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IONOSPHERIC DATA IN JAPAN

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

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

b. Sudden Phase Anomaly (SPA) at Inubo

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

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

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

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

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

Transmitting Stations

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

HOURLY VALUES OF FOF2 AT WAKKANAI

JUL. 1990

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	76	80	71	66	77	84	94	94	95	96		87	84	78	76	80	78	76	78	87	78	80	86	87
2	85	85	66	73	79	84	96	103	101	78	90	84	86	86	80	76	72	69	76	81	81	86	83	82
3	80	76	74	78	78	88	100	108	99	96	88	86	87	86	83	82	79	86	84	N	78	89	86	
4	81	80	66	74	71	81	91	88	80	A	A	A	72	76	69	70	68	70	66	80	72	80	80	68
5	80	80	74	68	66	86	90	96	83	88	83	80	82	79	61	78	78	67	67	71	76	75	84	52
6	84	74	67	77	61	78	78	82	A	59	A	59			56	A	64		A	78	80	65	74	84
7	N	75	74	68	66	87	109	111	99	A	91	83	84	82	67	77	73	75	72	76	70	87	68	82
8		77	78	74	72	84	100	104	101	90	A	74	A	76	68	72	75	77	81	87		109	A	86
9	84	83	78	71	61	63	54	A	72	A	58	44	68		65	54	63	80	71	71	80	76	72	65
10	64	66	68	70	66	70	96	105	102	91	92	92	89	90	95	90	86	87	80	84	87	87	88	68
11	76	75	74	73	65	73	78	86	87	72	70	78	81	80	84	88	84	82	78	87	81	81	86	85
12	83	72	74	58	66	66	71	80	83	73	76	76	74	83	83	81	81	80	79	82	N	87	86	84
13	68	74	76	61	68	78	86	90	81	69	68	60	73	64	73	74	71	76	60	53	79	75	76	53
14	69	75	80	74	67	67	79	88	71	75	72	63	70	A	72	68	73	78	72	78	78	83	84	78
15	81	84	75	64	64	78	64	85	86	78	66	A	63	A	68	72	73	75	81	64	74	78	78	76
16	72	66	70	64	64	74	82	86	81	83	A	A	A	65	74	66	A	70	70	66	84	82	84	78
17	80	74	74	73	73	66	83	82	74	86	82	78	72	80	86	72	72	75	74	87	91	89	83	73
18	74	71	66	65	71	64	84	88	91	94	93	67	81	84	77	83	82	83	84	90	87	87	72	77
19	73	65	70	70	68	69	78	83	66	A	72	79	62	75	82	87	80	80	75	80	86	88	88	84
20	87	68	71	60	66	45	A	65	A	A	A	A		A	63	45	64	66	66	A	61	64	63	65
21	60	58	63	57	55	57	53	A	A	66	A				60	60	62	65	65	70	64	74	61	65
22	65	67	64	67	64	72	56	72	80	65	A	63	75	72	72	70	71	67	74	68	80	72	66	66
23	62	69	61	60	60	72	86	89	83	90	80	76	75	71	67	68	68	78	79	81	A	105	75	55
24	74	68	64	68	62	73	81	75	82	81	A	54	76	72	71	63	74		A	84	79	39	66	66
25	77	74	66	63	65	74	80	86	A	85	85	75	74	77	79	68	67	72	73	65	59	81	78	66
26	66	78	66	63	66	74	80	83	86	87	92	105	84	83	81	78	74	78	72	A	63	80	86	79
27	74	74	74	73	68	76	85	92	90	85	86	82	66	78	76	76	72	78	78	80	90	85	88	87
28	66	66	64	71	64	63	48	62	60	67	55		69	74	71	68	68	68	78	84	88	89	85	82
29	66	63	A	58	54	51	54	58	44	A	54	56	48	A	66	A	62	86	86	84	64	77	62	61
30	62	58	49	48	39		65	62	A	63	67	79	64	64	73	A	64	72	70	71	87	66	71	67
31	63	73	69	65	64	73	80	87	79	62	64	76	74	73	74	75	A	64	86	107	60	86	61	67
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	31	30	31	31	30	30	29	26	25	22	25	26	24	31	28	29	29	29	28	28	31	30	30
MED	74	74	70	68	66	73	80	86	83	81	78	76	74	78	73	73	72	76	75	80	79	81	79	74
U Q	80	77	74	73	68	78	90	93	91	89	88	82	82	82	80	79	78	80	79	84	85	87	86	82
L Q	66	67	66	63	64	66	71	81	79	68	67	63	69	72	67	68	67	69	70	71	71	75	71	66

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HOURLY VALUES OF FES AT WAKKANAI

JUL. 1990

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	G	30	G	38	41	61	60	69	58	101	54	69	G	59	G	69	65	42	42	39	28	31	31
2	G	G	G	G	G	32	67	85	85	54	64	74	62	56	G	G	58	59	54	57	68	59	42	40
3	G	29	28	G	30	57	60	61	43	61	87	66	63	G	54	G	47	58	91	60	58	29	G	48
4	36	27	32	35	G	G	50	42	59	65	82	75	58	G	G	G	G	G	46	G	55	58	27	35
5	34	G	G	G	G	38	G	G	G	G	G	G	G	G	G	56	47	56	39	31	33	G	60	58
6	33	44	29	G	30	45	61	60	104	69	65	94		G	G	99	128	166	88	41	36	G	G	58
7	34	G	28	36	G	54	64	73	58	89	81	50	60	90	54	79	G	62	51	52	69	43	30	G
8	40	32	G	G	G	G	45	85	84	114	96	63	105	62	69	60	G	49	G	33	134	167	94	58
9	60	58	56	70	84	72	50	90	64	85	58	G	G	G	G	G	74	96	74	G	28	28	56	38
10	G	G	G	24	24	G	56	78	92	60	58	93	G	73	80	54	85	115	65	70	60	59	54	42
11	38	28	28	28	27	G	45	57	G	G	G	54	G	56	G	G	G	G	61	G	G	G	G	G
12	G	28	G	G	G	G	G	52	66	54	58	G	G	G	54	G	G	G	61	52	71	32	36	38
13	G	G	G	G	G	G	46	58	76	G	G	G	G	G	59	73	50	60	69	74	59	G	59	61
14	73	70	67	27	G	57	48	72	84	70	62	70	73	79	74	G	G	74	92	54	32	44	50	33
15	G	G	G	G	G	G	47	G	54	70	56	62	61	52	58	44	42	45	57	60	44	28	40	61
16	32	48	44	37	G	G	G	58	83	66	72	102	95	62	64	66	68	74	58	65	70	60	59	30
17	28	37	38	50	G	G	G	59	60	56	60	G	G	47	G	G	47	57	44	30	39	31	29	38
18	G	G	G	G	G	G	G	50	G	G	G	G	G	48	G	G	G	G	53	G	58	34	33	27
19	G	G	29	28	G	43	60	48	57	89	58	123	75	58	G	50	59	G	G	54	44	G	33	29
20	28	58	69	59	97	50	61	92	92	97	107	60	G	64	G	G	G	66	58	93	29	57	91	G
21	G	G	G	23	28	36	44	56	62	78	51				G	G	42	45	G	32	45	33	54	59
22	44	51	56	35	41	46	72	70	90	G	69	91	63	56	64	60	64	69	70	60	72	90	59	44
23	30	28	29	28	28	G	45	54	63	62	58	59	G	G	G	54	G	G	61	106	144	129	93	70
24	48	28	40	G	G	G	G	64	70	60	77	64	63	48	G	G	86	177	108	40	44	47	65	29
25	33	28	G	G	G	G	G	66	108	103	G	G	G	G	94	93	60	G	38	72	73	92	72	93
26	58	G	G	56	34	G	G	47	43	69	97	92	70	74	71	46	G	50	63	104	71	60	66	58
27	54	31	34	30	32	G	G	G	G	G	62	56	G	62	64	46	46	51	65	30	29	46	29	G
28	G	G	G	G	26	G	G	45	G	G	G	G	G	48	G	G	G	92	117	59	60	47	29	32
29	32	46	70	G	G	G	G	G	G	57	68	G	G	57	46	58	64	96	106	90	46	28	49	G
30	G	11	G	24	29	G	45	41	64	53	46	71	51	54	61	95	62	G	37	35	33	33	58	59
31	60	51	44	G	28	36	52	69	44	54	55	61	54	66	66	62	71	80	95	130	72	44	30	33
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	30	29	30	31	31	31	31	31	31	31	31	31	31
MED	32	28	28	23	G	G	45	58	63	60	60	60	51	53	54	46	47	58	61	54	55	43	49	38
U Q	40	44	40	35	30	43	60	70	84	70	77	74	63	62	64	60	64	74	74	70	70	59	59	58
L Q	G	G	G	G	G	G	G	47	43	53	51	G	G	G	G	G	G	G	44	32	36	28	30	29

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT WAKKANAI

JUL. 1990

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	17	14	20	16	18	18	20	22	26	54	54	43	46	54	48	56	36	24	18	20	17	20	14	17
2	15	15	16	17	20	18	20	24	35	39	43	42	43	44	58	43	38	23	20	18	14	16	17	16
3	15	18	21	18	17	21	24	26	28	38	40	43	49		40	42	27	22	20	20	18	18	16	18
4	15	16	17	17	20	21	20	24	38	40	40	42	45			40	38	23	23	21	17	18	17	17
5	16	16	17	15	20	20	33	40	38	40	58	45		63		39	36	30	20	17	16	15	15	17
6	16	16	16	15	22	18	23	23	38	40	40	42		39		45	28	29	18	17	14	15	16	15
7	16	15	16	18	17	18	26	23	36	36	39	43	46	40	40	26	26	22	17	17	17	15	15	15
8	16	15	15	15	18	20	22	24	36	36	42	40	42	38	40	30	27	23	20	17	17	16	16	17
9	15	16	16	15	16	18	21	26	34	49	44	44	38		70	45	28	24	18	20	17	20	17	18
10	17	16	16	14	22	18	21	26	28	48	42	43	50	48	39	33	38	21	20	18	18	18	16	16
11	16	17	15	14	17	21	22	26	26	40	42	38	54	51	40	39	23	33	20	21	18	18	16	18
12	22	18	17	16	18	20	22	38	27	36	39	53	38	54	36	39	35	22	21	18	16	18	16	17
13	16	15	17	16	18	26	20	23	27	35	40	42		70	36	28	28	23	21	20	18	18	17	16
14	18	20	17	16	18	18	21	23	27	36	38	42	43	40	38	32	23	21	20	18	18	15	17	18
15	15	17	17	16	17	18	22	22	30	34	36	39	38	37	38	38	46	28	22	20	16	17	21	16
16	15	16	17	18	18	26	22	24	34	27	38	41	39	42	40	40	28	22	21	18	17	18	15	17
17	17	16	16	15	20	18	20	22	24	27	37	51	40	39	52	24	21	21	17	18	16	16	18	17
18	18	15	18	15	18	24	21	22	38	49	39	49	42	36	34	29	28	21	24	20	17	17	16	16
19	17	18	18	14	17	20	21	23	36	35	34	52	44	38	50	33	29	21	18	17	16	15	17	17
20	16	17	15	16	16	18	20	22	23	28	38	36	70	36		42	49	18	20	17	18	18	17	15
21	17	17	16	14	17	18	18	23	27	33	35						35	26	18	18	16	16	20	15
22	17	16	18	18	16	18	22	23	33	46	36	38	44	35	45	29	32	22	20	17	18	17	17	16
23	16	18	15	16	17	18	22	24	24	35	36	36	59	55		36	35	32	27	39	17	15	15	17
24	16	15	17	16	17	26	21	24	24	28	38	37	40	38	57	24	24	23	18	17	17	17	18	16
25	17	18	15	17	18	20	23	24	36	34	57	43		52	29	44	24	22	22	16	21	17	17	16
26	15	15	15	18	18	24	18	21	38	44	40	40	45	41	52	29	27	22	18	20	16	15	17	15
27	18	16	15	18	14	23	20	23	23	45	33	40	52	39	36	35	26	22	18	15	20	17	17	14
28	17	16	20	15	17	17	23	22	26	32	40	41	80	52	42	40	23	21	18	18	15	17	16	17
29	17	16	17	15	N	23	23	23	33	38	38			40	38	36	23	20	18	16	17	16	15	16
30	18	15	16	15	17	18	21	29	35	37		42	40	46	42	24	24	42	20	16	14	15	17	18
31	17	15	15	16	17	20	18	23	34	37	39	37	41	42	41	38	23	28	20	18	18	18	18	17
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	30	31	31	31	31	31	30	29	25	27	25	30	31	31	31	31	31	31	31	31
MED	16	16	16	16	18	20	21	23	33	37	39	42	44	41	40	37	28	22	20	18	17	17	17	17
U Q	17	17	17	17	18	21	22	24	36	40	42	43	49	52	49	40	35	26	21	20	18	18	17	17
L Q	16	15	15	15	17	18	20	23	26	34	38	39	40	38	38	29	24	21	18	17	16	15	16	16

HOURLY VALUES OF FOF2 AT AKITA

JUL. 1990

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	86	80	79	74	78	86	97	102	98	92	86	A	88	90	84	85	83	84	88	80	75	86	88	89
2	86	86	86	82	81	89	93	99	96	A	94	A	A	A	90	90	83	84	87	84	86	84	A	82
3	83	81	66	81	78	84	96	100	A	93	A	A	A	86	90	90	88	84	88	90	A	82	87	88
4	86	88	84	86	73	81	98	108	84	84	85	N	84	77	79	77	75	73	81	80	81	80	84	85
5	85	67	79	76	70	80	99	97	90	85	87	85	84	86	77	78	83	76	71	70	74	85	86	79
6	84	54	80	43	78	83	86	88	88	77	A	77	A	A	65	68	68	A	75	A	78	A	81	82
7	85	76	85	80	67	79	A	110	91	A	86	92	100	83	90	91	86	80	A	A	78	84	88	86
8	84	80	80	77	77	84	103	107	95	89	A	A	91	84	83	80	81	85	84	91	78	76	79	79
9	82	73	76	66	68	65	N	77	N		93	A	A	70	71	A		A	A	77	77	79	66	A
10	77	74	72	66	66	77	87	106	102	95	94	92	85	88	94	104	92	91	83	A	83	84	87	75
11	84	80	79	71	74	75	87	100	91	121	A	84	89	89	93	102	91	88	82	82	86	A	84	88
12	89	85	80	80	77	84	86	96	96	91	86	87	89	67	100	91	89	85	90	87	90	89	84	99
13	91	87	84		81	86	60	98	91	A	71	74	80	82	83	86	A	82	80	A	A	82	84	A
14	76	84	82	78	74	73	86	80	104	84	89	76		A	108	A	76	76	77	64	79	79		A
15	81	81	76	51	64	77	86	A	92	71	A	A	A	A	A	A	A	A	A	A	84	A	86	85
16	80	78	84	77	A	77	81	90	90	83	82	78	78	68	76	82	80	80	82	86	87	79	86	84
17	85	83	85	71	67	58	67	86	83	84	76	A	A	A	85	81	76	A	84	86	87	86	87	79
18	72	75	72	67	54	66	83	100	88	94	94	85	86	85	84	90	88	90	95	90	88	86		
19	72	74	76	73	74	72	80	72	71	71	A	73	81	85	92	90	80	83	76	85	78	84	90	57
20	82	57	82	54	53	A	A	86	64	A	A	A	A	68	72	86	A	71	A	77	A	A	A	A
21	67	67	70	59	57	55	53	A	A	A	A	A	A	64	78	67	76	78	75	76		73	73	68
22	66	66	68	66	67	66	78	85	80	79	76	82	A	101	86	A	A	80	83	A	54	A	75	76
23	67	67	66	67	57	70	86	99	A	87	87	84	90	85	A	80	79	86	87	87	54	74	A	A
24	A	A	77	73	73	72	80	79	86	A	A	A	A	A	A	A	A	A	A	A	A	A	80	A
25	A	76	74	70	70	78	84	100	90	102	87	84	A	91	88	81	80	79	85	86	80	A	A	A
26	77	84	82	75	67	72	78	84	87	87	86	A	90	94	A	89	88	84	80	78	79		80	A
27	78	72	76	68	67	71	84	86	91	79	82	85	82	80	83	79	80	81	83	86	82	85		86
28	84	78	74	78	72	67	62	76	A	67	A	A	74	77	77	55	68	A	77	84	89	84	88	82
29	A	72	A	50	A	A	55	62			A		A	A	71	A	A	65	72	65	67	A	68	A
30	A	76	63	52	43	52	69	73	72	68	76	86	86	73	A	80	71	73	75	84	87	85	76	79
31	54	67	69	71	69	71	86	104	84	N	A	76	86	81	N	A	75	78	A	A	87	84	78	74
	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	30	30	30	29	29	28	29	25	22	19	17	18	24	25	24	24	25	25	23	26	22	24	21
MED	82	76	78	71	70	75	85	96	90	84	86	84	86	84	84	84	80	81	82	84	80	84	84	82
U Q	85	81	82	77	75	82	87	100	93	92	89	85	89	87	90	90	87	84	86	86	87	85	87	86
L Q	76	72	72	66	66	68	78	82	84	79	82	76	82	75	77	79	76	77	76	77	78	79	78	77

COMMUNICATIONS RESEARCH LABORATORY. JAPAN

HOURLY VALUES OF FES AT AKITA

JUL. 1990

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	49	57	36	33	32	35	63	54	69	90	69	96	56	67	60	G	56	51	83	60	49	65	40	35
2	49	78	51	37	38	32	45	80	121	121	93	138	141	89	49	44	102	85	72	54	131	109	113	34
3	38	40	38	44	44	38	58	93	174	83	96	152	103	61	G	G	70	56	62	47	93	81	92	37
4	29	36	38	59	38	44	G	G	G	G	61	60	55	G	G	G	51	44	39	G	28	32	46	31
5	32	31	30	28	31	G	49	78	57	51	50	G	54	55	G	G	G	G	G	41	92	35	26	G
6	G	30	33	31	G	G	51	97	62	66	127	122	118	91	G	G	42	92	G	140	60	60	30	40
7	92	53	59	58	37	49	86	103	78	123	G	116	54	82	77	123	74	62	82	92	65	50	61	49
8	40	29	57	43	45	G	36	54	77	69	138	125	G	50	70	54	50	44	42	33	32	58	41	33
9	G	31	45	28	G	49	61	53	77	173	73	84	54	71	59	128		175	126	87	69	58	26	40
10	30	30	29	G	30	39	78	48	69	124	82	78	78	88	117	G	58	70	74	86	127	112	91	44
11	39	37	50	45	40	G	46	54	83	129	95	72	G	49	G	49	G	51	50	55	40	50	33	G
12	37	30	27	32	39	31	43	54	74	58	51	62	51	64	50	51	51	41	36	32	61	50	37	30
13	32	30	34	34	37	G	43	54	73	80	56	74	48	G	46	70	117	102	106	102	72	50	50	85
14	41	43	40	40	34	G	86	100	92	74	130	90	87	184	125	108	45	40	39	29	70	50	35	48
15	41	32	36	31	29	32	41	103	64	74	78	65	72	123	96	125	116	102	89	73	36	86	33	31
16	51	72	50	72	54	32	36	43	54	68	70	72	52	50	G	51	49	49	50	55	91	57	92	56
17	50	28	30	31	30	28	38	44	G	59	56	94	74	92	60	55	73	82	92	33	34	49	58	33
18	24	40	30	24	36	32	40	61	73	53	52	G	52	60	61	G	49	40	53	49	27	34	40	40
19	34	41	35	27	G	G	37	G	70	53	94	G	G	50	64	G	59	92	46	32	24	50	33	35
20	32	32	30	23	26	58	85	106	50	168	86	93	57	G	48	74	117	85	144	50	42	84	117	69
21	70	G	34	38	30	37	50	64	75	83	70	58	51	G	G	54	58	114	57	48	38	30	36	33
22	30	34	31	31	G	40	46	61	61	78	63	90	146	G	52	62	54	44	62	102	91	84	90	57
23	51	40	27	25	G	30	50	51	84	72	59	56	62	74	66	G	G	55	69	47	34	59	92	83
24	104	92	71	57	45	34	50	53	94	100	109	144	144	138	122	139	94	118	144	117	117	148	65	79
25	92	55	32	37	21	G	41	58	94	54	92	92	125	60	58	69	G	127	62	69	55	49	81	91
26	59	38	G	31	31	30	34	G	68	95	92	84	64	72	74	56	G	44	44	51	92	49	90	60
27	40	42	40	32	32	G	57	50	50	G	69	G	G	G	G	61	50	54	53	42	39	28	G	69
28	32	33	29	G	G	G	G	G	54	69	49	47	G	G	53	58	65	135	91	29	49	33	34	32
29	53	35	41	47	86	52	40	G	42	G	52	G	55	68	G	49	71	61	53	46	40	57	54	50
30	44	G	24	31	31	31	40	50	G	G	48	85	68	55	61	69	63	51	65	36	27	29	33	33
31	37	G	G	G	29	G	39	G	48	124	62	48	60	67	92	77	68	57	100	92	103	92	33	48
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31
MED	40	35	34	32	31	31	45	54	69	74	70	78	56	61	58	54	57	57	62	50	55	50	41	40
U Q	51	42	41	43	38	38	57	78	78	100	93	94	78	82	70	70	71	92	89	86	91	81	90	57
L Q	32	30	30	28	26	G	39	44	54	54	56	56	51	49	G	G	49	44	46	36	36	49	33	33

HOURLY VALUES OF FMIN AT AKITA

JUL. 1990

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	15	15	15	15	15	15	16	16	23	21	22	39	35	33	23	26	22	18	17	16	15	15	15	15
2	15	15	15	15	15	17	17	18	23	28	28	35	35	35		24	22	18	16	16	15	15	15	15
3	15	15	15	15	15	16	16	18	23	35	22	36	44	35	33		21	17	16	15	15	16	15	15
4	16	15	15	15	15	17	17	20	23	21	23	45	45	47		21	22	20	16	21	15	16	16	15
5	16	15	15	15	15	16	16	17	26	26	34	64	37	46			22	21	18	16	15	15	15	15
6	16	15	16	15	16	16	17	18	22	22	23	36	37	34			23	17	17	15	15	15	16	15
7	15	15	15	15	15	20	17	18	23	24		32	36	32	26	22	18	16	15	15	15	16	15	15
8	16	15	15	15	15	15	17	17	18	29	40	35	28	34	20	24	20	16	15	15	15	15	16	15
9	16	16	15	15	17	16	17	18	26	36	35	34	34	34	30	22		20	17	15	15	15	18	15
10	15	15	15	15	16	16	17	20	23	22	21	27	23	24	27	28	20	17	15	15	15	15	15	15
11	15	15	15	15	15	23	17	16	21	24	34	33	32	28	22	18	16	16	15	16	16	17	16	17
12	16	16	17	15	16	16	17	20	23	23	38	36	35	26	33	23	23	18	16	16	16	15	15	16
13	16	15	15	15	15	15	16	18	18	22	32	34	30	28	39	24	21	18	17	16	17	16	16	16
14	16	16	17	16	16	17	17	17	21	22	38	38	28	34	32	23	20	18	16	16	15	16	16	15
15	15	15	16	17	17	16	17	18	20	24	28	36	38	26	24	26	17	17	16	16	16	16	16	16
16	17	16	17	17	16	17	17	20	24	24	38	27	33	29	27	21	21	17	15	15	16	16	16	16
17	16	16	15	15	17	21	17	18	18	21	23	33	29	27	24	21	20	15	16	15	15	16	16	15
18	15	15	16	15	15	17	15	16	20	23	26	26	35	32	24	40	21	16	16	15	16	15	15	15
19	16	15	15	15	15	23	17	18	21	23	22	54	63	26	27	21	20	16	16	16	15	15	15	15
20	16	15	15	15	15	16	17	18	20	26	28	36	35	28	22	21	18	17	16	15	16	15	15	15
21	15	16	15	15	16	15	16	16	17	18	22	32	28	N	23	22	18	17	17	15	15	15	15	15
22	15	15	15	15	16	16	18	20	23	26	32	23	28	32	27	22	20	16	16	15	15	15	15	15
23	15	15	15	14	16	15	17	21	21	21	21	26	26	27	28	22	22	20	15	16	16	16	15	15
24	17	15	15	15	15	16	16	22	21	22	26	34	22	24	23	22	22	17	16	15	16	16	15	15
25	15	15	15	15	16	16	16	16	18	20	24	33	34	30	26	18	17	17	16	15	18	15	15	15
26	15	16	15	16	15	16	15	17	24	38	40	36	37	34	28	26	23	20	17	15	15	15	16	15
27	15	15	15	16	15	23	15	20	20	23	24	26	26	23	24	21	24	17	16	15	15	16	16	16
28	15	15	16	16	16	22	16	17	20	26	27	27		33	36	22	18	17	16	15	15	16	15	15
29	16	15	15	17	15	16	17	16	33	26	24	26	41	43		23	20	16	16	15	15	16	16	16
30	15	16	15	15	17	15	16	18	24	23	42	42	42	27	27	23	23	34	17	16	16	16	15	16
31	17	16	15	15	16	16	18	17	18	22	35	35	35	22	24	22	20	17	17	16	16	15	15	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	30	31	30	30	26	28	30	31	31	31	31	31	31	31
MED	15	15	15	15	15	16	17	18	21	23	28	34	35	31	26	22	20	17	16	15	15	15	15	15
U Q	16	16	15	15	16	17	17	20	23	26	35	36	37	34	28	24	22	18	17	16	16	16	16	16
L Q	15	15	15	15	15	16	16	17	20	22	23	27	28	27	24	21	20	16	16	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

JUL. 1990

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	90	90	87	76	76	84	92	98	95	87	89	92	95	96	96	91	90	91	89	A	77	86	90	91
2	90	93	87	89	86	97	93	92	97	106	100	96	92	97	97	96	96	91	90	82	85	87	89	90
3	84	84	76	86	85	85	98	96	94	A		86	91	92	97	100	98	98	94	93	A	80	91	88
4	86	86	84	85	80	82	98	96	84	77	90	98	91	90	86	85	87	83	85	84	78	75	87	84
5	88	82	86	79	70	72	93	98	91	87	86	90	88	87	81	85	88	78	77	N	80	83	88	88
6	90	90	87	84	79	83	87	91	91	84	81	81	76	78	77	A	78	79	80	77	70	84	A	80
7	76	76	84	78	74	80	98	106	108	94	A	90	106	106	102	101	98	88	91	86	76	78	76	89
8	90	87	84	80	78	84	107	98	A		95	N	97	95	91	92	86	92	94	92	77	78	76	83
9	86	81	77	81	65	68	73	74	72	60	A	A	A	73	A	74	A		A	A	A	A	85	85
10	85	86	82	79	77	79	102	103	100	91	113	96	96	100	N	111	100	95	101	85	82	74	A	A
11	82	54	73	70	65	74	88	108	84	A	A	A	93	97	106	108	103	100	93	88	88	90	89	87
12	84	85	84	78	78	87	96	97	99	93	A	90	102	110	100	106	99	96	101	106	81	81	96	104
13	111	92	89	82	78	89	98	103		76	A	70	85	88	A	90	93	90	90	77	80	85	86	73
14	84	82	80	77	76	73	84	94	95	90	90	104	114	94	88	A	84	80	84	84	76	77	76	69
15	79	84	86	61	61	68	88	88	94	90	A	A	85	88	80	84	80	84	A	84	81	A	80	85
16	81	83	88	85	70	79	88	88	88	80	80	84	80	81	81	87	86	89	92	103	81	84	90	86
17	92	94	95	88	66	70	76	90	90	72	83	A	84	94	90	88	A	A	A	A	A	90	100	90
18	85	86	86	84	68	63	84	91	90	89	100	93	90	90	94	98	102	96	95	98	100	88	88	84
19	81	80	83	88	71	72	81	72	65	70	75	79			103	97	95	92	85	88	86	89	98	87
20	87	84	85	73	62	54	A	74	78	A	68	A	A	71	82	76	72	A	84	83	79	58	62	A
21	67	A	74	73	64	54	56	A	65	A	A	A	70	77	78	85	84	84	84	A	A	73	74	73
22	52	64	68	60	58	67	80	97	84	A	78	86	102	109	105	102	88	90	85	83	A	73	A	A
23	73	68	68	70	63	68	83	90	90	74	90	89	95	95	92	92	92	90	94	89	62	66	71	72
24	A	55	67	73	68	65	C	77	91	82	82	81	84	88	92	94	94	92	81	77	69	86	87	A
25	82	80	77	70	67	68	90	103	114	93	A	90	93	105	102	91	85	89	89	85	78	81	77	72
26	75	80	77	72	72	67	81	80	89	A	82	A	90	90	100	102	98	95	85	85	83	81	81	79
27	79	81	78	72	70	71	81	81	83	77	83	86	90	87	88	A	85	85	A	88	90	87	87	55
28	86	88	86	87	81	75	78	86	75	56	56	71	80	86	84	84	78	A	87	91	90	93	84	87
29	80	75	68	55	63	59	66		A	69	A	A	A	68	71	67	66	72	71	67	68	72	67	64
30	54	77	69	59	62	63	73	84	80	83	85	93	86	76	80	78	77	86	88	91	86	80	81	80
31	80	80	77	72	63	67	88	102	81	60	75	80	84	92	86	80	80	80	85	87	87	85	86	83
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	31	31	31	31	29	29	28	24	21	22	27	30	28	28	29	27	27	26	26	29	28	27
MED	84	82	83	78	70	72	88	92	90	82	83	90	90	90	90	91	88	90	88	86	80	81	86	84
U Q	87	86	86	84	78	82	94	98	94	90	90	93	95	96	98	99	97	92	93	91	86	86	89	88
L Q	79	80	76	72	64	67	80	85	82	73	79	81	84	86	81	84	82	84	84	83	77	76	76	73

HOURLY VALUES OF FES AT KOKUBUNJI

JUL. 1990

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	60	60	49	34	65	37	59	63	63	55	59	53	69	54	58	53	57	62	72	85	59	68	93	90
2	91	61	G	G	43	G	41	60	62	61	59	55	70	58	62	G	82	54	47	37	37	57	60	57
3	64	60	48	38	30	31	46	68	72	117	114	74	85	61	G	G	55	85	42	50	77	122	72	83
4	45	48	29	46	31	40	41	G	G	45	G	G	G	G	G	G	79	44	37	31	33	G	26	38
5	33	30	33	33	G	39	38	53	48	55	61	60	G	G	G	50	57	42	34	56	32	56	34	26
6	G	G	G	G	G	G	G	54	58	G	49	50	G	G	58	79	53	50	40	64	90	73	128	83
7	71	49	55	50	27	42	45	80	78	78	114	62	55	57	59	G	G	38	40	32	49	37	58	70
8	92	34	32	47	40	G	48	90	176	179	154	96	62	G	59	62	58	74	37	40	50	58	48	46
9	40	50	43	27	32	58	G	58	56	50	48	58	111	57	108	60	90	130	114	126	126	96	48	G
10	G	24	26	30	30	32	67	72	80	141	126	96	76	G	53	G	42	41	44	45	82	68	128	132
11	91	40	38	52	59	49	34	54	48	97	116	182	90	52	77	51	51	50	44	42	35	38	28	G
12	58	59	55	44	38	31	G	68	70	90	101	61	79	78	74	65	42	55	74	73	36	81	60	34
13	G	31	G	G	36	G	49	59	150	86	92	60	77	53	175	98	126	90	58	50	32	37	31	27
14	29	38	30	G	G	G	43	85	106	102	70	122	92	125	94	136	148	40	G	25	46	32	31	60
15	33	38	26	G	G	G	G	59	53	62	118	96	88	84	91	57	56	48	78	57	58	72	68	58
16	60	54	40	38	29	57	G	40	G	60	58	56	61	65	G	51	58	58	43	31	59	92	91	57
17	50	58	58	43	42	29	G	60	58	92	93	92	73	74	64	55	137	140	150	122	133	60	33	60
18	54	43	34	28	44	33	47	62	60	61	89	68	77	61	55	52	47	63	50	36	35	34	44	34
19	34	28	23	25	G	G	G	G	43	G	G	57			G	50	55	53	48	31	44	40	58	38
20	33	47	57	53	60	42	124	84	57	115	74	56	54	52	52	G	58	128	54	123	38	30	71	72
21	58	92	50	50	36	50	59	73	80	108	85	102	G	50	58	62	76	92	110	128	96	72	58	50
22	31	24	G	G	G	30	53	60	114	100	98	78	58	G	51	60	62	57	42	82	94	92	103	91
23	76	50	32	24	G	G	G	51	86	63	82	88	72	69	60	48	60	53	44	64	49	57	44	78
24	93	58	32	26	26	G	G	41	50	54	59	57	58	57	65	122	92	74	90	114	73	126	60	92
25	49	43	43	38	28	40	G	52	83	105	173	166	G	58	67	78	71	58	61	64	108	72	69	51
26	56	55	35	G	24	G	G	44	52	103	74	106	76	69	51	G	G	61	60	59	31	72	60	50
27	59	32	32	27	38	44	48	41	G	G	47	G	53	G	G	81	61	59	128	55	51	32	25	32
28	58	72	30	33	G	28	G	G	49	48	46	82	G	64	62	59	G	62	46	36	57	38	24	G
29	39	25	43	32	23	30	39	47	70	67	53	60	55	76	G	49	52	49	36	33	46	32	92	34
30	60	53	38	48	31	G	G	61	G	61	60	58	60	G	55	58	46	47	61	38	33	25	28	24
31	30	28	25	26	40	29	50	40	48	58	52	G	G	G	54	50	52	60	62	42	64	102	71	41
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	30	30	31	31	31	31	31	31	31	31	31	31
MED	54	47	33	32	30	30	39	59	58	63	74	61	62	57	58	53	57	58	48	50	50	58	58	50
U Q	60	58	43	44	40	40	48	68	80	102	101	96	77	65	65	62	76	74	72	73	77	73	71	72
L Q	33	31	26	24	G	G	G	44	48	55	53	56	53	G	51	48	51	49	42	36	36	37	33	34

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT KOKUBUNJI

JUL. 1990

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT YAMAGAWA

JUL. 1990

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	88	91	99	88	86	83	86	90	87	84	82	88	96	98	96	89	95	90	78	80	A	78	84	85
2	86	90	90	84	86	82	80	87	97	A	88	90	94	A	102	105	102	104	89	87	84	81	86	86
3	84	79	85	78	80	76	83	90	88	A	A	A	87	94	100	102	102	104	105	103	84	79	85	86
4	85	89	86	85	86	83	87	84	83	86	97	97	94	90	88	96	95	92	89	85	75	76	84	85
5	83	88	92	84	76	75	86	90	87	82	A	87	88	91	88	86	86	90	84	85	88	78	79	88
6	85	88	90	80	73	74	78	89	84	80	75	76	82	81	82	86	88	92	84	86	77	A	84	84
7	86	82	86	79	80	81	85	107	92	70	87	90	100	102	A	103	104	102	91	88	84	78	78	80
8	83	76	86	83	79	71	80	86	87	88	92	97	101	102	101	100	102	103	108	103	84	80	83	106
9	111	108	104	80	81	80	80	77	72	71	71	73	74	75	72	81	80	85	77	81	A	68	80	87
10	94	88	83	84	79	71	73	83	83	77	86	86	A	97	91	112	104	104	88	87	81	A	83	A
11	87	86	72	73	68	68	87	102	75	85	90	98	105	112	127	122	124	120	108	103	99	88	88	82
12	85	85	96	76	82	74	85	94	95	86	79	78	102	108	A	114	113	122	126	116	97	85	84	87
13	110	90	91	75	75	81	88	A	87	86	A	87	A	98	A	105	107	104	100	87	90	87	87	86
14	84	82	79	79	80	71	69	64	83	84	81	87	95	95	97	99	119		93	90	85	80	77	86
15	78	80	85	66	60	60	82	80	85	84	A	80	84	96	A	93	100	95	90	91	88	86	84	83
16	84	89	88	82	78	75	82	85	86	80	79	78	78	88	100	108	102	104	98	100	88	90	99	105
17	110	106	112	84	73	58	69	98	84	77	72	81	89	95	97	102	104	101	111	110	88	83	87	86
18	104	125	140	88	81	86	87	94	86	88	A	92	91	96	100	96	108	110	A	108	108	106	104	87
19	85	88	93	102	86	80	67	65	71	72	75	87	101	104	98	102	102	98	99	111	104	86	86	87
20	84	87	88	65	68	48	50	A	66	67	64		A	120	A	90	80	86	94	90	79	40	63	68
21	67	72	64	45	38	43	58	71		109	55	A	A	91	89	91	A	A	A	A	79	79	77	82
22	82	83	80	66	66	56	75	86	75	A	A	A	102	113	118	113	109	102	88	80	71	A	80	A
23	78	78	83	81	77	64	67	82	77	67	76	82	88	97	A	106	104	105	110	100	46	65	80	81
24	78	74	82	82	77	62	58	75	76	75	78	74	78	88	100	107	103	A	86	82	69	65	76	A
25	84	85	82	66	58	58	66	85	A	86		A	95	102	100	104	102	103	103	87	83	82	A	83
26	80	84	84	75	65	78	75	88	87	91	72	80	87	94	106	111	106	103	104	100	87	86	79	87
27	82	78	76	76	66	70	77	78	77	73	85	86	95	94	97	95	A	A	103	103	92	90	84	86
28	83	85	77	84	84	80	87	106	84	72	A	86	91	100	110	100	90	72	104	111	89	84	86	82
29	77	67	68	65	78	62	64	61	A	56	A	A	73	74	67	A	70	75	76	65	64	63	A	A
30	A	72	67	A	50	57	57	77	80	77	88	87	86	89	85	87	A	95	102	110	102	87	88	98
31	101	87	90	87	76	67	80	95	71	77	77	80	87	96	96	86	86	92	94				86	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	31	31	30	31	31	31	29	28	28	22	25	27	30	25	30	28	27	29	29	28	27	29	26
MED	84	85	86	80	77	71	80	86	84	80	79	86	91	96	97	101	102	102	94	90	84	81	84	86
U Q	87	89	91	84	81	80	85	92	87	86	87	89	96	102	100	106	105	104	104	103	89	86	86	87
L Q	82	79	80	75	68	62	67	77	76	72	75	80	86	91	88	91	92	92	88	85	79	78	79	83

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

JUL. 1990

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	25	G	G	G	G	25	33	44	48	66	50	G	G	G	G	G	74	82	56	41	73	41	48	59
2	92	44	44	91	58	45	58	44	84	107	G	79	63	124	G	59	63	84	40	39	57	45	39	69
3	59	65	54	47	38	28	33	42	60	101	160	126	51	G	G	G	68	71	58	43	60	46	30	89
4	92	58	79	38	80	44	54	78	61	49	46	47	G	G	G	G	G	48	38	36	G	37	49	36
5	32	40	40	29	30	G	31	G	54	44	149	72	86	G	G	48	67	77	75	65	58	38	32	58
6	36	31	30	G	G	G	32	40	G	50	61	62	G	G	61	G	67	85	94	72	90	58	79	48
7	160	82	69	40	44	30	45	82	74	91	78	94	86	90	96	56	50	71	39	34	29	32	29	28
8	77	70	49	40	26	G	G	G	G	G	G	G	G	G	G	52	58	92	94	49	38	G	29	48
9	27	28	48	37	26	G	G	G	G	G	G	G	G	G	59	54	76	48	46	62	108	58	56	84
10	71	54	72	56	38	G	33	90	109	104	80	61	130	49	96	84	46	41	40	50	123	147	81	125
11	136	81	59	40	26	32	58	58	86	45	46	54	86	122	122	61	G	G	G	31	32	34	25	24
12	G	G	G	G	G	25	31	44	76	73	50	61	69	72	126	81	64	78	78	66	41	39	40	59
13	71	59	38	33	G	G	44	116	80	68	148	97	134	73	139	65	91	73	110	92	59	28	38	30
14	26	G	36	32	G	G	34	41	53	81	75	111	79	114	62	77	84	135	92	83	45	26	G	30
15	24	29	G	G	G	G	G	43	67	69	108	91	97	72	153	62	49	47	56	45	37	53	46	38
16	57	72	38	32	32	G	G	G	G	53	G	G	G	G	G	G	51	47	72	73	92	57	34	92
17	85	70	49	46	57	29	30	40	59	112	150	126	73	84	G	G	53	101	57	59	25	25	23	24
18	62	45	G	25	28	28	59	69	163	91	168	98	G	62	73	83	53	70	103	78	54	27	G	G
19	G	G	G	G	G	G	G	G	43	52	G	52	56	53	54	53	54	44	G	G	G	G	24	24
20	G	G	G	39	25	33	113	147	136	67	52	G	100	125	70	G	74	84	70	89	28	34	83	72
21	53	40	39	30	30	28	43	55	145	134	72	112	97	100	104	107	154	112	153	150	109	72	49	71
22	56	45	29	28	24	G	G	44	48	70	92	90	78	63	78	112	71	73	56	72	67	92	90	86
23	59	44	37	25	26	G	43	44	56	79	79	86	73	95	110	50	63	58	54	42	33	30	33	40
24	28	26	30	25	G	G	G	G	49	45	G	56	56	67	81	76	50	129	83	34	40	57	68	69
25	40	38	40	31	39	38	31	55	114	82	112	124	70	68	G	G	84	60	56	32	36	93	108	69
26	43	45	34	30	26	G	G	40	56	62	49	62	G	62	G	47	G	G	57	50	25	25	G	91
27	38	72	43	29	24	G	41	43	56	48	G	G	57	66	69	64	114	125	92	54	60	24	G	26
28	26	G	G	G	29	G	36	63	60	81	87	80	G	53	54	80	G	47	40	40	32	G	29	G
29	24	26	29	G	28	43	G	40	101	53	54	52	G	60	68	85	78	49	G	32	60	50	127	108
30	91	92	60	69	43	39	32	84	G	47	66	53	58	75	80	54	96	161	58	G	30	31	31	32
31	G	G	34	46	54	54	G	44	46	49	53	48	G	G	G	G	G	48	46				46	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	30	30	31	30
MED	43	44	38	31	26	G	32	44	59	67	61	62	58	63	62	54	63	71	57	50	43	38	38	53
U Q	71	65	49	40	38	32	43	63	84	82	92	94	86	84	96	77	76	85	83	72	60	57	56	72
L Q	26	26	29	25	G	G	G	40	48	49	46	48	G	G	G	G	50	48	40	36	32	27	29	30

HOURLY VALUES OF FMIN AT YAMAGAWA

JUL. 1990

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	15	15	15	15	15	15	16	20	23	33	56	64	56	62	43	27	18	15	15	15	15	15	15
2	15	15	15	15	15	15	15	16	24	30	42	39	40	45	66	44	39	21	16	15	15	15	15	15
3	15	15	15	15	15	15	17	20	23	26	34	40	54		34	38	29	22	16	15	15	15	15	15
4	15	15	15	15	15	15	15	16	21	27	30	33	48		62	42	38	18	17	16	15	15	15	15
5	15	15	15	15	15	15	15	16	18	23	30	38	36		44	42	30	21	16	15	15	15	15	15
6	15	15	15	15	15	15	15	17	17	35	35	36			43		39	22	15	15	15	15	15	15
7	15	15	15	15	15	15	16	16	21	24	34	34	35	35	34	34	29	17	15	15	15	15	15	15
8	15	15	15	15	15	15	16	17	21	24	52	38	56	46	57	33	23	17	15	15	15	15	15	15
9	15	15	15	15	15	15	16	16	36	32	35		48		36	39	26	22	18	15	15	15	15	16
10	16	16	15	15	15	15	16	17	24	30	35	39	36	34	39	30	27	20	16	16	15	15	15	15
11	15	15	15	15	15	15	15	15	18	21	32	46	40	52	30	22	22	18	15	16	15	15	15	15
12	16	15	15	15	15	15	15	18	18	27	34	36	35	36	35	34	33	17	15	15	15	15	15	15
13	15	15	16	15	15	15	16	16	32	27	35	38	39	45	40	35	29	21	16	15	15	15	16	15
14	16	16	16	16	15	15	15	16	23	30	36	38	35	38	38	29	20	17	15	15	15	16	17	16
15	15	15	15	15	16	16	15	17	18	26	28	36	35	36	33	29	24	16	15	15	15	15	15	16
16	16	15	15	15	15	15	18	16	21	23	34	52	43	66	33	52	23	17	15	15	15	15	15	15
17	15	15	17	15	15	16	15	16	17	22	29	42	40	40	44	39	23	18	16	15	15	17	15	15
18	15	15	15	15	15	15	15	15	17	26	35	39	36	40	37	32	24	17	15	15	15	15	15	15
19	15	16	15	15	15	15	20	15	17	29	27	40	34	35	29	23	23	16	15	15	15	16	15	15
20	15	16	16	15	15	15	15	16	21	26	33	36	36	35	34	32	22	17	16	15	15	15	15	15
21	15	15	15	15	15	15	15	16	21	26	34	33	33	35	33	24	24	20	16	15	15	15	15	15
22	15	15	15	16	16	16	17	17	20	23	32	35	35	35	34	32	24	18	15	15	15	15	15	15
23	16	15	15	15	16	15	15	17	18	22	32	35	37	35	34	33	24	18	16	15	15	15	15	15
24	15	15	15	16	15	15	21	16	16	26	43	41	32	41	33	30	24	17	15	15	15	15	15	15
25	15	15	16	16	16	15	16	16	17	21	32	34	35	33	53	58	28	20	16	15	15	15	15	15
26	15	15	15	15	15	15	15	17	24	42	39	42		43	43	45	40	16	16	15	15	15	15	15
27	15	15	15	15	15	15	15	15	17	22	32	50	42	35	35	33	23	18	16	15	15	15	16	15
28	16	15	15	15	15	15	15	15	18	22	28	30	53	34	30	23	21	21	16	15	15	15	15	15
29	15	16	15	15	16	15	16	16	20	26	32	30	34	42	33	28	24	16	17	15	15	15	15	15
30	15	15	15	15	15	15	17	15	18	22	34	42	44	43	42	26	36	38	17	22	15	15	15	15
31	15	15	15	15	15	16	16	16	21	29	33	34	38	58	48	42	23	20	16				15	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	30	29	26	31	30	31	31	31	30	30	30	31	30
MED	15	15	15	15	15	15	15	16	20	26	34	38	37	39	36	33	24	18	16	15	15	15	15	15
U Q	15	15	15	15	15	15	16	17	21	29	35	41	43	45	44	42	29	21	16	15	15	15	15	15
L Q	15	15	15	15	15	15	15	16	18	23	32	35	35	35	33	29	23	17	15	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT OKINAWA

JUL. 1990

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	N	141	130	103	88	88	86	82	78	88	87	89	100	104	102	104	96	85	90	86	78	67	67	62
2	77	79	80	72	66	62	70	84	94	95	82	A	A	102	116	120	118	106	92	87	85	76	B	72
3	74	80	71	74	76	73	75	92	88	88	77	75	96	93	105	106	111	118	133	105	84	76	81	84
4	82	86	85	86	85	78	A	77	80	86	91	97	97	102	102	102	105	106	100	84	77	76	80	85
5	86	84	87	77	A	63	83	86	81	81	87	92	88	98	102	96	92	96	96	93	85	65	71	84
6	87	86	86	86	79	73	78	88	82	78	78	74	90	93	93	101	103	96	97	86	81	66	76	79
7	88	97	97	84	70	71	84	90	78	77	85	91	N	105	115	111	118	115	105	90	85	75	84	78
8	80	85	90	84	78	66	62	77	80	76	110	95	107	107	112	122	119	133	140	108	110	127	140	164
9	146	165	159	86	85	88	90	80	80	85	76	80	93	A	88	96	104	94	92	84	78	75	65	62
10	72	67	78	78	72	53	63	77	81	72		A	92	A	A	112	108	105	107	87	78	66	66	80
11	77	83	68	66	60	66	85	81	72	72	80	92	107	118	127	141	143	142	137	111	A	90	110	84
12	85	85	88	76	71	64	80	87	86	76	89	87	104	102	105	112	131			110	110	90	85	79
13	81	86	82	65	66	67	82	80	85	A	A	A			96	108	A	A	105	A	88	84	87	85
14	102	104	108	104	90	72	69	76	81	85	76	85	95	107	105	106	107	109	120	108	82	85	82	85
15	76	77	85	59	51	51	61	71		75	A	A	110	114	104	107	107	106	107	107	104	103	86	88
16	72	86	103	88	74	67	75	82	85	86	78	83	85	97	112	120	121	122	106	110	108	A	134	130
17	124	141	131	86	80	73	86	96	74	74	74	79	97	95	111	126	124	128	131	110	108	124	140	144
18	146	147	132	130	126	86	87	90	87	98	89	92	91	93	100	107	111	A	A	A	A	107	108	86
19	86	109	136	142	85	80	63	66	75	75	74	88	105	60	105	108	101	106	125	130	87	79	85	85
20	88	85	79	67	33	54	51	72	78	68	A	68	76	86	97	102	107	106	122	102	85	80	66	63
21	74	72	66	52	44	A	47	83	84	66	68	A	85	97	97	101	106	105	103	97	88	90	84	83
22	84	83	76	76	73	67	81	81	71	64	64	86	108	122	132	141	134	128	104	98	86	85	85	A
23	76	76	82	85	85	64	60	72	72	74	72	A	94	105	111	118	117	124	127	88	76	90	88	64
24	108	69	72	79	79	66	71	84	77	76	78	71	88	94	111	111	106	97	104	97	77	52	63	43
25	80	82	85	80	66	61	62	84	92	98	72	81	98	100	102	111	123	118	108	101	88	80	80	82
26	81	85	89	62	68	66	75	81	88	74	80	79	92	102	112	118	121	118	122	111	97	86	88	85
27	87	84	85	91	82	81	80	80	76	77	80	91	97	A	A	105	102	107	108	107	88	86	85	87
28	88	86	84	78	84	75	84	96	77	74	82	86	102	110	109	A	105	94	103	123	88	80	84	82
29	104	68	66	58	71	66	58	54	44	A	A	A	75	90	77	80	82	84	92	82	75	63	49	53
30	A	A	A	A	A	31	54	81	75	85	87	88	94	103	91	100	110	113	126	122	120	108	146	159
31	142	170	169	164	128	83	86	83	82	88	81	87	88	107	116	103	106	108	105	104	97	90	86	89
	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	30	30	30	29	30	30	31	30	29	26	24	28	27	29	30	30	28	29	29	29	30	30	30
MED	85	85	85	80	76	67	75	81	80	77	80	86	94	102	105	108	108	106	106	102	86	82	84	84
U Q	95	97	103	86	85	75	84	86	85	86	87	91	101	107	112	118	119	118	123	110	97	90	88	86
L Q	77	80	79	72	67	64	62	77	76	74	76	79	89	94	98	102	105	101	101	87	79	75	76	78

HOURLY VALUES OF FES AT OKINAWA

JUL. 1990

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	24	G	G	G	G	G	28	41	G	46	50	G	G	G	G	G	G	G	G	32	34	28	25	69
2	40	58	90	31	G	36	68	58	61	68	70	169	151	67	58	54	58	69	88	65	57	65	B	40
3	43	58	36	32	31	30	33	68	82	57	88	63	63	55	G	G	G	46	36	41	40	G	24	G
4	G	67	30	92	66	36	86	94	G	66	78	70	58	G	50	56	57	G	40	36	40	37	40	32
5	45	33	32	49	46	66	30	44	56	86	G	51	G	G	59	56	65	64	69	82	48	44	37	57
6	38	26	28	G	G	G	G	G	G	G	G	N	G	G	50	G	50	41	44	32	23	G	38	58
7	G	G	G	23	G	G	34	46	72	48	74	57	84	103	88	62	G	74	69	60	33	40	33	G
8	G	33	33	91	49	49	29	36	G	44	G	G	G	62	61	59	54	73	62	45	81	59	65	40
9	34	42	45	32	G	G	34	38	42	72	G	G	G	85	G	G	G	41	36	30	38	30	24	39
10	58	25	39	31	G	37	30	52	66	80	144	170	87	148	182	83	71	G	41	32	81	G	41	39
11	32	G	G	G	G	G	G	39	48	62	63	72	64	79	56	G	116	69	44	58	109	82	34	30
12	31	81	G	G	G	G	38	48	44	59	103	121	56	92	58	78	77	149	163	90	82	44	28	G
13	G	57	31	34	G	G	28	43	72	148	179	126	170	134	96	72	160	150	96	125	82	60	59	38
14	30	30	G	G	G	G	G	G	44	47	61	75	60	80	70	95	77	G	40	32	33	29	G	G
15	G	G	G	G	G	G	28	40	168	77	84	110	144	63	72	79	G	G	40	36	32	33	24	G
16	68	28	58	30	39	38	28	42	49	85	54	G	G	G	58	58	51	45	42	32	G	128	146	24
17	32	G	32	G	G	G	32	39	90	88	68	151	80	G	49	G	G	48	72	39	57	33	26	25
18	G	24	32	G	26	33	49	90	91	108	136	G	63	143	70	60	98	134	179	170	177	37	34	28
19	27	G	G	G	G	G	G	39	40	56	55	51	60	50	90	48	53	58	54	36	34	24	32	31
20	G	25	34	30	35	32	32	38	126	95	94	49	G	57	50	116	84	62	50	50	40	29	80	69
21	72	90	44	38	33	38	30	40	134	88	146	95	55	53	G	52	83	84	58	45	38	G	32	33
22	G	33	32	33	24	G	29	36	48	44	106	65	94	G	68	90	61	70	G	G	29	23	45	68
23	66	54	33	27	G	G	32	68	61	61	67	112	80	144	81	84	62	48	44	57	59	41	30	28
24	33	31	45	58	58	58	45	41	44	G	46	G	G	61	69	64	68	51	50	38	42	40	33	33
25	32	33	32	28	24	25	G	49	48	114	100	144	90	78	85	G	57	76	96	176	83	38	G	58
26	48	34	31	G	24	G	G	38	45	62	63	64	G	G	G	G	G	41	46	40	32	31	29	24
27	85	G	G	38	G	G	G	49	79	53	49	61	61	152	113	66	54	51	95	50	93	56	G	G
28	G	G	G	G	G	G	32	42	48	56	100	124	48	66	74	111	44	45	38	28	33	G	G	G
29	G	G	G	G	37	32	29	34	46	58	55	48	66	63	G	46	G	42	G	G	44	48	39	84
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	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	30	31
MED	32	31	32	30	G	G	30	41	48	62	68	64	60	63	59	58	57	48	44	39	40	37	32	32
U Q	45	54	39	34	37	37	34	49	72	85	100	112	80	85	74	79	71	70	69	58	81	48	39	57
L Q	G	G	G	G	G	G	G	38	44	53	54	49	G	G	49	G	G	41	40	32	33	24	24	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT OKINAWA

JUL. 1990

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	15	15	15	14	15	14	15	22	29	29	36	36	44	27	29	23	23	14	14	15	14	15	15
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3	14	14	14	14	15	15	16	16	24	29	28	33	36	36	34	46	27	22	15	14	15	15	15	15
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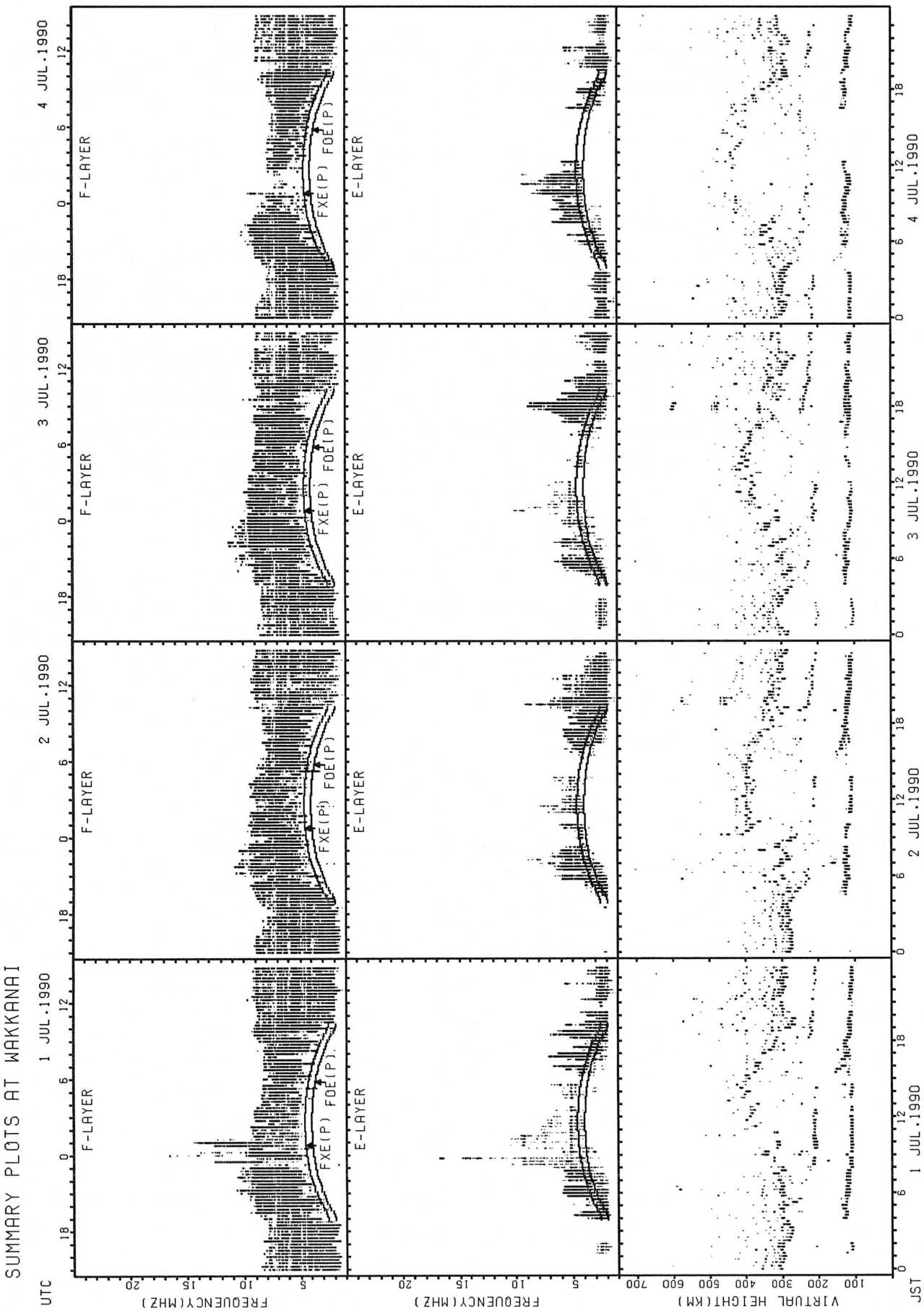
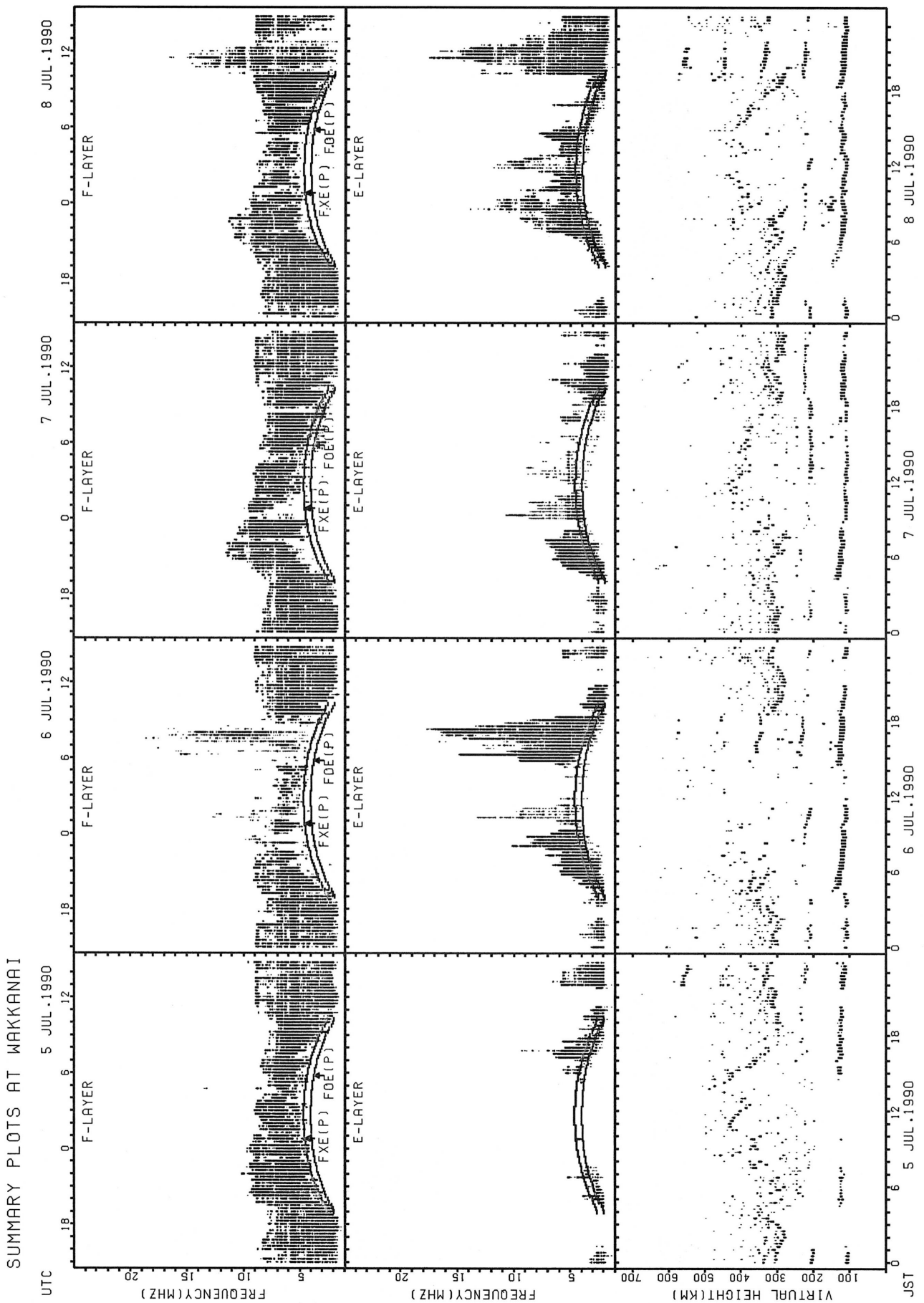
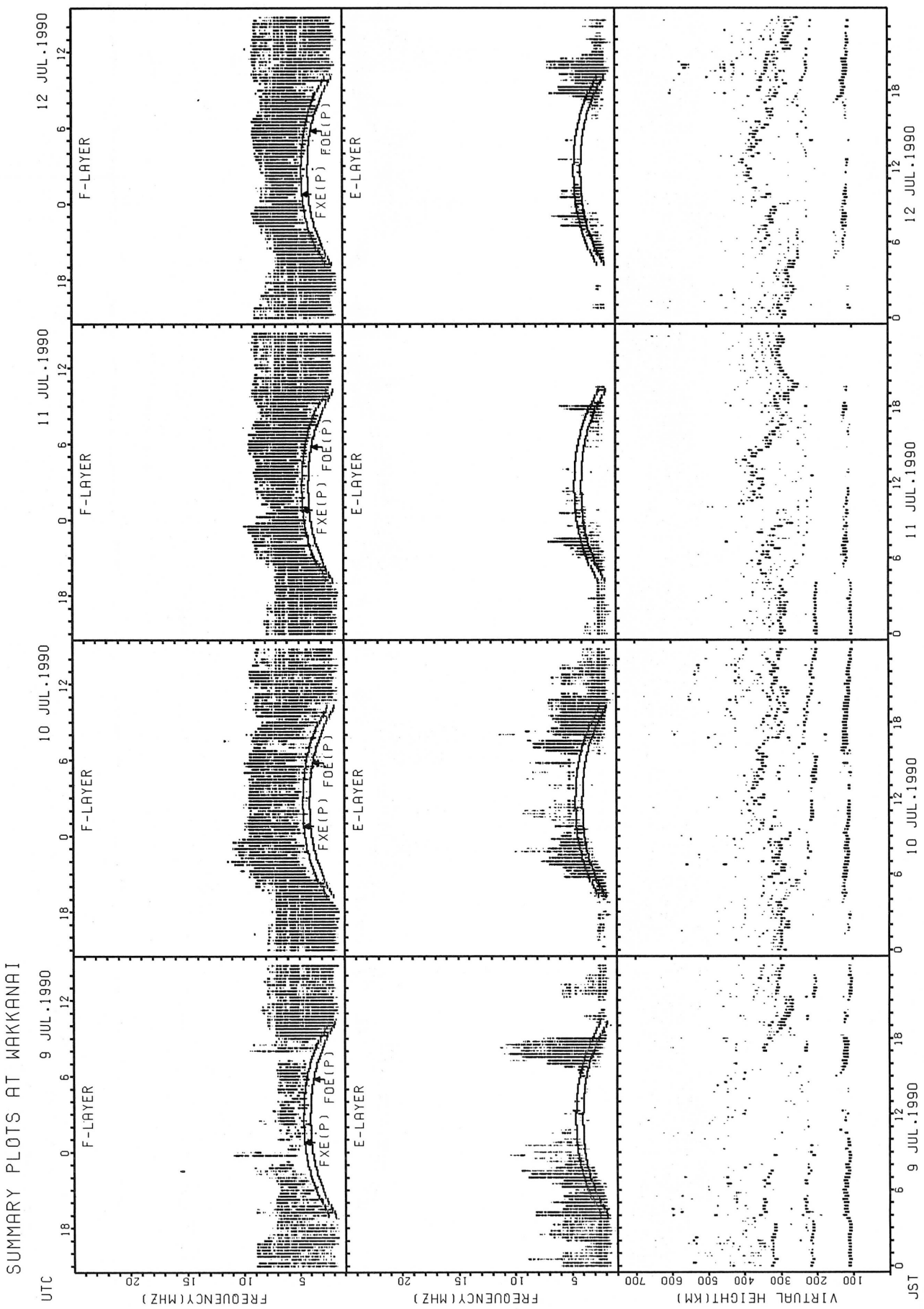
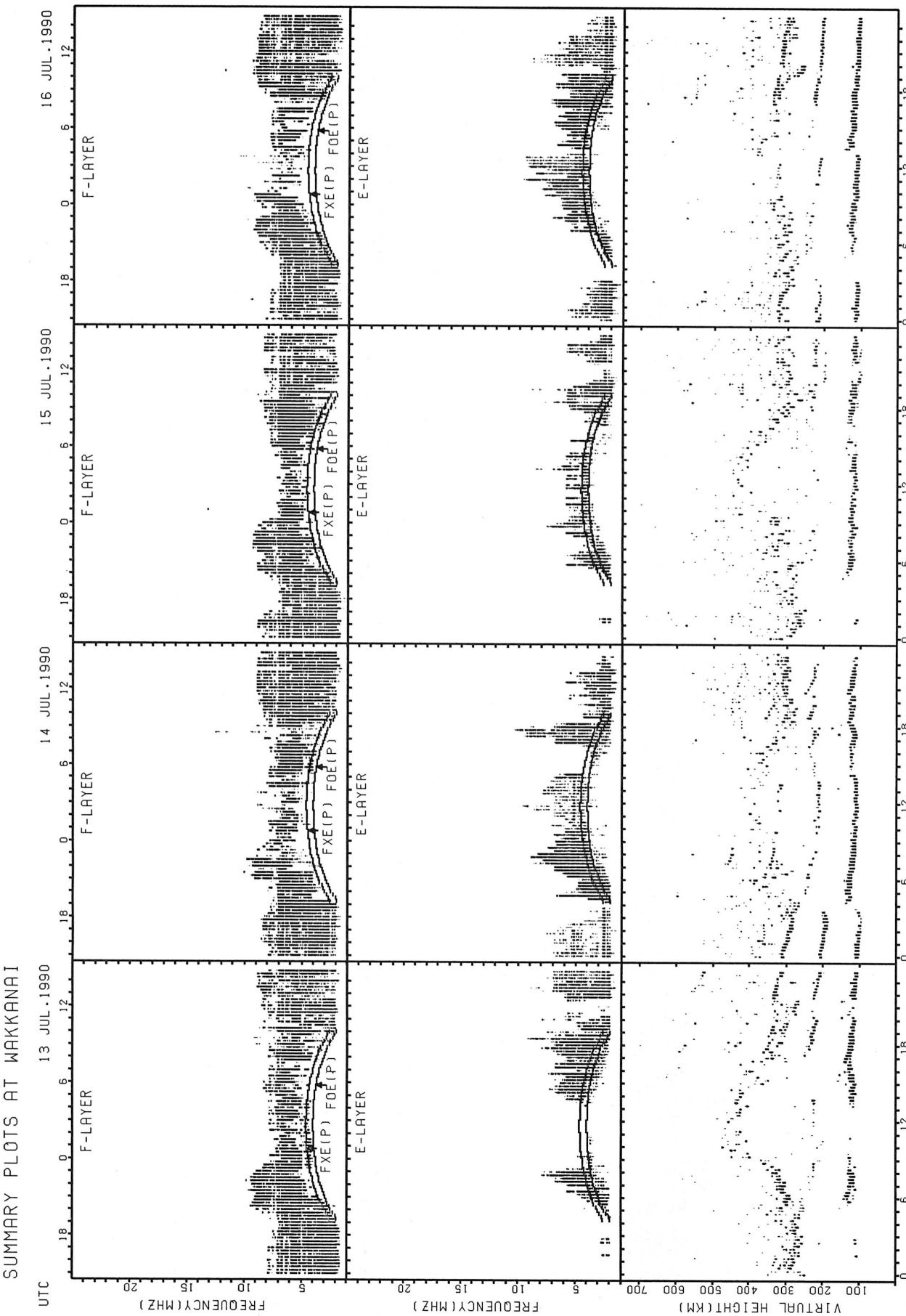
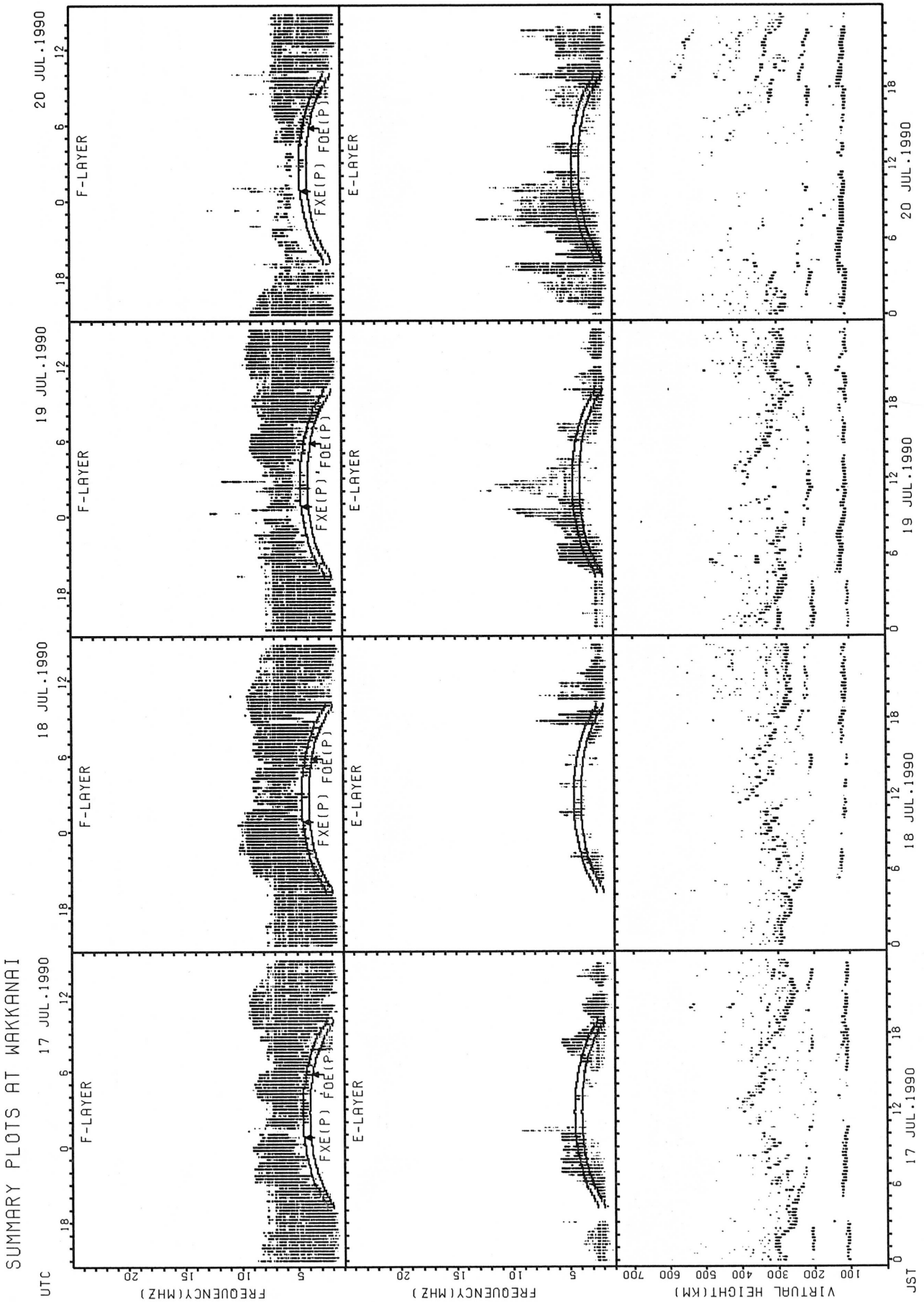
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	28	30	31	30	31	31	31	31	31	31	30	31
MED	15	15	15	15	15	15	15	15	20	24	27	29	30	31	29	28	26	22	15	15	15	15	15	15
U Q	15	15	15	15	15	15	18	16	22	27	29	32	33	34	32	29	26	23	16	15	15	15	15	15
L Q	15	14	15	14	15	14	15	15	16	23	26	28	28	29	28	26	23	18	15	14	14	15	15	15

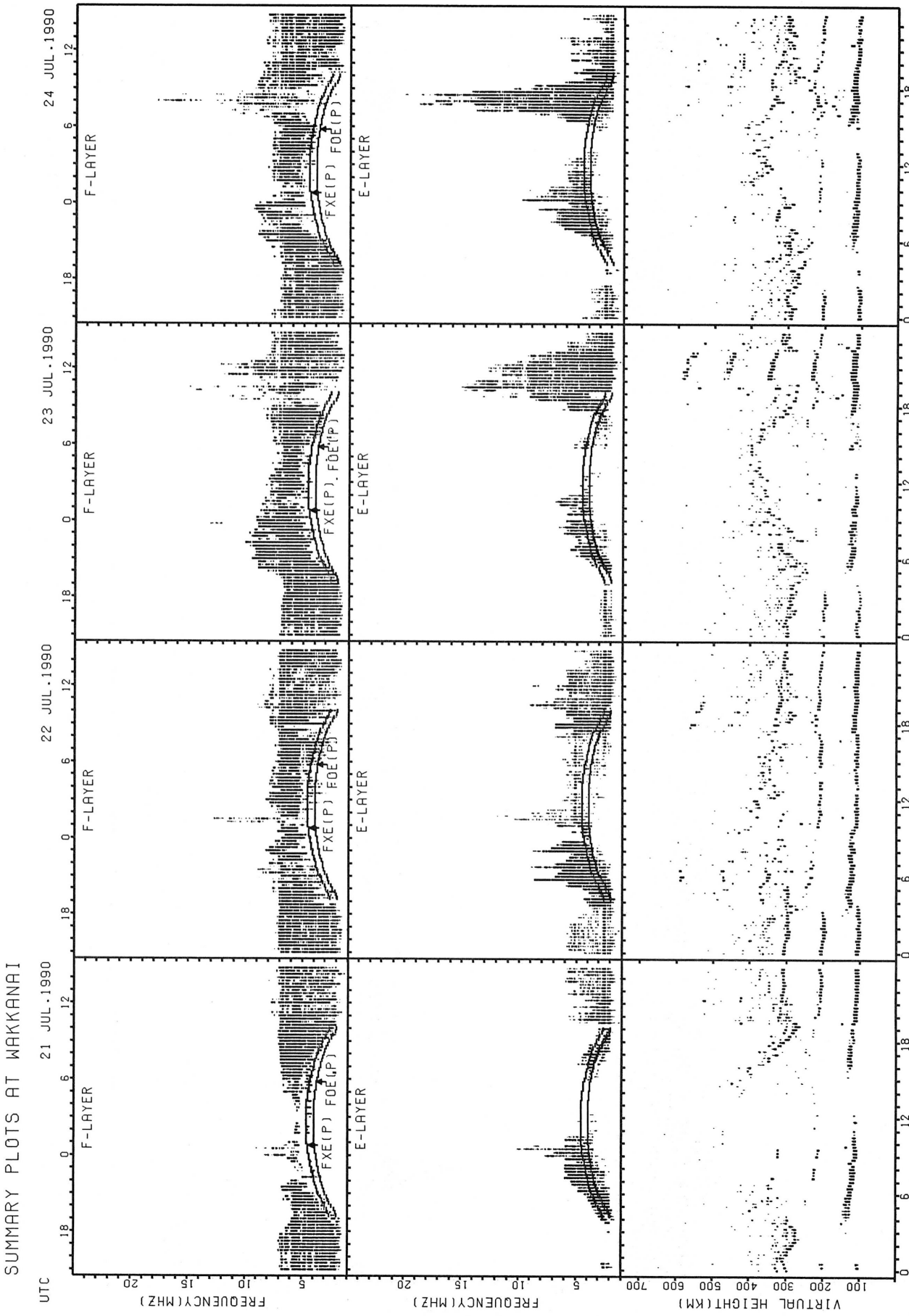

SUMMARY PLOTS AT WAKKANAI
UTC
JST
1 JUL.1990
2 JUL.1990
3 JUL.1990
4 JUL.1990
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

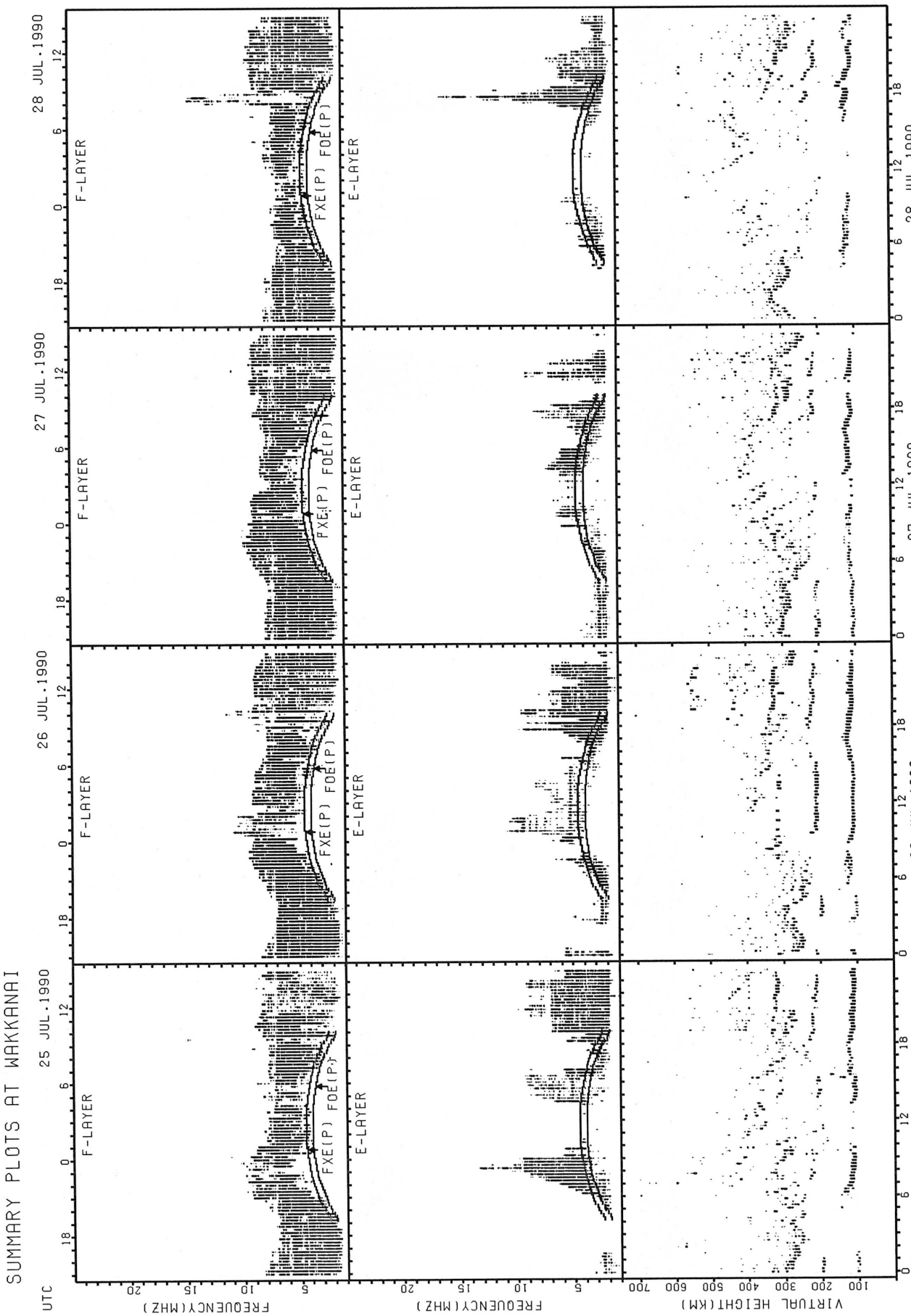

SUMMARY PLOTS AT WAKKANAI
UTC
JST
5 JUL.1990
6 JUL.1990
7 JUL.1990
8 JUL.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
JST
9 JUL.1990
10 JUL.1990
11 JUL.1990
12 JUL.1990
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

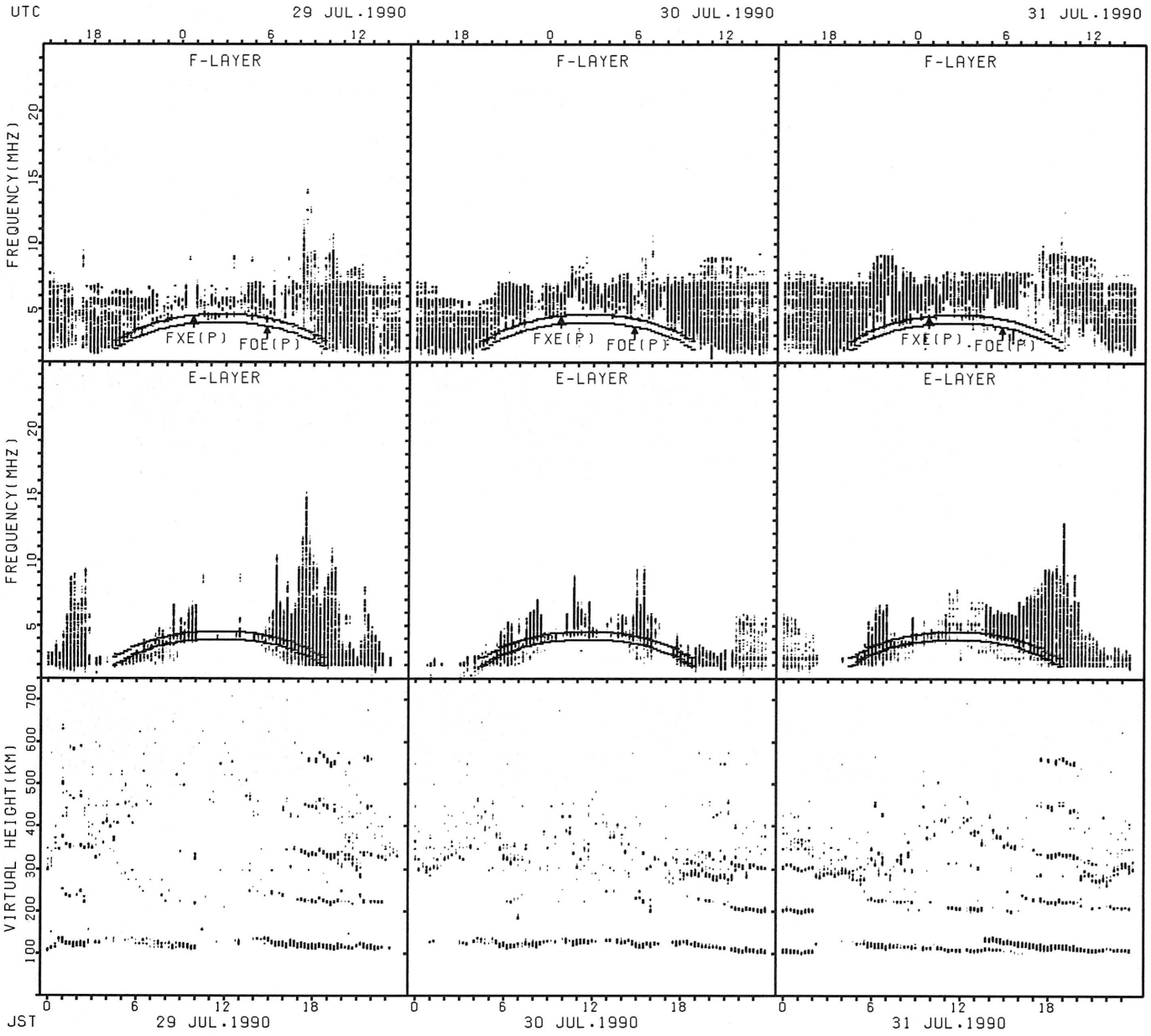

SUMMARY PLOTS AT WAKKANAI
UTC
JST
13 JUL.1990
14 JUL.1990
15 JUL.1990
16 JUL.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
JST
17 JUL.1990
18 JUL.1990
19 JUL.1990
20 JUL.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
21 JUL.1990
22 JUL.1990
23 JUL.1990
24 JUL.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
JST
25 JUL.1990
26 JUL.1990
27 JUL.1990
28 JUL.1990
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI



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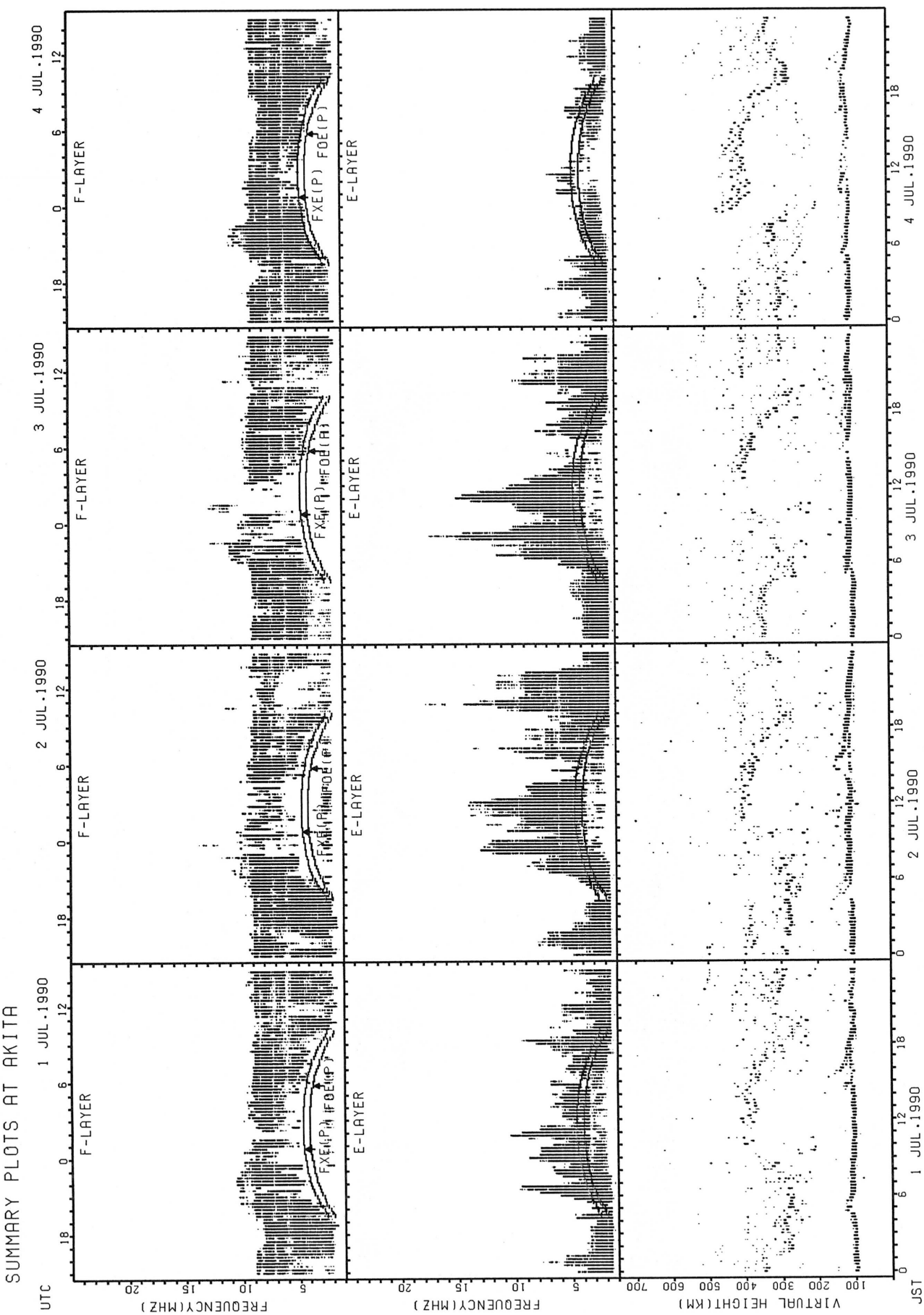
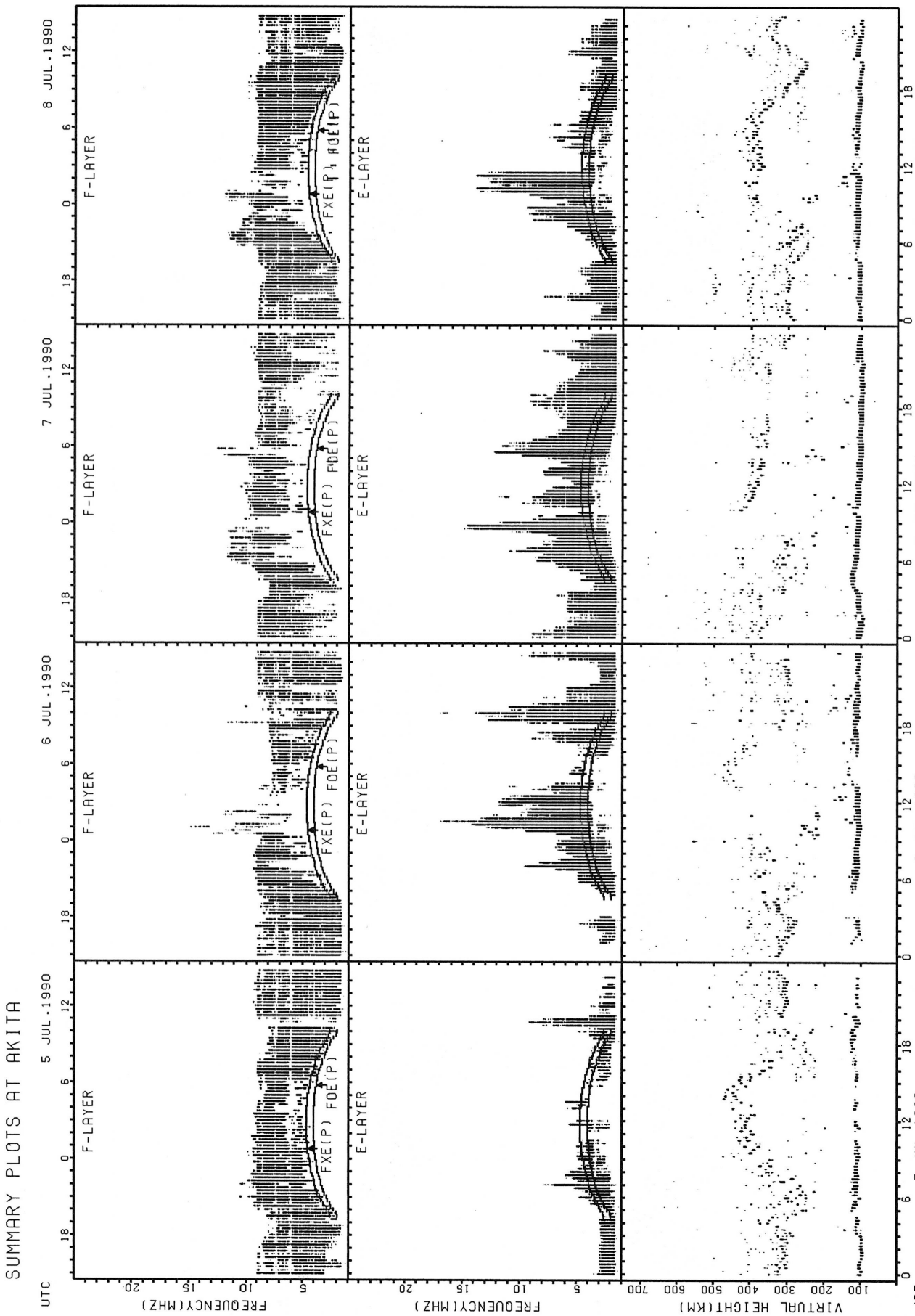
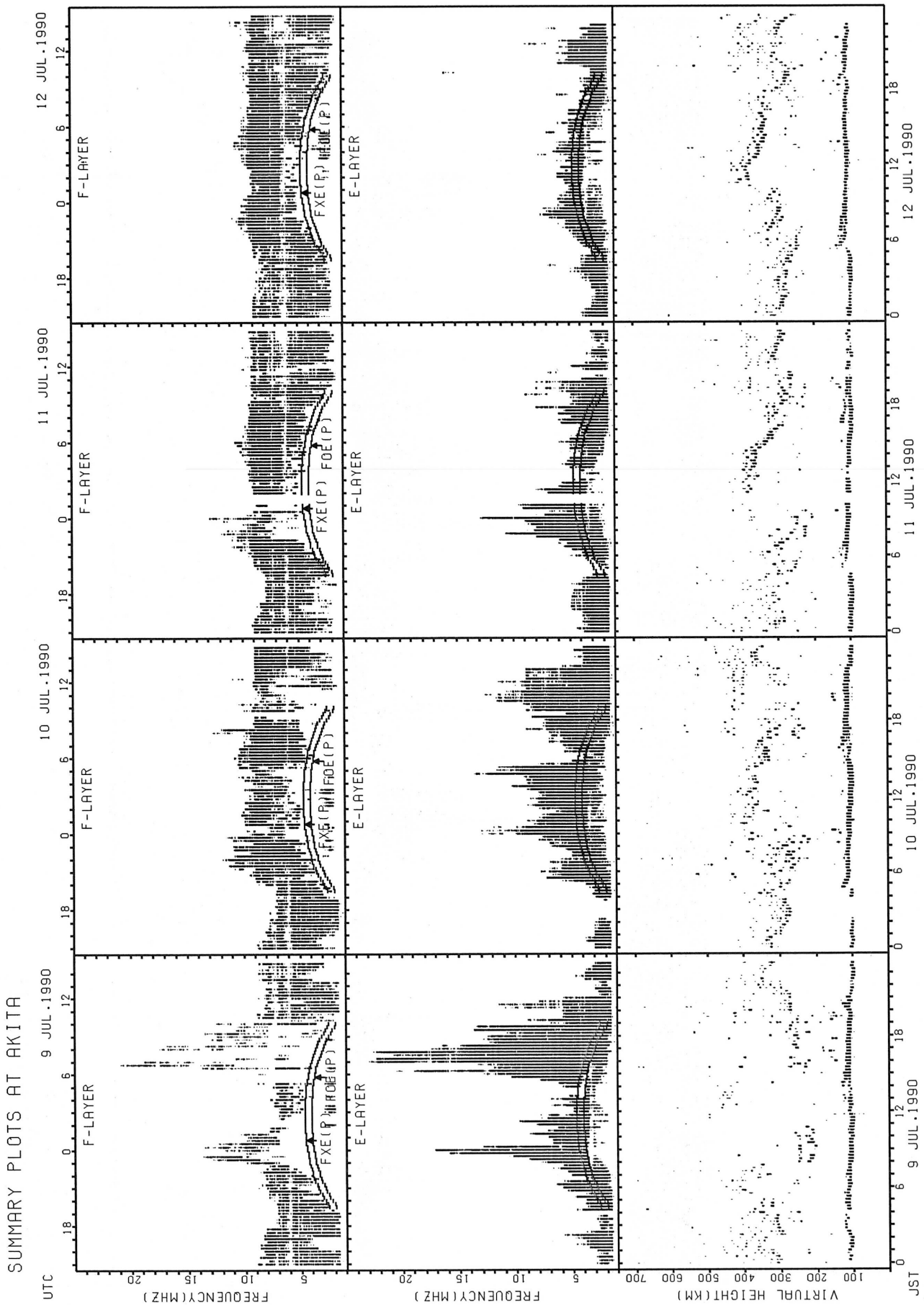
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
1 JUL.1990
2 JUL.1990
3 JUL.1990
4 JUL.1990
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 AKITA
UTC
JST
5 JUL.1990
6 JUL.1990
7 JUL.1990
8 JUL.1990
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
9 JUL.1990
10 JUL.1990
11 JUL.1990
12 JUL.1990
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
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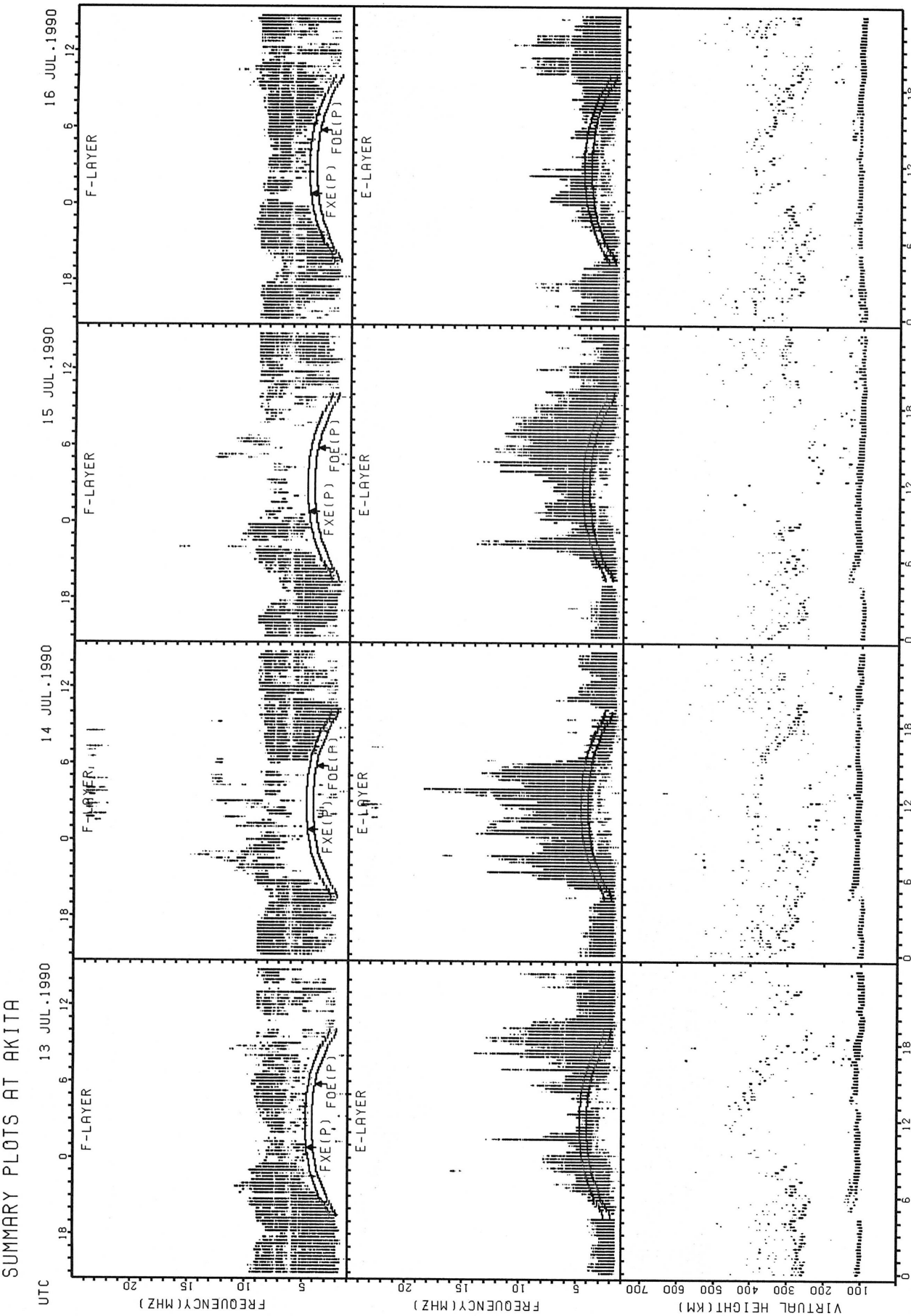
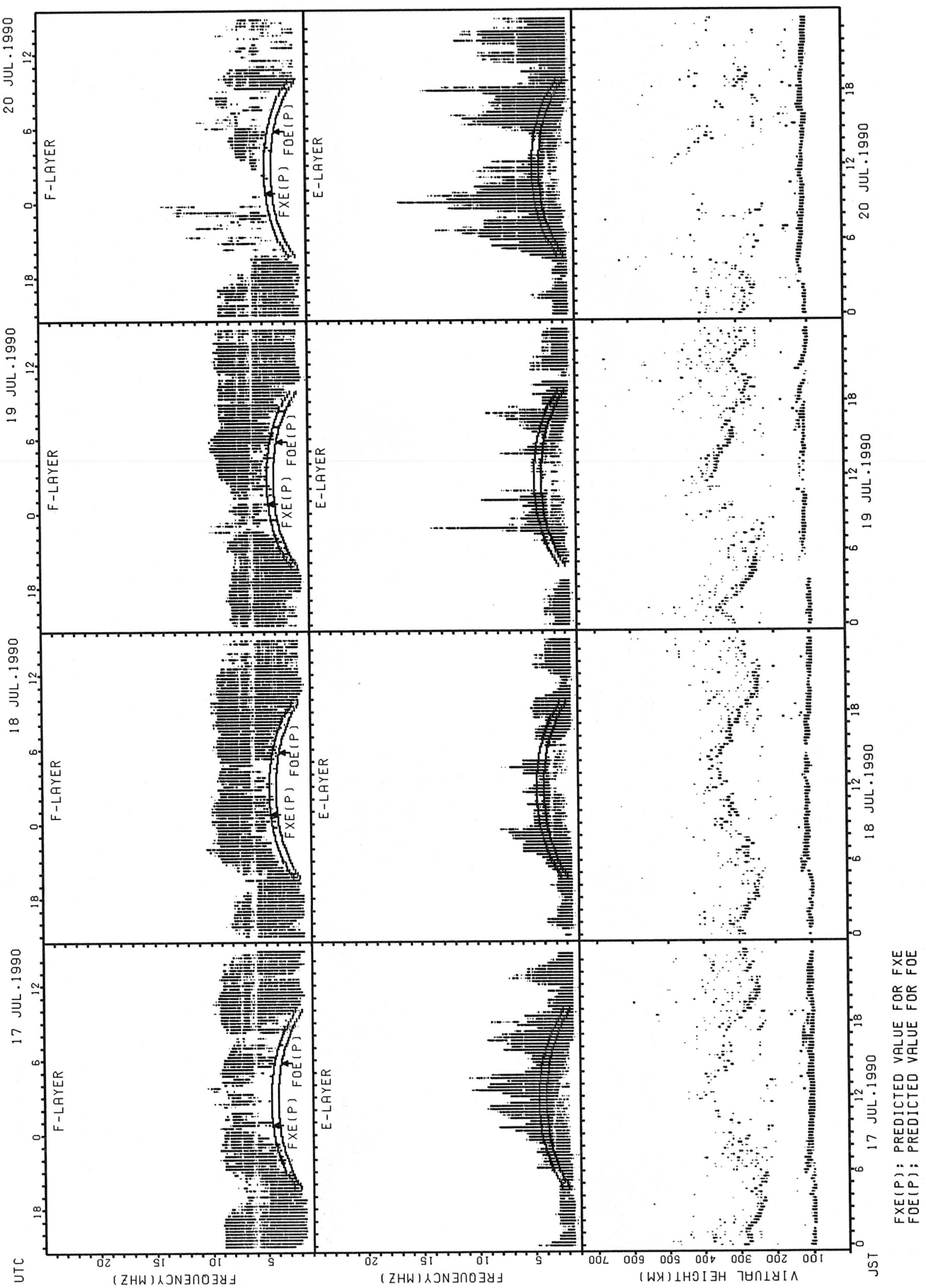

SUMMARY PLOTS AT AKITA
UTC
13 JUL.1990
14 JUL.1990
15 JUL.1990
16 JUL.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
17 JUL.1990
18 JUL.1990
19 JUL.1990
20 JUL.1990
F-LAYER
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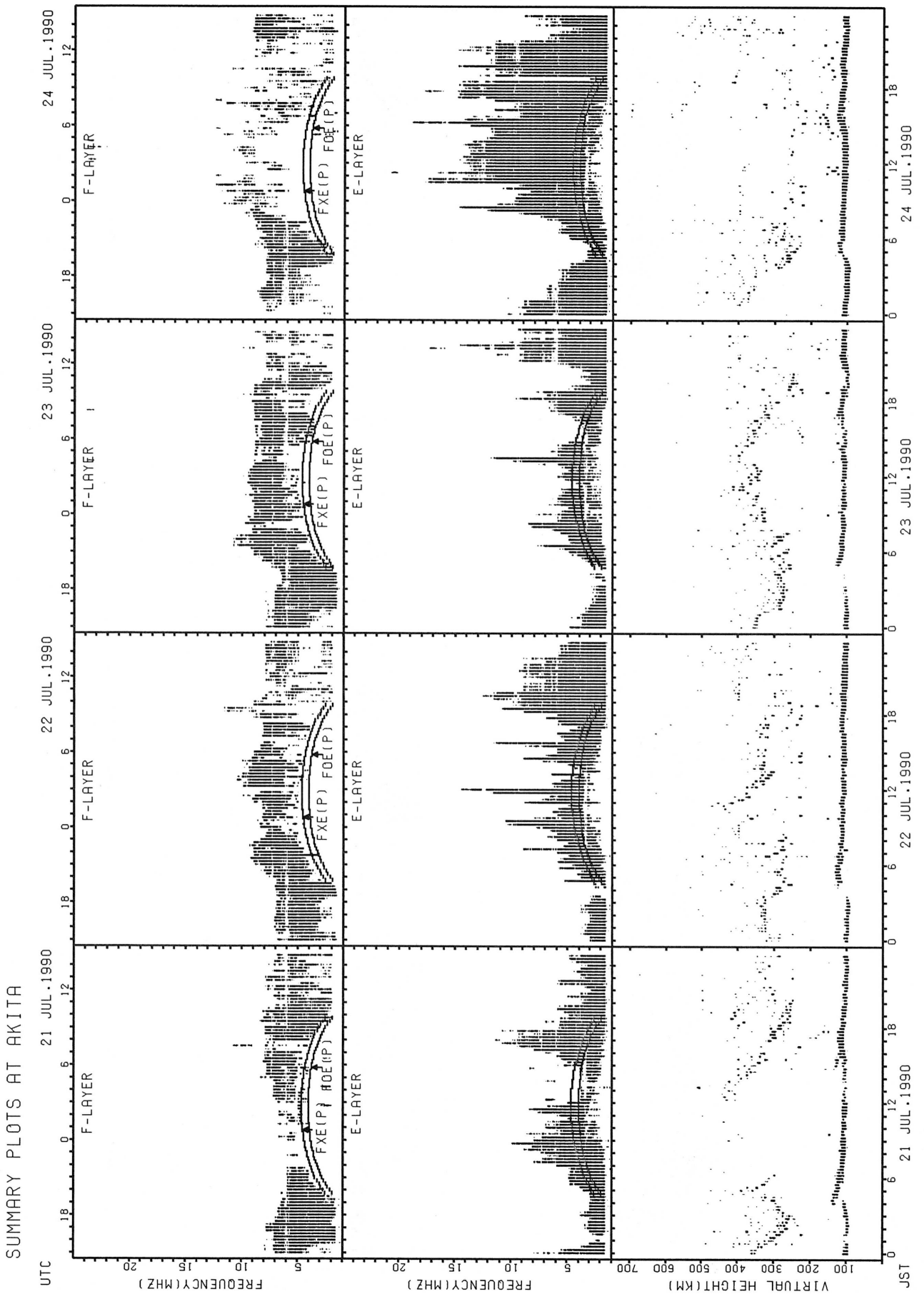
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
JST
21 JUL.1990
22 JUL.1990
23 JUL.1990
24 JUL.1990
F-LAYER
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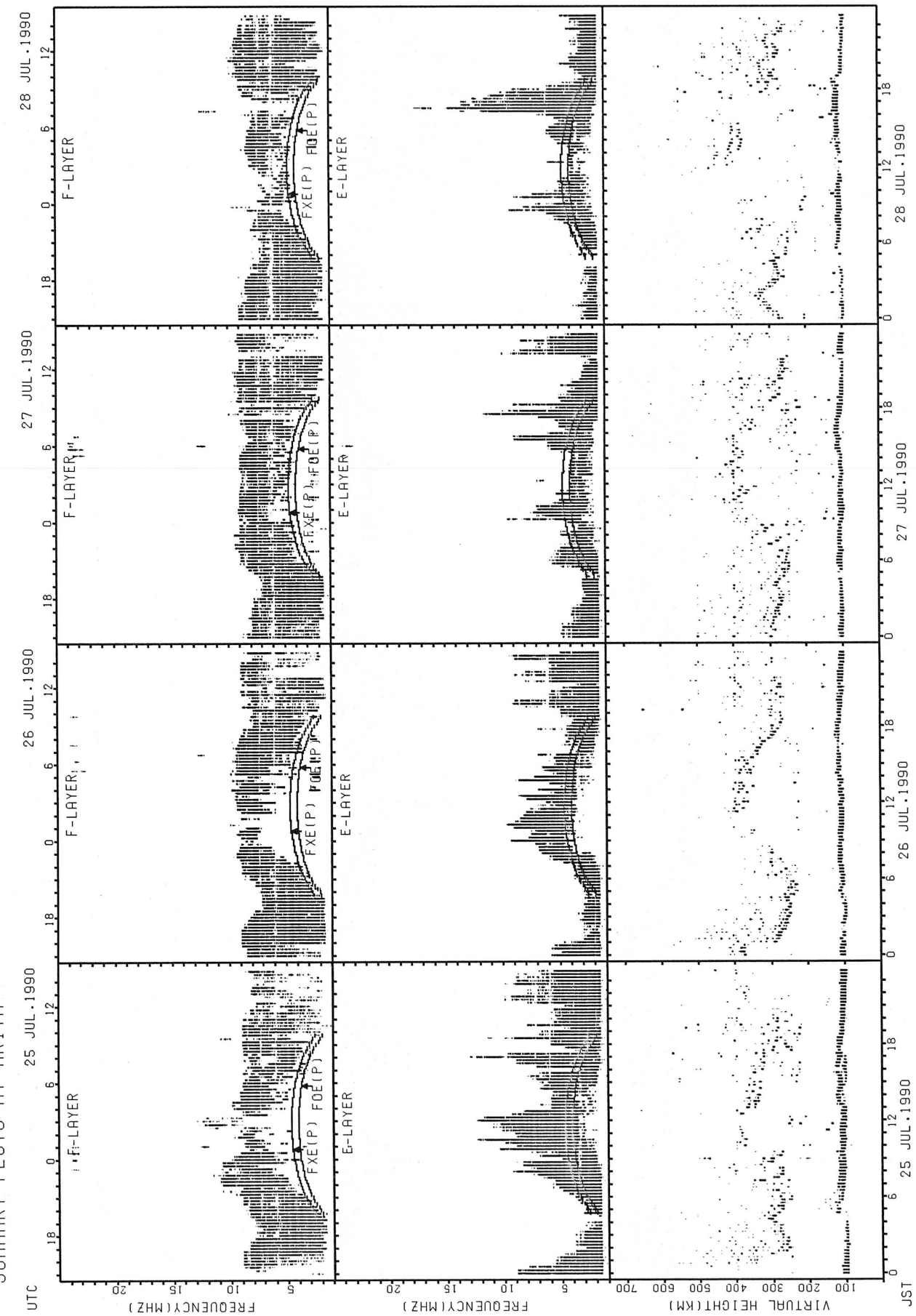
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
JST
25 JUL.1990
26 JUL.1990
27 JUL.1990
28 JUL.1990
F-LAYER
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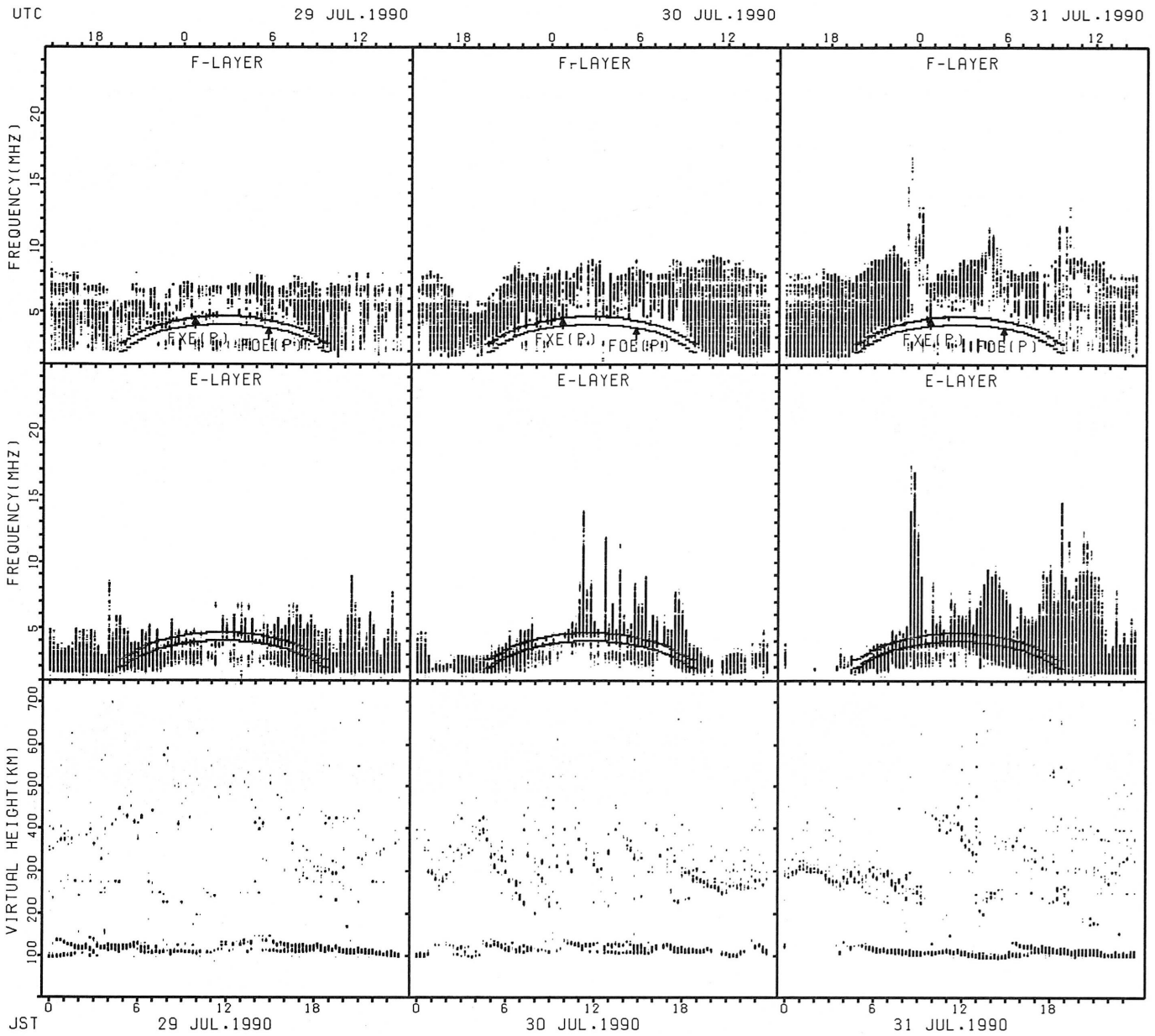
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



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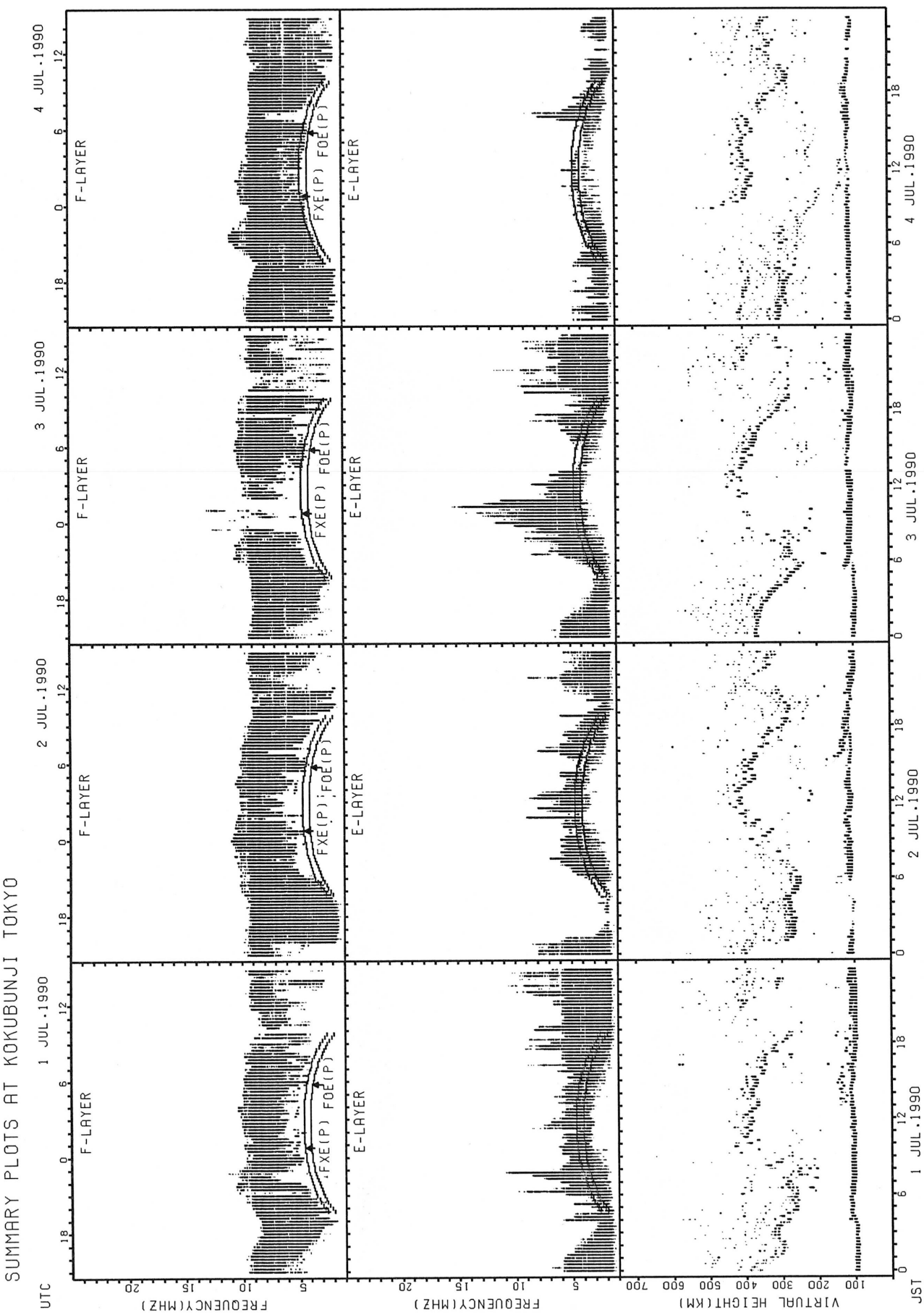
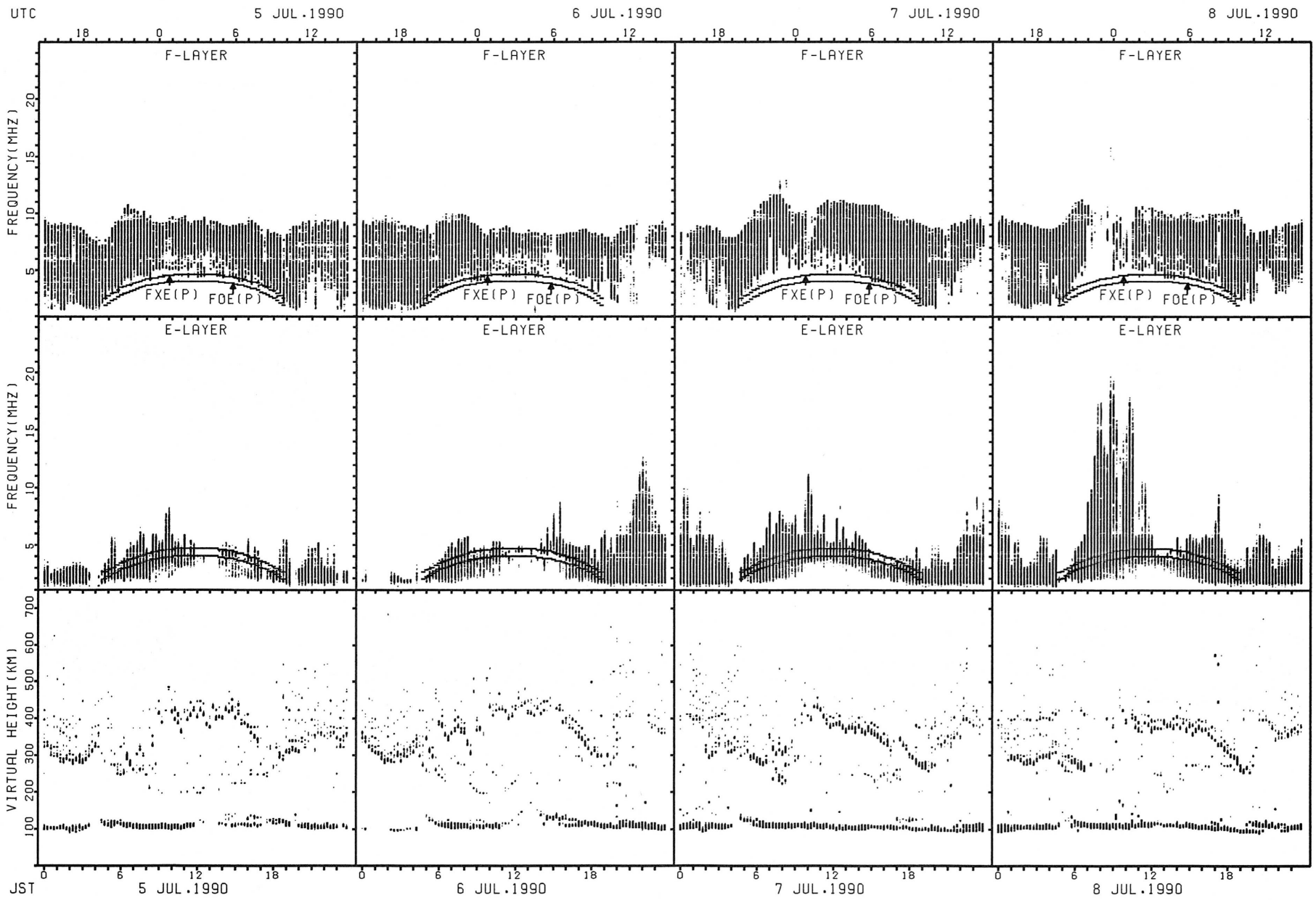
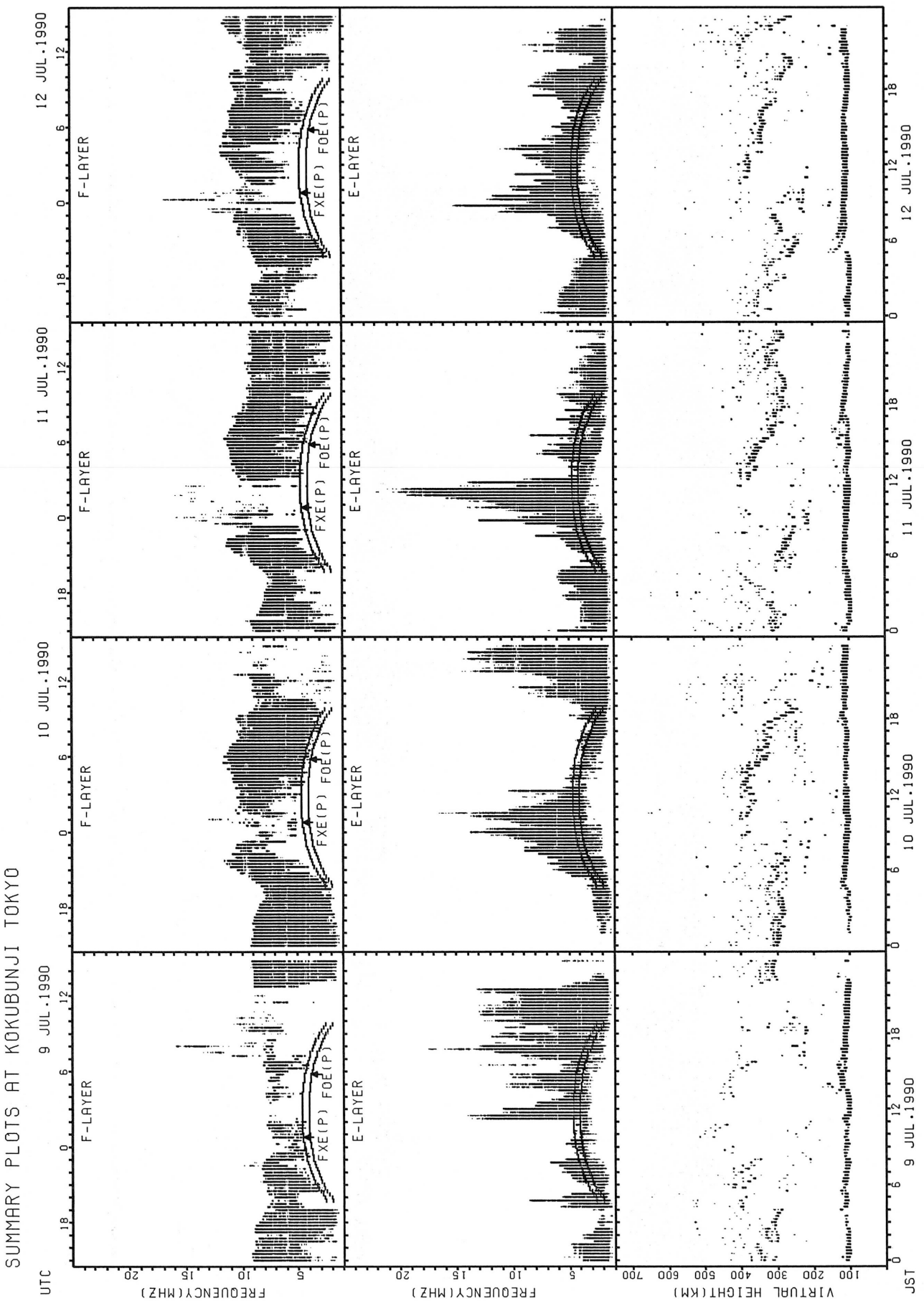
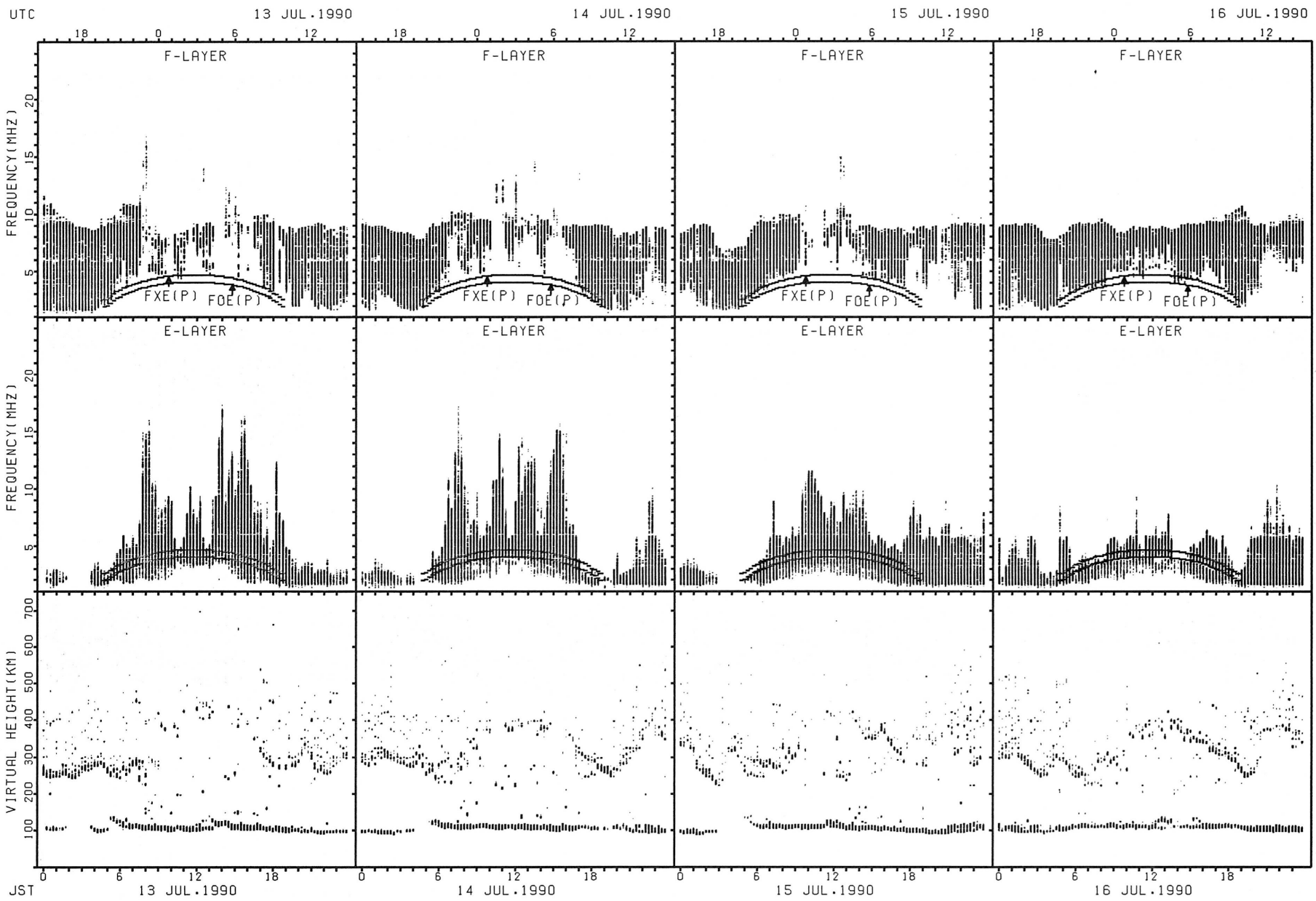

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
1 JUL.1990
2 JUL.1990
3 JUL.1990
4 JUL.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

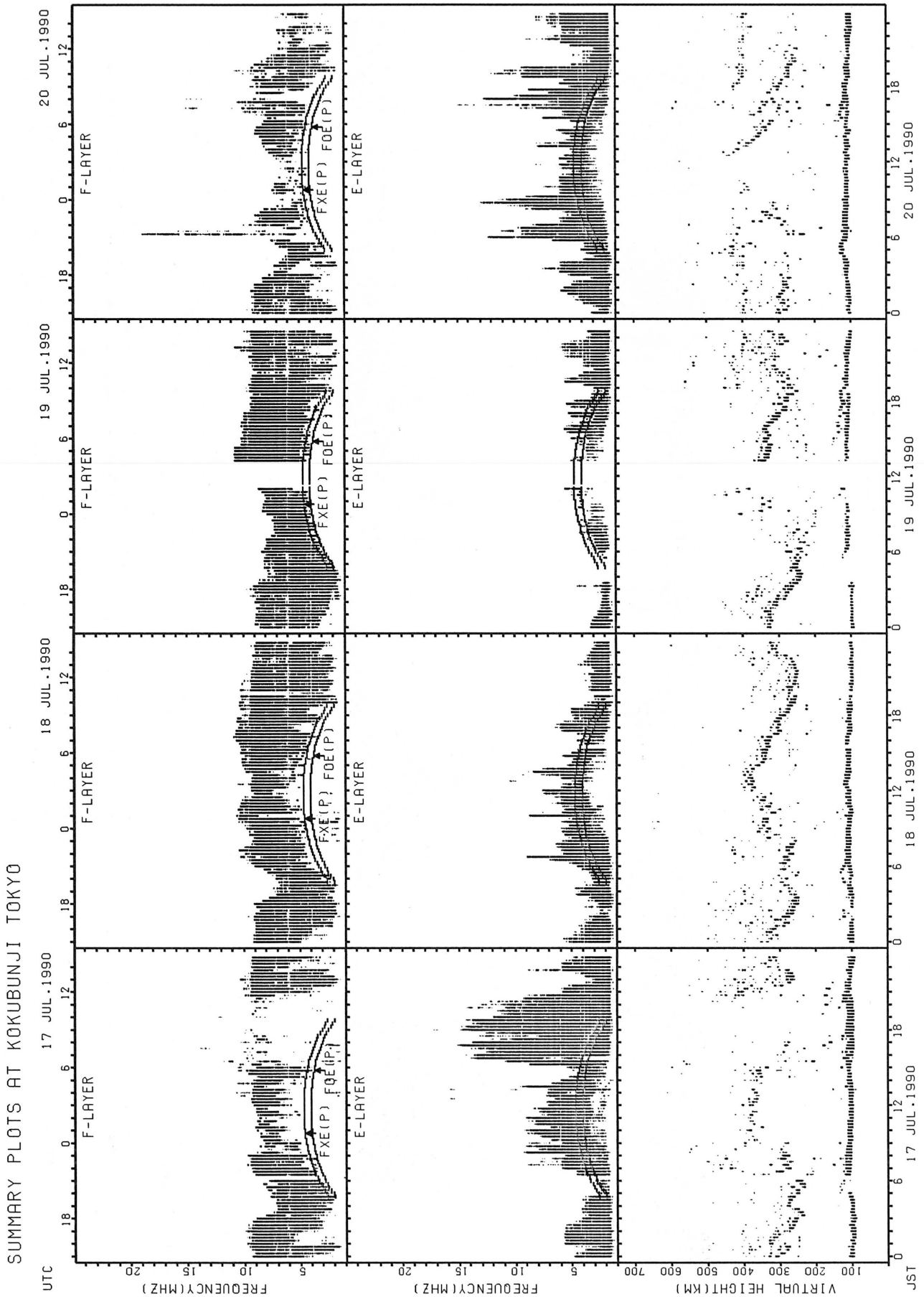

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
5 JUL.1990
6 JUL.1990
7 JUL.1990
8 JUL.1990
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
9 JUL.1990
10 JUL.1990
11 JUL.1990
12 JUL.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT KOKUBUNJI TOKYO



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


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
17 JUL.1990
18 JUL.1990
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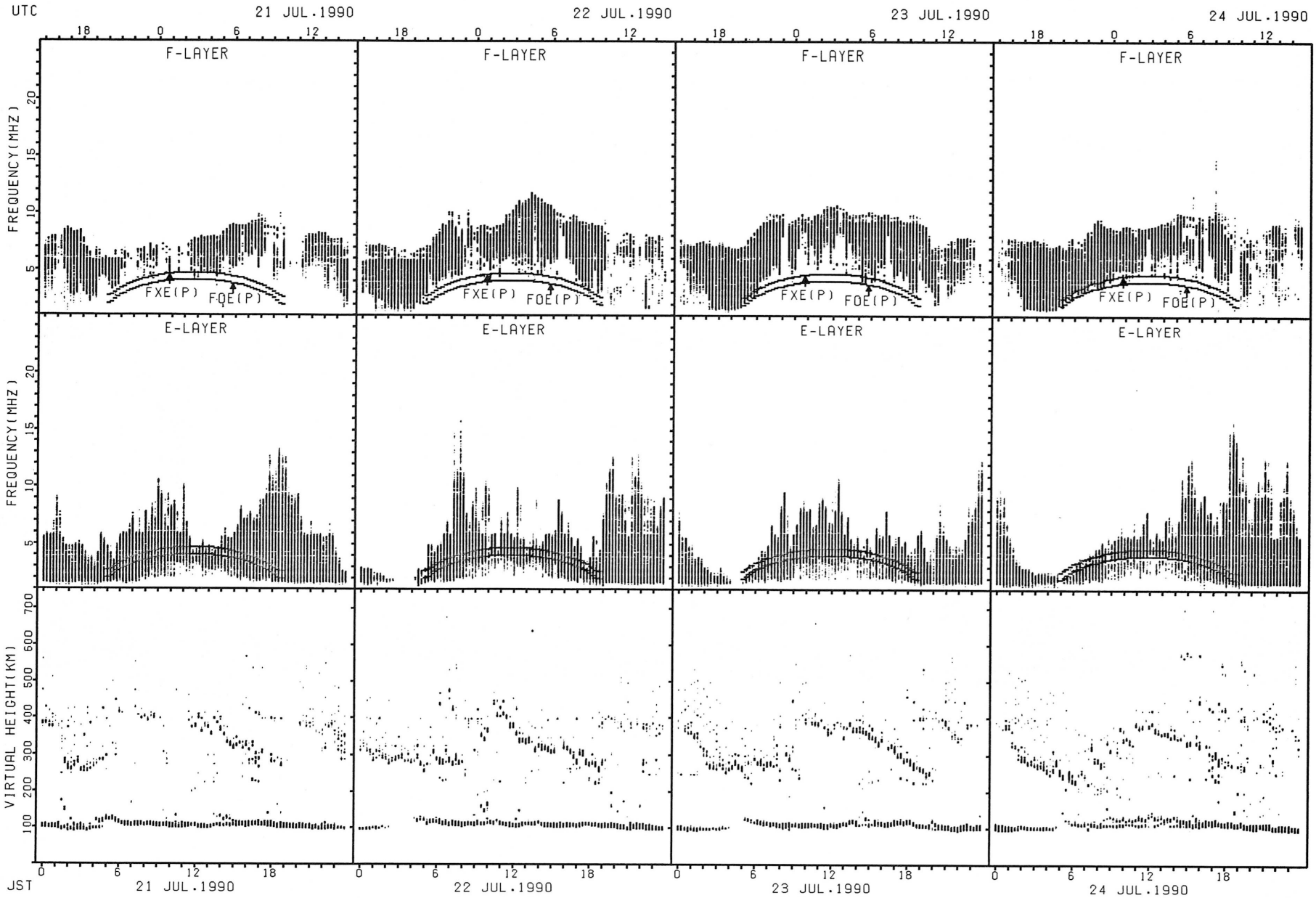
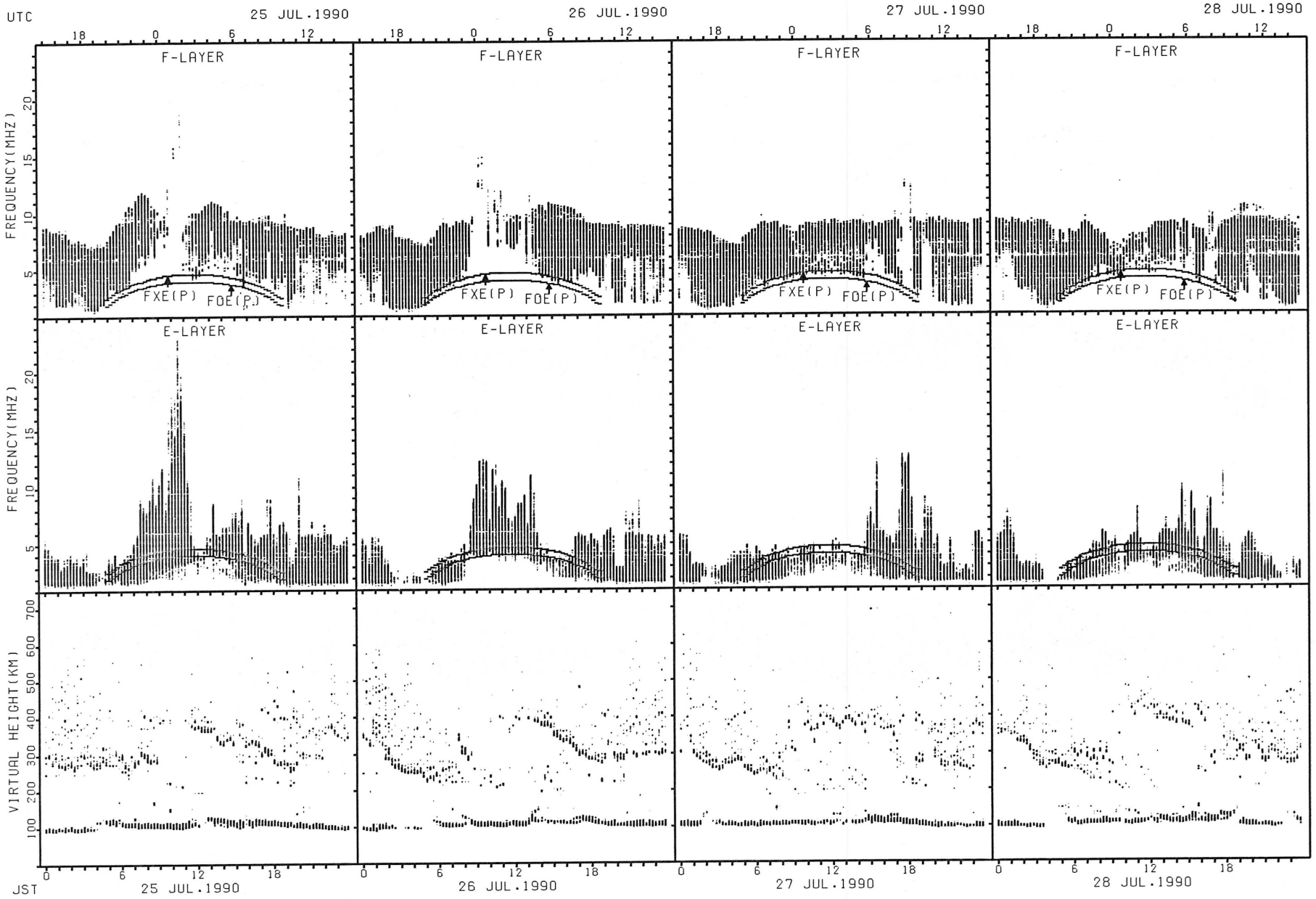
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT KOKUBUNJI TOKYO

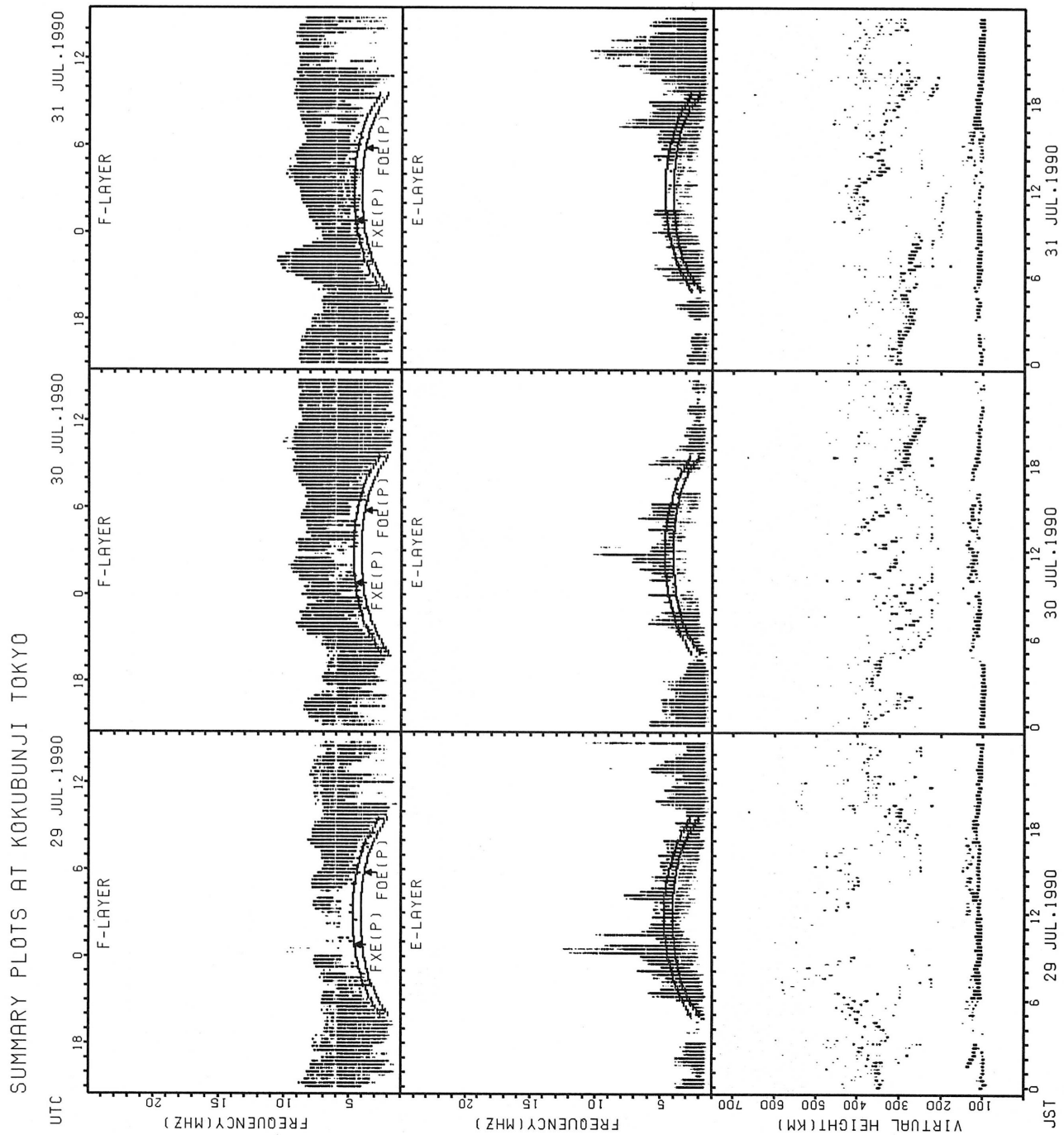


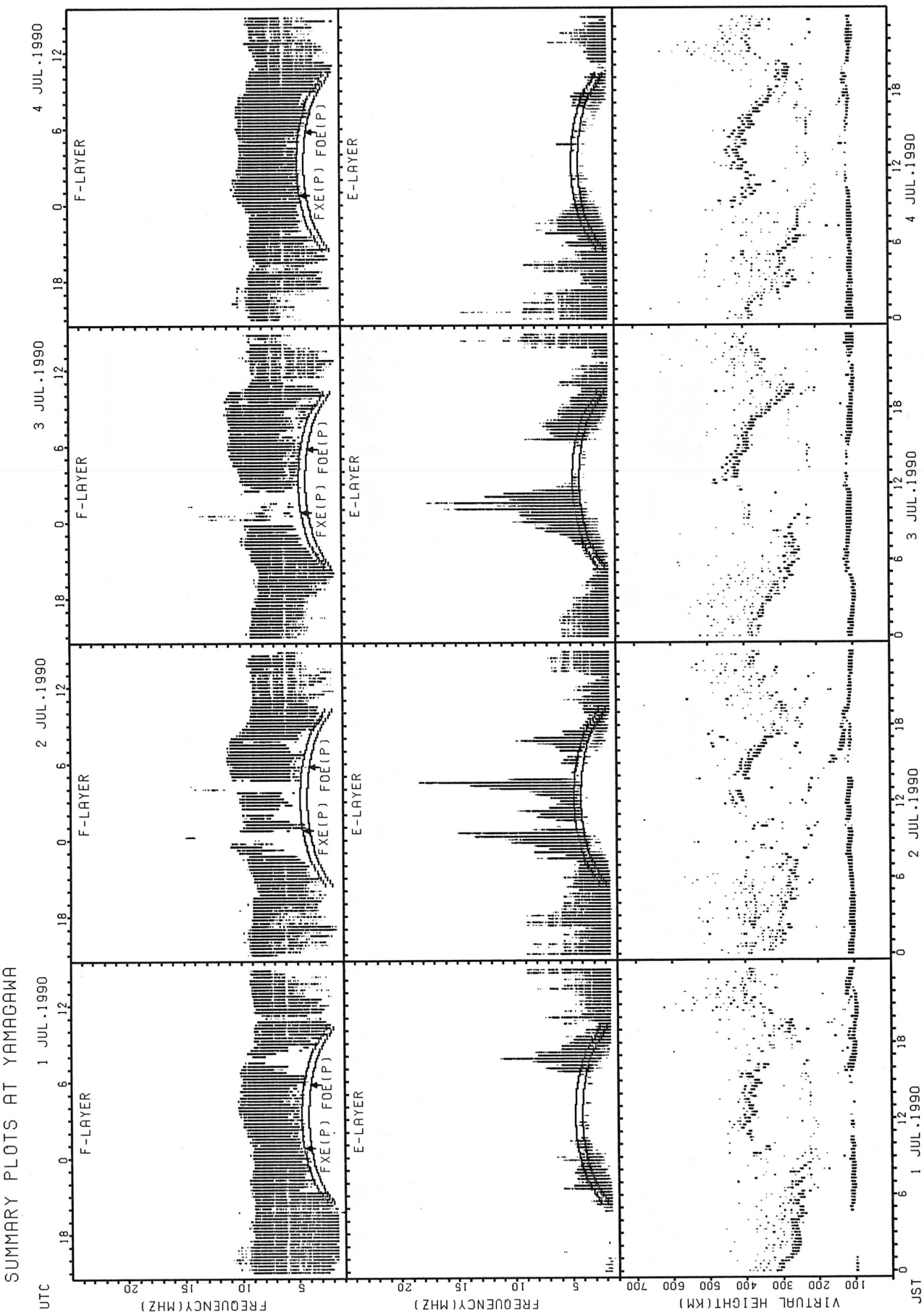
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT KOKUBUNJI TOKYO

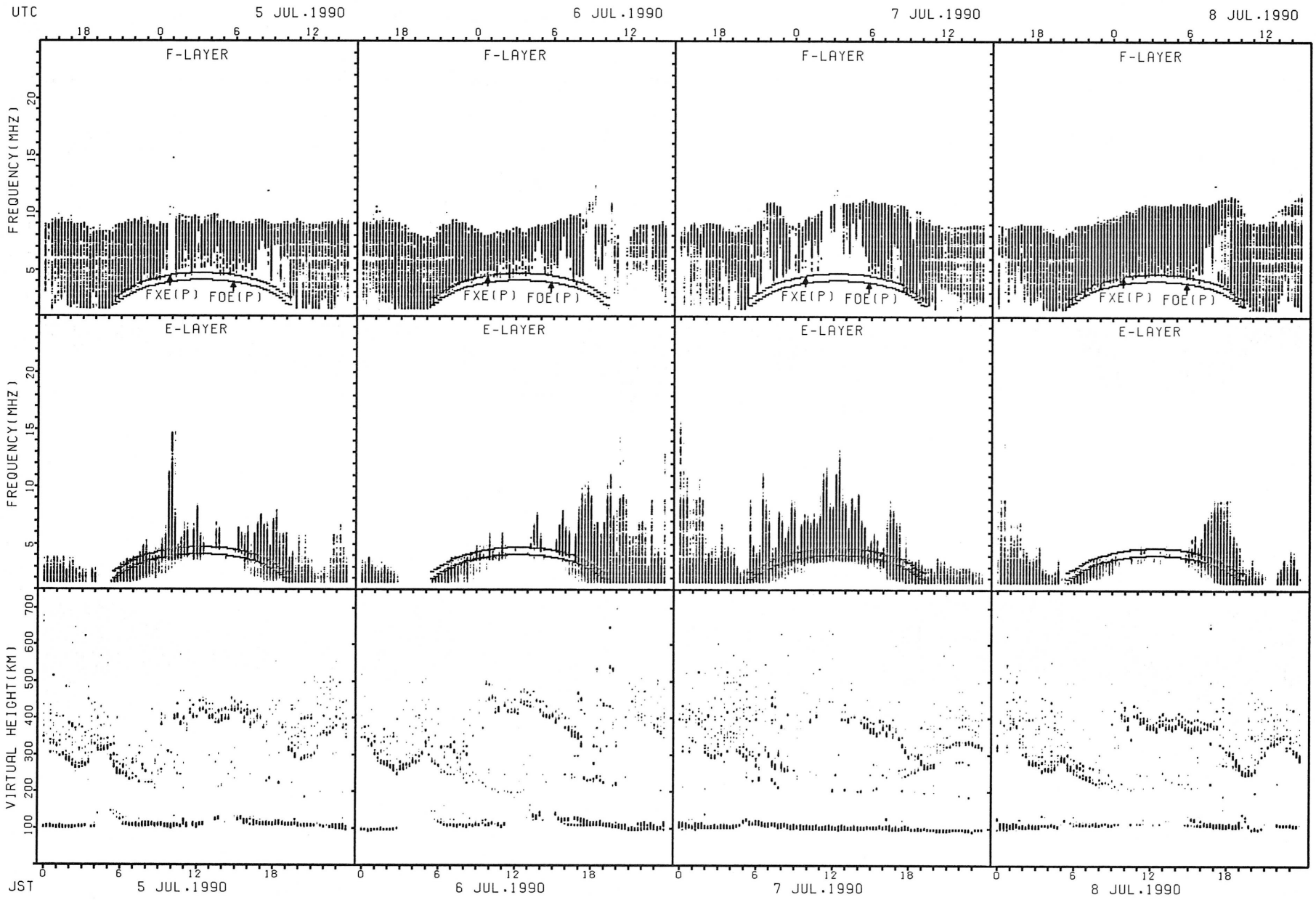


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
29 JUL.1990
30 JUL.1990
31 JUL.1990
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

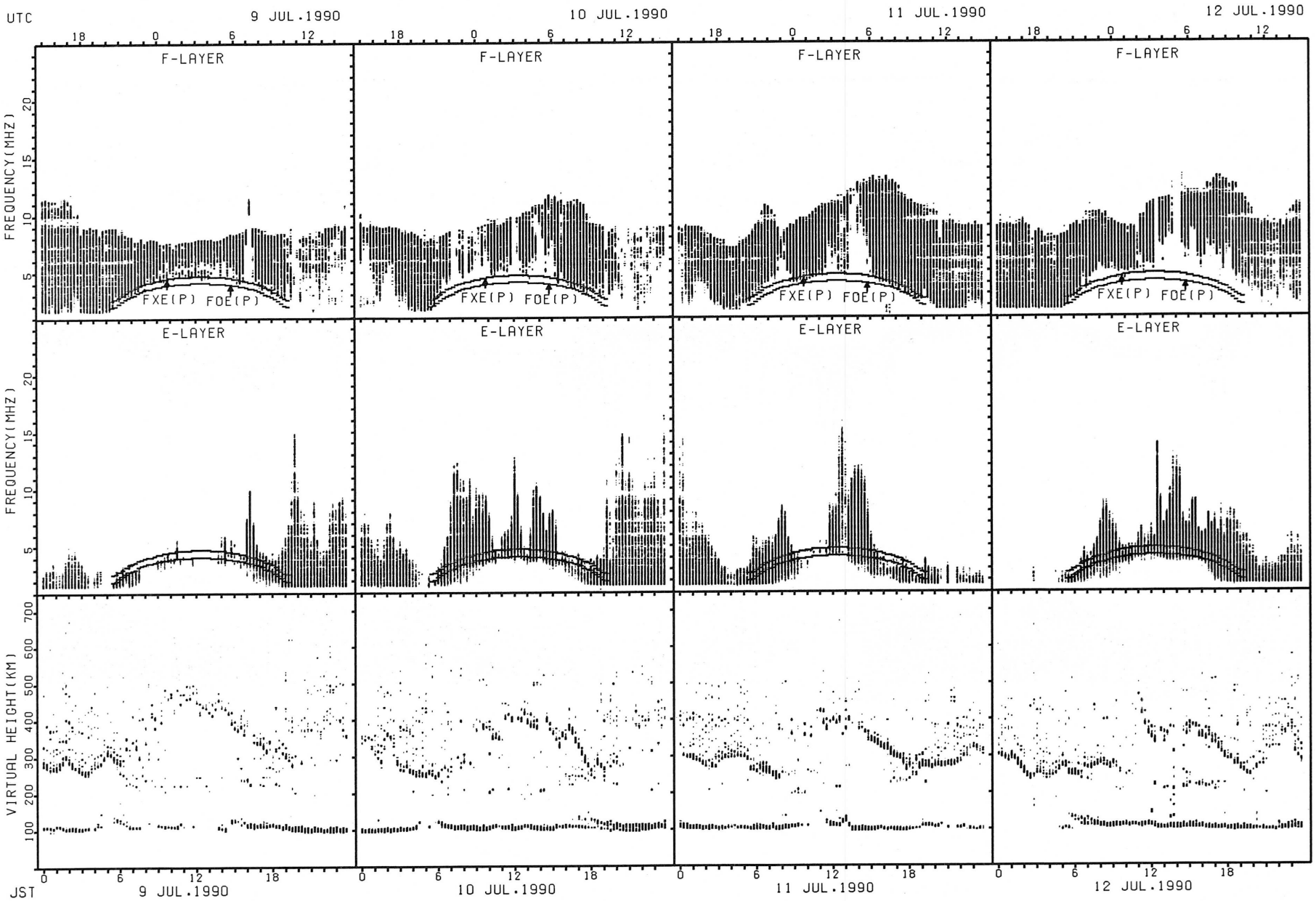

SUMMARY PLOTS AT YAMAGAWA
UTC
1 JUL.1990
2 JUL.1990
3 JUL.1990
4 JUL.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



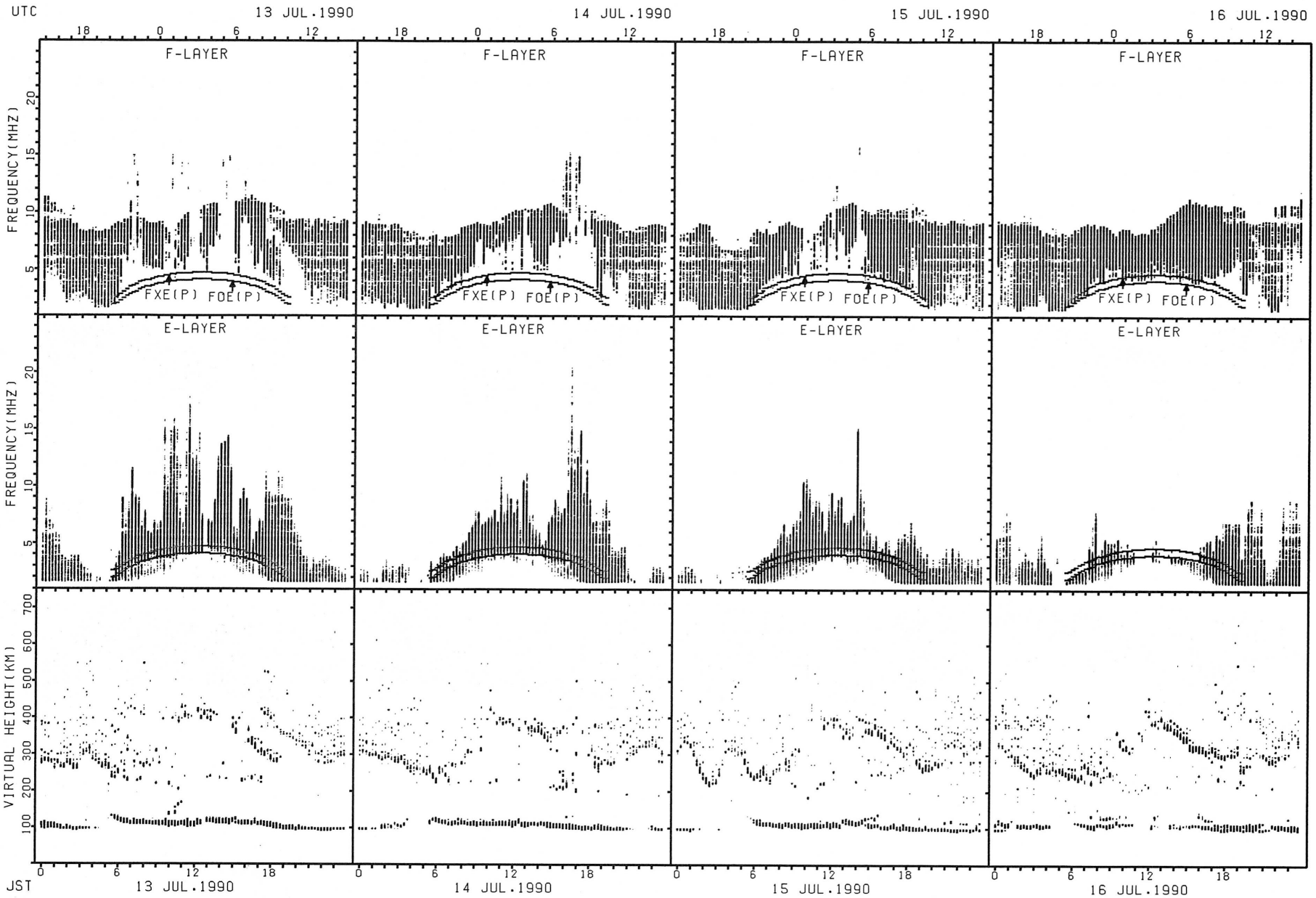
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA

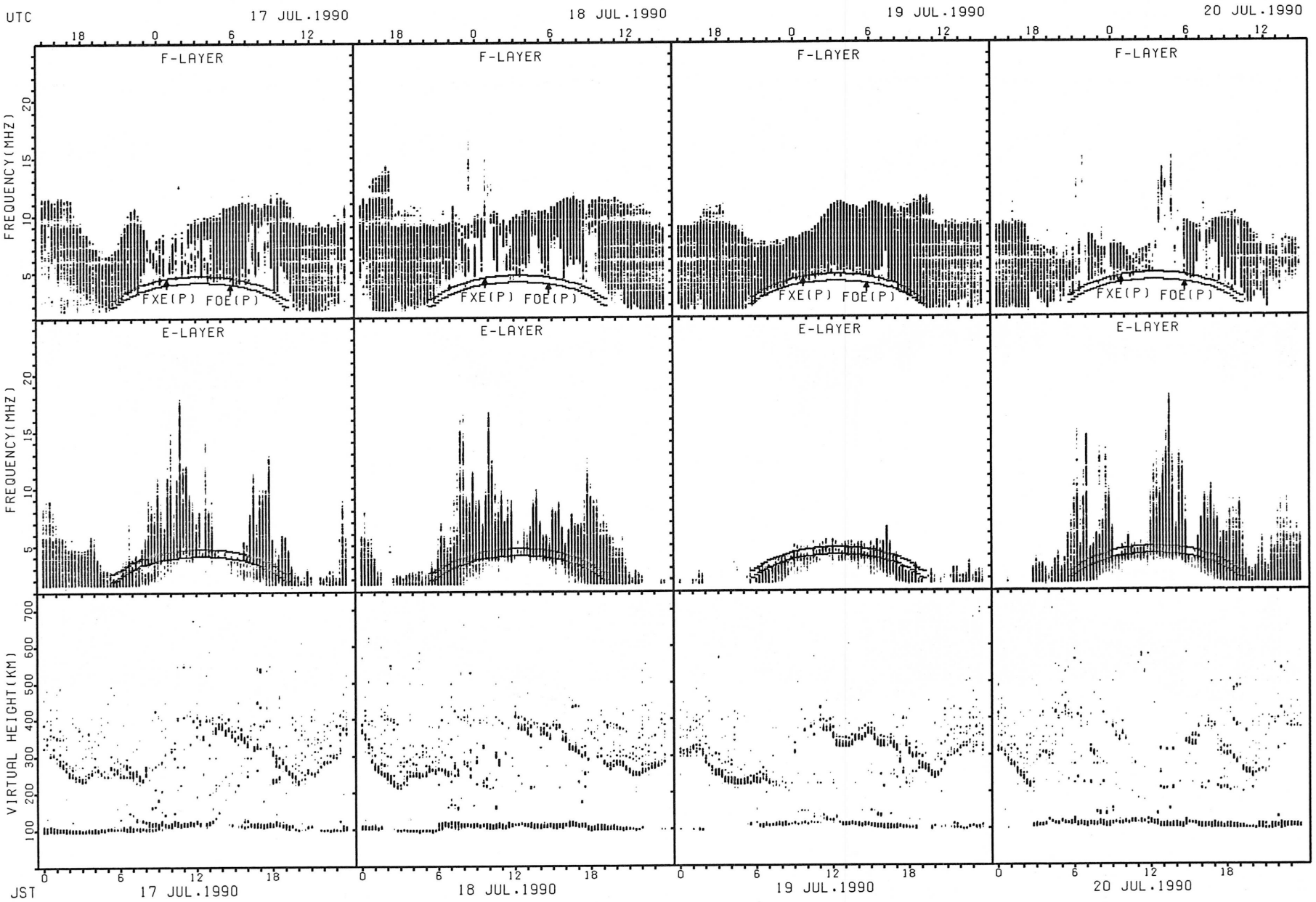


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

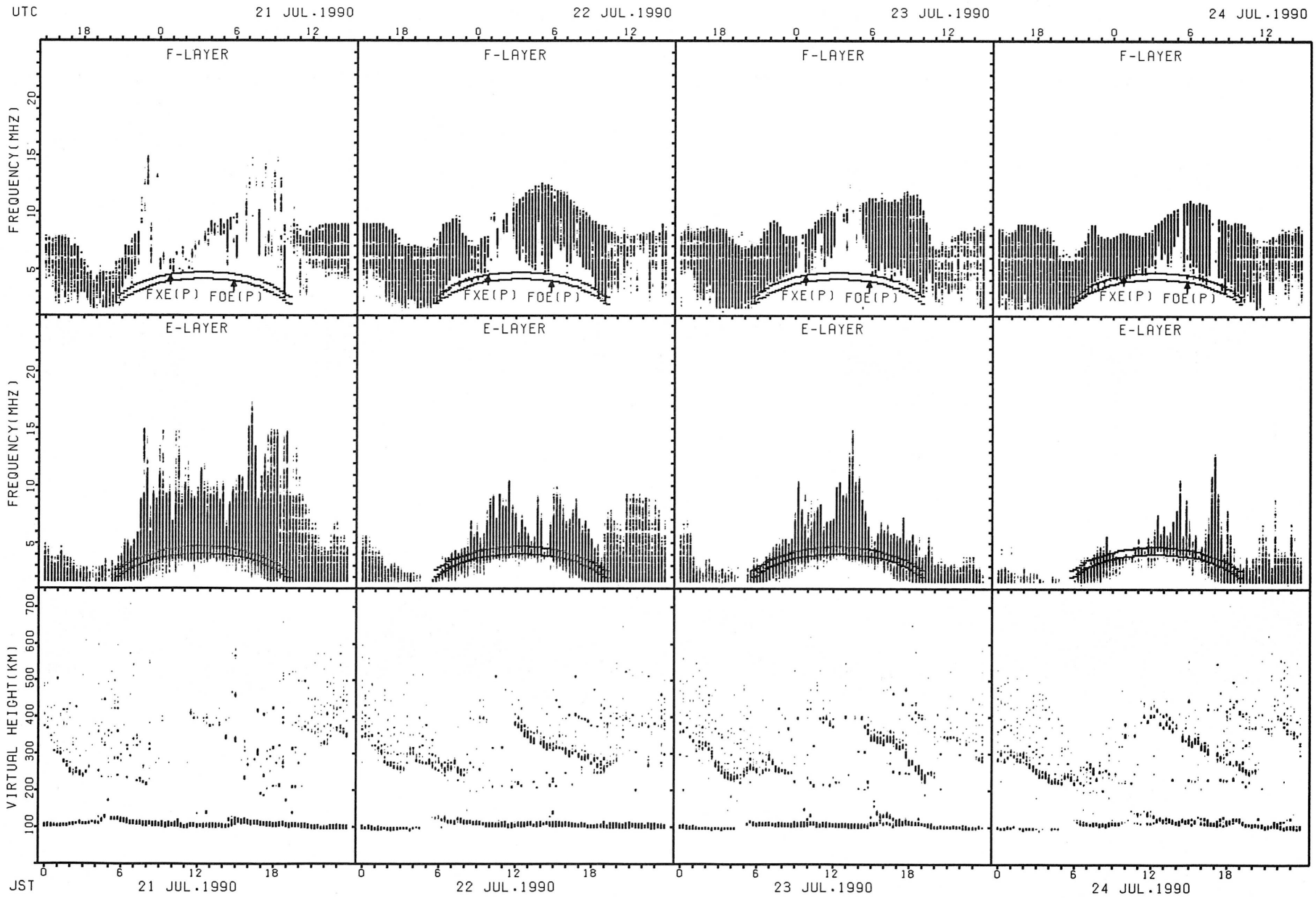
SUMMARY PLOTS AT YAMAGAWA



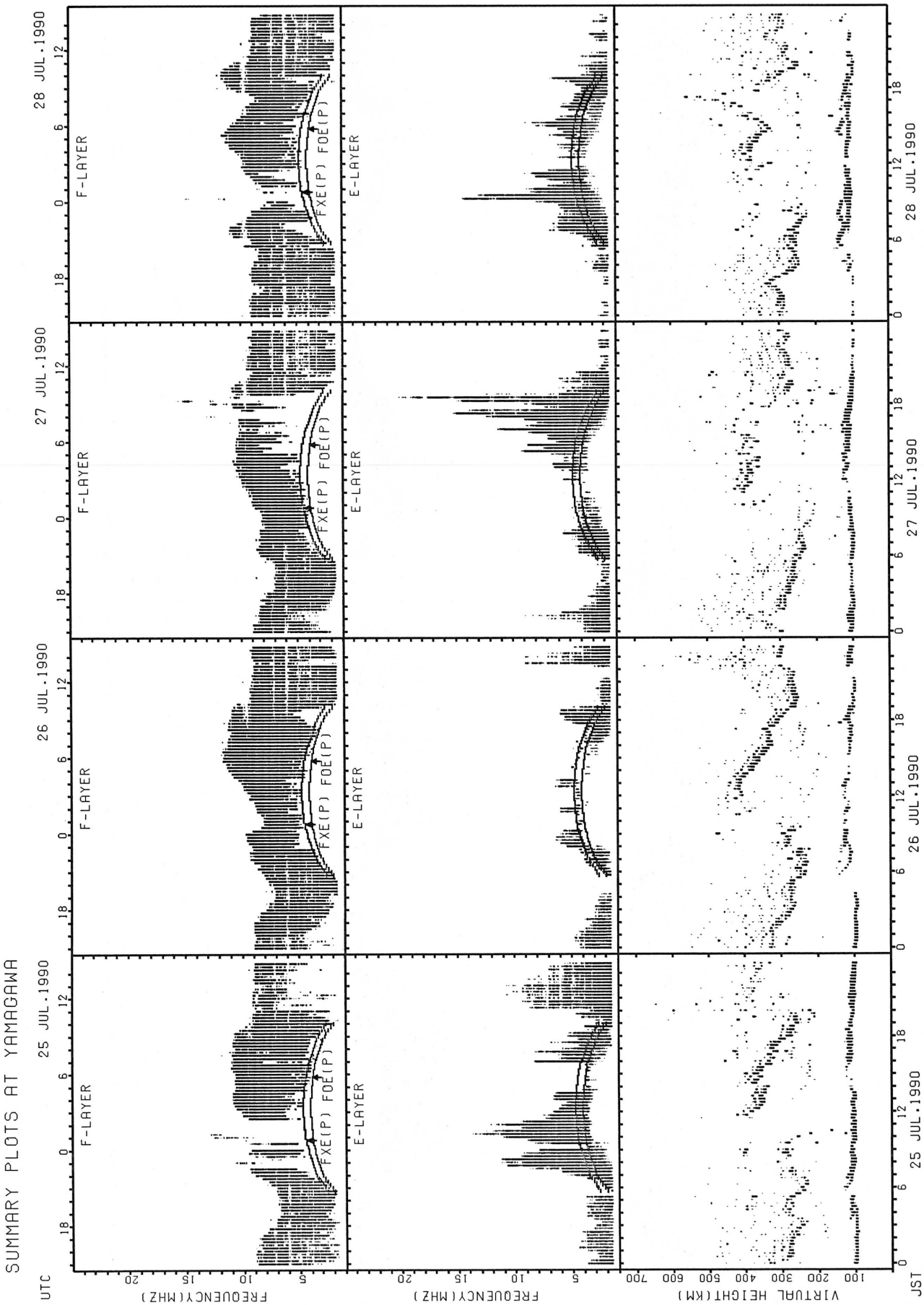
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
17 JUL.1990
18 JUL.1990
19 JUL.1990
20 JUL.1990
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P) FOE(P)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

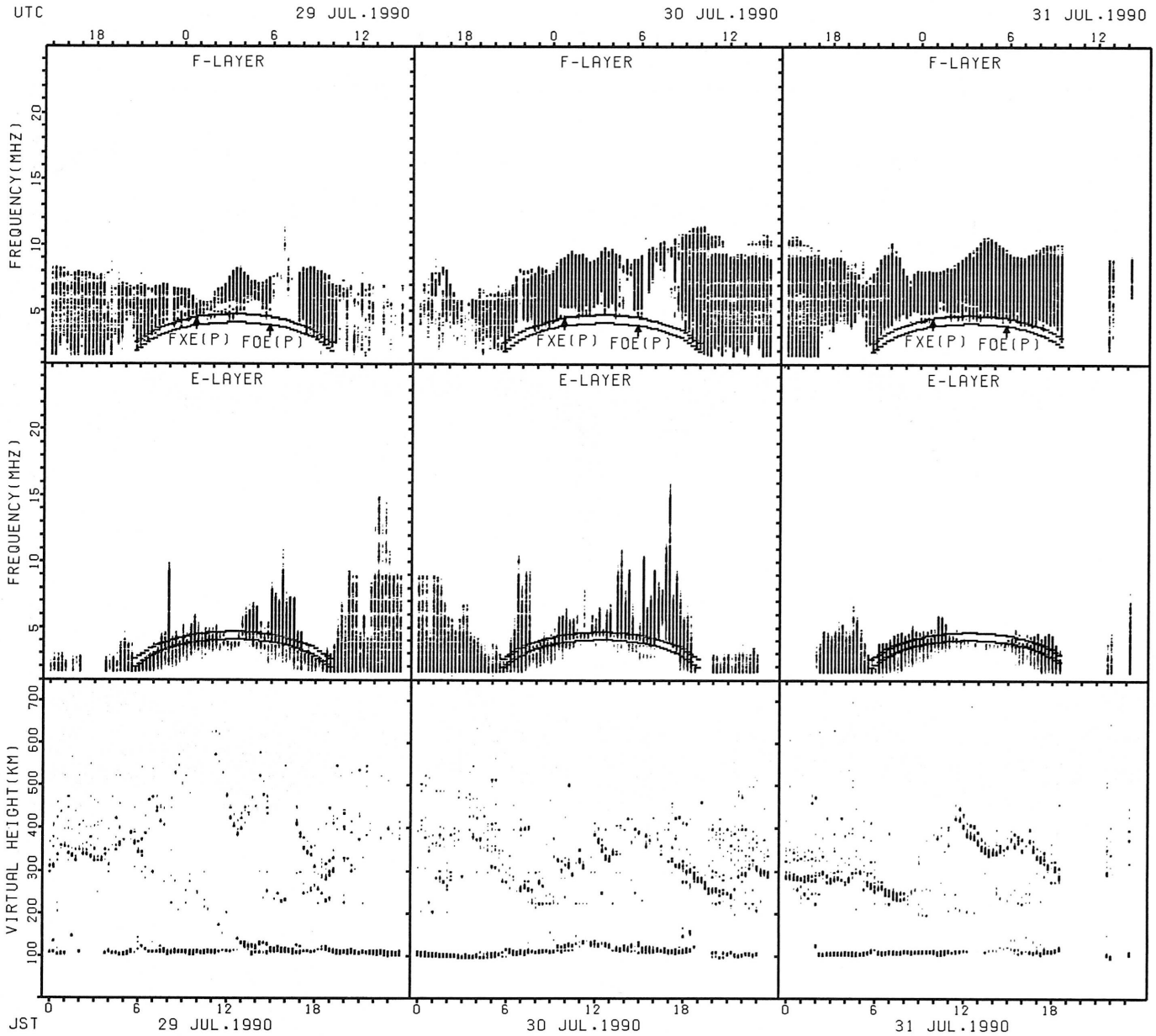
SUMMARY PLOTS AT YAMAGAWA



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

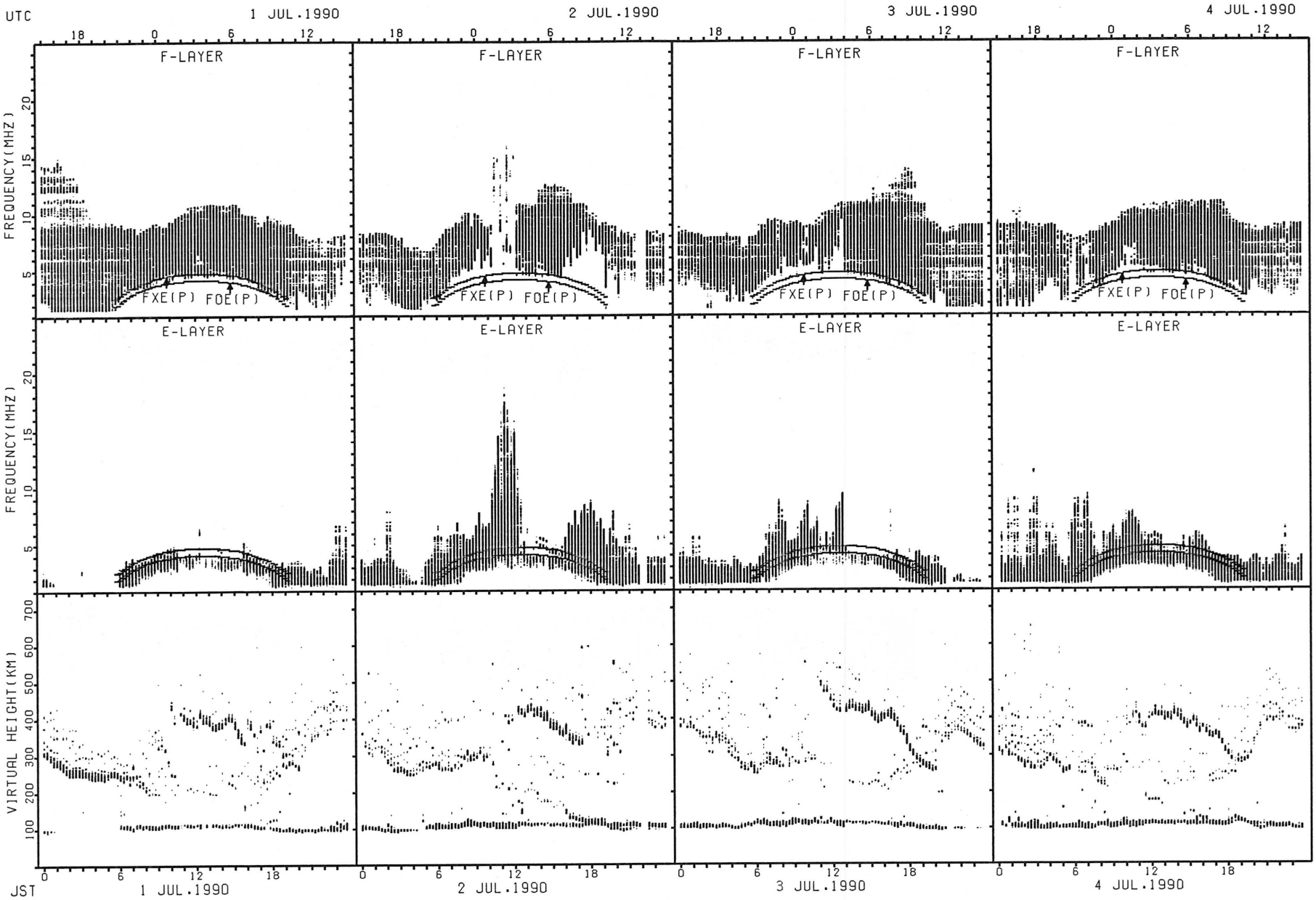

SUMMARY PLOTS AT YAMAGAWA
UTC
25 JUL.1990
26 JUL.1990
27 JUL.1990
28 JUL.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



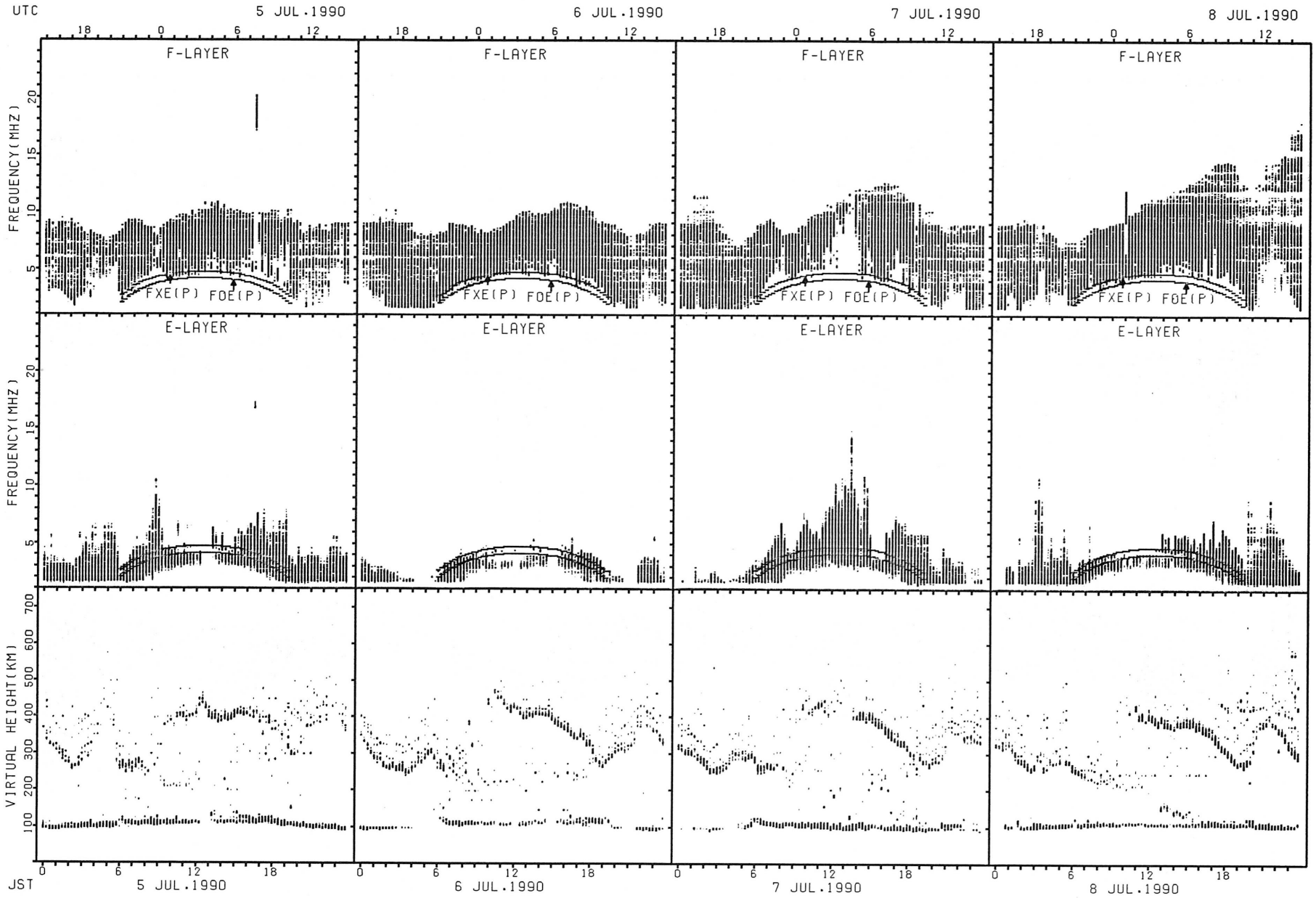
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA

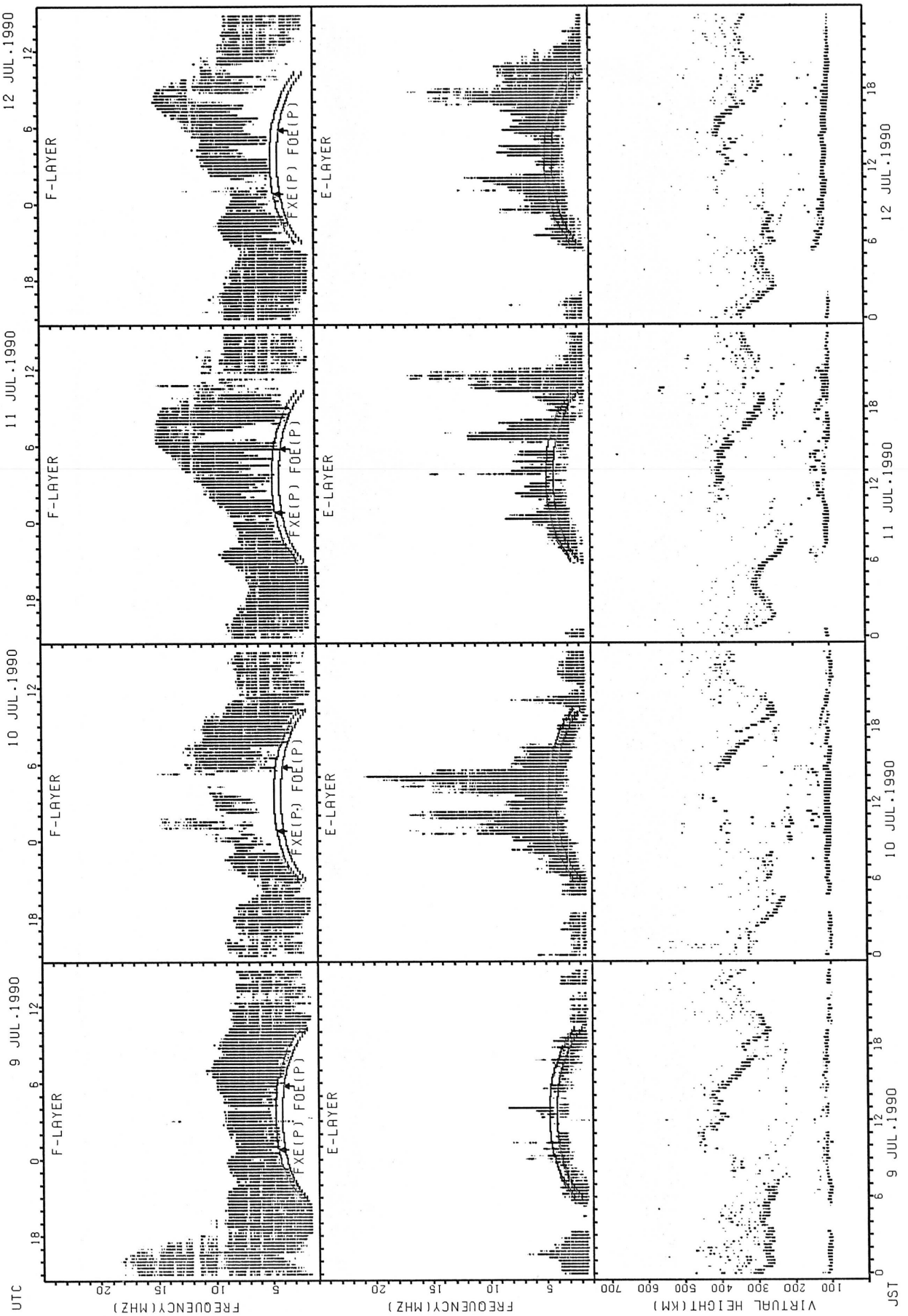


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

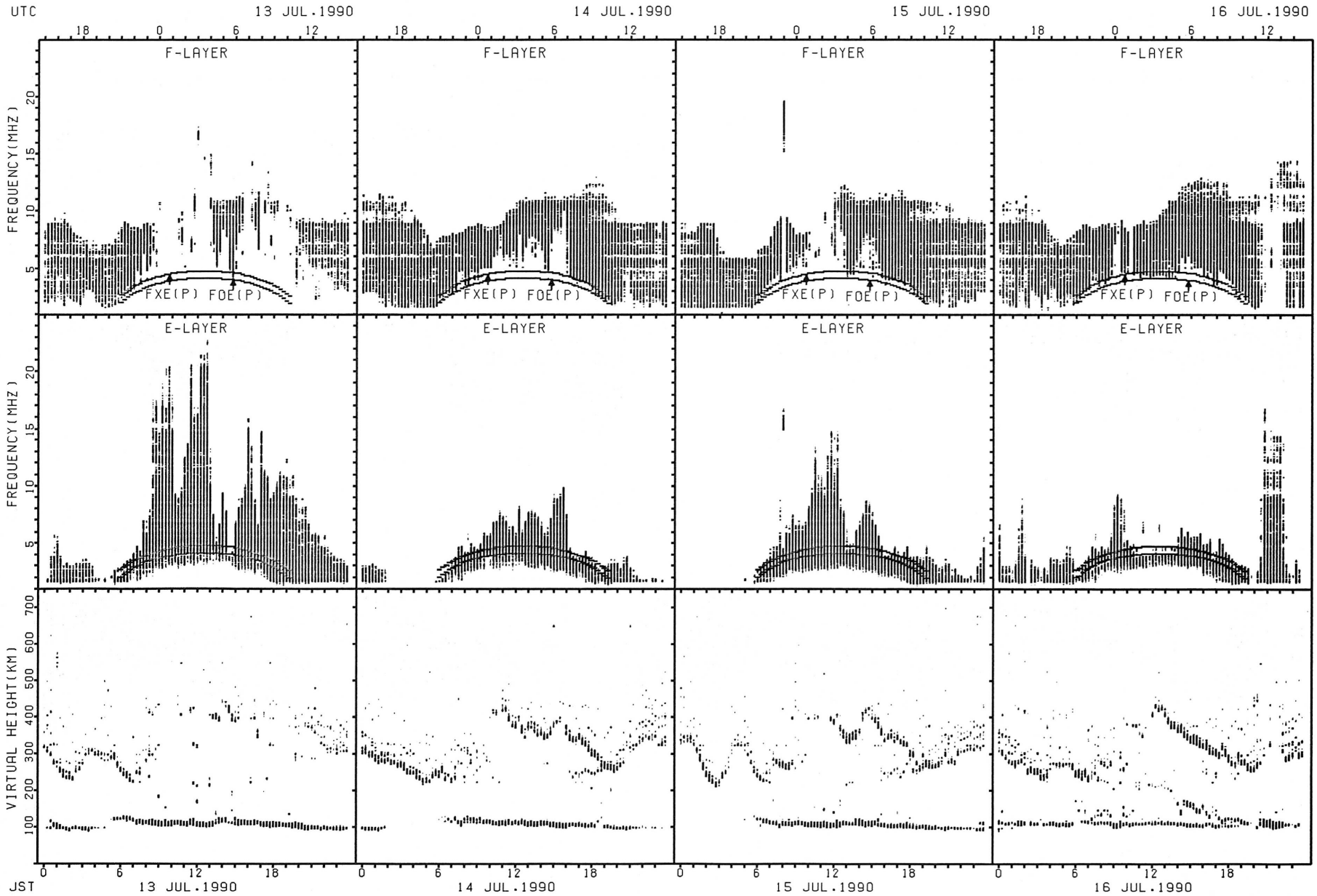
SUMMARY PLOTS AT OKINAWA



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

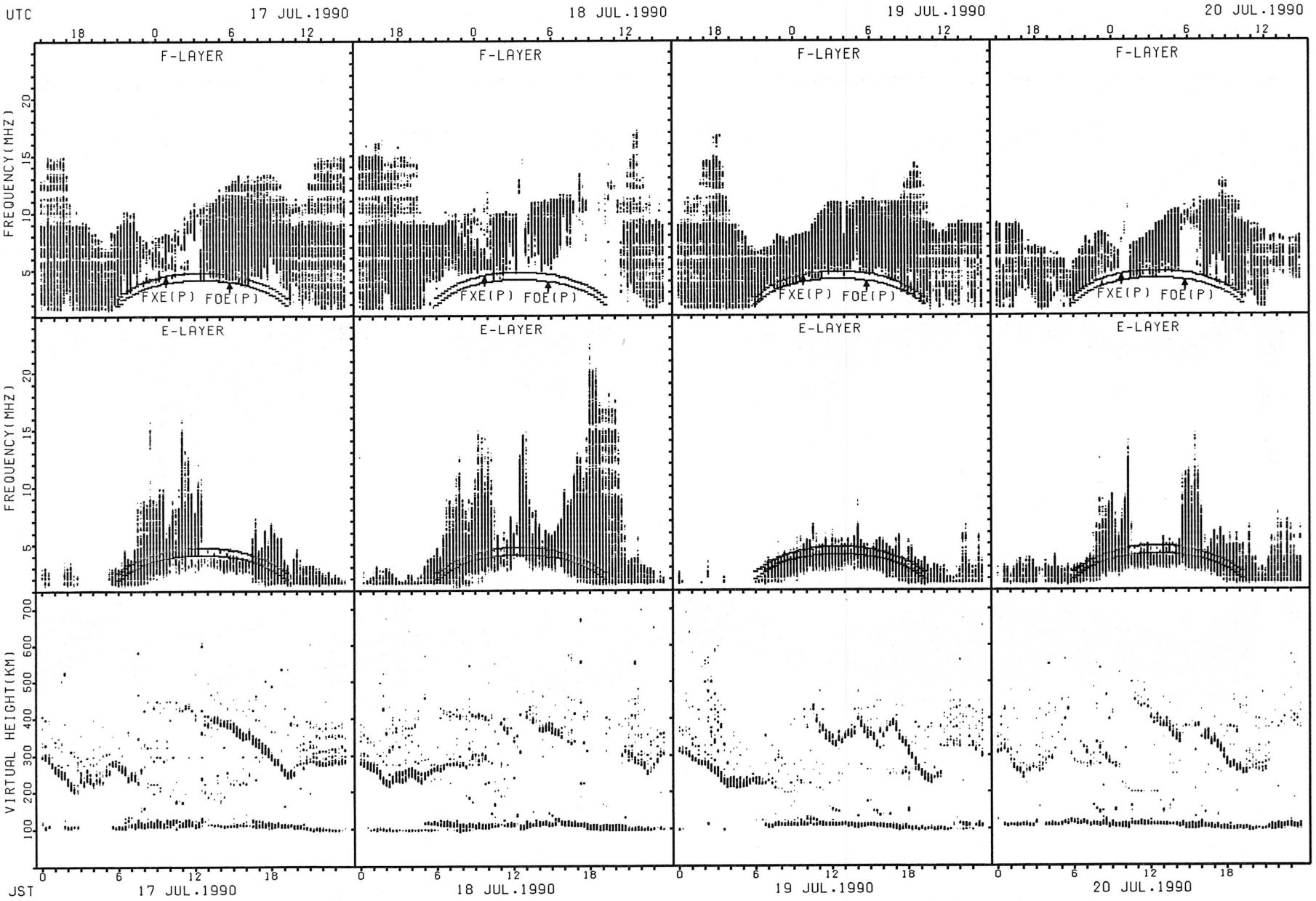

SUMMARY PLOTS AT OKINAWA
UTC
9 JUL.1990
10 JUL.1990
11 JUL.1990
12 JUL.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



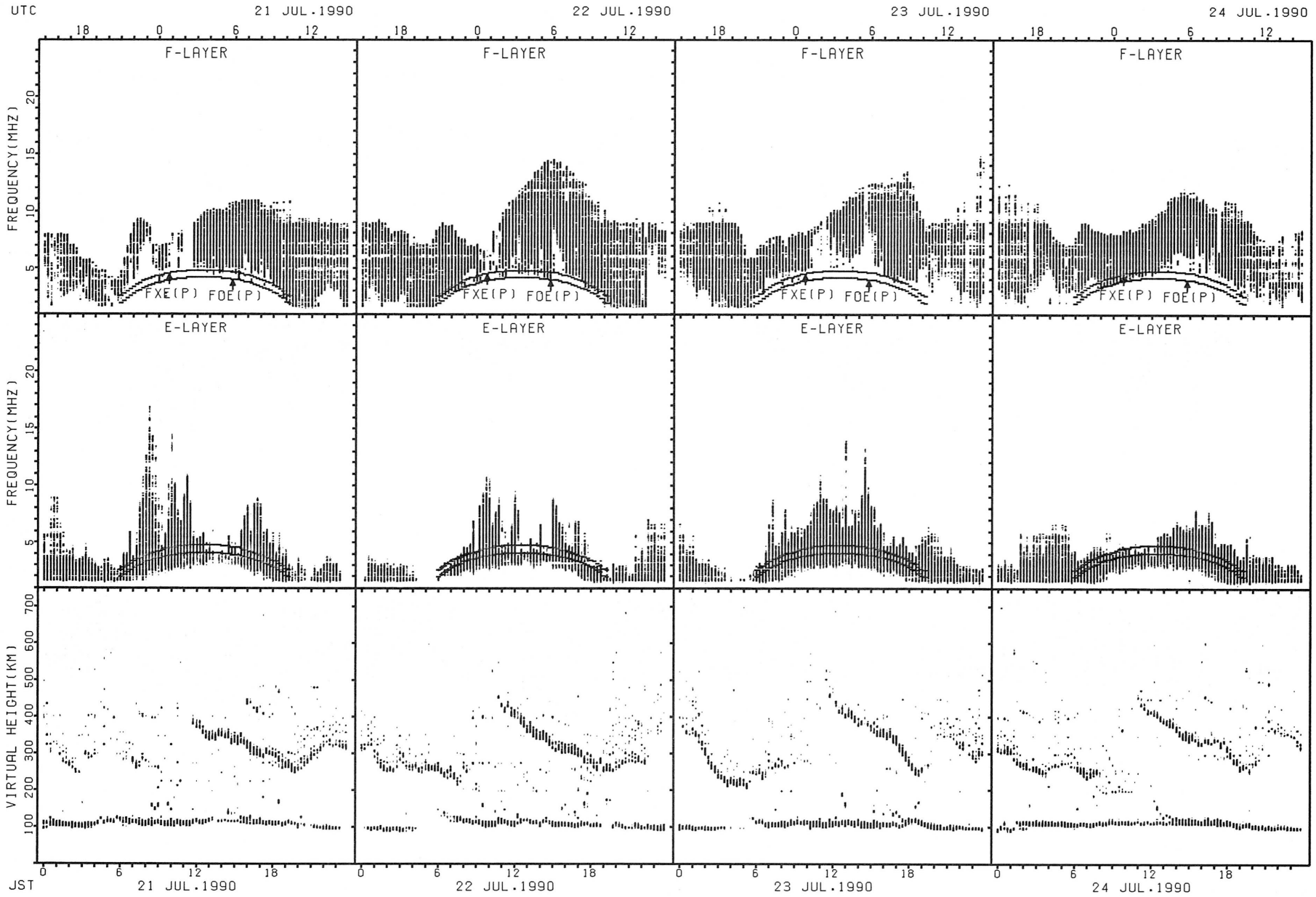
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



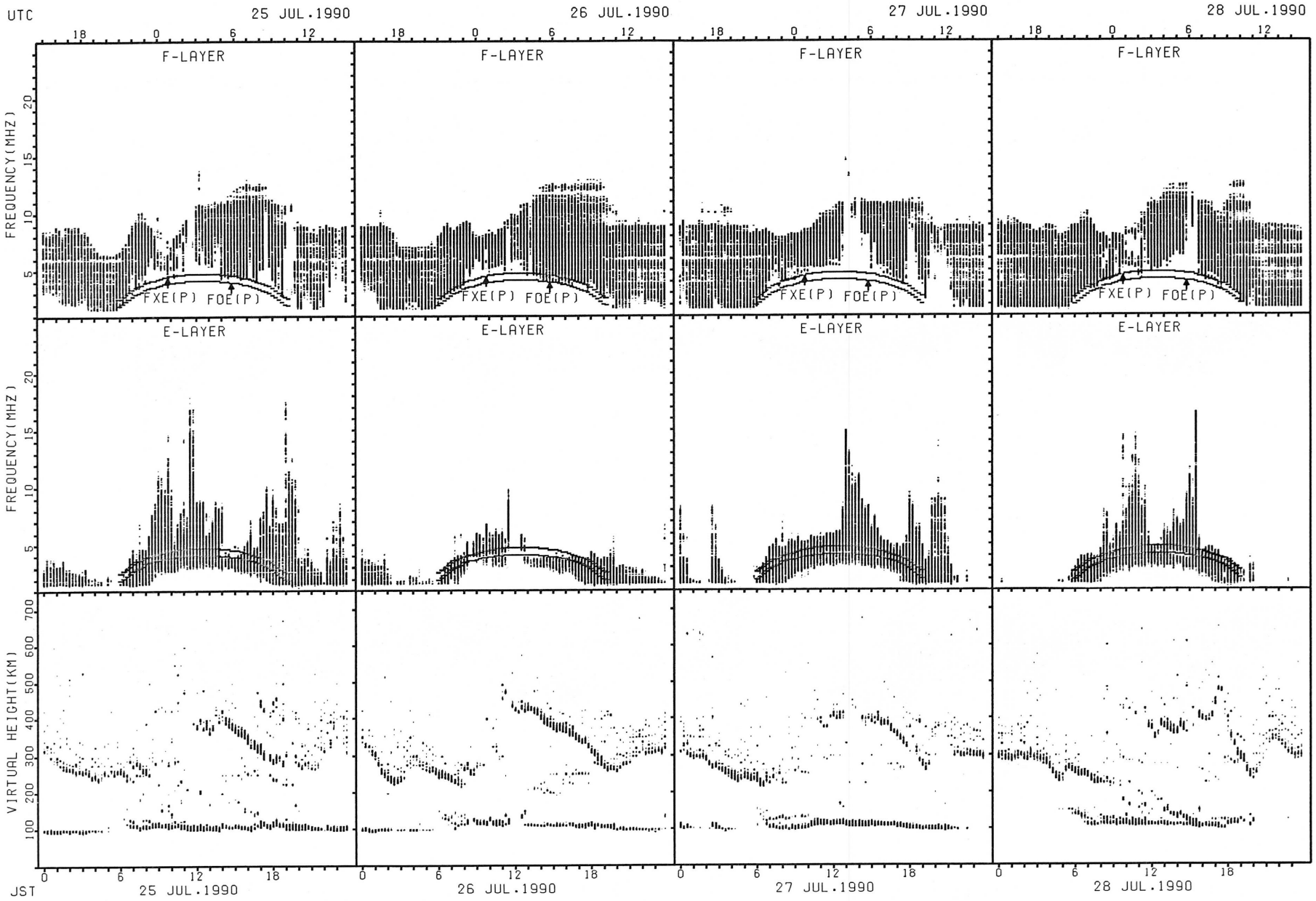
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



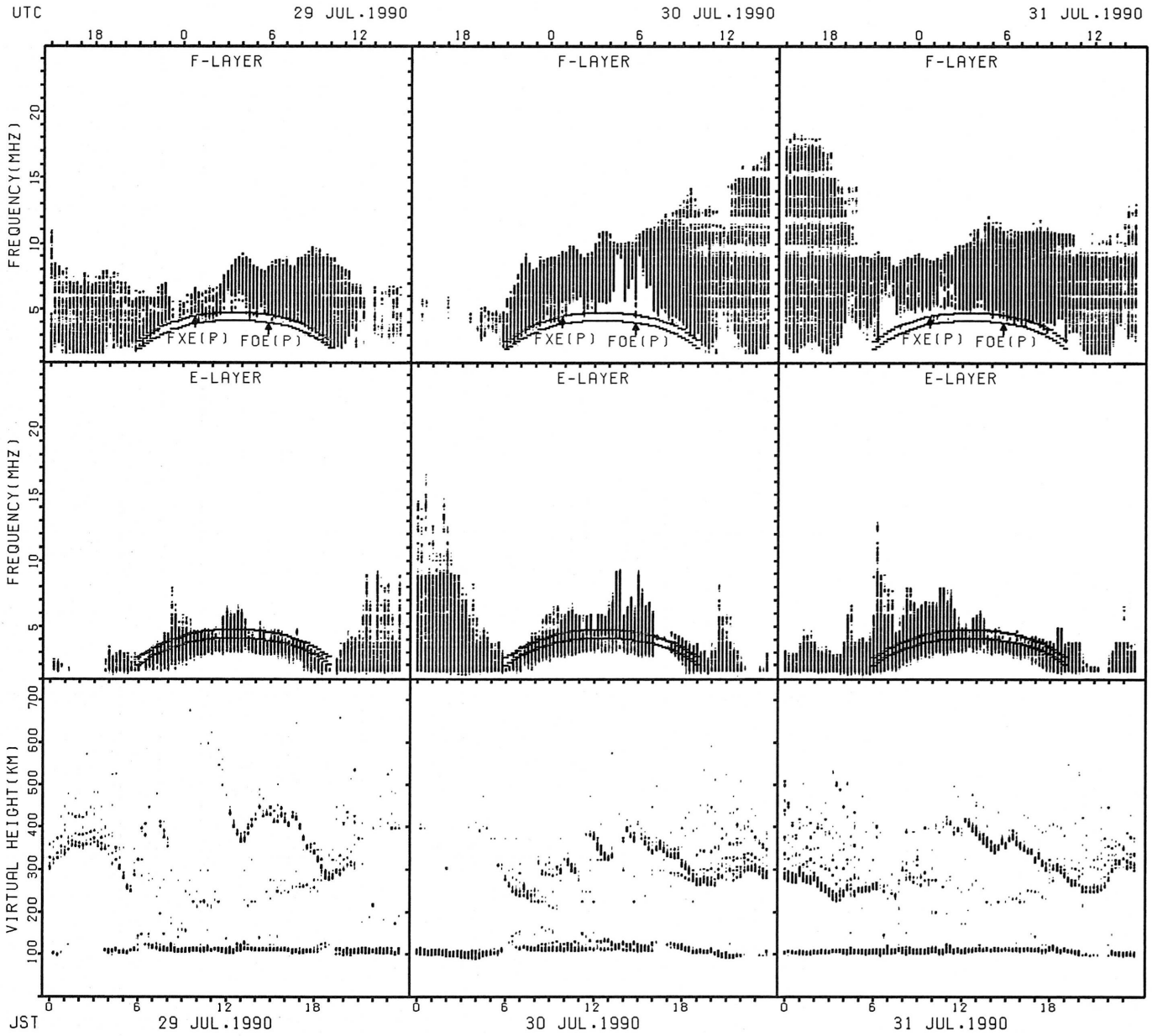
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



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

SUMMARY PLOTS AT OKINAWA



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

MONTHLY MEDIANS OF H'F AND H'ES
JUL.1990 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	14					15	22	26									11	23	20	23	15	24	15	15
MED	352					324	305	311									318	334	319	310	334	348	346	350
U Q	374					348	320	324									396	346	344	338	408	365	356	380
L Q	336					306	298	290									238	238	239	290	292	327	332	330

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	19	18	18	16	15	13	20	27	25	24	25	21	15	20	17	17	20	23	28	27	30	26	28	26
MED	111	113	110	112	127	127	125	121	121	117	115	113	113	115	117	125	123	121	123	121	117	115	115	113
U Q	113	115	113	118	133	131	127	125	123	123	117	119	115	124	124	129	130	129	125	123	121	121	119	117
L Q	109	109	107	107	113	124	121	119	117	115	113	113	111	113	112	114	120	117	121	117	115	115	112	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		12	13	10		12	20	27									15	22	21	16	10			
MED		368	338	353		322	305	296									344	337	312	302	332			
U Q		383	367	376		338	318	316									352	348	332	309	366			
L Q		358	320	326		306	293	278									330	318	276	285	302			

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	29	28	29	28	25	20	29	25	28	27	30	26	26	24	22	22	25	30	29	30	31	31	30	29
MED	105	103	103	103	105	119	117	117	113	113	111	112	109	109	110	117	119	119	115	112	111	111	109	105
U Q	107	107	108	108	107	124	124	119	115	115	113	121	113	116	121	131	127	125	119	117	117	115	113	109
L Q	101	100	97	100	99	111	113	114	111	109	107	105	107	106	107	113	113	113	110	107	103	105	105	103

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	19	21	24	19	11	14	24	23	26								18	24	25	23	14	10	12	12
MED	360	350	348	338	354	347	289	276	281								334	311	308	296	345	358	360	349
U Q	386	373	364	378	380	370	302	284	302								342	334	325	318	352	378	365	360
L Q	340	331	322	318	328	300	275	270	252								326	288	291	280	308	338	337	338

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	28	30	27	24	23	20	18	28	27	28	29	28	23	21	24	24	28	31	30	31	31	30	31	28
MED	105	103	103	102	103	114	116	113	113	111	111	111	109	111	119	119	118	117	113	109	107	109	109	107
U Q	109	107	107	109	111	123	123	117	115	119	117	118	117	123	136	128	127	123	119	113	113	113	113	110
L Q	99	99	97	97	99	109	113	111	109	107	107	107	105	107	110	111	113	111	111	107	103	105	103	104

COMMUNICATIONS RESEARCH LABORATORY. JAPAN

MONTHLY MEDIANS OF H'F AND H'ES

JUL.1990 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	15	23	28	22	15	13	22	26	21								19	20	24	26	23	14		13
MED	358	332	321	321	314	332	298	271	282								322	318	303	285	300	358		352
U Q	372	356	349	350	338	386	314	288	311								348	331	317	304	340	378		385
L Q	340	322	308	290	290	303	274	258	255								234	280	281	266	276	334		339

H'ES

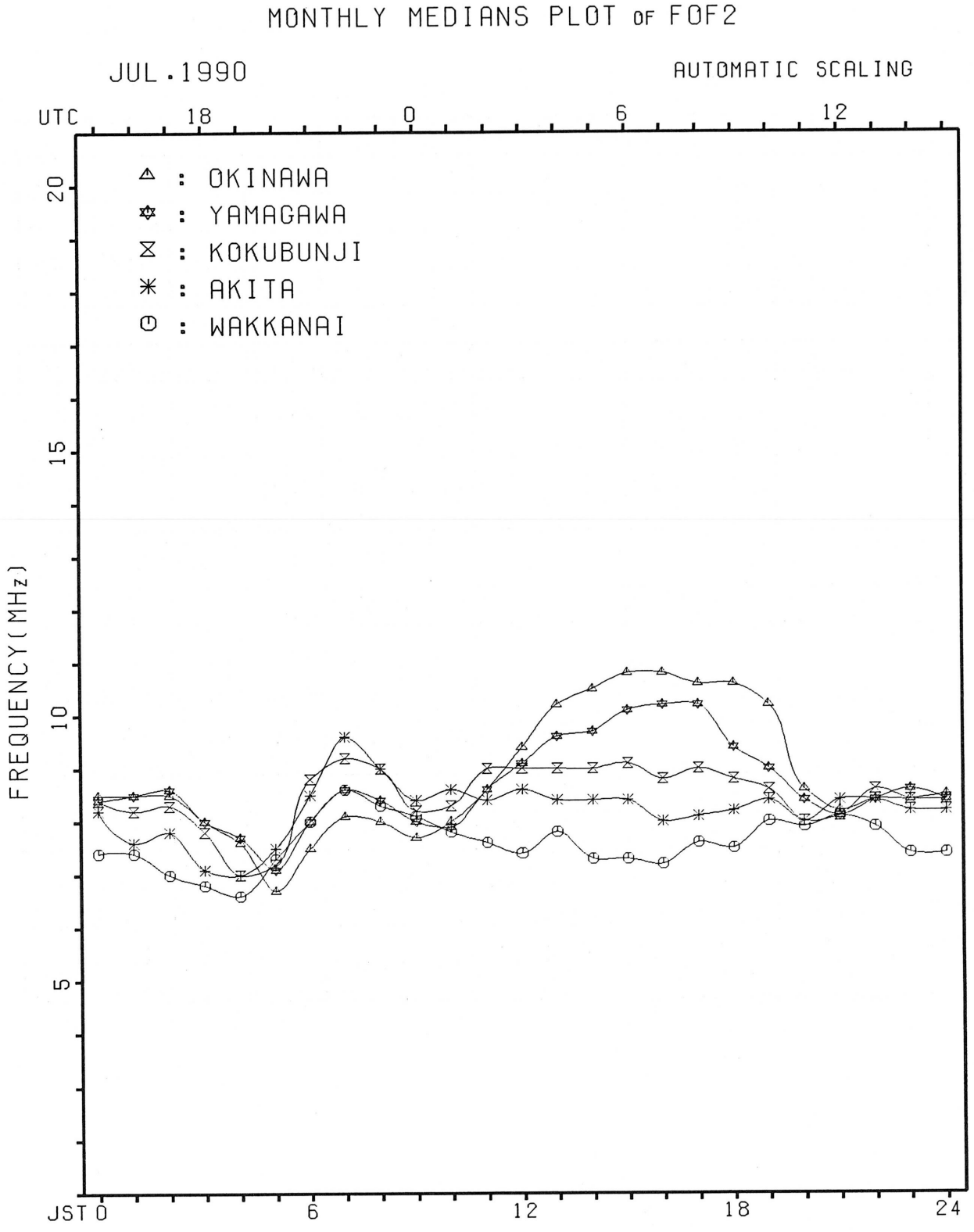
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	24	24	24	23	15	21	25	26	29	24	25	20	22	20	22	26	29	28	29	29	28	27	29
MED	107	107	103	106	107	107	119	115	113	113	111	113	114	114	109	120	117	113	111	111	105	104	107	109
U Q	113	109	107	107	109	117	126	118	117	120	119	125	122	119	115	133	123	121	116	115	112	111	113	114
L Q	101	101	99	98	101	105	108	112	107	111	108	108	107	109	106	111	107	106	104	105	101	101	101	101

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	13	23	25	19	14	11	15	26	20	13							17	24	25	26	17	11	13	14
MED	348	318	300	296	296	314	280	276	282	294							346	335	304	290	308	336	342	346
U Q	364	342	330	310	326	334	296	300	296	334							358	343	313	318	335	350	355	378
L Q	317	302	277	270	266	286	264	258	260	261							331	310	289	272	290	332	306	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	21	22	21	19	15	15	23	29	27	29	27	24	21	23	25	22	23	25	28	29	30	25	26	23
MED	105	102	105	105	109	107	119	117	119	115	115	119	111	121	123	117	119	119	113	111	105	101	101	103
U Q	114	111	108	111	111	109	141	123	121	119	129	127	116	137	138	125	127	124	119	114	111	105	107	113
L Q	99	97	97	97	99	105	111	110	113	111	111	113	107	113	111	109	109	111	111	103	101	99	97	99


MONTHLY MEDIANS PLOT OF FOF2
JUL.1990
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

JUL. 1990 | FXI (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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	98	98	91	89	X 86															A	X 87	97	X 99	X 100
2	98	100	99	X 97	X 97																X 93	X 96	X 99	X 98
3	97	94	90	X 90	91																X 91	91	102	O X 100
4	98	X 98	96	X 93	88																X 89	X 93	X 99	X 97
5	X 97	X 95	X 94	X 87	X 77																X 92	X 95	X 98	X 100
6	X 98	X 101	X 99	X 94	X 90											A					X 85	X 91	A	X 91
7	X 87	89	93	89	80																X 89	X 89	94	99
8	X 99	X 95	X 92	X 88	X 87				86												X 86	X 87	X 90	X 92
9	X 94	X 91	X 86	X 88	X 78								A						A		A	X 88	X 92	X 92
10	X 96	X 94	X 91	X 87	X 76																X 90	92	99	A
11	91	90	X 84	X 79	X 78							A									X 94	X 100	X 99	X 100
12	X 95	X 94	X 92	X 86	X 86																X 97	X 96	X 106	X 115
13	X 118	X 101	X 97	X 90	X 87										A						X 90	X 95	X 93	X 87
14	X 93	X 91	88	87	X 82							A									X 85	X 86	X 88	X 91
15	X 86	X 92	X 94	X 72	X 71							A									X 92	X 91	X 91	X 94
16	91	X 90	X 94	X 90	X 78																X 94	X 94	93	99
17	98	X 101	100	X 91	X 73												A		A	A	O X 95	101	X 104	X 97
18	X 94	93	X 94	92	72																X 105	X 102	X 97	X 93
19	X 93	X 90	X 91	X 91	X 80																X 94	X 97	X 105	X 103
20	X 101	X 99	X 94	X 78	X 69		A	86										A			X 84	X 69	X 71	70
21	79	86	86	78	X 68	63		A													O X 70	X 83	X 84	78
22	X 79	X 72	X 72	X 70	X 67																X 82	X 85	X 82	82
23	80	77	76	77	X 71																X 75	76	80	80
24	X 78	81	79	79	73																X 78	91	97	88
25	93	X 86	83	78	75																X 90	X 90	X 84	84
26	84	88	90	83	79	75						A								X 95	X 92	91	X 90	91
27	X 87	X 88	85	79	77	79													A	X 101	X 100	X 97	X 98	S
28	X 97	X 97	X 94	X 96	91															X 104	X 104	X 101	X 96	X 95
29	X 88	X 84	X 77	X 78	X 71															X 75	X 79	X 79	X 81	X 80
30	X 77	X 86	X 80	X 71	X 69															X 100	X 99	X 90	X 91	X 90
31	X 91	X 90	X 87	X 81	X 72															X 98	X 95	X 91	X 95	X 90
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	3		1	1											6	30	31	30	29
MED	X 93	X 91	X 91	X 87	X 78	75		86	86											X 99	X 90	X 91	X 94	X 92
UQ	X 98	X 96	X 94	X 90	X 86	77														X 101	X 94	X 96	X 99	X 99
LQ	X 87	X 88	86	X 78	X 72	69														X 95	X 85	X 88	X 90	X 88

JUL. 1990 | FXI (0.1 MHZ)

IONOSPHERIC DATA

JUL. 1990 | FOF2 (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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 89	89	F 83	79	80	86	95	101	98	93	95	96	97	100	96	95	93	94	92	I A 82	81	88	93	94
2	F 86	F 94	F 92	91	91	96	S 95	99	101	108	103	99	98	100	99	98	96	94	92	87	88	90	S 93	V 92
3	89	F 85	F 82	S 84	F 82	89	98	102	98	98	98	94	94	97	100	101	99	99	98	96	86	F 84	F 94	U S 94
4	F 89	92	F 84	87	F 81	87	100	101	94	93	98	100	95	91	90	87	88	85	86	86	83	88	93	91
5	91	89	88	81	71	81	98	101	94	90	93	93	90	92	86	85	89	84	81	79	86	89	92	94
6	92	95	93	88	84	85	93	94	96	86	82	84	80	81	79	I A 78	79	81	80	78	79	85	I A 86	85
7	81	F 77	F 85	F 81	F 72	85	99	111	109	98	99	103	108	107	105	103	98	91	91	87	83	83	83	F 91
8	93	89	86	82	81	90	105	104	F 80	97	98	100	100	96	95	95	92	95	96	95	80	V 81	84	86
9	88	85	J S 80	82	72	72	74	78	75	68	69	74	I A 73	75	73	75	76	78	A	80	I A 81	S 82	86	86
10	90	88	85	81	76	83	R 100	R 101	100	97	96	101	101	102	110	112	104	98	100	85	84	F 83	F	I A 85
11	F 83	F 83	77	73	V 72	79	97	110	90	87	R 90	I A 91	98	R 102	106	109	106	101	93	90	J S 88	94	93	94
12	J S 89	88	86	80	80	87	95	R 98	101	99	94	96	104	112	110	108	105	100	102	105	S 91	90	F 96	109
13	112	95	91	84	81	91	101	104	91	80	80	80	88	90	I A 93	96	93	92	92	83	84	89	87	81
14	87	V 85	F 81	F 79	76	77	85	98	98	95	94	I A 92	94	95	91	92	88	85	86	87	79	80	82	85
15	80	86	88	66	65	70	91	94	96	93	82	I A 83	88	83	84	85	82	83	82	86	86	J S 85	84	88
16	F 83	84	88	83	72	78	92	89	91	84	80	84	84	84	84	87	88	91	96	103	88	88	F 86	F 90
17	F 92	S 95	F 92	85	67	S 71	76	R 90	92	79	85	84	88	90	91	92	I A 87	S 86	A	A	S 89	F 93	F 98	91
18	88	86	V 87	F 80	F 62	67	86	98	91	94	102	98	91	92	97	99	103	J R 103	99	99	S 99	96	91	87
19	87	84	85	85	74	76	80	74	68	76	77	82	C	C	103	98	R 99	94	89	94	88	S 91	S 99	97
20	S 95	93	88	72	63	60	A	F 76	80	63	69	59	62	75	81	79	75	I A 80	84	84	78	62	65	F 59
21	F 69	F 79	F 78	F 71	62	F 55	I 62	I A 61	66	71	R 61	69	73	76	79	85	86	86	84	80	S 64	77	78	J F 72
22	J S 73	66	66	64	61	67	84	98	86	H 84	83	90	103	111	109	100	90	89	87	82	76	V 78	S 76	J F 75
23	F 71	F 68	F 69	F 67	65	68	83	94	Z 95	91	92	96	103	99	95	95	96	93	94	90	69	F 69	F 73	F 71
24	U S 72	J F 74	F 71	F 70	F 64	69	I R 73	79	91	84	85	83	85	90	95	96	94	90	V 83	80	72	J F 85	F 86	F
25	F 86	80	F 73	F 69	J F 68	71	91	R 103	114	100	R 76	95	98	105	103	95	90	92	92	88	84	84	78	F 76
26	F 75	U F 77	F 76	F 73	F 69	F 66	81	84	91	91	87	I A 90	94	96	101	103	101	98	90	89	86	F 82	84	83
27	81	82	F 74	F 71	F 68	70	79	85	83	H 79	88	87	90	88	90	88	86	89	I A 93	95	94	91	92	I S 86
28	91	91	88	90	83	77	78	84	78	66	70	76	81	85	87	87	79	S 71	90	S 98	98	95	90	89
29	82	78	71	S 72	65	67	71	64	68	73	65	65	70	72	74	68	67	76	74	69	73	S 73	75	S 74
30	71	80	75	66	63	64	73	87	82	84	83	93	88	78	80	81	80	85	90	94	93	84	85	84
31	85	84	81	75	66	69	89	101	84	H 71	78	82	85	95	88	83	81	84	87	92	89	85	89	84
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	30	31	31	31	31	31	30	30	31	31	31	31	29	30	31	31	30	30
MED	87	85	84	80	72	76	90	98	91	87	85	90	90	92	93	95	90	90	90	87	84	85	86	86
UQ	90	89	88	84	80	85	97	101	97	94	94	96	98	100	100	98	97	94	93	94	88	90	93	91
LQ	81	80	F 76	72	65	68	79	84	82	79	79	82	85	84	85	85	84	84	86	82	80	82	83	83

JUL. 1990 | FOF2 (0.1 MHZ)

IONOSPHERIC DATA

JUL. 1990 | FOF1 (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								L	L	L	600	600	L 600	580	590	560	L 590	L 530	A	A				
2							L		U L 560	L 620	U L 680	660	620	590	R 560	560	A	U L 540	L					
3							L	L	L	A	A	L 640	A	620	610	570	L 560	A	L					
4						L	L	L		610	590	620	L 630	580	580	550	A	L 520	U L 410					
5						L			L	610	580	U L 670	590	580	600	550	560	L	L					
6						L	U L 520	U L 520	540	550	570	580	H 580	560	570	A	550	500	L	A				
7						L	L	A	A	L	A	640	570	580	580	570	L 550	L	L					
8						L	L	A	640	600	600	600	580	590	U L 620	560	550	L 500	L					
9						A	470	490	520	550	560	550	A	550	L 590	530	510	A	A	A				
10						L	A	A	A	U L 610	610	A	590	H 590	550	550	U L 530	L	U L 420					
11							L	L	U L 630		A	A	A	570	U A 560	550	L	U L 510	L					
12							L		A	L	A	580	580	U A 560	A	560	U L 540	A	A					
13								L	A	U L 610	560	570	U A 570	550	A	A	510	L 450	U L 370					
14							L	A	L	570	L 620	A	A	L 580	570	A	U L 520	L	L					
15							L	J L 480	L	L	L	A	A	A	U A 510	520	520	U L 460	A					
16							L		L	A	R 650	580	L 580	540	550	520	L	L	L					
17							L	L	U L 510	A	590	L	550	U A 550	U L 570	550	A	A	A	A				
18							L	A	L	510	L 560	540	A	560	550	L 520	520	L	L					
19							U L 450	L	U L 520	560	L 550	540	C	C	550	530	L 510	L	L					
20						U A 330	A	U A 440	490	520	510	L	550	510	510	490	480	A	A					
21							A	A	490		A	A	L 560	560	550	540	510	L	A	A	A			
22							L	J L 500	A	530	550	U A 550	570	540	530	500	L 540	L 440	L					
23							L	L	A	L 750	U A 540	U A 540	550	550	510	530	500	U A 450	L					
24							U L 360	U L 520	L 500	540	550	560	U L 600	560	580	A	L 510	A	A					
25							L	L	L	A	A	570	R 590	570	550	L	L 510	L	L					
26								L	L 540	A	A	A	A	590	540	540	L 550	L	A					
27								L	L	U L 550	600	600	560	600	580	A	L 550	L	A					
28							U L 430	L 500	540	490	570	L 620	580	560	570	550	L 520	L 470	L					
29						L	410	480	U A 510	U A 510	540	550	550	A	500	550	520	L	L					
30						L	L	U L 480	L 530	U A 540	650	540	630	U L 570	L 590	U L 570	U L 580	U L 510	L					
31							L	L	L 500	L	580	570	580	560	580	L 550	L 540	L	A					
	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						1	6	9	15	19	23	24	23	28	29	25	25	12	3					
MED						U A 330	440	U L 490	L 520	550	580	575	580	565	570	550	L 530	L 500	U L 410					
UQ							470	U L 500	540	610	600	610	590	580	580	560	L 550	L 515	U L 415					
LQ							U L 410	U 480	505	535	555	550	565	550	550	530	510	L 455	U L 390					

JUL. 1990 | FOF1 (0.01 MHZ)

IONOSPHERIC DATA

JUL. 1990 | FOE (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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	A	A	A	A	A	A	A	430	415	395	UA 380	A	A	B				
2						H 225	295	330	370	405	410	425	410	UA 410	A	395	360	310	255	B				
3						A	A 260	A	UA 370	A	A	A	A	A	410	400	A	A	A	B				
4						A	270	330	355	395	405	410	420	410	390	380	355	305	240	B				
5						A	A	A	A	A	A	UA 395	UA 405	A	405	380	355	310	270	B				
6						200	275	320	350	390	A	425	R 425	R 400	410	R 405	360	320	A 240	B				
7						185	275	325	350	A	A	A	A	A	A	380	355	320	245	B				
8						200	280	A 335	A 370	A 400	UA 405	A	A	420	405	A	A	305	235	B				
9						A	270	UA 320	A	A	A	A	A	A	405	385	350	UA 305	A	B				
10						A	A	UA 330	UA 370	A	A	A	A	A	A	380	A	305	235	B				
11						A	275	325	345	350	A	A	A	405	A	380	350	300	UA 215	B				
12						180	275	330	355	385	A	A	A	A	A	A	A	A	A	B				
13						195	270	305	A	A	A	A	A	A	405	UA 350	A	A	A	B				
14						200	270	320	UA 340	375	UA 390	UA 400	390	380	UA 365	A	A	A	230	B				
15						200	270	UA 340	A	A	A	UA 400	415	A	A	A	A 335	300	A	B				
16						A	255	315	360	380	385	A	A	405	390	365	340	280	A	B				
17						UA 175	265	310	360	A	A	A	A	A	A	385	345	A	A	B				
18						A	265	UA 330	A	A	A 390	A	A	A	A	A	A	A	230	B				
19						180	255	305	340	370	395	405	C	C	380	365	340	285	225	B				
20						165	265	310	350	UA 370	A	A	A	A	A 400	365	335	275	220	B				
21						180	260	A	A	A	A	A	A	A	395	370	345	285	A	B				
22						A	260	310	A	UA 365	375	UA 390	A	UA 395	A	A	A	A	A	B				
23						180	265	315	A	A 360	A	A	A	A	395	380	345	300	UA 215	B				
24						195	260	330	A	375	390	400	410	405	400	375	350	310	UA 230	B				
25						A	255	310	A	A	A	A	405	400	390	375	350	300	A	B				
26						180	270	320	350	UA 385	A	A	UA 395	395	400	380	350	305	235					
27						A	A	A	A 350	UR 370	410	405	410	405	405	380	355	305	A					
28						160	270	310	345	A	400	A	A	A	UA 390	A 405	345	300	A					
29						A	250	A	A 355	UA 370	A	A	A 400	405	385	370	340	305	235					
30						195	255	305	345	375	400	415	415	410	400	380	355	345	UA 230					
31						A	A	A	A 345	UA 365	A 365	400	410	405	400	370	345	300	UA 220					
	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	26	24	20	18	13	12	13	16	22	25	23	23	18					
MED						185	268	320	350	375	395	402	410	405	400	380	350	305	232					
UQ						200	270	330	360	385	405	412	415	410	405	385	355	308	240					
LQ						180	260	310	345	UA 370	390	UA 400	405	400	390	370	345	300	UA 225					

JUL. 1990 | FOE (0.01 MHZ)

IONOSPHERIC DATA

JUL. 1990 | FOES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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	JA 53	JA 59	JA 42	JA 27	JA 58	JA 30	JA 53	62	62	JA 49	58	JA 51	JA 63	50	JA 53	48	JA 52	JA 57	JA 68	85	JA 53	JA 60	JA 85	JA 65
2	JA 84	JA 54	JA 19	JA 15	JA 20	G	34	JA 53	JA 55	JA 55	51	48	JA 63	52	JA 57	45	JA 76	JA 48	JA 42	36	36	JA 50	JA 55	JA 43
3	JA 57	JA 54	JA 42	JA 33	JA 22	JA 24	JA 41	JA 62	JA 66	JA 111	114	JA 68	JA 78	JA 55	G	G	JA 48	JA 80	JA 37	JA 43	JA 74	JA 118	JA 66	JA 84
4	JA 41	JA 42	JA 23	JA 25	JA 30	JA 33	JA 29	35	39	43	43	47	49	45	G	G	JA 71	36	31	26	JA 27	21	JA 20	JA 33
5	JA 27	27	JA 26	JA 27	EB 13	JA 34	34	JA 47	JA 43	JA 49	JA 55	JA 54	43	43	46	44	JA 52	33	JA 31	JA 50	JA 27	JA 50	JA 28	JA 21
6	21	EB 13	EB 14	21	JA 15	24	33	JA 47	JA 53	43	44	45	46	G	54	79	45	JA 44	32	65	39	JA 67	JA 127	JA 78
7	JA 65	JA 45	JA 50	JA 44	JA 20	33	JA 40	JA 74	74	JA 71	JA 107	JA 56	JA 49	JA 50	JA 52	G	G 33	37	JA 34	JA 26	JA 44	35	JA 51	JA 64
8	JA 85	JA 27	JA 26	JA 41	JA 36	22	JA 42	JA 83	JA 170	JA 191	JA 133	JA 55	JA 54	G	53	JA 55	JA 53	JA 70	JA 35	JA 26	JA 45	JA 51	JA 34	JA 40
9	JA 35	JA 43	JA 36	JA 20	JA 24	JA 52	33	JA 52	JA 49	42	41	JA 52	JA 104	JA 51	JA 91	54	JA 84	JA 125	113	JA 121	JA 121	JA 95	JA 33	EB 14
10	EB 13	JA 17	JA 20	JA 23	JA 24	JA 27	JA 63	70	JA 73	JA 133	JA 120	JA 91	JA 62	JA 52	JA 46	G	36	G 29	JA 37	JA 40	JA 72	JA 61	JA 122	JA 127
11	JA 66	JA 34	JA 32	JA 45	JA 53	JA 43	30	JA 50	40	JA 92	JA 113	206	JA 84	49	JA 72	JA 44	45	JA 47	43	JA 41	JA 30	JA 33	22	EB 16
12	JA 51	JA 52	JA 50	JA 40	JA 35	24	34	JA 63	JA 65	JA 84	92	61	JA 72	72	JA 67	JA 58	36	JA 48	JA 70	JA 70	JA 30	JA 75	JA 53	JA 29
13	JA 21	JA 24	EB 13	EB 13	JA 31	22	JA 43	JA 55	JA 140	JA 55	JA 87	JA 54	JA 71	49	JA 170	JA 99	JA 119	JA 83	50	JA 44	JA 29	JA 29	JA 24	JA 26
14	JA 23	JA 34	JA 24	JA 17	JA 18	G	JA 37	84	JA 101	JA 64	JA 63	111	JA 86	JA 119	JA 55	JA 130	JA 67	JA 35	G 23	JA 18	JA 42	JA 25	32	JA 55
15	JA 27	JA 34	JA 20	JA 20	EB 14	22	G	JA 54	JA 45	JA 58	JA 112	96	JA 80	JA 77	JA 72	JA 51	JA 50	JA 42	JA 71	JA 52	JA 53	JA 65	JA 53	JA 52
16	JA 54	JA 46	JA 34	JA 33	JA 22	JA 50	30	34	38	53	JA 52	JA 50	JA 55	JA 59	G	45	JA 52	JA 50	JA 36	JA 24	JA 53	JA 87	JA 65	JA 51
17	JA 45	JA 52	JA 52	JA 36	JA 36	JA 23	33	JA 54	JA 52	JA 54	JA 86	JA 86	JA 68	JA 68	JA 58	JA 51	JA 132	JA 133	151	121	JA 130	JA 54	JA 27	JA 56
18	JA 44	JA 35	JA 30	JA 21	JA 39	26	JA 41	JA 58	JA 53	JA 54	JA 82	JA 62	JA 71	JA 60	JA 43	JA 45	40	JA 60	JA 45	JA 29	JA 31	JA 28	JA 38	JA 28
19	JA 27	JA 21	23	23	EB 12	G	G	G	38	40	44	50	C	C	41	44	JA 49	JA 46	JA 43	JA 23	43	JA 33	JA 53	JA 29
20	JA 26	JA 43	JA 52	JA 46	JA 55	JA 36	JA 118	JA 77	JA 52	JA 109	JA 71	JA 52	47	JA 45	46	40	JA 53	JA 123	JA 49	JA 118	JA 31	JA 24	JA 64	JA 66
21	JA 52	JA 86	JA 43	JA 44	JA 29	JA 43	JA 52	74	JA 74	JA 100	JA 78	JA 96	41	JA 44	JA 53	JA 57	JA 70	JA 85	JA 120	JA 122	JA 89	JA 66	JA 51	JA 41
22	JA 24	22	20	19	EB 13	23	JA 46	JA 56	JA 110	JA 72	JA 44	JA 73	JA 51	43	JA 46	JA 53	60	JA 50	JA 35	JA 75	JA 88	JA 52	JA 99	JA 79
23	JA 67	JA 42	JA 26	JA 19	JA 14	G	30	JA 45	JA 79	JA 57	JA 75	JA 83	JA 67	JA 63	JA 53	47	JA 56	JA 48	JA 42	JA 57	JA 34	JA 51	JA 39	JA 72
24	JA 84	JA 49	JA 26	JA 21	JA 21	G	30	G	JA 43	46	JA 53	JA 51	JA 52	JA 53	JA 64	JA 118	JA 86	JA 68	JA 86	JA 110	JA 66	JA 121	JA 56	JA 87
25	JA 42	JA 36	JA 37	JA 34	JA 23	JA 31	29	JA 46	JA 79	JA 99	137	JA 163	48	51	JA 60	JA 73	JA 65	JA 51	JA 57	JA 58	JA 104	JA 65	JA 65	JA 44
26	JA 50	JA 51	JA 30	EB 13	JA 20	G	32	38	44	JA 97	72	106	JA 69	JA 62	46	G	G	JA 55	JA 53	JA 52	31	JA 66	56	JA 42
27	JA 52	JA 26	JA 27	JA 22	JA 32	JA 37	JA 42	JA 37	38	G 36	44	47	52	44	G	JA 75	JA 55	JA 53	JA 123	JA 49	JA 48	JA 25	22	22
28	JA 50	JA 66	JA 27	JA 25	18	G	G 23	35	JA 45	43	46	JA 77	43	JA 60	JA 56	JA 55	38	JA 58	JA 42	30	JA 51	32	23	EB 13
29	JA 33	JA 21	JA 36	JA 26	22	24	32	JA 42	JA 67	JA 61	JA 46	JA 53	49	JA 70	46	42	46	JA 43	29	JA 26	JA 41	JA 28	JA 57	JA 30
30	JA 54	JA 46	33	JA 43	JA 23	G	30	JA 56	G	JA 55	JA 55	53	JA 54	45	JA 50	JA 53	40	40	JA 55	JA 34	JA 27	25	JA 22	JA 18
31	JA 24	JA 23	JA 19	JA 19	JA 35	21	JA 45	34	41	JA 51	45	G	43	G	47	43	JA 46	JA 55	JA 55	43	JA 59	JA 64	62	JA 36
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	30	30	31	31	31	31	31	31	31	31	31	31
MED	JA 45	JA 42	JA 27	JA 25	JA 23	24	34	JA 53	JA 53	JA 55	JA 63	JA 55	JA 54	JA 51	JA 53	48	JA 52	JA 50	JA 43	JA 44	JA 44	JA 51	JA 53	JA 42
UQ	JA 54	JA 50	JA 35	JA 35	JA 34	JA 33	JA 42	JA 62	JA 74	JA 88	JA 90	JA 84	JA 71	JA 60	JA 58	JA 56	JA 66	JA 64	JA 62	JA 68	JA 62	JA 66	JA 63	JA 64
LQ	JA 27	JA 26	JA 23	JA 20	JA 19	EG 21	30	JA 40	43	49	46	JA 51	49	45	46	44	45	JA 44	JA 36	JA 30	JA 31	JA 30	JA 30	JA 28

JUL. 1990 | FOES (0.1 MHZ)

IONOSPHERIC DATA

JUL. 1990 | FBES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24sec in automatic operation

Hour / Day	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	40	28	23	23	17	25	41	51	53	47	49	49	51	46	51	43	G 38	39	40	A A 85	42	48	42	20
2	33	17	E B 13	E B 12	E B 13	G	32	43	50	52	50	46	55	48	50	44	74	42	36	32	30	16	33	17
3	26	44	24	25	20	21	33	44	43	96	79	56	67	46	G	G	43	50	28	33	46	18	42	44
4	17	20	15	16	15	28	G 25	34	38	41	42	45	44	43	G	G	64	33	30	21	24	E B 14	E B 16	28
5	17	18	20	17	E B 13	31	33	40	40	43	43	51	42	U Y 42	43	42	44	35	G 20	20	17	29	18	E B 13
6	E B 13	E B 13	E B 14	E B 13	E B 12	21	31	35	44	G	43	45	46	G	52	A A 79	40	39	30	62	21	50	A A 127	37
7	35	22	20	21	E B 13	30	33	64	62	53	64	53	46	47	43	G	G 33	34	31	19	16	27	18	27
8	45	20	16	19	19	22	37	78	55	48	50	44	45	G	47	41	37	33	G 18	19	19	27	16	22
9	17	24	19	E B 12	E B 13	37	31	43	43	42	41	42	A A 104	50	52	50	47	50	A A 113	63	A A 121	71	19	E B 14
10	E B 13	E B 13	E B 13	20	19	24	56	67	70	47	45	66	45	44	41	G	35	G 27	29	25	35	44	51	A A 127
11	18	22	25	23	24	26	29	43	40	63	82	A A 206	65	42	56	G 29	40	37	34	33	18	17	19	E B 16
12	30	30	38	30	26	22	30	42	51	50	82	54	54	56	61	50	35	44	54	52	20	36	24	E B 13
13	E B 13	E B 13	E B 13	E B 13	16	21	38	41	64	42	49	49	57	44	A A 170	74	44	42	27	27	19	25	18	16
14	20	16	19	16	E B 14	G	31	68	47	53	58	A A 111	77	47	49	79	45	30	G 21	16	16	16	20	21
15	21	19	19	E B 16	E B 14	22	G	35	41	50	52	A A 96	70	74	51	39	39	34	49	37	40	31	20	17
16	E B 13	E B 14	21	17	19	32	30	34	37	51	43	42	51	51	G	42	49	45	32	21	34	44	32	30
17	31	40	30	33	25	G 17	33	36	43	50	53	47	50	55	48	41	A A 132	66	A A 151	A A 121	79	49	17	41
18	22	26	19	16	18	22	35	45	39	41	51	51	62	44	45	40	37	41	33	16	23	23	21	26
19	23	18	17	E B 13	E B 12	G	G	G	G 31	40	41	46	C	C	40	42	37	42	31	20	27	26	15	20
20	20	28	39	35	17	33	A A 118	44	39	41	41	42	45	40	44	40	42	A A 123	38	30	16	17	40	39
21	27	54	27	26	23	32	46	A A 74	40	61	52	51	40	40	43	49	57	59	43	72	50	38	27	24
22	18	E B 13	E B 13	E B 13	E B 13	20	35	41	53	44	42	55	42	43	42	44	48	39	33	48	34	41	62	55
23	36	22	18	E B 13	E B 13	G	30	39	64	45	54	54	43	47	47	41	42	45	35	36	19	26	24	52
24	50	33	16	E B 13	E B 13	G	30	G	36	42	43	44	45	46	43	55	45	47	36	22	41	43	46	66
25	34	19	23	19	E B 14	25	29	37	51	75	66	46	42	50	50	48	40	37	38	44	31	44	41	29
26	35	21	20	E B 13	E B 13	G	30	34	40	84	64	A A 106	66	52	46	G	G	40	51	35	20	45	21	20
27	22	19	E B 13	E B 13	17	20	31	34	38	G 32	42	45	44	43	G	65	51	33	A A 123	27	22	17	E B 14	E B 14
28	35	42	21	18	E B 13	G	G 22	35	40	41	44	46	43	51	53	46	36	36	24	21	22	17	17	E B 13
29	31	E B 13	31	21	E B 17	21	27	34	51	51	42	44	47	62	43	41	40	33	28	19	33	15	33	22
30	29	29	20	18	16	G	29	39	G	54	45	47	51	42	45	44	38	40	28	17	19	E B 13	19	E B 13
31	20	E B 13	16	16	22	20	33	33	39	43	43	G	43	G	46	41	42	40	53	33	29	29	41	23
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	30	30	31	31	31	31	31	31	31	31	31	31
MED	23	20	19	17	16	21	31	40	43	47	49	47	46	46	46	42	42	40	33	30	24	27	21	22
UQ	34	28	23	21	19	26	34	44	51	52	54	54	57	50	50	48	46	44	42	40	34	44	40	34
LQ	18	16	16	E B 13	E B 13	E G 17	30	34	39	42	43	45	44	42	43	40	38	34	28	20	19	17	18	16

JUL. 1990 | FBES (0.1 MHZ)

IONOSPHERIC DATA

JUL. 1990 | FMIN (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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	14	14	12	13	15	16	17	17	21	35	34	31	28	27	21	17	17	13	13	15	15	15	13
2	13	13	13	12	13	16	16	18	19	25	33	34	32	34	26	21	22	17	17	14	13	13	13	13
3	13	14	14	13	14	13	17	18	20	27	33	35	32	33	23	24	20	16	16	14	14	14	13	13
4	13	13	13	13	13	14	15	16	18	26	28	22	31	33	26	21	21	16	17	14	15	14	16	14
5	13	13	13	13	13	15	19	17	18	22	22	29	28	37	26	20	20	18	17	14	13	13	13	13
6	13	13	14	13	12	15	17	16	21	20	23	40	34	29	35	35	19	17	17	15	14	12	13	13
7	12	13	13	13	13	15	16	17	17	21	34	27	31	26	23	21	20	17	14	13	13	13	13	13
8	15	13	13	13	13	17	18	18	20	20	34	30	33	27	22	21	16	14	13	14	15	12	12	13
9	14	13	12	12	13	16	16	19	21	32	25	31	31	30	30	25	18	16	16	13	13	13	13	14
10	13	13	13	13	13	14	16	18	20	21	26	30	31	32	21	24	18	14	14	15	13	13	14	13
11	13	13	13	12	13	15	18	17	20	19	21	23	23	24	21	19	18	13	15	13	15	14	14	16
12	15	13	13	13	13	13	16	16	17	21	22	31	33	30	27	22	22	16	16	14	15	13	13	13
13	13	13	13	13	13	13	17	17	20	19	23	28	31	30	34	25	17	17	16	15	13	15	14	14
14	15	13	13	14	14	17	18	16	18	22	21	36	33	30	25	23	17	16	14	13	13	13	13	15
15	14	13	13	16	14	17	16	17	20	20	24	26	26	24	17	18	19	14	13	14	13	13	14	14
16	13	14	13	13	13	13	16	17	21	22	26	25	23	27	28	25	19	16	15	13	13	14	13	13
17	15	15	13	13	14	14	16	16	18	20	21	21	20	21	21	17	16	15	13	13	13	14	13	13
18	13	13	15	13	13	13	14	16	18	21	18	25	34	31	29	21	21	14	14	13	13	13	13	13
19	12	13	13	13	12	15	16	16	17	23	28	26	C	C	21	21	18	16	13	14	13	13	13	13
20	13	13	14	12	13	14	15	17	17	22	25	25	27	25	27	21	17	15	13	13	13	13	15	14
21	14	13	13	13	13	14	16	13	18	20	20	28	31	24	24	21	18	17	15	13	13	14	14	14
22	13	13	13	13	13	14	17	17	19	20	21	30	22	23	31	19	18	15	13	12	14	13	13	13
23	13	13	13	13	13	13	16	18	17	21	22	20	22	28	21	20	20	16	14	13	15	14	13	14
24	13	13	13	13	13	16	16	21	18	21	21	26	23	34	25	20	18	18	13	13	13	13	13	13
25	13	13	14	13	14	13	15	16	17	22	20	24	24	37	27	20	20	19	17	13	13	13	13	13
26	14	14	14	13	13	15	16	16	22	34	35	35	33	32	28	21	20	18	17	16	13	13	13	13
27	13	13	13	13	13	13	13	13	17	21	27	27	25	28	23	19	17	15	14	15	13	14	14	14
28	13	13	13	13	13	11	13	16	20	22	22	28	34	31	22	21	19	16	14	14	14	13	13	13
29	14	13	13	13	17	13	16	17	20	21	23	34	28	22	22	21	19	16	15	13	13	13	15	13
30	14	13	13	12	13	13	17	18	18	24	24	34	30	26	23	21	19	26	17	13	13	13	14	13
31	14	13	14	13	12	14	17	18	27	24	22	26	27	32	23	23	18	17	14	13	14	13	14	12
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	30	30	31	31	31	31	31	31	31	31	31	31
MED	13	13	13	13	13	14	16	17	18	21	23	28	31	30	25	21	19	16	14	13	13	13	13	13
UQ	14	13	14	13	13	15	17	18	20	22	28	32	32	32	27	22	20	17	16	14	14	14	14	14
LQ	13	13	13	13	13	13	16	16	18	20	22	26	25	26	22	20	18	15	14	13	13	13	13	13

JUL. 1990 | FMIN (0.1 MHZ)

IONOSPHERIC DATA

JUL. 1990 | M(3000)F2 (0.01)

135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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 255	280	F 285	270	275	295	285	295	270	255	255	255	250	270	260	265	275	275	285	A	250	240	260	265
2	F 265	F 275	F 280	275	280	290	S 290	265	270	260	255	250	245	250	260	260	265	265	285	265	255	245	S 265	V 260
3	260	F 265	F 245	270	F 270	270	275	270	275	A	265	255	250	250	255	260	260	270	270	275	265	F 235	F 250	U S 280
4	F 265	275	F 275	280	F 265	260	280	275	255	240	250	260	255	255	255	270	275	280	275	275	245	240	255	255
5	260	270	275	270	250	245	280	275	270	250	250	250	260	260	260	265	260	270	265	260	255	255	245	250
6	245	260	270	270	255	250	245	255	265	270	255	250	260	265	265	A	270	280	285	275	250	245	A	265
7	260	F 245	F 265	F 265	F 260	260	280	270	280	250	245	245	255	260	260	260	270	265	285	280	255	250	250	F 260
8	270	275	270	265	270	260	285	275	F 210	265	250	260	265	260	260	265	260	275	275	290	250	V 245	250	250
9	260	255	J S 270	260	260	260	250	255	280	260	240	270	A	265	265	275	280	280	A	275	A	S 260	255	255
10	265	270	275	270	270	270	R 285	R 305	285	260	255	265	260	250	255	270	265	270	295	275	270	F 270	F	A
11	F 270	F 275	270	270	V 250	265	280	300	290	275	R 285	A	260	R 265	265	275	280	280	285	275	J S 270	260	265	275
12	J S 275	270	275	280	270	285	300	R 285	285	280	260	260	260	275	270	265	265	270	275	290	S 295	250	F 265	270
13	300	295	290	280	275	285	290	295	270	255	255	255	250	255	A	260	270	285	295	270	260	265	275	265
14	275	V 265	F 270	F 275	275	275	290	260	275	275	265	A	270	280	270	280	280	290	295	290	265	270	250	260
15	255	275	295	275	265	270	295	305	280	275	265	I A 270	275	A 275	270	280	275	285	280	280	265	J S 255	260	270
16	F 265	265	280	285	270	280	295	290	280	310	270	280	275	280	270	285	280	285	285	295	265	270	F 275	F 280
17	F 285	S 285	F 295	320	290	S 295	315	R 320	320	290	275	275	270	275	270	280	I A 280	S 285	A	A	S 285	F 265	F 285	275
18	270	275	V 285	F 300	F 280	270	285	305	265	260	280	270	270	265	275	270	280	J R 290	290	285	S 285	285	275	270
19	270	265	270	290	295	310	325	310	315	260	295	270	C	C	280	280	R 275	295	285	285	275	S 270	S 265	270
20	S 270	260	285	275	260	250	A	F 260	290	250	290	300	235	265	285	300	285	A	285	285	300	270	265	F 240
21	F 260	F 270	F 305	F 330	300	F 295	Z 260	A	280	285	R 290	270	280	280	285	300	300	310	305	A 305	S 260	260	275	J F 270
22	J S 260	270	280	275	275	305	285	310	285	H 245	260	250	260	275	285	295	290	300	305	300	270	V 265	S 280	J F 275
23	F 280	F 265	F 275	F 280	290	290	295	295	Z 275	255	255	260	265	270	265	275	275	295	295	310	255	F 260	F 275	F 280
24	U S 270	J F 270	F 280	F 290	F 305	320	I R 300	280	300	290	290	275	265	280	275	285	285	305	V 315	290	275	J F 270	F 280	F
25	F 295	285	F 300	F 290	J F 280	280	290	R 290	305	260	R 305	260	265	265	275	270	275	285	295	295	265	265	275	F 265
26	F 270	U F 270	F 280	F 290	F 285	F 290	295	310	305	A 290	265	A	255	255	260	270	275	280	285	275	270	F 275	270	270
27	270	275	F 290	F 290	F 275	305	305	320	310	H 285	265	265	275	265	265	265	265	265	A	280	275	270	275	I S 270
28	265	270	255	270	275	285	300	315	315	335	255	255	255	270	270	275	260	S 220	255	S 275	265	275	255	275
29	255	245	245	S 250	245	245	255	225	240	265	240	230	250	265	270	260	255	280	235	255	250	S 250	255	S 250
30	250	275	285	245	260	275	280	325	315	310	285	290	270	290	275	290	280	290	285	275	295	270	265	265
31	265	270	275	285	275	275	280	310	320	H 290	270	270	260	285	280	285	280	270	280	275	275	265	270	270
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	30	30	31	30	31	28	29	30	30	30	31	30	28	29	30	31	29	29
MED	265	270	275	275	275	275	285	292	280	265	265	260	260	265	270	272	275	280	285	280	265	265	265	270
UQ	270	275	F 285	288	280	290	295	310	302	285	278	270	270	275	275	280	280	290	295	290	275	270	275	270
LQ	260	265	270	270	262	262	280	270	270	255	255	255	255	260	260	265	265	270	280	275	255	250	255	260

JUL. 1990 | M(3000)F2 (0.01)

IONOSPHERIC DATA

JUL. 1990 | M(3000)F1 (0.01)

135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								L	L	L	350	350	L 315	350	A 325	350	L 305	L 320	A	A				
2							L		A	L 330	U L 315	H 325	A 315	340	R 330	335	A	U L 320	L					
3							L	L	L	A	A	A	A	350	335	350	L 320	A	L					
4						L	L	L		350	365	H 350	L 340	360	360	340	A	L 325	U L 330					
5						L			L	340	360	U L 305	375	365	H 335	360	A 320	L	L					
6						L	U L 325	310	345	380	H 360	365	H 365	375	A	A	320	325	L	A				
7						L	L	A	A	L	A	335	370	360	A 340	335	L 320	L	L					
8						L	L	A	A 275	330	340	355	360	350	U L 305	335	335	L 325	L					
9						A	310	350	A 340	375	345	375	A	A 355	A	A	A	A	A	A				
10						L	A	A	A	U L 340	345	A	360	H 360	355	340	U L 335	L	L					
11							L	L	U L 350		A	A	A	350	A	350	L	U L 340	L					
12							L		A	L	A	A	A 305	A	A	A 325	U L 330	A	A					
13								L	A	U L 320	355	330	A	360	A	A	A 325	A	U L 340					
14							L	A	L	A	A	A	A	L 330	A 340	A	A	L	L					
15							L	U L 345	L	L	L	A	A	A	A	350	330	U L 330	A					
16							L		L	A	R 335	350	A	A	350	345	L	L	L					
17							L	L	U L 365	A	A 345	L	365	A	U L 345	H 350	A	A	A	A				
18							L	A	L	405	A	A	A	H 375	360	L 350	340	L	L					
19							L	L	U L 365	345	L 355	360	C	C	H 355	360	L 330	L	L					
20						A	A	A	360	370	380	L	H 355	380	370	370	H 345	A	A					
21							A	A	345		A	A	A	365	355	355	A	L	A	A	A			
22							L	U L 350	A	375	H 375	A	H 360	370	360	370	L 360	A	L					
23							L	L	A	L 300	A	A	H 380	A 350	A 375	350	360	A	L					
24							A	U L 365	L 375	375	390	H 380	U L 335	365	330	A	A	A	A					
25							L	L	L	A	A	380	R 360	A 325	A 350	L	L 345	L	L					
26								L	L 360	A	A	A	A	A 320	415	370	L 325	L	A					
27								L	L	U L 375	360	H 350	385	345	350	A	A	L	A					
28							U L 345	L 370	360	L 425	365	L 315	370	A 370	A	A	L 335	A	L					
29						L	315	320	A	A	360	385	355	A	385	345	340	L	L					
30						L	L	U L 365	L 360	A	350	390	340	U L 370	L 345	U L 340	U L 325	U L 335	L					
31							L	L	L 385	L	H 360	370	370	H 375	335	L 340	L 335	L	A					
	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	8	13	16	20	18	21	25	24	22	21	8	2					
MED							320	U L 350	L 360	360	358	352	360	360	350	350	L 330	L 325	U L 335					
UQ							335	L 365	L 365	375	362	375	370	370	360	350	L 340	U L 332						
LQ							312	U L 332	345	335	345	335	340	350	335	340	L 325	L 322						

JUL. 1990 | M(3000)F1 (0.01)

IONOSPHERIC DATA

JUL. 1990 | H'F2 (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24sec in automatic operation

Hour / Day	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								280	330	L 360	390	390	385	365	385	370	360	350	300	A				
2							260		310	385	380	410	415	415	375	380	E A 385	355	305					
3							315	290	340	A	A 405	415	415	430	405	375	370	340	310					
4						350	300	290		455	395	385	410	400	405	380	A 365	355	315					
5						L 380			330	420	420	420	410	380	410	410	380	L 325	L 365					
6						355	390	360	365	370	435	430	430	420	420	A	390	350	310	A				
7						350	290	335	300	L 385	410	425	380	365	380	365	340	350	310					
8						310	290	E A 315	635	370	390	370	365	390	390	380	370	350	315					
9						355	420	405	350	430	505	435	A	425	460	390	355	340	A	A				
10						320	305	270	330	345	405	370	370	385	370	330	330	345	295					
11							305	280	L 330		A	A	375	355	355	335	320	305	305					
12							270		305	290	A	380	370	340	340	340	340	305	A 305					
13								280	A 325	420	435	425	430	410	A	E A 400	345	320	280					
14							280	E A 340	310	325	370	A	A	360	375	A	335	320	305					
15							295	285	330	310	370	A	A 365	E A 420	380	350	370	320	A 310					
16							265		295	300	435	370	365	355	380	350	345	320	300					
17							245	275	280	285	380	390	380	365	370	340	A	E A 365	A	A				
18							L 315	265	H 255	330	350	325	365	380	360	340	330	310	290					
19							270	L 275	290	405	330	390	C	C	325	330	330	305	275					
20						415	A	405	335	495	370	L	565	410	360	325	355	A	300					
21							A 420	A	405	A 375	E A 350	430	380	375	370	320	325	300	285	A				
22							290	285	285	H 315	370	410	380	335	320	305	325	280	275					
23							295	275	A 330	455	390	375	360	350	365	355	345	315	290					
24							225	L 325	290	315	345	385	385	360	355	335	325	305	265					
25							300	270	290	E A 365	E A 335	365	375	365	330	365	330	300	280					
26								270	300	A	E A 365	A	A 400	395	380	355	340	305	A 290					
27								260	270	310	385	405	385	395	405	A 390	360	335	A					
28							300	285	300	265	480	435	425	390	380	375	400	530	L 320					
29						405	380	560	485	410	545	565	485	E A 435	405	450	455	355	305					
30						330	305	270	275	310	400	315	380	300	380	340	350	330	305					
31							310	275	255	L 260	400	390	410	350	350	325	350	L 330	A 310					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						10	25	26	30	28	29	26	28	30	30	29	30	30	28					
MED						352	300	281	310	357	390	390	382	375	378	352	346	325	305					
UQ						380	310	U 308	330	408	410	425	412	402	390	378	368	350	310					
LQ						330	280	275	290	310	370	375	372	360	360	335	330	305	290					

JUL. 1990 | H'F2 (KM)

IONOSPHERIC DATA

JUL. 1990 | H'F (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24sec in automatic operation

Hour / Day	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 350	A 300	280	305	285	260	A 255	A	A	A 270	A 250	H 210	A	220	A	230	240	A 255	A	A	A 350	E A 395	E A 345	300
2	A 350	285	265	270	270	255	240	A 255	A	E A 280	A 240	H 210	A	A 250	E A 290	250	A	A 280	E A 280	A 290	A 305	320	A 340	315
3	330	365	350	325	295	265	230	A 270	A 240	A	A	A	A	220	215	H 230	E A 275	A	260	A 270	A 320	330	E A 390	E A 340
4	305	300	280	285	300	A 275	230	240	230	205	205	H 190	215	225	210	210	A	245	A 255	280	300	335	320	340
5	320	305	290	280	330	E A 305	250	255	225	210	205	E A 280	200	240	H 200	220	E A 275	260	270	310	315	A 330	335	325
6	340	310	290	280	310	260	250	230	A 255	205	H 200	H 205	H 230	H 190	A	A	240	A 265	265	A	305	A	A	A 330
7	A 325	360	305	A 315	310	280	255	A	A	E A 280	A	E A 275	235	225	A 265	235	240	235	A 280	270	275	A 330	335	A 340
8	A 330	290	280	285	300	275	265	A	A	A 245	A 265	H 200	230	215	E A 280	225	225	A 255	265	260	270	A 355	330	335
9	315	335	305	310	295	A	255	A 255	E A 275	225	235	210	A	E A 275	A	A	A	A	A	A	A	A	310	315
10	305	295	295	285	300	280	A	A	A	A 250	225	A	210	H 205	215	230	220	245	260	255	330	E A 345	A	A
11	310	280	A 310	320	335	265	240	A 240	H 210	A 360	A	A	A	215	A	220	235	A 255	E A 265	A 280	275	295	305	290
12	310	310	A 310	270	300	255	240	A 270	A	A	A	A	A	A	A	A	220	A	A	E A 285	255	E A 340	A 355	300
13	255	250	245	265	280	260	A 250	240	A	H 215	E A 270	E A 275	A	255	A	A	A	A	A 250	270	290	300	260	280
14	290	280	300	290	275	255	235	A	A	A	A	A	A	E A 255	E A 280	A	A	230	255	260	260	300	330	325
15	320	305	255	225	315	265	250	235	240	A	A	A	A	A	A	240	250	A 260	A	A 275	A 315	A 310	315	285
16	300	305	285	250	275	A 290	255	235	225	A	225	215	A	A	220	240	A	A	E A 280	260	260	E A 330	315	310
17	300	A 305	280	255	275	250	250	220	225	A	A	A 250	A 255	A	E A 260	H 190	A	A	A	A	A	A 340	265	A 310
18	315	A 310	280	255	245	270	A 250	A	240	205	A	A	A	H 200	A 250	230	245	A	A	260	270	260	260	A 300
19	A 315	310	305	270	240	250	H 220	H 200	205	195	220	A 250	C	C	H 200	220	225	A	A 260	260	280	325	315	290
20	300	280	A 275	A 300	310	A	A	A	230	210	200	190	H 230	225	A 250	240	E A 260	A	A	270	245	235	E A 350	A
21	A 360	E A 375	260	250	265	E A 275	A	A	A 250	A	A	A	205	220	235	A	A	A	A	A	A	E A 345	A 305	A 315
22	300	290	290	290	280	260	E A 270	E A 270	A	215	H 205	A	H 200	220	220	A 245	E A 270	A	A	E A 270	A 310	E A 340	A	A
23	A 330	A 345	295	265	260	260	225	A 235	A	A 255	A	A	H 185	E A 275	E A 265	230	A 260	A	A	250	245	A 350	315	A
24	E A 380	310	285	275	255	255	A	H 215	200	205	190	H 190	A 240	240	240	A	A	A	A	255	A 310	E A 355	E A 310	A
25	285	270	270	290	270	265	255	245	A	A	A	200	200	A	A	A	E A 235	A	A	E A 265	E A 300	E A 325	E A 320	A 325
26	A 330	320	285	250	250	220	220	220	H 215	A	A	A	A	A	200	205	H 200	E A 280	A	A 285	285	A 340	300	310
27	305	305	270	255	280	255	235	235	220	200	H 190	H 200	205	210	210	A	A	250	A	270	290	265	255	260
28	A 330	A 325	320	280	265	260	250	235	220	200	210	A 250	210	E A 255	A	A	H 205	A	265	305	290	270	280	270
29	A 340	350	A 370	350	340	310	260	220	A	A	215	205	A 270	A	235	240	250	A 265	E A 270	300	E A 345	315	A 345	A 340
30	A 370	A 310	270	365	330	275	240	A 245	210	A	220	215	280	H 215	230	H 220	235	265	275	285	260	240	285	275
31	305	300	290	265	285	280	250	220	225	205	205	200	190	H 190	250	230	E A 260	A	A	270	A 280	A 305	A 325	290
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	29	27	23	19	20	19	20	18	23	22	21	21	15	16	26	28	29	28	26
MED	315	305	285	280	285	262	250	235	225	210	212	206	212	218	225	230	232	A 255	262	270	286	A 315	312	310
UQ	A 330	312	302	295	305	275	254	A 248	238	A 244	228	U A 231	235	235	U A 248	240	A 250	A 264	268	285	A 309	A 335	A 332	325
LQ	305	292	278	265	270	255	238	225	218	205	205	200	200	215	215	220	225	248	259	260	270	298	297	290

JUL. 1990 | H'F (KM)

IONOSPHERIC DATA

JUL. 1990 | H'E (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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	A	110	A	110	A	A	A	E A 130	115	A 125	A	A	A	B				
2						130	E A 135	110	110	115	120	120	115	B 125	120	115	115	115	120	B				
3						A	115	115	115	120	120	A	A	A	120	115	A	A	A	B				
4						A	A	A 130	110	115	115	110	115	120	115	110	110	110	120	B				
5						A	115	110	A	110	110	115	120	A	120	110	115	115	125	B				
6						140	115	110	110	110	110	A	120	115	B 130	B 130	110	110	115	B				
7						E B 140	110	110	110	110	A	110	A	A	A	110	E A 130	A 125	A 120	B				
8						A	120	115	110	110	110	A	115	115	115	110	A	E A 130	A 130	B				
9						A	115	110	110	A	115	A	A	A	120	120	115	115	A	B				
10						A	A	110	110	110	A	A	A	A	A	110	A	A 125	A 125	B				
11						A	115	110	110	110	110	110	A	A 115	A	E A 130	A 115	110	115	B				
12						120	115	105	110	110	110	120	A	B 120	120	115	110	A	A	B				
13						E A 140	120	110	110	110	A	A	A	A	120	115	A	A	A	B				
14						E B 140	120	110	110	115	110	E B 130	B 120	120	115	A	A	A	A	B				
15						E B 140	115	110	110	115	115	115	115	115	110	A	A	A	A	B				
16						A	A	A	115	115	110	A	A	A 125	115	A 130	110	110	120	B				
17						A	A 120	110	110	110	A	A	A	A	110	A 125	A	A	A	B				
18						A	A 120	110		110	A	115	A	115	115	A	115	A	E A 130	B				
19						140	120	110	110	110	120	115	C	C	110	E A 130	110	E A 140	A 125	B				
20						E B 140	120	115	115	115	115	A	115	110	A	115	110	110	120	B				
21						B 130	120	110	110	110	110	A	A	A	115	110	110	110	A	B				
22						A	120	110	110	110	120	120	A	A	A	115	115	110	A	B				
23						130	120	115	110	110	110	110	A	115	110	110	115	115	120	B				
24						E B 165	115	115	A	110	115	120	115	120	110	110	110	110	115	B				
25						120	110	110	A	110	A	A	110	E B 130	110	110	110	110	A	B				
26						E B 140	110	E A 130	A 120	E B 120	A	115	B 120	120	120	115	115	115	B 125					
27						A	A	A	A	A 130	A	A 120	110	110	110	110	110	110	A					
28						135	E A 130	105	110	A	A 125	A	A	A	110	A	110	110	A					
29						A	115	110	110	110	115	A	A	110	115	110	110	110	120					
30						125	120	115	110	115	110	120	115	115	110	110	110	120	120					
31						A	A	115	120	115	110	115	115	120	110	A 115	A 115	115	120					
	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						16	25	29	25	29	22	17	14	20	26	27	23	23	18					
MED						U 130	118	110	110	110	112	115	115	116	115	112	110	110	120					
UQ						E B 140	120	115	110	115	115	120	120	120	120	116	115	115	A 125					
LQ						129	115	110	110	110	110	115	115	115	110	110	110	110	120					

JUL. 1990 | H'E (KM)

IONOSPHERIC DATA

JUL. 1990 | H'ES (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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	95	115	95	95	115	110	110	100	105	105	105	130	105	135	130	140	130	105	115	115	105	110	110	115
2	110	105	110	105	100	G	140	115	120	115	115	120	110	115	115	E G 180	130	130	130	120	115	110	105	100
3	100	95	95	100	100	100	120	115	110	110	110	110	115	115	G	G	110	120	110	105	115	120	115	110
4	110	110	115	110	110	110	110	E G 195	E G 160	140	E G 150	140	135	140	G	G	115	135	120	115	110	120	110	105
5	105	105	105	110	B	115	120	110	110	110	105	110	125	125	135	135	130	130	120	115	110	110	110	110
6	110	B	B	100	110	150	135	120	110	125	120	E G 160	E G 155	G	140	130	130	120	115	110	105	110	110	105
7	105	110	110	110	110	120	120	110	110	110	105	110	105	105	105	G	110	140	130	105	115	100	115	110
8	110	110	110	110	110	E G 140	120	115	110	110	110	115	115	G	120	115	110	120	105	95	110	110	110	110
9	110	105	110	115	125	110	125	110	110	110	115	110	105	105	125	125	120	110	115	110	110	105	105	B
10	B	105	105	105	105	120	110	110	110	105	105	110	110	135	110	G	115	110	120	115	110	110	110	110
11	110	100	100	110	110	110	140	115	110	105	105	100	100	135	100	105	135	115	115	110	110	105	100	B
12	105	100	100	95	95	140	135	120	110	110	110	110	105	105	110	110	115	105	100	100	105	110	110	140
13	115	110	B	B	110	E G 155	130	115	105	105	105	110	120	145	120	115	110	110	105	110	105	110	95	115
14	105	115	100	105	105	G	125	115	110	115	110	110	110	110	110	105	105	110	110	110	110	105	115	105
15	100	100	105	110	B	E G 160	G	120	110	115	110	110	120	110	105	110	130	125	100	100	100	115	115	120
16	115	115	110	115	110	105	E G 155	E G 150	E G 150	120	115	110	120	130	G	140	125	115	115	110	105	110	115	105
17	105	100	100	100	100	110	135	120	120	110	105	105	110	105	110	130	115	110	115	110	125	115	110	110
18	105	105	125	100	105	120	120	110	115	110	120	110	110	110	110	110	115	105	120	115	105	100	100	100
19	100	100	100	100	B	G	G	G	115	E G 155	E G 150	120	C	C	E G 180	140	135	125	125	120	115	110	110	105
20	105	105	110	115	115	125	115	115	120	115	115	120	115	115	140	160	130	115	120	115	115	110	110	110
21	105	105	110	110	115	125	115	110	110	110	105	110	110	105	130	125	115	115	110	105	105	110	100	110
22	100	105	105	110	B	125	120	110	110	110	130	115	110	125	115	110	110	110	115	105	110	100	105	100
23	100	100	100	100	105	G	125	115	110	110	110	110	110	115	115	125	115	125	115	110	120	105	105	105
24	105	105	105	105	105	G	E G 155	G	120	130	130	130	140	135	135	120	120	120	110	110	105	110	100	100
25	95	100	110	105	115	115	E G 160	125	110	105	105	105	125	125	120	115	115	115	110	110	105	105	100	100
26	100	105	100	B	105	G	E G 155	E G 140	120	110	110	105	110	110	125	G	G	130	115	110	110	105	105	110
27	110	110	130	115	110	110	105	110	E G 165	110	E G 160	E G 180	130	E G 150	G	120	110	125	105	105	110	95	100	100
28	100	100	100	95	100	G	110	E G 150	130	130	140	125	115	110	110	135	E G 150	120	120	105	100	95	95	B
29	105	100	130	120	120	125	135	120	115	110	110	110	130	120	140	140	125	120	120	110	110	110	105	105
30	100	100	100	100	100	G	120	110	G	115	130	130	125	135	135	125	135	130	120	110	110	110	105	110
31	110	115	110	120	110	120	110	115	115	110	115	G	125	G	140	145	130	120	110	110	110	105	105	105
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	29	29	27	23	29	29	30	31	31	30	30	27	27	26	30	31	31	31	31	31	31	28
MED	105	105	105	105	110	118	120	115	110	110	110	110	114	115	120	125	116	120	115	110	110	110	105	108
UQ	110	110	110	110	110	124	130	118	118	115	118	120	125	134	134	138	130	125	120	112	110	110	110	110
LQ	100	100	100	100	105	110	115	110	110	110	105	110	110	110	110	115	115	110	110	105	105	105	102	105

JUL. 1990 | H'ES (KM)

IONOSPHERIC DATA

JUL. 1990 | TYPES OF ES | 135° E Mean Time (G.M.T. + 9 h)

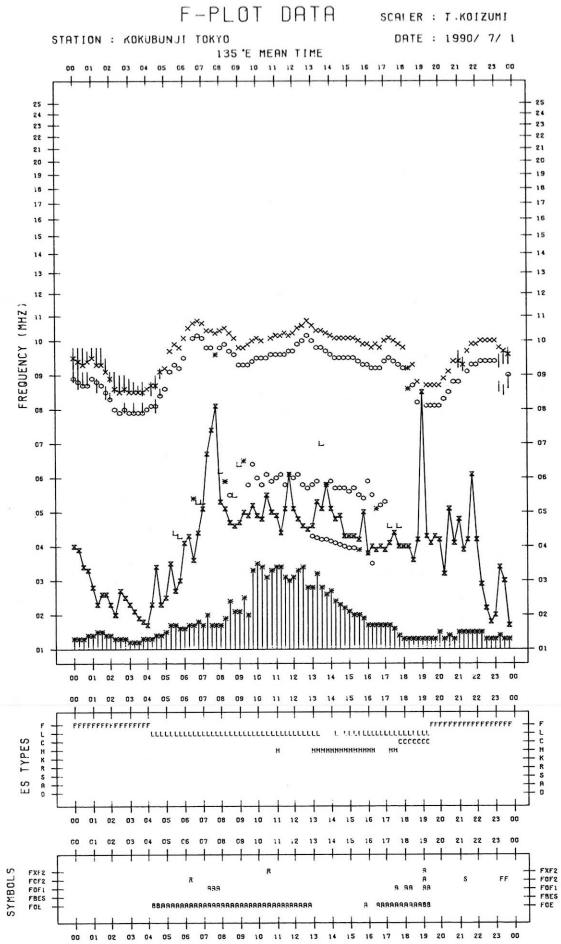
Station KOKUBUNJI TOKYO Lat. 35° 42.4' N, Long. 139° 29.3' E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

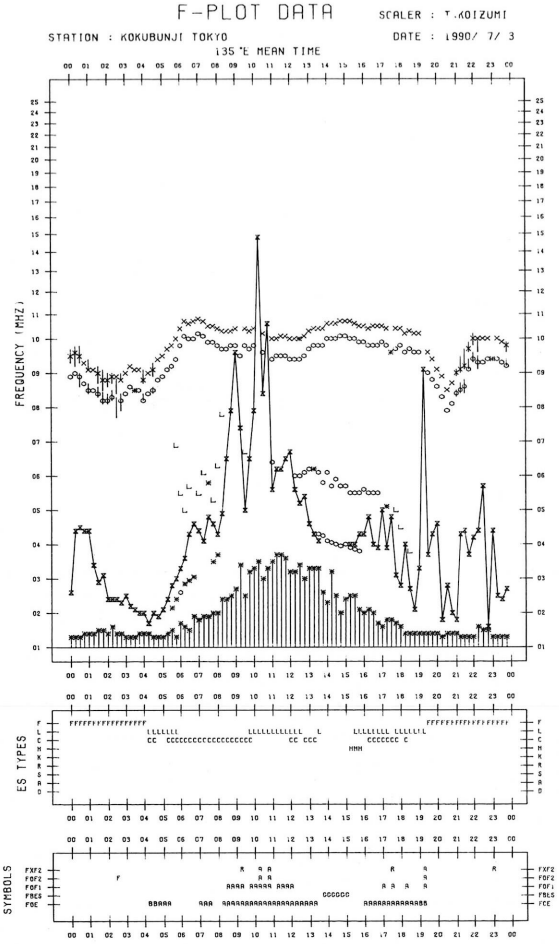
Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F 4	FF 13	F 2	F 3	FF 21	L 2	L 2	L 5	L 3	L 2	L 2	HL 12	L 2	HL 11	H 2	HL 11	HL 22	LL 22	CL 22	CL 33	FF 33	FF 43	FF 43	FF 22
2	F 4	F 2	F 2	F 1	F 1		HL 11	C 3	C 2	C 2	C 3	C 1	C 2	C 2	C 2	H 1	H 3	H 2	H 3	C 4	F 3	F 2	F 5	F 4
3	F 4	F 5	F 4	F 3	F 2	L 1	C 2	C 3	C 3	C 3	L 2	L 2	CL 22	C 2			L 2	CL 32	L 3	L 3	FF 44	FF 22	F 5	F 3
4	F 5	F 4	F 2	F 2	F 2	L 3	L 2	HL 12	H 1	H 1	H 1	H 1	H 1	H 1			C 2	H 1	C 2	C 2	F 4	F 1	F 2	F 5
5	F 2	F 2	F 3	F 2		C 2	C 2	C 2	L 1	L 2	C 2	C 2	C 1	C 1	H 1	H 1	H 2	H 1	L 1	C 2	F 2	F 4	F 3	F 2
6	F 2			F 2	F 1	H 1	H 1	H 2	C 2	C 1	C 1	HL 11	H 1		H 1	H 1	H 1	H 3	C 2	C 4	F 4	F 6	F 6	F 3
7	F 4	F 2	FF 32	F 5	F 2	C 3	C 2	C 3	C 3	C 2	C 2	C 2	L 2	L 2	L 2		L 2	HL 12	HL 22	L 3	FF 22	F 5	FF 22	FF 32
8	FF 33	FF 22	F 2	F 3	F 5	HL 11	C 2	C 3	C 2	C 2	C 2	C 1	C 2		C 2	C 1	L 1	HL 22	LC 11	L 2	FF 22	F 5	F 2	F 2
9	F 2	F 4	F 3	F 2	F 1	L 3	H 2	C 2	C 2	L 1	L 1	L 1	L 3	L 2	H 1	H 2	H 3	C 3	C 4	C 4	F 5	F 5	F 2	
10		F 1	F 1	F 3	F 3	C 2	C 3	C 4	C 3	C 2	L 2	L 2	L 1	HL 11	C 1		L 2	LL 22	CL 21	C 3	F 4	F 6	F 3	F 5
11	F 2	F 2	F 4	FF 23	FF 22	L 3	H 1	C 3	C 1	C 3	C 2	L 3	L 3	HL 11	L 2	LH 11	HL 11	CL 21	C 2	C 3	F 2	F 2	F 1	
12	F 3	F 2	F 3	F 4	F 2	HL 11	H 1	H 3	C 3	C 3	C 3	C 2	C 2	C 3	L 2	L 2	C 2	L 4	L 4	L 5	F 3	FF 32	F 4	F 2
13	F 2	F 2			F 2	HL 11	H 3	C 2	C 3	L 2	L 2	L 2	CL 22	CL 12	H 3	CC 32	L 2	L 2	L 2	LL 32	F 2	FF 23	F 2	FF 12
14	F 1	FF 11	F 3	F 1	F 1		C 2	C 3	C 2	C 2	C 2	C 3	C 2	C 2	C 2	L 3	L 3	L 2	L 2	L 1	F 3	F 2	FF 23	FF 34
15	F 3	F 2	F 2	F 1		H 1		H 2	C 2	C 2	C 2	C 2	C 2	C 2	C 2	L 2	HL 22	HL 22	L 4	L 3	F 4	FF 24	FF 22	FF 22
16	FF 22	F 2	FF 22	FF 31	FF 21	L 4	HL 11	HL 11	H 1	C 2	C 1	C 1	CL 21	HL 21		HL 12	H 3	C 3	C 2	L 3	F 4	F 4	FF 23	F 4
17	F 4	F 4	F 4	F 2	F 3	L 1	HL 11	H 2	H 2	C 2	L 2	L 2	L 2	L 2	L 2	HL 11	CL 32	CL 33	CL 33	CL 43	FFF 14	F 5	F 2	F 3
18	FF 22	F 3	FF 22	F 2	F 3	CL 21	CL 32	C 3	C 2	C 1	CL 22	C 1	C 2	C 1	C 2	C 1	C 2	L 2	CL 31	CL 22	F 3	F 4	F 4	F 5
19	F 4	F 2	F 2	F 2					L 1	H 1	H 1	H 1			H 1	HL 11	H 2	HL 21	HL 32	C 2	F 6	F 5	F 3	F 4
20	F 4	F 7	F 5	F 7	F 3	C 3	C 3	C 3	C 2	C 2	C 1	C 1	C 2	C 1	HL 11	H 1	H 2	C 3	C 4	C 4	F 2	F 2	F 4	F 4
21	F 4	F 4	FF 25	FF 24	FF 14	C 4	C 4	C 4	C 2	C 3	C 3	CL 12	L 1	L 2	H 1	H 2	C 3	C 5	C 4	C 4	F 4	F 3	F 3	FF 24
22	F 2	F 2	FF 11	F 1		C 2	C 3	C 2	C 3	C 2	H 1	C 2	C 2	CL 11	C 1	C 3	C 3	C 3	L 2	L 4	F 4	F 5	F 5	F 5
23	F 4	F 3	F 3	FF 22	F 1		C 1	C 2	C 4	C 2	C 2	C 2	C 1	C 2	C 1	H 1	C 2	C 2	C 3	C 4	FF 21	F 3	FF 22	F 5
24	F 4	F 3	F 2	F 2	F 1		H 1		CL 11	H 1	H 2	H 1	H 1	H 1	H 1	H 2	H 2	H 3	C 3	C 3	F 4	F 4	F 5	F 4
25	F 4	F 2	FF 23	FF 22	FF 11	C 2	H 1	H 3	C 3	C 3	C 3	L 2	H 1	H 2	H 2	C 2	C 2	C 3	C 3	C 5	F 3	F 4	F 4	F 3
26	F 4	FF 23	F 2		F 1		H 1	HL 12	HL 11	C 2	C 2	L 2	C 2	C 2	H 1			H 2	C 4	F 3	F 4	F 4	F 3	F 3
27	F 2	F 3	F 1	F 1	F 2	L 2	L 2	L 2	HL 12	L 1	HL 11	HL 11	H 1	H 1		H 2	C 2	H 1	C 5	F 3	FF 24	F 2	F 2	F 2
28	F 3	F 3	F 4	F 2	F 1		L 2	HL 12	H 1	CL 12	HL 12	HL 12	L 1	C 2	C 2	HL 22	H 1	H 3	C 2	F 2	F 4	F 2	F 2	
29	F 3	F 1	FF 31	F 3	F 1	C 2	H 1	C 1	C 3	C 2	C 2	L 2	HL 11	H 2	H 1	H 1	H 2	H 2	C 2	F 2	F 5	F 2	F 4	F 4
30	F 4	F 4	F 3	F 2	F 3		C 1	C 2		C 2	H 1	H 1	H 1	H 1	H 1	H 2	H 1	C 1	C 2	F 2	F 3	F 1	F 2	F 1
31	F 2	FF 21	F 2	F 1	F 3	C 1	C 2	C 2	C 2	C 2	C 1		H 1		H 1	HL 11	HL 21	C 3	C 3	F 4	F 5	F 3	F 5	F 4
	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																								
UQ																								
LQ																								

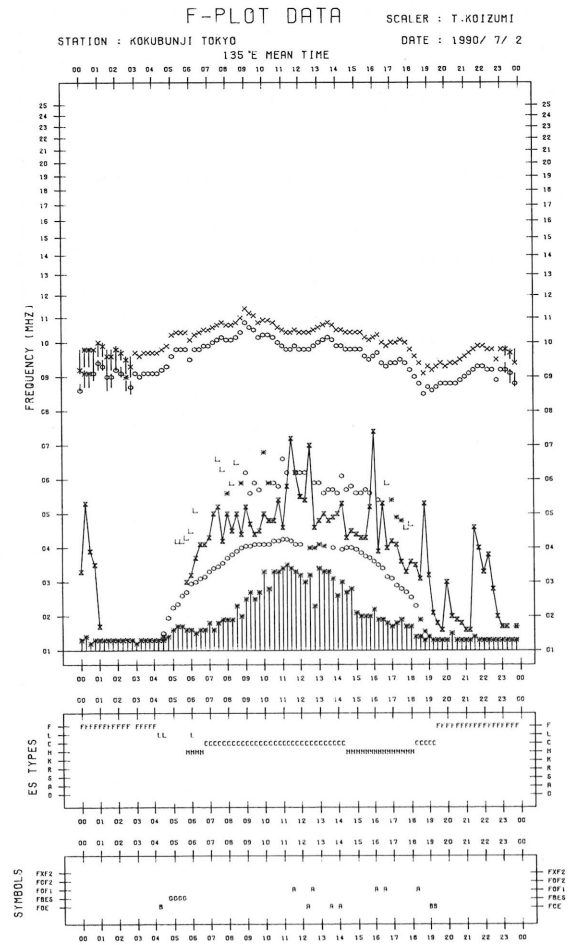
JUL. 1990 | TYPES OF ES

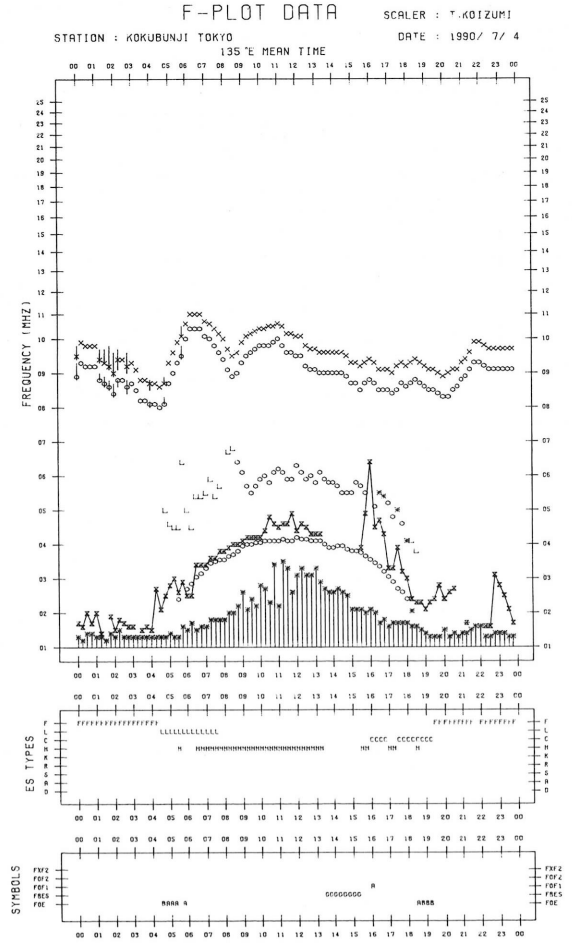
f-PLOTS OF IONOSPHERIC DATA

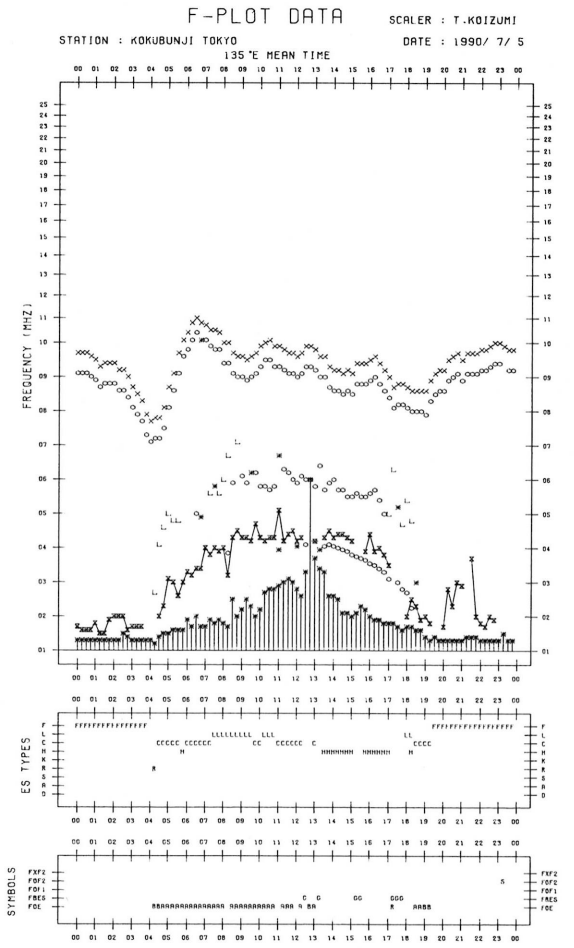
KEY OF F-PLOT	
!	SPREAD
○	FOF2,FOF1,FOE
×	FXF2
✳	DOUBTFUL FOF2,FOF1,FOE
⧖	FBES
⌊	ESTIMATED FOF1
↑,Y	FMIN
∧	GREATER THAN
∨	LESS THAN

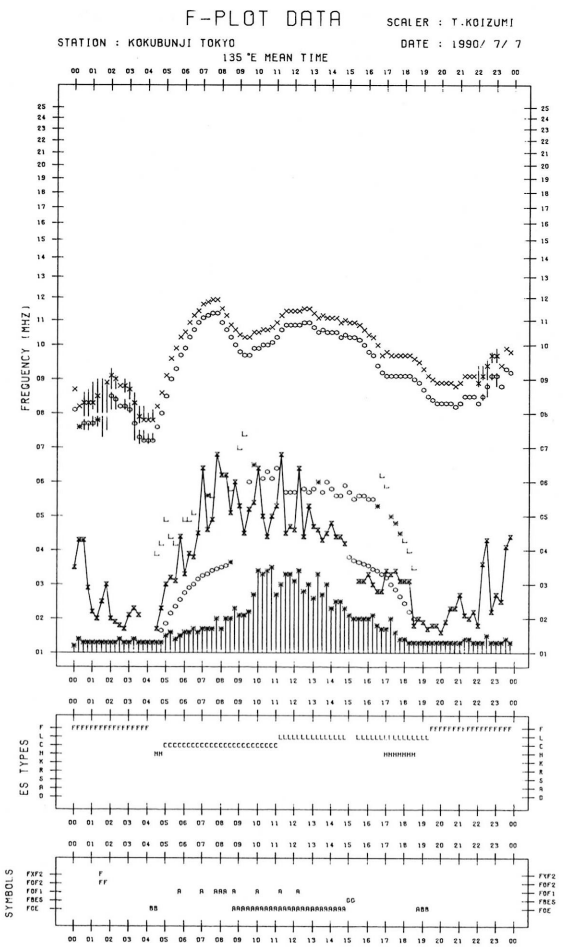

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/ 1
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/ 3
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/ 2
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/ 4
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/ 5
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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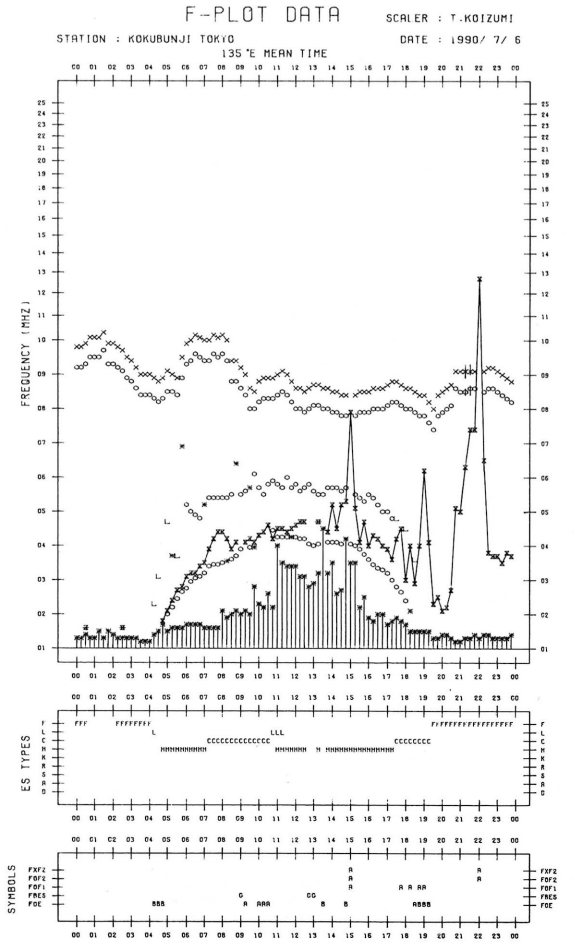
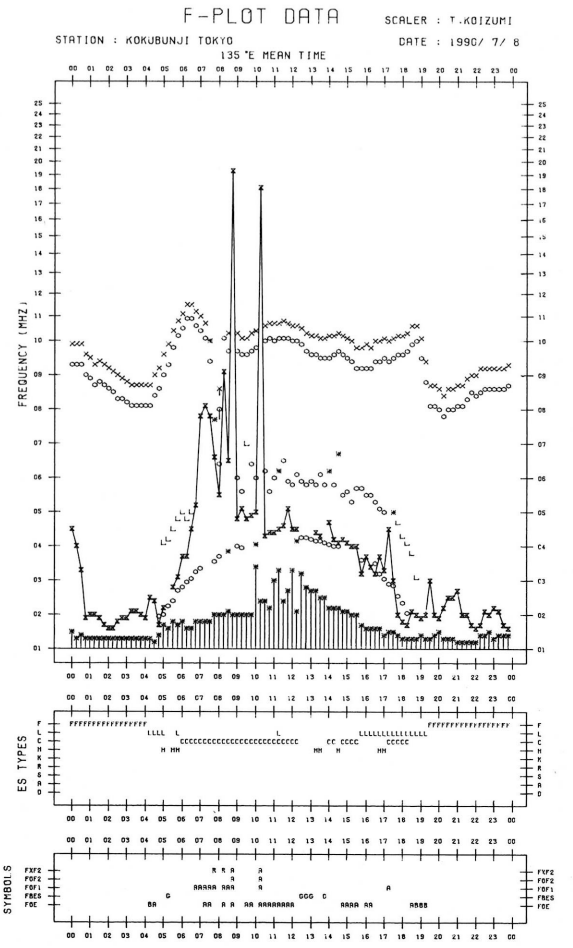
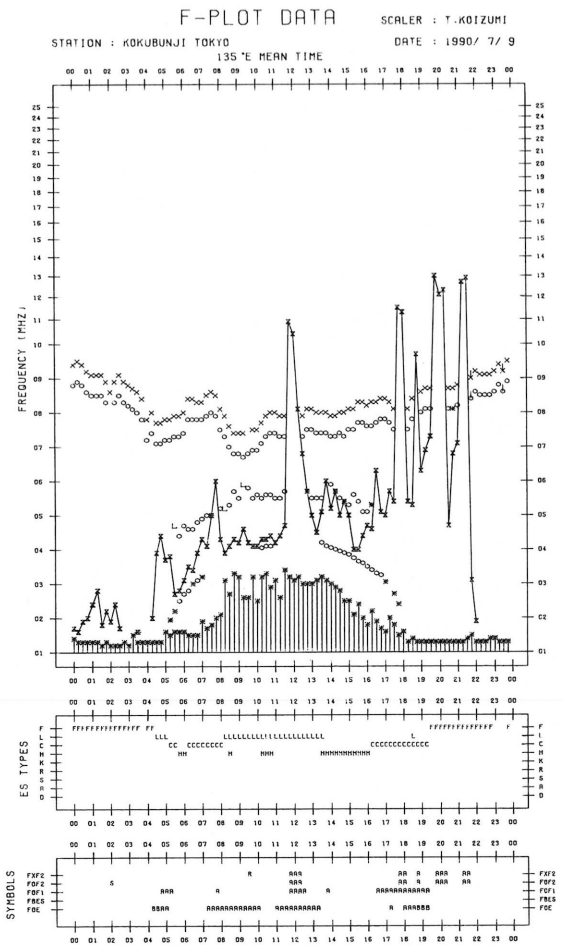
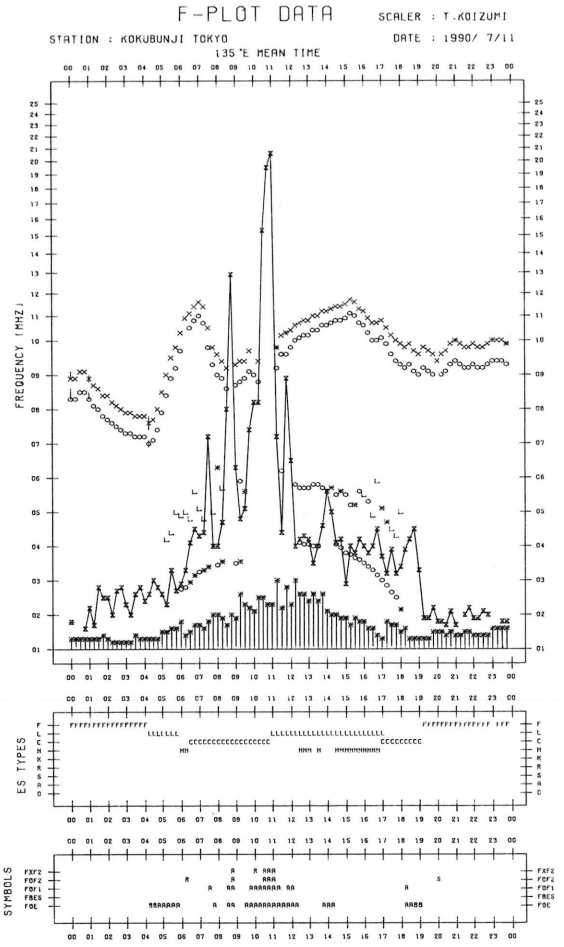
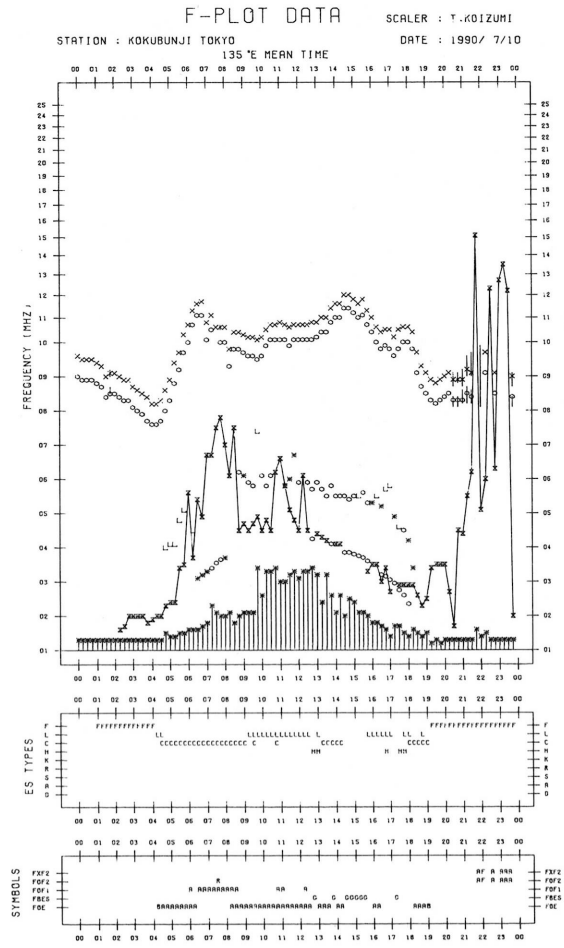
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/ 7
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

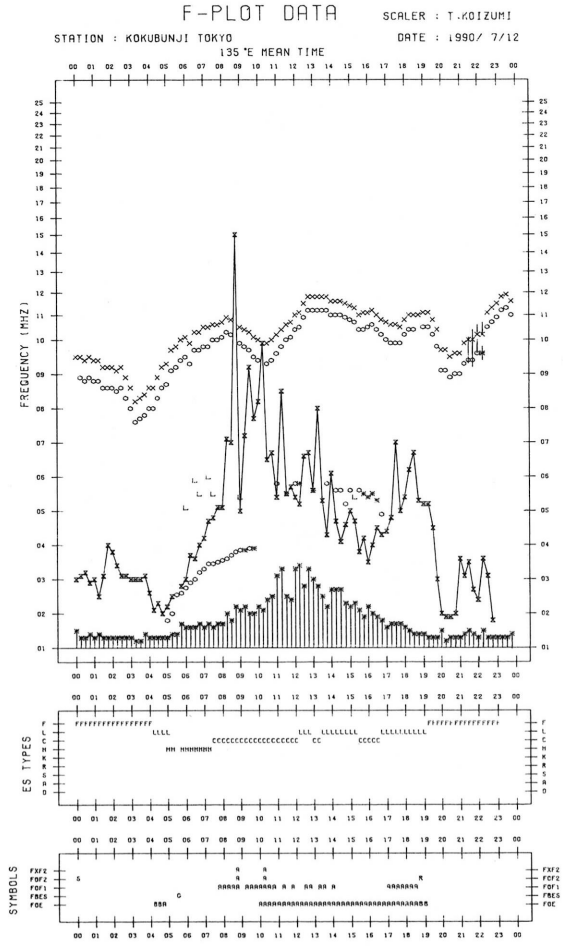

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/ 6
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

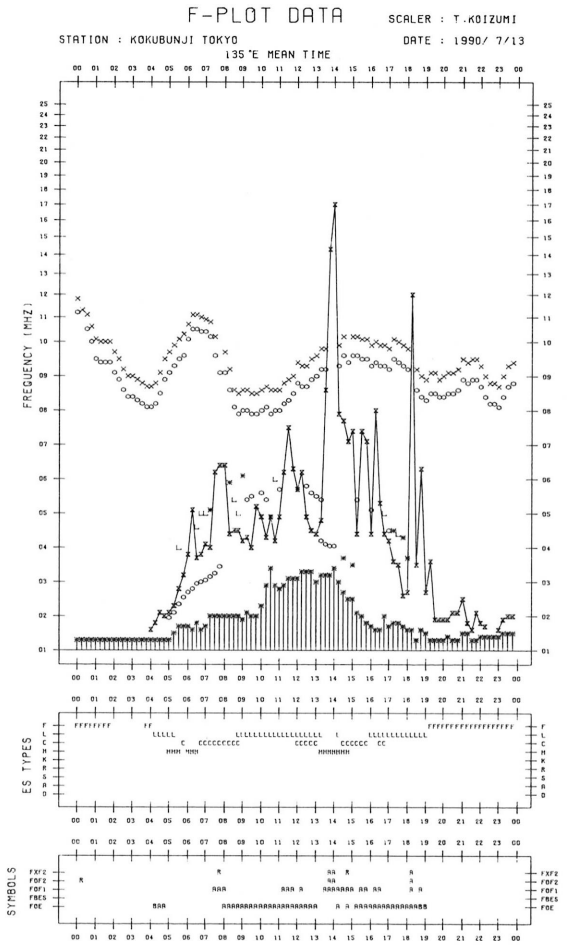

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/ 8
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

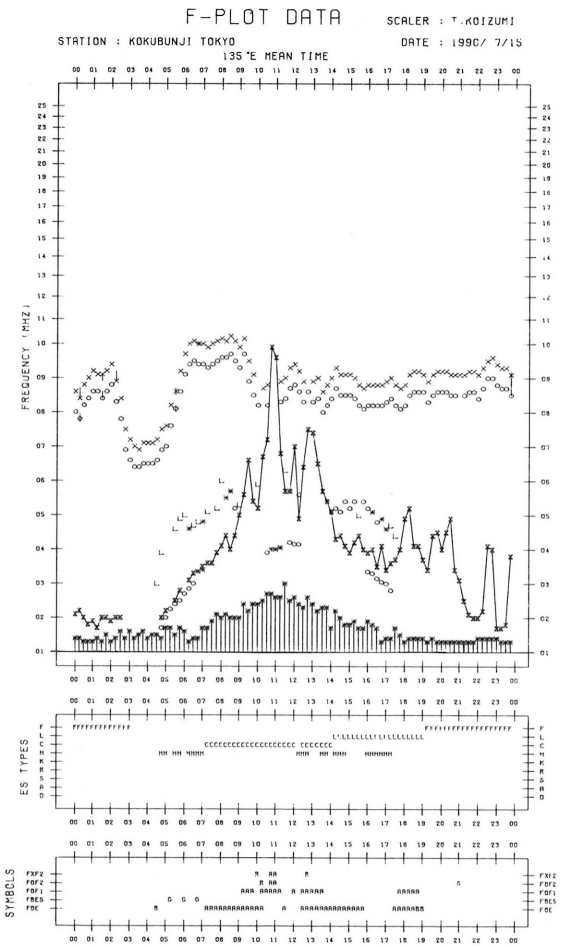

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/ 9
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

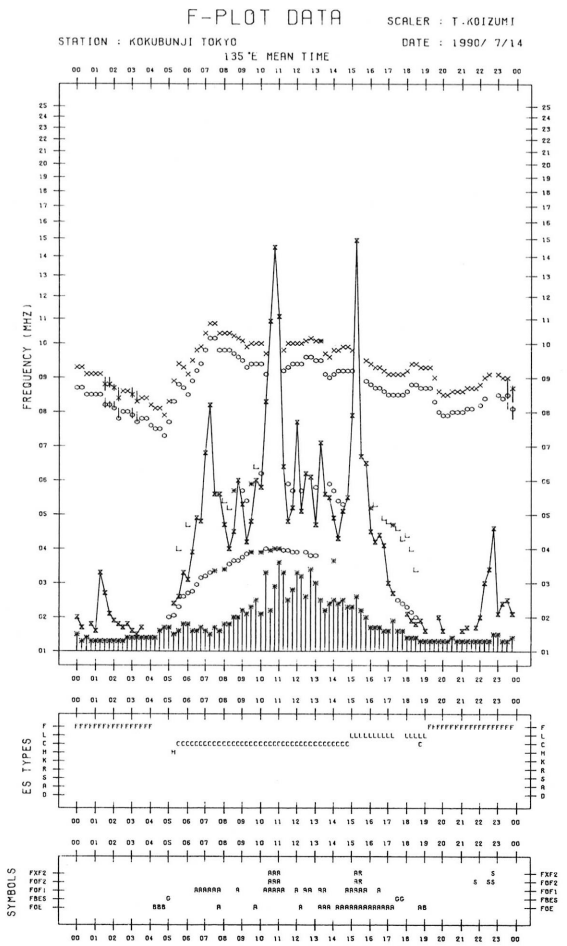

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/11
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

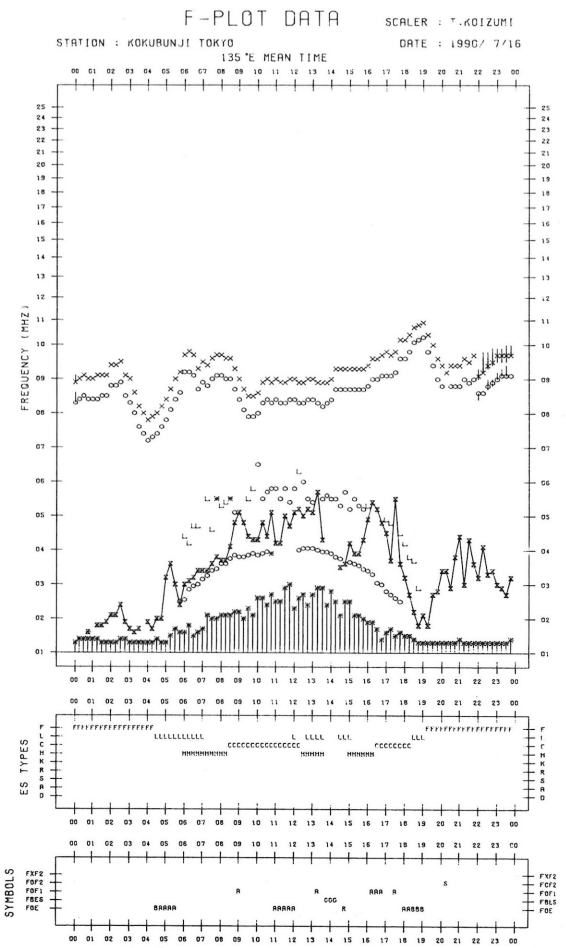

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/10
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

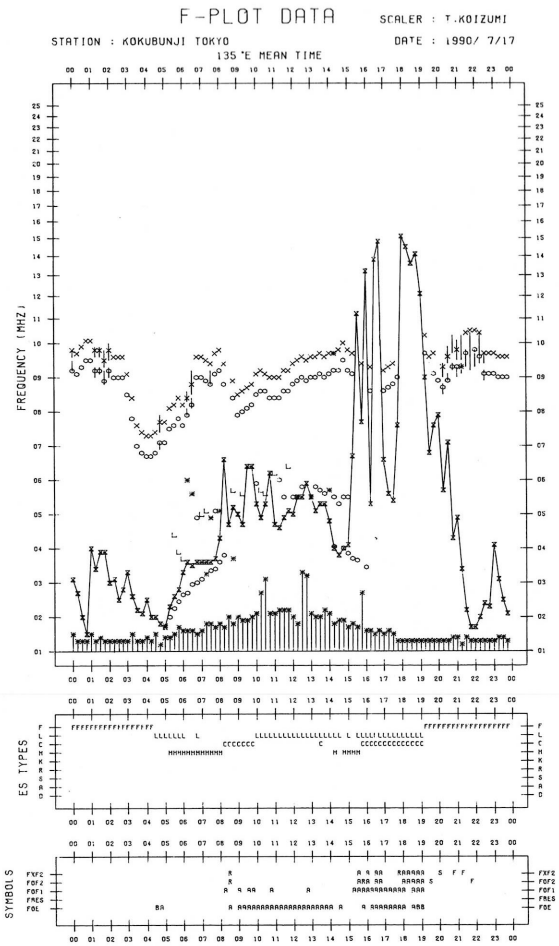

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/12
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

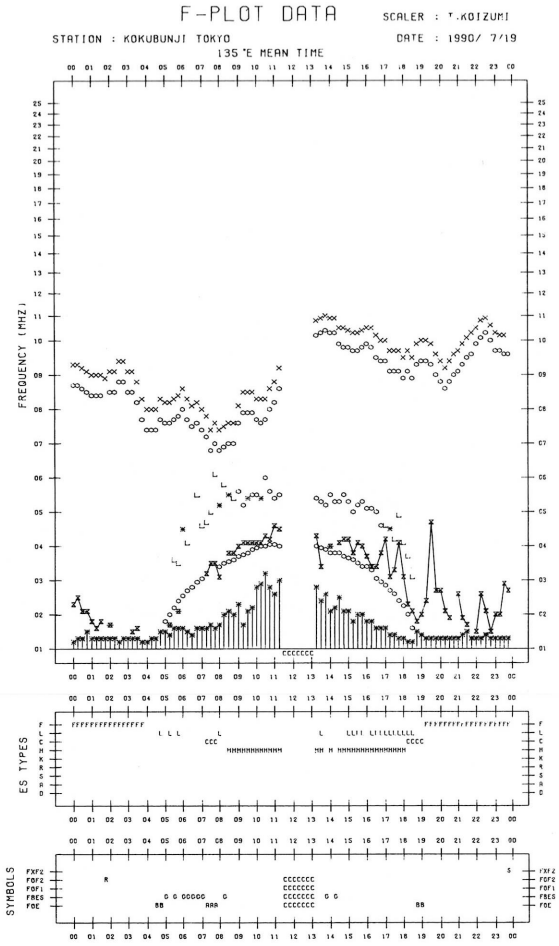

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/13
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

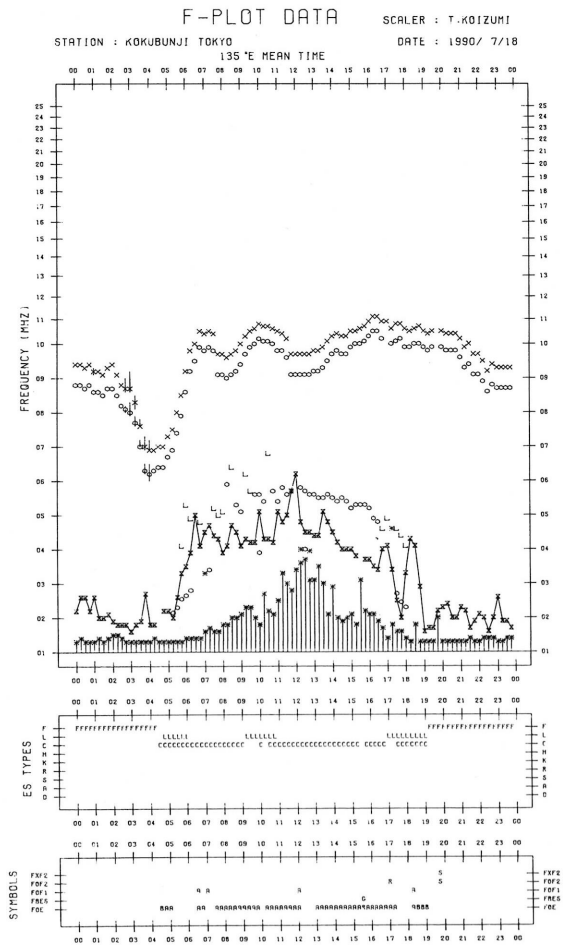

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/15
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

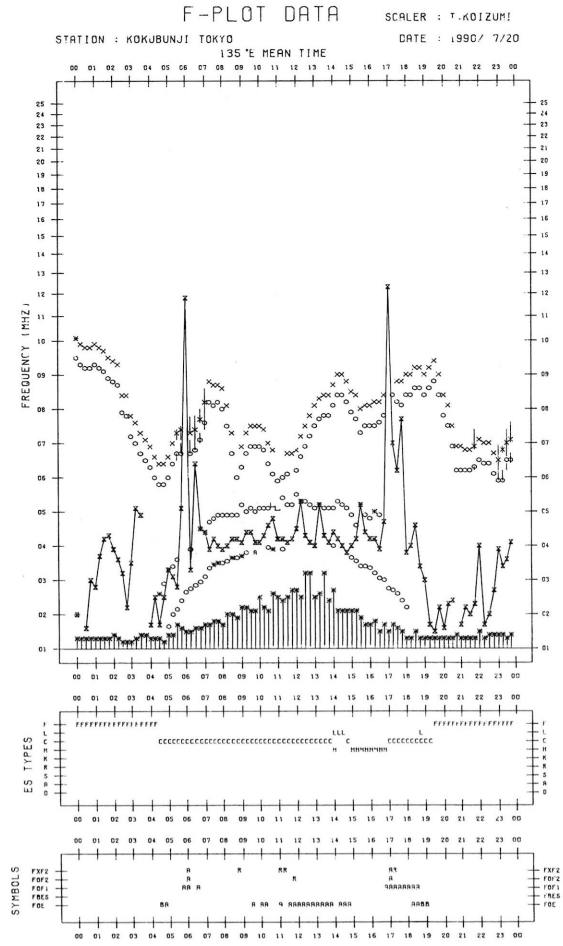

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/14
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

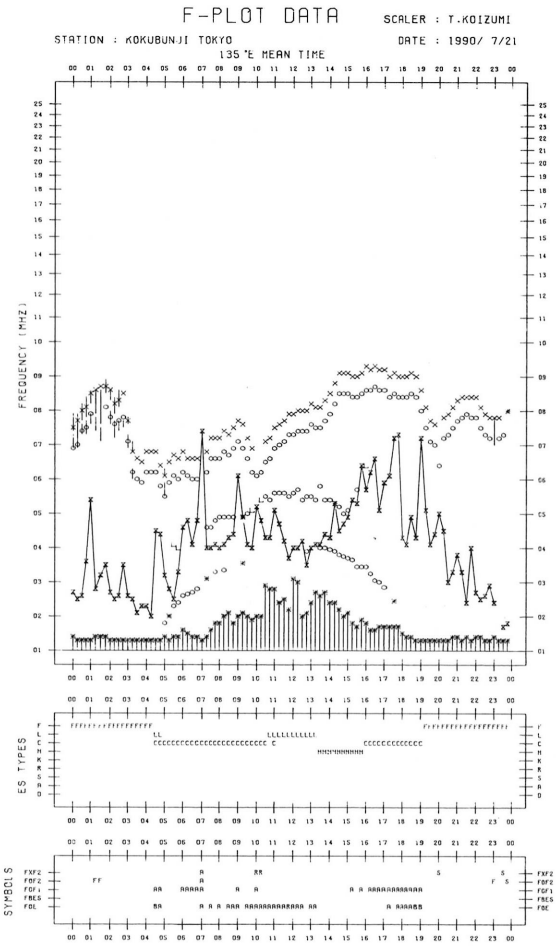

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/16
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

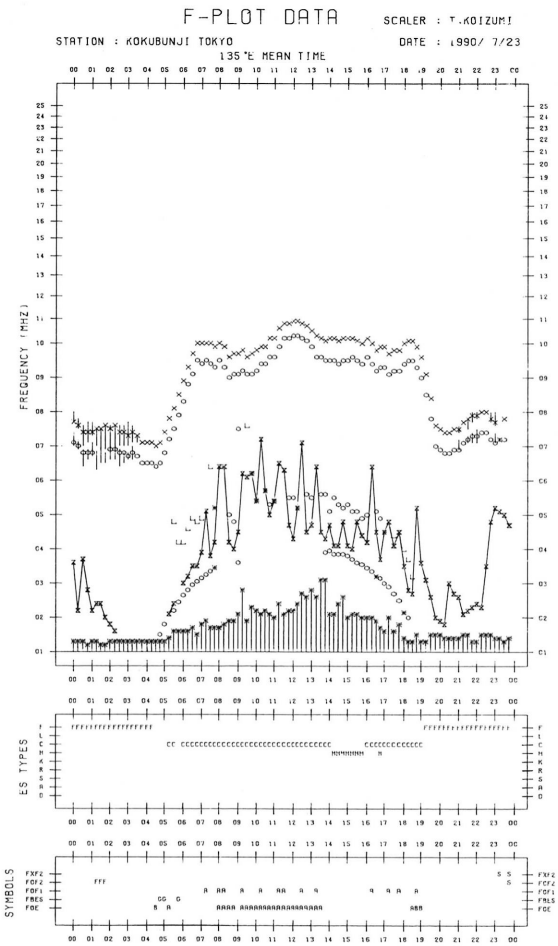

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/17
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

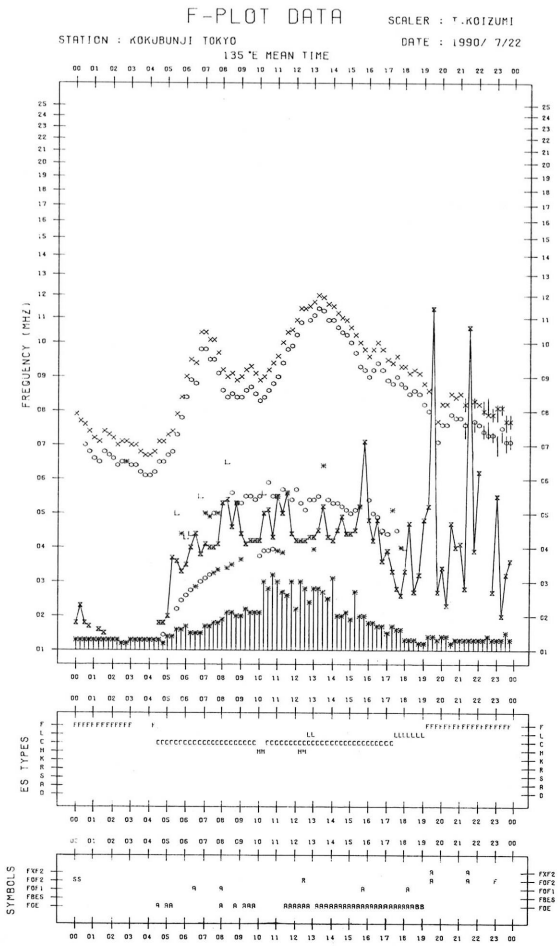

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/19
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

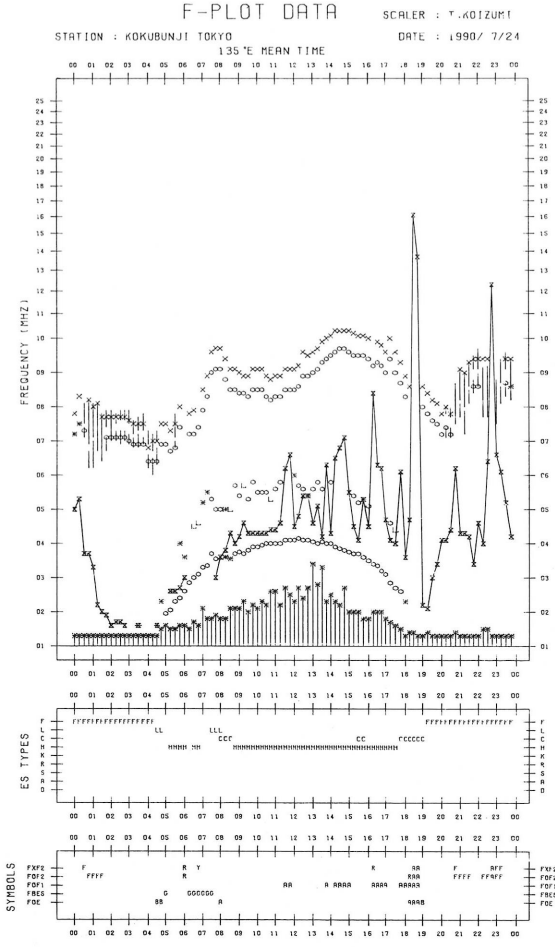

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/18
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

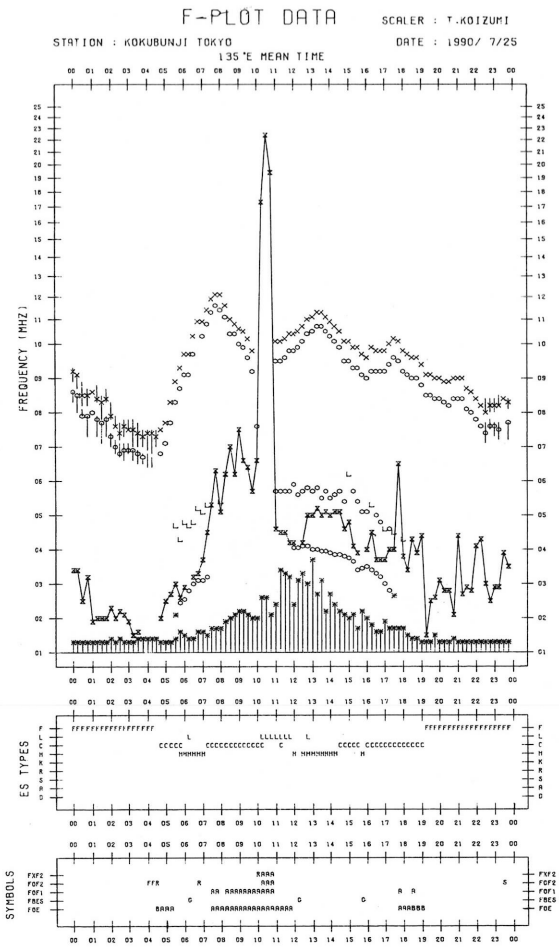

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/20
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

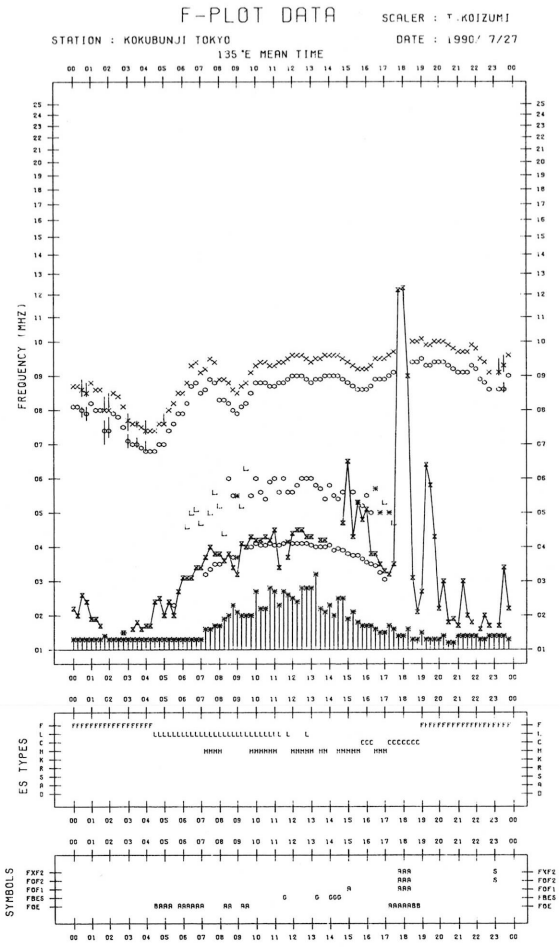

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/21
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

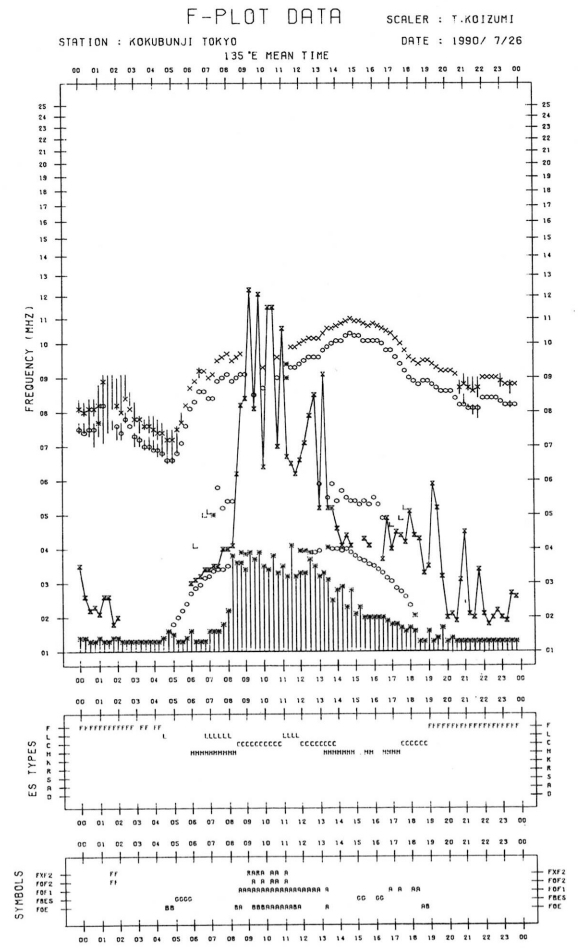

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/23
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

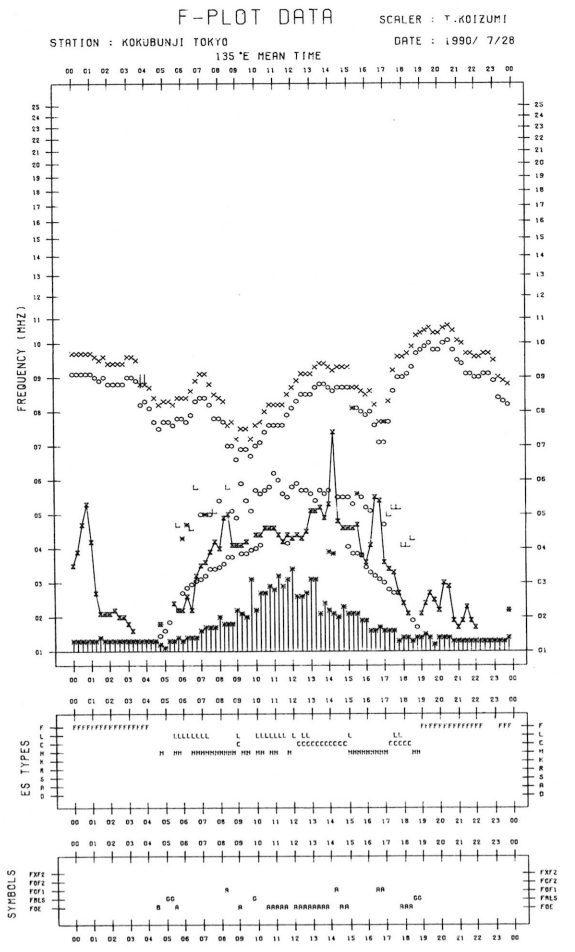

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/22
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

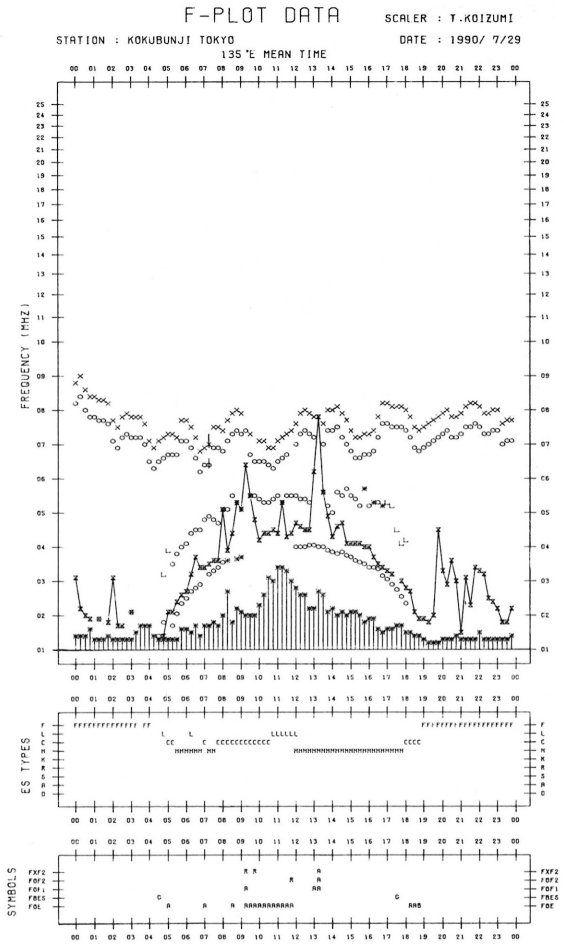

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/24
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

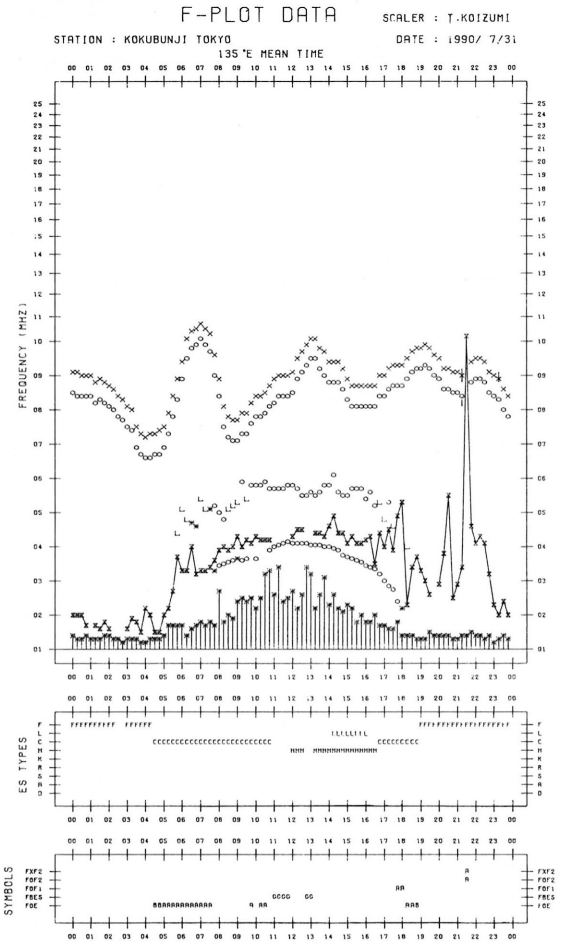

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/25
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

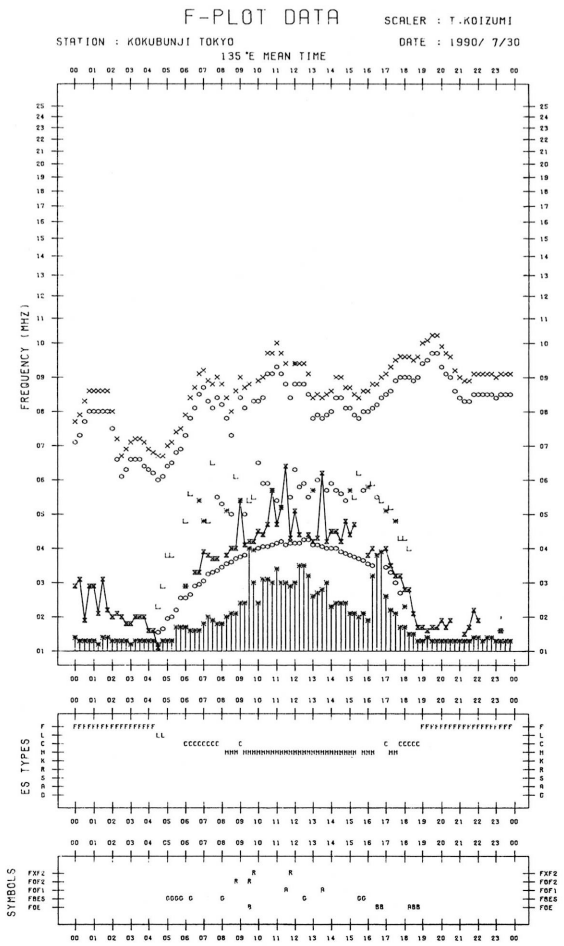

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/27
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/26
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/28
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/29
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/31
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 7/30
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

B.Solar Radio Emission

B1.Daily Data at Hiraiso

200 MHz

Hiraiso July 1990

Single-frequency total flux observations at 200 MHz

	FLUX DENSITY: 10^{-22}Wm^{-2}Hz^{-1}					VARIABILITY: 0 TO 3				
UT	00-03	03-06	06-09	21-24	DAY	00-03	03-06	06-09	21-24	DAY
DATE										
1	B	B	B	B	B	3	2	1	1	2
2	B	B	B	B	B	2	(1)	1	3	1
3	B	B	B	B	B	3	3	3	1	3
4	B	B	B	B	B	1	1	1	3	1
5	B	B	B	B	B	3	3	3	3	3
6	B	B	B	B	B	3	3	3	3	3
7	B	B	B	B	B	3	3	3	3	3
8	B	B	B	B	B	3	2	3	2	3
9	B	B	B	B	B	1	2	1	2	2
10	B	11	10	10	B	1	1	*	*	1
11	11	10	10	10	10	*	*	*	0	*
12	10	10	10	B	10	0	0	0	2	0
13	12	*	*	10	12	1	*	*	0	2
14	11	10	10	10	10	0	0	1	1	0
15	(10)	(10)	10	10	10	*	*	*	0	*
16	10	10	10	11	10	0	0	*	1	0
17	B	B	B	11	B	1	3	3	*	2
18	12	12	11	12	11	*	*	*	0	*
19	12	12	*	12	12	1	*	*	0	*
20	(12)	(12)	12	11	12	*	*	*	1	*
21	12	11	11	10	11	0	1	0	0	1
22	10	10	10	11	10	0	*	*	0	0
23	14	13	12	12	12	2	2	*	2	2
24	12	*	*	B	12	1	*	*	3	1
25	B	*	*	B	*	3	*	*	1	*
26	(B)	*	*	B	*	(3)	*	*	3	*
27	B	B	B	14	B	3	3	3	2	3
28	14	*	13	13	14	1	*	*	1	*
29	14	14	13	B	13	1	2	1	3	1
30	B	B	B	B	B	3	3	2	3	3
31	B	B	B	12	B	3	2	2	0	2

Note: No observations during the following periods.

none.

B. Solar Radio Emission

B1. Daily Data at Hiraiso

500 MHz

Hiraiso July 1990

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	53	55	48	51	54
2	53	52	52	B	52
3	56	55	55	55	B
4	56	57	55	-	56
5	B	B	B	B	B
6	60	61	B	56	B
7	56	55	55	54	56
8	54	53	53	51	53
9	51	51	49	48	51
10	50	50	49	-	49
11	49	49	48	47	48
12	49	50	48	48	48
13	49	50	48	48	49
14	50	49	48	47	49
15	49	50	(48)	-	48
16	50	50	48	50	49
17	50	50	50	48	50
18	48	49	50	-	49
19	47	47	48	-	47
20	48	47	46	-	47
21	48	47	47	48	47
22	47	46	49	-	47
23	B	51	52	B	B
24	52	52	52	-	52
25	53	B	B	B	B
26	B	B	B	B	B
27	B	B	B	-	B
28	-	-	-	-	-
29	-	-	-	-	-
30	B	B	B	-	B
31	B	54	54	51	B

Note: No observations during the following periods:

4th 0920 - 0950.
8th 0300 - 0420.
10th 1930 - 2340.
15th 1935 - 2345.
18th 1935 - 2350.
20th 1935 - 2354.
24th 1950 - 2345.
30th 1940 - 2355.
1930 - 2345
9th 0600 - 0800
15th 0600 - 0955
18th 0550 - 0720
19th 1935 - 2340
22nd 1953 - 2353
27th 1950 - 29th 2345

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso July 1990

Single-frequency observations

Normal observing period: 1950 - 0950 U.T. (sunrise to sunset)

JUL 1990	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
1	500	46 C	0228.8	0248.0	58	436	29	SL
				0246.0		256		0
	200	27 RF	0232	0317	155	112	25	-
	200	44 NS	1932E	-	860D	-	8	-
2	200	27 RF	0028	0053	120	31	10	WL
	100	43 NS	0040	0648	550D	130	54	-
	100	46 C	0338.3	0339.7	15	950	-	-
	200	46 C	0940.9	0942.9	5.3	162	-	WL
	100	46 C	0942.9	0946.2	5.3D	1000D	-	- SUNSET
	200	44 NS	1932E	2326	860D	36	18	MR
	100	44 NS	1932E	0811	860D	170	39	-
	500	22 GRF	2012	2127.5	263	45	7	MR
	200	46 C	2037.0	2039.6	5.3	120	-	SR
	200	46 C	2136.3	2139.9	6.6	202	-	SR
3	200	42 SER	0017.4	0033.0	20.5	690	-	-
	200	41 F	0157.0	0205.9	10.6	150	-	-
	100	46 C	0418.5	0419.8	4.6	1000D	-	-
	200	44 NS	1934E	0550	860D	23	8	MR
4	200	44 NS	1934E	0536	860D	270	121	SR
	100	44 NS	1934E	0826	860D	760	310	-
	500	44 NS	2345E	0825	600D	19	9	WR
5	200	44 NS	1934E	0143	860D	490	295	SR
	100	44 NS	1934E	0650	860D	630	570	-
	500	42 SER	2014	2120.5	95	32	-	MR
6	500	20 GRF	0528	0600	160	18	9	WR
	100	44 NS	1934E	0800	860D	610	305	-
	200	44 NS	1934E	0800	860D	160	95	SR
7	200	44 NS	1936E	2100	860D	33	13	MR
	100	44 NS	1936E	0133	860D	140	42	-
	200	46 C	2137.0	2139.3	13.9	71	24	SR
8	200	41 F	0353.7	0400	10.2	53	-	MR
	200	41 F	0542.6	0546.2	4.8	104	-	MR
	200	44 NS	1936E	2133	860D	23	8	MR
9	100	43 NS	0100	0200	300	64	10	-
	200	41 F	0434.3	0452	38	91	-	SR
	100	44 NS	1936E	2018	260D	410	130	-
	200	44 NS	1936E	2116	400D	18	10	MR
12	200	43 NS	2000	2123	240	7	3	WR
14	500	4S/F	0005.0	0007.5	4.5	5	-	0
16	200	42 SER	0057.4	0100	5.3	240	-	0
	500	41 F	0320.0	0324.0	5.0	49	-	0
	500	41 F	0405.0	0406.0	2.5	18	-	0
	200	43 NS	2340	0600	610D	18	5	WR
	200	8 S	2340.7	2340.9	0.8	130	-	0
21	200	8 S	0211.2	0211.5	0.7	305	-	0
	200	41 F	0325.0	0328.4	3.5	5600	-	0
	100	41 F	0325.7	-	3.8	1000D	-	-
	500	41 F	0326.0	0328.0	3.5	21	-	WR
	500	46 C	0401.0	0408.5	21.0	53	7	0
	200	46 C	0405.9	0410.3	20.5	41	-	0
	100	46 C	0406.6	0422.4	50.0	29	-	-

Hiraiso July 1990

Single-frequency observations

Normal observing period: 1950 - 0950 U.T. (sunrise to sunset)

JUL 1990	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
22	200	46 C	2156.8	2157.4	2.2	100	-	O
	100	46 C	2156.8	-	2.6	1000D	-	-
23	100	48 C	0003.5	-	4.3	1000D	-	-
	200	46 C	0003.6	0004.0	2.0	335	-	O
	500	8 S	0003.8	0003.8	0.7	946	-	O
	200	41 F	0130.4	0133.7	8.6	110	-	O
	100	8 S	0133.7	-	1.0	1000D	-	-
	200	42 SER	0311.2	0338.9	44.2	94	-	MR
	200	41 F	0433.0	0433.4	50.0	105	-	MR
	500	21 GRF	2100	2152	85	12	3	O
	200	41 F	2123	2130.0	57	36	-	WR
	500	8 S	2350.5	2351.0	0.7	548	-	WR
24	200	46 C	0139.5	0139.6	1.5	104	-	O
	200	46 C	0228.8	0230.0	2.1	710	-	MR
	100	46 C	0229.0	0230.0	2.2	3000	-	O
	100	46 C	0417.6	0418.5	2.0	720	-	-
	200	46 C	0417.8	0417.8	2.0	98	-	MR
	200	48 C	0929.0	0929.7	3.4	6500U	1100U	MR SUNSET
	100	48 C	0929.0	0930.7	4.0	6000U	850U	MR SUNSET
	200	44 NS	1940E	-	780D	-	39	-
25	500	46 C	0034.0	0037.5	18.0	19	-	WR
	500	20 GRF	0425	0504	75	22	3	WR
	200	46 C	2239.6	2242.2	3.3	97	-	SR
	500	46 C	2256.5	2314	71.5	56	22	ML
				2332		46		O
	200	46 C	2257.0	2312.9	46.2	76	22	O
				2333.7		73		O
26	500	44 NS	0008E	0220	570D	12	5	WR
	100	46 C	0114.2	0114.9	1.7	3000	-	O
	500	44 NS	1940E	2100	780D	35	10	WR
	200	44 NS	1940E	2148	780D	94	27	MR
	500	41 F	2122.5	2123.5	2.5	175	-	O
	100	46 C	2203.3	2203.9	1.6	910	-	-
	500	46 C	2209.0	2211.3	8.0	39	-	WR
27	500	41 F	0003.5	0004.5	1.8	85	-	O
	500	27 RF	0010.0	0022.0	94	26	9	WR
	200	41 F	2144.0	2150.0	59	27	14	O
	200	46 C	2302.6	2302.6	3.2	130	-	O
	200	27 RF	2308.6	2315.8	69	20	15	O
28	200	42 SER	2123.1	2125.7	4.6	285	-	O
29	100	46 C	0017.2	0017.2	1.5	815	-	-
	200	46 C	0017.2	0017.3	1.3	110	-	WR
	200	41 F	0519.8	0523.1	21.8	56	-	O
	200	44 NS	1940E	0340	780D	160	37	O
	500	44 NS	2345E	-	430D	-	18	-
30	100	41 F	0113.9	0117.2	30.0	310	-	-
	200	46 C	0301.1	0302.1	3.3	1400	240	O
	100	41 F	0316.5	0337.0	44	140	-	-
	200	41 F	0459.0	0500.1	4.3	780	-	O
	200	46 C	0707.9	0724.4	66	190	40	MR
	100	46 C	0715.8	0717.8	41.6	980	150	O
				0735.0		120		-
	200	44 NS	1940E	2320	450D	52	17	O
	500	44 NS	2355E	0119	240D	24	11	O
31	200	41 F	0317	0346	79	280	-	O
	200	42 SER	0532	0618	152	47	-	O
	100	46 C	0840.3	0841.3	4.1	540	-	-
	200	46 C	2000.0	2002.2	4.6	190	-	O

C. RADIO PROPAGATION

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

JUL 1990 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	-8	ES -23	ES -23	ES -23	0	5	15	13	15	17	18	13	18	20	8	11	11	6	0	-5	ES -23	-10	ES 2	ES 2
2	ES 7	5	0	-8	ES 9	7	18	22	22	19	20	15	US 17	23	16	S	S	5	-11	-1	ES -23	ES -23	ES -23	ES -23
3	ES -23	-10	-11	-4	0	15	5	6	18	ES -8	ES -23	ES -23	19	10	17	8	4	5	2	0	2	0	ES 0	-17
4	-10	-10	ES -23	ES -23	ES -23	5	5	24	19	6	-10	ES -23	15	20	7	2	10	0	ES -23	0	ES -23	ES -23	ES -23	ES -23
5	-9	-2	-9	ES -24	-1	5	13	17	17	17	10	ES -24	13	14	10	9	11	14	-2	-1	-2	-1	ES -24	-3
6	ES -24	ES -24	ES -24	-15	-15	-15	7	4	11	17	16	3	7	16	17	14	6	-4	-3	ES -22	ES -22	ES -7	ES -22	ES -22
7	ES -22	ES -22	-10	-10	-10	9	7	4	17	21	22	14	19	22	24	13	4	1	-4	-9	-8	-3	1	ES -22
8	ES -22	ES -22	-14	-4	3	5	11	5	14	20	10	13	13	25	18	9	10	-1	2	-14	ES -23	ES -23	ES -23	ES -23
9	ES -22	ES -22	ES -22	ES -22	ES -22	-9	-1	8	7	8	5	-10	16	18	18	13	11	11	9	-10	ES -22	ES -22	ES -22	ES -22
10	ES -23	ES -23	ES -23	ES -23	-11	8	12	14	18	18	6	-1	8	20	15	8	9	5	-10	-5	-8	ES -23	ES -23	ES -23
11	ES -23	-11	ES -23	1	-5	4	14	17	19	13	15	5	7	14	8	12	4	4	ES -23	-2	-8	-10	-5	ES -23
12	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-10	-11	-1	ES -23	8	ES -23	5	18	12	11	5	6	-5	3	1	-6	-5	ES -23
13	ES -23	5	-3	-11	-11	6	8	19	17	ES 2	-11	-6	10	22	10	-5	5	11	6	-11	8	-1	ES -2	ES -23
14	ES -23	ES -23	ES -23	-11	-10	11	10	15	25	18	10	13	12	24	15	10	6	12	-1	5	11	10	ES -14	ES -23
15	ES -23	ES -23	ES -23	ES -23	5	3	6	5	6	ES -2	ES -2	ES -2	ES -8	4	8	12	-5	5	-5	ES -23	-10	ES -23	-11	-11
16	ES -23	ES -23	-11	-11	-2	7	6	15	13	10	11	10	10	15	15	15	11	9	1	-1	-11	-13	ES -5	-6
17	-11	-14	-13	-3	0	5	4	6	11	10	13	-1	5	6	5	-4	0	6	3	2	0	4	ES -6	-3
18	-11	-9	0	-1	-4	6	11	2	-11	5	5	2	10	16	10	10	4	10	-8	-4	0	-8	ES -8	-13
19	-14	-12	-14	-4	9	10	10	14	10	10	-4	-5	10	8	12	4	7	0	ES -26	-7	ES -26	-5	9	-12
20	-5	ES -26	ES -26	-5	11	-3	7	0	-5	-9	ES -26	-14	ES -8	ES -26	-3	7	-11	ES -26	ES -26	-14	-14	ES -26	-8	ES -26
21	-1	ES -26	-2	-12	-1	2	11	6	-3	ES -11	ES -26	ES -26	ES -11	1	10	-12	11	-6	-8	-3	10	-14	-11	4
22	-4	-14	-14	-3	-1	-1	10	17	7	0	3	-14	2	6	16	6	3	2	-13	-1	-4	-14	-3	-1
23	-14	-11	-8	-5	-4	5	10	9	15	7	-2	-5	1	19	5	10	9	5	-1	15	1	-1	-11	-5
24	-11	-14	-1	ES -26	-5	5	10	14	8	-1	-4	2	20	18	10	15	4	-1	5	-5	-4	-11	ES -13	-14
25	ES -26	ES -26	-14	-4	5	5	10	15	3	-1	0	-14	-4	15	14	10	5	2	-3	-14	-13	-11	0	ES -26
26	ES -26	ES -26	-14	-14	-1	7	9	15	20	14	12	0	19	19	6	5	-1	6	-11	-14	-11	-14	-11	-14
27	ES -26	ES -26	-14	-5	0	10	4	9	16	6	-14	2	15	21	10	10	2	-3	4	-3	-14	-11	ES -26	ES -26
28	-11	-14	-9	-14	0	2	18	-14	-11	-8	ES -11	ES -26	ES -26	14	-9	-4	-14	ES -26	ES -26	ES -26	ES -26	ES -26	ES -8	ES -26
29	-17	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-17	-17	-14	-14	-14	ES -26	ES -26	-9	-9	1	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26
30	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-5	-3	6	3	-14	-9	-4	7	6	2	11	-1	10	-5	0	-2	ES -11	-14
31	-8	-17	-5	ES -26	-5	3	6	13	-5	-14	-4	-11	-7	8	4	-4	3	-3	ES -26	ES -26	ES -26	-14	-14	ES -26
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	30	31	31	31	31	31	31	31
MED	US -22	US -22	-14	-11	US -2	5	9	9	11	6	3	US -5	10	16	10	9	5	4	-4	-5	-10	US -11	ES -11	ES -22
UD	ES -4	-2	-1	-3	ES 9	10	15	19	20	19	18	13	19	23	18	14	11	11	6	3	8	0	ES 1	ES -1
LD	ES -26	ES -26	ES -26	ES -26	ES -23	ES -23	-5	-11	-11	ES -14	ES -23	ES -24	ES -11	1	-3	-5	-5	ES -26	ES -26	ES -26	ES -26	ES -26	ES -24	ES -26

C. RADIO PROPAGATION

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

JUL 1990 FREQUENCY 15 MHZ BANDWIDTH 50 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	0	ES -23	0	2	18	16	25	27	26	25	25	22	25	21	25	27	23	15	12	16	11	5	ES 5	8
2	ES 7	5	2	5	15	19	22	25	27	30	30	26	25	24	21	25	24	10	13	9	5	5	-5	-11
3	-8	-11	ES -23	2	15	20	22	27	24	28	24	24	22	21	18	17	23	13	18	12	7	5	4	0
4	-10	-8	5	10	17	19	23	29	27	27	25	23	25	22	22	20	7	-5	15	12	10	5	5	6
5	2	-2	8	ES -24	9	20	17	24	17	16	14	13	15	12	13	12	3	7	6	6	0	-3	ES -24	-2
6	-12	-12	-2	1	14	14	9	19	23	31	23	21	22	25	23	28	23	31	19	19	20	12	-1	-3
7	-7	4	11	6	14	19	23	26	38	27	27	25	27	26	28	27	31	19	17	20	17	12	3	-1
8	-3	-4	7	8	13	17	26	24	27	22	29	25	24	26	27	19	25	8	13	7	9	-2	ES -23	ES -23
9	ES -22	ES -22	ES -22	-7	1	6	16	21	22	27	30	26	32	32	28	24	19	22	22	13	9	8	-2	-1
10	ES -23	-10	-5	0	12	18	20	25	25	25	22	21	22	22	24	26	26	17	10	7	9	6	-5	-3
11	-2	-11	-5	4	9	17	22	29	23	31	25	25	25	23	21	27	28	22	23	15	12	6	12	1
12	2	4	5	6	13	15	21	25	26	25	26	21	22	26	28	25	25	20	20	14	13	-1	-3	11
13	-3	-5	-8	6	14	24	25	30	27	23	20	22	30	21	20	19	18	25	19	19	8	US -5	5	-8
14	-11	-11	5	6	11	19	20	22	26	29	21	27	26	24	25	18	20	24	-11	13	8	5	10	-5
15	-8	-5	-5	-5	11	16	22	31	25	29	27	28	25	30	22	25	30	22	19	18	13	9	-1	7
16	3	1	5	8	12	18	17	20	21	25	26	25	25	24	27	20	19	22	16	8	16	4	0	4
17	2	-4	2	13	13	17	25	26	26	22	22	26	21	22	15	13	22	25	17	10	11	8	2	4
18	-4	-4	1	6	16	15	19	26	25	28	25	24	24	22	23	20	22	20	15	11	12	6	-4	-4
19	4	2	2	4	14	15	25	25	25	25	24	27	20	25	18	20	20	10	15	21	12	9	7	0
20	-1	0	1	7	9	17	17	17	31	26	21	18	19	17	24	19	19	15	10	5	5	0	-5	-5
21	-5	2	3	0	10	14	20	27	23	25	13	16	19	14	11	10	16	14	3	13	4	2	-3	0
22	-4	0	2	5	15	15	21	17	19	16	20	25	22	17	10	15	14	10	-11	16	14	0	15	2
23	-5	-4	0	3	10	19	20	20	26	28	16	20	17	16	25	21	29	15	10	10	5	6	2	-5
24	-11	-5	-5	0	8	19	20	25	28	17	21	18	17	17	21	10	19	11	15	16	-4	-5	-4	-14
25	-5	-5	-1	1	4	14	19	28	22	21	22	19	17	17	25	13	14	16	0	5	4	0	-4	ES -26
26	ES -26	-14	-5	0	5	14	20	25	26	23	25	28	19	21	23	22	20	14	12	0	6	1	0	6
27	-5	-3	-4	5	6	10	15	20	21	19	19	22	20	20	24	25	20	22	8	-4	4	1	-11	-11
28	-5	-4	-9	-2	8	17	12	16	25	25	25	22	23	25	20	-15	-17	-3	17	4	5	8	2	-5
29	-17	-8	-2	4	8	8	11	10	25	15	9	26	22	17	25	16	16	ES -26	-14	5	0	1	-17	-14
30	-14	-14	-5	0	0	10	16	14	21	20	25	21	26	25	15	7	17	18	13	0	15	6	-5	-13
31	-4	-4	2	2	2	16	17	21	28	20	25	22	17	17	17	16	-1	-3	5	2	2	-4	-4	-11
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	US -5	-4	0	4	11	17	20	25	25	25	24	23	22	22	23	20	20	15	13	11	9	5	US -1	-3
UD	ES 3	4	7	8	16	20	25	29	28	30	29	27	27	26	28	27	29	25	20	19	16	9	10	7
LD	ES -22	-14	-9	-5	2	10	12	16	21	16	14	18	17	16	13	10	3	-3	-11	0	0	-4	ES -17	-14

C. Radio Propagation

C2. Radio Propagation Quality Figures at Hiraiso

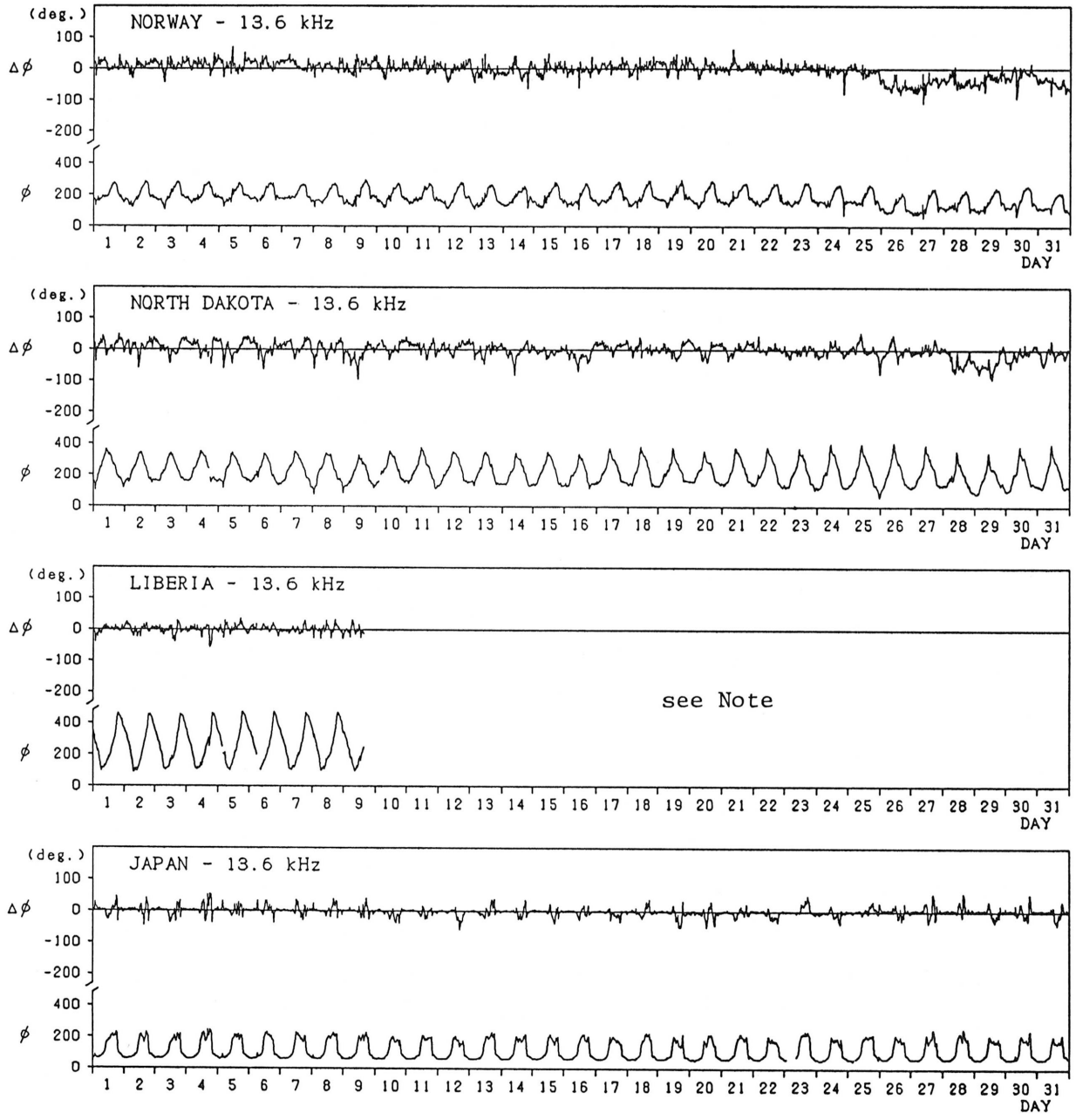
Hiraiso — Time in U.T

Jul. 1990	Whole Day Figure	W W V 00|06 06|12 12|18 18|24	W W V H 00|06 06|12 12|18 18|24	Conditions 00|06 06|12 12|18 18|24	Principal Geomagnetic Storms Start h m	End h	Range nT
1	4o	4 5 4 4U	4 4 4 4	N N N N			
2	4o	5 5 4 3U	4 4 4 4	N N N N			
3	4o	4 3 4 4	4 4 4 4	N N N N			
4	4-	4 4 3 3U	4 4 4 4	N N N N			
5	4-	4 4 4 4	4 3 3 3	N N N N			
6	4o	3 4 4 3U	4 4 4 5	N N N N			
7	4o	4 5 4 4	4 4 4 4	N N N N			
8	4o	4 4 4 4U	4 4 4 3	N N N N			
9	4o	3U 4 5 4U	3 4 5 4	N N N N			
10	4o	4U 4 4 4U	3 4 4 4	N N N N			
11	4+	4 5 4 4U	4 4 5 4	N N N N			
12	4-	3U 2 4 4	4 4 4 4	N N N N			
13	4o	4 4 4 4	4 4 4 4	N N N N			
14	4+	4 5 4 5	4 4 4 4	N N N N			
15	4o	4U 3U 3 4U	4 4 4 5	N N N N			
16	4o	4 4 4 4	4 4 4 4	N N N N			
17	4o	4 4 4 5	4 4 4 4	N N N N			
18	4o	5 4 4 4	4 4 4 4	N N N N			
19	4o	5 4 3 4U	4 4 4 4	N N N N			
20	3+	4 2 2U 3U	4 4 4 4	N N N N			
21	4-	4 3U 3 4	4 4 3 4	N N N N			
22	4o	4 4 4 4	4 4 3 4	N N N N			
23	4+	5 4 4 5	4 4 4 4	N N N N			
24	4o	4 4 4 4	4 4 3 4	N N N N			
25	4-	4 4 4 4	4 4 3 3	N N N N			
26	4o	4 5 4 4	3 4 4 4	N N N N			
27	4-	4 4 4 4	4 3 4 3	N N N N			
28	3+	4 3 2 2U	4 4 3 4	N N N N	0331	---	282
29	3-	2U 2 2 2U	4 3 3 3	U U U U	---	24	
30	4-	3U 3 4 5	3 4 4 4	U U U U			
31	3+	4 3 3 3U	4 4 3 3	N N N N			

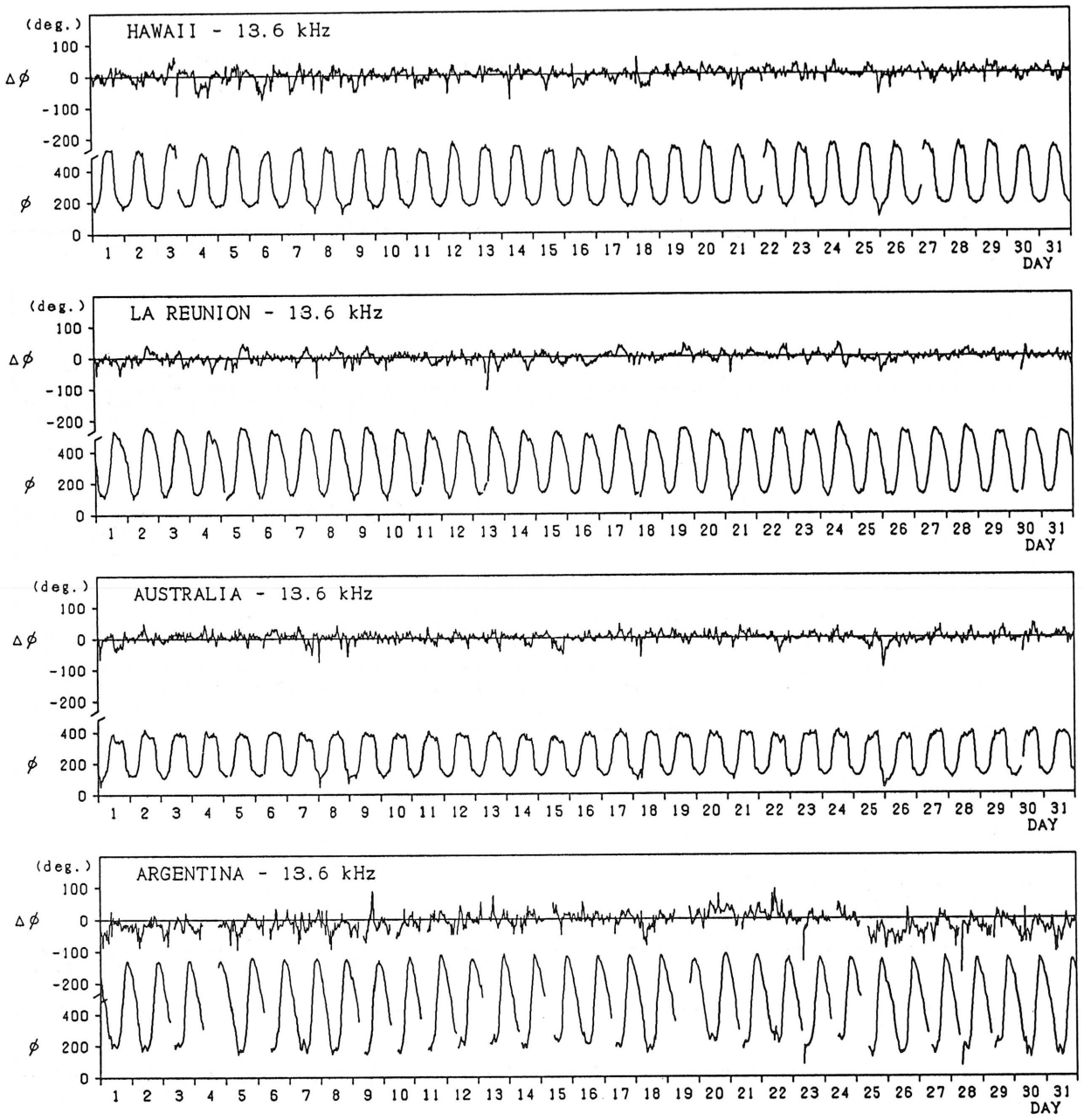
C. Radio Propagation

C3. Phase Variation in OMEGA Radio Waves at Inubo

Inubo July 1990



Inubo July 1990



Note: As for LIBERIA - 13.6 kHz, no record during July 09 - July 31, due to the maintenance of transmitter.

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

Start (U.T.)	End (U.T.)	Max. (U.T.)	Max. Phase Deviation (negative value, deg.)
Jul.26/0056E	Jul.30/1100	Jul.26/1543	90.0
Jul.30/1916	Aug.06/1730	Aug.01/1437	133.2

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso

Time in U.T.

Jul. 1990	S W F									Correspondence	
	Drop-out Intensities(dB)					Start	Duration	Type	Imp.	Solar Flare	Solar Noise
	CO	HA	1)	2)	3)						
1			12			0136	24	G	1	x	
4	27	47			28	1645	47	SL	2	x	
4	26	44			9	1735	24	SL	1-	x	
5		25	18	x		0325	31	G	1	x	
6	18	32	16	x	17	0539	39	SL	1+	x	
8		17	18			0042	24	SL	1+	x	
12					11	1343	10	S	1-	x	
18			8	x		0304	21	SL	1-		
18			13		12	0622	29	SL	1	x	
25			15			2250	90	G	1	x	
30			8	5	14	0710	119	G	1-	x	

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

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Jul. 1990	S P A								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
1	17		18	13	11	13	0035	0051	0040
1	14	11	31	27	19	25	0120	0141D	0125
1	38	40	45	56	41	54	0141E	0243	0155
1	14				6	13	0253E	0334	0313
1			12	8			0417	0435	0422
1			22	13	9		0500	0546	0511
1			25	10			0610	0727	0626
1		40					1230	1322	1238
1					13	24	1938	2017	1941
1					15	21	2035	2121	2039
1		19	14	19	25	27	2256	0028	2314
2	22		36	—	10	20	0451	0538	0457
2		27	33	—	12		0635	0730	0644
2		31	24				0820	0855	0832
2		49	35				0903	1020	0919
2		35					1144	1215	1153
2		25					1216	1257	1232
2					18	30	1936	2022	1940
2					23	34	2104	2214	2117
3				9	6		0045	0108D	0050
3		16		26	14	14	0108E	0133D	0114
3				14	8	8	0133E	0207	0140
3		16	15	13	9	23	0232	0339	0248
3		26	27	23	10		0420	0538	0427
3			50	30	13		0554	0655	0606
3		22	27				0951	1028	0959
4		38	26				1107	1152	1120
4	20	—				—	1651	1726	1658
4					35	61	1736	1821	1744
4				—	6		2342	0000	2349
5	63	99	128	—	55	66	0324	0530	0344
5	28	23	36				0915	1014	0924
6			26	24*	9		0445	0530D	0454
6	73	—	172	107	58	51	0530E	0635D	0552
6			54		31	16	0635E	0750	0645
6	11				13	16	2223	2256	2230
6					5		2339	0025	2343
7		32	27				1020	1106	1035
7		7		8	5		2318	2347	2327
8	17	8		6	5	8	0002	0026	0007
8	34	41	62	80	60	46	0047	0200	0054
8				16	5		0214	0240	0219
8			12	12			0358	0457	0410
8	14		19	10	7		0625	0725	0634
8	36	29		69	55	61	2228	0042	2326

Inubo

Jul.	S				P		A		
1990	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
9	31		72	—	23	34	0418	0558	0438
9			16	—	13		0628	0650	0634
9			38	10			0800	0856	0812
9		34	22				1005	1105	1015
9		—	14		29	41	2209	2304	2221
10		—	19	18	16		0039	0114	0044
10		—	29	24	14		0128	0232	0145
10		—	12	12	10	—	0302	0338	0316
10		—	13	6		20	0433	0502	0438
10		—	20	14			0550	0634	0602
10		—	58	36	36		0642	0726	0650
10		—	22				0920	1004	0925
11		—		16	12	21	0112	0208	0130
11		—		12	7		0217	0237	0222
11		—	25	18	8		0435	0508	0441
11		—	23	16			0628	0706	0630
11		—	61	12			0908	1030	0918
12		—	25	—	9		0512	0600	0525
12		—	37	36			0611	0648	0625
12		—			8		2138	2152	2212
13		—	16	14	11	24	0303	0343	0310
13		—	92	22			0734	0840	0744
13		—	56				1012	1236	1058
13		—			5	13	2331	0001	2343
13		—		10*	7		2358	0037	0015
14		—	14	16	9		0248	0342	0256
15		—		8	6		0117	0158	0126
15		—	36		7		0225	0306	0245
16		—	13	—	7		0323	0356	0330
17		—			7		2213	2236	2217
17	16	—	10	11	17		2347	0044	2356
18	22	—	34	36	19	20	0302	0417	0314
18	59	—	140	87	43	23	0626	0748	0634
18		—	13				0853	0912	0858
18		—	20				1106	1147	1117
20		—	14		25	15	0640	0716	0648
20		—	16			25	0725	0834	0734
21		—	14	48	20		0358	0602	0435
21		—			8		2001	2049	2014
22		—			18	22	2056	2149	2110
22		—	16		34	30	2159	2248	2209
23	27	—	20	—	45	37	0004	0100	0010
23		—	17	—	8		0328	0411	0340
23		—	30	—	9	17	0431	0520	0441
23		—			31	42	2153	2245	2204
24		—	18	13			0620	0642	0625
25	20	—		34	45	45	2255	2321D	2316
25	25	—		42	54	55	2321E	0139	2335
26		—	17	18	9	17	0222	0334	0239
26		—	27	8			0658	0722	0706
26		—	14	11			0732	0755	0737
26		—				36	1701	1745	1714
26		—			6		2123	2223	2129
26		—		6	4		2330	2357	2343
27	19	—	22	31	27	27	0003	0043	0008
28	14	—	22	21	9	12	0238	0317	0247
29		—			19		0636	0706	0644
29		—			10		2146	2243	2203
30		—		—	11		0004	0106	0018
30		—	15	—	4	12	0300	0348	0322
30		—	32	—	15	17	0630	0704D	0648
30	68	—	214	—		22	0704E	1010	0734

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