ISSN 0021–0382

F—534

IONOSPHERIC DATA IN JAPAN

FOR JUNE 1993

VOL. 45 NO. 6

CONTENTS

COMMUNICATIONS RESEARCH LABORATORY
MINISTRY OF POSTS AND TELECOMMUNICATIONS
TOKYO, JAPAN

INTRODUCTION

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

Station	Geographic		Geomagnetic		Technical Method
	Latitude	Longitude	Latitude	Longitude	
Wakkanai	45°23.5′N	141°41.2′E	35.3°N	206.5°	Vertical Sounding (I)
Kokubunji	35°42.4′N	139°29.3′E	25.5°N	205.8°	Vertical Sounding (I)
Yamagawa	31°12.1′N	130°37.1′E	20.4°N	198.3°	Vertical Sounding (I)
Okinawa	26°16.9′N	127°48.4′E	15.3°N	196.0°	Vertical Sounding (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°	Radio Receiving (P)

A. IONOSPHERE

Ionospheic observations are carried out at the above four 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 descriptivel etter 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 I-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 transmisson 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 normnal *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 200, 500 and 2800 MHz are carried out at Hiraiso. The observation equipment consists of two parabolic antennas, one with 10-meter diameter for 200 MHz measurements and one with 2-meter diameter for 500 and 2800 MHz measurements, 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 are tabulated separately for 200 and 500 MHz measurements. 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 200, 500 and 2800 MHz 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.

B3. Summary Plots of $F_{10.7}$ at Hiraiso

The 10.7 cm solar radio flux at Hiraiso is plotted over a one month period. The 10.7 cm flux ($F_{10.7}$) is determined by adjusting the 10.7 cm radio flux measured at Hiraiso to the Pentincton 10.7 cm radio flux. The figure on the right-hand side shows the $F_{10.7}$ index estimated at Hiraiso.

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 600 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 for 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	innuenced 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.

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

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 par hour from JJY (Japan Standard Wave) staion. The conditions are denoted as follows:

N normal,
U unstable,
W disturbed.

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

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

C4. Sudden Ionospheric Disturbances

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

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

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

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

Types of fade-out are as follows:

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

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

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

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

b. Sudden Phase Anomaly (SPA) at Inubo

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

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

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

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

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

Transmitting Stations

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

HOURLY VALUES OF FOF2 AT WAKKANAI

JUN. 1993

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	66	66	66		65	66	79	88	71	77	72	A	63	67	67		71	72	76	61		54	78	64
2	71	65	66	65	65	78	84	80	A	A		A	A	A	A	59		A	84	76	65	73	73	
3	71	65	62	62		66	72	A		A	A	71	66	65	68	74		70	76		84	83	82	73
4	74	65	68	61	57	66	64	A	A	A	A	A			A	62	66	65	64	80		86		78
5		72	66	62	65	64	64		A	A	66	A	A	68	79	86	88	80	64	57	80	79	83	66
6	78	72	58	55	52	60			A	86	A		A	A	A	A	61	66	67	98	66	77	72	A
7	61	60	58	57	55	49	52	63	A		A	A	A	64	68	65	64	71	66	70	76	82	76	65
8	65	65	63	58	54	60	73	71	65	62		64		62	63	63	68	61	66	66	73	71	77	72
9	68	65	64	65	60	52	74	66	71	62	61	72	65	67	75	76	A	63	69	73	66	A	A	A
10	83	66	64	60	65	71	A	A		A	A	A	A	62	A	A								
11											68				57			63	64	73	65	67	A	65
12	64	A		A	45	48	52	A	A		A	A			A	A		60		57	56	68	66	61
13	55	55	55	54	53			69	70	A	A			A	A	61		A	62	A	61	62	65	64
14	A	A	A	54	53	67	74	A			A	N	A	A		A	A	A	A	65	A	54	61	62
15	A	A	54	52	55	52	A	79	A		A	A	A	A		A		52	56	A	A		58	A
16	55	52	52	47	55	52	62	73	70		A			A				A	58	67	73	73		63
17	51	51		48	A	37	A	A	A	A	A						63	62	A	58		64	51	50
18	52	54	53	50	51	55	63	63	A	A	A	A		66			56	66	58	58	70	66	63	63
19	62	54	56	54	55	59	69	54	A	A	54		A				66	66	65	72	80	78	62	57
20	50	53	53	50	47	34		A	A	A	A							57	57	58	64	65	67	63
21	51		52	53	56		63	A	62	A	A			60		58	57	57	55	64	72	77	73	64
22	59	57	50	55	57	62	66	76	76	A	71	55	60	60	66	67	A	68	70	72	64	76		66
23	66	61	60	60	63	67	67	62	69	67	67	61	66	73	A	A	A	70	64	78	A	A	86	66
24	54	62	62	61	60	56	64	87	A	85		A	A	A	64	A	70	79	78	55	78	80	77	66
25	74	56	58	62	53	47	A	A	A	A	A	A						66	62	63	65	58	76	73
26	66	61	64	58	61	63	66	67	A	A	A	A					A	57	A		54	78	74	65
27		66	63	58	64	71	78	89	81		59		A	A	A	A	63	67	60	62	81	77	76	66
28	67	66	64	61	61	67	89	A	A	A	61	A	A	59	57	A		58	66	70	73	78	77	77
29	71	69	66	67	65	84	90	88				67		A		74	67	64	64	74	84	89	90	90
30	66	66	66	62	55	74	79	67	67	77	A	A		A	67	A	64	70	73	82	86	87	86	72
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	25	26	27	27	27	22	17	10					12	11	11	14	25	25	25	23	26	24	25
MED	66	65	62	58	56	62	68	71	70					64	67	65	65	66	64	67	72	76	75	65
U Q	71	66	64	62	63	67	78	83	71					67	68	74	68	70	69	73	80	79	77	72
L Q	55	55	55	54	53	52	64	64	67					61	63	61	63	60	61	59	65	66	65	63

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT WAKKANAI

JUN. 1993

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	55	59	38		G	34	45	58	78	58	59	68	58	64	61		65	126	83	78		58	31	G
2	26	32	G	G	G	33	48	50	53	60		49	86	126	78	52	113	76	55	34	60	60	49	
3	83	58	58	26	34	40	52	66		82	85	84	53	G	G	G		53	44		34	30	30	29
4	G	32	G	G	31	46	54	62	67	65	113	64			64	G	G	G	33	G		G		G
5	28	38	35	29	31	34	45		55	53	53	54	62	50	G	41	57	63	63	72	72	41	37	34
6	28	25	G	G	31	41			68	101	58		61	76	68	147	41	G	60	66	71	69	64	71
7	36	34	39	24	G	36	38	58	77		73	68	82	42	G	G	G	G	G	38	46	34	25	36
8	G	28	G	G	G	G	43	62	58	43	G	G		57	G	62	G	G	30	31	28	47	30	26
9	26	40	G	G	G	37	36	60	70	56	56	G	G	G	50	56	74	59	60	66	88	112	112	136
10	114	88	44	59	35	54	80	79	138	147	177	125	62	54	58	96								
11											69	G	G		G			G	53	48	59	72	93	66
12	G	69	34	151	58	G	50	95	71	G	76	113			74	72	G	34	52	91	61	47	30	G
13	G	G	G	G	G			G	57	94	59		G	54	54	G		71	56	151	79	96	94	73
14	103	67	62	62	36	39	38	95		170	154	91	166	83	42	54	61	139	61	41	91	72	60	66
15	93	90	60	46	30	48	70	90	92	180	64	56	107	61		52		52	60	69	70	54	32	64
16	50	26	G	G	G	G	54	66	113	175	122	G	G	73		103	143	64	34	28	36	45		33
17	36	31	32	34	39	G	36	60	64	61	58	G	G				G	42	53	40		G	28	G
18	G	G	G	G	G	G	38	46	72	53	62	55	G	G		G	G	G	34	36	26	29	35	30
19	32	27	25	G	G	33	35	50	54	64	G	G	58	G		G	38	G	45	57	59	33	G	32
20	G	25	G	G	G	35		52	69	53	52		G			G	G	45	78	41	50	50	27	29
21	30	34	30	G	31		54	60	60	70	64		G	G		G	41	49	54	72	39	70	33	34
22	24	59	71	37	27	40	58	64	63	78	60	G	G	G	G	G	68	G	31	61	57	38		G
23	24	G	G	G	88	32	G	38	54	64	G	G	61	56	59	57	91	60	72	69	102	82	27	29
24	G	G	G	36	35	39	50	93	113	60		60	60	91	83	80	53	63	137	70	140	70	144	56
25	45	42	29	23	37	41	60	72	76	62	93	65	G			G		36	31	54	40	28	46	29
26	24	G	G	G	G	35	37	50	59	78	65	68				G	55	G	61	112	91	57	60	40
27		38	27	G	G	G	36	71	G	G	G	G	66	68	67	81	G	39	59	36	46	46	57	72
28	G	24	G	G	G	29	58	113	126	74	64	64	79	G	G	71	G	47	50	38	60	36	29	38
29	35	26	G	33	34	36	80	74	80	G	G	G	G	62	G	G	G	46	47	60	34	35	29	40
30	32	G	29	43	G	31	45	38	54	G	84	64	G	64	G	58	38	58	54	42	69	35	G	G
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	29	28	29	27	26	27	27	28	28	26	26	23	21	27	24	29	29	28	26	29	26	28
MED	28	32	25	G	27	35	46	62	68	63	63	56	56	56	50	52	40	46	54	56	60	47	32	34
U Q	40	50	36	35	34	40	54	74	78	80	80	68	62	68	65	71	63	61	60	69	72	69	60	60
L Q	G	24	G	G	G	29	38	50	57	53	54	G	G	G	G	G	G	G	39	38	40	34	29	27

HOURLY VALUES OF FMIN AT WAKKANAI

JUN. 1993

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

H / D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	16	17		17	17	28	24	26	35	39	29	38	32	39		21	17	17	15		16	16	17
2	17	16	16	17	17	17	17	21	32	38		42	41	47	40	36	30	20	18	15	16	16	18	
3	15	14	16	17	16	17	21	32		39	38	38	38	54	53	27		21	17		14	15	16	16
4	16	16	16	15	16	16	20	20	35	40	32	24			33	23	21	20	21	20		17		15
5	16	14	16	15	16	17	18		33	35	36	41	33	32	28	23	33	20	22	17	15	15	15	16
6	17	15	16	15	16	17			24	40	36		34	33	39	32	20	32	17	15	16	14	16	18
7	16	16	15	16	20	18	18	18	33		42	34	33	33	27	50	21	18	35	16	15	15	16	17
8	16	17	16	15	18	17	18	28	21	22	66	51		44	27	22	22	30	22	16	16	15	16	16
9	16	15	17	16	18	18	20	21	22	24	37	50	48	53	32	34	32	21	21	15	15	15	16	16
10	16	16	16	15	16	17	20	32	34	38	38	38	36	33	33	36								
11											40				49			18	21	14	14	15	14	15
12	15	14	14	15	14	17	18	29	34		39	34			36	42	22	18	16	15	15	15	15	15
13	16	15	16	14	17			29	22	33	33		49		32	28		17	18	16	14	15	14	16
14	15	15	15	15	15	17	18	20		34	38	34	32	41	24	24	21	18	16	15	15	15	15	14
15	14	14	15	15	15	15	27	28	20	33	33	33	46	33		36		17	15	15	15	15	14	15
16	15	14	14	14	16	17	26	27	18	30	44			46		21	16	18	15	15	14	14		16
17	15	15	14	15	15	23	27	29	21	33	44		34				50	18	20	15		15	14	14
18	14	15	15	15	16	14	18	20	22		45	39	47	48			20	18	24	16	14	14	15	15
19	15	15	16	15	17	15	16	18	17	41	50	48	45	48		26	22	17	18	14	14	15	15	16
20	14	15	15	14	16	18		20	22	36			66			22		20	18	15	15	14	16	15
21	14	15	15	14	14		17	28	33	48	35			49			20	18	17	15	15	14	15	15
22	15	14	14	15	14	14	21	18	20	39	45	51		50	28	28	27	20	20	14	16	16		15
23	15	21	14	16	20	15	16	30	39	41	50	50	46	32	28	27	27	18	20	16	16	21	17	20
24	20	22	15	18	16	15	17	32	42	39		46	45	34	30	38	32	44	22	15	15	15	15	14
25	15	15	15	14	15	18	17	30	33	42	34	44				28		20	21	15	14	14	14	15
26	14	15	16	14	15	16	22	26	22	45	45	45				24	21	18	18	15	15	15	14	16
27		15	15	15	16	17	18	20	47	46		55	45	46	44	29	24	20	17	16	14	15	14	15
28	15	14	14	14	16	16	17	32	32	45	42	48	34		50	42	22	18	20	16	16	15	15	15
29	15	15	14	16	15	16	18	22	45	54	49	58		53	55	46	21	29	22	15	14	15	15	14
30	15	15	15	15	17	15	17	18	29	48	45	28	52	42	49	42	18	20	21	15	15	15	15	14
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	29	28	29	27	26	27	27	26	26	23	20	21	21	25	23	29	29	28	26	29	26	28
MED	15	15	15	15	16	17	18	26	29	39	40	42	43	44	33	28	22	18	20	15	15	15	15	15
U Q	16	16	16	15	17	17	21	29	34	42	45	50	46	48	46	37	27	20	21	16	15	15	16	16
L Q	15	14	14	14	15	15	17	20	22	34	36	34	34	33	28	24	21	18	17	15	14	15	14	15

HOURLY VALUES OF FOF2 AT KOKUBUNJI

JUN. 1993

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	93	93	75	76	69	95	85	83	76	A	82	80	A	84	85	A	A		A	A	77	A	84	82
2		72	81	73	77	94	84	94	87	83	75	51	A	A	70	80	A	85	82	93	94	94	73	A
3	74	77	72	67	71	73	105	94	83	A	A	74	82	81	87	91	88	92	99	92	93	93	92	81
4	94	80	80	81	72	98	98	A	A	A	72	73	A	86	A	86	81	97	86	93	94	94	93	98
5	93	95	80	80	92	86	80	120	73	81	A	A	95		109	115	106	103	90	84	A	93	94	A
6	93	A	53	58	68	74	83	A	A	A	A	A	74	77	78	86	82	A	A	83	82	95	73	74
7	76	75	71	70	69	61	A	A	A	70	A	A	73	A	80	86		80	A	80	80	78	85	84
8	76	76	82	58	51	60	69	76	69	67	A	80	75	82	A	87	80	86		A	N	73	79	84
9	72	67	73	61	61	78	76	78	77	73	78	A		A	A	A	A	A	A	A	74	70	54	67
10	A	A	57	68	63	88	78	71	A	A	73	72	A		80	77	74	70	77	A	77	74	71	70
11	A	A	A	68	68	63	A	77	93	A	A	A	A	A	A	A	A	76	89	84	A	A	A	A
12	62	A	A	56	52	54	A	A	A	A	A	A	A	A	51	71	A	A	78	A	72	54	A	67
13	66	58	58	52	53	57	74	72	70	67	A	A	A	76	A	84	A	70	76	A	A	A	74	69
14	67	66	70	64	55	57	77	68	54			51		A		59	66	72	74	68	73	72	72	60
15	50	57	56	47	45	55	A	62	A	A	A		A			91	69	59	A	71	72	66	60	58
16	51	78	55	51	52	56	71	65	A	63		A		A	A	A	A	A	85	A	A	73	68	52
17	54	56	57	46	47	47	55	62	79	49			50		59	45		A	71	72	61	62	62	60
18	51	54	55	48	45	57	67	70	102		58			A	65	67	68	69	94	70	69	60	61	60
19	61	62	57	60	58	58	58	68	69	60	A	A	A	A	A	A	A	85	100	A	82	70	69	69
20	57	56	52	46	45	51	62	63	A	A	A	A	A	A	46	A	A	A	115	76	65	A	59	69
21	69	57	57	50	48	58	67	104	83	A	A	A	A	A	A	A		A	A	A	81	74		68
22	57	70	58	55	56	68	60	A	82	76	A	A	72	A	A	86	103	97	93	94	66	68	71	58
23	58	58	57	55	70	59	76	86	A	55	61	A	70	78	A	86	86	95	97	97	93	93	69	73
24	58	69	70	56	56	59	72	97	109	81	A	A	74	A	A	98	97	95	87	A	84	A	A	79
25	95	74	69	57	58	43	A	A	A	A	A	A	A	A	A	A	A	61	A	A	A	A	68	70
26	70	72	58	75	A	59	A	A	A	A				A	A				84			A	A	A
27	70	70	58	60	57	82	70	76	68	A	88			A	74	70	74	92	84	80	A	A	70	68
28	76	70	73	55	58	75	95	78	78	90	A	A	A	A	73	A	A	A	A	A	86	82	75	73
29	75	71	70	68	68	74	94	94	77	A			A	A	A	A	A	A	71	84	93	93	95	96
30	93	93	97	76	71	75	79	97	70		A	73	A	A	69	74	80	75	91	75	95	96	84	84
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	26	28	30	29	30	24	23	19	13					14	19	14	19	21	17	22	22	25	26
MED	70	70	64	59	58	60	76	77	77	70					74	86	80	85	86	83	80	74	72	70
U Q	76	76	73	68	69	75	83	94	83	81					80	87	88	95	93	92	93	93	84	81
L Q	58	58	57	55	52	57	68	68	70	61					65	71	74	70	77	73	72	70	68	67

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT KOKUBUNJI

JUN. 1993

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	36	47	50	63	27	37	44	62	57	118	78	57	100	46	51	94	112	177	150	95	59	92	54	48
2	G	34	34	30	26	G	40	40	58	62	60	51	76	111	88	70	145	78	63	35	29	G	G	74
3	51	40	33	44	36	G	49	60	76	81	67	58	88	75	G	49	57	49	38	53	74	75	62	G
4	62	69	32	32	28	62	62	98	113	138	74	59	59	78	110	G	G	G	72	63	72	119	107	38
5	G	98	39	48	75	64	62	120	104	66	101	124	82	78	G	G	46	G	G	36	76	62	70	106
6	107	85	53	50	37	73	80	87	91	122	91	78	G	60	55	64	61	108	116	73	32	41	96	59
7	62	61	55	53	25	72	81	62	59	58	69	86	73	81	59	58	93	83	108	64	70	60	57	61
8	60	34	24	G	29	27	40	51	52	72	62	67	148	62	100	G	48	43		55	54	73	60	95
9	58	32	25	G	G	44	44	51	53	62	52	58	103	118	106	106	170	138	96	129	70	42	62	68
10	69	99	61	61	26	42	41	54	72	156	93	72	111	46	G	54	G	58	64	92	41	92	66	102
11	60	80	58	36	24	34	69	87	83	117	125	126	142	70	61	110	91	G	55	92	147	151	132	82
12	62	73	88	87	28	34	61	61	55	56	76	75	99	90	53	46	101	102	49	100	88	92	81	25
13	40	24	40	G	34	26	51	67	83	91	91	109	80	59	74	72	129	62	62	133	137	136	82	60
14	54	91	60	42	34	57	49	62	55	G		G		57	G	49	52	40	34	29	26	24	G	36
15	29	G	28	58	26	30	100	55	69	75	70	88	68	69	118	82	73	46	59	28	26	34	32	40
16	33	56	56	58	52	35	58	71	70	51	72	57	55	75	64	104	89	103	77	96	86	56	37	56
17	57	49	34	G	G	G	44	53	88	68	77	G	60	63	72	G	58	62	50	36	26	40	26	G
18	24	G	G	G	G	G	40	44	50	56	71	95		61	62	48	40	38	46	44	37	42	58	30
19	33	43	40	42	G	42	46	44	G	49	60	78	62	92	82	75	73	59	92	121	56	76	66	94
20	30	39	28	G	G	51	51	71	90	138	132	136	136	72	61	60	119	100	74	66	55	61	76	62
21	58	28	32	33	26	37	62	69	63	74	57	86	82	87	60	56		60	96	90	84	72	59	47
22	48	G	G	G	G	G	76	84	100	68	98	61	60	76	78	61	54	37	94	48	38	51	59	128
23	96	60	59	40	G	41	44	65	62	58	78	62	51	70	136	84	80	50	64	70	64	60	97	70
24	40	65	61	48	57	47	64	98	74	95	104	90	47	103	101	70	54	63	97	71	40	63	96	60
25	100	58	50	33	64	48	62	57	73	105	88	60	132	113	126	74	52	63	96	99	78	78	62	97
26	119	76	57	86	55	G	51	72	74	127		G		58	108	G		G	G	G	G	54	51	55
27	62	53	52	29	25	G	40	63	56	63	74			61	52	51	57	76	97	112	89	67	46	46
28	74	97	64	52	58	57	100	50	55	73	134	139	56	88	64	61	62	68	119	98	96	60	34	34
29	45	31	G	G	G	G	45	54	52	54		G	98	98	113	100	77	104	64	80	90	64	96	48
30	34	40	41	30	28	29	44	50	61	81	132	79	74	68	51	G	G	50	126	83	129	65	99	64
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	30	27	29	26	30	30	30	28	30	29	30	30	30	30	30
MED	56	51	40	38	26	36	51	62	66	72	77	72	78	74	64	60	62	61	72	72	67	62	62	60
U Q	62	73	57	52	36	48	62	71	83	105	98	89	100	88	101	75	92	83	96	96	86	76	82	74
L Q	34	34	32	G	G	G	44	53	55	58	69	57	60	61	53	48	52	43	52	48	38	51	51	40

HOURLY VALUES OF FMIN AT KOKUBUNJI

JUN. 1993

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT YAMAGAWA

JUN. 1993

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	90	90	90	90	A	54	64	76	A	67	A	A	A	92	87	94	A	108	110	90	90	88	87	90
2	100	87	97	87	85	80	80	90	81	76		A	A	80	86	88	97	100	97	97	87	90	89	85
3	87	92	81	71	66	65	76	90		A	A	A	83	91	102	95	98	98	90	88	98	84	85	87
4	85	85	76	72	78	77	90	A	A	N	A	A	A	A	98	107	112	112	95	105	104	85	103	112
5	106	79	A	A	82	76	A	A	A	81	87	86	96	116	104	97	105	114	107	87	79	88	83	87
6	86	87	84	A	78	73	85	77		A	A	A	90	110	110	111	112	107		90	98	85	72	77
7	84	80	78	71	84	60	A	54	A	66	A	68	67	75	81	87	94	85	85	78	77	77	78	80
8	76	80	84	54	57	46	72	80	59	A	76	77	A	A	96	104	94	88	90	A	66	78	78	A
9	85	A	84	73	65	58	66	77	71	80	66	70	86	92	92	95	95	100	87	87	A	A	76	74
10	A	A	A	73	66	60	55	89	99	70	73	A		84	81	80	81	84	82	A	80	79	84	73
11	A	85	A	66	66	63	64	71	A	A	A	A	90	A	A	86	A	A	78	86	78	A	66	77
12	A	A	62	54	53	54	63	62	51	A	A	A		A	71	80	82	81		85	77	A	54	85
13	74	67	63	52	45	52	A	A	66	64	A	65	A	85	A	84	A	85	A	86	80	85	80	76
14	A	78	83	67	55	A	66		58	A	60	A	A	62	65	71	74	77	76	A	A	78	A	65
15	71	73	73	53	41	A	54	63	60	A		A	A	A	A	A	A	A	66	78	77	73	60	62
16	62	61		47	A	A	79		66	78	A	A	64	67	71	75	80	77	70	75	78		76	83
17	76	66	63	54	48	43	57	73	A	57		60	A	A	A	A	A	A	74	66	A	A	54	62
18	61	57	52	51	42	46	53	66	63	64	77	71	67		A	76	89	80	78	71	60	61	52	
19	58		57	53		51		58	72	59	A	A	62	62	N	84	90	97	104		87	75	64	A
20	61	A	62	66	53	51	58	A	A	A	A	A	59	A	A	A	94	119	N		A	A	A	A
21	64	A	62	61	51	48	52	82	80	49	A	A	A	A	A	A	80	80	A	A	A	A	A	63
22	A	80	73	A	64	51		63	70	A	68	70	A	75	81	90	96	97	87	75	72		64	A
23	67	64	67	64	66	62	68	70	66	A	A	65	72	75	76	84	93	108	111	111	88	85	A	63
24	77	78	74	65	66	60	52	80	81	A	A	71	69	66	68	91	95	94	81	78	84	85	76	76
25	86	85	80	78	79	51	A	A	A		92	A	A	A	A	57	A	A	A	72	66	66	63	66
26	66	61	67	64	63	54	54		A	A	A		A		77	75	84	107	107	A	75	A	72	72
27	77	77	76	67	58	51	61	62		72		70	69	73	76	73	68	85	98	67	63	71	66	73
28	77	77	77	72	66	64	67	78	90	91	72	59	A		A	A	A	67	A	76		84	66	74
29	74	78	73	75	77	66	72	68	78	76	76	71	70	76	81	82	74	67	73	84	90	77	78	N
30	A	86	90	A	A	62	66	76	71	73	75	A	A	A	A	87	84	76	82	90	86	77	84	84
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	24	24	26	26	26	27	24	22	18	16	11	13	14	17	19	25	23	26	23	23	24	21	26	24
MED	76	78	75	66	66	58	65	74	70	71	75	70	70	76	81	86	93	91	87	85	80	79	76	76
U Q	85	85	83	72	77	64	72	80	80	77	77	71	86	91	96	94	96	107	98	90	87	85	83	84
L Q	66	70	63	54	53	51	56	63	63	64	68	65	67	70	76	78	81	80	78	75	76	76	64	69

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

JUN. 1993

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	24	26	40	25	57	49	40	G	128	72	118	106	104	66	G	80	106	88	106	64	91	105	60	83
2	30	28	G	38	28	G	40	G	69	84	150	128	92	69	64	61	81	81	59	70	82	43	28	G
3	40	30	30	28	34	30	40	58	G	82	115	110	92	81	G	66	56	61	84	84	141	92	93	106
4	70	33	41	47	34	27	60	78	129	94	135	108	172	167	G	G	G	G	37	43	25	34	85	69
5	103	48		84	80	54	152	84	91	61	62	G	93	63	54	52	G	G	G	28	59	30	G	60
6	92	70	82	92	83	110	93	91	114	150	160	88	G	80	G	G	G	48		35	29	30	83	110
7	26	70	40	G	40	29	30	55	76	70	87	60	G	G	G	G	47	38	33	G	31	26	46	104
8	86	30	40	52	36	93	55	89	54	62	58	46	81	78	86	71	50	G	45	72	39	72	89	93
9	84	126	40	32	32	24	44	53	48	68	44	G	G	75	91	90	73	57	84	46	111	164	80	93
10	29	93	94	89	32	32	48	86	112	67	54	98	159	G	G	G	48	52	54	94	112	112	41	G
11	84	69	93	69	40	G	38	59	76		134	149	106	100	128	75	169	144	59	38	40	131	80	59
12	81	91	69	70	60	25	G	60	72	52	62	94	125	91	52	45	63	G	G	50	89	142	36	G
13	40	59	55	46	28	28	34	72	61	71	88	64	92	82	84	54	97	44	101	72	81	83	83	59
14	31	60	72	43	61	65	81	G	58	54	52	88	68	61	G	61	60	63	34	26		35	28	G
15	G	23	33	38	61	49	30	G	64	115	G	97	124	107	90	76	90	70	50	49	72	33	24	36
16	38	48	G	70	79	83	92	G	59	63	114	52	54	G	43	49	G	42	60	45	60	G	59	48
17	58	59	25	30	G	G	G	45	84	55	G	46	92	97	68	63	77	88	64	45	59	55	32	G
18	30	26	G	G	G	G	G	43	55	53	G	50	G	G	84	45	91	76	69	50	49	28	G	G
19	70	G	37	45	G	41	G	45	54	67	91	82	G	55	55	65	59	68	77		40	59	50	88
20	40	88	58	G	83	58	34	59	62	97	124	151	54	68	81	85	84	84	69	117	150	67	92	59
21	59	62	54	25	26	G	46	80	63	53	72	82	133	69	94	91	G	66	142	161	100	72	92	G
22	107	60	41	26	29	56	100	59	66	87	94	76	93	59	69	60	54	44	G	31	40	G	24	28
23	G	89	92	G	G	G	43	51	60	62	72	52	53	44	52	52	91	90	61	114	82	85	93	41
24	41	70	48	40	G	30	G	G	47	150	117	G	58	G	60	75	51	66	67	69	30	83	86	29
25	G	38	84	55	69	44	54	64	77	90	114	150	101	83	70	48	164	75	72	65	40	30	24	G
26	G	34	G	G			33	G	71	108	125	147	74	G	G	65	69	58	G	85	86	126	85	58
27	40	44	33	25	23	G	G	45	G	59	96	74	56	53	44	57	49	48	48	60	68	67	G	32
28	54	51	59	41	G	G	44	43	46	62	67	62	84		103	96	71	47	62	70	G	93	41	G
29	24	44	32	G	25	G	G	36	43	45	G	58	57	G	52	G	45	G	G	G	32	G	G	44
30	32	29	59	60	57	44	39	50	60	63	71	76	85	98	113	58	48	55	37	36	G	36	57	39
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	29	30	29	29	30	30	30	29	30	30	30	29	30	30	30	30	29	29	29	30	30	30
MED	40	50	41	39	34	30	40	52	62	67	88	79	84	68	58	60	60	58	59	50	59	63	54	42
U Q	70	70	64	55	60	51	54	64	76	88	117	106	101	82	84	75	84	75	70	72	87	92	85	69
L Q	29	30	32	25	24	G	30	36	54	60	58	52	54	22	G	48	48	44	35	37	35	30	28	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT YAMAGAWA

JUN. 1993

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	16	15		35	24	20	20	34	34	34	34	35	22	29	26	16	15	15	23	15	26	
2	21	22	40	15	15	15	15	40	32	23	32	32	38	34	33	32	24	17	24	15	15	15	36	15
3	24	15	15	15	15	15	15	16	24	30	35	20	36		21	30	27	17	15	29	26	15	15	15
4	26	15	30	15	15	15	26	16	17	35	34	34	33	24	34		34	16	15	15	16	15	15	15
5	15	15		15	30	15	16	16	35	34	39	21	36	33	35	34		21	15	20	22	15		15
6	28	15	15	15	15	15		16	38	34	35	36	53	43	54	38	35	27		15	21	22	15	15
7	18	15	15	15	15	15	23	16	17	30	34	35	34	54	53	52	34	17	15	24	15	15	15	22
8	15	23	15	15	15	15	15	15	17	32	34	35	39	21	38	36	34	18	17	26	15	16	28	15
9	16	21	15	15	15	15	15	15	17	28	32	40	54	40	38	36	33	30	40	15	15	21	15	15
10	21	15		16	15	15	16	16	32	34	35	35	38	53	51	52	35	30	16	15	15	15	15	42
11	15	15	15	15	15	15	15	26	22		35	36	37	36	35	33	32	28	27	15	27	34	15	15
12	28	26	15	15	15	15		15	17	33	35	42	34	34	33	35	34	24	20	15	15	15	15	29
13	15	15	15	23	15	15	28	15	36	34	36	38	38	39		34	28	16	16	15	36	15	15	15
14	24	15	15	16	15	38	16	24	18	29	33	36	36	36	35	35	18	16	15		71	15		27
15	15	15	15	15	15	15	15	20	16	22		32	32	36	30	26	20	16	15	16	15	16	16	15
16	15	15		15	15		15	22	17	23	23	33	33	24	50	36		41	15	15	15		35	15
17	15	23	15	16	39	15	23	29	16	29		50	34	48	36	28	18	34	43	24	16	15	15	15
18	15	15	28	28	16	26	17	15	40	39	49	34	49		32	32	23	16	24	26	15	16	29	
19	29		15	15		15		15	40	18	42	35	50	38	24	36	21	38	15		15		15	
20	16	28	15	26	15	29	16	15	52	32	36	34	34	40	27	37	33	17	27	24	41	38	15	15
21	28	15	16	15	15	27	15		17	14	33	34	32		32	38	21	17	26	22	15	15	15	
22	15	15	15		16	15	38	16	30	32	33	29	38	34	28	30	27	24	15	15	16		15	
23	36	15	30	15	15		15	15	52	34	34	34	35	33	34	32	30	16	15	15	15	16	15	16
24	15	15	15	15	39	15	16	44	32	33	34	52	35	34	40	29	35	38	17	35	26	16	15	15
25	16	16	15	32	15	28	15	15	16	34	35	36	36	23	35	33	29	28	28	15	26	15	16	
26	16	16	16	16	15	15	15		17	28	36	34	35	66	53	38	35	27	16	15	15	16	15	15
27	16	16	15	15	15	15	15	16		34	34	23	36	34	55	32	20	21	15	15	15	42		15
28	15	32		15		15	15	15	32	22	36	39	38		34	32	30	17	15	24		16	15	16
29	16	16	15	23	15	40	18	18	24	28	54	36	36	58	37	47	38		15	15	15	15	20	15
30	26	15	16	24	15	15	15	15	16	34	35	38	38	36	35	36	33	18	16	15	34	15	15	15
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	29	26	29	27	28	27	28	29	29	28	30	30	26	29	29	28	29	29	28	29	27	27	24
MED	16	15	15	15	15	15	15	16	22	32	35	35	36	36	35	34	30	18	16	15	15	15	15	15
U Q	24	18	16	16	15	20	18	20	33	34	36	36	38	40	39	36	34	28	24	24	26	16	16	15
L Q	15	15	15	15	15	15	15	15	17	28	34	34	34	34	32	32	23	16	15	15	15	15	15	15

HOURLY VALUES OF FOF2 AT OKINAWA

JUN. 1993

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	105	106	123	101	73	62	62	85	84	76	84	161	111	121	122	125	141	138	A	124	106	105	106	105
2	148	148		130	106		101	97	97	93	214	105	122	A	A	112	117	A	126	A	123	121	125	131
3	129	132	104	100	102	90	101	98	74	78	94	115	130	142	147	146	137	136	103	106	126	104	104	100
4	104	102	92	92	77	78	87	76	91	101	A	112	130	142	144	142	174	190	170	147	169	131	131	142
5	130	99	101	101		72	67	65	85	196	100	98	112	132	133	131	144	156	132	127	102	102	106	104
6	99	102	103	83	79	97	106	78	74	82	86	101	112	141	143	143	154	147	132	126	125	106	100	101
7	106	104	104	120	107	58	62	65	186	86	A	A		78	94	101	105	104	90	90	80	78	80	87
8	85	84	83	A	A	A	75	A	42	64	85	A	77	81	103	106	103	100	100	90	A	66	75	64
9	66	78	66	63	63	44	61	71	72	71		76	95			91	107	103	90	87	85	77	66	83
10	78	80	85	72	54	A	51	53	A	A	74	A	87	A	88	95	94	97	88	86	82	77	77	76
11	66	67	66	54	57	52	55	66	76	67	A	A	100		129	A	107	101	87	100	86	66	63	66
12	61	66	66	58	54	53	63	A	A	A	66	61	70	77	87	90	102	106	104	80	A	66	53	53
13	62	76	A	A	A	43	52	61	66	63	A	A	A	91	90	86	95	A	68	90	85	74	62	76
14	71	74	72	54	53	35	34	60	42	69	A	A	66	A	A	77	84	A	75	78	84	66	65	72
15	64	64	75	60	53	35	A	54	66	62	A	A	A	A	A	67	64	A	A	85	73	54	60	41
16	60	54	55	44	44	40	44		78	70	A	A	63	70	81	85	87	86	80	78	A	63	61	64
17	A	64	62	52	A	31	52	55	52	A	71	62	A	67	A	A	A	A	82	66	66	62	52	53
18	60	62		55	44	44	45	58	44	A	77	A	65	A	74	85	88	90	86	66	54	45	54	
19		50	46	43	42	37	38	60	79	A	52	43	62	69	A	82	95	103	108	A	A	A	36	52
20	62	62	54	63	40	37	50	A	88		A	A	64	76	80	84	91	105	102	90	A	A	66	A
21	62	A	60	64	52	A	41	75	72	A	45	51	71	82	82	87	90	91	103	100	87	63	A	60
22	A	62	61	54	54	52	84	A		73	A	78	75	83	87	94	101	106	78	83	65	A	66	66
23	64	66	66	60	54	53	62	66	A	A	A	A	74	78	82	88	93	105	111	110	85	66	67	77
24	72	64	66	64	63	59	61	66	78	70	66	67	70	71	72	88	100	111	87	78	80	78	66	66
25	71	77	66	72	A	A	A	A	A	A	A	A	A	A	A	A	63	72	82	78	57	60	57	66
26	62	63	62	64	52	44	52	63	71	78	76	78	72	72	78	90	103	117	88	78	74	62	63	66
27	61	66	66	66	60	53	55	63	72	80	77	78	76	73	76	58	84	105	90	73	A	34	65	66
28	64	65	66	52	52	58	54	76	88	78	65	68	78	74	70	A	80	87	88	85	85	66	61	66
29	66	66	74	64	57	62	62	66	72	81	72	70	76	76	82	90	84	82	87	88	85	66	66	42
30	72	80	78	51	44	45	51	66	73	73	A	80	74	A	A	A	91	81	90	69	77	78	82	81
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	29	27	28	25	25	28	24	25	21	17	18	25	21	22	25	29	25	28	28	24	27	29	28
MED	66	67	66	64	54	52	58	66	74	76	76	78	76	78	87	90	95	104	90	86	85	66	66	66
U Q	99	91	85	77	68	60	65	75	84	81	85	101	105	106	122	109	107	114	103	100	94	78	81	85
L Q	62	64	62	54	52	41	51	60	68	69	66	67	70	72	80	85	87	90	86	78	75	63	61	64

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

JUN. 1993

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	83	46	38	36	G	34	41	47	58	86	112	108	G	64	56	111	98	114	138	66	46	106	36	36
2	92	45		52	54		44	39	96	58	151	54	64	137	108	78	106	158	138	150	106	81	50	38
3	43	39	30	26	26	27	38	55	82	112	103	154	114	131	104	83	127	93	134	71	61	44	96	108
4	98	106	80	37	24	30	49	104	108	112	138	151	137	90	88	84	87	48	44	28	46	110	96	92
5	95	32	27	46		47	90	108	111	150	176	90	85	58	51	G	46	47	39	38	32	37	41	96
6	82	82	68	28	26	G	31	41	71	54	62	57	62	76	80	92	48	40	46	G	25	34	G	26
7	39	32	30	G	24	26	36	69	131	83	161	119		70	49	54	71	87	43	60	68	32	G	G
8	91	92	48	70	71	72	52	144	59	73	96	142	62	52	44	72	45	59	58	59	84	92	85	59
9	107	85	136	90	34	39	176	42	61	47		46	56			56	69	62	59	64	43	32	45	66
10	60	92	40	57	72	91	59	63	95	91	78	135	70	126	68	72	81	60	58	50	84	80	42	59
11	33	29	25	G	G	G	34	68	73	79	86	147	166	177	105	124	57	G	37	44	24	24	78	58
12	85	79	66	37	33	23	59	95	114	115	69	47	58	G	49	47	58	84	114	91	88	48	39	33
13	59	65	86	90	83	69	84	51	84	64	82	85	94	66	61	71	94	165	94	83	79	59	110	92
14	43	59	84	94	59	45	40	36	60	91	128	94	70	76	102	70	82	90	66	62	70	29	45	40
15	31	G	32	33	33	42	61	83	50	50	66	66	71	107	126	104	73	84	72	69	40	24	30	27
16	G	39	33	30	26	25	35	45	58	61	64	66	51	53	48	46	50	72	50	42	136	46	59	81
17	84	94	78	69	72	38	40	34	44	85	79	84	68	86	117	112	112	83	80	38	32	24	37	33
18	40	33	40	33	G	36	31	42	45	62	66	76	74	77	60	45	63	61	91	78	40	33	29	24
19	33	32	24	69	93	42	46	50	60	64	48	48	48	49	97	80	58	73	78	96	69	48	48	83
20	59	110	34	59	59	33	46	111	114	150	157	86	G	52	59	54	62	71	60	48	70	80	58	59
21	40	68	49	59	55	49	47	50	60	85	51	47	58	67	62	74	70	51	49	50	37	28	48	48
22	46	44	33	40	34	78	111	167	164	117	170	175	166	102	62	94	77	85	84	93	59	39	34	G
23	33	60	40	34	35	47	40	44	95	157	115	98	73	70	79	60	60	94	85	32	84	40	40	33
24	31	G	58	59	49	43	32	42	44	43	44	50	45	62	72	44	43	117	71	68	33	45	56	33
25	30	28	84	69	72	90	91	90	91	81	161	87	116	136	176	82	47	47	110	38	33	40	29	23
26	G	G	G	G	G	G	28	36	57	45	58	56	52	70	44	50	42	42	70	70	31	30	49	31
27	34	G	33	G	24	G	28	42	48	50	69	93	78	59	60	50	48	50	58	62	61	40	41	35
28	32	33	60	34	50	57	38	44	46	46	48	G	G	50	51	162	66	60	41	61	80	92	68	78
29	57	69	36	70	71	32	30	35	45	47	50	50	69	58	44	G	G	48	71	72	57	38	40	35
30	28	G	G	G	G	G	35	G	57	66	97	82	64	96	195	126	64	81	84	47	34	40	40	G
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	29	30	29	29	30	30	30	30	29	30	29	29	29	30	30	30	30	30	30	30	30	30
MED	43	44	40	38	34	38	40	48	60	76	82	84	68	70	62	72	64	72	70	62	58	40	44	37
U Q	83	79	67	69	65	48	59	83	95	91	133	108	81	99	103	92	81	87	85	71	79	59	58	66
L Q	33	32	31	30	24	25	35	42	57	54	63	54	54	58	51	50	48	50	50	44	34	32	37	31

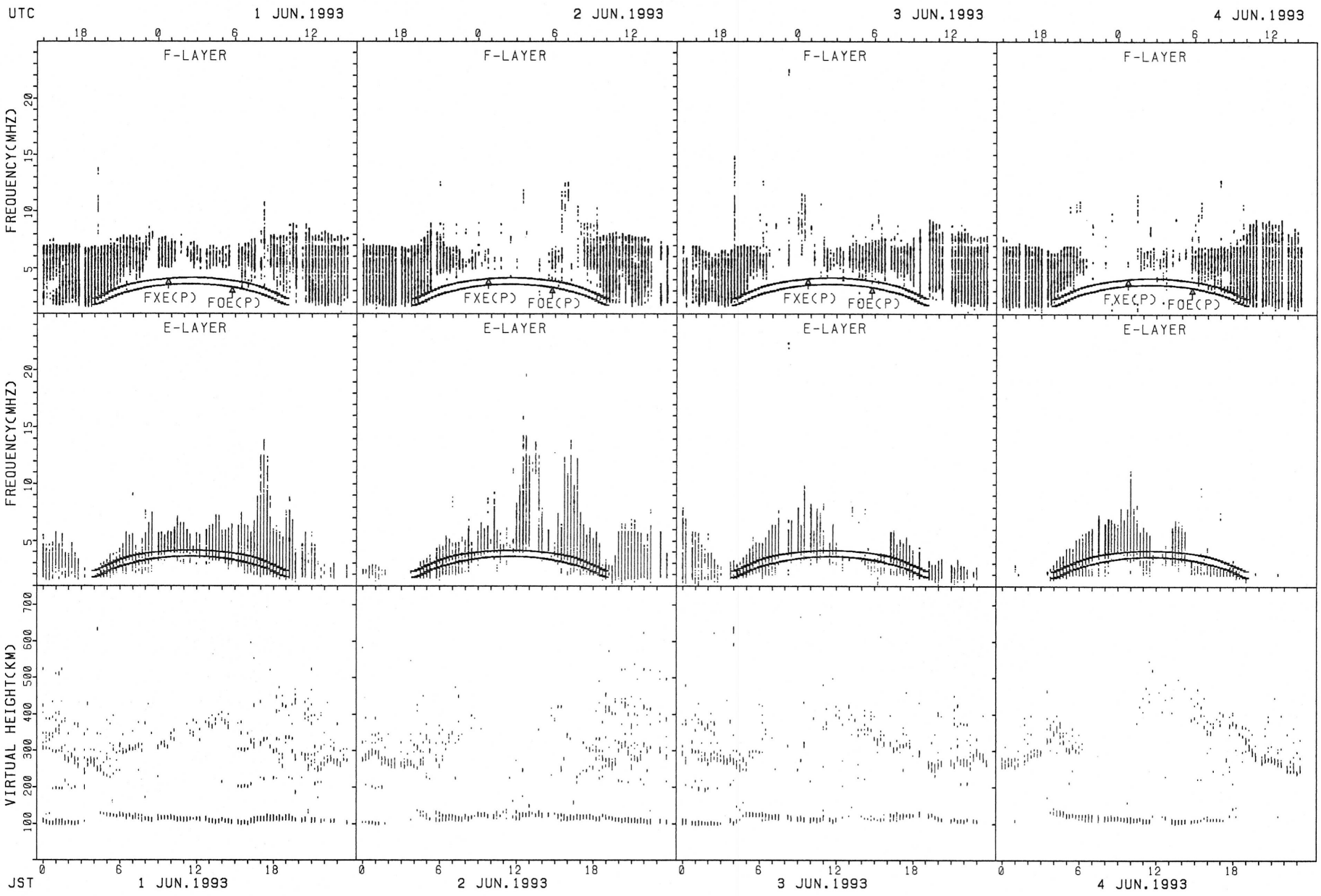
COMMUNICATIONS RESEARCH LABORATORY, JAPAN

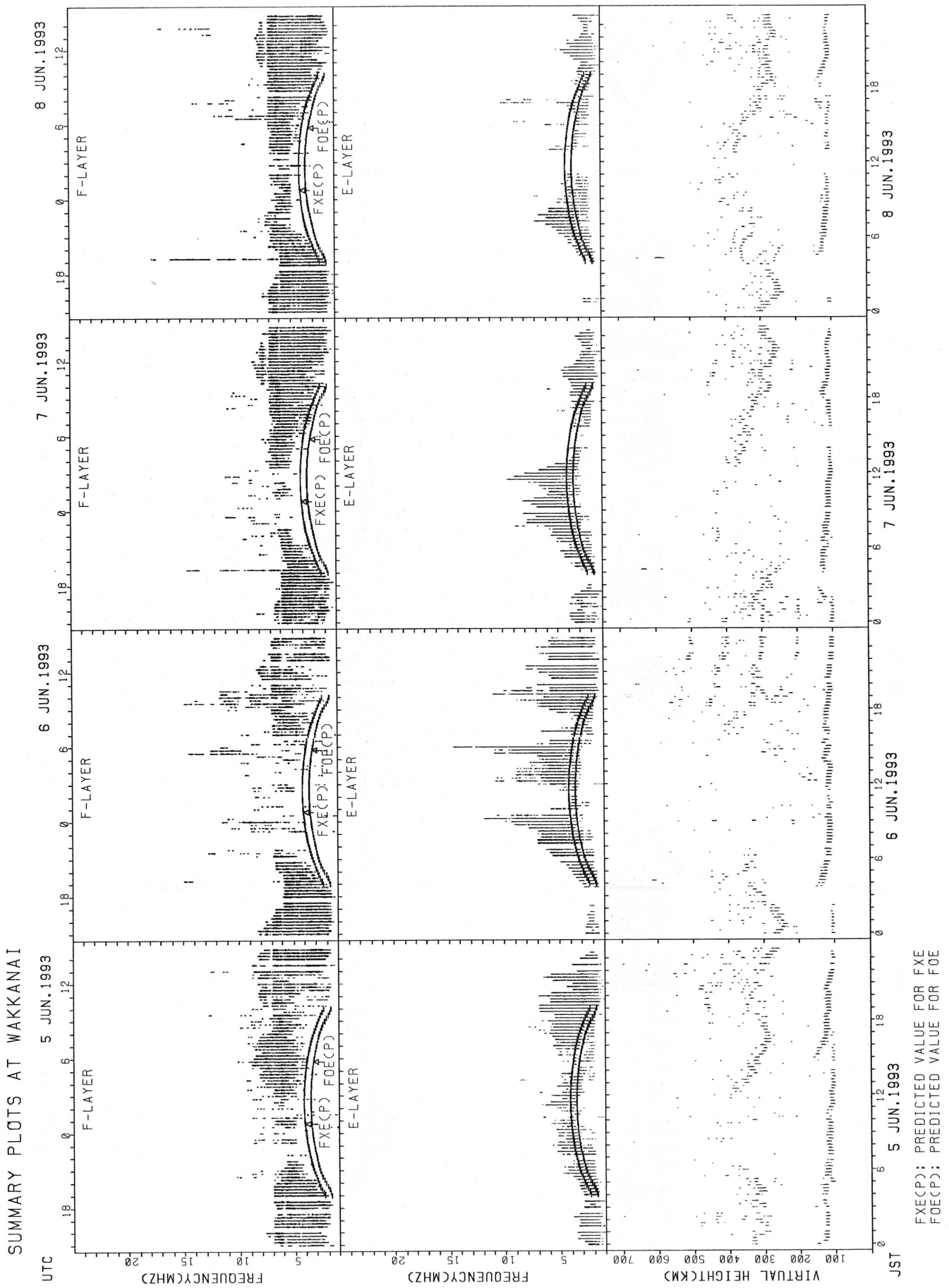
HOURLY VALUES OF FMIN AT OKINAWA

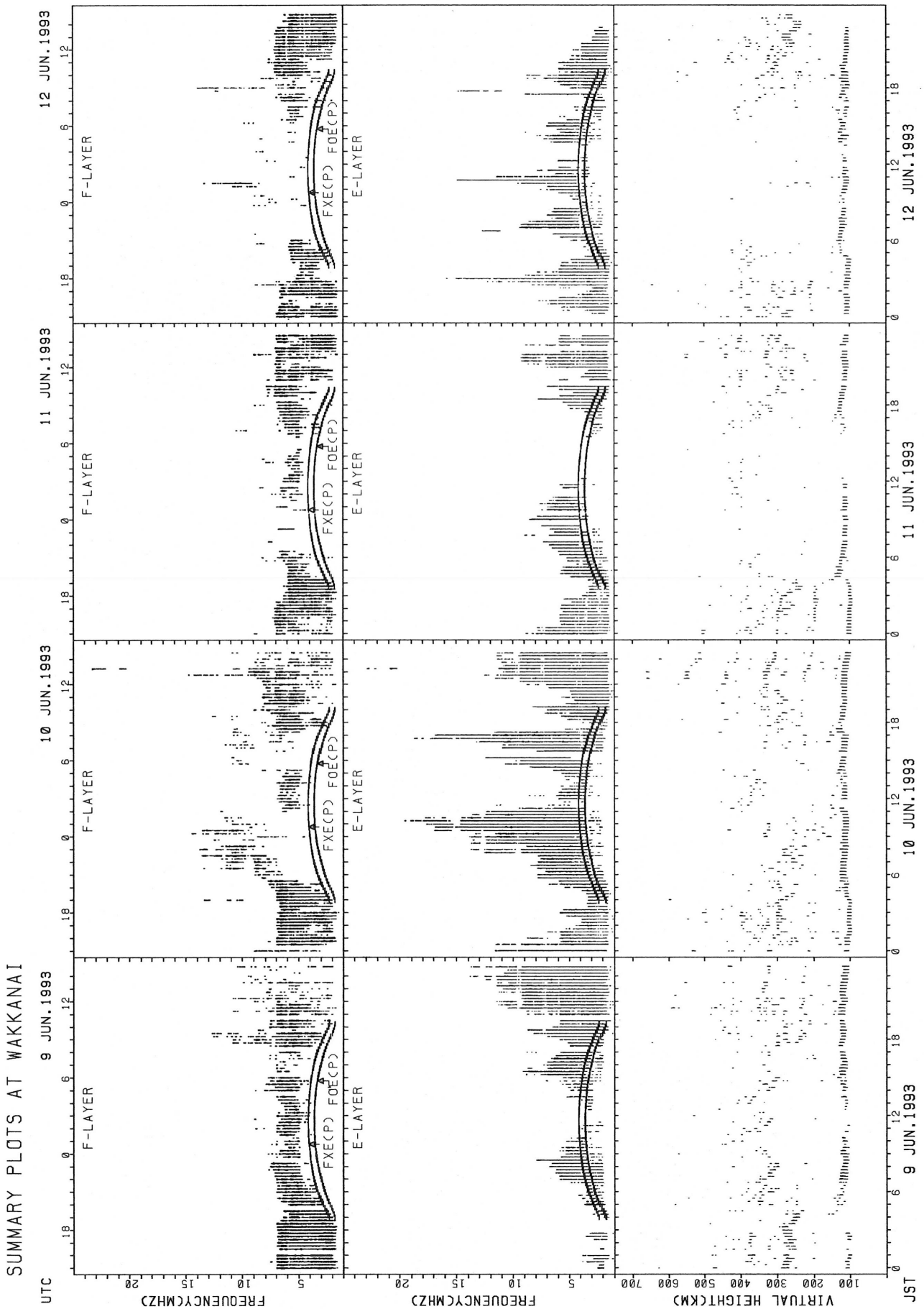
JUN. 1993

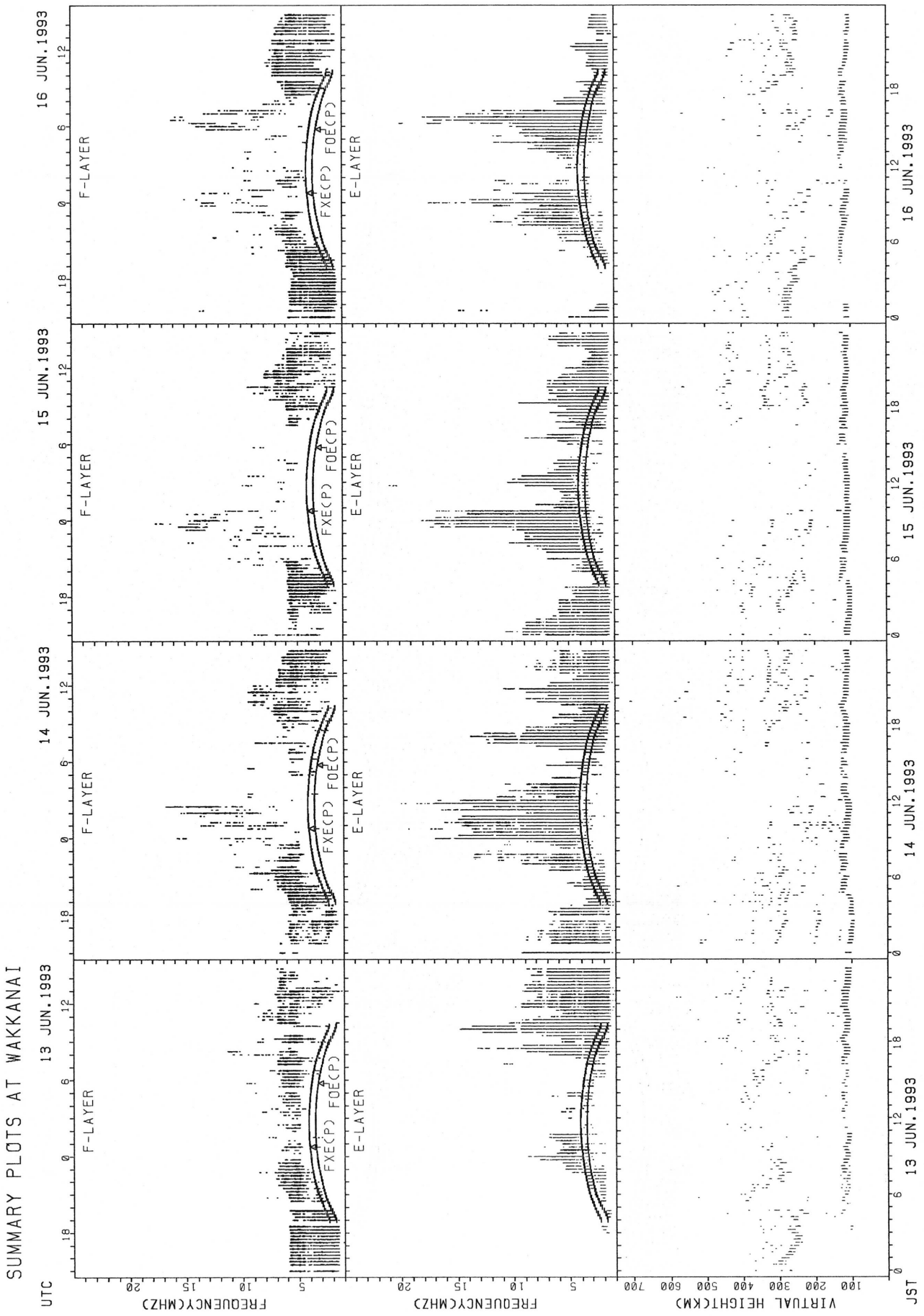
LAT. 26.3N LON. 127.8E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

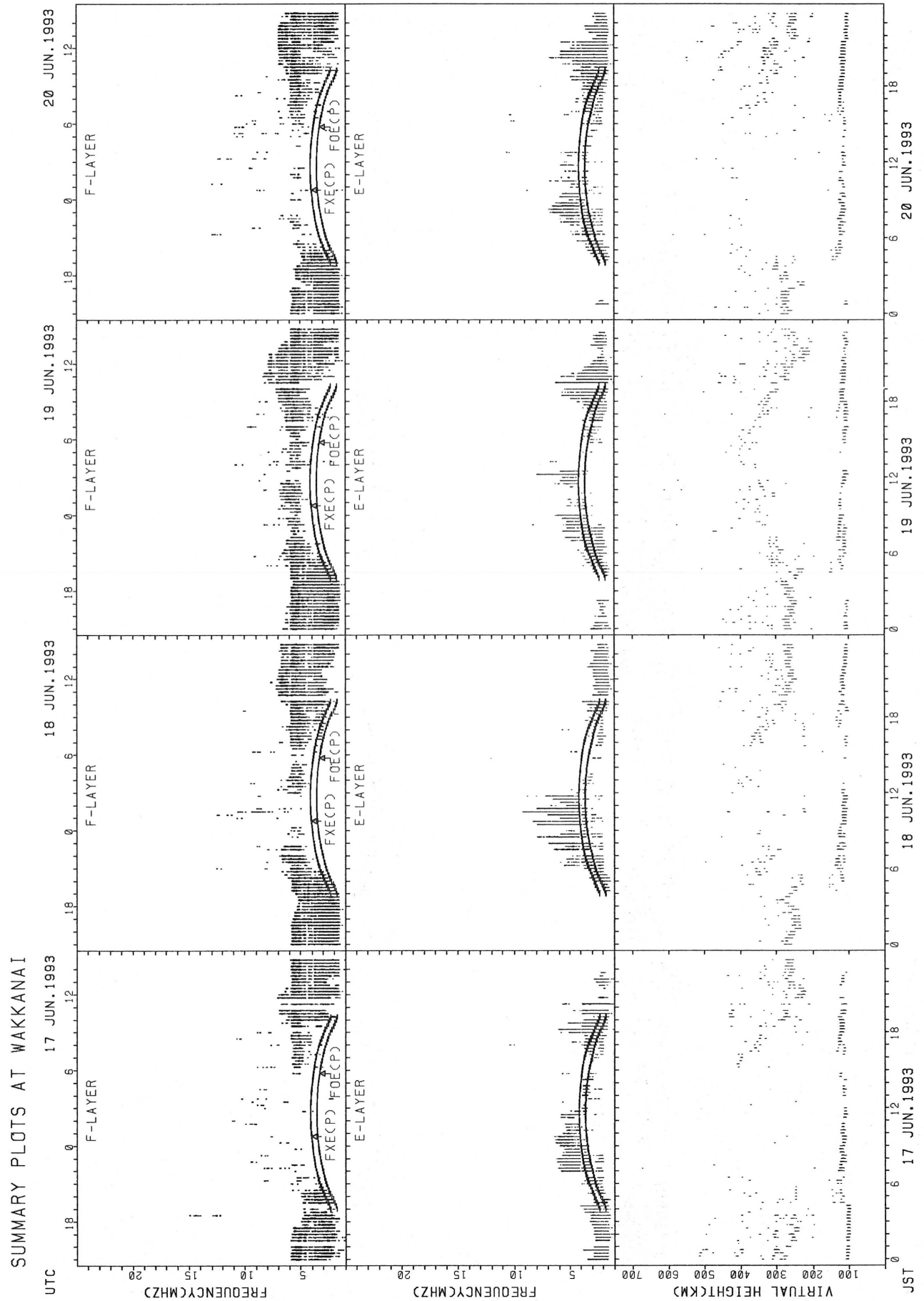
D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	15	15	15	15	14	16	16	20	26	32	40	34	28	37	29	26	20	16	14	16	16	15	16
2	15	14		15	15		21	18	18	26	17	44	49	40	32	30	23	18	14	14	15	16	15	16
3	16	16	16	16	16	15	15	17	16	21	24	34	40	40	32	33	20	17	14	15	15	15	15	15
4	15	15	14	14	16	14	14	14	16	26	21	29	29	32	30	28	18	16	15	15	16	15	16	15
5	15	16	15	15		16	14	14	16	29	32	27	33	32	33		22	18	17	17	15	14	15	15
6	16	14	15	15	15	15	16	17	17	22	30	44	45	34	36	28	27	18	16	20	16	16	15	16
7	15	15	15	16	14	15	15	15	14	20	18	34		28	29	29	21	21	14	14	15	14	15	14
8	15	15	14	14	14	14	15	15	17	18	23	29	36	39	39	21	20	17	14	14	14	14	15	15
9	15	14	14	14	14	14	14	14	15	16		27	29			36	20	16	15	14	15	14	15	15
10	15	14	14	15	15	14	15	15	16	18	24	28	29	29	29	39	24	17	15	14	15	14	14	14
11	15	14	15	15	14	14	14	15	17	22	27	28	28	28	30	28	29	15	14	14	15	14	14	15
12	15	14	14	14	14	15	15	14	15	17	22	26	32	49	30	24	17	15	14	14	14	15	14	15
13	14	15	14	14	14	14	15	14	17	21	22	24	29	29	26	20	17	17	15	14	14	15	15	15
14	15	14	14	14	14	15	15	14	17	20	22	24	27	27	23	20	17	16	14	14	14	14	14	14
15	14	14	15	15	14	14	14	14	16	16	23	23	24	24	22	20	16	15	14	15	14	15	15	15
16	15	15	14	14	15	15	15	14	15	16	20	21	28	24	27	21	16	16	14	14	14	14	14	14
17	14	15	14	15	14	14	14	14	16	17	17	22	27	24	21	16	15	14	14	14	15	15	15	15
18	15	15	15	15	14	14	14	14	18	20	20	26	22	26	22	21	16	14	14	14	15	15	15	15
19	15	14	15	15	14	14	14	14	15	17	20	27	18	26	28	22	18	16	14	14	14	14	15	15
20	15	15	15	14	14	14	14	14	15	20	17	23	22	26	27	22	20	15	14	14	14	14	15	14
21	15	15	15	14	14	14	14	14	14	15	17	20	27	27	27	24	21	15	14	14	14	14	15	14
22	14	14	14	14	14	14	14	14	17	18	21	27	24	27	26	21	17	16	14	14	15	15	15	15
23	14	15	14	14	14	14	14	14	16	20	20	27	27	28	24	26	17	16	15	14	15	15	15	14
24	14	15	15	14	14	14	14	15	23	22	30	33	29	27	28	28	23	38	16	14	14	14	15	17
25	15	14	14	14	14	14	14	14	15	17	20	22	29	34	23	28	18	17	16	14	14	14	15	15
26	16	14	15	15	14	14	14	14	15	16	21	28	30	26	26	27	18	16	14	14	14	14	14	14
27	14	15	14	15	15	15	14	15	17	23	26	32	36	29	24	28	22	18	15	15	14	14	14	15
28	15	14	15	15	14	14	14	15	18	20	26	32	30	29	24	21	22	16	14	14	15	14	15	14
29	15	15	15	15	14	14	15	15	16	20	22	27	27	30	29	30		21	21	16	15	14	14	15
30	15	15	15	14	15	14	15	17	22	34	34	45	40	32	48	32	24	20	15	16	15	15	15	15
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	29	30	29	29	30	30	30	30	29	30	29	29	29	29	29	30	30	30	30	30	30	30
MED	15	15	15	15	14	14	14	14	16	20	22	27	29	28	28	27	20	16	14	14	15	14	15	15
U 0	15	15	15	15	15	15	15	15	17	22	26	32	33	32	31	29	22	18	15	15	15	15	15	15
L 0	15	14	14	14	14	14	14	14	15	17	20	24	27	26	24	21	17	16	14	14	14	14	14	14

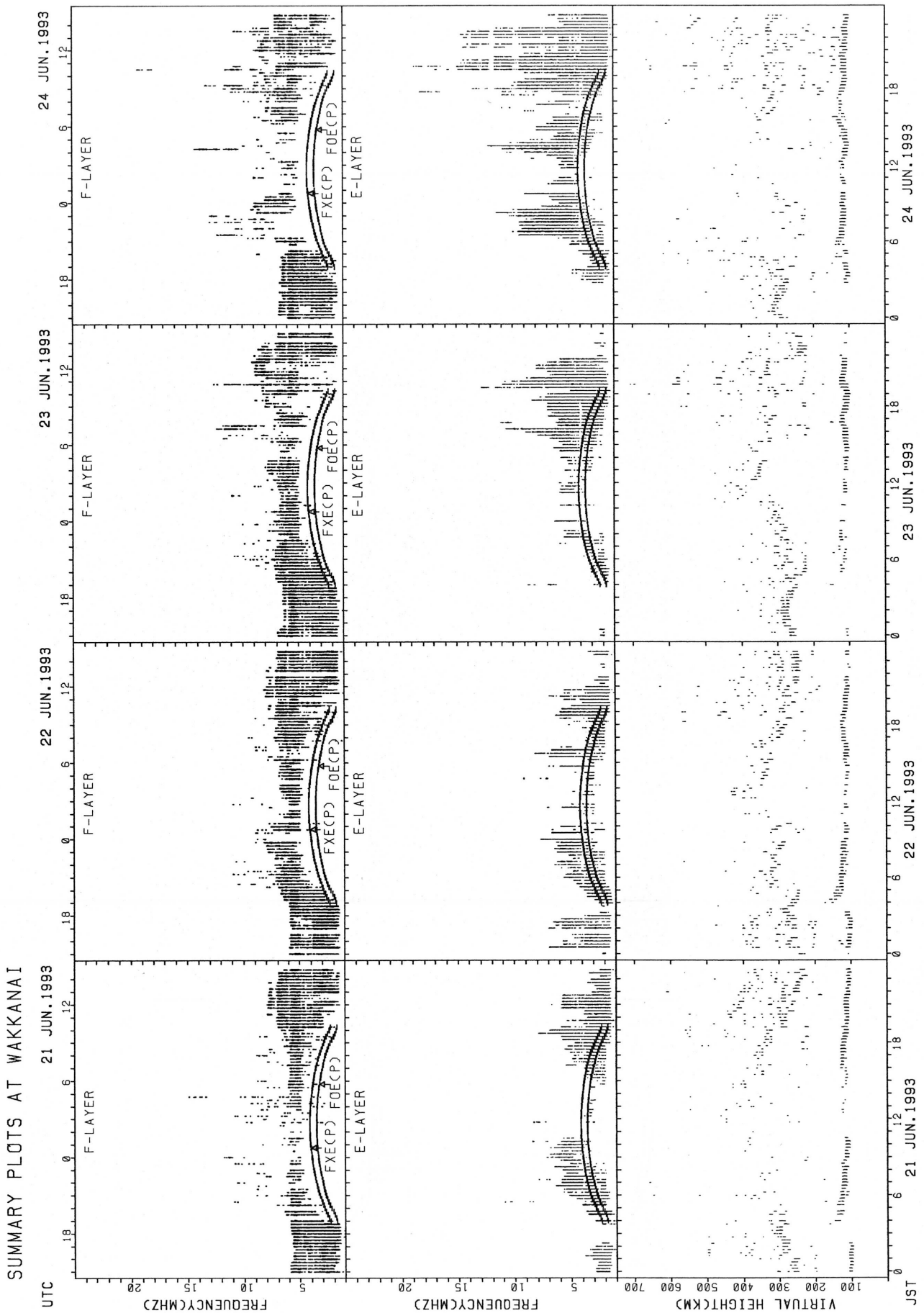

SUMMARY PLOTS AT WAKKANAI
UTC
1 JUN.1993
2 JUN.1993
3 JUN.1993
4 JUN.1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
JST
5 JUN.1993
6 JUN.1993
7 JUN.1993
8 JUN.1993
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

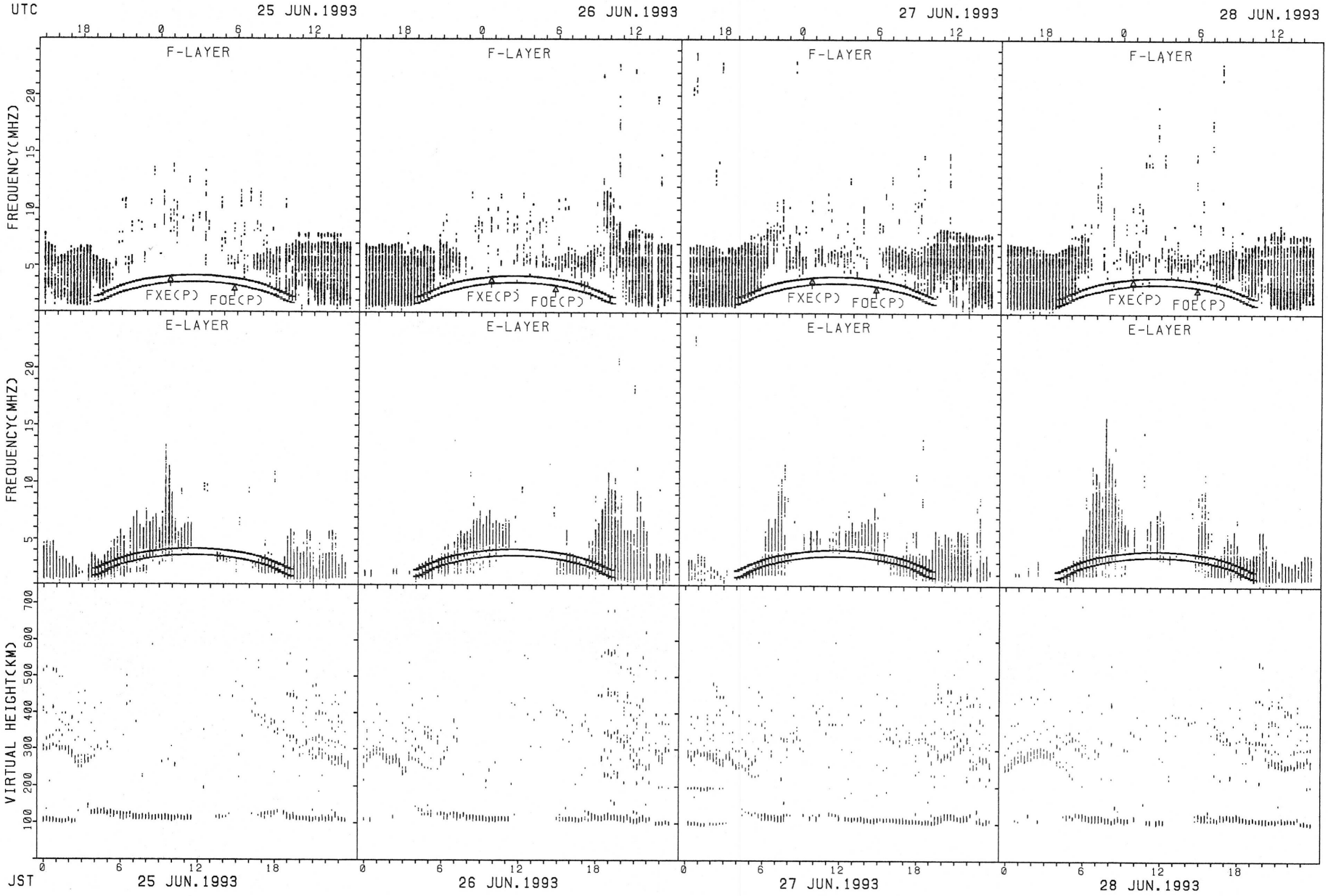

SUMMARY PLOTS AT WAKKANAI
UTC
9 JUN.1993
10 JUN.1993
11 JUN.1993
12 JUN.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
JST
13 JUN.1993
14 JUN.1993
15 JUN.1993
16 JUN.1993
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

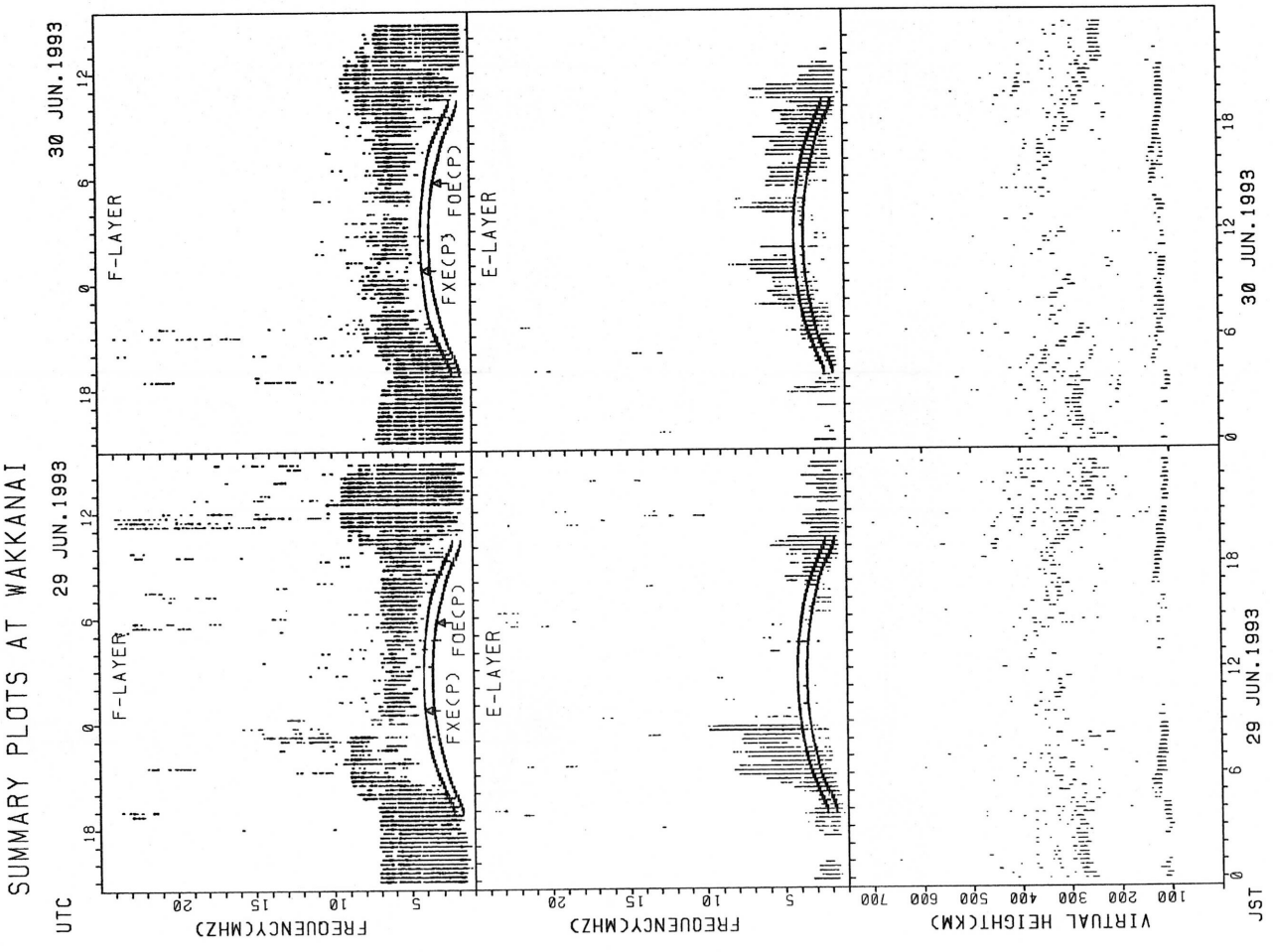

SUMMARY PLOTS AT WAKKANAI
UTC
17 JUN.1993
18 JUN.1993
19 JUN.1993
20 JUN.1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
JST
21 JUN.1993
22 JUN.1993
23 JUN.1993
24 JUN.1993
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

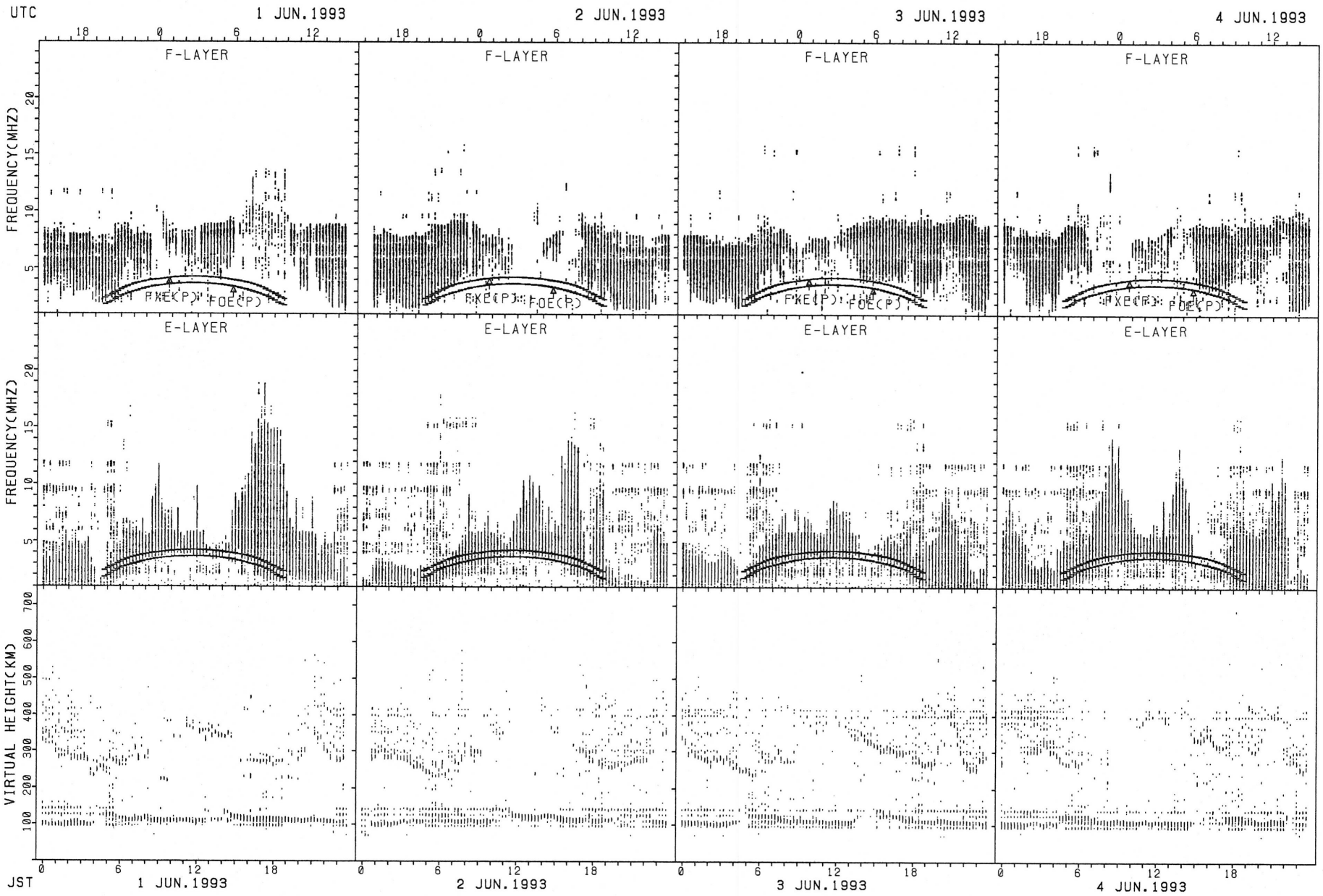
SUMMARY PLOTS AT WAKKANAI



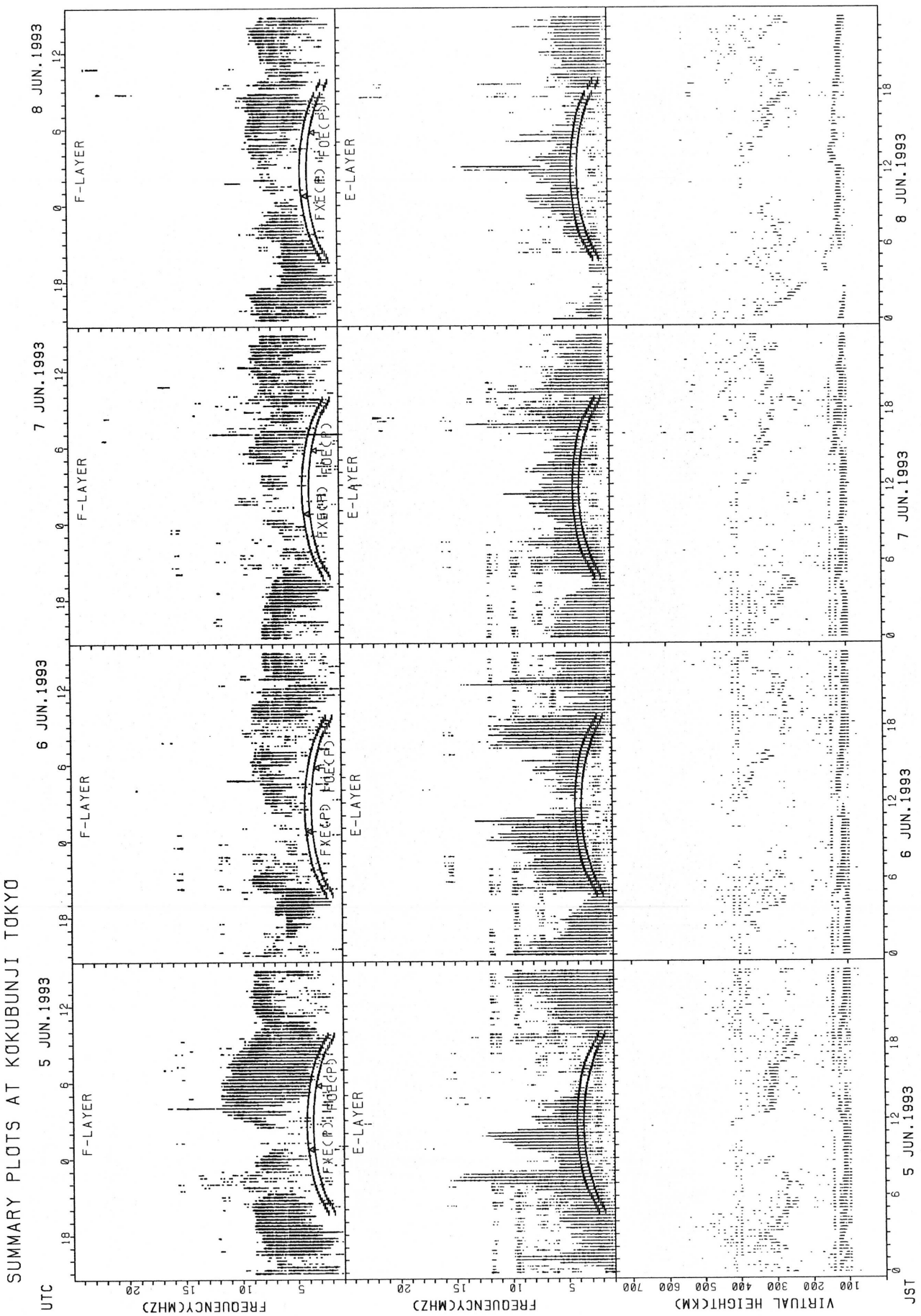
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

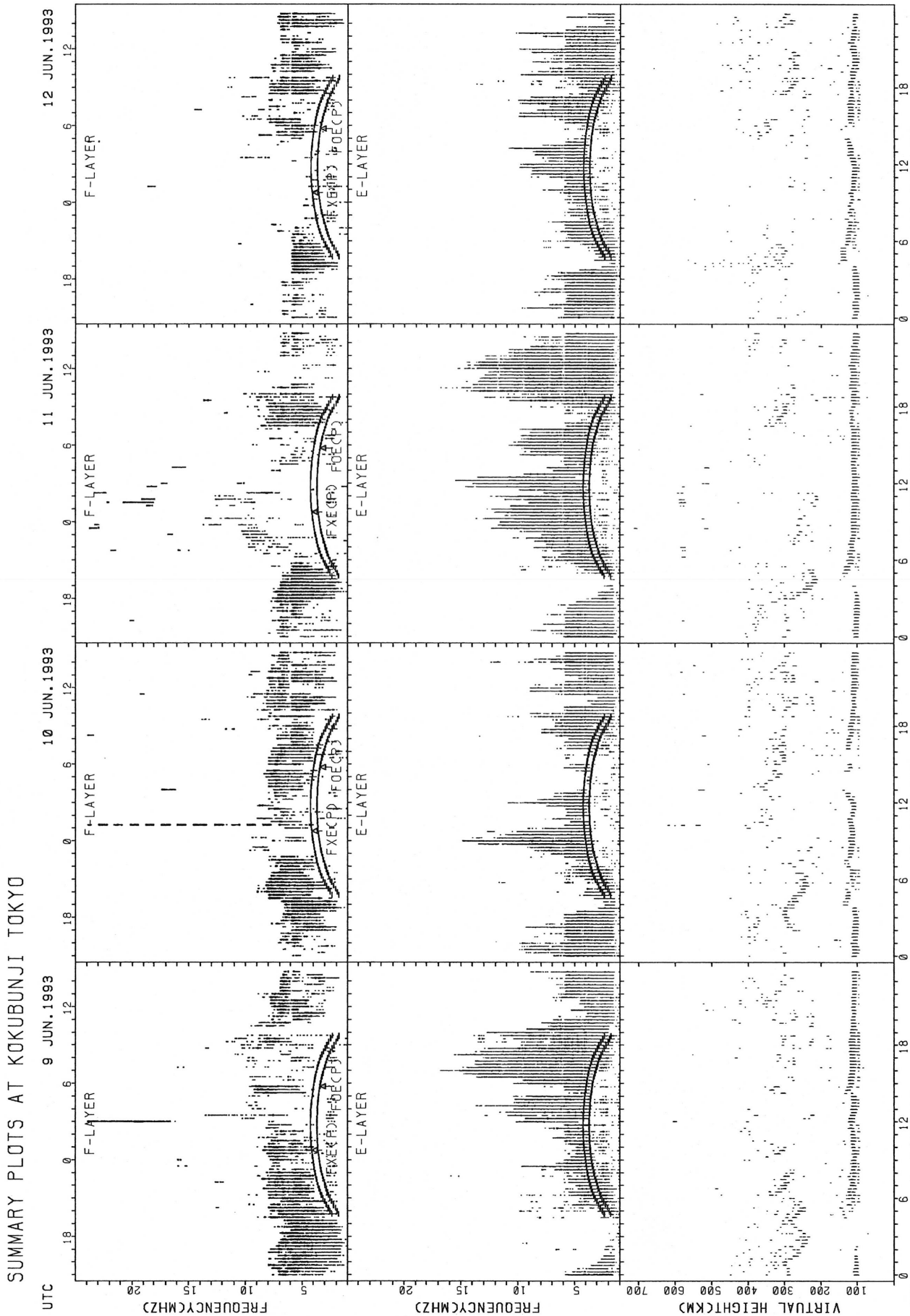

SUMMARY PLOTS AT WAKKANAI
UTC
29 JUN.1993
30 JUN.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

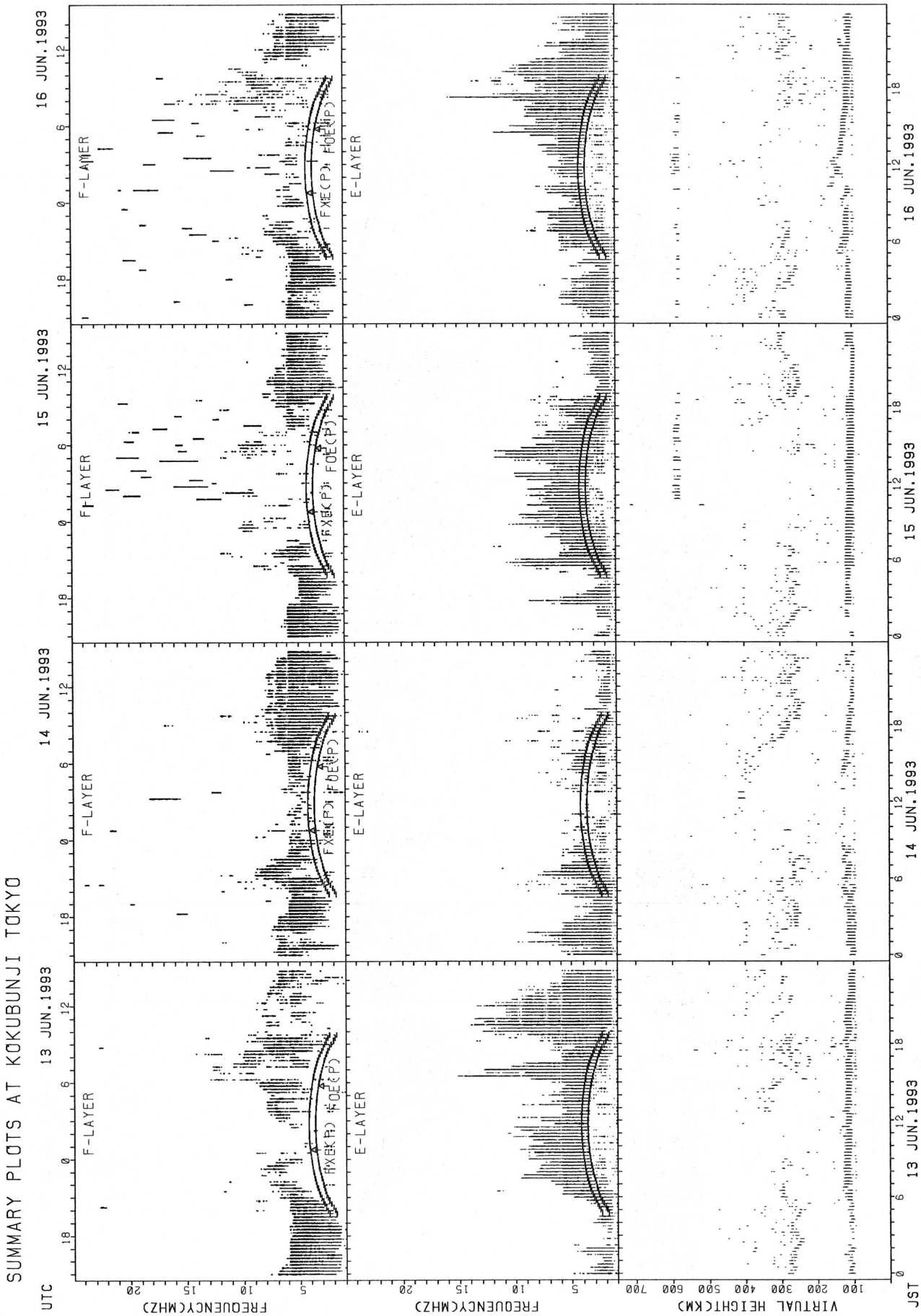
SUMMARY PLOTS AT KOKUBUNJI TOKYO

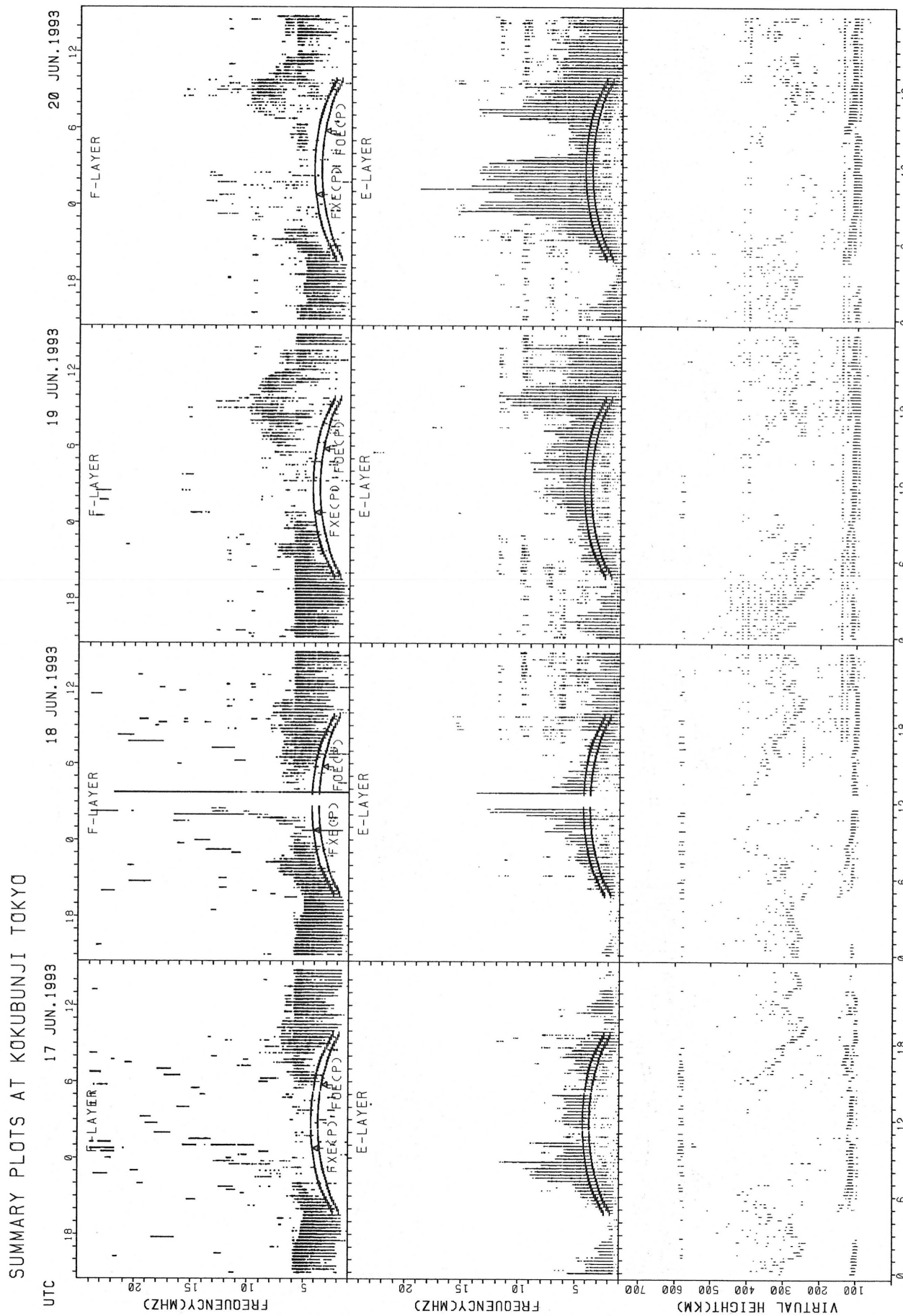


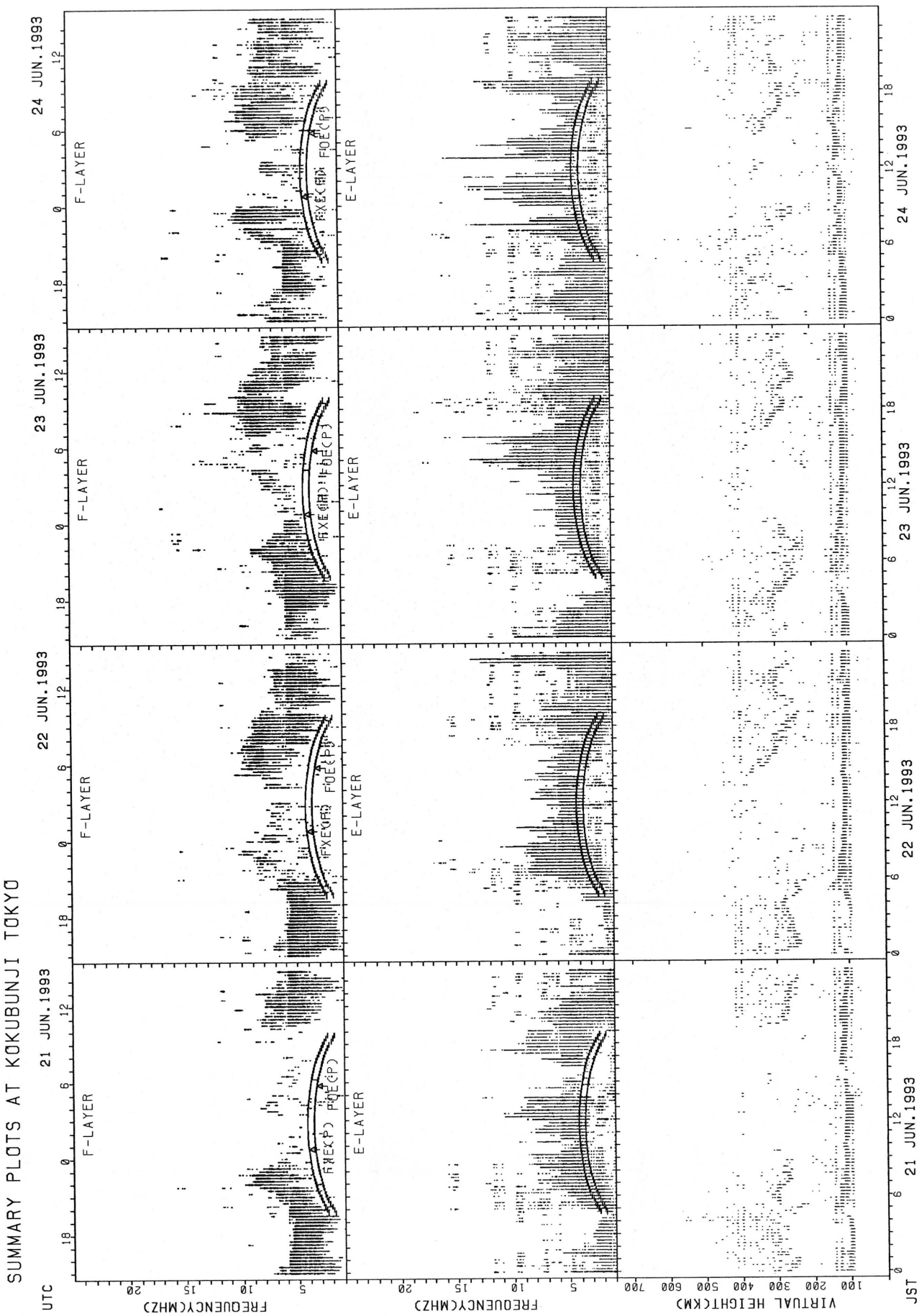
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

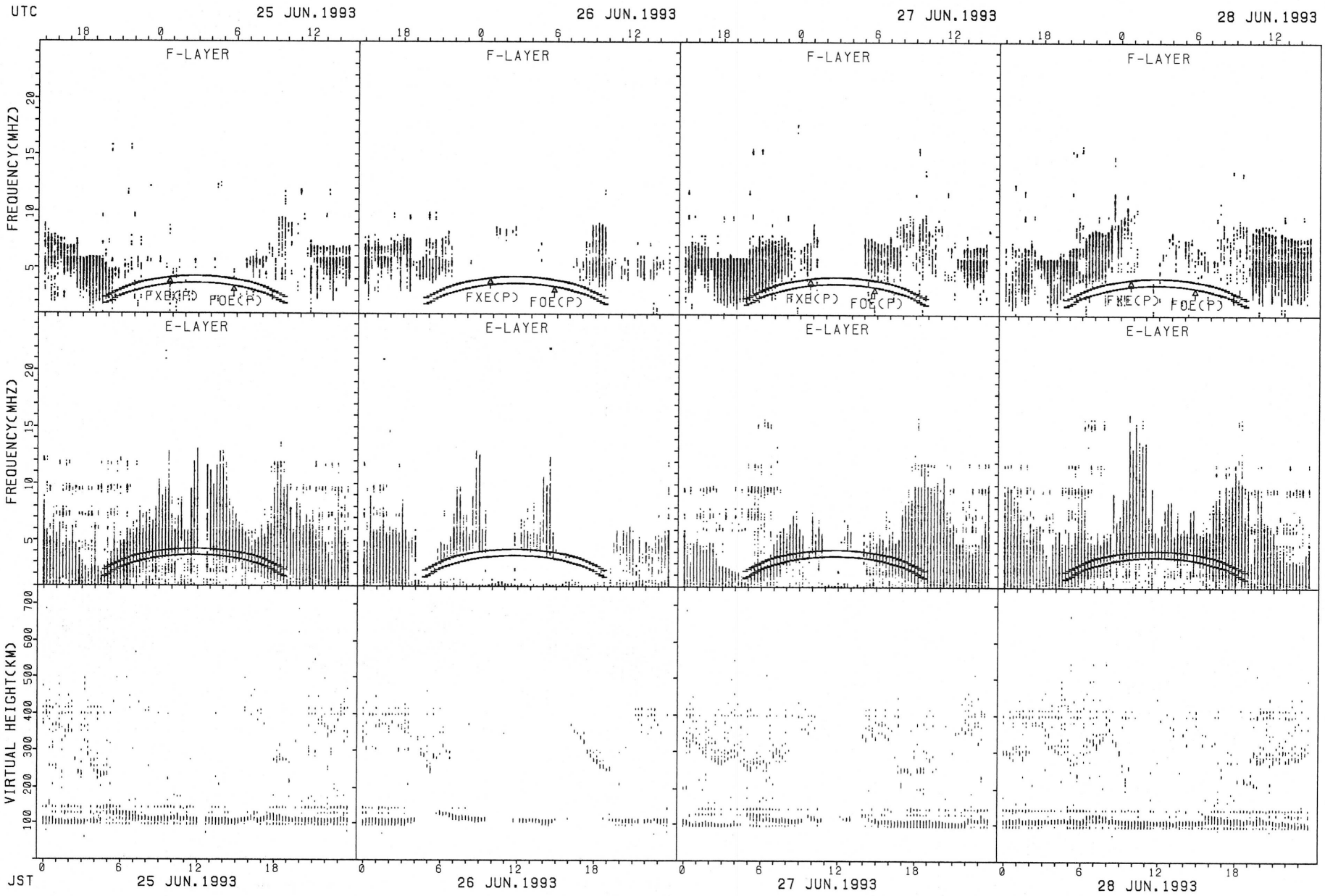

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
5 JUN.1993
6 JUN.1993
7 JUN.1993
8 JUN.1993
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P)
FOE(P)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

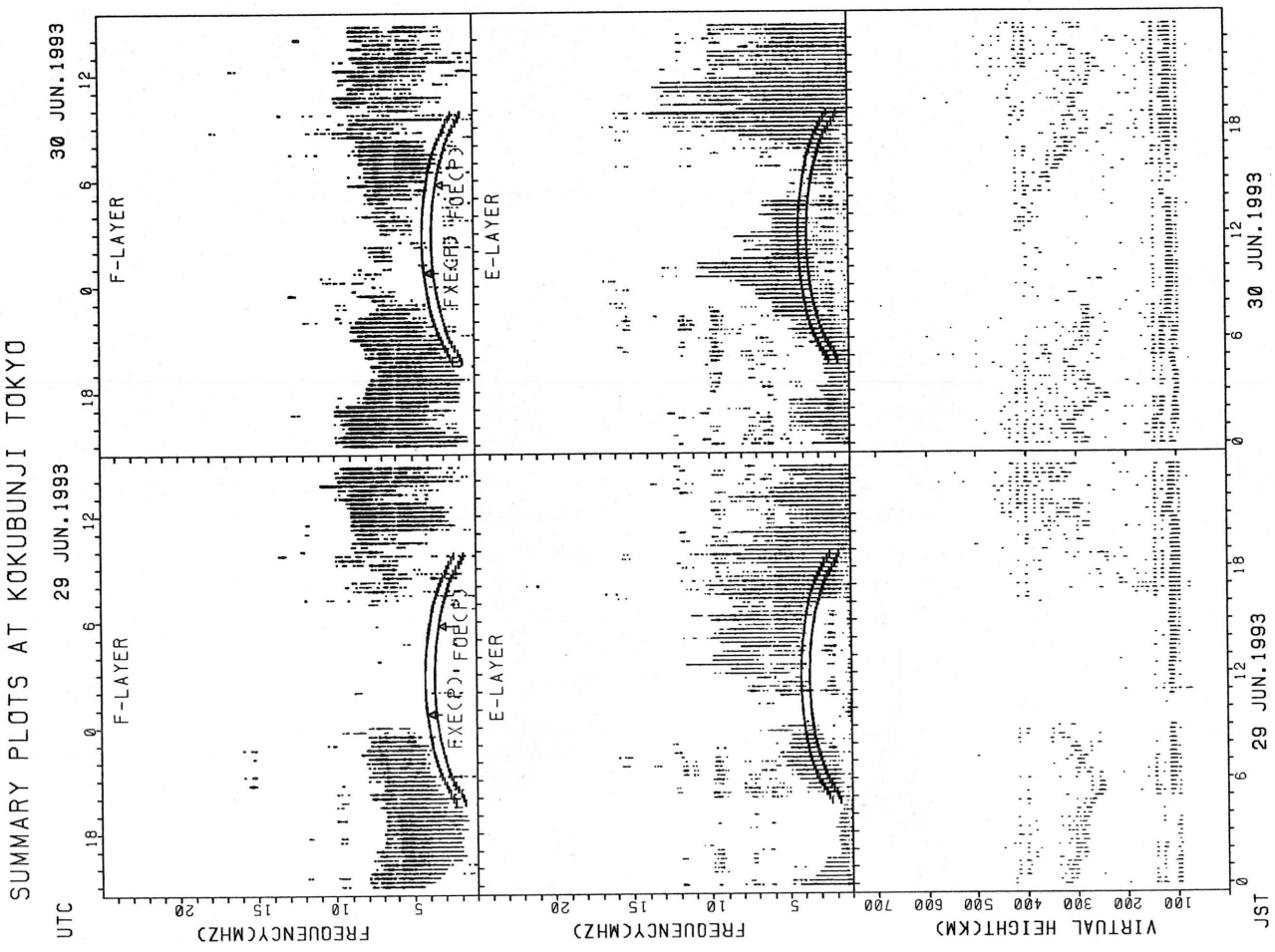

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
9 JUN.1993
10 JUN.1993
11 JUN.1993
12 JUN.1993
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE
JST
9 JUN.1993
10 JUN.1993
11 JUN.1993
12 JUN.1993

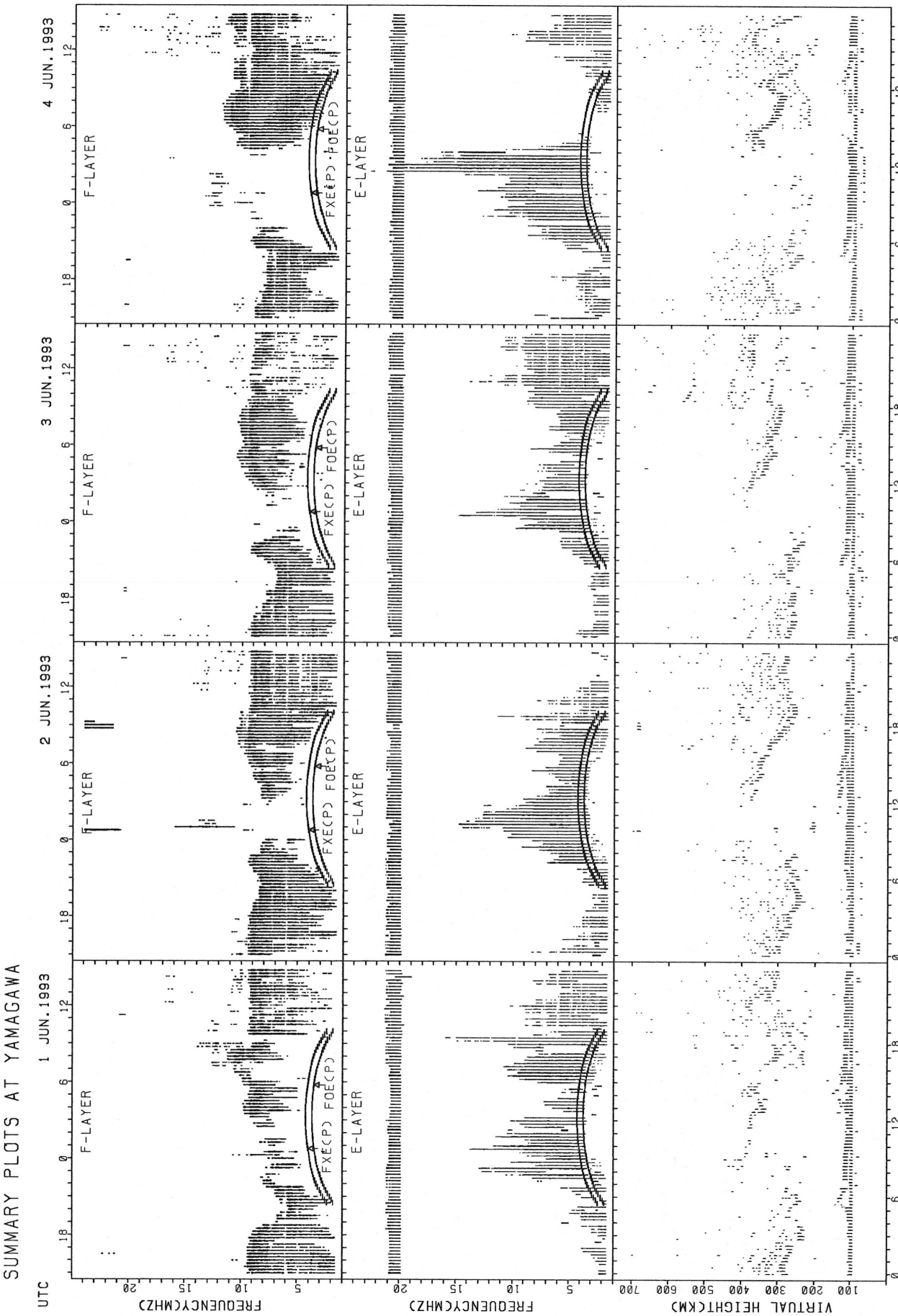

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
13 JUN.1993
14 JUN.1993
15 JUN.1993
16 JUN.1993
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P)
FOE(P)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

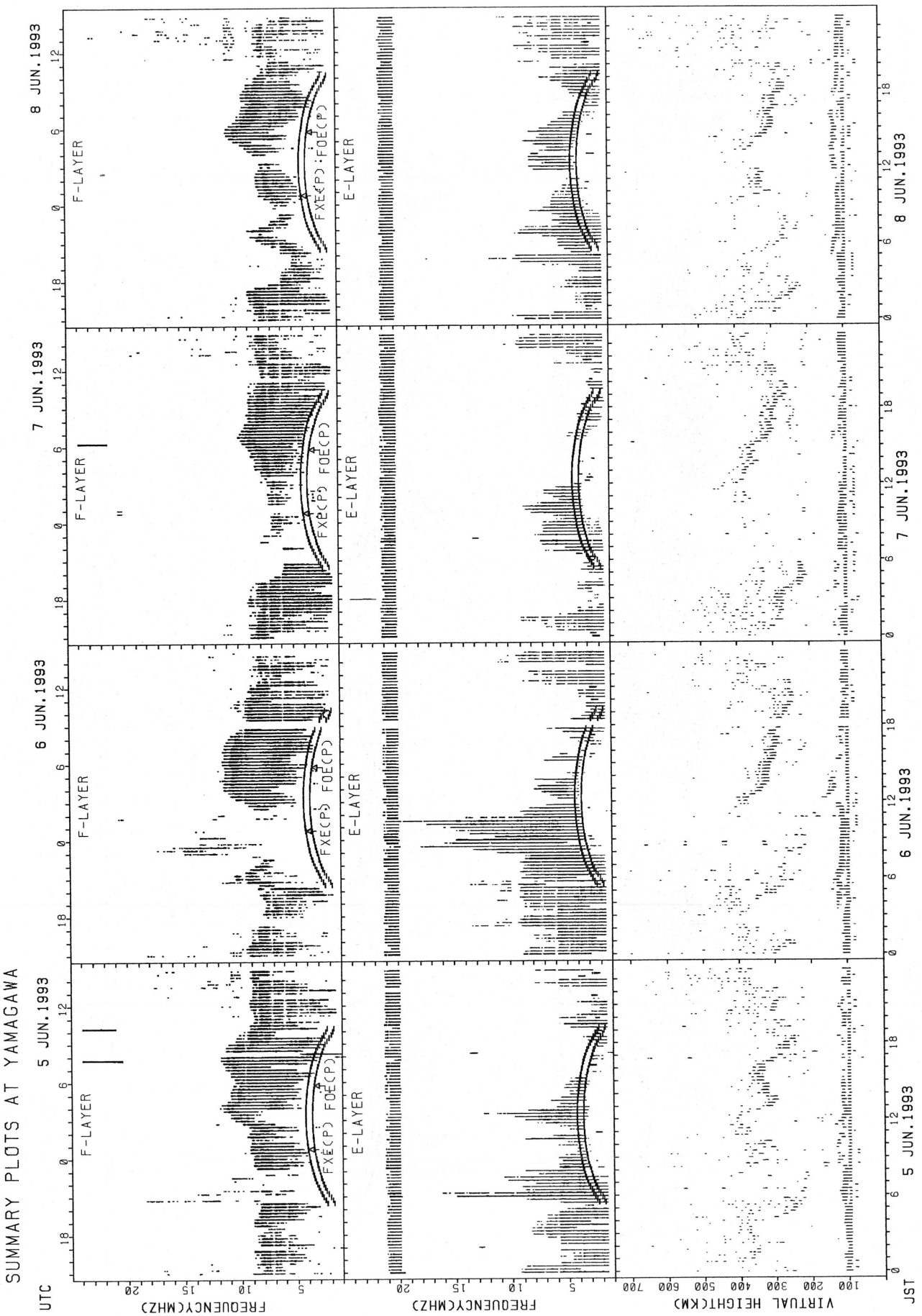

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
17 JUN.1993
18 JUN.1993
19 JUN.1993
20 JUN.1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

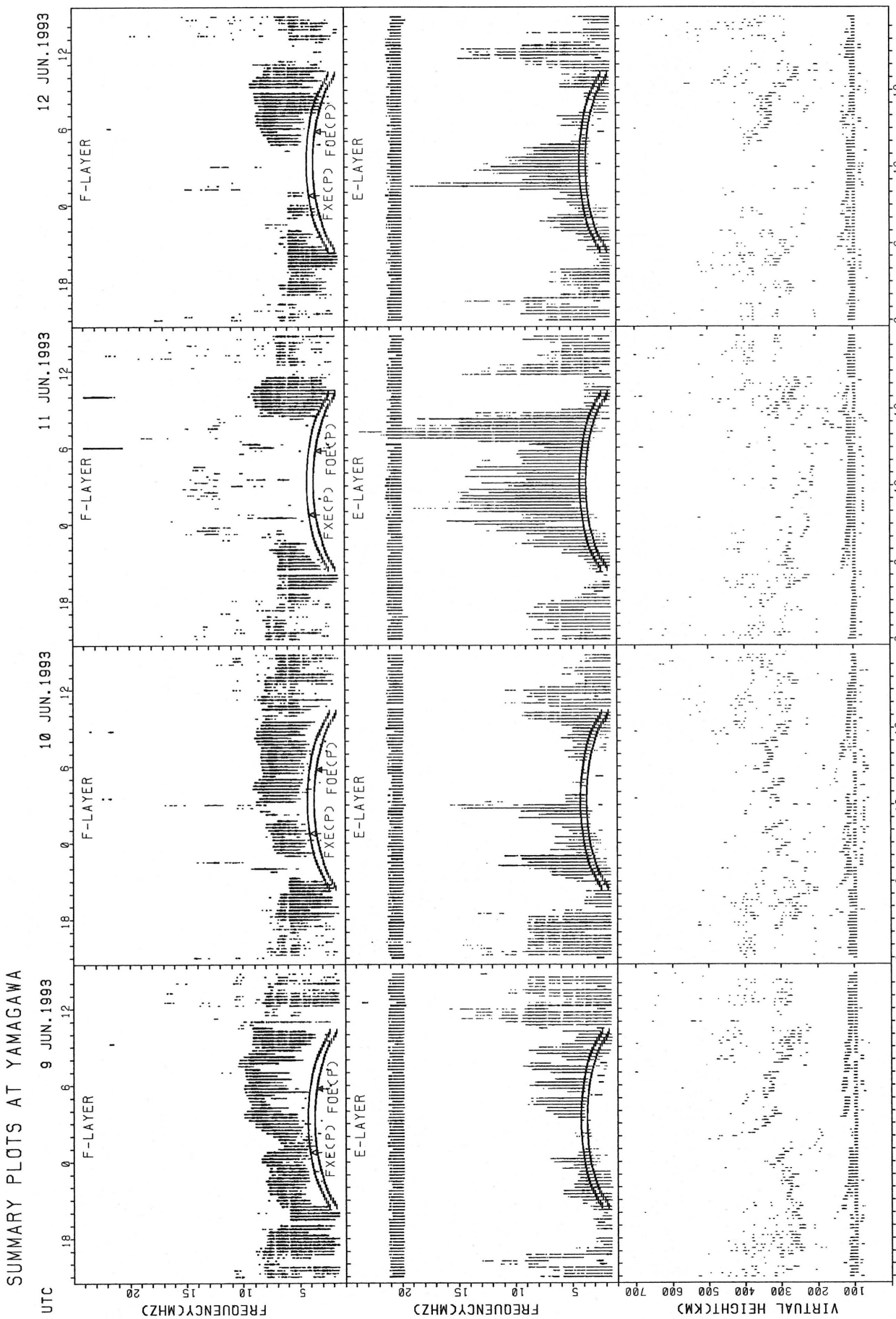

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
21 JUN.1993
22 JUN.1993
23 JUN.1993
24 JUN.1993
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P)
FOE(P)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

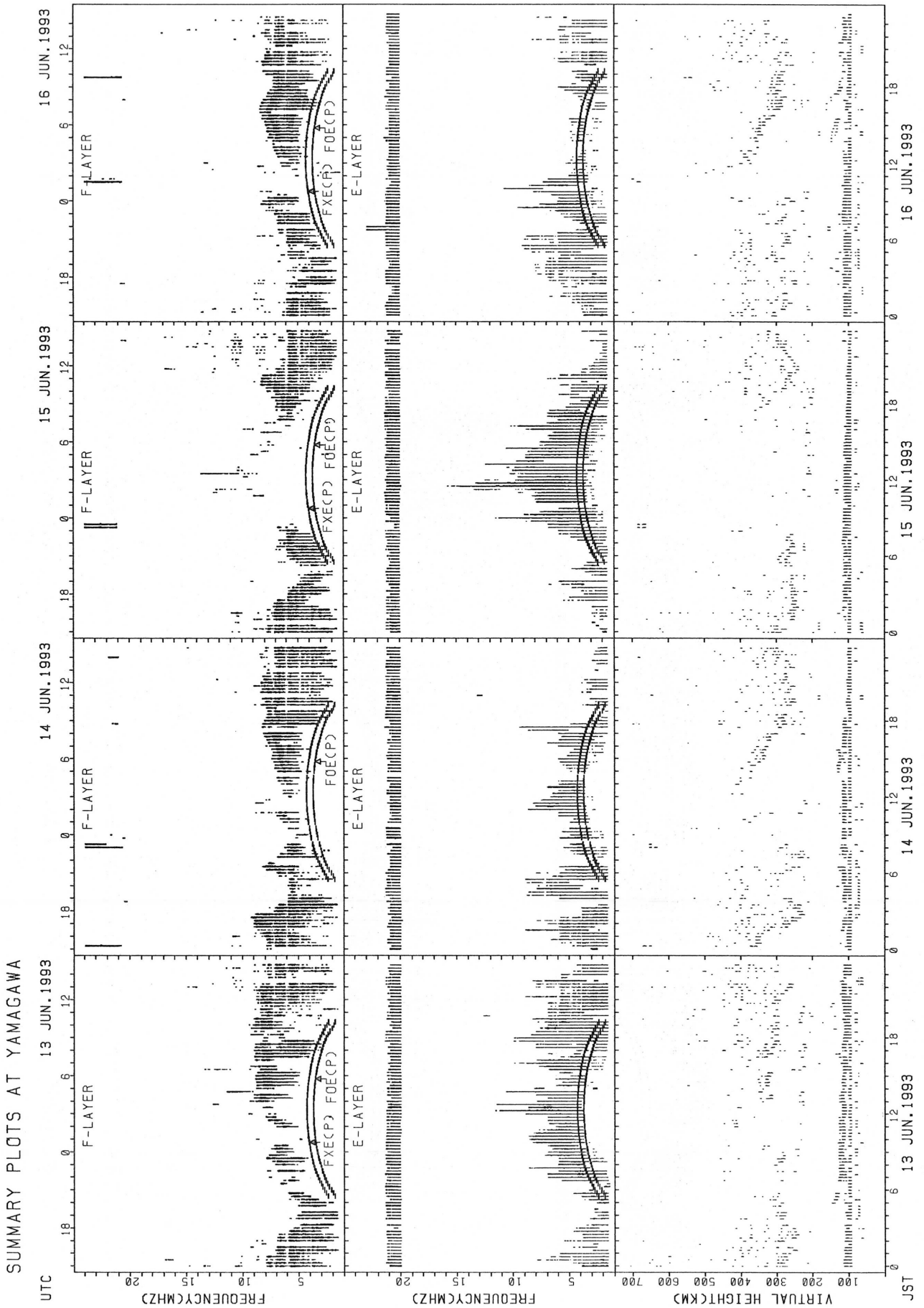

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
25 JUN.1993
26 JUN.1993
27 JUN.1993
28 JUN.1993
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P)
FOE(P)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

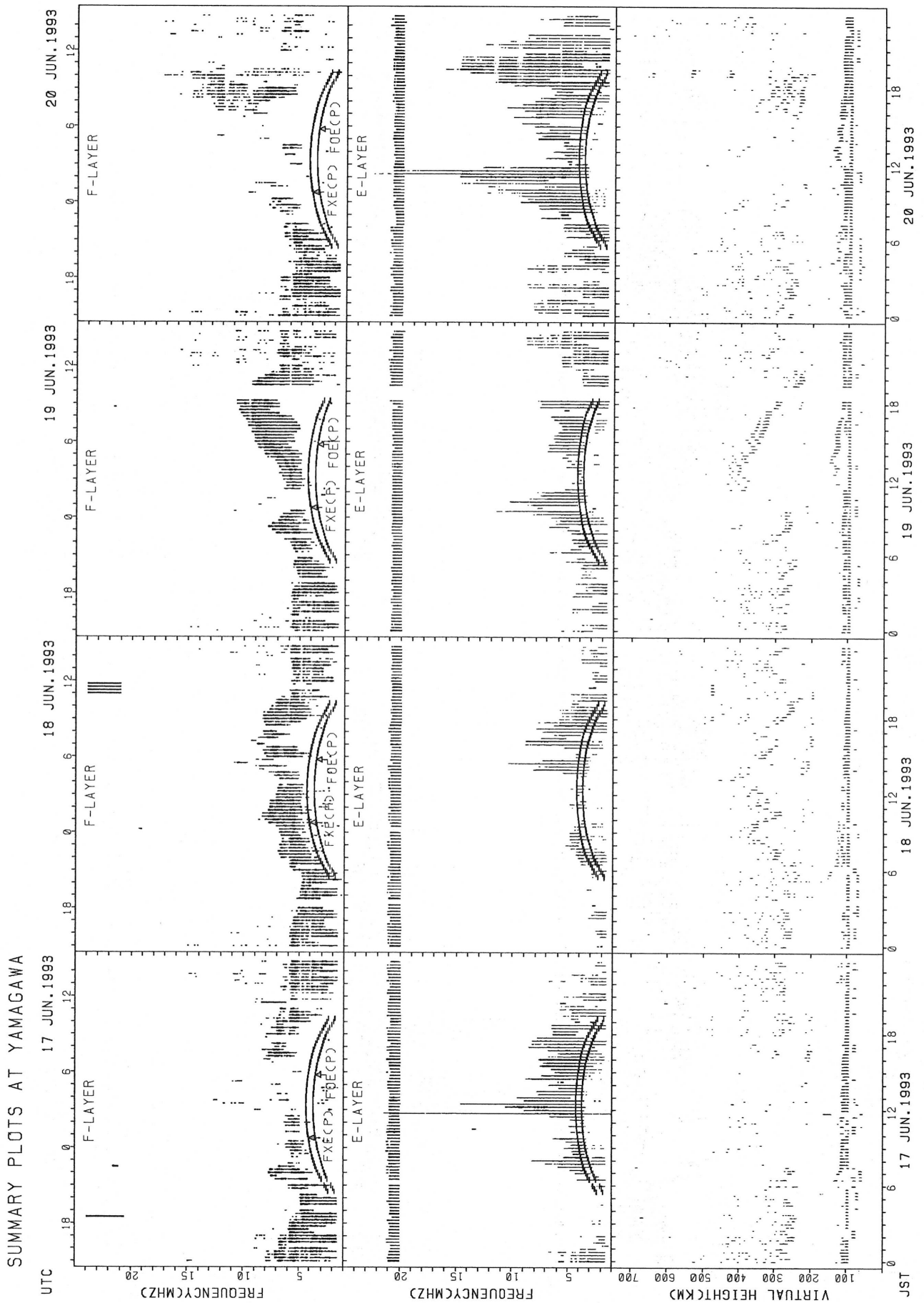

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
29 JUN.1993
30 JUN.1993
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); FOE(P)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

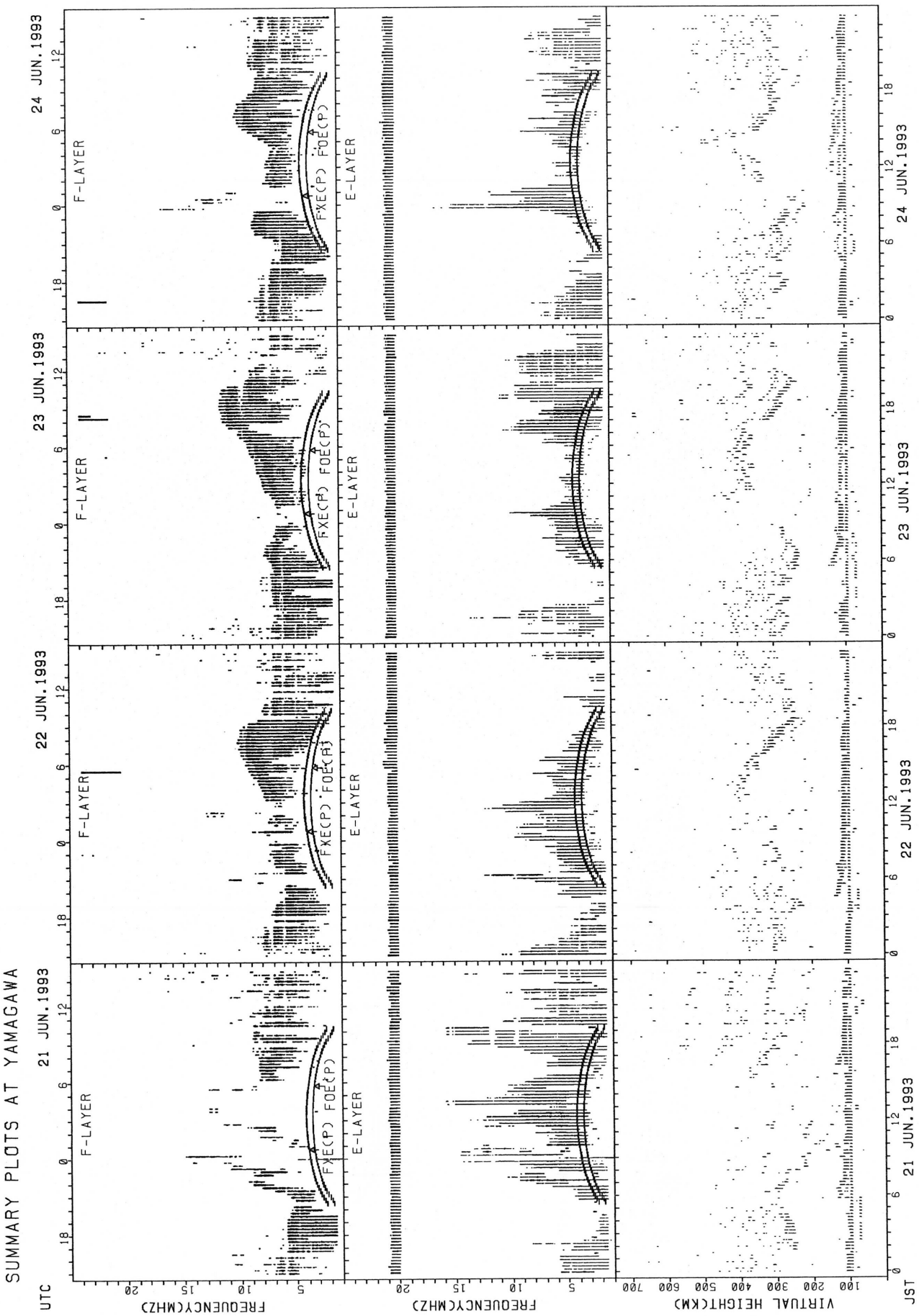

SUMMARY PLOTS AT YAMAGAWA
UTC
1 JUN.1993
2 JUN.1993
3 JUN.1993
4 JUN.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

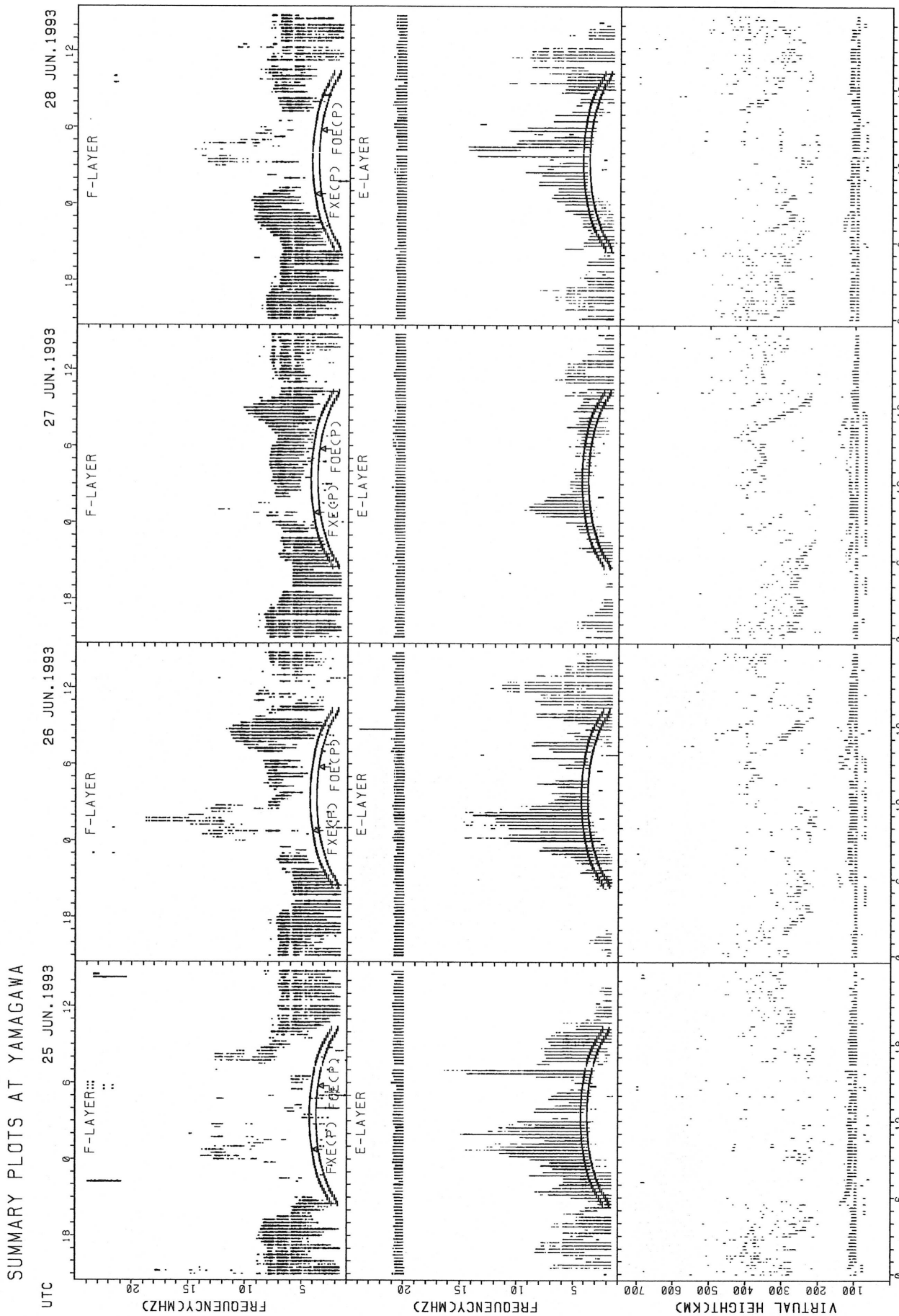

SUMMARY PLOTS AT YAMAGAWA
UTC
5 JUN.1993
6 JUN.1993
7 JUN.1993
8 JUN.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

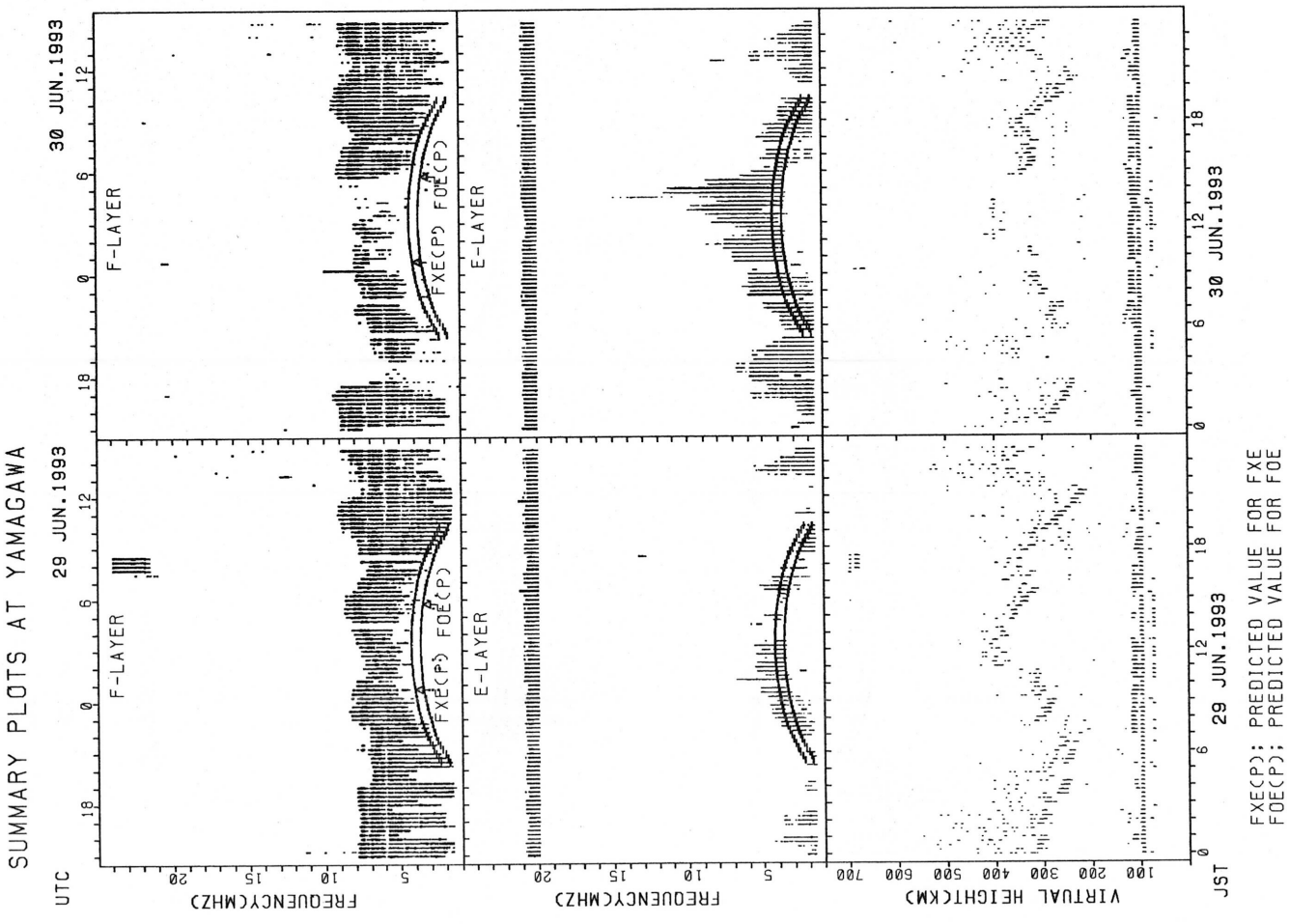

SUMMARY PLOTS AT YAMAGAWA
UTC
9 JUN.1993
10 JUN.1993
11 JUN.1993
12 JUN.1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

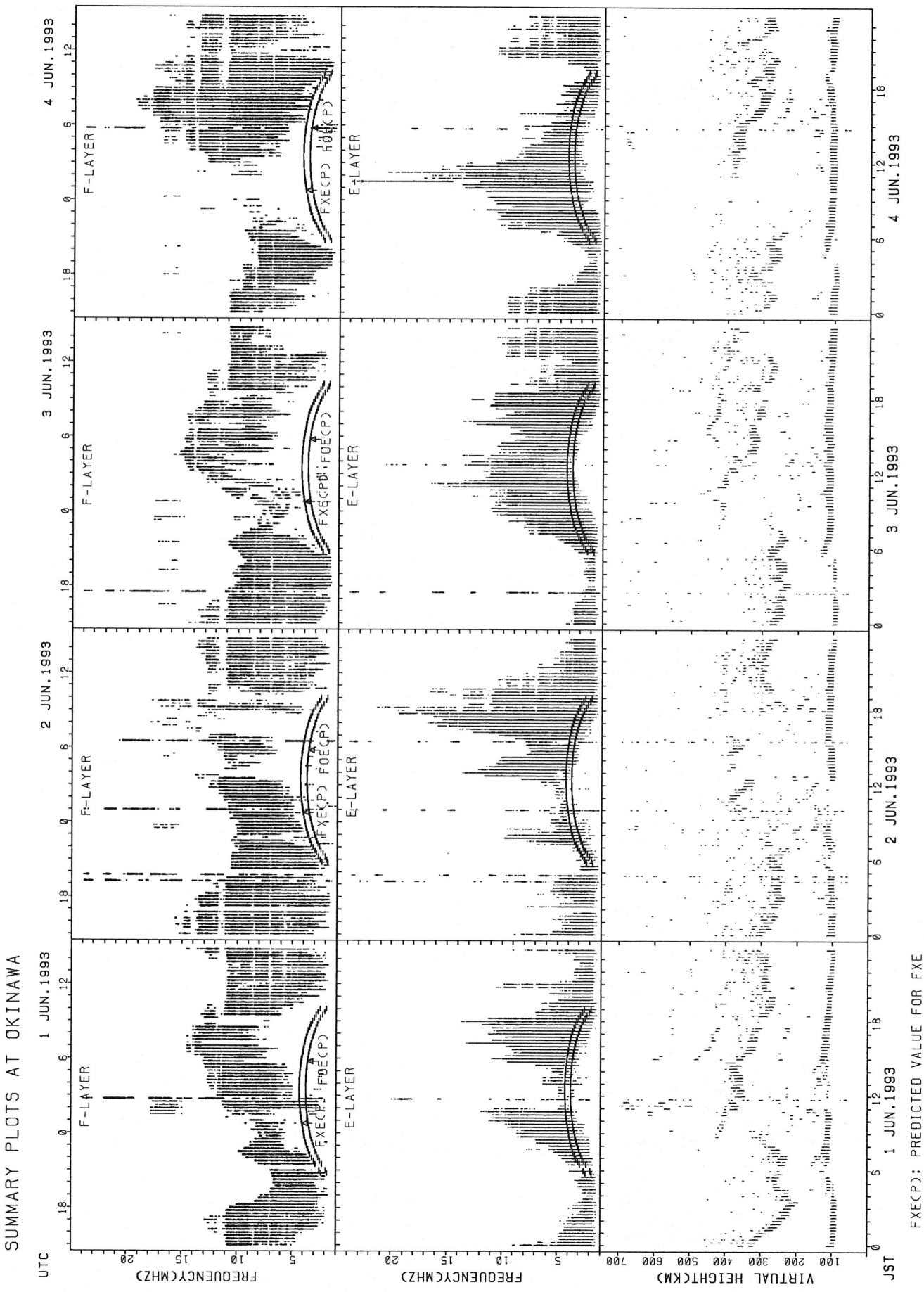

SUMMARY PLOTS AT YAMAGAWA
UTC
13 JUN.1993
14 JUN.1993
15 JUN.1993
16 JUN.1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

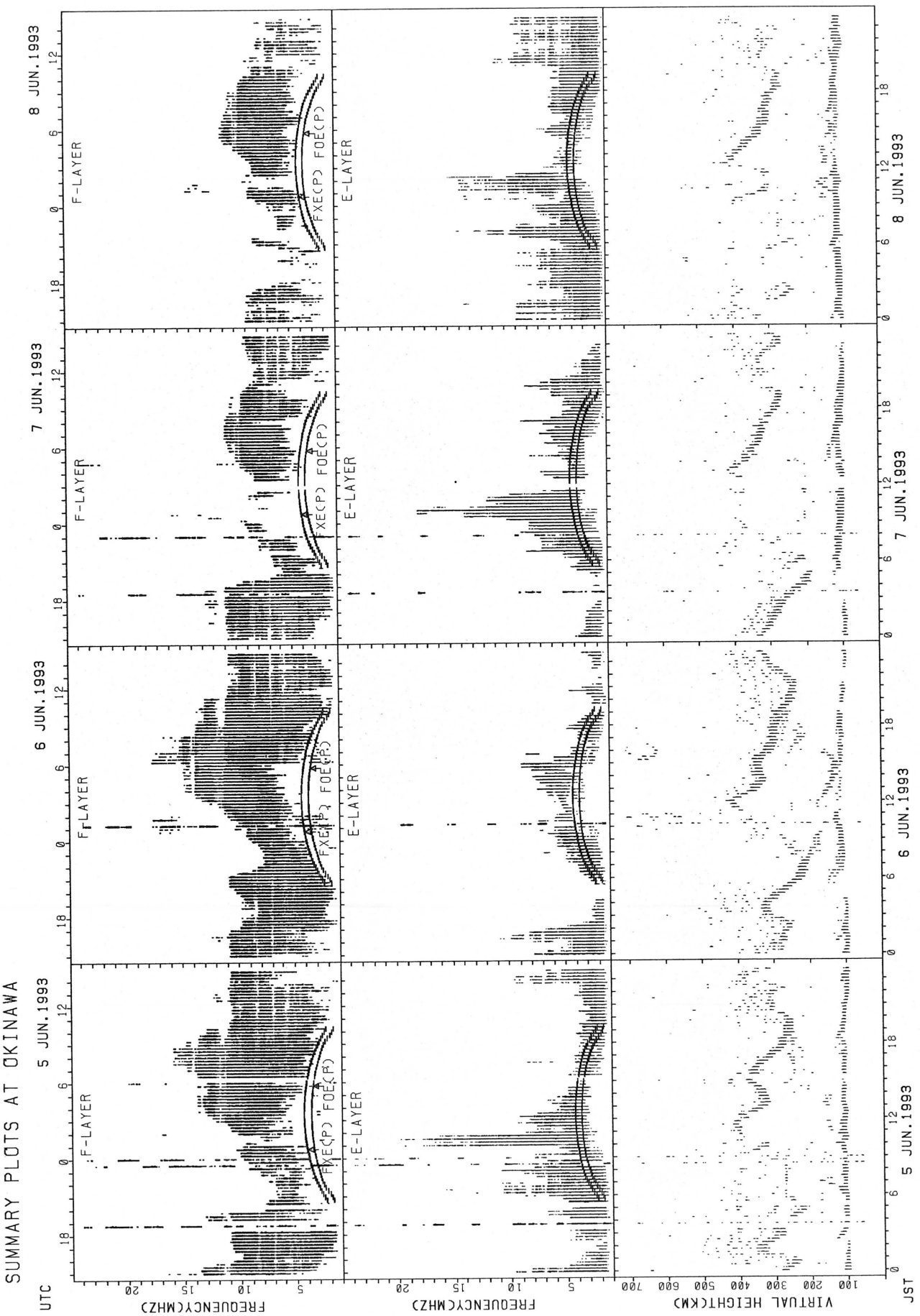

SUMMARY PLOTS AT YAMAGAWA
UTC
17 JUN.1993
18 JUN.1993
19 JUN.1993
20 JUN.1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
21 JUN.1993
22 JUN.1993
23 JUN.1993
24 JUN.1993
UTC
JST
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

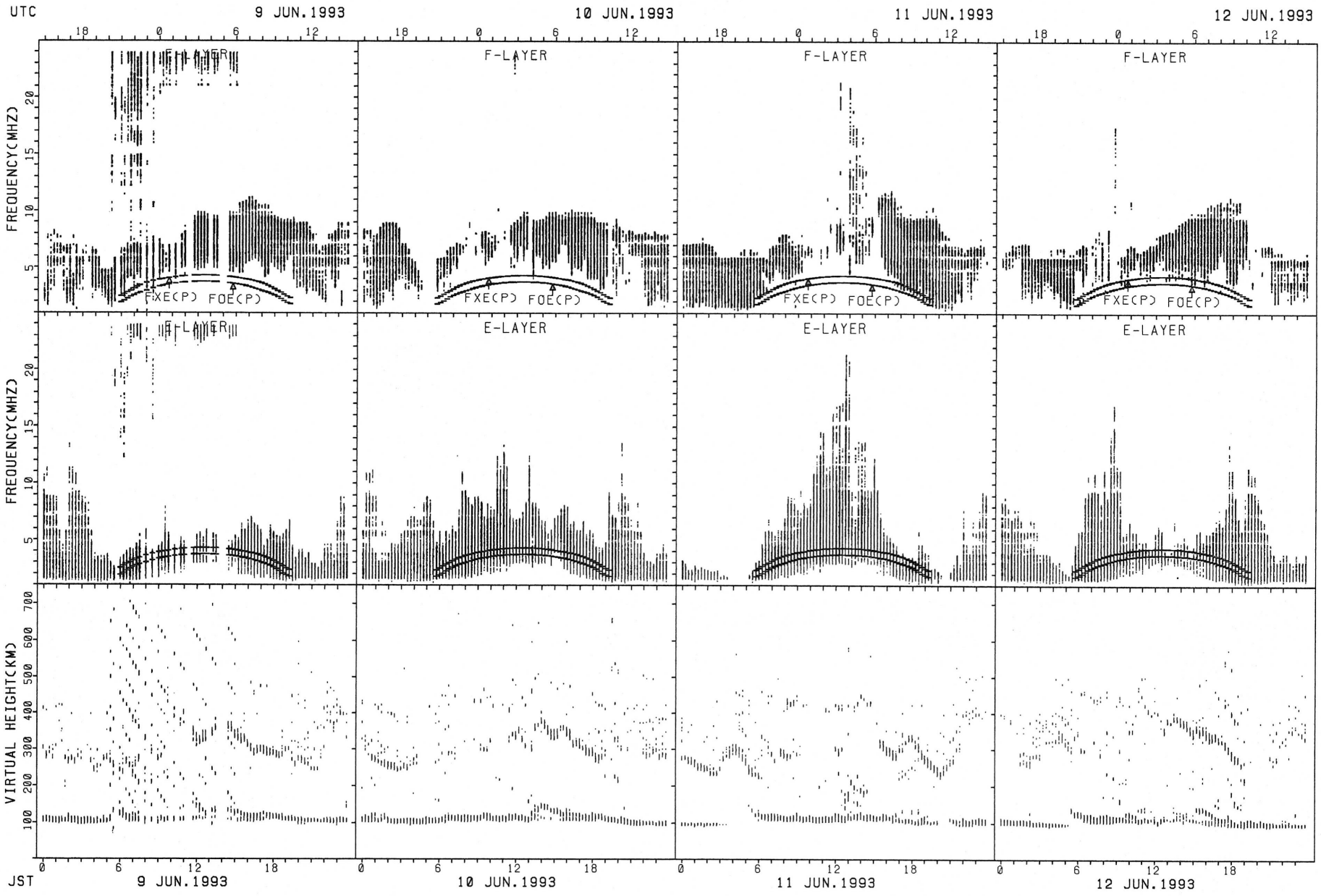

SUMMARY PLOTS AT YAMAGAWA
UTC
JST
25 JUN.1993
26 JUN.1993
27 JUN.1993
28 JUN.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
29 JUN.1993
30 JUN.1993
UTC
JST
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
1 JUN.1993
2 JUN.1993
3 JUN.1993
4 JUN.1993
F-LAYER
E-LAYER
FXE(P); FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

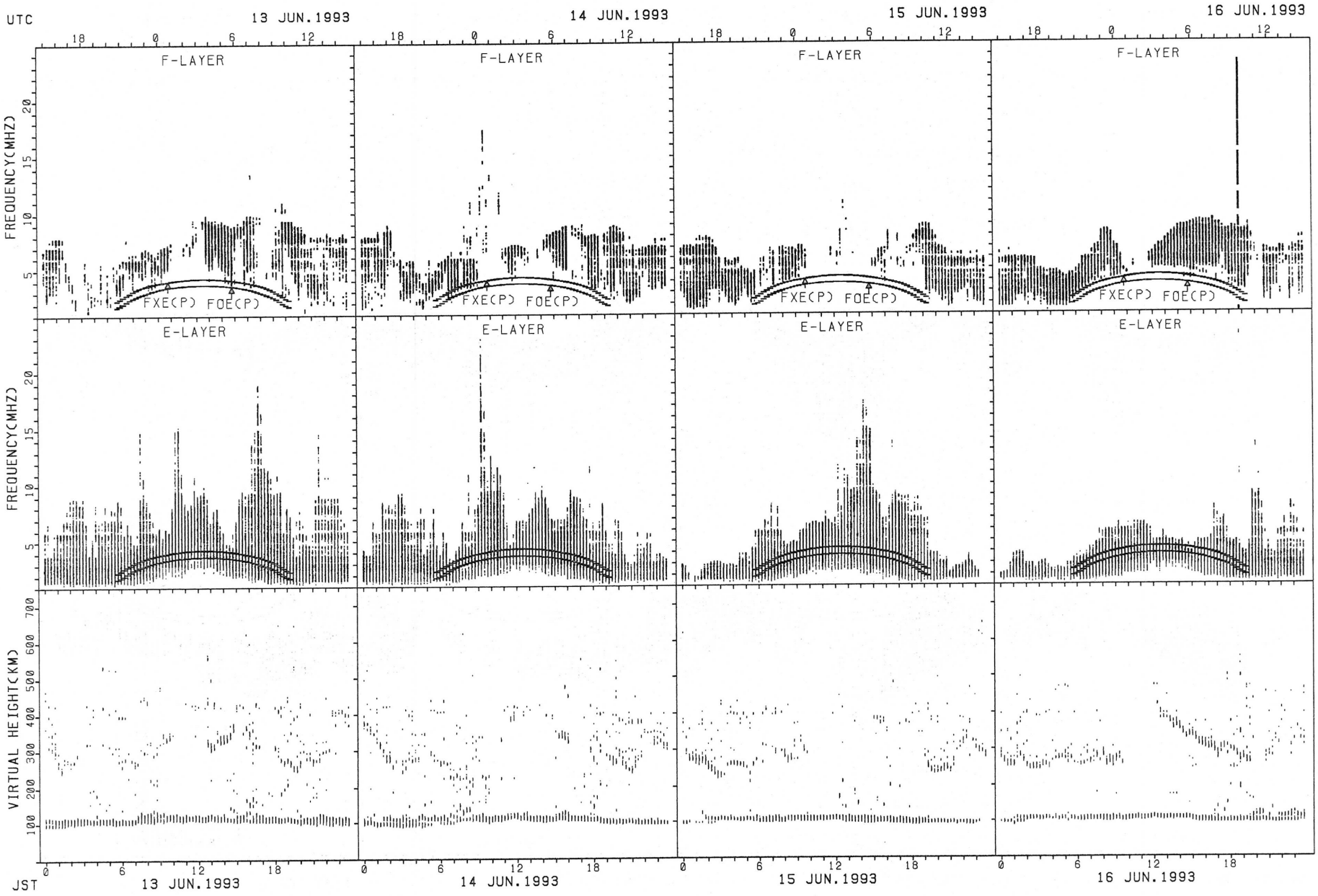

SUMMARY PLOTS AT OKINAWA
UTC
5 JUN.1993
6 JUN.1993
7 JUN.1993
8 JUN.1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



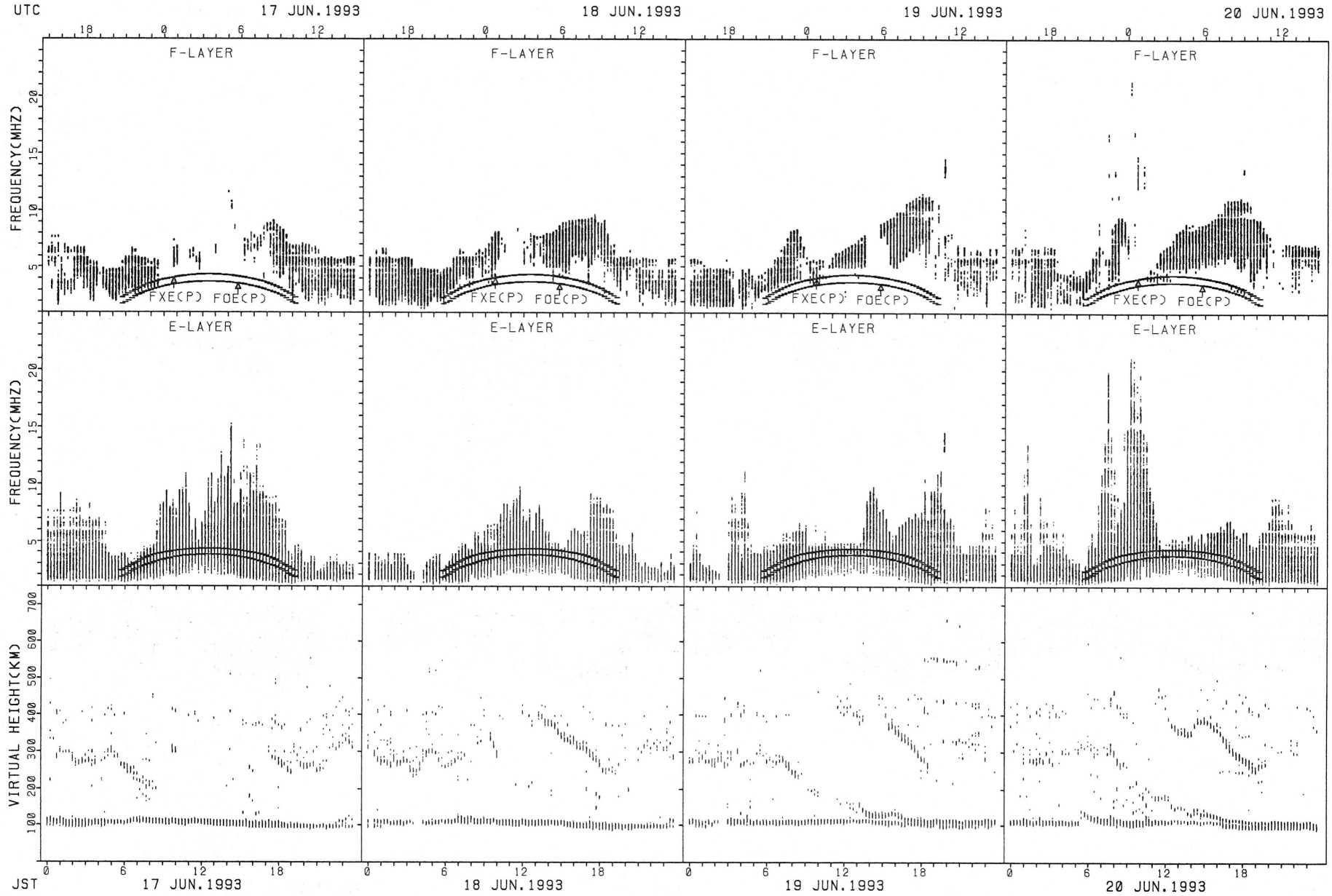
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA

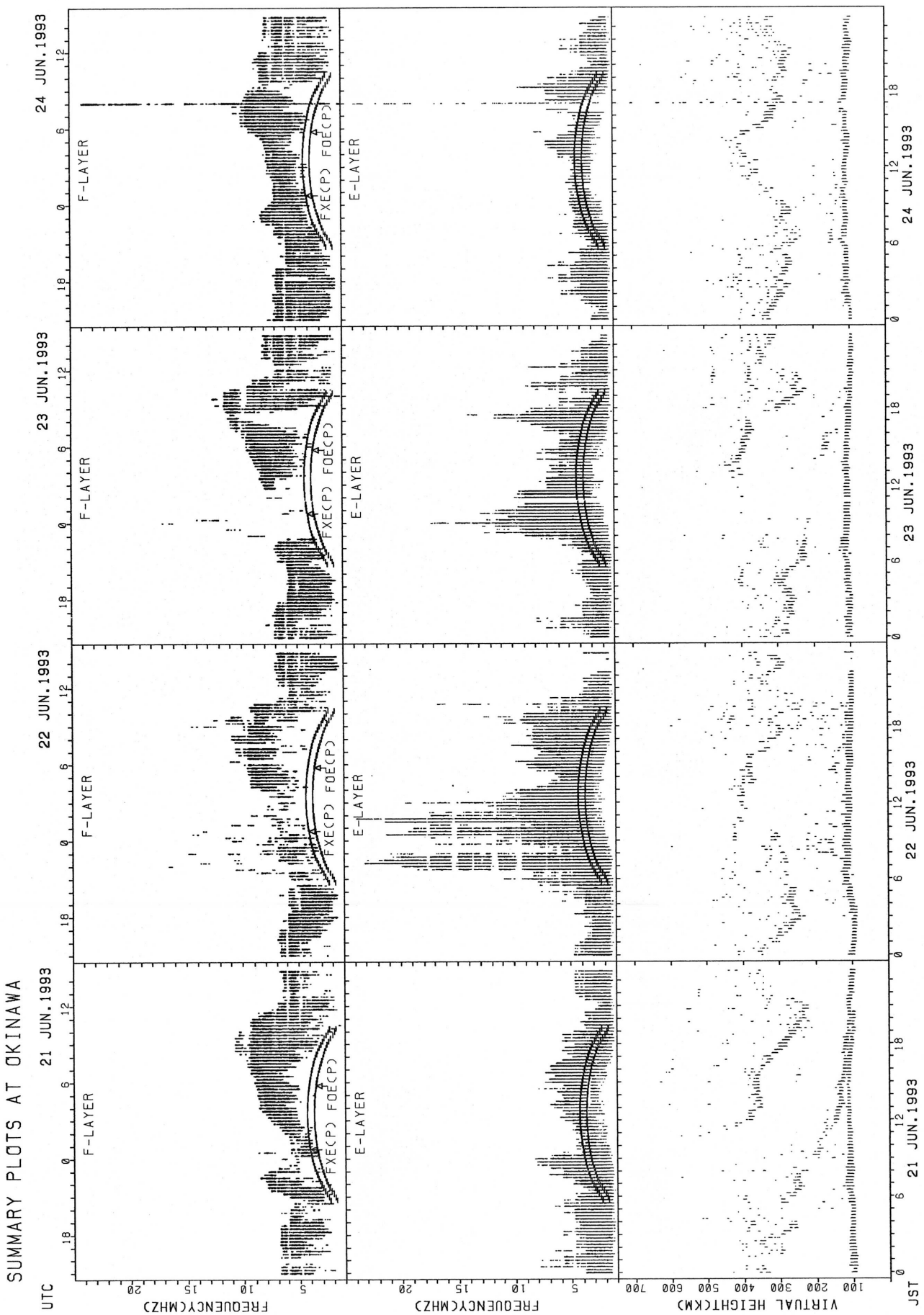


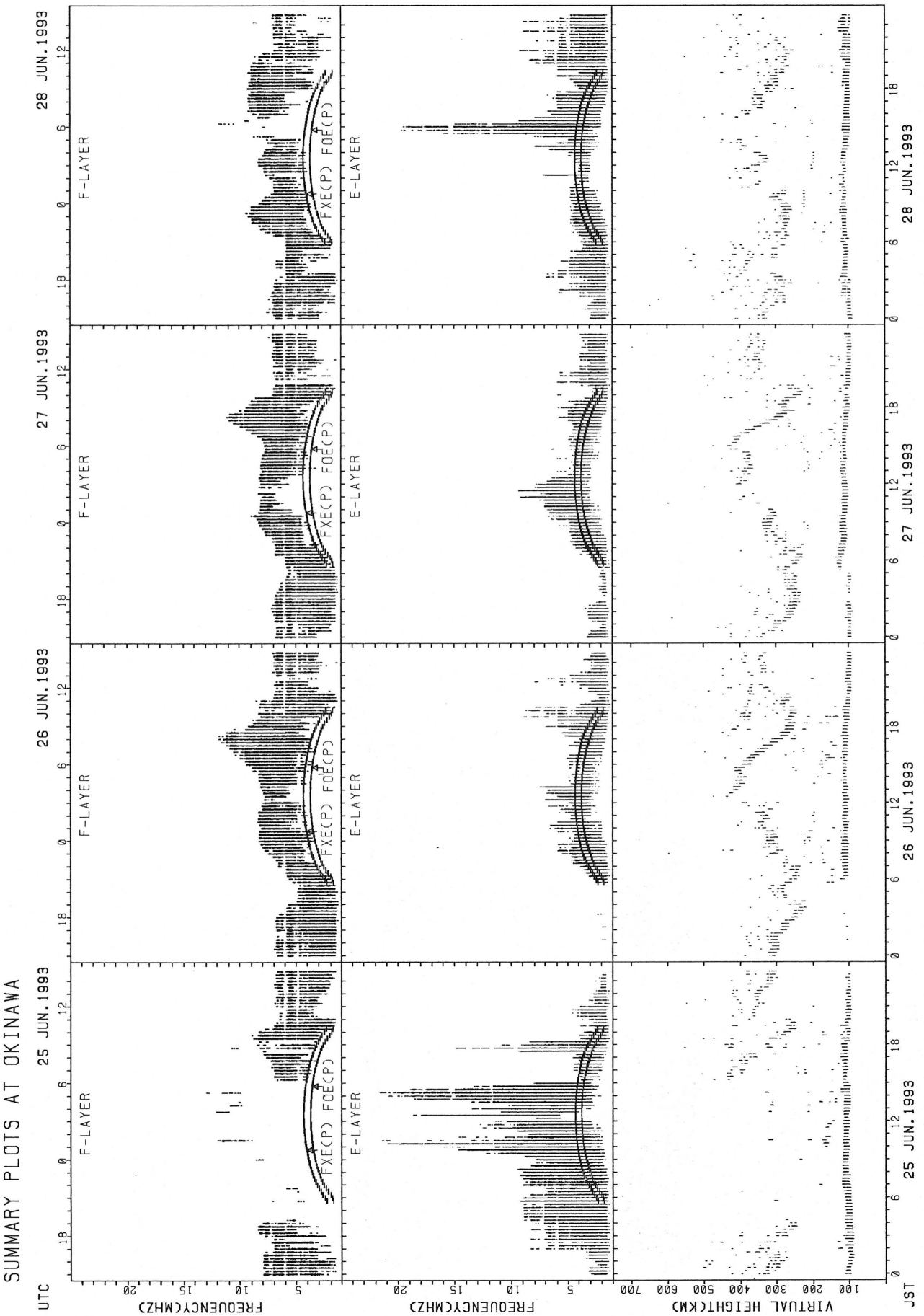
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

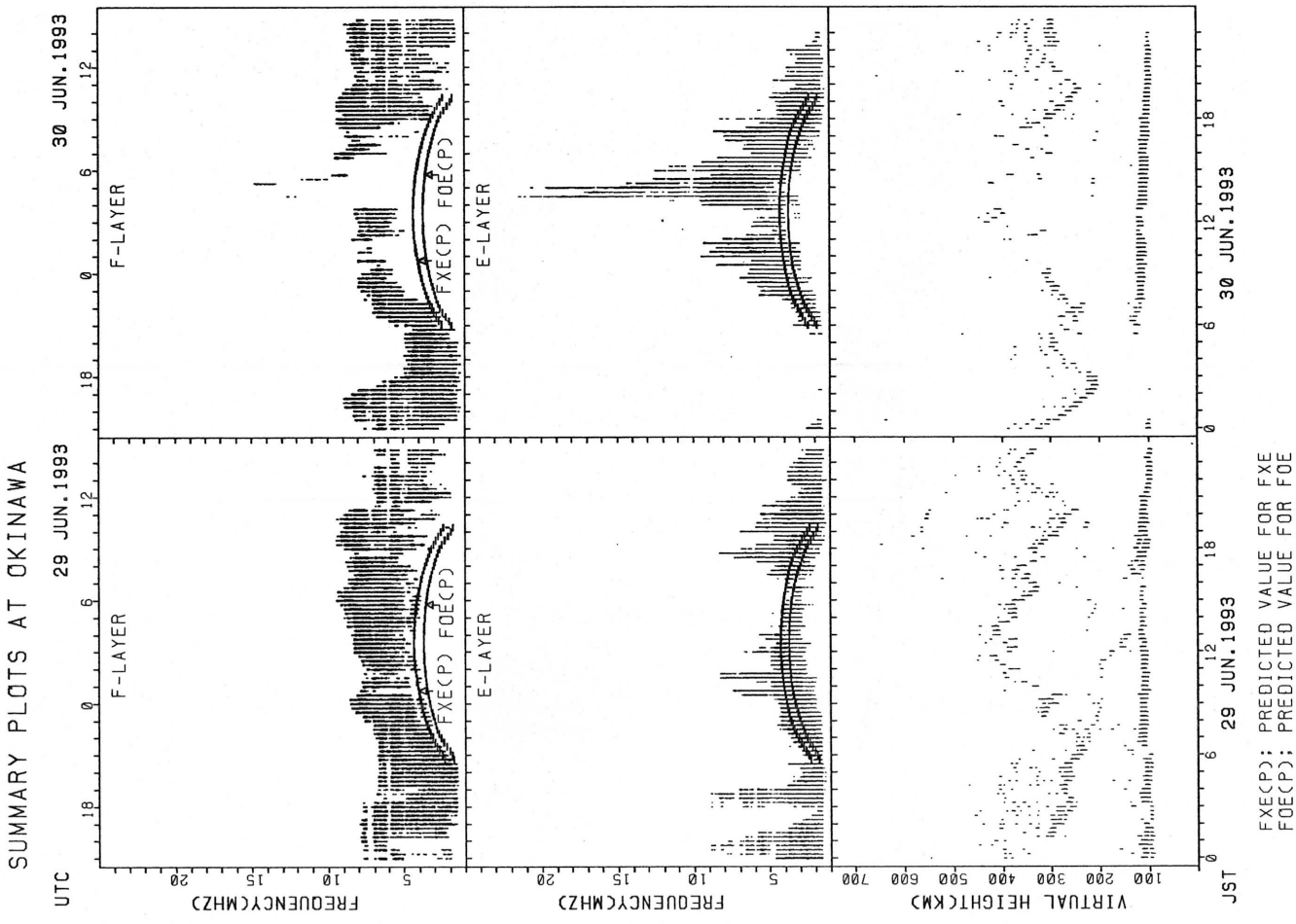
SUMMARY PLOTS AT OKINAWA



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


SUMMARY PLOTS AT OKINAWA
21 JUN.1993
22 JUN.1993
23 JUN.1993
24 JUN.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
JST
25 JUN.1993
26 JUN.1993
27 JUN.1993
28 JUN.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
29 JUN.1993
30 JUN.1993
UTC
JST
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

MONTHLY MEDIANS OF H'F AND H'ES

JUN. 1993 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								15											12	13	12	17	11	
MED								322											249	282	303	306	296	
U Q								344											323	308	319	343	332	
L Q								308											230	237	283	291	282	

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	22	24	16	14	16	22	26	27	27	25	24	17	15	17	13	16	15	21	29	28	27	28	25	23
MED	110	110	107	106	117	131	123	121	117	117	114	113	113	113	119	122	117	121	121	117	117	115	115	109
U Q	113	116	112	137	139	137	125	125	119	118	119	122	117	121	122	132	133	125	127	120	121	118	121	113
L Q	107	107	103	103	106	123	119	119	115	113	111	109	111	109	113	117	115	117	119	116	113	111	109	107

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	15	14	14	12	12	18	18	19									13	18	21	14	14	13	12	13
MED	354	361	355	362	349	314	306	292									320	298	300	305	315	362	339	368
U Q	372	372	378	386	382	384	366	306									350	330	325	340	372	382	360	402
L Q	318	350	314	337	333	272	286	272									304	246	277	280	300	338	300	306

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	28	23	23	23	31	31	30	30	28	26	26	31	27	25	26	27	28	30	30	30	29	29
MED	107	106	105	105	109	125	121	117	116	112	111	111	113	111	111	119	116	115	113	113	112	111	113	111
U Q	109	111	111	111	115	133	127	123	117	115	114	115	119	121	121	126	123	121	115	115	115	117	115	113
L Q	103	102	101	101	103	115	113	113	111	109	109	109	109	107	109	109	109	113	110	109	105	107	108	107

MONTHLY MEDIANS OF H'F AND H'ES

JUN. 1993 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	13	17	16	15	10		11	15	13									24	23	21	20		10	10
MED	346	338	316	332	348		288	272	272									298	286	296	287		351	370
U Q	381	379	368	368	376		296	302	304									324	322	308	315		408	386
L Q	330	308	293	302	290		270	266	251									289	264	273	237		344	344

H'ES

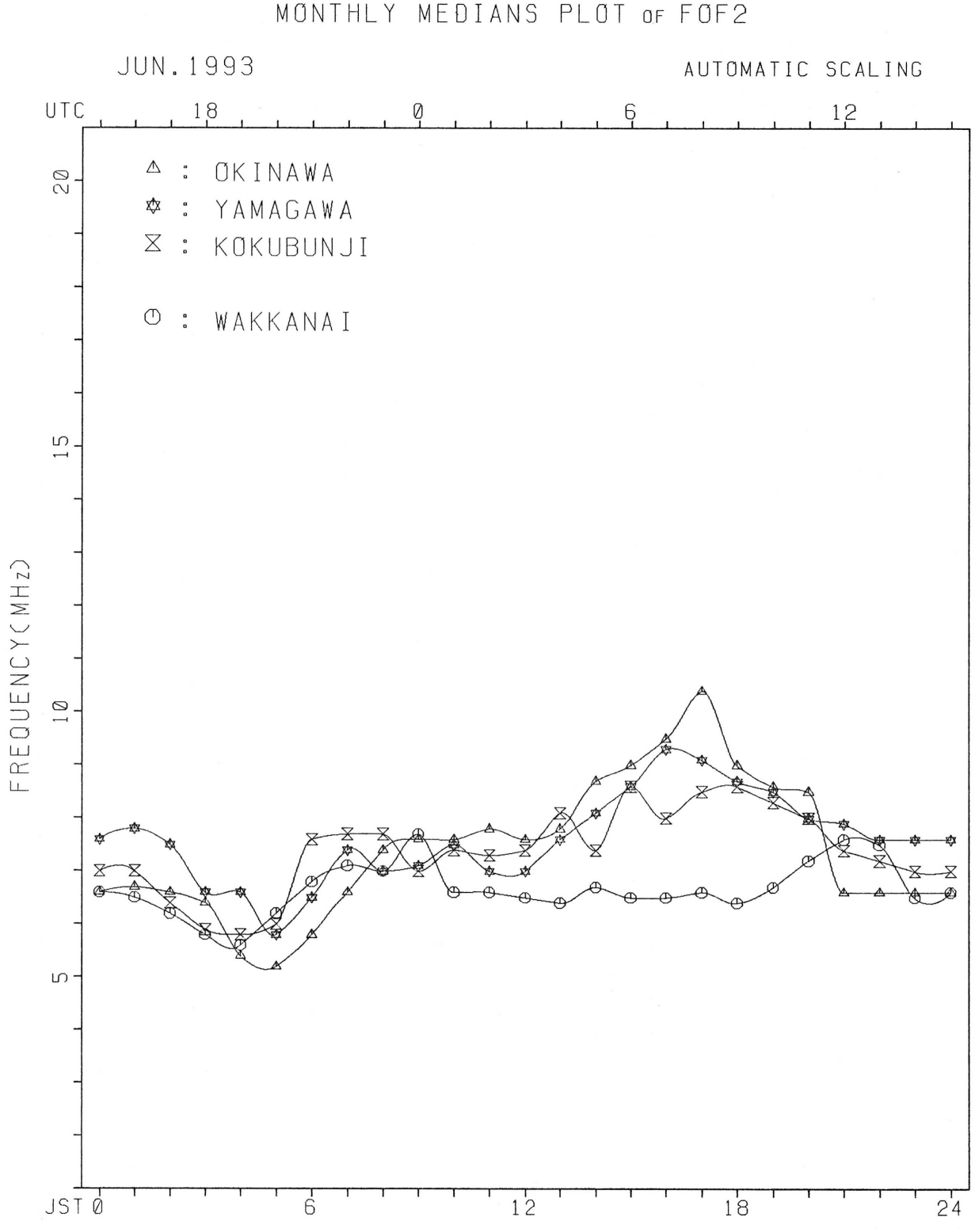
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	30	26	25	24	21	24	24	29	30	27	28	26	23	23	26	26	26	25	29	28	28	27	22
MED	107	107	109	107	104	109	123	119	115	112	111	111	109	115	115	116	117	117	115	111	111	112	113	109
U Q	115	115	113	109	111	125	127	123	119	117	115	114	117	125	129	125	129	121	119	115	113	117	117	113
L Q	103	103	103	101	101	107	113	115	113	111	109	108	107	109	107	107	113	109	107	106	104	103	105	105

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT		16	16	11				12	19									22	27	24	19	10		
MED		310	284	310				274	288									302	286	277	286	350		
U Q		365	326	374				291	314									322	310	303	322	388		
L Q		285	265	256				246	266									294	274	261	262	316		

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	26	28	26	25	25	31	30	31	31	30	30	27	29	30	29	30	30	31	30	31	31	29	28
MED	107	107	107	110	107	109	119	119	117	113	113	117	117	113	116	123	119	119	115	113	109	105	103	106
U Q	114	119	118	119	119	112	125	125	133	125	131	131	145	139	131	133	131	125	119	117	115	111	115	116
L Q	100	99	102	105	103	105	107	113	113	109	109	111	111	107	107	110	113	111	113	105	101	101	101	99


MONTHLY MEDIANS PLOT OF FOF2
JUN. 1993
AUTOMATIC SCALING
UTC
18
0
6
12
△ : OKINAWA
✡ : YAMAGAWA
⧖ : KOKUBUNJI
◷ : WAKKANAI
FREQUENCY(MHz)
20
15
10
5
JST 0
6
12
18
24

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 1993 FXI (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	86	85	X 83	X 82	X 75																X 87	X 89	91	90
2	C	84	X 81	X 78	X 81		91														X 85	X 82	X 79	X 80
3	84	81	77	74	76																X 96	97	103	X 86
4	90	81	82	84	77																X 97	X 97	X 99	X 104
5	X 91	X 82	X 83	87	X 91																X 83	X 92	X 93	92
6	93	A	70	66	69	74															X 87	X 84	X 78	81
7	81	81	77	75	X 72																X 85	X 84	87	87
8	82	81	X 90	X 63	X 55																X 75	X 80	X 84	88
9	X 78	X 74	X 74	X 66	X 62																X 80	X 76	X 78	72
10	68	69	73	69	68																X 83	X 79	0 X 81	X 75
11	X 75	X 77	77	77	75																A	A	75	72
12	68	70	X 63	73	61	62															X 76	X 63	71	X 72
13	X 70	X 65	X 64	X 57	X 56																0 X 85	0 X 89	X 80	X 76
14	X 71	73	76	X 69	61	60															X 77	X 77	X 77	72
15	63	64	X 62	54	X 50																X 77	X 70	X 65	63
16	X 62	X 58	59	57	55																X 79	X 77	X 73	X 63
17	X 63	X 62	X 60	53	X 51	53															X 69	X 67	X 67	X 66
18	X 61	X 59	X 55	53	X 49																X 75	X 65	X 64	X 63
19	62	63	62	62	62	60															X 91	X 70	X 72	69
20	X 56	55	X 51	51	X 48																X 74	X 66	63	73
21	74	X 62	60	56	54	64															X 83	81	79	X 70
22	78	74	62	X 57	X 56																X 73	X 73	75	69
23	62	62	63	63	X 69																X 98	X 87	78	79
24	77	74	75	65	64																X 89	X 83	X 83	81
25	88	81	73	60	64																A	X 74	X 69	71
26	76	75	74	81	X 64																0 X 68	0 X 67	X 62	X 65
27	76	76	X 69	X 66	62																A	X 73	74	72
28	77	76	74	65	67	67	77														X 89	X 83	X 82	X 79
29	X 80	X 76	X 72	X 71	X 69																X 93	94	94	99
30	99	95	98	X 82	77	79															X 94	X 90	X 85	82
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	30	30	30	8	2														27	29	30	30
MED	76	74	73	66	64	63	84														X 83	X 80	X 78	74
U Q	83	81	77	75	72	70															X 89	X 88	84	82
L Q	66	64	62	57	X 56	60															X 76	X 72	X 72	X 70

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 1993 FOF2 (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	76	F 78	77	76	69	72	82	76	75	I A 78	81	79	82	84	86	86	88	A	A	A	81	J R 83	F 83	J F 84
2	I A 78	F 72	75	72	75	77	F 83	90	87	80	74	66	A	A	69	79	I A 84	84	84	80	79	76	73	74
3	F 73	F 73	F 70	F 66	67	72	75	76	78	68	73	73	76	83	87	91	90	89	89	90	90	F 89	F 96	80
4	79	F 73	F 73	F 75	F 67	86	84	J R 64	A	A	71	71	74	85	80	86	84	87	83	91	91	91	93	98
5	85	76	77	F 79	85	87	76	I A 74	75	79	78	79	96	112	110	109	105	101	93	83	77	86	87	F 85
6	F 83	I A 69	F 60	F 58	F 61	F 65	85	71	64	A	A	64	73	77	77	85	81	I A 80	I A 82	85	81	78	72	F 73
7	F 74	F 74	F 69	F 67	V 65	58	I A 56	55	60	70	69	I A 70	72	74	79	82	78	73	73	77	79	J R 78	F 80	F 77
8	F 75	F 74	84	57	49	55	63	72	68	R 64	69	71	73	75	84	87	81	84	77	69	J R 69	75	78	J F 82
9	72	68	68	60	56	69	65	77	76	73	75	68	I A 78	92	93	91	I A 86	I A 78	83	I A 84	74	70	72	F 65
10	F 61	F 62	64	F 62	F 61	73	75	67	A	64	64	R 72	73	72	78	76	71	67	68	76	77	73	75	69
11	69	71	F 69	F 69	F 66	58	I A 55	69	A	A	A	82	I A 80	72	64	67	77	74	78	79	A	A	F 67	F 65
12	F 61	F 63	57	J R 64	F 52	F 53	53	50	A	I A 52	A	A	A	I A 60	64	71	I A 74	I A 74	76	I A 72	70	57	F 62	66
13	64	59	58	52	50	52	64	70	74	65	I A 64	I A 62	67	75	73	81	I A 75	71	78	R 77	R 79	83	74	70
14	65	F 65	F 67	63	53	F 52	76	70	54	54	E G 46	57	U R 54	57	56	57	60	69	71	73	71	71	71	F 64
15	56	F 56	V 56	45	44	51	65	57	I A 56	A	A	A	A	A	A	A	A	57	63	69	71	64	59	54
16	56	52	F 52	48	F 46	52	65	69	I A 64	60	64	R 56	55	I A 57	58	62	A	A	I A 69	R 66	S 73	71	67	J R 57
17	V 57	56	V 54	F 47	45	46	50	58	A	A	A	E G 47	J R 53	58	58	55	60	63	65	66	J R 63	61	61	60
18	55	53	49	F 45	43	49	60	67	58	57	60	74	I A 67	60	63	63	64	63	66	69	69	59	58	57
19	F 54	F 55	J F 56	J F 56	F 53	F 53	59	67	56	60	61	60	62	I A 64	I A 68	73	78	84	85	I A 90	85	64	66	F 61
20	50	F 48	45	F 43	42	44	58	64	A	A	A	A	A	53	61	60	A	A	A	75	68	60	F 55	F 63
21	F 63	56	F 53	F 51	J F 47	F 58	66	86	80	62	U S 54	I A 56	A	63	R 72	J R 70	R 61	62	I A 68	R 75	77	F 74	F 73	64
22	F 62	65	F 55	51	50	61	62	I A 69	75	75	69	68	69	I A 68	77	87	91	87	86	78	67	67	J R 66	F 60
23	F 55	F 55	J F 55	F 54	63	62	V 64	82	65	60	61	62	71	82	I A 86	86	89	93	96	98	92	81	68	70
24	F 69	F 65	64	F 55	F 55	58	62	89	103	85	67	R 63	74	I A 66	I A 78	87	94	94	72	I A 78	83	J R 77	77	J F 75
25	J F 82	F 72	F 62	F 52	56	44	46	I A 52	58	57	A	A	A	A	A	57	57	61	63	66	I A 70	68	63	F 65
26	F 65	F 65	F 66	F 73	U R 59	74	72	A	A	A	87	87	B	Y	I A 70	R 61	J R 63	73	86	U R 69	62	R 61	56	R 59
27	R 67	68	63	60	F 55	61	69	70	67	64	69	B	B	U R 70	74	70	67	73	81	80	I A 70	67	F 65	F 64
28	F 68	J F 69	F 67	F 58	F 58	F 58	F 68	79	78	90	S 81	I A 71	U R 61	71	69	65	58	61	I A 66	I A 75	83	77	76	73
29	74	70	65	65	63	72	69	74	74	77	U R 77	I B 75	A	A	A	I A 78	73	68	70	81	87	F 84	F 85	F 87
30	F 91	F 85	F 87	74	F 68	F 71	79	80	68	71	73	71	69	69	71	73	78	77	80	88	J R 88	84	79	F 74
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	29	23	23	23	25	21	25	27	29	27	27	28	29	29	29	30	30
MED	68	F 66	64	F 59	56	58	65	70	68	65	69	70	72	71	73	76	78	74	78	77	77	74	72	F 68
U Q	75	F 72	69	F 67	65	72	75	76	76	77	75	74	75	80	80	86	86	84	84	84	83	82	78	F 75
L Q	61	56	56	52	50	52	60	66	60	60	64	62	64	62	64	64	64	67	68	70	70	66	65	63

JUN. 1993 FOF2 (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 1993 FOF1 (0.01MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							L		L			L 530		520	510									
2							L	U L 500	L 550	U L 550	U A 510	530			U A 510	490		L 430						
3												540		550	520	500		L 440	U L 380					
4												530	520			480	470	420						
5										U L 540					500	500	L 480	L						
6						L			460				510	U A 530	U A 470									
7									460	480			U A 510		U A 490	480	450							
8						L	L	L	L	L 490	U A 510	510	510	510		470	470	U L 420	L					
9						L		U A 430	480	510	490													
10						L	L	L		500	500	490		480	480		L 460	U L 510						
11															U A 490			410	L					
12						U L 310									R 470	460								
13							L							U A 490					L					
14						L	380			450	460	470	R 460	450	460	430	410	H 390	U L 360					
15						L		410										U A 390						
16						L	L			440		U A 480	U A 475											
17						U L 340	360	U A 420				470				430			L 350					
18							L 400	420	450	U A 460	U A 480				U A 460	440	420	400	U A 310					
19							400	420	450	460														
20						U L 330	U A 350							460	U A 460									
21							L				460													
22												U A 490				450	440	L 420	L					
23						L	L	430	460	480	500	480	480					U A 420						
24						U L 360	410					R 520	480			U A 470	460							
25										U A 480							450							
26							U L 530												380					
27							L	U L 460	L		530				480	490	475							
28							L	470	490				530		U A 510									
29							L	L	L	U A 500								L						
30						L 400		L	U L 460	L			500	U A 530	510	500	490	470	L					
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						5	7	10	8	13	9	13	10	9	15	14	12	11	5					
MED						U L 340	400	430	460	480	500	500	510	510	490	475	460	420	U L 360					
U Q						L 380	410	U L 460	485	U 505	U A 510	530	520	525	510	490	470	L 430	380					
L Q						U L 320	360	420	455	460	470	480	480	470	470	450	445	400	330					

JUN. 1993 FOF1 (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 1993 FOE (0.01MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1						A	260	310	U A 345	A	A	A	A	395	A	370	330	A 275	A	B				
2						185	265	325	A	A	A	400	410	A 400	370	U A 340	315	A	A	B				
3						195	265	315	A	A 370	380	A	A	A	B	365	325	290	A	B				
4						A	260	320	A	A	A	A	A	A	A	R 360	R	285	225	B				
5						U A 180	260	U A 300	A	A	A	A	A	A	A	345	320	275	230	B				
6						200	270	305	A	A	A	A	A	B	A	A	U A 325	U A 275	A	B				
7						A	260	A 290	U A 315	A	B	A	A	A	A	355	340	275	A 220	B				
8						190	260	300	340	A	A	A	B	385	B	345	A	270	210	B				
9						170	265	A 305	U A 335	A	A	A	A	A	A	340	A	A 270	U A 210	B				
10						185	255	A	340	A	A	A	A	R 385	365	355	340	U A 285	205	B				
11						205	260	305	335	A 355	A	A	A	A	A	A	A	A	A	B				
12						A	245	305	A	A	A	A	A	A	350	335	320	275	A	B				
13						180	A	310	A	U A 350	A 355	A	A	A	A	A	320	A	220	B				
14						A	245	A 275	320	A	B	A	B	350	345	320	295	A	A	B				
15						A	A	A	A	A	A	A	A	A	A	A	A	A	A	B				
16						185	245	295	A 320	A	A	405	395	375	360	340	310	265	U A 200	B				
17						150	255	295	325	A	U A 355	B	A	A	A	330	295	265	205	B				
18						185	255	290	320	340	A	A	A	A	A	A	A	A 265	A	A				
19						A	270	300	335	340	A	A	A	A	A	A	A	A	A	B				
20						165	255	300	A	A	A	A	A	A	A	345	310	270	205	B				
21						195	260	300	A	A	A	A	A	A	A	A	A	B	B	B				
22						200	255	310	A 340	A	A	A	A	A	A	A	A	A	A	B				
23						170	255	300	340	A 345	A	A	A	A	A	A	A	A	215	B				
24						A	275	A 305	A	A 370	A	A	A	A 395	U A 370	345	335	B	A	B				
25						200	265	310	340	A	A	A	A	A	A	A	A	A	A	B				
26						B	A	A	B	B	B	B	B	A	A	A	A	B	R	B				
27						A	A	A	A	A	A	B	B	B	U A 380	A	A	A	A	B				
28						A	A	315	U A 350	A	A	A	A	A	A	A	340	285	U A 225	B				
29						200	A	A	A	A	B	B	B	B	A	A	A	A	A	B				
30						185	265	310	345	A	A	A	A	A	A	A	A	275	210	B				
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						19	24	25	16	7	3	2	2	7	7	15	15	16	13					
MED						185	260	305	338	A 350	A 355	402	402	385	365	345	320	275	210					
U Q						200	265	310	A 340	A 370	380			A 395	U A 370	355	335	280	222					
L Q						180	255	300	322	340	A 355			375	350	340	310	270	205					

JUN. 1993 FOE (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 1993 FOES (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	J A 30	J A 34	J A 53	J A 42	J A 21	24	36	J A 56	J A 50	112	75	J A 51	J A 94	46	46	J A 87	J A 106	173	144	92	J A 53	81	J A 47	22
2	C	J A 26	J A 27	J A 23	J A 21	G	G 23	37	J A 52	J A 54	53	50	72	J A 103	81	63	138	72	49	32	J A 23	21	E B 13	J A 54
3	J A 45	J A 33	J A 27	J A 38	J A 30	24	J A 42	J A 52	J A 70	J A 76	J A 62	J A 53	J A 82	J A 64	E B 39	43	56	J A 42	J A 32	J A 47	59	J A 65	J A 51	19
4	J A 49	59	J A 25	J A 25	J A 21	J A 45	J A 54	77	J A 99	131	J A 68	J A 52	J A 53	73	98	G	G	G	J A 55	J A 54	J A 51	98	100	23
5	19	J A 102	J A 32	J A 42	J A 56	J A 42	J A 57	112	J A 100	61	J A 94	J A 119	J A 76	J A 58	41	37	40	G	G 19	J A 29	J A 54	54	58	97
6	J A 105	J A 79	J A 49	J A 43	J A 30	J A 51	J A 66	J A 80	J A 84	J A 116	90	J A 71	40	J A 53	49	J A 59	J A 54	J A 103	J A 108	40	J A 24	39	J A 52	J A 51
7	J A 54	J A 54	J A 47	J A 47	J A 22	J A 49	62	J A 55	J A 54	52	J A 62	82	J A 65	73	J A 52	J A 54	J A 49	J A 77	J A 87	51	J A 63	55	J A 46	J A 48
8	J A 54	J A 27	20	E B 13	J A 21	24	34	J A 45	J A 46	J A 69	J A 57	J A 53	138	J A 51	J A 91	38	J A 42	35	J A 29	53	J A 52	65	J A 53	J A 85
9	J A 55	J A 26	J A 18	E B 14	E B 15	25	J A 37	J A 44	J A 44	J A 56	J A 44	J A 51	96	113	J A 101	J A 99	J A 166	J A 133	95	126	70	41	J A 57	J A 63
10	J A 63	J A 91	J A 56	J A 54	J A 19	J A 36	36	J A 46	J A 66	J A 145	J A 85	J A 53	J A 101	44	41	51	38	J A 50	J A 53	J A 85	41	J A 92	J A 53	J A 124
11	J A 55	J A 75	J A 52	34	J A 17	27	J A 71	J A 74	82	J A 144	J A 110	J A 116	J A 132	J A 64	54	J A 104	90	29	J A 49	J A 104	J A 145	J A 145	J A 127	J A 74
12	J A 55	J A 65	J A 80	J A 81	J A 21	27	J A 56	60	55	53	74	J A 68	J A 97	J A 84	46	40	J A 95	J A 95	J A 42	J A 93	J A 82	J A 87	J A 82	J A 18
13	J A 33	23	J A 35	E B 13	J A 31	22	J A 44	J A 60	J A 77	J A 85	90	86	J A 80	J A 53	J A 70	J A 69	128	52	28	J A 126	J A 133	J A 131	J A 77	J A 54
14	J A 48	J A 84	J A 61	J A 36	J A 26	J A 51	J A 38	60	J A 48	35	E B 38	39	E B 42	43	39	42	37	33	J A 28	J A 20	J A 21	22	19	J A 30
15	28	E B 13	J A 27	J A 52	J A 22	J A 24	J A 92	J A 49	68	70	65	80	68	68	J A 112	79	67	45	J A 53	J A 21	J A 20	J A 28	J A 26	J A 35
16	J A 27	J A 51	J A 48	J A 51	J A 47	J A 29	J A 51	J A 65	69	39	J A 65	50	49	J A 69	J A 59	J A 97	J A 83	J A 97	76	97	J A 81	J A 53	37	J A 50
17	J A 50	J A 44	J A 27	E B 13	E B 13	21	33	J A 47	87	68	J A 71	43	J A 50	J A 55	J A 61	36	J A 50	J A 55	J A 43	J A 29	24	J A 35	J A 23	E B 14
18	23	21	E B 15	J A 16	E B 13	22	33	38	J A 45	J A 50	J A 64	95	83	61	54	J A 38	J A 35	J A 31	41	38	J A 31	J A 35	J A 50	28
19	J A 27	J A 37	J A 34	J A 27	E B 13	19	J A 40	37	36	41	J A 53	76	60	90	80	73	70	57	J A 84	J A 116	J A 52	J A 34	61	J A 78
20	J A 23	J A 34	J A 23	E B 13	E B 13	25	J A 41	J A 64	J A 85	J A 133	129	J A 129	J A 129	77	J A 54	J A 54	J A 112	J A 94	74	J A 61	54	J A 54	J A 56	J A 50
21	J A 51	J A 21	J A 27	J A 26	J A 20	29	J A 45	61	J A 54	J A 66	J A 45	J A 83	J A 71	73	J A 62	J A 52	37	J A 54	J A 92	J A 84	J A 82	J A 54	J A 37	24
22	J A 34	E B 13	E B 13	20	18	G 17	J A 54	J A 80	87	J A 61	J A 91	60	60	75	J A 71	J A 55	J A 47	39	J A 92	45	J A 32	J A 37	J A 43	J A 121
23	J A 88	J A 56	J A 52	J A 33	E B 12	22	32	J A 48	J A 55	J A 52	J A 66	J A 54	J A 44	J A 63	J A 130	J A 76	79	J A 45	49	64	J A 53	J A 54	J A 87	J A 56
24	39	J A 60	J A 54	J A 42	J A 51	36	41	J A 83	J A 68	J A 90	J A 84	58	46	J A 97	101	48	J A 47	60	95	70	39	J A 54	J A 90	J A 51
25	J A 80	J A 50	J A 43	J A 26	J A 57	25	J A 45	57	J A 66	J A 99	J A 82	60	J A 126	J A 107	J A 126	J A 70	J A 46	J A 55	J A 86	95	J A 72	J A 73	J A 43	J A 91
26	J A 31	J A 69	58	J A 82	J A 51	E B 22	J A 45	72	75	126	55	47	B	61	101	48	48	E B 42	G	44	50	J A 47	52	53
27	J A 54	49	J A 45	28	J A 19	21	J A 29	J A 43	J A 49	J A 57	J A 52	B	B	61	45	J A 45	J A 43	75	J A 101	J A 113	J A 86	J A 63	J A 42	J A 42
28	J A 76	J A 78	J A 53	J A 50	J A 55	J A 49	J A 85	J A 44	J A 49	J A 65	134	J A 130	J A 55	J A 76	J A 54	J A 55	J A 55	67	J A 108	J A 92	J A 86	58	J A 29	J A 28
29	J A 38	J A 24	19	19	E B 15	G 20	J A 38	J A 47	J A 43	52	E B 72	B	J A 94	94	J A 113	J A 95	J A 71	J A 103	J A 58	76	J A 83	J A 46	J A 78	J A 34
30	34	J A 37	J A 26	J A 23	J A 21	21	33	42	J A 54	74	J A 123	J A 73	J A 70	60	41	37	35	J A 43	J A 111	J A 130	J A 122	J A 52	J A 87	58
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	30	30	30	30	30	30	30	30	30	28	28	30	30	30	30	30	30	30	30	30	30	30
MED	J A 48	J A 46	J A 34	J A 30	J A 21	24	J A 42	J A 56	J A 60	J A 67	J A 68	J A 60	J A 72	J A 66	J A 60	J A 54	J A 52	J A 54	J A 56	J A 67	J A 54	J A 54	J A 52	J A 50
U Q	J A 55	J A 65	J A 52	J A 43	J A 30	J A 36	J A 54	J A 65	J A 77	J A 99	90	J A 82	J A 95	J A 77	J A 98	J A 73	J A 83	J A 77	J A 92	J A 95	J A 82	J A 65	J A 77	J A 63
L Q	J A 30	26	26	E B 20	E B 17	22	36	45	J A 49	53	J A 57	52	54	J A 58	46	42	42	42	42	44	J A 39	J A 39	J A 42	28

JUN. 1993 FOES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 1993 FBES (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	20	28	30	27	16	20	30	48	40	A A 112	69	45	80	44	43	84	79	A A 173	A A 144	A A 92	34	45	24	E B 14
2	C 16	20	16	E B 13	G	G 22	35	43	46	51	46	A A 72	A A 103	51	46	A A 138	34	40	30	17	E B 14	E B 13	35
3	29	26	20	28	17	24	35	46	55	56	60	47	64	52	E B 39	41	51	38	29	34	41	61	18	E B 13
4	22	39	E B 14	19	19	40	51	65	A A 99	A A 131	60	46	44	54	63	G	G	G	43	51	49	50	36	E B 14
5	E B 13	30	24	27	42	37	46	A A 112	56	46	71	75	69	55	41	37	38	G	G 18	27	46	46	43	58
6	52	A A 79	38	33	20	34	51	62	42	A A 116	A A 90	54	40	53	47	51	51	A A 103	A A 108	34	23	22	31	33
7	32	22	30	26	15	45	A A 62	48	38	46	57	A A 82	51	68	49	47	42	45	70	48	30	36	40	20
8	25	20	E B 14	E B 13	19	21	32	41	43	42	51	44	46	48	80	37	36	30	23	49	37	40	36	38
9	32	19	16	E B 14	E B 15	21	34	43	40	44	41	51	A A 96	70	80	65	A A 166	A A 133	73	A A 126	40	32	45	30
10	45	35	20	32	17	24	33	34	A A 66	38	43	42	57	42	39	51	U Y 38	37	40	66	30	43	31	27
11	46	44	38	28	E B 13	27	A A 71	61	A A 82	A A 144	A A 110	79	A A 132	54	49	51	74	28	32	43	A A 145	A A 145	24	24
12	34	45	45	30	17	21	49	42	A A 55	A A 53	A A 74	A A 68	A A 97	A A 84	42	40	A A 95	A A 95	40	A A 93	47	29	46	E B 13
13	19	E B 13	18	E B 13	16	20	38	56	58	51	A A 90	A A 86	53	49	52	47	A A 128	52	28	66	43	65	46	29
14	33	28	37	24	20	25	31	43	45	35	E B 38	38	E B 42	40	39	41	37	32	26	20	18	18	E B 13	18
15	19	E B 13	17	32	E B 13	22	53	37	A A 68	A A 70	A A 65	A A 80	A A 68	A A 68	A A 112	A A 79	A A 67	39	45	21	17	27	23	33
16	24	30	26	15	16	26	37	54	A A 69	38	56	48	48	A A 69	52	52	A A 83	A A 97	A A 76	59	55	37	17	30
17	16	21	22	E B 13	E B 13	21	30	42	A A 87	A A 68	A A 71	42	49	51	54	35	50	51	30	22	21	22	22	E B 14
18	E B 13	E B 13	E B 15	15	E B 13	20	29	34	37	46	48	71	A A 83	52	46	36	33	G 26	31	30	27	21	40	16
19	18	16	16	16	E B 13	18	34	35	35	40	50	55	55	A A 90	A A 80	63	62	51	80	A A 116	23	29	45	15
20	17	15	18	E B 13	E B 13	22	35	49	A A 85	A A 133	A A 129	A A 129	A A 129	42	46	50	A A 112	A A 94	A A 74	50	43	49	35	40
21	22	17	22	20	16	25	38	57	51	55	44	A A 83	A A 71	53	60	51	U Y 37	53	A A 92	60	33	31	20	E B 13
22	30	E B 13	E B 13	E B 13	E B 12	G 16	51	A A 80	70	56	63	49	55	A A 75	55	42	41	33	34	33	18	28	30	33
23	30	31	37	21	E B 12	22	28	35	43	44	42	44	41	56	A A 130	50	61	42	40	56	45	38	22	43
24	26	33	37	20	37	27	38	63	55	65	59	48	44	A A 97	A A 101	47	44	57	65	A A 70	29	46	70	31
25	36	45	37	21	19	23	40	A A 57	50	48	A A 82	A A 60	A A 126	A A 107	A A 126	53	43	43	55	61	A A 72	40	27	38
26	23	29	38	30	33	E B 22	37	A A 72	A A 75	A A 126	U Y 55	U Y 46	B	U Y 61	A A 101	48	U Y 47	E B 42	G	41	36	43	44	44
27	35	30	29	17	E B 12	20	28	34	40	54	41	B	B	U Y 61	42	41	40	70	50	62	A A 86	60	22	28
28	21	35	30	36	20	31	34	37	44	62	76	A A 130	45	54	51	52	48	50	A A 108	A A 92	15	23	20	21
29	33	21	17	19	E B 15	G 19	35	43	40	50	E B 72	B	A A 94	A A 94	A A 113	A A 95	50	41	46	57	46	27	51	29
30	21	18	22	19	20	20	29	37	46	66	58	48	53	49	40	37	34	41	54	37	71	22	16	43
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	30	30	30	30	30	30	30	30	30	28	28	30	30	30	30	30	30	30	30	30	30	30
MED	25	27	22	20	16	22	35	44	50	54	59	50	56	54	52	48	49	42	44	50	36	36	30	29
U Q	33	33	37	28	19	26	46	57	A A 68	A A 68	A A 72	A A 77	A A 82	A A 70	A A 80	52	A A 74	A A 57	A A 73	A A 66	46	46	43	35
L Q	20	17	17	E B 15	E B 13	20	31	37	42	46	50	46	47	51	43	41	38	34	31	34	23	27	22	E B 16

JUN. 1993 FBES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 1993 FMIN (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

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	14	12	13	13	13	13	17	20	25	35	35	34	32	34	34	31	21	17	14	12	15	13	13	14
2	C	14	12	13	13	15	15	19	20	29	32	30	39	31	30	20	24	17	13	13	14	14	13	14
3	13	13	14	13	13	13	14	14	21	23	32	35	35	35	39	22	24	21	14	13	14	15	14	13
4	14	15	14	14	13	14	16	18	34	37	30	32	34	32	32	29	23	15	12	13	13	14	13	14
5	13	16	13	14	14	13	14	17	20	34	32	30	32	32	27	22	21	15	13	13	13	13	14	14
6	15	14	14	14	14	13	14	19	22	25	32	31	37	39	37	34	25	15	13	13	13	14	15	15
7	14	14	12	14	12	13	15	15	20	29	35	30	34	33	26	32	19	19	14	13	14	13	15	14
8	13	13	14	13	12	13	16	19	23	33	34	32	40	34	38	30	22	14	14	13	14	14	13	13
9	13	13	13	14	15	13	13	17	16	30	34	32	37	34	34	32	26	17	14	16	13	13	15	14
10	14	13	14	14	12	13	15	20	25	25	35	35	35	32	31	34	25	22	13	13	14	13	13	15
11	13	14	14	14	13	13	13	20	22	30	29	34	34	36	33	30	21	16	14	13	14	13	13	14
12	13	14	14	13	12	13	13	16	28	34	25	34	35	38	32	24	20	15	13	12	13	15	13	13
13	13	13	13	13	13	14	13	19	25	28	27	36	35	22	31	26	20	18	14	13	14	13	14	14
14	14	14	14	13	14	13	12	15	19	25	38	32	42	30	27	18	19	19	13	12	13	13	13	13
15	13	13	13	12	13	13	13	17	20	21	25	32	31	30	28	17	15	15	12	12	13	13	13	13
16	12	13	12	12	13	14	12	17	29	30	30	34	37	30	30	25	26	17	15	13	14	14	13	13
17	13	13	15	13	13	13	13	17	19	30	27	40	34	32	22	21	20	15	12	12	12	13	13	14
18	13	13	15	14	13	13	14	12	20	23	29	22	30	29	30	27	21	20	13	11	13	12	12	13
19	13	12	12	13	13	13	13	15	19	29	33	29	34	33	31	29	20	14	13	14	13	14	14	14
20	13	13	14	13	13	13	13	14	25	27	30	30	31	31	28	29	20	13	13	13	13	13	13	15
21	13	12	13	14	12	12	13	13	19	30	30	30	32	32	33	30	31	37	22	24	12	13	13	13
22	12	13	13	13	12	12	16	16	21	29	32	34	35	34	27	29	22	17	13	13	13	14	14	13
23	13	13	14	12	12	12	13	14	24	29	32	30	30	32	30	29	22	15	12	17	12	14	12	14
24	13	14	14	14	13	13	15	19	28	27	38	35	28	37	29	30	20	35	12	12	14	15	13	13
25	13	14	13	13	14	11	14	16	25	28	31	35	37	36	31	23	23	16	13	14	15	13	13	14
26	13	13	12	13	13	22	23	29	37	40	53	42	B	37	22	28	32	42	24	21	20	14	19	15
27	13	14	15	13	12	12	15	16	20	31	36	B	B	42	23	21	18	18	15	13	13	12	13	13
28	13	14	13	14	13	12	14	15	22	24	32	36	35	34	29	30	20	17	14	12	13	11	12	14
29	13	12	13	12	15	13	17	17	18	31	72	B	42	41	35	36	30	20	20	13	13	14	15	13
30	15	13	13	12	11	12	12	22	21	31	22	31	33	33	29	21	16	14	13	12	15	13	14	12
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
MED	13	13	13	13	13	13	14	17	22	29	32	33	35	33	30	29	21	17	13	13	13	13	13	14
U Q	14	14	14	14	13	13	15	19	25	31	35	35	37	36	33	30	24	19	14	13	14	14	14	14
L Q	13	13	13	13	12	13	13	15	20	27	30	30	32	32	28	22	20	15	13	12	13	13	13	13

JUN. 1993 FMIN (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 1993 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9H)

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

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	270	F 280	285	290	295	305	310	295	295	A	290	285	A	285	285	A	290	A	A	A	280	J R 270	F 280	J F 295
2	C	F 280	285	280	290	285	F 290	300	290	310	290	305	A	A	275	280	A	295	295	285	280	275	275	270
3	F 270	F 290	F 290	F 285	290	310	300	325	340	310	290	290	280	290	280	295	290	295	285	295	270	F 270	F 300	280
4	300	F 285	F 285	F 285	F 275	300	330	J R 290	A	A	280	280	265	280	260	280	275	280	255	265	270	255	280	290
5	285	255	275	F 265	285	310	305	A	255	295	A 275	A 280	270	285	280	290	285	295	300	290	265	270	270	F 270
6	F 295	A	F 290	F 270	F 285	F 285	315	320	310	A	A	270	270	275	280	285	300	A	A	285	290	290	285	F 260
7	F 280	F 275	F 290	F 295	V 310	320	A	325	275	285	280	A	285	A 280	285	305	285	300	A	275	280	J R 265	F 270	F 270
8	F 270	F 280	325	295	275	280	300	310	295	R 315	285	285	285	280	A 285	305	305	305	305	290	J R 265	265	270	J F 290
9	285	285	295	295	295	320	285	305	310	290	310	275	A	290	295	300	A	A	300	A	295	275	285	F 280
10	F 305	F 280	300	F 295	F 300	330	335	315	A	305	280	R 300	305	290	305	305	305	295	275	295	290	270	310	275
11	300	290	F 285	F 300	F 305	325	A	A 285	A	A	A	A 275	A	310	290	285	A	290	285	295	A	A	F 270	F 280
12	F 295	F 285	305	J R 320	F 275	F 310	290	305	A	A	A	A	A	A	290	285	A	A	300	A	305	280	F 295	285
13	295	300	315	295	295	290	320	320	315	315	A	A	285	290	295	300	A	280	300	R 295	R 290	300	305	275
14	280	F 280	F 310	315	300	F 300	325	330	360	295	G	275	U R 250	295	285	285	290	310	290	295	285	290	300	F 320
15	280	F 305	V 325	315	325	340	325	345	A	A	A	A	A	A	A	A	A	300	300	300	300	295	290	295
16	295	295	F 290	305	F 305	315	330	330	A	325	340	R 285	290	A	285	310	A	A	A	R 285	S 300	290	290	J R 300
17	V 290	295	V 315	F 290	300	270	285	305	A	A	A	G	J R 275	305	320	290	305	305	310	320	J R 310	280	300	295
18	295	300	300	F 295	305	305	305	320	290	295	280	340	A	300	285	295	305	300	310	305	320	285	300	300
19	F 275	F 305	J F 270	J F 295	F 315	F 325	315	340	320	310	310	310	295	A	A	285	275	280	A	A	330	325	295	F 295
20	290	F 300	300	F 295	300	275	295	325	A	A	A	A	A	275	290	285	A	A	A	310	310	285	F 285	F 290
21	F 290	305	F 285	F 295	J F 275	F 315	300	320	335	300	U S 280	A	A	295	R 285	J R 295	R 315	290	A	R 290	295	F 285	F 300	290
22	F 280	315	F 305	295	305	335	290	A	A 325	295	A 280	300	300	A	275	290	295	295	305	315	285	285	J R 295	F 305
23	F 305	F 290	J F 310	F 285	290	310	V 315	355	350	315	280	270	265	275	A	275	275	290	295	310	305	295	275	285
24	F 285	F 285	315	F 305	F 285	285	255	275	320	325	315	R 285	295	A	A	295	300	325	A 295	A	285	J R 260	A 290	J F 245
25	J F 285	F 290	F 285	F 355	330	330	245	A	295	305	A	A	A	A	A	375	280	275	285	305	A	270	280	F 260
26	F 280	F 275	F 270	F 300	U R 325	325	285	A	A	A	290	295	B	Y	A	R 310	J R 285	300	310	U R 345	300	R 300	R A 280	R 285
27	R 295	290	290	285	F 285	315	310	320	310	285	280	B	B	U R 295	295	300	285	A	300	295	A	A	F 265	F 260
28	F 280	J F 290	F 280	F 275	F 290	F 300	F 280	275	270	310	S 325	A	U R 280	305	305	285	285	280	A	A	290	280	280	275
29	275	280	285	285	290	320	300	310	305	310	U R 295	B	A	A	A	A	290	285	280	280	285	F 270	F 275	F 270
30	F 285	F 280	F 300	295	F 280	F 275	290	320	295	A 295	320	290	280	280	275	285	290	295	280	280	J R 275	305	285	F 275
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	30	30	30	30	28	26	21	21	22	20	17	20	23	27	22	23	22	24	27	28	30	30
MED	F 285	F 290	290	F 295	295	310	300	320	310	305	288	285	280	290	285	290	290	295	298	295	290	280	285	F 282
U Q	295	298	305	300	305	320	315	325	322	312	310	298	292	295	295	300	300	300	300	305	300	290	295	295
L Q	280	F 280	285	F 285	F 285	290	290	305	292	295	280	275	270	280	280	285	285	285	285	285	280	270	275	F 270

JUN. 1993 M(3000)F2 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 1993 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							L	A	L	A	A	L 345	A	A 325	370	A	A	A	A	A				
2							L	U L 355	L 350	A	A	360	A	A	A	A 340	A	L 350	A					
3								A	A	A	A	355	A	A 330	365	345	A	L 340	U L 355					
4							A	A	A	A	A	350	355	A	A	355	335	330	A					
5							A	A	A	U L 340	A	A	A	A	370	345	L 330	L						
6						L	A	A	A	A	A	A	360	A	A	A	A	A	A					
7						A	A	A	365	355	A	A	A	A	A	A	A 350	A	A					
8						L	L	L	L	L 360	A	355	A 325	A	A	365	350	U L 340	L					
9						L		A	350	370	380	A	A	A	A	A	A	A	A	A				
10						L	L	L	A	370	355	370	A	380	375	A	L 355	U L 310	A	A				
11							A	A	A	A	A	A	A	A	A	A	A	335	L					
12						U L 335	A	A	A	A	A	A	A	A	R 325	355	A	A	A	A				
13							L	A	A	A	A	A	A	A	A	A	A	A	L					
14						L	A 345	A	A	395	380	400	R 365	395	380	A 340	A 365	H 350	U L 350					
15						L	A	A 365	A	A	A	A	A	A	A	A	A	A	A					
16						L	L	A	A	400	A	A	A	A	A	A	A	A	A	A				
17						U L 335	370	A	A	A	A	385	A	A	A	375	A	A	A					
18							L 340	365	375	A	A	A	A	A	A	370	350	345	A					
19							A 345	365	380	390	A	A	A	A	A	A	A	A	A	A				
20						U L 325	A	A	A	A	A	A	A	365	A	A	A	A	A	A				
21							L	A	A	A	415	A	A	A	A	A	U R	A	A	A				
22							A	A	A	A	A	A	A	A	A	A	A 350	L 345	L					
23						L	L 380		A	365	390	375	400	A	A	A	A	A	A					
24						U L 335	A 305	A	A	A	A	R 315	370	A	A	A	A	A		A				
25							A	A	A	A	A	A	A	A	A	A	A	A	A	A				
26							U L 315	A	A	A	B	Y	B	A	A	A	A	B	Y					
27							L	U L 355	L	A	360	B	B	A	385	355	330	A						
28							L	350	A 335	A	A	A	370	A	A	A	A	A	A	A				
29							L	L	L	A	B	B	A	A	A	A	A	L	A	A				
30						L 310		L	U L 365	L	A	A	A	A	350	355	345	L	A					
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						5	6	8	6	9	6	10	7	5	8	11	10	9	2					
MED						U L 335	342	365	358	370	380	358	365	365	370	355	350	L 340	U L 352					
U O						U L 335	345	365	375	392	390	375	370	388	378	365	A 350	L 348						
L O						L 318	315	U L 355	350	L 358	360	350	355	A 328	358	A 345	335	332						

JUN. 1993 M(3000)F1 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 1993 H'F2 (KM) 135° E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							270	A 290	290		A	E A 360	345	A	360	345	A	A	A	A	A				
2							250	290	320	305	355	355	A	A	405	360	A	300	270					
3								265	270	A 320	A 355	365	E A 385	345	350	320	310	295	290					
4							255	A	A	A	A 390	385	415	365	A 405	340	350	315	335					
5							265	A	A 420	315	A	A	385	320	315	310	305	290						
6						340	290	A 320	315	A	A	435	410	390	365	340	320	A	A					
7						A 290	A	A 320	400	370	A 390	A	375	A	350	315	325	305	A					
8						L 335	280	300	320	310	375	365	360	380	A	310	300	290	255					
9						260		305	280	350	305	380	A	340	A 340	320	A	A	A	A				
10						255	245	260	A	335	405	335	330	355	325	320	310	340	A 300	A				
11							A	A	A	A	A	A	A	335	385	360	A	315	300					
12						310	A	A 345	A	A	A	A	A	A	380	350	A	A	280	A				
13							300	A 300	315	A 290	A	A	380	345	355	310	A	A 330	285					
14						310	265	250	270	375	G	420	525	395	410	390	360	300	285					
15						270	300	270	A	A	A	A	A	A	A	A	A	345	315					
16						300	280	280	A	305	A 285	415	420	A	E A 400	340	A	A	A	A				
17						L 395	385	340	A	A	A	G	A 445	370	A 355	385	330	A 320	295					
18							315	290	355	370	405	E A 325	A	E A 370	370	355	320	325	285					
19							310	270	330	310	330	A	E A 370	A	A	E A 385	E A 370	A 325	A	A				
20						380	335	290	A	A	A	A	A	455	375	385	A	A	A	A 300				
21							315	A 275	255	A	435	A	A	380	A 380	325	350	E A 365	A					
22							A	A	A	A 325	A	345	355	A	370	330	300	285	280					
23						265	L 310	240	260	330	405	435	390	365	A	340	350	310	280					
24						340	435	345	265	A 275	A 330	415	340	A	A	325	305	275		A				
25							510	A	370	370	A	A	A	A	A	270	405	385	E A 385	A				
26							355	A	A	A	E Y 390	Y 335	B	Y	A	340	E Y 400	340	275					
27							260	290	315	395	390	B	B	Y	345	335	340	A						
28							350	330	355	300	A	A	450	335	345	375	A	370	A	A				
29							L 305	300	310	310	E B 405	B	A	A	A	I A 350	360	355	345	E A 325				
30						360	285	265	340	A	315	355	390	385	385	355	330	310	A 320					
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						14	24	24	20	19	19	17	17	18	22	28	20	23	18	2				
MED						310	300	290	315	320	382	365	385	364	364	340	326	315	286	312				
U Q						340	325	312	348	370	405	418	418	380	385	358	355	340	315					
L Q						270	268	270	275	305	330	345	365	345	345	320	310	300	280					

JUN. 1993 H'F2 (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 1993 H'F (KM) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	315	290	290	285	230	245	240	A	240	A	A	E A 265	A	A	235	A	A	A	A	A	270	A 335	310	280
2	C	285	285	285	260	245	230	225	A 270	A	A	A 245	A	A	A	A	A	A 260	A	250	260	270	280	A 330
3	320	290	275	280	255	250	A 250	A	A	A	A	A 250	A	A	220	260	A	E A 270	A 255	260	A 300	E A 365	260	255
4	265	A 315	280	305	305	A 255	A	A	A	A	A	A 260	250	A	A	230	220	245	A	A	A 310	E A 370	A 310	270
5	250	355	275	325	A 295	255	A	A	A	E A 265	A	A	A	A	230	220	A 270	H 240	255	260	E A 350	345	335	E A 370
6	A 330	A	A 335	A 370	280	A	A	A	A	A	A	A	230	A	A	A	A	A	A	A 265	250	275	295	A 340
7	A 340	310	310	280	235	A	A	A	225	A	A	A	A	A	A	A	A	A	A	A	310	A 320	345	300
8	A 335	295	245	270	320	275	235	A 265	E A 285	A 255	A	A 250	A	A	A	235	230	250	240	A	A 340	A 365	A 340	310
9	290	305	265	240	280	260	A 250	A	A 250	230	210	A	A	A	A	A	A	A	A	A	A 270	A 330	A 330	315
10	A 320	A 350	270	290	275	245	A 240	225	A	195	A 260	235	A	235	215	A	240	A 255	A	A	285	E A 340	275	305
11	A 315	325	315	285	225	225	A	A	A	A	A	A	A	A	A	A	A	230	A	A 290	A	A	A 345	305
12	330	E A 340	A 330	295	290	275	A	A	A	A	A	A	A	A	A	A 265	A	A	A	A	A 275	A 310	A 350	285
13	275	270	260	255	275	245	A	A	A	A	A	A	A	A	A	A	A	A	A 260	A	A 315	E A 330	A 305	315
14	330	305	A 290	255	245	A 260	A	A	A	205	225	205	E B 265	225	235	A	E A 265	230	245	260	245	270	260	240
15	305	280	245	E A 285	250	250	A	E A 265	A	A	A	A	A	A	A	A	A	A	A	255	250	265	280	A 300
16	290	320	310	275	260	255	A	A	A	H 180	A	A	A	A	A	A	A	A	A	A	A	A 290	265	285
17	310	300	245	265	275	255	A 260	A	A	A	A	235	A	A	A	225	A	A	A	250	255	295	285	255
18	260	270	265	280	275	240	230	A 245	220	A	A	A	A	A	A	230	220	235	A	270	250	290	A 305	265
19	320	280	320	280	240	225	E A 275	A 245	220	220	A	A	A	A	A	A	A	A	A	A	230	225	A 310	270
20	285	280	300	270	280	270	A	A	A	A	A	A	A	E A 270	A	A	A	A	A	A	A 275	A	A 345	A 335
21	265	250	295	295	305	245	A	A	A	A	235	A	A	A	A	A	A 250	A	A	A	A 280	280	260	250
22	A 300	240	255	260	280	240	A	A	A	A	A	A	A	A	A	A	E A 270	235	A	240	260	300	300	A 265
23	A 300	A 320	A 305	310	270	235	230	230	A	A 260	205	A 250	205	A	A	A	A	A	A	E A 290	270	265	310	A 350
24	290	325	275	310	A 360	A 275	A	A	A	A	A	A	A 260	A	A	A	A	A	A	A	290	A 315	A	A 365
25	A 325	A 315	A 340	225	235	235	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A 315	330	A 360
26	315	335	A 340	A 305	A 295	250	255	A	A	A	B	Y	B	A	A	A	A	B	Y	245	A 285	E A 345	A	E A 360
27	A 320	315	300	270	285	255	215	210	A 250	A	225	B	B	A	245	250	A 240	A	A 290	A	A	A	335	365
28	305	A 310	305	360	310	275	A 260	A 250	A	A	A	A	235	A	A	A	A	A	A	A	275	270	275	280
29	310	305	290	290	280	260	A 245	A	A 245	A	B	B	A	A	A	A	A	A	A	A	305	315	A 365	340
30	280	300	270	260	285	250	235	235	A	A	A	A	A	A	250	230	H 205	A	A	A 300	A	225	250	A 335
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	30	30	30	28	15	10	9	8	6	9	6	3	7	9	10	10	6	13	25	27	28	30
MED	310	305	290	281	278	250	240	236	A 242	218	225	A 248	237	230	235	230	232	240	255	260	275	U 295	308	302
U Q	A 320	320	310	295	290	260	A 255	A 250	A 260	A 258	235	A 255	260	E A 270	245	255	E A 265	A 255	A 260	A 280	A 302	E A 335	A 335	A 340
L Q	288	282	270	270	255	245	230	225	222	200	210	235	230	225	220	228	220	235	245	250	258	270	278	270

JUN. 1993 H'F (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 1993 H'E (KM) 135° E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1						125	120	115	120	A	A	125	120	A 130	A	120	115	120	A	B				
2						120	A 130	A 135	A	A	A	A 135	120	120	120	120	B 120	120	120	B				
3						130	115	110	110	110	120	B 120	A	A	B	120	120	115	A	B				
4						130	110	110	A	A	115	A	A	A	A	120	120	115	110	B				
5						120	120	110	110	A	A	A	A	A	A	110	120	115	A 130	B				
6						B 145	120	115	115	115	A	A	A	B	A	125	120	120	A	B				
7						A	120	115	115	120	B	A	A	A	A	B 125	120	A 130	120	B				
8						E A 150	115	115	120	A	A	120	B	B 140	B	B 130	120	120	125	B				
9						125	120	110	110	A	A	A	A	A	A	B	125	120	125	B				
10						130	115	A	115	120	A	A	A	125	B 130	B 135	120	125	120	B				
11						130	120	115	115	120	115	A	A	A	A	A	A	A	A	B				
12						A	115	110	120	A	A	A	A	A	E B 140	A 130	115	115	A	B				
13						E A 160	A	115	120	115	120	A	A	115	A	A	115	A	115	B				
14						A	115	115	115	120	B	A	B	120	120	110	115	A	A	B				
15						A	A	115	115	A	A	A	A	A	A	A	A	A	A	B				
16						130	110	115	120	A	A	E A 145	E B 140	125	120	120	115	115	125	B				
17						130	120	110	110	B 125	120	B	120	120	110	110	110	110	120	B				
18						140	115	115	115	110	120	115	A	A	A	A	A	A	A	A				
19						A	115	110	110	110	A	120	A	A	A	A	A	A	A	B				
20						140	110	110	110	120	A	A	A	A	A	A	120	115	115	B				
21						120	115	110	110	A	110	110	A	A	A	A	A	B	B	B				
22						A 135	110	110	115	A	A	A	A	A	A	115	115	A	A	B				
23						130	115	110	115	115	A	115	115	A	A	A	A	A	115	B				
24						A	120	110	A	115	A	115	A	B 130	120	125	115	B	A	B				
25						130	115	110	110	115	A	A	A	A	A	A	A	A	A	B				
26						B	120		B	B	B	B	B	A	A	A	A	B	125	B				
27						A	A	A	115	A	A	B	B	B	A 115	110	A	A	A	B				
28						A	A	110	110	A	A	A	A	A	A	A	110	110	110	B				
29						E A 145	A	A	A	A	B	B	B	B	A	A	A	A	A	B				
30						A 135	125	120	110	B 125	A	A	125	B 125	120	A	115	115	115	B				
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						21	25	26	25	15	7	10	6	10	9	16	20	16	15					
MED						130	115	110	115	115	120	119	120	125	120	120	118	115	120					
U Q						140	120	115	115	120	120	A 125	125	B 130	B 125	B 125	120	120	125					
L Q						128	115	110	110	115	115	115	120	120	118	112	115	115	115					

JUN. 1993 H'E (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JUN. 1993 H'ES (KM) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	110	100	110	105	105	125	125	115	120	110	110	115	110	140	115	120	115	110	110	110	110	110	110	110
2	C	105	105	110	115	G	115	135	125	110	110	140	130	120	120	120	115	110	115	120	115	105	B	105
3	105	105	105	105	110	150	125	120	115	110	110	110	110	105	B	150	125	120	115	110	110	110	110	110
4	110	100	105	105	105	120	115	115	110	110	110	110	110	105	110	G	G	G	120	115	110	120	110	110
5	110	110	120	120	115	115	115	115	125	110	110	105	120	125	110	E G 170	170	G	110	120	115	115	110	110
6	105	105	105	100	105	130	120	115	110	110	110	115	115	125	120	115	115	115	115	110	110	110	110	110
7	110	110	105	105	115	120	110	110	110	115	110	110	110	105	105	130	130	120	115	115	115	115	115	110
8	110	110	105	B	155	150	130	120	120	115	115	115	115	135	125	140	130	125	120	120	115	115	115	110
9	110	110	110	B	B	140	130	120	125	110	115	115	120	110	110	120	115	115	115	115	115	115	110	110
10	110	120	110	105	130	130	125	125	120	115	115	115	110	140	150	125	135	120	120	110	110	110	115	120
11	105	100	100	105	110	135	120	120	110	110	110	110	105	110	110	110	110	120	110	110	110	130	120	110
12	110	105	100	115	110	140	125	125	120	120	115	110	110	120	125	140	115	120	120	115	110	115	110	110
13	110	110	110	B	110	160	125	120	115	115	115	115	115	120	115	110	110	115	135	115	110	110	105	105
14	100	110	110	110	115	115	125	110	120	125	B	120	B	125	130	120	120	115	110	110	105	105	105	115
15	100	B	115	110	115	110	110	110	105	105	110	105	105	105	100	105	105	100	110	100	100	100	100	115
16	110	110	110	110	125	130	120	110	115	120	110	155	145	130	125	120	120	110	110	115	110	125	105	110
17	110	105	105	B	B	155	130	120	115	110	115	120	115	110	110	125	120	130	125	105	100	120	130	B
18	115	115	B	115	B	150	130	130	120	115	110	110	105	105	110	110	110	105	105	105	100	120	115	110
19	110	110	115	115	B	110	135	130	125	120	115	110	110	110	110	105	105	100	120	115	120	105	110	115
20	110	110	115	B	B	135	130	120	115	110	110	105	125	115	140	130	120	115	115	110	110	110	110	110
21	120	105	100	100	105	135	120	115	115	110	120	110	110	105	110	135	110	120	120	115	120	115	115	105
22	110	B	B	100	105	110	125	120	115	110	110	110	110	110	110	110	110	115	105	105	105	115	115	110
23	110	105	105	110	B	140	150	125	115	115	115	110	120	110	110	110	110	125	115	110	100	100	115	110
24	110	105	100	105	110	110	130	110	110	120	110	110	170	115	115	125	125	120	110	110	110	105	105	110
25	105	100	100	105	115	140	125	120	110	110	125	110	105	105	105	100	110	110	110	110	110	110	110	105
26	105	110	105	100	115	B	125	115	115	110	115	120	B	110	105	110	120	B	G	110	110	110	105	110
27	105	100	100	95	105	120	120	115	110	110	115	B	B	115	125	110	110	105	105	100	100	100	105	110
28	110	110	110	110	110	110	110	120	120	110	105	115	110	110	110	110	125	120	115	115	110	110	110	100
29	100	100	105	100	B	115	110	105	110	110	B	B	110	110	105	110	110	105	100	100	100	115	115	110
30	105	140	105	100	100	130	135	120	115	110	130	110	110	110	125	125	120	120	115	110	120	115	120	110
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	28	28	25	23	28	30	30	30	30	28	28	27	30	29	29	29	27	29	30	30	30	29	29
MED	110	108	105	105	110	130	125	120	115	110	110	110	110	110	110	120	115	115	115	110	110	110	110	110
U Q	110	110	110	110	115	140	130	120	120	115	115	115	120	120	125	128	122	120	120	115	115	115	115	110
L Q	105	105	105	100	105	115	120	115	110	110	110	110	110	110	110	110	110	110	110	110	105	110	108	110

JUN. 1993 H'ES (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

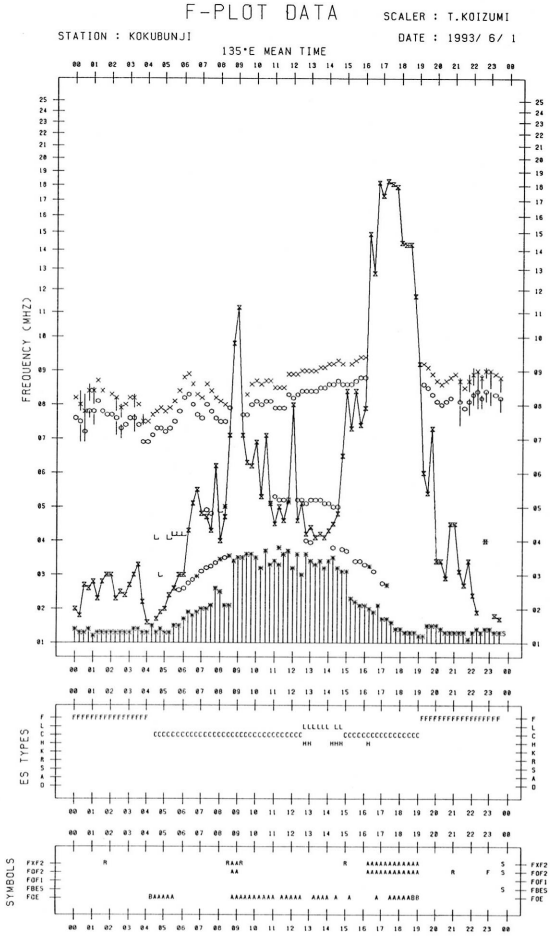
JUN. 1993 TYPES OF ES 135°E MEAN TIME (G.M.T. + 9H)

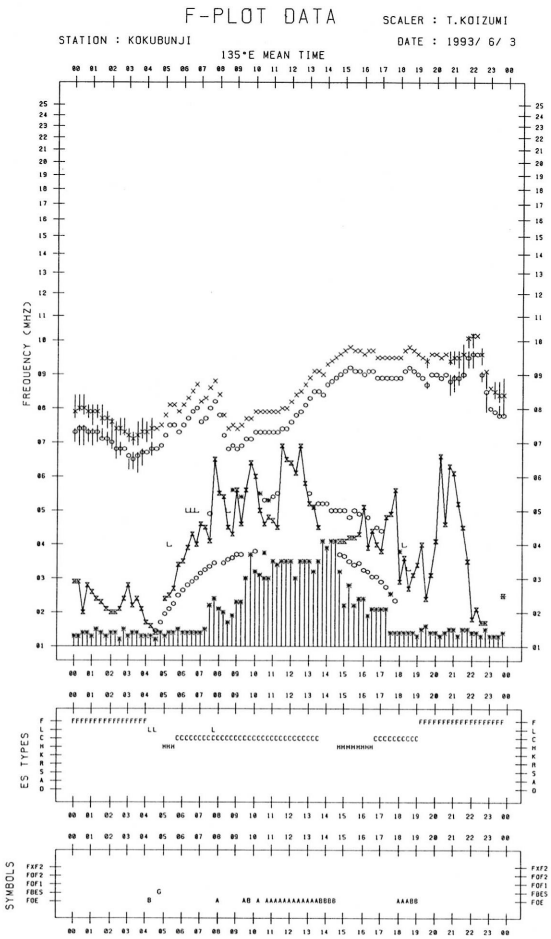
LAT. 35°42.4'N LON. 139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

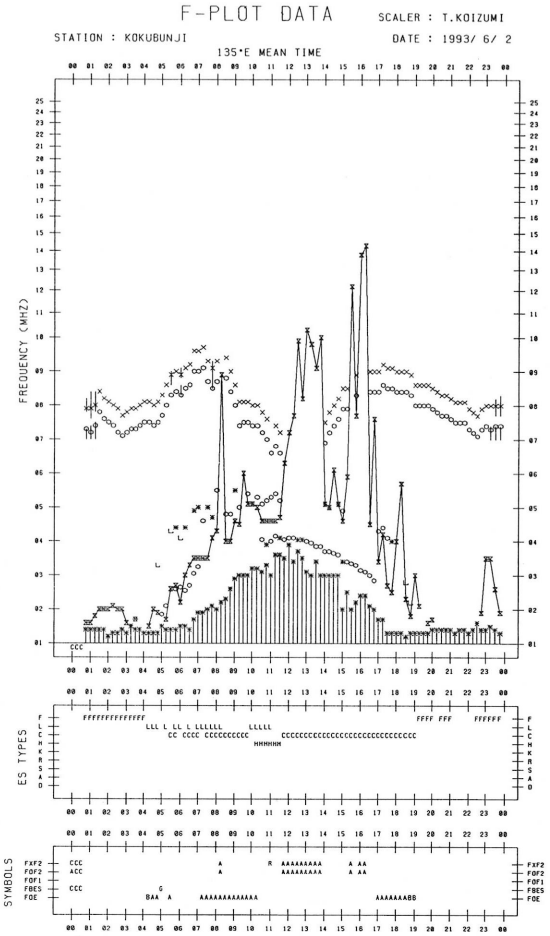
D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F 2	F 3	FF 23	F 2	F 1	C 1	C 2	C 2	C 1	C 2	C 2	C 2	C 2	HL 11	L 1	C 2	C 3	C 2	C 3	C 5	F 3	F 3	F 3	F 1
2		F 2	F 4	F 2	F 2		L 1	CL 11	CL 11	C 2	L 1	HL 11	C 1	C 2	C 2	C 2	C 3	C 2	C 3	C 2	F 1	F 1		F 3
3	F 3	F 3	F 2	F 3	F 3	H 1	C 2	C 2	C 2	C 2	C 2	C 1	C 3	C 2		H 1	H 2	C 2	C 2	C 3	F 3	F 3	F 2	F 2
4	FF 23	F 4	F 1	F 1	F 2	C 3	C 3	C 3	C 2	C 2	C 2	C 2	C 2	L 2	C 2				C 3	C 3	F 3	FF 23	F 3	F 2
5	F 1	F 2	FF 42	F 3	FF 52	C 2	C 3	C 3	CC 23	C 2	C 3	C 2	CL 21	CL 21	L 1	H 1	H 1		L 1	CL 11	F 6	F 5	F 5	F 4
6	F 4	F 4	F 4	F 3	F 2	CL 21	C 4	C 3	C 3	C 2	C 2	C 2	L 1	C 1	C 1	C 2	C 2	C 3	C 3	L 3	F 3	F 5	F 4	F 4
7	F 4	F 4	F 3	F 2	F 1	C 4	C 4	C 3	C 2	C 2	C 2	L 3	L 2	L 2	L 2	C 1	C 2	CL 21	C 3	C 3	F 2	F 3	F 3	F 2
8	F 3	F 2	F 2		F 2	HL 11	H 2	C 2	C 2	C 1	C 1	C 1	C 2	C 2	C 2	H 1	C 1	C 1	C 2	C 3	F 5	F 4	F 5	F 4
9	F 3	F 4	F 1			H 1	H 2	C 2	C 1	C 2	L 2	L 3	L 3	L 2	L 2	C 2	C 4	C 4	C 3	C 5	F 4	F 3	F 4	F 3
10	F 4	FF 14	F 3	F 3	FF 21	C 2	C 2	C 1	C 3	C 2	C 1	C 1	C 2	H 1	H 1	C 1	H 1	C 2	C 3	C 3	F 3	F 3	FF 23	FF 13
11	F 4	F 4	F 4	F 4	F 1	C 1	C 3	C 3	C 3	C 3	C 3	C 3	C 3	L 2	L 2	L 2	L 2	C 1	C 2	C 4	F 3	FF 23	FF 23	F 3
12	F 4	F 4	F 3	FF 12	F 2	C 1	C 3	C 2	C 2	C 1	C 2	C 2	C 2	C 2	C 1	HL 21	C 3	C 3	C 2	C 4	FFF 32	FF 22	F 3	F 1
13	F 2	F 1	F 2		F 3	HL 21	CL 22	C 3	C 3	C 2	C 2	C 2	C 1	C 1	C 2	C 1	C 3	C 3	H 2	C 4	F 3	F 4	F 4	F 3
14	F 4	FF 22	FF 22	F 2	F 2	CL 11	C 2	C 2	C 2	C 1		C 1		C 1	C 1	C 1	C 1	C 2	C 2	C 2	F 3	F 2	F 1	F 2
15	FF 32		F 2	F 4	F 1	L 2	L 3	L 2	L 3	L 3	L 3	L 2	L 3	L 3	L 3	L 3	L 4	L 2	CL 42	L 3	F 2	F 3	F 3	FF 43
16	FF 42	F 4	F 4	F 3	FF 22	C 2	C 3	C 3	C 2	C 1	L 2	HL 11	H 1	H 2	C 2	C 2	C 3	C 3	C 4	C 4	F 5	FF 23	F 3	F 3
17	F 2	F 2	F 1			H 1	H 2	C 2	C 3	C 2	C 2	C 1	C 2	C 2	C 2	C 1	C 2	C 2	CL 32	L 3	F 1	FF 31	FF 22	
18	F 1	F 1		F 1		H 1	H 1	H 1	C 1	C 2	C 2	C 2	L 3	L 2	L 2	L 1	L 2	LH 21	L 2	L 3	F 4	FF 23	F 4	F 2
19	F 2	F 4	F 3	F 2		L 1	H 2	H 2	C 1	C 1	C 2	C 3	C 2	C 3	L 3	L 3	L 4	L 3	CL 43	CL 53	FF 24	F 4	F 3	FF 22
20	F 2	F 2	F 1			C 2	C 2	C 3	C 3	C 3	C 3	L 3	CL 12	CL 12	HL 22	HL 21	C 3	C 4	C 6	C 3	F 3	F 4	F 3	F 6
21	FF 23	F 2	F 2	F 2	F 2	H 2	C 3	C 4	C 2	C 2	C 2	C 2	C 2	C 3	L 1	CL 11	C 1	C 2	C 3	C 3	FF 21	F 2	F 3	F 2
22	F 2			F 1	F 1	L 1	C 4	C 3	C 3	C 2	C 2	C 2	C 2	C 2	C 2	C 1	C 2	L 2	L 2	L 4	F 3	FF 12	F 3	F 4
23	F 3	F 3	F 2	F 4		H 2	H 1	H 1	C 2	C 2	C 1	C 2	C 1	C 3	C 2	C 2	C 3	HL 22	C 3	CL 52	F 4	F 3	FF 22	F 3
24	F 4	F 3	F 3	F 3	F 3	L 4	C 2	C 2	C 2	C 2	C 2	C 1	HL 11	C 2	C 2	C 2	C 1	C 1	CL 41	C 4	F 3	F 3	F 4	F 3
25	F 2	F 4	F 4	F 4	FF 12	H 1	C 2	C 2	C 2	C 2	CC 12	C 1	C 2	C 2	C 2	L 2	LC 21	L 3	C 3	C 4	F 4	F 3	F 3	F 3
26	F 2	F 4	FF 32	F 2	F 1		C 2	C 1	C 1	C 3	C 1	C 1		C 1	L 2	L 2	C 1			C 2	F 2	F 2	F 2	F 2
27	F 3	F 3	F 3	F 2	F 1	L 1	C 1	L 1	C 2	C 2	C 1			C 1	CL 11	C 2	L 2	L 3	L 4	L 4	F 4	F 5	FF 32	F 4
28	F 3	F 2	F 3	F 3	F 3	C 2	C 2	C 2	C 2	C 2	L 3	L 2	L 2	L 2	L 2	L 2	C 2	C 3	C 3	C 3	F 2	F 2	F 2	F 3
29	F 3	F 2	F 1	F 1		L 1	L 2	L 2	C 2	C 1			L 2	L 2	L 2	L 2	L 1	L 3	L 3	L 4	F 4	F 3	F 4	F 3
30	F 3	FF 12	FF 31	F 3	F 2	HL 12	HL 12	C 1	C 2	C 2	CL 12	C 2	C 2	C 2	C 2	CL 11	C 1	C 2	C 4	C 4	F 5	F 2	F 2	F 5
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
U Q																								
L Q																								

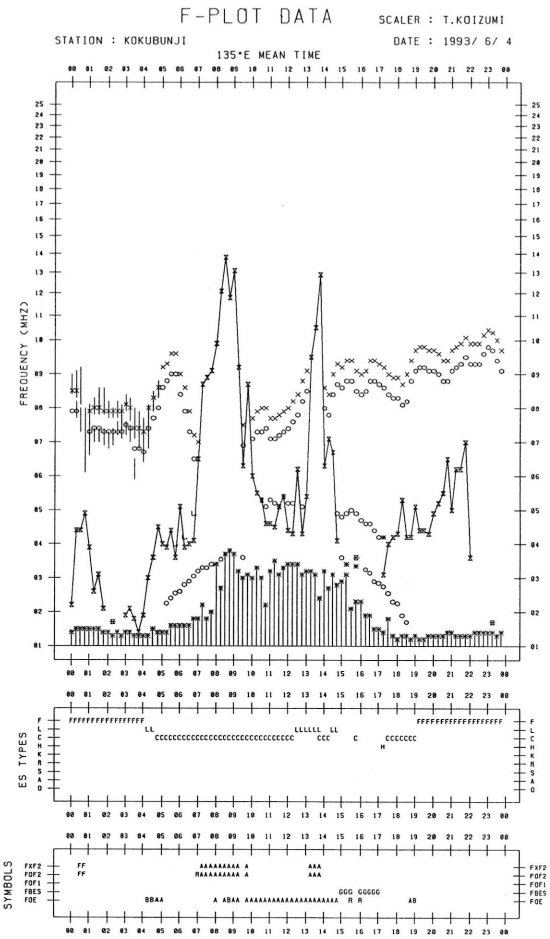
f-PLOTS OF IONOSPHERIC DATA

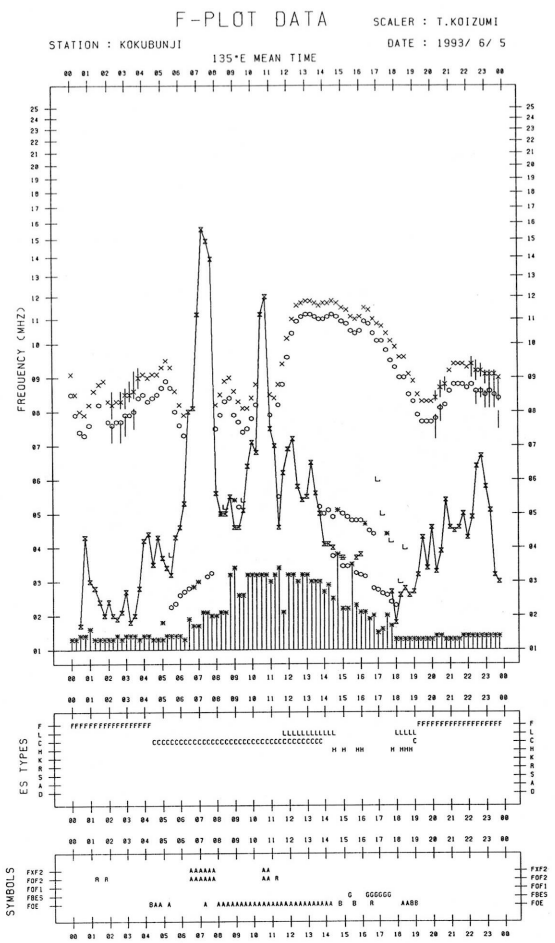
KEY OF F-PLOT	
I	SPREAD
○	FOF2, FOF1, FOE
×	FXF2
✳	DOUBTFUL FOF2, FOF1, FOE
⧖	FBES
⌊	ESTIMATED FOF1
⊤, ⊥	FMIN
∧	GREATER THAN
∨	LESS THAN

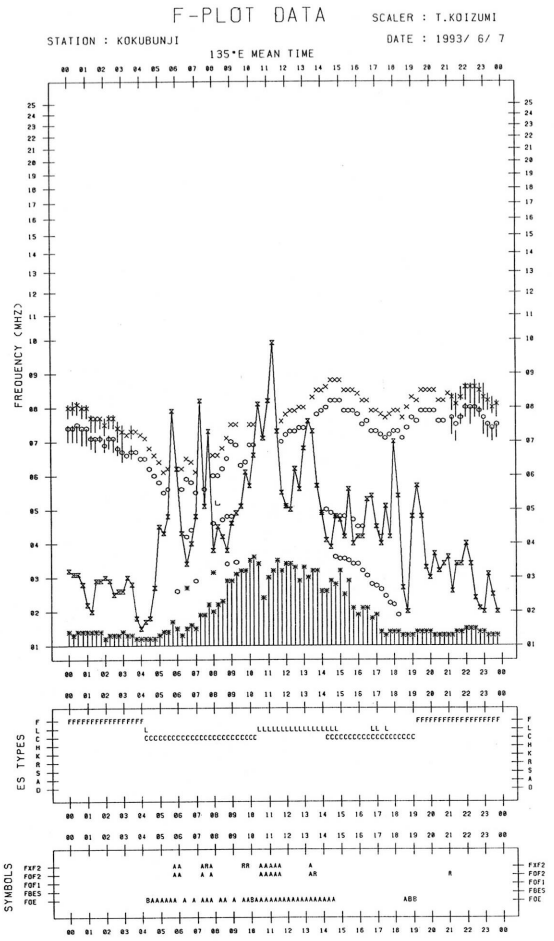

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/ 1
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

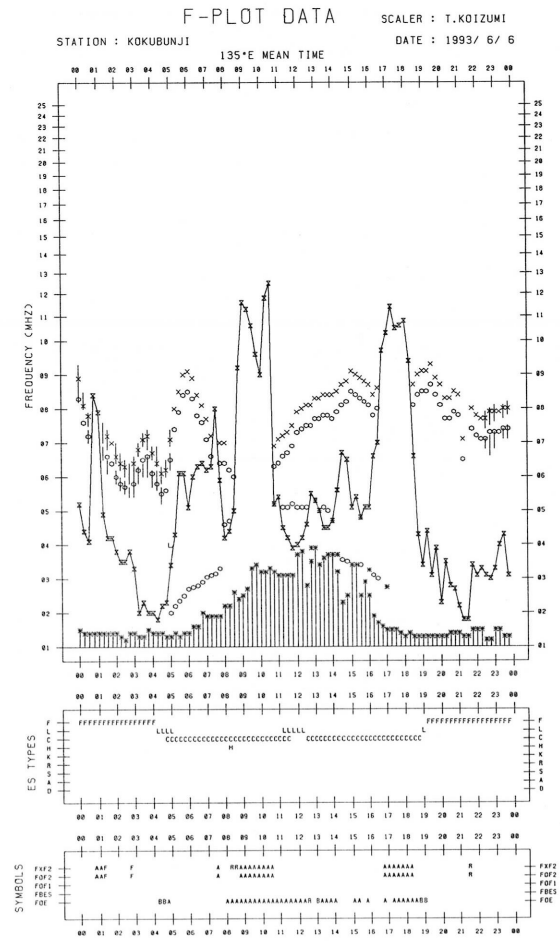

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/ 3
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

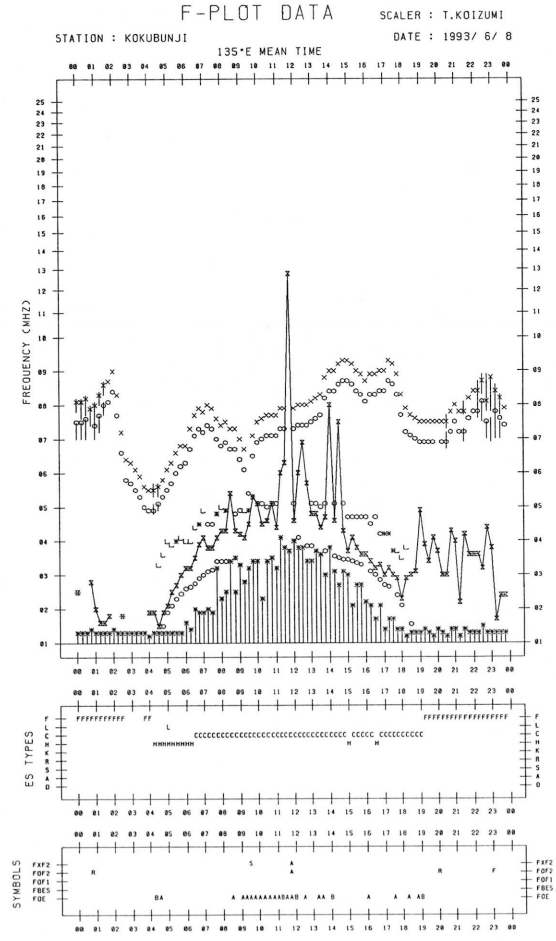

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/ 2
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

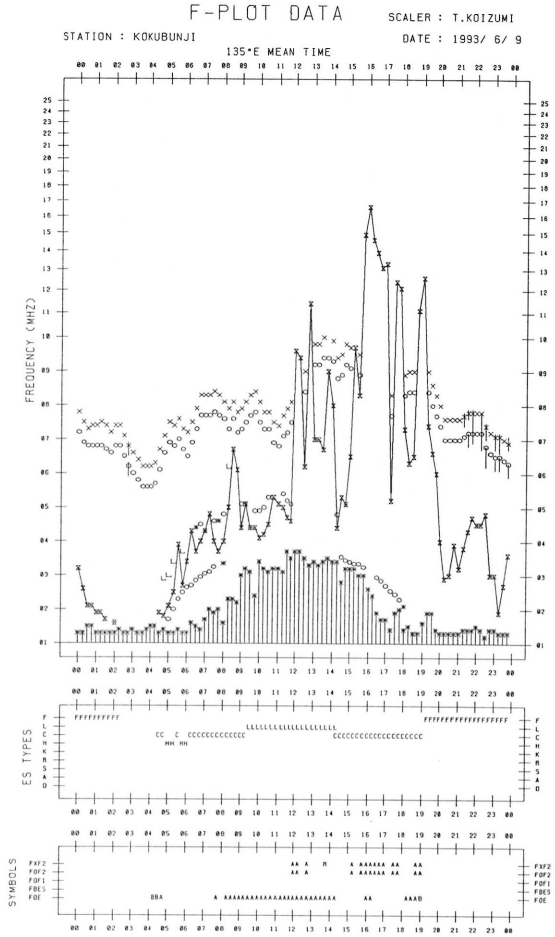

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/ 4
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

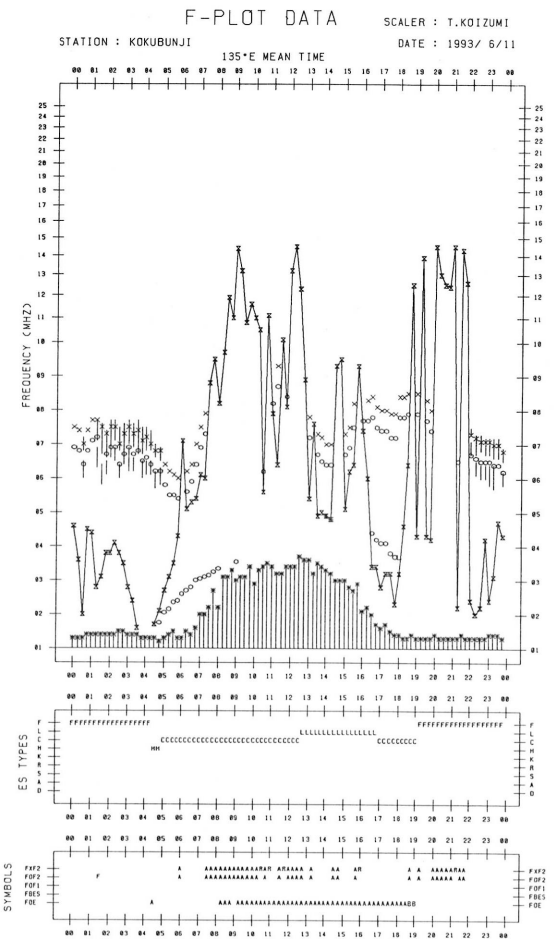

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/ 5
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FOE

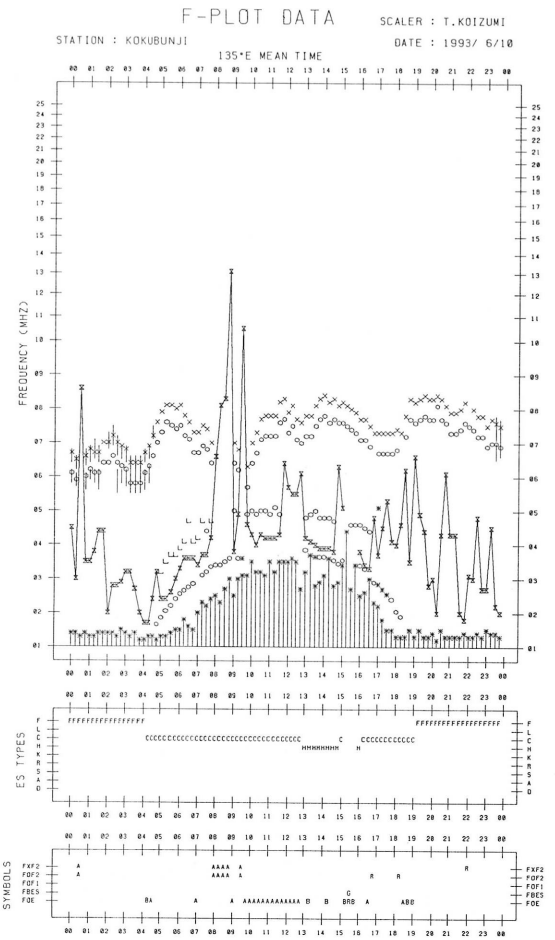

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/ 7
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FOE

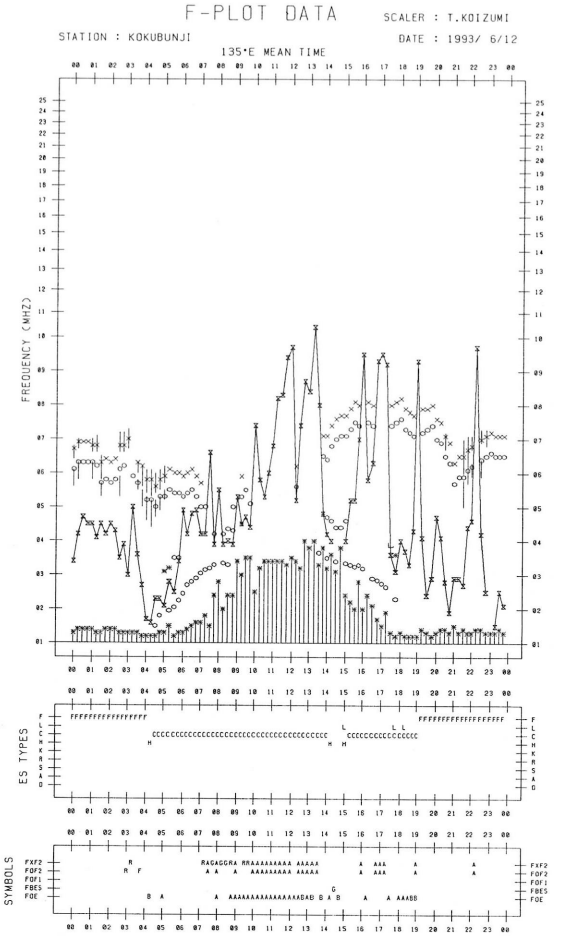

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/ 6
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FOE

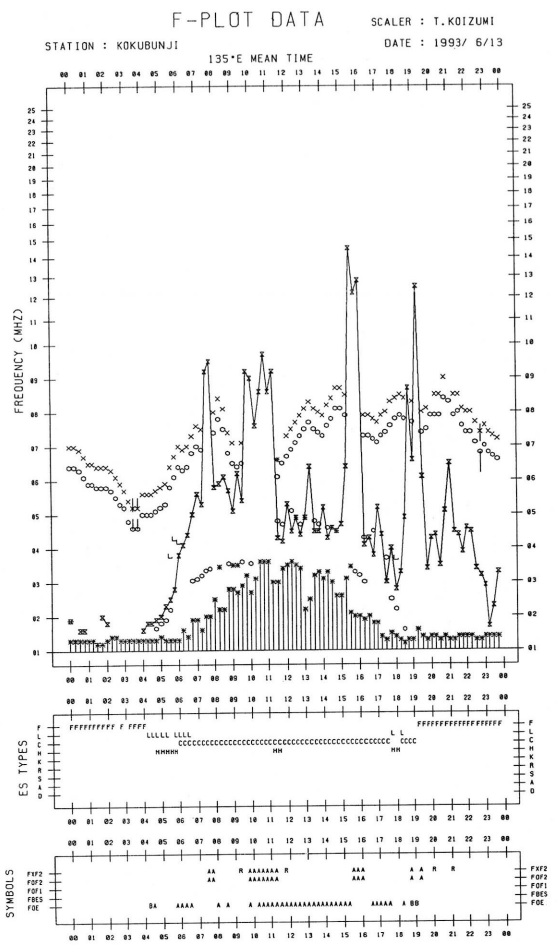

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/ 8
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FOE

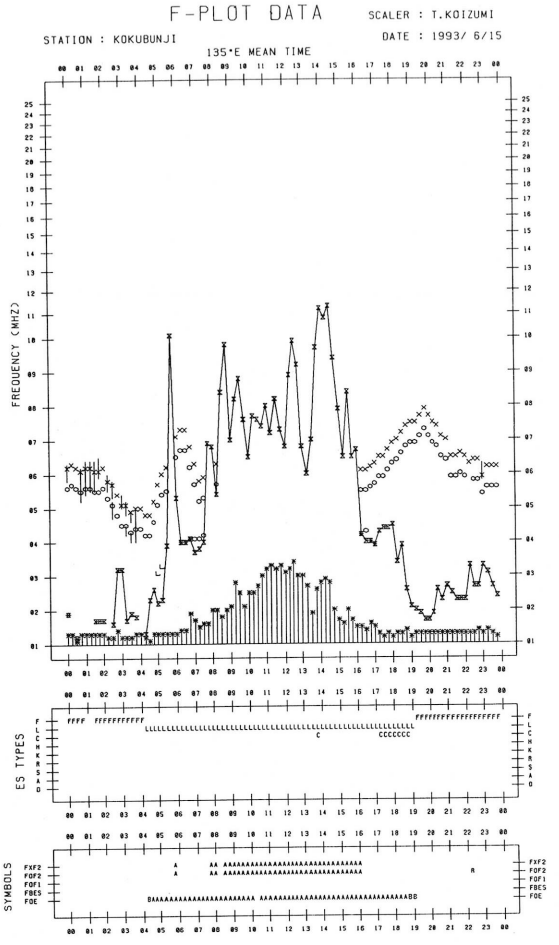

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/ 9
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

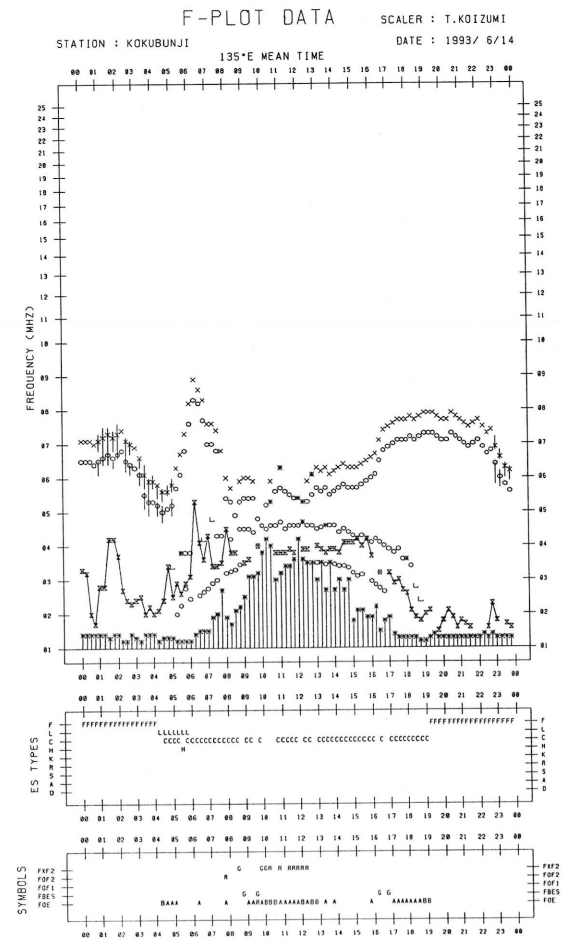

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/11
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

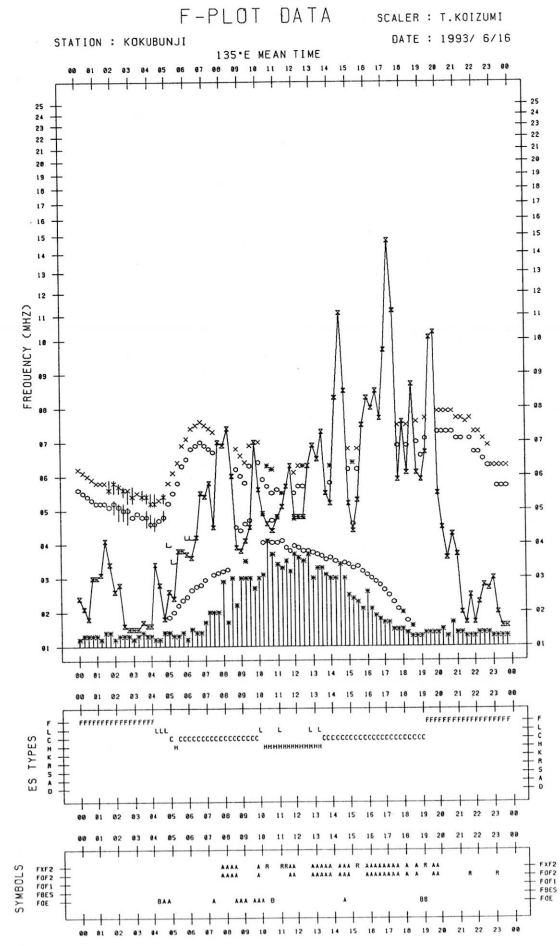

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/10
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

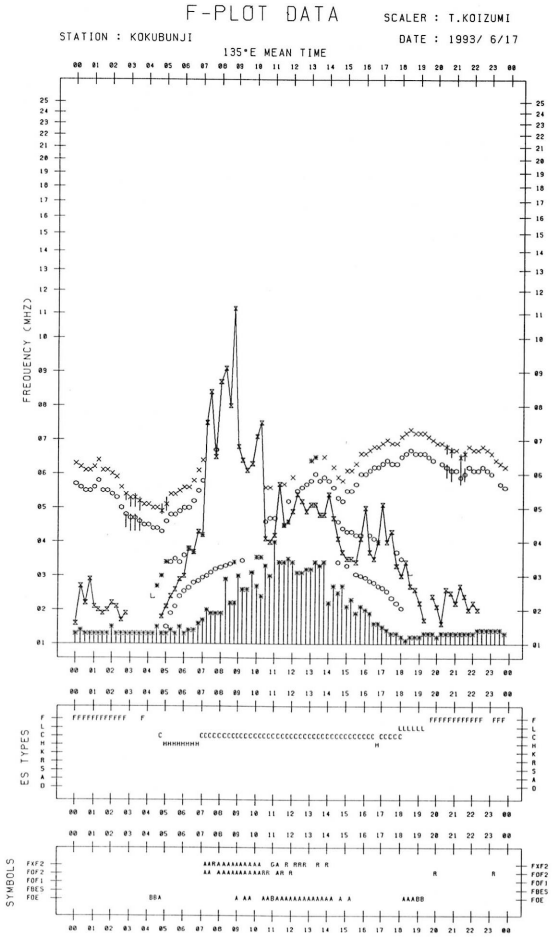

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/12
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

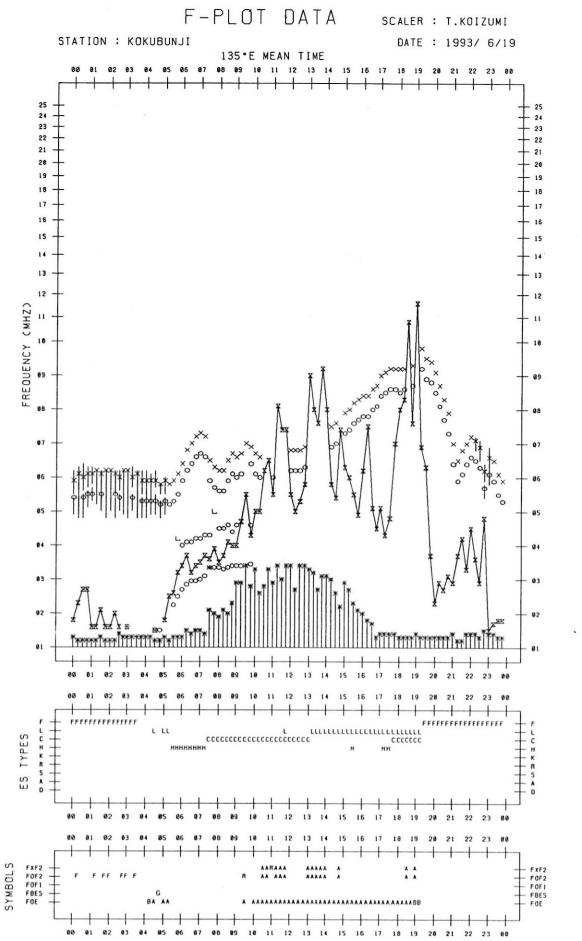

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

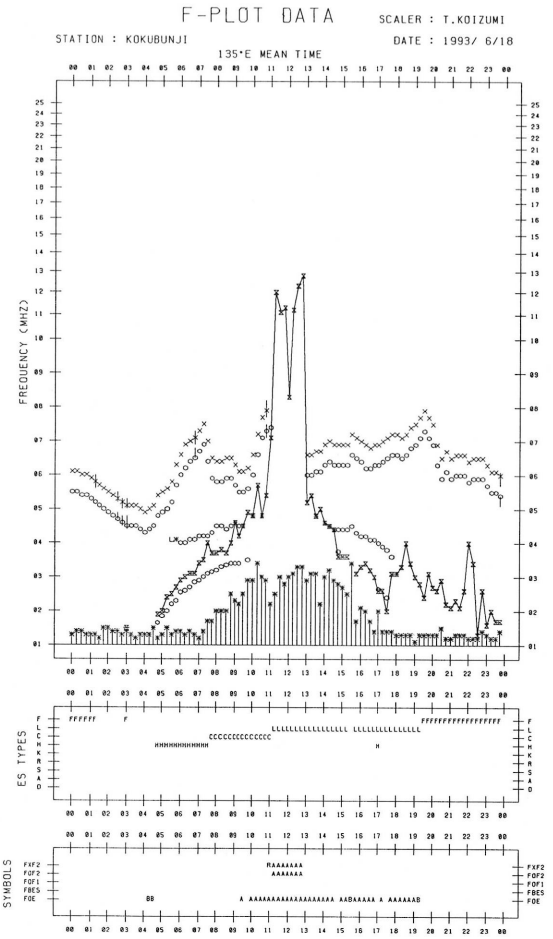

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

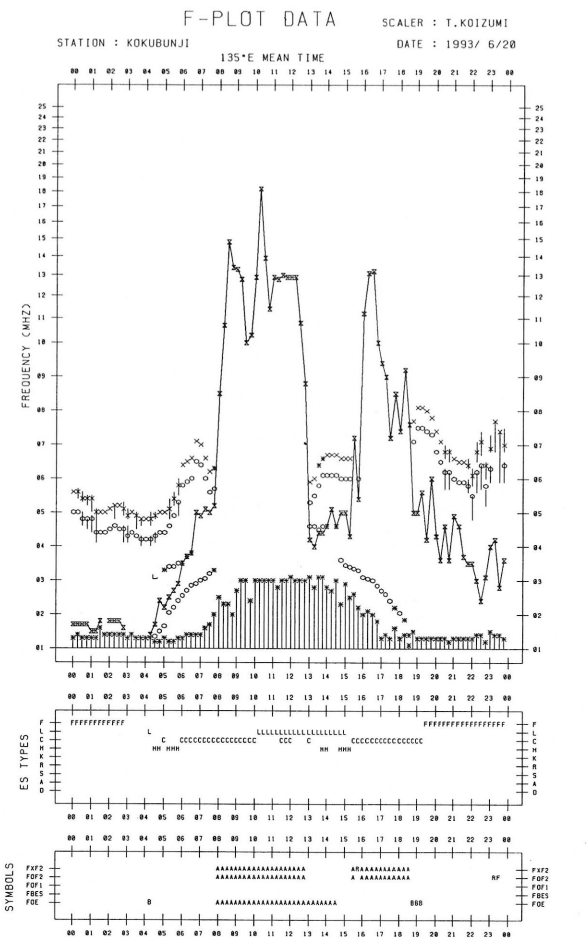

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

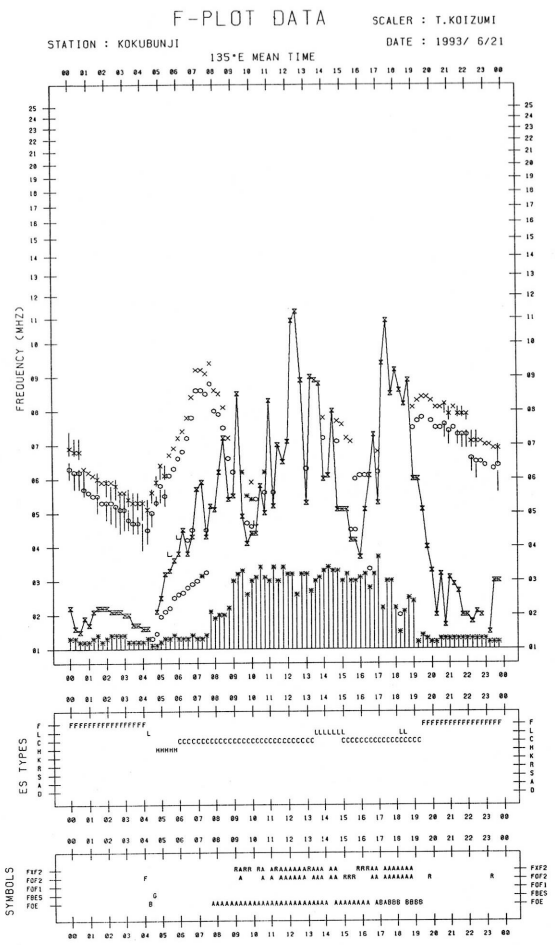

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

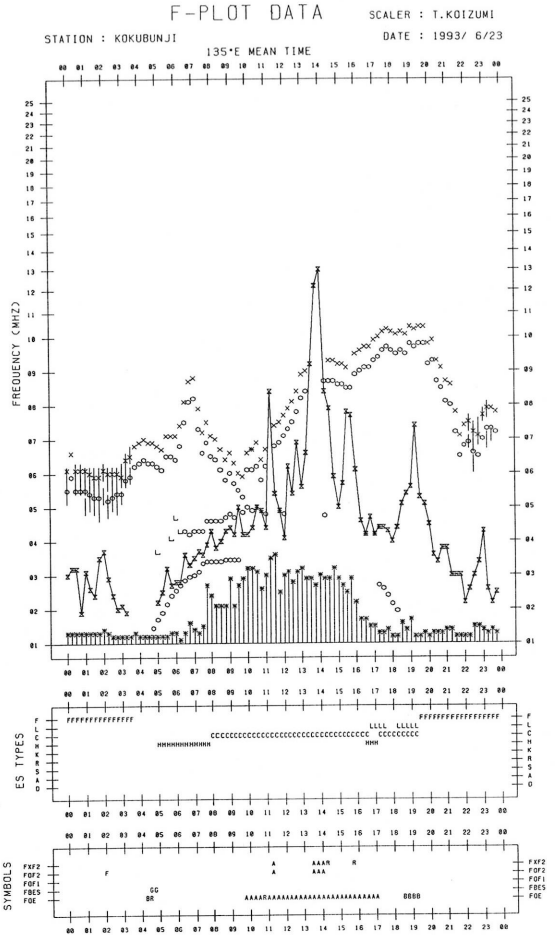

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

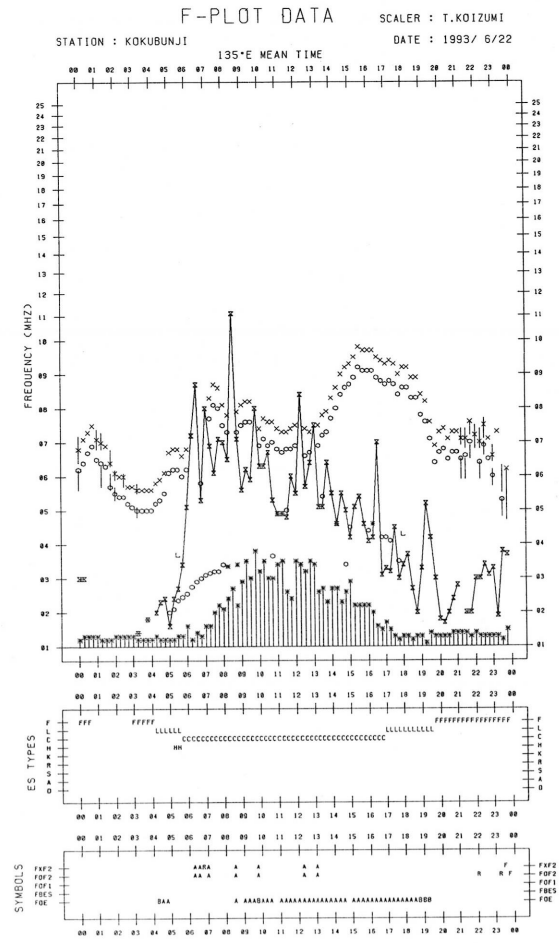

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

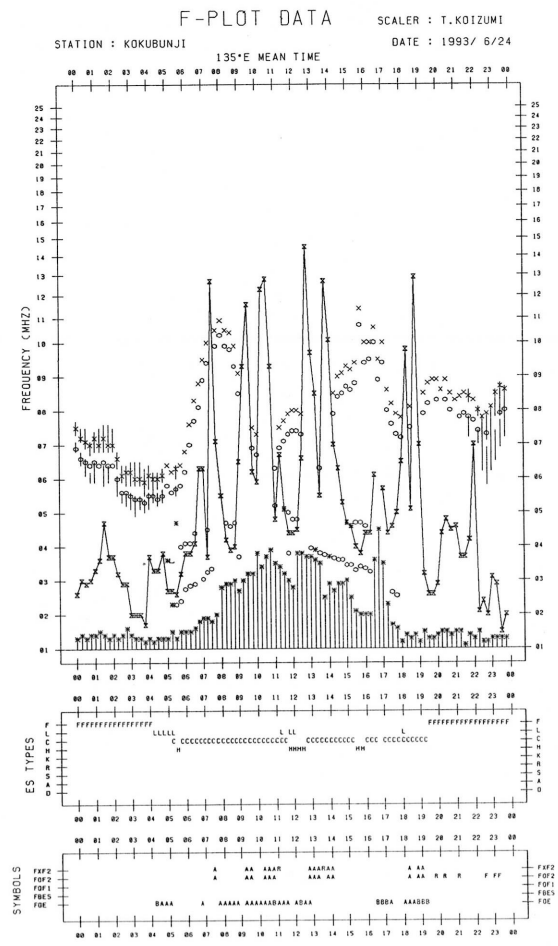

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

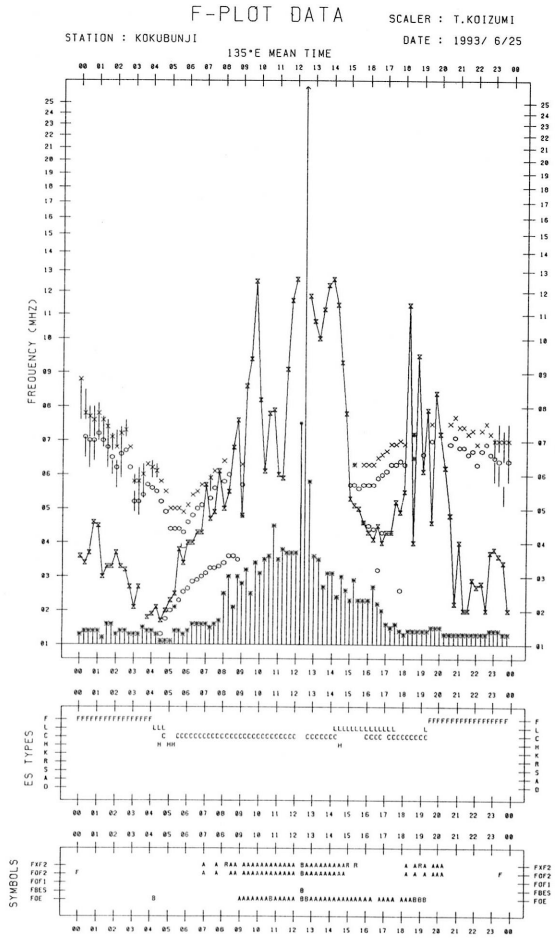

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

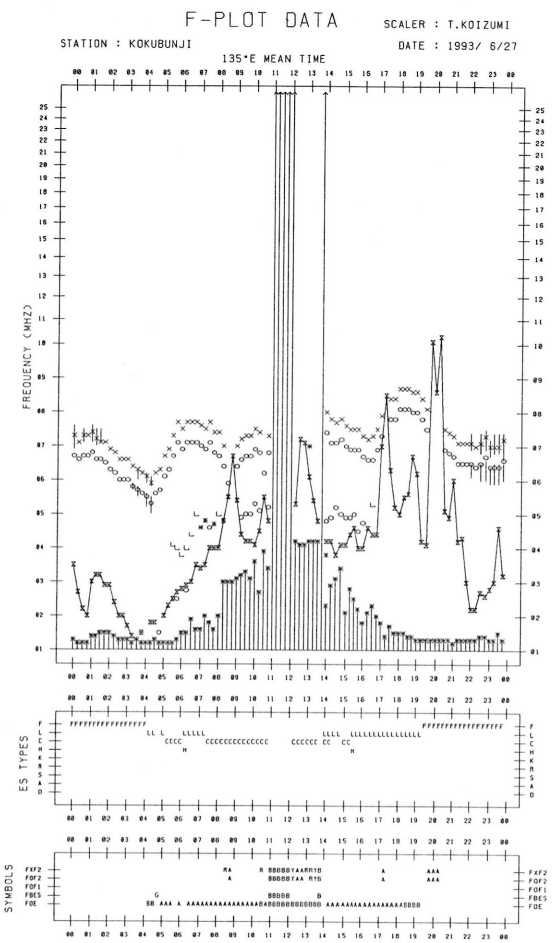

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/21
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

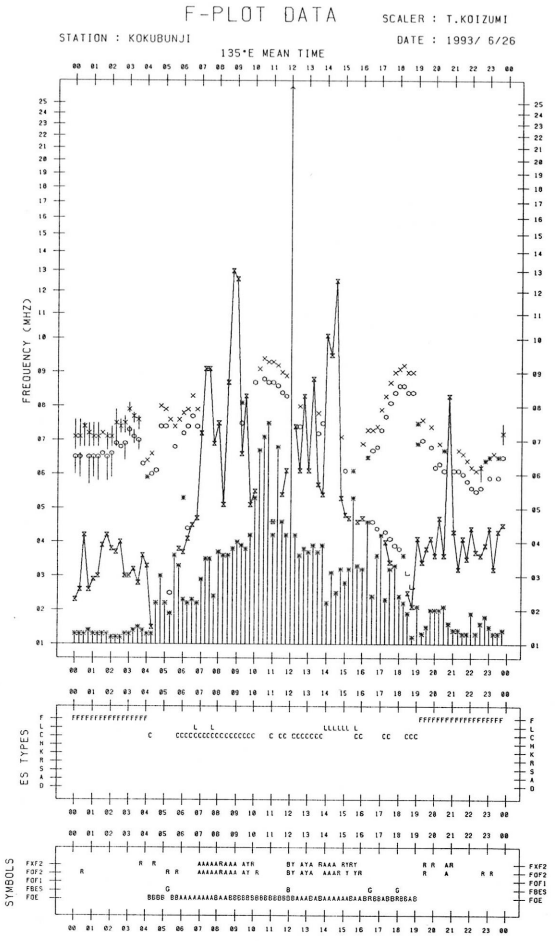

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/23
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

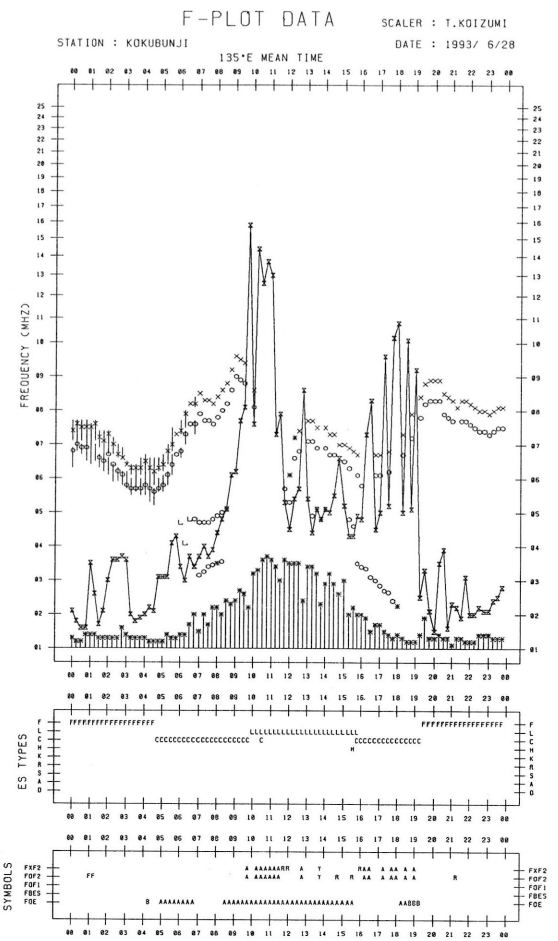

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/22
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

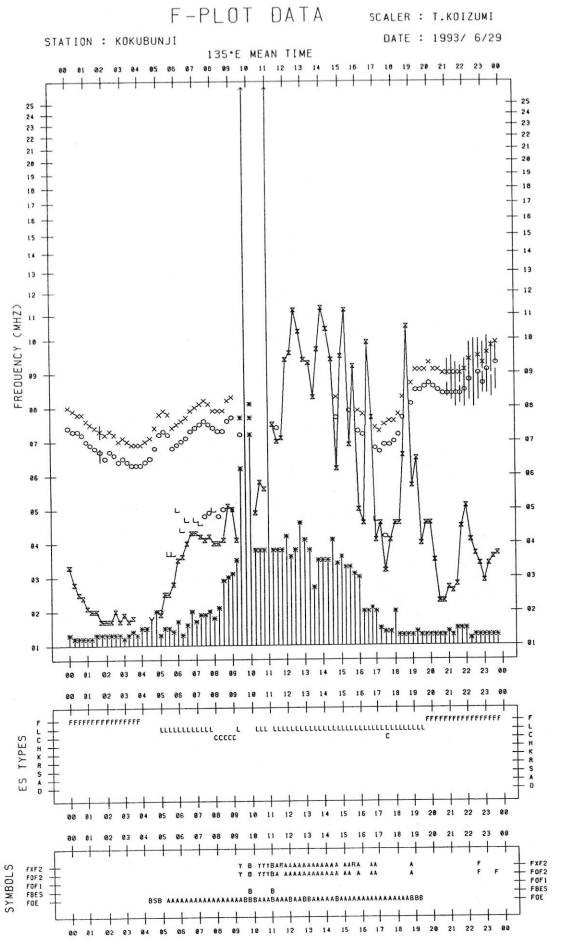

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/24
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

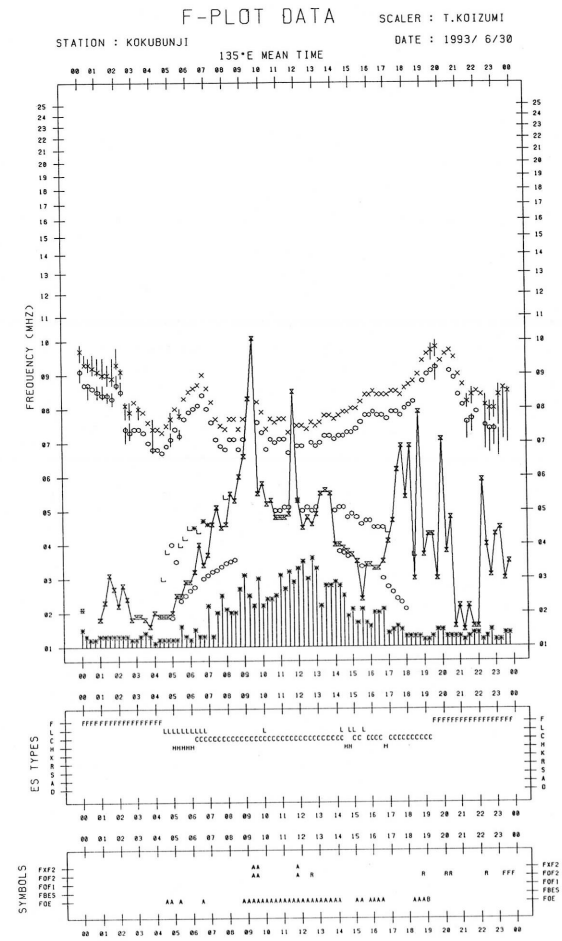

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/25
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/27
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/26
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/28
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/29
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 6/30
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

B. Solar Radio Emission

B1. Daily Data at Hiraiso

200, 500 MHz

No observations due to system replacement.

B2. Outstanding Occurrences at Hiraiso

200, 500, 2800 MHz

No observations due to system replacement.

B3. Summary plots of $F_{10.7}$ at Hiraiso

No observations due to system replacement.

C. RADIO PROPAGATION

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

JUN 1993 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

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

C. RADIO PROPAGATION

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

JUN 1993 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

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

C. Radio Propagation

C2. Radio Propagation Quality Figures at Hiraiso

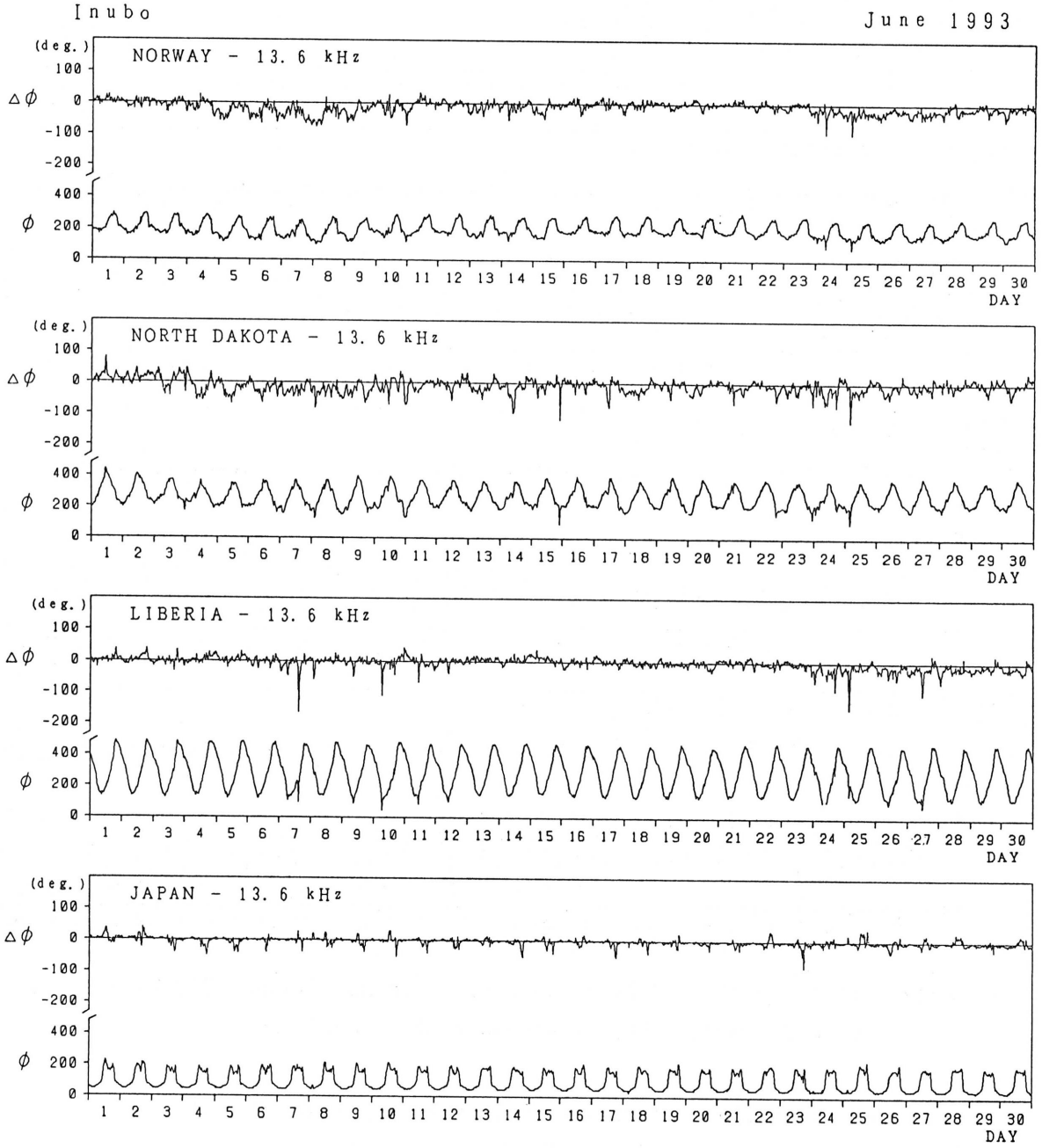
Hiraiso

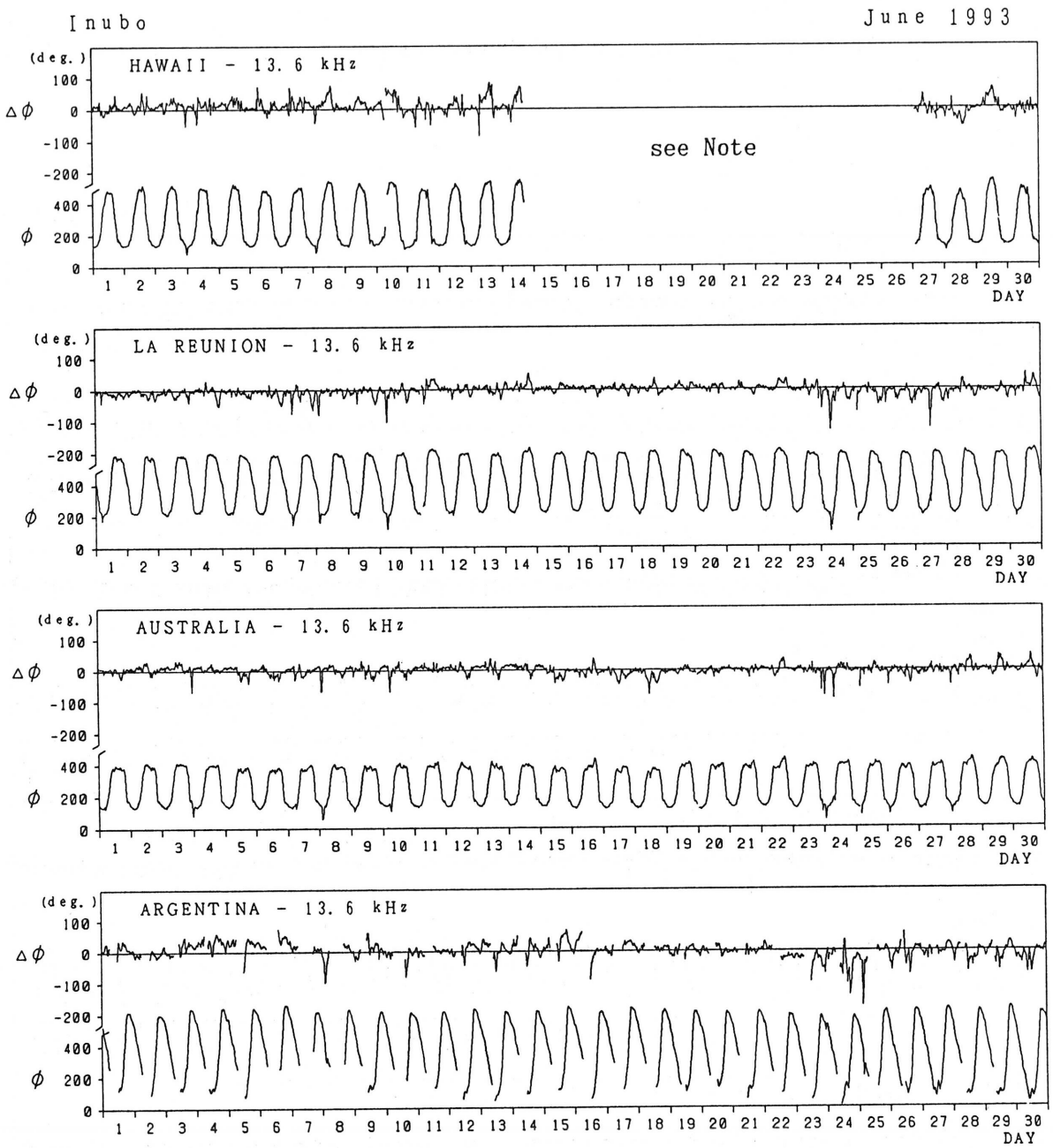
Time in U.T.

Jun. 1993	Whole Day Figure	W W V 00 06 12 18 / 06 12 18 24	W W V H 00 06 12 18 / 06 12 18 24	Condition 00 06 12 18 / 06 12 18 24	Principal Geomagnetic Storms Start h m	End h	Range nT
1	4+	(5)(5)(5) -	4 4 4 4	n n n n	none		
2	4+	- (5)(5)(5)	3 4 4 4	n n n n			
3	4o	(3)(4)(5) -	4 4 5 3	n n n n			
4	4-	(4)(3)(2) -	3 4 5 4	n n n n			
5	4-	- (3)(3) -	4 4 4 4	n n n n			
6	4-	- (3)(4) -	4 4 4 4	n n n n			
7	4o	- (3)(4)(5)	4 4 5 4	n n n n			
8	4o	(3)(3)(5)(5)	5 4 4 4	n n n n			
9	(4-)	- (5)(4) -	4 4 4 (2)	n n n n			
10	C	(4)(5) C C	4 C C C	n n n n			
11	3+	(3)(4)(3) -	3 4 4 3	n n n n			
12	3+	- (3)(3) -	3 4 4 4	n n n n			
13	3+	- (3)(3)(5)	3 4 2 4	n n n n			
14	3o	(2)(3)(2) -	3 4 3 3	n n n n			
15	3+	(4)(3)(3) -	4 4 3 3	n n n n			
16	(3+)	(2)(5)(3) -	(3) 4 3 3	n n n n			
17	(3+)	(3)(5)(3)(5)	3 3 (1) 4	n n n n			
18	(4o)	(5)(5)(3)(5)	4 4 (2) 4	n n n n			
19	4-	(4)(5)(2)(5)	4 4 3 3	n n n n			
20	4-	(3)(3)(3)(5)	4 3 4 5	n n n n			
21	4+	(5)(5)(5) -	4 4 4 4	n n n n			
22	4o	(4)(4)(5)(5)	4 4 3 4	n n n n			
23	4+	(4)(4)(5)(5)	4 4 4 4	n n n n			
24	4o	(4)(4)(3) -	5 4 3 4	n n n n			
25	(3+)	- (4)(2) -	(3) 4 3 4	n n n n			
26	4o	(3)(4)(4) 5	3 4 4 4	n n n n			
27	4o	(4)(4)(4)(5)	4 4 4 4	n n n n			
28	4+	(4)(5)(5)(5)	4 4 4 4	n n n n			
29	5-	(5)(5)(5)(5)	4 4 5 5	n n n n			
30	4o	(5)(5)(5)(5)	4 4 4 4	n n n n			

C. Radio Propagation

C3. Phase Variation in OMEGA Radio Waves at Inubo





Note: As for HAWAII-13.6kHz, no record during 14 June 1700 UT - 27 June 0200 UT, due to the maintenance of transmitter.

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

NONE

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso

Time in U.T.

Jun. 1993	S W F								Correspondence	
	Drop-out Intensities(dB)					Start	Dur.	Type	Imp.	Solar * Flare	Solar Burst
	CO	HA	AUS	MOS	BBC						
7					15	1413	45	2 sl	1	x	C
8		x	27			0205	65	2 sl	2	x	C
9					>15	0812	58	2 sl	1	x	C
10					17	0541	68	3 G	1	x	C
11		x			13	1014	18	2 sl	1	x	C
19					12	0005	21	1 S	1-	x	C
19			5			2345	11	2 sl	1-	x	C
23			12			2242	32	3 G	1	x	C
24			11			0109	50	3 G	1-	x	C
24			37		16	0728	42	2 sl	3	x	x
24		x			11	1721	37	1 S	1-	x	C
25			>35			0303	47	2 sl	3-	x	C
26			14			0143	17	1 S	1	x	C
27		x	12			0431	22	1 S	1	x	C
28			17			0105	43	3 G	1	x	C
28					5	0548	15	2 sl	1-	x	C

NOTE CO:Colorade(WWV) HA:Hawaii(WWVH) AUS:Australia MOS:Moscow BBC:London

* Optical and X-ray Flares.

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Jun. 1993	S P A								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	Ω/AU	Ω/H	Ω/ND	Start	End	Max.
1	19	27	47	31	16	27	0442	0534	0452
1				5	7		2304	2318	2308
3			4	6			0310	0332	0316
3		22					1552	1624	1558
3			11	14	18	24	2246	2316	2252
3	32	36*	29*	74*	58*	71*	2320	0030	2338
5		20	27				0808	0912	0822
6				11	8		0108	0140	0115
6			9				0720	0744	0726
6				7	9		2236	2254	2240
7	25	60	83*	41*	12		0543	0648	0610
7	29	127					1412	1530	1428
8	34	46*	79*	86*	56*	49*	0204	0350	0216
9			16	19	14		0246	0342	0306
9		44	59				0814	0900	0824
9					50	42	1832	1918	1842
9					29	30	2108	2142	2118
9				16	25	11	2200	2238	2212
10	92	140	176	101	70	25	0542	0706	0608
10		15	24				0748	0820	0756
10		19					1420	1456	1428
10		32					1540	1632	1552
10					19		2138	2238	2200
11			6				0438	0524	0454
11	32	71	52				1014	1104	1030
11					13		1808	1924	1828
11					50		2056	2118	2100
11				7	9		2212	2230	2220
12			6	5			0404	0430	0414
12			31*				0810	0848	0832
12		39	29				0858	0938	0910
13						25	0954	1026	1008
19				13	—		0008	0046	0020
23	25	15	14	56	—	50	2234	2314	2256
24	25	24	61	63	—	39	0108	0224	0126
24			18	11	—		0538	0624	0552
24	137	—	299	103	47	29	0722	0954	0738
24			11		—		1046	1100	1052
24		52			—		1456	1532	1504
24		73			—	59	1722	1810	1732

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Jun. 1993	S P A								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	Ω/AU	Ω/H	Ω/ND	Start	End	Max.
25	99	152	220	180	108	106	0305	0448	0324
25			8				0614	0632	0618
25		31	7				1028	1102	1038
26	40	32	54	74	53	44	0142	0240	0148
26			14				0810	0844	0818
26		39	25				0940	1024	0956
26		20					1238	1310	1246
26		39					1502	1534	1512
26	7		7	11	—		2310	2334	2316
26	11		11	22	22		2354	0022	0004
27	7		20	25*	—		0036	0130	0050
27	14			25*	—	17	0148	0234	0212
27			11	17	9		0236	0300	0242
27	40	59	106	65	30	36	0430	0512	0436
27			4				0732	0750	0738
27	14	—	86				1116	1208	1130
27				6	6		2332	2354	2338
28				12	9		0016	0052	0024
28	18	24	43	38	31	22	0106	0156	0138
28			20				0548	0620	0552
28				6	11		2156	2214	2204
30	14*	29	36*	17*	11		0442	0558	0508

IONOSPHERIC DATA IN JAPAN FOR JUNE 1993
F-534 Vol.45 No.6 (Not for Sale)

電離層月報 (1993年6月)
第45巻 第6号 (非売品)
1993年9月25日 印刷
1993年9月30日 発行
編集兼 郵政省通信総合研究所
発行所 〒184 東京都小金井市貫井北町4丁目2－1
☎ (0423) (21) 1211(代)

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