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IONOSPHERIC DATA IN JAPAN

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CONTENTS

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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, Independent Administrative Institution in 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°40.5'N	128°09.2'E	16.5°N	161.7°	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

Ionospheric 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. 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*).

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 Hand-book 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 spred ***F*** trace
foF2 ***foF1*** ***foE*** ***foEs***	Ordinary wave critical frequency for the ***F2***, ***F1***, ***E*** and ***Es*** including particle ***E*** layers, respectively
fbEs	Blanketing frequency of the ***Es*** layer, e.g. the lowest ordinary wave frequency visible through ***Es***
fmin	Lowest frequency which shows vertical ionospheric reflections
M(3000)F2 ***M(3000)F1***	Maximum usable frequency factor for a path of 3000 km for transmission by ***F2*** and ***F1*** layers, respectively
h'F2 ***h'F*** ***h'E*** ***h'Es***	Minimum virtual height on the ordinary wave for the ***F2***, whole ***F***, ***E*** and ***Es*** layers, respectively
Types of ***Es***	See below b. (iii)

b. Symbols

(i) Descriptive Letters

The following letters are entered after, or used to replaced a numerical value on the monthly tabulation sheets, if necessary.

A Measurement influenced by, or impossible because of, the presence of a lower thin layer, for example *Es*.

B Measurement influenced by, or impossible because of, absorption in the vicinity of *fmin*.

C Measurement influenced by, or impossible because of, any non-ionospheric reason.

D Measurement influenced by, or impossible because of, the upper limit of the normal frequency range in use.

E Measurement influenced by, or impossible because of, the lower limit of the normal frequency range in use.

F Measurement influenced by, or impossible because of, the presence of spread echoes.

G Measurement influenced by, 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.

X 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 part *E* layer minimum virtual height.

c An *Es* trace showing a relatively symmetrical cusp at or below *foE*. (Usually a daytime type.)

h An *Es* trace showing a discontinuity in height with the normal *E* layer trace at or above *foE*. The cusp is not symmetrical, the low frequency end of the *Es* trace lying clearly above the high frequency end of the normal *E* trace. (Usually a daytime type.)

q An *Es* trace which is diffuse and non-blanketing over a wide frequency range.

r An *Es* trace showing an increase in virtual height at the high frequency end similar to group retardation.

a An *Es* trace having a well-defined flat or gradually rising lower edge with stratified and diffuse traces present above it.

s A diffuse *Es* trace which rises steadily with frequency and usually emerges from another type *Es* trace.

d A weak diffuse trace at heights below 95 km associated with high absorption and large *fmin*.

n The designation 'n' is used to denote an *Es* trace which cannot be classified into one of the standard types.

k The designation 'k' is used to show the presence of particle *E*. When *foEs* > *foE* (particle *E*) the *Es* type precedes k.

c. Definitions of the CNT, MED, UQ and LQ

Median count (**CND**) is the number of values from which the median has been computed. In addition to numerical values, the count may include certain descriptive letters.

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

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

B. SOLAR RADIO EMISSION

Solar radio observations at 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 Measurement, 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

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 F10.7 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. 2002

LAT. 45°23.5'N LON. 141°41.2'E 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	38	42	44	52	45	36	29	66	81	86	95		92	93	92	94	74	55	54	44	34		28	32
2	34	36	32	37	40	37	36	54	82		93		94	102	101	92	71	66	47	44	34	28	26	34
3	34	37	37	36	34	38	37	70	83	92	94	94	92	93	91	82		54	41	35	32		32	34
4	26	34	31	34	38	38	34	62	81	93	100		93	91	89	88	78	61	47	45	42	36	32	
5		37		40	31		31	58	85	94	92	94	88	94	93	84	80	54	43	43	40	32	36	32
6	36	38	40	42	42	44	38	49	74	93	95	104	103	103	93	85	75	58	47		32	26	26	32
7	32	26	34	34	34	31	40	51	83	93	94	92	82	82	92	91	82	66	62	61	53	48	34	38
8	32	34	40	41	44	40	36	65	85	94	80		95	88	92	93	84	79	62	36	29		37	37
9	32	40	40	37	40	40	36	53	82	94			92	94	92	83	82	54	41	51	37			34
10	36	38	40	40	41	38	30	54	73	93	79	94	93	88	92	84	76	54	46	40	30	32	37	36
11	38	42	43	44	46	47	32	60	95	78	111	94	94	91		82	66	67	52	32	32	34	34	
12	36	34	36	32	34	38	37	62	84	97			82	93	82	82	80	55	47	43	40		34	32
13		30	32	32	40	40	40											62	54	47	36	38	42	49
14	40	42	41	38	41	36	34	58										55	54	57	42	36	44	34
15	36	25	38	40	38	38	40	67											58	45	36	A	38	35
16	34	34	43	41	45	44	42	54	91	94	106		106	104	93	81	70	61	46	38	37		A	37
17	36	32	36	37	38	40	36	63	91	91	101	100	93	94	93	92	82	58	46	32	36	34	37	36
18	34	36	36	18	40	43	37	58	84	103	94			92	102	77	81	63	50	40	36	34	40	41
19	40	40	38	40	41	40	32	54	85	92	119	108	95	94		92	C	78	77	52	31		34	34
20			30					47	66	71	78	81	76	92	84	81	77	50	44	32	34		35	40
21	34	30	35	42	44			54	85		126	126				92	91	83	77	60	62	61	54	60
22	61	52	52	63	57	55	54		84	113		128	125		91	89	75	74	60	45			38	40
23	40	40	41	41	38	34	31	53	85		123		92	103	91	95	78	52	48	42	35	32	32	34
24	34	34	34		24	29	31	52	88	90		94		105	90	83	84	66	57	38	36	26	38	40
25	40	38	32	36	34	32	40	53	83	84	144	137	92	110	91	93	82	48	51	32		34	34	34
26	34		34	37	34	34	34	43	89				95	104	91	91	76	53	42	28		23	29	30
27	34	34	32	34	34	34	36	54	74	92				110	104	91	90	78	64	40	42	36	32	38
28	37	34	34			A	A		66			106	92	84	82	81	72	48	37	28		25	32	32
29	34	30	35	38	A	A	A	41	69	84	93		88	88	82	82	52	63	54	37		A	34	
30	34		34	34	34	32		45	70	79		101	83	75	82	75	65	48					32	34
31	34	29			45	35	31	44	62	88	88	84	78	80	74	67	60	34	41				36	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	29	27	28	26	26	28	28	23	20	16	24	26	25	28	26	30	30	28	24	18	29	27
MED	34	35	36	38	40	38	36	54	83	92	94	97	92	93	91	84	78	58	49	41	36	34	34	34
U Q	37	39	40	41	43	40	38	61	85	94	108	107	94	103	93	92	82	66	57	45	40	36	37	38
L Q	34	33	34	34	34	34	32	51	74	86	92	94	88	88	86	82	72	54	46	35	33	28	32	34

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fEs AT Wakkanai

DEC. 2002

LAT. 45°23.5'N LON. 141°41.2'E 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	29	G	G	28	G	G	G		38	G	G		G	G	G		29	28	G	G	G	G	G	G
2	G	G	27	G	G	G	G	28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
3	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
4	G	G	26	G	27	G	G	G	G		G		G	G	G	G	G	G	G	30	G	39	26	32
5	43	28	46	29	24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
6	31	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	28	G	G	G	G	G
7	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
8	G	31	G	29	25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		G	G
9	G	G	G	G	G	G	G	G	G	36	G	G	G	G	G	29	G	33	30	G	G			G
10	28	30	29	28	G	G	G	G	39	G	G	G	G	G	G	G	G	G	G	27	G	G	G	G
11	G	G	G	G	G	G	G	G	34	39	G	G	G	G	G	G	G	G	G	G	G	G	G	29
12	G	G	G	G	G	G	G	G	G	35	40	G	G	G	G	G	G	G	G	G	G	32	G	25
13	33	G	G	G	G	G	G	G	G	G	G	G	G	G	G		G	G	G	G	G	G	G	G
14	G	G	G	G	24	G	G	G			40	38	39	G	G	G	G	G	G	G	28	26	26	G
15	33	G	G	G	G	G	30	G			G		G	G	G	G	36	40	59	45	32	33	31	G
16	G	G	G	G	G	30	26	26	G	G	G	G	G	G	G	G	G	G	G	33	28	33	65	27
17	G	G	G	G	G	G	G	G	G	G	G	G	50	40	G	G	30	29	26	G	G	G	G	22
18	G	G	G	G	G	G	G	G	40	38	G	40		G	G	G	27	G	G	G	G	G	G	G
19	G	G	26	G	G	G	G	G	G	48	G	G	41	G	39	G	C	31	G	G	G		G	G
20	28		G				30	30	31	G	41	38	G	G	G	42	39	32	G	G	G	34	30	31
21	G	G	G	G	31	60	71	32	41	72	G	40	G		37	G	G	G	G	G	G	G	G	60
22	G	G	G	G	G	G	28		42	70		G	G	G	G	G	G	G	G	G	60	29	G	G
23	G	G	G	G	G	G	G	29	G		G	G	40	G	G	G	G	G	G	G	G	24	G	G
24	G	G	23		G	G	G	G	G	G	G	39	G	G	G	G	G	G	G	G	G	G	G	G
25	G	G	G	G	G	G	G	24		65	G	G	G	G	G	G	G	G	G	G		G	30	G
26	28	43	G	G	G	G	G	G	33	G	41	G	G	G	G	G	G	G	G	G	G	G	G	G
27	G	G	G	G	G	25	G	30	78	40	46	45	G	G	46	G	29	G	G	G	G	26	G	G
28	G	G	G	39	60	51	43	60	67	40		40	G	G	G	G	G	G	G	G	28	G	32	G
29	G	G	28	G	64	76	59	35	54	63	39	G	G	G	G	G	42	G	33	31		51	G	39
30	32	29	G	G	G	27	33	39	32	52		G	G	G	G	G	G	38	76	64	38	41	26	G
31	G	40	72	60	28	G	G	25	G	40	G	38	G	G	G	G	45	49	42	59	41	53	33	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	31	30	31	29	30	30	31	29	28	27	28	28	30	30	31	29	30	31	31	31	29	28	30	31
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
U Q	28	G	23	G	24	G	26	28	38	40	G	38	G	G	G	G	27	28	G	G	14	32	26	25
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fmin AT Wakkanai

DEC. 2002

LAT. 45°23.5'N LON. 141°41.2'E 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	16	15	15	20	14	15	17	20		21	21	18	21	16	14	15	15	14	18	20	14
2	14	15	16	14	15	16	15	15	18	20	33	22	21	20	27	22	18	15	15	20	14	18	20	15
3	15	15	16	16	16	15	15	17	16	18	20	20	20	29	28	23	17	15	15	15	17	23	16	17
4	21	20	15	16	17	15	14	20	22	29	21		18	16	18	22	16	15	15	14	14	14	14	15
5	14	20	14	14	15	15	15	20	16	18	15	14	16	17	16	23	15	15	14	14	15	16	16	14
6	14	15	16	15	14	15	14	18	21	18	18	18	18	17	27	15	18	16	17	15	15	17	20	15
7	15	18	16	14	15	15	14	17	27	39	49	49	49	37	28	23	18	14	14	14	15	17	20	15
8	15	15	15	14	14	18	15	17	23	28	21	35	22	22	27	22	17	14	14	14	17		17	20
9	16	14	15	17	15	15	15	17	22	20	21	21	22	21	29	17	16	14	14	15	20			18
10	17	14	14	14	15	14	15	20	22	20	17	18	16	18	18	23	16	15	15	14	17	17	17	20
11	15	21	15	15	16	15	15	18	20	15	18	17	18	18	21	23	17	14	14	15	15	15	15	15
12	18	20	15	20	20	15	16	20	23	18	17	21	15	20	15	23	15	15	15	15	16	17	18	18
13	14	20	18	16	17	20	15	17	15	16	20	16	18	18	18	22	20	15	15	15	17	18	17	22
14	15	15	16	17	17	15	15	17	17	14	18	20	20	16	18	23	20	15	14	14	15	16	16	20
15	16	20	20	16	14	15	17	17	24	14	20	17	18	17	18	22	15	15	14	14	14	15	15	15
16	14	15	18	15	14	15	15	18	14	14	17	20	17	16	17	15	16	16	15	15	15	15	15	16
17	20	17	16	16	15	20	15	18	14	18	18	18	15	17	20	20	14	15	15	22	15	16	18	15
18	16	17	21	15	14	20	15	16	17	18	18	17		17	15	14	16	18	15	14	15	20	15	14
19	16	14	15	15	15	15	15	16	14	16	18	24	18	17	14	17	C	15	16	17	20		15	16
20	16		20				14	14	15	21	21	20	20	21	17	14	16	14	17	17	18	18	16	18
21	20	15	18	17	17	15	14	15	17	20	20	20	21		20	23	20	15	16	18	15	15	16	15
22	14	14	14	14	14	15	16		14	17		16	22	20	15	22	18	16	14	14	14	16	17	16
23	15	20	15	14	15	18	15	15	22		16	21	17	18	15	24	20	18	17	15	17	20	18	18
24	14	21	15		18	17	17	17	17	16	18	20	17	18	23	23	18	17	15	18	16	21	21	18
25	16	15	18	18	20	17	16	18	21	20	30	22	23	32	28	24	18	16	20	15		18	17	16
26	15	14	20	15	14	15	17	20	14	18	20	21	20	20	18	16	18	14	14	17	20	18	20	17
27	15	16	15	16	16	18	15	15	14	18	18	18	20	20	21	18	14	14	18	17	14	18	15	18
28	15	15	15	14	15	14	14	15	15	18		18	21	21	26	21	18	18	20	14	17	20	18	14
29	16	14	15	14	15	15	14	14	18	18	18	20	20	20	28	16	14	18	14	14		14	21	16
30	14	15	17	15	14	18	16	14	14	14		20	18	20	28	22	20	14	14	14	15	14	18	21
31	18	14	14	18	14	14	20	17	20	18	18	20	22	22	21	20	15	15	15	15	14	14	15	18
	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	30	31	29	30	30	31	30	31	30	28	29	30	30	31	31	30	31	31	31	29	28	30	31
MED	15	15	15	15	15	15	15	17	17	18	18	20	20	20	20	22	17	15	15	15	15	17	17	16
U Q	16	20	18	16	16	17	16	18	22	20	20	21	21	21	27	23	18	16	16	17	17	18	18	18
L Q	14	15	15	14	14	15	15	15	15	16	18	18	18	17	17	17	16	14	14	14	14	15	15	15

HOURLY VALUES OF foF2 AT Kokubunji

DEC. 2002

LAT. 35°42.4'N LON. 139°29.3'E 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	39	39	42	49	34		36	80	84	90	105	121	126	100	105	101	97	64	47	44	32	26	32	27
2	34	32	34	36	34	35	42	75	90	111	104	111	112	113	105	102	97	78	63	47	37	32	30	34
3		38	41	36	37	28	42	77	90	104	118	117	111	122	115	108	95	71	54	39	39	34	31	34
4		30	34	36	36	34	38	72	90	108	110	108	106	102	98	93	81	67	64	54	47	34	30	32
5	34	34	36	34	34	36	36	66	98	105	128	116	112	101	90	92	90	77	48	42	23			
6		30	34	36	37	37	34	68	86	91	101	112	117	108	104	97	85	62	54	45	31	28		26
7	28	34	32	34	34	30	41	64	91	100	105	105	98	104	106	100	100	84	54	52	54	49		26
8	34	27	34	34	43	32	38	65	82	98	126	111	116	124	111	102	112	98	66	43	43	39	36	34
9	30	36	36	36	37	39	36	53	80	88	108	114	117	112	100	96	82	88	76	48	34	30	32	26
10	27	31	32	32	36	28	30	66	83	88	97	107	C	90	100	93	78	76	54	48	47	28	34	36
11	36	34	36	34	37	36	36	62	86	103	104	112	122	96	102	91	91	63	54	54	34	37	39	34
12	36	35	36	37	36	34	38	80	100	100	111	100	97	104	105	95	85	73	59	52	48	39	37	36
13	C	34	36	37	37	36	41	76	91	100	110	110	102	105	100	90	90	83	63	44	38	33	34	34
14	37	34	34	31	36	36	40	72	86	98	118	127	121	112	102	101	91	76	63	61	51	36	32	34
15		38	34	29	27	32	39	64	87	105	126	141	126	107	107	108	94	81	66	51	42	32	34	34
16	C			36	36	34	36	73	118	117	105	115	117	116	111	96	81	64	71	49	48	44		31
17		28	34	36	30		34	76	106	112	117	122	105	101	101	92	95	77	62	49	43	34	32	37
18	34	32	32	34	36	37	38	71	92	96	112	118	C	104	102	99	82	80	72	43	36	34	26	35
19	38	36	36	39	39	39	38	74	102	101	111	125	125	121	115	113	105	85	74	51	46	44	46	49
20	53	43	32			26		64	107	118	135	142	130	120	118	108	100	91	63		46		32	42
21	38	34	32		39	34	39	82	98	111	136	132	132	120	115	123	117	91	75	64	51	54	53	42
22	46	44				48	54	72	106	125	141	134	124	124	118	112	102	76	77	54	49	36	25	32
23			36	37			36	73	87	134	126	118	104	102	111	101	88	66	53	51	63	43	38	34
24	42	36	39	30	30		38	72	108	115	122	121	105	104	101	94	81	75	61	38	34	37	39	41
25	38	39	36	34	37	37	37	62	97	134	127	127	126	112	108	111	83	63	52	48	46	41	47	34
26		32	32	32	30	27	32	61	98	111	134	104	120	105	117	112	86	64	52	47	39	34	32	
27	34	39	34		38	42	42	64	82	117	136	134	114	117	92	94	90	81	59	52	53	46	48	54
28	47			32	34	34	36	64	102	95	107	118	116	94	94	94		54	59	49			34	36
29	34	34	36	32	28	30	27	54	77	81	101	108	98	81	84	86	77	67		51		42		36
30	39	41			30		31	48	66	85	112	124	102	82	71	79	75	63	48	39	36	34	34	
31	31	38	32	32	34	30		54	73	91	91	91	90	76	74	76	67	51	51	51	28	30	30	
	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	28	27	26	28	26	29	31	31	31	31	31	29	31	31	31	30	31	30	30	29	28	26	27
MED	36	34	34	34	36	34	38	68	90	103	112	117	116	105	104	97	90	76	60	49	43	35	34	34
U Q	39	38	36	36	37	37	39	74	100	112	126	125	123	116	111	108	97	81	66	52	48	41	38	36
L Q	34	32	32	32	34	30	36	64	84	95	105	110	104	101	100	93	82	64	54	44	35	32	32	32

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fEs AT Kokubunji

DEC. 2002

LAT. 35°42.4'N LON. 139°29.3'E 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	29	G	G	G	G	G	40	G	G	33	23	G	G	G	G	G	G
2	G	G	G	G	G	G	G	G	46	G	G	G	G	G	G	50	G	27	G	G	G	25	26	G
3	G	G	G	G	G	G	G	G	37	G	G	G	G	G	G	G	G	G	G	G	G	27	G	G
4		G	G	G	G	G	G	G	G	G	G	G	G	G	37	39	33	32	G	G	G	G	G	G
5	G	G	G	G	G	G	G	G	G	G	G	G	G	52	45	G	40	34	33	24	26	39		26
6	27	25	G	G	G	G	G	G	G	G	G	G	G	G	G		G	G	G	G	27	G		G
7	G	24	G	G	G	G	G	G	35	G	52	G	G	G	G	G	G	G	27	G	G	G		G
8	G	G	G	G	G	G	26	G	G	G	47	47	G	G	G	G	G	G	G	G	24	G	G	G
9	G	G	G	G	G	G	G	28	33	G	G	G	G	G	G	G	G	24	G	G	G	G	G	G
10	G	G	G	G	G	G	G		34	39	43	46	C	G	G	G	G	G	24	G	G	G	G	G
11	G	G	G	G	G	G	G		54	G	G	G	G	47	G	G	G	G	G	G	G	G	G	G
12	G	G	G	G	G	G	G	G	G	G	G	45	G	G	G	G	G	G	G	G	G	G	G	G
13	C	G	G	G	G	G	G	G		G	G		G	G	39		G	G	G	G	G	G	G	G
14	G	G	G	G	G	G	G	G	34	G	G	47	44	G	G	37	G	G	24	G	G	G	G	G
15	30	G	30	G	G	G	G	G		G	G	G	G	G	G	56	G	G	G	G	G	G	G	G
16	C	50	37	G	G	G	G	G	G	G	48	41	G	G	G	G	29	G	G	G	G	G		G
17		G	G	G	G	G	G	G	G	G	G	G	G	48	52	51	51	28	G	G	G	G	G	G
18	G	G	G	G	G	G	G	G	33	G	40	G	C	53	G	G	31	34	G	G	G	G	G	G
19	G	G	G	G	G	G	G	G	34	G	G	43	G	G	G	G	33	25	G	G	G	G	G	G
20	G	26	26	29	53	G		31	48	49	55	52	G	G	G	G	G	29	47	31	34	31	G	G
21	G	G	G		G	G	29	G	40	G	G	79	G	76	41	G	G	31	43	G	G	G	G	G
22	G	G	G	G	G	G	G	G	G	N	G	G	G	61	52	50	53	37	29	26	G	G	29	G
23	37	30	G	G			G	G	47	39	G	G	G	G	G	G	G	36	G	G	G	G	25	G
24	G	G	G	G	G		G	G	G	G	43	48	44	41	G	36	29	25	G	G	26	G	G	G
25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
26	23	G	G	G	G	G	G	G	G	G	45	G	G	G	G	G	29	G	G	G	G	G	29	31
27	G	G	22	37	24	G	G	G	40	50	52	51	61	44	40	G	34	31	G	G	24	G	G	37
28	31	28	G	G	G	G	G	29	39	59	40	95	84	53	54	61	109	83	49	36	36	90	35	31
29	G	G	G	G	G	G	G	G	38	47	G	G	G	G	G	G	G	G	92	59	35	29	31	31
30	33	36	39	50	29	23	G	G	44	G	G	53	G	G	43	36	30	29	G	G	G	G	G	34
31	27	34	28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	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	31	31	30	30	29	30	29	28	30	31	30	29	31	31	29	31	31	31	31	31	31	27	30
MED	G	G	G	G	G	G	G	G	33	G	G	G	G	G	G	G	G	23	G	G	G	G	G	G
U Q	23	24	G	G	G	G	G	G	39	G	43	47	G	44	39	36	33	31	24	G	24	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fmin AT Kokubunji

DEC. 2002

LAT. 35°42.4'N LON. 139°29.3'E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	18	15	13	13	18	14	14	13	17	17	21	18	18	14	29	15	13	13	13	14	17	15	18
2	13	13	13	14	14	14	14	22	13	15	17	22	17	15	15	15	22	14	13	13	14	13	14	15
3	20	13	14	14	14	15	14	20	15	15	35	21	20	23	15	13	22	15	14	13	14	15	15	14
4		14	14	13	13	14	13	14	15	15	17	17	23	18	13	15	14	13	17	14	13	14	17	14
5	17	14	14	14	13	13	13	20	31	17	21	18	21	21	18	17	17	13	13	14	13	13		14
6	13	13	14	14	13	20	14	18	13	15	17	18	20	17	17	17	22	17	20	14	14	14		14
7	18	13	14	13	13	17	13	22	17	15	21	21	20	20	18	14	22	15	14	14	13	14		14
8	14	14	17	18	21	14	14	13	13	17	18	23	20	20	17	17	23	14	13	14	15	18	14	14
9	14	14	13	14	13	15	13	13	15	18	17	21		23	18	17	23	14	18	14	14	13	17	14
10	14	13	15	14	14	13	17	13	14	15	24	23	C	28	34	17	17	14	15	15	24	13	14	14
11	14	15	13	15	13	15	14	21	18	13	17	21	18	15	17	15	23	15	13	13	13	17	14	14
12	13	13	13	14	13	14	14	21	13	15	18	22	20	23	18	28	17	15	14	13	14	13	13	14
13	C	13	13	13	17	13	14	22	14	13	17	23		20	17	17	22	13	15	13	14	15	13	21
14	15	13	15	14	13	14	13	21	13	14	18	18	21	23	20	13	22	14	13	15	13	13	18	14
15	17	17	13	13	14	15	14	22	14	15	21	21	21	21	20	15	23	14	13	13	13	15	14	15
16	C	14	13	13	13	14	20	21	13	21	18	18	25	22	17	17	15	14	18	17	15	13		15
17		21	14	13	17	18	14	22	18	17	18	21	20	14	17	17	13	13	13	17	14	13	17	14
18	14	14	14	13	13	14	13	22	13	17	21	22	C	18	14	14	13	14	18	17	17	13	18	13
19	20	14	13	13	15	14	13	21	14	17	22	25	30		18	14	13	14	13	13	14	13	14	14
20	14	13	13	13	13	14		13	18	21	30	37	38	39	34	21	17	13	14	13	13	13	17	15
21	13	21	13		17	13	14	17	14	18	23	22	36	21	18	17	13	14	14	15	13	14	20	14
22	17	13	17	13	17	17	13	20	18	15	17	22		18	17	15	13	13	13	17	13	14	15	14
23	13	13	14	17			14	21	26	17	17	17	20	14	21	17	23	15	13	14	13	15	14	17
24	13	13	13	17	17		14	21	18	15	20	22	21	24	22	15	14	14	14	13	17	14	13	15
25	14	17	17	13	17	14	13	20	13	13	25	21	22	20	20	29	23	24	22	15	15	14	13	13
26	18	14	14	13	14	14	14	18	13	13	22	21	20	17	15	15	15	14	13	13	13	14	14	13
27	13	14	14	13	13	13	13	17	13	15	18	18	29	20	18	17	13	15	13	14	13	13	14	14
28	13	15	20	15	14	14	14	14	14	21	20	22	25	20	18	15	13	13	26	13	13	13	13	13
29	14	14	14	13	22	15	14	17	13	14	18	17	17	15		33	23	14	14	15	13	13	13	13
30	14	14	13	13	13	13	20	15	18	15	18	20	17	18	15	14	13	14	14	14	17	14	14	13
31	17	13	13	14	14	17	20	22	28	20	23	22	23	35	21	26	25	13	14	17	13	20	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	27	31	31	30	30	29	30	31	31	31	31	31	26	30	30	31	31	31	31	31	31	31	27	30
MED	14	14	14	13	14	14	14	20	14	15	18	21	20	20	18	17	17	14	14	14	14	14	14	14
U Q	17	14	14	14	17	15	14	21	18	17	22	22	23	23	20	17	23	15	15	15	14	15	17	15
L Q	13	13	13	13	13	14	13	15	13	15	17	18	20	18	17	15	13	13	13	13	13	13	14	14

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF foF2 AT Yamagawa

DEC. 2002

LAT. 31°12.1'N LON. 130°37.1'E 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	34	34	38	47			28	62	84	84	86	130	130	111	111	104	87	85	64	51	34	48	34	
2	34	34	34	36	34	36	37	64	86	113	110	104	113	127	114	111	116	110	72	66	49	36	27	34
3		36	36	36	32	29	32	52	86	101	111	111	111	115	121	112	108	84	72	54	53	47	37	34
4	34	34		41	42		28	57	98	89	111	103	111	116	111	103	98	77	75	54	51	53	36	34
5	32	30	32	34	36	34	41	64	84	112	115	114	101	110	108	110	105	86	76	50	66	52	36	32
6	32	26	34	41	41	32	36	52	90	86	104	112	114	122	126	114		86	63	54	54	36	42	42
7	43	36	37	36	36	34	36	54	78	113	80	100	91	109	120	114	113	104	78	66	78	66	52	32
8	34	36	34	36	42	26	28	49	80	86	114	111	113	130	129	114	114	111	81	66		54	53	53
9	42	34	40	32	43	34	36	52	90	80	90	112	126	122	100	109	90	113	80	77	54	66	53	35
10	36	34	36	43	44	28		54	82		87	90	104	90		112	103	87	82	66	54	66	51	36
11	34	33		34	37	32		50	87		113	114	126	114		101	104	86	71	76	78	54	52	34
12		34	36	37	34	37	28	52	87	90	87	86	99	111	114	111		86	82	70	66	66	53	47
13	36	36	34	34	36	36	36	54											78	66	66	66	61	36
14		34	32	32		28	49	49										86	85	80	77	52	44	42
15	40	34	34	32		28	36	52	84									88	76	74		52	46	36
16	40	34	36	36	28	26	28	48	111	130		109	127	130	128	118	87	87	76	64	77	66	36	
17		32	34	34	34	30	32	53	103	124	114	127	128	113	111		100	100	87	71	54	52	52	37
18	41	34	28	34	34	35	32	51	80	98	111	109	113		123	113	104	86	85	66	53	50	34	34
19	34	32	36	22	37		26	52	87	108	107	112	116	131	130	128	116	110	84	66	73	52	58	52
20	54	36			37		48	53	107	161	165	158	147	146	141	130	130	130		74	54	54	52	36
21	43		42	41	40	36	34	53	82	86	120	145	154	127	81	140	115	111	79	81	80	78	57	48
22	36	43	43	44	44	40	43	54	84	110	144	136	117	129	128	126	114		78	70	76	52	37	32
23	37	37	36	36		41	34	50		111	130	124	111	110	115	123	114	108	78	78	78	78	52	36
24	52	36	36	A	30		34	52	88	111	112	140	123	110		110	86	86	78	53	51	52	49	36
25	36	34	23	34	37	36	42	49	82	131	131	127	128	129	127	110	112	90	74	66	65	51	34	
26	30	34	36	34	29		28	48	82	111	112	112	124	127	111	127		81	65	53	66	53	52	52
27			36	34	32	34	34	47	74	84	111	157	112	127	115		112		78	54	77	78	66	52
28	52	42						47	86	111	114	111	127	141	123	111		97		70	76	54	40	34
29	43	38	36	38					72	82	104	114	111	88	91	86	92	80	68	53	72	52	50	42
30	34		34			29		43	66	81	122		111	110	84	76	82	76	60	51	53	51		34
31	34	36	32				29	32	76	83	112	92	87	92	93	87	86	79	54	66	66	52	36	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	26	28	27	26	23	22	26	30	28	26	27	27	28	27	25	26	24	28	29	31	29	31	30	28
MED	36	34	36	36	36	34	34	52	84	104	112	112	114	116	115	112	104	86	78	66	66	52	50	36
U Q	42	36	36	38	41	36	36	54	87	112	115	127	126	129	126	118	114	106	80	71	76	66	52	42
L Q	34	34	34	34	34	29	28	49	81	86	104	109	111	110	109	109	91	85	71	54	53	52	36	34

HOURLY VALUES OF fEs AT Yamagawa

DEC. 2002

LAT. 31°12.1'N LON. 130°37.1'E 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	G	G	41	G	G	G	48	G	G	G	G	G	G	29	40
2	G	G	G	G	G	G	G	G	39	39	G	G	G	G	G	G	G	G	G	G	G	G	26	26
3	27	G	G	G	G	G	G	G	G	40	G	48	46	G	G	G	38	G	G	11	G	G	G	G
4	G	24		26	G	G	G	G	G	G	G	48	46	G	G	G	G	G	25	G	G	G	G	G
5	G	G	G	G	G	G	G	28	G	G	G	50	61	52	43	40	G	G	11	24	G	G	G	G
6	G	G	G	G	G	G	G	28	G	G	G	42	G	42	G	42	G	35	G	39	43	33	G	G
7	G	G	G	G	G	G	G	27	48	46	G	G	G	G	G	G	41	27	G	25	G	G	G	G
8	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	30	G	24	G
9	G	G	G	G	G	G	G	G	G	G	54	G	48	44	G	54	G	G	G	G	G	G	G	G
10	G	G	G	G	G	G	G		G		40	G	44	G	G	G	G	G	G	G	G	34	G	G
11	29	G		G	G	G	G	G	G	40	42	46	52	G		64	G	G	G	G	G	G	G	G
12		G	G	G	G	G	G	G		G	G	47	G	G	G	G		29	26	G	G	G	G	G
13	G	G	G	G	G	G	G	G	48	G	G	G	52	43	44		G	G	G	G	G	G	G	G
14		G	G	G		G	G	G	G	36	G	51	G	41	G	G		G	G	G	G	G	G	G
15	G	G	G	G		G	G	G	G	G	G	G	G	44	G	39	51	41	33	G	31	G	G	G
16	G	32	G	G	G	G	G	G	G	G		G	G	G	G	55	G	36	32	24	G	G	G	G
17	G	G	G	G	G	G	G	G	G	G	G	G	54	G	G		40	58	39	G	G	G	G	G
18	G	G	G	G	G	G	G	G	G	G	G	G	G		G	G	G	G	G	G	G	G	G	G
19	G	26	G	G	G	G	G	G	G	G	G	G	G	G	40	G	G	G	G	G	G	G	G	G
20	24	23	44	34	24		G	27	G	47	44	50	61	73	146	G	58	G	G	G	G	G	G	G
21	G	33	25	G	G	G	G	G	G	G	G	G	G	G	G	G	35	35	30	28	G	G	G	G
22	30	26	G	G	G	G	G	G		39	40	G	G	G	G	38	G		G	G	G	G	G	G
23	G	35	27	24		G	G	G	G	G	G	40	51	G	G	G	G	27	26	G	G	G	G	G
24	G	G	G	28	G		G	G	G	G	G	43	G	43	40	G	G	G	G	G	G	G	G	G
25	G	G	G	G	G	G	G	G	G	G	G	G	G	48	G	G	G	G	26	24	25	24	G	G
26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		G	41	39	23	G	G	G
27	40	37	28	24	G	G	G	G	G	G	51	58	61	50	G		69		G	G	G	G	26	26
28	28	23	32	31	39	36		24	G	60	79	G	48	58	84	52		G	11	39	28	G	G	G
29	G	G	30	26	29	28	G		40	56	78	51	51	G	41	G	38	34	G	38	25	G	25	G
30	31	39	23	28		G	G	G	G	G	48	53	49	G	G	51	52	37	30	29	40	G		G
31	G	28	G	38	34		G	G	G	36	44	53	G	G	G	G	G	G	28	26	G	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	29	31	29	31	27	27	30	29	29	30	30	31	31	30	30	28	27	29	31	31	31	31	30	31
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
U Q	12	26	12	24	G	G	G	G	G	39	42	48	51	43	G	41	38	31	26	25	23	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fmin AT Yamagawa

DEC. 2002

LAT. 31°12.1'N LON. 130°37.1'E 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	15	15		15	17	14	16	17	18	20	23	18	16	16	22	14	15	14	15	15	14
2	15	15	15	17	15	16	16	18	16	18	22	28	26	24	18	20	15	15	17	15	16	14	15	15
3	16	15	15	15	15	17	14	17	14	16	21	22	20	22	20	18	15	21	14	15	15	14	15	15
4	15	15		15	15	15	15	17	16	15	16	15	18			17	15	14	15	15	15	15	15	16
5	15	15	15	14	15	15	14	14	18	18	21	33	27	28	27	21	16	21	15	16	15	16	15	15
6	14	15	16	15	15	15	15	14	15	18	18	20	27	22	16	21	18	16	14	15	14	15	15	22
7	15	15	15	14	14	14	15	14	16	18	21	18	21	26	20	16	16	14	15	16	15	15	15	15
8	15	15	15	15	15	16	18	17	20	17	18	21	29			18	16	21	15	15	14	15	15	16
9	15	16	15	15	14	15	15	17	16	21	18	23	18	23	20	16	16	21	15	15	15	15	14	15
10	15	15	15	15	15	14	20	16	15		21	21	27	26	21	17	16	22	15	15	16	14	16	15
11	14	16		15	15	16	16	17	15	18	21	28	26	21		16	14	22	15	15	15	14	14	15
12		14	15	14	15	14	15	16	15	16	17	32		27	18	18		15	15	15	15	15	15	15
13	15	15	16	16	15	15	15	17	16	20	18	26		18	20		18	20	15	17	15	15	17	15
14		16	16	15		15	15	16	16	16	17	21	24	21	18	18	16	20	15	15	15	15	15	15
15	15	15	15	16		15	14	16	15	15	17	20	21	23	24	18	16	15	15	15	15	14	15	17
16	14	15	15	15	15	15	17	15	27	18		21	21	20	21	16	14	14	14	16	15	15	15	15
17	15	16	15	17	15	15	15	16	29	17		20	34	21			15	15	15	15	15	15	15	15
18	15	15	16	15	15	15	16	16	16	32	21	24			22	17	35	22	14	15	16	15	14	15
19	15	15	17	17	18	16	15	15	29	16	18	26				34	28	22	14	14	14	15	15	18
20	15	15	14	16	16		16	15	21	22	32	34	34	34	32	33	17	21	15	15	15	15	15	15
21	16	15	15	20	15	15	16	16	27	17	22		38			38	17	17	15	14	18	16	16	14
22	14	15	14	16	15	14	15	15	21	16	34	36	45			21	15		16	16	17	16	15	15
23	15	14	15	15		15	15	15	21	16	17	24	26	21	20	16	14	14	15	16	16	15	18	17
24	16	14	15	15	16		16	15	28	17	17	18	18	24	20	20	15	21	14	14	15	15	17	15
25	15	15	17	16	17	15	15	16	15	15	16	18	21	18	21		15	14	15	15	15	15	15	15
26	15	17	15	15	15	16	15	16	26	15	16	18	17	18	20	17		17	15	14	17	20	18	15
27	15	16	15	15	16	14	15	15	16	15	18	21	20	28	18		15		15	15	15	15	15	15
28	14	16	14	14	14	14		15	15	15	18	20	23	24	21	17		22	15	15	15	15	15	16
29	14	15	15	15	14	15	15		15	16	17	17	18	18	16	16	18	18	15	15	15	15	15	15
30	15	15	15	14		20	18	15	22	15	16	15	16	18	17	16	15	15	14	15	16	17		15
31	16	15	15	14	15		15	16	15	17	17	20	20	18	18	16	15	17	15	15	15	16	18	21
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	31	29	31	27	27	30	30	31	30	29	30	27	25	24	27	28	29	31	31	31	31	30	31
MED	15	15	15	15	15	15	15	16	16	16	18	21	21	22	20	17	16	18	15	15	15	15	15	15
U Q	15	15	15	16	15	16	16	17	21	18	21	26	27	25	21	20	16	21	15	15	16	15	15	16
L Q	15	15	15	15	15	15	15	15	15	16	17	18	20	19	18	16	15	15	14	15	15	15	15	15

HOURLY VALUES OF foF2 AT Okinawa

DEC. 2002

LAT. 26°16.9'N LON. 127°48.4'E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	40	39	54	51				62	90	90	111	136	134	135	135	125	110	110	90	82	54	65	65	53
2	54	54	44	44	34	38	36	66	110	116	132	118	117	131	144	146	146	144	108	87	88	76	51	52
3	53	49	54	54	38	37	34	60	104	125	123	136	128	135	131	132	128	110	98	74	82	60	64	53
4	42	34	47	47	42	31	30	54	96	126	111	120	127	134	128	124	111	110	78	82	80	74	52	37
5	37	37	41	46	47	38	53	74	97	124	142	118	120	130	108	134	120	101	102	73	87	80	52	53
6	48	43	47	62	63	35	46	65	101	109	112	108	131	136	141	150	144	140	105	88	106	106	73	54
7	63	66	66	54	60	50	46	58	86	112	122	101	114	121	140	146	143	142	126	90	88	107	87	54
8	37	53	63	73	58	41		64	90	100	120	108	131	141	143	132	131	130	110	102				106
9	88	88	88	88	86	54	50	77	96	117	108	108	124	135	131	131	141	136	131	130	131	126	110	73
10	54	63	73	74	66	42	34	54	101	121	118	104	115	118	121	130	122	110	104	87	87	87	98	65
11	49	53	54	47	50	44	38	53	86	125	132	108	120	142	144	146	131	134	108	88	128	130	88	64
12	52	43	40	38	37	37	29	53	88	107	111	101	114	117	130	130	126	125	108	107	88	88	86	58
13	42	43	42	37	41	36	35	54	88	105	111	110	111	115	131	134	137	130	124	118		104	88	77
14	54	41	36	30	43	41	30	51	88	108	118	121	98	111	117	124	110	123	121	108	107	87	84	73
15	61	54	51	37	34	40	48	51	105	128	127	138	132	131	130	125	127	122	110	103	82	76	73	62
16	54	49	52	46	34			50	114	144	141	125	134	146	146	147	141	136	128	88	88	98	73	43
17	38	40	44	42	34	30	28	58	102	126	140	125	145	134	127	128	122	124	122	108	88	87	80	52
18	53	49	48	43	48	48	32	52	96	108	111	102	110	122	131	131	124	110	106	87	78	73	66	52
19	48	42	43	44	42	30	28	51	100	117	118	114	123	143	145	148	146	143	131	88	88	89	80	66
20	65	66		44	41		51	64	114	157	171	148	145	147	150	146	146	146	144	131		107	87	54
21	60	52	53	55	48	37	34	60	87	102	122	146	158	131	129	145	145	134	130	108	124	106	87	76
22	48		50	52	51	44	46	66	89	112	147	151	125	135	143	146	146	130	107	87	87	100	75	54
23	51	42	46	42	41	40	41	60	110	116	128	116	118	131	135	134	140	134	128	109	130	118	87	73
24	66	63	51	47	36	31	36	66	97	130	141	141	124	128	121	126	126	115	88	83	73	74	64	55
25	54	61	53	46		35	44	54	83	137	146	130	132	142	145	127	117	128	106	74	84	66	53	42
26	42	40	42	32			26	54	105	121	117	110	131	146	145	146	141	130	118	87	87	108	85	76
27	72	83	70	51	44	41	42	54	84	96	121	144	131	131	137	145	150	146	143	134	130	122	108	76
28	72	64	40	30	43	35	32	47	100	121	125	111	148	171		171	146	146	136	109	131	130	76	65
29	81	72	66	54	A			45	87	101	106	130	121	122	137	142	131	126	107	88	108	107	88	78
30	64	54	55	44	A			50	88	111	111	108	116	131	126	120	106	107	87	84	109	137		54
31	52	51	48	28				38	88	100	98	96	94	105	121	130	138	136	108	86	108	109	76	52
	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	30	30	31	25	24	25	31	31	31	31	31	31	31	30	31	31	31	31	31	28	30	29	31
MED	53	52	50	46	43	38	36	54	96	116	121	118	124	131	133	134	131	130	108	88	88	99	80	55
U Q	63	63	54	54	50	41	46	64	102	125	132	136	132	141	143	146	144	136	128	108	108	108	87	73
L Q	48	42	44	42	37	35	31	51	88	107	111	108	116	122	128	128	122	115	105	86	85	76	65	53

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF fEs AT Okinawa

DEC. 2002

LAT. 26°16.9'N LON. 127°48.4'E 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	43	42	50	G	G	G	G	G	25	40	32	49	34
2	G	G	G	G	G	G	G	G	G	40	45	45	48	45	45	G	G	G	25	G	G	29	G	G
3	G	G	G	G	G	G	G	G	G	G	G	48	59	46	G	48	G	G	G	G	G	G	G	G
4	G	G	G	G	G	G	G	G	G	G	46	47	47	48	45	49	G	34	36	G	G	G	G	G
5	G	G	G	G	G	G	G	G	G	G	G	49	G	43	51	47	47	44	53	25	G	G	G	G
6	G	G	G	G	G	G	G	G	G	G	46	51	59	50	G	47	G	G	26	G	G	G	G	G
7	G	G	G	G	G	G	G	G	G	G	G	G	54	42	58	G	G	G	G	30	G	G	G	G
8	G	G	G	G	G	G		G		42	G	48	70	G	G	G	36	G	34	32	38	32	G	G
9	G	G	24	G	G	G	G	G	G	G	G	70	53	83	53	104	55	G	33	28	G	G	G	G
10	G	G	G	G	G	G	G	G	G	41	49	50	48	46	46	G	G	G	G	G	29	G	G	G
11	G	G	G	G	G	G	G	G	48	G	G	48	42	42	G	G	G	G	G	11	G	G	G	G
12	G	G	G	G	G	G	G	G	G	G		46	44	46	G	41	35	31	G	G	G	G	G	G
13	G	G	G	G	G	G	G	G	G	G	G	48	56	44	51	G	35	G	G	G	G	G	G	G
14	G	G	G	G	G	G	G	G	G	G	G	55	47	48	60	40	35	G	G	G	G	G	G	G
15	G	G	G	G	G	G	G	G	G	G	G	G	G	62	46	40	36	G	G	G	G	G	G	G
16	G	G	G	G	G	G		G	G	G	G	G	G	52	42	84	43	84	40	36	33	G	G	G
17	G	G	G	G	G	G	G	G	G	G	G	50	51	69	102	103	G	47	44	25	G	27	G	G
18	G	G	G	G	G	G	G	G	G	G		G	G	G	44	50	39	37	G	G	G	G	G	G
19	G	G	G	28	G	G	G	G	G		G	G	44	50	G	G	G	G	G	G	G	G	G	G
20	G	26	35	26	25		G	G	G	G	G	41	62	72	87	76	52	G	30	11	G	G	G	G
21	G	G	G	G	G	G	G	G	G	G	G	G	G	48	G	G	42	36	G	28	G	26	G	G
22	G		27	28	27	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	27	G	G	24
23	G	G	29	G	G	G	G	G	G	G	46	G	44	46	48	G	36	40	30	31	26	G	G	G
24	G	G	G	G	G	G	G	G	G	G	43	50	54	48	46	40	G	G	G	G	G	G	G	G
25	G	G	G	G		G	G	G	G	G	G	G	50	G	G	G	G	38	24	G	G	G	G	G	G
26	G	G	G	G			G	G	G	36	G	G	G	46	G	60	58	44	49	48	34	39	28	G
27	39	35	32	33	G	G	G	G	G	G	G	56	67	51	G	G	G	G	32	48	58	28	32	33
28	32	28	28	G	26	G	G	G	G	42	46	55	G	42		44	G	G	38	30	51	66	71	57
29	32	G	G	37	36		32	24	G	48	62	61	52	105	65	G	40	68	70	40	34	34	G	30
30	G	G	34	46	34		G	G	G	G	44	79	84	63	48	39	52	60	83	60	32	33	26	G
31	G	G	G	G	27	25		G	G	40	52	68	80	54	48	G	37	43	33	27	G	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	31	30	31	31	28	26	27	31	30	30	29	31	31	31	30	31	31	31	31	31	31	31	31	31
MED	G	G	G	G	G	G	G	G	G	G	G	48	48	48	45	39	35	G	25	11	G	G	G	G
U Q	G	G	G	G	G	G	G	G	G	G	45	51	56	52	51	48	40	40	36	30	32	28	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	43	G	G	G	G	G	G	G	G	G	G

HOURLY VALUES OF fmin AT Okinawa

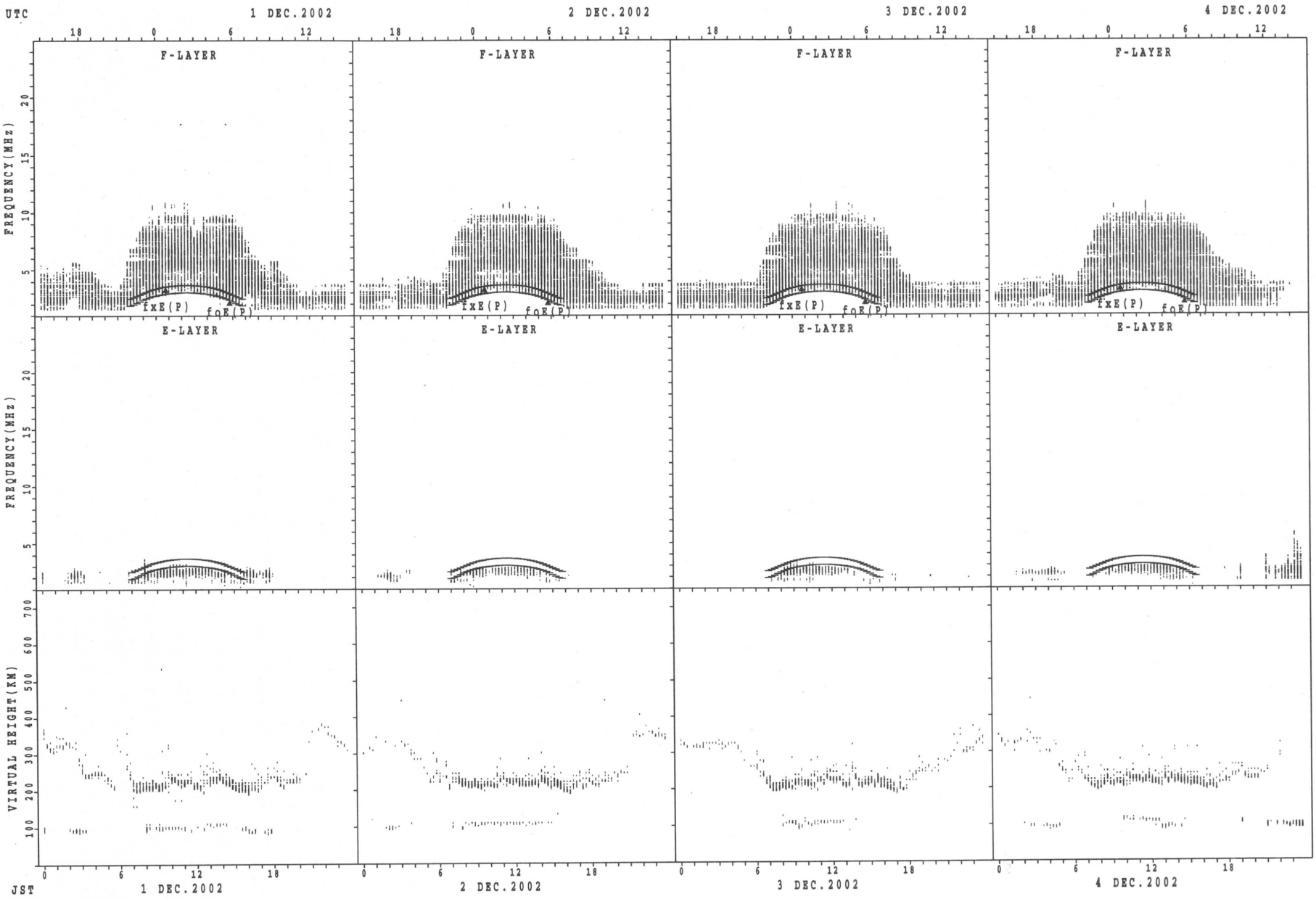
DEC. 2002

LAT. 26°16.9'N LON. 127°48.4'E 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	20	16	14				20	14	16	17	20	26	23	22	18	18	22	15	16	14	14	15	15
2	15	15	14	17	15	14	15	20	16	17	20	28	24	23	24	24	17	14	14	16	17	16	15	15
3	14	14	14	15	15	15	15	16	27	20	20	21	26	24	21	17	15	16	15	15	15	15	14	15
4	16	15	15	14	15	14	16	17	14	18	21	21	24	24	20	17	17	15	14	16	21	15	14	15
5	15	14	15	15	14	14	16	17	29	18	35		40	26	23	23	20	16	14	14	15	14	17	15
6	15	15	15	15	15	16	20	18	16	20	28	28	29	26	26	22	18	26	16	15	17	16	14	15
7	15	15	15	14	14	15	16	17	18	18	22	23	33	24	24	21	21	15	16	14	15	17	15	15
8	15	15	15	15	15	16		17	15	16	18	34	22			24	17	21	14	15	15	14	20	16
9	15	15	14	16	14	17	16	16	20	21	20	22	21	27	24	20	15	15	14	14	15	15	15	15
10	15	15	15	15	15	15	17	18	16	18	22	24	29	24	22	20	15	24	16	18	15	17	15	15
11	16	15	16	16	15	15	17	18	17	20	28	26	28	26		17	17	23	16	15	15	15	15	15
12	15	16	15	17	15	14	15	16	15	17	21	21	27	29	20	18	14	14	17	18	14	15	15	15
13	15	16	16	18	15	15	15	17	16	17	20	26	21	24	21	24	15	27	14	15	16	15	16	15
14	15	17	16	18	15	15	14	16	15	15	20	26	22	21	20	17	14	15	17	15	14	15	15	17
15	15	16	15	14	17	16	15	16	26	17	18	23	27	28	24	21	21	24	14	14	15	16	15	15
16	15	15	16	15	14	16		18	27	32	24	23	32	28	23	20	17	15	14	14	15	14	17	15
17	15	15	15	15	16	16	16	16	29	22		24	35	23	24	24	16	14	14	14	14	15	16	15
18	17	15	15	18	16	15	15	16	26		23	37	42	27	26	18	21	18	20	15	15	16	14	15
19	15	15	17	14	14	17	18	17	15	17	20	24	22	33	20	34	18	23	14	16	15	14	15	16
20	15	14	14	14	14		16	17	27	20	22	27	35	30	22	24	14	23	16	15	16	14	15	15
21	15	17	14	16	17	18	15	16	28	34		27	40	42		35	29	21	20	15	23	18		14
22	17		16	14	14	18	16	15	27	18	20	40	44		36	21	18	20	17	15	14	16	15	15
23	15	15	14	15	15	20	15	15	27	17	18	24	29	26	22	18	15	15	14	15	16	21	21	15
24	15	16	15	15	16	16	15	16	24	15	20	20	28	26	21	20	16	24	14	14	15	16	18	16
25	15	15	17	15		20	15	15	15	17	18	21	20	28	27	26	17	14	17	15	18	15	15	15
26	15	15	16	14			16	16	26	16	20	22	27	22	21	16	14	14	14	14	14	14	14	16
27	14	14	14	14	15	15	14	15	15	16	18	21	20	21	23	20	16	15	14	14	14	14	14	14
28	14	14	14	21	14	14	17	15	14	14	18	21	21	27		20	18	14	15	14	14	15	14	14
29	15	16	15	15	16		14	16	14	15	17	23	22	18	17	16	17	15	14	14	15	15		18
30	15	14	14	14	14		24	15	24	20	22	23	20	22	18	16	14	15	14	15	14	14	14	15
31	18	15	16	15	14	14		14	15	15	17	20	18	21	20	16	14	14	14	14	15	18	20	20
	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	30	31	31	28	26	27	31	31	30	29	30	31	29	27	31	31	31	31	31	31	31	29	31
MED	15	15	15	15	15	15	16	16	17	17	20	23	27	26	22	20	17	15	14	15	15	15	15	15
U Q	15	16	16	16	15	16	16	17	27	20	22	26	32	27	24	24	18	23	16	15	16	16	16	15
L Q	15	15	14	14	14	15	15	16	15	16	18	21	22	23	20	17	15	15	14	14	14	14	14	15

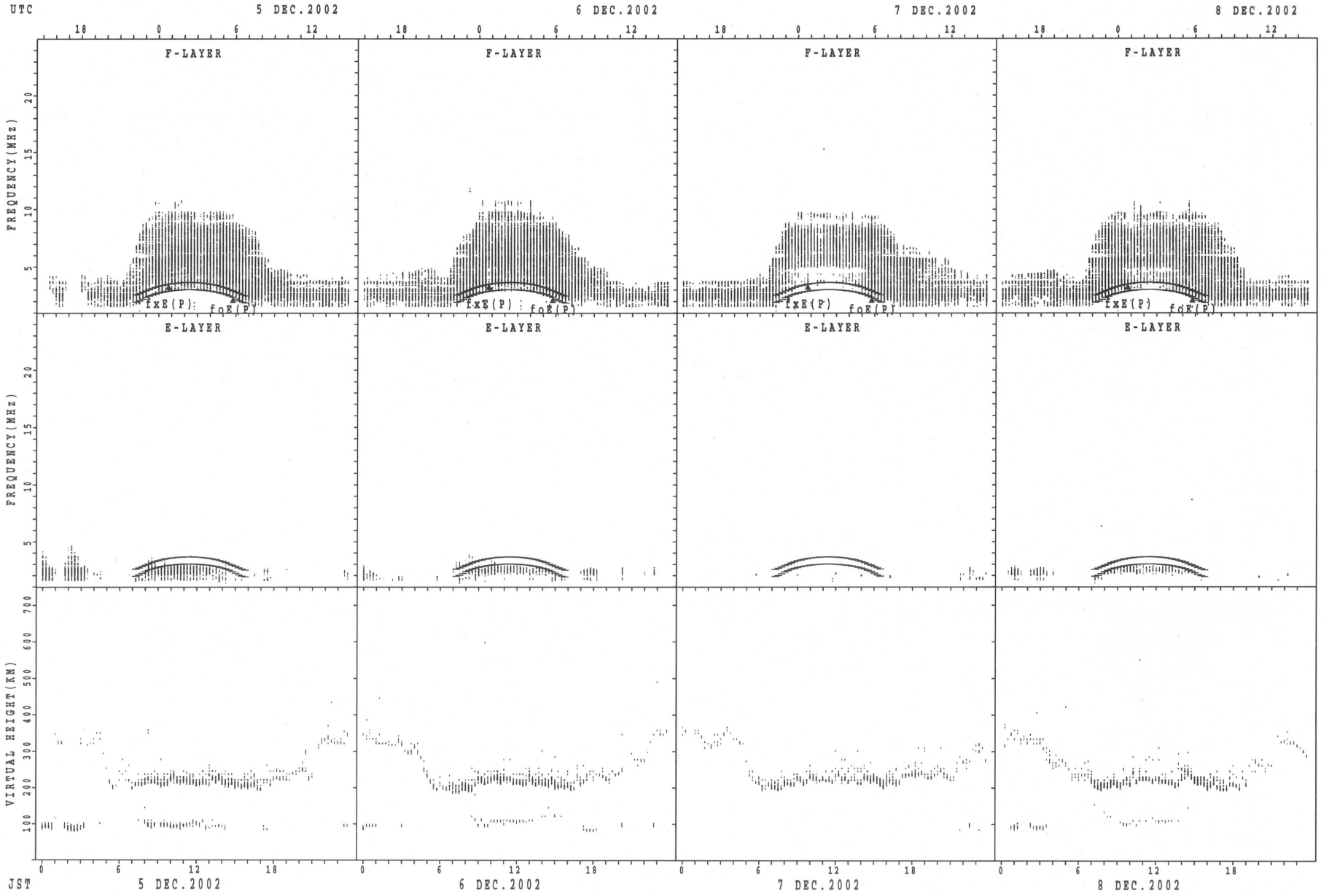
COMMUNICATIONS RESEARCH LABORATORY, JAPAN

SUMMARY PLOTS AT Wakkanai



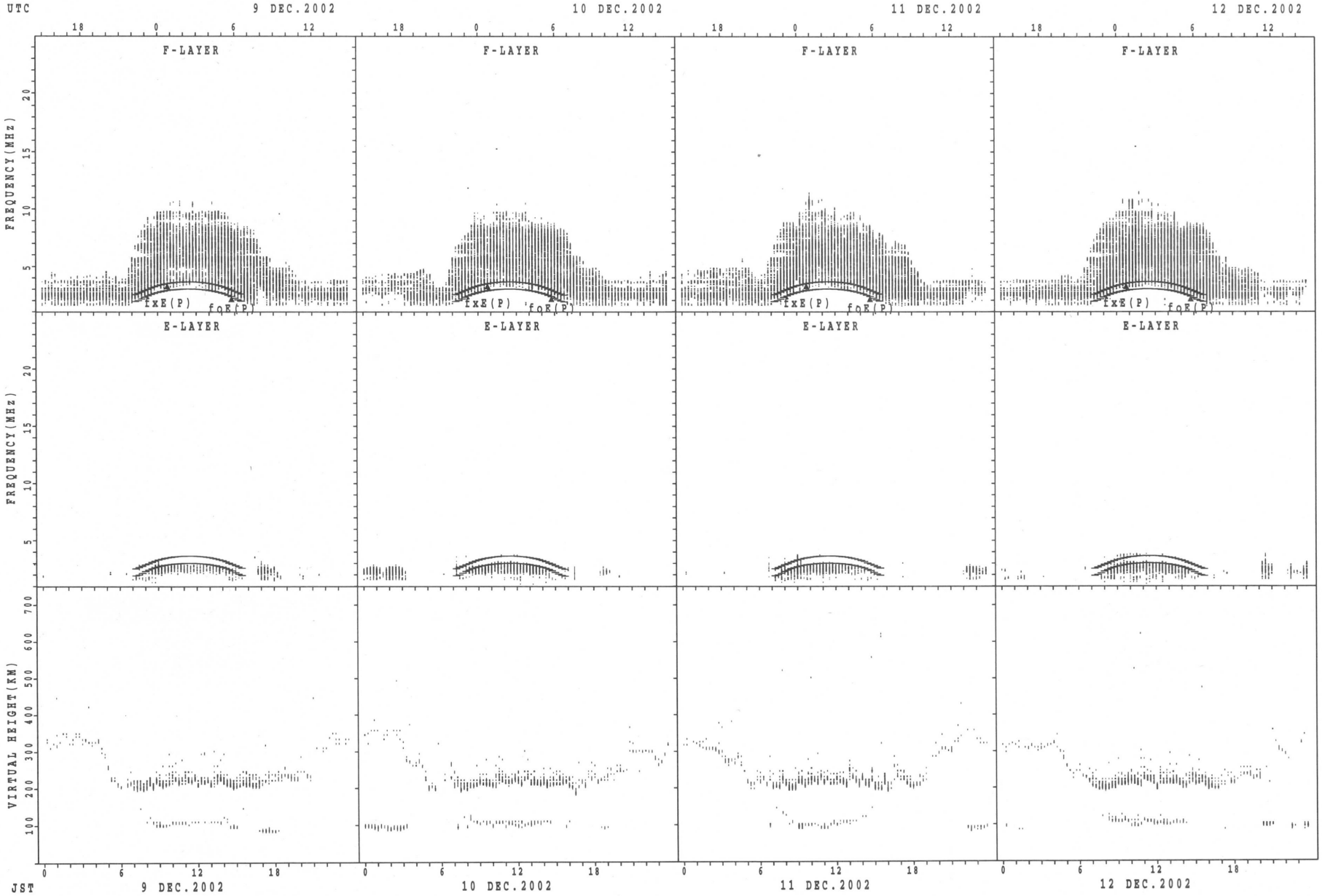
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai



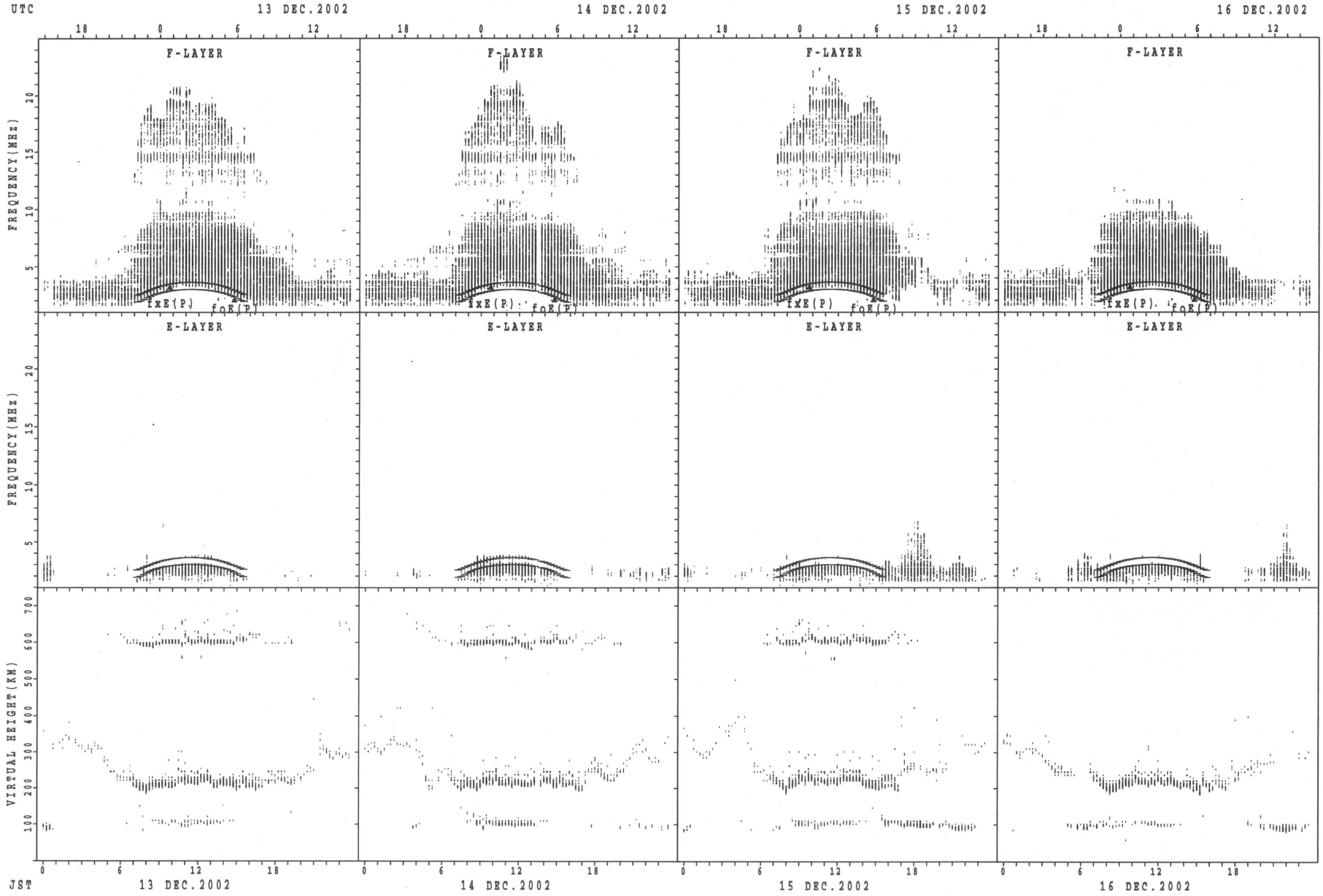
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai



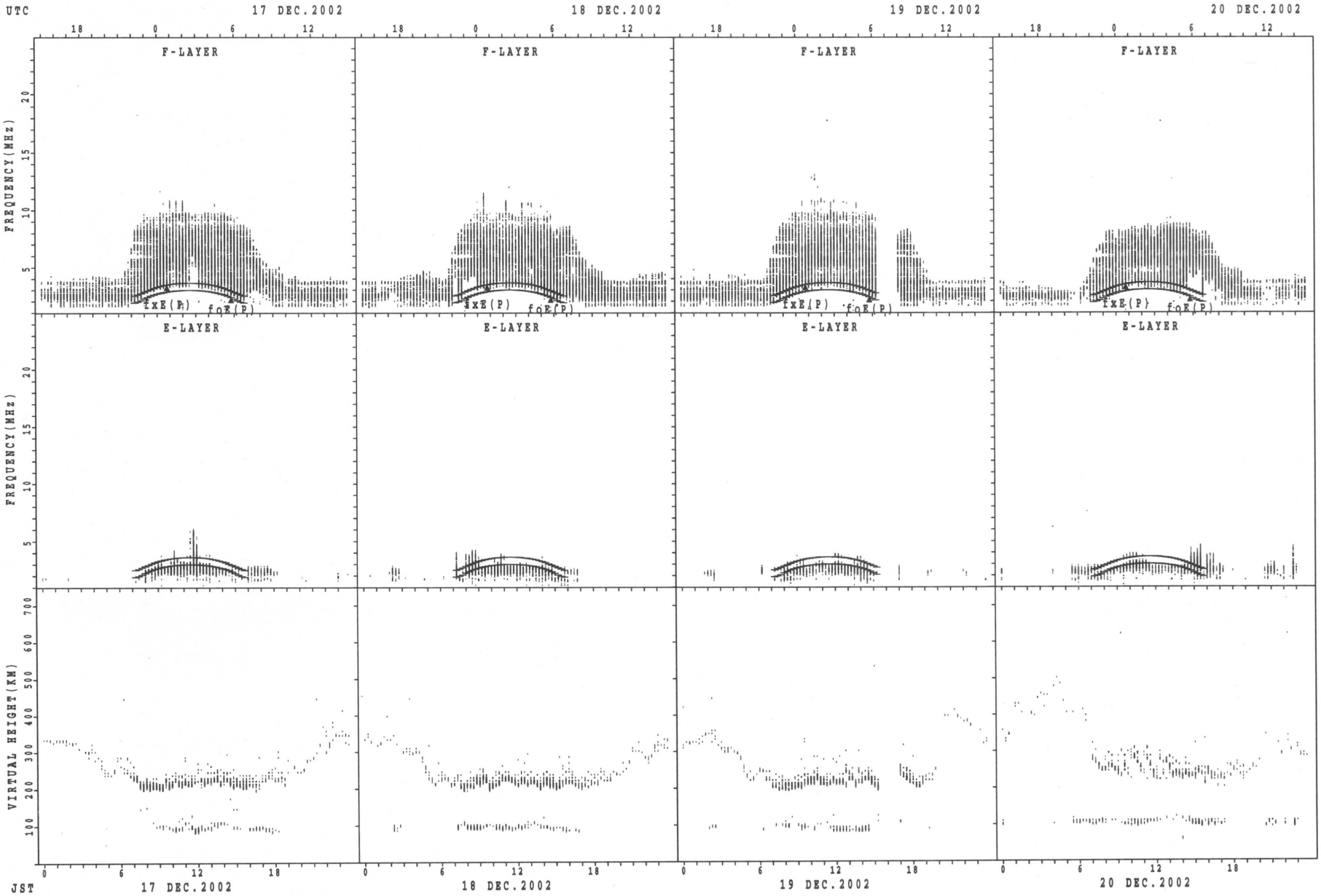
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai



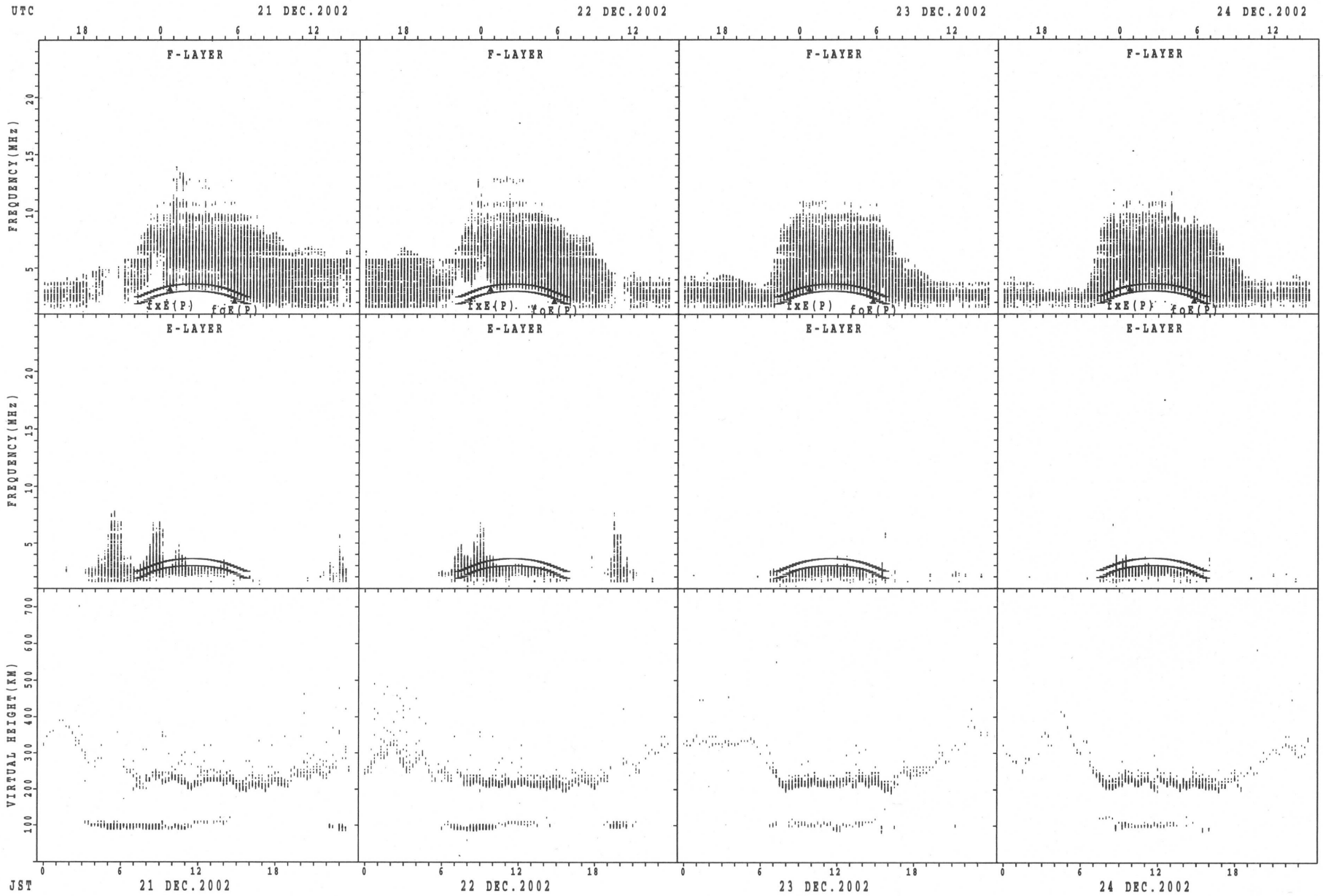
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai



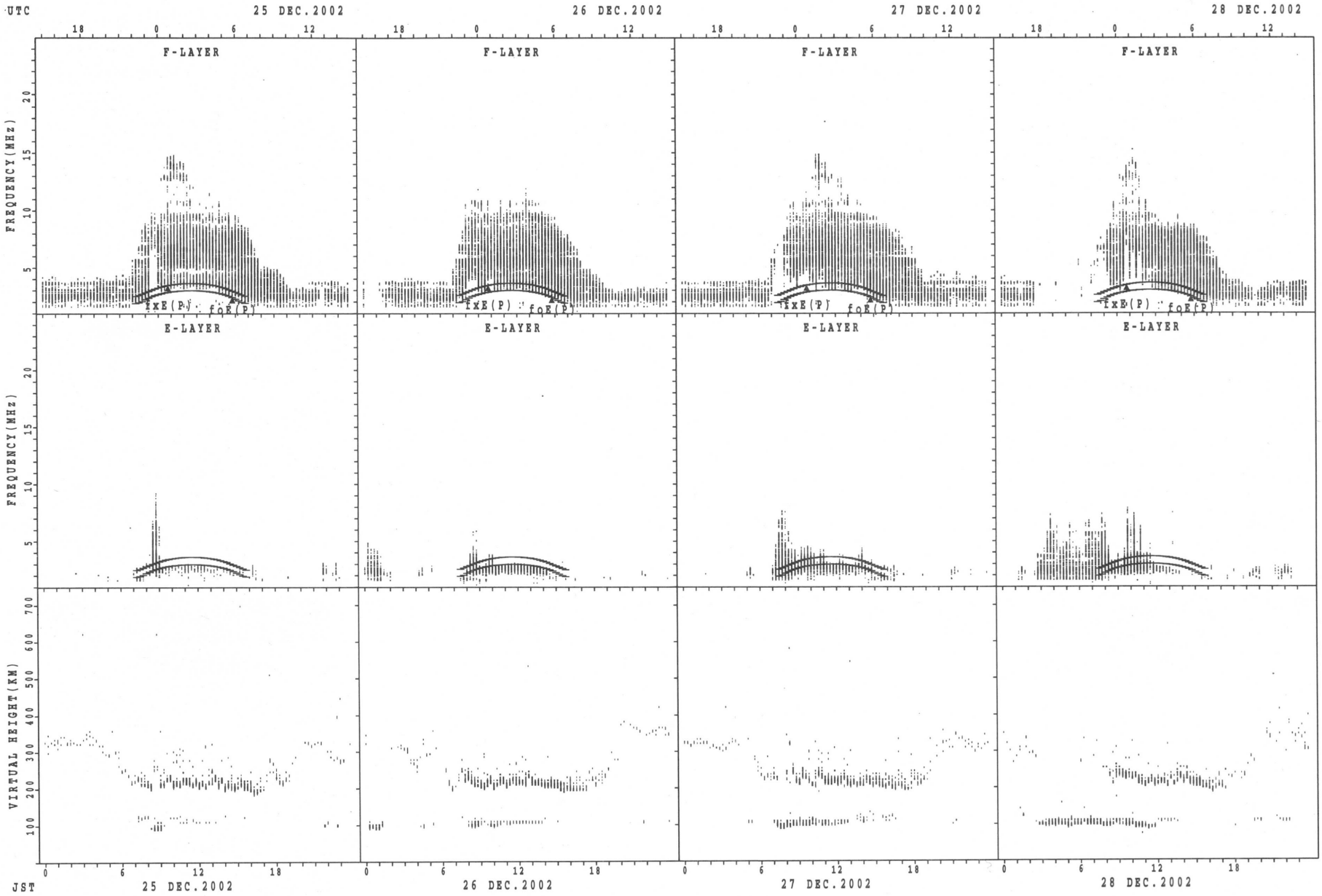
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai

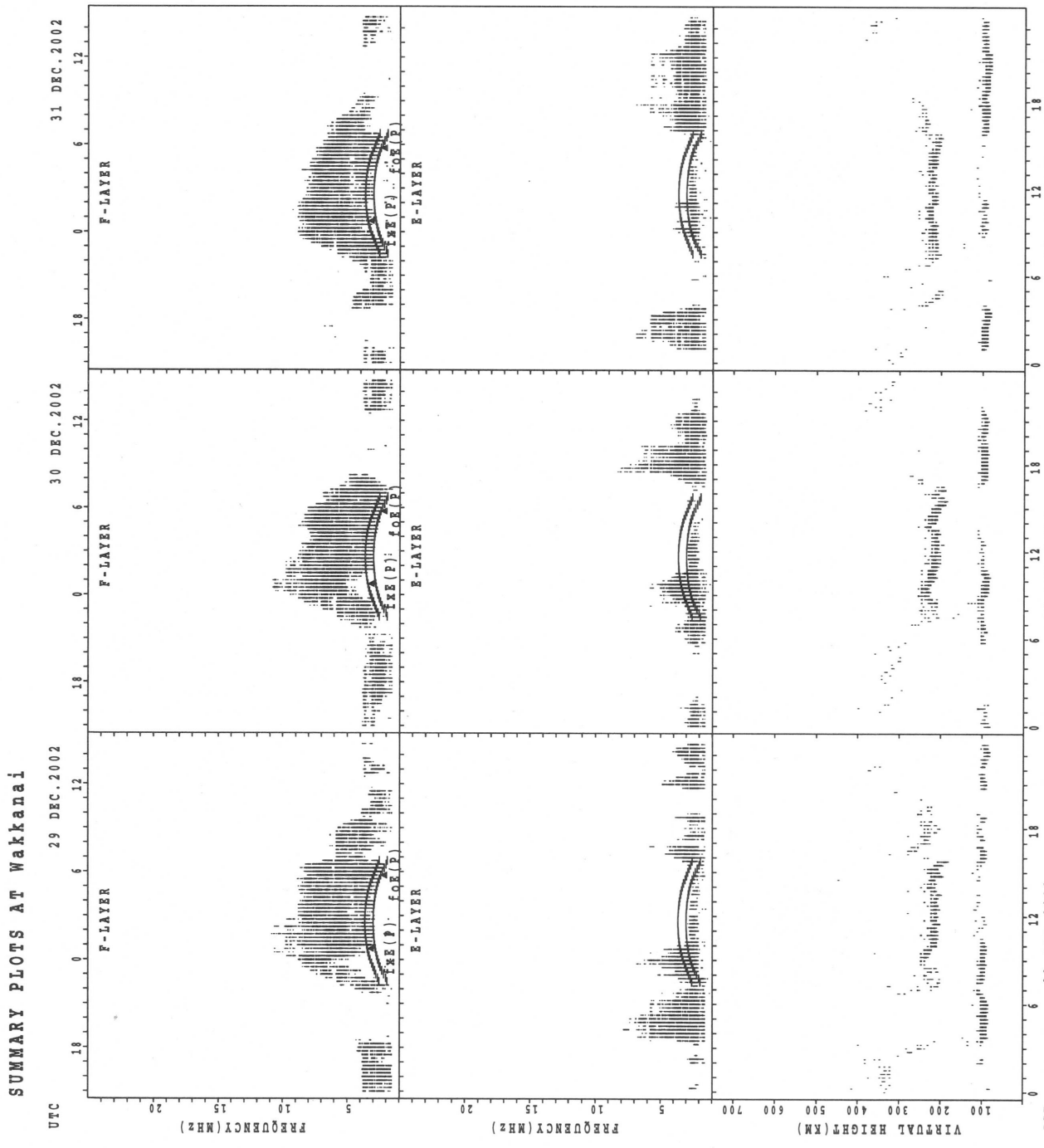


fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

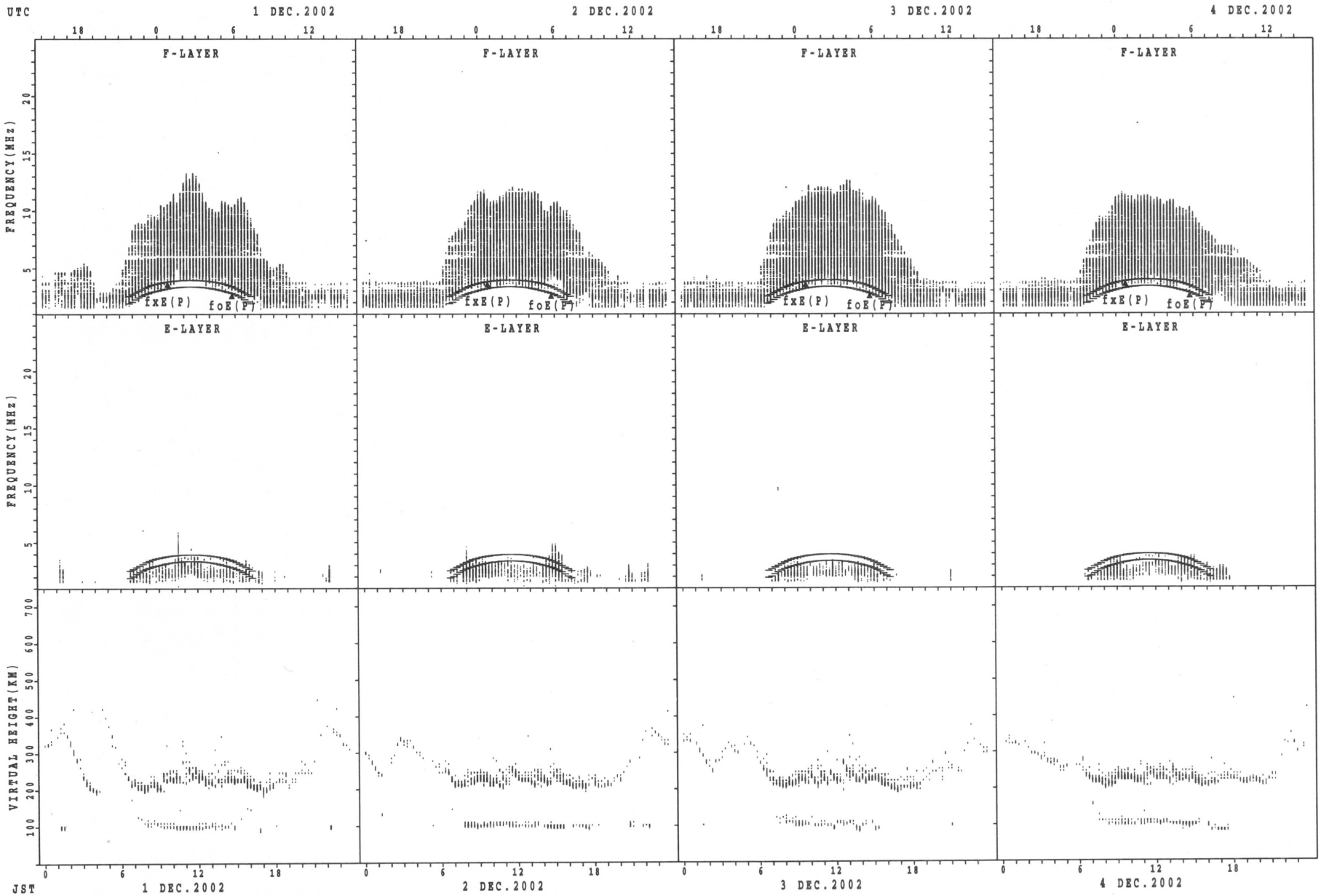
SUMMARY PLOTS AT Wakkanai



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

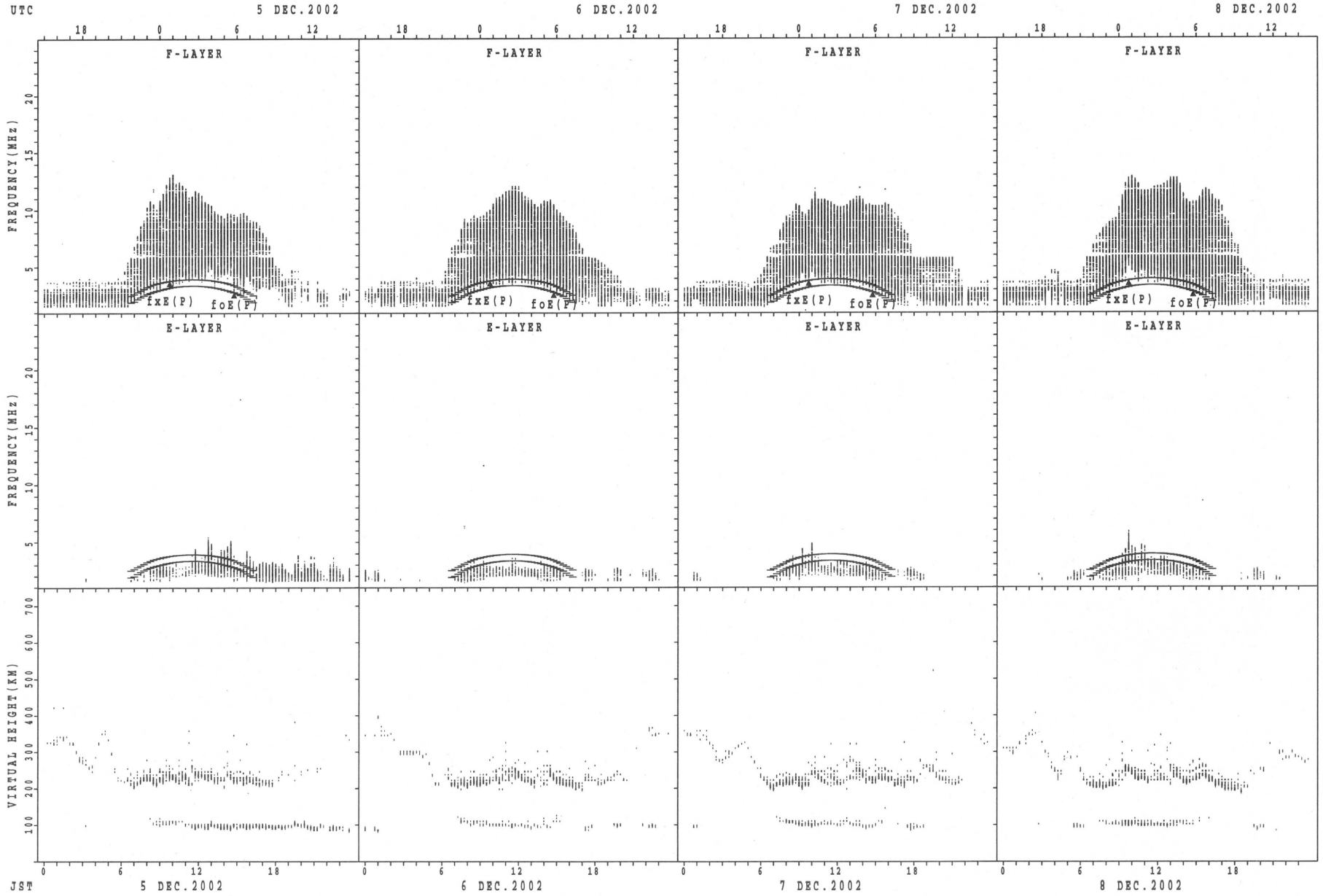

SUMMARY PLOTS AT Wakkanai
UTC
29 DEC.2002
30 DEC.2002
31 DEC.2002
F-LAYER
E-LAYER
FREQUENCY(MHz)
VIRTUAL HEIGHT(KM)
fxE(P); foE(P)
JST
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



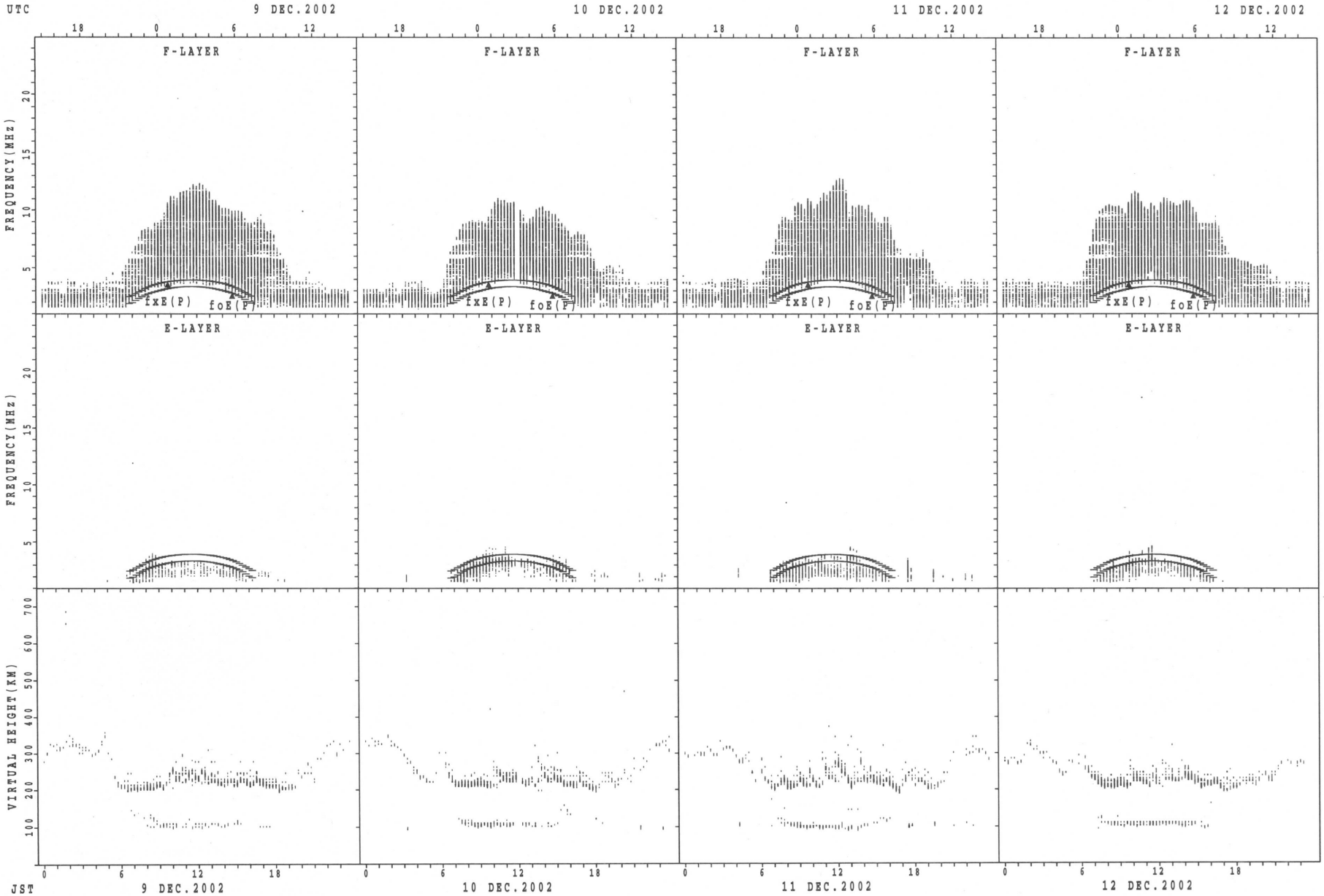
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



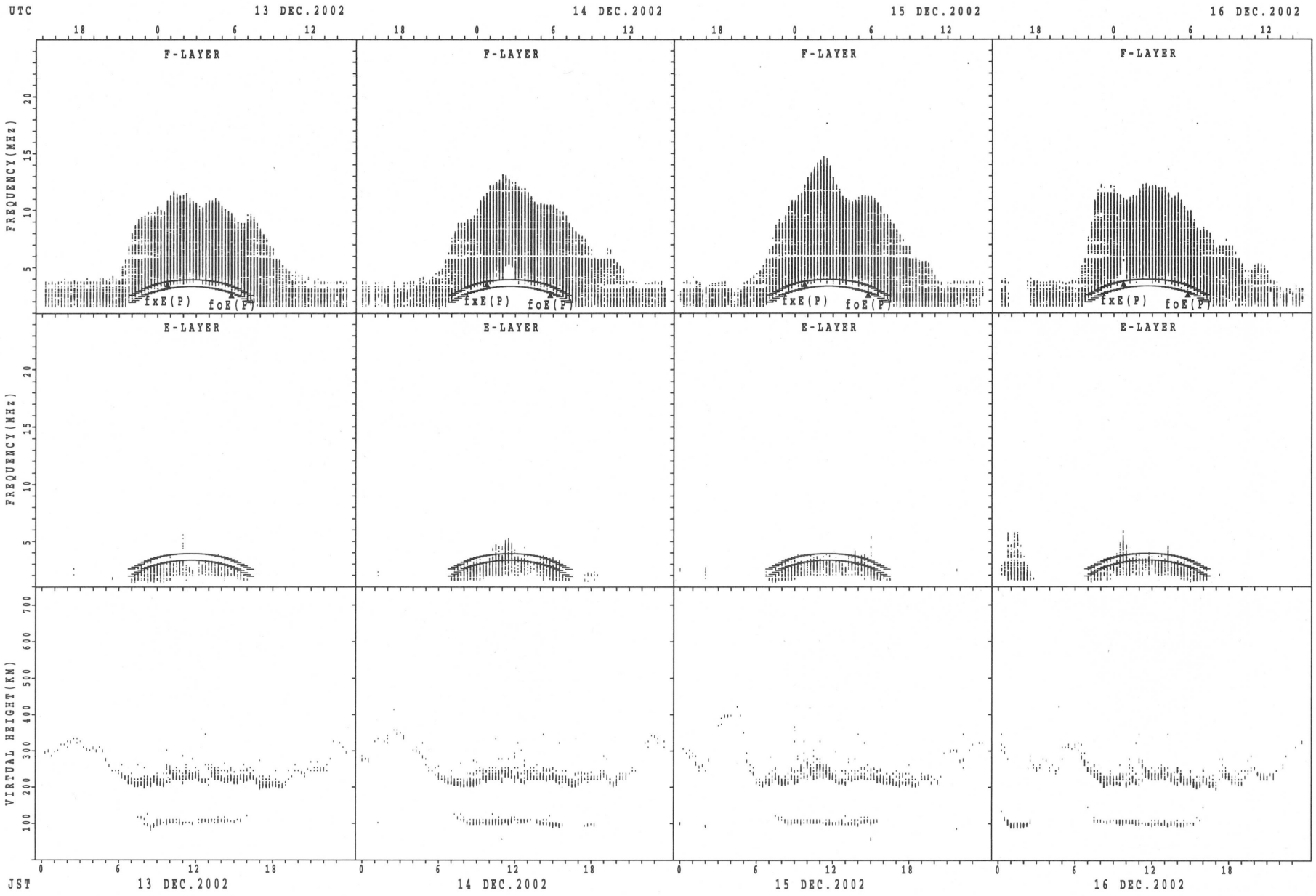
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



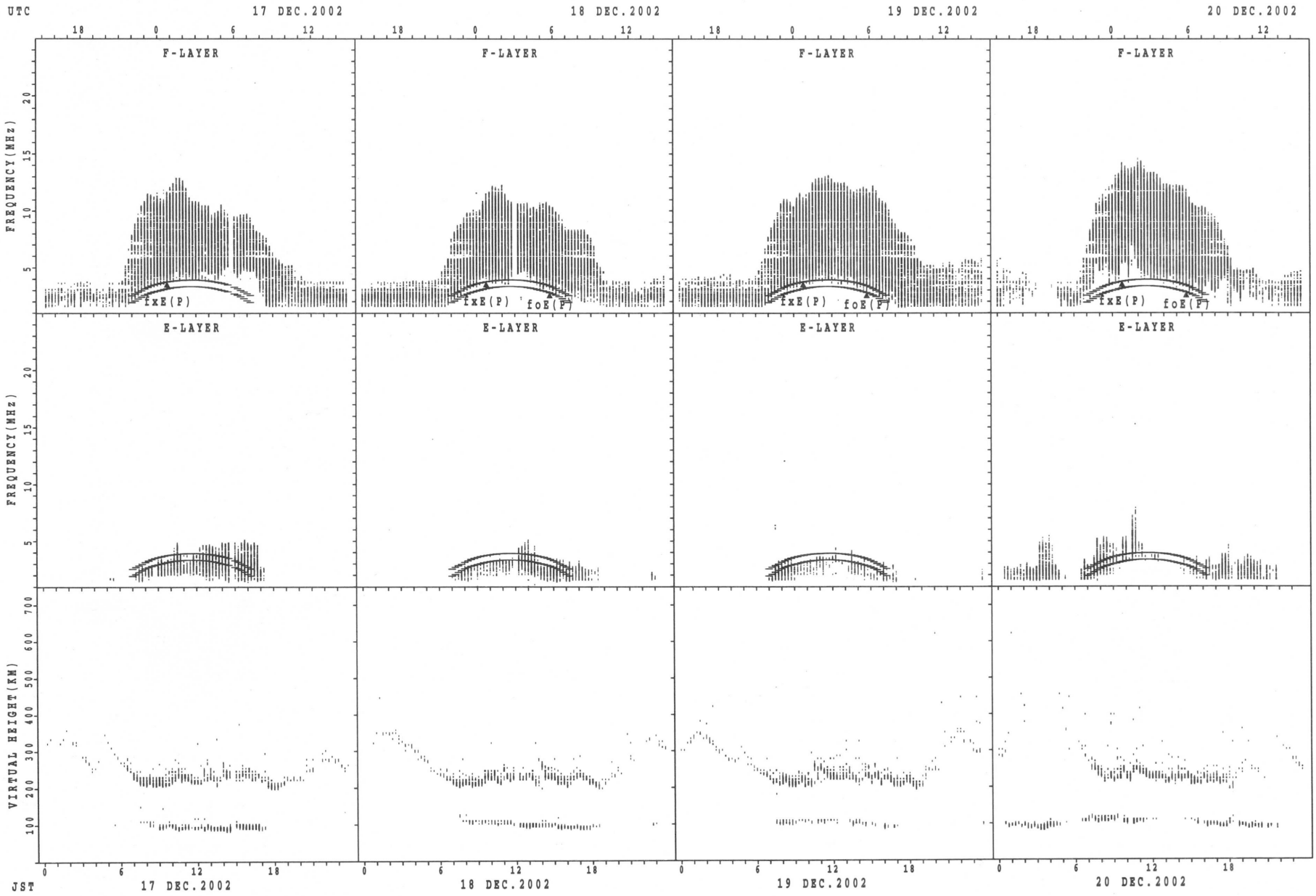
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



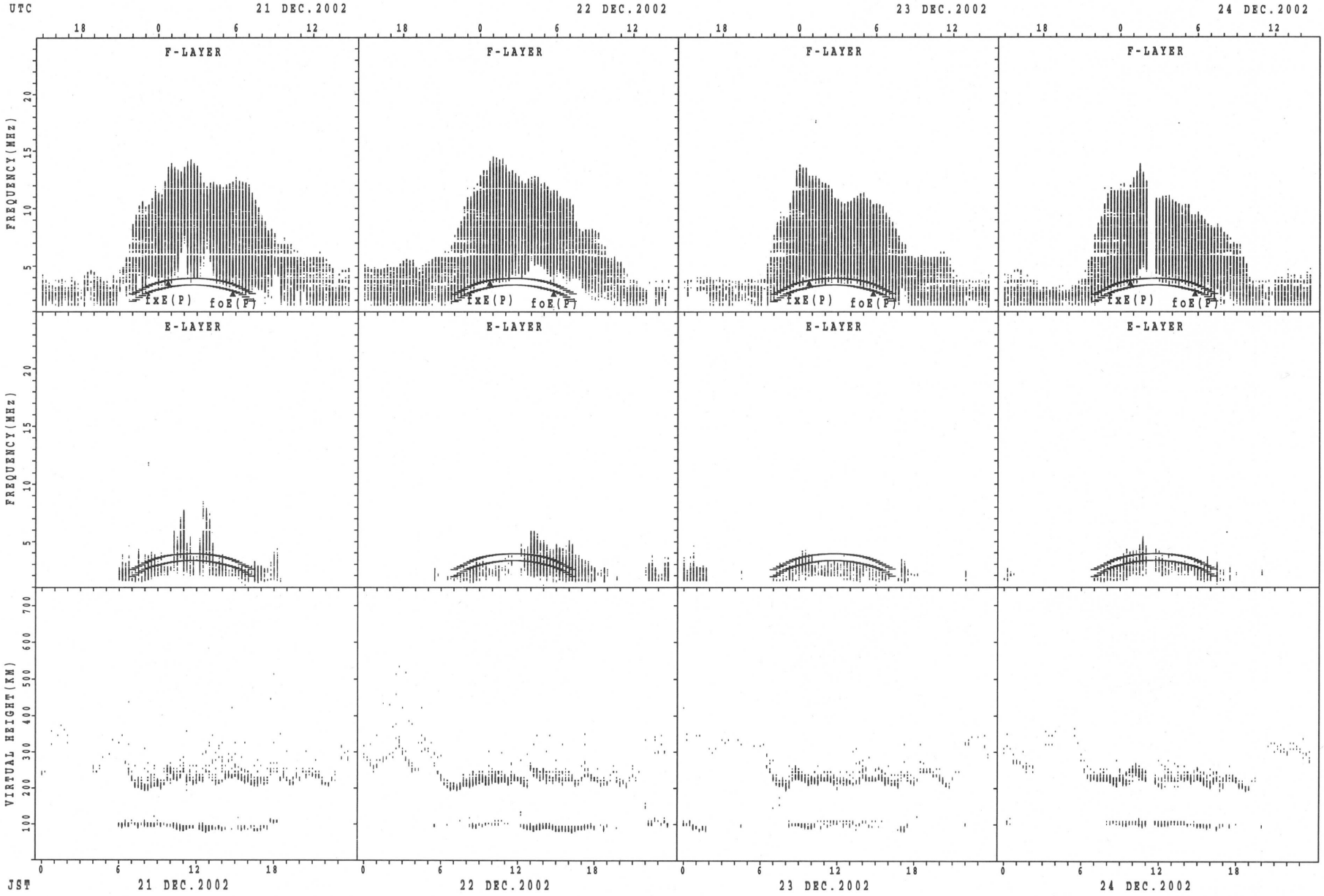
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



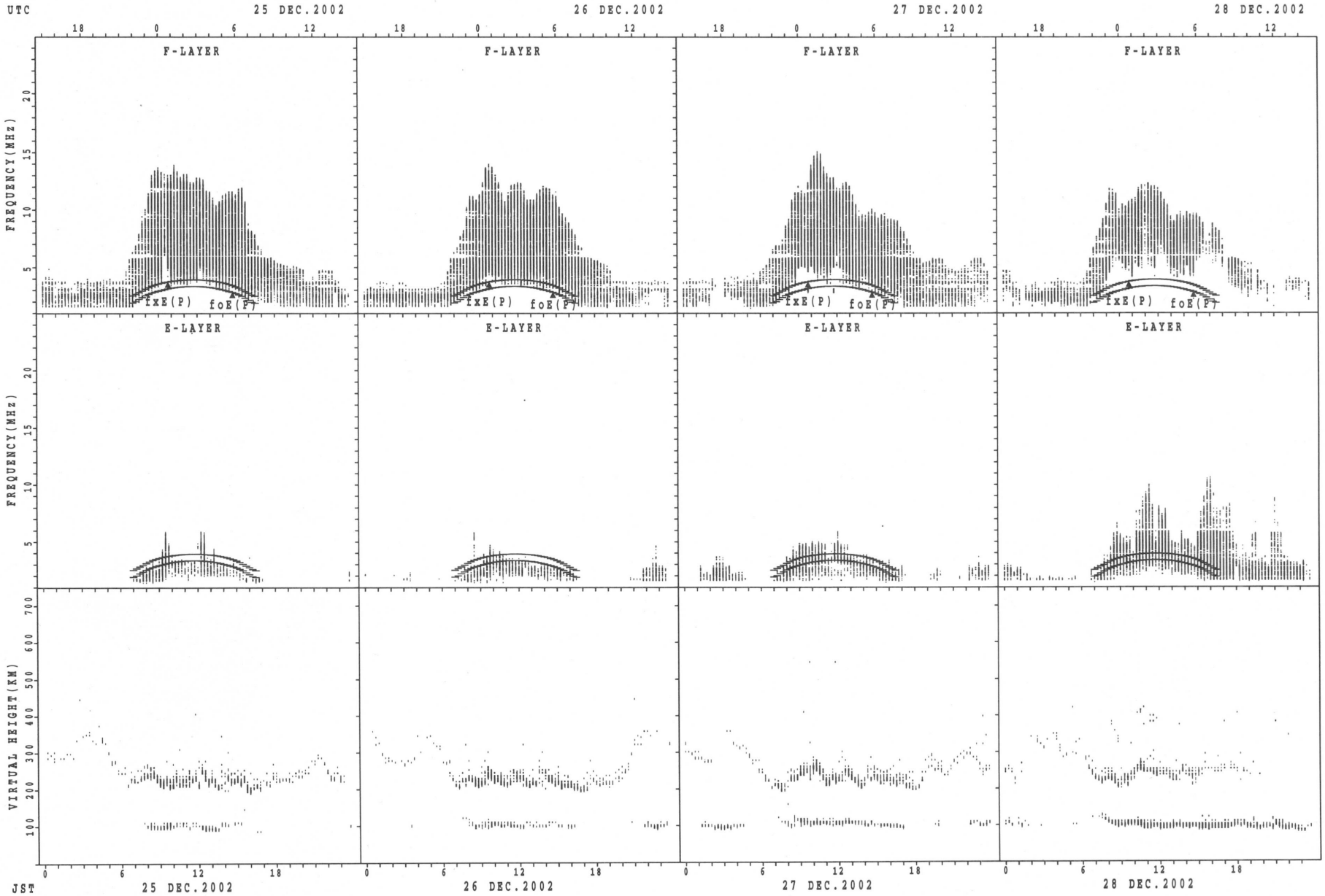
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



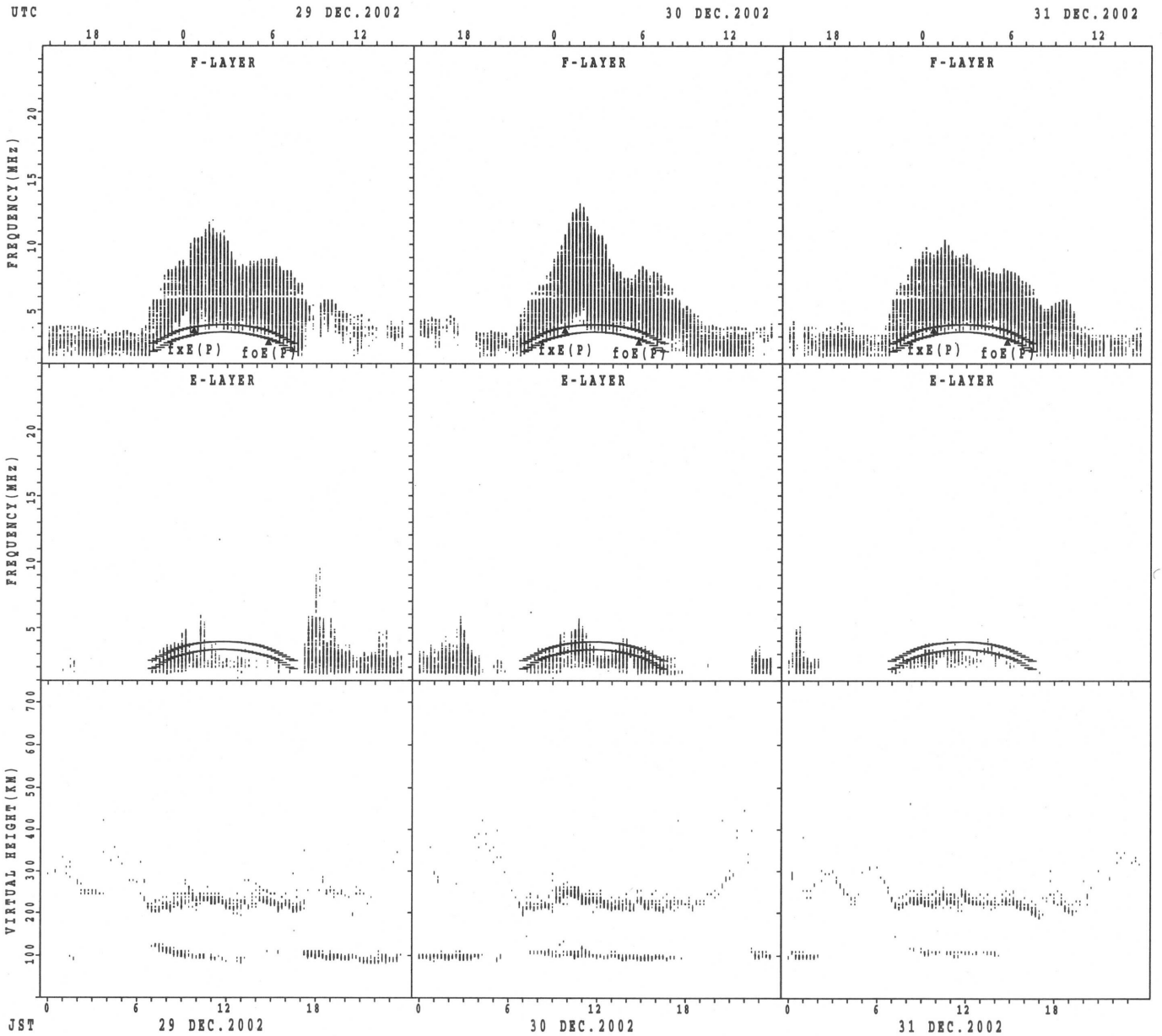
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



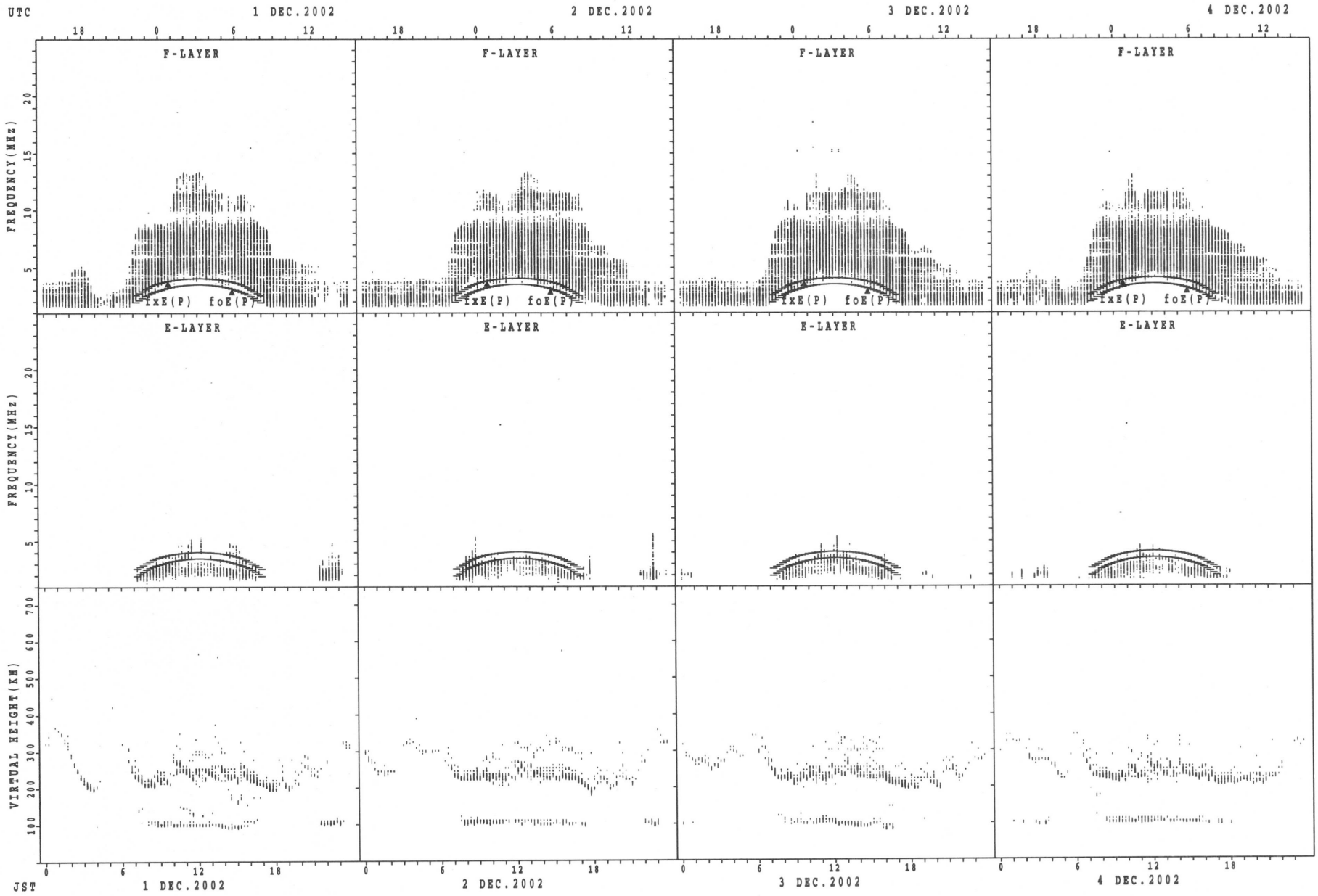
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



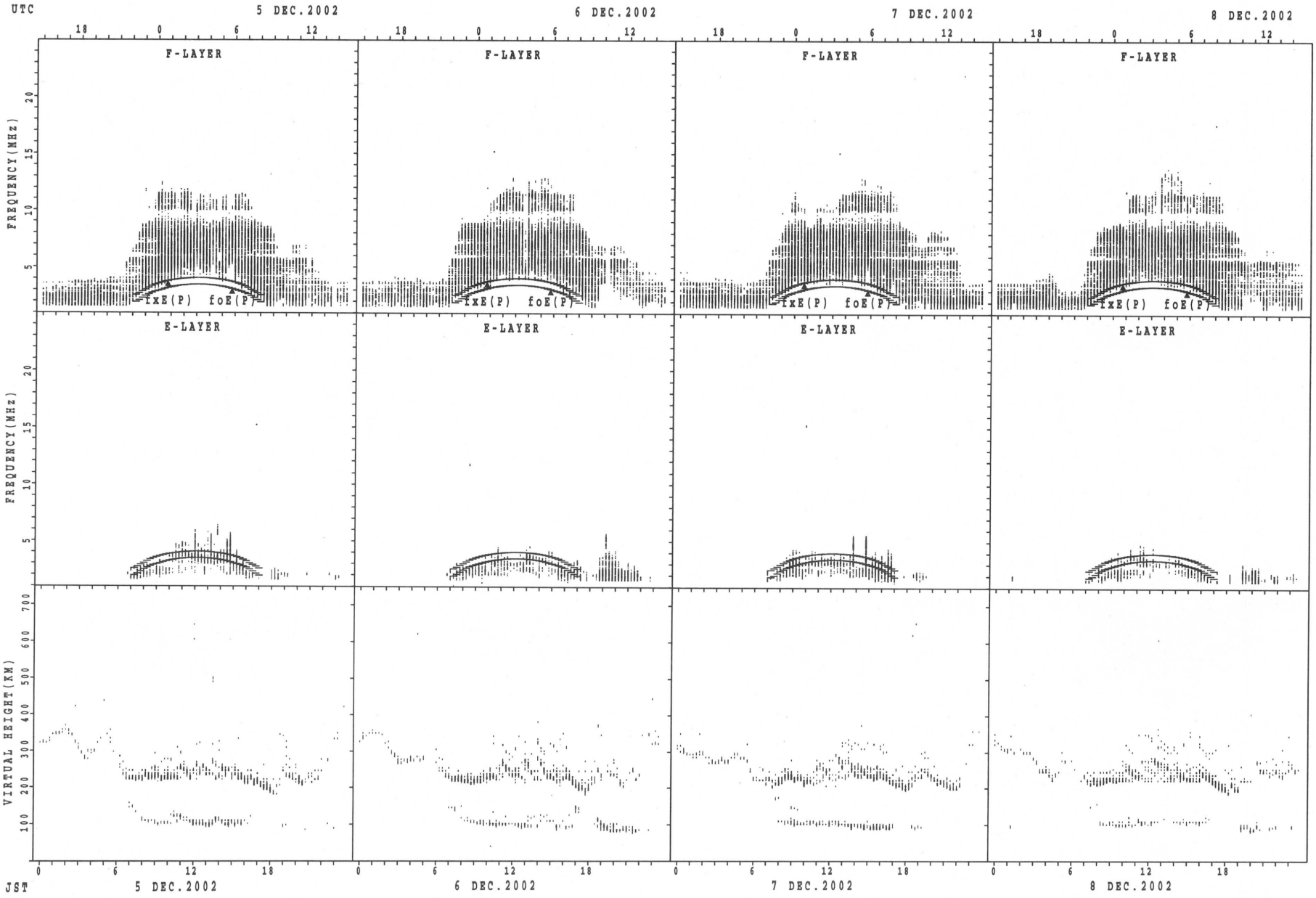
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



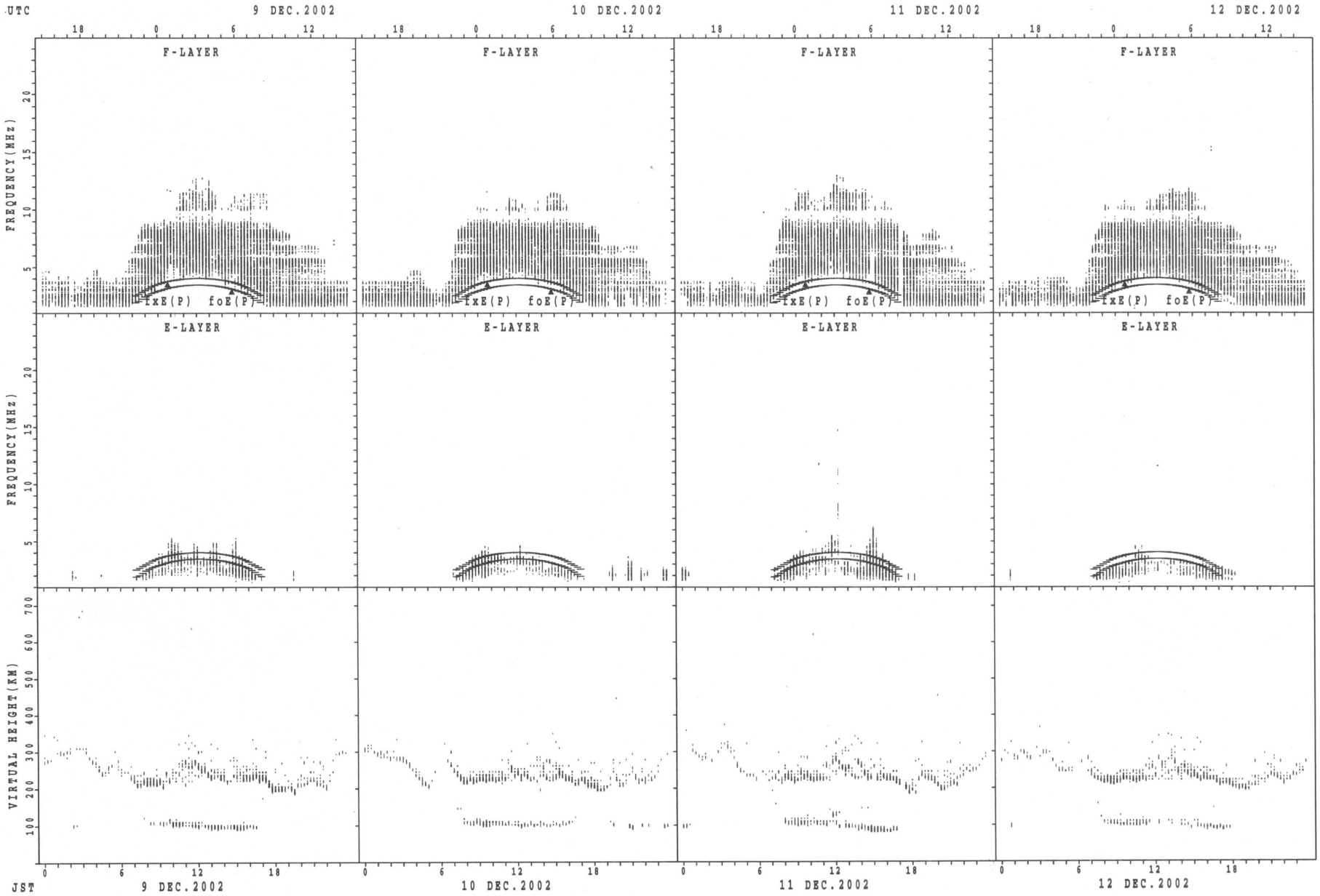
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



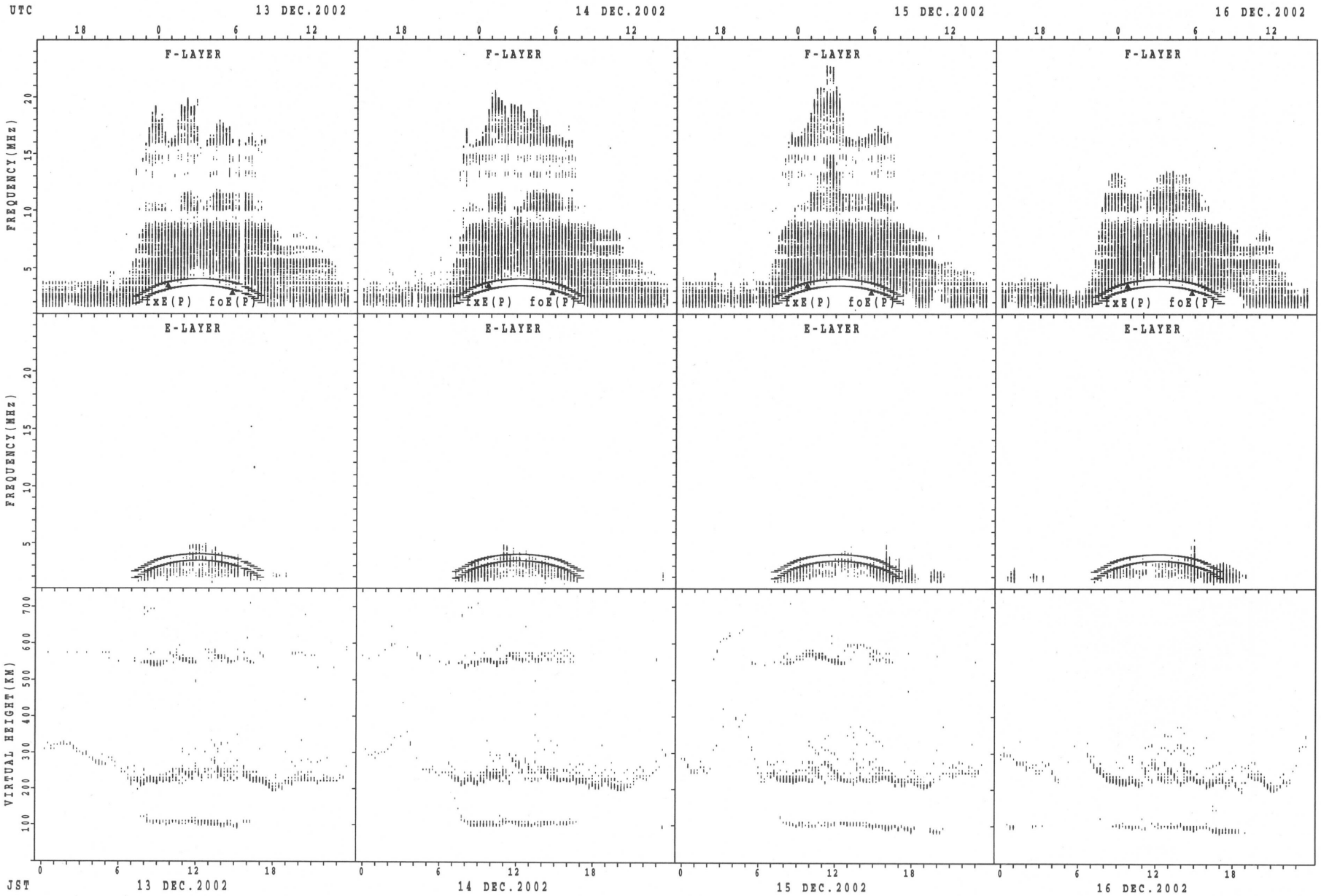
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



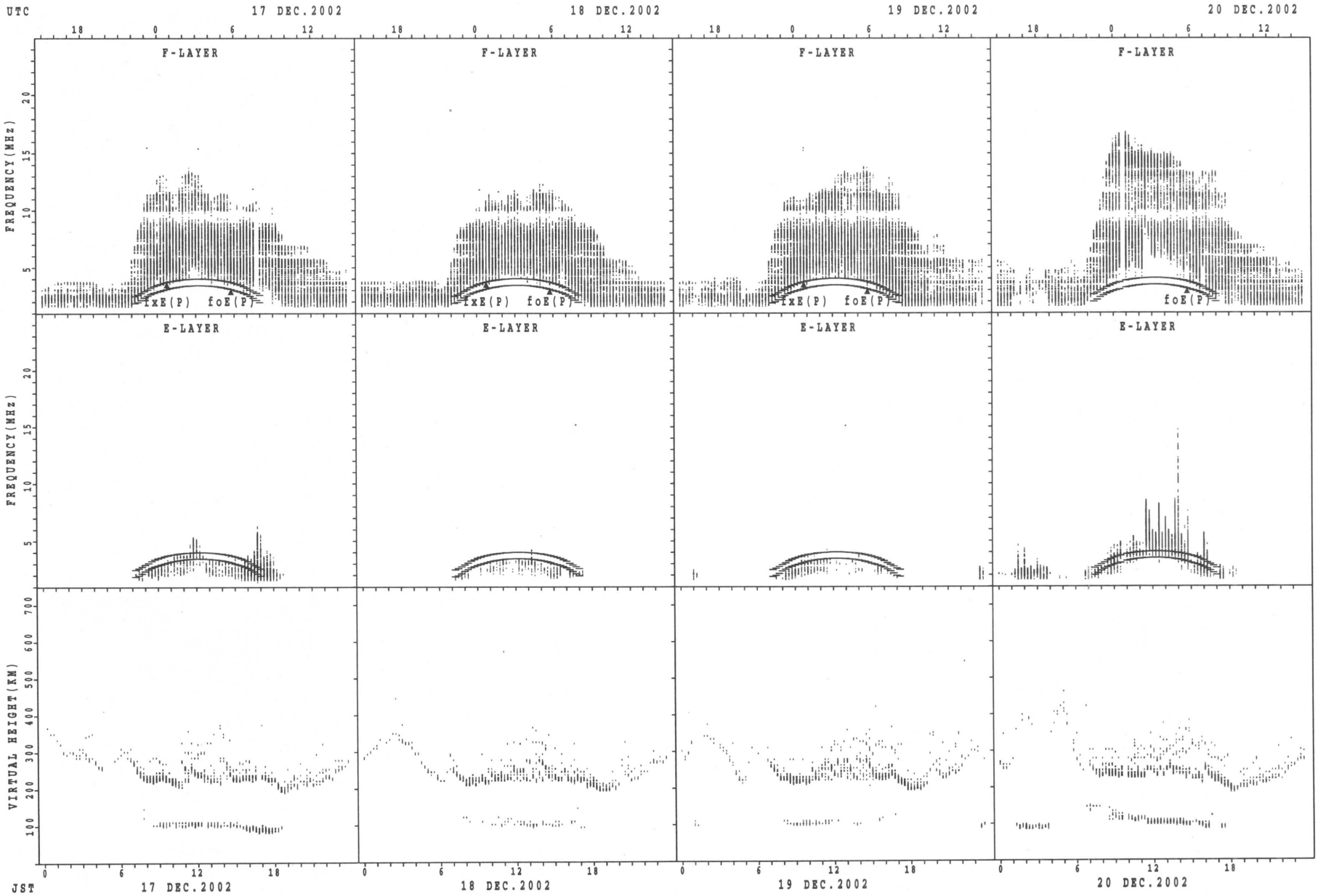
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



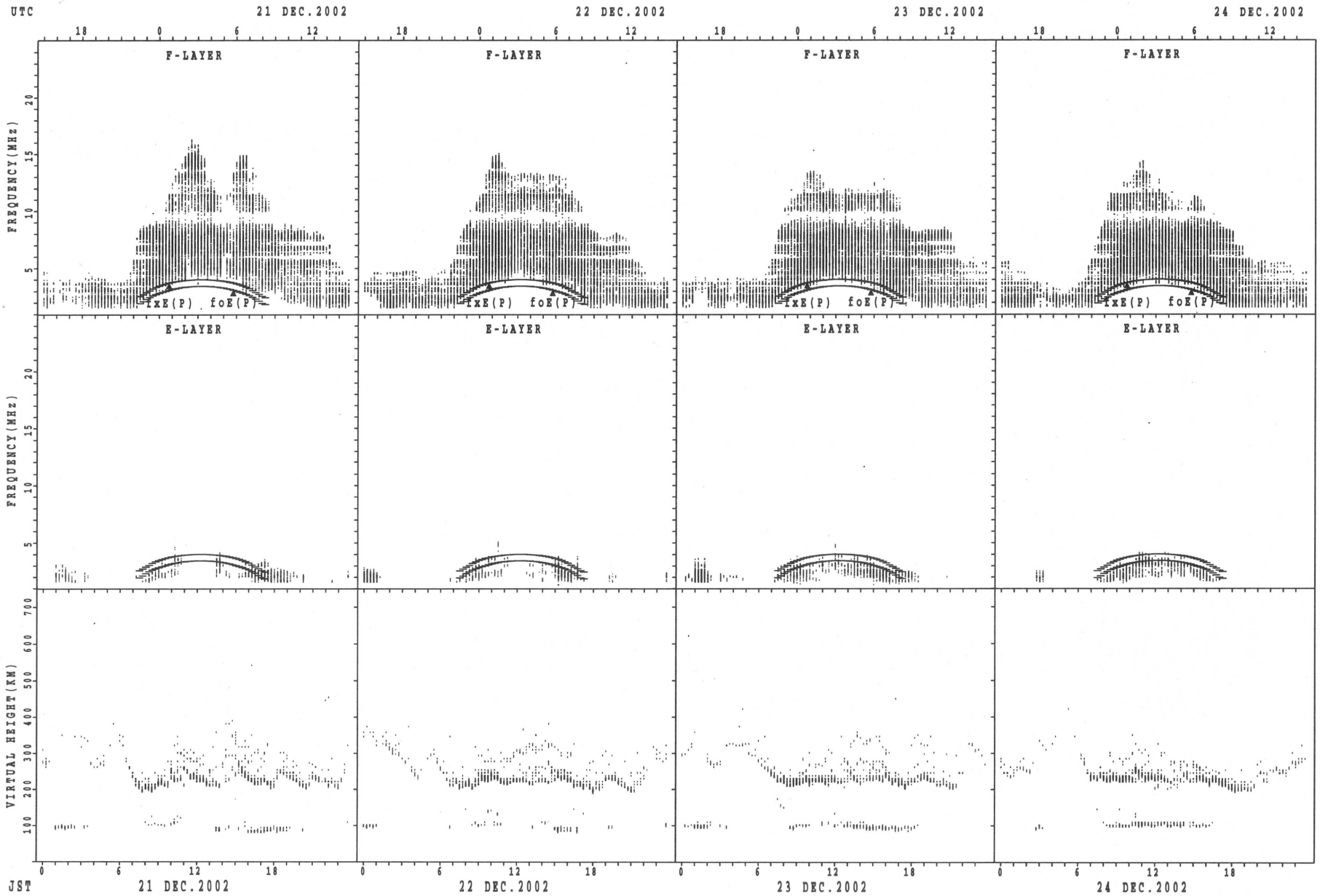
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



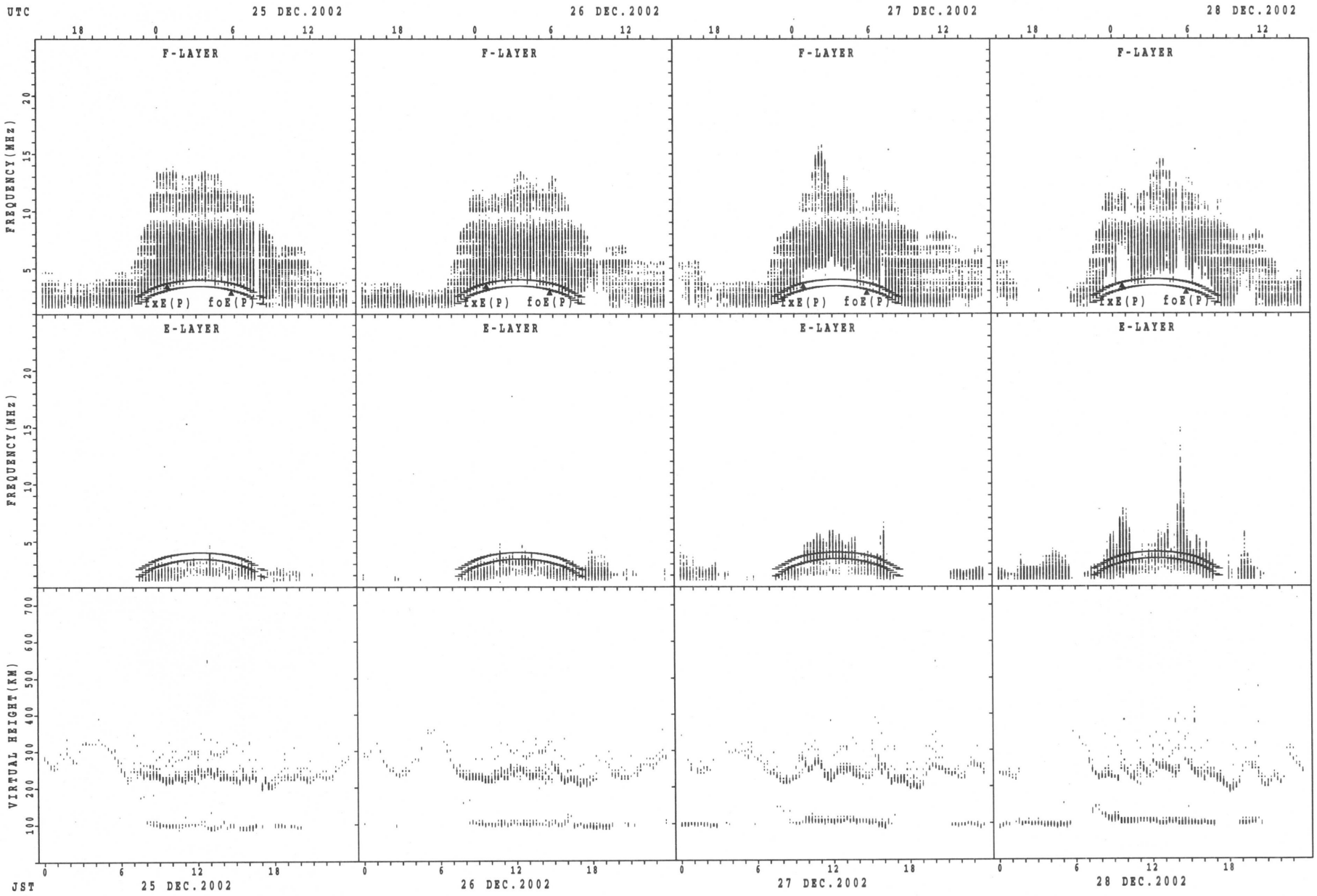
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



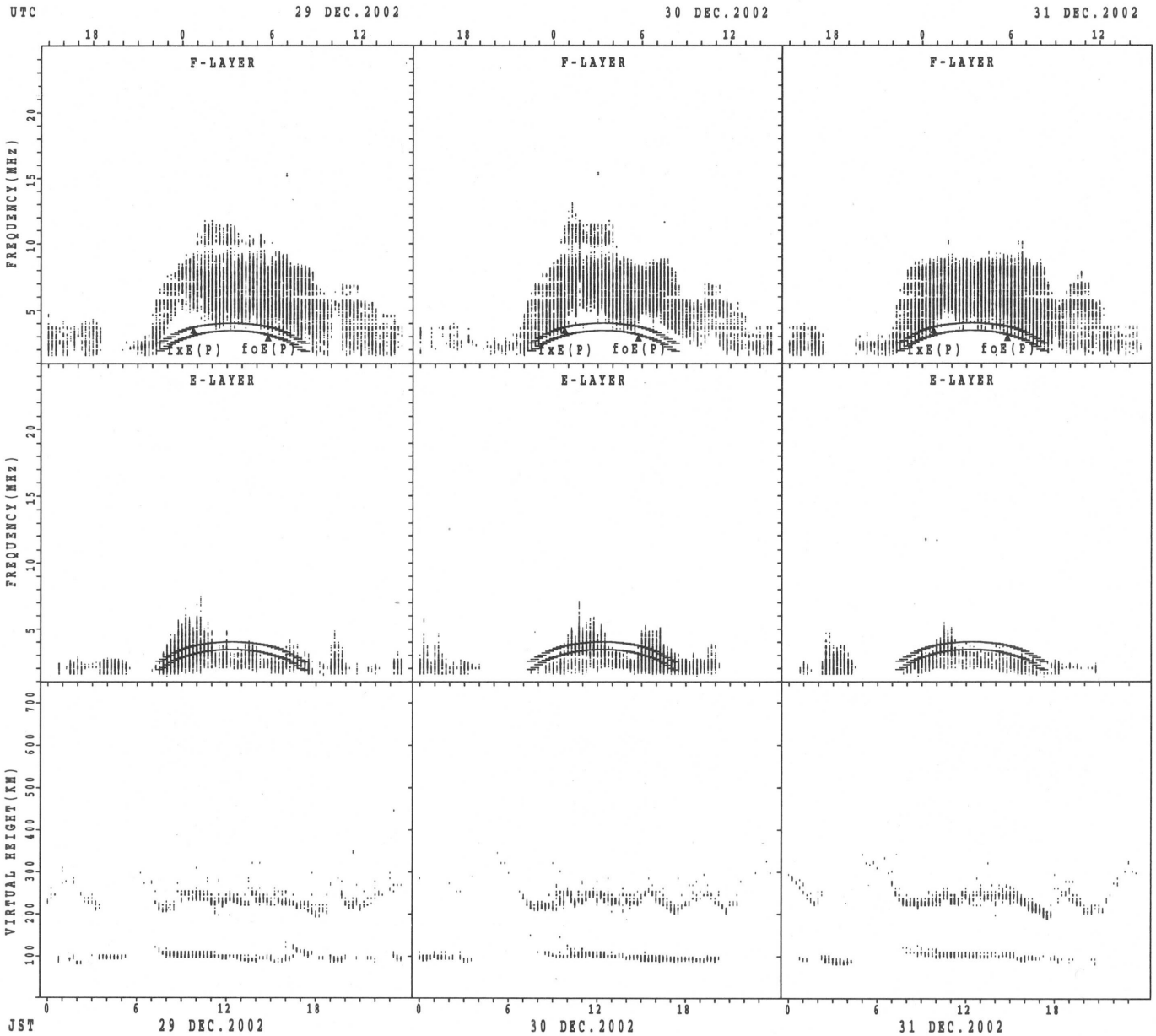
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



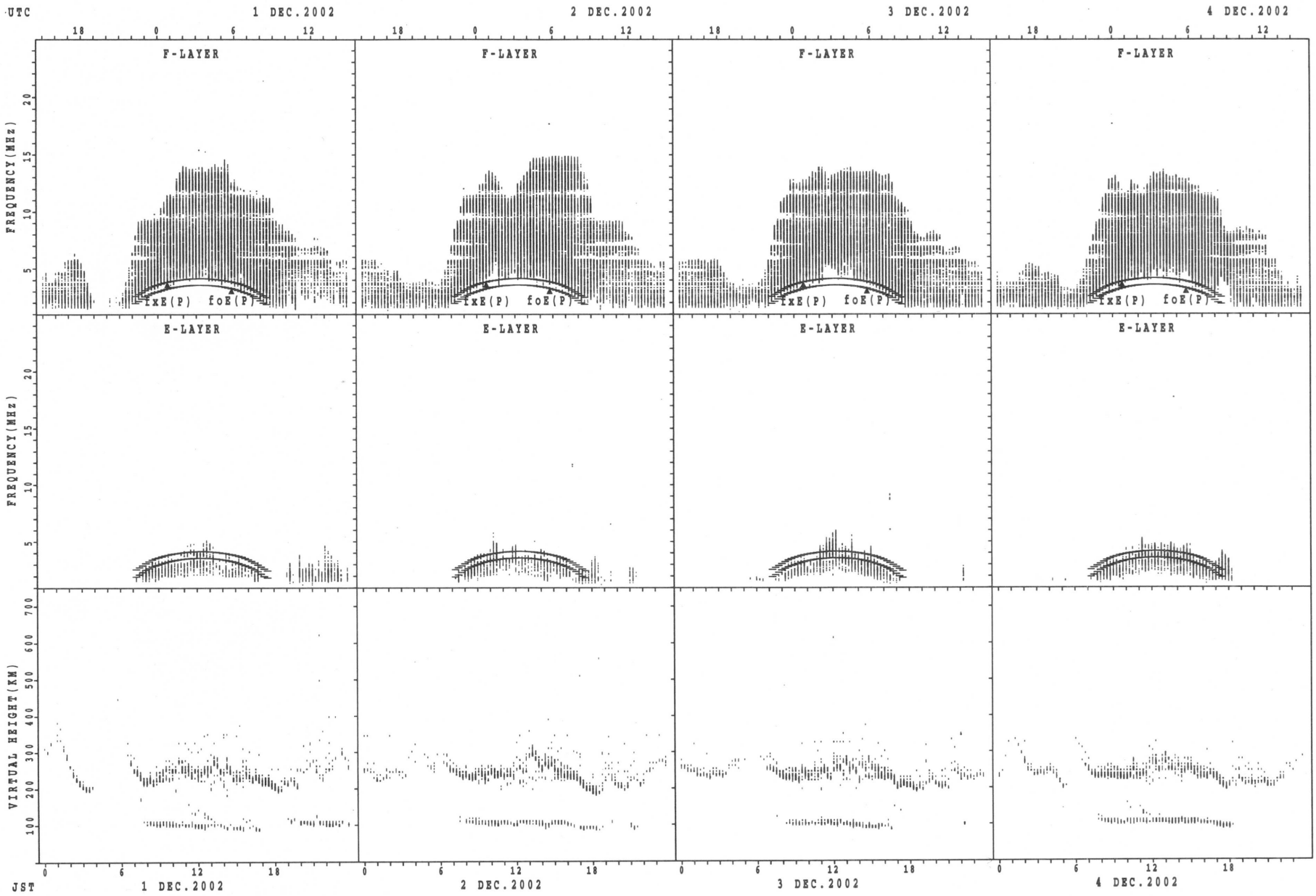
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



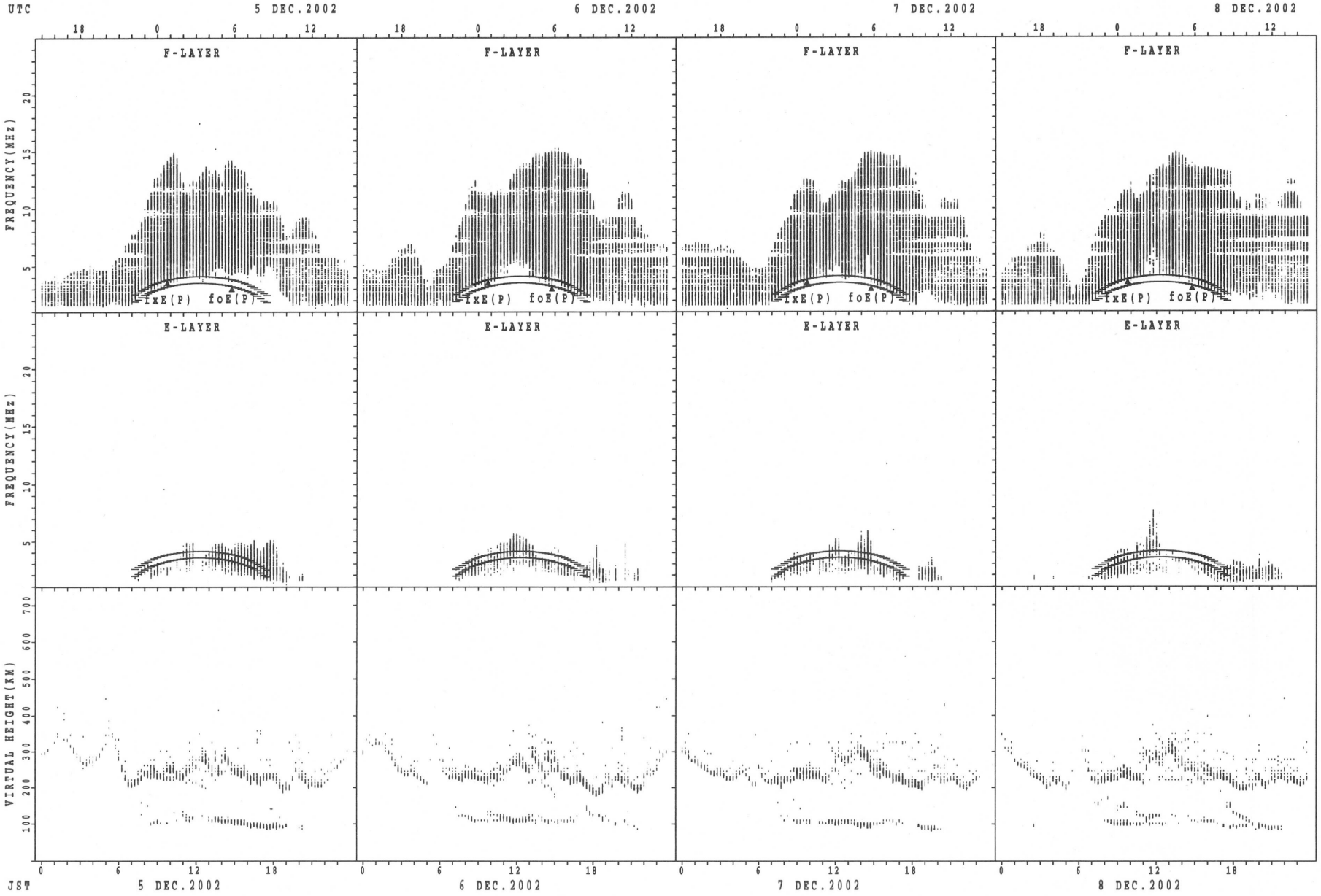
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



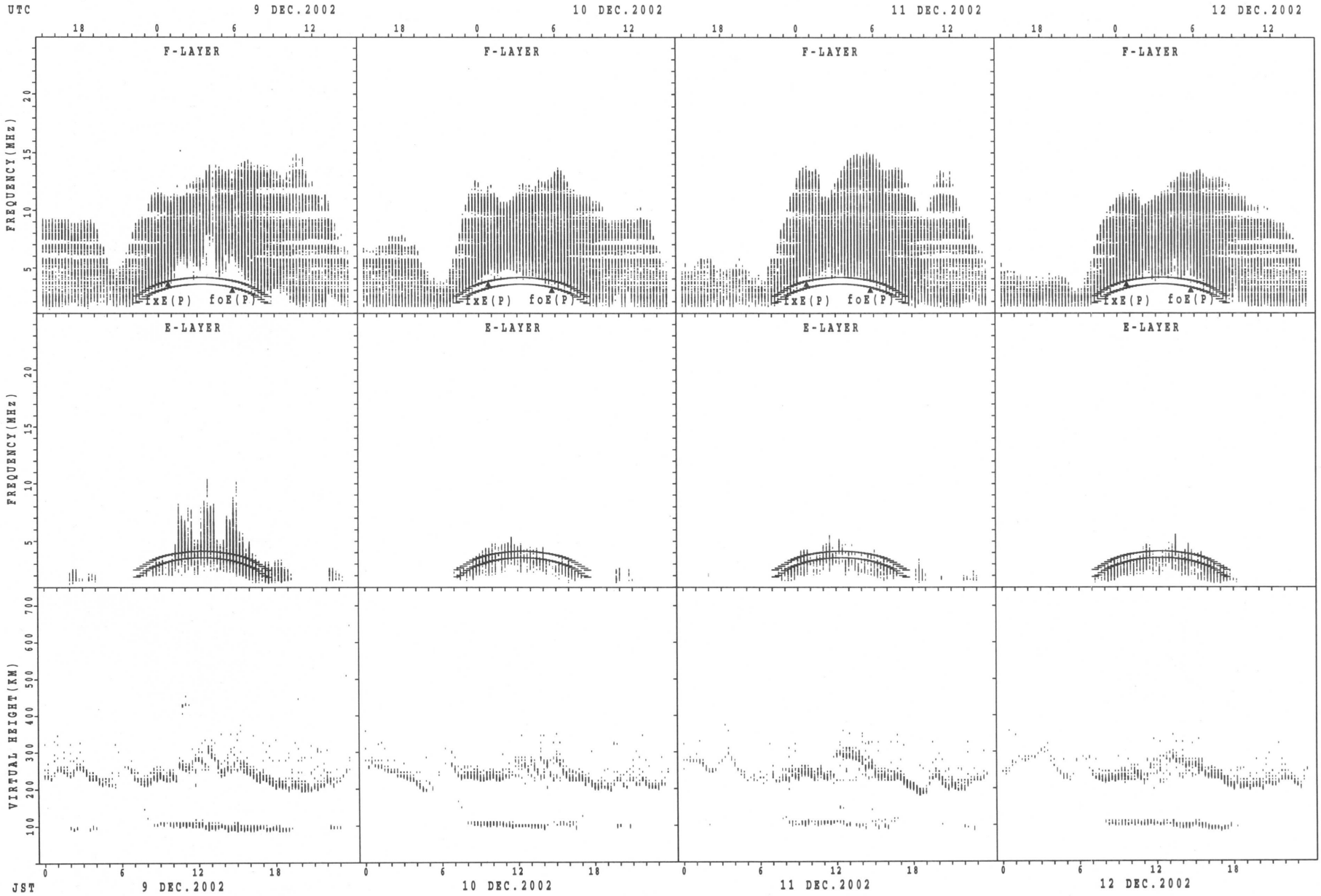
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



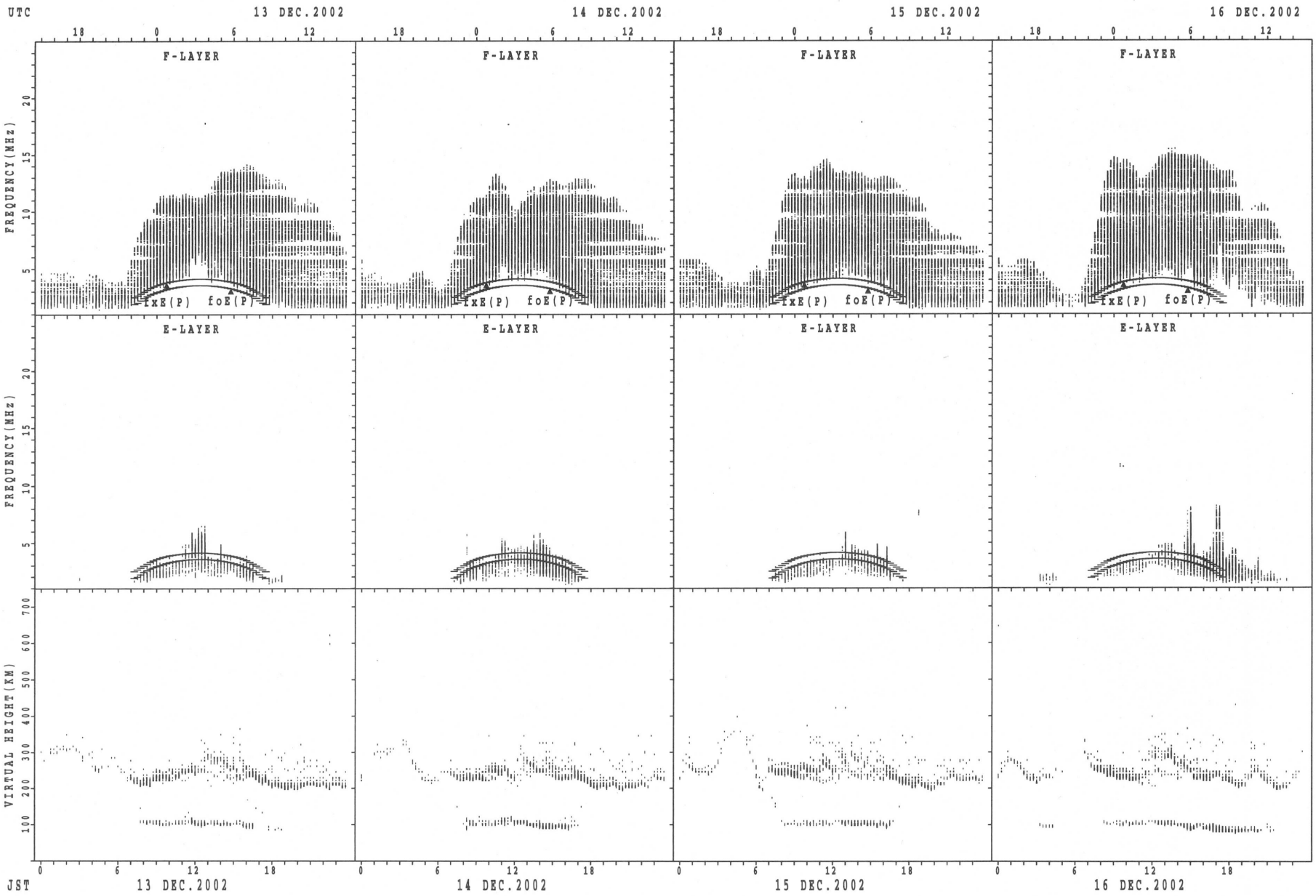
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



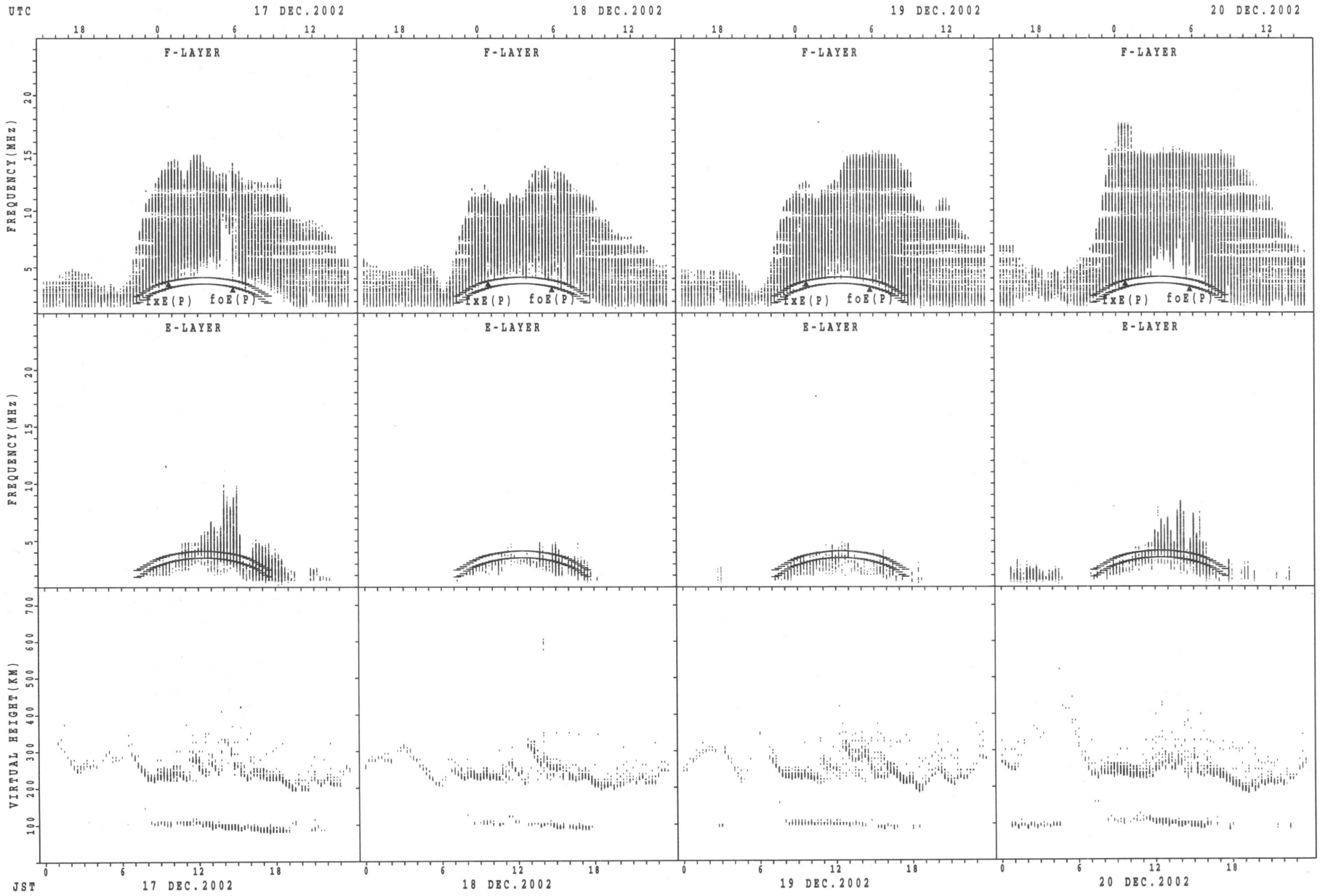
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



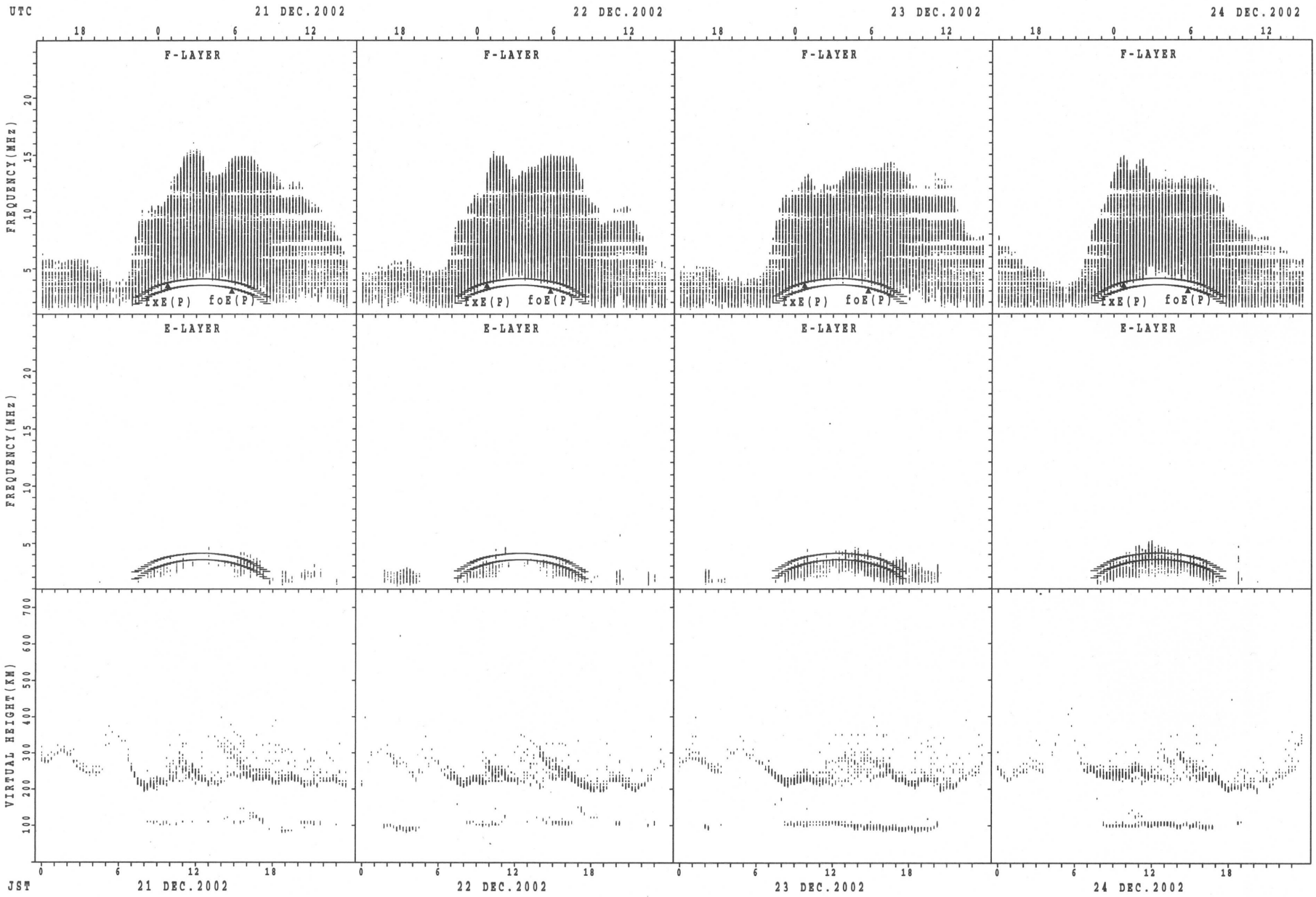
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



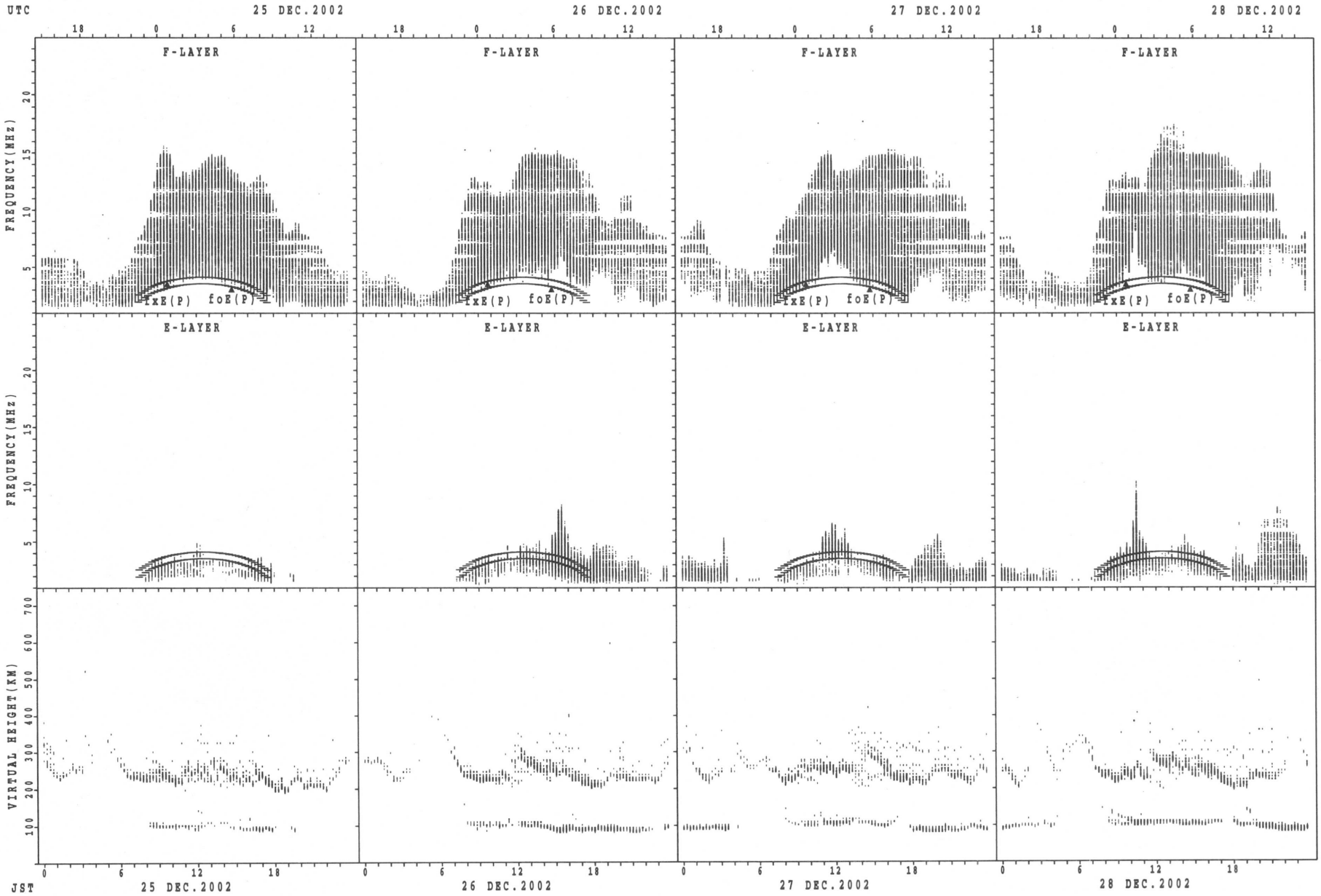
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



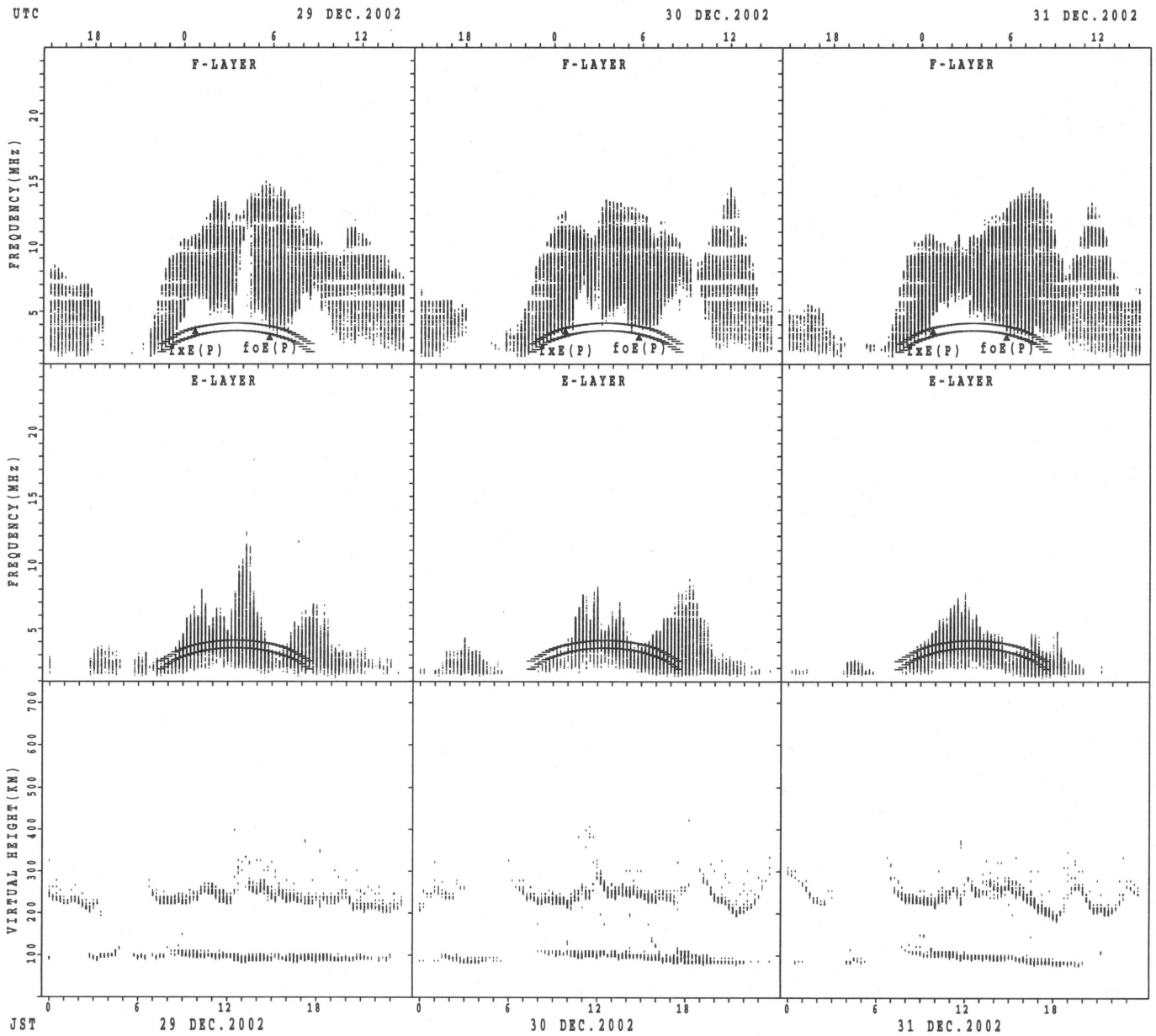
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



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.2002 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

h'F STATION Wakkanai LAT. 45°23.5'N LON. 141°41.2'E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								9	29	30	28	29	30	30	31	31	25	8	5					
MED								262	220	222	223	222	225	228	226	228	238	269	266					
U Q								270	230	228	232	230	230	240	232	236	245	274	284					
L Q								238	214	216	215	217	216	222	222	222	229	240	255					

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	9	6	8	6	8	6	8	11	12	13	6	8	4	1	3	2	8	8	7	7	7	12	9	9
MED	95	96	96	95	99	103	102	105	103	103	103	101	91	107	109	100	95	98	97	105	101	96	105	95
U Q	101	101	101	95	104	109	105	113	105	109	107	105	97	53	111	103	103	104	103	111	103	103	111	100
L Q	90	91	90	95	97	101	96	105	96	97	99	96	90	53	87	97	94	94	87	99	95	94	94	92

h'F STATION Kokubunji LAT. 35°42.4'N LON. 139°29.3'E

	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	30	31	31	31	29	31	30	31	30	14	6					
MED								238	222	224	232	230	232	238	245	238	238	245	249					
U Q								246	230	232	246	246	236	246	254	248	240	256	272					
L Q								232	216	216	222	226	226	230	238	230	232	238	242					

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	7	8	6	3	3	1	2	4	15	7	10	12	4	10	9	9	13	16	9	5	8	6	6	6
MED	103	95	97	95	99	101	97	141	113	107	107	107	106	101	97	97	97	97	103	97	97	95	104	97
U Q	107	99	103	95	101	50	99	150	149	113	109	112	111	107	101	102	103	100	106	98	108	103	105	101
L Q	91	94	97	91	99	50	95	125	105	103	107	104	99	95	92	93	95	90	95	96	96	91	95	89

h'F STATION Yamagawa LAT. 31°12.1'N LON. 130°37.1'E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									30	29	30	31	31	30	30	28	28	29	18	8	6	2		
MED									240	230	238	244	246	251	250	247	246	238	250	286	267	279		
U Q									248	240	248	256	258	260	264	263	254	249	266	314	286	286		
L Q									230	222	226	230	238	238	238	238	235	224	242	278	250	272		

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	7	11	7	9	4	2		6	6	10	10	15	14	11	7	10	10	10	11	11	8	3	5	3
MED	99	99	99	99	96	98		149	172	111	108	111	106	103	105	98	94	95	91	93	94	95	97	105
U Q	107	103	101	102	99	101		161	175	121	115	115	107	105	115	105	97	97	95	97	99	97	106	105
L Q	97	99	93	92	92	95		143	105	107	107	105	103	101	99	95	91	91	91	91	89	89	93	97

MONTHLY MEDIANS OF h'F AND h'Es

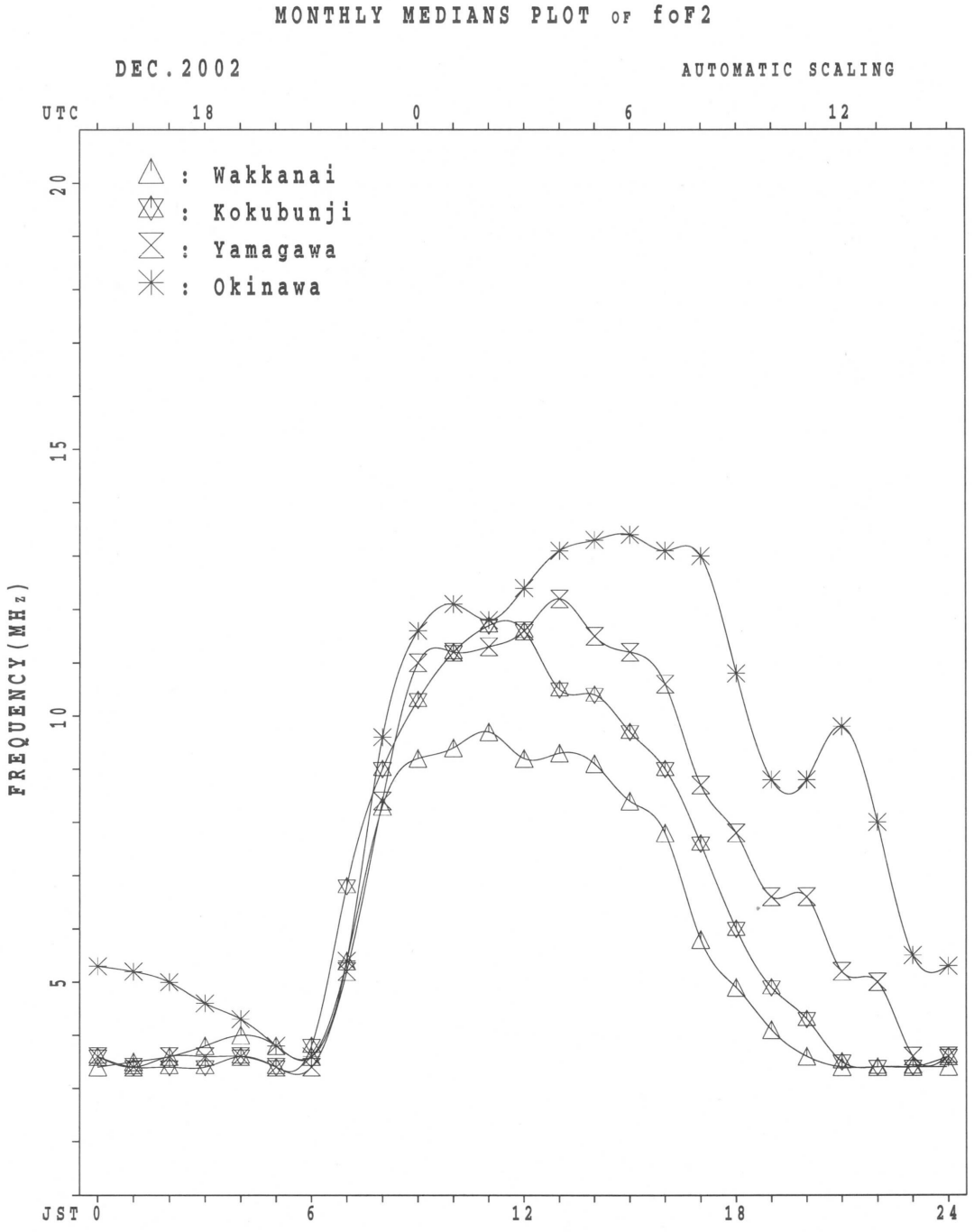
DEC.2002 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

h'F STATION Okinawa LAT. 26°16.9'N LON. 127°48.4'E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	4	3	3	3	1			3	31	31	31	31	31	31	30	31	31	31	30	28	25	28	19	4
MED	286	278	264	272	246			264	238	234	234	238	254	268	255	254	240	230	228	241	248	240	256	245
U Q	316	294	272	278	123			288	246	242	246	246	278	286	278	272	250	238	232	259	263	254	268	273
L Q	270	256	244	264	123			248	228	226	230	230	238	246	246	246	238	224	216	227	237	230	238	236

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	3	3	7	6	6	1	1	1	2	8	12	21	23	27	18	16	16	13	17	15	11	10	5	5
MED	95	95	97	95	96	89	97	101	185	108	111	109	107	105	99	103	97	91	95	91	95	93	91	99
U Q	95	101	105	95	101	44	48	50	187	131	130	122	111	111	103	105	112	99	104	97	103	99	98	106
L Q	95	93	95	95	89	44	48	50	183	105	108	105	103	101	97	95	95	89	91	89	89	89	88	95


MONTHLY MEDIANS PLOT OF foF2
DEC.2002
AUTOMATIC SCALING
UTC
18
0
6
12
△ : Wakkanai
⛛ : Kokubunji
⧖ : Yamagawa
✳ : Okinawa
FREQUENCY(MHz)
20
15
10
5
JST 0
6
12
18
24

IONOSPHERIC DATA STATION Kokubunji

DEC. 2002 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 46	X 48	X 48	X 55	X 39	X 35	X 44											X 71	X 53	X 51	X 44	X 41	X 40	X 42
2	X 45	X 45	X 41	X 43	X 43	X 43	X 47											X 84	X 68	X 53	X 45	X 39	X 38	X 41
3	X 44	X 43	X 47	X 41	X 41	X 40	X 46											X 77	X 60	X 46	X 46	X 42	X 37	X 40
4	X 41	X 41	X 43	X 44	X 44	X 41	X 43											X 74	X 71	X 60	X 53	X 40	X 35	X 40
5	X 40	X 40	X 41	X 42	X 40	X 42	X 42											X 83	X 55	X 47	X 46	X 41	X 34	X 36
6	X 38	X 38	X 39	X 41	X 42	X 42	X 41											X 68	X 62	X 52	X 42	X 35	X 35	X 36
7	X 37	X 38	X 39	X 42	X 41	X 40	X 46											X 90	X 68	X 64	X 66	X 60	X 41	X 39
8	X 42	X 40	X 41	X 43	X 50	X 39	X 44											X 104	X 73	X 50	X 47	X 44	X 45	X 46
9	X 43	X 43	X 42	X 43	X 44	X 44	X 45											X 95	X 81	X 54	X 46	X 42	X 40	X 40
10	X 38	X 38	X 38	X 40	X 43	X 36	X 35						C					X 82	X 62	X 53	X 54	X 42	X 40	X 41
11	X 43	X 41	X 42	X 40	X 42	X 42	X 42											X 68	X 65	X 61	X 41	X 42	X 44	X 42
12	X 46	X 43	X 42	X 43	X 44	X 41	X 43											X 79	X 63	X 58	X 54	X 46	X 44	X 44
13	C	X 44	X 43	X 43	X 44	X 45	X 46											X 89	X 70	X 50	X 48	X 43	X 41	X 41
14	X 44	X 41	X 42	X 42	X 42	X 45	X 49											X 81	X 68	X 67	X 57	X 44	X 39	X 41
15	X 41	X 43	X 40	X 38	X 39	X 40	X 48											X 86	X 70	X 58	X 48	X 39	X 42	X 42
16	C	X 44	X 45	X 43	X 44	X 40	X 42											X 71	X 76	X 56	X 54	X 50	X 39	X 38
17	X 38	X 39	X 40	X 41	X 37	X 37	X 42											X 83	X 68	X 55	X 48	X 41	X 41	X 44
18	X 39	X 40	X 40	X 41	X 42	X 42	X 44						C					X 85	X 78	X 48	X 42	X 40	X 39	X 41
19	X 43	X 44	X 44	X 45	X 45	X 45	X 45											X 91	X 80	X 56	X 52	X 55	X 56	X 58
20	X 60	X 51	X 46	X 44	X 41	X 40	X 40											X 97	X 70	X 50	X 50	X 41	X 44	X 48
21	X 45	X 42	X 42	X 46	X 48	X 40	X 45											X 98	X 81	X 76	X 64	X 67	X 57	X 46
22	X 51	X 47	53	58	54	X 55	X 64											X 82	X 84	X 60	X 55	X 42	X 38	X 40
23	X 40	X 43	X 43	X 43	X 42	X 43	X 42											X 73	X 60	X 63	X 68	X 52	X 45	X 45
24	X 47	X 48	X 44	X 38	X 38	X 37	X 43											X 80	X 74	X 45	X 40	X 42	X 46	X 45
25	X 44	X 46	X 42	X 41	X 43	X 44	X 42											X 69	X 58	X 54	X 53	X 46	X 54	X 42
26	X 36	X 39	X 38	X 39	X 37	X 36	X 39											X 69	X 58	X 53	X 46	X 40	X 42	X 41
27	X 43	X 47	X 41	X 42	X 44	X 47	X 49											X 88	X 66	X 57	X 59	X 54	X 54	X 62
28	X 52	X 41	X 36	X 39	X 40	X 40	X 42											X 76	X 65	X 56	X 43	X 37	X 41	X 41
29	X 40	X 40	X 42	X 40	X 34	X 36	X 35											X 72	X 57	X 61	X 48	X 46	X 40	X 42
30	X 44	X 46	X 46	X 42	X 37	36	X 36											X 69	X 54	X 44	X 41	X 38	X 39	X 39
31	X 43	X 46	X 39	X 41	X 41	X 36	X 36											X 57	X 57	X 59	X 40	X 37	X 36	X 38
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	31	31	31	31	31	31											31	31	31	31	31	31	31
MED	X 43	X 43	X 42	X 42	X 42	X 40	X 43											X 81	X 68	X 55	X 48	X 42	X 41	X 41
U Q	X 45	X 46	X 44	X 43	X 44	X 43	X 46											X 88	X 73	X 60	X 54	X 46	X 44	X 44
L Q	X 40	X 40	X 40	X 41	X 40	X 37	X 42											X 71	X 60	X 50	X 44	X 40	X 39	X 40

IONOSPHERIC DATA STATION Kokubunji

DEC. 2002 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	40	42	42	49	33	29	38	80	84	93	105	122	126	99	105	102	97	65	47	45	38	35	34	S 36
2	39	39	35	37	37	37	41	75	87	110	104	110	113	112	104	102	96	78	62	47	39	32	32	35
3	S 38	37	41	35	35	34	40	76	90	104	118	116	110	122	113	108	94	71	54	40	40	36	30	34
4	35	35	37	37	38	35	37	71	92	108	110	108	105	103	98	94	78	68	65	54	47	34	29	33
5	34	34	35	36	34	36	36	67	S 98	106	128	116	111	100	89	90	90	77	49	41	40	35	28	30
6	32	32	33	35	35	36	35	69	86	91	102	112	117	107	104	96	84	62	56	46	36	29	28	30
7	31	32	33	36	34	34	40	65	90	99	105	104	99	104	106	99	100	84	62	58	60	54	34	33
8	36	34	35	37	44	33	38	71	81	98	125	112	117	123	110	102	112	98	68	44	40	38	39	40
9	37	37	36	37	38	38	39	61	80	87	107	114	116	112	98	96	88	89	75	48	40	36	34	34
10	32	32	32	34	37	30	29	68	86	88	98	105	C	90	98	92	78	76	56	46	48	S 36	S 34	35
11	37	34	36	34	36	36	36	63	92	103	104	111	122	S 103	100	90	90	62	59	55	35	36	38	36
12	40	37	36	37	38	35	37	79	100	100	111	100	97	103	104	94	85	73	57	52	48	40	38	38
13	C	37	37	37	38	39	40	76	93	99	109	110	103	105	100	90	90	83	64	44	42	37	36	35
14	38	35	36	36	36	39	43	71	86	98	119	127	121	112	101	100	93	74	62	61	50	37	33	35
15	35	38	34	32	S 33	34	42	63	88	104	126	140	126	106	107	108	94	80	64	52	42	33	36	36
16	C	38	38	37	37	34	36	73	119	117	105	115	117	116	111	95	82	65	70	49	48	43	33	32
17	32	33	34	35	31	31	36	76	106	109	117	122	104	100	102	92	94	77	62	49	42	35	35	38
18	33	34	34	35	36	36	38	71	92	95	112	118	C	103	102	99	82	79	72	42	36	34	33	35
19	37	38	38	39	39	39	39	74	102	100	109	124	124	121	114	113	106	85	74	50	46	49	50	52
20	54	44	40	38	35	34	34	64	105	118	R 136	143	130	119	119	108	99	91	64	44	44	35	38	42
21	39	36	36	40	42	34	39	82	S 98	U 110	S 136	134	133	120	116	123	117	92	75	70	58	61	51	Z 41
22	45	40	F	F	F	49	58	72	104	125	142	133	125	124	118	111	105	76	78	54	49	36	32	34
23	34	37	37	37	36	36	36	73	93	134	125	118	104	102	110	101	89	67	54	57	62	S 46	39	39
24	41	42	38	32	32	30	37	73	108	S 118	122	121	104	103	100	92	80	74	68	39	34	36	40	39
25	38	40	36	35	37	38	36	61	97	132	127	128	126	112	108	110	H 86	63	52	48	46	40	47	36
26	30	33	32	33	31	30	33	61	98	110	133	103	120	106	116	108	86	62	52	47	40	34	36	35
27	37	41	35	36	38	41	43	63	82	116	137	133	118	118	92	94	88	82	60	51	53	46	48	55
28	46	33	30	33	34	34	36	64	102	99	106	118	115	94	95	93	86	69	59	50	37	31	35	35
29	34	34	36	32	28	30	29	54	77	84	101	108	98	80	82	86	76	66	51	55	42	40	34	36
30	38	40	40	36	31	F	30	48	66	85	114	124	102	81	71	79	74	63	48	38	35	32	33	33
31	37	40	32	35	35	30	30	56	73	92	92	92	89	76	73	75	66	51	51	53	34	31	30	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	31	30	30	30	30	31	31	31	31	31	31	29	31	31	31	31	31	31	31	31	31	31	31
MED	37	37	36	36	36	34	37	71	92	103	112	116	116	105	104	96	89	74	62	49	42	36	34	35
U Q	39	40	37	37	38	37	40	74	100	110	126	124	123	116	110	108	96	82	68	54	48	40	38	38
L Q	34	34	34	35	34	33	36	63	86	95	105	110	104	100	98	92	82	65	54	44	38	34	33	34

DEC. 2002 foF2 (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC. 2002 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

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

DEC. 2002 foF1 (0.01MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC. 2002 foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								160	U R 260	304	R	U R 348	352	R	288	268	200							
2								196	U A 264	U R 304	U A 336	R	348	U R 320	U R 292	A	R							
3								U R 180	U R 264	A	U R 328	R	U R 352	U R 328	296	U A 256	U A 180							
4								U A 164	256	U R 308	U R 328	A	348	R	A	U A 264	A							
5								B	R	R	U A 316	R	R	A	A	A	A							
6								164	U R 268	R	R	R	R	R	304	U R 268	U R 196							
7								160	A	A	A	340	U R 344	U R 324	U R 300	U R 260	B							
8								B	244	U A 300	A	A	R	R	R	U R 272	R							
9								B	272	U A 304	A	R	R	U R 328	U R 304	U R 272	188							
10								200	U A 272	A	A	A	C	R	U R 300	U R 272	220							
11								B	256	316	U R 332	352	360	328	U A 304	260	200							
12								188	264	U R 312	U A 336	A	R	U R 340	U R 324	U R 272	176							
13								B	264	U R 308	U R 332	U R 352	U R 356	U R 340	U R 324	280	208							
14								160	A	U R 308	U A 332	A	A	U R 352	U R 324	A	200							
15								U R 184	U R 264	U R 316	A	U R 340	U R 356	336	U R 308	U R 272	U R 184							
16								B	U R 272	U R 332	A	R	360	U R 336	U R 308	268	180							
17								B	U R 272	U A 316	U A 340	R	U R 360	A	A	A	A							
18								164	264	U R 316	U R 332	U R 340	C	A	U R 308	268	A							
19								B	U R 256	R	R	A	A	R	U R 308	U R 268	A							
20								B	A	A	A	A	A	B	316	R	A							
21								B	A	U A 300	R	A	A	A	A	U R 288	208							
22								B	244	296	R	344	U A 376	A	A	A	A							
23								B	240	A	A	U R 344	U R 352	U R 324	U R 308	U R 256	200							
24								B	U R 272	U A 304	A	A	A	A	A	R	A							
25								B	240	296	A	U R 356	R	U R 336	U R 304	U R 256	U R 216							
26								B	U R 244	284	A	A	R	U R 316	U R 300	268	A							
27								B	244	A	A	A	A	A	R	U R 256	A							
28								164	248	A	A	A	A	A	A	A	A							
29								B	240	A	R	U R 328	U R 336	U R 308	R	U R 268	220							
30								B	240	A	308	A	U R 332	A	A	U A 272	U A 236							
31								B	240	U R 296	R	R	340	R	A	252	184							
	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	26	19	11	10	15	14	19	23	17							
MED								164	258	U 304	U 332	U R 344	U R 352	U R 328	U R 304	U R 268	200							
U Q								186	U R 264	U R 316	U A 336	U R 352	360	U R 336	U R 308	U R 272	212							
L Q								162	244	300	U 328	U R 340	U R 344	U R 324	U R 300	U 260	184							

DEC. 2002 foE (0.01MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC. 2002 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 15	E B 15	E B 14	19	E B 16	E B 16	E B 15	22	G	G 24	G 28	G 32	41	G 29	32	G 22	26	J A 20	J A E B 24	15	19	20	J A E B 20	15
2	19	E B 15	E B 15	E B 14	E B 15	E B 15	E B 16	23	J A 42	G 28	35	G 28	G 28	G 20	G 23	J A 44	G 21	J A 24	E B 15	E B 15	20	J A 21	J A E B 20	15
3	E B 16	E B 14	E B 15	E B 15	E B 15	E B 15	E B 15	G	G 32		G	G	G 28	G	G 21	J A 28	J A 20	J A 18	A E B 16	20	E B 15	J A 22	E B E B 15	16
4	E B 20	E B 16	E B 16	18	E B 15	18	E B 15	22	G 19	G 23	36	36	J A 37	G 29	J A J A 32	J A 34	J A 26	J A 27	A E B E 16	B E 16	E B 15	E B 16	E B E B 16	15
5	E B 16	E B 16	E B 15	E B 15	E B E B 15	E B 15	E B 16	20	G	G 20	34	G 30	G 34	J A J A 50	J A 38	35	J A 34	J A 29	J A J A 26	J A 18	J A J A 21	34	19	J A 22
6	J A 23	J A 21	20	18	18	E B 15	E B 15	20	G 24	G 24	G 28	G 27	G 27	G 26	33	G	G 17	J A 20	J A J A 22	J A 20	J A 21	E B 15	J A J A 23	18
7	E B 15	J A 20	E B 14	E B 15	E B 15	E B 15	E B 15	G	28	33	J A 44	G 29	G 29	G 28	G 24	G	21	J A 20	J A 24	19	E B 14	E B 15	C E B 28	16
8	E B 16	E B 16	E B 15	J A 18	18	J A J 17	A E B 20	16	G 23	33	J A J 41	A 41	G 31	G 27	G	G	G E 15	B E B 15	15	20	J A 20	20	E B E B 15	16
9	E B 16	E B 15	E B 14	E B 14	E B 14	20	E B 15	22	31	34	35	G 28	G 28	G 28	G 27	G	G	J A 23	E B 16	20	E B 16	E B 17	E B 15	E B 15
10	E B 15	E B 16	20	19	E B 16	E B 15	E B 15	G	29	35	J A J 40	A 40	C	G	G	32	25	E B 15	J A 22	22	E B 16	22	J A 18	20
11	E B 15	E B 16	E B 15	E B 14	E B 15	E B 15	E B 15	20	32	G 28	G 29	G 31	39	40	34	29	22	E B 15	E B 15	E B 15	19	20	J A 18	E B 14
12	E B 15	E B 14	E B 15	E B 14	E B 15	E B 15	E B 16	G	G	G 27	36	38	G 34	G 32	G 28	G	G	18	E B 16	E B 16	E B 16	E B 16	E B E B 15	B 15
13	C	E B 14	E B 15	E B 14	E B 16	E B 15	E B 14	19	G	G 20	G 20	G	G 28	G 25	G 27	G	G	E B 15	E B 16	E B 16	E B 16	E B 14	E B 15	E B 16
14	E B 15	J A J 18	A J 21	A E B 15	E B 16	E B 15	E B 15	20	J A 29	G 20	38	40	J A 40	G 30	G 30	J A 32	G 18	E B 15	J A E 17	B 15	J A E B 25	E B 14	E B 15	B 14
15	J A 26	E B J 16	A E B 25	15	E B 15	E B 18	16	G	G	G 20	35	G 32	G 31	G 29	G 26	G 26	22	E B 16	E B E B 16	E B 15	E B 15	E B E B 15	E B 16	E B 15
16	C	J A J 52	A E B 32	16	E B 16	19	E B 16	20	G 24	G J 28	A 44	G 34	G 33	G 30	G 26	30	23	J A E B 20	15	20	E B E B 14	15	E B E B 14	15
17	E B 16	E B 16	E B 14	E B 15	E B 15	E B 15	E B 15	E B 16	G 20	34	36	G 31	39	40	J A J 46	A J 44	A J 46	A E B 24	E B 14	E B 16	19	E B 15	E B E B 16	16
18	E B 16	E B 15	E B 16	E B 15	E B 15	E B 15	E B 15	20	G 19	G 30	G 32	J A 36	C	J A 46	G J 28	A J 29	A J 28	A J 29	A J A 22	19	E B 16	E B 16	22	J A 18
19	E B 16	E B 15	E B 14	E B 15	E B 15	E B 16	E B 15	G	J A 28	G 21	G 28	38	38	G 30	G 28	G 23	G J 26	A J 21	A 20	E B 16	E B 19	E B 15	E B E B 15	16
20	E B 15	J A J 24	A J 22	28	J A 54	J A 19	A E B 14	J A 24	J A 42	J A 43	J A 49	J A 51	40	E B 35	34	G 27	24	J A 24	J A J 44	A J 28	J A 31	J A 30	A E B 16	B 15
21	E B 15	E B 15	E B 13	J A 19	J A 17	A E B 15	J A 22	18	J A 34	G 28	G 29	J A 73	39	J A 70	J A 41	G 23	27	J A 28	J A E B 38	15	E B 16	E B 16	E B E B 16	B 15
22	E B 16	E B 15	E B 14	E B 15	E B 16	E B 15	E B 16	20	G 20	32	G 27	38	40	J A J 55	A J 46	A J 43	A J 48	A J 32	A J A J 26	A 23	19	E B 15	J A J 30	A 20
23	J A J 32	A J 27	A J 19	A E B 15	J A 21	E B 18	16	19	27	J A 37	38	G 28	G 27	G 24	G 20	G 19	23	J A E 33	B E B 15	15	E B 15	E B 15	J A E 19	B 15
24	20	J A E 17	B E B 16	E B 15	E B 15	E B 15	E B 15	19	G 21	34	37	J A 42	J A 38	34	J A 34	G 28	J A 23	J A 21	A J A 18	E B 15	J A E B 20	E B 14	E B 15	B 14
25	E B 16	E B 15	E B 16	E B 14	E B 14	E B 16	E B 15	E B 15	G	33	J A 41	G 30	G 23	G 32	G	G	G	23	E B E 18	B 16	J A 21	E B 16	18	E B 16
26	J A 23	E B E 16	B 16	19	E B 16	E B 16	E B 15	E B 16	G	31	J A J 42	A 36	J G 30	G 28	G 25	G 26	J A 30	E B 15	E B E 16	B E 16	E B 15	18	J A J 29	A 35
27	E B 16	19	J A 19	J A J 32	A J A 20	E 16	B E 16	B E 15	31	J A 45	J A 46	J A 46	J A 54	J A 39	G 32	G 24	J A 29	J A 24	E B 15	22	J A 20	20	J A J 18	A 36
28	J A 28	J A 23	J A 23	19	18	19	E B 15	21	J A 35	J A J 52	A J 37	A J 89	J A 77	J A 52	J A 47	J A 57	J A 111	J A 80	J A 46	A J 31	J A 32	J A 99	J A 31	A 26
29	E B 16	J A 16	E B 15	E B 15	E B 14	E B 15	E B 15	19	31	J A 41	G 26	J A 41	G 29	J A 33	G 25	G	26	E B 16	J A J 101	A 75	J A 31	J A 23	J A 27	A 27
30	J A J 28	A J 30	A J 38	A J 46	A J 25	A J 23	A J 17	A J 20	30	31	36	J A 47	G 29	34	J A J 40	A 33	26	J A 26	J A E 19	B E 15	E B 15	E B 15	E B 16	B J 32	A
31	J A J 21	A J 35	A 23	19	E B 14	E B 15	E B 14	20	27	G	G	G 32	G 31	G 30	33	G 23	22	E B 15	E B 16	E B 15	E B 15	E B 16	E B 15	E B 15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	31	31	31	31	31	31	31	31	31	31	31	29	31	31	31	31	31	31	31	31	31	31	31
MED	E B 16	E B 16	E B 16	E B 15	E B 15	E B 15	E B 15	19	G	31	36	36	G 33	G 31	G	G	23	J A 21	E B 17	E B 16	19	E B 16	E B 16	E B 16
U Q	J A J 20	A J 20	A J 20	19	J A 17	18	E B 16	20	31	J A J 34	A J 40	A 41	39	J A J 39	A J 34	A J 32	J A 27	J A 26	A J 24	A J 20	J A 20	20	J A 20	A 20
L Q	E B 15	E B 15	E B 15	E B 15	E B 15	E B 15	E B 15	G	G 24	G 24	G 29	G 31	G 28	G 28	G 26	G 26	G	E B 16	E B 16	B E 15	E B 15	E B 15	E B 15	B E 15

DEC. 2002 foEs (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC. 2002 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 15	E B 15	E B 14	E B 15	E B 16	E B 16	E B 15	21	G	G 24	G 28	G 30	39	G 28	31	G 22	25	15	E B 15	E B 15	17	17	15	E B 15
2	E B 14	E B 15	E B 15	E B 14	E B 15	E B 15	E B 16	22	G 23	G 24	34	G 28	G 27	G 19	G 23	34	G 20	E B 15	E B 15	E B 15	E B 16	18	E B 15	E B 15
3	E B 16	E B 14	E B 15	E B 15	E B 15	E B 15	E B 15	G	G 30		G	G	G 28	G	G 21	G 21	G 16	16	E B 16	E B 16	E B 15	17	E B 15	E B 16
4	E B 20	E B 16	E B 16	E B 14	E B 15	E B 16	E B 15	21	G 19	G 22	36	35	G 32	G 28	32	G 24	23	22	E B 16	E B 16	E B 15	E B 16	E B 16	E B 15
5	E B 16	E B 16	E B 15	E B 15	E B 15	E B 15	E B 16	20	G	G 20	34	U Y 30	U Y 34	34	36	33	31	26	21	16	19	27	E B 16	E B 15
6	17	16	16	E B 15	E B 15	E B 15	E B 15	20	G 23	G 23	G 27	G 27	G 25	G 25	32	G	G 17	17	17	16	19	E B 15	16	E B 15
7	E B 15	E B 16	E B 14	E B 15	E B 15	E B 15	E B 15	G	28	31	35	G 28	G 28	G 28	G 23	G	21	16	E B 16	16	E B 14	E B 15	E C 28	E B 16
8	E B 16	E B 16	E B 15	16	E B 15	E B 15	16	E B 16	G 23	32	36	36	G 30	G 26	G	G	G	E B 15	E B 15	E B 16	16	19	E B 15	E B 16
9	E B 16	E B 15	E B 14	E B 14	E B 14	17	E B 15	20	28	32	34	G 28	G 28	G 28	G 27	G	G	15	E B 16	E B 16	E B 16	E B 17	E B 15	E B 15
10	E B 15	E B 16	E B 15	E B 15	E B 16	E B 15	E B 15	G	28	33	36	37	C	G	G	31	25	E B 15	19	E B 15	E B 16	E B 16	E B 16	E B 15
11	E B 15	E B 16	E B 15	E B 14	E B 15	E B 15	E B 15	19	30	G 28	G 28	G 30	38	38	33	28	22	E B 15	E B 15	E B 15	E B 15	E B 15	E B 16	E B 14
12	E B 15	E B 14	E B 15	E B 14	E B 15	E B 15	E B 16	G	G	G 27	36	36	U Y 34	G 32	G 28	G	G	17	E B 16	E B 16	E B 16	E B 16	E B 15	E B 15
13	C	E B 14	E B 15	E B 14	E B 16	E B 15	E B 14	19	G	G 17	G 20	G	G 28	G 25	G 24	G	G	E B 15	E B 16	E B 16	E B 16	E B 14	E B 15	E B 16
14	E B 15	E B 15	E B 15	E B 15	E B 16	E B 15	E B 15	20	27	G 20	35	39	37	G 29	G 27	29	G 18	E B 15	16	E B 15	16	E B 14	E B 15	E B 14
15	E B 14	E B 16	E B 14	E B 15	E B 15	E B 15	E B 16	G	G	G 20	34	G 32	G 30	G 28	G 26	G 26	21	E B 16	E B 16	E B 15	E B 15	E B 15	E B 16	E B 15
16	C	20	25	E B 16	E B 16	E B 15	E B 16	19	G 24	G 28	36	G 32	G 31	G 29	G 25	29	22	E B 16	E B 15	E B 16	E B 14	E B 15	E B 14	E B 15
17	E B 16	E B 16	E B 14	E B 15	E B 15	E B 15	E B 15	E B 16	G 20	34	36	G 30	38	38	42	38	40	20	E B 14	E B 16	E B 16	E B 15	E B 16	E B 16
18	E B 16	E B 15	E B 16	E B 15	E B 15	E B 15	E B 15	19	G 19	G 30	G 32	G 31	C	38	G 24	G 20	23	21	18	E B 15	E B 16	E B 16	E B 16	E B 15
19	E B 16	E B 15	E B 14	E B 15	E B 15	E B 16	E B 15	G	G 19	G 21	G 27	37	36	G 30	G 27	G 23	23	16	E B 15	E B 16	E B 15	E B 15	E B 15	E B 16
20	E B 15	20	17	25	E B 16	16	E B 14	22	37	42	48	38	38	E B 35	33	U Y 27	23	20	17	18	21	20	E B 16	E B 15
21	E B 15	E B 15	E B 13	E B 15	E B 14	E B 15	21	16	28	G 25	G 28	67	36	48	34	G 23	25	21	32	E B 15	E B 16	E B 16	E B 16	E B 15
22	E B 16	E B 15	E B 14	E B 15	E B 15	E B 16	E B 15	19	G 19	30	G 27	36	40	41	36	40	35	29	20	19	E B 15	E B 15	E B 16	E B 16
23	16	17	16	E B 15	E B 15	16	E B 16	19	27	31	35	G 20	G 23	G 22	G 18	G 18	23	31	E B 15	E B 15	E B 15	E B 15	16	E B 15
24	E B 16	E B 15	E B 16	E B 15	E B 15	E B 15	E B 15	19	G 21	G 30	35	34	34	34	32	G 28	23	16	E B 14	E B 15	E B 16	E B 14	E B 15	E B 14
25	E B 16	E B 15	E B 16	E B 14	E B 14	E B 16	E B 15	E B 15	G	32	34	G 22	G 23	G 28	G	G	G	20	E B 18	E B 16	E B 15	E B 16	E B 15	E B 16
26	16	E B 16	E B 16	E B 15	E B 16	E B 16	E B 15	E B 16	G	31	35	34	G 28	G 20	G 21	G 21	22	E B 15	E B 16	E B 16	E B 15	E B 16	E B 15	17
27	E B 16	E B 16	E B 16	22	E B 16	E B 16	E B 16	E B 15	30	41	38	35	40	34	G 30	G 22	21	20	E B 15	E B 15	E B 15	E B 16	E B 15	22
28	E B 15	E B 15	E B 15	E B 15	E B 16	E B 16	E B 15	20	31	41	32	44	46	36	37	51	41	22	E C 28	23	21	16	20	20
29	E B 16	E B 15	E B 15	E B 15	E B 14	E B 15	E B 15	19	28	38	G 21	G 24	G 24	G 25	G 22	G	23	E B 16	43	37	21	18	19	18
30	24	19	25	19	E B 15	E B 16	E B 16	E B 18	28	29	35	36	G 27	34	32	G 21	G 20	20	E B 15	E B 15	E B 15	E B 15	E B 16	20
31	E B 16	18	E B 16	E B 16	E B 14	E B 15	E B 14	19	26	G	G	G 32	G 30	G 30	32	G 22	21	E B 15	E B 16	E B 15	E B 15	E B 16	E B 15	E B 15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	31	31	31	31	31	31	31	31	31	31	31	29	31	31	31	31	31	31	31	31	31	31	31
MED	E B 16	E B 16	E B 15	E B 15	E B 15	E B 15	E B 15	19	G	G 30	34	G	G 31	G 30	G	G	22	16	E B 16	E B 16	E B 16	E B 16	E B 16	E B 15
U Q	16	16	16	15	E B 16	E B 16	E B 16	20	28	32	36	36	38	34	32	29	23	20	18	16	16	17	16	16
L Q	E B 15	E B 15	E B 14	E B 15	E B 15	E B 15	E B 15	G	G 23	G 24	G 28	G 30	G 28	G 28	G 24	G 22	G	E B 15	E B 15	E B 15	E B 15	E B 15	E B 15	E B 15

DEC. 2002 fbEs (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.2002 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	15	15	14	15	16	16	15	14	15	16	14	19	19	16	16	16	16	11	15	15	14	14	15	15
2	14	15	15	14	15	15	16	14	14	15	17	19	14	14	15	16	14	15	15	15	16	15	15	15
3	16	14	15	15	15	15	15	14	16	14	E C 28	18	19	23	16	15	16	16	16	16	15	15	15	16
4	20	16	16	14	15	16	15	14	15	16	15	16	19	20	14	15	14	14	16	16	15	16	16	15
5	16	16	15	15	15	15	16	16	20	16	16	19	21	19	19	16	14	14	15	14	15	16	16	15
6	14	15	15	15	15	15	15	12	15	16	15	18	20	17	15	17	15	14	15	14	15	15	15	15
7	15	16	14	15	15	15	15	14	18	16	21	20	20	18	18	15	16	14	16	14	14	15	E C 28	16
8	16	16	15	13	15	15	14	16	16	16	16	18	17	20	17	15	16	15	15	16	14	15	15	16
9	16	15	14	14	14	14	15	14	16	20	16	19	20	22	20	18	14	14	16	16	16	17	15	15
10	15	16	15	15	16	15	15	14	16	16	20	20	C	30	23	16	16	15	15	15	16	16	16	15
11	15	16	15	14	15	15	15	15	15	15	16	20	20	16	16	17	13	15	15	15	15	15	16	14
12	15	14	15	14	15	15	16	16	15	15	17	20	20	20	18	19	13	14	16	16	16	16	15	15
13	C	14	15	14	16	15	14	14	16	14	16	21	17	20	17	16	16	15	16	16	16	14	15	16
14	15	16	15	15	16	15	15	14	15	15	19	16	18	21	19	15	15	15	14	15	15	14	15	14
15	14	16	14	15	15	16	16	14	16	13	18	18	20	20	22	16	14	16	16	15	15	15	16	15
16	C	16	15	16	16	15	16	16	14	15	20	19	24	20	19	13	13	16	15	16	14	15	14	15
17	16	16	14	15	15	15	15	16	15	20	20	19	20	15	16	18	14	15	14	16	16	15	16	16
18	16	15	16	15	15	15	15	14	14	20	19	19	C	20	16	14	14	14	14	15	16	16	16	15
19	16	15	14	15	15	16	15	14	14	14	20	22	21	16	20	15	13	14	15	16	15	15	15	16
20	15	16	14	14	16	16	14	14	17	18	23	30	35	35	27	20	14	13	14	14	14	15	16	15
21	15	15	13	15	14	15	14	14	16	17	19	21	22	20	16	16	13	14	16	15	16	16	16	15
22	16	15	14	15	16	15	16	16	16	16	16	20	24	18	15	14	16	14	16	14	15	15	16	16
23	14	14	15	15	15	13	16	15	15	16	14	15	16	15	15	15	15	14	15	15	15	15	14	15
24	16	15	16	15	15	15	15	14	15	15	16	20	20	20	17	14	15	14	14	15	16	14	15	14
25	16	15	16	14	14	16	15	15	12	16	19	16	17	20	19	20	14	15	18	16	15	16	15	16
26	14	16	16	15	16	16	15	16	14	14	20	19	20	16	17	16	14	15	16	16	15	16	15	15
27	16	16	16	15	16	16	16	15	16	14	16	14	20	19	17	14	14	15	15	15	15	16	15	16
28	15	16	15	15	16	16	15	14	13	18	20	21	22	20	19	16	15	14	E C 28	15	15	14	15	16
29	16	15	15	15	14	15	15	15	14	14	16	16	14	16	13	19	18	16	14	15	16	15	16	16
30	15	15	14	14	15	16	16	18	16	17	17	18	20	18	14	16	15	12	15	15	15	15	16	16
31	16	14	16	16	14	15	14	16	18	14	20	21	20	23	21	19	15	15	16	15	15	16	15	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	31	31	31	31	31	31	31	31	31	31	31	29	31	31	31	31	31	31	31	31	31	31	31
MED	15	15	15	15	15	15	15	14	15	16	17	19	20	20	17	16	14	14	15	15	15	15	15	15
U Q	16	16	15	15	16	16	16	16	16	16	20	20	20	20	19	17	16	15	16	16	16	16	16	16
L Q	15	15	14	14	15	15	15	14	14	14	16	18	18	16	16	15	14	14	15	15	15	15	15	15

DEC.2002 fmin (0.1MHz) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.2002 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	277	264	270	340	399	268	306	357	344	302	315	308	330	321	314	320	347	339	299	330	305	283	259	S 270
2	290	323	295	268	281	284	306	357	339	341	339	322	318	321	333	328	334	346	341	344	337	291	266	270
3	S 260	275	312	288	283	271	308	346	346	339	336	327	313	319	328	327	338	331	334	322	314	312	287	296
4	286	285	286	298	303	291	300	341	349	349	339	331	325	318	321	345	337	327	333	339	341	320	283	296
5	276	278	281	301	293	282	326	337	S 347	328	350	343	337	338	318	324	339	336	332	321	328	321	297	276
6	273	256	270	300	299	314	300	361	359	352	322	320	324	312	319	329	343	319	327	342	345	301	273	275
7	272	271	280	304	275	276	327	356	356	357	323	326	315	306	328	314	331	328	334	302	322	327	324	277
8	285	278	270	277	330	284	312	345	347	317	332	315	307	311	314	297	324	339	336	296	304	281	290	289
9	283	283	270	286	300	289	338	356	365	338	331	325	317	332	317	323	321	339	352	331	300	319	273	278
10	278	277	276	287	321	342	301	365	355	360	324	341	C	310	323	332	337	328	342	317	290	S 309	S 306	275
11	285	302	291	287	289	304	327	343	367	350	346	323	319	S 301	321	330	354	319	314	357	325	277	285	290
12	296	304	278	293	304	305	300	349	351	356	340	335	303	324	323	342	324	341	335	324	305	304	292	303
13	C	285	274	279	288	297	321	349	354	347	340	329	330	314	324	324	317	324	346	331	313	316	321	276
14	301	275	270	264	280	298	336	356	362	331	326	321	315	322	318	322	335	319	330	321	335	298	265	277
15	282	302	304	255	S 258	269	342	352	336	311	311	315	317	307	303	315	322	326	329	315	349	295	308	278
16	C	297	287	313	308	280	281	322	355	347	321	313	313	324	325	342	331	299	340	335	319	339	313	285
17	286	281	279	309	315	295	306	342	346	345	326	336	322	333	321	324	336	325	326	310	319	308	305	306
18	286	272	269	284	286	298	322	352	346	351	335	339	C	318	318	329	326	330	357	323	322	302	278	277
19	292	267	268	280	291	287	322	339	345	332	317	318	317	309	302	302	321	318	335	311	281	239	243	265
20	264	242	247	245	244	247	254	293	321	311	R 331	326	321	316	317	329	326	338	335	314	306	259	286	300
21	321	264	268	257	313	284	281	343	S 351	U 348	S 334	306	320	289	289	304	320	318	327	331	313	320	334	Z 280
22	289	294	F	F	F	269	336	361	344	335	336	338	317	311	315	322	336	312	332	329	308	333	268	281
23	277	284	281	268	277	271	296	333	339	344	341	328	315	294	313	304	327	314	301	313	331	S 296	269	268
24	270	298	304	274	260	257	295	332	347	S 337	325	337	313	323	320	331	325	323	350	325	292	273	284	287
25	278	287	283	261	273	288	306	337	325	350	319	319	317	330	312	326	H 320	320	336	331	320	301	322	327
26	279	289	296	294	293	275	295	341	343	331	352	330	330	319	326	339	349	334	329	338	307	273	279	288
27	284	302	291	274	290	289	326	339	336	348	318	347	325	340	310	330	318	326	330	297	304	285	273	315
28	339	306	297	280	285	282	285	321	349	333	327	323	327	325	316	336	334	338	330	297	332	295	296	311
29	290	282	313	318	299	290	312	362	361	355	346	345	347	327	327	338	353	340	311	357	350	331	293	289
30	298	299	319	329	269	F	302	349	346	326	334	352	355	363	350	346	354	341	335	338	325	279	278	283
31	299	333	296	300	307	296	290	338	338	349	342	348	354	341	334	344	352	324	330	327	304	289	277	280
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	31	30	30	30	30	31	31	31	31	31	31	29	31	31	31	31	31	31	31	31	31	31	31
MED	285	284	281	286	290	286	306	345	347	344	332	327	319	319	319	328	334	327	333	325	319	301	285	281
U Q	291	299	296	300	304	296	326	356	355	350	340	338	328	327	325	336	339	338	336	335	331	319	305	296
L Q	277	275	270	274	280	275	296	338	343	331	323	320	315	311	314	322	324	319	329	314	305	283	273	276

DEC.2002 M(3000)F2 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.2002 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

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

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

DEC.2002 M(3000)F1 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.2002 h'F2 (KM) 135°E MEAN TIME (G.M.T. + 9 H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1												292			270									
2																								
3																								
4										244														
5												256	256											
6												272	250											
7											276			278										
8										262	260			280										
9											266													
10											274		C											
11												262	280											
12																								
13											256			280										
14																								
15											286	282												
16												282			266									
17																								
18												258	C		268									
19												270												
20																								
21											262				294									
22														282										
23																								
24											260													
25																								
26															260									
27											284													
28														248										
29											236	242												
30										276	266		242											
31												252	236											
	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	11	10	5	5	5									
MED										262	266	266	250	280	268									
U Q										276	276	282	268	281	282									
L Q										244	260	256	239	263	263									

DEC.2002 h'F2 (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.2002 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	E B 312	E B 332	E B 316	234	196	E B 330	256	216	206	206	H 186	214	220	218	H 182	H 180	214	190	212	206	242	252	E B 328	E B 330
2	E B 288	240	266	E B 316	E B 288	266	240	212	218	226	216	204	H 196	224	H 206	228	214	208	218	210	216	252	E B 338	E B 332
3	E B 312	E B 314	256	278	E B 296	E B 312	258	218	206	H 198	224	H 194	216	H 196	H 206	228	214	196	204	228	230	244	E B 274	E B 296
4	E B 318	E B 304	E B 298	E B 276	260	246	252	220	202	H 180	222	210	H 194	216	222	216	210	216	222	212	214	218	E B 296	E B 286
5	E B 302	E B 314	E B 316	260	E B 264	E B 306	210	206	222	216	222	204	202	224	210	220	216	212	206	230	228	E A 300	242	E B 322
6	E A 310	E A 344	E A 334	E B 286	E B 284	256	222	206	H 202	H 196	220	206	H 188	212	216	222	216	200	216	212	226	264	E A 338	E B 324
7	E B 330	E B 322	E B 310	268	E B 292	E B 296	230	H 182	216	208	208	214	212	198	234	220	224	210	212	252	226	210	E C 288	E B 310
8	E B 298	E B 278	E B 324	E A 314	240	E B 270	248	H 156	202	204	222	222	214	214	218	228	222	210	198	192	234	E A 282	E B 276	270
9	270	E B 300	E B 318	E B 302	E B 276	E A 300	204	206	206	212	204	224	228	214	214	214	H 184	216	208	198	224	222	E B 286	E B 290
10	E B 312	E B 316	E B 320	E B 282	240	210	E B 274	218	216	216	212	220	C	210	238	224	214	212	200	216	210	250	248	E B 298
11	E B 290	268	E B 288	E B 300	E B 286	260	242	204	210	222	224	H 182	224	212	224	220	216	202	210	204	210	246	E B 286	294
12	274	256	E B 306	E B 284	258	248	252	230	210	212	214	218	210	226	228	220	216	202	204	216	226	226	260	254
13	C	270	E B 296	E B 298	E B 290	266	232	214	206	210	210	210	230	210	224	216	220	204	206	206	232	228	236	E B 308
14	268	E B 290	E B 312	E B 328	E B 284	250	224	214	208	212	214	214	218	214	228	224	218	208	214	228	208	222	E B 294	E B 302
15	E B 298	272	244	E B 346	E B 370	E B 318	210	212	214	218	210	228	232	212	220	226	214	210	210	208	210	260	258	E B 286
16	C	E A 296	E A 330	244	242	266	274	248	224	210	206	212	226	222	210	218	216	198	224	208	246	216	240	274
17	E B 302	E B 308	E B 308	274	236	E B 296	252	228	216	214	216	218	218	224	222	220	228	218	200	208	218	238	264	252
18	270	E B 320	E B 334	E B 314	E B 286	254	226	216	212	210	224	212	C	220	H 192	226	206	230	212	198	226	250	E B 296	E B 316
19	E B 292	E B 320	E B 326	E B 286	262	270	242	222	212	210	208	220	226	224	212	218	218	206	216	200	240	E B 312	E B 324	E B 296
20	276	E A 336	E A 372	E A 426	E B 380	E A 374	E B 286	264	232	222	228	220	226	202	226	214	222	216	202	228	E A 242	E A 262	E B 284	272
21	232	E B 330	E B 326	E B 314	240	E B 274	E A 300	H 208	202	212	214	244	208	232	218	238	222	208	E A 244	220	224	234	212	E B 270
22	272	248	268	E B 290	236	286	222	204	208	214	216	220	220	210	220	220	218	214	218	208	206	220	E B 296	E B 284
23	E B 290	E B 308	E A 284	E A 292	E B 304	E B 308	E A 278	E B 224	198	232	212	H 200	204	214	H 204	224	218	224	212	242	228	206	E A 280	E B 308
24	E B 286	266	252	E B 302	E B 328	E B 378	268	228	228	222	218	218	210	208	224	228	212	208	218	200	254	E B 292	E B 286	296
25	270	E B 280	276	E B 340	E B 308	E B 292	224	H 188	232	218	210	210	210	222	200	224	198	202	222	222	230	262	246	232
26	E A 302	E B 302	260	252	262	E B 322	258	208	230	214	228	216	218	210	204	224	214	198	214	216	226	E B 298	E B 312	E A 310
27	E B 302	272	260	E A 342	E B 290	E B 280	238	210	204	240	226	216	222	H 206	210	226	214	214	198	244	248	258	E B 280	250
28	226	214	E B 306	E B 292	E B 312	E B 276	E B 284	230	230	204	218	234	238	210	236	234	228	208	226	238	220	E A 280	E A 300	E A 282
29	E B 266	E B 290	264	242	244	E B 292	244	208	214	216	206	204	210	H 192	H 200	222	218	212	E A 330	230	222	E A 242	E A 270	E A 286
30	E A 300	E A 276	266	258	E B 342	E B 320	242	202	214	204	222	226	204	212	212	204	212	210	214	212	232	260	E B 302	E B A 338
31	E B 286	248	262	276	234	256	262	232	222	232	214	212	204	220	212	H 210	214	194	230	206	228	254	E B 298	E B 314
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	31	31	31	31	31	31	31	31	31	31	31	29	31	31	31	31	31	31	31	31	31	31	31
MED	E B 290	E B 296	E B 306	E B 290	E B 284	E B 280	241	214	212	212	216	214	216	214	216	222	216	208	212	212	226	U 239	E B 286	E B 296
U Q	E B 302	E B 316	E B 320	E B 314	E B 296	E B 308	E 262	224	222	218	222	220	225	222	224	226	218	214	218	228	232	E 262	E B 298	E B 310
L Q	271	270	266	274	242	260	226	206	206	208	210	210	206	210	H 206	218	214	202	206	206	218	226	260	274

DEC.2002 h'F (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.2002 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								122	114	116	120	114	118	114	120	120	120							
2								124	120	118	122	122	114	114	116	A	A							
3								116	114	A	120	112	118	114	112	112	124							
4								124	116	118	122	112	122	118	A	120	A							
5								B	120	116	130	A	A	A	A	A	A							
6								120	128	120	120	118	118	114	112	122	116							
7								124	A	A	A	118	118	118	114	112	B							
8								B	112	120	A	A	120	114	110	120	118							
9								B	128	120	A	118	118	120	122	112	112							
10								E B 140	124	116	A	A	C	116	116	118	112							
11								B	118	118	118	116	114	112	120	116	120							
12								E B 148	116	120	118	116	A	122	118	118	116							
13								B	118	116	116	116	120	118	118	112	110							
14								122	114	118	120	112	A	124	122	A	A							
15								E B 134	116	114	118	120	120	114	116	110	E B 130							
16								B	122	124	A	118	114	116	114	126	112							
17								B	118	114	118	114	114	114	A	A	A							
18								E B 124	116	122	120	120	C	A	118	114	A							
19								B	126	116	116	A	A	A	120	120	A							
20								B	116	A	A	A	A	B	118	A	A							
21								B	A	120	118	A	A	A	A	118	118							
22								B	116	114	118	118	112	A	A	A	A							
23								B	116	A	A	116	112	116	110	112	116							
24								B	124	120	118	A	A	A	A	A	A							
25								B	114	108	A	118	112	112	110	110	128							
26								B	116	112	A	A	116	116	116	116	A							
27								B	118	118	114	110	A	A	122	122	A							
28								114	118	A	A	A	A	A	A	A	A							
29								B	118	A	114	114	114	112	108	118	118							
30								B	112	118	112	116	122	120	A	114	114							
31								B	120	118	118	118	118	120	A	114	118							
	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	29	25	21	22	20	22	22	23	17							
MED								122	118	118	118	116	118	116	116	116	117							
U Q								E B 129	120	120	120	118	119	118	120	120	120							
L Q								121	116	116	117	114	114	114	112	112	113							

IONOSPHERIC DATA STATION Kokubunji

DEC.2002 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	B	90	B	B	B	148	G	104	104	100	148	106	134	106	146	92	96	B	158	94	110	B
2	90	B	B	B	B	B	B	128	106	102	136	106	102	94	100	104	100	102	B	B	100	104	102	B
3	B	B	B	B	B	B	B	G	G	106	G	G	100	G	98	96	92	92	B	120	B	100	B	B
4	B	B	B	100	B	96	B	154	104	104	152	128	104	106	102	104	100	88	B	B	B	B	B	B
5	B	B	B	B	B	B	B	140	G	104	138	104	98	102	102	96	96	98	94	96	102	94	98	96
6	92	88	98	98	94	B	B	152	108	104	106	100	104	96	128	G	96	96	96	102	102	B	104	96
7	B	96	B	B	B	B	B	G	108	106	104	104	102	108	102	G	138	106	96	92	B	B	C	B
8	B	B	B	98	98	98	94	B	110	128	106	100	102	102	G	G	G	B	B	94	94	94	B	B
9	B	B	B	B	B	98	B	136	140	116	110	102	102	106	106	G	G	104	B	92	B	B	B	B
10	B	B	98	96	B	B	B	G	128	116	106	106	C	G	G	154	138	B	120	108	B	98	100	100
11	B	B	B	B	B	B	B	136	138	98	102	100	158	140	148	142	138	B	B	B	106	104	106	B
12	B	B	B	B	B	B	B	G	G	104	120	116	104	110	108	G	G	96	B	B	B	B	B	B
13	C	B	B	B	B	B	B	158	G	94	104	G	106	106	108	G	G	B	B	B	B	B	B	B
14	B	96	94	B	B	B	B	150	120	100	120	118	108	106	104	100	98	B	96	B	96	B	B	B
15	96	B	96	B	B	96	B	G	G	102	114	106	100	96	98	108	132	B	B	B	B	B	B	B
16	C	94	96	B	B	96	B	142	104	108	104	104	102	102	98	130	142	98	B	94	B	B	B	B
17	B	B	B	B	B	B	B	B	104	154	140	96	118	112	94	98	96	96	B	B	90	B	B	B
18	B	B	B	B	B	B	B	162	104	106	106	106	C	98	96	106	94	94	92	96	B	B	104	102
19	B	B	B	B	B	B	B	G	108	104	108	106	102	104	104	98	94	92	94	B	104	B	B	B
20	B	96	94	92	98	108	B	108	114	108	106	108	108	B	154	108	102	100	104	96	94	94	B	B
21	B	B	B	102	102	B	100	102	98	102	100	92	94	90	92	94	138	90	106	B	B	B	B	B
22	B	B	B	B	B	B	B	152	98	146	102	146	134	94	98	90	90	90	94	96	88	B	148	106
23	104	94	94	B	92	96	B	140	170	104	98	100	106	98	94	94	154	92	B	B	B	B	108	B
24	106	102	B	B	B	B	B	164	106	138	118	104	104	104	110	106	102	100	102	B	98	B	B	B
25	B	B	B	B	B	B	B	B	G	138	106	102	94	98	G	G	G	92	B	B	94	B	88	B
26	104	B	B	102	B	B	B	B	G	126	104	104	100	104	102	102	100	B	B	B	B	104	102	102
27	B	106	100	98	98	B	B	B	152	118	110	112	110	108	100	102	100	96	B	96	104	100	114	102
28	108	104	96	100	106	104	B	144	116	102	106	96	96	96	100	92	98	100	106	98	94	104	92	90
29	B	98	B	B	B	B	B	124	114	102	100	98	92	92	92	G	124	B	102	96	98	94	92	92
30	96	94	98	98	100	98	98	108	152	124	128	122	106	126	98	98	96	98	102	B	B	B	B	102
31	100	100	102	102	B	B	B	138	144	G	G	110	106	108	110	104	158	B	B	B	B	B	B	B
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	9	12	11	12	8	9	3	20	23	30	29	29	29	28	28	23	26	22	15	14	16	12	14	10
MED	100	96	96	98	98	98	98	141	110	105	106	104	104	104	102	102	100	96	96	96	98	99	103	101
U Q	105	101	98	101	101	101	100	152	138	118	119	109	107	107	108	106	138	100	104	98	103	104	108	102
L Q	94	94	94	97	96	96	94	132	104	102	104	100	100	97	98	96	96	92	94	94	94	94	98	96

IONOSPHERIC DATA STATION Kokubunji

DEC. 2002 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

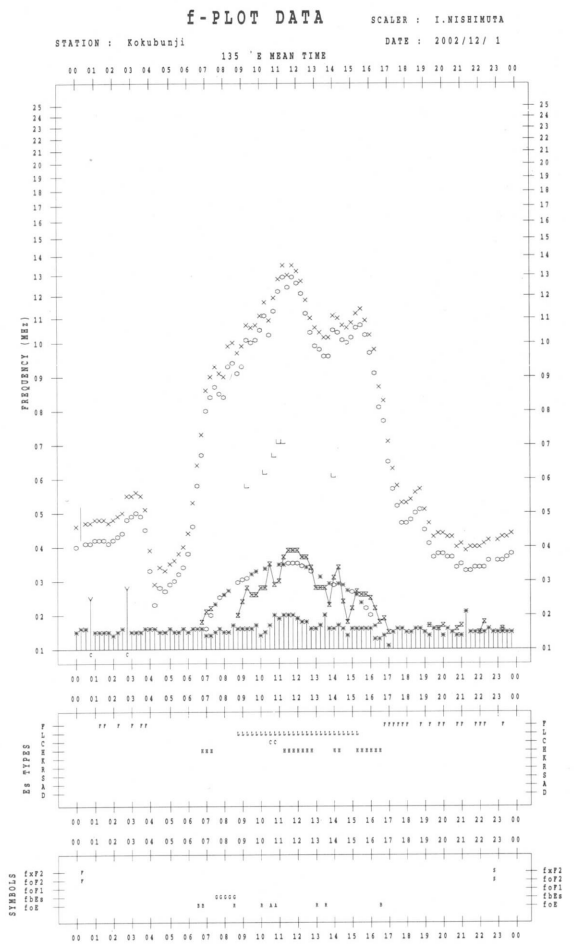
LAT. 35°42.4'N LON. 139°29.3'E SWEEP 1.0MHz TO 25.0MHz IN 24.0SEC IN MANUAL SCALING

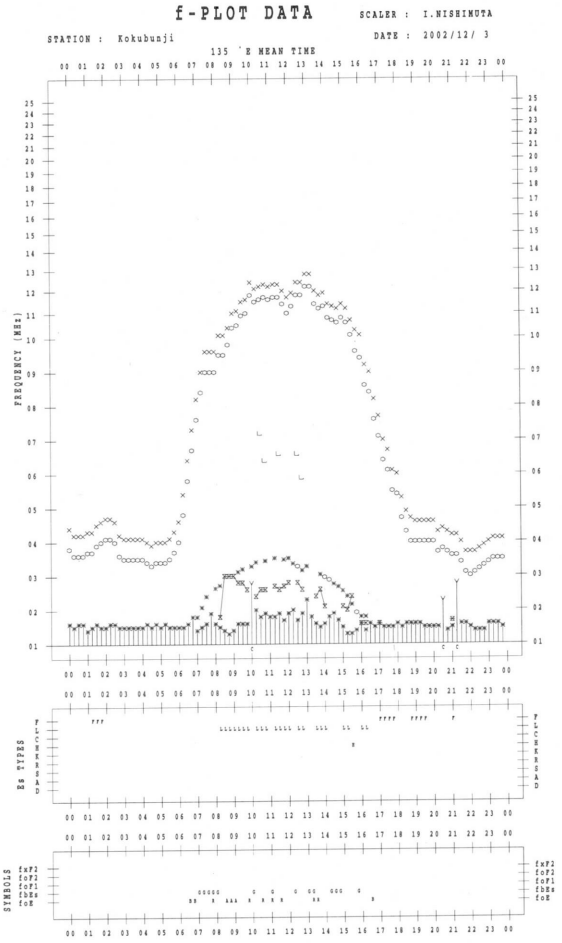
D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1				F1				H2		L1	L1	L1	HL11	L1	HL11	L1	H2	F1	F1		F1	F1	F1	
2	F1							H1	L2	L1	CL11	L1	L1	L1	L1	L3	L2	F1			F1	F2	F2	
3										L1			L1		L1	L2	L1	F1		F1		F2		
4				F1		F1		H1	L1	L1	HL11	CL11	L1	L1	L2	L1	L2	F3						
5								H1		L1	HL11	L1	L1	L1	L2	L1	L2	F5	F4	F2	F3	F4	F1	F2
6	F3	F2	F1	F1	F1			H1	L1	L1	L1	L1	L1	L1	HL11		L1	F1	F1	F1	F4		F1	F1
7		F2							L2	L1	L1	L1	L1	L1	L1		HL11	F1	F2	F1				
8				F1	F1	F1	F2		L1	CL11	L2	L1	L1	L1						F1	F1	F1		
9						F1		H2	HL11	CL11	L1	L1	L1	L1	L1			F1		F1				
10			F1	F1					CL11	CL11	L1	L1				HL11	H1		F2	F1		F1	F1	F1
11								H1	H1	L1	L1	L1	HL11	HL11	HL11	HL11	H1				F1	F1	F1	
12										L1	CL11	CL11	L1	L1	L1			F1						
13								H1		L1	L1		L1	L1	L1									
14		F1	F1					HL11	C2	L1	CL11	CL21	L1	L1	L1	L2	L1		F1		F1			
15	F1		F1			F1				L1	CL11	L1	L1	L1	L1	L1	C1							
16		F3	F3			F1		H1	L1	L1	L1	L1	L1	L1	L1	CL11	H1	F1		F1				
17									L1	HL11	HL11	L2	CL11	CL11	L3	L3	L4	F3			F1			
18								H1	L1	L1	L1	L1		L2	L1	L1	L2	F4	F1	F1			F1	F2
19									L1	L1	L1	L1	L1	L1	L1	L1	L2	F3	F1		F1			
20		F2	F2	F5	F3	F1		L2	C2	L1	L2	L1	L1		H1	L1	L1	F3	F1	F2	F3	F2		
21				F1	F1		F4	L1	L3	L2	L1	L2	L1	L2	L1	L1	HL21	F3	F2					
22								H1	L1	HL11	L1	HL11	H1	L2	L1	L3	L3	F3	F2	F2	F1		F1	F1
23	F2	F2	F1		F1	F1		H1	HL11	L2	L2	L1	L1	L1	L1	L1	H1	F3					F2	
24	F1	F1						H1	L1	HL11	CL11	L1	L1	L2	L1	L2	L2	F1	F3		F2			
25										HL12	L1	L1	L1	L1				F1			F1		F1	
26	F1			F1						HL11	L1	L1	L1	L1	L1	L1	L1					F1	F2	F2
27		F1	F2	F3	F2				HL11	CL21	CL11	CL11	L1	L1	L1	L1	L1	F3		F1	F1	F1	F1	F2
28	F2	F1	F1	F1	F1	F1		H2	C2	L3	L1	L2	L2	L2	L2	L3	L2	F2	F1	F3	F4	F3	F2	F3
29		F1						C4	C2	L1	L1	L1	L1	L1	L1		C1		F3	F3	F4	F3	F3	F2
30	F2	F1	F3	F2	F1	F1	F1	L1	H1	C1	C1	CL11	L1	CL11	L1	L1	L2	F2	F1					F2
31	F1	F4	F2	F1				H2	H2			L1	L1	L1	L1	L1	H1							
	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																								

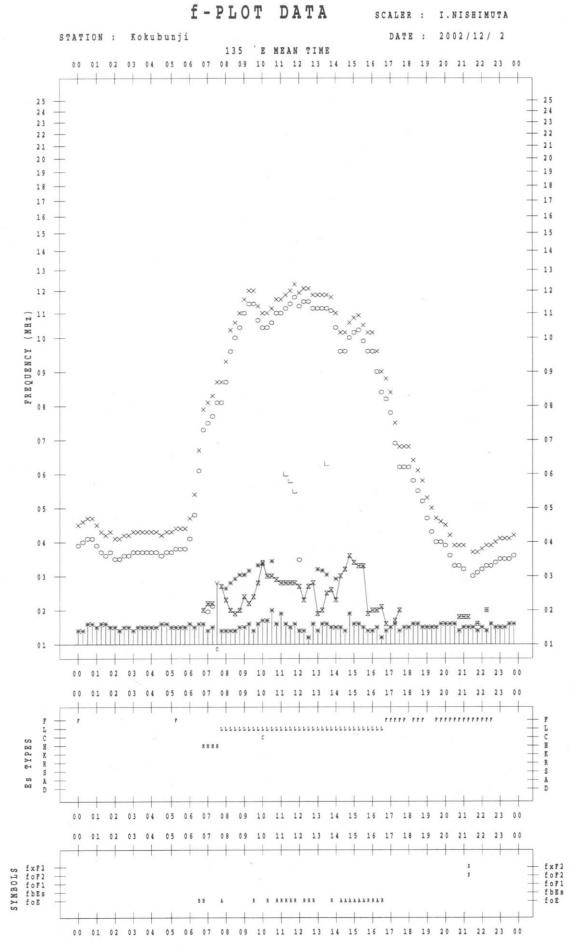
DEC. 2002 TYPES OF Es COMMUNICATIONS RESEARCH LABORATORY, JAPAN

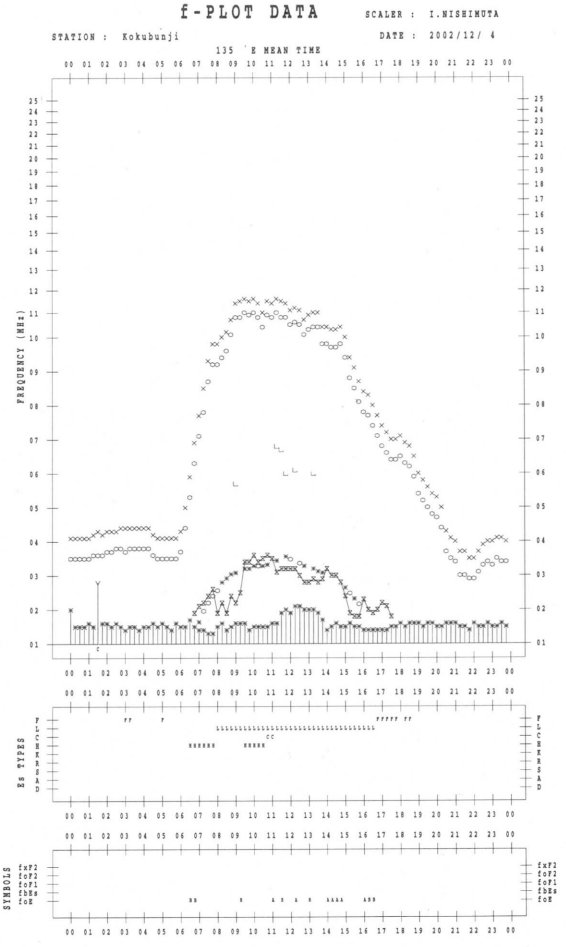
f-PLOTS OF IONOSPHERIC DATA

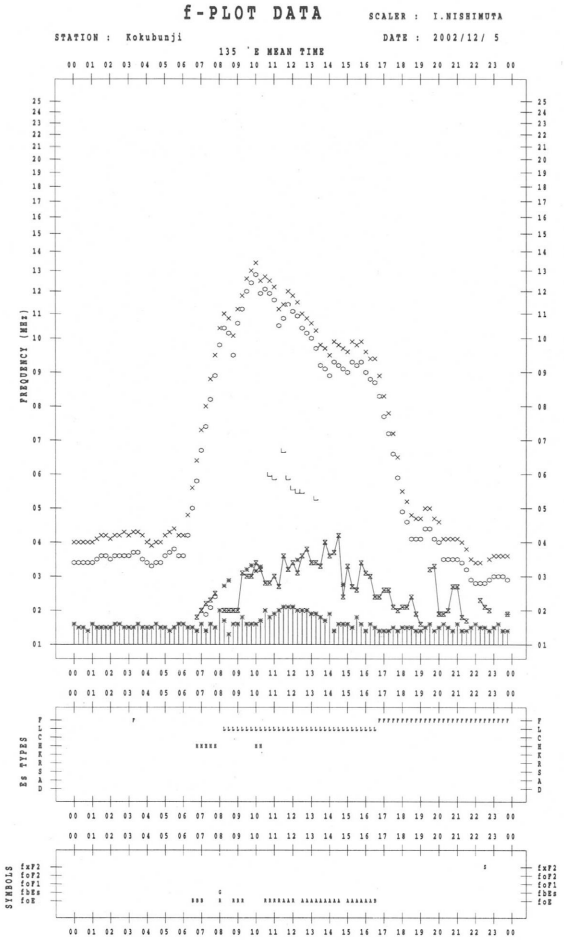
KEY OF f-PLOT	
	SPREAD
	foF2,foF1,foE
	fxF2
	DOUBTFUL foF2,foF1,foE
	fbEs
	ESTIMATED foF1
	fmin
	GREATER THAN
	LESS THAN

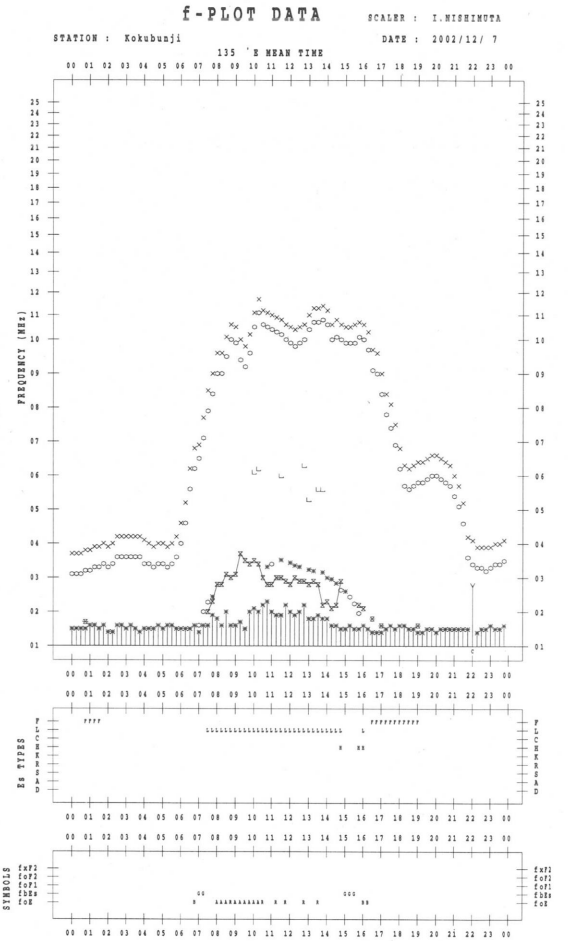

f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/ 1
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

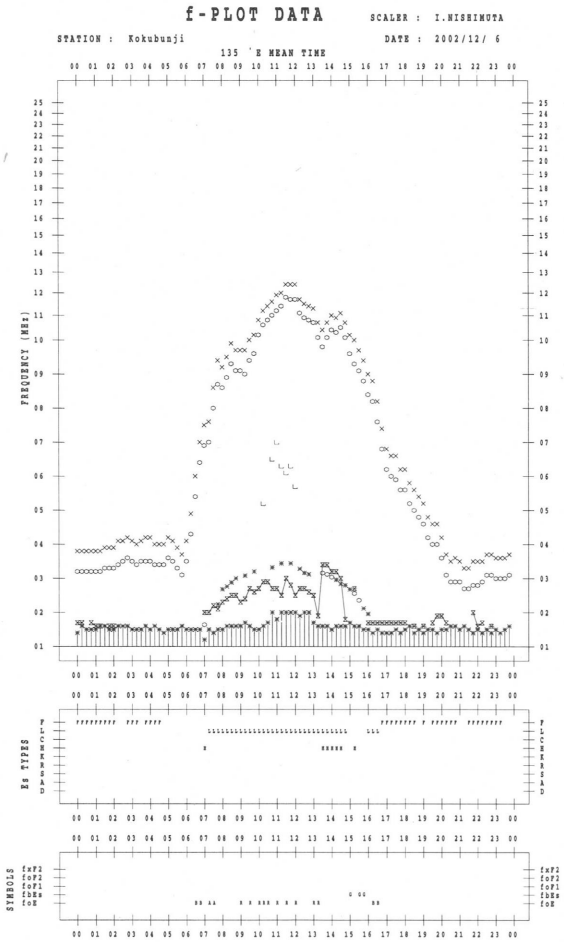

f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/ 3
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

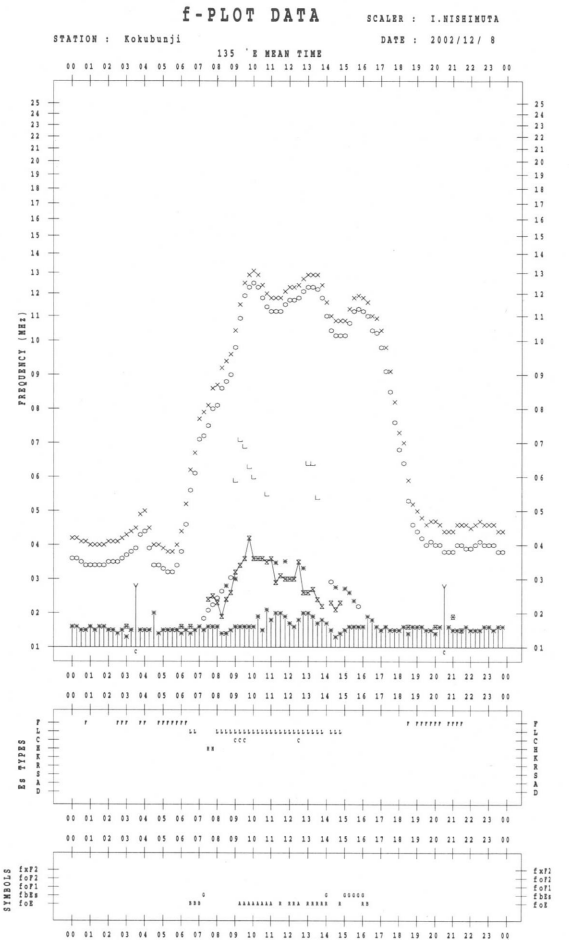

f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/ 2
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE

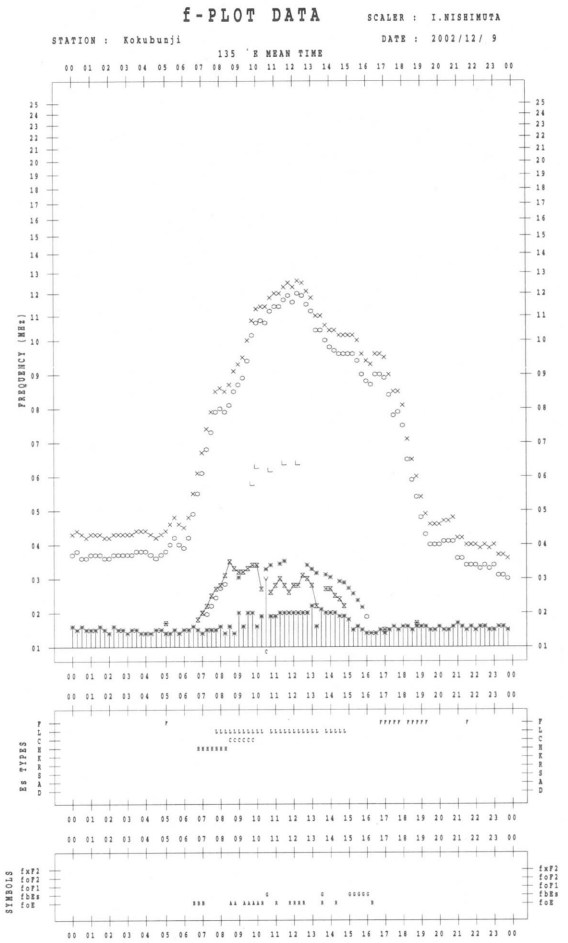

f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/ 4
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/ 5
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/ 7
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/ 6
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/ 8
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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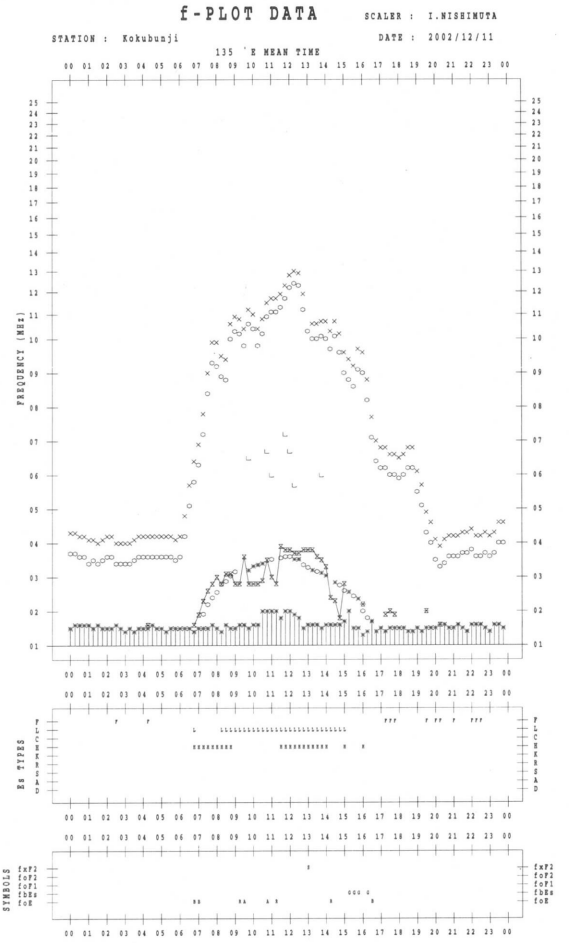
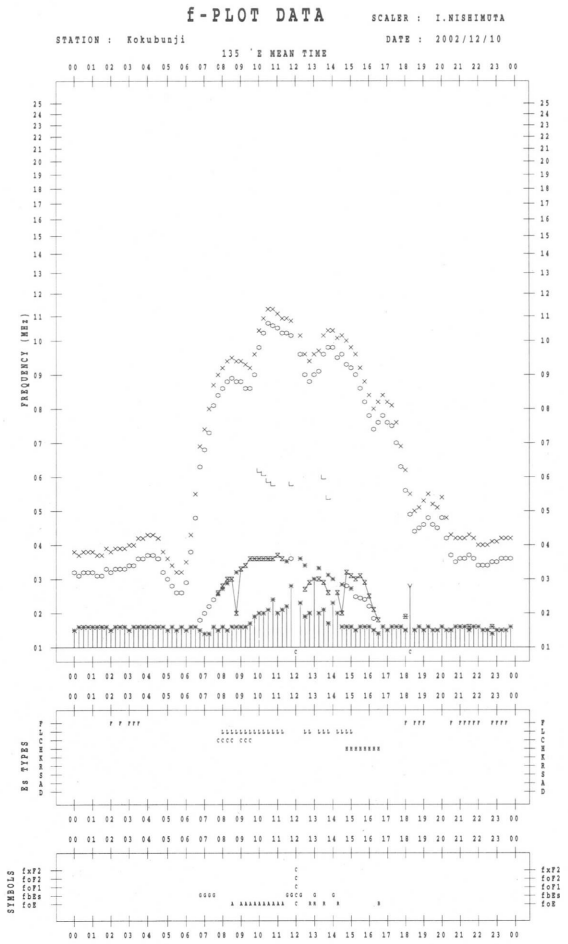
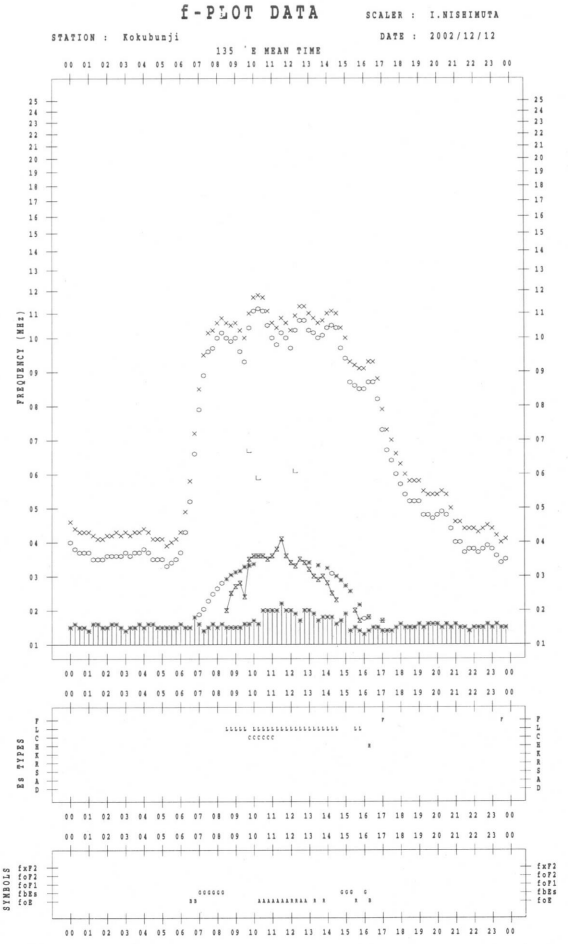
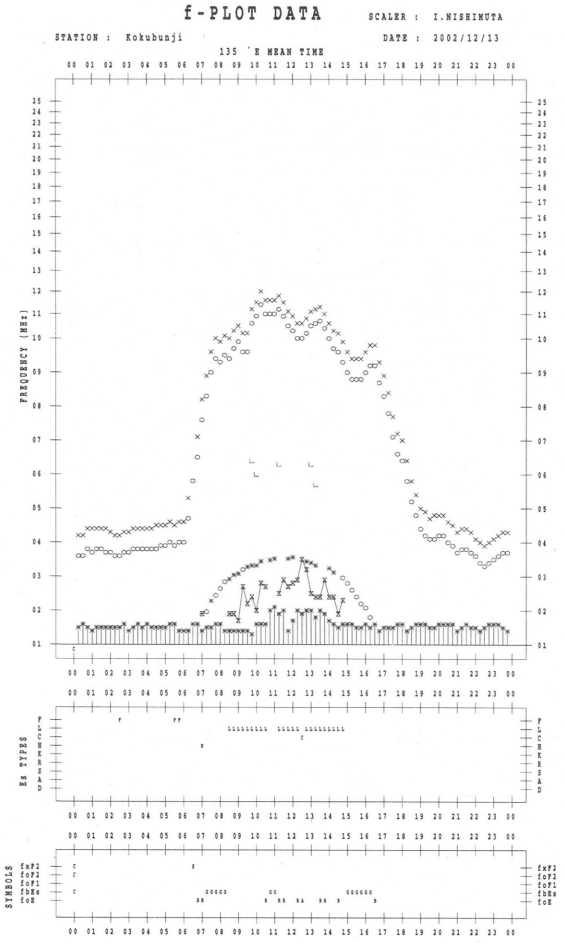
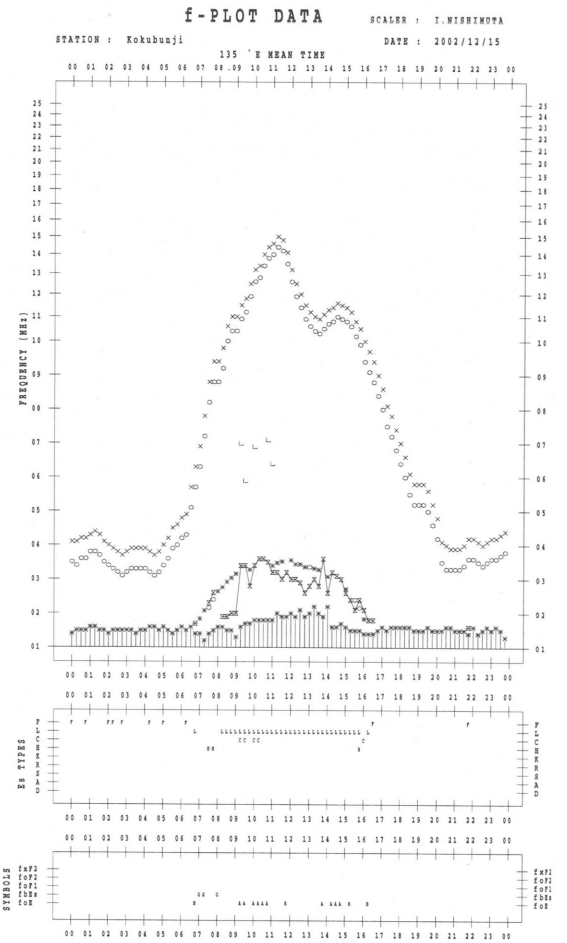
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/ 9
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/11
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/10
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/12
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE


f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/13
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS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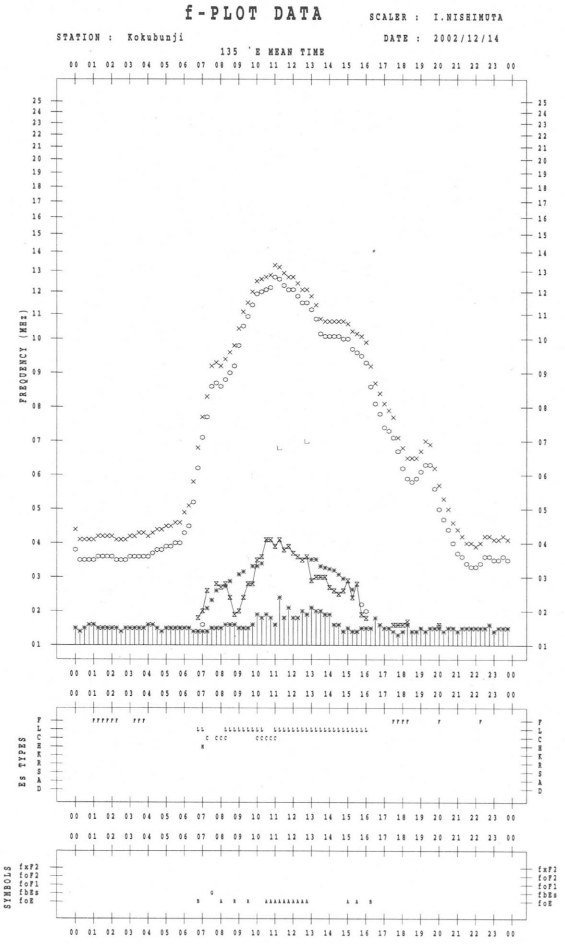
STATION : Kokubunji
DATE : 2002/12/15
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS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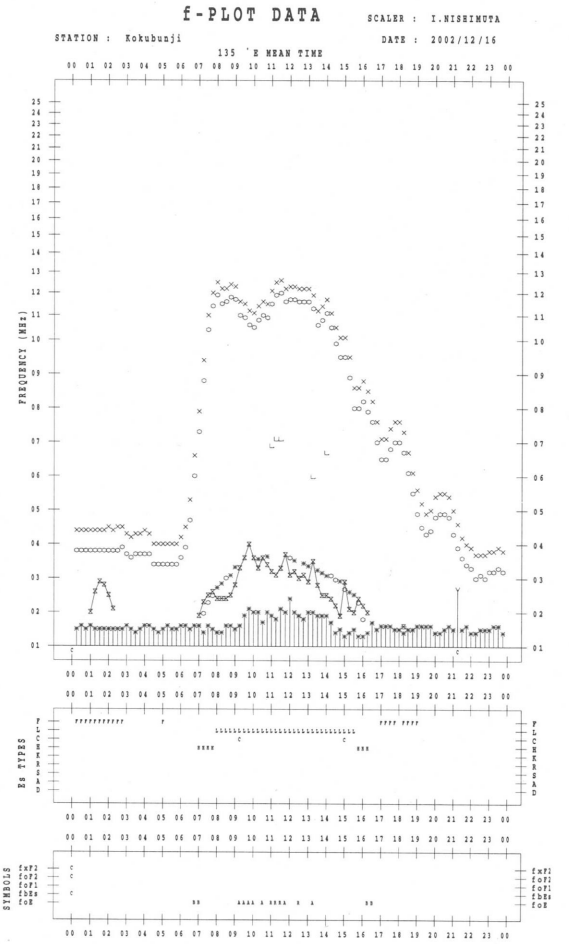
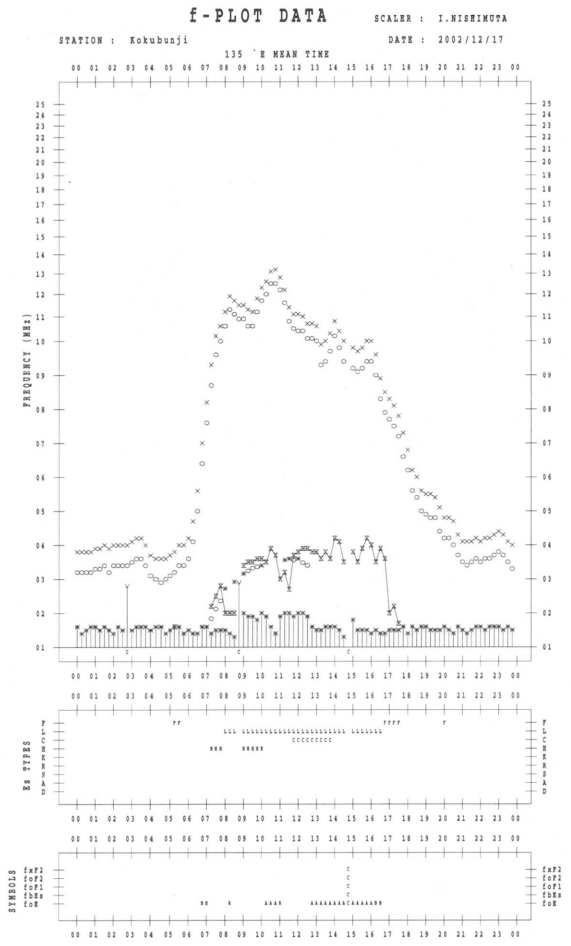
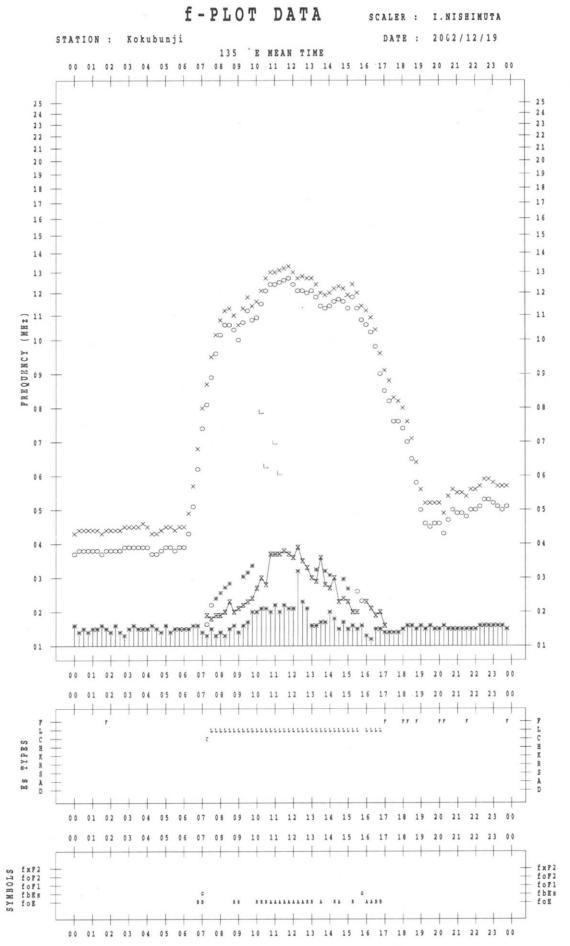
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/14
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/16
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/17
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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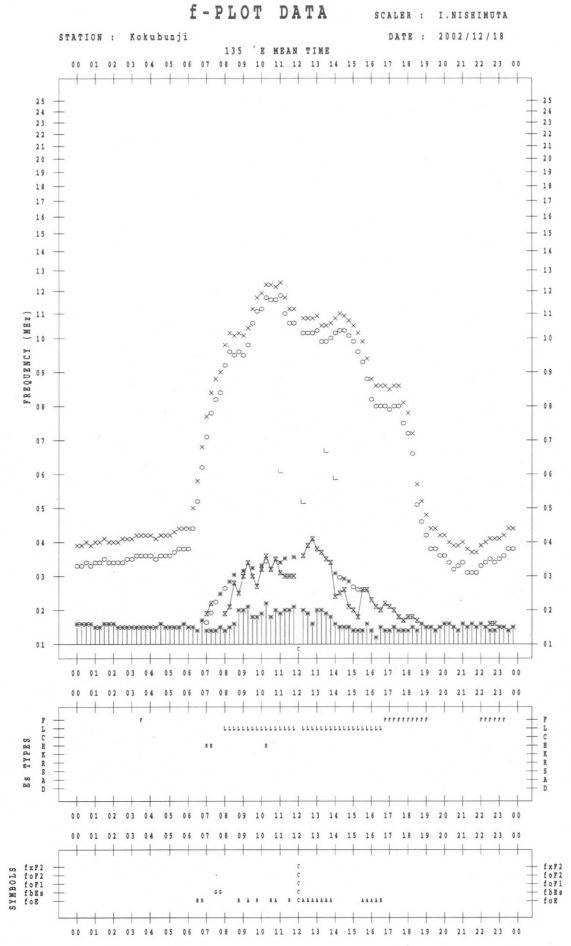
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/19
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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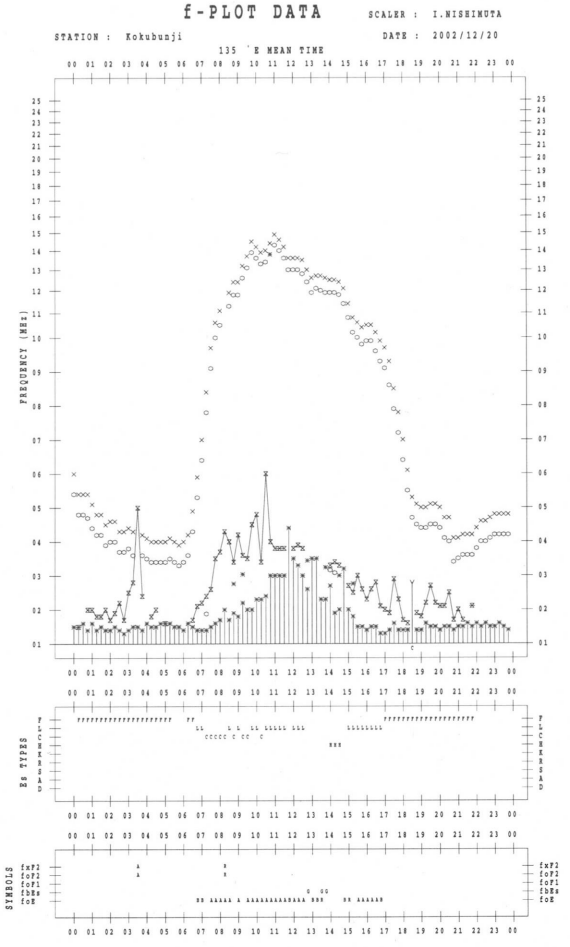
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/18
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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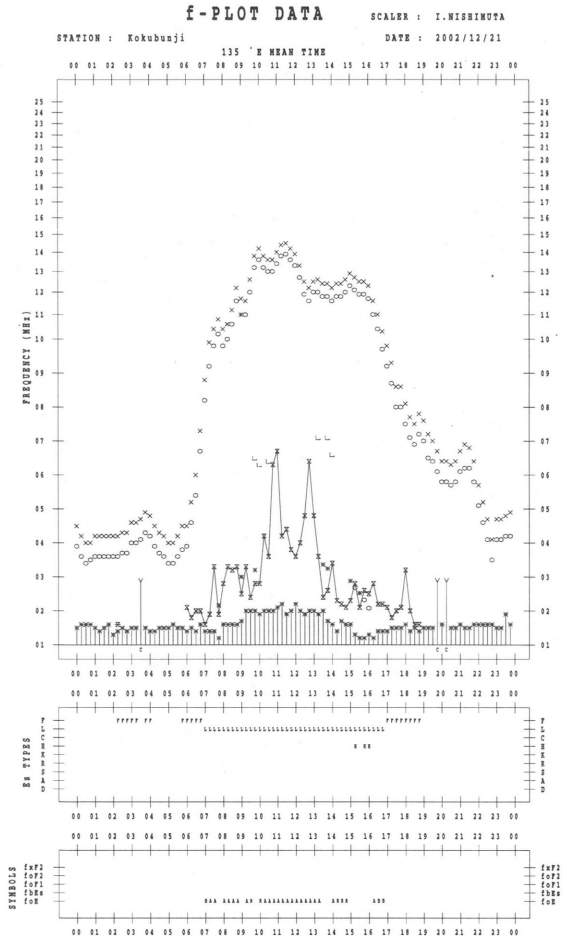
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/20
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS
fxF2
foF2
foF1
fbEs
foE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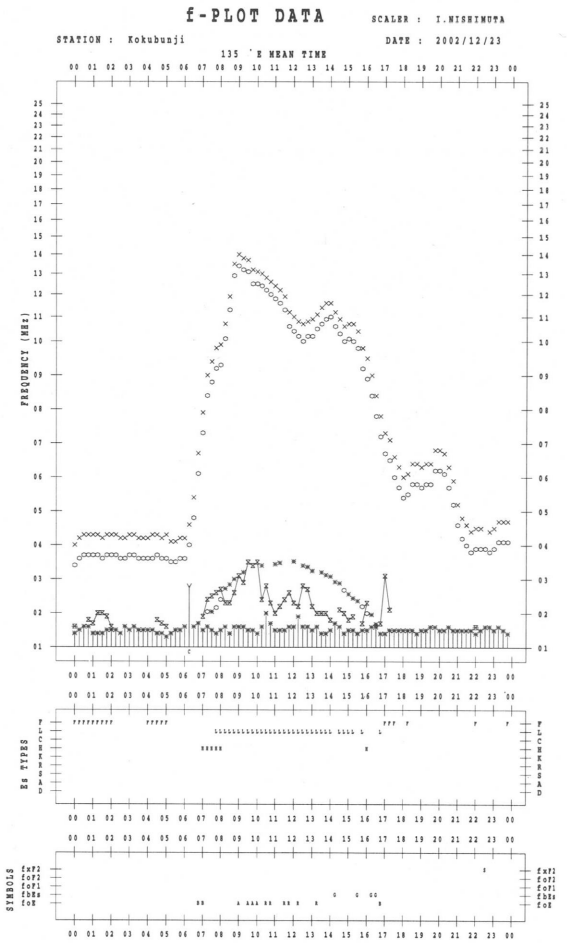
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/21
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS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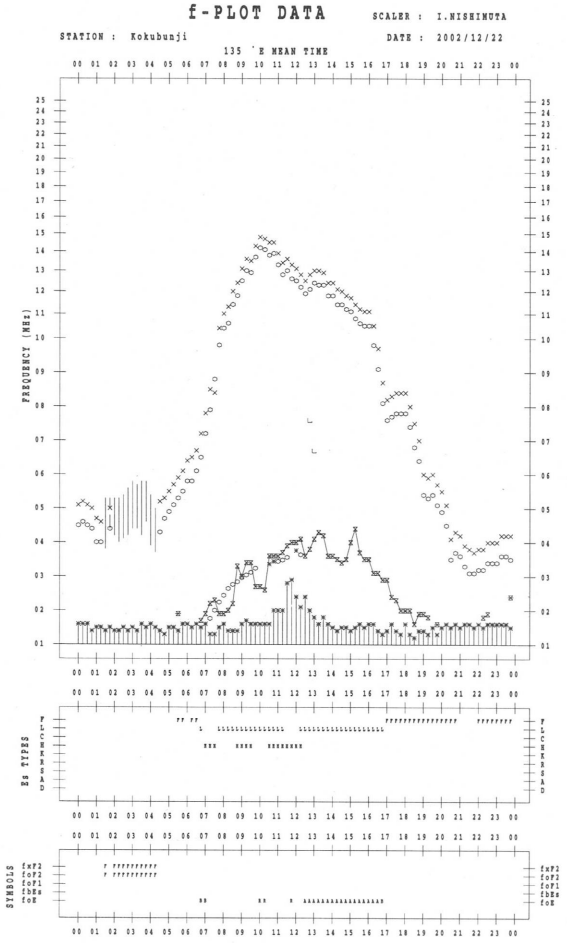
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/23
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS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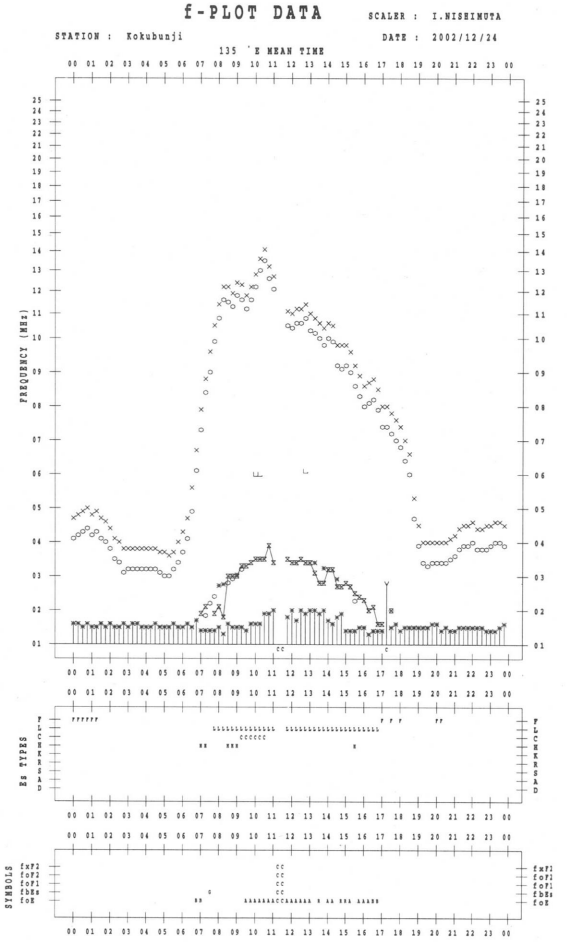
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/22
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS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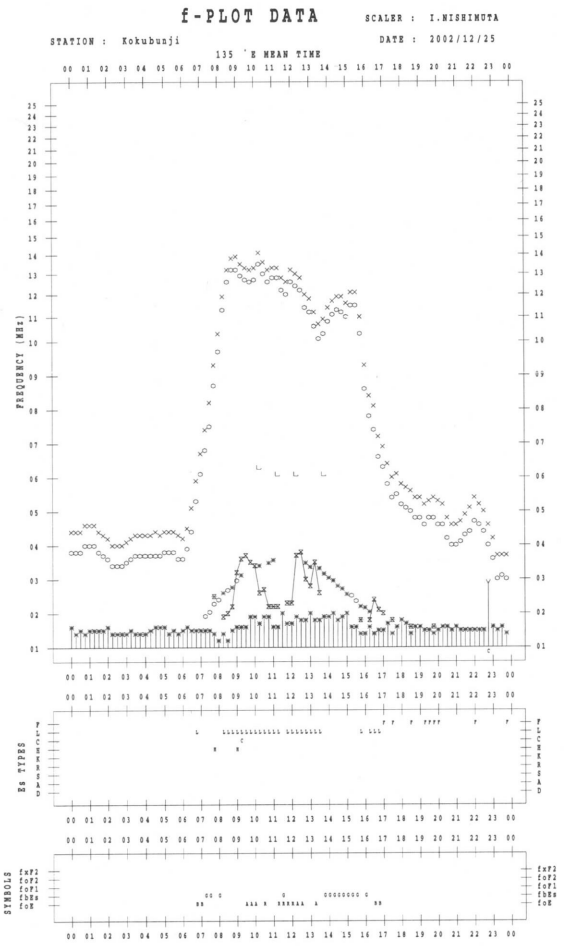
STATION : Kokubunji
DATE : 2002/12/24
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS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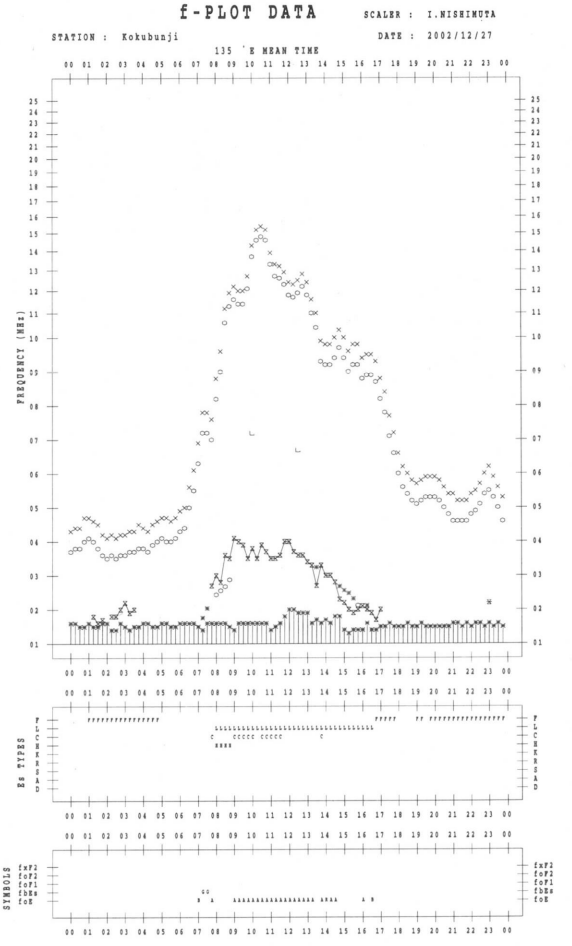
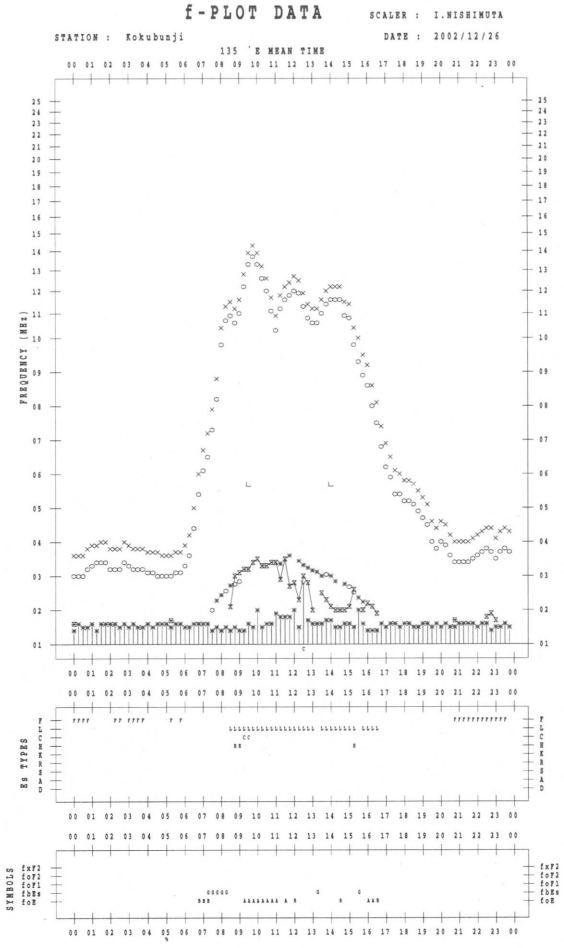
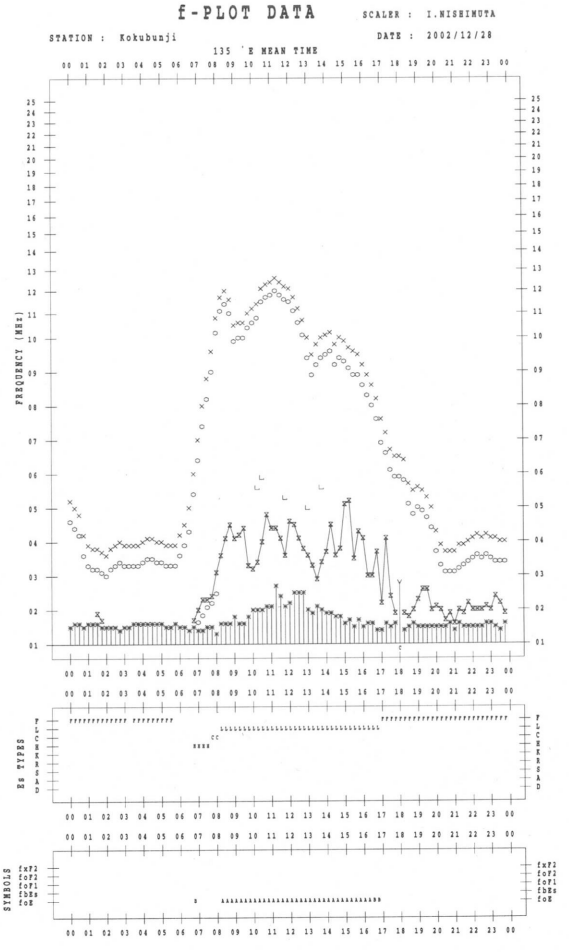
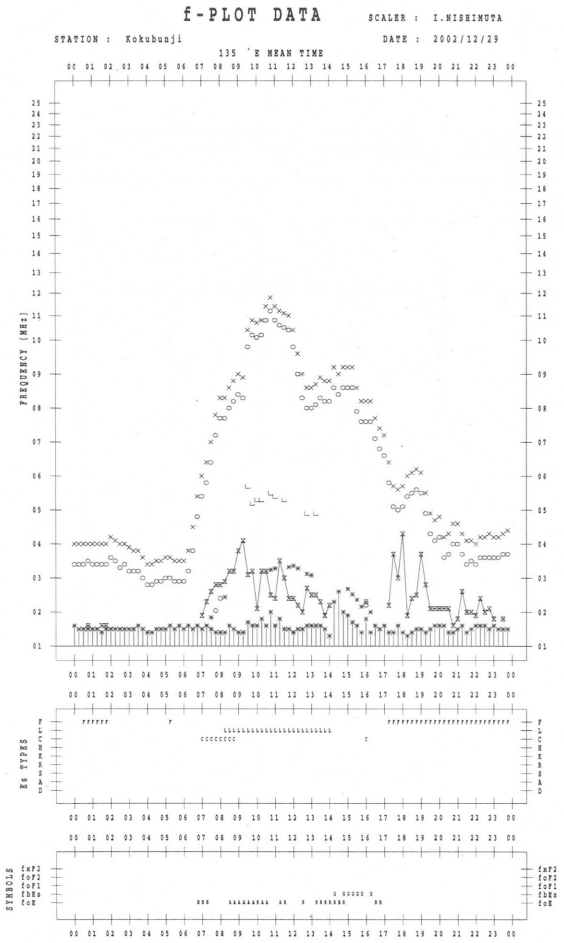
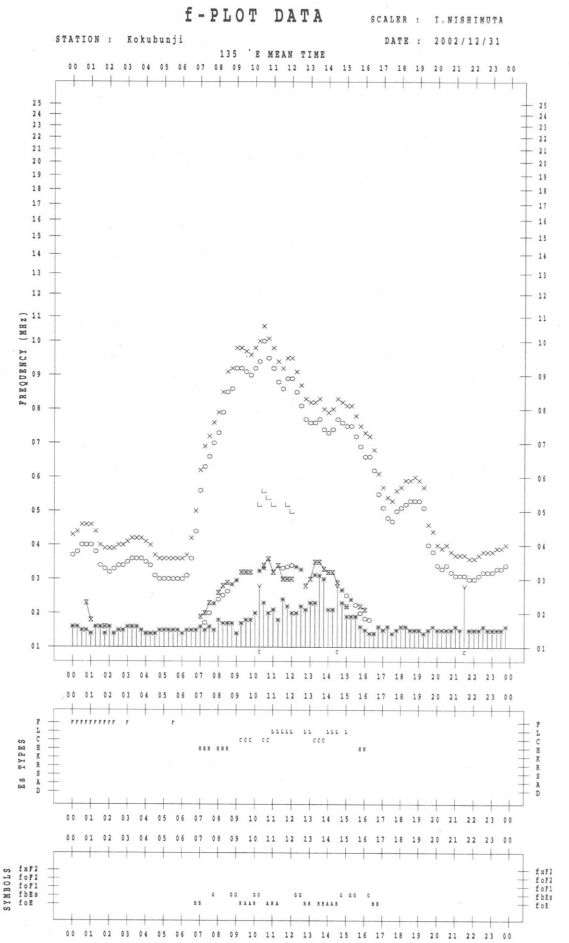
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/25
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS

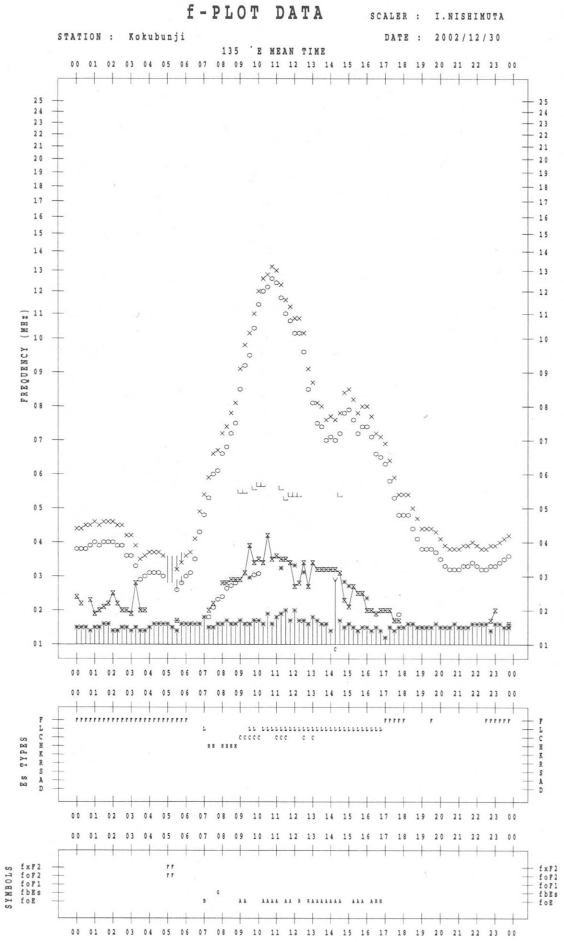

f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/27
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/26
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/28
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/29
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/31
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS


f-PLOT DATA
SCALER : I.NISHIMUTA
STATION : Kokubunji
DATE : 2002/12/30
135 °E MEAN TIME
FREQUENCY (MHz)
Es TYPES
SYMBOLS

B. Solar Radio Emission
B1. Daily Data at Hiraiso
500 MHz

Hiraiso December 2002

Single-frequency total flux observations at 500 MHz					
Flux density: 10^{-22} W m^{-2} Hz^{-1}					
Date \ UT	00-03	03-06	06-09	21-24	Day
1	42	42	42	49	44
2	44	42	42	48	44
3	43	39	39	41	41
4	41	39	37	45	41
5	42	39	38	45	41
6	44	40	42	43	42
7	45	45	45	45	45
8	45	47	46	41	45
9	43	43	43	41	43
10	42	42	42	49	44
11	45	37	35	47	42
12	43	40	39	48	43
13	45	43	43	48	45
14	45	41	41	47	44
15	46	43	44	48	45
16	45	42	41	56	46
17	53	45	45	54	50
18	51	43	42	50	47
19	46	44	44	-	45
20	-	52	53	45	48
21	46	46	43	47	46
22	46	44	45	45	45
23	43	40	39	39	41
24	41	39	40	44	41
25	42	38	39	42	40
26	41	40	41	42	41
27	41	39	39	45	41
28	42	39	38	45	41
29	42	40	40	46	42
30	42	39	37	44	41
31	42	39	38	42	41

Note: No data is available during the following periods.
19th 2200 - 20th 0530
A superscript * stands for being superposed on a burst.

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

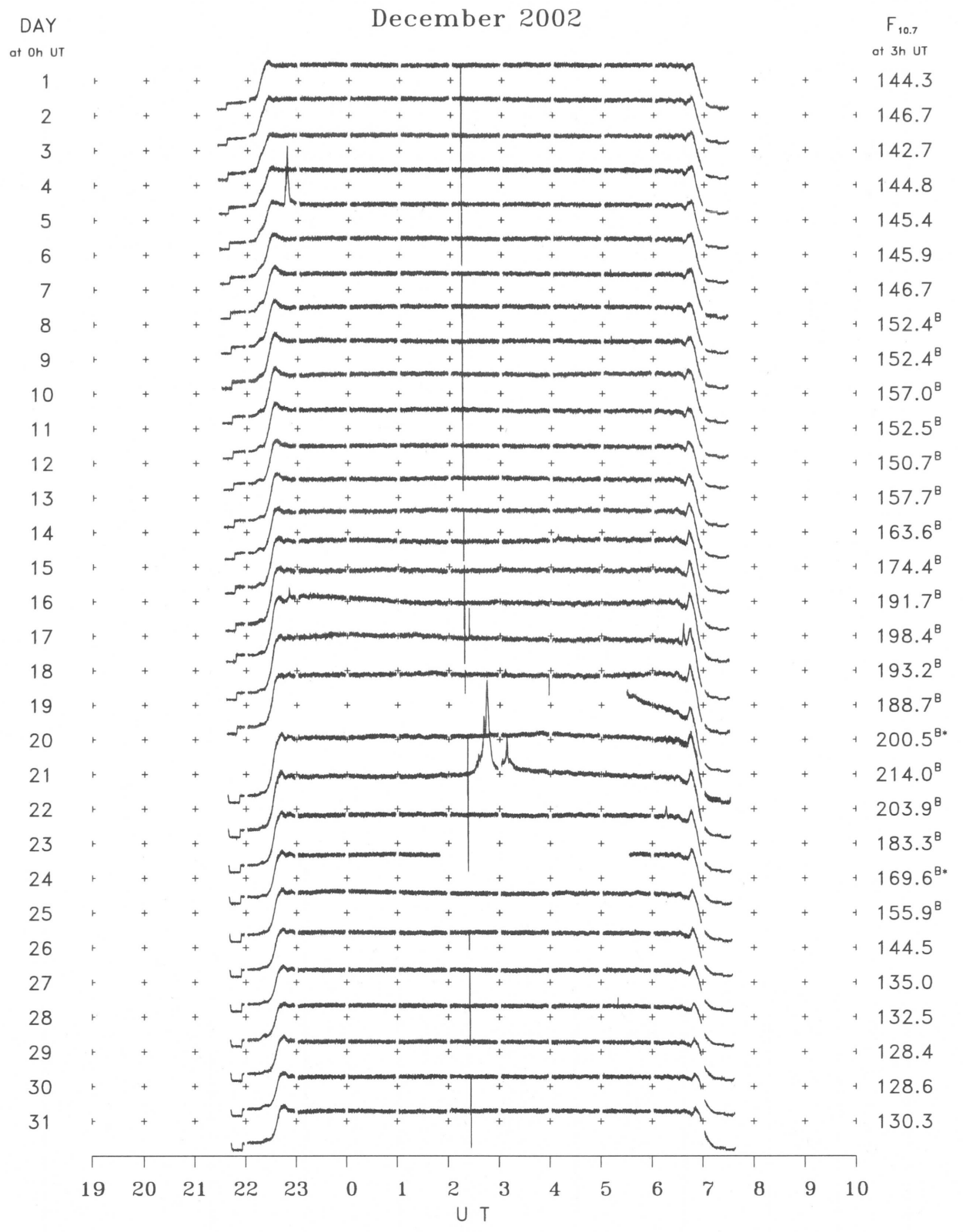
Hiraiso December 2002

Single-frequency observations

Normal observing period: 2140 - 0725 U.T. (sunrise to sunset)

DEC.	FREQ.	TYPE	START TIME	TIME OF MAXIMUM	DUR.	FLUX DENSITY (10^{-22} W m^{-2} Hz^{-1})		POLARIZATION
2002	(MHz)		(U.T.)	(U.T.)	(MIN.)	PEAK	MEAN	REMARKS
1	500	8 S	02390	02390	1.0	10	-	0
2	500	8 S	01550	01550	3.0	45	-	0
2	200	8 S	04580	04580	1.0	25	-	0
4	200	7 C	01440	01470	4.0	20	-	WR
4	500	8 S	04330	04330	1.0	25	-	0
4	200	8 S	04330	04340	1.0	15	-	0
4	2800	4 S/F	22440	22470	7.0	165	-	0
4	200	47 GB	22440	22500	7.0	510	-	WR
4	500	4 S/F	22450	22490	12.0	45	-	0
5	200	8 S	02130	02130	1.0	15	-	0
6	200	8 S	23390	23390	1.0	50	-	MR
10	200	8 S	01390	01400	1.0	40	-	0
10	200	8 S	06460	06460	1.0	10	-	0
12	200	8 S	01170	01170	1.0	15	-	0
12	200	8 S	04130	04130	1.0	15	-	0
12	200	8 S	21570	21570	1.0	60	-	0
13	200	8 S	01130	01130	1.0	35	-	0
15	200	8 S	01300	01300	1.0	15	-	0
15	200	8 S	23320	23320	1.0	40	-	0
16	200	8 S	23290	23300	2.0	25	-	0
17	200	8 S	00270	00280	1.0	85	-	WR
18	200	8 S	00310	00310	1.0	15	-	0
18	500	8 S	02240	02240	1.0	55	-	0
18	200	8 S	05300	05300	1.0	30	-	ML
19	200	8 S	02450	02450	1.0	20	-	0
19	200	8 S	03130	03140	1.0	10	-	0
19	200	8 S	04200	04200	1.0	190	-	0
21	500	8 S	00300	00300	1.0	20	-	0
21	500	8 S	03210	03220	1.0	20	-	0
21	200	8 S	03210	03220	1.0	20	-	0
22	200	8 S	01290	01290	1.0	50	-	0
22	200	8 S	01500	01500	1.0	45	-	0
22	500	7 C	02300	03140	76.0	100	-	WL
22	2800	7 C	02300	02450	48.0	250	-	MR
22	200	7 C	02420	03110	73.0	130	-	WL
23	200	8 S	00170	00170	1.0	10	-	0
23	200	8 S	06230	06230	1.0	15	-	WL
24	200	8 S	01260	01260	1.0	25	-	0
25	200	8 S	01560	01560	1.0	40	-	0
28	200	8 S	23270	23270	1.0	35	-	0
28	200	8 S	23310	23310	1.0	40	-	0
31	200	8 S	02240	02240	1.0	20	-	0

B. Solar Radio Emission
B3. Summary Plots of $F_{10.7}$ at Hiraiso



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

IONOSPHERIC DATA IN JAPAN FOR DECEMBER 2002
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