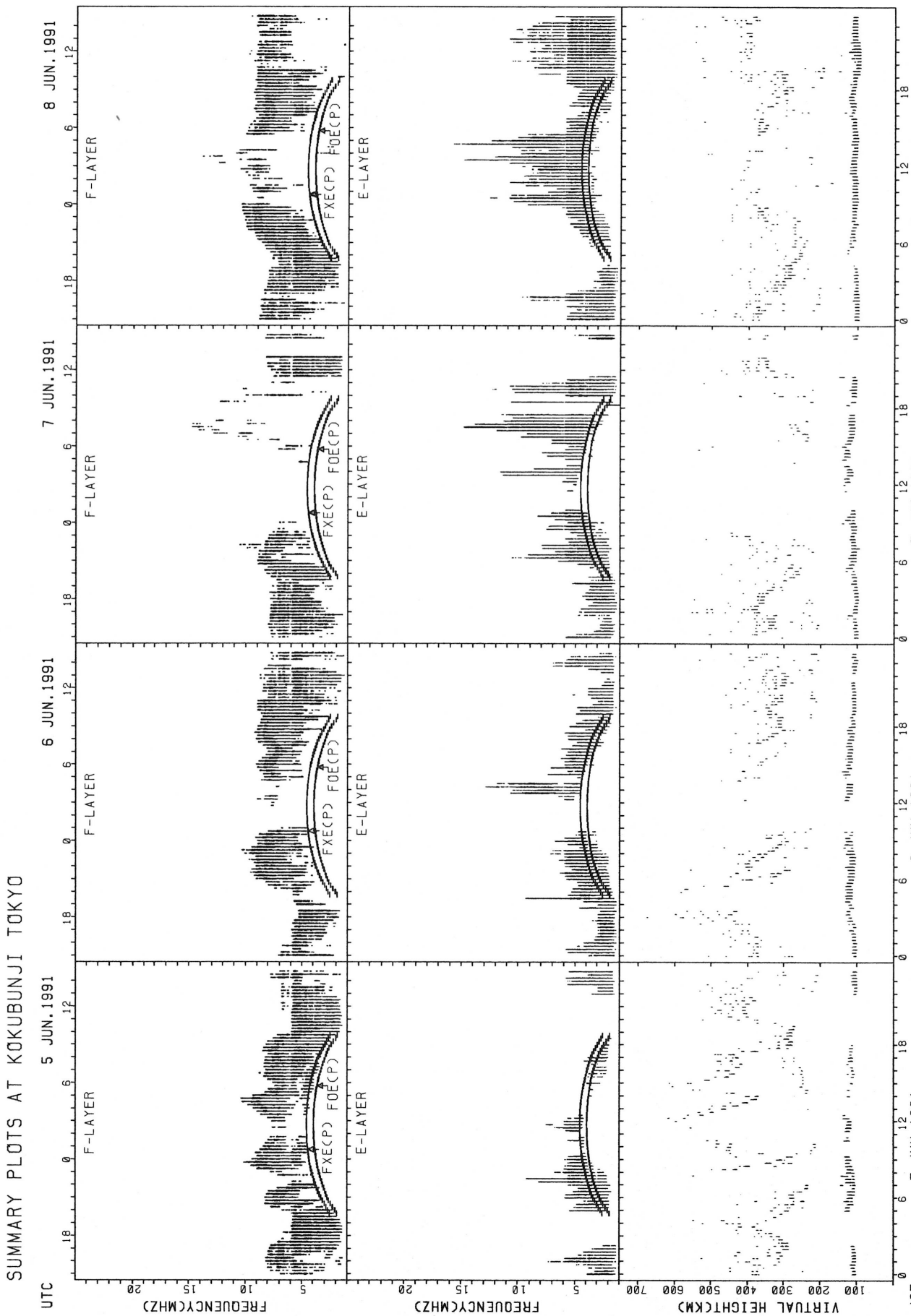
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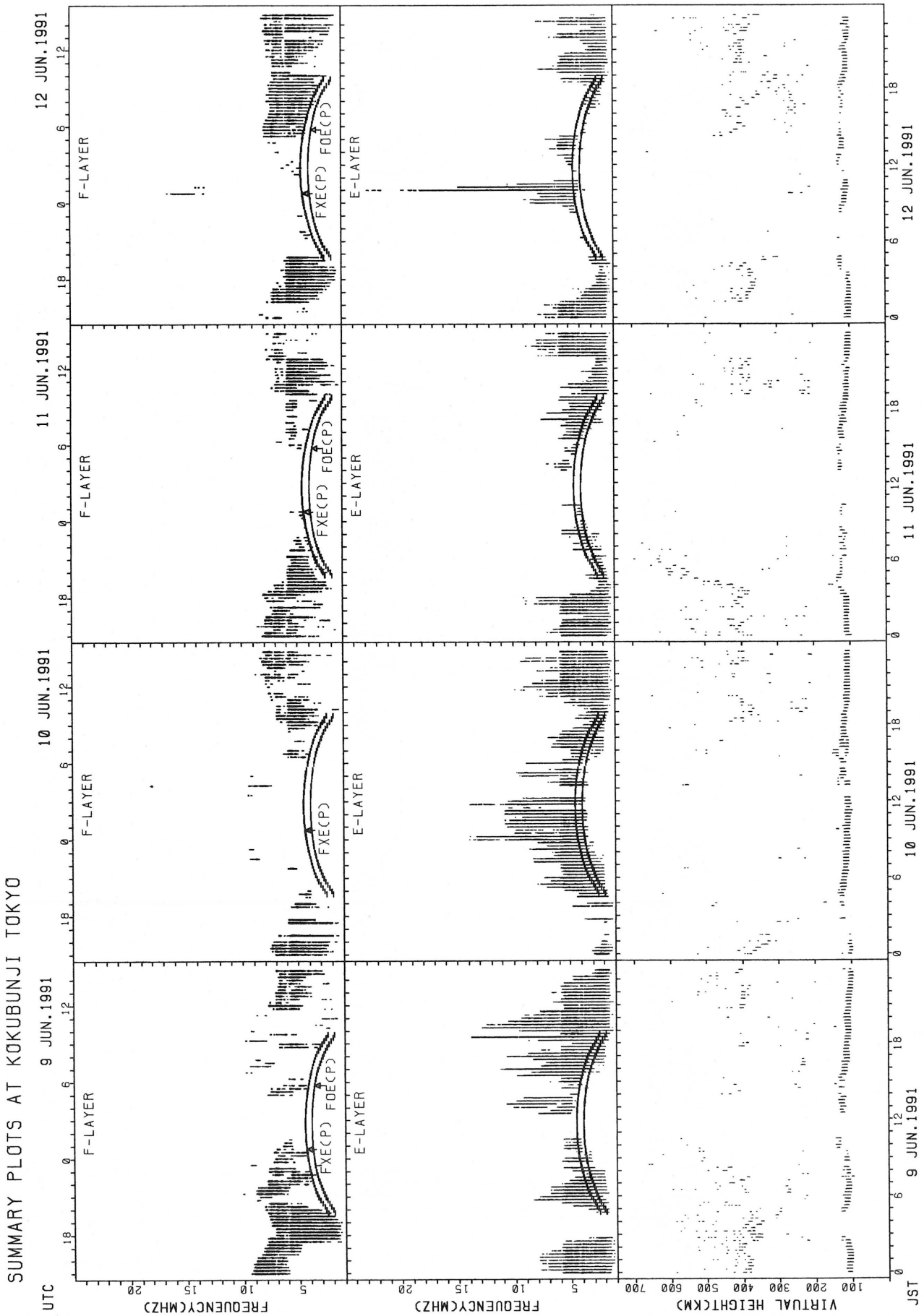
SUMMARY PLOTS AT KOKUBUNJI TOKYO
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FOE(P)
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VIRTUAL HEIGHT(KM)
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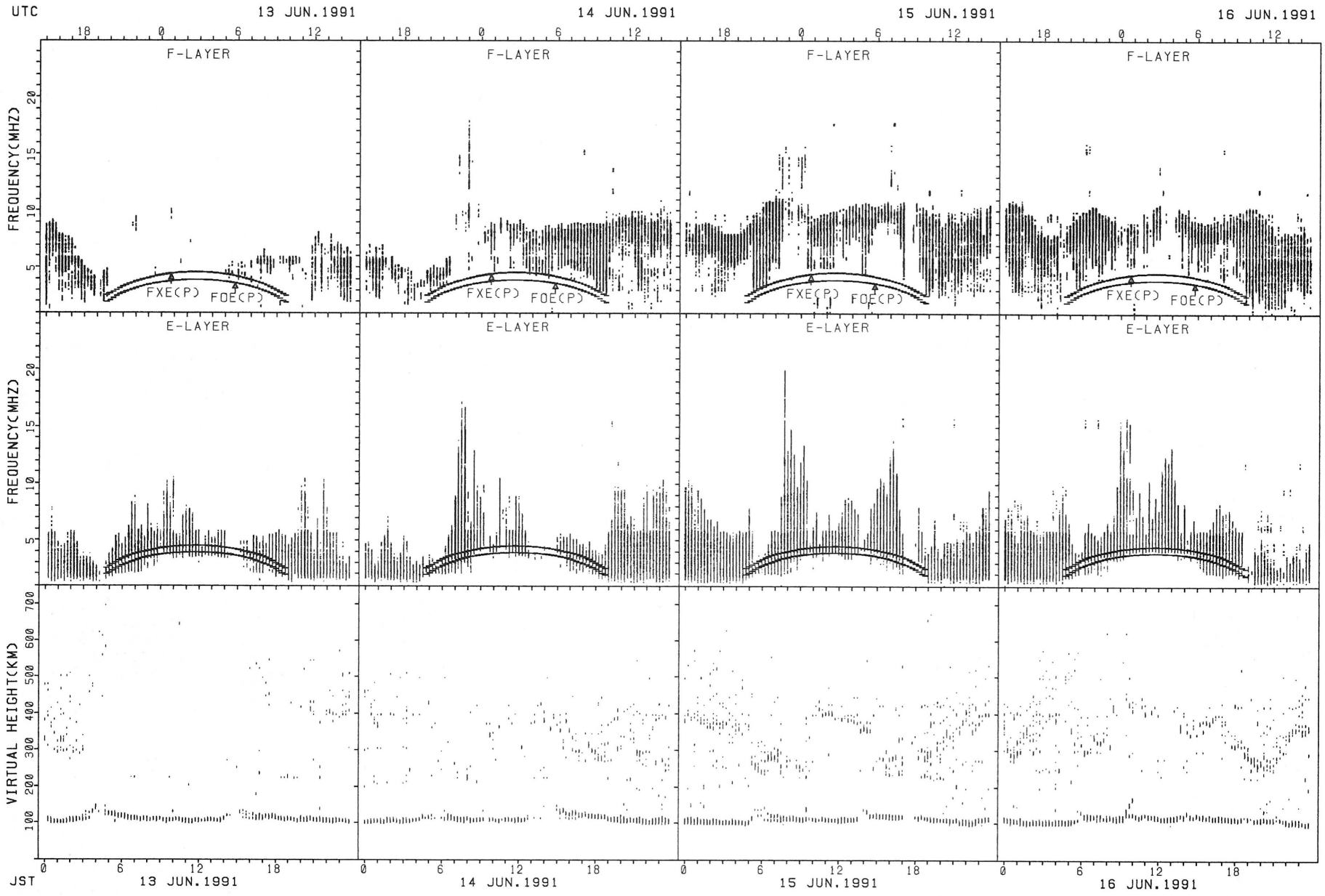
SUMMARY PLOTS AT KOKUBUNJI TOKYO
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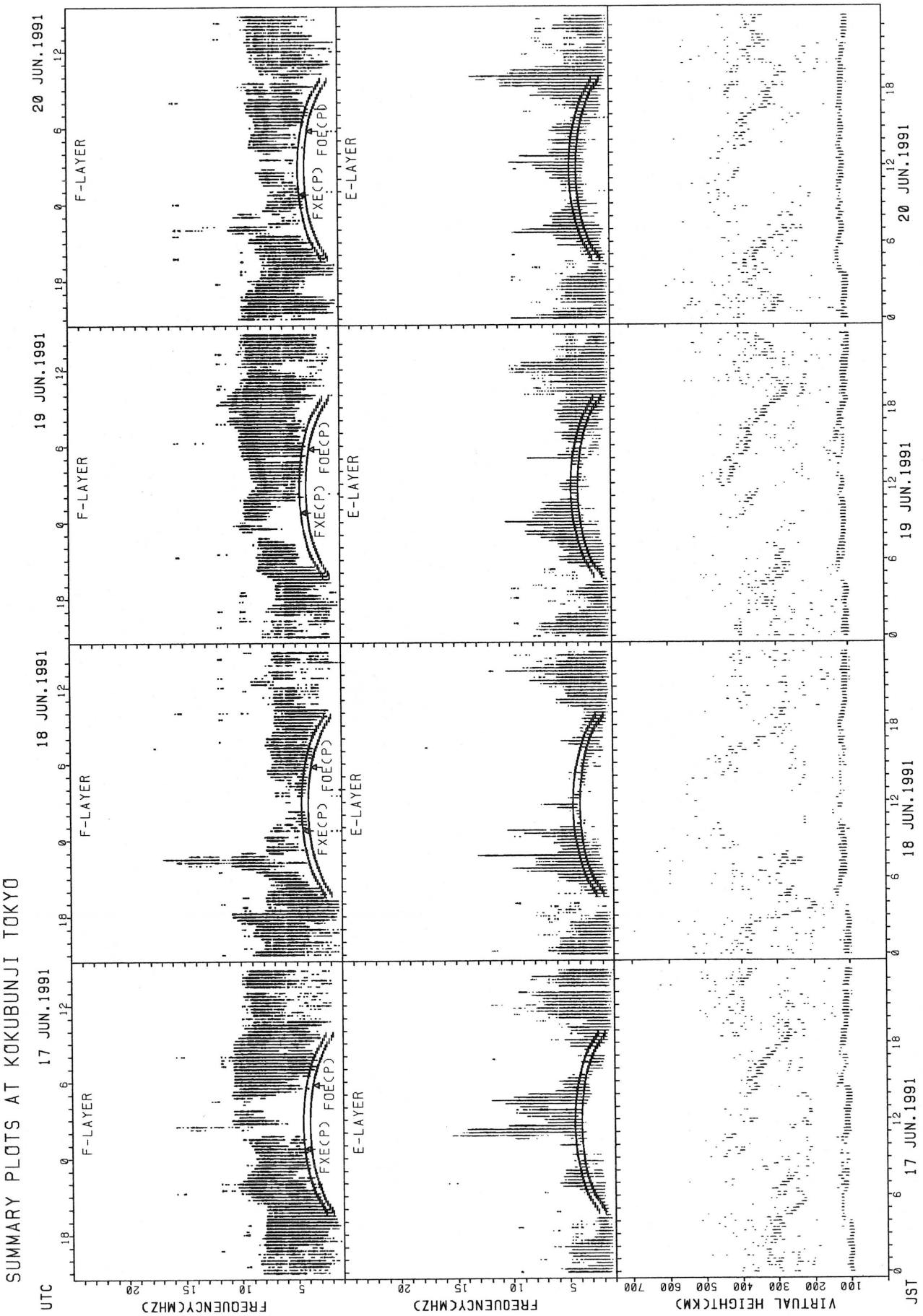
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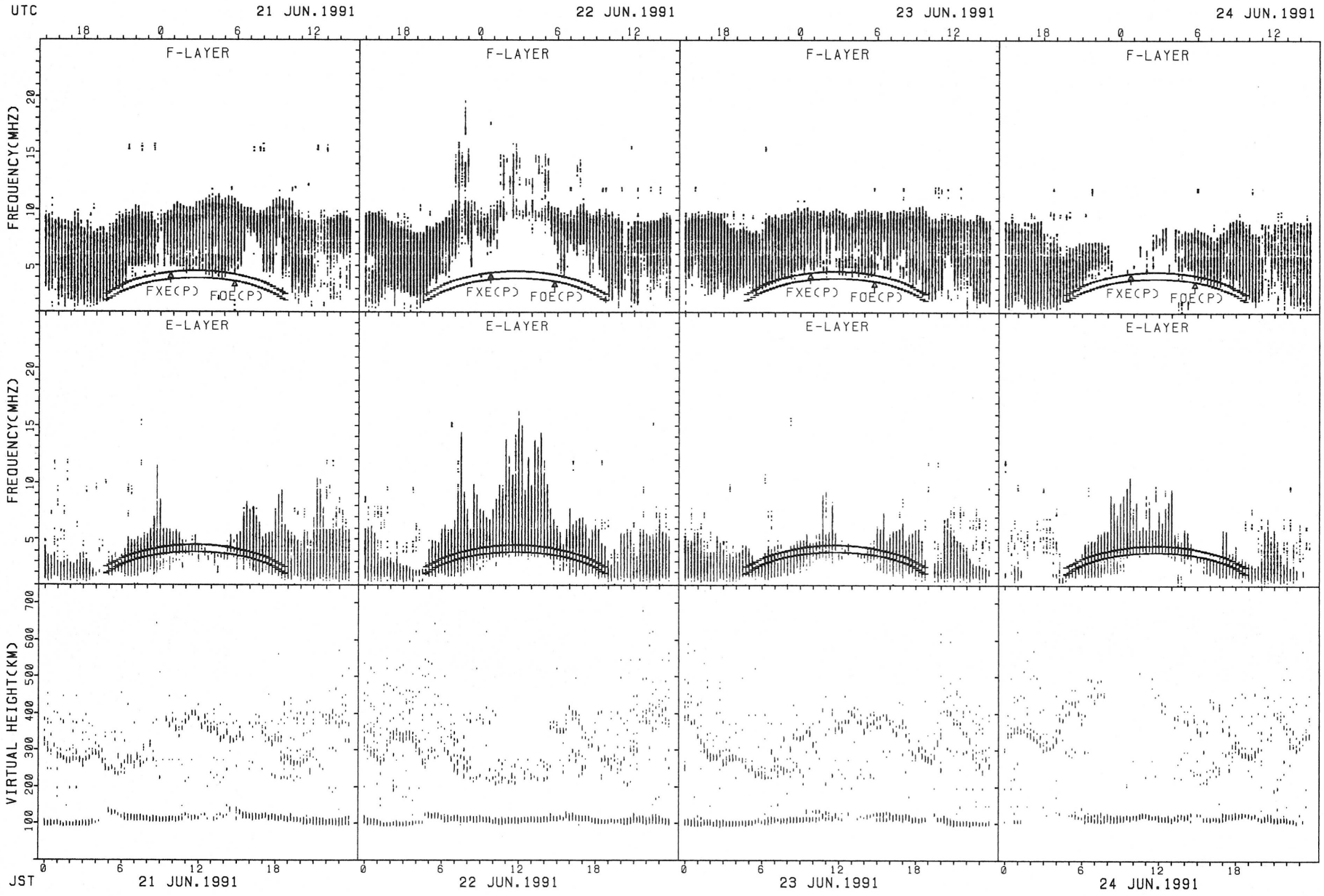
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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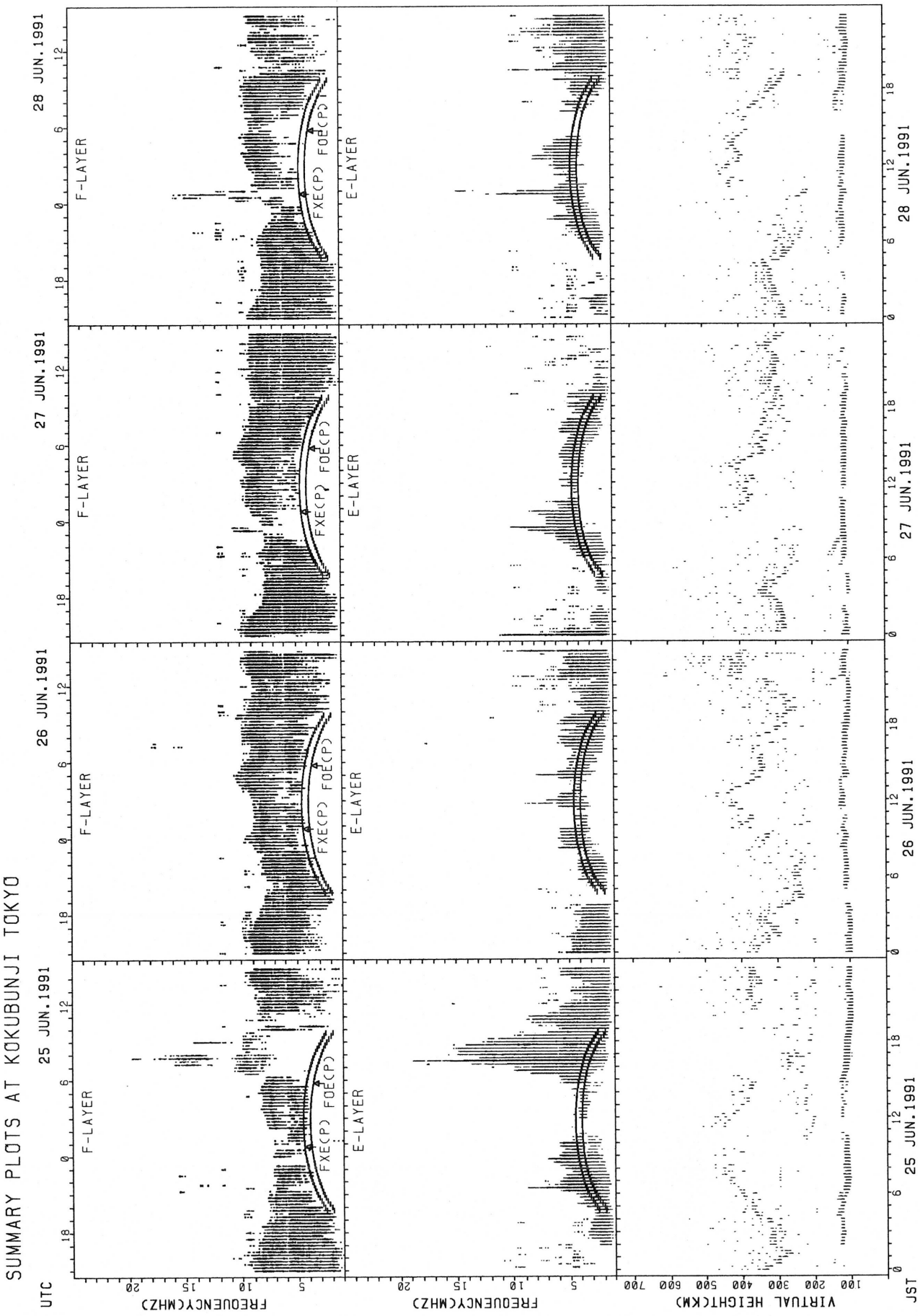
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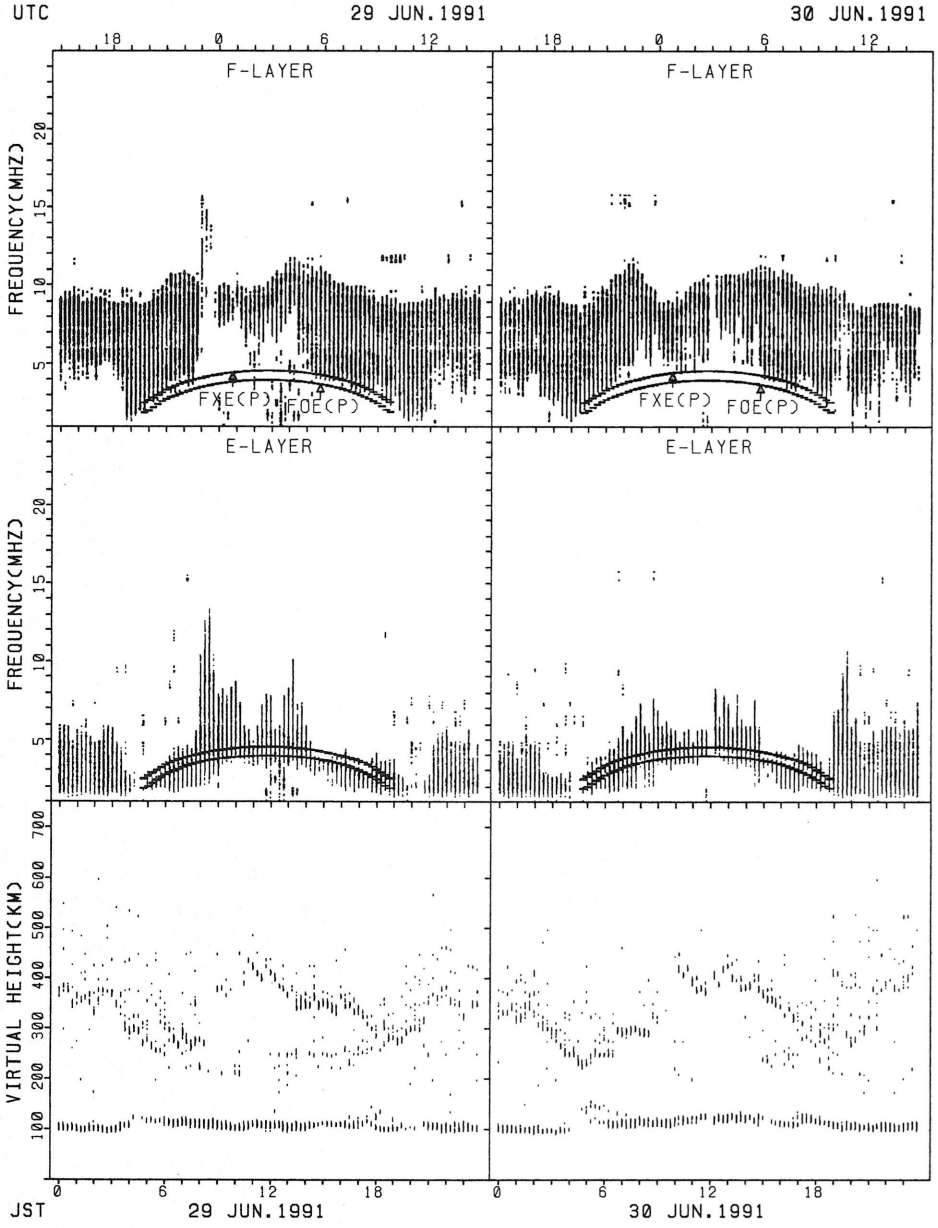

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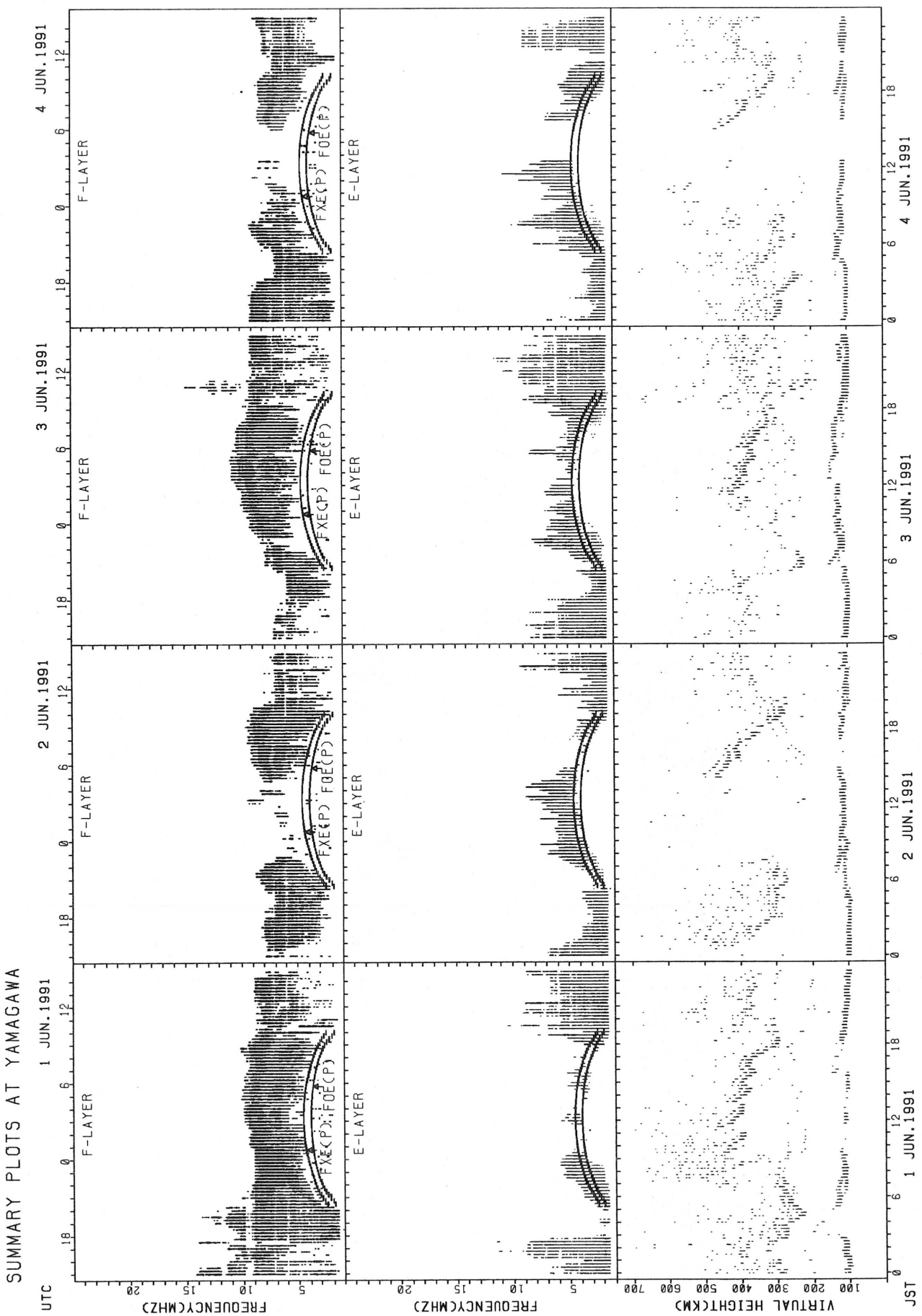
SUMMARY PLOTS AT YAMAGAWA
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E-LAYER
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FREQUENCY(MHZ)
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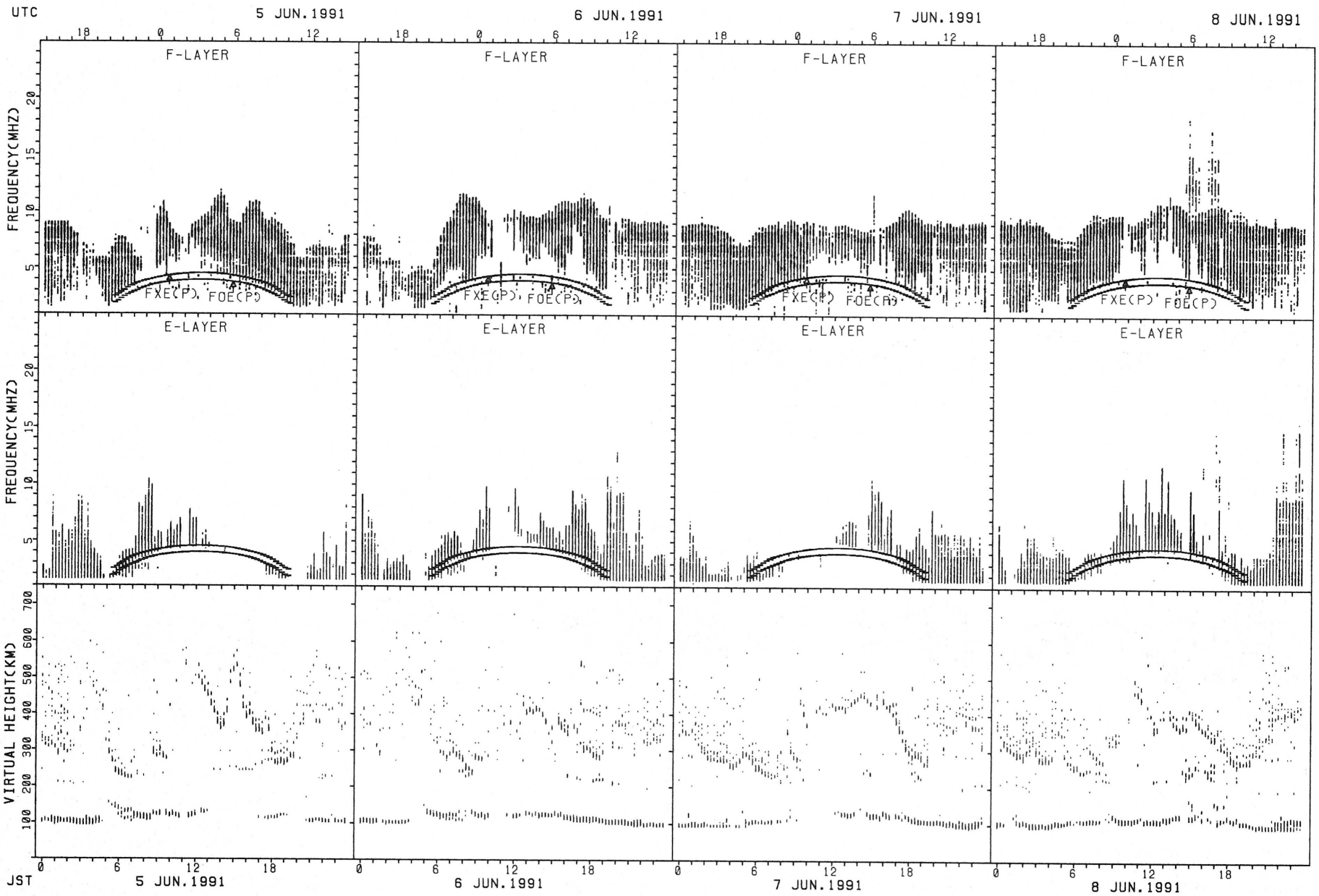
SUMMARY PLOTS AT YAMAGAWA



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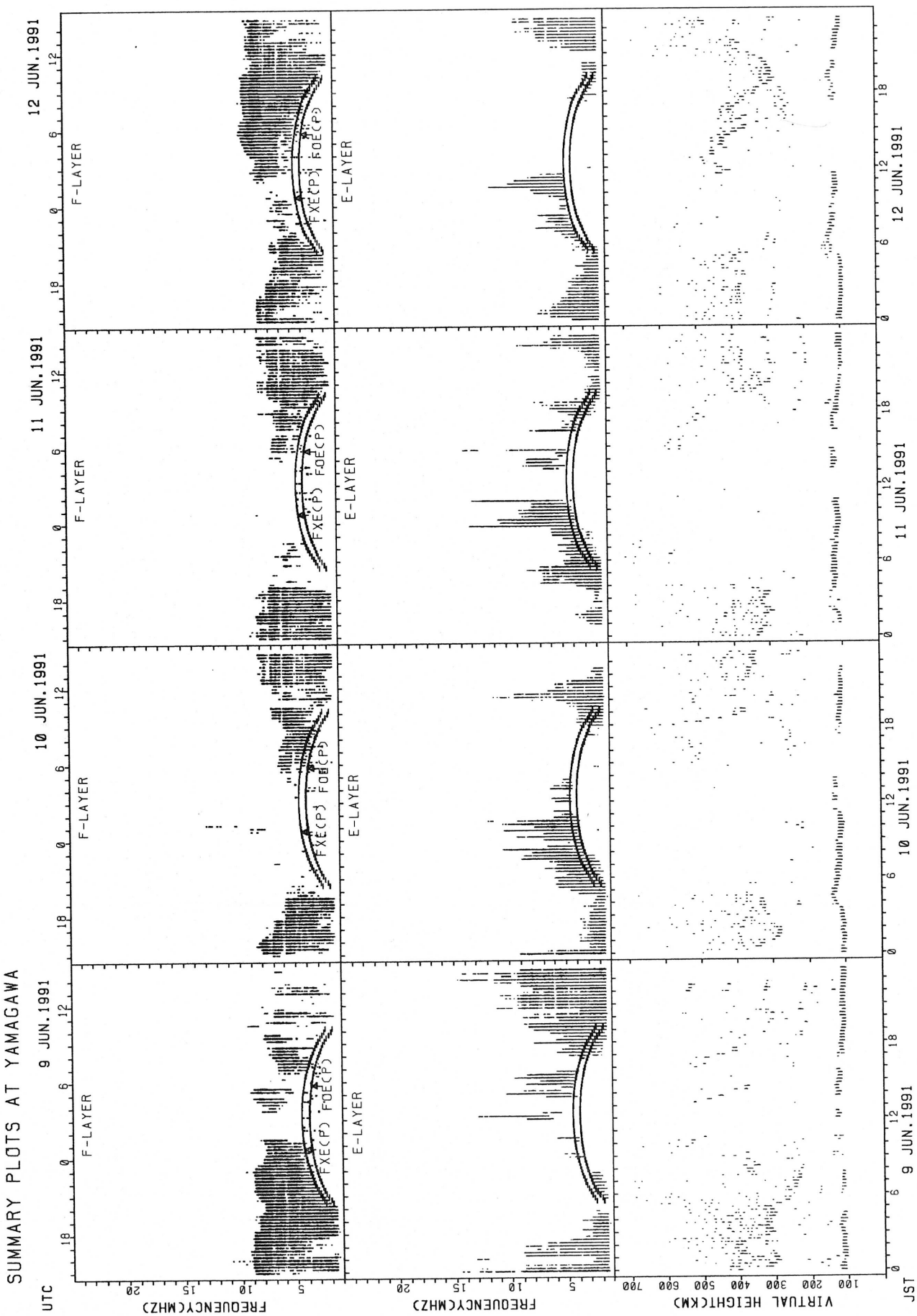
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F-LAYER
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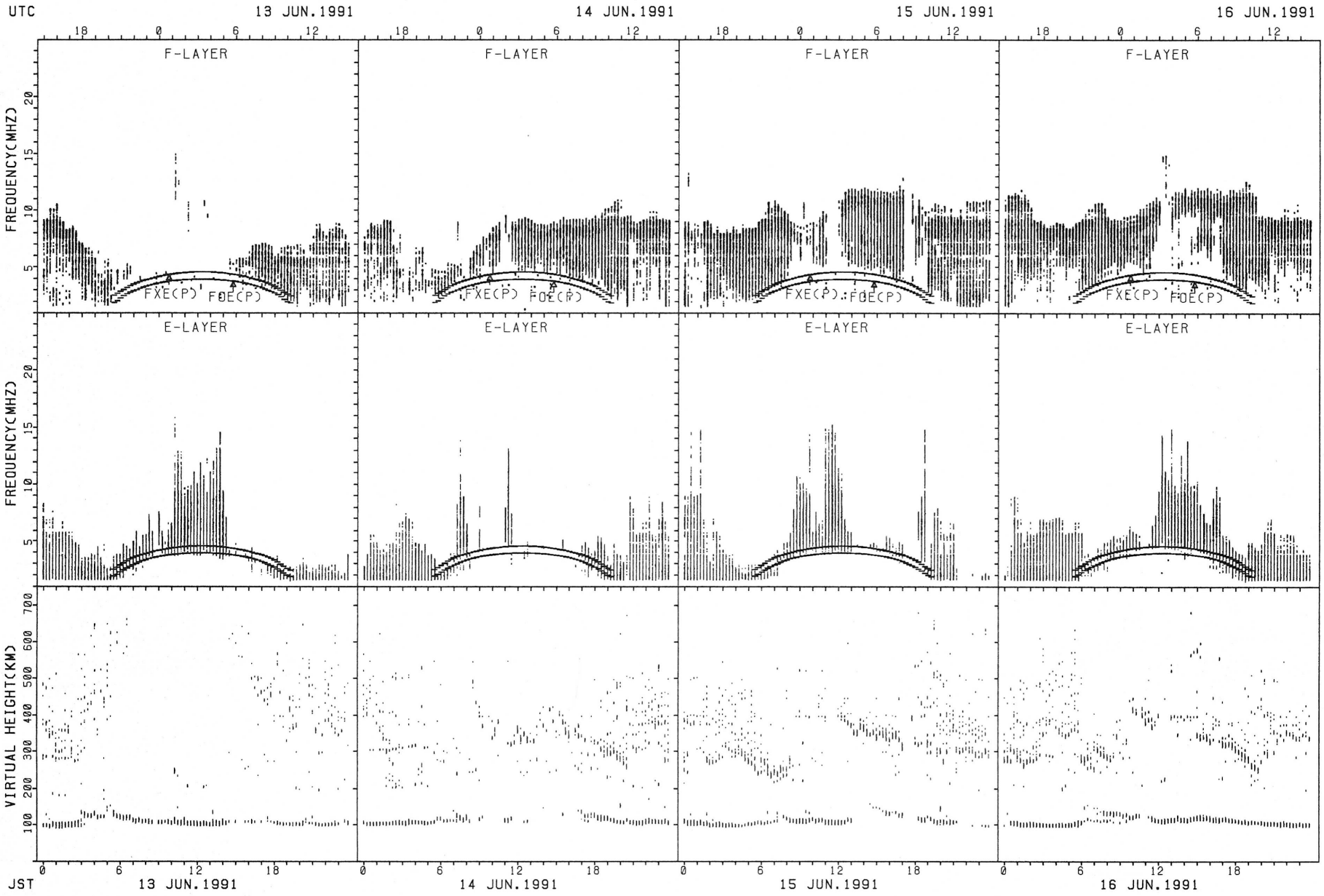
SUMMARY PLOTS AT YAMAGAWA



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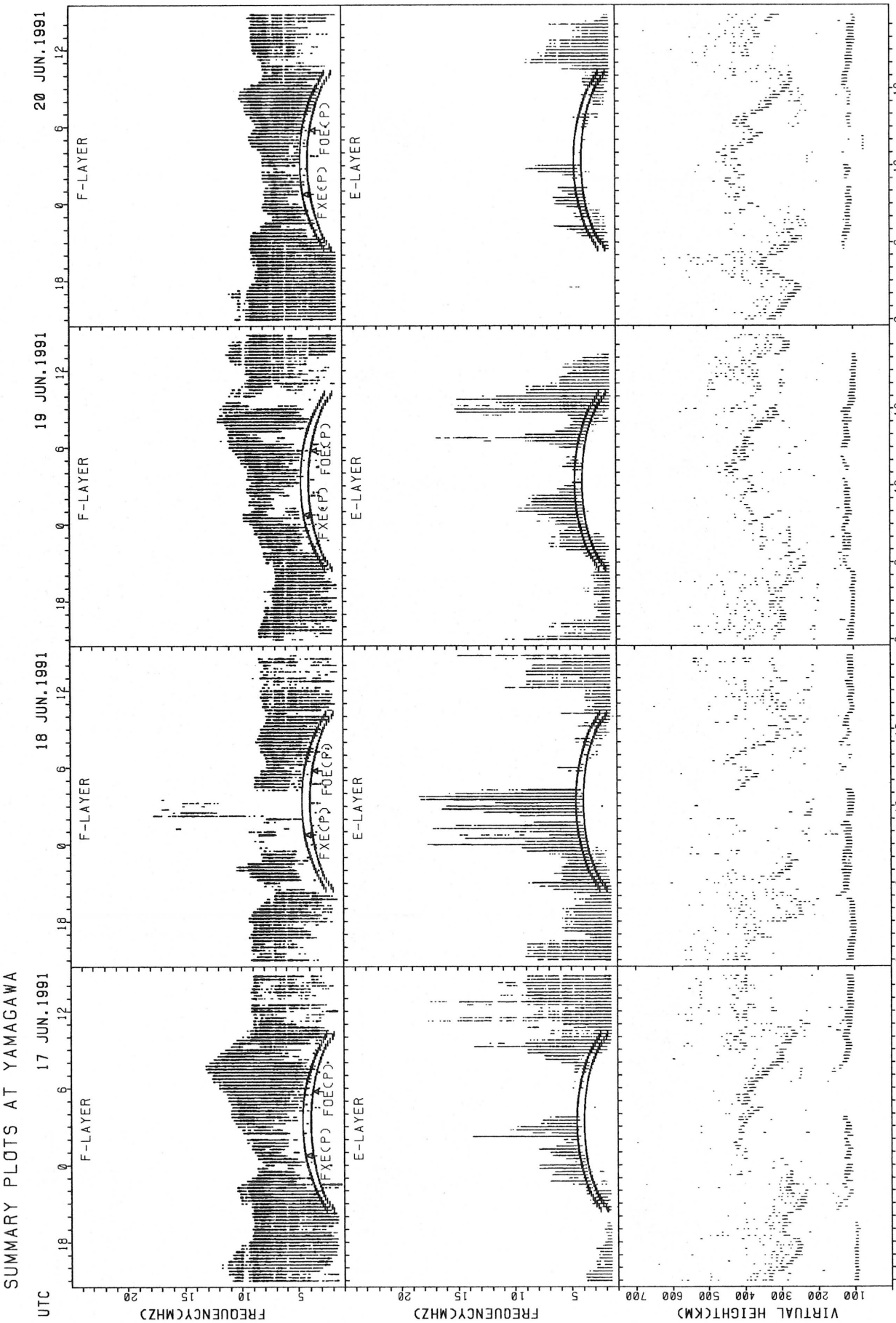
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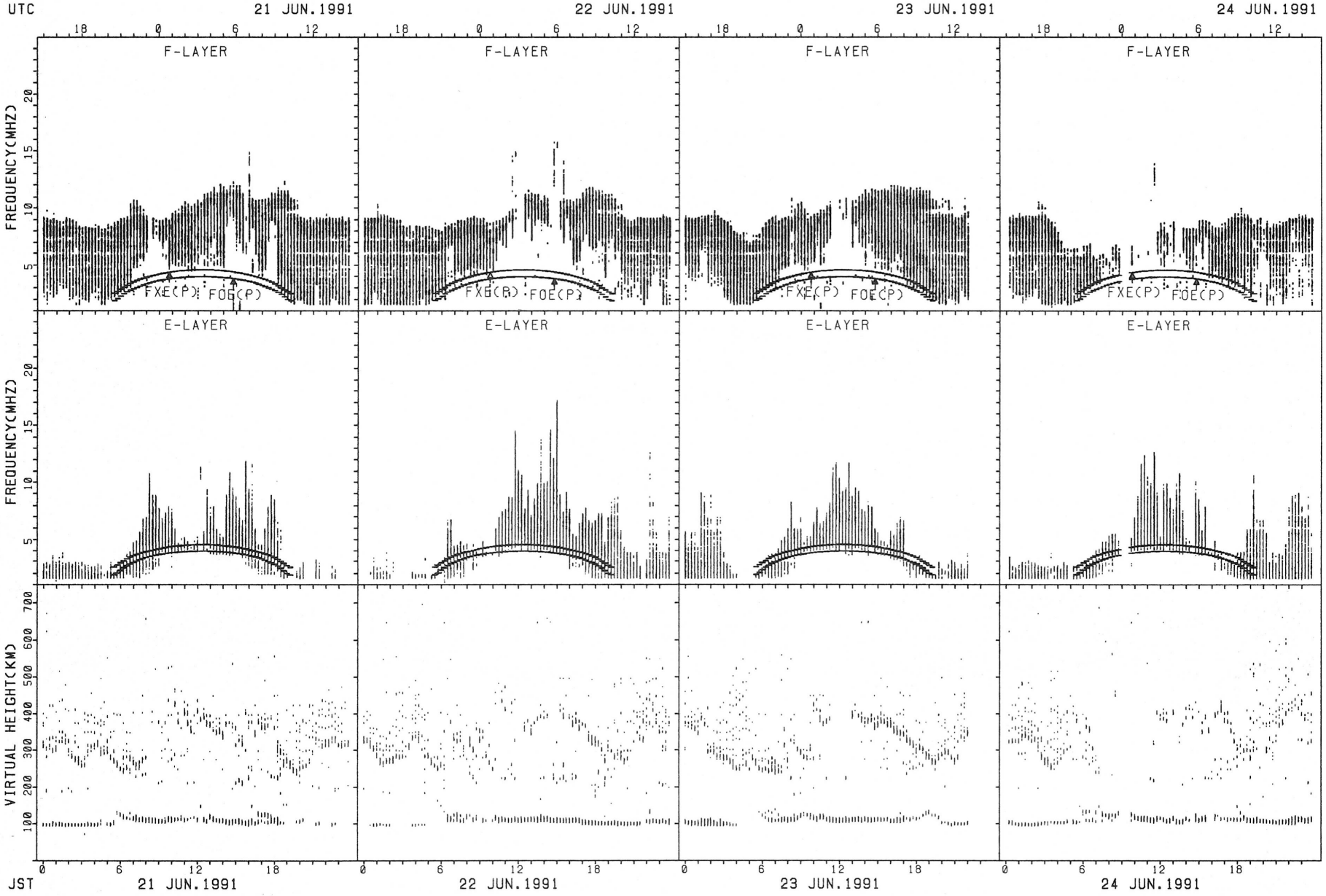
SUMMARY PLOTS AT YAMAGAWA



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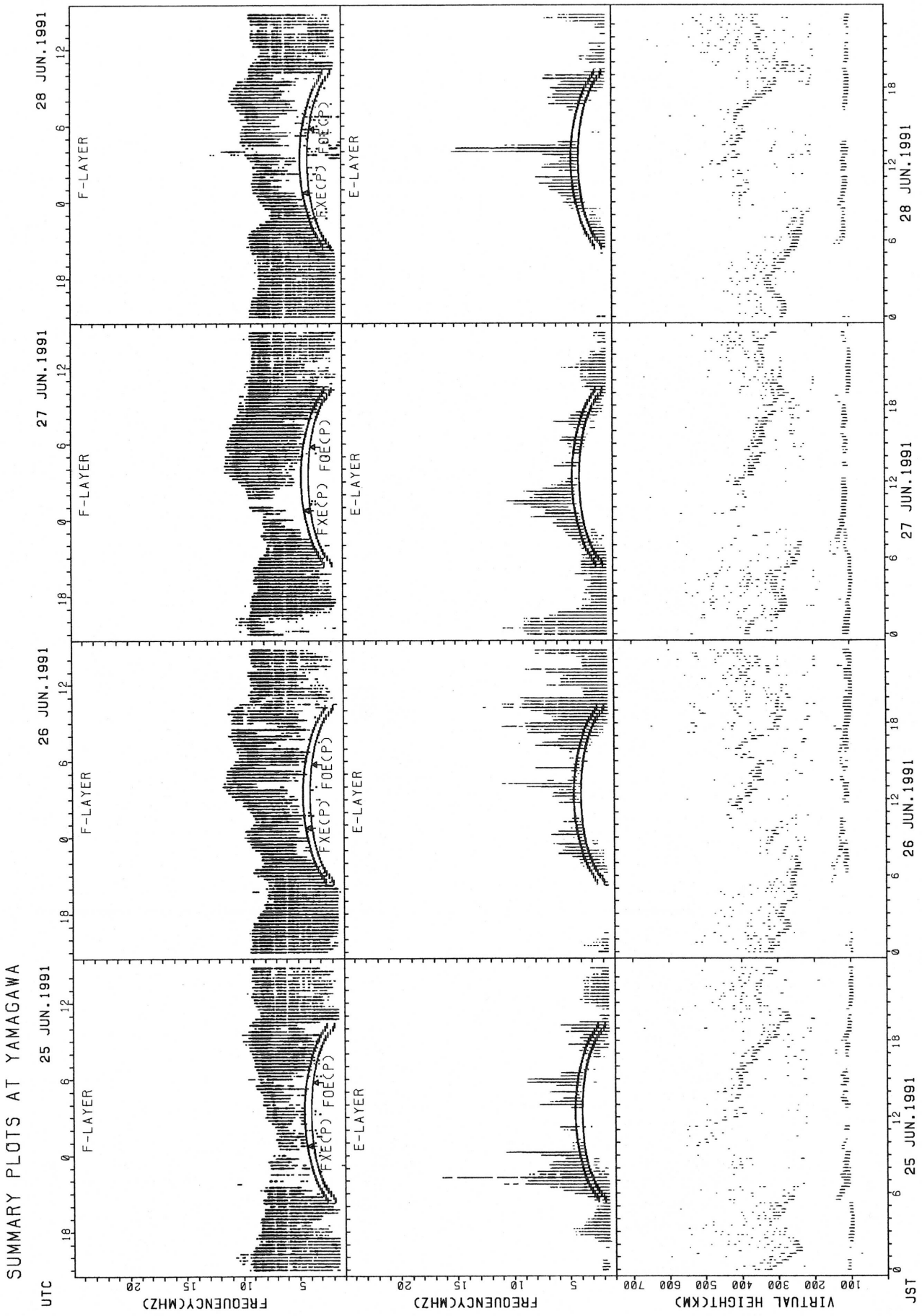
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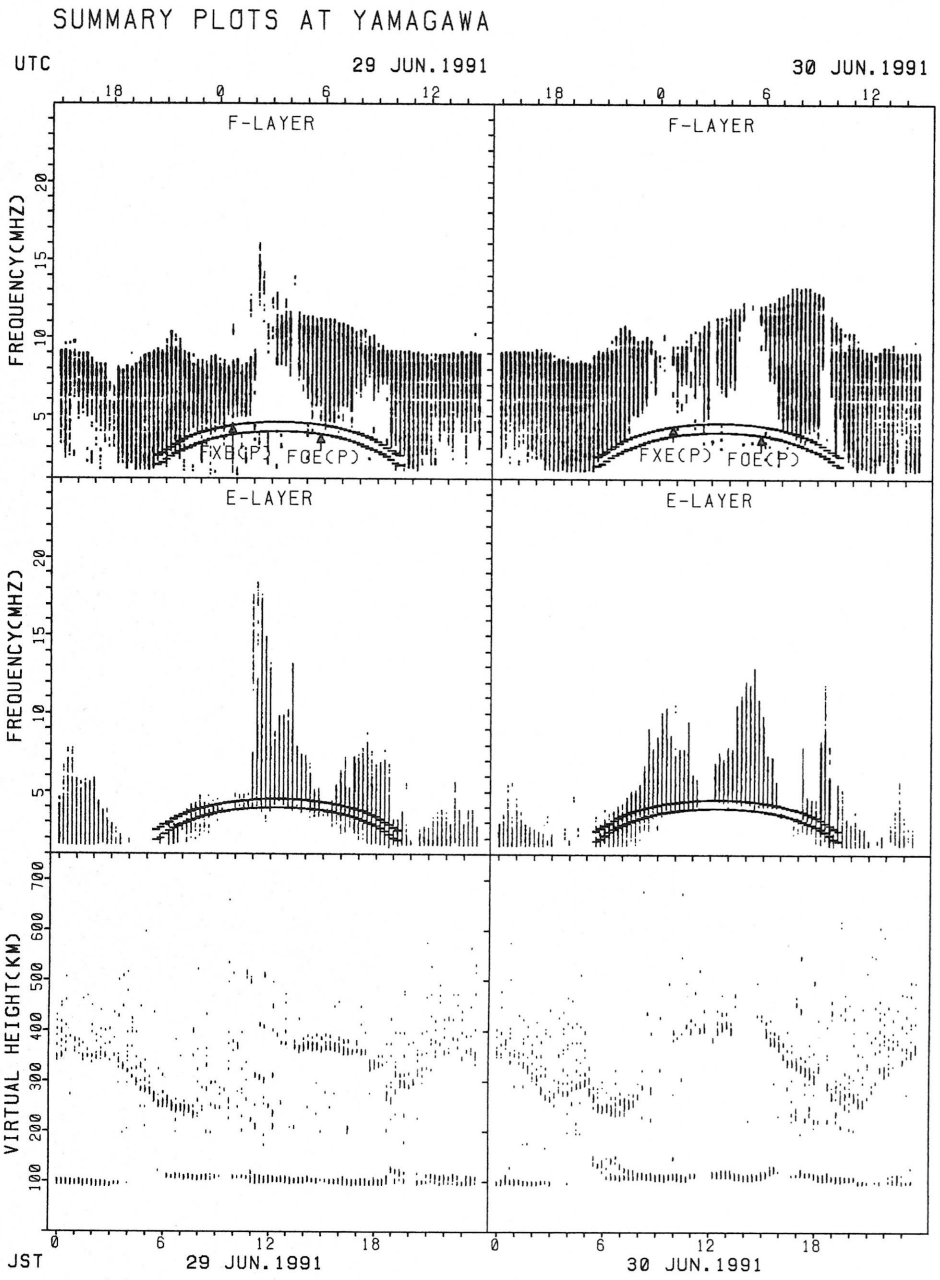
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VIRTUAL HEIGHT(KM)
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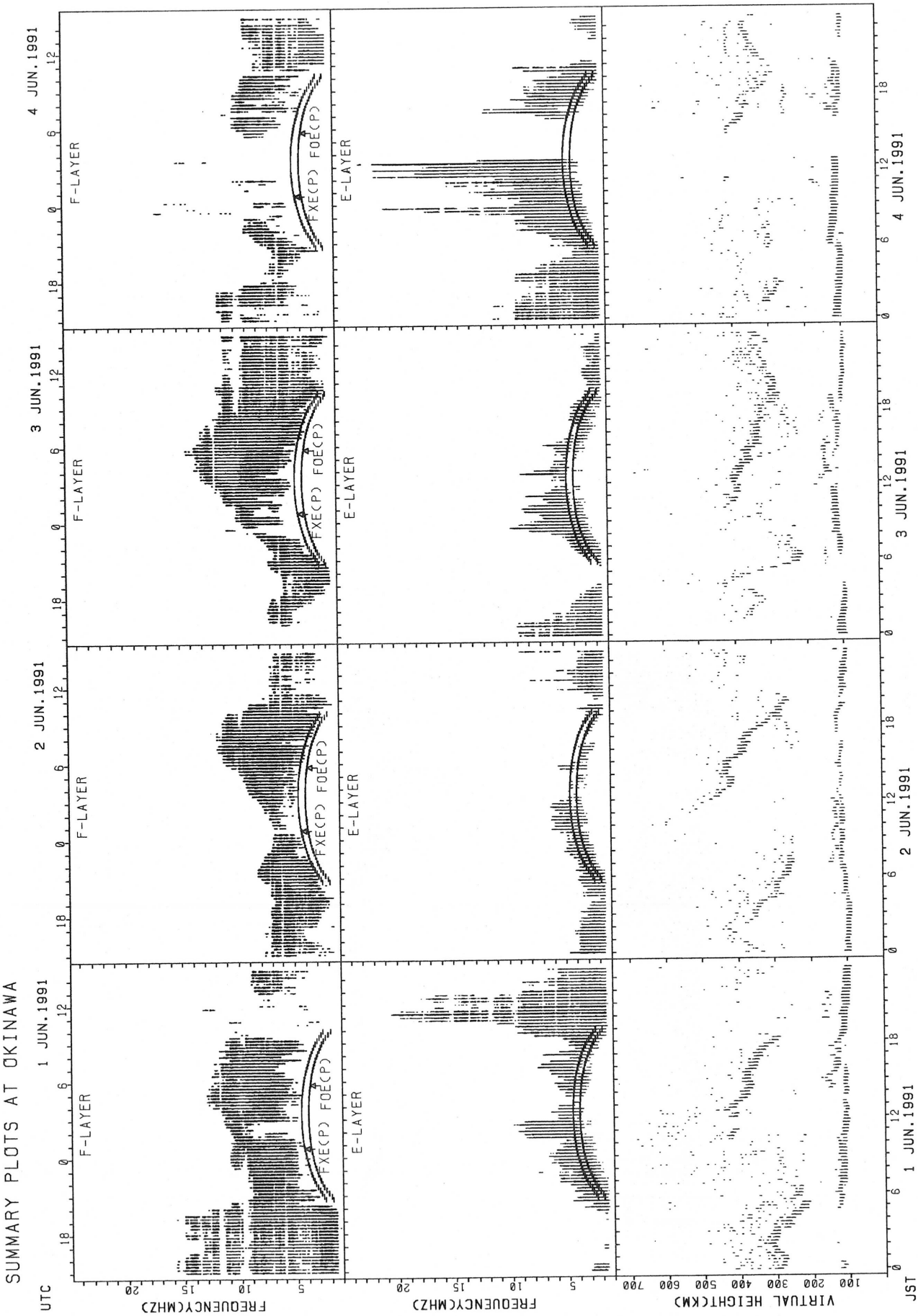
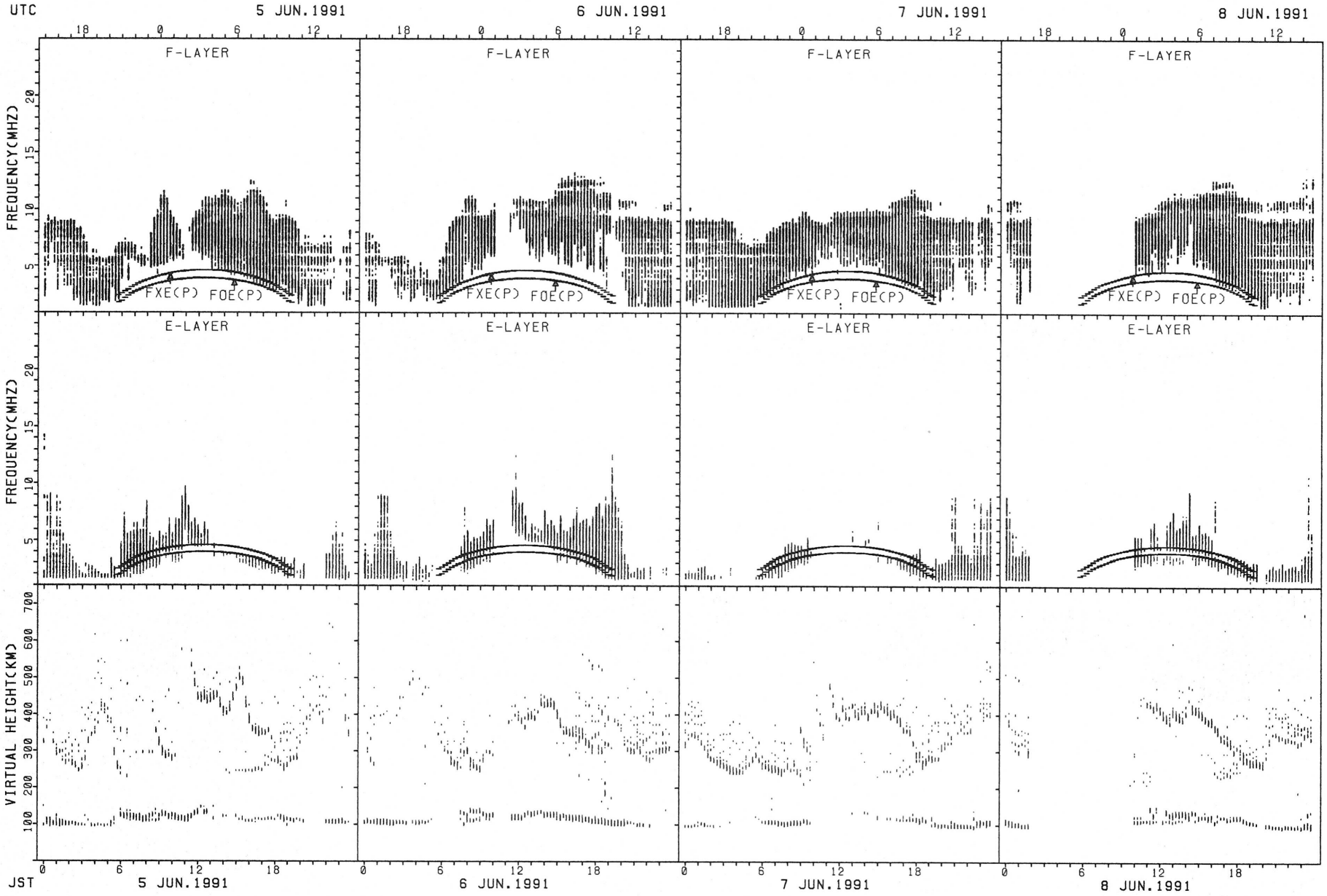
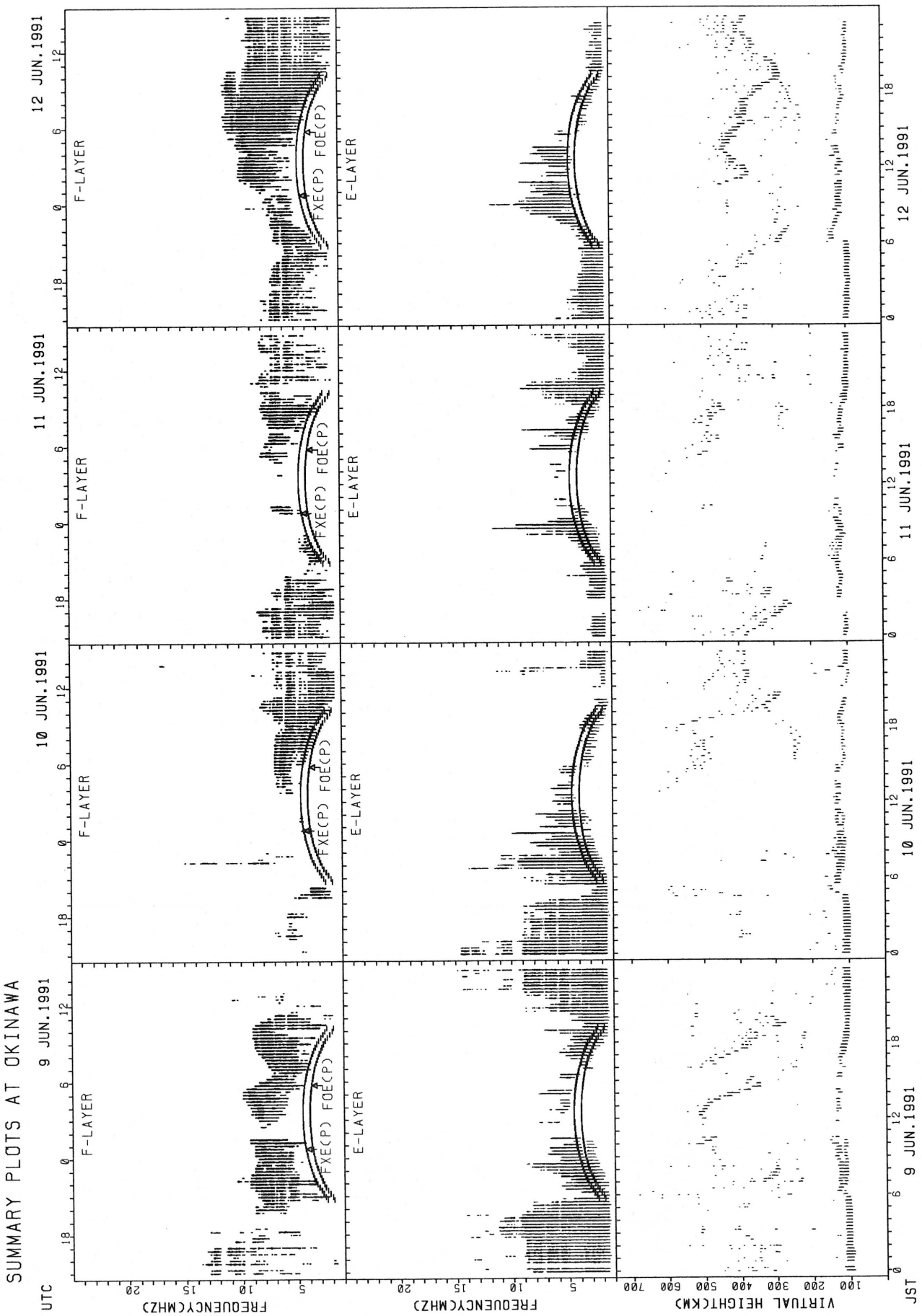
30 JUN.1991
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

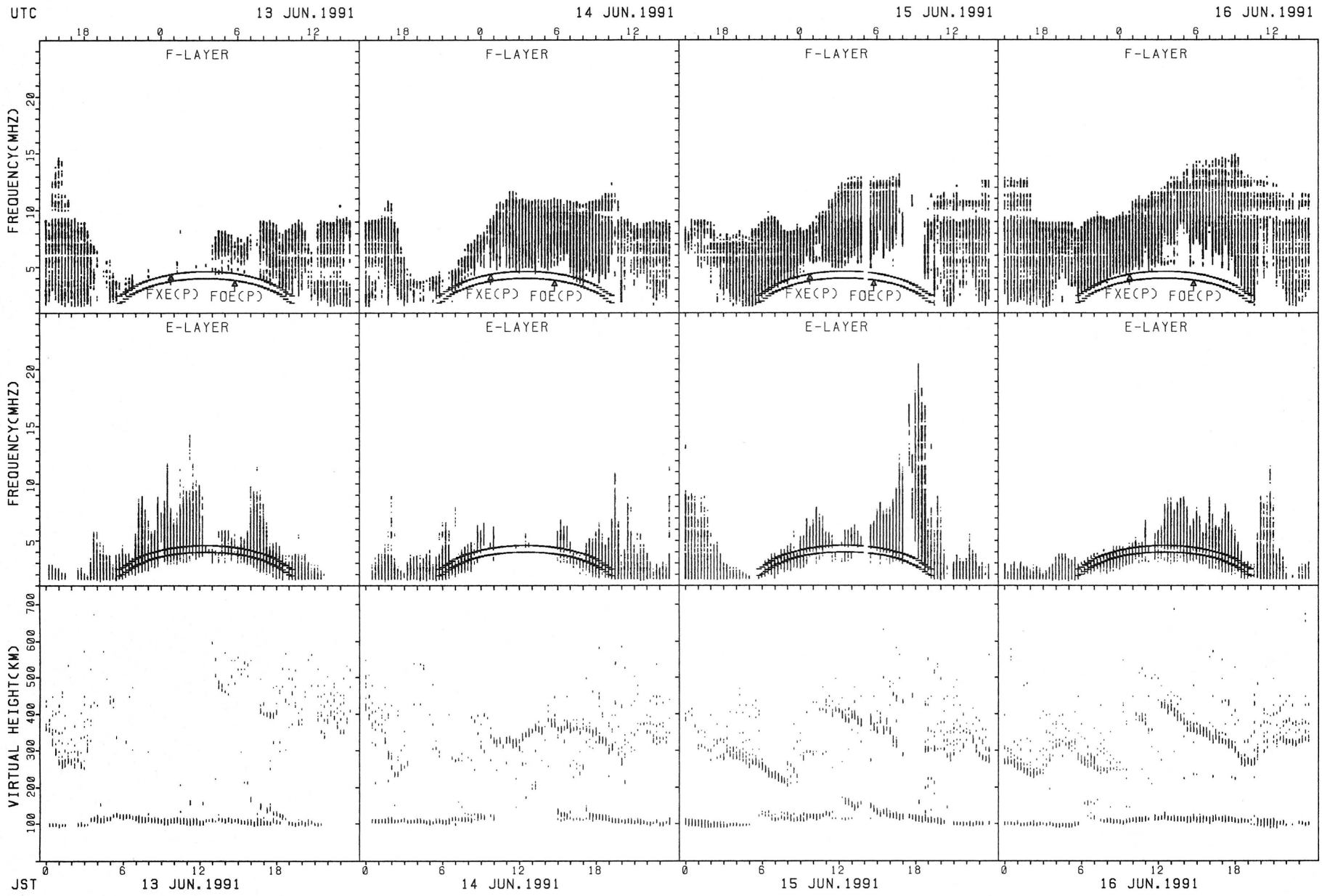

SUMMARY PLOTS AT OKINAWA
UTC
1 JUN.1991
2 JUN.1991
3 JUN.1991
4 JUN.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA

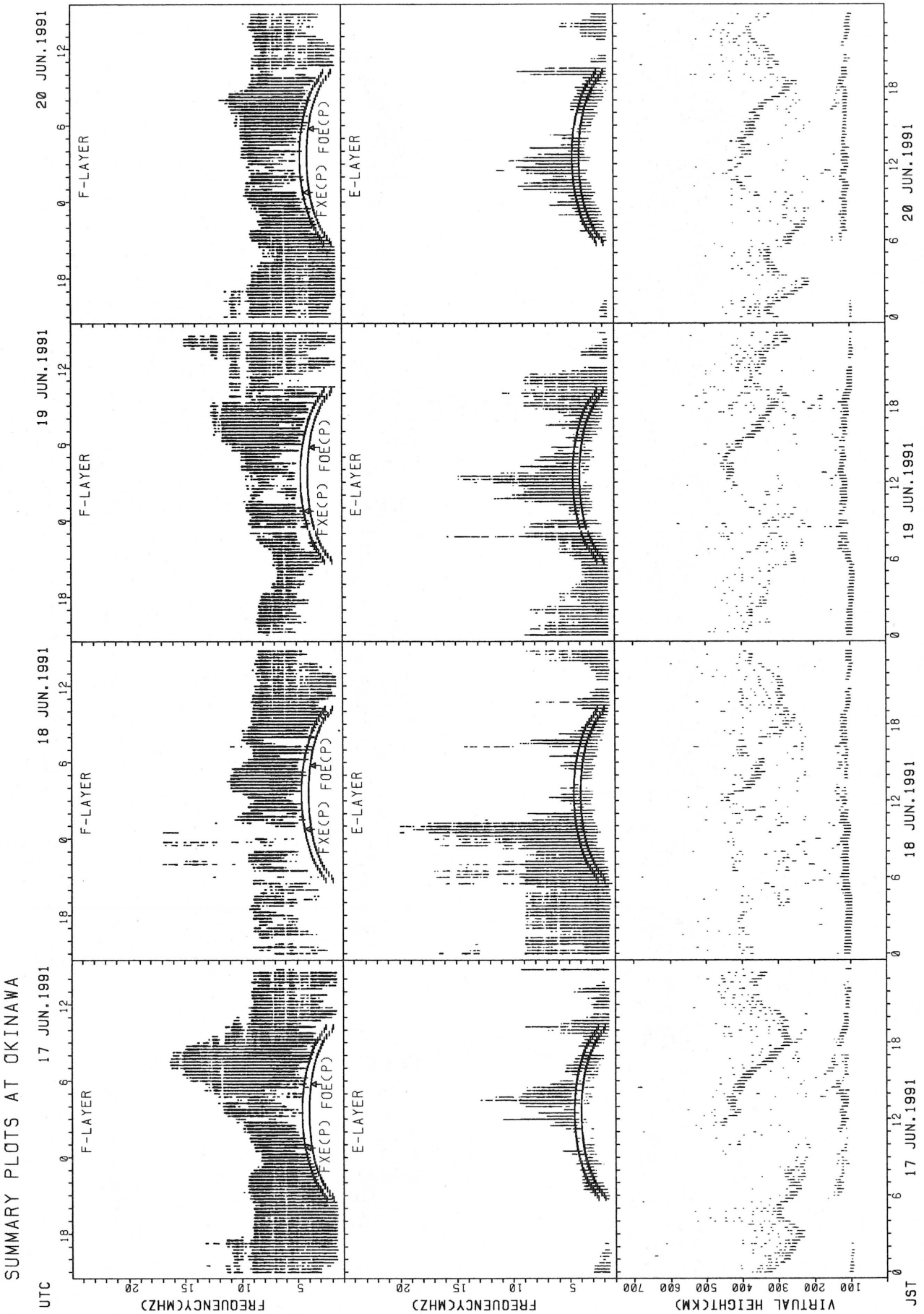


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

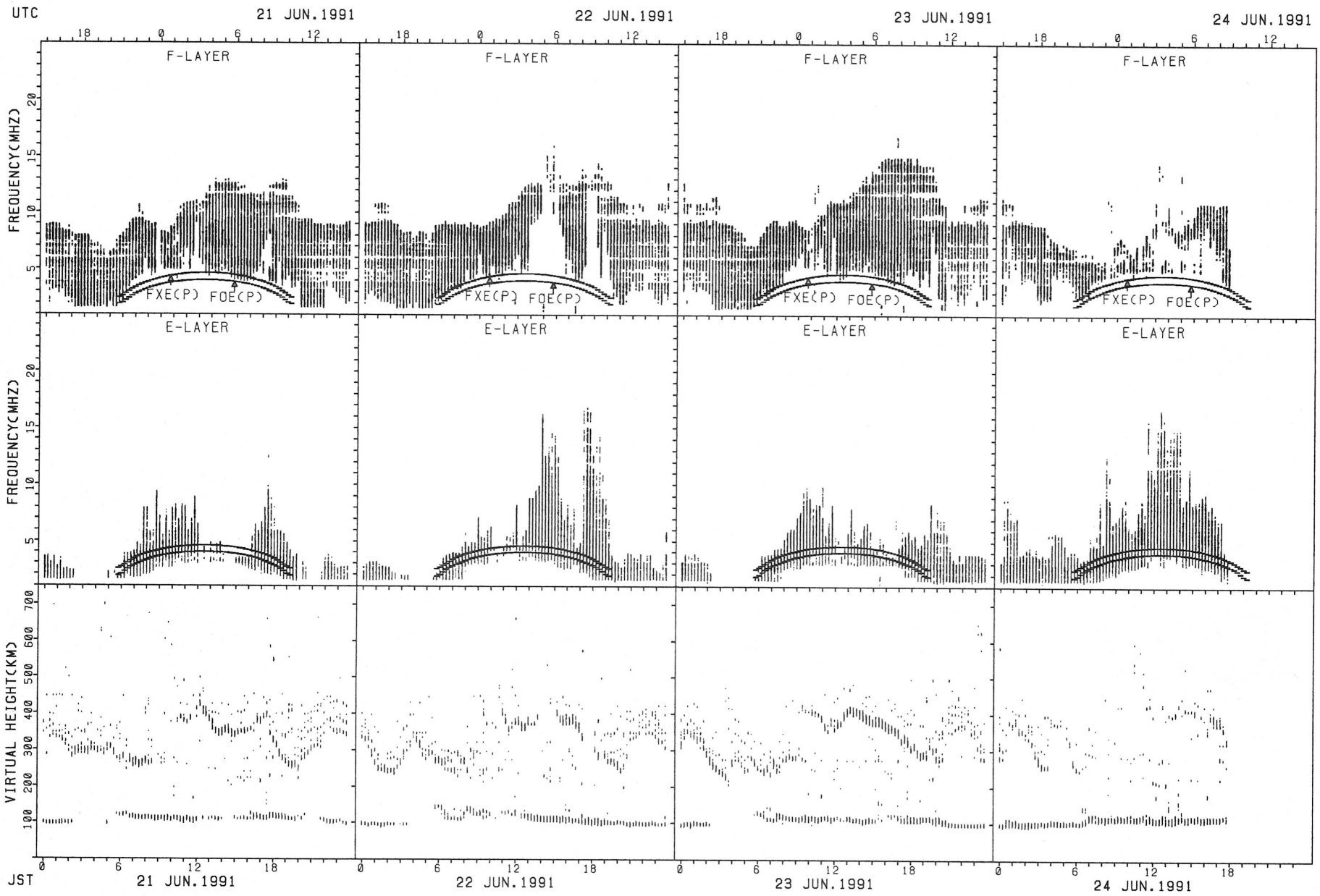

SUMMARY PLOTS AT OKINAWA
UTC
9 JUN.1991
10 JUN.1991
11 JUN.1991
12 JUN.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE



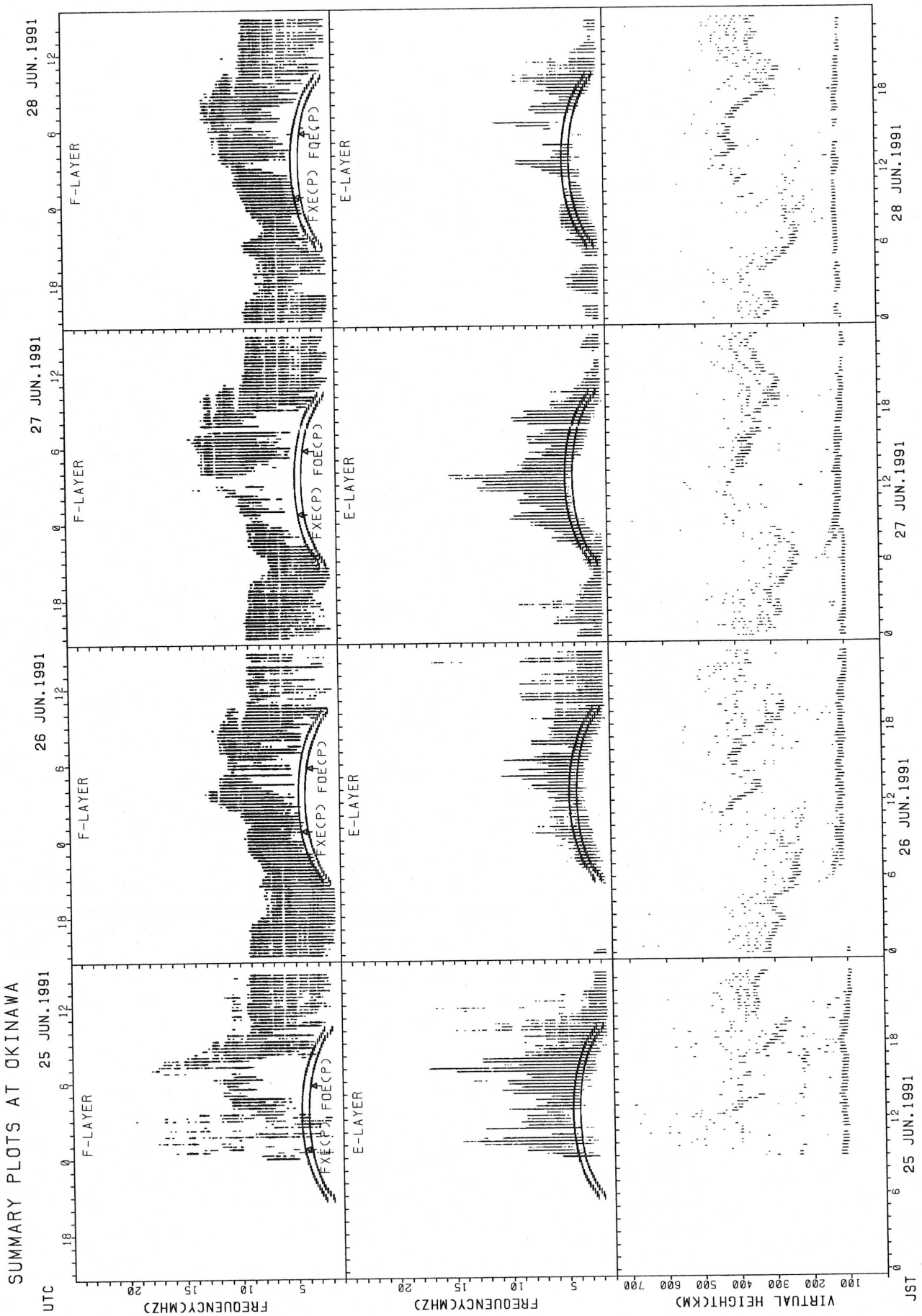
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

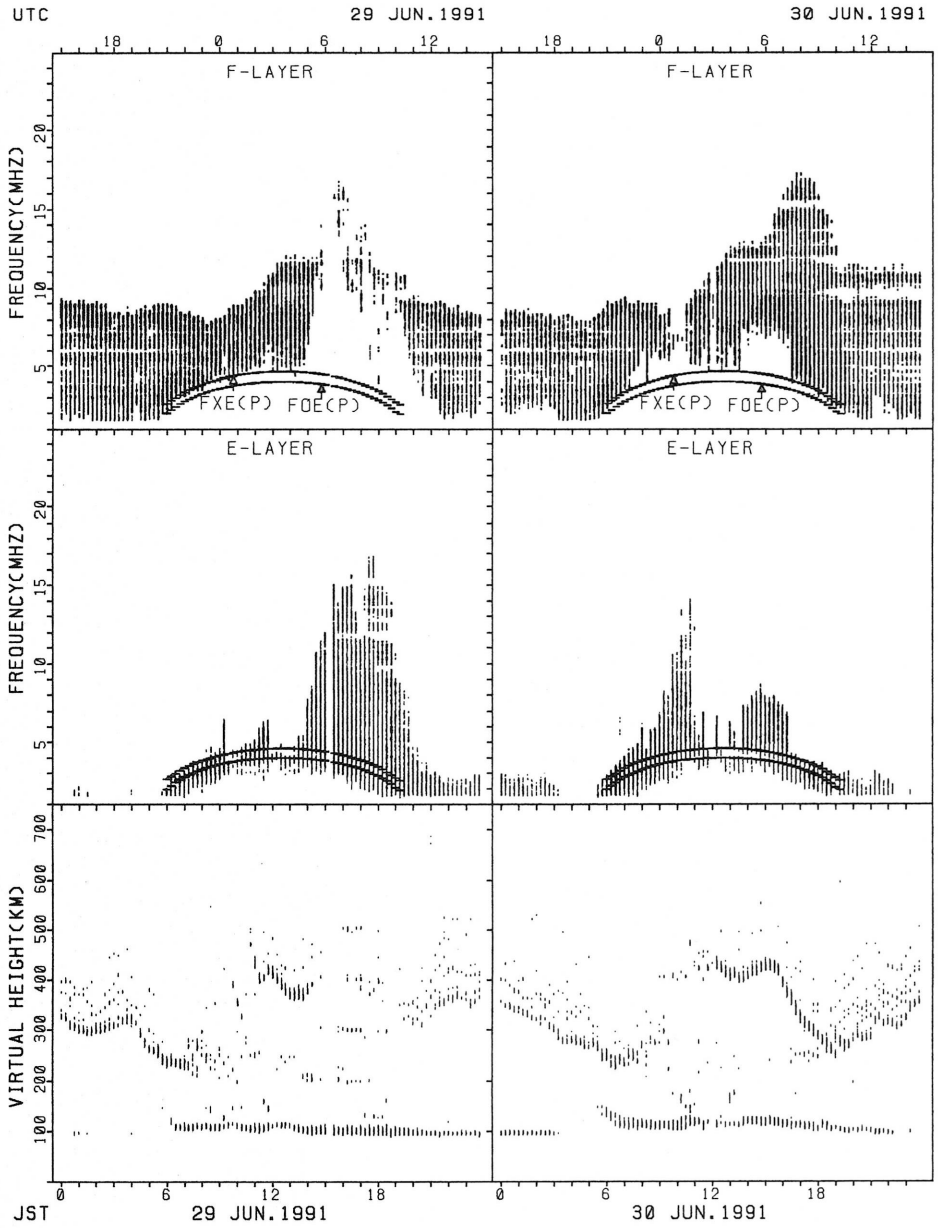

SUMMARY PLOTS AT OKINAWA
UTC
17 JUN.1991
18 JUN.1991
19 JUN.1991
20 JUN.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



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


SUMMARY PLOTS AT OKINAWA
UTC
25 JUN.1991
26 JUN.1991
27 JUN.1991
28 JUN.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



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

MONTHLY MEDIANS OF H'F AND H'ES

JUN. 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							12													11	13	10		
MED							319													310	314	354		
U Q							335													326	380	400		
L Q							305													244	261	320		

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	17	19	23	19	17	22	25	27	27	23	23	20	22	22	18	17	19	22	25	26	24	26	19	19
MED	111	115	115	119	127	127	121	121	117	115	119	117	115	115	117	119	125	121	119	119	117	117	113	113
U Q	116	121	125	125	136	135	126	125	121	121	123	123	119	121	123	124	129	125	123	121	119	125	119	119
L Q	109	109	107	113	116	125	118	117	113	113	111	111	111	109	111	114	117	117	115	117	115	115	111	111

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																		10	11					
MED																		351	326					
U Q																		360	346					
L Q																		338	316					

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	22	20	22	22	20	25	27	27	26	26	21	22	18	20	18	18	21	25	25	23	24	26	25	24
MED	107	107	107	109	118	121	121	115	115	116	115	114	116	116	118	121	119	119	119	115	115	113	113	110
U Q	109	110	113	125	126	126	125	119	119	121	123	117	129	124	123	129	126	122	122	117	120	121	118	118
L Q	105	105	103	105	108	113	115	113	113	113	113	109	109	112	113	113	115	114	115	111	111	109	107	105

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		14	10	10	12		11	13									12	17	19	17	13			
MED		349	351	369	376		312	284									348	334	324	304	346			
U Q		366	370	392	390		334	335									365	348	342	341	380			
L Q		332	332	312	343		292	261									259	319	314	280	327			

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	25	28	25	23	19	20	22	29	29	29	28	19	23	20	23	20	20	29	25	29	27	28	27	28
MED	107	107	105	107	111	121	123	119	115	115	117	113	113	114	117	121	119	119	115	113	111	111	109	109
U Q	107	109	110	109	129	132	131	123	117	117	129	123	123	122	125	127	123	123	119	115	115	114	113	113
L Q	105	104	103	101	107	114	117	114	113	111	111	109	109	110	111	118	116	115	113	109	109	107	105	105

MONTHLY MEDIANS OF H'F AND H'ES

JUN. 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	13	17	19	18	10	13	17	19	17								12	19	26	23	15			10
MED	362	342	334	344	368	324	286	284	282								339	320	310	286	310			363
U Q	371	367	360	370	394	363	306	304	336								354	348	334	324	380			378
L Q	329	313	288	324	324	281	261	248	241								274	270	300	234	252			326

H'ES

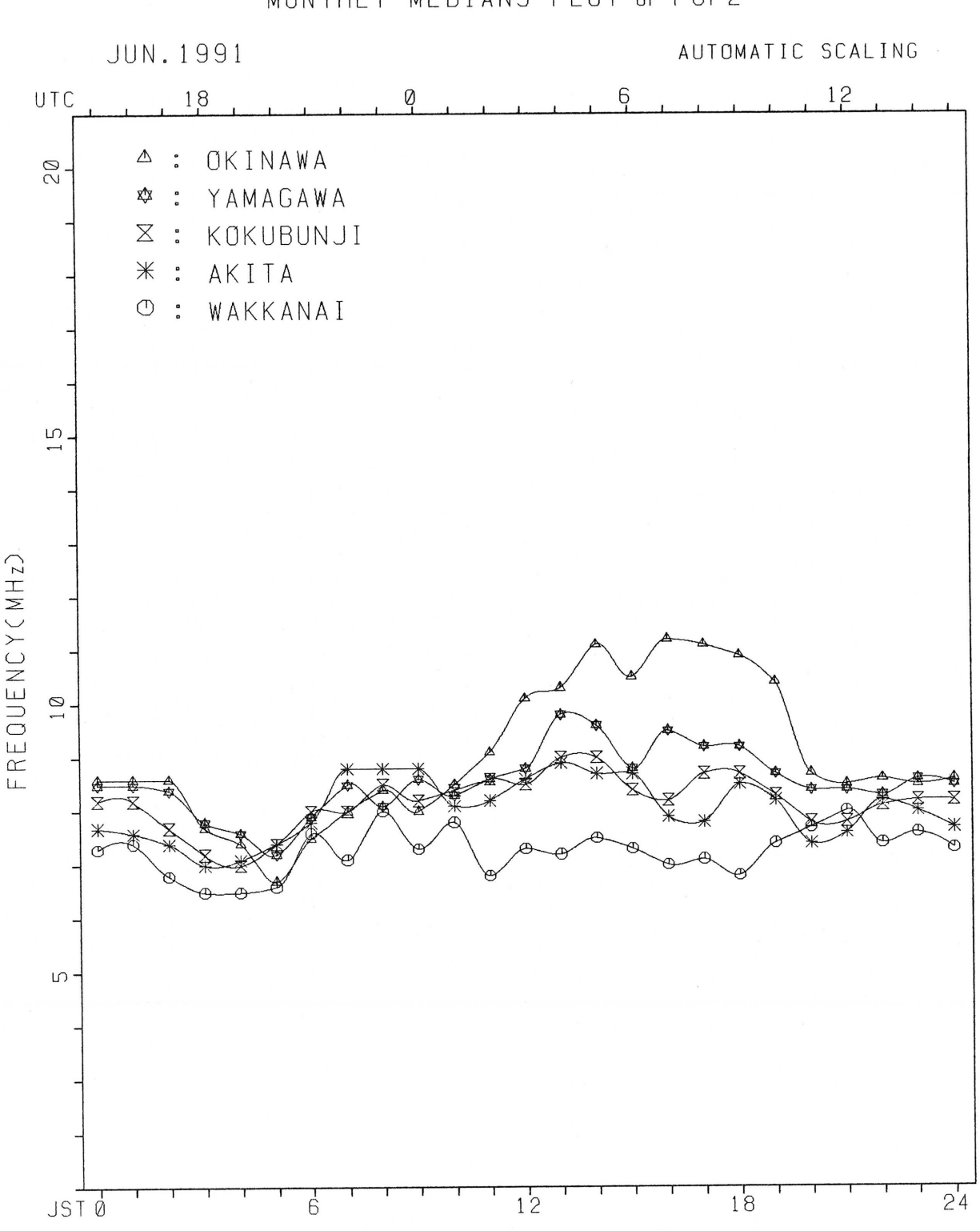
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	26	24	22	22	21	25	28	27	25	19	23	19	15	18	15	24	23	27	29	26	25	27
MED	109	105	103	104	105	128	123	125	119	117	117	115	115	117	121	120	131	125	117	113	109	107	113	111
U Q	117	111	119	112	121	143	137	142	124	123	123	117	121	129	125	125	147	137	123	123	115	111	118	113
L Q	103	101	99	99	99	103	121	119	116	111	111	113	111	113	115	113	111	116	113	109	106	105	103	105

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	12	16	19	12			11	18	16	11							14	23	22	20	17	10		
MED	360	330	308	333			272	283	297	282							348	338	304	298	330	370		
U Q	376	354	348	368			290	308	316	324							356	354	322	320	349	384		
L Q	333	304	288	285			254	264	268	234							326	318	298	276	315	356		

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	25	26	20	18	18	17	23	27	29	29	28	22	23	24	22	22	19	24	26	28	28	24	25	25
MED	105	107	104	105	105	105	125	123	119	119	119	119	117	124	119	120	115	117	120	113	107	103	103	101
U Q	120	115	111	113	111	120	149	131	125	125	125	129	125	131	137	135	125	123	125	117	113	109	107	108
L Q	99	99	98	97	99	98	107	119	113	111	112	115	109	115	111	111	109	113	113	107	104	100	99	97


MONTHLY MEDIANS PLOT OF FOF2
JUN. 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

JUN. 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 117	X 99	X 105	79	102	91	84	76	66		86		89								X 86	X 86	X 92	X 82
2	X 78	X 80	X 83	X 79	71																X 78	X 76	X 75	74
3	X 68	X 71	X 68	65	70																X 77	X 80	X 85	X 82
4	X 81	X 80	X 77	X 73	X 69																X 75	X 77	X 77	X 80
5	X 79	X 82	X 80	X 68	61																X 64	X 71	X 72	X 73
6	X 72	X 68	X 63	X 54	57																X 92	X 87	X 85	O X 84
7	X 80	X 81	79	X 78																	X 82	X 81	X 84	X 88
8	X 89	X 88	X 85	X 83																	X 92	X 94	A	96
9	97	X 91	83	76	78																A	X 78	X 76	X 70
10	X 74	X 74	68	61	54																X 70	X 82	X 77	87
11	84	X 83	X 75	X 83				56													X 70	X 73	X 78	X 80
12	X 79	O X 77	X 75	X 65																	X 77	X 77	X 75	X 79
13	X 87	X 81	74	X 52	43																X 68	X 81	X 77	X 71
14	X 70	X 68	X 63	X 51																	X 102	X 102	X 93	99
15	91	87	86	82	81																X 95	X 98	X 98	103
16	103	104	91	80	79	87				91			107								X 97	X 88	X 84	X 83
17	X 85	X 85	X 81	83	81																X 88	X 97	99	101
18	X 89	X 84	X 88	X 109			73		76												X 73	X 76	X 75	X 74
19	X 73	X 73	X 71	X 69																	X 97	X 97	X 103	X 97
20	98	X 98	X 93	X 82																	X 81	X 91	X 93	X 95
21	X 99	X 96	X 91	X 86																	X 97	X 93	X 97	99
22	98	X 98	88	84	79	83															X 89	X 89	88	93
23	91	96	99	89	82																X 92	X 99	X 99	X 101
24	X 91	X 89	X 89	X 85																	X 86	X 88	X 93	X 91
25	X 92	X 98	X 86	X 84																	X 87	X 89	X 90	X 95
26	X 90	95	X 91	X 86	X 83																X 94	X 92	95	100
27	X 102	X 99	X 86	79	79																X 95	X 98	X 93	X 95
28	X 93	X 87	X 83	X 81	X 81																O X 83	X 88	90	X 89
29	X 94	97	X 93	91	X 91																X 93	X 93	X 98	X 99
30	X 97	X 95	98	X 97	X 91																X 93	X 89	X 92	X 89
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	19	3	2	2	2	1	1		2								29	30	29	30
MED	X 90	X 87	X 84	X 80	79	87	78	66	71	91	86		98								X 87	X 88	X 90	X 89
U Q	97	X 96	X 91	X 84	X 82	91															X 94	X 93	X 94	97
L Q	X 79	X 80	X 75	X 69	69	83															X 77	X 80	X 77	X 80

JUN. 1991 FXI (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 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	R 111	93	V 99	F	F 92	F 82	F 72	F 62	F 58	76	F 78	V 80	F 81	83	79	75	78	80	81	77	80	80	86	76
2	72	74	77	73	F 61	60	60	64	61	58	I R 60	67	72	73	73	77	81	86	88	81	72	70	69	F 65
3	S 62	65	62	F 59	F 62	Z 71	80	75	I A 72	I A 68	I A 67	70	71	72	73	74	76	75	72	75	Z 71	74	79	76
4	75	74	71	67	63	66	70	78	79	69	J R 66	R 71	74	B	B	R	69	70	I A 70	69	69	71	71	74
5	73	76	74	62	F 53	65	79	60	77	92	82	I B 74	73	90	89	72	80	79	77	62	58	65	66	S 67
6	66	62	57	48	F 49	63	87	87	100	84	64	B	83	81	80	85	77	86	84	83	87	81	79	78
7	74	75	F 72	72	72	76	87	81	75	66	A	Y	U R 62	I A 60	58	68	A	A	A	81	76	75	78	82
8	83	82	79	77	73	72	84	95	97	102	93	95	102	104	103	95	89	90	91	89	86	V 89	I A 86	F 87
9	88	85	F 73	J S 69	F 70	76	83	76	75	69	69	B	B	69	77	64	A	A	65	I A 66	I A 70	72	70	64
10	68	68	F 60	53	F 47	49	I A 50	54	A	A	E G 50	A	A	E G 50	A	A	60	I A 56	59	65	64	76	71	80
11	F 76	77	69	77	69	60	55	F 50	I A 51	E G 48	57	B	B	A	58	58	56	I A 56	57	61	64	67	72	74
12	73	S 71	69	59	57	54	E G 45	B	E G 50	A	58	E G 56	U R 62	69	74	76	69	71	70	69	71	71	69	73
13	81	75	62	46	F 35	44	49	52	I A 50	A	E G 49	A	A	57	53	55	59	61	51	62	62	75	71	65
14	64	62	V 57	45	36	47	49	I A 62	65	78	84	85	87	79	81	83	84	83	84	87	96	V 96	87	87
15	F 84	F 80	F 78	F 74	F 74	83	98	106	107	95	90	92	98	101	103	101	U A 101	104	106	94	89	92	92	F 94
16	U F 95	F 95	F 80	F 72	F 71	F 80	94	F 97	89	F 83	86	92	98	I A 97	92	85	85	88	91	99	91	82	78	77
17	79	79	75	F 75	F 72	79	91	100	88	83	89	97	106	I A 105	105	103	103	106	104	93	82	91	F 88	F 94
18	83	78	82	103	73	69	F 64	73	F 67	73	69	U R 59	U R 61	J R 64	70	68	70	72	65	65	67	70	69	68
19	S 67	67	65	63	62	73	79	78	79	I A 88	91	89	81	84	90	94	93	105	R 112	105	91	91	97	91
20	F 90	92	87	76	69	76	85	R 75	66	68	67	75	73	78	82	79	82	85	83	83	S 75	85	87	89
21	93	90	85	80	77	82	92	97	92	88	101	99	105	109	106	101	98	95	108	105	91	87	91	F 90
22	89	92	F 76	F 75	F 71	F 75	84	89	91	92	88	A	A	102	A	97	89	96	96	94	83	83	F 82	F 85
23	F 84	F 88	91	F 82	F 76	76	83	90	91	98	96	93	96	90	98	94	94	95	98	91	86	S 93	93	96
24	85	83	83	79	67	63	69	70	65	U R 65	I R 64	68	78	82	76	79	72	77	87	80	80	82	87	85
25	86	92	80	78	73	72	74	67	68	69	68	69	75	80	81	76	I A 76	U A 80	I A 80	79	81	83	84	89
26	84	F 86	85	80	77	69	75	77	80	91	84	84	86	97	101	93	88	95	94	93	89	86	F 86	U F 91
27	96	93	80	F 72	F 71	72	78	74	73	78	86	90	94	89	99	97	90	85	85	84	89	92	87	89
28	87	81	77	75	75	79	80	72	67	71	U R 77	80	87	91	90	91	89	91	92	84	S 77	82	F 83	83
29	88	87	87	F 83	V 85	85	99	105	94	95	93	95	101	113	R 109	105	97	95	89	88	87	87	92	93
30	91	89	91	V 91	85	85	94	107	102	90	89	98	I B 102	105	108	108	106	97	99	95	87	83	86	83
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	29	30	30	30	29	29	27	29	23	25	28	27	28	28	28	29	30	30	30	30	30
MED	84	80	77	74	71	72	80	76	75	78	78	84	83	84	82	84	83	86	85	83	80	82	84	83
U Q	88	89	83	78	74	79	87	92	91	91	89	93	98	99	101	96	92	95	95	93	87	87	87	89
L Q	73	74	69	62	F 62	63	69	66	66	69	65	70	73	72	74	74	74	76	71	69	71	74	71	74

JUN. 1991 FOF2 (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 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							440	480	U A 520	550	H 550	L 595	U A 550	U A 570	560	530	510		L					
2							435	455	495	U A 520	U R 535	540	U A 565			550	515	L 490	L					
3												550				545	530	L						
4							L	490	505		550	R 555	540				505	U L 490						
5					L	L				570	585		U A 590	540	545	515	505	475	L					
6							L	U L 580	U L 575	L	L				L 550	U L 600	L							
7								L	545	550						530								
8							L	L	L							L 580	U L 565	L	L					
9								500	515	U A 530	U A 535				Y 530				U L 405					
10								U A 435			500			500			490		U L 415					
11					U L 220	335	400	425		480	505					515	485							
12							445		495			555	565			535	U L 565	U L 505	L					
13					220	U A 320	U A 400	U A 435			485			485	500	485	470	450						
14						360			560		L		565	L 600	560	U L 580	555		L					
15							L	L			L	620			605			L						
16							L	L 525			555	570				U L 555	L	U L 485						
17							U L 500	L 505	U L 600	H 615	L 560					555	520	L 480						
18									U A 520	U A 535	530	520	525	535	525	505	485	480	L					
19						L						575	570	535		565	L	L 505						
20						L 370	L 440		515	L 610	530	U A 540		545	U A 555	560	515	U L 495						
21							L	L	L		U L 680	590	560	595	560	U L 605		L						
22						L	L									550								
23								L	L	590	535	L	615	615	580	550	L 575	U L 525						
24						360	420	450	520		535	555	R 560		555	540	L	475	L					
25						L 370	425	495	520	535	545	R 555	545	565	560	550								
26						L		U L 545	U L 620	U L 585	620	L	L	610	595	565	L 590	525						
27						L	L				555	590	580	600	550	L 595	L 580	L 515	L					
28							L	U L 540	620	560	R 575	595	R 610	600			L	L 515	L					
29							L	U L 490				655			585	575	L 595	U L 545	L					
30							L	L			L 685	580			U L 635	580	L	L	L					
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT					2	6	9	15	15	13	20	17	14	14	17	25	18	16	2					
MED					220	360	435	490	520	550	548	570	565	568	560	550	518	L 492	U L 410					
U Q						L 370	L 442	U L 525	U L 575	588	568	592	580	600	582	L 578	L 565	L 515						
L Q						335	410	450	515	532	532	552	550	535	548	532	505	480						

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

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 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

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						180	270	330	365	385	A	A 395	405	415	A	370	360	305	240	B				
2						A	R 350		A	A	A	A	420	420	400	380	355	310	A	B				
3						220	285	345	370	395	405	410	420	420	405	385	360	300	220	B				
4						210	300	330	365	395	410	410	420	B	B	B	385	325	245	B				
5					B	200	280	340	375	390	410	B	420	U R 405	390	375	350	300	U A 200	B				
6					B	205	275	325	365	385	410	B	B	B	B	395	360	330	A	B				
7					B	A	U A 275	U A 320	A	A 395	B	B	B	B	420	410	360	315	A	B				
8					B	210	A 280	340	U A 375	A	A	A	410	390	A	A	355	310	240	B				
9					B	A	275	U A 325	370	385	410	B	B	B	430	405	365	320	U A 230	B				
10					B	A 210	275	A 330	A 360	U A 380	A	A	A	A	415	390	355	310	A	B				
11					B	205	275	330	350	A	395	B	B	B	B	400	360	320	A	B				
12					B	235	B	B	B	B	U A 410	B	R 430	430	410	U S 385	360	315	255	B				
13					B	205	285	A 340	360	B	A	A	A	A	A	380	350	300	240	B				
14					B	A	290	A	A	A	A	B	A	R 405	415	B	350	310	235	B				
15					B	A	280	335	365	A 370	U A 380	A	A	A	410	385	355	315	B	B				
16					B	A	B	345	365	A	415	410	420	B	400	380	355	U A 300	A	B				
17					B	H 210	270	320	360	385	A	A	A	B	A	380	355	310	245	B				
18					B	H 210	280	325	360	380	395	400	410	A	395	375	345	295	245	B				
19					B	210	280	330	355	A 375	A	A 390	A	400	395	365	345	300	220	B				
20					B	A	270	325	350	375	400	405	A	A	380	U A 350	A	290	210	B				
21					B	200	280	330	345	375	A 385	A	395	385	R 390	375	345	305	A 230	B				
22					B	185	A 290	A	A	A	A	A	A	U A 390	A	A	355	A	A	B				
23					B	A	270	340	A	A	A 410	420	R	405	R 395	390	345	300	A	B				
24					B	205	275	320	350	370	R 395	400	400	395	A	375	345	305	235	B				
25					B	A	275	315	355	370	380	R 385	A	400	390	380	345	A	A	B				
26						200	U A 270	A	A	A	410	R	425	A	A	385	345	295	A	B				
27						210	280	335	355	380	A	A 405	A	A	A	A	A	A	A	B				
28						H 210	275	330	U A 365	380	A	A 390	390	A	A	B	R 410	345	255	B				
29						A	A	A	A	385	A	A	A	A	A	380	355	305	255	B				
30						175	285	345	365	A 390	405	A 420	B	425	415	395	365	325	250	B				
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						20	26	25	22	20	17	13	13	14	17	24	28	27	18					
MED						208	278	330	362	382	405	405	420	405	400	380	355	310	240					
U Q						210	280	340	365	388	410	410	420	420	415	390	360	315	245					
L Q						200	275	325	355	375	395	A 392	402	395	392	375	348	300	230					

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

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 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	J A 19	E B 13	E B 15	E B 13	J A 16	25	40	43	J A 55	55	46	J A 62	J A 105	J A 62	J A 55	G	39	J A 85	28	J A 40	E B 13	E B 15	20	J A 37
2	J A 24	J A 39	22	J A 61	J A 44	J A 41	G	43	42	J A 52	51	J A 56	60	J A 75	J A 67	J A 54	48	J A 42	25	J A 36	26	J A 48	J A 86	J A 43
3	J A 50	J A 66	J A 52	J A 35	20	G 21	43	J A 62	102	91	107	48	61	J A 74	J A 65	J A 53	G	G	J A 72	59	J A 66	J A 54	43	33
4	J A 19	19	E B 17	E B 13	E B 14	27	34	J A 51	J A 52	J A 64	46	J A 55	50	B	B	54	G	38	J A 104	J A 66	J A 21	J A 21	J A 24	J A 53
5	J A 33	J A 66	J A 31	20	E B 14	J A 50	J A 54	J A 53	61	J A 55	45	B	60	G	G	41	G	37	24	E B 16	E B 14	E B 13	J A 30	J A 53
6	J A 34	43	J A 27	J A 27	32	J A 49	J A 52	J A 54	J A 67	J A 62	44	B	E B 73	J A 102	49	54	J A 52	J A 51	J A 50	50	32	J A 34	20	73
7	J A 52	28	J A 41	J A 36	J A 35	J A 30	J A 61	J A 75	J A 49	52	60	55	54	J A 112	J A 56	52	96	115	J A 136	60	J A 71	E B 13	E B 14	J A 65
8	J A 53	J A 54	J A 64	32	J A 24	G	33	43	J A 52	J A 97	76	J A 93	J A 124	J A 98	J A 130	J A 55	43	J A 50	J A 40	J A 58	J A 77	J A 88	J A 115	J A 87
9	58	J A 76	J A 65	E B 13	E B 13	30	J A 75	J A 55	47	57	54	B	74	J A 98	51	J A 65	J A 108	J A 102	J A 47	J A 90	J A 93	J A 52	J A 61	43
10	J A 24	23	21	J A 36	J A 39	J A 50	73	J A 55	68	J A 141	J A 102	J A 102	J A 102	J A 50	J A 99	90	45	71	J A 37	36	J A 49	J A 86	62	88
11	57	J A 51	J A 54	J A 87	18	25	32	40	61	42	43	B	B	J A 58	E B 55	46	46	J A 70	49	48	J A 36	J A 27	J A 74	J A 74
12	J A 65	J A 65	J A 34	J A 22	16	J A 29	E B 36	B	E B 43	84	J A 240	E B 44	49	61	71	G	G	35	28	J A 43	J A 63	J A 28	J A 61	J A 54
13	18	J A 47	J A 53	J A 30	J A 21	33	J A 43	J A 85	J A 77	60	60	J A 83	60	47	J A 54	G	39	J A 48	J A 52	47	J A 100	J A 37	J A 78	J A 32
14	J A 42	J A 26	J A 44	J A 51	J A 27	J A 35	34	J A 90	101	J A 84	48	84	J A 85	G	46	47	50	42	J A 36	56	J A 92	J A 53	J A 88	J A 87
15	J A 85	J A 87	J A 65	55	J A 51	73	34	J A 54	J A 127	J A 117	J A 61	60	67	J A 81	53	J A 92	124	J A 51	60	41	34	J A 27	J A 53	J A 61
16	J A 63	J A 45	J A 54	J A 49	J A 54	J A 63	42	J A 52	J A 62	J A 156	J A 91	52	J A 72	133	J A 78	J A 53	J A 57	J A 70	J A 61	22	J A 46	J A 23	J A 30	32
17	53	J A 36	J A 50	J A 21	J A 23	24	31	J A 55	49	G	J A 55	J A 148	J A 71	100	88	55	G	38	J A 46	49	J A 56	J A 86	J A 75	60
18	J A 54	J A 52	J A 40	J A 23	E B 13	28	J A 54	J A 76	J A 56	J A 57	J A 52	45	46	41	42	40	37	J A 41	32	J A 29	J A 55	52	J A 66	60
19	J A 26	J A 67	J A 35	J A 27	J A 28	G 20	J A 50	J A 51	86	105	74	43	J A 51	G	J A 79	G	J A 54	J A 53	53	J A 45	60	J A 86	42	30
20	J A 91	J A 19	J A 44	J A 47	J A 23	25	33	J A 83	J A 58	43	47	J A 57	J A 72	J A 57	J A 59	J A 55	39	J A 43	J A 69	J A 128	J A 28	43	29	53
21	J A 32	J A 26	J A 25	J A 33	J A 15	26	31	J A 43	J A 49	86	J A 52	45	46	41	G	48	77	53	80	59	J A 39	J A 65	58	J A 53
22	J A 51	J A 39	J A 29	27	J A 16	J A 38	J A 54	J A 66	J A 72	77	77	139	J A 159	100	121	J A 55	J A 73	70	J A 58	J A 27	J A 51	J A 34	J A 51	J A 64
23	J A 44	J A 50	J A 33	J A 36	J A 34	J A 38	30	38	43	J A 42	46	J A 88	G	G	G	61	J A 51	J A 59	J A 54	21	J A 25	J A 48	37	28
24	20	J A 21	E B 13	E B 13	E B 13	25	32	J A 44	J A 55	J A 78	J A 79	J A 85	J A 70	J A 90	J A 54	G	G	J A 54	J A 41	J A 25	32	J A 53	J A 28	E B 14
25	E B 13	E B 13	27	J A 30	J A 25	J A 30	35	J A 54	J A 49	J A 55	J A 54	41	43	G	43	J A 53	J A 101	151	127	J A 54	J A 82	J A 49	J A 47	J A 44
26	J A 47	J A 42	J A 36	J A 42	J A 21	23	31	J A 37	39	J A 55	45	G	J A 65	44	J A 76	44	42	J A 54	J A 54	J A 29	J A 34	32	J A 52	J A 45
27	J A 106	J A 24	J A 19	20	J A 19	J A 19	30	43	J A 65	J A 62	J A 53	45	50	46	J A 51	J A 47	J A 50	J A 46	J A 41	J A 43	24	J A 20	E B 15	E B 15
28	E B 14	J A 22	20	20	E B 14	G	31	40	J A 58	51	93	J A 51	J A 58	60	60	E B 68	47	48	J A 42	J A 42	J A 52	J A 54	J A 34	J A 52
29	J A 52	J A 51	J A 42	J A 55	J A 25	26	32	39	J A 102	J A 74	88	47	J A 73	83	J A 57	G 37	G 33	G 25	J A 36	J A 32	J A 19	J A 22	J A 52	J A 49
30	J A 31	31	J A 42	J A 22	22	23	35	J A 54	74	J A 64	J A 52	49	B	74	J A 57	G	G	J A 43	J A 36	60	J A 55	J A 47	J A 54	J A 51
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	29	30	30	30	26	28	29	29	30	30	30	30	30	30	30	30	30
MED	J A 46	J A 40	J A 36	J A 30	J A 22	28	34	J A 53	J A 58	J A 62	54	55	62	61	J A 56	51	46	J A 50	J A 48	J A 44	J A 48	J A 45	J A 52	J A 52
U Q	J A 54	J A 52	J A 50	J A 42	J A 28	J A 38	J A 50	J A 58	72	J A 84	77	J A 84	J A 73	J A 94	J A 74	J A 55	J A 54	70	J A 60	J A 58	J A 63	J A 53	J A 62	J A 61
L Q	24	24	25	21	E B 16	24	32	43	49	55	47	45	50	G 42	50	G 40	G	42	36	J A 32	28	J A 27	30	37

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

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 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

H / D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 13	E B 13	E B 15	E B 13	E B 14	24	39	39	52	53	42	55	55	57	54	G	39	50	28	35	E B 13	E B 15	E B 13	27
2	20	27	E B 13	37	23	38	G	43	40	52	49	51	57	66	65	47	48	41	U Y 25	34	17	28	28	31
3	43	36	31	24	E B 15	G 20	40	51	A A 102	A A 91	A A 107	46	59	67	61	43	G	G	69	50	51	42	38	29
4	E B 14	15	E B 17	E B 13	E B 14	26	33	40	43	62	44	46	47	B	B	U Y 54	G	38	A A 104	55	16	18	18	17
5	23	21	18	E B 14	E B 14	23	46	37	57	49	44	B	59	G	G	40	G	34	24	E B 16	E B 14	E B 13	26	34
6	19	40	19	17	30	44	46	45	50	46	43	B	E B 73	78	48	52	49	49	49	40	25	27	E B 13	70
7	49	20	15	34	23	24	56	40	41	50	A A 60	U Y 55	U Y 53	A A 112	56	43	A A 96	A A 115	A A 136	51	35	E B 13	E B 14	40
8	36	45	30	29	20	G	31	39	50	63	67	67	77	96	93	51	42	38	34	37	70	51	A A 115	62
9	43	52	37	E B 13	E B 13	28	71	42	41	53	54	B	E B 70	66	U Y 51	60	A A 108	A A 102	31	A A 90	A A 93	44	20	29
10	17	E B 14	E B 13	31	23	39	A A 73	44	A A 68	A A 141	46	A A 102	A A 102	46	A A 99	A A 90	41	A A 71	30	31	25	62	46	25
11	41	45	39	19	17	24	31	34	A A 61	42	43	B	B	E B 49	E B 55	43	45	A A 70	41	30	18	22	45	48
12	47	65	18	E B 13	15	27	E B 36	B	E B 43	A A 84	54	E B 44	48	60	67	G	G	34	28	22	23	22	43	16
13	E B 14	29	22	18	20	32	40	44	A A 77	A A 60	42	A A 83	A A 60	44	42	G	38	38	43	40	22	34	23	16
14	37	E B 13	33	27	19	28	34	A A 90	41	70	46	82	54	G	43	47	43	39	33	39	34	46	36	52
15	42	22	28	34	36	61	33	44	87	86	49	49	60	77	43	90	U A 84	42	U Y 60	24	26	17	28	39
16	44	27	38	31	40	43	41	48	62	62	50	52	69	A A 133	72	46	49	39	46	U Y 22	25	E B 13	17	20
17	40	26	36	16	E B 13	G 19	30	34	45	G	47	86	61	A A 100	69	54	G	35	40	31	43	62	55	45
18	34	23	26	16	E B 13	27	46	65	52	54	42	42	42	41	40	39	36	35	29	24	51	41	52	17
19	20	28	18	18	18	G 17	41	45	74	A A 105	70	43	46	G	66	G	50	43	45	31	38	69	25	22
20	37	17	29	17	E B 13	22	31	61	44	41	42	54	64	52	56	52	35	39	52	40	18	32	21	27
21	22	21	17	E B 14	E B 14	24	30	39	43	75	47	43	43	41	G	47	69	45	68	49	25	33	47	23
22	19	16	21	17	E B 13	29	44	52	61	65	73	A A 139	A A 159	92	A A 121	48	65	56	50	22	23	17	26	43
23	36	28	25	25	28	30	30	36	40	41	44	44	G	G	G	48	42	39	34	18	24	28	29	18
24	E B 13	19	E B 13	E B 13	E B 13	21	31	41	47	61	48	44	53	66	41	G	G	38	30	21	24	27	24	E B 14
25	E B 13	E B 13	19	25	20	26	33	40	42	51	49	41	42	G	42	41	A A 101	75	A A 127	44	67	25	33	35
26	30	17	32	28	18	23	30	34	38	51	44	G	59	43	51	41	39	48	37	26	27	19	38	31
27	41	17	E B 13	E B 13	17	G 15	30	39	63	62	48	44	47	46	46	44	43	32	34	34	E B 13	17	E B 15	E B 15
28	E B 14	17	E B 14	E B 13	E B 14	G	31	36	48	48	52	45	54	56	50	E B 68	45	43	36	25	29	28	21	22
29	22	32	23	34	17	26	31	36	74	66	80	46	64	76	46	G 35	G 32	G 24	33	28	E B 13	18	35	20
30	19	23	33	19	E B 13	23	33	42	66	61	45	46	B	73	50	G	G	39	31	44	17	21	25	25
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	29	30	30	30	26	28	29	29	30	30	30	30	30	30	30	30	30
MED	26	22	22	18	17	25	33	41	50	60	48	46	56	57	50	44	42	39	36	32	25	27	27	27
U Q	41	29	31	28	20	29	41	45	63	66	54	55	64	76	66	52	49	49	50	40	35	41	38	39
L Q	E B 19	17	E B 17	E B 14	E B 14	G 22	31	38	43	50	44	44	48	G 42	42	G 39	G	38	31	24	18	18	21	20

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

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 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	15	13	14	15	16	17	21	27	34	33	34	34	25	30	28	18	16	13	13	15	13	13
2	13	14	13	13	13	17	24	24	28	31	39	37	33	31	33	33	22	28	17	12	13	13	13	13
3	14	13	13	13	15	17	18	18	19	26	28	35	32	33	35	21	18	14	16	14	15	13	13	14
4	14	14	17	13	14	15	20	18	20	24	32	35	35	B	B	46	33	22	17	14	13	12	13	14
5	13	13	13	14	14	16	18	17	20	32	33	B	E S 39	35	32	25	20	18	18	16	14	13	14	13
6	13	13	13	13	13	16	18	20	20	24	E S 36	B	73	47	43	30	30	24	17	15	13	14	13	14
7	16	13	13	13	15	16	19	18	21	24	43	53	49	46	35	33	32	21	17	14	14	13	14	14
8	14	13	14	13	13	17	21	22	22	32	34	24	27	34	35	22	24	18	17	13	14	13	13	13
9	14	12	13	13	13	17	19	19	20	27	32	B	70	47	36	35	24	16	17	13	13	14	13	13
10	13	14	13	12	12	16	19	18	25	28	35	35	37	34	35	32	20	18	18	14	13	14	14	13
11	15	13	14	13	13	16	18	21	23	34	31	B	B	49	55	35	23	21	19	13	12	13	13	14
12	14	14	12	13	12	16	36	B	43	42	35	44	40	39	37	33	26	22	18	13	12	14	14	13
13	14	13	13	13	13	15	18	20	22	43	32	37	35	34	34	34	21	19	19	14	13	13	15	13
14	15	13	14	13	12	16	19	19	27	38	33	42	34	33	33	40	22	21	18	14	15	15	14	13
15	13	13	13	13	13	14	20	20	20	21	22	39	36	31	32	33	23	20	42	13	14	13	14	13
16	14	14	13	13	13	17	34	24	21	24	34	35	33	41	35	23	21	18	17	13	12	13	13	14
17	14	13	14	13	13	16	19	18	22	28	38	34	34	51	30	32	20	17	18	13	13	16	13	14
18	14	13	15	13	13	15	18	17	23	24	24	34	34	39	32	25	18	19	17	15	15	13	13	14
19	13	13	14	13	13	15	16	17	18	20	23	26	31	32	26	21	22	17	15	13	13	14	14	14
20	15	13	13	13	13	15	17	16	22	20	30	33	33	33	21	25	19	17	13	15	14	14	15	13
21	13	15	14	14	14	16	16	17	17	20	25	26	29	27	32	22	22	18	16	14	13	13	13	12
22	13	13	12	12	13	12	17	16	21	22	31	35	35	35	32	23	18	18	16	13	14	13	14	13
23	14	14	13	13	13	14	16	16	18	18	28	27	28	32	30	18	21	16	17	15	13	13	13	14
24	13	13	13	13	13	13	17	16	20	21	24	37	33	25	21	20	17	16	16	15	13	13	14	14
25	13	13	13	13	13	14	15	15	18	22	24	31	32	33	25	26	20	17	18	14	14	14	15	14
26	15	13	13	16	15	15	17	17	27	23	30	35	33	35	26	23	18	17	16	13	14	14	13	13
27	14	13	13	13	14	12	16	17	19	27	37	35	40	36	32	23	21	20	17	13	13	13	15	15
28	14	13	14	13	14	17	16	18	21	24	32	34	31	34	34	68	34	23	16	16	14	13	13	13
29	14	14	14	14	13	16	18	18	18	25	35	37	34	E S 36	28	27	21	16	15	13	13	13	13	14
30	14	13	13	13	13	16	17	19	21	24	29	35	B	34	30	21	20	17	18	13	13	13	13	13
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
MED	14	13	13	13	13	16	18	18	21	24	32	35	34	34	32	26	21	18	17	14	13	13	13	13
U Q	14	14	14	13	14	16	19	20	22	28	35	39	39	39	35	33	24	21	18	14	14	14	14	14
L Q	13	13	13	13	13	15	17	17	20	22	28	34	33	33	30	23	20	17	16	13	13	13	13	13

JUN. 1991 FMIN (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 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	R 270	245	V 260	F	F 275	260	F 260	F 260	F 235	250	F 250	V 250	F 250	255	265	260	270	270	280	260	240	245	260	260
2	245	245	260	250	F 250	255	255	255	270	240	I R 245	250	265	A 250	250	250	245	260	270	260	265	250	260	F 250
3	S 250	260	260	F 255	F 255	Z 300	290	260	A	A	A	250	255	A 255	260	265	265	275	A	265	Z 270	245	250	250
4	255	260	270	285	265	280	265	265	265	A 230	J R 220	R 245	250	B	B	R	260	270	I A 270	275	260	245	245	245
5	270	260	270	255	F 235	260	295	335	230	290	250	I B 235	220	240	270	225	240	245	280	280	220	230	225	S 240
6	250	255	230	220	F 225	220	260	250	265	280	350	B	255	A 260	270	280	250	275	275	255	265	245	255	A 260
7	245	260	F 245	260	255	260	275	265	265	245	A	Y	R	A	A	245	A	A	A	280	250	235	240	250
8	255	255	260	270	270	260	255	255	255	265	260	245	260	A 265	A 265	270	265	275	280	270	260	V 260	I A 255	F 250
9	255	265	F 260	J S 240	F 240	230	A 250	245	250	235	230	B	B	A	255	A 250	A	A	265	A	A	250	250	235
10	245	250	F 255	245	F 235	215	A	250	A	A	G	A	A	G	A	A	250	A	230	255	255	250	240	245
11	F 250	255	230	245	225	215	210	F 205	A	G	225	B	B	A	220	230	235	I A 230	230	Y 245	240	235	240	235
12	A 235	245	240	240	235	235	G	B	G	A	240	G	U R 270	250	A 255	265	260	265	270	265	245	240	235	235
13	250	265	270	265	F 225	205	215	215	A	A	G	A	A	225	210	225	240	250	220	230	215	235	240	230
14	235	245	V 245	245	240	255	305	A	255	A 255	285	A	310	275	280	280	280	280	280	265	270	V 280	285	255
15	F 265	F 260	F 280	F 270	F 280	285	280	275	290	A 260	250	255	260	265	265	A 265	A	275	290	275	255	250	260	F 265
16	U F 280	F 295	F 280	F 255	F 255	F 255	275	F 280	270	F 270	250	260	265	I A 270	270	275	270	270	275	280	280	250	255	250
17	260	275	270	F 275	F 265	285	290	305	280	240	235	A 260	250	I A 250	255	255	260	270	280	280	250	255	F 250	F 255
18	260	235	240	300	H 275	290	F 300	270	F 245	240	260	U R 220	U R 255	J R 245	260	260	270	300	270	275	260	255	265	260
19	S 270	265	265	265	265	285	290	260	A	A	255	280	255	260	260	260	260	265	R 275	280	255	255	265	255
20	F 255	270	270	255	245	260	270	R 295	255	255	255	270	250	265	275	275	275	285	285	285	S 245	250	260	260
21	270	280	280	280	270	265	285	285	285	A 250	255	255	255	265	270	270	275	260	275	275	275	265	255	F 270
22	260	290	F 275	F 270	F 265	F 275	260	280	255	260	265	A	A	A 270	A	265	255	275	265	290	270	260	F 260	F 260
23	F 245	F 275	290	F 280	F 275	290	265	310	285	280	290	265	275	260	270	265	260	265	270	275	245	S 245	255	270
24	240	240	245	260	250	250	255	250	250	A	R 235		260	280	275	285	255	270	285	270	245	240	250	245
25	255	280	250	255	250	255	265	255	255	260	265	245	255	270	275	275	A	A	A	280	260	245	250	260
26	260	F 270	270	265	285	310	270	280	275	285	270	255	250	260	275	275	270	270	270	290	260	255	F 245	U F 250
27	275	280	275	F 265	F 270	270	270	270	260	245	260	270	270	255	275	280	280	290	290	260	255	265	250	260
28	270	275	265	260	260	295	300	295	235	250	U R 255	260	255	260	260	265	250	270	280	285	S 255	245	F 250	250
29	260	260	265	F 255	V 265	265	280	300	280	265	245	250	250	265	R 265	270	270	270	275	270	260	255	255	255
30	260	260	265	V 270	280	265	290	285	300	275	245	260	I B 250	245	255	265	270	270	275	270	275	250	250	240
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	29	30	30	29	28	25	24	27	22	24	26	26	28	26	26	27	29	29	30	30	30
MED	255	260	265	260	258	260	270	268	260	255	250	252	255	260	265	265	260	270	275	275	255	250	250	250
U Q	265	275	270	270	270	285	290	285	278	268	260	260	262	265	270	275	270	275	280	280	265	255	260	260
L Q	250	255	250	252	F 240	255	258	255	250	242	240	245	250	250	255	258	250	265	270	262	245	245	245	245

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

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 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							A 315	340	A	A	H 375	A	A	A	A	330	325	A	L					
2						A	325	A	355	A	U R 325	A 315	A	A	A	A 300	A	L 315	L					
3								A	A	A	A	350	A	A	A	320	320	L	A					
4							L	330	345	A	345	R 365	375	B	B	A	330	U L 320	A	A				
5					L	L			A	L 340	355	B	A	345	335	330	320	305	L					
6						A	L	U L 295	A	L	L	B	B	A	L 330	U L 320	L	A	A					
7							A	L	330	A 325	A	A	A	A	A	340	A	A	A					
8							L	L	L	A	A	A	A	A	A	A 320	U L 325	L	L					
9							A	350	370	A	A	B	B	A	A	A	A	A	U L 305	A				
10					A	A	A	A	A	A	385	A	A	385	A	A	330	A	U L 280	A				
11					L	275	310	340	A	375	370	B	B	B	B	345	A 300	A	A					
12							340	B	345	A	A	355	340	A	A	340	U L 300	U L 305	L					
13					A	A	A	A	A	A	360	A	A	375	365	350	340	A 315	A	A				
14						300		A	340	A	L	A	A	L 340	365	U L 315	325		L					
15						A	L	L	A	A	L	335	A	A	320	A	A	L	A					
16						A	L	A	A	A	360	350	A	A	A	U L 335	L	U L 335	A					
17							U L 350	L 355	U L 340	H 335	L 350	A	A	A	A	A	345	L 320	A					
18							A	A	A	A	350	365	A 345	340	355	360	350	325	L					
19						L			A	A	A	350	350	360	A	315	L	A	A					
20						L 300	L 340	A	330	L 315	375	A	A	A	A	A	345	U L 330	A					
21							L	L	L	A	U L 290	350	360	H 330	340	U L 325	A	L	A					
22						L	L	A	A	A	A	A	A	A	A	345	A	A	A					
23								L	L	340	365	L	345	330	335	A 330	L 310	U L 315						
24						290	315	355	A 320	A	385	365	A	A	345	345	L	330	L					
25						L 305	330	315	335	A 310	355	R 375	380	355	H 355	345	A	A	A	A				
26						L		U L 345	U L 325	U L 340	335	L	L	330	A 310	325	L 325	A						
27						L	L		A	A	365	H 355	350	335	355	L 325	L 330	L 340	L					
28							L	U L 350	315	H 340	R 310	340	R 320	A	R	B	L	L 325	L					
29							L	U L 365	A	A	A	325	A	A	325	330	L 320	U L 305	L					
30							L	L	A	A	L 315	380	B	A	U L 305	325	L	L	L					
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						5	8	11	12	9	19	15	9	11	14	23	17	14	2					
MED						300	328	345	338	340	355	350	350	340	338	330	325	L 320	U L 292					
U Q						L 302	L 340	L 355	345	L 340	370	365	368	360	355	345	335	L 330						
L Q						282	315	330	328	A 320	335	340	342	330	325	320	320	315						

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

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 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							385	455	570	455	445	445	445	425	415	435	390	360	320					
2						385	455	450	435	575	Y	525	450	A	E A 485	435	420	365	300					
3								375	A	A	A	500	470	A	450	425	400	350	A					
4							370	370	390	A	605	510	465	B	B	R	440	380	A	A				
5					430	L 365			500	310	455	I B 530	600	465	375	560	455	430	300					
6						570	390	400	355	295	L 270	B	E B 470	A	375	370	L	350	A 310					
7							325	355	405	520	A	Y	E Y 525	A	A	500	A	A	A					
8							L 335	350	365	360	370	420	A 405	A	A	360	355	330	305					
9							A	430	455	515	560	B	B	A	440	E A 535	A	A	375	A				
10					440	A 575	A	490	A	A	G	A	A	G	A	A	500	A	500	355				
11					425	550	635	705	I A 765	G	615	B	B	A	E B 675	585	575	I A 540	475					
12							G	B	G	A	590	G	460	515	E A 485	390	435	400	L 325					
13					580	675	660	625	A	A	G	A	A	645	730	630	530	465	655	E A 420				
14						435		A	490	A	310	A	330	375	380	370	360		305					
15						E A 325	L 295	275	A	A	310	405	390	E A 380	360	A	A	335	E Y 315					
16						365	320	335	340	360	415	400	385	A	A 370	345	370	335	320					
17							290	280	340	455	360	A	365	A	380	375	355	320	280					
18							315	A	475	485	455	640	525	520	450	430	390	335	L 370					
19						305			A	A	A 385	360	425	415	400	380	375	350	320					
20						350	330	A 345	460	485	450	410	E A 475	435	380	390	365	320	315					
21							260	H 260	320	A	385	380	385	350	335	340	355	350	A 325					
22						305	350	330	A 350	A 360	A	A	A	E A 425	A	355	A	340	330					
23								270	320	330	315	350	365	400	350	365	375	360						
24						410	375	430	445	A	605	560	435	390	385	355	L 430	360	330					
25						370	370	435	455	455	455	Y 530	445	400	405	375	A	A	A	310				
26						275		330	385	330	400	410	415	410	350	350	370	350						
27						330	360		A	465	410	365	375	405	365	350	350	330	310					
28							295	320	610	485	Y	415	425	400	415	390	410	350	310					
29							315	290	A	355	A	420	410	360	350	350	370	335	290					
30							295	295	295	A 310	450	395	I B 380	420	380	370	350	330	340					
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT					4	16	22	24	23	20	24	21	25	20	25	27	24	25	24	3				
MED					435	368	342	352	435	455	448	420	418	410	380	375	382	350	320	U 332				
U Q					510	492	385	432	490	485	575	528	468	450	445	435	432	362	335	E A 420				
L Q					428	328	315	308	350	342	378	398	385	395	368	355	362	335	308	310				

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

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 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	295	310	310	345	300	295	A	255	A	A	220	A	A	A	A	240	275	A	280	320	320	325	305	285
2	350	360	325	E A 370	360	A	E R 290	A	250	A	A	A	A	A	A	A	A	E A 285	280	A 295	280	340	A 350	A 365
3	A	A 360	A 350	360	335	240	A 250	A	A	A	A	235	A	A	A	A 265	250	255	A	A	A	E A 390	365	340
4	310	310	290	250	255	250	250	A 260	A 270	A	260	235	235	B	B	A	E R 290	A 295	A	A	305	315	350	345
5	345	335	295	315	370	290	265	240	A	E A 280	220	B	A	240	245	250	250	275	280	285	380	410	420	A 410
6	280	E A 370	375	460	E A 510	A	A	E A 290	A	A 255	230	B	B	A	E A 290	E A 300	A	A	A	A 320	310	325	295	A
7	A	325	340	A 355	A 315	265	A	A 260	230	A	A	A	A	A	A	260	A	A	A	E A 310	A 310	335	360	A 375
8	350	A 360	A 330	A 315	285	260	250	235	E A 280	A	A	A	A	A	A	A	A 260	A 265	A 280	A 290	A	E A 365	A	A
9	A 360	E A 365	A 375	360	350	A 285	A	A 270	225	A	A	B	B	A	A	A	A	A	E A 300	A	A	A 395	335	A 415
10	365	310	305	E A 410	A	A	A	A	A	A	240	A	A	A 250	A	A	280	A	A 305	A	340	A	A 410	355
11	A 360	A 395	E A 425	350	440	335	300	265	A	245	240	B	B	B	B	265	A	A	A	370	300	400	E A 415	E A 435
12	E A 430	A	355	360	395	H 290	E B 270	B	E B 300	A	A	E B 255	260	A	A	250	H 230	220	270	305	340	380	I A 400	370
13	330	295	275	305	A	A	A	A	A	A	260	A	A	A 260	245	255	255	A	A	A	A 455	A 405	385	355
14	A 425	350	A 365	A 390	435	A 315	250	A	220	A	A 245	A	A	230	225	A 270	A 260	260	A 280	A 320	310	A 310	A 300	E A 375
15	E A 365	325	A 310	A 325	A 325	A	240	A 260	A	A	A 235	235	A	A	235	A	A	260	A	285	280	310	340	A 350
16	330	290	300	A 340	A 370	A	A	A	A	A	270	A 280	A	A	A	A 265	A	260	A	280	260	250	310	340
17	355	305	A 320	290	300	255	235	230	250	225	A 245	A	A	A	A	A	240	250	A	250	E A 335	E A 380	E A 425	375
18	350	360	380	270	H 200	265	A	A	A	A	230	225	E A 280	250	225	225	235	250	260	285	A	A 365	A	305
19	300	A 335	300	310	310	265	A 270	E A 280	A	A	A	A 210	230	220	I A 245	240	A	A	A	270	295	A	315	305
20	360	295	A 305	320	350	280	245	A	E A 280	210	215	A	A	A	A	A	230	275	A	A 285	310	355	320	330
21	305	280	270	255	290	250	235	235	A 240	A	230	215	220	H 200	220	A 255	A	A	A	A 270	255	A 305	E A 370	315
22	310	275	305	320	310	A 255	A	A	A	A	A	A	A	A	A	A 285	A	A	A	260	265	290	350	E A 355
23	375	325	275	260	280	235	225	245	230	215	230	210	220	H 200	220	A	A 270	A 270	A 265	270	A 340	365	320	255
24	H 295	345	335	300	325	285	285	A 270	A	A	240	225	A	A	220	210	230	A 265	270	280	325	360	345	310
25	340	285	320	315	330	A 280	A 270	A 275	A 260	A	E A 275	215	200	230	215	255	A	A	A	A	A	325	A 360	A 350
26	330	300	305	315	260	235	245	220	H 215	E A 280	235	225	A	215	A	230	H 235	A	275	260	280	300	A 380	390
27	A 335	280	290	310	300	270	230	245	A	A	250	H 215	250	235	240	A 260	265	240	275	300	315	300	295	310
28	270	280	300	310	320	270	240	220	A 275	H 260	A	220	A	A	E A 280	B	310	A 280	A 290	280	340	365	330	350
29	330	325	310	A 340	295	275	250	240	A	A	A	245	A	A	275	H 230	235	240	275	285	300	315	A 350	310
30	315	315	325	285	250	235	250	260	A	A	H 220	200	B	A	A	240	H 240	250	265	A 305	270	310	325	370
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	30	30	28	24	21	20	14	8	20	16	8	11	14	20	19	18	16	24	25	28	28	28
MED	334	318	310	316	315	268	250	252	240	U 235	236	224	228	230	232	254	250	260	276	285	310	332	344	346
U Q	A 360	A 355	340	355	355	285	270	A 268	E A 275	E A 270	248	235	255	A 250	A 245	A 265	270	A 275	A 280	A 305	338	A 372	A 375	A 372
L Q	310	295	300	305	292	252	240	238	230	220	230	215	220	H 215	220	240	235	250	270	275	280	310	320	312

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1						B 140	110	110	110	110	115	120	115	120	120	120	120	115	120	B				
2						A	120	115	A	A	A	125	120	120	120	B 125	120	B 130	A	B				
3						E A 150	115	110	110	115	115	120	120	120	B 130	110	115	115	120	B				
4						B 150	120	115	110	115	120	120	120	B	B	B	125	120	120	B				
5					B	E B 145	115	110	110	120	120	B	E S 130	125	120	120	115	115	120	B				
6					B	130	115	115	110	115	E S 125	B	B	B	B	120	B 130	120	125	B				
7					B	A	120	110	A	110	B	B	B	B	130	B 125	B 130	120	120	B				
8					B	135	120	115	110	115	115	110	115	120	A	A	120	115	120	B				
9					B	A	120	110	110	115	120	B	B	B	125	130	120	115	B 120	B				
10					B	B 135	120	115	120	120	A	A	A	A	120	B 125	115	115	115	B				
11					B	120	120	115	110	A	115	B	B	B	B	135	115	120	A	B				
12					B	130	B	B	B	B	115	B	125	130	125	120	120	120	125	B				
13					B	120	120	115	110	B	A	A	A	A	A	B 130	115	110	B 125	B				
14					B	A	115	110	110	A	115	B	A	115	120	B	115	120	120	B				
15					B	A	120	110	110	110	110	A	A	120	120	B 125	115	120	B	B				
16					B	A	B 110		110	115	120	120	120	B	B 130	120	115	110	A	B				
17					B	A 140	120	110	110	115	B	A	120	B	A	130	115	115	120	B				
18					B	130	120	110	110	110	110	125	130	A	120	110	110	115	120	B				
19					B	A 135	115	110	110	110	110	115	115	115	120	115	120	115	E A 130	B				
20					B	A	120	110	115	110	120	115	A	115	115	115	110	110	115	B				
21					B	135	120	110	110	110	110	110	110	110	120	110	115	115	120	B				
22					B	A 130	115	110	110	110	110	A	A	B 125	120	120	110	115	A	B				
23					B	A	A 120	110	105	A	A	115	110	110	115	110	115	115	A	B				
24					B	120	115	110	110	110	110	B 135	B 120	110	115	110	110	115	120	B				
25					B	A	115	110	110	110	110	115	120	120	115	115	115	A	A	B				
26						125	A	A	115	A	120	120	120	A	A	120	A 125	110	A	B				
27						E A 135	E A 145	110	110	115	A	120	A	A	A	A	A	A	A	B				
28						130	115	110	110	110	A	120	115	A	A	B	120	115	A 130	B				
29						A	A	115	110	115	A	A	A	A	A	A 125	E A 130	A 120	A 125	B				
30						E B 145	120	110	115	115	A 125	120	B	120	120	115	115	110	120	B				
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						20	26	28	27	23	21	17	17	16	20	25	29	28	21					
MED						132	120	110	110	115	115	120	120	120	120	120	115	115	120					
U O						B 140	120	115	110	115	120	120	120	120	122	B 125	120	120	125					
L O						130	115	110	110	110	110	115	115	115	120	115	115	115	120					

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

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 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	130	B	B	B	140	140	120	125	120	120	120	110	125	115	120	G	180	120	165	120	B	B	110	105
2	105	110	115	110	120	110	G	130	115	125	115	125	125	120	120	120	120	120	120	120	115	110	110	110
3	105	105	105	110	110	115	135	120	115	120	120	130	130	135	125	130	G	G	115	115	115	115	110	110
4	120	115	B	B	B	140	150	130	125	120	130	120	125	B	B	120	G	160	120	115	120	120	110	120
5	110	110	110	115	B	125	120	140	120	120	135	B	125	G	G	135	G	120	120	B	B	B	110	110
6	110	110	115	120	120	120	120	120	120	125	150	B	B	120	135	125	120	120	110	110	110	110	115	110
7	105	110	110	105	110	120	110	115	120	140	115	140	140	120	135	140	120	120	115	110	110	B	B	110
8	110	105	105	110	110	G	125	120	115	110	110	110	110	110	110	110	130	120	120	115	100	120	110	110
9	110	110	110	B	B	120	115	110	120	115	135	B	130	125	135	125	120	115	115	110	110	110	110	105
10	105	105	130	125	175	120	120	115	115	110	115	110	125	115	125	120	140	110	120	115	110	105	110	110
11	110	110	110	110	150	135	130	135	110	120	125	B	B	130	B	130	120	110	115	110	110	110	105	105
12	105	110	105	105	125	125	B	B	B	110	110	B	130	120	120	G	G	140	130	115	110	115	110	120
13	115	105	110	110	145	130	120	110	110	115	110	110	110	110	110	G	150	115	115	110	110	110	105	110
14	105	110	105	105	110	120	140	110	110	110	110	110	105	G	145	140	125	125	120	110	120	110	105	110
15	105	115	105	105	105	105	135	120	110	110	110	110	105	110	140	120	115	115	120	115	110	110	110	110
16	110	105	100	100	100	100	130	120	110	110	165	120	115	115	115	120	115	110	110	115	115	110	105	110
17	100	105	95	100	110	120	145	115	115	G	115	105	110	105	100	125	G	135	120	115	110	110	110	110
18	105	120	105	105	B	135	125	115	115	115	120	140	135	135	150	E G 150	E G 155	125	125	115	110	110	110	110
19	105	105	105	105	105	130	125	120	110	105	105	120	110	G	130	G	130	120	120	115	110	110	105	100
20	105	110	105	100	120	125	120	110	120	120	120	110	110	110	110	110	120	120	115	110	115	105	105	105
21	95	105	100	100	105	135	140	120	115	110	110	120	115	130	G	135	120	120	115	110	110	110	100	110
22	115	110	95	100	105	120	115	110	110	110	105	105	105	110	110	110	115	110	105	105	105	110	105	115
23	105	115	100	110	100	100	140	150	110	110	130	125	G	G	G	125	120	115	110	115	110	100	100	100
24	105	105	B	B	B	135	135	120	120	115	115	120	115	110	115	G	G	125	130	125	110	110	110	B
25	B	B	130	120	125	125	130	110	120	115	115	125	125	G	130	120	110	110	110	105	100	110	105	110
26	105	105	100	110	115	E G 185	E G 160	110	115	110	130	G	120	120	110	125	120	110	115	105	105	100	115	110
27	110	110	115	105	105	105	E G 180	135	115	110	110	115	110	110	105	110	110	110	120	105	105	105	B	B
28	B	110	115	105	B	G	140	120	110	115	105	120	110	110	110	B	140	130	120	115	115	120	105	110
29	105	105	105	100	110	120	120	120	110	105	105	110	110	105	105	115	110	110	125	120	110	115	110	115
30	105	100	110	100	105	135	140	120	115	115	120	125	B	120	120	G	G	125	120	110	110	125	110	115
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	27	26	24	28	28	29	29	29	30	24	26	24	25	23	23	29	30	29	28	27	28	28
MED	105	110	105	105	110	121	128	120	115	115	115	120	115	115	120	122	120	120	120	115	110	110	110	110
U Q	110	110	110	110	122	135	140	122	120	120	125	125	125	120	132	130	130	125	120	115	112	115	110	110
L Q	105	105	105	100	105	120	120	112	110	110	110	110	110	110	110	120	115	110	115	110	110	110	105	110

IONOSPHERIC DATA STATION KOKUBUNJI

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

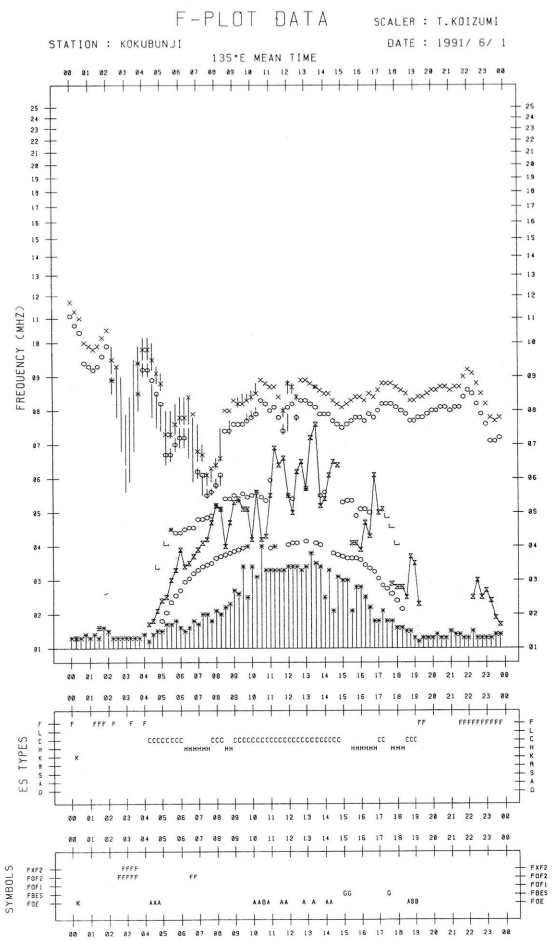
LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

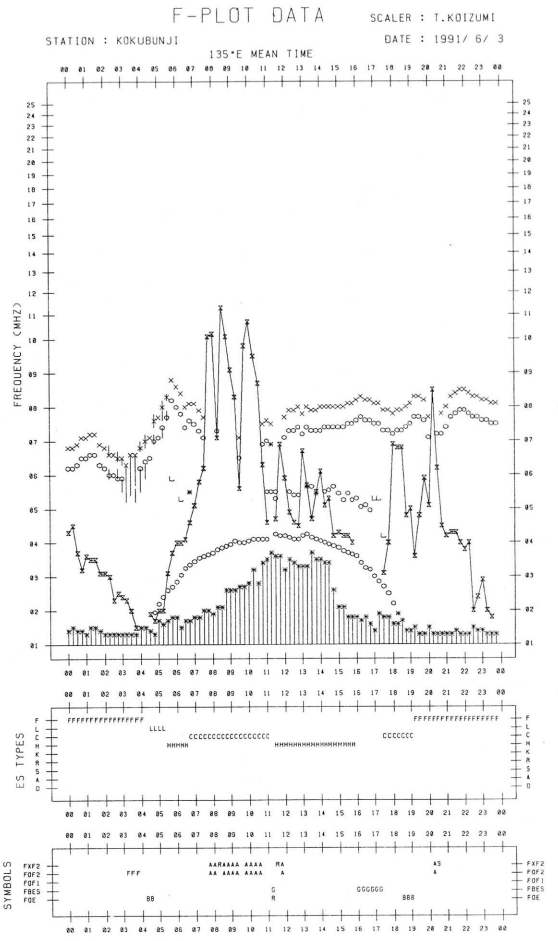
D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F 1				F 1	C 1	C 2	H 2	C 2	C 2	C 1	C 2	CC 22	C 2	C 2		H 1	C 2	H 1	C 4			F 1	F 4
2	F 2	F 4	F 1	F 4	FF 23	L 3		H 1	L 1	C 1	L 1	C 1	C 1	C 2	C 2	C 2	C 2	C 1	C 1	CL 42	F 2	F 4	F 4	F 5
3	F 4	F 4	F 4	F 4	F 1	L 1	H 2	C 3	C 4	C 3	C 3	C 2	H 2	H 2	H 2	H 2			C 4	C 5	FF 52	F 5	F 6	F 6
4	F 1	F 1				H 1	H 1	H 2	C 2	C 2	H 1	C 1	C 1			C 1		H 1	C 3	C 4	F 2	F 2	F 2	FF 23
5	F 5	F 4	F 3	F 1		C 2	C 3	H 1	C 2	C 2	H 1		C 1			H 1		C 1	C 1				F 4	F 5
6	F 2	F 5	F 3	F 3	L 4	C 3	C 3	C 2	C 2	C 2	H 1			C 1	H 1	C 2	C 2	C 2	C 3	C 4	F 4	F 5	F 2	F 5
7	F 4	F 3	F 3	F 5	L 4	CL 12	C 3	CL 31	C 2	HC 21	C 1	C 1	H 1	C 2	H 1	H 2	C 3	C 3	C 3	C 4	F 3			F 2
8	F 4	F 4	F 4	F 3	L 3		C 1	C 2	C 2	C 3	C 2	C 2	C 2	C 2	C 3	C 2	C 1	C 2	C 3	C 4	F 5	FF 24	F 5	F 5
9	F 4	F 4	F 4			C 2	C 3	C 2	C 1	C 2	H 1		C 1	C 1	C 1	H 1	C 3	C 3	C 2	C 4	F 5	F 6	F 4	F 5
10	F 2	F 2	F 1	F 5	FF 23	C 3	C 3	C 3	C 3	C 2	C 1	C 2	CC 22	C 1	C 2	C 2	H 1	C 3	C 2	C 3	F 4	F 5	F 5	F 5
11	FF 43	F 5	F 5	F 3	R 1	H 1	H 1	H 1	C 2	C 1	C 1			H 1		C 1	C 2	C 3	C 2	C 3	F 4	F 4	F 4	F 5
12	F 5	FF 25	F 2	F 1	L 1	L 2				C 1	C 2		C 1	C 1	C 2			H 1	H 1	C 3	F 4	F 4	F 4	FF 22
13	F 1	F 4	F 3	F 2	H 3	H 2	C 2	C 2	C 3	C 1	C 1	L 2	L 2	L 1	L 1		H 1	C 2	C 2	C 4	F 6	F 6	F 3	F 3
14	F 6	F 3	F 3	F 5	L 4	L 2	H 2	C 3	C 2	L 2	C 1	L 1	L 2		H 1	H 1	H 2	C 2	C 2	C 2	FF 14	F 5	F 4	F 5
15	F 4	FF 13	F 5	F 4	L 5	L 3	H 1	H 2	C 3	C 2	C 2	L 2	L 2	L 2	H 1	H 3	C 3	C 3	C 1	C 3	F 5	F 2	FF 23	F 3
16	F 3	F 4	F 4	F 5	F 6	L 4	H 1	C 3	C 2	C 2	HC 12	C 1	C 2	C 2	C 2	C 2	C 3	C 3	C 2	C 2	FF 24	F 1	F 2	FF 13
17	F 4	F 4	F 3	F 2	R 1	L 1	H 1	C 2	C 2		C 2	C 3	C 2	L 1	L 2	C 2		H 1	C 3	C 3	F 5	F 4	F 5	F 5
18	F 6	FF 24	F 5	F 2		C 2	C 3	C 3	C 2	C 2	CH 11	H 1	H 1	C 1	H 1	H 1	H 1	C 2	C 1	C 2	F 6	F 5	F 4	F 2
19	F 4	F 5	F 3	F 3	L 2	L 1	C 2	C 3	C 3	C 3	C 2	C 1	C 2		H 2		H 2	C 3	CL 32	CL 32	F 5	FF 44	FF 23	F 2
20	FF 32	F 2	F 3	F 2	L 1	C 2	C 2	C 4	C 2	C 1	C 1	C 2	C 2	C 2	C 2	C 2	C 1	C 2	C 3	C 3	F 2	F 3	F 3	FF 22
21	F 3	F 3	F 2	F 2	L 1	C 1	H 1	C 2	C 2	C 2	C 2	C 1	C 1	H 1		H 2	C 3	C 3	C 4	C 4	F 3	FF 23	F 5	FF 23
22	FF 22	FF 22	F 4	F 3	L 1	CL 21	C 3	C 3	C 4	C 3	C 2	L 3	L 3	C 2	C 3	C 2	C 3	C 4	C 4	C 4	F 3	F 2	F 3	FF 43
23	FF 42	FF 14	F 3	FF 12	L 2	L 2	HL 11	H 1	CL 11	C 2	HL 11	H 1				H 2	H 2	C 3	C 2	L 1	F 3	F 4	F 4	F 3
24	F 1	F 2				C 1	H 2	C 2	C 2	C 3	C 2	C 1	C 2	C 2	C 1			C 2	HC 11	C 2	F 4	F 4	F 3	
25			F 3	F 5	C 4	C 2	C 2	C 2	C 2	C 2	C 2	C 1	C 1		H 1	C 2	C 3	C 3	C 4	L 4	F 5	FF 24	F 5	FF 31
26	F 4	F 2	F 3	F 2	F 1	HL 11	HL 12	L 2	L 1	C 2	H 1		C 2	C 1	C 2	C 1	CL 11	C 2	CL 22	C 3	F 4	F 2	F 4	F 6
27	F 4	F 3	F 1	F 1	F 2	L 1	HL 12	H 2	C 3	C 2	C 1	C 1	L 1	L 1	L 2	L 2	L 2	L 2	CL 23	CL 32	F 2	F 2		
28		F 2	F 1	F 1			H 1	H 1	C 2	C 2	C 2	C 1	C 2	C 2	L 1		H 1	H 1	CL 21	CL 32	FF 33	FF 24	F 3	F 3
29	F 3	F 2	F 2	F 2	F 1	C 1	L 1	C 2	C 3	C 3	C 2	C 1	C 2	L 2	L 2	L 1	L 1	L 1	CL 21	CL 33	F 1	F 2	FF 33	FF 22
30	F 2	F 2	FF 23	F 2	F 1	H 1	H 2	H 3	C 2	C 2	CL 11	C 2		C 2	C 2			H 2	C 2	C 3	F 3	FF 22	FF 23	FF 24
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
U Q																								
L Q																								

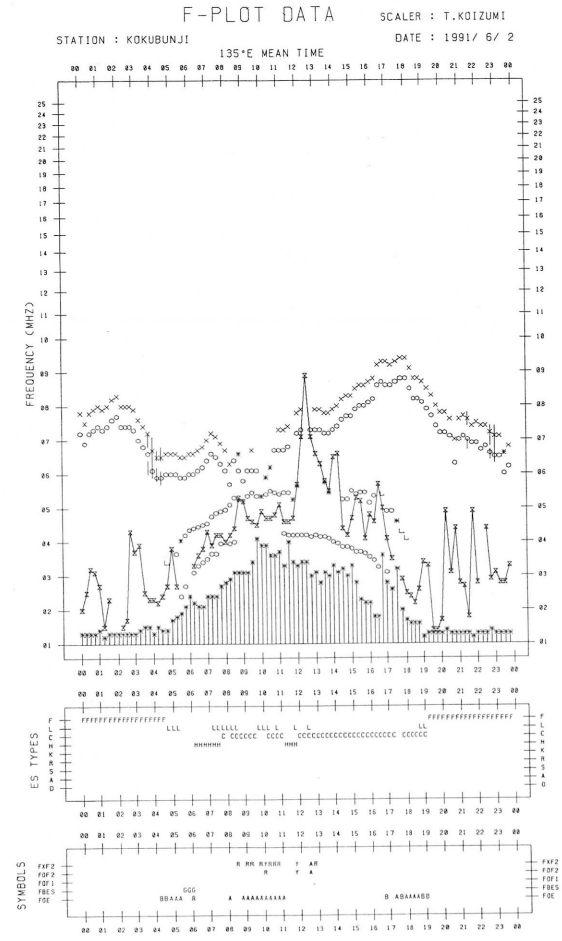
JUN. 1991 TYPES OF ES COMMUNICATIONS RESEARCH LABORATORY, JAPAN

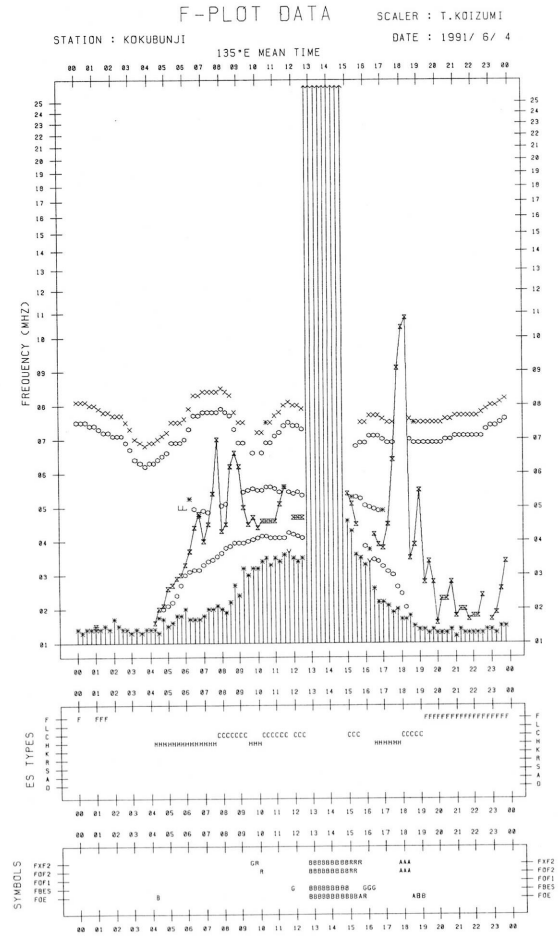
f-PLOTS OF IONOSPHERIC DATA

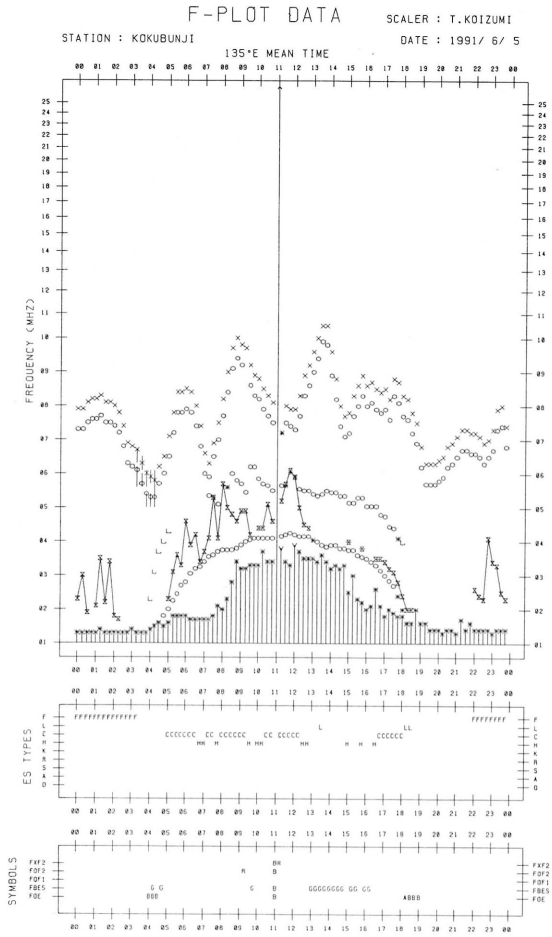
KEY OF F-PLOT	
I	SPREAD
○	FOF2, FOF1, FOE
×	FXF2
✳	DOUBTFUL FOF2, FOF1, FOE
⧖	FBES
⌊	ESTIMATED FOF1
*, Y	FMIN
∧	GREATER THAN
∨	LESS THAN

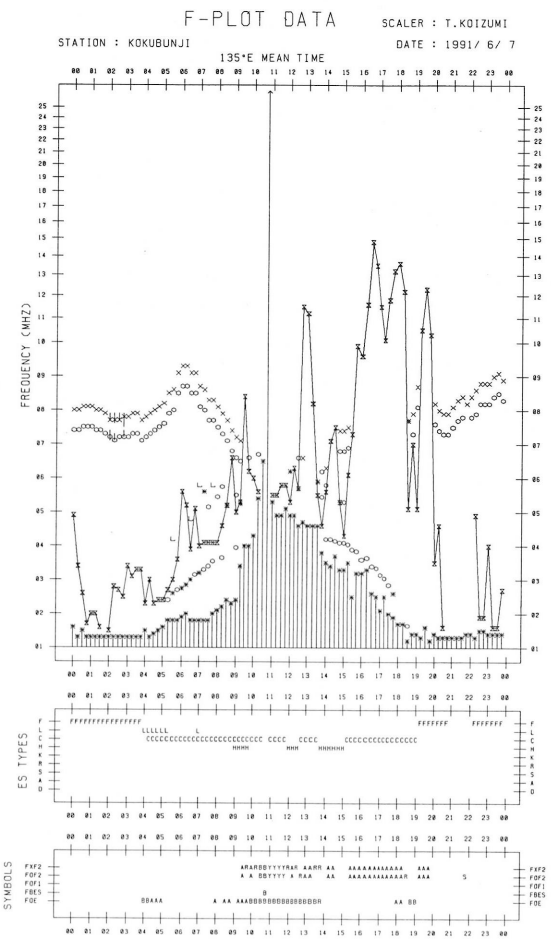

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/ 1
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

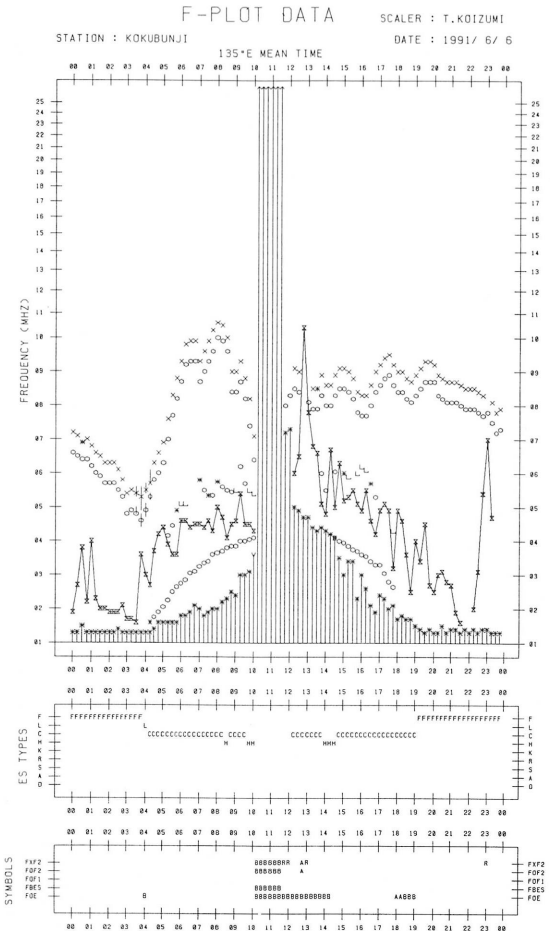

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/ 3
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

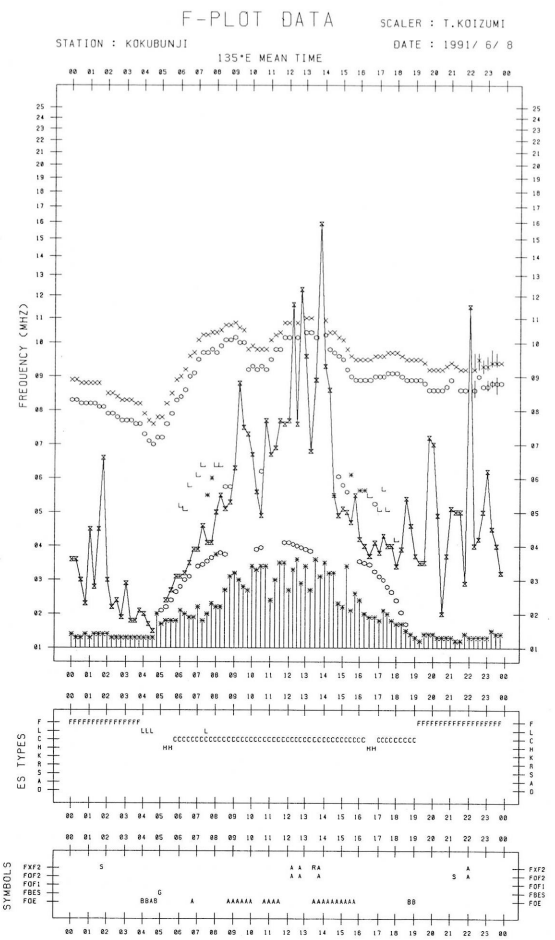

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/ 2
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

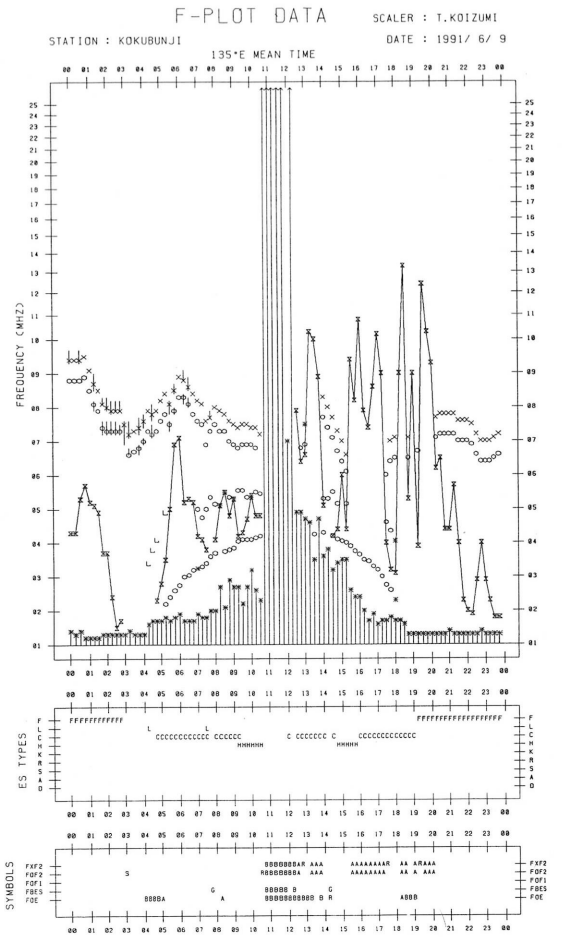

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/ 4
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

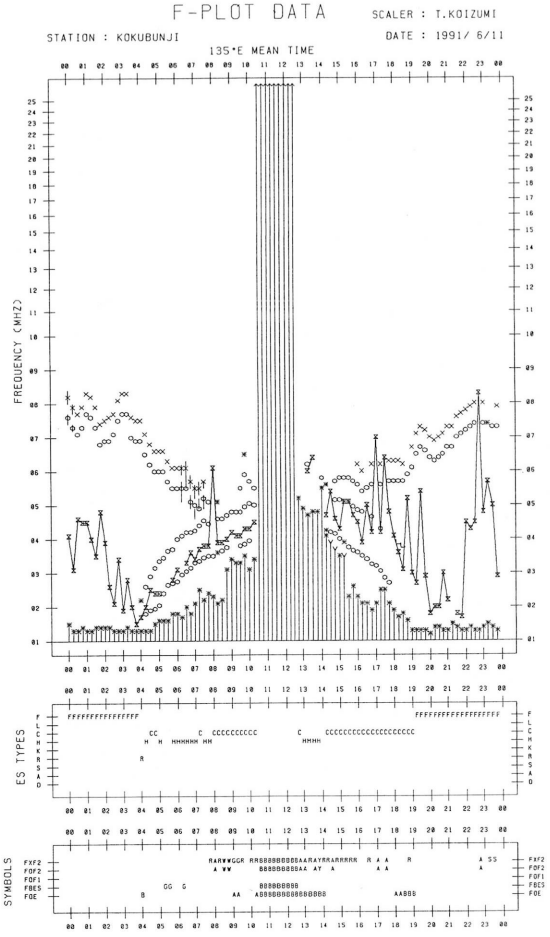

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/ 5
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

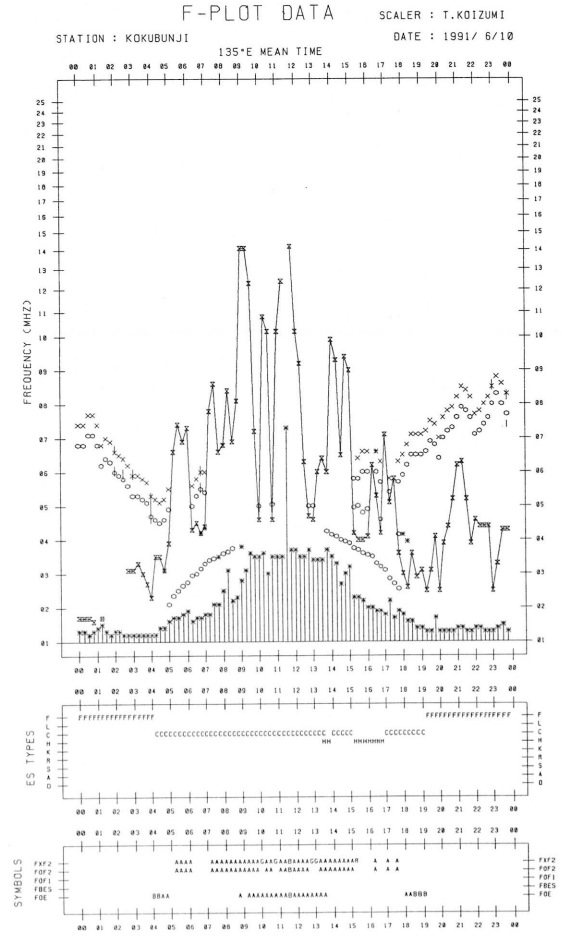

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/ 7
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/ 6
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/ 8
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/ 9
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/11
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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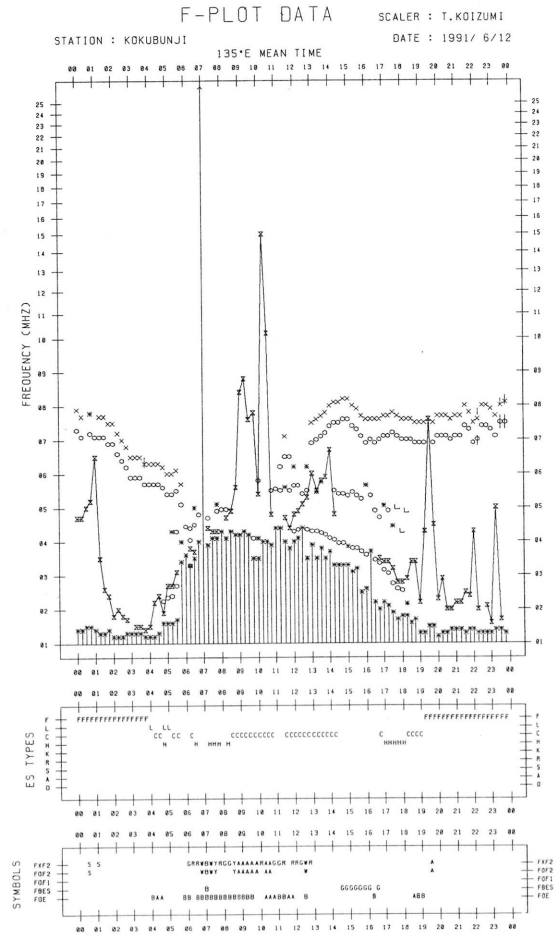
STATION : KOKUBUNJI
DATE : 1991/ 6/10
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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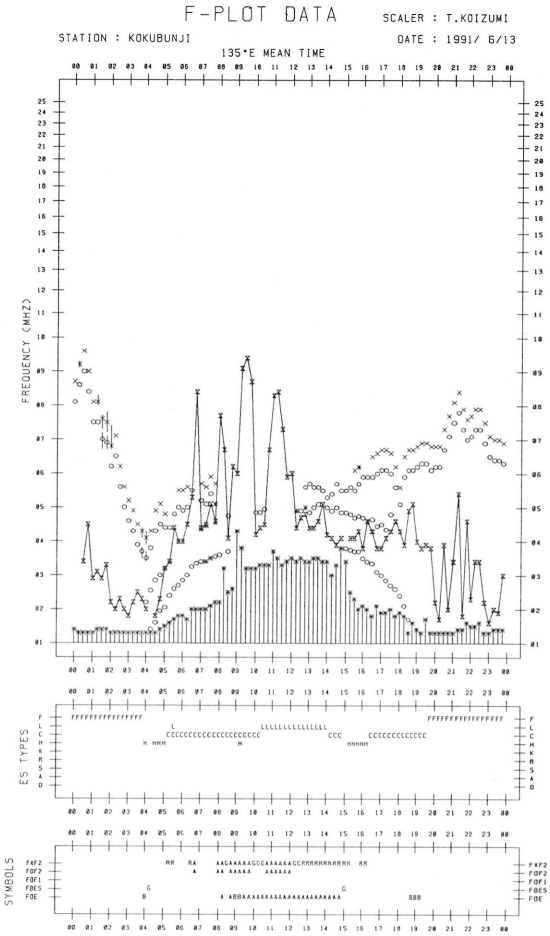
STATION : KOKUBUNJI
DATE : 1991/ 6/12
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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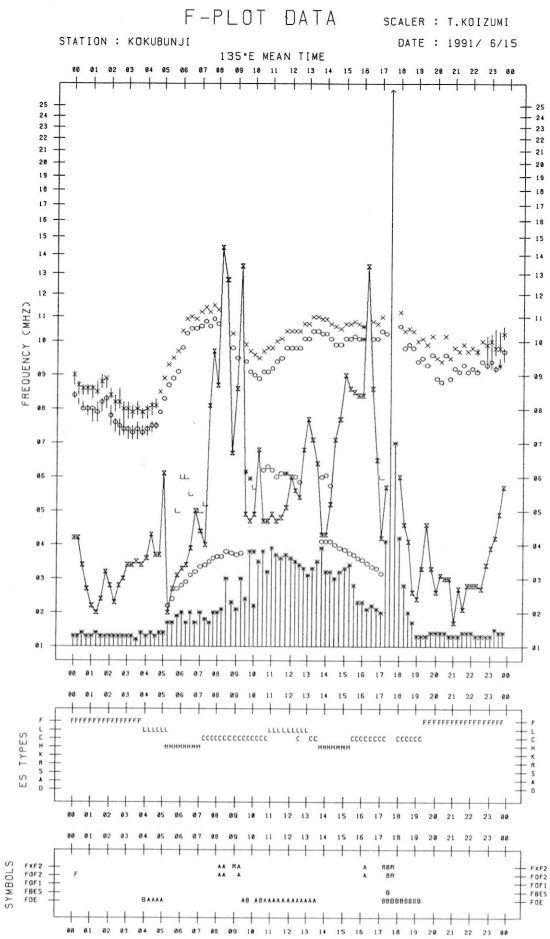
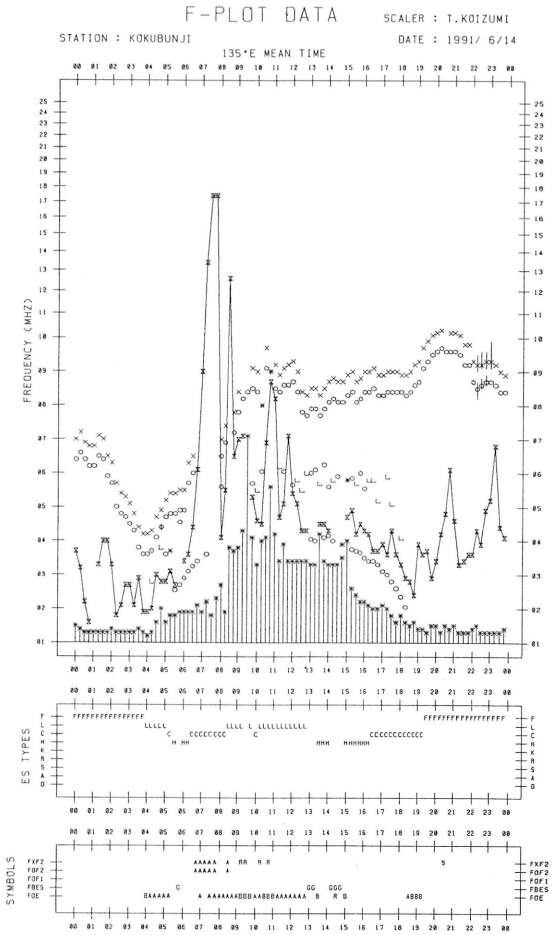
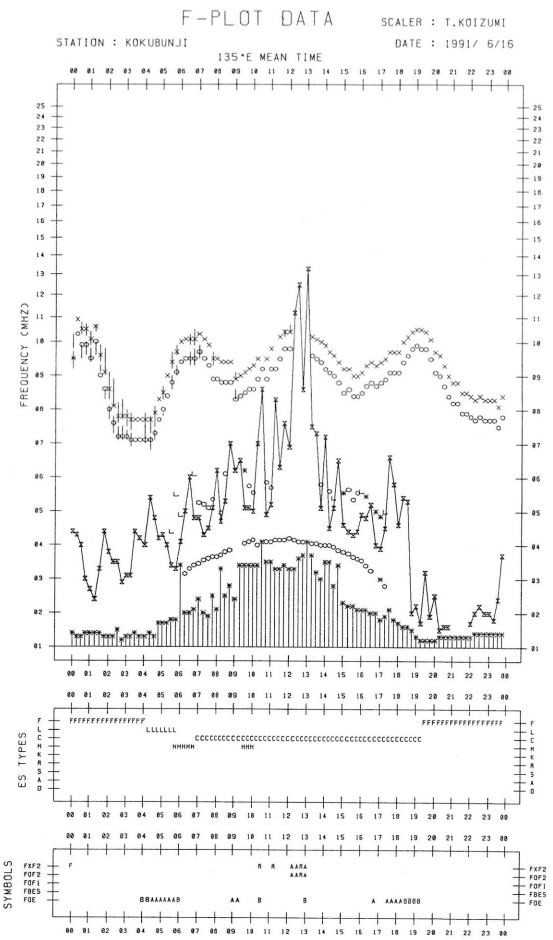
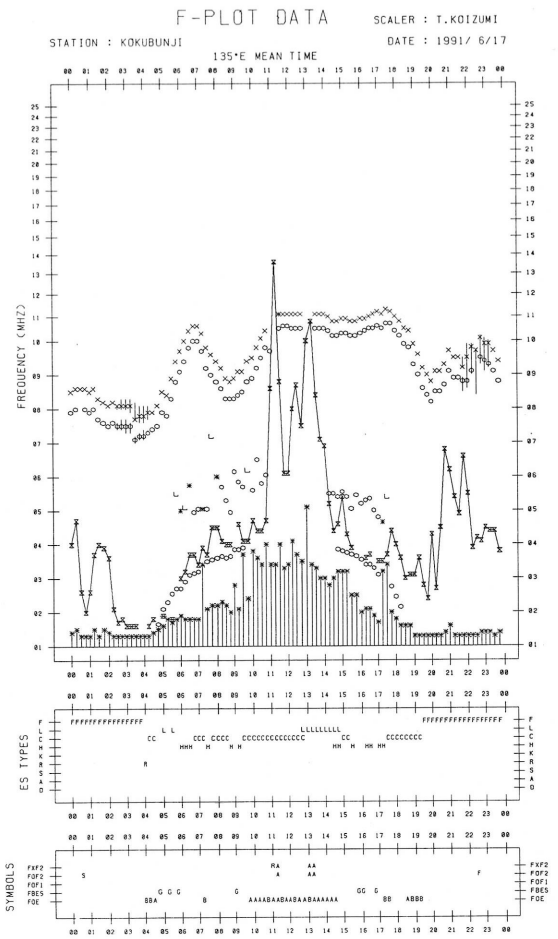
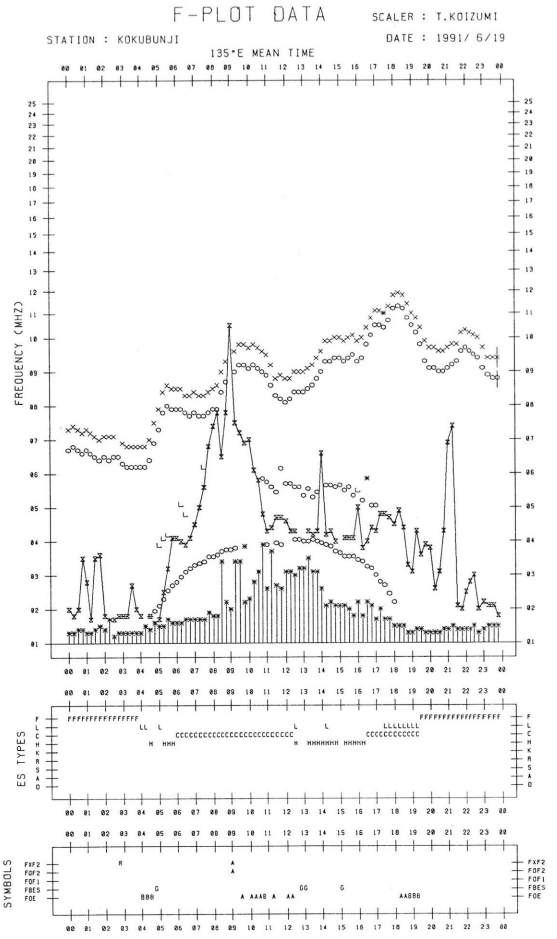
STATION : KOKUBUNJI
DATE : 1991/ 6/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

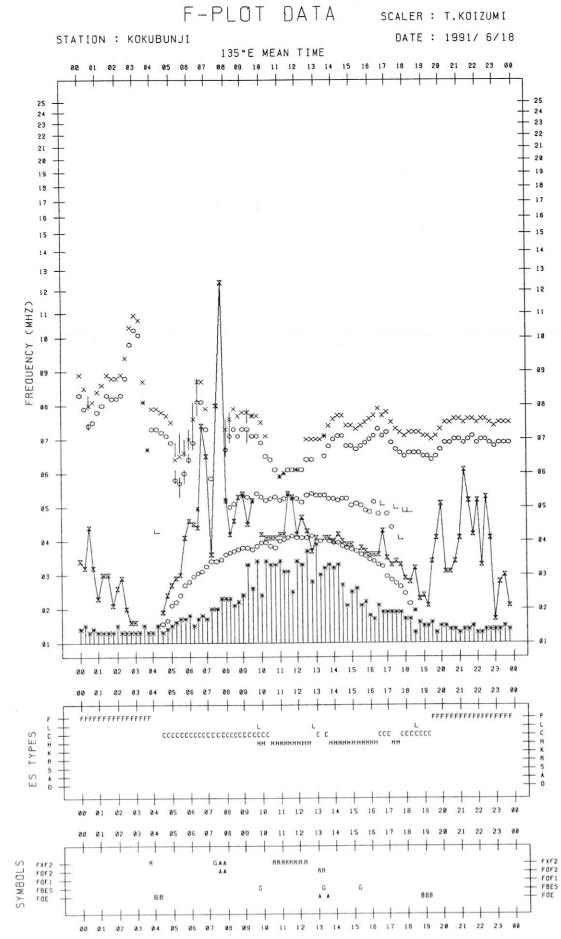

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

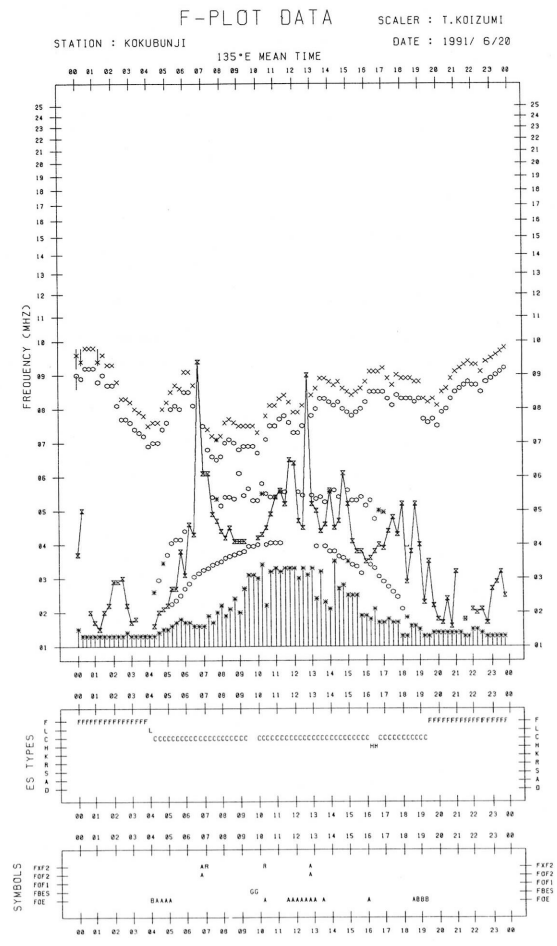

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

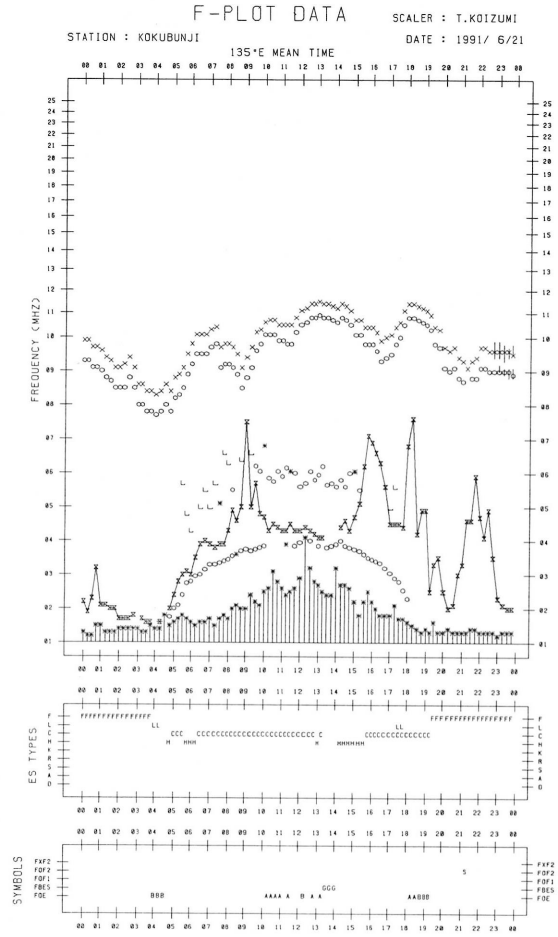

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

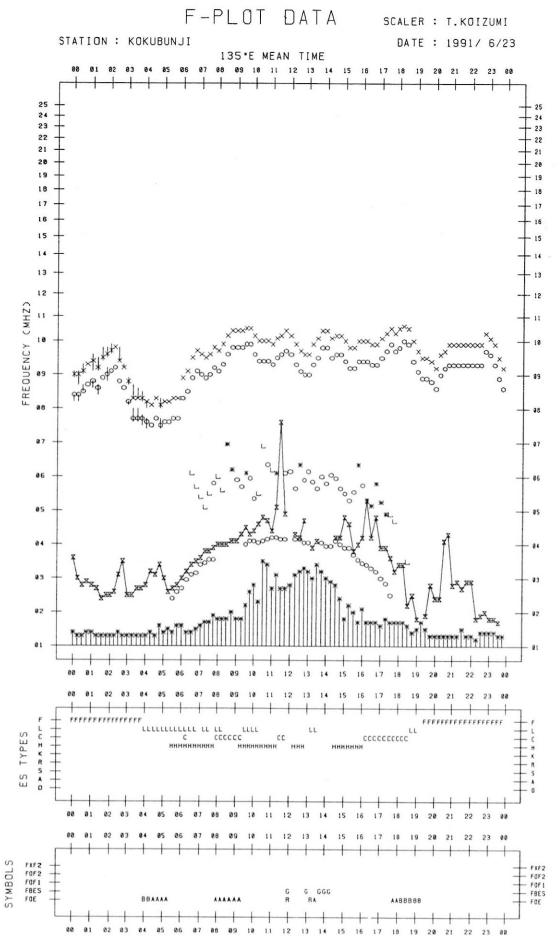

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

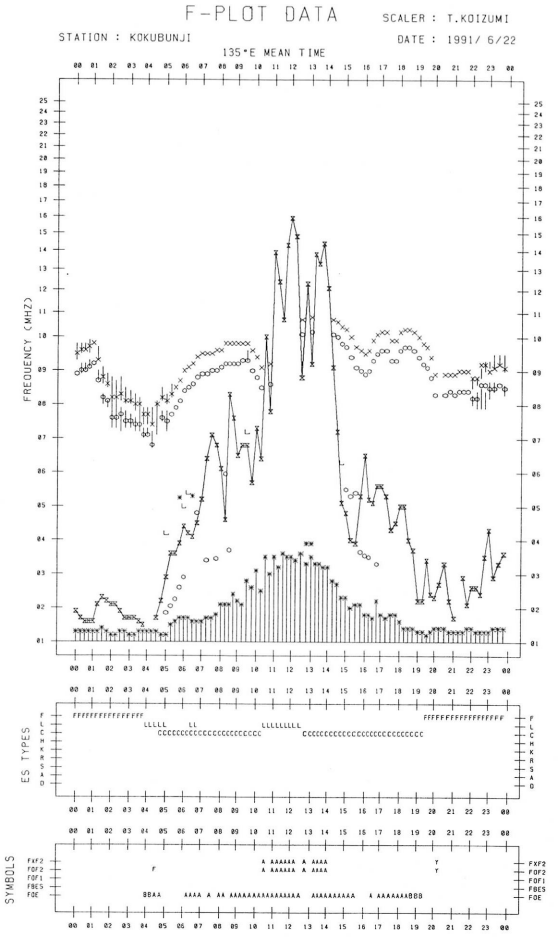

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

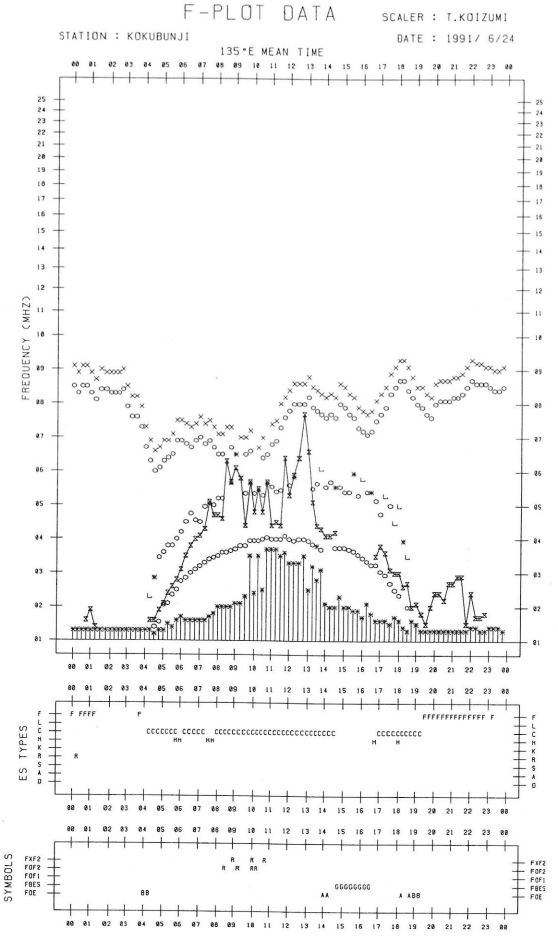

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

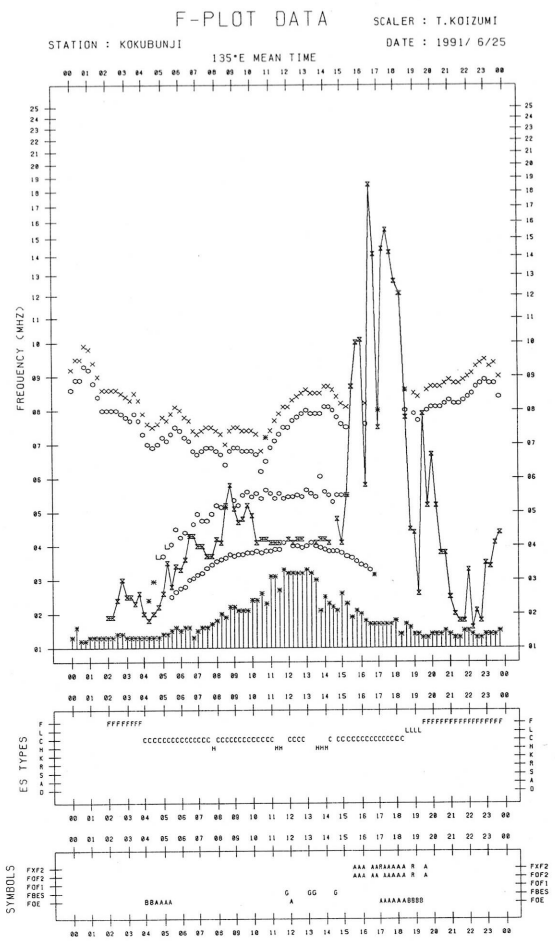

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

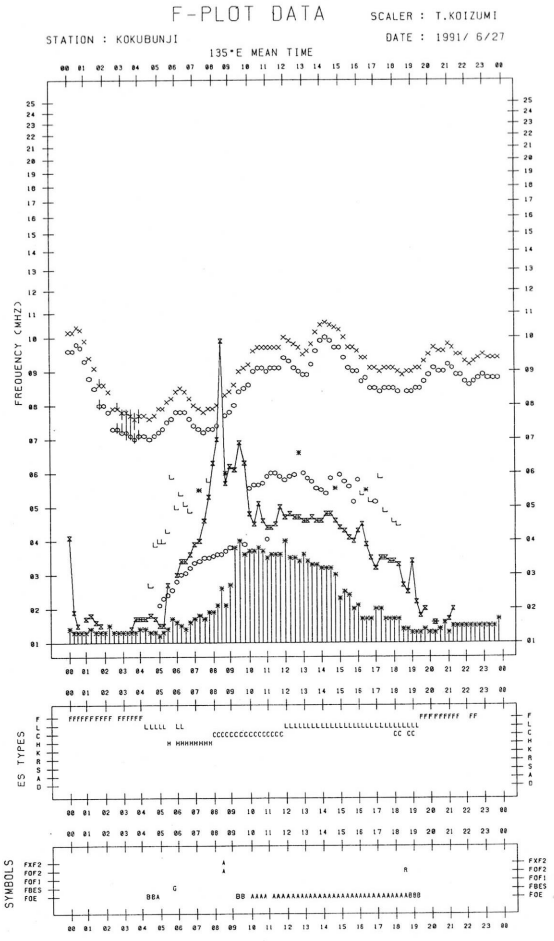

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/21
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE

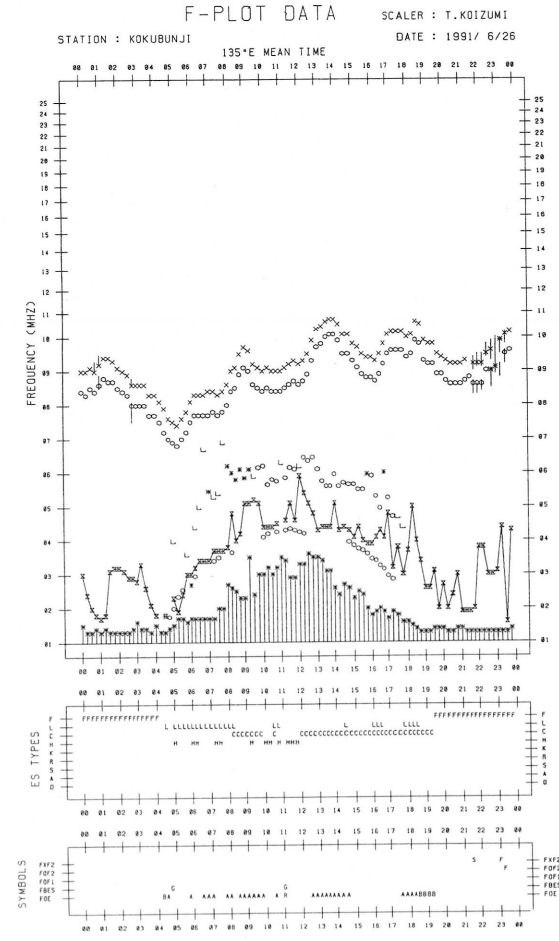

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/23
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE

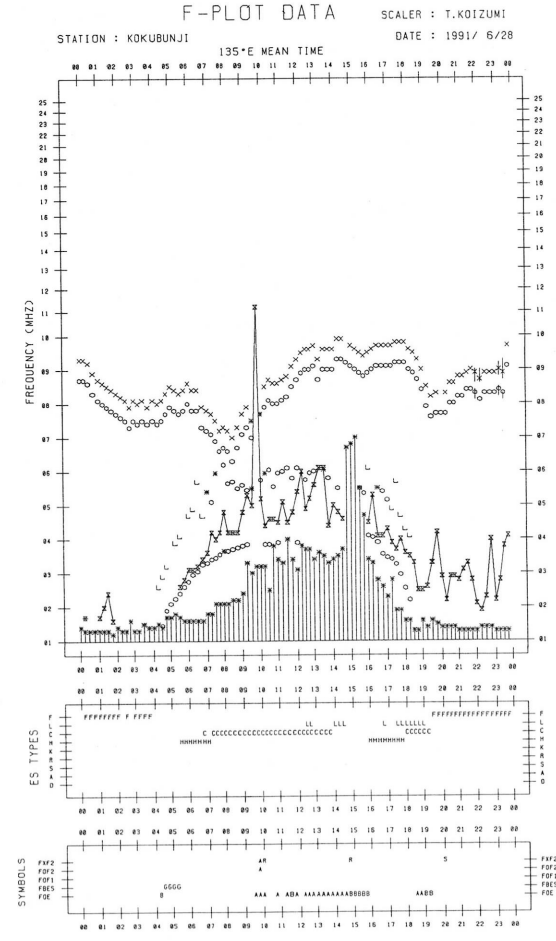

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/22
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE

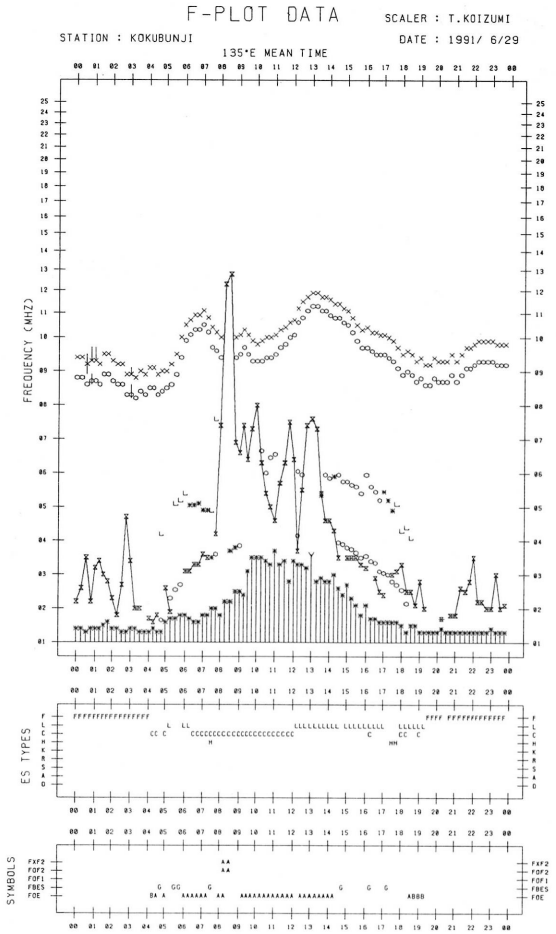

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/24
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE

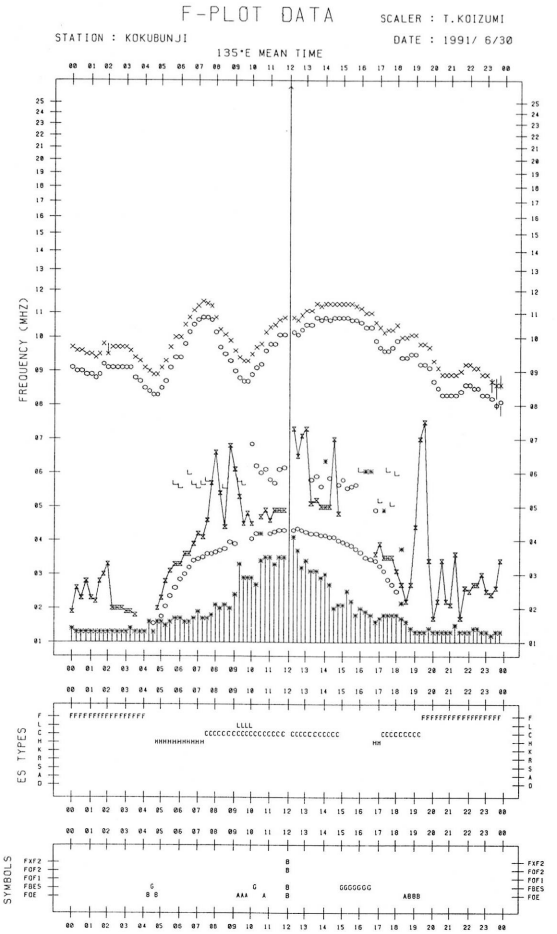

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/25
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/27
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/26
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/28
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/29
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 6/30
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 June 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	B	23	B	23	B	2	1	2	0	1
2	20	20	22	20	21	0	0	0	0	0
3	20	18	18	15	19	0	0	0	0	0
4	*	*	*	22	*	*	*	*	0	*
5	*	*	*	18	*	*	*	*	0	*
6	B	B	B	B	B	0	0	0	2	0
7	B	B	B	B	B	1	1	1	1	1
8	B	B	B	16	B	1	1	1	0	1
9	B	B	B	B	B	0	0	0	1	0
10	B	B	B	B	B	1	2	2	1	2
11	B	B	B	B	B	1	1	1	3	1
12	B	B	B	B	B	3	2	1	1	2
13	B	B	B	10	B	1	1	1	0	1
14	12	12	16	B	13	0	0	0	2	0
15	B	B	B	B	B	1	1	1	1	1
16	B	*	*	14	B	1	*	*	*	1
17	14	15	14	12	14	0	0	0	0	0
18	13	14	13	13	13	0	0	0	0	0
19	14	13	17	11	14	0	1	0	0	0
20	13	16	12	*	13	0	0	0	*	0
21	*	*	*	-	*	*	*	*	-	*
22	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-
27	14	14	15	-	14	0	0	0	-	0
28	24	24	26	-	25	0	0	0	-	0
29	14	11	10	10	11	0	0	0	0	0
30	10	10	10	-	10	0	0	1	-	0

Note: No observations during the following periods.

21st 2030 - 26th 2340
27th 2030 - 28th 0010
28th 0733 - 0900
28th 2030 - 2345
29th 2030 - 2240
30th 2030 - 2353

B. Solar Radio Emission

B1. Daily Data at Hiraiso

500 MHz

Hiraiso June 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	B	64	B	60	B
2	60	63	B	-	B
3	63	64	61	62	63
4	63	B	63	64	B
5	66	67	65	61	65
6	B	78	70	-	B
7	B	67	64	62	B
8	59	61	58	59	60
9	B	B	71	60	B
10	58	57	57	-	58
11	B	B	B	B	B
12	B	B	-	-	B
13	55	54	53	55	54
14	56	57	57	63	56
15	64	63	60	52	63
16	51	51	49	49	51
17	50	52	49	-	50
18	48	49	48	48	49
19	51	50	48	-	49
20	48	47	46	48	47
21	48	49	48	47	48
22	48	48	46	-	47
23	50	50	50	-	50
24	51	49	48	49	50
25	50	49	49	51	49
26	52	51	51	-	51
27	54	55	53	-	54
28	56	57	58	-	57
29	55	54	53	57	54
30	56	56	56	-	56

Note: No observations during the following periods.

2nd 2025 - 2347	6th 2025 - 2348	10th 2015 - 2338
12th 0600 - 0910	12th 2015 - 2344	17th 2015 - 2345
19th 2030 - 2345	22nd 2030 - 23rd 0027	23rd 2030 - 2340
26th 2030 - 2342	27th 2030 - 28th 0050	28th 2030 - 2345
29th 2030 - 2227	30th 2030 - 2357	

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso June 1991

Single-frequency observations

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

JUN	FREQ.	TYPE	START TIME	TIME OF MAXIMUM	DUR.	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1})		POLARIZATION REMARKS
1991	(MHz)		(U.T.)	(U.T.)	(MIN.)	PEAK	MEAN	
1	500	46 C	0015.8	0017.8	2.5	70	30	WL
	200	43 NS	0140	0244	460D	80	20	SL
	500	20 GRF	0146.0	0246.5	118	20	10	WL
	500	45 C	0251.0	0251.3	11.0	60	15	WR
	500	42 SER	0359.5	0405.3	21	300	-	WL
	200	42 SER	0601.3	0612.6	14	600	-	SL
	500	45 C	0609.1	0609.4	5.0	300	30	SL
	500	20 GRF	0619.0	0740.1	150	30	10	WL
2	500	27 RF	0607.8	0652.5	75	15	10	0
4	500	48 C	0337.5	0341.9	144	2300	200	WR
				0422.8		2100		WR
	200	48 C	0339.3	0343.3U	117	70000D	600D	WR
	100	48 C	0340.0	0345.4	9.3	2000	800	-
5	500	46 C	0000.0	0001.0	8.0	15	6	WR
	500	27 RF	0229	0249.5	84	15	5	WR
	500	6 S	0516.5	0516.8	1.0	120	60	WR
	500	42 SER	0614.0	0616.5	4.0	150	-	WL
	500	46 C	2329.5	2329.5	1.0	60	15	0
6	500	48 C	0102.2	0108.8	115	5000	300	WR
	200	48 C	0105.4	0106.2	56	65000	700	WL
	100	48 C	0105.8	0108.5	72	16000D	2000D	-
	500	46 C	0704.8	0705.7	1.5	170	70	WL
	500	45 C	0747.2	0748.1	3.5	60	30	WL
	200	44 NS	2030E	2226	770D	100	45	SR
	500	20 GRF	2352.5	0104.1	120	140	50	WR
7	200	27 RF	0003.8	0036.6	95	1000	150	MR
	100	48 C	0032.0	0047.8	80	1000	300	SR
	200	46 C	0611.8	0612.8	2.0	3500	500	WL
	100	42 SER	0612.0	0613.3	9.3	10000	-	-
	500	42 SER	0612.5	0616.6	6.0	650	-	MR
	200	44 NS	2030E	0536.5	780D	60	26	MR
	500	27 RF	2156	2206.5	32	60	25	MR
9	500	48 C	0138.5	0251	133	4800	700	SR
				0146.8		1600		WL
	200	48 C	0139.3	0220.6	420D	3000	300	SR
	100	48 C	0140.6	0142.8	118	7100	3500	SR
	200	44 NS	2030E	0738	780D	50	30	WL
10	200	44 NS	2030E	2350	780D	30	26	WL
11	500	45 C	0054.7	0056.8	13.5	650	110	ML
	500	48 C	0155.5	0207.0	28.5	2500	1000	WL
	200	48 C	0200	0628	420D	3500	1200	SR
	100	48 C	0204.6	0207.6	172	7400	2500	SR
	500	24 R	0224.0	0430.0	400D	1100	800	SR
	200	44 NS	2030E	0226	780D	200	80	SR
	500	24 R	2020E	2115	580D	270	160	SR
12	200	44 NS	2030E	2320	780D	120	46	SR
14	200	44 NS	2030E	0125	780D	40	25	WR
15	500	42 SER	0539.0	0539.0	4.0	850	-	WL
	500	48 C	0814.5	0820.0	65D	1200	300	MR,SUNSET
	100	48 C	0812.8	0820.4	67D	16000D	9000D	MR,SUNSET
	200	48 C	0816.0	0816.6	70D	60000	600	-, SUNSET
	200	44 NS	2030E	-	780D	-	-	-
16	500	46 C	2207.5	2212.0	6.0	700	50	0
17	500	42 SER	0130.5	0135.6	7.5	2900	-	0
	200	42 SER	0304.0	0309.3	6.0	160	-	WL
	500	46 C	0308.0	0309.5	4.5	160	35	0
	500	46 C	0348.5	0349.0	10	700	80	0
	200	6 S	0348.6	0348.6	2.6	90	100	WL
	500	42 SER	0809.2	0824.2	18	2200	-	0
	200	6 S	0809.3	0809.3	1.3	6000	500	0
	200	6 S	0824.0	0824.1	1.0	3000	300	0
18	100	46 C	2239.4	2240U	4.0	1000D	-	-
	500	42 SER	2239.7	2242.0	9.0	50	-	MR
	200	42 SER	2240.0	2242.5	5.3	4000	-	WR
20	500	45 C	0009.6	0010.5	2.5	10	4	0
	500	42 SER	0430.0	0430.0	9.7	5	-	0
	500	46 C	0501.5	0503.4	7.5	320	100	WR
	200	42 SER	0503.0	0507.4	7.3	70	-	WL
	500	46 C	2146.6	2148.0	7.0	25	10	0
21	500	46 C	0300.4	0301.7	13	140	10	WR
	500	46 C	0838.0	0841.6	7.0	100	15	0
	100	42 SER	0838.2	0854.4	20	3400	-	-
	200	46 C	0838.5	0840.3	5.3	200	40	-
25	500	46 C	0352.9	0353.9	2.5	15	8	0
28	200	42 SER	0716.8	0721.2	8.0	5400	-	WL
	500	45 C	0717.2	0721.4	15	230	20	WL
	100	42 SER	0717.3	0722.0	8.0	2800	-	-
29	500	27 RF	0026.8	0055.5	46	8	5	WR
	500	46 C	0107.6	0108.1	1.7	15	8	0
30	500	45 C	0255.6	0257.0	23	270	120	0
	200	48 C	0255.8	0256.0	8.0	70000D	500D	0
	100	48 C	0256.2	0256.3	10	14000	-	-

C. RADIO PROPAGATION

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

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

C. RADIO PROPAGATION

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

JUN 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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
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	-2	1	ES -25	5	4	8	20	29	20	30	27	27	27	25	26	26	26	25	18	20	17	7	-2	-2
16	2	ES -25	8	7	14	15	22	26	29	34	29	28	31	27	31	35	25	17	18	14	11	1	-4	3
17	-4	ES -25	-2	6	9	18	20	26	27	26	29	23	21	21	27	33	2	21	11	4	6	11	-13	-2
18	0	ES -25	ES -25	14	14	15	27	25	20	20	26	18	18	16	19	27	6	ES -25	2	1	14	7	ES -25	-12
19	-10	1	2	11	17	19	24	27	29	32	26	27	34	30	22	31	24	29	19	13	15	3	9	9
20	1	-3	-4	4	13	15	20	26	21	17	20	15	17	31	9	20	16	9	13	15	7	-5	6	-1
21	0	1	10	7	17	19	20	19	31	27	30	22	26	27	26	28	27	19	17	17	4	3	5	4
22	5	-10	3	6	15	19	22	25	32	29	28	28	21	24	30	31	25	22	19	14	12	5	-4	-6
23	1	3	1	6	14	20	23	27	30	32	31	30	30	31	36	30	17	21	7	9	8	1	0	-1
24	26	-4	6	11	11	16	18	16	21	26	33	25	30	16	18	26	19	32	13	20	11	8	7	1
25	0	-1	1	14	11	19	24	30	31	27	28	30	25	25	24	25	9	13	13	13	7	12	2	3
26	2	2	-1	13	7	26	17	27	26	32	32	26	22	28	27	32	32	14	12	17	12	7	2	ES -24
27	ES -25	-12	-2	3	8	16	19	27	30	27	25	25	26	31	25	32	22	15	23	19	12	6	6	3
28	-1	-1	1	11	12	-3	18	26	30	33	26	31	30	27	24	33	33	29	14	14	14	7	7	2
29	-12	-9	7	7	16	21	24	30	31	36	30	31	31	31	31	26	32	21	18	20	13	4	7	4
30	-1	9	7	4	20	21	31	33	32	34	35	35	35	35	34	28	24	24	17	12	7	8	2	ES -9
CNT	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
MED	0	-2	1	7	14	18	21	26	30	30	28	27	26	27	26	29	24	21	16	14	12	6	2	0
UD	5	3	8	14	17	21	27	30	32	34	33	31	34	31	34	33	32	29	19	20	15	11	7	4
LD	-12	ES -25	ES -25	4	7	8	18	19	20	20	25	18	18	16	18	25	6	9	7	4	6	1	-13	ES -12

C. Radio Propagation

C2. Radio Propagation Quality Figures at Hiraiso

Hiraiso

Time in U.T.

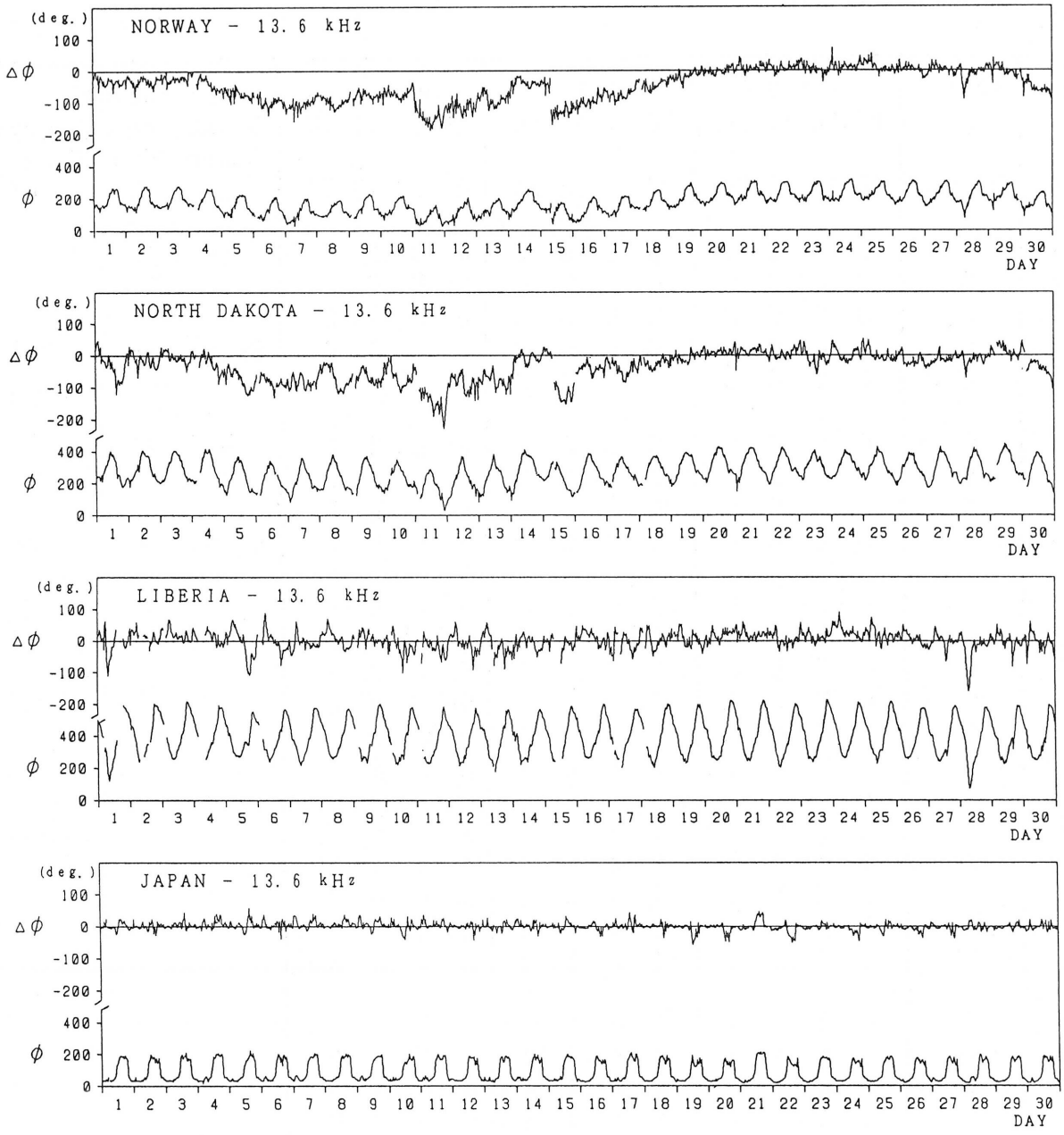
Jun. 1991	Whole Day Figure	W W V 00 06 12 18 / 06 12 18 24	W W V H 00 06 12 18 / 06 12 18 24	Conditions 00 06 12 18 / 06 12 18 24	Principal Geomagnetic Storms Start h m	End h	Range nT
1	C	C C C C	C C C C	N U U U			
2	C	C C C C	C C C C	U U U U			
3	C	C C C C	C C C C	U U U U			
4	C	C C C C	C C C C	U U U U	08.5	---	297
5	C	C C C C	C C C C	U U U U	---	---	
6	C	C C C C	C C C C	U U U U	---	24	
7	C	C C C C	C C C C	U U U U			
8	C	C C C C	C C C C	U U U U			
9	C	C C C C	C C C C	U U U U	0040	C	194
10	C	C C C C	C C C C	U U U U			
11	C	C C C C	C C C C	W W W W			
12	C	C C C C	C C C C	W W W W			
13	C	C C C C	C C C C	WU U U U			
14	C	C C C C	C C C C	U U U U			
15	4-	4 4 4 3	3 4 4 4	N N N N			
16	4-	3 5 4 2	4 4 4 4	N N N N			
17	3+	4 4 2 2	4 4 3 3	N N N N			
18	3o	2 2 3 4	4 4 3 3	NU U U U			
19	3+	4 2 3 3	4 4 4 4	UN N N N			
20	3+	4 3 3 4	4 3 3 4	N N N N			
21	4o	4 4 5 4	4 4 4 4	N N N N			
22	4o	4 4 4 4	4 4 4 4	N N N N			
23	4-	5 3 4 2	4 4 4 4	N N N N			
24	3+	4 2 3 2	4 4 4 4	N N N N			
25	4-	4 1 4 5	4 4 4 4	N N N N			
26	4o	5 4 4 4	4 4 4 4	N N N N			
27	4o	4 4 4 5	3 4 4 4	N N N N			
28	4+	5 4 5 5	4 4 4 4	N N N N			
29	4+	5 5 4 5	4 4 4 4	N N N N			
30	4+	5 4 4 3	5 5 4 4	N N N N			

C: Due to receiver's trouble.

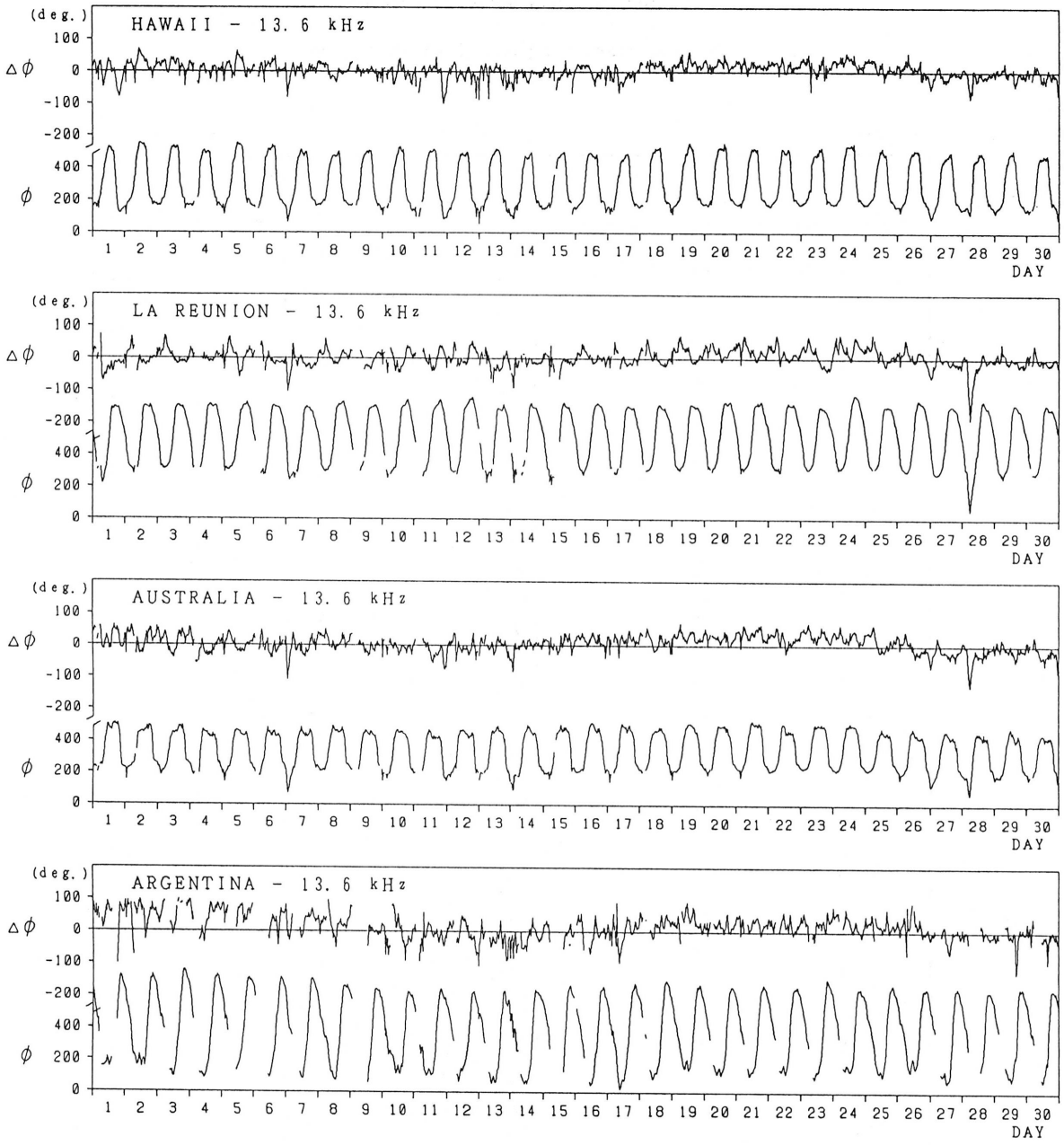
C. Radio Propagation

C3. Phase Variation in OMEGA Radio Waves at Inubo

Inubo June 1991



Inubo June 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.)
Jun.02/1430E	Jun.04/1325D	Jun.02/2156	52.9
Jun.04/1325E	Jun.11/0324D	Jun.07/1019	181.8
Jun.11/0324E	Jun.15/0815D	Jun.11/1348	201.6
Jun.15/0815E	Jun.19/1820	Jun.15/0945	187.2
Jun.30/0116	Jul.01/0744D	Jun.30/2001	87.5

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso — Time in U.T.

Jun. 1991	SWF Drop-out Intensities(dB) CO	HA	1)	2)	3)	Start	Dur.	Type	Imp.	Correspondence Solar * Flare	Solar Burst
1			14			0108	35	1	1	x	
1			16			0248	9	1	1+	x	x
1			27			0400	15	1	2	x	x
1			20			1502	37	2	2-	x	
2			16			0031	31	2	1+	x	
2			33	x	>30	0739	21	2	3-	x	x
3			22			0201	21	2	2-	x	
4			8	x	x	0048	35	3	1-	x	x
4			10	x	x	0155	21	2	1-	x	x
4			13	x	x	0241	19	2	1	x	x
4			>28	>12	x	0337	198	3	2+	x	x
4		x	21	x		1842	25	3	2-	x	
5		x	12	7	x	0001	20	1	1	x	x
5		x	>31	x	x	0158	31	1	2+	x	x
6		x	>48			0100	160	1	3+	x	x
7			37	>30		0044	197	3	3	x	x
7			8			0403	17	2	1-	x	
9			>43			0137	212	3	3+	x	x
9	x	x	9	x		0547	15	2	1-	x	x
10			18			0020	26	2	1+	x	x
10			>31			0220	21	2	2+	x	x
10			8			0241	15	1	1-	x	x
10			9			0341	16	2	1-	x	x
10			11			0441	22	1	1-	x	
10				x	11	1354	12	1	1-	x	
10				x	7	1654	24	1	1-	x	
11			>30			0126	239	2	2+	x	x
12			13	x	14	0701	37	2	1	x	x
12					**7**	**2117**	**13**	**2**	**1-**	**x**	
12			**20**			**2346**	**43**	**1**	**2-**	**x**	
13			**>41**			**0325**	**60**	**1**	**3+**	**x**	
13			**10**			**0532**	**34**	**2**	**1-**	**x**	
13			**7**	**x**	**4**	**1800**	**15**	**1**	**1-**	**x**	
13			**20**			**2328**	**22**	**2**	**2-**	**x**	
13			**12**			**2355**	**15**	**2**	**1**	**x**	
14			**45**			**0015**	**37**	**3**	**3+**	**x**	**x**
14			**>30**			**0130**	**36**	**1**	**2+**	**x**	**x**
14			**>22**			**0213**	**27**	**2**	**2-**	**x**	**x**
14			15			0418	22	2	1	x	x
15			>60	x	x	0813	43	2	3+	x	x
15					6	2050	20	2	1-	x	x
16			5			0527	13	2	1-	x	
16			11			2203	15	2	1-	x	
17			7			0111	15	1	1-	x	
17			22			0137	19	1	1+	x	x
17			15			0307	15	2	1	x	x
17			>21			0349	29	1	2-	x	x
17	x			>12	>10	0810	40	1	1-	x	x
18			15			2321	13	2	1	x	
19		30	12			0009	25	2	1	x	
20		>35	22			0230	17	1	2-	x	
20	x	12	18	12	18	0502	35	2	1+	x	x
21	x	10	21	>13		0302	13	2	2-	x	
26			15			0150	25	2	1	x	
28	x	x	15			0503	109	3	1	x	x
30	>35	>35	x	x	30	0256	21	1	2	x	x

NOTES CO:Colorado(WWV) HA:Hawaii(WWVH) 1):Australia 2):Moscow 3):London
* Optical and X-ray Flares

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Jun.	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			18	10	10	11	0016E	0057	0023
1				10	8		0159	0251D	0206
1	30	25	58*	55*	37		0249	0358D	0312
1	47	74	163	111	75	63	0358E	0551	0406
1		114	124	63			0610	1220	0749
1		27					1145	1254	1207
1		56					1420	1455D	1440
1	42	79					1455E	——	1511
2	45	53	62	97	83	70	0030	0213	0043
2			13	18	6		0508	0552	0513
2		32	44	34*		24	0615	0723	0628
2	65	—	246	139	32	61	0736	1033	0751
2		87					1356	1607	1426
2					56	41	2028	2135	2035
3			13	12	9	15	0021	0045	0028
3	20	—	55	71	42	30	0206	0326	0210
3			18	14	6		0406	0446	0417
3	29		9		67	43	2051	2155	2103
3				8	8	14*	2302	2334	2310
4				—	10		0101	0125	0109
4				—	14	13	0151	0229	0205
4	17		31	—	17	16	0243	0314	0252
4	242	42	521	—	279	226	0336	1021	0345
4		34					1355	1452	1415
4		17					1556	1640	1615
4		15					1719	1807	1734
4					51	34	2009	2057D	2018
4					14		2057E	2136	2104
4					7		2227	2250	2231
5	35	28	38	79	67	50	2348**	0126	0006
5	68	79	152	143	113	91	0156	0328	0206
5			8*	10*	5		0338	0407	0351
5			8	8			0413	0435	0423
5			13				0827	0850	0831
5					30		1847	1929	1857
5					10		2112	2206	2129
5				9	14		2323	0002	2337
6	159	—	351	324	288	221	0100	0428D	0113
6	43	32	142*	94*	55*	27*	0428E	0704D	0438
6		—	93	54			0704E	0750D	0713
6		—	119	54			0750E	1039	0800
6		52*			27		1701	1846	1750
7	42	49	107	120	98	86	0030	0612D	0130
7		11	86	64	14	25	0612E	0705D	0618
7			102	63		35	0705E	0806D	0718
7			41*	12			0806E	0919	0825
7					14	23	2214	2310	2222
8			9	11			0413	0446D	0416
8			21	20			0446E	0539	0502
8		18	11	6			0723	0806	0738

Inubo

Jun.	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
8		19	17	8			0826	0923	0851
8		27					1324	1420	1342
8		14					1548	1616	1602
8					9		2104	2142	2109
9	153	—	368	123	266	200	0136	0547D	0144
9	46	—	133	74	48	21	0547E	0733	0555
9			15				0834	0913	0849
9	33	—	86				0950	1049	0956
9		21*	20				1057	1128	1103
9		54					1308	1444	1335
9					54	47	2003	2120	2010
9	20*		12	17	26*		2239	0019	2252
10	22	23	54	—	57	35	0024	0133D	0035
10				—	8		0133E	0223	0158
10	57	58	177*	—	100	84	0222	0340D	0231
10	29	18	91*	—	43*	26	0340E	0440D	0351
10	36	57	132*	—	60	33	0440E	0651D	0450
10			22	—			0651E	0722D	0704
10	23	28	19	—			0722E	0803	0743
10		24	49*				0837	1038	0931
10		38	54				1057	1228	1107
10		94					1353	1514	1416
10		52					1653	1849	1715
10					6		2054	2115	2058
10	23				33	19	2124	2151D	2136
10	18				33*		2151E	2311	2232
10	11			7	8		2328	2351D	2334
10	21	10	15	43	36		2350E	0050	0007
11	34	53	114	107	87	70	0120	0153D	0138
11	132	188	393	279	255	43*	0153E	0441D	0208
11	78*	54	138	75	69	57	0441E	0628	0450
11			21				0804	0837	0813
11		16	14				1157	1212	1202
11		19					1357	1446	1411
11		19			31		1724	1806	1736
11	51				99	83	2013	2326D	2117
11	29		22	30	85	45	2326E	0223D	2336
12		14	23	20	26		0223E	0328	0229
12			13	10	10		0600	0637	0610
12	56	—	193	114	31	49	0653	0852	0713
12			33				0907	0939D	0917
12			23				0939E	1012	0944
12		13	16				1015	1037	1020
12		36	10				1126	1154	1132
12					22		1755	1819D	1800
12		26			35		1819E	1924	1835
12					10		1939	2016	1947
12					17	21	2020	2049	2024
12	38	25	17		77	61	2115	2228	2123
12				19	36*		2229	2345D	2315
12	64	55	83	116	113	83	2345E	0129	2355
13			10	16	5		0240	0319	0251
13	32	46	100	79	49	33	0322	0438	0330
13	42*		159*	100*	60*	43	0513E	0714	0542
13		23	33	10			0845	0923D	0854

Inubo

Jun.	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
13	29	—	133	13			0923E	1101	0942
13		38	13				1116	1210	1143
13		55					1742	1917	1820
13					24		2008	2041	2016
13	25				64	37	2043	2133D	2051
13	24				55	29	2133E	2202D	2147
13	38	18	19		79	45	2202E	2305	2207
13	35	31	52	82	80*	57	2319	2356D	2338
14	59*	60	75*	120	114*	89	2356E**	0105D	0026
14	82*	73	158	144	125*	100	0107E	0218D	0143
14	40	40	130	88	67	46	0218E	0334	0226
14	18	16	37	31	15	11	0346	0415D	0401
14	34	67	120	79	27	30	0415E	0457D	0426
14	22	46	83	58	33	13	0457E	0522D	0506
14	28	80	110	69	29		0522E	0619D	0547
14	15	42	62	35	19		0619E	0700	0633
14			28	15			0712	0813	0721
14			17				0950	1017	0954
14		42	30*				1041	1149	1101
14		18					1341	1433	1353
14		16					1853	1924	1903
14					47	45	1912	2008	1917
14	14				14	17	2117	2144	2124
14					5		2159	2218	2206
14	20		9	20	31	16	2231	2323	2236
14		13	12	17	19	20	2328	0007	2333
14	20*		31	48	36*	32	0018	0118	0042
15				19	13		0152	0247	0207
15	12		18	20	10		0257	0336	0308
15	20		87*	61*	39*	29*	0359	0540D	0409
15	23	38	78	47	41	20	0540E	0716	0556
15	—	—	—	—	76	117	0811	0927	0822
15	35	24	12		108	63	2053	2257	2102
15	—	—	—	17	—	—	2356	0041	0016
16			18	18	10		0506	0528D	0512
16		27	83	67	33		0528E	0626D	0538
16			12	14			0626E	0700	0629
16		25					1639	1738	1654
16	35	20	24		74	69	2205	2335	2215
17	24		29	—	30	32	0110	0134D	0118
17	46	43	77	—	79	65	0134E	0256	0142
17	42	36	117	—	61	47	0303	0345D	0314
17	69	—	245	—	123	94	0345E	0545	0357
17			39	—			0554	0704	0607
17	35		198	109	22	25	0808	0825D	0817
17	64	—	238	136	26	35	0825E	1013	0830
17					27	34	1949	2036	2008
17				13	12	19	2328	0003	2349
18	14	18	30	43	27	18	0133	0227	0139
18	—	—	—	7	—	—	0312	0330	0318
18	—	—	—	36	—	—	0347	0448	0358
18			9				0908	0935	0914
18		33	17				0954	1034	1002
18					12		1936	2024	1958
18	28			28	37	35	2240	2322D	2250

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Jun.	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
18	28			36	45	34	2322E	0009D	2329
19	31	34*		57	59	41	0009E	0217	0023
20				22	14		0142	0229D	0205
20	41	29	88	88	61	34	0229E	0353	0234
20	18	28	23*	16			0406	0459D	0434
20	44	64	165	107	59	37	0459E	0658	0509
20			15	7			0704	0744	0710
20		34	8				1125	1222	1149
21	32	38				91	0105	0301D	0128
21	20	35	91	83	48	50	0300	0416	0312
21			18	18	5		0511	0609	0520
21				13	18	21	2305	0002	2314
22				17	14		0054	0137	0106
22	26		36	13			0738	0820D	0751
22	29		45	8			0820E	0920	0831
22				8	9		2254	2334	2311
23			13	12			0518	0548	0524
23					46	40	1854	1948	1900
23	35						1940	2022	1953
24			15	—	5		0418	0453	0424
25	18			13	11		0030	0057	0037
25			12	6			0623	0655	0636
25		56	53	10			0858	0925	0906
25					10		2216	2305	2223
26	30	24	26	55	35	28	0149	0250	0158
26	25				18		2009	2056	2016
26				55	55		2244	0333	0028
27		80					1343	1519	1412
27					5		2302	2318	2306
28				10			0142	0158	0147
28	78	213	243	134	94	50*	0401	0806D	0555
28	32	135	120	36			0806E	1017	0814
28			26				1045	1130	1057
29	16	23	32	39	33	23	0017	0145	0043
29				7			0237	0256	0242
29			—	24	13		0304	0342D	0312
29			—	17			0342E	0413	0351
29		24	28	20			0537	0641	0558
29			23				1011	1034	1016
29		104					1539	1741	1602
30				8	8		0030	0057D	0036
30				6	6		0057E	0114	0103
30			39	23	18	20	0120	0206	0132
30	91	129	238	171	130	113*	0243	0420	0305
30			19	9			0502	0539	0510
30		26	28	14			0604	0705	0618
30			14				0729	0802	0734
30		43					1211	1251	1222
30		47					1340	1409	1359
30		68					1529	1724	1553
30					20		1849	1947	1902
30					7		2128	2212	2142
30	35		24	29	54	48	2229	0016	2254

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☎ (0423) (21) 1211(代)

Queries about "Ionosperic Data in Japan" should be forwarded to:
Communications Research Laboratory, Ministry of Posts and Telecommunications,
2-1 Nukui-Kitamachi 4-chome, Koganei-shi, Tokyo 184 JAPAN.