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IONOSPHERIC DATA IN JAPAN

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CONTENTS

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MINISTRY OF POSTS AND TELECOMMUNICATIONS
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INTRODUCTION

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

Station	Geographic		Geomagnetic		Technical Method
	Latitude	Longitude	Latitude	Longitude	
Wakkanai	45°23.5'N	141°41.2'E	35.3°N	206.5°	Vertical Sounding (I)
Akita	39°43.5'N	140°08.0'E	29.5°N	205.9°	" (I)
Kokubunji	35°42.4'N	139°29.3'E	25.5°N	205.8°	" (I)
Yamagawa	31°12.1'N	130°37.1'E	20.4°N	198.3°	" (I)
Okinawa	26°16.9'N	127°48.4'E	15.3°N	196.0°	" (I)
Hiraiso	36°22.0'N	140°37.5'E	26.3°N	206.8°	Radio Receiving (S, P)
Inubo	35°42.2'N	140°51.5'E	25.6°N	207.0°	" (P)

A. IONOSPHERE

Ionospheric observations are carried out at the above five stations in Japan by means of vertical sounding using ionosondes. The ionosonde produces ionograms, which are recorded digitally on computer storage medium as well as graphically on 35 mm photographic film. The digitally-recorded ionograms are collected from each station by the central computer and reduced to numerical values and Summary Plots by the automatic processing system. The ionograms obtained at Kokubunji are manually scaled as well by experienced specialists to supplement automatically-scaled parameters.

A1. Automatic Scaling

Digital ionograms are automatically scaled by the pattern recognition method. The following five factors of ionospheric characteristics are published for the present. The reliability of these factors has been ascertained by comparison of the automatically-scaled parameters with the manually-scaled values of large amounts of test ionograms.

The published data consist of tabulations of hourly values of three factors (*foF2, fEs, fmin*) and monthly medians of two factors (*h'Es, h'F*), daily Summary Plots and monthly medians plot of *foF2*.

a. Characteristics of Ionosphere

foF2	Ordinary wave critical frequency for the *F2* layer
fEs	Highest frequency of the *Es* layer whether it may be ordinary or extraordinary
fmin	Lowest frequency which shows vertical ionospheric reflections
h'Es *h'F*	Minimum virtual height on the ordinary wave for the *Es* and *F* layers, respectively

b. Descriptive Letters

The following descriptive letters are used in the tables.

A Impossible measurement because of the presence of a lower thin layer, for example *Es* (for *foF2*).

B Impossible measurement because of absorption in the vicinity of *fmin*.

C Impossible measurement because of any failure in observation.

G Impossible automatic scaling because of too small ionization density of the layer (for *fEs*).

N Impossible automatic scaling because of complex echoes.

Blank No digital record because of trouble in the automatic data processing system, but existence of film record.

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

Median count (CNT) is the number of numerical values from which the median has been computed. In addition to numerical values, the count may include a descriptive letter G.

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

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

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

d. Reliability of Automatic Scaling

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

e. Summary Plot

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

A2. Manual Scaling

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

All symbols and terminology in the tables or figures of ionospheric data are used in accordance with the "URSI Handbook of Ionogram Interpretation and Reduction (Second Edition) 1972" and its revision of chapters 1-4, published in July 1978.

a. Characteristics of Ionosphere

fxI	Top frequency of spread *F* trace
foF2 *foF1* *foE* *foEs*	Ordinary wave critical frequency for the *F2*, *F1*, *E* and *Es* including particle *E* layers, respectively.
fbEs	Blanketing frequency of the *Es* layer, e.g. the lowest ordinary wave frequency visible through *Es*
fmin	Lowest frequency which shows vertical ionospheric reflections
M(3000)F2 *M(3000)F1*	Maximum usable frequency factor for a path of 3000 km for 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 or impossible because the ionization density of the layer is too small to enable it to be made accurately.
H Measurement influenced by, or impossible because of, the presence of a stratification.
K Presence of particle *E* layer.
L Measurement influenced or impossible because the trace has no sufficiently definite cusp between layers.
M Interpretation of measurement questionable because the ordinary and extraordinary components are not distinguishable.
N Conditions are such that the measurement cannot be interpreted.
O Measurement refers to the ordinary component.
P Man-made perturbations of the observed parameter; or spur type spread *F* present.
Q Range spread present.
R Measurement influenced by, or impossible because of, attenuation in the vicinity of a critical frequency.
S Measurement influenced by, or impossible because of, interference or atmospherics.
T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
V Forked trace which may influence the measurement.
W Measurement influenced or impossible because the echo lies outside the height range recorded.
X Measurement refers to the extraordinary component.
Y Lacuna phenomena, severe layer tilt.
Z Third magneto-electronic component present.

(ii) Qualifying Letters

The following letters are entered in the first column before a numerical value on the monthly tabulation sheets, if necessary.

A Less than. Used only when *fbEs* is deduced from *foEs* because total blanketing of higher layer is present.
D Greater than.
E Less than.
I Missing value has been replaced by an interpolated value.
J Ordinary component characteristic deduced from the extraordinary component.
M Mode interpretation uncertain.
O Extraordinary component characteristic deduced from the ordinary component. (Used for x-characteristics only.)
T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
U Uncertain or doubtful numerical value.
Z Measurement deduced from the third magneto-electronic component.

(iii) Description of Types of *Es*

When more than one type of *Es* trace are present on the ionogram, the type for the trace used to determine *foEs* must be written first. The number of multiple trace is indicated after the type letter.

The types are:

f An *Es* trace which shows no appreciable increase of height with frequency.
l A flat *Es* trace at or below the normal *E* layer minimum virtual height or below the particle *E* layer minimum virtual height.
c An *Es* trace showing a relatively symmetrical cusp at or below *foE*. (Usually a daytime type.)
h An *Es* trace showing a discontinuity in height with the normal *E* layer trace at or above *foE*. The cusp is not symmetrical, the low frequency end of the *Es* trace lying clearly above the high frequency end of the 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 100, 200 and 500 MHz are carried out at Hiraiso. The observation equipment consists of two parabolic antennas, one with 10-meter diameter for 100 and 200 MHz measurements and one with 6-meter diameter for 500 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 at the base-level are tabulated separately for 200 and 500 MHz measurements. Here, the base-level intensity is defined as the intensity recorded during the time when no radio emission burst is taking place. The intensities are expressed by the flux density in 10^{-22} Wm^{-2} Hz^{-1} unit.

The table for 200 MHz measurements also presents the variability indices defined by the number of impulsive radio bursts within the three-hour intervals as follows:

0 quiet or no burst,
1 a few bursts,
2 many bursts,
3 very many bursts.

The daily variability index is defined as the daily mean of three-hourly indices.

The following symbols are used in the tables, when interference or radio bursts prevented measuring the base-level flux densities or determining the variability indices:

* Measurement impossible because of interference.
B Measurement impossible because of bursts.

Daily data within parentheses mean that the observation time does not exceed one third of the period.

B2. Outstanding Occurrences at Hiraiso

The table is a list of outstanding occurrences of solar radio emission bursts observed at Hiraiso during a month. Listed in the table are the date, frequencies, the type of event, the start time and the time of maximum, both in U.T. expressed in hours, minutes and tenths of a minute, the duration in minutes, the peak and mean flux densities in 10^{-22} Wm^{-2} Hz^{-1} unit, and the polarization.

The type of event is expressed by a combination of a numerical code and a letter symbol in accordance with the "Descriptive Text of Solar Geophysical Data, NOAA" as defined by H. Tanaka in the "Instruction Manual for Monthly Report of Solar Radio Emission, WDC-C2" in January 1975:

SGD Code	Letter Symbol	Morphological Classification
1	S	Simple 1
2	S/F	Simple 1F
3	S	Simple 2
4	S/F	Simple 2F
5	S	Simple
6	S	Minor
7	C	Minor+
8	S	Spike
20	GRF	Simple 3
21	GRF	Simple 3A
22	GRF	Simple 3F
23	GRF	Simple 3AF
24	R	Rise
25	R	Rise A
26	FAL	Fall
27	RF	Rise and Fall
28	PRE	Precursor
29	PBI	Post Burst Increase
30	PBI	Post Burst Increase A
31	ABS	Post Burst Decrease
32	ABS	Absorption
40	F	Fluctuations
41	F	Group of Bursts
42	SER	Series of Bursts
43	NS	Onset of Noise Storm
44	NS	Noise Storm in progress
45	C	Complex
46	C	Complex F
47	GB	Great Burst
48	C	Major
49	GB	Major+

The polarization is expressed by the polarization degree and sense as follows:

R or L right- or left-handed polarization,
W, M or S weak, moderate or strong polarization,
0 almost zero or unable to detect polarization due to small increase of flux,
00 polarization degree of less than 1 percent.

One of the following symbols may be attached after numerical values, if necessary.

D greater than, or later than,
E less than or earlier than,
U approximate, or uncertain.

C. RADIO PROPAGATION

C1. H.F. Field Strength at Hiraiso

Field strength observation of 15 MHz standard waves transmitted from WWV and WWVH stations which are located respectively at Fort Collins, Colorado and Kauai, Hawaii, is carried out at Hiraiso. In order to avoid interference among the same frequency waves, the upper sideband of WWV or WWVH with the audio tone 660 Hz is picked up by the use of a narrow band-pass filter with 80 Hz bandwidth. Particulars of the transmitters and the receiver are summarized in the following table.

The tabulated *field strength* expressed in dB above one microvolt per meter is the average of quasi-peak values of the incident upper sideband field intensity in 45 seconds after the universal time indicated on the table. Abbreviated symbols are as follows:

CNT number of observed values,
MED median,
UD value of the uppermost decile when they are ranked according to magnitude,
LD value of the lowest decile when they are ranked according to magnitude,
U uncertain,
E less than,
C influenced by, or impossible because of, any artificial accident,
S influenced by, or impossible because of, interferences or atmospherics.

C2. Radio Propagation Quality Figures at Hiraiso

The tabulated six-hourly quality figures are calculated for standard waves WWV transmitted from Fort Collins and WWVH transmitted from Kauai.

Quality figures expressing radio propagation conditions range over five grades as follows:

1 very poor (very disturbed),
2 poor (disturbed),
3 rather poor (unstable),
4 normal,
5 good.

Whole day quality figure ranged in grades of 1o, 1+, 2–, 2o, 2+, 3–, 3o, 3+, 4–, 4o, 4+, 5–, 5o stands for an average of six-hourly quality figures of the two circuits. Abbreviated symbols are as follows:

C artificial accident,
S propagational accident,
U inaccurate.

The column of conditions presents a record of the forecast of *radio propagation conditions* which is applicable to forthcoming 12 hours and broadcast six times per hour from JJY (Japan Standard Wave) station. The conditions are denoted as follows:

N normal,
U unstable,
W disturbed.

Characteristics	Transmitter		Receiver
Station Call	WWV	WWVH	
Location	Fort Collins, Colorado	Kauai, Hawaii	Hiraiso, Ibaraki
latitude	40°41′N	22°00′N	36°22′N
longitude	105°02′W	159°46′W	140°38′E
Distance	9150 km	5910 km	—
Carrier Power	10 kW	10 kW	—
Power in each sideband	625 W	625 W	—
Modulation	50 %	50 %	—
Antenna	λ/2 vertical	λ/2 vertical	4.5 m vertical rod
Bandwidth	—	—	80 Hz for upper sideband
Calibration	—	—	Every hour

Data on *geomagnetic storms* which are often correlated with radio propagation disturbances are tabulated based on reports from observation at Kakioka Magnetic Observatory, Japan Meteorological Agency. *Time* (U.T.) is expressed in hours and minutes (or tenths of an hour), and *range* in nanotesla. When they are uncertain quantitatively, /'s are used to replace the numerical values. Continuation of a geomagnetic storm is denoted by ---.

C3. Phase Variation in OMEGA Radio Waves at Inubo

The phase values of eight OMEGA radio signals as received at Inubo are depicted for an interval of one month, along with the phase deviation defined as a deviation from a value averaged over the six quietest day within the month. Particulars of the received signals are given in the table below.

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

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

C4. Sudden Ionospheric Disturbances

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

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

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

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

Types of fade-out are as follows:

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

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

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

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

b. Sudden Phase Anomaly (SPA) at Inubo

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

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

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

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

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

Transmitting Stations

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

HOURLY VALUES OF FOF2 AT WAKKANAI

DEC. 1991

LAT. 45.4N LON. 141.7E 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	44	44	44	50	42	38	37	91	122	108	125	121	120	103	102	112	112	85	62	51	43	35	A	43
2	38	37	48	40	38	38	44	94	86	110	128	108	102	118	113	97	92	N	41	43	48	43	51	42
3	36	35	35	43	43	40	53	90	96	111	134	127	117	119	101	124	100	90	53	46	43	32	33	35
4	53	43	36	49	51	53	32	61	86	113	142	127	116	107	117	100	100	76	68	60	35	A	38	56
5	50	38	42	53	62	51	57	85	122	126	131	126	111	119	103	122	108	90	61	60	54	54	54	52
6	56	60	51	54	55	53	53	89	86	145	111	117	116	117	122	103	102	61	47	51	52	44	54	43
7	42	48	56	52	54	51	89	86	86	109	129	122	109	125	108	86	90	62	57	45	43	34	53	53
8	A	43	48	50	44	50	43	67	87	110	134	127	120	118	118	103	120	90	66	58	48	43	36	49
9	49	43	43	48	50	40	49	84	105	128	122	115	100	108	104	108	87	86	63	42	36	A	46	38
10	36	43	43	38	35	40	42	61	108	121	114	122	130	106	121	132	97	66	63	63	48	43	43	46
11	49	44	41	49	42	39	64	85	109	124	133	136	120	128	128	128	110	111	74	72	62	42	37	71
12	56	41	42	38	42	42	126	89	104	138	144	136	133	121	132	130	120	92	76	60	59	51	50	41
13	43	43	41	48	48	42	99	79	108	129	128	145	150	132	140	121	95	88	67	63	59	41	50	40
14	41	41	42	43	41	38	72	94	110	146	144	150	138	130	134	139	113	90	66	52	46	38	35	37
15	30	30	35	A	37	46	54	88	122	151	140	141	140	136	129	122	112	67	67	55	46	A	A	39
16	A	36	32	A	37	46	64	51	111	129	128	132	119	118	110	105	81	66	60	34	35	37	N	A
17	51	66	31	26	38	34	103	61	109	121	154	132	121	132	138	139	103	83	71	53	46	41	37	46
18	39	41	A	41	43	42	46	67	90	129	129	134	140	127	117	130	91	91	60	44	23	44	A	A
19	51	37	34	37	45	59	A	57	107	130	124	106	104	120	105	90	91	85	54	A	44	A	37	40
20	A	A	71	A	66	66	89	57	87	142	132	121	121	130	119	122	90	85	56	45	50	44	34	N
21	38	56	37	38	38	37	102	53	83	130	115	136	130	121	120	101	119	85	61	52	56	A	A	51
22	52	48	44	43	48	A	54	85	88	119	121	128	117	113	118	124	111	A	58	32	A	37	A	38
23	38	A		44	36	37	40	54	89	110	122	106	91	120	99	98	67	70	63	49	A	A	A	38
24	40	31	36	41	42	51	44	84	88	126	124	111	114	112	101	110	110	72	62	A	A	A	A	A
25	A	A	56	38	A	41	35	74	90	129	126	124	120	112	112	118	71	57	51	44	A	A	41	A
26	A	56	A	38	31	36	89	51	87	121	130	122	118	120	116	99	79	90	57	46	42	32	42	42
27	71	47	A	44	41	38	65	83	84	109	127	119	117	120	120	125	98	92	74	42	N	32	55	26
28	51	51	26	51	51	51		51	91	130	151	130	130	119	122	141	101	91	76	58	31	31	38	
29	34	35	34	65	35	34	69	84	87	148	139	126	130	130	128	120	92	77	72	58	37	48	57	55
30	51	58	58	55	57	54	37	66	102	138	122	136	120	127	132	127	122	81	72	54	48	42	A	43
31	48	44	45	46	54	44	58	60	110	123	134	120	130	120	121	129	100	87	72	55	43	46	49	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	26	28	27	28	30	30	29	31	31	31	31	31	31	31	31	31	31	29	31	29	26	23	22	25
MED	46	43	42	44	42	42	54	79	91	126	129	126	120	120	118	121	100	85	63	52	46	42	42	42
U Q	51	48	48	50	51	51	80	86	109	130	134	134	130	127	128	128	111	90	71	58	50	44	51	50
L Q	38	37	35	39	38	38	43	60	87	113	124	120	116	117	108	103	91	71	57	44	42	35	37	38

HOURLY VALUES OF FES AT WAKKANAI

DEC. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	86	G	61	G	G	G	G	46	G	G	G	30	31	29	29	28
2	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	27	28	G	G	G	G	G
3	G	G	G	G	G	G	G	G	G	G	G	52	G	G	G	48	34	58	G	57	31	G	G	G
4	G	G	G	G	G	G	G	42	G	G	48	G	G	G	G	G	35	46	G	G	G	41	37	34
5	G	G	G	G	G	G	G	G	G	45	G	G	G	G	G	G	G	G	G	30	60	35	29	G
6	58	29	G	G	G	G	G	G	G	G	G	49	G	G	G	43	33	33	33	G	G	G	G	G
7	G	G	34	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	29	57	32
8	40	41	G	G	G	G	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	33	G	G	G	G	G	G	G	G	G	28	G	G	38	G	G
10	30	30	G	G	G	G	G	G	G	34	G	G	G	G	G	G	G	G	G	G	G	G	G	30
11	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	72	46	G	G	G	G
12	G	G	G	G	G	G	30	38	G	G	G	G	G	G	G	G	G	G	G	28	G	25	27	G
13	G	26	53	32	G	G	G	G	G	G	39	G	G	G	G	G	32	G	G	G	G	28	G	32
14	G	24	45	39	33	G	G	G	G	G	G	G	G	63	G	G	G	G	G	G	G	G	30	G
15	G	G	G	34	44	33	G	G	G	G	G	G	G	G	G	40	G	G	G	G	G	58	56	60
16	32	32	G	27	28	G	G	29	G	G	G	G	G	G	G	G	G	G	29	41	33	G	29	33
17	G	G	G	G	32	G	G	G	41	G	G	G	G	G	G	G	G	G	G	G	G	G	30	35
18	38	50	40	38	G	G	G	G	50	G	G	G	G	G	G	G	G	G	G	G	G	G	50	32
19	27	24	24	33	G	G	43	33	44	G	G	G	G	G	G	G	32	G	82	94	34	32	G	36
20	58	45	33	32	G	G	G	G	G	G	36	G	G	G	51	71	59	68	32	30	G	G	G	G
21	G	G	G	G	G	G	G	36	G	G	G	G	G	G	G	G	G	G	G	G	G	46	48	40
22	31	G	29	G	33	44	35	91	103	41	50	41	42	G	51	G	60	84	58	36	38	40	50	28
23	32	30	G	G	G	G	26	30	61	G	G	G	G	G	G	G	G	G	32	G	60	46	35	30
24	G	G	G	G	29	34	65	66	47	61	G	G	G	G	G	43	72	26	69	107	104	60	60	43
25	42	35	G	G	29	50	G	G	38	G	G	G	G	50	G	G	G	G	30	39	48	37	30	58
26	30	G	28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	28	30	G	G	G	G
27	G	G	32	27	G	G	G	G	G	G	G	G	G	52	G	G	G	G	G	G	G	G	29	28
28	G	G	G	G	G	G	G	G	50	G	G	G	G	G	G	G	G	G	G	G	G	32	30	G
29	G	31	G	G	G	G	G	33	38	48	G	G	G	G	G	G	G	34	39	31	G	G	G	G
30	34	58	36	34	28	G	G	G	38	G	42	G	G	47	G	G	G	G	G	G	30	35	38	30
31	27	28	26	G	31	32	39	G	G	G	G	G	G	G	70	G	G	G	G	29	32	G	27	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	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	25	29	28
U Q	32	30	29	27	28	G	G	30	41	G	G	G	G	G	G	G	32	26	32	31	32	37	37	33
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. 1991

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

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

HOURLY VALUES OF FOF2 AT AKITA

DEC. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	46	47	64	N	40	60	62	80	103	103	111	120	116	106	90	103	111	64	57	62	52		A	
2	36		A	41	51	36	40	78	86	91	118	116	118	102	108	110	86	69	63	52	46	34	56	59
3	51	44	50	30	46	34	34	78	90	107	124	128	125	103	106	107	96	73	62	43	48	53	A	35
4	34	59	51	51	54	62	65	64	94	105	135	138	127	110	108	113	89	84	64	51	A	A	N	A
5	A	50	34	54	48	24	52	64	90	111	123	118	113	100	105	101	90	80	60	62	66	44	47	57
6	52	51	62	57	54	63	64	78	100	94	120	116	122	106	110	106	90	70	43	43	43	34	38	34
7	40	43	48	46	48	37	38	72	87	90	112	110	112	107	105	106	86	70	63	46	35	30	30	26
8	A	A	A		34	36	38	67	83	108	127	115	116	116	111	107	96	83	66	58	43	35	34	34
9	34	35		35	40	34	32	62	90	101	121	117	118	103	108	106	101	78	63	60	34			35
10	34		35	30	30	32	37	66	97	102	121	113	118	114	112	106	98		55	48	56	32	36	42
11	34	34	20	40	30	36	48	70	90	126	126	134	116	116	117	120	107	90	86	64	49	35	35	A
12	38		41	41	41	43	43	72	106	117	138	133	127	111	122	128	104	87	67	69	47	34	34	40
13		A		43	38	46	48	72	96	120	134	132	134	126	121	118	103	84	56	55		40	62	
14	38	37	42	44	A	38	A	71	104	127	136	134	134	128	128	135	110	90	87	61	48	35	A	A
15	A	30	A	37	A	A	A	72	104	128	138	141	124	125	126	116	113	84	66	63	51	34	34	34
16	34	34	A		32	37	34	64	88	105	120	122	111	111	117	109	98	53	54	59	61	N	N	N
17		45			26	A	31	58	108	140	144	126	121	130	131	124	114	38	62	53	64	65	34	50
18	41	38	41	30	36	32	35	88	105	127	136	131	126	136	121	118	90	72	54	45		N	A	A
19	34	34	30	31	51	32	36	62	89	126	136	112	108	101	111	97	77	74	52	26	37	A	A	A
20	A		37	35		32	30	68	111	122	134	126	113	116	118	105	74	54	67	A	N	26	31	50
21	34	34	34	N	35	34	34	62	81	100	122	121	114	112	111	99	90	73	63	60	64	58	62	A
22	52	52	63	55	51	50	47	73	85	103	116	112	101	106	111	106	84	56	55	A	A	A	A	A
23	A	38	40	40	36	35	35	64	98	97	103	114	91	91	113	91	76	64	63	60	26	A	48	A
24	A	A	A	A	36	40	68	63	90	108	121	107	92	108	98	100	88	79	52	A	38	37	43	35
25	A	A	A	A	A	A	35	58	85	107	136	122	110	107	90	89	87	51	51	57	38	A	A	34
26	A	A	A	A		A	30	67	88	112	133	122	118	116	105	97	84	53	54	54	40			35
27	37	38	31	37	38	38	41	66	84	111	107	120	116	116	116	111	96	88	87	55				49
28	A	A	30	N	30		30	62	87	117	153	136	111	107	124	122	106	84	77	62		29		31
29	29	30	30	34		30	30	55	121	132	151	130	110	124	122	115	98	71	66	64	43	43	51	48
30	43	53	54	44	43	43	43	68	90	132	141	135	131	122	132	133	121	84	80	63	40		36	34
31	A	38	40	38	40	40	38	61	94	107	130	121	115	112	112	127	90	78	66	52	44	28	48	46
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	19	21	21	22	25	26	29	31	31	31	31	31	31	31	31	31	31	30	31	28	24	19	18	20
MED	37	38	40	40	40	36	38	67	90	108	127	122	116	111	112	107	96	74	63	58	45	35	37	35
U Q	43	48	50	44	48	43	47	72	103	126	136	132	124	116	121	118	104	84	66	62	51	43	48	48
L Q	34	34	32	35	34	34	34	62	87	103	120	116	111	106	108	103	87	64	55	51	39	32	34	34

HOURLY VALUES OF FES AT AKITA

DEC. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	30	G	56	47	50	57	50	G	G	G	38	25	G	G		29	
2	G	G	27	G	G	G	G	G	G	41	G	G	G	G	G	56	31	25	G	G	G	G	27	G
3	G	G	G	G	G	G	G	G	34	G	G	G	43	41	G	G	G	G	G	G	G	G	49	G
4	G	G	G	G	G	G	G	G	G	41	G	50	G	G	G	40	G	G	32	48	54	60	36	40
5	39	30	24	27	G	G	30	G	G	G	60	51	G	40	G	G	36	45	44	40	G	G	36	40
6	37	38	28	G	G	G	G	G	G	38	40	44	57	40	G	G	G	G	G	G	G	G	G	G
7	G	G	G	G	G	G	G	G	33	40	65	41	42	44	37	33	G	29	G	G	G	G	G	G
8	55	27	24	G	G	G	G	G	G	38	G	41	G	G	40	G	G	G	G	G	G	G	G	G
9	G	G	G	G	G	G	G	G	38	53	42	G	G	41	G	G	37	G	G	G	G			G
10	G		G	G	G	G	G	G	G	G	G	G	43	59	37	42	50		G	44	41	G	G	G
11	G	G	G	G	G	G	G	G	G	G	G	52	G	51	43	G	G	G	G	G	G	G	G	39
12	G		G	G	G	G	G	28	G	G	G	G	60	G	G	G	G	G	G	G	G	G	G	G
13		28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		G	G	
14	G	26	G	G	29	28	49	32	43	G	G	45	48	50	50	G	36	31	40	30	G	G	30	30
15	30	30	28	25	29	50	46	32	G	G	G	G	G	G	G	G	G	30	G	G	G	29	G	28
16	G	G	28	G	G	G	G	28	32	41	40	G	G	G	G	G	G	G	28	G	G	G	G	G
17		G	G		G	28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	29	G	G	G
18	G	G	G	G	26	G	G	29	G	G	G	46	62	56	G	G	28	G	G	G		G	28	32
19	G	G	G	G	G	G	G	G	40	G	49	G	G	G	G	37	31	30	G	39	34	123	68	33
20	28	G	G	G	G	G	G	G	42	38	40	42	G	G	G	40	44	36	73	70	33	29	G	24
21	G	G	G	G	G	G	G	30	G	58	G	G	G	G	41	45	G	G	G	G	G	G	G	28
22	G	G	G	G	G	25	G	G	G	G	G	G	52	40	39	37	32	54	49	117	59	57	58	32
23	41	32	28	29	G	G	32	G	50	50	G	59	G	G	G	37	34	37	48	41	67	40	45	46
24	58	40	30	30	29	G	G	G	G	G	G	42	42	57	45	40	30	32	36	92	57	26	25	38
25	57	60	57	66	51	40	G	40	40	38	G	G	G	G	51	40	34	28	G	27	32	34	36	30
26	41	36	30	30	G	28	G	G	G	49	G	G	G	G	G	G	G	28	28	G	G			G
27	G	G	G	24	G	G	G	G	N	G	G	G	G	G	G	G	G	G	G	27	G		G	G
28	30	34	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		G	G	G
29	G	G	24	G		G	G	G	44	59	58	G	44	41	38	G	G	25	G	G	G	G	G	G
30	G	G	27	27	G	G	26	G	G	52	59	G	G	G	G	54	G	29	G	G	G		G	28
31	28	G	24	G	27	29	30	G	49	50	42	G	G	G	G	G	G	G	G	G	G	G	G	29
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	31	30	30	31	31	31	30	31	31	31	31	31	31	31	31	30	31	31	28	26	29	29
MED	G	G	G	G	G	G	G	G	G	38	G	G	G	G	G	G	G	13	G	G	G	G	G	24
U Q	33	30	27	24	G	G	G	28	38	49	42	44	43	41	38	40	32	30	28	39	32	29	33	32
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

HOURLY VALUES OF FMIN AT AKITA

DEC. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	18	18	18	16	18	17	18	17	17	17	18	18	23	21	18	18	16	17	18	20	18		18	
2	18	18	17	18	18	17	17	21	18	21	20	21	21	20	35	17	16	18	16	17	18	18	17	18
3	18		17	18	17	16	18	20	18	17	20	18	17	18	17	26	20	16	17	17	18	20	17	18
4	20	16	18	17	17	16	18	22	17	18	21	20	35	22	34	30	21	16	16	16	16	18	18	15
5	17	17	17	18	17	18	16	21	30	34	27	22	38	20	21	16	17	17	16	16	20	20	17	17
6	16	16	16	16	16	20	17	21	16	16	17	18	18	18	21	18	20	17	16	17	18	17	21	18
7	18	18	18	16	16	16	17	21	18	20	18	22	21	20	18	17	21	16	16	16	20	18	18	18
8	17	18	18	18	18	16	18	21	16	18	21	20	18	17	17	16	23	18	17	18	17	18	16	18
9	21	17	20	18	17	17	20	21	17	23	23	27	36	28	35	22	16	16	16	16	18			18
10	17		15	17	20	18	18	21	20	23	23	22	17	17	18	17	16		16	18	16	17	21	20
11	17	21	20	20		17	17	21	20	21	35	27	27	26	22	30	22	16	16	17	16	20	21	17
12	21		18	18	17	20	16	18	17	21	23	24	20	36	22	20	21	17	18	17	17	22	22	20
13		18	18	17	17	16	15	20	20	21	26	26	27	38	22	28	22	17	16	17		18	18	
14	17	18	16	17	18	16	18	16	23	33	35	24	23	24	24	18	16	16	17	17	18	18	18	17
15	16	16	17	18	18	17	16	16	22	21	22	35	38	23	21	29	21	16	16	20	18	18	18	17
16	21	23	18	24	17	17	18	20	16	18	20	21	21	21	35	29	22	18	20	17	17			
17		15	18		17	17	20	20	16	17	18	21	18	20	21	18	24	18	17	18	17	20	18	20
18	16	17	17	17	17	20	18	16	17	18	20	22	21	17	17	28	21	17	17	17		21	18	16
19	20	18	20	18	18	20	18	20	17	17	21	24	24	23	21	17	17	16	17	16	18	17	16	17
20	18	22	21	18	20	20	20	20	16	17	21	23	22	21	21	18	17	16	17	17	18	20	18	18
21	20	18	20	22	16	20	20	17	17	16	17	17	21	20	20	20	22	17	17	18	17	17	18	18
22	17	17	17	17	17	18	18	18	16	17	17	18	17	17	16	16	17	17	18	16	16	16	17	18
23	16	17	16	17	18	17	18	18	16	17	18	20	18	17	20	16	17	17	16	18	16	17	17	17
24	16	15	15	18	18	17	16	17	17	18	20	20	20	20	18	18	17	17	16	16	16	16	17	17
25	17	16	16	16	16	17	17	17	17	20	21	36	26	26	21	18	16	15	18	18	18	18	17	17
26	17	16	16	17	18	20	18	18	17	18	21	20	21	22	21	23	23	17	20	18	17			17
27	17	16	20	18	21	18	20	20	18	20	20	20	23	21	21	18	17	16	18	17	18			21
28	17	15	18		18		18	18	17	21	24	21	23	20	18	20	22	16	17	16		17	20	18
29	18	18	20	20		21	20	18	18	23	22	26	23	23	22	18	22	18	20	17	20	18	18	21
30	21	18	18	17	18	20	17	18	27	16	21	22	23	22	22	18	24	16	17	17	20		16	17
31	17	16	17	18	18	18	17	20	15	17	22	36	38	38	35	29	17	17	16	17	16	21	17	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	29	28	31	29	29	30	31	31	31	31	31	31	31	31	31	31	31	30	31	31	28	25	27	28
MED	17	17	18	18	18	17	18	20	17	18	21	22	22	21	21	18	20	17	17	17	18	18	18	18
U 0	19	18	18	18	18	20	18	21	18	21	23	24	26	23	22	26	22	17	18	18	18	20	18	18
L 0	17	16	17	17	17	17	17	18	16	17	20	20	20	20	18	17	17	16	16	16	16	17	17	17

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

DEC. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	48	55	50	40	41	68	57	80	105	110	105	126	117	108	111	101	104	94	77	61	53	46	40	36
2	35	35	38	44	36	36	41	92	121	95	102	127	126	118	110	110	101	84	80	73	52	41	49	A
3	43	27	34	34		30	34	94	110	105	120	135	140	126	118	114	116	98	72	55	43	34	65	36
4	32	31	34	43	35	35	49	84	92	98	127	139	142	127	115	120	108	96	80	52	55	35	32	38
5	34	34	A	43	46	N	32	83	97	102	126	113	113	114	108	104	100	86	70	51	57	40	41	45
6	47	50	46	52	47	50	50	86	100	96	118	121	119	117	116	118	104	83	68	43	59	48	46	46
7	43	41	40	42	43	41	36	74	92	97	106	120	116	107	120	114	95	78	74	58	46	46	A	34
8	48	42	37	41	50	34	41	74	98	104	128	114	116	122	112	113	101	92	70	61	55	46	36	31
9	41	35	36	46	37	30	34	73	91	115	118	120	117	122	110	112	114	92	81	62	49	50	47	42
10	35	43	34	32		35	37	82	98	125	131	122	117	121	116	113	97	86	78	80	67	40	41	41
11	38	42	37	38	42	35	57	93	95	120	130	132	126	114	123	122	116	102	95	74	67	50	47	48
12	49	49	43	44	41	41	50	76	100	113	136	132	130	114	126	131	121	106	66	73	58	46	38	38
13	38	38	39	49	50	41	47	76	97	118	147	136	122	137	126	130	114	87	81	77	71	49	38	46
14		41	43	48	35	37	41	93	104	130	138	135	130	136	141	138	131	116	108	78	56	40	44	35
15	35	38	38	37	36	42	56	80	107	128	142	141	133	124	128	127	116	100	78	73	66	44	38	
16	38	34	36	40	31	36	32	70	102	108	121	124	120	112	122	125	112	82	70	70	55	35	34	35
17	48	49	34		36	35	42	74	103	141	140	125	127	132	138	127	105	91	78	63	52	54	47	41
18	42	49	A	41	38	33	44	88	124	141	145	135	135	132	138	134	121	87	78	70	56	38	44	42
19	A	41	34	41		37	43	86	98	130	135	130	113	108	112	111	88	72	81	56	51	43	48	A
20	A	38	41	43	37	38	29	78	118	127	135	123	116	114	121	104	84	70	72	54	A	A	A	32
21	45	37	42	34	35	42	34	74	96	96	120	108	124	106	108	104	86	77	73	71	54	58	48	48
22	49	51	51	52	51	51	53	76	98	102	112	106	110	110	101	104	90	70	66	58	46	A	38	A
23	A	38	38	38	35	35	36	70	97	103	103	108	97	97	110	107	77	71	61	66	53	A	47	43
24	35	A	35	35	37	40	54	80	95	117	119	116	107	107	107	102	94	85	70	51	55	35	42	46
25	34	A	34	35	34	38	41	74	92	104	130	125	128	112	117	105	92	70	58	61	47	31	34	A
26	A	A	38	36		29	34	84	98	102	122	120	125	117	120	104	84	73	67	60	43		47	37
27	36	40	47	40	37	37	43	80	102	108	124	124	131	124	123	120	114	97	81	84	51	46	41	48
28	43	44	32	29	30	37	37	66	97	113	148	130	105	107	126	134	120	96	83	66	49	32	34	55
29	38	A	27	31	40	28	30	60	117	137	144	124	118	126	130	122	110	88	70	73	52	41	48	53
30	48	47	47	40	36	A	41	67	101	117	142	138	128	136	135	142	132	110	86	91	60	37	43	37
31	41	31	34	41	35	41																		
	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	27	29	30	27	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	26	28	25
MED	41	41	38	40	37	37	41	79	98	112	128	124	121	117	119	114	104	87	76	64	54	42	42	41
U Q	47	47	42	43	42	41	49	84	104	125	138	132	128	126	126	127	116	96	81	73	57	46	47	46
L Q	35	35	34	36	35	35	34	74	97	102	119	120	116	110	111	105	94	78	70	58	50	37	38	36

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT KOKUBUNJI

DEC. 1991

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

DAY \ HR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	27	G	G	G	G	G	30	44	44	54	46	58	48	G	G	36	32	G	G	G	G	G	G
2	24	G	G	G	G	G	G	29	41	54	46	48	52	48	G	48	37	30	25	G	G	G	28	31
3	33	G	G	G		G	G	G	G	G	G	G	G	G	G	35	G	G	G	G	29	G	G	G
4	G	G	G	G	G	G	G	31	G	G	G	G	G	G	G	35	G	G	G	36	26	G	G	G
5	G	G	29	G	G	38	G	29	G	G	G	G	G	44	G	G	G	30	30	29	G	G	G	33
6	45	56	58	25	G	G	G	G	42	42	49	43	42	43	G	G	G	G	G	G	G	G	G	G
7	G	G	G	G	G	G	G	G	34	41	51	54	48	42	44	43	G	G	G	G	23	25	25	G
8	G	G	25	26	29	G	G	G	G	43	41	41	44	48	52	G	G	G	G	G	G	G	G	32
9	27	28	G	G	G	26	G	30	34	43	47	56	42	43	G	G	G	G	G	G	G	G	G	G
10	G	G	G	G		G	G	30	34	48	50	46	G	G	G	G	G	G	G	G	G	G	G	G
11	G	G	G	G	G	G	G	48	33	46	41	G	41	G	39	G	G	G	G	G	G	G	G	G
12	G	30	29	G	G	G	G	G	33	G	G	G	G	G	G	G	G	34	31	26	G	G	G	23
13	26	G	41	G	G	G	G	G	G	G	G	44	44	G	G	34	G	G	G	G	G	G	G	G
14		G	G	G	G	G	G	27	58	G	48	49	48	47	47	40	32	37	32	G	G	G	G	G
15	G	G	G	G	26	32	44	50	60	55	G	58	G	G	39	G	G	32	29	33	26	G	G	G
16	G	G	G	G	G	G	G	27	40	40	42	42	G	60	G	43	29	28	G	G	G	51	G	G
17	G	G	G		G	G	G	G	G	59	45	G	G	44	48	47	32	29	38	G	G	G	G	40
18	G	G	38	27	G	G	G	28	G	37	41	G	G	G	G	G	31	31	27	54	32	G	32	30
19	41	26	G	G		G	G	G	G	G	G	53	G	47	G	41	G	30	29	30	G	G	G	53
20	39	32	G	G	G	G	G	G	G	44	42	44	50	G	50	54	42	30	47	57	48	37	34	27
21	26	G	G	G	G	G	G	38	G	44	G	G	G	G	G	G	G	29	G	G	G	G	26	G
22	G	G	G	G	G	G	G	G	G	G	G	G	G	44	G	36	34	G	G	27	32	60	48	38
23	40	34	G	G	G	G	G	48	37	G	42	G	G	44	58	37	G	G	30	57	31	40	47	31
24	34	29	33	30	G	G	G	48	G	G	G	44	G	G	45	46	59	34	36	30	24	G	G	G
25	G	38	G	G	G	G	G	G	G	41	G	G	G	G	G	G	G	25	26	28	G	58	26	30
26	53	46	28	G		G	G	26	G	G	G	G	G	G	G	G	33	G	G	G	G		G	G
27	G	G	G	G	G	G	G	G	G	G	40	42	G	60	76	57	55	61	38	G	G	G	G	G
28	28	24	26	30	G	G	G	G	34	38	53	58	50	47	G	G	G	25	27	28	G	G	G	26
29	G	28	G	G	G	G	G	G	58	54	78	61	53	51	G	G	G	G	G	G	G	G	G	G
30	G	G	G	48	29	36	34	34	G	37	61	51	48	43	G	G	33	G	G	G	G	G	G	G
31	G	G	25	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	30	31	31	30	27	31	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30
MED	G	G	G	G	G	G	G	26	G	39	41	42	G	43	G	G	G	25	G	G	G	G	G	G
U Q	28	28	26	G	G	G	G	30	37	44	48	49	48	47	44	41	33	30	30	29	24	G	25	30
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. 1991

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

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT YAMAGAWA

DEC. 1991

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

DAY \ HOUR	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	71	41	50	30	66	34	32	62	107	117	108	117	126	118	118	112	118	114	106	86	76	72	42	69
2	41	71	44	40	41	25	30	66	109	105	105	126	138	141	121	112	122	122	118	110	86	76	60	63
3	71	28	36	66	41	46	24	66	111	86	108	131	142	138	122	116	125	122	105	86	63	62	71	61
4	43	69	36	68	41		29	66	100	98	128	137	145	140	135	142	154	138	128	87	83	83	62	42
5	48	71	70	52	47	A	N	58	88	102	108	115	122	120	124	123	114	104	88	66	62	62	47	57
6	61	65	66	38	42	38	31	51	96	106	118	120	122	135	141	133	130	131	96	78	78	78	62	62
7	71		42	40	46	32	26	54	86	105	112	117	127	131	140	141	122	121	104	92	88	78	66	49
8	43	47	49	43	51	53	26	54	86	103	115	115	118	130	134	130	122	121	103	80	64	63	60	70
9	42	71	70	52	53	46	26	52	97	120	115	126	130	135	140	141	135	138	111	114	88	87	66	53
10	42	49	50	40	65	35	52	60	105	128	132	124	134	127	136	120	104	114	110	97	87	76	52	61
11	53	54	41	A	37	71	50	66	90	116	121	131	135	130	138	146	138	137	130	110	125	85	81	74
12	62	65	52	58	55	37	67	56	91	111	117	124	132	122	118	137	145	137	111	104	103	78	60	42
13	34	37	A	A	40	29	71	50	85	111	134	145	132	140	128	137	147	144	134	110	108	108	66	59
14	37	42	49	51	41	71	54	54	97	111	132	146	134	137	143	146	145	140	137	111	107	79	53	64
15	40	50	71	43	51	41	37	58	88	120	144	145	132	134	126	142	142	138	128	87	85	81	60	50
16	52	44	41	43	44	69	29	53	81	106	112	120	130	132	136	146	145	144	111	90	87	77	50	50
17	66	47	48	30	58	65	66	45	90	131	125	125	141	146	141	127	121	120	108	87	N	86	73	38
18	42	55	48	41	41	41	47	76	122	144	152	153	153	156	162	162	168	161	133	128	89	78	62	65
19	52	A	43	44		46	70	54	111	138	145	153	151	142	135		128	120	108	101	84	84	63	60
20	71	44	52	57	70	46	46	62	88	120	135	128	131		117	117	114	101	68	80	82	43	36	34
21	34		71	35	51		A	54	86	106	111	108	137	122	116	113	102	90	90	80	66	78	72	31
22	52	42	A	51	48	33	30	54	90	102	102	110	111	116	110	107	97	86	83	77	86	51	41	37
23	31	32	64	25	31	46	66	56	88	115	115	112	124	128	112	115	113	90	72	72	88	59	38	42
24	41	35	36	41	36	36	43	66	88	120	125	116	126	121	111	122	114	108	87	75	87	81	68	59
25	63	A	A	A	35	41	36	52	84	106	111	125	135	132	132	131	115	103	80	66	76	61	66	28
26	66	38	38	A	46	29	N	58	88	97	105	120	137	132	134	131	112	104	83	63	67	61	42	42
27	40	68	59	36	34	37	38	57	90	108	116	120	131	138	142	144	148	152	138	126	140	82	78	86
28	66	53	37	32	32	64		53	101	111	136	138	121	120	145	151	156	144	128	108	106	85	85	59
29	66	54	46	50	30	34	71	42	110	142	146	122	124	145	142	137	130	122	104	88	98	80	66	63
30	53	47	47	54	40		66	54	90	116	134	145	137	146	142	159	160	156	143	132	122	106	65	52
31	42	43	48	55	42		A	48	101	104	112	111	117	122	111	112	116	110	83	90	83	66	54	71
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	27	28	27	30	26	26	31	31	31	31	31	31	30	31	30	31	31	31	31	30	31	31	31
MED	52	47	48	43	42	41	40	54	90	111	117	124	132	132	134	132	125	122	108	88	86	78	62	59
U Q	66	65	55	52	51	46	66	62	101	120	134	137	137	140	141	142	145	138	128	110	98	83	66	63
L Q	41	42	41	38	40	34	30	53	88	105	111	117	124	122	118	117	114	108	88	80	78	63	52	42

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

DEC. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	G	G	G	52	53	46	G	G	G	G	G	G	G	G	G	G
2	G	G	G	G	G	G	G	G	G	43	47	56	47	50	G	G	G	G	G	G	G	G	G	G
3	G	G	G	G	G	G	G	G	G	G	41	43	44	44	42	42	G	G	G	G	G	G	G	G
4	G	G	G	G	G	G	G	G	48	G	G	G	G	G	G	42	G	27	28	22	G	G	G	G
5	39	G	G	G	G	30	G	24	G	G	G	51	44	58	72	70	58	45	39	G	G	G	G	G
6	24	G	24	G	G	G	G	G	34	40	44	49	53	49	G	40	34	37	24	G	G	G	G	G
7	G	G	G	G	G	25	G	G	G	G	40	48	47	59	44	43	G	31	G	G	34	24	G	G
8	G	G	G	G	G	G	G	25	G	G	G	47	50	45	41	G	G	38	25	G	G	G	G	G
9	G	G	G	G	G	G	G	G	G	G	47	48	G	62	63	57	56	54	48	43	G	G	G	G
10	G	G	G	G	G	G	G	G	34	G	G	G	44	62	68	G	G	G	G	G	G	G	G	G
11	G	G	G	29	G	G	G	G	G	G	G	G	45	50	42	41	43	G	G	G	G	G	G	G
12	G	G	G	G	G	G	25	G	G	38	40	G	G	44	42	G	G	G	26	25	G	G	G	G
13	G	G	33	28	24	26	G	G	G	G	G	G	45	G	G	G	G	G	G	G	G	G	G	G
14	G	G	G	G	G	G	G	G	32	G	G	44	48	44	44	G	G	G	G	G	G	G	G	G
15	G	G	G	G	G	G	G	G	G	G	66	G	G	G	G	38	G	30	G	G	29	G	G	G
16	G	G	G	G	G	G	G	G	G	38	G	42	59	44	G	G	G	G	G	G	G	G	G	G
17	G	G	G	G	G	G	G	G	G	G	G	65	51	48	G	45	G	G	G	G	G	G	G	24
18	G	G	G	G	G	G	G	G	G	G	G	G	G	44	43	G	G	G	44	33	G	G	G	G
19	G	36	27	G		G	G	G	G	G	46	49	45	G	G		40	46	28	32	G	G	G	G
20	G	40	35	24	G	G	G	G	G	G	44	48	53		53	49	39	G	G	24	G	G	G	G
21	G		27	25	24		30	24	35	G	G	74	G	53	63	G	G	G	25	G	G	G	G	G
22	G	24	26	G	G	24	G	G	G	G	G	G	G	G	45	44	G	35	36	29	G	G	G	G
23	G	G	G	G	G	G	G	G	G	44	45	44	G	G	G	G	G	G	G	20	G	G	24	24
24	G	24	29	24	G	G	G	G	G	41	44	60	92	80	68	69	39	41	24	G	G	G	G	G
25	G	29	33	30	27	25	G	G	G	G	42	G	G	65	G	G	G	G	G	G	G	G	28	G
26	G	G	G	37	31	G	G	G	G	G	42	G	G	62	G	G	G	29	G	24	G	G	G	G
27	G	G	G	G	G	G	G	G	G	G	G	47	45	65	G	39	G	45	G	G	G	28	G	G
28	G	G	G	25	23	23		24	G	39	G	69	93	72	42	46	59	37	32	28	G	G	G	G
29	G	G	G	G	G	G	G	G	G	38	64	64	73	72	58	54	G	28	32	28	G	G	G	G
30	G	G	G	G	G		G	G	G	G	42	48	62	59	42	40	G	46	G	G	G	G	G	G
31	G	G	G	G	G		24	G	G	G	G	G	G	G	42	48	G	G	46	34	30	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	30	28	30	31	31	31	31	31	31	30	31	30	31	31	31	31	31	31	31	31
MED	G	G	G	G	G	G	G	G	G	G	G	47	45	48	42	40	G	G	G	G	G	G	G	G
U Q	G	G	24	24	G	G	G	G	G	38	44	51	53	62	45	45	34	37	28	25	G	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	44	G	G	G	G	G	G	G	G	G	G

HOURLY VALUES OF FMIN AT YAMAGAWA

DEC. 1991

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

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

HOURLY VALUES OF FOF2 AT OKINAWA

DEC. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	26	N	54	46	32				88	128	125	112	124	142	132	132	138	131	146	131	108	110	86	74
2	71	66	66	52	30		N	55	111	121	124	132	146	162	156	146	146	160	171	146	128	125	106	66
3		30	N	38	37	38		70	120	108	110	131	130	147	146	124	146	162	162	131	129	110	87	72
4	54		55	37	32			66	106	122	133	132	161	159	160	157	162	162	163	145	138	131	104	90
5	86	87	67	85	45	N		39	104	89	118	116	134	131	135	137	138	130	111	87	90	90	86	53
6	54	54	54	52	53	34	31	48	85	120	146	125	N	145	161	160	162	161	146	124	130	131	111	63
7	46	54	53	44	44	30		43	86	107	130	110	131	146	166	160						128	108	86
8	77	85	86	66	70	66	37	53	86	111	131	111	120	124	131	146	146	131	129	87	108	108	110	85
9	78	79	86	86	59	32	26	54	88	111	131	131	137	152	160	152	176	176	141	146	146	121	90	73
10	66	55	53	37	36	50	43	54	107	145	133	116	133	146	145	137	131	139	144	129	108	110	110	86
11	72	66	66	54	34		54	66	107	111	130	128	126	142	158	157	136	189	171	145	162	163	145	111
12	86	66	86	86	86	53	34	54	106	121	120	120	120	132	130	147	162	161	140	145		130	107	88
13	53	53	62	54	66	53	43	53	90	132	143	146	125	133		160	162	169	177	178	136	171	128	88
14	72	63	66	66	47	31	37	54	105	118	130	137	143	146	146	157	169	169	146	171	N	146	130	87
15	66	66	54	47	46	46	31	70	108	121	146	132	143	124	131	151	160	175	188	162	145	146	131	88
16	86	66	54	48	48	46		51	90	111	116	108	120	137	147	163	176	189	189	146	146	145	88	67
17	66	86	66	40	63	66	63	42	90	130	105	118	148	146	142	122	131	137	143	108	85	110	106	63
18	52	63	48	50	38	46	37	80	128	145	154	159	169	165	159	156	N	189	146	159	154	159	127	86
19	84	53	52	47	37	30		32	110	131	146	135	145	160	150	161	145	170	176	146	146	145	108	88
20	62	A	54	53	30	N		63	105	111	134	132	130	126	111	124	121	130	88	66	81	79	52	34
21	30	N	26		31			26	118	95	111	111	131	136	120	121	112	107	104	82	34	86	78	32
22	34	52	45	31	53	29		32	89	90	118	110	131	130	124	120	108	110	89	83	87	79	52	34
23	34	47	48	47	35	32	32	36	90	118	121	127	141	146	146	131	140	118	90	29	98	87	52	34
24	30	32	38	47	34	A	32	54	87	121	146	112	130	146	146	144	136	127	111	104	110	110	87	63
25	52	52	61	63	48	34	50	54	90	111	122	107	145	146	152	146	146	144	108	86	86	88	66	28
26		32	52	34	31	31	36	32	107	104	111	111	132	146	169	155	N	146	107	79	80	87	61	
27	17	32	32	31	46	34	N	30	90	111	107	111	121	138	160	160	157	170	N	109	163	146	108	108
28	84	66	76	46	46	N		32	110	111	134	121	124	142	159	144	169	160	163	145	143	158	127	86
29	86	104	67	66	66		A					120	131	151	157	146	146	160	160	145	156	145	110	88
30	63	66	66	66	51	N	30	52																
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	26	29	29	30	19	16	28	28	28	28	29	28	29	28	29	26	28	27	28	26	29	29	28
MED	64	63	54	48	46	34	36	53	104	114	130	120	131	146	146	146	146	160	146	131	128	125	106	80
U Q	77	66	66	64	53	50	43	54	107	121	134	132	143	146	159	157	162	169	163	146	146	145	110	88
L Q	49	52	52	42	34	31	31	37	89	111	118	111	125	134	133	134	136	131	111	87	90	99	86	63

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

DEC. 1991

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G		G	G	G	G	G	G	G	G	G	G	G	G	25	28	G	G	G	G
2	G	G	G	G	G		G	G	32	G	55	57	91	58	G	44	G	G	26	G	G	G	G	G
3	G	G	G	G	G	G		G	G	G	G	G	44	46	42	43	G	G	G	G	25	G	G	G
4	G	G	G	G	G			G	G	G	G	G	G	G	42	44	36	G	G	G	G	G	G	G
5	G	G	G	G	G	G		32	G	40	58	G	G	51	51	55	G	G	G	G	G	G	G	G
6	G	G	G	G	G	G	G	G	G	40	44	47	50	45	G	40	37	30	G	G	G	G	G	G
7	G	G	G	G	G	G		G	G	38	42	G	49	52	54	44						G	G	G
8	G	G	G	G	G	G	G	G	G	G	G	42	50	51	45	G	G	33	G	G	G	32	G	G
9	G	G	G	G	G	G	G	G	G	41	G	62	58	60	55	92	G	G	26	G	G	28	28	28
10	G	G	G	G	G	G	G	G	G	43	G	65	G	56	48	69	40	37	34	26	G	G	G	G
11	G	G	G	G	G	G	G	G	36	G	44	G	56	57	44	41	39	G	G	G	G	G	G	G
12	G	G	G	G	G	G	G	G	G	G	44	G	44	G	G	G	G	G	G	G		G	G	G
13	G	G	G	G	34	G	G	G	G	38	G	G	G	G		G	36	37	36	G	24	G	G	G
14	G	G	G	G	G	G	G	G	G	G	41	G	G	50	46	41	G	G	28	G	G	G	G	G
15	G	G	G	G	G	G	G	G	G	G	42	G	G	43	44	42	37	G	G	G	G	G	G	G
16	G	G	G	G	G	G	G	G	G	37	40	50	G	44	G	42	G	G	G	G	G	G	G	G
17	G	G	G	G	G	G	G	G	G	G	G	G	G	49	48	58	G	G	28	G	G	G	G	G
18	G	G	G	G	G	G	G	G	G	G	G	G	G	G	44	G	G	42	27	26	92	G	G	G
19	G	G	G	31	29	G	G	G	G	37	G	51	44	G	G	42	36	30	24	G	24	G	G	G
20	G	31	G	37	36	G	G	G	G	G	47	62	53	51	54	46	62	G	G	28	29	24	G	G
21	G	G	G	G	G			G	32	38	41	44	G	50	54	G	G	G	29	24	G	G	G	28
22	G	36	32	22	G	G		G	G	G	G	G	G	G	48	40	38	G	38	27	40	24	G	G
23	G	G	G	G	G	G	G	G	35	41	48	49	49	47	80	44	40	33	30	G	G	G	G	G
24	G	G	G	G	33	26	G	G	34	G	G	45	61	89	83	84	79	85	38	32	28	24	G	G
25	G	G	G	G	G	G	G	G	G	G	G	47	G	50	51	62	81	41	36	G	G	G	35	33
26	G	G	G	G	G	G	G	G	G	G	46	56	57	50	G	64	G	36	36	29	G	35	32	G
27	G	G	G	G	G	G	G	G	G	36	G	G	G	G	44	G	37	G	24	G	G	G	G	G
28	G	G	G	G	G	G	G	G	G	G	G	57	60	91	116	45	59	35	37	32	G	G	G	G
29	G	G	G	G	G	G	147					65	69	69	56	58	61	57	76	39	28	G	G	G
30	G	G	G	G	G	G	G	G																
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	26	24	29	28	28	28	29	29	29	28	29	28	28	28	28	27	29	29	29
MED	G	G	G	G	G	G	G	G	G	G	G	42	44	50	46	43	36	G	26	G	G	G	G	G
U Q	G	G	G	G	G	G	G	G	G	38	44	53	54	54	54	56	39	35	35	26	24	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	21	20	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT OKINAWA

DEC. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	20	16	16	15	16		20	26	28	17	22	39	47	29	40	43	22	24	16	15	16	20	16	16
2	16	16	15	16	15		16	22	15	18	21	23	23	26	52	29	18	24	16	20	16	16	18	17
3	16	16	18	16	16	16		21	16	17	21	22	29	26	26	21	28	24	15	15	15	15	16	16
4	15	17	15	15	17			22	17	22	38	42	45	40	29	27	22	24	15	15	16	23	16	15
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7	16	16	16	15	16	22		20	18	21	23	30	23	34	30	21						16	16	16
8	16	17	15	16	15	15	16	20	17	22	42	27	29	26	22	27	17	18	16	16	16	16	18	17
9	16	15	15	15	15	15	17	21	17	21	30	30	44	32	33	24	18	26	16	15	17	15	15	
10	16	15	15	15	16	16	15	22	16	22	27	32	29	29	29	23	17	16	15	16	15	17	15	17
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20		18	16	15	15	23		20	16	20	22	22	28	23	21	18	17	16	16	15	15	16	15	16
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25	18	18	17	16	15	17	16	16	27	21	20	34	47	30	29	21	18	16	16	18	20	18	16	16
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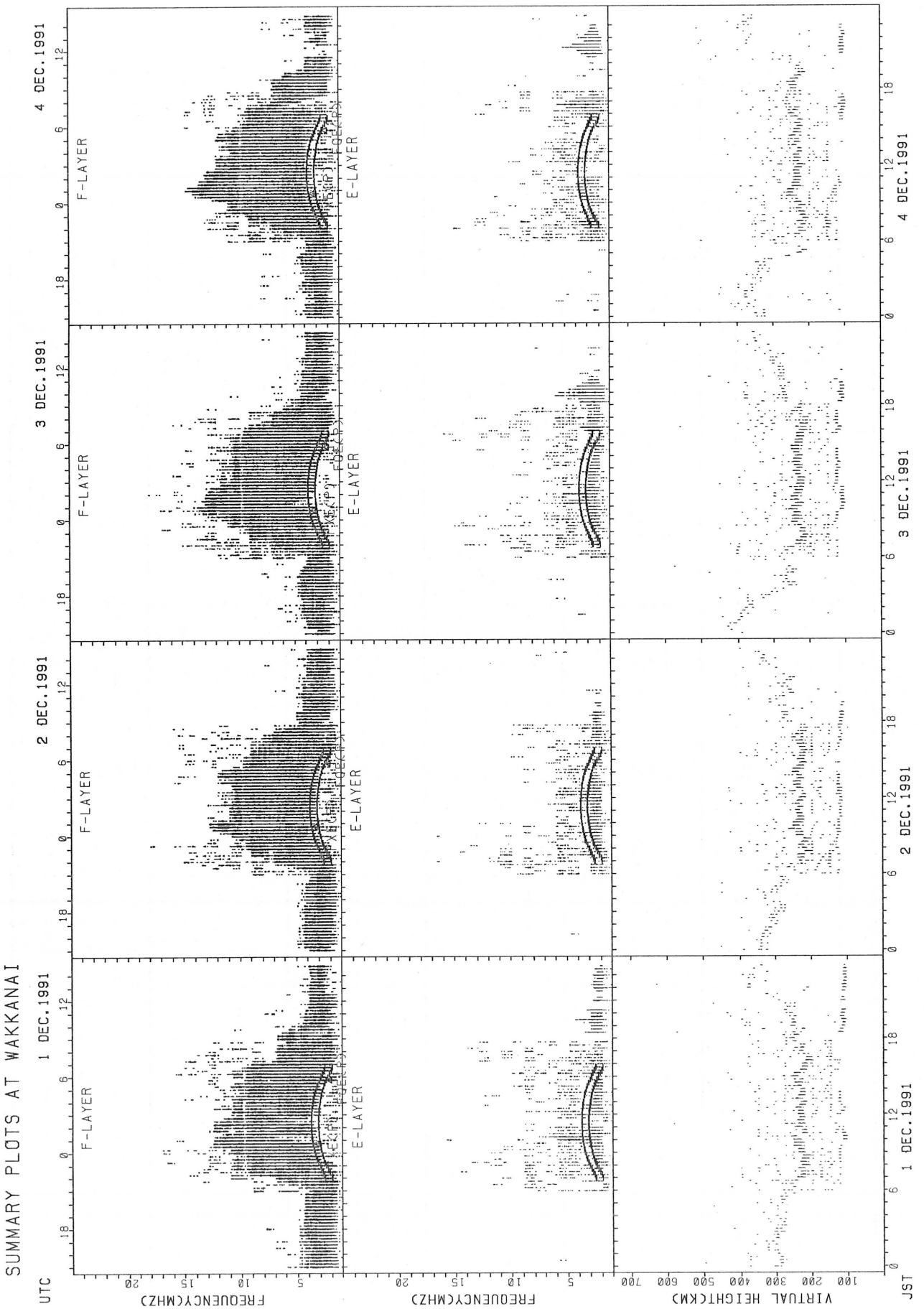
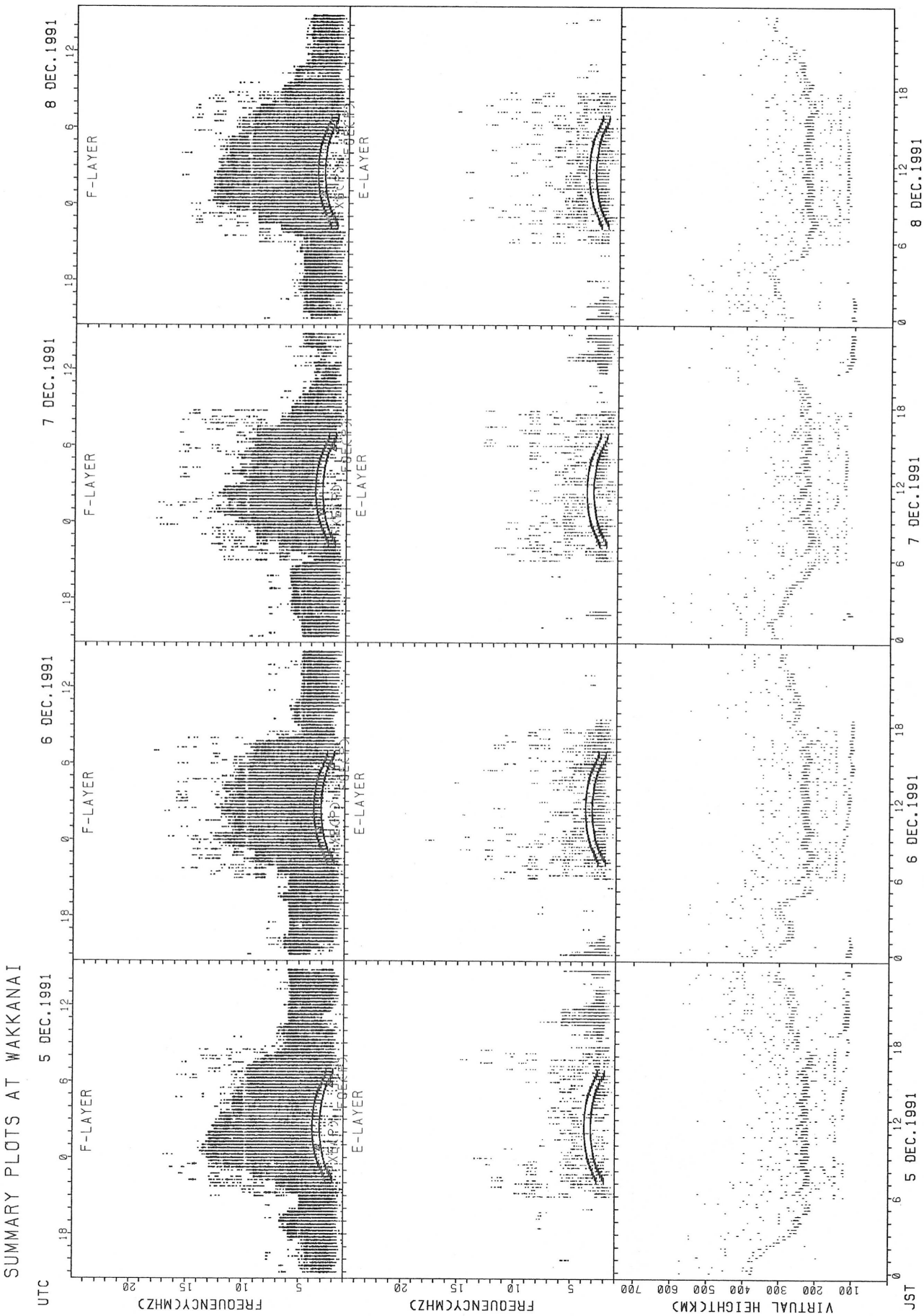
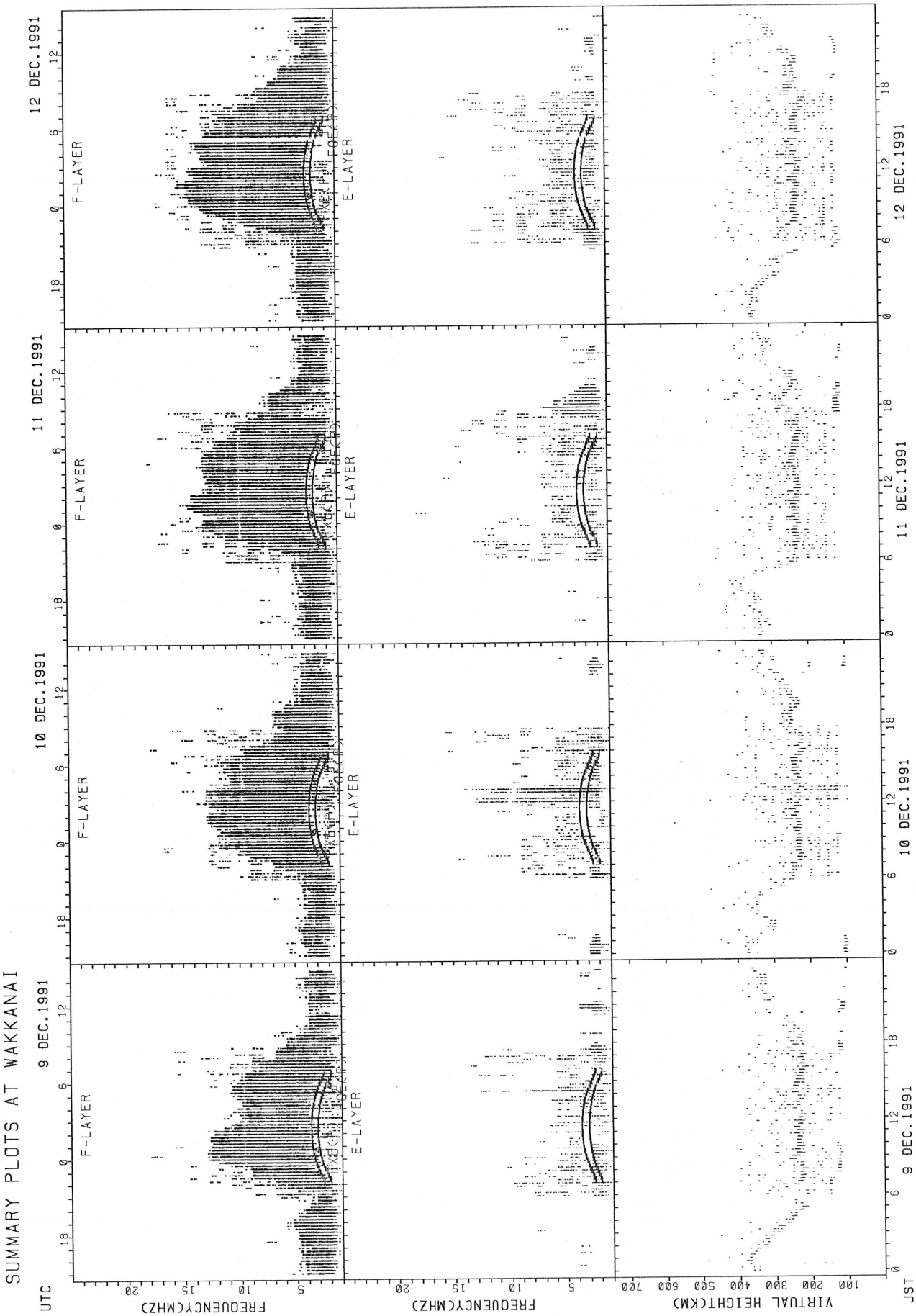
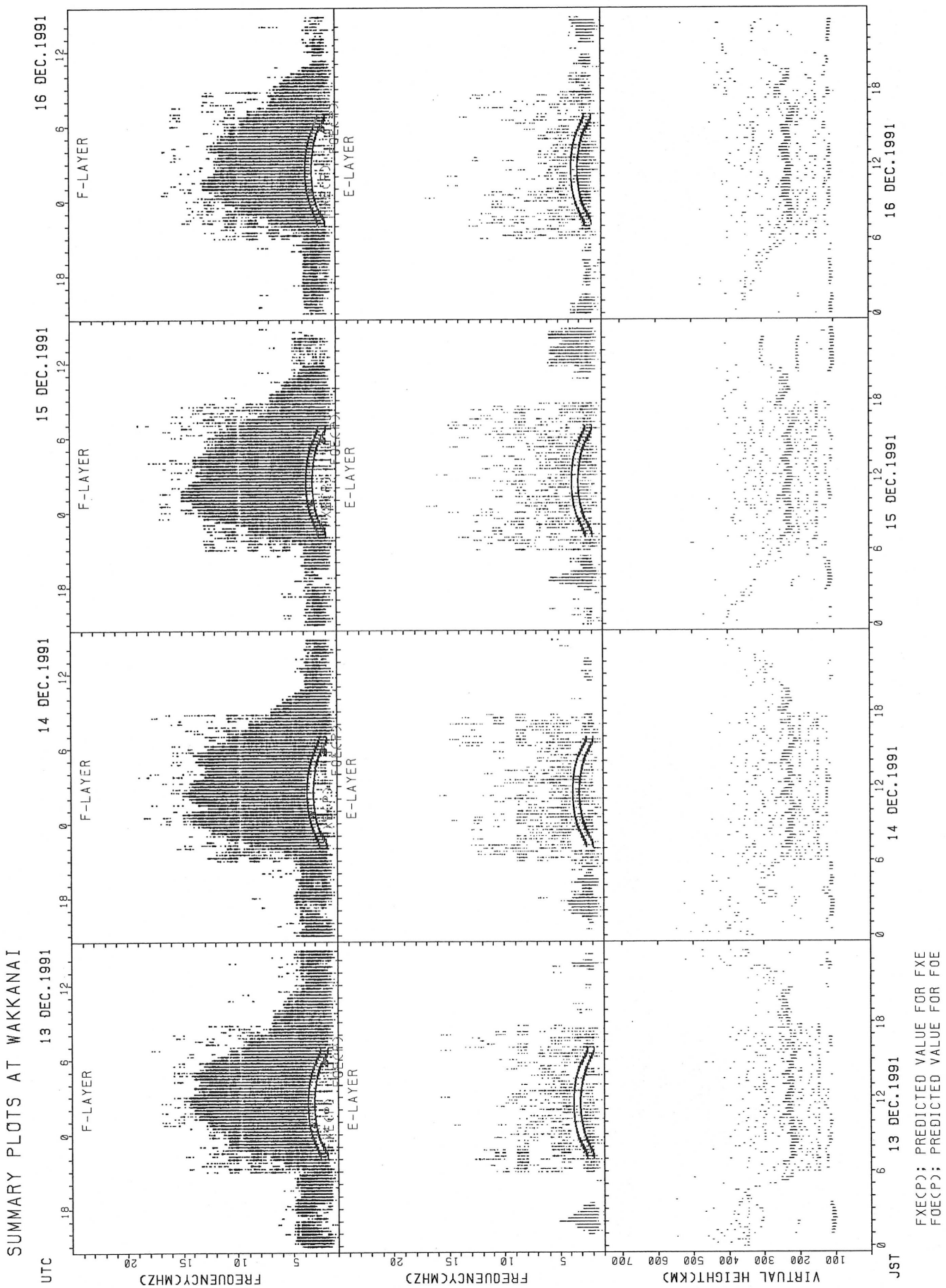
29	16	15	15	16	15		15					29	30	24	23	20	17	18	16	16	20	16	16	15
30	15	16	15	15	15	18	22	15																
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	30	29	30	23	21	29	28	28	28	29	29	29	28	29	28	28	28	28	27	29	29	28
MED	16	16	16	15	16	16	16	18	19	21	23	28	29	28	26	22	18	18	16	16	16	16	16	16
U Q	16	16	16	16	16	18	18	20	27	22	28	30	32	30	29	24	22	24	16	16	17	16	16	17
L Q	15	15	15	15	15	15	16	16	17	18	21	25	28	26	23	21	17	16	15	15	15	15	15	16

COMMUNICATIONS RESEARCH LABORATORY, JAPAN


SUMMARY PLOTS AT WAKKANAI
UTC
1 DEC.1991
2 DEC.1991
3 DEC.1991
4 DEC.1991
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
5 DEC.1991
6 DEC.1991
7 DEC.1991
8 DEC.1991
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
9 DEC.1991
10 DEC.1991
11 DEC.1991
12 DEC.1991
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
13 DEC.1991
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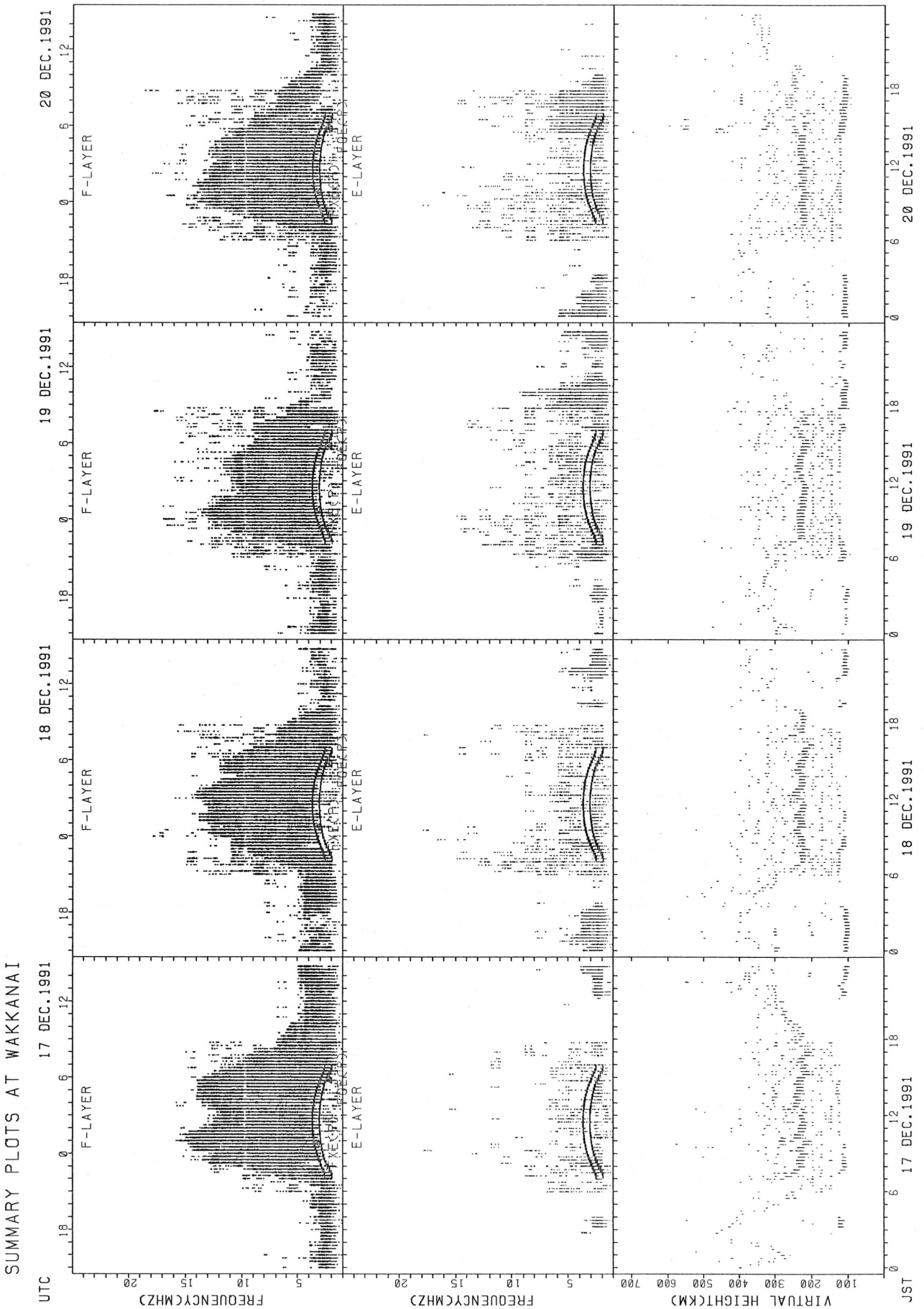
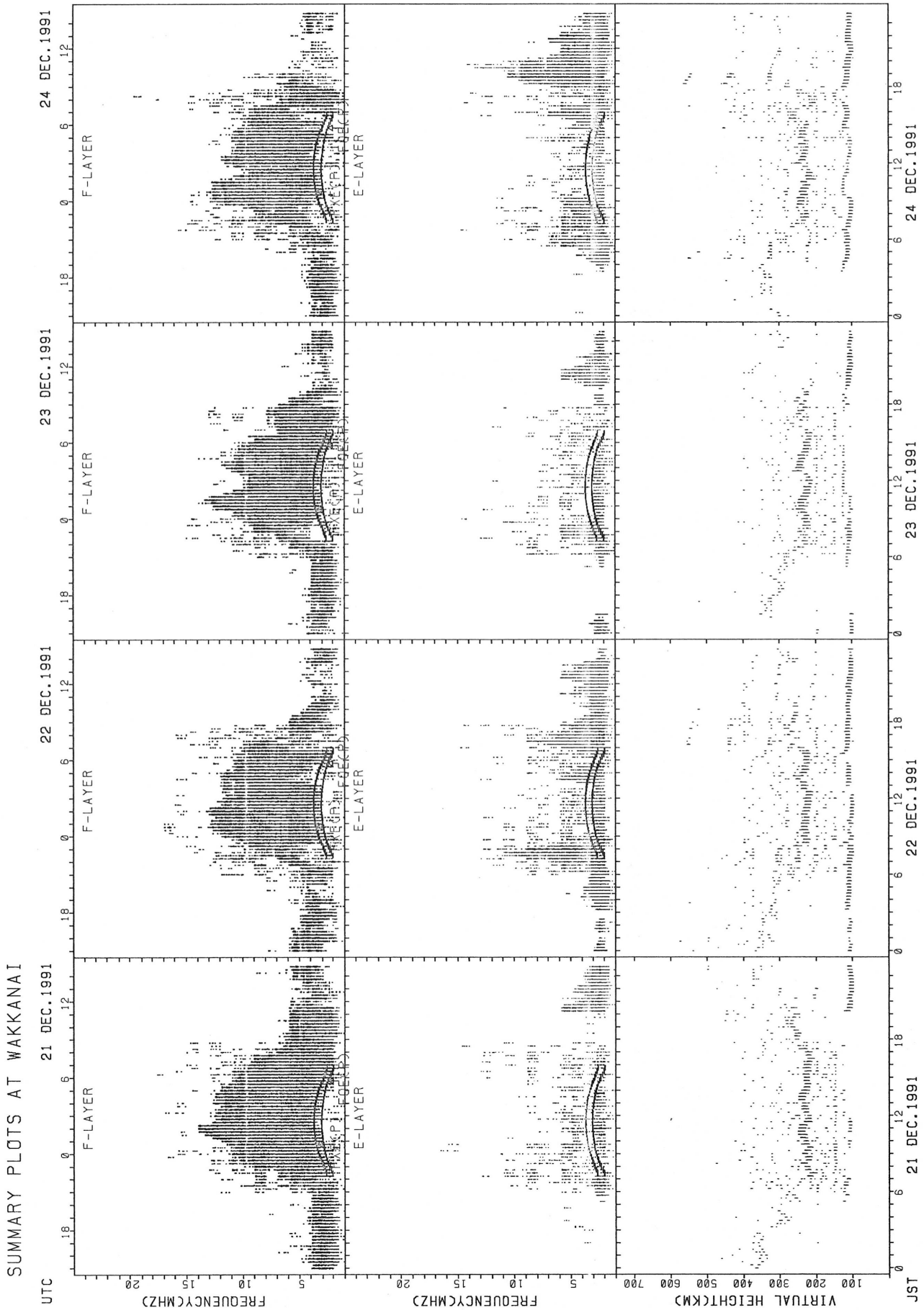
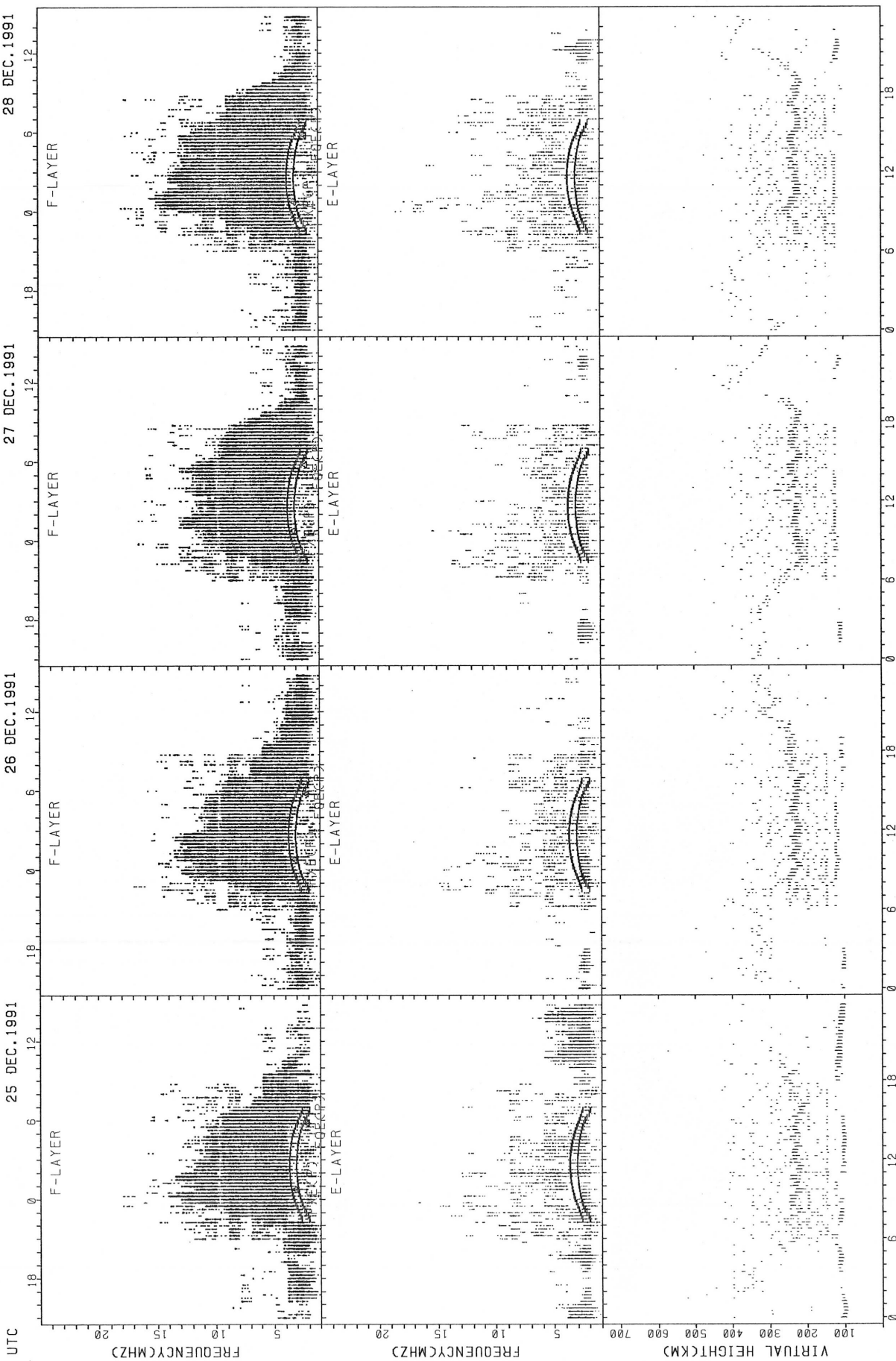
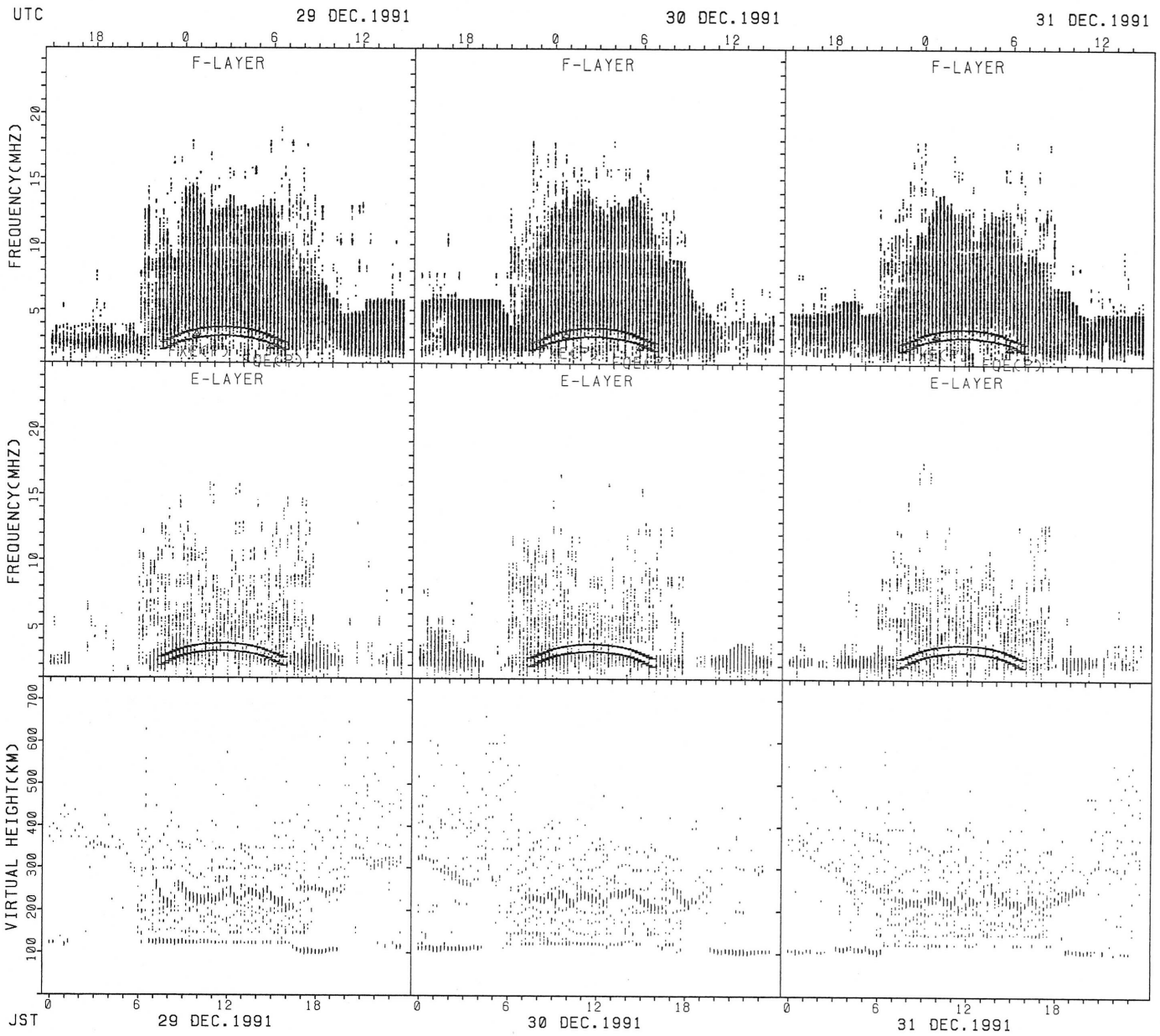
15 DEC.1991
16 DEC.1991
UTC
JST
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

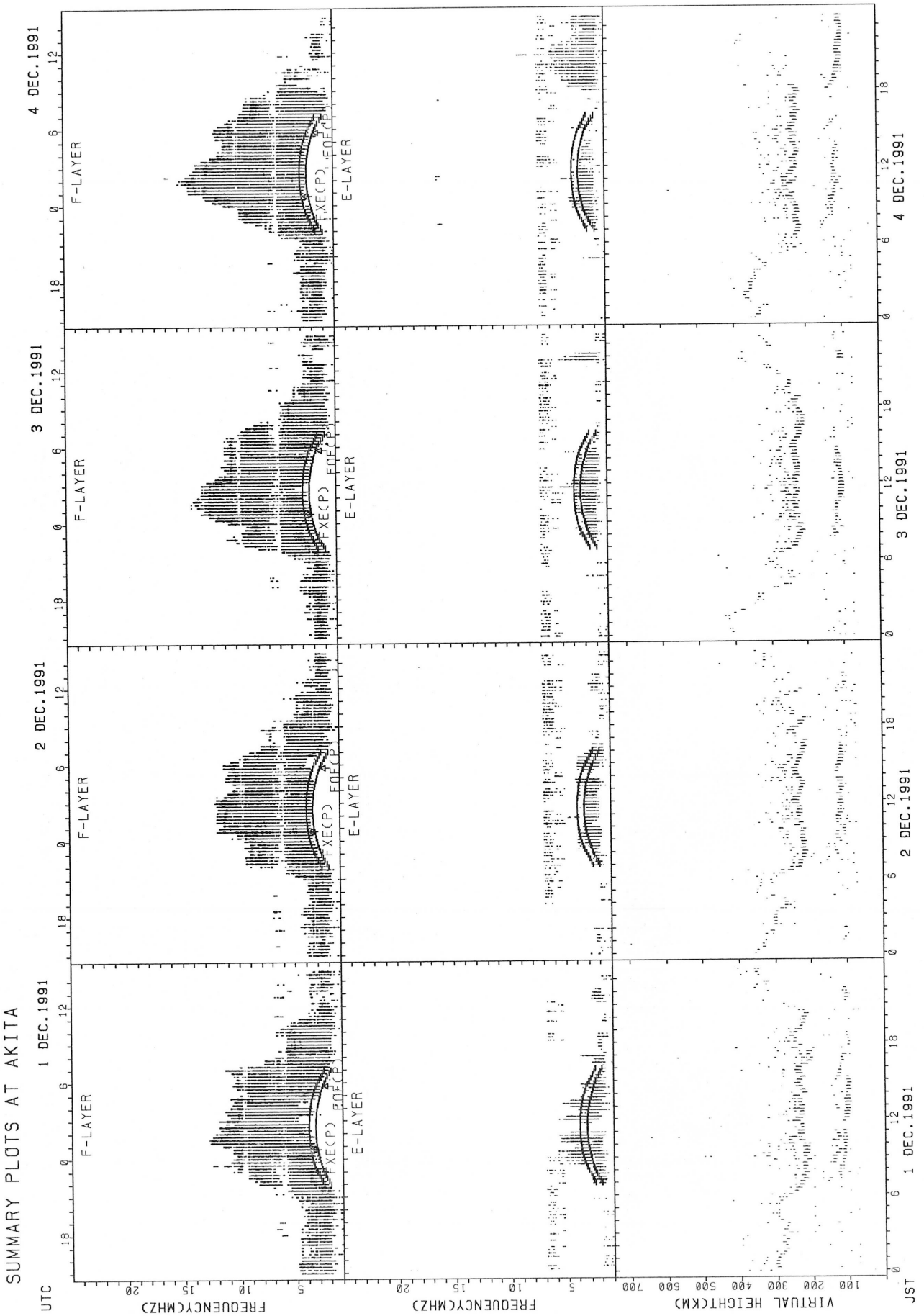

SUMMARY PLOTS AT WAKKANAI
UTC
17 DEC.1991
18 DEC.1991
19 DEC.1991
20 DEC.1991
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE
JST
17 DEC.1991
18 DEC.1991
19 DEC.1991
20 DEC.1991


SUMMARY PLOTS AT WAKKANAI
UTC
21 DEC.1991
22 DEC.1991
23 DEC.1991
24 DEC.1991
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
JST
25 DEC.1991
26 DEC.1991
27 DEC.1991
28 DEC.1991
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI




SUMMARY PLOTS AT AKITA
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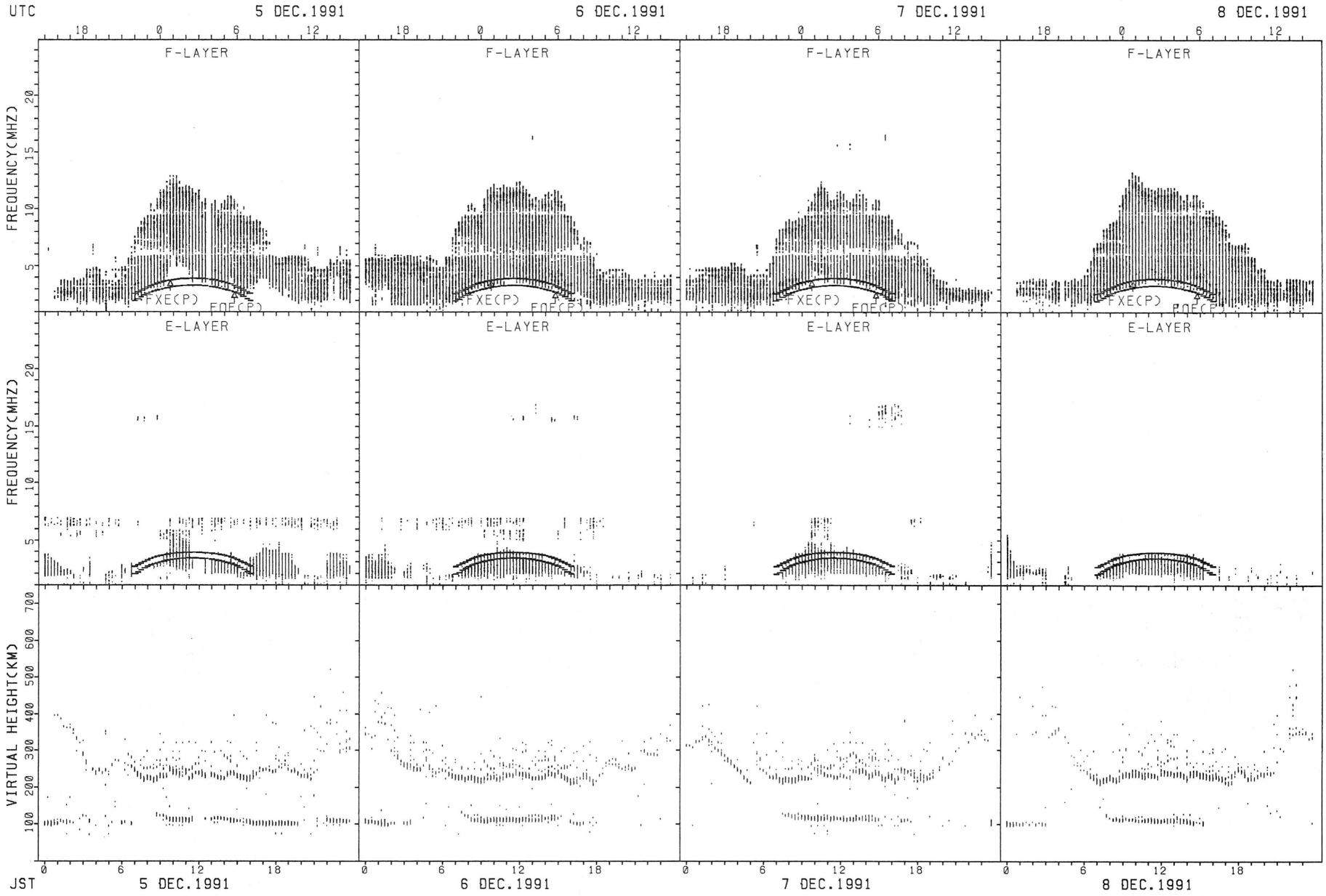
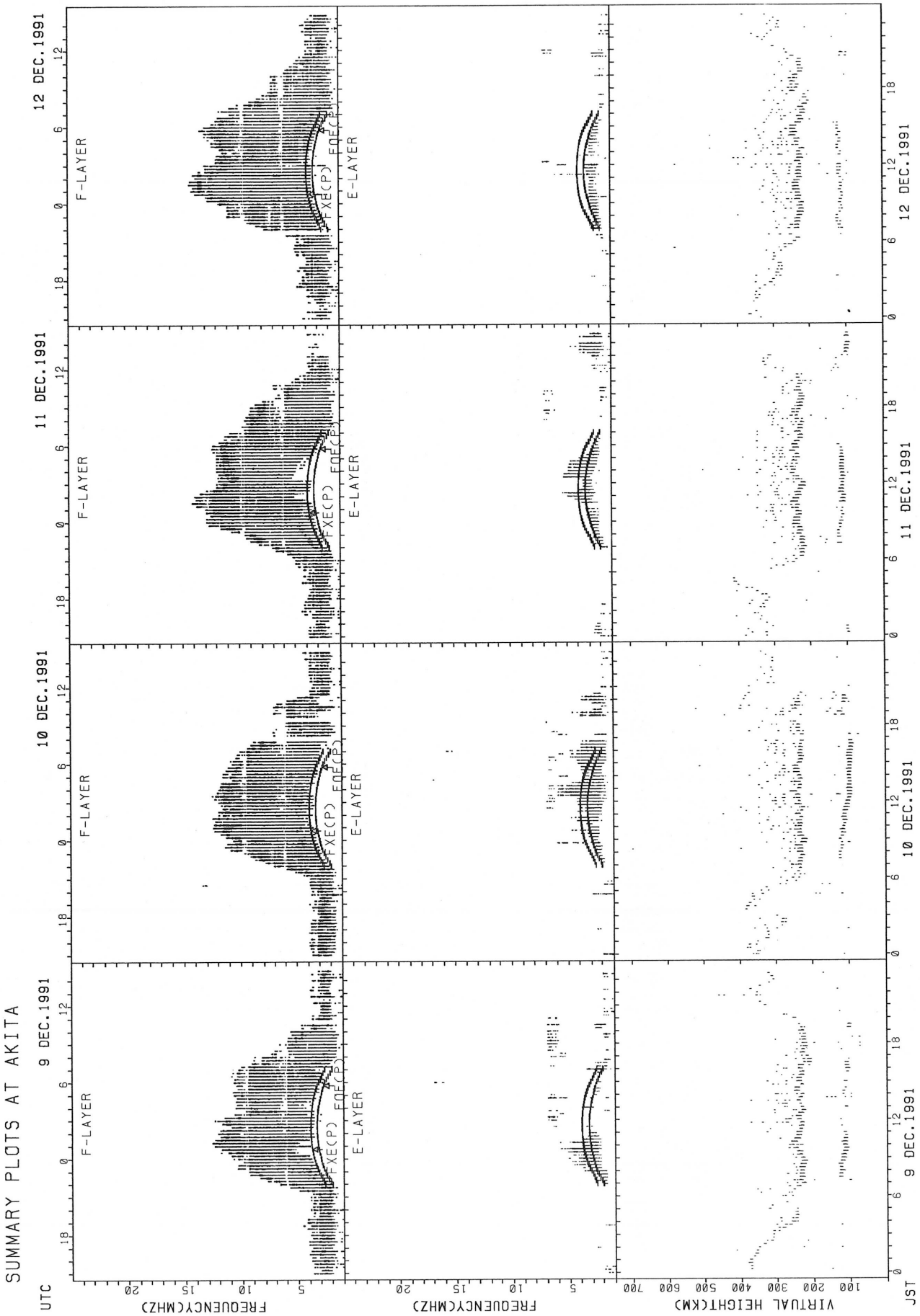
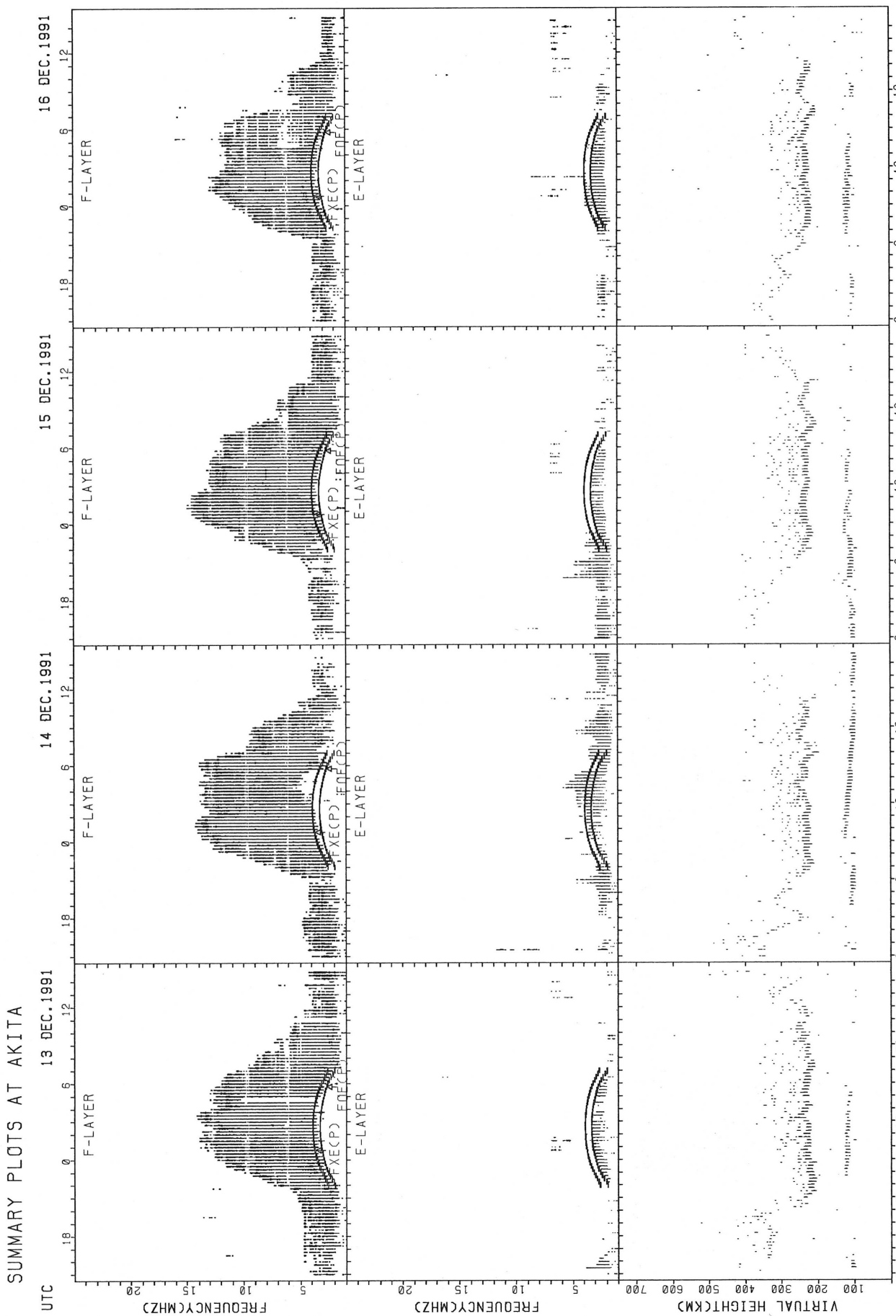
2 DEC.1991
3 DEC.1991
4 DEC.1991
UTC
JST
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

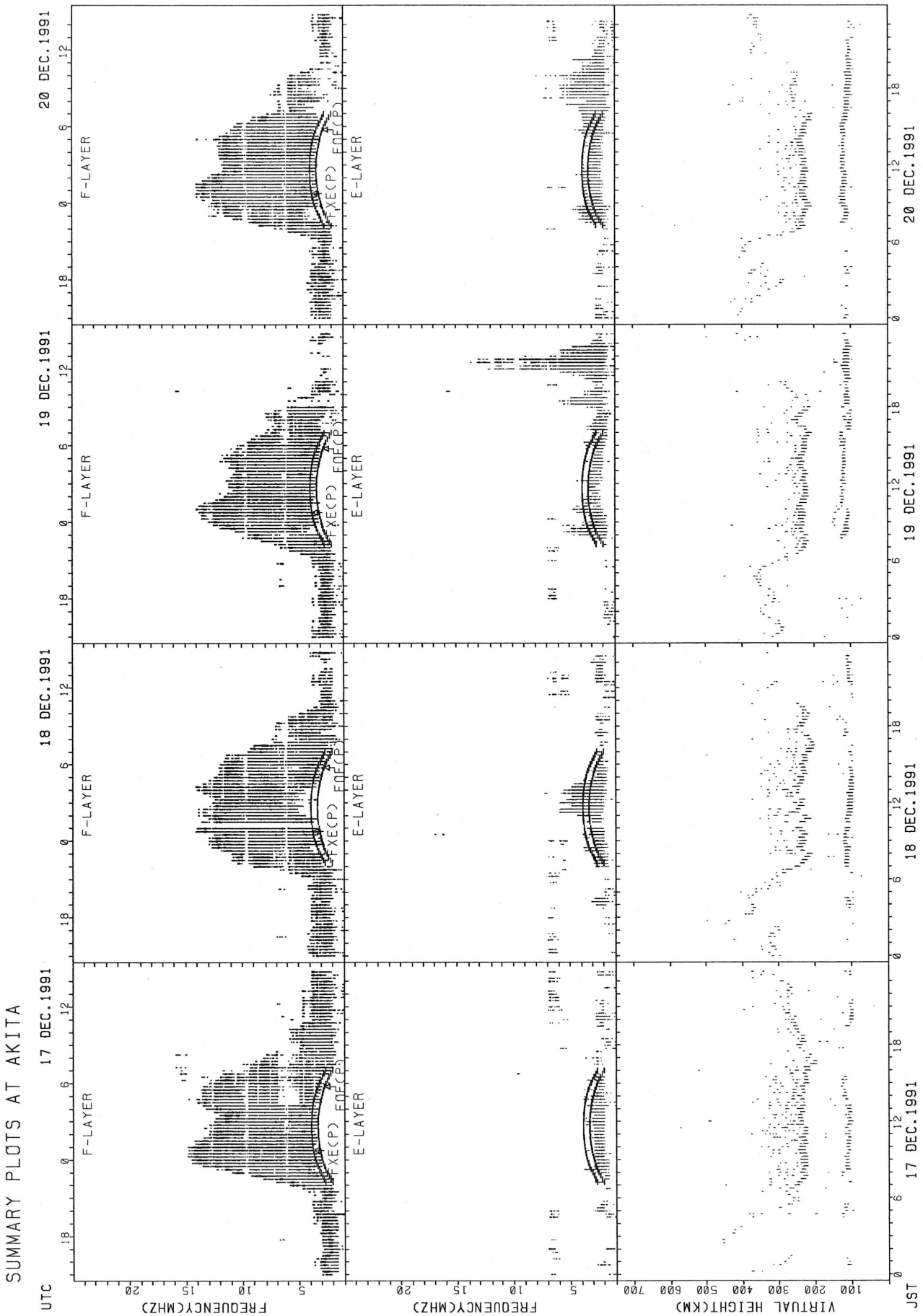
SUMMARY PLOTS AT AKITA



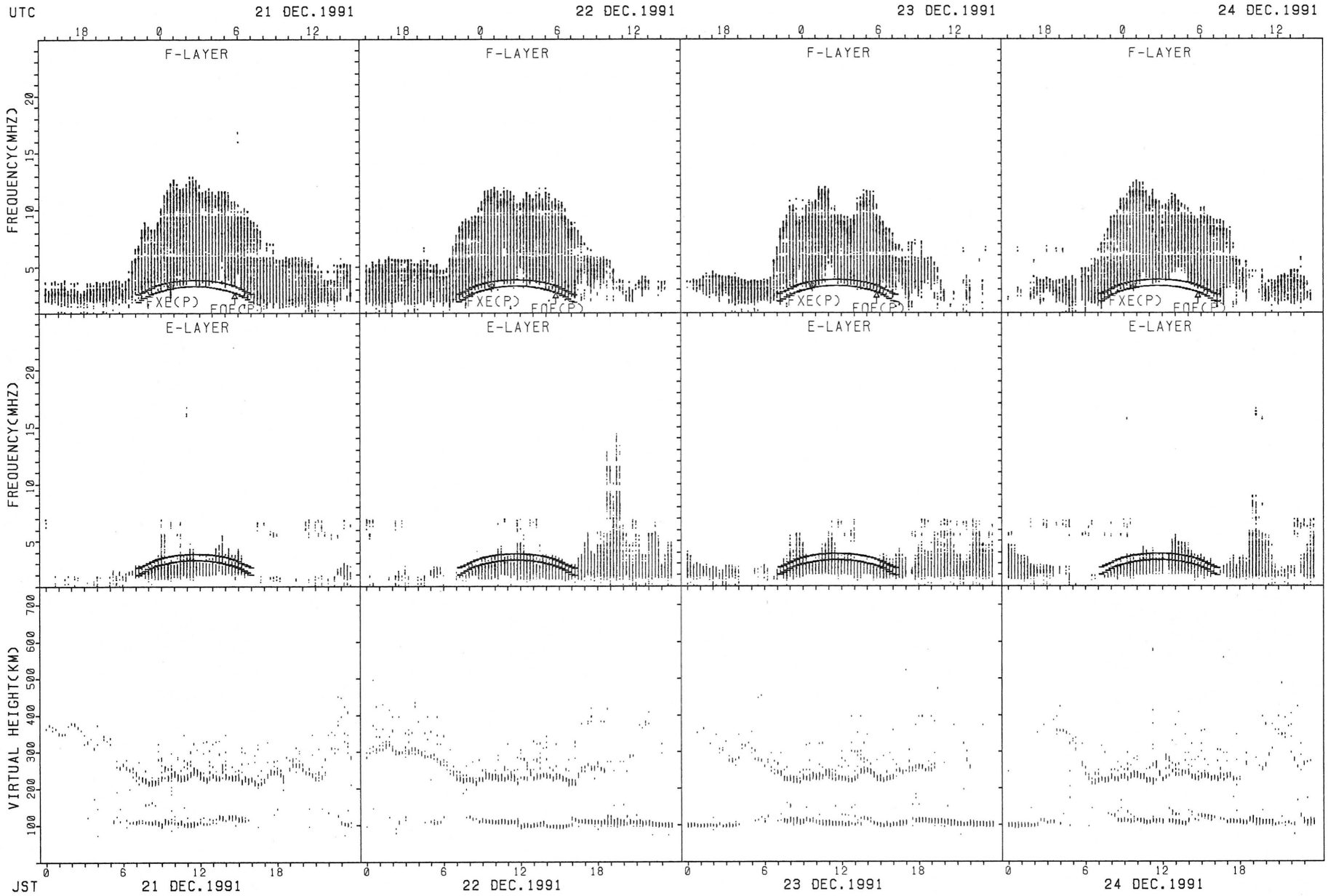
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
9 DEC.1991
10 DEC.1991
11 DEC.1991
12 DEC.1991
UTC
JST
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

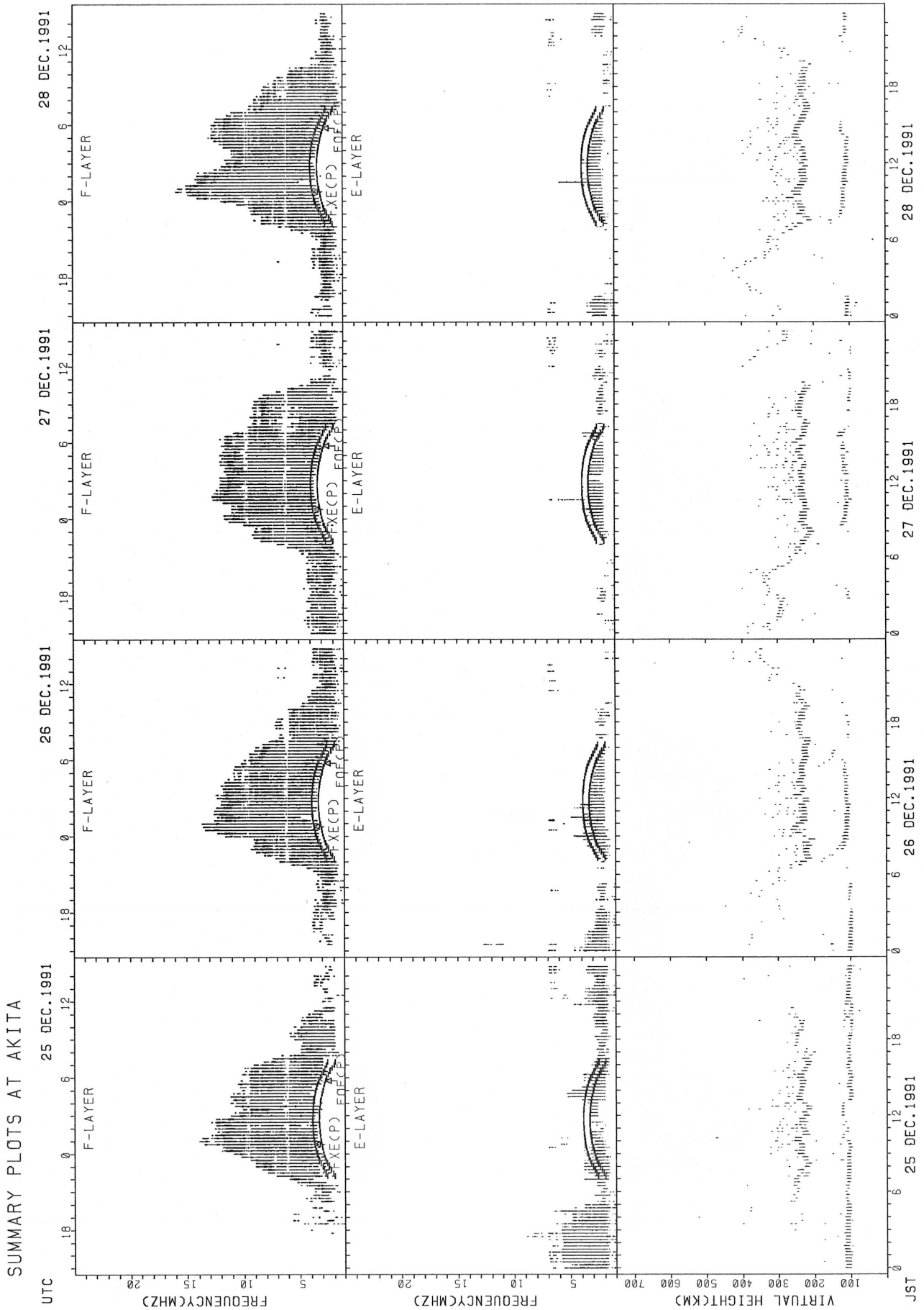

SUMMARY PLOTS AT AKITA
UTC
13 DEC.1991
14 DEC.1991
15 DEC.1991
16 DEC.1991
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
17 DEC.1991
18 DEC.1991
19 DEC.1991
20 DEC.1991
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

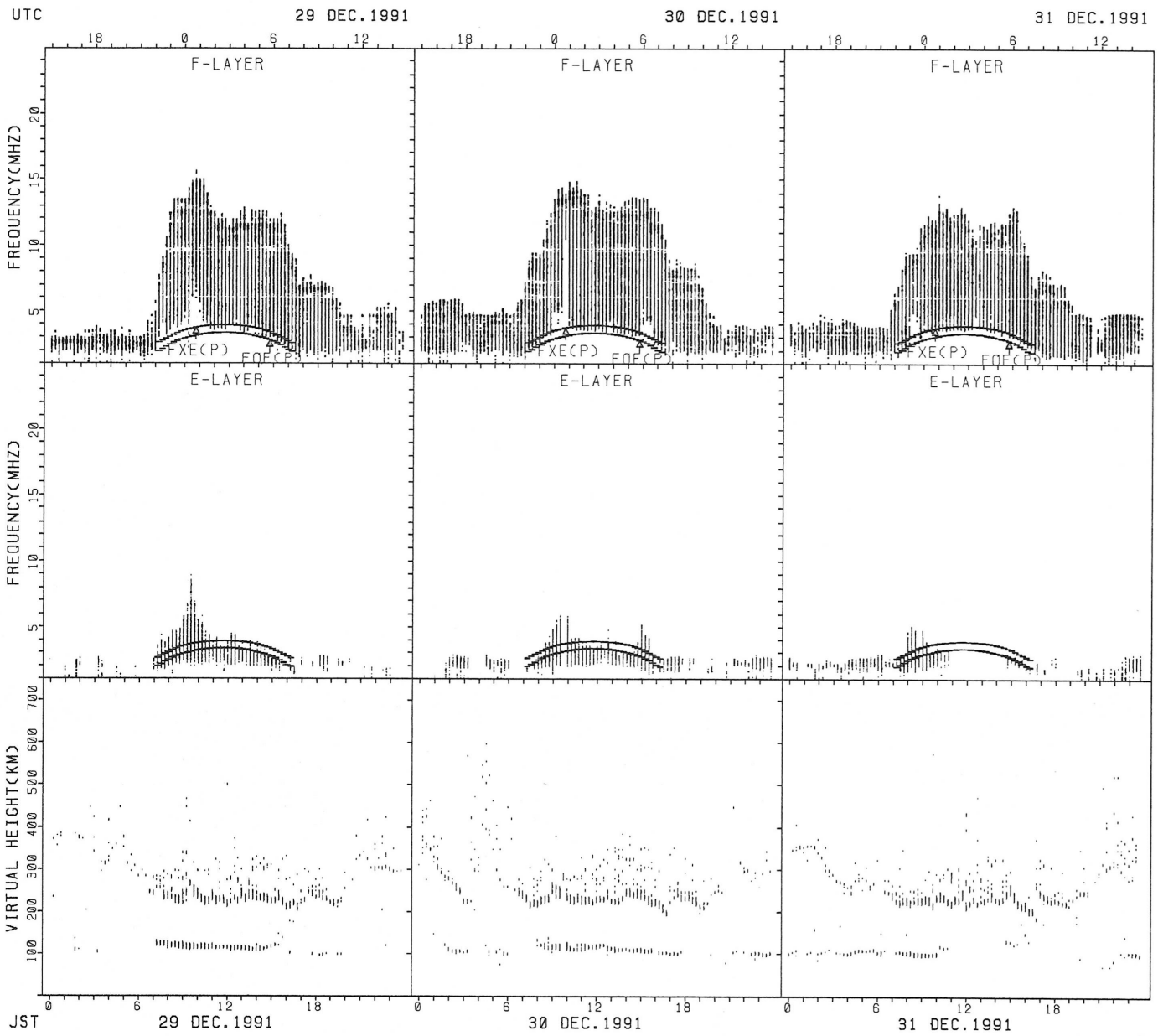
SUMMARY PLOTS AT AKITA



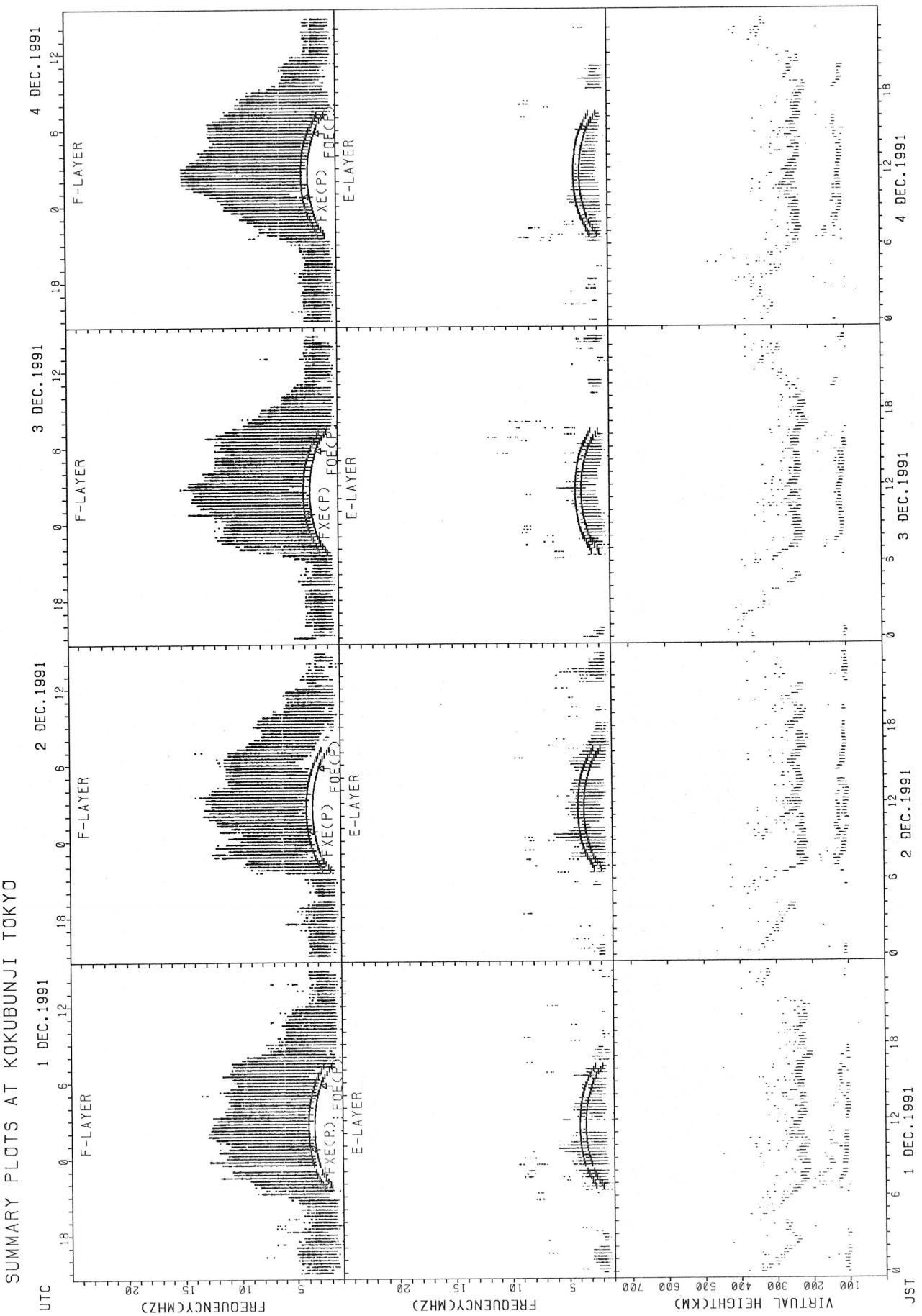
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

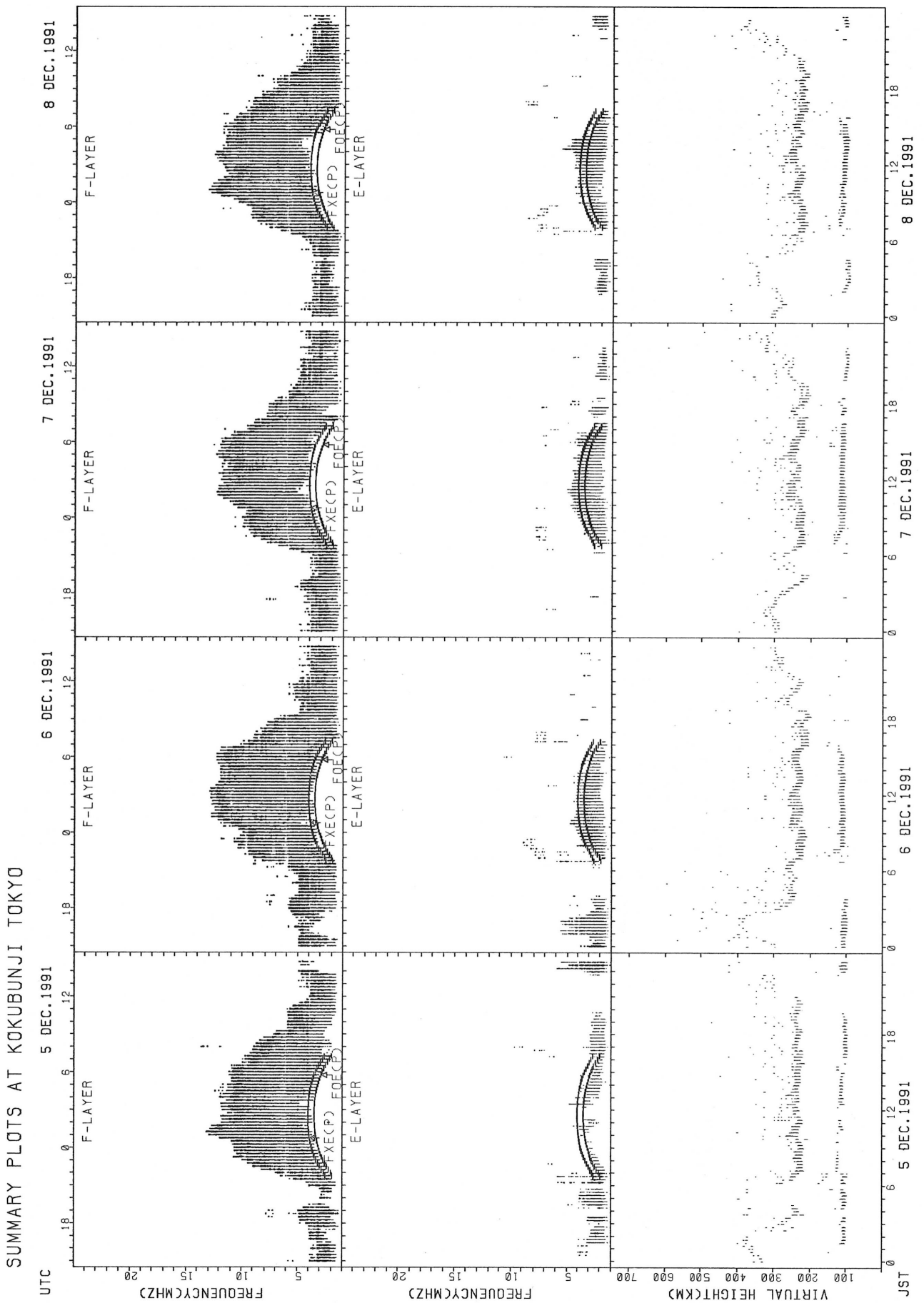

SUMMARY PLOTS AT AKITA
UTC
JST
25 DEC.1991
26 DEC.1991
27 DEC.1991
28 DEC.1991
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P) FOE(P)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



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


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
1 DEC.1991
2 DEC.1991
3 DEC.1991
4 DEC.1991
F-LAYER
E-LAYER
FXE(P); FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
5 DEC.1991
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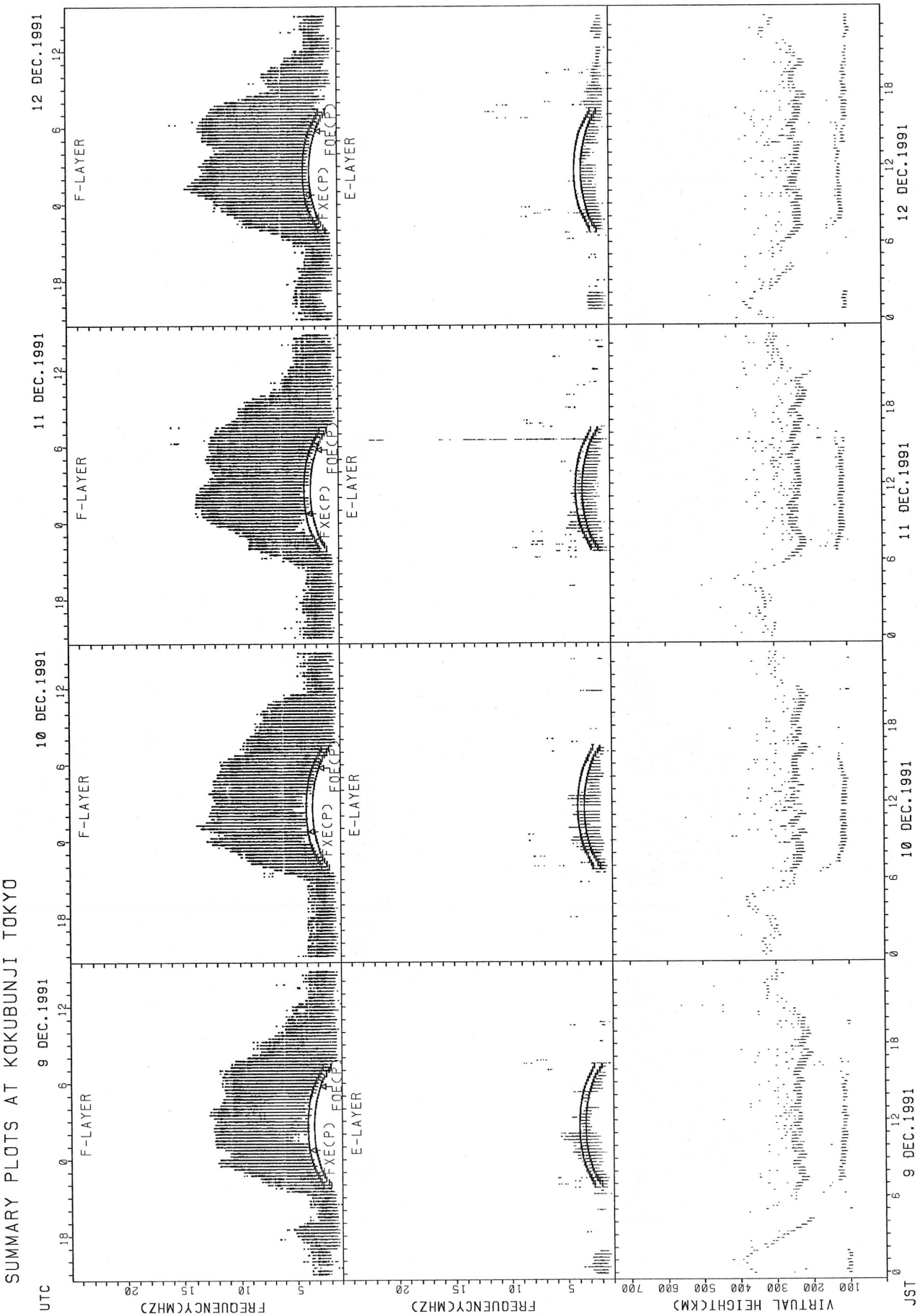
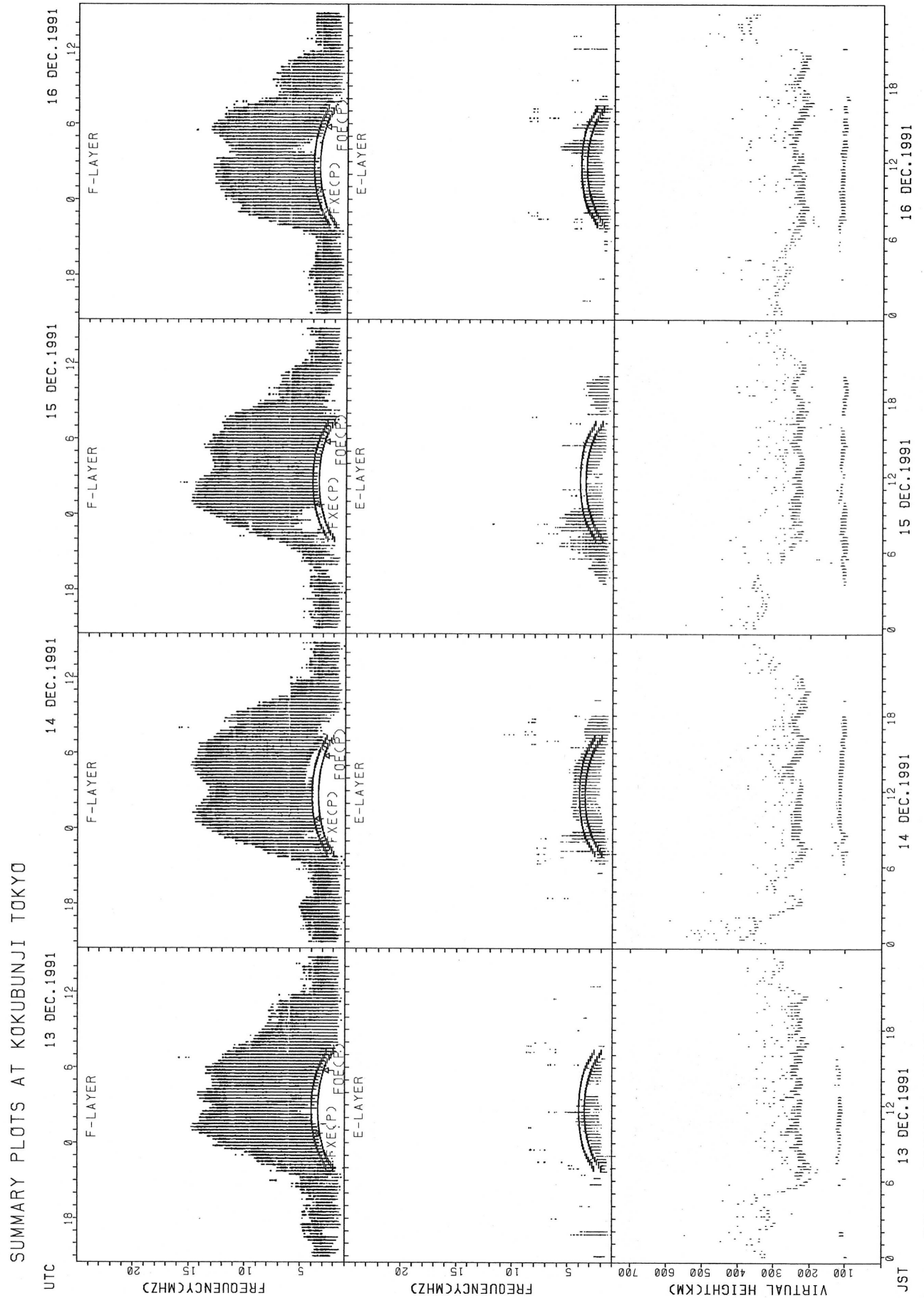
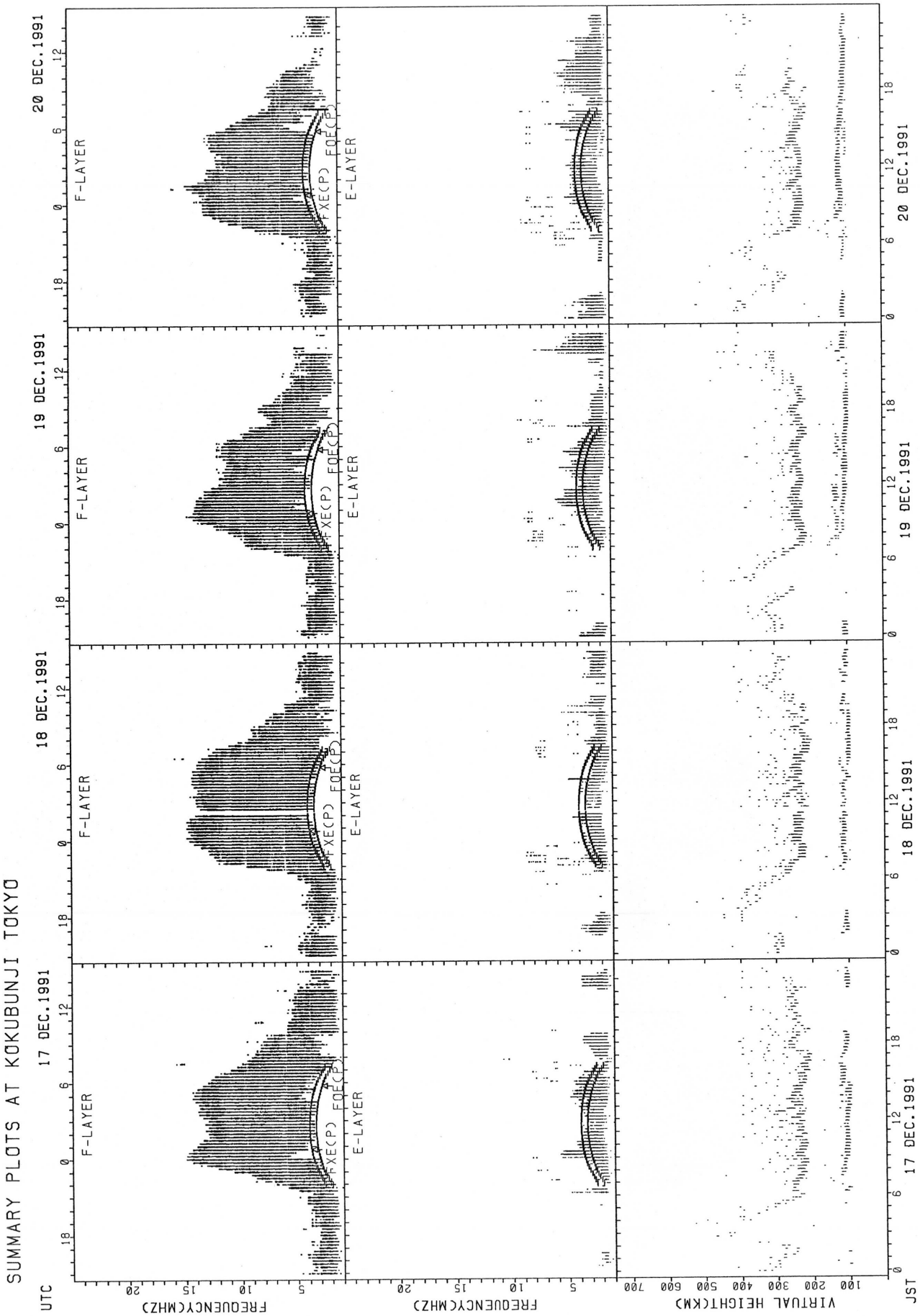
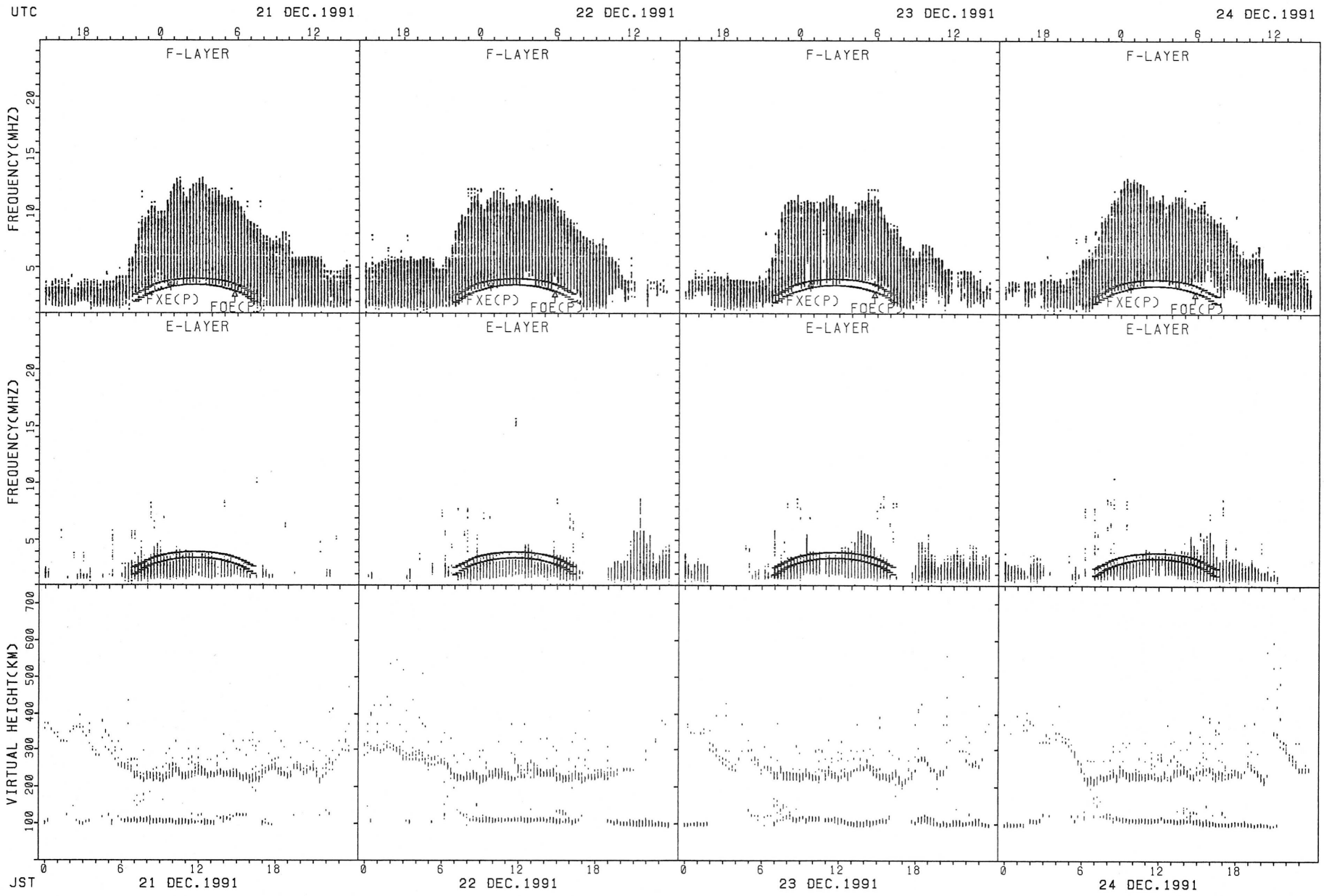
7 DEC.1991
8 DEC.1991
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
9 DEC.1991
10 DEC.1991
11 DEC.1991
12 DEC.1991
UTC
JST
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

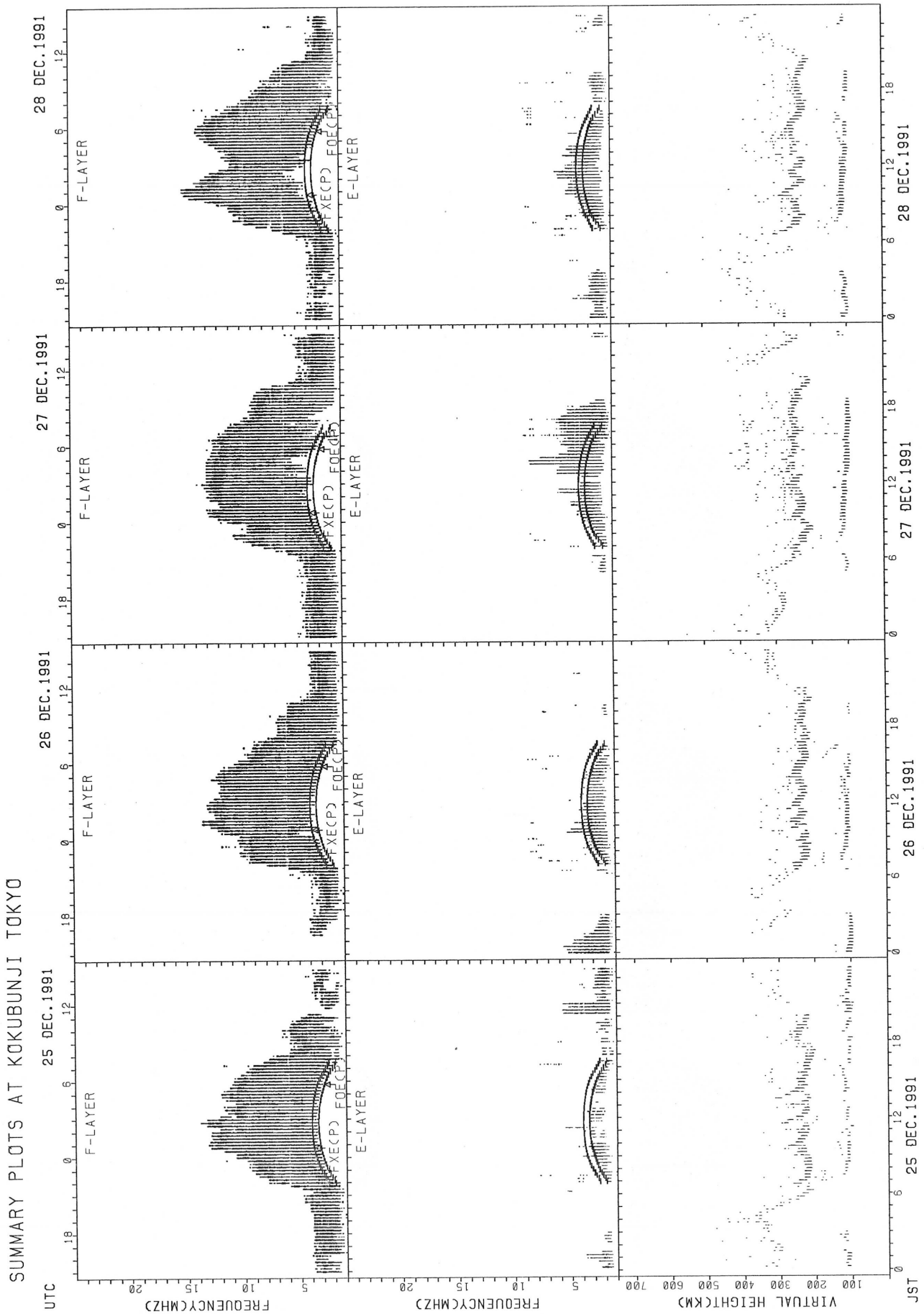

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
13 DEC.1991
14 DEC.1991
15 DEC.1991
16 DEC.1991
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

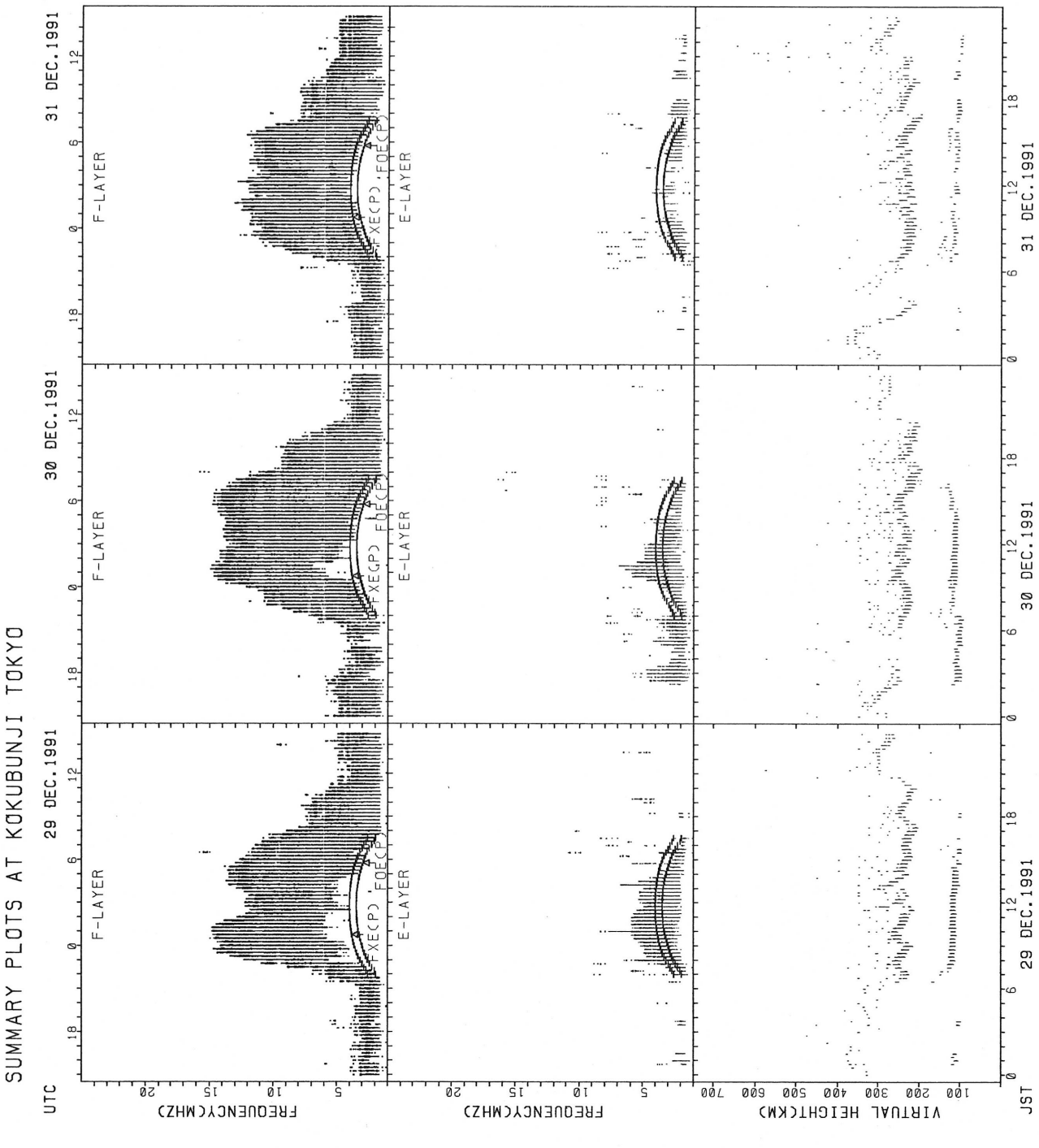

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
17 DEC.1991
18 DEC.1991
19 DEC.1991
20 DEC.1991
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

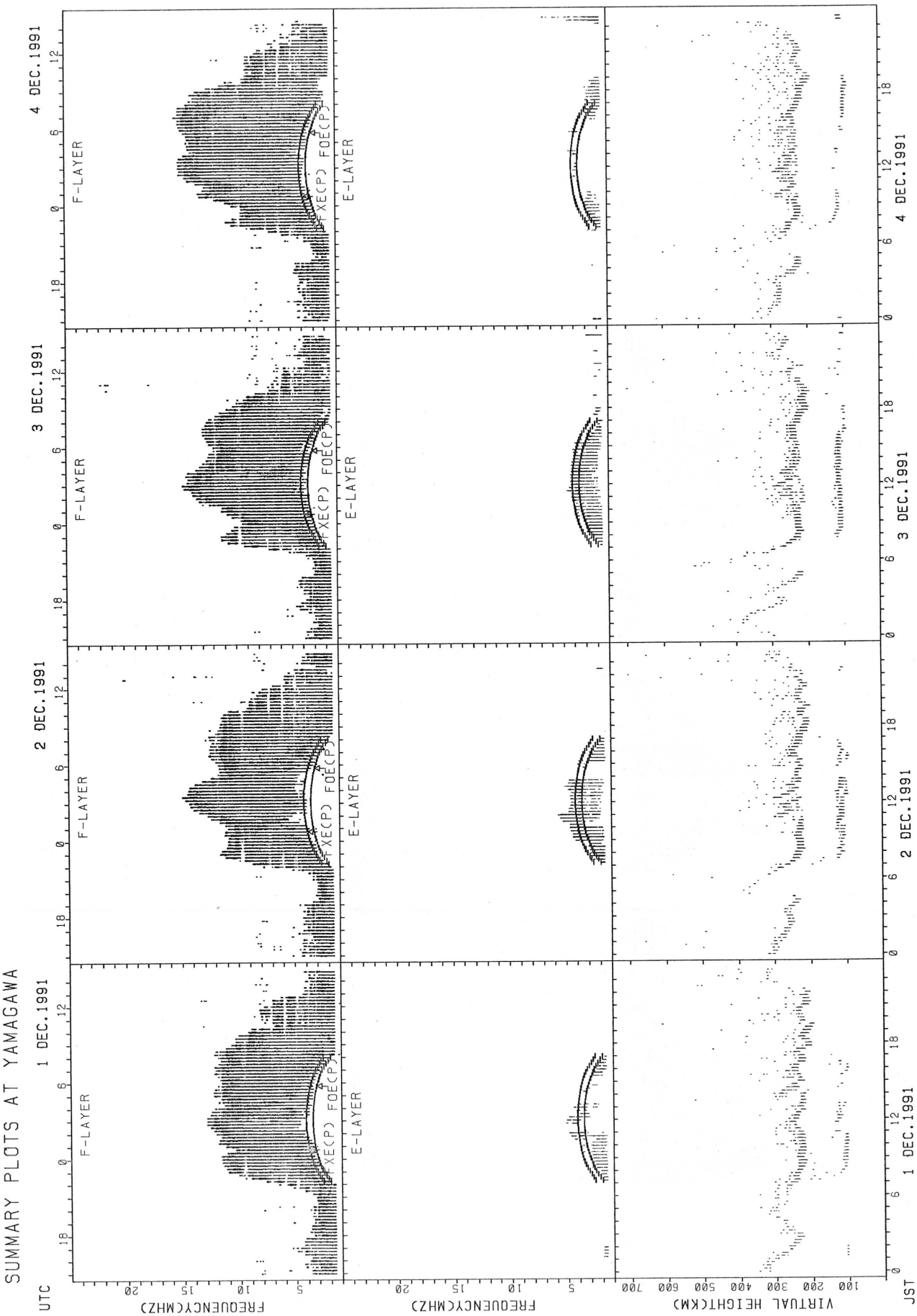
SUMMARY PLOTS AT KOKUBUNJI TOKYO



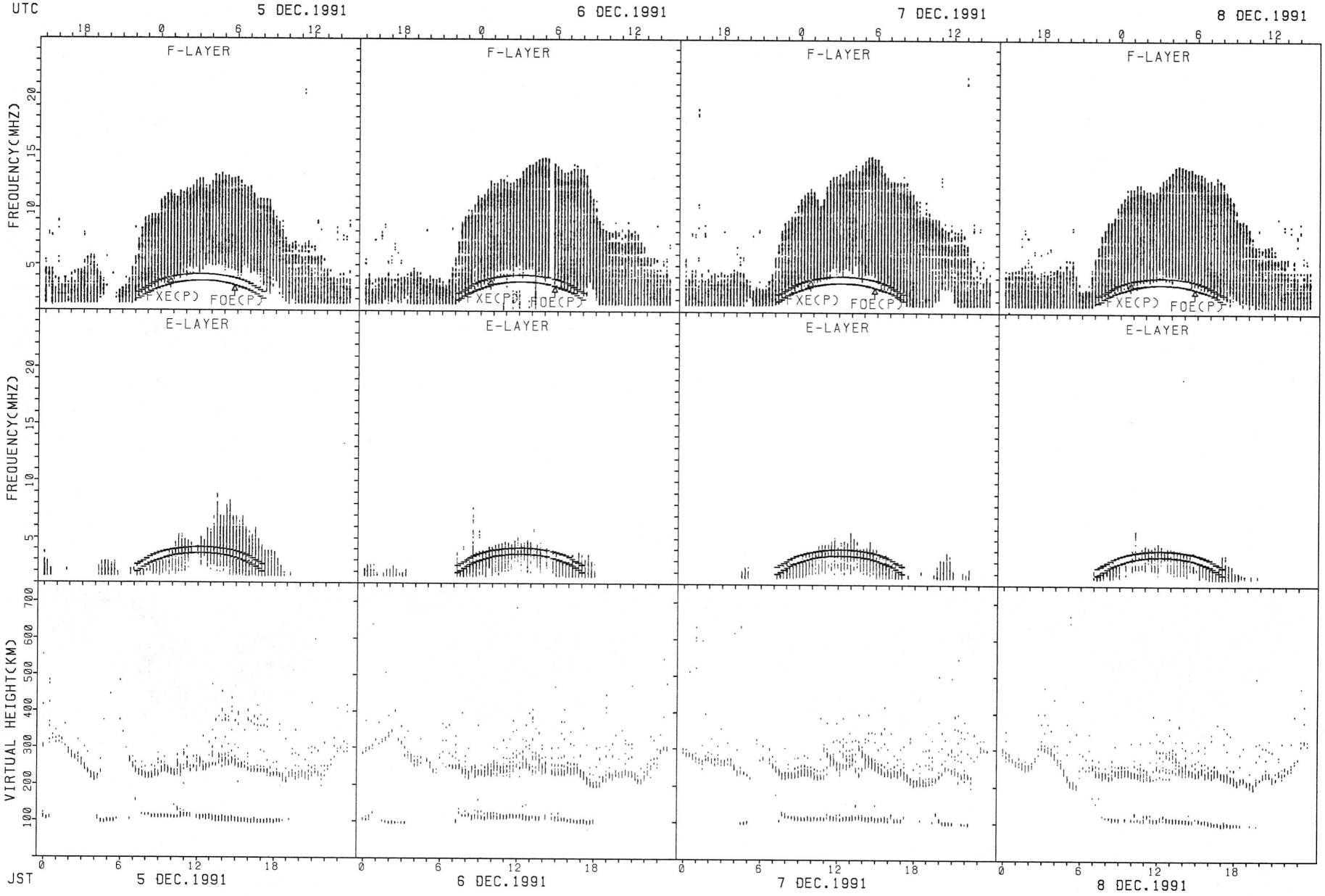
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
25 DEC.1991
26 DEC.1991
27 DEC.1991
28 DEC.1991
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
29 DEC.1991
30 DEC.1991
31 DEC.1991
F-LAYER
E-LAYER
FXE(P),FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
1 DEC.1991
2 DEC.1991
3 DEC.1991
4 DEC.1991
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



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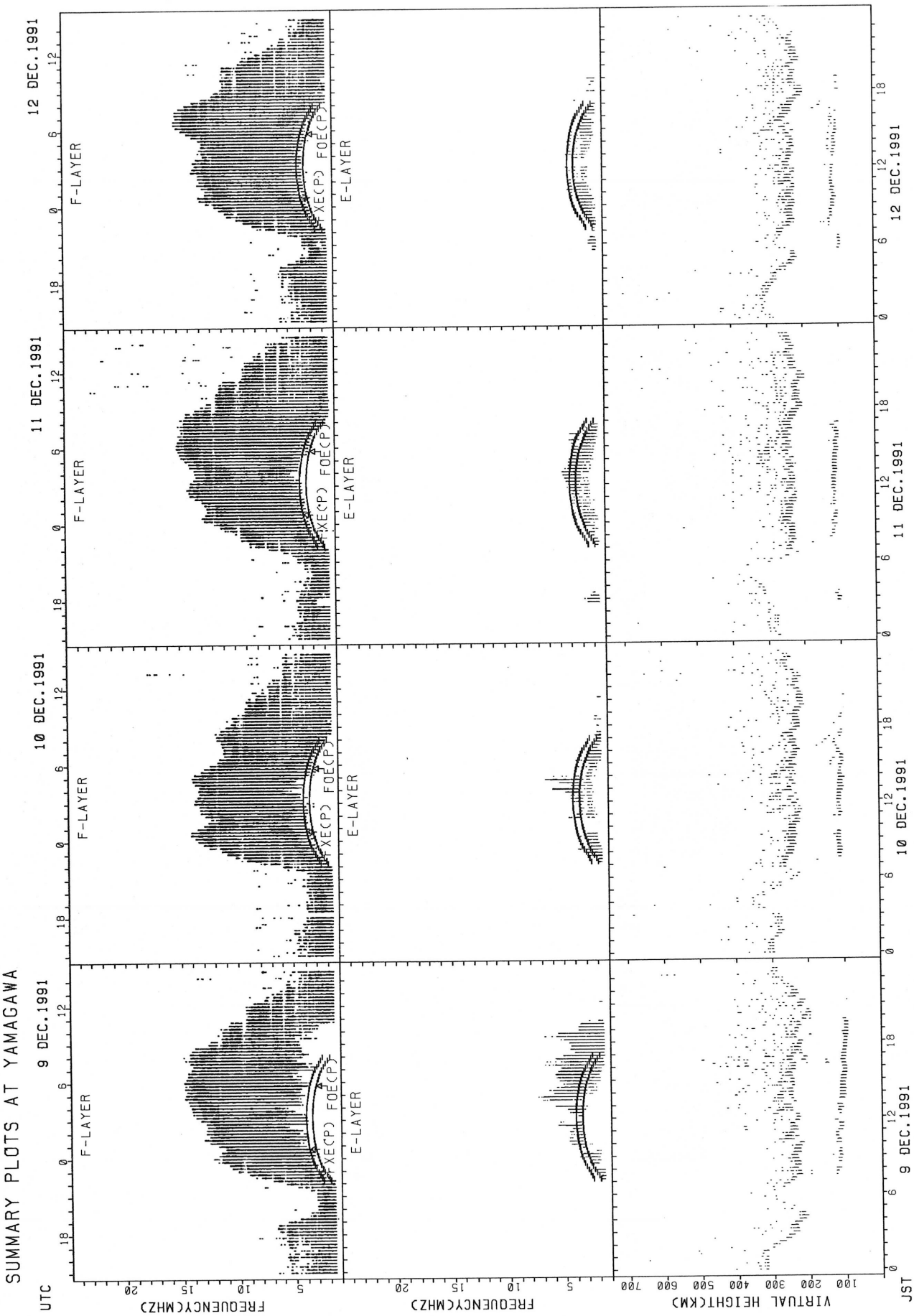
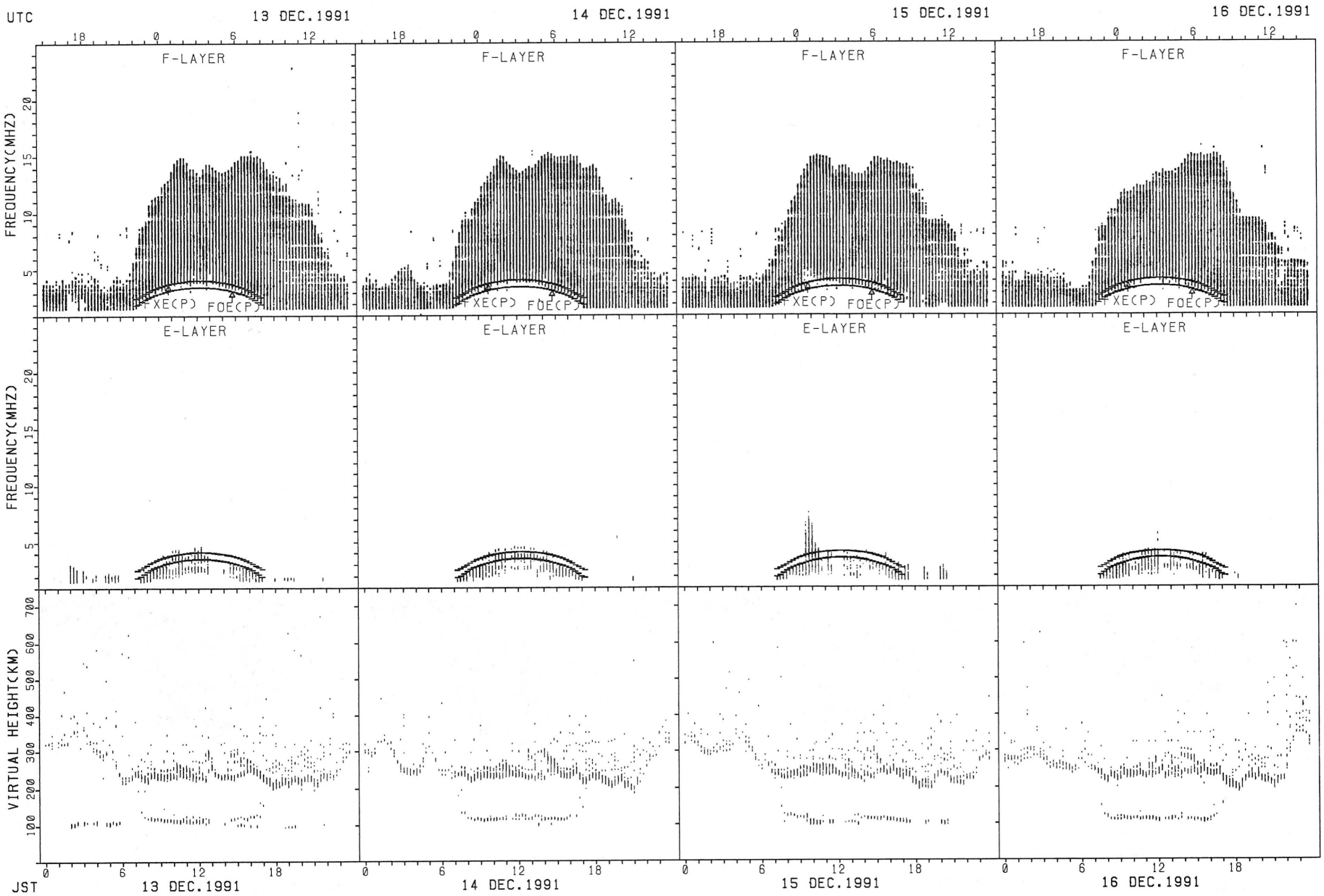
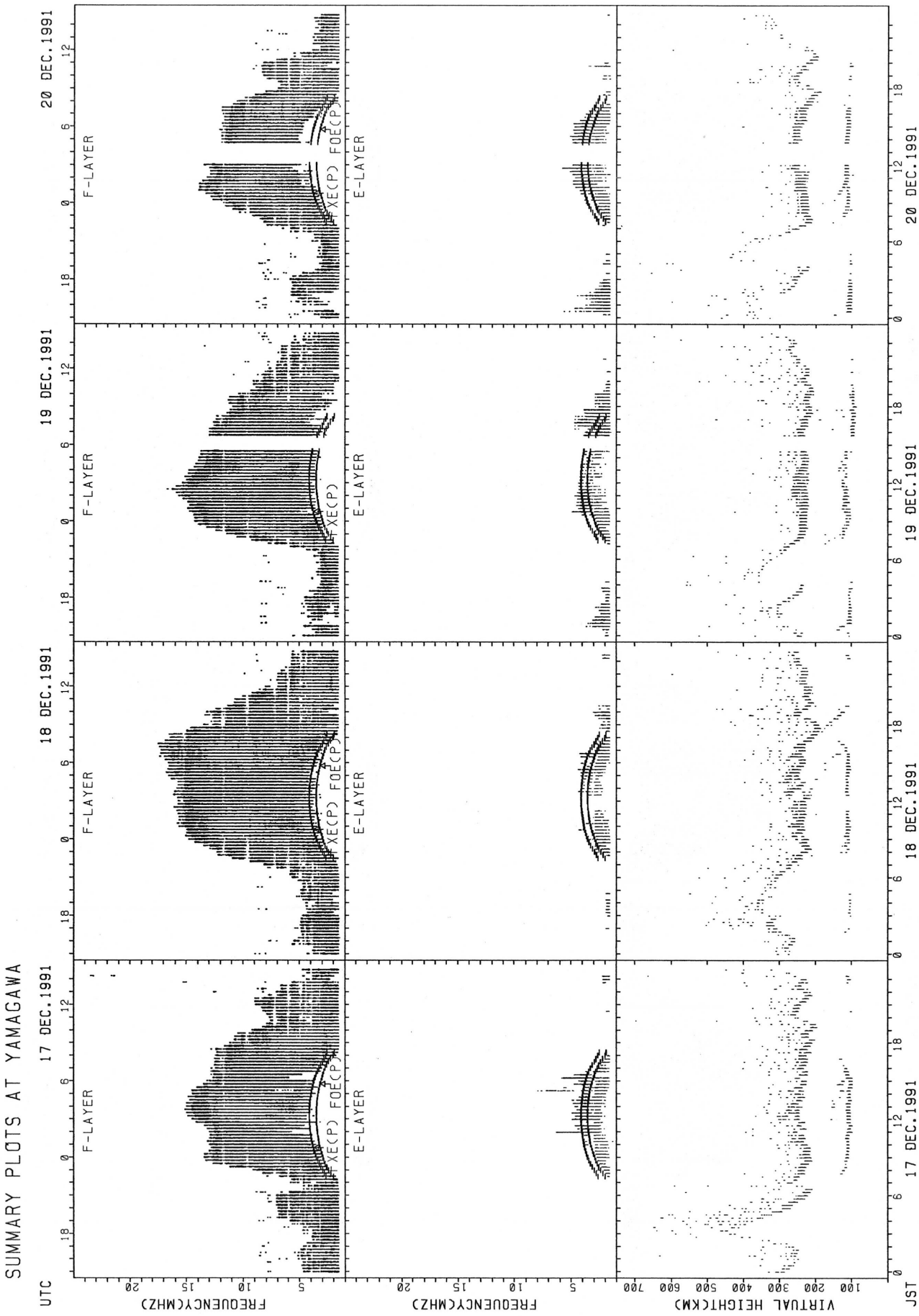
FOE(P): PREDICTED VALUE FOR FOE

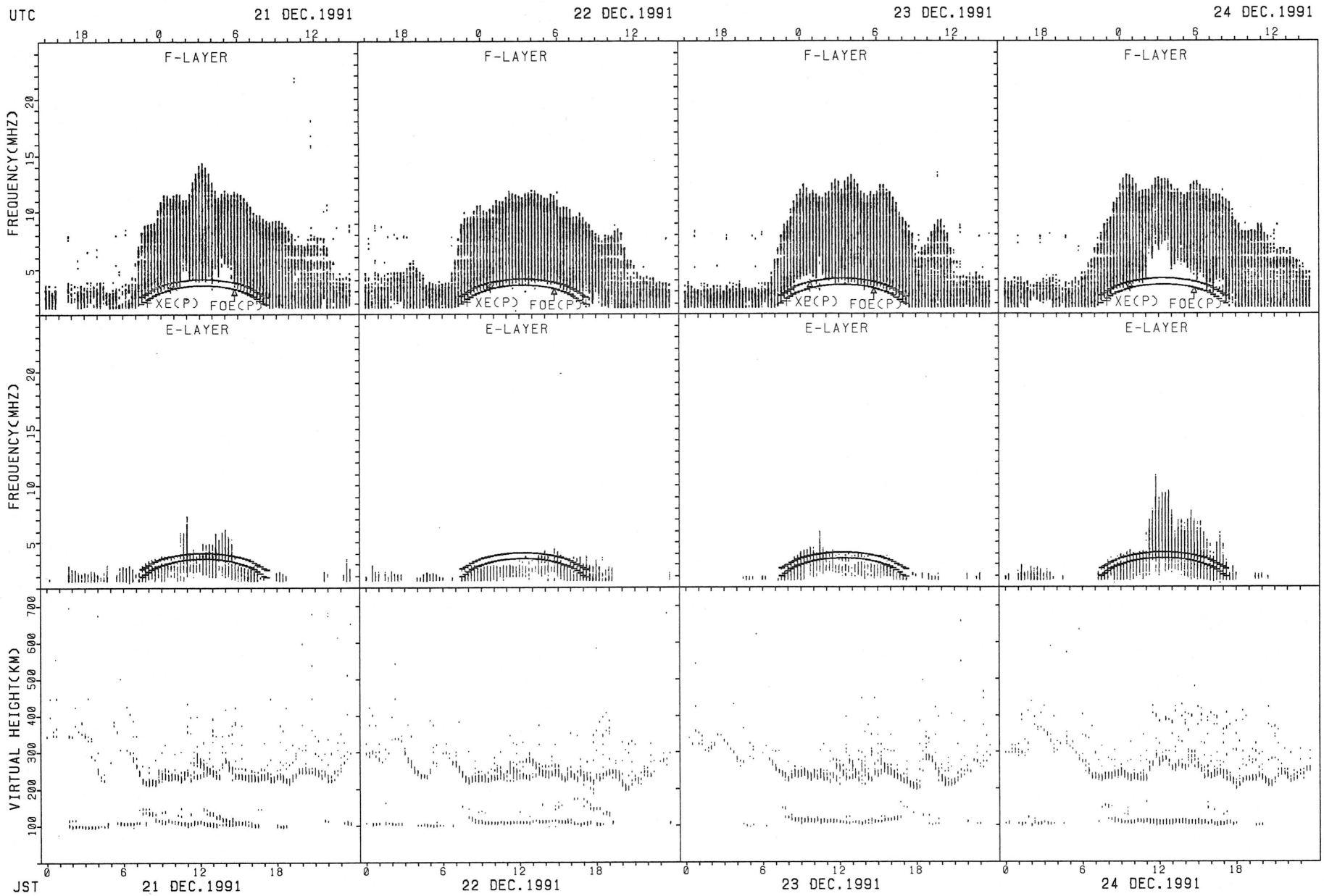

SUMMARY PLOTS AT YAMAGAWA
UTC
9 DEC.1991
10 DEC.1991
11 DEC.1991
12 DEC.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA

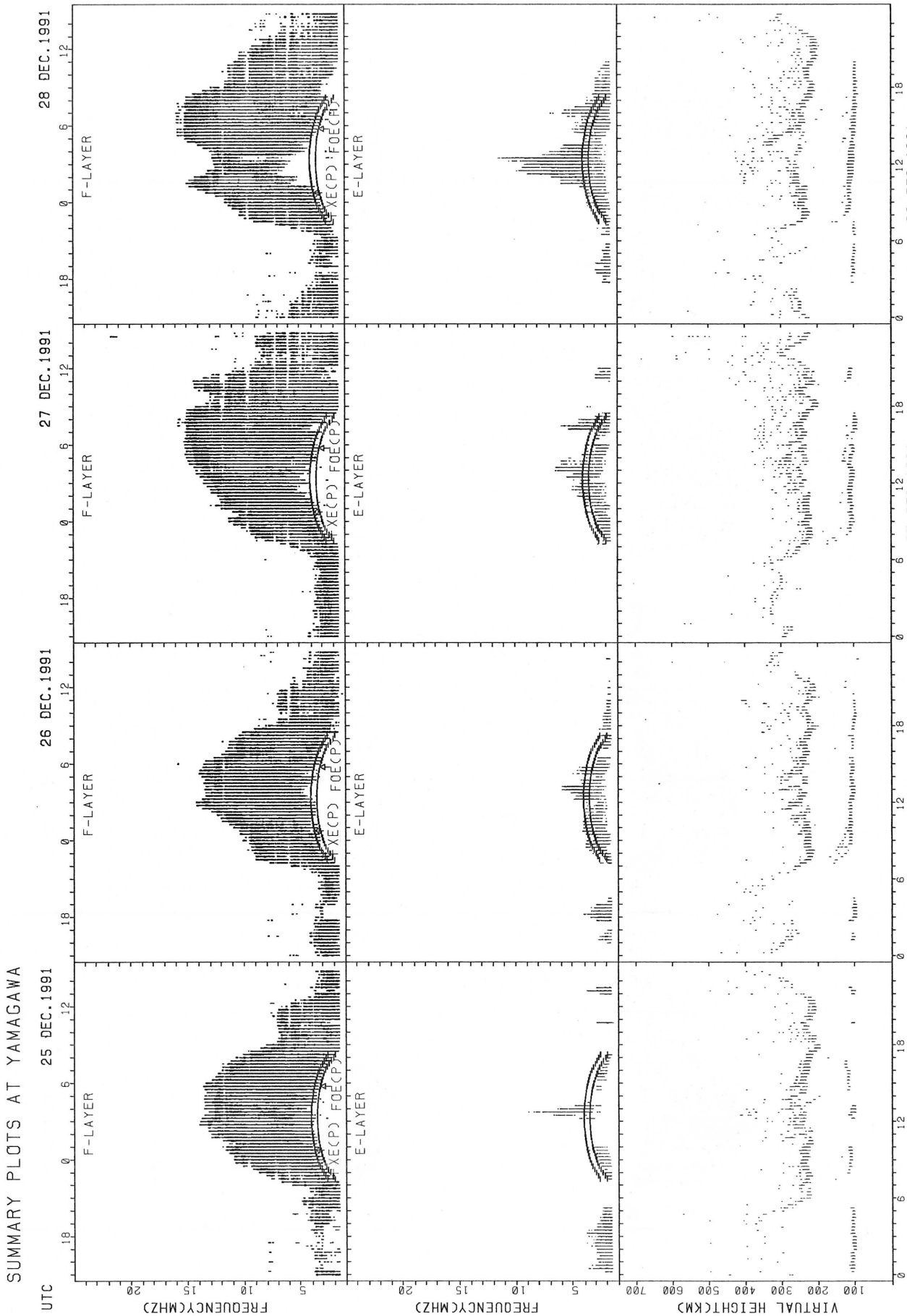


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

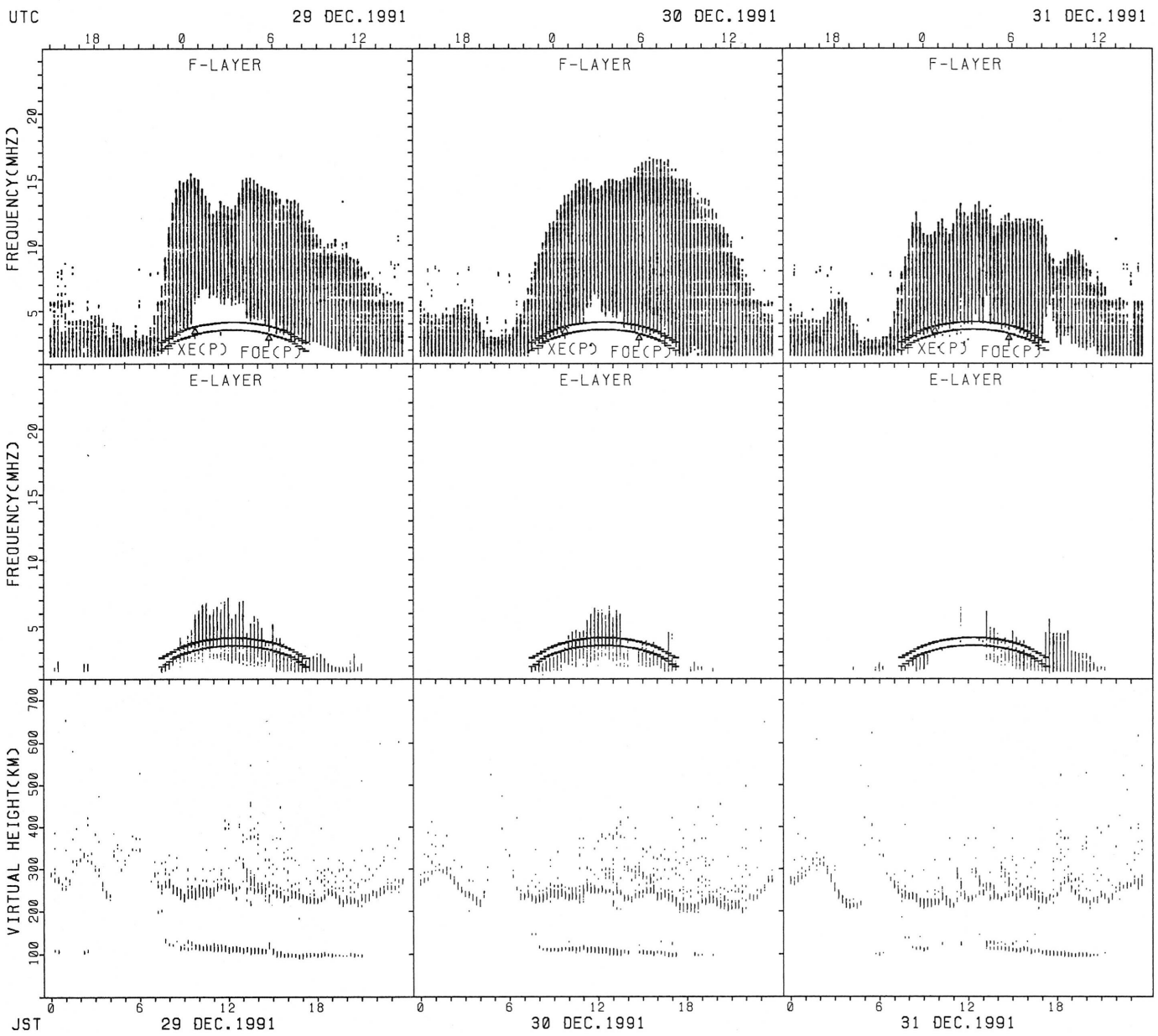

SUMMARY PLOTS AT YAMAGAWA
UTC
17 DEC.1991
18 DEC.1991
19 DEC.1991
20 DEC.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE



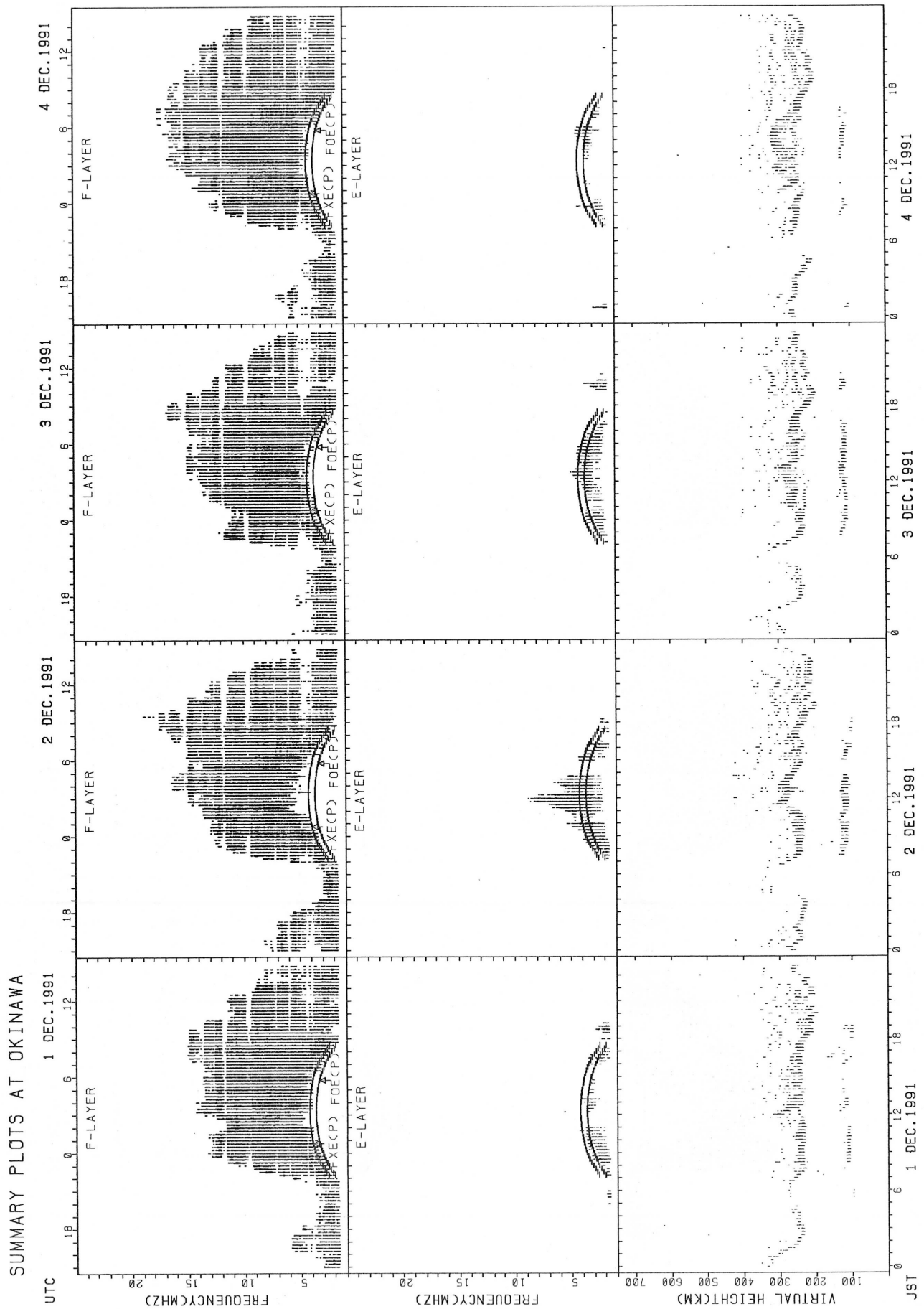
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

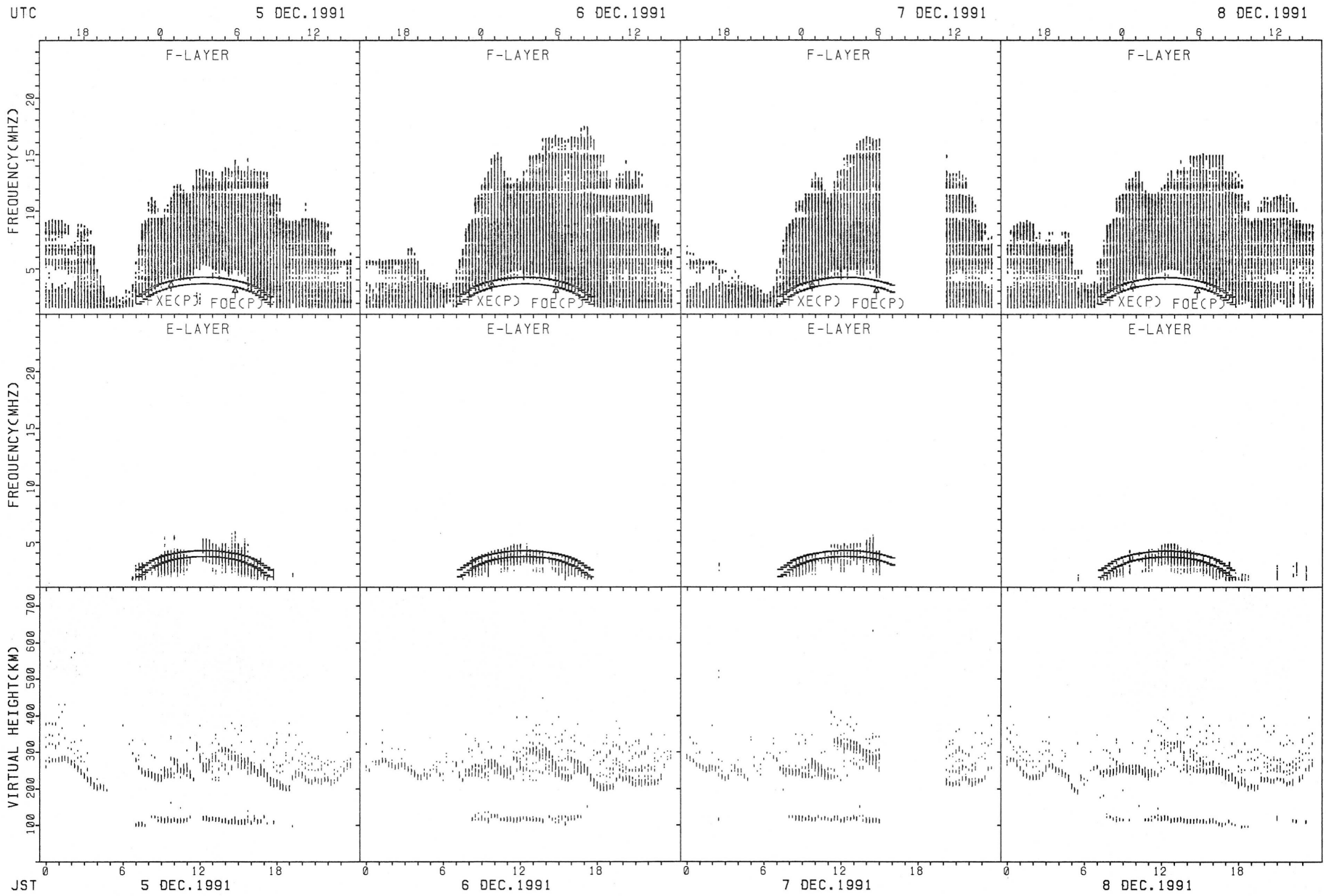

SUMMARY PLOTS AT YAMAGAWA
UTC
25 DEC.1991
26 DEC.1991
27 DEC.1991
28 DEC.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

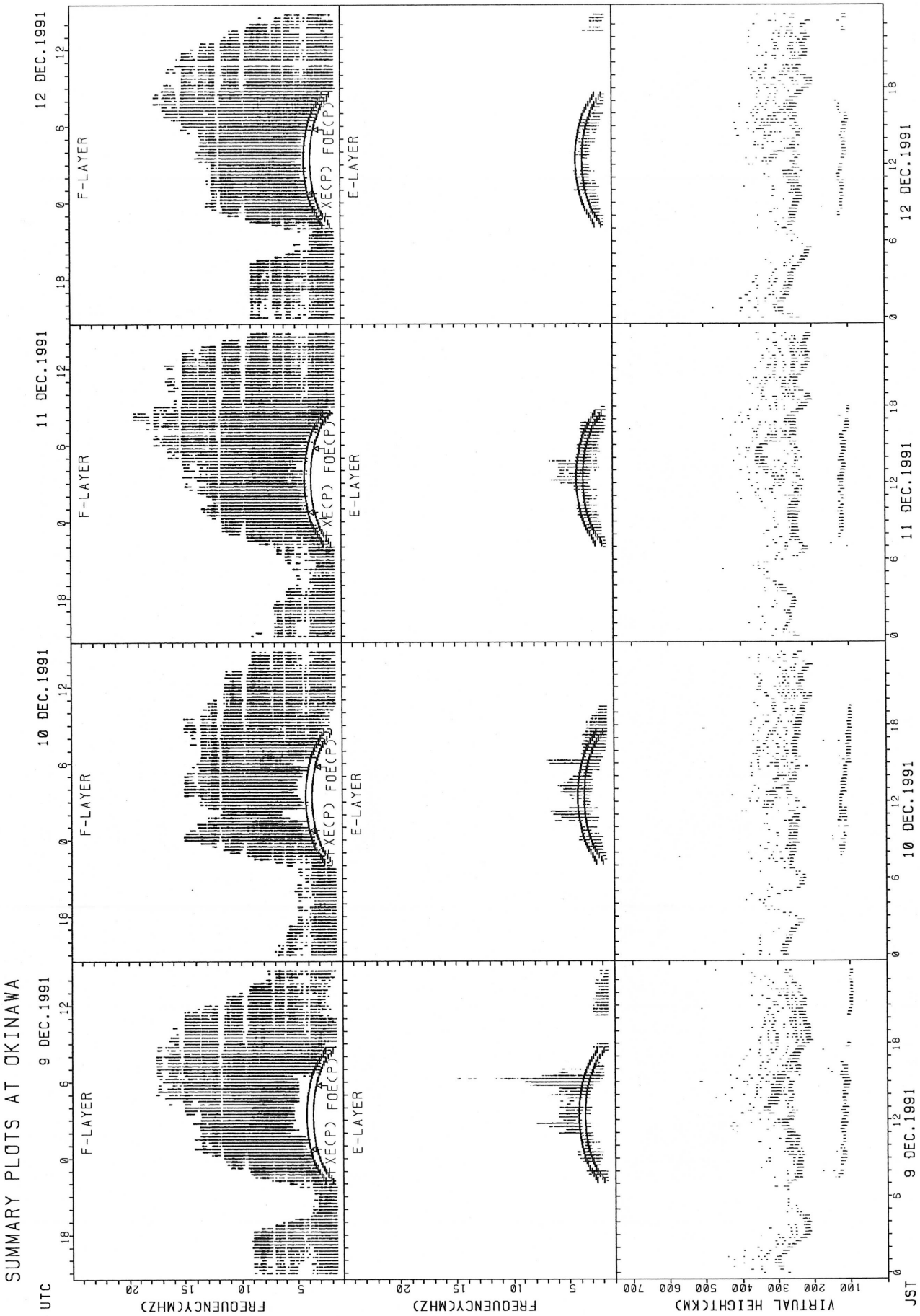
SUMMARY PLOTS AT YAMAGAWA

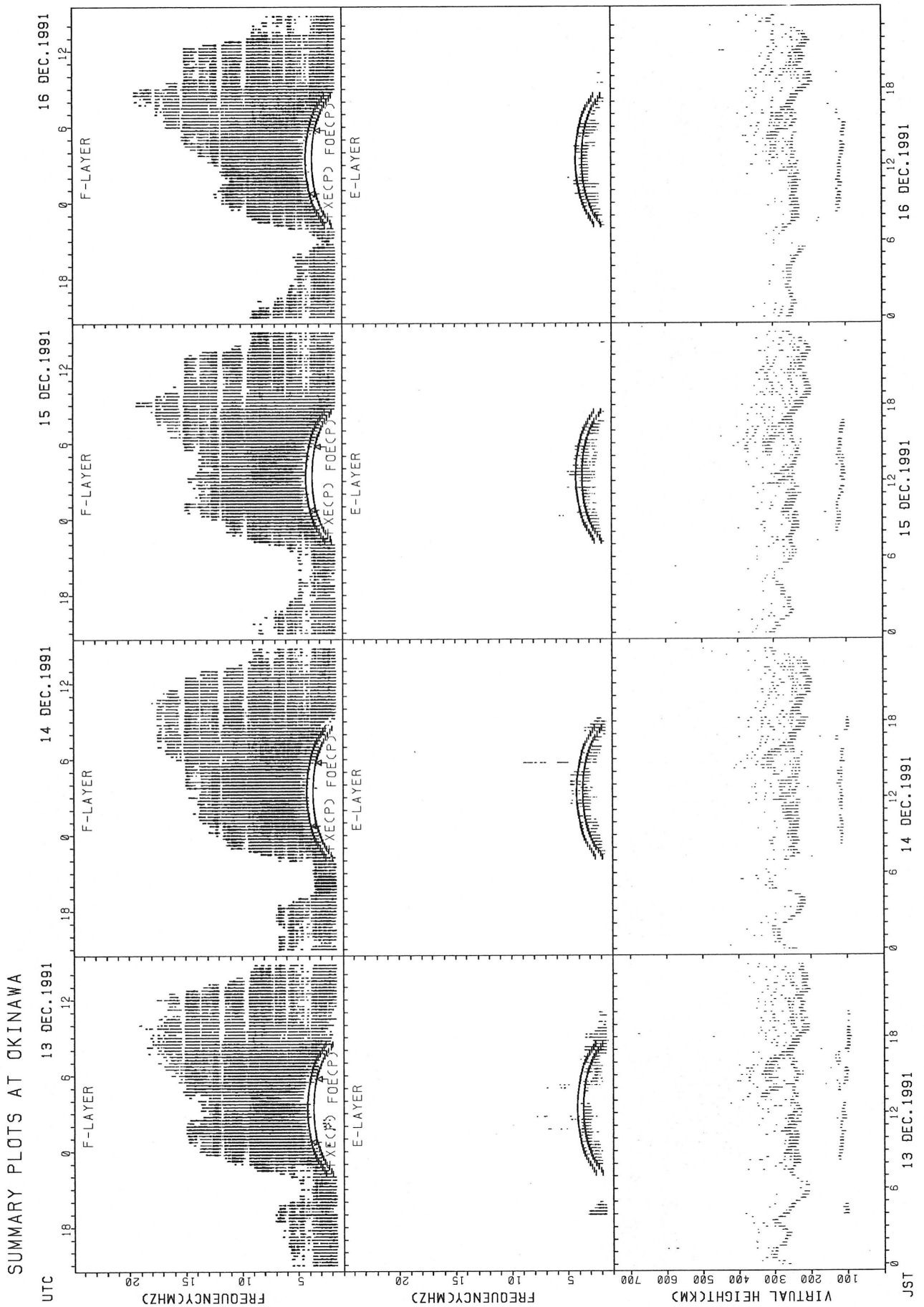


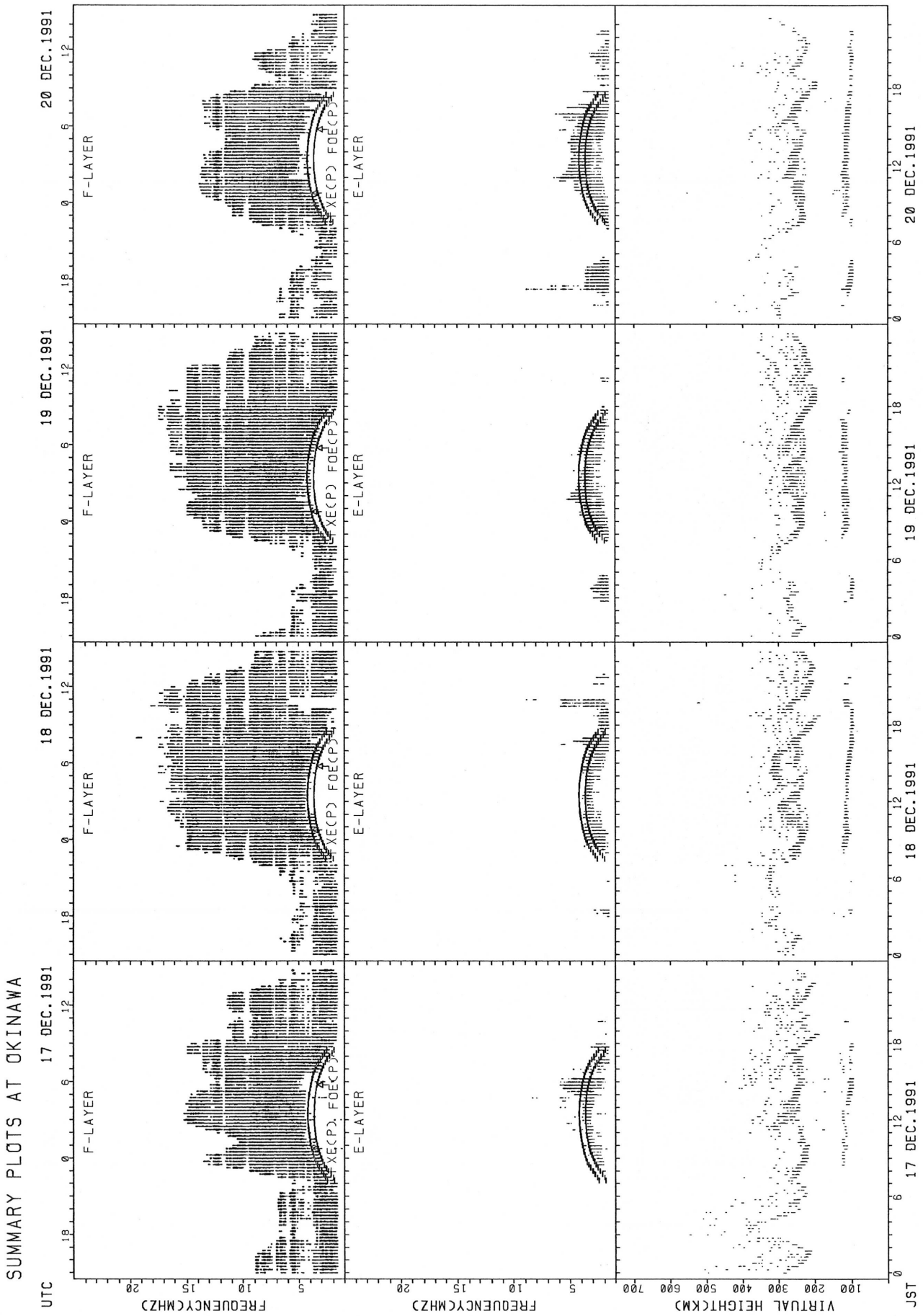
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
1 DEC.1991
2 DEC.1991
3 DEC.1991
4 DEC.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

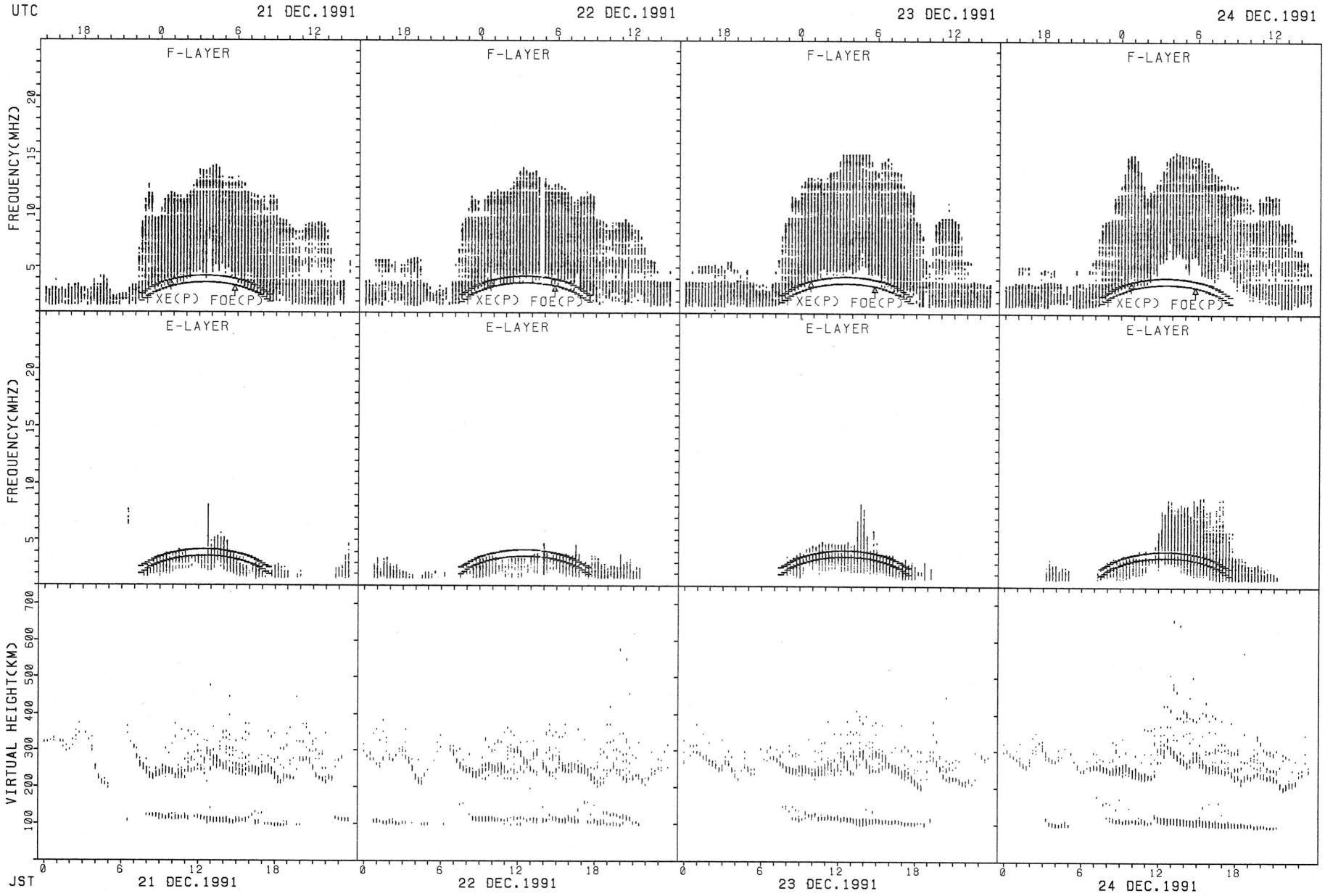

SUMMARY PLOTS AT OKINAWA
UTC
5 DEC.1991
6 DEC.1991
7 DEC.1991
8 DEC.1991
F-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
E-LAYER
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
9 DEC.1991
10 DEC.1991
11 DEC.1991
12 DEC.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

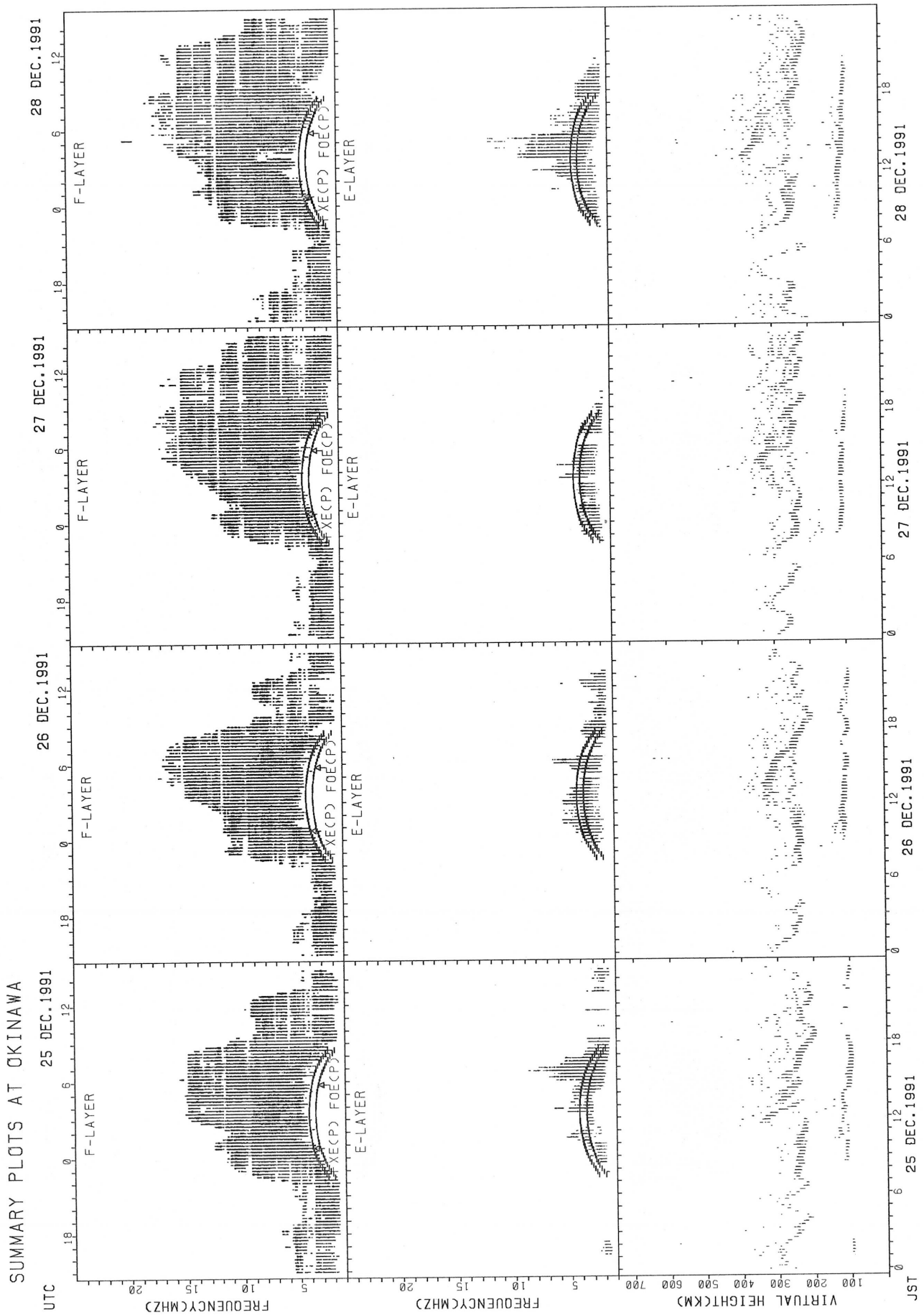

SUMMARY PLOTS AT OKINAWA
UTC
13 DEC.1991
14 DEC.1991
15 DEC.1991
16 DEC.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
17 DEC.1991
18 DEC.1991
19 DEC.1991
20 DEC.1991
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
XE(P) FOE(P)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

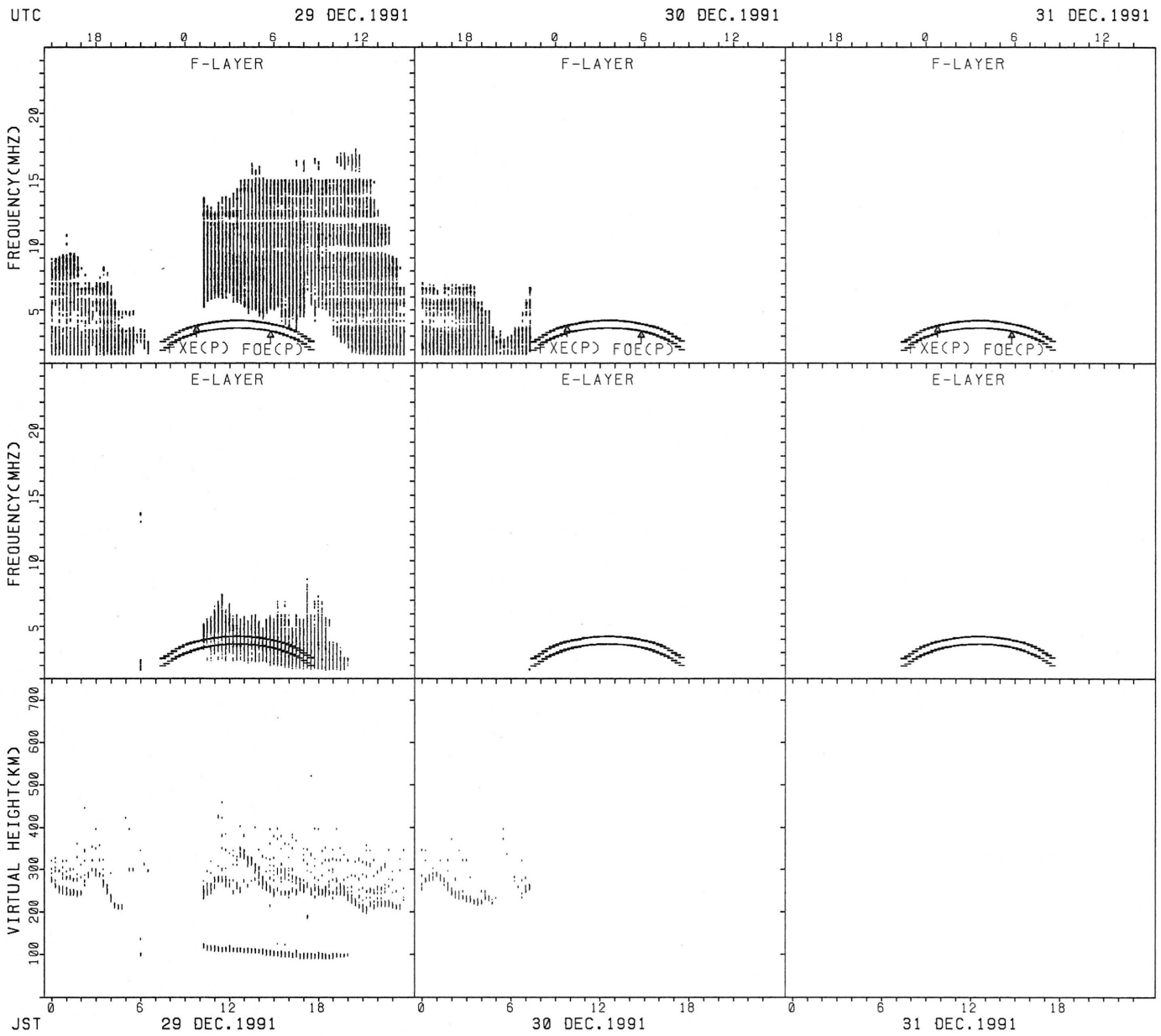
SUMMARY PLOTS AT OKINAWA



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


SUMMARY PLOTS AT OKINAWA
UTC
25 DEC.1991
26 DEC.1991
27 DEC.1991
28 DEC.1991
F-LAYER
E-LAYER
XE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



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

MONTHLY MEDIANS OF H'F AND H'ES

DEC.1991 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								26	31	31	31	31	31	31	31	31	29	20						
MED								274	236	232	232	230	234	242	242	234	246	278						
U Q								324	252	238	238	240	244	248	246	244	254	300						
L Q								248	230	228	224	220	228	234	232	228	238	263						

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	13	14	11						12										13	14	11	16	19	17
MED	107	107	109						121										115	114	115	112	113	109
U Q	113	111	111						132										119	119	119	117	117	111
L Q	105	105	107						110										112	111	109	107	107	106

H'F STATION AKITA LAT. 39.7N LON. 140.1E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								13	31	31	31	31	31	31	31	31	28	12						
MED								272	240	250	240	236	248	252	256	250	247	297						
U Q								282	248	262	250	242	266	266	268	254	258	317						
L Q								257	230	238	234	230	236	240	246	242	242	278						

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	11	11	13						11	16	11	12	11	13	10	12	12	15	10	11			12	15
MED	103	103	105						119	118	117	111	109	111	111	115	107	109	109	111			107	105
U Q	109	107	111						119	121	125	116	119	113	115	120	114	113	111	121			109	109
L Q	101	101	101						107	109	111	107	101	103	101	100	105	105	103	101			105	101

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								22	31	31	31	31	31	31	31	31	31	26	16					
MED								249	234	234	244	236	246	250	258	248	248	260	265					
U Q								258	246	244	250	244	248	262	268	256	252	274	283					
L Q								238	226	224	230	230	240	238	250	240	236	250	250					

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	12	12	10					17	15	19	19	19	14	18	11	15	13	17	15	13	10			13
MED	105	106	108					149	119	115	115	117	113	111	111	115	111	105	105	103	107			107
U Q	109	109	111					164	143	121	121	129	117	115	115	125	126	115	107	112	111			111
L Q	101	101	105					110	117	111	113	113	111	105	103	107	104	100	101	101	103			105

MONTHLY MEDIANS OF H'F AND H'ES

DEC. 1991 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									31	31	31	31	31	31	31	31	30	31	27	27	21	15		
MED									240	236	236	246	252	256	272	252	248	240	242	270	252	290		
U Q									248	242	242	254	266	276	288	264	254	244	256	282	275	306		
L Q									230	230	232	238	242	242	250	246	244	232	232	248	245	258		

H'ES

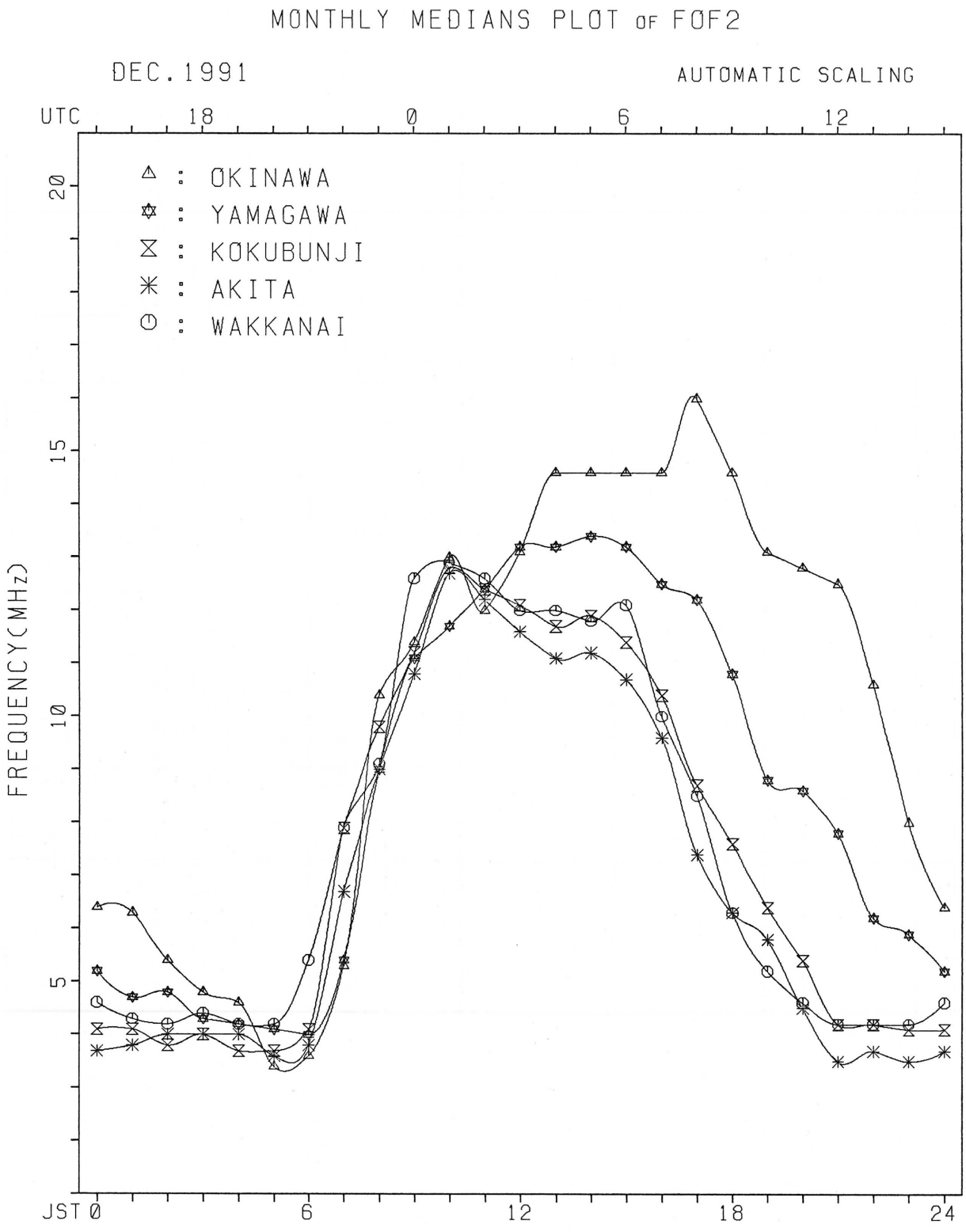
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT											15	20	20	24	18	18		15	14	12				
MED											119	116	113	113	113	112		101	103	100				
U Q											121	119	119	118	115	115		109	105	111				
L Q											115	114	109	109	109	107		97	97	98				

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									28	28	28	29	29	29	28	29	28	28	28	23	25	26	23	12
MED									250	238	246	252	274	292	287	294	270	252	240	258	262	253	262	280
U Q									256	248	252	264	309	315	304	312	286	260	249	282	280	258	280	295
L Q									243	235	240	240	263	262	256	270	258	240	231	236	249	244	244	264

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										11	13	15	15	20	21	21	15	13	19	10	10			
MED										119	123	119	119	117	113	113	111	107	101	102	114			
U Q										125	126	119	119	121	119	116	119	120	107	107	127			
L Q										117	118	115	115	111	110	106	107	101	101	99	103			


MONTHLY MEDIANS PLOT OF FOF2
DEC. 1991
AUTOMATIC SCALING
UTC
18
0
6
12
△ : OKINAWA
✡ : YAMAGAWA
⧖ : KOKUBUNJI
✳ : AKITA
◷ : WAKKANAI
FREQUENCY(MHz)
20
15
10
5
JST 0
6
12
18
24

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1991 FXI (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	X 47	X 48	X 51	X 44	X 42	X 43	X 52											X 90	X 71	X 66	X 57	X 43	X 38	X 40
2	X 40	X 41	X 44	X 42	X 37	X 37	X 42											X 87	X 85	X 74	X 57	X 49	X 45	X 37
3	X 35	X 37	X 39	X 39	X 44	X 34	X 41											X 92	X 77	X 60	X 46	X 40	X 41	X 41
4	X 40	X 42	X 41	X 41	X 41	X 40	X 43											X 101	X 84	X 57	X 57	X 43	X 40	X 42
5	X 40	X 37	X 41	X 44	X 51	X 33	X 38											X 89	X 76	X 61	X 58	X 45	X 43	48
6	50	52	53	59	54	X 52	54											X 85	X 73	X 47	X 56	X 50	X 47	X 44
7	X 44	X 42	X 44	X 46	X 47	X 36	X 39											X 82	X 79	X 62	X 48	X 48	X 43	X 40
8	X 43	X 42	X 40	X 39	X 38	X 39	X 44											X 94	X 74	X 66	X 48	X 41	X 41	X 40
9	X 40	X 40	X 42	X 51	X 44	X 36	X 38											X 97	X 83	X 67	57	52	X 48	X 47
10	X 41	X 39	X 38	X 38	X 36	X 39	X 41											X 95	X 83	X 82	X 69	X 46	X 44	X 45
11	X 43	X 43	X 44	X 45	X 42	X 42	X 54											X 106	X 100	X 79	X 67	X 55	X 51	X 49
12	X 45	X 47	X 49	X 47	X 42	X 42	X 49											X 111	X 76	X 78	X 61	X 48	X 43	X 45
13	X 43	X 45	X 48	X 47	X 47	X 48	X 50											X 98	X 86	X 80	X 75	X 53	X 44	X 48
14	X 42	X 44	X 47	X 51	X 39	X 41	X 45											X 119	X 114	X 84	X 63	X 45	X 45	X 41
15	X 42	X 43	X 43	X 43	X 45	X 47	X 52											X 111	X 82	X 73	X 70	X 48	X 42	X 40
16	X 43	X 41	X 42	X 44	X 40	X 41	X 39											X 84	X 73	X 75	X 60	X 41	X 40	X 42
17	X 42	X 43	X 35	X 34	X 38	X 39	X 44											X 93	X 83	X 65	X 57	X 54	X 53	X 42
18	X 46	X 48	X 43	X 40	X 44	X 42	X 49											X 97	X 85	X 74	X 50	X 43	X 48	X 47
19	X 42	X 40	X 39	X 40	X 35	X 37	X 41											X 76	X 83	X 66	X 54	X 48	X 49	X 48
20	X 42	X 44	X 46	X 45	X 41	X 41	X 42											X 71	X 76	X 64	X 42	X 34	X 37	X 38
21	X 39	X 41	X 39	X 39	X 39	X 40	X 44											X 79	X 77	X 74	X 66	X 63	X 46	X 49
22	X 54	X 56	X 57	X 57	X 56	X 57	X 53											X 78	X 72	X 65	X 45	X 41	X 43	X 41
23	X 41	X 44	X 44	X 44	X 40	X 40	X 40											X 71	X 66	X 71	X 57	X 45	X 49	X 42
24	X 41	X 41	X 40	X 42	X 42	X 45	X 59											X 90	X 72	X 62	X 62	X 43	X 46	X 45
25	X 39	X 41	X 40	X 41	X 39	X 44	X 46											X 73	X 58	X 66	X 51	X 36	X 39	X 38
26	X 37	X 41	X 42	X 41	X 36	X 36	X 39											X 77	X 70	X 66	X 47	X 37	X 40	X 42
27	X 42	X 44	X 45	X 44	X 41	X 44	X 47											X 102	X 93	X 88	X 57	X 47	X 47	X 50
28	X 42	X 39	X 38	X 38	X 39	X 38	X 37											X 101	X 86	X 73	X 61	X 39	X 37	X 36
29	X 38	X 38	X 36	X 37	X 36	X 34	X 35											X 90	X 76	X 78	X 57	X 47	X 50	X 54
30	X 50	X 53	X 56	X 47	X 44	X 41	X 45											X 115	X 97	X 90	X 65	X 43	X 45	X 43
31	X 40	X 38	X 40	X 46	X 33	X 35	X 35											X 78	X 78	X 78	X 58	X 49	X 48	X 48
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31											31	31	31	31	31	31	31
MED	X 42	X 42	X 42	X 44	X 41	X 40	X 44											X 90	X 78	X 71	X 57	X 45	X 44	X 42
U Q	X 43	X 44	X 46	X 46	X 44	X 43	X 49											X 101	X 85	X 78	X 62	X 49	X 48	X 48
L Q	X 40	X 40	X 40	X 40	X 38	X 37	X 39											X 79	X 73	X 65	X 51	X 41	X 41	X 40

DEC. 1991 FXI (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1991 FOF2 (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	41	42	45	38	36	37	46	82	100	110	102	127	R 116	106	111	100	100	84	65	60	51	37	32	34
2	34	35	38	36	32	31	37	88	105	93	101	122	122	112	106	108	105	81	79	68	51	43	39	31
3	29	31	33	33	38	28	35	85	108	104	121	134	135	120	109	109	108	86	71	54	40	34	35	35
4	34	36	35	35	35	35	37	73	90	104	121	145	147	126	115	118	107	95	78	51	52	37	34	36
5	34	31	35	38	45	27	32	70	95	101	125	114	112	111	107	107	93	83	71	55	52	39	37	41
6	F 43	F 42	F 41	F 52	F 44	46	F 46	85	99	95	117	121	124	117	114	118	99	79	67	41	49	44	41	38
7	38	35	38	40	41	30	33	70	91	95	105	119	115	110	118	113	92	76	73	55	42	42	37	34
8	36	36	34	33	32	33	38	72	90	99	127	113	115	121	113	111	100	88	68	60	42	35	35	34
9	34	34	36	45	38	30	32	72	94	113	118	119	117	121	109	109	109	91	77	61	48	F 42	42	41
10	35	33	32	32	30	33	35	76	97	124	130	123	116	121	116	112	91	89	77	76	63	39	38	39
11	37	37	38	39	36	36	48	82	93	119	129	132	125	116	123	121	115	100	94	73	61	49	45	43
12	39	41	43	41	36	36	43	74	98	113	135	133	128	114	125	130	121	105	70	71	55	42	37	39
13	37	39	42	41	41	42	44	69	93	118	142	136	V 127	137	125	128	114	91	80	74	69	47	38	42
14	36	38	41	45	33	35	39	75	102	129	141	134	128	136	146	138	130	113	108	78	57	39	39	35
15	36	37	37	37	39	41	46	74	106	127	148	140	133	125	129	126	116	105	76	67	63	42	36	35
16	37	35	36	V 38	34	36	33	69	101	108	119	123	119	111	120	126	112	78	67	69	54	H 36	34	36
17	36	37	29	28	32	33	38	62	101	146	135	128	126	132	138	126	105	87	77	59	50	48	47	36
18	40	42	37	34	38	36	43	92	122	141	145	135	135	131	138	132	119	H 92	79	68	44	37	42	41
19	36	34	33	34	29	31	35	81	94	128	133	129	R 112	108	110	109	91	70	77	60	48	42	43	42
20	36	38	40	39	35	35	36	77	116	126	133	122	112	115	120	103	83	65	70	58	36	28	31	32
21	33	35	33	33	33	34	38	67	94	94	119	108	124	112	107	104	85	73	71	68	60	57	40	43
22	48	50	51	51	50	F 50	47	76	98	100	112	105	109	109	106	99	88	72	66	59	39	35	37	35
23	35	38	38	38	34	34	34	68	102	100	102	107	97	96	109	105	79	65	60	65	51	39	43	36
24	35	35	34	36	36	39	53	64	94	116	124	116	108	107	107	100	93	84	66	57	56	V 37	40	39
25	33	35	34	35	33	38	41	70	90	104	129	124	127	R 113	116	104	91	68	52	61	45	30	33	32
26	31	35	36	35	30	30	33	75	97	100	124	122	124	115	119	104	87	71	64	60	41	31	34	36
27	36	38	39	38	35	38	41	76	102	108	119	123	129	126	123	119	114	96	87	82	51	41	41	44
28	36	33	32	32	33	32	31	68	96	110	153	128	104	111	126	133	118	95	80	67	55	33	31	30
29	32	32	30	31	30	28	29	57	120	136	150	123	117	126	129	121	110	84	70	72	51	41	44	48
30	44	47	50	41	38	35	39	69	100	117	143	139	128	136	138	145	132	108	91	84	59	37	39	37
31	34	32	34	40	28	30	29	68	99	105	112	122	118	107	R 113	111	103	73	72	72	52	F 41	42	42
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	36	36	36	38	35	35	38	73	98	110	125	123	122	115	116	112	105	84	72	65	51	39	38	36
U Q	37	38	40	40	38	37	43	77	102	124	135	133	128	126	125	126	114	95	79	72	56	42	42	41
L Q	34	34	34	34	32	31	33	69	94	100	118	119	115	111	109	105	91	73	67	59	45	36	35	35

DEC. 1991 FOF2 (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1991 FOF1 (0.01MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											L				U L 570									
2												U L 550												
3											L	L	L	L										
4												L	L	L										
5											L	L		L										
6													L		L									
7											L	L			L									
8											L		L											
9											L			L										
10											L	U L 820	L											
11												L		L	L	L								
12											L	L	L	L	L									
13											L	L	L		L									
14														L	L									
15										L	L			L	L									
16												L												
17													L											
18											L		L											
19										L														
20											L			L										
21											L		L											
22												L	L	L			L							
23												L												
24										L				L		L								
25										L	L	L		L	L									
26											L			L										
27										L		L				L								
28												L			L									
29											L			L										
30														L	L									
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT												2			1									
MED												U L 685			U L 570									
U Q																								
L Q																								

DEC. 1991 FOF1 (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1991 FOE (0.01MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

H / D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								175	265	300	325	345	360	340	315	280	A							
2								A 195	270	300	340	360	350	340	B	A 285	A							
3									260	305	335	345	A	320	310	A	H 195							
4								A	265	310	B	350	345	335	305	270	A							
5								170	265	310	340	350	360	A	310	260	205							
6								180	A	A	A	345	350	345	330	270	H 210							
7								180	280	315	330	A	A	A	315	A 265	A 185							
8								205	270	310	A	345	350	A	A	280	H 205							
9								185	280	A	345	A	A	A	A	280	185							
10								175	270	A	A	350	345	335	325	285	H 210							
11								A 175	265	A	345	355	350	345	320	290	205							
12								175	260	315	335	345	345	345	325	285	210							
13								180	250	305	A	A	A	R 350	330	275	205							
14								195	260	315	340	345	345	U A 335	A	A	A							
15								A	A 265	A	340	345	350	A	A	285	H 210							
16								H 200	A	A	335	340	350	335	B	270	A							
17								H 200	250	A	A	340	340	A 335	300	260	A							
18								A	255	R 310	330	340	345	335	310	270	A							
19								190	265	310	340	345	345	335	315	275	A							
20								160	255	A	A	A	A	340	315	A 275	A							
21								195	H 265	300	320	340	340	335	320	265	200							
22								155	255	300	320	345	340	335	310	275	A							
23								185	270	305	A	345	345	A	A	A	205							
24								H 190	255	300	330	345	355	350	315	A	A							
25								H 200	H 265	300	335	345	345	340	330	H 280	210							
26								155	255	305	335	345	350	340	320	265	200							
27								185	H 260	310	330	345	350	A	A	275	A							
28								160	250	300	A	A	A	A	320	285	215							
29								150	A	335	A	A	A 350	A	325	280	200							
30								190	255	310	330	A	A	A	330	290	210							
31								170	H 270	305	345	R 365	360	345	330	300	230							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								27	28	23	21	24	24	21	23	27	19							
MED								180	265	305	335	345	350	340	320	275	205							
U Q								195	268	310	340	348	350	345	325	285	H 210							
L Q								170	255	300	330	345	345	335	310	270	200							

DEC. 1991 FOE (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1991 FOES (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	21	J A 21	J A 18	J A 15	E B 14	E B 14	E B 14	G	35	38	J A 50	39	38	41	G 25	31	29	J A 24	E B 15	E B 13	E B 13	E B 13	E B 14	E B 15
2	22	E B 13	E B 14	E B 14	E B 13	E B 14	E B 14	21	31	J A 46	40	40	40	37	36	J A 42	35	J A 22	24	E B 14	E B 14	E B 14	J A 22	J A 23
3	J A 17	E B 14	E B 13	E B 14	E B 13	E B 14	E B 15	G	G	G	35	38	37	G 29	G	J A 29	G 18	E B 14	E B 13	E B 13	J A 22	E B 15	E B 14	J A 18
4	J A 20	E B 15	E B 15	E B 13	E B 14	20	E B 15	23	G	34	E B 45	38	G 33	G 32	G	33	21	E B 13	E B 13	J A 29	J A 20	E B 13	E B 15	E B 17
5	E B 14	E B 13	J A 22	J A 17	E B 13	J A 31	E B 14	J A 22	G	G	38	G 23	G	37	G	29	G 19	J A 24	J A 23	J A 22	E B 14	E B 14	E B 14	J A 27
6	J A 25	J A 50	J A 49	J A 20	J A 19	E B 14	E B 13	G	J A 35	J A 35	J A 42	J A 37	G	G	G	G	G	E B 13	E B 14	E B 14	E B 14	E B 15	E B 14	E B 14
7	E B 14	E B 13	E B 14	E B 13	E B 14	E B 14	E B 14	20	G	34	J A 43	J A 47	J A 42	J A 36	J A 37	36	23	E B 15	21	E B 13	J A 16	J A 18	J A 18	E B 14
8	E B 14	E B 13	J A 19	22	J A 22	E B 15	E B 13	G	G	J A 33	36	G 34	J A 40	J A 43	J A 47	G 20	G	E B 14	E B 14	E B 15	19	E B 15	J A 17	J A 25
9	J A 19	J A 22	E B 14	E B 13	E B 13	J A 16	E B 14	G	G	J A 37	40	J A 52	41	36	36	G	G	E B 14	E B 15	E B 13	E B 14	E B 13	E B 16	E B 13
10	E B 16	E B 14	E B 13	E B 13	E B 14	E B 13	J A 18	G	28	J A 41	J A 43	J A 39	J A 36	G 30	G	G	G	E B 14	E B 14	E B 14	E B 14	E B 13	E B 15	E B 16
11	E B 15	E B 14	E B 16	E B 14	E B 14	E B 13	E B 15	20	G 25	J A 40	G 31	G	36	G	G	G	G	E B 14	E B 14	E B 15	E B 14	E B 14	E B 13	E B 14
12	E B 14	J A 23	J A 22	J A 16	E B 13	E B 14	E B 13	G 16	G	G 28	G	G	G	G	G 26	G 23	22	J A 26	J A 23	J A 19	J A 15	19	20	21
13	J A 20	E B 15	J A 35	E B 13	E B 13	E B 14	E B 13	G	G	G	36	J A 38	37	G 34	G	G	G	J A 18	E B 14	E B 15	E B 14	E B 14	E B 15	E B 14
14	E B 15	E B 13	E B 15	E B 13	E B 14	E B 13	E B 14	G 19	J A 52	G 29	40	41	40	40	J A 41	34	26	J A 30	J A 22	E B 14	E B 13	E B 14	E B 16	E B 14
15	E B 13	E B 13	E B 14	E B 14	J A 20	J A 32	J A 38	J A 43	J A 55	J A 48	G 26	J A 51	G	34	33	G 28	G 19	J A 25	J A 22	32	J A 18	E B 13	E B 14	E B 16
16	E B 15	E B 13	E B 14	E B 13	E B 16	19	E B 14	G 19	J A 35	J A 35	36	38	G	J A 53	E B 34	J A 35	22	J A 19	E B 14	E B 15	E B 14	E B 45	E B 14	E B 14
17	E B 16	J A 18	J A 16	E B 14	E B 14	E B 13	E B 13	G	G 23	J A 52	J A 38	36	G 29	J A 38	J A 42	J A 41	J A 26	J A 23	J A 29	20	E B 14	E B 13	19	J A 33
18	E B 14	E B 15	32	26	E B 13	E B 15	E B 14	21	G	G 30	35	39	G	G 31	34	G 19	23	J A 24	J A 19	J A 47	J A 25	19	J A 24	J A 23
19	J A 35	J A 19	E B 13	17	E B 14	E B 15	E B 15	G	G	G 21	37	J A 48	G 28	J A 42	G 25	34	J A 21	J A 24	J A 22	J A 21	19	19	E B 15	J A 47
20	J A 30	J A 26	20	E B 13	20	J A 16	20	20	G	J A 36	J A 36	36	J A 43	G 19	J A 43	J A 47	J A 37	J A 23	J A 40	J A 50	J A 41	J A 32	J A 26	J A 20
21	J A 22	E B 14	E B 16	20	20	20	21	J A 22	G 24	J A 39	34	36	G 23	36	35	G	G	J A 21	19	20	E B 14	E B 14	J A 20	J A 14
22	E B 14	E B 14	E B 13	E B 15	E B 14	E B 14	E B 14	G	G	G	G	G	G	J A 37	G	J A 34	27	17	E B 15	J A 21	J A 26	J A 56	J A 42	J A 32
23	J A 33	J A 27	E B 16	E B 13	E B 13	E B 14	E B 14	29	29	G	J A 36	G 31	G 25	J A 37	J A 51	J A 31	G 20	E B 14	J A 23	J A 51	J A 25	J A 35	27	J A 24
24	J A 27	J A 22	J A 24	J A 24	E B 14	E B 14	E B 13	G	G	G	36	J A 38	G 33	39	38	J A 40	J A 53	J A 24	J A 29	J A 24	J A 19	20	E B 13	E B 14
25	E B 14	J A 31	E B 14	J A 15	20	J A 14	E B 14	G	G	34	35	G	G	G	G	G	G 19	J A 17	J A 19	J A 22	E B 14	J A 52	J A 20	J A 25
26	J A 45	J A 38	J A 22	20	E B 13	E B 14	E B 14	G	G	G	J A 32	35	G 31	G 22	G 30	G 24	26	E B 13	E B 15	20	E B 13	E B 14	E B 14	E B 14
27	E B 14	E B 13	E B 13	E B 15	E B 13	J A 16	J A 14	G	G	G	G	J A 36	G 35	J A 54	J A 69	J A 49	J A 49	J A 54	J A 32	E B 16	E B 15	E B 14	E B 14	E B 14
28	J A 22	J A 18	J A 28	J A 23	22	20	E B 14	G	J A 29	J A 31	J A 47	J A 51	J A 47	J A 40	G 22	G 26	G	J A 19	J A 20	J A 25	E B 15	E B 15	E B 13	J A 19
29	E B 14	J A 21	E B 13	E B 14	E B 14	E B 14	E B 14	20	J A 50	J A 47	J A 71	J A 55	J A 47	J A 44	J A 31	G 22	22	E B 14	21	E B 14	E B 14	E B 14	E B 14	E B 14
30	E B 13	E B 13	E B 13	J A 42	J A 21	J A 29	J A 22	J A 26	G	G	J A 54	J A 44	J A 42	J A 38	G 29	G	27	E B 15	E B 16	E B 15	E B 15	E B 15	E B 15	E B 14
31	E B 14	E B 15	24	E B 13	19	E B 15	E B 13	G	G	G	G	40	40	G	G	G 23	G	J A 26	J A 19	E B 15	J A 22	20	20	E B 14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	E B 16	E B 15	E B 16	E B 14	E B 14	E B 14	E B 14	G	G	33	36	38	G	36	G	G	21	J A 19	19	E B 16	E B 15	E B 15	E B 15	E B 16
U O	J A 22	J A 22	J A 22	20	19	16	15	21	J A 29	J A 38	J A 42	J A 41	J A 40	J A 40	J A 37	J A 34	26	J A 24	J A 23	J A 22	J A 19	J A 19	J A 20	J A 23
L O	E B 14	E B 13	E B 14	E B 13	E B 13	E B 14	E B 14	G	G	G	G 34	G 35	G 35	G	G	G 28	G	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14

DEC. 1991 FOES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1991 FBES (0.1MHZ) 135° E MEAN TIME (G.M.T. + 9H)

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

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

DEC. 1991 FBES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1991 FMIN (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

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

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1991 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	270	285	325	295	260	285	310	350	340	340	315	315	R 320	315	315	305	320	315	320	310	315	320	275	275
2	255	280	285	300	310	265	275	350	360	340	315	320	305	310	305	310	320	315	305	320	280	340	310	280
3	280	255	260	270	300	340	280	335	345	320	300	310	310	310	305	310	320	315	325	335	330	285	285	275
4	270	280	265	265	290	270	320	355	335	325	305	310	315	295	290	300	315	305	330	295	320	275	265	275
5	260	280	275	295	335	270	275	335	340	330	320	315	305	305	305	315	315	310	325	300	310	270	280	260
6	F 280	F 290	F 270	F 300	F 315	290	F 300	340	345	335	320	310	305	300	295	310	325	315	350	280	310	305	280	285
7	290	285	280	305	345	305	295	345	345	340	315	310	300	290	300	315	320	305	325	320	290	290	265	275
8	285	295	285	280	265	305	315	345	350	325	325	315	300	300	300	310	315	315	325	340	325	285	280	260
9	265	265	270	300	370	290	285	335	320	340	310	305	290	305	290	295	315	310	315	325	295	F 270	250	270
10	280	275	285	270	255	275	300	335	330	335	305	295	295	280	290	300	305	305	305	305	335	270	275	280
11	265	275	265	270	240	255	315	350	325	310	305	295	300	280	285	290	300	300	325	320	305	275	275	275
12	275	255	265	290	310	280	310	325	330	330	310	305	310	290	285	300	305	315	290	305	325	295	270	285
13	275	260	265	270	250	270	350	350	330	315	315	310	V 290	305	290	305	300	305	310	295	315	290	260	285
14	270	270	280	330	280	285	305	335	320	320	315	305	300	295	300	290	310	300	325	340	300	325	280	260
15	255	265	270	270	265	275	310	320	320	315	315	310	310	290	290	300	290	315	310	310	315	320	300	260
16	290	280	290	V 315	280	290	335	340	340	330	320	320	315	300	295	315	320	315	305	325	345	H 265	255	245
17	280	300	310	255	245	290	320	310	310	320	310	285	300	295	300	300	315	295	300	310	300	285	295	290
18	285	290	280	255	250	260	280	320	330	320	310	305	300	295	300	300	315	H 290	330	325	305	270	280	290
19	295	285	270	300	255	270	295	335	325	325	325	325	R 315	315	310	325	330	295	340	310	290	260	275	280
20	245	255	275	300	265	250	265	325	335	330	315	315	310	295	315	330	335	310	330	325	300	275	290	260
21	265	265	265	275	275	285	325	340	350	335	315	305	305	305	305	315	315	310	305	325	300	315	315	265
22	265	280	270	280	280	F 280	295	345	340	345	325	325	330	310	315	320	325	325	325	315	345	300	295	280
23	280	270	285	300	290	280	325	335	345	340	335	310	305	300	300	325	320	315	300	325	310	290	300	305
24	275	275	270	265	265	275	320	340	330	320	320	325	300	300	320	310	320	310	325	305	355	V 250	285	320
25	260	270	265	260	270	280	325	335	340	325	330	320	330	R 310	315	310	330	320	295	330	350	300	265	270
26	260	265	295	300	275	260	300	330	340	340	305	300	310	305	310	315	325	320	315	330	345	280	285	280
27	260	275	300	290	270	275	310	330	365	320	335	315	305	295	290	295	300	300	310	320	335	245	260	315
28	300	295	265	250	250	290	265	305	315	300	320	315	305	290	285	305	310	305	310	320	335	300	280	255
29	270	275	260	275	275	260	275	305	315	320	315	320	300	290	290	300	310	315	295	320	295	255	280	285
30	275	260	295	315	250	250	295	325	330	305	310	300	295	290	280	290	305	310	310	320	355	285	285	300
31	285	265	275	315	340	270	305	315	340	335	315	335	285	290	R 315	300	330	285	305	325	300	F 260	285	300
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	275	275	275	290	275	275	305	335	335	325	315	310	305	300	300	305	315	310	315	320	315	285	280	280
U Q	280	285	285	300	300	290	320	345	345	335	320	320	310	305	310	315	320	315	325	325	335	300	285	285
L Q	265	265	265	270	255	270	285	325	325	320	310	305	300	290	290	300	310	305	305	310	300	270	270	265

DEC. 1991 M(3000)F2 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1991 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											L				U L 370									
2												U L 360												
3											L	L	L	L										
4												L	L	L										
5											L	L		L										
6													L		L									
7											L	L			L									
8											L		L											
9											L			L										
10											L	U L 350	L											
11												L		L	L	L								
12											L	L	L	L	L									
13											L	L	L		L									
14														L	L									
15										L	L			L	L									
16												L												
17													L											
18											L		L											
19										L														
20											L			L										
21											L		L											
22												L	L	L			L							
23												L												
24										L				L		L								
25										L	L	L		L	L									
26											L			L										
27										L		L				L								
28												L			L									
29											L			L										
30														L	L									
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT												2			1									
MED												U L 355			U L 370									
U Q																								
L Q																								

DEC. 1991 M(3000)F1 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1991 H'F2 (KM) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											L 260				275									
2												260												
3											240	250	255	240										
4												260	245	L 300										
5											260	230		270										
6													260		L 300									
7											255	265			270									
8											245		285											
9											255			260										
10											280	325	265											
11												235		L 320	L 285	285								
12											255	240	260	L 295	L 300									
13											260	245	L 305		L 300									
14														285	265									
15										250	255			L 305	295									
16												250												
17													260											
18											245		300											
19										255														
20											260			300										
21											260		260											
22												225	250	275			250							
23												255												
24										250				290		275								
25										250	250	250		265	260									
26											255			L 295										
27										260		260				275								
28												255			290									
29											260			305										
30														300	300									
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT										5	16	15	11	15	11	3	1							
MED										250	255	250	260	295	290	275	250							
U Q										258	260	260	285	L 300	L 300	285								
L Q										250	252	240	255	270	270	275								

DEC. 1991 H'F2 (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1991 H'F (KM) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	H 320	290	255	255	265	300	260	225	215	225	H 215	230	235	230	210	230	230	210	225	240	220	215	330	335
2	340	310	300	275	250	355	305	230	230	225	225	220	235	235	230	245	235	215	250	220	260	230	270	300
3	335	380	355	320	265	230	305	250	225	225	230	225	235	225	H 225	235	230	210	220	225	245	275	305	285
4	315	300	335	335	280	305	235	225	H 225	230	240	235	230	H 220	H 220	235	220	220	210	240	235	225	350	335
5	330	355	325	270	235	E A 385	305	235	225	220	235	230	235	230	235	230	230	225	220	235	235	230	305	315
6	300	320	350	290	250	255	260	235	220	220	225	225	230	230	225	235	210	210	215	235	250	220	280	275
7	290	290	305	275	220	265	275	220	220	225	230	240	235	235	240	240	220	210	225	210	230	260	270	320
8	305	270	295	320	330	275	230	225	220	H 225	240	230	225	240	235	240	230	215	215	215	230	260	290	355
9	330	360	330	275	210	300	240	235	230	230	235	235	235	240	235	225	230	210	230	215	220	250	320	300
10	315	310	290	310	370	305	245	240	225	235	230	220	225	245	235	240	220	240	240	230	220	225	305	290
11	310	295	340	310	365	360	260	220	220	230	235	230	225	230	245	225	230	220	230	215	230	250	280	305
12	300	345	325	280	240	295	270	225	225	230	225	235	215	225	245	245	225	210	220	240	210	250	285	295
13	305	350	335	305	320	310	210	205	225	225	230	230	230	230	225	235	225	205	230	225	240	225	310	275
14	320	355	310	230	280	295	250	220	220	225	230	230	230	230	245	225	220	230	230	215	205	220	290	320
15	350	335	320	330	325	300	A 280	215	220	230	230	230	235	225	230	230	225	215	A 220	250	235	220	270	305
16	285	300	280	270	270	265	235	230	225	H 225	220	220	230	230	245	235	225	205	230	230	215	240	360	375
17	320	285	265	415	380	310	230	250	230	230	220	235	240	235	240	225	220	210	260	215	240	250	255	265
18	295	285	305	395	360	355	280	255	225	240	235	230	H 225	H 210	235	225	210	200	220	225	240	320	285	275
19	310	290	320	275	E B 360	340	295	240	215	230	230	235	225	230	235	235	220	210	230	225	250	300	285	310
20	A 425	355	300	270	320	380	335	240	230	220	225	225	225	230	240	225	215	220	255	260	A 265	A 365	330	340
21	360	340	350	335	290	300	255	230	225	220	230	230	240	235	235	235	220	225	250	230	255	250	235	290
22	290	300	310	280	280	265	270	230	225	215	230	230	H 210	230	235	225	220	220	230	220	220	A 315	280	325
23	A 350	325	305	270	250	300	240	230	225	220	225	220	225	230	250	235	220	210	230	250	230	315	275	250
24	A 350	320	350	330	335	320	250	215	230	235	230	230	225	225	250	235	235	230	230	265	220	315	300	250
25	305	330	310	340	350	300	230	235	220	220	245	220	A 195	220	220	240	225	210	250	235	220	260	310	315
26	E A 370	E A 390	300	280	270	350	280	240	220	225	230	225	235	230	245	230	225	220	235	230	210	260	305	310
27	340	310	285	285	310	315	250	240	215	220	225	230	240	240	A 255	235	225	A 245	240	240	205	330	330	260
28	275	280	330	380	390	280	315	255	220	240	250	H 225	225	230	240	250	230	210	230	225	215	240	300	365
29	315	A 350	340	320	315	310	290	230	250	220	245	235	235	A 230	235	225	230	210	240	235	215	280	300	280
30	265	315	275	260	255	A 405	260	235	225	230	245	240	230	220	230	250	220	205	245	225	210	250	295	275
31	285	360	340	250	220	315	265	245	220	220	230	240	230	230	250	235	220	H 205	230	220	245	225	295	270
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	315	318	310	285	280	302	260	230	225	225	230	230	230	230	235	235	225	210	230	230	230	250	295	300
U Q	340	350	335	330	335	340	280	240	225	230	235	235	235	235	245	240	230	220	240	240	240	280	310	320
L Q	300	295	300	270	250	295	240	225	220	220	225	225	225	225	230	225	220	210	220	220	215	225	280	275

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1991 H'E (KM) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								125	115	110	A	A 130	115	A 130	A 120	120	A							
2								A	115	110	A 125	A 115	A 130	115	B	120	A							
3								155	115	110	115	115	A	A 120	115	A	A 140							
4								A	120	110	B	110	A 130	A 125	110	A 120	A							
5								140	125	120	120	120	120	A	120	120	E A 150							
6								135	A	A	A	E A 140	115	115	115	115	125							
7								135	120	115	110	115	115	A	A 130	A	A							
8								155	120	115	A	E A 135	A 130	A	A	A 115	130							
9								B 150	120	A	A	A	A	A	A	115	135							
10								130	A	A	A	A 135	A 130	125	110	120	130							
11								A	A 135	110	A 120	120	A 130	115	115	120	120							
12								A 150	110	A 125	115	115	115	115	A 120	120	E A 175							
13								B 165	120	115	A	A	A	E A 135	115	115	135							
14								E A 175	A 125	E A 140	115	115	115	115	A	A	A							
15								A	A	A	A 115	115	120	A	A	A	A							
16								A 180	A	A	A 120	A 125	115	A 130	B	A 125	A							
17								B 145	A	A	A	A 130	A 115	A	A 115	120	A							
18								A	120	120	A 135	115	115	A 130	A 120	A 120	A							
19								B 160	120	120	E A 135	A 125	A 120	A 125	A 110	E A 130	A							
20								B 135	120	A	A	A	A	A 120	120	115	A							
21								E A 165	A 135	A 130	A 120	A 120	A 120	A 115	A 115	120	130							
22								E B 160	120	115	110	115	115	A 130	115	A 130	A							
23								B 155	120	115	A	A 125	A 115	A	A	A	A 135							
24								160	120	120	120	A	A 130	115	A	A	A							
25								B	120	A 130	A 125	120	120	120	125	120	A 130							
26								140	120	115	A 130	A 130	A 125	120	A 125	A 125	B 140							
27								160	120	110	115	A 130	A 125	A	A	A 130	A							
28								150	A 135	A 130	115	A	A	A	120	A 125	130							
29								150	A	125	A	120	120	120	A 125	120	135							
30								A 155	120	120	115	A	A	A	A 125	120	135							
31								170	115	115	120	120	A 135	120	110	125	125							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								25	25	24	20	25	25	21	22	25	17							
MED								152	120	115	119	120	A 120	120	118	120	132							
U Q								160	A 120	A 122	A 122	A 130	A 130	A 128	A 120	A 125	A 138							
L Q								140	120	112	115	115	115	115	115	120	130							

DEC. 1991 H'E (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1991 H'ES (KM) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	105	110	105	105	B	B	B	G	150	150	135	150	150	140	110	140	115	120	B	B	B	B	B	B
2	110	B	B	B	B	B	B	130	155	130	125	130	125	140	130	115	115	110	115	B	B	B	105	105
3	110	B	B	B	B	B	B	G	G	G	E G 160	135	115	110	G	105	105	B	B	B	125	B	B	130
4	125	B	B	B	B	115	B	145	G	140	B	145	115	115	G	135	120	B	B	110	110	B	B	B
5	B	B	105	115	B	105	B	115	G	G	E G 175	110	G	115	G	150	110	105	105	105	B	B	B	110
6	110	110	110	110	110	B	B	G	115	115	115	115	G	G	G	G	G	B	B	B	B	B	B	B
7	B	B	B	B	B	B	B	E G 210	G	135	120	115	115	115	115	140	130	B	115	B	110	105	105	B
8	B	B	110	100	100	B	B	G	G	115	120	110	110	110	100	110	G	B	B	B	120	B	115	110
9	105	105	B	B	B	105	B	G	G	120	145	115	110	115	115	G	G	B	B	B	B	B	B	B
10	B	B	B	B	B	B	110	G	115	110	110	110	110	110	G	G	G	B	B	B	B	B	B	B
11	B	B	B	B	B	B	B	125	115	110	110	G	110	G	G	G	G	B	B	B	B	B	B	B
12	B	100	100	110	B	B	B	115	G	110	G	G	G	G	110	110	105	100	105	105	105	100	100	100
13	100	B	110	B	B	B	B	G	G	G	120	115	115	120	G	G	G	110	B	B	B	B	B	B
14	B	B	B	B	B	B	B	110	125	115	120	120	120	115	110	110	110	100	105	B	B	B	B	B
15	B	B	B	B	110	110	105	105	105	105	110	125	G	115	110	110	110	110	110	100	105	B	B	B
16	B	B	B	B	B	120	B	120	115	115	115	115	G	110	B	110	105	100	B	B	B	110	B	B
17	B	130	110	B	B	B	B	G	115	110	110	165	110	105	120	120	120	115	110	110	B	B	115	105
18	B	B	105	110	B	B	B	115	G	120	E G 185	145	G	115	E G 170	105	100	95	100	115	115	110	110	110
19	105	110	B	110	B	B	B	G	G	110	150	130	105	105	105	120	105	100	100	100	105	100	B	110
20	105	110	110	B	110	110	110	110	G	120	115	120	120	105	110	115	110	115	110	105	105	105	110	110
21	105	B	B	105	120	120	115	110	110	110	E G 190	E G 160	110	E G 155	135	G	G	105	105	110	B	B	135	120
22	B	B	B	B	B	B	B	G	G	G	G	G	G	110	G	110	120	115	B	110	105	105	110	105
23	105	105	B	B	B	B	B	105	150	G	115	115	110	105	105	110	120	B	110	115	100	110	105	115
24	100	105	110	130	B	B	B	G	G	G	170	115	115	130	140	110	105	105	110	105	105	100	B	B
25	B	110	B	120	120	120	B	G	G	130	140	G	G	G	G	G	115	110	110	120	B	115	120	110
26	110	100	105	110	B	B	B	G	G	G	110	110	110	115	110	105	145	B	B	110	B	B	B	B
27	B	B	B	B	B	110	110	G	G	G	G	110	110	120	100	100	100	100	100	B	B	B	B	B
28	115	100	130	110	120	120	B	G	120	115	115	110	110	105	110	105	G	105	100	100	B	B	B	115
29	B	110	B	B	B	B	B	155	120	120	115	120	120	115	115	110	160	B	105	B	B	B	B	B
30	B	B	B	105	110	100	105	110	G	G	115	115	115	115	110	G	140	B	B	B	B	B	B	B
31	B	B	115	B	110	B	B	G	G	G	G	E G 190	160	G	G	110	G	105	105	B	110	110	100	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	14	13	13	13	9	11	6	15	13	21	26	27	23	26	20	23	22	19	18	15	13	11	12	14
MED	105	110	110	110	110	110	110	115	115	115	118	115	115	115	110	110	112	105	105	110	105	105	110	110
U Q	110	110	110	112	120	120	110	130	138	125	E G 145	135	120	115	118	120	120	110	110	110	112	110	115	115
L Q	105	102	105	105	110	105	105	110	115	110	115	115	110	110	110	110	105	100	105	105	105	100	105	105

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1991 TYPES OF ES 135°E MEAN TIME (G.M.T. + 9H)

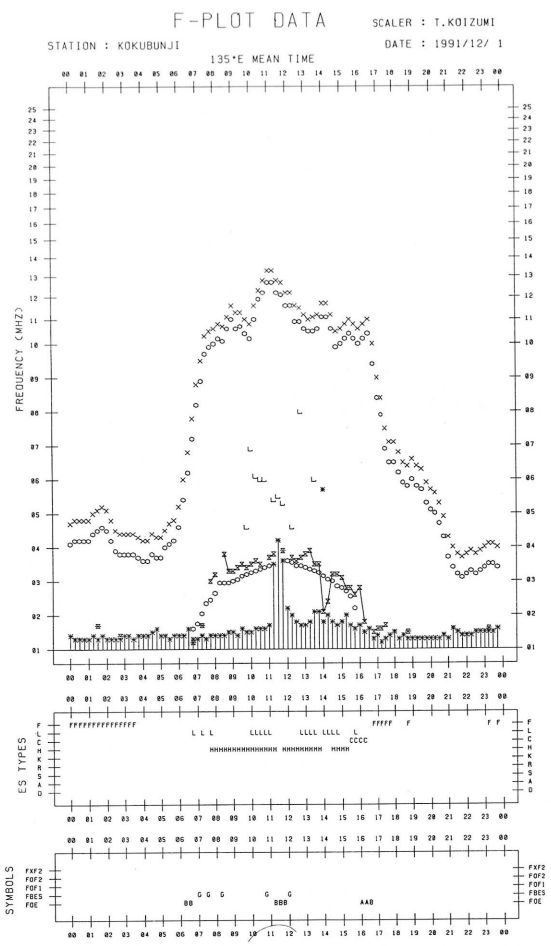
LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

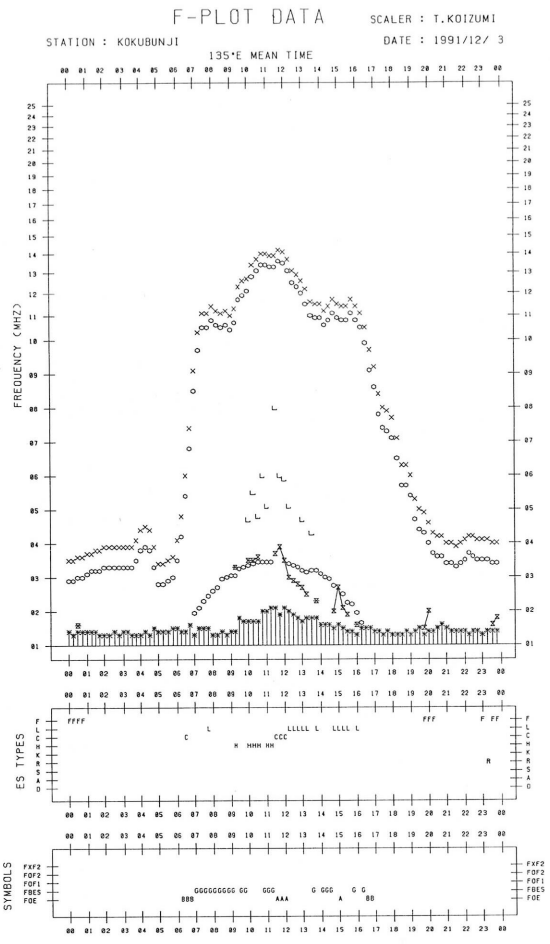
D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F 2	F 1	F 1	F 1					H 2	H 2	HL 22	HL 11	H 1	HL 22	L 1	H 1	C 2	F 1						
2	F 1							L 2	H 1	H 1	HL 22	HL 12	CL 12	HL 12	C 1	C 3	C 4	F 3	F 2				F 3	F 2
3	F 1										H 1	H 1	C 1	L 2		L 2	L 1				F 1			F 1
4	F 1					F 1		C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

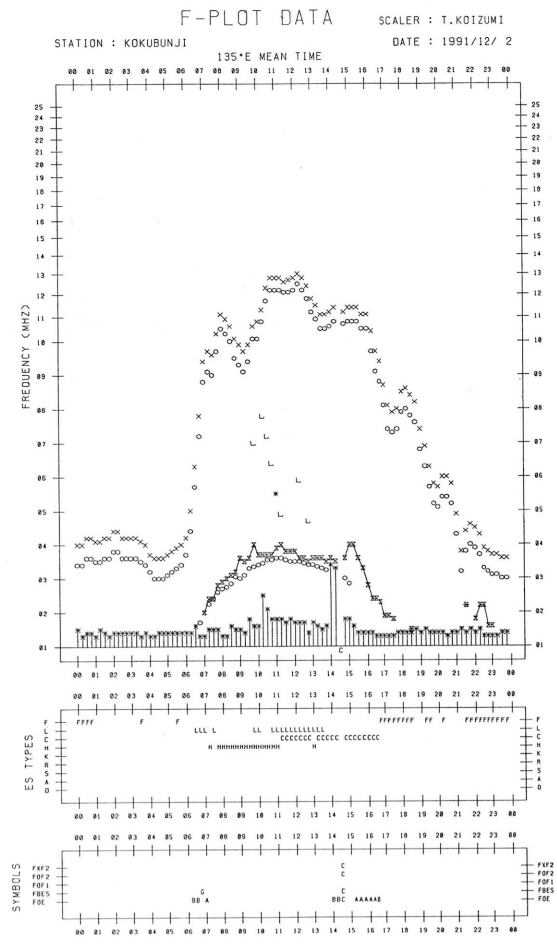
DEC. 1991 TYPES OF ES COMMUNICATIONS RESEARCH LABORATORY, JAPAN

f-PLOTS OF IONOSPHERIC DATA

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


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/ 1
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/ 3
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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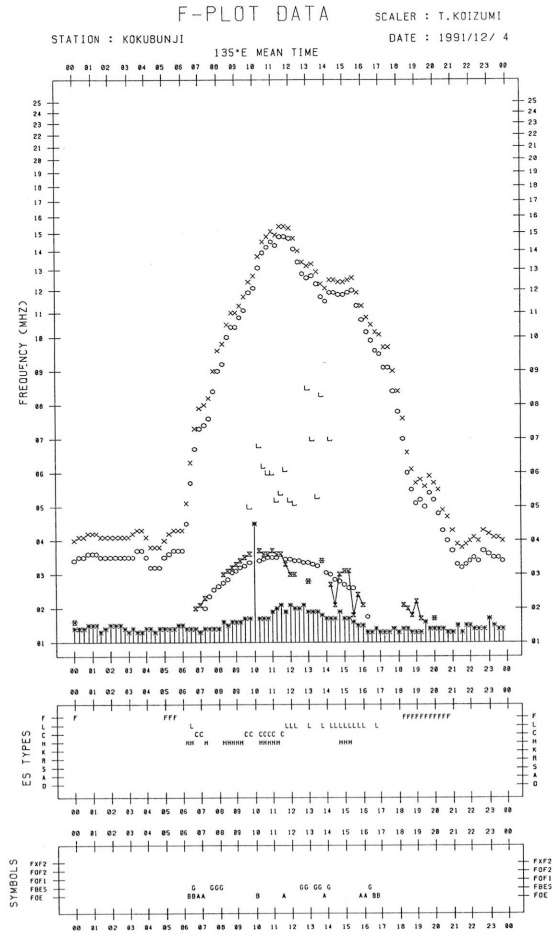
STATION : KOKUBUNJI
DATE : 1991/12/ 2
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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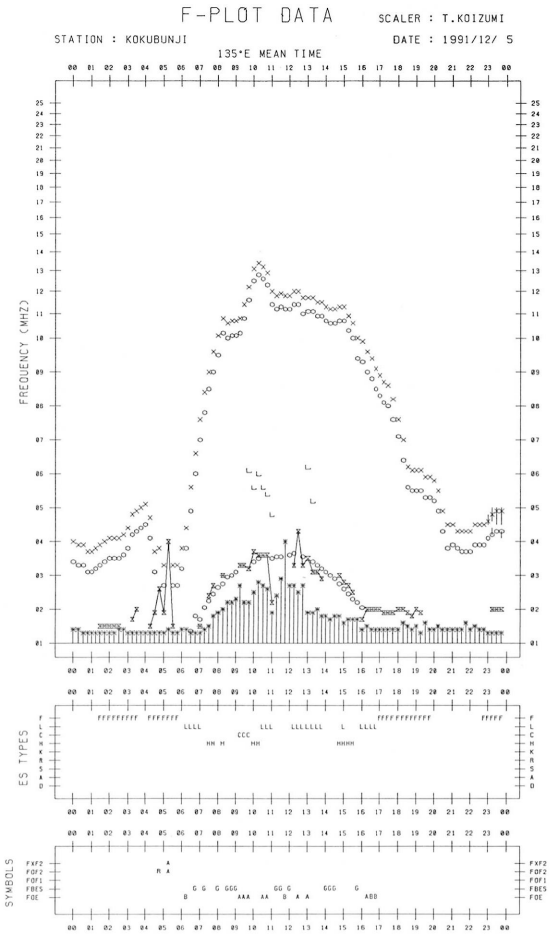
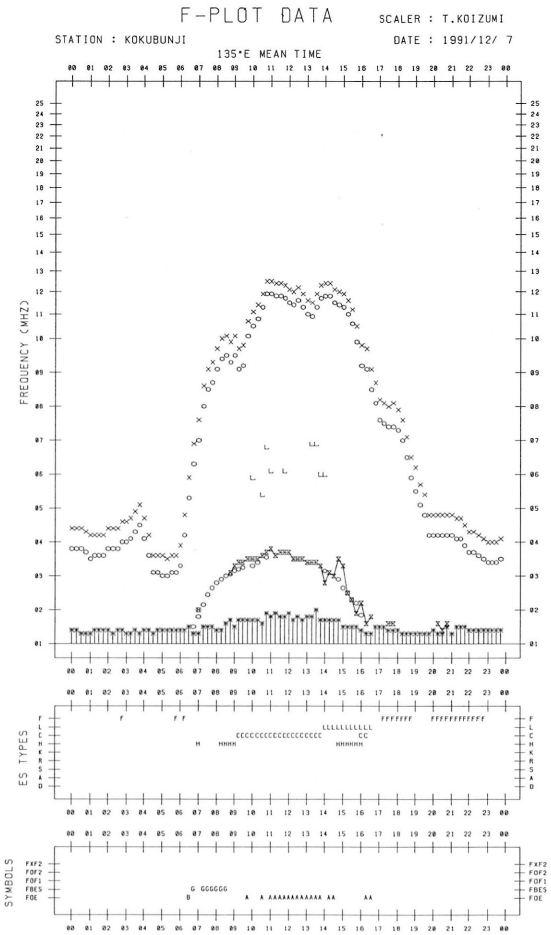
STATION : KOKUBUNJI
DATE : 1991/12/ 4
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/ 5
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
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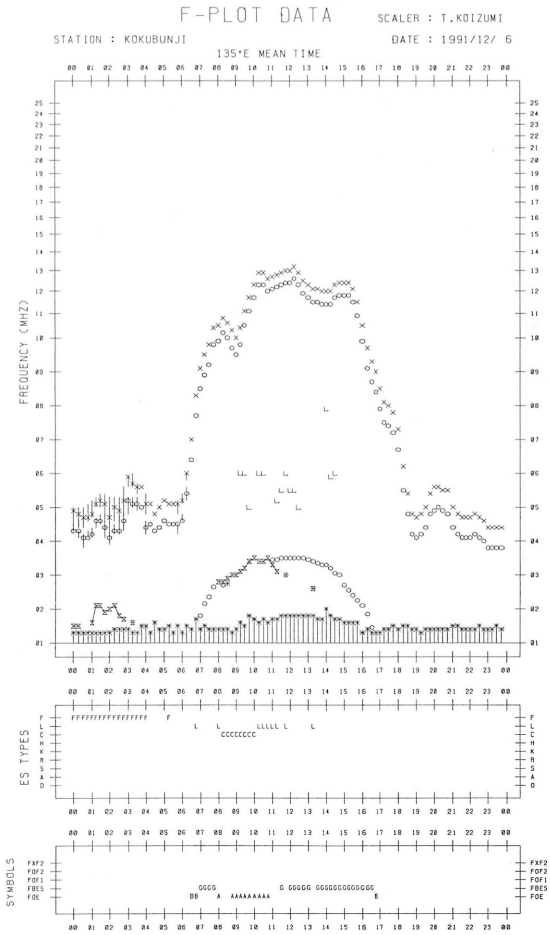
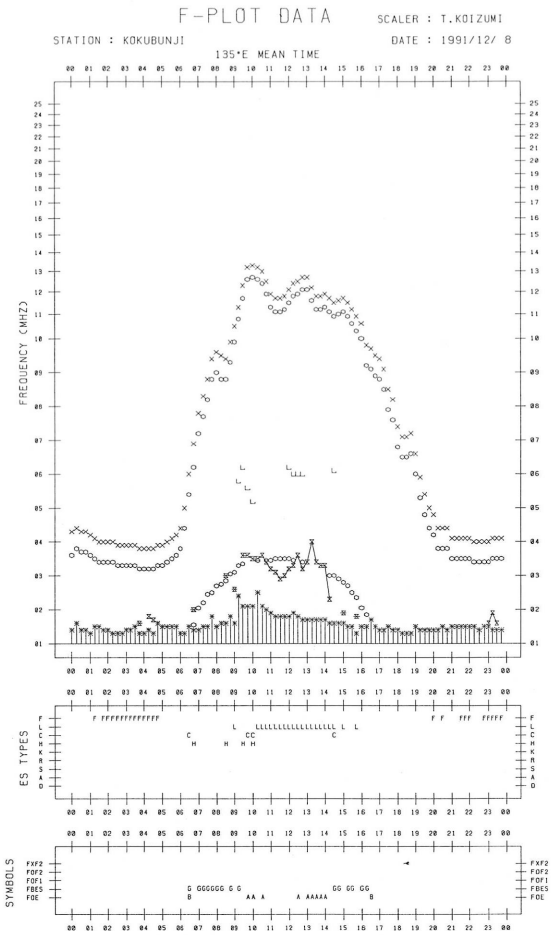
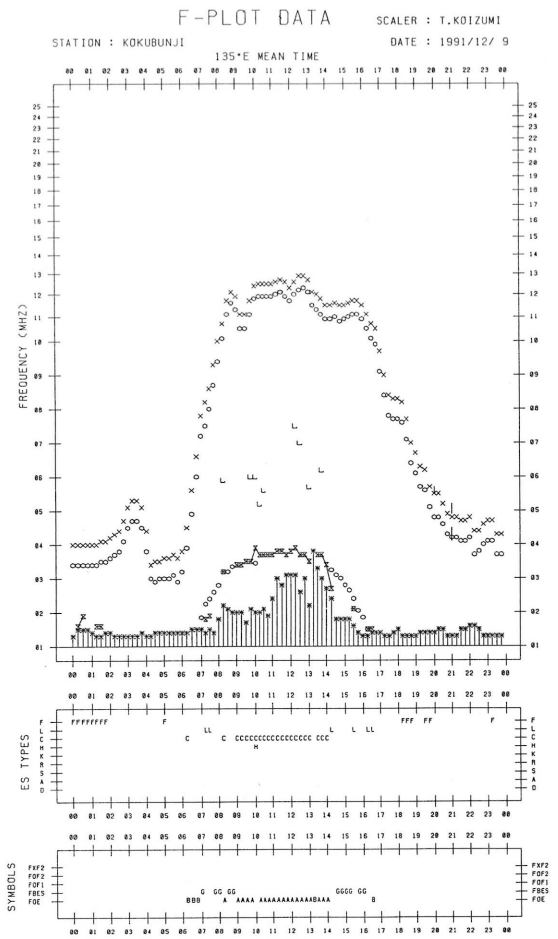
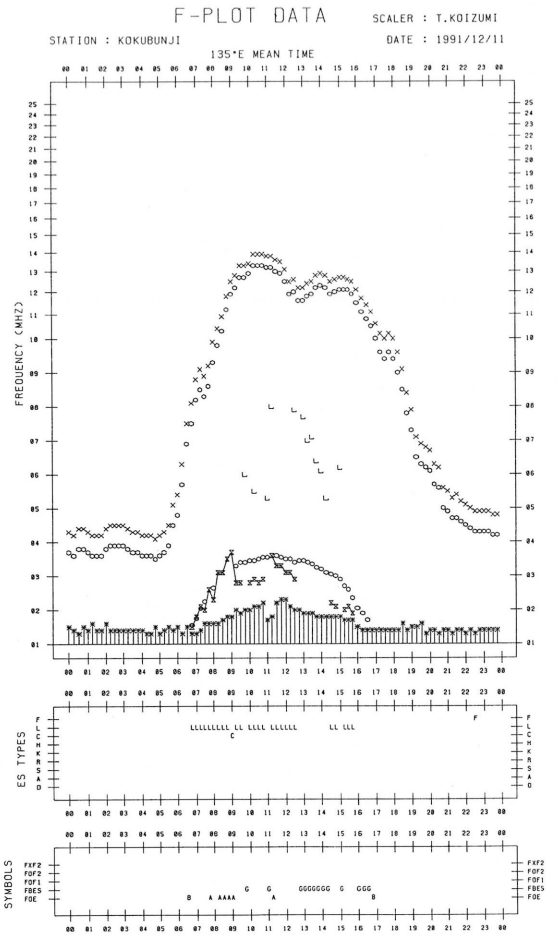
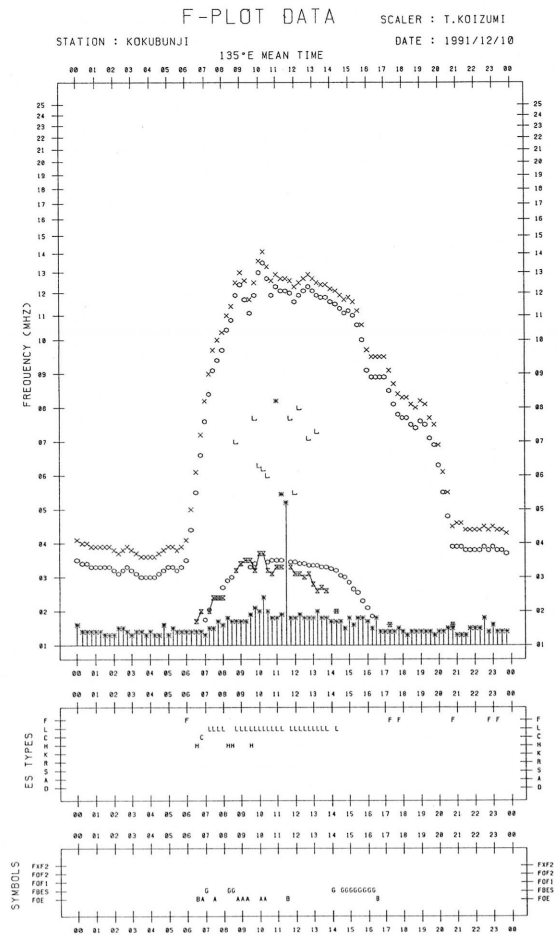
STATION : KOKUBUNJI
DATE : 1991/12/ 7
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

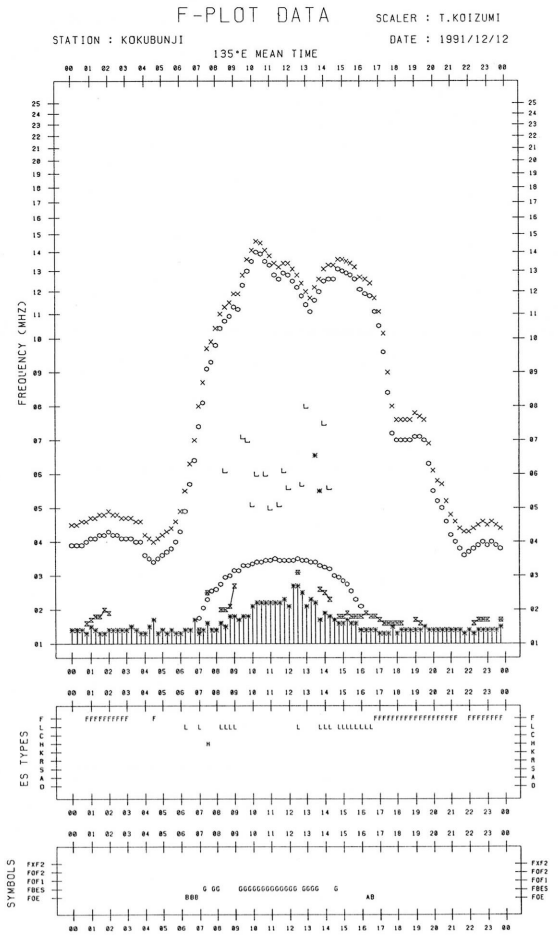

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/ 6
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

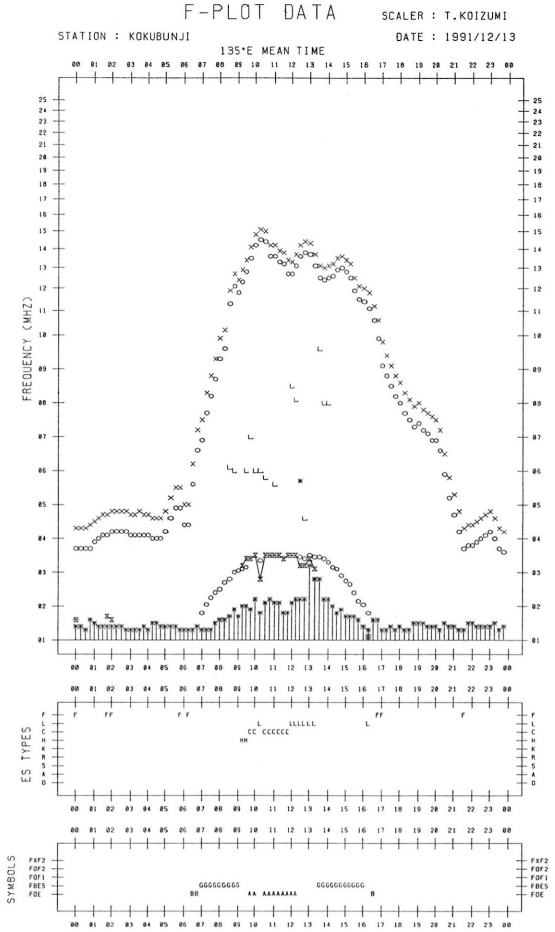

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/ 8
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

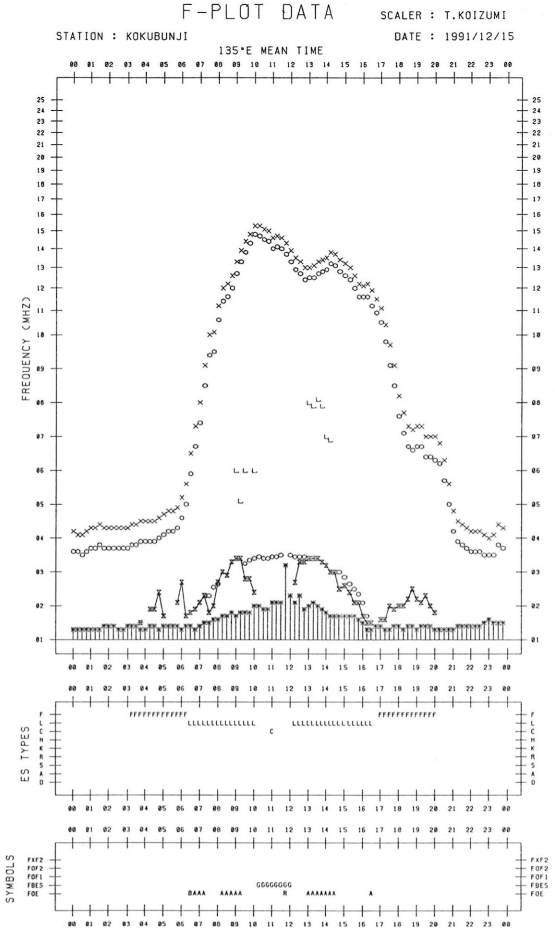

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/ 9
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

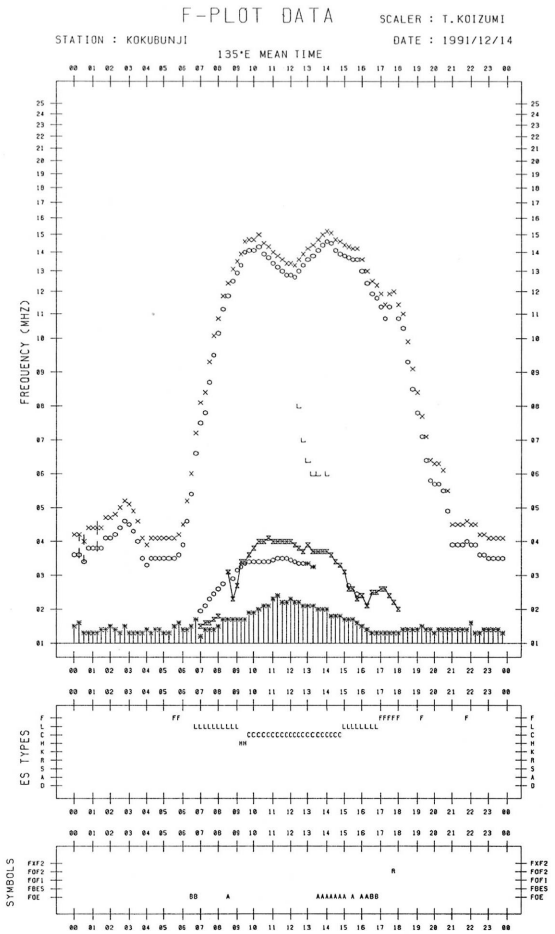

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/11
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

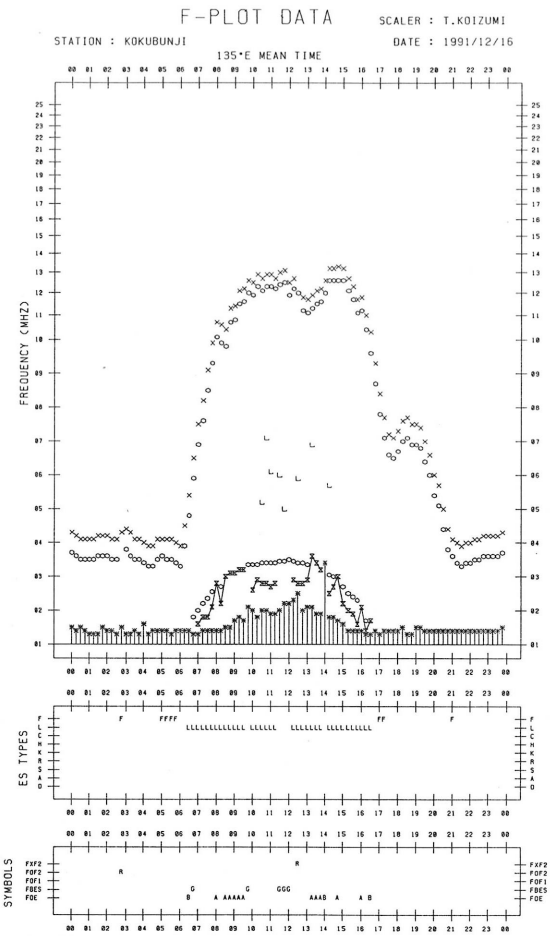

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/10
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

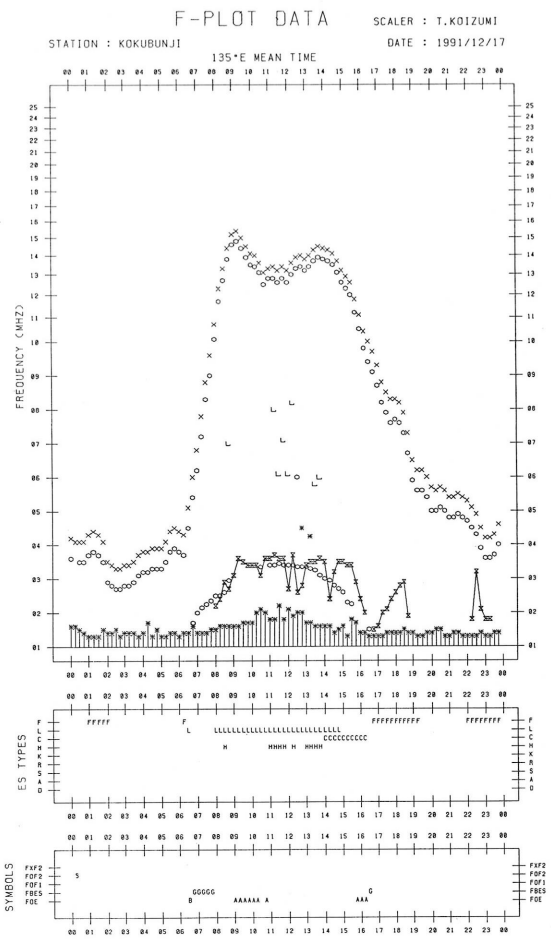

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/12
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

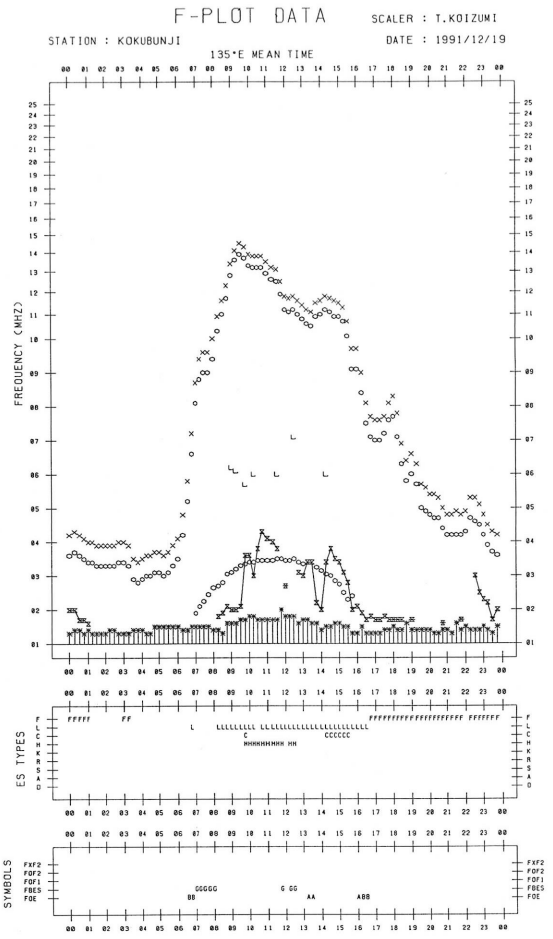

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

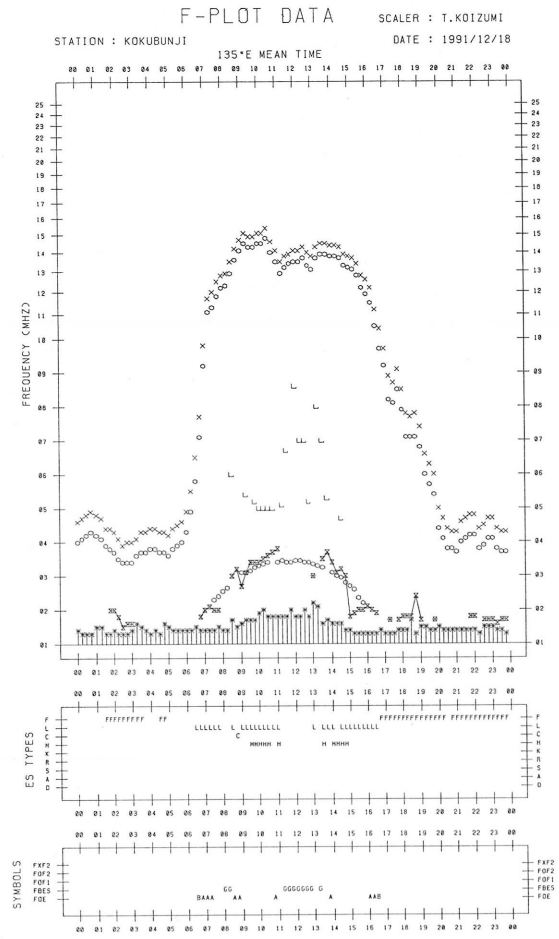

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

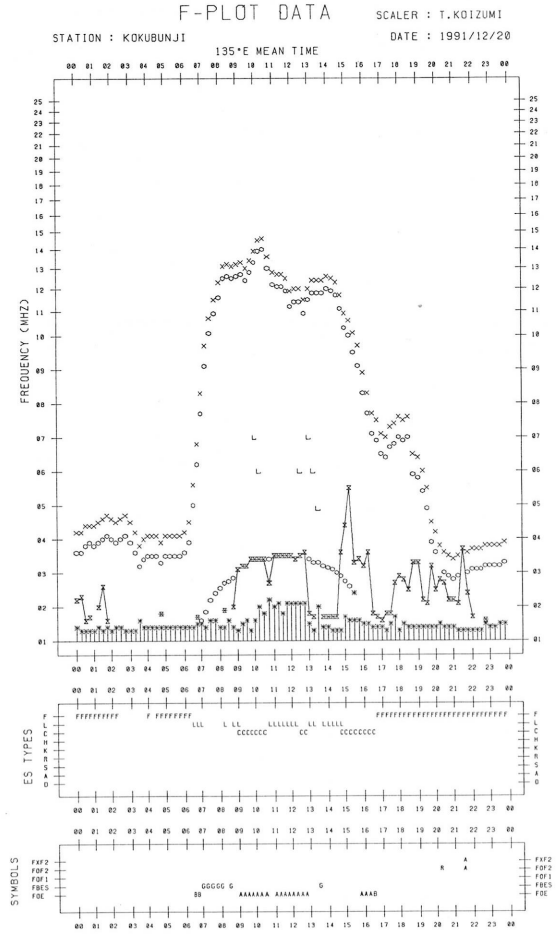

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

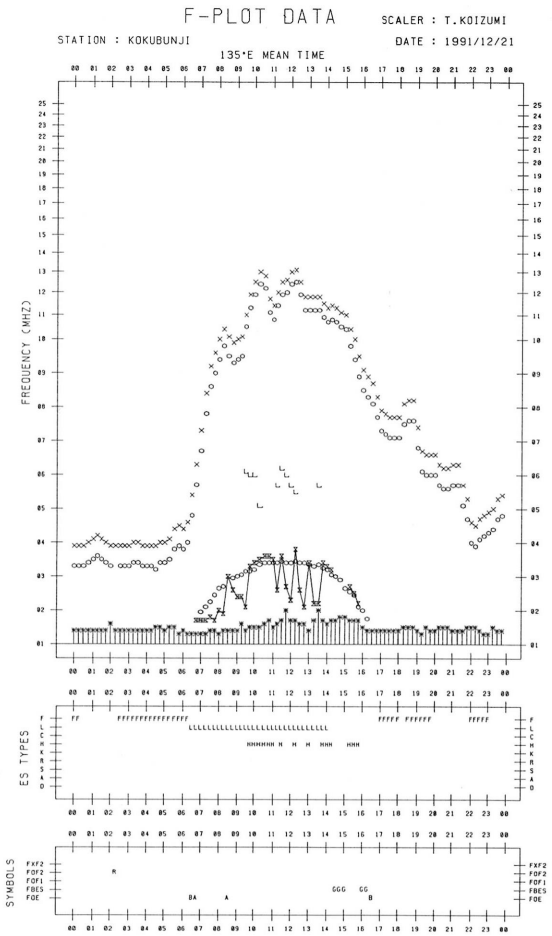

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

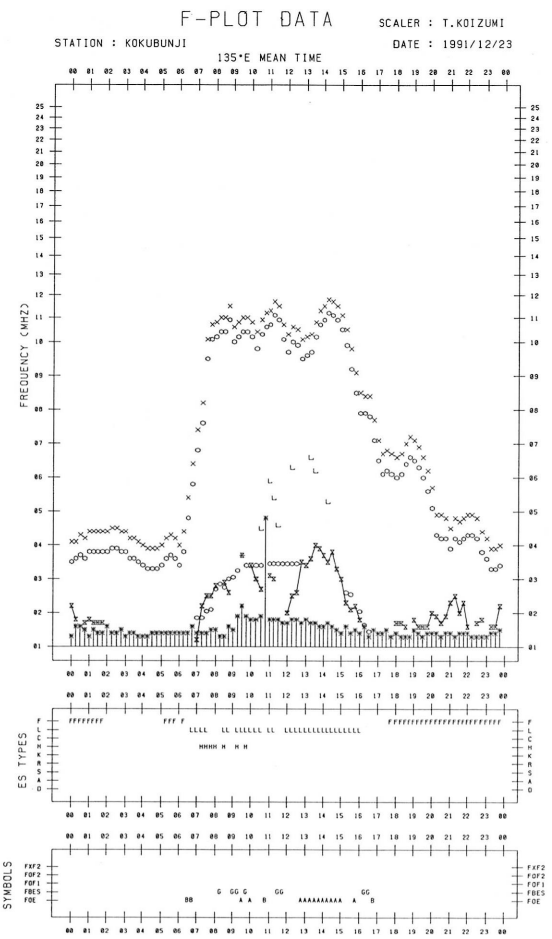

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

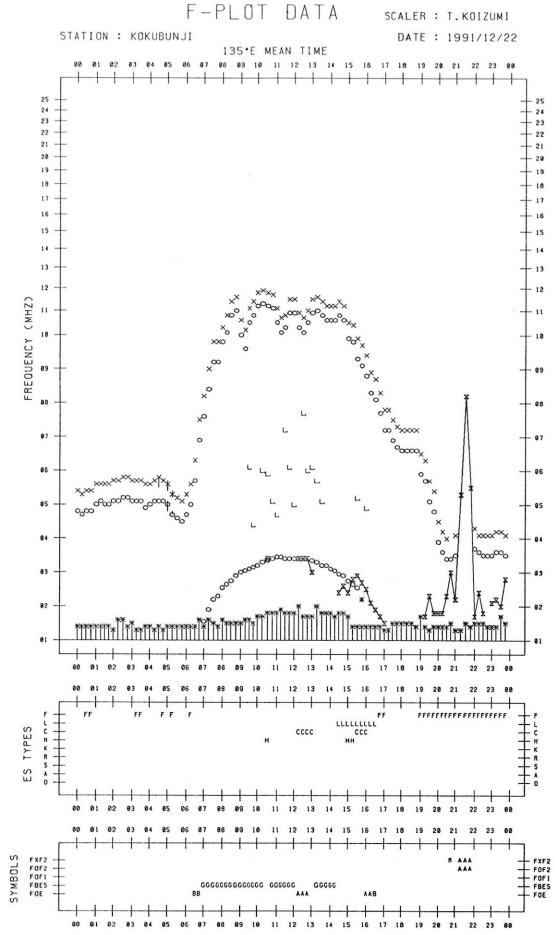

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

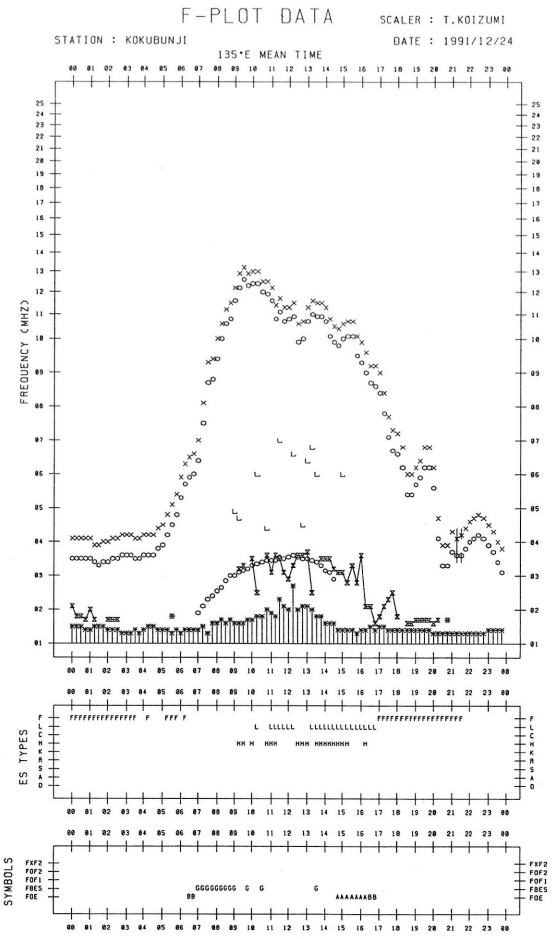

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

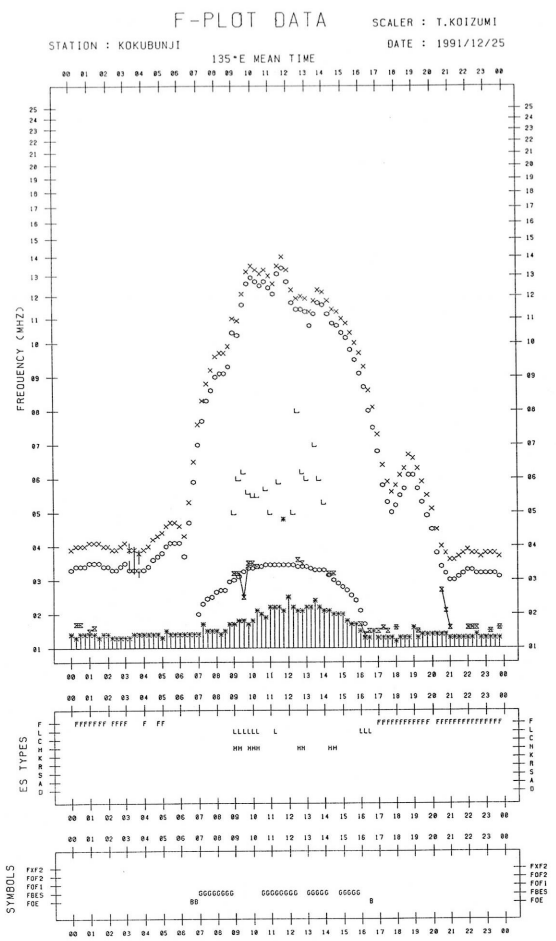

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

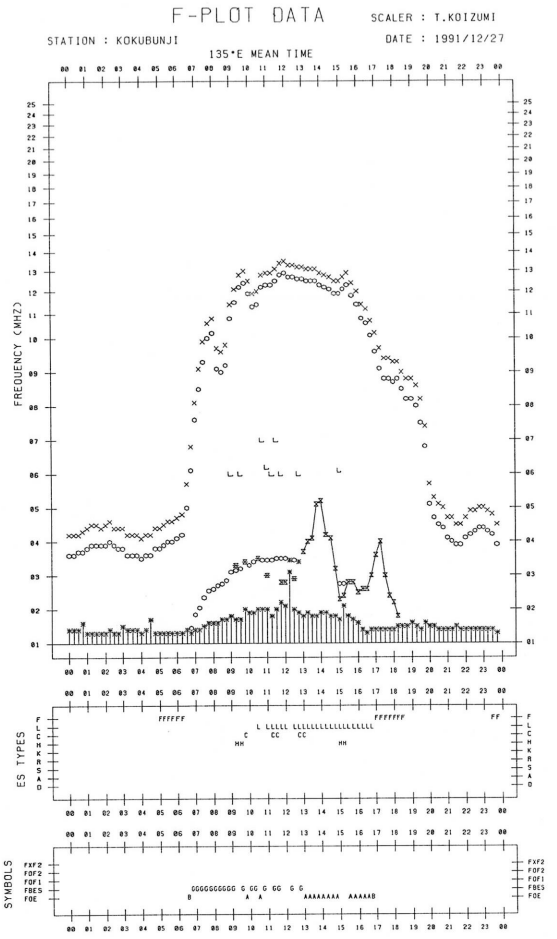

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/21
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

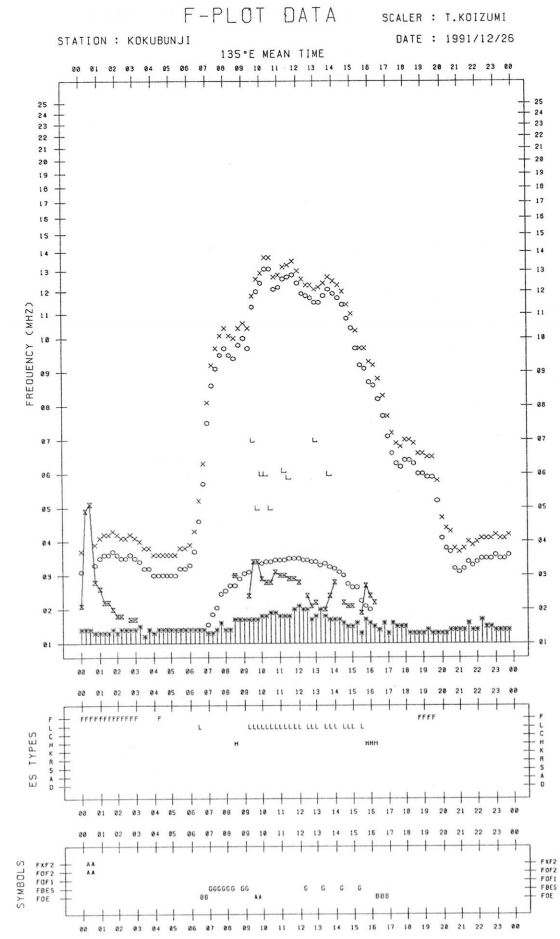

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/23
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

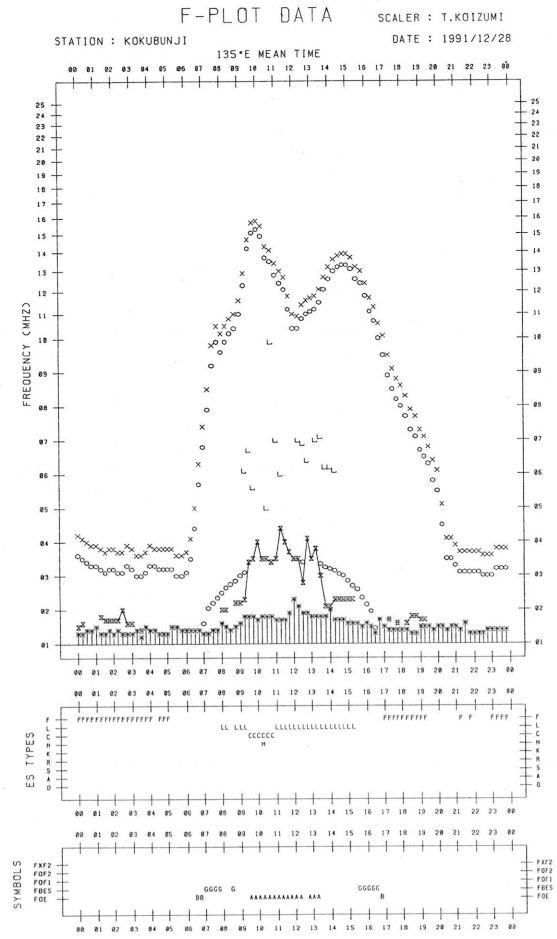

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/22
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

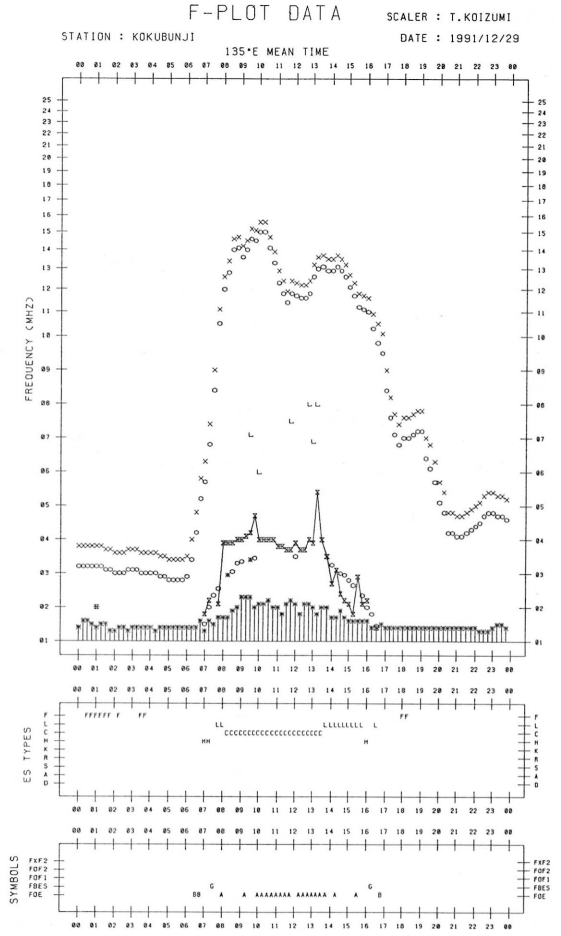

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/24
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

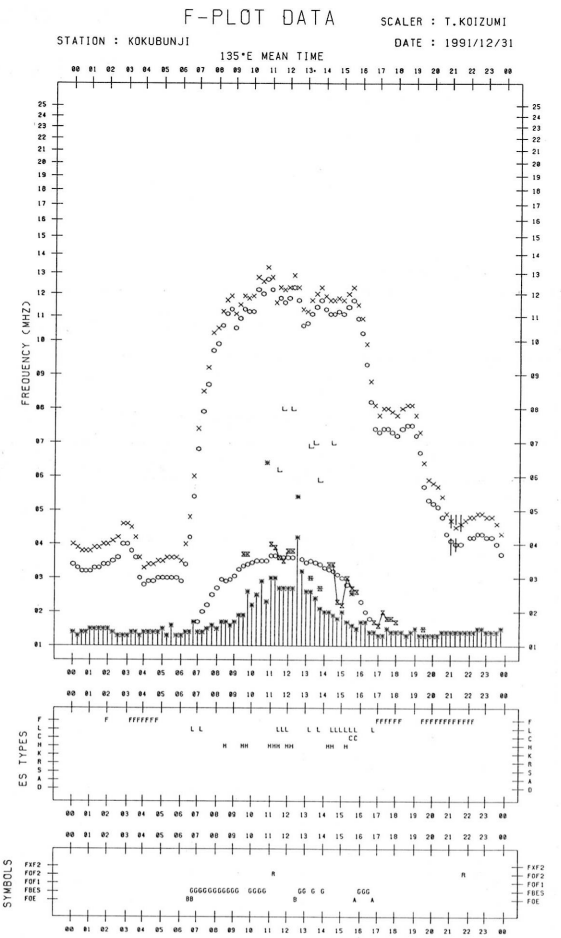

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/25
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

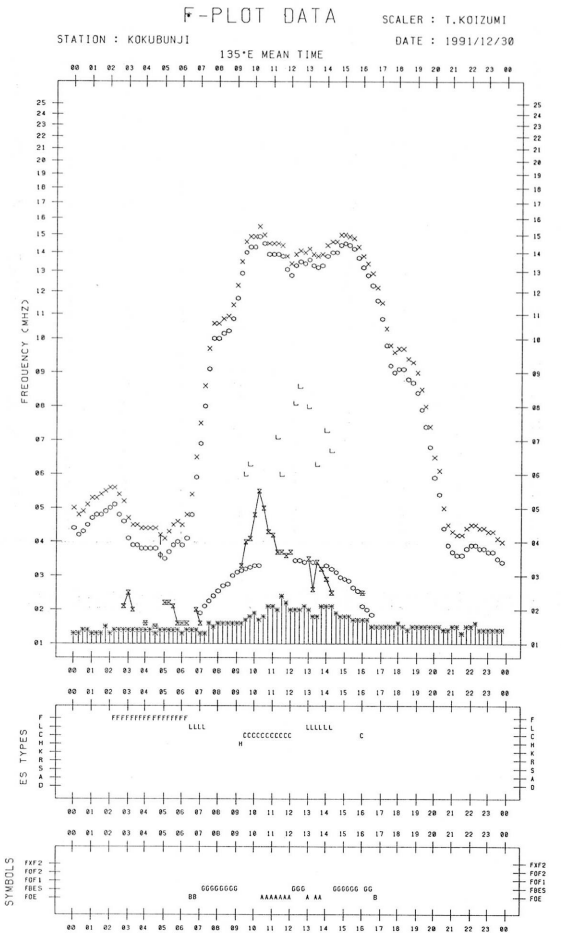

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/27
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/26
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/28
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/29
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/31
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/12/30
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

B. Solar Radio Emission

B1. Daily Data at Hiraiso

200 MHz

Hiraiso December 1991

Single-frequency total flux observations at 200 MHz										
	Flux density: 10^{-22}Wm^{-2}Hz^{-1}					Variability: 0 to 3				
UT Date	00-03	03-06	06-09	21-24	Day	00-03	03-06	06-09	21-24	Day
1	*	*	*	*	*	*	*	*	*	*
2	12	12	12	*	12	0	0	0	*	0
3	*	*	*	11	*	*	*	*	0	*
4	12	11	12	11	11	0	0	0	0	0
5	11	11	11	11	11	0	0	0	0	0
6	11	10	10	10	10	0	0	0	0	0
7	10	10	10	11	10	0	0	0	0	0
8	11	11	11	13	11	0	0	0	0	0
9	13	12	12	B	13	0	0	0	1	0
10	B	B	B	B	B	1	1	1	3	1
11	B	B	B	B	B	3	3	3	3	3
12	B	B	B	B	B	3	2	2	2	3
13	B	B	B	B	B	2	2	2	3	2
14	B	B	B	B	B	3	3	3	2	3
15	B	B	B	B	B	1	2	2	3	2
16	B	B	B	B	B	1	2	2	2	2
17	B	B	B	B	B	2	1	1	2	2
18	B	B	B	B	B	1	1	1	1	1
19	B	B	B	14	B	1	0	1	0	1
20	14	15	16	*	15	0	0	0	*	0
21	*	*	*	*	*	*	*	*	*	*
22	*	*	*	14	*	*	*	*	0	*
23	15	15	*	B	15	0	1	*	1	0
24	B	B	*	B	B	1	2	*	1	1
25	B	B	B	B	B	2	2	2	1	2
26	B	B	B	B	B	2	3	3	2	2
27	B	B	B	B	B	1	2	2	2	2
28	B	B	B	B	B	3	2	2	1	2
29	B	B	B	B	B	1	1	2	2	1
30	B	B	B	B	B	1	2	2	1	2
31	B	B	B	15	B	1	1	1	0	1

Note: No observations for 500 MHz due to equipment failure by lightning.

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso December 1991

Single-frequency observations

Normal observing period: 2145 - 0730 U.T. (sunrise to sunset)

DEC. 1991	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
1	200	46 C	0259.3	0301.4	4.0	500	150	WR
6	200	46 C	0114.6	0115.1	1.0	130	40	0
	100	42 SER	0114.8	0114.8	4.6	570	-	WL
8	200	42 SER	0316	0316.1	16	90	-	ML
	200	46 C	0628.8	0629.6	3.0	75	40	0
9	200	44 NS	2140E	0607	560D	50	15	ML
	200	46 C	2336.8	2338.0	2.0	700	150	WL
	100	42 SER	2336.9	2338	5.2	1500	-	-
10	200	46 C	0000.5	0001.3	1.3	1000	250	WL
	100	46 C	0001E	0002	1D	1000D	-	-
	200	44 NS	2140E	0109	560D	150	60	WR
11	200	44 NS	2140E	0031	560D	150	40	WR
12	200	44 NS	2140E	0443	560D	100	20	WL
13	200	44 NS	2140E	0532	560D	100	50	SL
14	100	42 SER	0101.2	0102	14	1000D	-	-
	200	48 C	0546.9	0548.0	2.3	8800	2000	WR
	200	44 NS	2145E	0545	560D	110	30	SL
15	200	8 S	0205.0	0205.0	0.4	270	-	WR
	200	46 C	0622.8	0623.3	1.0	2500	400	0
	200	44 NS	2145E	2308	560D	150	50	SL
16	200	8 S	0101.6	0101.8	0.6	1200	-	WR
	200	8 S	0312.0	0312.0	0.8	3300	-	WR
	200	8 S	0445.6	0445.8	0.6	6000	-	WR
	200	46 C	0606.7	0606.8	1.5	500	200	WL
	200	42 SER	0633.0	0633.2	5	2000	-	0
	200	44 NS	2145E	0031	560D	150	60	SL
17	200	46 C	0354.2	0355.4	4.0	2000	800	WL
	200	46 C	0531.1	0531.6	1.5	500	150	WL
	200	44 NS	2145E	0215	560D	100	30	ML
18	200	44 NS	2150E	0009	550D	60	25	ML
23	200	44 NS	2150E	0321	550D	100	40	WR
24	100	48 C	0307.3	0308	2.5	20000	-	-
	200	46 C	0307.5	0307.9	5.0	2400	400	0
	200	44 NS	2150E	0612	550D	200	80	SR
	100	44 NS	2150E	0631	550D	600	250	SR
25	200	44 NS	2150E	0453	550D	200	50	SR
	200	46 C	2314.6	2316.8	4.0	2500	300	WL
	100	46 C	2314.6	2317	4.6	1200	-	-
26	100	48 C	0047.4	0048	4.8	14000	-	-
	200	48 C	0047.6	0047.7	4.7	17000	800	WL
	200	44 NS	2150E	0350	550D	200	50	SR
27	100	46 C	0314.1	0315	1.3	1000D	-	-
	200	46 C	0314.5	0314.8	1.0	550	150	ML
	200	46 C	0603.1	0604.6	1.6	370	200	MR
	200	44 NS	2150E	0142	550D	150	60	MR
	100	46 C	2250.6	2252	1.6	2700	-	-
	200	46 C	2250.8	2250.8	1.3	8600	500	WL
28	100	43 NS	0114	0445	360D	400	150	MR
	200	44 NS	2150E	0633	550D	70	30	MR
29	200	44 NS	2150E	0525	550D	150	60	SR
30	200	44 NS	2150E	2335	570D	150	25	SR
	200	48 C	2306.2	2306.7	2.3	4000	500	WL
	100	42 SER	2306.4	-	10.6	1000D	-	-

Note: No observations for 500 MHz due to equipment failure by lightning.

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

DEC 1991 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

UT DAY	00H 17M	01H 17M	02H 17M	03H 17M	04H 17M	05H 17M	06H 17M	07H 17M	08H 17M	09H 17M	10H 17M	11H 17M	12H 17M	13H 17M	14H 17M	15H 17M	16H 17M	17H 17M	18H 17M	19H 17M	20H 17M	21H 17M	22H 17M	23H 17M
1	6	S	2	12	17	ES 7	ES 5	ES 12	ES 12	ES -26	ES -26	ES -26	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-3	5	6
2	13	ES 6	ES 11	13	ES 17	ES -25	ES 7	ES 13	ES 15	ES 13	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-7	7	3
3	2	13	14	18	13	ES 13	15	ES 21	ES 13	ES -25	ES -25	ES -25	ES -16	ES -16	ES -16	ES -16	ES -16	ES -16	ES -16	ES -16	ES -16	-2	7	6
4	5	10	10	13	5	ES 5	ES 10	ES 12	ES 13	ES -11	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-7	-8	-11	-3	ES -26	-6	-3	-11
5	-11	S	S	S	S	S	S	S	S	ES -26	ES -26	ES -26	ES -25	ES -25	ES -25	-10	0	0	-7	-10	-13	-16	-2	0
6	6	S	S	S	S	S	S	S	S	ES -4	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-2	ES -25	ES -25	ES -25	-4	-4
7	ES -11	S	S	7	S	S	S	S	S	ES -26	ES -26	ES -26	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-12	1	-2
8	-6	ES -26	ES -26	ES -26	S	S	S	18	S	ES -26	ES -26	ES -26	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-16	7	-13
9	-1	S	S	S	ES -26	10	ES 10	S	S	ES -26	ES -26	ES -26	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-16	5	1
10	-10	S	S	S	S	ES 13	ES 23	ES 18	19	ES -10	ES -10	ES -10	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-7	ES -16
11	ES -25	S	S	S	S	S	S	S	S	S	ES -10	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-3	-10
12	ES -17	S	S	S	S	S	S	S	S	ES -26	ES -4	ES -26	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-16	3	-2
13	1	S	S	S	S	S	S	S	S	ES -10	ES -25	ES -4	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-16	-10	7
14	-10	S	S	S	S	S	S	S	S	-4	ES -3	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-5	-4	-2
15	-7	S	S	S	S	S	S	S	S	ES -25	ES -4	ES -10	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	1	1
16	-1	S	S	S	S	S	S	S	S	ES -2	ES -2	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES 1	ES -2
17	0	S	S	S	S	S	S	S	S	S	ES -25	ES -4	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-10	-4
18	-2	S	S	S	3	ES 14	S	S	ES -25	ES -25	ES -10	ES -10	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-1	-9
19	ES -11	S	S	S	S	S	S	S	S	ES -11	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-1	-4
20	-3	S	S	S	S	S	S	S	S	ES -11	ES -11	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-6	5	2
21	-2	ES -26	ES -26	ES -26	ES -26	S	S	S	S	S	S	6	ES -3	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -4	ES -1
22	ES -1	S	S	S	S	S	S	S	S	ES 5	ES 5	ES -26	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	1	0
23	S	S	S	S	ES 17	C	C	C	C	C	C	C	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-16
24	S	S	S	S	S	S	S	S	S	S	S	ES -21	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -10	-3	-3
25	ES -26	S	S	S	S	S	S	S	S	S	S	ES 2	ES 2	ES -5	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-11	ES -3
26	ES -4	S	S	S	S	S	S	S	S	S	S	ES -5	ES -5	ES -5	ES -5	ES -5	ES -5	ES -5	ES -5	ES -5	ES -5	ES -5	ES -5	ES 3
27	ES 2	S	S	S	S	S	S	S	S	12	ES 5	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-17	ES -26
28	-5	S	4	11	11	ES -11	ES -11	ES -11	ES -5	ES -11	ES -5	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-11	ES -26
29	ES -26	1	4	2	5	ES -11	ES -11	ES -11	ES -5	ES -11	ES -11	ES -26	ES -26	ES -26	ES -26	-5	-1	-3	ES -26	ES -26	ES -26	ES -26	-17	ES -26
30	-3	1	5	8	5	ES -5	-5	-5	ES -11	ES -5	ES -7	ES -26	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	13	-5
31	-3	1	3	6	ES -25	ES -10	ES -25	ES -25	ES -16	ES -25	ES -16	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	6	5
CNT	29	8	10	11	12	11	10	10	10	24	26	30	31	31	31	31	31	31	31	31	31	31	31	31
MED	US -3	S	S	S	S	SC	SC	SC	SC	ES -11	ES -14	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	US -2	ES -2
UD	6	S	S	S	S	SC	SC	SC	SC	ES 12	ES -2	ES -4	ES -5	ES -16	ES -25	ES -10	ES -5	ES -5	ES -7	ES -10	ES -16	-5	7	6
LD	ES -25	S	S	S	S	SC	SC	SC	SC	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -17	ES -26

C. RADIO PROPAGATION

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

DEC 1991 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

UT DAY	00H 46M	01H 46M	02H 46M	03H 46M	04H 46M	05H 46M	06H 46M	07H 46M	08H 46M	09H 46M	10H 46M	11H 46M	12H 46M	13H 46M	14H 46M	15H 46M	16H 46M	17H 46M	18H 46M	19H 46M	20H 46M	21H 46M	22H 46M	23H 46M
1		S	S	4	21	22	24	24	20	19	19	-3	ES -26	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	13	15	14	6
2	19		ES 11	20	20	24	25	16	28	17	1	-10	-7	-10	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	10	6	19	19	10
3	11	14	19	23	33	26	25	28	23	13	-10	-16	-10	ES -16	ES -16	ES -16	ES -16	ES -16	ES -16	ES -16	15	16	13	12
4	11	12	18	19	23	22	35	23	22	-2	ES -26	-17	ES -26	ES -26	ES -26	ES -26	ES -26	-11	-17	ES -26	10	10	8	8
5	7		S	S	S	19	26	26	24	24	16	-9	-11	ES -25	ES -25	ES -25	ES -25	ES -25	-2	-16	ES -25	9	13	13	13
6	3		S	S	S	26	23	29	25	S	-2	-10	-2	-10	ES -25	ES -25	ES -25	ES -25	-16	ES -25	ES -25	11	22	11	7
7	10		S	S	23	23	20	23	20	20	2	-17	ES -26	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-16	23	13	8	-3
8	-2	ES -26	ES -26	20	22	30	30	31	S	2	-3	-3	-10	ES -25	ES -25	ES -25	ES -25	-8	-12	ES -25	5	11	6	-4
9	6		S	15	18	23	18	S	24	S	14	-5	-5	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	11	5	5	-4
10		S	S	S	S	26	27	26	31	24	27	20	-5	-10	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	16	17	5	5
11	10		S	S	21	24	39	30	36	35	S	-2	1	-10	-10	ES -25	ES -25	ES -25	ES -25	-16	ES -25	7	13	7	7
12	7		S	S	S	21	23	25	28	21	-6	-5	-8	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	13	15	13	8
13	9		S	S	S	24	27	30	24	24	18	5	1	-4	-10	ES -25	ES -25	ES -25	-10	ES -25	ES -25	10	19	13	6
14	7		S	S	21	24	24	34	30	30	29	29	21	-10	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	13	14	13	6
15	3		S	S	21	25	23	28	26	26	1	-4	-10	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	7	13	16	13
16	10		S	18	S	24	29	25	31	28	13	-2	-13	ES -25	ES -25	ES -25	-16	ES -25	ES -25	ES -25	15	13	23	11
17	13		S	S	S	26	23	36	29	30	8	-2	-2	-13	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	15	15	13	11
18		S	S	S	20	24	28	25	25	21	23	6	1	7	-5	-17	ES -26	ES -26	ES -26	ES -26	7	16	17	12
19	10		S	18	17	23	23	28	28	S	12	-3	-5	-3	ES -26	ES -26	ES -26	ES -26	-11	ES -26	5	17	10	13
20	12		S	S	20	27	24	23	24	20	0	-5	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	10	13	12	11
21	8	ES -26	ES -26	ES -26	23	27	23	30	S	S	S	ES -5	ES -11	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	17	12	15	10
22		S	S	20	22	25	21	28	24	23	ES 5	ES 5	-3	-16	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	14	19	13	13
23		S	S	S	23	27		C	C	C	C	C	C	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	18	3	13	7
24		S	S	S	19	25	23	25	24	S	S	S	-4	-10	-10	ES -25	ES -25	ES -25	ES -25	ES -25	11	15	19	16
25	9		S	S	20	25	29	23	S	S	S	18	12	ES 2	ES -5	ES -26	ES -26	ES -26	ES -26	ES -26	12	18	10	8
26		S	S	S	S	17	22	21	28	22	12	ES 5	ES -5	ES -5	ES -5	ES -5	ES -5	ES -5	ES -5	ES -5	12	ES -5	12	10
27	8		S	S	S	23	22	30	30	30	17	ES 5	-11	-4	-4	-11	ES -26	ES -26	ES -26	-17	13	18	19	13
28	12		S	14	19	25	26	27	28	10	5	8	-4	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	2	2	-17	ES -26
29	-3	4	11	18	22	29	27	20	22	25	2	-11	ES -26	-17	ES -26	ES -26	ES -26	-17	ES -26	ES -26	5	5	17	5
30	13	11	12	18	22	24	28	29	18	3	-1	-11	-16	ES -25	ES -25	ES -25	ES -25	-8	ES -25	ES -25	10	13	13	11
31	5	8	10	16	23	31	31	26	21	10	1	1	-4	-10	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	8	14	11	12
CNT	24	8	14	22	31	30	29	29	23	26	28	30	31	31	31	31	31	31	31	31	31	31	31	31
MED	9		S	S	20	24	24	27	28	22	11	ES -2	US -5	ES -11	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	11	14	13	10
UD	13		S	S	23	27	30	34	31	30	25	18	1	ES -3	ES -5	ES -16	ES -16	ES -25	ES -8	ES -16	ES -16	17	19	19	13
LD	-2		S	S	16	21	21	23	20	17	ES -2	ES -10	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	5	3	5	-4

C. Radio Propagation

C2. Radio Propagation Quality Figures at Hiraiso

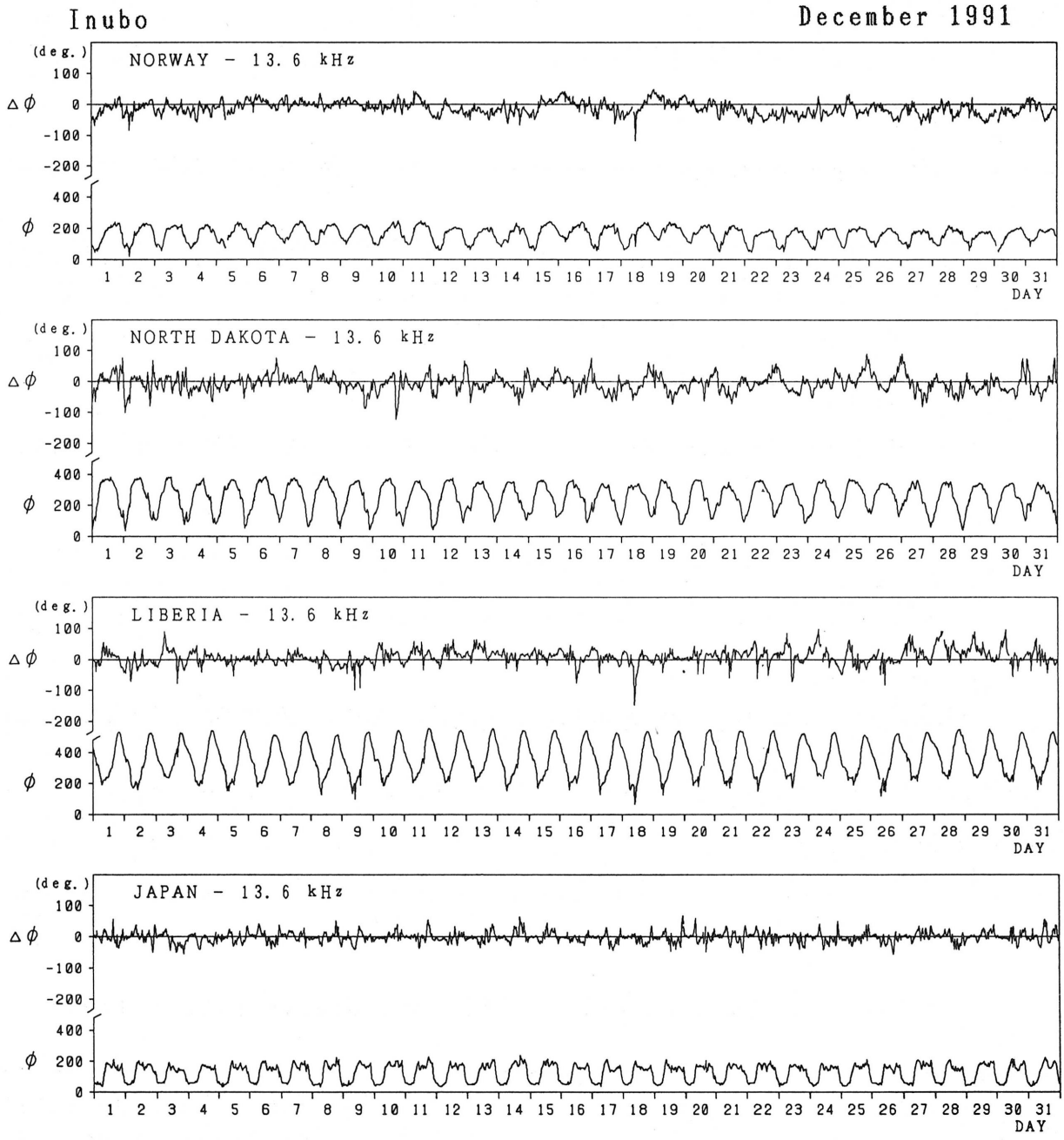
Hiraiso — Time in U.T.

Dec. 1991	Whole Day Figure	W W V 00 06 12 18 / 06 12 18 24	W W V H 00 06 12 18 / 06 12 18 24	Conditions 00 06 12 18 / 06 12 18 24	Principal Geomagnetic Storms Start h m	End h	Range nT
1	4+	- - - 5	4 4 - 4	N N N N	none		
2	4-	- - - 4	4 3 - 4	N N N N			
3	4+	- - - 5	4 4 - 4	N N N N			
4	4+	- - 5 4	4 4 5 4	N N N N			
5	4+	S - 5 5	4 4 5 4	N N N N			
6	4o	S - - 4	4 4 4 4	N N N N			
7	4-	S - - 4	4 3 - 4	N N N N			
8	4+	- - - 4	4 4 5 4	N N N N			
9	4-	- - - 4	4 4 - 3	N N N N			
10	4-	S - - 3	4 4 - 4	N N N N			
11	4o	S - - 3	4 4 5 4	N N N N			
12	4o	S - - 4	4 4 - 4	N N N N			
13	4+	S - - 4	4 5 5 4	N N N N			
14	4+	S - - 4	4 5 - 4	N N N N			
15	4o	S - - 4	4 4 - 4	N N N N			
16	4o	S - - 4	4 4 - 4	N N N N			
17	4o	S - - 4	4 4 - 4	N N N N			
18	4+	S - - 3	4 5 5 4	N N N N			
19	4+	S - - 4	4 4 5 4	N N N N			
20	4-	S - - 4	4 3 - 4	N N N N			
21	4-	- S - 4	3 4 - 4	N N N N			
22	4o	S C - 4	4 4 - 4	N N N N			
23	3+	S C - 2	4 C - 4	N N N N			
24	4-	S S - 3	4 4 4 4	N N N N			
25	4o	S S - 3	4 5 - 4	N N N N			
26	4-	S S - 4	3 4 - 4	N N N N			
27	4o	S S - 3	4 4 5 4	N N N N			
28	3+	- - - 2	4 4 - 3	N N N N			
29	4-	- - 5 3	4 4 5 3	N N N N			
30	4o	- - - 4	4 4 4 4	N N N N			
31	4+	- - - 5	4 4 5 4	N N N N			

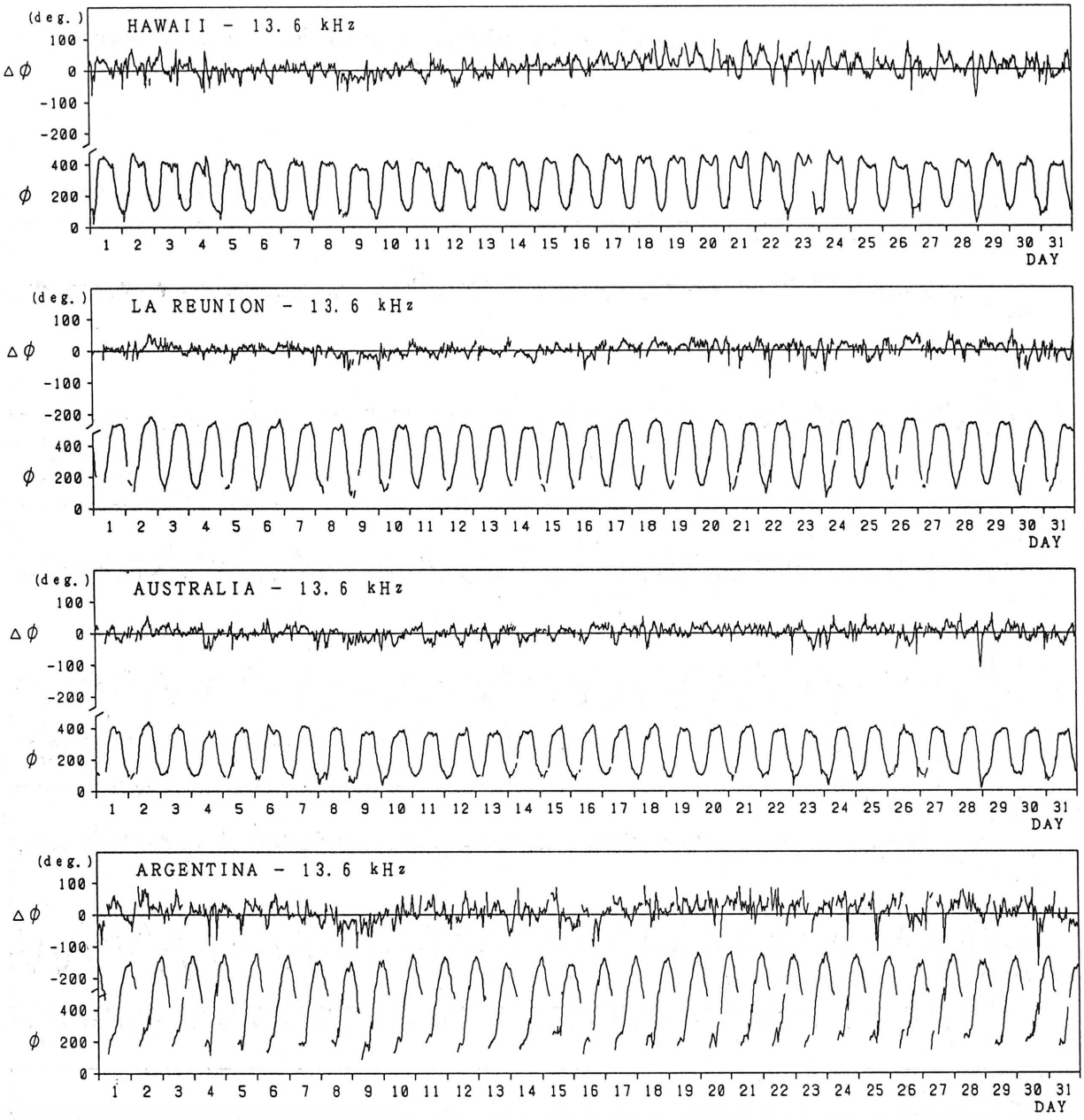
* Data was not available due to interfevences.

C. Radio Propagation

C3. Phase Variation in OMEGA Radio Waves at Inubo



Inubo December 1991



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

Start (U.T.)	End (U.T.)	Max. (U.T.)	Max. Phase Deviation (negative value, deg.)
Dec. 12/1125	Dec. 12/2051	Dec. 12/1418	51.5
Dec. 21/2240	Dec. 23/0730	Dec. 22/0554	104.4
Dec. 26/0949	Dec. 27/0300	Dec. 26/1724	77.0
Dec. 29/0700	Dec. 30/2100	Dec. 29/1653	84.6

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso — Time in U.T.

Dec. 1991	S W F								Correspondence	
	Drop-out Intensities(dB)					Start	Dur.	Type	Imp.	Solar * Flare	Solar Burst
	CO	HA	AUS	MOS	BBC						
1		22	25			0207	79	3	2	x	x
1			9			0420	32	1	1-	x	
2		x	24			0111	25	1	2	x	x
2		x	27			0451	48	2	2	x	x
5		x	17			0223	14	2	1+	x	x
5		x	27			0237	38	2	2	x	x
6		8				0035	53	2	1-	x	
6		11				0301	17	2	1-	x	
6		14				0446	29	2	1	x	
8	x	x	16			0012	18	1	1+	x	
8			12			0518	53	3	1	x	
8			6			0619	31	1	1-	x	
8			12			0729	32	2	1	x	
8	>36	17	20			2257	61	2	2-	x	
9			17			0159	23	2	1+	x	
9	15	16	19	7		0409	48	1	1+	x	
9			10			0715	13	2	1-	x	
9			6			0728	20	2	1-	x	
9					17	0939	16	2	1	x	
9			22			2340	25	2	2-	x	
10			22			0023	36	3	2	x	
10			12			0011	16	1	1	x	
10			15			0217	39	3	1	x	
10			7			0400	10	1	1-	x	
10			7			0750	9	2	1-	x	
12			16			0300	29	3	1+	x	
12			6			0420	14	2	1-	x	
13			22	x		0348	35	2	2-	x	
14			15			0101	14	2	1	x	x
14			8			0549	16	1	1-	x	x
14			10			0710	38	2	1-	x	
15			13			0242	12	1	1	x	x
15			11			0625	12	1	1-	x	x
16			12			0055	14	2	1	x	x
16			11			0313	11	1	1-	x	x
16			21			0456	20	1	2-	x	x
16			25			0636	13	2	2	x	x
17			11			0342	16	2	1-	x	
17			18			0623	16	2	1+	x	
17			6			0639	13	1	1-	x	
18					7	1002	22	1	1-		
19			11			0749	33	1	1-	x	
21			13			0244	34	2	1	x	
21			15			0408	35	2	1	x	
22			6			0120	19	2	1-	x	
23			13			0000	52	3	1	x	
23			7			0530	20	1	1-		
24			7			0031	18	2	1-		
24			12			0108	22	2	1		
24			12			0223	37	2	1	x	
25			14			0110	17	1	1	x	x
26			13			0048	12	1	1	x	x
26			7			0428	14	1	1-	x	x
26			7			0453	13	2	1-	x	x
26			25			0638	17	2	2	x	x
26			13			0737	21	1	1	x	
26			18			2121	38	2	1+	x	
27			20			0306	23	1	2-	x	x
27			15			0603	37	2	1+	x	x
30			10			0453	29	2	1-	x	
30			13			2307	17	2	1	x	
31			8			0112	18	2	1-	x	
31			10			0130	25	2	1-	x	
31			14			0155	29	2	1	x	
31			22			0320	25	2	2-	x	
31			6			0520	26	2	1-	x	
31			12			0751	19	2	1	x	
31			10			2243	15	2	1-	x	
31			12			2351	12	1	1	x	

NOTE CO:Colorado(WWV) HA:Hawaii(WWVH) Aus:Australia Mos:moscow BBC:London
* Optical and X-ray Flares

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Dec.	S			P			A		
1991	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	Ω/AU	Ω/H	Ω/ND	Start	End	Maximum
1				8	8		0024	0044	0027
1	26	35	193*	154	113*	40	0206	0419D	0240
1	32	29	157	115	70	30	0419E	0450D	0427
1	23		139	98			0450E	0543D	0519
1			158	102			0543E	0817	0602
1				35	26		2332	0024	2343
2	22	27	103	111	73	37	0111	0245	0121
2	53	75	237	154	82	55	0446	0716	0507
2		53	55				0931	1120	0945
2		27					1409	1504	1426
2				20	16		2325	0013	2339
3	16		47	25			0516	0615	0529
3			11				0620	0656	0628
3		91				29	1634	1820	1644
3				4	5		2315	2347	2324
4				4	3		0056	0109	0100
4					4		0157	0212D	0201
4				6	5		0212	0234	0217
4			5	5		18	0413	0436	0418
4			7				0515	0531	0521
4			8				1037	1058	1042
4		77	39				1117	1225	1143
4		12					1246	1304	1253
4				5	4		2331	2349	2337
5				13	6		0058	0126D	0103
5				6	3		0126E	0147	0135
5	31	40	190	145	87	43	0224	0500	0246
5		41*	22*				1055	1144	1122
5		50	14				1146	1253	1159
5		21					1302	1331	1309
5					15		2011	2033	2020
6				40	27		0034	0126	0045
6			7		4		0226	0251	0238
6	19	25	81	55	27	20	0301	0421	0311
6			10	6			0427	0447D	0434
6	42	42	155	96	45	36	0447E	0640	0459
6			8				0642	0705	0648
6		20					1555	1632	1606
6					33		2100	2157	2106
7			7	6			0350	0408	0357
7	11		41	31			0417	0513	0431
7		23	8				1218	1251	1237
7				27	20		2152	2223	2158
7				31	22		2231	2331	2251
8	25	29	75	106	73	52	0009	0036D	0019
8	13	13	63*	90*	65*	33*	0036E	0250	0051
8			30	22	10		0312	0355	0318
8			115	62*			0521	0717D	0559
8			194	74			0717E	0940	0740
8		27					1336	1434	1357
8		16					1456	1523	1502
8		17					1602	1639	1614
8		16					1702	1741	1709
8						54	2022	2041D	2027
8					55		2041E	2152	2101
8	17		45	149	107	64	2256	0054D	2319
9			35	47	33	19	0054E	0157D	0105
9	18	24	111	96	59	27	0155E	0255D	0212
9	8	23	109	79	46		0255E	0410D	0307
9	41	54	210	149	62	31	0410E	0524D	0418
9	10		77*	45			0524E	0643D	0528
9			57	29			0643E	0717D	0651
9		99*	188*	67			0717E	0934D	0740
9		141	125				0934E	1147	0946
9		45	15				1211	1246D	1219
9		25					1246E	1315	1250
9		132	23				1346	1502	1356
9					22		2000	2035	2009
9			22*	63*	48*		2335	0042D	2359
10	30*	10*	68*	82*	58*	16	0042E	0112D	0055

Inubo

Dec. 1991	S P A								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	Ω/AU	Ω/H	Ω/ND	Start	End	Maximum
10		27	112	100	72	16	0112E	0240D	0118
10			27	14	9		0237E	0330	0247
10	18*	17	84*	57	16		0349	0443D	0406
10			41*	22*			0443E	0542D	0515
10			30*	16			0542E	0630D	0605
10			38*	14*			0630E	0742D	0646
10		72	126	21			0742E	0814D	0754
10		74	117				0814E	0846D	0818
10		49*	46*				0846E	0958	0857
10		13	8				1252	1313	1255
10					20		1947	2027	1957
10				14	12		2300	2337	2309
11				22	15		0033	0120	0038
11			37	20			0555	0712	0609
11		21	13				0814	0851	0826
11		27	22				1127	1207	1135
11		63					1505	1638	1513
11				41	59		2103	2200	2106
11				28	30		2226	2314	2234
11				13	11		2359	0025	0005
12	35	28	131	90	58		0300	0443	0315
12			7	5			0455	0510	0457
12			22	9			0511	0553	0516
12			11				0636	0705	0641
12			7				0727	0748	0731
12		41	30				1022	1128	1031
12		13					1705	1743	1711
13				23	12		0049	0138	0059
13			12	11	8		0306	0350D	0317
13	28	39	152	108	50	25	0350E	0609D	0400
13	20		15				0609E	0706	0627
13			9				0801	0824	0806
14	10		49	54	34	16	0103	0231D	0109
14			6	7	3		0231E	0307	0240
14	13		99	50			0549	0706D	0557
14		43	133	50			0706E	0936	0720
14		20	8				0946	1005	0954
14		47					1448	1535	1454
14				41	100		2054	2227	2101
15				6	6		0001	0021	0004
15				32*	24*		0047	0151	0104
15			10	13	8		0205	0235	0210
15	20	23	98	76	56	23	0241	0354	0248
15			24	11		16	0506	0528D	0514
15			44	19			0528E	0549D	0535
15			45*	21*			0549E	0624D	0557
15			132	65			0624E	0759	0628
15		21	18				1016	1038	1031
15		38	22				1136	1214	1151
15		20					1355	1420D	1400
15		48					1420E	1515	1431
15					18		2002	2021	2005
15				8	6		2203	2223	2210
15				15	16		2234	2259	2240
16	7	14	40	50	37	22	0057	0157	0107
16			7	6	4		0200	0219D	0206
16			22	21	13		0219E	0258	0224
16	16	21	73	51	39	21	0312	0435	0318
16	36	51	182	158	64		0447	0636D	0501
16	15	52	156	73			0636E	0816	0643
16		60	27				1200	1228D	1208
16		61					1228E	1500	1300
16					73	28	1924	2027	1928
16				27	29		2205	2247	2209
17			16	12			0341	0421	0348
17	32	42	192	118	14	12	0622	0811	0632
17		13	7				0825	0852	0836
17		20					1312	1347	1327
17		16					1516	1557	1533
17				15	21		2145	2226	2153

Inubo

Dec.	S			P		A			
1991	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	Ω/AU	Ω/H	Ω/ND	Start	End	Maximum
18				5	3		0037	0052	0039
18			32	29	10		0233	0411	0250
18			23	16	10		0433	0504D	0439
18			24	13			0504E	0552	0510
18			32	7			0722	0806	0739
18	—	130	112				1018	1147	1032
18		22	7				1222	1251	1229
18		15					1339	1410	1351
18		10					1652	1715	1658
18				27	15		2201	2248	2213
19				13	5		0053	0122	0058
19				5	3		0133	0145	0138
19			12	9			0352	0420	0357
19			23	11			0434	0524D	0444
19			12				0524E	0559	0527
19			19	8			0647	0714	0653
19		63	160	38			0749	1001	0804
20			6	6			0254	0308	0258
20			10	6			0332	0414	0345
20		61	46				1046	1152	1102
20		197	25				1400	1703	1414
20				6	5		2331	2351	2336
21		15	80	61	40		0240	0351	0251
21	36	41	152	107	69	16	0413	0626	0427
21			9				0655	0733	0704
21		32	54				0806	0910	0822
21		70	61				1042	1130	1058
21		70	42*				1148	1259	1212
21		28					1502	1555	1513
21				23	21		2215	2315	2230
22			33	27	19	11	0115	0233	0127
22			8	6			0353	0424	0403
22		31	103	59		16	0527	0725	0542
22			23				0752	0833	0802
22		94	113				0912	1055D	0922
22		41	28				1057E	1200	1114
22		15					1251	1323	1303
22		61					1650	1827	1703
22					17		2039	2054	2044
22				28	23		2241	2339	2302
23		20	62	99	74	33	0007	0141D	0035
23			15	10	10		0141E	0204	0148
23			57	30			0604	0735D	0613
23		29	26				0734	0759	0746
23		102	58				1116	1408	1143
23				114	92		2134	2240	2142
24	17	24	102	81	55	16	0219	0307D	0236
24	24	31	163	121	77	20	0307E	0549	0313
24			37*				0603	0740	0650
24		230	190				1011	1157	1033
24		36					1606	1704	1618
24					15		2134	2157	2146
24				26	21		2248	2331	2256
25	13	11	58	73	49	24	0108	0214D	0120
25		10		15	9		0214E	0239D	0218
25			9	13	7		0239E	0306	0241
25			10	8			0310	0328	0317
25			14				0721	0739	0727
25		58	57				1008	1055D	1036
25		65	53				1055E	1149	1109
25		72	27				1254	1358	1308
25		44					1436	1535	1449
25			6	27	24		2317	2346	2319
26	12		48	51	37	34	0048	0142D	0054
26			10	12	8		0142E	0216	0150
26			6	4			0357	0422	0408
26	—		49	30			0425	0453D	0433
26	—		67	44	14		0453E	0549	0503
26			16				0618	0633D	0626
26	30	74	229	138	14		0633E	0732D	0649

Inubo

Dec. 1991	S P A								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	Ω/AU	Ω/H	Ω/ND	Start	End	Maximum
26		94	212	101			0732E	0837D	0742
26		21	42				0837E	0909	0842
26		120	105				0932	1046D	0946
26		101	90				1046E	1148	1057
26		20					1334	1428	1342
26		26					1433	1520	1444
26		20					1716	1758	1723
26					34*		2032	2059	2038
26				129	118	47	2134	2318	2149
27				6	4		0001	0021	0009
27				5	4		0130	0217	0139
27		9	22	18	14		0244	0305D	0249
27	39	53	168	123	86	28	0305E	0436	0315
27			20	11			0521	0602D	0530
27	36	70	206	138			0602E	0758	0620
27		70	59				1107	1217	1118
27		23					1712	1801	1732
27				4	5		2251	2305	2253
28					4		0048	0109	0054
28			24	21	17		0349	0425	0404
28			48	29	12		0444	0548	0456
28			7				0849	0859	0852
28			10				0909	0922	0912
28		28	28				1035	1128	1046
28		98	47				1225	1358	1234
28				74	109		2109	2148D	2113
28				132	93		2145E	0300	2319
29			27	12			0604	0638	0613
29		43	17				1203	1241	1212
29		19					1559	1613	1605
29					30		2046	2135D	2057
29				32	42		2135E	2231	2148
29			16	40	36	24	2332	0052	2343
30			14	14	12	11	0131	0204	0137
30			6	5	5		0308	0338	0318
30	22	20	85	57	26		0454	0546D	0509
30	24		80*	54*			0546E	0740	0630
30		128	102				0952	1123	1023
30		90	35				1216	1403	1242
30		18					1612	1646D	1627
30		44					1646E	1747	1655
30	15	13	27	129	98	65	2305	0023D	2311
31				58	45		0023E	0115D	0040
31	10		45	65	45	17	0115E	0152	0121
31	10		40	58	35		0152E	0320D	0205
31	51	55	204	161	83	48	0322	0453	0328
31	15		17	9			0537	0612	0547
31		92	176				0748	0908	0757
31			10				0931	0951	0937
31		69	50				1023	1124	1033
31		30	12				1124	1153	1135
31		21	11				1206	1254	1212
31		13					1448	1510	1452
31		52					1540	1647	1555
31				11	8		2226	2243D	2231
31				35	32		2243E	2340	2251
31	7		20	45	42		2350	0011D	2358

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