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IONOSPHERIC DATA IN JAPAN

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INTRODUCTION

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

Station	Geographic		Geomagnetic		Technical Method
	Latitude	Longitude	Latitude	Longitude	
Wakkanai	45°23.5′N	141°41.2′E	35.3°N	206.5°	Vertical Sounding (I)
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°	Solar Radio Emission (S)
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 descriptive letter G.

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

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

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

d. Reliability of Automatic Scaling

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

e. Summary Plot

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

A2. Manual Scaling

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

All symbols and terminology in the tables or figures of ionospheric data are used in accordance with the "URSI Handbook of Ionogram Interpretation and Reduction (Second Edition) 1972 " and its revision of chapters 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 three parabolic antennas, one with 10-meter diameter for 200 MHz measurements, one with 6-meter diameter for 500 MHz measurements and one with 2-meter diameter for 2800 MHz measurements, each being equipped with a pair of crossed doublet antennas as a primary radiator, and three appropriate receivers. Each pair of the crossed doublet antennas is used as a polarimeter. Observations are continuously carried out almost from sunrise to sunset.

B1. Daily Data at Hiraiso

The three-hourly mean and daily mean values of the solar radio emission intensities are tabulated for 500 MHz measurements. The intensities are expressed by the flux density in 10^{-22} Wm^{-2} Hz^{-1} unit.

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.

The following symbols are used in the $F_{10.7}$ index:

*	Measurement made not at 3h U.T..
B	Measurement affected by bursts.

C. RADIO PROPAGATION

C1. 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.

C2. 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	/N	13.6	10	7820
Liberia	06°18′N	010°40′W	/L	13.6	10	14480
Hawaii	21°24′N	157°50′W	/H	13.6	10	6100
North Dakota	46°22′N	098°20′W	/ND	13.6	10	9140
La Reunion	20°58′S	055°17′E	/LR	13.6	10	10970
Argentina	43°03′S	065°11′W	/AR	13.6	10	17640
Australia	38°29′S	146°56′E	/AU	13.6	10	8270
Japan	34°37′N	129°27′E	/J	13.6	10	1040
North West Cape	21°49′S	114°10′E	NWC	22.3	1000	6990

HOURLY VALUES OF foF2 AT Wakkanai

JUL. 1999

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	80	80	80	80	61	78	58	82	52	80							56	82	80	68	74	86	88	94
2	95	95	73	71	79	81	80	67	68	A	B							52	60	68	72	95	70	91
3	73	73	68	62	58	69	61	A	A	A	A	A		A	A		66	67	76		77	76	80	
4	74	74	73	71	68	76	76	81	A	A	A		A		A		60	67	72	72	68	94		83
5	78	77	68	73	77	82	78	85	82	A							64	64	76	77	83	84		83
6	92	95	72	81	74	80	87	78	78	68	A			59	A	A	A	78	70	94	79	95	82	82
7	80	80	84	85	78	82	79	82		101	83	A				59	75	73	80	81	80	82	58	78
8	73	71	78	74	77	81	99	90	90	56	72		69			77	A		80	80	38	89	93	93
9		72	71	67	66	69	68	66	A	69	A		A	A	A	A	A	A	A	59	69	93	95	79
10	79	76		68	66	80	72	A	66	A		59	81	A	69	66	64	76	A	83			93	76
11	81	93	75	71	71	63	76	82	A	78	A		A	76	69	A	A		A		92	54	80	76
12	75	65	68	68	69	72	A	A	A	A	A	A	A	A	A	A	A	A	A	80	92	A	91	67
13	68	69	70		60	61	77	A	A	A		A	73	A	A	A	65	67		78	82	68	71	
14	58	72	71	65	71	78	86	85	A	A	A		A	76	68	69	73	68	70	83	96	92	67	76
15		68	71	72	74	71	83	86	78	68	66	78	A	A	78	68	67	74	A	A	78	78	83	59
16	67	71		66	68	71	87	A	77	A	A						55	58	58	67		70	83	94
17	92	72	70	68	68	68	54	77	A	77	A	A	A	68		61	64	A	68	74	60	81	83	92
18	63	55	60	57	60	66	81	87	A	A	A	A	A	A	58	A	A	60	A	71		83	70	
19	66	67	73	62	66	74	86	92	82	A					A	A	A	59	60	80	80	91	70	76
20	68	70	67	60	69	68	78	67	82	A							73	72	73	81		83	65	74
21	68	70	74	68	68	69	78		76	76	76	A	69	78	80	77	67	A	72	76		A	56	
22	68	61	61	57	57	60	71	A	A	A				A	A	A	58	68	A	71	71	65	68	66
23	68	70		51	51	A	63	A	A	A	A	A	A				A	A	A	58	58	70	70	66
24	64	65	70	61	56	56	62	A		A	A	A	A	A	A	A	66	A	A	A	95	81	60	
25	69	54	60	61	58	59	A	A	A	A	A	A			A	A	70	70	A	A	71		72	72
26	64	69		62	52	64	67	67	A	A		A		64			66	66	70	58	78			73
27	72	82	68	67	58	64	A	A	A	A	A	A				57	60	60	61	63	80	79		72
28	64	61	57	56	55	63	65		68		A								59	63	66	68	64	68
29	69	67	54	57		54		A	66								56			71	69	75	67	71
30	67	71	65	60	60	70	60		69	A		59			70	78	64	71	80	80	83	92	92	76
31	76	95	71	64		56	58	61	A	A	A	A	A	A	A	A	64	A	69	67	62	73	72	71
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	31	27	30	29	30	27	17	14	9	4	3	4	6	7	9	21	20	19	26	26	26	27	26
MED	69	71	70	66	66	69	76	82	76	76	74	59	71	72	69	68	64	68	70	73	78	82	72	76
U Q	78	77	73	71	71	78	81	85	82	79	79	78	77	76	78	77	67	72	76	80	82	91	83	83
L Q	67	67	67	61	58	63	63	67	68	68	69	59	69	64	68	60	60	62	61	67	69	73	67	71

HOURLY VALUES OF fEs AT Wakkanai

JUL. 1999

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	30	32	29	28	G	G	G	41	G	56	59		G	G	G	G	G	38	39	35	31	28	52	37
2	31	G	28	G	29	G	53	60	54	54					G	G	G	G	G	30	30	34	31	25
3	25	27	G	G	G	33	44	57	58	59	44	60	G	57	44	G	G	42	G	38	40	73	60	44
4	80	42	24	32	68	39	63	64	92	73	72	G	63	G	65	G	G	41	44	28	30	44		64
5	40	60	41	27	33	34	46	45	61	84		G	G	G	G	G	G	G	44	41	39	40		24
6	28	G	33	38	G	G	36	59	60	60	44	G	G	G	72	78	79	38	51	51	57	41	44	28
7	G	39	40	33	30	G	G	52	58	G	G	44	G	G	G	42	43	59	44	38	38	32	33	33
8	37	39	29	G	G	33	37	44	58	G	G	G	G	G	G	64	74		61	58	124	60	98	22
9		28	31	26	G	G	49	60	62	47	44	G	83	75	177	72	74	121	128	98	23	28	29	28
10	G	29		32	27	36	41	62	59	58		57	58	45	G	54	G	37	91	62			32	24
11	28	28	G	G	31	41	52	64	90	G	73	G	55	63	57	76	73		96		76	72	38	59
12	41	43	36	30	57	45	83	98	127	87	124	72	60	55	62	107	89	96	77	64	107	150	146	67
13	73	72	38		59	73	84	78	88	75	G	46	61	59	176	97	40	60	44	61	65	72	50	
14	86	60	60	38	39	30	38	56	88	97	86	G	54	52	G	G	44	39	50	32	37	65	50	34
15		28	28	29	27	G	39	G	64	44	G	60	60	45	G	G	G	44	56	68	44	36	56	48
16	40	34		49	30	39	60	52	42	60	55	G	G	G	G	G	44	47	44	34		40	45	33
17	27	29	29	30	G	G	G	62	66	74	75	75	56	G	G	G	G	67	82	61	65	41	32	44
18	40	28	29	29	G	36	60	60	82	76	92	60	96	75	G		72	37	72	45		72	62	
19	61	30	33	29	28	42	46	52	59	57	G	G	G	G	59	88	92	65	59	39	32	65	37	26
20	G		26	30	G	G	G	44	G	62	G	G	G	G	G	G	42	51	54	63	59	59	63	88
21	34		29	G	27	32	34	52	58	60	79	59	58	44	56	G		70	60	38	86	59	72	40
22	29	28	24	24	26	31	34	65	79	97	G	G	G	81	74	88	65	65	73	64	33	33	33	40
23	38	70		40	41	40	60	67	70	73	75	61	44	G	G	G	39	54	68	40	31	30	44	34
24	29	40	33	30	29	G	39	62	G	67	86	96	107	60	63	84	39	62	37	88	45	33	84	40
25	29		29	42	36	52	72	84	84	135	127	69	G	G	58	44	47	47	73	60	72		94	44
26	52	32		30	34	54	73	65	85	84		54	G	54	G	G	53	57	57	56	48			29
27	28	34	33	82	G	47		97	83	87	44	55	G	G	G	G	G	36	40	40	32	30	33	32
28	G	25	40	33	29	29	G		44	G	66				G	G	G		G	29	25	33	29	28
29	G	G	26	27	G	34		63	44	G	G	G	G	G	G	G	42		85	82	29	G	36	31
30		32	38	30	G	35	G		43	57	G	G	G	G	G	G	43	46	40	35	44	43	40	G
31	G	G	G	29	26	39	43	50	56	70	83	58	56	75	92	77	64	86	34	69	54	43	52	60
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	27	30	31	31	29	29	31	31	27	28	29	29	31	30	30	27	31	30	28	28	28	29
MED	30	31	29	30	27	34	43	60	60	60	55	45	G	G	G	G	42	47	54	48	42	41	44	34
U Q	40	39	36	33	33	40	60	64	83	76	79	60	59	58	62	76	65	65	73	63	62	62	61	44
L Q	26	28	26	27	G	G	34	52	54	54	G	G	G	G	G	G	G	38	40	38	31	33	33	28

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fmin AT Wakkanai

JUL. 1999

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	15	15	15	15	17	15	15	17	17	22	46				21	17	22	16	16	15	15	15	15	15
2	14	15	15	15	16	15	16	17	18	17						18	17	16	16	15	15	15	15	15
3	15	15	15	15	18	16	15	16	17	17	20	22	21	20	18	21	18	16	16	16	15	15	15	14
4	15	15	15	15	15	15	17	17	18	20	21	22		24	20	18	17	16	15	14	15	15		15
5	15	15	15	15	15	15	15	16	17	18		26		18			17	18	16	15	15	15		16
6	15	15	15	14	18	16	16	18	16	17	18		22	24	16	17	16	18	16	15	15	15	15	15
7	15	15	14	15	15	15	15	15	16	17	21		21	21	18	16	16	16	15	15	15	15	14	15
8	15	15	15	15	17	15	16	15	21		20	22	21	18	23	20	23		16	14	15	15	15	14
9		15	15	15	16	15	16	16	16	17	20		21	18	18	17	16	17	15	15	15	16	15	15
10	16	15		14	17	15	16	16	16	20		18	37	38	24	22	16	16	15	14			14	15
11	15	15	15	15	15	15	15	16	17	17	23	22	26	23	20	16	17		15		14	14	15	15
12	14	15	15	15	15	15	17	16	16	20	28	32	30	32	17	21	16	16	15	15	15	15	15	15
13	15	15	15		15	15	16	16	17	21	18		44	28	20	22	17	15	16	15	15	15	15	
14	15	15	15	14	14	15	16	16	17	18	20	21	22	20	17	17	17	16	15	15	15	15	14	15
15		15	15	15	16	15	16	16	17	17	18	18	23	22	18	17	16	15	15	14	15	15	15	14
16	15	14		15	14	16	15	15	16	17	18	22	27	21	21	16	16	16	16	16		14	15	14
17	15	15	14	15	16	15	15	15	16	17	26	20	21		20	21	16	16	15	14	15	15	14	14
18	14	15	14	15	16	16	16	15	17	18	17	20		27	17	20	17	17	15	15		14	14	
19	14	14	15	15	15	15	15	16	16	18	24	23	22	21	22	17	16	15	18	16	14	15	15	15
20	15	15	15	15	16	15	16	16	17	17	21	20	17	17	17	17	16	15	15	15	15	15	15	15
21	15	15	15	15	15	15	16	17	17	16	16	18	23	23	17	17	16	15	15	15	14	15	15	14
22	15	15	15	15	15	15	15	16	16	21	21	24	32	21	18	17	16	16	15	14	14	15	15	15
23	14	14		15	15	15	15	16	17	38	48	26	36	26		18	16	15	15	15	15	15	15	15
24	15	14	14	15	15	15	16	16	18	21		33	36	49	20	20	17	21	16	15	15	14	14	15
25	15	15	16	15	15	16	17	16	17	16	36	44	30	24	21	17	17	16	15	14	14		15	14
26	15	15		15	15	15	17	17	17	21		20	21	20	18	17	16	16	16	15	14			15
27	15	15	14	15	17	16	16	16	17	20	22	21		21	24	20	20	16	16	15	14	15	15	15
28	15	15	15	15	16	15	15		17	18					18	17	17		16	15	15	14	15	15
29	14	14	16	15	16	15		16	17	21	21	23	20	18	17	17	17		15	15	15	15	14	15
30	14	14	15	15	15	15	16		16	22	18	22		24	20	21	17	15	15	15	14	15	15	15
31	16	15	15	15	16	15	16	16	18	36	38	23	18	18	27	18	17	16	15	14	15	15	14	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	31	27	30	31	31	30	29	31	30	25	24	23	27	28	30	31	27	31	30	28	28	28	29
MED	15	15	15	15	15	15	16	16	17	18	21	22	22	21	19	17	17	16	15	15	15	15	15	15
U Q	15	15	15	15	16	15	16	16	17	21	25	23	30	24	21	20	17	16	16	15	15	15	15	15
L Q	14	15	15	15	15	15	15	16	16	17	18	20	21	20	17	17	16	15	15	14	14	15	14	14

HOURLY VALUES OF foF2 AT Kokubunji

JUL. 1999

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	80	81	82	80	78		78	93	83	85	82	90	88	84	85	87	A	A		83	84	96	94	92
2	94	81	93	94	87	88	94	92	87	84	78				80	78	67	74	70	73	76	67	61	82
3	83	81	67	68	70	74	A	A	A	A	A	A	A	109	79	73	77	A	82	86	A	A	A	A
4	93	81	68	68	80	86	89	94	102	87	A	A	A	A	A	85	85	88	93	77	56	75	95	82
5	95	79	81	67	72	77	94	97	90	87	A	90	86	81	87	92	92	88	91	84	80	68	112	94
6	93	106	95	86	83	92	103	114	87	A		79	A	A	97	94	A	86	86	92	84	80	84	93
7	91	92	92	93	77	82	82	82	95	102	106	99	A	97	91	88	91	94	93	96	82	84	82	94
8	70	95	A	51		85	91	98		A	A	82		91	83	81	83	85	86	82	90	69	92	84
9	92	82	94	94	82	72	78	93	78	A	A	A	A	81	86	86		A		60	A	82	83	85
10	A	92	80	70	67	78	85	92	84	99	101	A	A	93	96	A		97			A	A	85	A
11		81	82	73	71	72	90	106	98	A	A	93	A	A	95	A	81	82	93	98	94	82	94	95
12	81	85	93	85	81	81	85	116	100	102	89	93	102	97	91	97	103	100	97	93		81		84
13	81	93	95	93	77	85	93	93	82	81	80	87	86	93	88		92	84	93	91	68	78	82	78
14	80	81	93	67	68	68	82	104	113	84	A	109	A	A	91	86	83	83	86	94	93	86		81
15	81	93	94	70	82	81	94	90	71	A	84	87	A	91	97	92	85	82	87	94	86	92	95	94
16	77	94	78	71	73	94	94	106	A		A	66	A	A	A	A	A	A	A	A	81	92	70	81
17		66	78	71	68		A		91	80		A	A	82	A	A	74	78	86	93	93	94	A	91
18		68	68	67		70	93	105	A	A	A	77	82	82	82	76	75	93	93	93	81	68	71	64
19	75			77	68	67	82	70	85	95	86	84	A	81	91	86	A	A	83	82	A	85	84	94
20	73	70	75	71	69	66	70	94	83	81	76	84	81	A	86	84	86	83	94	93	84	94	84	81
21	67	68	70	68	67	63	82	88	107	96	A	88	A	101	108	103	A				96		58	A
22	61	68	A	56	50	58		66	A		A	A	A			68	A	A	95	85	58	57	59	59
23	A	56	56	52	57	A	52	A	A	A	A	A	A	A	A	49		A	58	A	58	A	68	63
24	63	60	57	56	57	61	64	59	A	76	A	A	A			89	A	73	A	A	79	A	71	A
25	68	73		71	70	66	71	A	77	70	A	A	A	A	84	88	A	78	A	64	68	68	68	68
26		68	A	68	60	60	83	93		71		84	A	97	85	A	81	93	81	68	68	68	82	A
27	66	68	67	67		62	68	94	92	A		A	109	A	81	80	73	67	63	66	70	77	79	70
28	64	64	68	60	57	69	71	73	74	A	A	A	A	A	A	A	A	60	62	58	60	58	70	
29	72		94	68	58	58	60	A	A	A	A	A	A	A		81	A	A	A	73	A	68	71	69
30	66	68	70	69	68	64	81	93		A	81	A	A	A	95	A	80	78	94	92	77	95	84	84
31	82	94	95	68	60	63	94	A	72	A		A			100	86	88	87	86	81	69	73	70	95
	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	29	26	31	28	28	28	25	21	16	10	16	7	15	23	23	18	22	23	26	25	26	27	25
MED	80	81	80	69	70	71	82	93	87	84	83	87	86	91	88	86	83	84	86	84	80	79	82	84
U Q	87	92	93	77	77	81	93	101	96	95	89	91	102	97	95	89	88	88	93	93	85	86	85	93
L Q	67	68	68	67	63	63	74	89	80	80	80	83	82	82	84	80	77	78	82	73	68	68	70	74

HOURLY VALUES OF fEs AT Kokubunji

JUL. 1999

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	40	25	31	37	32	34	45	52	57		G	G	48	52	68	106	150	180	86	55	63	52	G
2	27	G	G	G	32	30	47	61	77	60	55			G	G	G	G	36	34	G	G	G	G	81
3	28	30	38	34	34	40	74	88	94	67	88	92	116	80	46	62	46	93	34	49	55	107	96	98
4		133	57	70	56	52	54	60	74	70	69	90	118	88	111	54	75	46	46	43	32	33	29	45
5	34	37	38	35	34	G	G	G	50	G	61	G	70	58	70	G	49	56	73	37	116	45	74	28
6	44	39	38	33	40	34	39	92	76	68	63	69	88	91	G	58	92	107	43	41	33	44	88	49
7		68	G	33	39	41	37	42	69	95	58	86	126	94	110	G	54	85		115	74	23		38
8	28	36	56	52		35	34	G		84	49	G	G	G	55	52	G	58	55	38	G	29	32	86
9	60	64	53	24	25	G	46	45	60	72	89	58	118	48	60	58	105	129	111	94	71	70	52	34
10	54	40	26	48	30	G	36	62	G	86	55	86	84	130	82	143	180	G	68		176	109	73	90
11	57	32	60	G	35	40	49	48	58	142	128	60	82	125	109	90	87	68	53	30	G	34	G	G
12	37	33	40	34	89	58	50	41	58	50	G	52	56	G	G	G	G	52	45	32	107	71	55	30
13	42	28	40	29	G	32	33	40	57	54	54	78	58	60	89	113	74	57	72	43	55	31	40	40
14	53	42	39	G	G	G	57	52	69	54	84	108	88	122	70	78	G	50	72	80	60	54	56	54
15	58	39	40	37	36	31	48	124	60	57	58	59	104	56	54	44	57	41	35	47	44	40	72	56
16	58	61	44	54	58	54	49	70	124	179	71	G	62	72	54	50	59	81	132	64	34	44	88	90
17		70	25	28	29		120	90		G	G	56	73	78	104		52	52	42	62	54	24	85	42
18		52	43	37		34	50	71	117	180	67	G	G	54	G	58	60	83	59	30	71	62	63	62
19	57			32	25	32	62	59	68	86	60	58	46	66	86	49	81	76	60	84	90	106	62	53
20	48	41	40	31	31	G	34	50	G	G	51	47	52	57	G	G	68	70	54	54	44	48	82	60
21	G	28	G	G	G	30	34	G	57	61	155	108	110	84	57	81	180	147			99	45	34	68
22	60	72	56	46	33	30		60	83		127	54	58		G	G	60	94	59	40	46	41	33	34
23	60	35	51	51	54	60	59	71	88	93	86	68	88	152	90	G	G	50	97	81	40	68	98	60
24	25	37	30	32	30	G	G	55	74	66	59	116	81	132		71	160	126	132	90	34	80	59	70
25	38	34		54	61	30	39	74	62	71	64	92	84	88	65	61	74	69	74	58	46	54	59	89
26		37	60	32	33	G	57	55	116	57	G	53	125	54	54	47	71	56	50	50	44	33	49	58
27	56	G	G	G		G	32	59	86	155	98	154	104	183	88	66	G	60	52	49	61	44	34	34
28	30	30	G	G	G	G	35	40	47	52	52	62	66	66	86	73	70	47	46	45	34	34	28	
29	32	G	G	G	G	28	43	71	72	62	58	92	77	59	G	G	84	57	89	56	71	71	36	40
30	34	23	G	G	G	G	38	47	44	60	58	97	135	89	61	84	60	54	41	65	44	33	31	73
31	50	30	38	43	32	49	49	66	48	92	150	182			106	55	56	57	35	37	65	60	73	101
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	30	29	31	28	30	30	31	29	30	30	30	29	29	30	30	31	31	29	29	31	31	30	30
MED	43	37	38	32	32	30	44	59	68	66	60	65	82	72	60	56	60	58	55	49	54	45	56	55
U Q	57	42	47	43	38	40	50	71	80	86	86	92	107	92	88	71	84	85	73	72	71	68	73	73
L Q	30	30	13	G	25	G	34	45	54	57	55	53	58	55	46	G	49	52	44	39	34	33	34	38

HOURLY VALUES OF fmin AT Kokubunji

JUL. 1999

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	15	16	15	15	17	15	17	23	39	43			39		42	23	16	16	14	14	15	14	15
2	16	15	14	14	14	14	16	18	22		39					27	20	14	17	18	15	14	16	15
3	14	14	14	14	16	15	14	16		40	42	40	40	39		35	20	16	14	15	15	14	14	14
4	14	14	15	14	15	15	18	18	21	26	40	42	39	40	24	23	24	18	14	15	15	15	14	14
5	15	15	14	14	15	15	16	16	21				40	40	43	64	23	16	17	14	14	15	15	14
6	14	14	14	14	14	14	15	17	21	22	40	40	39	39		26	21	15	15	14	15	14	15	14
7	15	15	14	14	15	14	15	14	17		43	40	42	43	14		16	17	15	14	14	15	14	14
8	14	15	14	15		14	16	18		35					45	39	48	17	14	15	16	14	14	15
9	15	14	14	14	15	15	14	15	22	18		46	14			18	18	16	15	14	15	14	14	14
10	15	14	14	15	14	15	16	16		27		40	39	38	17	35	14	15	15		15	14	14	14
11	15	15	14	15	14	15	14	14	26	23	35	21		45	40	39	18	15	14	14	14	14	16	15
12	14	15	14	14	14	15	15	15	16	20	27		36		60	30	18	15	15	14	14	14	15	15
13	14	15	15	15	14	14	15	17	18	29		38	44	43	45	39	22	17	15	15	14	14	15	14
14	14	14	14	15	15	20	14	17	17	22	26	36	40	34	38	22	18	14	15	15	14	14	15	15
15	14	14	14	15	15	15	15	16	18		36	38	36	39	17	26	22	14	16	14	15	15	15	14
16	15	15	14	14	14	14	16	15	18	20			38	34	22	22	17	15	15	15	15	14	14	14
17		14	15	14	15		15	14	17			40	40	44	36	22	18	14	14	15	14	15	14	14
18		14	15	14		15	14	15	17	27	36		66		54		15	14	15	14	14	14	14	14
19	14			14	14	14	15	16	16	23		40		39	33	21	17	15	20	15	15	15	14	15
20	15	15	14	14	15	21	15	15	18	20	38	24	34	34	28	20	18	15	15	15	14	14	14	14
21	14	15	15	14	15	15	15	17	17	20	26		38	35	37	20	16	14			14	14	15	14
22	15	15	14	15	14	14		20			33	40	42		66	54	16	14	15	15	15	14	14	14
23	14	14	14	14	14	14	14	17	21		42	43	42	39	43	24		15	14	15	15	14	14	15
24	14	15	14	14	16	20	15	18	40	38	40	39	40	46		33	20	34	14	15	14	14	15	14
25	14	14		15	14	14	16	18	20		40	40	43	44	27	24	20	15	15	14	14	14	14	14
26		14	15	14	15	14	16	16	17	26		29	27	34	32	23	17	15	15	14	14	15	15	15
27	15	15	17	15		16	16	15	24		39	42	44	42	41	29	21	14	15	15	15	15	15	14
28	15	14	15	18	15	16	15	16	17	24	32	53	36	38	36	23	15	15	14	16	14	15	14	
29	14	14	14	14	16	15	15	15	22	34		35	27	28	26	27	21	14	16	15	17	14	15	15
30	14	15	15	14	14	16	17	16	20	36	39	42	38	38	32	32	17	16	14	14	14	14	15	14
31	15	15	15	15	14	15	17	18	21	26		42		39	36	24	17	15	14	14	15	15	14	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	30	29	31	28	30	30	31	27	22	20	23	25	25	25	29	30	31	30	29	31	31	31	30
MED	14	15	14	14	15	15	15	16	20	26	39	40	39	39	36	26	18	15	15	15	14	14	14	14
U Q	15	15	15	15	15	15	16	17	22	34	40	42	42	42	43	35	21	16	15	15	15	15	15	15
L Q	14	14	14	14	14	14	15	15	17	22	34	38	36	36	26	22	17	14	14	14	14	14	14	14

HOURLY VALUES OF foF2 AT Yamagawa

JUL. 1999

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	80	84	79	75	74	73	76		84	80	84	83	86	95	103	99	91	88	91	87	86	82	82	94
2	85	98	87	87	84	80	82	86	81	A	91	83	69	99	104	106	98	87	88	98	94	74	79	66
3	80		73	54	N	72	87	87	A	A	A	A	A	A	82	86	A	88	A	A	84	80	81	78
4	84	92	85	75	77	75	75	88	98		84	86		86	89	89	91	91	87	90	79	59	59	65
5		80	74	A	68	66	A	91	86	N	83		73	82	93	101	102	101	88	92	92	79	69	92
6	91	90	92	87	76	74	99	92			73	A	A	A	97	101	100		105	103	87	86	86	
7	90	97	90	83	A	89	A	88	84	98	90	84	95	95	94	88	91	A	139	84	87	81	86	85
8	94	88	97	94	88	88	94	102	92	74	A		90	A	A	87	90	103	102	88	84	82	79	
9	92	94	86	79	89	69	74		82		78	75	88	93	90	96	102	103	92	82	A	80	A	82
10	A	83	82	77	72	69	73	86	93	98	88	86		97	95	93	98	108	110	91	83	86	83	
11	94	86	91	82	82	77	93	92	94	A		91	93	102	104	103	87	102	108	87	90	93	88	90
12	86	98	92	86	80	73	78	92	98	97	87	86	90	99	93				99	87	86	84	88	88
13	87	86	82	83	82	81	86	92	81	A	86	83	91	A	96	92	A	105	105	100	79	81	92	97
14	115	99	85	86	72	69	76	101	88	75	A	76	81	84	A	87	96	98	100	90	87	82	86	93
15	88	84	86	81	81	82	92	A	A	78	75	83	A	87	98	A	A	A	99	103	93	82	74	66
16	95	82	92	82	83	72	77	98	91	A	77	A		77	A		67	71	76	72	82		76	81
17	82	82	87	82	83	70	71	82	92		A	A	86	A	81	74	77	83	87	91	98	86	81	80
18	71	77	78	78	72	75	91	93	77	A	74	75	82	84	82	81	85	97	103	88	94	79	83	81
19	77		83	93	82	70	66	A	81	A	74	A	78	A	A	93	97	93	94	91	91	81	80	76
20	81	80	84	76	70	60	53	81	84	72	77	81	88	88	90	94	90	79	79	93	97	89	90	86
21	78	84	81	92	85	70	67	90	94	83	81	97	A	110	104	105	101	105	102	102		90	81	85
22	82	84	95	70	59	58		77		70		A		74	74	82	76	80	90	A	67	31	59	34
23	34	61	69	62	62	59	60	79	A	A	A	A	A	A				A	62	A	30	79	A	34
24	33	69	A	60	58	59	60	66	A	77	A	A	A	85	92	96	94	87	85	81	88	80	70	73
25	76	83	85	94	86	72	A	87	82		71	A	90		100	102	A	A	A	82	A	82	79	78
26	77	79	66	60	67	A	66	98	74		75	A	93	100	97	91	104	98	81	68	79	71	A	73
27	73	74	73	A	A	64	A	76	102	96	77		90	A		A	A	86	A	74	82	84	80	81
28	77	74	59	60	54		57	76	75	72	A	A	A	A										
29										75	75	83	74	80	80	80	76	77	81	72		99		A
30	75		79	74	67	54	71	80	82	76	80	84	84		98	101	93	90	91	84	66	83		
31	92	73	84	86		54		58	73		A	86	96	99	108	97	101	111	104	100		76	90	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	27	29	28	26	28	24	26	24	15	21	17	20	20	24	25	23	24	27	27	25	29	25	24
MED	82	84	84	82	76	71	76	88	84	77	78	83	88	90	94	93	93	92	92	88	86	82	81	81
U Q	90	90	88	86	83	75	86	92	92	96	85	86	90	99	99	101	100	102	103	93	91	85	86	87
L Q	77	79	78	74	68	65	66	80	81	74	75	82	81	84	89	87	87	86	87	82	80	79	77	73

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fEs AT Yamagawa

JUL. 1999

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	29	G	G	G	G	G	G	G	50	G	66	90	74	35	33	33	33	G
2	G	G	G	31	G	G	G	G	96	161	G	G	G	G	G	G	G	G	G	42	32	23	G	G
3	29	G	G	G	G	G	G	54	128		167	175	80	97	G	G	87	G		93	82	41	G	G	39
4	33	G	35	G	32	28	36	51	G		G	G	G	G	G	G	G	G	G	27	G	G	G	G
5	28	G	28	35	G	33	38	G	G	G	G	G	G	G	G	G	G	G	G	34	32	G	G	32
6	G	G	G	34	33	G	G	36	G		G	89	77	128	78	G	G	152	G	33	27	G	22	G
7	G	33		40	37	32	93	G	G	G		G	G	G	G	G	110	89	91	86	36	33	G	40
8	80		36	39	G	30	60		52	60	89		G	106	82	G	G	G	36	G	G	G	G	G
9	G	30	26	32	31	G	G	G	G		G	G	G	G	G	G	81	95	54		76	32	106	32
10	90	37	33	G	32	50	G	G	90	G	G	G		G	104	133	79	78	54	33	33	G	G	144
11	34	36	G	37	30	25	46	84	66	164		G	G	G	G	G	G	G	46	37	40	32	G	G
12	21	G	G	G	G	G	32	35	45		G	G	G	G	G				G	G	G	G	G	
13	G	32	40	31	37	34	37	36	62	93	G	G	G	88	85	65	134	93	76	40	G	G	G	G
14	G	G	G	G	G	G	G	G	G	G	64	74	60	G	132	G	G	38	G	G	32	G		
15	32	33	32	50	37	40	35	110	163	162	62	76	81	125	83	100	102	104	34	27	32	G	40	31
16	25	26	G	39	50	33	46	44	57	136	68	160	149	61	76	G	G	G	48	32	52		29	32
17		G	29	43	31	G	32	G	G		152	144	83	88	62	G	G	G	G	26	G	32	28	32
18	G	34	33	39	32	31	28	48	76	52	52	52	65	G	66	G	46		37	32	G	G	28	34
19	32		30	40	40	40	53	69	83	79	76	79	82	130	104	60	68	G	G	32	G	38	40	G
20	37	32	32	40	38	28	G	37	G	62	G	G	77	G	G	G	78	84	83	40		39	39	33
21	32	G	G	G	G	G	G	39	G	G	G	G	148	117	90	75	72	68	110	152	162	91	G	38
22	31	G	G	G	G	G	G	61		60		66	G	G	G	G	G	G	33	88	38	G	40	32
23	39	32	28	G	G	G	G	97	96	185	97	105	65	101		G	G	39	33		39	38	40	40
24	29	80	45	33	G	G	G	49	115	64	86	91	124	79	G	61	G	G	G	G	G	G	32	G
25	32	G	G	G	G	G	56	72	82		G	67	94	78	G	91	100	84	80	50	40	32	G	32
26	38	30	32	32	G	48	32	G	51	G	56	134	51	G	G	G	G	G	51	59	40	G	29	33
27	G	32	32	36	39	44	33	36	61	84	77		124	146		136	171	53	60	40	40	G	32	G
28	G	G	G	G	G		G	G	G	G	68	76	111	86										
29										81	92	G	G	G	G	G	G	60	57	54		27	30	56
30	29	48	28	G	G	G		39	43	G	G	G	G		58	57	76		G	G	G	28	28	
31	40	31	G	G		G		G	56	80		102	149	102	G	G	77	G	G	41	G	G	46	40
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	28	29	30	29	29	28	29	29	25	27	29	30	30	28	29	29	27	30	28	28	29	29	27
MED	29	28	28	32	G	G	30	36	52	60	52	52	62	31	G	G	46	38	36	34	32	G	28	32
U Q	33	32	32	39	35	33	37	52	82	88	77	90	83	101	80	60	80	84	60	46	40	32	36	38
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	27	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fmin AT Yamagawa

JUL. 1999

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	15	16	15	16	15	18	18	22		58				69	68	55		20	18	14	16	15	15
2	15	15	20	16	20	18	18		58	58	58				72	66	72	59	18	18	17	15	18	15
3	16	16	15	17	21	17		18	22	66	69	67	45	68			66	23	20	18	16	16	16	16
4	16	15	15	16	17	16	18	20				69					66	22		17	16	15	15	16
5	15	18	16	16	16	16	16	20		68	67					66	66	66	44	20	18	15	16	16
6	21	17	20	16	20	18		22				65	70	70		68	68	65	20	17	15	16	16	20
7	16	16	16	17	16	17	18	17	70	68	70		70	69	60	58	45	44	18	18	15	15	16	16
8	15	15	15	16	16	16	18	21		44	58		67	59	67	66	58	64	20	20	15	15	15	15
9	17	15	17	15	16	15	17	20	21		66		N	73	70	68	47	22	20	16	16	16	16	15
10	16	15	15	17	15	16	16	21		70	61	66		N	61	59	70	21	20	18	15	15		17
11	17	15	18	20	15	23	18	16	21	46		59	70	68	59	55			21	16	15	14	15	15
12	18	15	16	15	15	15	16	20	21	56	55	60	59	68	70				29	18	14	15	16	16
13	15	15	15	15	15	15	16	20	21	43	56	57	59	48	54	48	49	22	17	15	15	15	15	15
14	15	17	15	15	14	14	22	18	20		48	48	49	56	46	54	54	22	16	15	15	16	15	15
15	15	15	15	16	16	18	17	18	20	23	45	44	49	43	41	45	23	21	21	17	17		20	16
16	17	16	18	16	16	15	18	18	21	36	44	44	66	45	40		66		24	18	15	15	14	16
17	17	16	15	16	18	15	18	21	22		45	44	43	46	45	58	22	21		18	17	16	18	15
18	18	17	16	16	14	16	15	17	22	60	57	44	45	56	52	55	54		20	17	15	21	17	15
19	22		15	16	15	17	16	18	22	43	44	49	46	46	46	43	29	22	44	16	16	15	14	16
20	15	15	15	16	15	16	21	20	23	23	60	56	45	54	60	58	42	41	22	17	16	17	16	16
21	15	18	20	15	14	15	18	18	22	50		60	46	48	48	43	35	21	17	15	17	18	16	15
22	16	15	14	16	14	15	21	21		40		46	60		54	60	62		16	18	17	17	16	16
23	16	16	16	16	15	15	18	20	51	54	46	48	53	45				23	20	18	16	15	15	16
24	15	15	15	18	15	15	21	20	46	60	43	54	48	54	68	43	55	56	21	22	14	15	17	91
25	17	15	17		14	15	18	18	21			56	54	55	69	39	67	22	20	16	20	16	15	16
26	16	15	18	18	15	26	15	21	21		45	43	63	58	69	59	58	53	20	17	16		23	17
27	21	21	16	16	15	16	17		23	66	46		60	68		44	41	22	22	15	15	20	17	20
28	15	15	15	15	15		21	16	23		48	56	46	49										
29										56	57	69	60	63	62	54	53	34	21	18	16	15	17	21
30	18	15	16	18	16	15	22	21	27		56	56	N		46	36	35	22	33	18	16	21	20	
31	15	18	16	15		15		36	34	44	47	48	46	44	56	59	27	22	26	14	16	15	18	16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	29	30	29	29	29	27	28	24	21	25	24	24	24	24	25	27	24	28	30	30	28	29	29
MED	16	15	16	16	15	16	18	20	22	54	56	56	54	56	60	58	54	22	20	18	16	15	16	16
U Q	17	16	17	16	16	17	18	21	25	63	59	60	61	68	68	63	66	48	22	18	16	16	17	16
L Q	15	15	15	15	15	15	16	18	21	43	45	47	46	47	47	44	41	22	20	16	15	15	15	15

HOURLY VALUES OF foF2 AT Okinawa

JUL. 1999

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	76	95	94	73	73	94	72	80	82	78	A	A	115	A	A	134	A	104	111	88	81	73	N	75
2	77	94	94	80	94	95	72	76	A	82	A	A	87	113	117	133		110	139	111	84	83	81	95
3		80	62	57	54	58	95	95	94	92	78	79	93	91	94	101	94	101	102	113	86	88	87	
4		88		94	81	67	71	94	96	76	85	87	92	92	92	95	104	111	111	90	70	76	78	77
5	95	95	74	74	66	68	77			114	77	71	80	95	111	116	113	112	95	88	91	83	82	
6	113	110	117	93	80	83	92	84	72	76	A	77	69	92		97	113	117	110	128	83	83	87	96
7	94	95		73	92	70	80	81	91	94	78	90	92	92	92	92	97	122	129		93	84	A	92
8	94		80	81	77	80	96	91	94	80	76	82	92	92	93	94	100	105	106	84	81	A	71	80
9	94	80	79	70	70	77	76	72	74	83	82	86	88	93	92	134	105	113	104	90	83	83	83	A
10	76	78	74	72	A	A	68	A	84	95	81	77	92	92	92	103	112	120	112		88	86	95	90
11	93		94	95	77	84	92	94	93	71	75	93	92	103	112	95	104	116	120	88	88	86	81	96
12	69	133	115	115	80	70	72	92	94	87	82	76	92	92	114	94	106	111	82	87	78	80	85	95
13	82	84	77	93	73	68	70	80	80	81	85	92	89	104	94	105	116	117	122	A	A	86	136	
14	155	153	151	116	94	80	93	109	101	70	75	92	79	77	78	A	105	112	105	84	82	74	76	76
15	75	94	81	75	76	75	61	A	93	82	85	A	A	92		115		128	111	110	96	81	79	94
16	79	93	92	95	76		A	88	95	91	92	A		A	A	80	75	81	81	83	76	95		76
17	80	94	80	97	69	58	67	84	83	66	A	A	A	82	84	91	91	92	94	93	92	83	57	78
18	76	74	70	75	75	69	76	86	78	66	77	84	92	91	80	90	95	106	85	88	90	83	83	80
19	83	75	81	92	73	48	57	95	93	75	72	72	77	74	89	112	114	106	105	85	82	75	79	A
20	80	93	78	78	62	56	67	83	80	71	A	88	91	100	92	95	107	94	98	110	84	87	82	90
21		94	96	93	80	77	72		96	71	A	A	95	114	116	114	128	134	121		94	81	A	81
22	87	96	92	70	60	58	57	83	87	A	82	87		93	91	91	91	92	94	88	67	A	A	59
23	67	59	66	69	55	56	50	54	59	A	A	69	A	76	A	A	73	92	73	84	60	A	61	58
24	62	A	68	55	61	50	51	68	A	A	A	81	92	92	92	94	103	94	96	87	94	95	71	78
25	80	115	122	94		96	93	91	95	67	73	81	92	120	79	109	113	90	109		86		95	75
26	81	78	64	65	68	71	74	94	72	72	80	88	88	103	114	122	121	94	93		A	72	A	87
27	94	93	95	95	68	62	54	72	98	93	72	90	97	104	106	106	112	110		A	94	81	A	95
28	82	92	95	77	69	63	60	92	69	72	77	A	90	93	94	91	91	113	94	90	A	83	71	78
29	94	81	80	70	58	52	56	84	93	82	93	91	91	92	92	88	92	91	81	82	A	A	A	94
30	A	94	73		68	58	61	84	71	72	76	81	81	90				91	93	88	93	84	90	94
31	95	60	81	75		72	68	63	70	92	76	115	112	A	120	117	125	153	132	114	94	81		95
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	28	29	30	28	29	30	27	28	28	23	24	26	28	25	28	27	31	30	24	27	26	22	26
MED	82	93	81	78	73	69	72	84	89	79	78	85	92	92	92	99	105	110	104	88	86	83	82	84
U Q	94	95	94	94	78	78	77	92	94	89	82	90	92	101	111	114	113	116	111	101	93	86	87	94
L Q	76	80	74	72	67	58	61	80	76	71	76	78	88	91	91	93	94	94	94	86	81	81	76	77

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fEs AT Okinawa

JUL. 1999

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	60	25	G	G	G	G	G	40	78	98	90	66	66	113	146	56	96	133	65	79	26	44	70	79
2	80	75	64	37	27	G	33	51	82	72	118	125	98	72	67			G	35	G	G	G	24	23
3	G	G	G	G	G	G	G	35	50	G	84	G	G	G	G	G	45	78	67	44	23	54	54	
4		67		32	G	G	G	45	54	42	61	60	G	G	G	G	45	52	41	36	28	26	G	G
5	G	G	25	G	G	25	41	45		67	68	56	G	G	G	G	G	G	G	34	G	30	24	
6	42	40	24	G	G	25	42	48	G	43	88	G	66	G		G	66	76	60	49	60	57	38	38
7	34	33	26	27	24	G	G	39	66	68	50	G	G	50	57	65	63	50	64		92	65	77	75
8	33		43	G	G	43	34	56	54	47	G	56	64	70	85	68	61	63	47	59	33	40	G	24
9	28	41	28	G	G	G	43	72	G	47	81	58	G	62	73	47	G	G	78	57		48	G	82
10	66	88	75	62	59	60	56	93	80	83	44	46	77	65	54	97	63	94	87	82	26	30	33	50
11	33	60	66	G	28	47	G	35	G	77	G	G	G	60	59	57	57	97	48	29	G	G	31	35
12	48	G	G	G	G	G	G	38	G	45	52	G	G	G	52	G	G	G	36	46	27	G	G	G
13	50	26	98	58	31	38	68	47	42	61	G	G	G	G	G	78	74	52	59	56	95	60	41	
14	34	28	G	G	G	G	G	41	42	42	G	G	53	G	66	111	61	59	46	42	60	64	G	84
15		60	77	66	47	46	33	60	82	56	G	89	86	62	104	62	45	40	39	51	40	36	40	50
16	29	36	54	30	58	43	54	51	42	48	59			144	143	54	45	50	55	50	42	38		73
17	59	27	G	G	G	G	G	34	46	G	110		67	68	G	47	47	45	36	88	82	50	85	34
18	30	G	G	G	34	43	35	38	41	50	G	60	G	60	65	G	42	56	45	58	G	G	G	G
19	G	G	G	G	56	35	G	G	44	G	G	G	G	G	63	48	162	51	79	49	66	33	25	65
20	67	44	41	38	37	31	G	38	64	61	96		56	55	60	G	46	64	44	109	60	78	80	
21		38	31	G	G	G	G		46	60	96	97	G	76	56	83	55	45	63		40	49	72	74
22	79	38	49	33	39	G	G	40	58	97	81	55	G	68	71	62	66	73	60	60	36	59	36	34
23	43	43	44	26	G	G	G	42	56	66	120	58	59	G	64	44	59	44	G	44	38	82	73	96
24	63	90	44	37	39	37	48		98	87	57	47	G	G	60	67	G	G	G	35	32	40	28	32
25	33	38	33	G	G	G	30	42	68	60	62	68	64	63	63	74	124	116	68		66		36	
26	68	66	44	G	G	32	50	69	68	42	G	G	57	68	G	G	G	61	47		59	G	42	40
27	34	38	36	39	39	38	34	44	57	64	58	62	70	83	82	90	47	82		95	68	58	38	43
28	37	35	43	28	25	G	G	G	G	42	G	78	60	76	69	56	65	90	85	86	76	48	50	40
29	28	44	45	40	40	25		40		55	96	56	66	79	59	G	64	82	68	70	85	92	112	78
30	59	36	G	G	G	G	G	34	52	G	80	G	G	46				66	79	79	73	77	68	40
31	40		G		36	37	29	38	38	63	63	62	57	86	45	G	97	91	82	36	G	25	G	59
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	30	30	31	31	30	29	29	31	31	28	30	31	29	29	29	31	30	27	30	30	30	26
MED	38	38	34	G	24	25	15	41	52	56	61	56	54	62	60	54	57	59	57	51	40	46	37	42
U Q	59	52	45	37	39	38	41	49	67	67	88	62	66	72	70	67	65	82	68	79	66	59	68	74
L Q	31	26	G	G	G	G	G	38	41	42	G	G	G	G	48	G	45	45	41	42	26	30	24	34

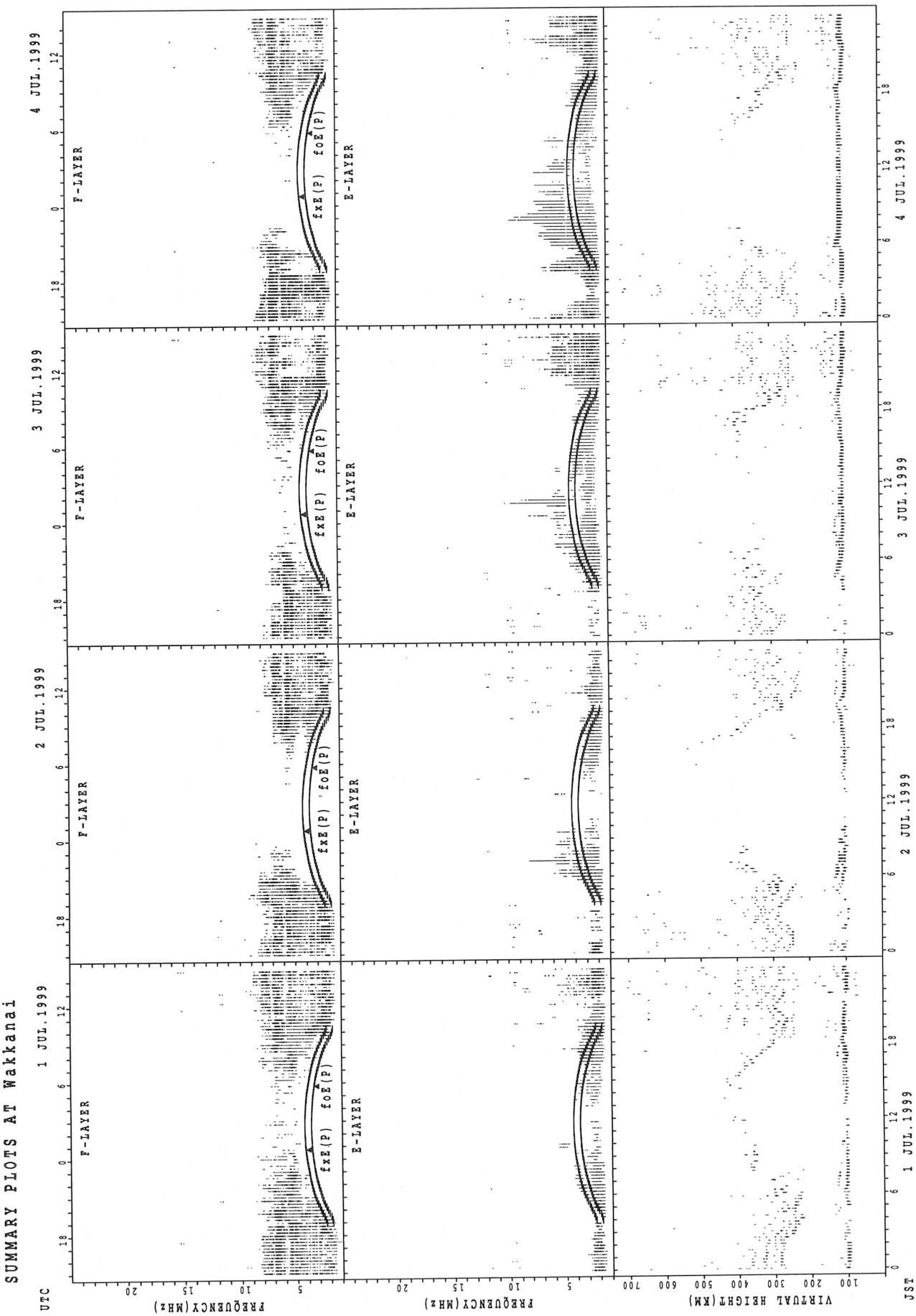
HOURLY VALUES OF fmin AT Okinawa

JUL. 1999

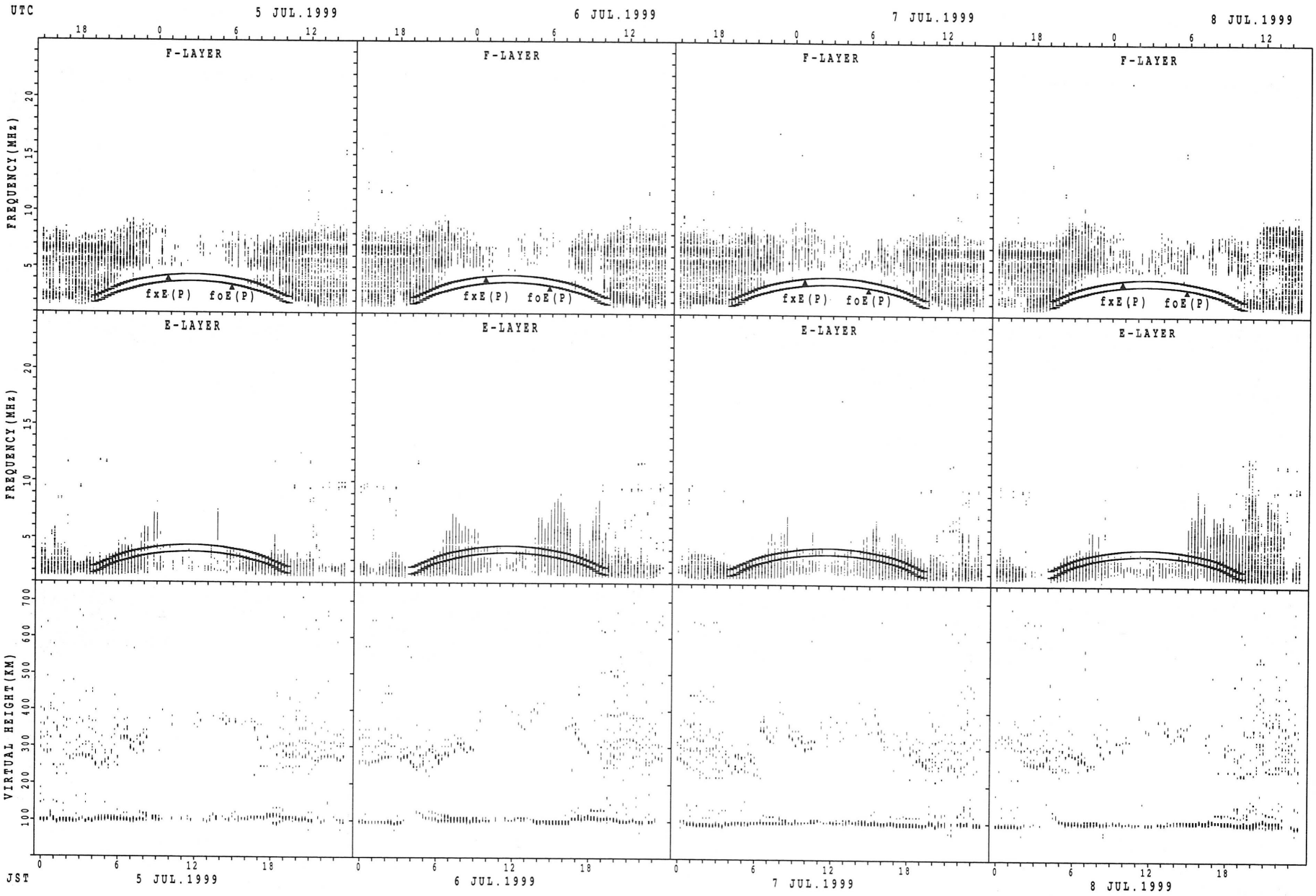
LAT. 31.2N LON. 130.6E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

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	14	16	17	14	15	26	16	21	28	29	42	45	46	39	42	44	24	17	15	15	14	15	14
2	14	14	14	14	14	14	16	16	17	30		49	43	46	42	36		27	16	15	16	15	14	16
3	15	14	14	15	16	21	24	17	18	27	32		71	68	64	29	28	17	15	15	17	14	14	
4		14		14	16	15		15	18	27	36	41		71	35	33	26	18	15	14	14	15	15	15
5	15	14	16	15	16	15	15	15		26	32	38	33		64	29	52	26	15	14	15	14	15	
6	15	14	15	14	15	14	16	15	16	21	29		47	53		58	50	22	16	14	16	14	14	15
7	14	14	14	14	14	18	22	15	17	30	30	56	56	55	43	42	30	21	15		14	15	14	15
8	15		15	30	27	15	16	16	20	29		42	44	44	47	39	38	29	15	14	14	15	18	15
9	15	16	14	15	18	15	15	15	15	20	29	45	55	46	44	39	22	16	16	15	14	14	15	14
10	14	14	15	14	14	14	15	15	20	26	30	58	33	45	46	33	28	18	15	15	14	14	14	14
11	15	14	15	14	14	14	15	15	17	23	30		58	50	43	29	23	27	16	15	15	14	14	14
12	14	16	15	17	14	15	18	15	18	28	29	35		34	35	29	28	17	14	14	15	15		16
13	15	15	14	14	14	15	15	16	18	28	30	33		59	32	32	29	30	15	15	14	15	15	
14	15	14	14	15	15	14	22	15	17	26	32		41	53	29	30	23	17	14	14	14	14	15	14
15	14	14	14	15	14	14	15	15	16	20	28	33		38	30	30	28	18	15	15	15	14	15	14
16	14	14	15	14	14	14	15	14	15	21	34	33		39	32	30	23	18	18	14	15	14		15
17	14	14	15	16	17	14	27	18	17	22	29	35	40	46	58		39	16	15	15	14	15	14	15
18	14	15	17	15	15	14	15	15	18	24	34	34	33	34	35	29	26	26	15	14	14	18	15	15
19	17	15	16	16	14	14	22	16	18	27		52			32	30	24	16	29	14	15	14	15	14
20	15	14	14	14	14	14	26	15	17	28	33	32	39	36	32	30	29	16	15	14	14	14	14	14
21		14	14	26	17	16	23		18	29	28	32		32	33	27	29	26	15		14	15	15	15
22	15	14	14	14	14	14	20	16	18	28	27	39		38	43	44	36	18	15	14	15	15	15	14
23	14	14	15	14		15	18	16	17	34	38	40	45	57	49	36	29	21	15	15	14	14	14	14
24	14	14	14	14	14	14	15	15	32	28	29	39	59	63	48	48	29	54	42	14	14	15	14	14
25	14	15	14	17	14	14	15	15	16	27	34	45	48	42	44	33	28	21	15		15		14	14
26	14	14	15	16	16	15	15	16	16	27	29	29	29	28	27		21	18	17		15	16	14	14
27	15	14	14	14	15	14	15	16	18	32	33	40	46	53	34	29	26	18		14	14	15	14	14
28	15	15	15	14	14	14	18	14	17	23	30	53	44	43	44	32	21	16	15	15	14	14	14	15
29	14	14	14	14	14	15	15	15	22	32	30	42	43	42	45		27	20	15	15	15	15	14	14
30	14	14	14	15	15	14	23	14	17	29	33		34	35				16	14	15	15	15	14	14
31	15	14	15	14	14	16	15	15	17	30	39	40	43	43	38		29	20	16	15	15	15	15	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	30	31	30	31	30	30	30	31	28	26	23	29	29	26	29	31	30	27	31	30	29	28
MED	15	14	14	14	14	14	16	15	17	27	30	40	44	45	42	32	28	18	15	15	15	15	14	14
U Q	15	14	15	16	16	15	22	16	18	29	33	45	48	53	45	39	29	26	16	15	15	15	15	15
L Q	14	14	14	14	14	14	15	15	17	24	29	34	39	38	32	29	25	17	15	14	14	14	14	14

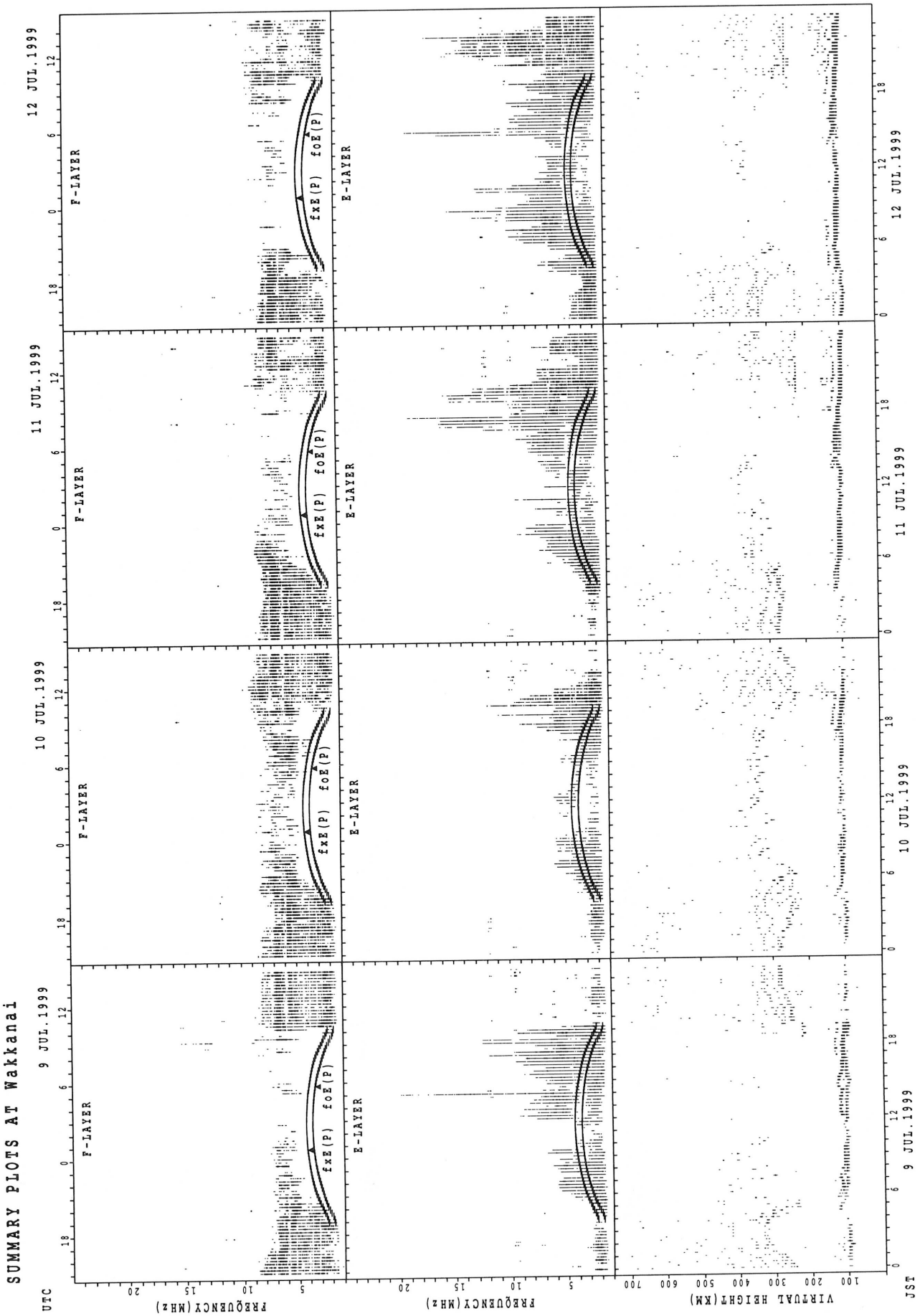
COMMUNICATIONS RESEARCH LABORATORY, JAPAN


SUMMARY PLOTS AT Wakkanai
1 JUL.1999
2 JUL.1999
3 JUL.1999
4 JUL.1999
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

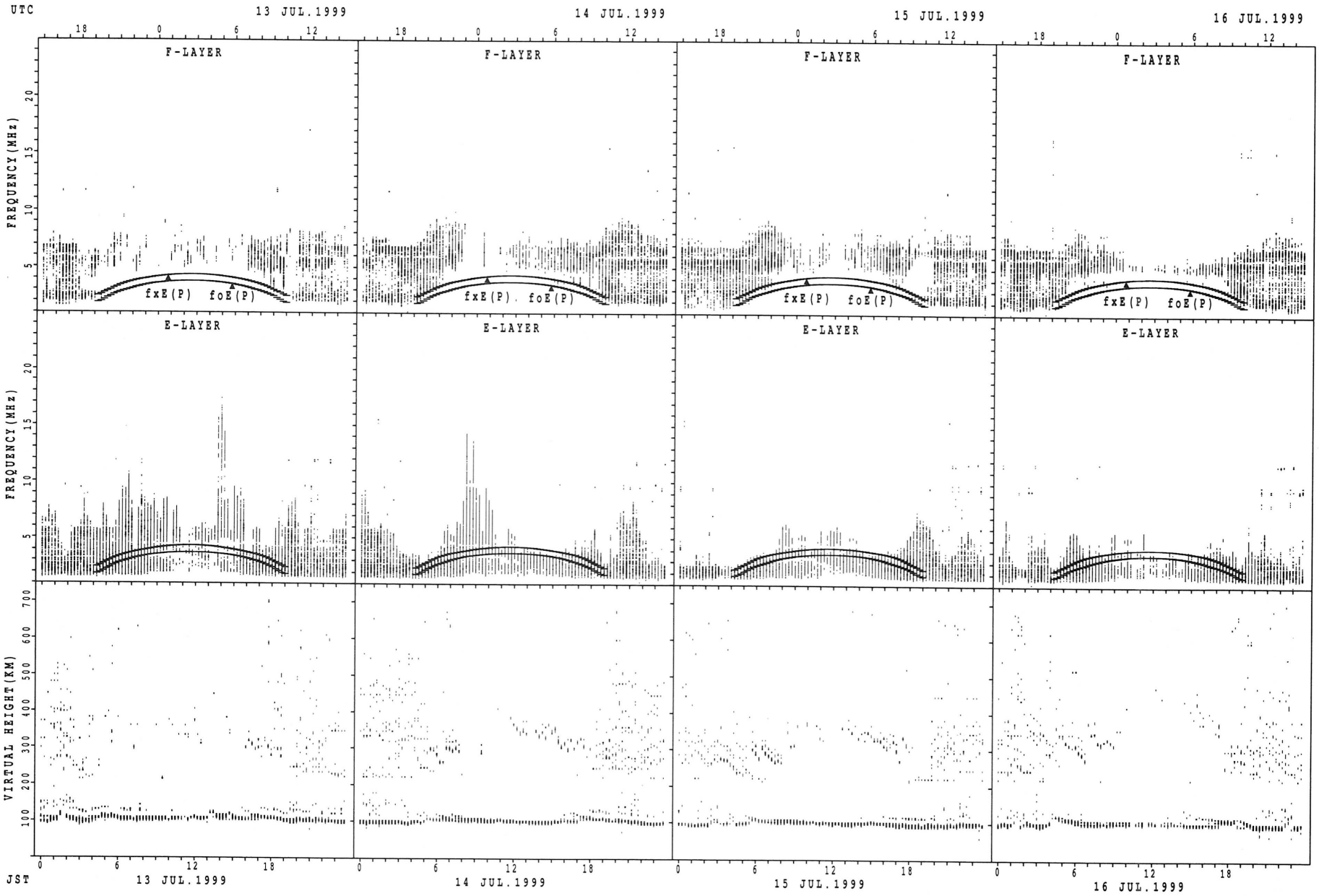
SUMMARY PLOTS AT Wakkanai



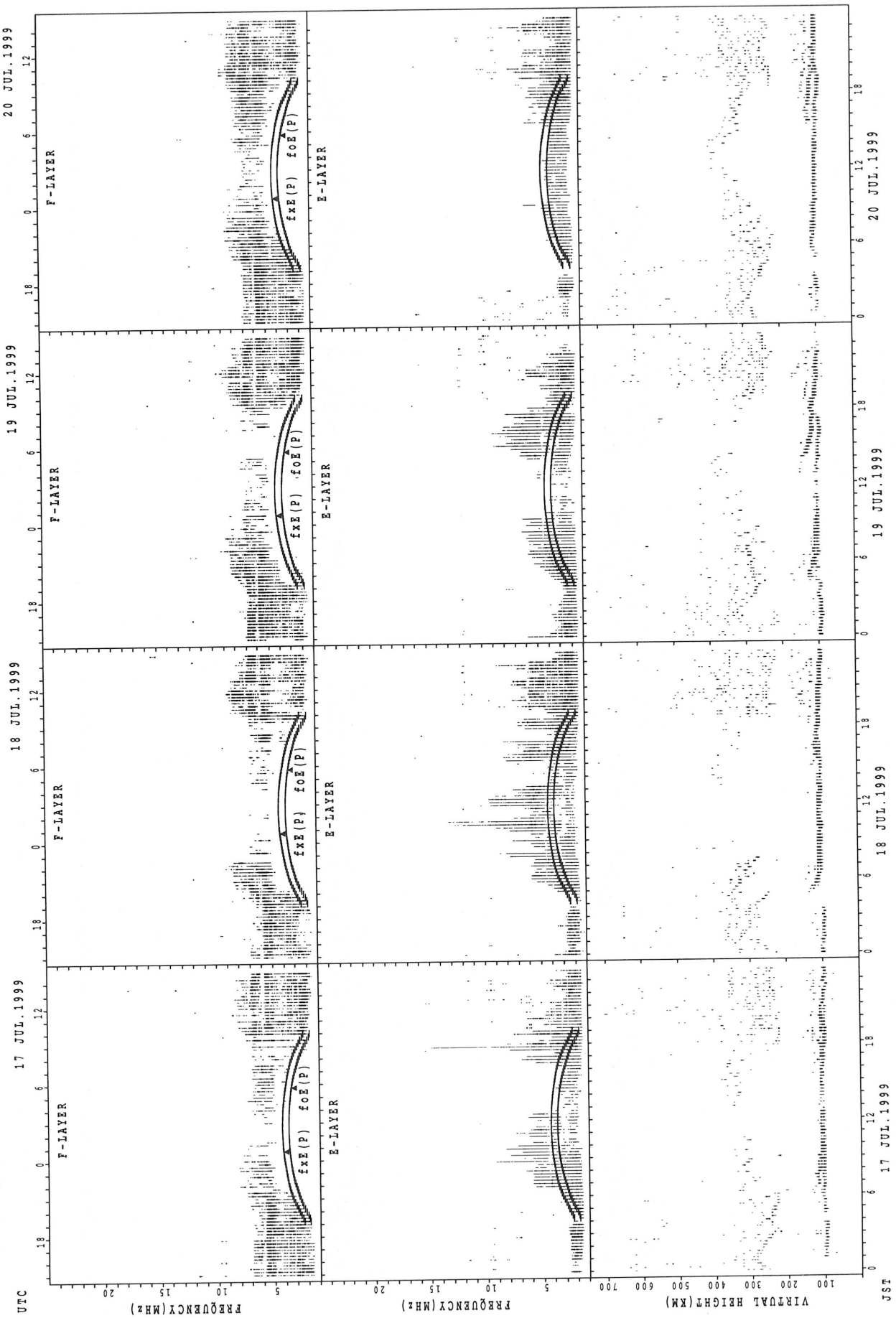
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT Wakkanai
9 JUL.1999
10 JUL.1999
11 JUL.1999
12 JUL.1999
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

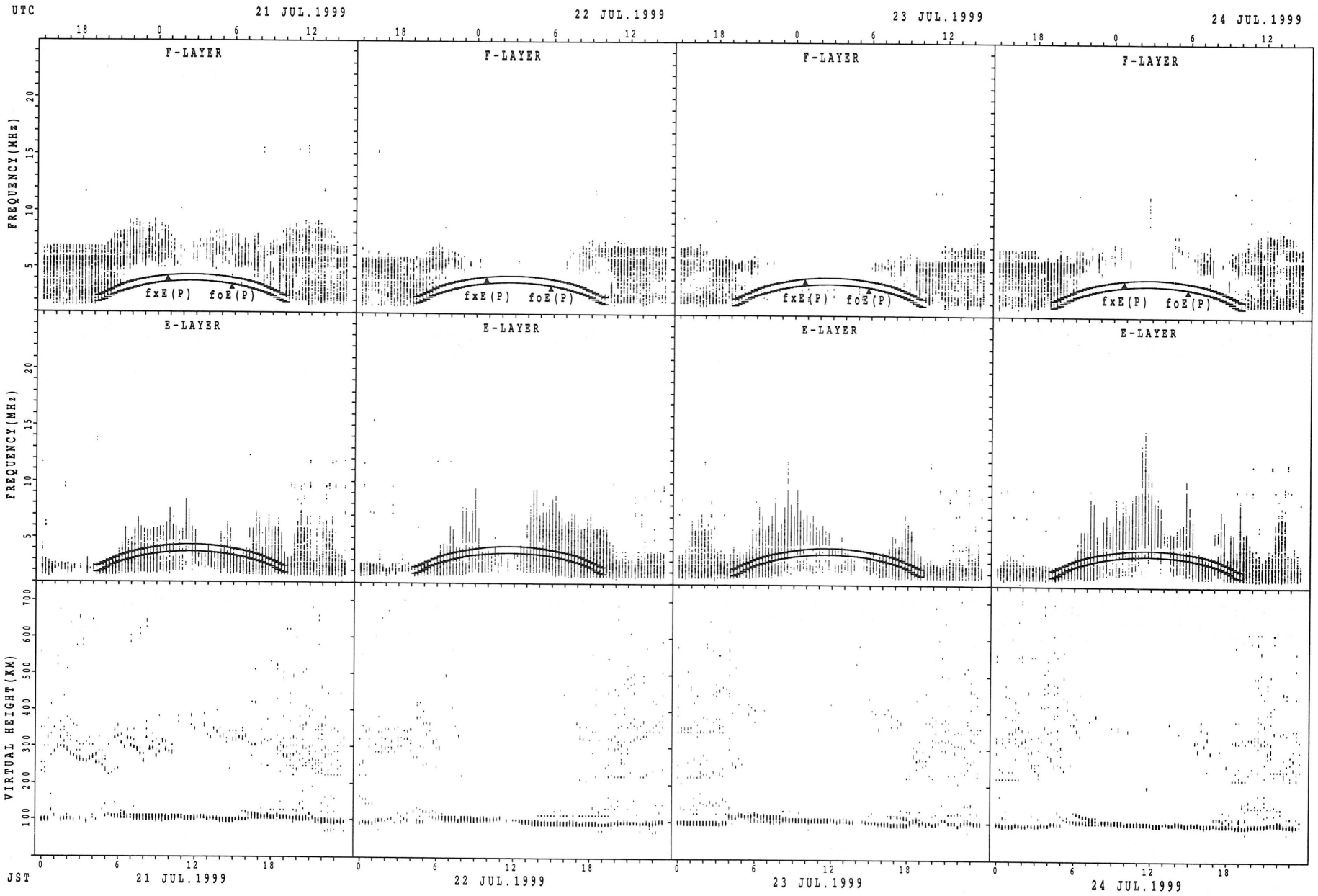
SUMMARY PLOTS AT Wakkanai



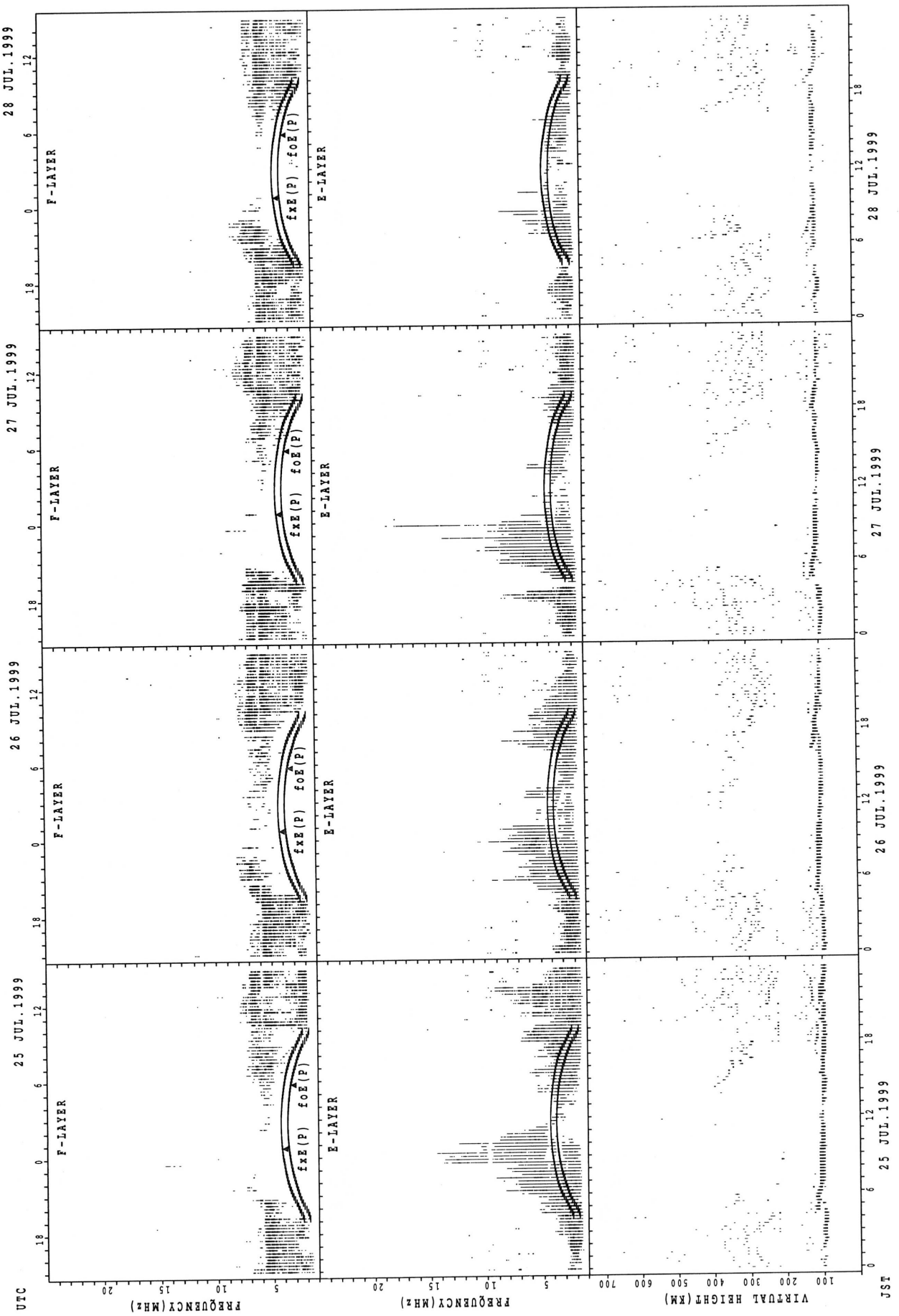
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT Wakkanai
UTC
JST
17 JUL.1999
18 JUL.1999
19 JUL.1999
20 JUL.1999
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

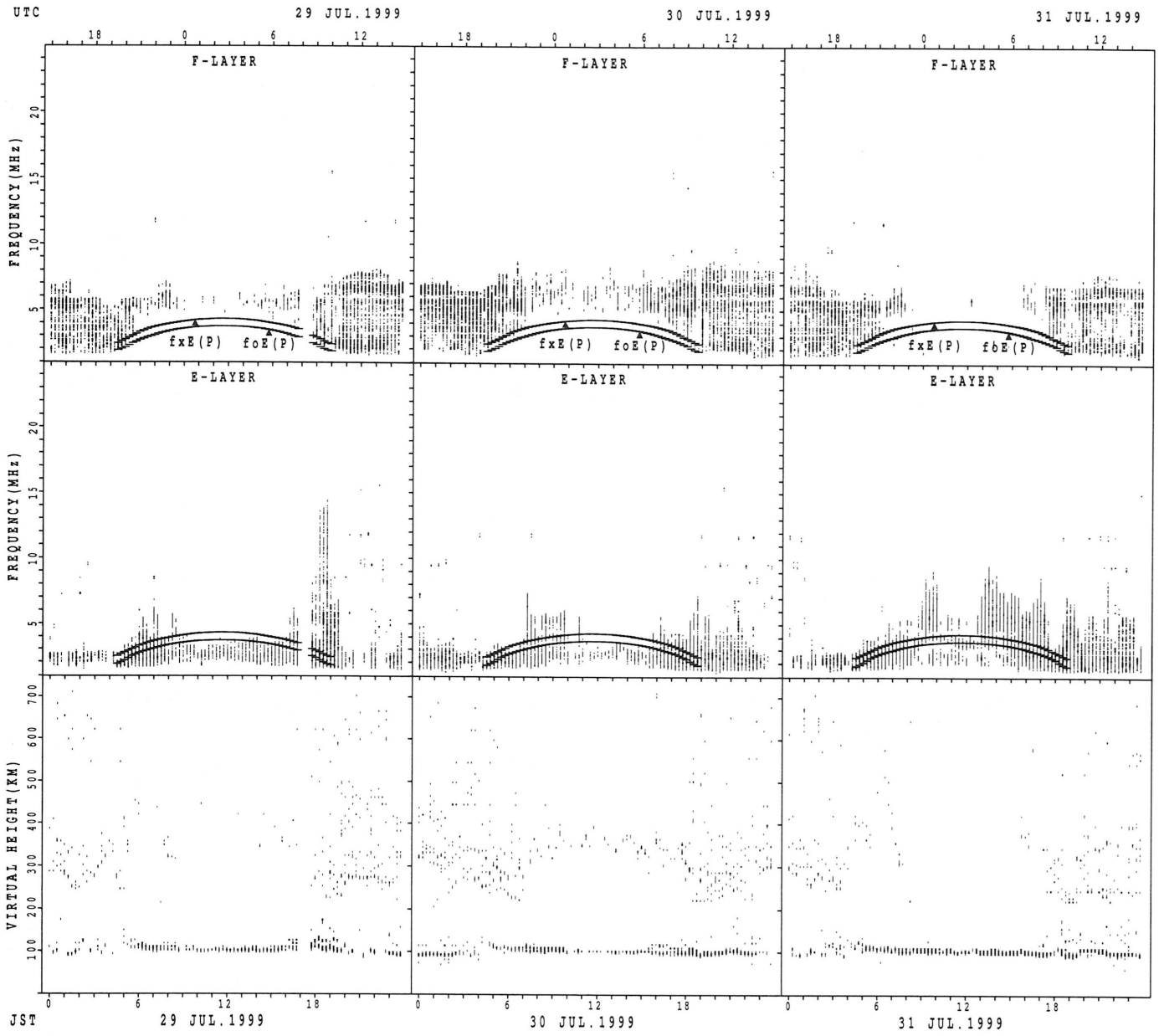
SUMMARY PLOTS AT Wakkanai



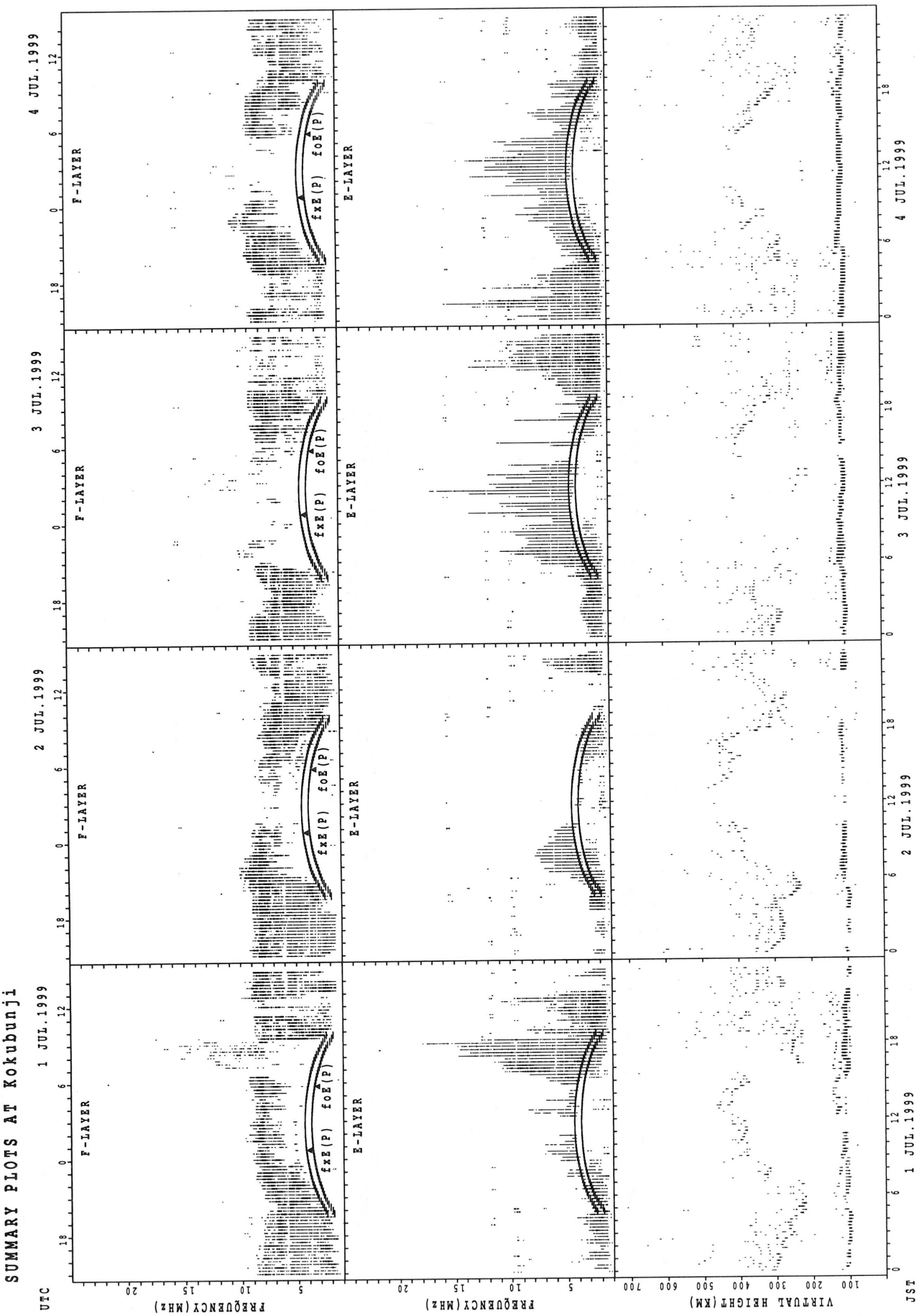
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT Wakkanai
UTC
JST
25 JUL.1999
26 JUL.1999
27 JUL.1999
28 JUL.1999
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

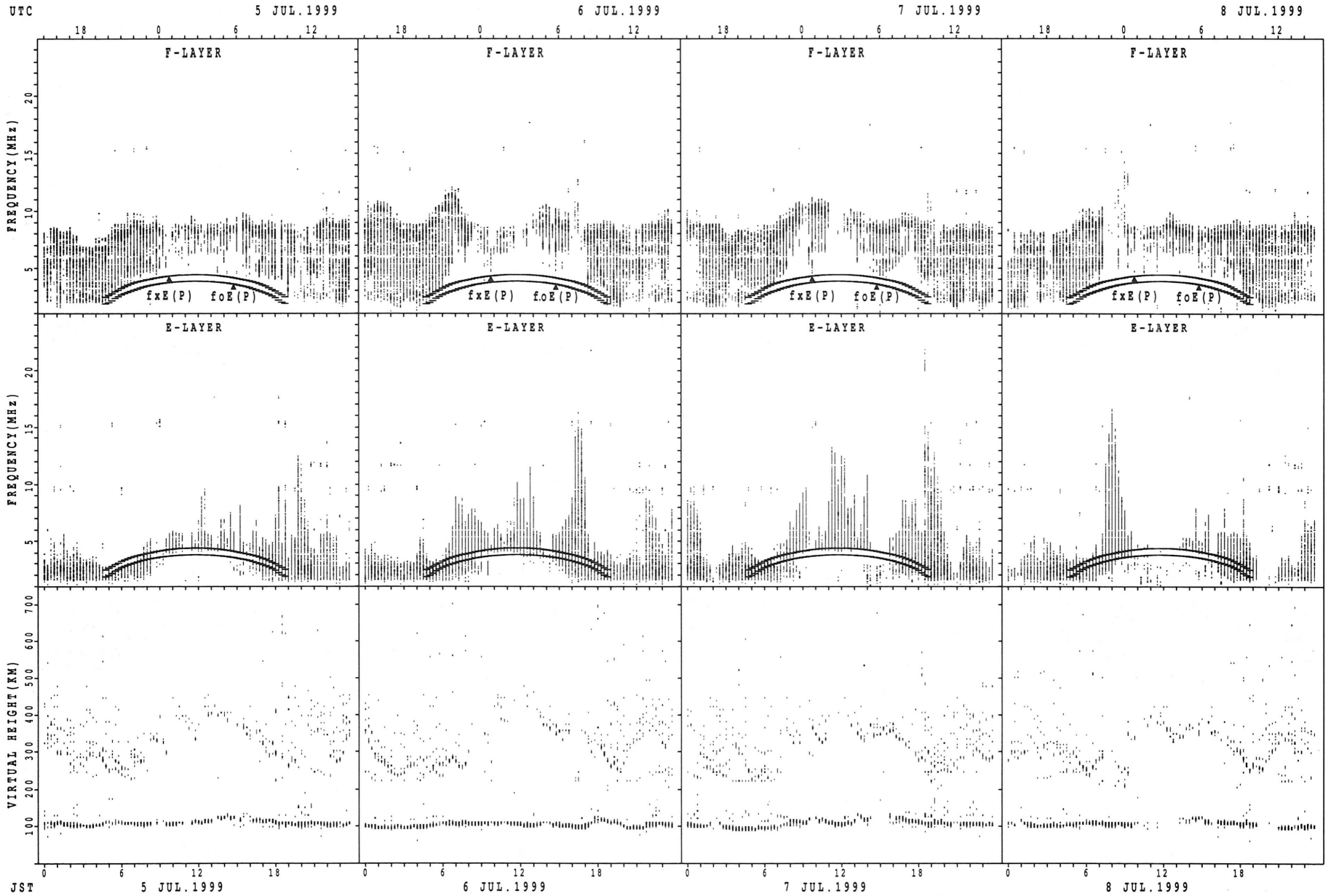
SUMMARY PLOTS AT Wakkanai



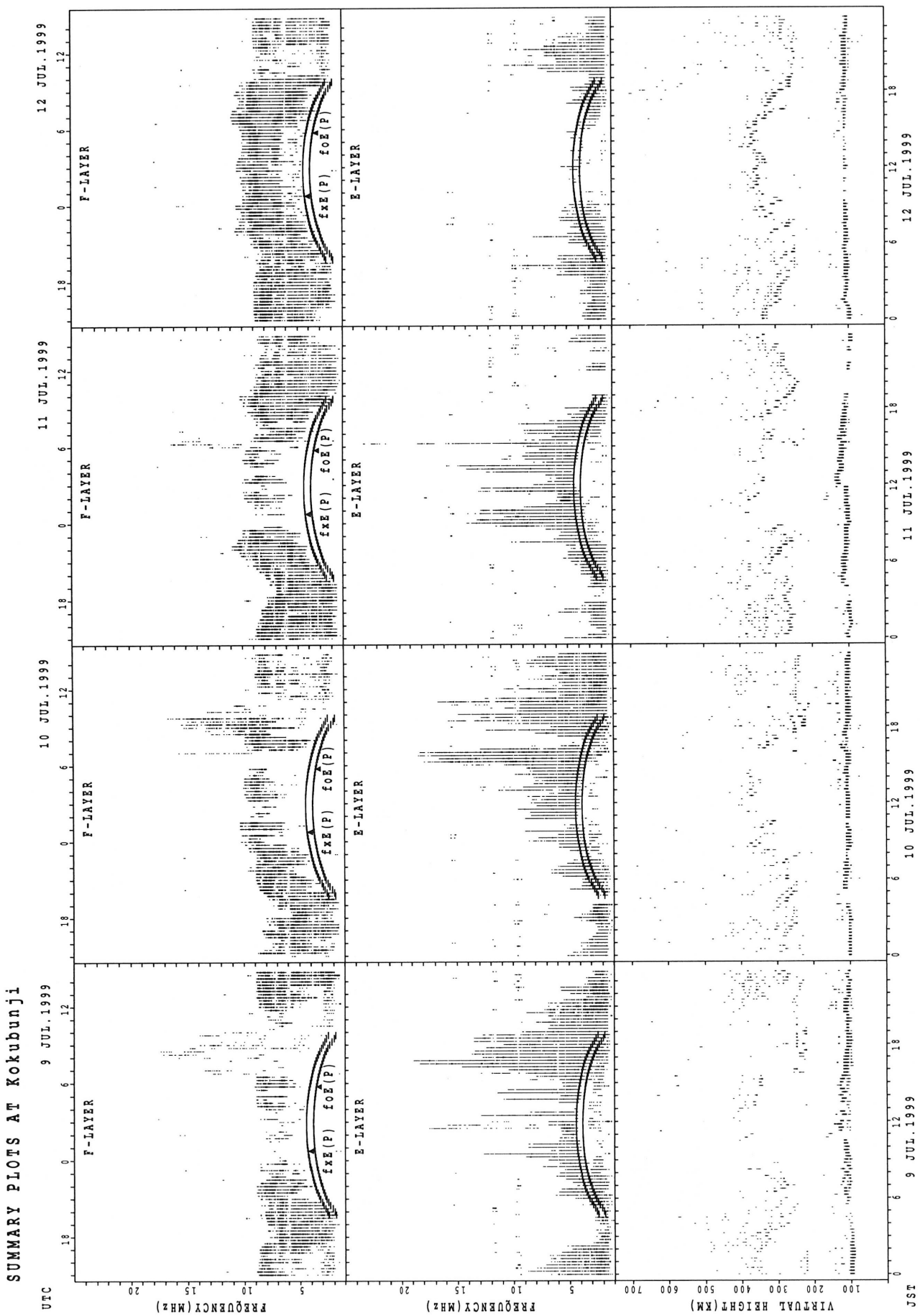
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT Kokubunji
1 JUL.1999
2 JUL.1999
3 JUL.1999
4 JUL.1999
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

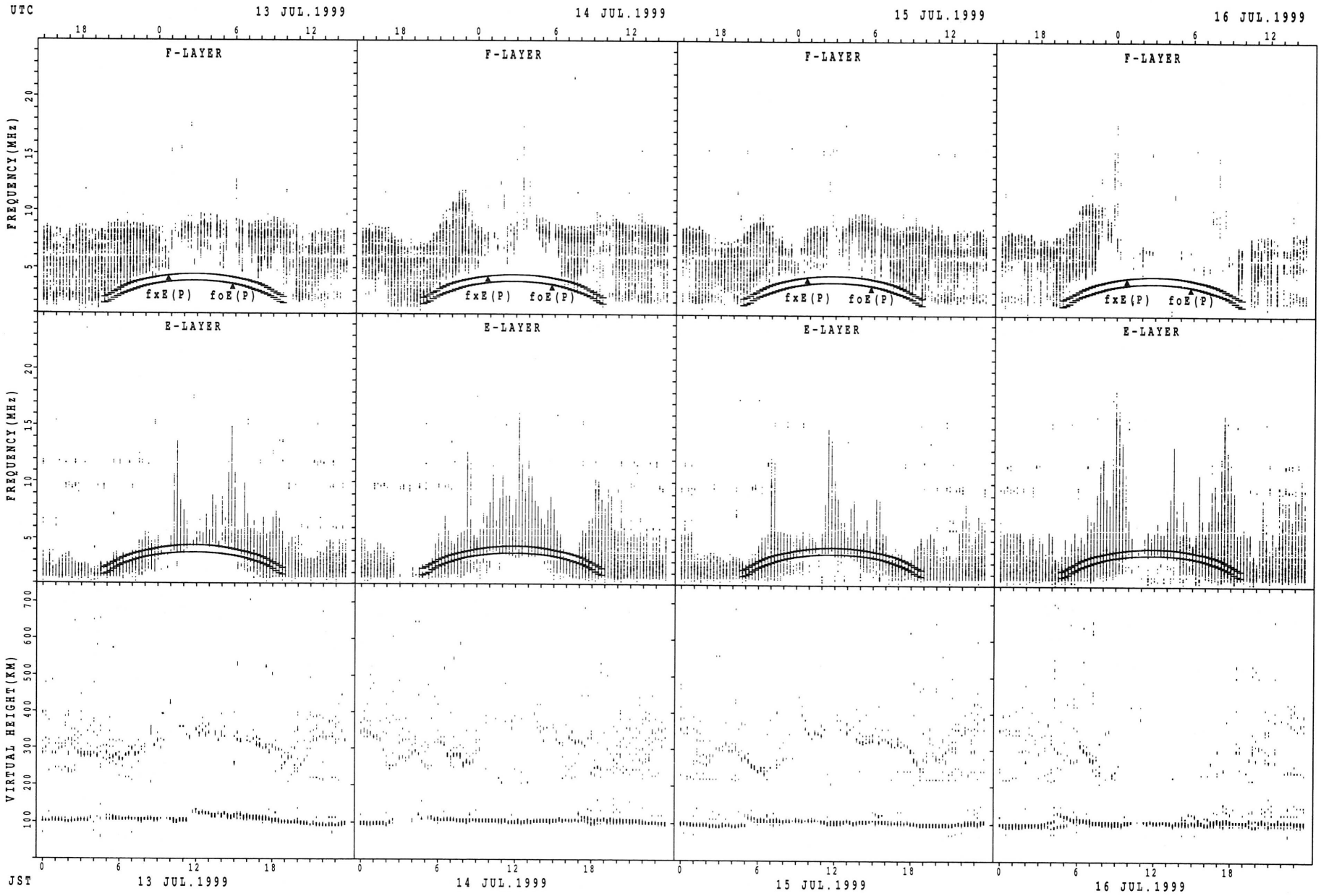
SUMMARY PLOTS AT Kokubunji



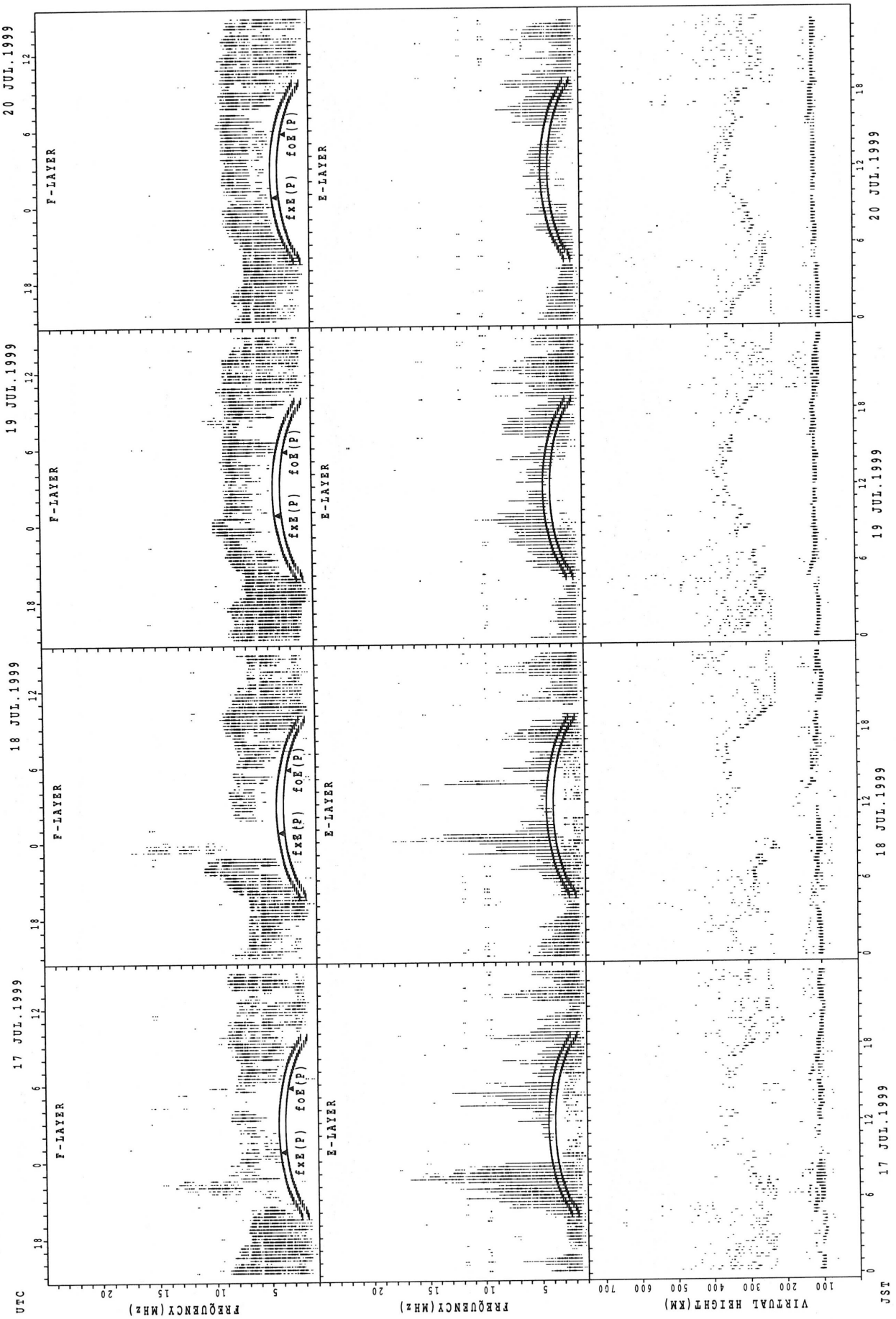
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT Kokubunji
UTC
JST
9 JUL.1999
10 JUL.1999
11 JUL.1999
12 JUL.1999
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

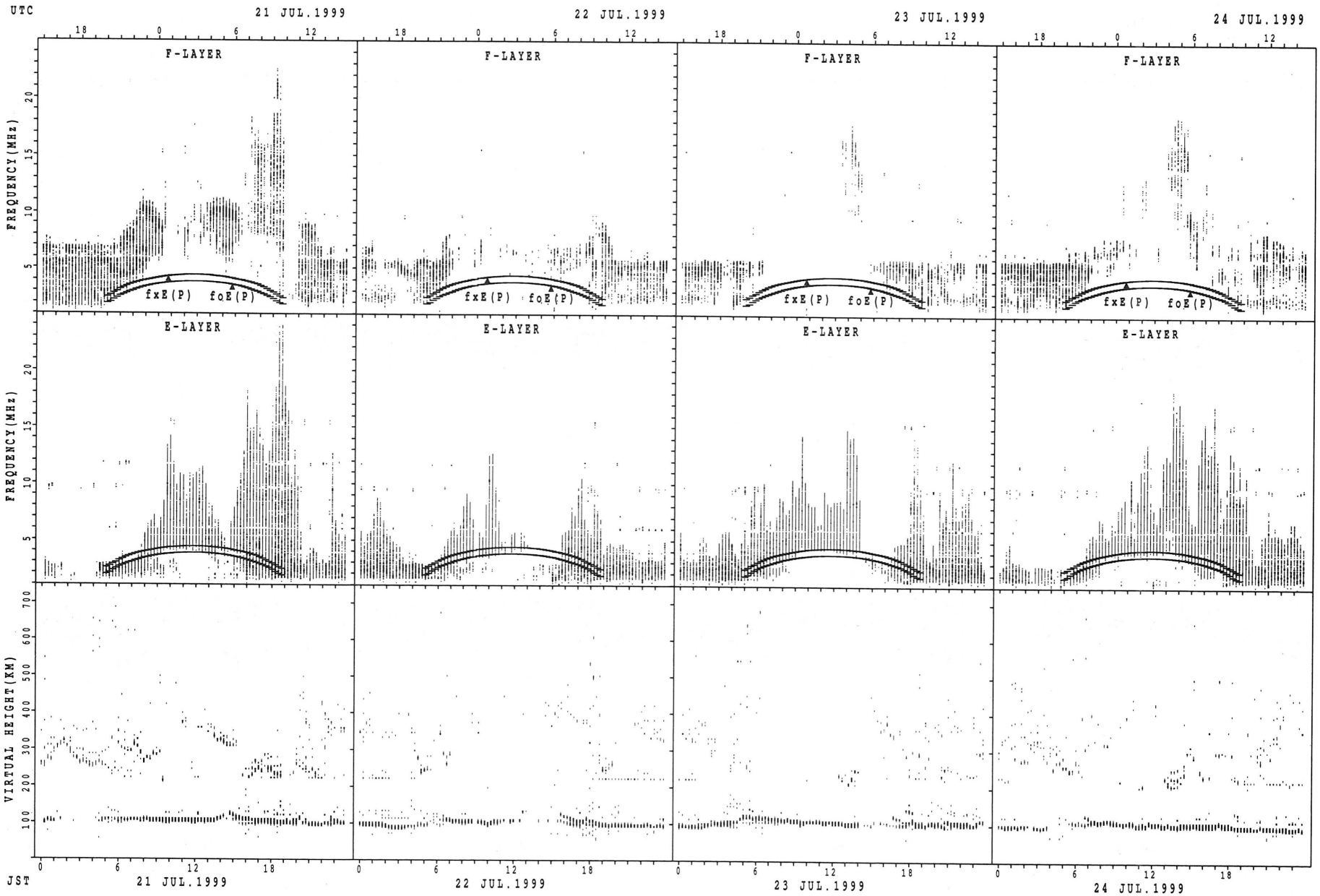
SUMMARY PLOTS AT Kokubunji



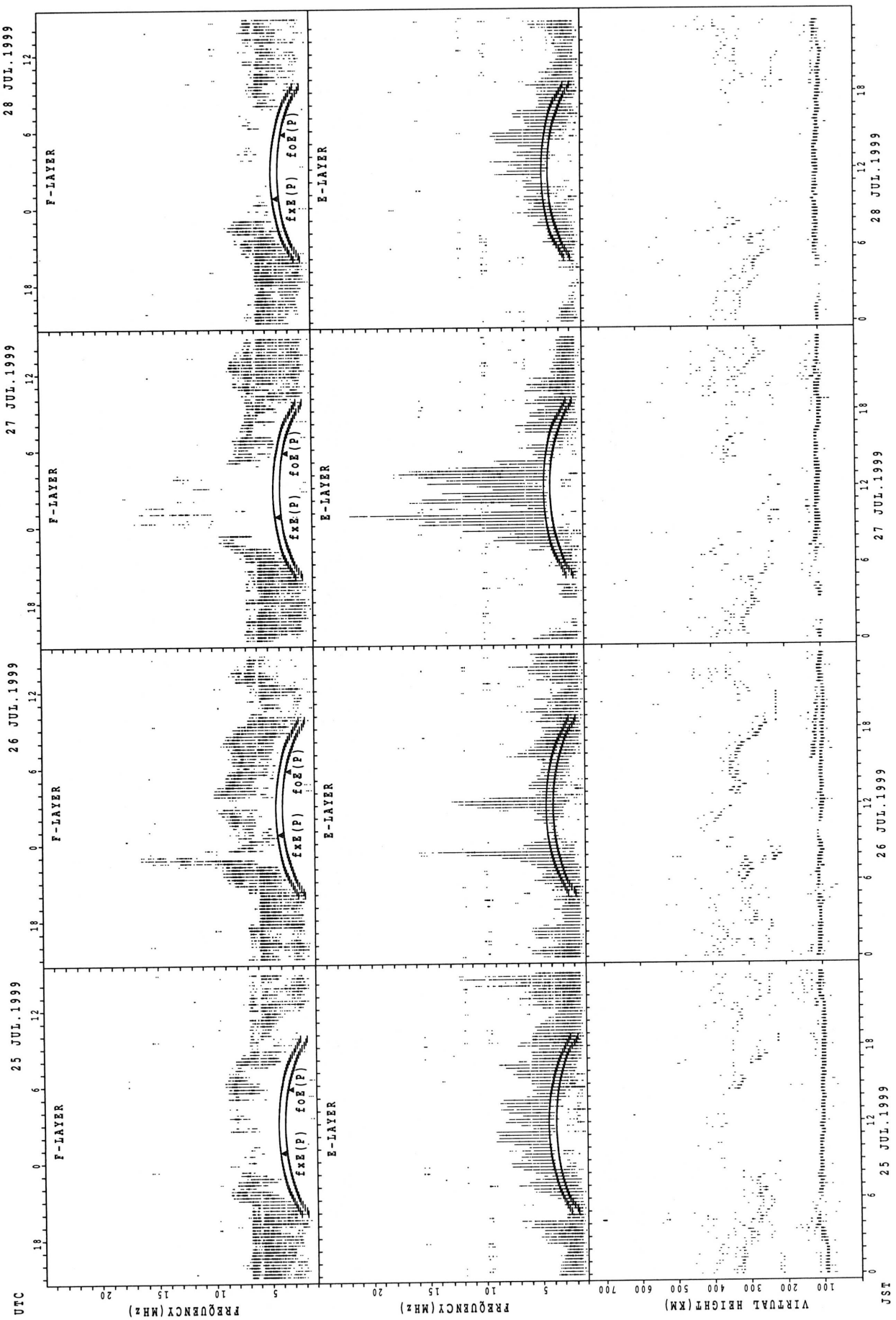
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

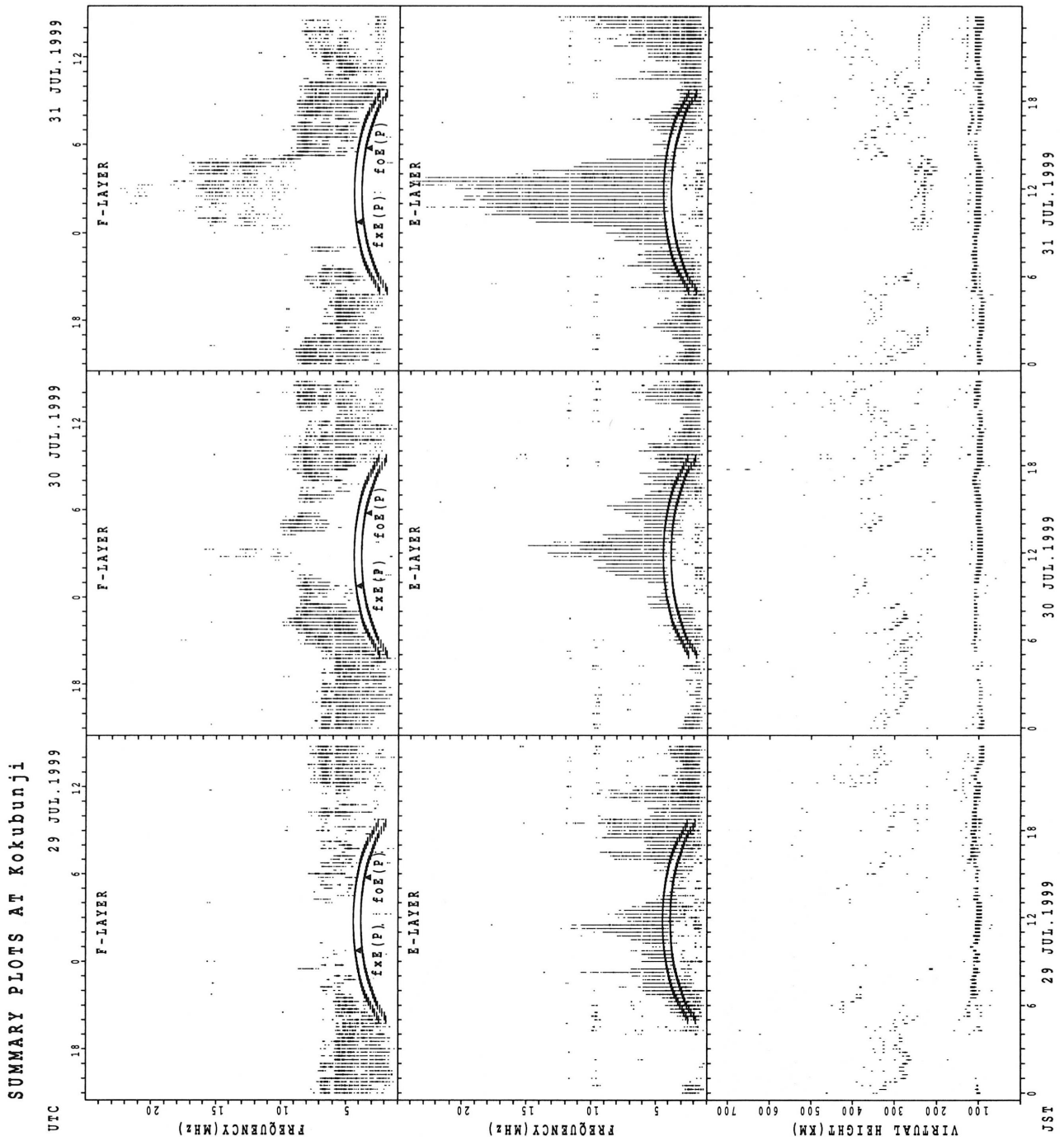

SUMMARY PLOTS AT Kokubunji
UTC
JST
17 JUL.1999
18 JUL.1999
19 JUL.1999
20 JUL.1999
F-LAYER
E-LAYER
fxE(P)
foE(P)
FREQUENCY(MHz)
VIRTUAL HEIGHT(KM)
fxE(P) ; PREDICTED VALUE FOR fxE
foE(P) ; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji

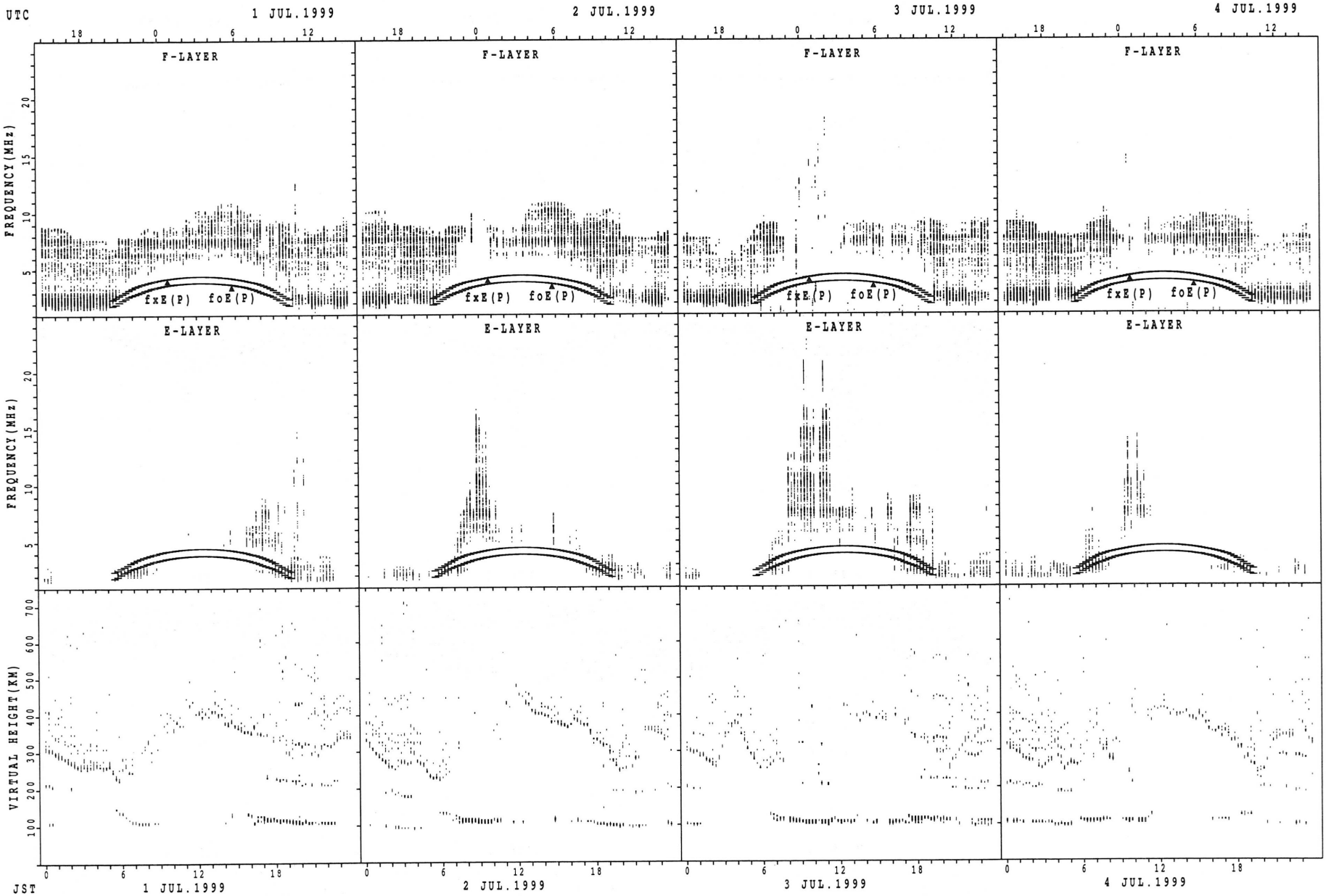


fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT Kokubunji
UTC
JST
25 JUL.1999
26 JUL.1999
27 JUL.1999
28 JUL.1999
F-LAYER
E-LAYER
fxE(P)
foE(P)
FREQUENCY(MHz)
VIRTUAL HEIGHT(KM)
fxE(P) ; PREDICTED VALUE FOR fxE
foE(P) ; PREDICTED VALUE FOR foE

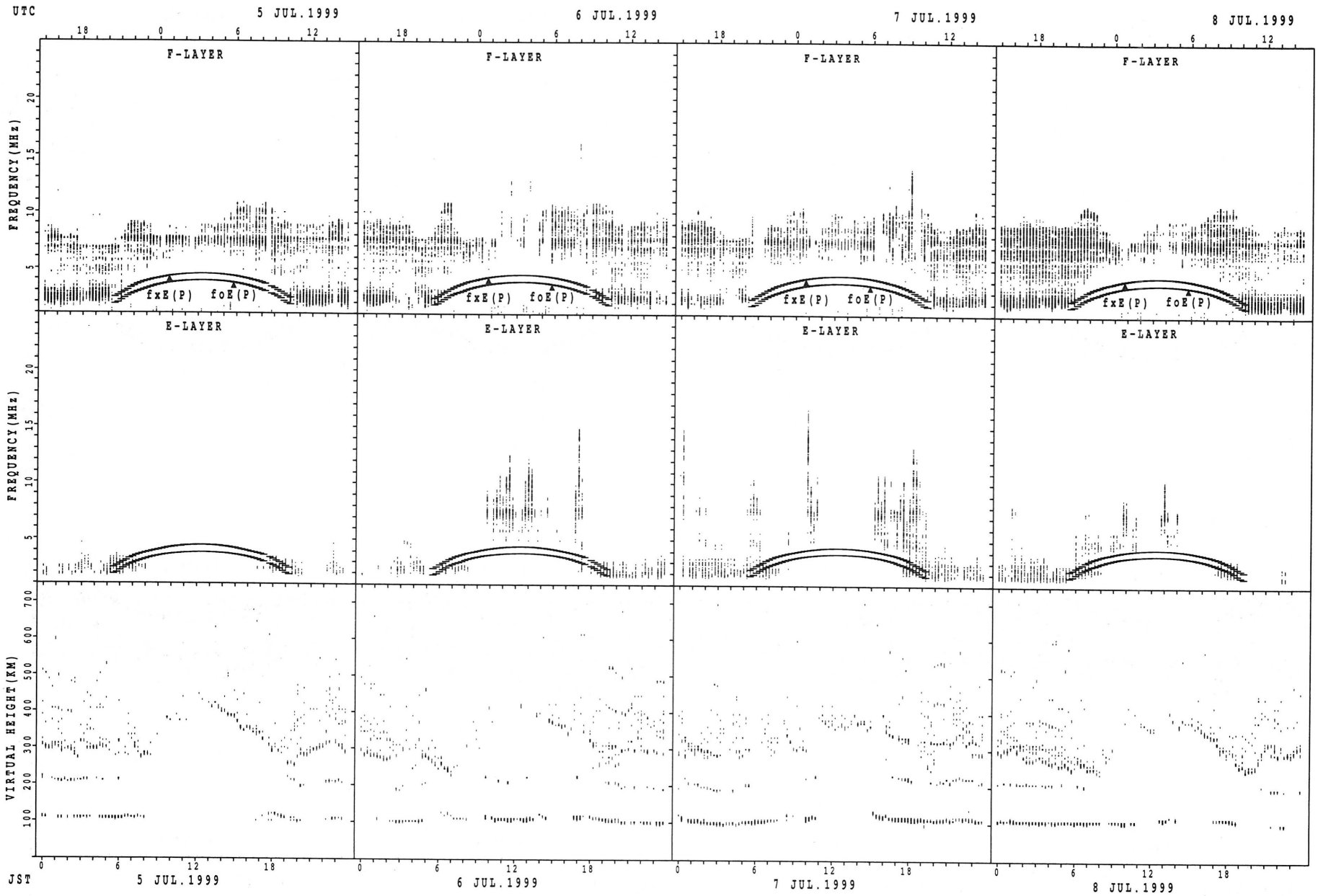

SUMMARY PLOTS AT Kokubunji
29 JUL.1999
30 JUL.1999
31 JUL.1999
UTC
JST
F-LAYER
E-LAYER
FREQUENCY(MHz)
VIRTUAL HEIGHT(KM)
fxE(P)
foE(P)
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



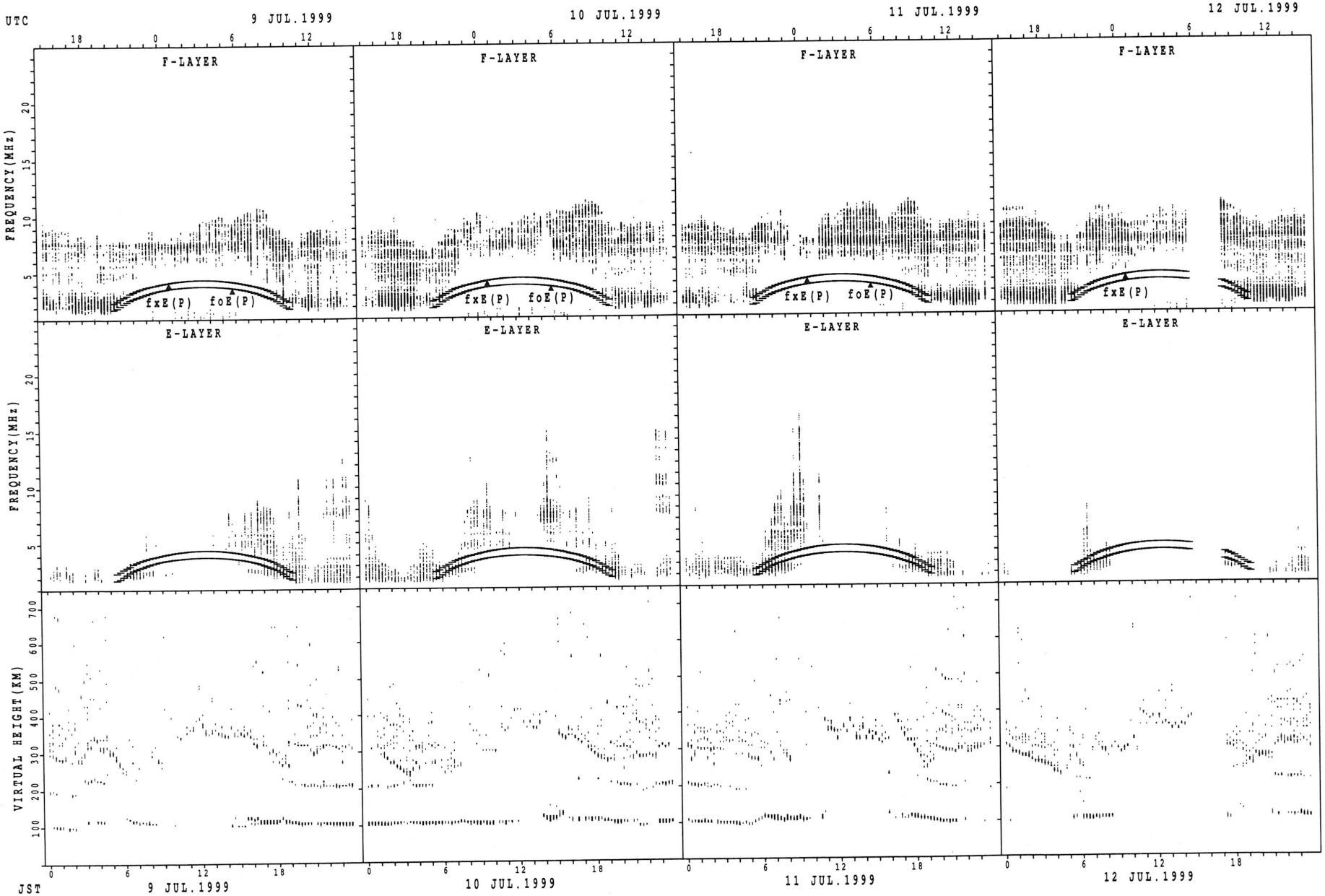
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



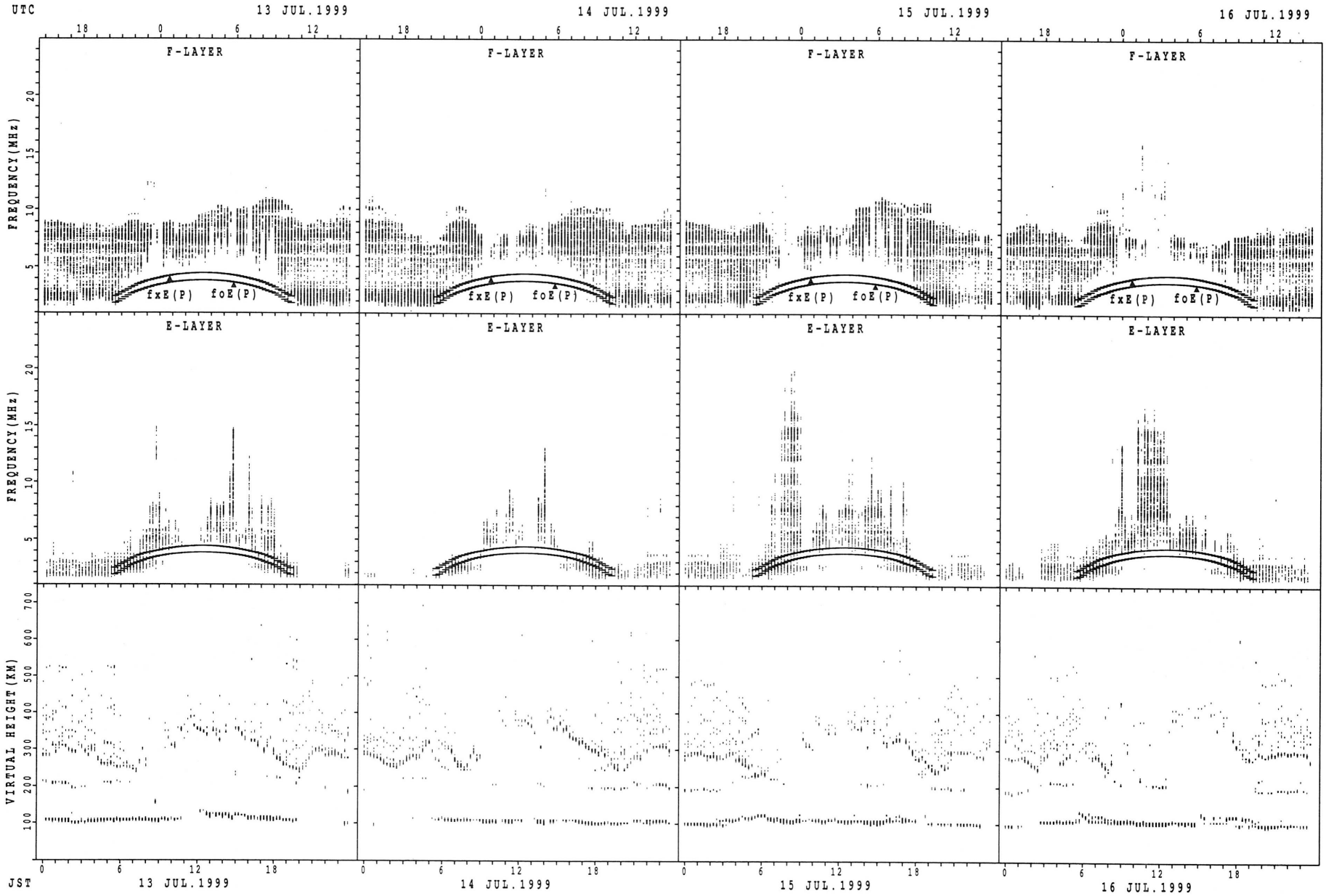
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



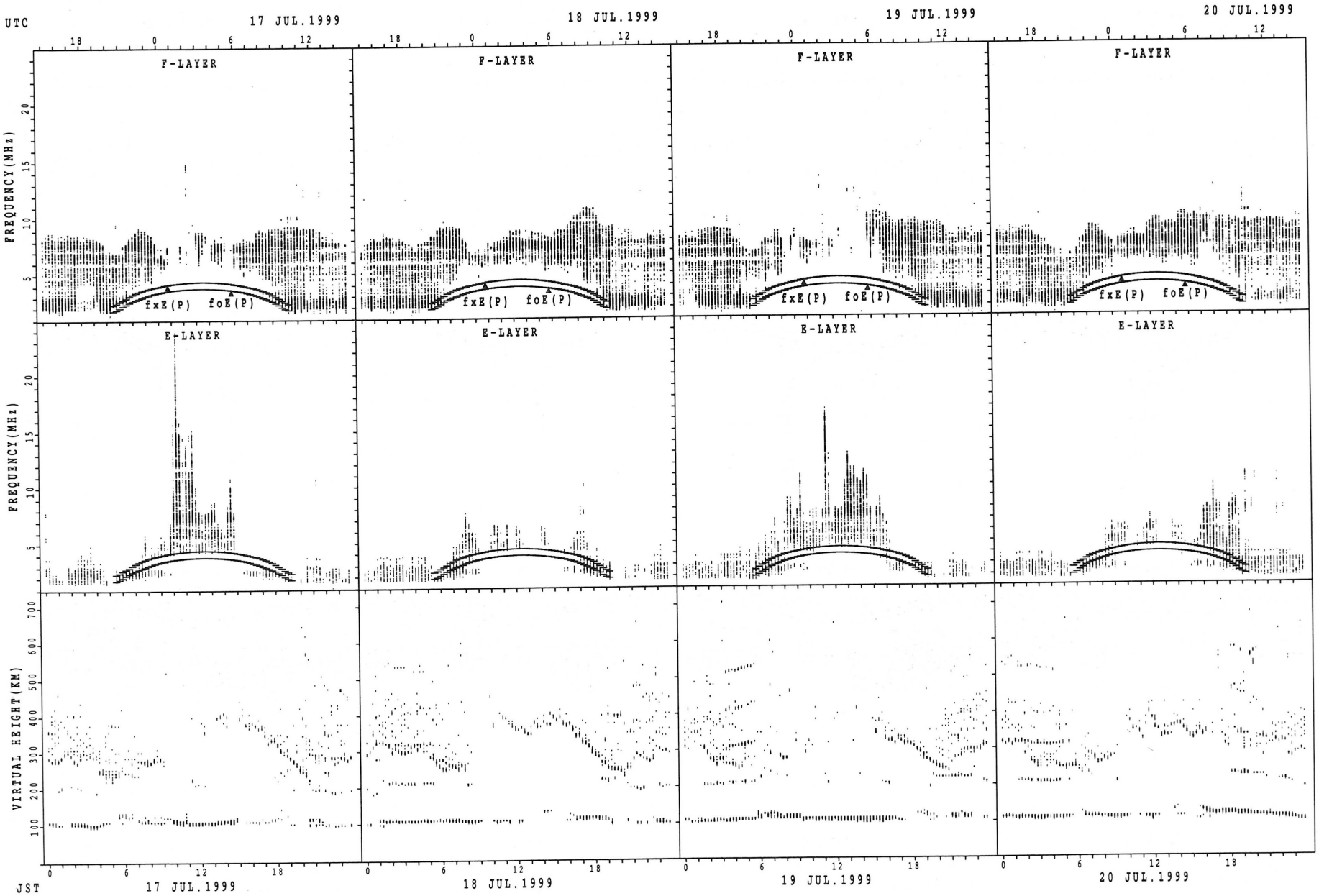
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



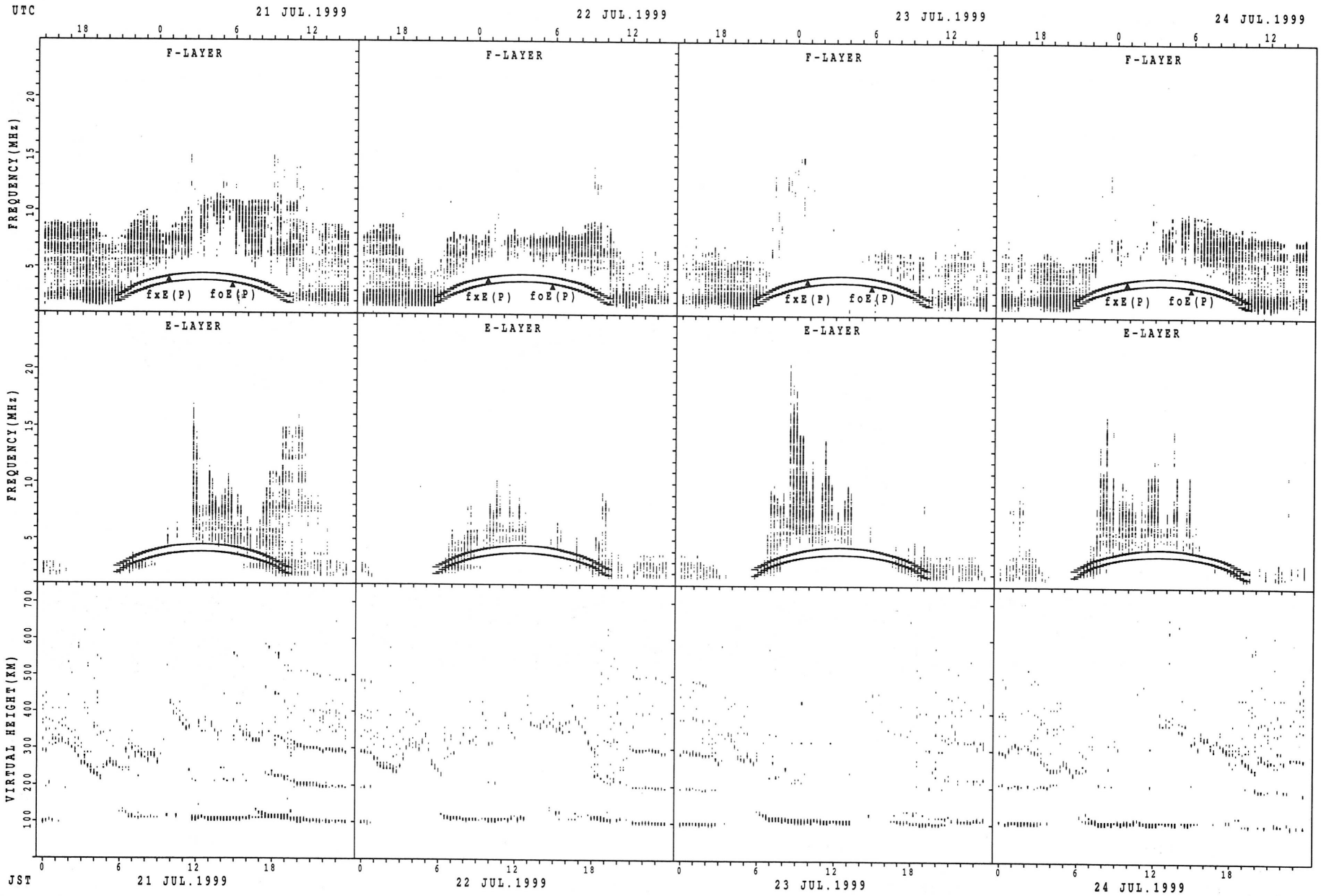
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa

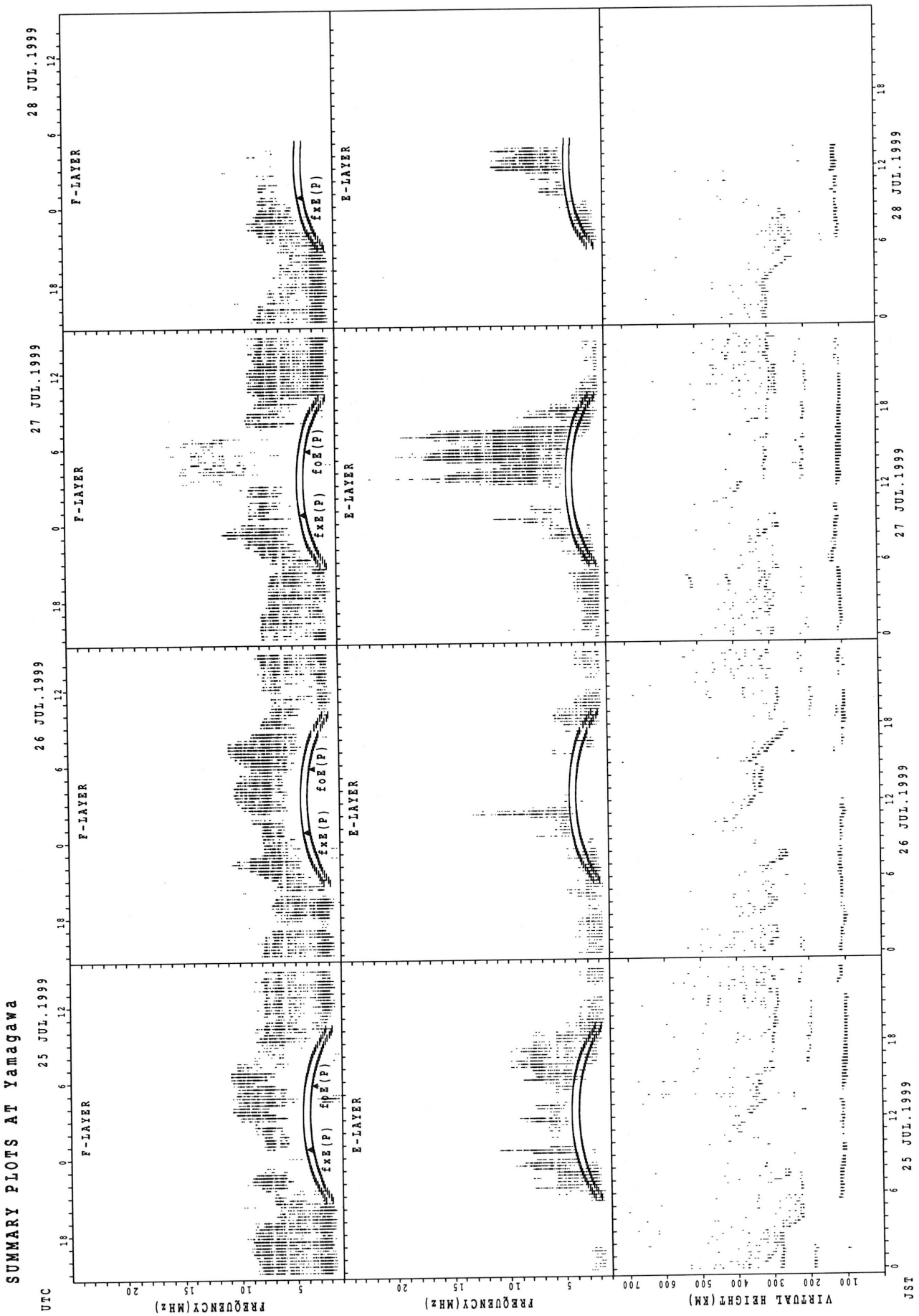


fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

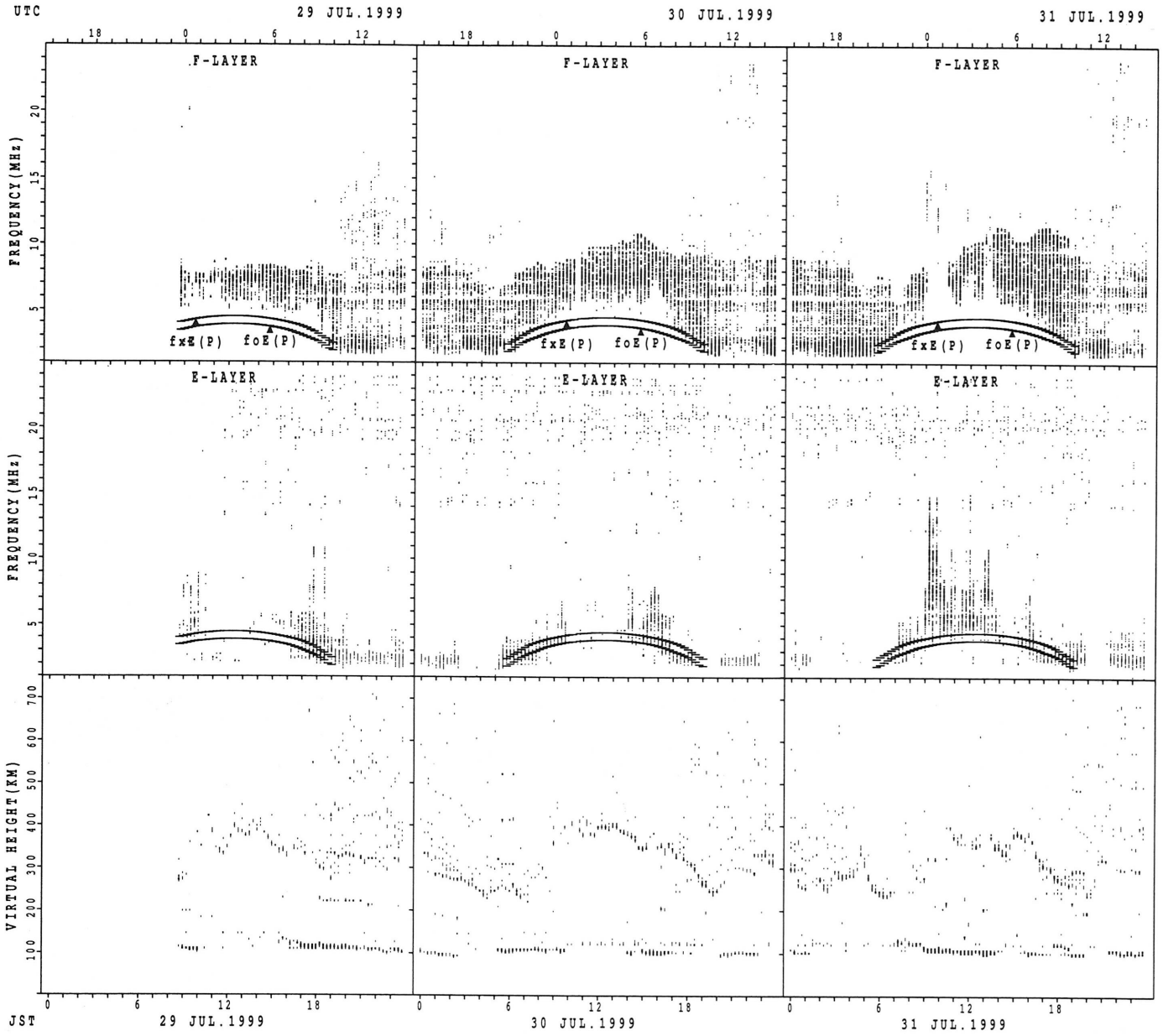
SUMMARY PLOTS AT Yamagawa



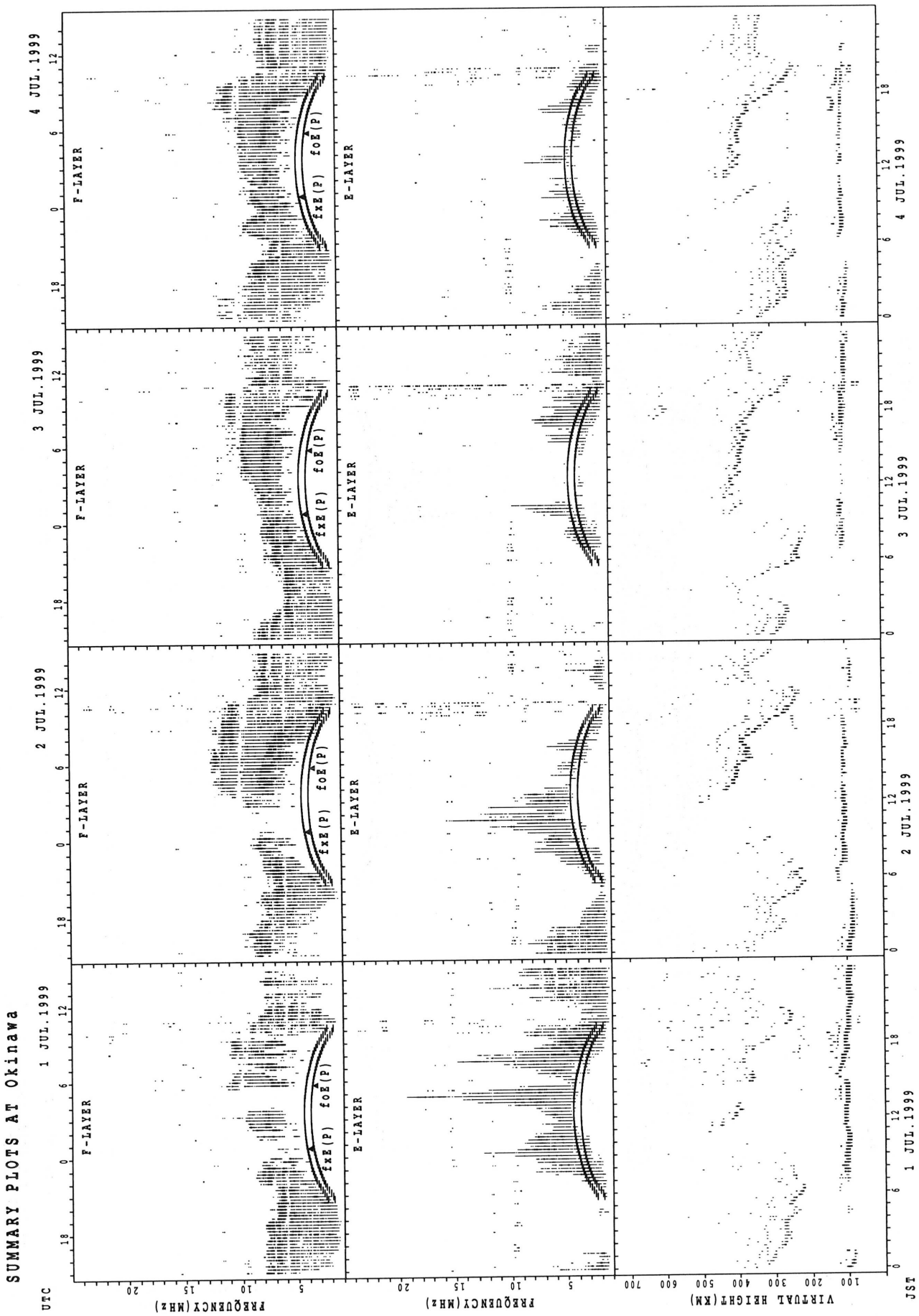
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT Yamagawa
UTC
JST
25 JUL.1999
26 JUL.1999
27 JUL.1999
28 JUL.1999
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

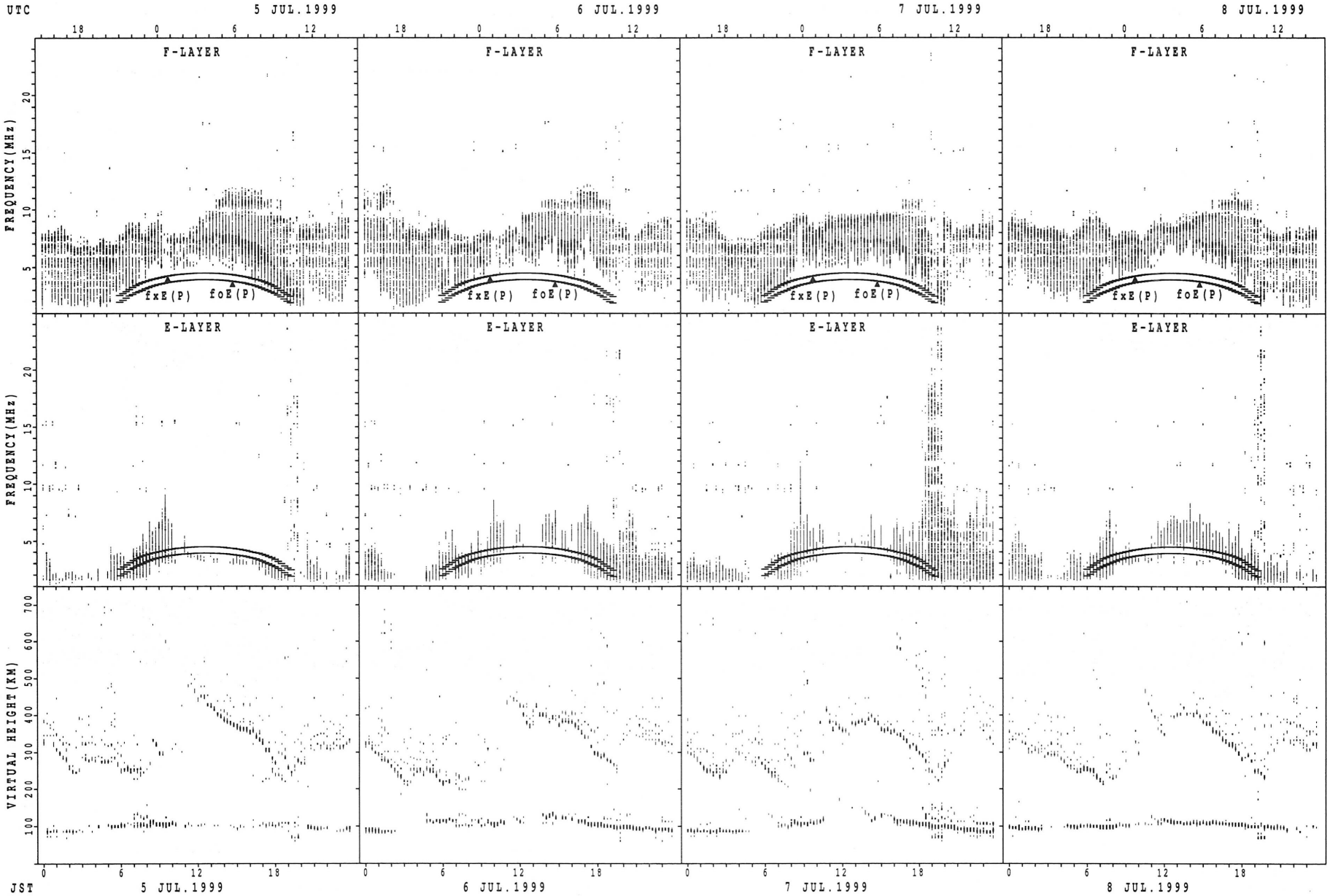
SUMMARY PLOTS AT Yamagawa



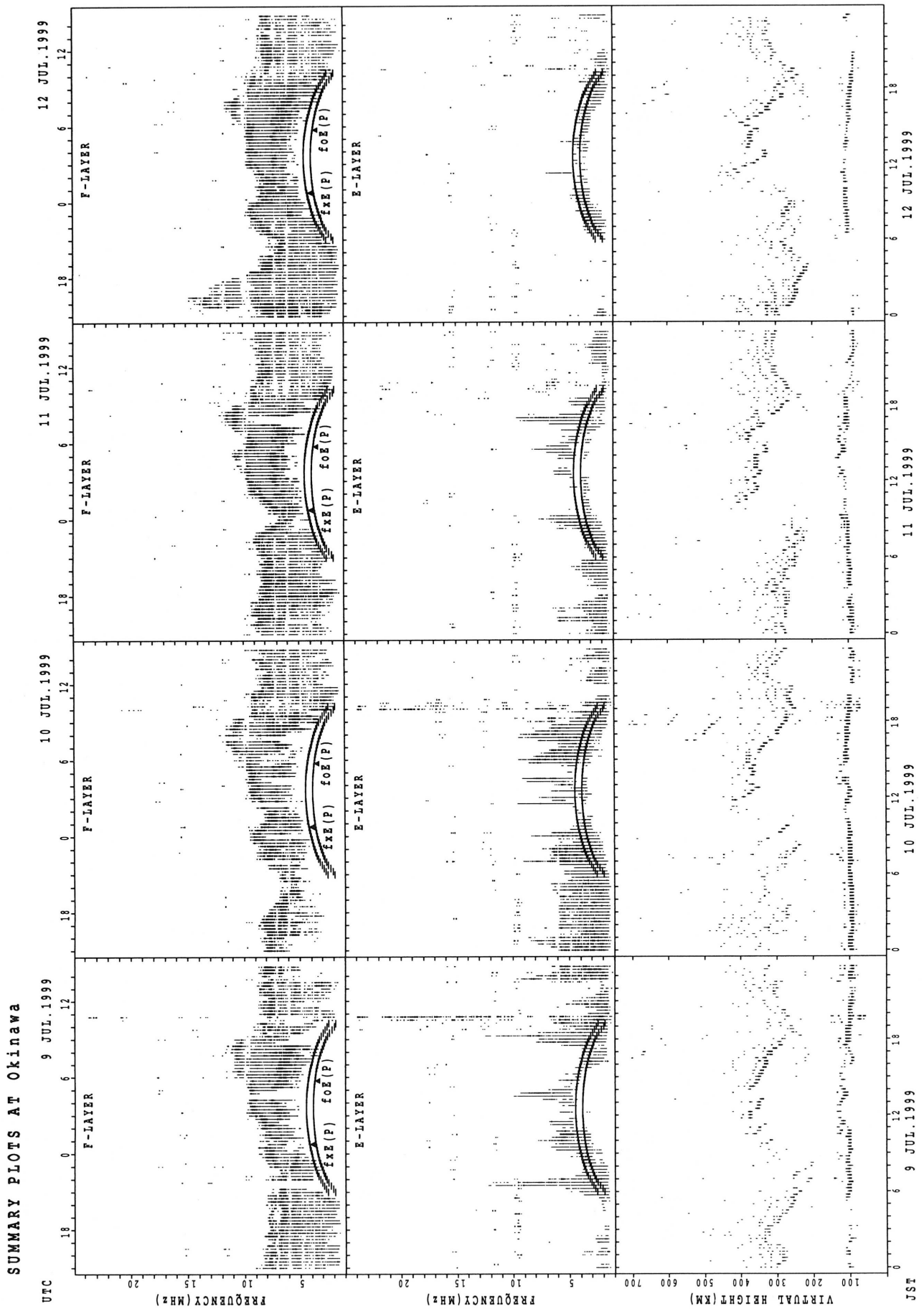
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT Okinawa
1 JUL.1999
2 JUL.1999
3 JUL.1999
4 JUL.1999
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

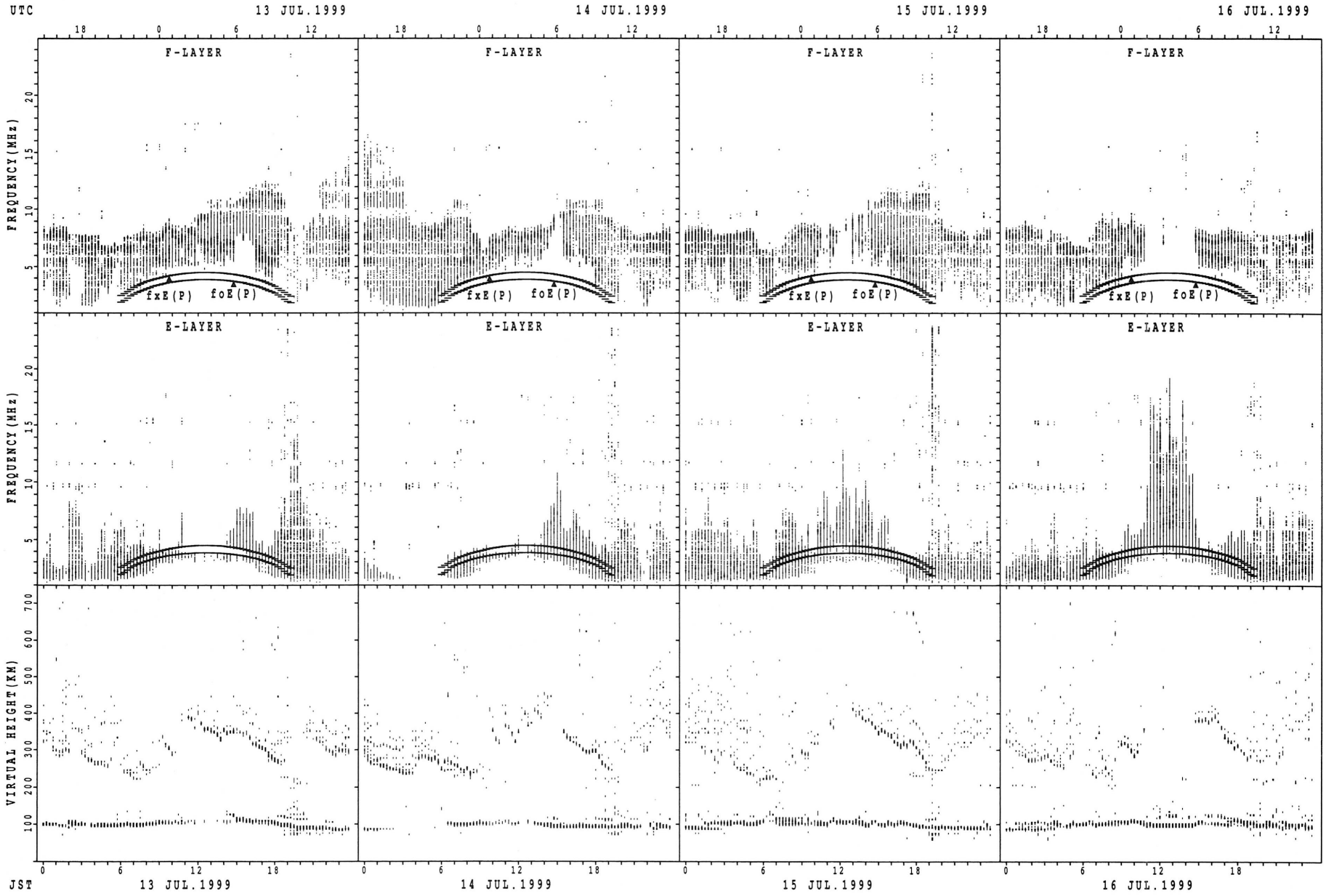
SUMMARY PLOTS AT Okinawa



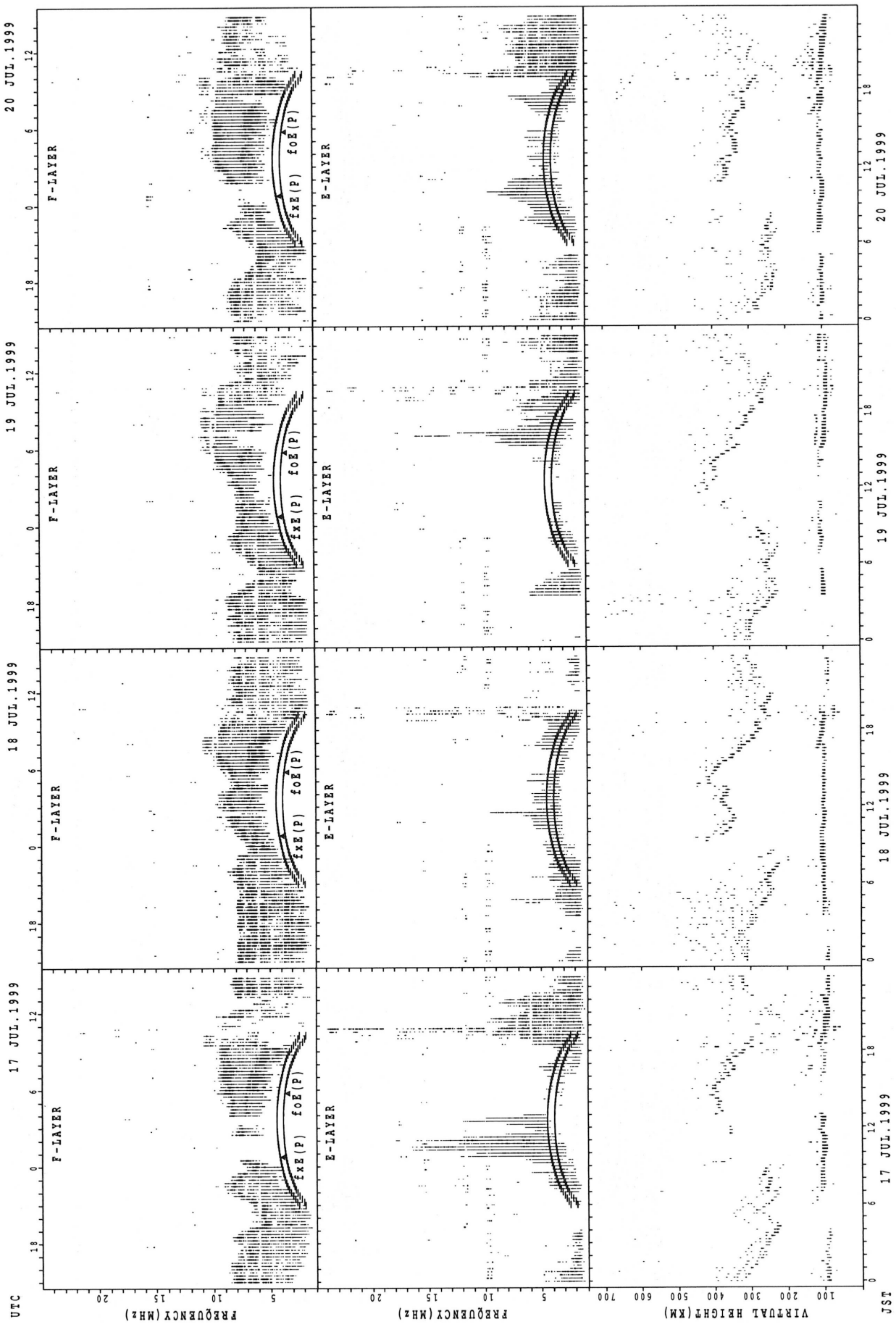
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT Okinawa
9 JUL.1999
10 JUL.1999
11 JUL.1999
12 JUL.1999
UTC
JST
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

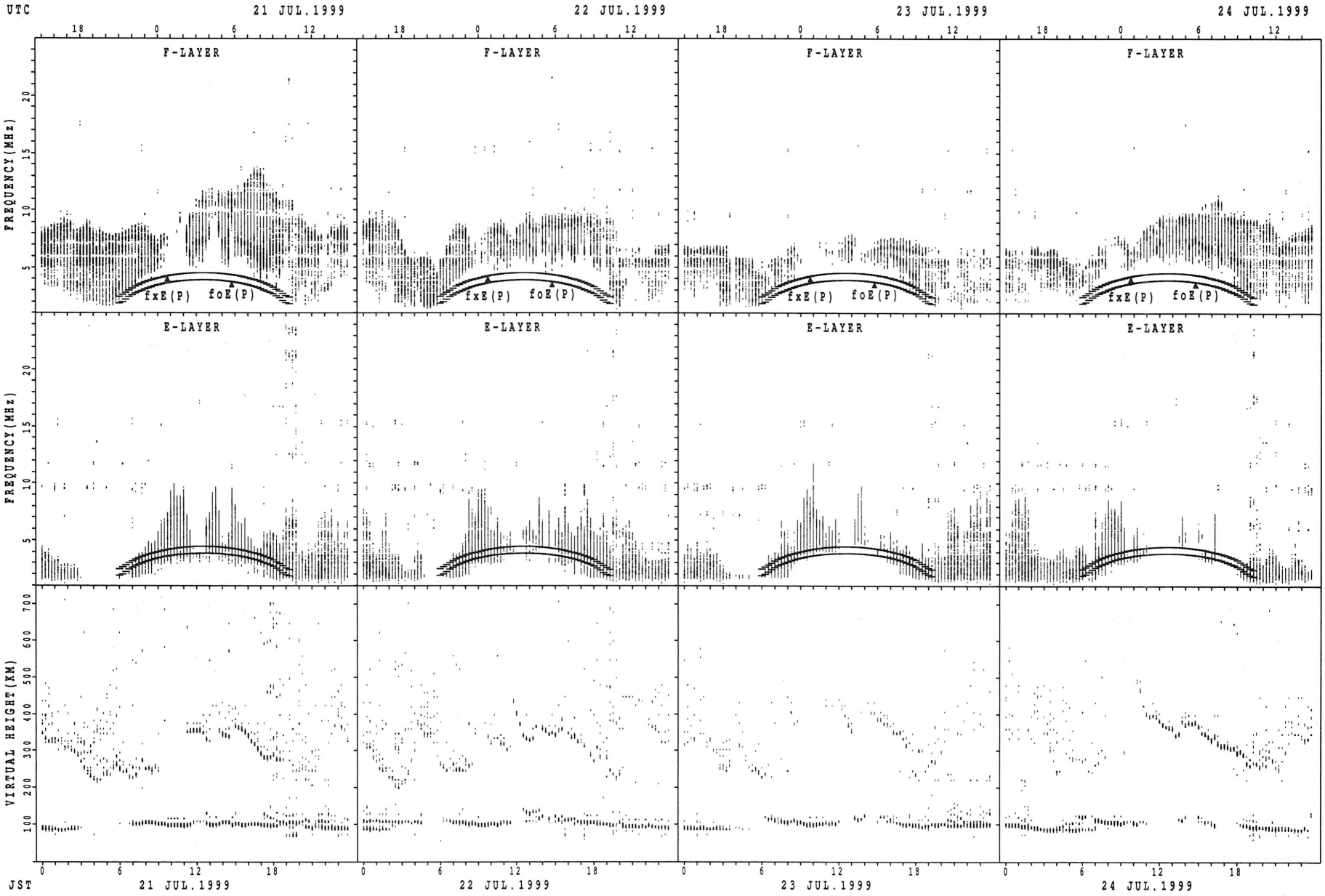
SUMMARY PLOTS AT Okinawa



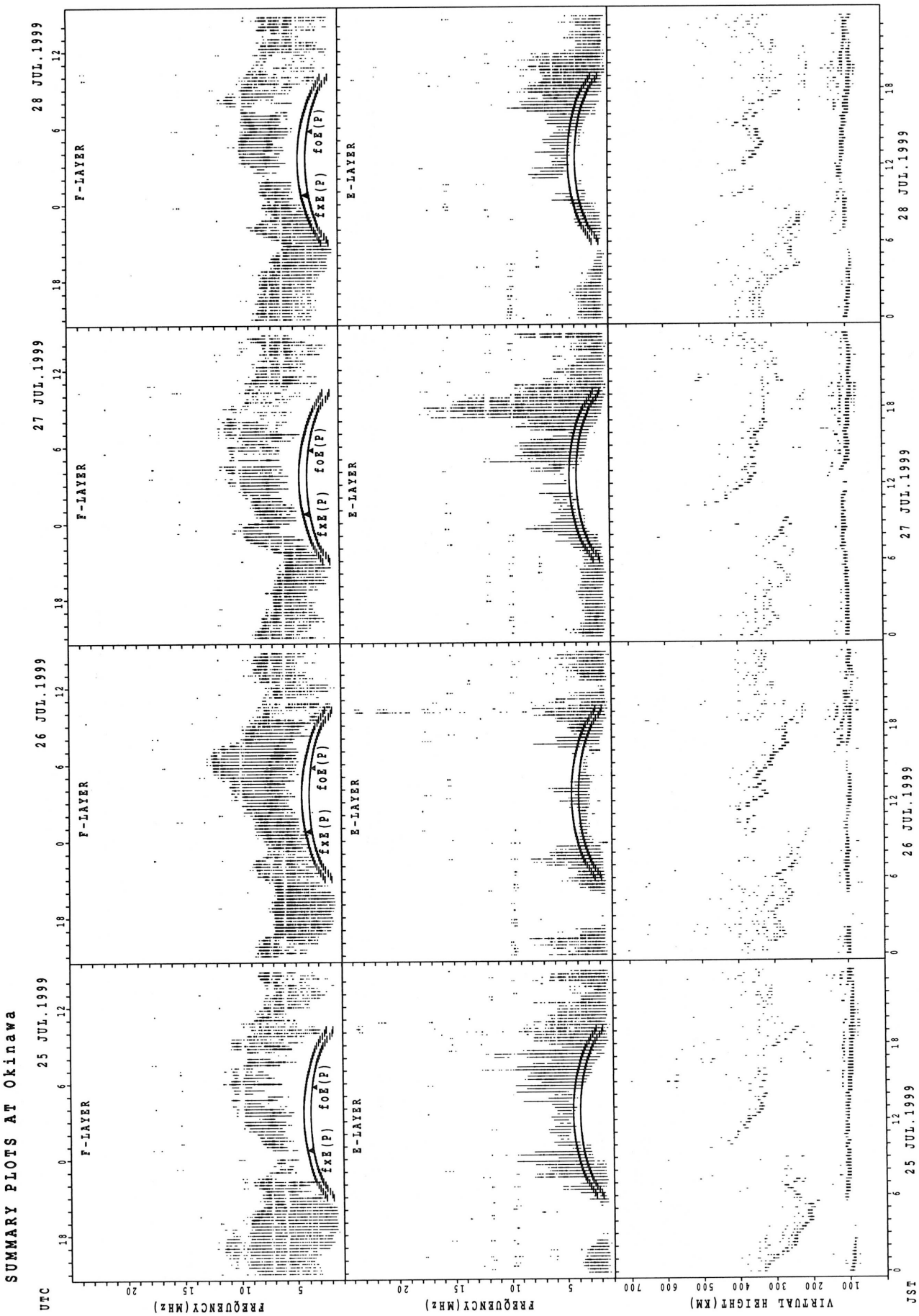
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT Okinawa
17 JUL.1999
18 JUL.1999
19 JUL.1999
20 JUL.1999
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

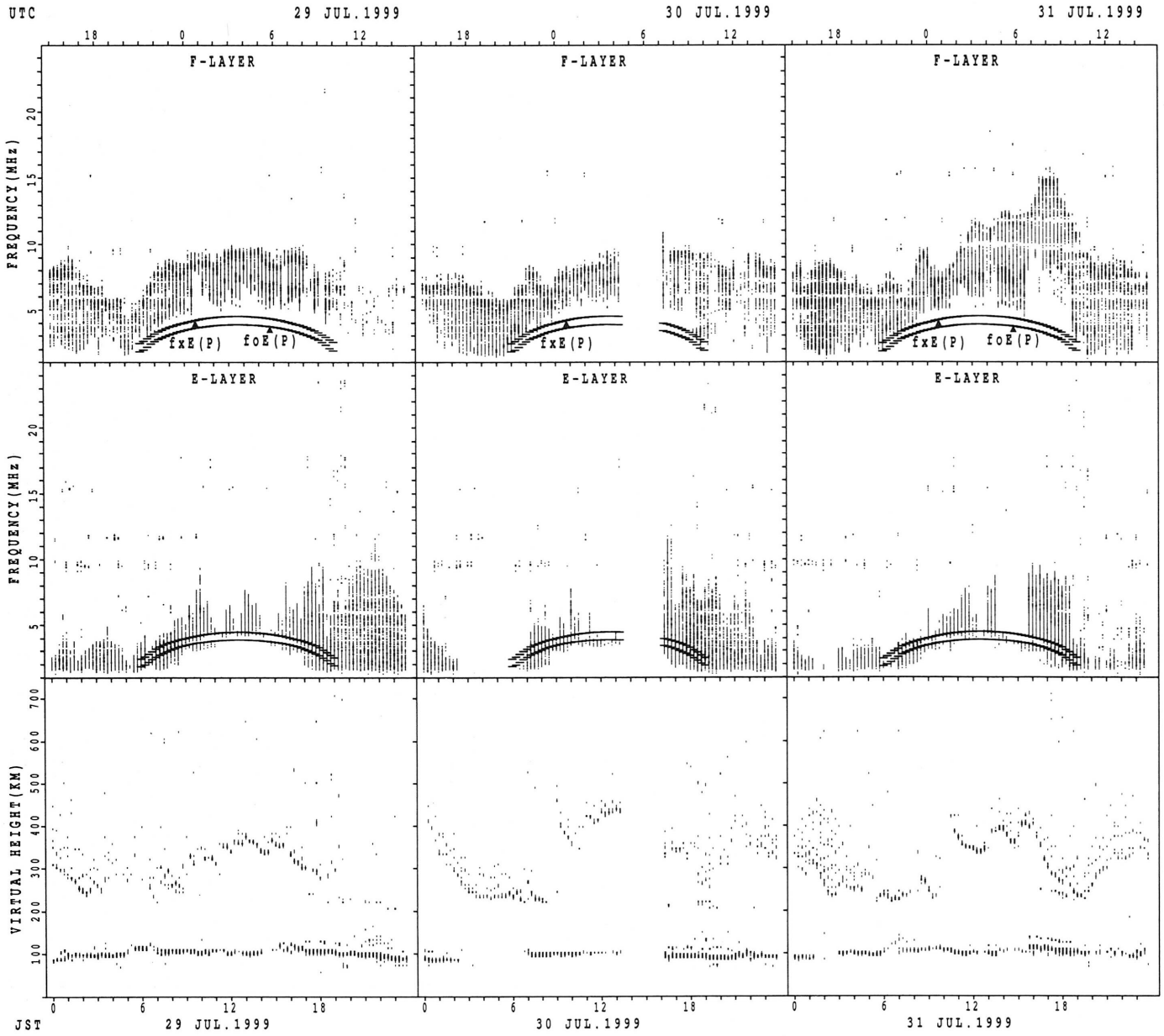
SUMMARY PLOTS AT Okinawa



fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT Okinawa
25 JUL.1999
26 JUL.1999
27 JUL.1999
28 JUL.1999
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



fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

MONTHLY MEDIANS OF h'F AND h'Es

JUL. 1999 135E MEAN TIME (UTC+9H) AUTOMATIC SCALING

h'F STATION Wakkanai LAT. 45.4N LON. 141.7E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	12	14	11	7	8	10	15	14									6	8	8	16	20	17	19	16
MED	366	359	358	378	373	314	304	298									326	339	333	314	348	350	336	344
U Q	389	418	386	406	439	334	322	306									332	353	348	331	371	364	348	350
L Q	336	346	334	314	351	304	284	282									322	325	317	299	317	331	312	334

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	24	25	20	22	23	28	28	26	18	15	14	14	13	13	20	25	28	30	28	27	28	28
MED	100	97	97	99	106	115	113	113	113	109	106	105	107	105	107	109	110	111	113	107	107	105	102	103
U Q	103	101	105	103	111	119	115	115	113	111	109	111	113	113	117	117	114	115	115	111	113	111	106	107
L Q	97	95	95	97	98	111	111	111	110	107	105	103	103	103	102	102	102	105	108	103	100	99	96	98

h'F STATION Kokubunji LAT. 39.7N LON. 140.1E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	9	21	17	16	17	15	24	19	2								15	16	22	18	14	15	12	15
MED	344	362	336	368	386	320	303	288	313								326	316	299	303	305	390	363	352
U Q	370	379	356	391	401	380	324	302	332								358	324	322	332	352	414	373	404
L Q	339	339	318	338	335	298	281	276	294								318	299	274	282	290	372	350	340

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	24	27	22	23	22	20	28	28	27	27	27	25	26	26	23	22	25	30	29	28	28	30	28	28
MED	103	103	103	101	101	113	113	111	111	111	109	107	107	109	111	112	115	113	111	107	107	108	106	107
U Q	105	105	107	105	109	122	117	115	113	111	111	111	109	119	119	121	120	117	114	113	111	113	111	111
L Q	102	99	97	97	97	105	111	110	107	107	107	105	103	105	107	105	105	111	107	104	100	99	105	103

h'F STATION Yamagawa 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	10	16	21	18	12	7	7	18	18								1	19	23	23	15	8	3	8
MED	357	352	332	340	321	316	292	294	275								350	340	300	296	314	324	356	338
U Q	374	364	348	362	331	334	310	314	308								175	348	314	304	342	356	360	373
L Q	332	329	316	308	287	296	274	258	262								175	320	286	280	296	313	336	325

h'Es

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	19	15	16	17	14	14	16	18	18	15	14	15	17	15	13	9	15	14	19	23	18	13	17	17
MED	109	107	107	107	107	111	116	115	113	113	113	109	111	113	115	109	115	115	115	113	107	109	109	107
U Q	113	109	111	111	113	113	126	119	117	115	115	111	113	117	121	118	119	121	119	117	111	115	114	110
L Q	103	103	104	101	105	107	110	113	111	111	111	107	107	107	106	106	105	111	111	107	103	105	105	104

MONTHLY MEDIANS OF h'F AND h'Es

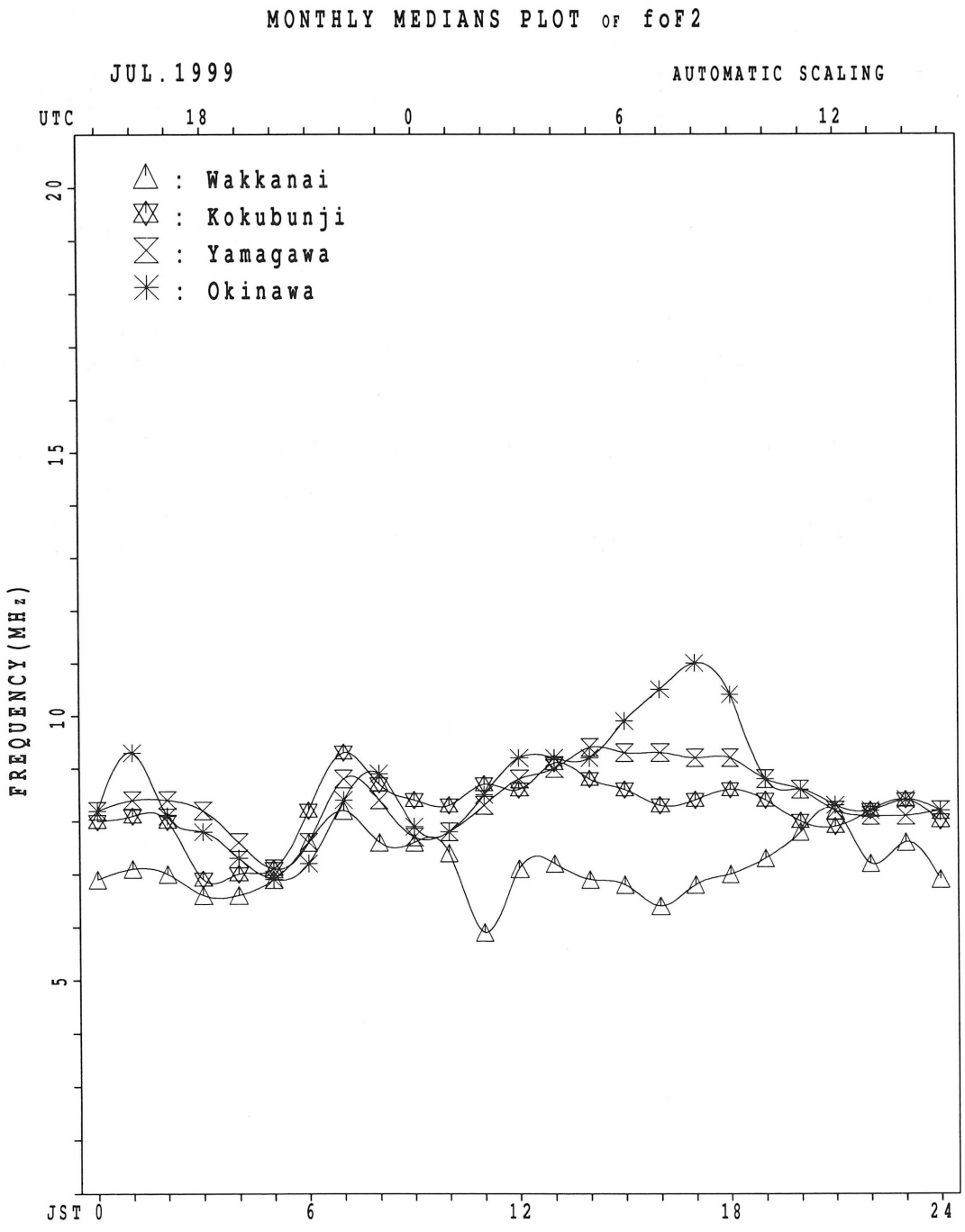
JUL.1999 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

h'F STATION Okinawa LAT. 31.2N LON. 130.6E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	21	25	23	20	18	14	14	22	22	17							2	30	29	24	20	16	9	14
MED	352	328	304	307	332	307	281	257	270	302							290	313	292	279	301	353	362	361
U Q	369	360	356	351	362	366	306	270	278	316							342	334	306	314	321	374	401	396
L Q	343	313	282	263	296	280	272	250	246	279							238	302	280	257	283	331	331	336

h'Es

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	24	21	14	16	16	15	27	24	27	22	18	16	21	23	19	24	26	27	26	25	25	23	23
MED	97	95	95	95	99	101	105	109	106	105	105	105	106	105	107	111	113	107	105	103	101	97	95	99
U Q	107	103	106	103	103	104	111	119	112	109	111	111	112	119	125	125	120	113	107	107	107	104	103	107
L Q	92	89	90	89	92	98	103	101	100	105	103	105	104	105	103	101	105	99	97	97	96	93	91	91


MONTHLY MEDIANS PLOT OF foF2
JUL.1999
AUTOMATIC SCALING
UTC
18
0
6
12
△ : Wakkanai
✡ : Kokubunji
⧖ : Yamagawa
✳ : Okinawa
FREQUENCY(MHz)
20
15
10
5
JST 0
6
12
18
24

IONOSPHERIC DATA STATION Kokubunji

JUL. 1999 fxI (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	X 90	X 90	X 88	X 84	X 84																90	X 94	105	X 98
2	X 96	X 94	X 95	X 93	X 94		100														X 82	X 80	O X 78	X 88
3	X 91	X 91	X 85	X 78	76	83															X 86	X 90	X 85	X 87
4	90	95	86	X 74	86	92															X 71	X 83	X 85	89
5	X 86	88	86	X 74	X 76																X 88	X 91	X 104	X 100
6	103	X 112	X 104	X 92	X 90	97															X 91	X 91	94	X 97
7	106	X 102	X 96	X 82	87																X 92	90	X 92	X 92
8	X 86	X 84	X 84	X 80	X 84																X 92	O X 92	X 94	X 95
9	X 92	92	89	82	82	83															X 80	X 86	X 90	92
10	X 90	X 82	86	X 75	74	84															A	X 91	93	X 91
11	92	89	X 86	80	75																X 90	X 91	X 88	X 85
12	93	X 90	X 92	X 91	X 85																X 96	X 90	X 92	X 92
13	X 86	X 88	X 90	X 90	X 86																X 86	X 84	X 88	X 86
14	86	87	X 83	78	X 74	75															X 98	X 92	X 96	X 90
15	87	X 90	X 85	X 77	X 76																X 93	X 84	X 85	87
16	X 83	X 85	X 83	X 78	X 79																X 83	X 83	77	86
17	C	88	X 82	74	74	71															X 92	X 86	81	92
18	C	76	72	X 71	69	79															X 88	X 80	X 76	71
19	82	84	X 86	84	75	74	83	86													X 96	X 93	90	X 80
20	X 78	X 78	X 78	75	72	71															X 97	X 91	X 89	87
21	X 81	X 76	X 76	X 77	X 74																X 101	X 94	X 69	68
22	69	72	X 75	X 63	X 61					C											X 66	X 64	X 65	X 65
23	X 62	X 64	X 66	X 58	X 60																X 64	X 71	X 68	X 68
24	X 68	X 68	X 65	X 64	62																X 82	X 86	X 76	X 79
25	74	78	76	75	75															X 70	X 73	X 72	76	75
26	C	70	70	69	66	66														X 70	O X 71	X 74	X 82	X 81
27	X 74	X 71	X 70	X 72	X 69															X 73	X 80	X 82	X 85	X 78
28	X 71	X 70	X 66	X 64	X 62															X 68	X 71	X 70	X 76	74
29	X 77	X 79	X 77	X 70	X 64															X 79	X 75	X 74	X 78	X 81
30	X 78	X 76	X 76	X 75	X 71															X 99	X 88	X 84	X 91	X 92
31	X 93	X 92	X 80	X 72	X 66															X 90	X 77	X 81	86	88
	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	31	31	31	31	11	2	1												7	30	31	31	31
MED	X 86	X 85	X 83	X 75	X 75	79	92	86												X 73	X 87	X 86	X 85	X 87
U Q	92	X 90	X 86	X 82	X 84	84														X 90	X 92	X 91	X 92	X 92
L Q	X 78	X 76	X 76	X 72	X 69	71														X 70	X 77	X 80	X 77	79

JUL. 1999 fxI (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1999 foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	84	R 84	82	78	78	74	R 76	81	85	90	89	94	90	87	U R 87	92	A	U A 88	U A 76	84	F 83	87	R 91	92
2	90	88	R 88	87	88	88	F 92	94	89	85	83	81	76	R 76	82	79	72	R 74	75	76	76	74	72	82
3	85	85	R 79	72	F 68	F 74	76	79	82	72	A	80	79	79	81	79	80	82	84	87	R 80	84	79	81
4	F 83	F 84	R 77	68	F 75	F 84	84	90	R 102	89	85	83	A	80	R 80	86	86	86	82	75	65	77	79	F 80
5	80	V 80	F 78	68	70	75	86	95	92	90	86	91	87	88	90	92	93	89	90	89	82	85	98	94
6	F 92	106	98	86	84	F 90	102	114	88	82	78	82	86	94	102	98	92	88	87	89	85	85	F 86	90
7	F 97	96	90	76	F 76	79	84	88	100	105	110	104	A	98	92	89	92	94	93	93	86	F 82	86	86
8	R 80	78	78	R 74	78	87	97	97	U A 100	84	R 81	83	91	92	84	82	84	86	92	88	86	86	88	89
9	86	F 85	F 81	73	F 73	F 74	80	85	79	69	75	U R 78	R 77	83	86	86	86	93	U A 89	A	74	80	84	F 86
10	R 84	R 76	72	69	F 66	F 75	84	92	88	99	100	96	U R 88	97	95	89	A	96	96	A	A	85	F 84	84
11	F 86	F 80	80	72	F 68	75	89	106	97	A	A	94	J R 95	A	95	89	86	84	91	R 98	84	85	82	R 79
12	F 86	84	86	85	79	80	89	102	99	100	94	98	102	98	96	98	106	99	101	90	90	84	86	86
13	80	R 82	84	84	80	84	87	88	81	80	80	90	92	93	88	89	86	88	92	90	81	78	82	V 80
14	80	79	76	F 66	68	F 67	85	104	111	87	A	R	91	93	92	87	82	84	88	92	92	86	90	84
15	81	84	R 79	71	70	80	93	86	74	68	84	87	86	94	97	92	85	82	88	86	87	78	79	R 77
16	77	79	77	72	73	81	R 100	106	A	80	R 68	73	U R 66	A	67	U R 59	62	A	64	A	J R 77	77	F 70	F 76
17	C	F 80	V 75	R 65	F 66	F 64	A	81	87	79	74	R 73	80	82	A	78	75	79	85	86	86	J R 80	F 74	F 85
18	C	F 70	F 65	65	F 62	F 71	88	V 103	90	66	66	78	81	81	79	77	R 73	79	90	91	82	74	70	F 63
19	R 75	F 75	80	F 76	F 65	F 66	F 75	F 80	89	94	88	85	83	85	90	88	84	82	82	88	90	87	F 84	74
20	72	72	72	Z 68	F 64	64	71	79	83	80	80	84	82	86	86	89	86	83	87	89	91	85	83	80
21	R 75	70	70	71	68	65	78	91	107	95	A	92	A	105	108	104	A	A	A	A	95	88	64	F 59
22	F 61	64	J R 69	57	55	58	65	65	A	C	A	U R 56	68	U R 65	U R 64	70	66	71	76	87	60	58	59	R 59
23	56	R 58	60	52	54	50	58	A	A	A	A	A	A	A	A	58	59	58	56	A	58	65	62	62
24	62	62	59	58	F 57	60	60	68	75	77	R 73	A	A	A	A	99	A	74	73	A	76	80	70	73
25	F 68	F 69	F 66	F 66	F 66	63	76	H 82	77	71	76	A	83	86	86	89	84	80	70	64	R 67	66	F 66	F 65
26	C	F 62	F 63	F 62	F 60	F 58	82	90	A	77	79	87	94	96	87	80	80	88	79	65	R 65	68	V 76	75
27	U R 68	65	64	66	63	61	64	77	91	A	A	A	A	A	82	78	74	69	63	67	74	76	79	72
28	65	64	60	58	56	58	72	76	V 75	R 64	58	A	66	70	A	66	64	60	62	62	65	65	69	F 67
29	71	73	71	64	58	52	57	65	R 65	69	U R 58	A	A	72	69	75	69	65	69	72	69	68	72	75
30	72	70	70	69	65	67	80	92	90	86	90	92	A	94	97	89	83	81	88	93	83	78	85	86
31	87	86	74	66	60	64	79	64	73	A	A	A	A	90	100	87	89	88	84	84	71	75	F 76	F 81
	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	31	31	31	31	31	30	30	27	26	23	23	22	26	27	31	27	29	30	25	30	31	31	31
MED	80	79	76	69	68	71	81	88	88	81	80	85	84	88	87	87	84	83	84	87	82	80	79	80
U Q	86	84	80	74	75	80	88	95	97	90	88	92	91	94	95	89	86	88	90	90	86	85	85	86
L Q	72	70	69	65	62	63	75	79	79	72	74	80	79	81	82	78	73	76	75	76	71	74	70	73

JUL. 1999 foF2 (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1999 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							L	U L 568	L 548	584	R 592	572	L 624	R 604	R	U A 560	A	A	A					
2								A	U A 536	U A 524	R 560	B	R 556	R 548	R 544	540	520	488	L					
3							A	A	A	R 568	A	A	A	A	R 556	548	L 536	L	U L 476					
4						L	A	U L 588	A	A	A	A	A	A	A	540	A	U L 512	A					
5							L	L	L	L 548	A	R 604	R 564	R 564	580	556	L 564	A	A					
6						L	L	A	A	L	A	L 556	A	A	U R 532	L 560	A	L 480	L					
7								L	A	A	U R 596	A	A	A	A	560	524	A						
8						L	L	L	A	A	552	R 576	U R 572	R 544	A	L 560	U L 536	U L 468	A					
9								L	A	A	A	U A 556	540	R 544	U A 516	U A 484	A	A	A	A				
10						L	U L 440	L	560	L 556	R 540	A	A	560	A	A	A	L 468	A	A				
11						L	U L 460	L 496	U L 512	A	A	U A 548	A	A	A	L 536	A	U L 532	L					
12							L	L 512	568	504	L 588	564	548	560	548	L 552	500	476	A					
13						L	U L 420	L 476	L	U L 536	R 576	A	U R 556	U R 612	552	A	A	L	A					
14							U L 460	L	500	L 496	A	A	A	A	A	A	L	U L 488	A					
15						L	L	A	U L 488	L	524	528	A	528	528	L 544	L 508	L 468	U L 444					
16							L	U A 472	A	U A 496	A	516	A	A	U A 508	U A 472	A	A	A	A				
17							A	A	A	U L 492	540	572	A	A	A	A	L 500	L 476	U L 412					
18						L	L	A	A	A	U A 536	R	516	U A 516	500	U A 504	500	L 460	L 392					
19									A	A	U L 524	R 552	R	A	A	520	A	A	A					
20						216	L	L 472	L 500	L 496	L 584	U L 544	L 560	524	532	516	A	L	U L 392					
21							U L 464	440	492	A	A	552	A	A	L 532	A	A	A	A	A				
22							L	U A 460	A	C	A	A	A	524	524	U R 504	U A 468	L 460	A					
23						A	A	A	A	A	A	A	A	A	A	U R 480	L 464	A		A				
24							L	500	A	A	U L 564	A	A	A	A	A	A	A	L	A				
25							L	A	A	A	A	A	A	A	U A 508	U A 516	A	A	A					
26							L	L 472	A	568	L 560	544	A	544	544	U L 524	U A 484	U A 436	A					
27							L	500	A	A	A	A	A	A	A	A	L 500	A						
28							U L 452	L 552	496	R 516	512	A	A	A	A	A	A	L 468	A					
29							444	U A 472	L 540	A	R 532	A	A	544	536	524	524	L	A					
30						L	L	L 488	U L 520	U L 640	L 560	A	A	A	U A 552	A	U A 528	L	L					
31						A	L	A	U L 548	A	A	A	A	A	A	532	L 560	A	U L 376					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						1	7	15	13	14	17	14	9	14	17	22	16	14	6					
MED						216	U L 452	L 488	L 520	530	560	554	556	544	532	534	514	L 472	U L 402					
U Q							U L 460	L 512	548	568	R 580	572	R 568	R 560	550	552	L 532	U L 488	U L 444					
L Q							U L 440	472	498	L 496	534	544	544	528	U A 520	U 516	500	L 468	L 392					

JUL. 1999 foF1 (0.01MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1999 foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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						160	292	348	368	B	A	B	B	A	A	A	A	U A 316	A	B				
2						220	292	336	368	R	A	B	R	B	R	R	360	U A 316	A	B				
3						A	A 288	324	368	384	A	A	A	A	A	A	A	304	A	B				
4						A	A	U A 344	A	A	A	A	A	A	A	A	A	A	A	B				
5						A	R	A 328	A	A	A	A	A	A	B	R 392	360	316	U A 248	B				
6						A	276	A 320	U A 348	A 368	A	A	A	A	A	A	A	A	228	B				
7						A	272	R 308	352	380	U R 400	B	A	A	396	R	348	312	A 232	B				
8						A	A	U A 312	A	A	A	B	R	B	A	B	B	U A 304	A	B				
9						192	A 268	312	U A 344	372	A	U A 420	R 424	R	392	R 376	336	296	A	B				
10						192	A	A	R	A	A	A	A	A	A	U A 340	A	316	A	B				
11						A	A	A 308	A	A	A	A	436	U R 412	A	R 364	344	304	A	B				
12						A	A	A	A	A	R	A	A	B	U R 408	R	R 344	296	236	B				
13						A	A	A	A	A	A	A	B	B	B	384	336	304	U A 228	B				
14						184	A	A	A	A	A	A	A	A	A	A	A	284	A	B				
15						A	A	A 300	U A 348	A 360	A	A	A	A	A	A 364	A	A	A	B				
16						A	260	U A 312	A	A	A	B	A	A	A	A	A	276	216	B				
17						A	A	U A 312	348	A	A	A	A	B	A	348	340	292	U A 212	B				
18						A	A 244	A	U A 348	A	A	A 416	R 424	U R 424	R 400	R 368	332	A	A	B				
19						176	A 260	A	344	U A 364	A	A	A	A	A	A	340	300	U A 256	B				
20						A	252	A	A	A	A	A	A	A	A	A	336	288	212	B				
21						A	280	308	U A 352	U A 364	U A 380	A	A	A	A	372	332	A	A	B				
22						192	A	312	A	C	A	A	A	U R 408	R 400	R	336	U A 292	A	B				
23						A	248	312	348	U R 368	B	B	A	A	A	R	336	292	224	B				
24						180	272	328	U R 360	A	B	A	A	A	A	A	A	A	A	B				
25						A	268	A	A	U A 364	A	A	A	A	A	A	A	A	A					
26						180	A	U A 308	A	A	A	A	A	A	A	A	A 324	A 296	212					
27						A	252	316	352	A	A	A	B	A	A	A	A	A	A					
28						B	A	A	A	A	A	A	A	A	A	A	A	A	A					
29						A	264	A 320	A	A	A	A	A	A	R	A	344	296	A					
30						164	A	A	A	A	A	A	A	A	A	A	A	A 308	A					
31						A	U A 284	U A 324	U A 360	U A 392	A	A	A	A	A	A	344	A 284	A					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						10	17	21	15	10	2	2	3	3	5	9	17	22	11					
MED						182	268	A 312	352	A 368	U 390	A 418	R 424	U R 412	R 400	368	340	298	228					
U Q						192	282	326	360	380			436	U R 424	R 404	R 380	344	A 308	U A 236					
L Q						176	256	310	348	U A 364			R 424	U R 408	394	A 356	336	292	212					

JUL. 1999 foE (0.01MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1999 foEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 14	J A 35	24	J A 26	J A 31	25	32	38	J A 46	J A 51	J A 66	E B 45	53	55	52	J A 61	106	J A 142	J A 176	J A 86	J A 48	J A 50	J A 46	19
2	26	E B 15	J A 18	J A 16	J A 25	J A 23	39	J A 54	J A 71	J A 54	54	E B 74	G 38	E B 52	G 38	G 34	G	36	32	E B 17	E B 16	E B 14	21	J A 63
3	J A 22	J A 23	J A 31	J A 26	J A 26	J A 34	J A 68	J A 82	J A 86	J A 61	J A 82	J A 84	J A 110	79	45	J A 57	46	J A 85	J A 27	48	52	J A 101	J A 90	J A 87
4	71	J A 125	J A 50	J A 66	J A 50	J A 44	J A 48	J A 56	J A 67	J A 63	68	J A 84	116	87	J A 105	J A 46	J A 68	J A 40	45	43	32	J A 27	J A 24	J A 40
5	J A 28	J A 31	J A 32	J A 31	J A 30	23	G 27	35	J A 44	40	61	44	J A 79	57	J A 65	G	51	J A 49	70	J A 30	J A 112	45	J A 66	26
6	J A 38	J A 33	J A 31	31	J A 37	J A 27	33	J A 85	J A 69	J A 61	61	J A 63	J A 81	84	42	57	90	J A 121	J A 36	J A 35	J A 26	J A 40	J A 82	J A 49
7	J A 78	J A 61	J A 23	J A 26	J A 32	J A 37	32	J A 43	68	92	51	86	J A 120	J A 90	J A 103	G	J A 48	J A 77	J A 55	J A 128	J A 54	22	J A 44	36
8	J A 22	J A 31	J A 49	J A 46	J A 42	J A 29	33	37	J A 162	82	41	E B 46	G 33	E B 49	54	46	44	J A 51	53	37	18	27	31	J A 80
9	J A 52	J A 58	J A 48	25	24	G 19	J A 40	39	J A 54	J A 64	82	58	J A 115	47	J A 53	J A 52	105	129	109	98	J A 65	J A 65	51	J A 28
10	J A 45	J A 34	25	J A 41	J A 24	G	38	J A 56	G 34	J A 80	J A 58	85	84	J A 124	J A 81	J A 138	J A 181	37	67	J A 143	J A 178	J A 102	72	J A 86
11	J A 50	J A 25	J A 52	E B 14	J A 30	J A 33	J A 46	J A 42	J A 52	J A 136	J A 124	56	84	123	J A 103	88	J A 80	J A 61	J A 46	J A 22	E B 14	J A 28	E B 14	J A 22
12	J A 31	31	J A 33	J A 28	J A 79	J A 52	J A 43	J A 37	J A 50	J A 43	G 38	51	55	E B 42	44	39	G	J A 45	45	J A 25	J A 100	J A 68	J A 50	29
13	J A 36	J A 21	J A 33	J A 22	23	24	J A 30	34	J A 50	J A 48	54	77	51	58	J A 82	J A 126	J A 70	J A 51	70	42	J A 50	J A 27	J A 34	J A 34
14	J A 46	J A 38	J A 37	E B 14	J A 20	G	J A 51	J A 46	J A 62	J A 47	85	109	86	120	J A 63	J A 71	35	J A 42	70	78	J A 54	J A 48	J A 49	J A 48
15	J A 50	J A 32	J A 33	J A 31	J A 30	J A 24	J A 41	J A 134	J A 52	J A 51	J A 52	J A 54	J A 96	J A 52	J A 50	45	J A 51	J A 38	J A 28	J A 41	J A 38	J A 33	J A 66	J A 51
16	J A 51	J A 56	J A 41	J A 47	J A 51	J A 46	J A 46	J A 64	122	J A 178	70	E B 41	65	71	J A 52	49	59	82	114	64	J A 28	J A 46	J A 84	J A 82
17	C	J A 63	24	28	28	J A 43	J A 113	90	J A 124	J A 45	41	55	72	76	102	67	J A 46	J A 50	J A 36	60	52	22	J A 82	J A 37
18	C	J A 46	J A 38	J A 32	J A 21	J A 28	J A 44	J A 68	114	187	J A 60	50	47	53	J A 51	57	J A 53	J A 77	J A 52	J A 26	J A 64	J A 42	J A 53	J A 56
19	J A 50	30	J A 27	J A 26	23	J A 25	J A 54	J A 52	J A 61	J A 79	60	57	45	65	J A 80	J A 42	J A 74	75	59	J A 77	J A 83	J A 92	J A 53	46
20	J A 41	J A 36	J A 35	J A 24	J A 26	J A 22	29	J A 43	39	J A 43	50	47	52	J A 50	41	37	66	J A 63	J A 47	54	J A 39	J A 43	J A 76	J A 53
21	E B 14	J A 20	E B 15	E B 14	E B 13	J A 23	32	34	J A 50	J A 55	J A 137	J A 101	109	J A 82	J A 50	J A 74	J A 177	J A 148	168	186	J A 102	J A 37	J A 26	J A 63
22	J A 52	J A 68	J A 50	J A 39	J A 26	J A 24	J A 28	54	82	C	126	54	58	48	44	G	J A 52	J A 86	J A 54	J A 32	J A 42	J A 37	J A 26	J A 28
23	J A 56	J A 28	J A 46	J A 44	J A 47	J A 54	58	70	87	92	86	66	86	150	89	G 34	G 28	J A 43	J A 90	81	J A 40	J A 64	J A 84	J A 55
24	24	J A 28	J A 24	J A 26	J A 22	G	31	J A 50	J A 67	65	60	114	80	131	176	70	J A 156	J A 119	J A 126	89	34	J A 72	J A 51	J A 63
25	J A 34	J A 28	J A 26	J A 48	60	J A 24	33	J A 68	J A 54	J A 66	J A 66	91	84	J A 81	J A 60	J A 53	73	60	J A 66	J A 54	J A 42	J A 47	J A 56	J A 84
26	C	J A 32	J A 55	32	J A 27	21	J A 51	J A 48	114	J A 50	42	J A 48	J A 121	J A 48	53	47	J A 65	J A 48	42	48	44	J A 29	J A 43	J A 50
27	J A 51	J A 22	E B 14	E B 14	J A 20	22	31	57	87	J A 150	110	J A 149	102	J A 178	J A 82	66	37	J A 54	50	J A 42	J A 54	J A 38	J A 29	J A 27
28	J A 24	J A 24	21	18	E B 15	J A 22	J A 30	J A 34	J A 40	51	51	67	65	66	J A 79	J A 67	J A 62	J A 40	J A 40	J A 39	J A 32	J A 27	J A 22	J A 49
29	J A 24	E B 13	E B 14	E B 14	E B 15	J A 21	36	70	J A 68	62	57	92	75	57	G 38	44	J A 77	57	J A 82	J A 48	J A 65	J A 66	J A 31	J A 33
30	J A 28	J A 22	20	J A 19	J A 19	G	J A 31	J A 44	J A 44	J A 56	J A 53	J A 89	J A 138	J A 81	60	84	59	J A 48	39	62	J A 40	J A 26	30	J A 69
31	J A 45	J A 22	J A 32	J A 39	J A 27	J A 44	J A 42	J A 59	J A 42	91	149	J A 179	206	160	91	J A 48	J A 50	56	34	J A 30	J A 58	J A 52	J A 77	J A 89
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	J A 40	J A 31	J A 32	J A 26	J A 26	J A 24	J A 38	J A 52	J A 62	J A 62	60	64	81	71	J A 60	52	J A 59	J A 56	J A 53	J A 48	J A 48	J A 42	J A 50	J A 49
U Q	J A 50	J A 38	J A 41	J A 39	J A 32	J A 34	J A 46	J A 68	86	82	82	89	J A 109	90	82	J A 67	J A 77	J A 82	70	78	J A 64	J A 64	J A 72	J A 63
L Q	25	J A 23	24	E B 19	J A 22	G 22	31	39	J A 50	J A 51	52	51	55	52	50	G 42	46	J A 45	J A 40	J A 35	34	27	J A 30	J A 33

JUL. 1999 foEs (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1999 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 14	17	19	E B 15	21	23	32	37	43	45	48	E B 45	49	48	49	56	A A 106	U A 63	U A 50	24	22	22	22	E B 14
2	21	E B 15	E B 14	E B 14	E B 16	G 16	33	52	54	52	48	E B 74	U G 38	E B 52	U G 38	U G 34	G	35	28	E B 17	E B 16	E B 14	E B 14	38
3	16	16	23	20	19	23	59	76	76	45	A A 82	64	68	72	U Y 44	48	44	46	27	41	42	45	43	42
4	52	40	20	42	37	28	44	47	62	60	60	70	A A 116	77	67	46	55	35	39	25	21	19	E B 15	20
5	18	E B 14	20	18	20	22	U G 27	34	40	U Y 40	U Y 60	U Y 43	49	53	50	G	48	46	40	25	29	33	44	18
6	28	24	18	21	22	22	31	78	66	56	58	51	77	75	42	52	67	40	34	21	20	23	21	38
7	66	35	E B 15	E B 15	24	28	30	40	62	86	49	74	A A 120	77	59	G	39	61	46	34	19	E B 14	18	E B 13
8	E B 14	E B 15	36	34	22	24	30	36	80	79	40	E B 46	U G 33	E B 49	53	43	43	41	44	24	17	17	19	30
9	28	50	29	18	17	G 17	37	36	49	57	64	56	48	46	52	48	76	84	78	A A 98	46	26	29	20
10	44	24	E B 14	20	17	G	31	54	G 34	52	48	80	78	50	64	77	A A 181	34	54	A A 143	A A 178	59	55	55
11	26	18	18	E B 14	E B 15	26	34	39	46	A A 136	A A 124	55	78	A A 123	68	47	50	37	37	20	E B 14	18	E B 14	E B 15
12	19	22	18	20	19	24	35	32	38	41	U G 38	45	48	E B 42	44	U Y 39	G	42	37	20	48	56	20	21
13	20	E B 14	18	18	E B 16	20	27	33	42	43	54	67	49	57	46	66	64	45	60	34	19	20	25	24
14	31	26	20	E B 14	E B 15	G	34	36	46	46	A A 85	66	74	78	60	70	34	35	61	68	21	21	20	20
15	37	18	20	20	19	21	30	41	42	43	44	45	66	44	44	43	40	32	26	20	34	28	41	22
16	42	42	20	28	35	40	37	47	A A 122	50	54	E B 41	60	A A 71	51	47	50	A A 82	52	A A 64	22	19	23	40
17	C	43	13	18	17	28	A A 113	70	50	40	41	47	70	67	A A 102	63	42	37	27	46	47	18	46	27
18	C	33	24	20	E B 14	20	40	62	84	61	54	48	46	52	46	50	42	35	30	18	19	22	20	21
19	29	20	20	18	E B 13	22	45	46	59	65	48	49	U Y 45	62	65	40	71	62	54	60	42	22	20	18
20	29	30	24	19	E B 14	18	28	33	38	40	42	U Y 47	45	46	U Y 41	U Y 37	61	42	G 20	40	18	17	19	22
21	E B 14	E B 14	E B 15	E B 14	E B 13	18	G 22	33	46	54	A A 137	44	A A 109	64	48	71	A A 177	A A 148	A A 168	A A 186	18	18	22	21
22	36	30	27	37	20	G 16	26	46	A A 82	C	A A 126	52	56	45	43	G	47	38	36	24	35	30	19	22
23	43	22	24	29	24	40	42	A A 70	A A 87	A A 92	A A 86	A A 66	A A 86	A A 150	A A 89	U G 34	G 27	42	28	A A 81	20	44	40	45
24	17	20	17	18	15	G	29	43	60	63	52	A A 114	A A 80	A A 131	A A 176	65	A A 156	44	30	A A 89	26	43	30	45
25	26	22	21	23	46	18	31	63	50	60	61	A A 91	78	77	51	52	68	40	45	43	36	21	26	18
26	C	17	29	20	19	G 17	35	39	A A 114	42	42	43	74	44	50	46	48	44	35	26	37	19	34	36
27	44	E B 14	E B 14	E B 14	18	20	30	G 24	76	A A 150	A A 110	A A 149	A A 102	A A 178	64	62	36	48	34	27	21	18	18	18
28	14	E B 15	E B 14	E B 14	E B 15	E B 14	26	31	40	46	45	A A 67	62	66	A A 79	64	57	34	35	37	20	23	18	24
29	20	E B 13	E B 14	E B 14	E B 15	20	33	47	41	U Y 61	47	A A 92	A A 75	50	U G 38	41	40	42	45	43	37	39	21	22
30	24	E B 15	E B 14	19	E B 13	G	28	35	40	50	50	86	A A 138	78	55	78	53	45	32	58	20	20	20	43
31	31	18	23	32	21	40	33	58	40	A A 91	A A 149	A A 179	A A 206	73	73	45	41	47	24	19	22	25	42	43
	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	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	27	20	20	19	18	20	32	41	50	53	54	56	70	64	51	47	48	42	37	34	22	22	21	22
U Q	36	30	23	21	21	24	37	54	76	63	A A 82	A A 74	A A 80	77	65	63	67	47	50	A A 60	37	30	34	38
L Q	18	E B 15	E B 15	E B 15	E B 15	G	29	35	41	45	47	46	49	49	44	G 40	40	37	30	24	19	18	19	20

IONOSPHERIC DATA STATION Kokubunji

JUL. 1999 fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	14	15	15	15	12	16	15	17	40	40	45	42	39	22	22	20	14	13	14	14	15	14	14
2	14	15	14	14	16	14	14	17	20	22	37	74	35	52	34	21	19	18	19	17	16	14	14	14
3	15	14	14	14	14	14	14	14	15	16	27	41	39	35	37	26	20	14	14	15	16	14	16	14
4	14	14	14	15	16	13	14	16	24	24	28	28	37	38	25	20	16	19	15	16	16	15	15	15
5	16	14	14	15	14	14	17	17	17	22	25	40	40	41	42	23	22	16	15	13	16	15	14	14
6	14	14	14	14	15	15	15	15	18	21	29	37	34	21	34	22	18	15	15	14	14	15	16	15
7	14	15	15	15	14	16	15	16	16	21	30	42	21	40	24	26	16	17	16	15	15	14	15	13
8	14	15	16	15	15	14	16	20	20	20	23	46	27	49	26	38	41	18	14	15	14	14	15	14
9	14	16	16	14	15	14	14	15	20	19	21	24	20	19	19	16	15	14	14	13	15	16	15	13
10	14	15	14	16	14	14	14	16	20	24	25	41	38	24	20	22	16	15	16	13	14	14	14	14
11	15	14	14	14	15	14	14	14	16	21	24	20	22	21	39	22	20	15	15	14	14	14	14	15
12	15	13	14	13	15	13	15	17	14	21	26	38	35	42	32	22	20	15	14	14	14	14	15	15
13	15	14	14	14	16	15	15	18	18	22	24	30	42	44	42	21	18	15	13	14	15	14	16	15
14	14	14	15	14	15	14	14	16	14	20	22	23	35	33	34	21	20	15	15	14	15	14	15	14
15	15	15	14	14	15	15	14	14	18	19	22	34	34	26	18	22	20	14	14	14	14	14	15	15
16	15	15	15	15	14	14	14	14	16	17	18	41	30	28	24	21	18	13	14	15	15	15	14	14
17	C	14	13	14	14	14	14	12	16	21	20	38	28	40	22	18	15	14	14	13	14	14	15	15
18	C	15	15	15	14	16	15	14	17	22	26	27	28	28	26	21	19	17	14	14	14	14	15	14
19	14	14	14	13	13	13	12	15	16	19	22	39	40	26	22	22	18	14	19	15	13	15	15	15
20	14	14	15	14	14	14	14	14	20	20	26	22	22	28	23	20	17	15	15	15	16	15	14	14
21	14	14	15	14	13	14	13	16	16	18	19	23	21	21	32	19	17	14	12	14	13	14	13	14
22	15	15	14	14	15	14	16	18	13	C	23	33	28	27	21	22	18	15	17	15	15	14	14	15
23	14	15	14	14	14	15	14	14	16	24	41	42	41	37	39	26	22	16	14	15	14	14	15	12
24	14	14	14	13	14	15	15	16	26	23	39	30	38	38	32	23	17	22	16	12	14	14	15	14
25	14	13	15	15	15	13	14	21	17	21	29	40	37	32	26	24	19	16	15	15	14	12	14	14
26	C	15	16	14	13	15	15	16	17	17	24	22	26	28	27	22	17	15	14	15	15	14	14	14
27	15	14	14	14	14	14	16	18	18	18	27	39	43	34	29	23	22	15	14	14	15	15	14	14
28	14	15	14	14	15	14	15	15	14	16	26	42	27	27	24	21	17	16	15	16	14	15	13	14
29	14	13	14	14	15	16	12	14	21	21	23	31	25	23	25	19	19	15	16	15	14	13	14	14
30	14	15	14	14	13	14	16	15	18	24	39	35	32	31	29	26	22	14	13	13	15	15	14	15
31	12	15	15	14	15	14	15	15	19	24	24	40	24	36	35	22	18	15	14	15	15	15	14	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	14	14	14	14	15	14	14	15	17	21	25	38	34	32	26	22	18	15	14	14	14	14	14	14
U Q	15	15	15	15	15	15	15	17	20	22	29	41	38	39	34	23	20	16	15	15	15	15	15	15
L Q	14	14	14	14	14	14	14	14	16	19	23	28	26	26	23	21	17	14	14	14	14	14	14	14

IONOSPHERIC DATA STATION Kokubunji

JUL. 1999 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

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	265	R 271	277	282	292	334	R 303	289	286	269	258	263	255	250	U R 253	258	A	A	A	273	F 251	282	R 266	263
2	260	278	R 281	273	271	280	F 279	270	260	256	264	B 269	253	R 248	255	260	262	R 258	267	278	276	250	246	257
3	257	279	R 283	259	F 258	F 266	286	A	A 298	248	A	267	268	265	271	274	270	276	266	270	R 279	263	269	246
4	F 267	F 285	R 287	287	F 271	F 290	288	259	R 283	272	264	266	A	A	R 274	276	273	294	302	295	279	246	258	F 269
5	263	V 262	F 291	282	271	277	306	302	282	273	262	273	275	260	257	266	282	285	285	289	270	260	279	279
6	F 269	285	306	293	284	F 288	284	320	293	277	257	266	A 252	252	269	270	277	284	276	275	279	260	F 263	277
7	F 283	284	299	294	F 286	276	290	255	269	264	270	274	A	276	275	279	277	285	291	300	299	F 273	264	272
8	R 261	265	271	R 281	268	279	313	297	A	A 266	R 269	263	269	281	279	280	273	282	284	285	266	270	261	267
9	274	F 274	F 266	263	F 261	F 273	276	304	274	322	266	U R 276	R 266	275	277	280	A 282	A 308	A	A	264	258	274	F 273
10	R 280	R 285	293	283	F 288	F 309	294	295	279	277	282	271	U R 276	275	279	273	A	293	293	A	A	265	F 284	282
11	F 286	F 289	281	274	F 293	268	272	291	294	A	A	280	R	A	289	288	292	267	283	R 288	270	263	268	R 271
12	F 257	273	273	278	284	290	267	295	293	294	267	272	279	277	270	266	266	283	299	298	281	264	272	275
13	273	R 269	270	280	279	287	306	299	296	297	263	288	279	288	291	290	294	300	297	305	287	258	266	V 280
14	273	269	286	F 289	273	F 272	271	284	310	288	A	R	272	278	283	286	277	286	286	292	294	279	277	270
15	267	287	R 292	285	281	307	332	317	301	283	284	281	256	279	284	288	286	291	287	283	288	269	268	R 274
16	272	273	286	273	269	264	R 268	299	A	288	R 278	274	U R 279	A	282	U R 293	266	A	289	A	R	281	F 271	F 274
17	C	F 284	V 301	R 301	F 307	F 297	A	302	297	320	284	R 266	281	284	A	286	285	278	283	279	285	J R 280	F 281	F 278
18	C	F 282	F 270	273	F 276	F 283	290	V 314	A 307	300	252	280	283	301	293	282	R 288	278	289	305	299	295	271	F 269
19	R 277	F 277	285	F 290	F 281	F 317	F 293	F 269	287	289	279	282	295	270	286	281	285	290	288	281	290	281	F 286	282
20	274	274	286	Z 298	F 287	295	333	311	307	312	275	285	282	289	289	283	294	290	288	283	286	291	284	278
21	R 285	273	273	284	295	276	282	271	307	299	A	269	A	267	275	291	A	A	A	A	298	311	288	F 257
22	F 294	288	J R 285	267	280	327	266	323	A	C	A	R 280	284	U R 293	U R 246	291	276	278	283	314	282	256	251	R 274
23	276	R 270	274	257	267	263	267	A	A	A	A	A	A	A	A	270	289	286	287	A	257	271	282	278
24	274	277	284	275	F 278	302	316	282	278	271	R 281	A	A	A	A	302	A	290	290	A	276	293	278	262
25	F 280	F 279	F 281	F 301	F 291	306	308	H 309	296	296	258	A	A 277	288	273	297	307	316	301	283	R 277	271	F 274	F 287
26	C	F 291	F 283	F 289	F 267	F 272	293	295	A	273	252	268	274	288	299	284	290	310	321	296	R 289	270	V 260	278
27	U R 289	270	274	278	284	265	270	263	287	A	A	A	A	A	297	290	305	301	284	279	256	264	281	278
28	273	273	279	287	290	304	298	276	V 292	R 277	255	A	A 282	285	A	A 283	294	292	284	297	272	269	264	F 262
29	266	278	286	281	274	275	264	276	R 269	R 242	U R 279	A	A	275	273	295	294	287	293	285	264	259	263	261
30	271	274	278	283	282	291	301	293	293	262	261	A 259	A	269	280	287	282	271	280	295	286	255	252	249
31	268	295	292	263	266	269	305	A 306	305	A	A	A	A	265	289	273	280	295	289	287	284	253	F 265	F 266
	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	31	31	31	31	31	30	29	26	26	23	23	21	25	27	31	27	28	28	25	29	31	31	31
MED	273	277	283	282	280	283	290	295	293	277	266	272	276	276	279	283	282	286	288	287	279	269	269	273
U Q	278	285	287	289	F 287	302	305	305	298	296	279	280	282	286	289	290	292	294	292	296	288	280	279	278
L Q	266	273	274	273	271	272	272	276	282	269	258	266	267	266	271	273	276	280	284	280	270	259	263	263

JUL. 1999 M(3000)F2 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1999 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							L	U L 330	L 348	339	R 339	356	L 323	R 330	R	A	A	A	A					
2								A	A	A	R 366	B	R 366	B 330	R 339	351	323	327	L					
3							A	A	A	R 349	A	A	A	A	A	356	A 320	L	U L 302					
4						L	A	U L 326	A	A	A	A	A	A	A	338	A	U L 323	A					
5							L	L	L	L 359	A	R 341	R 359	A	339	341	A 336	A	A					
6						L	L	A	A	L	A	A	A	A	U R 362	A	A	A 338	L					
7								L	A	A	U R 326	A	A	A	A	330	331	A						
8						L	L	L	A	A	399	R 343	U R 362	B	A	L 315	U L 322	A	A					
9								L	A	A	A	A	382	R 354	A	A	A	A	A	A				
10						L	U L 353	L	356	A	R 373	A	A	A 339	A	A	A	L 347	A	A				
11						L	U L 343	L 342	U L 376	A	A	A	A	A	A	A 328	A	U L 310	L					
12							L	L 331	353	396	L 338	362	379	365	347	Y 308	334	A 339	A					
13						L	U L 357	L 364	L	U L 363	A	A	U R 384	A	355	A	A	L	A					
14							U L 346	L	A 355	A 385	A	A	A	A	A	A	L	U L 342	A					
15						L	L	A	U L 382	L	375	364	A	366	356	L 329	L 325	L 337	U L 314					
16							L	A	A	A	A	383	A	A	A	A	A	A	A	A				
17							A	A	A	U L 391	391	346	A	A	A	A	A 327	L 325	U L 351					
18						L	L	A	A	A	A	R	381	A	384	A	336	L 335	L 337					
19									A	A	A 364	A	R	A	A	343	A	A	A					
20						403	L	L 363	L 358	L 384	L 338	U L 332	L 337	369	352	379	A	L	U L 340					
21							U L 334	370	A	A	A	363	A	A	A	A	A	A	A	A				
22							L	A	A	C	A	A	A	365	344	U R 355	A	A	A					
23						A	A	A	A	A	A	A	A	A	A	Y	L 355	A		A				
24							L	342	A	A	A	A	A	A	A	A	A	A	L	A				
25							L	A	A	A	A	A	A	A	A	A	A	A	A					
26							L	L 362	A	328	L 356	351	A	346	A 345	A	A	A	A					
27							L	334	A	A	A	A	A	A	A	A	L 332	A						
28							U L 349	L 339	H 384	R 378	A 325	A	A	A	A	A	A	L 338	A					
29							341	A	L 335	A	R 339	A	A	A 319	354	355	337	L	A					
30						L	L	L 351	U L 363	U L 314	A 346	A	A	A	A	A	A	L	L					
31						A	L	A	U L 346	A	A	A	A	A	A	349	L 321	A	U L 357					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						1	7	12	11	11	14	10	9	10	11	14	13	11	6					
MED						403	U L 346	L 342	L 356	363	351	354	366	350	352	342	331	L 337	U L 338					
U Q							U L 353	L 362	U L 376	385	373	363	382	365	356	355	336	L 339	U L 351					
L Q							341	L 332	L 348	339	338	R 343	L 348	330	344	329	322	U L 325	U L 314					

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IONOSPHERIC DATA STATION Kokubunji

JUL. 1999 h'F2 (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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							300	336	326	386	386	392	414	438	428	386	A	A	A					
2								A 310	396	396	408	B	464	480	442	426	444	412	L 322					
3							A 346	A	A	518	A	410	A 422	E A 452	394	404	380	352	354					
4						294	282	376	324	376	392	A 406	A	A	A 406	378	A 354	330	294					
5							260	296	304	312	Y 386	382	358	414	404	382	346	324	302					
6						290	276	276	A 292	L 328	428	390	E A 478	A 424	368	360	A 362	326	368					
7								L 362	352	A 384	352	A 336	A	A 370	348	356	360	318						
8						310	258	298	A 300	A	326	398	382	332	376	374	358	324	308					
9								282	294	A 298	A 436	384	406	386	366	350	A	A 362	A	A				
10						268	284	316	342	332	350	A 390	A 412	366	354	A 396	A	308	288	A				
11						338	318	298	286	A	A	362	A 354	A	340	330	324	L 362	304					
12							296	304	326	308	346	348	346	350	362	376	328	324	292					
13						290	274	306	300	332	430	352	360	350	340	342	A 322	314	A 304					
14							336	284	260	H 298	A	A 378	A 382	A 368	348	352	364	330	A 332					
15						290	246	260	278	L 268	348	344	A 390	354	324	332	334	320	300					
16							L 338	282	A	326	420	394	E A 414	A	404	398	A 410	A	A	A				
17							A	E A 332	302	290	380	426	A 378	360	A	A 360	344	346	298					
18						L 308	290	268	E A 372	E A 376	482	376	362	326	354	372	364	334	304					
19									324	A 330	322	346	326	388	348	350	A 370	A 328	A 314					
20						244	258	286	292	298	378	346	358	346	350	338	324	316	296					
21							322	304	274	292	A	372	A	348	336	320	A	A	A	A				
22							L 306	294	A	C	A	E A 450	A 372	406	Y 524	374	392	358	336					
23						A	386	A	A	A	A	A	A	A	A	454	366	A 310		A				
24							276	330	A 386	A 398	388	A	A	A	A	320	A	304	310	A				
25							288	A 276	326	A 354	A 442	A	E A 442	E A 382	368	332	A 328	278	A 294					
26							320	308	A	392	436	384	A 364	334	344	334	332	300	270					
27							312	396	A 362	A	A	A	A	A	A 348	A 360	312	A 302						
28							290	404	334	408	516	A	E A 456	E A 420	A	A	A 388	344	298					
29							428	372	436	A	L 444	A	A	414	442	354	358	352	A 322					
30						316	284	300	292	402	380	A	A	A 396	A 352	E A 390	334	370	324					
31						A 350	282	A	324	A	A	A	A	A 410	A 340	352	360	A 276	274					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						11	26	27	26	24	23	22	22	25	27	30	26	28	24					
MED						294	290	302	319	332	388	382	A 372	375	354	359	358	325	304					
U Q						316	320	332	342	389	436	394	A 414	414	404	382	366	349	322					
L Q						290	276	284	292	303	352	352	360	350	348	342	332	312	295					

JUL. 1999 h'F2 (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1999 h'F (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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	314	296	292	260	266	236	230	226	224	246	A 248	224	256	256	A 260	A	A	A	A	282	334	296	322	290
2	326	282	284	288	288	240	248	A	A	A	236	B	E Y 258	B	E Y 272	218	238	250	A 262	288	278	312	346	390
3	302	292	280	332	334	256	A	A	A	232	A	A	A	A	Y	A 262	A	A	250	A 288	A 312	A 342	A 350	386
4	A 388	A 294	270	A 304	A 324	A 272	A	A	A	A	A	A	A	A	A	252	A	234	A	264	284	344	332	320
5	312	308	278	272	300	258	244	224	234	236	A	234	A 254	A	246	236	A	A	A	266	284	342	322	284
6	354	286	262	248	272	252	240	A	A	A 260	A	A	A	A	226	A	A	A	A 264	262	270	308	348	342
7	A 328	302	256	248	296	232	250	248	A	A	E A 282	A	A	A	A	258	224	A	A 274	272	260	268	308	296
8	284	296	320	302	298	246	244	218	A	A	180	E B 278	H 214	B	A	A 252	A 242	A	A	262	276	310	318	308
9	304	A 352	342	324	282	258	268	A 248	A	A	A	A	232	A 260	A	A	A	A	A	A	A 360	340	338	290
10	A 316	290	272	254	260	254	216	E A 288	H 210	A	236	A	A	E A 288	A	A	A	246	A	A	A	A 378	A 340	A 362
11	298	266	272	276	268	A 278	250	228	A 246	A	A	A	A	A	A	A	A	230	A	268	240	276	292	306
12	322	308	300	280	270	276	A 248	224	214	196	E Y 276	220	224	204	252	E Y 294	Y	A	A	262	A 292	E A 350	294	288
13	286	288	290	286	274	262	226	214	A 236	218	A	A	226	A	242	A	A	A	A	260	248	286	326	312
14	A 330	332	264	274	290	258	A 254	242	A	238	A	A	A	A	A	A	236	254	A	A	268	256	272	298
15	354	272	266	288	290	260	A 242	A	220	214	222	238	A	222	240	A 254	242	226	234	252	276	302	A 340	306
16	A 352	A 326	280	296	A 320	E A 316	A 256	A	A	A	A	218	A	A	A	A	A	A	A	A	282	284	330	360
17	C	A 308	234	240	266	272	A	A	A	198	196	236	A	A	A	A	A	250	264	E A 292	A 298	252	A 332	306
18	C	326	336	304	292	264	A	A	A	A	A	Y	252	A	248	A	A 270	A 258	256	260	248	254	288	296
19	344	302	274	258	280	254	A 286	252	A	A	A	A	Y	A	A	238	A	A	A	E A 306	270	282	276	280
20	342	326	302	266	250	228	226	218	202	200	H 226	Y	A 250	238	224	212	A	A	A 252	A 282	274	260	290	310
21	264	298	312	264	256	262	240	224	A	A	A	216	A	A	A	A	A	A	A	A	270	236	226	348
22	A 342	A 334	324	A 392	302	250	226	A	A	C	A	A	A	222	266	228	A	A	A	250	274	384	372	340
23	E A 382	320	334	A 348	318	A	A	A	A	A	A	A	A	A	A	Y	226	A	A 256	A	304	A 380	A 348	A 378
24	298	300	284	306	278	264	238	E A 280	A	A	A	A	A	A	A	A	A	A	A 266	A	286	308	306	366
25	328	316	304	292	A 334	262	246	A	A	A	A	A	A	A	A	A	A	A	A	A 314	A 310	324	360	292
26	C	292	314	288	306	266	A	A 248	A	228	212	226	A	244	A	A	A	A	A	258	A 328	294	344	310
27	332	310	294	280	270	266	226	252	A	A	A	A	A	A	A	A	216	A	A 272	286	314	314	278	272
28	310	306	310	278	272	268	224	H 218	H 186	224	A	A	A	A	A	A	A	230	A	A 296	302	322	322	A 352
29	330	282	278	290	282	262	250	A	240	A	E A 284	A	A	A	248	240	234	A	A	A 296	A 304	A 378	330	316
30	318	292	280	272	270	272	244	220	228	E A 268	E A 288	A	A	A	A	A	A	A	A	A 296	272	292	336	398
31	318	274	248	344	330	A	A 266	A	226	A	A	A	A	A	A	A 254	238	A	224	278	270	352	A 384	A 370
	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	31	31	31	31	29	25	18	12	13	12	9	9	8	11	13	10	9	12	24	30	31	31	31
MED	322	300	284	286	282	261	244	226	225	226	U 220	225	241	236	247	246	237	246	A 259	271	280	308	330	310
U Q	342	316	310	304	302	267	A 250	A 248	235	242	E A 279	237	255	A 258	260	256	A 242	252	A 265	A 290	A 304	A 342	344	360
L Q	307	290	272	266	270	253	228	220	212	207	217	219	225	222	240	232	226	230	251	262	270	282	294	296

JUL. 1999 h'F (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1999 h'E (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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						132	142	112	110	B	A	B	B	A	A	A	A	118	118	B				
2						A 134	130	114	112	110	A	B	A	B	A	A	120	118	A	B				
3						A	122	A 128	114	114	114	A	A	A	A	116	A	120	A	B				
4						A	124	120	114	A	A	A	A	A	A	A	A	A	A	B				
5						A	A	A	A	A	A	A	A	A	B	120	126	120	122	B				
6						A	126	116	120	116	A	A	A	A	A	A	A	A	126	B				
7						A	A 130	116	116	114	116	B	A	A	122	124	116	118	118	B				
8						A	A	118	114	A	A	B	A	B	A	B	B	114	A	B				
9						130	A	A 124	116	112	118	120	112	116	118	114	116	118	A	B				
10						130	A	A	A	A	A	A	A	A	114	116	116	118	A	B				
11						A	116	116	110	A	A	A	110	114	A	116	116	116	A	B				
12						A	A	A	A	A	A	A	A	B	130	A	120	116	120	B				
13						A	A	A	112	A	A	A	B	B	B	120	118	118	116	B				
14						126	A	A	A	A	A	120	A	A	A	118	A	118	A	B				
15						A	122	118	110	122	118	A	A	A	A	A	A	A	A	B				
16						A	120	112	A	A	A	B	A	A	A	A	A	122	120	B				
17						A	A	130	114	A	114	A	118	B	118	114	114	114	114	B				
18						A	A	A	116	A	A	A	118	122	118	120	A 124	A	122	B				
19						126	120	A	114	116	114	A	A	114	A	A	114	112	116	B				
20						A	A 138	A	A	A	A	A	A	A	A	A	120	122	128	B				
21						A	A 134	132	112	116	114	A	116	A	A	120	122	A	A	B				
22						114	A	118	116	C	A	A	A	126	124	120	112	A 126	A	B				
23						128	A	118	118	120	B	B	A	A	A	A	126	124	124	B				
24						142	120	122	118	110	B	A	A	A	A	A	A	A	A	B				
25						A	128	A	A	116	A	A	A	A	A	A	A	A	A					
26						E A 158	A	116	114	A	A	A	A	A	A	A	A	A 126	A 132					
27						A	126	116	116	116	122	A	B	A	A	A	A	A	A					
28						B	A	A	A	A	A	A	A	A	A	A	A	A	A					
29						A	126	118	A	116	A	A	A	A	A	A	118	120	A					
30						124	114	A	A	A	A	A	A	A	A	A	A	116	A					
31						A	116	114	112	112	A	A	A	A	A	A	120	A	A					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						11	18	20	21	14	8	2	5	5	7	12	17	21	13					
MED						129	125	118	114	116	115	120	116	116	118	119	118	118	120					
U Q						A 134	A 130	121	116	116	118		118	124	124	120	121	121	125					
L Q						126	120	116	112	112	114		111	114	118	116	116	116	117					

JUL. 1999 h'E (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1999 h'Es (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	B	110	112	104	102	144	144	132	128	124	116	B	138	140	136	130	106	114	114	120	112	110	106	108
2	108	B	104	102	100	102	130	118	116	112	112	B	110	B	112	114	G	120	120	B	B	B	104	110
3	110	104	100	106	110	110	120	114	114	124	112	110	108	106	122	112	126	114	122	114	114	110	112	114
4	108	108	102	102	102	124	120	114	110	110	112	108	104	106	106	112	108	106	122	116	102	106	104	116
5	106	114	108	110	108	174	114	158	110	114	108	114	116	120	128	G	134	116	116	112	112	110	106	114
6	108	104	102	102	104	106	128	110	114	114	114	112	108	108	116	108	104	104	128	120	112	104	110	112
7	108	104	122	104	98	100	144	132	122	114	126	118	110	126	122	G	132	124	114	134	112	114	112	108
8	116	120	106	106	108	108	114	124	106	110	114	B	112	B	124	130	130	114	112	108	106	106	98	104
9	104	100	98	100	106	100	130	128	120	118	116	160	128	134	130	132	120	114	112	110	114	116	110	104
10	106	104	106	106	134	G	118	118	114	108	112	110	112	114	112	116	112	132	114	110	112	112	114	108
11	106	100	110	B	112	120	118	118	112	104	104	160	130	126	124	122	122	120	114	114	B	106	B	112
12	102	104	112	112	112	110	110	108	110	112	112	114	112	B	136	118	G	132	122	116	114	110	116	112
13	110	110	108	112	116	114	114	114	112	114	116	110	136	128	122	120	124	118	114	106	108	100	96	98
14	102	102	102	B	110	G	114	114	110	114	108	108	106	106	108	108	114	130	120	116	114	110	108	104
15	104	104	102	100	100	98	118	120	110	116	118	112	104	116	110	134	108	108	106	104	104	102	104	108
16	104	106	106	110	116	128	126	116	110	106	108	B	110	112	124	134	130	116	112	110	122	120	112	112
17	C	104	120	98	104	122	120	122	114	118	124	118	116	110	110	116	132	122	114	108	110	102	106	112
18	C	104	110	110	136	128	116	114	108	122	110	180	168	142	136	128	124	118	114	136	106	106	114	110
19	112	106	106	104	110	130	116	114	116	114	118	114	114	112	112	112	124	114	118	112	114	114	112	110
20	96	96	100	100	102	112	164	104	110	112	114	112	112	114	112	110	122	118	116	108	114	112	110	114
21	B	112	B	B	B	114	108	132	118	116	108	114	108	122	116	128	114	112	106	106	108	100	104	108
22	104	100	98	96	96	100	124	114	112	C	104	108	116	138	184	G	126	116	116	98	104	98	98	100
23	108	98	112	110	108	124	126	122	116	112	114	114	112	104	106	106	112	122	138	106	110	118	114	106
24	110	104	104	100	100	G	132	124	118	116	114	106	110	110	102	106	108	110	106	104	102	94	108	100
25	98	98	100	110	118	128	124	116	118	114	114	110	110	104	104	110	104	104	100	100	102	124	114	118
26	C	114	110	108	106	114	112	116	108	110	114	108	102	104	106	108	128	124	124	116	118	120	112	108
27	106	130	B	B	116	132	132	108	114	108	112	108	108	106	106	112	114	102	102	118	120	112	112	108
28	108	106	98	100	B	106	110	108	110	108	112	110	108	110	108	104	106	104	104	100	116	90	120	114
29	106	B	B	B	B	140	128	120	114	108	114	106	102	102	110	112	124	118	116	114	112	112	108	98
30	98	102	100	102	110	G	114	112	124	114	110	102	100	104	110	104	108	118	102	108	102	102	112	108
31	108	108	98	100	98	120	116	114	120	114	104	108	102	128	106	122	128	120	104	116	108	110	110	114
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	29	28	26	28	27	31	31	31	30	31	27	31	28	31	28	29	31	31	30	29	30	30	31
MED	106	104	105	104	108	114	120	116	114	114	112	110	110	112	112	113	122	116	114	111	112	110	110	108
U Q	108	109	110	110	112	128	128	122	118	116	114	114	116	126	124	125	127	120	120	116	114	112	112	112
L Q	104	102	100	100	102	106	114	114	110	110	110	108	108	106	108	109	108	112	106	106	106	102	106	106

IONOSPHERIC DATA STATION Kokubunji

JUL. 1999 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

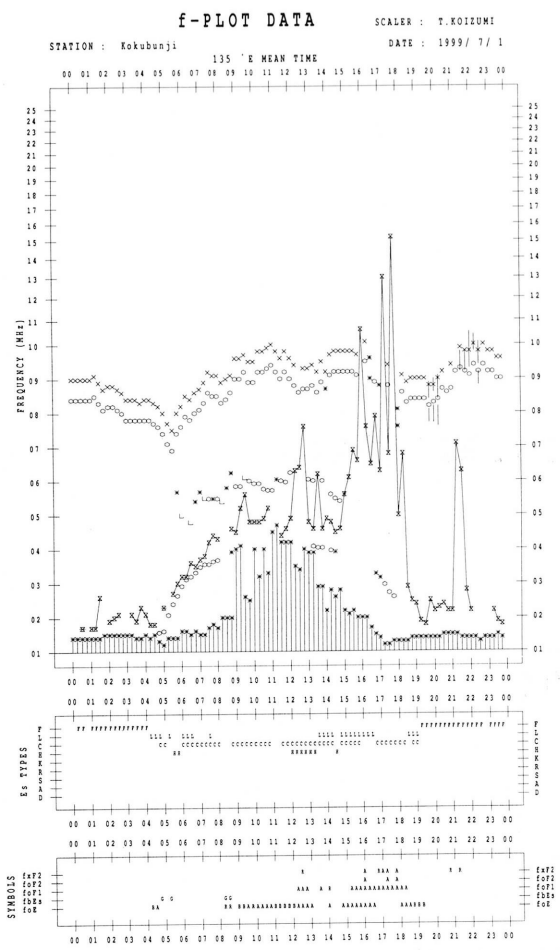
LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHz TO 25.0MHz IN 24.0SEC IN MANUAL SCALING

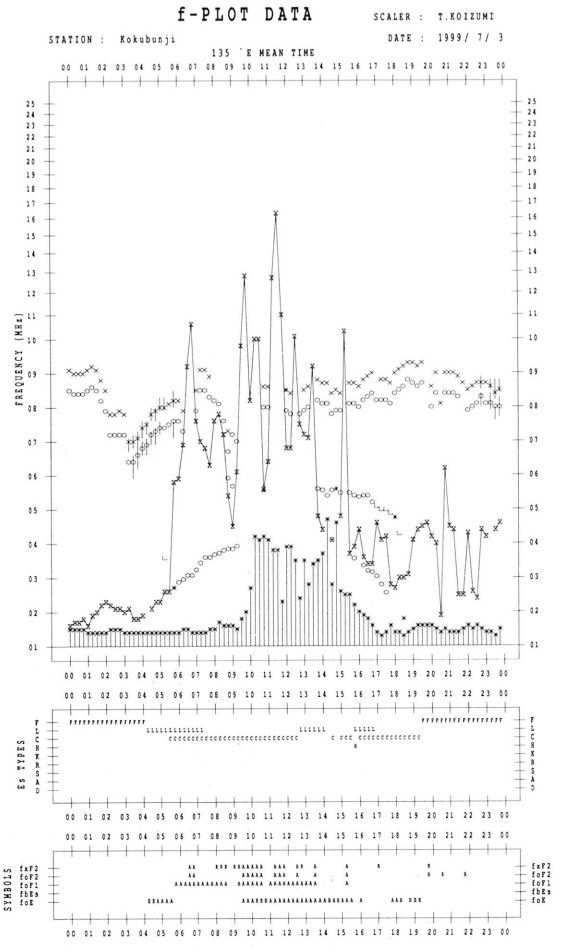
D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		F 2	F 1	F 2	F 3	C 1	CL 11	C 1	C 1	C 1	C 1		HC 11	HC 11	CL 11	CL 21	L 3	C 3	C 3	CL 23	F 2	FF 21	F 3	F 1
2	F 2		F 1	F 1	F 2	L 1	CL 21	C 2	C 2	C 1	C 1		L 1		L 1	L 1		C 1	C 2				F 1	F 3
3	F 1	F 2	F 2	F 2	F 2	L 2	CL 31	CL 31	C 2	C 1	C 1	C 2	C 2	L 2	L 1	C 2	CL 11	C 2	C 2	C 5	F 5	F 3	F 3	F 4
4	F 4	F 4	F 3	F 3	F 5	CL 22	CL 21	C 2	C 3	C 2	C 2	L 2	L 2	L 2	L 2	C 2	L 2	L 2	CL 32	CL 22	F 2	F 2	F 1	FF 12
5	FF 21	FF 11	F 2	F 2	F 2	HL 11	L 1	HL 11	L 1	L 1	L 1	L 1	L 1	L 1	C 1		CL 11	C 2	C 3	L 4	F 3	F 4	F 3	F 1
6	F 4	F 4	F 2	F 2	F 5	L 2	CL 11	C 3	C 2	C 2	C 2	C 1	C 2	L 2	L 1	L 2	L 3	L 2	CL 21	L 4	F 2	F 2	F 3	F 4
7	F 4	F 3	F 1	F 2	F 4	L 2	HL 12	CL 11	C 2	C 2	C 1	C 1	C 2	CL 11	CL 21		C 1	C 2	C 5	CL 23	F 2	F 1	F 2	F 2
8	F 2	F 1	F 3	F 4	F 3	L 4	L 1	C 1	C 3	C 2	C 1		L 1		CH 11	C 1	C 1	C 2	L 3	L 2	F 1	F 2	F 3	F 3
9	F 3	F 4	F 3	F 1	F 1	L 1	CL 22	C 1	C 1	C 2	C 2	HC 21	C 1	C 1	CL 21	C 1	C 2	C 4	C 3	L 3	F 4	F 3	F 4	F 4
10	F 4	F 4	F 1	F 3	FF 11		C 1	CL 21	L 1	L 2	L 1	L 2	L 2	L 1	C 1	C 2	C 2	C 1	C 4	L 3	F 3	F 5	F 6	F 4
11	F 3	F 4	FF 22		F 3	C 3	C 2	C 1	C 2	C 2	L 2	HL 11	C 1	C 2	C 2	C 2	C 2	C 2	L 3	L 2		F 2		F 1
12	F 2	F 3	F 2	F 2	F 4	L 3	L 2	L 2	L 1	L 1	L 1	L 1	L 1		CL 11	L 1		C 1	C 2	C 2	F 6	F 4	F 3	F 3
13	F 4	F 2	F 3	F 2	F 1	L 3	L 2	L 1	C 1	C 1	L 1	L 1	C 1	C 1	C 1	C 2	C 2	C 2	C 4	L 4	F 3	F 2	F 4	F 3
14	F 3	F 3	F 2		F 1		L 2	L 2	L 2	L 2	C 2	L 2	L 2	L 2	L 2	L 2	L 1	C 2	CL 42	L 3	F 2	F 3	F 3	F 3
15	F 5	F 3	F 3	F 2	F 2	L 2	L 2	C 2	C 1	CL 11	C 1	C 1	C 2	C 1	L 1	CL 11	L 2	C 1	L 2	L 3	F 4	F 5	F 4	F 3
16	F 4	FF 32	FF 32	FF 42	FF 42	CL 31	C 2	C 2	C 3	L 2	L 2		L 2	L 2	CL 11	CL 11	CL 22	CL 32	CL 31	L 3	FF 22	FF 31	F 2	F 3
17		F 3	F 1	FF 21	FF 11	CL 31	CL 33	CL 21	C 1	C 1	C 1	C 1	C 1	C 2	C 2	C 3	C 1	C 1	C 2	C 4	F 5	F 2	F 3	F 3
18		F 3	F 4	F 2	F 2	C 2	LC 32	C 2	C 2	CL 23	C 2	HC 11	HL 11	H 1	C 1	CL 21	CL 21	C 1	C 2	CL 13	F 2	F 3	FF 23	F 3
19	F 4	F 4	F 3	F 4	F 1	C 3	C 3	C 2	C 2	C 2	C 2	C 1	C 1	C 1	C 2	C 1	C 2	C 4	C 2	C 2	FF 22	FF 32	F 3	FF 12
20	F 3	F 3	F 2	F 1	F 1	L 1	HL 12	L 2	L 1	L 1	L 1	L 1	L 1	L 1	L 1	L 1	CL 21	CL 21	L 2	L 3	F 3	F 2	F 3	F 3
21		F 1				L 2	L 2	CL 11	C 2	C 3	C 3	C 2	L 2	CL 11	C 1	C 3	C 3	L 3	L 4	L 3	F 3	F 3	F 3	F 4
22	F 4	F 3	F 4	F 2	F 2	L 1	C 1	C 2	C 2		C 3	C 1	C 1	C 1	H 1		C 2	CL 21	CL 21	C 3	F 4	F 4	F 3	F 3
23	FF 24	F 3	F 2	F 3	F 4	C 5	CL 32	C 2	C 2	C 2	C 3	C 1	C 2	C 3	L 2	L 1	L 1	CL 22	CL 31	L 3	F 2	F 6	F 4	F 4
24	F 1	F 2	F 1	F 2	F 2		C 1	C 2	C 1	C 2	C 2	C 2	C 2	C 2	L 3	L 3	C 2	L 1	L 2	L 5	F 5	F 4	F 3	F 3
25	F 4	F 3	F 3	F 2	F 5	CL 21	CL 21	C 3	C 2	C 3	C 2	C 2	C 2	L 2	L 2	L 2	L 3	L 2	L 2	F 3	F 2	FF 22	F 3	F 2
26		F 2	F 3	F 2	F 2	L 1	C 2	CL 21	C 3	L 1	L 1	L 1	L 1	L 2	L 1	L 1	CL 22	CL 22	CL 22	FF 23	FF 32	FF 22	FF 41	F 3
27	F 2	FF 11			F 2	C 1	C 1	LC 11	C 3	C 3	L 2	L 2	L 2	L 2	L 2	L 1	L 1	L 2	L 2	FF 23	FF 22	F 3	F 3	F 3
28	F 2	F 1	F 1	F 1		L 1	L 2	L 2	L 2	L 2	LH 11	L 1	L 2	L 2	L 2	L 2	L 3	L 2	L 3	F 3	FF 13	F 3	FF 11	F 3
29	F 2					C 1	CL 21	C 2	C 2	C 3	L 1	L 2	L 2	L 1	L 1	L 1	C 1	CL 21	C 3	F 3	F 3	FF 13	F 2	F 3
30	F 2	FF 11	F 1	F 1	F 1		L 2	L 1	C 1	C 2	L 1	L 2	L 3	L 2	L 2	L 2	L 3	C 2	L 3	FF 63	F 3	F 2	F 2	F 3
31	F 3	F 2	F 3	F 3	F 2	CL 31	C 3	C 2	C 1	C 2	C 3	L 3	L 3	CL 22	L 2	CL 11	CL 11	CL 22	L 2	F 2	FF 32	F 3	F 3	FF 42
	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																								

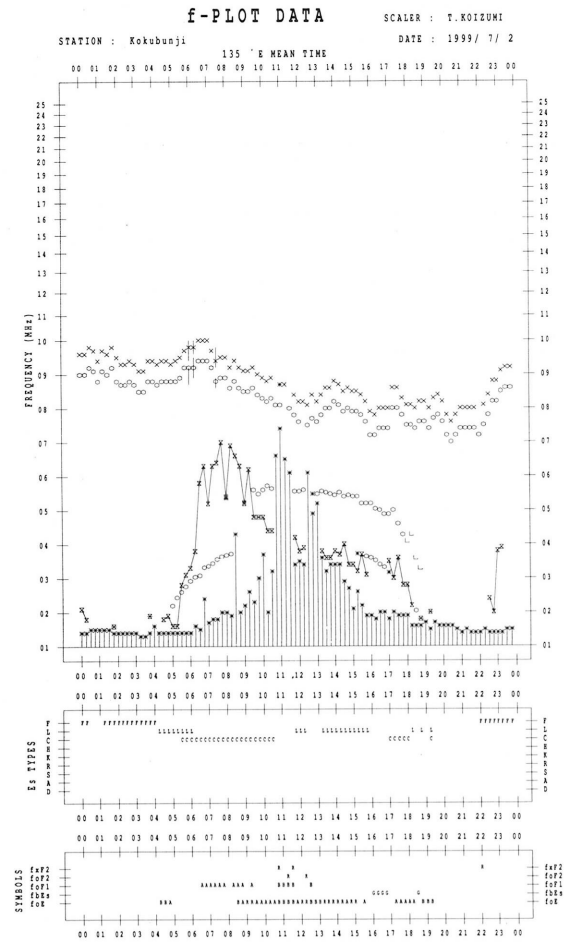
JUL. 1999 TYPES OF Es COMMUNICATIONS RESEARCH LABORATORY, JAPAN

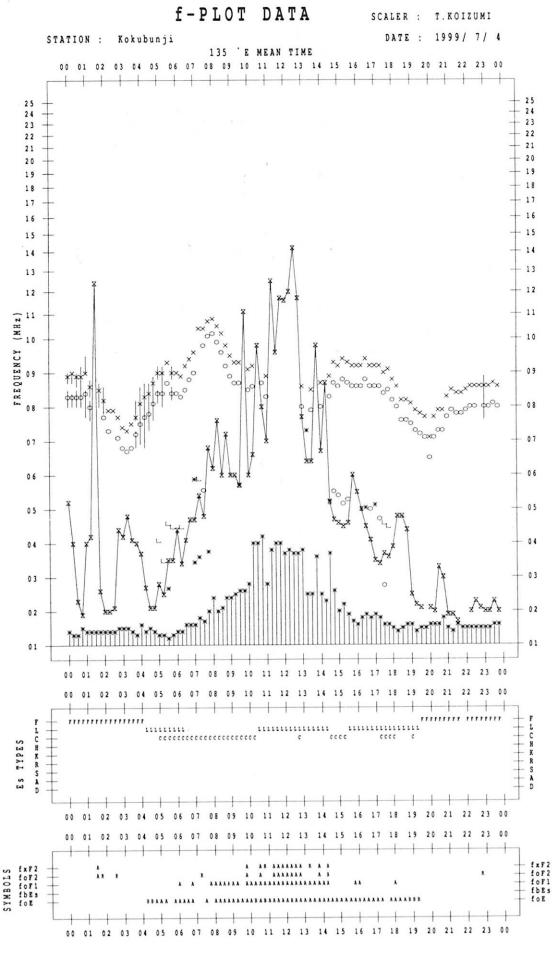
f-PLOTS OF IONOSPHERIC DATA

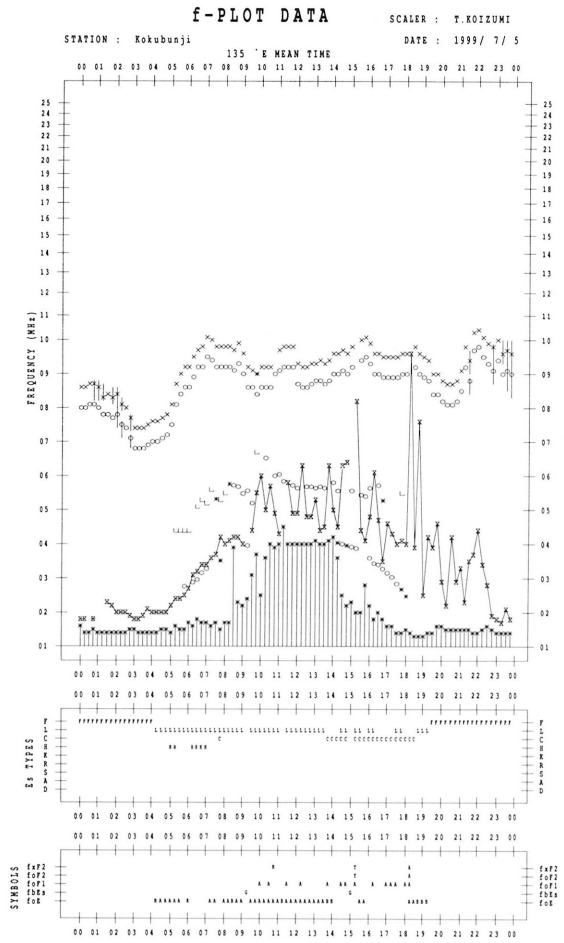
KEY OF f-PLOT	
	SPREAD
	foF2, foF1, foE
	fxF2
	DOUBTFUL foF2, foF1, foE
	fbEs
	ESTIMATED foF1
	fmin
	GREATER THAN
	LESS THAN

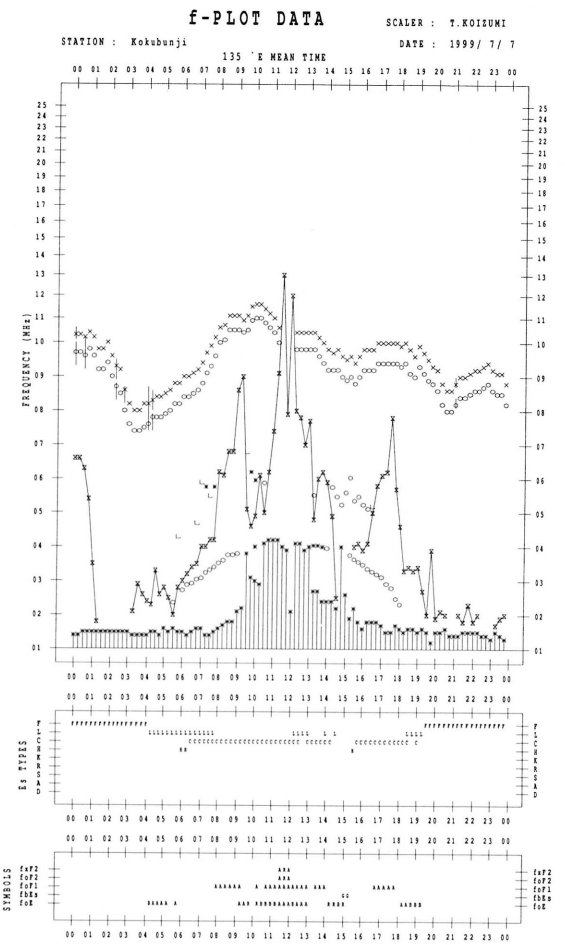

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/ 1
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

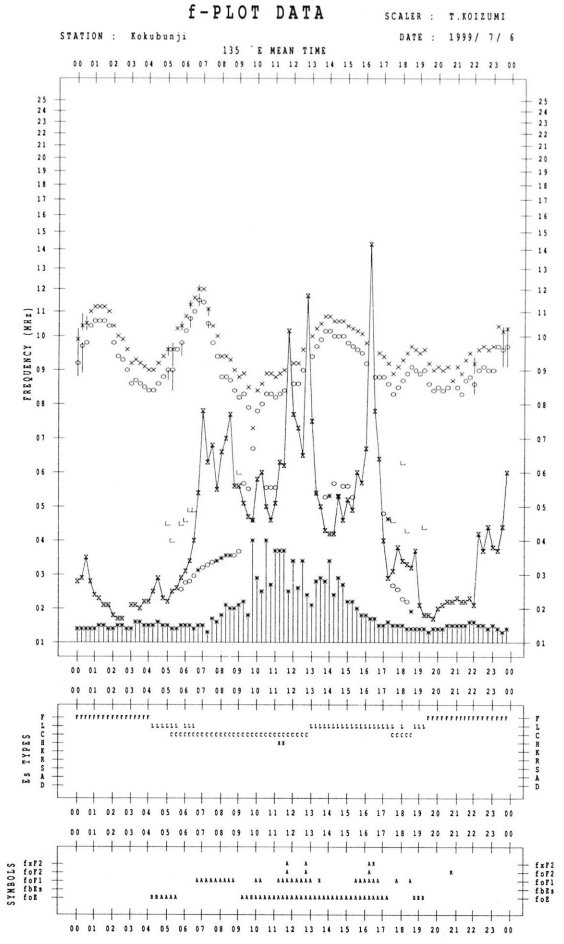

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/ 3
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

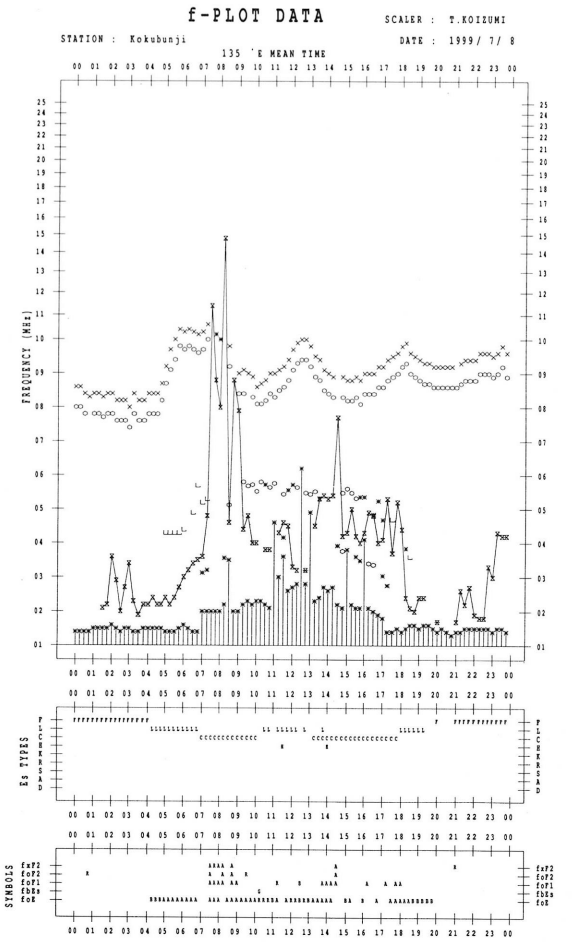

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/ 2
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

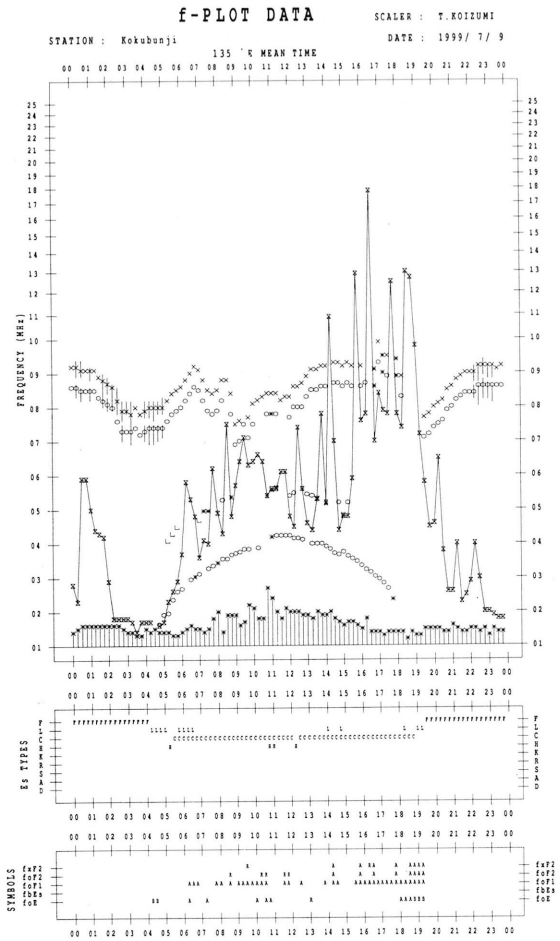

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/ 4
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

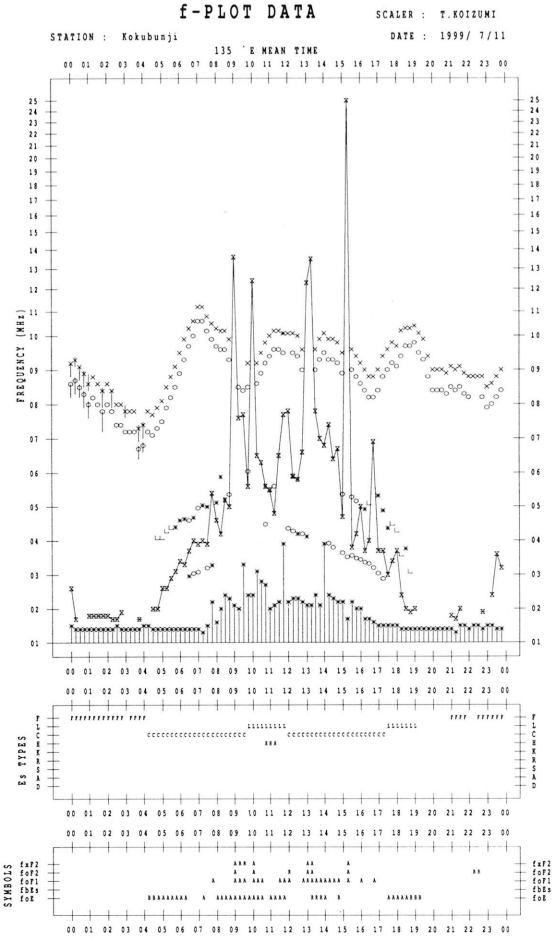

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/ 5
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

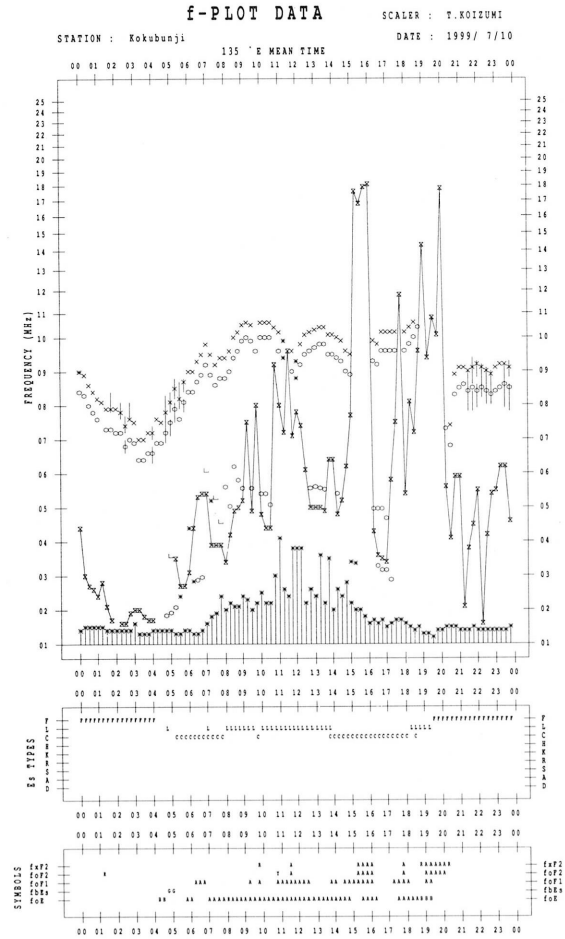

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/ 7
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

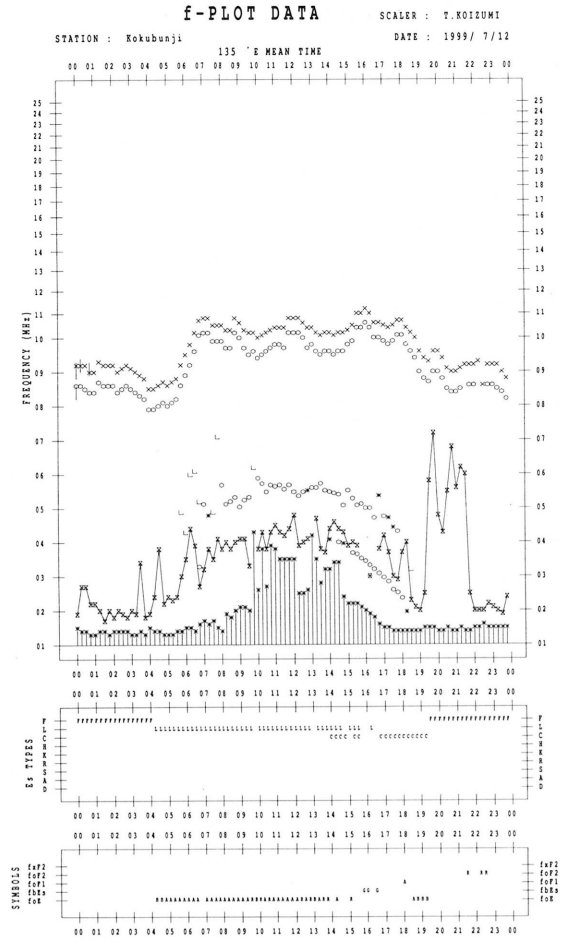

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/ 6
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

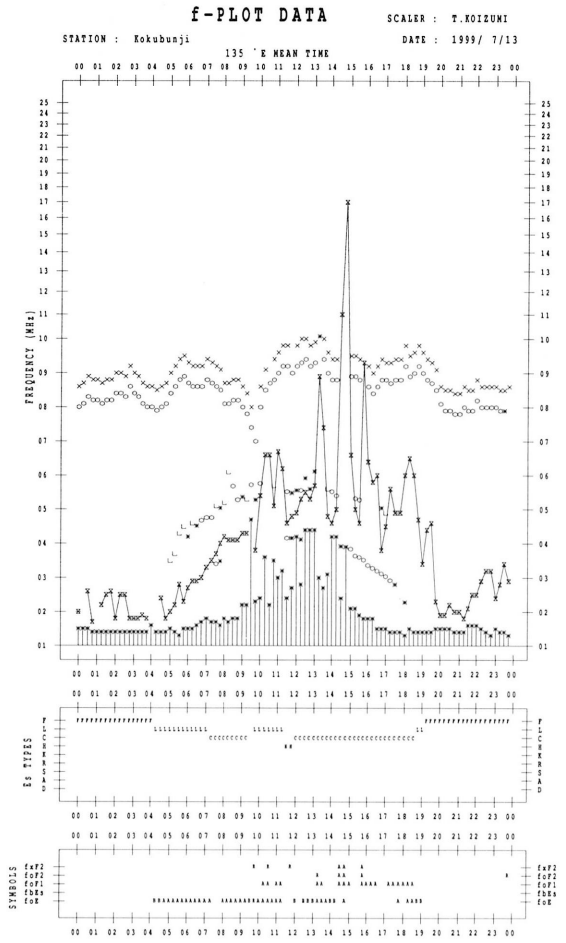

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/ 8
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

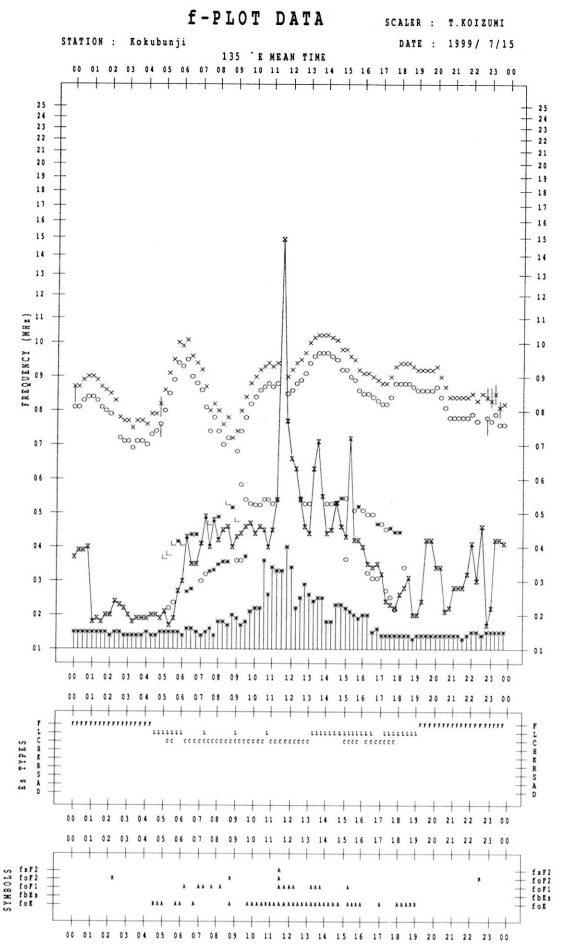

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/ 9
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

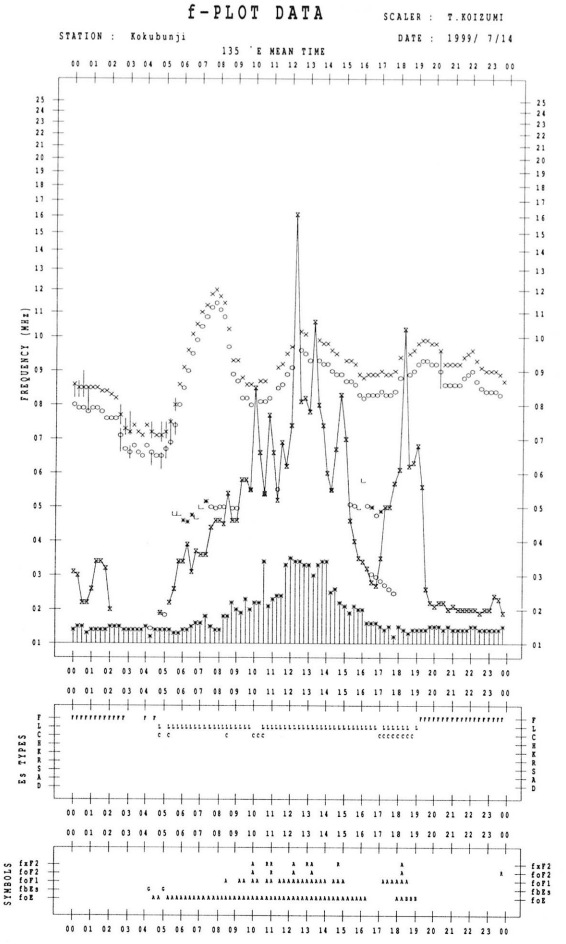

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/11
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

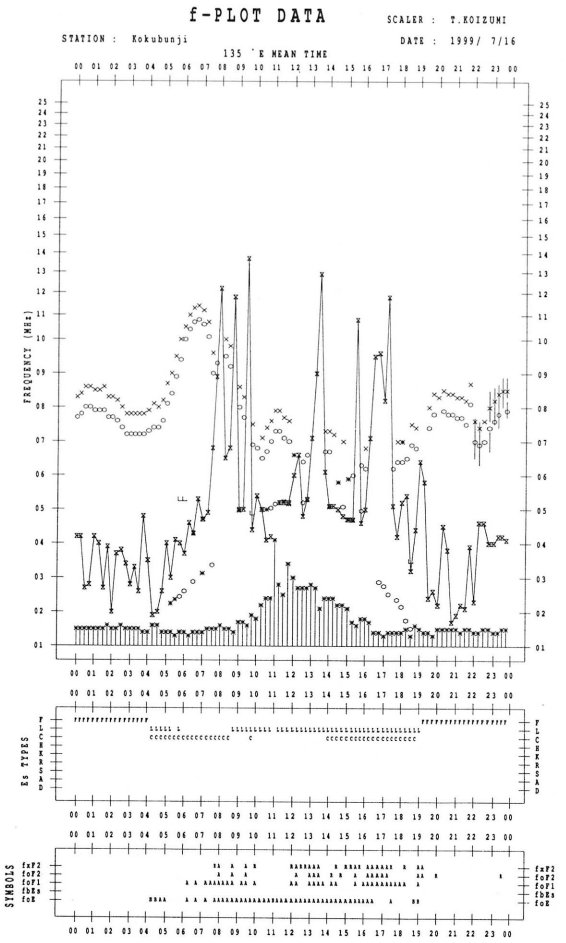

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/10
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

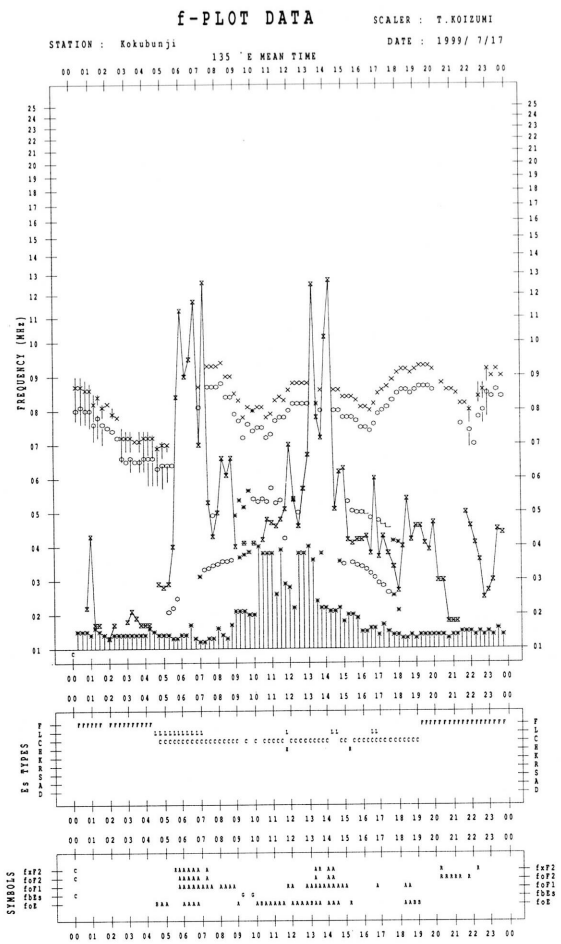

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/12
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

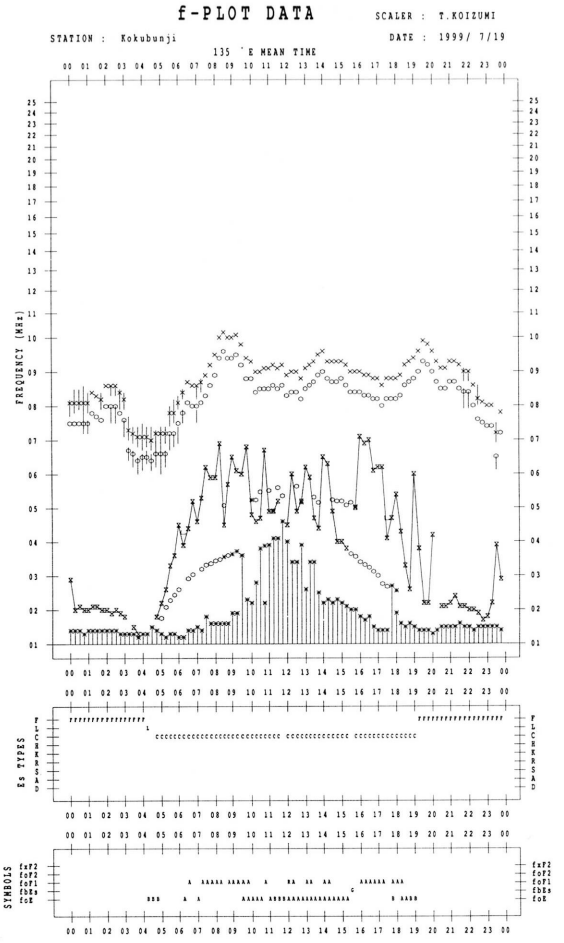

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/13
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS

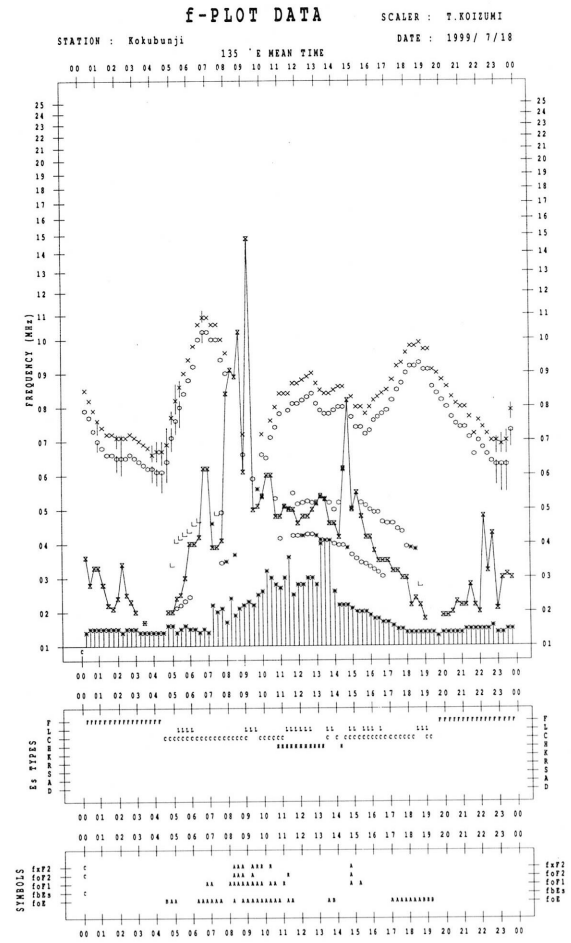

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/15
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS

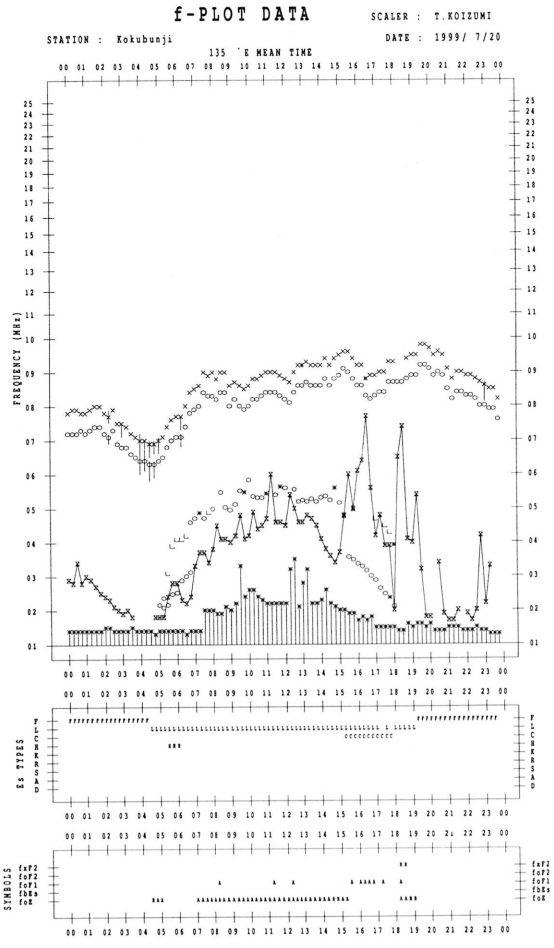

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/14
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS

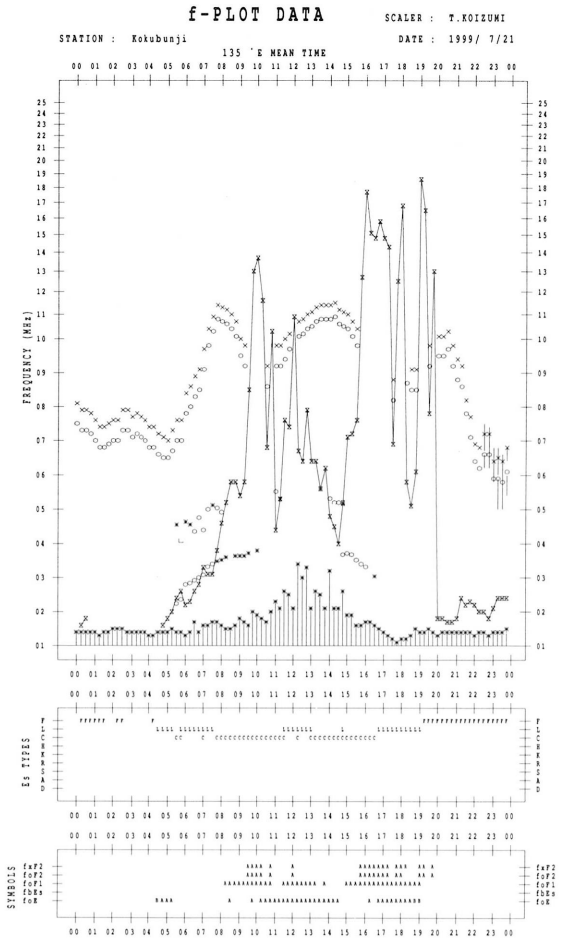

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/16
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS

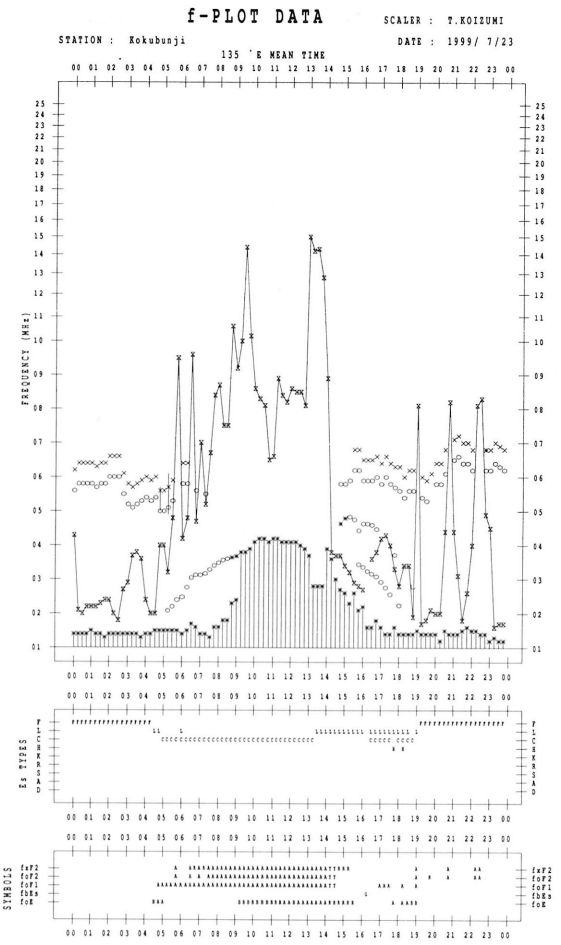

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/17
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

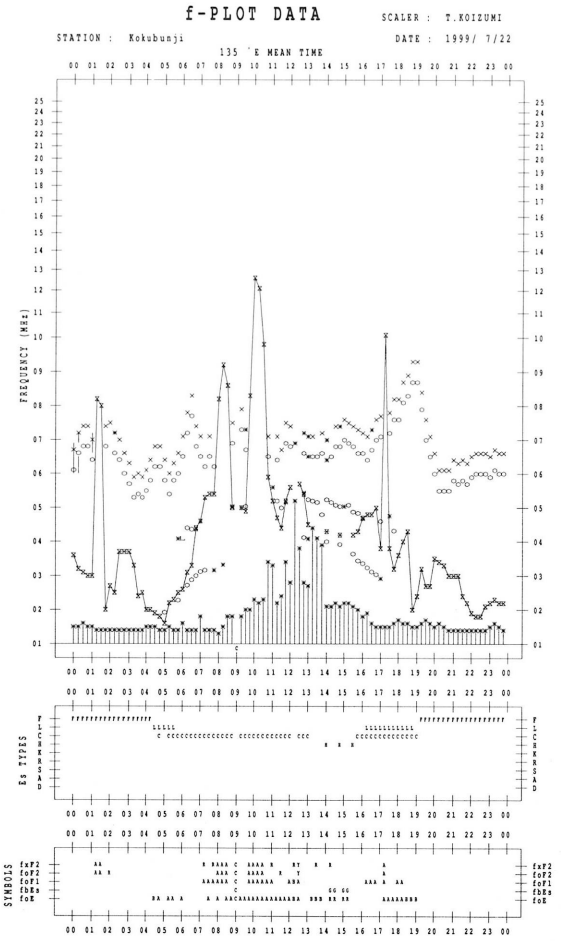

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/19
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

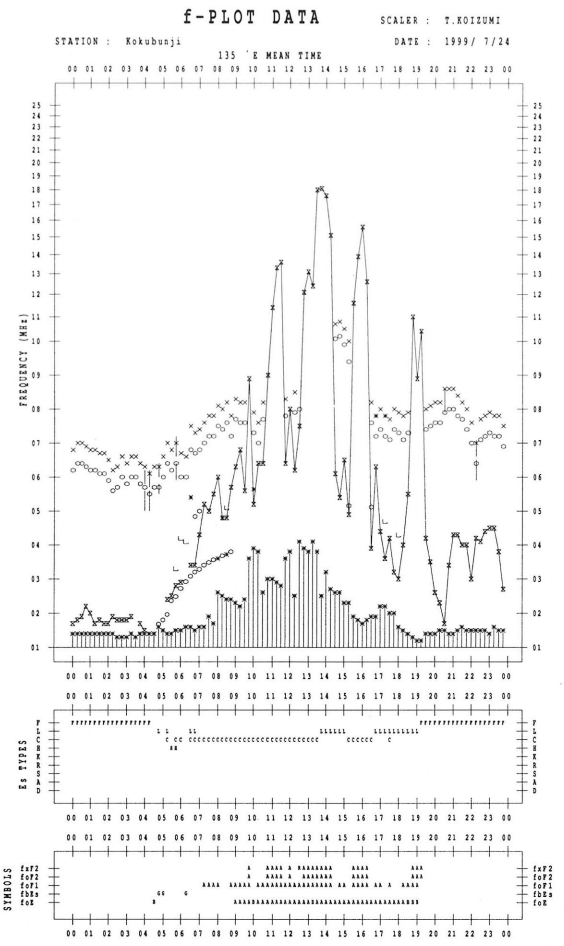

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/18
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

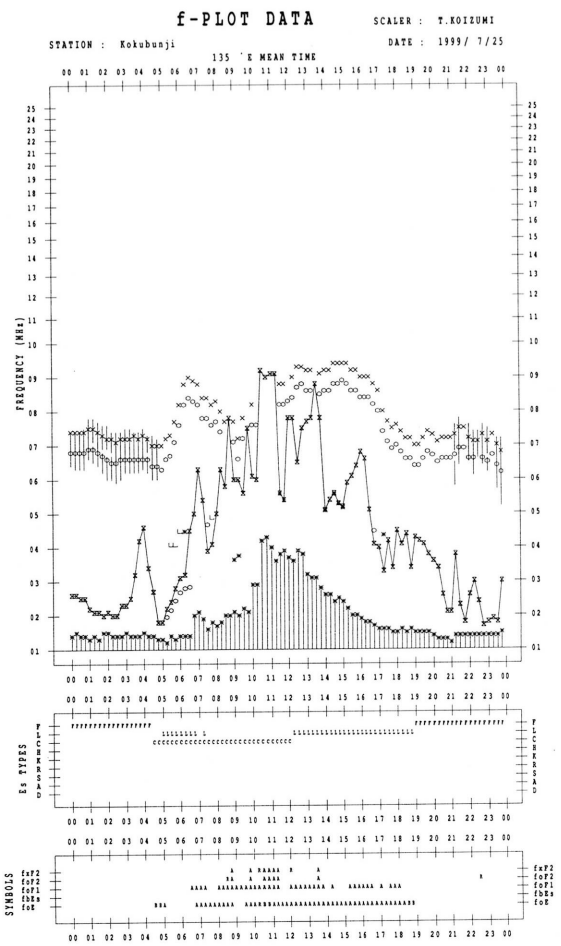

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/20
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

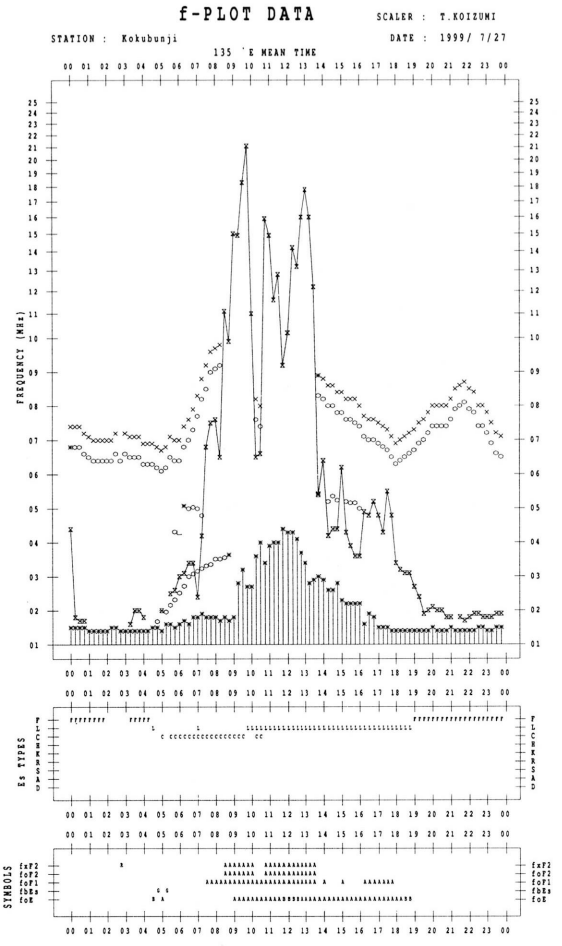

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/21
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

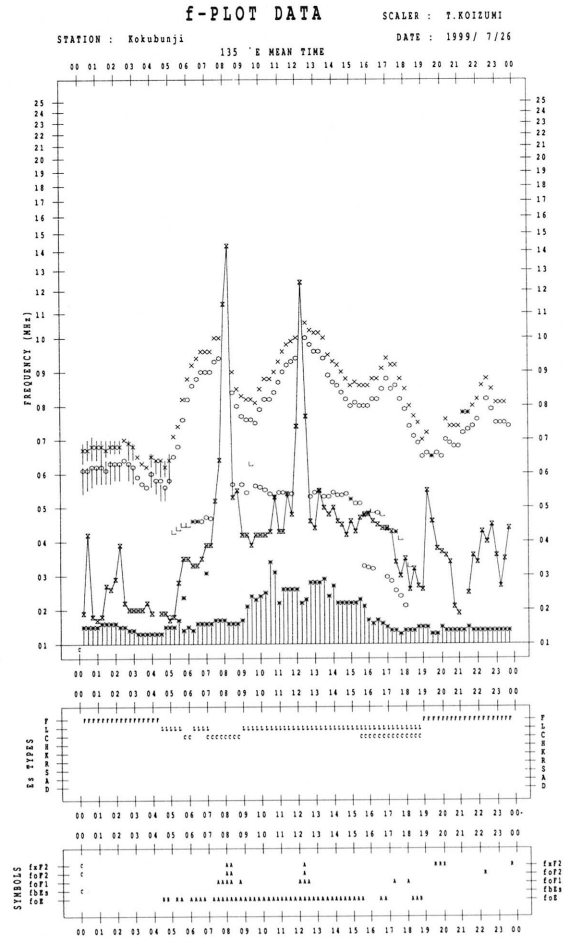

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/23
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

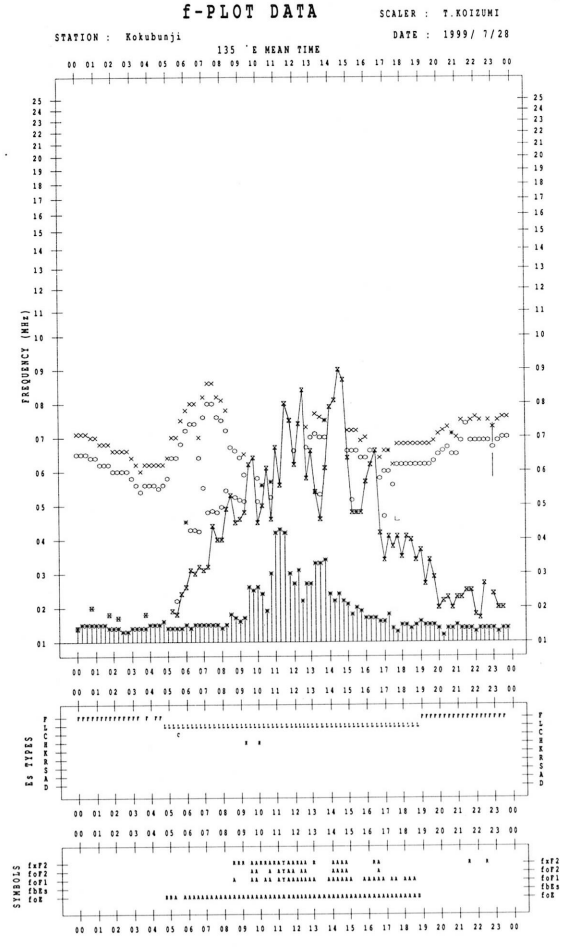

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/22
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

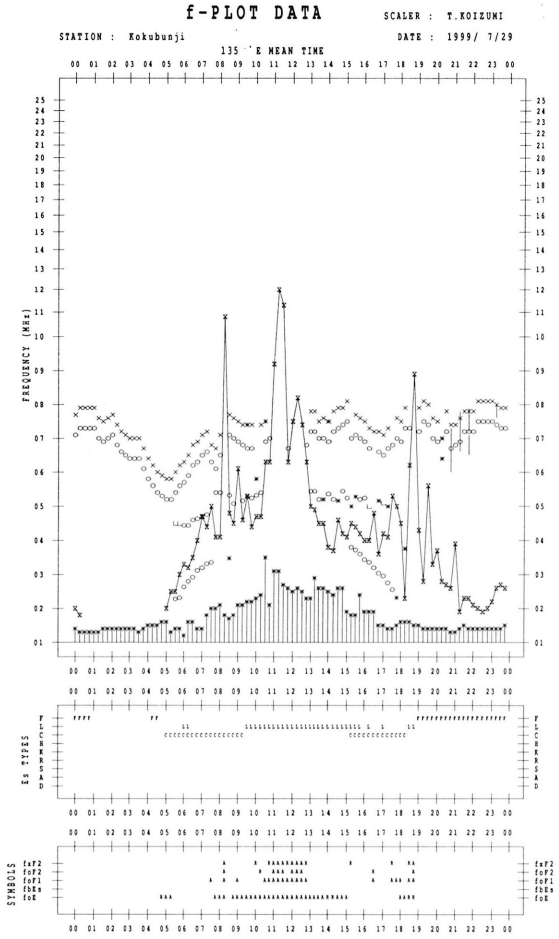

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/24
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

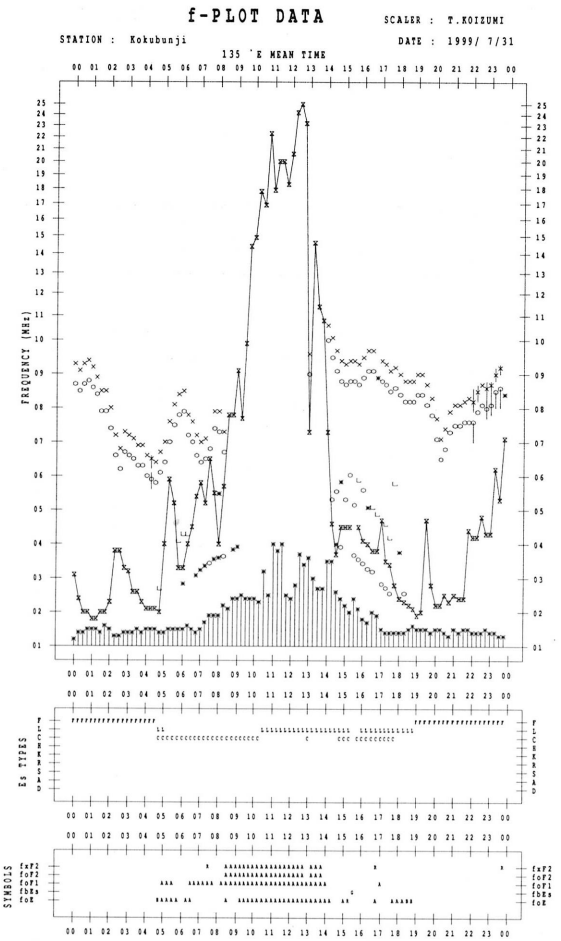

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/25
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

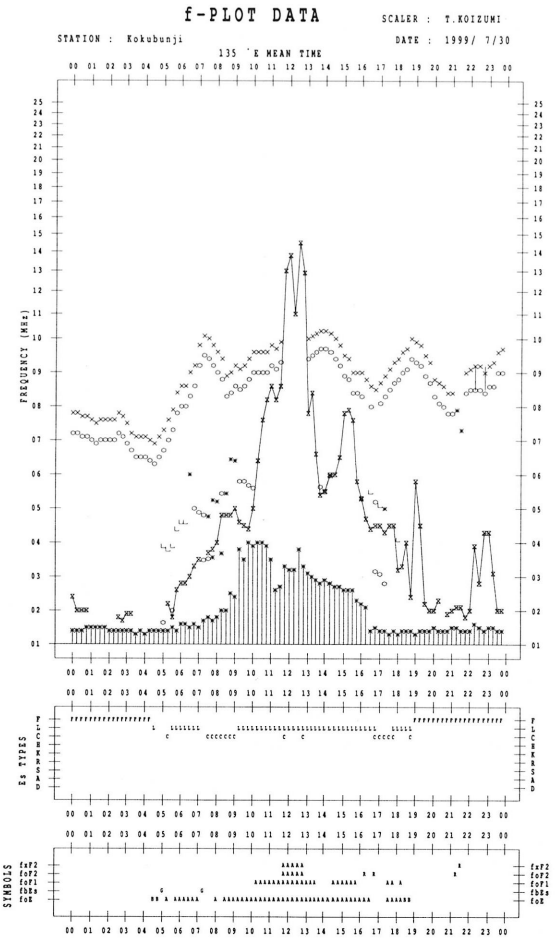

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/27
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/26
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/28
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/29
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/31
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1999/ 7/30
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

B. Solar Radio Emission

B1. Daily Data at Hiraiso

500 MHz

Hiraiso July 1999

Single-frequency total flux observations at 500 MHz					
Flux density: 10^{-22} Wm^{-2} Hz^{-1}					
UT	00-03	03-06	06-09	21-24	Day
Date					
1	48	48	47	50	48
2	49	48	49	49	49
3	49	47	46	46	47
4	45	45	46	49	46
5	49	46	45	45	46
6	45	44	45	46	45
7	45	44	44	47	45
8	47	46	46	44	46
9	-	-	-	-	-
10	45	46	46	45	45
11	45	44	44	44	44
12	44	44	44	46	44
13	46	45	43	41	44
14	40	40	41	40	40
15	39	41	40	41	40
16	40	40	40	41	40
17	39	39	39	41	39
18	41	40	40	40	40
19	39	40	40	39	40
20	38	38	38	37	38
21	36	37	37	39	37
22	39	38	37	39	38
23	39	39	39	42	40
24	42	42	42	44	42
25	42	42	42	43	42
26	42	42	43	44	43
27	43	43	44	46	44
28	45	44	45	48	45
29	47	45	45	48	46
30	47	46	-	-	46
31	-	-	-	-	-

Note: No observations during the following periods.
9th 0000 - 9th 2400 30th 0600 - 31st 2400

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso July 1999

Single-frequency observations

Normal observing period: 1930 - 1000 U.T. (sunrise to sunset)

JUL.	FREQ.	TYPE	START TIME	TIME OF MAXIMUM	DUR.	FLUX DENSITY (10^{-22} Wm^{-2} Hz^{-1})		POLARIZATION
1999	(MHz)		(U.T.)	(U.T.)	(MIN.)	PEAK	MEAN	REMARKS
1	500	42 SER	0144.5	0144.7	0.8	80	-	WR
	2800	46 C	2138.5	2140.0	6.5	60	-	0
2	2800	45 C	0132.5	0134.0	6.0	50	-	0
	2800	46 C	0343.5	0343.7	2.2	50	-	WR
	500	42 SER	0828.5	0829.5	2.8	150	-	WR
3	200	8 S	0136.5	0136.6	0.2	260	-	0
	500	8 S	0136.6	0136.8	0.4	150	-	0
	500	42 SER	0253.2	0253.4	3.0	200	-	0
	500	42 SER	0530.0	0530.5	0.8	280	-	0
	500	8 S	0536.1	0536.2	0.2	70	-	0
	500	8 S	0604.1	0604.2	0.2	50	-	0
	500	47 GB	0750.0	0752.0	2.2	1300	-	0
4	200	42 SER	0922.5	0926.0	3.8	110	-	0
	500	8 S	0922.7	0922.8	0.2	40	-	WL
	200	8 S	2050.7	2050.8	0.2	90	-	0
	500	46 C	2143.5	2144.0	1.8	270	-	MR
	500	42 SER	2209.5	2215.3	6.0	200	-	MR
	200	8 S	2215.0	2215.3	0.6	70	-	0
	500	47 GB	2244.7	2244.8	0.2	1700	-	MR
	200	47 GB	2245.0	2245.2	1.0	1600	-	WR
	500	47 GB	2313.5	2314.0	3.0	950	-	MR
	200	42 SER	2313.5	2315.0	1.8	370	-	0
	500	42 SER	2352.5	2354.5	2.8	200	-	MR
	200	47 GB	2354.0	2354.5	1.8	1000	-	0
5	200	8 S	0118.7	0118.8	0.2	80	-	0
	200	46 C	0316.0	0319.0	26.0	200	-	WR
	500	47 GB	0332.6	0332.7	0.2	2100	-	WR
	200	8 S	0748.7	0749.0	0.6	70	-	WR
	200	8 S	0836.6	0836.7	0.2	60	-	0
	500	42 SER	0837.5	0837.6	3.0	130	-	WR
7	200	8 S	0103.9	0104.0	0.2	310	-	0
	200	8 S	0159.8	0159.9	0.2	200	-	0
	200	8 S	0227.1	0227.2	0.2	90	-	0
	500	8 S	0344.9	0345.0	0.2	30	-	0

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso July 1999

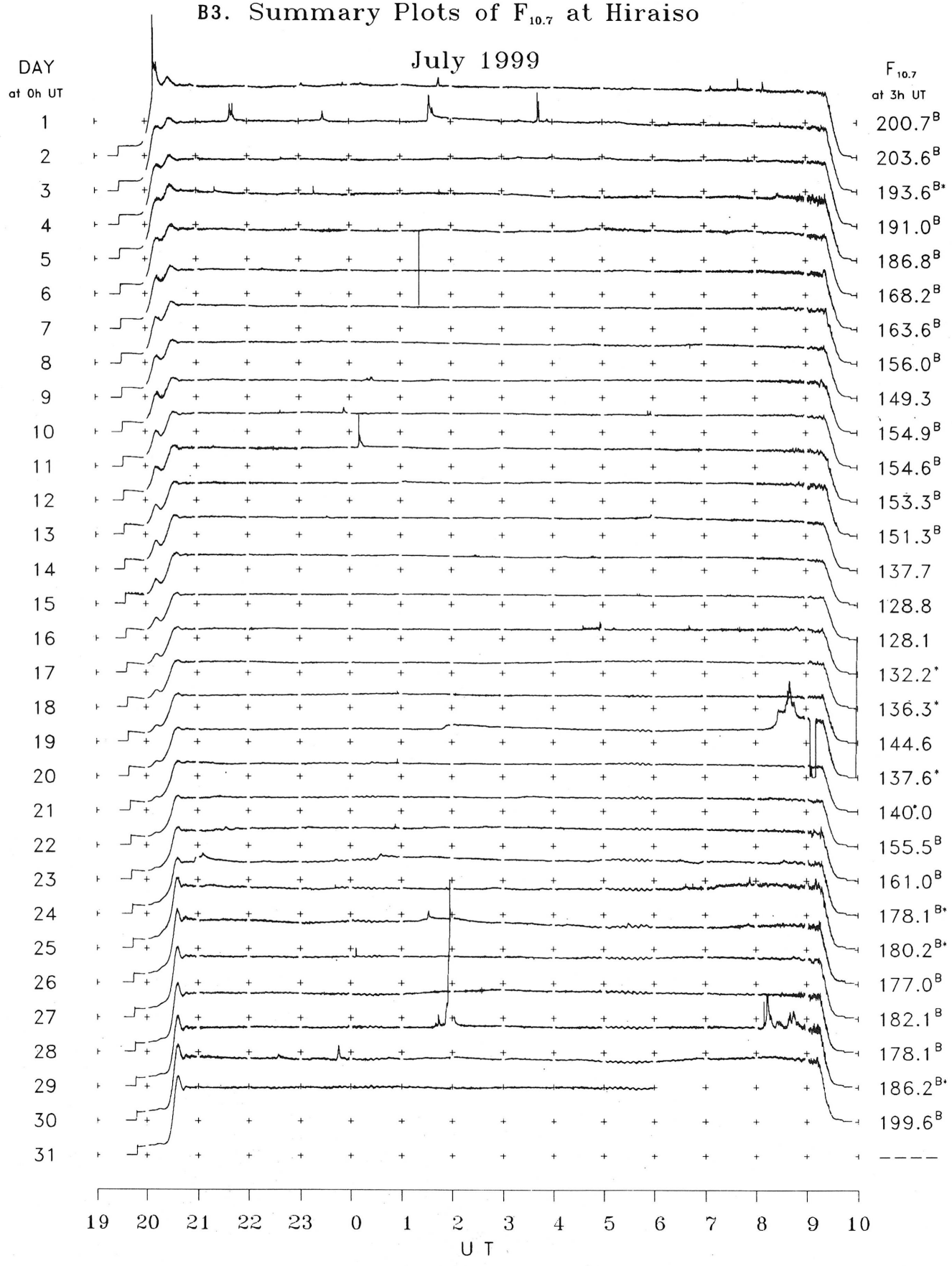
Single-frequency observations

Normal observing period: 1930 - 1000 U.T. (sunrise to sunset)

JUL. 1999	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22} Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22} Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
7	200	42 SER	0520.5	0520.6	0.6	150	-	0
	200	42 SER	0619.7	0620.5	1.2	230	-	0
	200	42 SER	0847.5	0848.0	6.0	450	-	0
	500	8 S	0848.0	0848.1	0.2	30	-	0
	200	8 S	0935.0	0935.1	0.2	70	-	0
	200	8 S	2021.7	2021.8	0.2	110	-	0
9	500	42 SER	0024.5	0026.5	2.6	70	-	0
	500	6 S	2351.5	2353.0	3.6	480	-	0
11	500	4 S/F	0011.0	0012.5	2.6	80	-	WL
12	500	8 S	0046.1	0046.2	0.2	100	-	0
	200	4 S/F	2252.0	2252.5	1.0	80	-	0
	500	8 S	2324.0	2324.2	0.4	50	-	0
13	200	4 S/F	0556.5	0556.7	1.2	350	-	WL
	500	42 SER	0557.0	0558.5	1.8	50	-	ML
	200	4 S/F	2120.0	2120.2	0.6	70	-	0
	200	4 S/F	2237.3	2237.5	0.6	50	-	WR
15	200	8 S	0558.5	0558.6	0.2	60	-	0
23	200	42 SER	2014.2	2015.6	1.6	110	-	WL
26	200	8 S	0812.2	0812.4	0.4	100	-	0
	200	8 S	2024.4	2024.5	0.2	70	-	0
27	200	42 SER	0737.0	0742.5	6.0	280	-	0
	500	8 S	0746.2	0746.3	0.2	40	-	WL
28	2800	4 S/F	0151.5	0157.0	12.5	340	-	ML
	500	47 GB	0151.5	0210.5	20.0	550	-	ML
	200	47 GB	0156.5	0157.5	4.8	3000	-	0
	200	8 S	0643.5	0643.6	0.2	60	-	0
	2800	46 C	0809.5	0812.8	11.0	70	-	0
	2800	8 S	0809.7	0809.8	0.2	50	-	0
	500	49 GB	0811.5	0814.5	90.0D	5900	-	SL, SUNSET
	200	49 GB	0815.0	0840.0	80.0D	650	-	SL, SUNSET

B. Solar Radio Emission

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



Note: A vertical grid space corresponds to a 100 sfu.
Elevation angle range ≧ 6°.

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☎ (042) (327) ７４７８(直通)

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2-1 Nukui-Kitamachi 4-chome, Koganei-shi, Tokyo 184-8795 JAPAN