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IONOSPHERIC DATA IN JAPAN

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COMMUNICATIONS RESEARCH LABORATORY
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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. 1992

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			A	37	35		30	73	98	90	118	120	126	115	118	87	78	56	40	37	47	30	35	38
2	38	42	25	44	51	65	34	64	97	90	113	107	111	97	85	84	73	66	62	54	51	34	52	52
3	53	54	54	62	57	52	63	67	109	105	100	109	105	103	110	87	70	A	41	34		36		
4		62	38	35	37	43	38	62	79	90	121	110	97	110	97	83	77	A	48	35	50			A
5	A	A	40	41	41	35	62	64	109	101	90	109	121	90	91	87	76	58	38	64	38	A	A	A
6	A	A	A	A	37	65		67	63	88	110	107	102	103	78	87	89	58			35	51	28	
7			34	32	34	34		62	75	87	91	95	87	85	88	67	61	60		29	45		66	32
8	32	34	37	31	32	A	86	62	85	78	108	100	88	100	92	86	72	63	A	45	30	A	37	29
9	38		38	35	37	35	35	52	85	92	85	103	95	100	85	79	76	43	41	40	38	34	37	30
10	34		40	43	41	38		59	86	88	112	106	103	97	88	81	70	30	35	38	40	A	34	35
11	42	30	31	30	31	36		82	86	98	111	N	101	98	90	81	66	40	40	40			109	34
12	46		32	37	38	40	56	54	81	85	97	103	88	87	92	115	58	42	53	31				34
13	34	34	38	40	30		86	61	86	97	103	89	90	101	87	89	76	53	A	59		71	87	91
14	42	38	38	43	40	41	42	52	77	98	98	96	90	111	88	80	67	53	45	35		36	38	34
15	43		38	40	43	40		50	73	97	97	100	98	101	91	98	88	67	43	30	A		37	38
16	40	40	37	36	38	40	62	52	87	105	122	90	105	112	90	90	86	66	44	A	A	30	A	43
17	43	40	40	40	40	38	38	63	85	95	115	114	91	87	96	86	74	61	34	29	46	35	A	34
18		30	34	29	25		86	59	86	85	106	98	121	126	116	90	77	69	42	35	28	38	42	43
19	58	52	47	43	46	53	60	60	85	118	106	106	100	100	101	84	65	58	43	35	31	51	37	38
20	43	38	42	41	42	32		52	77	106	101	111	98	102	87	90	82	52	50	38	22	40	40	38
21	38	A	A	A	37	31	71	52	92	108	115	98	87	94	91	87	72	62	35	30	A	34	32	30
22	37	35	35	35	A	37	52	63	85	110	117	120	100	103	113	87	70	64	48	38	A	49	34	59
23	36	31	34	37	37			54	88	84	87	91	100	95	107	75	68	51	36			28		
24	34	35	37	42	42	37	33	64	66	73	87	103	84	95	97	74	67	61	60	31	A	30	31	56
25	34	61	35	37	35	A	A	52	77	91	90	106	89	92	95	82	57	A	51	44	32			
26	35	35	34	35	36	64		53	75	89	96	88	104	105	87	82	62	50	43	31			31	69
27	70	30	34	36	40	40		56	63	83	91	90	89	84	81	84	60	85	38	51	30	28		
28	34		34	33	36	38		62	80	86	90	88	83	86	90	88	66	40	41	41	34	35	38	
29	51		30	30	28		A	A	66		88	84	82	88	77	87	58	62	66	46	34		A	52
30			37	40	A	A	A	55	80	91	125	112	94	90	86	94	65	46		35	28	51	30	33
31	66	65	28	30	30		86	49	84	91	82	101	87	91	87	69	67	53		65	A		A	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	24	19	28	29	29	22	18	30	31	30	31	30	31	31	31	31	31	28	25	28	18	19	20	22
MED	39	38	37	37	37	39	58	60	85	91	101	103	97	98	90	86	70	58	43	38	34	35	37	38
U Q	44	52	38	41	41	43	71	63	86	98	113	109	103	103	97	88	76	62	49	44	45	49	41	52
L Q	34	34	34	34	34	36	38	52	77	87	90	95	88	90	87	81	65	50	39	32	30	30	33	34

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT WAKKANAI

DEC. 1992

LAT. 45.4N LON. 141.7E 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	G	G	28	G	G	G	G	G	G	38	39	G	39	G	G	G	G	G	24	G	G	G	G	26
2	G	G	28	G	26	G	G	G	G	G	G	G	G	42	38	32	G	G	G	G	45	40	36	32
3	34	26	26	29	G	G	G	G	G	36	36	57	46	38	67	60	64	58	36	26	G	G	G	G
4	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	36	36	33	33	G	G	56
5	28	45	34	28	24	G	G	G	G	G	58	50	G	39	G	G	G	G	G	28	28	35	54	71
6	64	56	36	33	G	G	G	G	G	G	G	G	G	G	43	G	G	G	G	G	G	G	G	G
7	G	G	G	G	G	28	24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
8	G	G	G	G	G	30	G	G	G	G	G	G	G	67	62	36	55	77	36	G	G	40	36	33
9	G	G	24	28	25	G	G	G	G	48	37	40	G	G	G	G	G	G	29	27	G	G	G	G
10	25	G	G	G	G	G	G	G	34	G	G	45	G	G	G	G	G	29	28	G	G	32	G	G
11	G	G	G	G	G	G	G	G	G	38	50	38	G	G	G	G	G	G	G	G			33	G
12	24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		G	G	G
13	25	G	G	G	G	G	G	G	43	57	G	38	G	G	G	G	G	G	33	G	G	G	G	G
14	G	G	G	G	G	G	G	G	G	G	39	G	G	G	G	G	G	G	G	G		G	G	G
15	G		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	35	G	G	28		G	G
16	G	G	G	G	G	G	G	G	29	G	G	G	G	G	38	G	G	G	G	59	57	28	28	G
17	G	G	G	G	G	G	G	G	G	53	G	G	G	G	G	G	G	G	G	G	G	G	29	G
18		G	G	G	G	G	G	G	G	G	G	39	G	G	G	G	35	G	36	34	29	36	G	27
19	G	G	G	G	G	G	G	G	G	52	35	G	G	G	G	G	G	G	G	G	G	G	G	G
20	G	G	G	G	G	G		G	G	73	52	G	G	G	G	G	G	G	G	G	G	G	G	34
21	28	30	23	35	G	G	G	G	G	G	G	41	G	44	G	G	38	46	G	24	33	34	G	G
22	G	G	26	32	65	G	G	G	34	92	41	G	50	36	G	G	G	G	G	G	26	G	G	G
23	G	G	G	G	G	G		G	G	G	G	G	G	77	37	33	G	G	G			G		G
24	G	25	G	G	G	G	G	G	58	G	G	G	G	G	G	G	G	G	G	G	38	G	G	G
25	26	66	55	39	G	34	35	G	G	G	G	G	G	37	35	33	36	29	G	G	G		G	G
26	G	G	24	24	G	G		G	G	G	G	G	G	G	G	G	G	G	G	G			G	G
27	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	33	43	G		
28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	24	G	G	
29	G	G	G	G	G	G	26	43	G	G	G	G	G	G	G	G	G	G	55	G	G	G	34	G
30		G	28	34	59	69	65	26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
31	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	33	128	37	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	31	31	31	31	28	31	31	31	31	31	31	31	31	31	31	31	31	30	26	27	29	28
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
U Q	24	G	26	28	G	G	G	G	G	38	36	38	G	36	G	G	G	G	28	24	33	32	28	13
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. 1992

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	17	15	14	15	15	17	20	27	20	18	18	18	18	17	23	18	21	16	15	17	16	15	16
2	15	20	14	15	14	14	18	17	24	20	30	21	34	32	22	17	20	17	16	15	15	16	15	15
3	15	15	15	15	15	15	20	18	26	21	21	22	21	17	18	17	17	16	15	16	17	18	18	16
4	16	15	15	15	15	17	17	18	28	28	20	23	33	18	27	23	18	18	16	14	15	20		16
5	16	16	15	15	15	17	21	21	18	18	24	18	22	21	27	26	17	18	18	16	16	16	15	15
6	16	15	14	15	15	15	17	18	23	21	21	30	30	20	18	27	20	21	16	16	16	26	17	21
7	15	15	16	15	15	16	16	21	24	29	32	30	23	20	18	26	18	18	20	17	16	16	17	18
8	16	22	16	15	15	18	17	16	24	28	33	33	42	21	21	18	17	18	15	21	16	16	17	16
9	16	17	15	14	14	16	16	18	22	26	21	28	20	33	18	24	17	17	17	18	16	16	17	16
10	16	17	15	14	15	16	18	20	27	30	20	20	20	21	17	23	16	16	15	16	16	17	22	15
11	16	21	15	15	16	16	17	17	27	26	28	28	32	22	29	26	20	17	16	15			16	17
12	20	18	16	16	16	17	21	18	26	30	30	32	44	29	28	27	17	24	21	15		16	16	17
13	15	18	17	15	14	17	18	20	27	29	33	27	35	23	28	24	28	28	18	17	16	20	17	20
14	16	16	15	15	16	16	20	17	30	32	29	30	33	32	30	29	18	18	16	16		16	16	15
15	16		16	15	15	15		20	27	29	28	33	34	33	27	26	20	17	16	16	15		16	20
16	18	16	14	14	14	15	18	21	22	33	48	46	44	46	46	29	18	17	21	15	17	18	22	15
17	15	16	14	16	16	21	17	18	26	29	33	46	44	32	29	29	24	23	18	17	16	16	16	16
18		17	16	22	15			18	27	45	27	31	32	32	30	27	18	17	17	16	17	16	22	17
19	18	15	15	15	16	17	17	17	24	20	22	32	33	30	29	27	20	18	16	16	17	18	18	16
20	26	17	16	15	14	17		17	26	18	22	32	30	30	28	26	18	18	16	15	21	16	16	16
21	16	20	16	15	15	18	20	20	17	29	18	22	33	21	29	26	21	17	16	20	16	16	15	21
22	16	20	15	16	16	18	17	16	20	21	21	26	23	20	27	20	21	21	17	16		16	18	16
23	17	17	15	15	16	17		17	24	30	30	32	30	29	20	18	22	23	20			20		
24	20	16	16	15	16	16	22	18	24	26	21	30	47	30	29	26	21	21	17	16	20	23	16	15
25	16	16	15	15	16	15	16	17	26	29	33	45	48	27	28	29	20	17	17	16	17			21
26	17	16	16	15	15	16		17	28	30	32	32	46	33	30	30	20	20	16	15			16	16
27	16	17	15	15	15	16		17	27	29	32	33	32	30	29	29	18	20	16	16	16	21		
28	17	18	16	17	15	15		16	24	28	30	30	23	29	32	24	20	22	16	16	16	17	16	
29	17	16	16	18	16	15	18	18	26		44	30	32	30	30	28	20	17	15	18	18	16	18	18
30		71	17	15	16	18	17	18	29	27	30	32	33	29	28	26	20	17	16	16	17	18	16	16
31	16	17	16	16	15		20	18	24	27	30	32	29	30	28	26	20	16	17	18	18	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	30	31	31	31	29	24	31	31	30	31	31	31	31	31	31	31	31	31	30	25	27	27	27
MED	16	17	15	15	15	16	18	18	26	28	29	30	32	29	28	26	20	18	16	16	16	16	16	16
U Q	17	18	16	15	16	17	20	20	27	29	32	32	35	32	29	27	20	21	17	17	17	18	18	18
L Q	16	16	15	15	15	15	17	17	24	21	21	26	23	21	21	23	18	17	16	15	16	16	16	16

HOURLY VALUES OF FOF2 AT AKITA

DEC. 1992

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	A	59	34	64	38	38	45	62	100	118	106	114	115	120	105	90	74	61	48	44	64	N	35	32
2	34	45	36	64	41	64		64	80	94	117	118	96	98	88	84	69	60	64	67		A	A	38
3	50	37	A	41	40	40	50	72	87	97	114	98	106	107	100	83	90	54	A	A	A	A	A	38
4	A	36	35	A	46	35	35	67	74	101	112	112	90	104	100	101	66	53	42	64	38	A	A	51
5		A	A	40	40	A	A	68	88	114	108	104	111	101	87	88	76		A	A	47	A	A	50
6	30	32	50	A	37	A	30	63	84	85	98	108	94	88	110	87	72	63	63	64	37	48	50	
7	31	30	34	60	53	N	35	64	77	84	91	104	87	108	85	88	63	44	42	30	35	36		26
8	25	35	38	30	50	A	34	67	78	85	107	105	101	84	91	90	90	68	48	32	32	51	33	A
9	A	33	38	36	32	37	38	63	83	88	108	110	111	90	87	89	73	40	48	40	37	31	35	31
10	35	35	A	38	41	36	36	62	78	86	111	107	90	100	90	88	68	49	60	37	32	38	N	35
11	34	32	30	26	32	35	31	57	78	89	111	121	111	101	89	85	74	54	40	43	59	51	30	30
12	30	31	34	54	36	34	34	61	74	92	105	94	90	88	88	88	74	41	37	45	46	A	N	A
13	31	35	38	38	53	50	34	62	86	86	103	106	88	88	95	87	76	66	64	35				
14										87	105	90	90	97	101	95	72	55	49	35	53	34		34
15	38	36	38	36	37	40	30	57	81	101	111	107	97	102	98	96	82	67	54	A	A	35	36	38
16	40	40	36	38	38	59	31	63	78	105	125	97	97	97	107	98	80	73	54	35	28	A	A	40
17	41	40	38	37	37	62	40	73	85	90	108	110	110	95		88	78	52	50	35	31	34	38	38
18	37	38	37	A	28	N	N	64	78	87	106	108	120	118	115	98	74	72	52	34	A	A	A	A
19	44	A	43	41	43	43	38	67	87	115	118	90	96	90	91	87	70	51	52	36	A	N	34	35
20		37	41	42	43	37	38	63	73	96	112	102	87	90	101	92	73	67	47	65	43	43	41	
21	35	37	35	41	37	34	34	61	87	101	112	111	91	110	98	84	78	52	50	32	35	35	60	35
22	51	51	32	A	A	42	40	70	77	112	120	127	106	97	97	101	80	56	50	40	35	59	26	35
23	36	36	37	35	34	32	26	56	84	97	107	96	97	90	96	91	60	63	53	34	30	31	34	35
24	35	35	35	40	35	31	34	52	74	67	92	100	97	90	97	86	57	57	56	34	A	A	A	34
25	34	A	28	30	A	A	35	61	76	84	97	106	106	92	98	87	55	A		54	42		28	32
26	A		41	35	46	37	34	54	67	86	111	112	97	101	100	84	71	44	43	A	A	A	31	31
27	34	34	35	35	38	31	31	52	66	87	96	99	83	80	81	82	62	51	48	37	35	A	A	35
28	31	34	34	35	36	31	29	48	74	86	91	101	91	87	84	86	61	44	46	45	36		35	A
29	34	35	N	34	31	30	N	42	78	81	127	135	97	90	87	80	77	67	67	52	38	A	37	42
30	45	35	36	37	32	A		52	91	92	132	124	96	90	91	83	64	65	41	29	34	N	A	
31		32	30		31		31	54	75	86	100	101	85	77	103	78	54	48	47	40	34	25	A	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	23	26	26	25	28	22	25	30	30	31	31	31	31	31	30	31	31	29	28	27	23	14	16	23
MED	35	35	36	38	38	37	34	62	78	89	108	106	97	95	96	88	73	55	50	37	36	36	35	35
U Q	40	37	38	41	42	42	38	64	85	101	112	112	106	101	100	91	77	65	54	45	43	48	37	38
L Q	31	34	34	35	34	34	31	56	75	86	103	100	90	90	88	84	64	50	46	34	34	34	32	32

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT AKITA

DEC. 1992

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	29	G	G	25	G	G	G	G	G	40	49	44	41	40	G	G	G	G	23	G	G	G	G	G
2	G	G	G	G	G	G	G	G	35	37	G	G	G	G	159	38	G	G	G	29		30	52	32
3	G	G	32	31	G	G	G	48	G	G	60	50	40	60	47	92	40	49	60	50	58	28	54	G
4	37	30	30	26	26	G	G	G	G	G	46	59	42	38	41	33	31	31	29	58	40	53	28	G
5	25	52	41	31	30	28	28	G	G	50	45	47	43	50	51	66	61		54	52	40	66	45	28
6	G	G	G	54	42	28	26	G	G	G	G	G	38	G	55	G	34	29	G	G	G	G	G	
7	G	G	G	G	G	G	G	30	G	G	38	G	40	40	G	G	26	G	G	G	G	G		G
8	G	G	G	G	G	28	G	G	48	G	G	G	G	G	40	36	37	G	G	G	G	24	26	54
9	43	29	28	G	G	29	G	40	G	35	39	50	G	43	G	G	35	30	G	G	G	G	G	G
10	G	G	33	G	G	G	G	26	31	46	49	50	50	44	59	G	41	43	56	38	G	G	G	G
11	G	G	G	G	G	G	G	G	34	G	G	50	41	G	G	G	54	G	G	G	G	G	G	G
12	G	G	G	G	G	G	G	G	G	G	G	38	G	G	G	G	G	G	G	G	G	26	G	26
13	G	G	29	G	29	G	G	G	G	G	G	G	G	39	G	G	29	26	31	31				
14										G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
15	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	44	43	27	29	30	G
16	G	G	G	G	30	G	G	G	G	67	51	G	G	G	G	G	G	27	26	24	51	52	40	G
17	G	G	33	28	G	G	G	28	55	59	G	46	66	G		50	G	G	G	G	G	G	G	G
18	37	G	27	27	G	G	G	33	37	60	42	44	G	G	G	G	G	35	32	27	57	65	67	42
19	40	54	36	G	G	G	G	G	32	37	41	51	G	G	G	33	31	28	28	27	24	G	24	G
20		G	G	G	G	G	G	G	G	G	42	G	41	52	44	G	G	27	G	G	G	G	G	G
21	G	G	G	G	28	G	G	24	30	37	54	40	42	43	40	G	30	27	G	G	G	G	G	G
22	G	G	G	28	36	G	G	25	G	41	52	74	46	44	48	32	G	32	40	36	27	27	G	G
23	G	G	G	G	G	G	G	G	48	36	46	38	G	42	75	64	56	54	33	G	G	G	G	24
24	G	G	28	G	G	G	G	G	48	G	37	49	93	60	74	55	42	37	40	25	124	82	30	G
25	G	42	38	33	38	29	30	34	G	G	G	G	51	57	57	60	55	43		29	G	G	G	28
26	29		G	G	G	G	28	G	G	G	G	G	G	G	G	G	34	G	33	36	32	29	G	G
27	G	G	G	G	G	G	G	34	G	G	G	G	44	43	G	G	G	25	G	G	28	30	28	G
28	G	G	G	G	G	G	G	G	48	G	G	G	46	G	G	G	30	G	G	G	25	G	25	26
29	G	G	24	G	G	G	26	31	35	81	G	G	G	G	84	G	39	G	26	29	29	24	G	G
30	29	30	G	31	51	43	115	49	60	G	G	41	G	G	G	G	G	G	26	G	G	G	28	G
31	G	G	G	G	29	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	27	37	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	30	30	30	30	30	30	30	31	31	31	31	31	30	31	31	30	30	31	29	30	29	29
MED	G	G	G	G	G	G	G	G	G	G	G	38	38	G	G	G	30	26	24	G	G	12	G	G
U 0	27	G	29	27	29	G	G	30	35	40	46	49	43	43	51	36	39	31	33	31	30	29	30	25
L 0	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 AKITA

DEC. 1992

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	16	17	15	15	15	17	17	18	17	17	16	16	17	17	16	17	20	16	16	15	15	17	17	20
2	17	18	17	16	16	16	17	18	17	17	16	18	16	16	17	17	18	16	16	16		18	17	17
3	18	17	17	16	18	17	18	18	15	16	17	18	17	16	16	16	16	16	16	16	16	17	16	17
4	16	16	15	16	17	17	18	20	17	16	17	18	17	18	17	16	16	17	16	16	16	16	17	16
5	17	16	16	15	16	16	16	20	16	16	16	17	17	17	16	16	16		15	15	16	17	16	17
6	18	17	17	16	16	17	17	20	16	17	17	18	17	16	17	16	16	17	18	16	17	17	18	
7	16	16	16	16	17	17	17	17	16	17	16	16	20	18	16	16	21	17	16	17	16	16		18
8	18	17	16	15	15	16	17	20	24	17	17	18	16	16	16	18	16	16	17	20	18	17	18	17
9	17	16	17	15	17	16	17	16	18	16	18	18	18	20	16	17	16	17	16	17	18	17	16	16
10	17	16	17	17	17	17	17	18	16	17	20	18	18	17	17	16	16	16	16	16	18	17	22	18
11	16	16	17		18	16	16	18	16	17	18	22	22	20	20	36	16	16	16	16	15	17	18	16
12	17	17	16	17	16	16	16	18	16	17	18	20	18	17	16	17	18	17	18	18	17	16	17	18
13	18	17	16	16	16	17	17	17	17	18	21	21	20	21	21	18	21	17	16	18				
14										18	33	37	38	23	22	28	18	16	18	17	18	21	18	16
15	18	17	15	17	15	16	20	20	26	32	33	36	36	35	33	20	16	17	16	16	18	16	16	17
16	16	17	16	15	17	17	15	17	24	22	27	36	36	35	36	29	21	17	17	20	18	16	16	17
17	16	16	17	17	18	17	16	18	16	18	20	21	27	18		17	20	17	17	16	18	18	16	18
18	16	18	17	17		18	18	16	17	20	28	29	24	26	21	17	18	16	16	17	15	17	17	16
19	17	16	17	16	15	15	17	18	16	16	16	16	17	18	17	16	16	17	18	17	22	17	18	17
20		16	15	17	15	17	18	18	16	17	17	17	16	16	17	18	20	16	16	18	17	17	16	18
21	15	17	16	16	16	17	17	18	17	16	17	20	20	18	17	17	18	16	18	17	17	18	16	15
22	16	17	18	16	15	17	16	17	17	17	20	17	18	18	17	16	21	17	16	15	18	16	22	18
23	17	17	18	18	17	18	17	18	17	15	18	21	16	17	17	16	16	16	17	16	17	16	18	17
24	18	16	18	20	17	17	15	17	18	17	21	20	16	16	16	16	16	16	16	18	17	17	17	17
25	17	14	15	17	16	17	16	16	26	20	20	20	18	17	16	15	16	16		17	17	18	18	15
26	17		16	16	16	16	17	17	18	17	18	21	23	22	20	17	17	18	16	16	15	17	16	17
27	16	17	16	17	17	16	17	17	17	18	18	17	17	16	18	26	22	18	18	16	16	17	16	17
28	17	16	16	16	15	16	16	17	17	18	18	16	17	18	18	26	16	20	16	17	16	20	17	18
29	17	18	17	17	18	20	17	16	17	18	20	20	22	22	18	17	17	16	17	17	17		17	17
30	16	16	17	15	15	17	16	17	16	17	17	17	17	18	17	17	20	17	17	17	18	18	18	21
31	17	16	17	18	17	16	17	17	17	17	18	17	20	18	20	26	21	16	17	16	17	18	15	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	29	30	29	29	30	30	30	30	31	31	31	31	31	30	31	31	30	30	31	29	29	29	29
MED	17	17	16	16	16	17	17	18	17	17	18	18	18	18	17	17	17	16	16	17	17	17	17	17
U Q	17	17	17	17	17	17	17	18	17	18	20	21	22	20	20	18	20	17	17	17	18	18	18	18
L Q	16	16	16	16	15	16	16	17	16	17	17	17	17	17	16	16	16	16	16	16	16	16	16	16

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

DEC. 1992

LAT. 35.7N LON. 139.5E 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	38	41	31	41	37	A	46	60	105	115	118	114	105	121	127	82	82	70	60	46	42	41	35	35
2	34	31	38	40	43	44	38	61	85	95	110	121	102	92	93	82	75	68	70	48	46	34	35	35
3	A	A	36	38	36	40	44	81	94	97	116	112	107	119	102	100	88	84	48	43	A	41	A	43
4	54	40	31	31	41	A	A	74	90	91	112	111	100	97	105	100	91	58	42	43	40	A	A	38
5	A	A	37	43	37	35	34	83	93	121	112	118	122	110	91	87	81	64	48	44	46	40	29	28
6	35	36	34	35	40	35	31	67	86	96	99	104	96	89	92	85	73	50	50	47	38	41	29	32
7	32	42	34	38	41	35	40	64	85	104	90	100	94	97	77	82	70	60	44	37	34	35	46	N
8	37	37	38	48	29	35	32	67	97	93	95	108	114	86	81	101	98	73	52	46	A	43	44	36
9	35	A	44	38	A	35	36	66	95	104	101	121	114	98	104	106	80	52	47	46	30	34	34	38
10	34	38	37	34	40	35	42	80	86	107	105	92	95	100	100	100	80	58	43	44	43	45	42	40
11	32	32	35		A	34	35	67	81	86	117	121	107	102	108	97	75	62	35	50	43	38	31	30
12	35	37	31	40	41	N	31	66	80	95	107	96	101	96	91	88	75	66	40	51	51	A	34	34
13	30	38	40	36	31	35	34	82	93	88	93	107	105	97	102	102	76	48	61	43	34	A	A	A
14	36	35	40	41	38	32	42	96	82	100	112	102	92	100	104	104	86	57	57	43	37	A	40	38
15	38	38	36	36	38	38	44	62	82	104	108	97	107	103	112	103	92	75	84	51	40	A	41	43
16	46	41	34	35	36	32	44	66		106	108	105	96	101	120		84	80	68	52	44	38	A	A
17	34	35	38	36	35	34	44	74	91	106	101	112	116	105	92	94	87	67	60	47	40	42	47	47
18	46	43	40	A		25	38	82	83	92	114	115	121	115	108	106	86	78	63	48	33	37	40	46
19	47	46	36	37	35	32	35	74	98	106	128	112	98	95	96	100	85	57	55	44	38	31	35	31
20	34	37	42	38	31	30	32	64	83	94	114	107	96	85	97	101	82	62	51	42	44	47	32	35
21	36	44	40	36	31	40	34	78	91	106	107	124	100	104		97	77	77	60	41	38	38	36	34
22	31	35	34	36	30	35	35	67	91	101		122	112	107	105	110	100	69	62	44	45	41	43	45
23	35	46	46	35		30	37	63	94	98	115	108	101	112	96	95	77	60	58	41	40	43	45	37
24	43	44	35	40	43	30	40	62	73	75	108	100	105	100	101	102	74	58	66	61	46	30	35	46
25	38	38	34	37	A	28	A	75	77	89	121	114	122	99	108	88	A		58	61	46	A		34
26	34	31	32	37	38	36	41	58	82	92	113	121	104	114	114	97	78	53	45	41	A	A	29	34
27	35	34	42	37	36	36	34	57	78	82	104	105	101	88	91	90	78	56	58	46	41	34	36	37
28	35	35	38	41	40		29	57	80	90	98	108	108	100	88	90	75	54	46	46	44	34	40	34
29	31	36	31	35	34	35	41	58	90	96			98	100	97	85	82	73	62	60	46	A	40	46
30	48	42	31	37	35	29	30	70	98	106	124	137	118	105	87	84	78	62	62	41	44	34	A	31
31	35	A	29	A	29	45	34	57	68	88	90	97	93	85	78	92	67	53	51	46	38	29	35	32
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	27	31	28	26	27	29	31	30	31	29	30	31	31	30	30	30	30	31	31	28	23	25	28
MED	35	38	36	37	36	35	36	67	86	96	108	110	104	100	98	97	80	62	57	46	42	38	36	36
U Q	38	42	40	40	40	36	41	75	93	106	114	118	112	105	105	101	86	70	62	48	44	41	41	41
L Q	34	35	34	36	34	32	34	62	82	91	101	104	98	96	91	88	75	57	47	43	38	34	34	34

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT KOKUBUNJI

DEC. 1992

LAT. 35.7N LON. 139.5E 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	28	25	36	G	G	43	46	54	G	G	37	40	G	26	G	G	35	G	G
2	G	G	G	G	G	G	G	G	34	40	G	G	G	43	G	38	30	G	G	G	24	G	25	56
3	48	46	G	G	28	G	G	G	56	37	50	47	62	52	58	41	31	42	54	32	70	40	37	54
4	30	30	G	G	G	28	29	29	G	G	45	52	49	61	37	49	34	31	29	28	32	44	28	34
5	54	45	G	31	29	28	25	29	G	G	G	55	54	61	76	58	74	29	25	32	46	26	G	G
6	G	G	30	31	G	25	G	G	34	G	61	G	G	40	G	G	G	G	28	G	G	G	G	G
7	G	G	G	G	G	G	G	G	G	G	G	G	G	G	40	34	G	G	G	G	G	G	G	G
8	G	G	G	G	G	G	G	G	G	G	G	G	G	G	46	38	30	G	G	G	34	G	G	G
9	G	36	38	37	35	28	G	G	G	G	55	53	47	73	42	54	46	37	30	G	40	G	26	G
10	G	G	G	G	G	G	G	48	32	40	48	53	42	40	38	49	62	26	24	29	24	43	G	G
11	G	G	G	G	28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	26	G	G
12	G	G	G	G	G	G	G	38	G	G	40	40	G	G	44	35	29	G	G	24	48	34	G	G
13	G	G	G	G	G	G	G	37	G	G	G	43	42	41	G	34	52	27	G	G	G	34	36	27
14	G	G	G	G	G	24	G	G	G	G	61	42	G	G	G	G	38	40	G	30	38	34	26	G
15	24	G	G	G	G	G	G	42	G	44	G	G	G	G	G	G	G	34	26	34	30	36	30	28
16	33	28	G	G	G	G	G	35		43	G	46	G	G	G		G	G	G	G	G	G	55	65
17	32	29	G	G	G	G	G	29	40	49	G	G	55	60	61	G	G	G	G	G	G	G	29	G
18	G	28	29	27		G	G	29	59	54	62	60	G	G	G	42	G	G	G	28	30	G	30	41
19	39	38	26	G	G	G	G	27	34	49	40	G	43	52	48	58	37	30	28	G	24	24	G	G
20	G	G	G	G	G	G	G	28	33	41	G	45	G	G	G	36	35	36	29	G	G	G	G	G
21	G	G	G	G	G	G	G	G	32	60	44	44	G	G	60	G	28	23	G	G	G	G	G	G
22	G	G	G	G	28	G	G	G	34	43	43	58	80	76	37	58	74	40	G	43	29	30	G	G
23	G	G	28	31		G	G	G	31	G	42	53	G	55	G	G	G	G	26	G	G	G	G	38
24	G	G	G	G	G	G	G	29	G	42	40	G	G	G	37	G	33	43	28	G	G	G	G	G
25	G	G	G	35	31	G	41	28	G	40	48	44	48	90	59	85	111		67	34	25	24		G
26	G	G	G	G	24	G	G	G	G	36	38	G	G	53	58	34	G	G	G	38	43	26	G	28
27	G	G	G	G	G	G	G	G	G	53	48	G	G	G	44	G	49	30	G	G	40	40	55	41
28	27	G	G	G	G		G	34	G	G	45	G	40	G	G	G	G	30	26	24	24	G	G	G
29	G	28	G	G	G	G	23	27	36	43	59	G	57	G	G	G	G	G	G	G	31	26	G	28
30	27	54	30	29	34	27	G	37	84	60	G	G	G	47	37	34	G	G	G	25	G	G	38	26
31	40	29	24	27	G	G	G	G	G	50	48	56	44	55	G	G	55	34	34	34	30	G	G	37
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	29	30	31	31	30	31	31	31	31	31	31	30	31	30	31	31	31	31	30	31
MED	G	G	G	G	G	G	G	27	G	40	42	42	G	40	37	34	30	24	G	G	24	24	G	G
U Q	27	29	G	27	26	G	G	34	34	44	48	52	48	55	46	42	46	34	28	30	34	34	29	34
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. 1992

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

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT YAMAGAWA

DEC. 1992

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	36	42	39	49	40	46		52	96	105	116	108	116	131	116	86	94	97	85	58	62		48	
2	46	51	34	40	42			53	88	108	88	105	97		90	96		86	70	50	50		52	
3	46	45	42	37	38	36	46	52	85	87	90	111	114	116	111	112	105	105	78	58	63	53	63	50
4	54	51	33					51	85	104			96		101	108	106	78	52	44	44	43		36
5		66	37	37	42	26	46	53	88	112	117	121	138	131	121	111	112	101		73	52		52	38
6	30	36	36		37		45	45		97		110	92	111	98		88	83	66	54		52	52	
7	46		36	34			45	52	74	97	104	91	98	90	90	84				51	53	35	47	42
8	31		38		45	46		48	88	108	107	120	134	101	87	108	112		86	73	53	52	51	42
9	42	26	29	31	44	32	A	54		108	107	101	114	128	121	127	108	78	51			49	25	34
10	51		62		36	23		55	87	110	118	96	90	105	121	106	97	80		59	62	66	52	53
11		50	46				36		85	100	116	128	131	146	144	125	126	107	83		66			
12	32		46		47				82	108	100	100	114	121	112	116	86	92	85	59	63	66	58	
13	46	32	34		30	35					99	93	111	116	125	122	103		72	68	59	67	40	33
14		38	36		32		31	53	89	97	114	104	102	108	122	107	106	100	71	64	79	75		26
15	A	28	34				37	53	84	98	100	116	120	120	133	134	114	102	86	78		60	43	42
16	42	A	36	51	36	35	37	61	86	100	112	107		121	140	130	120	104	105	78	51		61	A
17	38	35	31	35		46	36	54	101	111	112	116	116	127	114	111	98	95	77	67	77	79	54	
18	35	42	35				46			86	114	121	125	126	112	116	105	76	62	61			53	35
19	47	36	34	A	51			52	88	94	122	125	104	108	108	117	107	90	76	62	62	52	66	A
20		34		40	34			50	80	82	99	125	121	98	97	112	108	83	66	52	55		40	26
21	34	41	42		36		30		74	98	114	136	132	121	126	122	108	97		67	75	42	36	35
22		46	36	36	29	34	34	47	72	87	142	144	122	121	122	138	134	121	86	58		60	40	51
23	33	34	A	31	46	29	28	43	80	102	106	117	114	107	112	113	108	78	55	64	66	53	50	53
24	52	51		42	58	46	51	45	70	86	100	111	121	117	120	122	110	87	70	78	60		51	A
25	A	36		42		25	32	52		78	97		145	126	112	108	91	78	51	60	66	54	46	46
26	46	46	46	38	40	36	46	40	80	85	104	121	118	122	131	126	119	108	63	54				
27	A	34	37	37	46		28	43	77	80	100	106	116		122	95	101		51		66			37
28	A	A		40	43				67	64	90	122	124	116	98	103	91	82	54	54		43		28
29	A	35	55	48	32	34	37	A		117	146	148	107		103	97	101	90	81	71	61	52	36	38
30	42	59	35		36	46		53	87	102	111	135	135	116	126	106	94		61	60	58	53	71	51
31				31		37	40	42		88	88	97	116	85	86	87	81		51	61	60	50	65	
	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	20	24	25	18	23	17	19	24	24	30	29	29	30	27	31	30	29	25	27	28	24	21	25	20
MED	42	40	36	38	40	35	37	52	85	98	107	116	116	117	114	112	106	90	70	60	62	53	51	38
U Q	46	48	42	42	45	46	46	53	88	108	115	123	124	126	122	122	111	101	83	67	66	63	56	48
L Q	34	34	34	35	36	30	32	46	78	87	99	104	107	108	101	106	95	81	55	56	54	49	41	34

HOURLY VALUES OF FES AT YAMAGAWA

DEC. 1992

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	24	G	24	G	G	G		24	G	45	44	50	45	43	G	G	36	G	32	26	G		G	
2	23	G	G	G	G			G	G	G	G	G	46		G	G		G	G	28	G		G	
3	G	G	G	G	G	G	G	24	52	40	47	51	86	55	G	48	36	G	G	G	G	G	G	G
4	G	G	G					24	G	40			54		54	52	41	G	G	G	G	G		G
5		G	G	G	G	G	G	G	G	G	G	51	G	G	G	45	G	39		24	G		G	G
6	G	G	24		28		68	G		G		47	G	48	42	G	G	G	G	G		G	G	
7	G		G	G			G	G	G	G	G	G	45	44	44	40				G	G	G	G	G
8	G		G		G	G		G	G	G	G	G	G	G	G	G	G		G	G	G	31	G	G
9	G	G	33	24	G	24	26	G		G	40	G	49	G	48	G	40	30	25			33	29	G
10	G		G		G	G		24	G	G	45	56	51	48	46	G	55	G		23	G	24	33	G
11		G	G			G	G		G	G	G	42	G	G	G	G	34	G	G		G			
12	G		G		G	G			32	38	G	41	51	G	40	G	40	50	47	33	G	G	G	
13	G	G	G		G	G			G	G	117	G	G	G	44	43	G		48	36	29	24	30	G
14		G	G		G		G	G	33	G	41	41	41	43	42	G	G	G	G	G	G	G		25
15	31	G	G				G	G	G	G	G	G	G	G	G	G	G	G	G	G		G	26	G
16	G	26	29	26	G	24	27	24	48	42	G	G		65	56	G	G	31	26	25	G		30	71
17	39	34	24	24		G	G	G	31	G	39	G	G	G	G	G	44	G	G	G	G	G	G	
18	32	24	G	G			G			40	51	49	G	G	G	39	G	G	G	24			30	G
19	G	G	G	32	24			24	29	G	42	50	45	42	G	G	G	G	25	G	G	G	G	59
20		G		G	G			G	G	G	G	G	41	G	G	G	G	30	24	G	G		G	G
21	G	G	G		G		G		G	37	46	G	67	45	G	G	G	G	G	G	G	G	G	G
22		G	G	G	G	G	27	G	G	38	45	58	G	62	59	91	52	57	41	46		25	28	G
23	G	G	33	26	G	G	G	G	G	G	G	52	48	44	44	44	G	G	28	24	G	G	G	G
24	30	38		28	G	G	G	G	48	G	G	43	41	45	41	38	G	36	G	30	29		G	24
25	34	25		G		G	G	G		G	G		45	47	66	61	G	G	G	G	G	G	G	G
26	G	G	G	G	G	23	G	G	G	37	G	G	G	G	G	G	G	G	G	G				
27	48	G	G	G	G		G	G	32	G	G	G	G		G	42	38		31		32			G
28	31	34		G	G				G	G	G	G	G	G	G	G	G	44	38	24		22		G
29	48	G	24	G	G	24	G	24		44	43	40	50		49	G	G	G	32	G	32	G	G	25
30	G	G	G		G	G		24	G	59	71	48	43	G	39	G	43		36	G	G	G	G	G
31				24		25	G	G		38	G	G	42	49	48	58	61		41	31	26	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	25	26	26	20	23	19	20	25	25	31	29	29	30	27	31	31	29	25	28	28	24	21	25	23
MED	G	G	G	G	G	G	G	G	G	G	G	40	42	42	39	G	G	G	12	G	G	G	G	G
U Q	31	G	24	24	G	23	G	24	31	38	44	49	48	47	46	43	40	30	32	25	G	23	27	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT YAMAGAWA

DEC. 1992

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT OKINAWA

DEC. 1992

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	53	47	53	53	51	35	32	62	89	111	111	111	121	136	121	111	111	121	111	90	67	66	72	54
2	53	25	32	54	53	32	30	52	90	122	94	92	101	103	91	99	110	110	87	66	52	63	72	54
3	42	43	52	60	48	28		53	88	86	105	111	118	111	122	127	141	138	N	103	93	87	105	110
4	104	66	53	40	35	34	32	43	87	104	111		99	94	101	111	110	104	66	A	54	66	59	53
5	42	34	36	44	31	26	32	41	88	105	118	139	121	146	144	130	119	138	111	90	84	66	66	62
6	43	32	34	35	37	28	N	42	82	107	111	122	111	118	112	111	111	105	91	78	83	66	66	60
7	53	60	50	42	54	30	34	42	87	111	130	111	118	112	111	111	90	91	90	78	60	66	58	52
8	34	60	52	47	40	26	28	37	86	111	111	141	142	143	105	122	138	130	108	103	103	107	108	87
9	82	52	54	44	30	N	30	42	78	108	121	104	120	162	170	168	161	160	103	87	87	90	86	77
10	52	64	66	60	52	34	41	54	88	111	120	131	105	110	138	154	121	111	104	87	90	87	87	60
11	32	32	34	32	29	38	N	42	85	121	122	137	157	171	189	170	164	162	158	105	88	88	87	52
12	26	32	34	35	44	26		42	86	111	111	111	111	162	170	160	167	145	138	121	87	105	87	51
13	34	36	44	35	28		N	52	86	107	111	101	121	146	170	170	163	163	109	106	90	84	63	35
14	34	37	34	31	29	N	28	25	88	104	112	111	121	121	133	124	111	145	111	87	87	90	66	53
15	34	34	32	35	43	35	26	52	103	105	107	108	122	144	153	145	120	117	108	106	107	66	66	42
16	43	34	30	32	A	32	36	55	90	103	105	95	107	134	162	161	158	164	161	144	108	87	76	42
17	43	31	38	36		N		43	90	132	121	116	122	145	163	166	145	146	121	90	108	90	64	34
18	26	34	41		A	N	28	55	85	90	105	111	130	121	128	111	121	107	80	63	66	N	63	34
19	34	32	34	35	29	A	34	43	90	108	119	131	118	122	144	146	145	143	121	90	87	89	60	34
20	42	A	42	52	34	28	26	53	87	87	91	106	120	111	111	111	112	111	85	66	80	77	42	28
21	38	44	32	31		N	N	53	66	87	111	128	141	122	146	161	161	145	146	107	108	90	44	31
22	35	34	C	C	C	C					146	148	111	120			170	169	162	109	108	90	78	50
23	43	52	31	32	32	A	25	42	84	105	121	130	111	127	146	146	146	127	87	84	90	90	66	25
24	34	34	53	53	36		N	24	87	90	111	111	131	144	144	145	156	144	107	104	107	87	60	53
25	55	51	34	30	37	A	A	43	84	90	101	122	144	161	C	C	C	112	78	35	73	65	55	34
26	38	32	32	38	40			34	77	90	111	110	121	118	139	146	146	145	108	67	66	66	53	A
27	A	52	60	52	52	31	31	42	82	90	89	121	142	166	164	146	111	111	85	66	78	85	63	34
28	35	36	44	52	59	N		34	76	78	85	120	122	N	111	143	146	111	90	A	73	73	60	A
29	A	43	64	34	23	34	35	34	66	162	144	111	121	105	111	112	118	107	90	80	74	73	159	169
30	53	54	47	35	C	31	31	50	90	149	132	111	136	132	167	C	160	146	108	90	103	86	83	66
31	34	38	34	36	40	34	N	32	72	90	104	100	105	104	104	91	C	92	73	60	66	66	35	A
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	30	29	25	18	18	30	30	30	31	30	31	30	29	28	29	31	30	29	31	30	31	28
MED	42	36	40	36	37	32	31	42	86	105	111	111	121	124	139	144	141	130	108	90	87	86	66	52
U Q	52	52	52	52	49	34	34	52	88	111	121	128	130	145	162	157	159	145	111	104	103	90	83	60
L Q	34	34	34	34	30	28	28	41	82	90	105	110	111	112	111	111	111	111	87	72	73	66	60	34

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

DEC. 1992

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	32	42	52	82	82	56	72	47	G	G	G	G	33	24	G	G
2	G	32	G	G	G	G	G	G	G	G	G	G	48	47	47	G	41	51	39	G	G	G	G	G
3	G	G	G	24	G	G		G	G	43	50	49	51	46	57	50	37	G	28	G	G	28	G	G
4	G	G	G	G	G	G	G	G	31	43	51		67	78	74	52	58	54	46	40	32	G	G	G
5	G	G	G	G	G	G	G	G	32	G	42	G	45	48	44	43	37	G	G	G	G	G	24	G
6	G	G	G	26	31	G	G	G	G	G	46	50	59	48	44	41	36	42	G	G	G	G	G	G
7	G	G	G	G	G	G	G	G	G	G	59	46	52	47	G	41	47	31	26	26	29	G	G	G
8	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	41	36	G	G	30	30	36	24
9	23	G	G	29	40	26	G	G	G	39	56	G	G	50	49	47	42	34	26	33	34	G	60	33
10	G	29	G	G	G	G	G	G	G	G	G	49	48	48	44	41	G	48	33	34	25	40	37	G
11	G	G	30	G	G	G	G	G	G	36	G	G	G	42	G	G	35	29	G	48	G	28	32	G
12	G	G	G	G	G	G		G	G	38	44	51	62	66	59	65	61	50	56	23	G	G	31	G
13	G	G	G	G	G		G	G	G	36	G	41	G	G	45	45	40	31	29	39	22	G	G	28
14	G	G	28	G	G	G	G	30	30	42	56	43	56	45	41	G	51	41	33	27	G	G	24	G
15	G	G	G	G	G	G	G	G	G	38	40	G	G	43	41	40	35	38	32	38	G	G	G	G
16	G	34	36	30	34	G	G	G	G	57	47	49	41	61	G	G	48	41	40	27	23	G	G	28
17	57	84	38	32		G		G	G	35	G	44	42	G	G	39	36	31	G	G	G	G	G	G
18	G	G	G		24	G	G	29	33	45	44	125	45	45	42	40	35	32	32	29	G	G	G	G
19	G	G	G	G	30	28	G	G	G	G	43	44	56	44	41	39	36	G	G	24	G	G	24	G
20	24	44	G	G	G	G	G	G	G	35	44	55	46	42	41	41	49	37	33	24	G	G	G	G
21	G	G	G	G		G	G	G	32	41	48	63	56	46	69	39	G	G	G	G	G	29	24	G
22	G	G	C	C	C	C					48	47	49	66			93	77	32	G	25	G	G	33
23	30	28	G	G	29	36	25	G	G	G	G	49	61	61	60	48	62	47	30	36	28	G	33	32
24	29	27	G	31	26		30	G	G	35	G	49	45	42	G	43	42	46	41	34	34	40	32	G
25	G	G	34	37	42	41	26	25	32	G	38	56	91	42	C	C	C	35	32	32	G	G	G	G
26	G	G	G	G	G			G	G	G	41	45	46	G	G	39	42	39	32	26	G	34	57	48
27	40	32	G	24	34	G	G	G	32	G	42	45	56	48	G	42	41	36	43	33	33	G	G	G
28	29	G	G	G	30	G		24	30	35	G	G	G	45	41	64	G	59	37	46	25	G	27	30
29	30	27	G	G	G	26	G	23	34	41	43	57	44	61	48	39	48	46	54	33	33	32	250	247
30	G	G	G	G	C	G	G	24	30	40	114	78	94	66	82	C	68	57	42	G	G	G	G	G
31	G	G	G	G	G	G	G	G	34	39	42	G	43	50	55	62	C	42	40	34	33	28	G	24
	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	30	29	27	27	25	30	30	30	31	30	31	31	29	28	29	31	31	31	31	31	31	31
MED	G	G	G	G	G	G	G	G	G	36	43	46	48	47	44	41	41	38	32	27	G	G	G	G
U Q	23	27	G	24	30	G	G	G	32	41	48	51	56	56	56	47	48	47	40	34	30	28	32	28
L Q	G	G	G	G	G	G	G	G	G	G	G	G	42	42	G	39	35	31	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT OKINAWA

DEC. 1992

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	15	15	15	15	15	16	16	15	14	15	17	20	21	17	15	16	14	15	15	14	15	15	15
2	15	15	15	15	15	15	15	16	15	15	17	23	26	23	17	20	17	14	14	15	15	15	15	15
3	15	15	15	15	15	15		16	16	15	18	21	24	26	22	17	15	15	15	15	14	15	15	15
4	15	15	15	15	15	15	15	16	15	15	16		22	21	23	21	16	14	15	14	15	16	16	15
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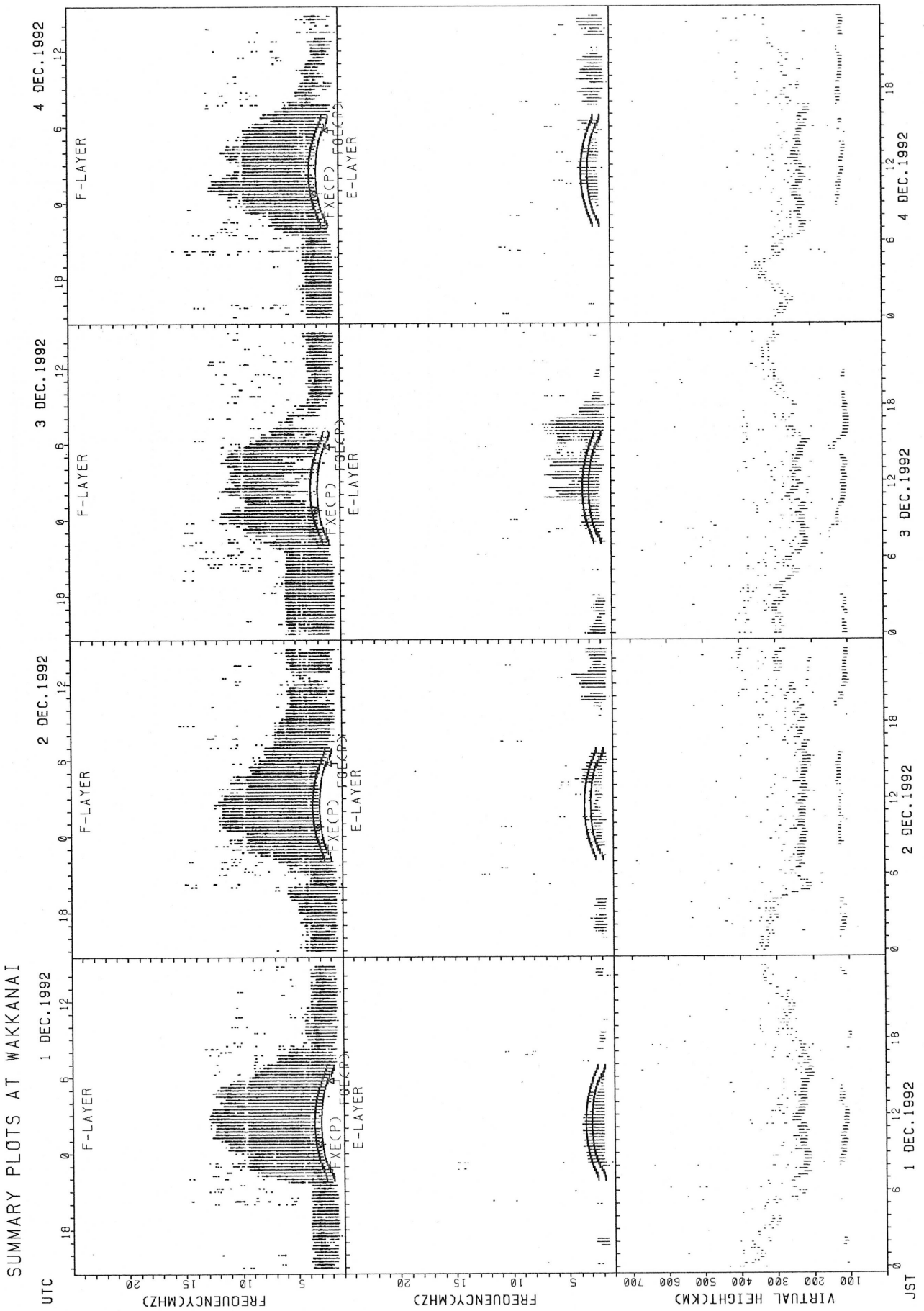
COMMUNICATIONS RESEARCH LABORATORY, JAPAN


SUMMARY PLOTS AT WAKKANAI
UTC
JST
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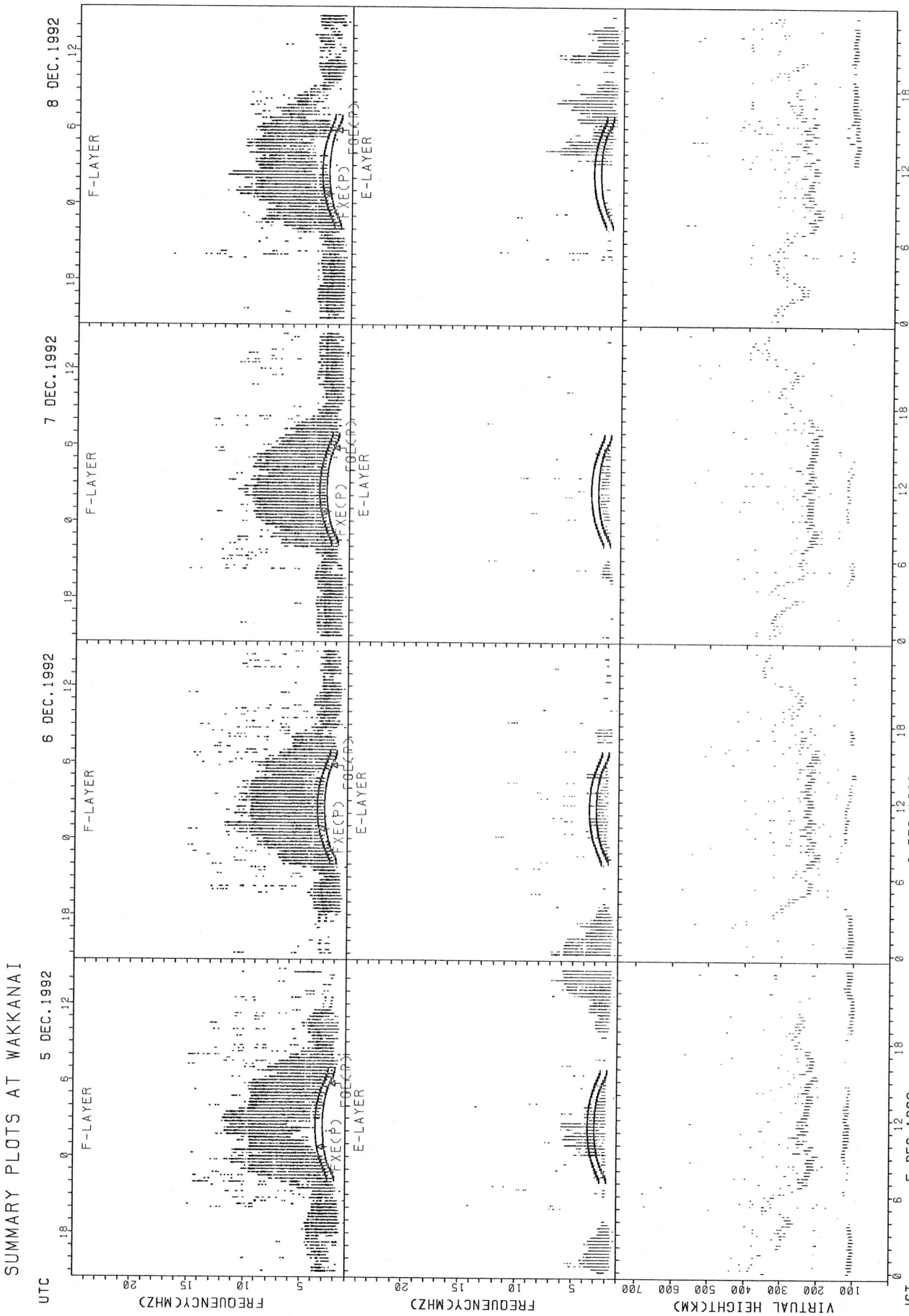
2 DEC.1992
3 DEC.1992
4 DEC.1992
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE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FOE(P)
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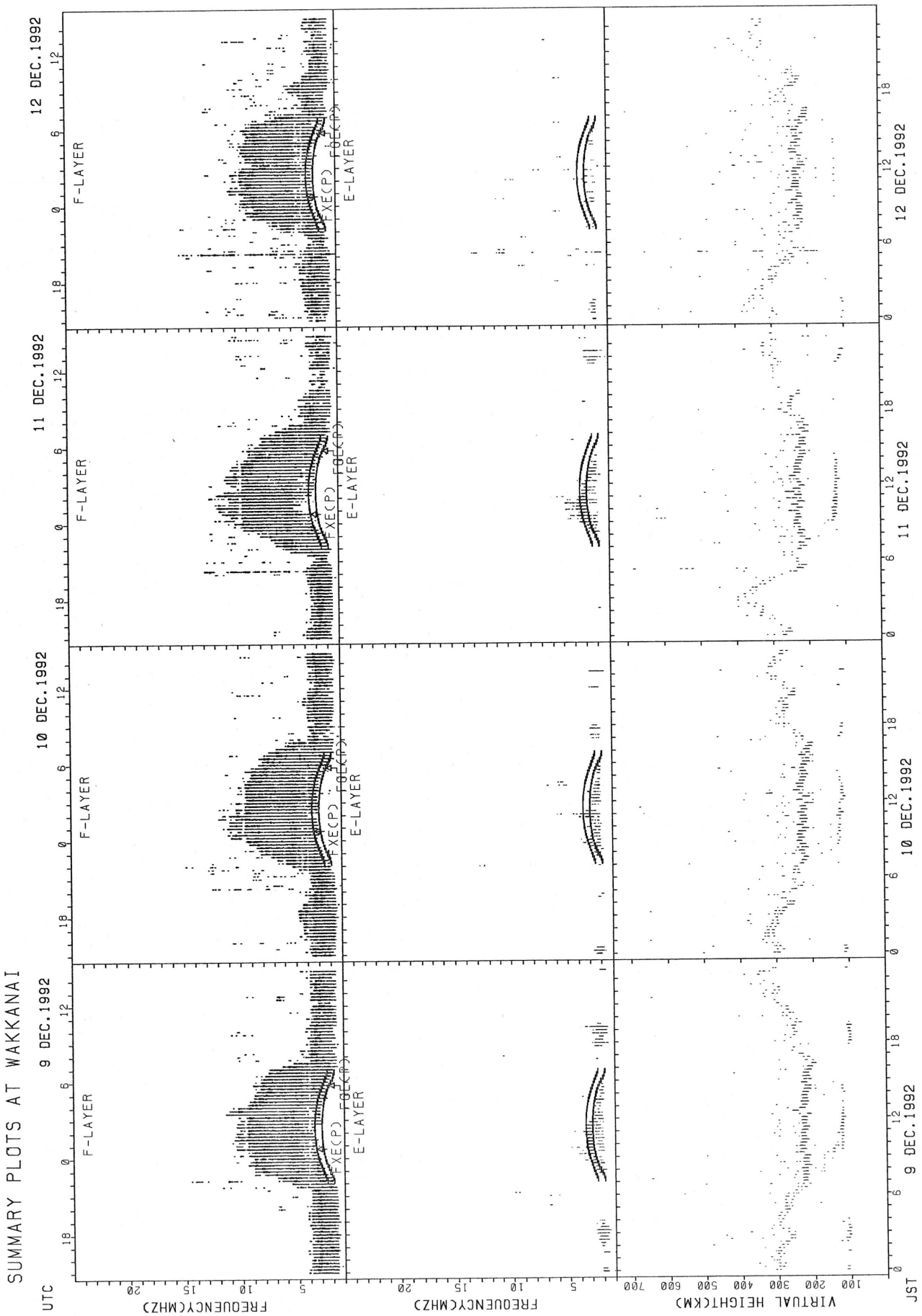
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E-LAYER
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VIRTUAL HEIGHT(KM)
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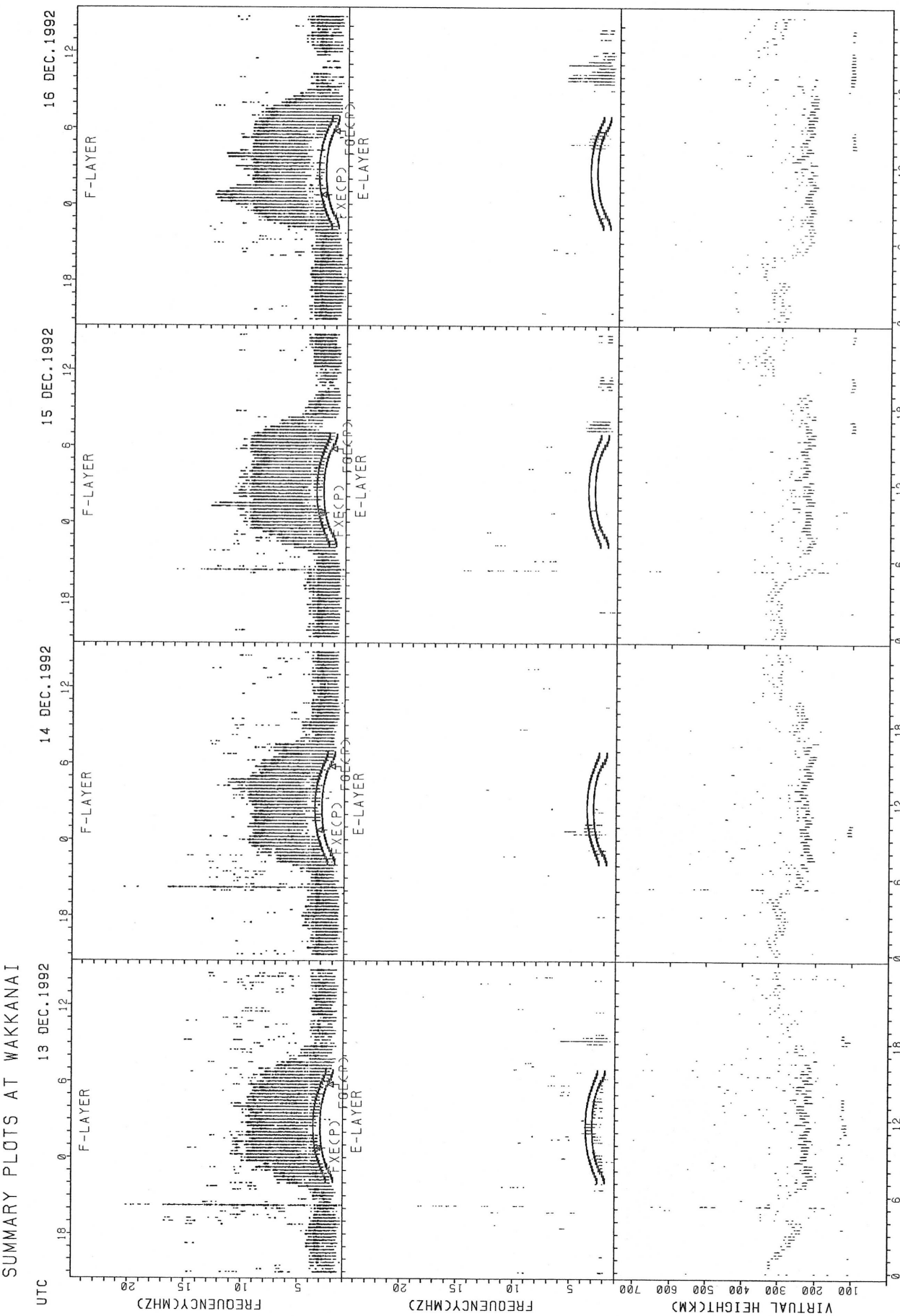
FOE(P); PREDICTED VALUE FOR FOE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E-LAYER
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FOE(P)
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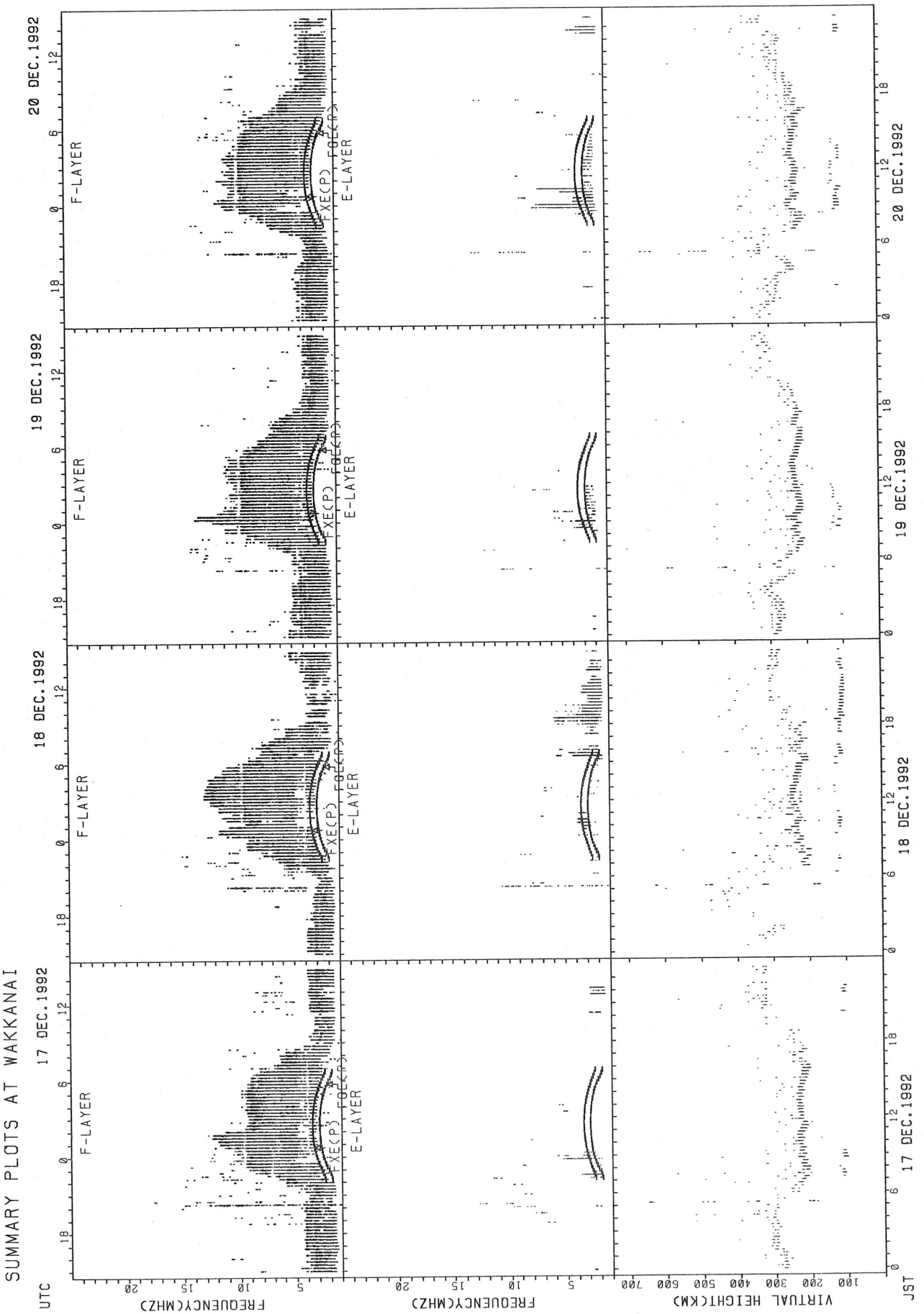
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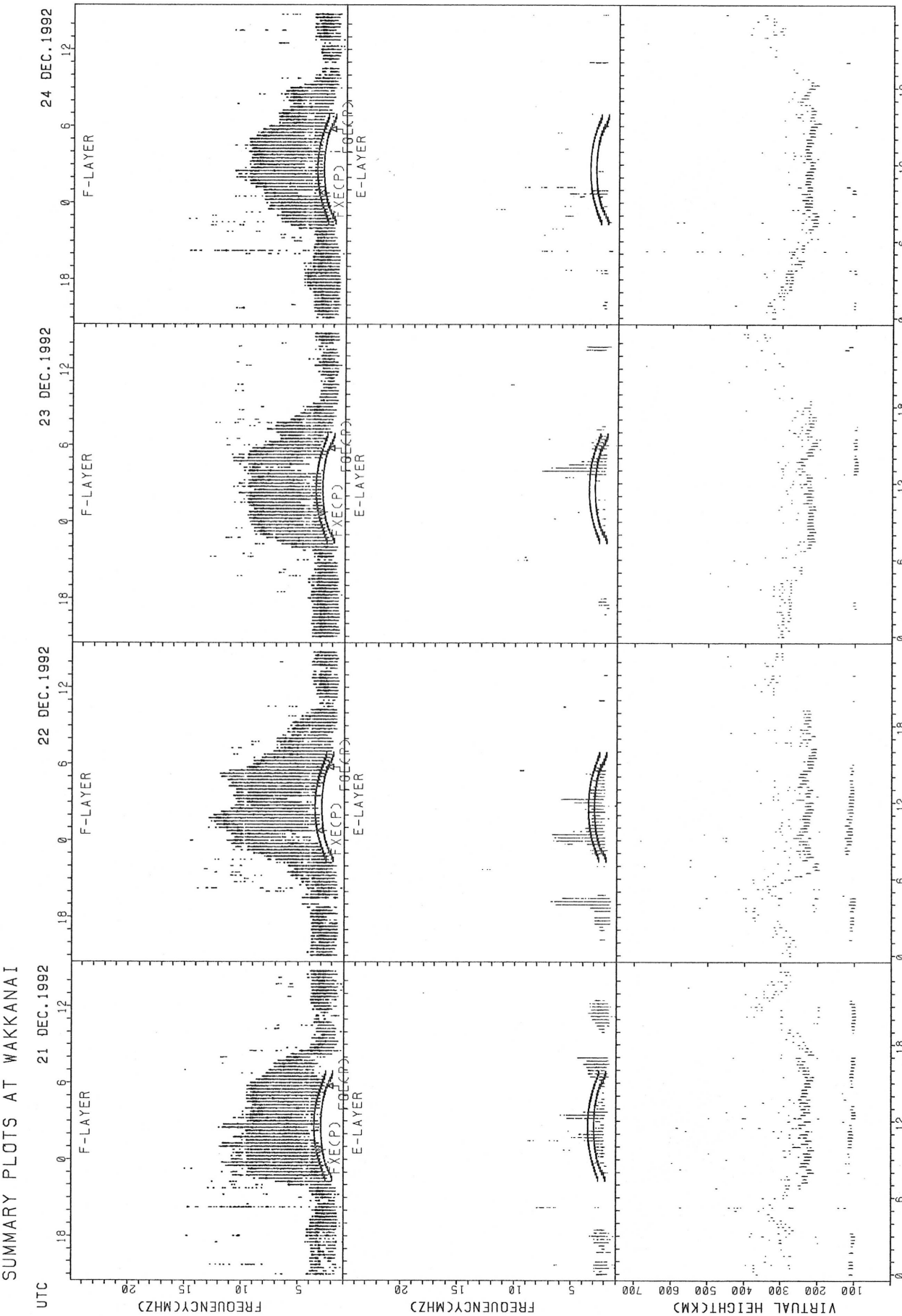
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E-LAYER
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FOE(P)
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VIRTUAL HEIGHT(KM)
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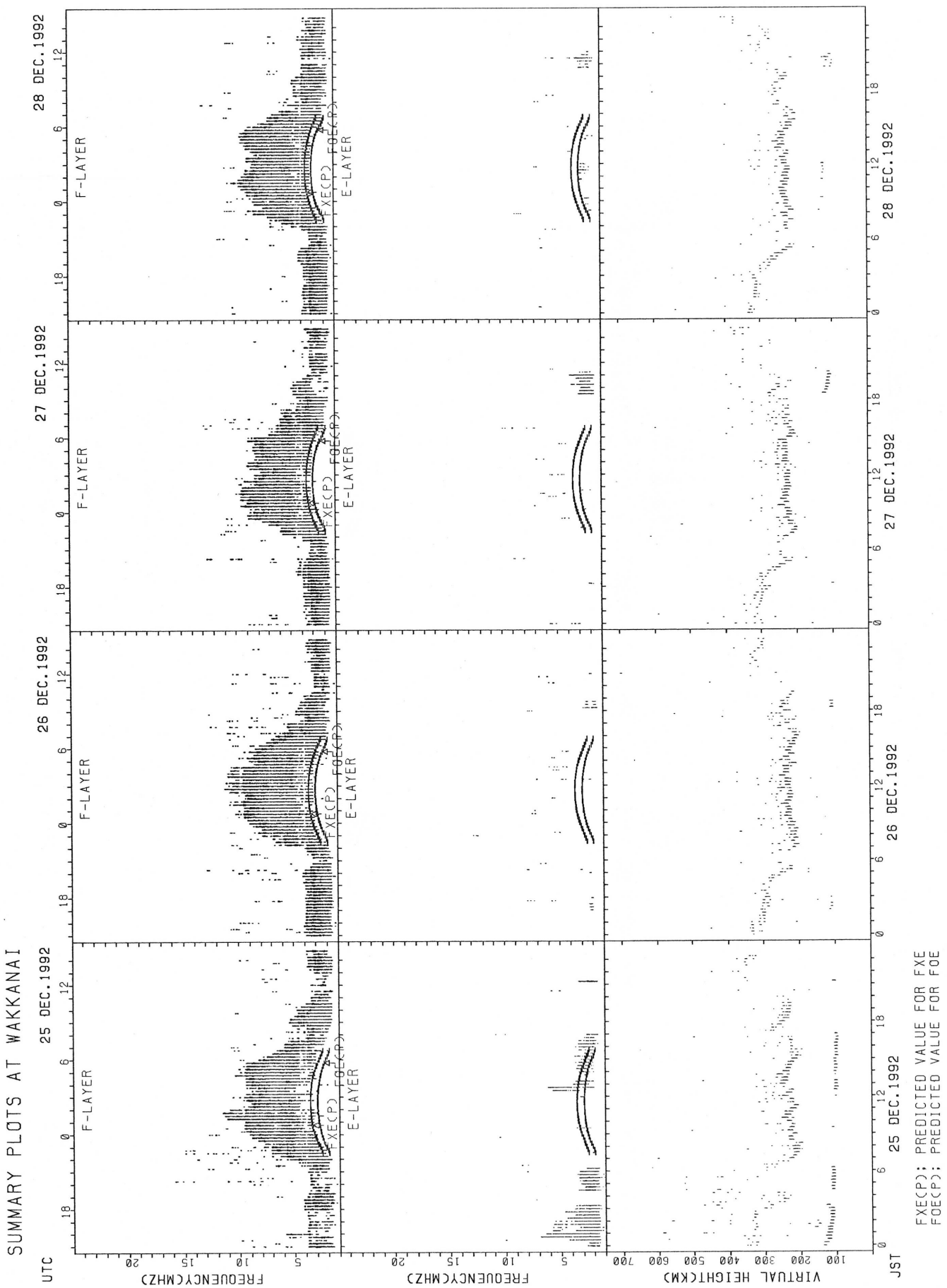
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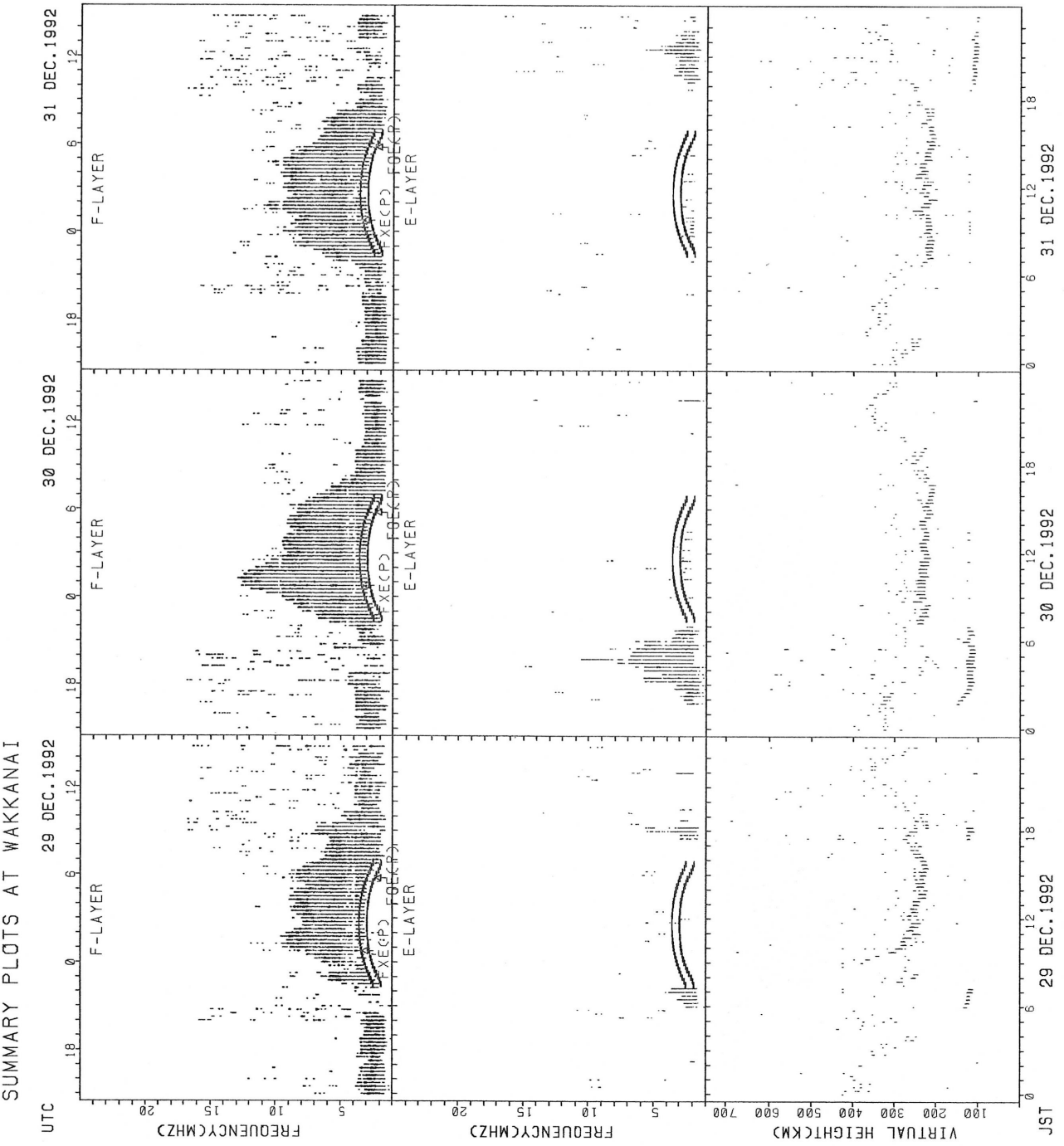
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VIRTUAL HEIGHT(KM)
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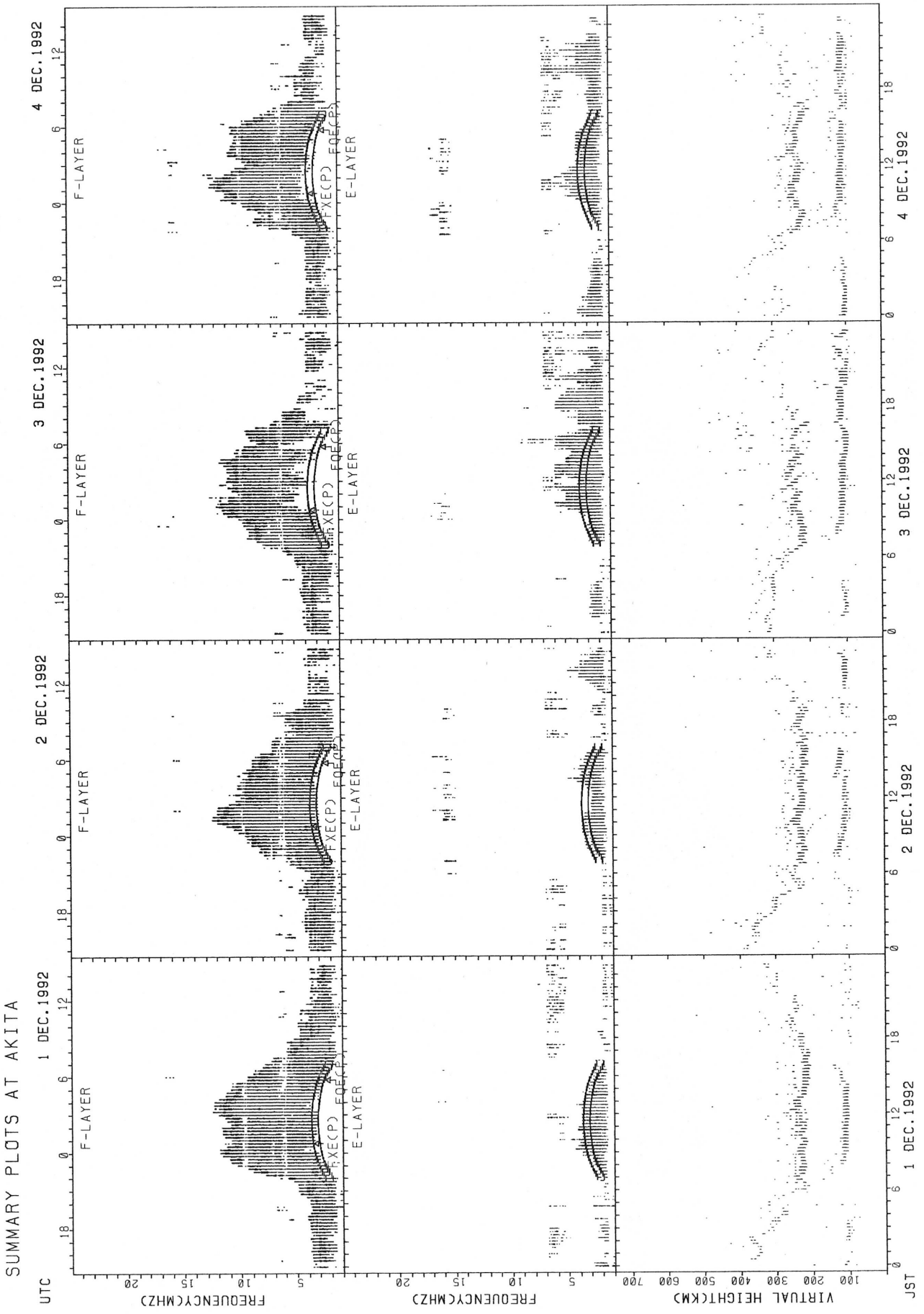
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3 DEC.1992
4 DEC.1992
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E-LAYER
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FOE(P)
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VIRTUAL HEIGHT(KM)
UTC
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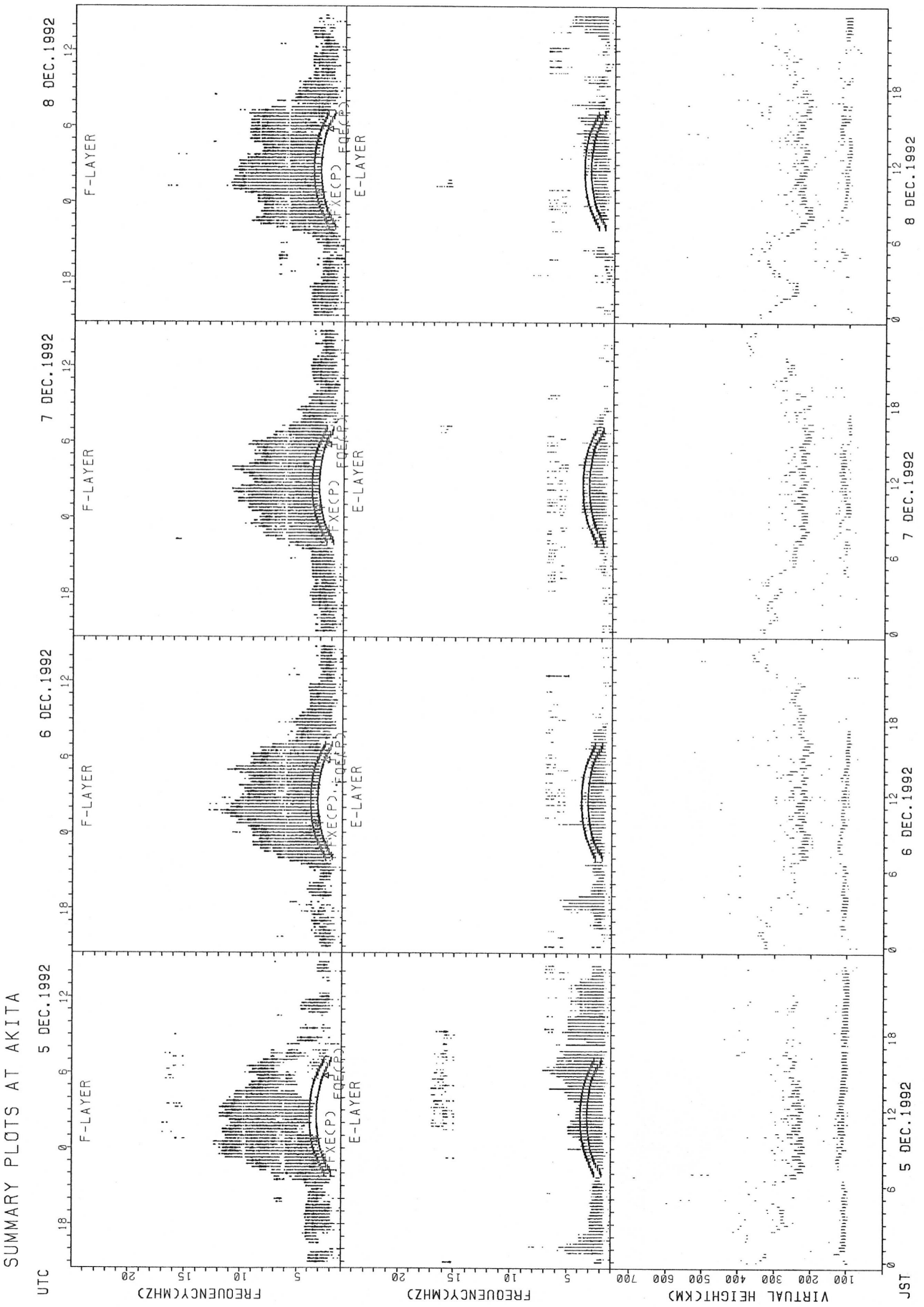
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UTC
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8 DEC.1992
F-LAYER
E-LAYER
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FOE(P)
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VIRTUAL HEIGHT(KM)
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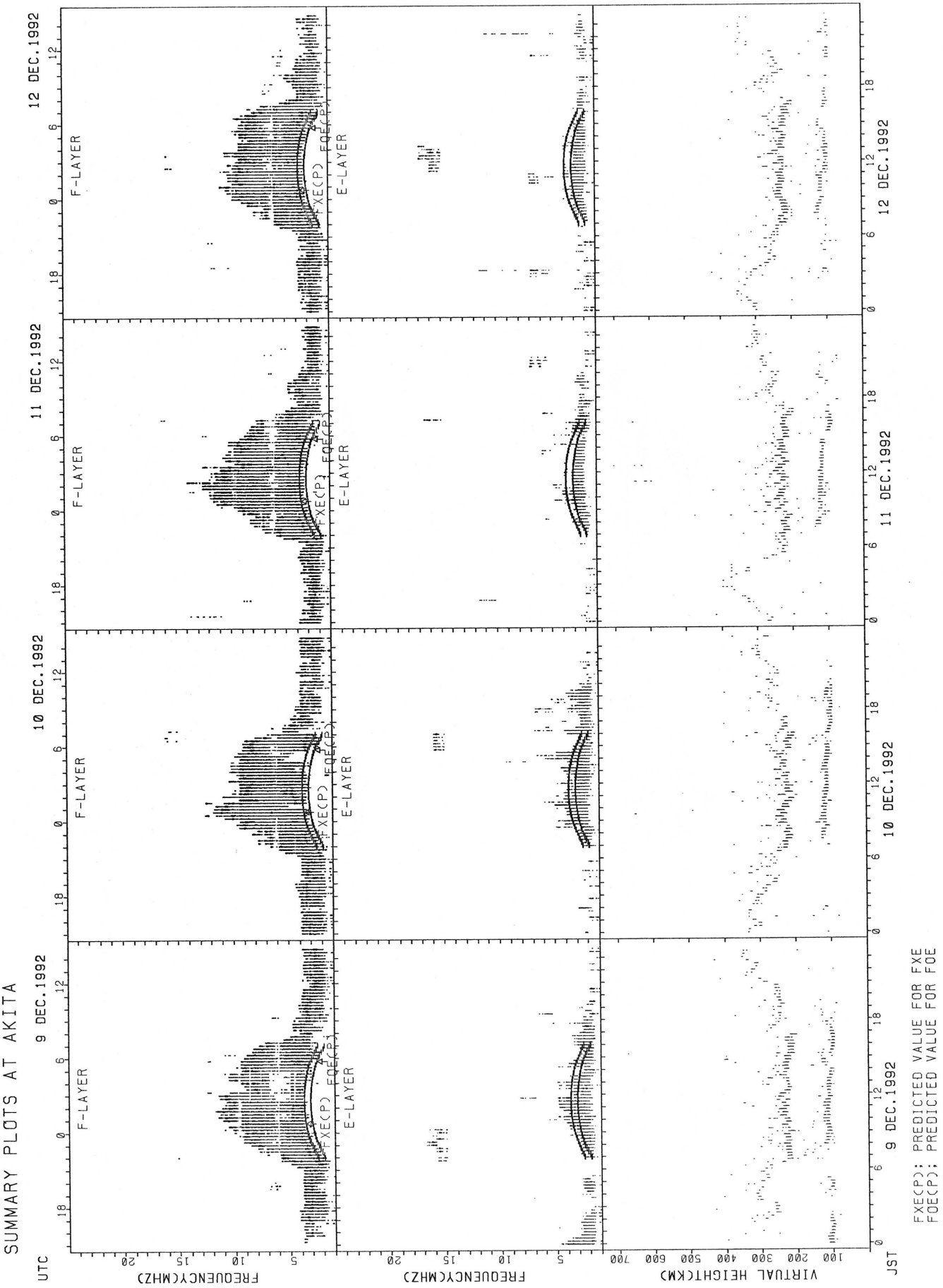
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10 DEC.1992
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12 DEC.1992
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JST
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E-LAYER
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FOE(P)
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VIRTUAL HEIGHT(KM)
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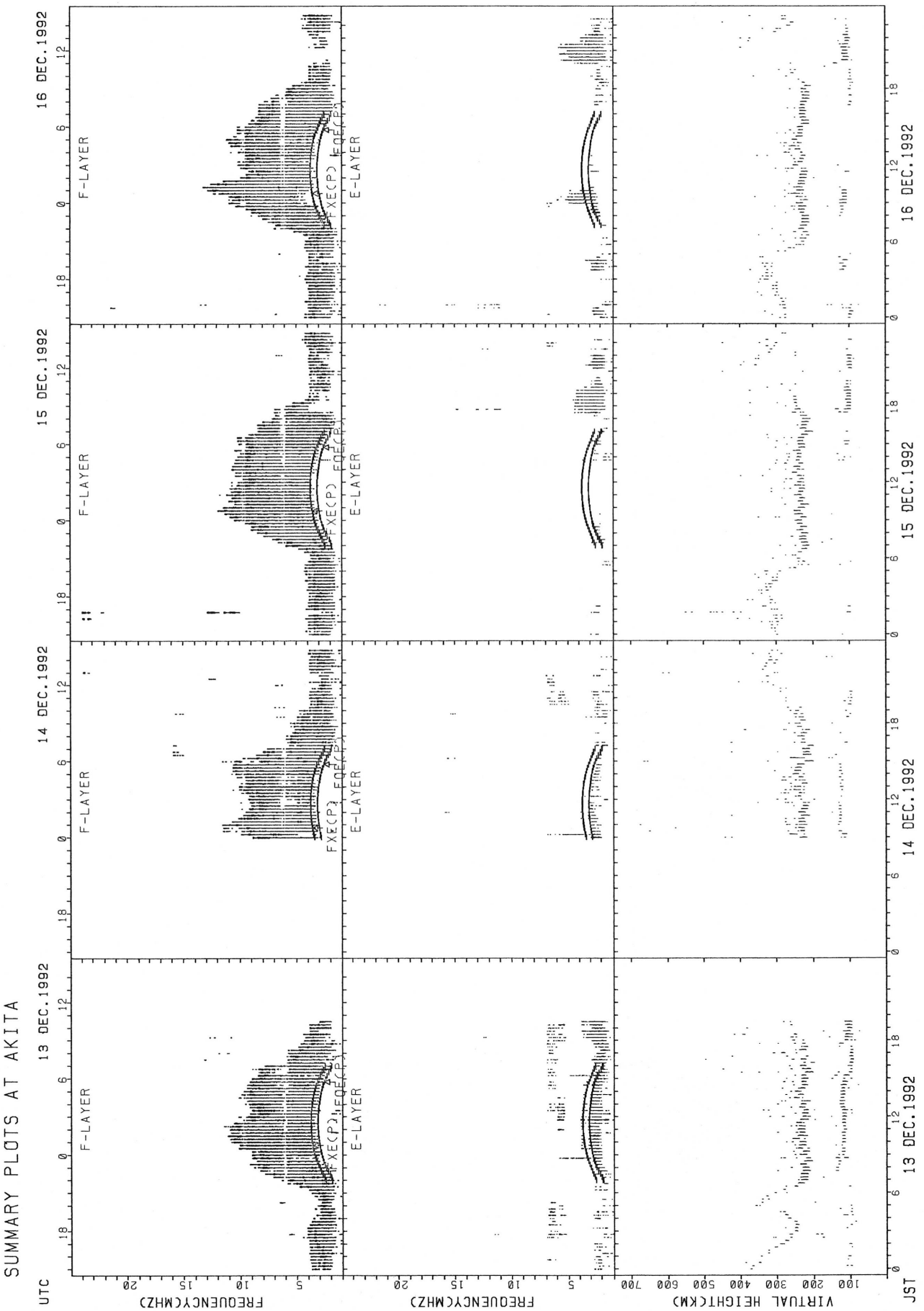
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UTC
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FOE(P)
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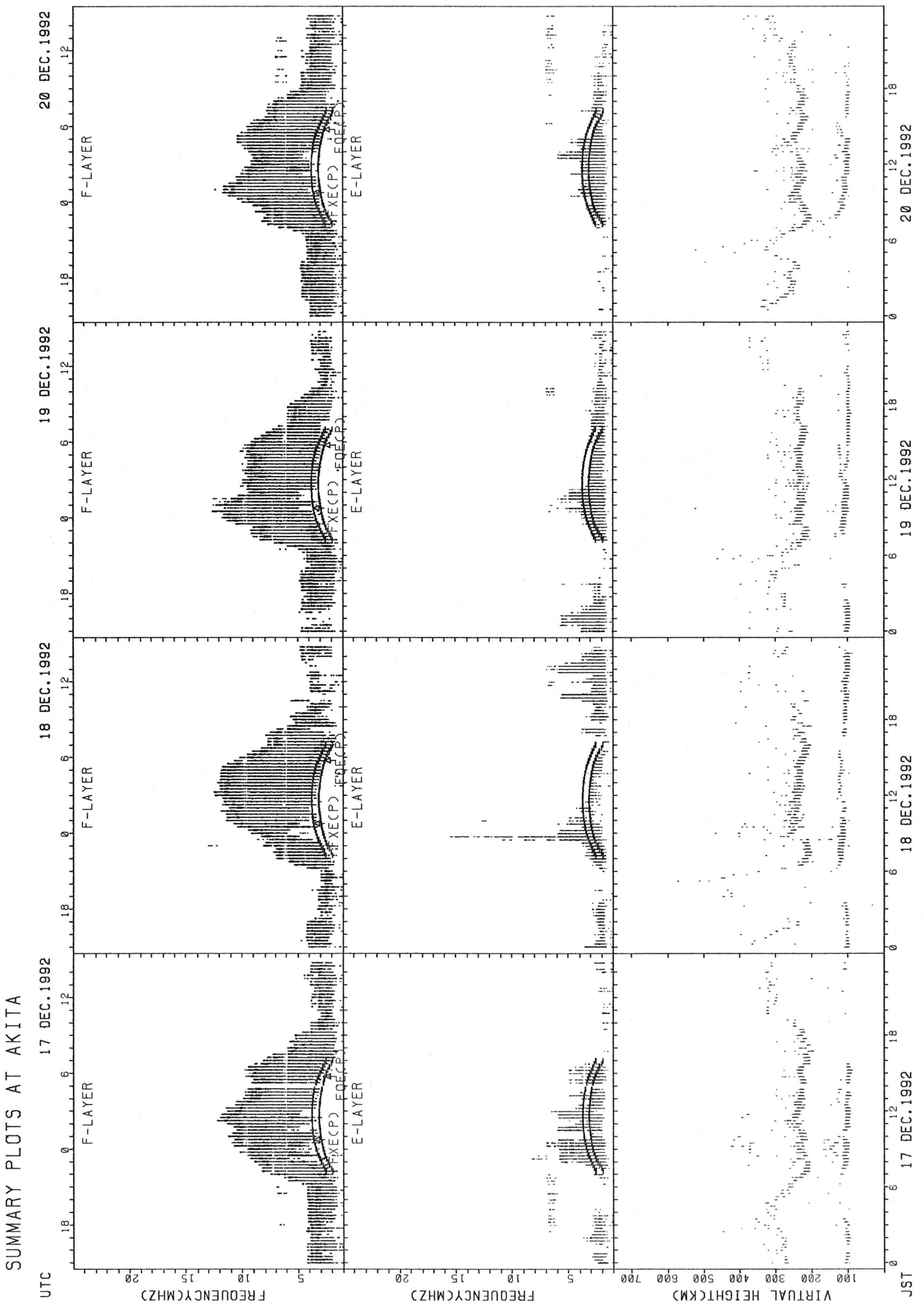
SUMMARY PLOTS AT AKITA
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18 DEC.1992
19 DEC.1992
20 DEC.1992
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FXE(P) FOE(P)
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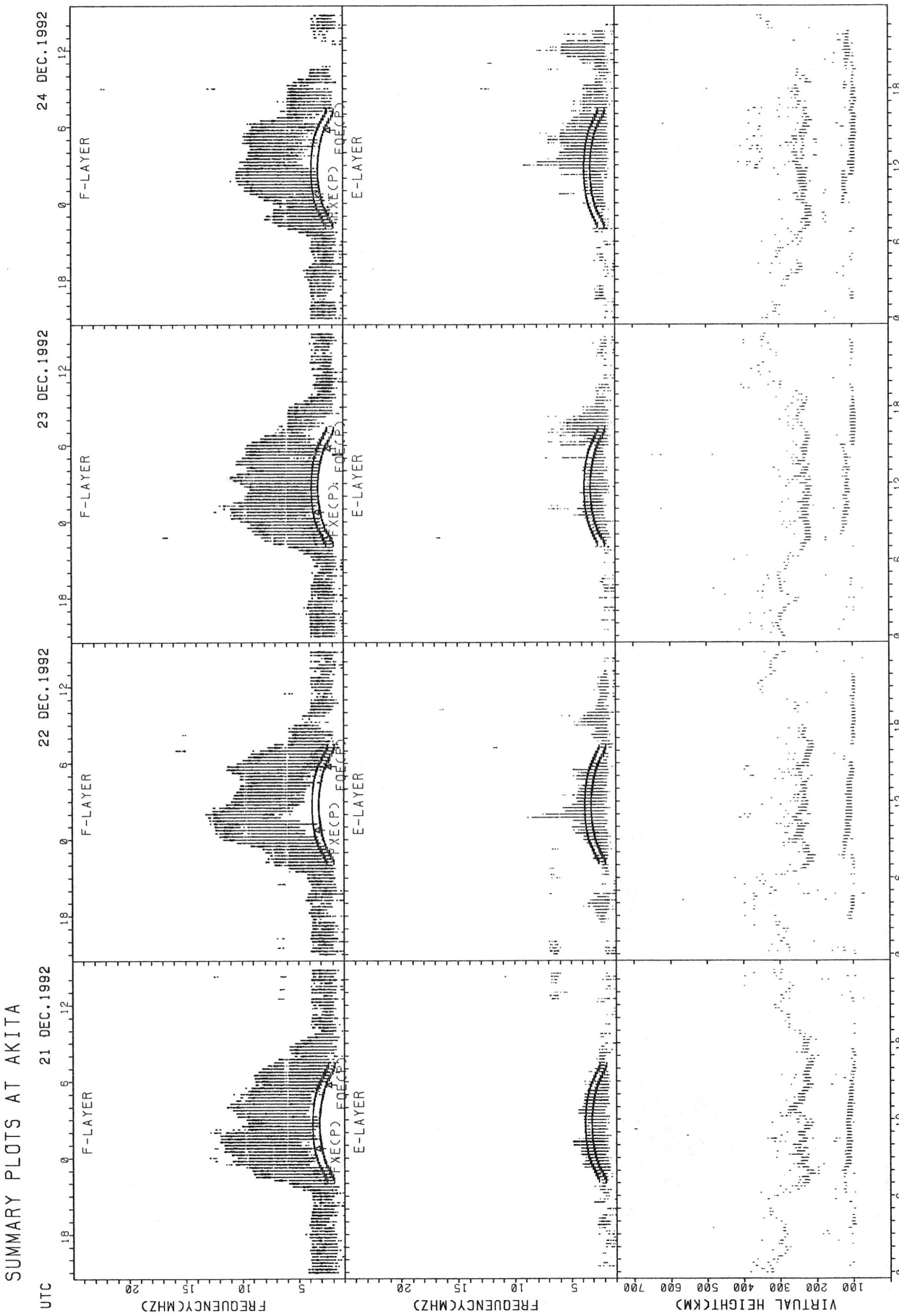
SUMMARY PLOTS AT AKITA
UTC
21 DEC.1992
22 DEC.1992
23 DEC.1992
24 DEC.1992
F-LAYER
E-LAYER
FXE(P)
FOE(P)
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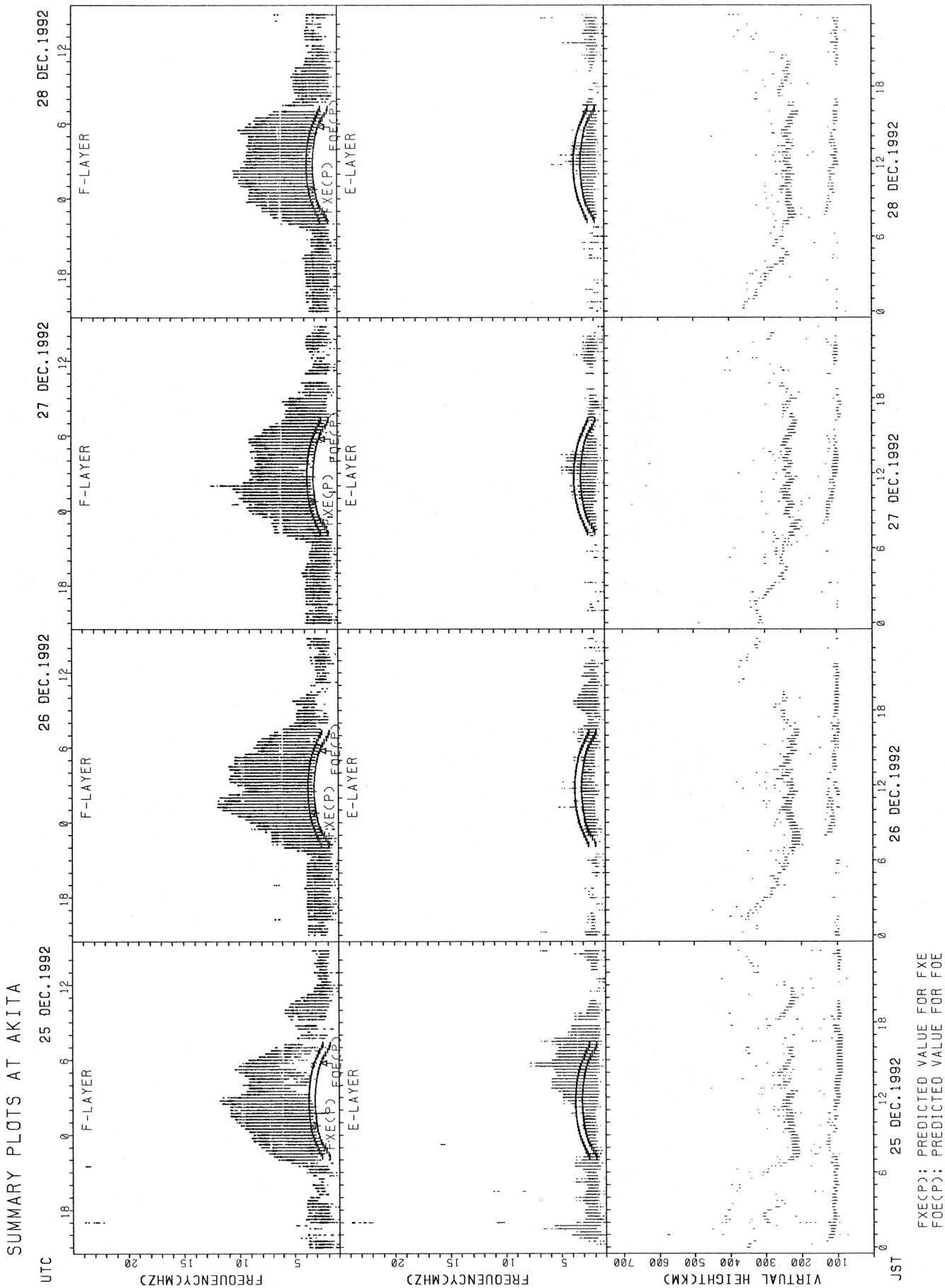
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F-LAYER
E-LAYER
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FOE(P)
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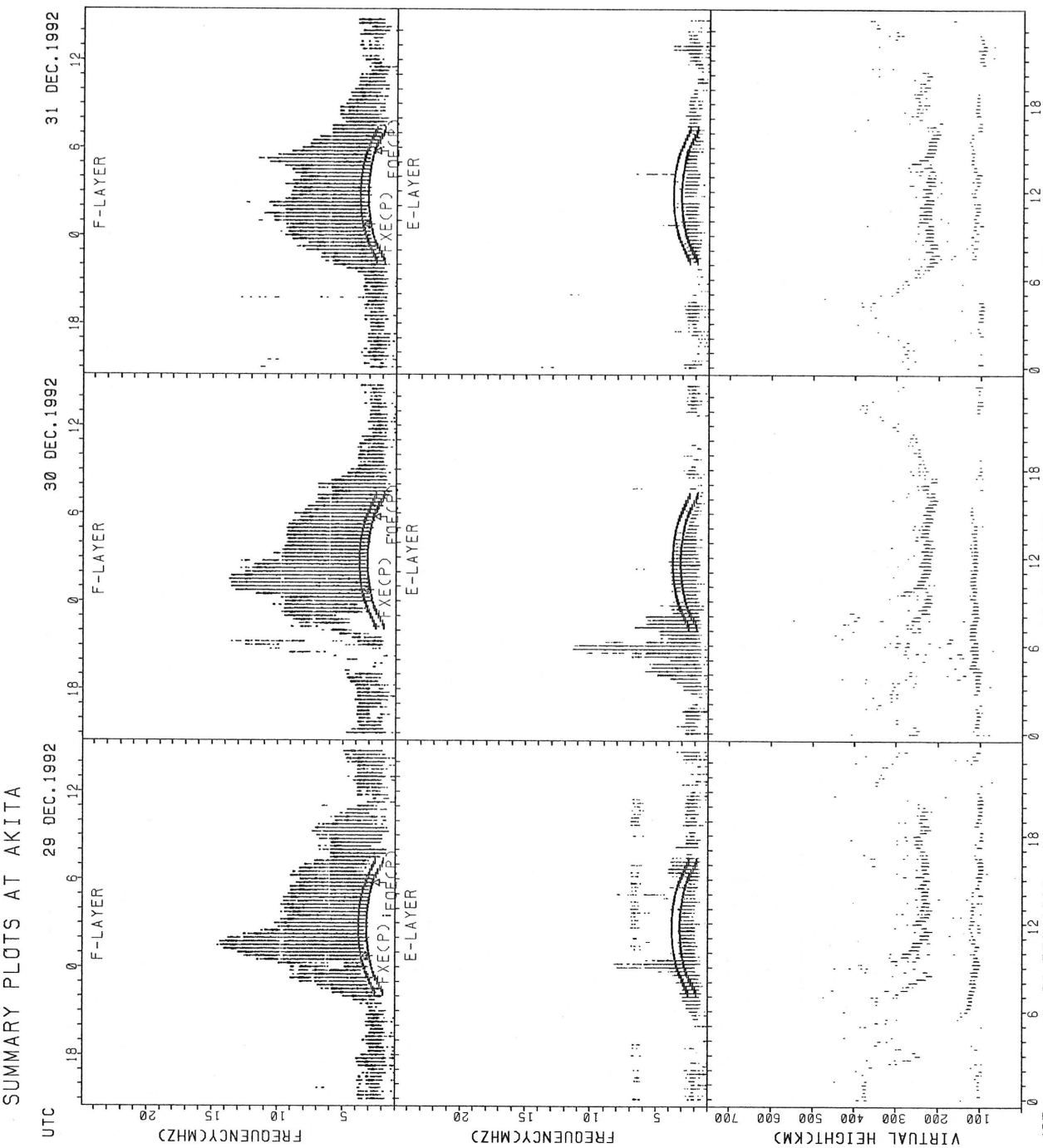
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E-LAYER
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VIRTUAL HEIGHT(KM)
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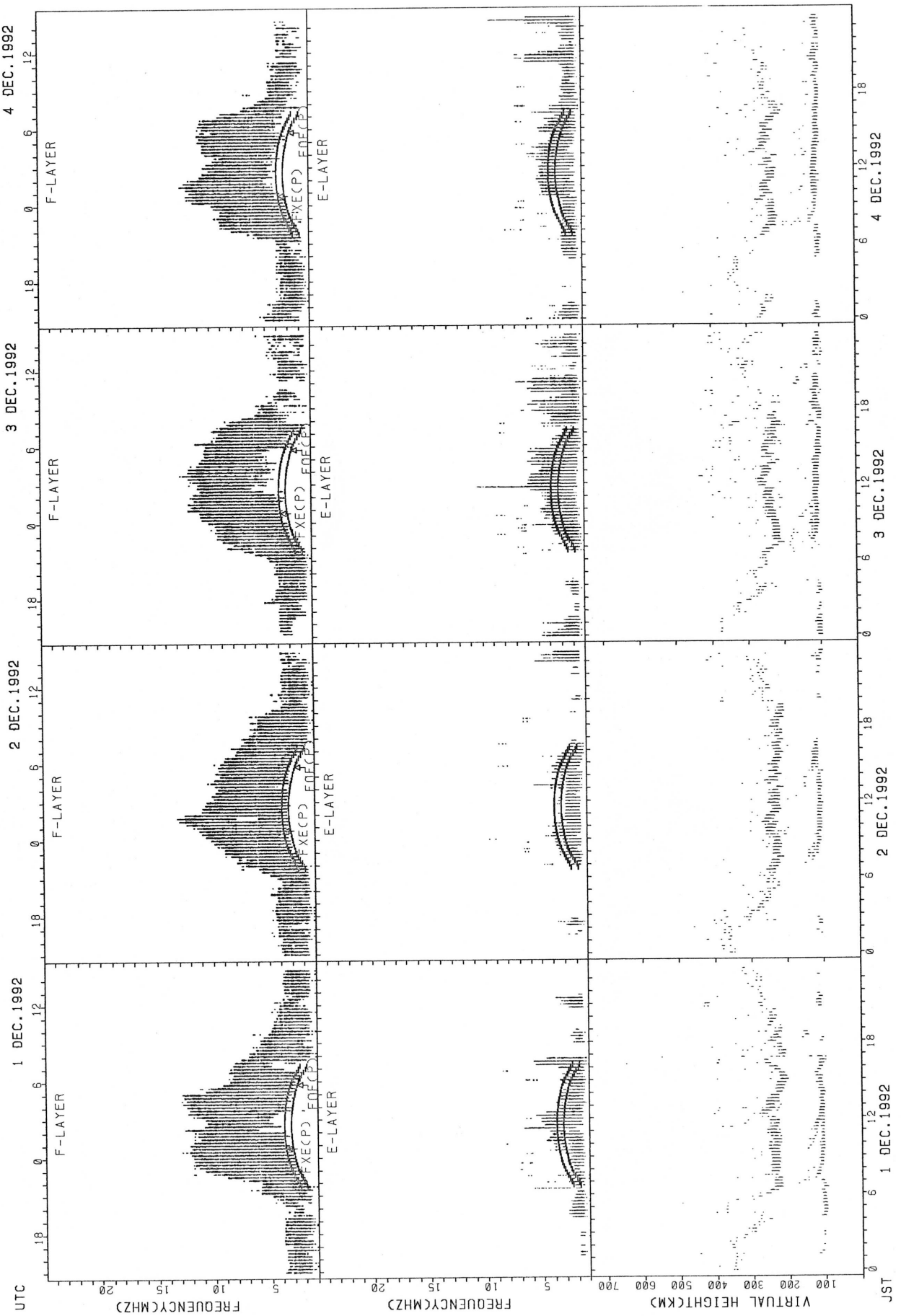
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3 DEC.1992
4 DEC.1992
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E-LAYER
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FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
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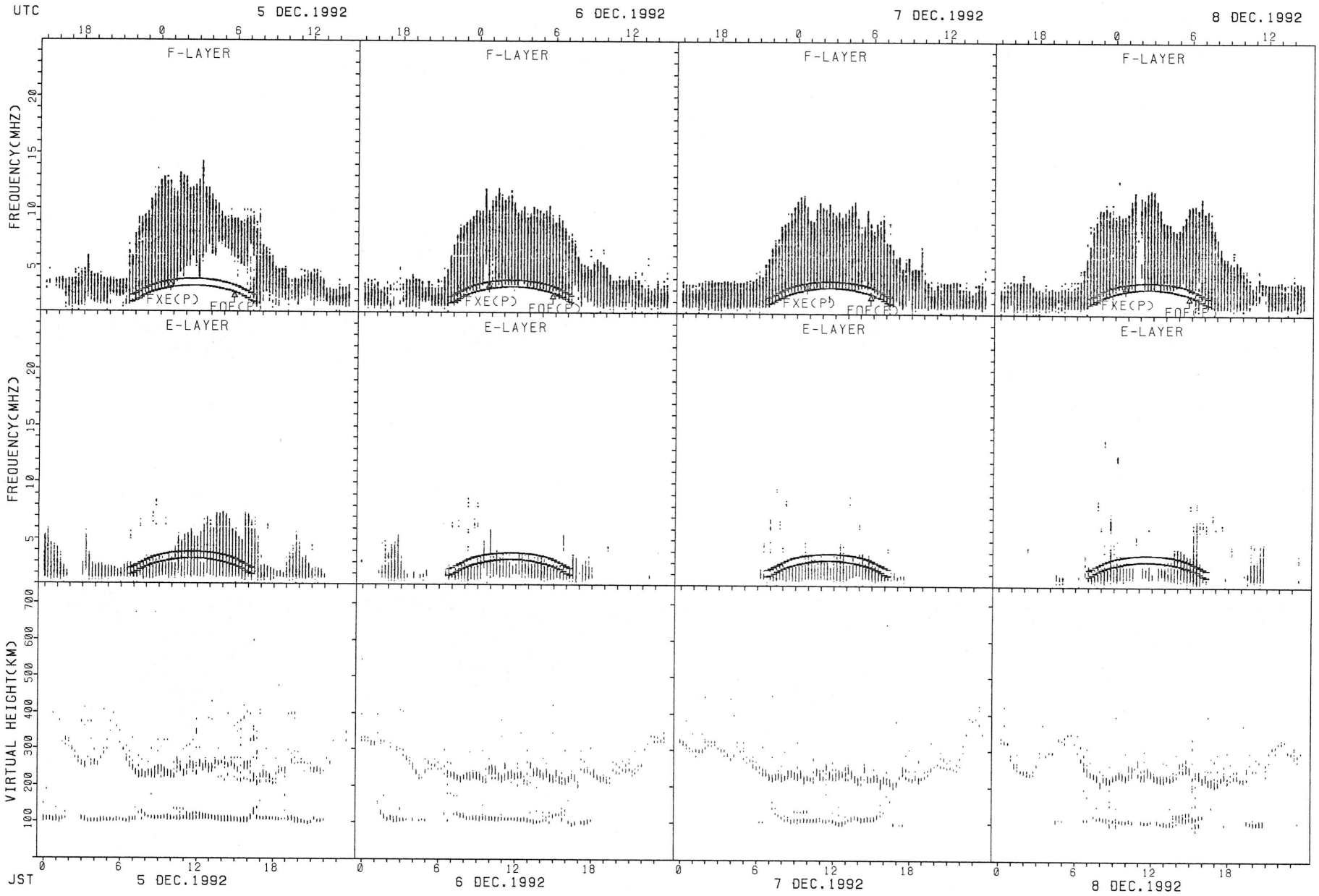
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT KOKUBUNJI TOKYO



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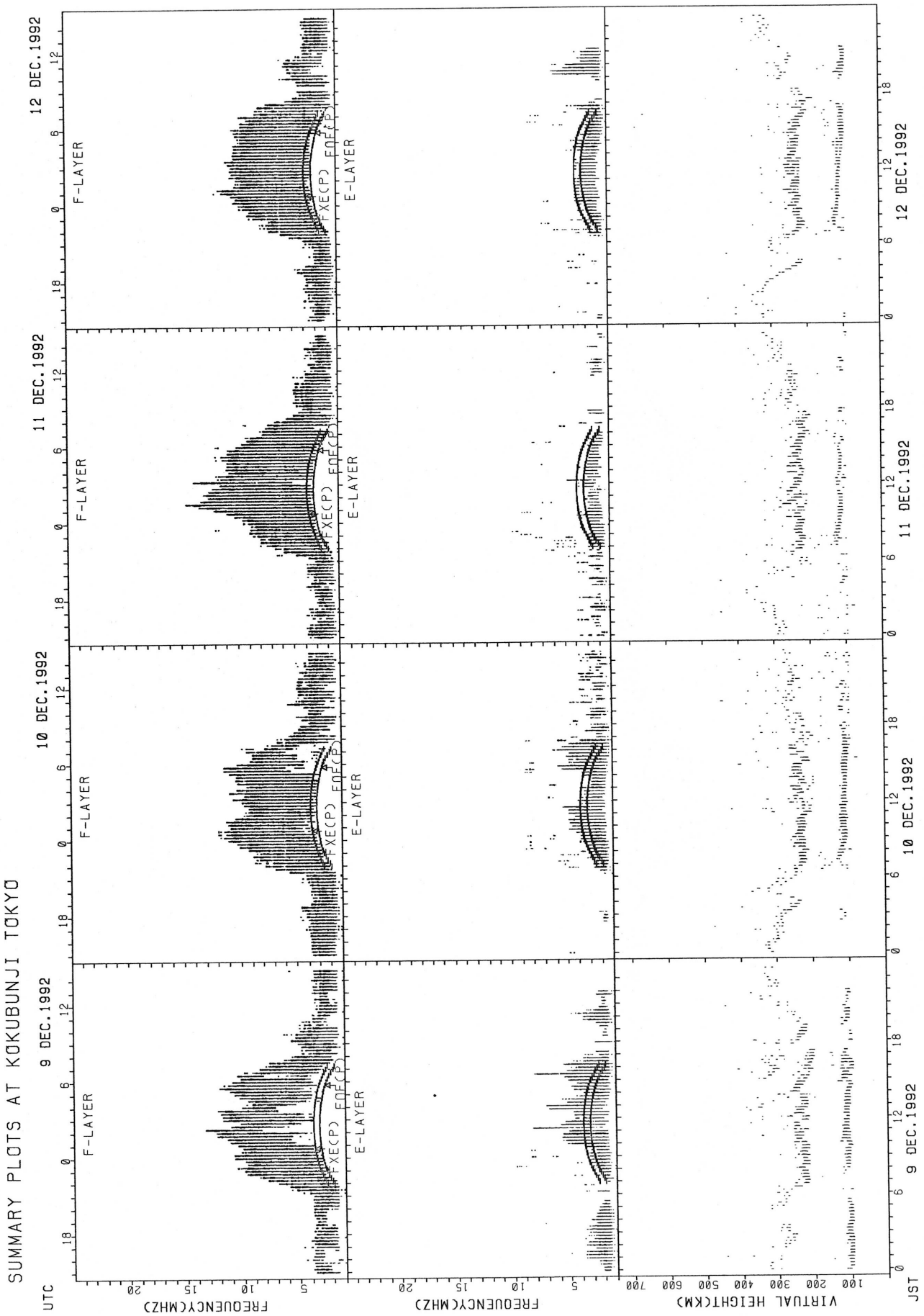
SUMMARY PLOTS AT KOKUBUNJI TOKYO
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E-LAYER
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FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
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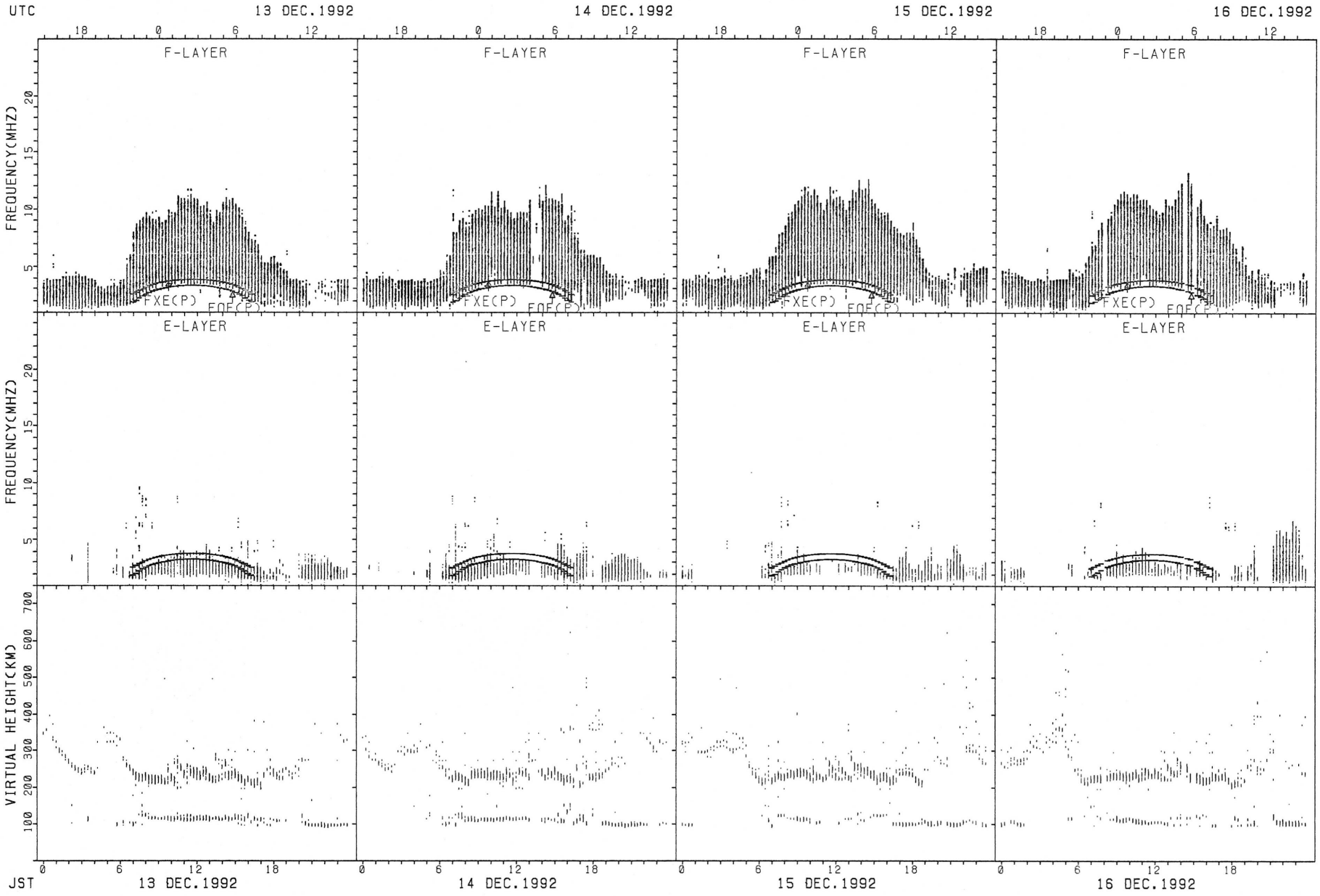
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT KOKUBUNJI TOKYO



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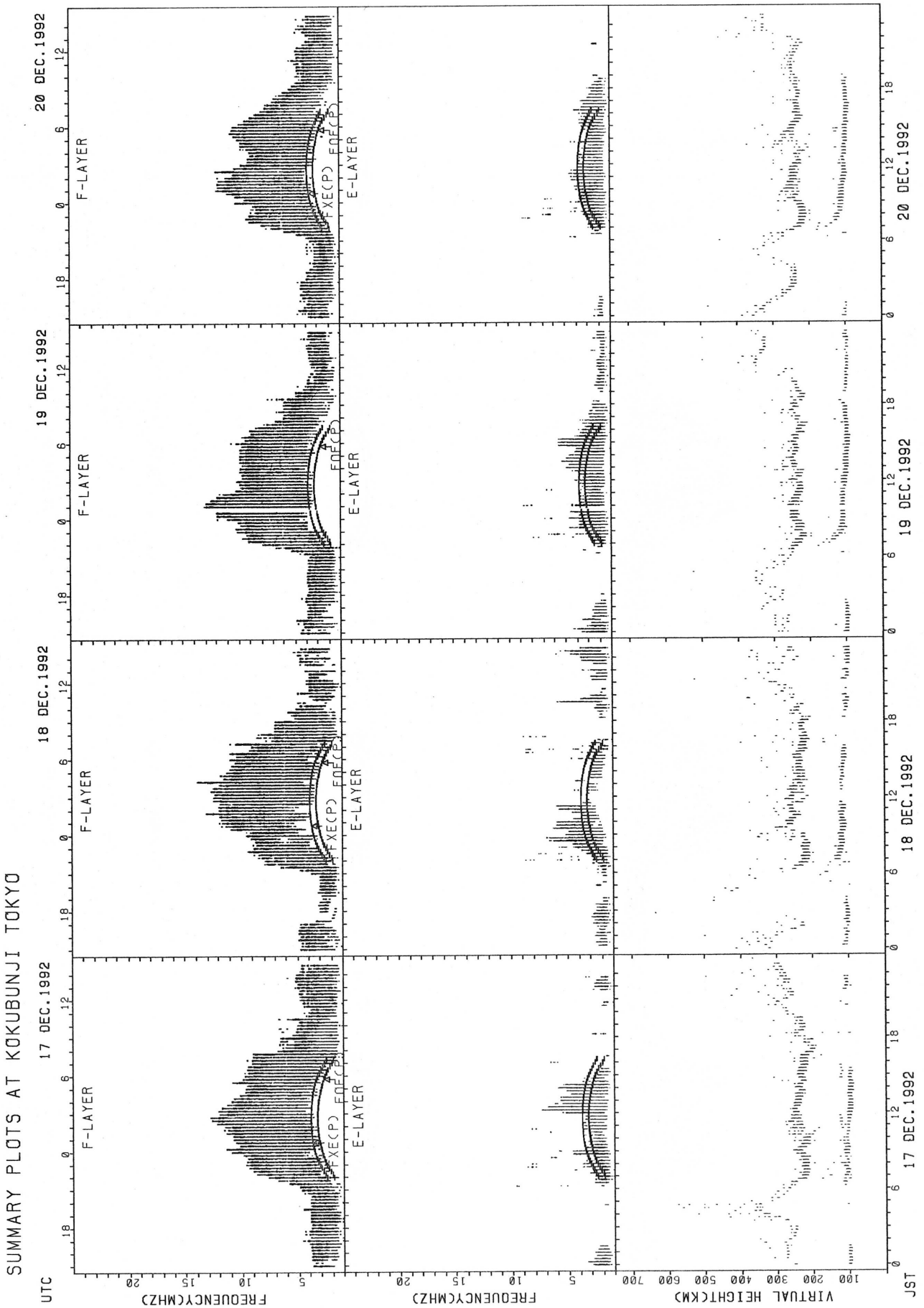
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E-LAYER
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FOE(P)
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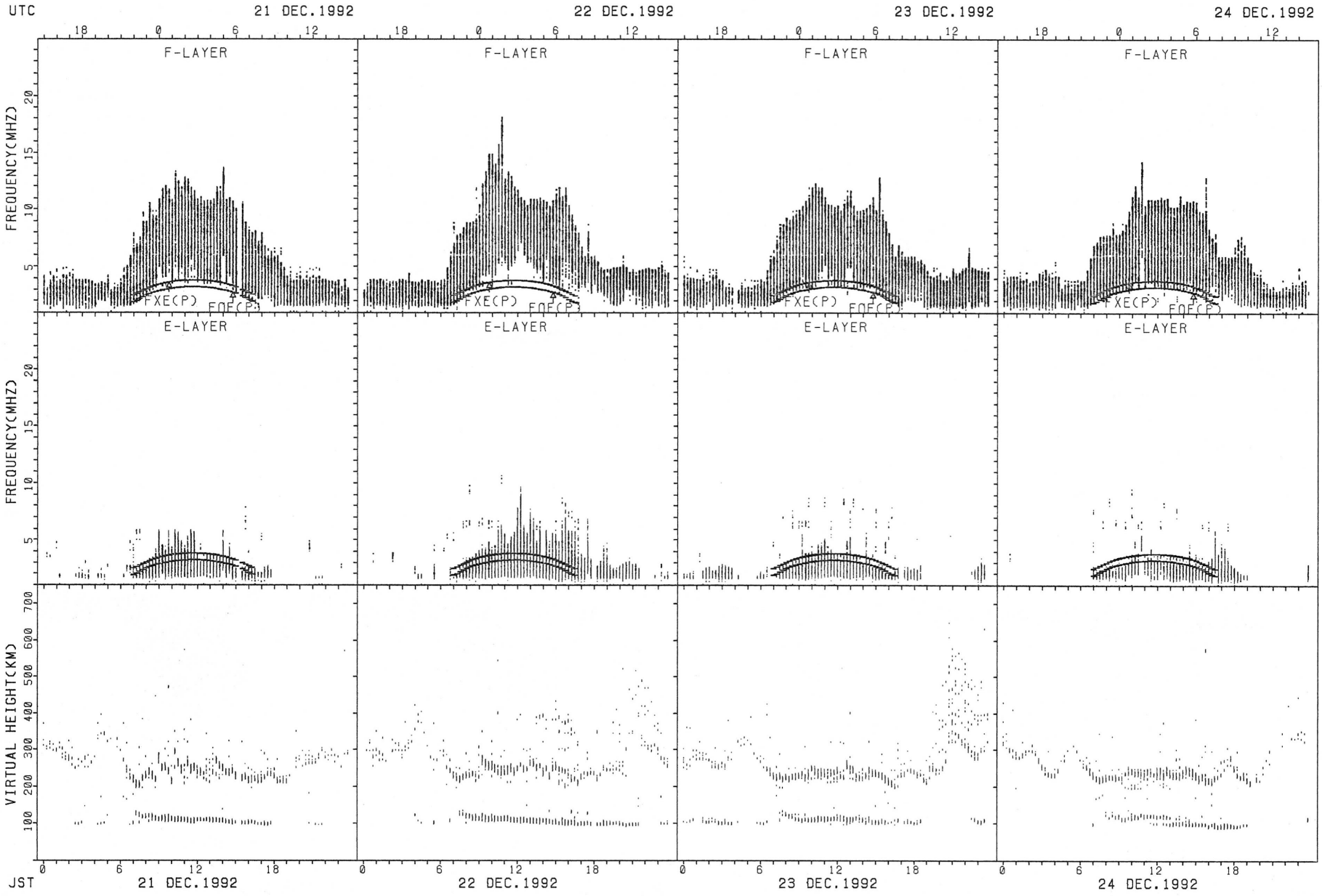
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FOE(P)
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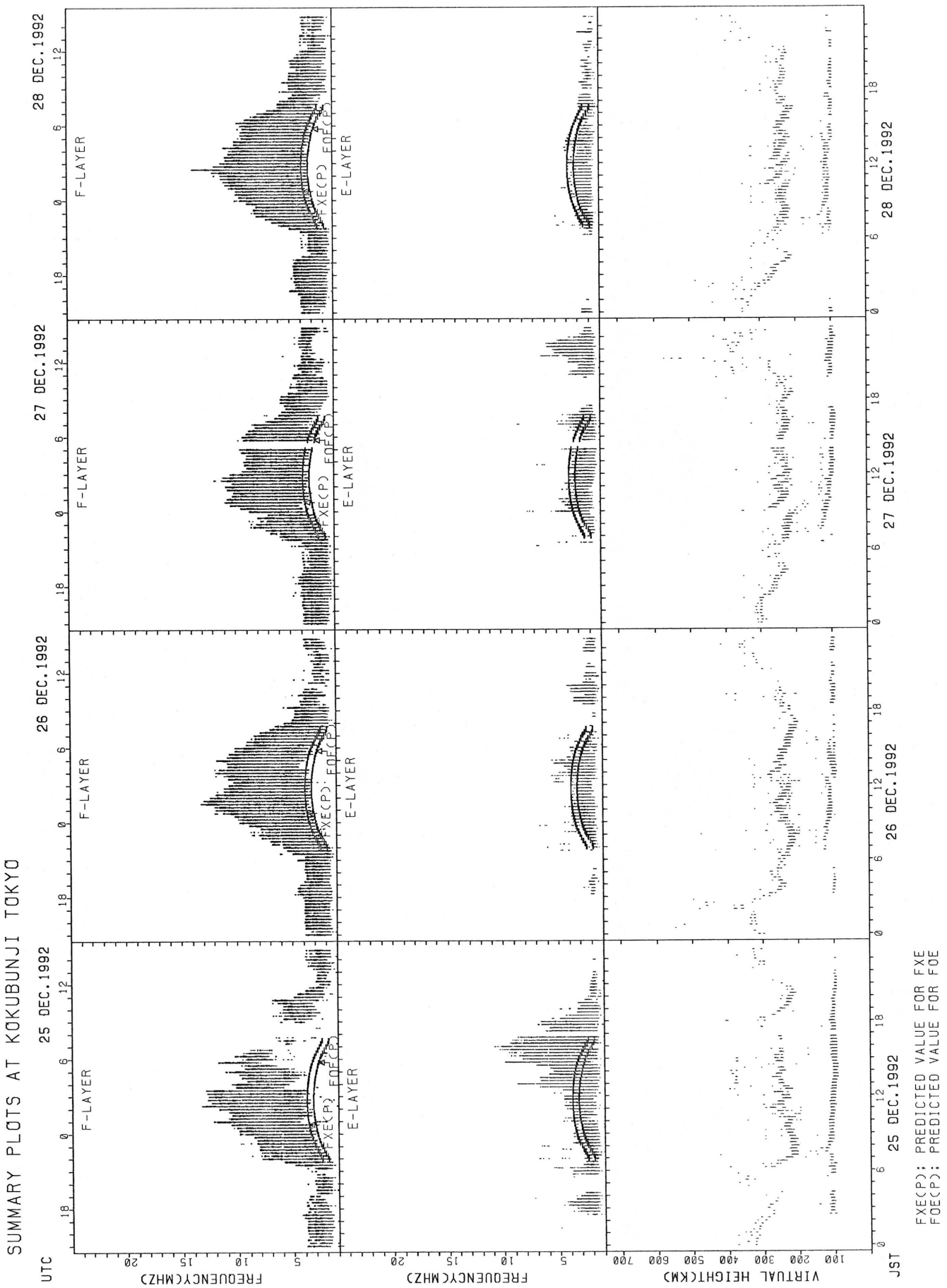
SUMMARY PLOTS AT KOKUBUNJI TOKYO
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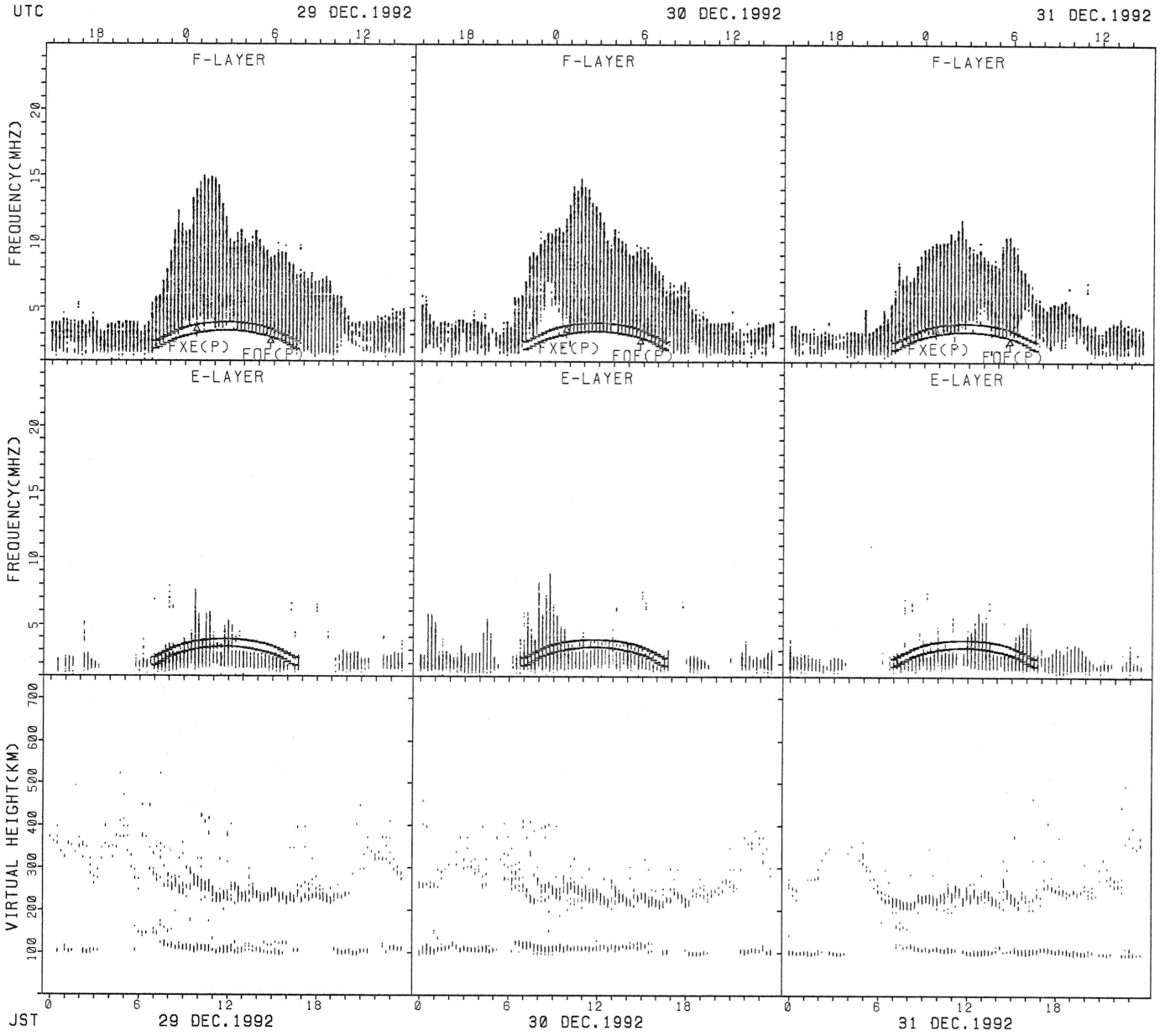
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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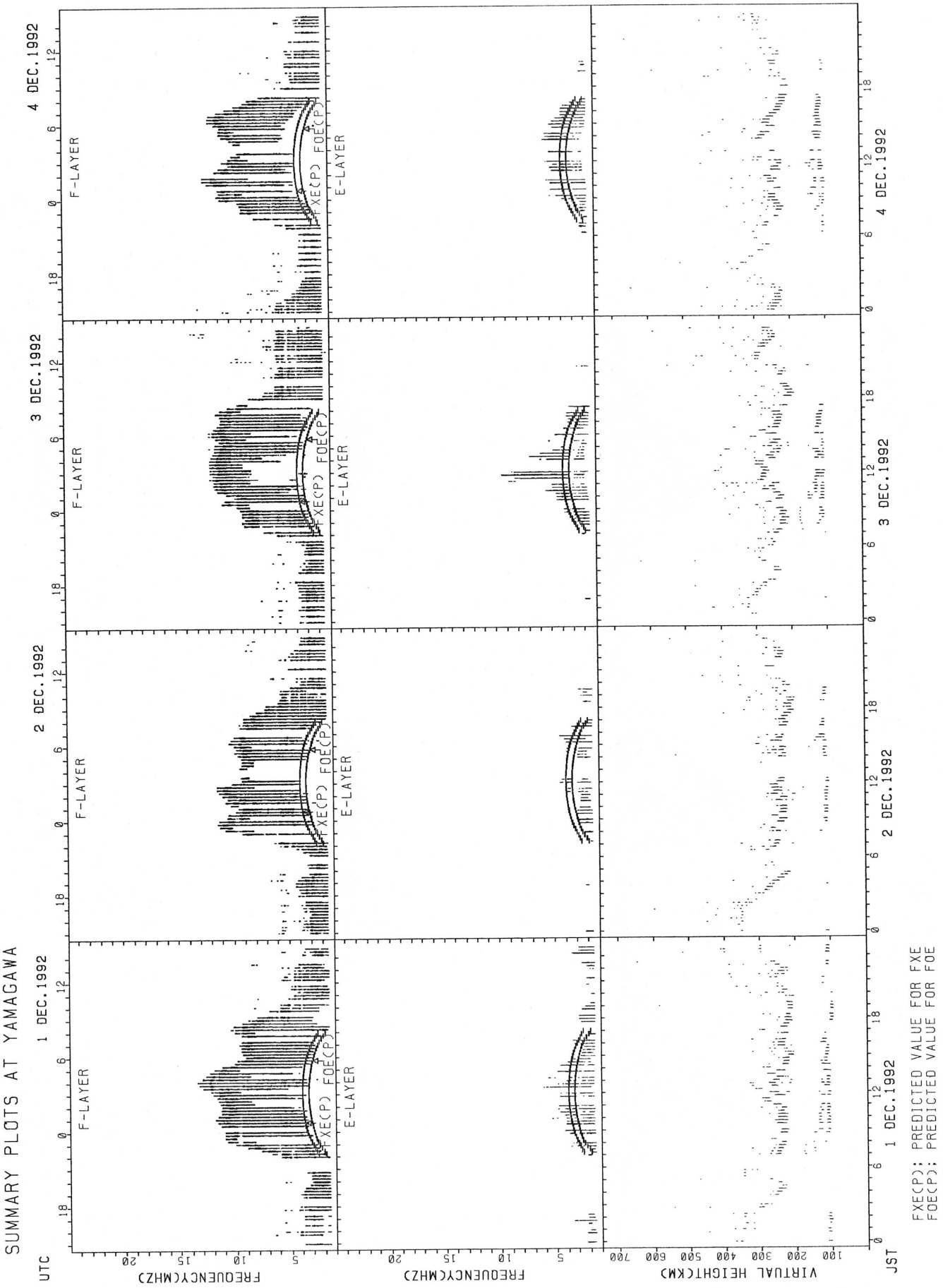
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FOE(P)
FREQUENCY(MHZ)
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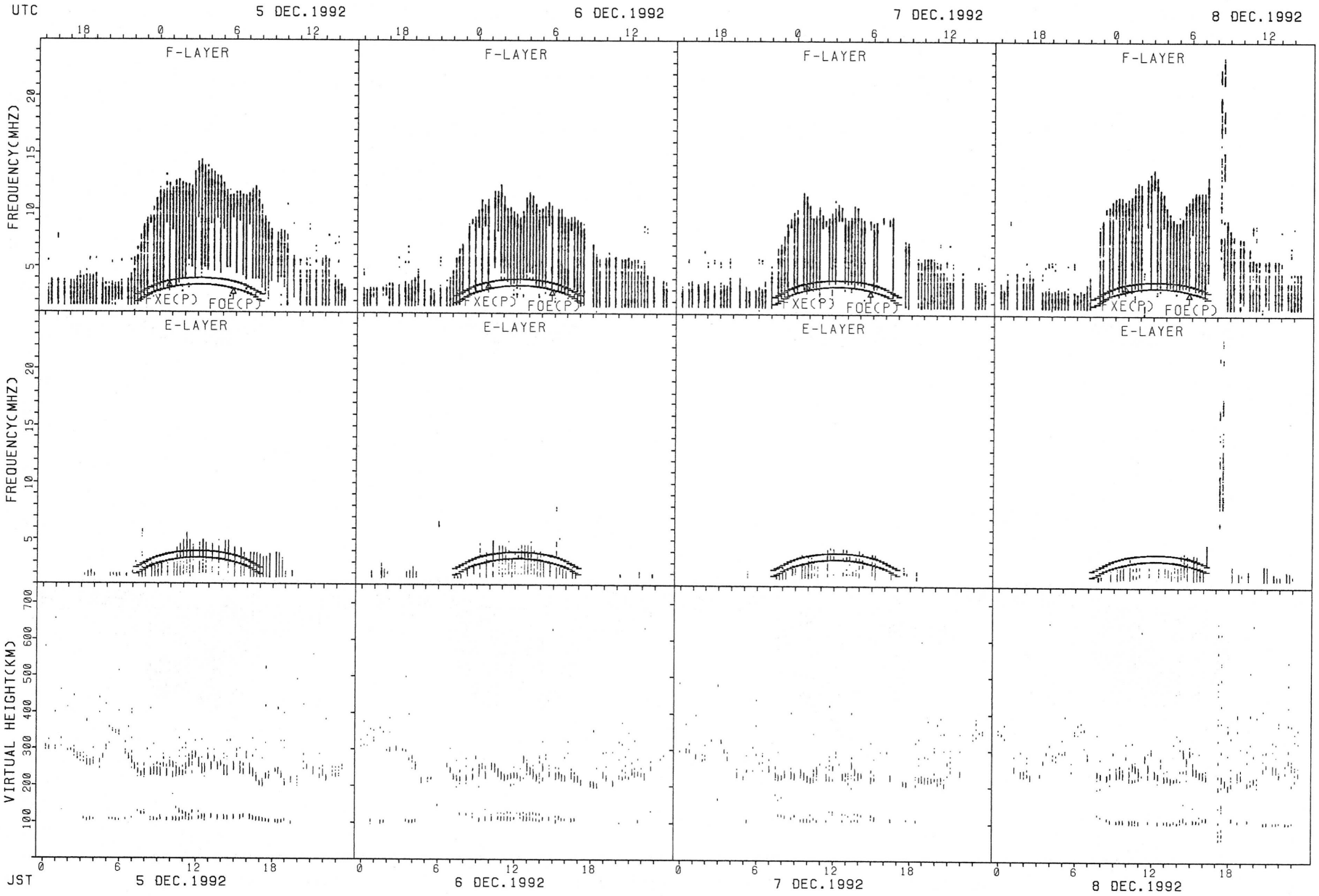
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



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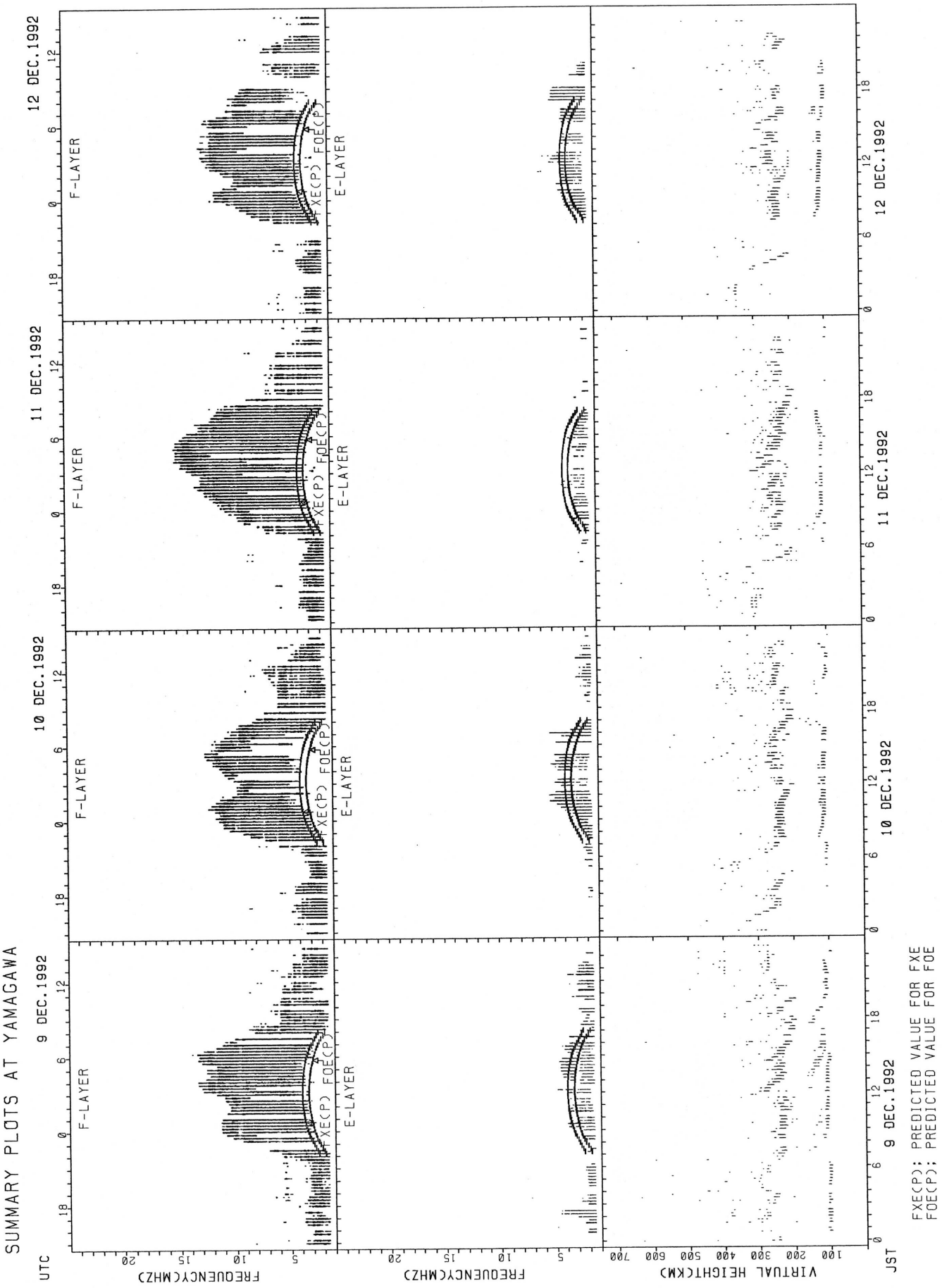
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JST
F-LAYER
E-LAYER
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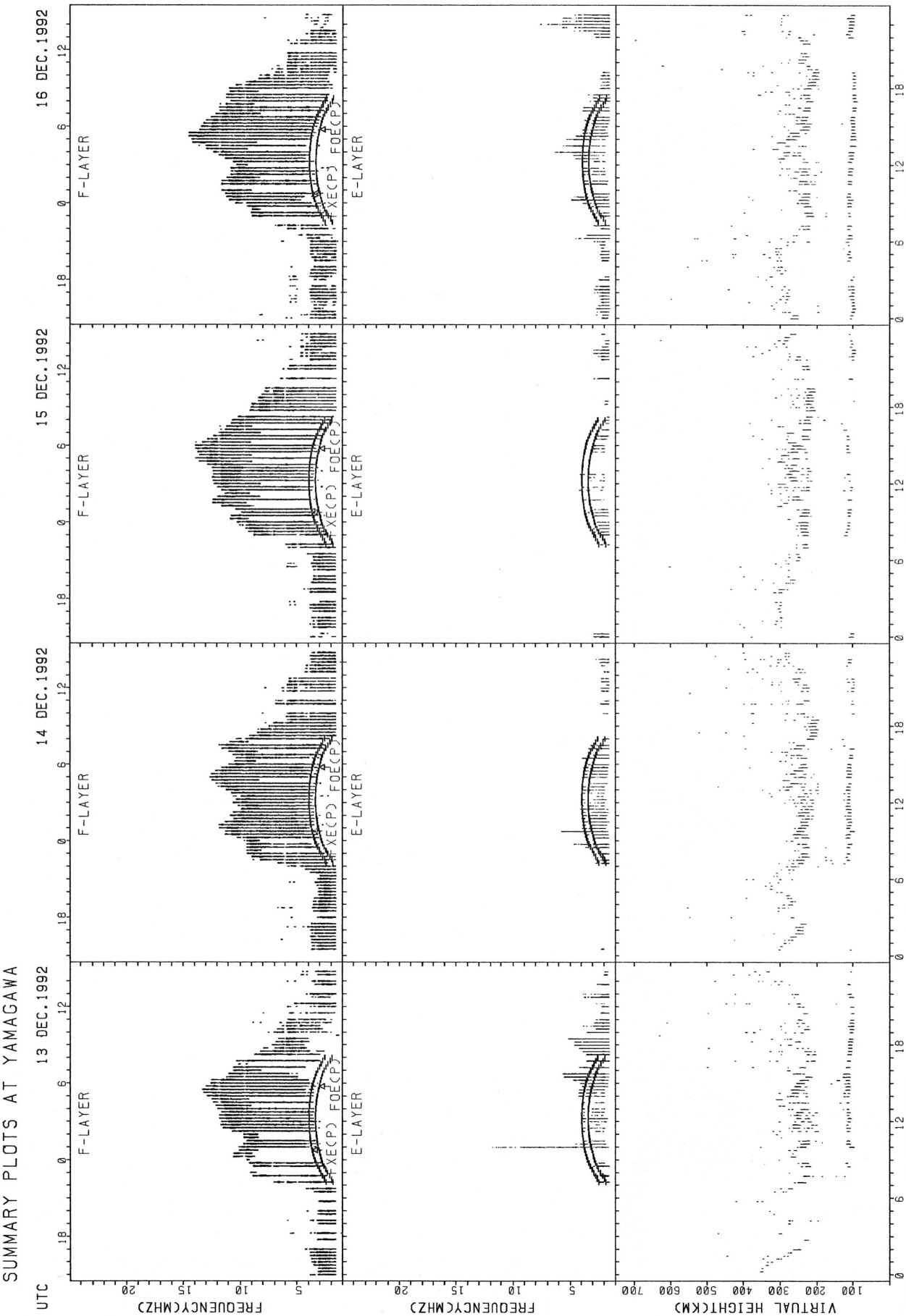
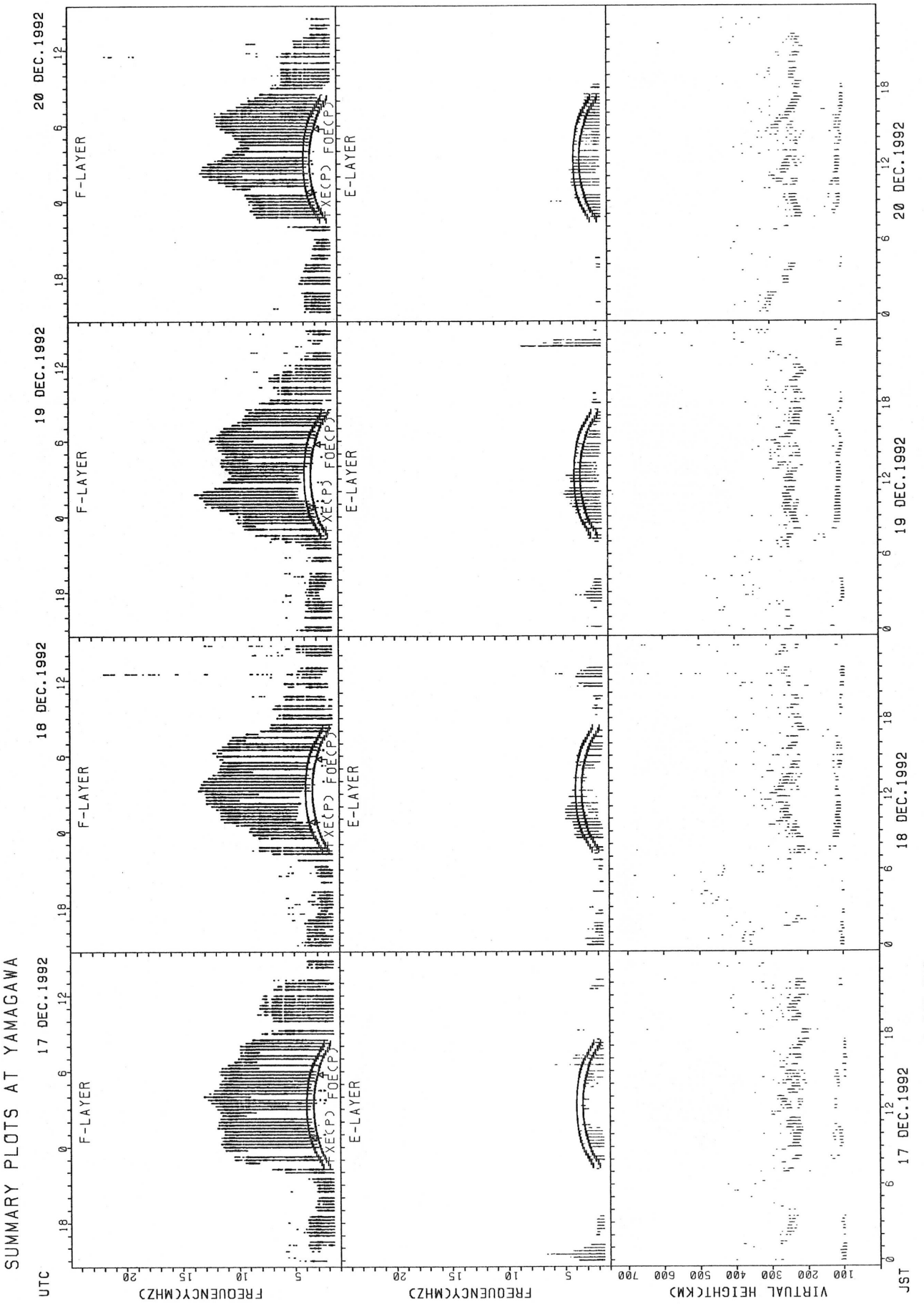
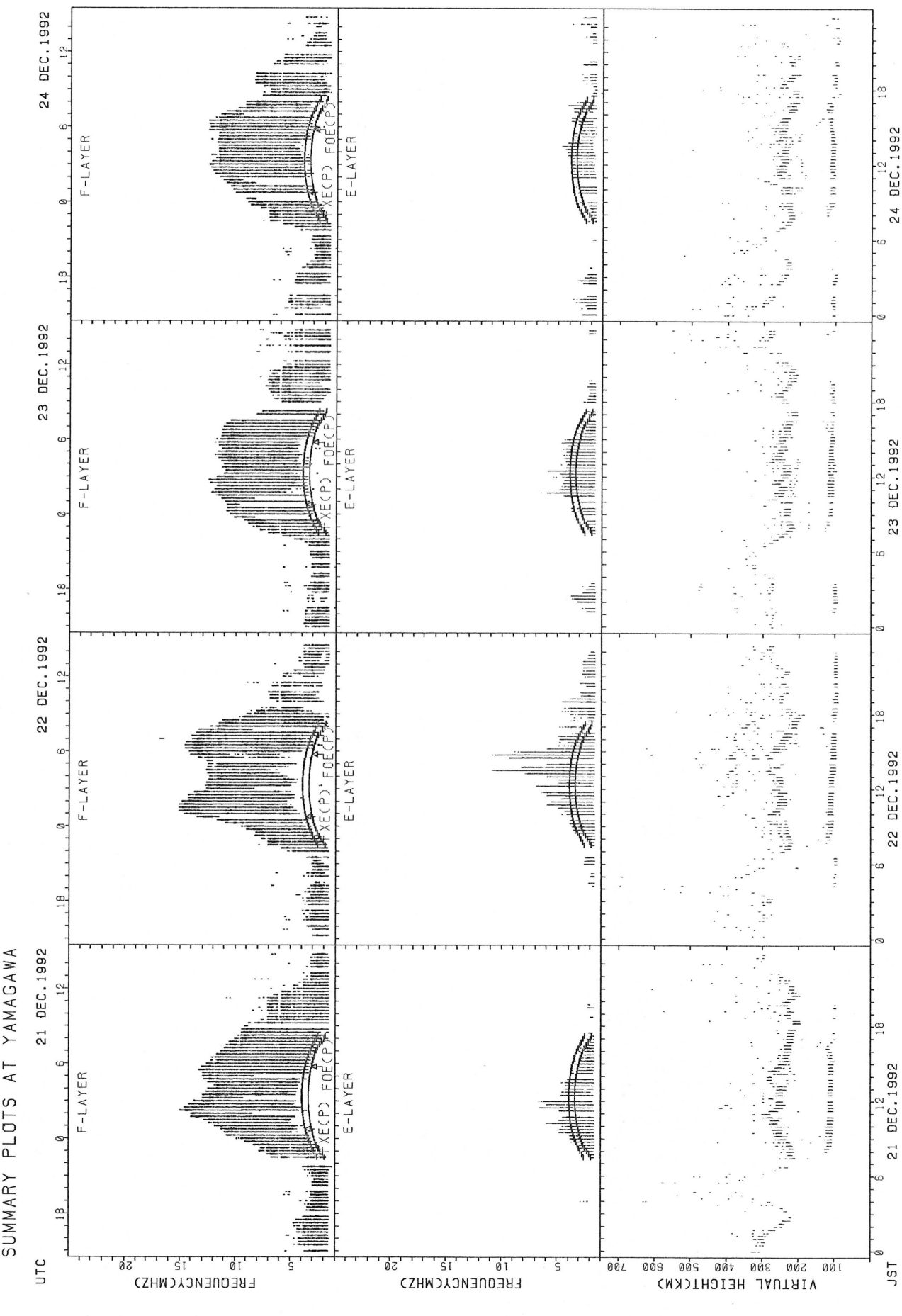
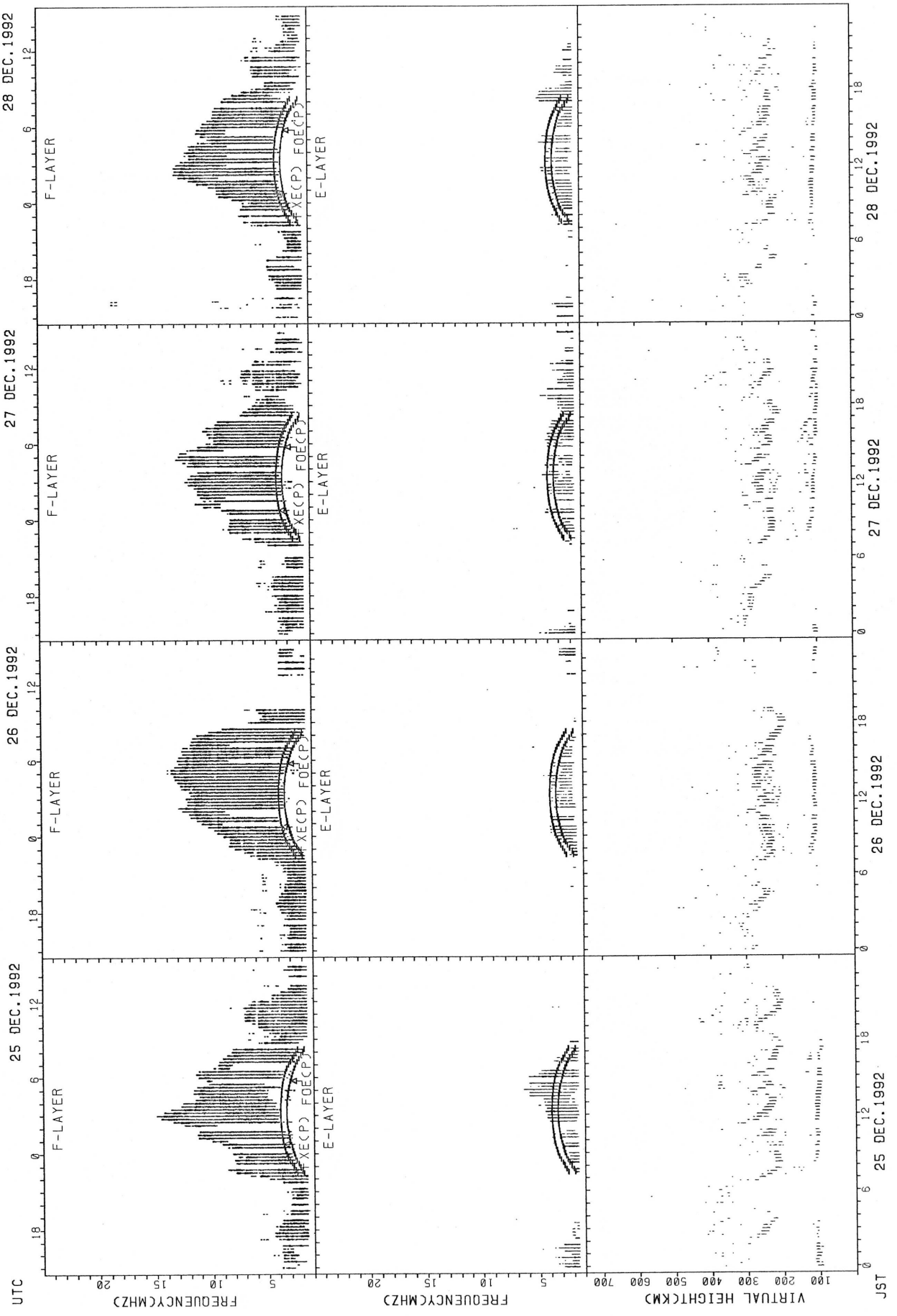
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

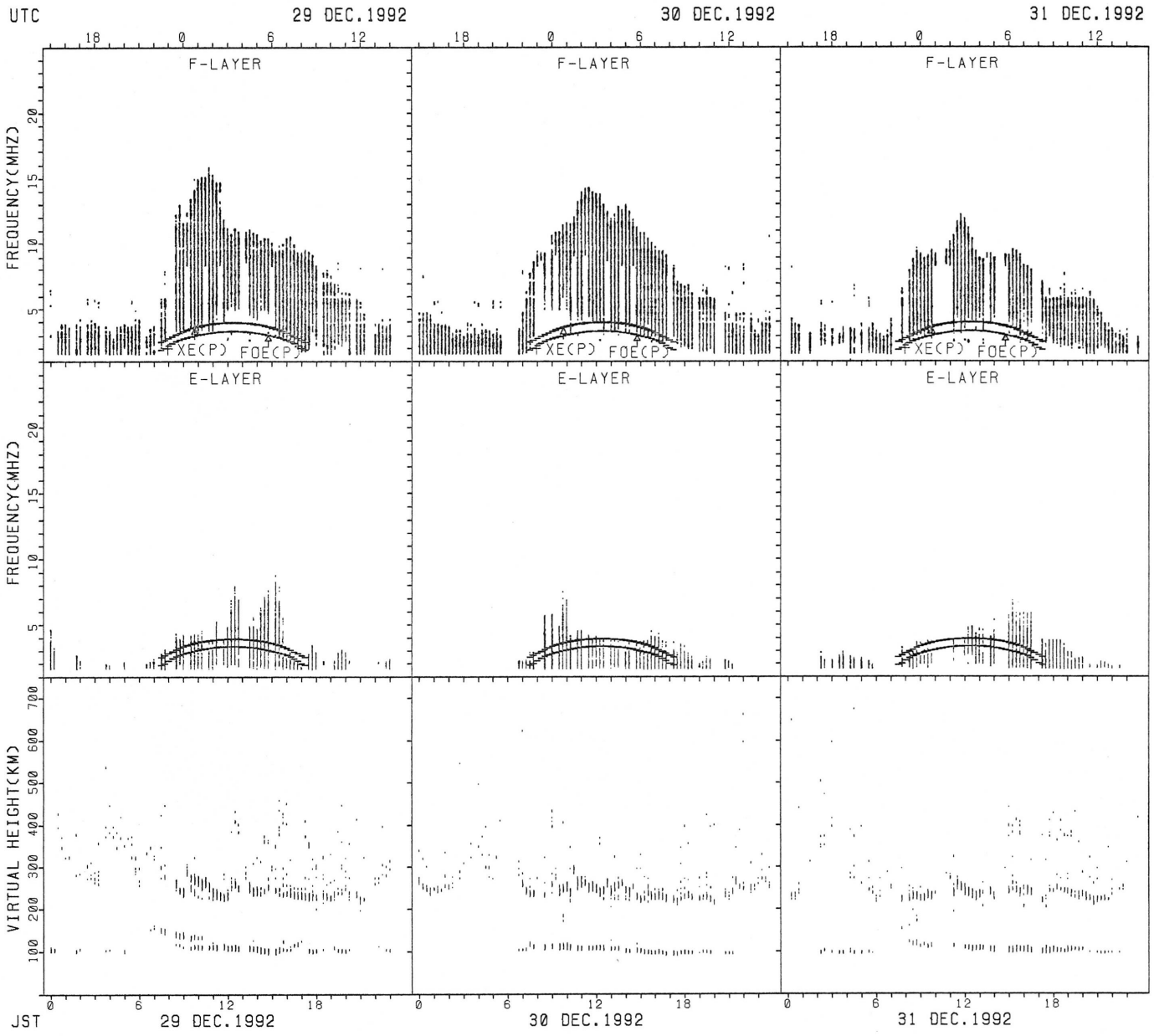

SUMMARY PLOTS AT YAMAGAWA
UTC
13 DEC.1992
14 DEC.1992
15 DEC.1992
16 DEC.1992
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
17 DEC.1992
18 DEC.1992
19 DEC.1992
20 DEC.1992
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

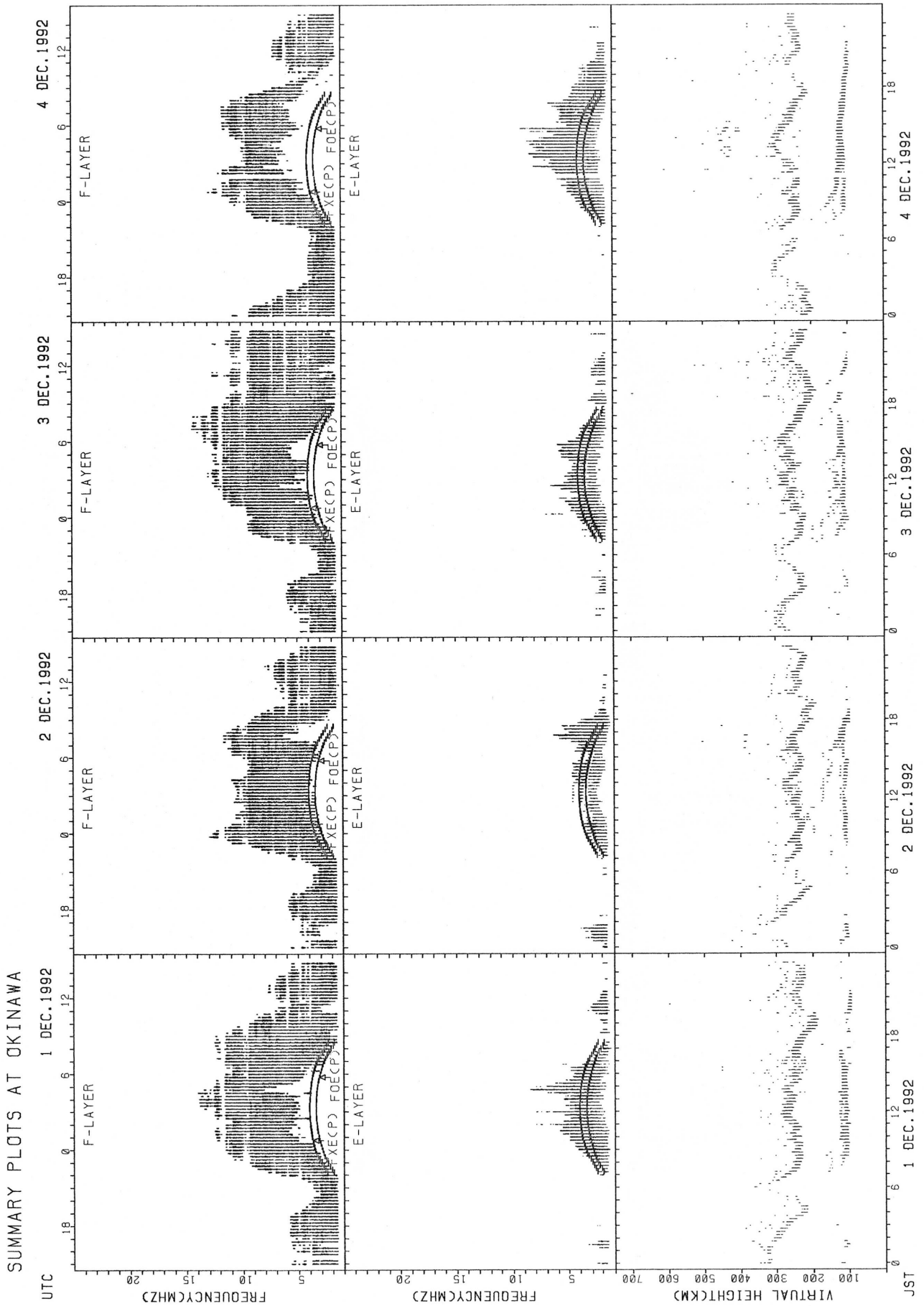

SUMMARY PLOTS AT YAMAGAWA
UTC
21 DEC.1992
22 DEC.1992
23 DEC.1992
24 DEC.1992
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

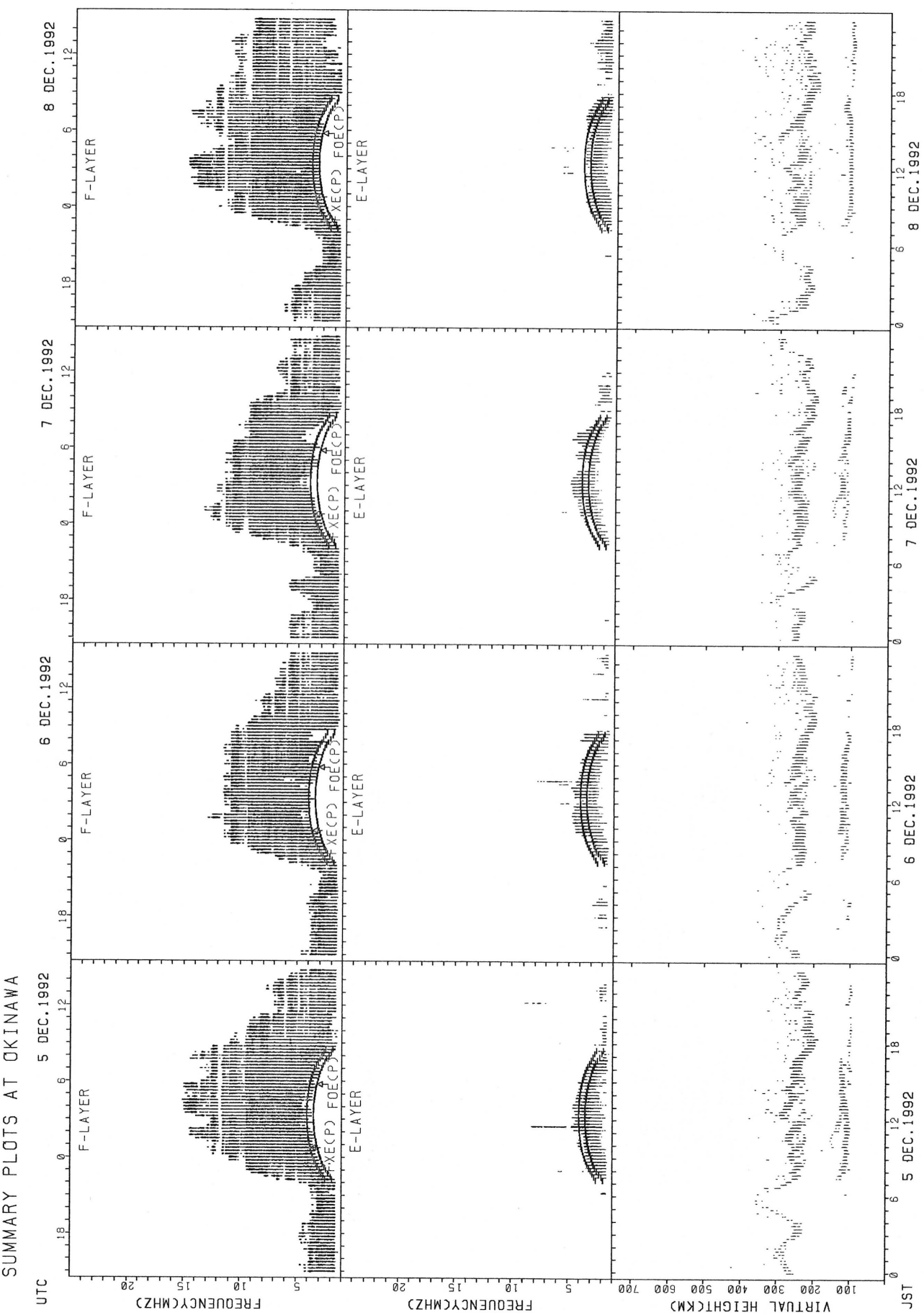

SUMMARY PLOTS AT YAMAGAWA
25 DEC.1992
26 DEC.1992
27 DEC.1992
28 DEC.1992
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

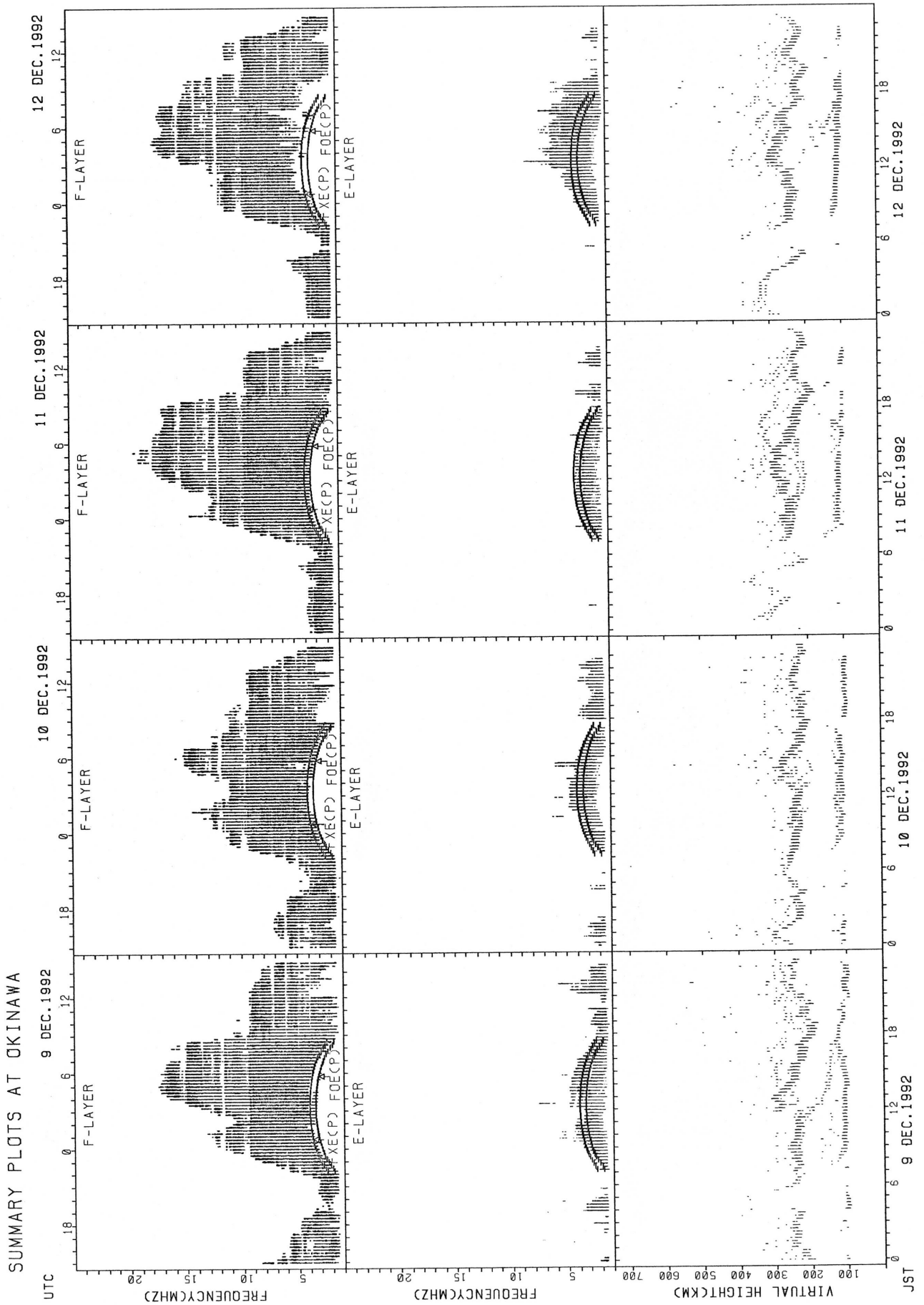
SUMMARY PLOTS AT YAMAGAWA



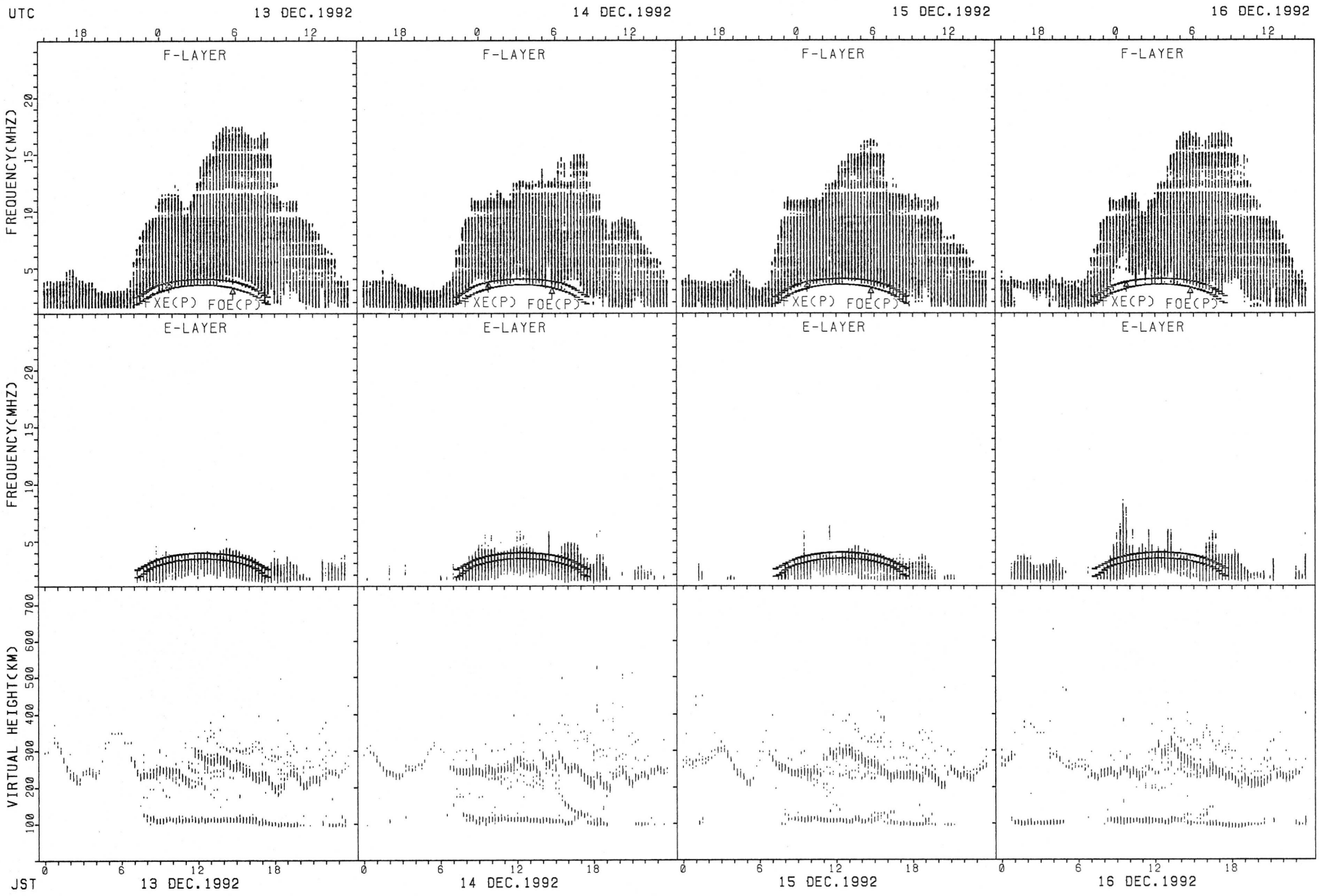
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
1 DEC.1992
2 DEC.1992
3 DEC.1992
4 DEC.1992
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

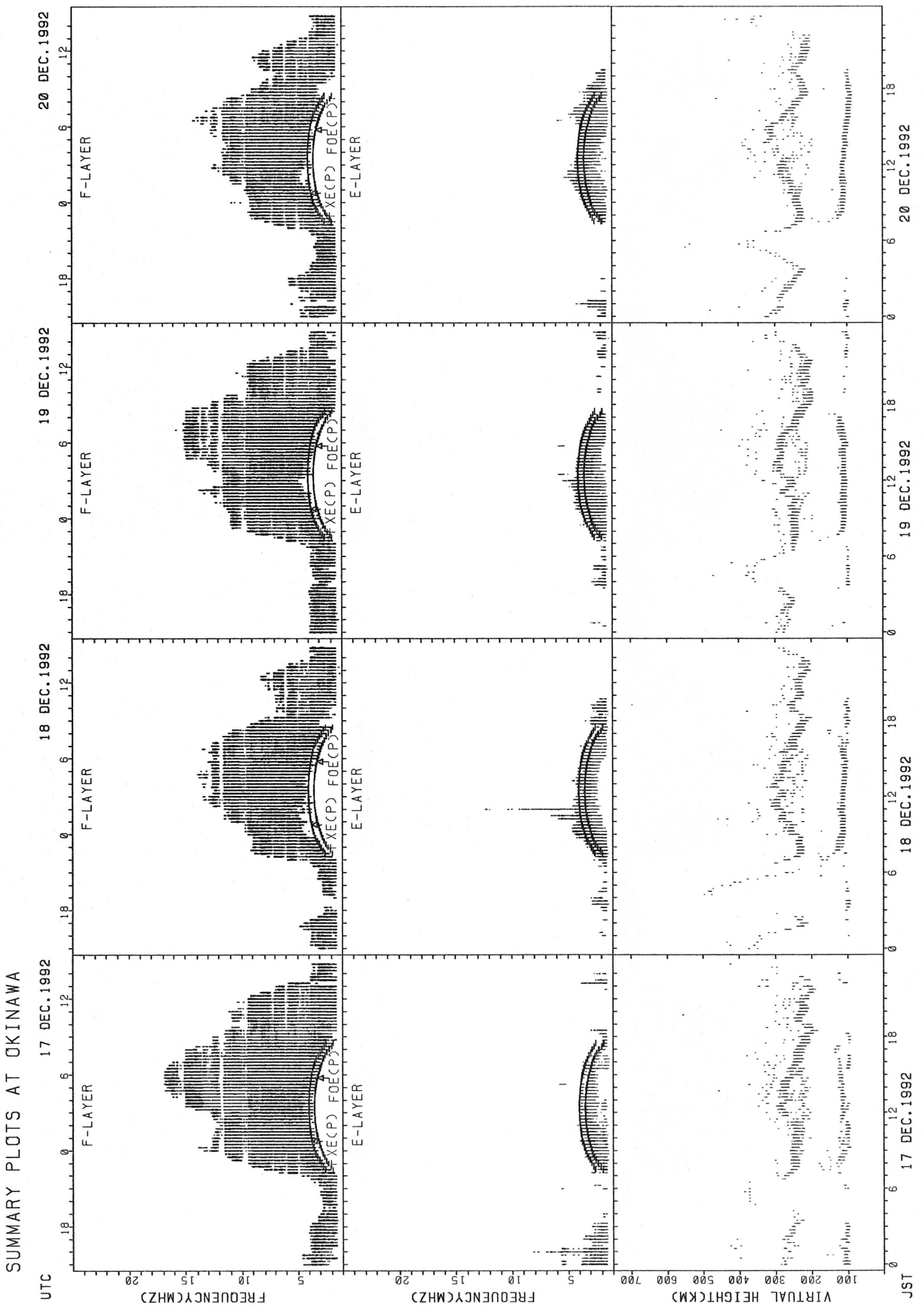

SUMMARY PLOTS AT OKINAWA
UTC
JST
5 DEC.1992
6 DEC.1992
7 DEC.1992
8 DEC.1992
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

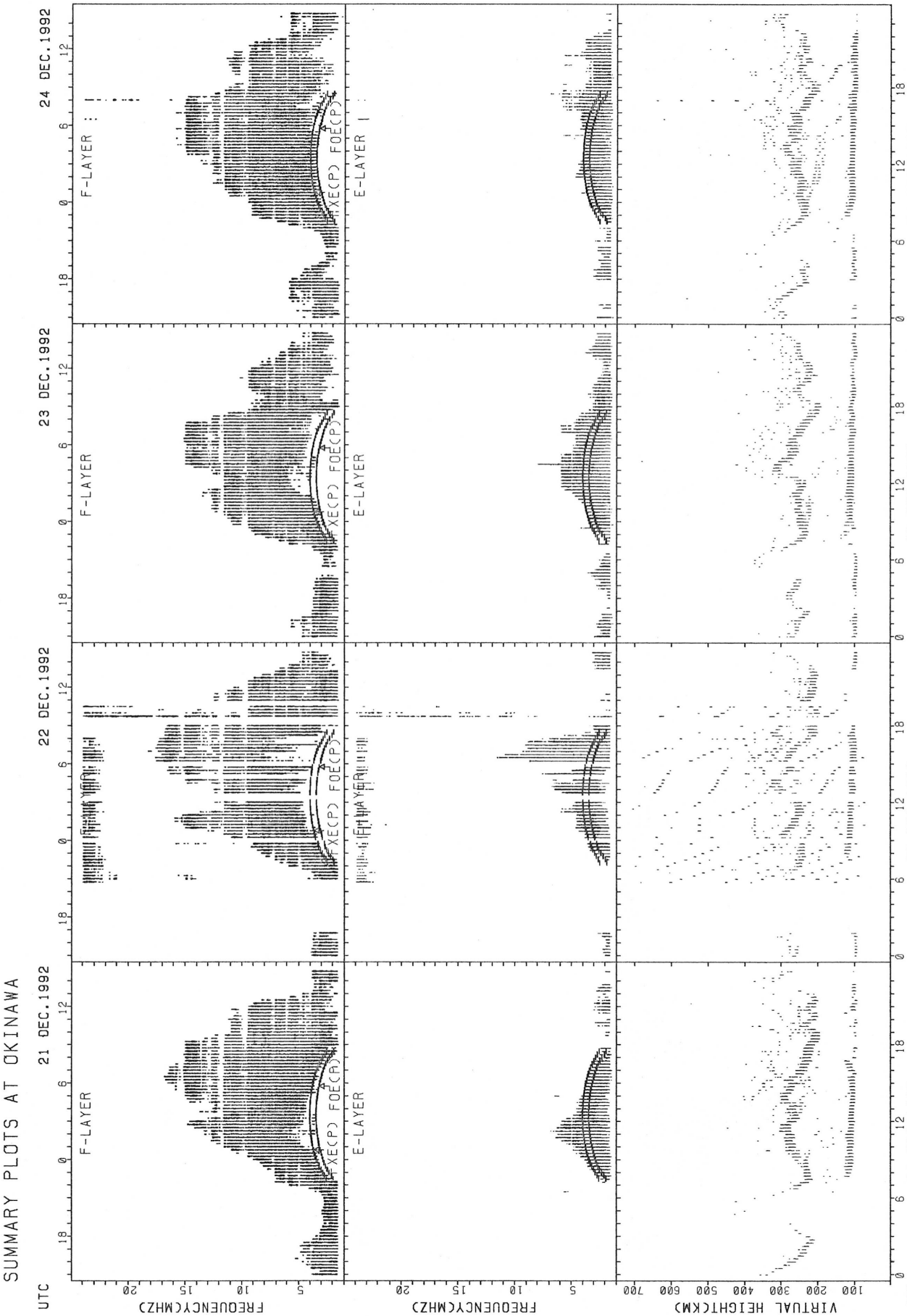

SUMMARY PLOTS AT OKINAWA
9 DEC.1992
10 DEC.1992
11 DEC.1992
12 DEC.1992
UTC
JST
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P) FOE(P)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

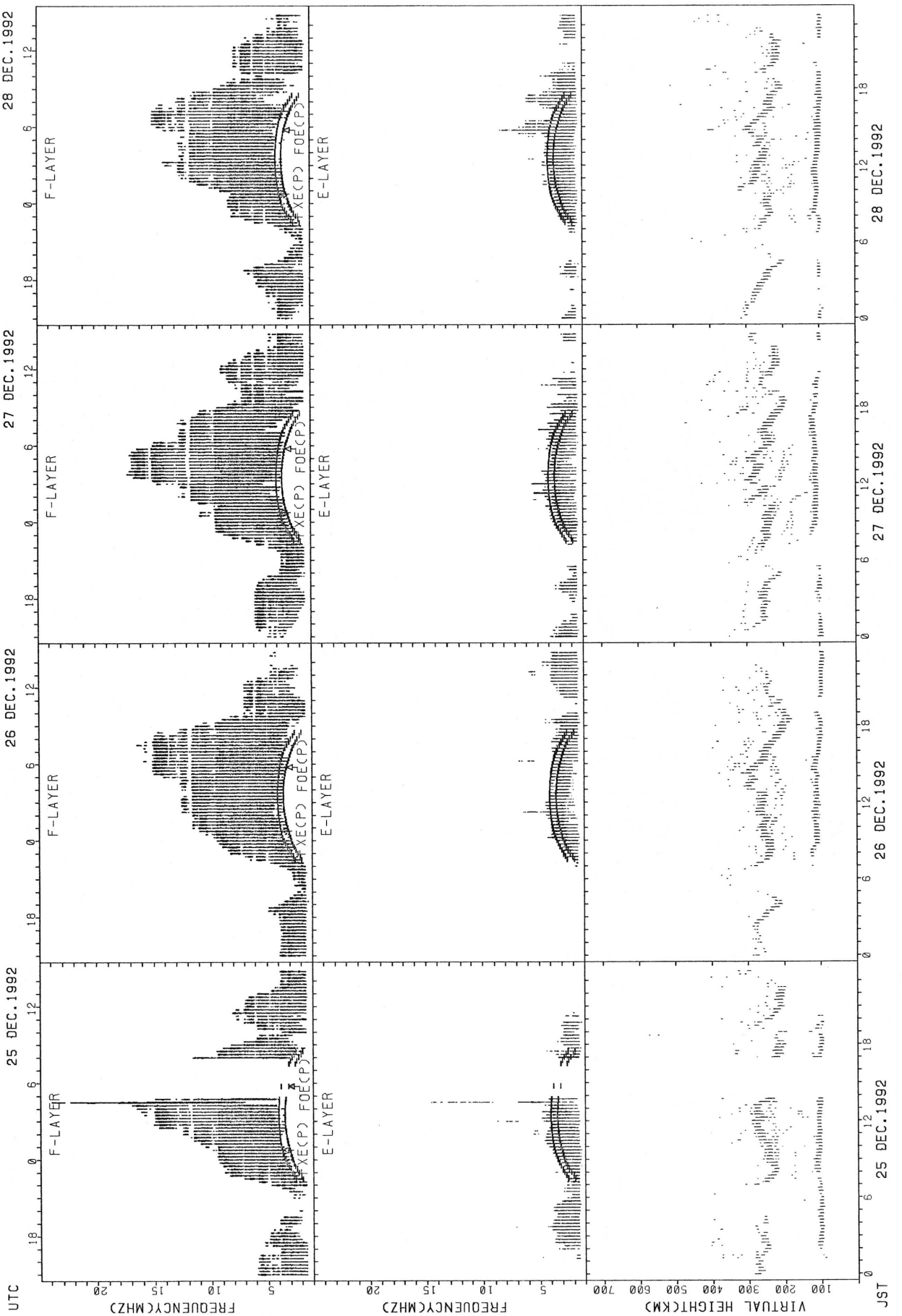
SUMMARY PLOTS AT OKINAWA



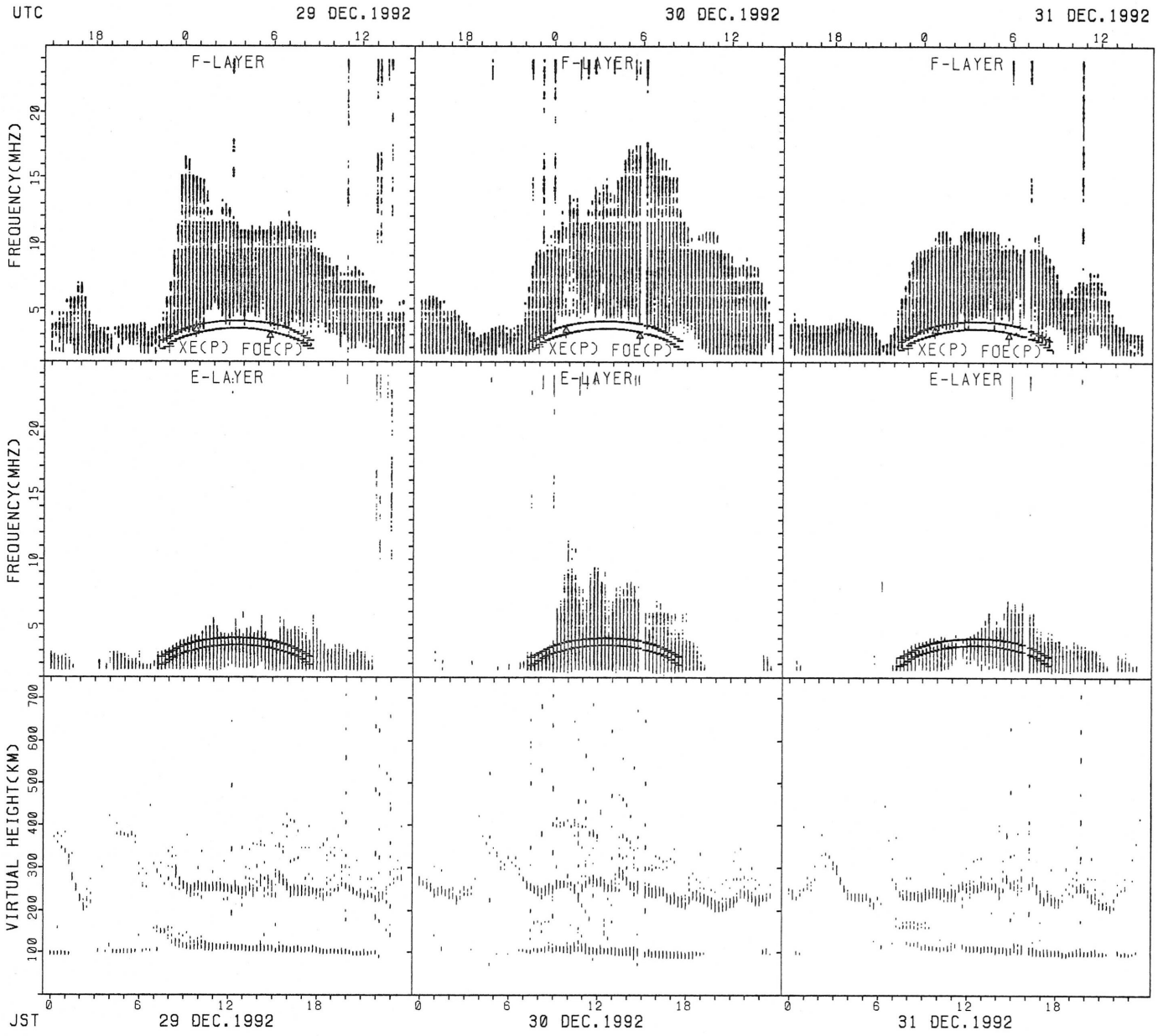
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
17 DEC.1992
18 DEC.1992
19 DEC.1992
20 DEC.1992
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
21 DEC.1992
22 DEC.1992
23 DEC.1992
24 DEC.1992
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
25 DEC.1992
26 DEC.1992
27 DEC.1992
28 DEC.1992
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



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

MONTHLY MEDIANS OF H'F AND H'ES

DEC. 1992 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									27	30	31	31	31	31	31	31	15							
MED									238	234	236	232	236	240	236	232	248							
U Q									246	242	240	236	248	248	246	238	264							
L Q									226	226	226	224	230	236	228	224	238							

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT			11																		12			
MED			113																		109			
U Q			127																		113			
L Q			113																		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									29	30	31	31	31	30	30	31	16							
MED									240	234	238	236	242	244	248	242	248							
U Q									245	250	248	242	256	258	254	250	253							
L Q									231	230	234	232	232	228	242	230	242							

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT			12	10	10			12	14	13	15	16	16	15	15	11	18	16	16	15	13	15	14	
MED			104	108	108			120	125	113	113	113	109	111	109	109	101	99	103	103	105	103	103	
U Q			107	111	109			154	181	120	123	120	114	117	123	125	107	105	107	109	113	113	111	
L Q			101	107	103			107	115	109	111	109	104	107	103	99	99	97	101	101	102	101	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								15	30	31	31	30	31	31	31	30	27	10						
MED								248	232	238	240	236	240	246	244	237	234	268						
U Q								262	240	248	250	244	246	262	254	246	246	272						
L Q								236	224	232	226	228	236	238	238	228	230	246						

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	10	11						17	14	18	20	17	14	16	17	19	19	17	15	14	19	16	12	13
MED	102	105						113	127	115	117	115	111	110	109	107	107	105	105	106	103	103	104	105
U Q	103	107						151	149	119	120	119	115	114	113	117	113	115	111	109	109	109	107	110
L Q	99	101						106	119	113	113	110	105	105	101	103	103	101	103	99	99	99	101	99

MONTHLY MEDIANS OF H'F AND H'ES

DEC. 1992 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									22	26	23	27	29	27	30	28	27	24	12					
MED									240	238	238	248	248	252	254	248	242	234	237					
U Q									250	248	260	258	260	266	264	270	260	244	252					
L Q									230	232	230	238	238	246	244	241	238	229	230					

H'ES

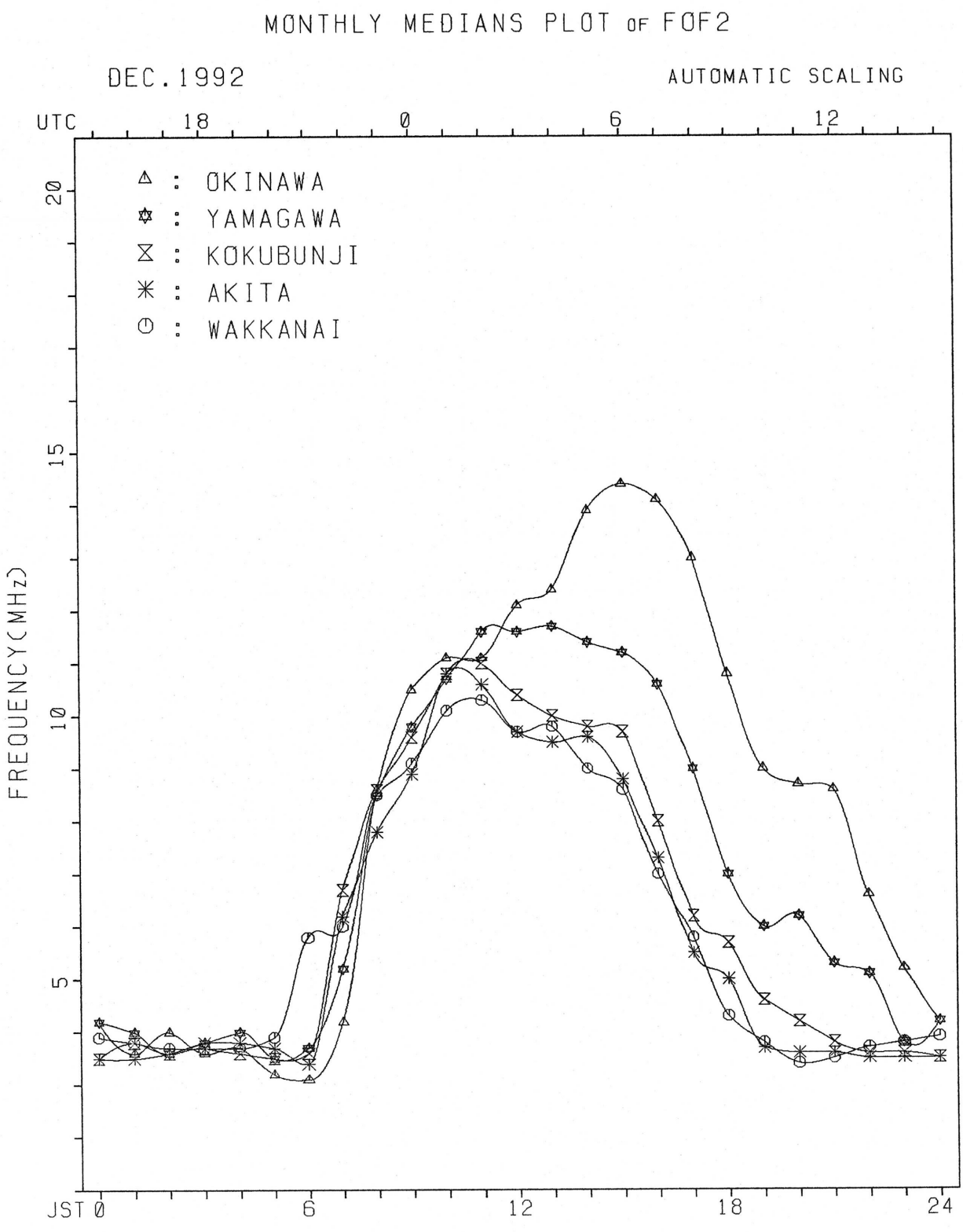
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	10									12	13	15	18	14	16	12	12		14	13				
MED	105									124	117	115	115	113	113	114	119		103	105				
U Q	107									149	119	123	123	119	121	123	124		105	111				
L Q	103									113	115	111	111	109	105	110	104		99	100				

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									29	31	30	30	31	31	31	31	31	31	29	20	21	21	10	
MED									252	244	244	248	264	270	266	256	242	230	226	239	246	258	264	
U Q									260	250	252	260	276	290	278	264	254	234	238	249	284	267	278	
L Q									241	236	236	240	250	252	254	246	232	226	217	227	231	244	244	

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					10				13	20	22	23	25	27	23	26	27	26	23	21	15	10	14	10
MED					103				119	119	122	119	115	115	113	119	115	108	103	101	105	103	101	101
U Q					105				158	131	129	131	119	125	125	125	131	123	111	110	107	107	105	105
L Q					101				115	112	113	113	110	109	109	113	107	103	99	99	101	99	99	101


MONTHLY MEDIANS PLOT OF FOF2
DEC.1992
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. 1992 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 39	X 38	X 38	X 41	X 40	X 38	X 51											X 72	X 62	X 47	X 47	X 45	X 39	X 39
2	X 39	X 42	X 44	X 46	X 45	X 46	X 42											X 73	X 67	X 53	X 38	X 39	X 39	X 39
3	X 41	X 40	X 41	X 42	X 41	X 43	X 44											X 79	X 56	X 43	X 40	X 45	X 44	X 48
4	X 50	X 44	X 36	X 37	X 38	X 38	X 40											X 57	X 46	X 45	X 42	X 39	X 38	X 40
5	X 40	X 42	X 42	X 46	X 44	X 39	X 39											X 70	X 52	X 46	X 46	X 47	X 33	X 33
6	X 35	X 36	X 38	X 39	X 40	X 35	X 36											X 54	X 55	X 50	X 42	X 41	X 34	X 35
7	X 37	X 38	X 38	X 38	X 38	X 40	X 43											X 53	X 50	X 42	X 37	X 39	X 37	X 36
8	X 37	X 41	X 42	X 35	X 36	X 36	X 38											X 78	X 58	X 49	X 43	X 39	X 38	X 40
9	X 39	X 41	X 42	X 40	X 38	X 40	X 41											X 58	X 52	X 50	X 42	X 36	X 39	X 39
10	X 38	X 42	X 41	X 44	X 38	X 38	X 42											X 61	X 48	X 43	X 44	X 49	X 45	X 43
11	X 40	X 37	X 36	X 35	X 36	X 37	X 33											X 66	X 46	X 51	X 45	X 37	X 36	X 35
12	X 36	X 36	X 37	X 38	X 41	X 32	X 36											X 66	X 44	X 49	X 57	X 40	X 37	X 38
13	X 38	X 40	X 44	X 43	X 35	X 34	X 37											X 59	X 58	X 47	X 39	X 36	X 37	X 40
14	X 41	X 44	X 41	X 39	X 39	X 38	X 42											X 65	X 61	X 47	X 44	X 39	X 40	X 41
15	X 42	X 42	X 41	X 41	X 40	X 44	X 48											X 80	X 81	X 47	X 44	X 41	45	50
16	X 48	X 45	X 38	X 39	X 39	X 39	X 44											X 84	X 74	X 45	X 47	X 39	X 40	A
17	X 39	X 39	X 43	X 41	41	X 39	X 44											X 69	X 54	X 51	X 43	X 47	X 51	X 50
18	X 47	X 48	X 45	X 32	X 34	X 31	X 38											X 72	X 64	X 53	X 42	X 41	X 45	X 49
19	X 45	X 44	X 42	X 42	X 41	X 39	X 40											X 61	X 59	X 47	X 38	X 34	X 39	X 39
20	X 39	X 41	X 47	X 42	X 36	X 35	X 37											X 73	X 55	X 47	X 47	X 49	X 39	X 41
21	X 43	X 42	X 44	X 41	X 38	X 37	X 38											X 72	X 66	X 45	X 43	X 43	X 41	X 39
22	X 36	X 39	X 38	X 40	X 39	X 41	X 40											X 69	X 60	X 47	X 49	46	49	X 50
23	X 45	X 41	X 43	X 39	C	X 36	X 37											X 65	X 61	X 45	42	41	50	48
24	X 46	X 44	X 39	X 45	X 39	X 36	X 38											X 63	X 70	X 65	X 43	X 35	X 35	X 38
25	X 38	X 39	X 40	X 40	X 37	X 33	X 34											A	X 53	X 64	X 51	X 30	X 33	X 36
26	X 38	X 39	X 40	X 42	X 42	X 40	X 40											X 58	X 49	X 45	X 40	X 33	X 34	X 36
27	X 38	X 39	X 40	X 40	X 40	X 36	X 36											X 58	X 59	X 45	X 45	41	43	42
28	X 39	41	X 43	X 45	X 45	X 33	X 34											X 57	X 52	X 52	X 48	X 38	X 39	X 40
29	X 40	X 41	X 39	X 41	X 39	X 38	X 35											X 76	X 72	X 66	X 45	X 40	X 43	X 46
30	X 53	X 41	X 38	X 40	X 39	X 34	X 35											X 62	X 61	X 44	X 41	X 37	X 34	X 36
31	X 40	X 34	X 34	X 35	X 35	X 35	X 37											X 52	X 56	X 48	X 40	X 34	X 39	X 38
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	30	31	31											30	31	31	31	31	31	30
MED	X 39	X 41	X 41	X 40	X 39	X 38	X 38											X 66	X 58	X 47	X 43	X 39	X 39	X 40
U Q	X 43	X 42	X 43	X 42	X 41	X 39	X 42											X 72	X 62	X 51	X 46	X 43	X 43	X 43
L Q	X 38	X 39	X 38	X 39	X 38	X 35	X 36											X 58	X 52	X 45	X 41	X 37	X 37	X 38

DEC. 1992 FXI (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1992 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	33	32	32	35	34	32	45	58	104	115	117	110	105	118	109	82	81	66	56	41	41	39	33	33
2	33	36	38	40	39	40	36	66	84	97	109	120	96	87	88	87	73	67	61	47	32	33	33	34
3	35	34	35	36	35	37	38	77	88	97	109	111	V 104	111	101	99	88	73	50	37	34	39	38	42
4	44	38	30	31	32	32	34	71	80	93	113	111	100	94	103	99	86	51	40	39	36	33	32	34
5	34	36	36	40	38	33	33	71	93	121	112	V 118	121	109	89	87	84	64	46	40	40	41	27	27
6	29	30	32	33	34	29	30	63	85	94	101	V 102	95	Z 94	92	H 90	71	48	49	44	36	36	28	29
7	31	32	32	32	32	34	37	62	83	103	86	98	91	96	74	80	68	V 46	44	36	31	33	31	30
8	31	35	36	29	30	30	32	67	95	89	96	105	113	86	80	101	94	72	52	43	37	33	32	34
9	33	35	36	34	32	34	35	65	95	101	101	107	110	97	103	105	77	H 53	46	44	36	30	33	33
10	32	36	35	38	32	32	36	74	83	107	102	91	98	98	99	95	77	55	41	37	38	43	39	37
11	34	31	30	29	31	31	27	61	78	V 85	118	122	112	102	108	96	73	60	40	45	39	31	30	29
12	30	30	31	32	35	26	30	65	79	91	107	96	98	97	89	92	79	60	37	43	51	34	31	32
13	32	34	38	37	29	28	31	72	92	84	93	106	104	92	103	101	75	53	52	41	33	30	31	34
14	35	38	35	33	33	32	36	63	H 84	96	102	98	92	Z 102	V 101	104	87	59	55	41	38	33	34	35
15	36	36	35	35	34	38	42	58	80	102	106	95	105	101	112	100	91	74	75	40	38	35	F 38	41
16	42	39	32	33	33	33	38	58	79	105	106	105	V 92	98	117	105	82	78	68	39	41	33	34	I A 38
17	33	34	37	35	F 33	33	38	72	91	105	99	110	115	105	91	93	85	63	48	45	37	41	45	44
18	41	42	39	27	28	25	32	72	83	77	111	114	118	114	108	99	83	66	58	48	36	35	39	43
19	39	38	36	36	35	33	34	72	97	105	127	109	96	92	94	95	80	55	53	41	32	28	33	R 33
20	33	35	41	36	30	29	31	66	81	87	112	106	92	84	97	99	80	67	49	41	41	43	H 33	36
21	37	36	38	35	32	31	32	62	86	107	104	125	105	103	110	95	75	66	61	39	37	37	35	33
22	30	33	32	34	33	35	34	68	83	100	134	123	109	101	103	110	98	63	54	41	43	F 35	Z 42	43
23	39	35	37	33	I C 29	30	31	61	86	93	113	104	97	98	96	93	76	59	55	39	F 33	F 31	J F 43	F 38
24	39	38	33	39	33	30	32	63	72	73	98	98	104	97	99	101	79	57	64	59	37	29	29	32
25	32	33	34	34	31	27	28	66	75	H 90	95	112	122	92	93	93	I A 72	A	47	58	45	25	27	30
26	32	33	34	36	36	33	34	57	73	91	112	119	102	112	104	94	79	52	44	39	34	27	28	30
27	32	33	34	34	34	30	30	57	75	80	102	103	H 99	87	91	88	72	52	53	39	V 38	F 32	F 35	F 36
28	33	F 34	37	39	39	27	28	51	76	88	90	108	103	H 98	88	90	73	51	46	46	42	32	33	34
29	34	35	33	35	33	32	29	52	90	101	140	148	97	94	97	84	80	70	66	60	39	34	37	40
30	47	35	32	34	33	28	29	67	90	105	123	131	118	95	85	88	73	56	55	38	35	31	28	30
31	34	28	29	29	29	V 29	31	58	65	87	91	97	91	V 81	78	92	65	46	50	42	34	28	33	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	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31
MED	33	35	35	34	33	32	32	65	83	96	106	108	103	97	97	95	79	60	52	41	37	33	33	34
U Q	37	36	37	36	34	33	36	71	90	105	113	118	110	102	103	100	84	66	56	45	40	36	37	38
L Q	32	33	32	33	31	29	30	58	79	88	99	102	96	92	89	90	73	53	46	39	34	31	31	31

DEC. 1992 FOF2 (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1992 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

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										L	L	L		L	L									
2									L		L	L	L	L										
3											L	L	L	L	L	L								
4											L	L	L	U L 570	L									
5										L	L													
6											L	L	L											
7										L	L	L		L	L									
8													L		L									
9										L	L		L		L									
10										L	L	L	L	L										
11											L	L	L	L	L									
12									L 320		L		L											
13											370	L	L	L	L									
14									L	L		L	L	L	L	320								
15										L	L	L	L		L	L								
16											L	L	L	U L 500	L									
17										L	L	L	L	L	L									
18											L	L	L	L	L									
19											L	L	L	L										
20										L	L	L	L	L	L									
21										L	L	L	L	L	L	L								
22										L	L	L												
23											L	L	L	L	L									
24										L	L 380	L	L	L	L	L								
25											L	L												
26										L	L	L	L	L										
27									270	L	L	L	L	L	L									
28											L	L	L	L	L									
29									L	L	L	U L 490	L	L										
30											L	L	L	L	L									
31											L	L												
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									2		2	1		2		1								
MED									295		375	U L 490		U L 535		320								
U O																								
L O																								

DEC. 1992 FOF1 (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1992 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

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								200	250	290	310	330	A	315	295	A	A							
2								185	265	280	310	330	325	305	290	260	A							
3								190	250	305	315	A	A	A	A	A 250	205							
4								H 200	250	280	310	A	A	A	295	260	A							
5								A	250	285	315	320	325	315	U A 255	A	A							
6								165	230	275	315	A	R 330	305	295	250	A							
7								195	255	300	310	325	325	320	A	255	170							
8								160	255	295	310	B	325	315	295	250	A							
9								B	245	285	320	325	325	A 310	315	U A 275	A							
10								165	250	295	315	U A 320	A 320	A	A	A	A							
11								B	240	300	320	R 335	330	320	285	260	H 190							
12								175	250	305	335	340	335	325	305	250	H 200							
13								150	255	295	325	325	A	325	300	250	200							
14								190	250	295	320	340	R 330	330	305	250	185							
15								170	250	A	295	325	335	320	310	265	185							
16								155	240	U A 285	320	A	330	320	305	265	190							
17								150	245	285	315	335	A	A	A	265	180							
18								A	A	A	A	A	340	335	315	A	185							
19								B	250	A	325	335	335	A	A	A	A							
20								180	265	295	325	340	340	325	295	250	A							
21								B	230	A	A	A	330	325	A	260	180							
22								175	245	A	A	A	A	A	300	A	A							
23								H 170	H 250	285	300	A	325	A	300	265	190							
24								H 200	210	270	A 295	A	330	A	R	A	A							
25								170	H 245	275	310	330	A	A	A	A	A							
26								170	235	300	325	340	340	330	A	A	B							
27								170	230	A	320	335	335	325	305	250	A							
28								165	235	280	310	330	H 330	315	285	260	A							
29								155	240	A 260	300	310	A 310	310	280	260	195							
30								A	A	A	310	315	320	310	300	265	180							
31								B	215	275	305	320	A 330	A	300	265	A							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								23	29	24	28	21	24	21	22	22	14							
MED								170	250	285	315	330	330	320	300	260	188							
U Q								190	250	295	320	335	335	325	305	265	195							
L Q								165	238	280	310	322	325	312	295	250	180							

DEC. 1992 FOE (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1992 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

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	E B 14	18	19	20	22	J A 23	J A 19	J A 24	G 21	G	37	40	J A 47	G 28	G 26	30	J A 32	E B 13	J A 19	20	E B 13	J A 27	E B 15	E B 13
2	21	E B 14	E B 14	E B 13	20	J A 19	E B 14	G	G	33	35	35	35	35	34	31	22	E B 15	E B 13	E B 14	23	E B 14	J A 18	J A 49
3	J A 42	J A 42	20	E B 13	27	E B 14	E B 13	22	30	32	41	J A 42	J A 56	J A 44	J A 51	J A 35	J A 24	30	J A 48	J A 24	J A 63	22	J A 30	J A 48
4	J A 22	J A 22	E B 13	E B 13	E B 13	J A 21	J A 22	23	G	G	39	J A 44	J A 42	J A 53	33	J A 42	J A 28	J A 23	J A 22	J A 21	J A 22	J A 32	J A 21	J A 26
5	J A 49	J A 38	18	J A 21	J A 21	J A 20	J A 19	J A 22	G	G	34	44	J A 49	60	75	57	72	J A 22	J A 18	J A 19	J A 40	24	21	E B 14
6	E B 13	E B 13	29	29	22	20	E B 14	G	27	31	J A 51	35	G	J A 34	G 21	26	19	17	J A 21	E B 15	E B 13	E B 13	E B 13	E B 14
7	E B 14	E B 14	E B 13	E B 13	E B 13	E B 15	E B 14	G	G	G 26	33	34	G	G	31	28	G	E B 14	E B 13	E B 13	E B 13	E B 14	E B 13	E B 13
8	E B 13	E B 13	E B 13	E B 13	E B 14	20	J A 14	J A 20	G	G	34	E B 43	G	34	38	32	22	19	19	E B 13	32	J A 20	18	21
9	J A 17	J A 32	28	J A 32	J A 28	J A 21	19	E B 16	27	G 27	J A 49	J A 46	36	71	J A 37	J A 47	J A 39	26	J A 24	22	J A 33	22	J A 20	E B 15
10	E B 14	16	E B 13	20	E B 13	E B 13	E B 14	23	28	32	J A 41	J A 46	38	J A 34	30	J A 42	57	J A 19	21	J A 23	24	J A 22	20	E B 15
11	E B 14	E B 13	E B 13	23	J A 18	20	23	E B 15	27	G	34	G 30	35	G	G	G 24	G	21	E B 15	E B 14	E B 13	J A 19	E B 13	E B 14
12	20	E B 14	E B 13	E B 13	E B 14	E B 13	E B 13	J A 36	G	G	G	36	G	G 25	34	28	21	J A 20	E B 13	23	J A 41	J A 27	E B 15	E B 13
13	E B 14	E B 13	E B 13	E B 13	E B 13	E B 14	E B 14	J A 22	G	G	34	J A 36	36	J A 36	32	28	J A 44	J A 20	22	20	J A 17	30	30	20
14	E B 16	E B 14	E B 13	E B 13	E B 13	J A 18	E B 15	20	G	32	34	G 31	G	G	G	G	J A 32	J A 34	21	J A 21	J A 31	J A 28	25	J A 21
15	22	E B 15	E B 13	E B 13	E B 13	E B 13	E B 14	27	G	J A 37	G 27	G	G	G	G	G	G	J A 26	J A 19	J A 23	J A 23	J A 27	J A 25	J A 22
16	J A 26	26	E B 13	E B 13	E B 14	21	E B 13	G	J A 46	J A 38	G	J A 40	G 23	G 28	G 20	29	20	21	20	J A 20	19	J A 20	J A 50	J A 58
17	J A 23	J A 21	20	18	E B 13	18	E B 13	J A 22	J A 34	J A 42	G 23	G 23	J A 52	57	J A 54	G 24	G	E B 13	E B 13	E B 14	E B 14	E B 14	J A 22	E B 15
18	21	J A 21	J A 22	25	20	E B 15	J A 15	22	J A 35	J A 47	J A 55	J A 52	G 31	G	G 29	29	G 18	E B 13	E B 15	J A 21	J A 24	E B 13	J A 22	J A 34
19	J A 30	28	J A 20	20	E B 14	E B 13	E B 13	E B 15	J A 27	J A 42	38	G	J A 36	J A 43	42	54	J A 30	J A 23	J A 20	20	22	23	19	19
20	21	20	E B 14	E B 14	E B 14	E B 13	E B 15	21	G	G	34	J A 37	G 23	G 29	G 27	J A 30	32	J A 30	J A 21	E B 14	E B 14	E B 13	E B 14	E B 14
21	E B 14	E B 13	E B 15	20	E B 14	E B 14	E B 14	J A 21	G	J A 53	J A 36	J A 37	G 30	G 31	35	G 21	J A 22	21	19	E B 14	E B 13	18	E B 15	E B 14
22	E B 14	E B 14	E B 13	E B 13	J A 21	19	E B 14	G	28	J A 35	J A 39	J A 51	J A 71	J A 64	G 30	J A 50	J A 54	J A 34	E B 33	J A 32	J A 23	30	E B 15	E B 14
23	19	E B 13	J A 21	J A 23	C	E B 13	20	G	G	G	35	J A 45	G 32	J A 48	G 27	G 24	20	20	J A 20	E B 14	E B 14	E B 13	E B 13	J A 21
24	E B 14	E B 13	20	E B 13	E B 13	E B 15	E B 14	J A 22	25	J A 36	35	34	G 20	32	G 29	28	J A 27	J A 44	J A 21	20	E B 13	E B 13	E B 14	E B 14
25	E B 13	20	E B 13	30	J A 27	E B 14	E B 33	J A 22	G	34	G	J A 37	J A 41	J A 71	57	J A 78	J A 98	J A 66	J A 53	J A 28	J A 17	22	21	20
26	E B 14	E B 13	E B 14	J A 16	23	19	E B 13	19	G	G 30	J A 35	G	G	J A 47	J A 43	31	E B 19	E B 16	E B 14	36	39	J A 19	E B 15	J A 21
27	19	E B 13	E B 15	E B 13	E B 14	E B 14	E B 15	G	G	J A 42	35	35	36	36	J A 35	27	J A 37	J A 23	E B 18	E B 17	37	J A 34	J A 49	J A 28
28	J A 21	22	E B 13	E B 14	E B 13	E B 13	E B 14	J A 20	G 22	30	G	G 22	G	35	34	29	20	J A 22	25	22	23	21	E B 16	19
29	E B 15	J A 21	E B 14	21	E B 13	E B 14	J A 16	19	29	J A 36	J A 53	35	J A 51	G 23	G	G 20	G	E B 14	E B 14	E B 14	J A 25	J A 19	E B 16	J A 22
30	J A 22	J A 47	J A 24	J A 22	28	J A 20	E B 14	J A 29	J A 74	J A 53	G 26	G	G	G	G	G	25	J A 18	J A 19	J A 18	E B 13	E B 13	J A 31	J A 20
31	J A 32	J A 23	J A 20	J A 21	E B 14	E B 13	E B 13	E B 15	G	31	J A 42	G	J A 37	J A 48	G 21	J A 30	J A 47	J A 22	J A 28	J A 27	J A 22	21	E B 14	J A 27
	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	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	19	16	E B 14	16	E B 14	E B 15	E B 14	20	G	32	35	36	35	34	31	29	24	J A 21	20	20	22	21	18	20
U Q	J A 22	J A 22	J A 20	21	21	J A 20	J A 16	J A 22	28	J A 37	J A 39	J A 43	J A 41	J A 48	37	J A 35	J A 37	J A 26	J A 22	J A 23	J A 31	J A 27	J A 22	J A 22
L Q	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	G	G 33	G	G	G	G 29	G	G 19	E B 17	E B 15	E B 14	E B 14	E B 14	E B 15	E B 14

DEC. 1992 FOES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 14	E B 14	E B 13	E B 13	E B 13	18	16	G	G 19	G	35	40	39	G 23	G 24	28	20	E B 13	16	E B 14	E B 13	E B 13	E B 15	E B 13
2	E B 15	E B 14	E B 14	E B 13	E B 13	E B 14	E B 14	G	G	32	34	35	35	35	32	28	20	E B 15	E B 13	E B 14	15	E B 14	E B 13	15
3	20	16	E B 14	E B 13	E B 13	E B 14	E B 13	G	29	31	35	35	36	33	32	G 24	G 17	20	17	16	20	E B 13	18	E B 13
4	18	16	E B 13	E B 13	E B 13	E B 13	16	G 16	G	G	35	38	36	35	32	G 24	26	19	E B 15	17	16	22	17	17
5	24	19	E B 13	E B 14	17	16	E B 13	18	G	G	33	43	40	52	66	45	69	19	16	E B 13	18	15	E B 14	E B 14
6	E B 13	E B 13	E B 13	19	E B 13	E B 14	E B 14	G	26	30	G	34	G	G 27	G 20	26	19	16	17	E B 15	E B 13	E B 13	E B 13	E B 14
7	E B 14	E B 14	E B 13	E B 13	E B 13	E B 15	E B 14	G	G	G 25	33	34	G	G	30	G 23	G	E B 14	E B 13	E B 13	E B 13	E B 14	E B 13	E B 13
8	E B 13	E B 13	E B 13	E B 13	E B 14	E B 13	E B 15	G	G	G	34	E B 43	G	33	36	30	21	E B 13	E B 14	E B 13	25	E B 13	E B 13	E B 13
9	E B 13	E B 13	17	17	20	16	E B 13	E B 16	26	G 25	35	43	36	60	G 23	35	34	21	15	E B 13	19	E B 15	15	E B 15
10	E B 14	E B 13	E B 13	E B 14	E B 13	E B 13	E B 14	G	G	31	34	35	34	33	30	37	44	E B 13	E B 13	E B 13	E B 14	E B 13	E B 15	E B 15
11	E B 14	E B 13	E B 13	E B 15	E B 13	E B 13	E B 15	E B 15	26	G	34	G 30	34	G	G	G	G	E B 15	E B 15	E B 14	E B 13	E B 14	E B 13	E B 14
12	E B 13	E B 14	E B 13	E B 13	E B 14	E B 13	E B 13	G	G	G	G	35	G	G 23	33	28	G 18	E B 13	E B 13	18	24	20	E B 15	E B 13
13	E B 14	E B 13	E B 13	E B 13	E B 13	E B 14	E B 14	G 12	G	G	33	34	34	G 28	32	G 24	G 18	18	16	E B 13	E B 14	18	17	E B 15
14	E B 16	E B 14	E B 13	E B 13	E B 13	E B 13	E B 15	E B 14	G	31	33	G 30	G	G	G	G	G 15	E B 13	E B 13	18	21	25	E B 15	E B 13
15	E B 14	E B 15	E B 13	E B 13	E B 13	E B 13	E B 14	E B 14	G	35	G 27	G	G	G	G	G	G	19	17	18	18	24	15	18
16	22	16	E B 13	E B 13	E B 14	E B 13	E B 13	G	G 21	31	G	36	G 23	G 28	G 20	28	G 13	E B 15	17	E B 14	E B 14	E B 14	25	A A 58
17	16	E B 14	E B 14	E B 13	E B 13	E B 14	E B 13	G 14	G 21	G 25	G 22	G 21	37	36	31	G 22	G	E B 13	E B 13	E B 14	E B 14	E B 14	16	E B 15
18	E B 15	E B 13	18	16	17	E B 15	E B 15	20	29	31	43	36	G 30	G	G 29	28	G 16	E B 13	E B 15	17	E B 13	E B 13	16	20
19	20	18	E B 14	E B 14	E B 14	E B 13	E B 13	E B 15	26	32	G	G	G 22	38	36	35	24	20	16	16	16	E B 13	E B 15	E B 13
20	E B 14	E B 13	E B 14	E B 14	E B 14	E B 13	E B 15	20	G	G	34	G 28	G 21	G 27	G 25	G 22	23	27	18	E B 14	E B 14	E B 13	E B 14	E B 14
21	E B 14	E B 13	E B 15	E B 15	E B 14	E B 14	E B 14	E B 15	G	30	34	33	G 30	G 29	34	G 20	G 16	E B 13	E B 14	E B 14	E B 13	E B 14	E B 15	E B 14
22	E B 14	E B 14	E B 13	E B 13	E B 13	E B 14	E B 14	G	G 19	32	32	36	42	54	G 28	28	29	23	E B 33	20	17	22	E B 15	E B 14
23	E B 14	E B 13	17	17	C	E B 13	E B 14	G	G	G	32	40	G 29	36	G 27	G 19	G 17	E B 14	16	E B 14	E B 14	E B 13	E B 13	16
24	E B 14	E B 13	E B 14	E B 13	E B 13	E B 15	E B 14	G 13	24	G	32	33	G 19	32	U G 29	27	25	22	20	16	E B 13	E B 13	E B 14	E B 14
25	E B 13	E B 13	E B 13	E B 14	E B 13	E B 14	E B 20	G	G	30	G	G 30	34	51	43	69	A A 98	A A 66	30	25	16	E B 15	E B 15	E B 14
26	E B 14	E B 13	E B 14	E B 13	E B 15	E B 14	E B 13	G	G	G 26	G 24	G	G	G 30	35	31	E B 19	E B 16	E B 14	26	29	16	E B 15	16
27	18	E B 13	E B 15	E B 13	E B 14	E B 14	E B 15	G	G	33	34	34	35	G 30	G 23	27	22	20	E B 18	E B 17	27	19	18	22
28	18	E B 15	E B 13	E B 14	E B 13	E B 13	E B 14	G	G 17	29	G	G 18	G	34	32	28	20	18	E B 13	E B 13	17	16	E B 16	17
29	E B 15	E B 13	E B 14	E B 13	E B 13	E B 14	E B 14	18	27	G 26	34	35	G 31	G 20	G	G 19	G	E B 14	E B 14	E B 14	20	16	E B 16	E B 13
30	16	17	E B 13	17	17	15	E B 14	20	64	34	G 25	G	G	G	G	G	G	16	E B 14	16	E B 13	E B 13	16	E B 13
31	17	17	E B 14	17	E B 14	E B 13	E B 13	E B 15	G	30	G	G	G 33	34	G 21	28	32	18	24	24	19	16	E B 14	E B 15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	30	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 13	E B 13	E B 13	E B 14	E B 14	G	G	29	33	34	G	G	G	27	19	16	E B 15	E B 14	16	E B 14	E B 15	E B 14
U Q	17	15	E B 14	15	14	14	E B 15	G	26	31	34	36	35	35	32	28	25	20	17	17	19	16	16	16
L Q	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 15	G	G	G	G	G 31	G 29	G 27	G 24	G 18	E B 13	E B 14	E B 14	E B 13	E B 13	E B 14	E B 13

DEC. 1992 FBES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1992 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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	14	13	13	13	13	13	15	16	15	16	18	16	15	14	13	14	13	13	14	13	13	15	13
2	15	14	14	13	13	14	14	14	14	16	15	16	16	14	13	14	13	15	13	14	13	14	13	13
3	14	13	14	13	13	14	13	15	13	15	14	17	16	17	16	13	13	13	13	13	13	13	15	13
4	13	13	13	13	13	13	13	13	14	16	15	21	17	16	16	14	14	13	15	13	13	14	15	13
5	13	13	13	14	13	13	13	14	13	15	16	17	16	18	17	17	14	13	13	13	13	13	14	14
6	13	13	13	14	13	14	14	14	15	14	16	17	19	17	13	14	13	13	14	15	13	13	13	14
7	14	14	13	13	13	15	14	15	15	15	15	19	16	15	18	15	12	14	13	13	13	14	13	13
8	13	13	13	13	14	13	15	13	14	15	17	43	17	17	14	15	13	13	14	13	14	13	13	13
9	13	13	13	14	14	13	13	16	14	16	18	16	18	17	15	16	13	13	13	13	13	15	13	15
10	14	13	13	14	13	13	14	14	15	16	16	17	18	16	15	14	14	13	13	13	14	13	15	15
11	14	13	13	15	13	13	15	15	14	16	18	18	18	21	17	17	13	15	15	14	13	14	13	14
12	13	14	13	13	14	13	13	14	14	16	17	17	18	18	16	14	13	13	13	14	14	14	15	13
13	14	13	13	13	13	14	14	14	16	17	18	17	17	17	17	17	15	13	13	13	14	13	13	15
14	16	14	13	13	13	13	15	14	14	17	17	18	18	18	17	15	13	13	13	13	13	13	15	13
15	14	15	13	13	13	13	14	14	17	20	20	28	30	21	19	18	15	13	14	14	14	13	13	14
16	15	14	13	13	14	13	13	14	17	18	20	21	20	22	16	17	15	15	13	14	14	14	13	13
17	13	14	14	13	13	14	13	13	14	14	17	17	19	17	16	16	16	13	13	14	14	14	13	15
18	15	13	13	13	16	15	15	13	16	17	23	26	24	24	17	17	13	13	15	14	13	13	14	14
19	13	14	14	14	14	13	13	15	13	13	15	17	15	16	17	16	14	15	14	14	13	13	15	13
20	14	13	14	14	14	13	15	14	15	13	13	14	16	16	17	14	15	13	14	14	14	13	14	14
21	14	13	15	15	14	14	14	15	15	14	16	17	17	15	15	14	13	13	14	14	13	14	15	14
22	14	14	13	13	13	14	14	14	16	15	15	17	17	17	15	13	13	13	33	15	14	14	15	14
23	14	13	15	13	C	13	14	14	15	14	13	17	17	16	15	15	14	14	14	14	14	13	13	13
24	14	13	14	13	13	15	14	15	15	16	15	20	15	15	16	15	14	14	13	13	13	13	14	14
25	13	13	13	14	13	14	13	14	13	14	15	17	17	17	14	16	15	13	15	13	13	15	15	14
26	14	13	14	13	15	14	13	13	16	18	16	18	20	16	16	14	19	16	14	13	14	14	15	15
27	13	13	15	13	14	14	15	14	16	15	17	18	14	13	13	14	13	14	18	17	15	14	14	13
28	15	15	13	14	13	13	14	14	13	16	17	16	17	16	14	14	14	13	13	13	14	14	16	15
29	15	13	14	13	13	14	14	14	13	16	17	17	17	17	16	14	14	14	14	14	13	14	16	13
30	13	13	13	13	13	13	14	13	13	16	16	17	18	17	16	16	16	15	14	13	13	13	13	13
31	13	14	14	15	14	13	13	15	15	16	17	17	19	17	17	16	16	14	13	13	13	14	14	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	14	13	13	13	13	13	14	14	15	16	16	17	17	17	16	15	14	13	14	14	13	14	14	14
U 0	14	14	14	14	14	14	14	15	16	16	17	18	18	17	17	16	15	14	14	14	14	14	15	14
L 0	13	13	13	13	13	13	13	14	14	15	15	17	16	16	15	14	13	13	13	13	13	13	13	13

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1992 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	280	270	290	290	270	315	325	330	335	340	330	300	315	340	325	325	325	335	315	315	315	290	285
2	270	265	265	275	300	330	305	330	345	325	325	350	340	320	320	350	325	335	330	340	295	300	320	280
3	275	280	275	305	310	300	305	360	360	335	330	335	V 315	330	325	320	330	335	345	320	265	285	280	280
4	320	320	300	275	280	290	285	345	350	310	330	350	330	315	325	325	370	345	325	320	305	320	275	295
5	275	280	285	315	320	290	270	340	330	335	335	V 320	310	330	335	330	355	325	355	325	320	330	330	260
6	280	290	285	300	320	310	310	345	355	360	335	V 315	335	Z 315	345	H 325	325	330	320	355	320	325	305	285
7	275	295	285	295	285	300	325	345	340	345	340	340	340	320	360	330	350	V 295	330	325	290	310	300	260
8	275	300	330	305	290	275	280	320	340	345	305	320	345	325	310	330	325	330	320	345	300	305	270	285
9	280	285	300	310	285	300	290	340	350	345	335	340	315	345	325	340	350	H 330	315	330	340	270	280	280
10	280	285	295	305	315	280	310	355	310	325	350	355	310	335	325	345	345	325	330	325	310	320	295	300
11	295	285	290	270	280	310	335	345	335	V 315	305	310	320	315	320	350	335	335	295	320	315	310	275	305
12	285	275	285	290	340	285	300	360	340	345	340	320	330	325	330	325	345	365	310	310	305	295	270	285
13	270	285	315	325	350	280	285	355	370	360	355	330	335	340	305	335	335	320	340	320	305	285	275	275
14	285	305	320	290	290	280	305	330	H 345	345	330	335	325	Z 305	V 320	340	320	335	330	335	305	300	285	280
15	280	285	285	280	280	290	345	345	345	340	330	315	320	300	325	335	330	325	350	335	290	270	F 285	300
16	325	315	290	295	280	290	325	335	350	340	340	325	V 335	335	315	340	320	315	340	325	310	280	275	A
17	330	300	315	320	F 270	275	310	355	355	345	325	325	325	335	325	340	340	355	300	320	290	305	290	280
18	270	270	335	255	240	265	290	355	360	330	325	305	310	310	310	320	330	320	350	330	290	270	290	310
19	315	305	275	290	265	285	295	345	350	330	340	335	325	320	320	325	330	320	330	335	290	285	285	R 285
20	285	295	320	340	315	285	290	335	360	335	330	340	335	300	305	325	330	325	335	305	305	325	H 260	260
21	280	290	300	305	290	275	290	360	325	320	320	310	320	305	320	350	340	325	340	330	295	305	285	300
22	285	295	285	290	255	280	265	335	345	300	330	325	330	310	320	315	335	335	350	315	310	F 270	Z 275	285
23	310	300	315	335	I C 310	285	305	335	355	345	335	335	335	325	315	335	355	320	335	340	F 290	F 285	J F 280	F 275
24	265	290	295	320	345	285	300	350	340	350	345	340	325	330	320	350	350	310	320	355	290	265	270	270
25	275	290	290	300	325	265	295	355	360	H 330	325	315	310	325	325	325	A	A 305	345		360	305	270	280
26	285	280	260	300	340	320	340	345	350	330	325	335	325	325	320	330	350	345	320	330	315	300	290	285
27	295	280	300	315	340	300	310	345	360	310	350	340	H 330	325	330	330	350	340	340	310	V 335	F 310	F 280	F 300
28	285	F 270	290	315	345	270	305	340	355	340	300	320	320	H 330	320	330	365	340	320	330	325	350	270	265
29	260	275	260	310	270	260	305	285	285	295	315	335	330	335	335	330	335	305	310	330	340	260	270	275
30	315	320	255	290	300	270	290	330	335	340	320	335	340	325	340	335	355	310	370	325	325	320	295	270
31	340	300	295	280	280	V 295	330	370	370	360	345	345	345	V 335	325	355	375	325	330	355	335	280	315	275
	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	30	30	31	31	31	31	31	30
MED	280	290	290	300	290	285	305	345	350	335	330	335	325	325	325	330	338	325	330	330	305	300	280	280
U Q	295	300	300	315	320	300	310	355	355	345	340	340	335	330	330	340	350	335	340	335	320	315	290	285
L Q	275	280	285	290	280	275	290	335	340	325	325	320	320	315	320	325	330	320	320	320	290	280	275	275

DEC. 1992 M(3000)F2 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1992 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

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										L	L	L		L	L									
2									L		L	L	L	L										
3											L	L	L	L	L	L								
4											L	L	L	U L 335	L									
5										L	L				A		A							
6											L	L	L											
7										L	L	L		L	L									
8													L		L									
9										L	L		L		L									
10										L	L	L	L	L										
11											L	L	L	L	L									
12									L 395		L		L											
13											A 400	L	L	L	L									
14									L	L		L	L	L	L	400								
15										L	L	L	L		L	L								
16											L	L	L	L	L									
17										L	L	L	L	L	L									
18											L	L	L	L	L									
19											L	L	L	L										
20										L	L	L	L	L	L									
21										L	L	L	L	L	L	L								
22										L	L	L		A										
23											L	L	L	L	L									
24										L	L 425	L	L	L	L	L								
25											L	L		A		A	A							
26										L	L	L	L	L										
27									420	L	L	L	L	L	L									
28											L	L	L	L	L									
29									L	L	L	U L 350	L	L										
30									A		L	L	L	L	L									
31											L	L												
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									2		2	1		1		1								
MED									408		412	U L 350		U L 335		400								
U Q																								
L Q																								

DEC. 1992 M(3000)F1 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1992 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

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										235	240	240		255	225									
2									230		250	230	230	225										
3											245	240	250	240	235	250								
4											245	225	265	285	260									
5										240	230				E A 260		A							
6											240	215	225											
7										230	230	240		240	210									
8													240		L 295									
9										235	250		270		260									
10										240	225	210	230	255										
11											L 280	225	230	225	240									
12									220		250		255											
13											220	250	245	225	260									
14									210	235		230	230	290	250	240								
15										235	225	220	255		255	225								
16											225	225	240	260	260									
17										240	L 250	260	250	240	230									
18											260	260	260	240	245									
19											250	230	250	270										
20										270	260	250	240	L 310	275									
21										290	215	265	245	265	255	225								
22										300	255	240		E A 260										
23											255	235	245	245	250									
24										230	240	235	250	230	240	230								
25											230	280		A 250		A	A							
26										240	255	240	250	275										
27									215	300	235	255	225	240	260									
28											235	245	220	240	230									
29									280	250	260	240	230	235										
30									A		260	240	240	265	215									
31											220	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									5	15	29	27	25	24	21	5								
MED									220	240	245	240	245	245	250	230								
U Q									255	270	255	250	250	265	260	245								
L Q									212	235	230	230	230	240	232	225								

DEC. 1992 H'F2 (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1992 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	350	330	345	300	260	345	260	230	235	235	230	230	235	225	225	210	A 230	215	235	225	240	250	285	270
2	330	365	335	295	260	235	240	230	225	225	H 195	H 235	220	220	225	230	220	225	225	215	235	255	260	290
3	340	320	320	280	255	280	250	220	220	225	215	210	240	H 210	220	225	225	230	220	235	A 300	300	330	300
4	260	260	270	335	310	295	300	240	220	H 220	235	A 235	230	225	230	235	210	215	220	235	240	A 270	300	295
5	A 365	330	305	255	260	305	310	245	225	210	225	230	235	A 240	A	A 240	A	210	210	230	265	240	225	325
6	320	310	305	305	250	230	250	230	220	225	210	220	220	205	230	215	210	200	235	215	240	245	255	320
7	320	300	310	310	280	280	255	225	220	235	225	225	H 210	225	220	220	220	H 190	225	225	260	260	260	370
8	345	280	250	250	280	315	325	240	210	225	230	240	H 210	220	235	250	220	210	220	225	A 290	250	315	300
9	300	300	280	265	A 325	295	280	220	240	H 220	230	230	220	A 225	220	225	215	210	250	225	240	275	320	315
10	315	290	285	275	240	320	250	225	215	220	220	210	200	H 205	H 190	210	A 230	205	225	240	250	240	250	270
11	275	270	300	380	320	275	210	220	225	220	220	210	220	215	215	220	205	205	230	250	230	240	270	270
12	300	315	320	300	230	255	265	220	205	225	H 205	225	220	235	230	220	210	205	220	270	250	260	305	305
13	340	310	265	240	235	320	305	240	220	215	E A 230	H 225	225	230	220	230	220	200	225	230	230	290	290	330
14	315	275	250	290	295	315	255	225	225	230	230	210	200	220	235	220	220	210	225	235	260	E A 335	310	300
15	305	310	285	315	290	290	215	220	225	A 240	220	225	230	220	230	245	220	230	230	215	285	E A 330	320	290
16	265	270	275	285	315	315	240	220	220	230	210	210	H 205	220	235	230	215	230	205	220	240	275	E A 365	A
17	240	270	270	250	330	310	270	220	220	225	215	H 190	240	235	225	H 235	220	200	220	230	270	275	270	280
18	310	305	220	390	445	365	285	215	215	230	A 250	230	220	230	225	235	220	220	215	230	240	300	300	280
19	270	270	290	285	330	305	255	230	225	235	225	230	225	A 215	240	245	225	220	230	220	250	270	320	315
20	340	295	255	240	245	310	285	230	215	220	230	230	225	220	230	240	225	235	225	240	245	235	245	325
21	320	300	270	270	285	325	295	215	H 205	225	215	H 210	230	215	230	235	H 215	210	230	215	255	270	285	270
22	300	285	290	285	355	310	E B 290	230	230	230	230	220	230	A	235	240	225	215	230	240	250	E A 320	315	290
23	260	280	270	260	I C 300	310	270	225	225	230	210	A 225	220	A 230	220	235	210	235	230	215	240	330	315	280
24	320	280	300	255	230	290	270	225	220	225	195	210	H 210	205	230	240	215	235	255	220	220	290	320	340
25	330	320	300	280	230	340	A 335	230	215	225	215	H 190	230	A	240	A	A	A	A 300	240	215	240	330	310
26	295	320	355	290	240	260	240	220	H 210	205	H 210	225	H 210	215	240	225	220	210	225	265	A	295	300	325
27	300	305	295	260	235	260	260	225	220	220	240	220	230	200	235	240	220	225	230	230	A 260	A 270	A 305	A 310
28	325	345	305	265	230	240	260	230	220	H 225	220	H 200	220	240	215	235	215	220	245	230	245	225	330	345
29	380	330	350	265	355	375	250	290	260	235	240	225	225	230	235	240	220	225	240	225	220	295	320	320
30	260	255	285	305	295	345	305	250	A	240	H 205	210	230	205	225	235	215	220	210	240	245	260	310	330
31	250	300	280	335	340	315	240	215	210	225	210	205	225	220	220	225	215	220	250	235	255	275	260	325
	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	31	31	31	29	30	30	29	30	31	31	30	31	31	30
MED	315	300	290	285	280	310	260	225	220	225	220	225	225	220	230	235	220	215	225	230	245	265	302	308
U Q	330	320	305	305	320	320	290	230	225	230	230	230	230	230	235	240	220	225	235	240	260	295	320	325
L Q	275	280	270	260	240	280	250	220	215	220	210	210	H 220	215	220	225	215	210	220	220	240	250	270	290

DEC. 1992 H'F (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1992 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

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								B 150	A 130	115	A 130	120	A	A 120	A 120	A	A							
2								140	115	115	115	110	110	110	115	120	A							
3								B 170	120	115	115	110	A	A	A	A	A							
4								A	115	115	A 120	A	A	A	A	A 130	A							
5								A	115	110	110	110	110	110	110	A	A							
6								B 150	120	110	110	A	110	A 130	A 120	115	A							
7								150	120	A 130	115	115	115	110	A	A 140	125							
8								135	120	115	115	B	110	E A 135	120	120	A							
9								B	115	A 130	A 130	110	110	110	A 130	120	A							
10								B 150	120	115	115	110	110	110	A	A	A							
11								B	120	115	110	A 130	120	115	115	A 125	130							
12								130	120	120	115	110	115	120	110	A 125	A							
13								B 170	120	115	115	115	A	A 135	115	A	E A 150							
14								E B 175	120	115	115	A 135	115	120	115	115	140							
15								B 150	125	120	120	B 130	A 130	115	120	120	120							
16								B	E A 140	115	115	A	120	A 120	120	120	135							
17								A	A 130	A 125	A 120	120	A	A	A	A 120	E B 165							
18								A	A	A	A	A	A 130	120	A 130	A	A 160							
19								B	115	A	A 135	110	A 120	A	A	A	A							
20								155	120	115	A 125	A 130	115	A 125	A 125	A 125	A							
21								B	115	A	115	A	A 130	A 130	A	A 120	A 130							
22								B	A 140	A	115	A	A	A	E A 140	A	A							
23								B	125	115	110	A	A 130	A	A 130	A 125	E A 140							
24								B	125	120	115	120	120	A	A	A	A							
25								B 170	120	115	110	E A 140	A	A	A	A	A							
26								B 175	120	A 135	A 130	115	115	E A 135	A	A	B							
27								B 170	125	120	115	A 130	125	A	120	115	A							
28								B 180	125	115	110	120	115	115	120	A 120	A							
29								145	120	A	A	130	A	120	110	120	125							
30								A	115	115	A 130	115	115	115	115	115	120							
31								B	120	115	115	110	A	A	120	A 120	A							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								17	30	26	29	23	22	21	21	20	12							
MED								150	120	115	115	115	115	118	120	120	128							
U O								B 170	125	A 120	A 120	A 130	A 120	A 128	A 122	A 125	145							
L O								148	120	115	115	110	110	112	115	120	125							

DEC. 1992 H'E (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1992 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

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	B 120	110	110		120	105	110	110	115	G 140		130	115	110	105	115	115	B 115		110	B 115		B	B
2	135	B	B	B	115	115	B	G	G 125		130	E G 190	E G 190	150	140	130	120	B	B	B	110	B	120	110
3	105	105	110	B	120	B	B	115	165	155	125	120	110	110	110	110	105	100	120	115	110	145	110	110
4	110	105	B	B	B	105	105	110	G	G 135		110	110	130	150	105	105	105	105	110	105	110	105	110
5	110	110	115	110	105	105	110	105	G	G 160		125	120	115	105	105	105	110	110	115	105	100	110	B
6	B	B 110	105		110	105	B	G	150	150	115	120	G 110	105	160		125	110	110	B	B	B	B	B
7	B	B	B	B	B	B	B	G	G 110		145	140	G	G 120	115		G	B	B	B	B	B	B	B
8	B	B	B	B	B 115	120	120		G	G	E G 170	B	G	180	130	130	120	110	105	B	110	120	135	135
9	115	105	105	110	105	105	110	B	160	110	125	120	130	110	110	120	120	120	105	105	110	115	110	B
10	B 110		B	115	B	B	B	150	100	135	120	115	120	120	110	110	110	110	110	120	125	115	110	B
11	B	B	B	115	115	115	130	B	185	G	160	115	E G 185	G	G	115	G	110	B	B	B	115	B	B
12	100	B	B	B	B	B	B	110	G	G	G	170	G	110	145	140	105	130	B	110	105	100	B	B
13	B	B	B	B	B	B	B	100	G	G	140	125	115	115	130	120	120	115	110	110	115	95	95	100
14	B	B	B	B	B 120		B	120	G	E G 190	E G 190	120	G	G	G	G	135	120	130	110	100	105	105	110
15	105	B	B	B	B	B	B	100	G	120	110	G	G	G	G	G	G	105	105	110	105	100	105	110
16	100	105	B	B	B 120		B	G	110	120	G	110	110	110	105	150	120	105	105	110	100	125	110	105
17	105	105	110	110	B 115		B	115	120	110	110	110	115	100	100	100	G	B	B	B	B	B 110		B
18	120	110	105	105	110	B	160	130	120	120	115	115	120	G	120	115	115	B	B	110	110	B	110	100
19	100	100	100	105	B	B	B	B	125	110	135	G	105	100	100	95	100	105	110	110	100	100	100	100
20	105	105	B	B	B	B	B	155	G	G	170	105	105	105	100	105	100	95	100	B	B	B	B	B
21	B	B	B	105	B	B	B	110	G	115	120	110	110	115	110	110	105	100	110	B	B	105	B	B
22	B	B	B	B	130	110	B	G	120	120	125	115	110	110	110	105	100	105	B	100	105	100	B	B
23	110	B	110	105	C	B	105	G	G	G	120	110	120	115	115	110	110	115	110	B	B	B	B	110
24	B	B	115	B	B	B	B	100	190	120	125	125	110	120	110	115	100	120	95	100	B	B	B	B
25	B	135	B	110	115	B	110	120	G	130	G	110	105	105	105	105	105	105	110	110	110	105	100	105
26	B	B	B	115	105	105	B	125	G	120	115	G	G	100	110	110	B	B	B	100	100	105	B	100
27	115	B	B	B	B	B	B	G	G	120	165	E G 190	E G 175	100	95	E G 170	95	100	B	B	105	110	105	95
28	100	105	B	B	B	B	B	110	105	E G 190	G	110	G	170	145	150	100	100	100	100	100	105	B	115
29	B	110	B	110	B	B	150	155	150	115	110	160	110	110	G	105	G	B	B	B	105	110	B	120
30	115	110	115	115	110	110	B	115	110	110	115	G	G	G	G	G	115	105	110	100	B	B	100	110
31	105	105	105	100	B	B	B	B	G	175	130	G	105	105	110	135	100	110	110	105	100	100	B	110
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	17	16	12	16	12	14	10	20	15	22	27	25	22	25	26	28	25	24	21	20	21	22	17	18
MED	105	105	110	110	112	110	110	115	120	120	125	118	111	110	110	114	105	108	110	110	105	105	110	110
U Q	115	110	112	112	118	115	130	122	160	135	145	128	120	118	120	130	120	112	110	110	110	115	110	110
L Q	102	105	105	105	108	105	110	110	110	115	115	110	110	105	105	105	100	105	105	102	100	100	102	100

IONOSPHERIC DATA STATION KOKUBUNJI

DEC. 1992 TYPES OF ES 135°E MEAN TIME (G.M.T. + 9H)

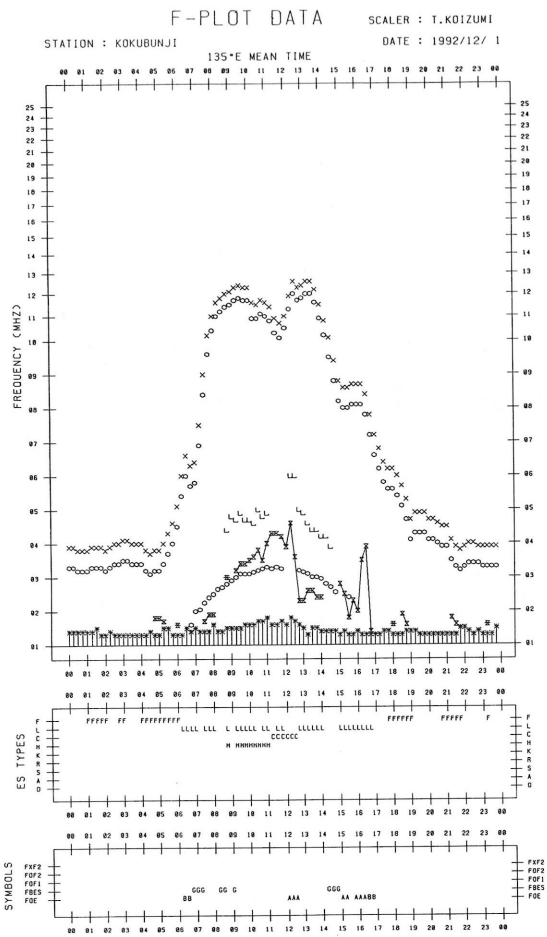
LAT. 35°42.4'N LON. 139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

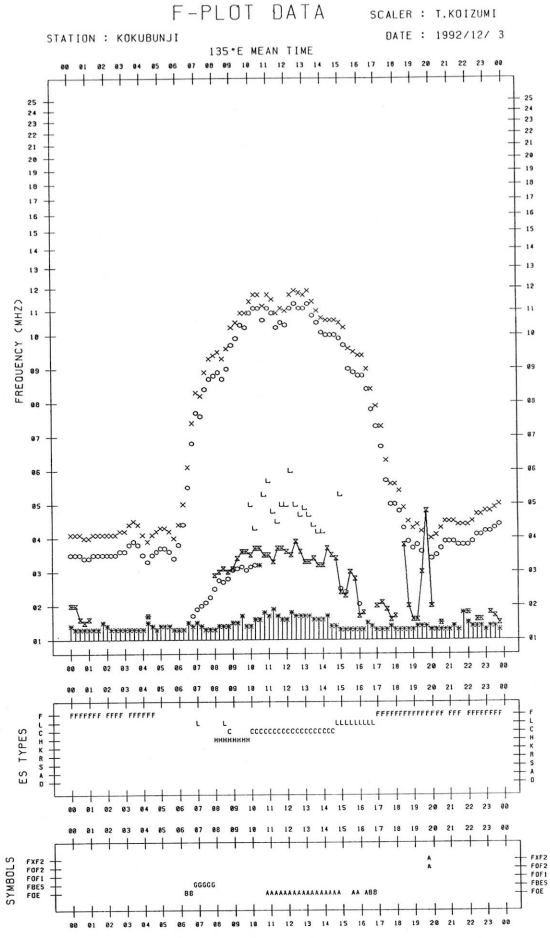
H / D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		F 1	F 1	F 1	FF 11	F 3	F 2	L 1	L 1		HL 21	HL 21	C 2	L 1	L 2	L 3	L 2		F 2	F 1		F 2		
2	F 1				F 1	F 1				C 1	C 1	H 1	H 1	H 1	HL 11	C 2	C 3				F 3		F 2	F 2
3	F 4	F 3	F 1		FF 22			L 1	H 1	H 1	C 2	C 2	C 2	C 2	C 2	L 3	L 3	F 3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

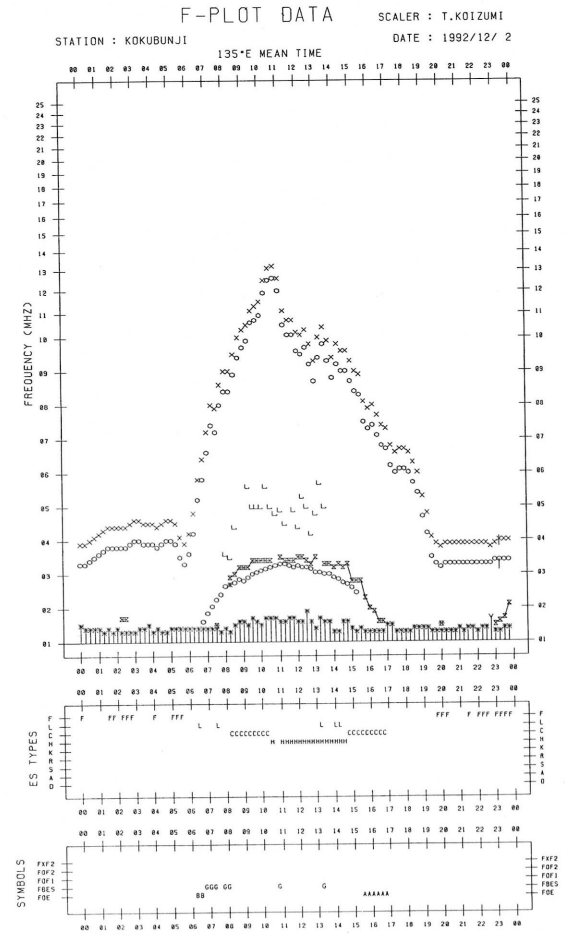
DEC. 1992 TYPES OF ES COMMUNICATIONS RESEARCH LABORATORY, JAPAN

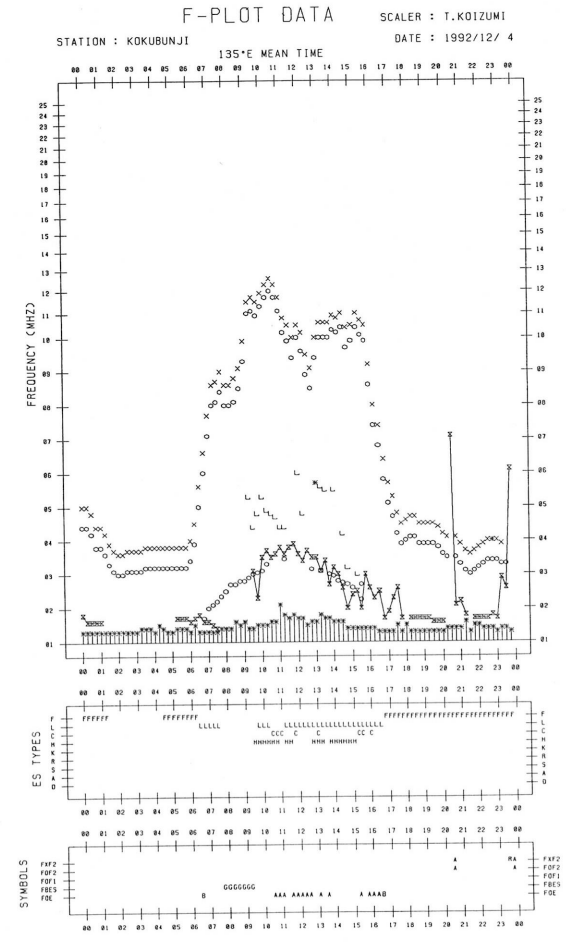
f-PLOTS OF IONOSPHERIC DATA

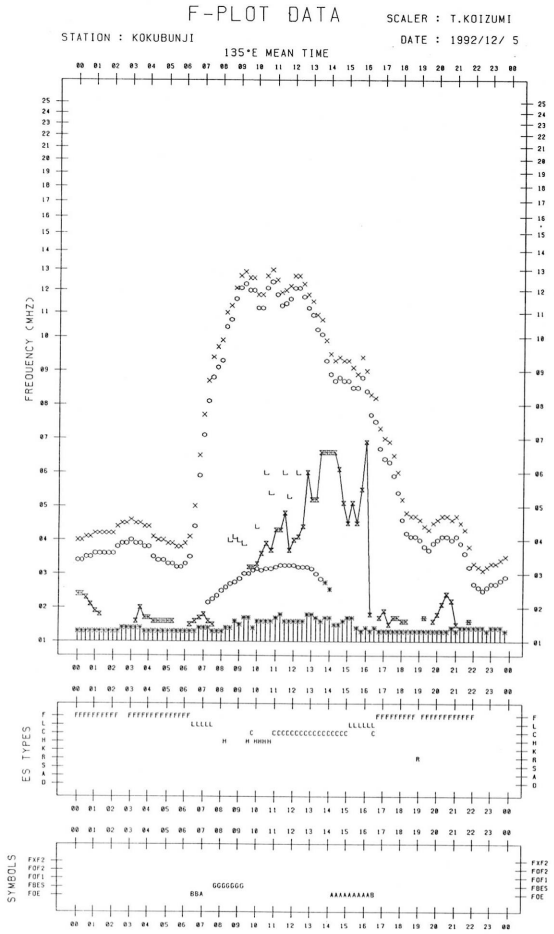
KEY OF F-PLOT	
|	SPREAD
⬡	FOF2, FOF1, FOE
×	FXF2
✳	DOUBTFUL FOF2, FOF1, FOE
⧖	FBES
⌊	ESTIMATED FOF1
⫯, Y	FMIN
∧	GREATER THAN
∨	LESS THAN

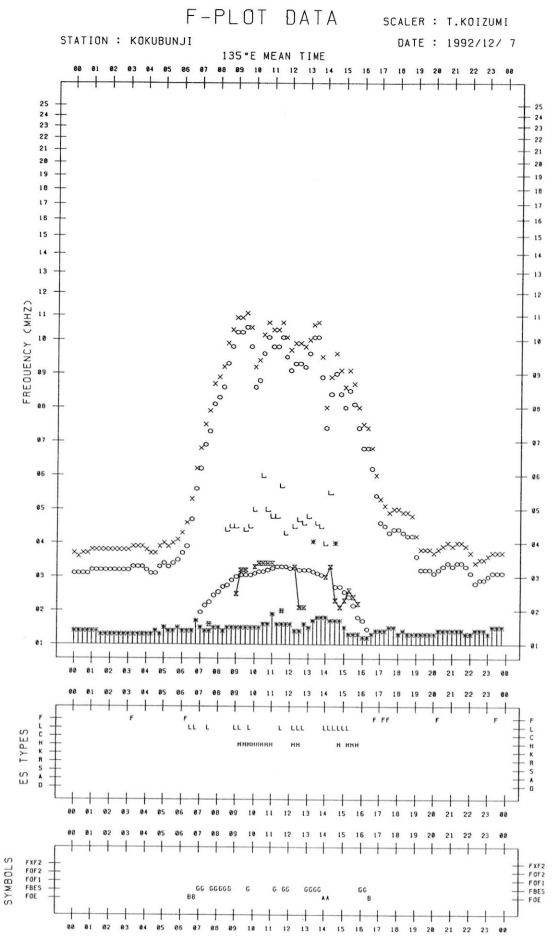

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/ 1
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

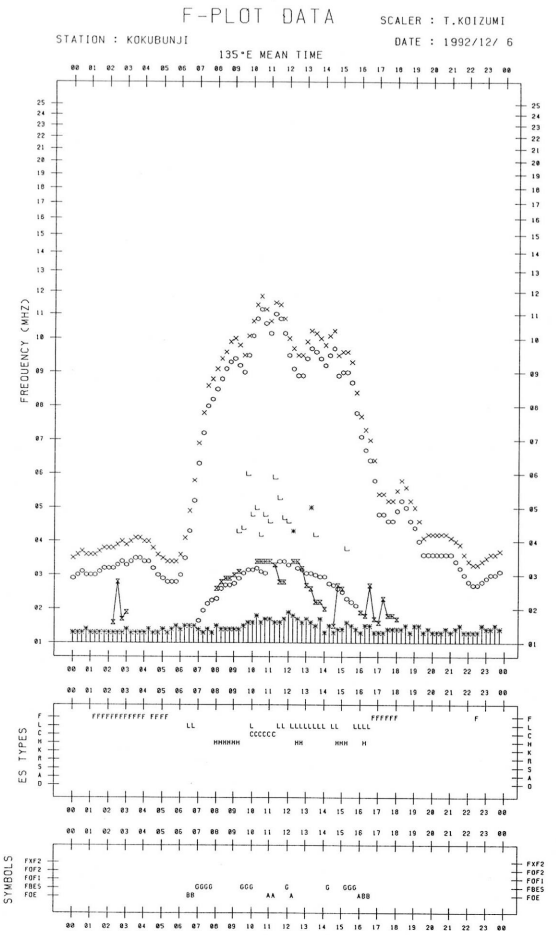

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/ 3
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

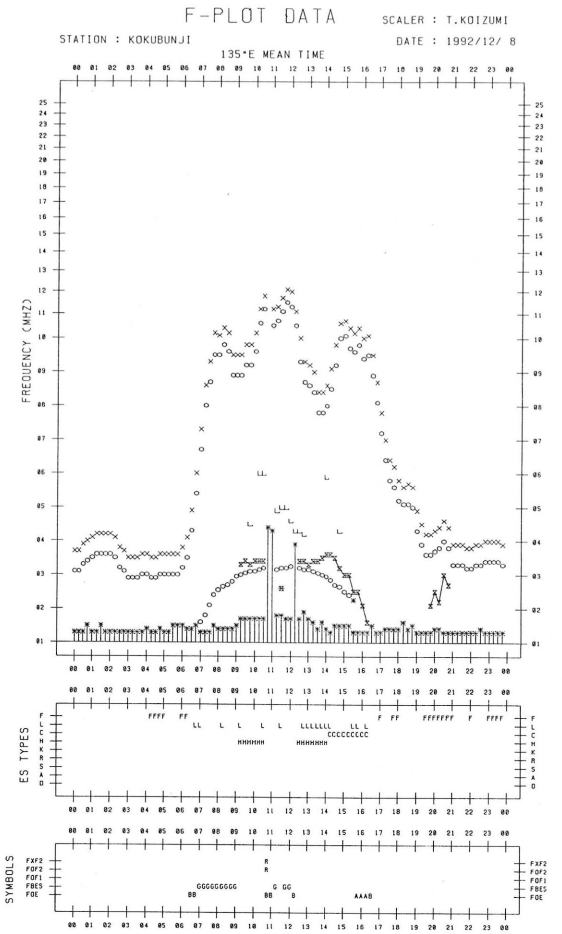

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/ 2
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

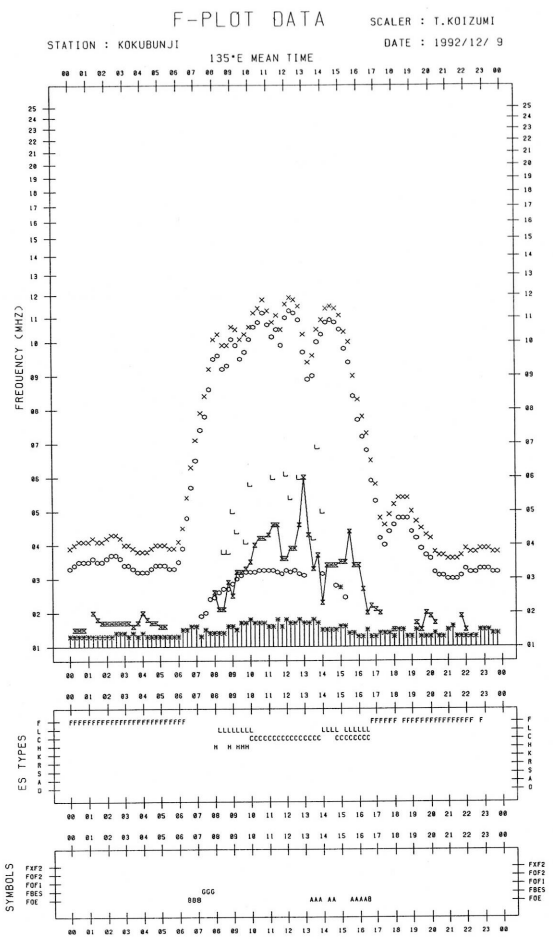

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/ 4
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

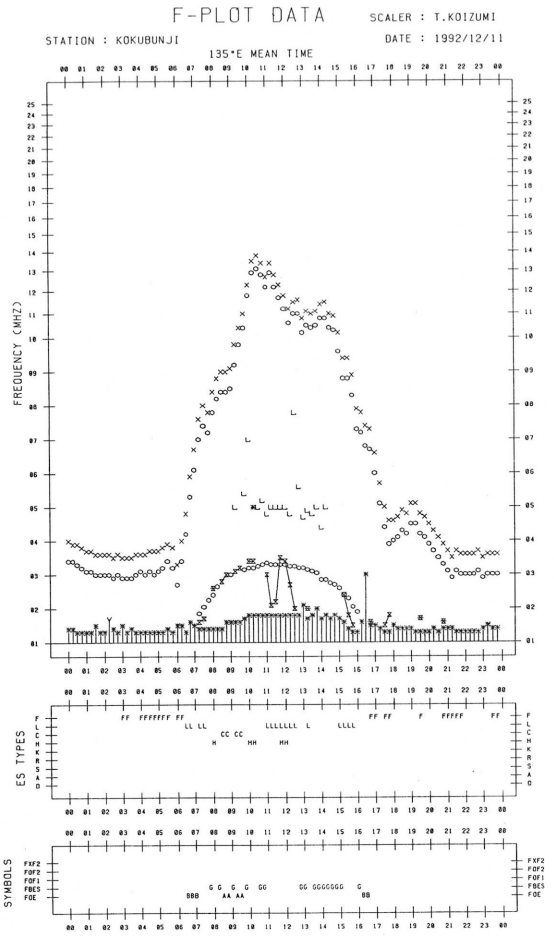

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/ 5
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

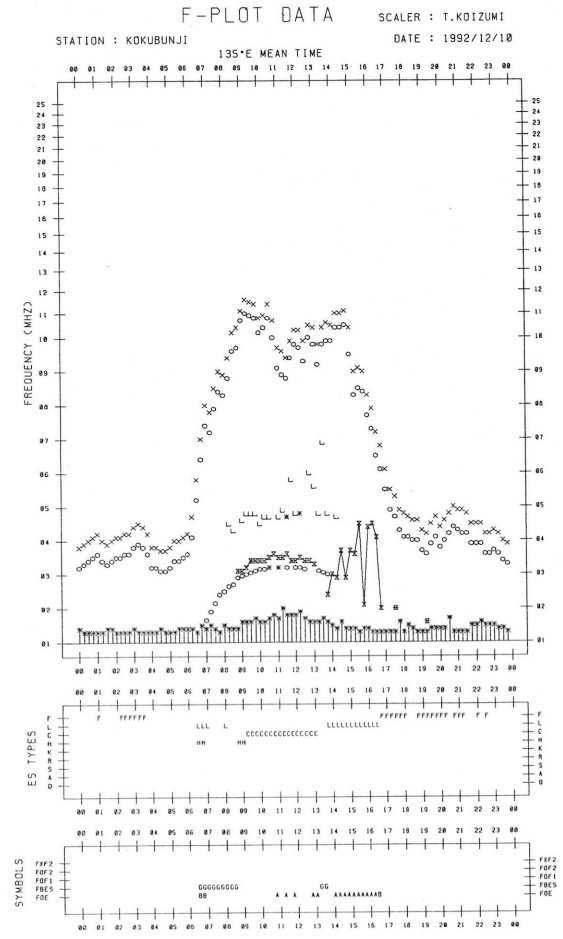

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/ 7
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

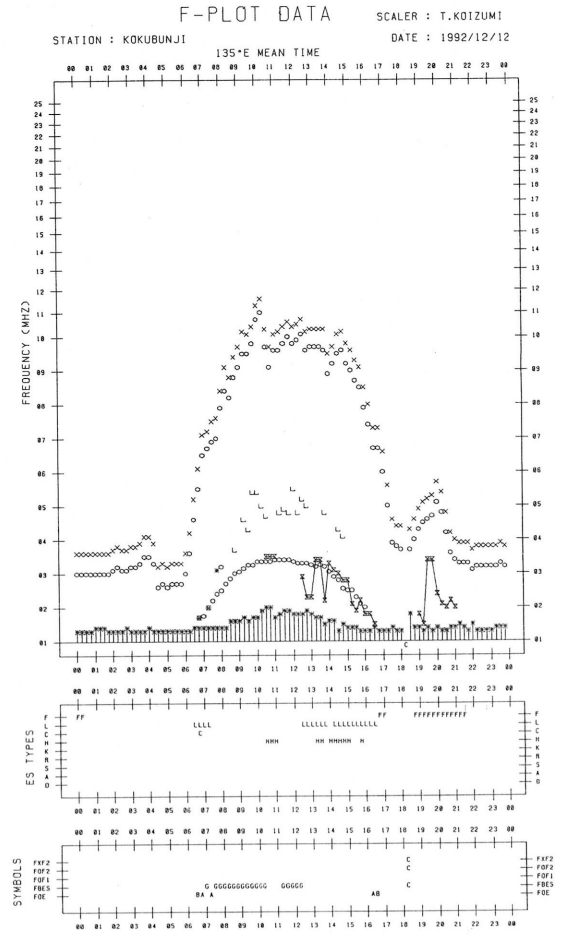

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/ 6
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

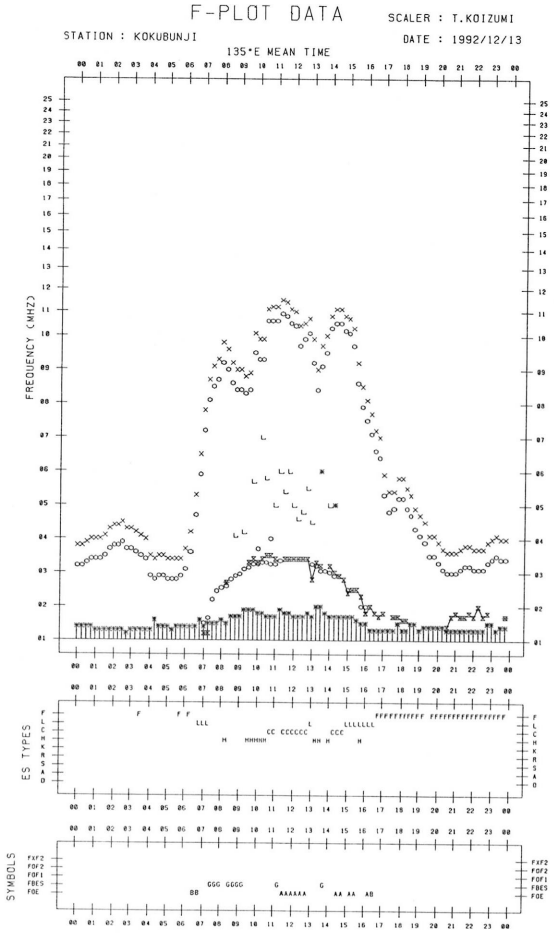

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/ 8
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

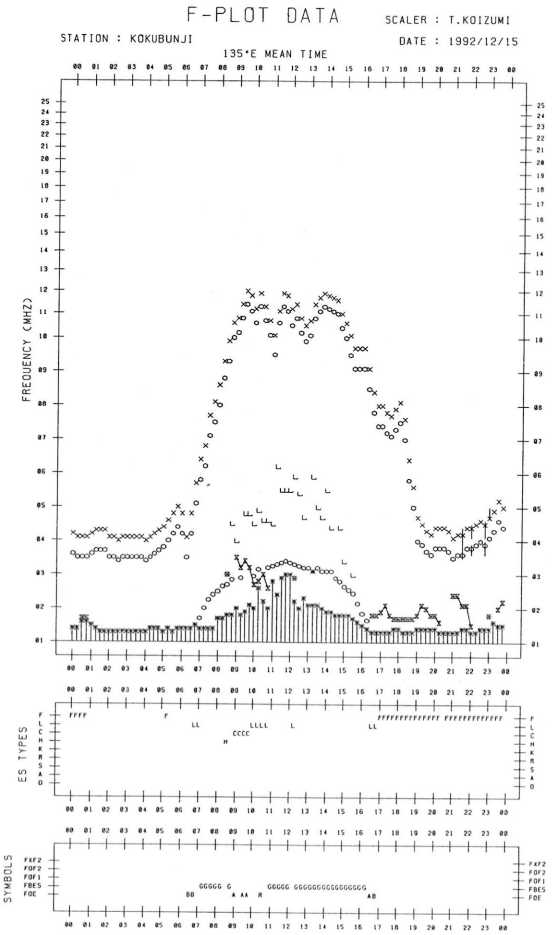

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/ 9
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

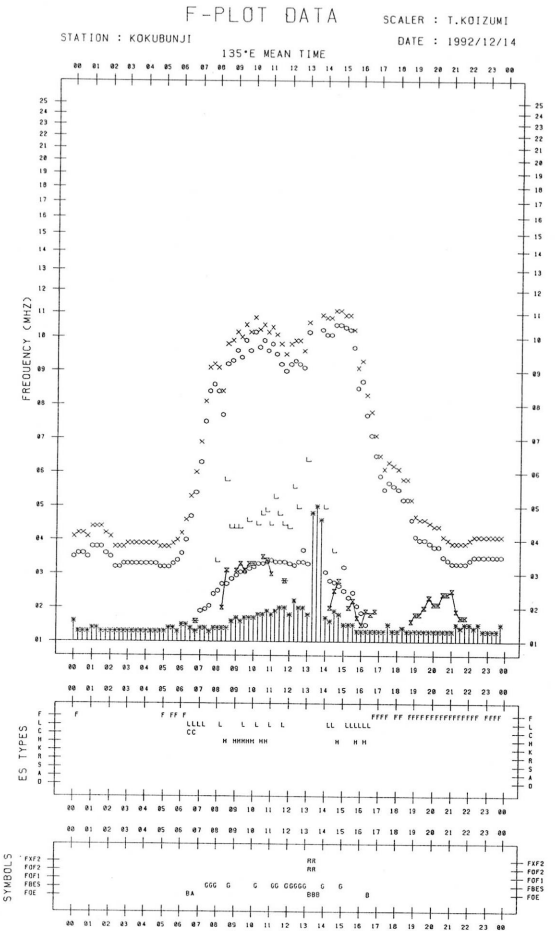

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/11
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

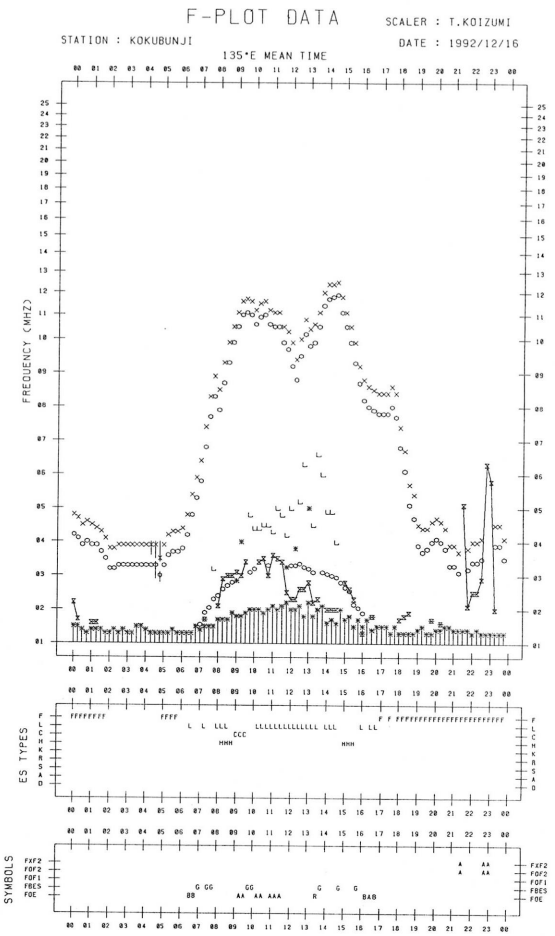

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/10
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

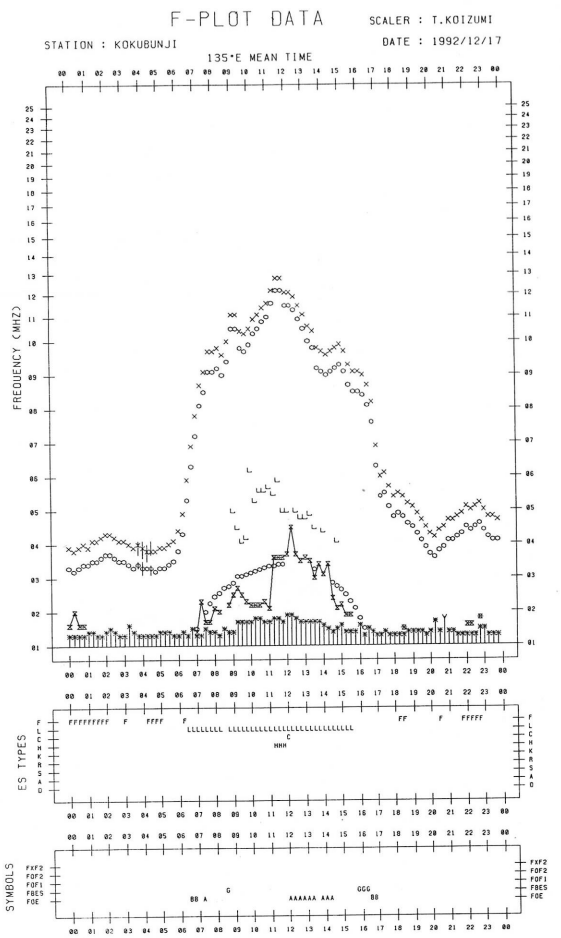

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/12
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

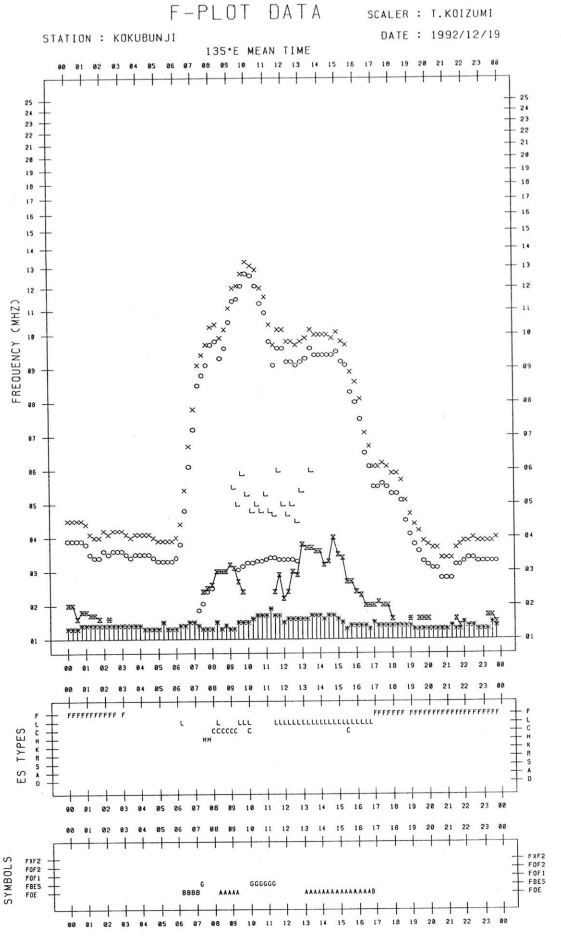

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

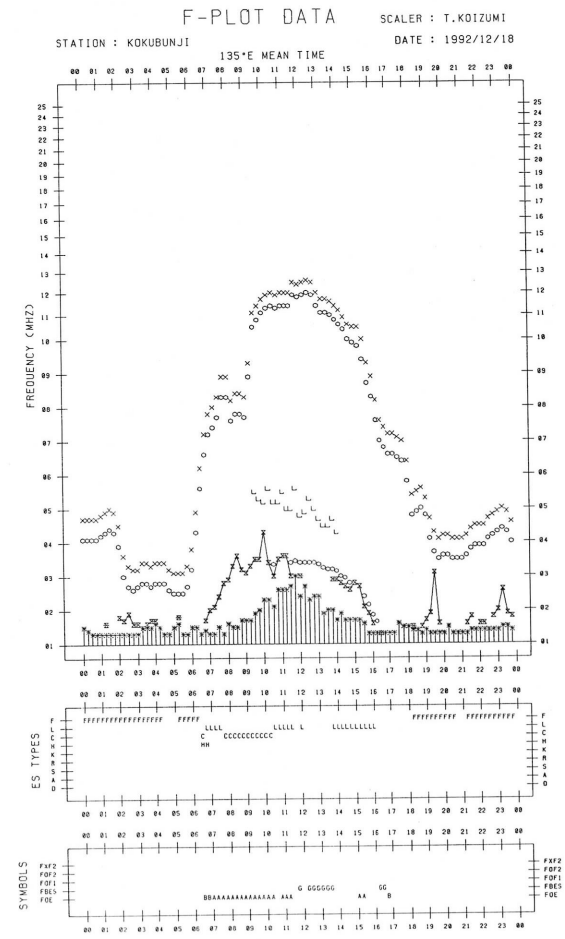

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

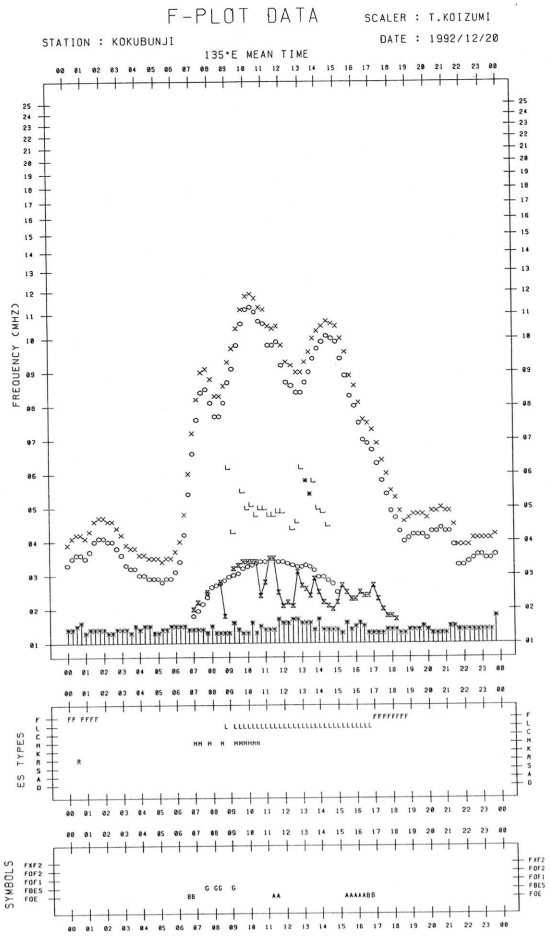

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

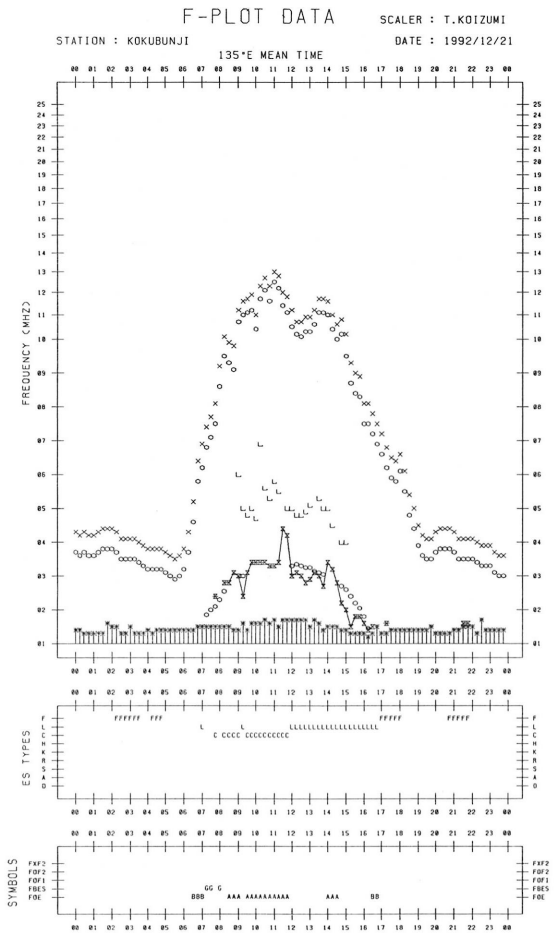

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

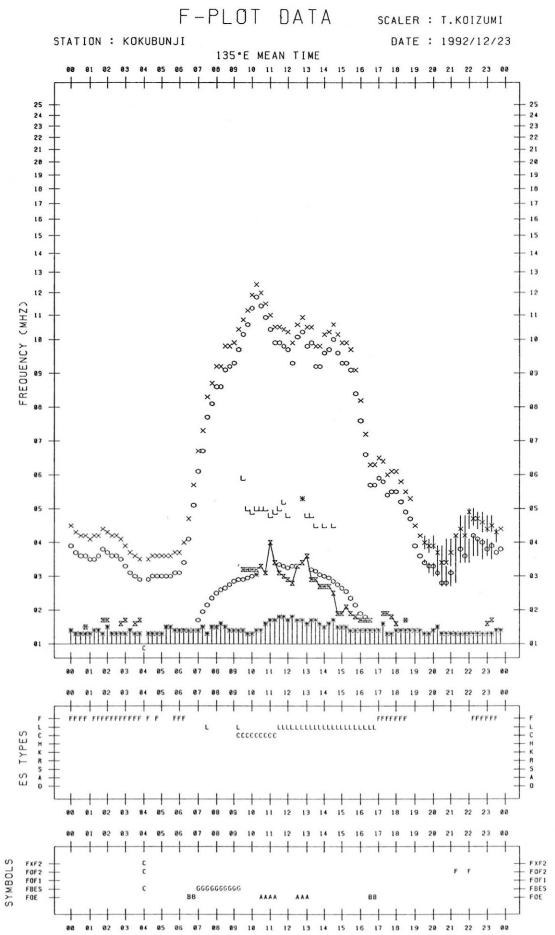

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

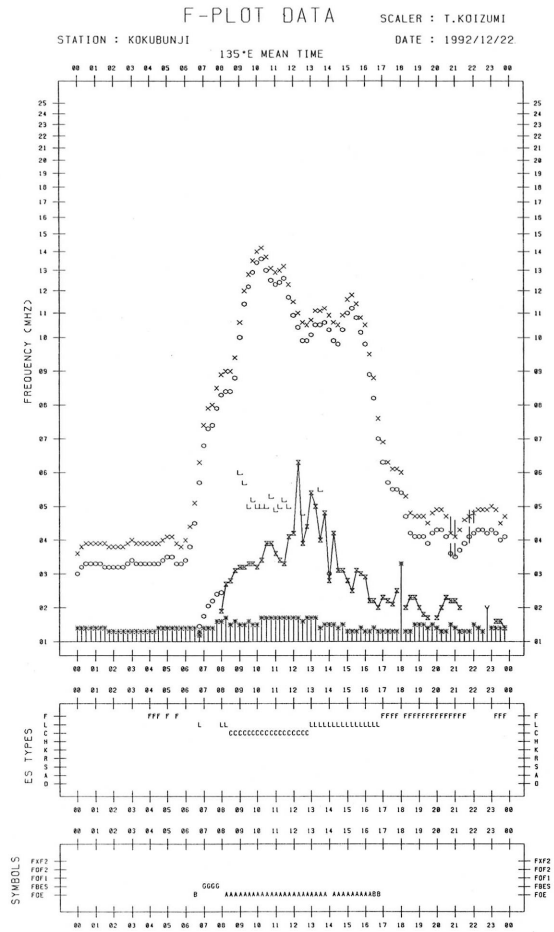

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

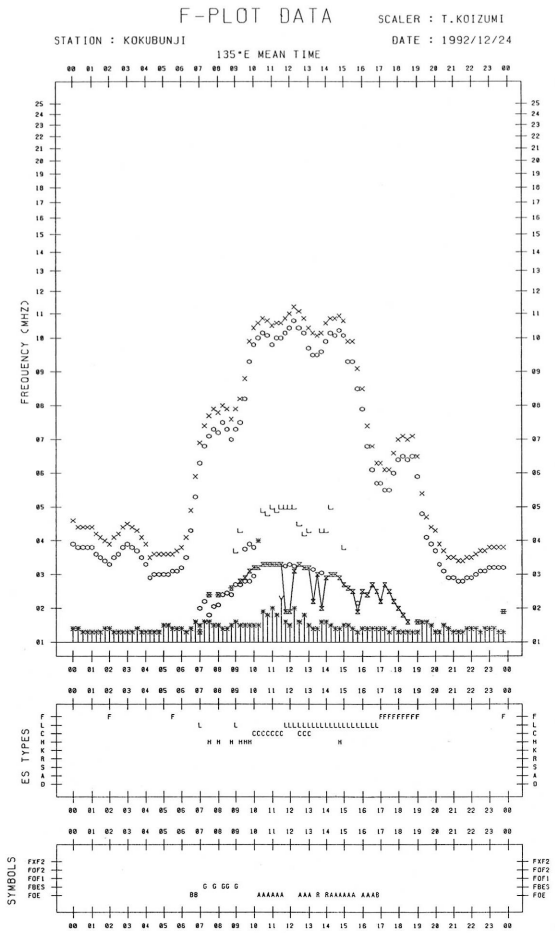

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

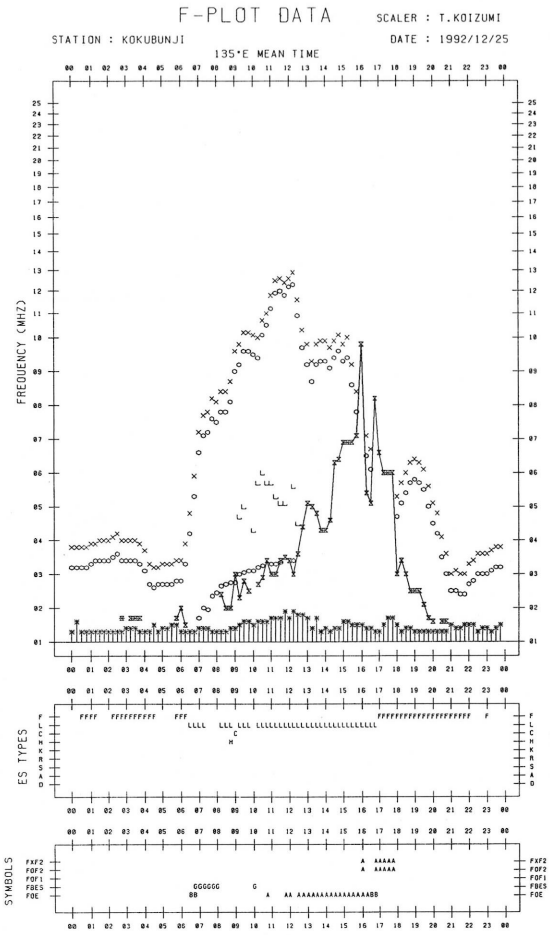

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

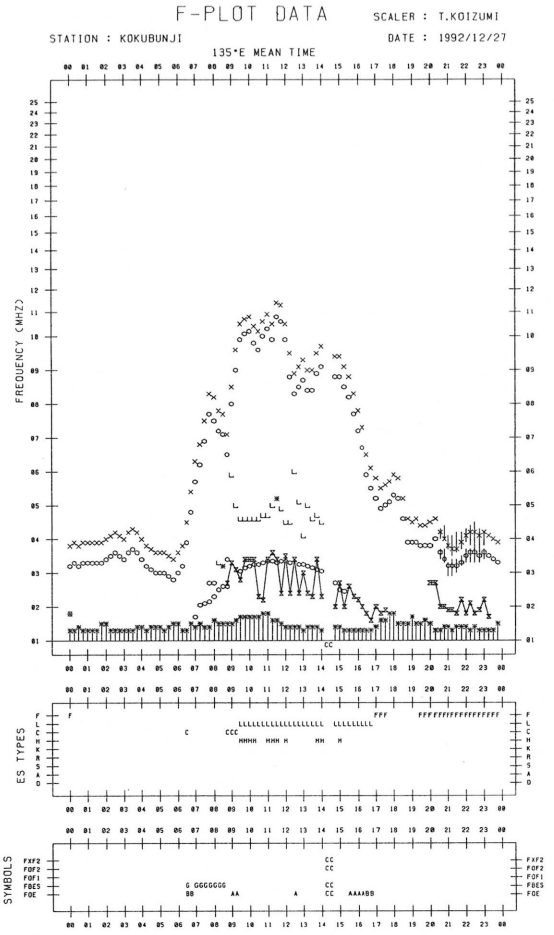

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/21
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

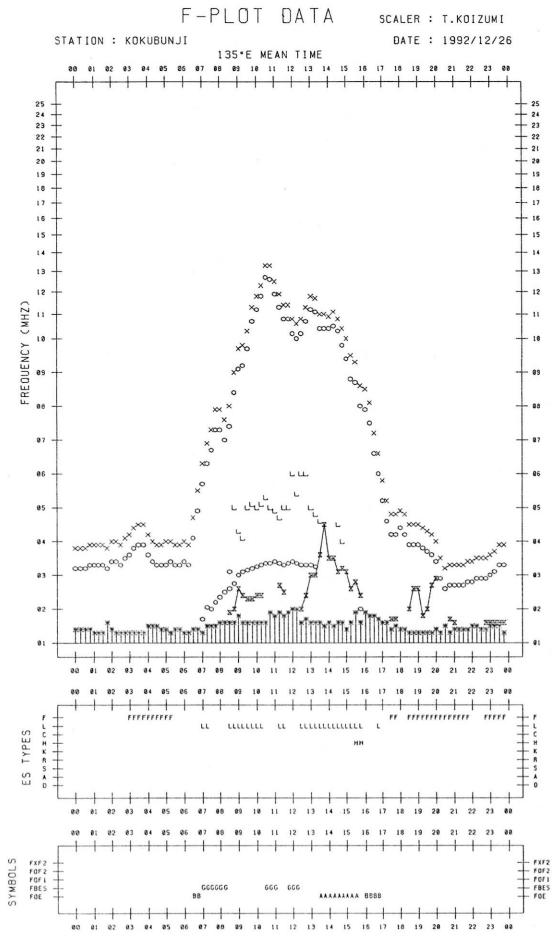

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/23
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

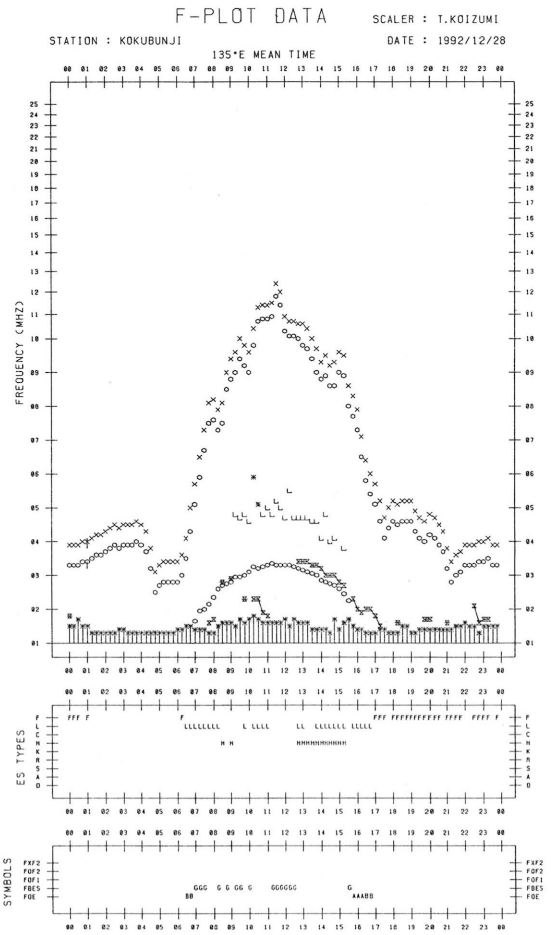

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/22
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

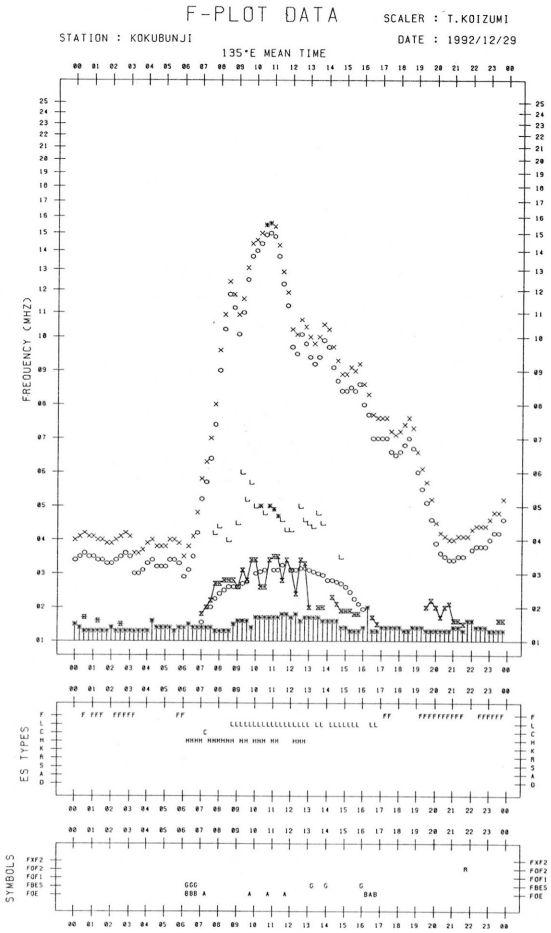

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/24
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

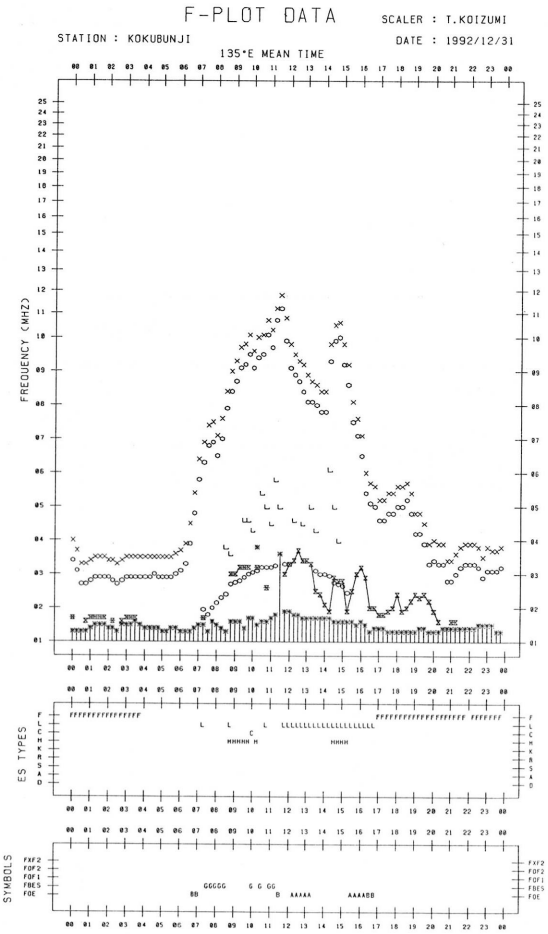

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/25
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

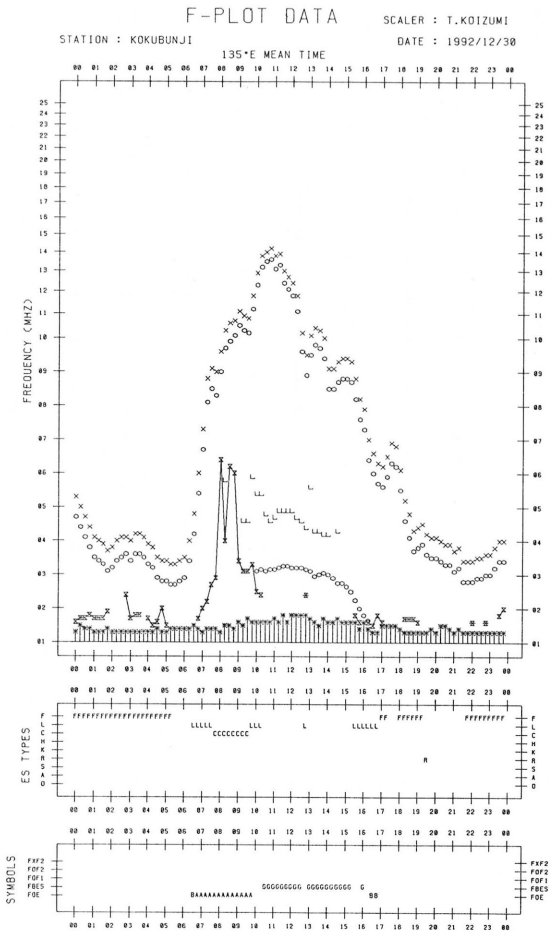

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/27
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/26
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/28
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/29
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/31
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1992/12/30
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 1992

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

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

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso

December 1992

Single-frequency observations

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

DEC. 1992	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
11	200	43 NS	2320	0002	460D	80	30	WL
12	200	44 NS	2200E	0243	240D	40	15	0
15	200	43 NS	0343	0426	180D	80	30	0
16	200	43 NS	0423	0632	160D	100	50	0
21	200	8 S	0549.5	0549.7	0.7	67	40	0
	100	46 C	0549.8	0549.8	1.2	630	400	WL
26	200	44 NS	2200E	0332	540D	40	15	WL
30	200	42 SER	0234	0245.3	12	45	-	0
	200	46 C	0628.7	0629.6	2.0	75	30	0

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

C. RADIO PROPAGATION

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

DEC 1992 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	8	21	15	10	-5	ES -20	-16	ES -20	ES -20	ES -29	ES -29	ES -29	ES -29	ES -29	-16	ES -29	ES -29	-14	-1	2	1	4	5
2	4	6	17	ES -29	ES -14	ES -14	ES -8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3	7	7	4	-16	ES -8	ES -8	ES -14	-11	ES -14	ES -14	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	1	4	2
4	2	3	-10	-4	ES -20	ES -20	ES -3	ES -20	ES -14	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	C	2	2
5	-1	-6	ES -20	ES -20	-20	ES -8	ES -20	ES -20	ES -29	ES -29	ES -29	ES -29	-20	ES -29	ES -29	ES -29	ES -29	ES -29	-11	-17	ES -29	-8	2	2
6	2	-3	ES -14	ES -29	ES -29	ES -29	ES -29	-16	-16	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-2	1	2
7	3	-2	ES -29	ES -14	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	1	4	4
8	8	8	10	8	-16	ES -29	ES -14	ES -14	ES -20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-1	4	9
9	3	-1	-9	ES -20	ES -29	ES -8	ES -8	S	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-1	6	3
10	2	3	3	-3	ES -14	ES -11	ES -14	-5	ES -14	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-8	-2	1
11	2	3	-8	ES -14	ES -29	ES -20	ES -8	ES -8	-15	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-4	0	0
12	-2	3	-9	ES -20	ES -20	ES -9	-14	ES -8	ES -29	ES -3	ES -8	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-4	-3	-2
13	-2	1	-4	ES -11	ES -29	ES -29	-16	ES -20	-14	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-8	-1	-8
14	-3	3	4	0	ES -29	ES -29	ES -29	ES -29	ES -20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-9	-6	-4
15	-4	-8	-6	ES -29	-9	ES -29	ES -14	ES -14	ES -11	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-2	-1	-8
16	-9	-7	-14	ES -29	ES -29	ES -29	ES -8	ES -14	ES -14	ES -14	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-7	-3	5
17	-4	-4	-11	ES -20	ES -20	ES -20	ES -11	ES -14	ES -10	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-7	-6	-3
18	-1	-1	-6	5	0	ES -8	ES -20	ES -20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-9	-7	-4
19	-3	-6	-2	ES -29	ES -14	ES -20	ES -11	ES -14	ES -14	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-25	-8	-10
20	-8	-8	0	-9	-15	ES -20	ES -20	ES -14	ES -9	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-16	-4	-14
21	-9	-9	-9	ES -8	ES -8	ES -11	ES -3	ES -14	ES -3	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-14	-8	-9
22	-8	-8	-10	ES -8	ES -20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-20	-9	-8
23	-9	-7	-9	-4	-7	-9	-9	ES -11	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-11	-6	
24	-7	2	-8	-14	-9	-20	-14	ES -14	-25	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-25	-8	-9
25	-20	-10	-14	-14	ES -14	ES -14	ES -20	ES -20	ES -14	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-14	-10
26	-14	-9	ES -20	-20	-20	ES -14	ES -20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-20	-8
27	-20	-11	-10	-7	ES -20	ES -20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-11	-11
28	-8	-4	1	-6	ES -20	ES -20	ES -20	ES -14	ES -14	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-6	-10
29	-3	4	-3	-10	ES -20	ES -14	-20	ES -20	-14	-23	-20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-14	-8	-9	-8
30	-10	-4	3	ES -20	ES -20	ES -29	ES -20	-11	ES -8	ES -11	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-12	-4
31	-3	-6	ES -29	ES -29	ES -29	ES -29	ES -9	ES -20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-1	-4	10
CNT	31	31	31	31	31	31	31	29	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30
MED	-3	-3	-8	ES -14	ES -20	ES -20	ES -14	ES -14	ES -16	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-8	-4	-4
UD	6	7	10	5	-7	ES -8	ES -8	ES -8	ES -9	ES -14	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	1	4	5
LD	-14	-9	ES -20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-12	-10

C. RADIO PROPAGATION

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

DEC 1992 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	8	12	13	16	21	5	-14	17	7	-6	-1	-20	-14	ES -29	ES -29	ES -29	ES -29	ES -29	-20	-1	13	5	7	19
2	7	15	12	16	16	17	4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3	10	10	10	16	16	13	14	10	0	-16	ES -29	ES -29	ES -29	-17	-17	-23	ES -29	ES -29	ES -29	ES -29	3	10	11	16
4	5	11	11	14	21	17	4	-11	ES -14	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-3	C	5	5
5	5	7	9	11	13	10	7	-3	-11	-16	-20	-17	-17	-20	ES -29	ES -29	ES -29	ES -29	-7	-15	3	7	6	3
6	2	7	10	9	12	17	-3	-10	-20	-12	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	1	9	2	4
7	7	6	11	9	12	4	-11	-17	-17	-16	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-2	8	7	7
8	13	9	13	13	13	11	7	10	-9	-14	-20	ES -29	ES -29	ES -29	2	ES -29	ES -29	ES -29	ES -29	ES -29	2	19	12	12
9	8	13	11	19	13	19	16	9	-17	-10	-20	ES -29	ES -29	-20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-1	13	7	5
10	18	18	14	12	15	11	-8	-8	-14	-20	-20	-20	-14	-14	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	4	13	12	8
11	8	6	8	17	14	12	-6	-11	-17	-20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	4	15	4	9
12	11	9	14	17	18	9	7	-14	-20	ES -3	ES -3	-20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	16	7	9	8
13	3	9	11	14	16	16	1	-9	-8	-14	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	9	9	13	7
14	6	5	11	13	22	9	7	9	-8	-14	-20	-20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	3	3	1	7
15	2	2	11	15	17	18	12	3	2	-6	ES -29	ES -29	-20	-9	-25	ES -29	ES -29	ES -29	ES -29	ES -29	9	11	13	10
16	7	5	11	11	18	13	18	18	7	-11	ES -29	ES -29	ES -29	ES -29	-20	ES -29	ES -29	ES -29	ES -29	ES -29	12	10	7	9
17	10	3	9	14	17	17	12	17	9	0	-3	-9	-11	-20	ES -29	ES -29	-20	ES -29	ES -29	ES -29	12	9	8	6
18	5	7	12	13	16	17	14	9	-3	-20	-14	-10	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	9	12	11	12
19	6	3	11	12	13	15	12	-4	-9	-20	-9	-23	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	5	13	10	7
20	6	9	8	13	16	19	19	19	-9	-16	-20	-20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	2	12	9	8
21	7	8	14	13	17	17	16	7	9	-20	-20	-14	-20	-23	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	14	9	11	11
22	18	20	19	-8	-16	-16	ES -29	ES -29	-23	-23	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	4	9	10	9
23	9	9	11	14	15	11	15	9	-11	-8	ES -29	ES -29	ES -29	-20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	9	7	13	9
24	7	9	9	24	17	4	8	7	-11	-14	-8	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-8	ES -29	3	9	5	5
25	-1	1	10	13	14	14	17	5	-8	-23	ES -29	-20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	12	8	9	4
26	6	3	7	16	19	0	-3	-3	-23	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	2	16	3	9
27	9	10	12	20	12	-7	6	-10	-8	-16	-23	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	9	12	13	9
28	9	12	9	13	13	1	-3	17	-11	-6	-14	-14	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	7	6	7	8
29	7	7	14	14	16	-8	13	11	-8	-4	-15	-23	ES -29	ES -29	-16	ES -29	ES -29	ES -29	ES -29	-20	9	12	10	9
30	8	9	9	13	21	14	22	1	-8	-11	ES -29	ES -29	ES -29	-20	-20	ES -29	ES -29	ES -29	ES -29	ES -29	13	12	8	3
31	7	3	1	9	12	0	-8	-9	3	7	-20	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-20	ES -29	10	14	7	16
CNT	31	31	31	31	31	31	31	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30
MED	7	9	11	13	16	12	7	4	-9	US -14	US -20	US -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	6	10	8	8
UD	13	15	14	19	21	18	18	17	7	ES -3	ES -3	-14	-14	-17	-17	ES -29	ES -29	ES -29	-20	-20	13	15	13	16
LD	2	3	8	9	12	-7	-11	-14	ES -20	ES -23	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	ES -29	-1	6	3	4

C. Radio Propagation

C2. Radio Propagation Quality Figures at Hiraiso

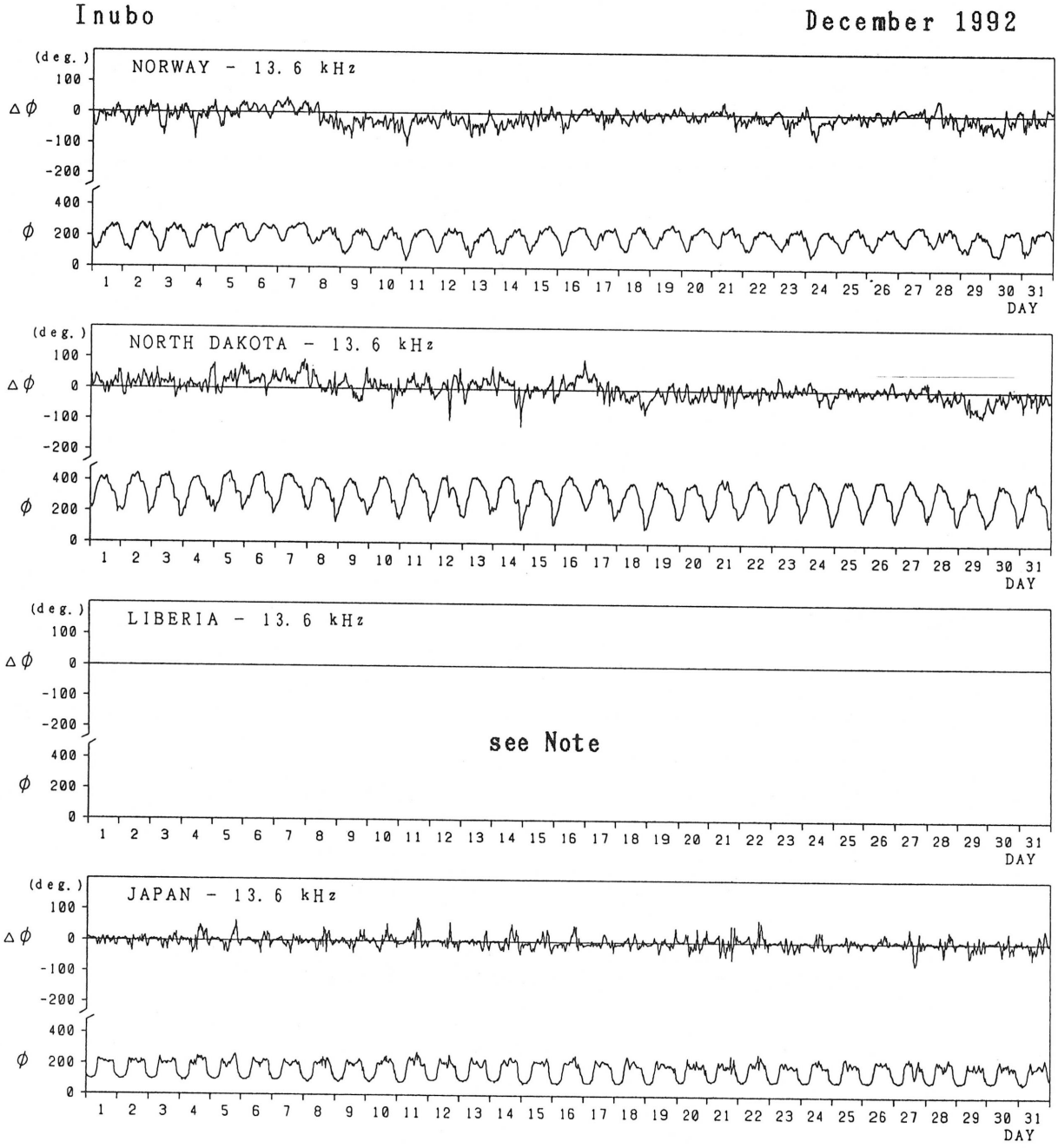
Hiraiso

Time in U.T.

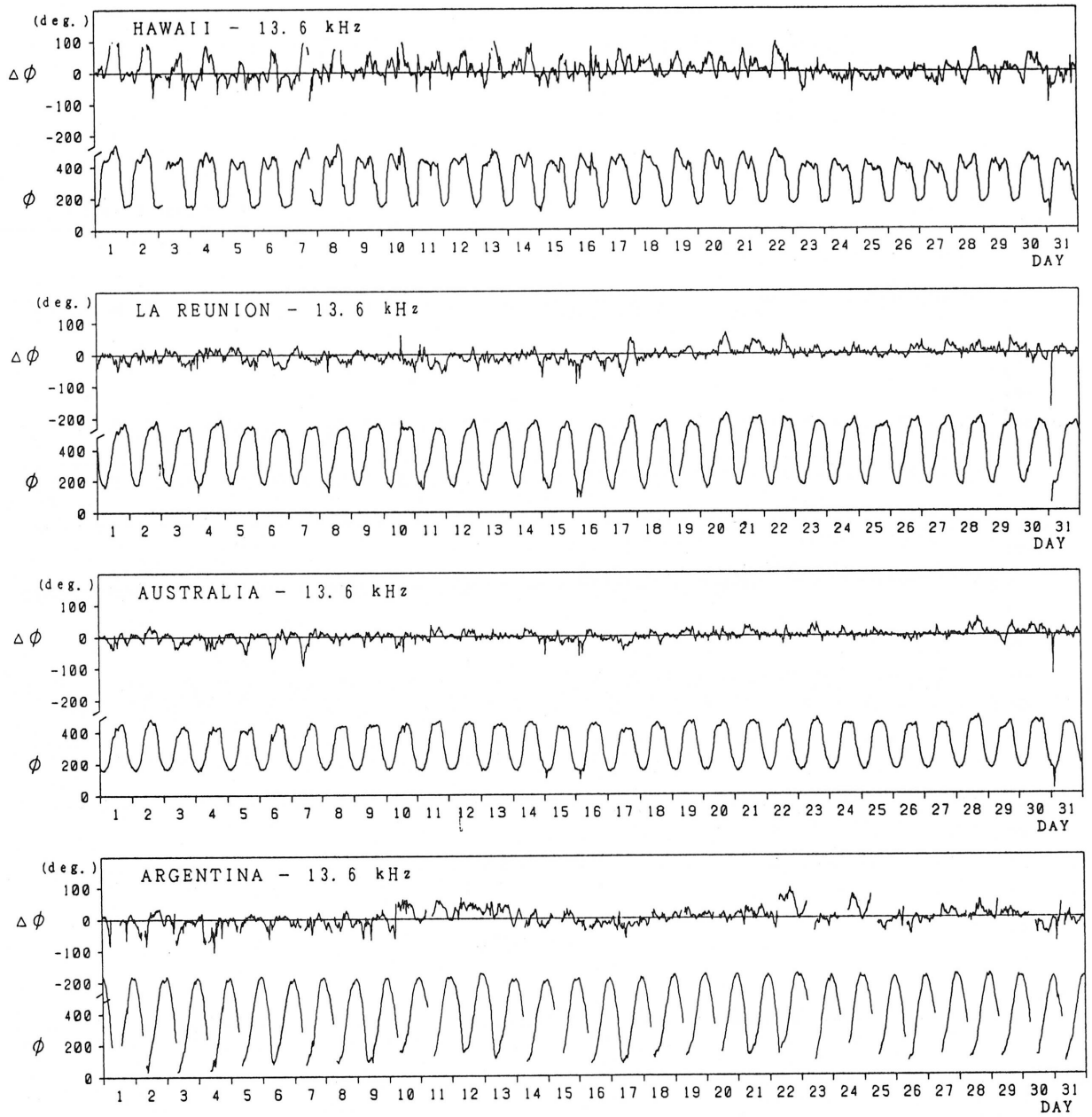
Dec. 1992	Whole Day Figure	W W V 00 06 12 18 / 06 12 18 24	W W V H 00 06 12 18 / 06 12 18 24	Conditions 00 06 12 18 / 06 12 18 24	Principal Geomagnetic Storms Start h m	End h	Range nT
1	5-	5U - - 5	4 5 - 4	N N N N			
2	C	5U C C C	4 C C C	N N N N			
3	4+	5U - - 5	4 4 5U 4	N N N N			
4	4+U	5U - - 5U	4 3U - 4	N N N N			
5	4+	4U - - 5U	4 4 - 4	N N N N			
6	4o	4U 4U - 5	4 3 - 4	N N N N			
7	4o	4U - - 5	4 3 - 4	N N N N			
8	4+	5U - - 5	4 4 4U 4	N U U U			
9	4+	4U - - 5	4 4 - 4	N N N N			
10	4o	5U - - 4	4 3 5U 4	N N N N			
11	4-	4U - - 4	4 3 - 4	N N N N			
12	4o	4U - - 4	4 4 - 4	N N N N			
13	4-	4U 4U - 4	4 3 - 4	N N N N			
14	4o	5U - - 4	4 4 - 3	N N N N			
15	4o	4U - - 4	4 4 5U 4	N N N N			
16	4-	3U - - 4	4 4 - 4	N N N N			
17	4+	4U - - 4	4 5 5U 4	N N N N	0615	----	100
18	4o	4U - - 4	4 4 - 4	N N N N	----	08	SSC
19	4-	4U - - 3	4 4 - 4	N N N N			
20	4-	4U - - 3	4 4 - 4	N N N N			
21	4-	3U - - 3	4 4 - 4	N N N N			
22	3o	3U - - 3	3 2 - 4	N N N N			
23	4oU	4U - - 4U	4 4 - 4	N N N N			
24	4-	4U - - 3	4 4 - 4	N N N N			
25	4-U	3U - - 3U	4 4 - 4	N N N N			
26	3+U	3U - - 3U	4 3 - 4	N N N N			
27	4-U	3U - - 3U	4 4 - 4	N N N N	2010	----	159
28	4oU	4U - - 4U	4 4 - 4	N N N N	----	----	
29	4o	4U 4U - 4	4 5 - 4	N N N N	----	----	SSC
30	4oU	4U - - 4U	4 4 5U 4	N N N N	----	06	
31	4-U	3U - - 5U	3 4 - 4	N N N N			

C. Radio Propagation

C3. Phase Variation in OMEGA Radio Waves at Inubo



Inubo December 1992



Note: As for LIBERIA-13.6kHz, no record during 18 October - 31 December, due to the maintenance of transmitter.

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

NONE

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso

Time in U.T.

Dec. 1992	S W F								Correspondence	
	Drop-out Intensities(dB)					Start	Dur.	Type	Imp.	Solar * Flare	Solar Burst
	CO	HA	AUS	MOS	BBC						
15	x	13	13			0104	24	2	2-	x	x
16			13			0312	25	2	1	x	
25		x	7			0139	16	2	1-	x	
31	x	x	35			0216	24	2	3-	x	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. 1992	SPA								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	Ω/AU	Ω/H	Ω/ND	Start	End	Maximum
1		—	27	9			0526	0610	0536
1		—	26				1022	1054	1030
1		—			29		2020	2038	2028
2		—	14	11	6		0304	0328	0312
2		—	24	12			0630	0654D	0636
2		—	13				0654E	0720	0700
2		—	6				0728	0740	0730
2		—	22				0908	1000	0922
3		—		11	5		2258	2330	2306
4		—	25*	31*	17	25	0152	0244D	0200
4		—	6	8			0244E	0310	0250
4	17	—	76	47			0412	0506	0418
4		—	22				0844	0904	0852
4		—	12				1050	1106	1054
4		—	42				1136	1256	1142
5		—	8				0600	0618	0606
6		—		22	13		0026	0104	0034
7		—	22	14			0358	0446	0408
7		—		25	27		2214	2236	2218
8		—		9	5		0200	0246	0218
8		—	14	4			0550	0624	0602
8		—	18				0634	0654D	0644
8		—	61	11			0654E	0736	0700
9		—	14				1042	1100	1050
9		—	14				1118	1136	1122
10		—		17	11		2256	2316	2258
12		—	8				0554	0612	0602
13		—		40	33		0026	0114	0038
13		—	12	9			0502	0524	0508
13		—	27	7			0704	0730	0712
13		—	9				0818	0912	0830
14		—	18	9			0516	0550	0526
15		—	65	65	58	25	0112	0200	0120
15		—	16	12			0420	0452	0428
15		—	14				0904	0936	0908
16		—	76	60	35		0316	0410D	0326
16		—	20	12			0410E	0442	0420
16		—	12	7			0458	0542	0514
16		—	40	34			0546	0648	0556
17		—	22				1128	1200	1134

Inubo

Dec. 1992	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
20		—	23	9			0448	0530	0458
21		—	5	4			0334	0400	0348
25		—	17	24	15		0140	0220	0148
28		—	29	6			0644	0716	0652
29		—	5				0938	0954	0942
30		—	18	17	9		0242	0314	0250
30		—	19	5			0632	0658	0636
30		—	20				0820	0850	0828
30		—	22				0936	1004	0942
30		—		21	18		2204	2224D	2212
30		—		30	24		2224E	2310	2240
30		—	9	45	27		2334	0022	2340
31		—		12			0152	0212D	0208
31	40	—	173	140	91	39	0212	0324D	0226
31		—	15	16	14		0324E	0358	0330
31		—	26				0810	0838	0814

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