ISSN 0021–0382

F—493

IONOSPHERIC DATA IN JAPAN

FOR JANUARY 1990

VOL. 42 NO. 1

CONTENTS

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MINISTRY OF POSTS AND TELECOMMUNICATIONS
TOKYO, JAPAN

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 1_0, 1+, 2–, 2_0, 2+, 3–, 3_0, 3+, 4–, 4_0, 4+, 5–, 5_0 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 flare, solar radio burst, and geomagnetic crochet 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

JAN. 1990

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	43	50	61	52	34	30	38	65	89	121	130	128	121	108	102	103	101	78	64	58	46	27	31	36
2	31	34	34	A	A	37	A	53	80	108	115	120	116	116	108	108	79	74	58	56	38	36	34	38
3	38	36	33	34	32	33	24	51	82	75	114	122	111	91	107	101	87	64	66	55	42	40	33	34
4	28	37	32	34	37	30	31	48	79	102	122	122	111	101	96	90	92	66	64	50	42		30	34
5	32	31	30	38	35	32	34	51	83	108	110	110	113	105	92	106	75	69	61	59	42	34	37	34
6	37	35	37	35	37	36	28	48	80	103	124	124	121	102	97	91	86	83	70	47	43	34	35	38
7	38	38	37	38	43	38	37	55	92	89	116	104	112	100	104	96	86	66	68	51	37	34	34	37
8	41	32	38	38	36	34	30	43	67	95	98	100	91	101	99	90	80	66	61	40	30	36	32	31
9	43	40	33	31	30	32	37	57	82	110	133	118	122	120	107	101	89	72	61	69	56			36
10	48	51	51	58	58	52	51	62	88	90	121	121	111	104	106	101	90	72	73	63	42	32	32	36
11	32	68	32	40	38	30	36	53	84	122	124	120	107	116	112	91	84	78	66	56	43	34	32	30
12	31	36	31	A	63	33	37	61	94	122	115	131	121	127	122	108	101	76	65	60	A	A	32	31
13	32	30	32	33	43	37	34	54	86	115		144	121	120	114	106	99	79	66	45	34	31	31	32
14	30	32	34	30	30	31	31	53	89	105	120	131	113	117	114	108	86	84	63	52	37	36	28	32
15	31	31	34	37	30	31		70	110	138	145	132	116	110	110	87	96	83	54	55	42	34	34	37
16	40		30	67	37	46	33	69	90	110	120	122	119	110	114	110	101	78	72	53	54	37	A	37
17	38	35	39	35	37	40	34	56	111	140	130	130	129	137	131	114	99	86	64	47	43	40	N	37
18	47	41	38	37	44	43	38	64	96	124	117	127	128	106	112	102	93	86	66	58	43	44	43	42
19	51	43	38	40	40	38	42	73	107	144	126	138	122	125	115	108	86	83	66	57	42	43	44	41
20	48	38	40	36	38	44	43	63	89	137	145	130	118	116	121	108	94	103	86	62	56	54	43	51
21	44	40	32	30	29	28	28	70	108	135	143	144	141	146	126	117	107	97	85	66	61	44	53	46
22	48	43	45	45	48	30	31	66	119	142	138	144		140	136	123	119	108	90	66	59	56	51	53
23	52	47	49	43	39	36	35	60	108	139	142	142	134	124	114	110	103	96	85	79	53	43	47	43
24	52		42	44	38	44	42	62	110	123	136	133	124	127	121	105	90	101	87	76	54	54	51	53
25	51	50	48	44	43	46	57	66	114	119	142	153	133	134	135	120	110	100	95	84	64	53	52	48
26	43	40	38	41	38	40	38	64	88	130	138	143	138	134	122	115	98	88	88	66	68	49	43	52
27	49	47	44	44	42	44	38	78	106	136	140	141	126	134	122	116	110	99	87	64	56	40	42	47
28	54	54	51	58	54	51	52	73	106	125	129	141	140	130	126	120	100	101	86	72	53	48	53	44
29	38	43	44	44	50	37	41	71	120	127	140	126	127	137	136	120	102	97	90	88	62	53	51	59
30	54	62	63	60	50	51	53	78	122	132	147	140		142	135	124	115	96	84	64	63	58	52	38
31	36	42	42	48	27	35	27	68	114	118	150	C	C	C	C	C	108	90	86	71	62	54	54	46
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	29	31	29	30	31	29	31	31	31	30	30	28	30	30	30	31	31	31	31	30	28	28	31
MED	41	40	38	40	38	37	37	62	92	122	130	130	121	118	114	108	96	83	68	59	44	40	40	38
U Q	48	47	44	44	43	44	41	69	110	135	140	141	127	134	122	115	102	97	86	66	56	51	51	46
L Q	32	35	33	35	35	32	31	53	84	108	120	122	113	106	107	101	86	74	64	53	42	34	32	34

HOURLY VALUES OF FES AT WAKKANAI

JAN. 1990

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
2	G	G	G	36	44	35	31	G	G	G	G	G	40	57	83	G	69	82	G	G	G	G	G	29
3	27	G	G	35	28	G	G	G	G	G	G	G	G	G	G	G	G	67	29	G	G	27	G	G
4	G	25	G	G	32	31	G	36	G	G	G	G	G	G	G	G	G	G	G	G	G		G	G
5	32	28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	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	G	27	G	G	G	G
7	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
8	G	G	G	G	G	28	G	G	32	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
9	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	29	G	G	G	G	G	G
10	28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
11	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
12	G	G	G	86	G	G	G	G	G	G	G	G	G	G	G	48	G	41	G	60	95	28	G	G
13	G	G	G	G	G	G	G	G	G	88		G	G	G	G	G	G	40	34	36	G	G	G	G
14	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	39	G	G	G	28	G	28
15	29	26	29	G	G	G		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	33
16	34		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	55	69	44	81	40	69	34
17	32	G	G	G	G	G	G	G	G	G	55	G	G	G	G	G	G	G	G	G	G	G	G	G
18	G	G	G	G	G	G	G	G	32	G	G	G	G	G	G	G	G	G	G	G	G	G	32	G
19	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	33	G	G	G	G
20	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	43	28	G	G	G	G	G	G
21	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
22	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
23	G	G	G	G	29	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
24	G		G	G	G	G	G	G	G	G	G	G	G	G	G	G	32	33	39	G	G	G	G	G
25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	39	G	G	G
26	G	G	G	G	59	31	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
27	G	G	G	G	G	G	G	G	G	G	G	G	48	G	G	G	G	G	G	G	G	G	G	G
28	G	G	G	G	67	30	G	31	G	G	G	G	G	G	G	G	G	G	G	G	58	34	G	33
29	G	G	G	G	G	G	G	27	48	G	G	G	G	G	G	G	G	G	G	G	G	G	28	G
30	G	G	G	G	G	G	28	G	G	G	G	G		G	G	G	G	G	G	G	40	38	G	24
31	G	G	G	G	G	G	G	G	G	G	G	C	C	C	C	C	G	28	G	G	G	G	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	29	31	31	31	31	30	31	31	31	30	30	29	30	30	30	31	31	31	31	31	30	31	31
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
U Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	29	G	G	G	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT WAKKANAI

JAN. 1990

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	15	15	15	16	16	16	16	26	29	32	34	35	26	32	24	21	15	15	15	15		16	16
2	17	15	15	16	16	16	18	17	26	27	28	34	30	32	23	28	20	17	16	16	15	20	16	16
3	17	18	20	16	16	16	18	17	27	30	38	36	34	35	34	27	22	17	20	17	16	18	17	15
4	20	20	18	16	16	16	17	18	26	33	41	33	44	49	33	27	20	16	15	16	16		17	17
5	18	18	16	16	15	16	17	15	27	33	42	45	45	40	33	29	18	18	16	17	15	17	16	17
6	15	16	16	15	16	16	15	16	27	30	39	44	43	49	56	33	22	17	17	17	15	18	15	15
7	16	15	16	16	16	16	16	17	28	28	26	26	35	32	29	26	18	16	15	15	15	15	15	15
8	16	16	15	15	15	16	16	15	17	28	30	33	27	30	29	18	20	16	15	15	15	16	15	16
9	16	15	15	N	N	15	15	16	23	21	22	26	23	33	20	17	20	17	15	15	20		24	20
10	18	23	29	16	14	23	24	17	24	27	32	35	33	33	24	26	20	15	15	15	15	16	15	15
11	17	16	15	15	14	16	20	16	26	28	30	21	36	33	29	21	21	16	15	15	16	17	16	15
12	15	17	17	18	15	15	16	16	18	20	34	34	24	33	30	26	20	16	15	15	17	17	16	16
13	16	16	16	16	18	16	16	16	24	22		33	33	33	29	30	22	17	16	16	16	17	15	16
14	15	15	15	15	15	15	16	16	27	30	32	30	34	40	42	35	24	22	16	15	15	17	15	18
15	18	16	16	15	14	16		21	26	29	39	41	40	38	34	28	21	20	18	15	15	17	15	16
16	17		15	20	15	17	24	17	27	32	33	40	43	35	32	27	21	17	16	24	16	17	17	15
17	17	18	16	16	17	16	16	17	26	21	26	34	36	26	30	21	22	15	15	15	15	18	15	16
18	16	15	14	15	16	15	15	17	18	21	21	22	22	22	30	18	21	15	15	15	16	16	15	15
19	15	16	15	16	15	15	15	16	27	21	22	27	38	38	32	28	22	16	15	16	16	15	15	16
20	15	15	16	16	16	15	14	17	27	32	35	36	36	38	33	27	23	16	15	15	16	17	16	15
21	15	N	16	N	15	18	N	17	28	33	39	42	42	39	43	29	23	15	17	15	15	15	17	17
22	17	16	16	15	14	15	16	18	28	32	35	37	40	35	33	29	24	16	15	17	16	16	15	20
23	15	15	16	15	17	16	20	18	27	33	42	40	36	35	33	32	26	15	16	15	17	15	15	16
24	18		16	14	16	15	15	18	27	36	38	40	39	40	32	30	24	17	17	15	16	17	15	16
25	16	17	15	15	17	16	15	18	28	33	35	39	35	40	34	30	24	15	16	16	15	18	16	17
26	16	20	16	17	16	15	16	18	28	33	36	38	29	39	33	23	24	17	15	17	16	15	16	18
27	16	16	15	14	15	15	15	20	28	32	38	38	38	40	34	30	24	17	15	16	17	16	15	16
28	15	15	16	15	15	15	17	16	28	33	35	35	36	38	32	28	27	16	15	15	16	15	18	17
29	16	17	16	16	15	15	15	21	28	32	39	38	38	36	34	30	26	16	15	16	15	16	16	16
30	16	15	15	15	15	15	16	21	27	32	27	28		35	33	28	26	17	16	15	20	18	16	16
31	18	16	16	16	N	15	N	20	21	24	34	C	C	C	C	C	24	15	15	16	15	15	16	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	28	31	29	29	31	28	31	31	31	30	30	29	30	30	30	31	31	31	31	31	28	31	31
MED	16	16	16	16	15	16	16	17	27	30	34	35	36	35	32	28	22	16	15	15	16	17	16	16
U Q	17	17	16	16	16	16	17	18	28	33	38	39	39	39	34	30	24	17	16	16	16	17	16	17
L Q	15	15	15	15	15	15	15	16	26	27	30	33	33	33	30	26	20	15	15	15	15	15	15	15

HOURLY VALUES OF FOF2 AT AKITA

JAN. 1990

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT AKITA

JAN. 1990

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	28	G	G	32	33	G	G	G	G	G	G	G	34	30	32	29	G	30	30	28
2	25	24	G	G	G	G	35	29	G	G	G	G	60	54	G	G	G	115	41	G	25	G	32	G
3	G	G	G	G	31	33	54	39	51	G	49	42	G	G	G	G	G	42	38	32	G	G	G	G
4	G	G	G	30	30	G	G	G	G	G	G	G	G	G	G	G	G	31	26	33	30	G	G	G
5	G	G	G	30		G	G	G	G	G	G	G	G	G	G	G	G	G	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	G	G	G	G	G
7	G	G	G	G	G	G	G	G	G	G	50	G	G	G	G	G	G	G	G	G	G	G	G	G
8	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	32	G	G	G		G	G
9	G	G	G	G	G	G	G	G	G	40	G	G	G	G	G	G	G	G	G	G	G	G	G	G
10	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	28	G	G	G	G	G
11	G	G	G		G	G	G	G	G	G	G	G	G	G	44	38	31	G	G	G	G	G	G	G
12	G	G	G	26	G	G	G	G	G	G	G	G	48	G	G	G	32	31	G	G	40	49	26	68
13	38	29	G	26	30	G	G	G	G	G	G	G	G	53	G	G	41	32	32	G	23	G	30	39
14	50	32	37	37	G	33	G	G	G	G	42	G	45	72	45	46	G	32	46	34	G	G	G	G
15	G	G	32	37	36	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
16	32	28	32	G	25	G	G	G	G	G	G	G	G	G	G	G	30	36	54	G	30	30	33	32
17	G	32	32	31	28	G	G	G	35	G	51	45	43	G	G	G	50	G	G	G	G	G	G	G
18	G	G	G	G	G	G	G	G	G	G	G	51	G	G	G	36	G	G	26	G	G	G	G	29
19	30	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	30	28	26	G
20	37	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
21	G	G	G	G	G	G		G	G	G	G	71	G	G	G	G	G	G	G	G	G	G	G	G
22	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	26	27	26	23	28	G	28
23	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	36	37	32	44	48	32	30
25	G	31	27	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	27	G	34	G	G
26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	31	G	G	G	G	G	G
27	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	41	46	70	31	30	G	G
28	G	28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	31	23	G	G	G	G
29	G	35	34	G	G	G	G	G	G	G	G	G	G	G	50	G	G	G	G	G	G	G	G	G
30	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	33	G	49	33
31	G	G	G	G	G	G	24	27	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	30	30	31	29	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	31	31
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
U Q	G	24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	32	32	26	25	28	26	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

HOURLY VALUES OF FMIN AT AKITA

JAN. 1990

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	17	18	17	16	21	16	20	17	20	18	21	20	23	22	29	20	16	15	16	17	16	N	23
2	16	15	15	20	20	16	15	20	28	22	22	38	35	26	22	30	21	15	16	16	16	20	17	16
3	21	15	21	15	16	15	15	16	17	20	21	22	22	23	35	20	17	17	16	16	17	22	20	18
4	21	18	16	15	15	16	16	20	28	26	35	38	39	35	35	28	16	16	16	16	16	22	21	21
5	N	17	20	15		18	18	18	20	24	38	36	44	47	36	34	23	20	18	20	17	16	16	17
6	17	15	15	15	18	15		18	18	22	35	35	36	35	24	33	22	17	17	16	16	20	16	16
7	17	15	15	15	16	16	16	18	16	20	22	23	22	22	21	20	22	15	16	16	16	16	18	17
8	17	15	15	15	15	16	18	20	21	17	20	23	22	21	21	16	22	17	17	16	17		18	16
9	23	15	15	N	N	18	20	18	26	18	20	20	21	22	23	20	22	16	17	18	16	17	16	17
10	16	15	15	15	15	16	16	20	18	20	20	22	24	22	22	20	22	16	17	16	17	15	16	17
11	17	15	15		16	16	17	18	26	18	21	21	22	16	17	15	17	16	15	17	16	17	20	18
12	18	15	15	15	15	16	17	18	26	23	30	23	23	23	23	21	18	16	15	16	15	16	16	16
13	16	15	16	15	15	15	16	20	16	17	20	20	21	20	15	17	18	18	16	17	15	21	16	16
14	15	15	15	15	17	15	17	18	27	21	22	24	22	22	22	18	22	15	15	15	15	16	20	16
15	17	15	16	14	14	20	18	18	29	35	35	39	40	35	35	30	27	18	16	16	16	16	18	16
16	16	15	16	15	15	15	15	20	28	33	24	26	26	36	23	16	24	15	15	15	16	16	16	15
17	16	15	14	15	15	18	15	20	16	16	18	21	20	18	16	17	16	17	16	16	16	18	16	17
18	17	15	16	17	16	18	16	18	18	15	18	18	18	22	21	17	24	17	16	17	15	20	15	16
19	17	15	15	16	15	16	16	20	15	20	21	23	24	27	22	22	27	16	15	16	16	16	16	16
20	16	16	15	15	15	16	16	21	21	22	23	27	40	24	22	21	18	16	15	16	17	16	16	16
21	16	18	16	15	15	15		20	21	23	36	33	39	38	46	36	28	17	16	16	16	18	18	18
22	16	15	15	15	15	15	20	20	18	21	23	23	23	26	35	34	26	18	16	16	16	16	16	16
23	16	15	16	15	15	15	16	18	29	22	22	26	38	24	21	36	27	20	16	17	20	17	17	17
24	17	15	14	16	20	17	17	18	28	35	36	39	39	38	39	41	22	15	15	16	16	16	16	16
25	18	15	15	18	15	21	18	20	29	23	36	45	38	36	35	33	26	20	17	18	16	17	18	16
26	18	16	15	15	15	17	16	22	29	34	36	26	28	26	22	22	18	15	16	16	16	16	17	17
27	16	15	15	15	15	16	15	22	30	21	23	45	39	38	35	23	28	16	16	15	15	16	16	18
28	16	15	15	15	15	18	15	20	22	26	27	29	38	36	23	32	29	18	15	16	18	17	16	16
29	16	14	15	18	15	16	15	23	27	36	26	38	39	40	36	22	17	18	16	16	16	21	18	21
30	16	15	15	15	15	17	17	23	16	22	23	24	26	23	23	18	17	20	16	16	16	17	16	18
31	16	15	15	15	18	16	18	21	29	22	24	28	27	23	22	21	28	20	16	17	15	17	16	17
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	31	31	29	29	31	29	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	30	31
MED	16	15	15	15	15	16	16	20	22	22	23	26	26	24	23	22	22	17	16	16	16	17	16	17
U Q	17	15	16	15	16	18	17	20	28	24	35	36	39	36	35	32	26	18	16	17	17	18	18	18
L Q	16	15	15	15	15	15	15	18	18	20	21	22	22	22	22	18	18	16	15	16	16	16	16	16

HOURLY VALUES OF FOF2 AT KOKUBUNJI

JAN. 1990

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	54	53	63	57	31	35	36	73	112	136	120	124	119	112	111	108	102	106	88	76	57	38	35	38
2	39	42	38	26	A	31	28	63	88	102				109	113	105	102	94	82	67	62	50		45
3	50	38	32	35	32	38	35	71	100	105	122		114	103	99	108	108	94	74		55	47	33	
4	30	26		35		32		67		114	121	131	121	115	108	110	110	105	85	78	67	48	40	38
5	36	34	36	45	30	26	31	69	88	113	120	121	122		108	111	102	89	78	71	64	47	39	
6	39	35		37	32	33	41	62	95	114	136	141	108	118	100	113	100	97	82	75	44	32	38	34
7	36	40	36	38	36	32	32	58	90	97	111	119	116	106	104	114	89	94	80	75	54	51	43	
8	38	39	38	33	28		27	56	84	90	113	106	110	104	99	98	93	84	71	58	51	43	32	34
9	32	33	32	26	29	36		66	90	124	144	98	110	114	114	110	97	93	75	63	52		36	36
10		45	48	37	31	31		67	89	106	105	132	124	107	107		111	115	94	72	55	53	48	40
11	35		36	32	28	28	29	65	90	117	132	131	110	99	105	102	92	89	77	65	56	52	30	31
12	30	31	31	30	30	36	37	71	104		144	124	126		122	116	100	108		70	53	42	40	35
13	38	A	A	A	A	34	38	58	95		148		128	114	126	128	108		A	71	44		35	35
14	30	N	40	32	35	38		60	94	102	125	118	118	117	123	114	100	86	85	67	44		44	42
15	38	26	32	36	38	31	32	65	95	121	130	132	123	122		112	95	83	76	67	52	42	39	37
16	46	36	38	35		40	45		99	116	117	117	121	130	117	109	112	101		67	50	39	44	41
17	A	39	43	38	40	42	47	70	90	141	137	120	125	126	130	123	111	93	77	73	50	48	54	
18		33	43	32	32	33	35	77	98	113	134	122	125	122	117	106	102	94	78	65	54	55	50	41
19	48	43	30	30	31	28		70	102	122	139	137	127	112	111	111	104	87	77	72	77	56	49	49
20	36	41	44	40	32	33	37	70	92	102	127	132	121	103	111	117		105	104	102	85	57	57	52
21	46	48	38	41		42	39	86	128	138	147	146	139	136	131	120	116	104	101	83	64	54	50	50
22	51	47	47	47	46	48	40	72	131	146	152	137	128	121	120	120	110	108	98	88	80	63	58	58
23	49	54		42	37		54	78	106	133	135		116	108	119	115	108	96	88	80	71	62	59	54
24	52		55	45		40	44	86	N		115	130	118	106	104	102	98	101	103	88	57	54	56	54
25	54	52	43	38	41	44	52	74	101	129	141	145	132	120		124	116	113	98	92	74	57	54	50
26	50	47	48	46	42	41	42	82	110	134	142	138	128	122	124	116	110	108	92	94		62	50	50
27	50	51	46	46	36	43	44	84	115	127	141	145	134	125	120	115	107	99	84	80	57	51	51	49
28	48	48	47	48	42	31	47	79	92	110	137	138	142	138	132	123	122	112	95	83	76	66	64	65
29	60	54	48	47	43	38	48	80	104	114	127	121	122	128	136	124	108	100	110	88	54	46	49	52
30	50	57	48	42	40	43	42	71	108	127	148	142	135	139	130	122	114	110	92	75	79	81		49
31	48	46	48	47	24	42	46	72	107	132	150	150	145	147	136	130	119	103	98	79	74	50	57	50
	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	27	27	30	25	29	26	30	29	28	30	27	30	29	29	30	30	30	28	30	30	28	29	27
MED	46	42	43	38	32	36	40	70	98	116	134	131	122	117	117	114	108	100	85	75	56	51	48	45
U Q	50	48	48	45	40	41	45	77	106	130	142	138	128	125	125	120	111	106	96	83	71	56	54	50
L Q	36	35	36	33	30	31	35	65	90	108	121	121	118	107	107	109	100	93	77	67	52	46	38	37

HOURLY VALUES OF FES AT KOKUBUNJI

JAN. 1990

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	32	G	G	G	G	G	G	34	G	45	69	54	58	46	G	G	G	G	G	G	24	24	24
2	32	G	G	G	34	G	29	50	G	G	43	G		G	G	G	G	G	41	32	33	G		G
3	G	G	G	G	28	31	30	G	G	G	G	G	G	G	G	G	34	60	G		G	G	G	
4	G	G		G		G		G		G	G	G	G	G	G	G	G	G	40	G	G	G	G	G
5	G	G	G	G	G	G	G	G	N	G	46	G	G		G	G	G	34	26	G	G	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
7	G	G	G	G	G	26	G	G	G	G	G	G	G	G	G	G	G	G	30	G	G	G	G	
8	G	G	G	G	G		G	G	G	G	G	G	G	G	G	G	G	G	24	G	G	G	G	G
9	G	G	G	G	G	G		G	G	G	48	48	43	G	G	G	32	G	G	G	G		G	G
10		G	G	G	G	G		G	G	G	G	G	G	G	G	G	G	37	24	24	G	G	G	G
11	G		G	G	25	G	G	G	G	G	G	G	G	46	46	40	G	25	23	G	G	G	G	G
12	G	G	G	29	G	G	G	G	G	G	48	G	G	G	G	G	34	37		25	G	G	G	25
13	25	35	48	50	46	30	G	G	G	G	G	G	G	G	43	G	38		24	24	G		G	G
14	G	25	G	G	32	26		G	G	G	58	43	49	44	43	43	43	G	G	G	G		G	G
15	G	G	G	G	31	G	28	G	34	G	G	G	G	53	G	G	G	G	G	G	G	G	G	G
16	G	33	31	24		G	G		G	G	G	G	G	G	G	G	G	G		32			G	G
17	40	31			26		G	G	G	G	G	46	57	G	G	38	47	G	25	G	G	G	G	
18		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	36	G
19	G	26	G	G	G	G		G	54	39	G	G	G	G	G	G	33	30	30	26	29	25	G	58
20	25	G	G	G	G	G	G	G	34	50	G	G	G	G	42	G		G	G	G	G	G	G	G
21	G	G	G	G		G	G	G	G	44	48	44	G	G	G	G	G	G	G	G	G	G	G	G
22	G	G	G	G	G	G	G	G	G	44	43	G	G	G	G	G	G	G	27	G	G	G	G	G
23	G	24		G	G		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
24	G		G	G		G	G	G	G	G	G	G	G	G	49	48	G	G	G	G	29	G	G	G
25	G	24	G	27	G	G	G	G	G	G	G	59	50	G	G	G	G	G	G	G	G	G	26	G
26	G	G	29	29	G	G	G	G	G	G	G	G	49	G	G	G	G	G	G	G	G	G	G	G
27	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	40	G	42	25	G	G	G	G	G
28	G	G	G	26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	26	G	G	G	G
29	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	34	G	G	G	G	G	G
30	G	G	G	G	G	G	G	G	37	42	44	G	G	44	G	G	G	G	G	G	G	G		G
31	24	25	G	G	G	G	G	G	G	G	G	49	48	G	G	G	G	G	G	G	G	G	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	27	30	27	28	26	30	29	31	31	31	30	30	31	31	30	30	29	30	30	27	29	27
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
U Q	G	24	G	G	25	G	G	G	G	G	43	G	G	G	G	G	G	25	25	G	G	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT KOKUBUNJI

JAN. 1990

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

HOURLY VALUES OF FOF2 AT YAMAGAWA

JAN. 1990

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	63	63	58	42	31	46		53	106	134	129	122	125	122	127	124	131	126	121	109	86	85	74	63
2	A	54	53	43	35	33		46	80	90	102	115	114	117	116	111	113	109	103	88	87	84	52	52
3	58	35	18	31	43	28		49	94	117	119	121	121	122	116	117	120	125	108	80	77	66	53	41
4	32	31	43	52	32		31	52	102	121	122	117	117	117	119	131	132	130	124	109	104	83	63	54
5	42	54	52	47	49	32	31	51	97	117	126	121	124		128	124	126	131	104	100	86	77	51	59
6	26	54	60	39	36	28	40	49	88	117	135	140	116	115	113	118	120	122	85	88	80	59	49	43
7	43	43	40	49	38	71		42	85	102	107	120	121	122	110	109	121	123	111	99	89	89	84	34
8	45	63	42	30	32			42	74	102	114	107	127	118	116	117	113	115	97	87	87	86	65	46
9	28	34	35	46		31	37	37	86	116	138	122	108	125	131	127		106	108	65	64	58	43	31
10	31	44	32	37	31	25	N	30	88	123	122	126	147	150	142	143	165	177	162	81	108	110	88	62
11	43	37	36	38	30	N		41	83	116	132	132	121	120	111	111	105	108	100	71	78	71	42	34
12	39	42	38	29	22	26	38	43	87	122	140	133	137	142	137	138	134	129	120	106	88	84	50	43
13	31	35	34	30	34	32	37	49	81	114	147	148	142	140	140	144	135	125	104	90	88	66	42	47
14	47	32	41	36	28	32	A	44	93	102	125	125	124	120	126	131	130	114	102	85	83	82	63	53
15	34	31	35	36	32	26	30	42	90	116	129	150	147	158	164	171	160	147	138	110	108	75	81	63
16	66	52	47	48	35	36	43	50	89	108	124	130	130	140	132	130	121	121	108	86	62	77	64	34
17	32	37	35	35	38	36	37	48	81	122	138	128	142	148	156	160	159	160	161	145	143	110	86	83
18	75	53	42	51	32	39	49	62	111	120	136	141	140	141	127	134	130	126	108	89	87	82	A	
19	38	32	34	31		31	31	53	97	106	144		137	139	145	146	145	144	141	135	139	138	89	86
20	81	73	63	50	40		34	53	86	100	118	128	128	112	122	126	126	126	122	132	130	88	78	74
21	44	45	30	28	40	37	40	66	121	131	151	151	146	141	145	N	141	127	122	126	89	80	74	76
22	51	55	46	53	40	31	25	43	122	127	134	144	141	137	137	128	124	116	123	126	138	143	107	86
23	86	77	78	68	48	24	32	52	100	120	128	126	116	115	128	127	124	114	113	89	109	109	88	82
24	80	65	64	53	31	30		63	108	118	105	130	130	112	112	112	111	112	106	105	89	78	84	66
25	53	38	41	38	29	36	37	54	88	115	133	138	127	114	112	122	114	115	114	97	85	84	65	N
26	30	63	58	56	49		30	53			144	135	129	126	127	124	131	127	111	108	111	125	86	80
27	83	84	64	51	44	31	44	56	107	126	144	144	137	128	125	124	128	116	108	96	100	86	74	68
28	67	66	54	54	50	28	26	56	101	113	132	142	142	145	146	148	148	142	136	145	166	146	125	115
29	106	86	78	72	53	37	37	52	100	102	116	132	134	135	138	132	133	123	116	110	79	75	64	66
30	68	66	58	41	34	25	31	53	88	108	130	148	88	141	129	130	127	122	121	107	108	103	86	64
31	53	54	54	48	40	23	34	54	88	108	144	153	146	145	138	145	145	132	131	108	88	86	68	58
	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	31	29	26	22	31	30	30	31	30	31	30	31	30	30	31	31	31	31	31	30	29
MED	46	53	43	43	35	31	36	51	90	116	130	131	129	127	128	128	129	125	113	100	88	84	71	62
U Q	67	63	58	51	41	36	38	53	101	121	138	142	141	141	138	138	135	130	123	110	108	103	86	75
L Q	34	37	35	36	31	28	31	43	86	108	122	122	121	118	116	122	121	115	106	88	85	77	53	44

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

JAN. 1990

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G		24	G	G	41	G	45	G	G	G	G	G	G	G	G	G	24	32
2	38	26	31	31	G	G		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
3	G	G	32	G	G	G		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
4	G	G	G	G	G		G	G	G	G	42	G	G	G	G	G	G	G	G	G	G	G	G	G
5	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	30	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	G	G	G	G		G	79	39	G	G	G	47	G	G	G	G	28	25	G	G	G	G
8	G	G	G	G	G			G	G	G	G	45	G	47	G	G	G	49	38	25	G	G	G	G
9	G	G	G	G	G	G	G	G	G	G	43	51	47	47	G	G	G	G	G	G	G	G	G	G
10	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
11	G	G	G	G	G	G		G	G	G	G	G	49	51	46	44	G	32	G	G	G	G	G	G
12	G	G	G	G	G	G	G	G	G	G	G	G	G	G	46	43	G	41	G	G	G	G	G	G
13	G	G	28	G	36	G	24	G	G	G	G	48	70	55	43	G	G	G	G	G	G	G	G	G
14	G	G	G	G	G	G	26	G	G	G	G	47	62	46	43	G	G	G	G	31	32	G	28	G
15	G	G	G	G	G	G	G	G	G	G	54	49	55	G	45	G	52	54	G	28	G	G	G	G
16	G	G	G	G	28	G	G	G	G	G	G	G	G	G	G	46	42	37	G	G	G	G	G	30
17	24	G	G	G	G	G	G	G	G	40	46	45	G	47	46	41	38	G	G	G	G	G	G	G
18	G	G	G	G	G	G	G	G	G	G	51	44	G	G	69	G	41	40	30	24	32	G	60	G
19	G	G	G	G		G	G	G	G	39	44		48	45	G	G	39	54	46	38	24	G	G	G
20	G	G	G	G	G		G	G	G	44	46	51	49	45	G	G	G	G	G	G	G	G	G	G
21	G	G	G	G	G	G	G	G	32	G	46	52	G	G	G	42	38	G	25	G	G	G	G	G
22	G	G	G	G	G	G	G	G	G	40	G	44	G	49	G	G	39	G	34	G	32	G	G	G
23	G	G	28	G	G	G	G	G	G	39	43	45	G	G	G	G	G	G	G	25	G	G	G	G
24	G	G	G	G	24	G		G	G	G	G	52	G	46	54	G	38	G	31	30	31	G	G	G
25	G	G	G	G	G	G	G	G	G	44	53	G	G	G	G	G	G	32	29	28	G	G	G	G
26	G	G	G	G	28		G	G			G	G	46	46	68	42	50	40	37	26	G	G	G	G
27	G	G	G	G	G	G	G	G	G	G	G	G	G	48	G	G	G	G	G	G	G	G	G	G
28	G	G	G	G	G	G	G	G	G	G	G	54	51	54	48	G	G	G	33	29	G	G	G	G
29	G	G	G	G	G	G	G	G	G	G	G	G	G	60	G	42	G	G	29	G	G	G	G	G
30	G	G	G	G	G	G	G	G	G	G	G	50	54	G	44	G	G	G	G	G	G	G	G	G
31	G	25	G	G	G	G	G	24	G	G	G	49	48	50	45	45	39	G	G	G	G	G	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	30	27	24	31	30	30	31	30	31	31	31	31	31	31	31	31	31	31	31	31
MED	G	G	G	G	G	G	G	G	G	G	G	22	G	45	G	G	G	G	G	G	G	G	G	G
U Q	G	G	G	G	G	G	G	G	G	G	43	49	48	47	45	41	38	32	29	25	G	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

HOURLY VALUES OF FMIN AT YAMAGAWA

JAN. 1990

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	21	15	15		16	16	33	24	36	28	39	27	36	22	22	15	15	15	15	15	15
2	15	15	15	15	15	15		16	27	33	34	37	38	38	35	20	18	16	15	15	15	15	15	15
3	15	15	15	15	15	15		15	17	21	35	38	38	39	36	34	30	15	16	15	15	16	15	15
4	15	15	15	15	15		15	15	27	33	27	38	40	42	36	24	30	23	15	15	15	15	15	15
5	16	15	15	15	15	15	15	16	15	16	18	36	38	38	38	21	20	23	15	15	15	15	15	15
6	15	15	15	15	15	15	15	15	15	16	17	24	38	38	38	16	22	26	15	15	15	15	15	15
7	15	15	15	15	15	15		15	16	17	18	28	38	35	27	23	20	15	15	16	15	15	15	15
8	15	15	15	15	15			15	15	16	17	20	36	24	21	16	15	15	15	16	15	15	15	15
9	15	15	15	N	70	15	15	15	26	16	18	24	29	27	22	18	17	15	15	15	15	15	15	15
10	15	15	15	15	15	N	16	15	15	16	21	20	28	23	22	18	20	23	15	15	15	15	15	15
11	15	15	15	15	15	N		15	15	18	17	21	22	22	24	24	15	15	15	15	15	15	15	15
12	15	15	15	15	15	16	15	15	15	16	24	17	21	22	22	20	17	16	15	15	15	15	15	16
13	15	15	15	15	15	15	15	15	23	17	17	23	23	29	23	21	17	17	16	15	15	15	15	15
14	15	15	15	15	15	16	15	16	17	18	21	24	33	22	22	21	18	24	15	15	15	17	15	16
15	15	15	15	15	15	15	15	15	17	17	21	23	24	27	21	22	18	16	15	16	15	15	15	15
16	15	15	15	15	15	15	15	15	15	16	18	20	22	40	27	24	18	18	15	15	15	15	15	15
17	15	15	15	15	15	15	15	15	15	16	18	23	24	28	23	20	15	16	15	15	15	15	16	15
18	15	15	15	15	15	15	15	15	15	15	15	17	17	23	18	16	16	15	16	16	16	15	15	15
19	15	15	15	15		15	15	15	16	15	17		27	23	23	23	18	15	16	15	16	15	15	15
20	15	15	15	15	15		15	16	16	16	16	23	24	26	24	21	18	26	15	15	15	15	15	15
21	15	15	15	15	15	15	15	17	17	21	23	32	34	32	48	24	20	15	15	15	15	15	15	15
22	15	15	15	15	15	15	15	15	16	16	23	32	32	32	29	38	16	16	15	15	15	15	15	15
23	15	15	15	17	15	15	15	15	16	17	21	32	29	22	22	21	23	27	16	15	15	15	15	15
24	15	15	15	15	16	18		15	16	18	38	32	34	26	29	24	18	16	15	15	15	15	15	15
25	15	15	15	15	15	15	15	15	16	18	27	32	29	39	38	36	18	16	15	15	15	15	15	15
26	15	15	15	15	15		15	16			21	26	30	23	18	17	16	15	15	15	16	15	15	15
27	15	15	15	15	15	15	15	16	17	17	20	24	29	26	26	26	20	16	16	15	15	15	15	15
28	15	15	15	15	15	17	15	16	28	34	26	36	32	32	29	29	24	26	15	15	15	15	15	15
29	15	15	15	15	15	15	15	15	16	23	40	32	41	32	26	22	17	15	16	15	15	15	15	15
30	15	15	15	15	15	18	15	16	17	17	22	22	22	29	32	23	23	28	16	15	15	15	15	15
31	15	15	15	15	15	15	15	16	16	16	21	34	18	24	23	22	20	27	16	15	15	15	15	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	30	30	25	24	31	30	30	31	30	31	31	31	31	31	31	31	31	31	31	31	31
MED	15	15	15	15	15	15	15	15	16	17	21	25	29	28	26	22	18	16	15	15	15	15	15	15
U Q	15	15	15	15	15	15	15	16	17	18	24	32	36	38	32	24	20	23	16	15	15	15	15	15
L Q	15	15	15	15	15	15	15	15	15	16	18	23	24	23	22	20	17	15	15	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT OKINAWA

JAN. 1990

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	82	84	80	60	29	35	37	56	100	136	145	122		141	153	N	167	167	168	170	162		144	110
2	86	87	100	64	53	58		42	97	98	104	109	120	106	130	122	117	135	112	111	145	144	108	85
3	71	51	49	45	56	47	31	50	103	137	124	107	119	134	101	141	147	156	144	139	108	107	108	88
4	70	62	52	50	40	44	40	54	108	144	138	122	124	129	140	144	161	163	163	164	166	164	110	98
5	88	88	83	68	54	44	37	59	103	137	130	121	126	144	152	163	165	171	164	146	164	142	120	90
6	76	76	77	44	38	43	52	52	87	141	145	120	107	128	120	134	145	144	145	90	138	N	111	92
7	66	64	54	59	54	28	31	47	88	105	140	121	130	144	128	121	146	164	164	N	164	170	145	107
8	84	91	80	43	39	26	27	42	85	98	125	107	124	135	134	132	136	143	138	143	164	170	145	88
9	84	65	60	33	34	48	52	54	104	140	140	114	117	146	147	133	127	140	122	88	88	90	85	82
10	44	45	57	52	28			32	86	135	144	131	160	165	156	162	176	187	170	146	164	169	146	87
11	79	76	64	54	32	N		37	88	111	156	141	136	137	130		122	126	111	88	88	88	66	30
12	35	55	36	36	34	36	43	37	96	132	152	133	145	153	162	170	166	170	172	163	164	145	109	67
13	64	61	43	35	44	24	38	51	88	122	142	147	160	176	184	175	176	164	164	146	141	108	82	66
14	67	66	55	51	31	34	28	36	88	120	119	128	121	137	144	165	169	168	145	145	144	145	108	81
15	66	52	63	55	38		N	42	97	111	118	152	164	176	169	163	162	165	168	142	144	142	104	88
16	91	86	75	71	56	37	38	51	100	104	124	130	121	144	146	146	145		142	122	121	122	108	65
17	54	54	53	44	43	42	42	57	99	111	121	138	156	170	171	164	163	164	170	171	164	163	145	103
18	91	86	66	52	51	50	53	66	110	136	142	130	143	147	152	156	165	165	145	139	104	90	81	60
19	53	A	32	A	A	25	27	63	104	112	126	145	140	160	176	171	A	171	166	165	164	175	162	122
20	102	88	88	88	63	44	32	57	104	108	101	117	122	132	138	145	151	166	164	169	174	145	130	90
21	86	82	72	58		32	50	78	121	134	141	147	144	145	152	156	164	166	164	170	164	145	140	110
22	86	80	71	79	40	30	N	25	122	136	128	137	147	160	144	N	160	163	171	168	171	171	145	134
23	128	122	85	86	65	45	34	64	106	133	124	123	117		140	143	156	142	145	144	166	164	145	146
24	126	88	68	64	44		32	54	108	121	122	111	117	118	121	121	111	122	121	93	139	145	144	88
25	83	66	53	49	44	44	44	85	110	130	146	133	120	127	121	136	131	138	145	129	108	103	110	87
26	84	88	82	84	62	34	31	53	107	142	145	146	147	146	145	161	164	171	171	171	168	178	162	141
27	141	107	88	87	65	53	43	54	104	147	146	145		136	140	146	146	139	138	145	143	145	108	87
28	85	81	60	72	58		27	53	102	124	142	144	146	164	176	181	171	171	164	160	170	179	156	144
29	110	110	99	90	86	62	35	70	107	127	120	129	128	145	142	146	157	146	140	124	103	111	88	80
30	88	85	72	40	32	24	26	52	104	106	119	C	135	136	140	140	142	143	141	145	146	142	145	110
31	87	84	83	69	43	31	28	52	104	127	146	147	147	154	163	167	180	170	177	164	146	144	128	87
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	31	30	29	26	26	31	31	31	31	30	29	30	31	28	30	30	31	30	31	29	31	31
MED	84	82	68	56	44	40	36	53	103	127	138	130	130	144	144	146	158	164	163	145	146	145	120	88
U Q	88	88	82	71	56	45	43	57	107	136	145	144	146	154	156	163	165	168	168	164	164	166	145	110
L Q	67	64	54	45	36	31	31	42	96	111	122	121	120	135	134	138	145	143	141	129	138	116	108	82

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

JAN. 1990

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	33	38	G	G	45	G	50	G	64	G	G	G	G	G	G	G
2	G	G	G	G	G	G		G	34	G	57	G	G	G	58	43	G	55	37	38	32	G	G	G
3	G	G	G	G	34	G	G	G	G	38	G	G	51	45	G	G	42	33	25	29	G	G	G	G
4	G	G	G	G	G	G	G	G	G	G	G	54	48	G	G	66	44	G	G	27	G	G	G	G
5	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	30	G	28	G	G	G
6	G	G	G	G	G	G	G	G	G	G	G	52	G	G	45	43	40	34	G	G	G	G	G	G
7	G	G	G	G	G	G	G	G	33	G	44	G	G	61	67	57	G	G	G	G	G	32	G	26
8	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	36	37	29	G	G	G	24
9	G	G	G	G	G	G	G	G	G	G	G	51	49	G	48	G	G	G	G	G	G	G	G	G
10	G	G	G	G	G			G	G	G	G	G	48	49	45	G	G	G	G	27	26	G	G	G
11	G	G	G	G	G	G		G	G	G	G	47	56	54	54		43	39	43	24	G	24	23	G
12	G	G	G	G	G	G	G	G	G	G	G	G	56	48	60	45	G	G	G	G	G	34	24	25
13	G	G	24	30	29	29	G	G	G	G	G	56	51	50	60	61	40	34	G	G	G	G	28	G
14	G	G	G	G	G	G	G	G	G	G	G	48	56	53	54	68	48	52	32	39	32	32	24	G
15	G	G	G	G	G		G	G	G	G	47	54	59	58	52	47	G	G	32	24	31	G	G	G
16	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	47	43		G	G	G	G	G	G
17	G	G	G	G	G	G	G	G	G	43	G	50	49	G	G	G	40	G	28	G	28	48	31	G
18	G	G	G	G	G	G	G	G	G	G	46	52	G	G	G	G	42	35	28	26	G	G	G	G
19	G	38	25	37	31	G	G	G	G	38	72	49	65	50	49	43	40	G	40	31	25	G	G	G
20	G	G	G	G	G	G	G	G	G	41	50	62	63	62	G	G	61	G	G	G	G	G	G	G
21	G	G	G	G		G	G	G	G	43	50	71	78	66	70	51	48	35	G	G	G	G	G	G
22	G	G	G	G	G	G	G	G	G	G	G	45	55	57	47	47	41	40	G	G	G	G	G	G
23	G	G	G	G	30	26	G	G	G	G	59	51	46		45	G	66	G	28	23	G	G	G	G
24	G	G	G	G	G		G	G	G	G	47	51	57	63	46	47	49	38	G	30	G	G	25	G
25	G	G	G	G	G	G	G	G	G	42	46	49	64	G	G	G	G	G	G	G	G	G	G	G
26	G	G	G	G	G	G	G	G	G	38	G	48	56	51	G	G	44	G	38	24	G	24	G	G
27	G	G	G	G	G	G	G	G	G	G	G	G	52	52	48	G	40	G	33	G	31	30	33	24
28	G	G	G	G	G		G	G	G	G	G	62	66	65	63	G	41	40	38	32	29	24	26	G
29	G	G	G	G	G	G	G	G	G	G	G	G	G	G	47	G	68	75	58	26	26	G	G	G
30	G	G	G	G	G	G	G	G	G	G	G	C	G	48	G	G	46	G	G	G	G	G	G	G
31	G	G	G	G	G	G	G	23	G	G	G	G	G	52	59	G	G	G	G	G	G	G	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	30	27	28	31	31	31	31	30	31	30	31	30	31	30	31	31	31	31	31	31
MED	G	G	G	G	G	G	G	G	G	G	G	48	49	48	47	G	41	G	G	G	G	G	G	G
U Q	G	G	G	G	G	G	G	G	G	38	46	52	56	54	54	47	46	36	33	27	26	24	23	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

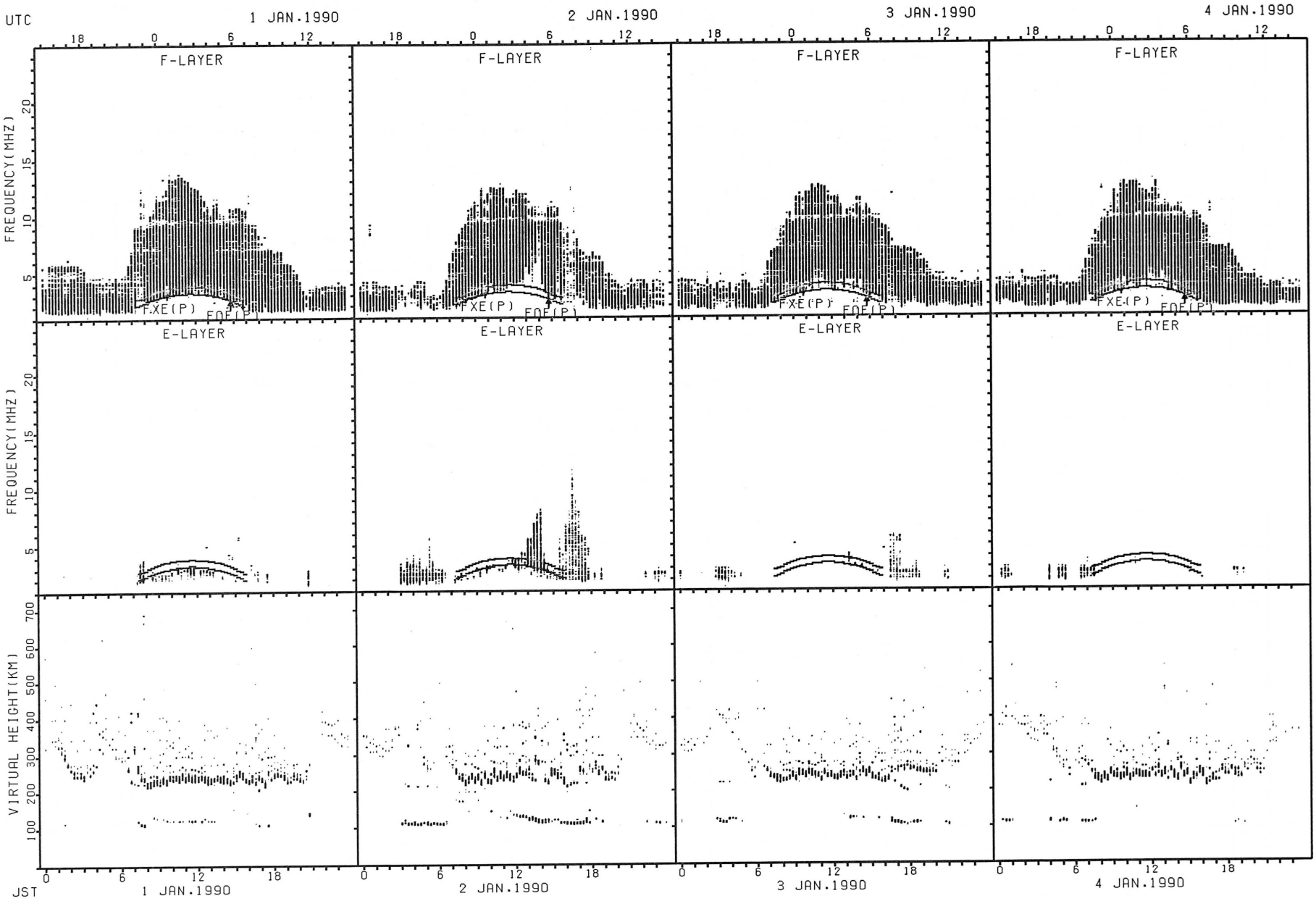
HOURLY VALUES OF FMIN AT OKINAWA

JAN. 1990

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

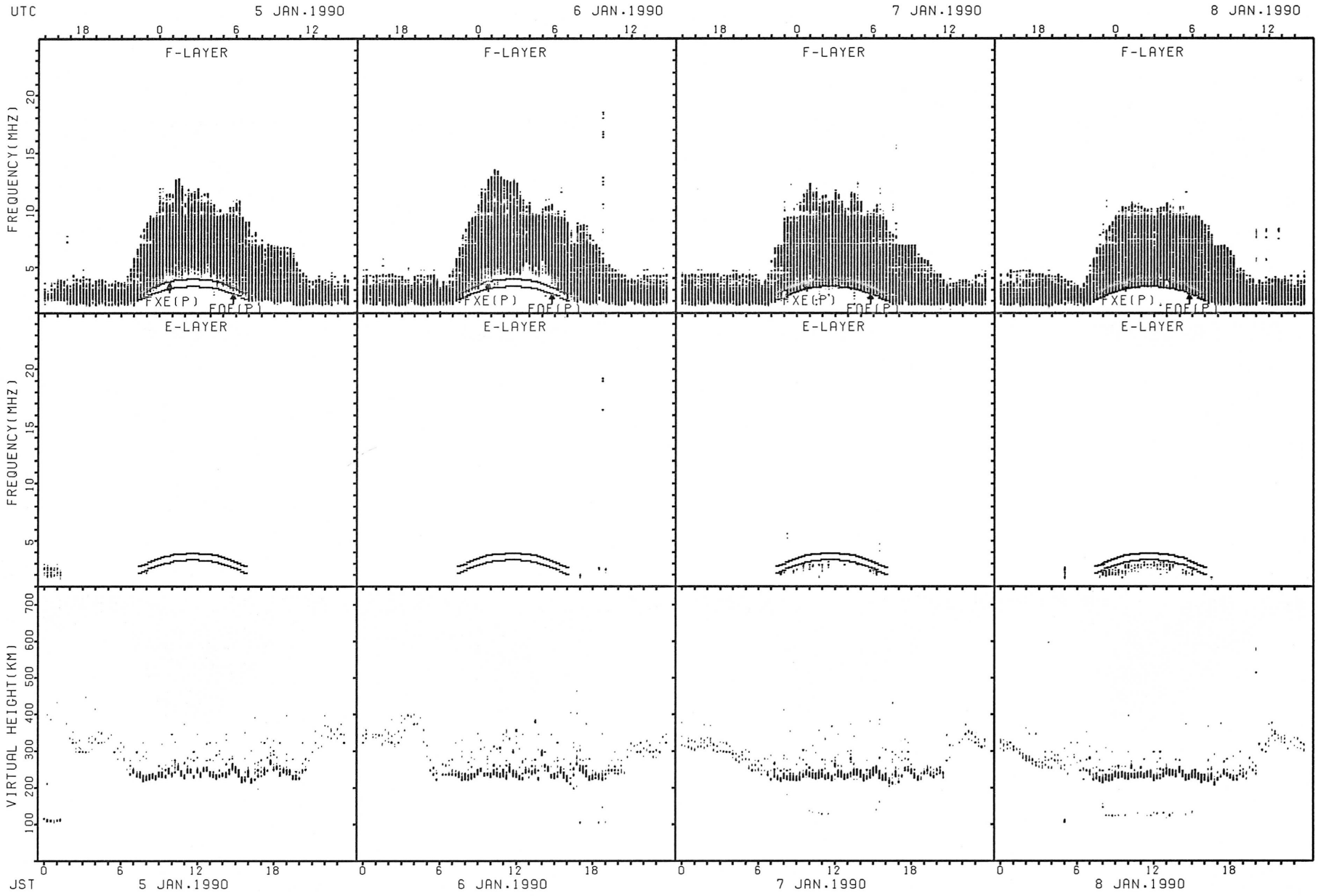
HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	15	14	15	N	15	15	15	16	18	22	27	27	28	27	23	18	26	16	15	15	15	15	15
2	15	15	15	15	15	15		16	16	23	24	21	27	26	26	22	18	15	15	15	15	16	16	15
3	15	15	15	15	15	15	15	15	16	17	22	26	32	29	27	23	18	18	18	17	15	16	18	17
4	15	15	15	15	15	15	15	15	16	18	21	23	24	27	27	21	16	26	16	15	15	15	15	15
5	15	15	15	15	15	15	15	15	16	16	23	24	24	24	23	22	20	18	17	16	16	16	16	16
6	16	15	15	15	15	15	15	15	15	16	17	23	26	23	24	27	22	16	17	15	15	15	15	15
7	15	14	14	15	14	15	15	15	16	15	18	28	24	24	24	26	14	16	17	15	15	15	15	15
8	15	15	16	16	16	16	16	15	15	16	22	26	24	22	22	23	16	15	14	16	20	15	15	16
9	18	15	15	17	N	16	15	16	24	17	22	26	27	27	23	22	15	15	18	15	15	15	15	15
10	15	15	15	15	14			15	24	15	18	21	28	23	23	23	17	15	17	15	15	15	15	15
11	15	15	16	16	15	N		15	15	16	22	23	23	24	22		18	15	15	15	15	15	15	N
12	15	15	14	15	15	15	15	15	15	15	28	23	26	26	27	21	20	15	15	15	15	15	15	16
13	15	15	15	14	15	15	15	16	15	16	17	23	27	26	26	22	17	15	15	15	15	15	15	15
14	16	15	15	16	15	15	15	15	15	20	20	26	23	27	27	21	20	15	14	14	15	15	15	15
15	15	15	18	16	16		15	15	24	22	23	26	24	27	26	22	20	15	15	17	15	24	15	15
16	15	15	15	15	15	16	15	16	27	18	23	22	28	41	26	21	22		22	17	16	16	15	17
17	16	16	15	14	15	15	15	15	15	16	21	26	29	27	27	26	20	14	17	15	18	15	15	15
18	16	16	15	15	15	15	15	15	15	15	20	23	27	26	26	20	20	14	15	16	15	15	15	15
19	15	15	15	15	14	15	16	15	16	16	18	28	27	29	28	22	21	14	15	14	15	15	15	15
20	15	16	15	15	14	15	15	15	15	17	23	26	27	29	26	26	23	16	21	15	16	16	15	15
21	15	15	15	16		16	15	15	29	22	22	23	35	26	44	26	23	20	21	16	16	16	15	16
22	17	15	15	14	14	17	15	15	15	17	22	27	29	30	27	29	21	17	21	15	15	16	15	15
23	15	15	15	15	16	15	15	15	16	15	17	23	30		26	23	20	15	16	16	16	15	15	15
24	15	15	15	15	15		15	16	26	22	24	27	24	29	26	23	22	20	17	15	15	14	15	14
25	15	15	15	15	15	15	15	16	15	17	26	26	26	29	29	26	23	21	22	15	15	15	15	15
26	15	15	15	15	15	15	15	15	16	17	21	23	23	23	22	23	18	16	15	15	15	15	15	15
27	15	15	15	15	14	15	15	15	15	16	23	23	24	27	24	24	22	16	15	15	15	23	16	15
28	14	15	15	15	15		N	15	17	24	26	27	28	26	26	26	24	18	14	15	15	15	15	15
29	15	14	15	15	15	14	16	16	27	21	26	27	28	26	22	21	17	15	15	15	15	16	15	15
30	15	15	15	15	15	15	15	16	15	22	21	C	22	23	26	21	18	17	21	15	16	15	15	15
31	15	15	15	15	15	15	15	15	16	17	20	23	26	29	26	23	20	16	21	15	15	15	15	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	28	26	27	31	31	31	31	30	31	30	31	30	31	30	31	31	31	31	31	30
MED	15	15	15	15	15	15	15	15	16	17	22	25	27	26	26	23	20	16	16	15	15	15	15	15
U Q	15	15	15	15	15	15	15	16	17	20	23	26	28	29	27	26	22	18	18	16	16	16	15	15
L Q	15	15	15	15	15	15	15	15	15	16	20	23	24	24	24	22	18	15	15	15	15	15	15	15

SUMMARY PLOTS AT WAKKANAI

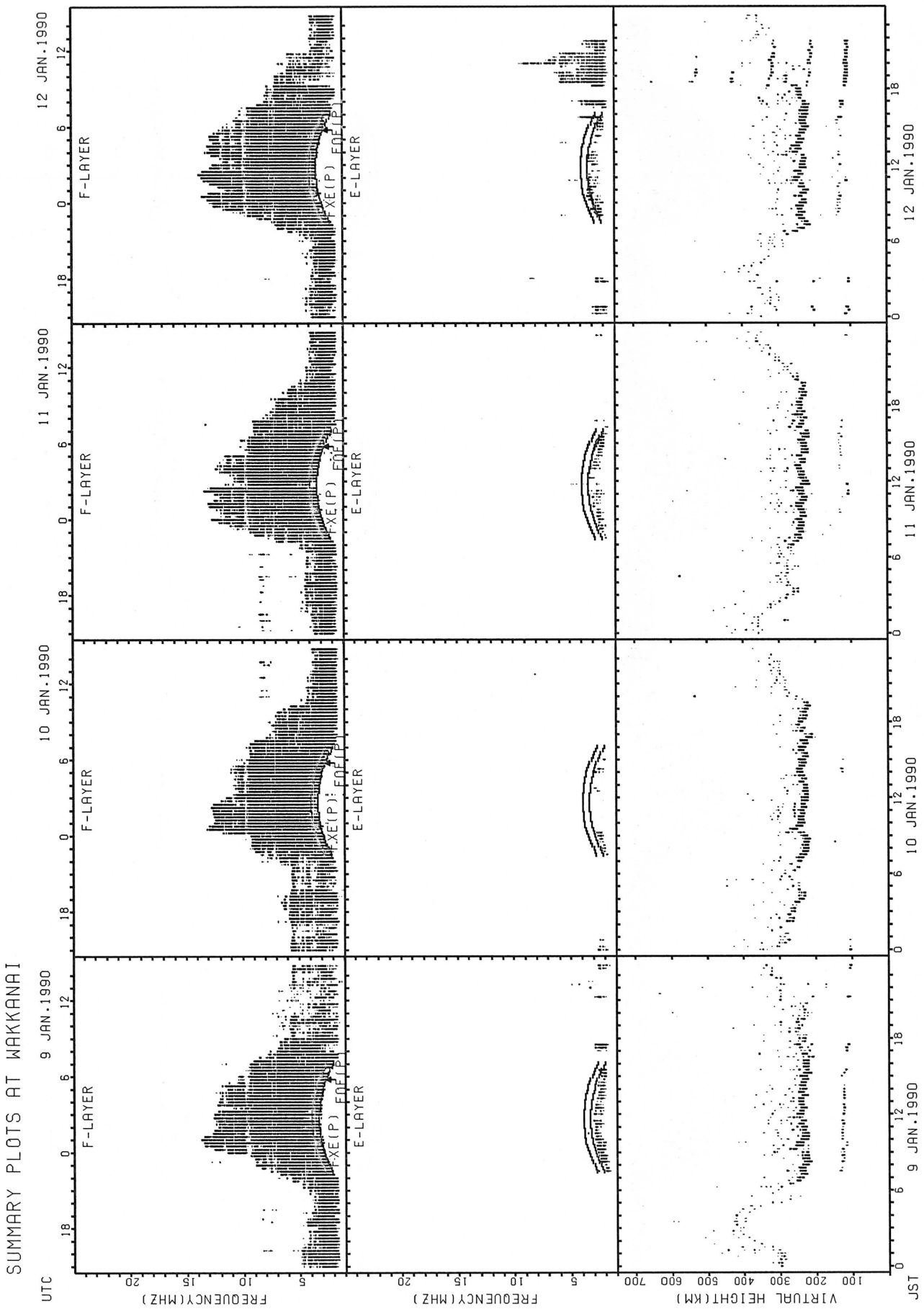


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

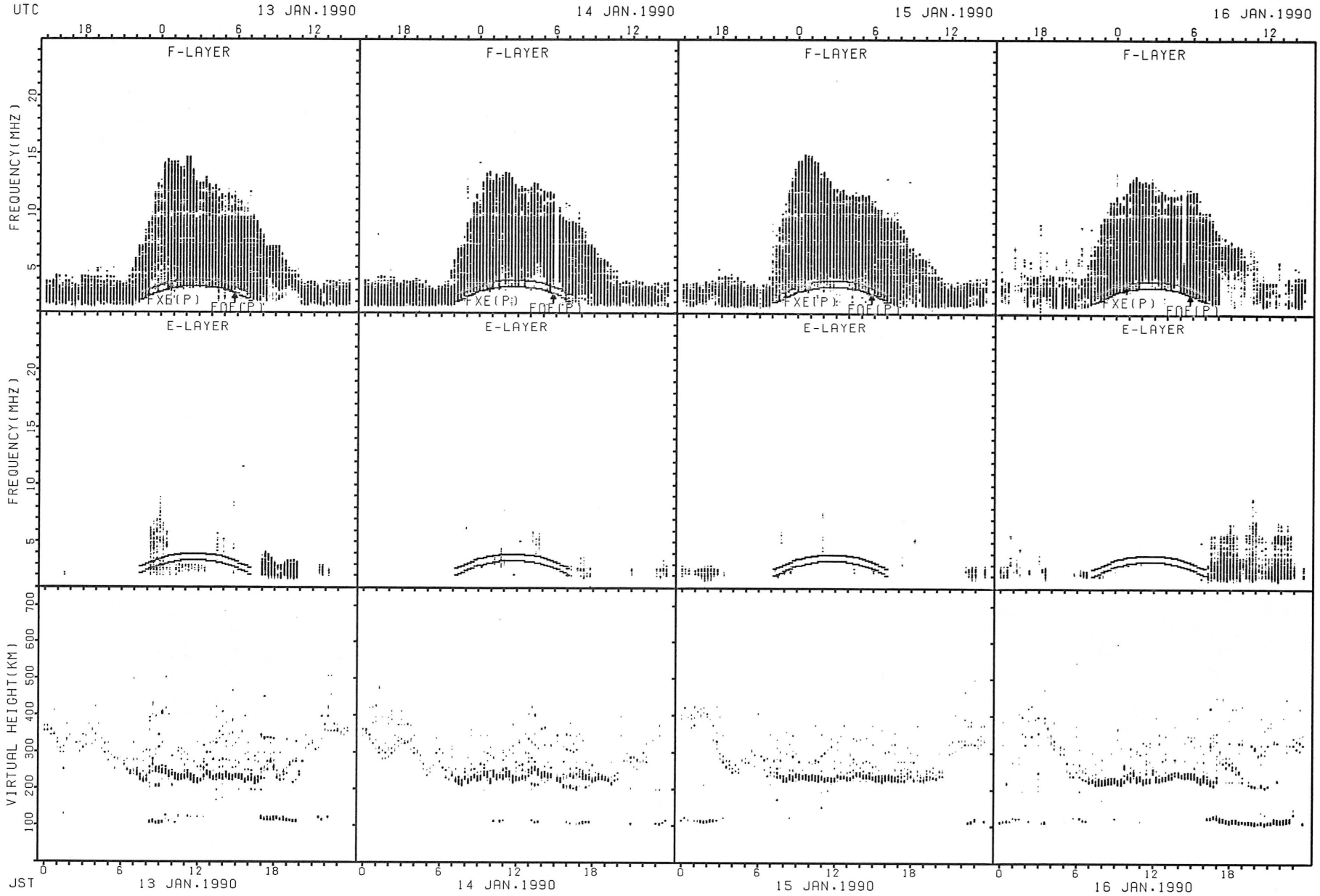
SUMMARY PLOTS AT WAKKANAI



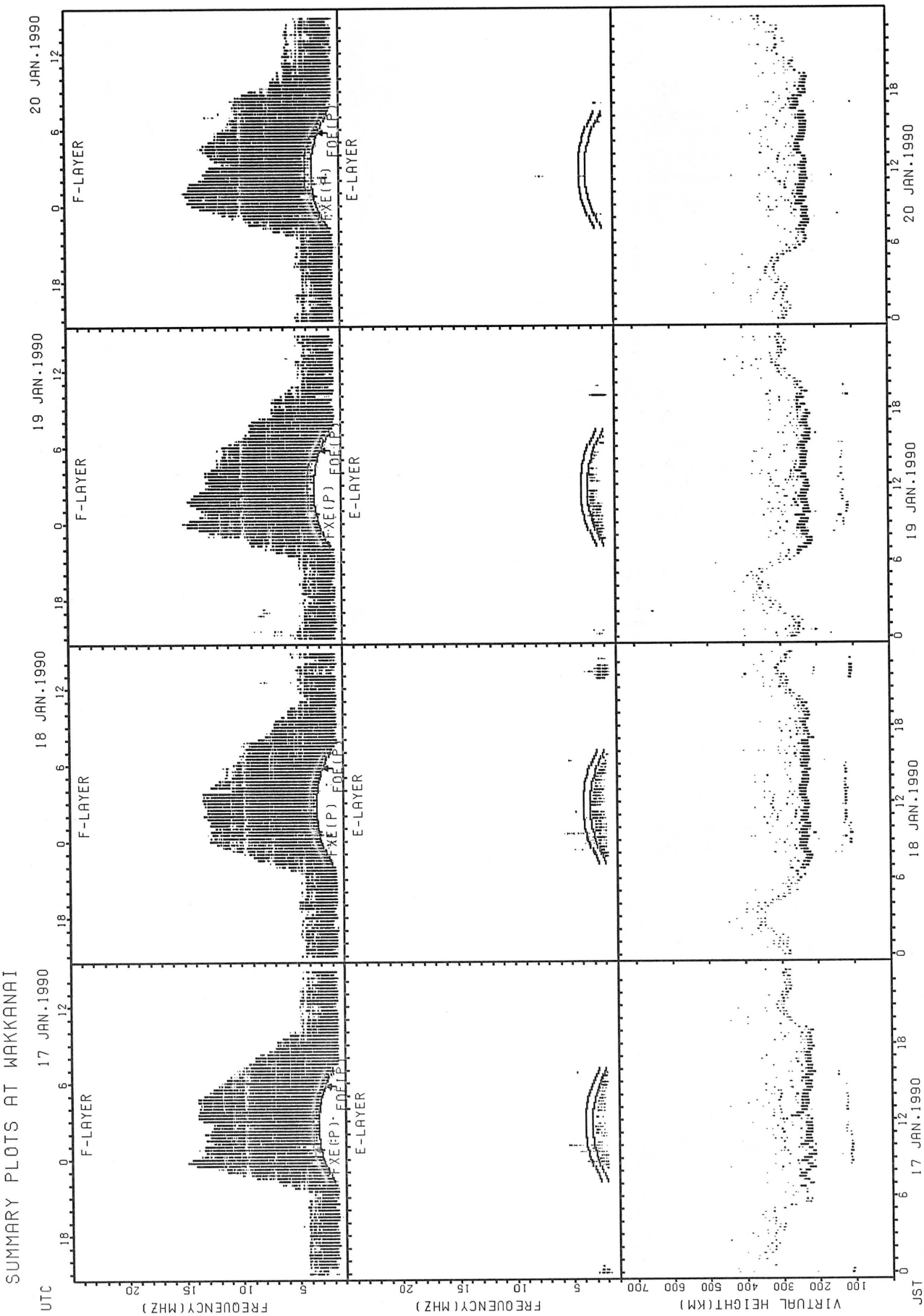
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
JST
9 JAN.1990
10 JAN.1990
11 JAN.1990
12 JAN.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

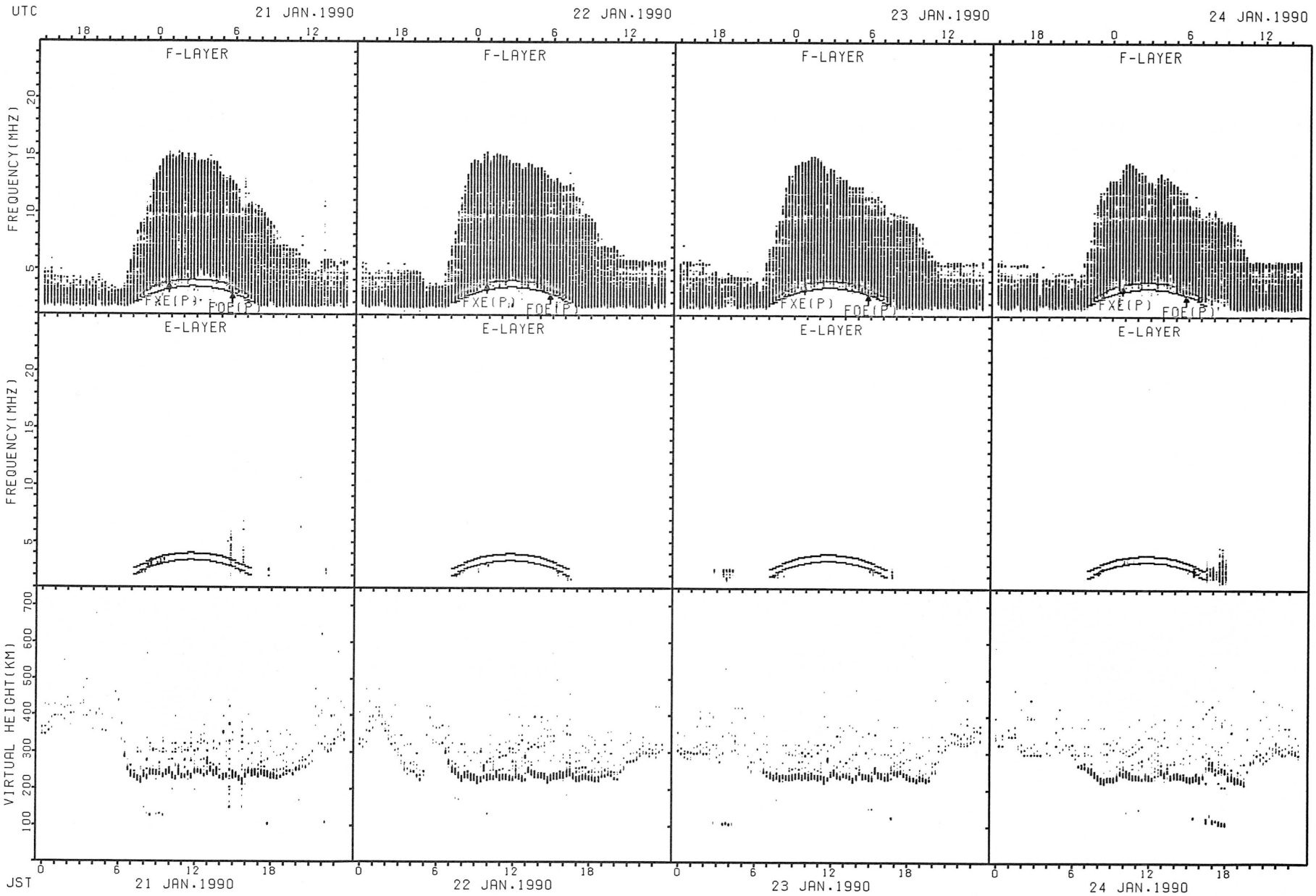
SUMMARY PLOTS AT WAKKANAI



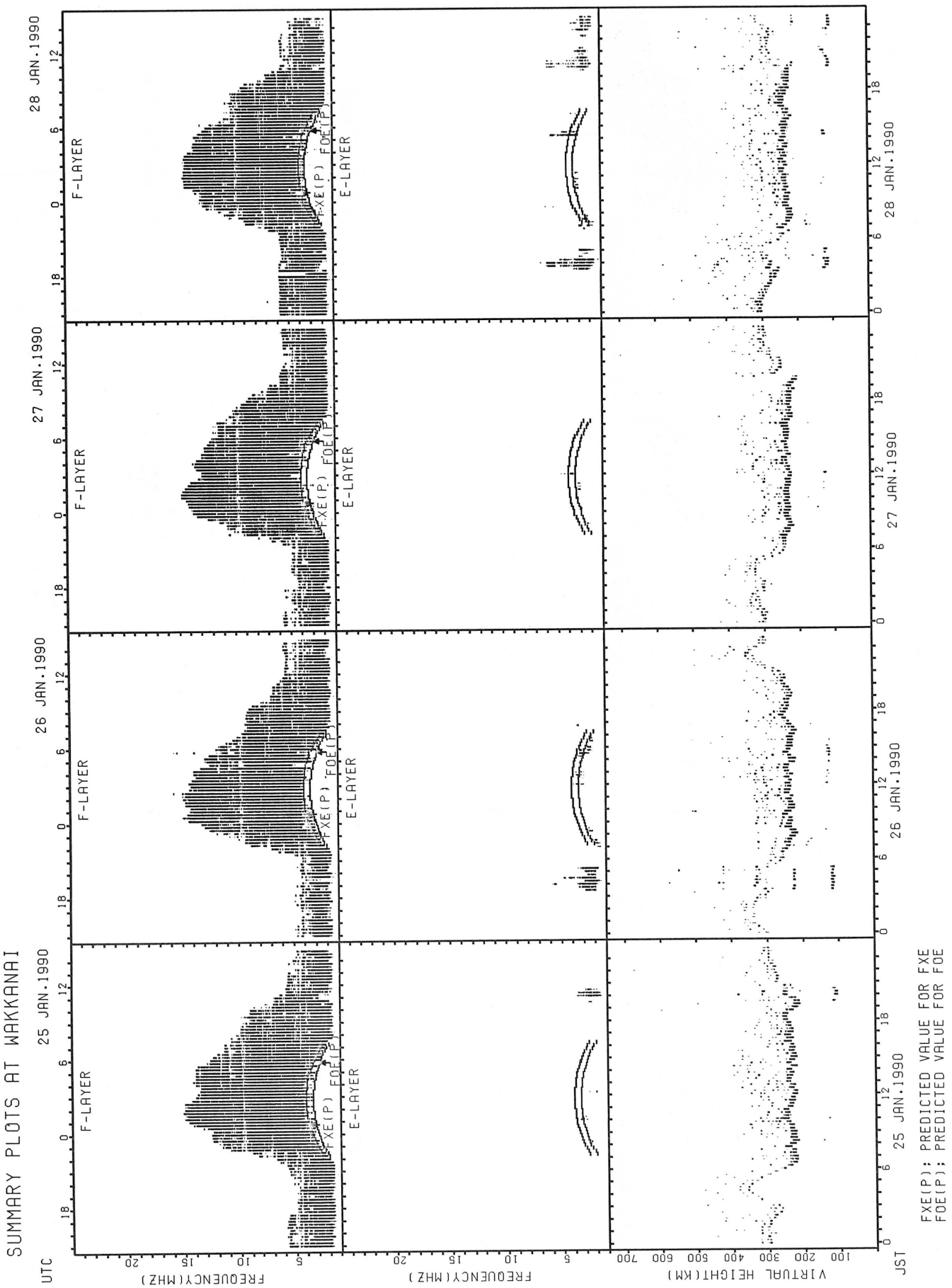
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

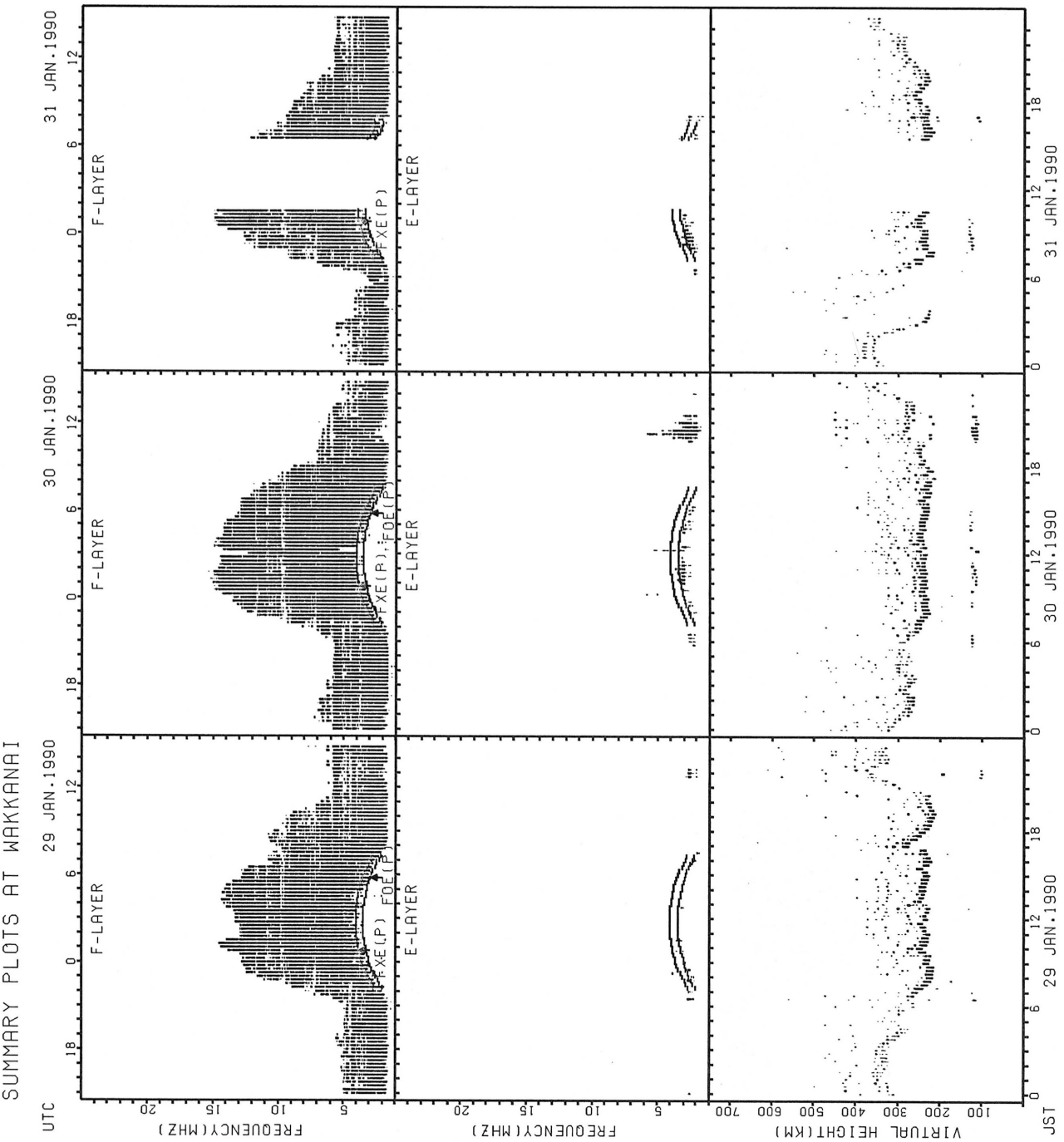

SUMMARY PLOTS AT WAKKANAI
17 JAN.1990
18 JAN.1990
19 JAN.1990
20 JAN.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

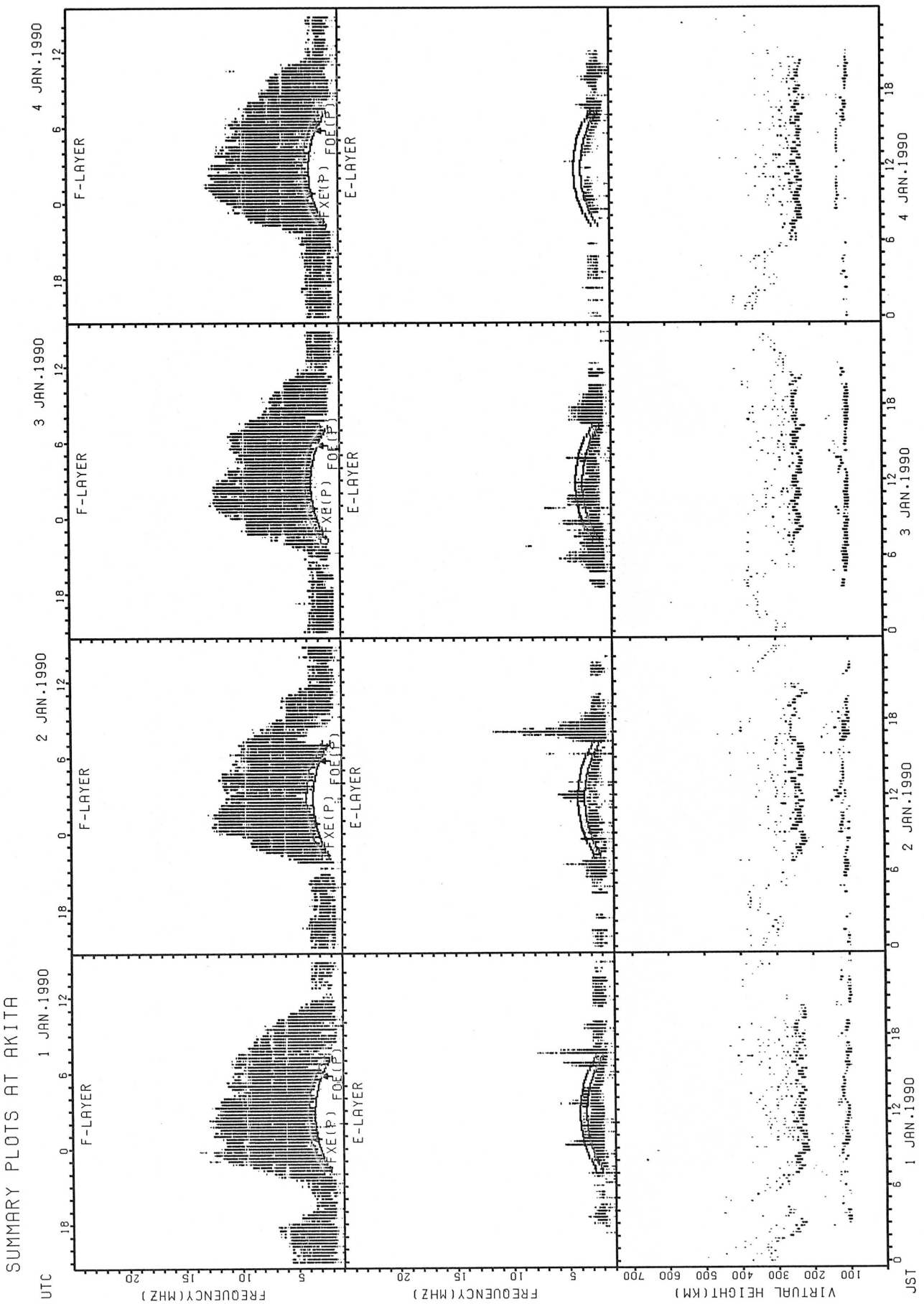
SUMMARY PLOTS AT WAKKANAI



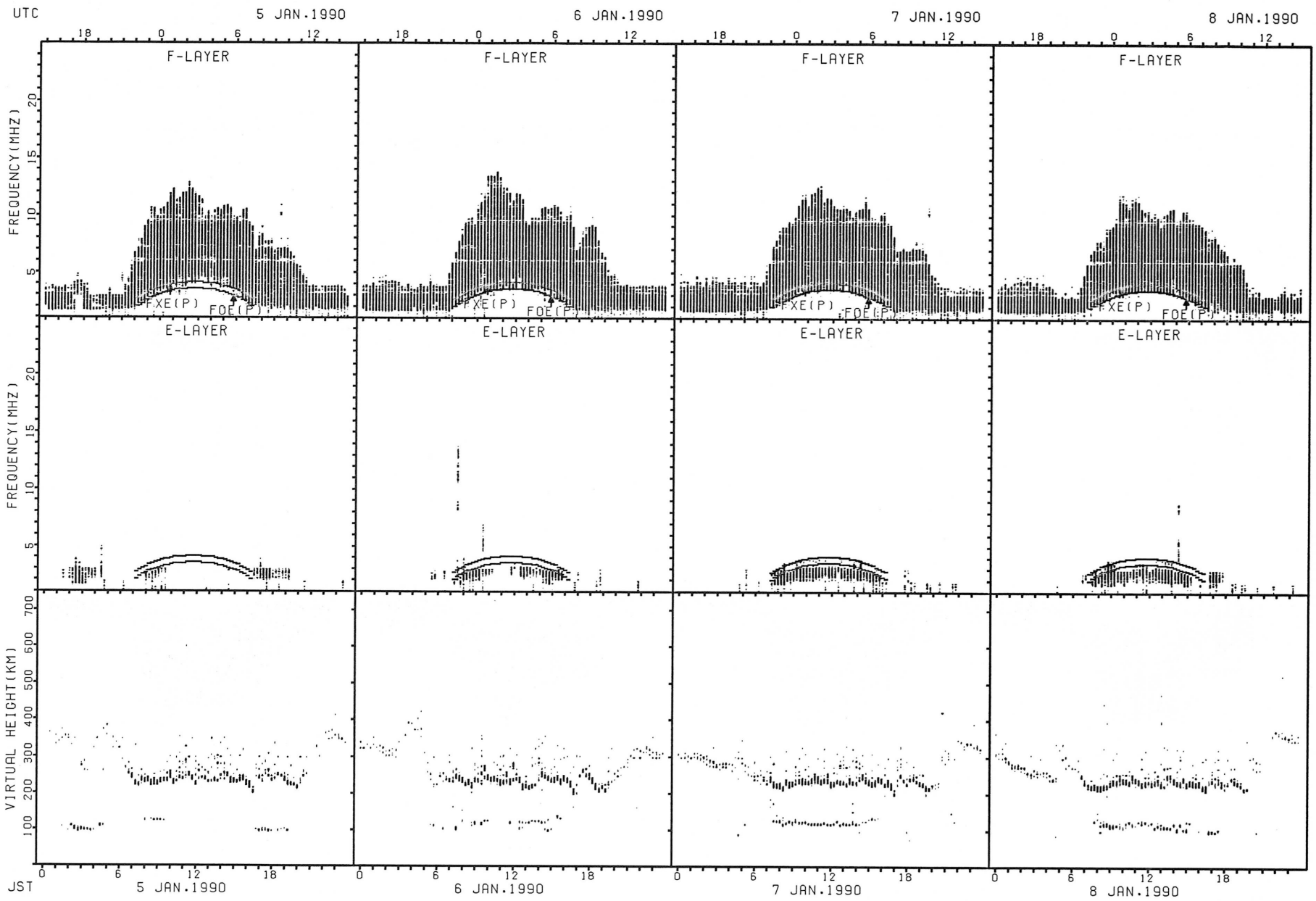
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
25 JAN.1990
26 JAN.1990
27 JAN.1990
28 JAN.1990
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

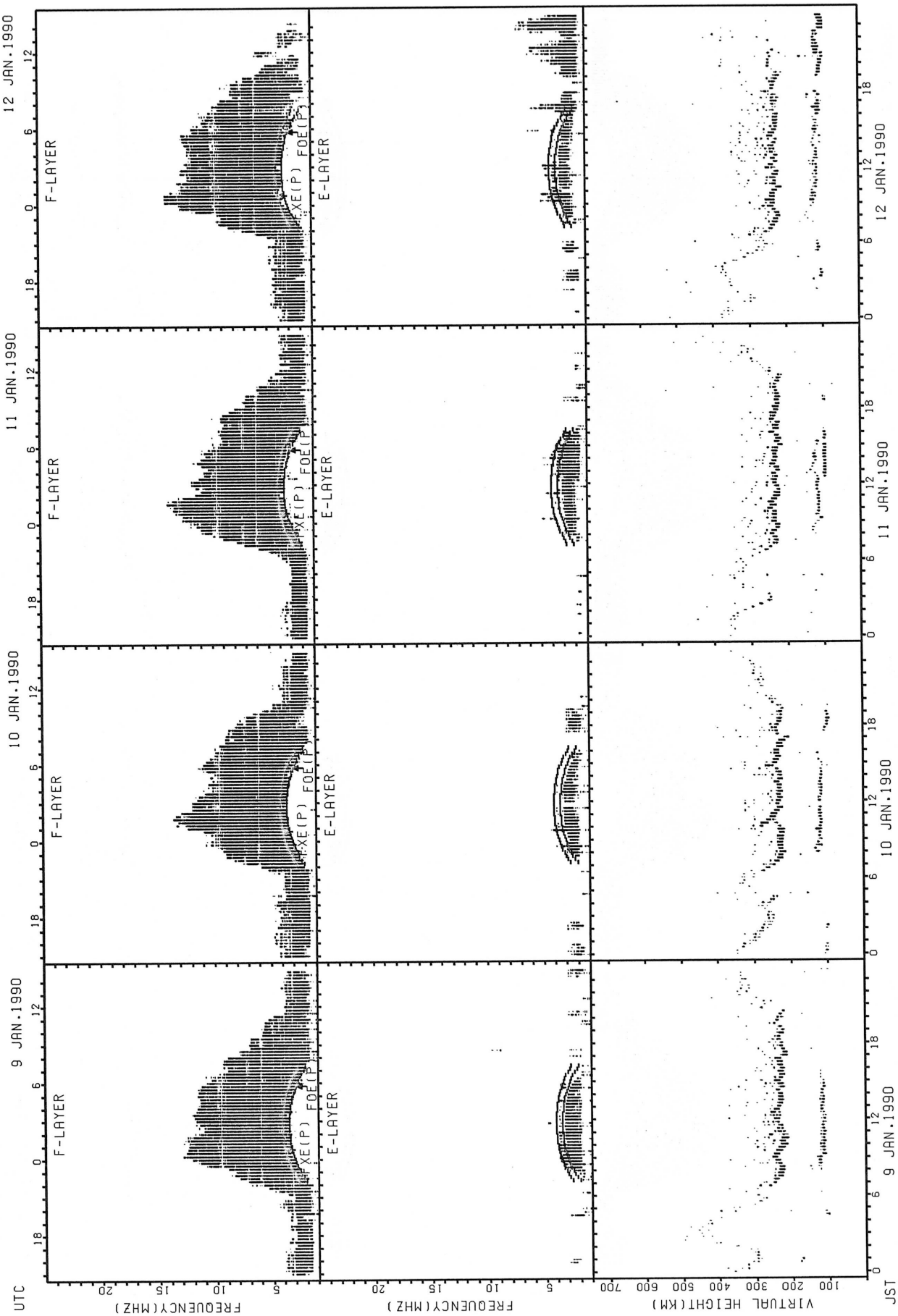

SUMMARY PLOTS AT WAKKANAI
UTC
29 JAN.1990
30 JAN.1990
31 JAN.1990
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
1 JAN.1990
2 JAN.1990
3 JAN.1990
4 JAN.1990
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

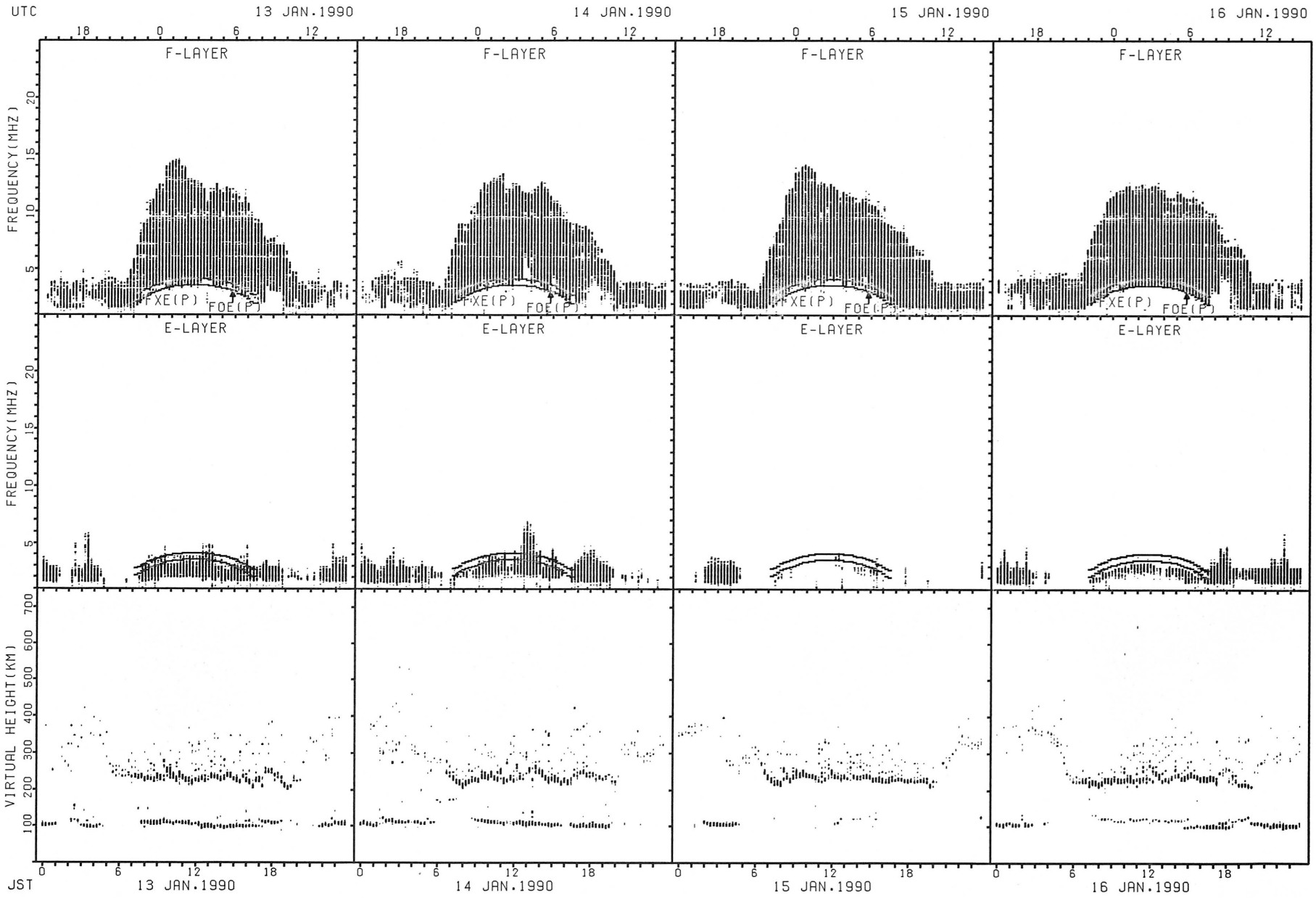
SUMMARY PLOTS AT AKITA



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

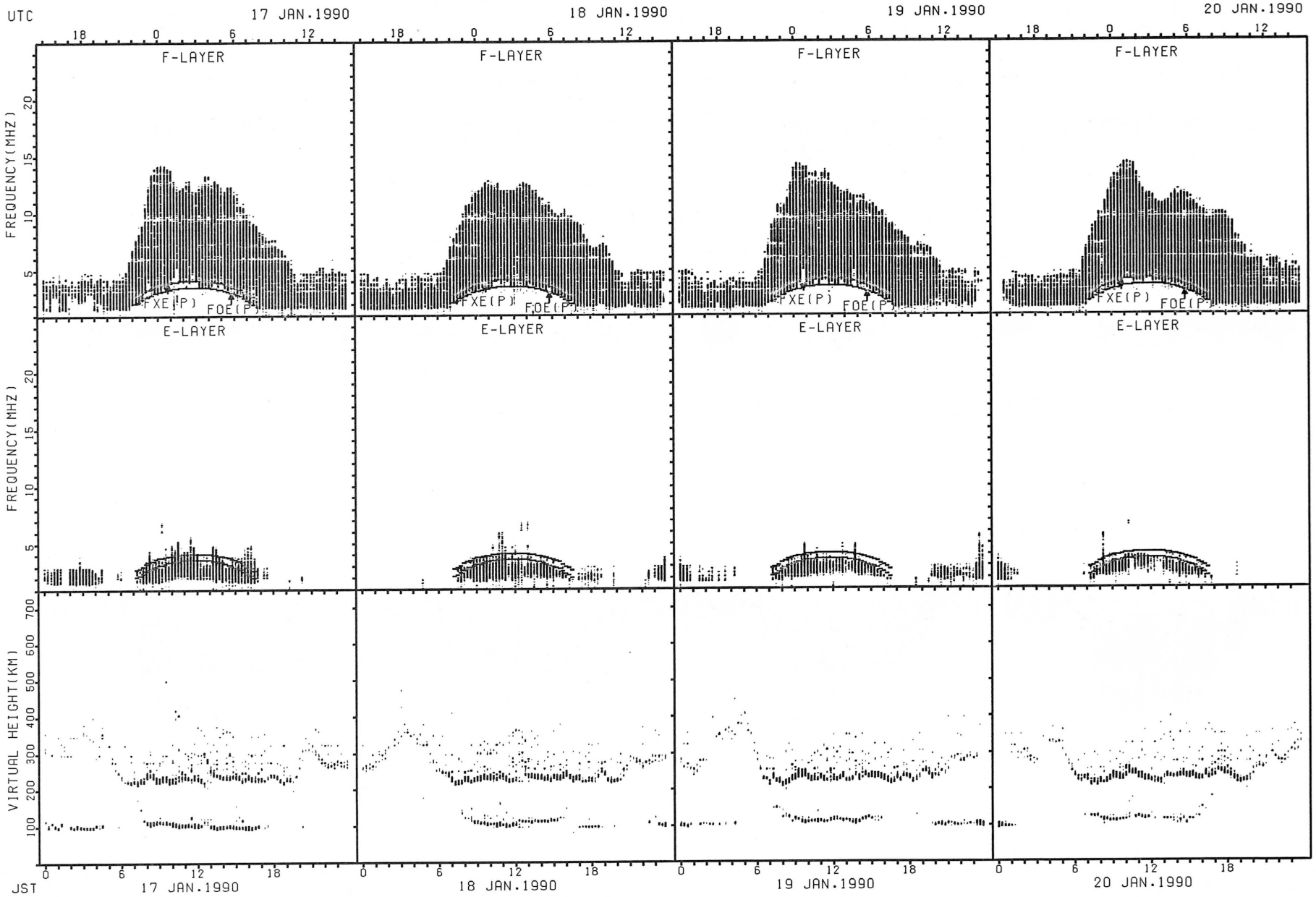

SUMMARY PLOTS AT AKITA
UTC
JST
9 JAN.1990
10 JAN.1990
11 JAN.1990
12 JAN.1990
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



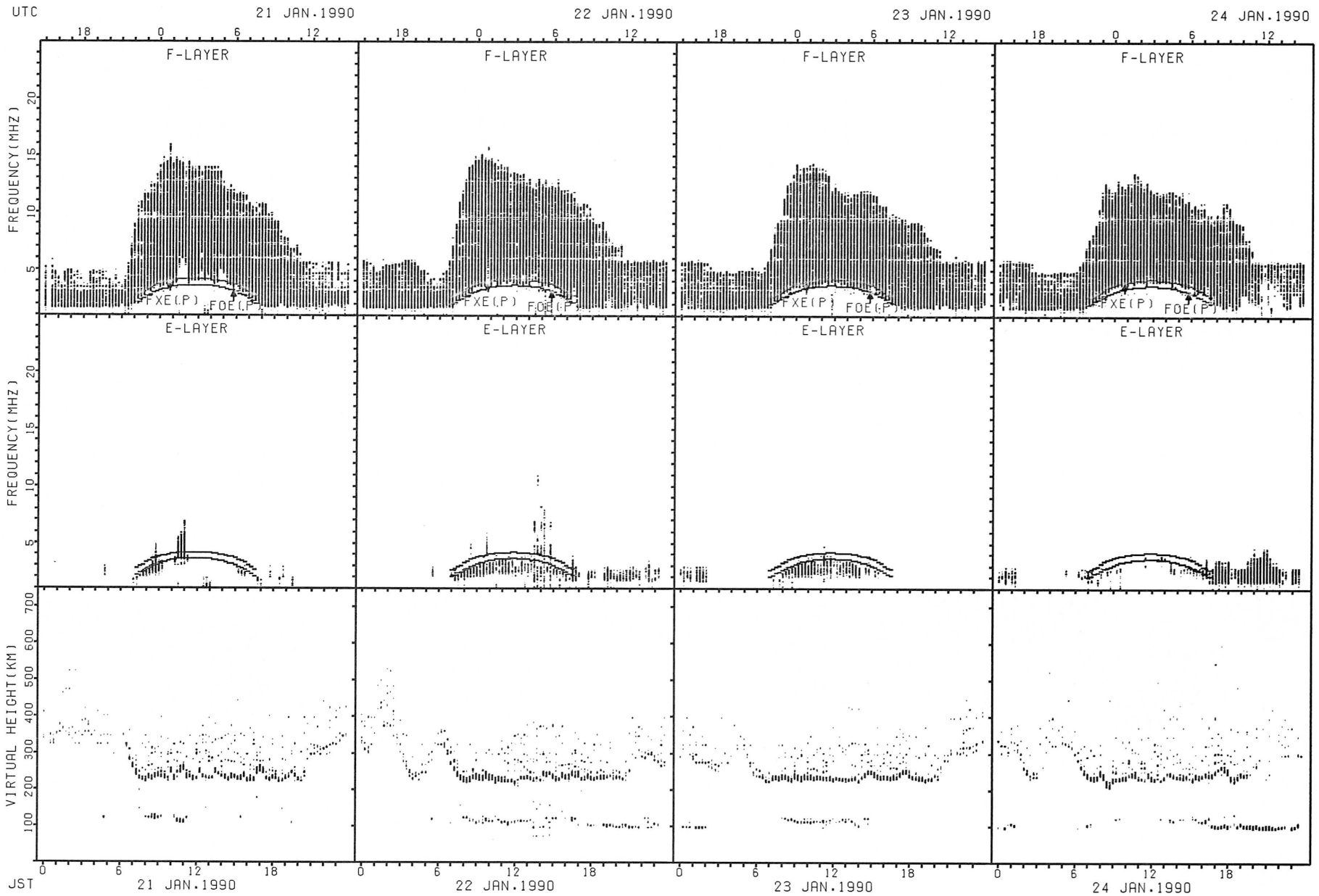
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



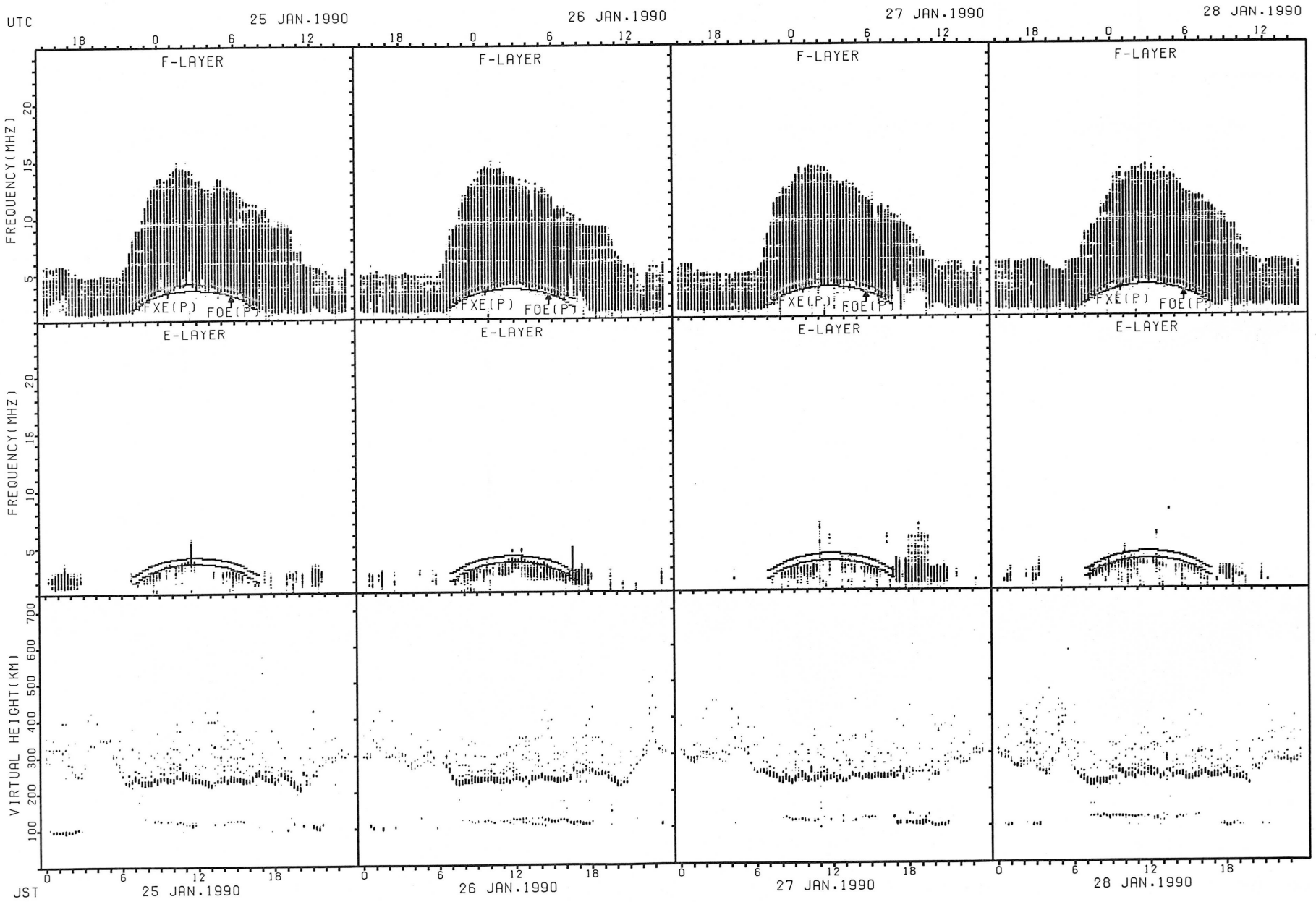
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



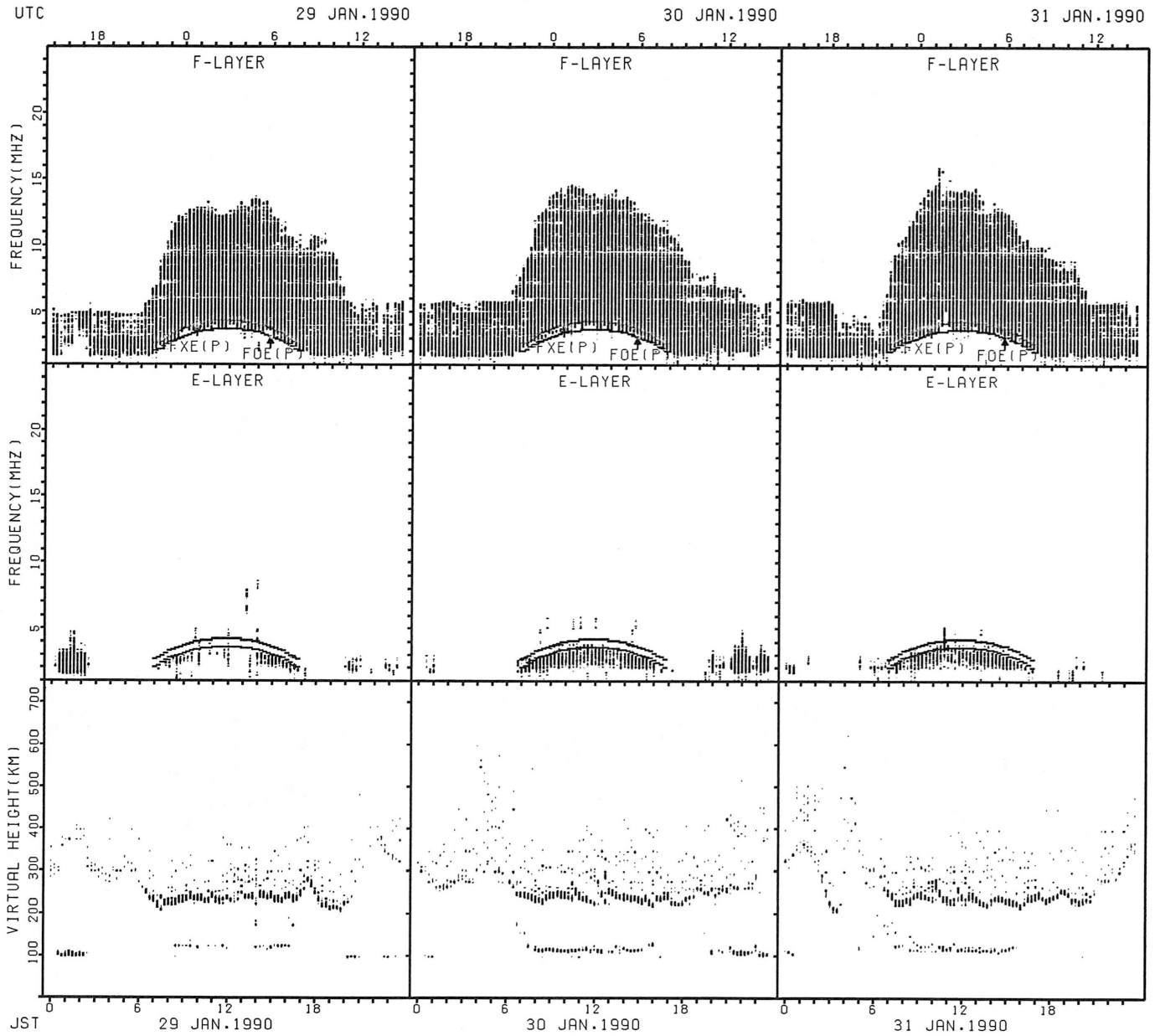
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



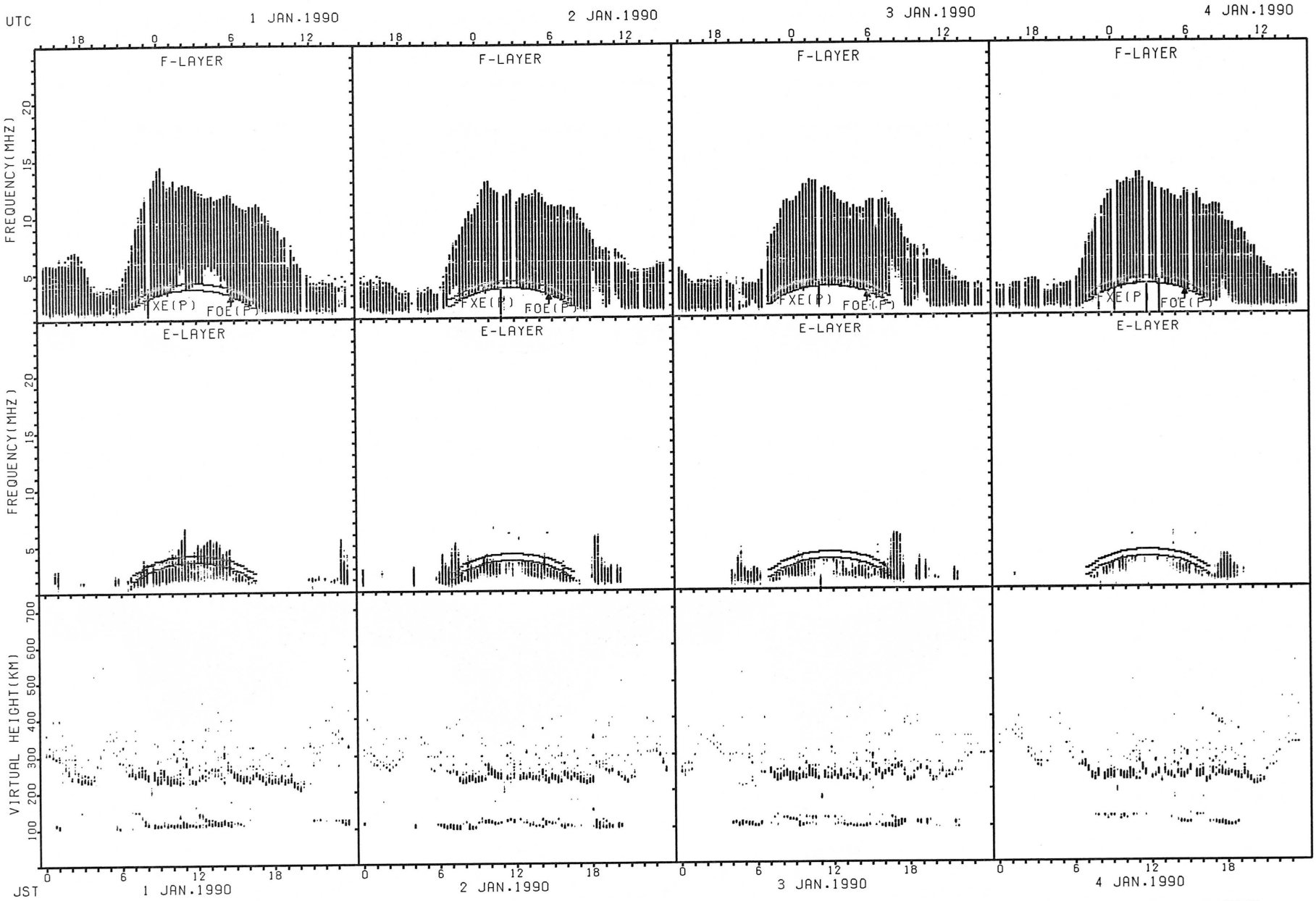
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



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

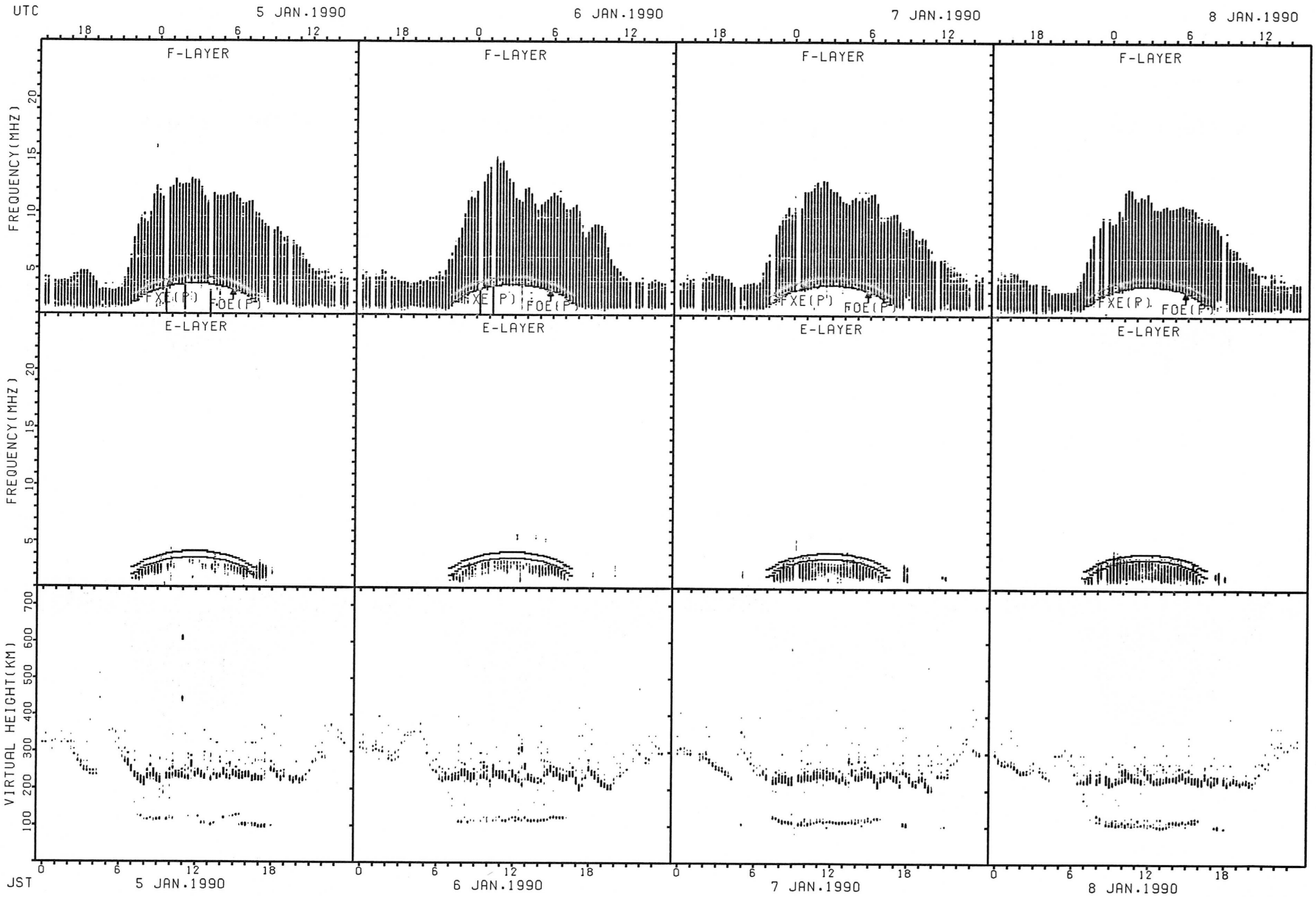
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

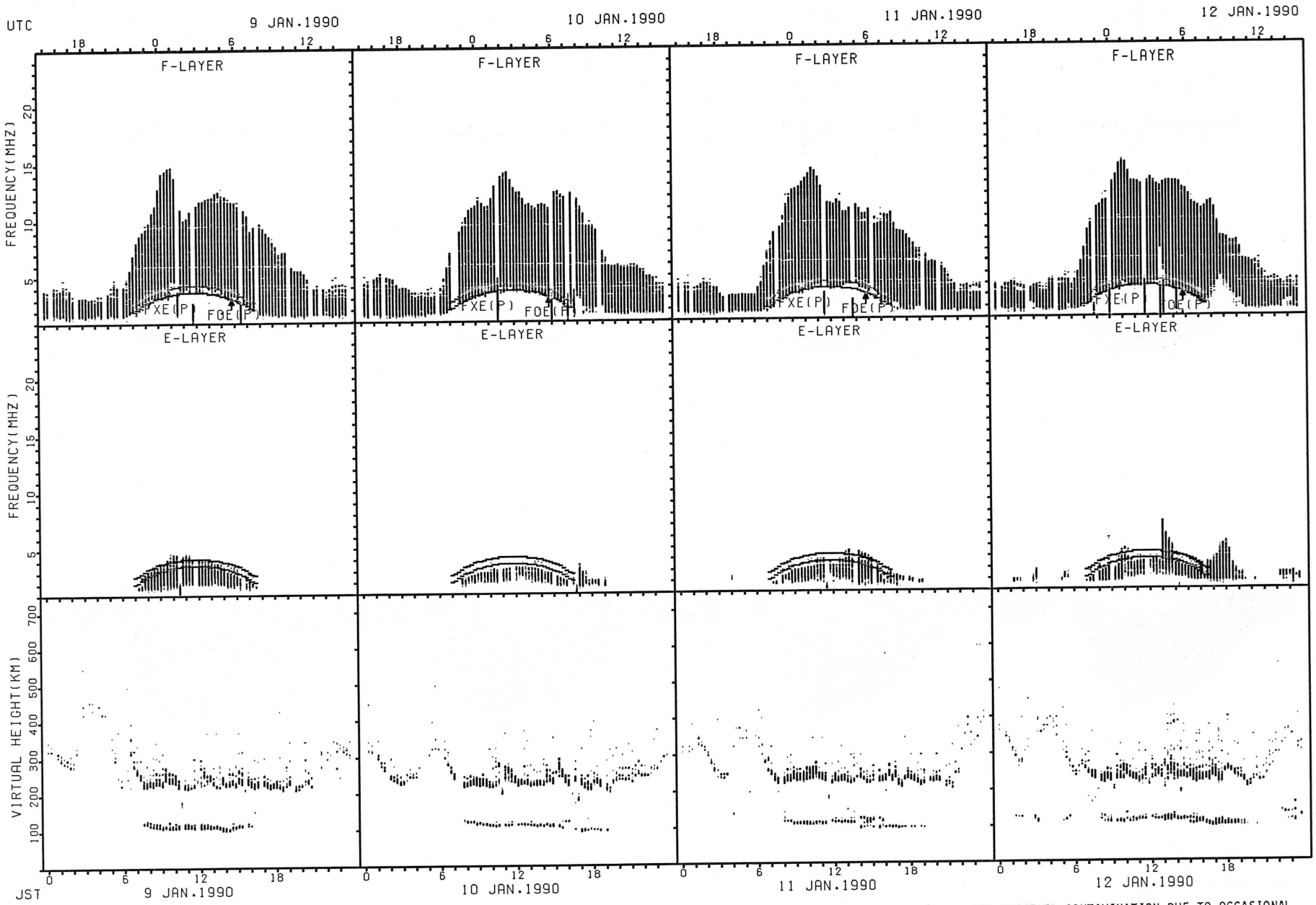
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

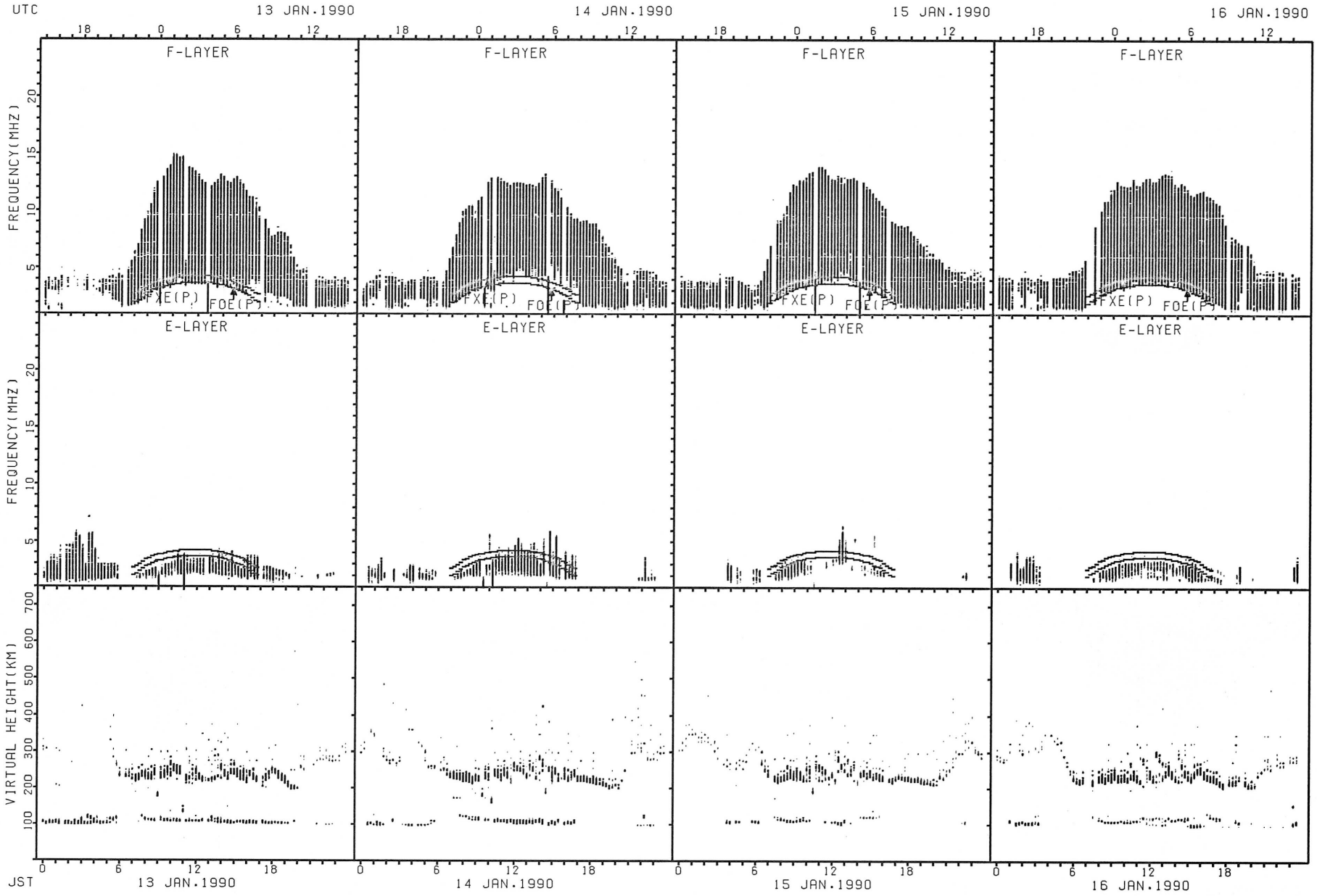
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

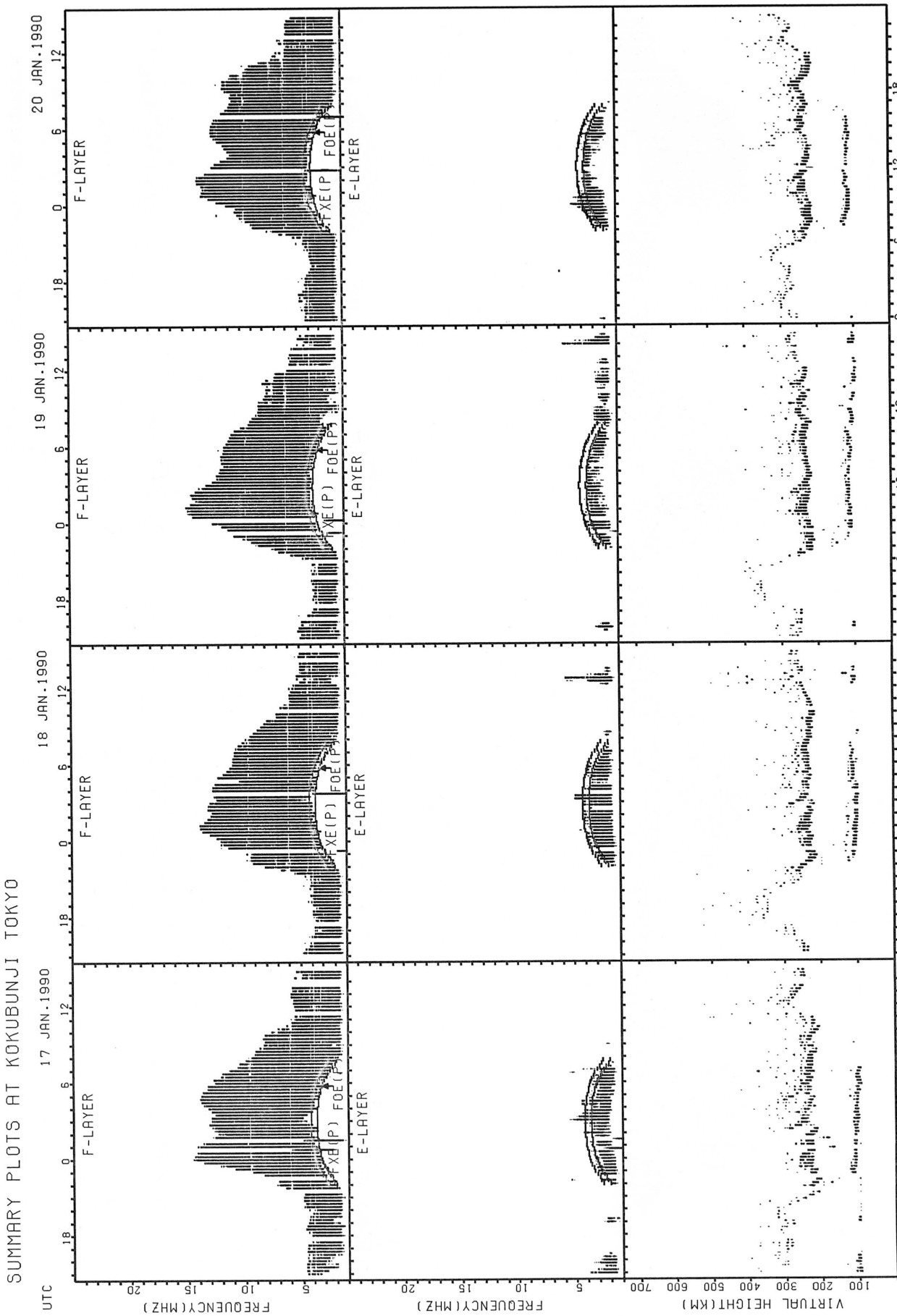
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT KOKUBUNJI TOKYO

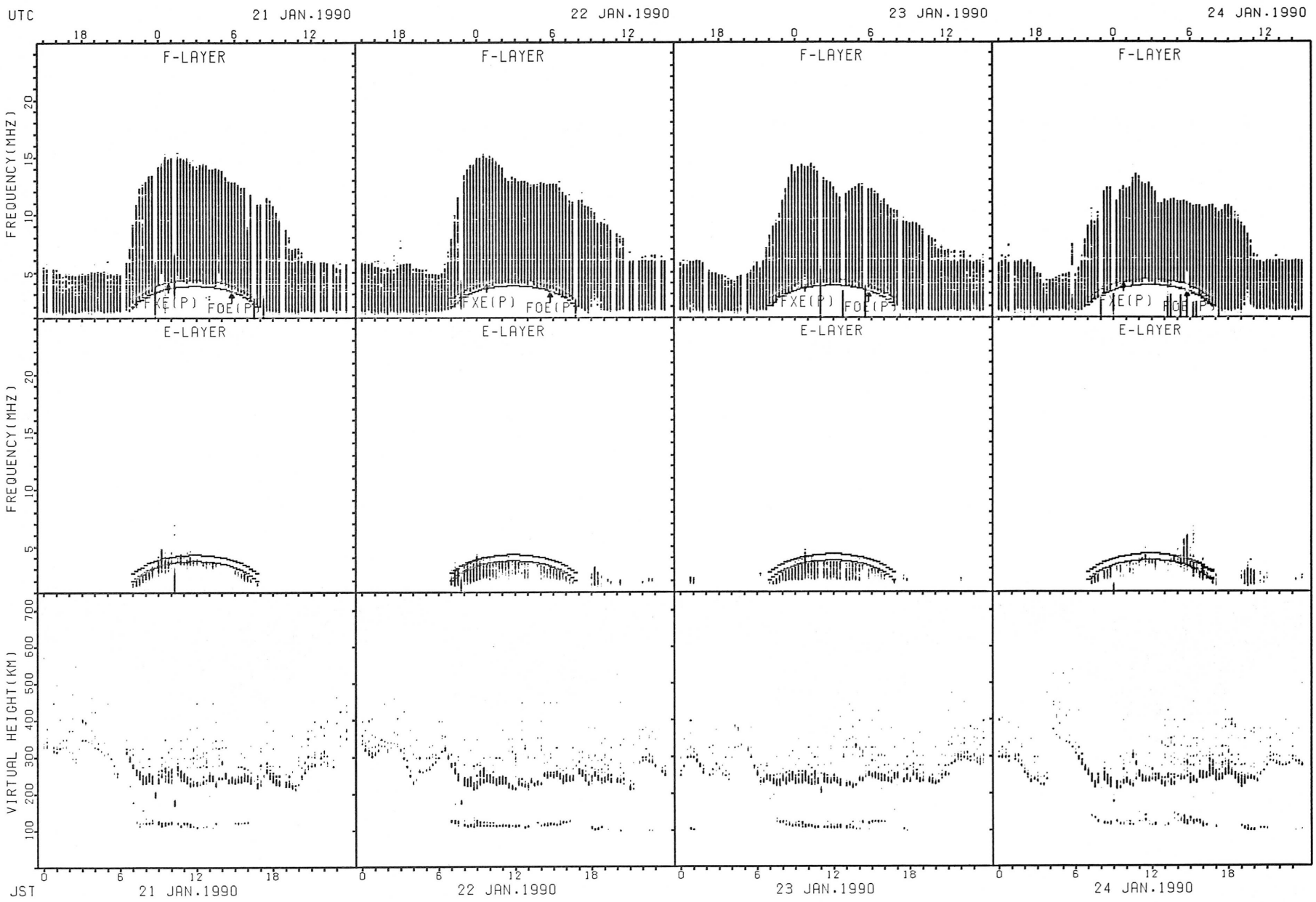


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
17 JAN.1990
18 JAN.1990
19 JAN.1990
20 JAN.1990
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
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL
MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

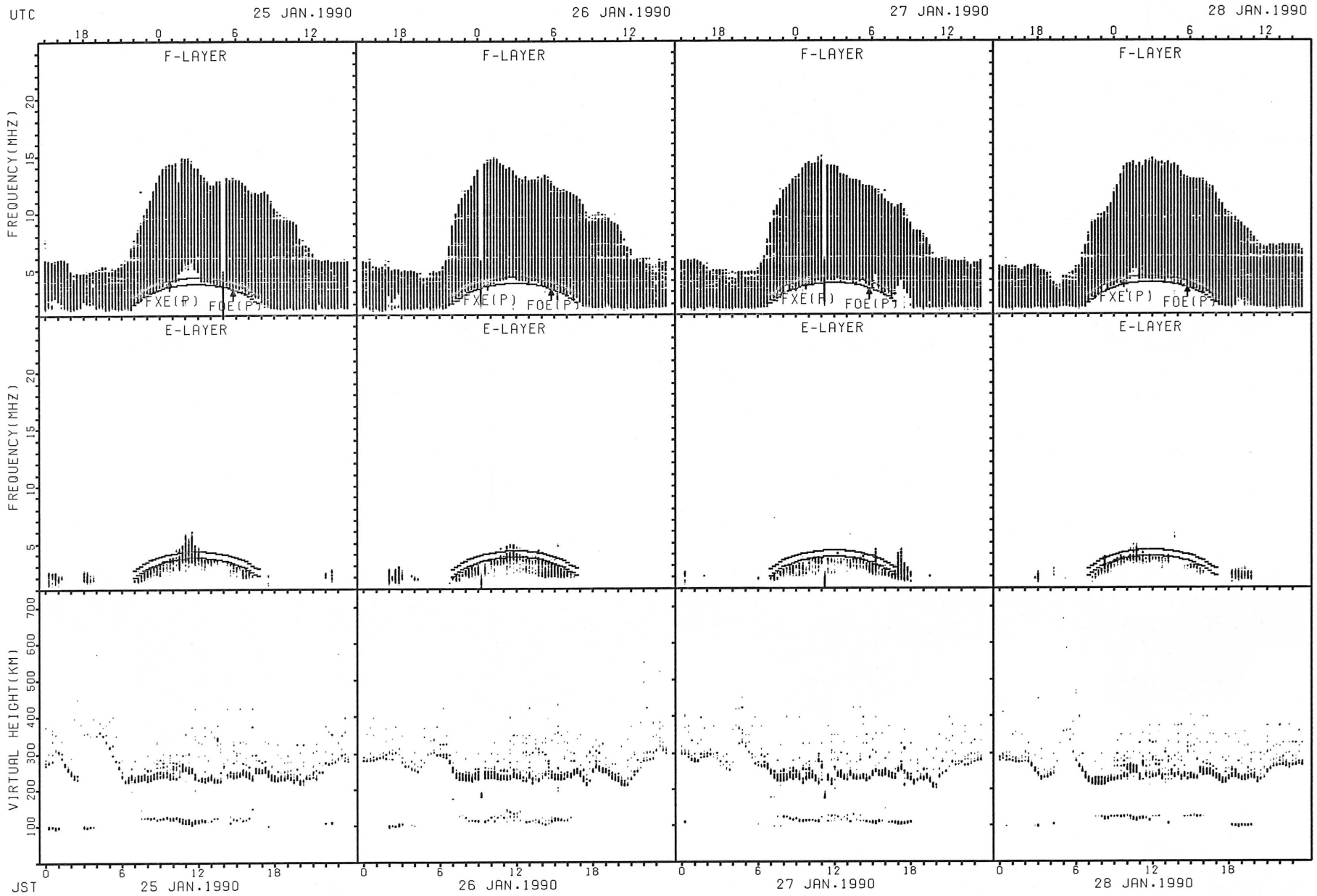
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

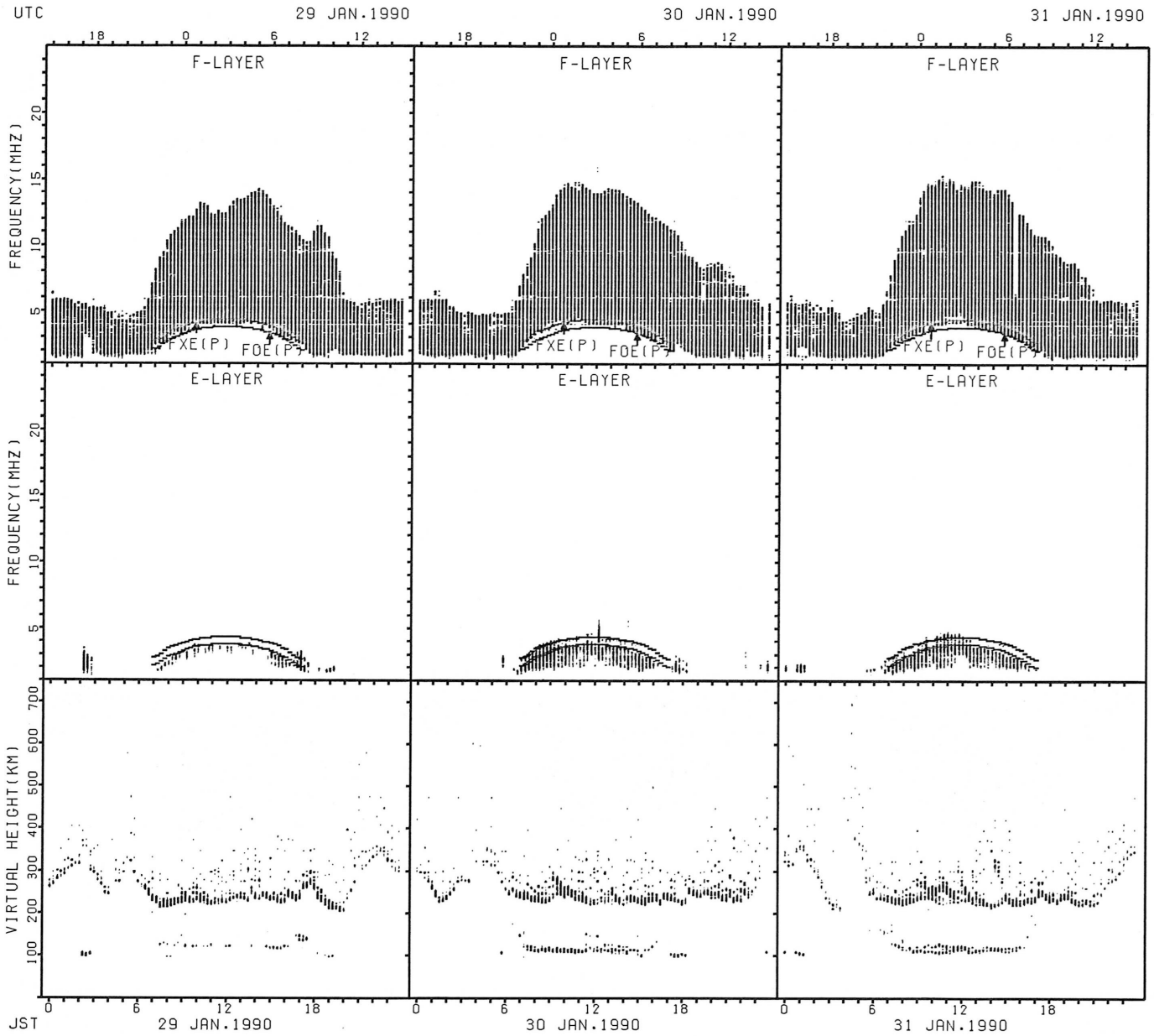
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

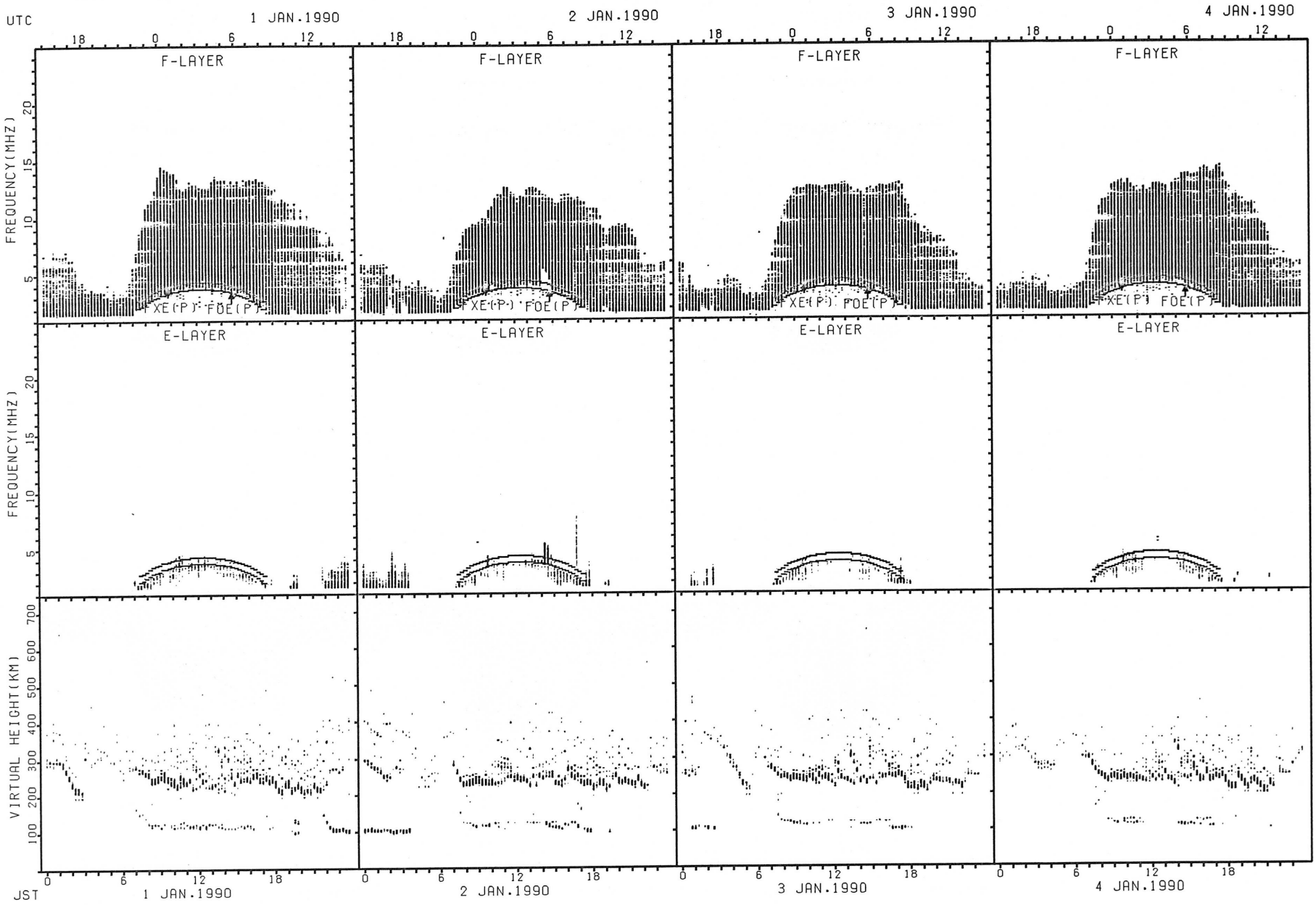
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

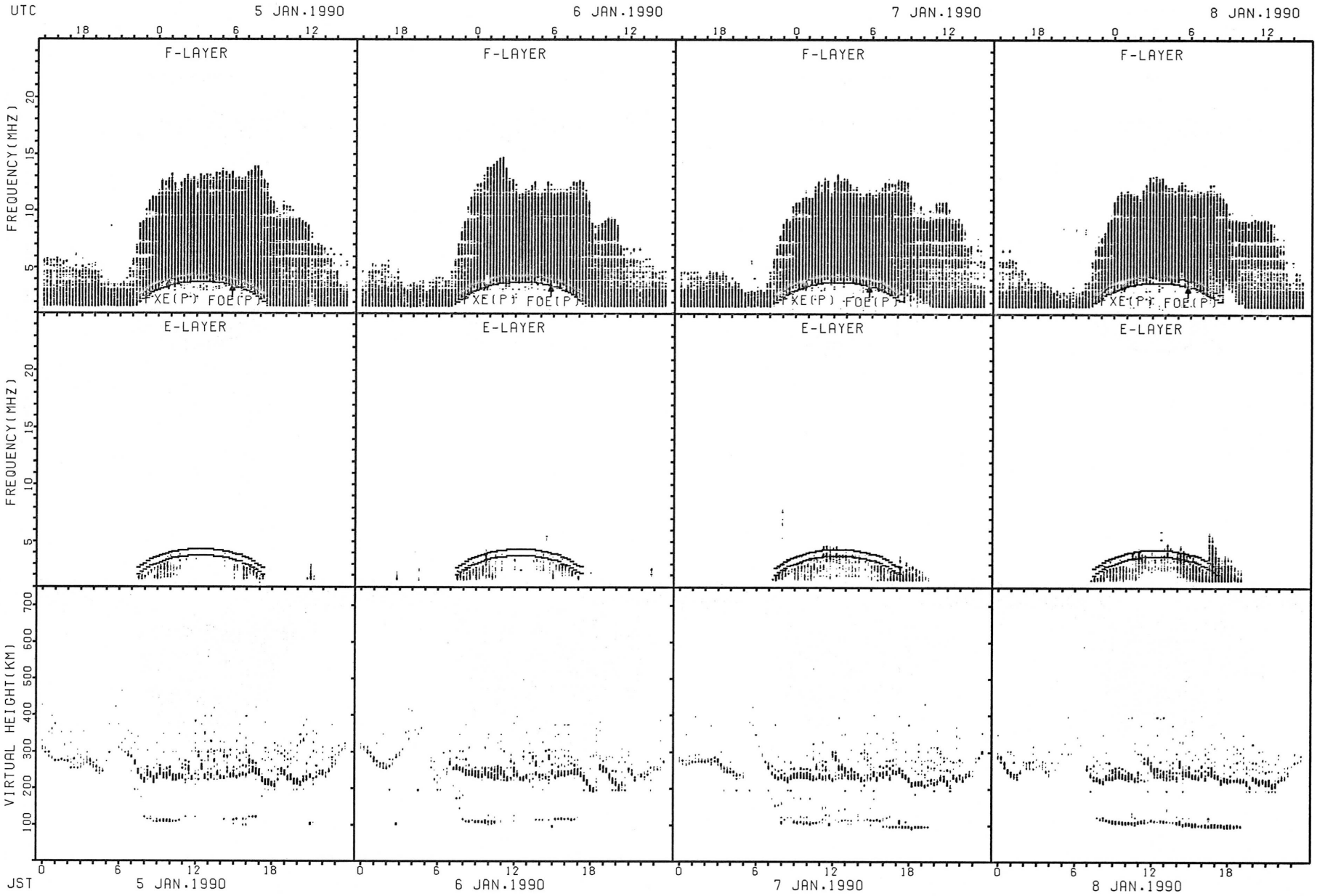
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT YAMAGAWA



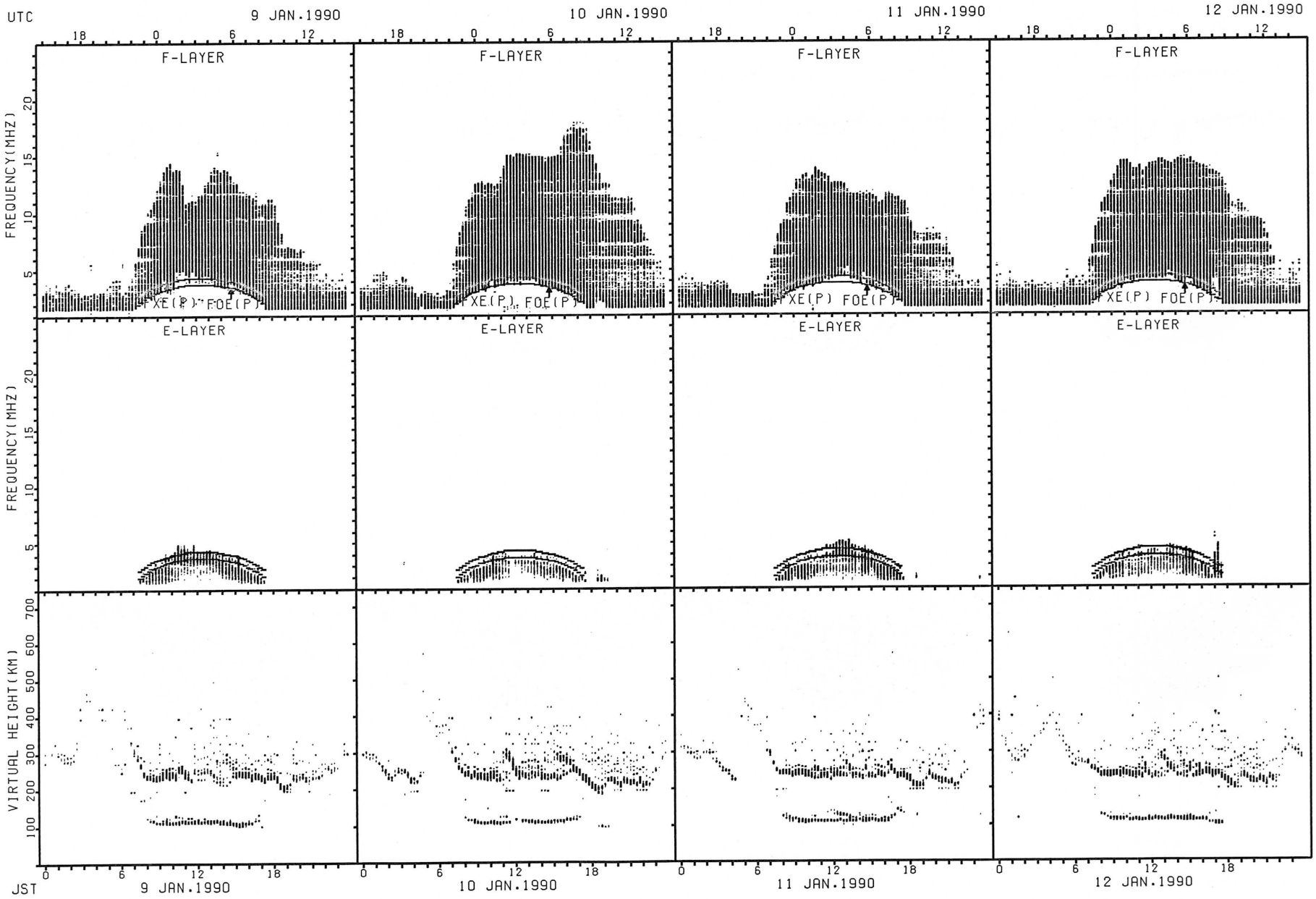
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



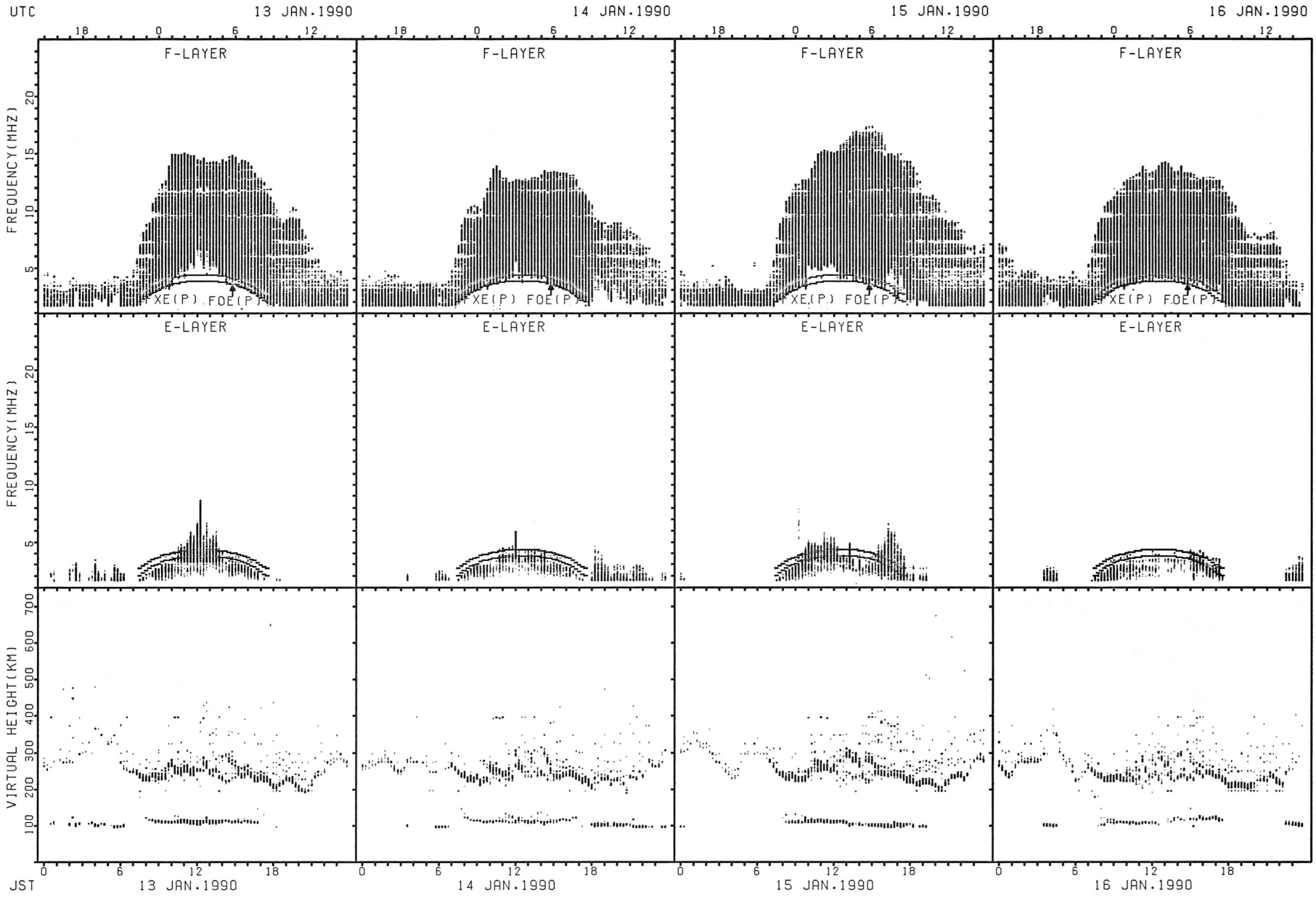
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



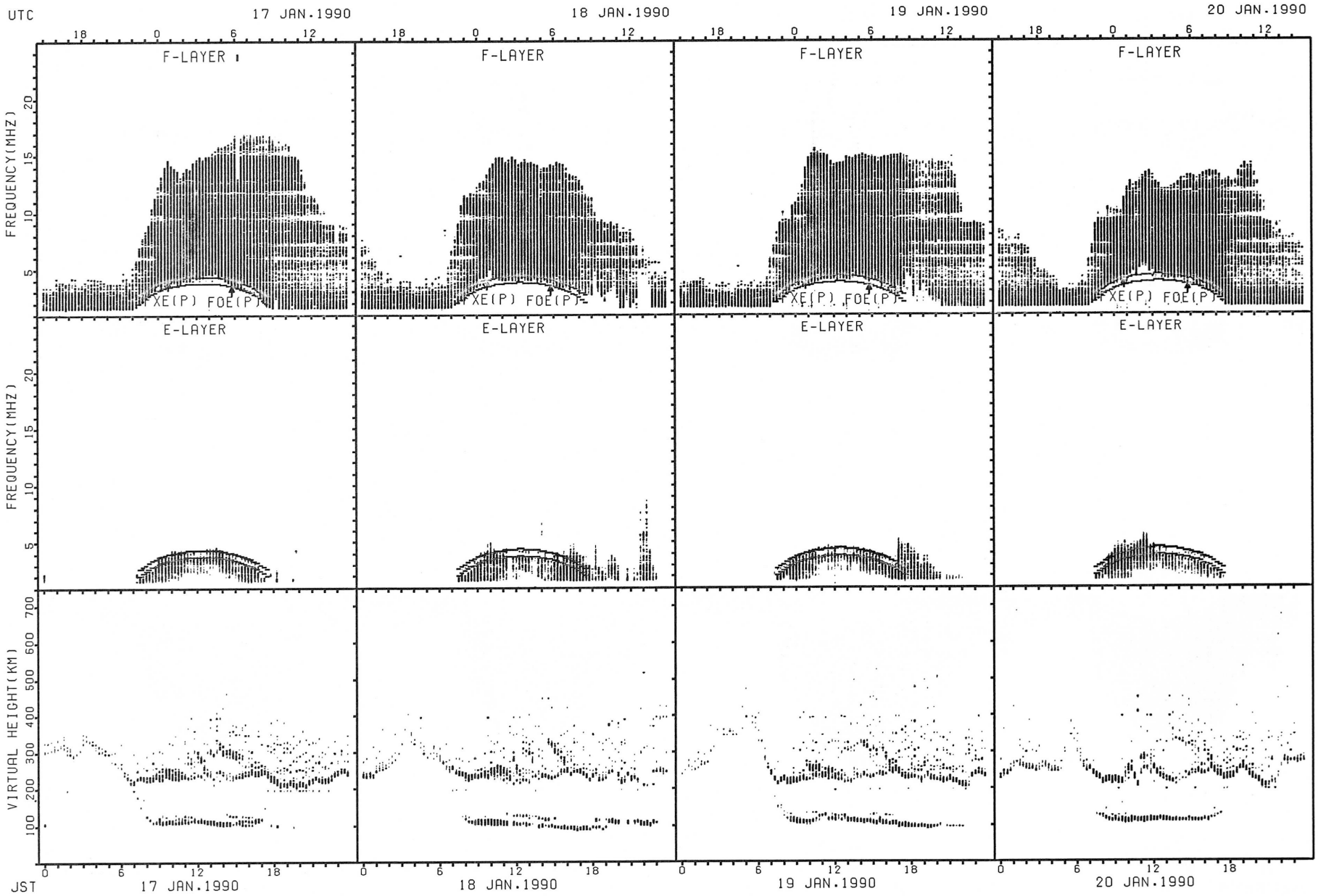
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



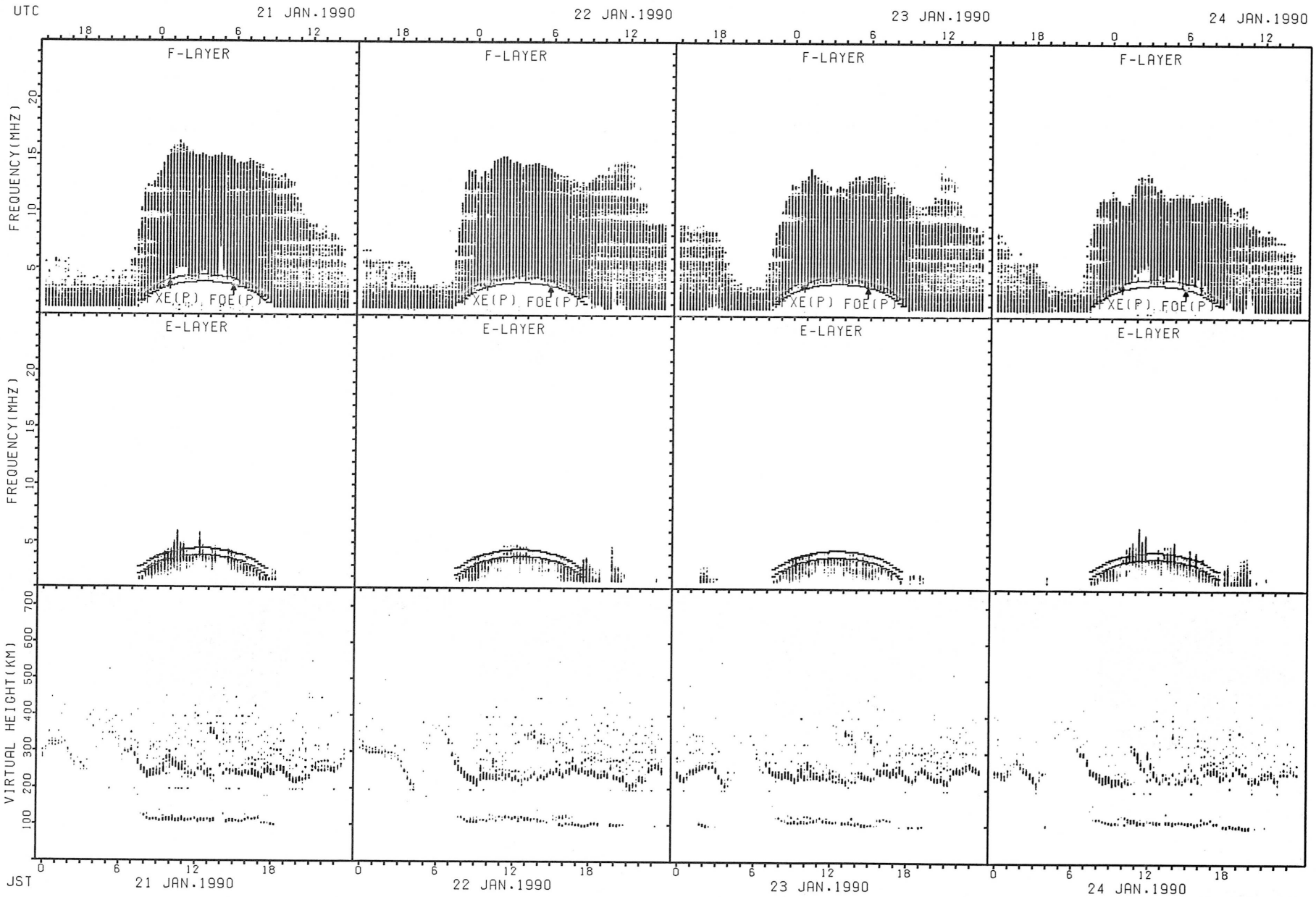
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA

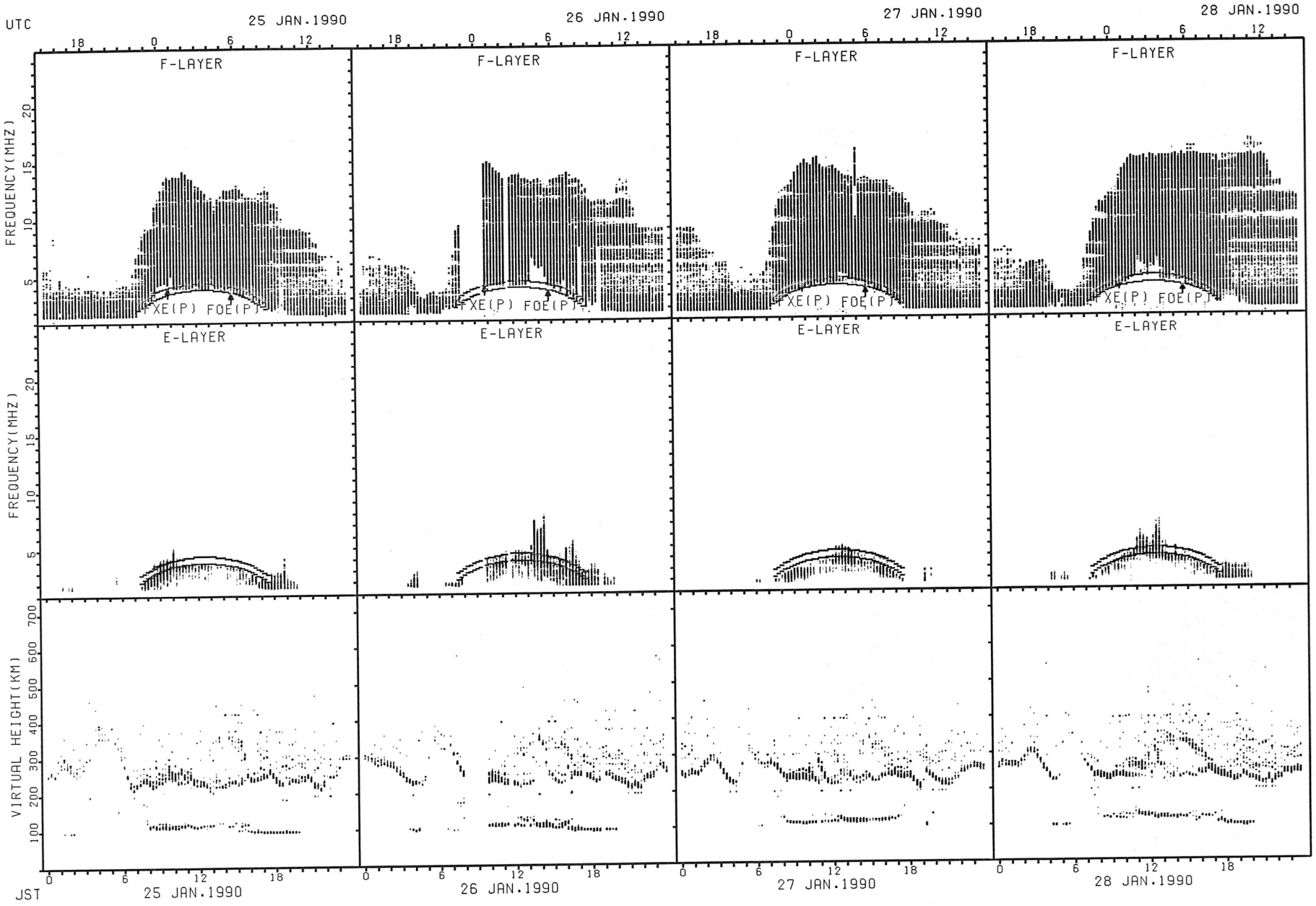


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

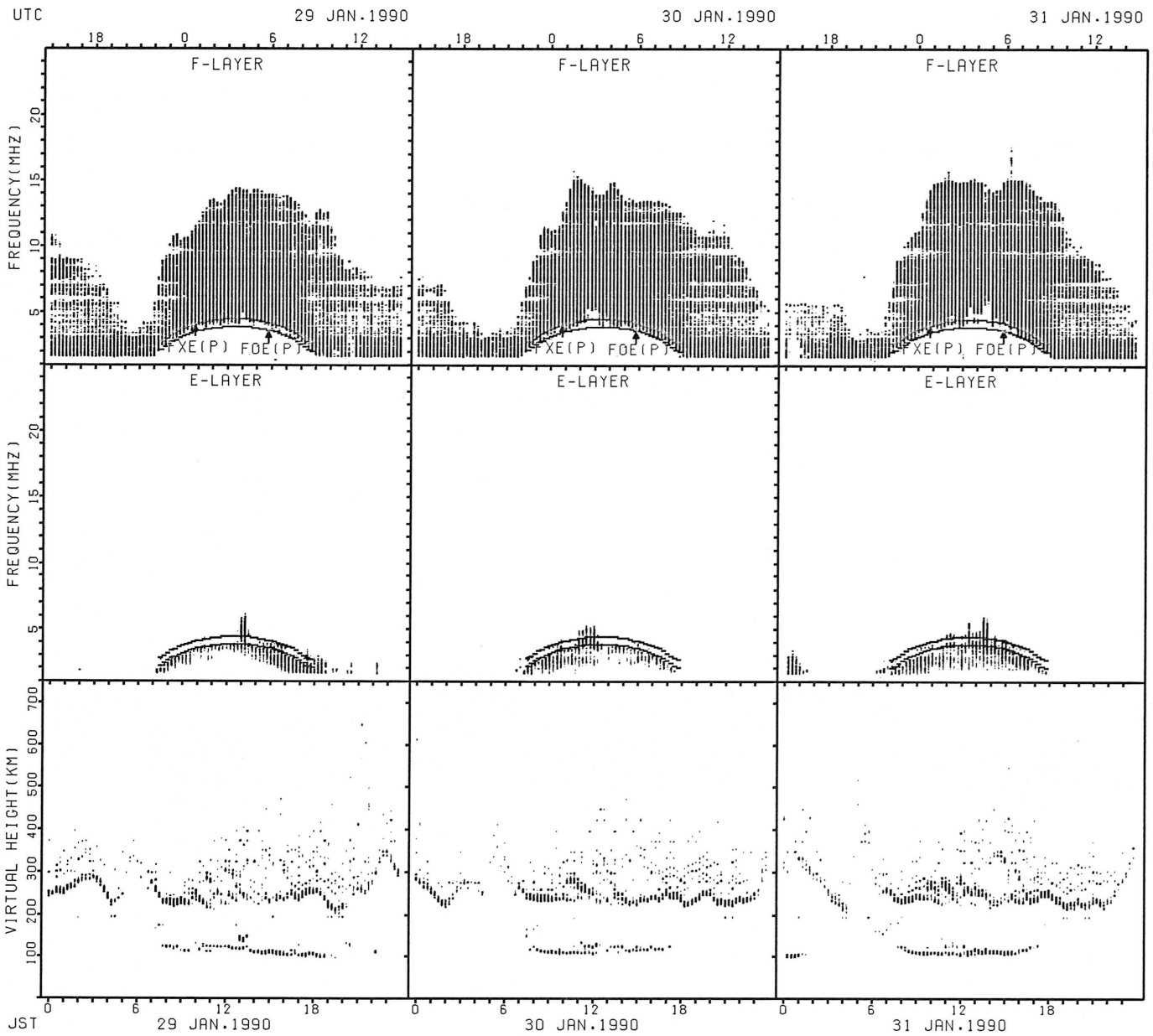
SUMMARY PLOTS AT YAMAGAWA



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

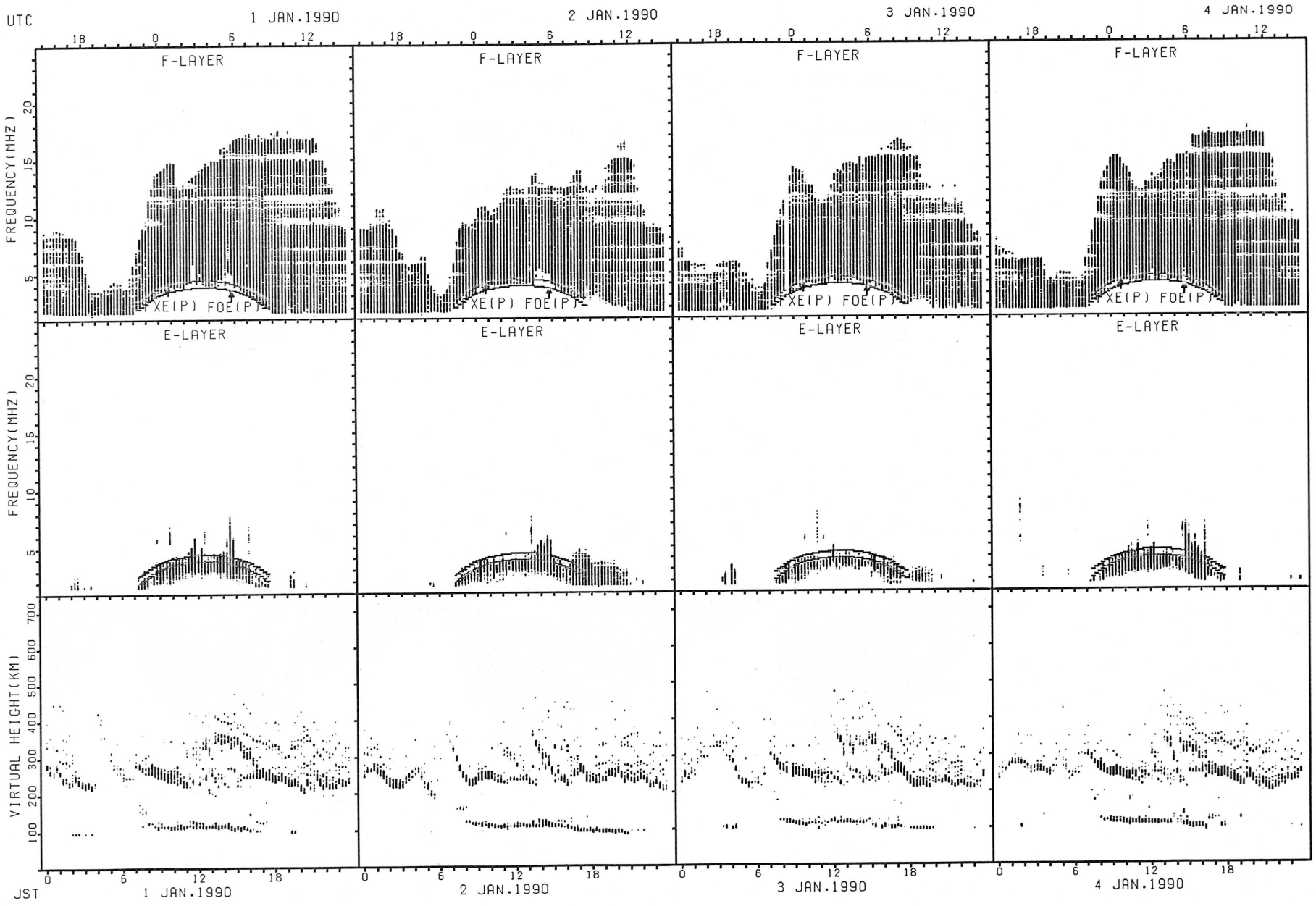

SUMMARY PLOTS AT YAMAGAWA
UTC
25 JAN.1990
26 JAN.1990
27 JAN.1990
28 JAN.1990
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P) FOE(P)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



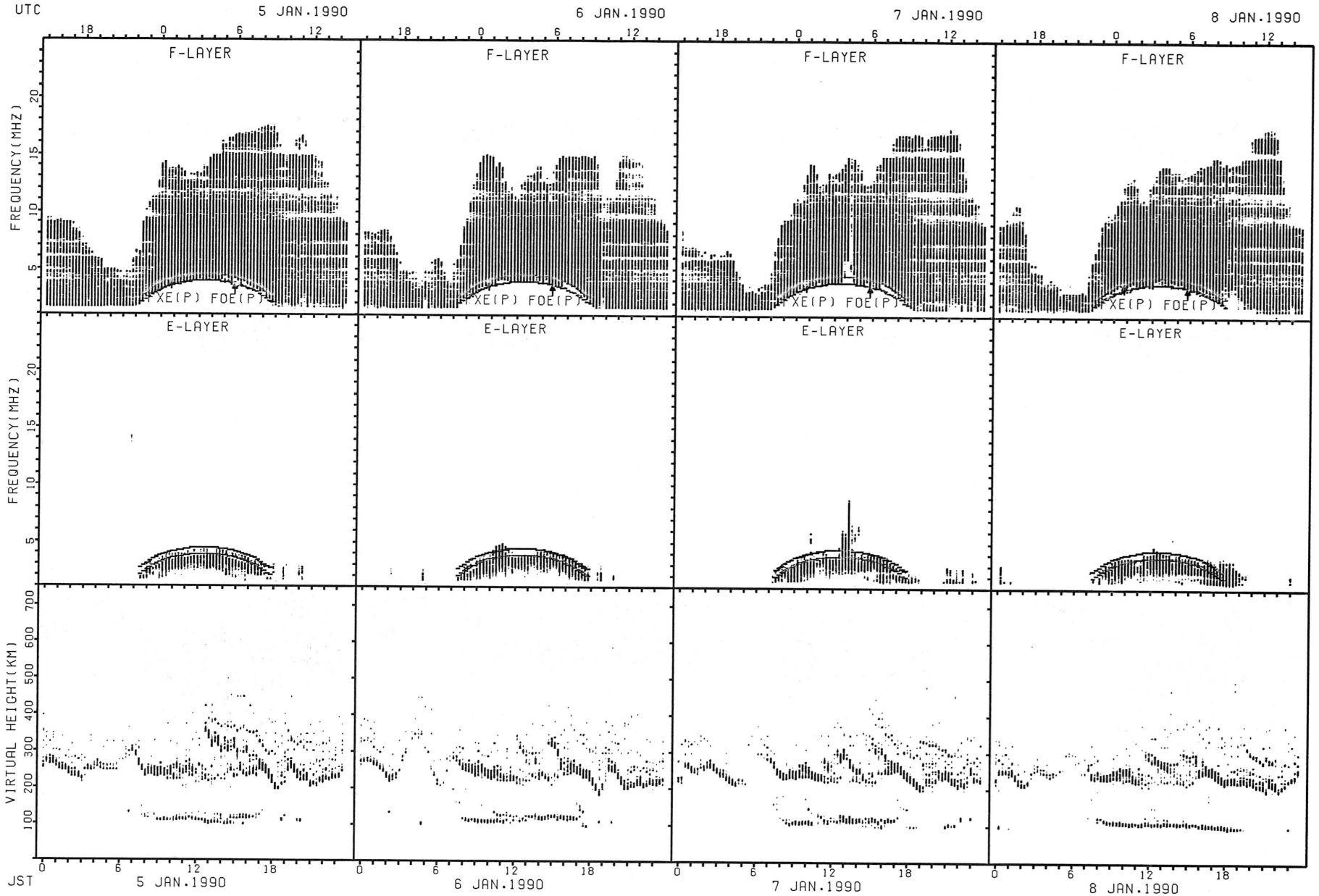
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



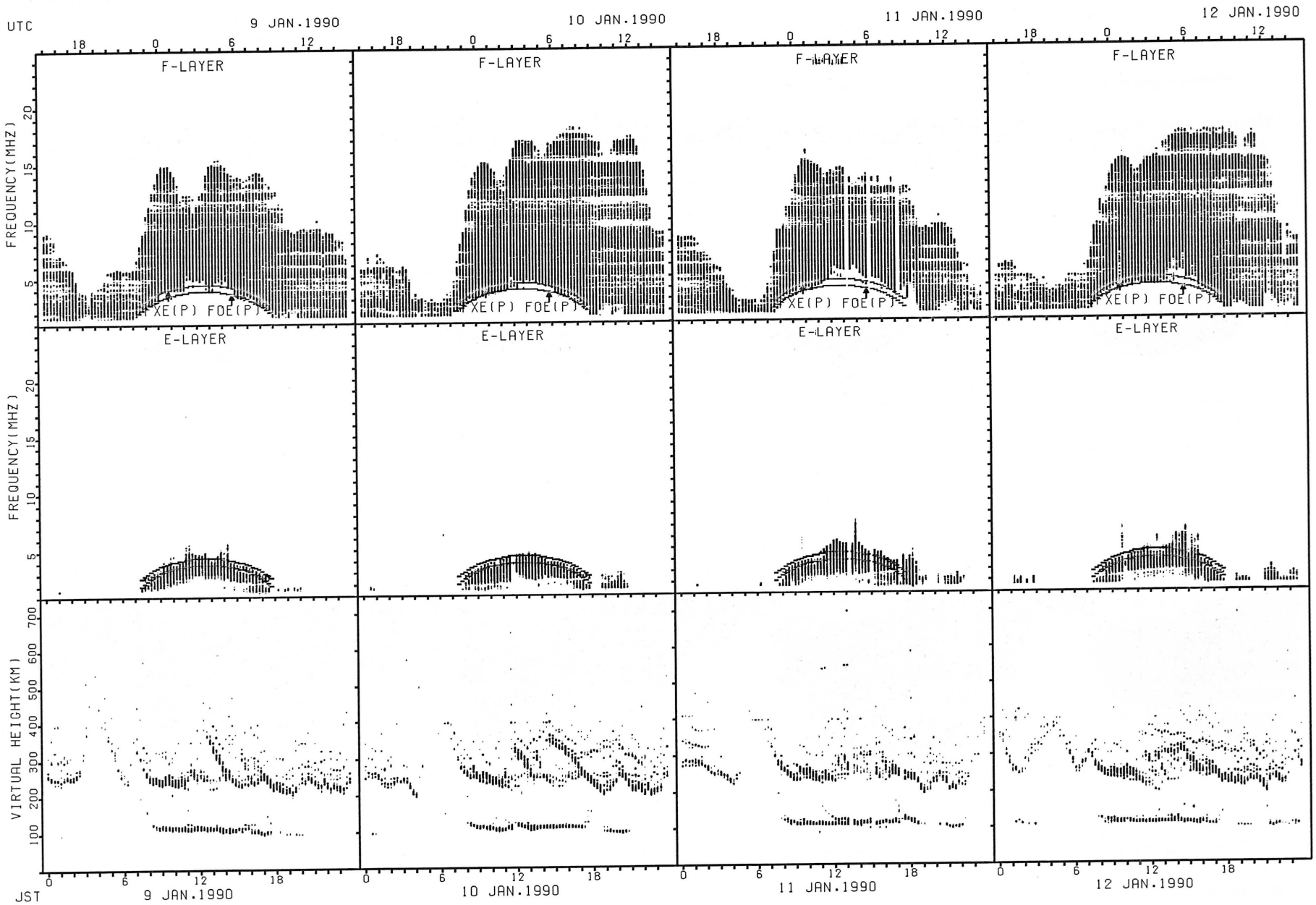
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



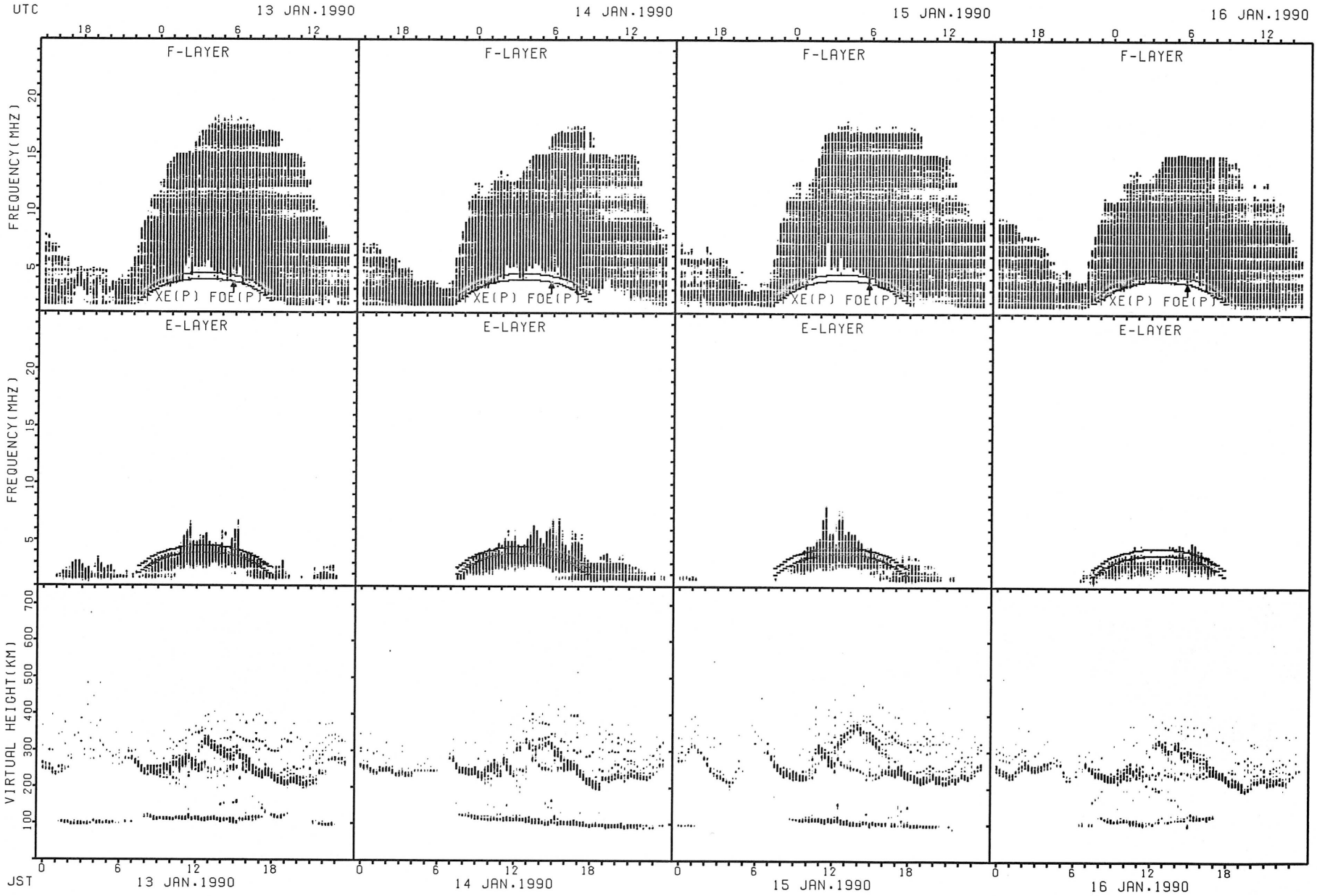
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



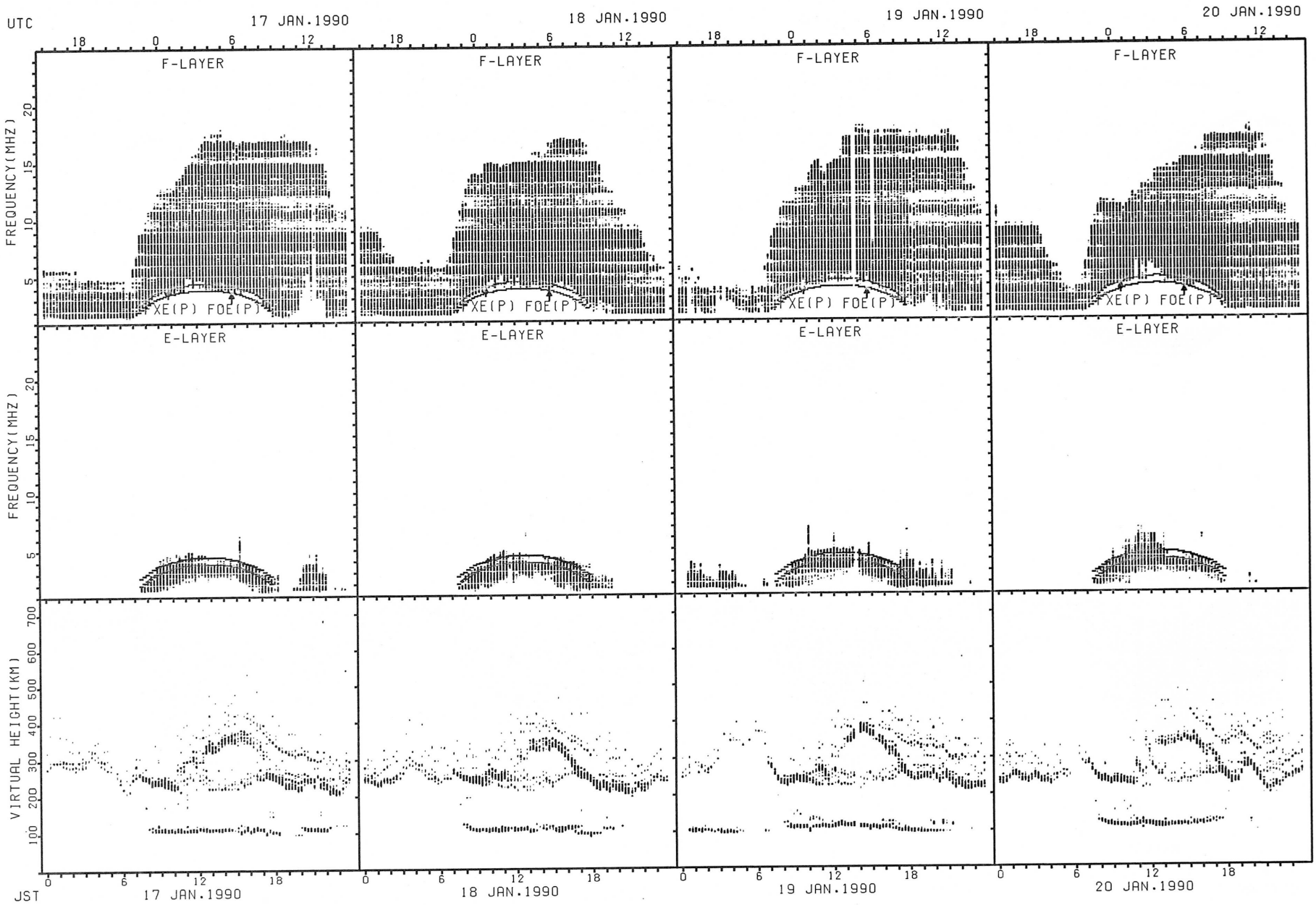
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



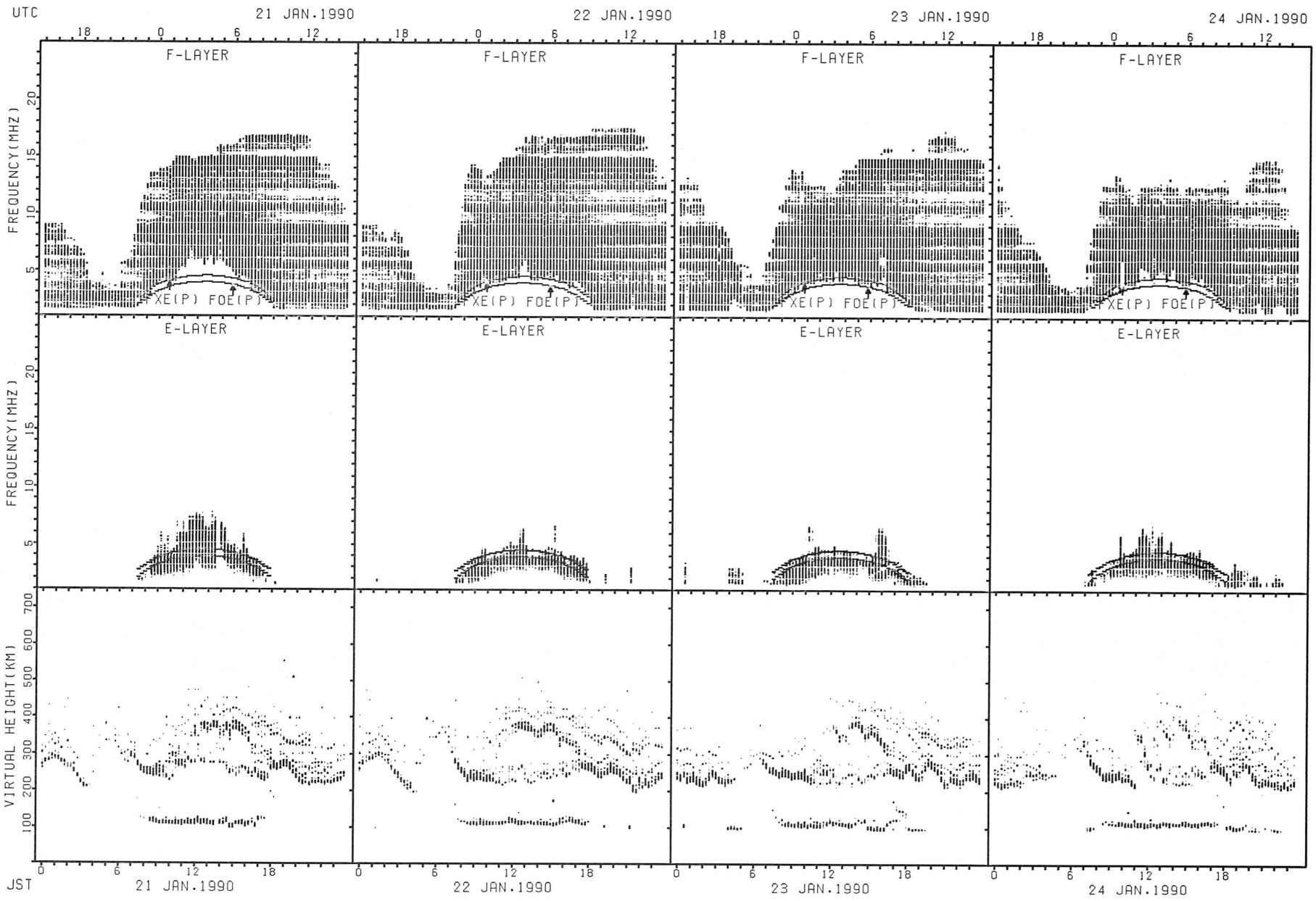
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



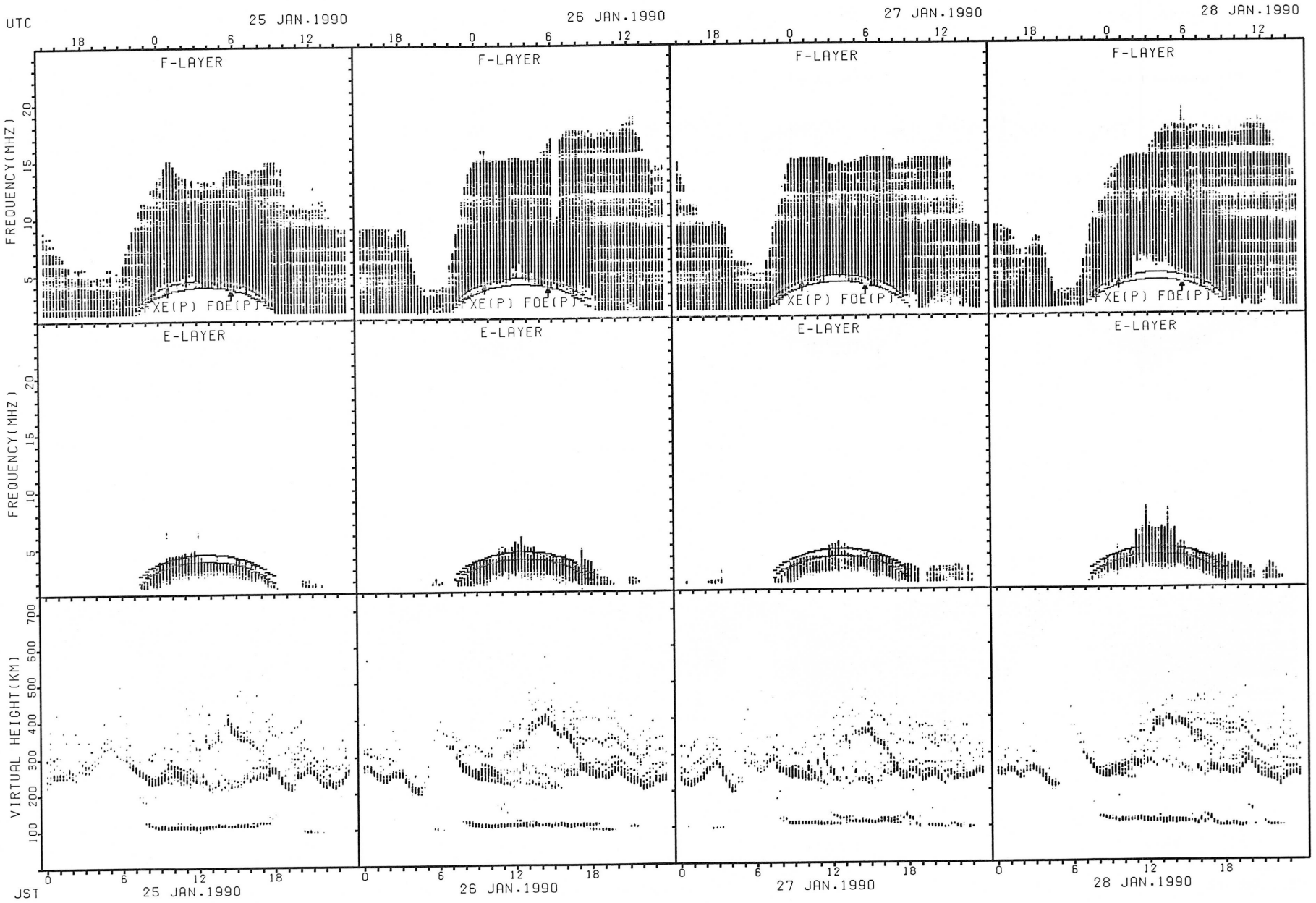
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



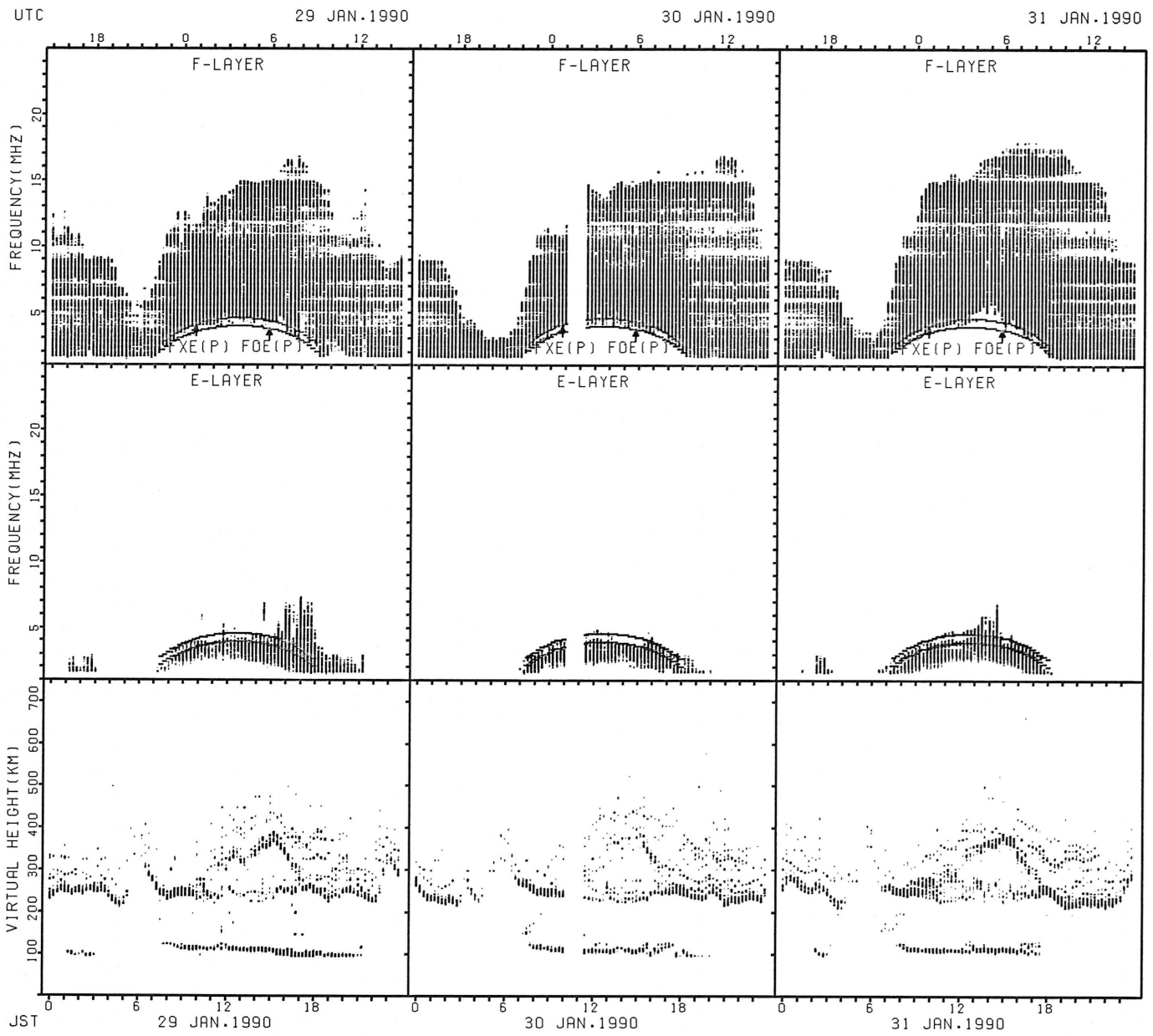
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



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

SUMMARY PLOTS AT OKINAWA



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

MONTHLY MEDIANS OF H'F AND H'ES
JAN.1990 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									31	31	30	31	31	31	31	31	30	24	17					
MED									238	236	236	238	238	248	242	246	257	284	282					
U Q									248	244	244	242	248	254	254	258	266	298	290					
L Q									234	228	228	230	232	244	238	240	250	272	268					

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						
MED																		117						
U Q																		121						
L Q																		113						

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									31	31	31	31	31	31	31	31	31	29	20					
MED									244	248	246	242	244	252	264	256	268	276	277					
U Q									252	256	254	248	258	262	270	270	274	291	287					
L Q									236	238	238	234	236	244	254	244	248	270	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																		13	13		10			
MED																		103	105		104			
U Q																		110	113		107			
L Q																		103	102		101			

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								16	29	28	31	27	30	28	28	30	30	30	25	20				
MED								269	240	243	248	246	250	259	276	257	264	274	276	288				
U Q								294	254	250	252	254	262	270	289	274	272	288	292	307				
L Q								262	234	236	240	236	242	244	254	252	252	264	264	260				

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																			12					
MED																			107					
U Q																			115					
L Q																			103					

MONTHLY MEDIANS OF H'F AND H'ES
JAN.1990 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									30	30	31	30	31	30	30	31	31	31	31	29	27	21	10	
MED									247	240	244	252	252	258	261	276	284	256	252	276	262	274	281	
U Q									260	244	252	262	286	292	278	316	298	264	266	290	280	285	288	
L Q									238	232	238	242	248	250	252	254	258	242	242	257	250	262	266	

H'ES

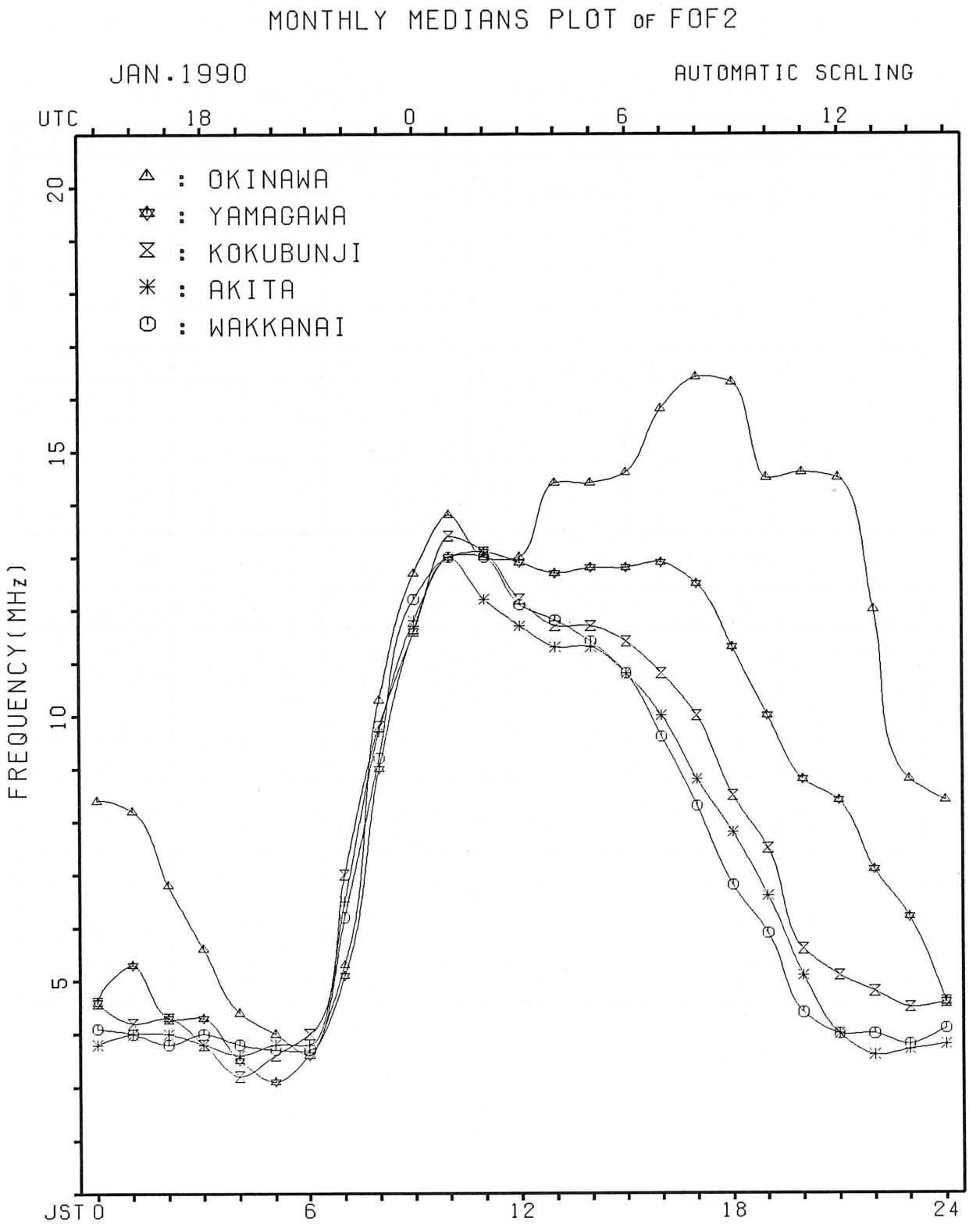
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT											11	15	12	16	12		10		11	11				
MED											115	117	116	118	114		115		99	97				
U Q											119	119	120	121	119		119		103	103				
L Q											115	115	113	114	109		113		97	97				

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	19	15	12						31	31	31	31	30	30	31	30	30	30	31	31	31	30	29	24
MED	296	274	293						258	242	246	250	277	325	310	341	314	273	250	252	270	248	248	273
U Q	324	296	328						266	250	256	266	326	342	360	364	342	294	264	266	312	262	257	288
L Q	272	270	267						250	238	236	242	250	276	264	312	292	254	236	234	246	240	243	260

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	19	21	19	20	14	21	14	15	15	10			
MED											118	119	115	117	114	119	113	117	103	101	99			
U Q											149	131	119	119	121	131	120	153	113	105	107			
L Q											113	115	112	109	111	111	106	103	99	97	97			


MONTHLY MEDIANS PLOT OF FOF2
JAN.1990
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

JAN. 1990 | FXI (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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	62	63	68	65	41	38	42											112	95	84	61	48	45	46
2	47	46	45	36	36	37	33											103	87	71	75	56	54	55
3	56	42	44	43	41	41	40											101	78	73	60	53	42	39
4	38	38	40	42	34	38	41											108	92	84	70	56	47	47
5	44	42	42	48	38	35	38												86	79	69	53	49	46
6	46	46	47	41	40	42	48												88	83	51	44	42	42
7	42	44	46	46	40	38	39												87	79	63	55	47	43
8	47	46	43	40	36	33	35												79	65	56	42	40	41
9	39	41	40	34	35	39	39												84	72	56	43	41	43
10	44	48	48	41	37	36	36												98	76	61	61	57	49
11	43	41	42	38	33	34	34												84	71	61	53	36	38
12	38	40	37	38	40	43	41												82	77	58	50	44	43
13	42	42	40	40	40	42	44												79	78	48	45	44	40
14	38	43	44	40	41	43	37												89	74	52	44	48	46
15	41	39	39	41	42	37	38												84	71	63	51	48	46
16	44	42	44	43	41	45	49												82	75	55	47	48	47
17	48	47	47	44	46	46	50												85	78	56	56	62	57
18	53	42	39	41	41	42	43												85	72	62	57	55	50
19	49	48	38	38	39	37	41												86	80	80	64	57	54
20	45	45	47	44	37	41	45												113	111	96	68	55	60
21	54	52	48	48	52	51	48												109	88	73	63	60	56
22	59	56	55	57	55	53	48												107	94	84	68	65	67
23	58	61	54	51	45	49	58												95	89	80	69	68	65
24	62	64	61	53	45	48	51												108	95	68	63	63	61
25	61	60	53	48	51	53	56												107	99	82	67	60	57
26	58	56	53	50	51	46	51												99	100	89	69	58	53
27	58	63	53	51	47	48	51												91	80	63	58	58	57
28	54	54	53	54	42	40	47												100	90	79	72	75	73
29	64	59	56	54	49	46	51												117	99	60	56	57	60
30	59	66	56	48	48	48	50												99	86	87	82	70	57
31	58	56	56	56	43	49													103	87	79	63	60	59
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	30											4	31	31	31	31	31	31
MED	48	46	47	44	41	42	44											106	89	80	63	56	55	50
UQ	58	56	53	50	46	47	50											110	100	88	79	64	60	57
LQ	44	42	42	40	38	38	39											102	84	74	59	50	46	44

JAN. 1990 | FXI (0.1 MHZ)

IONOSPHERIC DATA

JAN. 1990 | FOF2 (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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	57	62	59	35	32	35	72 S	110	137	124	126	121	114	112	108	102	104	89	77	55	40	38	40
2	40	39	38	30	30	31	27	61	86	102	127	114	114	112	115	104	103	96	81	64	68	50	47	49
3	49	35	37	37	35	34	34	59	100	106	124	121	115	103	100	108	107	95	72	67	53	46	36	34
4	32	33	34	35	29	33	35	68	98	114	122	130	122	114	109	111	106	102	86	77	64	49	39	41
5	37	36	37	42	32	29	32	72	90 H	109	118	120	124	111	110	109	105	91	81	73	62	46	43	39
6	40	39	41	35	34	36	41	60	94	112	137	142	112	117	103	112	98	96	83	76	44	38	36	35
7	35	38	40	40	34	32	33	60	91	100	113	120	114	104	106	112	90	94	81	72	57	47	41	U-S 37
8	40	40	38	34	30	27	29	55	83	88	114	109	108	101	101	101	91	86	73	60	46	34 S	34 S	34
9	33	35	34	28	30	33	32	64	91	123	142	100	110	116	116	111	99	92	77	65	50	38	35	37
10	37	42	42	34	32	30	30	54	91	106	108	133	123	109	109	112	115	115	92	68	56	56	50	42
11	37	35	36	32	27	28	28	62	89	119	130	131	107	101	107	102	92	91	77	65	55	46	30	32
12	32	35	31	32	34	38	35	69	102	118	144	125	125	120	124	117	102	107	75	71	53	43	38	37
13	37	35	34	34	34	36	39	59	94	121	149	135	126	115	124	125	107	93	73	73	42 H	38	38	34
14	33	38	38	34	35	37	32	62	95	103	126	122	119	119	125	115	98	86	83	67	45	37	42	40
15	35	34	32	35	36	32	32	57	93	121	131	134	123	125	122	111	97	82	77	64	57	43	41	40
16	38	36	38	37	35	38	43	65	96	116	118	118 V	122	129	118	111	113	103	75	68	48	41	41	41
17	41	41	41	38	40	41	44	69	91	142	137	121	127	129	133	124	109	91	78	71	49	48	56	49
18	46	36	33	35	35	36	37	76	91	114	133	124	126	122	117	107	102	93	80	66	57	50	48	44
19	43	41	32	32	34	31	34	70	101	121	144	138	126	113	111	110	103	86	30	72	73	58	50	47
20	40	39	41	38	32	35	38	71	93	107	129	133	119	102	113	119	112	102 S	106	105	91	60	59	53
21	48	47	42	42	47	45	41	87	125	140	156 R	153	141	136	134	123	116	105	102	82	67	57	54	50
22	53	50	48	51	49	46	42	77	131	151	155	137	128	124	124	123	112	109	101	88	77	60	59	60
23	52	55	47	45	40	44	53	77	108	132	138	134	120	115	122	117	108	98	89	83	73	63	62	59
24	57	58	55	47	39	43	45	86	106	111	117	129	120	108	108	104	101	100	103	90	62	57	57	55
25	55	54	47	42	45	47	50	71 S	100	131	140	147	134	120	128	126	115	113	99	93	75	61 S	54	51
26	52	50	47	44	45	41	45	84	112	133	143	138	128	126	128	119	113	108	93	94	83	63	52	47 S
27	52	57	47	45	41	42	44	86	113	128	142	145	136	128	122	117	106	101	86	74	57	52	52	51
28	48	48	47	48	37	34	41	76	92	112	137	139	144	142	135	126	124	112 X	94	84	73	67	69	68
29	58	53	50	48	43	40	45	77	102	115	127	120	126	131	140	126	111	100	111	94	55	50	51	54
30	53	60	50	42	42	42	44	74	108	128	144	145	137	141	133	125	118	109	93	80	81	75	64	51
31	52	50	50	50	37	41 F	42	74 S	103	131	150	154	148	149	137	134	117	103	97	82	73 S	57	54	53
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	41	40	41	38	35	36	38	70	96	118	133	131	123	117	118	112	106	100	83	73	57	50	48	44
UQ	52	50	47	44	40	41	44	76	107	130	142	138	128	127	126	123	112	104	94	82	73	58	54	51
LQ	37	36	36	34	33	32	32	64	91	110	124	121	119	112	110	110	102	92	78	68	53	43	38	38

JAN. 1990 | FOF2 (0.1 MHZ)

IONOSPHERIC DATA

JAN. 1990 | FOF1 (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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			U L 590									
2																								
3												L												
4												L	L		L									
5											L		L	L	L									
6											L	L		U L 470	L									
7												L	L	L										
8											L		L		L									
9													L											
10												L	L		L	L								
11											L	L												
12											L		L											
13											L	L	L	L	L	L								
14											L	L	L		L									
15											L	L	L	L	L									
16										L		L	L	L										
17										L	L	L	L	L	L									
18												L	L	L	L									
19										L	L		L											
20											L		L	L	L									
21											L	L	L			L								
22										L			L	L	L	L								
23												L	L	U L 690	L	L								
24													L	L	L									
25											L		L	L	L	L								
26											L			L	L									
27											L	L	L		L									
28										L	L	L	L	L	L									
29										L	L	L	L	L	L									
30										L	L		L	L	L									
31										L	L	L	L	L	L									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT														2	1									
MED														U L 580	U L 590									
UQ																								
LQ																								

JAN. 1990 | FOF1 (0.01 MHZ)

IONOSPHERIC DATA

JAN. 1990 | FOE (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								160	270	310	335	355	345	345	325 A	295	200							
2								A	265	305	350	355	365	355	A	290	230							
3								A	265	315	340	355	360	335	320	270	A							
4								185	255	315	335	350	355	355	330	275	H 225							
5								155	R 260	315	340	335	345	R	310	285	A	B						
6								H 180	H 250	290	340	345	345	335	325	300	225	B						
7								B	H 265	305	340	340	345	335	310	295	210	B						
8								B	260	305	335	350	345	340	335	290	225	B						
9								170	255	305	A	A	350	345	320	285	200	B						
10								155	230	295	335	335	355	335	315	280	225	B						
11								B	240	295	330	335	340	340	325	270	200	B						
12								180	250	300	340	350	345	340	325	275	A	B						
13								180	R 255	280	335	340	345	345	325	A	A	B						
14								170	260	310	R 340	340	A	A	315	290	A	B						
15								175	250	310	A	340	R	A	R 320	300	240	B						
16								180	255	305	340	345	350	345	330	295	225	B						
17								185	H 275	310	340	A	A	350	330	A	245	B						
18								H 180	H 265	310	345	355	355	350	335	300	U A 250	B						
19								180	270	325	340	360	370	365	355	320	250	B						
20								180	275	A	355	385	380	360	340	300	230	B						
21								H 210	280	U A 340	U A 345	A	A	370	B	305	255	B						
22								200	275	A	360	385	375	355	340	320	255	B						
23								H 195	280	335	360	365	370	355	340	315	250	B						
24								190	270	335	R 360	370	A	R 380	345	A	A	B						
25								195	285	330	A	A	A	360	340	325	255	B						
26								200	270	320	355	370	375	360	335	305	255	B						
27								205	270	320	340	355	R	365	350	A	245	A						
28								B	270	340	A	A	380	360	330	320	265	B						
29								H 205	H 285	340	355	365	370	355	R 350	320	265	165						
30								H 210	H 285	A	U A 355	A	370	370	350	310	260	A						
31							J K 140	H 215	280	320	350	U A 355	A	360	340	300	255	195						
	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	25	31	28	27	25	23	28	29	27	25	2						
MED							J K 140	180	265	310	340	355	355	355	330	300	245	180						
UQ								200	275	322	352	360	370	360	340	308	255							
LQ								180	255	305	340	340	345	342	325	288	225							

JAN. 1990 | FOE (0.01 MHZ)

IONOSPHERIC DATA

JAN. 1990 | FOES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 14	J A 27	E B 13	E B 13	E B 13	E B 16	E B 13	J A 19	J A 31	G	J A 51	J A 62	47	51	41	G	G	E B 14	E B 14	E B 14	E B 13	J A 18	J A 17	J A 17
2	J A 26	E B 13	E B 13	E B 14	J A 28	E B 13	J A 22	J A 46	J A 32	G	J A 39	G	G	G 30	36	G 25	27	J A 17	J A 19	J A 27	J A 28	E B 14	E B 13	E B 13
3	E B 14	E B 13	E B 12	E B 13	J A 21	J A 27	J A 22	J A 21	G	G	G	G	G 27	G 27	G	G 23	J A 28	J A 54	J A 28	J A 38	21	E B 15	J A 19	E B 13
4	E B 15	E B 12	E B 13	E B 12	E B 13	E B 13	E B 18	G	G	G	G	G	G	G	G 28	G 26	G	21	J A 36	J A 22	E B 14	E B 13	E B 14	E B 13
5	E B 13	E B 14	J A 21	E B 13	E B 13	E B 13	E B 14	G	J A 50	G	38	G	G	G 31	G	G	J A 29	J A 41	J A 22	E B 16	E B 13	E B 13	E B 15	E B 14
6	E B 13	E B 13	E B 13	E B 13	E B 14	E B 14	E B 13	G	G	G	G	G	G	G	G	G	G 21	E B 15	E B 14	E B 14	E B 13	E B 15	E B 13	E B 15
7	E B 12	E B 13	E B 12	E B 13	E B 13	J A 19	E B 12	E B 15	G	G	G	37	G 20	36	35	G	G	E B 14	J A 24	E B 13	E B 13	20	E B 13	E B 14
8	E B 14	E B 13	E B 13	E B 13	E B 13	E B 14	E B 13	E B 15	G	34	J A 36	38	G	G 26	G 21	G 20	G	17	J A 19	E B 13	E B 13	E B 14	E B 16	E S 16
9	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	20	23	G	G	J A 43	J A 42	J A 37	G 32	G 31	G	G	E B 15	20	E B 13	E B 14	E B 13	E B 14	E B 13
10	E B 14	E B 12	E B 12	E B 13	E B 13	E B 13	E B 13	G	G	G	G 33	G	G	G	G	G	G	J A 35	J A 19	J A 20	E B 14	E B 13	E B 13	E B 14
11	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 14	E B 14	G	G	G	36	G	40	40	34	G 20	J A 18	22	20	E B 13	E B 14	E B 12	E B 13
12	E B 13	E B 13	E B 12	J A 25	E B 13	22	E B 14	G	G	G	41	G	G	J A 44	G	G	J A 28	J A 30	J A 48	J A 18	E B 13	E B 14	E B 14	J A 19
13	J A 19	J A 36	J A 42	J A 44	J A 42	J A 24	20	G	G 25	G	G 30	40	G	G	J A 37	33	J A 33	J A 31	J A 21	J A 18	J A 16	E B 13	J A 17	E B 12
14	E B 14	25	E B 13	23	J A 27	J A 20	J A 20	G	G	34	G 31	J A 42	J A 41	J A 40	J A 37	J A 41	J A 39	20	E B 14	E B 14	E B 13	19	19	J A 20
15	E B 14	E B 13	E B 13	E B 13	J A 28	J A 19	J A 21	G	G	G 31	34	36	35	J A 50	G	G	G	E B 16	E B 15	E B 14	E B 13	E B 14	E B 13	20
16	E B 13	J A 28	J A 24	J A 26	E B 14	E B 14	E B 13	G	G	G	G	G	G	38	G	G 20	J A 25	22	E B 13	J A 25	20	E B 13	E B 15	J A 16
17	J A 35	J A 29	E B 13	E B 12	J A 21	E B 13	E B 13	G	G	G 28	G	J A 39	J A 51	39	G 30	J A 37	J A 48	E B 15	J A 18	E B 14	E B 13	E B 13	E B 13	E B 14
18	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	32	J A 30	J A 41	G 29	J A 35	G	G 27	G 24	23	E B 13	E B 12	E B 13	J A 16	J A 34	E B 14
19	E B 12	J A 21	E B 12	E B 13	E B 13	E B 13	E B 13	G	G	J A 33	G	G	G	G 32	G 30	G	G	J A 29	J A 27	J A 20	J A 22	J A 19	J A 16	J A 52
20	J A 19	J A 16	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	J A 43	G	G	G	G	G	G	G	E B 13	E B 14	E B 14	E B 13	E B 14	E B 14	E B 14
21	E B 13	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	39	43	42	41	G	E B 39	G	G	E B 15	E B 13	E B 13	E B 14	E B 13	E B 15	E B 14
22	E B 13	E B 12	E B 13	E B 13	E B 13	E B 13	E B 13	J A 24	G	J A 39	G	G	G	G	G	G	G	E B 18	J A 22	21	22	E B 13	20	E B 14
23	J A 21	J A 21	E B 13	E B 13	E B 14	E B 16	E B 14	G	G	G	G	G	G	G	G	G 23	G	E B 18	E B 13	E B 16	J A 14	E B 13	J A 17	E B 15
24	E B 14	E B 14	J A 17	E B 14	E B 14	E B 14	E B 14	G	G	G	G	41	39	G 37	41	J A 44	30	J A 22	J A 18	J A 23	J A 22	J A 27	J A 20	J A 21
25	J A 21	J A 19	E B 13	J A 22	J A 19	E B 13	E B 13	G	G	G	39	J A 53	J A 42	G	G	G	G	20	E B 12	E B 13	E B 14	E B 14	J A 19	E B 14
26	E B 15	E B 13	J A 22	J A 23	J A 17	E B 15	E B 13	G	G	G	G	42	43	41	36	G	G 25	E B 18	E B 13	21	E B 13	E B 13	E B 13	E B 13
27	E B 14	E B 13	E B 15	E B 13	E B 12	E B 14	J A 14	J A 19	G	G	38	G	G 36	G 32	33	33	G 23	J A 36	J A 18	E B 12	E B 13	E B 13	E B 14	E B 13
28	E B 14	E B 13	E B 13	J A 21	E B 13	E B 14	E B 13	E B 20	G	G	39	40	J A 52	G	G	G	G	E B 18	J A 16	J A 22	J A 19	E B 14	E B 13	E B 14
29	E B 14	E B 13	E B 13	J A 18	E B 12	E B 13	E B 14	G	G	G	G	G	G	39	G	G	G	27	E B 13	J A 16	J A 19	J A 14	E B 14	E B 13
30	E B 14	E B 13	E B 14	E B 15	E B 13	E B 13	E B 13	G	J A 31	J A 37	38	37	40	G	G 23	G 20	G	21	J A 21	E B 13	E B 14	E B 14	E B 13	E B 15
31	23	J A 20	E B 16	E B 13	E B 13	E B 13	J K 14	G	G	36	40	J A 43	J A 42	G	G	G	G	G	E B 13	E B 13	E B 14	E B 12	E B 13	E B 14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G	G 30	36	G 20	G 31	E G 21	G	G	18	J A 18	E B 16	E B 14	E B 14	E B 14	E B 14
UQ	E B 15	J A 20	E B 14	16	16	E B 16	14	E G 15	G	32	38	41	40	38	36	G 26	26	J A 25	J A 22	J A 20	18	E B 14	17	E 16
LQ	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G	G	G	G	G	G	G	G	E 3 16	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13

JAN. 1990 | FOES (0.1 MHZ)

IONOSPHERIC DATA

JAN. 1990 | FBES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 14	16	E B 13	E B 13	E B 13	E B 16	E B 13	G	G 20	G	G	42	42	48	39	G	G	E B 14	E B 14	E B 14	E B 13	15	E B 14	E B 13
2	20	E B 13	E B 13	E B 14	17	E B 13	16	27	G 21	G	G 27	G	G	G 29	33	G 24	G	14	16	18	18	E B 14	E B 13	E B 13
3	E B 14	E B 13	E B 12	E B 13	16	16	20	20	G	G	G	G	G 27	G 27	G	G 21	25	25	16	21	16	E B 15	E B 14	E B 13
4	E B 15	E B 12	E B 13	E B 12	E B 13	E B 13	E B 13	G	G	G	G	G	G	G	G 27	G 24	G	19	24	E B 13	E B 14	E B 13	E B 14	E B 13
5	E B 13	E B 14	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	G	36	G	G	G 31	G	G	23	19	18	E B 16	E B 13	E B 13	E B 15	E B 14
6	E B 13	E B 13	E B 13	E B 13	E B 14	E B 14	E B 13	G	G	G	G	G	G	G	G	G	G 20	E B 15	E B 14	E B 14	E B 13	E B 15	E B 13	E B 15
7	E B 12	E B 13	E B 12	E B 13	E B 13	E B 13	E B 12	E B 15	G	G	G	35	G 20	35	33	G	G	E B 14	20	E B 13	E B 13	E B 14	E B 13	E B 14
8	E B 14	E B 13	E B 13	E B 13	E B 13	E B 14	E B 13	E B 15	G	32	G	37	G	G 24	G 20	G 20	G	15	E B 15	E B 13	E B 13	E B 14	E B 16	E S 16
9	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G	34	36	G 32	G 31	G 29	G	G	E B 15	E B 13	E B 13	E B 14	E B 13	E B 14	E B 13
10	E B 14	E B 12	E B 12	E B 13	E B 13	E B 13	E B 13	G	G	G	G 27	G	G	G	G	G	G	24	E B 13	E B 13	E B 14	E B 13	E B 13	E B 14
11	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 14	E B 14	G	G	G	G	G	37	37	30	G 17	17	E B 14	E B 12	E B 13	E B 14	E B 12	E B 13
12	E B 13	E B 13	E B 12	E B 12	E B 13	E B 13	E B 14	G	G	G	40	G	G	38	G	G	24	23	35	E B 12	E B 13	E B 14	14	17
13	16	15	22	18	18	17	E B 14	G	G 24	G	G 29	36	G	G	G 27	31	30	18	17	E B 14	E B 13	E B 13	E B 14	E B 12
14	E B 14	15	E B 13	E B 13	20	15	E B 14	G	G	33	G 25	G 26	37	34	G 25	G 27	24	19	E B 14	E B 14	E B 13	E B 12	E B 13	E B 14
15	E B 14	E B 13	E B 13	E B 13	17	E B 13	19	G	G	G 25	34	G 31	35	38	G	G	G	E B 16	E B 15	E B 14	E B 13	E B 14	E B 13	E B 13
16	E B 13	E B 13	14	E B 13	E B 14	E B 14	E B 13	G	G	G	G	G	G	38	G	G 20	G 20	20	E B 13	19	E B 13	E B 13	E B 15	E B 13
17	21	16	E B 13	E B 12	17	E B 13	E B 13	G	G	G 26	G	37	38	37	G 28	31	G 20	E B 15	E B 13	E B 14	E B 13	E B 13	E B 13	E B 14
18	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G 20	G 22	G 23	G 25	G 24	G	G 18	G 23	E B 17	E B 13	E B 12	E B 13	E B 13	E B 13	E B 14
19	E B 12	E B 14	E B 12	E B 13	E B 13	E B 13	E B 13	G	G	G 22	G	G	G	G 32	G 29	G	G	18	E B 13	16	E B 14	17	E B 14	E B 13
20	E B 13	E B 12	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	32	G	G	G	G	G	G	G	E B 13	E B 14	E B 14	E B 13	E B 14	E B 14	E B 14
21	E B 13	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G 34	39	39	39	G	E B 39	G	G	E B 15	E B 13	E B 13	E B 14	E B 13	E B 15	E B 14
22	E B 13	E B 12	E B 13	E B 13	E B 13	E B 13	E B 13	G 14	G	34	G	G	G	G	G	G	G	E B 18	17	E B 14	E B 15	E B 13	E B 13	E B 14
23	E B 13	16	E B 13	E B 13	E B 14	E B 16	E B 14	G	G	G	G	G	G	G	G	G 21	G	E B 18	E B 13	E B 16	E B 13	E B 13	E B 13	E B 15
24	E B 14	E B 14	E B 13	E B 14	E B 14	E B 14	E B 14	G	G	G	G	39	38	G 36	39	38	28	18	E B 12	E B 13	17	17	E B 13	E B 13
25	E B 13	16	E B 13	16	E B 13	E B 13	E B 13	G	G	G	37	50	41	G	G	G	G	18	E B 12	E B 13	E B 14	E B 14	E B 13	E B 14
26	E B 15	E B 13	16	E B 13	E B 14	E B 15	E B 13	G	G	G	G	40	40	38	35	G	G 23	E B 18	E B 13	E B 14	E B 13	E B 13	E B 13	E B 13
27	E B 14	E B 13	E B 15	E B 13	E B 12	E B 14	E B 12	G	G	G	G	G	G 35	G 29	37	33	G 21	34	16	E B 12	E B 13	E B 13	E B 14	E B 13
28	E B 14	E B 13	E B 13	16	E B 13	E B 14	E B 13	E B 20	G	G	38	38	G	G	G	G	G	E B 18	E B 14	17	16	E B 14	E B 13	E B 14
29	E B 14	E B 13	E B 13	E B 15	E B 12	E B 13	E B 14	G	G	G	G	G	G	38	G	G	G	24	E B 13	E B 13	E B 15	E B 14	E B 14	E B 13
30	E B 14	E B 13	E B 14	E B 15	E B 13	E B 13	E B 13	G	G 22	34	G 36	37	39	G	G 22	G 20	G	20	18	E B 13	E B 14	E B 14	E B 13	E B 15
31	E B 14	15	E B 16	E B 13	E B 13	E B 13	K 14	G	G	G	G	37	37	G	G	G	G	G	E B 13	E B 13	E B 14	E B 12	E B 13	E B 14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G	G	G 23	G	G 29	E G 20	G	G	18	E B 14	E B 14	E B 13	E B 14	E B 13	E B 14
UQ	E B 14	E B 14	E B 13	E B 13	E B 14	E B 14	E B 14	G	G	G 24	G 32	37	37	36	30	G 22	G 22	19	16	E B 14	E B 14	E B 14	E B 14	E B 14
LQ	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G	G	G	G	G	G	G	G	E B 15	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13

JAN. 1990 | FBES (0.1 MHZ)

IONOSPHERIC DATA

JAN. 1990 | FMIN (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	12	13	13	13	16	13	18	15	16	16	18	17	21	20	18	15	14	14	14	13	13	14	13
2	13	13	13	14	14	13	13	13	18	18	21	19	22	19	16	18	16	13	13	12	14	14	13	13
3	14	13	12	13	13	12	14	18	19	17	19	22	21	18	18	18	17	13	13	15	16	15	14	13
4	15	12	13	12	13	13	13	16	17	20	21	24	26	27	21	17	15	14	14	13	14	13	14	13
5	13	14	14	13	13	13	14	13	18	18	19	19	22	21	21	20	17	14	13	16	13	13	15	14
6	13	13	13	13	14	14	13	14	13	17	19	24	26	22	19	18	14	15	14	14	13	15	13	15
7	12	13	12	13	13	13	12	15	14	16	17	16	15	16	18	17	14	14	14	13	13	14	13	14
8	14	13	13	13	13	14	13	15	14	17	17	15	18	17	16	17	15	13	15	13	13	14	16	E S 16
9	13	13	13	13	13	13	13	14	13	14	17	18	18	15	15	15	13	15	13	13	14	13	14	13
10	14	12	12	13	13	13	13	14	13	17	18	20	21	20	17	16	14	13	13	13	14	13	13	14
11	13	13	13	13	13	13	14	14	14	15	17	17	19	19	13	14	13	13	14	12	13	14	12	13
12	13	13	12	12	13	13	14	12	13	15	24	19	21	18	18	18	16	13	13	12	13	14	14	E S 14
13	13	13	13	13	13	12	14	15	16	18	17	19	21	20	17	17	15	13	13	14	13	13	14	12
14	14	13	13	13	13	13	14	14	17	18	18	18	19	18	17	18	16	14	14	14	13	12	13	14
15	14	13	13	13	13	13	13	13	14	18	21	24	28	25	18	18	16	16	15	14	13	14	13	13
16	13	13	13	13	14	14	13	14	15	15	20	16	19	17	16	14	13	16	13	13	13	13	15	13
17	14	13	13	12	13	13	13	14	14	14	18	18	21	19	17	14	14	15	13	14	13	13	13	14
18	14	13	13	13	13	13	13	14	13	13	14	15	16	15	18	15	15	17	13	12	13	13	13	14
19	12	14	12	13	13	13	13	14	14	16	16	20	18	23	20	18	15	13	13	12	14	13	14	13
20	13	12	13	13	13	13	14	15	18	18	19	23	25	23	17	16	13	13	14	14	13	14	14	14
21	13	14	13	13	13	13	13	13	19	23	25	28	33	28	39	23	18	15	13	13	14	13	15	14
22	13	12	13	13	13	13	13	14	16	17	21	21	24	21	21	20	18	18	12	14	15	13	13	14
23	13	13	13	13	14	16	14	16	16	18	22	20	20	17	19	18	17	18	13	16	13	13	13	15
24	14	14	13	14	14	14	14	15	17	20	21	26	27	32	27	31	19	15	12	13	13	14	13	13
25	13	13	13	13	13	13	13	15	19	20	25	25	27	27	24	19	18	13	12	13	14	14	13	14
26	15	13	13	13	14	15	13	14	18	21	21	25	22	21	17	16	18	18	13	14	13	13	13	13
27	14	13	15	13	12	14	12	15	17	19	21	22	21	22	21	20	17	13	12	12	13	13	14	13
28	14	13	13	14	13	14	13	20	18	24	33	26	29	23	24	20	18	18	14	13	14	14	13	14
29	14	13	13	15	12	13	14	15	17	25	25	25	27	32	28	20	17	14	13	13	15	14	14	13
30	14	13	14	15	13	13	13	13	17	19	21	18	20	21	19	17	17	14	14	13	14	14	13	15
31	14	13	16	13	13	13	13	15 R	14	18	18	18	21	20	20	18	17	14	13	13	14	12	13	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	14	13	13	13	13	13	13	14	16	18	19	20	21	21	18	18	16	14	13	13	13	13	13	14
UQ	14	13	13	13	13	14	14	15	18	19	21	24	26	23	21	18	17	15	14	14	14	14	14	14
LQ	13	13	13	13	13	13	13	14	14	16	18	18	19	18	17	16	14	13	13	13	13	13	13	13

JAN. 1990 | FMIN (0.1 MHZ)

IONOSPHERIC DATA

JAN. 1990 | M(3000)F2 (0.01) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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	260	265	280	320	290	265	305	300 S	315	315	285	295	290	285	285	300	280	305	305	310	310	260	255	250
2	275	305	315	285	260	280	325	305	325	305	315	300	295	285	295	285	295	310	305	305	325	310	260	265
3	305	280	265	270	265	280	315	325	310	305	310	310	295	290	280	295	295	305	300	305	300	315	305	280
4	265	270	280	320	250	270	305	330	340	315	310	305	295	300	295	300	320	300	315	305	305	280	270	265
5	265	265	275	305	335	250	280	325	320 H	340	310	300	300	290	295	305	300	300	300	300	320	275	270	265
6	270	280	290	275	255	260	325	320	315	320	305	315	320	325	290	300	310	320	310	335	295	295	290	295
7	280	290	285	305	320	280	325	330	345	310	325	310	315	295	295	310	310	315	310	315	300	285	270 U	285 S
8	290	295	320	310	335	290	300	320	340	340	320	310	330	310	305	310	315	315	330	330	320	310 S	280 S	285
9	275	290	300	240	230	275	300	310	330	305	325	300	295	290	295	310	320	315	320	340	300	290	275	270
10	270	290	320	330	295	290	295	330	335	320	305	305	305	300	300	295	300	315	315	315	285	275	290	280
11	275	275	285	320	270	265	270	315	320	320	315	320	315	310	315	305	305	325	330	335	315	325	265	270
12	265	280	285	275	245	275	315	320	335	315	330	305	300	300	295	310	305	320	320	330	290	280	270	270
13	285	280	290	275	280	280	340	330	330	320	310	320	310	290	305	310	310	320	310	350	285	295	295	295
14	295	285	305	285	275	305	315	325	350	325	315	310	305	290	295	310	320	315	325	350	340	270	295	285
15	285	260	280	295	315	305	295	325	325	315	310	310	290	300	295	305	320	315	320	330	315	305	270	280
16	295	280	295	280	265	290	345	330	330	325	320	290 V	300	295	290	290	310	320	320	320	350	290	295	295
17	285	280	290	275	290	270	330	360	300	325	325	290	285	275	290	285	300	295	300	325	280	280	295	310
18	315	300	305	250	260	260	300	335	340	315	315	295	295	285	295	290	300	305	310	310	315	310	310	290
19	305	320	320	270	255	255	295	335	340	310	315	300	305	290	285	290	305	300	290	310	315	320	295	295
20	290	285	295	290	295	280	330	335	350	310	315	305	300	275	275	280	290	290 S	295	310	280	280	285	280
21	260	270	245	250	255	260	265	300	310	295	300 R	290	280	270	280	275	290	280	300	305	290	275	265	255
22	255	265	250	265	280	295	270	285	325	305	310	295	285	275	270	280	280	285	290	290	285	295	275	285
23	280	285	295	285	250	255	320	330	310	325	300	295	280	265	270	280	285	285	280	290	290	275	260	270
24	265	270	290	300	240	250	270	330	310	325	300	295	290	275	275	280	280	290	290	305	295	260	270	270
25	285	280	315	250	255	260	305	320 S	310	295	300	280	280	260	265	275	280	285	290	295	310	295 S	280	275
26	285	280	280	295	290	270	285	315	325	310	300	295	285	275	270	275	280	295	285	305	310	290 S	275	275 S
27	270	290	280	280	255	275	295	330	330	315	310	310	295	285	285	285	290	295	310	315	290	280	290	290
28	285	290	285	325	320	260	285	345	340	305	305	290	285	285	280	275	290	305 R	300	300	310	275	275	280
29	285	275	265	275	275	255	285	315	335	315	305	290	280	275	275	280	275	275	290	315	285	255	260	265
30	260	305	310	285	245	270	285	310	310	290	305	290	280	280	275	275	280	290	290	285	285	300	300	275
31	265	255	265	285	260	245 F	310	335 S	315	300	310	315	290	285	270	275	285	290	295	295	315 S	285	275	260
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	280	280	290	285	265	270	300	325	325	315	310	300	295	285	290	290	300	305	305	310	300	285	275	280
UQ	285	290	302	302	290	280	318	330	338	320	315	310	302	295	295	305	310	315	315	328	315	298	292	285
LQ	265	272	280	275	255	260	285	316	315	305	305	295	285	275	275	280	285	290	292	305	290	275	270	270

JAN. 1990 | M(3000)F2 (0.01)

IONOSPHERIC DATA

JAN. 1990 | M(3000)F1 (0.01) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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			U L 360									
2																								
3												L												
4												L	L		L									
5											L		L	L	L									
6											L	L		U L 375	L									
7												L	L	L										
8											L		L		L									
9													L											
10												L	L		L	L								
11											L	L												
12											L		L											
13											L	L	L	L	L	L								
14											L	L	L		L									
15											L	L	L	L	L									
16										L		L	L	L										
17										L	L	L	L	L	L									
18												L	L	L	L									
19										L	L		L											
20											L		L	L	L									
21											L	L	L			L								
22										L			L	L	L	L								
23												L	L	U L 330	L	L								
24													L	L	L									
25											L		L	L	L	L								
26											L			L	L									
27											L	L	L		L									
28										L	L	L	L	L	L									
29										L	L	L	L	L	L									
30										L	L		L	L	L									
31										L	L	L	L	L	L									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT														2	1									
MED														U L 352	U L 360									
UQ																								
LQ																								

JAN. 1990 | M(3000)F1 (0.01)

IONOSPHERIC DATA

JAN. 1990 | H'F2 (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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 320	290			305									
2																								
3												260												
4												280	L 320		265									
5											255		255	L	280									
6											260	250		260	305									
7												255	255	240										
8											260		250		245									
9													285											
10												270	225		290	L 315								
11											260	245												
12											250		265											
13											270	230	250	L 290	260	265								
14											260	265	270		290									
15											260	260	L 290	265	265									
16										255		L 315	255	275										
17										255	255	L 310	L 285	L 320	275									
18												250	260	295	290									
19										260	260		250											
20											255		260	355	315									
21											265	255	315		290	L 330								
22										260			310	305	330	305								
23												L 290	260	350	330	310								
24													265	325	305									
25											260		L 310	L 365	L 315	310								
26											260			L 315	305									
27											255	260	275		300									
28										275	260	L 290	290	310	L 300									
29										260	265	L 310	310	310	L 310									
30										290	260		310	260	270									
31										275	260	260	285	265	L 355									
	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										8	20	19	25	17	23	6								
MED										260	260	260	270	305	300	310								
UQ										275	260	290	290	320	308	L 315								
LQ										258	258	255	255	265	278	305								

JAN. 1990 | H'F2 (KM)

IONOSPHERIC DATA

JAN. 1990 | H'F (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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	310	295	235	230	275	E B 340	285	245	240	230	230	A 240	235	A 245	230	240	230	240	230	230	210	280	330	335
2	A 305	270	260	295	A 365	290	265	A 255	220	230	250	235	235	240	240	230	235	225	220	240	230	240	300	310
3	255	275	335	305	A 300	305	275	250	235	225	240	H 225	235	230	240	260	240	235	220	250	230	240	255	290
4	320	355	315	260	280	335	265	250	235	230	225	220	225	240	H 230	245	235	230	230	220	210	240	300	320
5	310	305	320	260	235	355	300	250	210	220	230	230	235	230	230	240	235	220	255	235	225	250	285	335
6	310	310	295	285	340	335	245	230	240	230	230	230	H 220	210	H 205	255	230	220	255	210	220	260	295	300
7	300	290	290	255	240	310	250	230	230	220	235	230	235	230	230	240	230	230	240	235	205	225	280	315
8	290	275	250	260	235	290	265	225	225	220	235	230	240	225	235	230	225	220	220	225	220	260	310	310
9	325	300	280	425	425	325	215	265	230	230	240	220	235	235	230	240	230	230	225	230	225	220	305	325
10	315	300	250	230	245	310	310	245	225	225	220	240	230	225	225	H 225	225	225	225	205	240	230	250	265
11	310	325	310	240	295	340	320	250	225	230	240	235	230	230	240	235	230	220	230	220	225	220	275	310
12	365	310	280	360	375	310	235	245	225	225	240	220	235	240	225	240	230	240	A 245	230	230	245	305	340
13	310	A 310	E A 330	A 350	330	325	240	230	240	235	235	230	225	220	230	240	220	215	235	215	210	265	280	265
14	295	330	280	275	A 350	280	240	240	225	230	230	230	225	230	230	230	230	230	225	215	215	310	295	280
15	310	345	330	280	260	260	310	240	H 220	235	220	230	H 210	215	235	240	230	230	230	220	210	240	295	310
16	285	305	295	310	350	310	230	225	225	225	H 215	225	230	235	225	230	245	230	210	230	215	260	270	280
17	320	310	290	310	285	310	230	220	220	230	230	220	230	220	240	235	230	230	230	215	230	290	265	240
18	250	255	275	355	350	335	255	245	220	225	230	225	220	230	230	235	240	225	225	215	230	250	255	260
19	260	250	250	340	350	380	280	220	220	220	235	230	230	220	230	240	240	220	240	230	245	230	260	265
20	260	290	280	275	270	320	250	230	220	220	H 210	240	230	H 220	225	235	235	230	250	225	210	255	290	275
21	330	315	310	350	330	310	H 280	275	235	235	235	235	230	240	245	235	240	225	235	220	H 215	275	290	285
22	340	305	315	315	230	265	300	270	225	215	235	230	215	210	225	245	235	255	230	235	235	215	295	275
23	250	305	245	270	H 265	340	255	240	235	230	230	230	240	225	240	245	240	250	235	235	225	250	290	295
24	305	295	260	240	H 325	340	310	255	235	225	235	250	240	230	235	240	245	250	260	230	235	275	280	295
25	270	295	245	H 310	355	320	240	230	225	240	235	A 250	230	235	230	240	235	250	230	235	215	235	270	280
26	280	290	295	280	255	300	300	260	230	235	240	235	235	235	H 215	230	240	240	255	250	220	230	280	310
27	300	275	295	265	260	320	265	245	225	235	235	215	210	230	230	240	245	A 250	225	230	H 210	260	275	275
28	285	280	280	240	240	355	280	220	215	230	235	225	235	215	230	235	240	230	225	220	225	250	270	265
29	265	300	320	290	245	290	275	235	220	H 215	H 190	220	230	240	240	H 235	235	240	260	215	210	290	335	325
30	305	260	240	280	305	315	260	245	235	240	245	235	225	230	225	230	235	240	225	245	240	235	230	265
31	320	340	305	230	H 220	360	255	240	225	240	240	235	240	225	H 215	235	225	235	230	245	225	225	275	315
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	305	300	285	280	285	318	265	245	225	230	235	230	230	230	230	240	235	230	230	230	225	250	280	295
UQ	312	310	309	310	345	336	282	250	235	232	238	235	235	235	235	240	240	240	240	235	230	260	295	312
LQ	282	285	260	260	250	308	248	230	220	225	230	225	225	222	225	235	230	225	225	220	212	232	270	275

JAN. 1990 | H'F (KM)

IONOSPHERIC DATA

JAN. 1990 | H'E (KM) | 135° E Mean Time (G.M.T. + ? h)

Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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								130	A 130	115	115	115	115	115	120	115	130							
2								A	E A 130	115	A 130	110	120	A 120	A	A 125	135							
3								A	125	115	110	120	A 115	A 115	110	E A 120	A							
4								E B 175	120	120	115	120	125	B 125	A 125	E A 125	120							
5								E B 130	120	110	115	115	110	A	120	120	A	B						
6								E B 165	110	110	120	120	120	120	115	120	A	B						
7								B	115	110	110	110	110	115	115	120	130	B						
8								B	120	115	115	110	110	A 120	A 120	A 115	120	B						
9								E A 225	120	115	A	115	120	E A 130	E A 130	115	120	B						
10								120	125	120	E A 135	115	120	115	115	110	120	B						
11								B	115	110	115	115	120	120	A 120	A 120	A 125	B						
12								E B 165	115	115	115	120	120	120	120	120	A	B						
13								E B 165	A	115	E A 135	A 130	115	120	A 125	A	A	B						
14								E B 165	125	120	E A 140	E A 140	A	A	A 125	A	A	B						
15								B 160	120	A 130	A	E A 130	A	A	120	120	120	B						
16								E B 130	115	115	115	110	115	A 115	115	A 120	E A 130	B						
17								E B 170	120	E A 130	110	A	A	110	A 120	A	E A 130	B						
18								160	110	A 130	A 120	A 120	A 120	A 110	110	A 110	A	B						
19								E B 160	115	A 130	110	115	115	E A 130	A 120	110	115	B						
20								E B 165	120	A	110	115	120	115	115	115	120	B						
21								H 160	120	125	120	120	A	120	B	120	120	B						
22								E B 170	115	115	115	115	115	115	115	115	120	B						
23								E B 190	115	115	115	115	115	110	115	A 120	125	B						
24								E B 170	125	115	120	125		E A 135	125	A	A	B						
25								E B 170	125	120	120	115	A	120	120	115	120	B						
26								E B 165	120	115	120	120	120	115	110	115	E A 160	E B						
27								E B 175	120	115	115	115	A	A 125	A 125	A	A 130	A						
28								B	125	125	A	A	125	115	120	120	120	B						
29								E B 160	125	125	120	120	120	B 130	B 130	120	115	E B 160						
30								135	A	A	A	A	115	115	115	A 115	120	A						
31							B	H 160	120	115	115	110	115	115	120	120	125	E B 175						
	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	29	29	27	28	24	28	29	26	23	2						
MED								E B 165	120	115	115	115	118	116	120	119	120	E B 168						
UQ								E B 170	125	120	120	120	120	120	A 120	120	128							
LQ								U B 140	115	115	115	115	115	115	115	115	120							

JAN. 1990 | H'E (KM)

IONOSPHERIC DATA

JAN. 1990 | H'ES (KM)

135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI. TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	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	110	B	B	B	B	B	115	115	G	110	120	130	115	120	G	G	B	B	B	B	120	125	120
2	115	B	B	B	105	B	110	100	115	G	115	G	G	105	120	110	105	110	105	115	105	B	B	B
3	B	B	B	B	110	110	105	110	G	G	G	G	105	105	G	105	100	110	125	110	100	B	105	B
4	B	B	B	B	B	B	B	G	G	G	G	G	G	G	110	105	G	105	95	100	B	B	B	B
5	B	B	100	B	B	B	B	G	110	G	E G 185	G	G	105	G	G	105	100	105	B	B	B	B	B
6	B	B	B	B	B	B	B	G	G	G	G	G	G	G	G	G	120	B	B	B	B	B	B	B
7	B	B	B	B	B	110	B	B	G	G	G	E G 185	110	E G 150	135	G	G	B	105	B	B	110	B	B
8	B	B	B	B	B	B	B	B	G	E G 175	120	E G 165	G	105	110	110	G	110	105	B	B	B	B	B
9	B	B	B	B	B	B	110	105	G	G	115	120	120	115	110	G	G	B	105	B	B	B	B	B
10	B	B	B	B	B	B	B	G	G	G	115	G	G	G	G	G	G	100	105	100	B	B	B	B
11	B	B	B	B	B	B	B	B	G	G	G	E G 165	G	135	130	120	100	100	105	105	B	B	B	B
12	B	B	B	110	B	110	B	G	G	G	130	G	G	125	G	G	115	105	110	105	B	B	B	140
13	110	110	105	110	115	110	110	G	120	G	115	145	G	G	110	110	110	110	105	110	110	B	105	B
14	B	110	B	120	100	105	125	G	G	E G 190	120	110	110	110	115	110	110	115	B	B	B	110	105	105
15	B	B	B	B	110	115	115	G	G	115	120	115	110	110	G	G	G	B	B	B	B	B	B	120
16	B	115	110	130	B	B	B	G	G	G	G	G	G	E G 215	G	105	105	125	B	110	115	B	B	115
17	105	105	B	B	105	B	B	G	G	110	G	105	105	E G 150	105	100	100	B	120	B	B	B	B	B
18	B	B	B	B	B	B	B	G	G	110	105	100	100	100	G	105	110	100	B	B	B	110	125	B
19	B	105	B	B	B	B	B	G	G	110	G	G	G	120	110	G	G	110	130	105	105	100	110	105
20	105	110	B	B	B	B	B	G	G	115	G	G	G	G	G	G	G	B	B	B	B	B	B	B
21	B	B	B	B	B	B	B	G	G	120	120	120	110	G	B	G	G	B	B	B	B	B	B	B
22	B	B	B	B	B	B	B	125	G	120	G	G	G	G	G	G	G	B	110	105	110	B	105	B
23	120	110	B	B	B	B	B	G	G	G	G	G	G	G	G	110	G	B	B	B	100	B	120	B
24	B	B	110	B	B	B	B	G	G	G	G	E G 150	120	120	140	130	120	115	115	115	100	110	110	110
25	110	100	B	100	110	B	B	G	G	G	125	115	115	G	G	G	G	105	B	B	B	B	110	B
26	B	B	100	110	105	B	B	G	G	G	G	E G 150	135	135	125	G	120	B	B	115	B	B	B	B
27	B	B	B	B	B	B	110	120	G	G	140	G	115	115	E G 180	110	115	110	115	B	B	B	B	B
28	B	B	B	100	B	B	B	B	G	G	125	120	110	G	G	G	G	B	105	100	105	B	B	B
29	B	B	B	115	B	B	B	G	G	G	G	G	G	140	G	G	G	140	B	105	110	B	B	B
30	B	B	B	B	B	B	B	G	120	120	120	110	E G 160	G	110	105	G	110	110	B	B	B	B	B
31	110	110	B	B	B	B	B	G	G	125	125	120	120	G	G	G	G	G	B	B	B	B	B	B
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	7	10	5	8	8	6	7	6	5	11	17	17	16	19	15	14	14	18	18	14	10	6	10	7
MED	110	110	105	110	108	110	110	112	115	118	120	115	111	112	112	110	110	110	105	105	105	110	110	115
UQ	112	110	110	118	110	110	112	120	120	121	125	E G 150	120	U 128	125	110	115	110	115	110	110	110	120	120
LQ	108	105	100	105	105	110	110	105	115	112	115	115	110	108	110	105	105	105	105	105	100	110	105	108

JAN. 1990 | H'ES (KM)

IONOSPHERIC DATA

JAN. 1990 | TYPES OF ES | 135° E Mean Time (G.M.T. + 9 h)

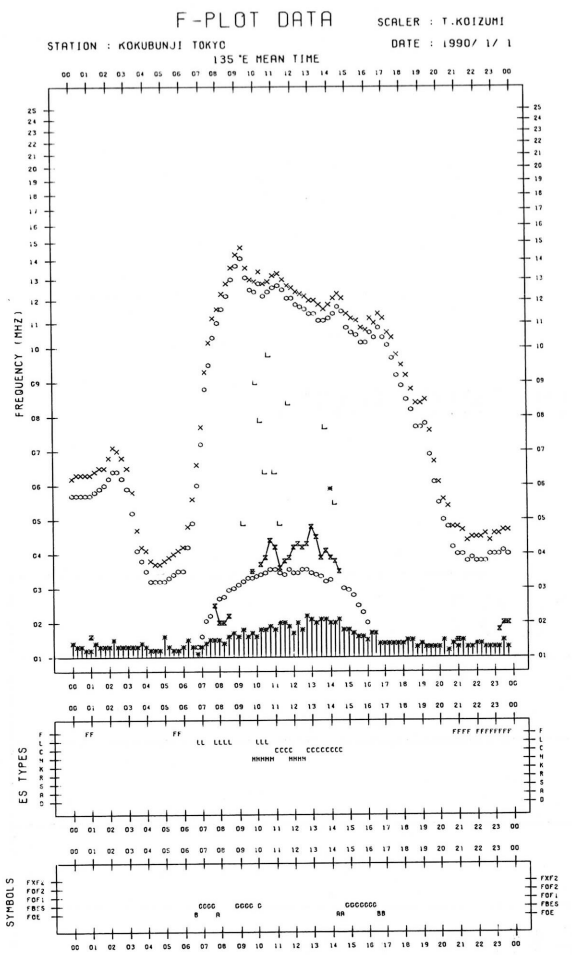
Station KOKUBUNJI TOKYO Lat. 35°42.4'N, Long. 139°29.3'E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

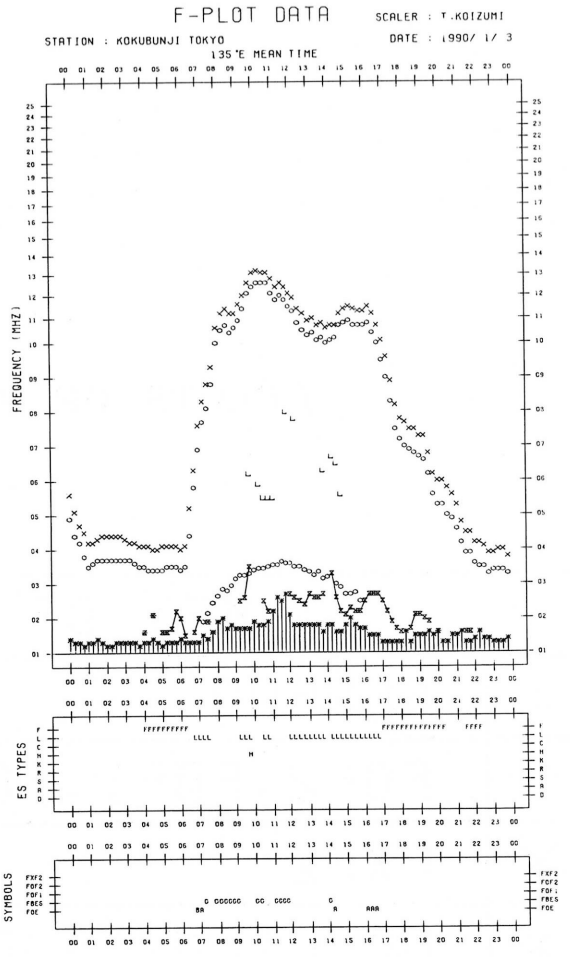
Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		F 2						LI 1	L 2		LH 11	C 3	H 1	C 2	C 2							F 1	F 1	F 1
2	F 3				F 2		F 2	LI 3	L 1		L 1			C 1	CL 11	L 1	L 1	F 1	F 1	FF 12	F 2			
3					F 2	F 2	F 4	LI 2					L 1	L 1		L 1	L 2	FF 22	FF 11	F 2	F 1		F 1	
4															L 1	L 1		F 2	F 3	F 1				
5			F 1						L 1		H 1			L 1			L 1	L 1	F 1					
6																	L 1							
7						F 1						H 1	L 1	H 1	A 1				F 2			F 1		
8										H 1	CH 11	H 1		L 1	L 1	L 1		L 1	F 1					
9							F 1	LI 2			L 1	C 1	L 1	L 1	L 2				F 1					
10											L 1							L 3	F 1	F 1				
11												H 1		H 1	HL 22	CL 21	L 2	L 2	F 1	F 2				
12				F 1		F 2					H 1			C 1			L 2	L 2	F 3	F 2				FF 21
13	F 2	F 2	F 4	F 3	F 2	F 2	F 1		L 1		L 1	HL 11			L 1	L 2	L 3	L 2	F 3	F 1	F 1		F 1	
14		F 2		F 1	F 4	F 2	F 1			H 1	L 1	LH 21	L 2	L 2	L 2	L 2	L 2	L 1				F 1	F 1	F 1
15					F 2	F 1	F 2			L 1	C 1	L 1	L 1	L 2										F 1
16		F 1	F 1	FF 21										HL 11		L 1	L 2	C 1		F 2	F 1			F 1
17	F 2	F 1			F 1					L 2		L 2	L 2	A 1	L 2	L 2	L 2		F 2					
18										L 2	L 2	L 2	L 1	L 2		L 1	L 2	L 1				F 1	F 2	
19		F 1								L 1				L 1	L 1			L 2	FF 11	F 2	F 2	F 1	F 1	F 2
20	F 1	F 1								C 2														
21										L 1	C 1	L 1	L 1											
22								LI 1		C 2									F 2	F 1	F 1		F 1	
23	F 1	F 1														L 1					F 1		F 1	
24			F 1									H 1	L 1	L 1	H 1	C 2	L 1	L 1	F 1	F 1	F 3	F 1	F 1	F 1
25	F 1	F 2		F 1	F 1						C 1	C 2	C 1					L 1					F 1	
26			F 2	F 2	F 1							H 1	H 1	H 1	H 1		L 1			F 1				
27							F 1	LI 1			H 1		L 1	L 1	HL 11	L 1	L 1	L 3	F 1					
28				F 2							C 1	C 1	L 1						F 1	F 2	F 1			
29				F 1										H 1				H 2		F 1	F 1			
30									L 1	L 2	LH 11	C 1	H 1		L 1	L 1		L 1	F 2					
31	F 1	F 1					K 1			H 1	H 1	H 1	C 1											
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
UQ																								
LQ																								

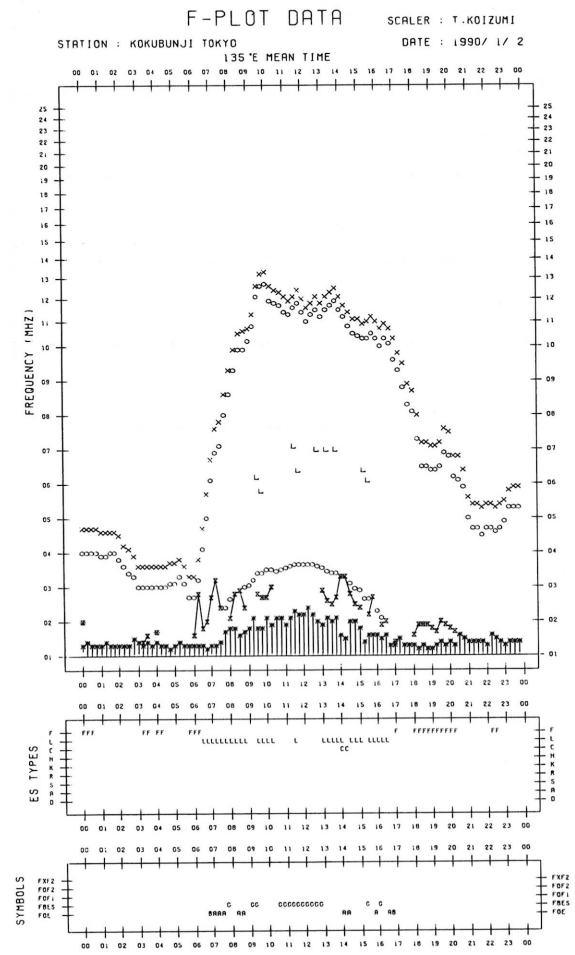
JAN. 1990 | TYPES OF ES

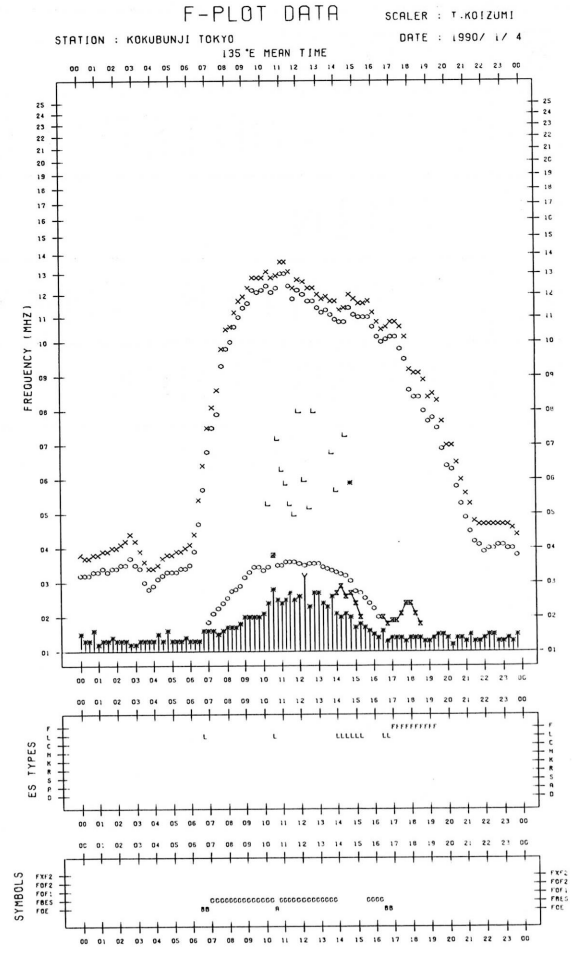
f-PLOTS OF IONOSPHERIC DATA

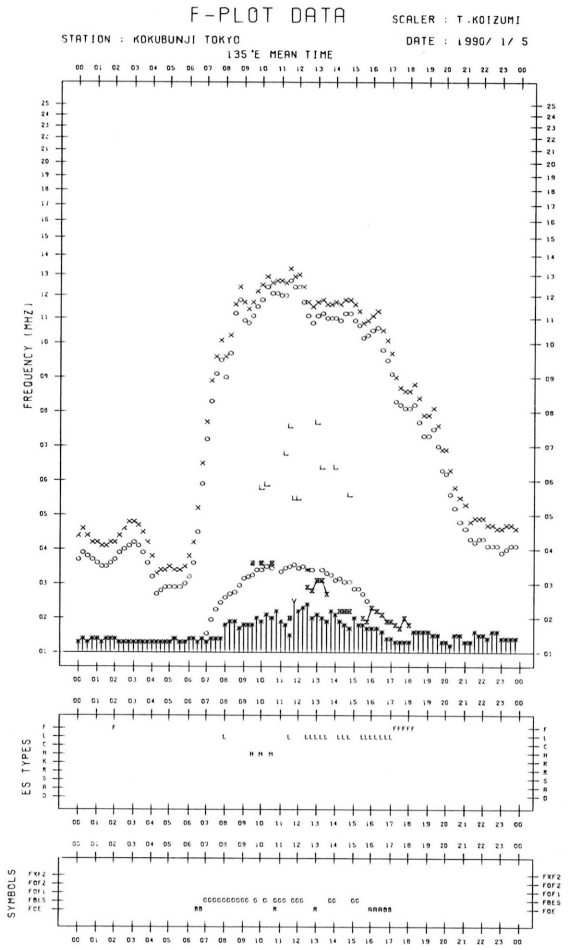
KEY OF F-PLOT	
!	SPREAD
○	FOF2, FOF1, FOE
×	FXF2
✳	DOUBTFUL FOF2, FOF1, FOE
⧖	FBES
⌊	ESTIMATED FOF1
↑, Y	FMIN
∧	GREATER THAN
∨	LESS THAN

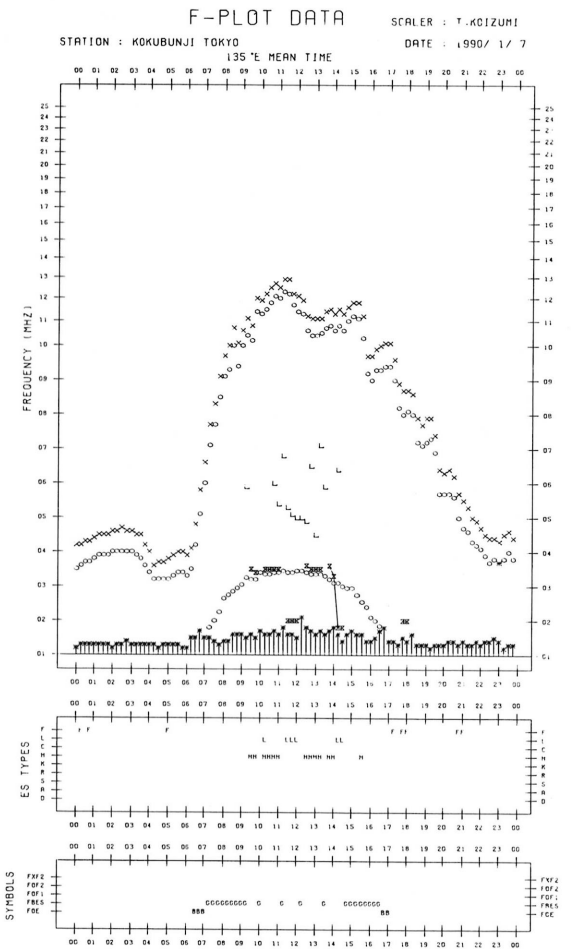

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/ 1
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

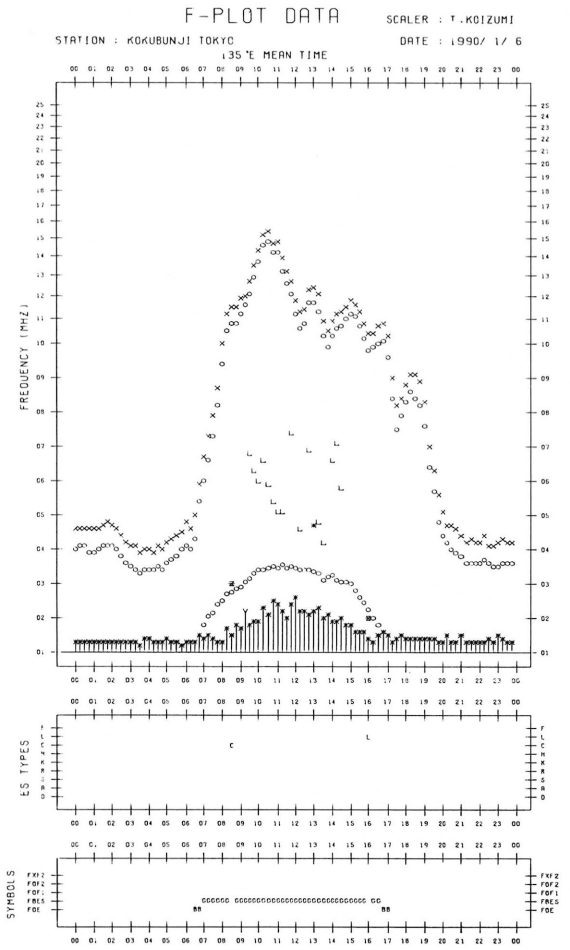

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/ 3
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

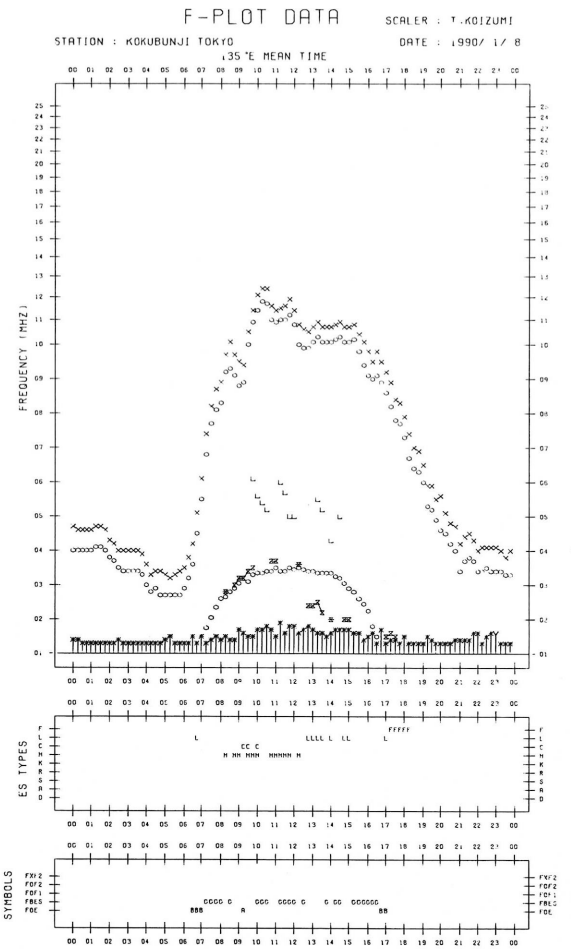

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/ 2
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

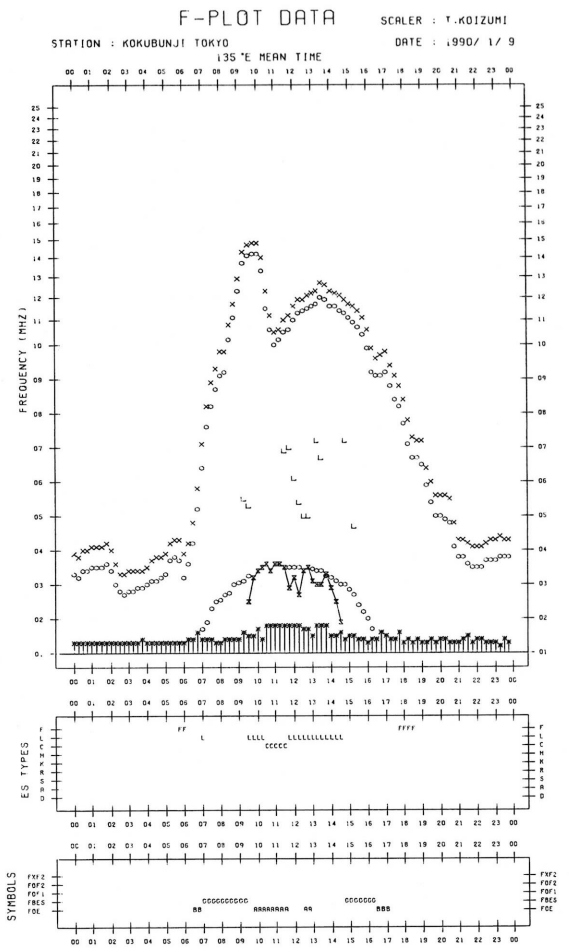

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/ 4
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

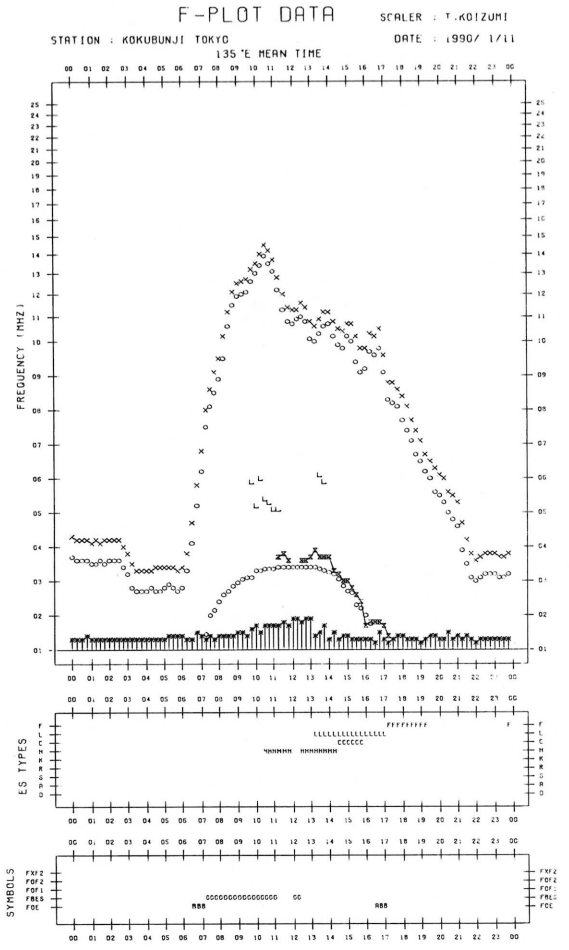

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/ 5
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

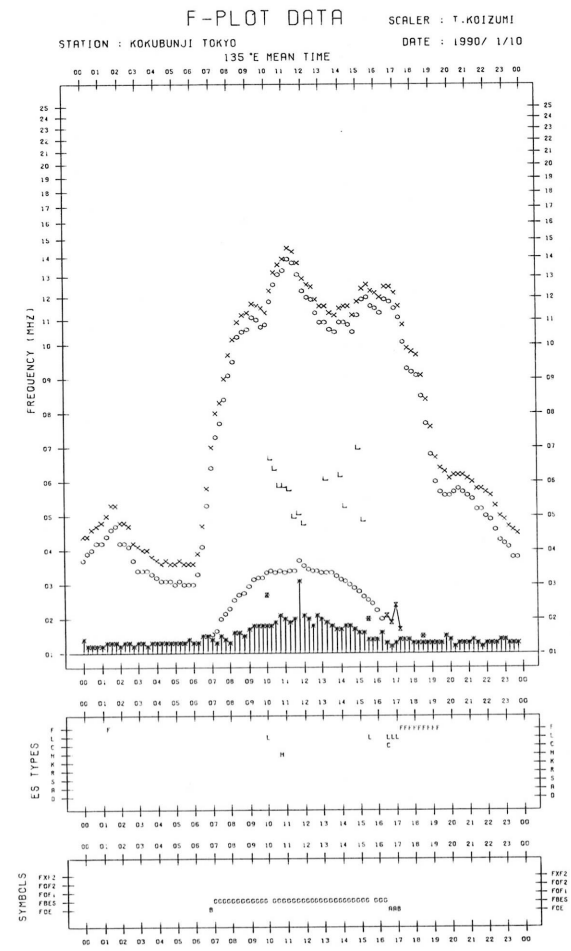

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/ 7
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

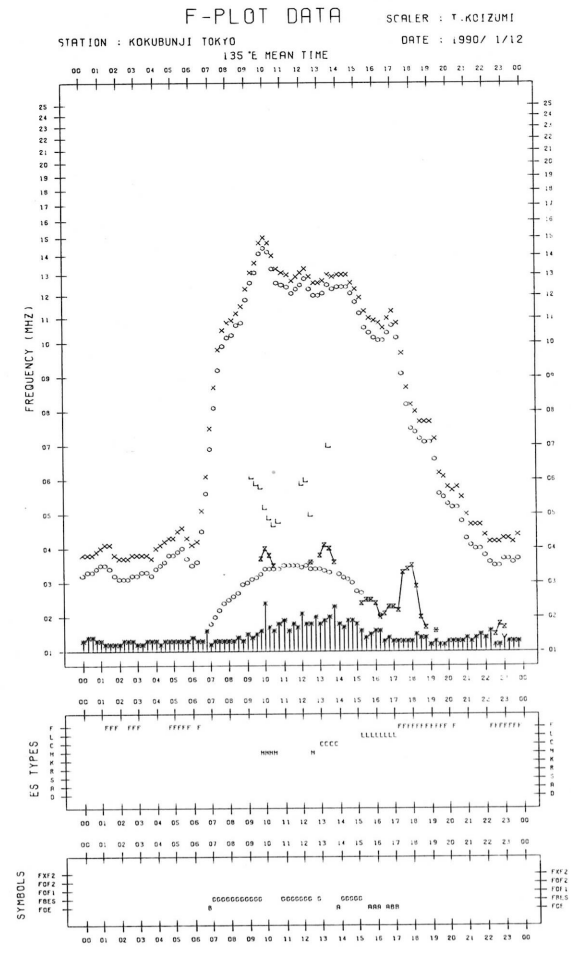

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/ 6
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

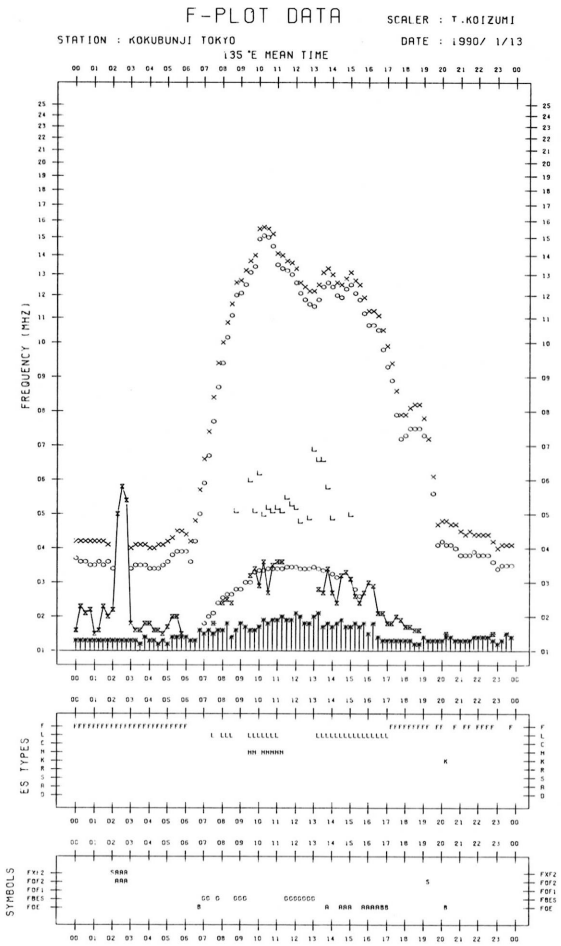

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/ 8
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

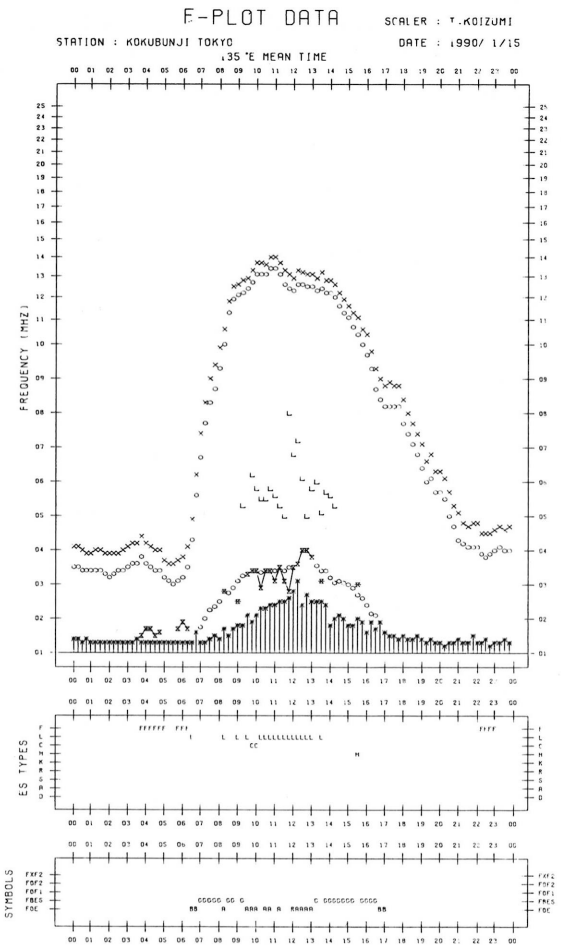

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/ 9
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE

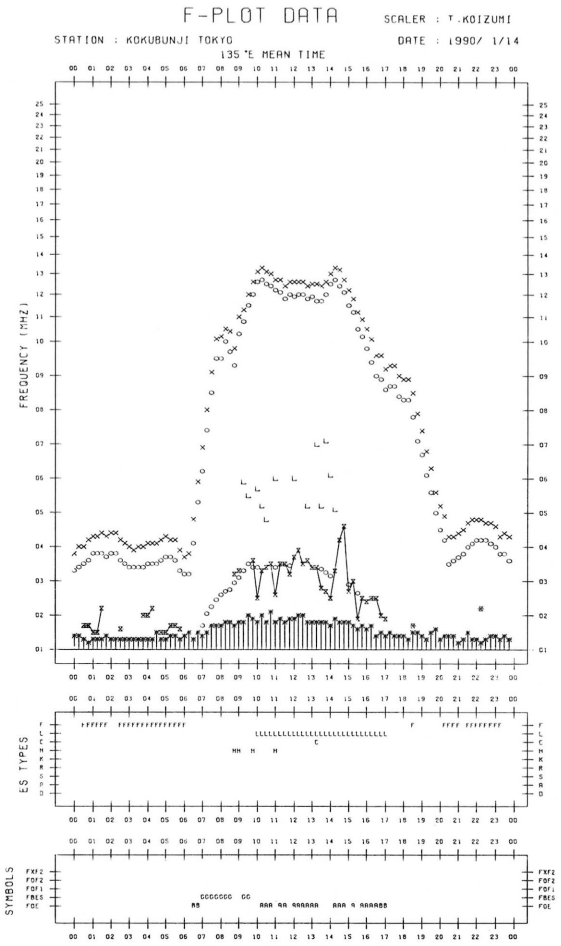

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/11
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE

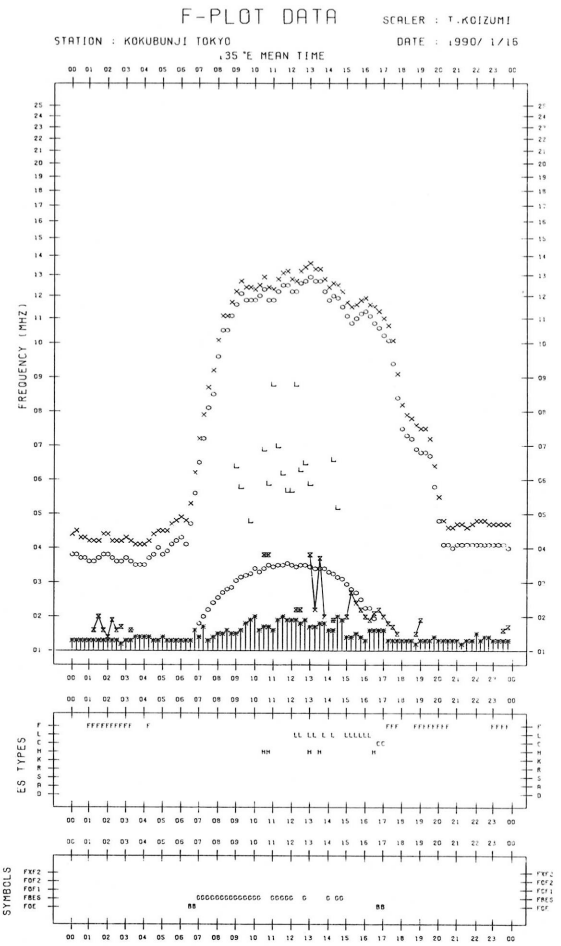

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/10
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE

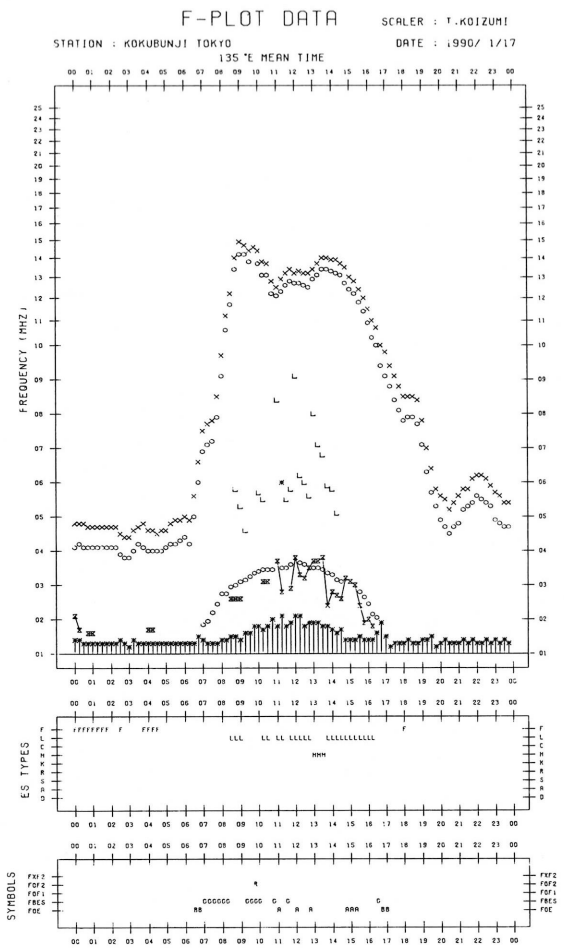

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/12
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE

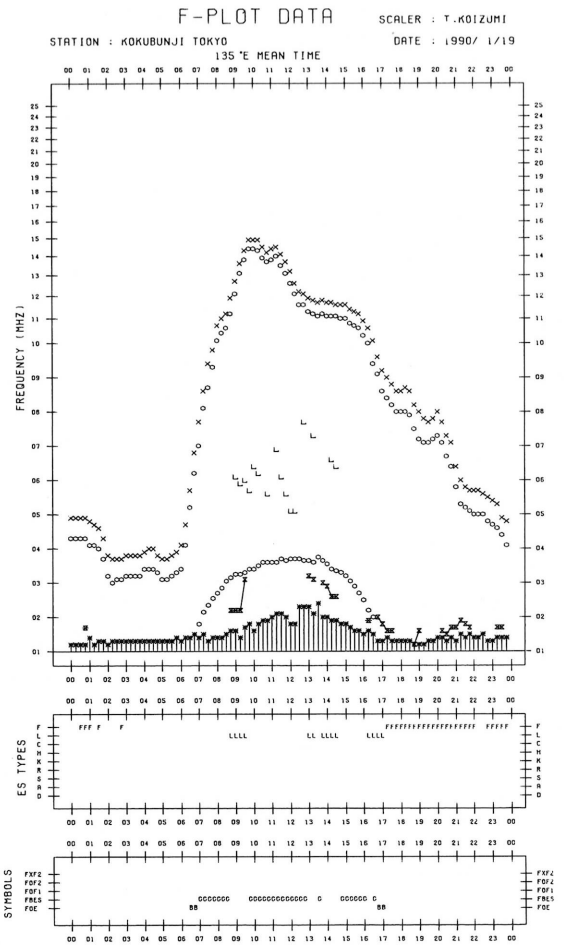

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/13
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

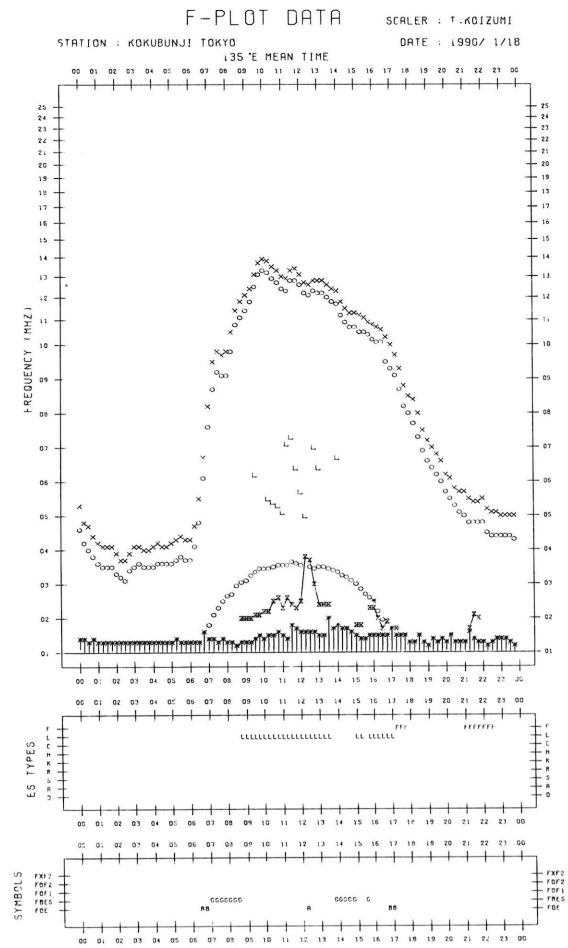

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/15
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

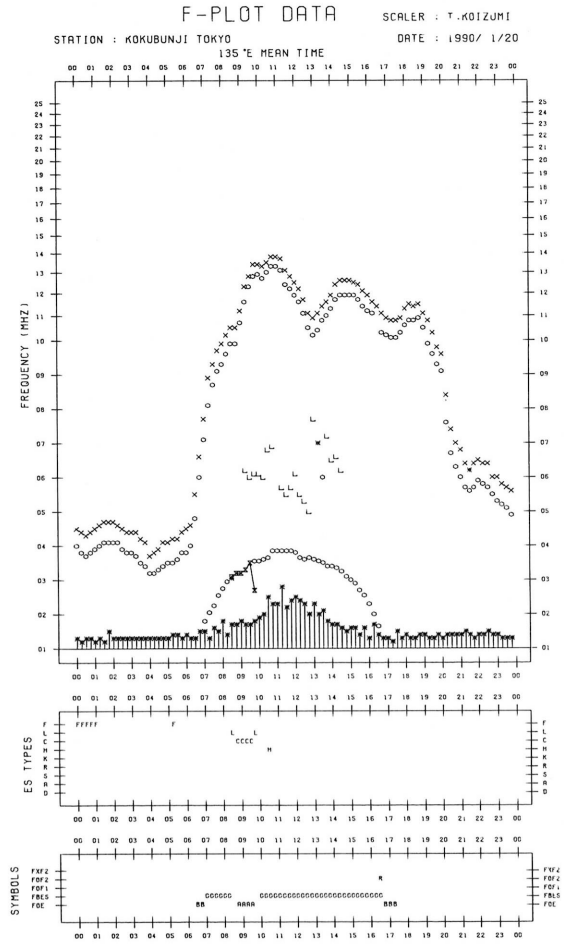

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/14
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

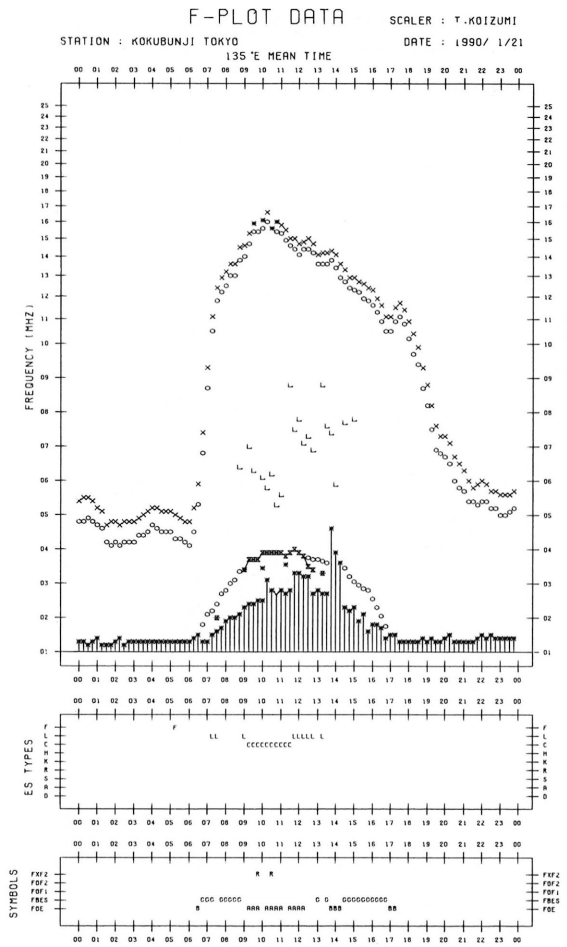

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/16
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

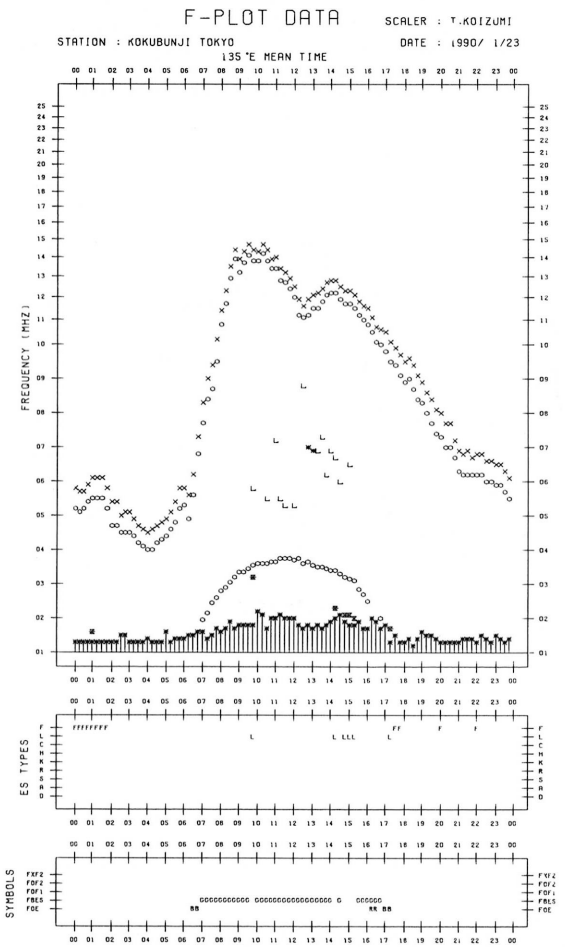

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/17
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/19
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/18
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/20
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/21
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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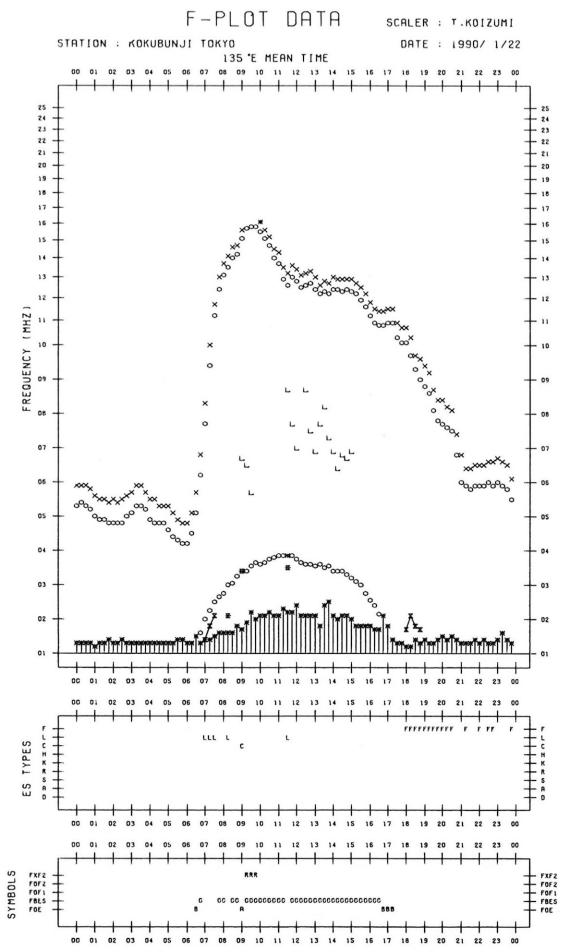
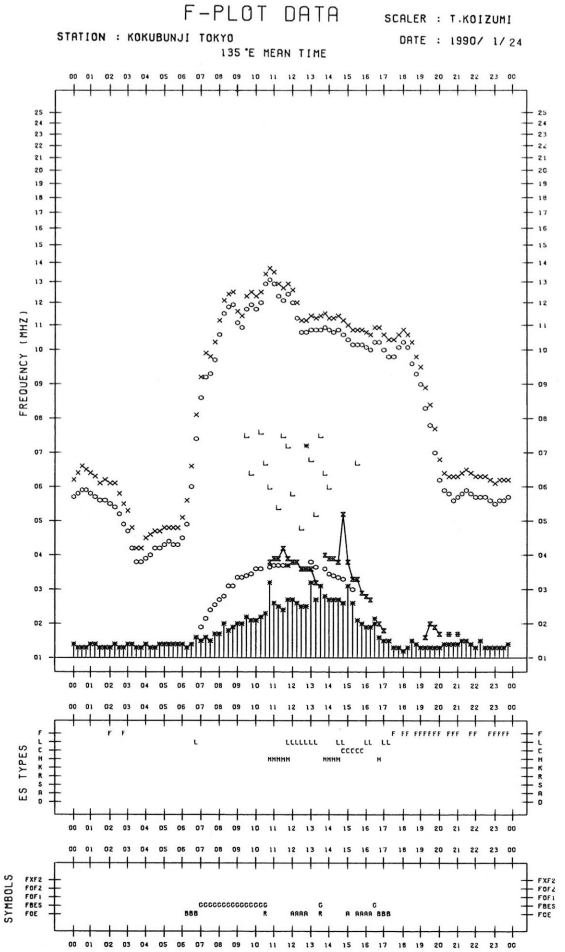
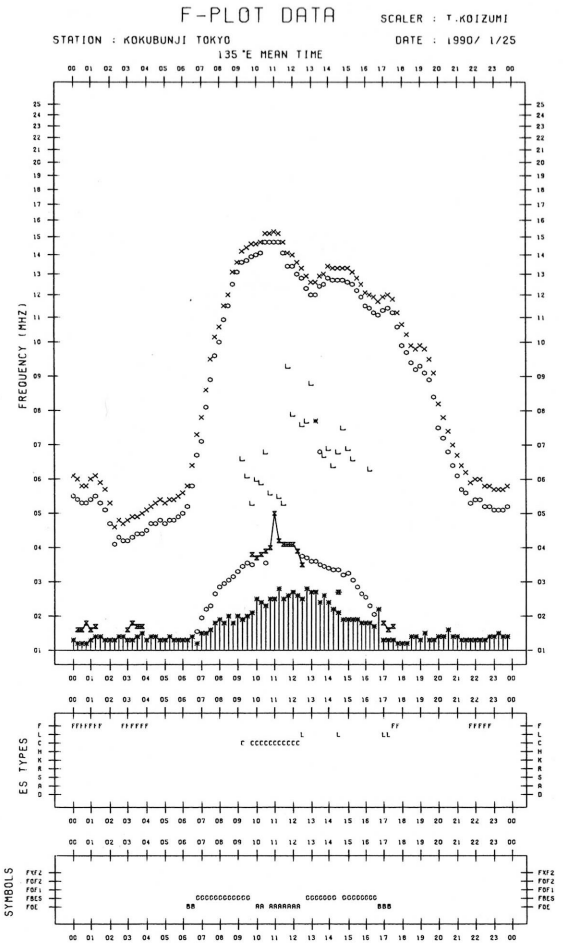
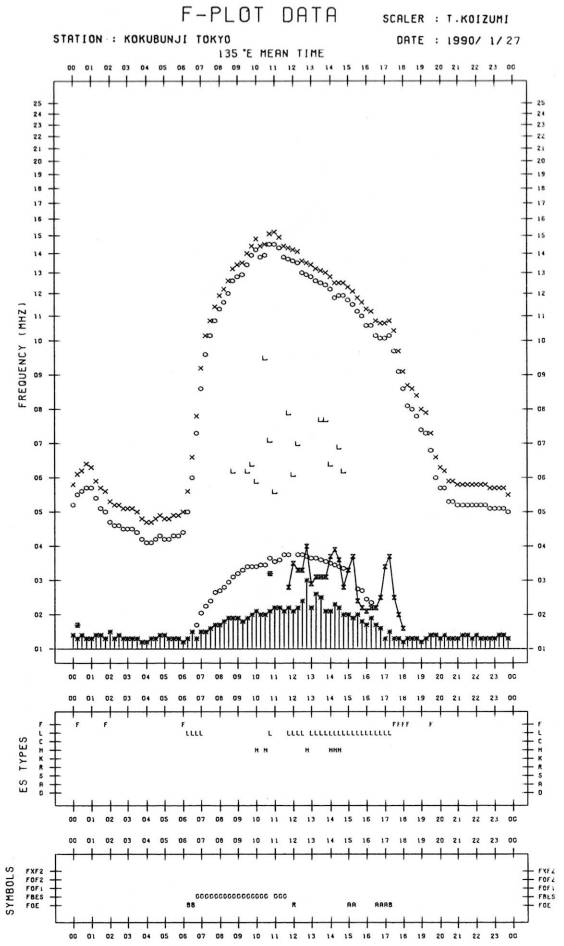
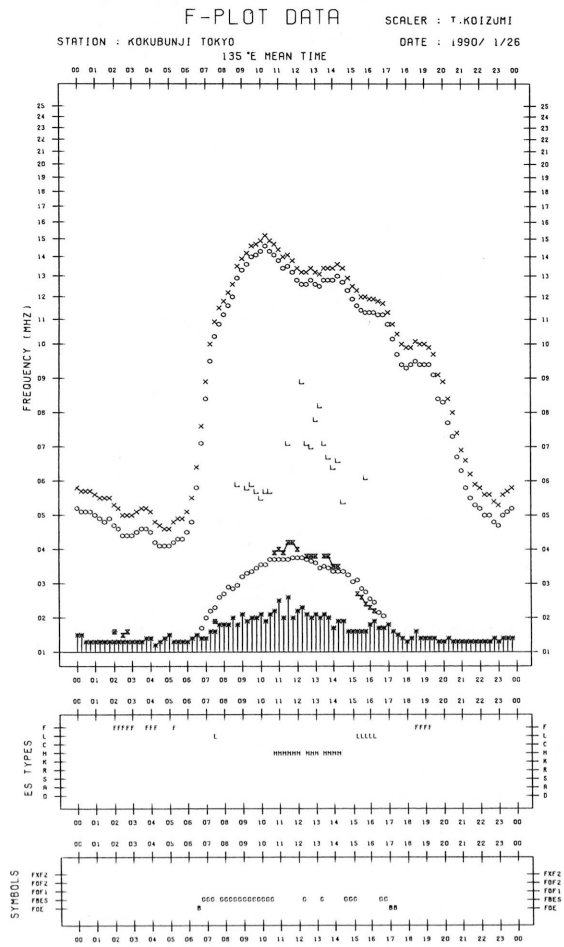
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/23
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

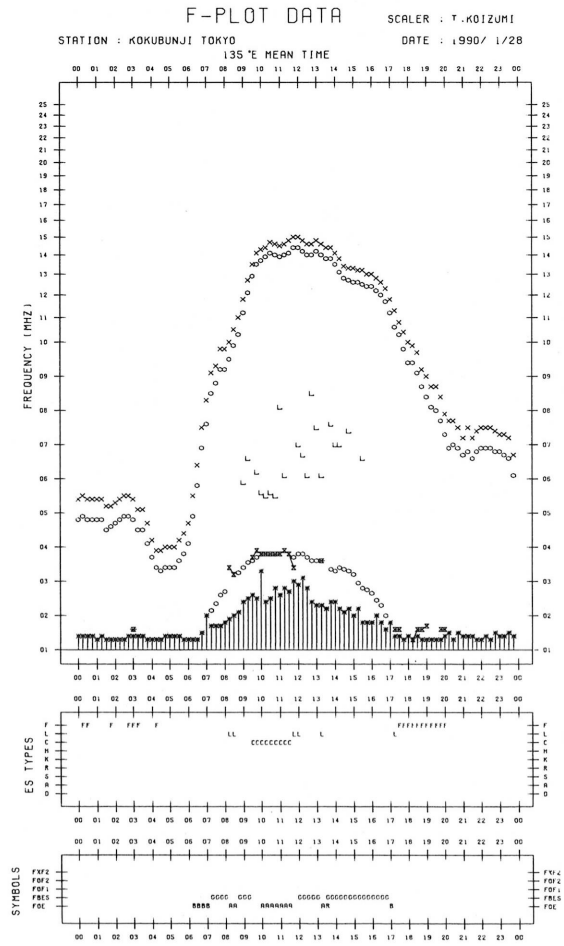

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/22
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

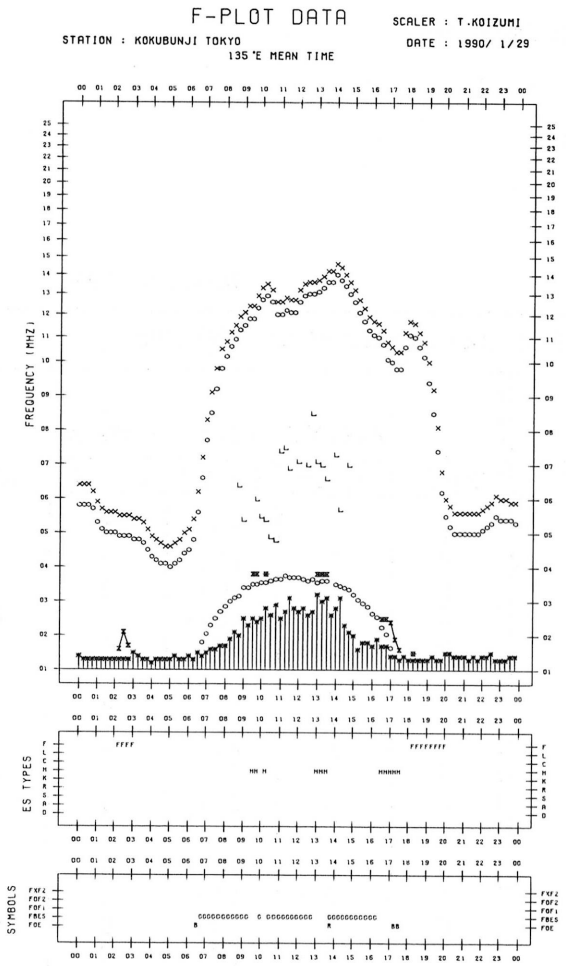

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/24
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

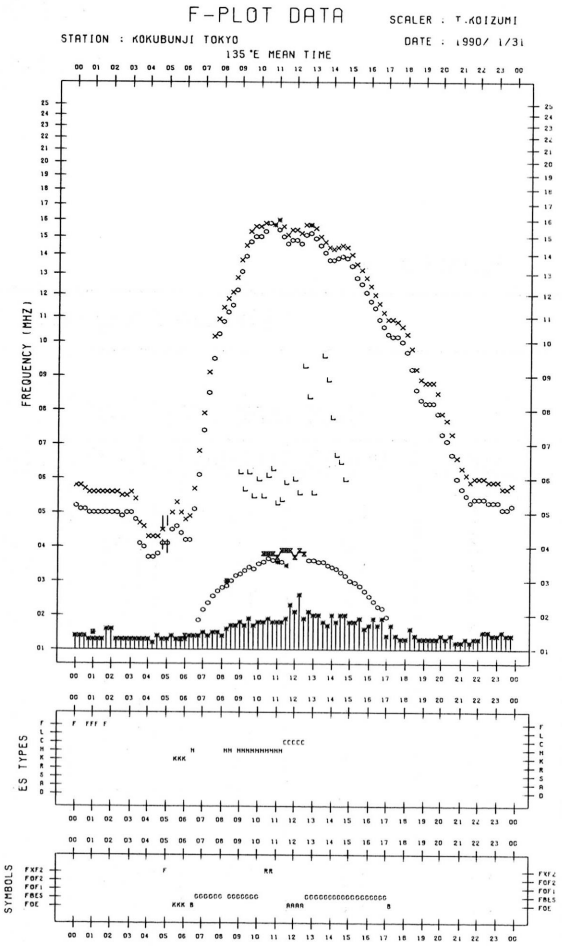

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/25
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

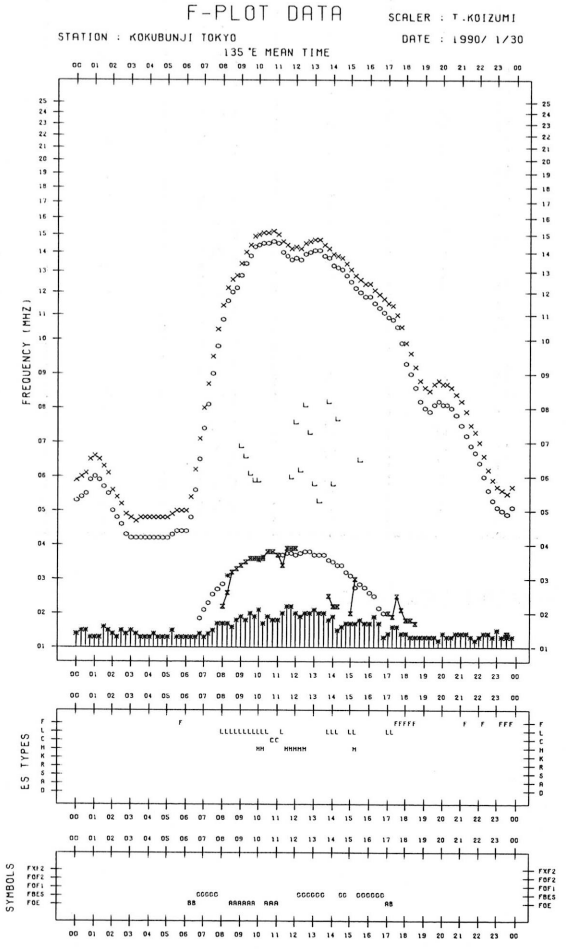

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/27
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/26
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/28
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/29
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/31
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1990/ 1/30
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

B. Solar Radio Emission

B1. Daily Data at Hiraiso

200 MHz

Hiraiso — January 1990

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	13	(B)	12	B	1	1	(2)	0	1
2	12	B	(B)	12	B	0	1	(1)	2	1
3	12	12	(12)	12	12	0	0	(0)	0	0
4	12	12	(12)	12	12	0	0	(0)	1	0
5	12	12	(12)	*	12	0	0	(0)	*	0
6	B	B	(B)	12	B	2	2	(1)	0	2
7	12	12	(12)	12	12	1	1	(2)	1	1
8	11	11	(11)	*	11	0	0	(1)	*	1
9	*	*	(*)	12	*	*	*	(*)	2	*
10	B	B	(B)	B	B	2	2	(2)	3	2
11	11	11	(11)	13	11	0	0	(0)	3	1
12	13	12	(12)	10	12	1	2	(*)	0	1
13	11	11	(11)	11	11	0	0	(0)	0	0
14	11	11	(11)	10	11	0	0	(0)	0	0
15	10	11	(9)	11	10	0	0	(1)	2	0
16	B	12	(10)	10	11	1	1	(1)	*	1
17	10	10	(9)	10	10	1	1	(1)	*	1
18	10	10	(10)	*	10	1	1	(1)	0	1
19	*	*	(*)	11	*	0	0	(0)	0	0
20	11	11	(11)	11	11	1	0	(0)	0	0
21	11	B	(B)	12	B	0	1	(2)	0	1
22	12	12	(13)	10	12	0	0	(1)	0	0
23	10	11	(11)	B	10	0	0	(0)	2	0
24	B	B	(B)	B	B	1	2	(2)	2	2
25	B	B	(B)	B	B	2	2	(2)	3	2
26	B	B	(12)	11	B	2	2	(1)	0	2
27	10	10	(10)	11	10	0	0	(0)	0	0
28	10	10	(10)	11	10	0	0	(0)	2	0
29	10	10	(11)	B	11	0	0	(1)	2	1
30	B	B	(13)	B	B	1	2	(1)	3	2
31	B	B	(B)	B	B	3	3	(3)	3	3

Note: No observations during the following periods.

none

B.Solar Radio Emission

B1.Daily Data at Hiraiso

500 MHz

Hiraiso January 1990

Single-frequency total flux observations at 500 MHz					
FLUX DENSITY: $10^{-22}Wm^{-2}Hz^{-1}$					
UT	00-03	03-06	06-09	21-24	DAY
DATE					
1	62	61	(61)	60	62
2	60	61	(58)	56	60
3	57	57	(56)	55	56
4	57	57	(56)	55	56
5	55	56	(55)	55	55
6	56	57	(56)	52	56
7	54	53	(54)	-	53
8	53	53	(52)	52	53
9	54	52	(52)	50	53
10	52	52	(53)	54	52
11	52	54	(53)	55	54
12	55	53	(52)	-	54
13	51	52	(52)	50	52
14	52	52	(52)	51	52
15	51	50	(49)	51	50
16	52	52	(51)	53	52
17	54	56	(56)	-	55
18	55	56	(56)	-	56
19	55	56	(55)	-	55
20	56	57	(56)	56	56
21	(55)	-	-	-	56
22	61	61	(61)	-	61
23	63	64	(63)	64	63
24	65	65	(64)	63	65
25	62	62	(61)	-	62
26	B	59	(60)	58	B
27	59	58	(57)	57	58
28	58	58	(57)	-	58
29	57	58	(58)	58	58
30	59	61	(60)	56	59
31	B	B	(60)	57	61

Note: No observations during the following periods:

7th 2150 - 2345 12th 2148 - 2343
17th 2148 - 2355 18th 2148 - 2400
19th 2148 - 2350 21st 0000 - 2350
22nd 2140 - 2350 25th 2144 - 2400
28th 2140 - 2350

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso January 1990

Single-frequency observations

Normal observing period: 2150 - 0750 U.T. (sunrise to sunset)

JAN 1990	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
1	200	43 NS	0453	0623	158D	4	1	WR
2	200	27 RF	0340	0500	185	7	3	0
3	200	42 SER	0417.4	0418.5	10.6	220	-	0
	100	41 F	0417.6	0418.5	4.2	250	-	-
	200	42 SER	0619.1	0620.7	7.9	170	-	0
5	500	42 SER	0453	0455.8	18.5	75	-	MR
6	500	20 GRF	0136	0225	84	11	5	0
	200	43 NS	0218	0444	284	10	2	0
9	500	27 RF	0003	0032	62	21	5	WL
	200	46 C	0142.2	0142.9	3.3	390	-	0
	200	43 NS	0153	0233	145	11	5	0
	500	41 F	0600	0700.5	80D	58	-	WL SUNSET
	200	46 C	0700	0702.4	30D	605	46U	0 SUNSET
	100	41 F	0700.7E	-	40D	1000D	-	-
	200	43 NS	2342	-	440	-	13	WL
10	100	42 SER	0022	0123	94	570	-	-
	200	46 C	0121.9	0123.0	3.2	400	-	0
	100	48 C	0240.9	0244.2	92	11700	175	WL
				0310.0		260		-
	200	7 C	0241.7	0242.6	46.9	885	27	WL
				0300.0		30		ML
	500	46 C	0242.5	0246.0	10.0	47	-	WL
	100	46 C	0547.9	0548.8	2.6	520	-	-
	200	27 RF	0552	0628	77	49	6	0
	200	44 NS	2150E	2332	130D	9	3	WL
12	200	27 RF	0003	0036	80	6	4	0
	200	42 SER	0027	0052.8	33	85	-	0
	500	46 C	0051.8	0058.7	10.5	354	40	0
				0054.0		74		0
13	200	8 S	2329.1	2329.7	0.6	1500	-	0
	500	8 S	2329.9	2330.0	0.7	19	-	WR
15	200	42 SER	0542	0609	75	48	-	0
	200	44 NS	2150E	0107	250D	4	2	0
16	100	42 SER	0139.2	0139.6	2.0	600	-	-
	200	42 SER	0139.6	0139.8	2.6	97	-	0
	200	46 C	0458.1	0501.0	5.3	60	-	0
	200	46 C	0555.8	0556.4	1.9	64	-	0
	100	41 F	0556.1	0556.5	2.1	820	-	-
17	500	41 F	0221.0	0221.5	5.5	15	-	0
	500	41 F	0543.5	0544.8	9.0	26	-	WR
18	500	46 C	0224.5	0225.0	3.0	49	-	0
	100	46 C	0425.7	0430.7	7.3	440	-	-
20	200	41 F	0047.5	0102.0	31.7	14	-	WL
	500	41 F	0323.0	0323.3	4.0	29	-	0
21	100	46 C	0146.2	0146.7	2.0	800	270	0
	100	46 C	0446.9	0447.9	1.2	1200	630	WR
	200	48 C	0446.9	0448.2	2.6	3500	860	0
	100	48 C	0451.5	0452.8	7.5	4300	770	WR
	200	43 NS	0450	0520	170	10	4	WR
	200	46 C	0612.5	0614.0	2.7	125	-	0
22	100	46 C	0029.7	0031.7	4.0	1600	-	WR
	200	46 C	0030.7	0032.3	4.8	340	75	WL
	500	46 C	0030.9	0032.5	5.5	33	-	WL
	500	27 RF	0100	0105.0	37.5	13	3	0
23	200	44 NS	2145E	0000	610D	9	5	0
24	200	44 NS	2144E	0400	610D	9	6	0
	500	41 F	2318.3	2318.8	3.5	37	-	0
25	200	44 NS	2144E	0000	370D	15	9	WR
	200	46 C	2247.5	2255.4	16.5	140	-	MR
26	500	22 GRF	0000E	0125	195D	41	15	MR
	200	41 F	0102.6	0109.2	54	85	-	MR
	100	41 F	0125.5	0127.0	3.0	590	-	-
	100	46 C	0228.3	0233.0	6.6	730	240	SR
	200	46 C	0228.7	0232.7	5.9	550	-	SR
28	200	42 SER	0150.2	0157.1	7.9	25	-	0
	500	46 C	0155.5	0157.2	3.0	12	-	0
29	200	44 NS	2140E	0038	200D	13	2	0
30	200	41 F	0228.4	0229.0	3.3	190	-	0
	200	43 NS	0300	0446	240	9	4	MR
	200	42 SER	0638.3	0642.6	22	58	-	MR
	200	44 NS	2140E	0500	610D	480	28	SR
	500	43 NS	2325	0228	330	18	6	WR
31	500	42 SER	0025.2	0032.0	8.7	190	-	0
	100	42 SER	0025.4	0026.4	7.6	700	-	WR
	200	44 NS	2140E	0244	610D	75	25	SR

C. RADIO PROPAGATION

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

JAN 1990 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

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

C. RADIO PROPAGATION

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

JAN 1990 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

UT DAY	00H 45M	01H 45M	02H 45M	03H 45M	04H 45M	05H 45M	06H 45M	07H 45M	08H 45M	09H 45M	10H 45M	11H 45M	12H 45M	13H 45M	14H 45M	15H 45M	16H 45M	17H 45M	18H 45M	19H 45M	20H 45M	21H 45M	22H 45M	23H 45M
1	-7	10	11	11	20	27	26	26	20	20	-1	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	-1	11	4	4
2	-1	4	10	11	14	21	28	31	19	19	22	15	-10	-9	2	ES -22	ES -22	ES -22	ES -22	ES -22	4	9	2	-3
3	1	2	6	8	18	24	29	21	22	11	-5	-13	-9	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	10	10	10	-1
4	1	7	7	10	16	18	19	23	21	20	25	15	-4	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	1	4	12	-2
5	4	6	4	12	16	22	25	21	9	2	2	-4	-13	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	7	10	7	4
6	4	4	9	11	22	25	28	25	22	16	-7	-13	-13	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	12	14	13	9
7	9	7	14	16	17	21	27	17	17	4	-3	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	2	17	13	8
8	10	16	19	19	19	24	27	26	14	-5	-11	-11	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	2	12	14	10
9	13	7	17	17	19	24	20	18	21	4	19	-4	ES -21	ES -21	ES -21	ES -21	ES -21	ES -21	ES -21	ES -21	3	13	11	13
10	8	11	0	21	16	28	25	27	21	17	-3	8	-5	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	-3	2	5	4
11	9	13	9	13	21	28	29	20	21	20	4	-8	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	1	11	12	7
12	6	4	14	14	20	22	22	21	21	2	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	2	6	7	8
13	2	2	9	10	17	20	31	24	11	13	-1	ES -22	ES -22	ES -22	-9	ES -22	ES -22	ES -22	-9	-7	10	12	8	8
14	7	7	10	16	21	20	30	27	22	0	-9	-9	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	14	11	7	7
15	2	2	4	12	22	20	20	21	16	-3	-9	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	4	7	4	5
16	4	5	14	11	17	22	25	27	21	25	18	-9	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	11	11	7	8
17	4	4	6	12	18	21	20	25	21	14	-3	-7	-1	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	-7	13	8	9
18	3	1	3	13	19	19	21	30	26	6	12	-3	2	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	-1	14	6	-1
19	8	S	US 7	14	18	21	21	21	11	14	11	-7	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	0	8	2	-1
20	1	0	10	16	20	23	30	27	21	12	21	13	22	5	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	9	7	6	0
21	-3	1	-1	7	-8	17	26	27	26	25	C	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	18	14	3	14	5	1
22	-7	-3	7	14	21	21	26	26	24	18	12	16	0	-5	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	10	9	7	8
23	1	0	8	11	15	18	26	21	24	21	20	20	3	-8	-8	-9	ES -23	ES -23	ES -23	ES -23	8	4	0	-4
24	3	-1	-2	6	15	16	23	22	26	17	17	-8	-2	-3	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	-5	5	-1	-1
25	-3	-3	6	14	15	21	29	22	26	29	23	-1	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	5	7	1	-7
26	-3	-4	-3	12	12	15	23	14	21	23	9	16	-9	-11	-11	ES -23	ES -23	ES -23	ES -23	ES -23	2	5	-3	-3
27	S	-3	2	10	12	17	24	27	17	10	0	-5	-11	-14	ES -23	-14	ES -23	-11	ES -23	ES -23	5	5	2	-4
28	-8	-4	-1	11	12	14	21	21	20	6	24	-5	-11	ES -23	ES -23	ES -23	ES -23	ES -23	-11	-5	11	1	0	-3
29	-2	1	3	11	11	18	21	22	19	9	21	1	-11	ES -23	-11	-8	ES -23	ES -23	ES -23	-14	3	-3	-3	-8
30	4	1	7	9	16	21	28	25	22	25	7	12	9	-9	ES -22	ES -22	ES -22	-7	ES -22	ES -22	7	7	2	2
31	-1	5	5	12	18	19	26	17	23	22	0	14	12	ES -23	ES -23	ES -23	ES -23	-11	14	ES -23	10	7	5	5
CNT	30	30	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	2	3	7	12	17	21	26	23	21	14	6	-5	-11	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	4	8	6	4
UD	9	11	14	17	21	27	30	27	26	25	23	16	9	-5	-9	-14	ES -22	-11	-9	-7	11	14	13	9
LD	-7	-3	-1	8	12	16	20	17	11	0	-9	ES -22	ES -22	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-3	1	-1	-4

C. Radio Propagation

c2. Radio Propagation Quality Figures at Hiraiso

Hiraiso

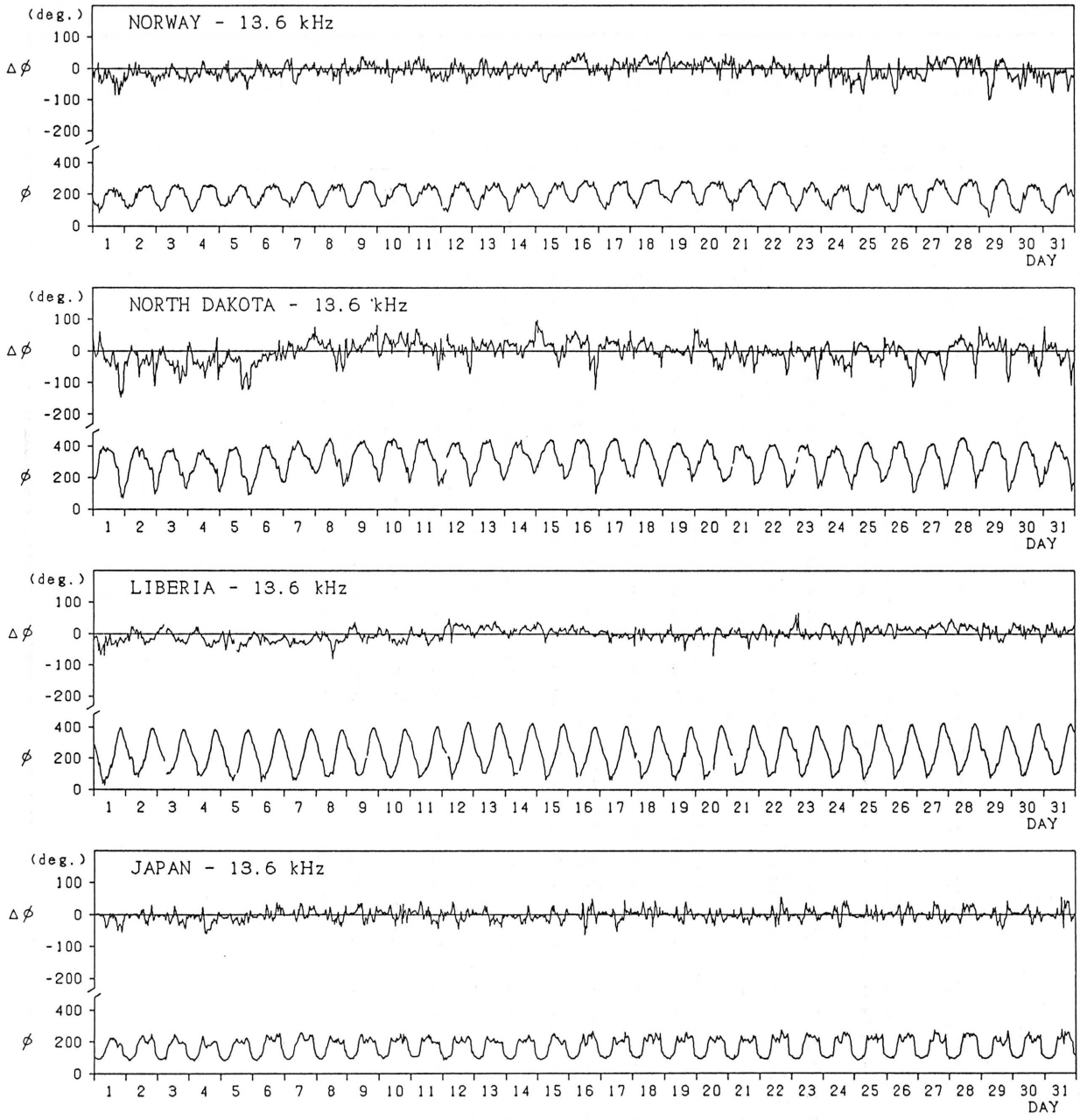
Time in U.T

Jan. 1990	Whole Day Figure	W W V 00-06	W W V 06-12	W W V 12-18	W W V 18-24	W W V H 00-06	W W V H 06-12	W W V H 12-18	W W V H 18-24	Conditions 00-06	Conditions 06-12	Conditions 12-18	Conditions 18-24	Principal Geomagnetic Storms Start h m	Principal Geomagnetic Storms End h	Principal Geomagnetic Storms Range nT
1	4o	4	S	S	4U	4	4	S	4	N	N	N	N			
2	4o	4	S	S	4U	4	4	5U	4	N	N	N	N			
3	4o	4	5U	S	4U	4	4	S	4	N	N	N	N			
4	4-	3U	S	S	4U	4	4	S	4	N	N	N	N			
5	4-	3U	S	S	4U	4	4	S	4	N	N	N	N			
6	4o	3U	S	S	4U	4	4	S	5	N	N	N	N			
7	4-	3U	S	S	4U	4	3	S	5	N	N	N	N			
8	4+	4	S	S	5U	5	3	S	5	N	N	N	N			
9	4o	5	S	5U	3U	4	4	S	4	N	N	N	N			
10	4o	4	S	S	4U	4	4	S	4	N	N	N	N			
11	4o	4	S	S	4U	4	4	S	4	N	N	N	N			
12	4-	4	S	S	4U	4	3	S	4	N	N	N	N			
13	4-	4	S	S	4U	4	3	4U	4	N	N	N	N			
14	4-	3U	S	S	4U	4	3	S	4	N	N	N	N	n o n e		
15	4-	3	S	S	4U	4	3	S	4	N	N	N	N			
16	4o	3U	S	S	5U	4	4	S	4	N	N	N	N			
17	4o	4	S	S	4U	4	4	S	4	N	N	N	N			
18	4o	4	S	S	4U	4	4	S	4	N	N	N	N			
19	4-	3U	S	S	4U	4	4	S	4	N	N	N	N			
20	4+	4	5U	S	5U	4	4	4U	4	N	N	N	N			
21	4-	4	S	S	4U	3	4	4U	4	N	N	N	N			
22	4+	4	5U	5U	4U	4	4	5U	4	N	N	N	N			
23	4+	4	S	S	4U	4	5	5U	4	N	N	N	N			
24	4o	4	5U	5U	3U	4	4	5U	3	N	N	N	N			
25	4-	4	S	S	3U	4	4	S	3	N	N	N	N			
26	4-	4	S	S	4U	3	4	5U	3	N	N	N	N			
27	4o	3	S	5U	4U	4	4	5U	4	N	N	N	N			
28	4-	4	S	S	4U	3	4	4U	4	N	N	N	N			
29	4+	4	5U	5U	4U	4	4	5U	4	N	N	N	N			
30	4+	4	5U	5U	4U	4	4	5U	4	N	N	N	N			
31	4+	5	5U	5U	4U	4	4	5U	4	N	N	N	N			

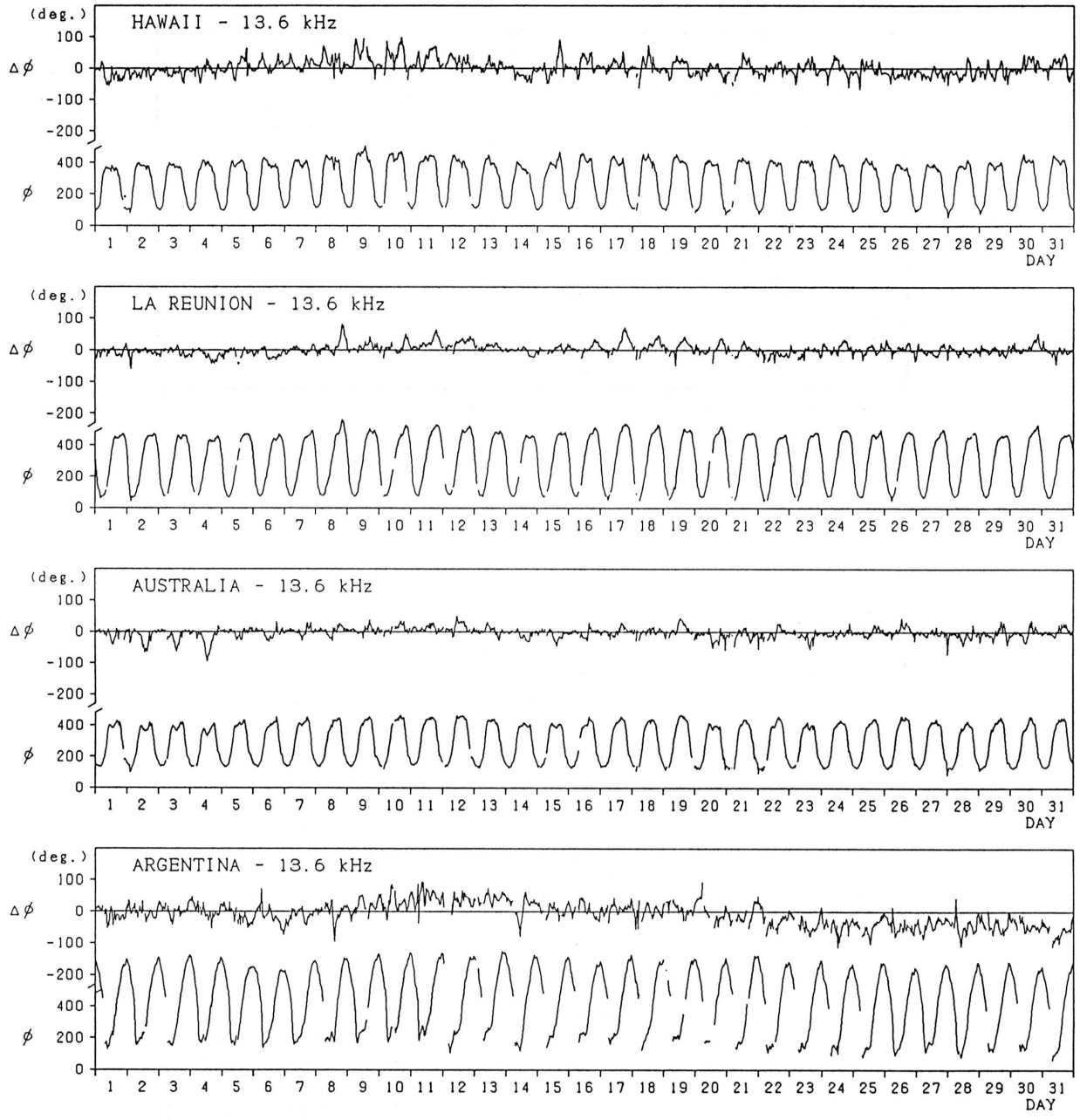
C. Radio Propagation

C3. Phase Variation in OMEGA Radio Waves at Inubo

Inubo January 1990



Inubo January 1990



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

NONE

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso Time in U.T.

Jan. 1990	S W F								Correspondence	
	Drop-out Intensities(dB)					Start	Duration	Type	Imp.	Solar Flare	Solar Noise
	CO	HA	1)	2)	3)						
1		12				2120	66	SL	2-	x	x
3					25	0614	33	G	2-	x	x
3			x		10	0647	25	SL	1-	x	
3					5	0712	19	S	1-		
3					8	0731	15	SL	1-		
10	13	18	11			0242	24	S	2	x	x
12	x	8	17			0054	25	SL	1+	x	x
14			11		12	0955	32	SL	1	x	
18	14	19	19	x		0223	9	S	1+	x	x
18	12		17			0416	31	SL	1+	x	
19			9			0424	51	SL	1-		
21	x	x	45			0430	55	G	3+	x	x
22			8			0012	13	SL	1-	x	x
22			11			0551	14	S	1-	x	
23	14		26	x		0502	21	S	2	x	
27			14			2351	21	SL	1		

NOTES CO: Colorado(WWV) HA: Hawaii(WWVH) 1): Australia 2): Moscow 3): Londn

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Jan. 1990	S P A								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
1	17	25	27	29		22	0343	0500	0359
1		31	37	14			0811	0922	0825
1		23					1309	1419	1330
1					79		2120	2232	2132
2		18	55		35	14	0221	0253D	0239
2			38	—	24		0253E	0306D	0259
2		16	55	—	31		0306E	0430	0323
2			17	—			0441	0528	0450
2			9	—			0650	0723	0656
3					6		0105	0147	0115
3			11	10			0421	0513	0433
3		22	99	68			0617	0802	0628
4			61	51	20		0335	0511	0400
4			40	29	6		0521	0627	0533
5				6	5		0206	0232	0212
5			16	14	9		0331	0436	0335
5			8	6			0451	0532	0502
5			6	5			0542	0600	0547
5		91	49				1151	1259	1159
6			26	24	17		0300	0353	0315
6				14	18		2303	2339D	2318
6				10	12		2339E	0050	0004
7				14	6		0150	0257	0214
7			11	6			0535	0642	0550
8			25	—	13		0317	0357	0323
8		40	6				1301	1359	1317
9				6	5		0126	0149	0133
9			41	18			0700	0732D	0705
9			30	24			0732E	0809	0737
9		29	19				1148	1240	1153
9		66					1452	1623	1457
9					59		2041	2155	2047
10				-6	5		0032	0115	0044
10	33	30	141	102	77	33	0241	0430	0248
10			27	20			0738	0844	0744

Inubo

Jan. 1990	S			P		A			
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
10		24					1301	1347	1306
10					40		2019	2048	2026
11				18	11		0026	0059	0033
11			23	12			0553	0715	0609
11			10				0836	0911	0841
12	19	28	81	110	71	31	0052	0233	0105
12		46	89	46			0739	0917	0759
12					113		2105	2239	2113
13			17	16			0351	0507	0411
13			20	14			0610	0711	0631
13			10				0833	0904	0840
14				6	5		0215	0245	0223
14		153	120				1005	1129	1016
15				6	5		0053	0120	0059
15			6	6			0448	0519	0453
15			60	46			0641	0800	0657
15				—	9		2345	0041	2352
15				—	4	18	0205	0256	0217
16		126	143	—			0742	1002	0818
17				—	16	8	0029	0133	0037
17				—	4		0223	0246	0227
17			12	8			0343	0446	0359
17			38	26			0542	0641	0550
17		30	62	36			0720	0819	0726
17		18	26	19			0856	0938	0901
18	33	39	120	98	74	36	0222	0334	0228
18	42	43	139	89	44	21	0410	0729	0425
19			39	28	27		0149	0250	0155
19		8	15	13			0346	0416	0355
19	15	18	63	56		12	0425	0547	0431
19		21	39	24			0844	0920D	0854
19		40	56				0920E	1033	0925
19		18	9				1156	1223	1205
19		34					1529	1553D	1545
19		50					1553E	1658	1603
19				29	63		2243	0057	2257
20				22	15		0121	0223	0130
20			31	30	17		0314	0423	0336
20		21	12				0917	1011	0925
20		104	69				1143	1237D	1152
20		149	55				1237E	1325D	1254
20		147	34				1325E	1428	1333
20					34		2107	2222	2121
20				24	39		2252	0012	2303
21			21	9	6		0130	0224	0141
21	17	15	81	68	45	20	0244	0415	0257
21	77	125	256	154	87	52	0430	0709	0449
21			12	11			0737	0803	0745
21		34					1611	1759	1624
22			26	—	39		0016	0212	0027
22				—	7		0236	0345	0248
22	12		36	—			0414	0512	0426
22			15	—			0521	0544D	0529
22	18	38	108	—			0544E	0736	0557
22			15	—			0826	0845	0832

Inubo

Jan.	S				P		A		
1990	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
22		33	37				1057	1138	1105
22		67	44				1151	1300	1204
22		19					1412	1459	1420
22				11	16		0216	0245	0221
23	53	58	160	101	67	20	0501	0715	0507
23		22	13				0925	0951	0934
23		37	31				1036	1106	1046
23		15					1249	1315	1253
24			9	10			0408	0455	0423
24			13	9			0643	0704D	0650
24			21	16			0704E	0742	0711
24		21	13				1216	1245	1225
24					42		2002	2122	2019
24				17	14		2321	2349	2324
25			28	16			0721	0814	0728
25			10				0856	0937	0907
25			11				0947	1019	0952
25				6			2342	0003	2346
26				6			0052	0121D	0103
25				9			0121E	0148	0133
26			31	29			0519	0631	0526
26			11				0648	0737	0657
26		6					1128	1150	1130
26		17	6				1231	1252	1236
26				15	25	14	2247	2339	2257
27			10	9		11	0535	0608	0543
27					12		2205	2233	2213
27	20		21	67	56	37	2351	0106	0002
28			9	7			0311	0357	0318
28			13				0934	0956	0937
28					8		2218	2243	2226
29			18	35	30		0048	0144	0054
29					4		0202E	0226	0214
29		18	13				0719	0744	0728
29		22					1243	1335	1301
29				12	13		2333	0017D	2343
30				—	9		0017E	0104D	0039
30				—	9		0104E	0147	0112
30			13	—			0356	0502	0415
31			17	—	23		0012	0134	0034
31			10				0419	0439	0425
31		26	12				0947	1004	0954
31		41	31				1029	1113	1035
31		23	6				1255	1319	1300
31					9		2243	2332	2255

IONOSPHERIC DATA IN JAPAN FOR JANUARY 1990
F-493 Vol.42 No.1 (Not for Sale)

電離層月報（1990年1月）
第42巻 第1号（非売品）
1990年5月21日 印刷
1990年5月25日 発行
編集兼 郵政省通信総合研究所
発行所 〒184 東京都小金井市貫井北町4丁目2－1
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