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IONOSPHERIC DATA IN JAPAN

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CONTENTS

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

NOV. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	56	50	51	42	47	45	58	106	130	127	137	151	141	124	125	130	128	90	91	76	63	57	35	36
2	N	46	35	A	30	69	56	57	83	74														
3																								
4																								
5					54	40	54	89	112	126	130	135	132	133	138	131	117	105	81	73	66	63	58	55
6	53	46	52	43	48	57	90	98	126	134	140	142	140	126	122	125	127	106	73	60	55	58	57	56
7	58	60	54	57	52	58	64	88	110	127	130	145	141	125	123	127	123	103	86	71	56	56	49	49
8	53	48	49	46	48	48	81	109	131	131	130	135	135	124	123	128	118	105	86	78	72	N	62	62
9	34	36	34	47	34		62	89	92	107	102	118	109	122	111	108	120	91	91	92	78	80	76	58
10	39	56	41	47	46	71	53	120	140	141	148	127	153	144	122	122	122	91	71	55	54	60	48	43
11	52		48	38	40	41	51	110	124	128	141	135	142	133	140	132	130	109	80	67	62	58	40	38
12	44	47	49	43	46	43	43	83	127	138	130	136	140	136	121	127	121	97	N	82	63	60	39	58
13	45	58	53	48	42	N	64	109	135	129	136	138	141	131	120	112	114	90	71	68	82	68	57	52
14	A	44	41	54	73		65	111	128	140	149	147	131	121	130	126	101	114	77	77	66	61	57	59
15	61	54	59	57	56	71	85	110	129	116	135	132	153	124	127	122	112	81	83	64	61	54	75	99
16	79		91	50	54	59	64	112	129	132	131	132	134	122	120	117	104	90	86	65	57	69	38	40
17	50	37	43	79	40	49	43	77	117	139	140	148	136	157	125	130	117	110	92	68	A	52	48	59
18	54	76	48	36	47	37	32	66	118	135	128	153	143	144	139	130	88	90	66	67	44	40	43	37
19	48	48	66	40	35	A	79	79	104	111	138	130	135	134	130	114	87	88	83	73	61	46	35	34
20	37	37	35	42	34	34	A	70	106	121	126	124	132	130	138	123	91	108	71	63	58	45	43	39
21	41	A	44	32	40	34	61	88	113	112	117	140	127	122	103	119	91	67	61	56	42	38	36	38
22	43	38	18		N	A	A	66	104	104	140	141	140	139	137	144	101	86	66	54	60	52	54	54
23	43	49	40	42	43	A	54	73	109	120	140	121	128	124	128	120	89	66	57	43	43	51	A	33
24	43	A	34	40	38	44		79	108	128	127	120	126	126	122	126	91	58	52	50	A	37	36	A
25	43	40	40	45	49	38	89	52	86	121	132	122	126	108	120	111	90	89	A	43	52	47	38	46
26	47	48	45	45	44	45	65	70	111	105	123	112	92	100	107	104	94	67	46	A	41	37	37	A
27	44	38	38	38	41	56	66	89	100	124	109	118	112	95	103	88	79	57	34	43	36	34	30	35
28	35	43	35	48	37	42	64	85	111	119	98	120	100	121	129	104	67	57	46	38	35	31	31	31
29	34	38	40	40	32	34	38	66	110	128	123	106	111	113	119	107	100	72	51	46	34	40	38	38
30	34	29	34	38	48	36		84	106	129	117	126	116	111	113	102	120	86	67	52	49	48	38	37
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	25	23	27	25	27	22	24	28	28	28	27	27	27	27	27	27	27	27	25	26	25	26	26	25
MED	44	46	43	43	44	44	63	86	112	127	130	132	134	124	123	122	104	90	71	64	57	52	42	43
U Q	53	50	51	48	48	57	65	107	127	131	140	141	141	133	130	128	120	105	84	73	63	60	57	57
L Q	40	38	35	40	38	38	53	71	106	117	123	121	126	121	120	111	91	72	59	52	43	40	37	37

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT WAKKANAI

NOV. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	48	G	G	43	50	G	G	G	G	G	34	29	26	G	G	G	G
2	G	G	G	28	G	G	26	30	94	47														
3																								
4																								
5					G	G	G	G	G	G	G	G	G	G	G	34	27	32	G	G	G	G	G	G
6	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	40	G	44	45	29	24
7	37	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	60	32	57	34	68	45
8	27	26	G	G	G	G	40	G	G	G	G	G	G	G	G	G	G	G	34	G	33	32	29	G
9	G	G	G	G	G		32	46	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
10	G	G	G	G	G	G	G	31	G	G	G	G	G	G	76	46	G	66	41	63	37	38	G	G
11	G	G	G	G	31	32	G	G	G	G	G	G	58	G	G	41	G	G	G	G	G	G	G	28
12	25	29	G	G	G	G	G	G	G	G	G	G	G	46	49	37	30	36	G	G	G	G	G	28
13	G	29	G	25	32	G	G	G	G	39	G	G	46	G	G	G	G	G	G	G	G	G	G	30
14	32	G	35	G	29	G	G	G	45	58	39	G	49	G	G	G	G	G	G	G	G	G	G	G
15	G	G	G	G	G	G	G	G	G	G	48	59	46	70	G	G	G	31	G	G	G	G	G	G
16	G	G	G	27	G	29	28	G	58	G	G	G	G	G	G	G	G	G	G	G	26	G	31	27
17	G	G	G	G	G	G	G	G	37	G	54	G	G	G	G	G	G	G	G	G	65	G	G	G
18	G	G	G	G	G	G	27	38	42	72	112	G	49	40	42	70	46	G	31	G	G	G	G	28
19	G	G	G	24	26	29	G	70	45	G	41	44	G	G	88	46	36	36	33	29	G	G	G	24
20	G	G	27	G	G	G	26	32	G	39	G	G	G	G	G	32	34	34	G	27	29	26	G	32
21	34	38	31	26	G	G	28	58	39	72	62	G	G	G	G	G	34	30	26	28	G	G	G	G
22	29	28	26		G	26	79	38	G	G	G	G	G	G	G	G	30	34	30	G	36	32	28	29
23	26	28	41	32	33	36	G	35	G	G	G	G	G	G	G	44	60	43	67	32	30	G	29	G
24	G	49	28	G	G	27	126	G	G	G	G	48	46	G	G	48	37	30	35	36	41	30	32	35
25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	39	93	60	39	G	G	G
26	G	G	G	G	G	G	G	G	G	G	G	G	39	G	51	G	G	69	92	105	33	38	35	38
27	44	29	30	34	G	G	30	G	35	42	58	G	G	G	G	34	72	103	44	43	34	28	29	28
28	G	G	G	G	G	G	G	G	34	43	G	G	G	G	36	48	G	67	34	G	G	G	G	G
29	G	G	G	G	G	G	G	G	G	G	G	48	G	G	G	G	33	G	G	29	G	27	26	G
30	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	27	G	G	G
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	27	26	28	27	28	28	28	28	27	27	27	27	27	27	27	27	27	27	27	27	27	27
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	30	29	G	26	G	G	G
U Q	26	28	26	24	G	G	27	33	36	39	41	G	39	G	G	41	34	36	40	32	36	30	29	28
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

NOV. 1991

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

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

HOURLY VALUES OF FOF2 AT AKITA

NOV. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	58	65	59	43	43	48	59	87	137	138	140	145	137	130	123	121	111			83		65	39	59
2	32	54	34	A		26	52	53	86	80	86	97	86	90	101	100	91	70	64	66	65	64	A	64
3	58	58	50	58	44	43	62	90	110	127	140	138	137	133	121	120	111	90	86	64	65	62	58	A
4	62	56	60	54	62	48	58	105	108	131	124	125	127	122	118	111	112	100	86	53	64	65	60	65
5	55	60	51	47	45	29	48	75	127	131	120	126	131	131	136	117	112	103	86	79	66	54	53	53
6	52	56	54	46	44	53	78	111	112	131	130	137	136	134	127	122	118	97	79	48	54	62	60	57
7	54	56	53	46	42	52	66	90	102	118	131	134	140	134	122	123	120	97	83	69	63	A	63	51
8	51	41	49	62	50	48	57	110	117	121	122	131	131	138	124	123	121	90	87	69	69	65	66	57
9		31	38	62		A	46	80	86	108	91	121	111	120	113	111	117	111	108	85	66	70	92	68
10	41	46	46	48	25	29	44	108	137	128	140	140	140	138	132	120	104	100	86	68	65		64	65
11	60	50	35	37	40	37	46	87	109	134	154	145	138	140	130	131	116	89	82	55	44	48	36	37
12	42	41	42		41	A	A		116	138	117	134	127	133	134	120	118	110	90	67	66	56	62	48
13	56	62	A	64	58	52	54	90	111	127	120	134	127	118	115	107	108	84	56	57	A		64	65
14	65	40	46	48	46	38	53	102	131	137	161	133	126	121	127	118	112	86		55	45	60	53	46
15	56	56	50	59	63		64	90	111	114	126	125	120	135	120	108	90	86	86	80	50	46	41	46
16	46	46	39	44	44	44	19	90	134	138	136	121	120	126	110	89	112	87	57	79	56	61	42	52
17	44	52		48	40	44	51	87	111	135	136	142	134	155	133	120	121	96		86	60	53	A	43
18	46	44	40	41	A	34	38	87	140	145	147	144	146	140	137	127	111	70	52	57	48	36	30	42
19	26	35	47	40	23	32		90	133	138	157	139	143	138	123	110	99	89	79	93	53			
20	30	28	36	38	30	N	37	64	108	141	140	130	124	124	136	122	97	56	84	46	26	23	A	40
21	40		40	36	31	26	43	90	103	109	110	128	137	125	113	105	92	51	51	68	52	35	23	37
22	42	41		25	30		36	69	112	112	121	136	130	130	141	125	88	81	84	63	50	62	60	63
23	37	38	51	41	44		44	74	102	122	135	138	111	131	131	97	90	52	63	56	23	A	35	A
24	A		48	48	40	A	A	85	109	112	122	122	120	122	120	120	103	53	51	48	41	N	A	A
25	A	A	31		41	38	36	67	86	104	117	124	116	106	110	96	78	74	54	A		34	35	34
26	35	40	40	40	32	35	43	77	88	86	108	114	102	102	98	98	85	54	24	37	36	A	31	A
27	A	A	33	A	38	40	45	67	87	103	100	107	96	94	100	90	66	54	43	41		30	N	45
28	A	30	34	32	34	31	40	80	90	104	90	107	108	107	102	112	96	53	35	N	41	N	30	47
29	31		38	36	37	34	40	67	86	111	116	111	122	107	116	107	97	69	53	44	41	32	34	
30	35	26	31	38	31	30	41	68	88	103	120	130	114	97	101	100	86	84	78	51	40	37	51	25
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	25	25	27	26	27	23	27	29	30	30	30	30	30	30	30	30	30	29	27	28	26	22	24	24
MED	46	46	42	45	41	38	46	87	110	124	123	130	127	128	122	114	106	86	79	64	52	55	52	50
U Q	56	56	50	48	44	48	57	90	117	135	140	138	137	134	131	121	112	96	86	74	65	62	61	61
L Q	36	39	36	38	32	31	40	71	90	109	117	122	116	118	113	105	91	62	53	52	41	36	35	42

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT AKITA

NOV. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	27	G	G	G	G	G	G	G	G	G	G	G	G		G		G	G	G
2	G	G	G	30		G	28	G	G	40	52	48	48	G	43	39	G	G	40	45	G	36	33	32
3	28	26	29	G	G	24	29	40	51	66	47	G	G	55	57	G	G	G	58	38	29	34	34	62
4	G	G	G	25	26	33	G	G	G	G	G	G	G	G	G	51	38	G	G	G	G	G	G	G
5	G	G	G	G	26	G	G	G	36	G	G	G	G	G	G	G	34	45	40	G	G	26	G	G
6	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
7	G	G	26	G	G	G	G	G	36	47	50	58	G	G	40	42	G	34	G	G	31	49	G	G
8	28	G	G	G	G	G	G	144	53	46	59	56	58	51	G	G	43	54	28	25	25	28	G	G
9		G	G	G		26	26	38	41	G	G	G	G	G	G	G	G	28	G	G	G	G	G	G
10	G	26	G	G	G	G	G	G	60	51	56	103	57	48	G	54	28	43	33	29	G		G	28
11	G	G	G	G	G	G	G	G	G	45	61	48	G	G	G	G	35	38	28	G	G	G	G	G
12	G	G	G		29	29	27		G	44	46	G	G	G	G	41	33	G	G	G	G	G	40	36
13	29	26	33	30	26	26	G	G	G	G	43	48	44	G	G	G	G	G	26	G	34		G	G
14	27	29	G	G	G	G	G	G	G	G	56	50	51	G	G	G	G	G		G	G	27	41	G
15	G	G	G	G	G		G	G	G	G	G	G	G	42	G	G	G	G	G	G	G	G	G	30
16	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	28	G	G
17	28	34	G	G	G	G	G	G	40	44	48	74	42	40	44	34	41	30		34	33	G	44	25
18	G	29	G	G	49	G	G	G	40	54	115	95	51	43	G	G	G	G	G	26	G	G	G	G
19	33	G	G	G	G	G		G	G	61	57	51	42	G	50	51	42	34	31	37	G			G
20	G	G	G	G	G	G	G	G	48	39	42	51	46	47	40	34	G	G	29	30	37	34	33	33
21	G		G	G	G	G	G	G	G	40	42	41	44	45	G	G	G	G	G	G	G	G	G	24
22	G	G		G	G	G	G	G	G	51	50	47	50	G	G	G	G	G	G	34	41	30	26	24
23	G	G	G	26	27		G	G	G	G	42	G	44	G	44	G	G	G	32	35	29	25	G	28
24	28		42	47	37	58	45	49	50	G	G	G	G	45	44	47	G	40	38	40	G	G	32	44
25	58	33	27		G	G	G	G	G	G	N	41	43	48	G	G	G	G	32	58		33	29	G
26	G	G	32	G	G	G	G	45	35	46	42	41	G	G	40	G	G	27	30	G	34	38	33	33
27	29	30	50	30	G	G	G	28	37	44	44	45	44	42	38	40	40	40	37	30	G	24	27	G
28	29	24	G	G	G	G	G	G	42	G	47	G	G	G	G	37	G	G	G	G	G	G	G	G
29	G		G	G	G	G	G	G	G	G	G	50	G	G	G	G	G	29	24	G	G	G	G	G
30	G	G	G	G	G	G	G	G	G	G	44	G	G	G	37	38	G	G	G	G	G	G	G	G
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	27	29	28	28	28	29	29	30	30	29	30	30	30	30	30	30	30	27	30	28	27	29	30
MED	G	G	G	G	G	G	G	G	G	20	44	41	G	G	G	G	G	G	26	G	G	G	G	G
U Q	28	26	13	G	13	12	G	G	40	46	51	50	44	43	40	39	33	34	32	34	29	30	32	28
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 AKITA

NOV. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	18	20	20	16	15	16	18	17		21	36	38	36	24	22	22	24			16		18	20	20
2		16	20	16		66	18	18	20	22	23	33	28	36	21	18	27	16	16	18	20	17	17	17
3	17	16	18	17	17	18	20	18	18	21	21	20	23	23	23	17	20	20	16	18	17	17	18	17
4	16	17	20	16	15	16	18	26	21	22	22	22	26	21	28	21	20	18	18	18	17	17	17	18
5	21	15	15	15	15	17	18	28	26	28	27	27	38	22	21	35	17	17	16	16	17	18	18	21
6	18	16	16	18	16	16	17	21	22	23	23	28	28	24	34	20	17	18	18	18	18	18	17	17
7	16	18	18	18	18	16	16	22	20	35	23	24	24	27	24	20	17	16	18	17	17	16	17	16
8	16	16	17	17	17	17	16	17	20	23	23	22	21	21	20	18	17	17	17	18	17	16	17	17
9				16		16	18	17	18	22	23	35	23	22	20	20	23	17	18	17	18	16	17	16
10	18	16	18	17			18	18	17	20	20	26	21	22	21	20	18	17	16	17	16		17	18
11	17	16	17	16	16	16	16	20	20	28	22	21	21	21	20	30	22	15	17	17	17	17	18	17
12	18	15	16		16	16	17		18	22	20	22	21	17	16	16	16	17	17	18	18	16	17	17
13	16	17	17	18	17	16	16	18	17	17	20	18	21	21	20	20	22	16	16	18	17		20	17
14	17	20	18	16	17	17	17	20	18	18	20	18	20	22		29	21	16		17	17	17	16	18
15	16	17	17	16	17		17	21	21	21	23		21	22	20	20	22	16	16	17	17	17	17	17
16	18	16	18	17	18	17	17	17	18	20	23	24	38	20	20	18	22	16	18	17	18	20	20	17
17	18	16	18	20	17	18	17	17	17	16	21	33	22	21	20	16	17	16		17	17	16	16	16
18	17	17	17	17	15		17	23	18	18	20	22	21	20		16	21	16	17	17	16	18	21	17
19	17	20	16	16		18		22	17	17	18	21	18	20	20	17	16	16	17	17	17			
20	17	18	16	18	18		16	23	18	20	32	33	23	22	18	18	23	20	17	17	17	16	16	16
21	21		17	17	18	18	18	24	20	17	18	23	20	24	18	17	24	18	17	17	15	20		17
22	22	20					20	22	16	18	18	17	17	20	20	17	17	16	17	18	17	17	17	17
23	17	17	21	16	18		18	21	18	22	21		17	16	17	18	18	18	16	17	18	18	18	
24	20		15	16	16	17	17	16	16	18	16	21	26	21	21	18	17	17	17	16	16	21	18	17
25	16	17	16		18	17	20	22	16	17	20	18	18	17	20	26	20	16	15	17		18	18	16
26	18	17	17	17	17	17	17	21	17	17	20	18	27	27	18	16	22	18	16	18	16	16	17	17
27	17	18	16	16	18	18	17	18	16	17	18	21	18	18	16	17	16	17	18	16	20	18	16	17
28	21	22	18	17	17	17	17	21	16	16	17	17	20	21	20	18	21	18	17	20	18	18	20	17
29	21		20	17	20	18	17	22	17	17	17	18	20	21	17	17	22	16	18	16	18	20	20	18
30	21	21	20	18	18	18	17	22	20	17	20	18	20	23	20	18	21	16	17	17	18	16	18	20
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	26	28	27	25	24	29	29	29	30	30	28	30	30	28	30	30	29	27	30	28	27	28	28
MED	18	17	17	17	17	17	17	21	18	20	20	22	21	21	20	18	20	17	17	17	17	17	17	17
U Q	19	18	18	17	18	18	18	22	20	22	23	26	26	23	21	20	22	18	18	18	18	18	18	17
L Q	17	16	16	16	16	16	17	18	17	17	20	18	20	20	19	17	17	16	16	17	17	16	17	17

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

NOV. 1991

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	56	55	50	47	43	50	68	90	144	142	142	144	144	138	129	132	127	118	100	90	102	71	73	54
2	55	68	44	63	46	48	68	90	98	98	103	104	98	101	114	108	96	83	79	76	66	70	58	62
3	52	54	44	52	40	42	62	102	120	130	142	142	142	144	135	123	117	106	85	76	69	55	46	47
4	56	56	56	52	41	43	73	111	121	120	131	125	125	130	127	118	116	114	84	68	60	58	57	58
5	44	48	48	45	40	46	55	97	127	127	107	125	128	135	132	130	108	105	86	81	82	67	73	66
6	58	56	60	52	54	48	72	101	110	127	140	138	135	141	135	128	115	105	82	54	58	72	63	62
7	60	54	57	47	46	56	68	96	108	126	133	135	136	143	137	128	122	116	85	85	70	52	A	47
8	51	43	50	48	47	50	64	103	120	124	135	136	140	142	140	136	126	120	91	84	86	73	62	58
9	53	31	48	43	36	N	47	102	97	125	94	127	121	114	126	120	125	122	102	98	88	83	90	73
10	48	55	50	41	31	43	53	120	140	135	140	142	N	141	136	122	117	106	90	87	58	46	48	57
11	47	40	41	41	38	48	56	87	112	137	130	141	146	142	138	127	126	110	86	87	82	58	48	43
12	48	47	45	45	38	35	56	97	113	135	118	124	128	145	134	127	124	116	100	90	75	67	66	55
13	54	46	56	46	48	43	57	98	118	130	131	125	123	118	116	115	107	84	77	64	83	70	56	51
14	50	41	50	53	41	38	51	95	129	140	142	133	134	130	121	126	110	90	80	73	70	72	49	55
15	51	51	56	50	44	46	54	104	118	114	136	131	125	137	134	117	104	86	93	85	60	52	52	59
16	58	51	36	50	48	54	66	114	130	146	137	120	115	125	123	106	114	100	86	74	71	56	56	54
17	54	53	53	57	53	51	68	98	114	137	139	140	123	131	128	141	118	108	94	90	80	55	A	46
18	48	53	44	41	41	34	A	101	142	142	148	145	140	141	140	135	131	100	73	76	70	48	48	55
19	48	54	57	43	A	35	42	114	127	145	143	147	141	136	127	125	108	102	70	88	56	A	32	34
20	43		48	31	34	51	50	93	121	147	141	138	126	131	137	137	102	83	82	82	55	37	36	41
21	44	43	34	41		37	37	100	100	113	136	126	140	131	116	106	103	80	66	80	61	41	32	48
22	49	48	N	28	29	37	50	76	120	140	172	137	140	138	138	127	110	84	86	59	61	43	A	54
23	46	44	50	43	29	30	47	76	105	132	126	137	128	130	124	105	101	82	70	52	50	38	36	36
24	A	48	49	52	34	A	A	91	114	120	137	126	120	131	132	127	99	62	58	50	43	28	28	35
25	31	32	A	37	40	32	47	76	93	102	121	130	121	108	104	102	90	78	73	61	A	31	A	A
26		35	37	37	36	34	47	80	94	96	112	118	108	104	121	104	86	68	66	52	48	43	A	40
27	A	A	40	A	35	47	46	83	99	104	105	104	112	112	103	97	82	67	56	44	33	38	35	34
28	30	34	47	41	35	41	47	81	94	102	117	117	110	107	112	108	100	62	51	57	54	38	A	32
29	35	38	48	43	35	32	41	80	98	112	122	116	124	118	122	118	101	73	67	58	56	44	49	43
30	40	31	34	49	35	32	38	76	101	106	124	135	115	100			97	95	82	52	46	48	46	35
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	27	28	28	29	28	28	28	30	30	30	30	30	29	30	29	29	30	30	30	30	29	29	24	29
MED	49	48	48	45	40	43	54	96	114	127	134	132	126	131	128	123	109	98	82	76	61	52	49	51
U Q	54	54	51	51	45	48	65	102	121	137	140	138	140	141	135	128	118	108	86	85	77	68	60	57
L Q	44	40	44	41	35	35	47	83	100	113	121	125	120	118	121	108	101	82	70	58	55	42	41	40

HOURLY VALUES OF FES AT KOKUBUNJI

NOV. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	58	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
2	G	G	G	G	G	G	G	49	43	76	50	66	56	G	41	G	G	G	G	58	44	G	G	G
3	G	G	G	G	G	G	32	37	45	58	47	G	G	43	G	36	40	42	30	G	29	G	G	28
4	G	44	43	26	G	G	G	G	G	G	47	50	G	G	48	44	G	G	G	G	24	G	G	G
5	30	29	31	28	G	G	G	32	G	G	54	58	G	G	G	G	33	50	32	30	G	G	G	33
6	G	G	G	G	G	G	G	48	G	46	G	G	G	44	G	G	G	26	G	G	G	G	G	G
7	G	G	G	G	G	G	41	35	37	G	G	G	48	45	40	G	G	G	31	57	30	33	46	G
8	G	G	24	G	24	G	G	G	54	59	72	62	G	44	42	G	32	40	32	33	29	G	G	G
9	G	G	G	G	G	23	28	37	38	43	44	G	G	46	40	G	G	29	40	37	34	G	G	G
10	G	G	G	G	G	G	G	35	37	44	G	49	48	56	54	52	36	50	56	32	26	G	27	33
11	31	G	G	G	G	G	G	41	G	49	G	G	50	51	41	46	30	32	26	41	50	G	G	G
12	G	G	G	G	G	G	G	33	G	53	44	49	G	G	G	G	34	31	28	41	G	G	G	G
13	G	G	G	G	G	25	G	G	G	G	47	48	G	G	G	G	G	30	G	G	24	G	G	G
14	G	G	G	G	G	G	G	32	G	42	G	43	G	54	40	G	G	36	G	G	G	G	G	G
15	G	G	G	G	G	G	G	G	G	43	G	56	G	G	40	G	G	G	G	G	G	26	G	G
16	G	28	G	G	G	G	G	G	G	41	G	48	55	43	G	G	G	G	G	G	33	G	G	G
17	G	G	G	G	G	G	G	G	G	G	58	G	G	50	G	37	39	51	58	24	28	30	36	34
18	29	G	33	31	26	26	26	G	49	50	69	128	83	69	39	62	G	33	G	G	G	G	G	G
19	G	29	29	26	32	23	G	48	G	50	106	56	60	50	G	40	57	42	44	36	34	28	24	G
20	G		G	G	42	26	G	G	39	G	48	56	62	70	43	39	G	32	38	32	26	G	G	G
21	G	G	G	G		G	G	G	G	50	41	G	47	45	51	40	35	29	52	41	G	G	G	G
22	G	G	G	G	G	G	G	29	41	G	60	53	74	57	41	G	G	41	29	37	30	32	38	G
23	28	30	22	G	G	G	G	G	G	G	G	G	44	49	47	41	34	60	34	G	G	G	43	29
24	29	33	40	25	32	58	43	G	G	G	G	G	G	46	44	58	41	48	49	42	30	G	G	G
25	G	G	26	G	G	G	G	G	G	40	G	G	G	G	G	G	G	40	48	28	86	55	52	32
26	G	43	26	G	G	G	G	29	35	G	42	42	42	G	44	57	37	24	G	G	24	29	30	30
27	40	35	G	27	30	33	G	G	38	52	50	44	G	58	49	43	32	34	G	G	G	G	G	G
28	G	G	G	G	G	G	G	G	G	42	43	42	G	44	42	45	40	38	G	G	32	33	28	G
29	G	26	G	G	G	G	G	G	G	39	40	G	G	G	G	G	G	27	G	G	G	G	G	G
30	G	G	G	G	G	G	G	G	G	G	G	G	G	G			29	27	G	G	G	G	24	24
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	29	30	30	29	30	30	30	30	30	30	30	30	30	29	29	30	30	30	30	30	30	30	30
MED	G	G	G	G	G	G	G	G	G	42	42	42	G	44	40	G	15	32	27	12	25	G	G	G
U Q	G	28	24	G	G	G	G	35	38	50	50	53	48	50	43	43	35	41	38	37	30	26	27	24
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	26	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT KOKUBUNJI

NOV. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	15	15	15	15	16	18	17	16	17	40	29	42	33	22	18	16	16	15	15	15	16	16	16
2	16	14	14	16		15	18	17	18	23	33	34	29	30	22	18	30	16	16	15	15	15	16	16
3	15	16	17	14	14	15	15	15	16	17	23	21	22	20	20	16	15	16	16	16	16	15	15	15
4	15	14	14	16	15	15	18	15	16	21	21	21	20	22	26	18	17	17	18	16	16	16	16	15
5	15	15	15	15	16	16	17	15	33	30	26	23	23	20	18	16	16	14	15	15	17	16	15	15
6	15	16	15	14	15	14	17	16	20	27	23	26	24	26	36	20	16	15	16	16	17	15	15	15
7	15	14	14	16	15	15	16	16	18	43	21	27	33	24	24	18	26	16	15	15	15	15	15	17
8	15	16	16	17	17	15	18	17	16	20	22	20	22	22	17	17	15	14	14	14	15	15	15	15
9	15		15	14	15	20	15	15	16	18	17	18	21	22	20	17	16	15	15	15	15	16	15	17
10	16	15	15	14			17	15	16	20	18	20	22	18	21	18	18	14	15	15	15	17	16	15
11	15	14	15	14	15	15	16	16	16	18	21	20	18	16	16	15	15	15	15	15	14	15	15	15
12	16	16	15	15	16	16	16	17	16	18	20	20	22	21	20	18	15	15	15	15	14	15	16	15
13	15	15	15	14	16	16	15	16	18	17	20	20	22	23	20	16	23	15	15	14	16	15	15	15
14	17	16	15	16	15	14	15	15	17	18	20	21	18	17	18	20	17	15	16	15	15	15	16	17
15	16	15	15	15	14	15	15	15	16	20	23	21	21	20	16	20	22	15	15	15	15	15	16	14
16	15	14	15	15	15	15	16	17	20	20	21	20	22	18	18	15	23	14	16	15	15	16	15	16
17	15	15	14	15	15	14	15	15	17	18	20	40	30	21	17	16	16	16	15	16	16	15	14	15
18	15	15	14	14	14	17	15	15	16	20	23	21	18	18	17	16	23	16	17	14	15	15	15	16
19	16	14	14	16	15	17	16	17	17	18	18	17	17	21	16	14	15	14	15	15	15	15	15	16
20	16		16	14	15	15	15	14	15	16	35	21	20	21	16	18	17	15	16	15	15	15	15	15
21	16	16	16	16		15	15	15	16	15	18	20	21	17	16	15	14	15	15	15	15	16		16
22	16	15	17	14			15	17	14	16	17	16	16	16	15	16	21	14	15	15	16	15	15	15
23	15	15	16	15	15	20	16	17	17	17	16	18	18	16	15	15	15	15	15	15	15	17	15	17
24	15	15	15	16	14	15	15	22	15	15	15	16	18	15	18	17	15	15	15	15	15	15	20	16
25	16	15	20	18	14	15	16	15	15	16	17	18	21	21	18	18	28	14	15	15	15	14	15	15
26		14	15	15	15	15	14	15	15	16	16	17	21	18	17	14	16	16	15	15	15	15	16	14
27	14	14	15	15	15	15	15	21	15	15	17	17	18	17	17	17	15	14	15	15	15	16	16	15
28	15	15	16	15	15	15	15	23	15	15	16	18	14	14	15	15	15	15	16	20	15	15	14	15
29	16	15	15	14	15	15	15	20	15	16	16	18	18	16	18	18	16	15	14	15	15	16	15	15
30	16	15	17	15	17	18	15	16	15	16	18	16	17	21			15	14	16	15	14	15	16	15
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	28	30	30	26	28	30	30	30	30	30	30	30	30	29	29	30	30	30	30	30	30	29	30
MED	15	15	15	15	15	15	15	16	16	18	20	20	21	20	18	17	16	15	15	15	15	15	15	15
U Q	16	15	16	16	15	16	16	17	17	20	23	21	22	22	20	18	21	16	16	15	15	16	16	16
L Q	15	14	15	14	15	15	15	15	15	16	17	18	18	17	16	15	15	14	15	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT YAMAGAWA

NOV. 1991

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	86	76	64	60	54	53	57	87	144	154	152	158	141	153	167	158	152	143	129	122	N	128	90	78
2	79	68	53	67	46	67	85	111	124	142	157	160	134	140	152	137	114	112	122	108	103	88	90	86
3	74	50	40	47	34	71	37	90	118	136	144	155	154	170	173	157	139	132	120	103	85	86	66	63
4	66	72	60	50	40	43	51	90	108	124	132	133	126	136	143	142	130	133	118	97	86	78	77	66
5	56	52	52	47	37	34	40	97	112	111	105	118	137	145	145	131	123	119	122	101	103	87	85	80
6	66	63	60	54	48	44	50	88	112	128	147	145	139	147	153	146	126	120	120	109	103	113	102	77
7	71	67	54	51	50	48	43	76	98	133	141	136	139	157	156	141	136	136	132	103	90	82	78	62
8	55	54	48	54	44	42	46	88	116	113	142	146	146	163	169	164	163	163	146	143	138	108	72	66
9	66	68	47	40		46	41	86	80	138	104	114	125	100	126	122	124	126	104	105	93	89	65	37
10	53	54	41	53		51	32	86	144	142	151	152	133	146	156	139	136	131	124	107	93	75	66	62
11	54	68	42	43	42	37	34	76	116	142	151	142	144	151	146	141	138	146	144	120	110	106	86	67
12	63	50		47	43		46	77	107	124	122	124	131	146	146	144	139	143	141	134	129	110	86	88
13	72	52	62	56	46	34	41	80	117	113	126	127	128	136	131	135	128	120	106	86	103	87	86	66
14	38	32	44	55	42	34		77	117	138	141	146	142	137	142	139	136	120	107	88	101	92	84	74
15	66	58	58	51	53	40	38	82	111	111	132	146	131	145	146	137	122	116	112	104	97	78	77	87
16	86	63	A	51	53	52	63	106	128	141	150	132	120	122	138	123	126	120	113	87	96	108	84	83
17	83	63	71	53	43	54	62	81	99	141	146	146	125	136	140	150	137	124	108	101	90	83	65	99
18	41	52	26	26		29	38	84	128	146	162	162	153	147	152	146	138	132	123	110	122	110	87	80
19	71	82	87	55	52	51	43	98	118	150	171	171	137	134	137	132	126	126	107	87	81	54	43	48
20	62	64	53	50	36	26	46	67	109	140	146	146	136	140	146	141	131	121	107	90	82	65	52	71
21	71	64	38	40	66	26	46	76	85	107	130	146	140	140	128	125	122	110	83	86	107	82	71	A
22	63	54	46	59	46		46	66	101	141	122	132	145	138	141	128	118	108	104	80	76	78	66	68
23	30	42	44	38	36	29	37	63	103	125	136	135	136	137	124	121	115	110	85	68	80	84	37	A
24	51	53	55	54	52	28	30	62	118	140	125	116	122	132	142	141	128	106	87	87	71	52	29	25
25	36	31	26	38	50		N	52	107	106	110	122	121	138	112	123	118	103	108	87	52	53	34	63
26	36	36	38	26	46	30	30	63	84	94	110	115	110	121	120	124	104	88	87	80	62	61	42	35
27	A	38	36	37	51	65		70	100	105	100	111	115	107	110	118	124	108	70	66	66	72	62	66
28	38	36	56	50	58	69	70	66	90	107	116	130	116	116	118	116	115	101	85	73	85	64	40	71
29	28	66	41	40	31	31	46	53	85	111	115	106	121	130	131	125	115	112	86	86	86	66	62	51
30	65	38	35	49	38		23	60	99	111	114	126	128	114	101	110	111	104	82	66	55	A	43	34
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	28	30	27	26	27	30	30	30	30	30	30	30	30	30	30	30	30	30	29	29	30	28
MED	63	54	48	50	46	42	43	78	110	130	134	136	134	138	142	137	126	120	108	94	90	83	68	66
U Q	71	66	57	54	52	52	50	88	118	141	147	146	140	146	152	142	136	132	122	107	103	99	85	79
L Q	46	50	40	40	40	31	37	66	99	111	116	124	125	132	128	124	118	110	87	86	80	69	52	62

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

NOV. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	33	33	39	30	G	G	G	G	G	42	G	G	G	G	G	G	G	G	G	G	G	29	29	G
2	G	G	G	G	G	G	G	29	44	81	59	62	104	90	G	41	G	40	50	56	30	32	24	G
3	G	G	G	G	G	G	G	31	40	54	G	G	53	G	53	52	50	G	29	40	32	44	G	G
4	G	G	G	G	G	G	G	G	G	G	G	59	G	G	G	46	G	32	25	G	G	G	30	G
5	G	G	G	G	G	G	G	29	G	G	G	G	G	G	G	54	54	38	G	G	G	G	G	28
6	32	24	G	G	G	G	G	G	G	46	50	55	G	G	G	G	G	G	G	25	36	36	58	40
7	33	29	G	27	G	G	G	G	G	G	56	60	48	G	G	G	G	G	G	65	57	34	G	G
8	G	25	G	G	G	G	G	33	G	41	42	51	G	G	G	G	G	G	31	G	G	G	G	G
9	24	G	G	G		G	26	G	43	50	45	46	46	G	44	G	38	G	24	G	G	24	33	25
10	G	G	G	G		G	G	G	40	G	G	51	G	50	61	89	57	57	44	31	G	G	G	G
11	G	G	G	G	G	G	G	G	G	48	43	45	G	G	G	41	G	G	G	G	G	G	G	G
12	G	G		G	G		G	G	G	G	G	G	51	51	45	G	G	36	26	30	G	G	G	G
13	G	G	G	G	G	G	G	39	38	G	G	G	50	G	G	G	G	G	G	G	G	G	G	G
14	G	G	G	G	G	G		30	38	G	48	48	G	G	42	G	G	G	G	G	G	G	G	G
15	G	G	G	G	G	G	G	G	G	41	41	G	G	G	G	G	G	G	G	G	G	30	30	G
16	G	G	32	28	G	G	G	G	G	G	48	48	G	63	G	G	39	G	49	28	G	G	G	G
17	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	47	32	29	G	24	G	G
18	G	G	G	32		G	G	G	G	43	50	75	144	82	56	39	44	G	G	G	G	G	G	G
19	G	G	G	G	G	G	G	G	G	G	G	43	44	47	71	72	44	41	G	G	24	24	G	24
20	24	G	G	G	G	G	G	28	G	43	44	43	48	49	43	58	50	G	31	38	30	G	G	G
21	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	32	G	G	G	27
22	G	G	G	G	G		G	29	G	G	G	57	G	50	52	43	49	40	61	40	G	G	G	24
23	G	G	G	G	G	G	G	G	G	G	G	46	G	58	61	45	38	39	34	32	23	G	G	29
24	G	G	G	G	G	G	G	G	G	G	G	G	43	42	44	G	G	41	27	31	G	G	26	G
25	G	G	G	G	G	G	G	29	G	G	42	54	44	47	G	G	G	G	G	G	G	G	G	G
26	G	G	G	G	G	G	G	G	G	G	45	44	44	G	G	G	40	G	25	G	G	26	G	G
27	30	G	G	G	G	G		24	G	G	G	52	50	73	114	58	36	G	11	G	G	G	24	G
28	G	G	G	G	G	G	G	G	G	G	46	G	49	49	52	67	G	G	G	G	G	23	G	G
29	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	32	G	G	G	33	G	G
30	G	G	G	G	G		G	G	G	G	G	G	50	G	G	40	40	G	29	G	G	40	26	G
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	29	30	27	27	28	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
MED	G	G	G	G	G	G	G	G	G	G	G	44	22	G	G	G	G	G	18	G	G	G	G	G
U Q	G	G	G	G	G	G	G	29	G	42	45	52	49	50	52	46	40	38	31	31	G	29	24	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

HOURLY VALUES OF FMIN AT YAMAGAWA

NOV. 1991

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

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

HOURLY VALUES OF FOF2 AT OKINAWA

NOV. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	146	110	88	82	66	54	62	105	145	159	148	163	147	162	184	160	182	170	146	159	188	171	163	109
2	111	86	79	68	42	67	79	124	124	124	163	164	147	160	172	146	131	146	147	146	146	145	146	146
3	87	73	63	54	47	C	32	88	111	129	146	158	158	196	197	197	188	170	171	160	146	131	111	88
4	88	89	74	54	40	37	44	85	111	128	125	138	146	150	146	157	160	163	146	145	146	130	107	87
5	78	80	66	48	34			87	121	105	111	121	144	150	158	136	134	146	160	130	146	146	134	128
6	87	86	66	71	35	37	37	106	110	131	148	156	152	161	177	171	160	159	158	160	187	188	170	128
7	110	87	87	66	44	43	37	70	105	132	149	147	147	170	171	170	170	171	171	N	170	163	130	108
8	87	86	79	82	55	39		86	111	126	124	148	160	185	179	162	162	146	N	109	179	145	108	87
9	57		A	55	31	54		94	81	110	100	116	116	75	120	111	113	111	111	108	90	90	53	
10	43	25	46	37	24	A		78	131	159	149	146	146	N	187	171	170	171	146	169	165	146	130	108
11	86	54	34	55	51	37	26	70	111	146	158	146	143	147	159	145	163	170	190	N	190	187	160	110
12	87	86	66	54	46			66	110	117	133	121	144	146	146	150	160	171	171	188	188	187	169	131
13	128	108	85	81	47	28	36	86	111	124	132	126	121	150	160	169	170	162	163	110	162	162	144	90
14	79	79	62	87	51	44	26	66	111	146	143	145	146	157	170	171	146	146	162	146	146	146	130	110
15	87	66	54	55	52	32	23	78	121	118	133	152	138	146	146	151	146	112	110	146	130	129	131	130
16	110	88	85	60	66	66	66	110	132	160	160	144	120	N	146	147	131	146	146	147	152	198	188	109
17	110	85	87	84	31	29	63	96	108	134	146	133	136	138	152	147	146	142	145	108	111	105	86	53
18	30	54	48	37	28	31	29	78	132	146	171	158	152	153	146	111	157	170	171	160	197	198	169	146
19	146	130	146	85	63		54	106	111	154	171	172	146	131	151	146	141	131	133	84	99	86	87	A
20	84	88	38	48	30		31	80	110	143	150	133	126	132	145	147	146	146	131	110	124	105	84	36
21	33	31	34	48	35			60	88	108	135	131	150	145	152	146	160	147	145	N	145	N	89	62
22	86	66	33	32				63	88	136	120	131	147	138	146	120	116	110	111	86	88	110	54	
23	30	32	53	40	N			54	110	131	141	134	145	146	132	146	144	121	121	121	111	145	108	84
24	86	86	83	88	63	32	26	66	117	146	146	121	138	147	151	145	143	147	146	130	110	88	77	32
25		34	42	49	53			38	108	121	118	120	131	144	145	146	160	159	161	146	111	97	86	60
26	58	66	66	37	35	32	30	66	88	111	116	122	120	141	144	130	131	109	111	85	94	82	65	28
27	45	32	32	53	84	46	29	62	110	120	123	120	133	132	131	146	146	146	110	87	108	108	90	87
28	72	66	64	42	64	31		62	88	119	146	136	137	124	124	130	120	126	140	109	110	110	66	86
29	32			48	35	34		32	84	118	132	103	112	134	136	126	131	130	131	110	110	107	85	66
30	35	44	30	38	31	30		52	107	127	117	120	132	124	112	110	123	112	108	87	78	66	66	N
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	28	28	30	28	20	18	30	30	30	30	30	30	28	30	30	30	30	29	27	30	29	30	26
MED	86	80	65	54	45	37	34	78	110	128	142	135	144	146	148	146	146	146	146	130	146	131	108	89
U Q	99	86	81	71	54	45	54	88	117	146	149	148	147	155	170	160	160	163	161	147	165	162	144	110
L Q	51	54	44	48	34	31	29	63	107	119	124	121	132	136	145	136	131	130	126	108	110	105	85	66

HOURLY VALUES OF FES AT OKINAWA

NOV. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	34	30	31	G	G	G	G	G	G	44	G	G	G	G	G	G	G	G	32	G	G	G	G	26
2	G	G	G	G	G	G	G	G	40	55	58	52	65	53	G	G	G	G	43	45	G	37	33	25
3	28	24	32	27	G	C	G	G	G	56	56	57	56	51	57	52	40	G	G	38	G	33	32	32
4	G	G	G	G	G	G	G	G	39	62	52	96	G	55	G	57	50	34	G	30	38	G	G	G
5	G	G	G	G	G	G		32	G	G	G	G	G	G	G	G	G	51	G	G	G	G	G	G
6	G	G	G	24	G	G	G	G	G	46	52	64	56	G	55	54	45	G	31	32	48	G	33	G
7	G	G	G	G	G	G	G	28	G	G	58	61	71	G	G	G	38	G	G	G	G	G	G	G
8	G	G	G	G	G	G	G	G	G	44	45	G	G	G	G	41	38	G	30	60	G	G	G	G
9	G		25	G	G	G		G	G	47	52	G	49	G	G	G	G	G	24	G	40	G	G	
10	G	G	24	24	G	29	G	G	G	52	56	51	62	G	51	62	60	41	53	59	38	38	32	G
11	G	G	G	G	G	G	G	G	G	48	42	88	83	50	55	43	G	G	G	G	G	G	G	G
12	G	G	G	G	G			G	G	G	G	51	G	51	51	49	53	34	G	G	G	G	G	G
13	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
14	G	G	G	G	G	G	G	G	G	G	46	G	G	G	G	G	G	43	G	G	G	G	G	G
15	G	G	G	G	G	G	G	G	35	44	44	45	G	50	45	44	40	32	G	G	G	G	G	G
16	G	G	G	G	G	24	G	G	G	40	42	G	53	G	56	52	G	36	G	G	32	30	25	32
17	G	G	G	G	G	G	33	G	G	45	G	51	63	64	67	62	50	41	33	G	G	G	G	G
18	G	G	G	G	30	G	G	G	G	42	43	48	51	79	84	115	64	47	40	G	G	G	G	G
19	G	G	G	G	G	G	G	G	G	G	51	G	G	G	50	51	44	G	G	30	G	40	24	33
20	30	24	G	28	32		G	36	G	45	55	80	95	90	G	G	G	44	23	G	G	G	G	G
21	G	G	G	G	G			G	G	38	G	G	G	G	G	G	38	60	28	G	G	G	G	G
22	G	G	G	G		G		28	36	40	56	58	55	48	56	64	46	G	32	34	G	G	G	G
23	G	G	G	G	G			G	G	G	G	G	G	52	50	52	58	54	34	25	G	G	G	G
24	G	30	G	G	G	G	G	G	G	G	G	G	44	49	G	G	G	G	G	24	G	G	29	27
25	G	G	G	G	G			G	G	G	G	G	G	50	48	43	G	G	38	47	30	G	G	G
26	G	G	G	G	G	G	G	G	G	G	G	G	G	50	G	G	G	G	34	G	G	G	G	G
27	G	G	G	G	G	G	G	G	G	G	G	G	55	50	52	49	39	50	G	G	G	G	G	G
28	G	G	G	G	G	G	G	G	G	G	G	50	54	53	G	G	G	40	G	G	33	24	30	G
29	G	G	G	G	G	G		G	G	G	G	G	G	60	G	G	G	G	G	G	G	G	G	G
30	G	G	G	G	G	G		25	G	G	47	51	51	G	G	42	39	35	34	G	G	G	G	G
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	29	30	30	29	24	21	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29
MED	G	G	G	G	G	G	G	G	G	39	42	23	46	50	G	42	38	16	12	G	G	G	G	G
U Q	G	G	G	G	G	G	G	G	G	45	52	52	56	52	52	52	45	41	33	30	G	G	24	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 OKINAWA

NOV. 1991

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	15	15	16	16	16	15	22	21	35	45	42	46	46	23	16	36	28	15	16	16	16	15	15
2	16	15	16	16		16	16	17	17	22	30	32	43	40	45	23	48	28	16	18	16	15	16	16
3	16	18	17	17	17	C	16	24	30	30	36	36	44	36	32	30	23	18	17	16	16	17	16	16
4	16	16	16	16	17	16	15	24	18	20	24	29	29	32	46	45	23	18	22	15	15	16	16	16
5	15	15	15	16	15			18	32	43	43	46	44	44	30	24	33	18	16	16	15	15	17	16
6	15	15	16	15	21	17	17	16	21	27	41	39	28	45	46	30	22	26	15	16	16	16	16	16
7	15	15	15	16	16	16	16	23	29	46	29	39	40	45	42	30	24	28	23	17	21	16	30	16
8	16	16	16	17	16	17		29	32	24	32	32	45	46	41	36	32	30	16	15	23	16	16	17
9	16		18	16	18	16		30	30	22	33	45	45	48	26	36	20	16	23	15	15	16	16	
10	16	16	17	16		15		24	18	33	35	46	42	46	30	30	30	18	15	18	16	15	16	18
11	17	17	17	21	23	18	21	17	30	23	30	32	30	28	28	22	20	27	18	16	16	16	15	15
12	16	16	16	16	15			16	18	34	39	38	43	33	38	29	22	17	16	16	15	15	16	16
13	15	15	15	15	15	16	16	21	33	34	29	45	45	45	44	34	22	27	18	17	16	16	15	15
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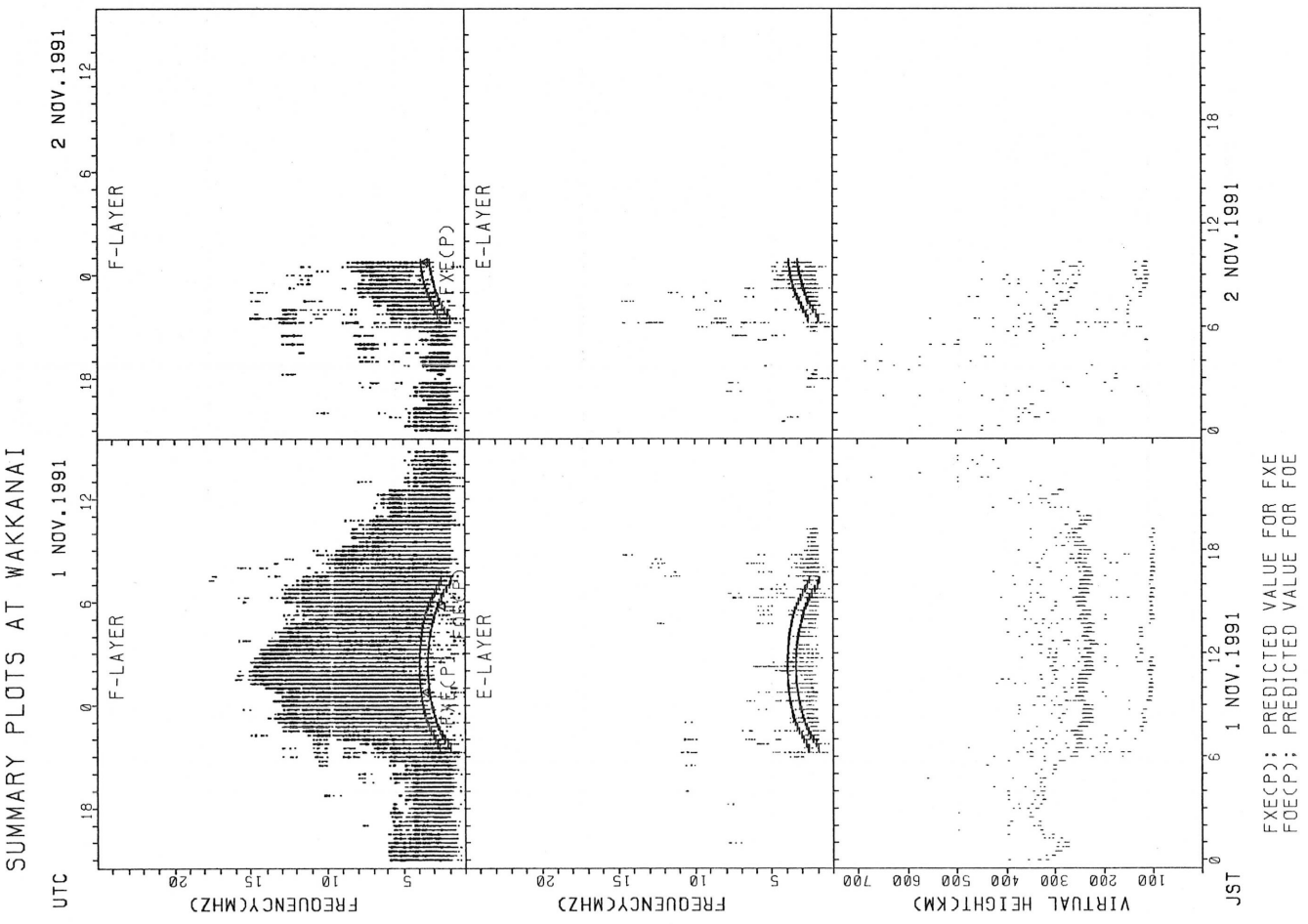
COMMUNICATIONS RESEARCH LABORATORY, JAPAN


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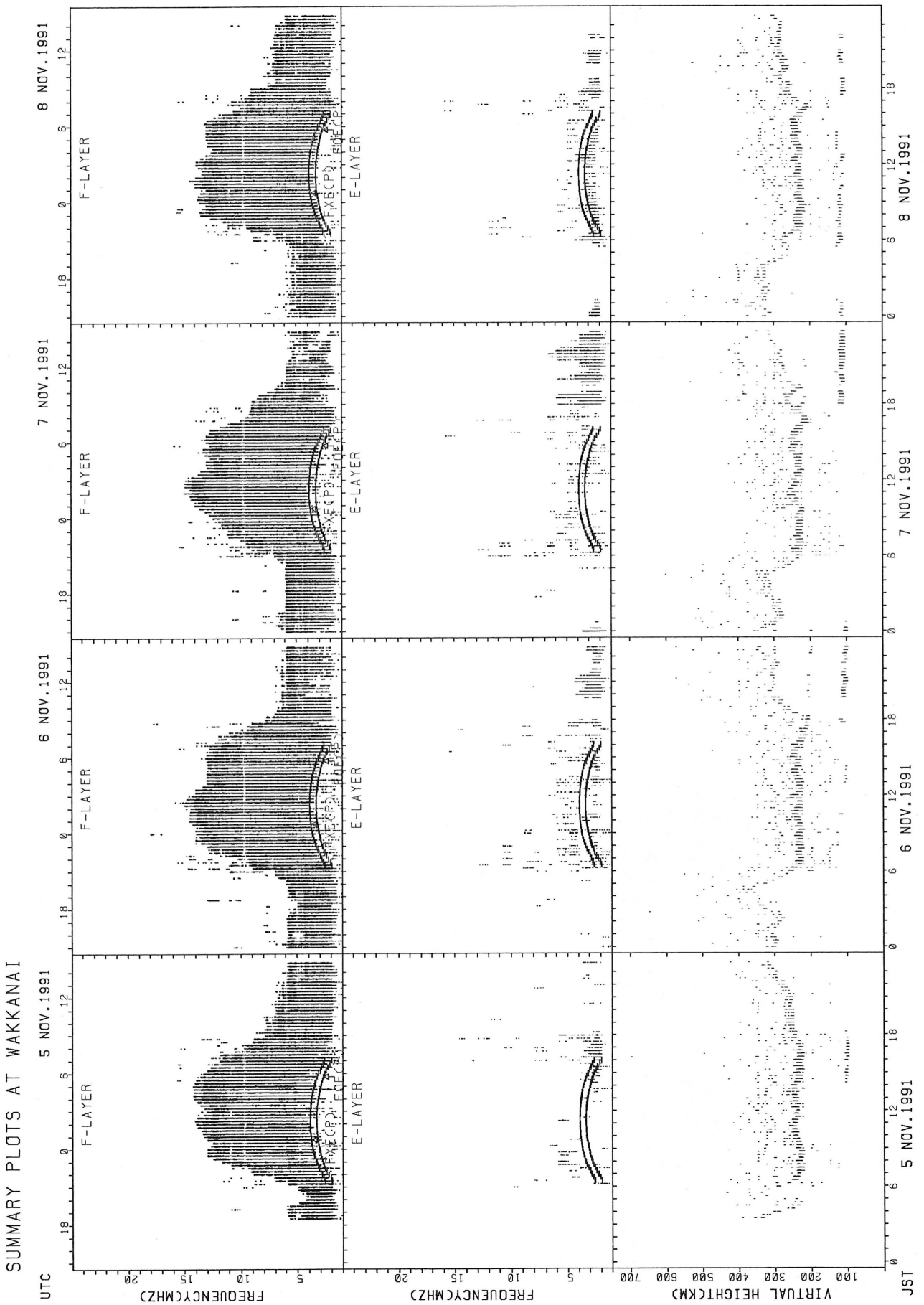
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE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F-LAYER
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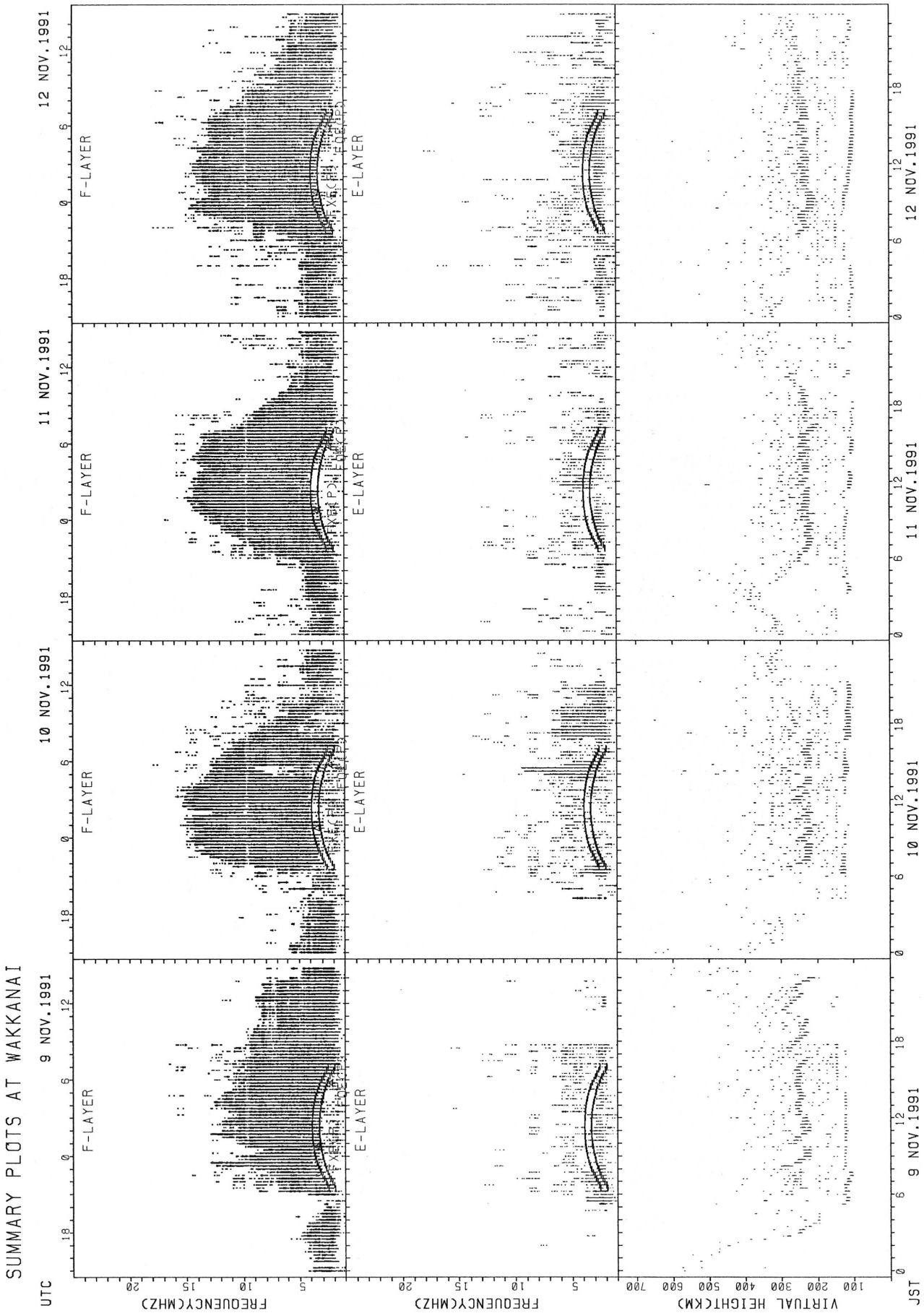
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE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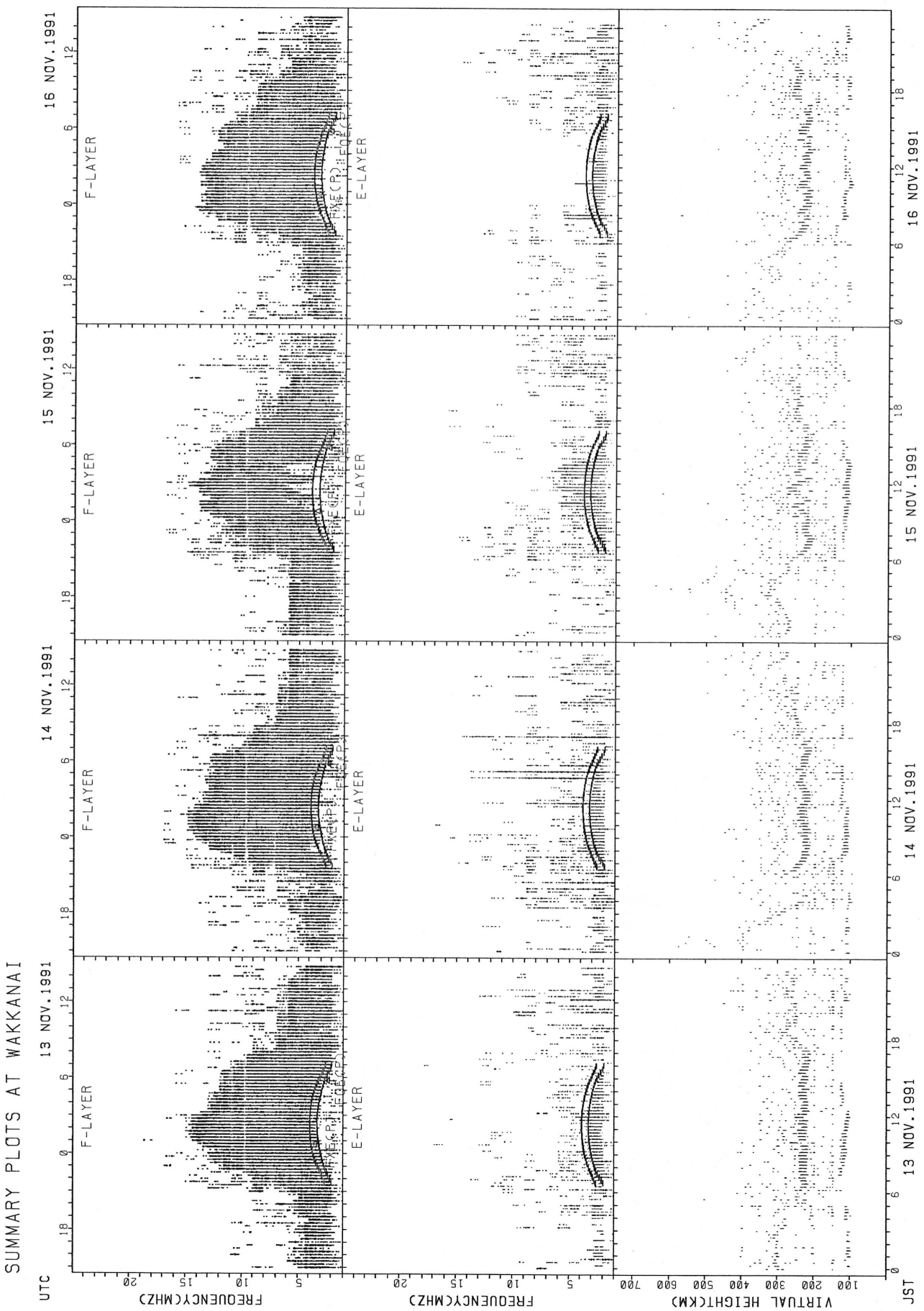
FOE(P): PREDICTED VALUE FOR FOE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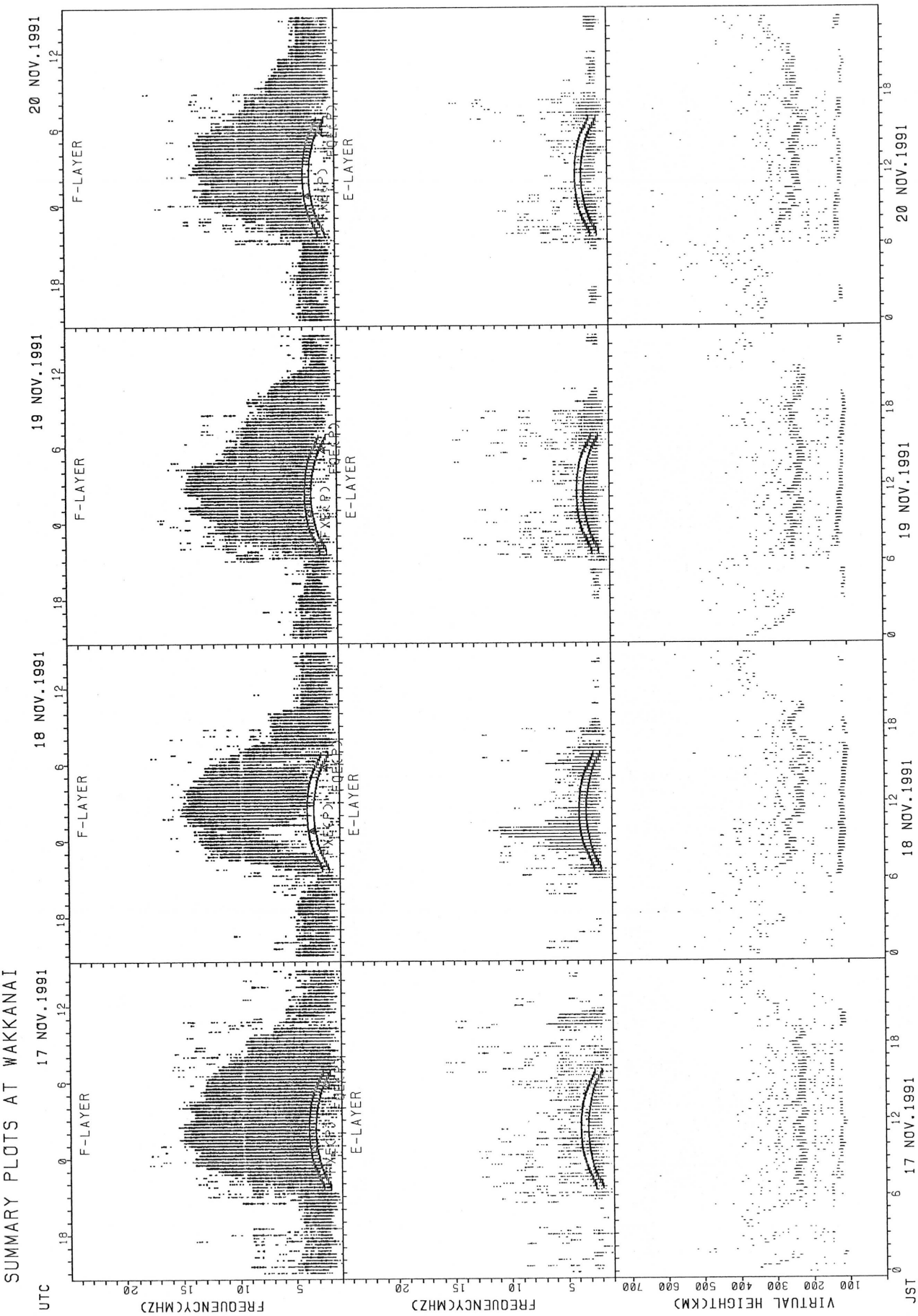
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E-LAYER
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UTC
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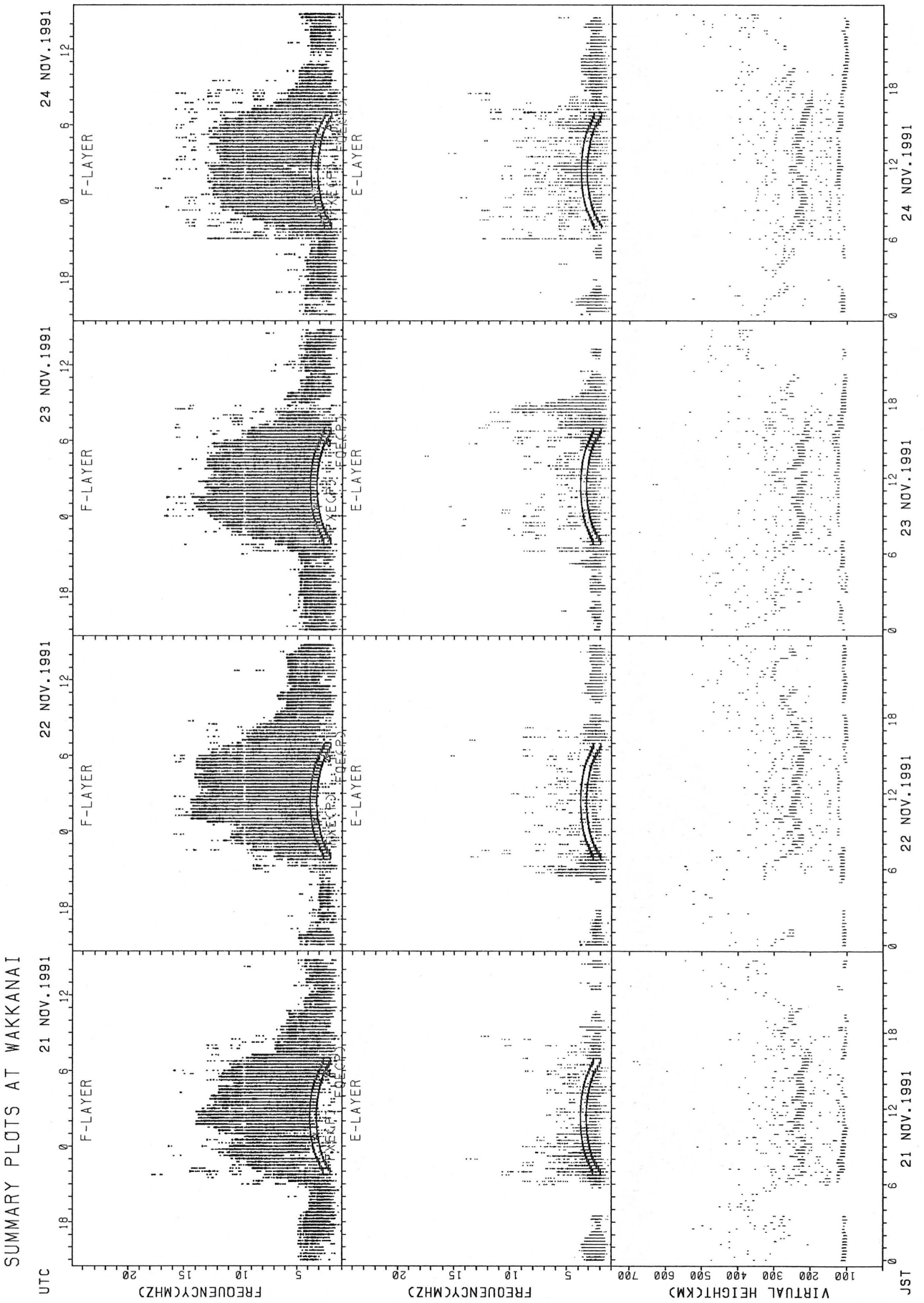
FOE(P); PREDICTED VALUE FOR FOE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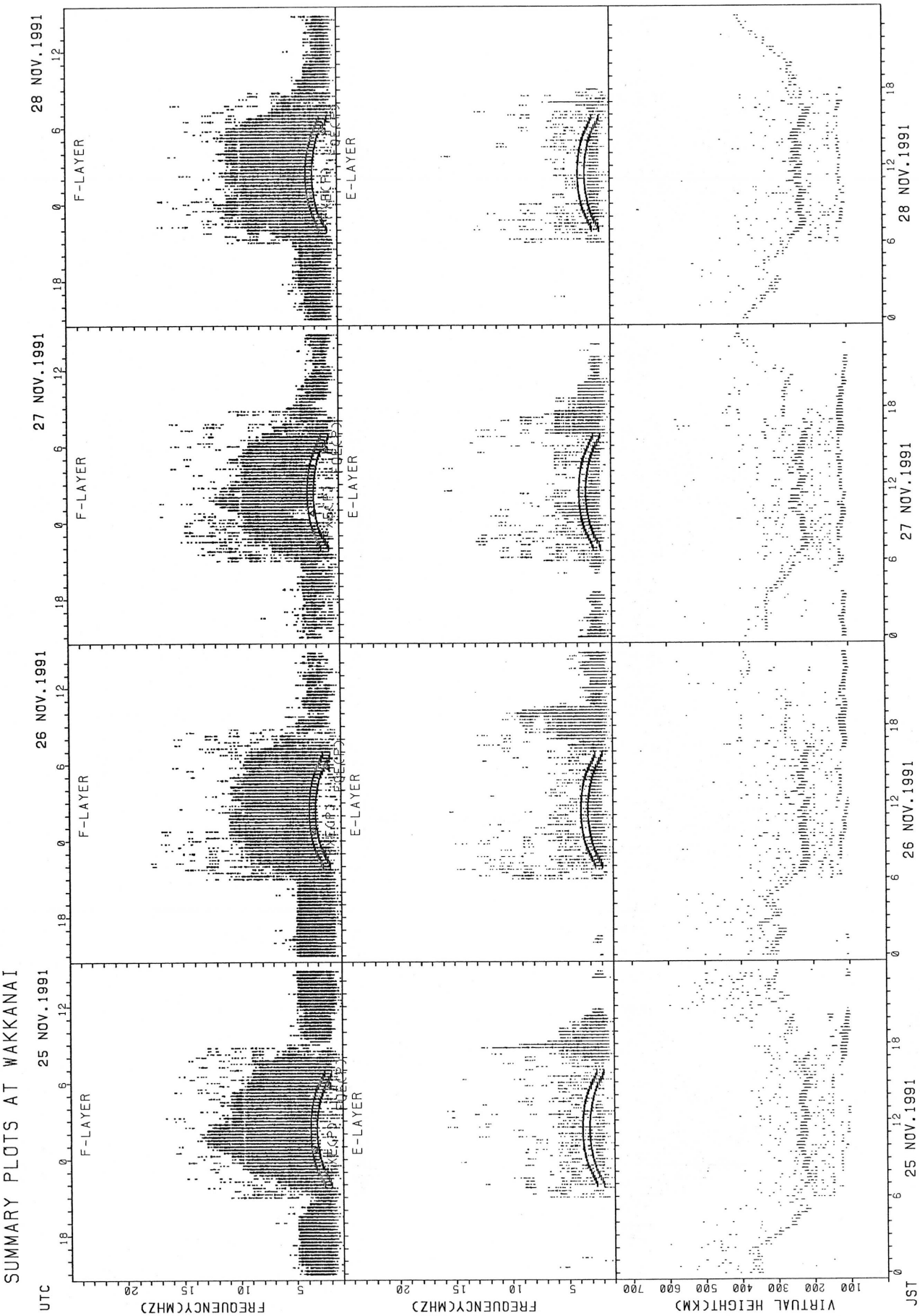
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FREQUENCY(MHZ)
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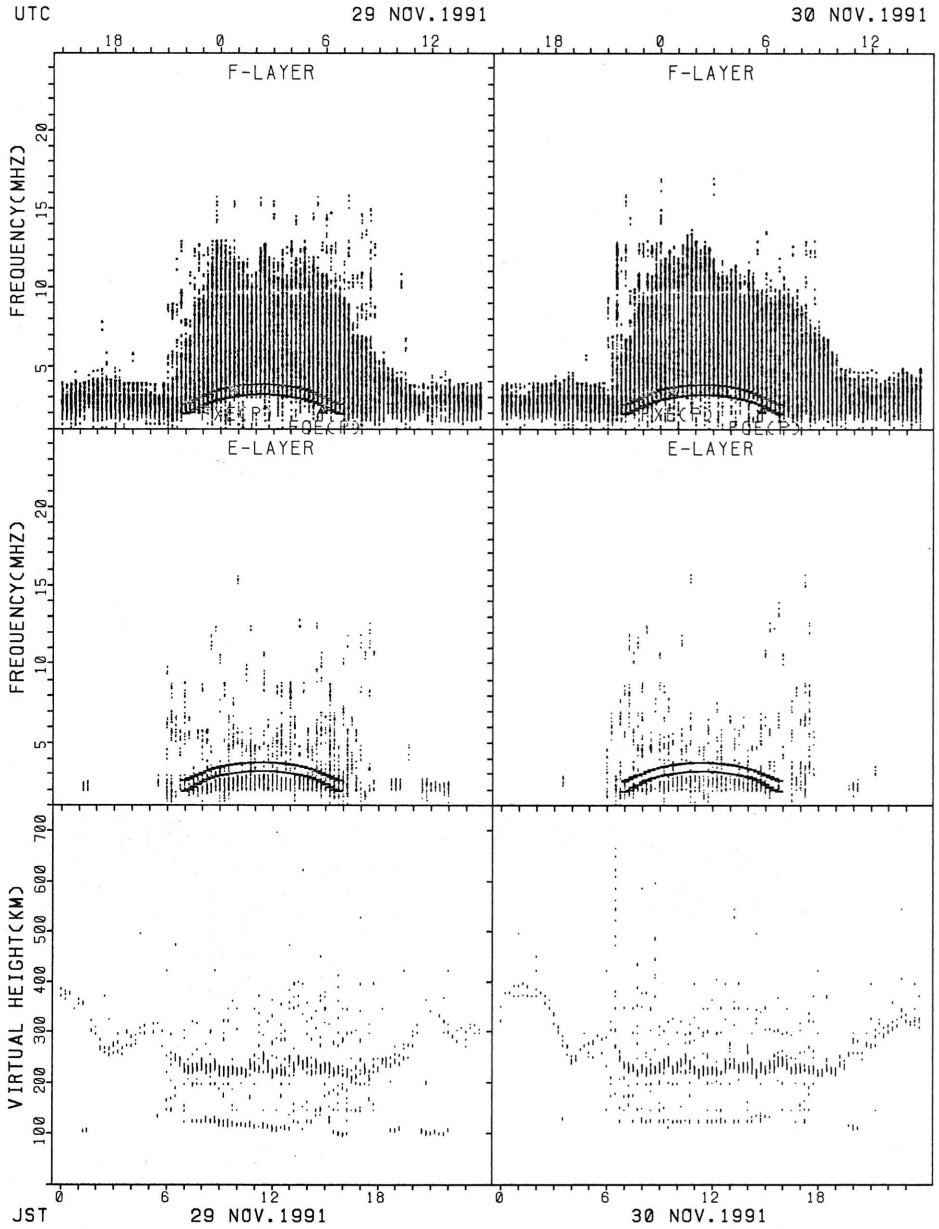
SUMMARY PLOTS AT WAKKANAI



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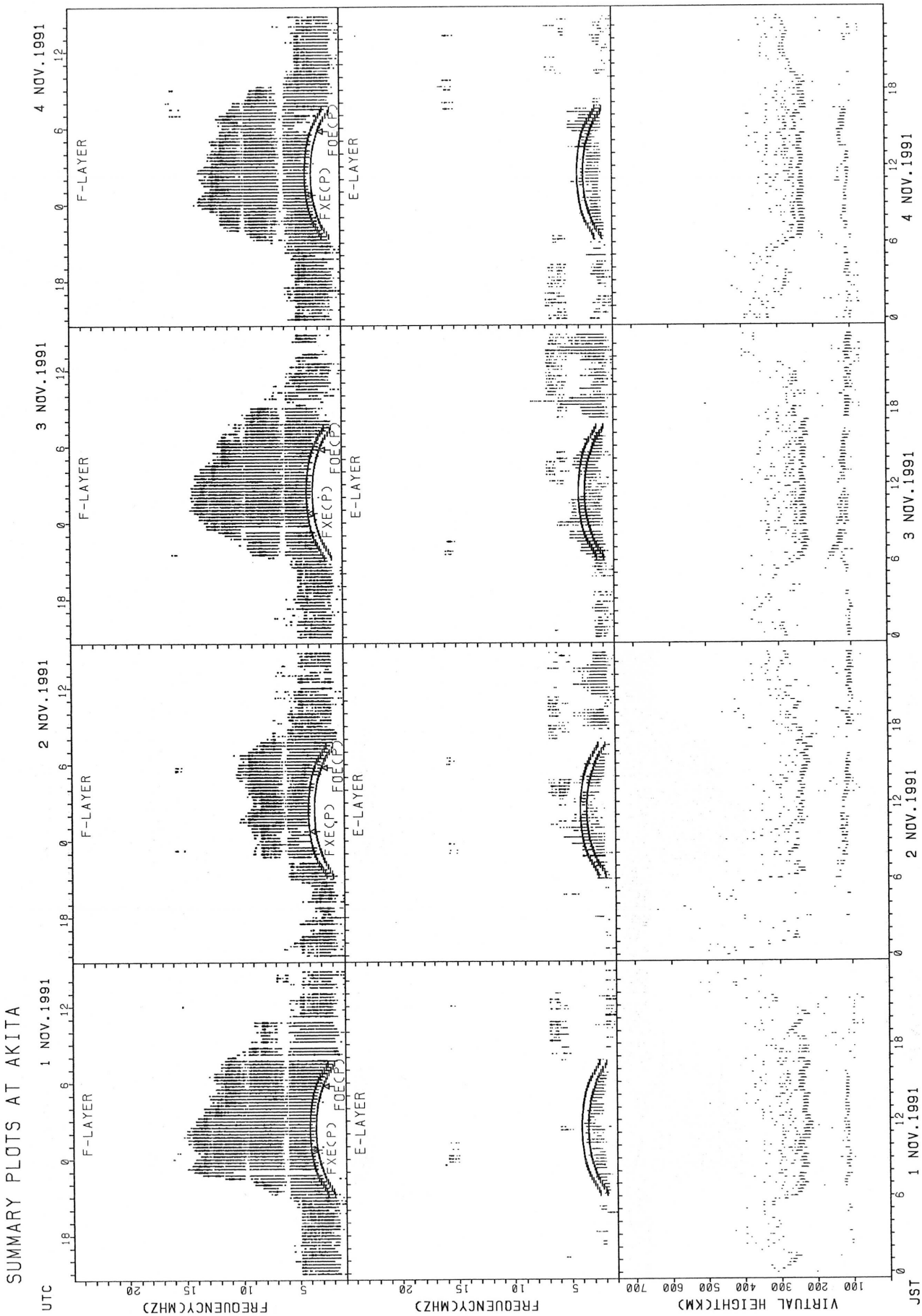
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E-LAYER
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FOE(P)
FREQUENCY(MHZ)
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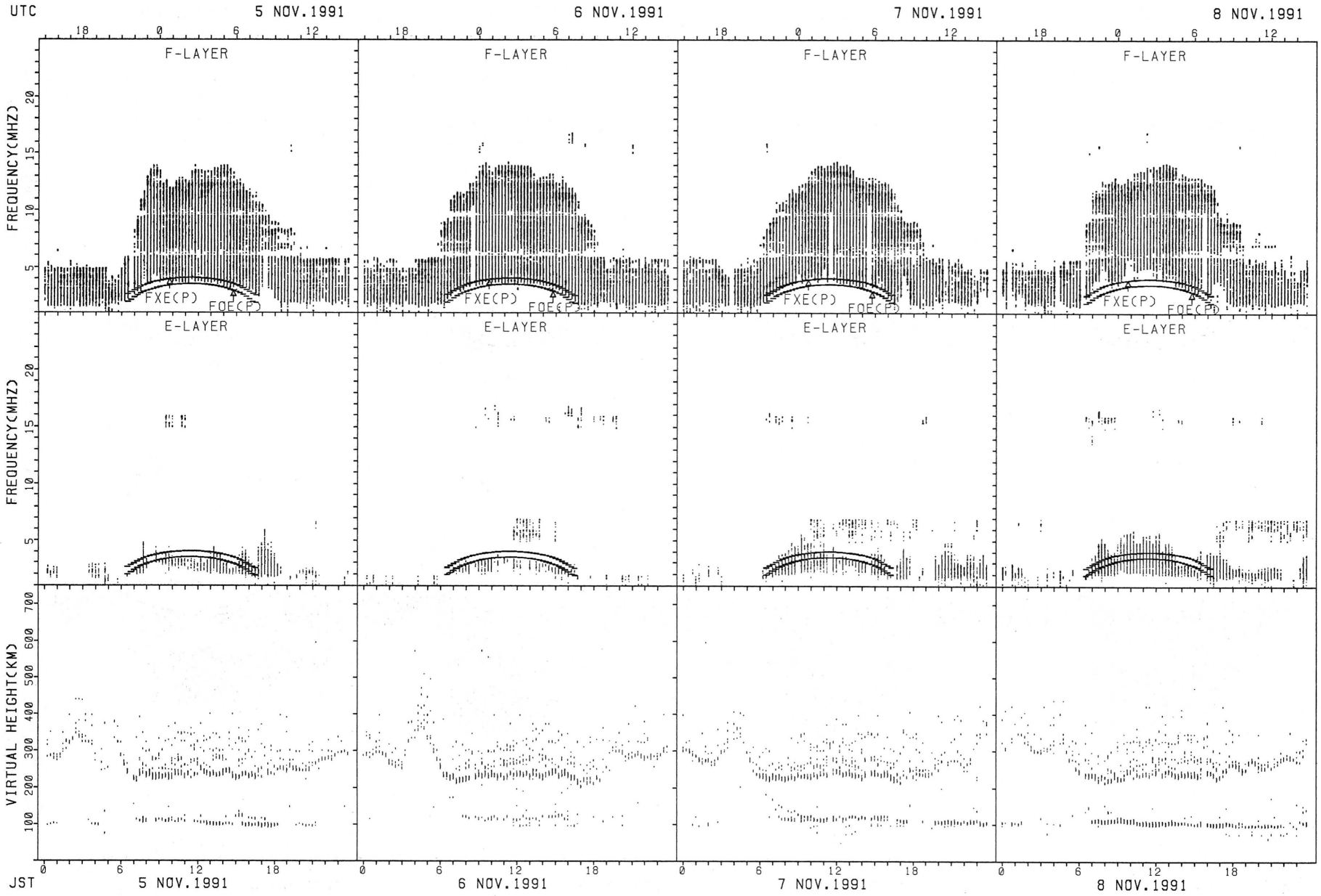
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



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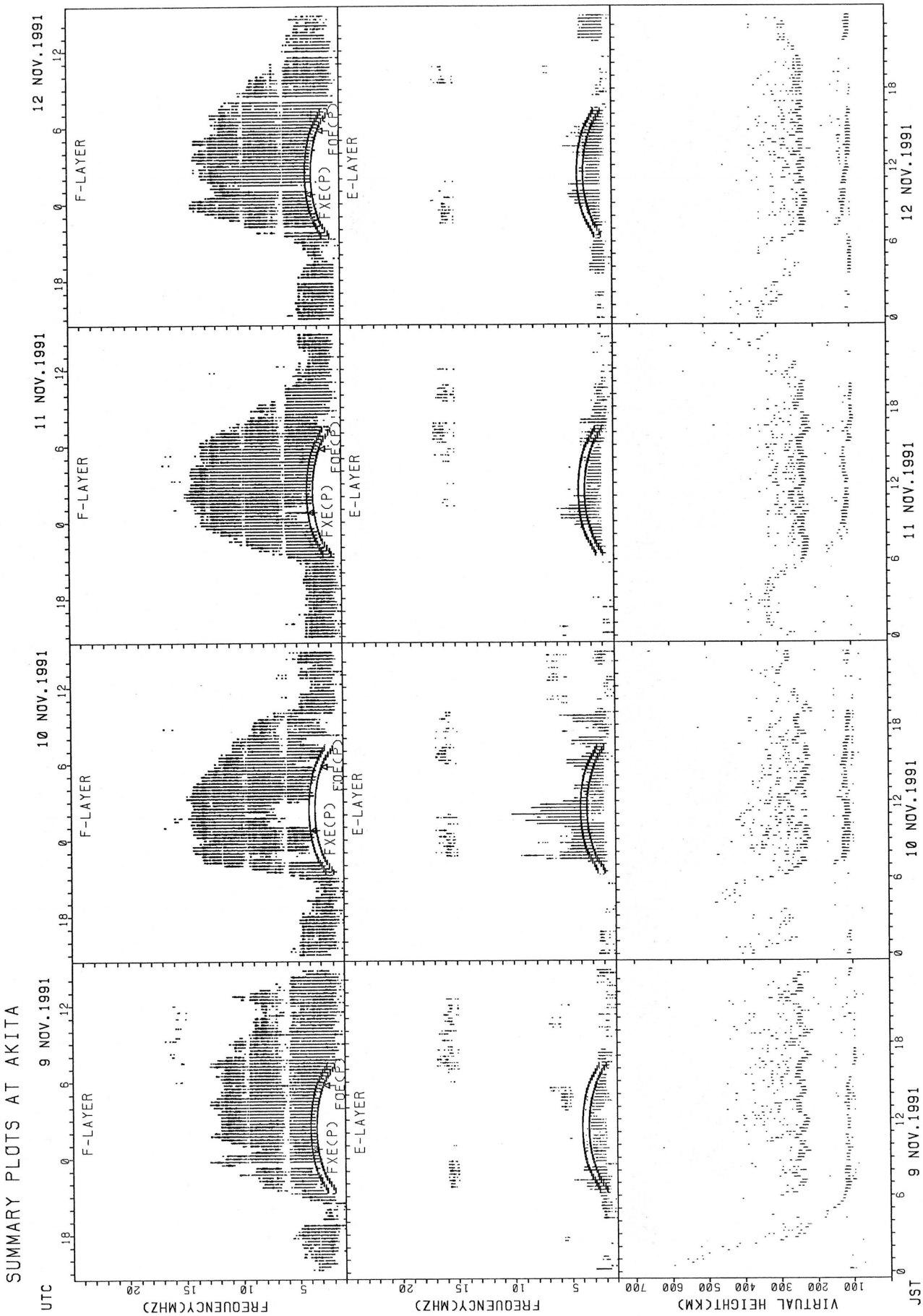
SUMMARY PLOTS AT AKITA
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FOE(P)
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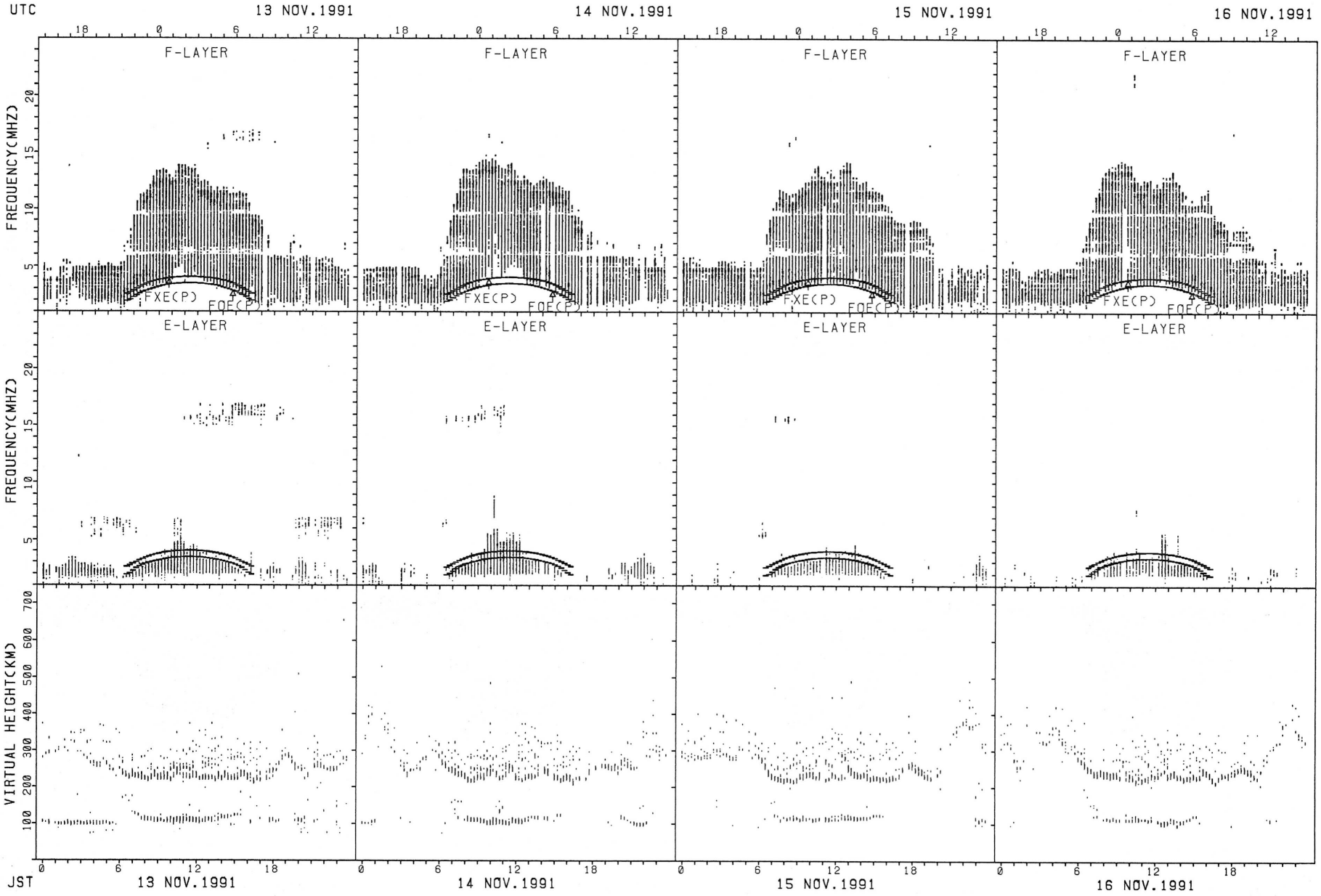
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



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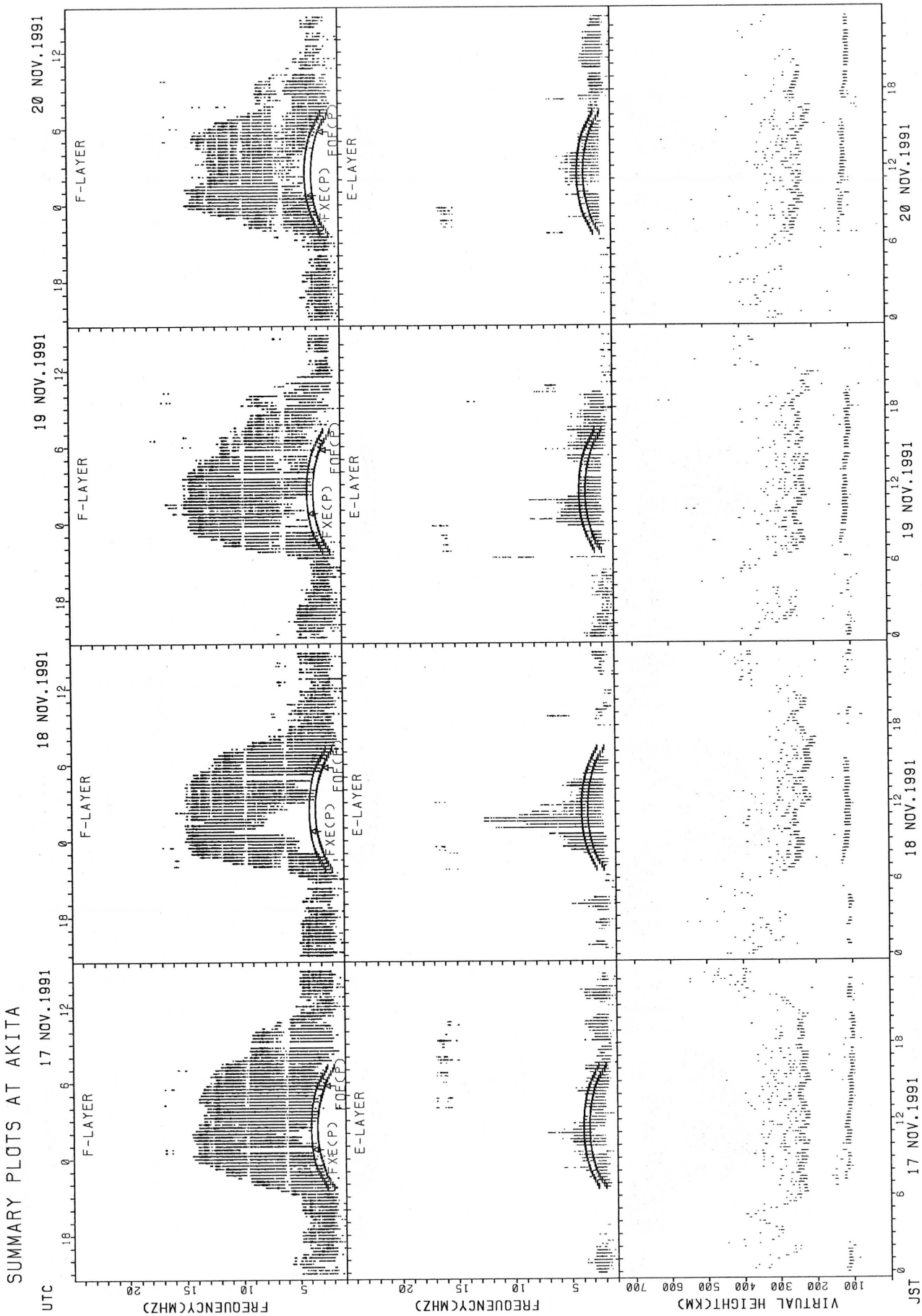
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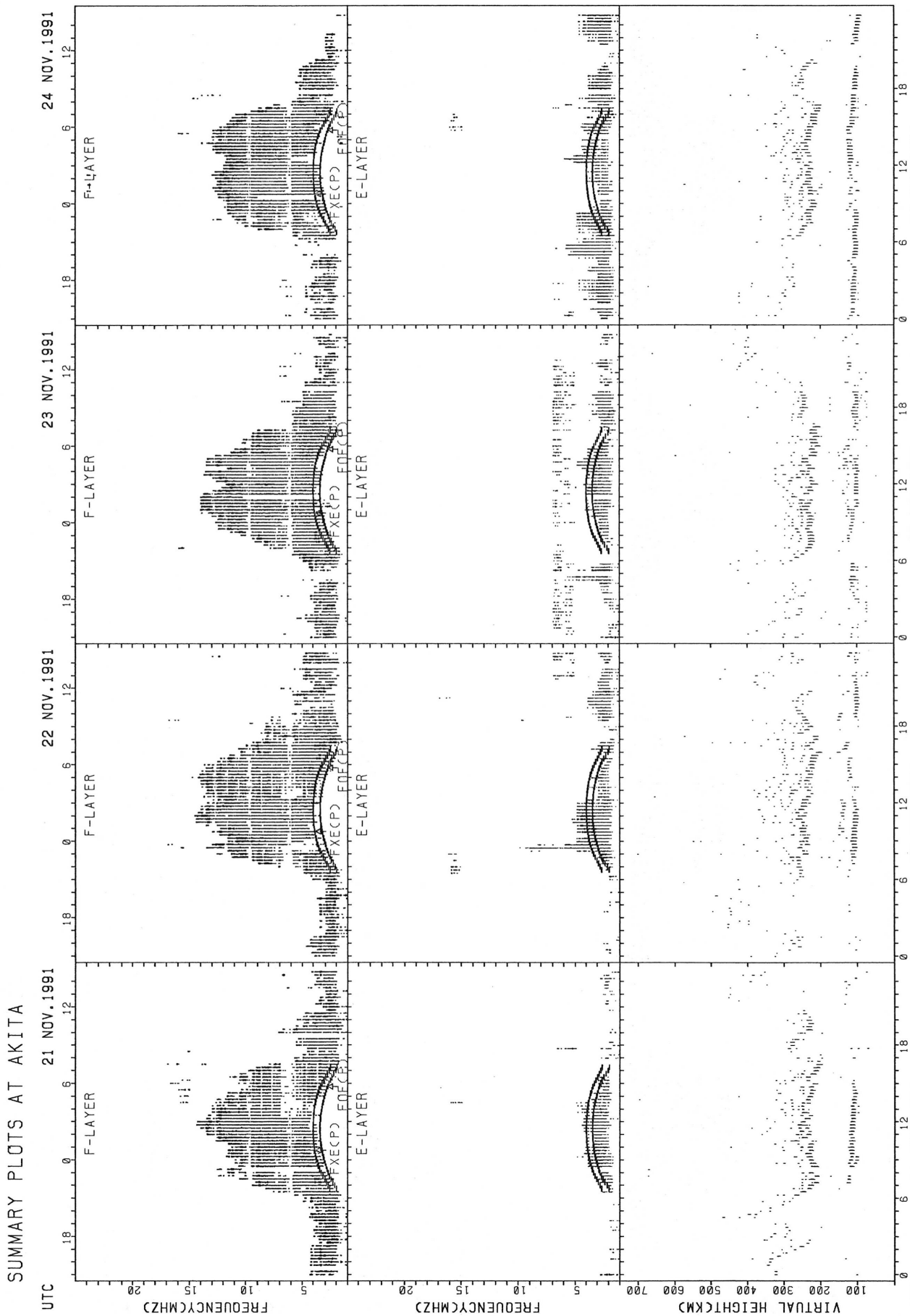
FOE(P); PREDICTED VALUE FOR FOE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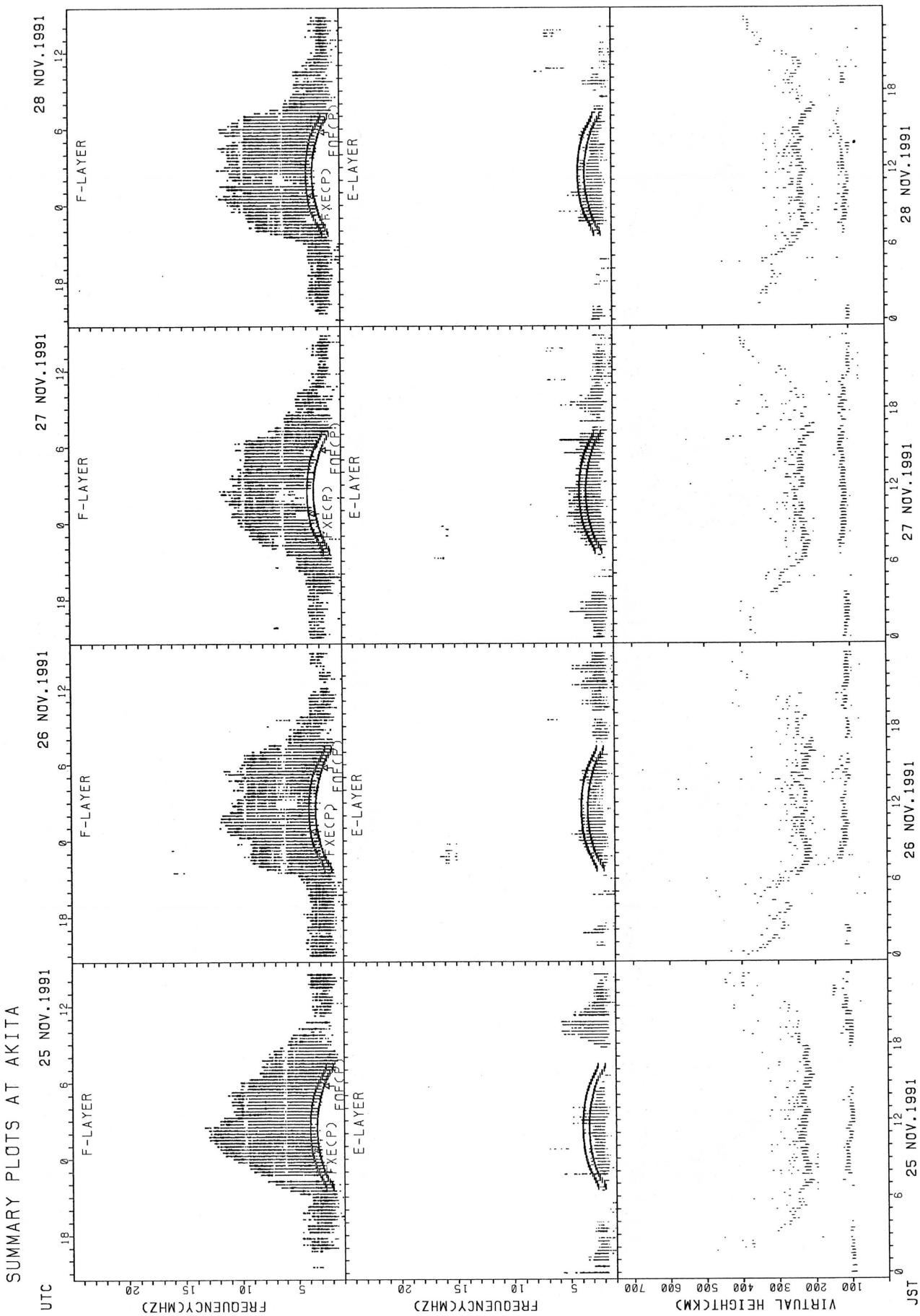
FOE(P); PREDICTED VALUE FOR FOE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28 NOV.1991
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FOE(P)
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JST
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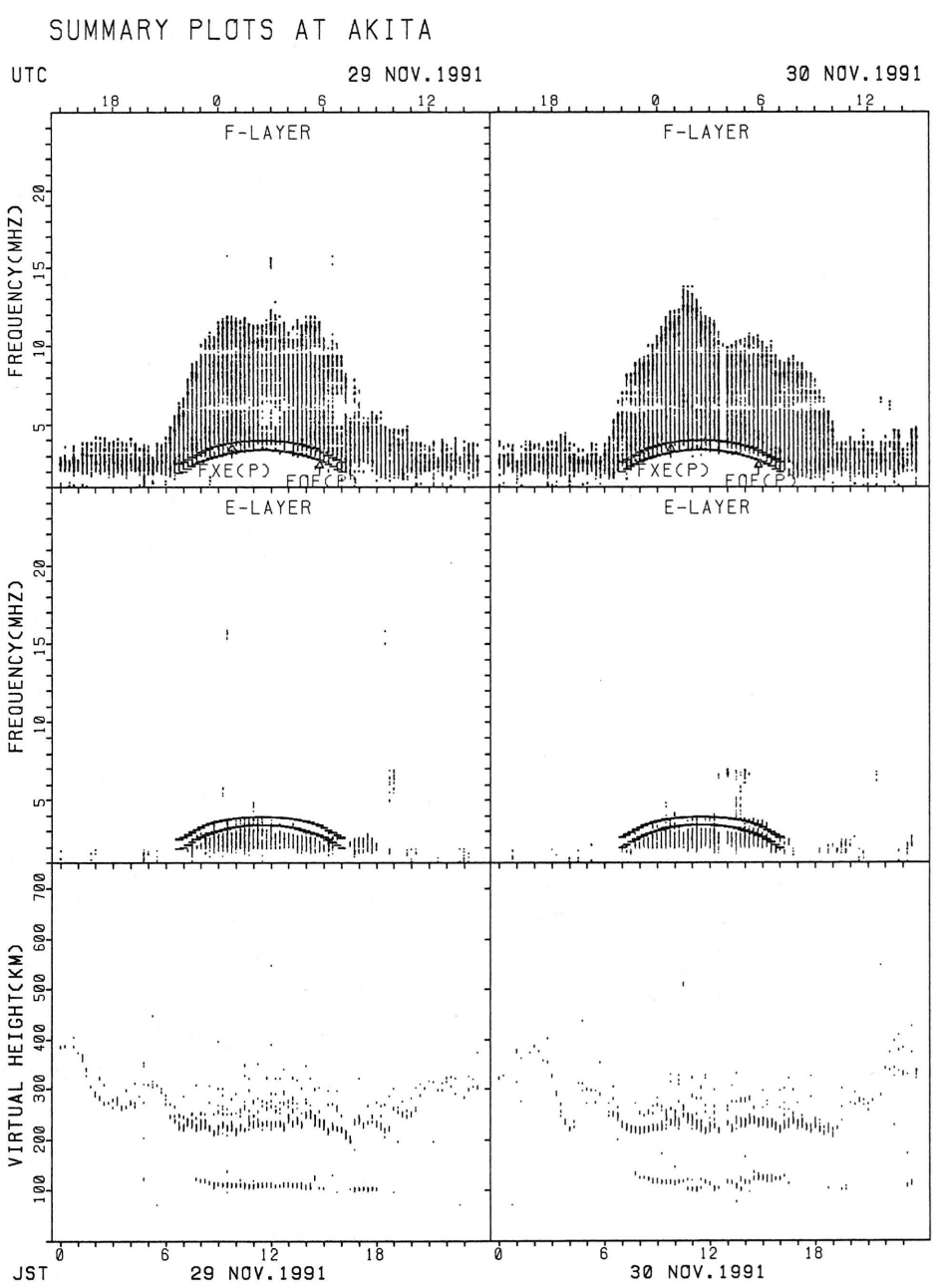

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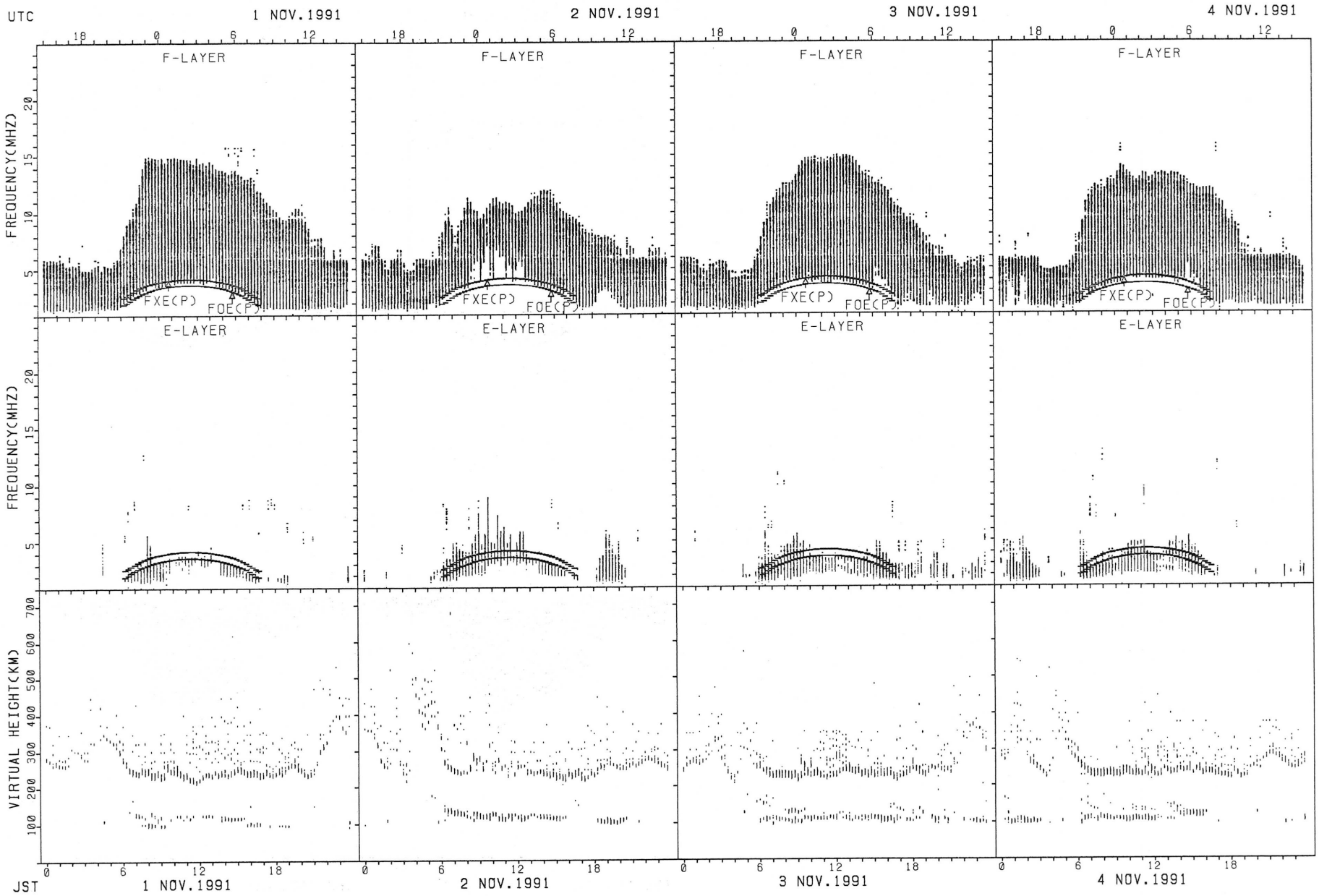
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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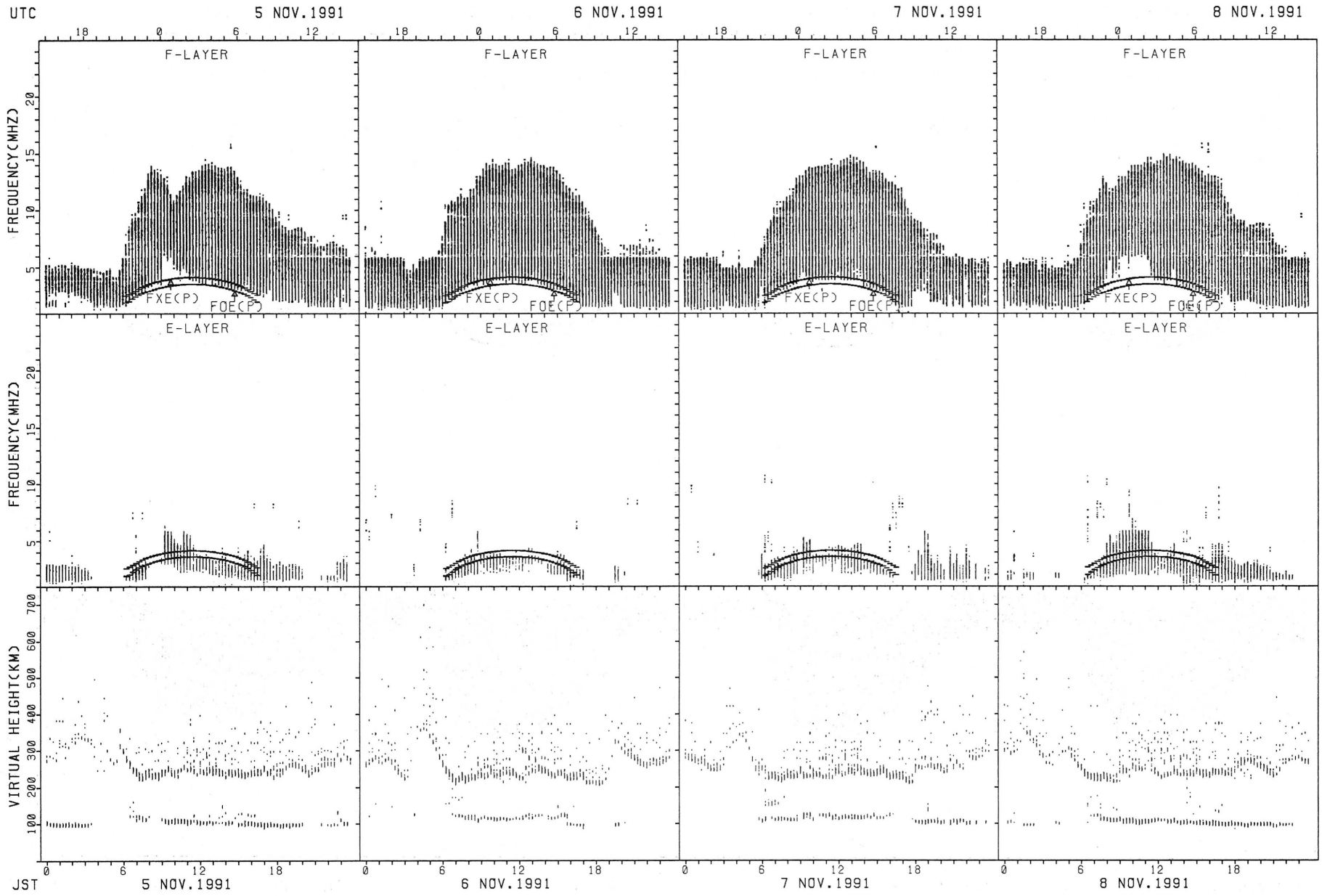

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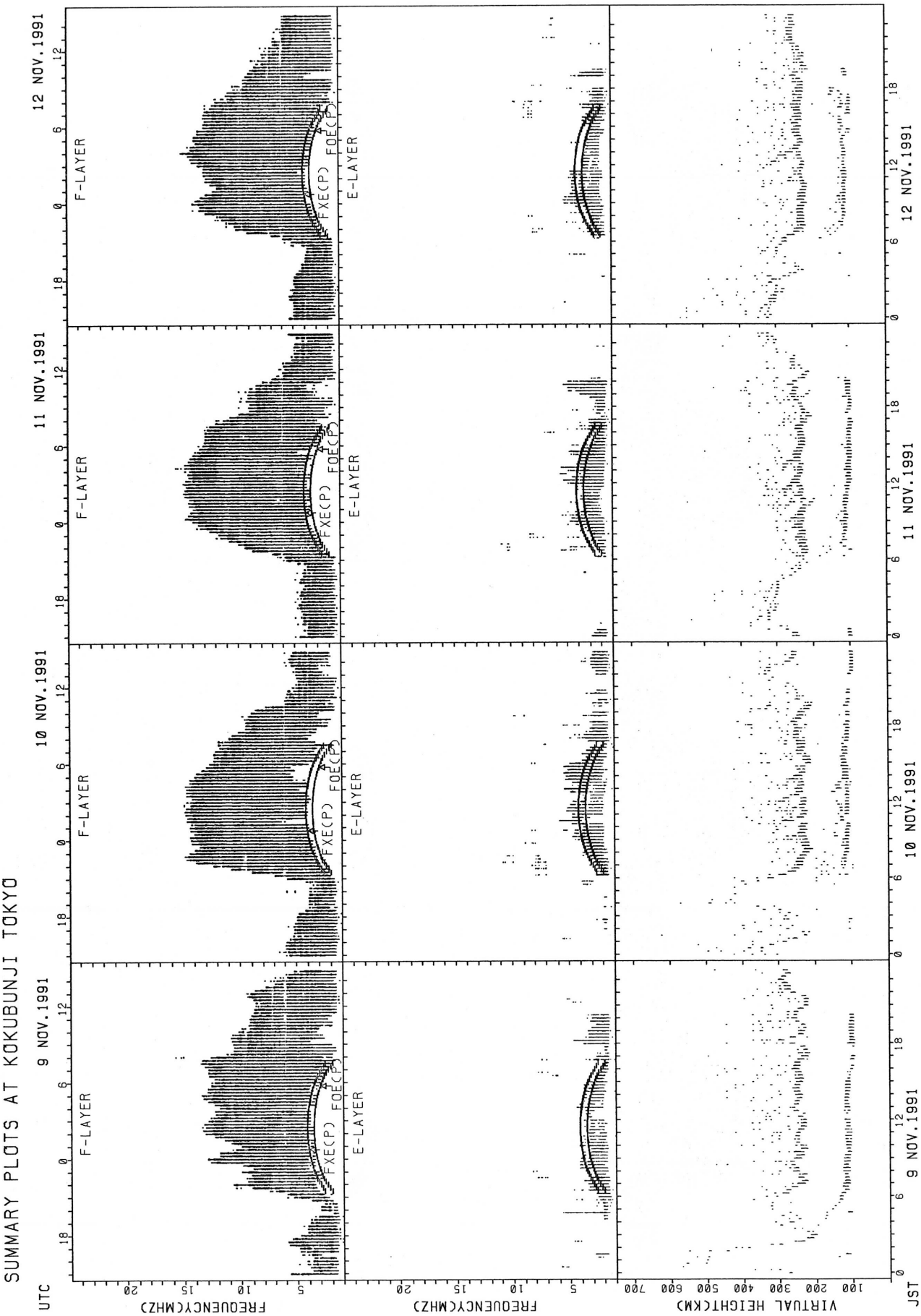
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E-LAYER
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FOE(P)
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VIRTUAL HEIGHT(KM)
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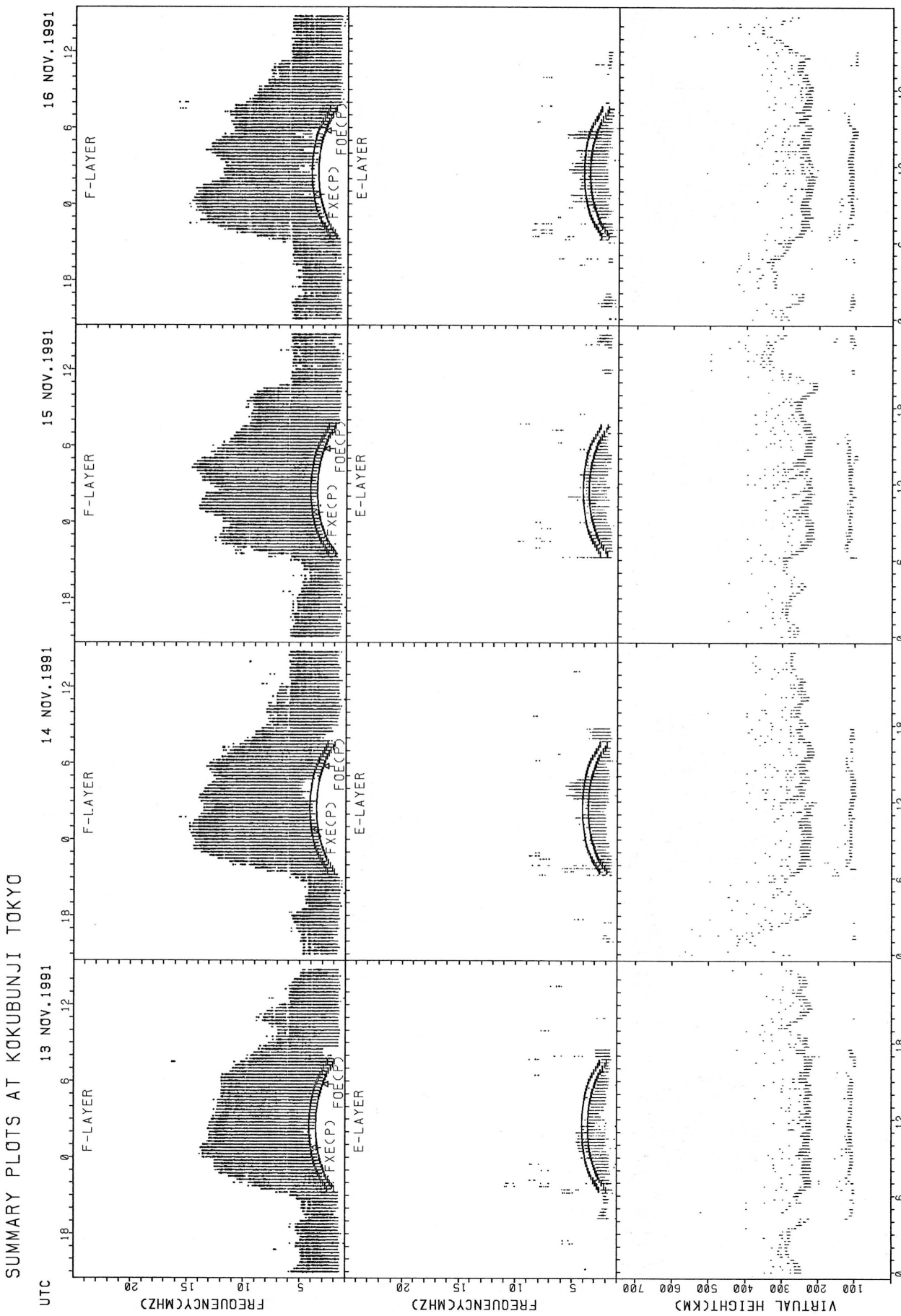
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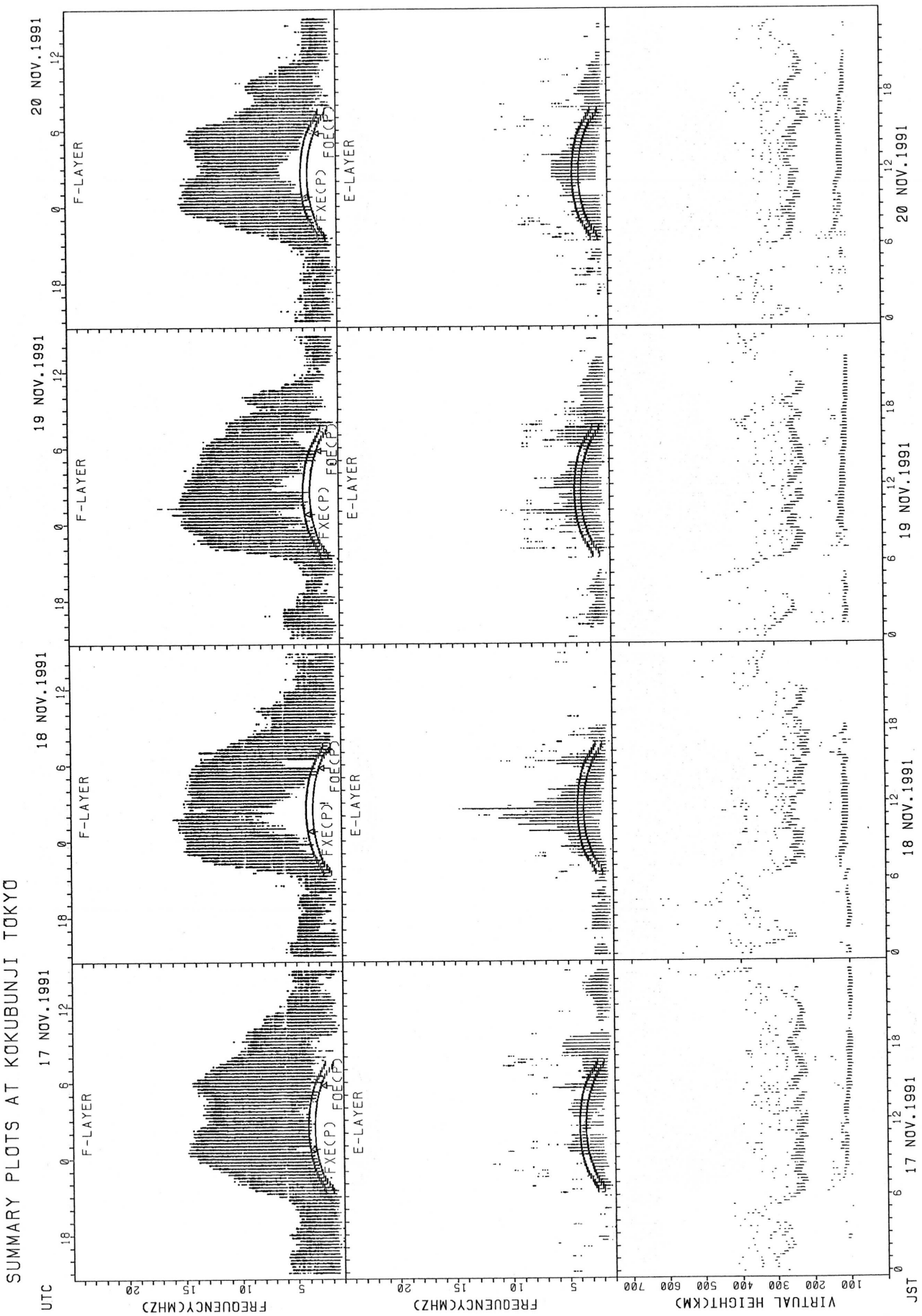
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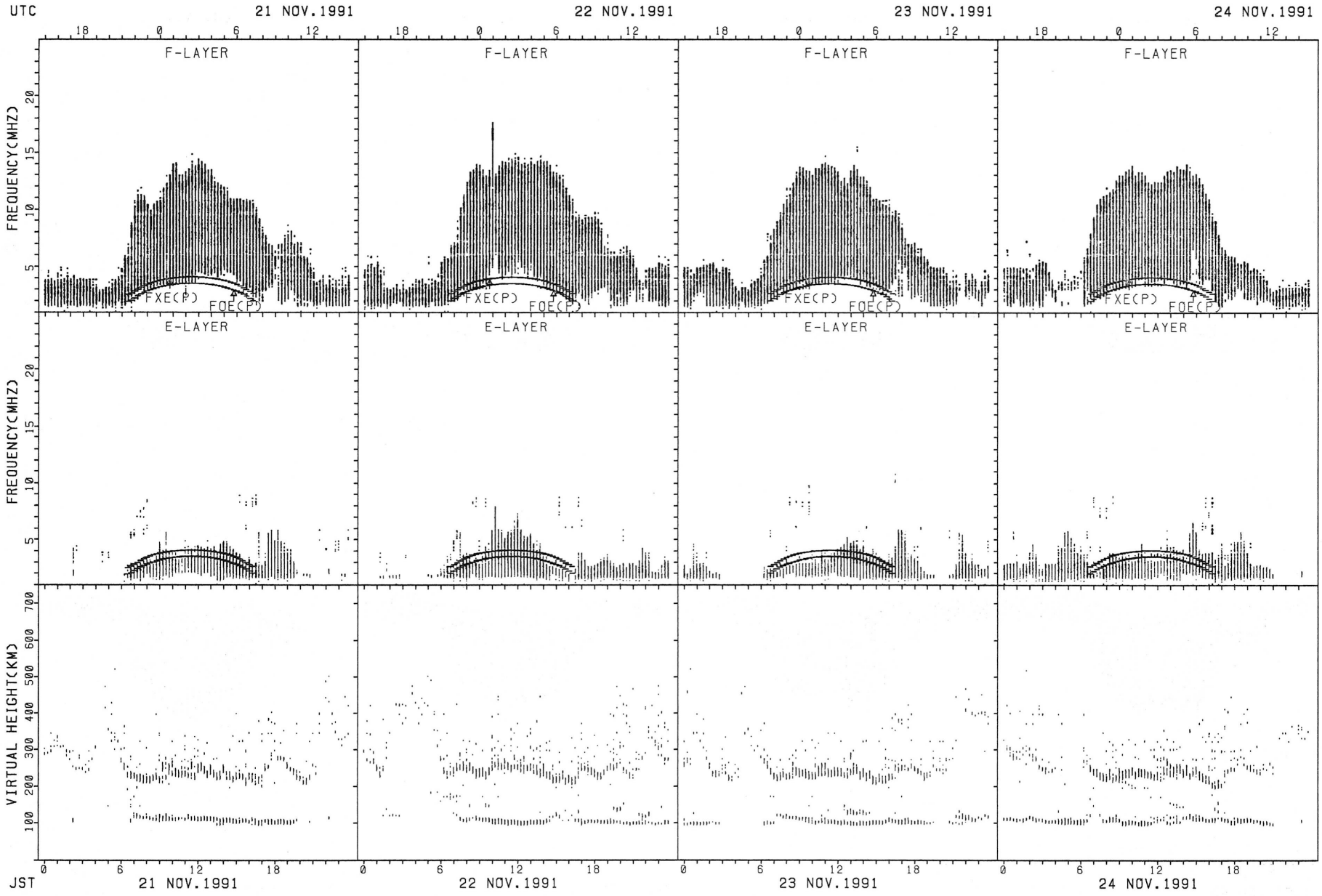
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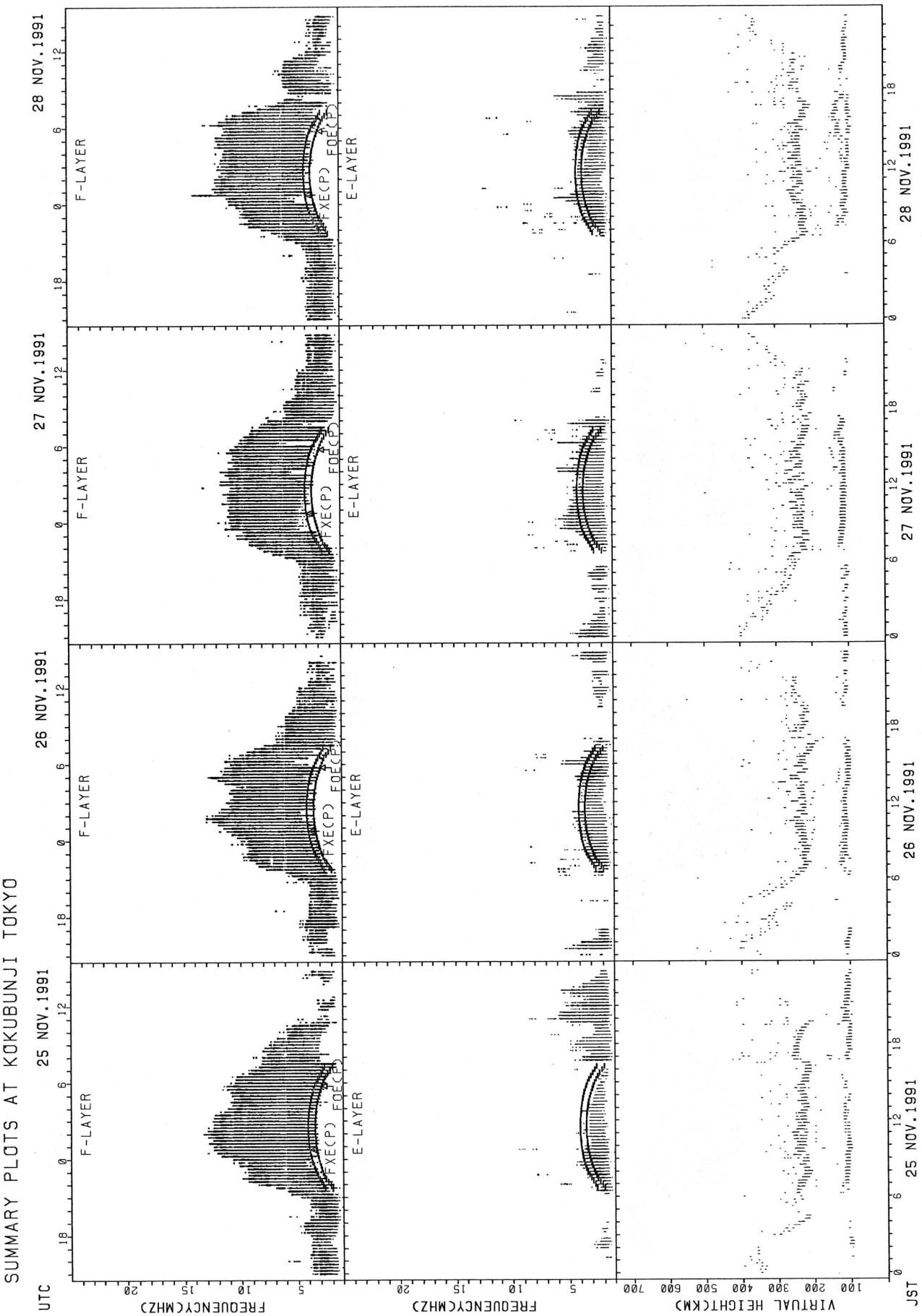
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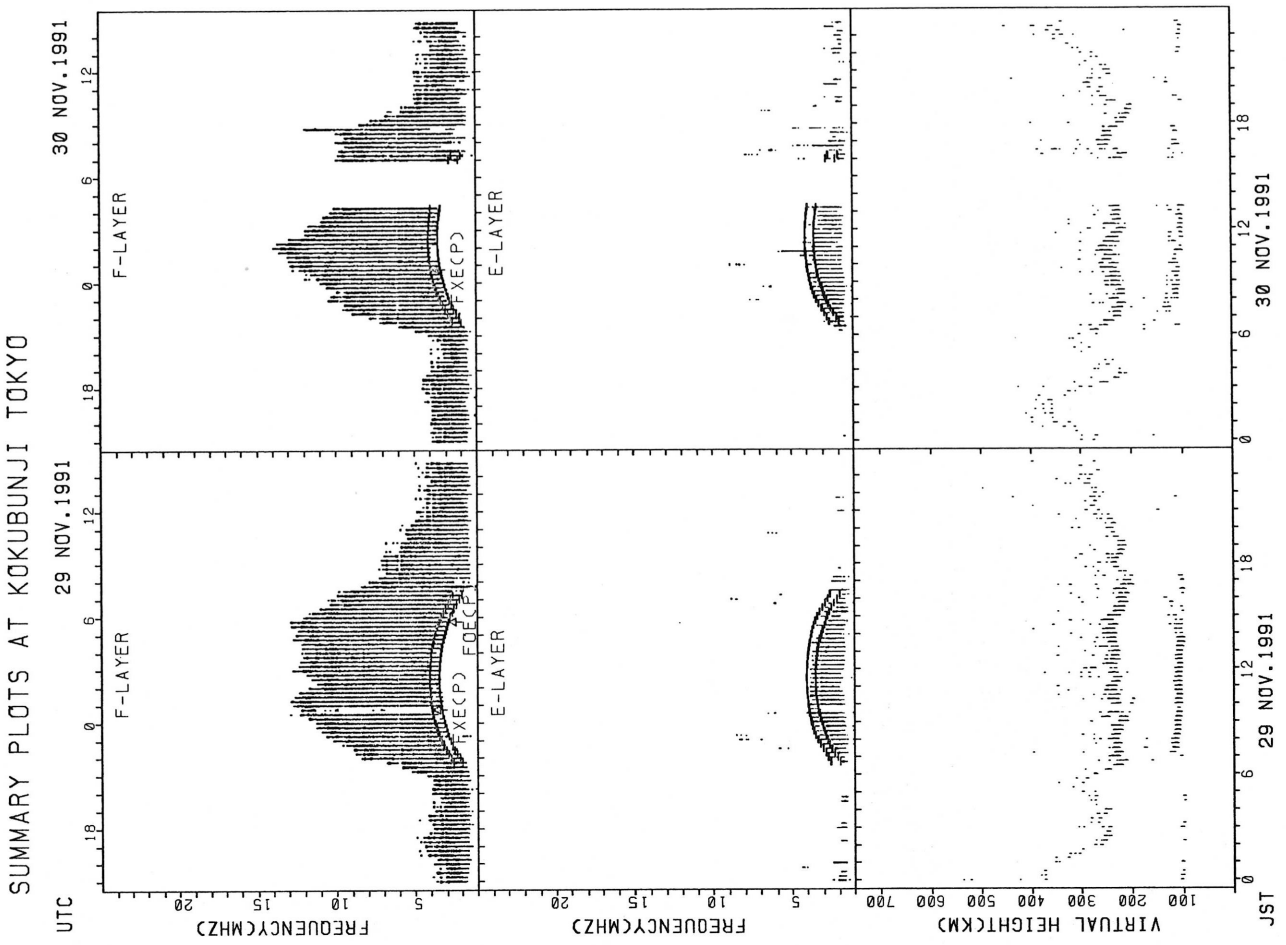
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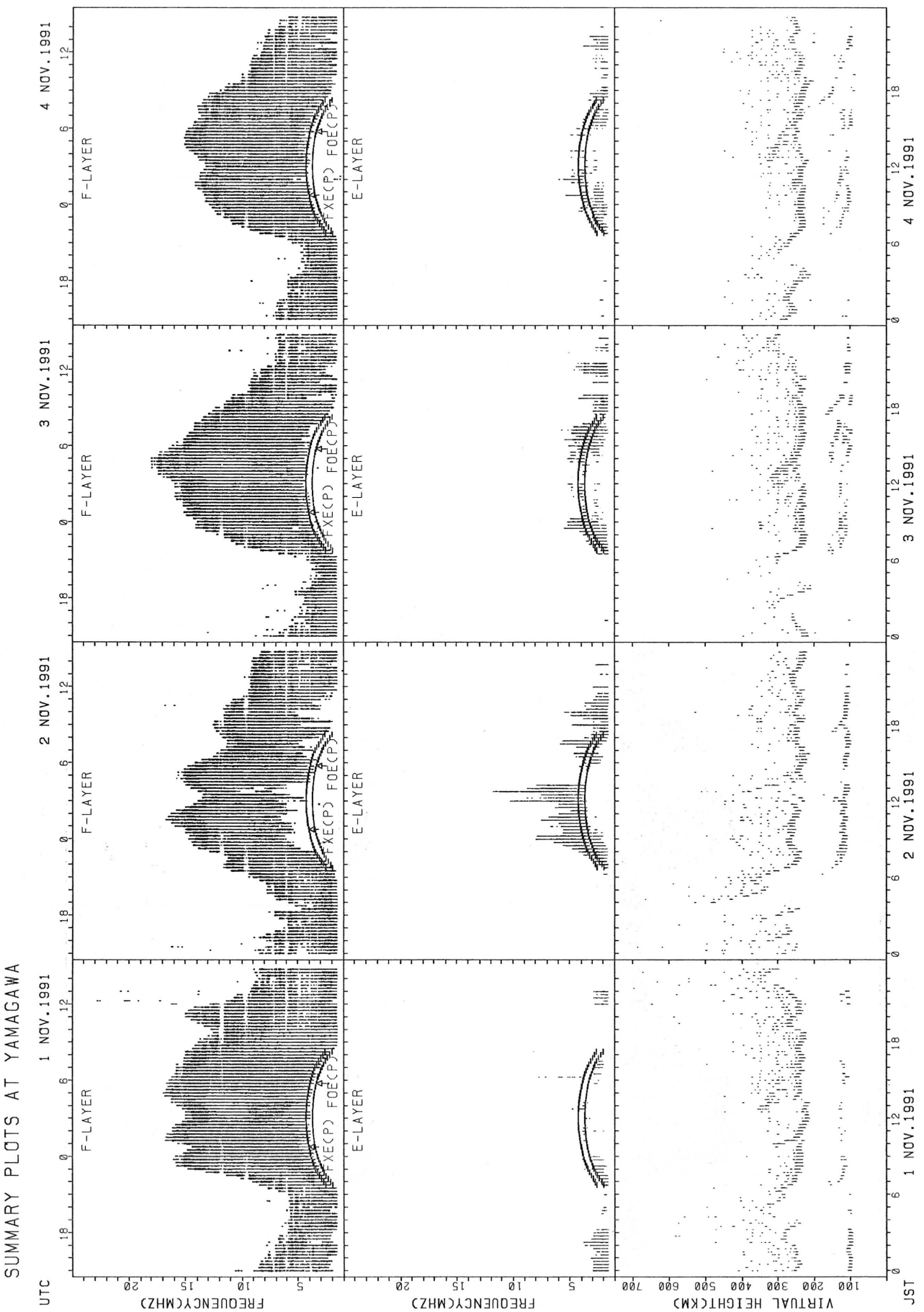
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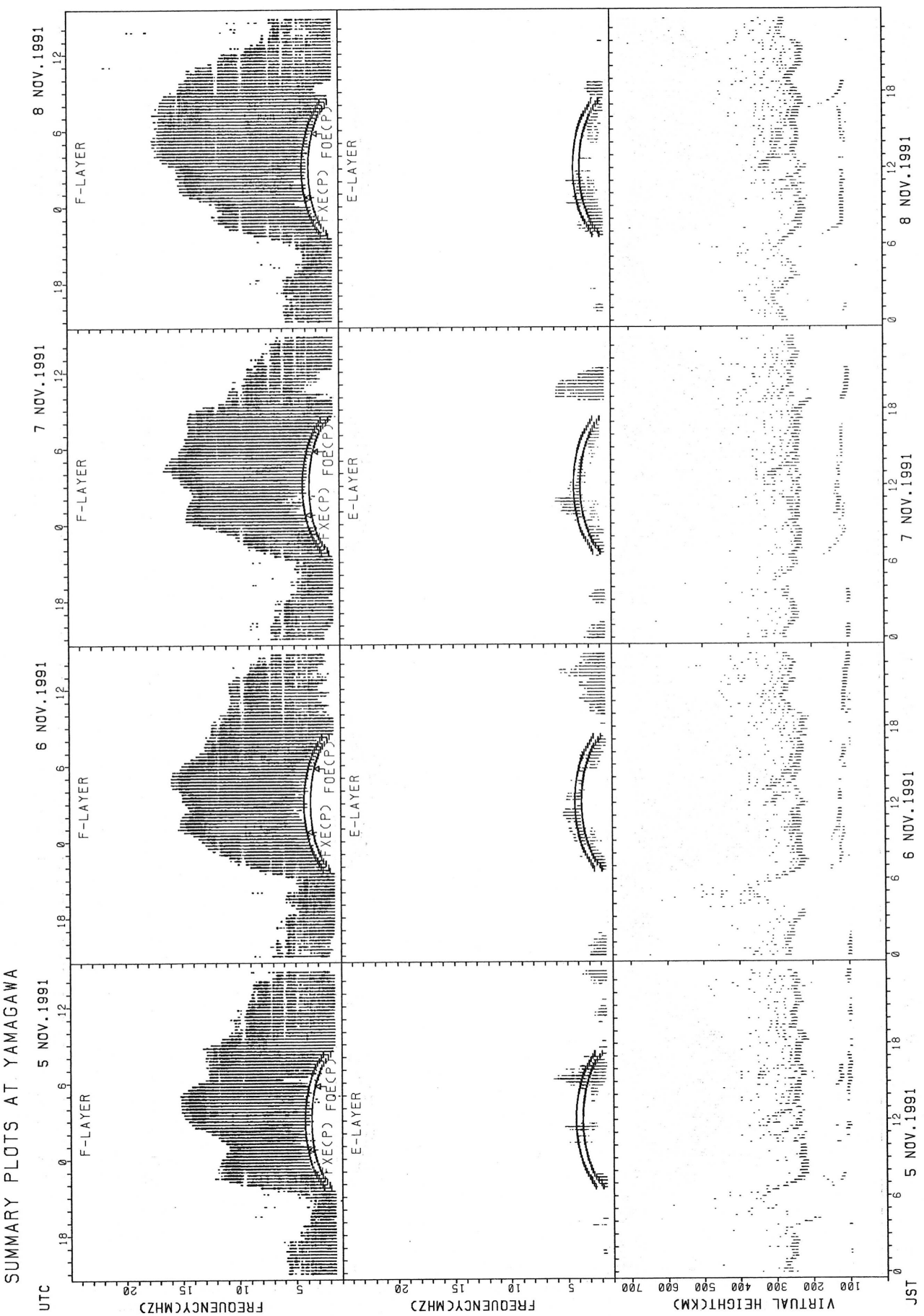
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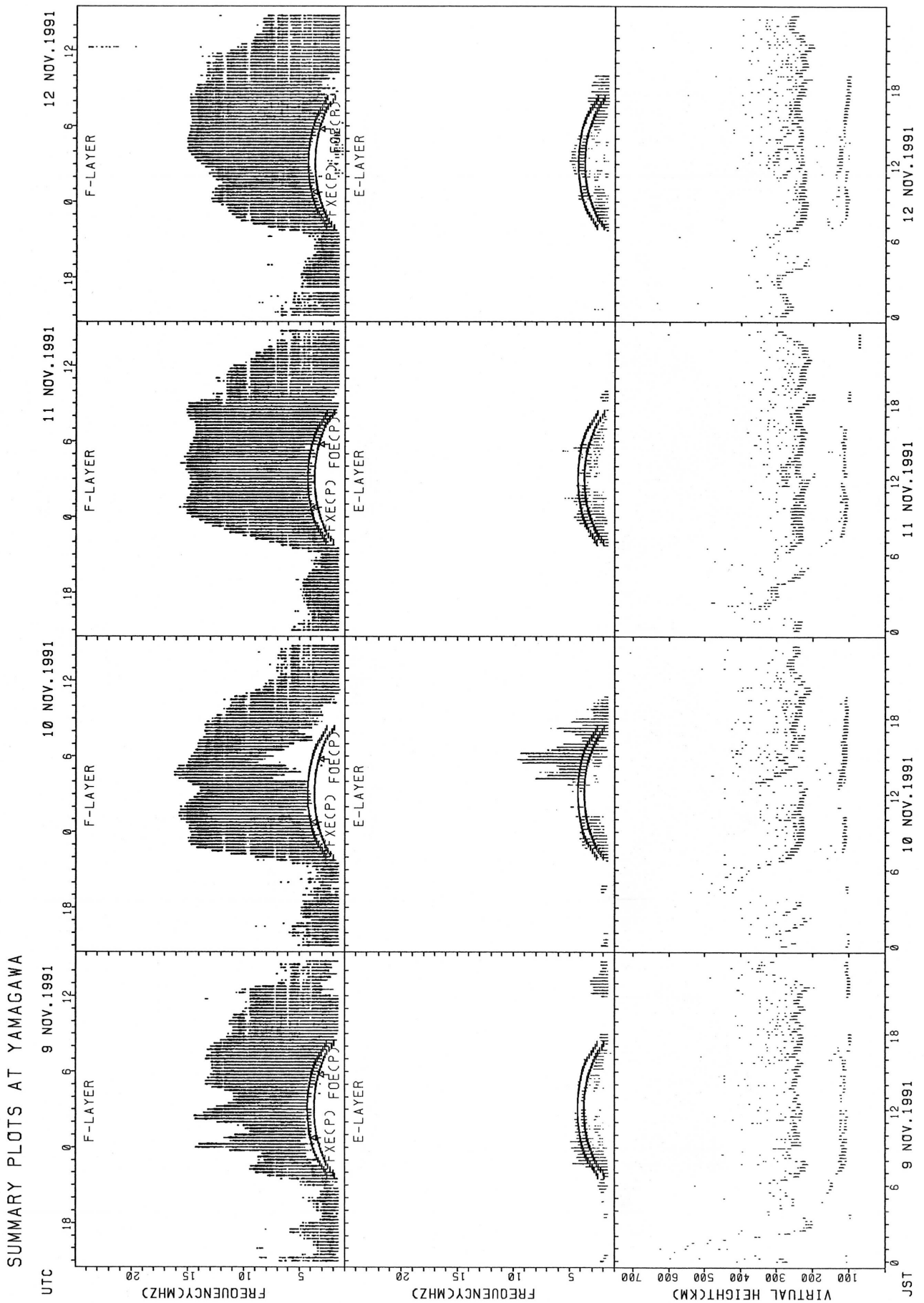
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FREQUENCY(MHZ)
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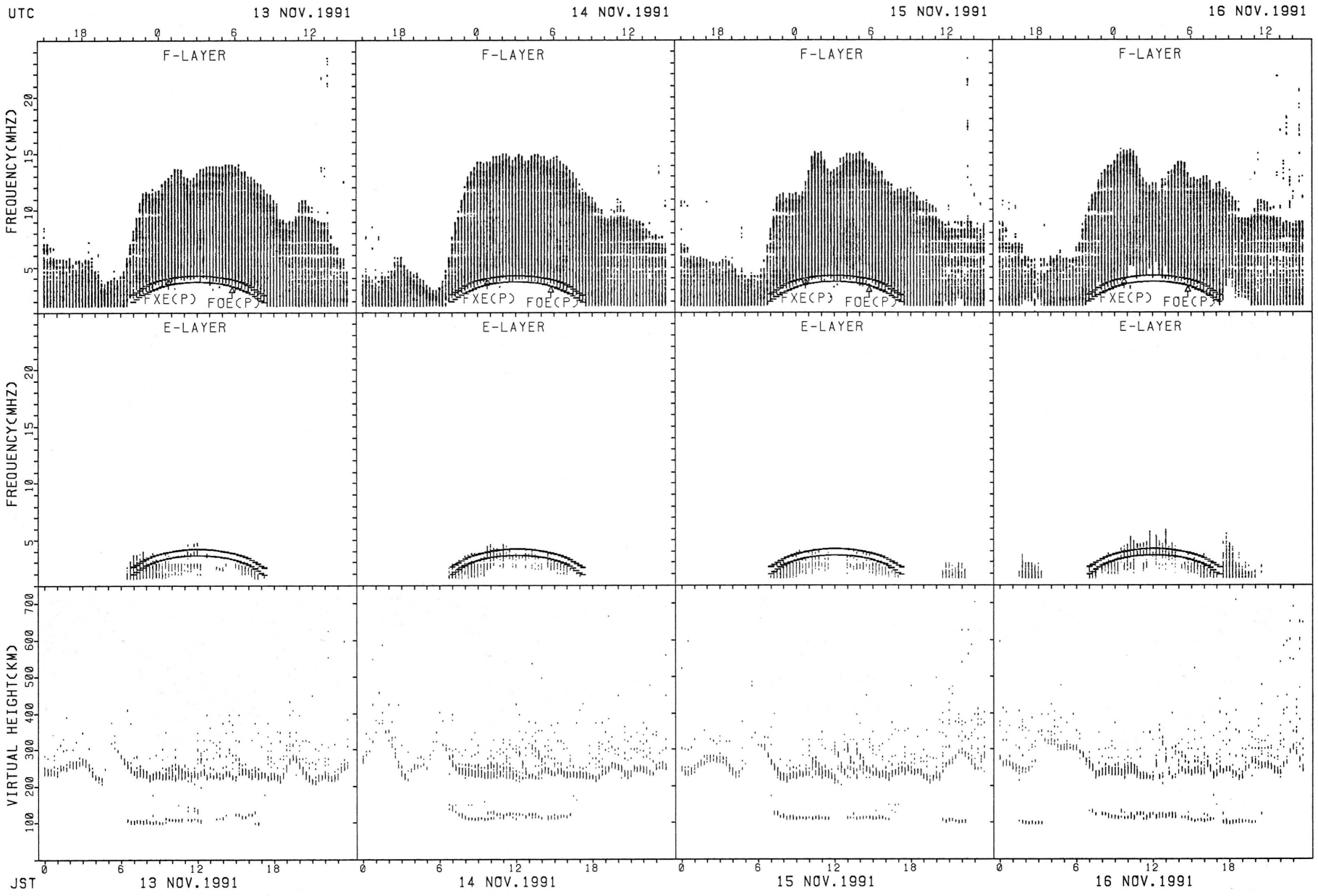
SUMMARY PLOTS AT YAMAGAWA



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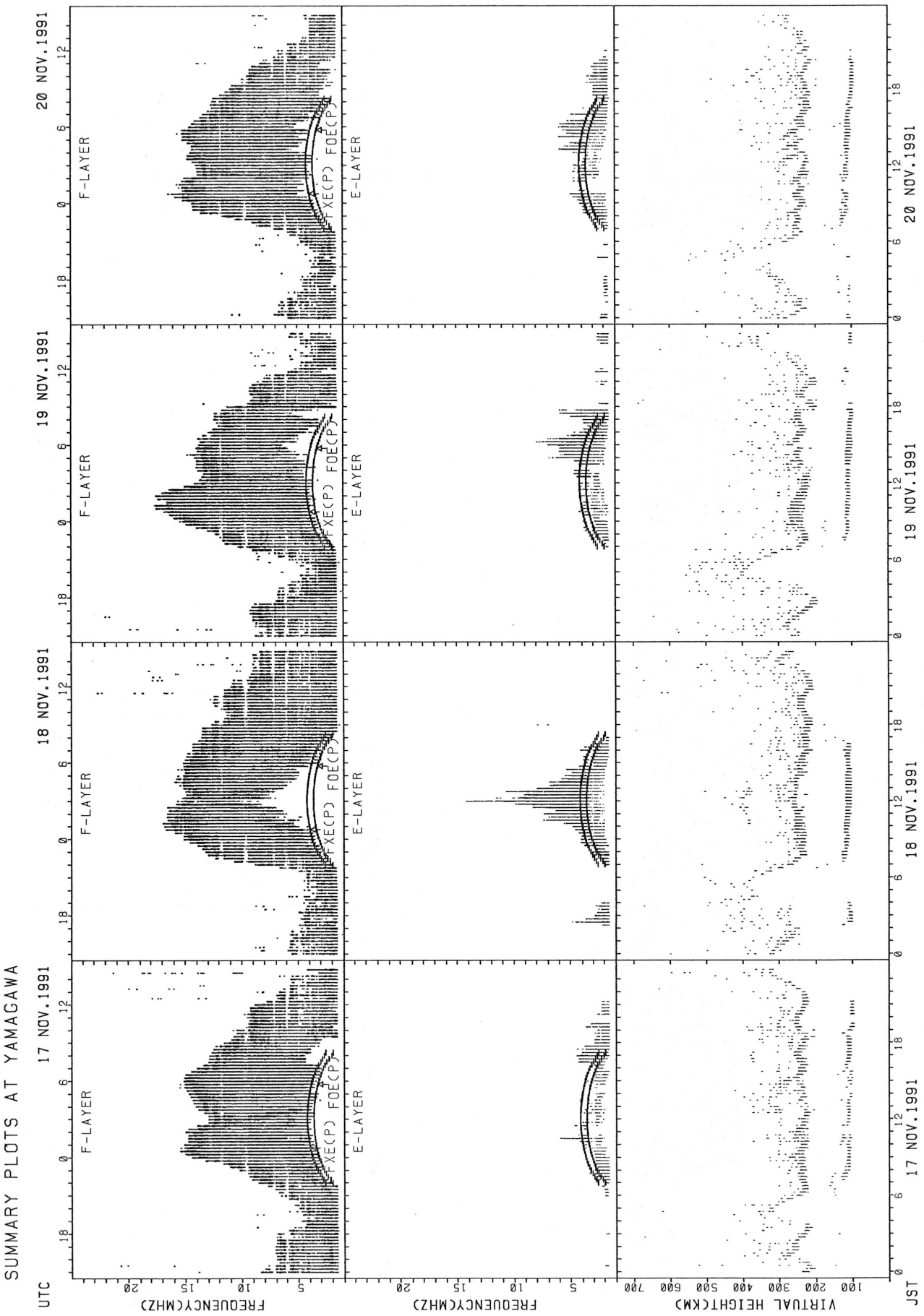
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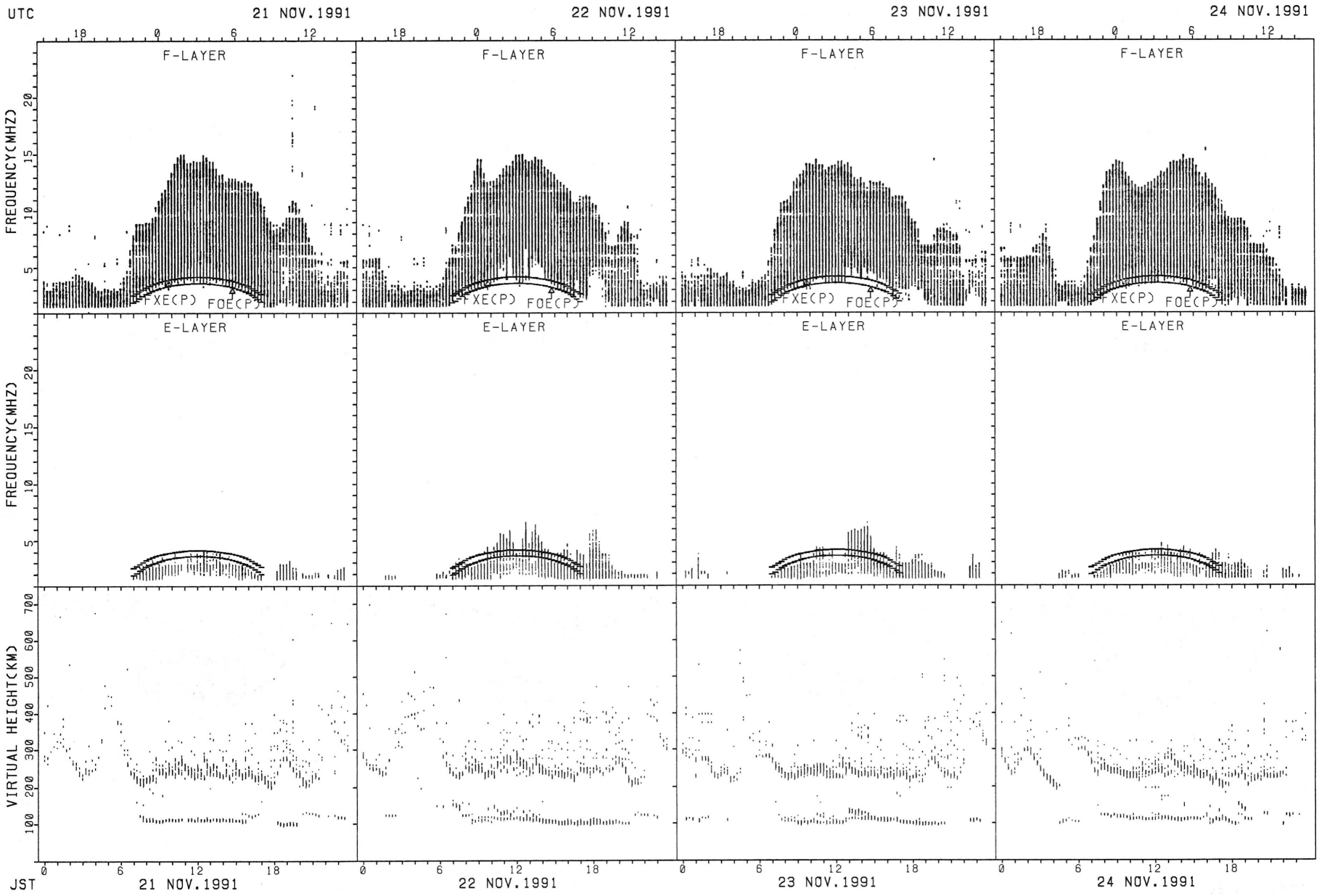
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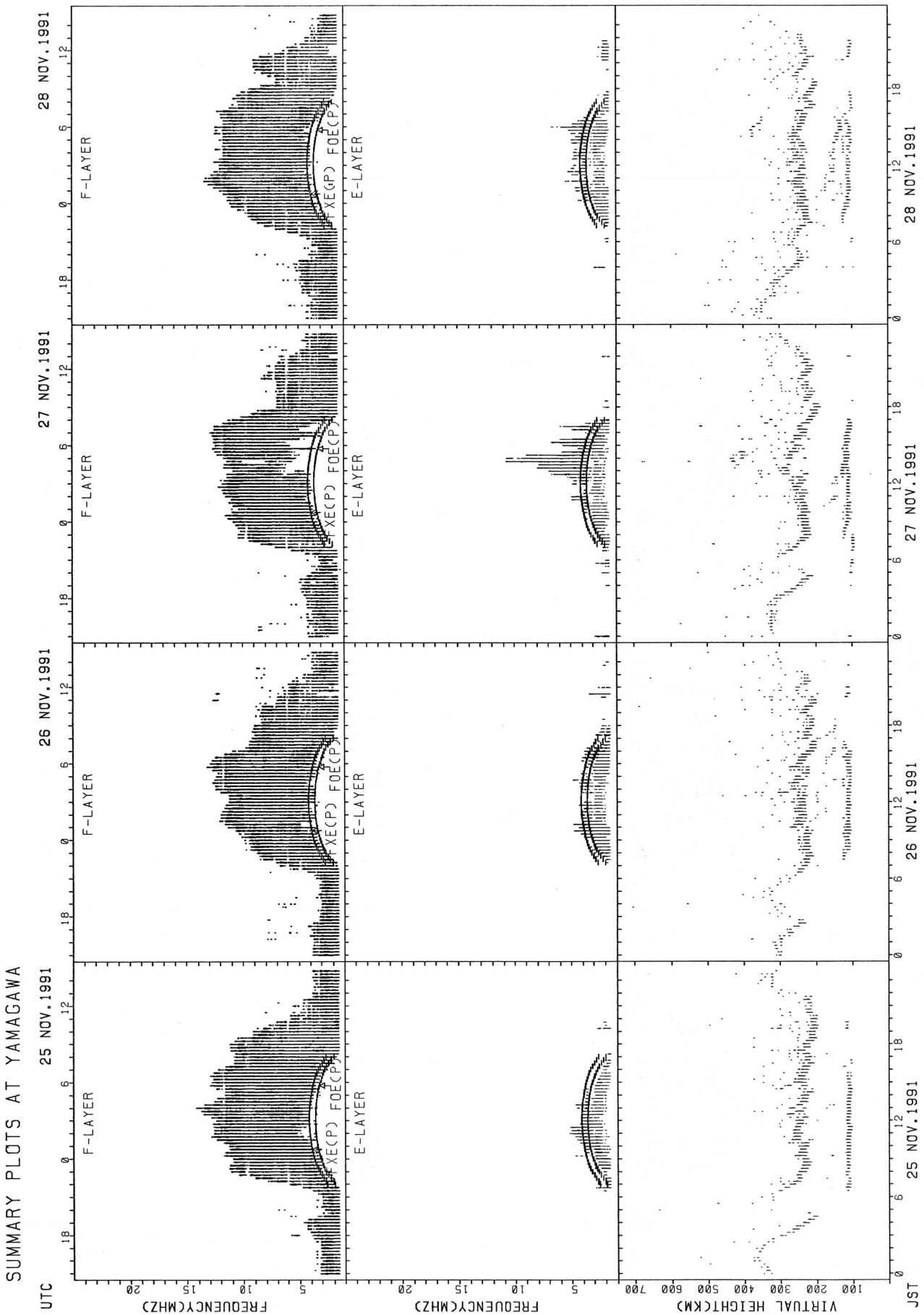
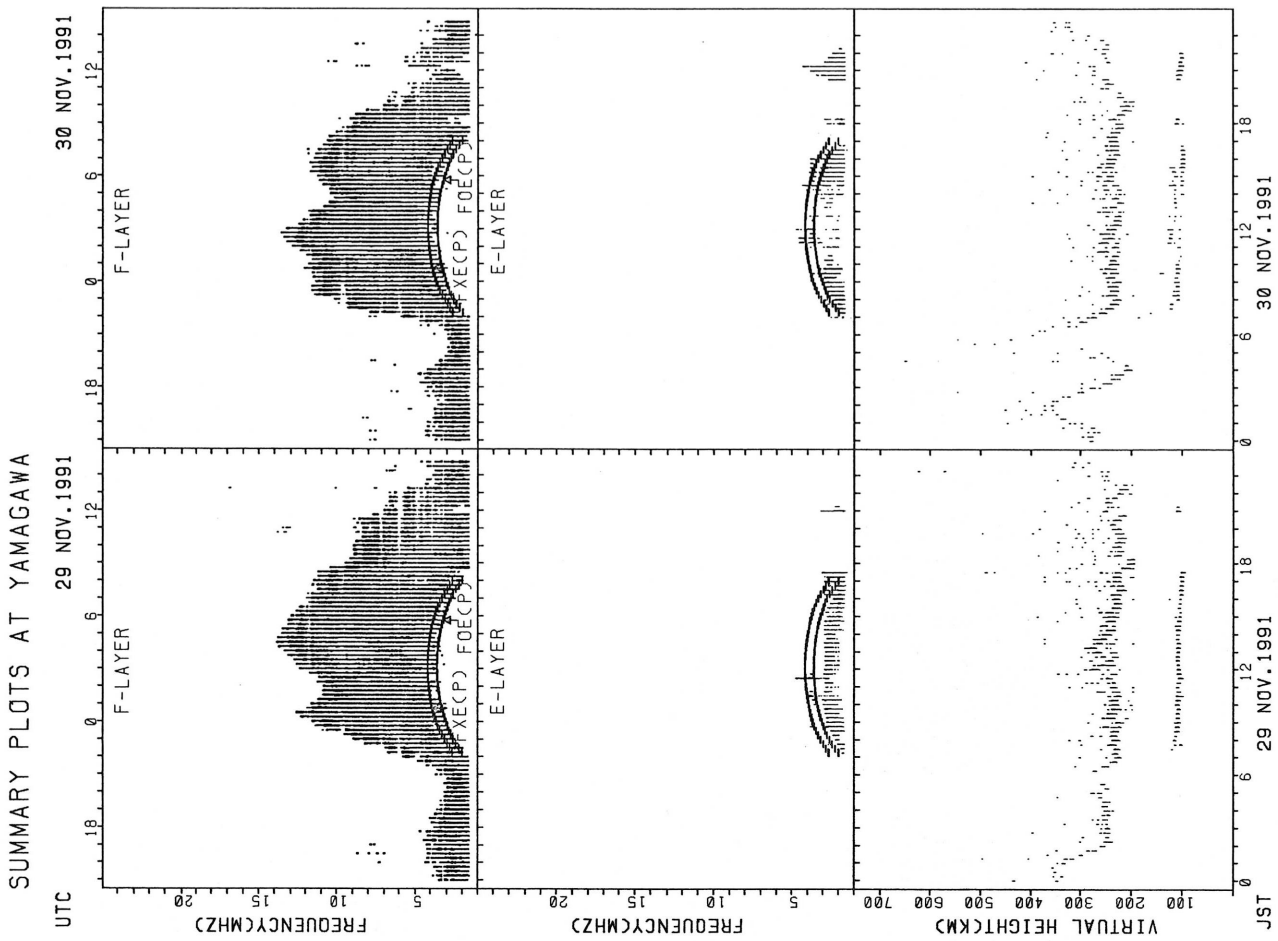
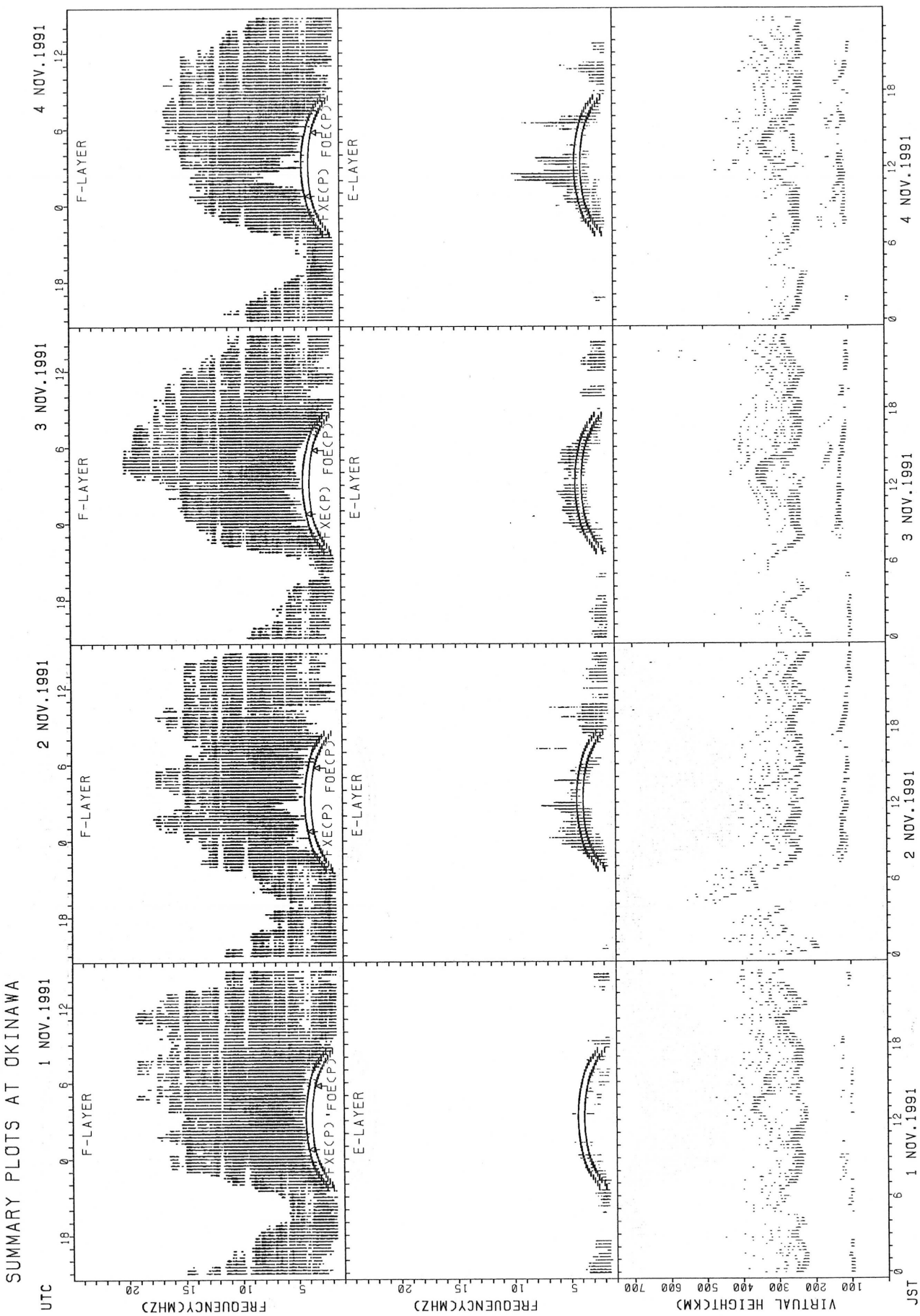
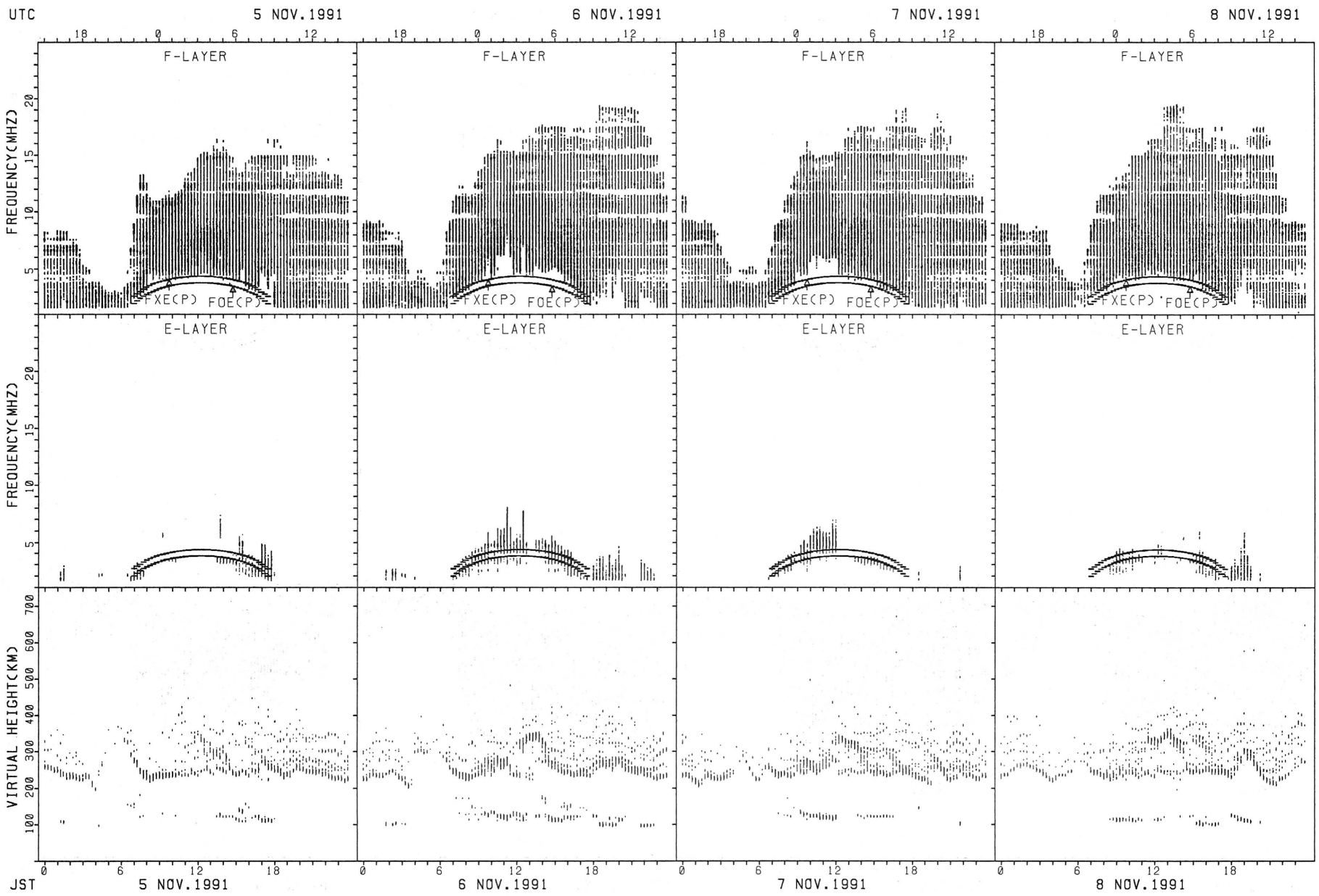
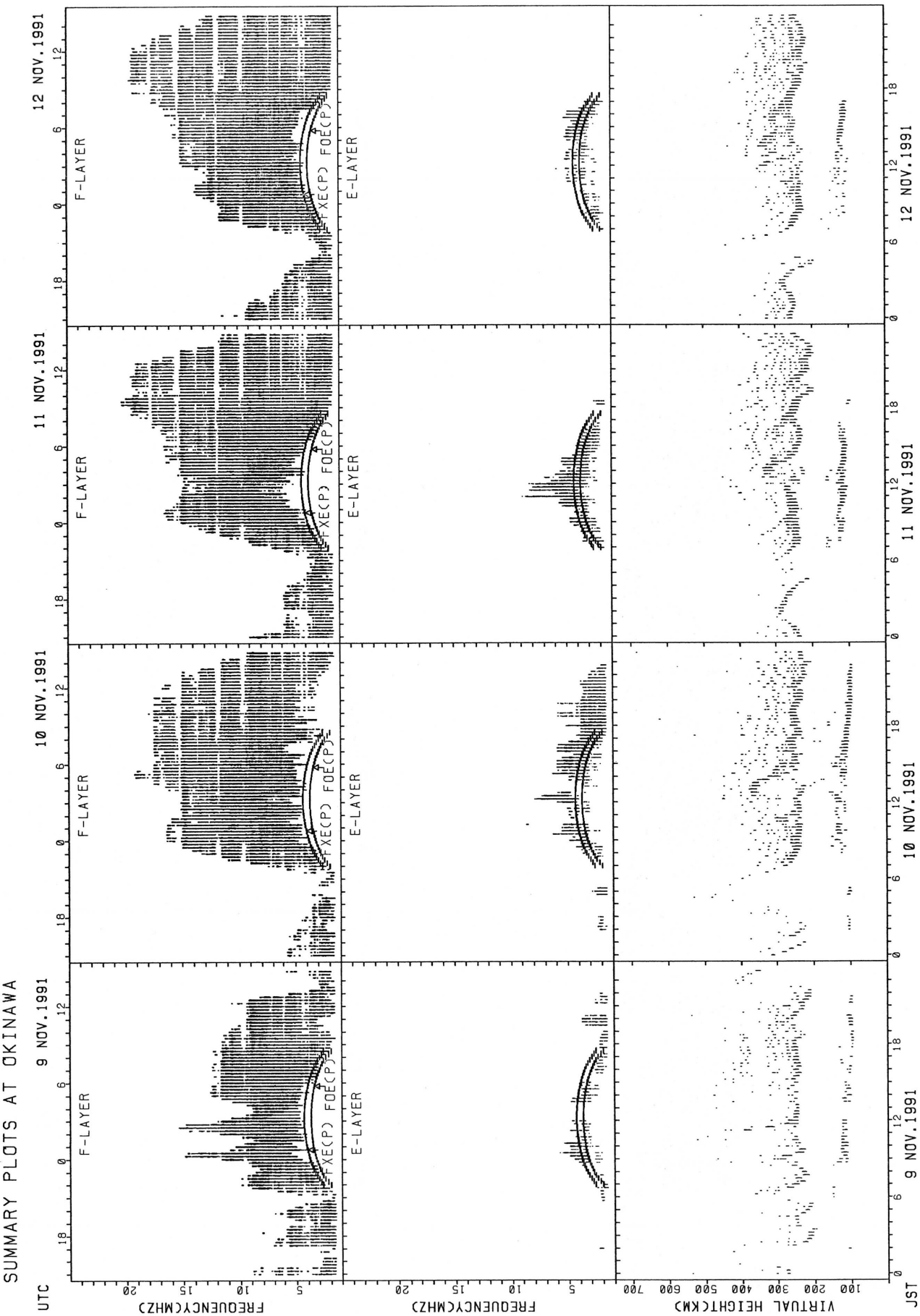
FOE(P)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

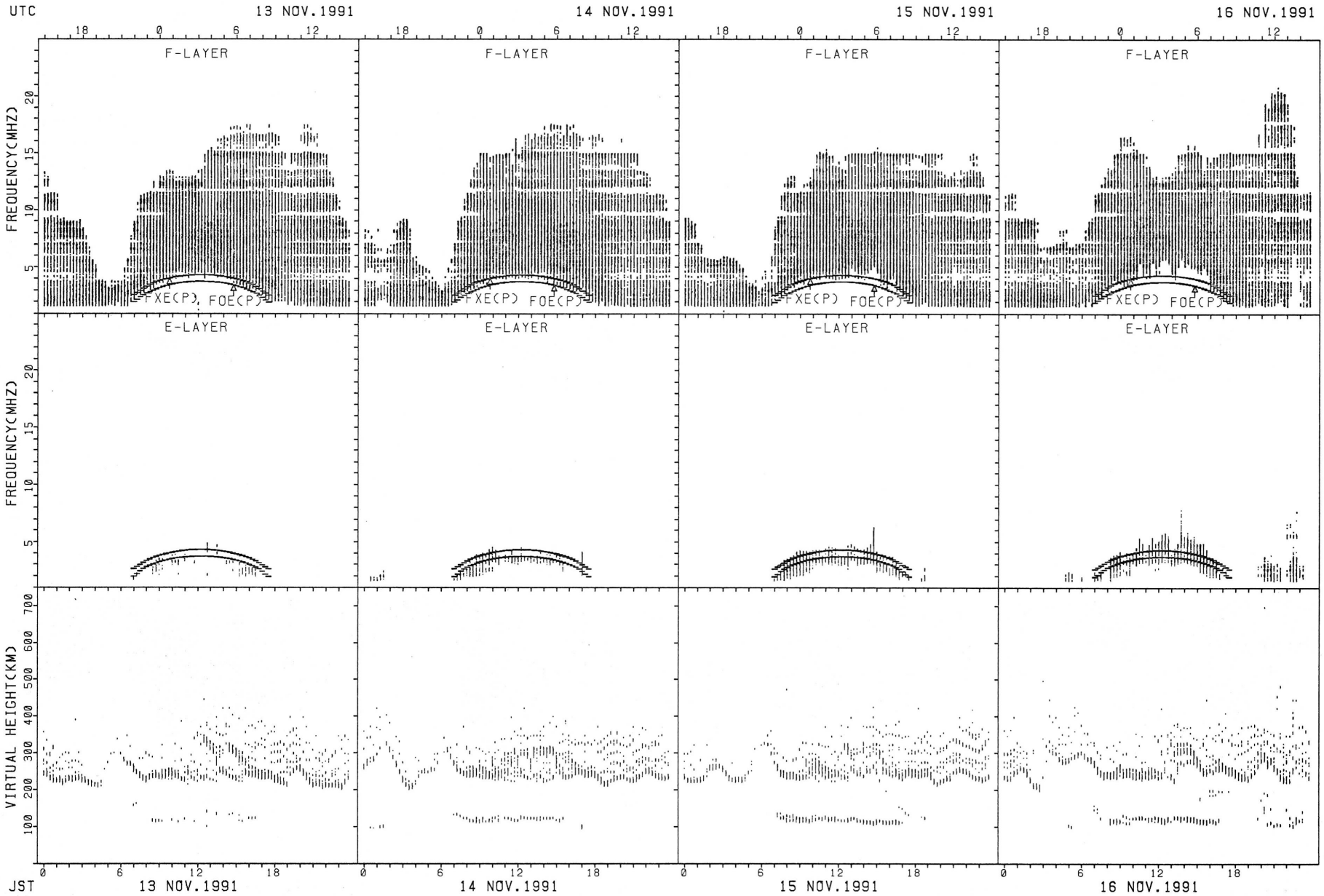

SUMMARY PLOTS AT YAMAGAWA
UTC
29 NOV.1991
30 NOV.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

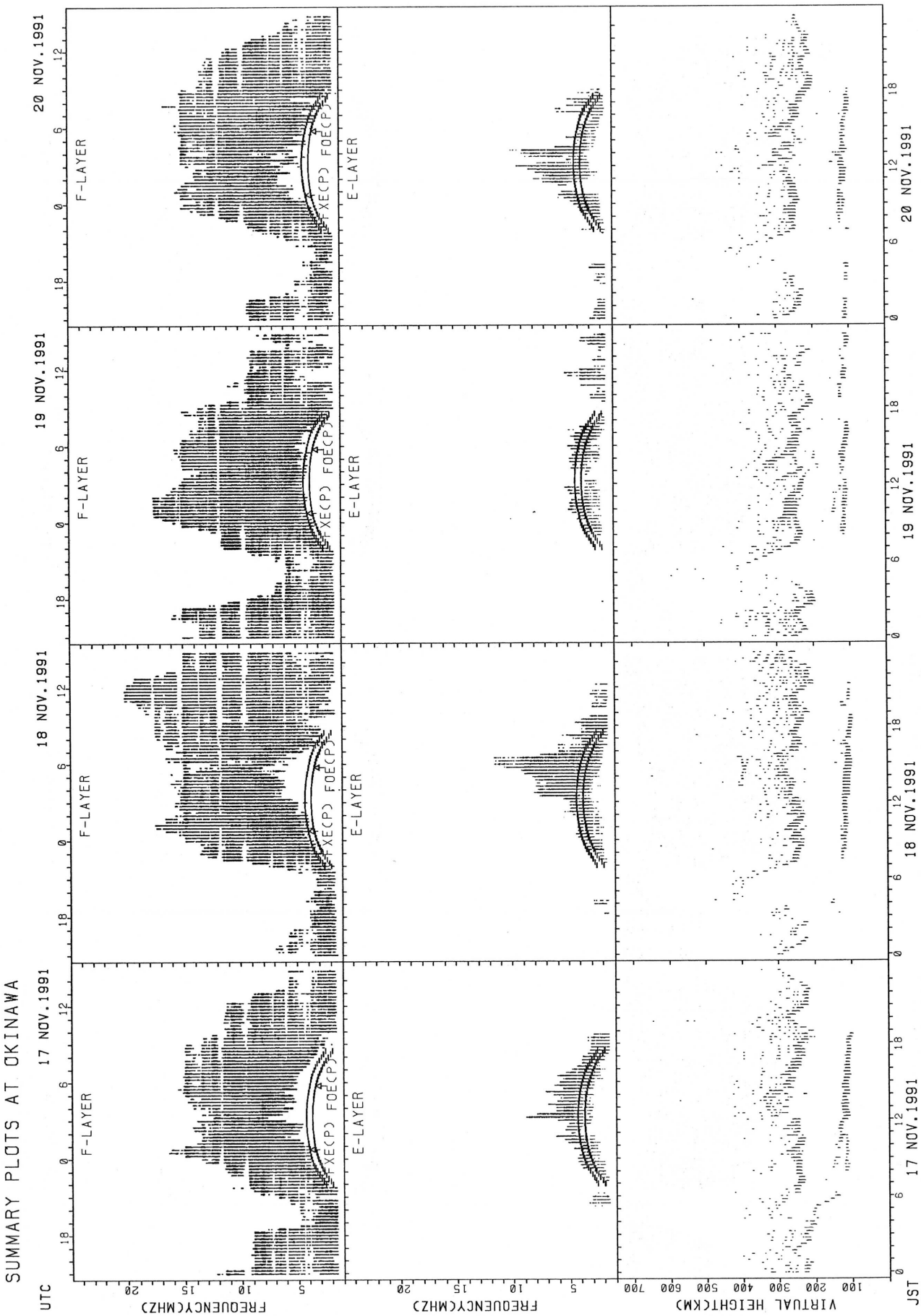

SUMMARY PLOTS AT OKINAWA
UTC
5 NOV.1991
6 NOV.1991
7 NOV.1991
8 NOV.1991
F-LAYER
FXE(P) FOE(P)
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

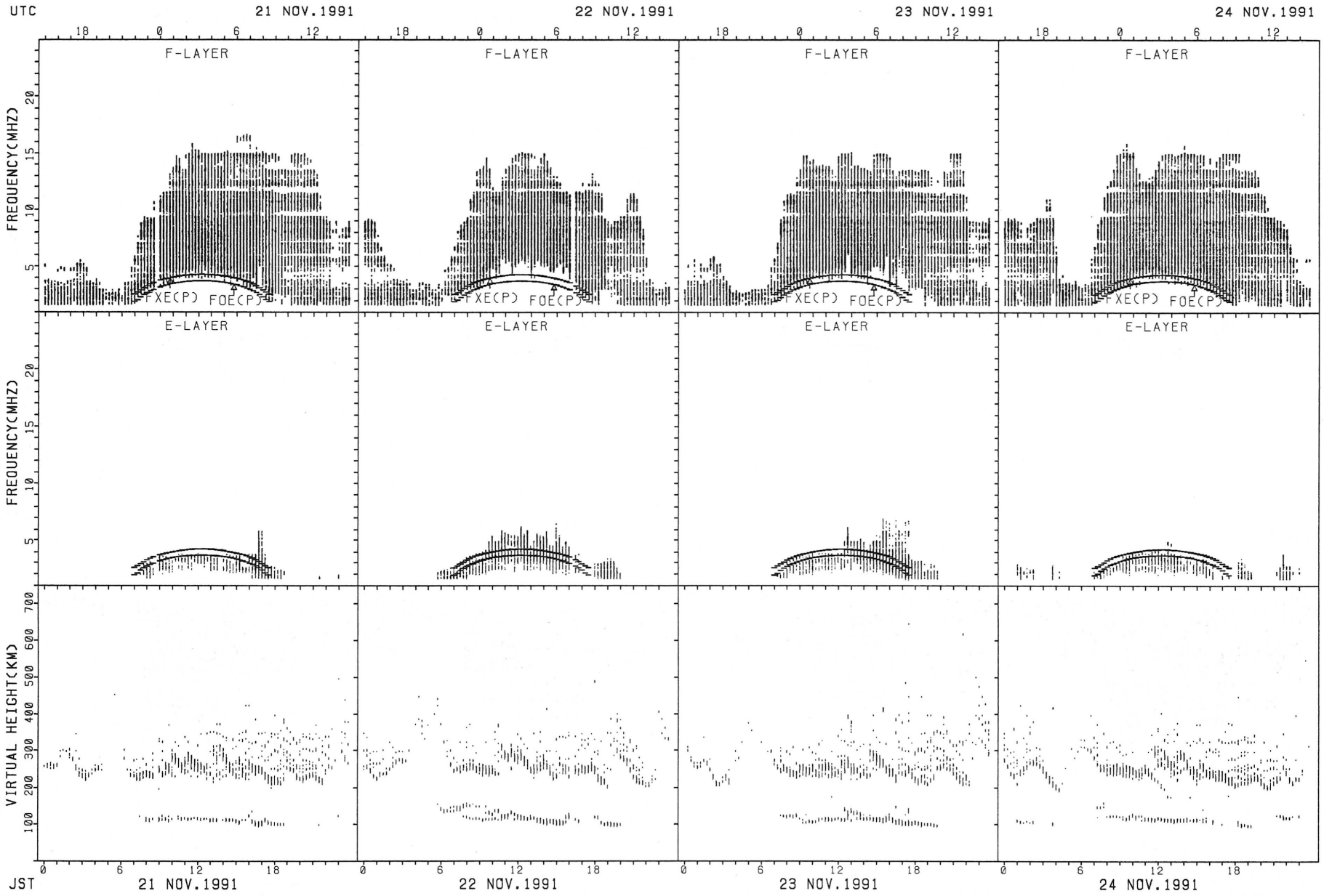
SUMMARY PLOTS AT OKINAWA



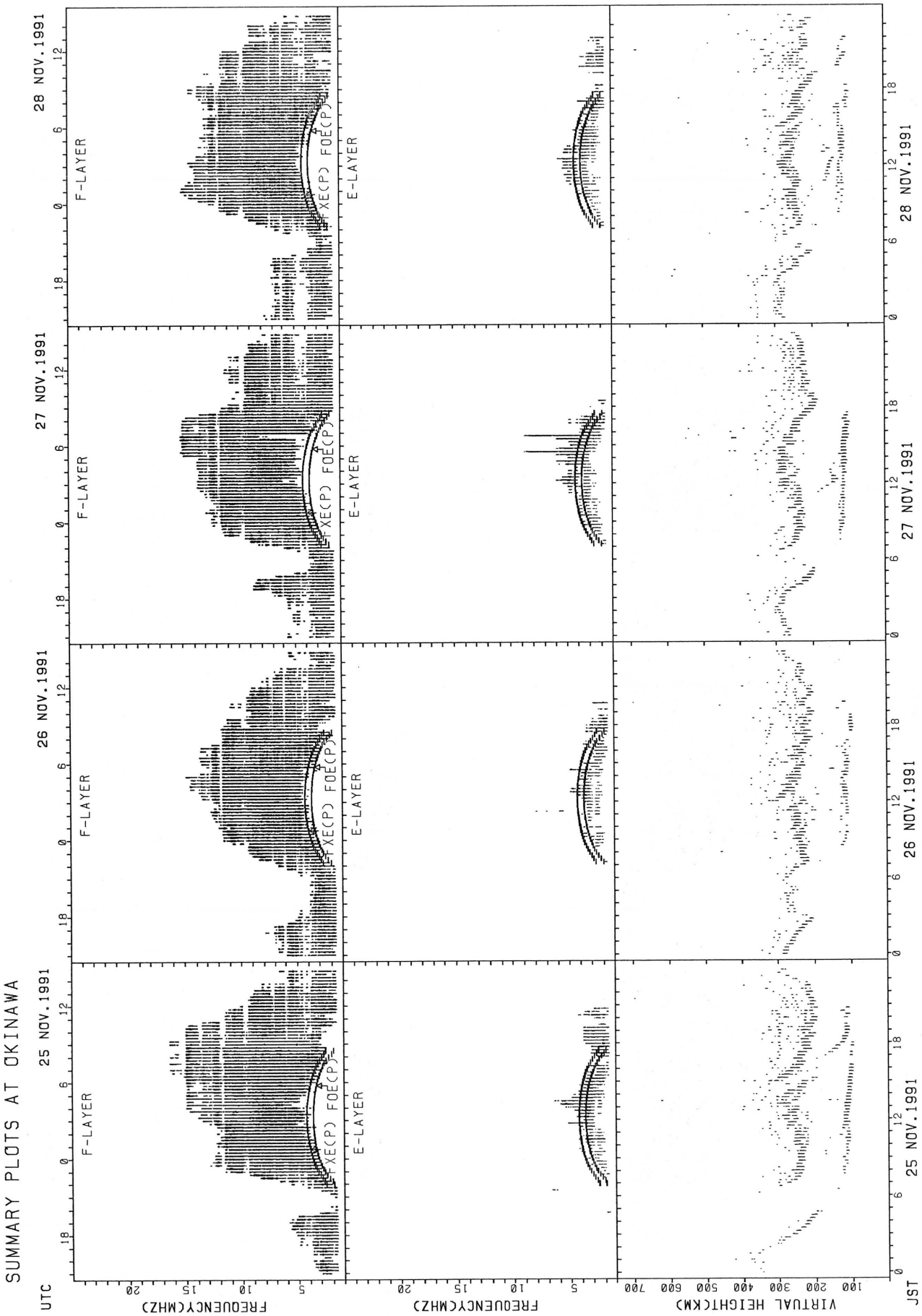
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

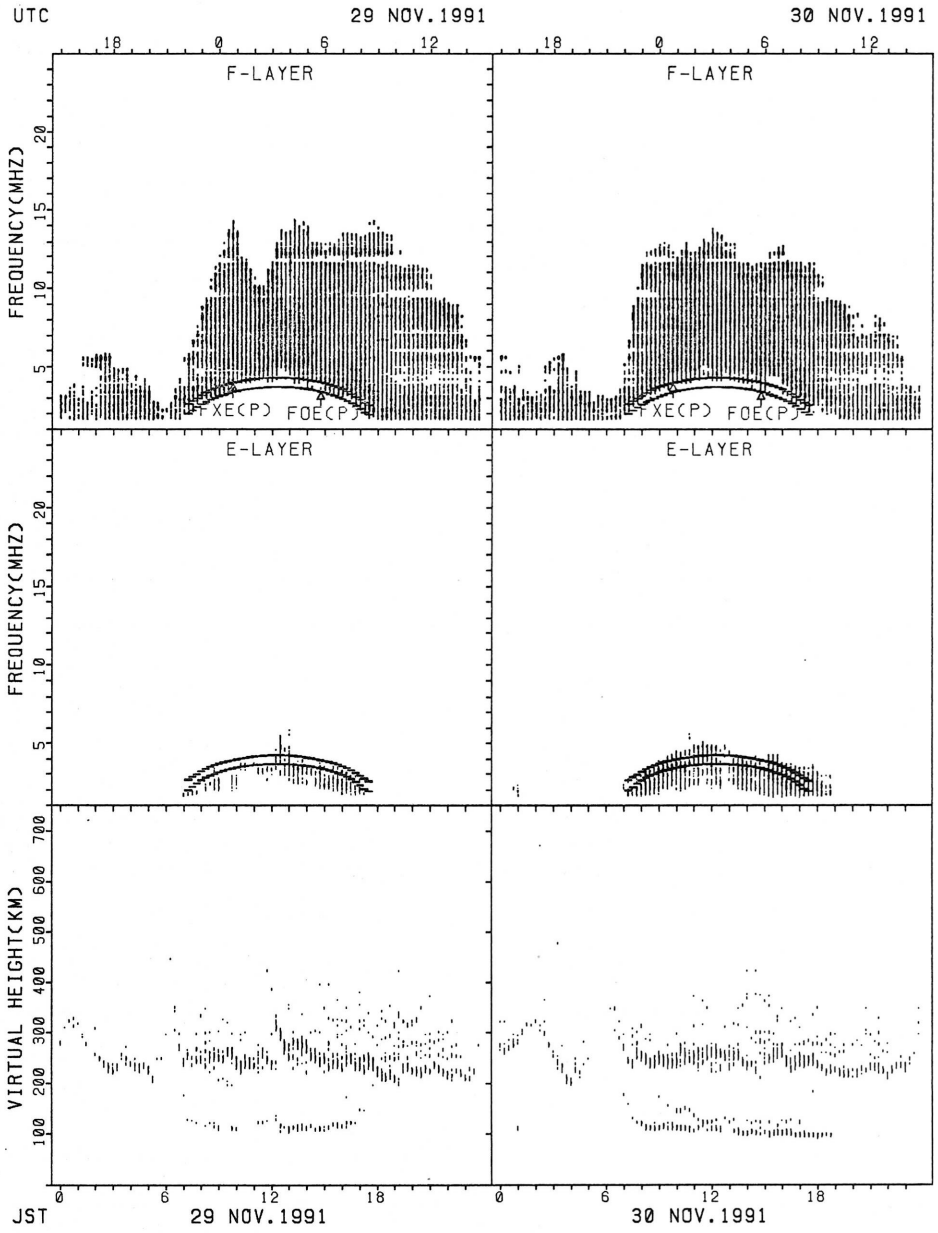
SUMMARY PLOTS AT OKINAWA



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


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

SUMMARY PLOTS AT OKINAWA



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

MONTHLY MEDIANS OF H'F AND H'ES

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

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								25	31	30	31	31	31	31	31	31	29	27	17					
MED								246	234	228	236	230	230	238	240	236	242	278	276					
U Q								270	244	236	250	240	242	246	250	246	249	304	295					
L Q								229	226	222	228	224	222	230	228	226	229	254	121					

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							11	11	12	11	12		11		10	15	14	16	16	13	15	11	11	14
MED							131	121	122	117	112		115		111	119	111	114	114	111	111	109	111	111
U Q							169	149	149	127	117		133		149	133	119	118	118	117	115	115	115	115
L Q							117	115	114	109	76		46		46	101	105	104	107	108	107	105	109	107

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								21	31	31	30	31	30	31	30	31	30	16	10					
MED								260	242	240	246	252	249	258	257	256	258	282	303					
U Q								275	260	246	252	266	258	276	270	272	268	297	332					
L Q								247	232	232	236	240	236	250	246	246	248	265	272					

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	11	10							14	16	21	18	15	12	12	13	10	13	16	14	10	14	12	13
MED	109	109							119	117	115	113	115	114	118	119	107	107	106	112	109	109	108	107
U Q	119	111							127	121	125	119	121	120	124	123	117	113	111	115	115	115	117	114
L Q	105	105							111	114	112	111	109	111	109	110	101	102	103	103	103	103	104	102

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								30	31	31	30	30	31	31	31	30	31	26	19	15				
MED								245	238	238	239	245	250	254	248	242	254	270	290	286				
U Q								260	244	244	252	260	266	272	252	256	262	296	312	350				
L Q								238	226	232	232	230	242	242	240	234	240	256	280	264				

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT		10	10					14	13	19	19	18	13	20	20	16	16	25	17	16	19		11	
MED		108	102					156	119	121	113	115	111	113	118	112	109	109	103	105	105		107	
U Q		111	105					167	126	125	119	121	118	126	125	123	121	122	108	109	119		113	
L Q		101	101					137	114	115	109	111	105	110	108	104	103	100	101	102	101		103	

MONTHLY MEDIANS OF H'F AND H'ES

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

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								23	30	31	31	31	23	30	31	31	31	31	30	26	26	17	14	
MED								268	237	238	240	244	242	268	256	244	244	252	256	285	284	272	311	
U Q								298	246	252	254	250	264	302	274	268	260	260	270	306	304	314	338	
L Q								256	228	230	230	238	234	252	246	240	236	242	246	266	262	250	282	

H'ES

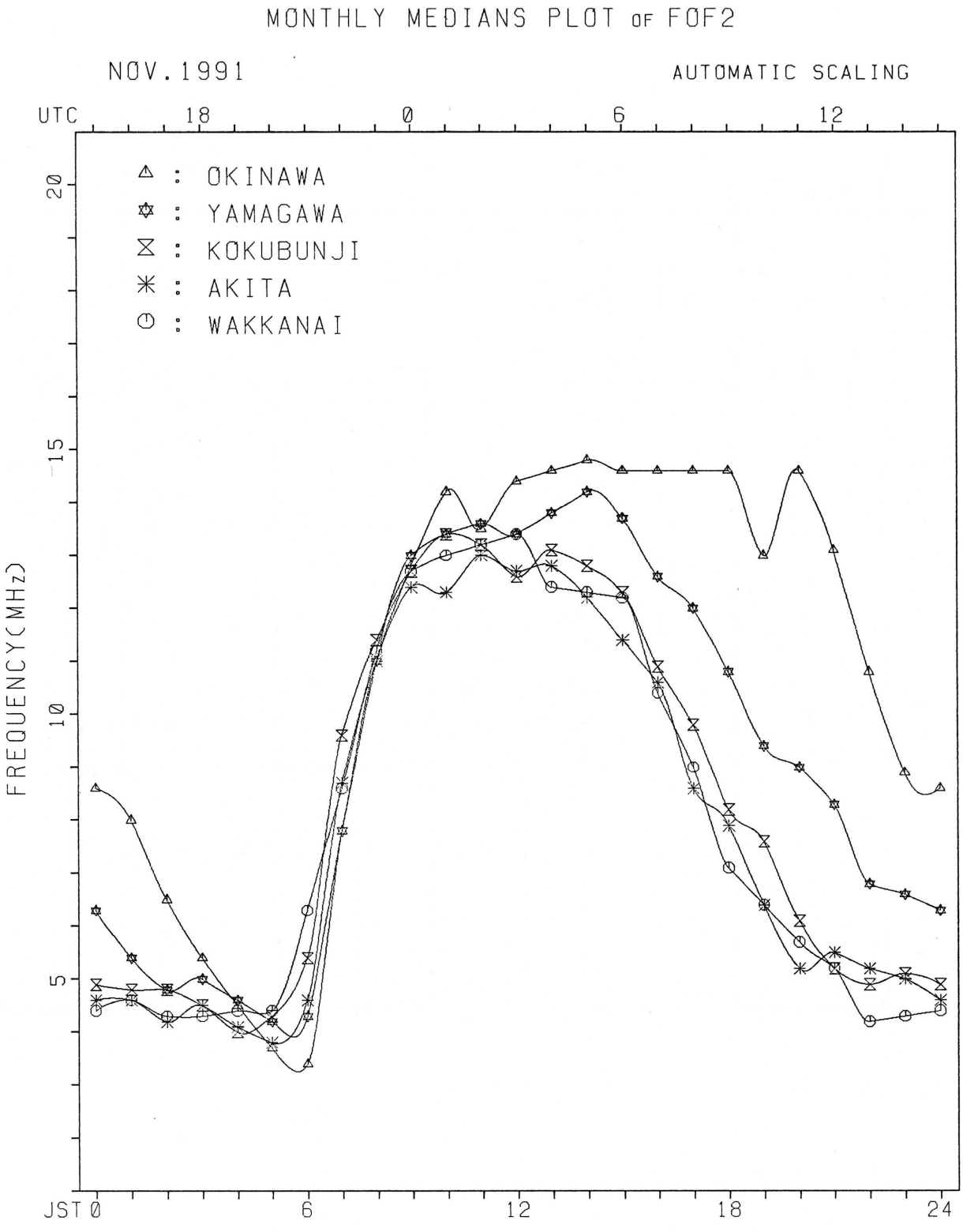
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								11		11	15	19	16	14	14	15	14	12	16	14		14	10	
MED								143		121	119	119	125	122	119	119	111	107	108	106		107	106	
U Q								159		123	123	125	130	131	127	131	133	115	136	113		113	111	
L Q								113		115	115	115	114	115	111	113	107	104	101	103		105	103	

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	20	13	11					17	30	31	31	28	16	21	31	31	31	31	31	30	30	29	26	17
MED	290	278	280					280	246	250	246	251	264	262	288	280	260	256	250	260	268	256	264	278
U Q	315	302	304					294	258	262	256	307	299	310	306	308	316	268	266	286	294	273	272	297
L Q	274	264	264					267	236	240	240	246	250	254	264	258	248	240	238	248	256	246	248	261

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT										17	18	16	17	18	15	18	17	16	16	12				
MED										125	125	124	123	125	119	117	113	113	110	113				
U Q										134	133	137	127	139	127	131	131	138	126	119				
L Q										120	123	119	119	121	113	111	111	108	104	103				


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

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	X 63	X 62	X 55	X 54	X 55	X 55													X 105	X 96	X 107	X 83	X 72	X 68
2	X 67	X 74	X 57	X 69	X 57	X 62													X 82	X 79	X 72	X 71	X 67	X 69
3	X 63	X 59	X 54	X 58	X 47	X 47													X 97	X 81	X 70	X 60	X 56	X 57
4	X 60	X 59	X 60	X 56	X 48	X 52													X 94	X 71	X 64	X 63	X 67	X 62
5	X 54	X 54	X 53	X 51	X 48	X 48													X 97	X 87	X 86	X 75	X 74	X 71
6	X 66	X 65	X 64	X 56	X 54	57													X 87	X 65	X 68	X 71	X 68	X 67
7	X 64	X 64	X 62	X 53	X 53	X 54													X 97	X 84	X 75	X 63	X 59	X 57
8	X 56	X 54	X 56	X 54	X 52	X 54													X 98	X 90	X 90	X 78	X 68	X 65
9	X 59	X 48	X 54	X 46	X 40	X 30													X 109	X 104	X 95	X 89	X 98	X 74
10	X 59	X 63	X 55	X 52	X 42	X 37													X 97	X 92	X 62	X 52	X 51	X 56
11	X 47	X 42	X 46	X 45	X 45	X 44												X 114	X 91	X 92	X 82	X 62	X 54	X 51
12	X 54	X 49	53	50	X 43	X 40												X 120	X 105	X 95	X 85	X 73	X 68	X 63
13	X 58	X 50	X 53	X 52	X 50	X 48												X 94	X 79	X 72	X 83	X 69	X 63	X 55
14	X 49	X 48	X 52	X 56	46	X 41												X 95	X 83	X 78	X 76	X 71	X 61	X 60
15	X 61	X 56	X 56	X 55	X 49	X 47												X 97	X 96	X 96	X 65	X 59	X 60	X 61
16	X 62	X 62	X 51	X 54	X 56	X 59												X 104	X 89	X 79	X 75	X 63	X 60	X 60
17	X 60	X 62	X 56	X 57	X 50	X 54												X 114	X 100	X 96	X 82	X 62	X 59	55
18	56	X 56	X 49	X 48	X 45	X 43												X 103	X 77	X 80	X 69	X 54	X 54	X 54
19	X 55	X 59	X 59	X 47	X 42	X 44												X 107	X 83	X 95	X 57	X 37	X 40	X 42
20	X 48	X 40	X 44	X 41	X 37	X 42												X 87	X 88	X 87	X 61	X 44	X 41	X 43
21	X 43	X 43	X 45	X 41	X 37	X 37												X 84	X 70	X 81	X 72	X 44	X 42	X 48
22	X 50	X 53	X 36	X 38	X 38	X 37	X 50											X 94	X 96	X 69	X 66	X 58	X 48	53
23	X 50	X 48	X 54	X 46	X 34	X 35	X 45											X 86	X 73	X 56	X 51	X 42	X 42	X 44
24	X 49	X 50	X 50	X 55	X 39	X 41	X 49											X 70	X 60	X 54	X 45	X 34	X 34	X 37
25	X 38	X 39	X 40	X 42	X 45	X 38	X 46											X 83	X 77	X 63	X 38	X 37	X 36	X 38
26	X 37	X 40	X 43	43	X 36	X 40	X 46											X 68	X 68	X 57	X 48	X 45	X 36	X 38
27	X 40	X 42	X 44	X 44	X 44	X 47	X 50											X 70	X 59	X 49	X 46	X 43	X 38	X 39
28	X 39	X 41	X 42	X 43	X 39	X 42	X 51											X 67	X 55	X 62	X 58	X 42	X 38	X 39
29	X 38	X 41	X 45	X 42	X 39	X 39	X 46											X 78	X 72	X 64	X 58	X 47	X 46	X 45
30	X 44	X 40	X 41	X 45	X 39	X 35	X 42											X 95	X 85	X 56	X 48	X 47	X 44	X 45
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	9											20	30	30	30	30	30	30
MED	X 54	X 52	X 53	X 50	X 45	X 44	X 46											X 94	X 88	X 80	X 68	X 60	X 55	X 55
U 0	X 60	X 59	X 56	X 55	X 50	X 52	X 50											X 104	X 97	X 92	X 82	X 71	X 67	X 62
L 0	X 47	X 42	X 45	X 44	X 39	X 39	X 46											X 80	X 77	X 64	X 58	X 44	X 42	X 44

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

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	57	56	49	48	49	49	64	95	144	144	150	151	139	137	133	132	127	115	99	90	R 101	77	66	62
2	61	68	50	63	51	56	64	83	98	97	105	107	98	105	114	108	95	84	76	73	66	65	61	63
3	57	53	47	52	H 42	41	61	99	119	129	147	145	147	149	134	121	116	100	91	75	64	54	50	52
4	54	V 53	54	50	43	46	63	109	116	121	130	125	126	128	127	118	115	109	88	65	58	57	61	56
5	48	48	47	45	42	42	56	92	127	127	107	124	131	137	133	124	111	108	91	81	80	69	68	65
6	60	59	58	50	48	F 48	71	100	107	126	138	138	135	143	135	130	115	104	81	59	62	65	62	61
7	58	58	56	47	47	48	62	95	108	125	132	134	136	143	138	128	120	112	91	78	69	57	53	51
8	50	48	V 50	48	46	48	69	100	118	123	134	140	145	148	141	136	126	118	92	84	84	72	62	59
9	53	42	48	H 40	34	24	50	S 100	97	124	96	128	127	118	128	122	126	122	104	98	89	84	92	68
10	54	57	49	46	36	32	53	118	140	139	141	142	143	145	136	121	117	106	91	86	56	45	45	50
11	41	36	40	39	39	38	51	91	112	137	136	145	146	141	138	127	124	108	85	86	76	56	48	45
12	48	43	F 43	F 42	37	34	48	96	112	134	117	122	130	141	133	126	123	114	98	89	79	67	62	57
13	52	44	47	46	44	42	57	92	117	127	130	126	123	118	115	114	105	88	73	66	77	63	57	48
14	43	42	46	50	38	35	50	97	134	138	141	133	134	130	122	125	107	89	77	72	70	65	55	54
15	55	50	50	49	43	41	52	102	118	112	136	130	126	139	134	116	102	91	90	90	59	53	54	55
16	56	56	H 45	48	50	53	62	110	130	140	138	119	R 113	127	122	106	110	97	83	73	69	57	54	54
17	54	56	49	51	44	48	62	95	114	137	144	141	128	130	131	141	123	108	94	90	76	56	53	F 47
18	F 46	50	43	42	39	37	42	98	142	R 150	R 159	R 152	R 149	142	143	134	118	97	71	74	63	48	48	48
19	48	53	53	41	36	38	45	107	127	147	U R 156	U R 158	143	136	126	122	107	101	77	89	51	31	34	36
20	42	34	38	35	31	36	48	84	120	150	148	138	126	131	137	136	101	81	82	81	55	38	35	37
21	37	37	39	35	31	31	42	98	J R 99	Z 105	135	128	140	130	114	105	102	78	64	75	66	38	36	42
22	44	47	30	32	32	31	44	69	119	134	129	140	138	139	143	127	108	88	90	63	60	52	42	F 46
23	44	42	48	40	28	V 29	39	78	103	133	125	137	128	130	123	104	97	80	67	50	45	36	36	38
24	43	44	44	49	33	35	43	88	108	125	133	126	119	130	131	126	106	64	54	48	39	H 28	28	31
25	32	33	34	36	39	32	40	80	89	101	121	129	121	107	103	101	82	78	71	57	32	31	30	32
26	31	34	37	F 35	31	34	40	79	H 95	H 95	112	119	107	104	124	104	85	62	62	51	42	39	30	32
27	34	36	38	S 38	38	41	44	77	98	104	104	H 106	111	111	101	99	86	64	53	43	40	H 37	32	33
28	33	35	36	37	33	36	45	75	89	101	117	116	109	107	111	109	98	61	49	56	53	36	32	33
29	33	35	39	36	33	33	40	76	98	108	123	114	122	116	120	117	97	72	66	58	52	41	40	39
30	38	34	36	39	33	29	36	73	99	106	123	135	114	98	C	C	C	89	78	H 50	42	41	38	39
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	29	29	30	30	30	30	30	30	30
MED	48	46	46	44	38	38	50	95	113	126	132	132	128	130	131	122	108	94	82	74	62	54	49	48
U Q	54	53	49	49	44	46	62	100	120	137	141	140	139	141	136	128	119	108	91	86	76	65	61	56
L Q	41	36	39	38	33	33	43	80	99	108	121	124	121	118	121	108	100	80	71	58	52	38	36	38

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

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

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							B	255	315	345	R 370	365	365	A 350	340	A	210	B						
2					J K 140	J K 125	B	240	300	345	365	A 380	A	370	340	315	B	B						
3						J K 140	B	235	305	340	365	370	365	360	340	285	A	B						
4							B	H 250	305	335	A 350	370	365	350	345	A 305	A	B						
5							B	250	305	A	A	A	360	345	335	290	A	A						
6							B	225	300	340	A 355	360	R	A	U R 340	290	205	B						
7							A	230	A 300	B	365	A	A	U A 360	A	300	225	B						
8							B	220	320	A	A	A	360	350	330	A	235	B						
9						K 160	B	A	A 270	305		A	A	350	A	A 275	A 210	B						
10							K 170	240	300	335	350	370	345	350	330	A 275	A	B						
11							B	215	295	A 330	355	360	370	355		A	A 210							
12							B	220	300	320	335	U A 325	360	340	325	290	205							
13							B	215	285	325	340	A	350	345	320	285	220							
14							B	205	285	315	320	350	350	A	325	280	200							
15							B	210	280	325	R 350	355	350	340	325	285	205							
16							B	H 220	270	320	340	A	A	A	315	275	H 210							
17							B	215	H 295	330	345	B	330	A	320	A	A							
18		J K 130					B	215	A 275	320	A	A	A	A	320	265	205							
19							B	H 220	270	A	A	A	A	A	305	A	A							
20							B	215	275	310	350	355	A	A	A	A	200							
21							B	205	270	A 310	335	350	A	A	A	A	A							
22							J K 145	H 200	275	305	A	A	A	A	295	260	H 205							
23								180	265	300	320	335	A	A	315	275	200							
24								205	250	295	320	345	340	330	305	A 255	A							
25								190	260	295	320	345	340	325	300	255	190							
26								185	A 255	300	320	340	A	335	A	A	A							
27								185	295	A	340	A 340	340	A	315	255	185							
28								190	270	305	320	A 335	330	320	305	270	A							
29								170	A	A	A	335	335	A	305	255	195							
30								185	270	305	340	345	340	330	C	C	C							
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		1			1	3	2	29	29	24	23	20	19	17	23	21	18							
MED		J K 130			J K 140	J K 140	K 158	215	285	320	340	350	350	345	320	275	205							
U Q						K 160		228	300	332	355	362	360	352	335	290	210							
L Q						J K 125		195	270	305	320	340	340	332	305	262	200							

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 15	E B 14	E B 14	E B 13	E B 14	E B 15	E B 17	G	J A 51	G 24	G	40	39	37	G	30	26	19	E B 15	21	E B 14	E B 15	E B 16	E B 16
2	19	E B 13	E B 13	E B 15	J K 14	J K 13	18	J A 43	34	J A 70	45	J A 59	J A 50	G 37	G	G	E B 29	E B 15	E B 17	J A 50	J A 36	E B 14	E B 15	E B 15
3	E B 14	E B 14	E B 14	E B 14	E B 13	K 15	J A 30	29	38	J A 51	39	G	G	G 35	G	32	J A 35	J A 30	J A 23	E B 14	J A 22	E B 15	J A 20	J A 21
4	E B 13	J A 31	J A 37	J A 19	E B 13	20	E B 16	G 20	33	G 26	J A 40	42	G 30	41	41	37	24	E B 16	E B 17	E B 15	23	E B 15	E B 15	E B 14
5	J A 22	J A 22	J A 22	J A 21	E B 14	E B 14	E B 16	27	G 28	36	J A 47	J A 51	G 33	G 30	J A 40	32	32	J A 47	J A 27	J A 24	23	E B 16	18	J A 26
6	E B 14	E B 15	E B 15	E B 14	E B 14	E B 13	E B 15	G	33	39	38	G 35	G 36	38	G	33	23	J A 18	E B 15	E B 16	E B 17	E B 14	E B 14	E B 15
7	E B 15	E B 14	E B 13	E B 15	E B 15	E B 14	J A 35	28	32	41	39	38	J A 41	J A 42	35	G	G	E B 15	J A 24	J A 39	J A 23	J A 28	J A 41	18
8	E B 14	E B 15	22	E B 16	22	E B 15	E B 16	25	J A 48	J A 51	J A 69	J A 55	G 32	J A 39	35	30	24	J A 33	J A 26	J A 26	J A 22	21	21	E B 14
9	18	E B 15	E B 14	E B 14	E B 15	G 15	20	J A 30	32	36	37	35	G 34	39	33	30	25	J A 22	J A 33	J A 30	J A 27	E B 14	E B 14	23
10	E B 14	E B 15	J A 14	E B 14	E B 13	E B 14	K 17	28	32	38	39	42	41	49	J A 48	J A 46	29	36	J A 50	J A 25	J A 19	E B 15	J A 21	J A 25
11	J A 24	J A 16	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	J A 42	G	G	J A 44	J A 44	J A 34	J A 40	J A 23	J A 26	24	41	J A 45	E B 14	E B 15	E B 14
12	E B 14	E B 13	E B 13	E B 13	E B 14	E B 14	E B 14	25	G	J A 47	38	J A 44	G 35	G	G	G	26	J A 21	J A 21	J A 35	E B 13	E B 14	E B 14	E B 14
13	E B 14	E B 13	E B 14	E B 14	E B 15	J A 18	J A 18	26	G	38	J A 40	41	G 33	G 30	G	G 25	G	J A 23	E B 15	E B 14	J A 17	E B 14	E B 14	E B 14
14	E B 14	20	E B 14	E B 14	E B 14	E B 13	E B 14	G	31	36	34	36	J A 34	J A 48	J A 35	G 20	23	J A 28	E B 15	E B 15	E B 13	E B 15	E B 15	E B 16
15	E B 14	E B 14	E B 14	E B 14	E B 13	E B 13	E B 13	G	G	J A 42	G	J A 50	G	G 20	G 20	31	G	E B 13	E B 13	E B 14	E B 14	J A 19	E B 14	21
16	E B 14	J A 21	J A 16	E B 13	E B 14	E B 14	J A 14	G	30	36	38	J A 42	J A 48	37	G	G 25	G	J A 17	E B 15	E B 14	J A 26	14	E B 14	E B 13
17	E B 14	E B 13	E B 14	E B 13	E B 13	E B 15	E B 13	G	G	G	J A 51	40	36	J A 43	G	J A 30	J A 32	J A 36	J A 51	22	J A 21	J A 24	J A 29	J A 27
18	24	17	J A 25	J A 23	24	J A 19	J A 19	G	J A 41	J A 43	60	107	J A 76	J A 62	G 31	J A 55	G	J A 25	J A 20	E B 14	E B 13	E B 14	E B 14	E B 15
19	E B 14	21	J A 22	J A 19	J A 25	21	E B 15	J A 23	G	J A 43	J A 101	J A 51	J A 54	J A 44	32	J A 34	J A 50	J A 25	J A 33	J A 29	J A 27	J A 21	22	E B 13
20	J A 20	E B 14	20	E B 13	J A 14	J A 19	E B 14	G	32	35	J A 42	J A 49	J A 56	J A 66	J A 38	J A 33	G 19	J A 25	J A 32	J A 24	J A 21	J A 14	E B 13	19
21	E B 15	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14	G	G	J A 42	36	G	40	J A 39	J A 44	J A 34	J A 28	J A 22	50	J A 34	E B 14	21	20	E B 14
22	E B 14	E B 13	J A 13	J A 20	E B 14	E B 15	J K 15	24	31	G	J A 53	51	J A 68	J A 49	J A 36	G	G	J A 34	J A 22	J A 32	J A 23	J A 25	J A 31	20
23	J A 21	J A 25	22	E B 15	E B 14	E B 14	19	19	G	G	35	36	J A 37	43	39	J A 35	25	J A 54	J A 28	19	E B 13	J A 14	J A 33	J A 22
24	J A 22	J A 25	J A 28	J A 19	J A 23	J A 52	J A 37	G 19	G 20	G	G 24	39	39	39	36	57	J A 36	J A 34	J A 44	J A 36	J A 22	20	E B 15	E B 15
25	E B 15	E B 13	J A 24	J A 19	19	E B 13	E B 13	20	29	J A 34	35	37	37	G 21	G	G	G	J A 34	J A 41	J A 22	J A 78	J A 47	J A 46	J A 27
26	J A 18	J A 36	J A 21	E B 13	E B 14	E B 14	E B 14	G	30	G	36	G	35	36	J A 39	J A 50	J A 30	J A 17	E B 14	E B 14	J A 17	J A 22	J A 22	J A 22
27	J A 28	J A 26	21	J A 20	J A 23	J A 27	E B 14	G	G	J A 47	J A 42	J A 39	39	J A 53	42	36	25	J A 27	E B 14	E B 14	E B 13	J A 18	20	E B 15
28	E B 13	E B 14	E B 14	E B 14	E B 15	E B 14	E B 14	G	G	J A 39	J A 36	J A 36	39	36	36	J A 41	J A 34	32	E B 14	22	J A 25	J A 27	J A 21	20
29	J A 16	J A 18	E B 13	J A 17	E B 14	E B 14	E B 13	18	27	32	33	37	38	37	G 23	G 18	G 17	J A 21	E B 14	E B 14	E B 14	E B 16	E B 14	E B 14
30	E B 13	E B 14	E B 14	E B 13	E B 13	E B 14	E B 14	G	G 20	G	G	37	36	G 23	C	C	C	J A 21	22	E B 13	E B 14	E B 14	23	22
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	29	29	30	30	30	30	30	30	30
MED	E B 14	E B 15	E B 14	E B 14	E B 14	E B 14	E B 15	G	30	37	38	40	38	39	34	32	24	J A 25	22	22	J A 21	15	17	E B 16
U Q	J A 19	J A 21	J A 22	J A 19	15	J A 15	J A 18	25	32	J A 42	J A 42	J A 49	J A 41	J A 44	J A 38	J A 36	J A 30	J A 33	J A 32	J A 30	J A 23	J A 21	J A 22	J A 22
L Q	E B 14	E B 14	E B 14	E B 13	E B 14	E B 14	E B 14	G	G	G	G 35	G 36	G 35	G 36	G	G	G	19	E B 15	E B 14	E B 14	E B 14	E B 14	E B 14

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

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

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

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

NOV. 1991 FMIN (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	265	290	260	265	250	255	295	310	320	300	295	290	275	280	275	285	285	290	290	275	R 295	255	245	235
2	230	265	215	270	220	215	275	330	285	290	280	275	290	275	285	310	320	305	290	295	300	285	270	285
3	290	285	260	280	H 270	275	305	330	335	300	315	290	290	295	295	300	305	300	300	300	290	295	250	255
4	285	V 260	295	310	240	265	310	335	330	310	320	290	285	295	290	290	295	300	300	310	285	275	290	290
5	270	280	275	265	255	285	275	340	320	320	300	285	275	285	280	290	285	290	295	280	295	285	285	290
6	280	280	290	300	250	F 255	305	325	325	310	300	295	285	285	290	295	295	300	300	275	270	280	285	285
7	275	290	300	265	255	260	325	335	320	320	310	295	285	285	295	285	290	305	290	295	310	290	275	275
8	270	260	V 260	280	265	270	315	340	340	310	300	280	275	290	285	290	290	300	285	290	290	295	270	270
9	275	210	235	H 315	320	295	270	S 320	300	310	260	270	265	260	270	260	275	285	265	285	285	280	285	280
10	235	275	250	255	230	225	260	315	325	310	300	290	290	285	290	290	300	300	300	325	290	280	280	305
11	325	265	270	275	265	290	305	335	325	310	305	295	305	295	295	295	300	295	285	310	310	295	270	275
12	255	270	F 275	F 280	285	280	285	345	315	315	315	300	285	290	290	290	290	300	305	315	295	300	290	295
13	295	280	285	290	310	270	300	345	340	320	325	300	300	295	290	305	310	300	305	275	315	315	310	320
14	255	240	265	315	290	280	280	320	320	315	315	300	295	290	290	305	305	295	295	285	305	295	270	280
15	285	285	280	290	295	270	280	330	335	310	310	295	285	290	305	305	300	290	290	325	295	250	245	250
16	265	280	H 235	255	255	270	295	330	315	320	315	315	R 305	285	300	290	295	300	305	295	295	270	250	250
17	250	260	270	285	250	265	320	340	315	310	310	310	275	290	280	305	305	300	300	315	310	280	280	F 235
18	F 245	275	260	265	245	235	240	305	320	R 320	R 320	R 310	R 300	290	295	310	305	320	305	300	310	260	240	245
19	255	285	320	280	240	240	270	325	315	310	U R 320	U R 320	310	305	305	310	310	305	295	330	315	265	255	265
20	280	270	275	255	295	245	295	290	305	320	315	310	300	300	295	320	320	295	305	330	340	290	285	275
21	280	275	295	310	255	255	295	340	J R 345	Z 300	325	315	310	325	325	315	315	305	285	305	325	310	225	260
22	280	325	250	250	250	235	280	310	310	325	300	300	290	290	310	300	320	300	325	305	285	300	255	F 275
23	305	270	320	310	330	V 275	295	345	325	335	320	325	315	310	325	300	330	330	320	325	295	275	260	240
24	265	290	300	340	280	280	290	330	325	330	330	325	305	310	305	330	335	330	320	325	325	H 285	270	265
25	270	260	255	295	335	285	280	330	340	320	335	325	320	325	310	325	320	305	325	340	300	295	265	260
26	275	260	280	F 270	275	270	305	350	H 335	H 330	325	320	330	305	335	335	335	330	310	340	295	325	270	280
27	255	265	275	S 285	285	300	305	335	350	345	330	H 310	315	330	325	335	335	330	325	325	300	H 250	285	265
28	260	270	275	280	290	285	300	340	350	340	325	330	315	315	320	310	340	335	305	315	315	300	265	260
29	255	260	305	305	320	285	295	330	335	315	320	315	310	300	310	315	320	310	310	295	300	280	280	295
30	310	270	270	300	325	280	290	330	340	330	320	325	310	325	C	C	C	310	340	H 315	285	295	285	265
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	29	29	30	30	30	30	30	30	30
MED	270	270	275	280	268	270	295	330	325	315	315	300	298	292	295	305	305	300	300	308	298	285	270	272
U Q	280	280	290	300	295	280	305	340	335	320	320	315	310	305	310	312	320	310	310	325	310	295	285	285
L Q	255	260	260	265	250	255	280	325	315	310	300	290	285	285	290	290	295	300	290	295	290	275	255	260

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

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

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									250				320	L 320	305									
2									325			L 350	270	L 310	255									
3										L 295	260	300	300		L 300									
4												L 300	L 315			L 300								
5												L 305	280		285									
6												255	L 320	310										
7												280												
8										L 265	265	320	315	275	300									
9											H 245	L 305	L 330		L 320									
10										265			290	305										
11												L 275												
12										255		265	L 315	265	280									
13										255					L	260								
14									250		235	L 295	305		L 290									
15										285	260		325	L 300										
16											235	230	L 300			L 300								
17										250				310	310									
18														L 300										
19												255	250											
20									275				U L 300											
21										295	265	240	250											
22												270		L 300	250									
23												260	245	285										
24										250	245	250		260										
25										255		255	255	250										
26										220	235	225	255		255									
27											250		270											
28											255	245		255	250									
29										210	225		280											
30										240	260	255	270		C	C	C							
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									4	13	13	21	22	14	12	3								
MED									262	255	250	265	295	300	288	L 300								
U Q									300	275	260	L 300	L 315	310	302	L 300								
L Q									250	245	235	252	270	265	255	260								

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

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	280	265	280	280	335	335	275	235	240	225	240	H 230	H 210	230	235	250	235	230	235	260	245	240	325	395
2	365	315	270	235	455	385	310	240	240	A 265	245	A 245	240	240	230	225	230	220	230	255	240	265	275	270
3	245	270	285	280	210	305	255	225	225	215	225	220	230	240	225	225	225	220	245	230	240	235	320	340
4	285	325	290	245	H 250	320	270	230	225	230	230	H 230	H 215	240	245	230	235	225	220	220	245	285	270	250
5	270	285	295	315	240	280	300	235	235	235	A 230	230	240	240	230	240	240	250	240	260	255	245	270	275
6	260	270	270	225	335	345	260	215	220	235	235	210	H 220	240	245	235	220	230	215	255	310	280	260	265
7	285	270	250	265	330	310	A 245	230	230	240	230	230	240	245	240	240	230	230	235	255	250	260	A 300	285
8	300	305	335	285	290	305	255	225	220	220	225	230	235	235	235	240	230	230	250	275	260	235	270	280
9	275	505	390	205	270	285	295	240	250	245	230	245	235	260	245	245	255	225	265	220	260	225	260	295
10	305	285	280	255	410	430	320	245	220	225	230	230	225	240	240	220	240	240	250	230	240	260	320	275
11	245	315	310	310	295	255	H 230	220	225	230	230	H 200	240	230	H 215	230	230	215	225	A 255	240	230	255	305
12	320	315	285	290	230	295	280	235	225	H 220	220	230	220	235	230	230	230	230	230	A 245	220	240	255	255
13	250	265	285	280	235	285	255	225	225	220	230	225	H 220	225	220	H 230	225	210	235	275	250	225	255	235
14	275	390	330	235	245	270	285	240	230	225	220	225	210	230	230	240	220	230	235	255	230	250	265	275
15	265	270	285	275	240	280	290	240	220	220	235	H 225	230	230	245	230	230	240	255	235	210	310	350	315
16	290	285	250	330	340	305	285	245	225	240	230	220	220	240	235	225	235	230	225	240	250	265	315	340
17	255	310	260	280	305	330	250	225	245	240	240	240	H 220	230	230	245	225	240	A 265	230	240	230	290	A 380
18	370	285	300	315	410	380	350	250	235	235	245	240	230	A 240	230	230	215	215	230	260	230	225	350	350
19	330	285	235	265	335	400	320	235	220	240	240	220	225	225	220	225	220	240	245	230	210	A 270	335	370
20	305	265	330	340	270	380	285	250	240	235	225	230	220	250	235	235	210	205	255	230	220	225	280	310
21	290	310	275	250	285	350	270	230	215	215	230	230	225	235	240	225	215	205	A 305	255	220	265	395	330
22	295	245	300	375	395	415	270	240	245	230	235	A 250	250	H 225	230	210	215	240	230	250	270	210	A 380	290
23	260	310	255	240	230	330	285	225	225	H 210	230	235	225	230	230	210	225	230	250	220	250	280	380	A 395
24	330	280	290	250	240	305	A 300	240	220	220	H 205	230	225	235	230	A 240	220	205	240	245	230	235	310	340
25	350	355	360	290	235	270	240	235	210	220	230	225	230	220	230	220	215	225	240	230	250	275	A 370	A 360
26	340	360	305	315	260	315	260	220	220	205	200	210	210	235	A 235	225	210	H 235	230	215	245	245	290	315
27	350	360	320	320	270	280	240	220	210	230	235	235	220	260	245	230	215	215	230	220	210	H 205	300	330
28	370	335	305	300	270	305	245	220	215	230	220	225	230	235	235	230	215	H 195	235	250	230	250	310	340
29	370	350	265	250	250	275	270	230	230	220	205	240	235	230	240	230	220	205	235	215	245	265	260	280
30	270	325	355	285	H 210	290	270	225	230	220	230	235	H 215	220	C	C	C	245	215	H 200	260	245	270	315
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	29	29	30	30	30	30	30	30	30
MED	290	308	288	280	270	305	270	232	225	228	230	230	225	235	235	230	225	230	235	242	242	245	295	312
U Q	330	325	310	310	335	345	290	240	235	235	235	235	235	240	240	240	230	235	250	255	250	265	325	340
L Q	270	270	270	250	240	285	255	225	220	220	225	225	220	230	230	225	215	215	230	230	230	230	270	275

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

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		A	A	B					A	A	B						
								130	120	120	130	120	130	120	120		115							
2					B	B	B					B	A	A			B	B						
								130	120	120	125	125		135	120	115								
3						B	B	A		A	E A					A	A	B						
								130	110	115	140	110	115	115	115	120								
4							B	E A		A	A	A	A	A			A	B						
								140	110	120		125	125	120	120	115								
5							B	A	E A	A	A	A	A	A	A	E A	A	A						
								125	135				125	120	125	135								
6							B				A	A	A		B		A	B						
								125	120	120		130		120	130	120								
7							A	A	A	B								B						
								135			120	125	120	120	120	120	130							
8							B		A	A	A	A	A	A	A	A		B						
								125					125	130	125		120							
9						K	B						E A		A	A	A	B						
						160		120	115	115	110	110	135	120										
10																	A	B						
							175	120	120	115	110	120	115	115	115	125								
11							B						A	A	A	A	A							
								120	115	115	120	115	120	130										
12							B						A				A							
								135	120	115	115	115	130	115	115	115								
13							B	A					A	A		A								
								125	115	110	110	110	130	125	110	130	135							
14							B					A	A	A	A		E A							
								125	115	115	115		125		125	120	155							
15							B																	
								120	115	115	120	115	115	115	120	120	130							
16							B									A								
								125	120	115	115	115	115	115	115	125	120							
17							B					B		A		A	A							
								135	120	115	115		120		115									
18		B					B					A		A		A								
								125	120	120	115		110		120	130	120							
19							B						A	A	A	A	A							
								130	115	110	110	110			120									
20							B				B		A	A	A	A	E A							
								130	120	110	135	115					150							
21							B								A	A	A							
								125	115	115	110	115	115	115										
22							B				A	A	A	A	A									
								130	110	115					130	115	110							
23								A			A	A	A	A	E A	A	E A							
								135	120	115	115	120			140	125	160							
24								B	A		A	A		A			A							
								155	120	110	120	120	115	115	115	120								
25								A	A	A	A													
								130	130	130	130	110	120	120	110	115	140							
26															A	A	A							
								130	120	115	110	110	115	110										
27											A	A		A										
								130	120	115	140		110		115	120	130							
28										A	A	A				A	A							
								130	110	120	120		110	110	110	120								
29								A	A	A	A	A		A	A	A	A							
												130	120		120	115	135							
30												A	A		C	C	C							
								135	120	110	110	120	120	110										
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						1	1	29	27	26	24	22	24	21	24	20	14							
MED						K 160	175	130	120	115	115	115	120	120	120	120	125							
U Q								132	A 120	A 120	A 122	A 120	A 125	A 120	A 122	A 125	E A 140							
L Q								125	115	115	110	110	115	115	115	115	120							

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	B	B	B	B	B	B	B	G	100	100	G	135	135	130	G	115	110	110	B	100	B	B	B	B
2	110	B	B	B	B	B	155	130	135	120	125	115	120	120	G	G	B	B	B	105	105	B	B	B
3	B	B	B	B	B	B	110	160	130	130	110	G	G	110	G	E G 165	110	140	125	B	110	B	105	105
4	B	100	100	105	B	105	B	110	170	110	105	130	110	150	135	120	120	B	B	B	120	B	B	B
5	105	100	100	100	B	B	B	165	120	115	110	110	110	110	145	150	125	100	100	95	105	B	105	115
6	B	B	B	B	B	B	B	G	155	150	E G 155	120	120	120	G	145	160	100	B	B	B	B	B	B
7	B	B	B	B	B	B	110	160	170	140	140	130	120	130	120	G	G	B	110	110	110	110	105	100
8	B	B	100	B	105	B	B	170	115	115	120	110	115	110	110	105	100	100	100	95	100	95	100	B
9	100	B	B	B	B	K 160	135	120	120	115	115	120	115	115	120	155	140	115	105	105	105	B	B	115
10	B	B	110	B	B	B	K 170	170	170	150	150	130	130	135	120	120	115	110	115	110	110	B	110	100
11	100	110	B	B	B	B	B	G	G	125	G	G	105	115	100	105	105	110	100	105	105	B	B	B
12	B	B	B	B	B	B	B	160	G	130	125	120	115	G	G	G	150	100	145	110	B	B	B	B
13	B	B	B	B	B	110	110	E G 200	G	150	120	110	115	110	G	110	G	105	B	B	105	B	B	B
14	B	105	B	B	B	B	B	G	150	125	130	115	110	105	110	110	110	110	B	B	B	B	B	B
15	B	B	B	B	B	B	B	G	G	120	G	105	G	110	100	160	G	B	B	B	B	110	B	110
16	B	115	110	B	B	B	B	G	145	130	130	120	120	120	G	110	G	110	B	B	120	105	B	B
17	B	B	B	B	B	B	B	G	G	G	125	125	120	120	G	110	110	105	105	110	105	105	105	105
18	105	110	110	105	105	110	115	G	120	120	110	110	110	105	115	105	G	135	110	B	B	B	B	B
19	B	110	100	105	105	110	B	110	G	120	110	120	105	110	110	105	105	105	105	100	100	95	100	B
20	120	B	160	B	110	110	B	G	130	135	125	120	110	110	115	115	110	110	105	105	105	105	B	100
21	B	B	B	B	B	B	B	G	G	120	E G 200	G	110	115	110	110	105	105	105	105	B	120	120	B
22	B	B	125	120	B	B	B	185	145	G	100	105	100	100	105	G	G	100	110	105	140	105	120	100
23	115	100	105	B	B	B	110	105	G	G	170	165	105	130	130	105	110	105	105	105	B	110	115	120
24	120	110	120	110	110	110	105	120	110	G	105	E G 190	185	150	140	110	110	115	120	110	110	100	B	B
25	B	B	115	110	110	B	B	120	140	110	E G 195	E G 185	E G 205	110	G	G	G	110	110	105	110	110	110	110
26	110	110	105	B	B	B	B	G	125	G	130	G	125	E G 185	130	105	110	120	B	B	125	110	115	115
27	110	110	110	110	110	105	B	G	G	115	115	115	E G 195	135	135	140	125	120	B	B	B	110	110	B
28	B	B	B	B	B	B	B	G	G	125	120	105	185	E G 170	150	125	130	125	B	115	110	105	105	105
29	110	105	B	105	B	B	B	120	115	115	110	E G 195	E G 200	110	110	110	110	105	B	B	B	150	B	B
30	B	B	B	B	B	B	B	G	110	G	G	150	135	105	C	C	C	115	115	B	B	B	110	105
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	11	12	14	9	7	8	9	16	20	24	26	26	28	29	20	24	21	26	18	18	19	16	15	14
MED	110	110	110	105	110	110	110	135	130	120	120	119	116	112	118	110	110	110	108	105	110	108	110	105
U Q	115	110	115	110	110	110	145	168	148	130	130	130	132	130	132	132	125	115	115	110	110	110	115	115
L Q	105	102	100	105	105	108	110	120	118	115	110	110	110	110	110	108	110	105	105	105	105	105	105	100

NOV. 1991 H'ES (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

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

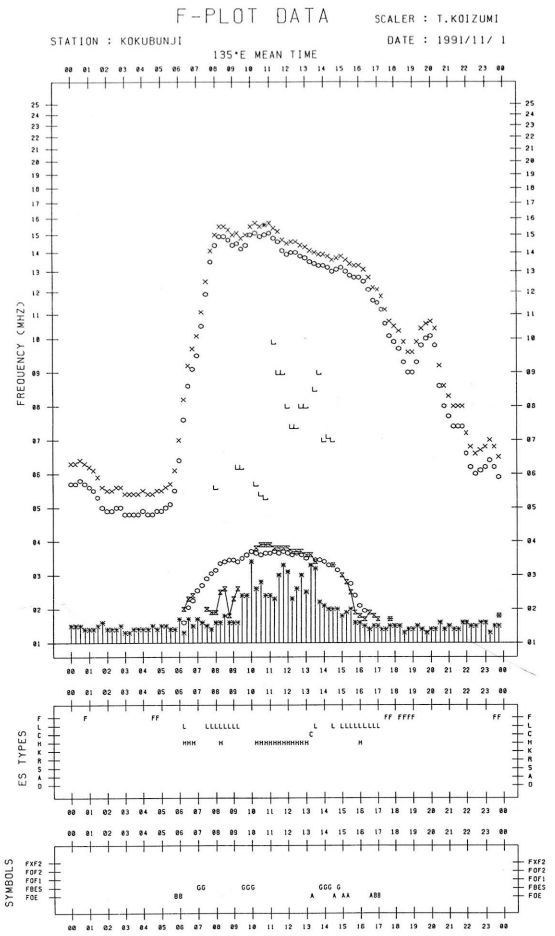
LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									L 1	L 1		H 1	H 1	H 1		L 1	LH 11	L 1		F 1				
2	F 1				K 1	K 1	H 1	C 3	H 2	C 3	C 1	C 2	C 1	L 1						F 4	F 2			
3						K 1	LH 11	HL 21	HL 11	HL 21	L 2			L 1		HL 11	C 2	HL 11	FF 11		F 1		F 1	F 2
4		F 3	F 2	FR 11		F 1		L 2	H 1	L 1	LH 21	HL 11	L 1	HL 11	H 2	C 2	C 1				F 1			
5	F 1	F 2	F 2	F 1				HL 11	L 1	L 1	L 2	L 2	L 1	L 1	HL 11	HL 11	CL 12	L 2	F 2	F 2	F 1		F 1	F 1
6									H 1	H 1	HL 11	L 1	L 1	C 1		H 1	HCL 11	L 2						
7							L 3	HL 22	HL 11	H 1	H 1	C 1	L 2	C 1	C 1				F 3	F 2	F 3	F 2	F 4	F 1
8			F 1		F 1			H 1	L 2	L 1	CL 11	L 2	L 1	L 1	L 1	L 2	L 2	L 2	F 2	F 3	F 2	F 2	F 1	
9	F 1					K 1	C 2	C 3	C 1	C 2	C 1	C 1	L 1	C 2	L 2	HL 12	HL 12	CL 21	F 2	F 2	F 3			F 1
10			F 1				K 1	H 1		H 1	H 1	C 1	C 1	H 2	C 2	C 2	C 2	C 5	F 2	F 3	F 1		F 1	F 3
11	F 2	F 1								C 1			L 1	LL 12	L 2	CL 22	L 1	FF 12	F 1	F 3	F 3			
12								H 2		H 1	C 1	C 1	L 1				HL 21	F 1	F 1	F 3				
13						F 1	L 1	HL 11		H 1	C 1	C 2	L 1	L 1		L 1		F 1			F 1			
14		F 1							H 1	H 1	H 1	L 1	L 1	L 2	L 1	L 1	L 1	F 1						
15										L 1		L 1		L 1	L 1	H 1						F 1		F 1
16		F 2	F 2				H 1		H 1	H 1	H 1	C 1	C 1	C 1		L 1		F 1			FF 11	F 1		
17											C 2	C 1	C 1	L 1		L 2	L 3	F 6	F 4	F 1	F 2	F 2	F 4	F 3
18	F 2	LK 11	F 2	F 2	F 2	F 1	L 1		C 2	C 2	C 2	C 3	C 3	C 3	L 1	L 2		F 1	F 1					
19		F 1	F 2	F 1	F 1	F 1		L 1		C 1	C 2	C 1	C 2	C 1	L 2	L 3	L 2	L 2	F 3	F 3	F 3	F 2	F 2	
20	F 1		FF 11		F 1	F 3			HL 11	H 1	H 1	C 1	C 2	C 2	C 2	C 3	L 1	F 1	F 3	F 4	F 2	F 1		F 1
21										C 1	H 1		C 1	C 2	CL 31	C 3	L 3	F 3	F 4	F 3		F 1	F 1	
22			F 1	F 1			K 1	H 1	H 1		L 3	L 3	L 4	L 2	L 1			F 2	F 2	F 4	FF 12	F 4	FF 52	F 2
23	FF 11	F 2	F 1				F 1	L 1			HL 11	HL 11	L 2	HL 23	HL 23	L 2	L 2	F 3	F 3	F 1		F 1	FF 31	F 2
24	F 2	F 2	F 2	F 2	F 2	F 2	F 3	L 1	L 1		L 1	HL 12	H 1	HL 11	H 2	C 4	C 3	F 1	FF 22	F 2	F 2	F 1		
25			FF 11	F 1	F 1			L 2	LH 21	L 2	HL 12	H 1	H 1	L 1				FF 11	F 3	F 2	F 2	F 2	F 3	F 2
26	F 1	F 3	F 1						C 2		H 2		C 1	H 1	HL 13	L 4	L 3	F 1			F 1	F 2	F 1	F 1
27	F 3	F 2	F 1	F 1	F 2	F 2				C 2	LL 11	LH 11	H 1	HL 11	H 2	H 3	C 3	F 6				F 1	F 1	
28										CL 11	CL H 12	LH 21	HL 11	HL 12	HL 21	HL 22	HL 22	FF 11		FF 11	F 2	F 2	F 2	F 2
29	F 1	F 1		F 1				L 1	L 2	L 2	L 2	HL 12	HL 11	L 2	L 1	L 1	L 1	F 1				F 1		
30									L 2			HL 11	HL 11	L 1				F 3	F 1				F 1	F 2
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																								
MED																								
U Q																								
L Q																								

NOV. 1991 TYPES OF ES COMMUNICATIONS RESEARCH LABORATORY, JAPAN

f-PLOTS OF IONOSPHERIC DATA

KEY OF F-PLOT	
I	SPREAD
⬡	FOF2, FOF1, FOE
X	FXF2
✳	DOUBTFUL FOF2, FOF1, FOE
⧖	FBES
L	ESTIMATED FOF1
⫯, Y	FMIN
∧	GREATER THAN
∨	LESS THAN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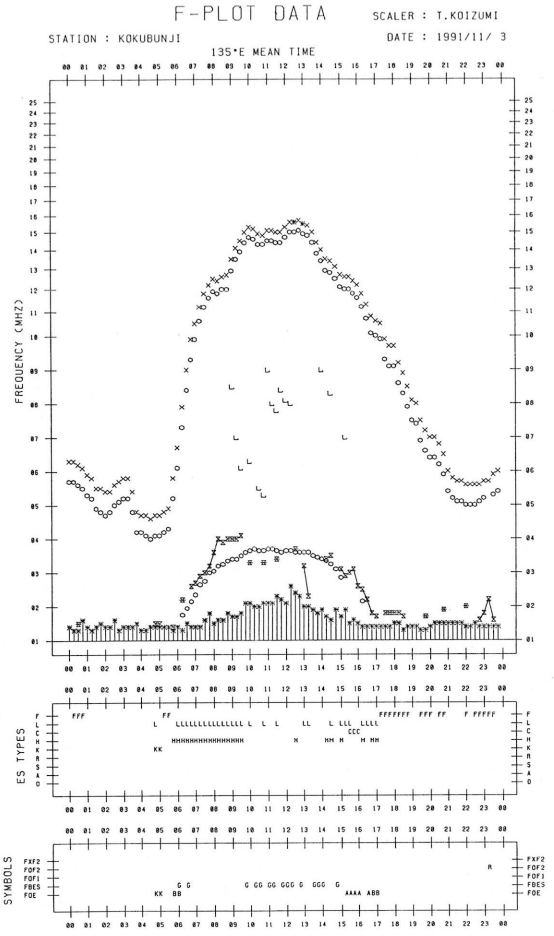
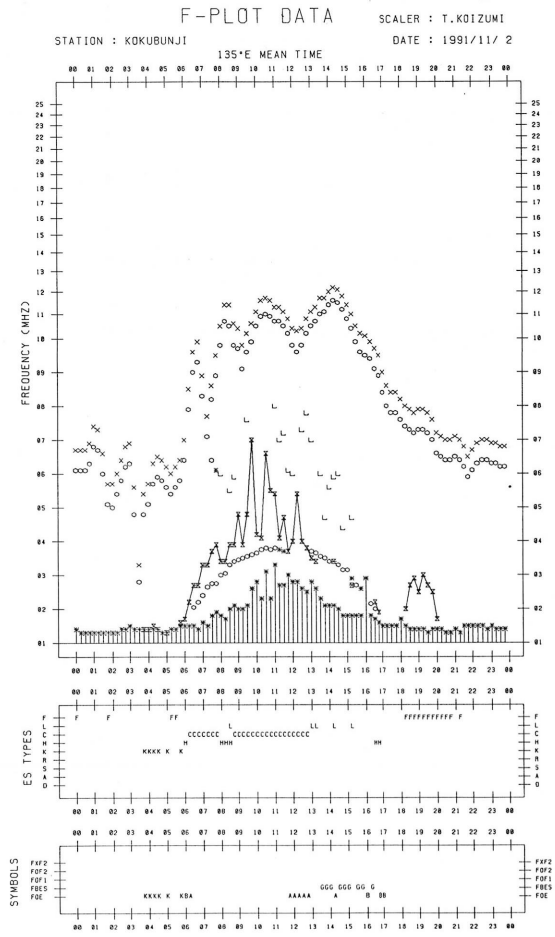
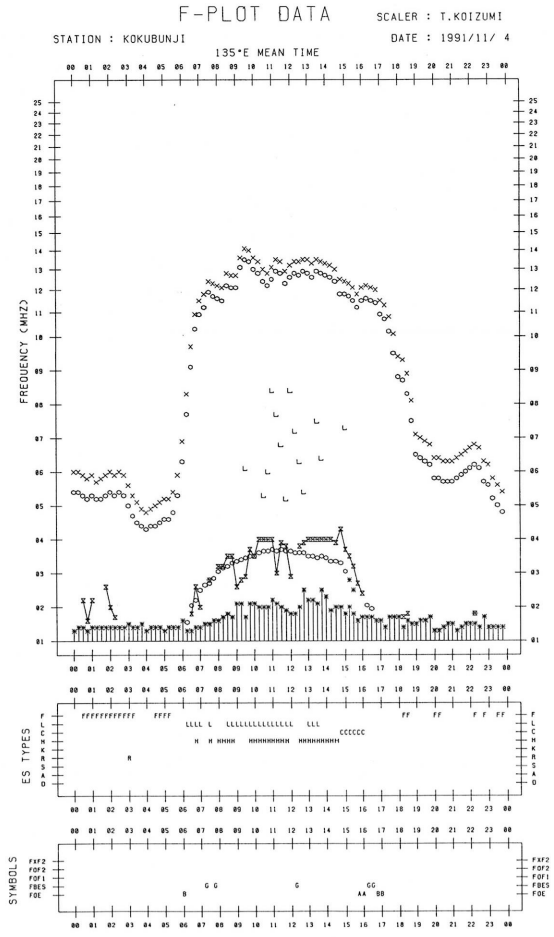
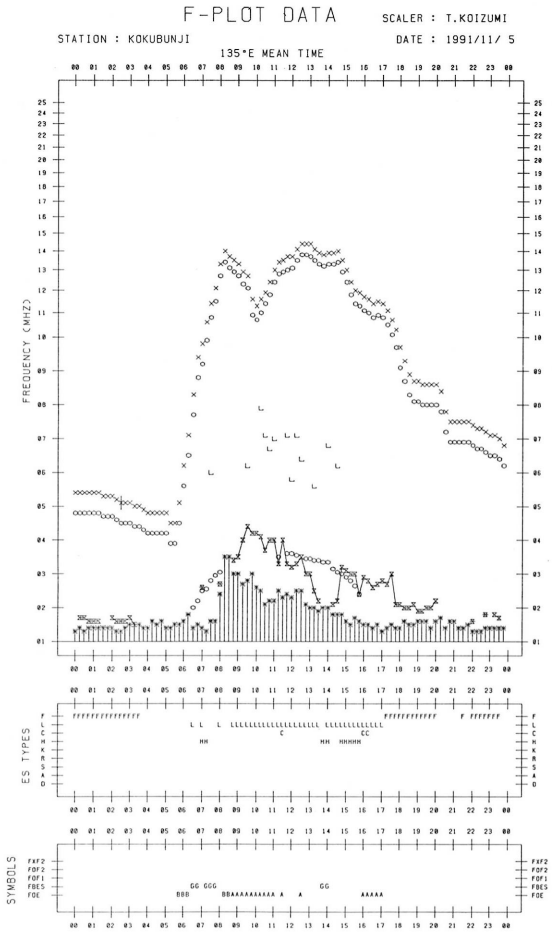
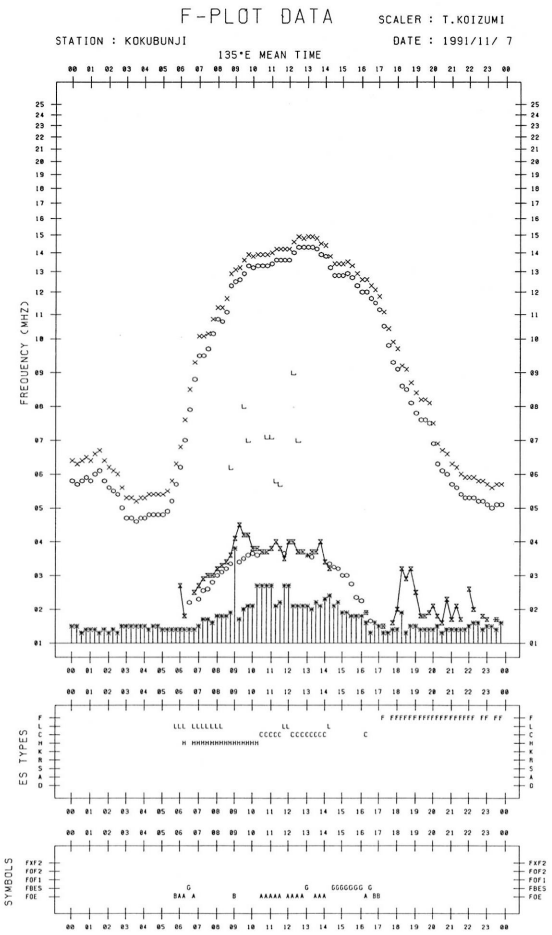
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/ 1
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

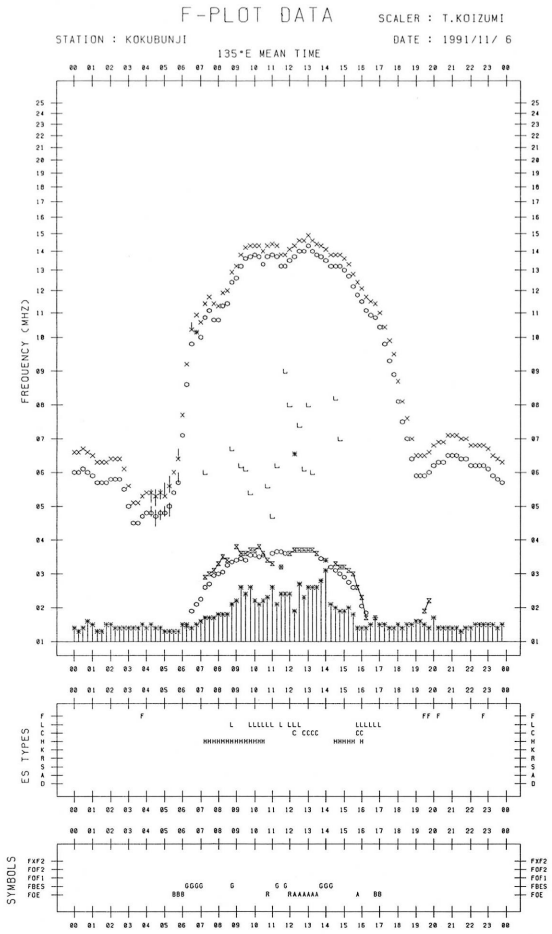

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/ 3
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

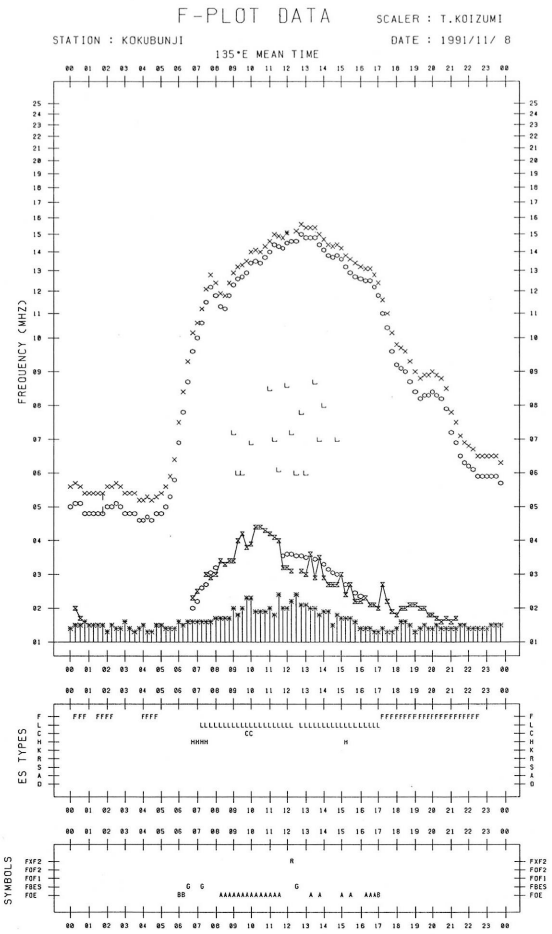

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/ 2
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

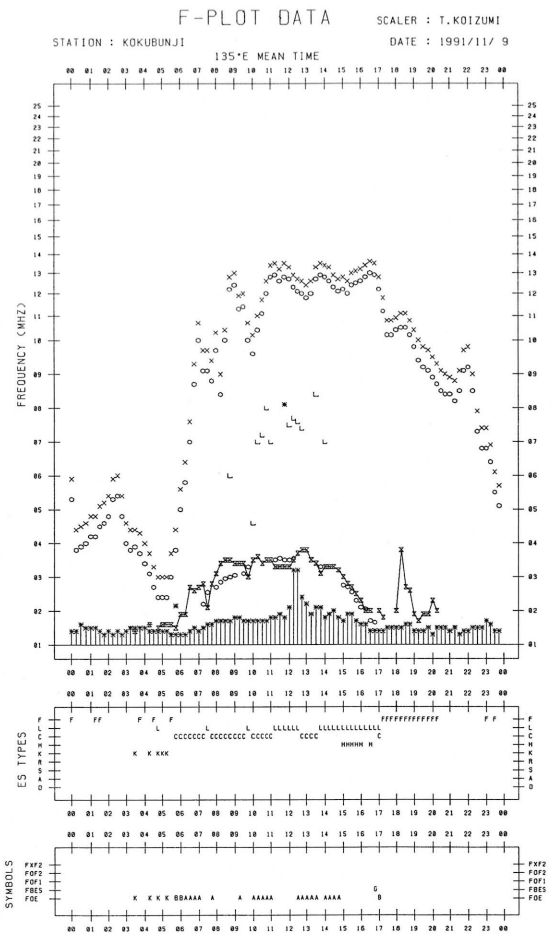

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/ 4
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

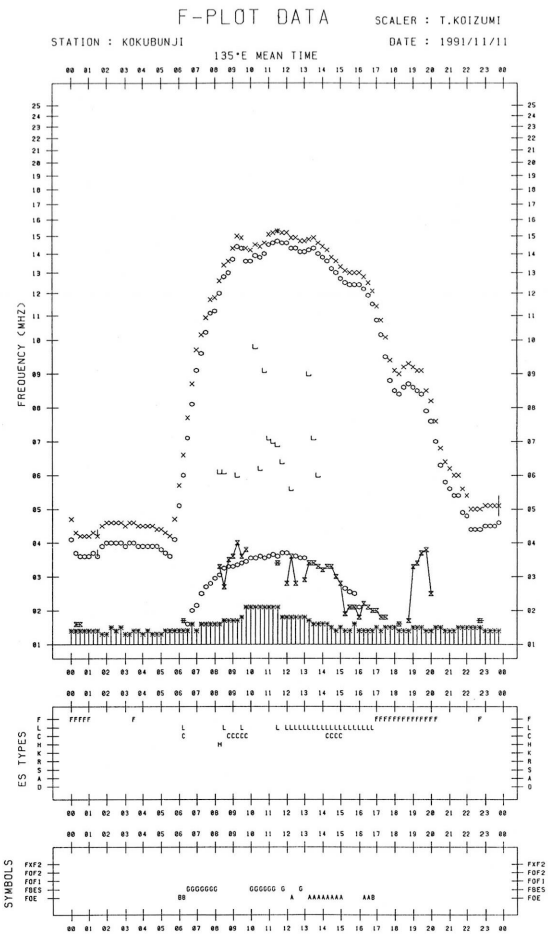

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/ 5
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/ 7
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/ 6
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/ 8
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/ 9
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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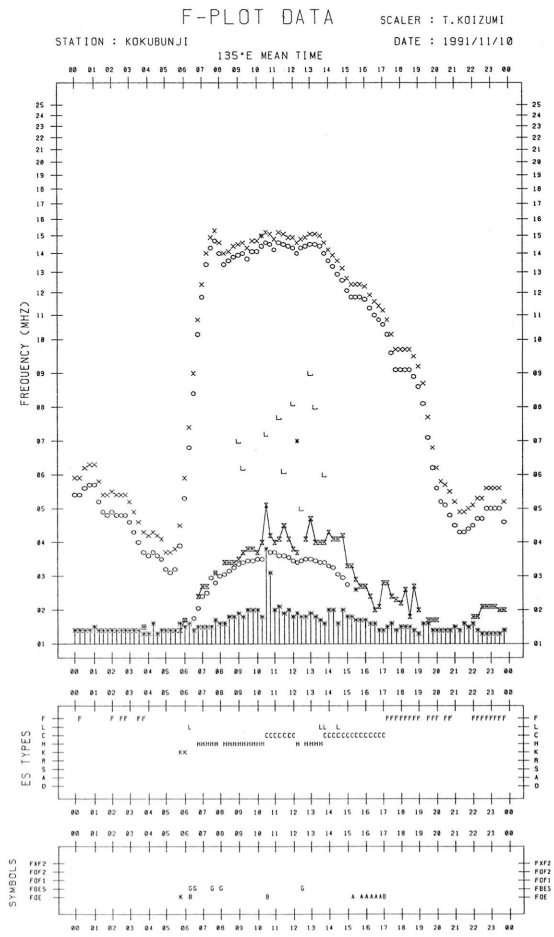
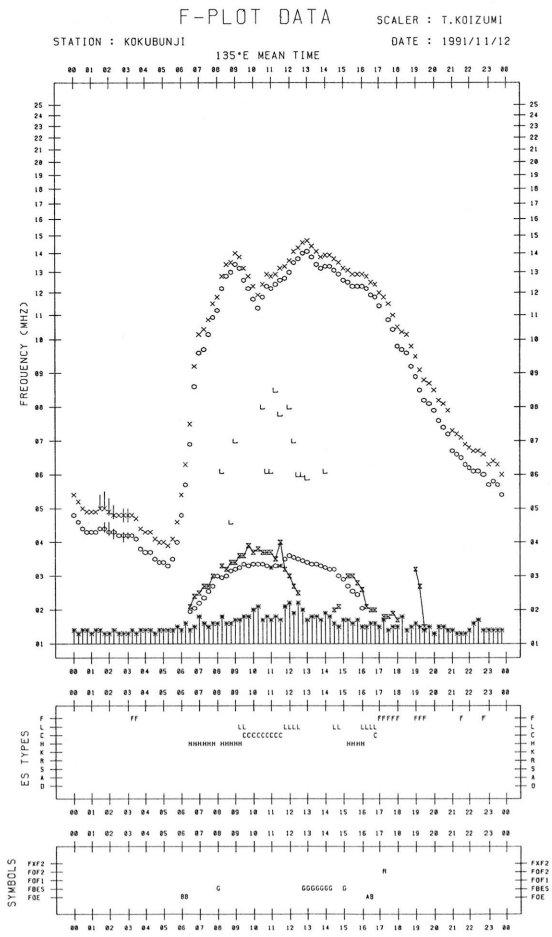
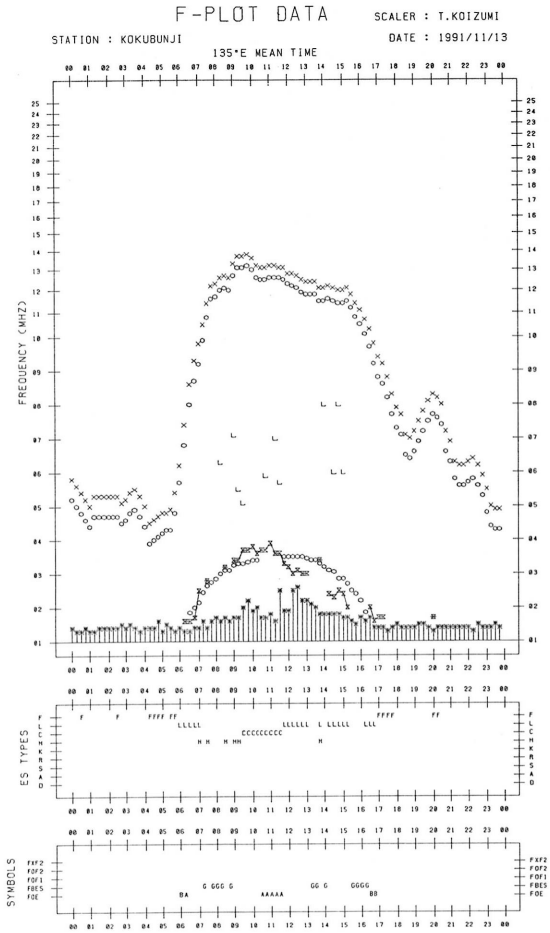
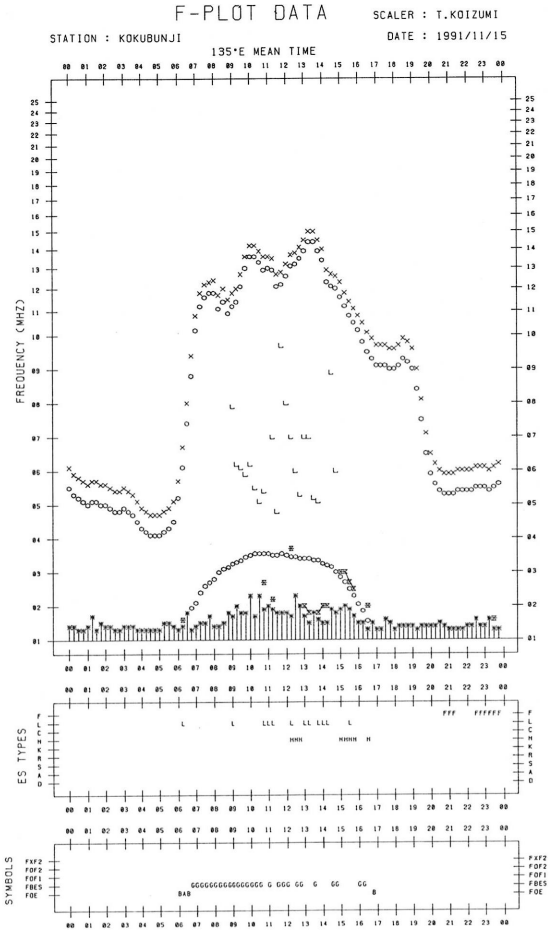
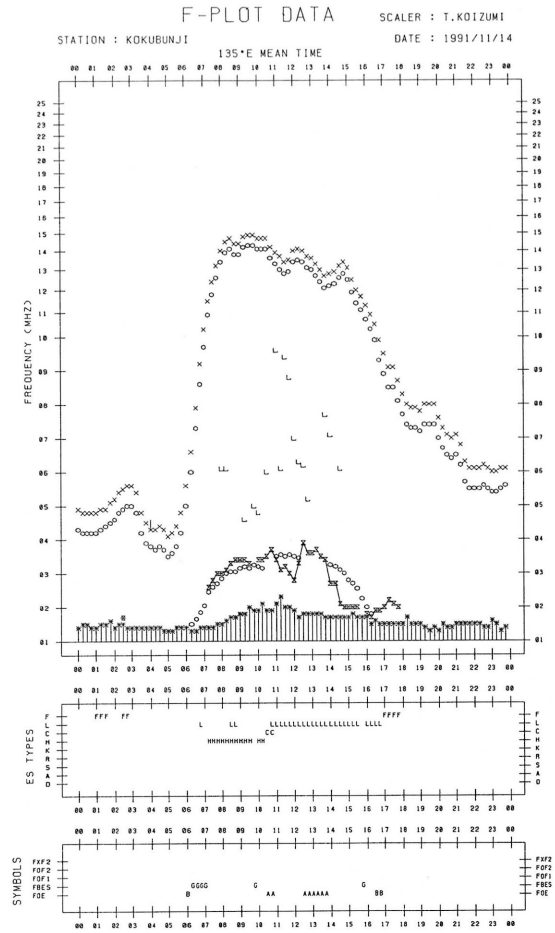
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/11
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

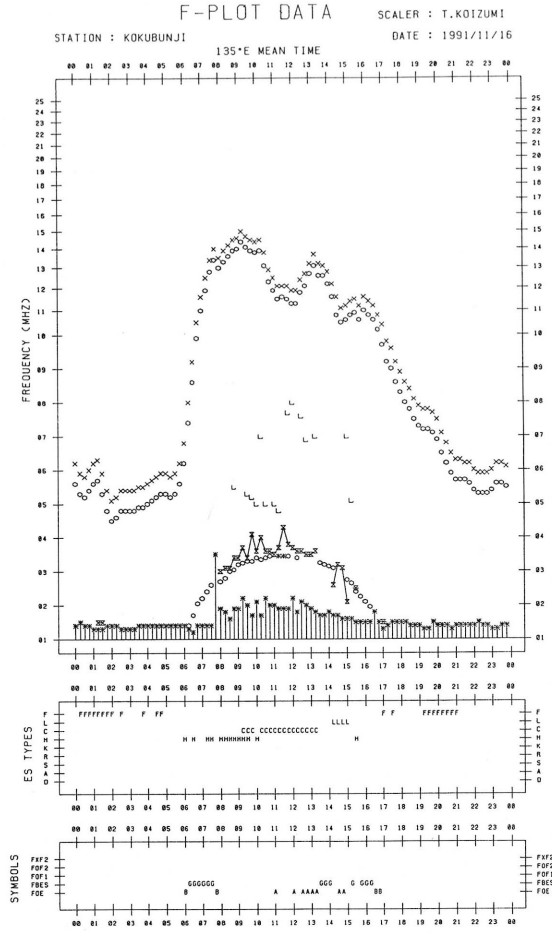

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/10
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

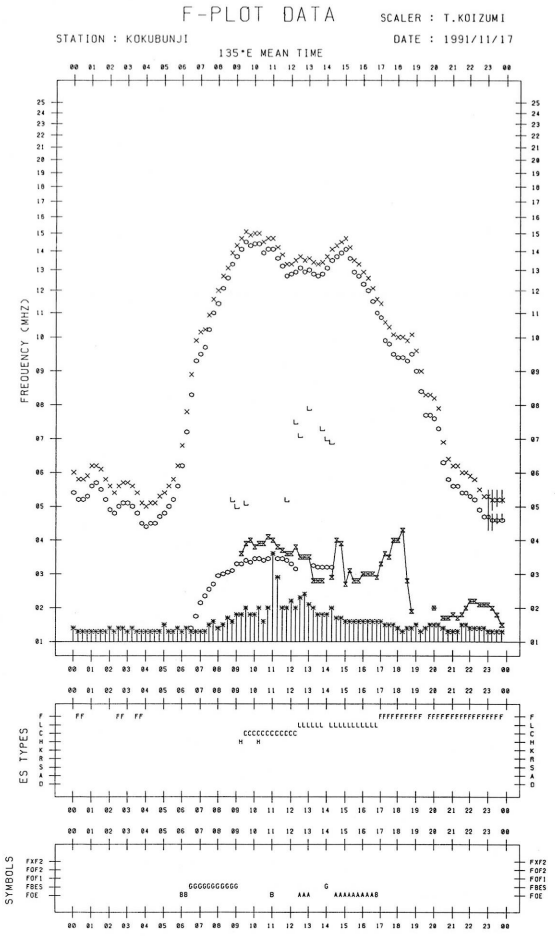

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/12
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

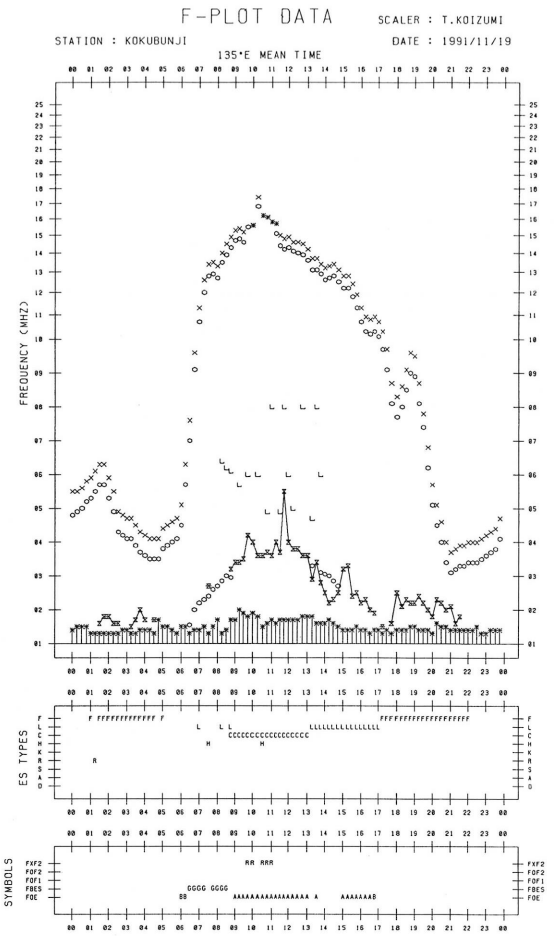

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

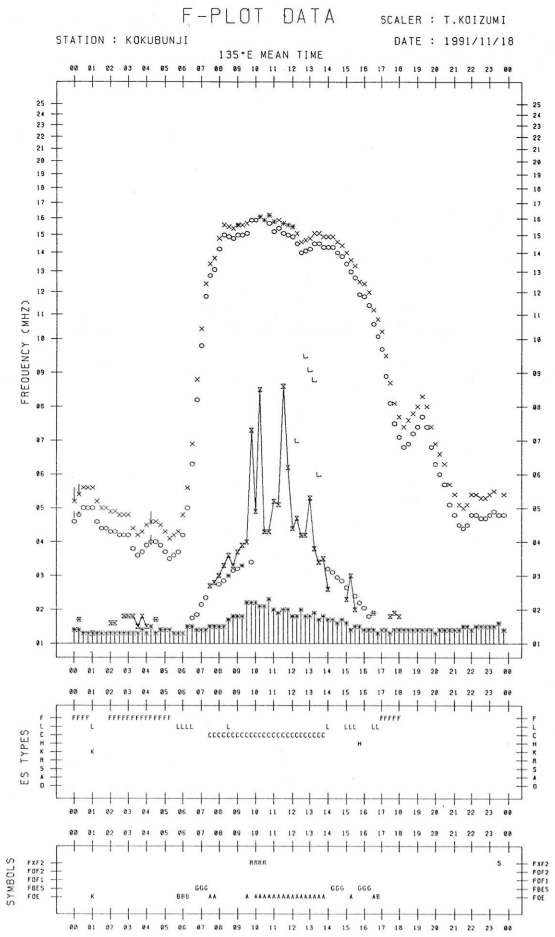

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

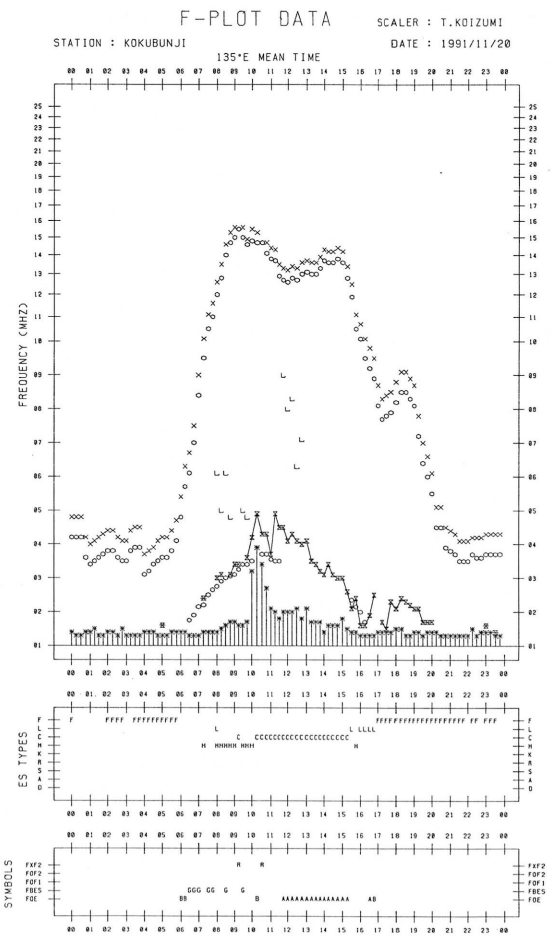

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

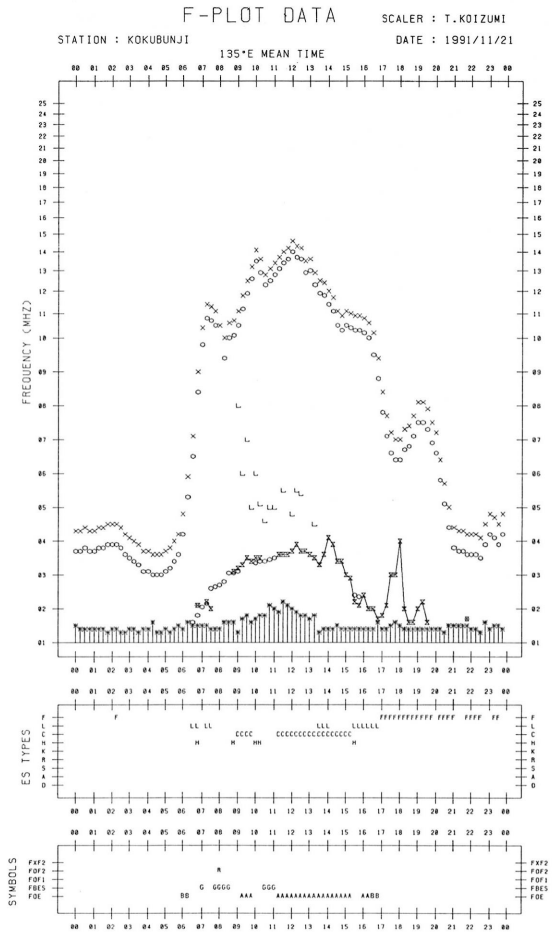

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

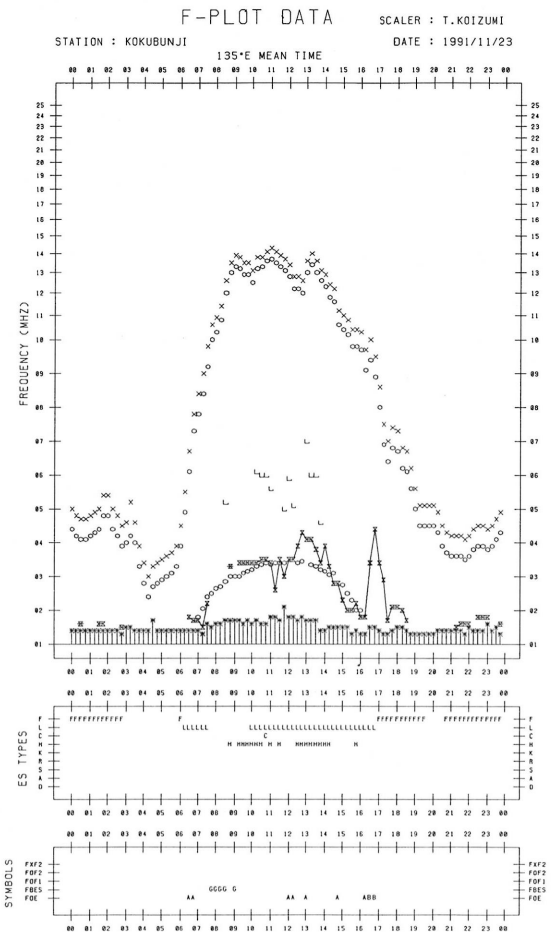

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

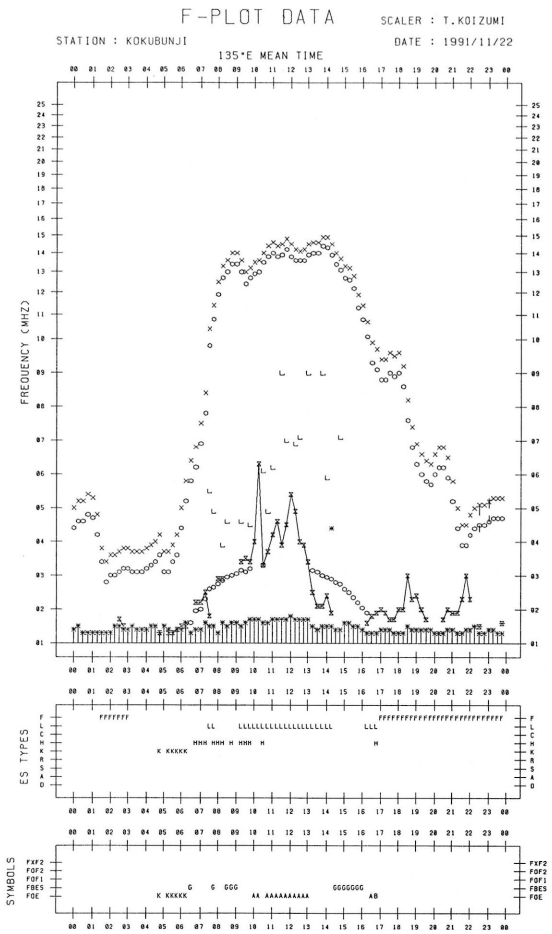

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

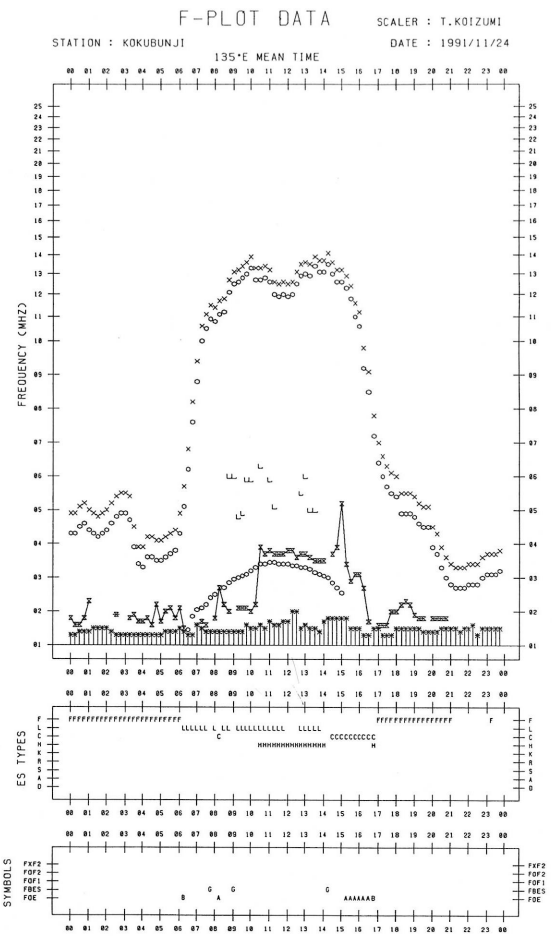

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

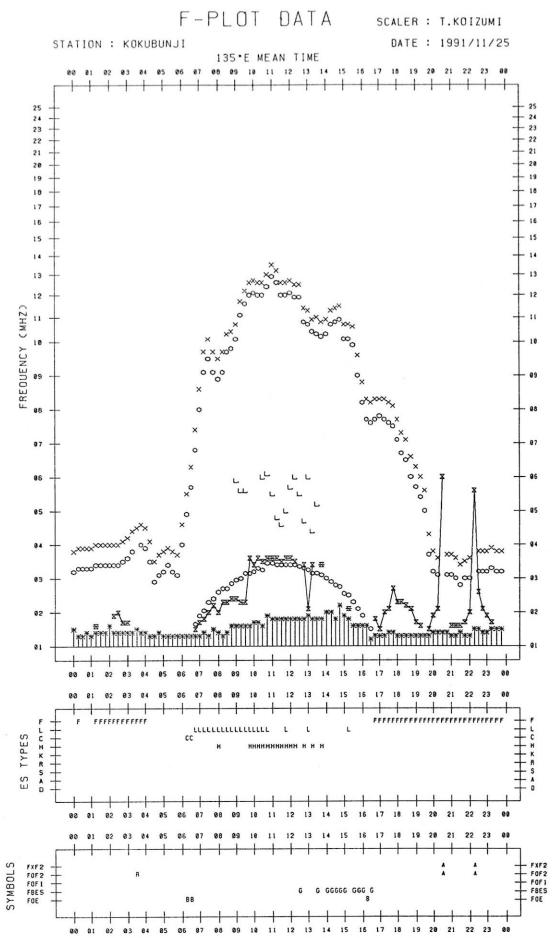

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

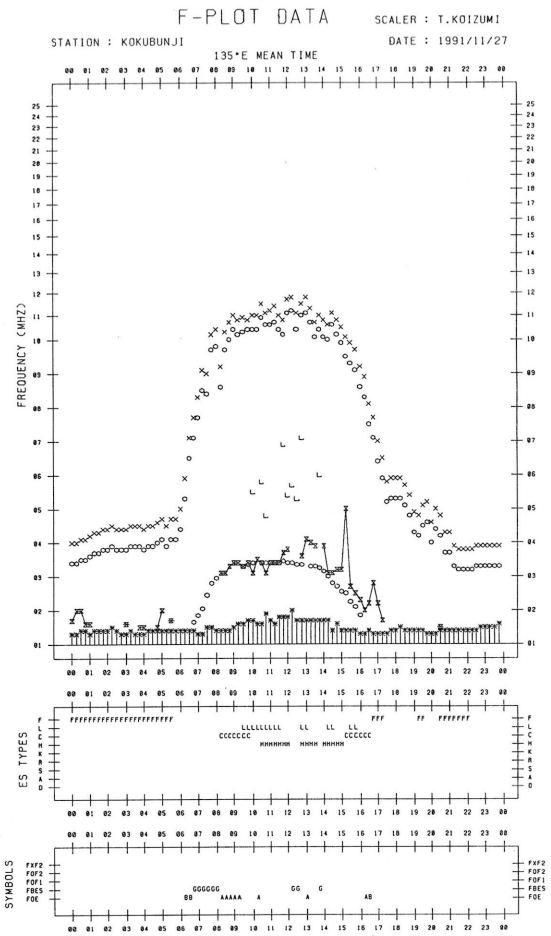

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/21
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

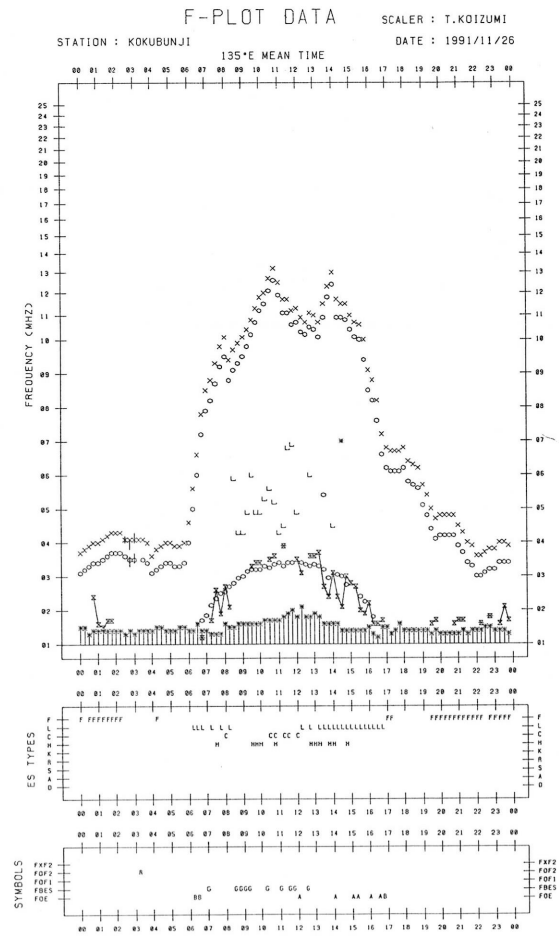

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/23
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

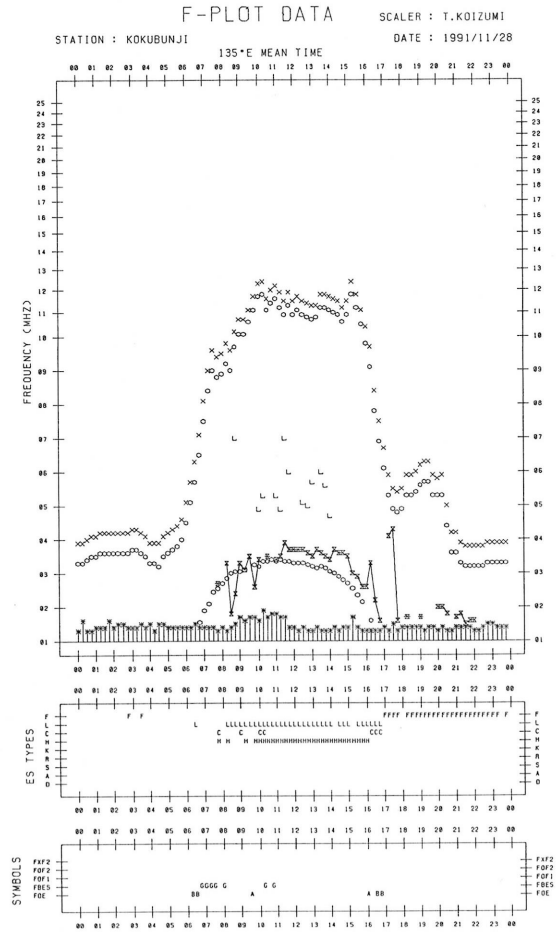

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/22
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

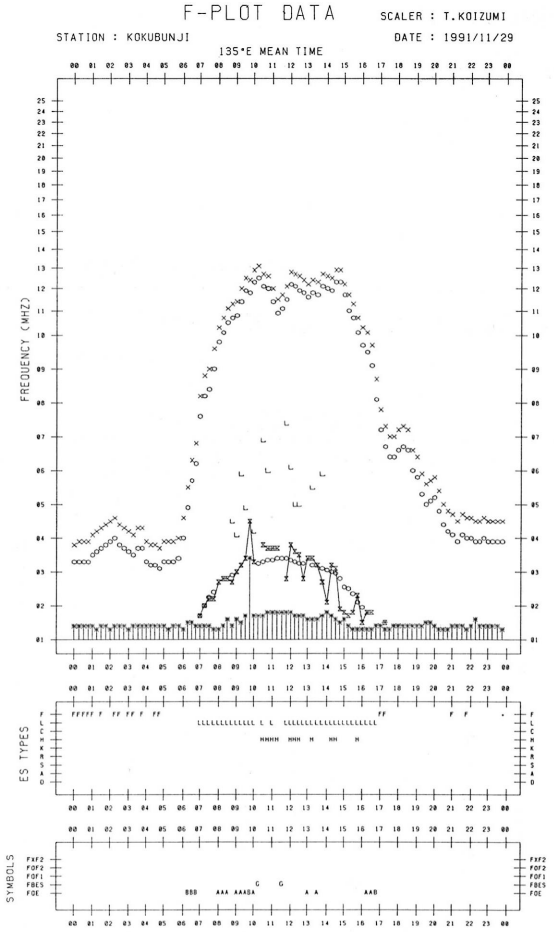

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/24
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

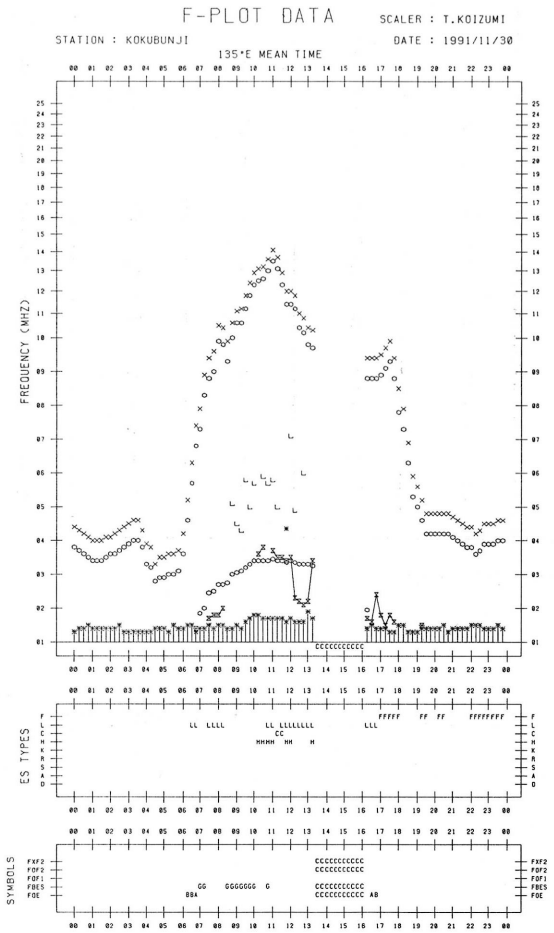

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/25
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/27
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/26
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/28
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/29
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/11/30
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

B. Solar Radio Emission

B1. Daily Data at Hiraiso

200 MHz

Hiraiso November 1991

Single-frequency total flux observations at 200 MHz

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

Notes: No observations during the following periods.

24th 0010 - 0715 24th 2120 - 25th 0010

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

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso — November 1991

Single-frequency observations

Normal observing period: 2115 - 0735 U.T. (sunrise to sunset)

NOV. 1991	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
2	200	44 NS	2115E	2150	600D	20	13	MR
3	200	44 NS	2115E	0413	600D	25	12	MR
5	200	46 C	2205.0	2205.0	2.0	1900	-	0
	100	46 C	2205.8	2206.6	1.6	1000D	-	-
6	100	42 SER	0405.3	0408.0	20	230	-	WL
	200	42 SER	0406.8	0408	10	190	-	0
	100	42 SER	0446.8	0448.6	5.0	40	-	WL
	200	7 C	0447.2	0450	27	190	-	0
	200	46 C	0603.9	0604.1	2.0	140	40	WR
	100	46 C	0603.9	0604.3	2.6	600	150	WR
	200	42 SER	2355.7	2356	8.5	3400	-	-
7	200	44 NS	2120E	0518	600D	20	12	MR
8	200	44 NS	2120E	0305	600D	40	12	MR
9	200	46 C	0310.7	0315	5.0	185	60	WR
	100	46 C	0310.8	0314	10	1000D	-	WR
	200	46 C	2308.0	2309.2	4.5	30	10	ML
	200	46 C	2342.1	2343	1.0	200	100	0
10	200	46 C	0126.1	0128.6	9.0	150	30	ML
	100	46 C	0126.2	0129	5.3	1300	500	WL
	100	7 C	0645.8	0647	29	1900	300	WL
	200	7 C	0647.5	0649.1	19	150	-	ML
12	200	44 NS	2120E	2340	580D	70	15	ML
13	200	44 NS	2120E	0114	580D	120	30	SL
	100	44 NS	2120E	0216	580D	100	15	ML
14	200	44 NS	2120E	0123	580D	100	17	SL
15	200	44 NS	2120E	0137	580D	150	38	SL
	200	48 C	2234.0	2240.5	20	50000	1500	WR
	100	48 C	2234.3	-	19	1000D	-	-
17	100	42 SER	0154.3	-	13	1000D	-	-
	200	48 C	0155.0	0202.4	8.6	3500	500	WR
	200	44 NS	2120E	0351	580D	30	12	WL
19	200	46 C	0010.0	0013.3	8.0	48	15	ML
	100	46 C	0010.8	0014.2	13	130	20	-
	200	44 NS	2120E	0340	580D	20	12	ML
20	200	48 C	0054.4	0100.0U	13	13000U	600	WR
	100	48 C	0054.6	-	16	1000D	-	-
	200	44 NS	2120E	0033	580D	30	14	ML
26	200	46 C	0420.8	0421.2	1.5	60	35	WR
27	200	44 NS	2120E	2302	580D	30	12	WR
28	200	44 NS	2120E	0040	580D	30	15	WR
30	200	48 C	0344.6	0344.8	6	45000	1000	WR
	100	48 C	0344.7	-	10	1000D	-	-

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)

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

MEASURED AT HIRAISO

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

C. RADIO PROPAGATION

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

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

MEASURED AT HIRAISO

UT DAY	00H 46M	01H 46M	02H 46M	03H 46M	04H 46M	05H 46M	06H 46M	07H 46M	08H 46M	09H 46M	10H 46M	11H 46M	12H 46M	13H 46M	14H 46M	15H 46M	16H 46M	17H 46M	18H 46M	19H 46M	20H 46M	21H 46M	22H 46M	23H 46M
1	1	S	14	22	22	24	24	32	31	23	23	14	-2	ES -25	ES -25	ES -25	ES -25	-4	ES 1	ES 1	17	11	37	ES -4
2	13	11	13	12	20	25	18	25	19	13	9	23	15	9	-4	ES -10	ES -25	ES -25	ES -25	3	13	13	1	2
3	S	13	13	19	23	20	29	29	29	29	23	13	-1	-4	ES -16	ES -25	ES -25	ES -25	ES -25	6	11	9	1	5
4	S	13	14	15	19	22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	-5	11	13	12	19	25	29	26	27	25	23	19	4	1	3	19	6	2	-10	9	11	8	6	-2
6	-4	S	S	18	19	25	26	29	32	7	-1	3	15	-3	-5	-10	0	ES -25	ES -25	11	20	12	13	3
7	4	9	16	21	20	34	26	29	29	24	-1	-10	-7	-7	ES -25	ES -25	ES -25	ES -25	ES -25	5	13	9	3	5
8	2	11	14	19	24	27	31	32	25	29	35	28	15	-3	ES -25	ES -25	ES -25	6	26	6	14	10	10	-3
9	14	S	14	13	22	28	26	34	25	28	33	27	3	-16	ES -25	ES -25	ES -25	3	9	-4	13	13	6	4
10	11	S	13	19	27	27	30	29	31	25	3	6	0	2	ES -10	ES -10	ES -10	ES -10	ES -25	1	14	13	7	5
11	8	12	13	19	23	29	29	29	23	19	16	3	-2	-10	ES -25	ES -25	ES -25	ES -25	ES -25	3	9	12	6	5
12	4	11	6	20	24	21	24	39	24	26	29	24	1	-2	ES -4	ES -25	ES -25	2	ES -25	23	13	15	4	8
13	7	S	S	16	27	27	27	31	32	29	23	20	-2	ES -2	-3	ES -25	ES -25	-2	-2	5	13	14	14	9
14	6	14	12	16	24	29	28	30	24	22	32	10	-2	0	1	-16	ES -25	20	-2	10	12	12	10	1
15	7	11	17	18	25	29	26	27	34	38	29	-6	-6	-7	-6	-7	-3	-4	-4	6	12	ES -25	ES -25	ES -25
16	18	-3	18	25	20	24	24	29	25	25	1	-7	ES -25	ES -25	ES -25	ES -25	-7	-6	ES -25	17	12	13	13	2
17	6	14	18	19	23	26	30	18	20	36	12	-7	-10	ES -25	ES -25	ES -25	ES -25	ES -25	7	ES -25	7	11	14	7
18	11	14	19	26	26	27	23	20	24	7	4	-3	-1	-8	-7	-1	17	-2	ES -25	ES -25	10	12	11	6
19	9	S	18	19	24	28	30	31	36	24	16	-10	-6	ES -25	-10	-10	ES -25	ES -25	ES -25	ES -25	8	8	5	9
20	11	8	13	22	25	31	27	19	23	19	5	-10	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	13	13	11	9
21	12	14	14	23	27	31	23	29	S	2	19	-3	ES -25	ES -25	-10	ES -25	ES -25	ES -25	ES -25	ES -25	8	10	19	7
22	7	S	17	23	23	24	C	C	C	11	7	24	17	-16	-16	-16	ES -25	ES -25	ES -25	ES -25	14	17	13	7
23	13	S	20	20	23	28	25	16	13	-1	-10	-16	ES -25	ES -25	-16	ES -25	ES -25	-1	-2	4	9	12	15	5
24	7	S	13	21	23	23	31	S	13	-7	-1	-16	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	12	19	11	10
25	S	19	17	16	26	24	23	21	21	-1	S	S	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	13	19	13	13
26	S	19	24	28	26	24	21	22	21	2	-6	-16	-16	ES -25	ES -25	ES -25	ES -25	-10	-10	-4	18	19	12	13
27	18	19	19	25	29	21	S	18	18	5	-4	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	18	18	16	13
28	13	16	19	27	29	23	29	26	22	2	-4	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES 1	ES 1	ES -4	13	13	20	18
29	18	16	20	23	23	26	31	21	21	13	0	ES 0	ES -2	ES -2	ES -2	ES -2	ES -2	ES -2	ES -25	ES -25	10	17	15	17
30	13	14	19	19	24	21	21	29	31	23	ES -25	ES -25	-16	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	15	13	18	13
CNT	26	21	28	30	30	30	27	27	27	29	28	28	29	29	29	29	29	29	29	29	29	29	29	29
MED	8	13	15	19	24	26	26	29	24	22	8	US -2	US -2	US -16	ES -16	ES -25	ES -25	ES -10	ES -25	US 1	13	13	11	6
UD	18	19	20	26	27	31	31	32	32	29	32	24	15	1	ES -2	ES -2	0	3	7	11	18	19	19	13
LD	1	8	13	13	19	21	21	18	18	-1	-6	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	8	8	1	-3

C. Radio Propagation

C2. Radio Propagation Quality Figures at Hiraiso

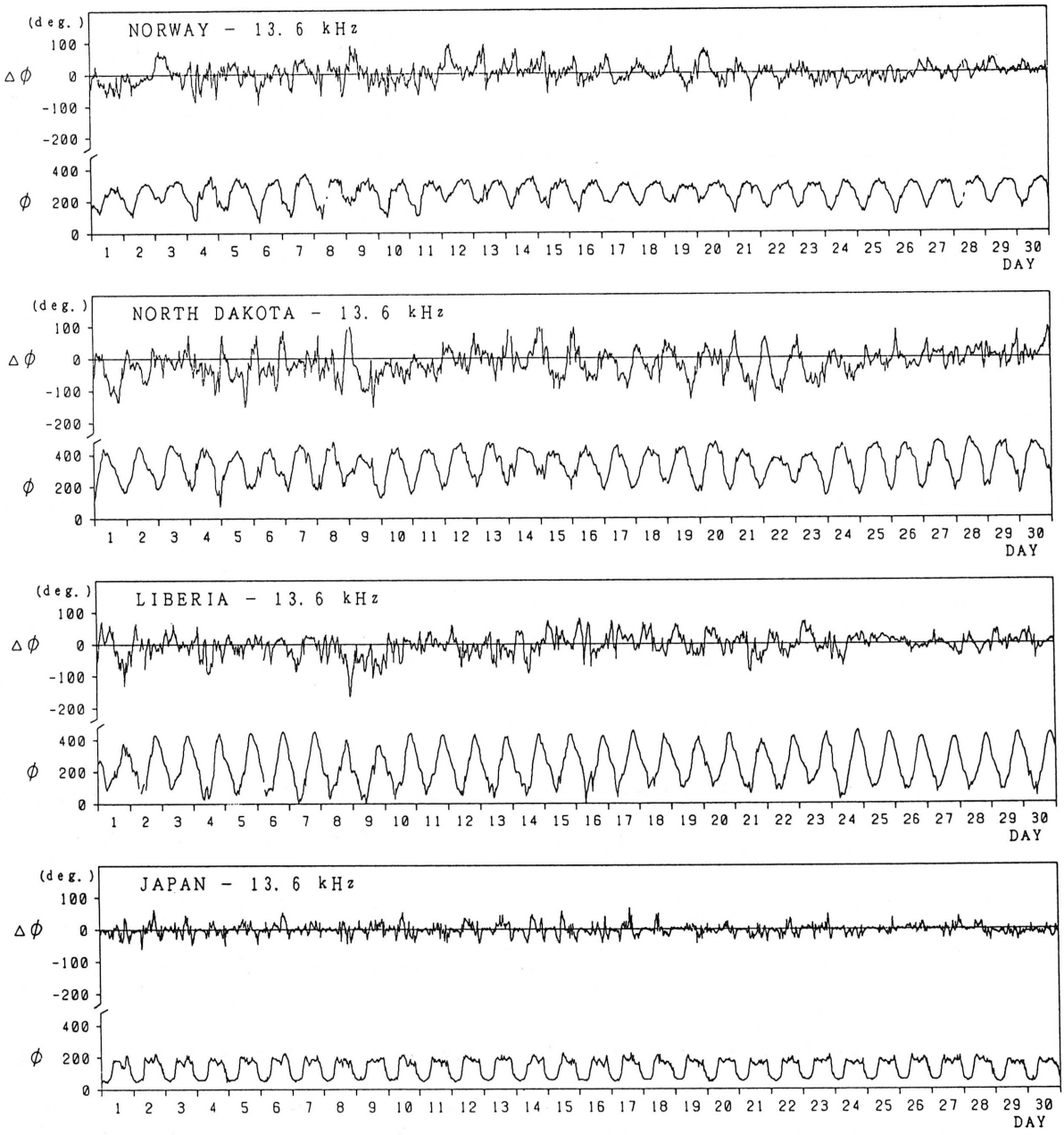
Hiraiso — Time in U.T.

Nov. 1991	Whole Day Figure	W W V 00 06 12 18 / 06 12 18 24	W W V H 00 06 12 18 / 06 12 18 24	Conditions 00 06 12 18 / 06 12 18 24	Principal Geomagnetic Storms Start h m	End h	Range nT
1	4o	4 4 - 4	4 4 (4) 4	N N N N			
2	4o	4 3 5 4	4 4 (5) 4	N N N N			
3	4o	4 4 - 3	4 4 (4) 4	N N N N			
4	C	4 C C C	4 C C C	N N N N			
5	4o	3 3 5 3	4 4 (5) 4	N N N N			
6	4+	4 5 5 4	4 4 (5) 4	N N N N			
7	4o	4 4 - 3	4 4 (4) 4	N N N N			
8	4+	4 - - 4	4 5 (5) 4	N N N N	0648	----	372
9	4+	4 4 - 3	4 5 (5) 4	N N N N	----	----	
10	4o	4 4 5 4	4 4 (4) 4	N N N N	----	03	
11	4-	3 3 - 4	4 4 (4) 4	N N N N			
12	4o	4 4 - 4	4 4 (5) 4	N N N N			
13	4+	4 4 - 4	4 5 (5) 4	N N N N			
14	4+	4 4 5 5	4 4 (5) 4	N N N N	18.7	----	92
15	4o	4 4 - 3	4 4 (5) 4	N N N N	----	----	
16	4o	5 4 - 4	4 4 (4) 4	N N N N	----	24	
17	4o	4 - - 4	4 4 (4) 4	N N N N			
18	4+	4 - 5 4	4 4 (5) 4	N N N N			
19	4o	4 - - 5	4 4 (4) 3	N N N N	0420	----	110
20	3+	4 5 - 3	4 3 (2) 3	N N N N	----	03	
					17.8	----	119
21	4-	4 4 - 4	4 4 (3) 3	N N N N	----	----	
22	4-	S C - 3	4 4 4 3	N N N N	----	21	
23	4-	4 4 - 2	4 3 (4) 4	N N N N			
24	3o	3 - - 4	4 2 (2) 3	N N N N			
25	3+	4 - - 4	4 3 (2) 4	N N N N			
26	4-	4 - - 4	4 3 (4) 4	N N N N			
27	3+	4 - - 4	4 2 (2) 4	N N N N			
28	3+	3 4 - 4	4 3 (2) 4	N N N N			
29	4o	4 4 - 4	4 4 - 4	N N N N			
30	4-	4 4 - 3	4 3 (3) 4	N N N N			

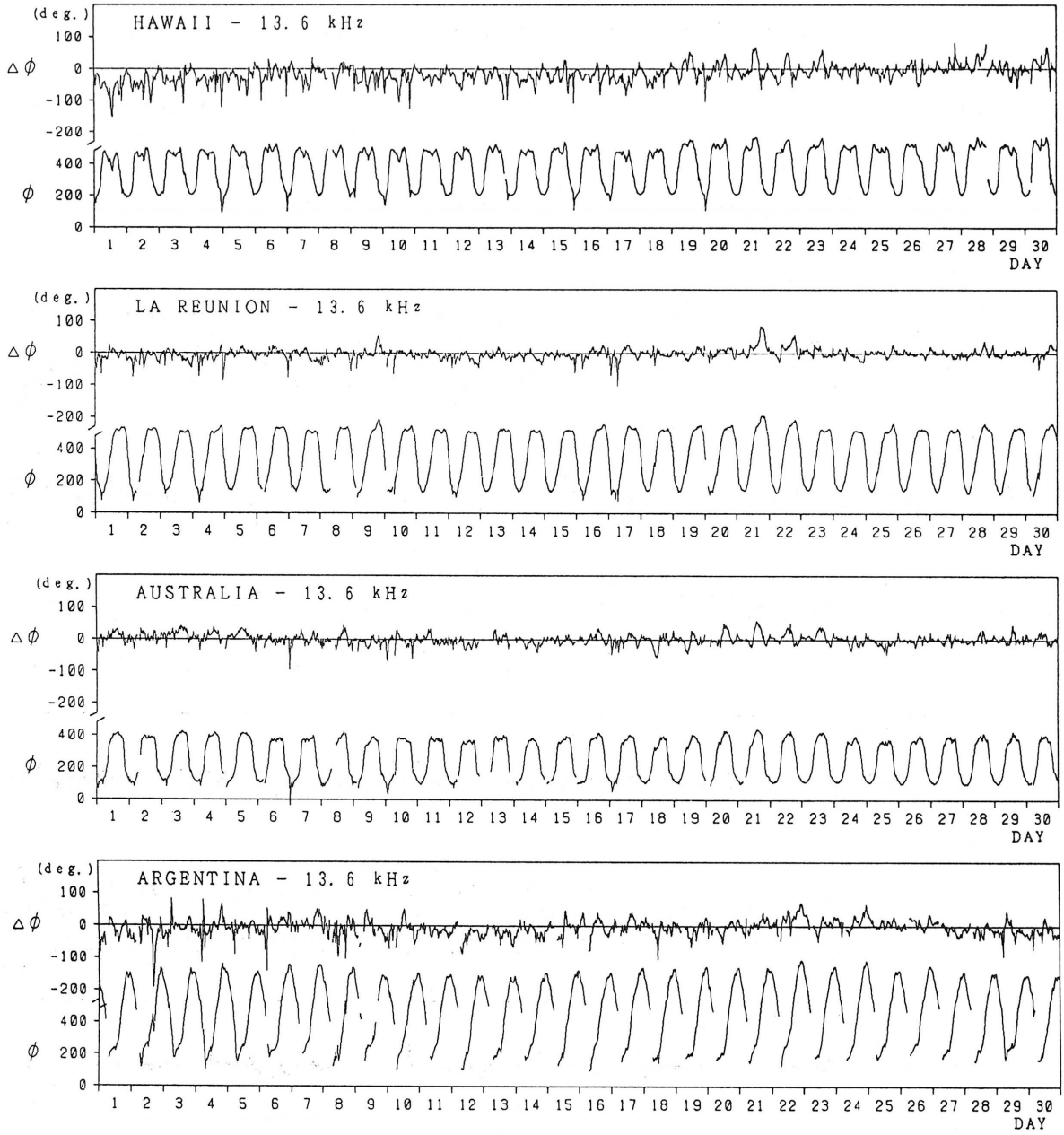
C. Radio Propagation

C3. Phase Variation in OMEGA Radio Waves at Inubo

Inubo November 1991



Inubo November 1991



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

Start (U T.)	End (U.T.)	Max. (U.T.)	Max. Phase Deviation (negative value, deg.)
Nov.17/0611	Nov.17/2207	Nov.17/1220	61.2

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso — Time in U.T.

Nov. 1991	S W F								Correspondence	
	Drop-out Intensities (dB)					Start	Dur.	Type	Imp.	Solar * Flare	Solar Burst
	CO	HA	AUS	MOS	BBC						
1			12			0040	22	2	1	x	
1			8			0332	18	2	1-	x	
1			8			0421	27	2	1-	x	
1			6			2339	25	2	1-	x	
2			29	x		0644	32	2	2+	x	x
2					7	1142	17	2	1-	x	
3			13	x		0304	26	3	1	x	
4			6			0437	38	2	1-	x	
5			13			0154	74	2	1		
5			9			2205	11	2	1-	x	
6			13			0407	15	1	1	x	x
6			5			0422	21	1	1-	x	x
6			13			0446	37	1	1	x	x
6			7			2354	13	1	1-	x	
7	x	x	7			0147	28	1	1-	x	
7					8	1135	36	2	1-		
8			8			0040	16	2	1-	x	
8			7			0216	20	2	1-	x	
9	x	x	19	x		0311	40	2	1+	x	x
9					x	1546	14	2	1-	x	
10	x	x	26			0122	38	2	2	x	x
10			17			0644	29	2	1+	x	x
12			13			0232	20	2	1	x	x
13	x	23		x		2112	32	3	2+	x	
13			8			2259	9	2	1-	x	
15			25	21		2235	31	2	2	x	x
17		x	20			0157	33	2	2-	x	x
20	16	15	37	x		0054	62	3	3	x	x
20			7			0350	28	1	1-	x	
30		>48	30			0345	23	1	2+	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

Nov.	S			P		A			
1991	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
1			17	43	31	47	0025E	0043D	0028
1			37	61	50	47	0043E	0147	0052
1			7	5	3		0211	0227	0214
1	9		17	15	6		0231	0324	0240
1	13	28	51	45	17	13	0334	0417D	0341
1	19		61	45	16	18	0417E	0513	0431
1			13				0823	0910	0836
1		50					1310	1435	1338
1		37					1609	1650	1632
1					41		2023	2104	2033
1					30		2157	2235D	2203
1	25			17	30		2235E	2321	2240
1	17	19	15	31	23		2349	0026	2352
2			17	11	6	14	0039	0106	0047
2		14	12	16	7		0125	0148	0129
2			17	20	13		0157	0228	0211
2			30	23	9	10	0315	0346D	0325
2		34	67	49	12	13	0346E	0446D	0359
2			28	18	15		0446E	0516D	0454
2			18	14			0516E	0553	0525
2	68*		280	157	19	23*	0625	0825	0653
2		—	9				0851	0911	0855
2		122	39				1146	1253	1157
2		41					1621	1745	1655
2				14	25		2229	2315	2235
3				11	9		0011	0038	0020
3			7	7	4		0121	0140	0126
3	12	26	44	63	32		0302	0415	0320
3					6		2242	2305	2249
3				6	6		2323	2345	2331
4			5	—	5		0149	0206	0153
4			15	—	6		0233	0254	0236
4			102	—	22		0425	0635D	0454
4			18	—			0635E	0719	0650
4		21	32	—			0719E	0757	0732
4	82		77	125	130	144	2218	0247	2315
5			4	10			0310	0346	0321
5			9	—			0748	0808	0755
5		38		—			1100	1203	1123
5				—	71	20	2206	2246D	2212
5				—	10		2246E	2309	2253
5				—	5		2345	0003	2350
6				—	7		0044	0108D	0053
6			21	—	17*		0108E	0200	0111
6			8	—	7		0238	0253	0241
6	27	27	100	—	24	10	0407	0446D	0424
6	55	85	225	—	58	57	0446E	0654	0453
6			8	—			0707	0732	0711
6		64	27	—			1124	1219	1138
6				—	54		1922	2002	1931

Inubo

Nov.	S				P		A		
1991	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
6	40	43	85	—	115	68	2355	0121	0002
7		14	34	—	27	21	0147	0230	0157
7			19	—			0452	0612	0527
7		65		—			1134	1234D	1150
7		24*		—			1234E	1257	1241
7				—	28		2202	2221	2207
7				—	36		2347	0038	2353
8				—	25		0043	0136	0053
8		21	28*	—	19*		0207	0255D	0232
8			8	—	5		0255E	0317	0300
8	32	44	56	—			0624	0715D	0639
8			23	—			0715E	——	0723
8		66		—			1422	1545	1447
8		36		—			1702	1737	1713
8				—	16		2136	2158	2143
8		28		—	37		2258	0021	2319
9				—	4		0106	0121	0110
9			10	—	6		0233	0251	0237
9	40	49	151	—	80	41	0313	0505	0323
9		97		—			1535	1700	1548
9				—	53		2052	2127	2058
9				—	10		2350	0026	2359
10	70	85	223	—	146	70	0124	0313	0138
10		161	181	—			0648	0820	0657
10				—	112	35	2006	2132	2017
11	15			—			0112	0138	0118
11			10	—	9		0209	0230	0213
11			7	—			0257	0317	0303
11			12	—			0409	0442	0418
11				—	42		1943	2020	1952
11				—	14		2140	2202	2146
11	38			—	22	27	2248	2309	2257
12				—	14		0102	0148	0112
12	25	30	73	—	39	17	0234	0333	0242
12		30	58*	—			0522	0636	0535
12		37		—			1603	1715	1618
12				—	29		2025	2123	2040
13		22		—			1250	1325	1257
13				—	71	29	2117	2217	2127
13				—	21		2254	2351	2304
14				—	3		0041	0104	0046
14			13	—	8		0206	0240	0215
15			8	—			0353	0427	0405
15		39	17	—			0700	0725	0711
15		54	6	—			1103	1222	1122

Inubo

Nov. 1991	S				P		A		
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
15	41	37	58	—	173	130	2233	0151	2242
16			17	—			0401	0440D	0412
16			69	—	15		0440E	0645	0504
16		129		—			1130	1345D	1159
16		61		—			1345E	1430	1351
16				—	21		1941	2005	1947
17	34	51	123	—	78	39	0155	0322	0208
17		26	93	—	15	24	0507	0636	0519
17		56	120	—			0700	0826	0718
17				—	17		1832	1859	1848
18				—	4		0035	0106	0045
18		67	42	—			1047	1206	1101
19			22	—	8	15	0328	0417	0342
19		57	47	—			0929	1004	0938
19				—	63		1920	2002	1928
20	59	66	154	—	119	76	0054	0300	0114
20			31	—	20	19	0346	0445	0356
20			11	—			0616	0649	0625
21				—	3		0107	0119	0112
21				—	5		0137	0207	0153
21				—	71		1912	2006	1921
22	18		9	—			0451	0520	0457
24			24	—			0822	0925	0835
26			11	11	7		0119	0151	0123
26			4	7	4		0228	0254	0238
26			11				0612	0642	0615
26			12				0954	1036	1005
26					6		2240	2305	2248
27			10	6			0441	0509	0452
27					19		2050	2127	2100
28				9	4		0013	0041	0025
28			14*	13*			0340	0423	0345
29			5	5			0443	0508	0450
29			12	7			0611	0636	0615
29			8				0718	0747	0727
29			11				0814	0851	0824
29					25		2012	2035	2017
29					31		2140	2223	2148
30			5	6		12	0310	0333	0319
30	39	58	222	166	96	68	0345	0552	0349
30			22	14			0555	0630	0601
30			8				0821	0851	0832
30		86	66				0952	1126	1000
30					10		2243	2316	2250

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