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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. 1998

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		66	57	56	60	68	77	91	74	A	A	A	A	67	66	A	A	A	58	56	A	A	71	69
2	68	69	57	57	69	68	68	78	73	70	A	A	A		63	63	65	A	59		A	79	69	68
3	71	67	56	66	64	68	71	71	79	59	.	A			67	66	64	70	70		60	56	72	57
4	60	62	64	57	62	68	70	57	66	A	A	A	A	A	A	60	64	66	71	95	A	68	68	68
5	68	60	64	56	60	63	57	66	A	59	A	A	A	A	A	A	A	A	61	71	A	71	A	75
6	76	68	60	67	68	92	70	71	78	A	A	A	A	A	A	N	A	A	70	A	59	A	70	A
7	A	A	56	58	62	68	A	A	67	A	A	66	A	A	68	A	A	A	72	93	A	72	74	58
8	68	A	58	57	54	A	A	A	A	A	A	A	A	A		A	A	71	71	70	60	75		68
9	68	68	57	57	58	60	67	80	81	87	63	A			A	66	74	A	A	89		A	73	71
10	67	64	60	58	62	71	92	78	78	N	68		66		66	67		66	72	73	92		76	68
11	68	68	64	57	60	68	71	57	76		70	A	A	67			66	68	71	78		49	76	68
12	57	68	56	54	50	A	A	66	59	A	A	A	A	A		51	A	A		A	A	70	68	67
13	56	56	52	56	55	52	A	54	A					A		A	A	A	A	A		68	58	60	59
14	57	57	57	52	53	38	61	66	A	A	A				A	49	59	A	A	A		68	67	70	58
15	56	57	58	58	69	60	61	68	75	66	A	A	A	A	65	57	65	A	A	A	A		68	70
16	63	58	54	52	55	71	66	68	A	73	A	A	A	A	A	67	A	80	80	94		80		76
17	78	68		47	50	56	68	A	62	A	A	74	A		59			65	72	70	68	68	68	68
18	68	55	57	60	54	61	57	58	50	66	49	A		A		54	A	A	70	82	67	60	71	58
19	58	68	52	56	57	53	68	68	59	59	67	A	A	A	A	A	A	A	A	A	A	67	A	68
20	68	57	57	51	51	66	74	75	A	A	A	A	A	59	A	A	A	A		A	82	81	68	68
21	58	58	60	58	57	A	68	77	69	A	73	59	A	A	A	67	71	81	66	60	59	70	60	59
22	57	68	58	A		A	61	70	A	A	A	A			A	A	A	58	A	A	69		70	68
23	57	56	A	56	54	A	57	A	A	A	A	A		A			79	64	A	64	76	A	68	56
24	58		A	52	37	A	A	A	A	A		A					A	A	A	60	60	56	68	67
25	44	42	40	35	41	A	57	58	A					A				54	A	58		68	67	57
26	56	58	40	31	40	55	A	A	64		A	A	A		49	A	54	52	56	72	A	67	68	69
27	56	54	59	57	54	64	A	A	61	A	A	A	A		A	61	68	64	62	70	68	74	68	58
28	57	52		58	51	57	57	A	A	49	A		A		49	A	60	A	60	A	74	A	68	57
29	57	A	35	46		57	57	A	A	A	A	A	64		60	67	62	59	58	69	67	68	70	
30	58	58	56	56	68	72	71	64	A	68	A			62	A	A	62	A	A	61	68	68	68	58
31	58	58	57		57	67	67	67	70	67	67			68		72	63	62	66	84	73		68	
	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	27	27	29	29	24	24	22	18	11					10	14	15	15	19	20	18	22	27	28
MED	58	58	57	56	57	65	68	68	70	66					64	64	64	65	70	70	68	68	68	68
U Q	68	68	59	58	62	68	70	75	76	70					66	67	68	70	71	83	73	72	71	68
L Q	57	57	56	52	52	57	59	64	62	59					59	57	62	59	60	62	60	67	68	58

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fEs AT WAKKANAI

JUL. 1998

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		35	39	32	34	57	52	42	56	74	58	88	64	60	G	42	58	67	55	46	64	76	71	32
2	40	40	56	33	46	36	34	39	44	64	57	62	54	G	G	G	60	105	82		87	97	33	58
3	57	G	28	23	28	30	42	40	54	56	G	58	G	G	G	G	56	41	64	58	54	62	65	77
4	29	45	33	28	30	39	40	46	55	73	63	65	54	85	60	G	G	G	61	62	76	63	G	38
5	38	39	36	58	30	60	54	80	43	58	84	58	67	130	60	96	74	76	62	66	92	57	73	59
6	41	45	55	54	34	42	38	64	68	86	107	126	76	60	68	41	85	93	46	98	90	83	70	87
7	74	75	48	36	29	42	61	83	93	70	63	64	55	62	76		74	136	38	60	76	60	59	51
8	58	65	59	40	38	67	61	73	77	54	63	55	56	65	G	40	65	60	65	132	61	71		34
9	G	34	31	28	28	34	44	46	66	44	56	43	G	G	78	52	59	81	91	119	84	86	64	46
10		44	32	34	42	48	46	46	63	64	G	G	G	G	G	G	G	44	36	37	58	63	37	
11	32		28	32	29	40	54	G	G	G	G	54	58	G	G	G	G	34	46	50	53	64	36	34
12	29	58	41	28	28	60	55	46	44	59	44	55	118	58	G	44	93	90	148		96	37	57	G
13	60	30	28	25	32	39	43	52	52	G	G	G	G	44	G	46	94	85	52	84	60	33	38	40
14	29	41	28	40	30	34	59	56	59	44	44	G	G	G	138	76	57	96	82	65	47	64	60	G
15	27	G	26	36	34	32	43	61	63	57	69	74	64	59	63	43	G	66	84	96	127		42	56
16	46	34	43	54	71	34	34	39	61	67	77	57	66	76	68	56	39	40	61	71	87	45		26
17	37	43		28	G	38	48	63	43	58	86	G	57		59	G		G	38	72	64	34	29	33
18	37	34	28	26	G	35	56	53	55	53	54	62	G	55	G	G	73	73	45	43	28	28	24	27
19	29	30	27	30	34	38	40	56	54	54	G	58	64	72	76	55	68	158	86	138	73	65	87	40
20	39	32	34	52	62	56	56	83	112	88	77	77	65	G	71	88	86	86		171	90	65	60	69
21	61	61	29	32	33	62	47	65	96	82	64	43	62	72	82	54	41	67	94	96	66	41	28	58
22	57	46	40	31	33	39	61	64	88	86	84	87	G	G	63	71	66	G	66	97	55		45	88
23	73	64	39	36	34	55	58	75	68	66	93	66	G	64	G	G	74	74	136	95	57	84	G	G
24	G	G	36	29	40	46	48	58	58	56	G	58	G	G	G	G	41	54	58	36	39	33	33	G
25	G	G	23	G	24	36	42	58	51	G	G	G	G	43	G	G	59	66	71	92	73	38	32	35
26	29	24	28	27	27	33	56	62	G	G	71	57	45	G	42	41	G	51	78	55	61	61	44	64
27	54	42	39	37	47	40	72	91	57	85	65	57	58	G	44	G	G	46	50	40	36	40	37	38
28	29	29	25	29	34	G	G	64	46	44	68	G	63	G	G	50	40	57	56	79	66	62	42	37
29	35	34	34	30	29	31	46	68	74	59	60	67	59	G	G	G	G	G	38	34	30	58	50	
30	40	46	56	41	28	30	G	47	62	G	56	G	G	44	54	56	56	73	84	76	40	32	27	25
31	37	33	35		28	G	43	46	G	G	G	G	G	G	G	G	61	42	39	G	G	G	G	82
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	30	30	31	31	31	31	31	31	31	31	31	30	31	30	30	31	30	29	31	29	29	29
MED	37	37	34	32	32	39	47	58	57	58	60	57	55	44	42	41	58	66	62	71	64	61	42	38
U Q	55	45	40	37	34	48	56	65	68	70	71	65	64	62	68	54	73	85	82	96	84	65	60	58
L Q	29	30	28	28	28	34	42	46	46	44	G	G	G	G	G	G	39	42	46	48	53	37	30	29

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fmin AT WAKKANAI

JUL. 1998

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

HOURLY VALUES OF foF2 AT KOKUBUNJI

JUL. 1998

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	49	57	51	58	56	63	81	A		A	A	A	A	A	A	97	86		A	A	A	94	69	65
2		63	56	56	60	67	72	80	80	101	84	A	A	A	87	90	86	82	92		93	68	69	67
3	69	67	64	70	60	67	87	94	A	A	A	A	A	87	90	81	85	93	86		78	93	81	
4	A	81		74	75	81	85	90	A	68		A	A	81	A	75	78	75	A	87	82	A	A	67
5	68	69		55	64	70	A	81	A	A	A	A	87	86	86	A	80	81	84	81	95	A	64	80
6	80	74	68		70	63	79	92	A	67	A	A		84	92	95	88	91	85	A	73	70		63
7	64	68	68	72		92		A	A	86	A		81	A	85	80	80	A	93		93	79	81	77
8	74	76	67	54	60	51	70	90	73	A	A		A	A	A	77	82	87	93	58			80	A
9	59	53	92	67	53	56	72	93	115	A	A	A	A	B	A	93	97	98	96	96	80	67	A	68
10		70		62	70	A	81	96	84	A	78	A	90	91	97	86	80	78	86	92	93	94	78	84
11	95	80	80	68		74	70	A	A	A		A	80	A	80	A	74	78	88	93	A	81	81	72
12	74		63	63	68	55	68	73	A	49	A	74	70	A	75	71	72	74	94	94	72	57	52	
13		64	67	67	57	53	68	A	67	A	66		A	A	A	66	70	76	81	68	A	56	57	55
14	A	56	A	A	47	56	57	81	73	A	A	A	A	A	A	A	67	67	61	A -	A	71	68	56
15	A	59	56	51	50	57	66	77	74	76	A	A	A	A	A	86	90	85	84	93	63	69	64	63
16	57	56	A	70	62	55	55	68	77	64	A	A	A		A		86	97	97	81	92	85	80	
17	80	71	74	55	54	73	77	82	67		94	78	80	77	85	92	91	100	93	76	A	66	63	
18	68	68	58	61	60	63	70	74	74	69	54	A		69	66	58	67	73	80	94	81	A	68	A
19	67	64	51	68	55	56	64	68	77		A	A	70	77	82	77	77	72	69	78	80	70	68	67
20	68	57	57	56	52	A	68	68	A	A	A	A	N	68		A	80	83	97	96	91	68	A	69
21	68		56	51	51	56	67	72	84	63	A	A		82	95	94	86	94	114	107	A	73	70	66
22	61		72	51	44	46	68	100	67	54	A	A	A	64	A	77	76	76	72	78	80	67	68	
23	68	A	56	50		A	67	63	A		A	A	A	82	78	85	A	73	81	82	A	81	68	
24	58	60	57	69	68		93	78	71	67	A				62	49	56	64	66	68	A	94	74	66
25	A	A	A	54	51	56		56	A	A	A	A	A	A	A	A	63	65	68		62	67	68	68
26	56	56	50	47	48	60	73	68	70	64	A	A	A		59	66	67	67	70	69	69	64	63	57
27	57	57		56	53	A	68	96	76	A	A	A	A	A	86	82	71	A	A	93	81	66	63	61
28	57	64	57	49	48	48	66	80	82	A	A	A		A	68	A		64	67	68	77	58	62	60
29	57	A	53	54	69	50	66	67	A	A	75	A	A	A	84	A	59	75	72		94	94	68	68
30	64	54	57	69	58	60	66		70	78	82	A		A	84	66	78	82	76	93	74	A	56	51
31	57	48	56	57		56	73	77	77	75	68	A	A	A	86	91		A	86	98	89	A	81	76
	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	25	24	29	27	26	28	26	19	14				12	20	23	28	27	28	23	22	25	27	23
MED	66	64	57	57	57	56	69	79	74	68				82	84	81	79	78	84	87	80	70	68	67
U Q	68	69	67	68	64	67	75	90	80	76				85	86	91	86	87	93	94	92	83	78	69
L Q	57	56	56	54	51	55	66	68	70	64				73	76	71	70	73	72	76	74	66	63	61

HOURLY VALUES OF fEs AT KOKUBUNJI

JUL. 1998

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	92	106	58	58	59	58	54	104	104	179		58	83	110	103	70	55	129	86	61	68	98	70	58
2		53	83	48	51	42	50	79	61	90	59	107	72	110	74	59	60	57	52		31	G	69	75
3	61	38	40	50	27	27	35	58	72	88	86	179	91	81	43	G	G	61	56	180	97	85	102	95
4	99	58		58	94	59	37	48	73	56	G	81	89	61	73	G	92	40	64	44	59	108	109	97
5	60	58		56	66	34	88		170	65	80	124	58	51	G	117	70	58	47	45	28	48	43	38
6	28	26	37		50	G	40	98	117	60	59	55		G	G	G	G	G	68	135	60	73		54
7	56	56	37	37		38		54	177	108	87	G	50	93	81	76	61	59	61	39	G	32	38	38
8	32	30	30	G	G	41	48	G	62	102	71		89	110	93	59	59	53	78	G			92	88
9	89	80	49	35	32	29	39	52	50	53	56	62	149		85	118	72	75	37	40	85	57	72	57
10	60	41		36	34	54	72	134	61	99	61	77	G	G	52	64	52	G	34	35	26	34	53	60
11	40	58	45	55		34	33	94	138	90		74	62	69	66	80	59	44	56	62	116	60	54	61
12	58		49	51	47	32	59	G	62	57	168	G	69	60	53	58	50	35	39	36	34	33	52	
13		59	50	54	35	47	56	92	56	86	51	G		125	73	50	82	60	48	44	44	30	43	59
14	67	34	58	95	48	39	52	59	58	58	79	61	66	84	167	66	47	G	49	61	81	38	33	55
15	70	29	33	32	37	28	G	G	58	64	128		100	168	85	59	56	42	132	G	G	G	36	57
16	33	37	68	38	38	G	35	45	51	64	54	95	109	125			54	62	78	58	60	68	32	28
17	34	31	36	33	40	28	43	55	72	70	46	G	G	G	G	41	G	40	44	35	57	62	59	70
18	61	40	32	28	30	29	34	37	G	57	59	47	G	G	74		G	55	70	41	54	84	68	91
19	56	34	32	26	G	30	G	G	73	96	56	58	G	54	G	G	38	48	72	52	59	34	39	35
20	52	46	54	44	59	77	G	56	133	95	118	99	136	60	G	68	89	66	60	51	96	60	61	67
21			G	39	28	32	62	58	60	58	59	53	G	G	G	G	66	62	56	91	106	54	63	52
22	39		28	G	26	32	36	53	58	56	56	53	97	54	88	68	57	61	45	43	59	50	40	
23	71	69	34	31		58		56	79	113	84	97	61	57	51	G	58	61	65	55	98	90	60	
24	44	34	34	36	29	28	44	53	54	52	86	G	G		G	G	G	43		30	43	43	54	53
25	79	73	58	55	39	G	47	48	66	60	54	54	53	54	60	58	48	41	37	52	56	51	50	55
26	28	34	29	24	28	G	33	41	57	43	52	55	56		G	G	39	36	G	32	33	37	33	32
27	24	30	G	G	60	57	45	50	59	74	69	84	60	94	69	67	90	66	61	54	88	65	60	48
28	49	55	32	42	49	G	48	45	62	130	69	60		83	56	60	G	52	37	28	28	36	32	25
29	G	26	32	G	G	G	31	G	59	50	68	57	70		68	93	56	34	32	32	G	G	27	G
30	G	G	G	G	G	G	G		45	52	67	128	185	149	101	71	57	44	50	33	33	68	41	54
31	61	58	58	52		33	39	51	56	70	52	73	129	98	G	60		109	62	77	105	77	62	72
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	30	27	31	29	29	31	31	29	29	28	27	30	29	30	31	30	30	30	30	30	28
MED	56	40	36	38	37	32	40	53	61	65	61	60	68	69	63	59	56	53	56	44	58	52	54	56
U Q	64	58	52	52	50	42	51	58	73	95	82	89	94	110	81	69	61	61	65	58	85	68	63	68
L Q	33	32	32	28	28	27	33	43	57	57	55	53	51	54	G	G	39	40	44	35	33	34	39	43

HOURLY VALUES OF fmin AT KOKUBUNJI

JUL. 1998

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

HOURLY VALUES OF foF2 AT YAMAGAWA

JUL. 1998

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	73	73	66	64	66	62	67	82	73	76	68		69	77	91	94	90	C	87	67	71		69	
2	87	84	84	67		70		64	86	91	A	72	69	81	90		96	91	87	88	88	85	66	68
3	73	66	72		61	63	71	84	76	67	67	72	73	81	78	C	C	C	90			86	92	87
4	76	83	91	73	73	60	73	93	76	68	78	75	A	76	72	75	79	85	96	88	74	79	68	73
5	74	75	72	70	73	67	66	77	87	69	79		93	90	A	104	96	95	88	90	77	73	83	74
6	78	54	66	74	62	64	73	83	70	70	71	75	85	92	92	97	100	98	91	88	82	67		78
7	77	74	83	85	74	69	62	55	75	75	67	72	81	83	88	87	92	97	97	92	87	85	85	82
8	87	98	87	93	82	75	93	91	61		A	65	A	A	77	91	92	91	81	74	80	73	76	78
9	85	88	84	62	69	62	64	94		A	A	A	70	72	84	100	110	103	103	87	87	99	74	
10	77		73	73	67	64	62	83	79	A	A		74	A	92	91	91	91	88	90	85		67	66
11	74	82	73	72	69	54	56	78	91			72	80	88	87	90	97	98	100	87		72	72	
12	74	74	77	81	59	63	66	66	69	A	58	66	70	70	86	84	83	92	87	81	83	63		74
13	62	62	62		79	44	62	82	78	61		A	84	87	86	91	101	107	99	78	64		67	66
14	66		54	41		79		73	66	60	57	A	A	A	A	A	A	75	72	66	74	73	68	67
15	61	49	56	A	89	A	60	73	73	84	A	A	A		73	83	95	100	108	90	86	86		84
16	76	73	84		72		59	71	70		71	70	A	65	75	78	98	114	117	90	90	85	99	97
17			82	73	71		74	62	58	86	103	75	71	71	86	90	103	110	97	74	66		49	
18	72	82	82	72	70	62		77	67	A	A	68	72	67	66	70	71	75	87	86	84	71	70	76
19	85	80	78	83	70		69	70	70	67	61	81	74	76	84	87	89	87	87	90		84		49
20	84		53	66		89	50	67	78	67	68	67		68	67	86	93	104	110	111	91	58	68	67
21	84	90	84	71		62		80	86	64	66	67	75	80	89	98	100	105	120	110	71	85	81	80
22	82	83	83	56		60	79	80	72		64	A			90		93	86		88	90	73	66	52
23	69	72	67	67	66	74	55	66	A	A	A		82	93	88	95	82	83	85	86	73	82	63	
24	75	84	71	69	67	63	74	C	C	77	70	74	77	75	74	72	78	75	80	80	78	78	76	66
25	67	66			C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
26	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	68	A	A	71	76	A	89	77	69	75	86	90	79	59	73
28	66	76	73	62	62	55	74	93	69	60	87	A		74	67		63	75	88	84	83	71	72	61
29	67	66	66	68	60	58	71	70	64	67	75	A	A	A	88	87	99	84	86	81	74	72	68	66
30	66	66	66	61		59	60	60	67	91	66	73	84	81	86	90	86	101	110	98	C	C	C	C
31	C	C	C	C	C	C	C	C	C	66	69		71	C	C	C	C	C	98	C	C	C	C	C
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	24	27	23	21	23	23	26	24	20	19	16	20	22	25	23	26	26	28	27	24	23	23	22
MED	74	74	73	70	69	63	66	77	72	68	68	72	74	76	86	90	92	92	89	87	82	78	69	73
U Q	82	83	83	73	73	69	73	83	78	76	75	74	81	83	88	94	98	101	99	90	87	85	76	78
L Q	67	66	66	64	64	60	60	67	68	66	66	67	71	72	74	84	83	84	87	81	74	72	67	66

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fEs AT YAMAGAWA

JUL. 1998

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	28	30	28	41		30	32	G	G	G	G		G	G	G	G	89	C	44	43	30	30	G	30
2	31	29	28	24		G		45	82	57	79	G	55	G	79		53	43	G	32	27	G	30	30
3	G	G	G		G	G	G	G	60	57	59	G	64	G	55	C	C	C	70	58				
4	31	25	G	G	G	50	38		55	51	65	76	80	58	60	72	66	54	37	G	G	G		32
5		54	32	37	43	33	54	60	51	G	92	151	85		145	77	56	61	49	40	27	G	G	G
6	G	G	41	39	60	59	32	45	38	G	G	G	G	G	G	G	G	G	G	G	G	G		30
7	40	40	30	40	G	G	28	43	60	60	G	54	G	61	G	53	44	71	57	69	G	G	G	26
8	G	G	G	G	G	G	G	40	G	G	61	55	92	70	60	G	G	38	37	39	27	29	G	
9		40	40	40	G	G	29	G	60	82		72	G	91	G	70	61	61	79	40	92	30	G	
10	32	45	28	28	G	25	32	40	86	91	95	88	54	89	80		52	G	G	28	25	G	25	G
11	G	G	32	G	G	G	G	G	G		G		61	77	61	81	70	51	50	43		32		
12	55	30	40	29	40	29	32			52	55	G	56	54	G	61	77	54	44	32	25	G		G
13	39	G	32	31	30	39	40	G	40	60	152	167		84	70	G	G	54	45	G	G	G	G	31
14		58	G		G	32	G	G	G	G	G	76	82	117	103	79	81	57	44	44		42	33	39
15		40	41	40	43	60	42	G	52	58	66	152	142		90	84	G	50	G	27	28	29	29	28
16		31	29		56	31	43			78	G		61	61		55	G	60	50	53	32	31	28	32
17	G	G	G	G	G		G	G	40	G	60	85	G	G	G	G	G	50		32	32	31	G	
18	G	29	30	G	G	G		G	G		70	G	G	G	G	G	55	G	G	G	28		40	142
19	G	G	G	G	G		G	G	39		52	G	56	G	G	61	76	G	G	G	30	G	30	29
20	30		40	26	29		40	44	G	70	G	G		G	G		106	71	60	G		G	31	30
21		G	G	G	G	G	32	44	G	G	G	G	G	G	G	G	G	G	33	32	G	40	30	32
22	30	27	24	G	G	G	90		G	G	78	92		61	G		49	54			37	30	32	29
23	G	G	G	G	G	G	G	41		92	68	164	83	G	G	G	G	G	G	G	G	28		
24	58		32	24	30	32	43	C	C		G	G	G	G	G	G	61	39	47	33	G	G	30	42
25	32	N			C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
26	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	45	57	91	70	73	146	102	66	80	59	32	G	150	59	28
28	58	58	59	31	39	30	40		106	71	94	124	104	66	61		93	75	32	G	32	G	24	G
29	G	G	G	G	G	G	G	G	62	G	G	78	110	111	63	53	115	G	G	G	G	G	G	G
30	G			G	G	G	31	44	G	G	G	G	75	65	G	G	G	37	G	26	C	C	C	C
31	C	C	C	C	C	C	C	C	C	62	81		G	C	C	C	C	C	85	C	C	C	C	C
	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	26	24	25	24	25	21	23	25	28	25	26	26	27	22	27	26	27	27	23	25	21	21
MED	29	28	28	24	G	13	32	G	40	52	58	72	58	60	G	53	55	50	44	32	27	G	28	30
U Q	32	40	32	34	34	32	40	44	60	66	74	91	82	73	70	72	76	60	50	40	30	30	30	32
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	13

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fmin AT YAMAGAWA

JUL. 1998

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	17	15	15	16	15	15	16	20	22	45	48		66	55	53	52	23	C	17	16	15	15	15	17
2	15	16	15	15		15		21	24	23	42	53	42	53	43		35	29	21	17	15	14	15	15
3	15	15	14		14	14	18	17	18	22		54	46	55	55	C	C	C	17	15	15	15	16	15
4	16	15	15	15	15	15	17	20	21	35	43	44	49	48	42	46	39	20	20	18	14	20	16	14
5	15	15	15	14	15	15	18	20	21		38	45	43	44	45	34	24	18	16	16	15	14	16	14
6	15	14	16	16	15	15	16	20	23	47	49			56	54	50	48	20	16	15	15	15		16
7	15	14	15	16	15	14	20	18	22	45	46	43	55	46	53	54	36	21	17	16	15	14	15	15
8	14	15	16	15	14	14	18	18	24	36	32	44	44	44	40	54	51	22	17	16	17	15	14	15
9	15	15	15	16	15	14	18	20	20	26	42	39		46	56	42	42	34	17	15	16	15	16	16
10	14	16	16	16	14	16	15	21	23	22	40	38	38	44	42	32		22	26	15	15	15	16	15
11	14	14	14	16	16	14	18	21	27		71	48	43	40	42	44	27	20	17	16		15	15	18
12	20	15	15	18	15	16	20	21	22	36			44		52	40	39	20	17	14	15	15		15
13	18	15	15	14	15	15	17	29	30	26	38	43	39	41	40	53	51	21	22	18	15	15	15	17
14	15	16	16	17	15	14	22	30	21	48		39	44	42	45	41	23	20	17	16	20	20	16	14
15	16	15	16	18	16	17	16	17	21	26	36	41	45		35	24	55	32	26	16	15	15	16	16
16	18	17	16		18	21	16	33	48	41	46	44	43	46	48		54	22	20	16	18	16	15	15
17	15	16	21	15	16		16	21	30		46	45	48	53	51	48	45	26	23	16	16	15	20	
18	14	17	18	18	16	16		18	20	34	45	53	53	52	47	50	34	30	28	21	15	18	15	15
19	14	15	14	16	15		22	34	47	36			48	54	50	46	35	41	18	17	18	16	20	17
20	16		15	17	17	16	17	20	21	42	46	50		53		58	23	21	18	16	14	15	17	18
21	17	17	16	16	16	15	15	23	44	49			53	54	54	52	23	22	24	17	16	15	16	18
22	16	20	18	20	15	15	20	23	42		44	43	46	41	54		47	32		17	15	16	16	18
23	15	15	14	14	14	15	18	18	20	23	36		38	55	53	53	46	22	16	20	14	15	15	15
24	16	16	15	16	15	14	17	C	C	26	48	54	54	55	50	48	32	21	21	15	14	14	15	15
25	18	20			C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
26	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	22	38	43	42	39	35	34	23	21	17	15	16	15	15	15
28	16	16	16	16	15	14	17	17	21	35	43	48	59	48	48		48	24	18	16	15	16	16	16
29	16	14	15	14	16	16	16	21	22	54	54	45	46	45	44	53	22	20	24	17	15	15	16	16
30	20	17	16	16	15	14	17	17	22	48	48	55	46	45	55	53	23	20	20	15	C	C	C	C
31	C	C	C	C	C	C	C	C	C	38	44			C	C	C	C	C	16	C	C	C	C	C
	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	27	25	26	25	25	26	26	25	24	22	25	26	27	23	26	26	28	28	26	27	25	26
MED	16	15	15	16	15	15	17	20	22	36	44	44	46	47	48	48	36	22	18	16	15	15	16	15
U Q	16	16	16	16	16	16	18	21	27	45	47	50	51	54	53	53	47	26	21	17	16	16	16	17
L Q	15	15	15	15	15	14	16	18	21	26	39	43	43	44	42	41	23	20	17	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF foF2 AT OKINAWA

JUL. 1998

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	76	80	71	71	68	68	77	81	70	72	72	66	80	88	91	90	91	85	86	86	81	68	66	64
2	73		64				60	76	94	68	70		72	76	86	90	92	110	93	84	110	64		A
3	45		95	73	71	69	94	79				73	78	81	85	91	109	107		A	A	A	84	81
4	95	75	82	80	71	73	92	71	60	80	A	71	72	80	85	82	96	102	94	88	69	66		74
5	A	65	68	72		60	67	83	74	A	A	A	A	A	A	105	104	106	88	84	80	65	67	74
6	75	73	71	71	70	61		72		67	70	71	92	105	105	106	116	111	103	84	81	70		95
7	68	72		69	68	67	58	69		78	72	72	77	91	92	92	104	110	105		91	81	91	93
8	95	82	99	93	93	93	93	94	63	68	72	76	73	81	92	102	92	91	97	88	83		67	68
9	A	94	67	70	69	56	58	94	95	61	65	A		81	94	121	116	112	A	84	98	83	79	92
10	95	95	67	72	71		92	76	A	52	61	A	80	91	96	115	112	112	93	83	71	63	68	54
11	66	72	77		A	38	63	87	95	62	A	81	87	92	104	116	120	124	110	85	81	78	73	71
12	66	70	72	60	58	58	54	66	61	68		64	78	81	91	93	92	98	96	78	92	61	58	A
13	57	62	57	72	57	42		72	72			86	92	102	112	130	144	148	126	110	94	81	74	
14	70	70	61	57	34	34	40	83	57	64		A	A	A	73	80	82	82	86	79	80	68		61
15	71	59	57	58	57	35	58	64	92	72		69		74	82	88	92	104	109	90	94	82		74
16	78	94	83	81	58		62	62	68	67	74	49	56	69	A	81	92	105	A	90	97	84	115	96
17	94	95	81		69	94		57	A	92	116	78	73	76	84	95	112	123	92		78	86	78	92
18	94	78	95	67	69	61		75	80	A	68	71	77	72	71	80	84	90	93	83	82		58	
19	73	81		70	58	56	50	61	78	67	73	81	70	73	92	115	116	116		103	85		64	60
20	60	68		59	51	38	A	60	71	65	72	58	70	72	71	81	92	112	128	129	81	63	66	70
21	77	74	95	71	69	57	56		74	60	60	69	81		91	94	116	120		84	94	72	76	73
22	72	74	74	57	A	A	41	72	72	79	72	78	84	92	102	102	107	95		90	94	95	66	73
23	68	65	79		86	68	A	54	67	66	A	A	75	A	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	91	92	85		84	84	81		
25	66	61	57	58		56	56	61	81	70	72	80	84		110	116	122	127	128	118		84		76
26	A	61	61		57	58	57		60	62	67	59	64		A	73	75	86	93		87	75	49	59
27	51	62	A	50	46	51	64	67	63	A	67	A	70	84	A	87	A	A	A		67	53	61	58
28	A	A	61		57	69	72	57	68	70	72	66	73	76	A	A	76	92	82	81	A	67	74	
29	70	72	70	62	68	72		69	67	73	76	75	75	83	92	95	102	105	111	90	71	71	67	60
30	67	63	68	70	61	50	63	60	71	90	67	76	85	84	88	88	113	122	124	84	72	66	68	68
31	68	A			61	50	55	73	A	A	A	74	75	82	98	115	117	122	124		112	85	93	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	26	26	25	23	25	26	23	28	24	24	20	23	26	24	24	29	29	29	22	24	27	26	23	24
MED	70	72	71	70	68	58	60	72	71	68	72	72	76	81	92	93	104	107	96	84	83	72	68	73
U Q	77	80	81	72	69	68	72	77	79	72	72	78	81	89	97	110	116	118	111	90	94	82	78	85
L Q	66	65	62	59	57	50	56	61	65	64	67	66	72	76	85	87	92	93	93	84	80	66	66	62

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fEs AT OKINAWA

JUL. 1998

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	40	46	36	25	66	66	46	42	51	65	53	G	G	G	G	42	44	G	47	38	47	28	39	28
2	49		36				42		88	47	G	G	G	G	G	58	68	43	43	32	28	42	50	37
3		G	G	G	G	G	G	33	38	G	G	G	G	G	G	G	54	57	79	92	92	65	39	32
4	G	G	G	G	G	34	44	44	60	50	43	G	G	G	57	64	G	53	37	45	34	43		45
5	74	29	36	66	G	34	43	64	50	96		109	96	170	138	124	124	74	75	84	58	26	49	G
6	24	32	43	G	37	40	28	71	48	68	G	G	G	G	G	47	46	G	33	42	34		G	48
7	G	G	41	26	67	47	G	38	G	40	G	56	69	62	60	64	46	48	37	30	29	G	G	G
8	33	G	G	G	G	G	G	40	68	46	G	G	58	G	G	G	G	G	36	28	G	G	G	G
9	61	32	G	G	G	G	G	37	61	69	G	44	G	58	60	56	59	56	125	70	67	41	49	29
10	26	26	G	G	G	G	G	34	60	G	G	77	58	81	73	68	47	42	51	39	37	42	26	G
11	G	G	G	G	36	25	G	46	48	56	68	52	61	52	56	58	59	45	44	46	30		50	47
12	G	G	32	G	G	34	37	36	41	40	G	G	G	G	G	G	G	54	56	47	42	49	33	35
13	38	34	25	25	G	G	G		46		G	G	47	G	81	G	G	G	G	G	G	G	G	26
14	32	40	44	41	40	32	26	82	39	G	G	94	52	70	65	73	63	58	56	47	51	36		50
15	68	39	38	61	50	25	38	59	42	50	G	57		G	60	60	50	42	49	56	36	22	27	29
16	39	28	25		G		G	37	45	42	44	49	G	56	121		94	64	107	G	51	46	41	48
17	48	37	G	G	G	G	G	35	56	59	43	67	53	G	G	46	G	G	G	G	27	26	26	24
18	26	G	G	G	G	G	G		38		43	G	G	45	58	78	46	G	38	35	40		40	
19	42	27		G	G	26	G	37	41	55	74	G	52	G	G	G	G	70	51	38	50	46	G	26
20	36	43		G	24	28	43	67	67	50	47	G	G	G	62	G	G	60	59	66	51	40	44	38
21	36	30	26	G	G	G	G		G	40	53	44	G	G	G	G	G	G	70	67		42	43	63
22	59	76	38	43	50	68	40	42	86	78	G	G	G	G	81	47	61	52	76	88	32		34	36
23	32	24	G		G	40	40	34	47	44	176	78	68	137	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	65	82	85		44	86	G	48	
25	60	69	42	33		43	G	66	77	48	G	61	59	56	88	68	51	44	41	35		43	42	40
26	67		69		24	32	25	32	39	48	G	G	G		69	66	54	41	66	40	26	25		34
27		27	39	26	G	G	G	G	G	61	52	58	G	46	76	58	97	96	94	55	42	26	26	
28	68	72	44		32	34	43	62	44	60	59	58	G	62	78	72	85	42	40	66	38	36	26	G
29	51	34	26	23	G	27		48	46	59	60	71	60	97	114	82	61	40	78	28	G	G	G	22
30	G	G	G	G	G	G	G	39	41	47	50		G	44		48	44	G	44	38	26	G	G	G
31	38	66			40	35	G	41	84	87	60	55	68	60	57	54	47	44	66		64		G	57
	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	24	28	28	29	26	30	28	29	29	29	29	28	29	30	30	29	29	28	25	27	27
MED	38	30	26	G	G	28	G	40	46	50	43	44	G	44	60	58	48	44	51	42	38	36	33	32
U Q	55	39	39	26	36	34	40	59	60	60	53	59	58	61	77	67	61	57	72	61	51	42	43	45
L Q	26	G	G	G	G	G	G	36	41	43	G	G	G	G	G	21	G	G	39	33	28	11	G	22

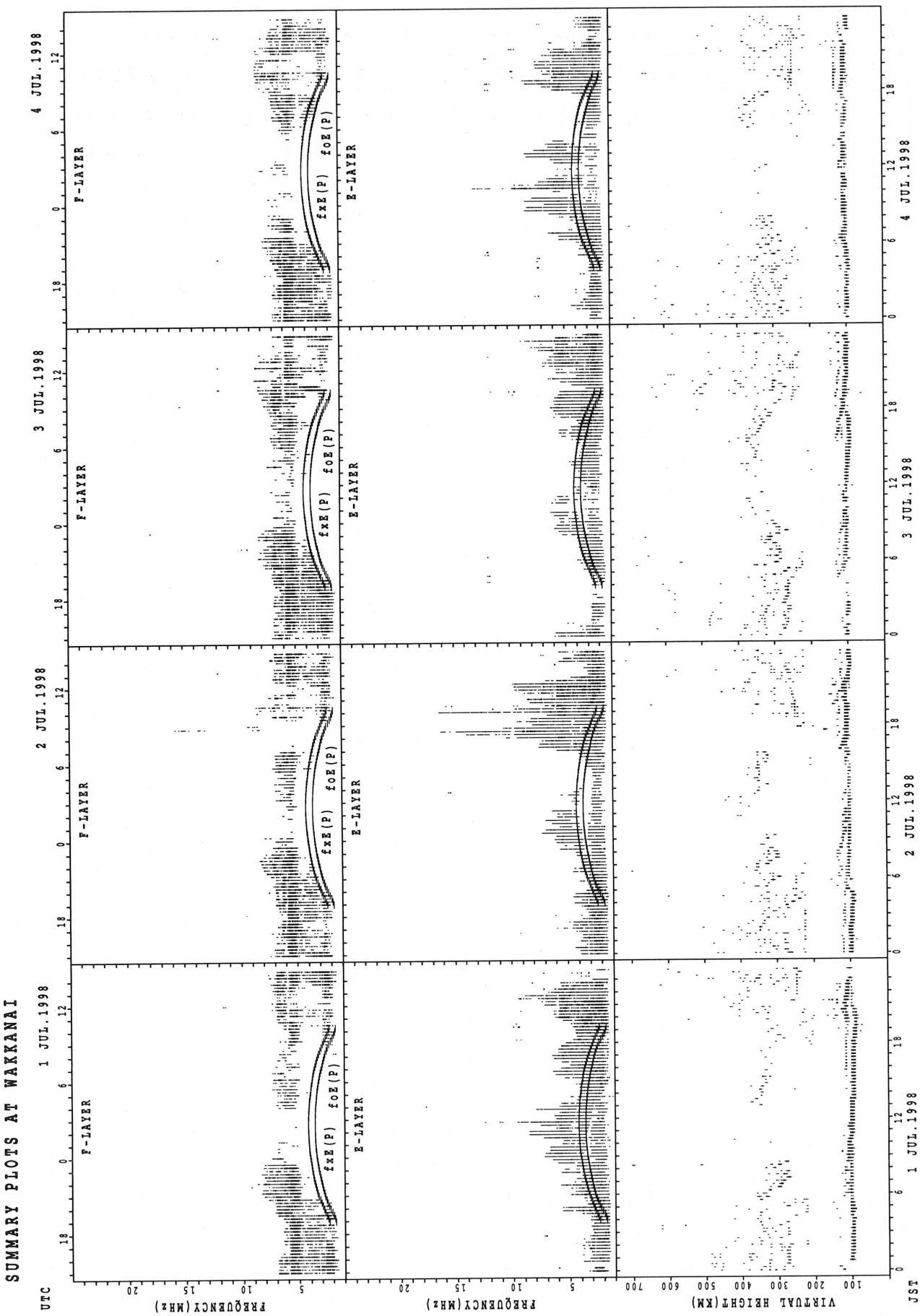
COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fmin AT OKINAWA

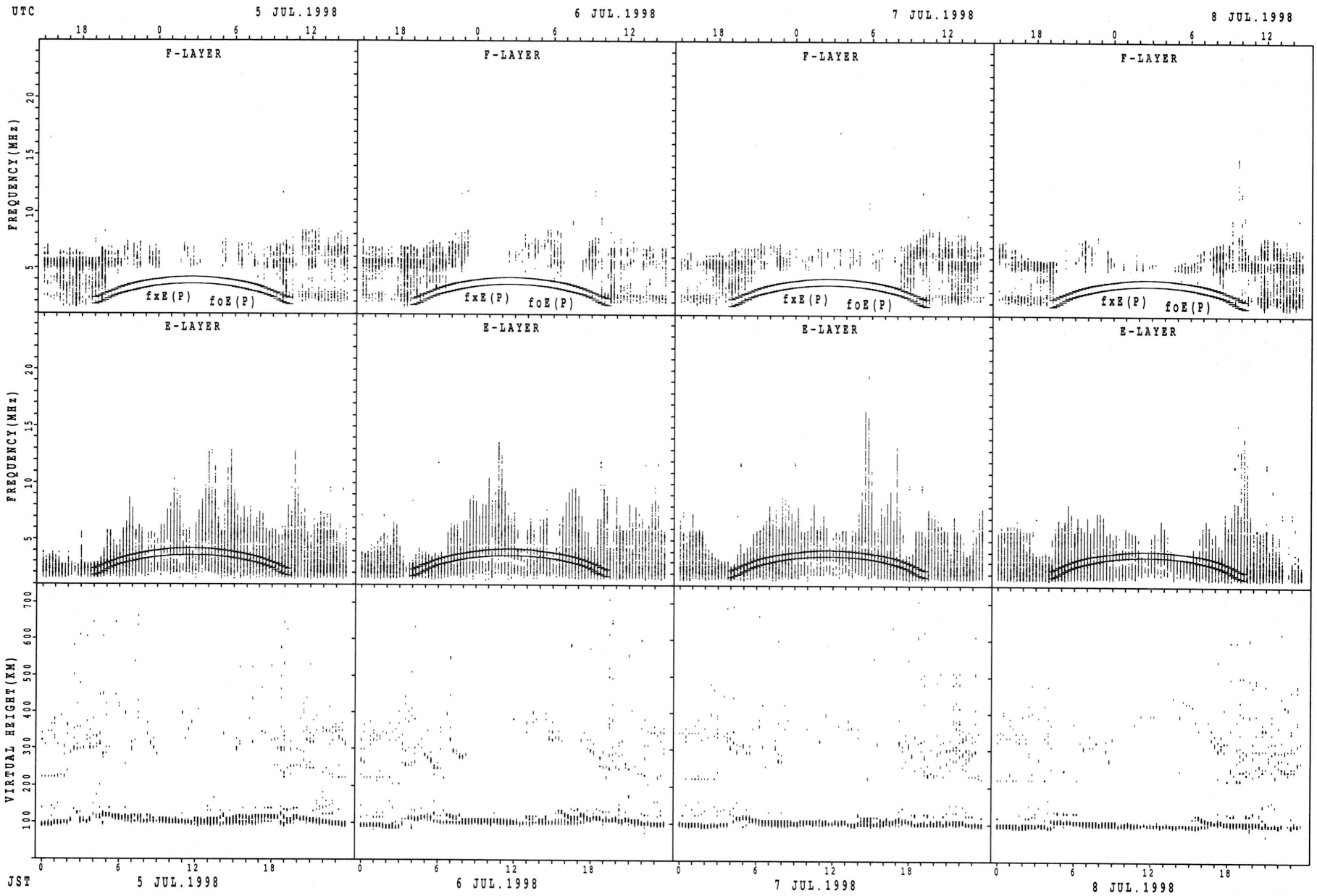
JUL. 1998

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

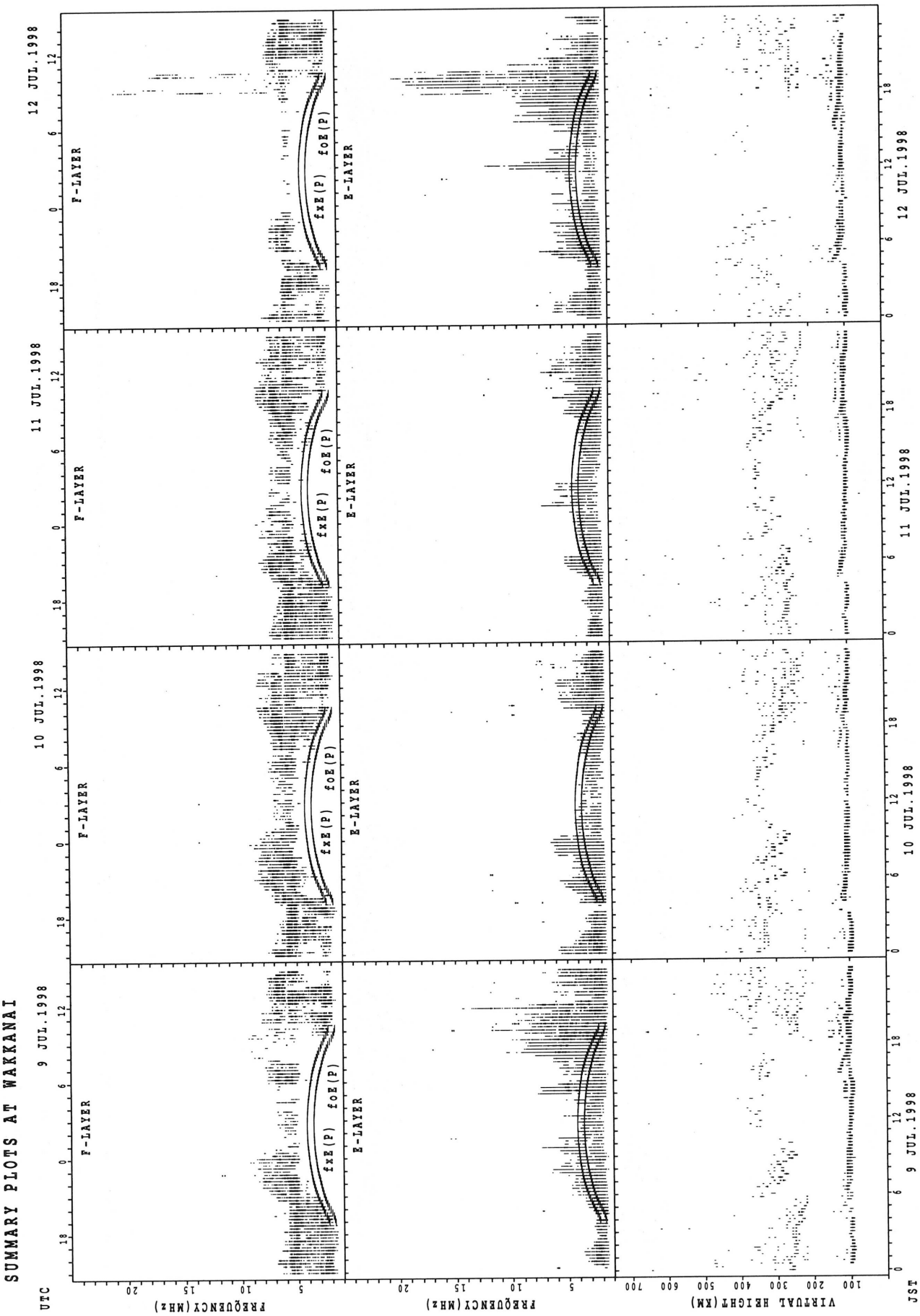
D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	15	14	15	14	15	16	14	16	20	24	30	34	32	30	27	35	16	15	14	14	14	14	14
2	14		14				15	15	16	21	26		29		49	28	24	16	16	15	15	14	16	14
3	15	15	17	15	14	15	27	15	16	28			56	57	56	54	29	23	16	15	14	14	14	14
4	14	17	15	14	15	15	15	16	16	26	30	30			43	45	47	17	15	14	15	14		15
5	15	14	14	14	14	14	15	15	16	21	28	34	40	32	34	29	27	15	16	14	14	14	15	17
6	15	15	15		14	16	15	15	17	26	28	32		57	34	29	26	18	14	14	14	16	14	15
7	15	14	15	14	14	14	23	15	16	18	24	28		29	39	33	27	16	15	14	14	15	14	15
8	15	15	15	14	17	15	22	15	16	20	29	32	30		35	29	28	16	14	14	14	15	15	14
9	14	14	15	20	14	15	18	16	18	29		34		43	51	34	27	17	15	14	14	14	15	14
10	15	14	14	15	14	15	18	14	15	21	26	29	30	30	29	28	21	17	15	15	14	15	15	15
11	14	15	14	14	14	14	15	16	15	27	28	29		34	32	29	27	16	15	14	14	14	15	14
12	14	14	15	15	14	14	17	15	17	24	29	29	32	32		26	26	18	14	14	14	14	14	15
13	15	14	15	15	15	15	18	15	18		28	30	32		32	29		32	17	17	15	15	14	16
14	14	15	14	14	14	14	17	15	17	24	28	29		30	42	29	28	17	16	14	15	15		15
15	14	15	15	15	14	15	15	15	17	22	23	39			39	35	27	17	15	14	14	14	15	14
16	14	15	14	15	14		15	18	16	20	18	42	32		39		17	17	15	15	14	14	15	14
17	15	14	15	15	17	15	17	15	16	18	27	27	22	14	26	26	21	16	15	17	14	14	14	14
18	15	15	15	15	15	14	26	15	15	18	26	29	29		30	38	18		18	15	14		15	
19	15	14		15	14	14	15	14	15	18	20	27	32	30	28			17	16	15	15	14	15	14
20	15	14		15	14	15	16	15	15	18	28	29		53	39		50	22	16	14	14	14	15	15
21	15	14	14	15	14	16	22		16	26	27	28	30		28		26	16	15	14	14	14	14	14
22	14	15	15	15	15	14	15	17	22	30		48		58	58	30	28	16	15	15	14	15	14	14
23	14	16	15		15	14	15	15	17	26	28	28	32	28	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	29	22	16		14	14	14	14	
25	15	16	14	14		14	16	14	16	18	28	28	30	40	40	35	17	15	14	14		15	15	14
26	15	14	15		14	14	17	15	17	18	29	30			29	34	32	20	16	14	15	14	15	14
27	15	14	14	14	14	15	17	14	15	17	28	32	30	28		30	18	16	14	14	14	15	14	15
28	14	15	15		15	14	15	14	16	22	38	42			44	40	34	17	15	15	15	14	14	15
29	14	15	14	15	14	14		14	16	18	26	30	35	32	30	27	26	17	14	14	15	15	15	15
30	15	15	15	14	14	15	17	15	16	20	29	33	32	34	29	28	20	16	14	14	16	15	15	15
31	15	14			14	14	18	15	15	21	36	28	30	30	28	32	26	17	15	14	14	14	16	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	29	27	24	28	28	29	29	30	29	27	28	19	20	27	26	28	29	29	30	29	29	28	28
MED	15	15	15	15	14	14	17	15	16	21	28	30	32	32	34	29	26	17	15	14	14	14	15	14
U Q	15	15	15	15	15	15	18	15	17	26	29	32	32	41	42	34	28	17	16	15	15	15	15	15
L Q	14	14	14	14	14	14	15	14	16	18	26	28	30	30	29	28	21	16	14	14	14	14	14	14


SUMMARY PLOTS AT WAKKANAI
UTC
JST
1 JUL.1998
2 JUL.1998
3 JUL.1998
4 JUL.1998
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

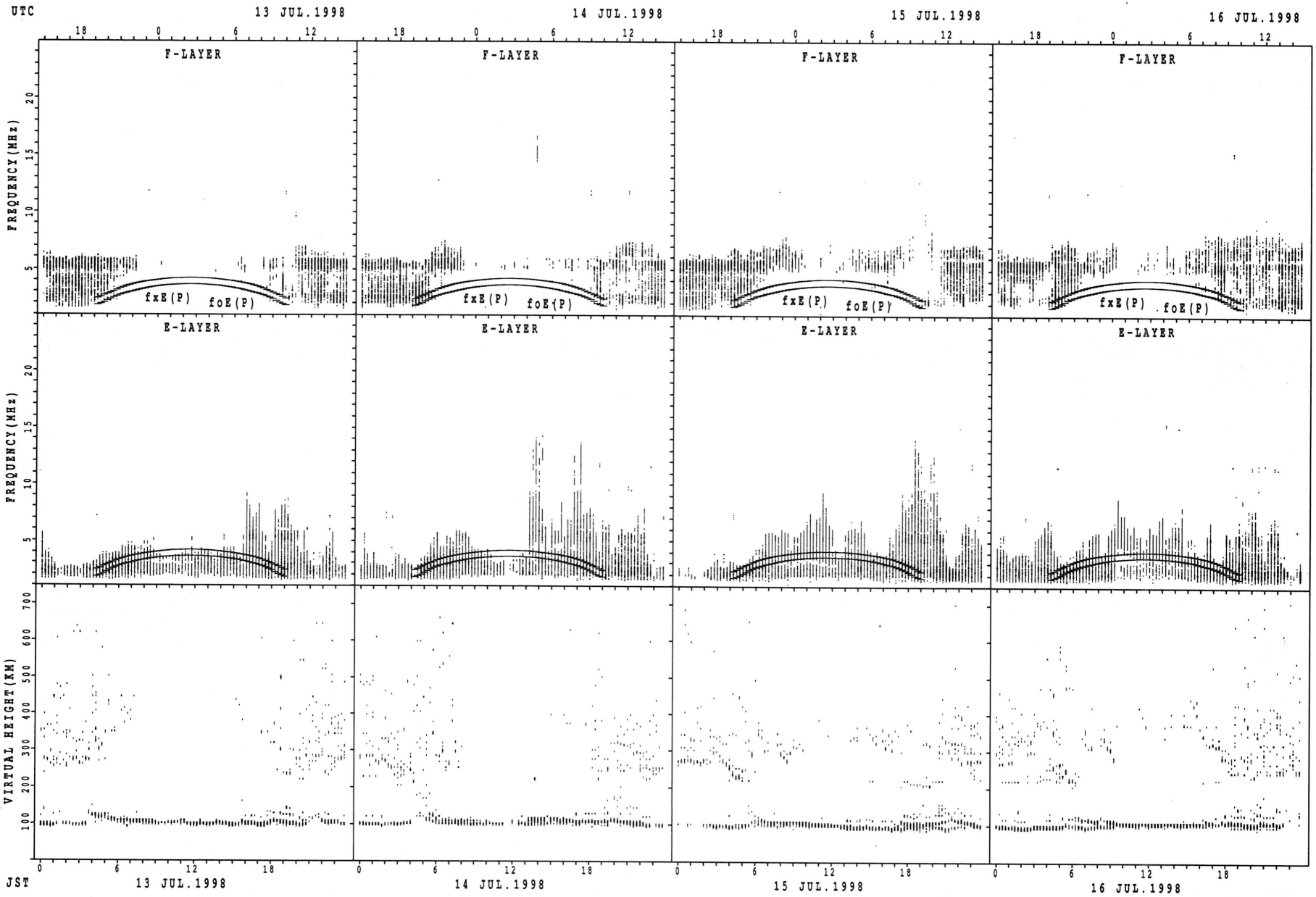
SUMMARY PLOTS AT WAKKANAI



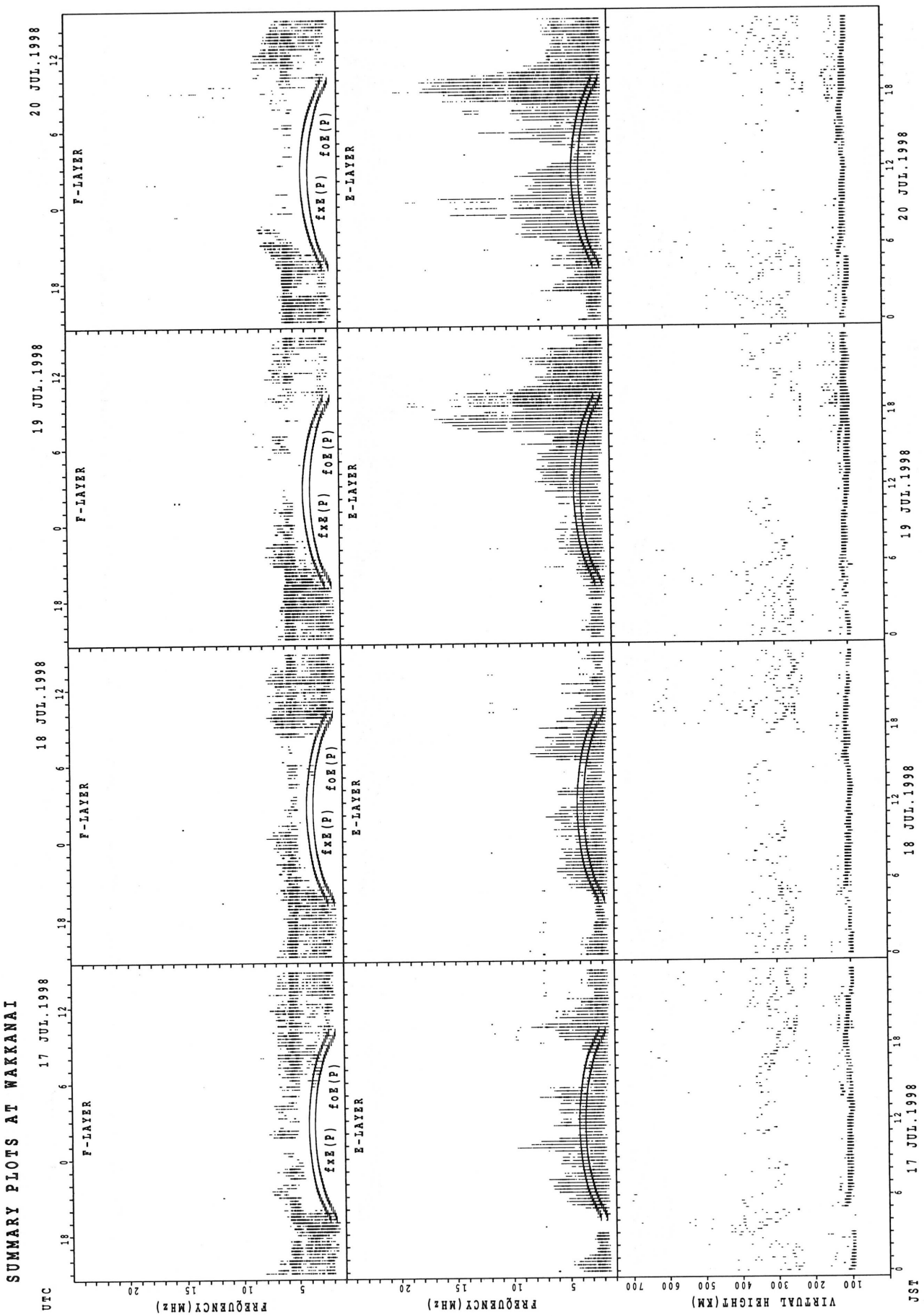
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT WAKKANAI
UTC
JST
9 JUL.1998
10 JUL.1998
11 JUL.1998
12 JUL.1998
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

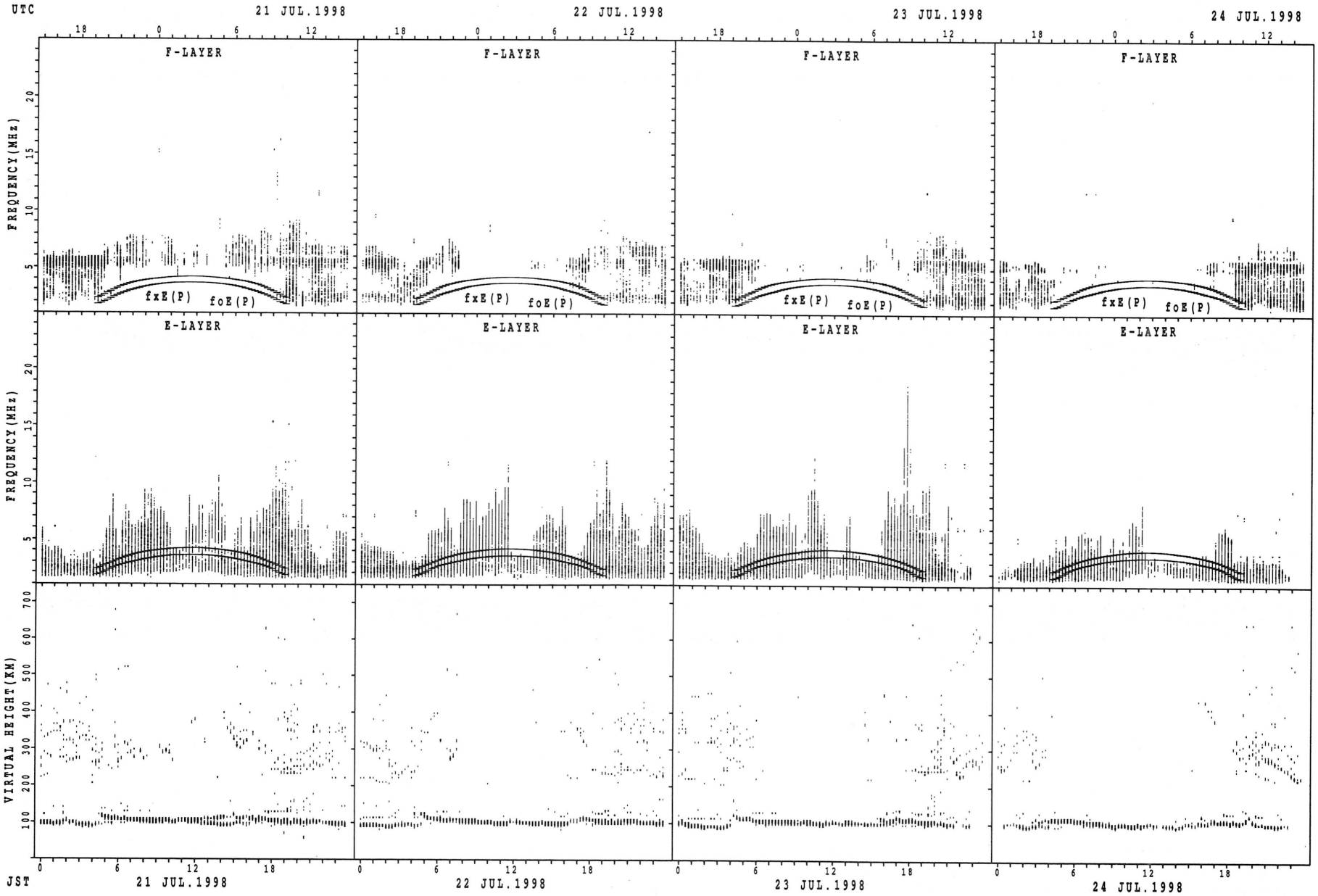
SUMMARY PLOTS AT WAKKANAI



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

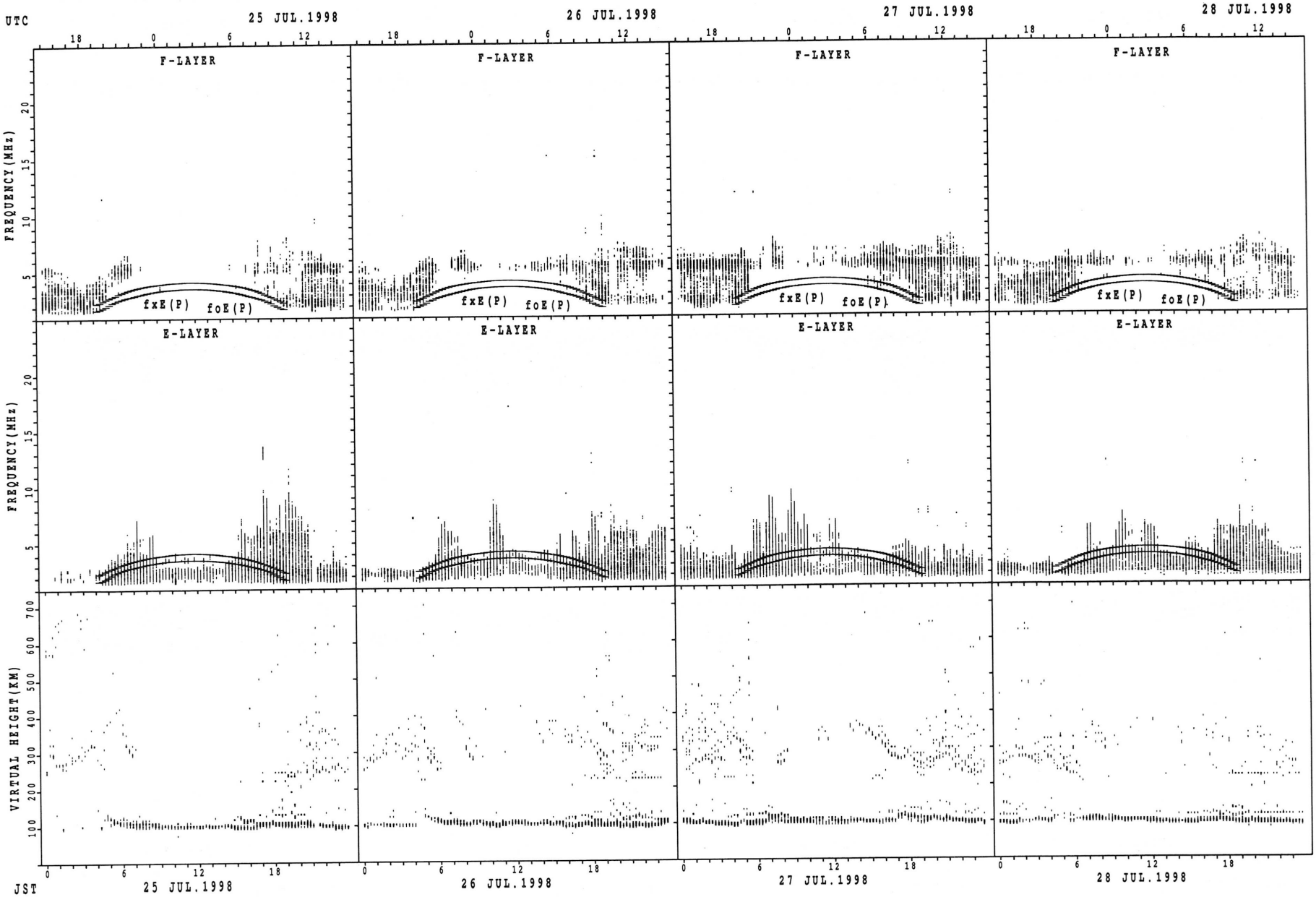

SUMMARY PLOTS AT WAKKANAI
17 JUL.1998
18 JUL.1998
19 JUL.1998
20 JUL.1998
UTC
JST
F-LAYER
E-LAYER
FREQUENCY(MHz)
VIRTUAL HEIGHT(KM)
fxE(P)
foE(P)
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT WAKKANAI



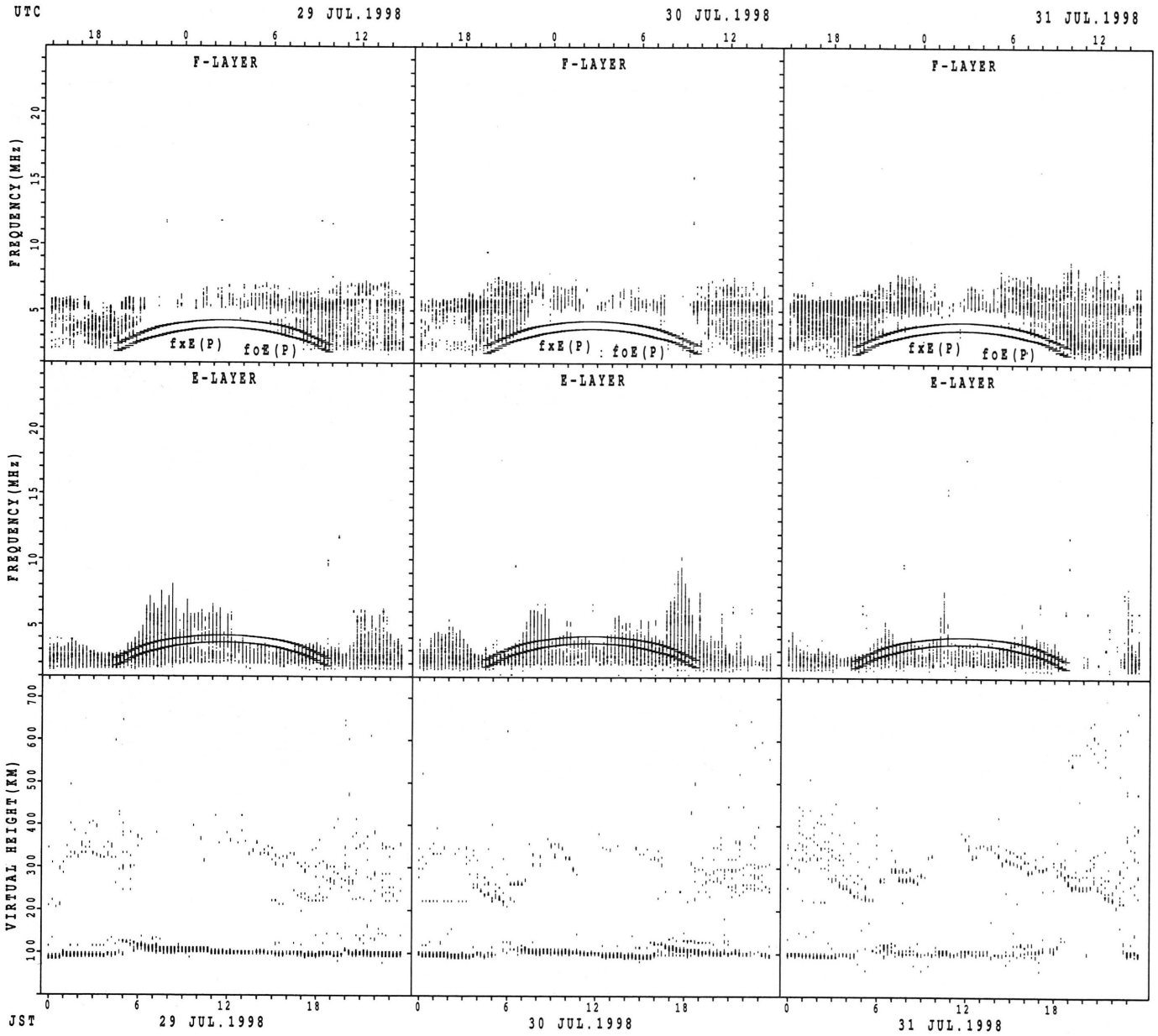
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT WAKKANAI

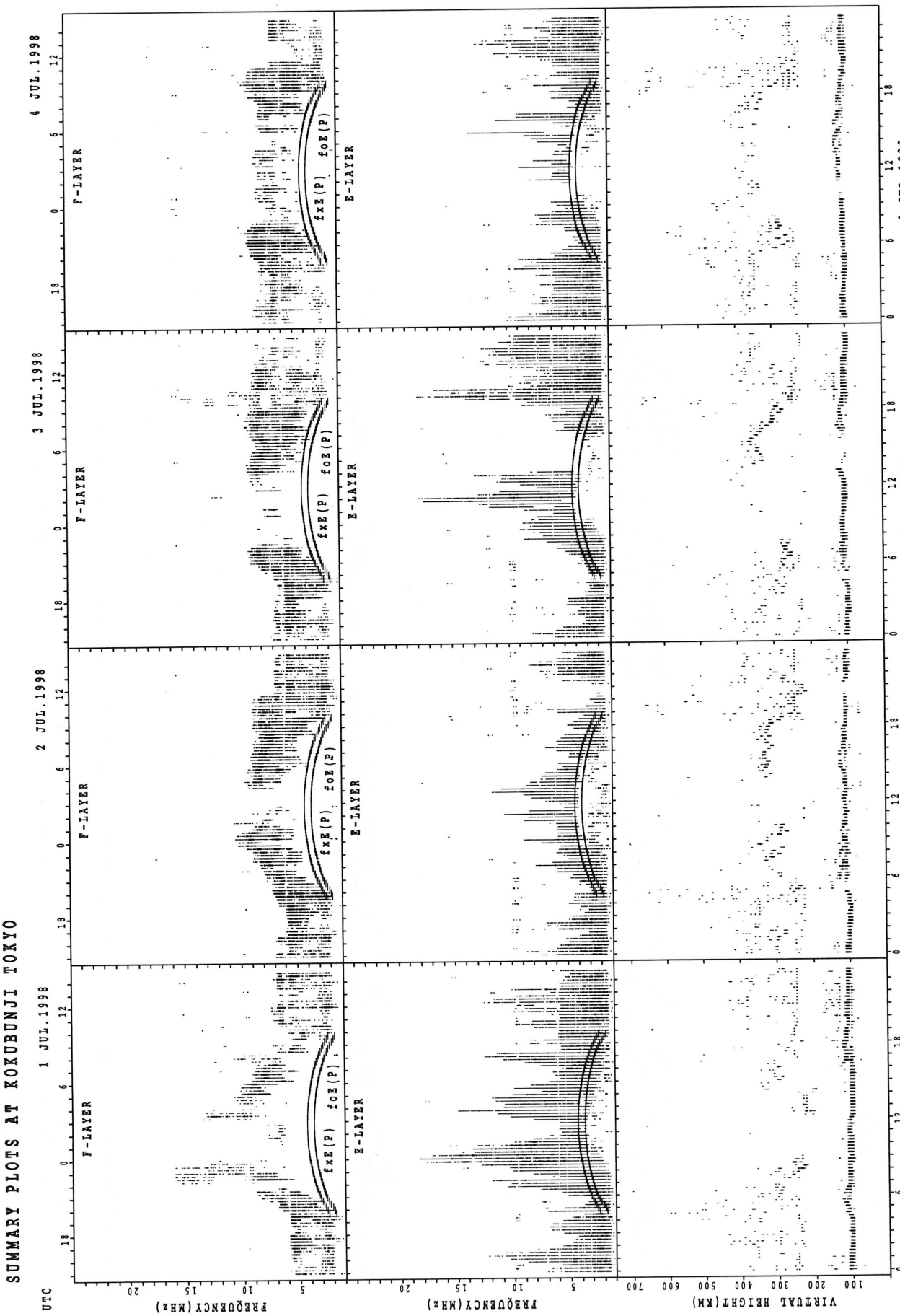


fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

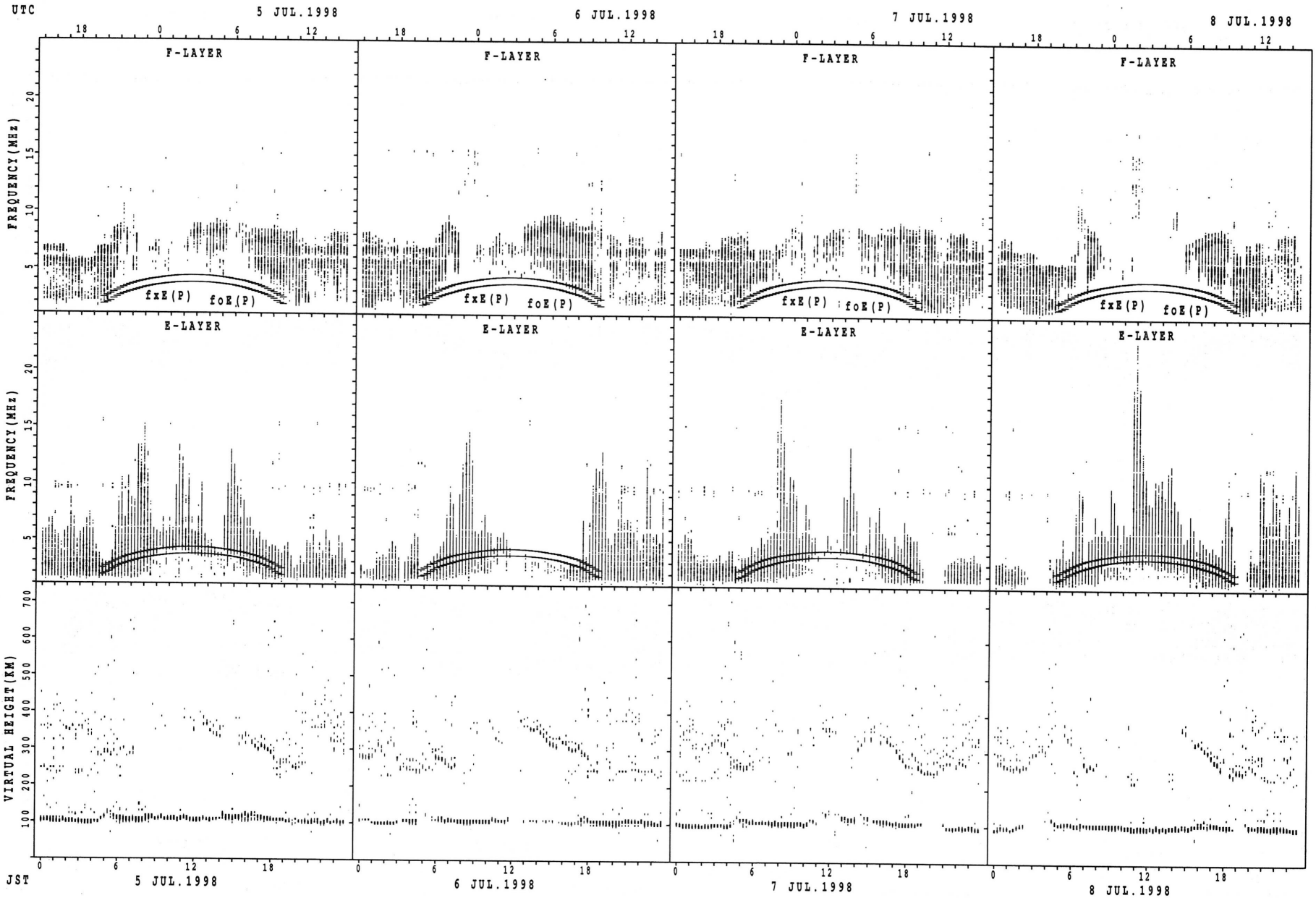
SUMMARY PLOTS AT WAKKANAI



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

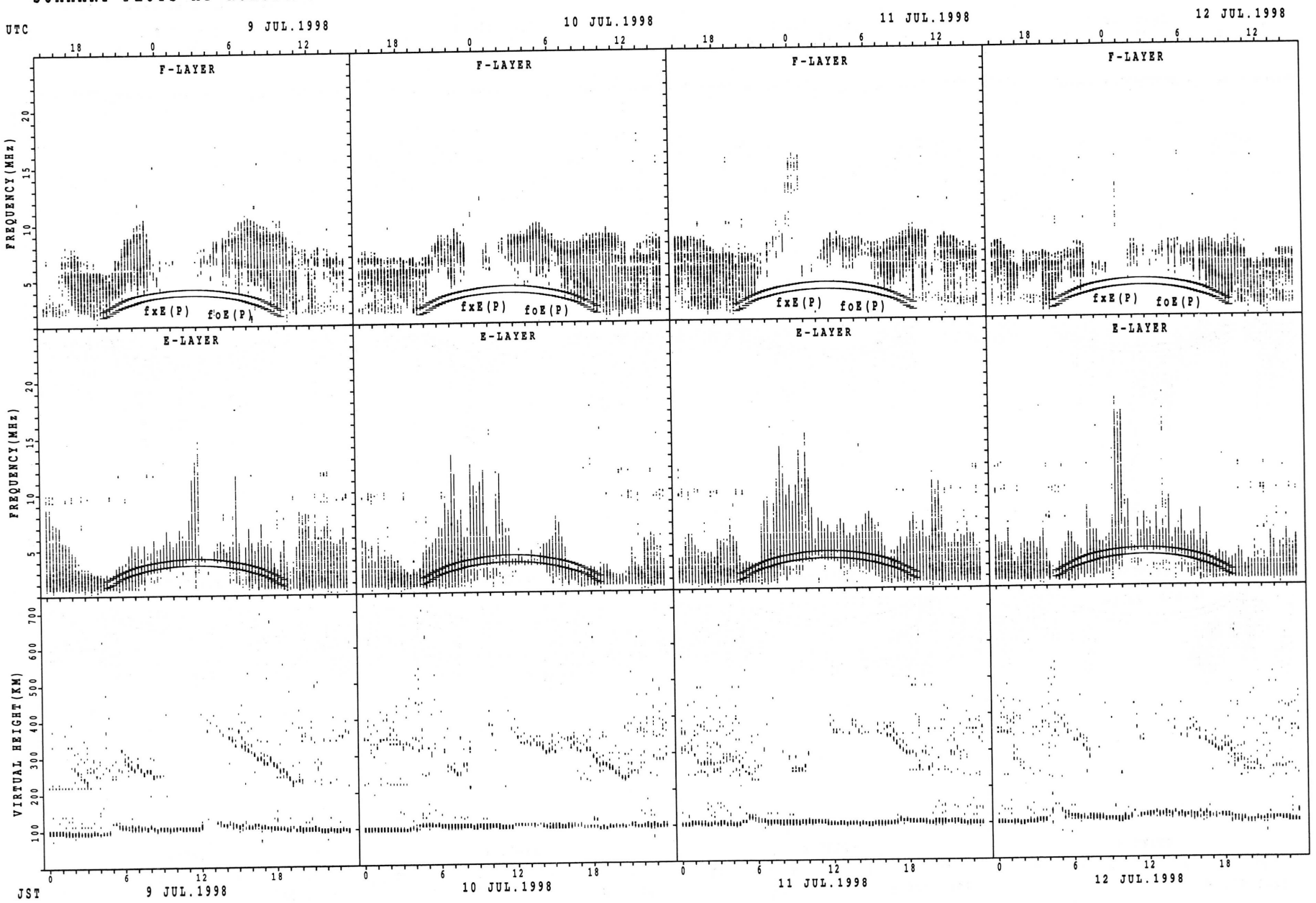

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
1 JUL.1998
2 JUL.1998
3 JUL.1998
4 JUL.1998
F-LAYER
E-LAYER
fxE(P)
foE(P)
FREQUENCY(MHz)
VIRTUAL HEIGHT(KM)
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT KOKUBUNJI TOKYO



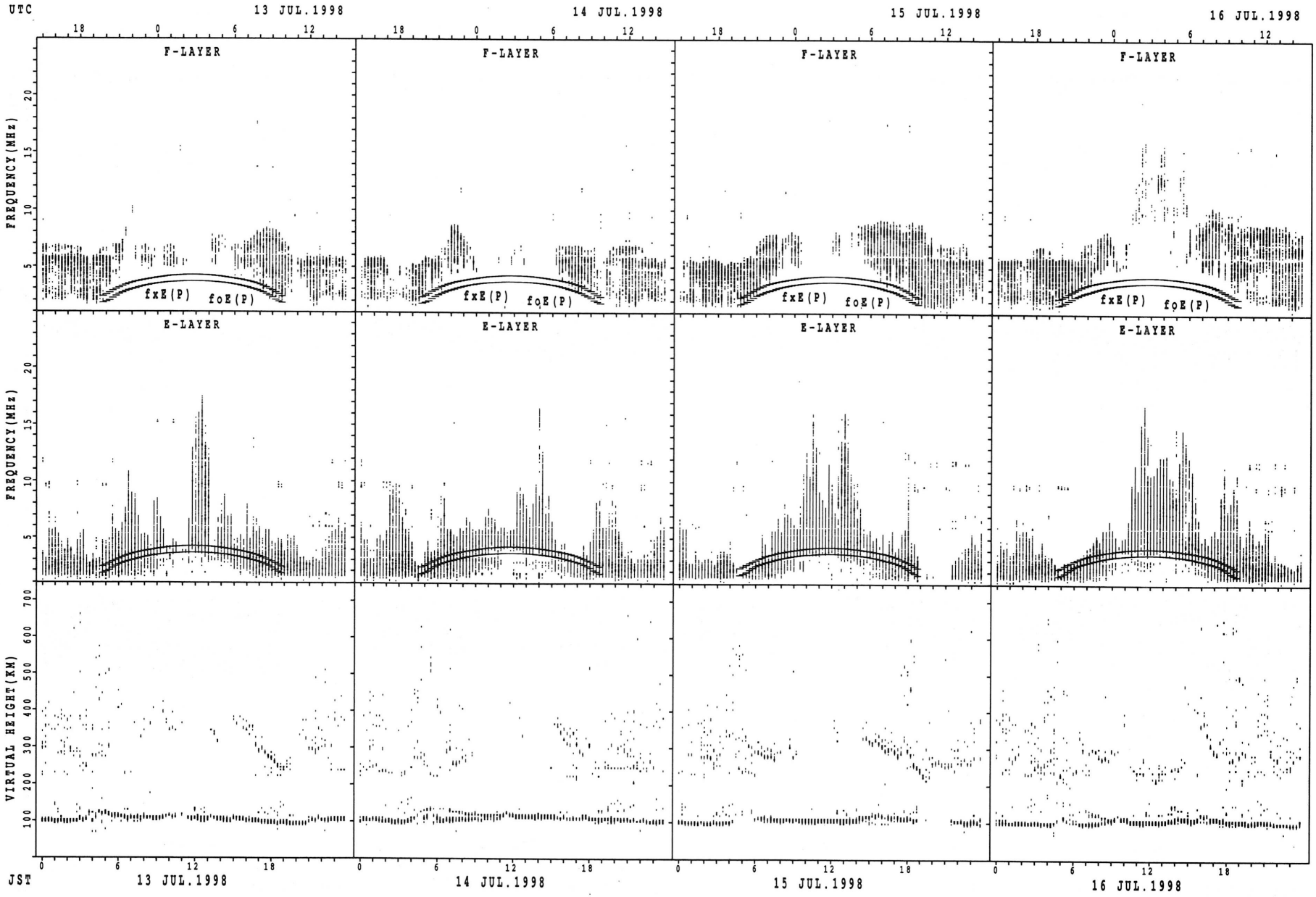
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT KOKUBUNJI TOKYO

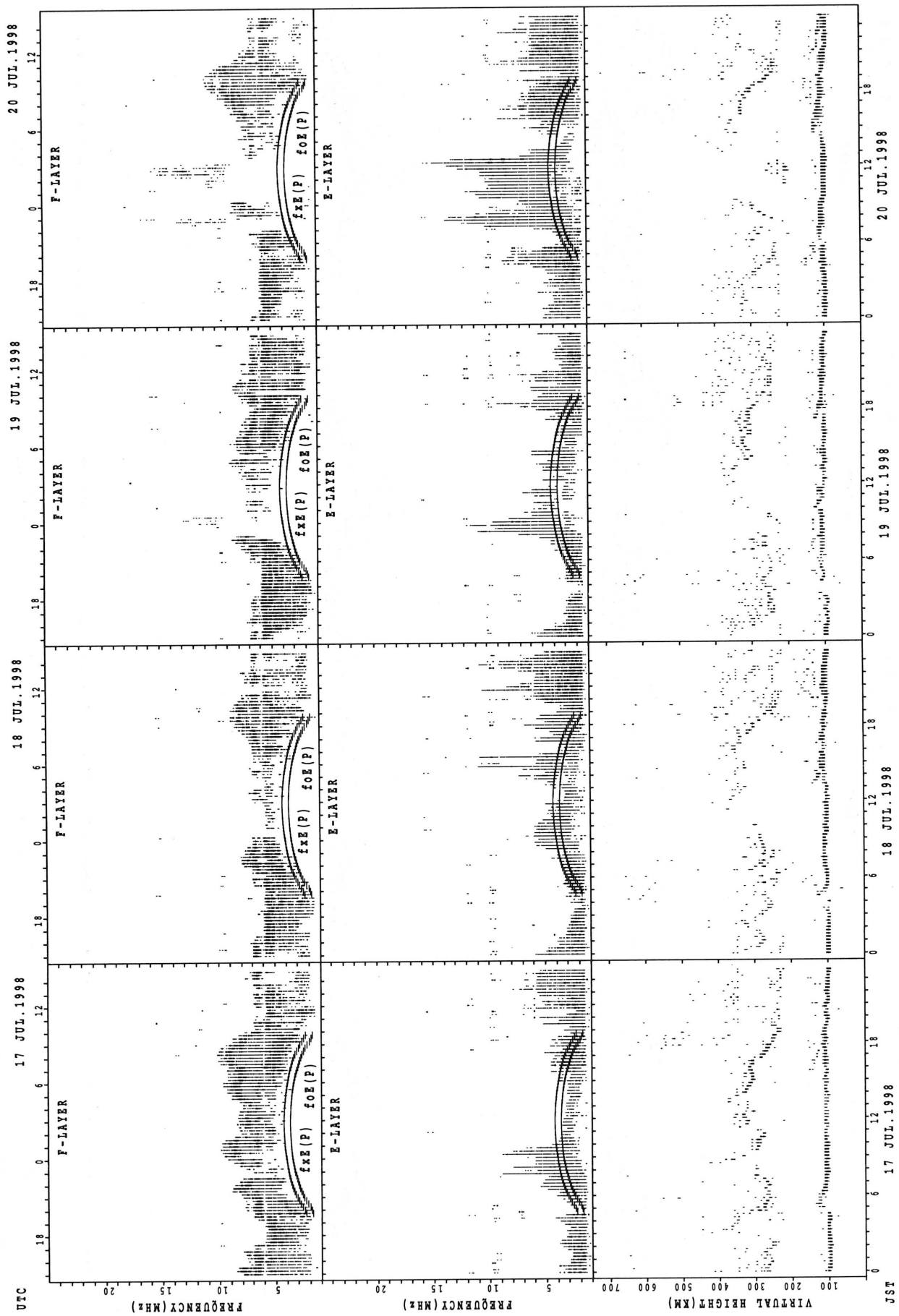


fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

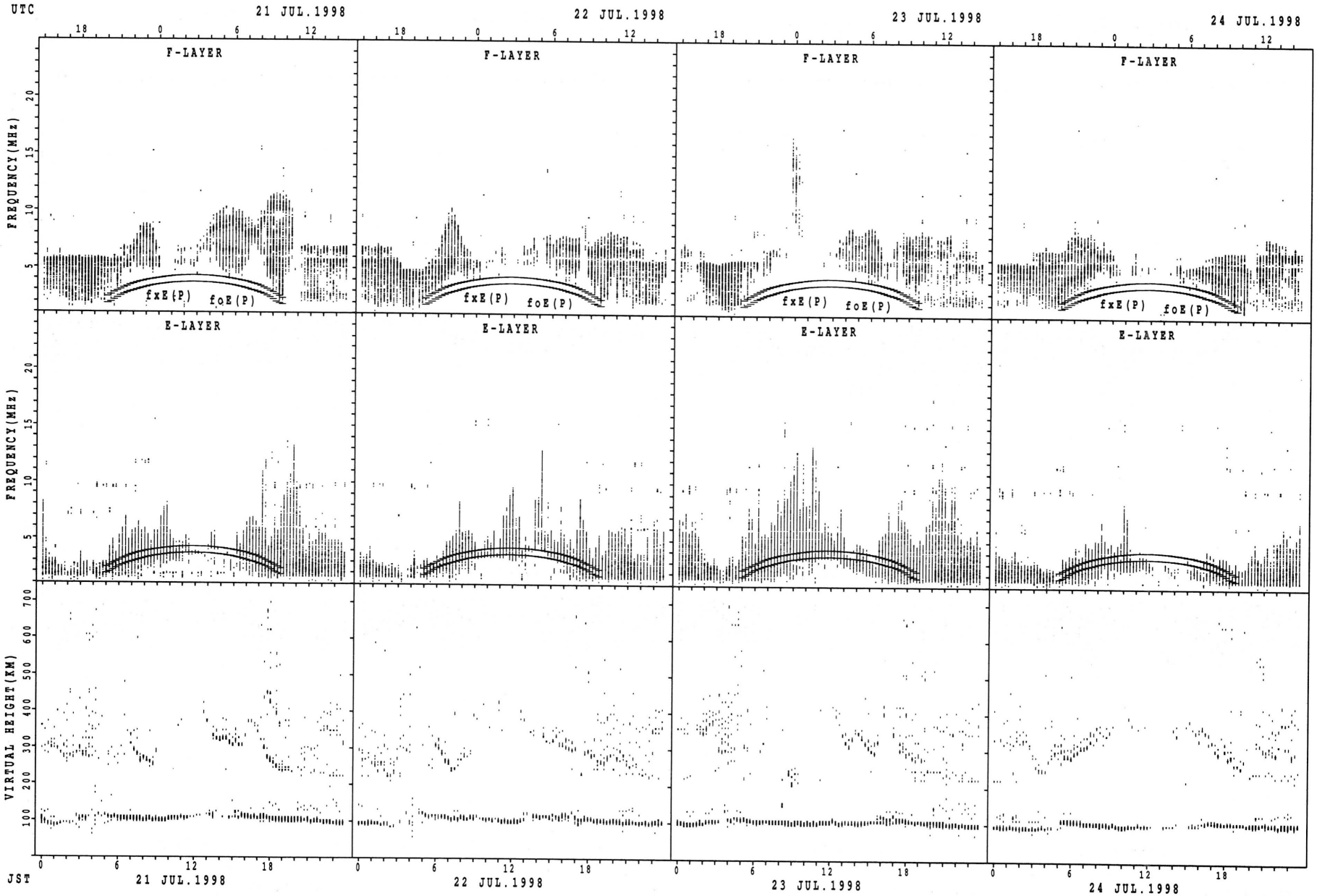
SUMMARY PLOTS AT KOKUBUNJI TOKYO



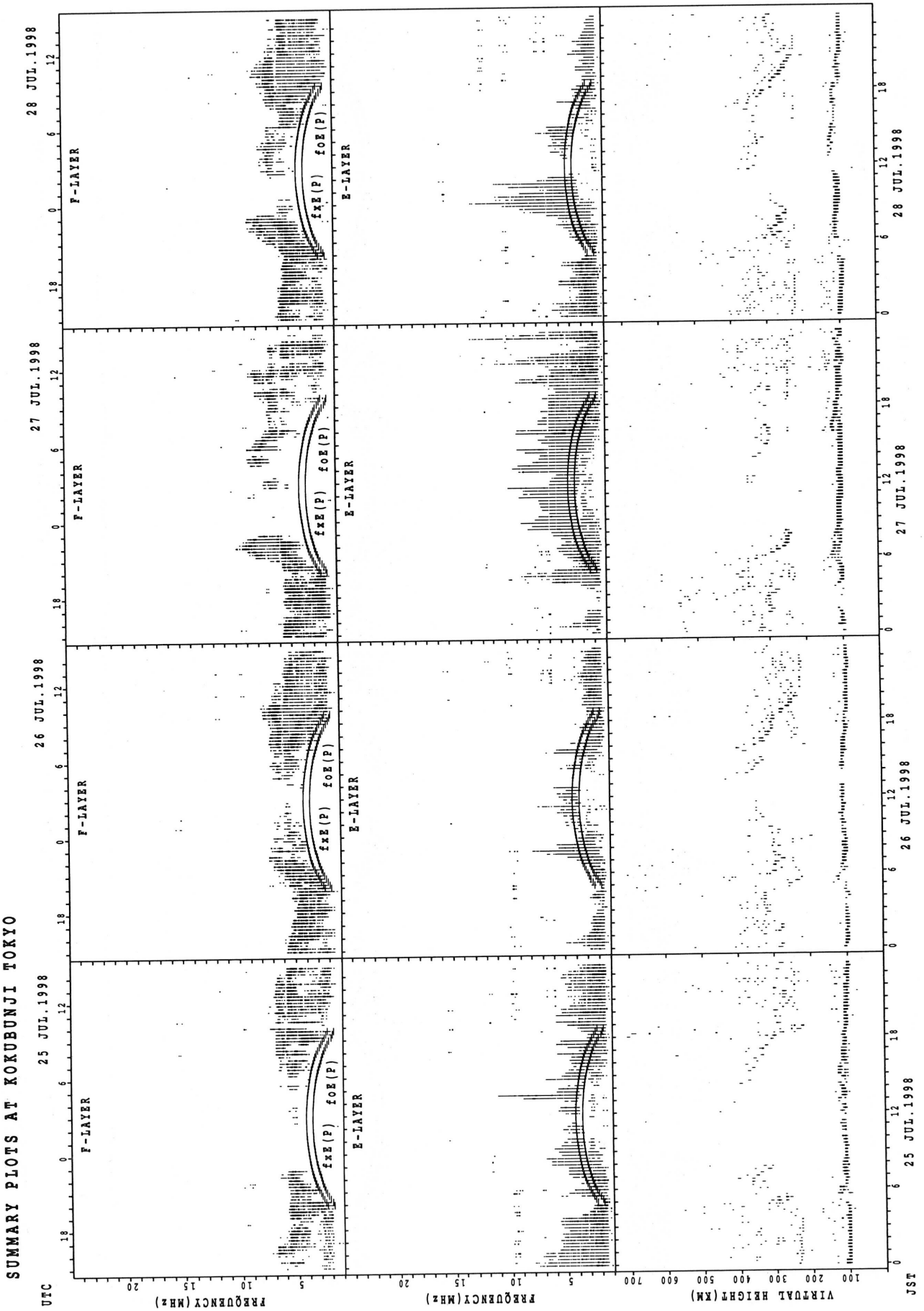
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
17 JUL.1998
18 JUL.1998
19 JUL.1998
20 JUL.1998
F-LAYER
E-LAYER
FREQUENCY (MHz)
VIRTUAL HEIGHT (KM)
fxE(P)
foE(P)
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

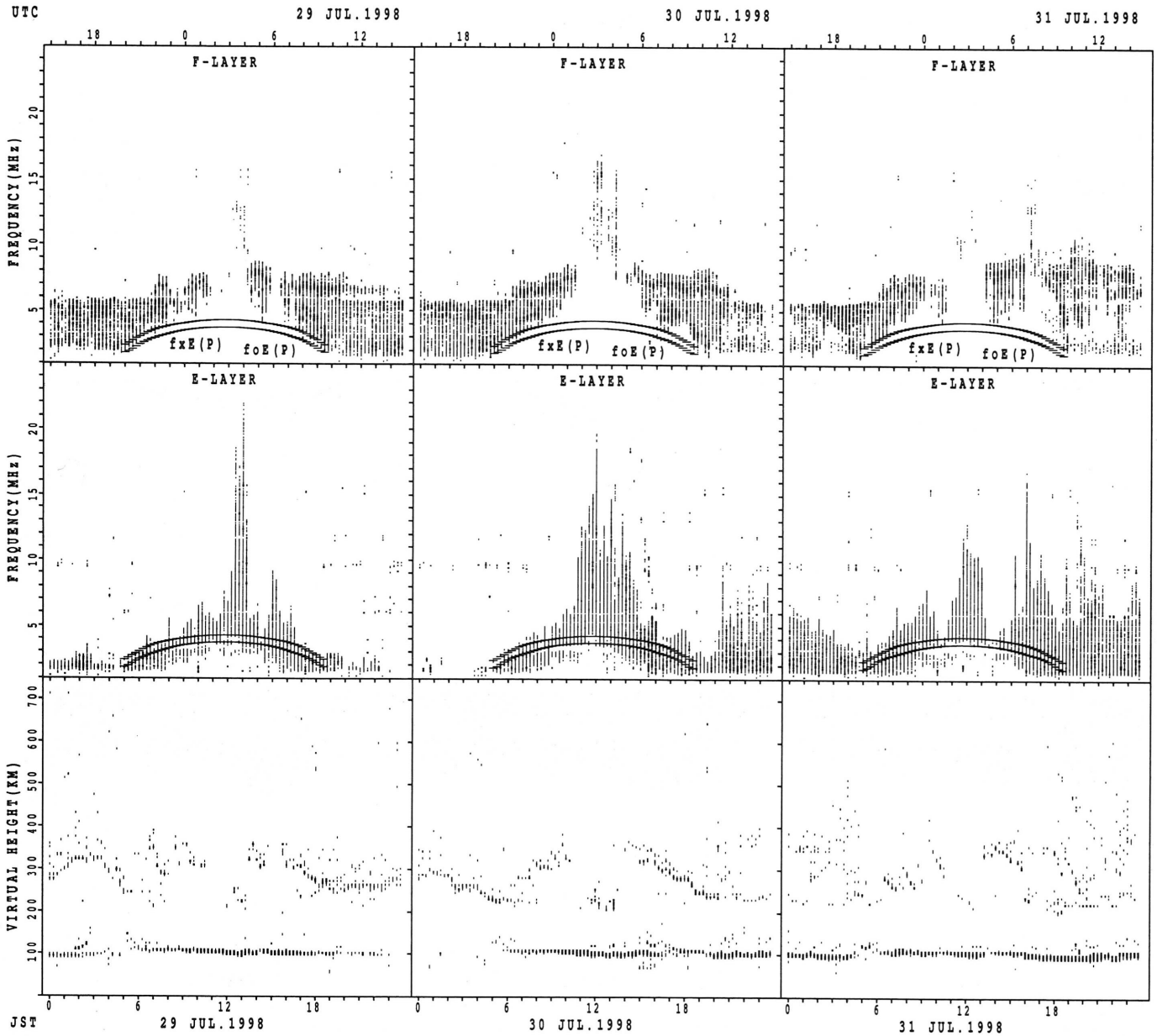
SUMMARY PLOTS AT KOKUBUNJI TOKYO



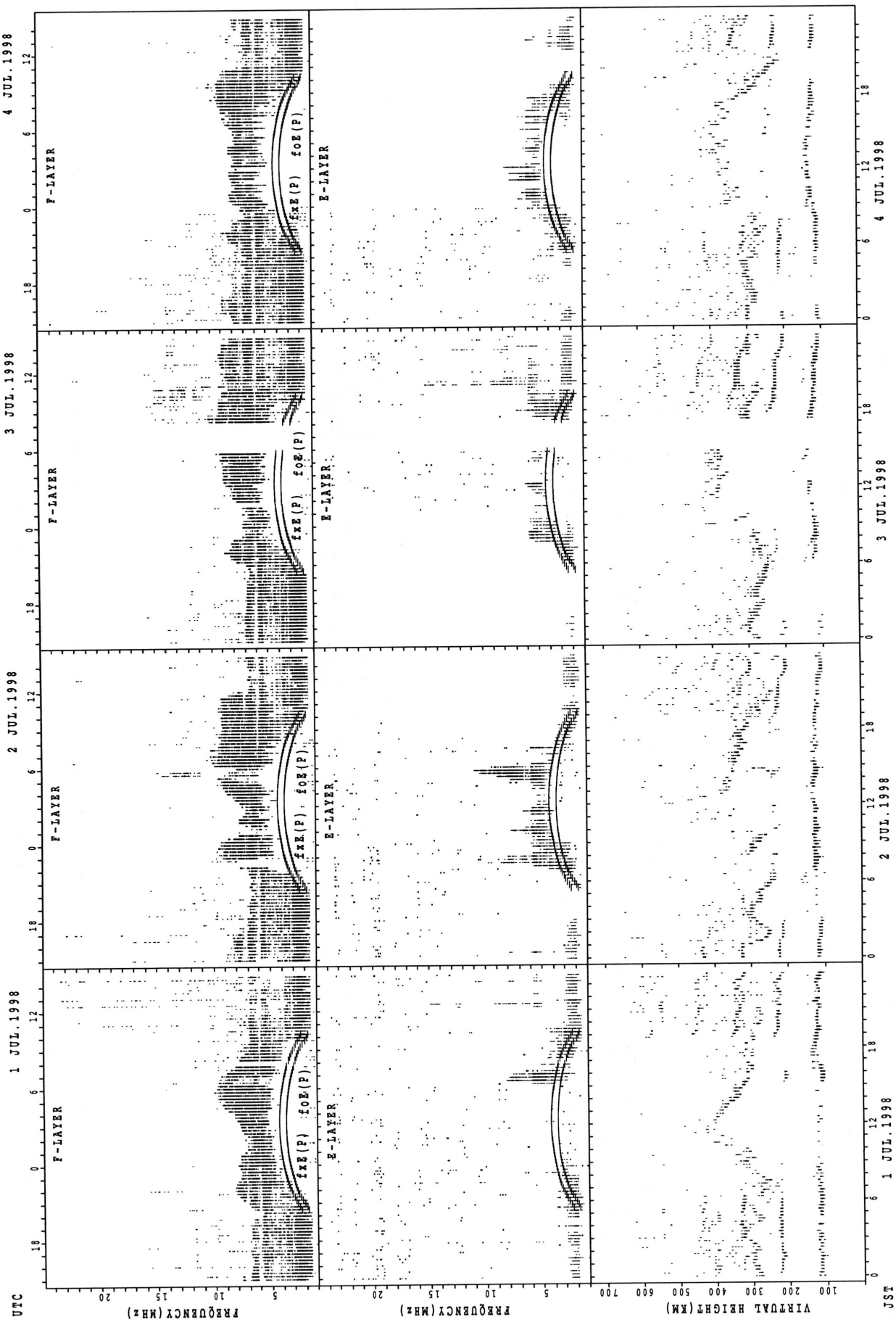
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
25 JUL.1998
26 JUL.1998
27 JUL.1998
28 JUL.1998
F-LAYER
E-LAYER
FREQUENCY(MHz)
VIRTUAL HEIGHT(KM)
fxE(P)
foE(P)
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

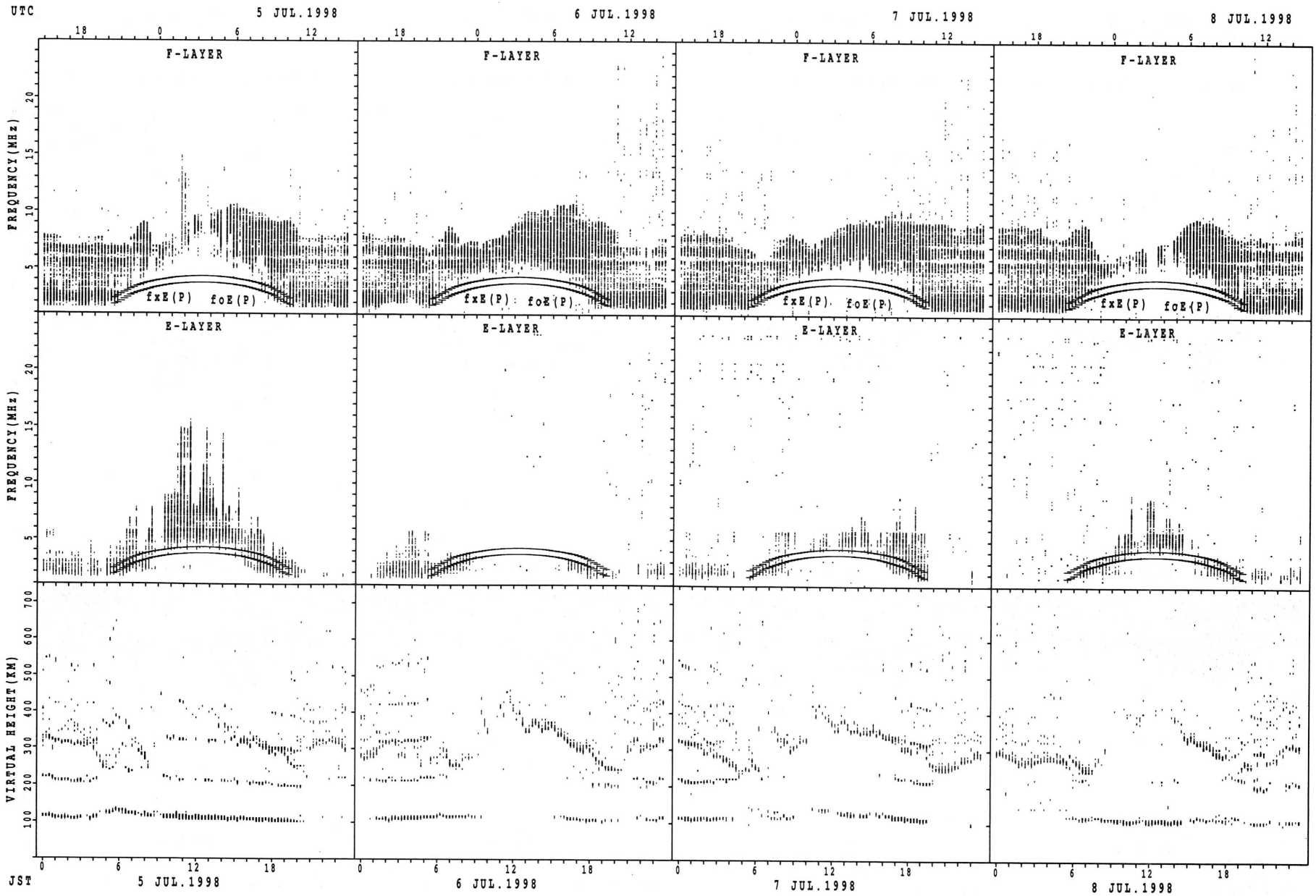
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

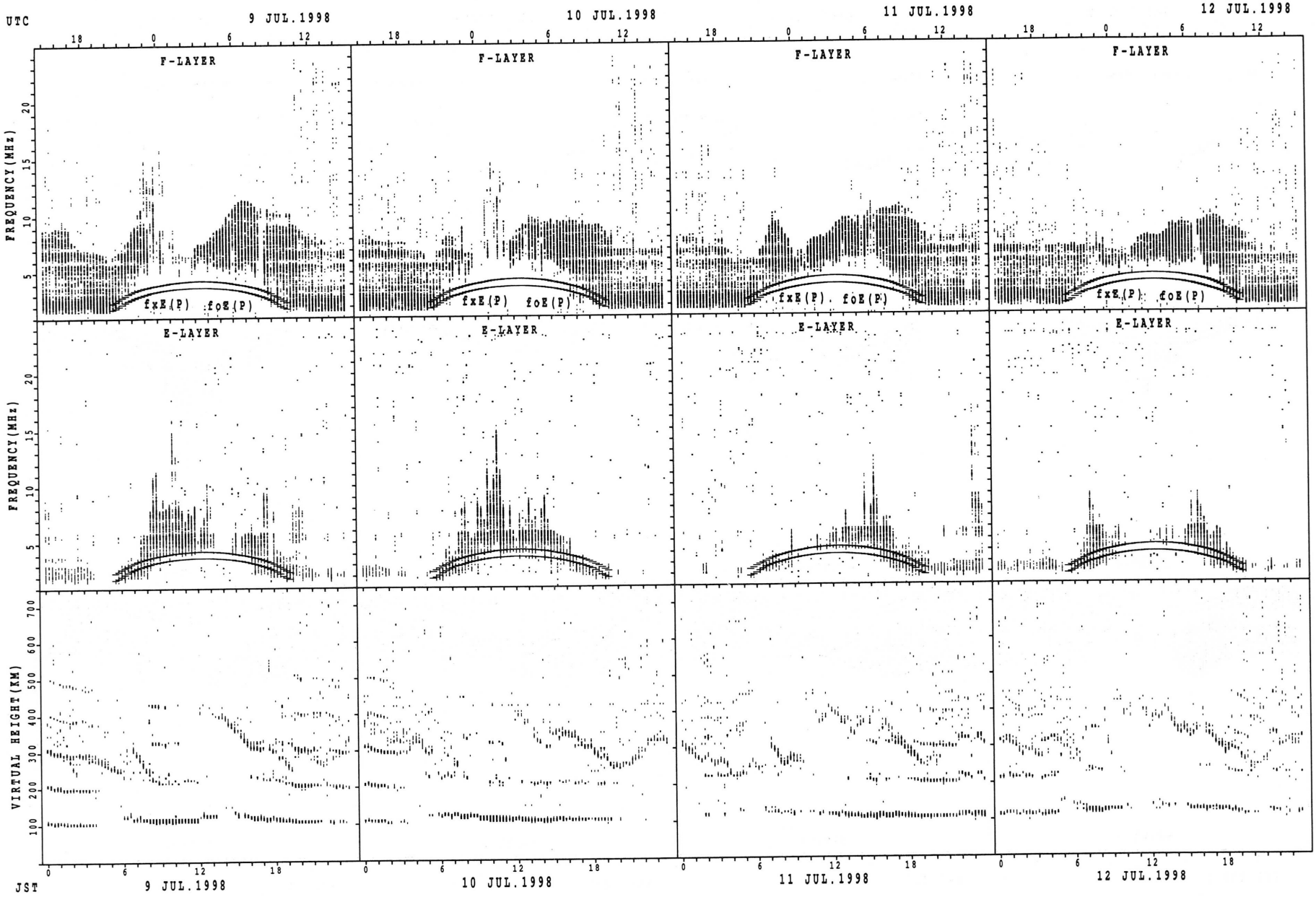

SUMMARY PLOTS AT YAMAGAWA
UTC
JST
1 JUL.1998
2 JUL.1998
3 JUL.1998
4 JUL.1998
F-LAYER
E-LAYER
fxE(P)
foE(P)
FREQUENCY(MHz)
VIRTUAL HEIGHT(KM)
fxE(P) ; PREDICTED VALUE FOR fxE
foE(P) ; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT YAMAGAWA



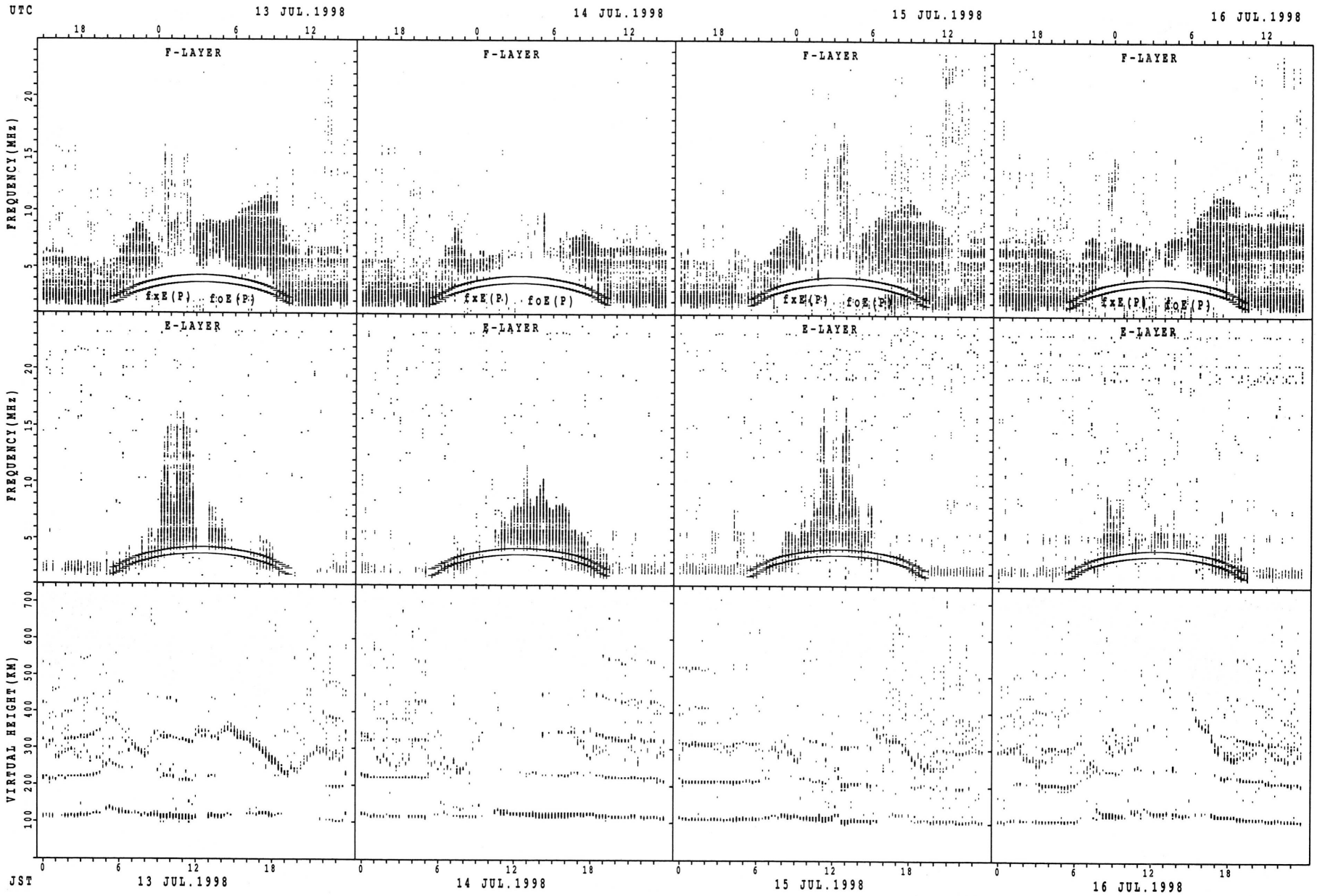
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT YAMAGAWA

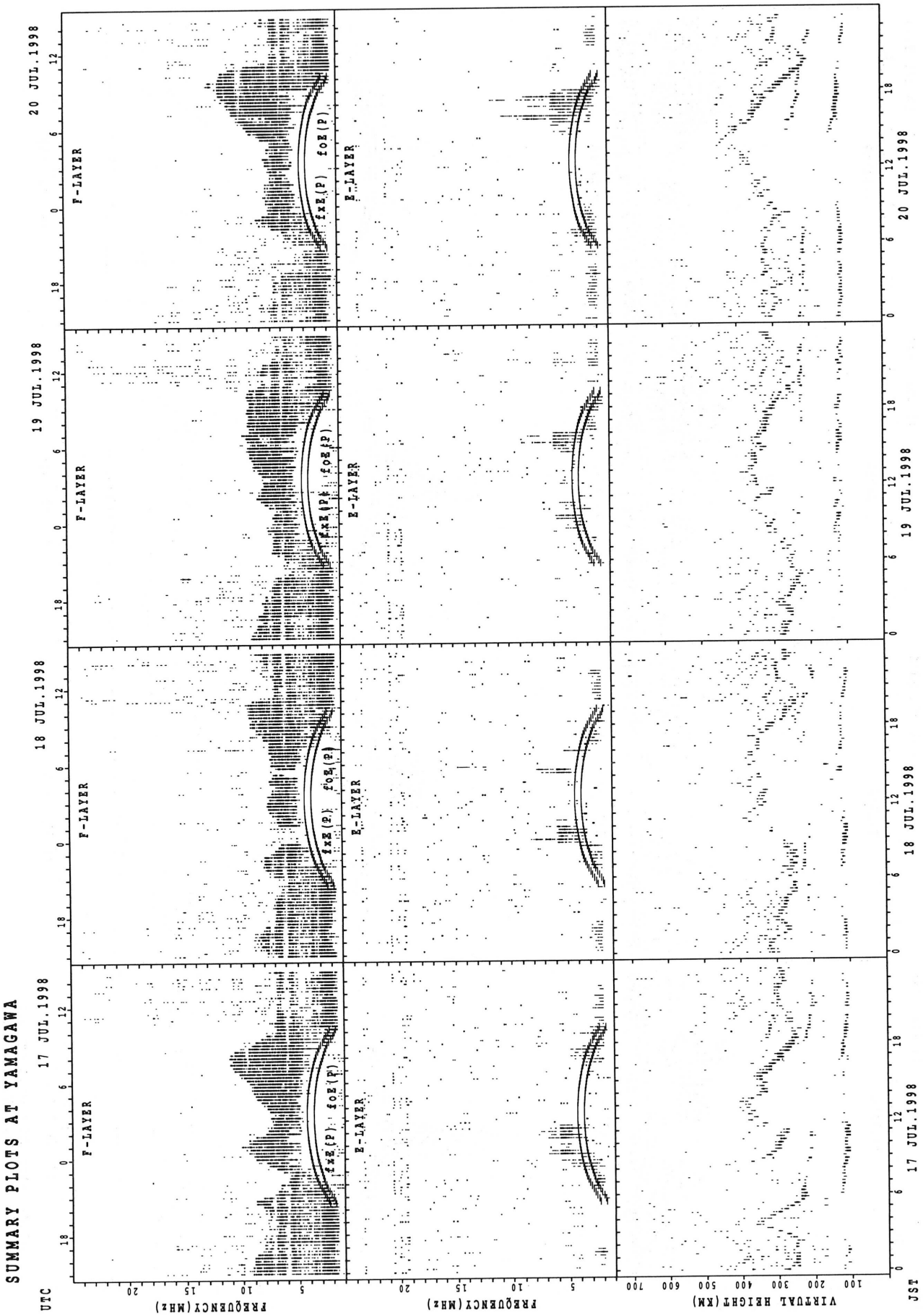


fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

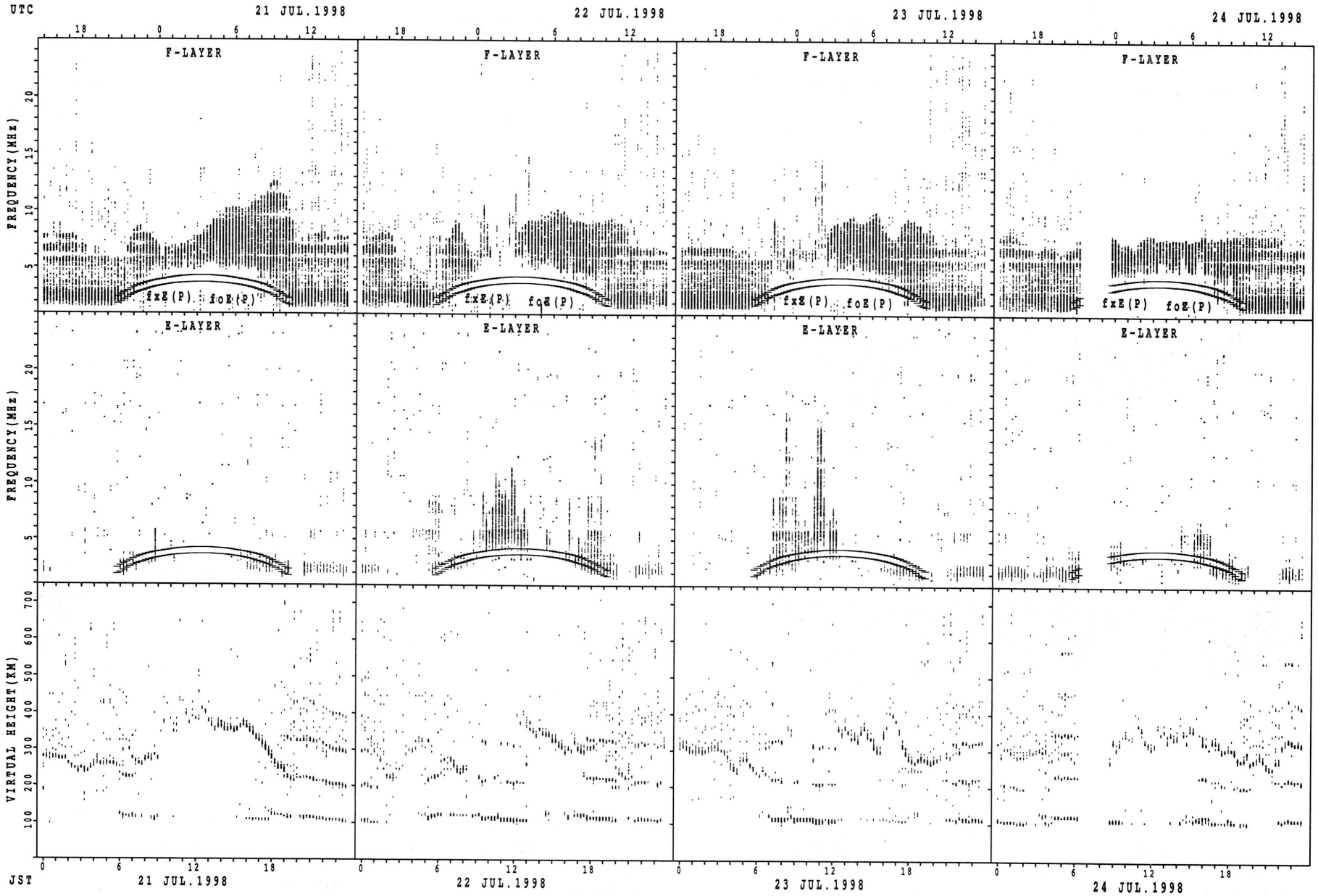
SUMMARY PLOTS AT YAMAGAWA



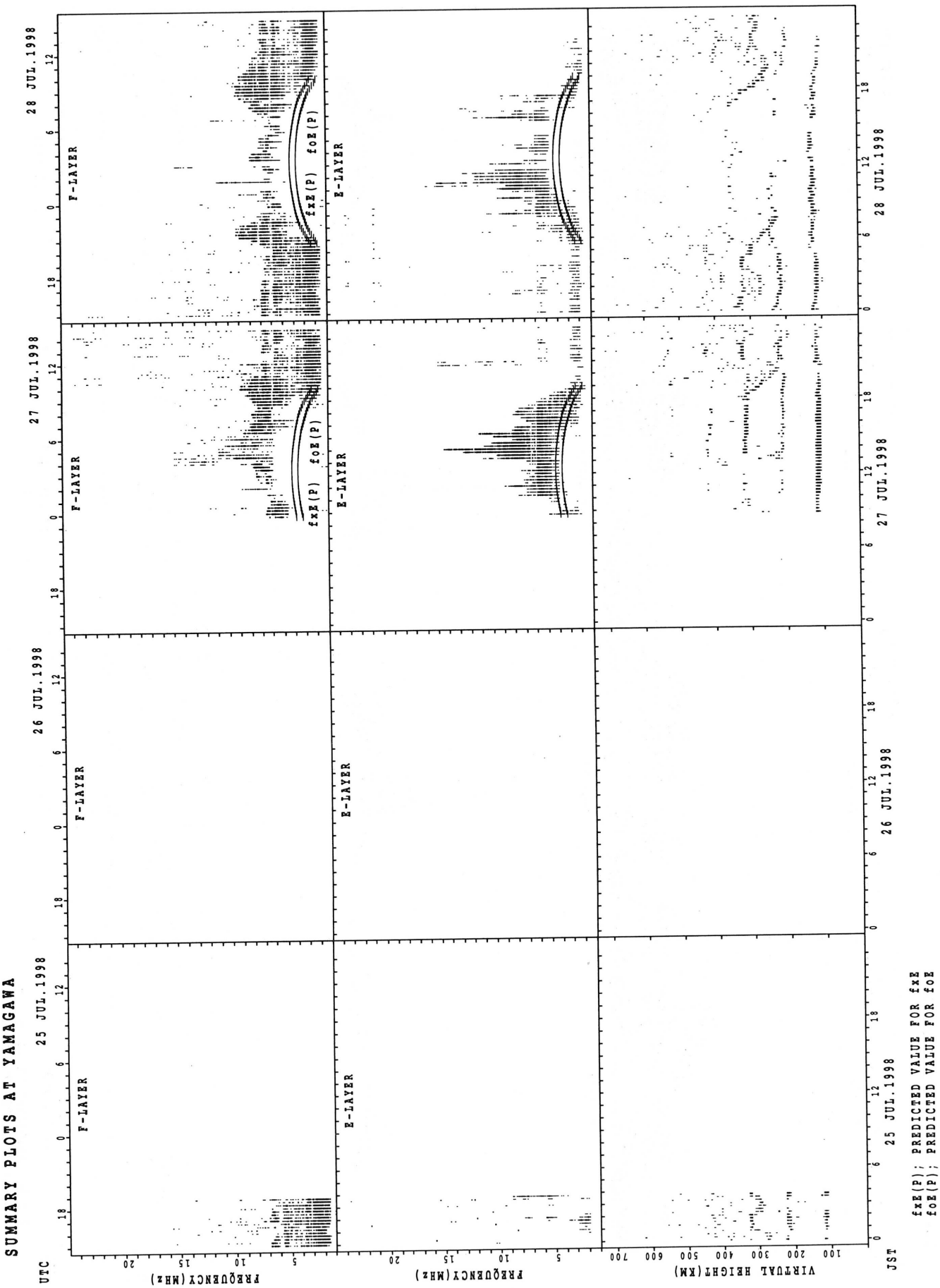
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT YAMAGAWA
UTC
JST
17 JUL.1998
18 JUL.1998
19 JUL.1998
20 JUL.1998
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

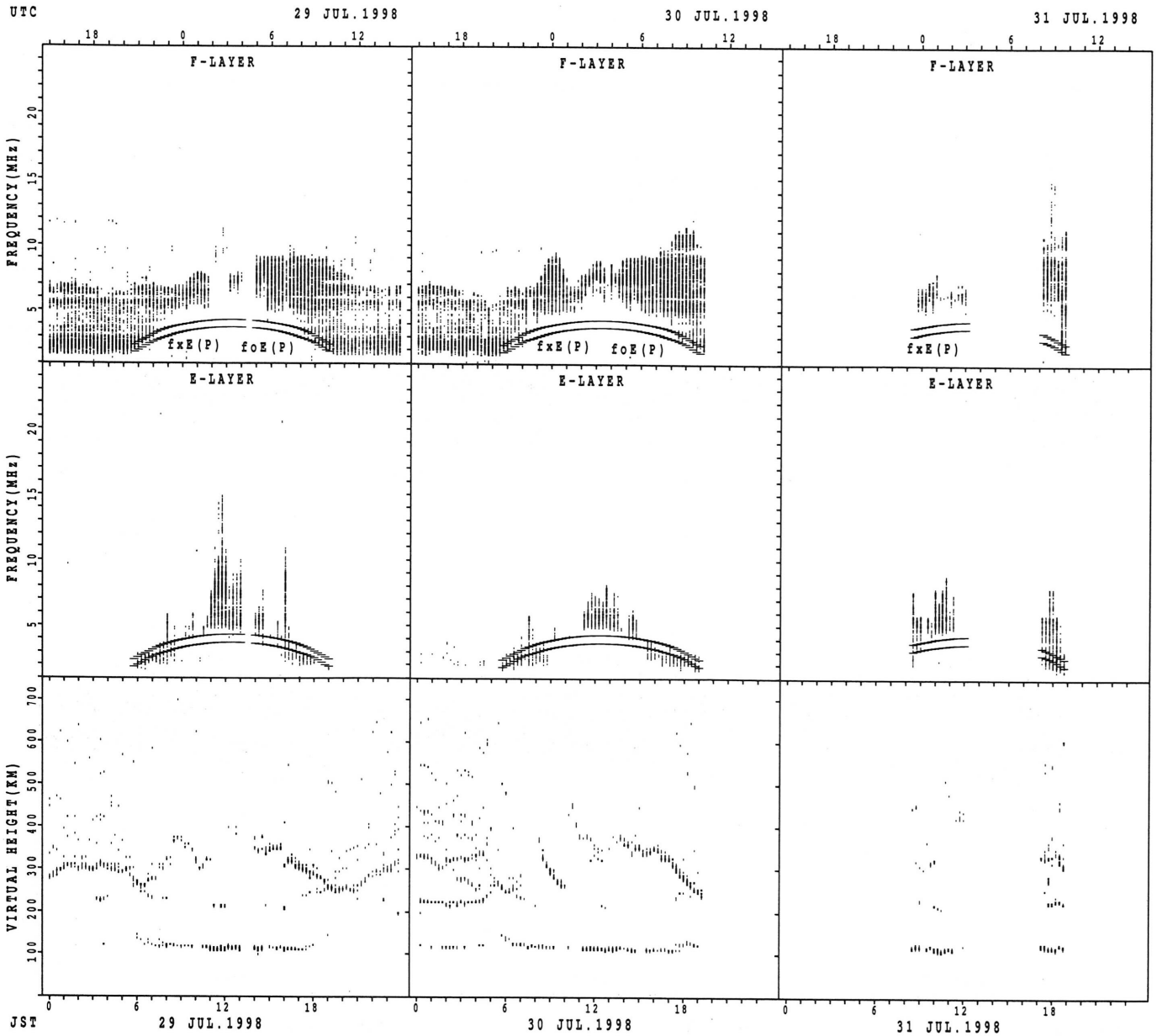
SUMMARY PLOTS AT YAMAGAWA



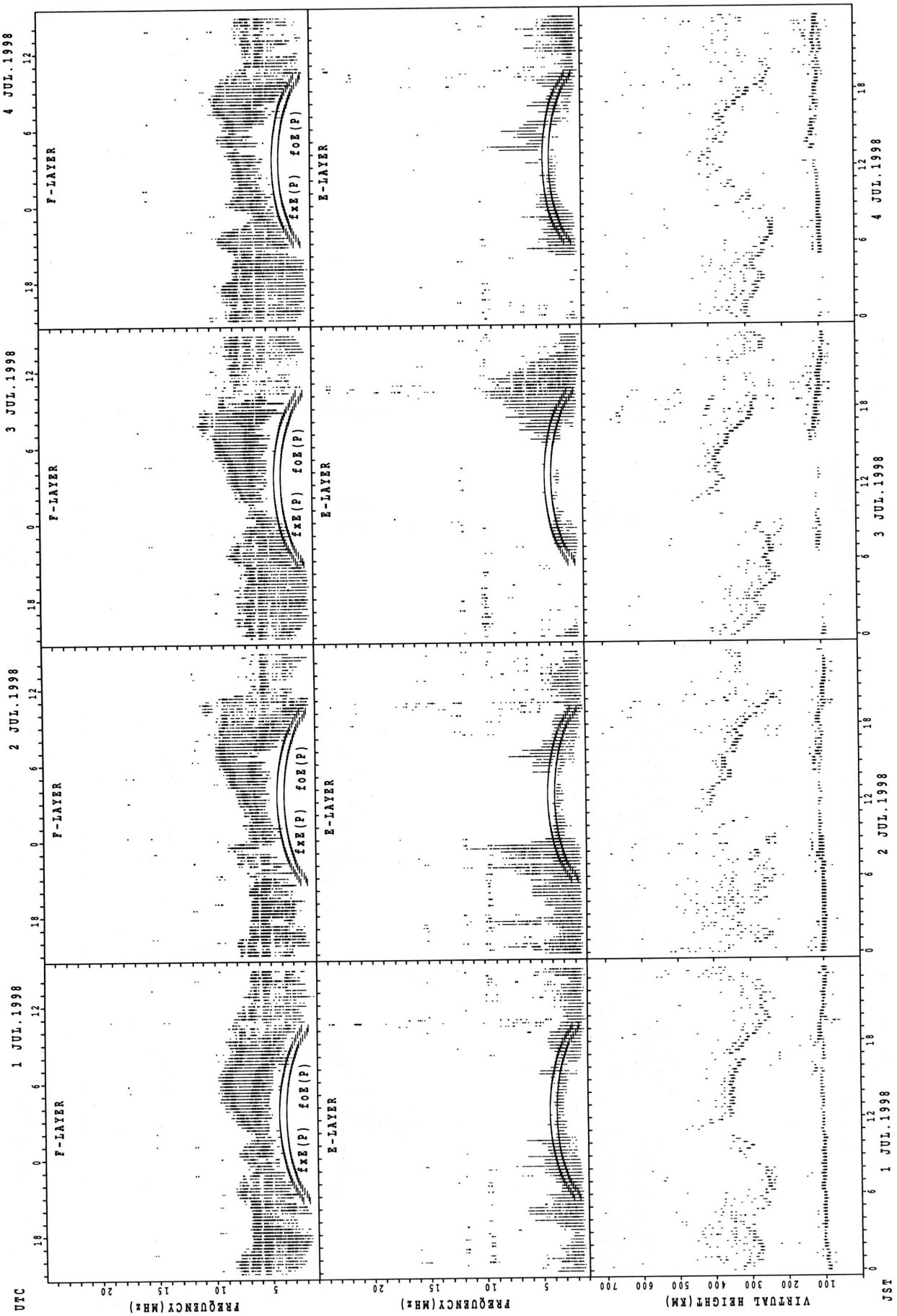
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT YAMAGAWA
UTC
JST
25 JUL.1998
26 JUL.1998
27 JUL.1998
28 JUL.1998
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

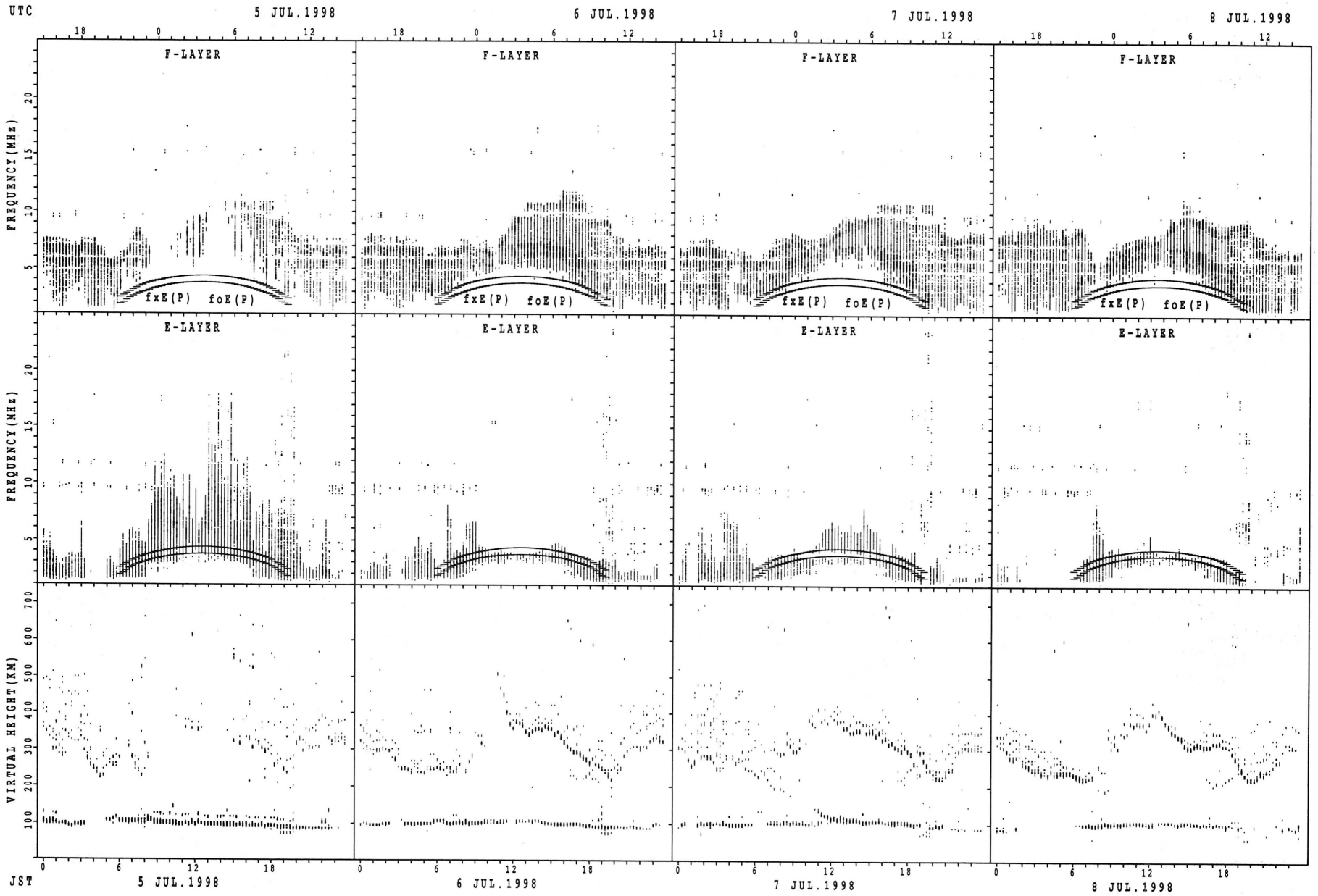
SUMMARY PLOTS AT YAMAGAWA



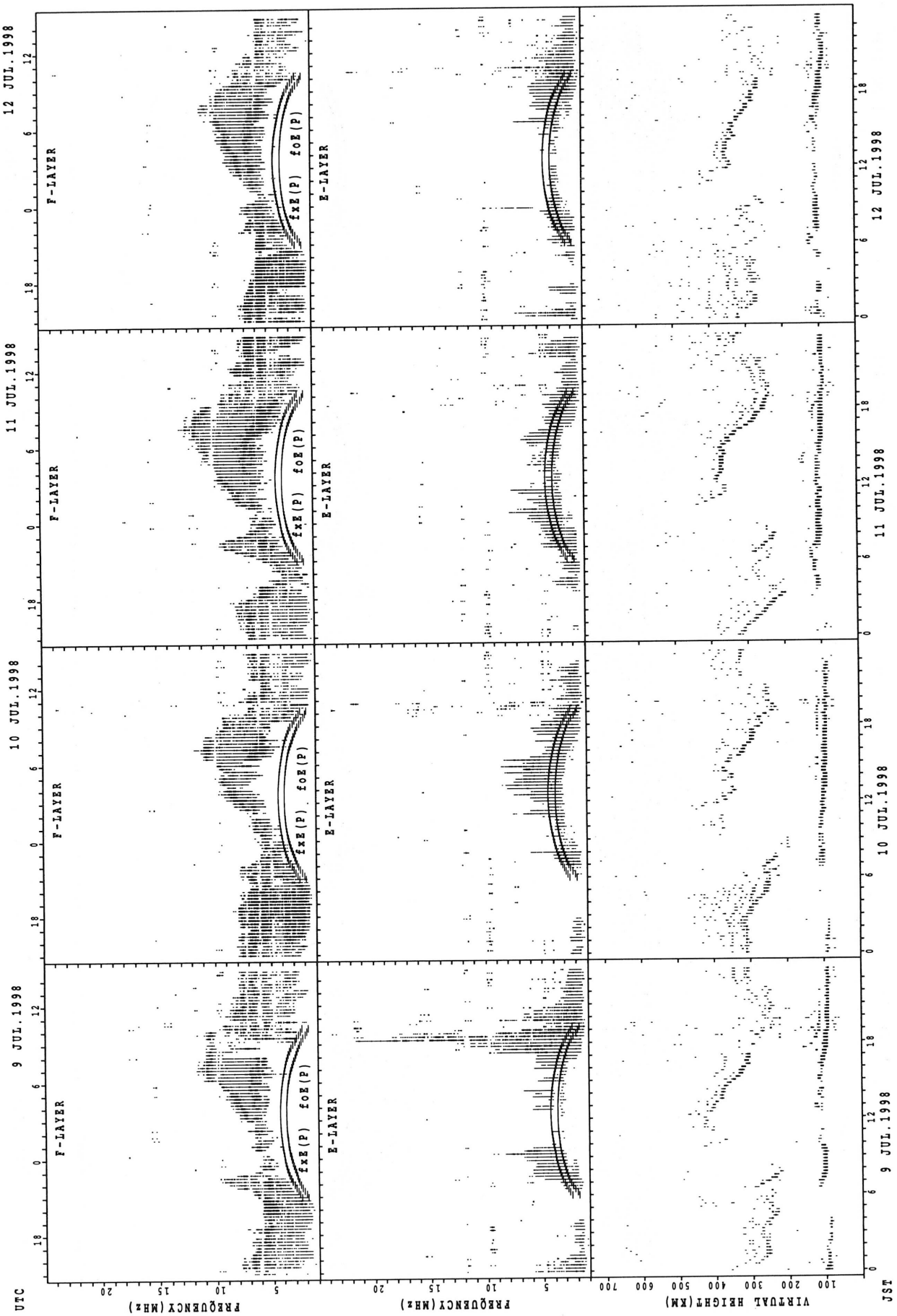
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT OKINAWA
UTC
JST
1 JUL.1998
2 JUL.1998
3 JUL.1998
4 JUL.1998
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

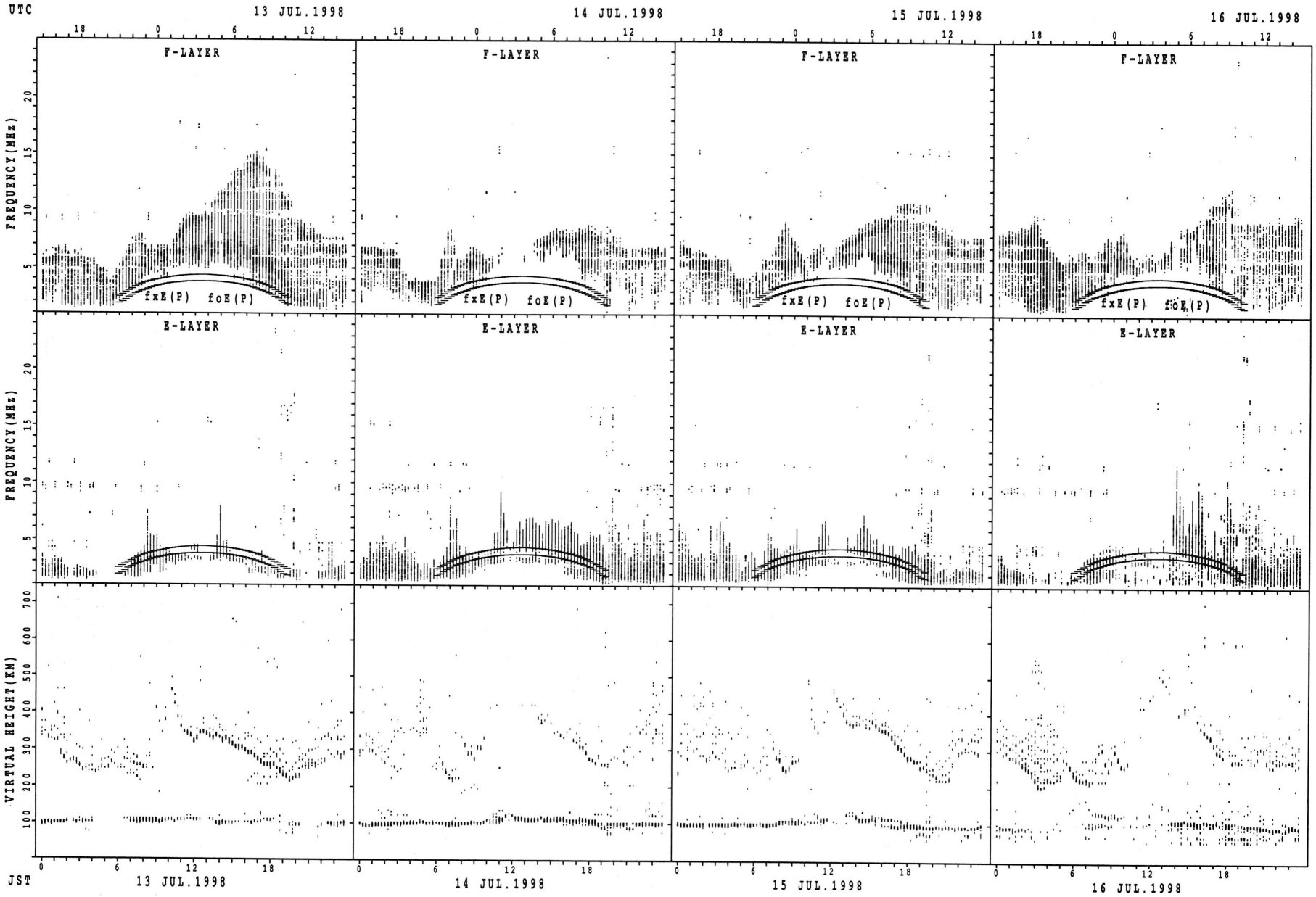
SUMMARY PLOTS AT OKINAWA



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

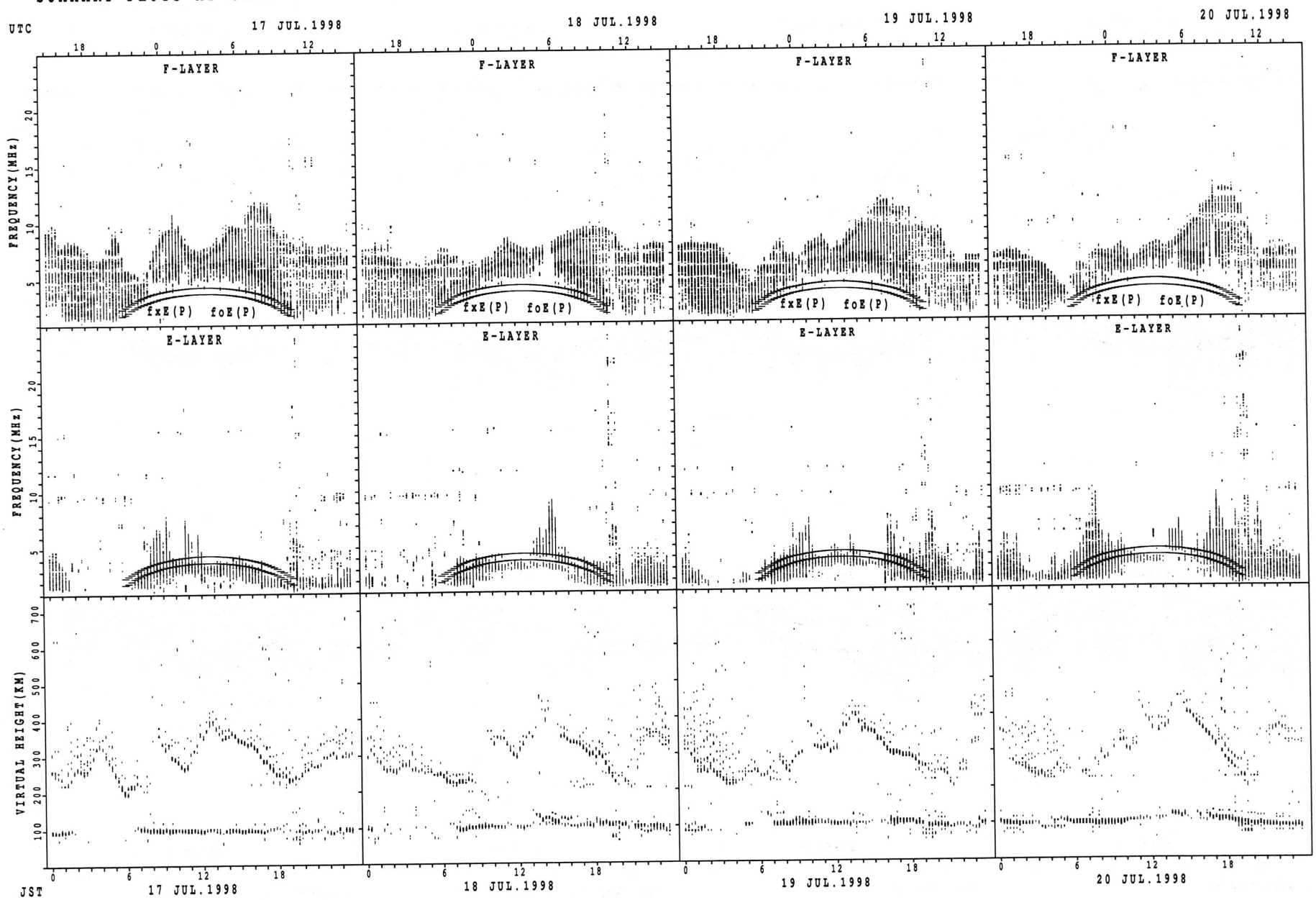

SUMMARY PLOTS AT OKINAWA
UTC
JST
9 JUL.1998
10 JUL.1998
11 JUL.1998
12 JUL.1998
F-LAYER
E-LAYER
fxE(P)
foE(P)
FREQUENCY(MHz)
VIRTUAL HEIGHT(KM)
fxE(P) ; PREDICTED VALUE FOR fxE
foE(P) ; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT OKINAWA



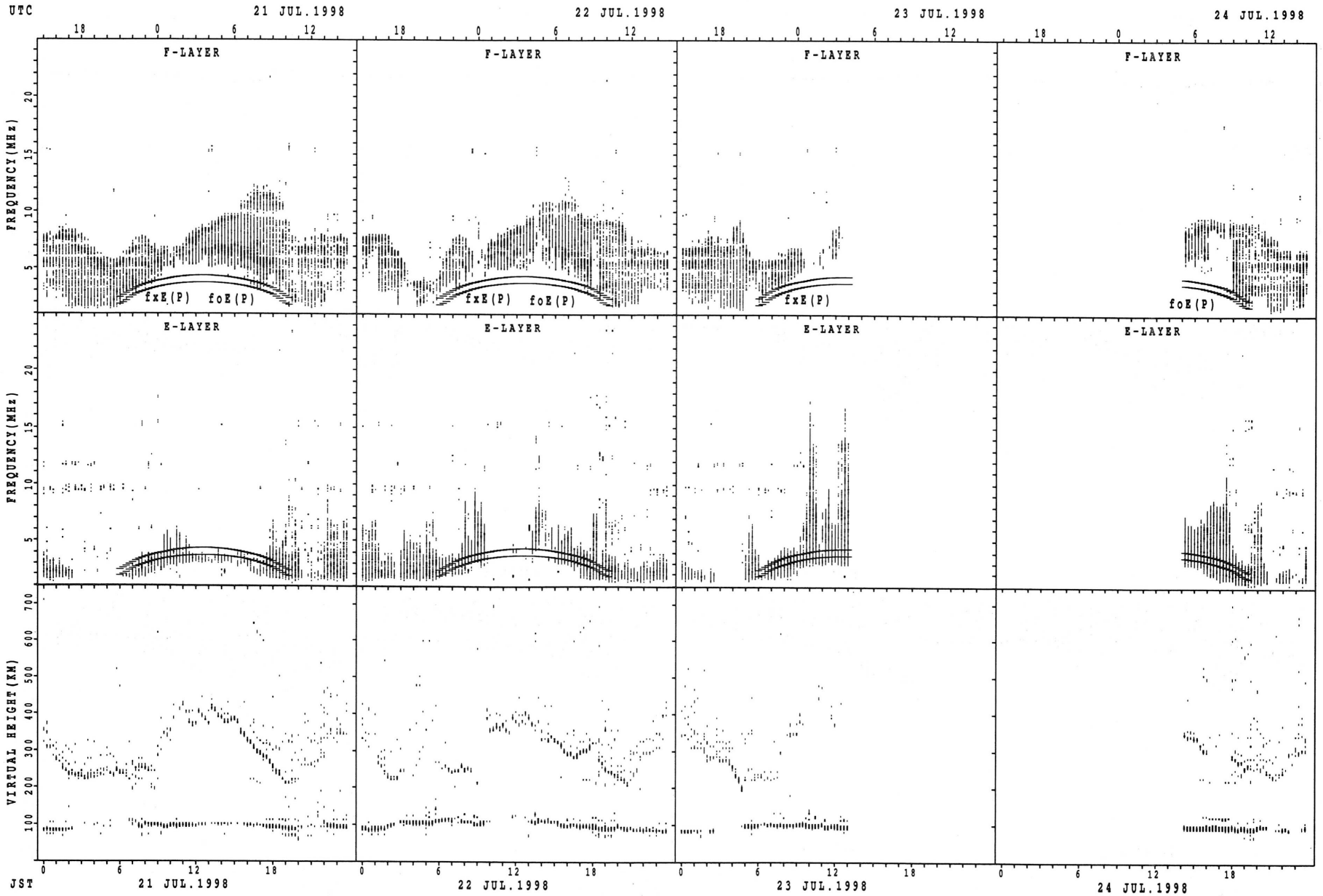
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT OKINAWA

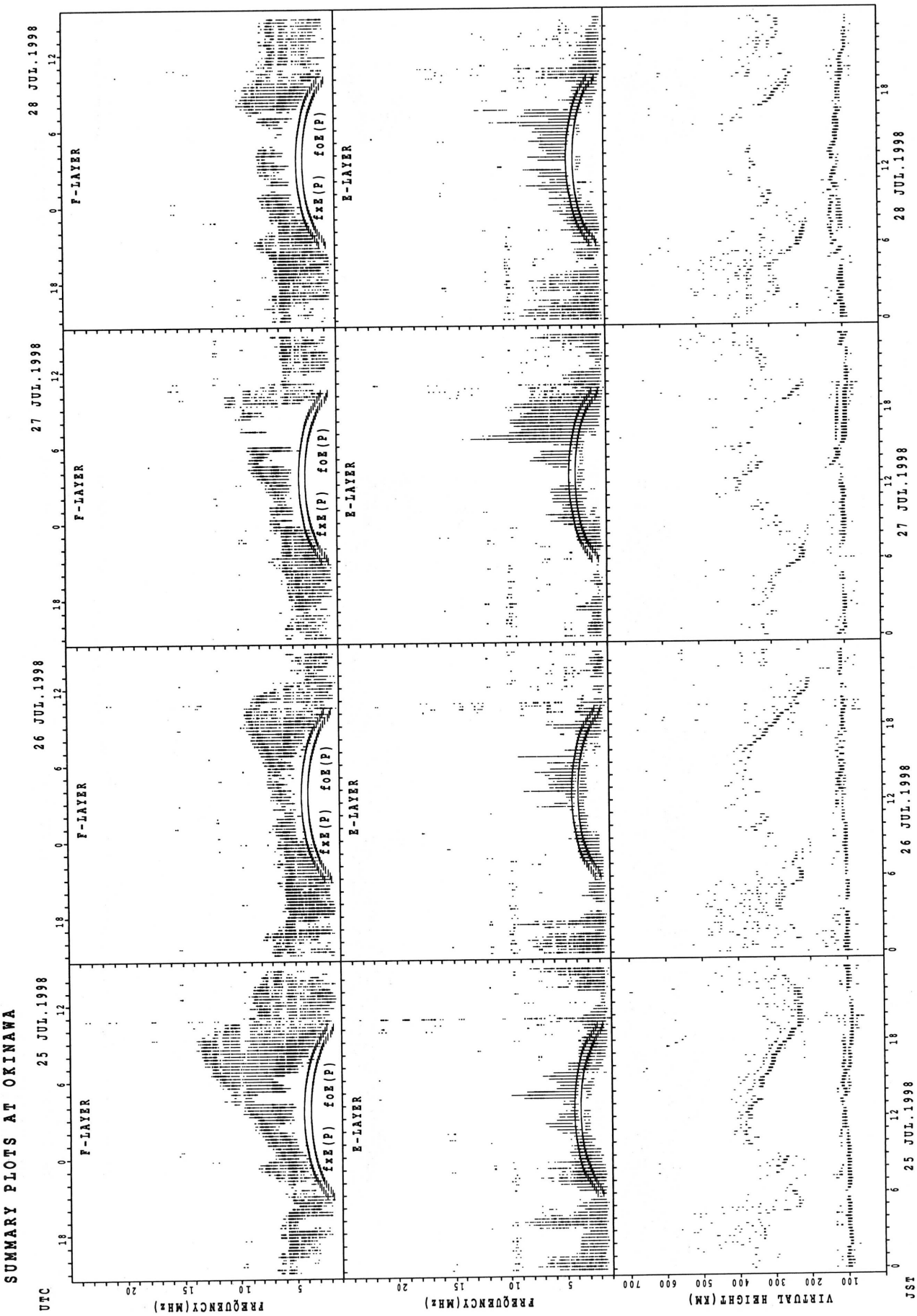


fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

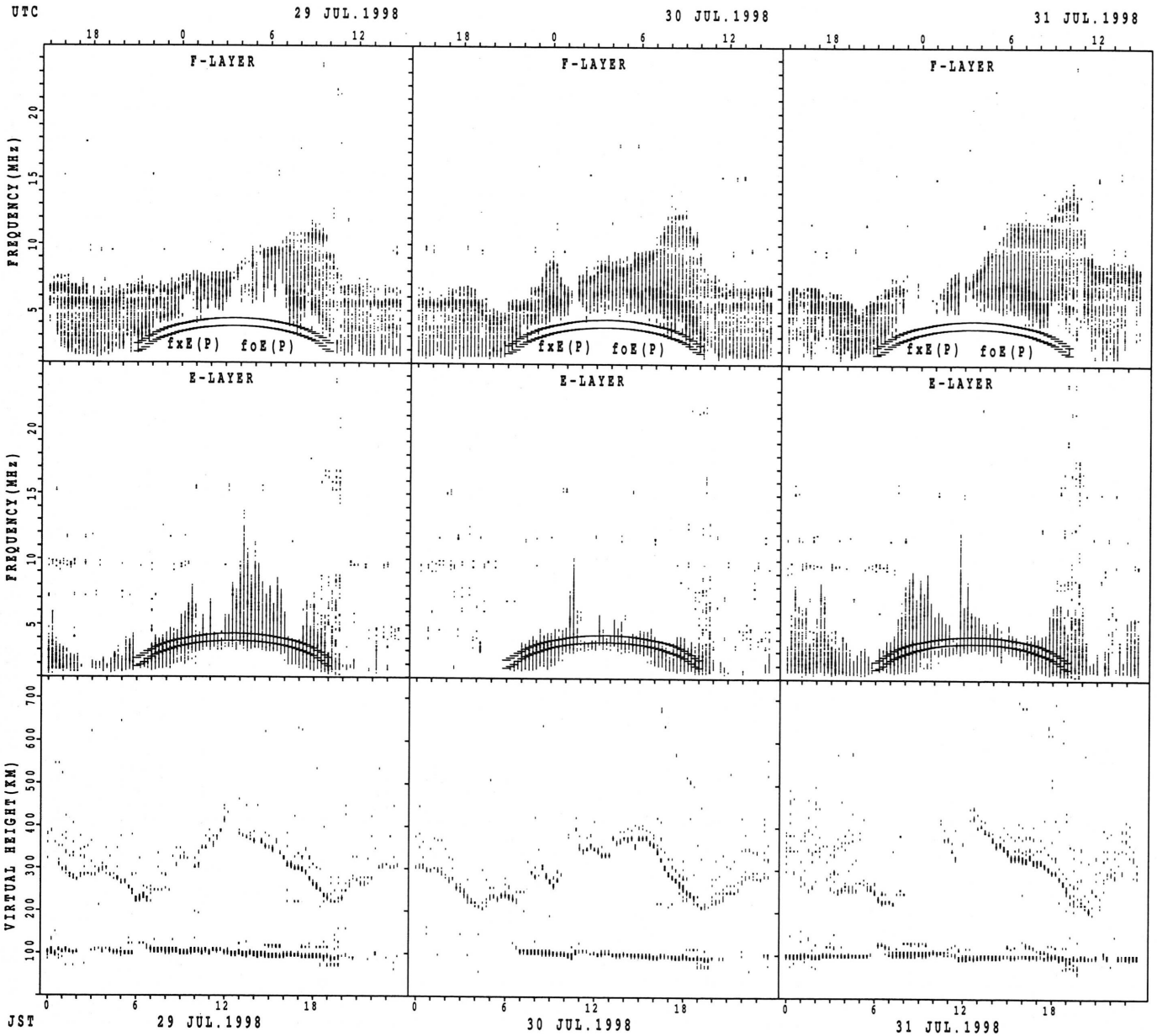
SUMMARY PLOTS AT OKINAWA



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


SUMMARY PLOTS AT OKINAWA
UTC
JST
25 JUL.1998
26 JUL.1998
27 JUL.1998
28 JUL.1998
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. 1998 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

STATION WAKKANAI LAT. 45.4N LON. 141.7E

h'F

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	11						12	13											11	13	11	17	13	
MED	332						307	318											306	296	302	348	346	
U Q	390						325	326											336	318	312	368	360	
L Q	330						290	294											228	248	296	316	305	

h'Es

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	30	29	29	29	29	30	28	25	23	23	19	16	16	18	23	27	30	29	30	28	26	26
MED	101	99	100	99	101	115	113	112	110	107	107	105	105	106	111	107	115	113	111	111	111	107	105	103
U Q	105	101	103	102	110	119	117	115	114	113	111	111	107	110	117	117	119	115	113	111	115	111	105	107
L Q	99	97	97	96	97	109	112	109	107	105	105	103	103	101	103	97	109	107	109	106	107	105	103	99

STATION KOKUBUNJI LAT. 35.7N LON. 139.5E

h'F

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							13	19									22	24	21	23	14	15	13	
MED							312	274									327	313	304	296	307	338	346	
U Q							328	316									340	333	317	324	320	370	370	
L Q							300	264									318	295	288	264	282	312	317	

h'Es

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	25	25	23	24	26	25	30	31	29	26	23	23	22	22	24	28	30	28	27	27	30	27
MED	105	101	101	103	103	115	117	111	111	109	107	109	111	107	117	113	119	115	111	107	109	107	107	105
U Q	107	105	103	107	107	124	121	116	113	113	115	111	119	119	123	121	120	117	113	111	111	111	109	109
L Q	101	99	97	98	99	109	111	109	107	107	105	105	103	103	107	105	106	111	109	104	105	105	103	105

STATION YAMAGAWA LAT. 31.2N LON. 130.6E

h'F

	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	17									23	27	24	15			
MED			338					272	272									306	292	280	288			
U Q			350					308	285									320	304	301	346			
L Q			298					264	236									298	278	266	258			

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	16	16	18	14	10	13	17	14	17	18	18	17	19	16	14	14	18	19	19	19	17	14	17	20
MED	119	116	114	115	116	123	123	125	121	122	120	117	121	121	115	124	124	123	121	119	113	117	117	114
U Q	120	119	117	119	121	146	135	129	127	129	127	129	129	130	133	129	127	129	127	121	121	119	120	119
L Q	115	113	113	113	115	118	116	121	119	119	115	113	113	114	111	117	115	113	119	111	112	111	111	113

MONTHLY MEDIANS OF h'F AND h'Es

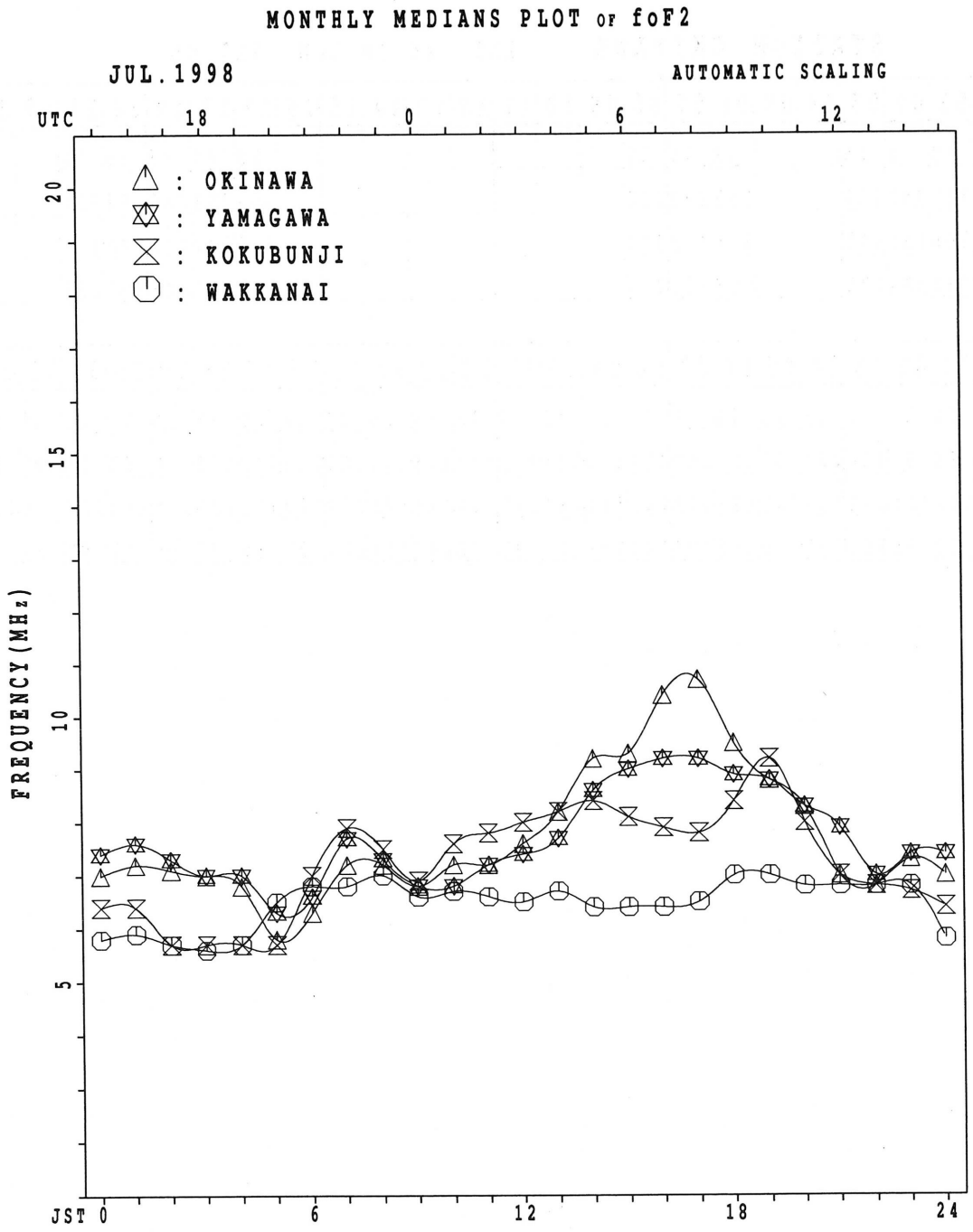
JUL. 1998 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	11	18	20	16			12	15	15									29	26	26	19	12		
MED	348	347	341	336			251	250	282									308	279	268	264	331		
U Q	386	366	401	445			275	262	304									322	302	294	290	401		
L Q	328	324	304	271			226	232	254									292	262	246	252	285		

h'Es

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	23	20	17	10	11	18	13	25	27	25	15	16	13	15	19	22	22	22	27	26	25	19	19	21
MED	99	96	97	106	103	103	105	107	107	105	103	111	103	119	115	108	110	108	105	100	95	95	95	97
U Q	103	102	104	111	105	107	111	113	111	111	121	115	118	129	121	113	113	111	109	105	103	105	95	100
L Q	91	89	95	101	101	99	102	103	103	102	103	103	99	107	111	101	97	99	97	95	92	91	91	92


MONTHLY MEDIANS PLOT OF foF2
JUL. 1998
AUTOMATIC SCALING
UTC
18
0
6
12
△ : OKINAWA
⊠ : YAMAGAWA
⊠ : KOKUBUNJI
⊙ : WAKKANAI
FREQUENCY(MHz)
20
15
10
5
JST 0
6
12
18
24

IONOSPHERIC DATA STATION Kokubunji

JUL. 1998 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	62	X 70	62	64	61	67															X 74	77	75	75
2	73	70	66	62	64	72															X 92	X 76	X 74	74
3	X 74	72	71	X 68	64																88	X 87	87	X 83
4	83	86	81	82	80	85	91														88	A	X 70	75
5	74	72	63	63	67	75															X 81	X 74	X 80	X 84
6	X 84	X 80	X 78	X 79	X 76																X 80	84	85	85
7	77	74	X 74	79	83																X 88	X 85	X 86	X 80
8	X 80	X 80	X 77	X 68	64																X 80	83	87	90
9	X 82	X 88	84	75	70																X 85	X 81	X 78	75
10	X 82	77	75	X 74	70																X 96	X 83	81	X 86
11	88	88	85	75	75																X 87	X 86	X 85	76
12	80	79	61	70	73	67															X 78	X 64	65	70
13	74	74	X 69	X 66	60	68	71														X 62	X 65	X 65	63
14	X 58	61	56	X 57	55	60	65	88													X 71	X 74	X 72	X 60
15	A	X 56	58	59	56	56															O X 80	X 75	X 74	X 65
16	63	70	X 64	74	68	66															X 92	91	X 92	X 82
17	86	X 75	X 78	X 62	X 65																X 72	X 70	72	76
18	74	X 71	X 66	X 66	X 64																X 85	X 70	79	X 77
19	76	72	X 69	70	X 59																X 84	X 80	X 76	X 69
20	X 68	X 65	X 62	62	X 62																X 93	80	74	71
21	72	X 66	66	62	62																O X 78	X 76	74	72
22	74	71	74	57	51																X 84	X 80	74	68
23	74	72	62	58	67	62		71													X 81	X 85	74	X 72
24	X 66	X 65	X 62	73	X 70															X 75	O X 67	X 84	80	78
25	A	X 69	X 64	60	58	64														X 75	X 73	X 74	X 71	X 69
26	X 62	X 56	X 54	53	X 52															X 81	X 76	X 72	X 65	X 60
27	X 60	X 59	X 57	X 58	58															X 83	87	X 87	73	69
28	62	64	60	57	56	56														X 81	X 83	X 74	X 68	X 68
29	X 67	X 64	X 60	X 60	X 60															X 80	X 79	X 78	X 73	X 71
30	X 69	X 64	X 68	X 64	X 64															X 86	X 80	71	61	59
31	62	58	61	58	58															X 104	X 110	X 90	X 91	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	29	31	31	31	31	12	3	2												8	31	30	31	31
MED	74	71	66	64	64	66	71	80												X 81	X 81	X 79	X 74	74
U Q	80	75	74	73	70	70	91													X 84	X 88	X 84	81	X 80
L Q	64	X 64	61	59	58	61	65													X 78	X 78	X 74	X 72	69

JUL. 1998 fxI (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1998 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	F 56	R 64	F 53	F 55	F 54	F 58	79	A	85	A	A	75	A	A	97	96	86	79	63	60	V 68	F 70	F 66	F 64
2	F 66	F 62	F 58	F 56	F 56	F 64	71	81	84	100	90	A	69	A	90	88	85	80	84	86	86	70	68	F 65
3	67	F 63	F 63	62	F 56	65	86	88	64	A	A	A	81	88	89	81	86	90	84	U A 88	F 81	81	79	77
4	77	F 78	F 70	F 71	F 72	F 78	F 84	87	72	71	80	76	78	80	73	75	78	76	85	91	F 81	A	R 64	F 69
5	F 68	F 63	F 56	F 56	F 57	F 68	84	82	J R 76	72	68	77	87	88	90	U A 83	79	80	83	82	75	68	73	78
6	R 77	74	72	73	70	63	78	91	A	68	69	R 77	72	88	R 92	96	90	86	84	A	74	74	F 77	F 74
7	F 70	F 67	68	F 71	F 76	76	R 65	67	R 75	84	68	Y	84	U R 92	86	80	80	86	86	R 81	82	79	80	74
8	74	74	71	62	F 54	54	68	88	73	A	J R 62	A	A	A	A	76	82	87	80	70	74	F 73	F 76	F 83
9	R 76	R 82	F 76	F 62	F 58	51	72	92	103	58	65	63	73	U R 76	A	92	100	98	96	94	79	R 75	72	F 68
10	R 76	F 70	F 67	68	F 62	64	80	91	84	69	80	79	89	91	97	87	79	78	85	88	90	77	74	80
11	F 79	F 82	F 77	F 66	F 66	66	68	A	88	A	60	70	80	81	80	76	73	78	85	89	81	80	79	F 69
12	F 72	F 70	F 54	F 62	F 64	F 59	68	74	H 58	59	63	75	70	69	75	70	72	74	71	77	72	58	F 56	F 62
13	F 66	F 64	63	60	F 54	F 60	64	A	64	60	67	59	59	A	74	64	69	76	79	69	56	59	59	F 55
14	52	F 51	F 50	51	F 46	F 52	F 55	F 79	72	52	A	61	66	A	57	A	67	66	62	58	65	68	66	54
15	A	50	F 52	F 50	F 48	F 51	66	77	74	78	A	A	73	A	82	86	90	86	86	85	74	69	R 68	59
16	F 55	F 58	58	F 66	F 61	F 54	56	67	76	69	68	A	A	A	A	84	88	96	93	85	86	F 83	86	76
17	F 74	69	73	56	59	70	76	83	67	89	94	R 77	81	77	89	91	90	98	90	74	66	64	F 66	F 67
18	F 68	65	60	60	58	58	69	73	74	70	60	60	R 66	68	66	64	66	71	79	86	79	J R 64	F 69	71
19	F 69	F 60	R 62	F 62	55	53	62	74	77	A	67	U R 54	70	77	82	76	76	71	68	78	78	74	70	63
20	62	59	56	F 56	56	54	63	66	R 76	R 78	A	A	A	70	72	74	79	86	97	106	87	F 72	F 66	F 63
21	F 64	60	F 57	F 54	F 54	55	63	71	85	68	R 58	70	V 68	85	98	96	89	94	112	108	72	70	F 66	F 63
22	F 66	F 63	F 64	F 50	F 44	45	70	99	68	54	U R 62	65	A	70	A	75	76	74	72	79	78	74	65	F 56
23	F 64	F 64	F 50	F 51	F 58	F 53	57	F 62	A	A	A	A	69	81	78	84	R 63	73	80	81	75	79	F 66	66
24	60	59	56	66	64	66	81	80	70	68	A	64	57	U R 58	R 63	58	60	64	66	69	U R 61	78	F 73	F 68
25	A	63	58	F 53	F 50	F 56	55	59	56	R 49	E G 47	56	57	Y	58	62	R 63	65	67	69	R 67	68	65	63
26	56	50	48	F 46	46	46	64	66	68	69	R 65	60	R 58	58	67	65	66	67	69	75	70	66	59	54
27	54	53	51	52	F 50	51	66	94	77	A	A	A	72	A	85	81	71	67	65	77	F 81	81	F 63	F 62
28	F 52	F 55	F 49	F 50	F 49	F 48	65	79	81	R 61	59	62	69	72	69	R 64	59	65	68	75	77	68	62	62
29	62	R 58	54	54	54	54	58	67	66	67	74	U R 62	A	A	85	78	R 76	74	73	74	73	72	67	65
30	63	58	62	58	58	60	63	70	71	76	82	A	A	A	84	78	77	76	75	80	74	65	F 54	F 52
31	F 51	F 51	F 52	F 51	F 50	54	64	76	77	75	73	A	A	A	86	91	A	86	86	98	R 104	84	85	F 83
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	31	31	31	31	31	31	28	29	24	23	20	23	19	27	30	30	31	31	30	31	30	31	31
MED	F 66	F 63	F 58	F 56	F 56	56	66	78	74	69	67	64	70	77	82	79	78	78	80	80	75	72	67	F 65
U Q	73	69	67	F 62	F 61	64	76	88	79	76	74	76	80	88	89	87	86	86	86	88	81	78	74	74
L Q	58	58	F 53	F 52	F 50	53	63	68	68	60	62	60	66	70	72	74	69	71	69	74	72	68	65	62

JUL. 1998 foF2 (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1998 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	L 432	A	A	A	A	U A 512	A	A	A	A	U A 480	A	A	A				
2								A 484		A	524	A	A	A	A	492	460	U A 464	A					
3						L	U L 448	L 468	A	A	A	A	A	A	516	512	468	A	L					
4							L	468	A	560	516	A	A	520	A	512	484	444	A					
5						U L 360	A	A	A	528	A	A	U A 528	536	516	A	A	L 444	U A 384					
6							U L 416	A	A	A	532	500	L	Y	500	500	500	460	L	A				
7						U L 348	L	L 496	L 484	U A 524	A	R 520	524	A	A	532	488	U A 440	L 392					
8						U A 320	L 416	436	A	A	A	A	A	A	A	A	A	436	A	U L 212				
9							420	452	464	A	A	A	A	B	A	A	U A 476	U A 424	L 388					
10						U A 324	A	U A 448	U L 488	A	A	A	504	R 524	U A 492	488	488	L 456	L 396					
11						L	U L 424	A	A	A	492	A	A	A	U A 508	A	468	444	A					
12						320	A	436	L 468	U A 472	A	496	A	U A 492	488	A	460	432	L 404					
13							U A 396	A	U A 448	464	472	484	500	A	U A 484	492	U A 460	424	L 372					
14							444	U A 452	U A 480	U A 456	A	U A 524	A	A	U A 496	A	452	432	L 400					
15							L 400	L 444	U A 492	U A 520	A	A	A	A	A	U A 476	U A 480	436	L 404					
16								L	456	A	U A 484	A	A	A	A	A	U A 460	A	A					
17						L	L	A	464	U A 492	500	500	492	500	496	472	476	L 436	L					
18						L	L 420	L 436	440	472	L 484	500	492	488	U A 492	476	440	U A 412	A					
19						L	L 432	432	A	A	488	A	496	484	468	464	456	L 436	A					
20						A	L 412	420	U A 480	L	A	A	A	A	464	U A 468	444	432	L 404					
21						L	L	U A 468	A	U A 480	A	U R 488	492	492	480	460	A	A	L 360					
22						L	L 412	U A 420	460	480	A	496	A	508	A	A	460	A	A					
23							A	A	A	A	A	A	U A 536	504	484	480	464	L 432	A					
24						L	L 404	420	440	468	A	R	484	B	476	468	448	L 444	L 380					
25						L	408	420	A	A	472	488	488	492	A	476	460	420	L 392					
26							404	440	L 456	472	492	A	U A 504	480	488	480	456	L 440	L 412					
27							404	U A 428	A	A	A	A	U A 504	A	A	A	A	A	A					
28							404	444	A	492	504	A	496	504	488	496	L 492	440	L					
29							408	440	A	492	A	520	A	A	U A 520	A	464	L 452	U L 380					
30								L	508	L 492	A	A	A	A	A	L 500	468	444	A					
31							L	L 452	U A 464	A	524	A	A	A	524	508	A	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						5	19	21	17	16	13	12	14	13	19	20	26	24	14	1				
MED						U 324	L 412	440	464	486	492	500	498	500	492	484	464	438	L 392	U L 212				
U Q						U L 354	L 424	452	484	U A 506	520	516	U A 504	514	508	500	480	L 444	L 404					
L Q						320	404	430	456	472	484	492	492	490	484	474	460	432	L 380					

JUL. 1998 foF1 (0.01MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1998 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						A	276	A 316	A 340	A	A	A	A	A	A	A	A	284	244	B				
2						176	264	320	352	372	380	A	A	A	A	356	328	296	U A 224	B				
3						208	268	A 312	A 352	A	A	A	A	A 400	388	372	340	300	A 244	B				
4						A	A	A	A	A	R	R 380	396	400	R	364	340	292	U A 236	B				
5						A	268	U A 312	U A 340	U A 364	A	A	A	A	372	352	328	292	220	B				
6						196	256	312	A	A	A	A	A	A	R	352	320	280	A 232	B				
7						A	A 268	A	U A 332	A	A	A	412	U R 396	R 384	356	A 332	A	A	B				
8						A	A	A 312	U A 340	A	A	A	A	A	A	A	A 336	284	A	B				
9						A	252	292	A	A	A	A	A	B	A	A 356	A	U A 300	A	B				
10						A	A	A	U A 340	A	A	A	A	A	A	A	A	280	A 216	B				
11						A	260	A 308	A	A	A	A	A	A	A	A	A	296	U A 216	B				
12						A	244	304	A 356	A	A	392	A 408	U R 380	364	348	320	284	220	B				
13						A 200	264	A	A 336	A	A	U A 376	A	A	A	A	A	296	A	B				
14						A	272	A	336	360	376	388	396	384	368	348	320	276	U A 212	B				
15						A	252	304	A 336	A 360	A	A	A	A	A	348	316	276	A	B				
16						176	256	A 308	A 344	356	A	A	A	A	A	A	336	288	A	B				
17						A	248	A 300	A	A	A	R	R	R	R	344	328	A	A	B				
18						A	A	A	A	A	A	A	A	R 396	368	348	332	276	208	B				
19						A	244	296	324	A 344	372	U A 380	R 380	A	R 360	R 348	A	272	A 208	B				
20						A	A	A	A	A	A	A	A	A	R 364	340	A 316	A	A	B				
21						A	A	A	A	A	A	A	A	U A 388	R 372	R 352	320	272	A	B				
22						A	A	A 300	A	A	A	A	A	A	A	352	A	284	A 200	B				
23						A	A	A	U A 320	A	A	A	A	A	A	A	328	280	U A 208	B				
24						A	A	A	A	A	A	A	A	B	U R 368	356	328	A 272	A					
25						A	248	296	A 332	U A 352	A	U A 372	U R 388	R 380	356	348	320	280	A 208					
26						A	260	A	A	360	A	A	A	A	R	A	A	A	216					
27						A	248	296	332	A 352	A	A	A	A	A	A	A	272	208					
28						B	A	U A 292	A	A	A	A	B	A	364	R 336	320	276	A					
29						180	260	316	332	U A 352	A	A	A	A	A	A	A	A	216					
30						A	244	300	328	U A 352	A	A	A	A	A	A	A	276	A					
31						160	248	A	336	A	A	A	A	A	A	A	A	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						7	21	19	19	11	3	6	6	8	12	19	19	25	18					
MED						180	256	304	A 336	A 356	376	380	396	392	368	352	328	280	A 216					
U Q						200	266	A 312	A 340	A 360	380	388	408	398	372	356	332	292	A 224					
L Q						176	248	296	332	A 352	372	U A 376	R 388	R 382	364	348	320	276	A 208					

JUL. 1998 foE (0.01MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1998 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	J A 86	J A 101	J A 52	J A 53	J A 52	J A 52	J A 48	J A 98	J A 96	J A 178	J A 156	58	J A 76	110	102	J A 64	55	J A 122	J A 78	J A 54	J A 60	J A 103	J A 64	J A 52
2	J A 64	J A 51	J A 77	J A 44	J A 47	25	J A 44	J A 74	J A 54	J A 83	J A 53	J A 100	71	109	J A 68	J A 53	J A 54	J A 51	J A 46	58	30	E B 15	J A 63	J A 70
3	J A 55	J A 31	J A 36	J A 44	J A 22	J A 24	J A 32	J A 51	J A 65	87	J A 79	J A 177	J A 85	J A 78	43	41	39	J A 54	J A 51	J A 176	J A 87	J A 77	J A 99	J A 89
4	J A 96	J A 52	J A 56	J A 50	J A 87	J A 51	J A 30	J A 42	J A 67	J A 50	G	J A 74	J A 82	J A 54	J A 66	G	J A 93	J A 39	66	46	J A 54	J A 102	J A 104	J A 82
5	J A 54	J A 51	J A 54	J A 51	J A 61	J A 28	J A 82	87	J A 166	J A 59	J A 88	J A 117	58	50	41	116	J A 62	J A 51	J A 40	45	J A 21	48	J A 38	32
6	29	24	J A 32	J A 31	J A 45	G	33	J A 94	116	59	58	J A 49	42	40	G	38	G 27	G	66	J A 129	J A 53	68	J A 38	49
7	J A 51	J A 50	J A 34	J A 31	J A 38	J A 32	J A 40	J A 48	J A 172	J A 114	J A 81	41	49	J A 86	J A 75	J A 78	J A 54	J A 52	J A 57	J A 39	E B 15	J A 27	J A 33	J A 31
8	32	J A 25	J A 24	J A 22	E B 16	J A 34	J A 41	34	62	J A 95	J A 64	J A 229	87	109	91	58	J A 52	J A 46	78	J A 23	J A 49	J A 103	J A 85	J A 81
9	J A 83	J A 77	J A 45	J A 30	J A 25	22	34	J A 47	J A 44	52	54	J A 55	J A 144	E B 64	J A 82	J A 112	J A 68	J A 68	J A 31	J A 36	J A 79	J A 52	J A 66	J A 50
10	J A 53	40	J A 38	J A 31	J A 26	J A 46	J A 66	J A 127	J A 54	92	60	77	40	43	50	J A 60	J A 46	32	32	J A 28	25	J A 28	J A 49	J A 53
11	J A 33	J A 52	J A 40	J A 50	J A 66	J A 28	32	89	J A 132	88	J A 157	72	60	J A 63	J A 59	J A 72	J A 54	37	J A 50	60	J A 114	59	48	J A 58
12	J A 51	J A 53	J A 44	J A 44	J A 42	J A 26	J A 52	G	J A 55	J A 51	J A 168	46	J A 65	J A 54	46	J A 51	44	34	J A 32	J A 31	J A 28	J A 26	J A 44	J A 62
13	J A 34	J A 53	J A 45	J A 48	36	J A 43	J A 49	91	J A 49	J A 79	J A 45	43	J A 185	J A 118	J A 78	J A 48	J A 77	60	J A 42	J A 38	J A 38	28	J A 37	52
14	J A 62	32	56	J A 86	J A 40	J A 33	J A 48	56	J A 52	J A 51	J A 76	J A 56	J A 60	J A 79	J A 160	65	39	30	J A 42	J A 54	J A 74	J A 31	J A 26	J A 47
15	J A 69	28	32	J A 31	J A 43	20	28	34	J A 52	J A 58	J A 121	J A 88	J A 99	J A 161	84	J A 52	J A 49	J A 36	J A 121	E B 15	E B 14	E B 14	E B 30	J A 50
16	J A 31	36	J A 61	J A 36	J A 30	20	30	38	44	J A 58	53	96	108	125	J A 84	J A 118	J A 52	60	78	56	J A 53	58	J A 28	27
17	J A 28	J A 24	J A 31	30	J A 33	21	J A 36	J A 48	J A 67	J A 63	J A 45	G 36	G 35	G 32	G	43	39	J A 38	J A 38	J A 28	J A 50	J A 47	J A 50	J A 66
18	J A 51	J A 34	J A 26	J A 22	J A 24	J A 22	34	37	36	J A 50	56	48	42	45	J A 67	58	G	J A 48	J A 63	40	49	J A 80	J A 52	J A 86
19	J A 48	33	J A 25	25	J A 22	29	J A 28	34	72	94	J A 50	J A 54	G 32	J A 52	40	G 33	34	J A 41	J A 66	J A 47	J A 51	32	39	32
20	J A 46	J A 41	J A 47	J A 37	J A 52	J A 70	31	J A 51	J A 129	J A 88	117	97	134	58	40	J A 60	J A 91	J A 62	59	J A 46	J A 100	J A 54	J A 54	J A 54
21	J A 80	J A 26	22	J A 33	28	J A 26	J A 48	J A 51	J A 54	J A 52	59	52	40	46	G	42	J A 59	J A 56	J A 50	J A 84	J A 108	J A 49	J A 51	J A 46
22	J A 33	32	J A 22	24	26	J A 26	31	J A 48	56	J A 50	54	51	J A 95	47	J A 84	J A 62	J A 51	J A 55	J A 40	J A 36	J A 53	J A 44	J A 34	J A 60
23	J A 64	J A 63	33	29	31	J A 51	52	J A 50	J A 73	111	85	96	61	J A 50	51	36	J A 50	J A 54	J A 60	53	J A 83	J A 83	J A 54	J A 50
24	J A 40	J A 32	J A 26	J A 30	J A 22	20	J A 36	J A 47	J A 46	J A 46	J A 80	43	38	E B 54	G 29	38	35	36	J A 33	28	43	43	J A 48	J A 47
25	J A 72	J A 67	J A 51	J A 50	J A 34	J A 20	J A 41	J A 41	J A 60	J A 53	J A 48	46	J A 48	J A 47	J A 54	J A 52	J A 41	J A 35	J A 32	49	J A 48	J A 43	J A 44	J A 49
26	J A 24	34	26	22	J A 24	J A 22	27	J A 36	J A 51	43	J A 46	54	55	46	G	38	J A 45	35	G J A 20	25	J A 27	J A 30	J A 26	J A 28
27	22	28	21	E B 14	J A 53	J A 52	J A 41	J A 43	J A 52	73	68	84	J A 54	92	68	67	J A 84	J A 59	J A 54	53	J A 81	J A 50	J A 54	J A 45
28	J A 46	J A 48	J A 26	J A 38	J A 45	19	J A 44	J A 40	J A 55	J A 122	J A 64	59	E B 43	J A 76	J A 50	J A 54	37	J A 46	J A 30	J A 22	26	36	J A 27	24
29	22	24	J A 26	19	E B 14	G	G	34	J A 52	J A 44	J A 62	J A 50	68	J A 221	J A 61	J A 88	J A 49	33	24	J A 22	E B 15	19	J A 20	17
30	E B 14	E B 16	E B 15	E B 15	J A 22	20	28	32	38	45	J A 60	J A 126	J A 195	J A 143	J A 94	J A 50	J A 53	J A 37	49	J A 26	32	J A 62	J A 36	J A 47
31	J A 54	J A 51	J A 52	J A 46	J A 33	J A 28	J A 32	J A 44	J A 50	J A 64	J A 47	72	J A 124	98	41	J A 53	J A 156	J A 103	62	J A 76	J A 111	77	58	J A 67
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	J A 51	J A 36	J A 34	J A 31	J A 33	J A 26	J A 36	J A 47	J A 55	J A 59	J A 60	58	61	U 60	59	J A 53	J A 51	J A 46	J A 50	J A 45	J A 50	J A 48	J A 48	J A 50
U Q	J A 64	J A 52	J A 51	J A 46	J A 45	J A 34	J A 48	56	J A 72	J A 88	J A 81	J A 96	J A 95	109	J A 82	J A 65	J A 59	J A 56	63	J A 54	J A 79	J A 68	J A 54	J A 62
L Q	32	28	26	25	J A 24	20	31	37	J A 51	J A 51	J A 53	49	43	47	G 41	42	39	36	J A 33	J A 28	28	30	J A 34	45

JUL. 1998 foEs (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1998 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	28	35	26	21	25	23	30	A A 98	70	A A 178	A A 156	51	A A 76	A A 110	91	62	48	72	47	44	34	17	19	43
2	22	17	18	19	25	24	40	62	45	80	50	A A 100	66	A A 109	63	42	40	46	40	57	20	E B 15	29	23
3	26	22	22	34	18	G	G	37	52	A A 87	A A 79	A A 177	62	64	42	39	38	46	35	U A 63	42	25	47	30
4	48	44	41	38	44	43	28	36	51	40	G	60	75	43	62	G	46	33	59	24	21	A A 102	34	42
5	36	20	23	24	20	20	66	47	64	47	61	65	53	43	41	U A 73	49	40	38	32	18	36	26	20
6	18	19	20	26	30	G	31	63	A A 116	54	42	44	42	U Y 40	G	37	G 27	G	35	A A 129	43	38	27	29
7	39	28	21	20	22	24	32	36	39	52	64	40	46	78	64	48	42	44	26	19	E B 15	E B 15	18	27
8	25	18	17	E B 16	E B 16	32	39	34	58	A A 95	63	A A 229	A A 87	A A 109	A A 91	55	48	39	63	E B 14	20	19	45	41
9	43	48	40	24	18	20	30	42	40	47	51	52	62	E B 64	A A 82	55	48	42	25	25	18	20	38	30
10	41	23	26	21	18	32	64	45	45	64	57	65	U Y 40	42	49	43	36	31	25	21	E B 15	E B 16	17	18
11	23	36	24	20	24	20	29	A A 89	63	A A 88	46	66	55	62	51	64	37	34	46	56	35	46	24	22
12	24	25	24	28	18	24	50	G	43	47	56	42	52	49	44	51	41	34	28	25	19	22	26	34
13	26	25	25	21	33	28	40	A A 91	45	42	42	42	44	A A 118	48	37	46	G 26	26	20	23	19	23	26
14	48	23	40	37	23	29	G 22	45	48	46	A A 76	52	54	A A 79	50	A A 65	37	30	28	47	35	18	19	20
15	A A 69	18	17	18	18	19	27	33	49	52	A A 121	A A 88	62	A A 161	64	48	48	34	28	E B 15	E B 14	E B 14	23	22
16	18	18	48	18	18	19	28	35	42	54	48	A A 96	A A 108	A A 125	A A 84	61	46	57	67	40	22	29	19	18
17	19	19	27	21	25	20	30	44	39	49	41	U G 36	U G 35	U G 32	G	42	38	32	25	19	31	E B 14	39	46
18	40	25	20	18	E B 15	18	24	32	36	42	41	42	40	44	49	40	G	41	47	29	37	62	22	43
19	24	24	20	18	E B 15	19	26	33	64	A A 94	42	46	G 30	41	38	G 31	33	34	35	24	19	20	20	22
20	35	29	24	25	26	45	26	34	48	46	A A 117	A A 97	A A 134	50	39	47	38	31	30	17	19	40	42	43
21	23	22	15	24	E B 14	21	33	47	50	48	52	42	40	44	G	40	56	51	28	26	64	19	34	38
22	23	19	E B 14	18	E B 13	21	28	42	36	41	52	45	A A 95	46	A A 84	58	36	52	37	25	18	30	23	20
23	36	42	19	17	16	30	45	45	A A 73	A A 111	A A 85	A A 96	54	45	42	U Y 35	36	36	41	42	56	38	26	29
24	23	21	20	22	E B 15	17	30	37	42	43	A A 80	42	U Y 38	E B 54	G 28	37	35	34	30	19	40	34	29	36
25	A A 72	52	33	34	20	18	29	39	53	45	44	44	U Y 47	44	52	39	41	32	24	40	36	19	30	27
26	E B 16	23	17	E B 15	E B 14	G	G 22	33	40	42	44	50	50	44	G	37	34	28	G 17	18	18	21	21	19
27	16	17	E B 14	E B 14	22	20	34	43	50	A A 73	A A 68	A A 84	50	A A 92	60	59	52	48	52	46	44	E B 14	44	E B 14
28	31	26	19	28	21	18	27	34	48	42	42	58	E B 43	45	42	46	37	40	27	18	E B 14	22	22	17
29	E B 14	17	E B 16	E B 15	E B 14	G	G	32	52	42	56	48	A A 68	A A 221	52	66	36	29	23	19	E B 15	E B 13	E B 14	E B 14
30	E B 14	E B 16	E B 15	E B 15	E B 15	16	26	32	36	43	59	A A 126	A A 195	A A 143	65	44	41	34	39	22	23	43	27	24
31	42	21	20	26	22	21	28	34	46	58	46	A A 72	A A 124	A A 98	U Y 40	48	A A 156	64	45	41	48	64	52	50
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	26	23	20	21	18	20	29	37	48	48	52	52	54	52	49	46	40	34	35	25	22	21	26	27
U Q	40	28	26	26	24	24	34	45	53	A A 73	A A 68	A A 88	A A 75	A A 109	64	58	48	46	45	42	37	38	34	38
L Q	22	19	17	E B 18	E B 15	18	26	34	42	43	44	44	43	44	G 40	39	36	32	26	19	E B 18	E B 17	21	20

JUL. 1998 fbEs (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1998 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	16	14	15	15	15	15	16	14	16	16	20	34	21	26	28	23	16	15	14	16	13	16	14	15
2	15	14	16	14	15	14	15	14	18	20	21	22	36	30	E S 28	22	20	18	14	16	15	15	15	16
3	14	14	15	14	16	14	14	16	15	19	36	38	28	27	22	23	19	14	15	14	15	15	15	15
4	16	14	14	14	16	15	15	15	18	19	26	24	26	24	22	23	17	15	14	16	15	14	16	16
5	15	16	14	15	15	14	15	15	17	23	27	23	24	32	22	18	16	17	16	14	13	15	16	16
6	14	14	13	15	15	13	14	16	17	21	19	26	34	24	22	19	18	15	16	16	15	15	15	15
7	16	14	15	15	15	16	14	15	15	18	21	24	25	28	25	21	18	15	16	16	15	15	15	15
8	15	15	15	16	16	17	14	16	15	19	19	30	22	27	25	25	20	14	14	14	14	15	15	16
9	16	16	16	14	15	15	14	15	19	22	22	26	26	64	26	20	16	17	15	14	15	15	15	16
10	16	15	15	14	14	14	15	14	16	17	22	22	26	26	31	18	18	17	16	15	15	16	15	16
11	15	16	15	14	16	16	15	15	20	20	25	33	34	27	26	22	18	15	14	15	16	16	15	15
12	15	15	16	15	14	15	15	14	16	17	21	23	22	23	24	24	18	15	15	15	15	15	15	14
13	15	15	14	15	16	14	14	15	18	20	24	26	35	17	20	21	20	16	14	15	16	15	15	16
14	16	15	16	15	15	14	15	14	16	18	18	20	27	21	20	18	17	16	15	14	17	14	15	15
15	15	16	15	16	15	15	15	15	14	20	24	27	24	22	27	19	15	16	15	15	14	14	14	14
16	16	14	14	14	16	14	16	15	15	17	25	22	24	34	21	22	18	17	15	15	16	16	15	15
17	15	16	14	15	14	13	15	15	15	20	20	26	26	23	19	18	17	15	18	16	15	14	15	15
18	16	16	15	16	15	15	15	15	18	18	17	24	20	19	14	18	18	16	16	15	14	15	16	16
19	16	16	17	15	15	15	15	15	16	17	20	21	21	21	20	16	16	15	15	15	16	14	16	16
20	16	15	14	13	14	14	15	18	20	21	23	21	26	23	20	17	17	15	16	15	16	14	15	15
21	15	16	14	13	14	14	15	15	17	26	25	25	31	27	26	20	19	15	13	16	14	16	16	15
22	15	15	14	14	13	14	15	16	21	23	31	34	27	23	42	25	21	16	15	15	15	15	15	15
23	15	15	15	14	15	15	14	16	19	18	17	22	34	26	22	20	17	13	14	15	15	16	15	15
24	15	15	15	16	15	14	14	14	18	24	23	26	24	54	22	24	18	17	15	16	13	15	16	15
25	16	16	16	16	15	15	13	14	16	21	19	22	29	19	21	18	15	14	13	15	15	16	16	14
26	16	15	15	15	14	13	15	15	17	18	27	21	30	22	24	21	17	16	15	16	16	16	16	15
27	15	14	14	14	16	16	15	15	15	16	23	23	20	20	24	19	16	15	13	15	15	14	16	14
28	16	14	14	16	16	17	14	16	18	17	24	26	43	26	23	22	20	15	15	14	14	14	14	15
29	14	15	16	15	14	15	15	19	16	22	25	25	22	29	27	22	19	15	13	16	15	13	14	14
30	14	16	15	15	15	15	15	14	17	22	26	24	32	22	21	20	18	15	14	15	16	14	15	16
31	14	16	15	15	15	14	14	16	16	21	20	22	28	36	23	25	17	15	16	14	16	17	16	16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	15	15	15	15	15	15	15	15	17	20	23	24	26	26	22	21	18	15	15	15	15	15	15	15
U Q	16	16	15	15	16	15	15	16	18	21	25	26	31	28	26	23	19	16	16	16	16	16	16	16
L Q	15	14	14	14	14	14	14	14	16	18	20	22	24	22	21	18	17	15	14	15	14	14	15	15

JUL. 1998 fmin (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1998 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	F 302	R 291	F 292	F 293	F 262	F 284	290	A	315	A	A	288	A	A	A 291	305	308	A 316	299	288	V 274	F 288	F 280	F 291
2	F 291	F 287	F 292	F 272	F 285	F 306	291	274	287	300	316	A	A 257	A	293	295	294	293	282	286	308	288	280	F 281
3	279	F 288	F 278	296	F 281	298	310	320	240	A	A	A	271	276	284	274	284	292	297	A	F 276	276	277	273
4	265	F 292	275	F 289	F 282	F 272	F 286	315	304	258	287	275	A 273	285	294	283	274	277	284	300	F 305	A	R 271	F 275
5	F 269	F 286	F 282	F 287	F 284	F 296	306	289	J R 331	299	249	264	282	270	288	A	294	309	296	278	301	271	266	273
6	R 277	275	281	294	300	281	302	322	A	294	268	R 292	257	270	R 274	285	284	296	298	A	278	271	F 263	F 284
7	F 271	F 279	280	F 280	F 274	314	R 316	290	R 285	312	290	Y	281	U R 284	293	282	283	295	295	R 308	300	272	275	275
8	280	292	292	274	F 282	281	279	327	338	A	R	A	A	A	A	284	287	312	324	291	293	F 274	F 292	F 305
9	R 282	R 274	F 306	F 338	F 305	290	310	305	325	355	285	269	274	U R 282	A	280	288	301	303	329	294	R 289	285	F 287
10	R 281	F 286	F 273	273	F 270	275	264	312	309	A 263	288	258	281	287	295	301	286	284	296	290	312	300	260	279
11	F 279	F 293	F 300	F 300	F 295	320	304	A	310	A	342	A 267	280	280	284	289	287	291	289	299	304	286	281	F 275
12	F 269	F 279	F 337	F 276	F 283	F 273	296	303	H 303	291	267	295	274	285	291	294	304	301	290	304	294	283	F 269	F 283
13	F 272	F 285	288	301	F 302	F 282	262	A	292	277	301	305	267	A	305	289	298	309	320	328	285	281	283	F 279
14	A 279	F 292	F 293	300	F 306	F 328	F 272	F 300	324	351	A	295	290	A	267	A	300	307	312	A 301	272	284	317	310
15	A	295	F 306	F 324	F 283	F 270	305	312	305	327	A	A	285	A	272	296	293	303	288	319	302	297	R 307	301
16	F 289	F 303	303	F 290	F 318	F 335	327	309	318	334	290	A	A	A	A	252	254	300	306	295	293	F 268	297	285
17	F 286	295	319	265	269	312	295	314	312	291	310	R 304	289	279	296	303	291	316	319	320	292	265	F 264	F 299
18	F 293	303	280	286	298	291	317	312	339	327	337	274	R 289	316	296	310	286	286	298	308	301	J R 311	F 287	295
19	F 284	F 307	R 317	F 325	301	312	320	334	328	A	320	U R 287	295	285	310	294	299	295	300	294	300	307	303	295
20	296	297	291	F 301	325	333	313	310	R 310	R 312	A	A	A	294	275	285	294	276	283	316	323	F 296	F 287	F 284
21	F 283	293	F 303	F 282	F 285	309	304	305	322	321	R 257	288	V 272	267	282	286	274	278	307	321	298	282	F 289	F 278
22	F 288	F 308	F 329	F 308	F 293	264	301	335	337	289	U R 282	280	A	284	A	313	303	311	296	288	299	317	300	F 275
23	F 285	F 299	F 292	F 276	F 298	F 292	295	F 276	A	A	A	A	273	289	283	307	R 284	287	298	289	293	298	F 280	282
24	288	292	271	293	292	283	292	292	289	277	A	292	282	U R 297	R 297	295	304	301	299	291	U R 287	271	F 277	F 283
25	A	286	304	F 281	F 283	F 315	302	297	271	R 320	G	271	271	Y	289	289	R 291	294	304	294	R 304	301	280	286
26	277	280	288	F 276	279	318	307	311	327	333	R 303	309	R 317	266	295	306	296	299	295	303	302	293	303	301
27	282	274	270	291	F 291	284	301	336	349	A	A	A	300	A	304	315	318	299	303	291	F 279	309	F 288	F 321
28	F 304	F 313	F 315	F 307	F 280	F 274	314	326	361	R 336	275	289	297	305	318	R 298	285	291	296	297	299	293	290	279
29	289	R 289	271	268	284	288	290	287	332	283	296	U R 299	A	A	300	294	R 305	302	303	297	293	290	285	285
30	277	281	278	309	300	324	308	318	311	293	303	A	A	A	295	300	306	309	301	287	308	301	F 293	F 277
31	F 300	F 274	F 296	F 297	F 285	328	313	324	322	330	292	A	A	A	277	286	A	283	274	284	R 311	285	271	F 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	29	31	31	31	31	31	31	28	29	24	22	20	23	19	27	29	30	31	31	29	31	30	31	31
MED	F 282	F 291	F 292	F 291	F 285	292	302	312	315	306	290	288	281	284	293	294	292	299	298	297	299	288	283	F 283
U Q	F 289	F 295	F 304	F 301	300	315	310	321	330	328	303	295	289	289	296	302	300	307	303	308	304	298	292	295
L Q	277	281	280	276	F 282	281	291	298	304	290	275	272	272	276	283	285	285	291	295	290	292	276	275	F 277

JUL. 1998 M(3000)F2 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1998 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	L 350	A	A	A	A	A	A	A	A	A	A	A	A	A				
2								A	A 368	A	A	A	A	A	A	359	363		A	A				
3						L	U L 354	L 362	A	A	A	A	A	A	352	344	353		A	L				
4							L	343	A	343	359	A	A	367	A	345	A	334		A				
5						U L 331	A	A	A	A	A	A	A	347	355	A	A	A	A					
6							U L 367	A	A	A	364	A	L	Y	374	349	338	L 345	L	A				
7						U L 355	L	L 332	L 360	A	A	R 374	349	A	A	A	339	A	L 339					
8						A	A	A 372	A	A	A	A	A	A	A	A	A	A 334	A	U L 371				
9							345	A	411	A	A	A	A	B	A	A	A	A	L 351					
10						A	A	A	A	A	A	A	391	R 368	A	347	343	L 338	L 322					
11						L	U L 358	A	A	A	361	A	A	A	A	A	352	321	A					
12						311	A	A 357	A 371	A	A	385	A	A	351	A	A 331	A 347	L 322					
13							A	A	A	391	383	411	371	A	A	355	A	348	L 356					
14							349	A	A	A	A	A	A	A	A	A	355	360	L 326					
15							L 349	L 345	A	A	A	A	A	A	A	A	A	L 340	328					
16								L	376	A	A	A	A	A	A	A	A	A	A					
17						L	L	A	363	A	368	Y	394	366	368	A	341	L 332	L					
18						L	L 334	L 356	398	417	L 404	391	378	A 348	A	353	367		A	A				
19						L	L 346	367	A	A	403	A	395	406	405	387	365	L 353	A					
20						A	L 350	392	A	L	A	A	A	A	420	A	363	331	L 326					
21						L	L	A	A	A	A	U R 407	404	364	Y	372	A	A	L 361					
22						L	L 332	A	373	399	A	372	A	A	A	A	341	A	A					
23							A	A	A	A	A	A	A	362	370	354	341	L 325	A					
24						L	L 352	370	A	A	A	R	389	B	371	364	356	333	A 329					
25						L	330	A	A	A	A 375	391	Y	343	A	365	352	341	L 322					
26							344	367	A 348	416	417	A	A	422	Y	362	361	L 335	L 316					
27							345	A	A	A	A	A	A	A	A	A	A	A	A					
28							348	365	A	378	404	A	382	366	366	A	L 335	A	L					
29							L 334	356	A	382	A	A 359	A	A	A	A	345	L 334	U L 338					
30								L	352	L 380	A	A	A	A	A	A 350	352	335	A					
31							L	L 345	A	A	A 344	A	A	A	338	A	A	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						3	17	14	10	8	11	8	9	11	11	14	20	18	13	1				
MED						U L 331	L 348	360	370	386	375	388	389	366	368	354	352	335	L 328	U L 371				
U Q						U L 355	U L 351	367	376	408	404	399	394	368	374	364	358	345	L 345					
L Q						311	L 339	L 345	360	379	361	373	374	348	352	349	341	L 333	L 322					

JUL. 1998 M(3000)F1 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1998 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						292	306	A	A 304	A	A	350	A	A	A	296	304	E A 352	A 300	A 338				
2								360	308	A 328	286	A	A	A	316	316	318	322	314					
3						294	282	272	E A 498	A	A	A	A 368	A 364	334	362	340	306	296					
4							H 266	284	292	430	346	A 350	E A 464	334	A 358	380	358	342	334					
5						290	A 308	296	A 328	352	E A 512	A 428	358	374	336	A	328	306	294					
6							284	262	A	364	440	328	470	368	364	324	330	306	288	A				
7						272	274	362	340	302	E A 416	Y	352	A 386	346	366	342	324	274					
8						366	340	278	A 272	A	E A 464	A	A	A	A	368	338	300	A 294	264				
9							304	286	270	256	A 344	448	A 416	416	A	356	322	294	282					
10						330	A	266	266	A	360	E A 416	356	338	326	314	348	312	304					
11						252	266	A	A 304	A	300	A	358	A 336	358	A 362	354	328	294					
12						390	A 330	308	318	392	A 452	364	376	394	358	332	332	316	308					
13							382	A	A 344	402	354	370	474	A	326	382	348	298	276					
14							410	296	276	300	A	386	A 376	A	466	A	332	316	314					
15							296	284	296	286	A	A	A 382	A	A 370	322	314	298	300					
16								268	290	A 294	372	A	A	A	A	A 426	370	298	A 294					
17						284	272	268	300	338	296	292	334	328	334	312	318	284	264					
18						274	284	286	258	292	304	436	374	332	360	334	356	346	306					
19						298	296	270	A 284	A	316	E A 368	358	356	308	328	310	314	300					
20						A 294	302	278	314	316	A	A	A	352	360	362	328	328	310					
21						330	306	320	278	304	528	380	382	374	328	316	334	344	272					
22						418	320	268	270	396	412	414	A	384	A	320	318	306	298					
23							336	A 362	A	A	A	A	A	418	350	356	318	370	352	294				
24						314	292	318	344	362	A	380	Y 422	406	368	380	346	340	316					
25						300	338	360	A	348	G	470	456	Y	418	378	360	340	310					
26							304	284	292	296	348	344	368	476	362	338	356	318	304					
27							318	258	252	A	A	A	354	A	318	302	302	A 324	A 316					
28							312	278	254	290	440	E A 416	350	336	316	366	386	352	292					
29							346	354	292	366	344	370	A	A	328	A 342	314	316	276					
30								288	318	310	330	A	A	A	334	324	328	302	282					
31							288	272	296	282	334	A	A	A	362	334	A	A 336	322					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						16	27	28	28	23	23	19	22	19	26	29	30	31	31	2				
MED						296	304	284	293	316	349	375	373	364	351	334	333	316	298	301				
U Q						330	330	313	316	364	440	416	418	386	362	366	354	340	310					
L Q						287	284	271	274	294	330	350	358	336	328	319	318	306	288					

JUL. 1998 h'F2 (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1998 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	286	320	306	300	338	248	240	A	A	A	A	A	A	A	A	A	A	A	A	A	322	276	318	342
2	282	308	296	312	310	248	A 286	A	A 262	A	A	A	A	A	A	232	A 252	A	A	A	250	238	300	352
3	280	304	322	320	276	264	236	A 248	A	A	A	A	A	A	240	226	248	A	E A 290	A	312	290	326	316
4	A 368	320	A 342	340	A 336	A 324	230	228	A	200	E Y 280	A	A	220	A	222	A	238	A	260	270	A	A 320	A 358
5	A 354	316	334	332	286	264	A	A	A	A	A	A	A	230	224	A	A	A	A	268	260	A 350	348	306
6	288	288	298	280	270	258	260	A	A	A	212	A	220	Y	216	220	228	236	A	A	A 302	358	348	324
7	A 338	328	298	312	304	254	230	A 232	A 248	A	A	200	246	A	A	A	E A 270	A	252	268	250	270	276	292
8	292	270	270	290	310	A	A	220	A	A	A	A	A	A	A	A	A	A	A	230	272	284	302	A 300
9	330	324	282	238	262	256	254	A	202	A	A	A	A	B	A	A	A	A	246	248	242	272	A 316	318
10	354	320	332	310	322	A	A	A	A	A	A	A	204	202	A	E A 282	232	236	238	272	252	244	272	294
11	308	296	274	266	280	244	226	A	A	A	A	A	A	A	A	A	246	A 256	A	E A 292	260	314	292	338
12	334	328	248	340	290	E A 294	A	242	A	A	A	210	A	A	A 266	A	A	240	A 266	270	250	272	364	346
13	302	302	298	278	270	278	A	A	A	232	224	198	250	A	A	226	A	234	244	246	264	304	302	336
14	A	308	E A 348	332	288	260	224	A	A	A	A	A	A	A	A	A	238	224	A 242	A	332	290	242	266
15	A	290	280	254	318	240	232	248	A	A	A	A	A	A	A	A	A	234	A 240	246	258	258	268	264
16	290	282	E A 334	258	256	232	240	236	A 256	A	A	A	A	A	A	A	A	A	A	A 276	274	342	280	262
17	270	262	258	340	344	256	248	A	E A 262	A	222	E Y 296	208	226	H 194	A	242	240	244	238	282	312	A 370	328
18	304	280	306	282	260	218	194	H 202	210	204	182	218	230	A	A	234	226	A	A	256	244	E A 382	308	A 338
19	312	282	254	256	260	248	228	204	A	A	202	A	194	188	210	232	212	244	A	272	252	258	268	284
20	322	308	302	302	266	A	H 204	198	A	A	A	A	A	A	198	A	242	246	A 258	252	236	286	E A 340	A 352
21	298	298	272	292	268	254	A 248	A	A	A	A	204	196	A 264	Y	238	A	A	A 266	240	A	274	320	352
22	290	274	244	228	290	278	240	A	216	212	A	242	A	A	A	A	238	A	A	270	252	262	262	296
23	350	A 332	324	338	276	A 346	A	A	A	A	A	A	A	260	236	H 210	230	A	A	A 292	A 342	288	338	306
24	324	306	324	286	252	H 252	262	250	A	A	A	246	206	B	212	228	236	256	E A 276	274	A 340	318	304	316
25	A	A 374	286	A 346	334	274	244	A	A	A	A 260	230	Y	286	A	224	A 284	246	246	A 286	296	262	A 322	322
26	290	316	290	314	318	260	232	218	A	202	204	A	A	212	Y	Y 250	218	242	242	264	244	258	270	270
27	294	316	302	296	308	272	A 268	A	A	A	A	A	A	A	A	A	A	A	A	E A 292	A 344	230	E A 354	246
28	306	292	244	288	304	246	224	224	A	228	202	A	236	252	244	A	234	A	254	268	250	248	276	286
29	278	290	322	318	296	254	234	218	A	224	A	E A 274	A	A	A	A	234	234	242	264	260	266	264	262
30	278	300	290	264	262	236	234	230	222	228	A	A	A	A	E A 268	A 266	A 266	244	A	252	242	A 302	286	318
31	E A 346	324	290	298	290	254	236	242	A	A	E A 268	A	A	A	244	A	A	A	A	304	266	E A 324	330	344
	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	28	25	16	8	8	10	10	10	10	11	14	19	16	16	26	30	30	31	31
MED	302	306	294	298	290	254	236	229	227	218	210	216	214	228	224	228	237	240	245	266	260	276	303	316
U Q	332	320	322	320	310	268	248	242	A 259	228	E A 260	E 246	236	260	244	238	A 248	245	A 262	A 274	296	312	330	338
L Q	289	290	274	278	268	248	229	218	213	203	202	204	204	212	210	224	230	235	242	252	250	262	276	286

JUL. 1998 h'F (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1998 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						A 120	110	110	112	114		A	A	A	A	A	A	A 128	126	B				
2						144	118	118	116	116	116	116	A	116	A	120	120	120	118	B				
3						136	120	116	116	116	A	A	A	116	120	124	120	118	118	B				
4						A	A	A	A	A	116	116	120	120	120	122	116	116	118	B				
5						A 120	120	120	120	120		A	A	A	130	116	118	128	118	B				
6						132	120	116	116	116	116	A	A	A	116	118	122	118	118	B				
7						A 120	120	116	A	118	A	124	128	126	124	122	122	A	B					
8						A 112	112	112	112	112	A	A	A	A	A	A	122	A	B					
9						A 118	118	118	A	A	A	A	B	A	122	122	122	A	B					
10						A 122	116	114	112	112	A	A	A	A	A	A	124	A	B					
11						A 120	116	118	A	A	A	A	A	A	A	A	124	122	B					
12						A	A 144	116	116	116	A	118	120	120	120	118	114	114	116	B				
13						120	124	114	114	A	A	118	A	A	A	A	116	A 124	A	B				
14						A 142	136	134	116	116	114	116	116	118	118	118	122	122	B					
15						A 126	116	114	114	114	A	A	A	A	A 130	122	122	A	B					
16						162	126	A	A	118	A	118	A	A	122	A	122	122	A	B				
17						A 128	116	A	A	A	A	A	A	114	114	A 126	A	A	B					
18						A	A	A	A	A	A	A	A	A	116	116	116	A 130	118	B				
19						A 122	A 132	118	122	122	118	124	A	124	A 128	A	130	124	B					
20						A	A 124	A	A	A	A	A	A	A	120	116	116	120	A	B				
21						A	A	A	A	A	A	A	A	122	122	120	120	118	A	B				
22						A 124	122	120	122	A	A	A	A	A	A 120	120	120	120	120	B				
23						A 118	A	118	116	A	A	A	A	A	A	A	120	120	120	B				
24						A	A	A	A	A	A	A	A	B	120	122	120	122	A					
25						A 124	120	116	116	116	118	118	A	114	114	114	118	118						
26						A	A 134	A	A	124	A	118	A	118	120	A	A	A	A 122					
27						A 122	118	116	116	116	116	116	A	A	A	A	A	A 126	122					
28						B	A 120	118	A	A	A	B	118	118	116	116	116	124						
29						134	122	120	118	118	118	A	118	A	A	A	A	A	A 130					
30						A 118	118	112	112	112	A	A	A	A	A	A	A	128	A					
31						B 134	134	A	116	120	A	114	A	A	116	A	116	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						7	25	23	23	20	15	11	7	9	18	19	22	27	18					
MED						134	122	118	116	116	116	118	120	118	120	120	120	122	120					
U Q						144	126	120	118	119	118	118	124	121	122	122	122	A 124	122					
L Q						132	120	116	114	115	114	116	118	116	116	116	116	118	118					

JUL. 1998 h'E (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1998 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	116	112	108	108	106	120	126	114	112	108	122	110	104	104	100	102	130	120	120	118	114	134	112	112
2	110	106	106	104	104	144	136	120	126	124	124	112	116	114	114	126	122	118	114	114	116	B	110	110
3	108	106	102	102	106	104	138	122	116	116	110	108	108	120	142	144	136	124	116	112	110	110	110	104
4	106	108	108	108	104	104	108	108	108	112	G	120	118	124	130	G	122	128	116	112	110	116	114	114
5	108	108	108	106	104	116	118	114	114	118	118	114	116	116	144	118	126	124	116	114	116	110	110	110
6	110	112	104	110	114	G	128	114	112	110	112	116	120	120	G	172	108	G	124	112	108	110	116	110
7	106	104	104	104	104	120	116	112	114	108	108	114	138	124	124	130	122	118	108	112	B	112	100	104
8	106	102	108	106	B	118	114	118	112	112	110	104	104	104	104	106	122	120	116	128	112	112	108	106
9	104	104	100	98	100	120	122	118	122	110	110	110	114	B	120	118	118	116	112	108	110	112	108	104
10	104	104	104	102	108	116	114	112	112	108	108	108	112	112	112	108	108	132	130	100	108	108	122	110
11	108	112	106	106	108	108	126	114	108	108	112	108	108	106	106	102	104	126	112	110	106	108	112	110
12	112	108	106	106	122	140	124	G	122	114	112	134	122	122	124	124	124	132	120	114	108	108	116	110
13	108	104	104	110	128	126	120	114	114	112	116	124	136	106	112	114	104	104	104	100	100	106	110	110
14	110	110	106	104	108	118	114	134	128	124	124	122	124	118	120	120	126	120	116	110	116	114	110	106
15	106	104	104	128	122	132	140	124	114	112	112	110	114	120	114	120	124	122	122	B	B	B	112	108
16	112	110	106	106	104	162	150	136	128	118	118	108	110	110	126	132	126	124	116	112	110	110	110	106
17	114	102	100	104	104	122	126	114	110	108	106	108	112	110	G	170	150	138	116	112	112	112	108	108
18	104	104	104	104	106	114	106	110	122	116	110	110	112	150	124	124	G	120	118	112	110	116	114	110
19	108	102	104	108	198	138	130	138	118	114	126	130	108	110	130	108	106	130	118	112	110	108	108	110
20	102	102	116	110	104	106	118	118	112	120	100	102	100	98	146	126	122	124	114	114	118	112	106	108
21	112	96	98	114	128	120	114	108	108	108	108	114	116	132	G	144	124	118	114	110	110	108	108	106
22	102	102	102	98	130	130	124	120	116	118	112	112	106	128	122	122	122	122	116	112	112	108	108	106
23	106	106	106	112	120	118	116	112	112	112	114	112	112	110	110	110	128	126	120	114	110	112	108	108
24	102	100	96	96	98	128	118	116	112	112	104	106	108	B	108	156	134	122	116	114	112	112	110	112
25	110	108	106	106	106	132	128	124	120	114	116	120	124	128	118	130	124	120	118	112	110	112	114	104
26	110	106	102	106	100	108	118	112	106	174	116	116	114	122	G	114	112	108	108	104	104	104	104	100
27	100	110	118	B	108	108	136	128	120	114	110	108	106	108	108	108	124	122	120	112	114	138	112	118
28	108	104	100	100	108	132	112	120	116	110	108	110	B	126	124	126	134	118	122	104	110	100	100	102
29	98	98	118	96	B	G	G	134	120	116	112	112	110	106	110	108	108	108	126	106	B	106	106	102
30	B	B	B	B	110	134	136	128	122	118	112	110	106	106	102	108	110	130	116	116	110	108	106	114
31	108	106	106	120	102	126	136	112	118	116	114	118	112	108	122	118	106	106	108	102	112	114	112	112
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	29	29	29	30	30	31	31	30	31	30	29	27	30	30	30	31	30	28	29	31	31
MED	108	105	105	106	106	120	123	117	114	114	112	112	112	114	120	120	122	122	116	112	110	110	110	108
U Q	110	108	106	109	117	132	130	124	120	118	116	116	116	123	124	130	126	126	120	114	112	112	112	110
L Q	104	102	102	103	104	115	116	112	112	110	110	108	108	107	110	108	110	118	114	110	110	108	108	106

JUL. 1998 h'Es (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

JUL. 1998 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

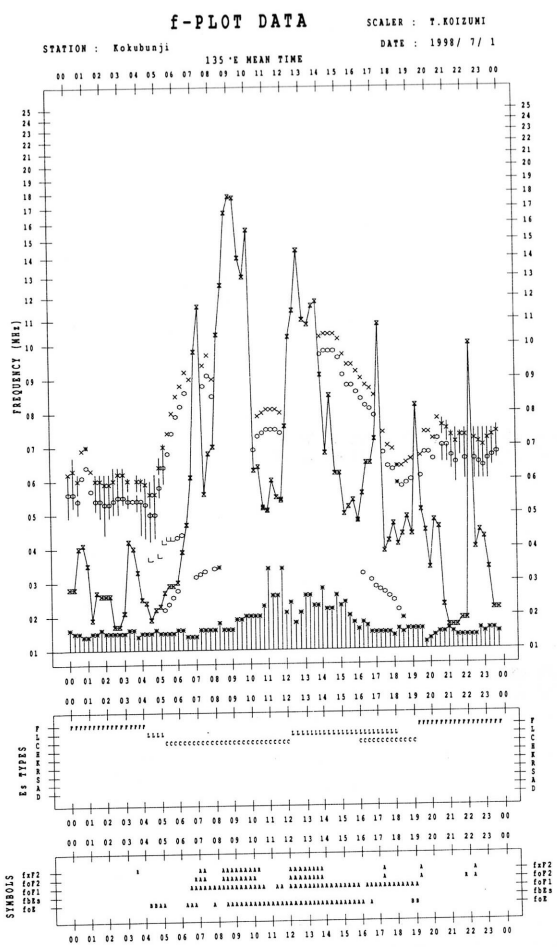
LAT. 35°42.4'N LON. 139°29.3'E SWEEP 1.0MHz TO 25.0MHz IN 24.0SEC IN MANUAL SCALING

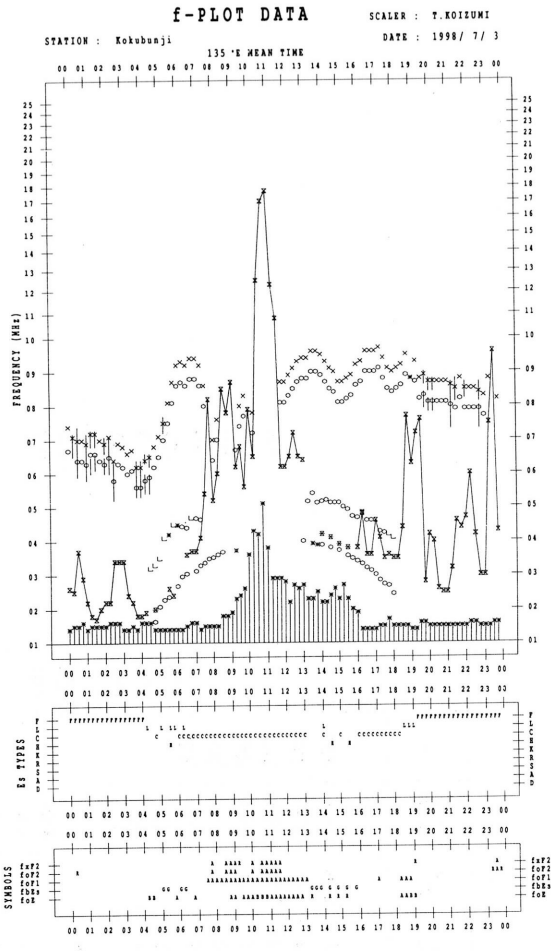
D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F 2	F 4	F 3	F 3	F 3	L 2	C 2	C 3	C 2	C 2	CC 12	C 1	C 2	L 3	L 2	L 2	CL 12	CL 32	CL 42	C 4	F 5	FF 12	F 3	F 6
2	F 3	F 3	F 2	F 2	F 6	C 2	C 2	C 3	C 1	C 2	C 1	C 2	C 2	C 2	C 2	C 1	C 2	C 2	C 4	C 3	F 2		F 3	F 3
3	F 4	F 5	F 3	F 2	F 2	L 1	C 1	C 2	C 2	C 2	C 2	C 2	C 2	C 1	CL 11	C 1	C 1	C 2	C 3	L 5	F 2	F 3	F 3	F 3
4	F 4	F 4	F 4	F 3	F 4	L 3	L 2	L 2	L 2	L 1		C 1	C 2	C 1	C 2		C 2	C 2	C 3	C 4	F 3	FF 34	F 4	F 5
5	F 5	F 5	F 6	F 3	F 3	L 2	C 4	C 2	C 1	C 1	C 2	C 1	C 1	C 1	CL 11	C 2	CL 21	CL 21	C 4	L 3	FF 21	F 4	F 3	F 3
6	FF 21	F 2	F 4	F 3	F 4		C 2	C 2	C 3	C 2	C 1	C 1	C 1	L 1		H 1	L 1		C 3	L 3	FF 42	F 5	F 6	F 5
7	F 6	F 4	F 3	F 2	F 4	C 3	C 2	C 2	C 2	C 2	C 2	L 1	C 1	C 2	C 2	C 1	C 2	C 2	C 2	L 2		F 1	F 2	F 2
8	F 2	F 2	F 2	F 1		C 3	C 2	C 1	C 2	C 2	C 2	C 3	C 2	C 2	C 3	C 2	CL 11	CL 21	C 3	CL 11	F 2	F 2	F 5	F 5
9	F 5	F 5	F 2	F 3	F 2	C 2	C 2	C 2	C 1	C 1	L 2	C 2	C 1		C 1	C 1	C 2	C 3	L 2	L 2	F 3	F 3	F 3	F 3
10	F 4	F 4	F 3	F 3	F 2	L 4	C 3	C 2	C 2	C 2	C 2	C 2	L 1	L 1	L 1	L 2	L 1	HL 11	CLH 22	L 3	F 1	F 2	FF 13	F 3
11	F 3	F 5	F 5	F 3	F 4	L 2	C 2	C 3	C 2	L 2	L 1	L 2	C 2	L 2	L 2	L 3	L 2	CL 12	C 3	L 4	F 3	F 6	F 4	F 3
12	F 4	F 3	F 2	F 4	F 2	C 2	CL 31		C 2	C 2	C 2	C 1	C 1	C 1	C 1	C 2	C 1	C 2	C 3	C 3	F 3	F 4	F 5	F 5
13	F 4	F 4	F 2	F 4	FF 23	C 4	C 2	C 3	C 1	C 1	C 1	C 1	CL 11	L 2	C 1	C 2	C 2	L 2	L 2	L 2	F 2	F 1	F 5	F 5
14	F 5	F 5	F 4	F 3	F 4	C 2	LC 22	CL 22	CL 21	C 2	C 2	C 2	C 1	C 2	C 2	C 2	C 1	CL 11	C 2	C 4	F 3	F 3	F 3	F 3
15	F 3	F 3	F 2	FF 12	FF 12	C 1	HL 11	C 1	C 2	C 2	C 2	C 2	C 2	CC 12	L 2	CL 11	CL 21	CL 21	CL 12				F 6	F 3
16	FF 21	F 4	F 3	F 2	F 2	C 1	HL 21	HL 12	CL 22	C 2	C 1	C 2	C 3	C 3	CC 22	CL 12	C 1	C 2	L 3	L 3	F 2	F 2	F 3	F 2
17	FF 21	F 2	F 2	F 2	F 4	L 2	C 3	C 2	L 3	L 2	L 1	L 1	L 1	L 1		H 1	HC 11	CL 11	L 3	L 2	F 4	F 2	F 4	F 4
18	F 5	F 4	F 3	F 1	F 1	C 1	L 1	L 2	C 1	C 1	L 1	L 1	L 1	HL 11	CL 21	C 1		CL 21	CL 31	L 3	F 3	F 3	F 4	F 3
19	F 3	F 2	F 2	F 1	F 1	CL 11	C 1	CL 11	C 2	CL 31	C 1	C 1	L 1	LC 11	CL 11	L 1	L 2	CL 22	C 5	L 3	F 3	F 3	F 5	F 3
20	F 3	F 3	FF 12	FF 12	F 4	L 4	CL 12	C 2	C 2	CC 22	L 2	L 3	L 3	L 2	HL 11	C 1	C 1	C 1	L 2	L 2	FF 23	FF 22	FF 23	FF 23
21	FF 23	F 3	F 1	FF 42	F 1	C 2	L 3	L 2	L 2	L 2	L 1	L 1	L 1	C 1		H 1	C 2	C 3	C 3	L 2	F 3	F 2	F 3	F 5
22	F 3	F 2	F 1	F 1	FF 11	C 2	C 1	C 2	C 1	C 1	L 1	L 1	L 1	CL 11	C 1	C 2	C 1	CL 21	CL 31	L 4	F 3	F 2	F 4	F 3
23	F 3	F 2	F 2	F 2	F 2	L 5	L 3	C 3	C 2	C 3	C 2	C 2	C 1	L 1	L 1	L 1	CL 11	C 3	C 4	L 4	F 5	F 3	F 3	F 3
24	F 3	F 2	F 2	F 2	F 1	C 1	L 3	L 2	L 2	L 2	L 2	L 1	L 1		L 1	H 1	H 1	C 2	L 3	F 3	F 2	F 6	F 4	F 4
25	F 5	F 5	F 4	F 4	F 3	L 1	C 2	C 2	C 2	C 2	C 1	C 1	C 1	CL 11	C 1	C 1	C 2	C 1	C 4	F 5	F 3	F 3	F 6	F 4
26	F 2	F 3	F 2	F 1	F 1	LC 11	L 1	L 2	L 2	HL 11	L 1	L 1	C 1	C 1		C 1	L 1	L 1	L 2	F 3	F 3	F 3	F 4	F 2
27	F 2	F 2	F 1		F 4	L 3	C 2	C 2	C 2	C 2	C 2	C 2	L 2	L 2	L 3	L 2	CL 32	CL 32	C 4	F 5	F 3	FF 12	F 4	F 2
28	F 4	F 2	F 3	F 2	FF 22	C 1	LC 11	C 2	C 2	C 2	L 1	L 2		C 1	C 1	C 1	C 1	C 2	C 2	F 2	F 2	F 3	F 2	F 2
29	F 2	F 2	FF 22	F 2				C 1	C 2	C 1	C 2	L 2	L 2	L 2	L 2	L 2	L 2	L 1	CL 11	F 2		F 1	F 2	F 1
30					F 1	C 1	C 1	C 2	C 2	C 1	C 2	C 2	C 2	C 3	L 2	L 1	LC 11	CL 11	C 3	F 2	F 6	F 3	F 3	FF 24
31	F 5	F 4	F 2	FF 13	F 3	C 3	CL 21	LC 11	C 2	C 2	C 1	C 2	C 2	L 2	C 1	C 1	C 3	L 3	L 3	F 3	FF 24	FF 54	FF 23	F 5
	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																								

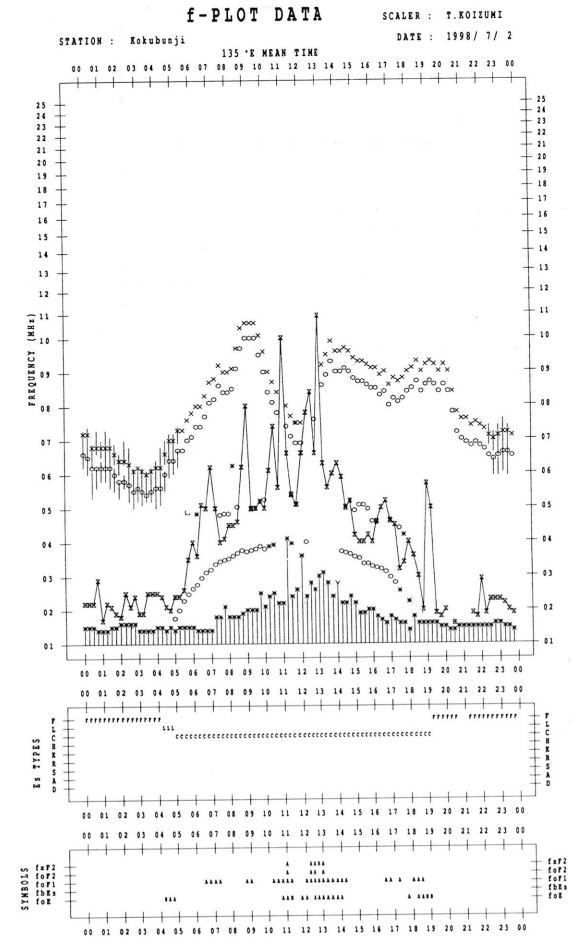
JUL. 1998 TYPES OF Es COMMUNICATIONS RESEARCH LABORATORY, JAPAN

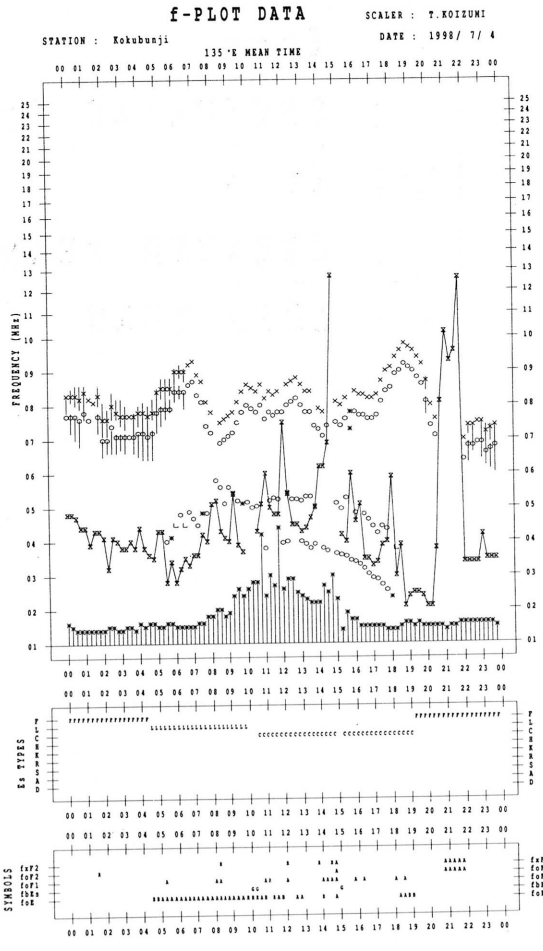
f-PLOTS OF IONOSPHERIC DATA

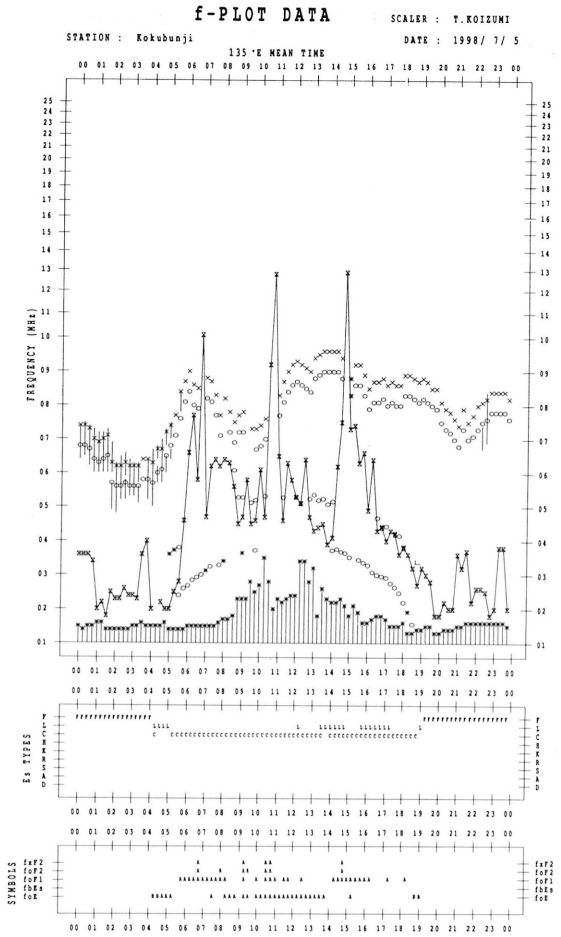
KEY OF f-PLOT	
	SPREAD
	foF2, foF1, foE
	fxF2
	DOUBTFUL foF2, foF1, foE
	fbEs
	ESTIMATED foF1
	fmin
	GREATER THAN
	LESS THAN

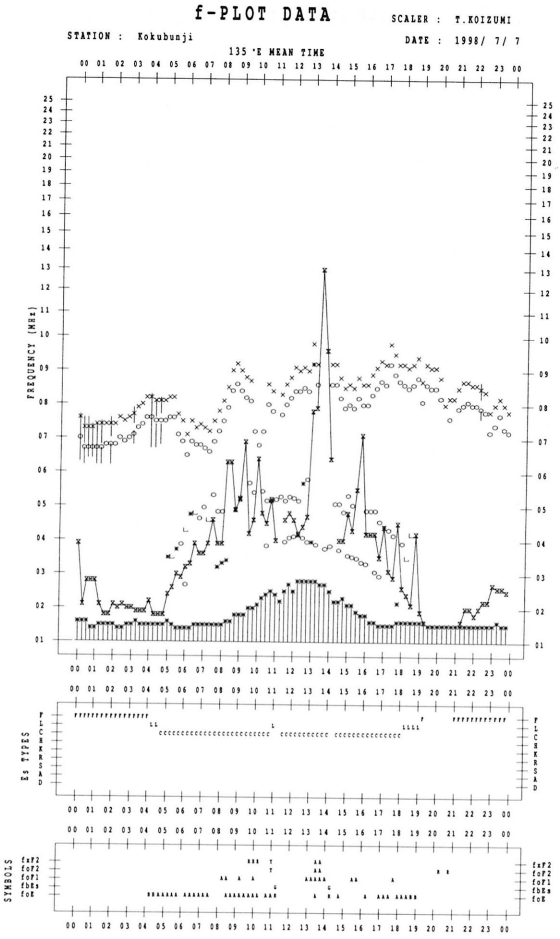

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 7/ 1
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

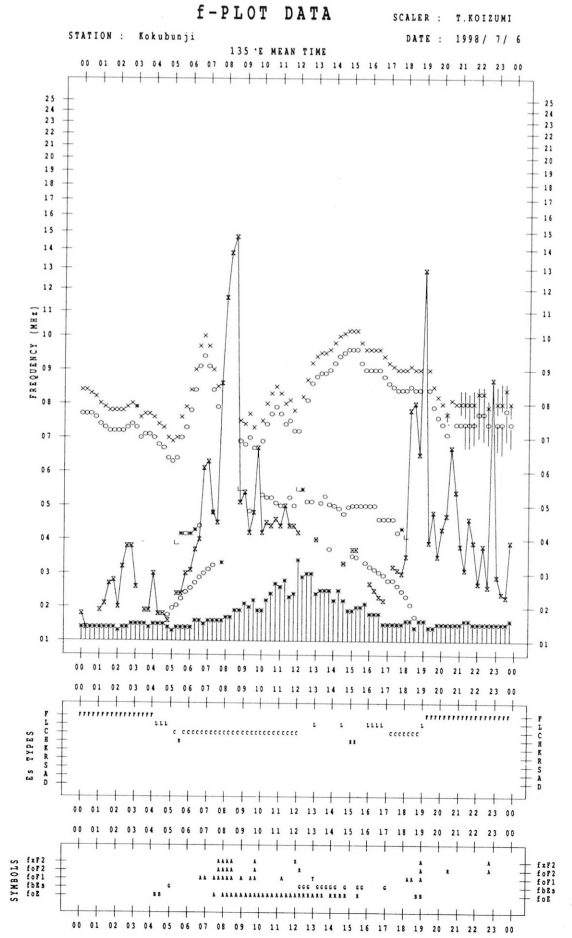

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 7/ 3
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

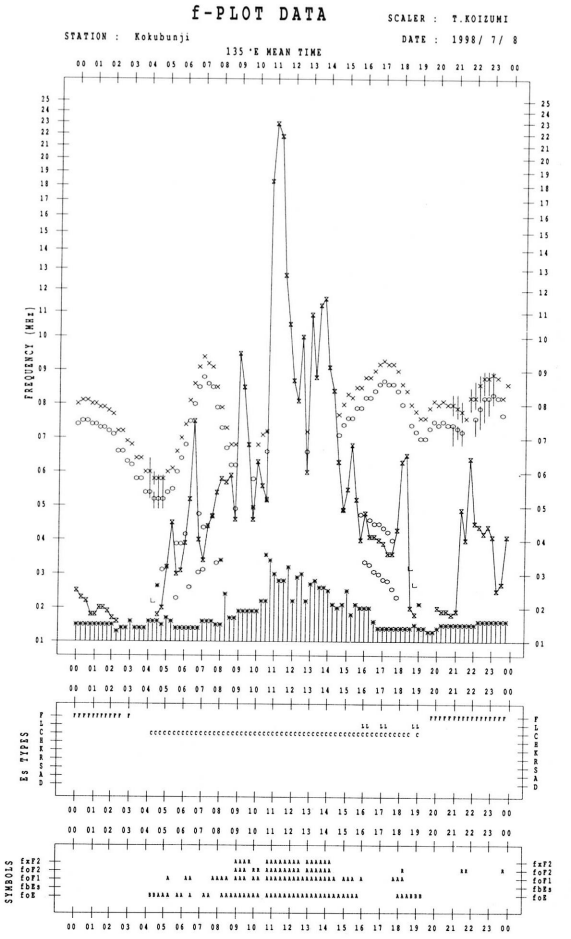

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 7/ 2
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

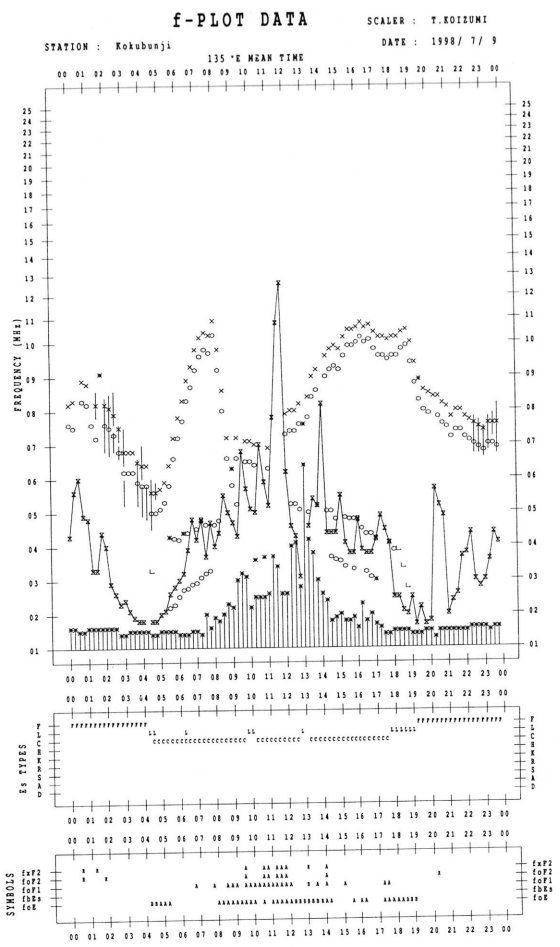

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 7/ 4
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

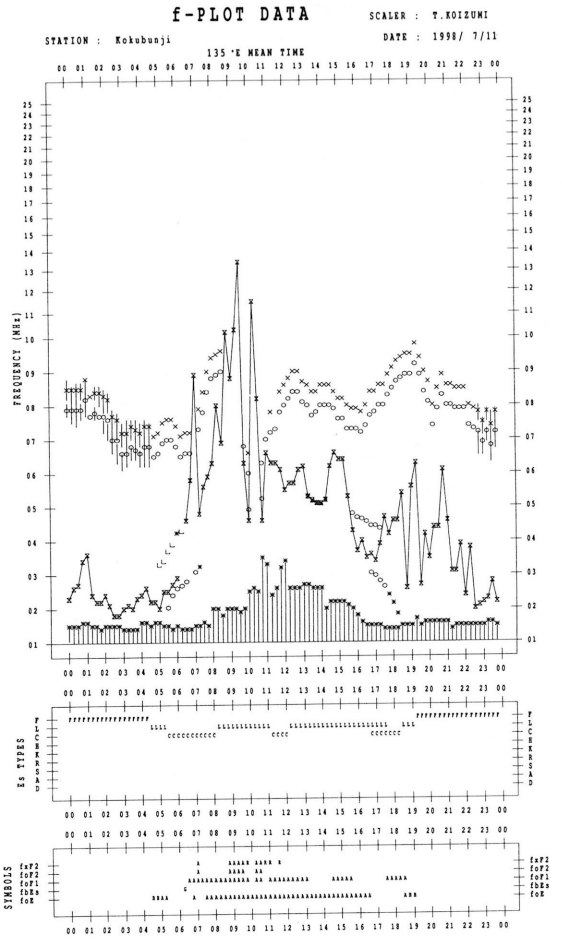

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 7/ 5
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 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 : 1998/ 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 : 1998/ 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 : 1998/ 7/ 9
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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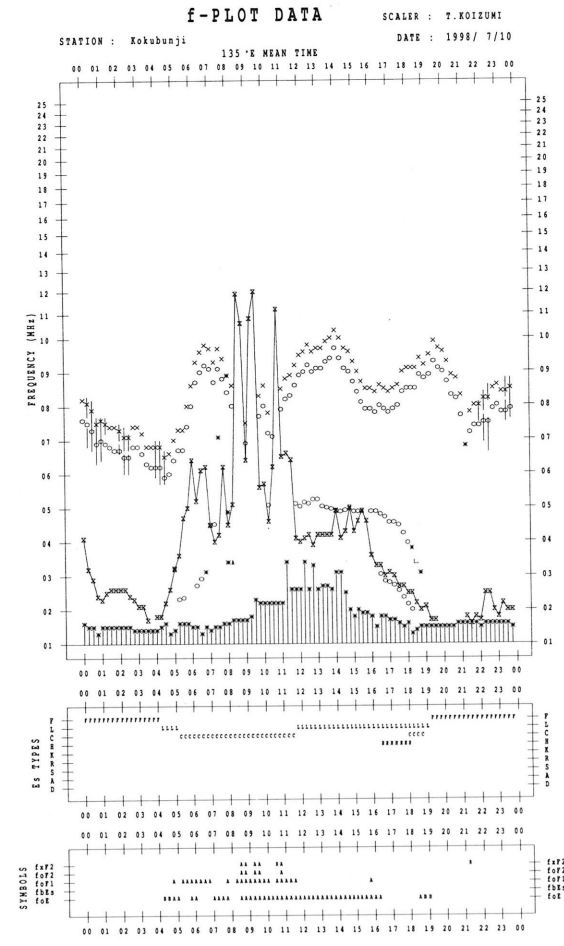
STATION : Kokubunji
DATE : 1998/ 7/11
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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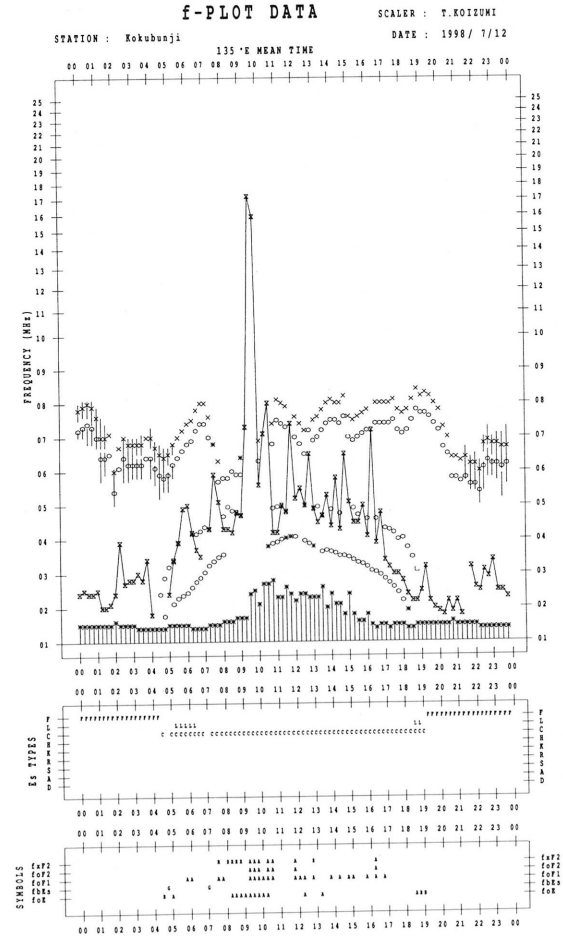
STATION : Kokubunji
DATE : 1998/ 7/10
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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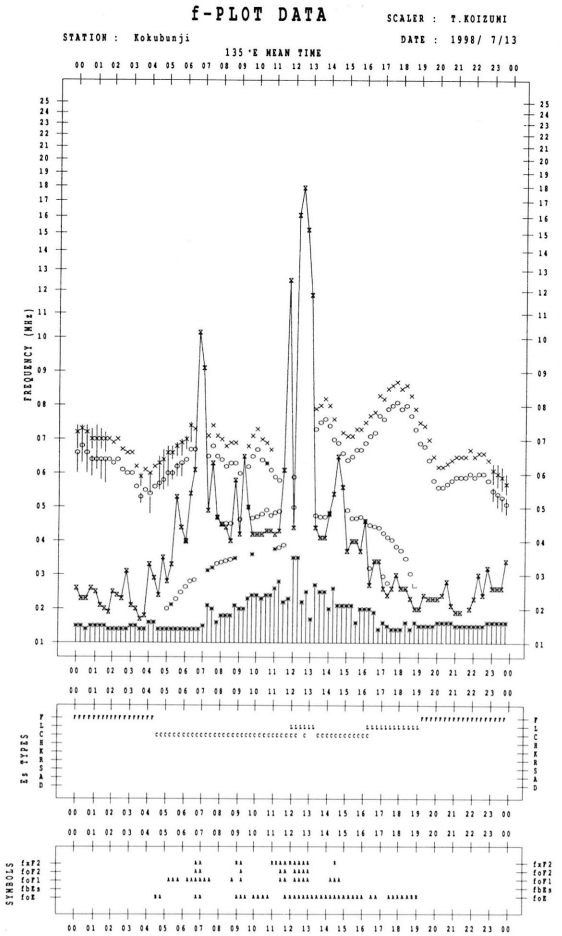
STATION : Kokubunji
DATE : 1998/ 7/12
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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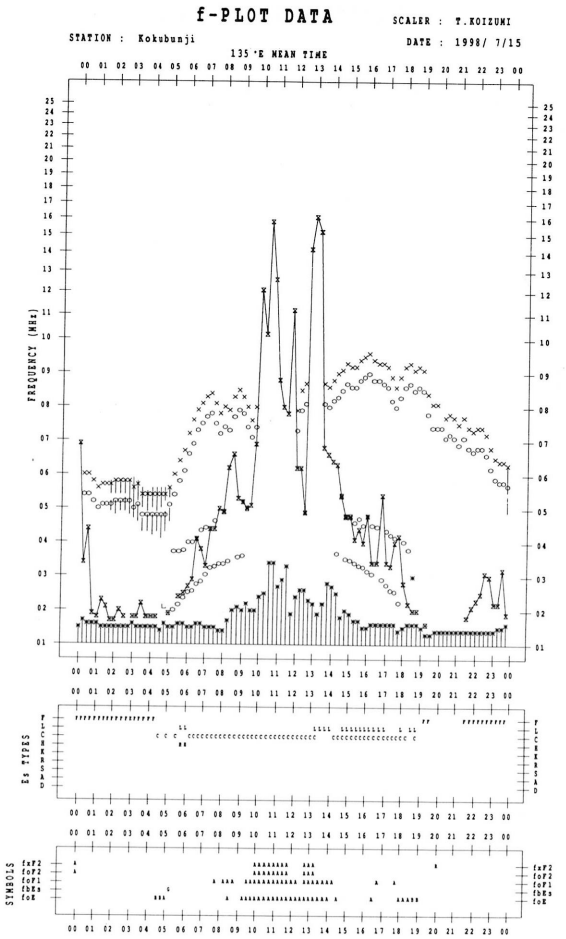
DATE : 1998/ 7/13
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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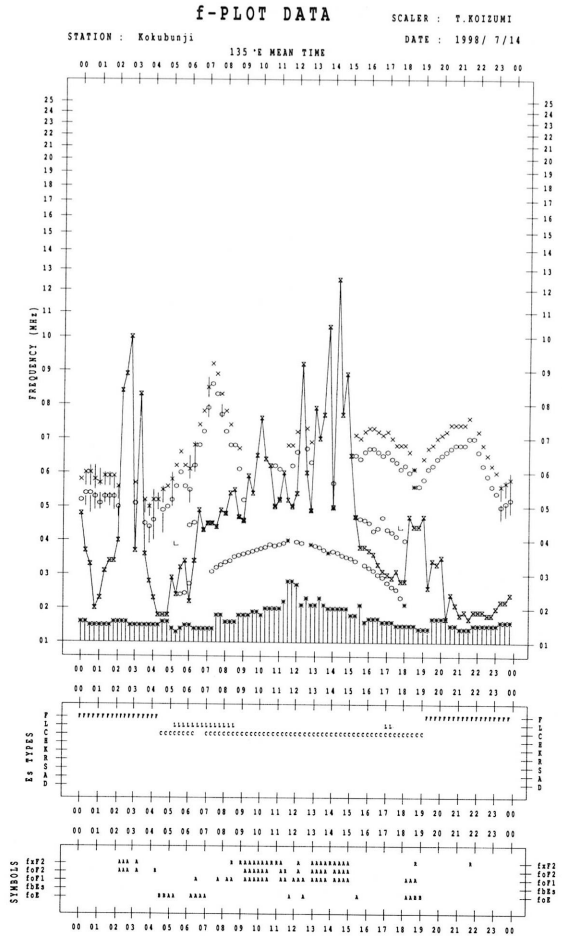
STATION : Kokubunji
DATE : 1998/ 7/15
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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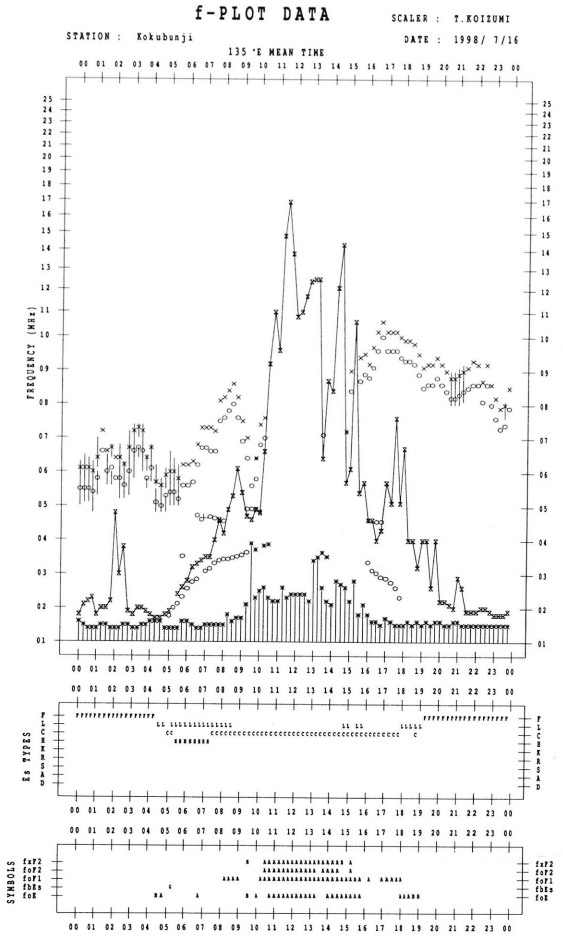
STATION : Kokubunji
DATE : 1998/ 7/14
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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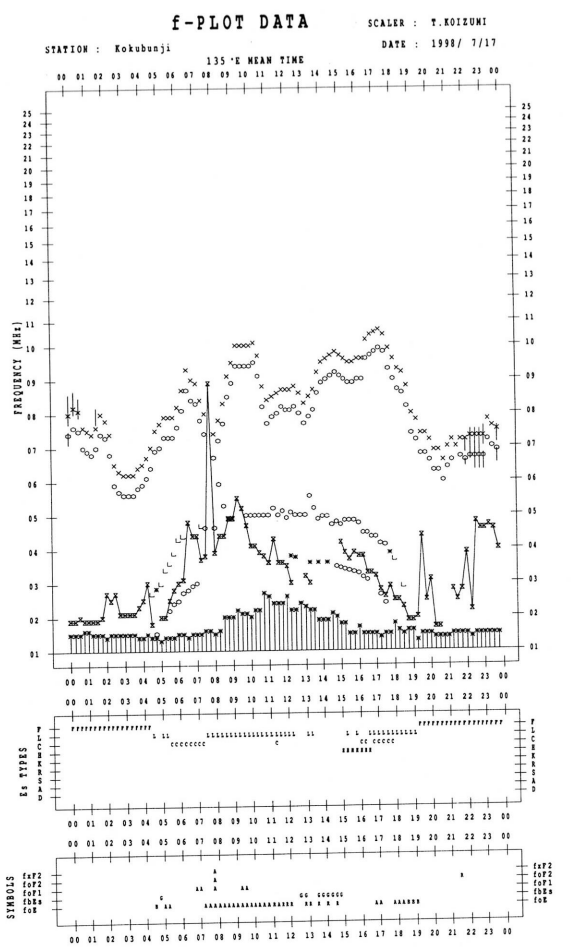
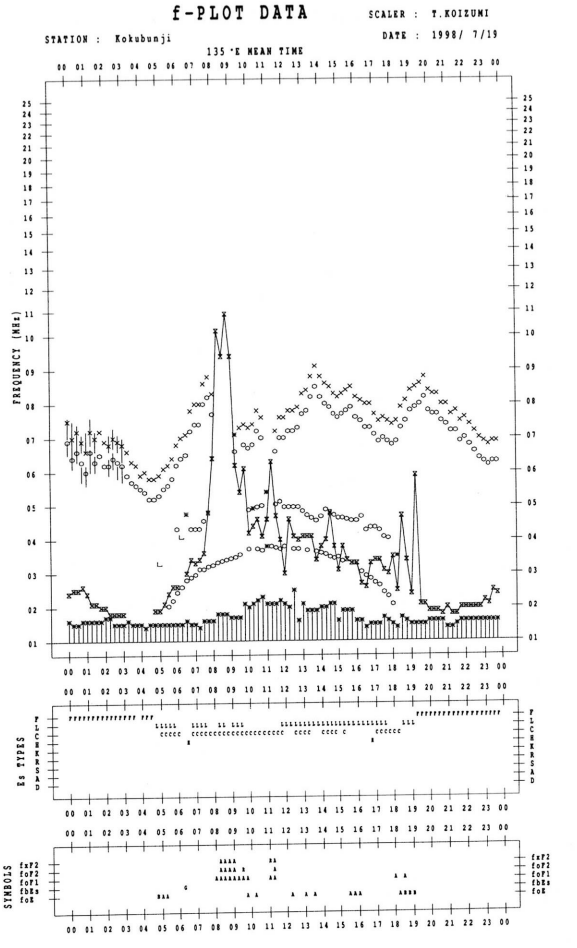
STATION : Kokubunji
DATE : 1998/ 7/16
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 7/17
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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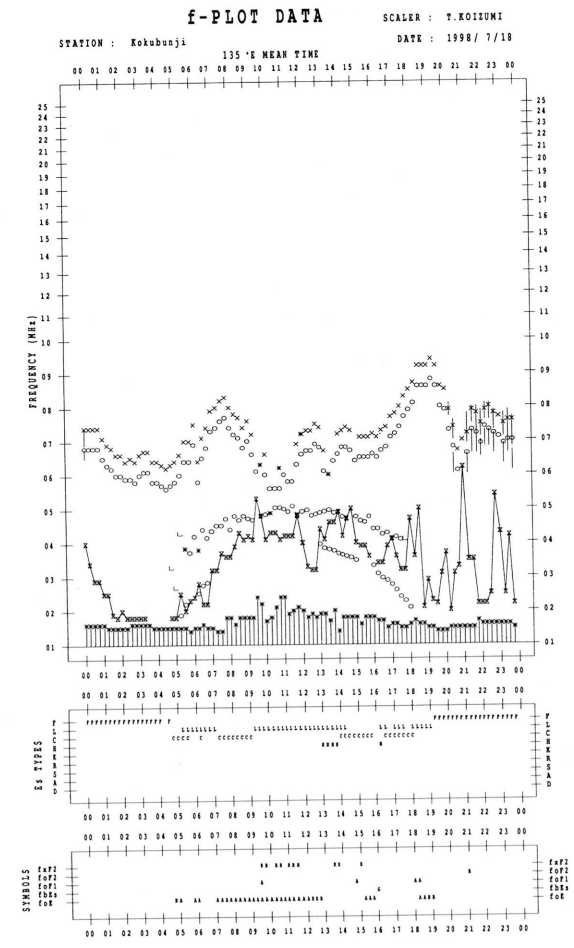
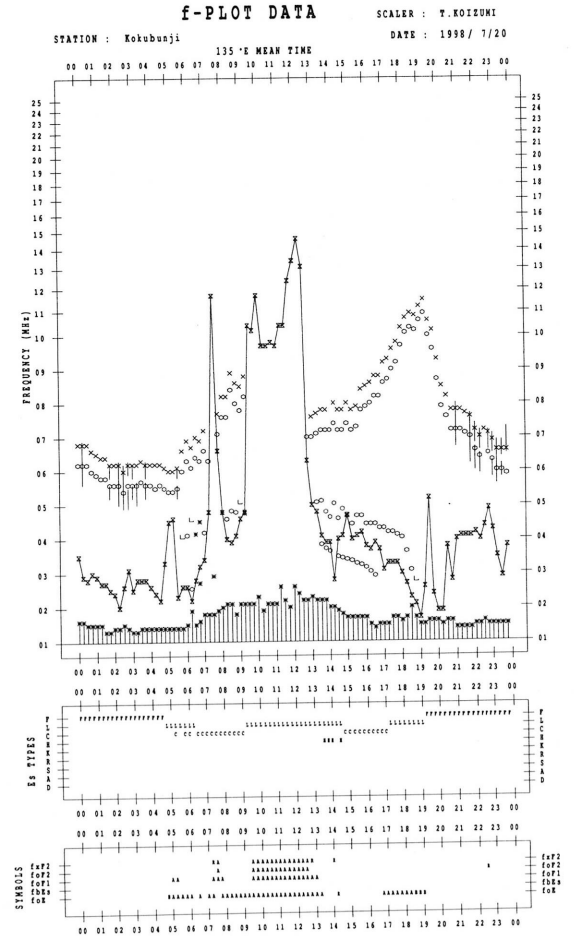
STATION : Kokubunji
DATE : 1998/ 7/19
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 7/18
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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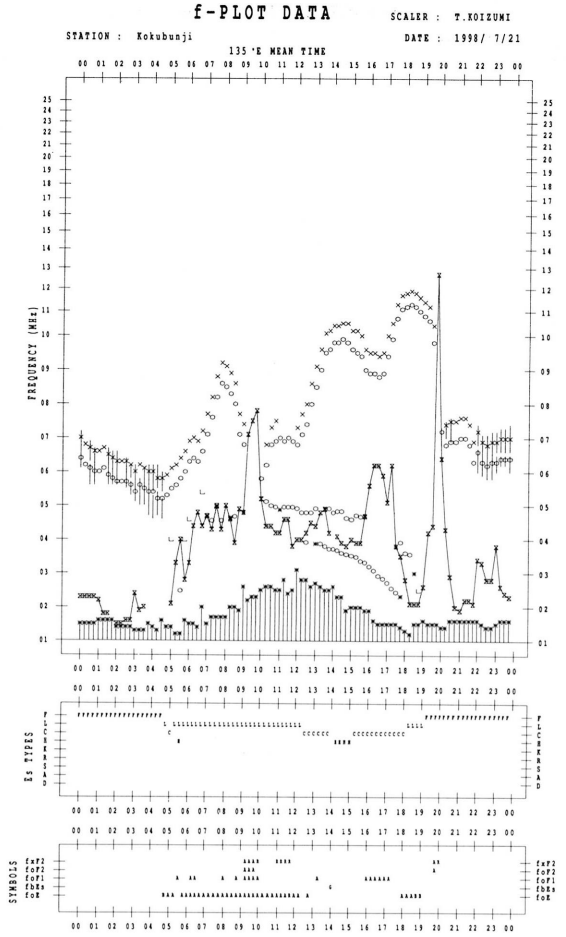
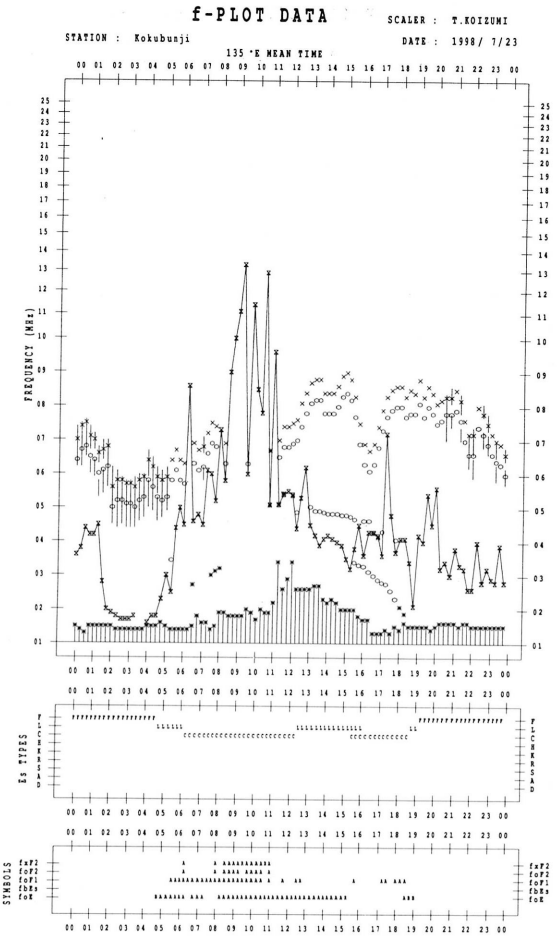
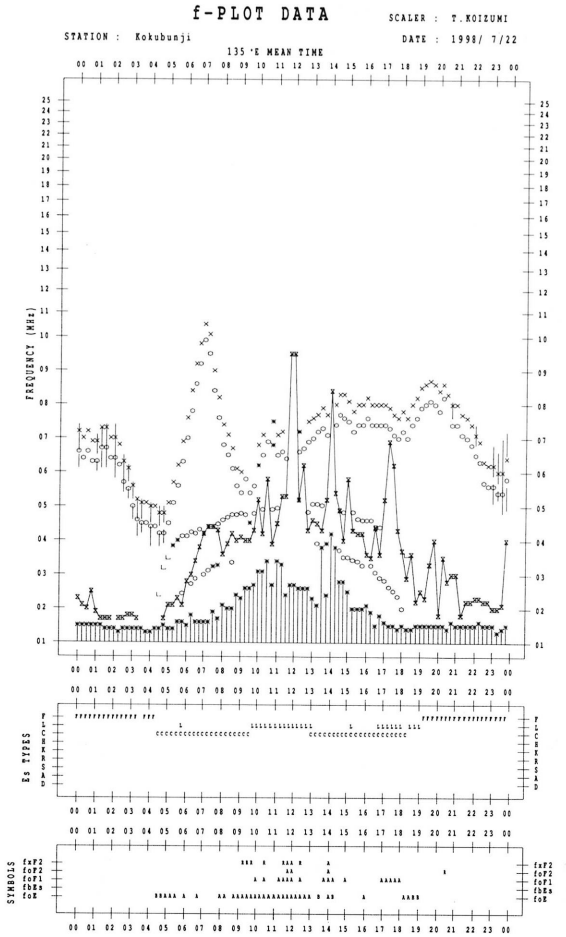
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 7/20
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 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 : 1998/ 7/23
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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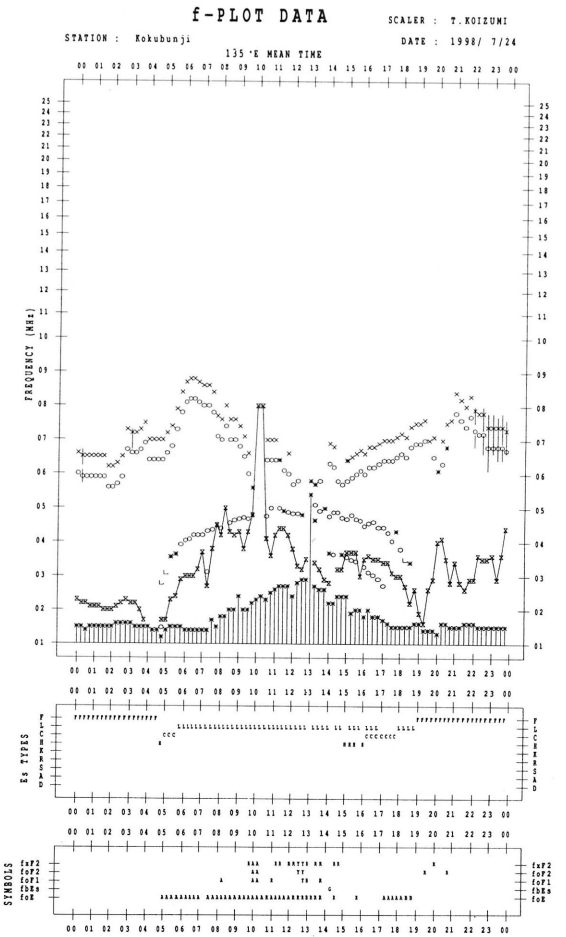
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 7/22
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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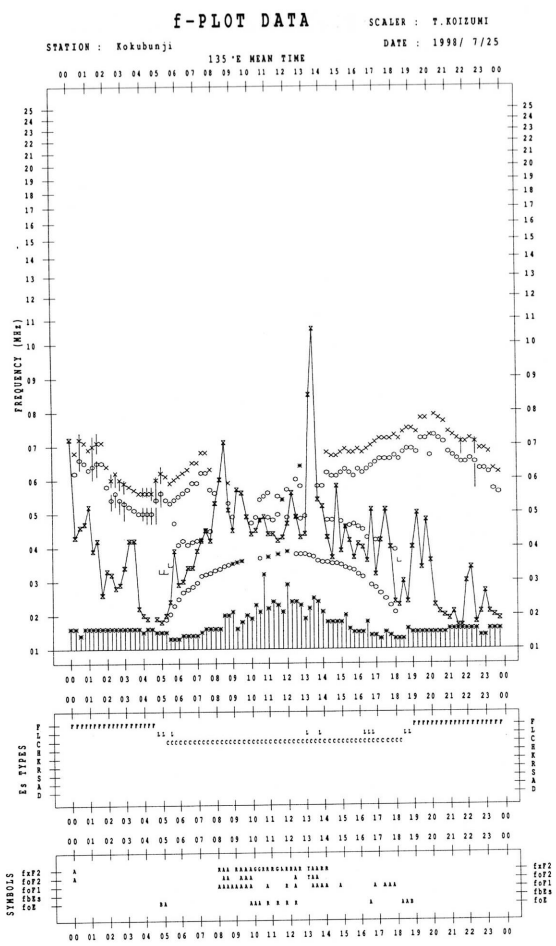
STATION : Kokubunji
DATE : 1998/ 7/24
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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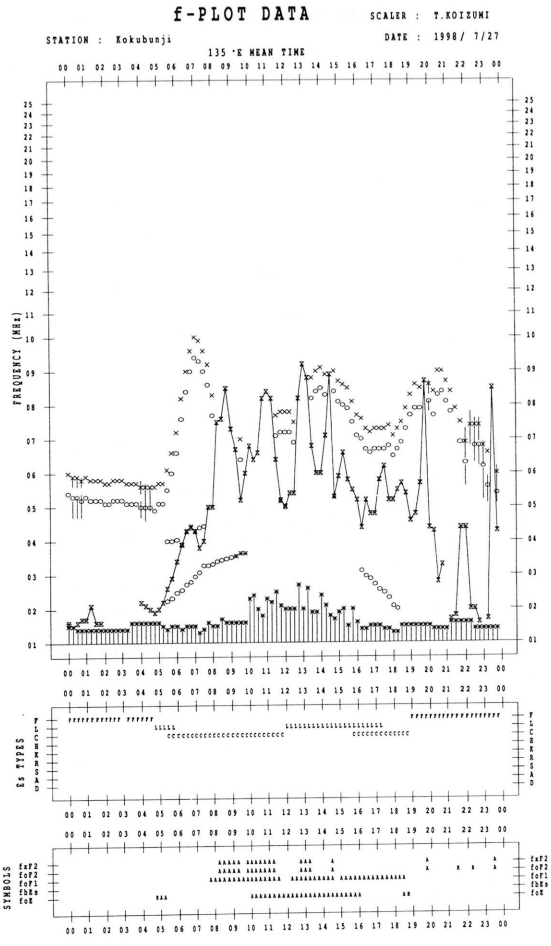
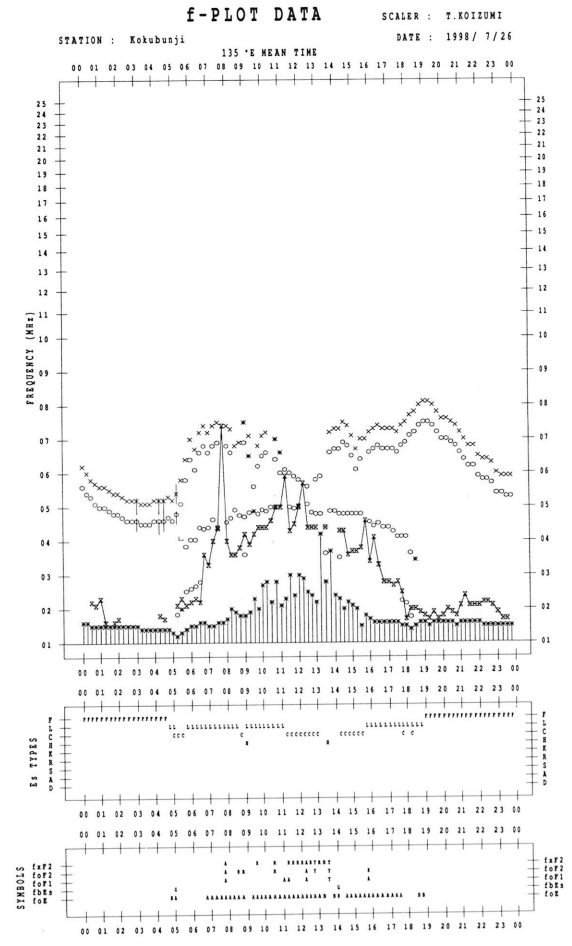
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 7/25
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 7/27
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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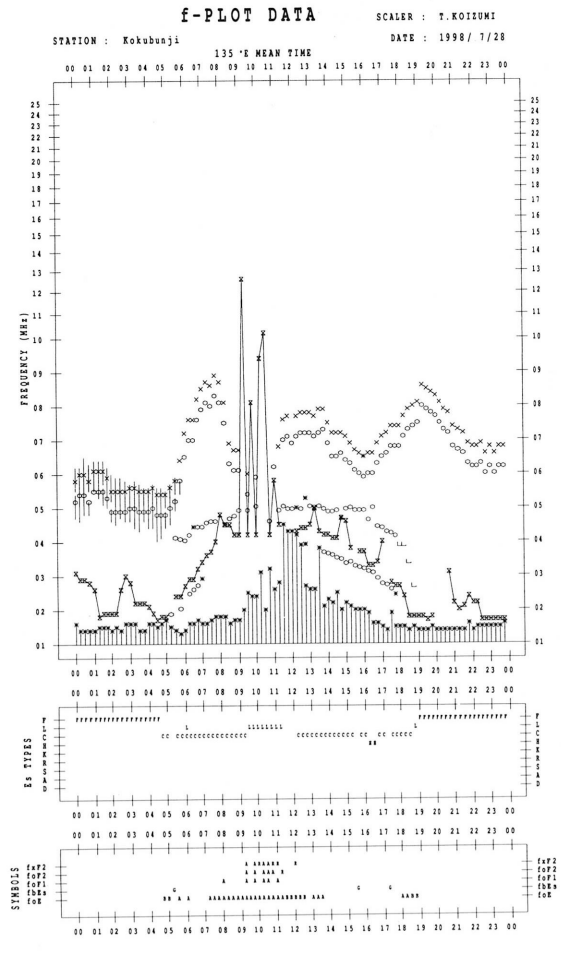
STATION : Kokubunji
DATE : 1998/ 7/26
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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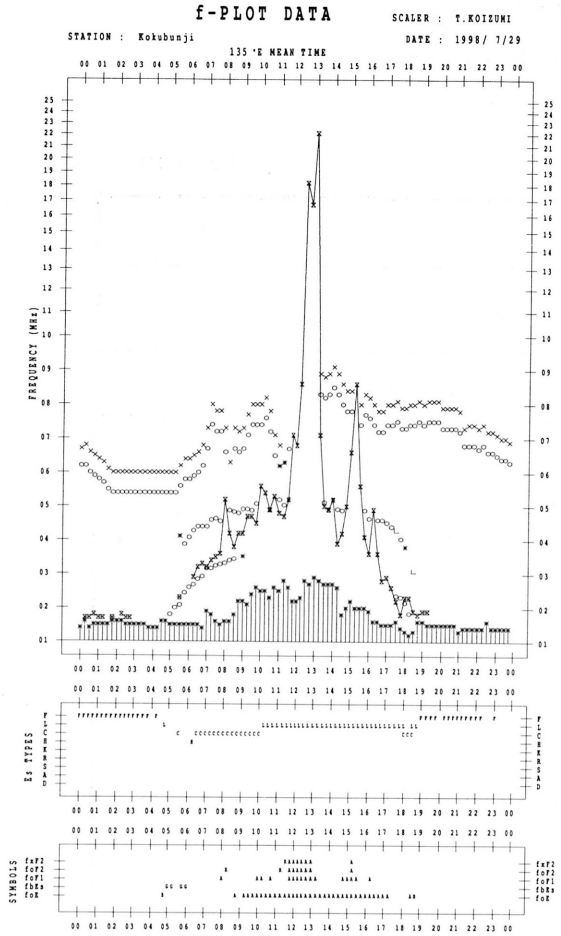
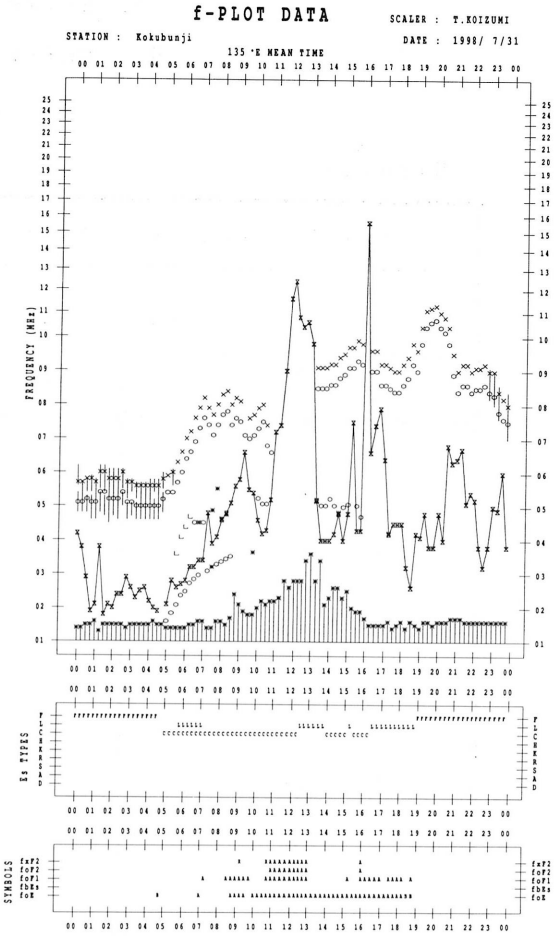
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 7/28
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 7/29
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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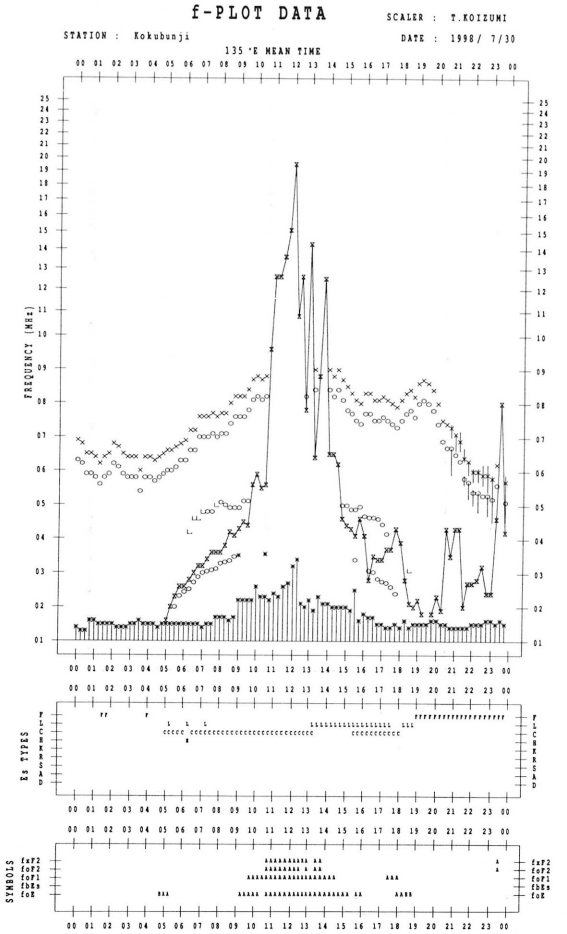
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 7/31
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1998/ 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 1998

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	-	-	-	-	-
2	-	-	-	-	-
3	-	-	-	-	-
4	-	-	-	-	-
5	-	-	-	-	-
6	-	-	-	-	-
7	-	-	-	-	-
8	-	-	-	-	-
9	-	-	-	-	-
10	-	-	-	-	-
11	-	-	-	-	-
12	-	-	-	-	-
13	-	-	-	-	-
14	-	-	-	-	-
15	-	-	-	-	-
16	-	-	-	-	-
17	-	-	-	-	-
18	-	-	-	-	-
19	-	-	-	-	-
20	-	-	-	-	-
21	-	-	-	-	-
22	-	-	-	-	-
23	-	-	-	-	-
24	-	-	-	-	-
25	-	-	-	-	-
26	-	-	-	-	-
27	-	-	-	-	-
28	-	-	-	-	-
29	-	-	-	-	-
30	-	-	-	-	-
31	-	-	-	-	-

Note: No observations during the folowing periods.
1st 0000 - 31th 2400

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso

July 1998

Single-frequency observations

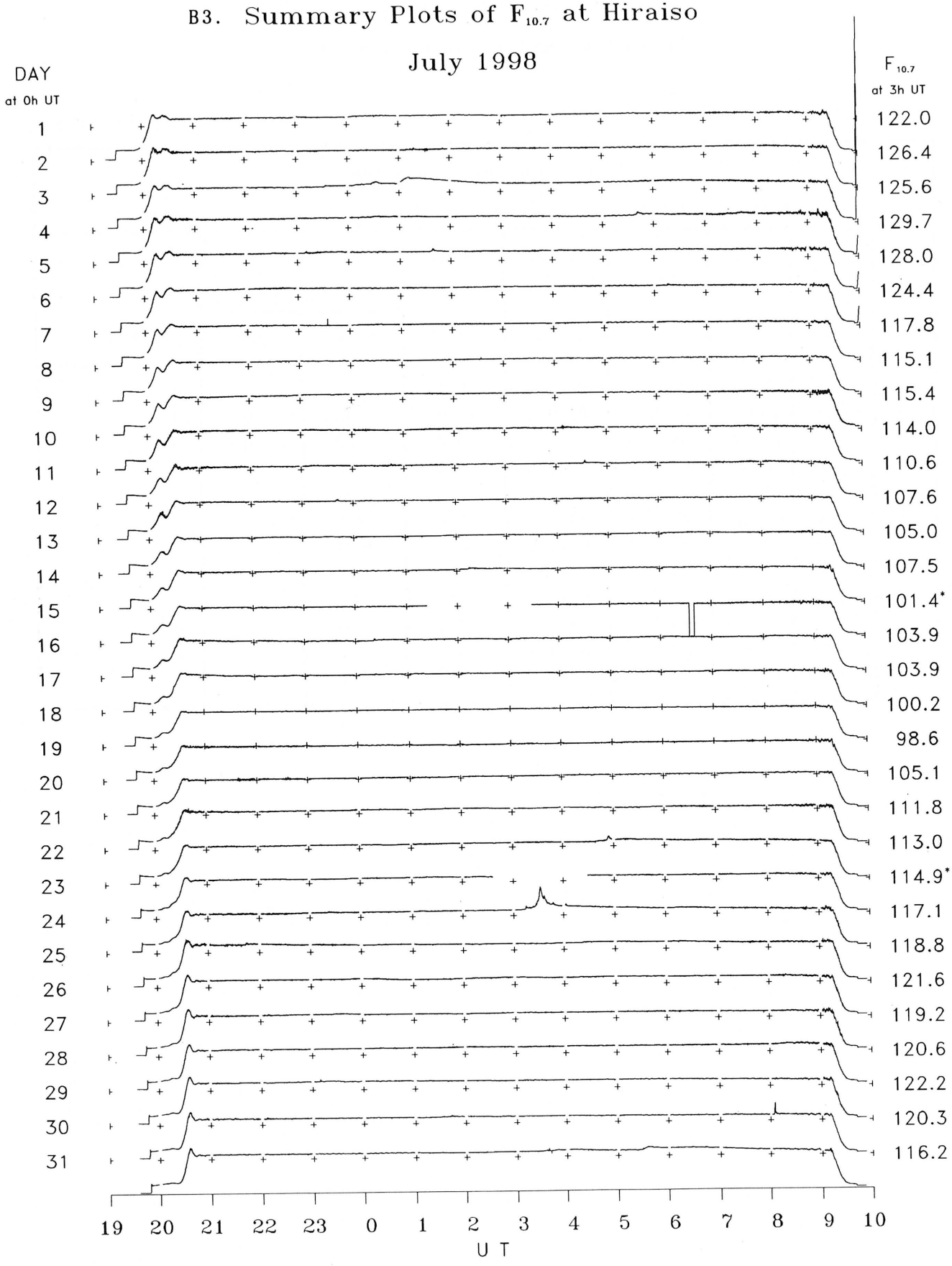
Normal observing period: 1930 - 1000 U.T. (sunrise to sunset)

JUL. 1998	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
2	200	8 S	0933.5	0933.7	0.7	50	-	0
3	200	46 C	0100.0	0109.0	15.0	80	6	0
	2800	20 GRF	0100.0	0112.0	80.0	20	4	0
5	200	8 S	0451.0	0451.2	0.4	50	-	0
	200	8 S	0822.2	0822.4	0.4	90	-	0
6	200	42 SER	2311.5	2320.2	10.0	320	-	0
7	200	8 S	0759.7	0759.9	0.4	1500	-	MR
	200	8 S	0814.6	0814.8	0.4	170	-	MR
	200	8 S	1957.0	1957.2	0.4	50	-	0
8	200	42 SER	0020.7	0021.2	2.5	90	-	0
	200	8 S	0233.2	0233.5	0.6	70	-	0
24	2800	46 C	0326.2	0332.0	38.0	50	15	0

B. Solar Radio Emission

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

July 1998



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

IONOSPHERIC DATA IN JAPAN FOR JULY 1998
F-595 Vol.50 No.7 (Not for Sale)

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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