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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 l etters 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

DEC. 1997

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	47	57	56	57	55	40	37	A	71	68	60	76	68	72	68	68	35		35	34	37	36	37	37
2		38	40	38	41	41	38	60	88	81	81	83	70	66		67	51	43	36	40		A	38	40
3	40	40	40	36	45	47	41	57	84	76	80	80	81	80		63	55	40	36		40	41	37	45
4	48	57	38	31	38	31	35	38	80	95	88	109	77	78	77	68	58	41	36	35	N	41	37	43
5	36	38	38	38	40	40	A	44	70		80	88	81	73		74	58	41	38	30	35	38	40	37
6	38	38	37	30	38	35	32	38	69	74	81	87	78	78	91	68	42	28	29	35	A	29	30	
7	38	A	A	59	24	N	N	42	60	77	76	80	86	71	64	64	58	48	26	A	A	36	37	37
8		32	38	38	41	42	N	50	61	70	75	67	71	73	68	56	40	29	31	32	33		30	40
9	35	40	38	38	A	37	36	A	79	68	69	68	70	70	60	58	37	37	38	30	35		35	32
10	36	35	37	35	35	38	34	43				67	74	70	60	58	40	34	36		31	40	41	39
11		A	38	38	38	B	B	30	60	79	84	72	A	73	79	58		40	40	40	41	41	48	56
12	57	56		56		45	45	51	71	71	70	81	75	74	82	57	46			A		59		26
13	35	A	A	35	29	A	A		58	68	69	91	67	A	62	66	37	A		37			44	35
14	40	36			40		29		62	68	82	80	68	70	68	60	47	A	28	34	36	32	31	32
15	38	40	41	35	50	43		69	58	71	74	71	62	61	67	60	A	A	28	30	26	31	35	40
16		35	40	31	35	A	N	A	57	69	64	64	64	64	61	A	69		A	28	A	35	A	35
17	35	29	29	32	35	35	29	A	63	73	73	80	66	71	67	61	47	38	29	29	A	40	A	29
18	35	37	34	35	38	29	N	A	68	70	82	76	56	74	60	57	58	60	25	32	A	A	35	34
19	38	36	36	35	35	34	30		57	68	68	65	65	71	70	58	45	43	34	35	35	A	31	32
20	35	38	35	34	35	38	35	42	57	68	69	68	61	58	60	56	37	41	41	34	36	29		32
21	35		A	35		38	35	43		62	68	70	61	62	67	58	40	37	29	29	31			37
22	35	36	35	31	A	34	31	43		79	68	70	67	63	60	60	56	N	28	B	A	69	35	38
23	35	35	38	35		35	32	A	57	68	71	72	62	57	57	56	58	28	34	B	A	B		N
24	26	A	38	31	30	30	35	44	56	58	61	70	63	65	56	56	47	56	N	30	B	A	N	25
25	28	34	35	35	28	32	34	40	56	71	68	60	68	65	68	60	47	43	30	N	28	31	35	35
26	29	38	35	32		34	35	46	70	68	60	70	68	58	59	59	50	32	31	34	A	A	A	A
27	25	32	31		32	35	38	40		71	60	66	58	57	60	56	A	24	A	A	B	31	31	
28	28		38	A	25	A	A	A	56	68	70	66	60	64	58		38	36	32	29	A	A	A	A
29	A	35	A	32	35	38	30	48		68	58	64	64	57	58	59	N	38	31	A	A	A	34	
30	A	36	29	A	35	30	28	A	51	64	71	66	74	64	58	60	47	40	35	21	A	34	35	A
31	35	38	N	37	30	A	31	54	70	78	92	88	A	82	67	56	58	32	38	A		52	56	56
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	25	24	27	25	24	22	20	26	29	30	31	29	30	28	29	27	24	26	21	13	19	22	24
MED	35	37	38	35	35	36	34	44	62	70	70	71	68	70	63	59	47	39	33	32	35	36	35	37
U Q	38	39	38	38	40	40	36	50	70	75	80	80	74	73	68	63	58	42	36	35	36	41	38	40
L Q	35	35	35	32	31	34	31	41	57	68	68	67	62	63	60	57	40	33	29	29	31	31	34	32

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fEs AT WAKKANAI

DEC. 1997

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	27	23	G	G	G	G	41	28	34	35	30	35	46	36	21	G	G	G	G	G	G	33	G
2		G	G	30	G	28	G	G	40	36	28	32	29	33	31	30	29	28	G	G	G	34	27	G
3	G	25	G	G	G	G	G	G	29	32	34	33	32	32	31	30	G	G	G	G	25	G	G	G
4	G	G	G	G	G	G	G	31	38	32	46	34	27	31	31	G	G	G	G	G	G	G	23	G
5	26	27	G	G	G	G	34	29	29		28	28	29	25	30	G	G	G	32	29	G	G	G	26
6	28	G	26	29	25	46	41	28	30	34	29	29	30	29	29	38	38	G	G	G	29	25	56	38
7	32	44	33	30	33	27	24	29	47	38	30	35	36	30	29	G	27	29	25	30	44	32	G	G
8	34	28	32	30	31	G	G	G	35	29	29	28	28	30	24	23	28	27	G	27	G		G	30
9	40	G	30	26	30	27	24	34	37	30	35	31	28	33	28	G	G	G	G	24	G	23	26	24
10	24	27	23	24	G	G	G	G				42	34	34	31	28	28	29	27	26	G	G	G	G
11	G	31	G	G	G	B	B	30	34	40	41			73	60		39	G	24	G	26	33	26	G
12	G	32	35	29	G	29	G	30	28		52	60	41			30	27	28	33	34	29	29	39	32
13	28	34	34	28	28	33	28	G	37	38	66	32	47	78	45	38		63		45			32	27
14	26	28			38	34	24		33	35	38	32	29	26	52	43	29	38	39	32	27	G	22	30
15	G	26	26	29	29	G	30	29		33	25	34	N	40	23	G	48	48	44	55	28	G	27	28
16		32	28	G	G	37	24	33	36	45	36	31	30	31	35	68		62	66	60	38	34	30	29
17	28	27	27	G	28	G	26	39	36	33	35	28	27	22	G	27	28	29	29	29	30	35	32	35
18	30	G	G	23	G	G	G	27	32	33	33	39	30	26	24	29	32	26	G	28	33	32	34	G
19	G	G	G	G	G	G	G	28	28	30	34	31	34	26	23	G	G	G	G	G	G	31	30	29
20	G	24	24	24	24	G	32	28	29	30	40	28	32	27	29	29	30	26	G	G	G	G	G	34
21	26		30	28	26	G	G	G		27	28	29	29	28	23	30	30	G	G	G	G	G	G	G
22	27	32	26	G	29	G	G	G		24	26	29	29	27		34	36	30	G	B	34	28	G	G
23	G	G	29	G	G	G	G	28	G	25	28	28	28	26	G	G	32	G	G	B	26	B	G	G
24	G	30	29	G	G	G	G	32	25	30	32	29	29	24	25	G	G	G	G	G	B	27	27	G
25	G	G		G	G	G	G	30		28	25	28	31	29	32	26	28	G	G	30	30	25	G	G
26	G	32	G	G		G	G	28		24	28	45	38	36	29	23	G	32	32	G	31	34	44	34
27	29	G	G	G	25	G	G	G		31	27	28	27	30	30	30	47	34	36	32	B	G	G	G
28	26	G	27	46	36		40	33	27	34	33	34	29	34	34	35	31	G	G	28	28	47	29	32
29	32	31	33	G	34	26	G	G	29	32	32	31	32	27	32	N	G	G	26	68	48	58	40	
30	33	32	34	32	G	G	G	60	29		41	42	35	40	31	41	26	42	29	32	39	57	43	42
31	33	33	29	26	28	32	32	45		68	60	54	84	29	33	60	G	31	29	38		30	35	32
	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	29	30	30	29	30	30	23	27	30	30	29	30	29	29	29	31	30	29	27	28	31	30
MED	26	27	26	12	12	G	G	28	30	32	33	31	30	30	30	29	28	26	G	28	27	28	27	25
U Q	29	32	30	29	29	27	26	32	36	35	38	34	34	34	32	34	31	31	29	32	31	33	33	32
L Q	G	G	G	G	G	G	G	G	28	30	28	29	29	27	24	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fmin AT WAKKANAI

DEC. 1997

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

HOURLY VALUES OF foF2 AT KOKUBUNJI

DEC. 1997

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	46	35		58	35	35		57		95	81	81	80	73	68	71	57	58	36	29			31	36
2	31	A	A	59	32	28	31	60	77	86	92	87	71	68	70			A	A	38		29	N	A
3	A	A	36	36	35	40	36	63	68	68	91	86	72	70	72	71	55	40	A	A		32	34	43
4	A	A	A	A	28	35	35		70	73	114	86	94	67	66	70	67	44	36	36		A	29	32
5	34	35	36		34	36			68	71	91	88	74	74	71	64	60	44	41				59	38
6	36	37	35	34		34	34	56	73	C	C	C	C	C	C	C	C	C	36	36	36		N	28
7	28	36	40	N	B	28		54	63	68	83	85	84	71	67	66	64	45			A	N	29	35
8	A	B	A	A	35	N	N	58	59	61	77	84	71	67	72	67	51	38		41	36			35
9	35		37	N	28	28		57	57	73	69	86	74	62	66	58	57	40	32		28		N	29
10	32	36	A	A	N	49	29	58	56	66	75	66		66	69	66	50	A	36			45	31	41
11	38	35	34	30		35	29	57	72	68	84	87	A	78	80	68	59		43		B	36		43
12		41	36	B	35	35	47	N	92	94	105	94	81	A	66	A	A	A	59	37	29	30		59
13	A	36	37		34		37	57		61	82	86	74	66	61	56	56	38	A	A		59	A	A
14	36	36	35	35	36	N	A	47	69	86	87	80	66	60	56	68	55	38	A	A	A	A	A	35
15	26	A	35	35	31	A	A	58	59		73	69	70	58	52	62	57	34	A		A	A	A	A
16	A	A	34	34	32	32	29		56	82	68	63	66	50	65	64	48	A	32	36	23	N	N	A
17	40	A	A		35	A	31	54	69	56	80	98	85	66	70	78	63	37	A	N	35		25	29
18			46	37	A	B	N	42	55	73	92	68	66	54	68	66	55	57	56	59	A	N	28	A
19	A	26		35		28	32	58	56	68	67	71	66	67	72	73	57	37	42		29	28	23	A
20	A	A	35	N	A	A	34		69	68	76	66	66	66	68	61	52	A	38			A	59	B
21	28	28	A	35	N	28	29	57		61	68	66	68	55	62	59	56	40		A	A	A	N	35
22	B	N	28	35	N	31	34		57	58	74		67	55	62	56	57	57	37	A		A	A	A
23	A	28	34	31	A	A		46	68	68	77	66	68	57	65	52	42	48	32	N	N	35	A	A
24	35	36	34	N	N	B	59	47	70	61	68		65	63	70	64	56	43	42		B	B	B	34
25	N	N	36	32	24	29		48	60	52	67	80	71	62	63	65	56	40	31	35	B		30	35
26	B	31	37	36	N	24	N	50	56	68	71	68	61	66	60	68	60		A	37		A	B	B
27	B	26	N	35	32	A	A	45	54	56	72			61	58	56	52	42	38	A	26	B		56
28	59	31		N	A	B	B	59	58	60	66	68	68	64	61	63	50	45	34		29	28	B	N
29	37	35	31	34	40	69	59	58	58	73	77	66	63	63	62	58	58		A	30	35	37		N
30	29	35	N	34				46	N	68	63	68	77	70	64	59	51	47	A	35	A	27	25	34
31		58		35	30	35	38	58	79	101	132	125	112	84	76	76	58	40	A	A	A	37	34	40
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	16	19	19	19	17	19	17	25	27	29	30	27	27	29	30	28	28	22	18	12	10	12	13	19
MED	35	35	35	35	34	34	34	57	63	68	77	80	71	66	66	64	56	41	36	36	29	34	30	35
U Q	37	36	37	36	35	35	37	58	70	73	87	86	77	69	70	68	58	45	42	37	35	37	34	41
L Q	30	31	34	34	30	28	30	47	57	61	69	68	66	60	62	59	52	38	34	35	28	28	26	34

HOURLY VALUES OF fEs AT KOKUBUNJI

DEC. 1997

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G			27		42	34	30	35	35	30		27	G	G	G	G	G
2	G	27	27	G	G	G	G	G	34	39	39	32	36	42	47	G	34	60	57	29		G	29	40
3	60	58	40	G	G	G	G	28	27	36	37	40	57	51	44	30	34	28	33	36	G	G	G	49
4	52	56	46	34	26	G	G		36	38	40	47	80	55	30	26	G	G	G	G	34	28	G	25
5	G	G	G	G	G	G	G	27	34	40	32	31	32	28	28	29	G	26	28	24	G	G	G	28
6	29	27	G	G	G	G	G	G		C	C	C	C	C	C	C	C	C	G	G	G	G	G	
7	30	G	G	G	B	G	G		53	33	40	30	G	30	26	28	G	G	G	24	25	G	G	G
8	35	B		37	28	G	G	G	33	33	31	40	30	30	30	24	29		G	G	G	G	G	G
9	G	G	G	G	G	G		26	37	51	53	50	32	30	33	26	G	G	G	G	G	G	G	23
10	G	G	42	34	G	G	G	G	29	30	28			32	40	30	26	28	26	G	G	G	G	G
11	G	G	G	G	G	G	G	34	31	43	51	46	86	44	61	38	30	29	29	G	B	G	G	G
12		51	G	B	G	G	G	G	29	30	44	48	60	92	48	80	83	53	26	G	G	G	G	24
13	48	40	24	G	G	27	29	33	34	40	43	40	40	50		40	36	41	52	40	41	58	53	48
14	G	26	28	29	29	G	32	39	60	54	50	50	50	54	37	24	29	39	95		84	61	55	29
15	24	29	28	G	G		34	26	30		51	50	41	32	27	27	G	27	35	G	29	47	42	36
16	37	28	24	25	G	G	G	29	36	50	30	57	30	33	26	41	G	30	G	30	30	G	G	29
17	G	29	30	29	G	27	G	G	35	32	36	29	44	39	54	50	43	34	30	24	G	G	G	G
18	30	G	G	G	28	B	G	G	39	41	33	50	29	30	G	27	G	G	G	28	31	G	30	30
19	30	G	G	G	G	G	G		29	29	30	30	31	30	27	24	33	29	27	G	G	G	G	26
20	41	29	24	30	29	23	G	G	28		30	30	29	41	43	38	30	28	G	G	26	28	40	B
21	G	32	32	32	26	26	24	24	29	34	29	31	31	30	28	28	31	29	G	24	40	29	G	G
22	B	G	G	G	G	G	G	G	22	27	30	G	31	30	G	G	G	G	G	39	30	54	48	36
23	41	24	G	G	27	27		G		28	28	30	G	G	31	G	G	G	G	G	G	G	41	36
24	28	G	G	G	G	B	G	G	28	32	G	G	G	26	26	29	25	30	G	G	B	B	B	G
25	G	G	G	G	G	G	G	G	N	33	30	32	31	29	G	26	G	G	G	G	B	G	G	G
26	B	G	G	G	G	G	G	G	28	26	31	31	37	31	28	25	G	34	28	G	G	28	B	B
27	B	G	G	G	23	27	28	G		49	36			29	31	37	28	29	23		G	B	G	G
28	G	G	G	G	29	B	B	G	26	29	33	32	32	30	28	24	29	47	G	G	27	G	B	G
29	G	G	G	G	G	G	G		28	33	35	34	39	37	26	31	35	27	31	28	G	G	G	G
30	G	G	G	G	G	G	G	G	28	32	44	47	51	48	49	37	28	30	29	G	25	G	G	G
31	G	G		G	G	G	G	32	42	49	50	56	30	28	28	29	44	40	45	41	28	G	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	30	29	30	30	27	28	26	26	28	29	28	28	30	29	30	30	28	31	29	27	29	28	28
MED	G	G	G	G	G	G	G	G	30	33	35	37	32	30	30	28	28	29	26	G	G	G	G	12
U Q	35	29	27	25	26	G	G	27	36	40	43	47	42	42	41	37	33	34	30	28	30	28	29	29
L Q	G	G	G	G	G	G	G	G	28	30	30	30	30	30	26	25	G	13	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fmin AT KOKUBUNJI

DEC. 1997

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

HOURLY VALUES OF foF2 AT YAMAGAWA

DEC. 1997

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	36		60	58	60	B	26	50	67	83	77	78	82	77	80	80	68	66	62		38		32	34
2		89	59	69	60	29		39	71	91	85	86	84	92	80	80	85	72	42	36	25	69	69	
3			43	39	46	36	N	53	67	67	69	92	85	97	91	85	84	61	53		40		89	N
4	69				40		60		70	66	83	101	105	86	77	85	80	70	56		55		26	69
5		89	34	32		69	48	48	67	80	88		86	78	76	74	74	66	A	56	44		34	
6	55	37	32			34		59	66	85	90	103	87	77	85	81	82	62	42	35		37	B	B
7	32		34		N	69		39	69	69	81	92	82	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	60	65	86	85	85	82	71	66	62	40		79	89	35	69
9	60					N	69		60	72	90	90	87	85	76	80	71	72	40	38				49
10	36		30		A	N	30	44	54	68	71	80	81	75	75	74	66	60	59	43		C	C	C
11	C	C	C	C	C	C	C	C	C	68	85	102	86	80	64	80	73	53	39	24	24	N	59	69
12	60	34	30	N	69	69	59	69	86	85	98	108	110	93	74	79	73	64				79	B	
13	26	79	79	36	34	44	N	25	67	70	82	82	96	80	66	60	65	62		27	34			A
14	79	34		37			30	48	82	95	98	80	82	76	71	70	81	60	29			C	C	C
15	C	C	C	C	C	C	C	43	73	69	C	C	C	C	70	63	66	61	109	61	N		N	69
16	29			59		79			58	60	72	76	93	74	86	87	73	60	36		N			32
17		79	32			29	36	46	57	66	72	106	108	86	86	87	92	55		42		28	69	59
18	89	69	89	79	46	B	N	34	61	68	66	86	75	66	65	72	72	52	54	69	89	59	69	59
19	49	N	N	36	48	39		49	61	68	73	80	76	82	85	81	76	73	37		43		N	69
20	59	37		59	40	59	69	42	61	69	68	76	87	78	87	83	71	61	A	59	34	89	34	A
21	59	69	29	37	28	49	B	59	66	72	66	66	75	77	71	72	77	74	A		89		29	30
22	A	59	59	59	30		32	48	57	68	73	71	82	72	60	74	75	72	55	42		A	59	
23	49		32	36		22	19	29	53	82	76	66	62	66	70	74	58	65	57		69	69	N	A
24	26	31	34		29	N	C	C	C	60	76	78	71	74	86	96	86	73	62	A	A			B
25	59	30		60	59	29	29		62	70	73	77	91	71	66	77	79	60	61	32		60	59	36
26	49	49	28	59	69	N	N	36	60	68	71	74	74	66	66	77	83	66	109	32		43	89	
27	28	30	31	49	59	29	32	49		62	72	77	65	67	65	57	67	48	49	43			49	
28	59	59	59	37	24	58	25	34	69	70	71	73	72	67	61	68	60	64		30	49	49		
29	24	28	30	34		43	31		59	72	81	81	68	71	68	70	65	60	A	34		49		
30		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
31	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	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	21	17	19	18	16	17	15	21	25	29	28	27	28	27	28	28	28	28	20	17	14	12	15	12
MED	49	49	34	44	46	43	32	46	66	69	74	80	83	77	74	77	73	62	54	38	44	60	59	59
U Q	59	74	59	59	59	64	59	49	69	76	84	92	87	85	83	81	80	68	60	49	69	74	69	69
L Q	30	32	30	36	32	29	29	37	59	67	71	76	75	71	66	71	66	60	40	32	34	46	34	35

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fEs AT YAMAGAWA

DEC. 1997

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	G	G	G	G	G	B	G	G		31	26	38	G	38	45	33	33	40	32	28	G	G	G	G
2	G	26	27	G	G	G	G	G	30	32	32	32	29	44	60	33	33	26	26	G	G	G	G	G
3	G	G	G	G	G	G	G	G	32	38	46	46	37	38	68	39	39	31	32	27	25	G	G	G
4	G	30	G	G	G	G	G	G	25	39	44	51	54	54	45	51	33	26	G	G	G	G	G	G
5	G	G	27	G	G	G	26	G	24	44	27		34	39	32	30	32	40	40	31	G	G	G	G
6	G	29	27	G	G	G	G	G	G	32	39	35		32	31	28	G	G	G	G	28	G	B	B
7	G	G	G	G	G	G	G	G	26	30	38	34	31	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	39	32	32	32	31	30	32	26	G	25	G	G	G	G	G
9	G	G	G	G	G	G	G	G	23	39	29	33	33	32	32	28	30	24	G	24	24	G	G	G
10	G	G	G	G		G	G	G	G	26	32	32	36	39	50	28	33	32	G	G	G	C	C	C
11	C	C	C	C	C	C	C	C	C	28	44	44	49	40	64	43	57	39	47	25	G	G	G	G
12	G	G	G	25	29	27	G	G	23	G	28	46	52	58		85	39	59	29	30	30	G	B	G
13	G	26	27	29	28	G	G	28	24	N	30	32	36	28	39	39	42	30	G	40	27	G	G	30
14	G	G	G	G	G	G	G	G	26		38	61	44	32	32	44	30	G	G	26	G	C	C	C
15	C	C	C	C	C	C	C	G		G	C	C	C	C	32	43	54	25	26	G	26	G	32	40
16	G	G	G	G	26	G	G		33	G	29	30	29	31	29	27	31	G	G	G	30	G	G	G
17	G	G	G	G	G	G	G	G	26	32	36	44	40	54	56	38	24	G	G	G	G	G	G	G
18	G	G	G	G	G	B	G	G		25	33	27	30	G	30	28	24	G	G	G	G	G	G	G
19	26	28	G	G	G	G	G	G	G	28	32	27	31	31	30	27	G	32	24	G	G	G	G	G
20	G	G	G	G	G	G	G	G	G	30	28	30	28	32	32	39	55		32	32	31	32	32	28
21	G		28	25	G	G	B	G	28	31	32	32	32	33	33	27	31	33	32	32	25	G	G	G
22	32	G	G	G	G	G	G	G		32	33	32	32	28	44	27	32	32	26	G	G	26	G	G
23	G	G	30	40	24	G	G	G	30	36	31	30	29	31	35	25	40	42	G	G	G	G	G	30
24		29	29	G	G	G	C	C	C	27	29	G	G	G	G	30	32	32	30	40	40	24	25	B
25	G	G	G	G	G	G	G	G	G	29	38	31	32	29	G	27	26	G	G	G	G	G	G	G
26	G	G	G	G	G	G	G	G	21	28	31	37	32	28	33	32	25	32	33	G	G	G	G	G
27	G	G	G	G	G	G	G	G	G	24	32	28	32	27	30	29	39	30		G	G	G		29
28	25	G	G	G	G	G	G	G		26	34	36	31	31	32	32	39	G		G	G	G	G	G
29	G	G	G	G	G	G	G	G	G	26	30	26	32	41	39	33	41	40	32	29	G	G	G	G
30	G	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
31	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	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	26	25	26	26	25	24	24	25	21	27	28	27	27	27	27	28	28	27	26	28	28	26	23	24
MED	G	G	G	G	G	G	G	G	24	30	32	32	32	32	32	32	32	30	26	G	G	G	G	G
U Q	G	13	27	G	G	G	G	G	27	32	37	38	36	39	45	39	39	33	32	28	25	G	G	G
L Q	G	G	G	G	G	G	G	G	G	26	29	30	30	29	30	28	28	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fmin AT YAMAGAWA

DEC. 1997

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

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF foF2 AT OKINAWA

DEC. 1997

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	52	70		52	43		69		63	88	87	93	94	104	104	90	93	73	A	A	A		44	44
2	43		42	43	36	A	A	38	75	86	94	91	122	149	140	112	120	96	A	A	60	54	44	38
3		69	60	47	47		59	A	52	84	84	97	112	150	153	150		A	A	A	69	59	59	47
4	44	36		A	56	49	N		48	77	94	82	123	121	105	152	124	114	A			43		B
5	89	38	37		44	30	32		60	73	106	84	96	77	92	88	70	71		A	58			38
6	38		69	32	37	38		48	39	94	94	96	87	100	90				84	A	65		46	
7	B	32		69	40	A	A	41	66	68	80	98	94	87	96	91	92		82			59	44	
8	89		59	59	30	B		A	84	70	68		89		94	84	88	93		A	59	44	46	B
9	89	89	N	49	N				67	68	96	96	114	122	150	121	114	96	111	70	70	72	71	38
10			89		44		B	A	69	69	95	73	75	81	77	81		64	54	A	43	49	57	
11	37	38	46	32			89	A	56		83	94		88	71	83	68	70	44		44	42		46
12	58	37		B	A	A	A	A		84	99	97	96	105	110	83	92	87		32	59	53		59
13				43	34	A	B	59	66	83	95	93	86	102	93	78	66	52	A	A	A	A	A	39
14		A	A	59	56	A	A	A		69			102	116	127		91		A	A	58		A	A
15	B		69		44	A	A	89	55		59	96	116	122	133	105	86	68	48	A	57	49		B
16	B	58	B	A	32	A	B			73	94	125	114	123	117	121	95	90		A	57	39	35	B
17	B		30	31	38	B		69	56	69	87	86	117		118	142	126	80		A	A	47	47	
18	69	59	A	47	41	B		34	52	70		93		77	83	81	83	52	59	A	35	43	A	
19	89	A	A	38	38		B	44	50	65		85		106	130	138	127	96				A	A	A
20	59	38		37	36	B	B			66	71	91	95	105	116	118	95	85	A	A	49	46	55	B
21	N	89			38	B	B	59	68	61	70	66	80	92	100	97	92			A	52		69	A
22	47	A	A	A	40		69	48	54	48	68	93		92	86	93	94	95	A	A	A	56		A
23		B	B	30	B	A	A	69	68	57	78	65	80	90	78	99	86	61	60	A	A	46	B	
24	B	35	36	44	A	A	A	A	66	89	87	104	116	113	117	N	122		76	68	80	57	A	B
25	A	59		A		B	B	44	59	67	60	92	95	92	90	98	104	84			32			A
26	B		N	55		B	B		53	70	78	87	78	86	111	102	91	92	71		57	58	38	B
27	N	32	35	44	42	36	31		70	72	64	75	77	87	78	68	74		54	59	49		46	
28	89	89	37	49	38	B	B	B	71	82		66	91	92	81	87	83	59	55	A	74	58	43	
29	B	30			58	59	25		53	84	91	87		98	91	76	62		64	A	37	43		A
30		N	35	A	58	B	B	A		70		87	111	114	110	96	86	73	A	A	46	55	40	
31	69		A		A	B	B	44	54	84	141	124	116	126	124	132	73	70	A	A	A	46		37
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	15	17	13	19	23			13	26	29	26	29	26	29	31	28	28	23	13		22	22	16	
MED	59	38	42	44	40			48	60	70	87	92	96	102	104	96	92	80	60		57	49	46	
U Q	89	69	64	52	44			64	68	84	94	96	114	118	118	119	99	93	79		60	57	56	
L Q	44	35	35	37	37			42	53	68	71	84	87	89	90	83	83	68	54		46	44	43	

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fEs AT OKINAWA

DEC. 1997

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	G	G	G	G	G	G	G	G	28	33	37	37	40	G	50	52	49	76	58	59	28	32		24
2	27	G	39	41	31	35	26	38	36	41	70	72	53	37	56	45	60	42	47	34	28	G	G	G
3	G	G	G	G	G	G	G		48	52	44		46	42	43	59		93	58	48	G	G	G	37
4	G	G	G	50	24	G	26	G		40		60	60	48	54	50	58	68	55			39	G	B
5	G	G	G	34	46	G	G	G		35	44	38	38	38	70	45	40	28		37	G	G	G	G
6	G	G		26	34	G	G	G		33	42	47		65	34	47	66	40	58	45	G	G	34	G
7	B	G	G	G	G	47	31	35	46		64	64	42	46	39	36	31		36	40	G	G	G	G
8	G	G	G	G	G	B	G	29	35	34	46	42	41	39	45	42	40	59		44	G	G	G	B
9	G	G	G	G	G	G	G	G	29	37	47	46	59	41	40	39	38	34	30	27	27	32	29	G
10	G		G	G	G	G	B	30	29		42	42	46	46	40	37	36	39	28	37	G	G	G	
11	G	G	G	G	G	G	G		34		42	35	52	63	47	62	49	56	48	36	34	40	23	G
12	G	G	G	B	68	52	27		45	33	43	45			58	55	37	58		G	37	G	G	G
13	G	G	G	38	37	28	B	G	23	32	34	44	48	46	76	37	37	40	35	47	34	38	48	
14				27	G	28	25	36	47		69		86	140	86	78	116		94	58	49	50	40	28
15	B	G	G	G	G	29	36		28	25	39	35	38	42	38	42	40	42	50	58	29	28	G	B
16	B	G	B	34	27	27	B			35	40	35	32	38	42	40	34	32		55	25	G	29	B
17	B	G	G	G	G	B	G	24	28	31	40	36	N	37	35	31	37	61		48	24	24	G	G
18	G	G	30	G	G	B	G	G		37	40	44	33	37	33	36	26	G	G	27	G	27	27	G
19	G	30	32	27	G	G	B	G		35	42	58	38	42	35	42	36	24		G		65	29	28
20	G	G	G	25	G	B	B			32	44	44	46	66	84	89	54	41	59	39	41	G	G	B
21	G	G	G	G	G	B	B	G			46	58	48	38	62	39	69			65	59		33	38
22	26	24	50	40	40	27	G	G	27	39	42	38	41	46	52	38	49	65	90	92	58	G	G	
23	G	B	B	G	B	35	41	48	56	58	57	41	42	43	64	44	36	27	37	46	33	G	B	G
24	B	29	32	26	41	38	25		G	35	30	47	34	38	38	37	40	38		G	G	34	29	B
25	34	G	G	27	G	B	B	G	31	34	43	38	38	23	23	35	G	32		G	G	G	G	24
26	B	G	G	G	G	B	B	G	23	34	38			44	38	40			28	G	G	G	G	B
27	G	G	G	G	G	G	G	G	26	32	34	36	38	38	N	34	37	37	30	25	33	G	G	G
28	G	G	G	G	G	B	B	B	28	29	34	35	38	47	43	40	40	38		38	G	G	G	G
29	B	G	G	G	G	G	G	G	26	26	35	36	37	47	39	37	40		55		42	G	G	32
30	G	G	G	42	26	B	B			29	28	38	40	59	35	40	41	39	35		38	33	G	G
31	G	G	28	G	24	B	B	G	28	34	36	49	53	38	33	48	40	41	58	82	65	34		G
	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	28	27	30	30	21	20	22	22	26	30	28	27	30	30	31	29	26	21	28	29	30	28	21
MED	G	G	G	G	G	G	G	G	28	34	42	42	41	42	42	40	40	40	48	40	28	G	G	G
U Q	G	G	G	27	27	32	26	29	36	37	44	47	48	47	56	48	49	58	58	51	37	33	29	26
L Q	G	G	G	G	G	G	G	G	27	32	37	36	38	38	38	37	36	34	32	27	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

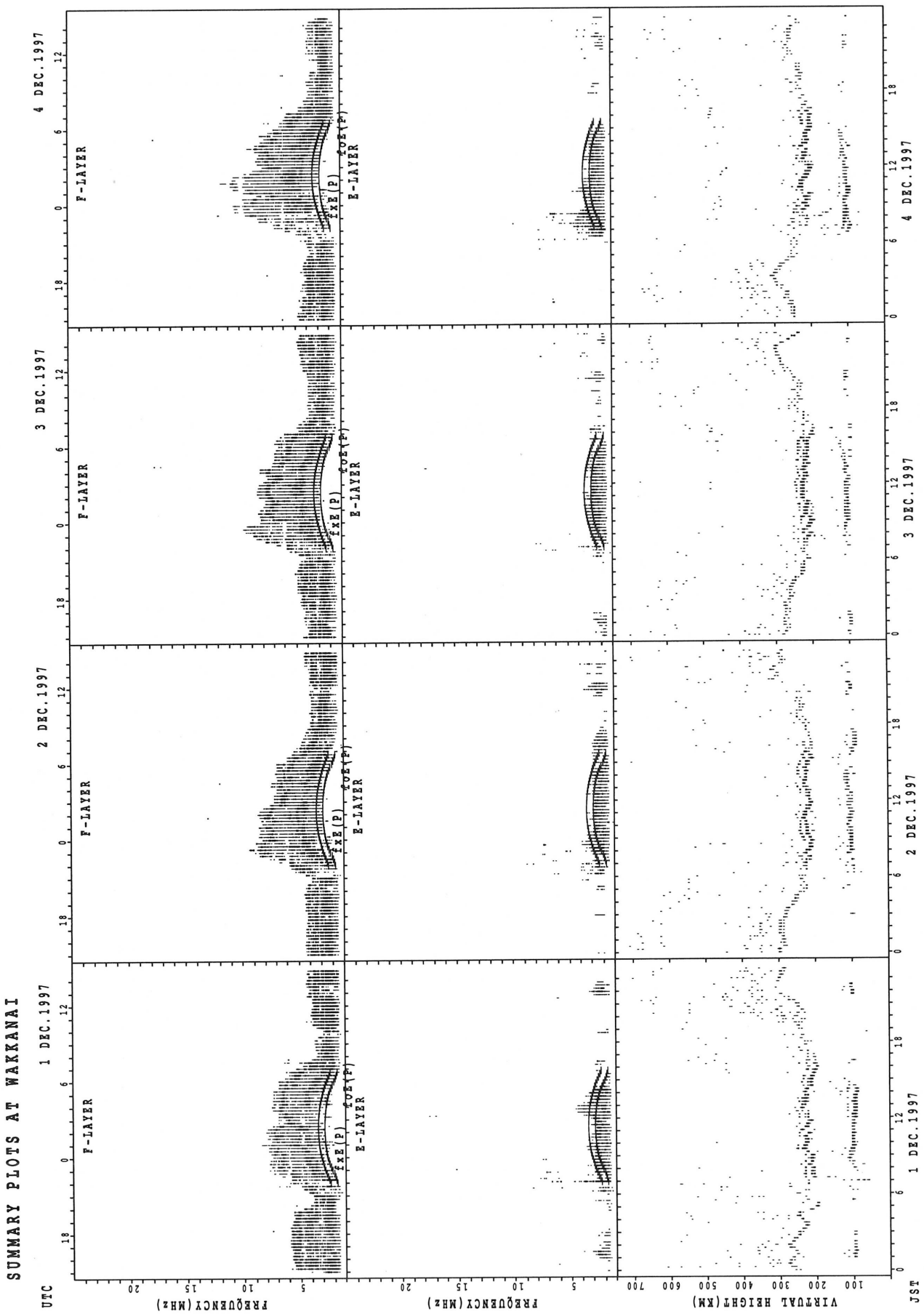
HOURLY VALUES OF fmin AT OKINAWA

DEC. 1997

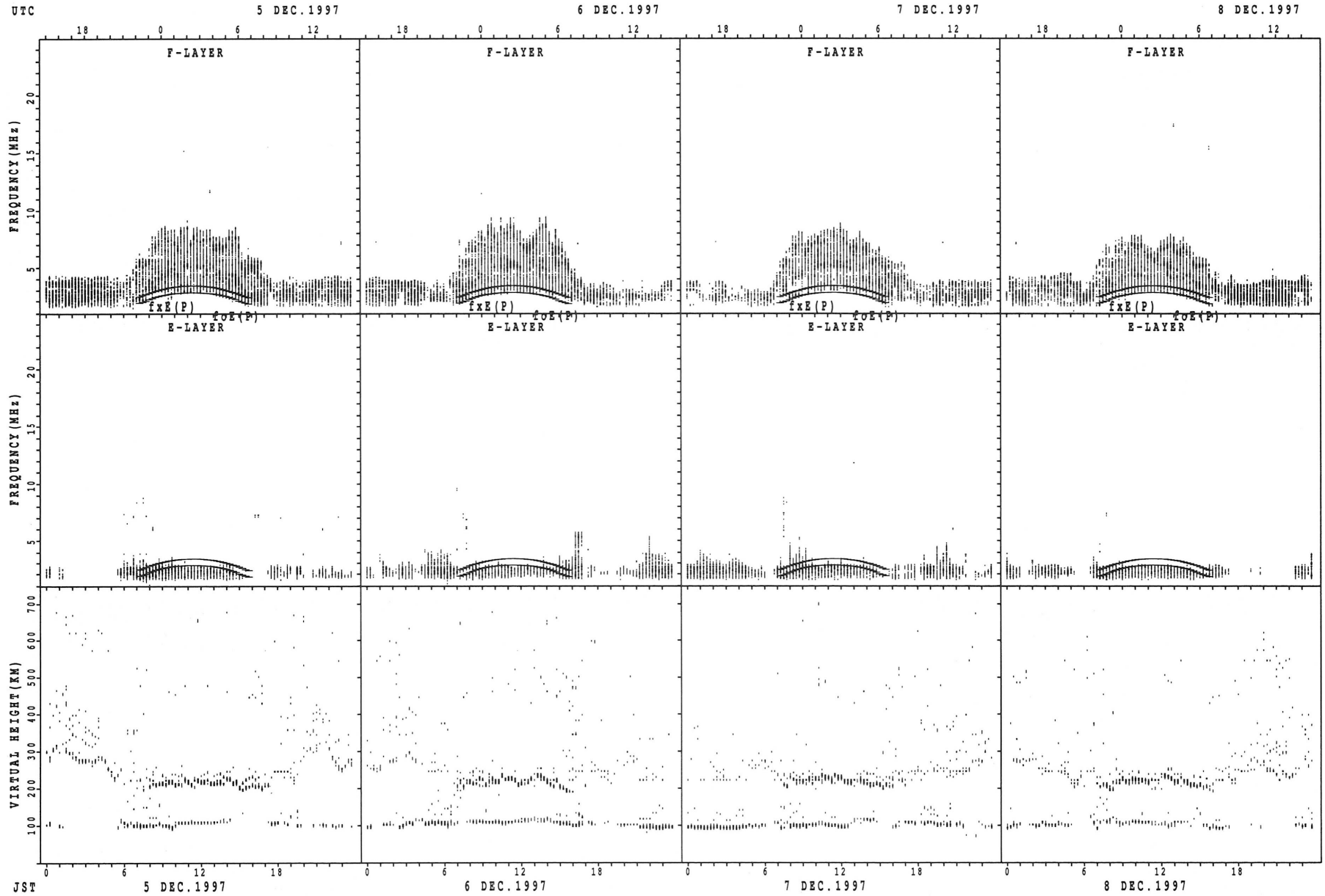
LAT. 26.3N LON. 127.8E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	15	15	15	14	15	16	16	14	15	15	15	16		16	17	14	14	15	14	15	15	14	15
2	14	15	14	14	14	14	15	15	14	14	15	18	20	29	16	20	14	14	15	14	15	14	14	14
3	15	15	14	15	15	15	14	14	15	14	18	16	16	17	17	15	14	14	15	14	15	15	15	15
4	14	14	14	14	14	16	16	14	14	14	16	16	16	17	15	18	14	14	14			14	16	B
5	16	14	14	14	15	15	15	16	14	14	15	16	20	16	21	15	14	14		14	15	15	14	16
6	14	15	14	14	15	15	16	15	14	14	15	17	17	18	17	15	14	14	14	14	15	16	15	
7	B	14	15	15	14	15	14	15	15	15	15	17	17	18	18	15	15		14	14	14	15	14	14
8	18	14	15	15	15	B	14	14	14	14	15	17	17	16	16	16	14	14		14	15	15	14	B
9	15	15	15	15	15	16	15	14	14	14	15	15	16	20	17	14	14	14	14	14	15	15	14	15
10	18		16	14	15	16	B	14	14	15	15	15	16	18	15	14	14	14	14	14	15	14	15	14
11	14	14	14	14	15	16	14	15	15		15	15	16	16	15	15	14	15	15	14	14	14	15	14
12	15	15	15	B	14	14	14	14	16	15	16	15	16	15	16	14	14	15		15	15	15	14	17
13	16	15	15	14	14	15	B	15	14	14	14	15	16	15	14	14	15	15	14	14	14	15	14	14
14		14	14	15	14	15	14	14	14	14	15		16	15	15	15	14		14	15	14	14	15	15
15	B	16	16	15	14	14	14	14	15	15	17	17	20	16	14	15	14	15	14	15	15	14	15	B
16	B	15	B	15	14	14	B	14		16	14	33	18	18	17	16	15	14		14	15	15	15	B
17	B		14	15	14	B		14	24	14	14	15	16	15	15	14	14	14		15	18	16	16	15
18	15	15	15	14	14	B	16	14	14	14	14	14	24	17	15	14	14	15	15	15	15	14	14	15
19	15	14	14	15	15	18	B	14	14	14	16	16	16	17	17	15	15	17		14		15	15	14
20	14	14	14	15	15	B	B			14	14	15	15	15	15	15	14	14	14	14	14	15	15	B
21	66	15	15	14	14	B	B	15	14	14	15	16	17	29	17	15	15			14	14		15	15
22	16	16	14	14	14	15	15	14	14	14	14	16	22	20	17	15	15	14	14	14	14	21	15	15
23	16	B	B	21	B	14	14	14	14	14	15	15	18	20	17	17	15	14	15	14	15	20	B	18
24	B	15	14	14	15	14	14	17	16	15	14		17	18	20	17	15	14	14	15	15	15	14	B
25	16	15		14		B	B	14	15	14	16	20	16			16		14		15	17	15	14	15
26	B		15	15	14	B	B	15	14	14	15	20	17	18	17	20	16	14	14	14	15	27	14	B
27	14	15	15	14	15	14	16	15	14	16	16	20	15	14	18	14	15	14	15	15	14	15		14
28	15	16	14	15	14	B	B	B	14	14	15	15	17	17	16	14	14	14	14	14	26	16	14	17
29	B	15	15	15	15	14	16	18	16	14	15	16	17	15	17	15	15		15	14	18	14	14	15
30		14	14	14	15	B	B	15		14	15	17	16	16	15	15	14	14	15	14	15	14	15	14
31	15	18	14	16	14	B	B	14	14	14	14	15	16	16	16	15	15	14	15	14	14	14		15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	22	27	28	30	29	21	19	29	28	30	31	29	31	29	30	31	30	27	23	30	29	30	28	23
MED	15	15	14	15	14	15	15	14	14	14	15	16	16	17	16	15	14	14	14	14	15	15	14	15
U Q	16	15	15	15	15	15	16	15	15	15	15	17	17	18	17	16	15	14	15	15	15	15	15	15
L Q	14	14	14	14	14	14	14	14	14	14	14	15	16	15	15	14	14	14	14	14	14	14	14	14

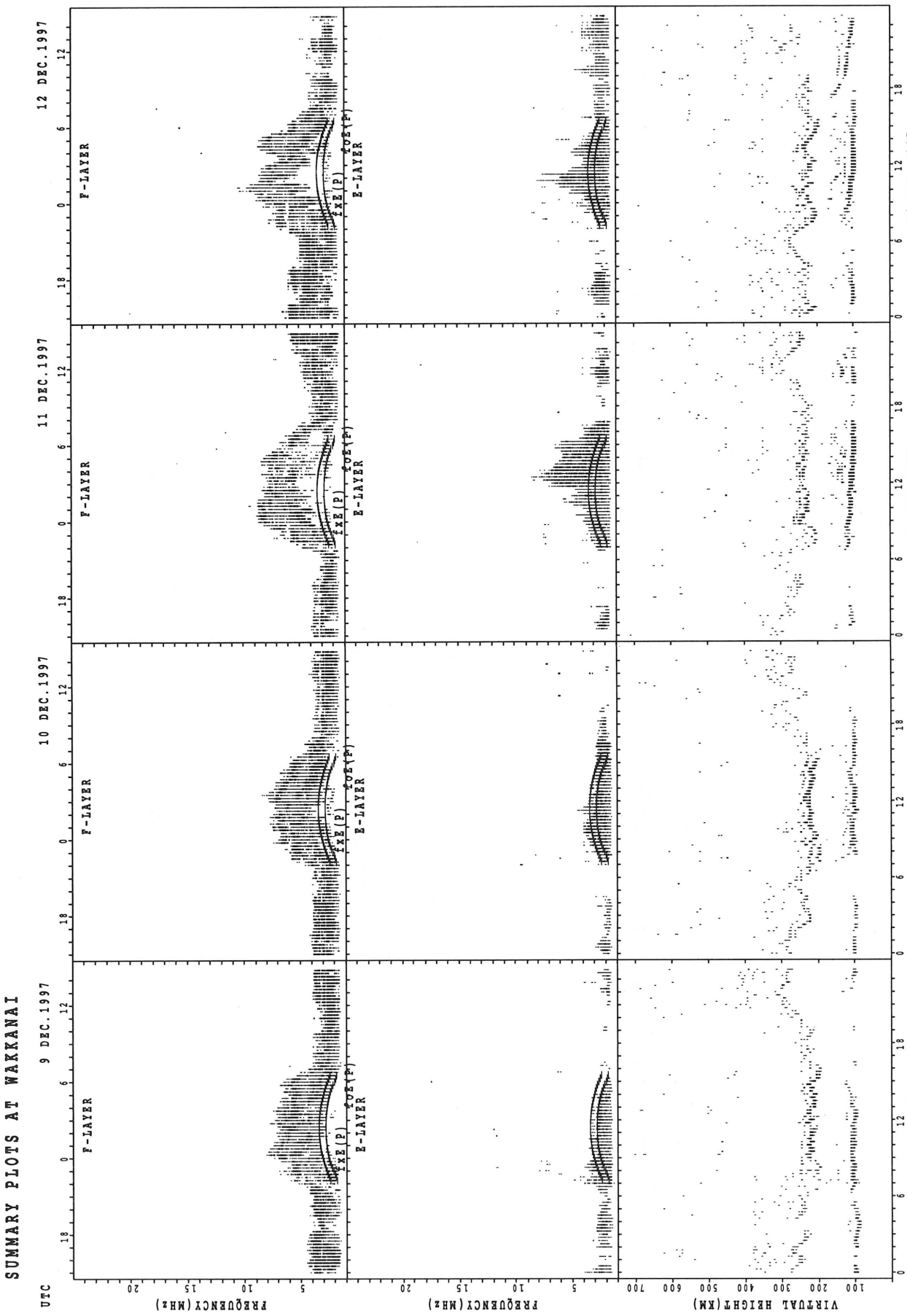
COMMUNICATIONS RESEARCH LABORATORY, JAPAN


SUMMARY PLOTS AT WAKKANAI
UTC
JST
1 DEC.1997
2 DEC.1997
3 DEC.1997
4 DEC.1997
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

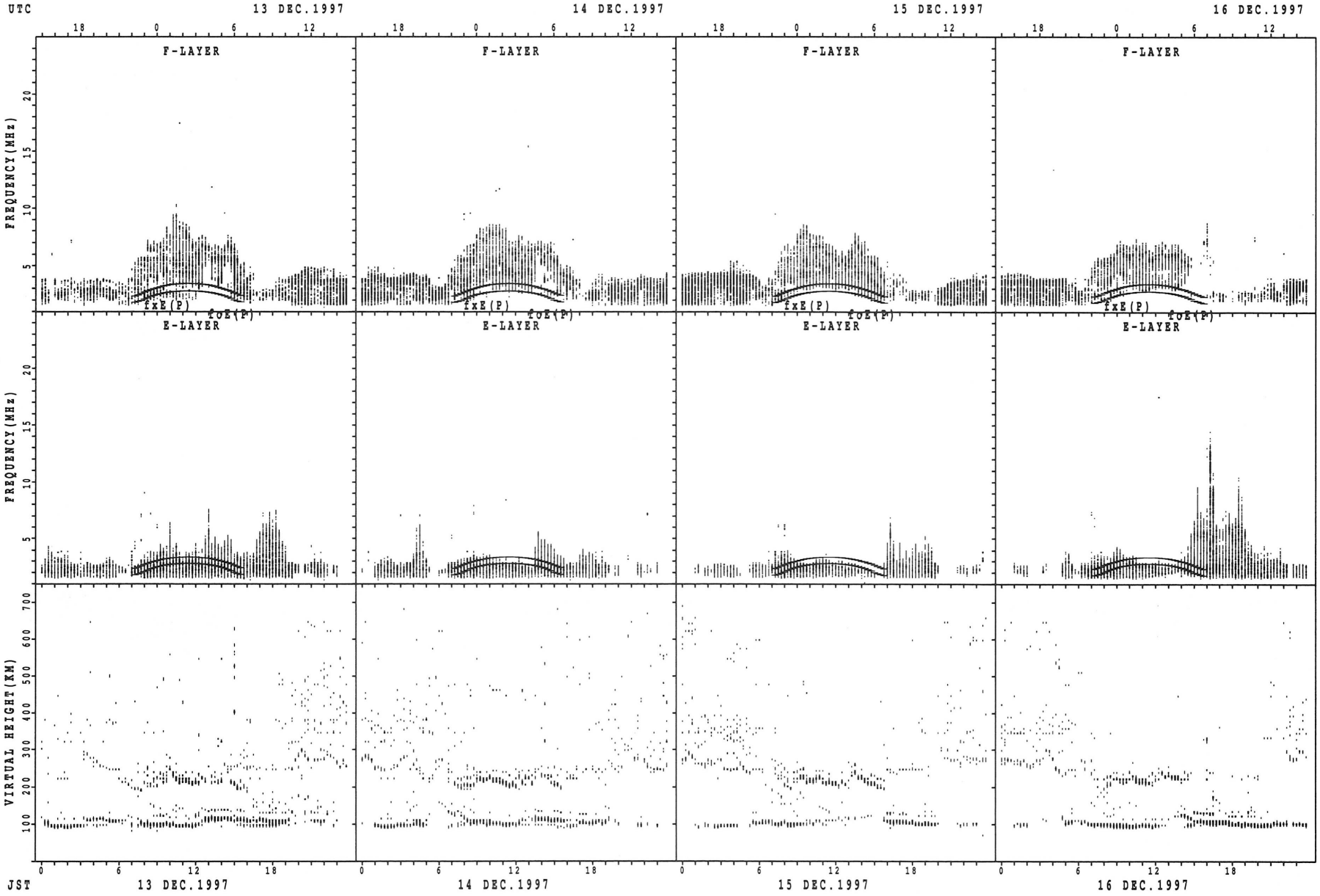
SUMMARY PLOTS AT WAKKANAI



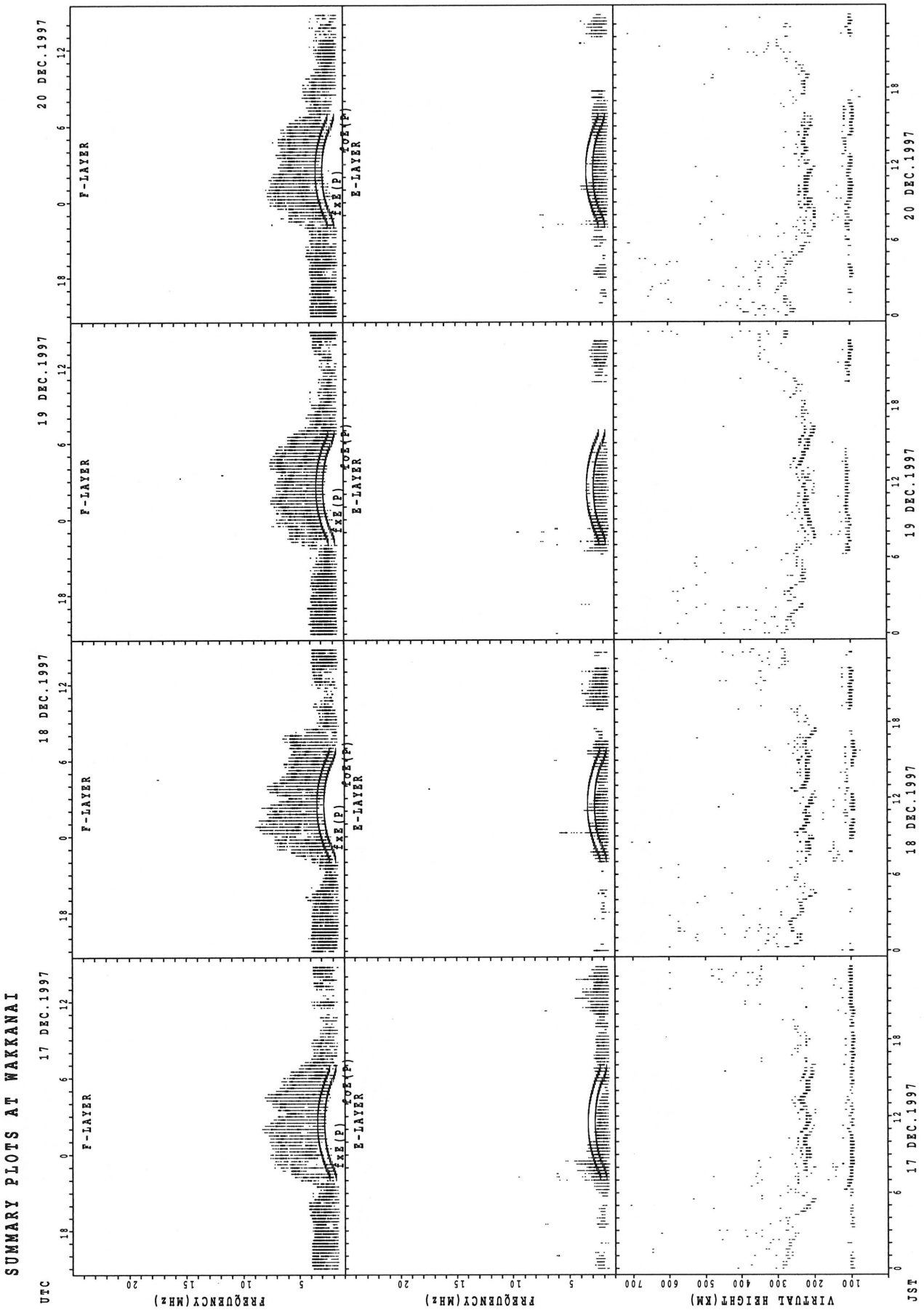
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT WAKKANAI
UTC
JST
9 DEC.1997
10 DEC.1997
11 DEC.1997
12 DEC.1997
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

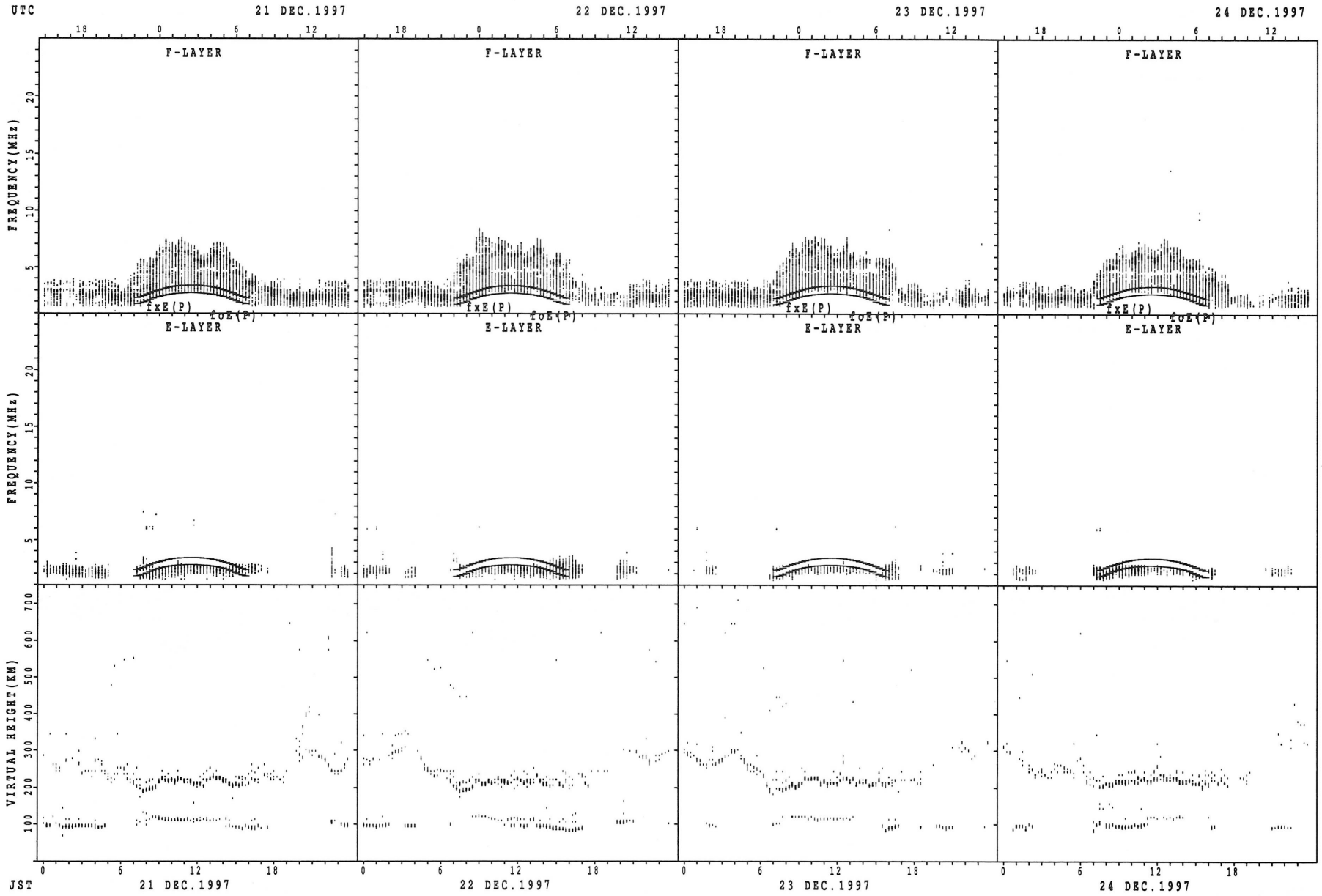
SUMMARY PLOTS AT WAKKANAI



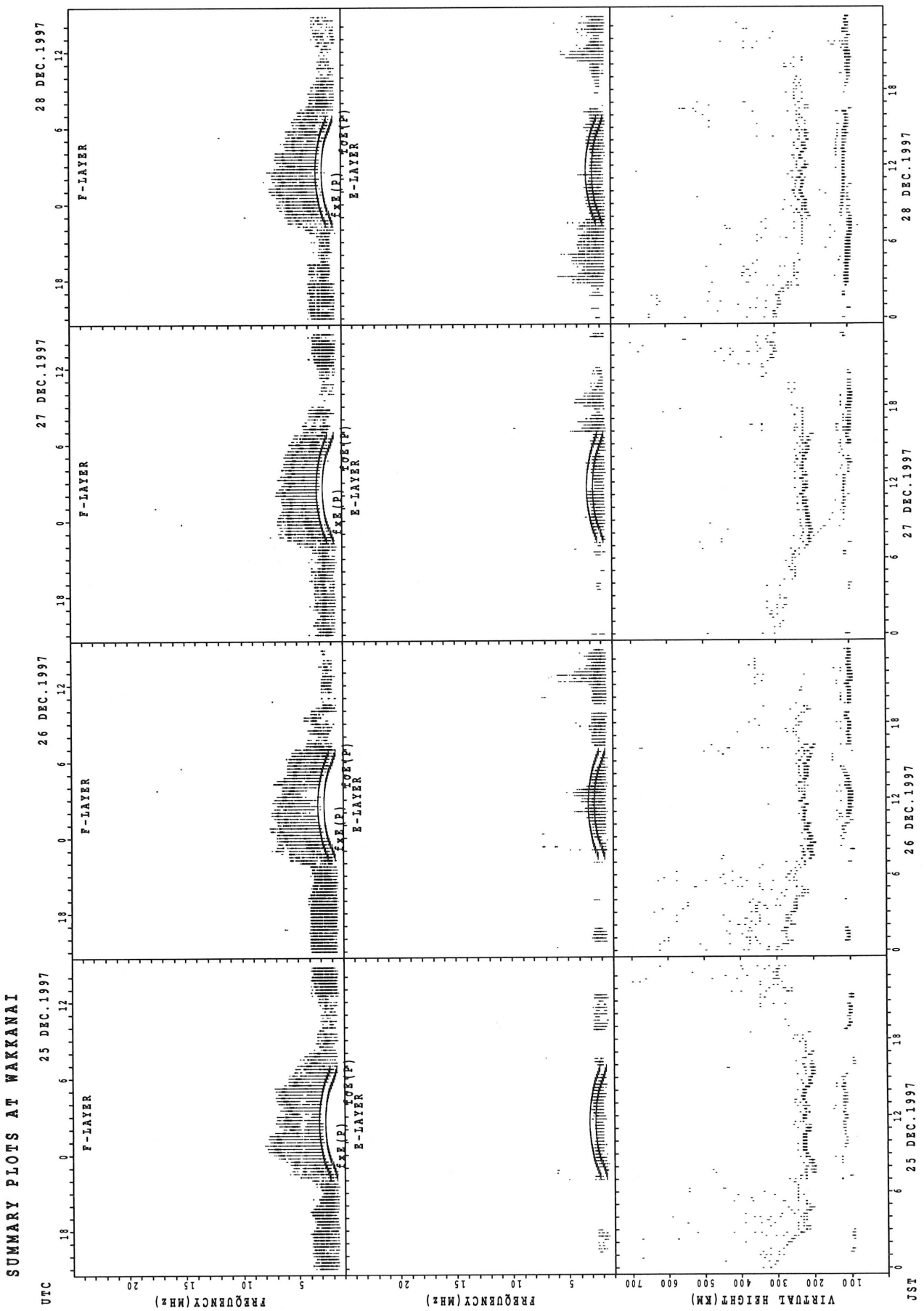
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT WAKKANAI
UTC
JST
17 DEC.1997
18 DEC.1997
19 DEC.1997
20 DEC.1997
F-LAYER
E-LAYER
fxE(P)
foE(P)
FREQUENCY(MHz)
VIRTUAL HEIGHT(KM)
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

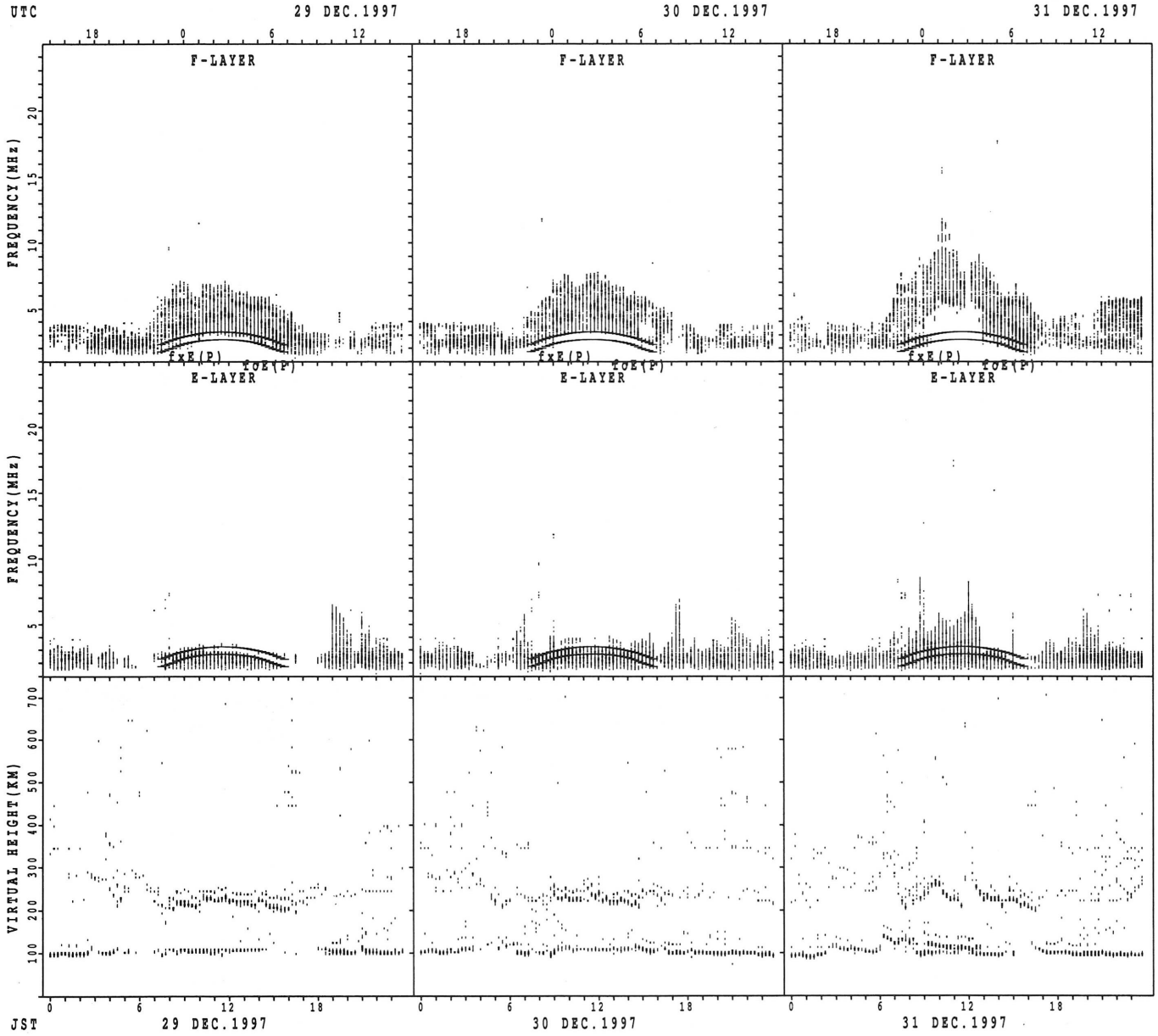
SUMMARY PLOTS AT WAKKANAI



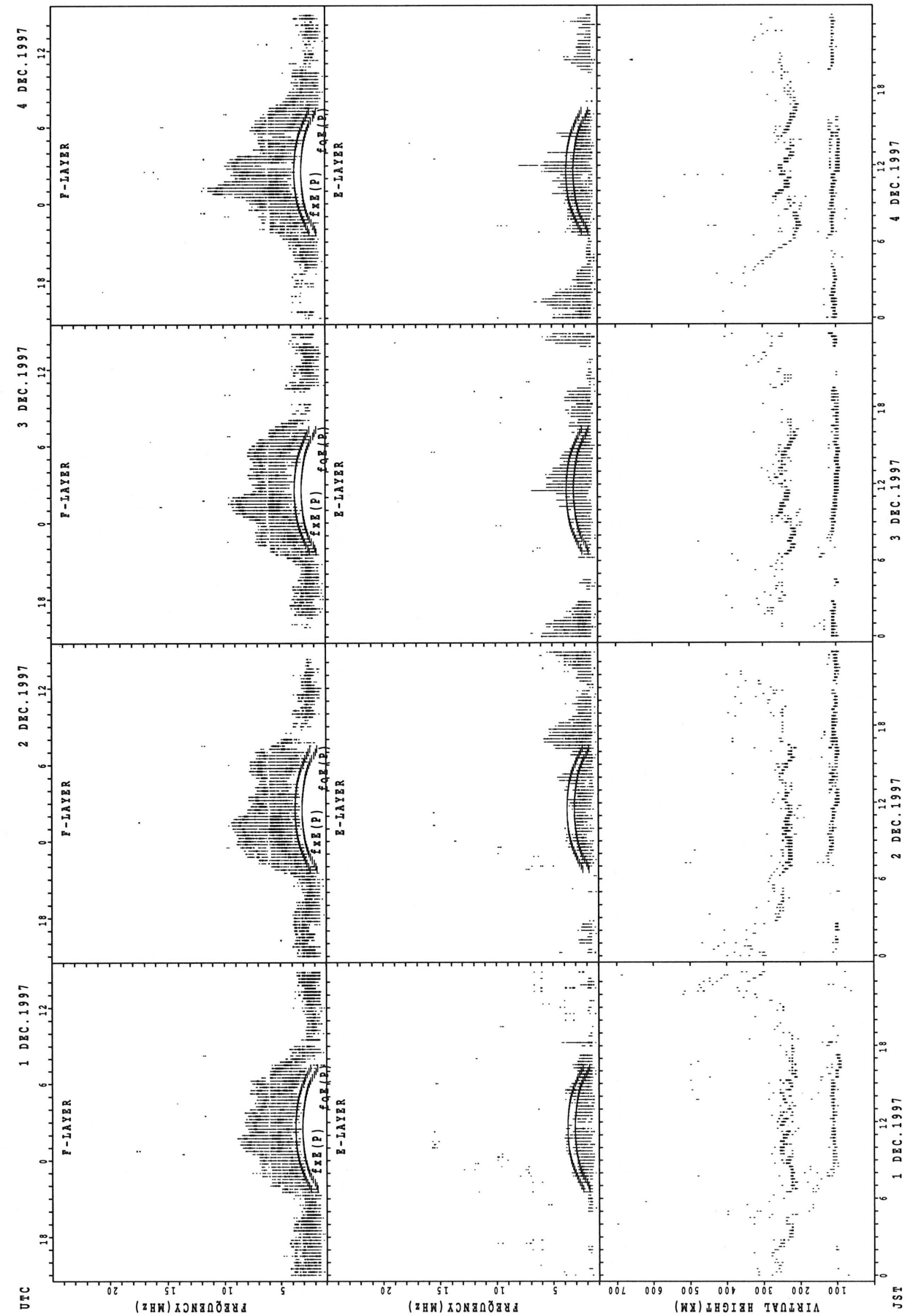
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT WAKKANAI
UTC
JST
25 DEC.1997
26 DEC.1997
27 DEC.1997
28 DEC.1997
F-LAYER
E-LAYER
fxE(P)
foE(P)
FREQUENCY(MHz)
VIRTUAL HEIGHT(KM)
fxE(P) ; PREDICTED VALUE FOR fxE
foE(P) ; PREDICTED VALUE FOR foE

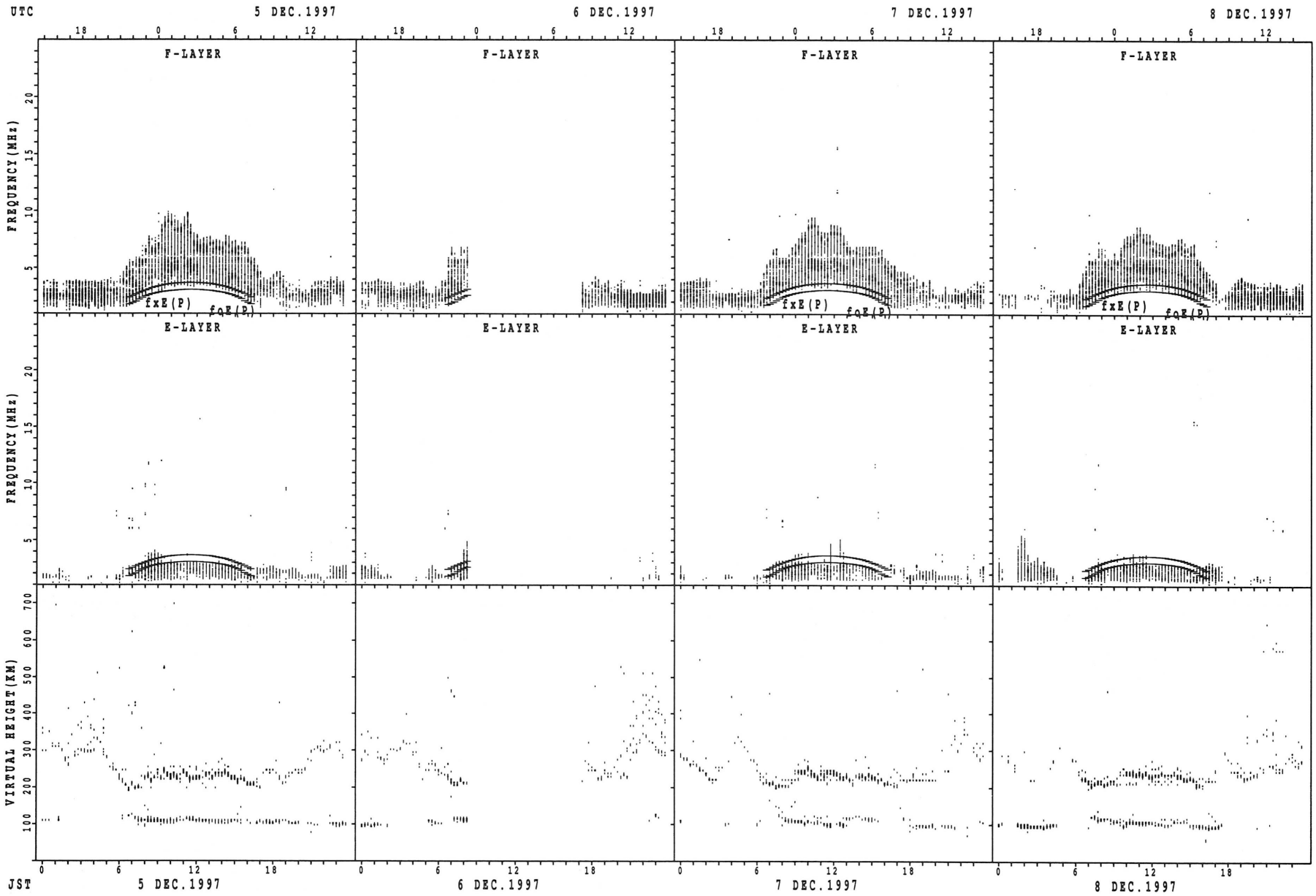
SUMMARY PLOTS AT WAKKANAI



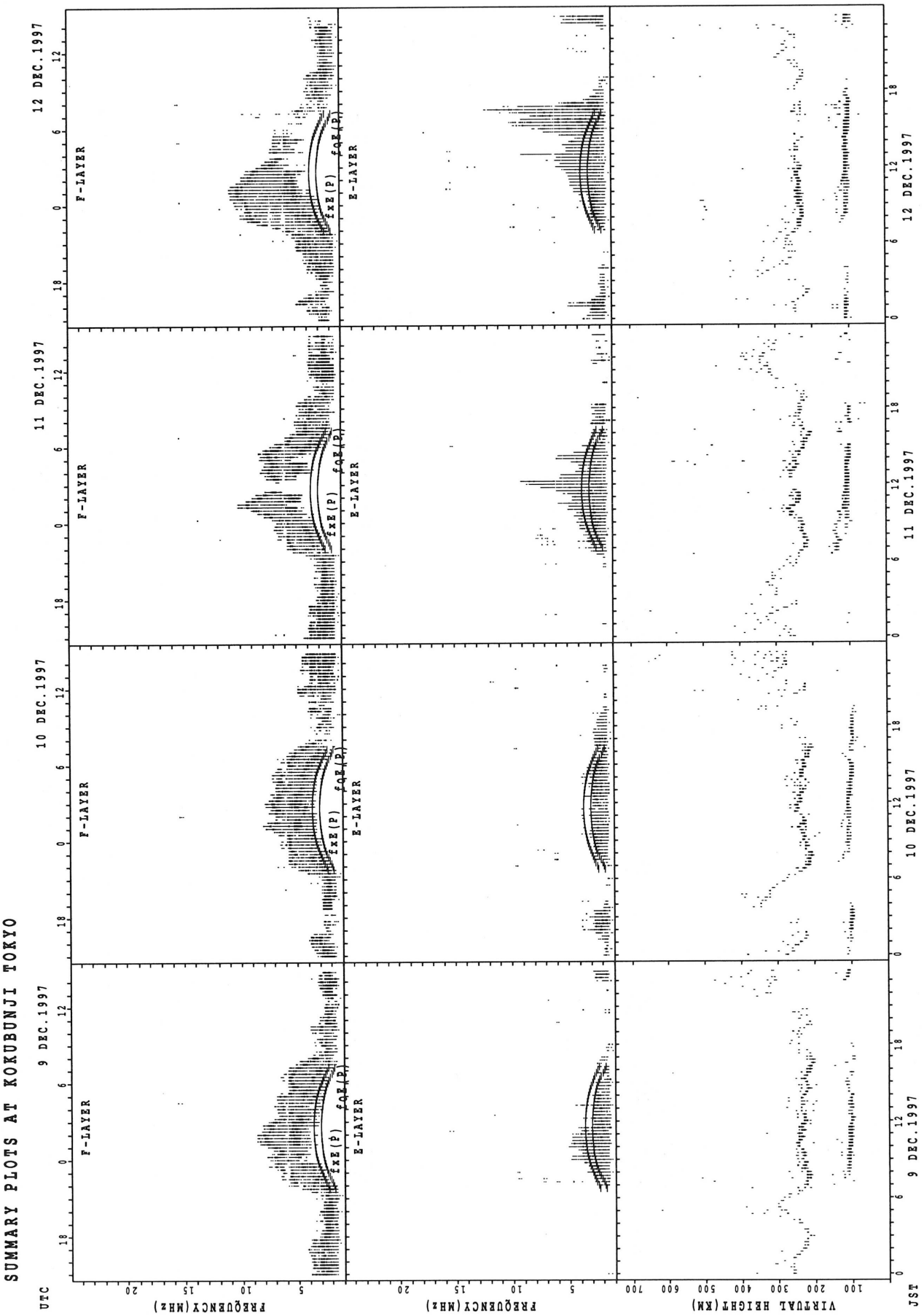
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
1 DEC.1997
2 DEC.1997
3 DEC.1997
4 DEC.1997
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

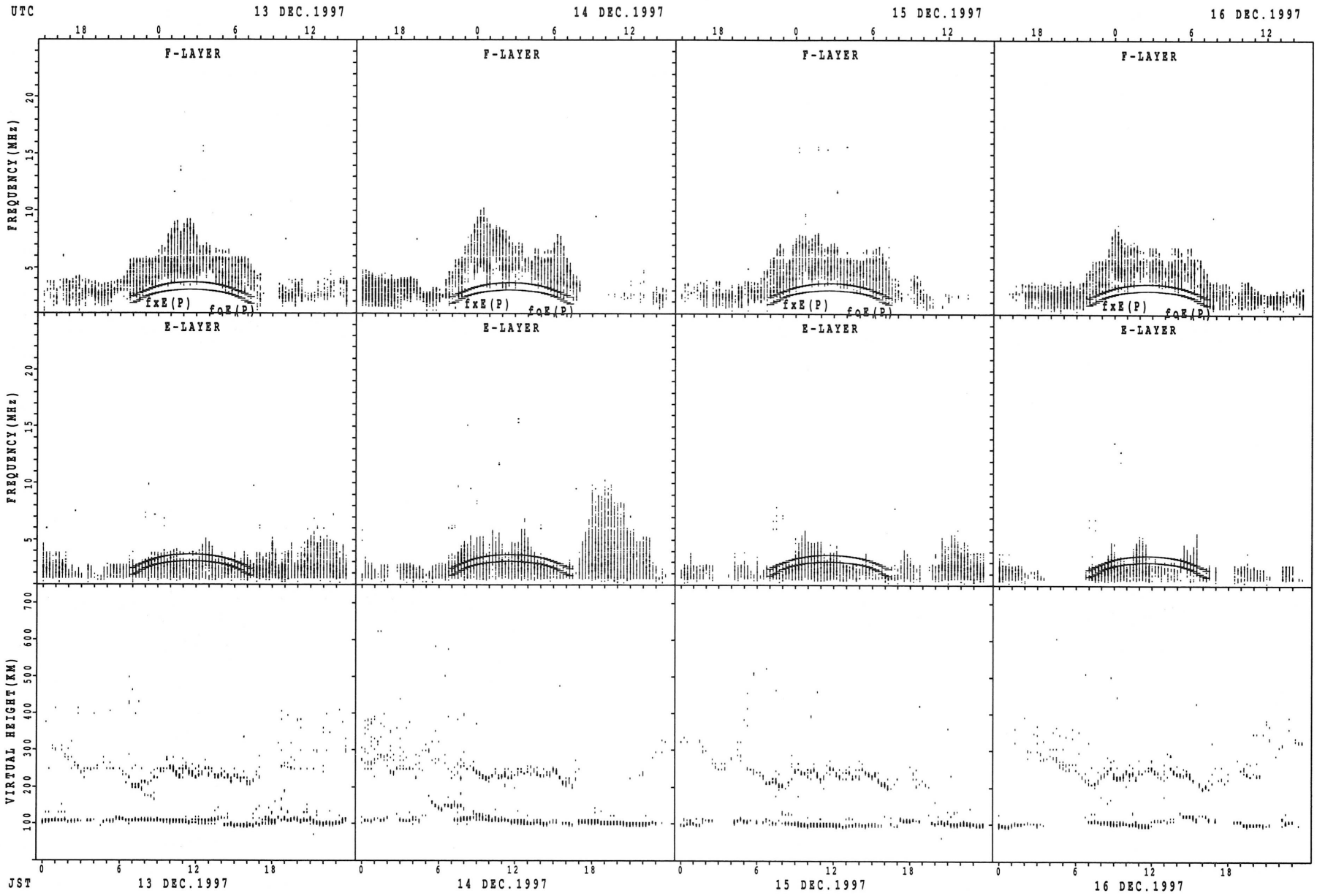
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

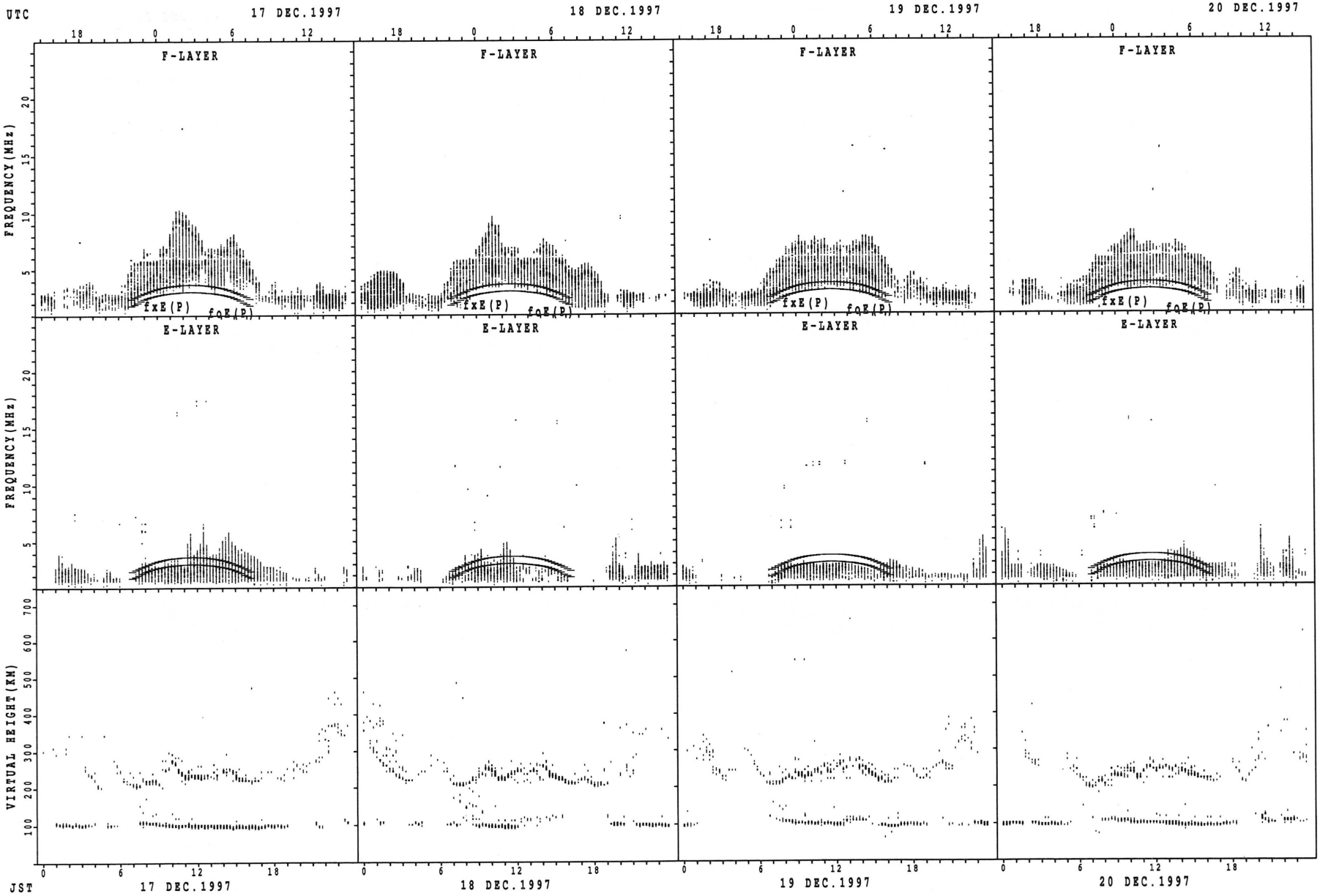

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
9 DEC.1997
10 DEC.1997
11 DEC.1997
12 DEC.1997
F-LAYER
E-LAYER
FREQUENCY(MHz)
VIRTUAL HEIGHT(KM)
fxE(P)
foE(P)
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT KOKUBUNJI TOKYO



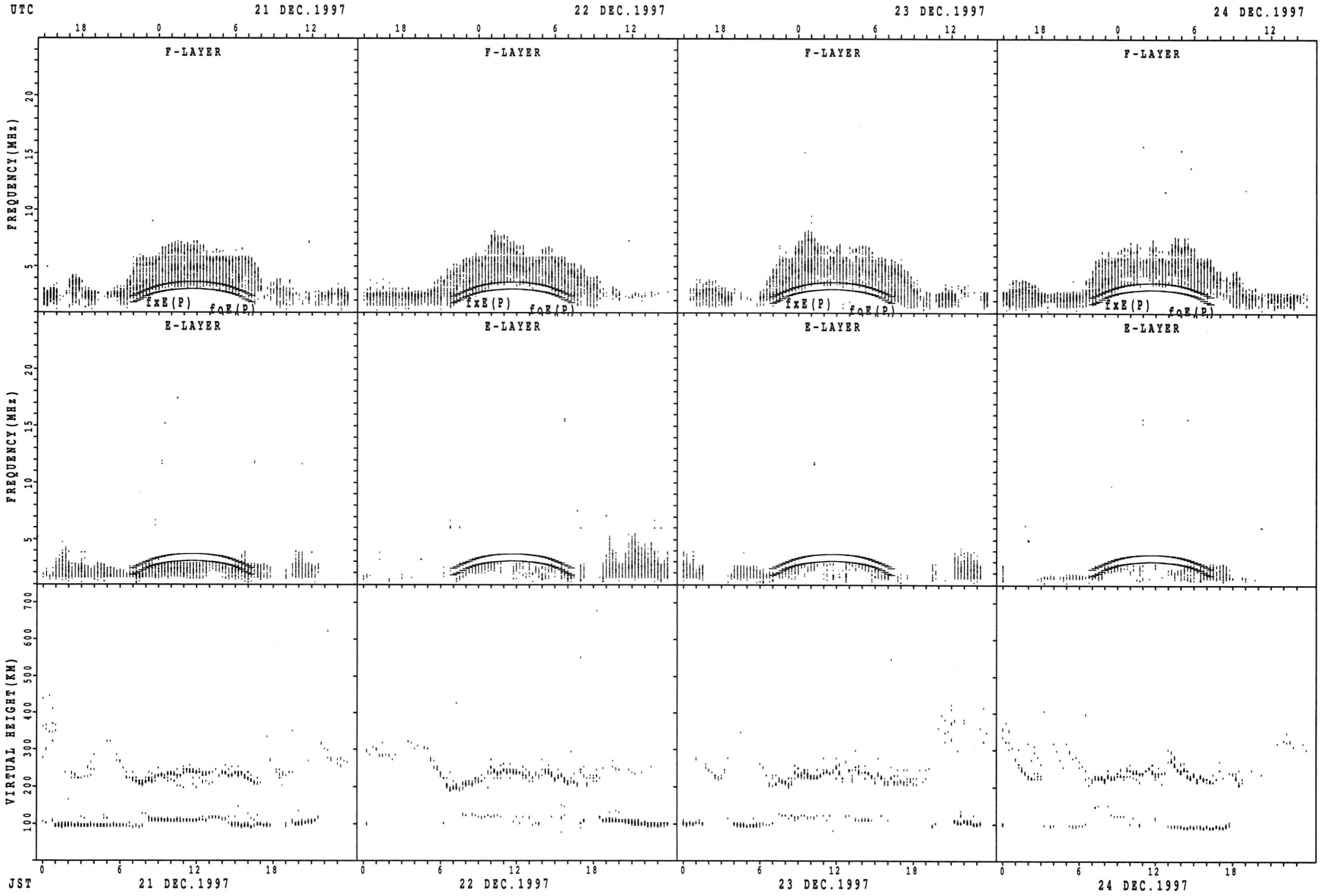
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT KOKUBUNJI TOKYO

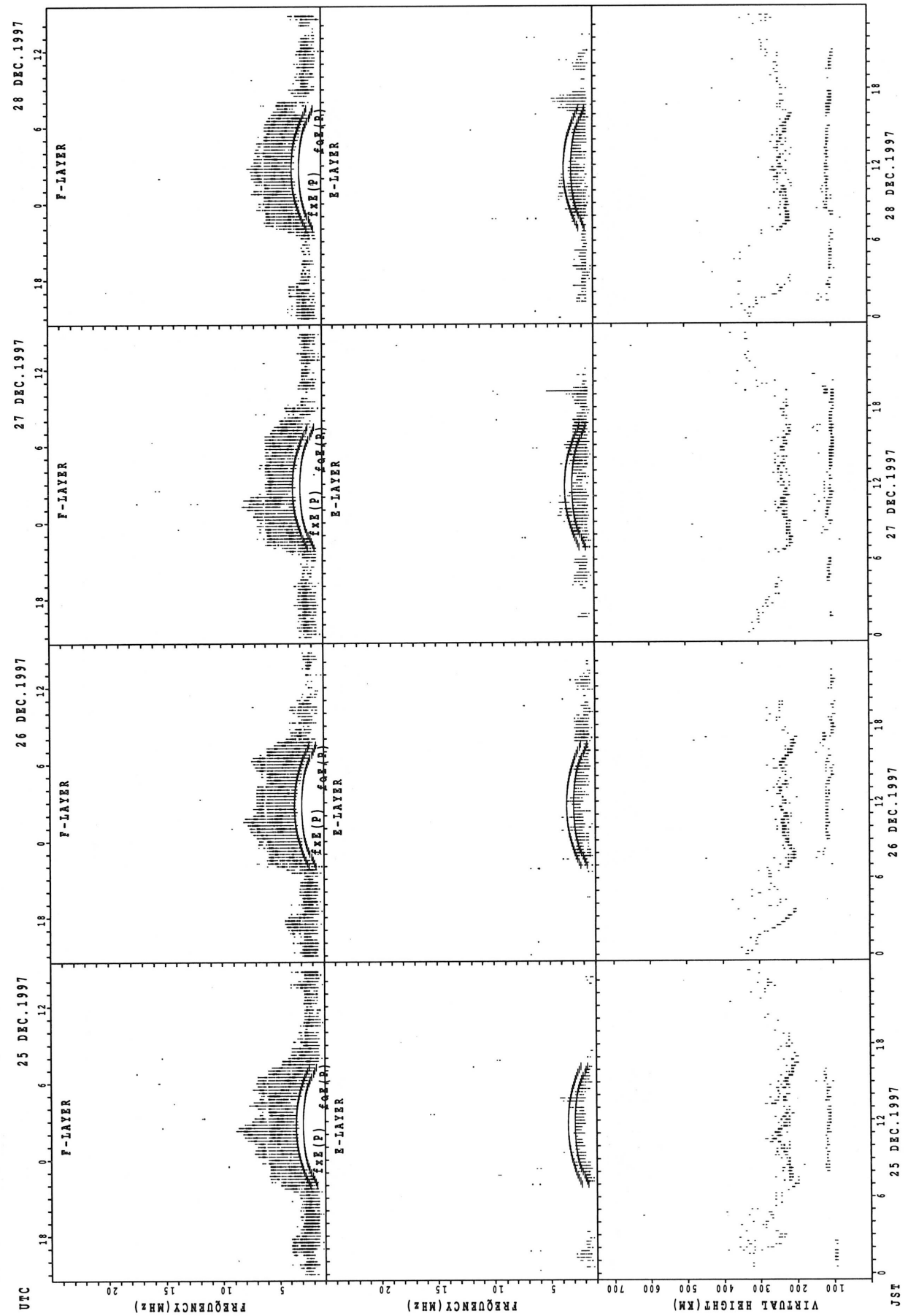


fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

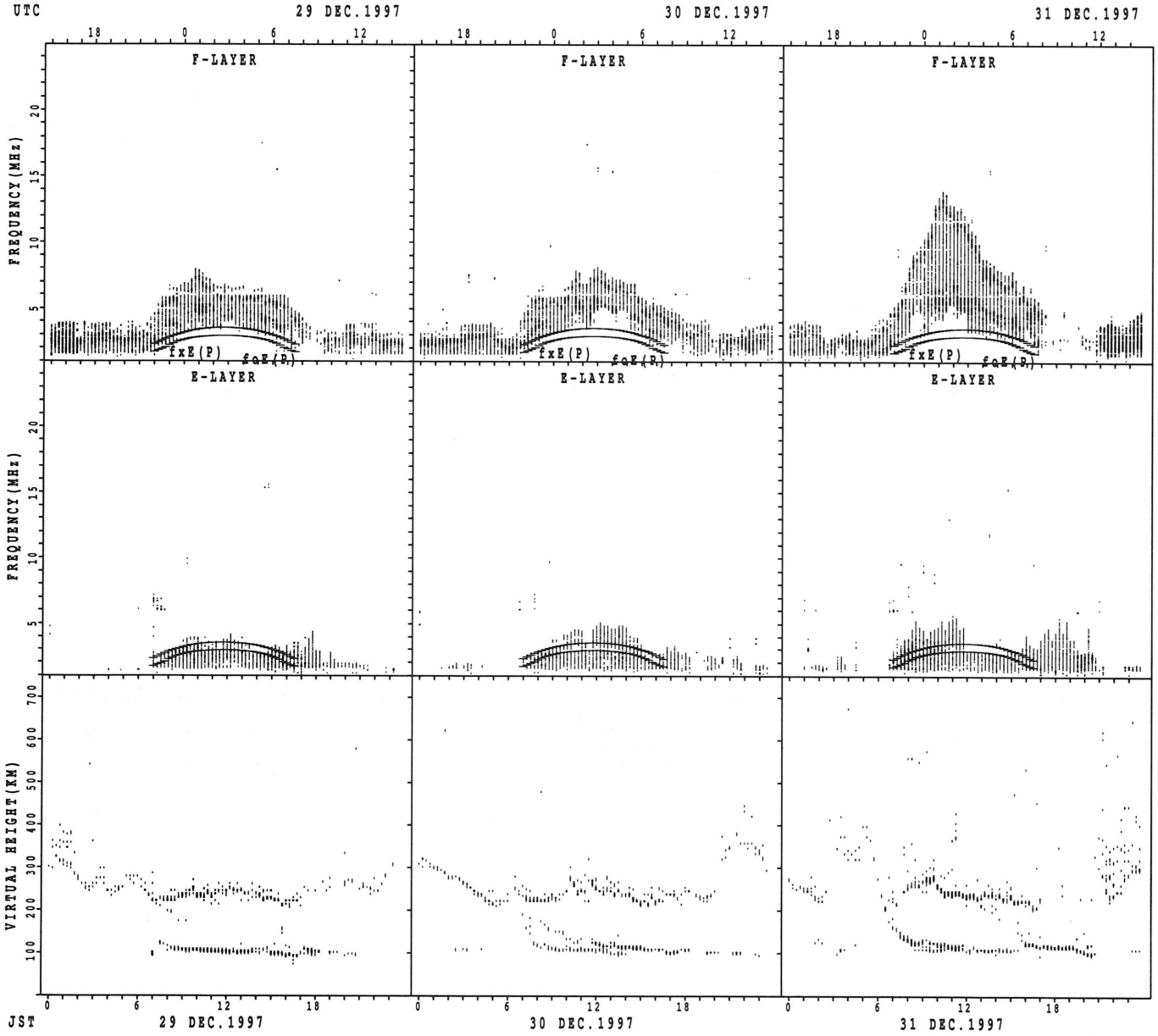
SUMMARY PLOTS AT KOKUBUNJI TOKYO



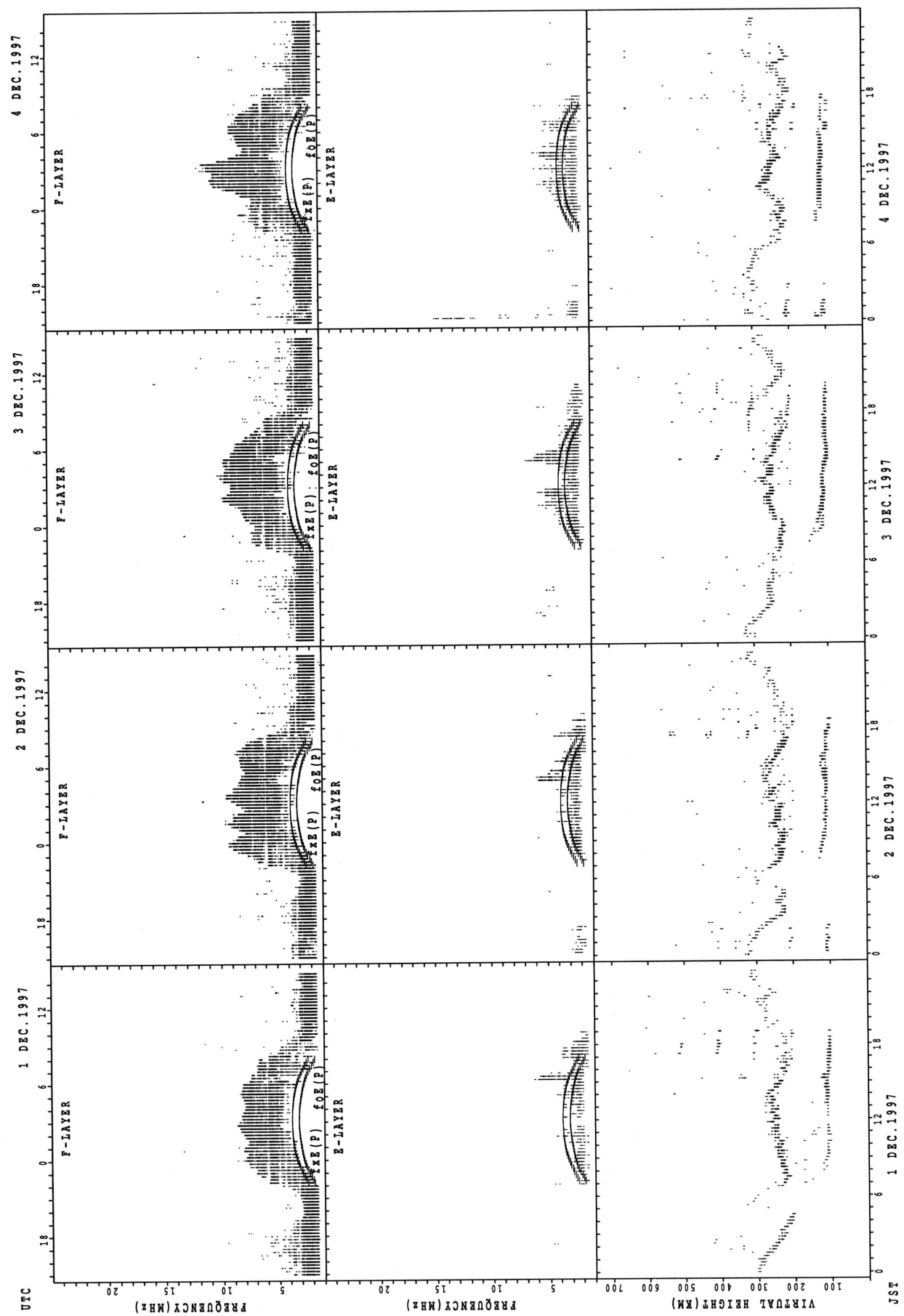
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
25 DEC.1997
26 DEC.1997
27 DEC.1997
28 DEC.1997
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

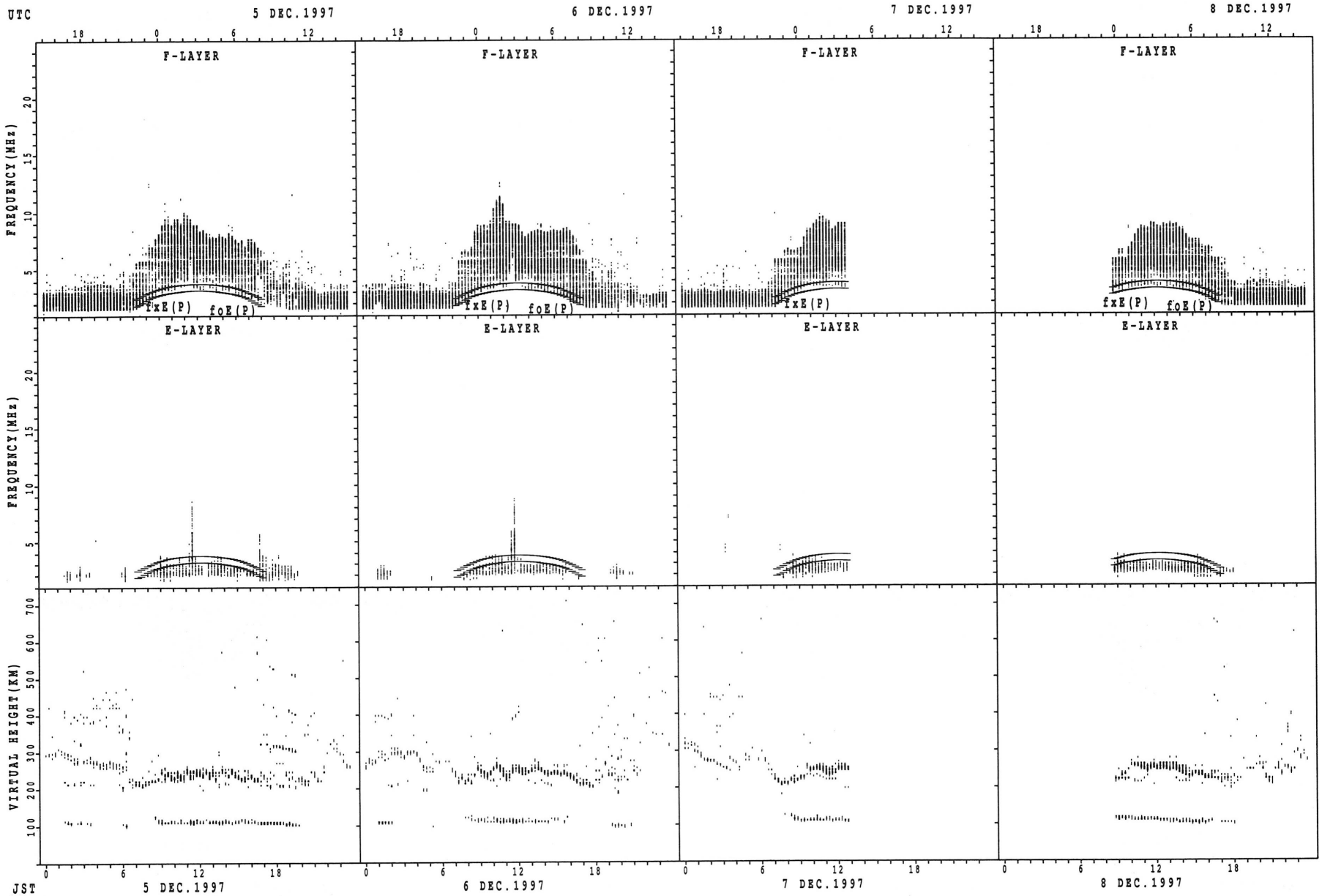
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

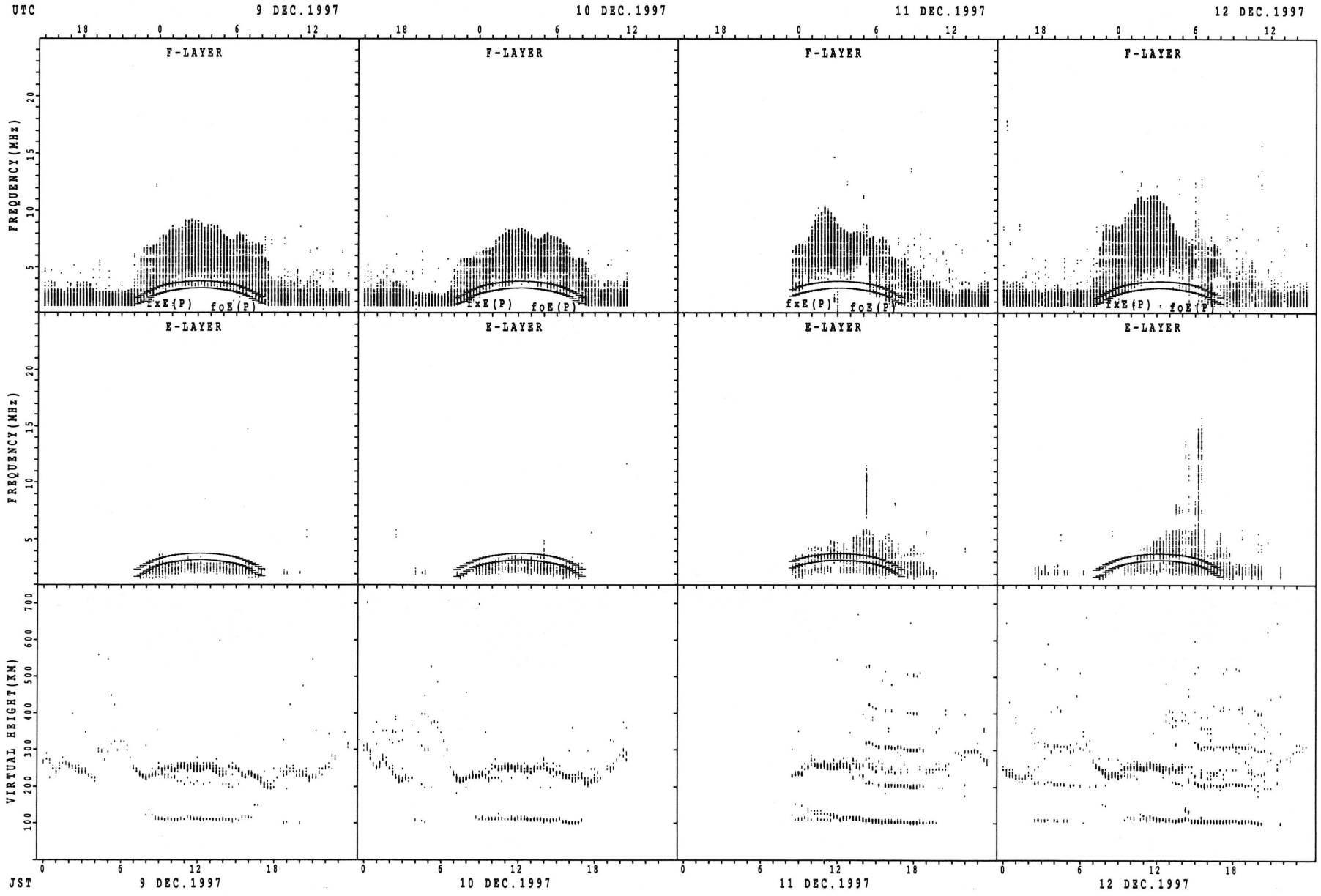

SUMMARY PLOTS AT YAMAGAWA
UTC
JST
1 DEC.1997
2 DEC.1997
3 DEC.1997
4 DEC.1997
F-LAYER
E-LAYER
fxE(P)
foE(P)
FREQUENCY(MHz)
VIRTUAL HEIGHT(KM)
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT YAMAGAWA



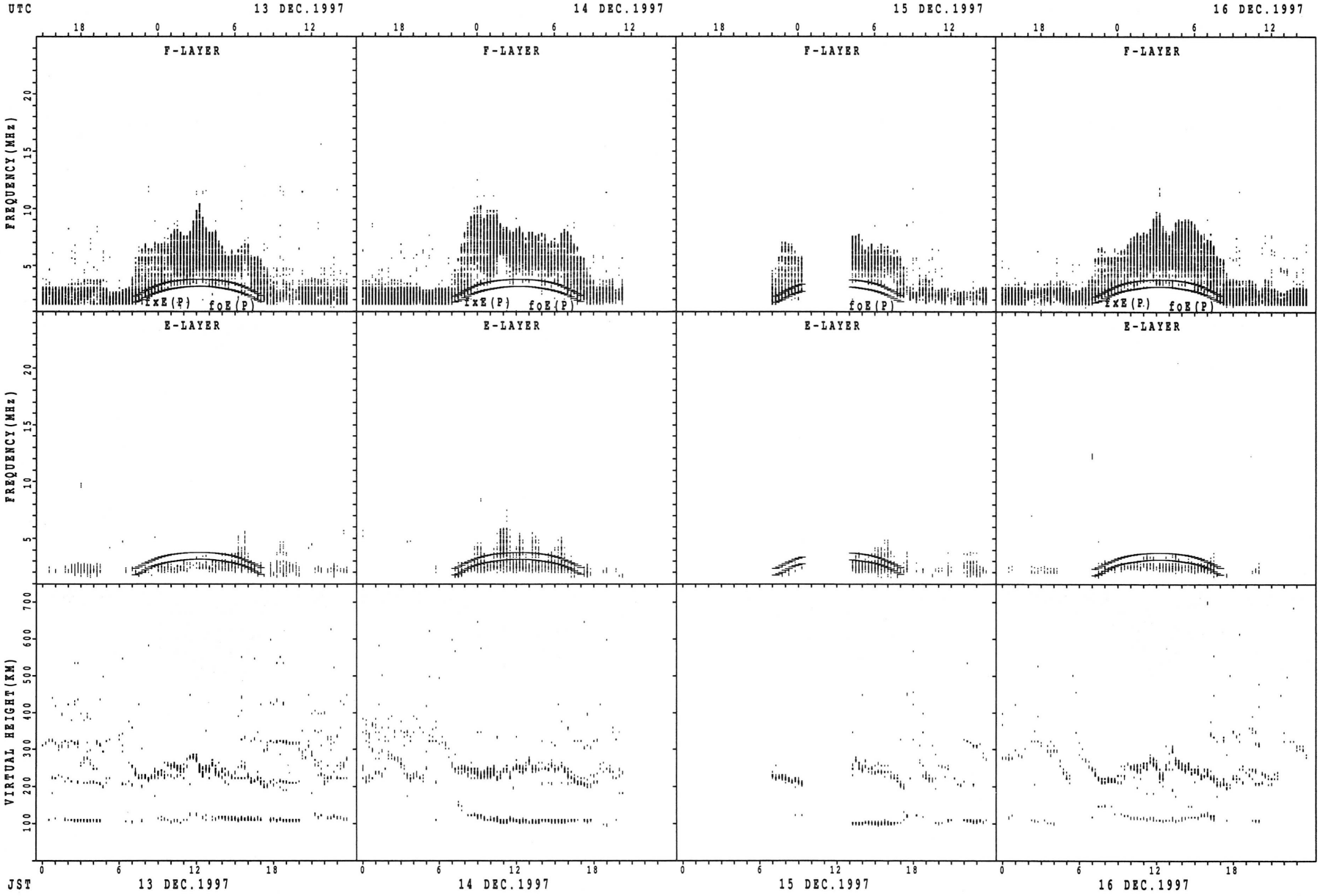
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT YAMAGAWA

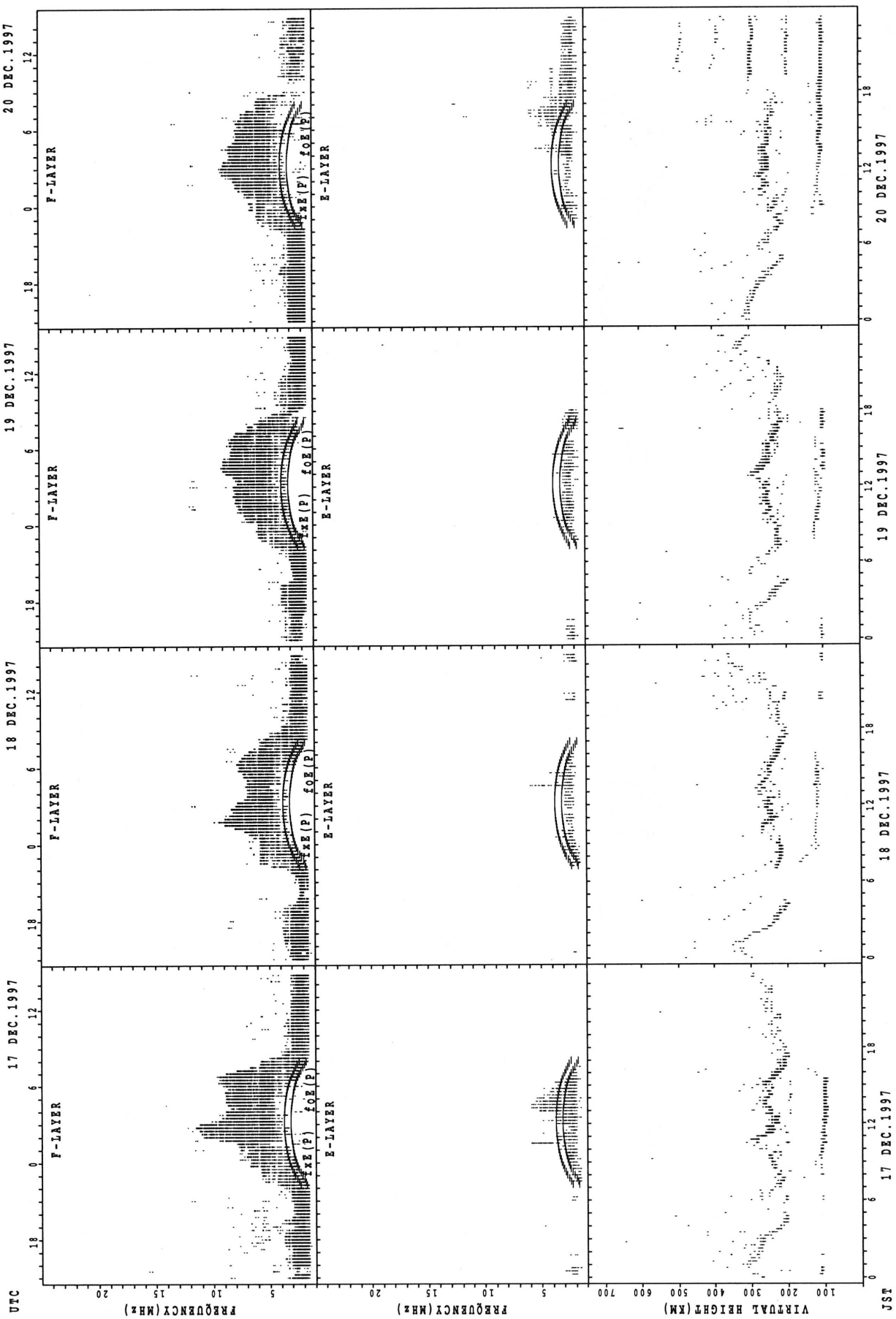


fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

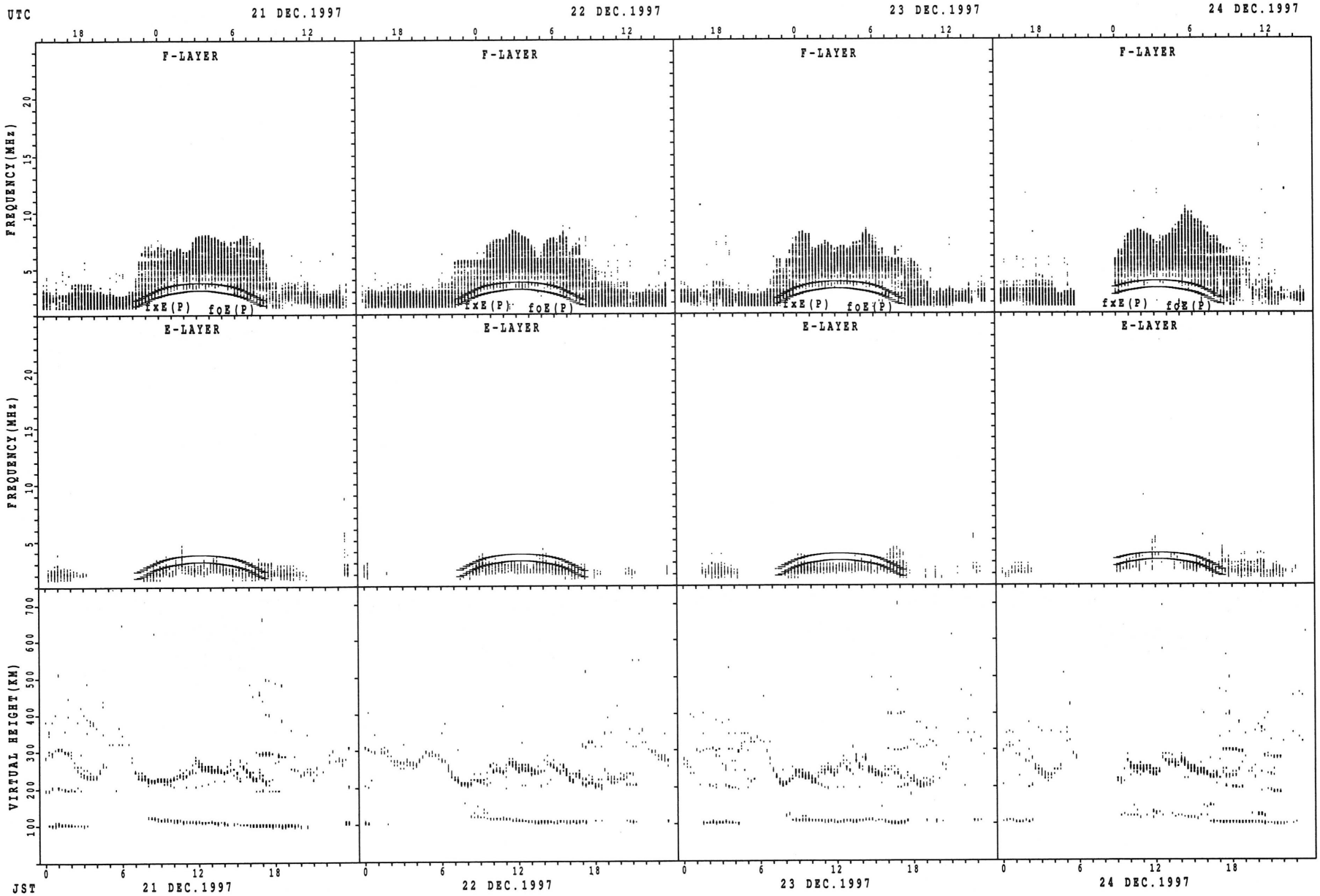
SUMMARY PLOTS AT YAMAGAWA



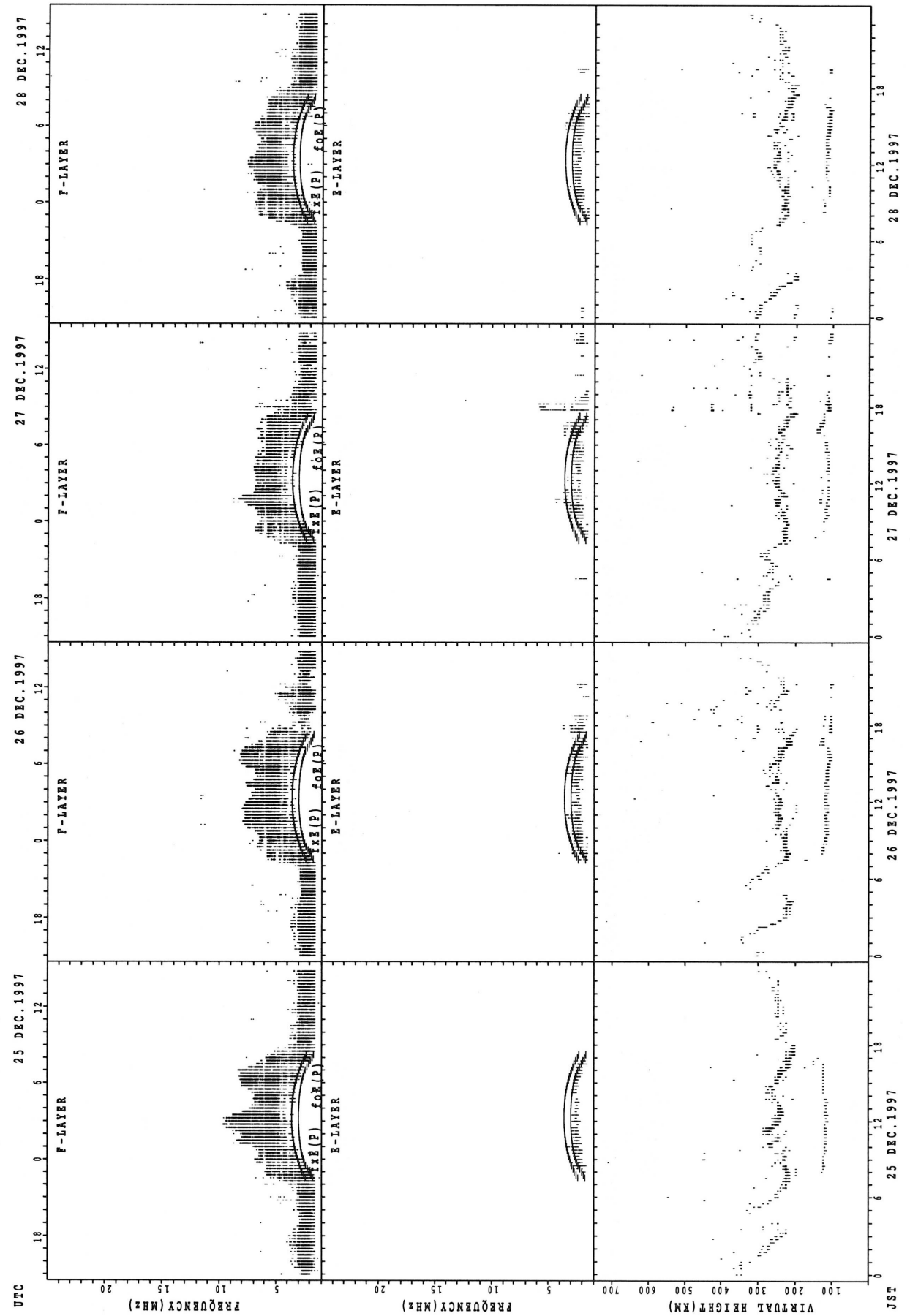
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE


SUMMARY PLOTS AT YAMAGAWA
UTC
JST
17 DEC.1997
18 DEC.1997
19 DEC.1997
20 DEC.1997
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

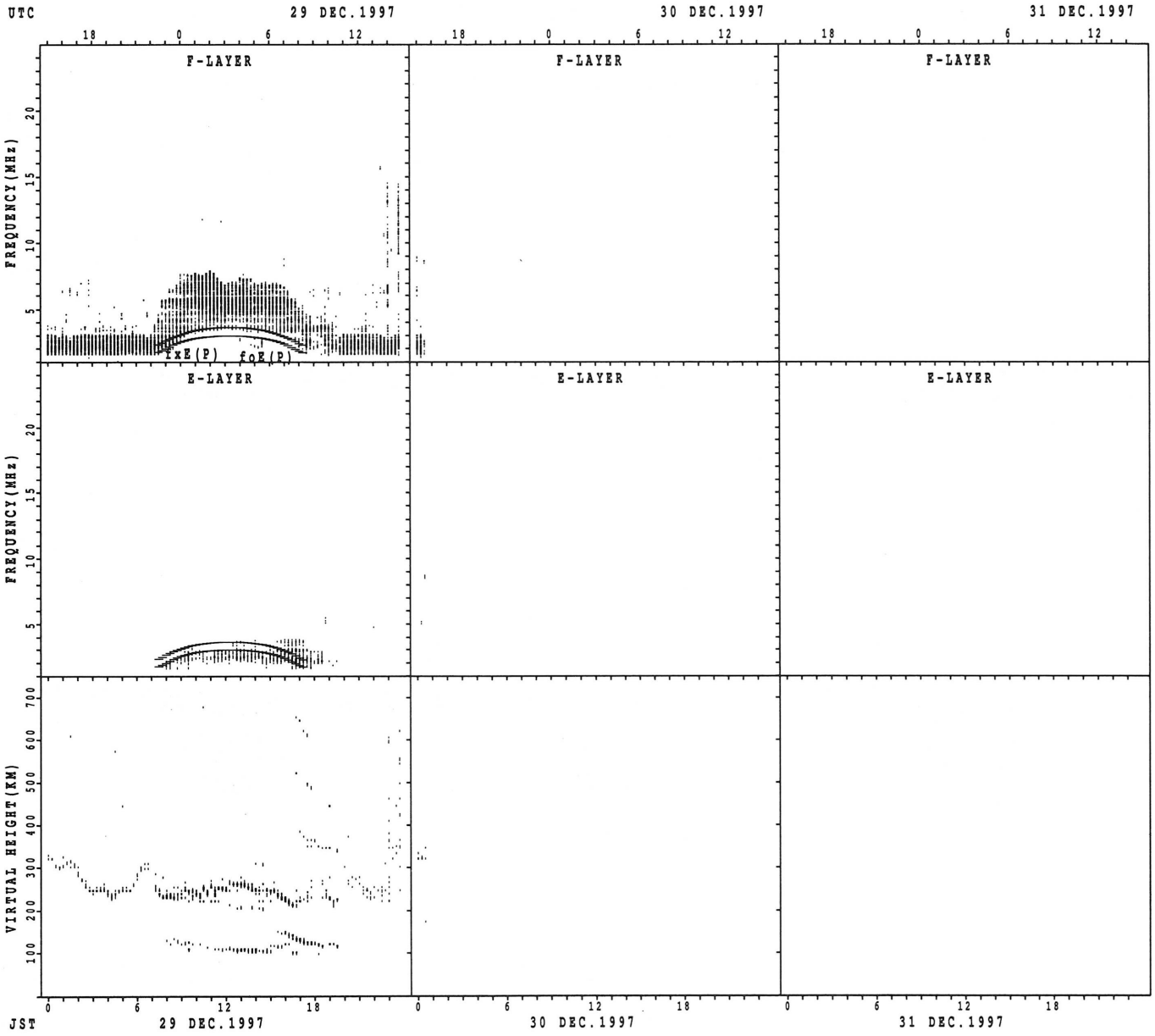
SUMMARY PLOTS AT YAMAGAWA



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

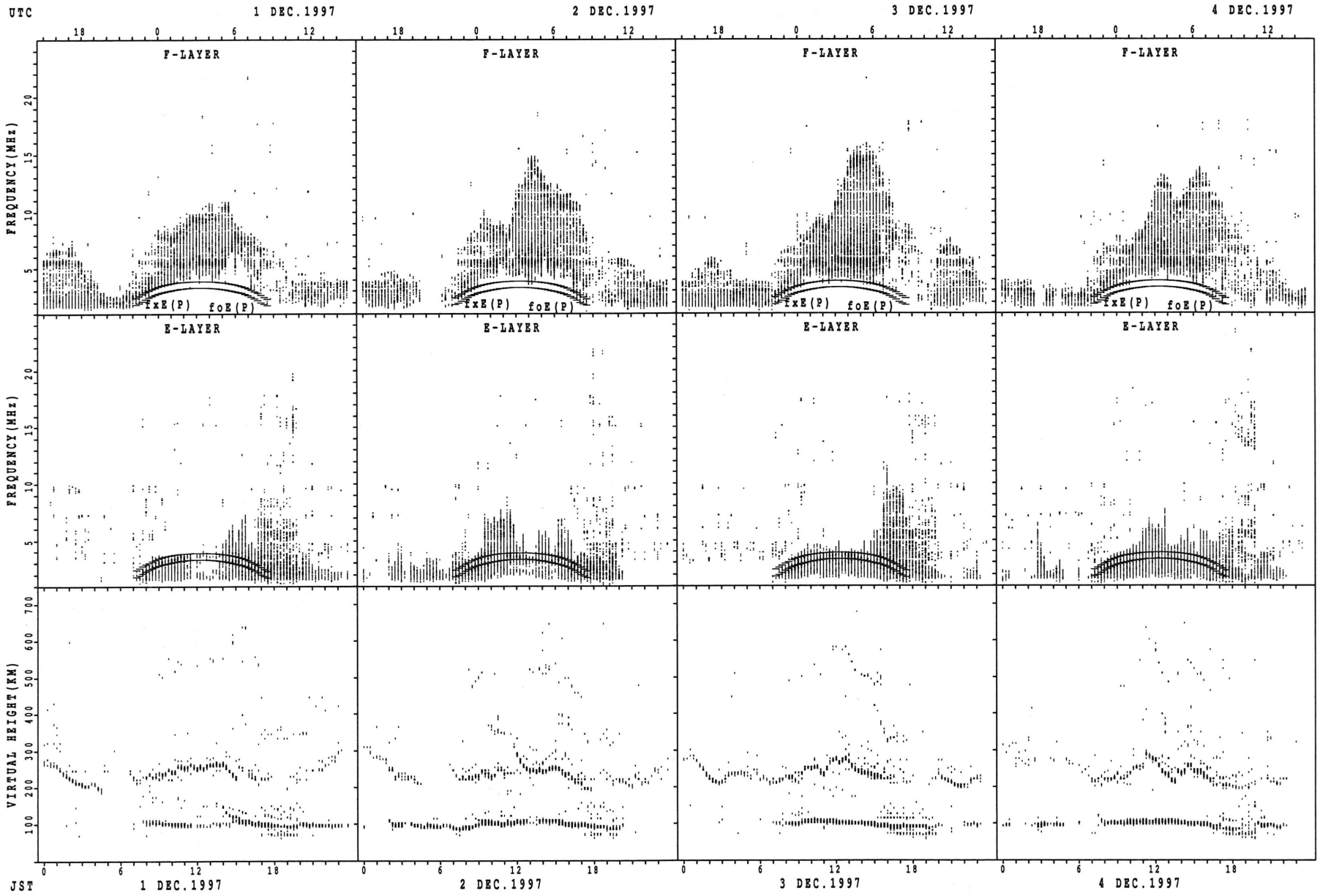

SUMMARY PLOTS AT YAMAGAWA
UTC
JST
25 DEC.1997
26 DEC.1997
27 DEC.1997
28 DEC.1997
F-LAYER
E-LAYER
FREQUENCY (MHz)
VIRTUAL HEIGHT (KM)
fxE(P) foE(P)
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT YAMAGAWA



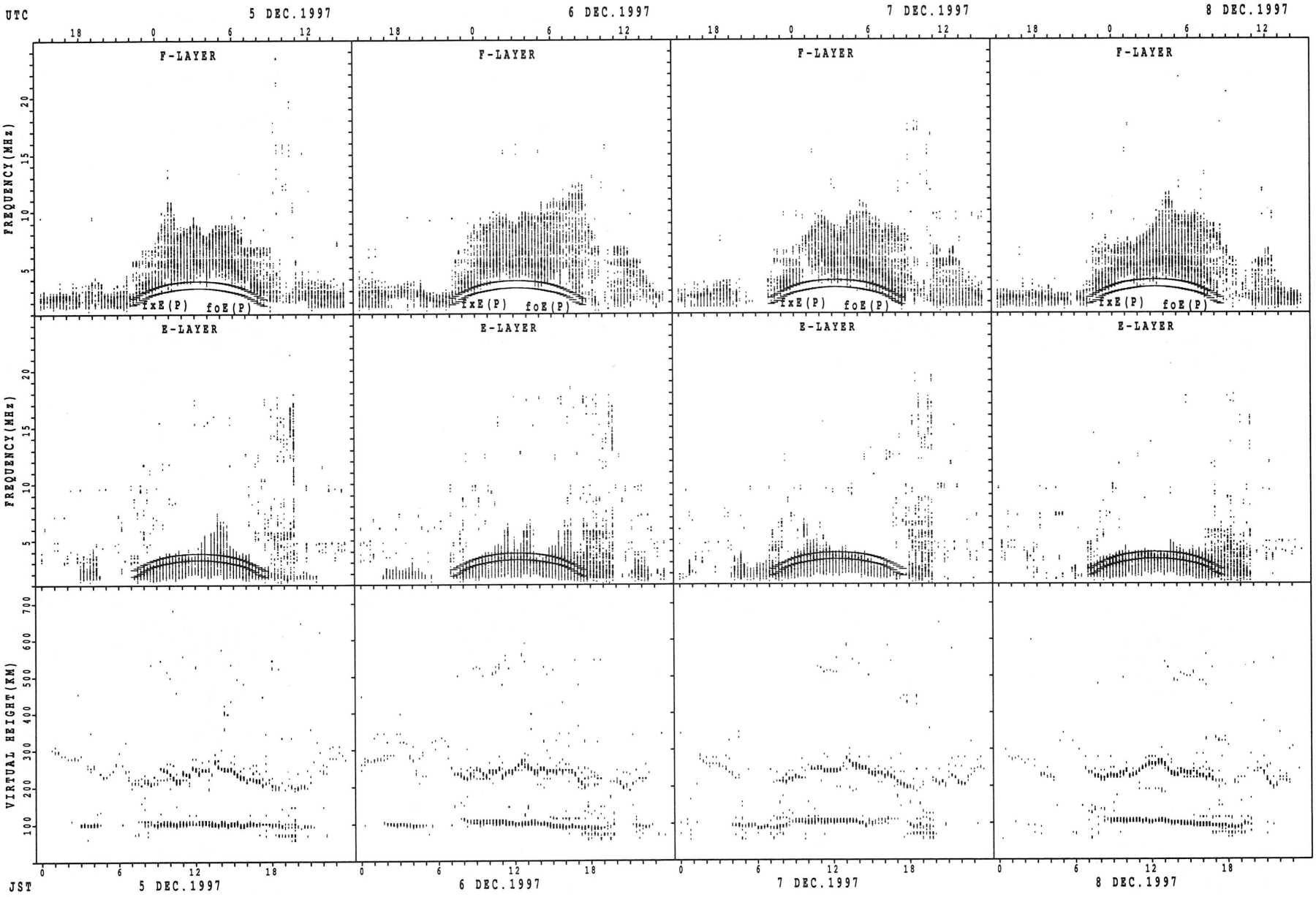
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT OKINAWA



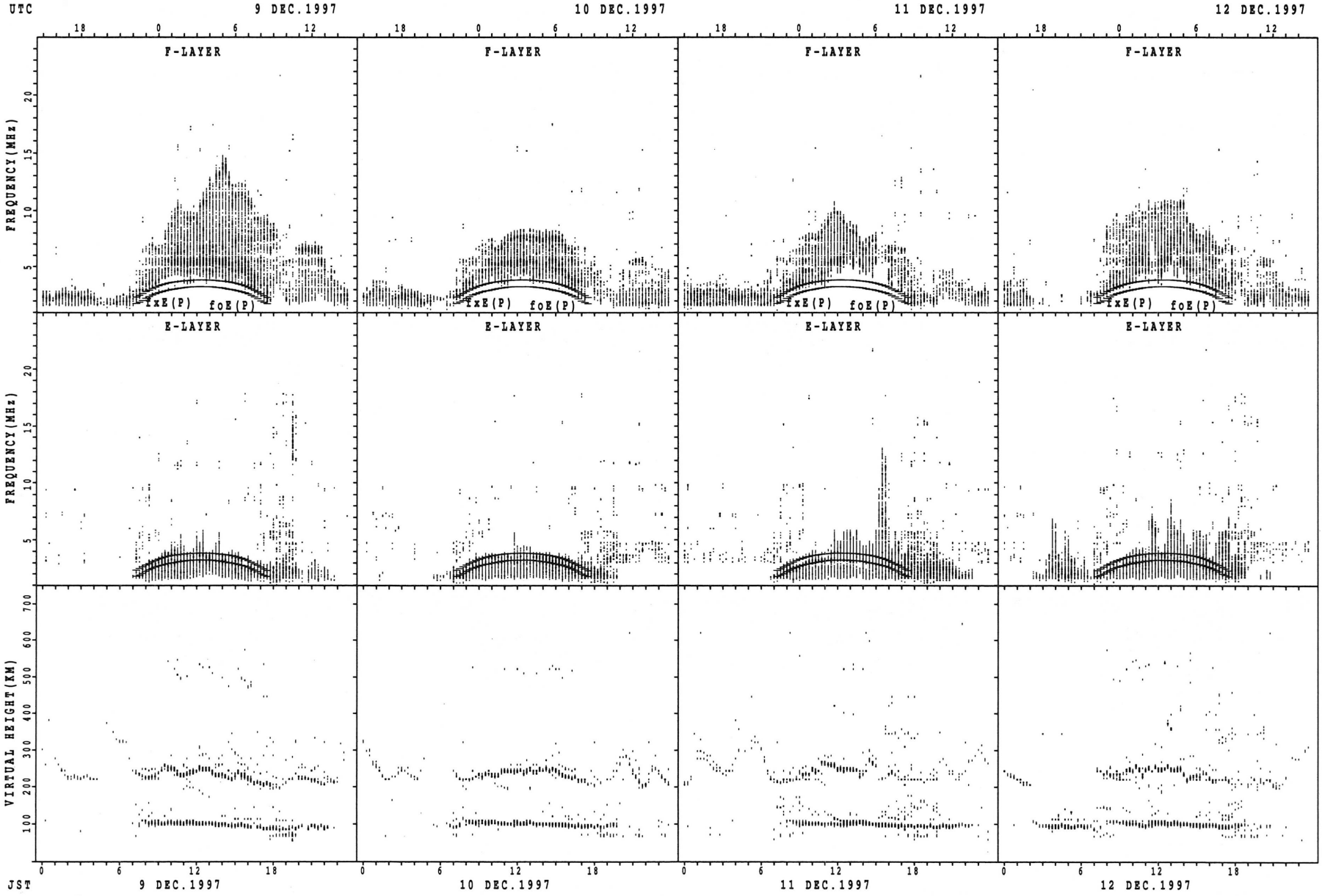
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT OKINAWA



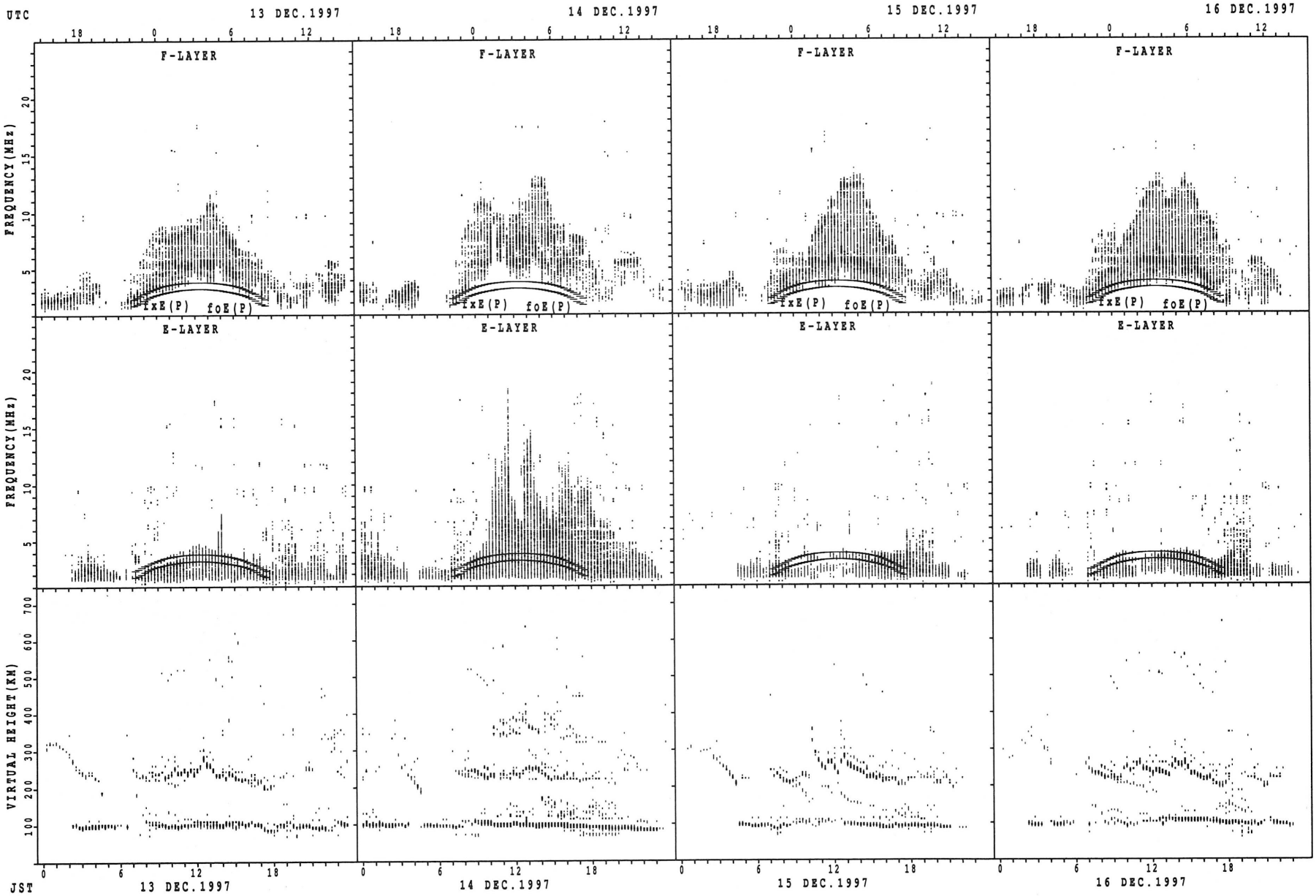
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT OKINAWA



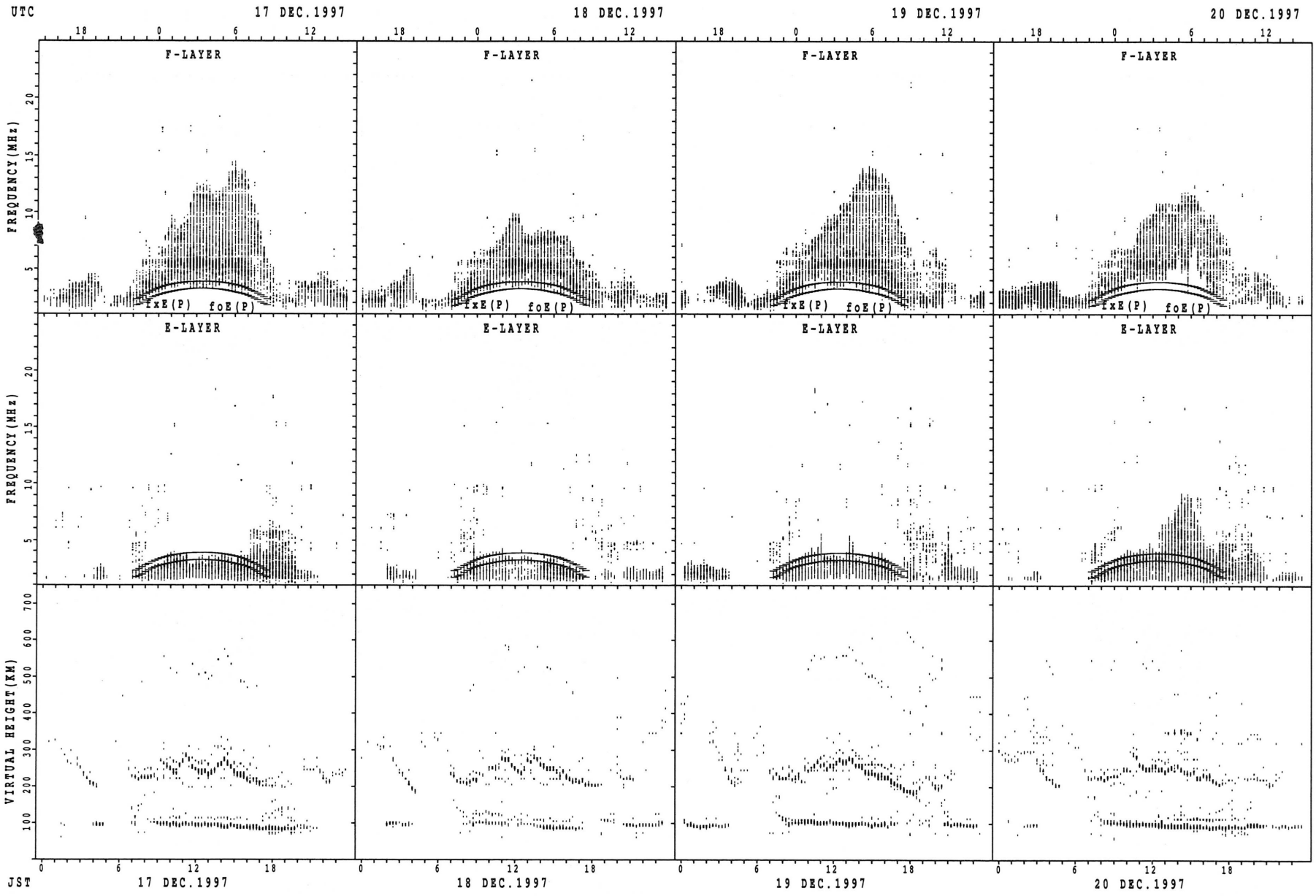
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT OKINAWA



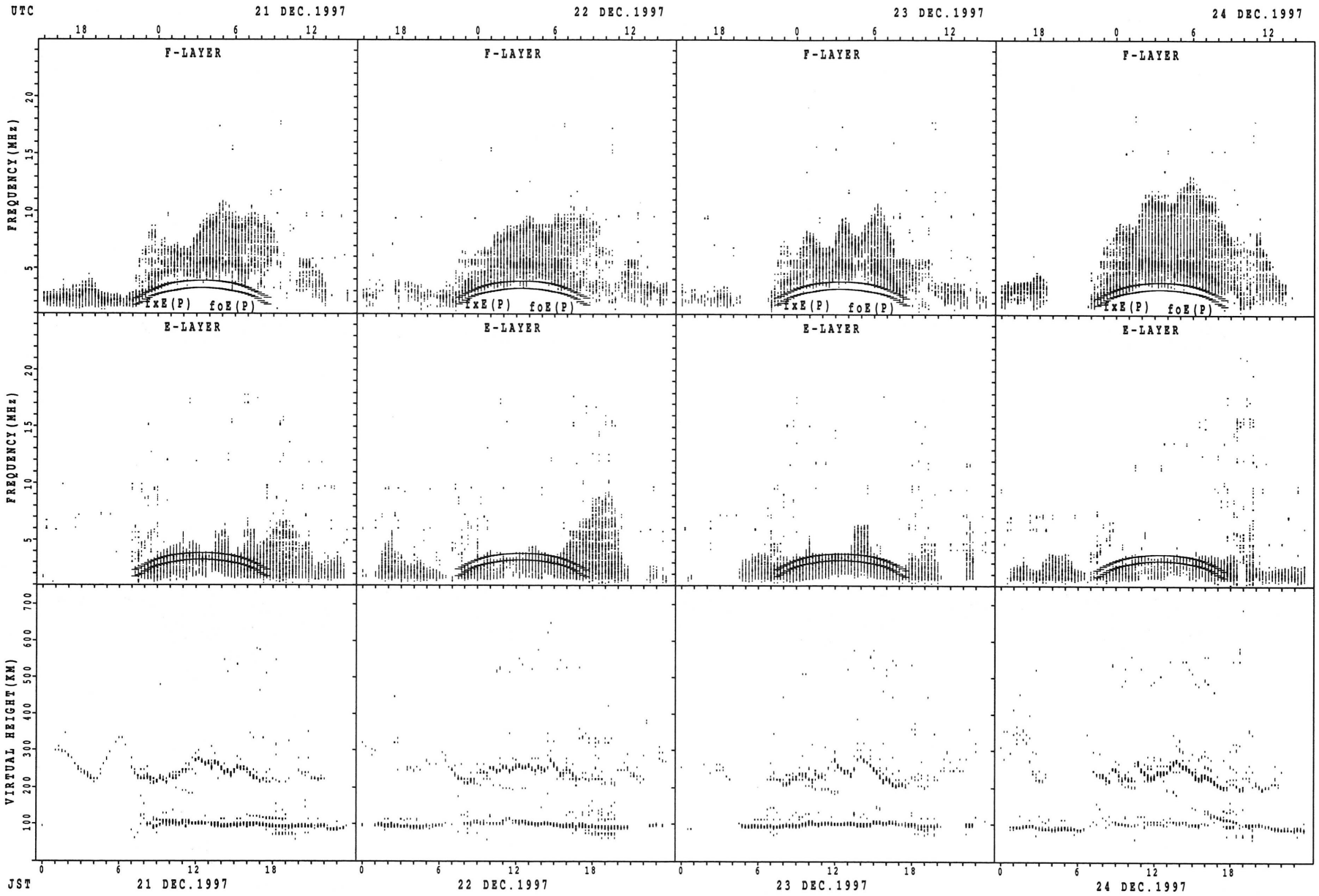
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT OKINAWA

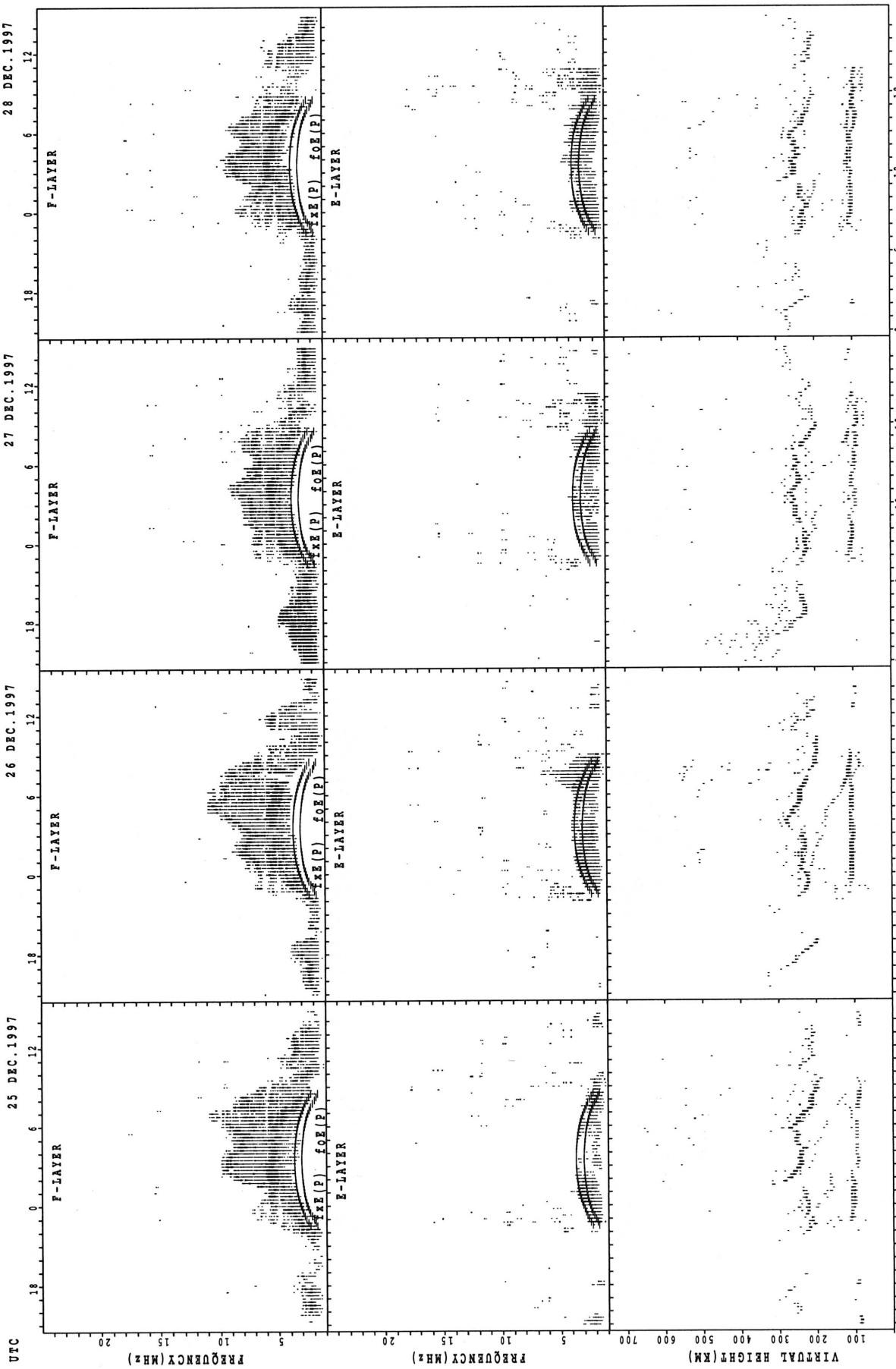


fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

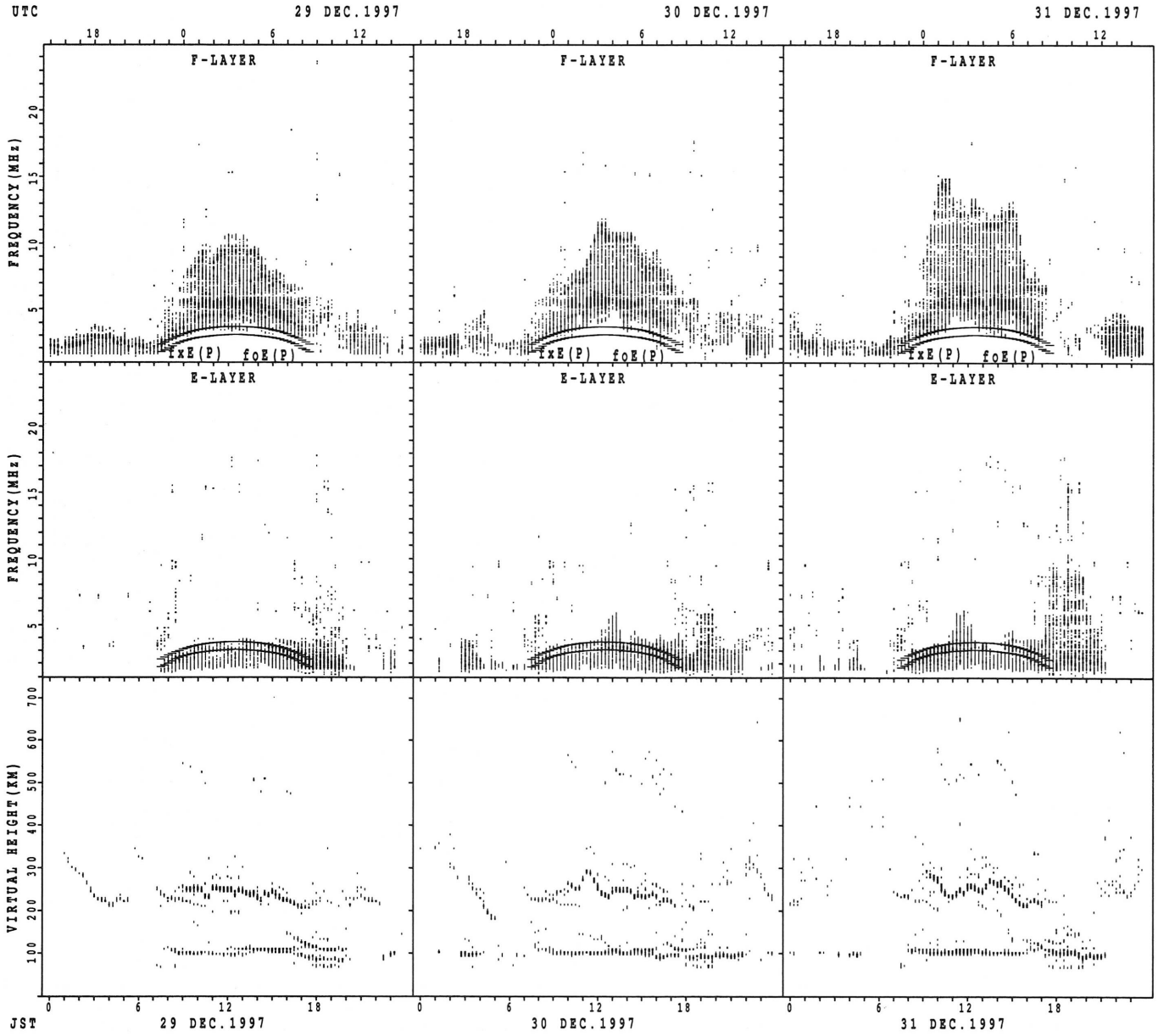
SUMMARY PLOTS AT OKINAWA



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


SUMMARY PLOTS AT OKINAWA
UTC
JST
25 DEC.1997
26 DEC.1997
27 DEC.1997
28 DEC.1997
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

DEC.1997 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									14	29	26	30	23	23	20	10								
MED									231	234	233	226	234	240	241	228								
U Q									234	247	244	234	240	256	246	240								
L Q									226	225	224	224	226	232	230	218								

h'Es

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	17	20	20	15	15	10	12	21	22	27	30	30	28	30	27	21	19	17	14	18	17	18	20	16
MED	101	101	99	101	103	105	109	105	107	107	110	109	111	113	115	103	99	103	105	107	105	105	103	103
U Q	105	104	103	107	105	113	112	111	119	119	113	119	113	119	119	121	103	107	111	109	107	109	107	103
L Q	98	97	96	97	97	101	104	103	101	103	99	107	100	107	111	98	95	99	103	103	99	103	101	99

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									13	21	28	23	21	14	18	15								
MED									240	248	247	242	248	253	264	252								
U Q									251	257	255	260	256	266	272	258								
L Q									231	240	241	238	236	240	258	248								

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	13	13	11					10	26	28	28	26	25	29	26	27	19	21	17	12	13			14
MED	103	105	107					130	118	114	113	113	111	107	107	107	101	103	107	111	107			104
U Q	108	109	109					151	133	129	121	115	115	118	113	115	107	108	112	118	111			105
L Q	98	101	103					109	111	111	108	109	104	103	99	99	97	97	99	99	104			101

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									12	17	25	26	26	25	23	23	24							
MED									240	248	248	254	248	250	260	254	240							
U Q									243	253	264	258	254	265	270	258	249							
L Q									231	240	241	242	246	245	248	242	238							

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									14	24	27	25	25	25	25	26	26	19	15	12	10			
MED									130	119	115	115	115	113	115	113	111	107	107	107	104			
U Q									151	127	119	119	117	117	119	119	121	113	111	109	113			
L Q									127	116	113	113	113	111	109	105	107	105	105	104	103			

MONTHLY MEDIANS OF h'F AND h'Es

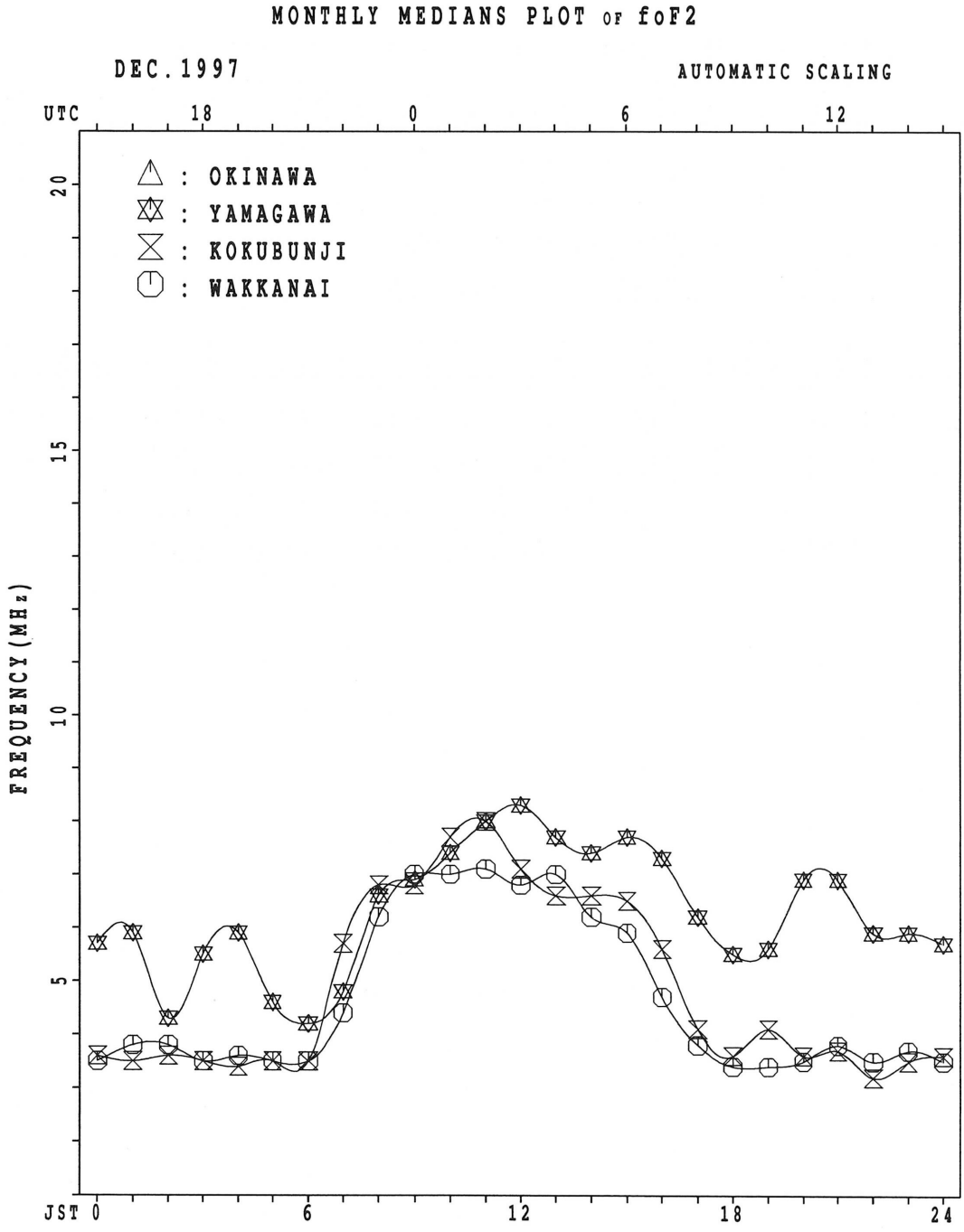
DEC. 1997 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

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									15	24	29	29	30	31	31	31	29	17						
MED									244	246	246	252	250	252	250	240	232	224						
U Q									258	269	255	263	256	260	256	252	243	231						
L Q									228	235	237	241	246	244	240	234	224	216						

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				13	11	10			21	26	29	28	26	29	30	31	28	25	20	23	18	13	10	
MED				97	99	95			115	107	109	107	109	107	105	105	105	99	94	91	97	95	95	
U Q				101	101	97			125	119	119	115	119	129	113	121	109	107	97	109	99	96	97	
L Q				93	95	95			105	105	105	104	103	103	101	97	97	94	89	89	95	92	91	


MONTHLY MEDIANS PLOT OF foF2
DEC.1997
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

DEC.1997 fxI (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

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

DEC.1997 fxI (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC. 1997 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	36	36	36	38	33	F 28	27	56	R 63	69	81	80	78	73	66	72	57	41	34	24	26	28	F 27	F 30
2	30	F 32	F 33	34	32	29	30	57	76	83	88	84	R 73	68	68	72	69	42	35	34	29	27	F 28	F 28
3	U R 32	33	33	35	32	31	34	61	70	68	89	87	72	70	72	70	58	39	32	A	37	32	32	36
4	32	A	33	32	31	34	38	63	66	73	109	86	94	H 68	68	70	63	44	35	36	37	27	27	31
5	33	33	34	33	F 32	33	40	R 54	66	76	94	93	74	74	70	69	65	43	40	34	33	33	36	36
6	35	36	33	33	34	33	31	66	64	C	C	C	C	C	C	C	C	C	36	34	32	F 25	F 23	F 26
7	30	F 34	38	27	25	27	30	58	60	68	89	80	84	71	66	64	55	44	40	34	24	27	30	33
8	31	J R 34	A	A	30	28	30	60	65	61	75	82	71	66	73	66	49	34	30	39	33	F 30	32	30
9	34	33	36	32	29	F 26	28	51	61	72	74	83	73	67	65	60	57	40	32	34	28	24	26	F 26
10	30	35	28	R 26	23	26	26	R 53	54	61	75	68	74	65	69	60	54	30	36	35	37	46	34	F 39
11	F 37	F 32	F 30	29	29	30	30	56	62	64	90	87	A	78	80	68	51	48	44	34	U R 34	F 30	F 33	36
12	31	F 38	36	25	34	39	44	61	95	99	105	93	80	70	65	65	A	J R 33	37	39	29	28	36	32
13	V 33	35	36	36	33	32	36	56	58	60	82	88	73	66	61	56	54	34	R 29	30	F 30	F 28	F 33	F 32
14	F 40	F 36	F 36	F 33	F 34	F 24	27	47	64	93	85	81	65	58	59	70	55	37	A	A	A	A	A	30
15	30	31	32	33	30	F 33	34	54	R 64	72	70	68	68	60	58	61	53	33	39	25	25	25	A	A
16	A	F 31	33	32	31	F 32	F 31	48	54	82	68	63	66	56	64	64	47	35	32	33	30	23	29	F 30
17	30	31	30	33	35	25	30	50	66	60	80	98	84	65	69	77	60	36	33	29	31	29	F 30	F 27
18	F 29	F 40	F 41	F 37	25	23	24	48	54	63	86	71	65	58	69	65	53	48	47	25	26	F 24	F 26	28
19	30	30	F 30	32	25	27	30	43	59	70	66	72	67	65	71	72	53	35	42	34	28	F 26	F 26	R 26
20	A	31	33	32	29	30	32	43	54	68	75	66	64	65	66	60	52	34	38	36	F 29	25	F 24	R 28
21	F 27	F 28	F 34	34	F 24	27	F 28	48	55	60	68	64	67	61	61	63	57	37	34	36	29	26	29	31
22	30	32	32	30	29	32	39	47	55	58	74	74	68	61	62	58	52	48	39	A	25	A	29	30
23	30	33	33	30	27	24	27	44	60	68	76	66	68	66	V 66	53	49	47	35	27	24	F 28	30	32
24	F 29	34	33	25	24	26	28	44	62	62	68	R 64	64	R 64	70	63	58	43	42	29	28	25	27	29
25	29	30	F 33	32	29	F 28	27	45	59	58	66	80	70	65	64	67	55	39	32	30	27	26	30	31
26	F 29	33	35	36	26	27	26	50	56	63	71	68	66	65	60	68	60	40	32	36	30	24	28	27
27	28	30	30	30	30	26	25	48	60	59	72	68	58	60	58	56	H 51	41	38	A	26	26	28	28
28	28	29	34	28	21	23	22	46	59	58	64	68	67	64	62	57	50	44	34	30	28	R 26	26	33
29	32	F 34	34	32	34	R 32	32	44	60	65	76	64	R 63	R 63	62	57	54	39	31	30	34	34	33	29
30	28	30	32	34	34	32	24	44	61	59	64	67	77	69	66	52	51	46	35	37	28	31	32	34
31	36	37	35	27	29	28	36	51	80	100	131	124	111	86	76	74	61	48	A	A	25	F 33	F 35	F 34
	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	30	30	30	29	30	30	30	29	30	29	26	30	29	29	30
MED	30	33	33	32	30	28	30	50	61	66	76	77	70	65	66	64	54	40	35	34	29	27	29	30
U Q	33	35	35	34	33	32	34	56	65	72	88	86	76	69	69	70	58	44	39	36	32	30	32	33
L Q	29	31	32	30	26	26	27	46	58	60	70	68	66	63	62	60	52	35	32	30	26	25	27	28

DEC. 1997 foF2 (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.1997 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										L	U L 440	L 448	L 440	U L 448										
2									L	L	U L 456	U L 468	L 440	L	L									
3										U L 416	U L 464	U L 468	L 448	A	L	L								
4									U L 340	L	L 416	U L 468	A	L	L	280								
5										L	U L 416	432	L	U L 440	L	L								
6									L	C	C	C	C	C	C	C	C							
7									292	L	U L 448	U L 452	U L 456	U L 428	L	L								
8									L 308	L	U L 452	U L 452	U L 444	U L 432	U L 428									
9										L	U L 440	L 452	U L 452	U L 428	U L 380	L 300								
10										L	U L 436	L	U L 436	L	L									
11											U L 440	U L 432	A	L 432	A	L								
12									L	L	L	U L 456	A	A	A	A	A							
13											L	L 436	U L 448	A	U L 376									
14										A	L 436	L 428	L 432	A	U L 364	U L 304								
15									L	L 376	U L 428	U L 432	U L 424	L	L									
16										U L 424	L 432	U L 440	L 428	U L 424	L									
17									L		L 448	U L 436	L 440	U L 436	U L 428	A								
18											U L 448	U L 424	L 424	L 404	U L 436	L								
19										L	U L 424	U L 436	L 448	U L 440	L	L								
20								204	304		L	L 436	L 436	U L 440	L									
21											L	L 420	L 420	L 424	U L 364	L								
22								L	L 292	L 352		U L 444	L 436	L 416	L									
23										L	L 424	L 432	L 416	L										
24										L	L	L 444	U L 428	L	L	L								
25											L	L 444	U L 436	L		L								
26											L	L 432	U L 440	U L 432	L	L								
27									L 304	L	U L 440	U L 440	L	U L 428	U L 432	292								
28									276	L	U L 436	L 440	U L 428	U L 428	L	L 300								
29									304	L	U L 444	L 436	U L 440	U L 440	L	L								
30										L	L	U L 448	L 444	L 420	A									
31								L 256	L	L	L	A	L 440	L 440	376	L								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								2	8	4	22	28	25	19	9	5								
MED								230	304	L 396	U L 440	U L 440	L 440	U L 432	U L 380	L 300								
U Q									L 306	U L 420	U L 448	U L 450	U L 444	U L 440	U L 430	L 302								
L Q									292	L 364	L 428	L 432	L 428	L 424	U L 370	286								

DEC.1997 foF1 (0.01MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC. 1997 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								H 196	248	292	U A 312	A	A	308	288	A 260	208							
2								184	U A 244	A	R 312	328	332	A	A	248	A							
3								168	240	A	A	A	A	A	A	244	A							
4								A	A	A	304	A	A	A	A	A 244	180							
5								168	256	A	312	R	R	300	288	248	A							
6								B	A	C	C	C	C	C	C	C	C							
7								172	236	272	308	328	R	304	284	260	B							
8								B	A	A	304	A	316	304	284	236	B							
9								168	240	A 288	A	A	A	296	276	232	172							
10								148	232	276	308	A	U R 324	312	A	252	192							
11								A 192	H 244	284	308	300	A 300	A	A	A	A							
12								172	228	276	296	A 300	U A 296	A	A	A	A							
13								A	256	R 288	R 304	A	A	A	272	A	A							
14								A 212	A	280	A	A	A	A	A	A 228	A							
15								172	220	280	A	A	316	296	R 264	A	A							
16								A	240	288	304	A	A	300	284	248	B							
17								B	232	R 272	A	304	A	A	A	A	A							
18								172	220	268	292	A	312	296	276	240	A							
19								160	228	A	300	308	312	304	276	240	A							
20								160	236	284	304	312	316	300	A	A 196								
21								A	240	276	296	312	316	304	280	A	A							
22								B	224	280	R 304	R 312	R 312	304	284	244	204							
23								B	228	276	R 304	R 312	R 316	304	A	248	172							
24								168	236	276	R	B	R	R	R	A	A							
25								B	236	284	308	324	R 320	312	284	264	188							
26								B	236	280	316	324	324	304	284	256	200							
27								B	224	280	296	316	R 316	304	292	A	204							
28								148	228	268	A	A	320	304	288	252	200							
29								A	228	276	300	A	A	312	288	252	A							
30								B	216	268	296	320	324	308	284	A	200							
31								168	216	276	296	316	320	300	284	240	U A 200							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								17	27	24	23	15	18	21	19	20	13							
MED								168	236	278	304	312	316	304	284	248	200							
U Q								178	240	284	308	324	320	306	288	252	202							
L Q								164	228	276	296	308	312	300	276	240	184							

DEC. 1997 foE (0.01MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC. 1997 foEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 16	E B 16	20	E B 13	E B 13	J A 14	21	G	28	G	36	J A 37	34	G 28	35	30	J A 28	J A 23	J A 20	21	E B 14	20	E B 16	20
2	E B 13	J A 21	J A 21	E B 13	E B 14	18	E B 15	J A 22	27	34	32	G 30	J G 30	J A 36	J A 40	27	J A 31	J A 53	J A 50	J A 22	28	E B 15	28	J A 39
3	J A 54	J A 53	J A 34	20	21	E B 13	E B 14	22	27	29	30	J A 32	J A 51	J A 45	J A 38	30	J A 28	J A 21	J A 26	36	18	18	18	J A 43
4	J A 46	J A 50	J A 43	J A 28	J A 20	J A 18	19	J A 31	J A 30	J A 34	J A 36	J A 41	J A 74	J A 50	J A 31	27	21	E B 15	E B 14	E B 14	32	27	23	24
5	20	22	E B 16	E B 14	E B 14	18	20	G	30	J A 34	G 30	G 30	G 31	G 28	G 24	G 22	J A 22	J A 18	J A 21	J A 18	21	20	E B 15	J A 22
6	J A 23	28	19	E B 13	E B 14	18	20	E B 18	J A 43	C	C	C	C	C	C	C	C	C	20	E B 12	E B 14	E B 13	17	J A 23
7	J A 23	E B 14	E B 14	E B 15	19	E B 14	20	24	28	33	34	35	G 23	G 20	G	G	E B 18	E B 14	20	23	J A 21	20	19	E B 14
8	J A 32	E B 14	J A 48	36	J A 22	E B 15	E B 14	19	J A 26	30	31	J A 34	G	G 22	G 18	G 20	J A 24	J A 23	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14
9	E B 14	E B 14	E B 14	E B 13	E B 14	E B 14	E B 14	18	J A 30	J A 45	J A 47	J A 44	J A 31	31	J G 26	G	19	20	19	E B 12	E B 14	E B 16	E B 14	22
10	21	21	J A 36	J A 29	20	E B 15	E B 15	G	G	29	33	34	G 30	G 31	J A 37	28	J A 20	J A 22	24	20	18	E B 14	E B 14	E B 14
11	E B 14	20	E B 14	E B 14	E B 15	E B 13	E B 14	J A 28	30	J A 37	J A 45	J A 40	J A 82	J A 38	61	J A 31	J A 27	28	J A 23	E B 15	E B 14	E B 15	E B 14	E B 14
12	J A 24	J A 47	20	20	22	E B 14	E B 14	G	J G 22	29	37	J A 42	J A 54	J A 86	J A 42	J A 76	82	52	26	21	E B 14	E B 15	E B 14	J A 22
13	J A 44	J A 36	24	22	J A 18	26	J A 22	J A 26	33	34	37	35	33	J A 43	31	J A 33	J A 34	J A 34	52	J A 37	J A 37	J A 53	J A 48	J A 43
14	23	25	J A 22	J A 22	J A 23	20	J A 27	J A 33	J A 53	J A 47	J A 45	J A 44	J A 44	J A 48	J A 34	G 23	J A 24	J A 34	J A 97	J A 98	J A 78	J A 54	J A 48	J A 22
15	22	J A 22	J A 23	E B 13	19	J A 28	J A 30	J A 20	G 20	J A 37	50	J A 46	J A 39	J G 26	G 25	28	22	J A 21	J A 31	E B 14	28	J A 42	J A 38	J A 32
16	J A 35	J A 22	24	23	E B 13	E B 14	E B 14	J A 23	30	J A 44	G 29	J A 50	32	33	32	J A 36	20	J A 27	E B 14	J A 23	J A 25	20	E B 15	J A 24
17	E B 14	J A 23	J A 24	28	J A 21	J A 22	20	E B 16	J A 32	J A 33	32	G 27	J A 38	38	J A 47	J A 44	J A 36	J A 29	29	23	19	E B 17	20	E B 14
18	29	J A 20	E B 14	19	J A 22	E B 14	E B 14	22	31	34	34	J A 43	33	32	30	28	20	E B 14	E B 14	J A 20	J A 28	21	J A 22	30
19	J A 24	21	20	20	J A 22	E B 13	E B 16	21	J A 24	30	G 29	G 28	G 30	G	G	G 18	J A 26	J A 24	26	22	19	19	20	J A 20
20	41	J A 23	25	J A 23	J A 22	23	18	J A 18	G 20	G 25	G 28	G 28	G 28	J A 34	J A 37	J A 33	J A 26	J A 22	J A 23	E B 14	J A 23	J A 24	J A 33	25
21	21	J A 25	J A 27	J A 25	J A 21	25	23	J A 21	G 24	28	G 26	G	G 27	G	G	28	J A 28	J A 23	J A 19	23	J A 33	E B 23	E B 14	E B 16
22	E B 14	E B 12	E B 14	18	E B 14	E B 14	E B 14	E B 16	G	29	G	G	G 24	G 22	G 25	27	G	J A 22	E B 14	J A 33	J A 25	J A 48	J A 44	J A 31
23	J A 35	22	E B 14	E B 14	J A 22	26	24	21	27	G	G	G	G	G	30	G 21	G	J A 17	E B 16	E B 14	E B 14	J A 22	J A 33	J A 31
24	29	E B 14	E B 14	18	19	20	20	G	28	30	G 25	E B 33	G	G 24	G 26	28	25	30	19	18	E B 14	E B 16	E B 14	E B 14
25	E B 15	J A 22	20	E B 14	E B 13	E B 16	E B 14	E B 16	G	33	33	G	G	36	G	G 20	G	E B 15	E B 14	E B 14	E B 14	E B 14	E B 13	E B 15
26	E B 13	E B 13	18	E B 14	E B 14	E B 14	E B 14	J A 24	28	30	34	G	36	G	G 24	G	G 17	J A 29	J A 22	21	E B 17	J A 22	20	18
27	E B 15	E B 14	E B 14	E B 14	22	J A 21	J A 22	E B 16	G 19	31	34	36	G 24	G 23	31	J A 31	26	J A 23	22	J A 34	19	E B 13	E B 13	E B 14
28	E B 13	J A 19	20	20	28	21	20	G	J G 22	G 22	33	33	G 30	G	G	G 22	J A 23	J A 41	20	E B 15	E B 22	20	E B 13	21
29	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14	J A 66	G	G 24	34	33	38	33	31	J A 25	J A 29	24	J A 24	J A 22	20	20	E B 14	E B 14
30	E B 14	E B 13	17	18	E B 14	E B 14	E B 14	J A 18	G	G	37	40	42	41	J A 44	J A 32	J A 22	J A 24	J A 22	J A 17	24	E B 14	E B 13	19
31	E B 13	18	18	E B 14	E B 15	E B 15	E B 15	26	J A 36	J A 43	J A 43	J A 50	34	G	G	27	43	40	J A 44	40	J A 23	18	E B 14	22
	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	30	30	30	30	30	30	30	30	30	31	31	31	31	31	31
MED	21	21	20	18	19	E B 15	E B 16	20	27	30	34	34	32	G	30	28	J A 24	J A 23	22	21	20	20	E B 16	22
U Q	J A 29	J A 23	J A 24	J A 22	J A 22	21	20	J A 24	J A 30	J A 34	37	J A 41	J A 38	J A 38	J A 37	J A 31	J A 28	J A 29	J A 26	J A 23	J A 25	J A 22	J A 23	J A 25
L Q	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14	G	G	G 29	G	G	G 30	G 28	G	G	20	21	E B 19	E B 14	E B 14	E B 15	E B 14	E B 14

DEC. 1997 foEs (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.1997 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 16	E B 16	E B 15	E B 13	E B 13	E B 13	E B 15	G	27	G	34	35	34	G 27	34	28	G 18	18	16	17	E B 14	E B 14	E B 16	E B 15
2	E B 13	17	17	E B 13	E B 14	16	E B 15	G	27	34	G 27	G 26	G 27	33	33	27	23	36	22	18	18	E B 15	16	17
3	26	26	16	E B 14	E B 13	E B 13	E B 14	20	26	29	30	32	34	43	31	G 21	24	18	22	A A 36	15	13	E B 14	20
4	21	A A 50	28	22	16	16	E B 14	28	26	30	G 23	33	62	36	29	26	19	E B 15	E B 14	E B 14	23	17	16	E B 13
5	16	E B 14	E B 16	E B 14	E B 14	E B 14	E B 14	G	30	30	G U 22	G 30	U G 31	G 27	G 22	G 20	19	16	18	E B 14	E B 13	16	E B 15	17
6	17	E B 14	E B 14	E B 13	E B 14	16	E B 14	E B 18	24	C	C	C	C	C	C	C	C	C	E B 13	E B 12	E B 14	E B 13	E B 13	17
7	16	E B 14	E B 14	E B 15	E B 14	E B 14	E B 15	21	26	30	34	34	G 20	G 19	G	G	E B 18	E B 14	16	16	15	E B 14	E B 14	E B 14
8	23	E B 14	A A 48	A A 36	18	E B 15	E B 14	18	24	30	G 21	32	G	G 20	G 18	G 18	18	18	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14
9	E B 14	E B 14	E B 14	E B 13	E B 14	E B 14	E B 14	G	28	G 24	34	33	31	G 22	G 22	G	G 14	16	E B 13	E B 12	E B 14	E B 16	E B 14	E B 14
10	16	17	20	22	16	E B 15	E B 15	G	G	29	33	34	G 26	G 24	30	G 20	G 17	18	18	18	16	E B 14	E B 14	E B 14
11	E B 14	E B 14	E B 14	E B 14	E B 15	E B 13	E B 14	24	28	30	39	35	A A 82	32	54	26	18	17	18	E B 15	E B 14	E B 15	E B 14	E B 14
12	17	16	17	E B 15	17	E B 14	E B 14	G	G 18	G 21	36	36	50	64	39	52	A A 82	23	E B 15	E B 13	E B 14	E B 15	E B 14	E B 14
13	18	17	16	E B 14	E B 14	17	E B 15	22	32	32	34	34	33	41	31	32	23	26	24	17	16	16	20	23
14	16	18	16	17	17	E B 14	19	29	34	42	32	32	32	40	27	G 21	18	26	A A 97	A A 98	A A 78	A A 54	A A 48	17
15	18	19	16	E B 13	E B 14	20	18	G	G 17	G 21	36	33	G 24	G 22	G 20	28	20	17	20	E B 14	23	17	A A 38	A A 32
16	A A 35	20	E B 14	15	E B 13	E B 14	E B 14	18	28	G 19	G 21	35	31	U Y 32	30	32	19	16	E B 14	16	16	18	E B 15	18
17	E B 14	16	18	17	17	E B 14	16	E B 16	G 18	G 18	32	G 22	31	31	30	32	31	21	21	18	E B 14	E B 17	E B 15	E B 14
18	17	E B 13	E B 14	E B 14	16	E B 14	E B 14	G	31	32	34	35	32	32	29	26	19	E B 14	E B 14	16	17	E B 15	17	20
19	22	E B 13	E B 14	E B 14	E B 14	E B 13	E B 16	19	G 20	27	G 21	G 23	G 22	G	G	G 16	22	20	18	E B 13	E B 14	E B 14	16	17
20	A A 41	19	E B 14	20	18	18	E B 14	G	G 18	G 23	G 25	G 22	G 24	G 22	33	27	G 17	20	19	E B 14	17	17	17	24
21	E B 14	20	24	18	17	17	E B 14	18	G 18	G 21	G 22	G	G 20	G	G	25	21	17	16	16	19	17	E B 14	E B 16
22	E B 14	E B 12	E B 14	13	E B 14	E B 14	E B 14	E B 16	G	29	G	G	G 21	G 20	G 22	26	G	19	E B 14	A A 33	17	A A 48	18	24
23	24	E B 14	E B 14	E B 14	E B 13	18	17	E B 14	26	G	G	G	G	G	30	G 20	G	E B 14	E B 16	E B 14	E B 14	E B 14	18	22
24	17	E B 14	E B 14	E B 15	16	16	E B 13	G	26	29	G 24	E B 33	G	U G 24	U G 26	28	23	23	17	E B 14	E B 14	E B 16	E B 14	E B 14
25	E B 15	E B 14	17	E B 14	E B 13	E B 16	E B 14	E B 16	G	32	32	G	G	35	G	G 19	G	E B 15	E B 14	E B 14	E B 14	E B 14	E B 13	E B 15
26	E B 13	E B 13	E B 15	E B 14	E B 14	E B 14	E B 14	E B 17	26	30	34	G	35	G	G 23	G	G 16	18	18	16	E B 17	18	18	17
27	E B 15	E B 14	E B 14	E B 14	E B 14	18	16	E B 16	G 17	30	33	34	G 22	G 21	30	25	24	17	E B 14	A A 34	E B 15	E B 13	E B 13	E B 14
28	E B 13	E B 13	E B 14	E B 13	16	17	17	G	G 17	G 21	32	33	G 29	G	G	G 19	G 17	23	E B 12	E B 15	E B 14	E B 13	E B 13	E B 14
29	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14	14	18	G	G 22	32	32	34	U Y 32	30	G 21	23	17	22	18	16	17	E B 14	E B 14
30	E B 14	E B 13	E B 14	E B 14	E B 14	E B 14	E B 14	E B 17	G	G	36	38	42	39	39	30	G 17	18	17	E B 12	17	E B 14	E B 13	12
31	E B 13	E B 15	E B 14	E B 14	E B 15	E B 15	E B 15	22	32	35	40	46	33	G	G	26	34	32	A A 44	A A 40	16	17	E B 14	17
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	30	30	30	30	30	30	30	30	30	31	31	31	31	31	31
MED	16	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14	G	26	29	32	33	G	G	29	26	19	18	17	16	15	E B 15	E B 14	E B 16
U Q	18	17	17	15	16	16	15	19	28	30	34	34	34	33	31	28	23	21	20	A A 18	17	17	17	18
L Q	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14	E B 18	G 20	G 23	G 25	G	G 26	G 24	G	G 21	G 18	E B 16	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14

DEC.1997 fbEs (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.1997 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	16	15	13	13	13	15	13	15	15	15	14	16	15	17	16	14	16	13	14	14	14	16	15
2	13	14	13	13	14	14	15	14	16	15	15	14	15	15	15	16	14	16	15	16	14	15	14	15
3	14	15	15	14	13	13	14	14	14	14	14	15	16	14	14	15	15	14	15	14	12	12	14	13
4	15	15	14	13	14	14	14	16	14	14	14	16	15	14	14	14	15	15	14	14	14	15	14	13
5	14	14	16	14	14	14	14	14	17	14	14	16	16	16	16	16	15	14	14	14	13	14	15	15
6	15	14	14	13	14	14	14	18	16	C	C	C	C	C	C	C	C	C	13	12	14	13	13	13
7	14	14	14	15	14	14	15	15	14	14	14	17	15	14	17	16	18	14	13	14	14	14	14	14
8	13	14	14	14	13	15	14	16	16	15	14	15	17	16	15	14	17	15	14	14	14	14	14	14
9	14	14	14	13	14	14	14	14	14	14	15	15	15	16	15	15	14	13	13	12	14	16	14	14
10	13	15	14	14	14	15	15	12	14	13	13	15	14	14	14	14	14	14	14	16	15	14	14	14
11	14	14	14	14	15	13	14	14	14	16	13	14	15	15	14	14	13	15	14	15	14	15	14	14
12	15	14	13	15	14	14	14	14	14	16	16	15	15	15	14	15	14	15	15	13	14	15	14	14
13	15	14	13	14	14	14	15	16	14	15	16	16	15	14	15	13	14	14	14	14	15	14	16	16
14	14	14	14	14	14	14	16	14	15	13	13	14	14	14	14	14	15	14	15	14	14	14	14	13
15	14	13	13	13	14	14	14	13	14	14	14	15	14	14	14	14	16	15	14	14	14	13	14	14
16	14	14	14	13	13	14	14	16	13	15	15	15	15	17	16	16	16	15	14	14	14	14	15	15
17	14	14	14	14	14	14	14	16	14	14	14	15	16	15	15	15	14	15	13	14	14	17	15	14
18	14	13	14	14	13	14	14	14	15	14	14	14	14	20	22	17	16	14	14	15	14	15	15	14
19	14	13	14	14	14	13	16	13	15	13	13	13	14	15	14	14	16	16	15	13	14	14	14	13
20	14	14	14	14	13	14	14	13	14	16	15	15	15	15	14	15	15	14	13	14	14	14	14	14
21	14	15	15	14	14	14	14	15	15	15	15	16	15	18	18	14	14	16	15	15	14	14	14	16
22	14	12	14	13	14	14	14	16	13	20	19	19	16	18	18	16	16	16	14	15	12	14	14	15
23	14	14	14	14	13	14	14	14	14	15	21	23	22	21	19	18	15	14	16	14	14	14	15	16
24	14	14	14	15	13	13	13	14	17	18	16	33	23	17	16	16	16	16	15	14	14	16	14	14
25	15	14	13	14	13	16	14	16	15	16	18	16	18	18	19	15	15	15	14	14	14	14	13	15
26	13	13	15	14	14	14	14	17	14	14	18	20	19	16	16	15	14	15	15	15	17	14	14	13
27	15	14	14	14	14	14	14	16	14	14	14	14	18	18	16	14	14	15	14	14	15	13	13	14
28	13	13	14	13	13	14	15	14	12	15	16	16	16	14	16	15	14	14	12	15	14	13	13	14
29	14	14	14	14	14	14	14	13	15	15	15	16	16	17	15	15	14	16	14	15	13	14	14	14
30	14	13	14	14	14	14	14	17	13	14	15	16	16	14	14	16	15	14	13	12	14	14	13	12
31	13	15	14	14	15	15	15	14	14	14	14	14	14	14	15	14	14	15	16	16	15	14	14	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	30	30	30	30	30	30	30	30	30	31	31	31	31	31	31
MED	14	14	14	14	14	14	14	14	14	14	15	15	15	15	15	15	15	15	14	14	14	14	14	14
U Q	14	14	14	14	14	14	15	16	15	15	16	16	16	17	16	16	16	15	15	15	14	15	14	15
L Q	14	14	14	13	13	14	14	14	14	14	14	14	15	14	14	14	14	14	13	14	14	14	14	14

DEC.1997 fmin (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.1997 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	313	312	313	343	338	F 308	338	363	R 371	360	354	356	348	354	333	322	376	350	365	336	289	326	F 285	F 277
2	301	F 274	F 288	323	306	325	314	349	362	360	358	370	R 338	336	334	351	360	365	339	322	320	316	F 270	F 300
3	U R 328	294	313	325	324	324	305	361	373	342	353	367	343	335	340	362	366	340	333	A	346	320	312	326
4	336	A	305	303	284	316	361	372	357	335	356	357	354	H 352	333	357	359	336	340	323	350	344	296	309
5	294	287	322	308	F 286	311	347	R 357	338	342	368	356	347	347	342	362	355	348	335	375	331	284	299	290
6	304	300		284	296	312	342	380	374	C	C	C	C	C	C	C	C	C	322	335	350	F 288	F 304	F 286
7	318	F 307	348	331	296	290	330	379	374	349	354	353	371	360	344	360	370	351	345	331	340	353	285	296
8	304	J R 323	A	A	328	306	320	371	386	359	363	362	366	359	353	359	374	348	326	343	342	F 323	311	315
9	316	314	338	356	344	F 314	309	349	354	362	344	353	375	347	357	347	363	359	324	323	339	317	297	F 301
10	322	346	360	R 336	306	308	323	R 368	367	367	352	334	359	362	352	359	368	351	331	295	284	353	288	F 306
11	F 302	F 295	F 311	289	299	300	317	347	355	344	329	346	A	343	341	366	356	331	334	360	U R 340	F 279	F 277	293
12	325	F 325	360	304	287	306	296	311	343	343	352	349	371	A 343	355	351	A	J R 285	334	352	338	336	309	290
13	V 291	303	305	331	318	331	343	373	371	343	347	335	383	380	362	358	380	368	R 343	344	F 338	F 302	F 302	F 319
14	F 303	F 296	F 316	F 323	F 341	F 317	337	357	335	364	371	353	356	364	359	336	364	340	A	A	A	A	A	320
15	298	290	308	339	325	F 315	340	381	R 394	342	362	378	342	367	331	346	379	348	335	367	A 349	311	A	A
16	A	F 288	298	310	318	F 313	F 336	362	354	373	364	348	344	370	358	364	388	333	354	334	344	296	312	F 294
17	307	302	312	314	361	318	346	366	369	319	320	357	363	346	340	366	371	362	328	325	339	333	F 294	F 269
18	F 277	F 297	F 321	F 343	329	301	323	352	371	338	346	377	357	355	342	367	360	321	371	364	379	F 356	F 278	288
19	312	311	F 296	365	318	315	352	373	343	361	348	332	330	339	340	366	374	339	343	360	325	F 345	F 314	R 309
20	A	297	315	336	314	318	358	348	376	372	359	357	355	347	353	369	360	346	318	357	F 321	327	F 300	R 337
21	F 315	F 312	F 330	357	F 374	310	F 328	358	364	356	359	358	363	348	346	341	357	363	329	335	349	302	313	308
22	307	301	307	297	301	302	342	382	370	378	346	352	363	364	338	371	346	337	345	A	359	A	295	311
23	317	311	334	337	312	306	324	363	385	364	382	348	355	349	V 339	368	356	356	348	340	306	F 283	290	314
24	F 285	315	344	335	309	306	324	335	371	352	359	R 354	358	R 305	352	365	352	336	333	333	332	288	306	295
25	305	291	F 320	343	301	F 317	328	353	365	350	339	342	365	322	320	349	372	352	340	343	312	331	323	317
26	F 300	291	331	354	334	328	318	347	377	354	366	360	345	360	345	356	366	357	311	336	343	297	295	292
27	287	302	303	323	341	315	308	365	361	370	359	390	367	352	364	340	H 359	350	373	A	346	312	285	301
28	293	300	341	375	306	303	304	350	371	377	365	354	357	346	347	366	353	357	345	342	336	R 325	301	294
29	296	F 288	304	313	327	R 321	323	371	355	350	368	364	R 346	R 349	352	369	370	343	352	316	317	329	335	301
30	299	294	311	309	337	358	336	340	370	364	328	354	348	353	357	381	354	332	339	351	312	276	273	281
31	323	326	347	286	274	262	309	341	317	306	339	345	345	333	344	349	353	363	A	A	367	F 289	F 322	F 302
	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	29	30	31	31	31	31	31	30	30	30	29	30	30	30	29	30	29	26	30	29	29	30
MED	304	300	315	328	318	313	328	361	369	355	355	354	356	349	344	360	363	348	339	338	339	317	299	301
U Q	316	312	336	343	334	318	342	371	373	364	363	360	364	360	353	366	372	357	345	352	346	332	312	311
L Q	297	294	306	309	301	306	317	349	355	343	346	348	346	343	340	349	356	337	330	331	321	292	286	292

DEC.1997 M(3000)F2 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.1997 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										L	U L 363	L 374	L 372	U L 366										
2									L	L	U L 377	U L 373	L 384	L	L									
3										U L 378	U L 343	U L 370	L 377	A	L	L								
4									U L 407	L	L 368	U L 388	A	L	L	447								
5										L	U L 375	383	L	U L 371	L	L								
6									L	C	C	C	C	C	C	C	C							
7									450	L	U L 351	U L 365	U L 374	U L 379	L	L								
8									L 380	L	U L 357	U L 365	U L 375	U L 375	U L 361									
9										L	U L 383	L 361	U L 362	U L 382	U L 368	L 420								
10										L	U L 387	L	U L 373	L	L									
11											U L 380	U L 383	A	L 361	A	L								
12									L	L	L	L	A	A	A	A	A							
13											L	L 385	U L 369	A	U L 403									
14										A	L 382	L 391	L 385	A	U L 393	U L 385								
15									L	L 402	U L 380	U L 399	U L 386	L	L									
16										L	L 370	U L 380	L 372	U L 384	L									
17									L		L 362	U L 379	L 366	U L 365	U L 361	A								
18											U L 360	L	L 380	L 386	U L 350	L								
19										L	U L 388	U L 366	L 352	U L 363	L	L								
20								405	399	L	L 351	L 390	L 380	U L 375	L									
21										L	L 387	L 392	L 389	L 380	U L 394	L								
22								L	L 433	L 407	L	U L 366	L 376	L 394	L									
23										L	L 390	L 380	L 394	L										
24										L	L	L 378	U L 388	L	L	L								
25											L	L 367	U L 384	L		L								
26											L	L 388	U L 381	U L 371	L	L								
27									L 415	L	U L 379	U L 380	L	L	U L 376	A 415								
28									395	L	U L 392	L 374	U L 394	U L 396	L	L 410								
29									396	L	U L 365	L 378	U L 372	U L 375	L	L								
30										L	L	A 378	A	A 388	A									
31								L 430	L	L	L	A	L 375	L 389	406	L								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								2	8	3	22	26	24	18	9	5								
MED								418	403	L 402	U L 376	L 378	L 376	U L 377	U L 376	L 415								
U Q									L 424	L 407	U L 383	L 385	U L 384	L 386	U L 398	434								
L Q									396	U L 378	U L 362	U L 370	L 372	U L 371	U L 361	L 398								

DEC.1997 M(3000)F1 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.1997 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										234	252	240	250	236										
2									234	228	238	232	242	240	266									
3										238	252	236	250	242	250	228								
4									218	226	252	230	A 250	228	242	234								
5										242	230	244	232	242	244	230								
6									222	C	C	C	C	C	C	C	C							
7									212	246	256	240	242	232	234	228								
8									222	230	244	244	236	242	238									
9										238	250	244	228	246	232	228								
10										232	246	246	244	240	242									
11											270	242	A	266	256	228								
12									234	242	244	244	230	E A 290	240	A 252	A							
13											254	250	228	234	236									
14										244	228	234	236	240	232	248								
15									208	248	240	226	254	248	L 278									
16										234	248	246	254	244	246									
17									224		280	236	238	260	256	240								
18											250	230	252	252	266	234								
19										240	238	266	260	272	258	232								
20								200	214	236	246	244	246	252	248									
21										232	240	246	246	242	248	252								
22								226	212	220	264	250	240	236	238									
23										234	230	244	258	248										
24										244	250	242	238	H 264	250	234								
25											248	256	234	276		242								
26											236	232	240	248	L 262	240								
27									224	222	250	224	236	254	240	228								
28									222	226	234	256	246	252	244	236								
29									228	242	236	238	250	254	250	238								
30										242	258	250	254	252	242									
31								230	278	280	266	244	238	236	248	238								
	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	14	24	30	30	29	30	27	19								
MED								226	222	237	248	244	242	246	246	234								
U Q								230	228	242	252	246	250	254	256	240								
L Q								200	214	231	238	236	236	240	240	228								

DEC.1997 h'F2 (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC. 1997 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	266	258	270	234	228	298	H 234	224	228	234	228	210	224	218	234	232	222	212	222	224	298	242	344	344
2	300	342	312	262	256	252	260	232	232	232	224	214	198	216	232	240	226	A 258	256	248	268	268	328	A 334
3	A 282	A 350	274	250	256	256	246	224	218	200	204	218	218	A	A 230	238	218	218	260	A	236	242	290	278
4	A 252	A	A 354	A 310	308	276	222	212	200	196	H 188	218	A	212	198	206	220	214	228	248	260	246	296	280
5	274	310	262	290	294	280	234	216	226	H 206	210	216	232	198	H 192	230	214	208	240	218	232	276	294	308
6	276	294	276	286	294	244	236	220	228	C	C	C	C	C	C	C	C	C	250	238	236	280	324	310
7	280	270	244	246	280	298	256	218	178	218	238	222	230	218	212	238	216	210	220	220	226	238	304	296
8	322	270	A	A	258	276	262	222	212	218	218	210	216	218	218	230	210	226	254	242	238	258	254	280
9	260	276	236	216	232	292	278	228	222	230	216	200	216	210	198	194	216	210	244	244	226	276	316	312
10	282	246	A 260	E A 332	322	302	270	220	216	216	222	222	216	H 204	234	230	218	208	266	280	300	228	314	278
11	266	294	296	270	286	296	250	226	226	236	A 256	236	A	232	A	240	212	236	232	228	258	322	342	302
12	248	274	220	248	286	260	260	250	230	230	238	A 234	A	A	A	A	A	252	246	226	244	260	254	280
13	328	312	286	240	232	252	236	208	218	230	244	226	224	A	214	228	214	256	A 342	256	222	324	336	A 344
14	282	274	260	254	232	290	272	220	244	A	222	206	200	A	206	200	218	240	A	A	A	A	A	284
15	318	326	292	250	256	286	236	218	214	H 182	226	212	204	H 194	228	234	214	214	252	200	A	308	A	A
16	A	320	290	290	270	262	254	218	232	242	212	212	200	226	240	236	204	246	222	256	234	328	288	336
17	296	294	308	272	228	286	248	216	232	220	218	220	214	206	220	A	220	220	256	238	242	252	288	358
18	344	294	256	226	226	292	262	220	212	238	234	A 230	214	216	222	240	218	226	212	212	234	228	364	360
19	A 324	282	282	228	244	276	234	214	230	H 222	216	206	210	216	H 218	238	218	228	248	222	244	250	300	292
20	A	330	284	258	264	284	228	198	200	H 194	212	208	210	222	A 238	230	224	220	266	218	256	258	340	E A 322
21	276	332	282	230	236	308	262	224	218	208	220	204	204	208	212	H 202	222	204	256	240	260	274	298	274
22	270	286	280	294	302	280	236	200	202	198	232	212	210	210	212	220	214	232	224	A	220	A	320	A 348
23	A 308	272	246	222	284	342	262	210	216	232	224	202	216	210	236	216	210	220	216	224	308	312	334	A 304
24	330	278	234	224	280	260	260	224	222	230	234	204	220	206	238	236	224	248	242	224	260	308	308	290
25	290	324	284	246	270	276	248	208	226	228	226	230	222	220	228	232	220	208	220	236	254	264	266	264
26	330	312	260	220	242	264	260	230	212	228	222	216	210	224	228	248	220	208	244	244	240	354	312	340
27	322	302	288	260	242	264	292	222	184	H 186	224	226	218	224	220	A 226	220	218	222	A	248	286	314	304
28	320	306	244	210	312	314	312	240	214	222	220	200	226	220	226	214	216	228	230	240	236	270	258	294
29	282	310	274	256	248	254	268	230	200	H 184	242	220	220	220	232	220	214	214	242	256	272	260	242	290
30	296	304	282	272	240	218	246	240	232	230	236	A 242	A	A 254	A	218	220	236	230	236	240	338	352	326
31	276	256	232	338	322	380	272	206	252	250	A 266	A	216	216	H 198	H 208	222	224	A	A	226	290	234	284
	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	29	30	29	26	26	27	28	29	30	29	26	29	29	29	30
MED	282	294	275	251	258	280	256	220	218	222	224	216	216	216	222	230	218	220	242	237	242	270	308	301
U Q	321	312	286	272	286	296	262	226	230	231	234	224	220	220	232	237	220	236	255	244	260	308	331	334
L Q	275	274	256	230	240	260	236	214	212	H 203	218	207	210	210	212	217	214	212	223	224	234	251	288	284

DEC. 1997 h'F (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC. 1997 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								158	122	116	118	118	118	A 130	A	A	E A 144							
2								B 166	126	A	136	A 132	A 120	A	A	A 124	A							
3								126	A 142	116	A	A	A	A	A	A 136	A							
4								A	A	A 116	A 136	A	A	A	A	A	A 126							
5								116	A	A	A 134	A	A	A 132	124	A 124	A							
6								B	A	C	C	C	C	C	C	C	C							
7								146	138	A 142	A 132	126	128	120	120	122	B							
8								B	A	A	A 138	A	118	122	122	118	B							
9								168	128	A 132	A	A	A	A 124	A 124	120	124							
10								124	118	124	A 134	116	A 136	A 138	A	A 126	A 142							
11								142	136	124	124	124	118	A	A	A	A							
12								194	138	132	122	120	120	116	118	A	A							
13								A	A	A 140	A	A	122	120	128	A	A							
14								154	A	A 126	A	A	A	A	A	A 130	A							
15								E B 170	134	A 134	A	A	A 130	A 128	E A 142	A	A							
16								A	E A 150	A 138	126	A	A	A	126	132	B							
17								B	A 146	A 146	A	A 126	A	A	A	A	A							
18								E B 140	128	124	A 122	A	A 122	122	124	124	A							
19								160	A 150	A	A 134	132	130	124	116	118	A							
20								120	A 140	A 130	A 142	A 128	126	A 126	A	A	116							
21								A	144	A 146	130	118	128	122	122	A	A							
22								B	130	132	128	124	122	122	124	122	142							
23								B	134	128	126	126	124	124	A	120	148							
24								140	134	128	A 122	B	122	A	A	A	A							
25								B	124	122	122	124	120	118	120	128	132							
26								B	A 142	124	124	124	124	120	120	122	138							
27								B	138	122	120	120	120	122	134	A	A							
28								158	124	134	118	A	134	116	120	124	130							
29								A	124	132	A 140	A	A	126	122	126	A							
30								B	130	116	120	120	118	118	120	A	A 140							
31								B	136	124	124	124	118	118	118	112	136							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								16	25	26	24	17	22	22	19	18	12							
MED								147	134	128	126	124	122	122	122	124	136							
U Q								163	A 141	A 134	A 134	A 126	128	A 126	124	A 126	142							
L Q								133	127	124	122	120	120	120	120	120	128							

DEC. 1997 h'E (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.1997 h'Es (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	B	B	104	B	B	178	110	G	168	G	124	122	120	114	166	152	106	102	128	122	B	114	B	118
2	B	112	102	B	B	100	B	112	132	118	116	112	100	120	116	152	100	116	112	110	108	B	106	118
3	114	112	118	120	106	B	B	146	194	112	110	106	102	100	102	102	108	102	112	110	104	104	136	106
4	108	108	114	108	110	110	124	114	116	116	112	110	96	96	114	190	172	B	B	B	116	116	116	112
5	114	118	B	B	B	128	126	G	182	114	114	118	116	114	110	110	112	110	110	114	112	106	B	106
6	100	100	104	B	B	118	108	B	118	C	C	C	C	C	C	C	C	C	106	B	B	B	106	130
7	116	B	B	B	110	B	106	170	166	166	170	154	112	104	G	G	B	B	102	102	98	98	98	B
8	106	B	104	100	104	B	B	140	120	122	112	112	G	104	108	106	102	100	B	B	B	B	B	B
9	B	B	B	B	B	B	B	140	136	112	112	108	108	108	106	G	106	98	100	B	B	B	B	126
10	114	110	108	102	104	B	B	G	G	E G 192	168	120	114	110	106	104	104	102	102	98	100	B	B	B
11	B	114	B	B	B	B	B	142	140	134	122	120	112	112	110	106	132	106	108	B	B	B	B	B
12	114	112	112	112	112	B	B	G	120	110	122	116	114	110	110	108	106	106	110	110	B	B	B	118
13	112	114	114	118	114	112	120	116	182	174	164	112	116	114	142	98	100	118	116	120	116	120	104	108
14	122	116	118	116	118	132	148	150	116	132	124	118	110	108	108	112	106	112	110	108	104	104	102	104
15	102	116	122	B	118	114	110	114	110	106	100	100	100	100	102	102	130	100	112	B	108	126	108	104
16	106	104	108	106	B	B	B	114	180	110	108	106	114	180	154	126	128	118	B	114	106	106	B	118
17	B	110	110	106	112	110	110	B	114	112	108	106	104	104	100	100	100	98	104	106	106	B	104	B
18	114	120	B	112	114	B	B	110	152	164	148	100	154	144	152	130	126	B	B	118	108	114	104	104
19	102	106	106	106	114	B	B	170	114	108	106	108	106	G	G	104	98	98	104	104	106	100	102	108
20	104	106	110	104	102	102	108	118	114	112	112	108	108	104	100	98	98	98	102	B	128	110	114	114
21	114	102	102	102	102	102	100	96	124	114	116	G	114	G	G	120	102	104	102	102	104	110	B	B
22	B	B	B	110	B	B	B	B	G	146	G	G	110	110	106	178	G	110	B	112	114	108	104	102
23	108	108	B	B	104	102	106	108	180	G	G	G	G	G	116	108	G	110	B	B	B	130	110	106
24	106	B	B	108	102	106	100	G	152	152	108	B	G	104	102	100	100	100	104	106	B	B	B	B
25	B	102	98	B	B	B	B	B	G	176	166	G	G	142	G	112	G	B	B	B	B	B	B	B
26	B	B	102	B	B	B	B	102	140	162	140	G	124	G	108	G	118	126	104	102	B	110	110	108
27	B	B	B	B	116	114	112	B	118	172	146	142	110	108	156	100	148	108	102	120	102	B	B	B
28	B	118	112	110	110	106	106	G	104	118	124	122	116	G	G	112	110	104	114	B	106	98	B	102
29	B	B	B	B	B	B	B	102	G	112	160	108	108	192	184	102	98	102	110	108	104	102	B	B
30	B	B	122	114	B	B	B	B	G	G	140	130	128	124	120	118	112	108	112	110	110	B	B	104
31	B	154	136	B	B	B	B	166	142	132	128	124	138	G	G	190	130	124	120	122	112	102	B	124
	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	18	21	21	17	18	15	15	19	26	27	28	24	26	24	24	27	26	26	24	21	21	19	15	21
MED	110	112	110	108	110	110	110	116	134	118	122	112	112	110	110	108	106	105	109	110	106	108	106	108
U Q	114	116	116	113	114	118	120	146	166	162	143	121	116	117	131	126	126	110	112	116	112	114	110	118
L Q	106	106	104	105	104	102	106	110	116	112	112	108	108	104	106	102	100	100	103	105	104	102	104	104

IONOSPHERIC DATA STATION Kokubunji

DEC. 1997 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

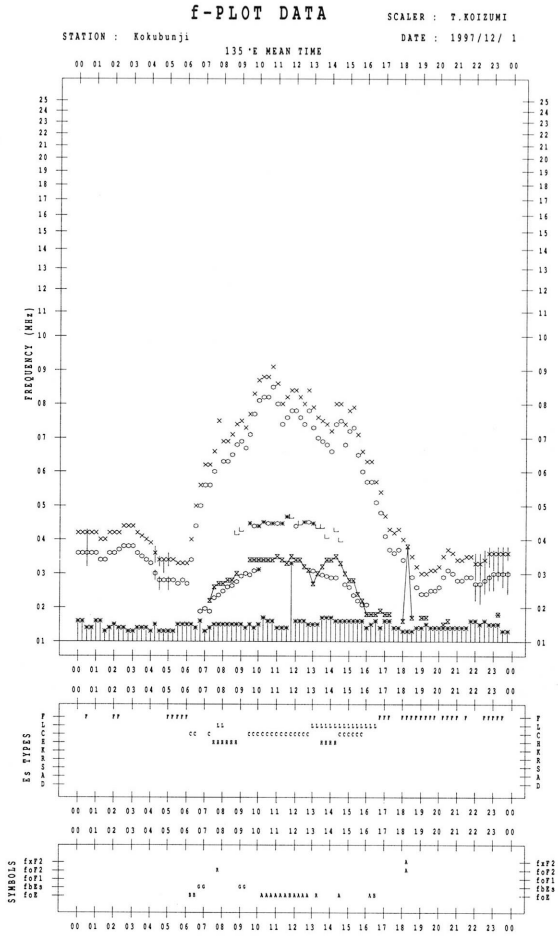
LAT. 35°42.4'N LON. 139°29.3'E SWEEP 1.0MHz TO 25.0MHz IN 24.0SEC IN MANUAL SCALING

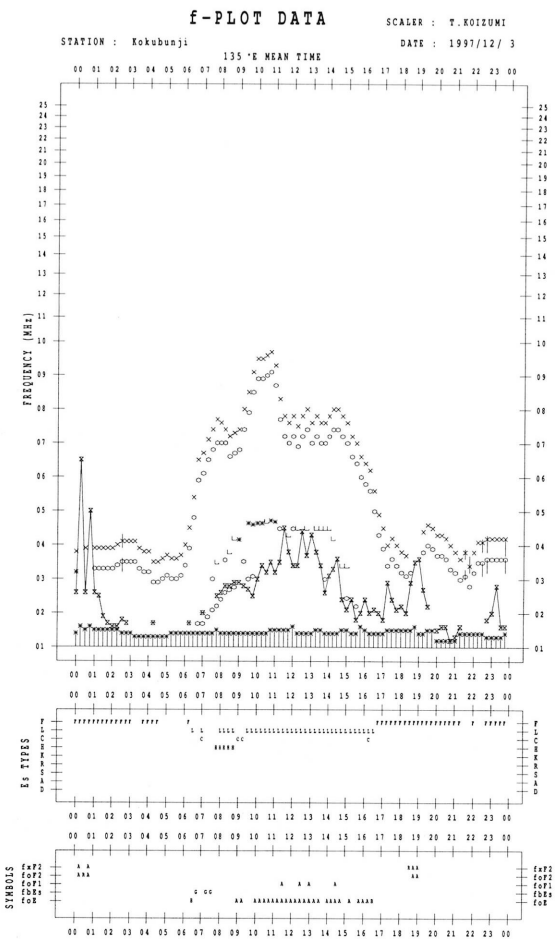
D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1			F2			F1	FF11		HL11		C1	C1	C1	L1	HL11	CL12	L1	F2	F2	FF11		F1		F1
2		F1	F2			F2		LC11	C1	C2	L1	L1	L2	CL11	CL21	HL11	L1	FF31	F2	F2	F3		F3	FF12
3	FF21	F3	FF12	FF11	F2			CL11	HL12	C2	L2	L2	L2	L2	L2	L2	L1	F2	F3	FF42	F1	F1	F1	F2
4	F3	F3	F4	F3	F1	F1	F1	L4	L2	C2	L2	L2	L4	L3	CL13	HCL11	HL11				F3	FF31	F1	F2
5	F2	F1				F1	F1		HL12	L2	L1	L1	L1	L1	L1	L1	L2	F1	F2	F1	F1	F1		F2
6	F2	F1	F1			F1	F2		L2										F1				F1	F2
7	FF21				F2		F1	C1	HL11	HL11	HL11	HL11	L1	L1					F2	F2	F2	F2	F1	
8	F2		F3	F3	F1			C1	C2	L2	L1	L1		L1	L1	L1	L2	F3						
9								L1	CL22	L2	L2	L2	L1	L1	L2		L1	F1	F1					F1
10	F2	F1	F3	F3	F1					HL11	HL11	C1	L1	L2	L2	L2	L1	F1	F2	F2	F1			
11		F2						C4	CL11	CL21	CL31	CL11	C3	L2	L3	L3	LC21	F2	F2					
12	F2	F3	F1	F2	F2				L1	L2	CL11	CL41	CL31	C2	C3	L3	L4	F3	F1	F1				FF11
13	F3	F3	F2	F1	F1	FF21	F1	L3	HL12	HL13	HL12	L2	CL11	CL21	CL11	L3	L3	FF41	FF31	FF31	F2	F3	F5	F2
14	F2	F3	F1	F2	F1	FF11	F3	C3	LC32	C3	C1	C1	L1	L2	L2	L1	L2	F3	F2	F3	F3	F3	F3	F2
15	FF21	FF11	F1		F1	F5	F2	L1	L2	L2	L3	L2	L1	L2	L1	L1	CL11	F1	F2		F2	FF11	F2	F2
16	F2	F1	F1	F1				C1	HL22	LH11	L1	L1	CL11	HL11	HL11	CL21	C1	F2		F1	F2	F2		F1
17		F1	F2	F2	F1	F1	F1		L2	L1	L1	L1	L1	L2	L1	L2	L3	F4	F3	F1	F1		F1	
18	F1	F1		F1	F1			L1	H2	HL11	HL12	L2	HL11	H1	H1	C1	C1			F1	F2	F1	F2	F2
19	F2	F1	F1	F1	F1			C1	L1	L1	L1	L1	L1			L1	L2	F1	F1	F1	F1	F2	F1	F1
20	F3	F3	F1	F3	F1	F1	F1	L1	L2	L2	L1	L1	L1	L2	L3	L2	L2	F1	F1		F1	F1	F2	F1
21	F2	F2	F2	F2	F3	F3	F2	L2	L1	L1	L1		L1			CL11	L1	F1	F1	F1	F2	F1		
22				F1						H1			L1	L1	L1	H1		F2		F3	F3	F3	F3	F3
23	F2	F2			F1	F2	F1	L1	H1						L1	L1		F1				F1	F2	F2
24	F1			F1	F1	F1	F1		H1	H1	L1			L1	L1	L1	L1	F2	F1	F1				
25		F1	F1							H1	H1			H1		L1								
26			F1					L1	CL11	H1	C1		C1		L1		L1	FF21	F2	F2		F1	F1	F1
27					F1	F2	F2		L1	HL11	H1	CL11	L1	L1	HL12	L2	HL12	F1	FF11	FF21	F1			
28		F1	F1	F1	F2	F2	F2		L1	L1	C1	C1	L1			L1	L2	F2	F1		F1	F1		F1
29								L1		L2	HL12	L1	L2	HL12	HL11	L3	L3	FF22	F4	F2	F1	F1		
30			F1	F2				H1			C1	C2	C2	CL21	CL21	L2	L2	F2	F1	F1	F1			F1
31		F1	F1					HL11	C2	C2	C2	C2	C1			H1	C2	F5	F3	F4	F2	F1		F1
	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																								

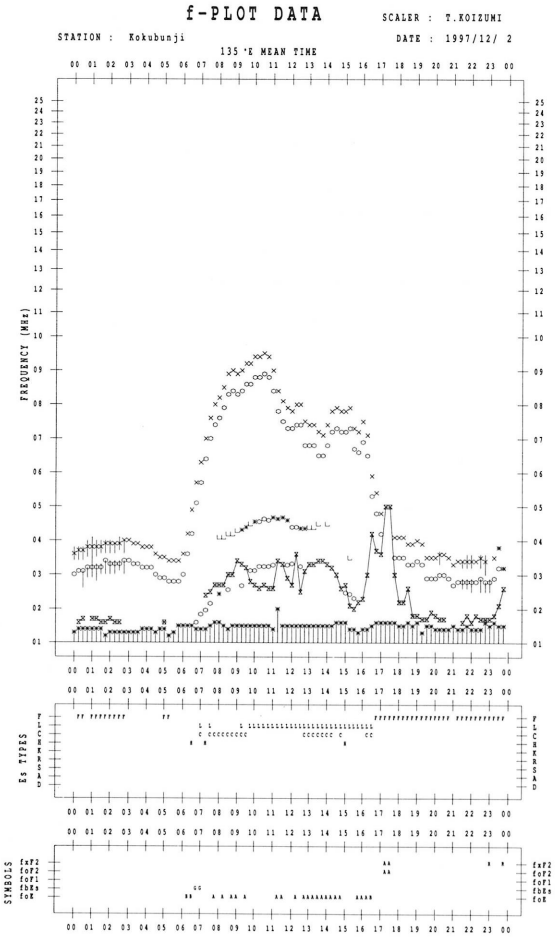
DEC. 1997 TYPES OF Es COMMUNICATIONS RESEARCH LABORATORY, JAPAN

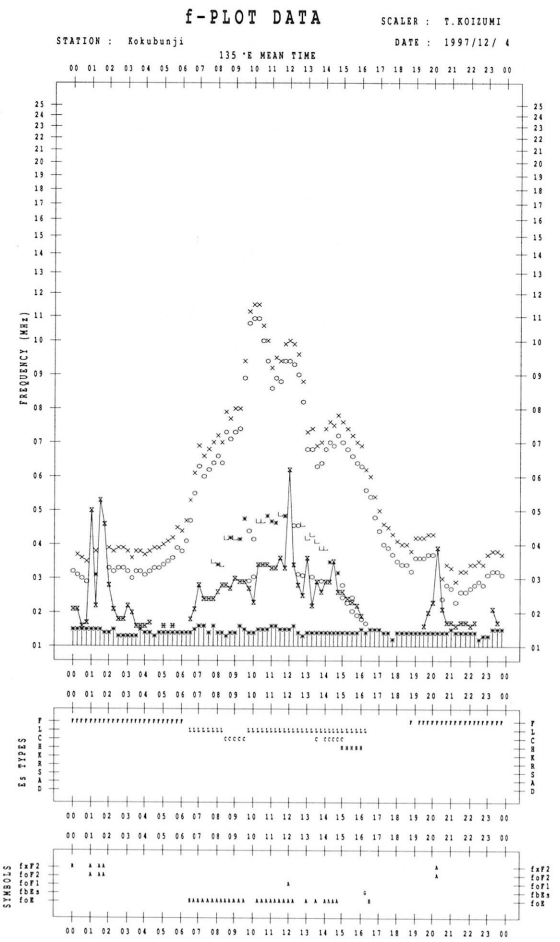
f-PLOTS OF IONOSPHERIC DATA

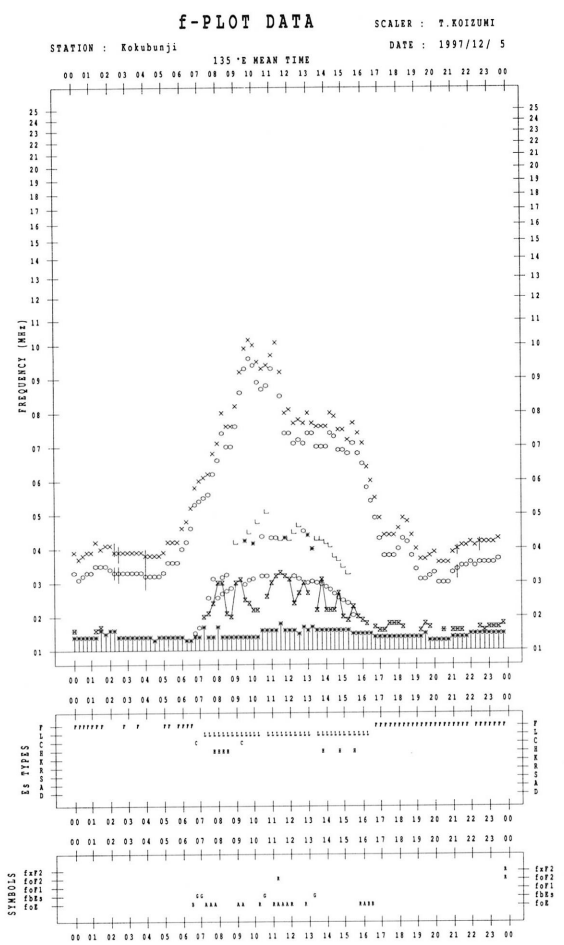
KEY OF f-PLOT	
	SPREAD
	foF2, foF1, foE
	fxF2
	DOUBTFUL foF2, foF1, foE
	fbEs
	ESTIMATED foF1
	fmin
	GREATER THAN
	LESS THAN

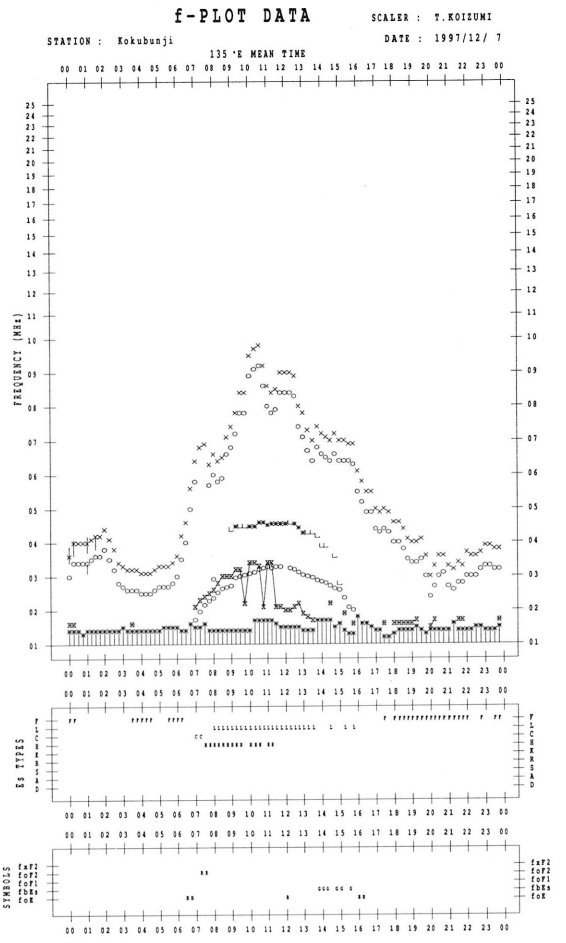

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/ 1
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

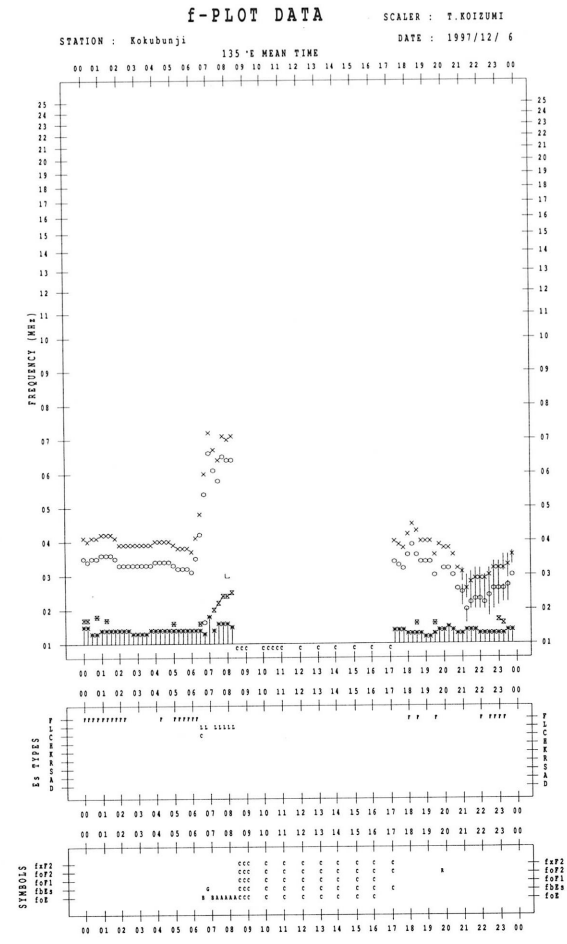

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/ 3
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

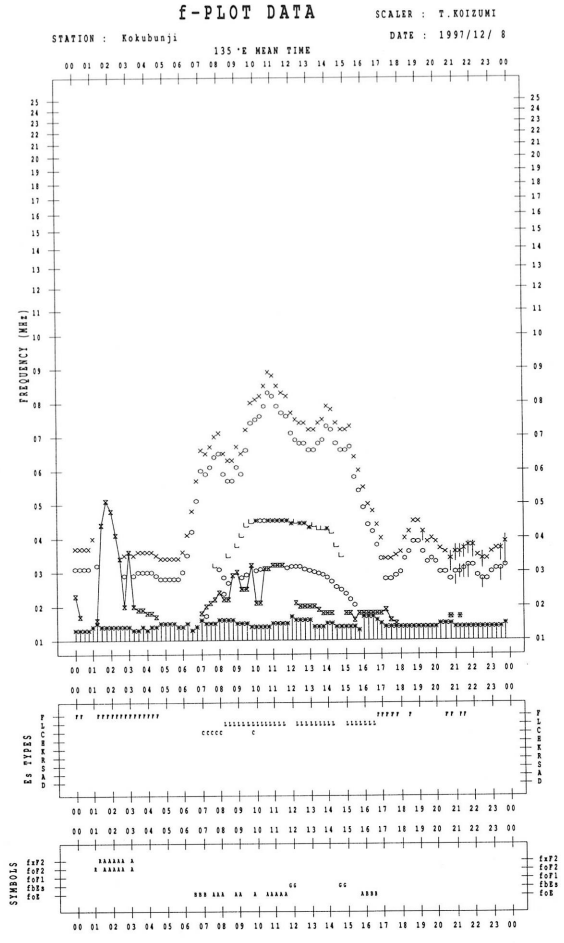

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/ 2
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

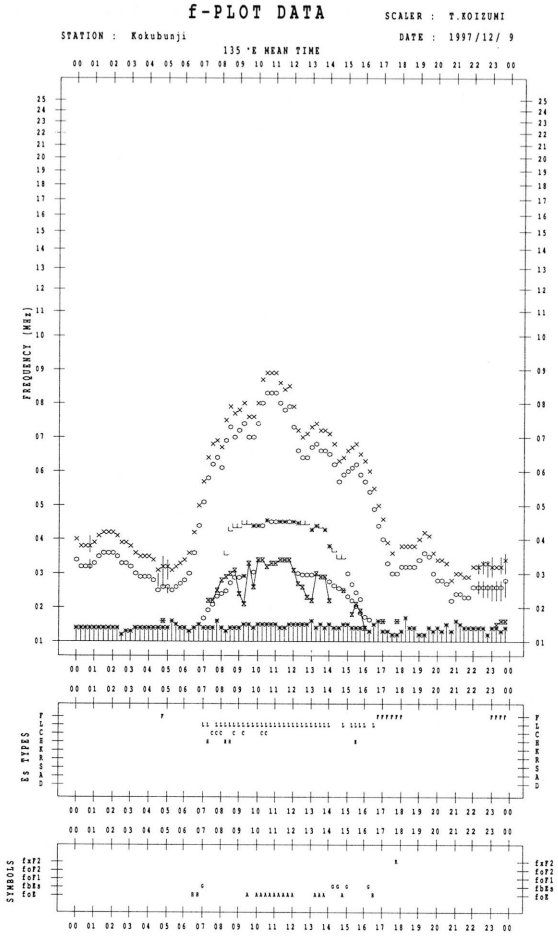

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/ 4
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

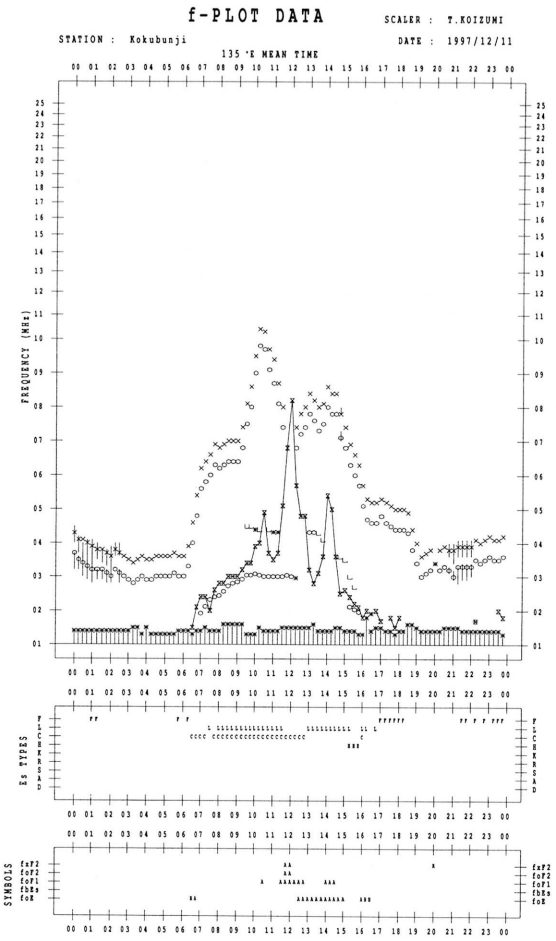

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/ 5
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

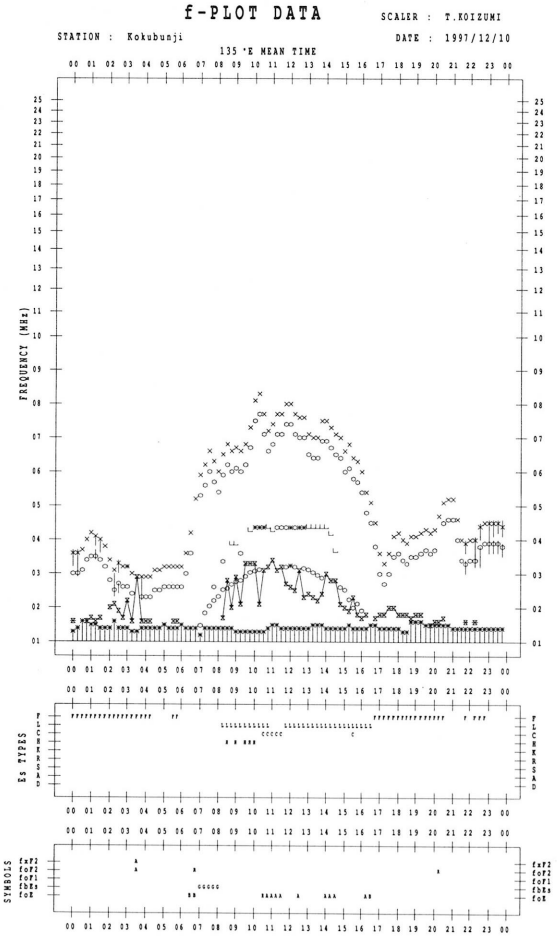

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/ 7
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

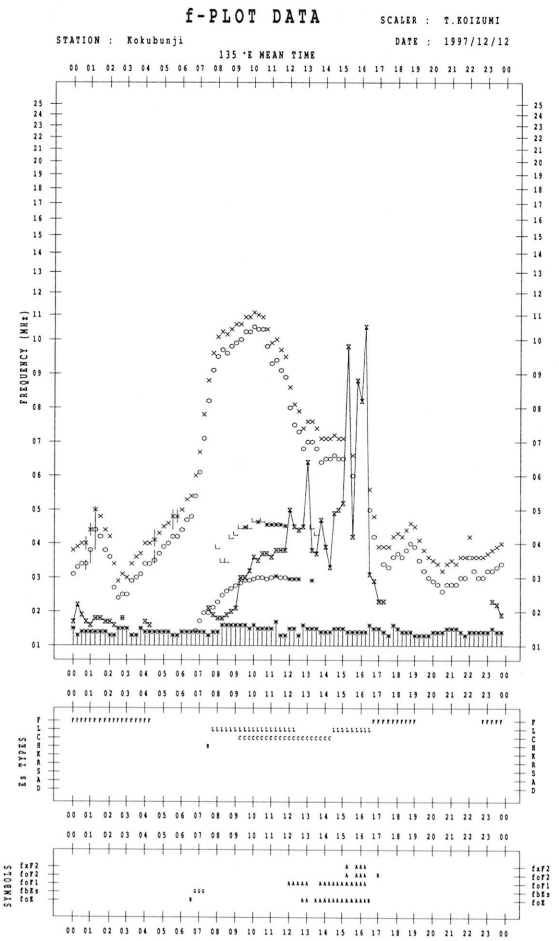

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/ 6
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

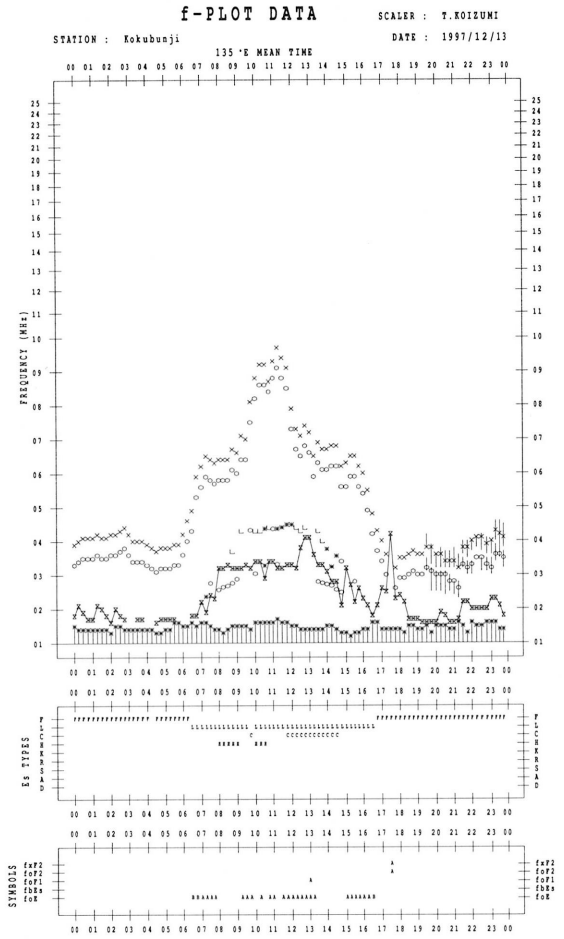

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/ 8
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

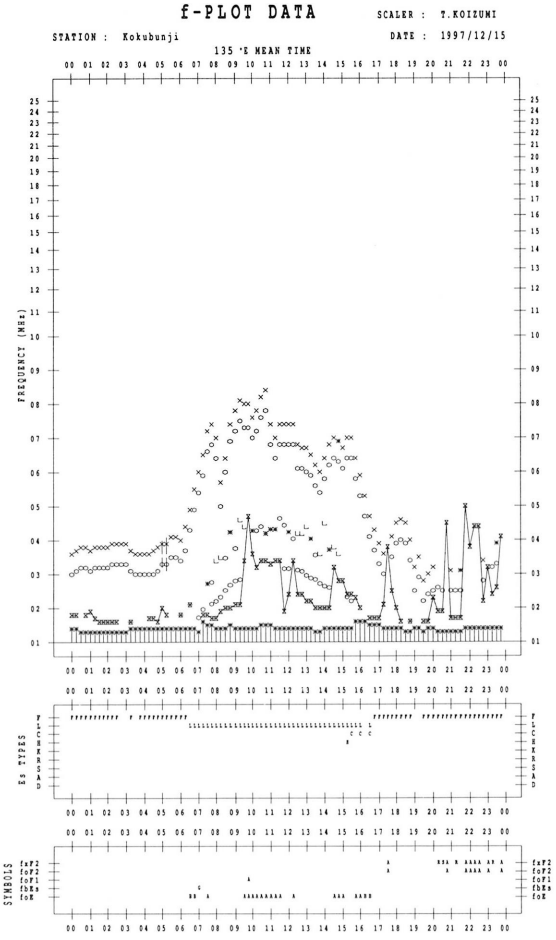

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/ 9
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS

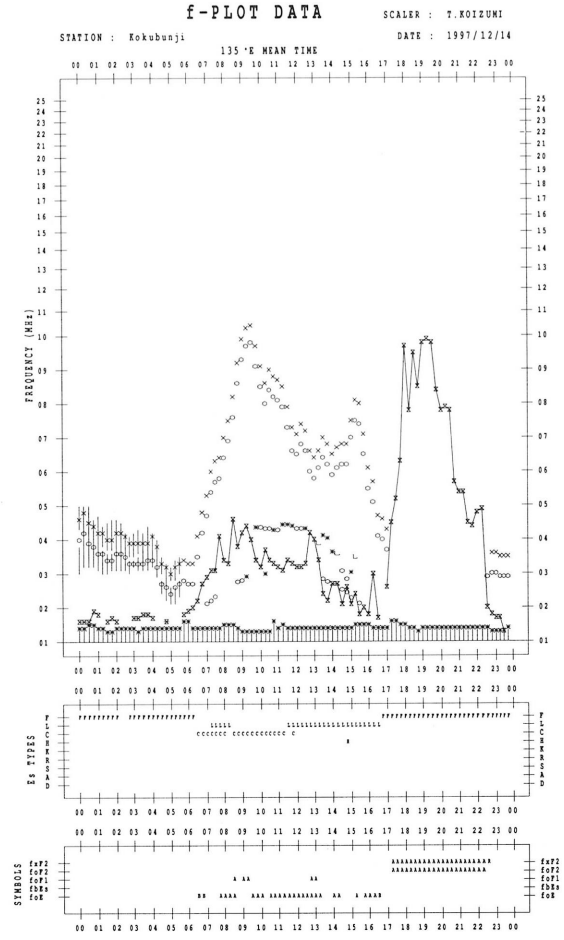

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/11
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS

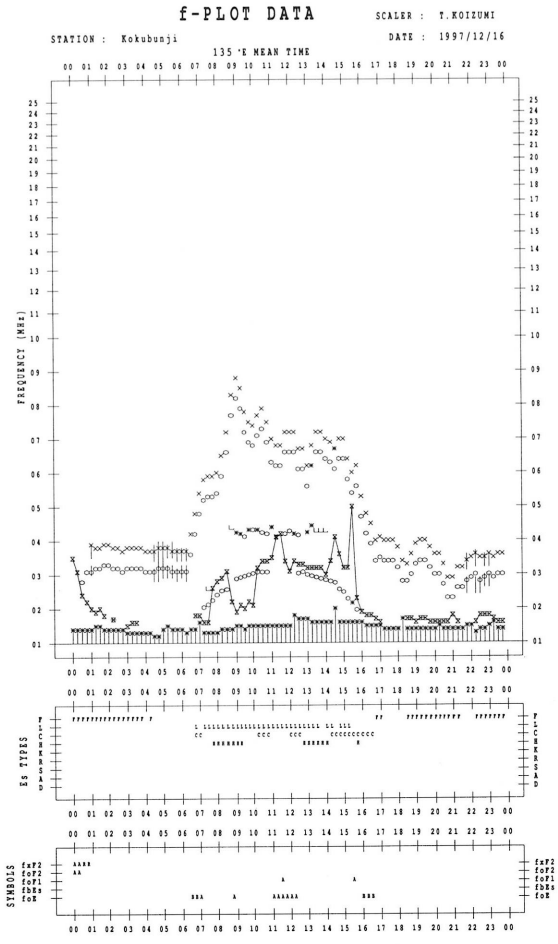

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/10
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS

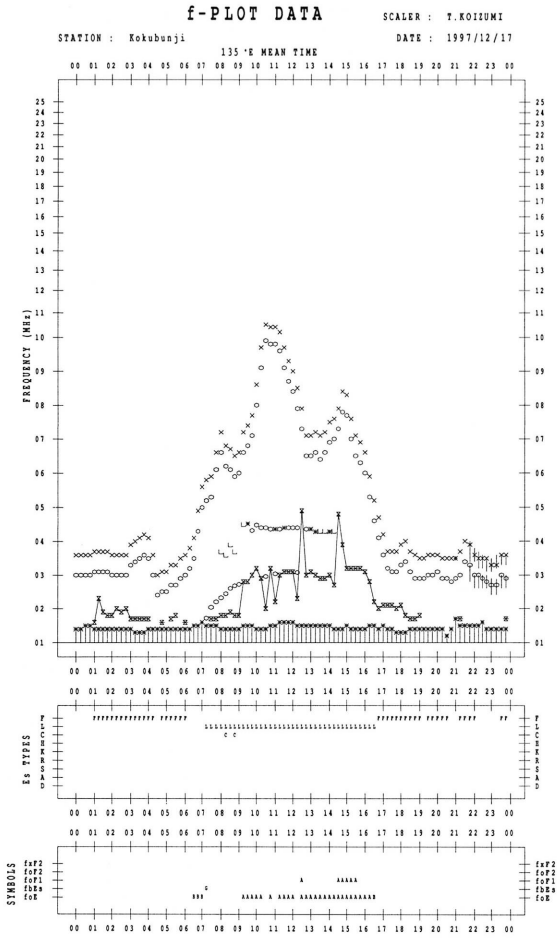

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/12
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS

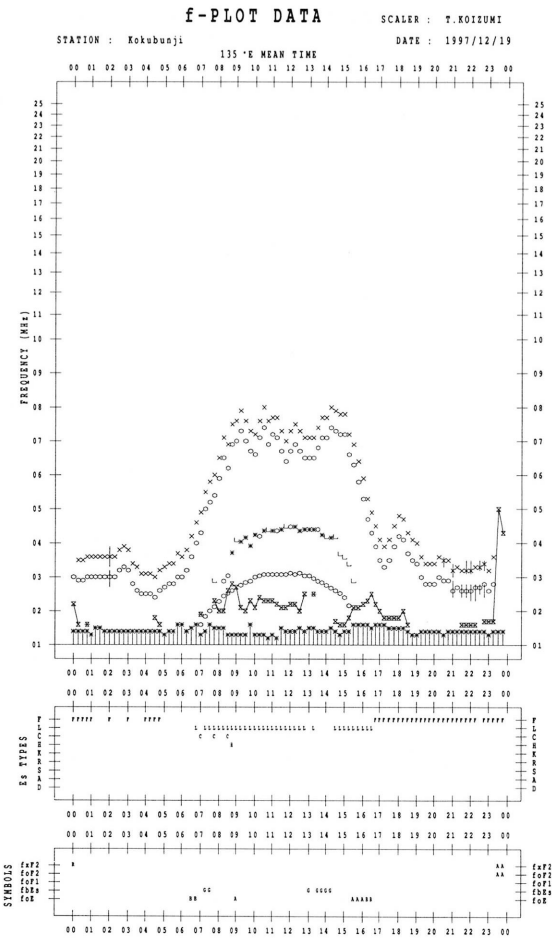

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/13
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS

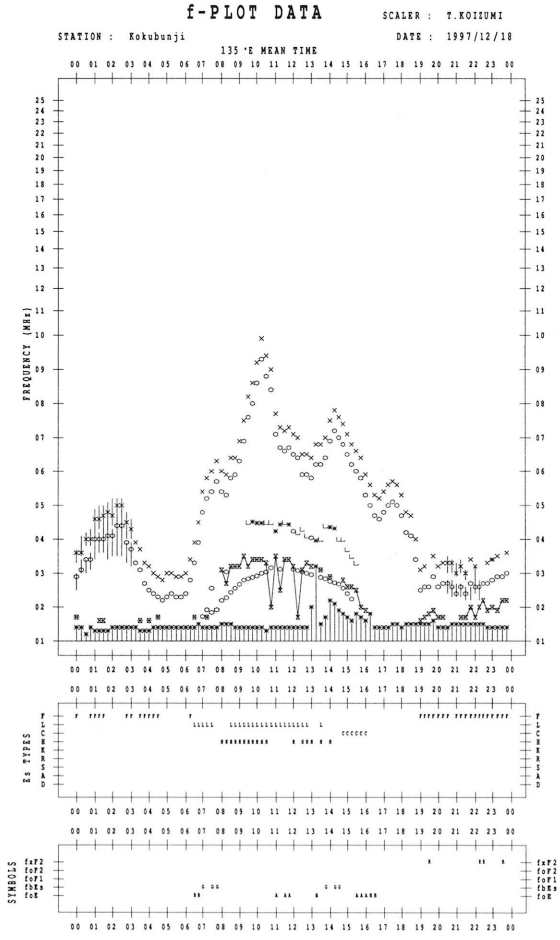

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/15
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS

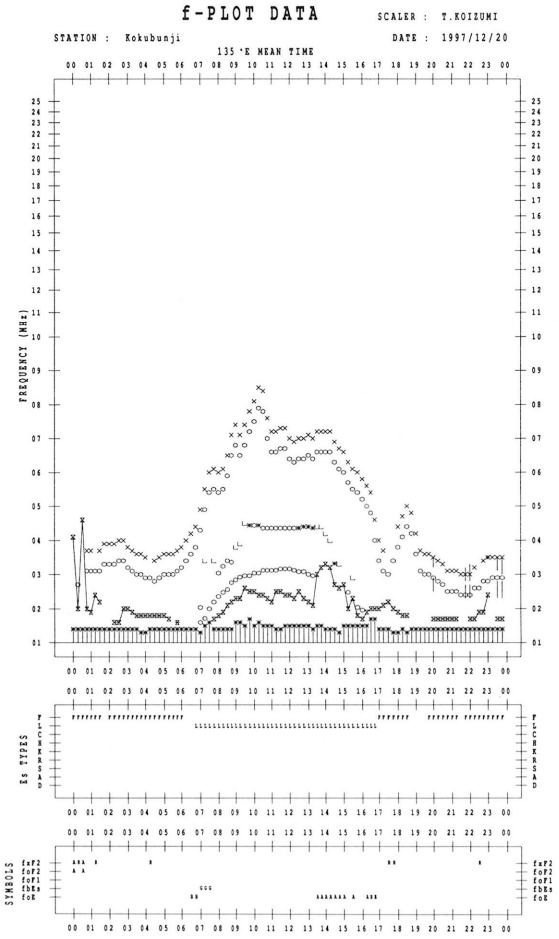

f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/14
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/16
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/17
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/19
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/18
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS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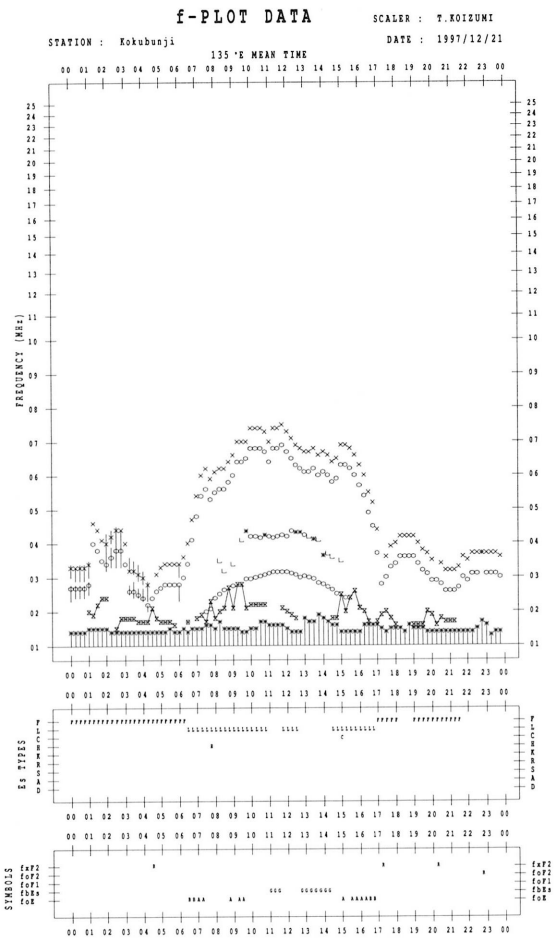
STATION : Kokubunji
DATE : 1997/12/20
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
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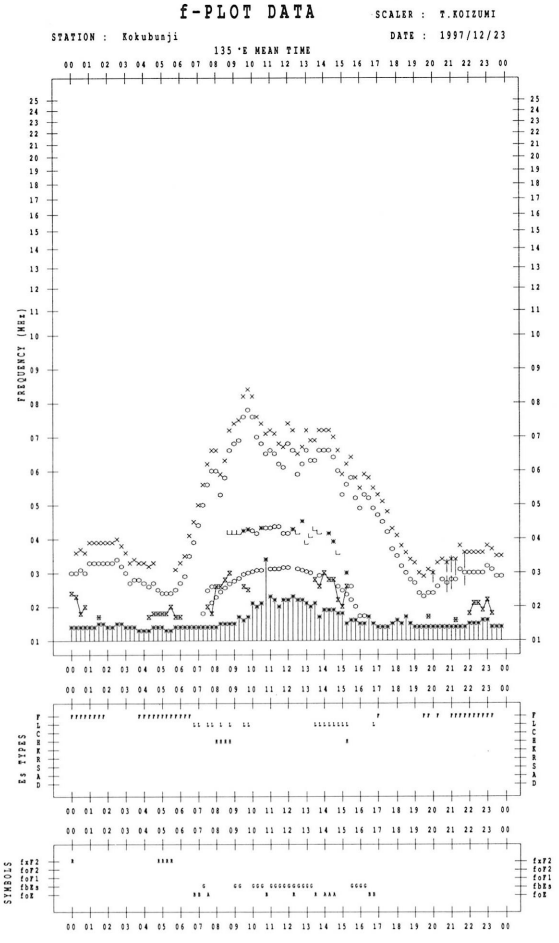
STATION : Kokubunji
DATE : 1997/12/21
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
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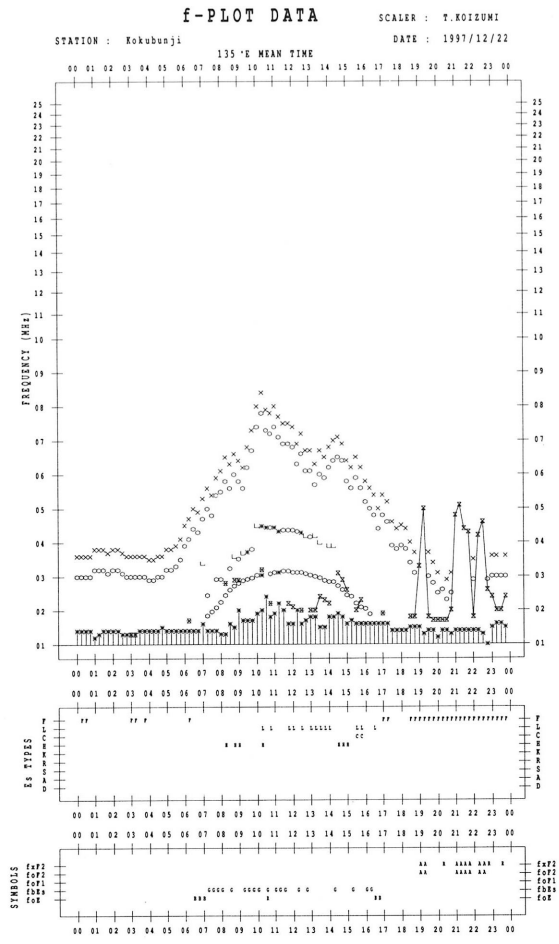
STATION : Kokubunji
DATE : 1997/12/23
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
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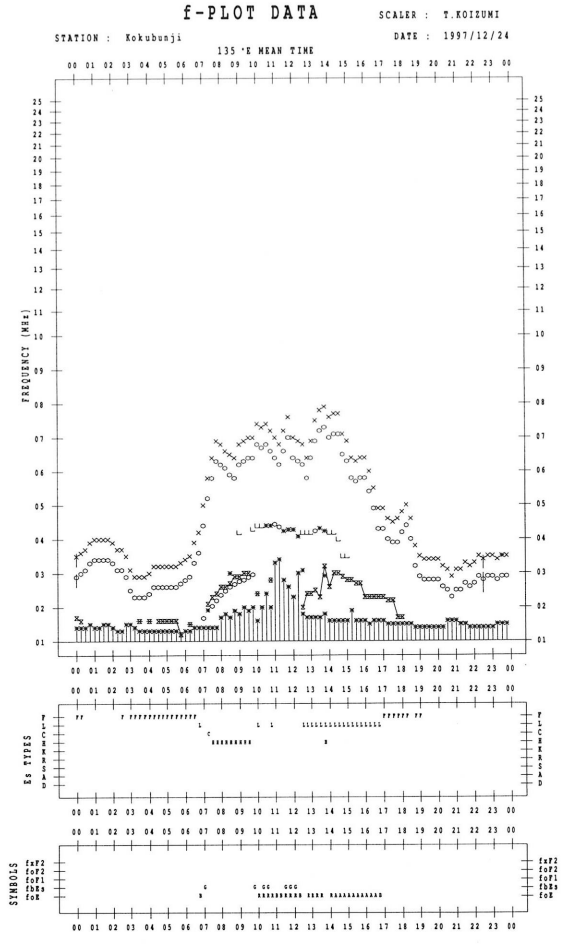
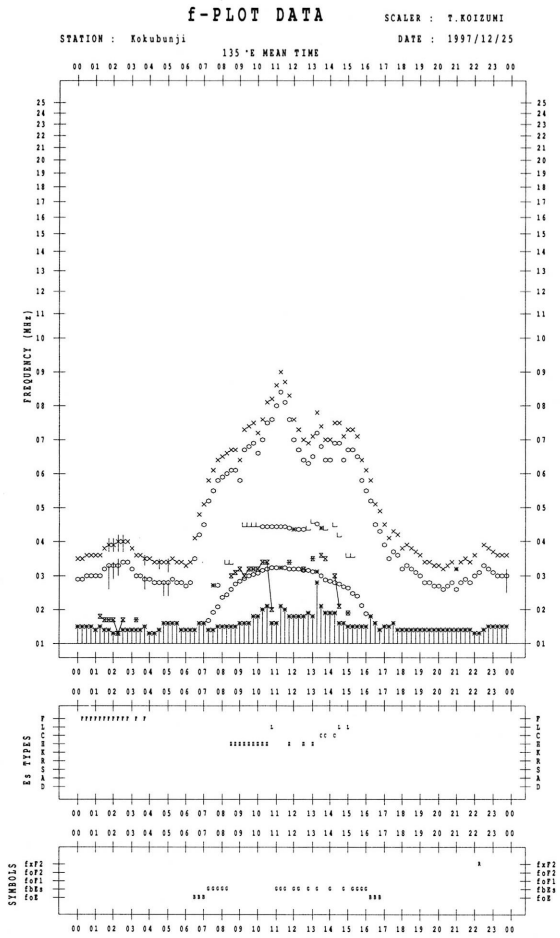
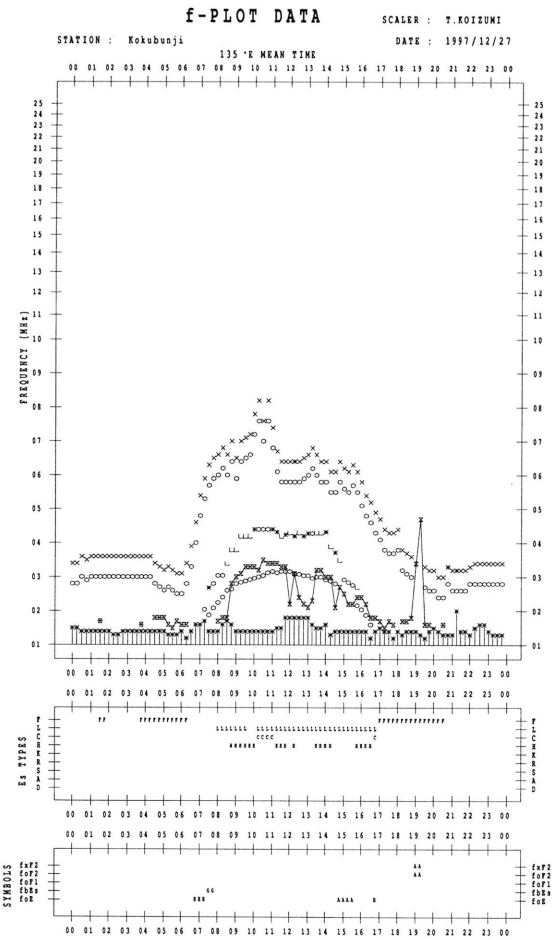
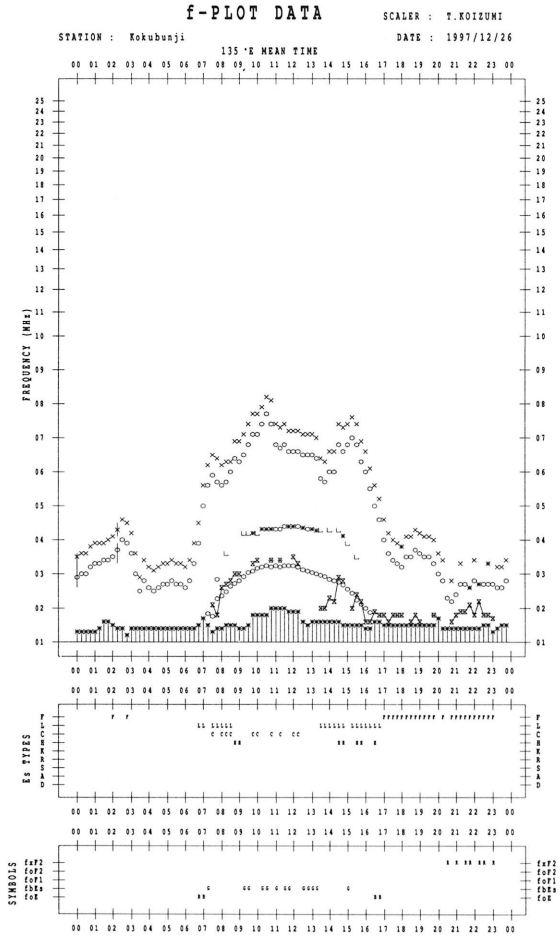
STATION : Kokubunji
DATE : 1997/12/22
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/24
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/25
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
foF2
foF1
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/27
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
foF2
foF1
foE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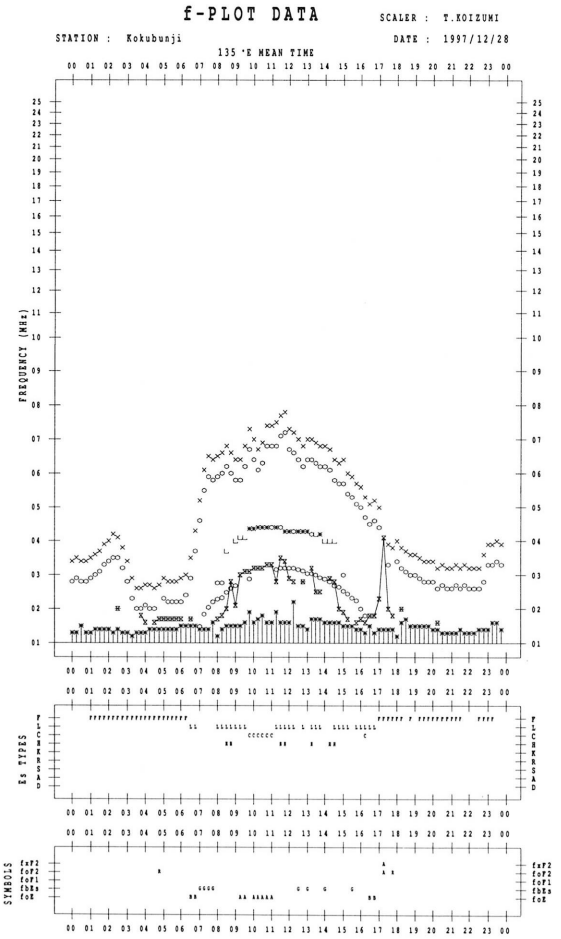
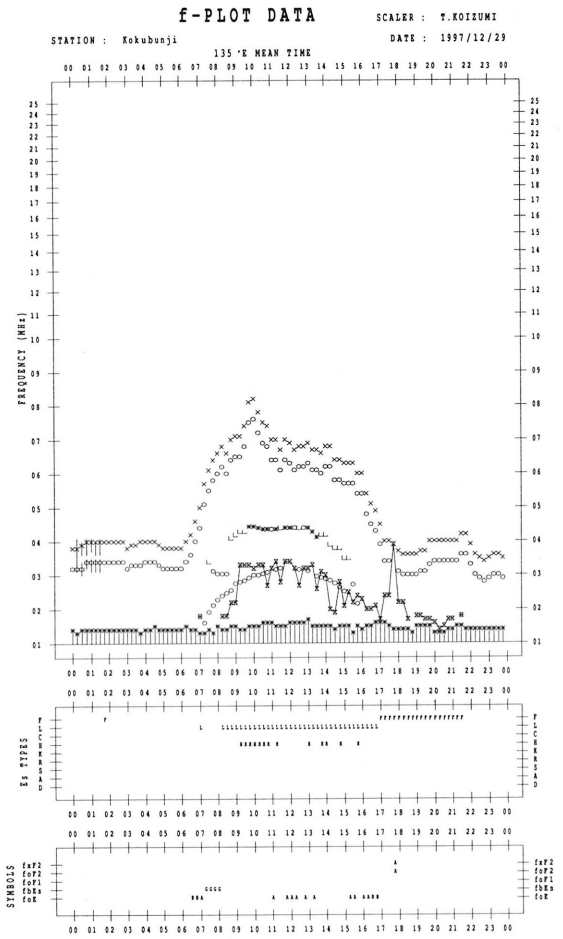
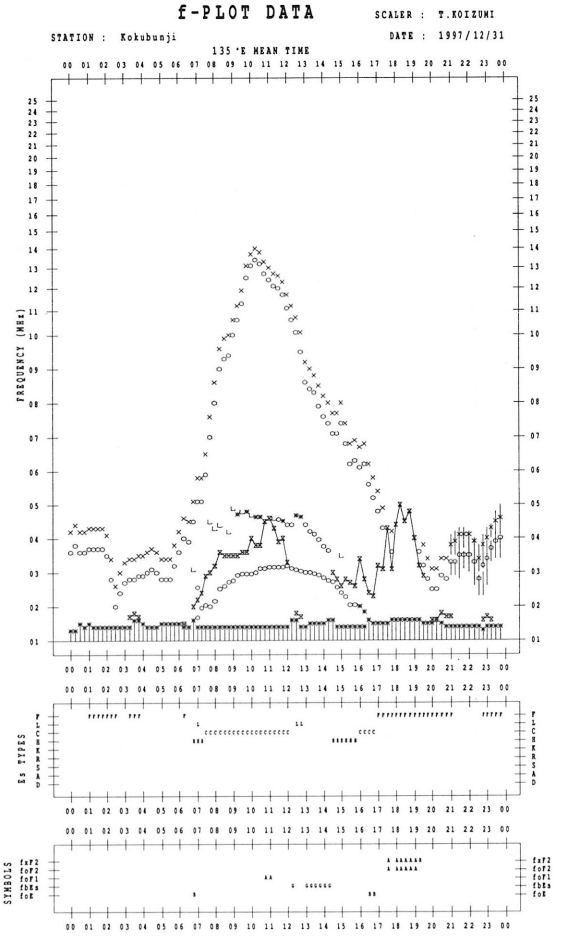
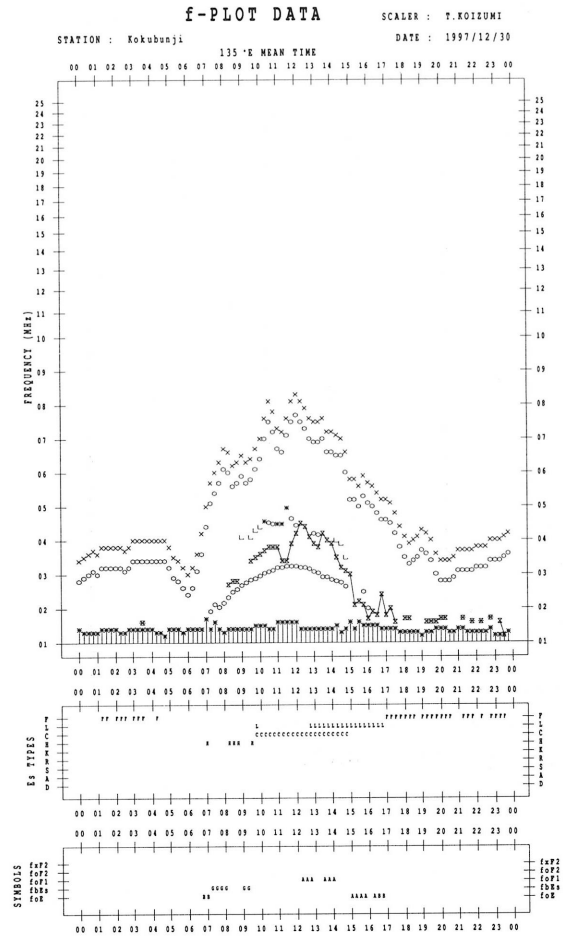
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/26
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
foF2
foF1
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/28
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
foF2
foF1
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/29
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/31
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : T.KOIZUMI
STATION : Kokubunji
DATE : 1997/12/30
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 December 1997

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	33	33	(32)	33	33
2	33	33	(33)	-	33
3	-	-	(-)	37	37
4	36	32	(30)	35	33
5	34	32	(32)	35	33
6	33	32	(31)	35	33
7	34	33	(32)	31	32
8	31	31	(31)	30	31
9	30	29	(29)	32	30
10	32	31	(30)	33	31
11	32	31	(30)	32	31
12	31	31	(31)	32	31
13	31	29	(29)	32	30
14	30	28	(28)	32	29
15	30	29	(28)	31	29
16	30	29	(28)	31	29
17	30	29	(28)	31	29
18	30	29	(29)	32	30
19	32	29	(29)	32	31
20	31	30	(30)	-	30
21	-	-	(-)	-	-
22	-	-	(-)	-	-
23	-	-	(-)	-	-
24	-	-	(-)	(33)	(33)
25	33	32	(31)	33	32
26	33	33	(33)	33	33
27	33	32	(32)	33	32
28	33	32	(31)	33	32
29	32	33	(31)	33	32
30	33	32	(32)	33	32
31	33	33	(32)	33	33

Note: No observations during the following periods.
2nd 2230 - 3rd 0630 20th 2230 -24th 0630

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso December 1997

Single-frequency observations

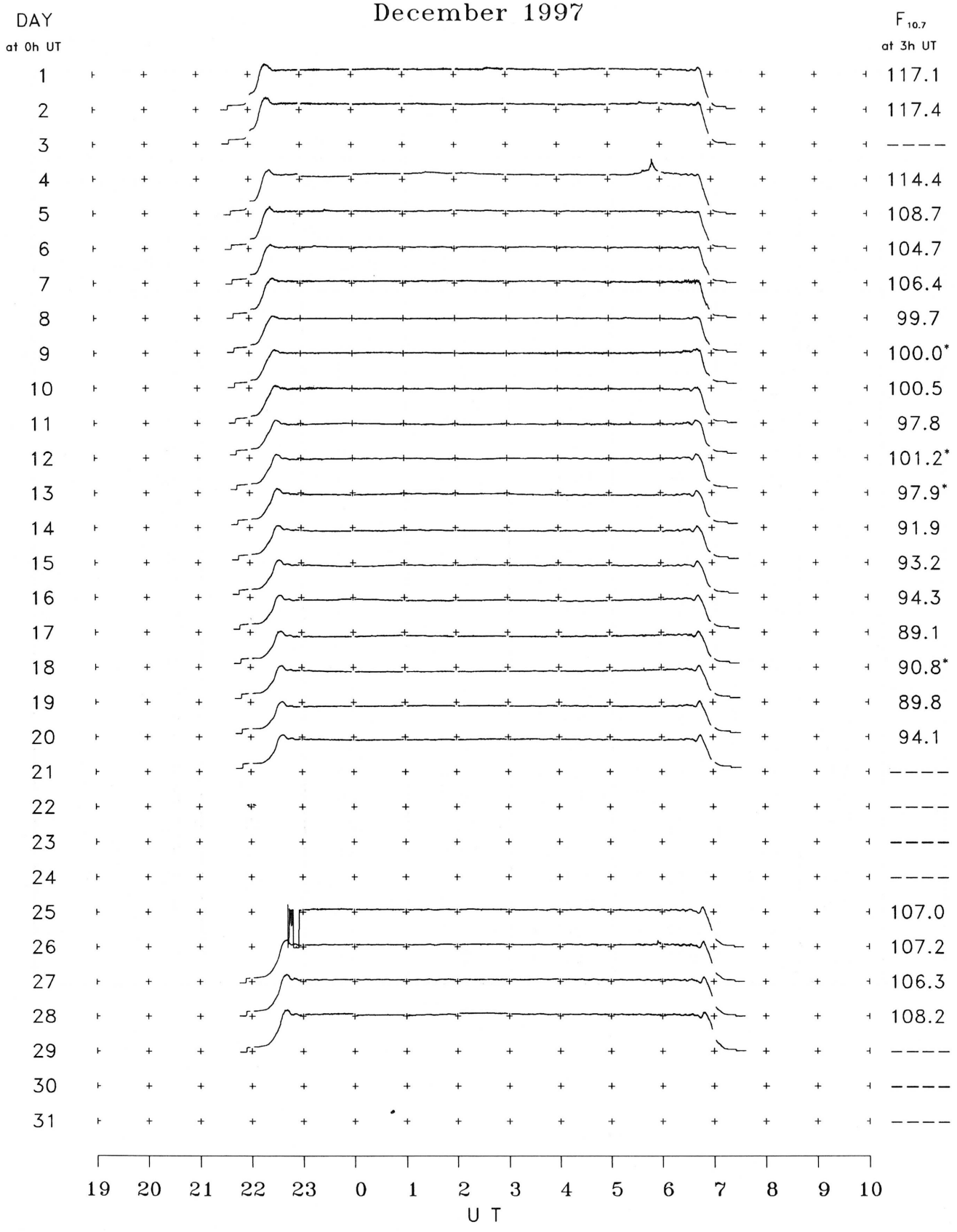
Normal observing period: 2140 - 0730 U.T. (sunrise to sunset)

DEC. 1997	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22} Wm^{-2} Hz^{-1}) PEAK	FLUX DENSITY (10^{-22} Wm^{-2} Hz^{-1}) MEAN	POLARIZATION REMARKS
1	200	8 S	0417.4	0417.6	0.4	17	-	0
	200	42 SER	0607.7	0608.7	1.7	17	-	WL
	200	42 SER	0631.2	0631.4	1.5	45	-	WL
	500	8 S	0631.2	0631.5	0.7	20	-	WL
	200	46 C	0703.9	0704.4	1.5	130	28	WL
2	200	46 C	0005.4	0006.1	2.0	50	4	WL
	500	8 S	0006.2	0006.7	0.5	18	-	WL
	200	46 C	0115.5	0119.7	5.0	60	5	WL
4	200	46 C	0215.0	0215.4	4.0	10	2	WL
	2800	45 C	0548.5	0550.5	10.0	30	9	WL
	500	46 C	0548.5	0550.9	6.0	21	5	0
	200	46 C	0550.1	0552.4	3.9	10	2	0
5	200	46 C	0033.1	0033.7	1.0	35	5	0
9	200	8 S	0505.4	0505.5	0.2	45	-	WL
10	200	42 SER	0103.4	0106.7	4.2	90	-	0
	200	42 SER	0154.7	0155.0	4.2	12	-	0
	200	42 SER	0256.4	0256.5	0.7	28	-	0
	200	8 S	0402.9	0403.0	0.3	25	-	0
	200	8 S	0521.7	0522.0	0.7	29	-	0
12	500	46 C	2219.5	2224.7	20.0	120	28	ML
	200	46 C	2223.6	2230.7	10.0	21	5	0
	500	4 S/F	2243.2	2245.0	7.0	50	18	WL
	200	3 S	2244.2	2245.2	2.7	12	3	0
14	200	8 S	0010.7	0010.9	0.5	18	-	0
	500	8 S	0010.9	0011.0	0.2	14	-	0

B. Solar Radio Emission

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

December 1997



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

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☎ (0423) (27) 7478 (直通)

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Communications Research Laboratory, Ministry of Posts and Telecommunications,
2-1 Nukui-Kitamachi 4-chome, Koganei-shi, Tokyo 184 JAPAN