ISSN 0021–0382

F—529

IONOSPHERIC DATA IN JAPAN

FOR JANUARY 1993

VOL. 45 NO. 1

CONTENTS

COMMUNICATIONS RESEARCH LABORATORY
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 1o, 1+, 2–, 2o, 2+, 3–, 3o, 3+, 4–, 4o, 4+, 5–, 5o stands for an average of six-hourly quality figures of the two circuits. Abbreviated symbols are as follows:

C	artificial accident,
S	propagational accident,
U	inaccurate.

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

N	normal,
U	unstable,
W	disturbed.

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

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

C3. Phase Variation in OMEGA Radio Waves at Inubo

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

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

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

C4. Sudden Ionospheric Disturbances

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

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

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

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

Types of fade-out are as follows:

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

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

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

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

b. Sudden Phase Anomaly (SPA) at Inubo

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

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

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

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

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

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

HOURLY VALUES OF FOF2 AT WAKKANAI

JAN. 1993

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		35	35	36	38	50	A	51	86	86	90	103	85	90	85	78	81	54	53	42		59	59	35
2	A		34	32	35	A	49	37	55	87	88	90	97	88	85	83	53		41	50	42	43	47	53
3	53	38	31	A	A	A		53	65	90	100	90	88	98	101	80	58	62	38	38	A			
4	37	42	A	A	35	31	91	30	56	81	88	94	94	88	87	72	62	51	56	49	37	43	42	50
5	43	42	40	42	44	37		55	66	101	102	87	91	91	98	90	65	63	48	56	32	30	51	34
6	37	38	38	38	38	65	32	64	70	87	90	90	91	104	92	76	67	65	48	A	A	A	50	35
7	37	37	35	35	36			50	79	90	90	103	84	98	98	90	61	58	40	A	A	A	37	40
8	34	38	41	38	41	40	79	32	67	87	106	102	90	97	86	87	66	56	47	32	26	A	37	66
9	38	A	41	42	42	35	40	61	80	77	86	88	96	100	88	86	77	59	38	A	32	A	A	A
10	51	36	34	35	35	23	30	39	A	89	106	102	106	86	74	72	66	66	49	54	53	38	38	38
11	43	40	38	40	40		A	A	100	98	85	78	87	85	75	73	62	A	54	A	A	37	31	A
12			36	34	A	A	A	49	86	98	117	118	115	88	87	87	86	60	58	38	A	A	40	A
13	31		30	35	35			59	95	108	90	88	88	85	87	87	67	51	41	A	A	A	A	A
14	A	34	35	31	35	35	A	33	61	82	107	121	95	86	77	75	64	73	60	52	38	34	40	38
15	A	A	38	37	40	38	29	53	88	83	91	102	88	87	78	78	76	60	63	46	38	38	37	38
16	43	43	40	42	40	42	53	56	67	87	104	108	86	82	115	77	61	53	51	58	45	35	35	35
17	36	37	46	35	37	69		52	72	83	88	86	87	78	75	71	65	54	47	51	34	35	38	43
18	38	53	42	40	40	38		52	73	90	88	88	87	80	82	82	62	54	49	40	34	30		35
19		34	34	35	40		42	66	71	80	86	109	93	87	90	90	74	30	40	38	51	34	50	34
20	37	37	34	46	38	A	A	41	85	87	96	90	90	88	90	87	73	58	51	48	30		38	18
21	32		38	40	45	A	A	58	71	73	75	85	88	80	94	90	72	52	40	38	31	43	61	34
22	30	42	44	42	42		34	48	72	70	81		94	80	87	70	60	50	54	35	19		32	29
23	38	37	38	43	35	40	51	55	73	94	81	88	91	100	77	76	66	48		37	38	36	38	34
24	44	38	38	40	42	40	38	54	66	75	86	90	87	92	84	78	67	60	65	42	A	A	A	41
25	38	41	38	35	38	A		A	66	74	80	83	86	108	78	78	60	52	A	39	51	A	A	A
26	34	26	28	38	37			54	57	111	91	102	114	91	87	71	66	60	55	60	38		88	86
27		A	34	33	37			50	68	98	84	90	77	90	70	90	62	52	43	A	43	32	A	29
28	53	47	44	35	35	29	46	61	82	90	90	88	73	82	80	73	53	52	38	38	34	34	35	40
29	41	43	43	41	38	34		52	66	74	84	82	85	72	70	76	64	47	42	36	35	30	34	34
30	37	37	37	35	35	32	30	48	66	73	90	78	80	75	83	71	64	56	51	42	34	34	37	34
31	37	37	37	38	42	34	32		72	90	80	90	100	70	88	87	81	62	56	51	34	34	35	37
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	24	24	30	29	29	18	15	28	30	31	31	30	31	31	31	31	31	29	29	25	23	19	24	25
MED	38	38	38	38	38	38	40	52	71	87	90	90	88	88	86	78	65	56	49	42	35	35	38	35
U Q	43	42	40	40	40	40	51	55	80	90	96	102	94	92	90	87	72	60	54	51	42	38	48	40
L Q	36	37	34	35	35	34	32	48	66	80	85	88	86	82	78	73	62	52	41	38	32	34	36	34

HOURLY VALUES OF FES AT WAKKANAI

JAN. 1993

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	58	G	G	26	24	55	37	35	G	39	G	G	G	G	G	G	G	G	G	G	G	G	G
2	34	G	G	G	G	33	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	30
3	34	G	30	36	37	34	G	31	57	66	G	G	G	G	G	G	G	G	34	G	26	G	G	G
4	G	29	31	29	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
5	G	G	G	G	G	G	G	G	G	64	G	G	G	G	G	G	G	G	G	G	G	G	G	G
6	G	G	G	29	G	G	G	G	G	G	G	G	58	G	G	G	G	38	62	39	33	30	24	G
7	G	G	G	G	G	G	G	G	G	G	G	36	68	G	34	G	60	40	G	40	40	32	G	G
8	G	G	24	G	G	G	G	G	G	G	G	41	54	52	G	41	G	G	G	56	G	29	36	26
9	G	46	34	37	40	G	G	G	G	G	G	G	G	G	38	32	G	61	77	57	62	40	38	36
10	G	29	32	60	29	38	G	G	56	G	40	65	G	G	G	G	G	61	G	G	39	33	33	G
11	G	33	G	G	28	G	72	41	36	96	G	G	G	38	38	G	G	142	124	37	36	27	28	26
12	G	G	G	G	35	32	38	28	33	G	G	G	G	G	G	G	G	35	31	G	40	58	42	41
13	36	G	25	G	G	G	G	28	52	G	G	G	G	G	G	G	G	36	G	34	40	61	49	56
14	33	G	G	G	G	G	36	37	G	G	G	G	G	G	G	G	G	G	G	32	33	G	G	G
15	29	33	G	G	G	G	G	G	G	G	38	G	G	G	G	G	42	G	G	G	28	32	28	G
16	G	G	G	G	G	G	G	G	G	G	G	G	G	57	G	G	G	29	26	G	G	G	G	G
17	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	36	30	G	G	G	G	G	G
18	25	G	G	G	G	G	G	G	G	34	G	G	G	G	G	G	G	G	G	G	G	G	G	G
19	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	25	G	G	G	26	G
20	24	G	34	42	33	38	36	G	37	G	G	38	G	G	G	37	G	G	41	35	G	G	G	G
21	G	G	G	G	G	76	34	G	36	G	G	G	G	G	G	G	G	G	36	26	G	G	G	G
22	38	30	28	G	27	G	G	G	G	G	G		G	G	G	G	G	G	G	27	G	G	G	G
23	G	G	30	32	43	30	G	G	G	G	G	G	G	G	G	G	G	40	37	G	36	36	G	G
24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	34	33	27	37	58	35	G
25	G	G	G	G	34	28	G	38	G	G	G	38	G	G	G	G	40	36	59	59	30	30	30	29
26	38	41	40	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		G	G
27		33	29	24	G	G	G	G	G	G	G	G	G	G	G	G	G	32	55	38	41	34	33	26
28	33	G	28	G	G	24	G	G	G	37	G	G	G	G	G	G	G	G	G	G	G	28	30	G
29	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	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	24	G	G	G	27
31	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	31	31	31	31	31	29	31	31	31	31	30	31	31	31	31	31	30	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	29	29	29	24	28	28	G	G	33	G	G	G	G	G	G	G	G	36	36	35	36	32	30	26
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. 1993

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

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

HOURLY VALUES OF FOF2 AT AKITA

JAN. 1993

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	32	35	32	37	40	30	34	56	74	106	86	96	100	90	84	80	66	54	50	41	31		31	32
2	34	34	35	A	35	34	37	52	64	73	92	101	100	105	78	78	66	46	47	51	48	50	52	55
3	55	43	51	31	30	A	31	54	61	83	108	118	106	102	100	87	65	50	A	40	31		35	
4	35	41	37	A	35	31	N	43	61	85	104	88	86	86	90	67	60	50	N	50	64	40	41	40
5	38	38	40	38	38		32	46	81	82	116	106	83	96	91	87	80	64	47	35		35	32	35
6	40	38	38	37	35	36	34	44	66	75	107	105	88	90	106	82	67	50	48	47	30	29	32	35
7	35										101	106	91	86	92	92	64	44	48	A	35	A	41	42
8	A	A	35	36	38	34	35	44	64	86	103	115	86	88	90	90	73	48	54	A	A	35	33	38
9	36	31	A	38	40														33	38	36	A	34	34
10	35	A	40	26		34	35	55	66	76	100	107	104	86	75	75	58	54	52	55	50	35	35	A
11	A	A	40	40	41	38	41	61	71	85	95	86	80	88	86	75	60	54	66	A	A	A	A	A
12	32	34	35	36	34	31	31	A	76			121	97	90	92	91	82	55	54	48	34	A	A	A
13	A	A	36	35	26	31		47	68	86	116	95	81	87	82	95	70	50	45	38	33	30	35	A
14	37	38	38	34	36	34	N	51	52	77	95	112	101	88	95	80	68	51	54	53	35		35	35
15	37	A	A	36	36	35	34	54	70	86	94	90	97	86	86	86	66	61	48	45	38	36	A	38
16	40	42	43	41	43	43	38	54	68	76	97	105	94	86	74	87	66	54	48	52	48	N	N	35
17	35	35		35	35	34	37	54	74	64	86	81	95	74	72	74	75	51	46	46	38	30		37
18	41	40	23	35	35	31	29	52		85	N	90	91	80	77	90	68	54	52	57	36	48	30	31
19	35		35	33	35	35	38	64	71	78	88	110	96	82	88	90	73	50	40	41	37	38		35
20	38	37	40	45	A	A	N	54	83	96	106	99	104	96	84	84	80	54	48	50	38	34	34	
21	40		36	41	37		N	50	80	80	78	90	88	82	86	90	75	50	41	37	37	30	35	35
22	37	37	41	A	40	36	32	56	73	77	86	90	92	78	74	78	67	30	44	44	35	35	30	30
23	32	34	36	37	37	A	A	50	70	90	86	86	88	87	81	87	65	51	29	35	38	37	37	N
24	40	40	40	40	41	40		62	58	67	86	86	88	78	70	80	63	51	45		38	34	34	35
25		A	37	37		38	35	60	67	71	76	90	90	96	94	76	63	48	48	36	35		65	36
26	33	35	38	35	A		34	51	66	86	105	97	112	97	88	84	63	63	51	63	64	N	N	50
27	A	A	34	A	A	34	25	63	77	90	80	85	76	86	76	78	77	64	60	38	34	50	51	32
28	46	49	35	37	48	46	44	64	73	90	97	94	108	80	86	87	64	22	47	64	45	51	37	38
29	42	43	42	42	41	37	34	55	72	75	86	78	77	83	76	80	70	51	43		31		31	34
30	34	36	38	37	36	31	37	56	70	76	79	86	87	75	78	77	67		50	51	35	35	40	35
31	38	36	38	38	37	35	30	52	67	75	93	101	100	93	87	78	76	67	51	58	26	32	32	35
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	21	27	26	25	23	22	28	28	28	28	30	30	30	30	30	30	29	29	26	28	20	24	24
MED	37	37	38	37	37	34	34	54	70	81	94	96	92	86	86	83	67	51	48	46	36	35	35	35
U Q	40	40	40	38	40	37	37	56	73	86	103	106	100	90	90	87	73	54	51	52	38	39	38	38
L Q	35	35	35	35	35	31	32	50	66	75	86	88	87	82	77	78	64	50	45	38	34	33	32	34

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT AKITA

JAN. 1993

LAT. 39.7N LON. 140.1E 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	30	26	28	G	G	G	26	25	G	58	71	G	40	G	G	G	G	27	28	G	G	G	G	G
2	G	25	G	28	29	G	G	G	32	G	49	58	G	G	G	G	G	G	G	G	24	26	G	28
3	29	G	G	G	G	26	G	G	52	42	74	58	51	G	G	G	G	29	54	26	G	G	G	G
4	G	G	G	67	G	G	28	29	G	G	42	G	G	G	G	G	G	G	G	G	G	G	G	G
5	G	G	G	G	G		G	24	G	G	42	43	G	G	G	G	G	G	G	G		G	27	G
6	G	G	G	G	G	G	G	G	43	41	G	G	G	G	G	40	G	31	27	G	G	G	G	G
7	30										G	42	38	58	G	G	36	48	G	59	30	30	38	32
8	28	40	26	31	G	G	G	G	43	G	47	50	50	50	117	60	G	27	117	45	37	28	G	34
9	26	30	49	29	36														91	34	38	25	40	28
10	40	42	42	31	26	G	G	G	G	G	G	43	G	G	42	37	G	G	G	32	G	29	46	43
11	46	58	26	G	G	G	G	29	G	G	G	G	81	41	43	42	43	33	42	41	136	59	44	33
12	G	G	24	G	24	G	G	49	44	41	52	58	41	40	40	42	54	37	29	29	28	40	48	40
13	53	33	30	29	G	G		30	55	G	G	G	G	G	G	G	50	G	G	28	26	54	57	33
14	G	28	29	28	29	G	G	34	55	G	G	G	G	G	G	G	G	G	G	26	28		G	31
15	G	30	29	G	G	G	G	G	G	42	38	G	43	43	48	34	G	G	G	G	G	38	49	40
16	26	G	G	G	G	G	G	G	G	36	40	39	40	G	G	G	G	28	G	26	27	G	G	G
17	G	G	G	G	28	G	G	G	48	G	N	G	G	41	50	42	37	36	29	28	G	G	G	G
18	G	G	29	26	26	G	G	G		41	41	40	41	G	G	G	G	G	25	G	G	G	G	G
19	G	G	G	G	G	G	G	G	G	G	G	44	G	G	G	G	G	G	32	G	G	G	G	G
20	G	G	35	49	36	29	G	28	G	59	42	60	55	84	57	G	G	G	G	G	G	28	G	G
21	G	G	G	G	G		G	26	32	G	G	G	G	G	46	54	55	55	56	G	G	G	G	G
22	G	59	57	43	31	86	28	28	G	G	G	48	41	42	G	34	G	33	36	28	24	26	G	G
23	G	G	G	G	G	30	71	35	40	44	G	42	42	G	50	40	G	31	41	27	G	28	G	G
24	36	30	24	G	G	G		G	G	G	G	G	G	G	G	G	G	G	29		G	G	G	G
25		45	28	33		G	G	29	G	G	G	G	G	42	G	38	G	26	26	G	G		G	29
26	26	26	27	G	32		G	G	32	37	42	67	45	44	37	40	G	G	G	G	G	G	G	G
27	27	25	G	28	26	G	G	G	G	40	40	G	G	G	G	G	G	G	G	G	G	G	G	G
28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	43	G	G	25	G	G	G	G	G	G
29	G	26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		G		G	G
30	G	G	G	G	G	G	G	26	G	G	G	G	G	G	G	G	G		G	G	37	26	G	G
31	G	G	G	G	G	G	G	G	48	G	G	G	G	G	G	G	47	43	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	30	30	30	30	29	26	27	29	28	29	29	30	30	30	30	30	30	29	31	29	30	28	31	31
MED	G	13	12	G	G	G	G	G	G	G	G	G	G	G	G	G	G	25	G	G	G	G	G	G
U Q	28	30	29	29	27	G	G	28	43	41	42	44	41	41	43	40	G	32	32	28	27	28	27	31
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT AKITA

JAN. 1993

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

JAN. 1993

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	34	34	36	35	35	51	41	63	82	97	111	111	101	100	90	80	72	60	57	46	38	30	31	37
2	35	40		40	34	32	36	51	75	72	86	101	97	97	87	81	81	51	48	50	59	55	52	60
3	58	42	48	A		N	32	72	72	78	110	127	128	96	91	97	67	51	58	47	29	28		34
4	34	34	41	32	30	32	A	50	76	78	90	88	107	88	98	72	72	75	70	60	38	37	47	35
5	46	41	44	36	34	38	34	57	80	91	124	116	98	97	94	86	91	74	61	38	38	35	35	31
6	37	38	38	37	34	37	44	61	87	91	86	114	103	82	120	102	80	58	62	46	35	29	N	29
7	36	35	38	43	31	35	38	57	74	66	107	115	98	82	122	92	81	58	58	A	A	32	35	38
8	37	A	32	32	32	36	26	54	83	90	112	117	85	A	99	96	80	58	57	54	A	A	A	38
9	36	40	42	44	A	A	32	69	91	79	91	106	95	106	104	81	82	57	45	43	46	28	30	31
10	34	37	46	43	A	29	35	77	78	81	82	114	93	108	86	76	60	53	66	61	48	34	41	A
11	A	A	41	37	41	43	44	81		78	100	97	82	98	122	97	71	60	61	59	32	40	38	A
12	33	36	34	46	29	31	43	72	78			135	97	102	100	97	90	71	61	55	42	N	A	36
13	A	A	35	32	26	28	28	51	66	82	98		92	92	96	94	74	56	44	37	37	32	30	34
14	35	35	34	31	34	31	35	56	76	87	113			101	96	88	85	70	84	68	36	29	34	38
15	39	A	38	34		35	37	57	72	80	102	100	91	101	96	84	75	65	46	42	A	35	41	38
16	40	38	38	37	38	38	41	58	86	87	106	117	121	116	88	80	81	66	50	60	63	38	35	38
17	42	38	41	42	38	36	50	67	75	80	94	111	80	90	73	85	78	56	50	44	45	35	34	46
18	41	46	43	35	27	29	37	64	82	103	116	92	92	95	80	95	74	58	57	61	44	35	30	37
19	40	46	43	40	40	41	38	81	75	90	91	96	102	85	98	80	78	70	42	40	57	40	43	41
20	38	38	38	42	A	A	31	58	78	92	95	100	100	90	101	90	81	58	51	57	46	35	38	38
21	46	36	38	44	46	A		50	82	96	95	88	126	90	77	98	107	62	38	37	42	36	44	35
22		40	43	36	35	30	A	66	78	84	113	88	87	90	80	97	65	75	42	46	37	42	27	30
23	27	32	35	40	40			60	76	84	97	91	87	92	96	85	79	56	38	34	38	40	35	38
24	38	A	46	38	41	46	42	64	78	77	75	87	88	82	90	82	78	53	51	51	48	31	30	31
25	35	48	30	38	35	47	34	62	84	70	78	97	101	101	95	86	70	55	46	44	35	26	31	41
26	30	35	43	37	A	31	30	58	80	98	107	105	114	101	92	80	67	66	73	61	35	29		32
27	43	30	29	28	30	36	28	55	70	85	101	84	90	75	76	68	80	51	42	44	37	29	37	34
28	35	35	37	30		41	48	67	80	95	90	102	110	104	90	102	86	56	48	48	43	32	32	35
29	38	37	36	38	46	30	31	65	72	72	86	92	86	84	81	78	65	58	46	45	35		34	32
30	34	35	38	38	36	38	38	57	72	78	82	80	86	79	78	87	75	60	48	58	50	40	36	19
31	44	41	36	40	40	37	37	54	66	79	90		112	104	84	78	78	73	60	60	42	28	34	40
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	26	30	30	24	26	27	31	30	30	30	28	30	30	31	31	31	31	31	30	28	28	26	29
MED	37	38	38	38	35	36	37	60	78	83	96	100	97	96	92	86	78	58	51	48	40	34	35	36
U Q	40	40	43	40	40	38	41	67	82	91	107	114	103	101	98	96	81	66	61	59	46	37	38	38
L Q	34	35	36	35	31	31	32	56	74	78	90	91	88	88	84	80	72	56	46	44	36	29	31	32

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT KOKUBUNJI

JAN. 1993

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	27	G	G	G	G	27	G	38	61	43	G	G	40	G	58	31	27	G	G	G	G	G
2	G	G	G	G	G	G	G	26	G	G	G	G	G	G	G	G	G	35	29	27	27	26	G	G
3	G	G	30	30		G	G	27	47	73	G	54	G	57	G	G	44	G	24	G	G	G		G
4	G	G	G	G	G	G	25	48	G	38	48	G	G	G	G	G	G	G	G	G	G	G	G	G
5	G	G	G	G	G	G	G	28	G	45	58	52	41	G	G	58	G	G	G	G	G	G	38	52
6	G	G	G	G	G	G	G	28	48	G	41	G	G	G	59	G	31	G	23	G	G	G	G	24
7	24	40	G	G	G	G	G	G	35	G	G	40	40	47	38	G	G	31	51	42	56	30	28	29
8	30	30	30	35	G	G	G	44	96	G	46	48	65	107	56	41	41	33	30	24	59	49	51	31
9	25	30	60	102	71	50	39	45	47	G	G	G	54	G	G	G	59	G	26	29	24	G	G	G
10	26	28	44	41	36	G	G	G	G	G	G	53	G	G	G	G	G	G	38	G	28	G	G	49
11	35	55	28	24	G	G	G	G		G	44	46	G	50	G	G	37	50	G	34	G	40	G	78
12	42	G	G	24	25	G	G	28	33	76	61	40	42	40	38	G	G	G	29	29	44	G	32	46
13	49	44	28	G	G	G	G	G	40	40	38	G	G	G	G	G	G	G	G	G	G	38	28	G
14	29	G	G	G	G	G	G	G	G	60	64	59	52	G	G	G	G	G	26	G	G	G	G	32
15	29	30	28	G		G	G	G	G	G	55	79	G	G	G	46	G	G	G	28	33	33	38	30
16	31	33	G	G	G	24	23	G	34	44	40	41	52	G	44	G	G	26	28	25	G	G	G	G
17	34	28	G	G	25	G	G	G	G	G	G	G	G	G	G	G	40	46	31	24	G	G	G	G
18	26	G	26	28	30	28	G	45	G	50	54	41	59	60	G	38	G	G	G	G	G	G	G	G
19	G	G	G	G	G	G	G	G	G	G	G	46	46	59	43	38	G	G	G	G	G	G	G	G
20	G	G	G	28	44	36	26	37	40	50	48	52	56	48	48	41	G	G	G	G	G	G	G	G
21	G	G	G	G	G	28	G	38	55	G	42	41	80	56	39	58	83	G	G	G	G	G	G	G
22		G	27	44	34	28	28	G	G	G	40	43	58	42	38	54	55	G	28	G	26	G	G	G
23	G	G	G	G	G			56	G	59	G	45	51	48	G	40	49	G	29	G	G	G	G	G
24	G	37	27	27	24	G	G	28	34	G	G	G	49	55	53	G	40	44	34	G	G	G	G	G
25	G	G	49	70	58	42	G	26	G	G	38	42	46	40	44	38	31	G	25	23	G	G	G	G
26	G	G	26	G	33	G	G	G	34	G	46	44	47	47	40	54	G	G	G	G	G	G		G
27	G	G	G	G	G	G	G	G	G	40	56	40	G	G	G	G	G	G	G	G	G	G	G	G
28	G	G	G	G		G	G	26	41	36	G	G	G	G	G	G	33	39	28	G	G	G	G	G
29	G	G	G	G	G	G	G	G	G	40	40	43	G	40	G	G	G	G	G	G	G		G	G
30	G	G	G	24	G	G	G	G	G	G	G	40	G	40	G	G	G	G	G	G	G	G	G	G
31	G	G	G	G	G	G	G	29	33	38	40	42	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	30	31	31	31	28	30	30	31	30	31	31	31	31	31	31	31	31	31	31	31	31	30	29	31
MED	G	G	G	G	G	G	G	26	G	G	40	42	40	40	G	G	G	G	24	G	G	G	G	G
U Q	29	30	28	28	27	G	G	29	40	44	48	46	52	48	40	40	40	31	29	24	24	G	G	29
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. 1993

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

HOURLY VALUES OF FOF2 AT YAMAGAWA

JAN. 1993

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	46	46	46	35	36	36	26	43	77	90	111	131	143	146	146	156	160	110	83		58		42	51
2	51	A	33	37		34	25	44	57			95	107	92	97	95	85	81	52	50	60	77	53	38
3	43	34	38	40	A		46	46		78	98	118	138	96	97	108	93	66	72	61		36	A	29
4		63	46	40	46	32	A	36	77	80	82	78	100	111	90	81	75	78		58	43	41		
5	31	36	38	35	34		45	38	78	75	96	118	112		102	96	111	111		54	41	42		A
6	A	32	36	47	38	23	46	38		82	87	101	117	91	101	108	96	74	54	51		32	51	30
7	34	29	38	35			31		74	77	86	115	125	90	87	101	90	72	59		52	58	38	62
8	34	51		36	45	36			66	90	90	112	85	91	112	100	87		54	51		A	A	28
9	A	A		41		46	A				93	101	111	105	112	116	90	80	63		66	52	64	A
10	35	51	38	36		28	A	52	80	78	82		100	121	109	84	83	66	63	76				34
11			40		43	37	34	54	87		90	125	87	96	104	102	91	75			38	46		
12	A	35	A	42	38		36	50	61	105	126	121	102	105	116	112	107	97		54	64			A
13		36	46	46	42			47	62		75	108	104	103	112	91	85	80		48	50	42		30
14	32	34	34	32	34		42	37	71	88	87		111	105	104	111	110	90	66	63		62	67	
15	38	38	A			30	35	44	66		82		A	102	108	114	104	86	72	52	59	53	A	
16	38	A	A		37	34	38	38	80	85	96	122	131	114	106	108	105	91	66		78	73	52	
17	47	48	34	41	53	35			85	86	86	91	95	100		91	90	91	74		54		42	51
18		42		40	36	A	A	48	80	90		91	100	86		96	102	86	66	51		58	71	
19		36	34	38	35			37	74	97		92	96	102		88	82	85	64	43	53	52		
20					49	45	29	40	82	96	92	91	97	110	121	108	95	87	64		52	62	43	70
21	61		41	59	46			33	70	98	90	87	88	90	87	80		81		38	42	42	41	34
22		30	31		30		A	38		88		91	86	101	91	81	84	84			82	56	71	51
23		46	31	51					66	81	86	84	78	87	99		78	77	58	40	70			
24	35		31	51		30	37	42	66	79	71	81	81	81	79	87	97	76			62	53	30	44
25	35	49	36	35	A	46	34	41		78	80	96	95	101	100	101	76	75		50	37	46	51	51
26		40	54	41		29		36	87	78		117	107	110	95		77		95	61	66		37	46
27	36	46	45	35	34	28	30		66	84	101	90	97	101	97	84	75	91	66	52	37	35	N	56
28	46	56	46	50		37		43	84		82	86	116		110	100	106		78	63	66	41	71	N
29	46	34		46			50	52	66	68	72	96		91	108	108	87	84		43	42			A
30	34	46	34	41	43	46	36		71	82	78	78	85		84					52	63		34	61
31			50	28	38	N	36	42		82	78	102	104	111	93	82	86	96		53	52	42	71	40
	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	18	23	23	26	19	18	18	24	25	25	26	28	29	28	28	28	29	27	19	22	25	22	18	18
MED	37	40	38	40	38	34	36	42	74	82	86	96	100	101	102	100	90	84	66	52	54	49	51	45
U Q	46	48	46	46	45	37	42	46	80	90	93	116	111	107	109	108	103	91	72	58	65	58	67	51
L Q	34	34	34	35	35	30	31	38	66	78	82	90	91	91	94	87	83	76	59	50	42	42	41	34

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

JAN. 1993

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	24	31	G	26	24	G	G	G	35	50	44	46	44	G	G	G	G	G		G		G	32
2	30	30	G	G		G	G	G	G			43	48	G	41	G	G	G	G	24	G	G	G	G
3	G	G	G	G	24		G	G		42	71	G	126	43	G	42	G	30	G	24		G	34	G
4		G	G	G	G	25	24	26	G	G	G	48	62	56	44	G	G	G		G	G	G		
5	G	G	G	G	G		G	G	G	38	40	G	G		G	G	G	G		G	G	G		24
6	24	G	G	G	G	G	G	G		G	G	G	G	41	40	44	G	G	G	G		G	G	G
7	G	G	G	G			G		48	N	G	41	41	G	G	G	G	G	G		G	G	30	25
8	G	G	G	G	25	G			32	G	43	46	58	92	G	39	48		25	32		29	29	28
9	26	59		G		33	31				40	G	49	42	G	G	G	G	25		33	25	G	39
10	25	G	23	37	G	31	28	G	G	G	41		48	42	41	G	G	G	25	34				G
11			26		G	G	G	G	48		G	41	48	49	45	G	35	30			G	G	69	
12	41	65	38	27	25		G	G	29	44	45	58	G	62	61	43	43	40		46	40			36
13		G	G	G	G			G	48		G	G	G	G	54	G	G	G		G	G	G		24
14	G	G	25	28	G		G	G	G	41	44		65	64	74	G	G	G	G	G		25	G	G
15	G	41	26			G	G	G	G		40		102	G	61	G	G	34	G	G	40	29	41	
16	45	44	46		30	G	G	G	G	44	40	G	62	71	72	G	62	G	24		26	G	G	
17	G	G	G	28	G	G			G	G	42	62	63	61		40	G	40	30		58		25	24
18		G		G	G	36	25	27	G	G	G	48	52	51		74	43	40	29	G		G	G	
19		G	G	G	G			G	G	G		G	G	45	G	41	G	G	G	G	G	G		
20					G	24	G	24	G	39	42	46	47	51	44	G	59	G	25		G	G	G	G
21	G		G	G	G			G	G	G	G	G	G	42	76	77	G	G		G	25	G	G	G
22		G	G		26		36	25		G		43	45	42	G	G	G	G			G	G	23	G
23		G	G	G					32	G	G	G	44	44	44		G	31	G	G	G		G	
24	G		G	G		G	24	25	G	G	G	40	G	G	G	G	G	32			G	G	G	G
25	G	G	G	G	69	G	G	G		G	38	G	49	44	43	G	G	G		28	G	G	G	G
26	G	G	G	G	G	G	G	G	G	G	G	48	43	45	G	G	G		G	28	G		G	G
27	G	G	G	G	G	G	G		G	36	40	42	41	G	G	G	G	G	25	24	G	G	G	G
28	G	G	G	G		G		G	G	G	38	G	48	G	44	G	G		25	G	G	G	G	G
29	G	G		G			G	G	G	G	40	43		G	G	38	G	G		G	G			24
30	24	G	24	G	G	G	G		G	37	44	G	43	G	G					G	G	G	G	G
31	G		G	G	G	G	G	G		37	G	50	G	50	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	23	26	27	26	23	20	24	24	25	25	28	28	30	30	29	29	30	27	19	22	25	24	24	24
MED	G	G	G	G	G	G	G	G	G	G	40	41	46	44	40	G	G	G	G	G	G	G	G	G
U Q	24	G	24	G	25	24	12	G	15	37	42	46	52	51	44	39	G	30	25	24	13	G	24	24
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT YAMAGAWA

JAN. 1993

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	16	17	15	15	15	15	16	17	18	17		20	16		15		15		15	15
2	15	15	15	15		15	15	15	15			17	18	34	39	21	17	22	15	15	15	15	15	15
3	16	20	15	15	17		16	15		21	26		29	30		20	17	15	15	15		15	15	15
4		15	15	15	15	16		16	20	17	35	22	27	27	24	32	18	21		15	15	15		
5	15	15	15	15	15		15	15	16	16	17				21	18	16			15	15	15		18
6	16	15	15	15	15	15	15	15		17	16			18	18	16	16	22	15	15		15	15	15
7	15	15	15	15			15		18	15	15	16	17	17	17	16	16	23	15		15	15	15	15
8	15	15	16	15	15	15			15	15	16	17	17	17		17	16		16	15		15	15	15
9	15	15		15		15	15				18	23	20	18	23	36	18	16	15		16	15	15	15
10	15	15	15	15		15	15	15	15	15	16		20	29	24	18	17	15	16	15				16
11			16		15	15	15	15	15		17	17	21	32	22	15	16	15			15	15	15	
12	15	15	15	15	15		15	15	15	16	17	18		24	20	17	16	15		15	15			15
13		16	15	15	15			15	15		17			38	36	33	28	23		15	15	15		15
14	15	15	15	15	15		15	15	15	16	17		22	23	18			23	14	15		15	15	66
15	15	15	15			15	15	15	18		16		18		20		21	15	16	15	15	15	15	
16	15	15	15		15	15	15	15	15	16	16		20	18	15		18	16	16		15	15	15	
17	15	15	15	15	15	16			24	16	16	20	17	17		17		15	15		15		15	16
18		15		15	15	15	16	15	18	20		20	16	18		17	15	15	15	15		15	15	
19		15	16	15	15			15	17	17		20	38	20		18	17	17	15	15	15	15		
20					15	16	18	15	15	16	17	20	21	17	17		15	15	15		15	15	15	15
21	15		15	15	15			15	17	15	16	20		17	17	16		15		15	15	15	16	15
22		15	15		15		15	15		18		21	20	17	17	16	16	16			15	15	16	16
23		15	15	15					20	16	17	20	23	22	18		17	16	15	15	15		15	
24	15		15	15		15	15	15	23	16	20	21	23	21	20	17	16	15			16	15	15	15
25	16	15	15	15	15	15	15	15		16	16	17	17	23	17		16	15		15	15	15	15	15
26	15	15	15	15	17	17		15	15	16		18	27	18			16			15	15		16	15
27	15	15	15	15	15	16	15		15	15	16	17	22		16	16	15	18	15	15	15	15	16	16
28	16	15	15	15		15		15	15		16	16	21	18	17	15	15		16	15	15	15	15	15
29	15	15		15			16	15	17	15	16	17		20		16	16	23		15	15			16
30	15	15	15	15	15	15	15		15	15	16	18	35		16					15	15	15	15	15
31			15	15	15	15	16	15		16	16	18		18		16	15			15	15	15	15	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	21	26	27	26	22	20	22	24	25	25	26	23	24	27	22	23	27	24	18	22	25	24	24	24
MED	15	15	15	15	15	15	15	15	15	16	16	18	20	18	18	17	16	16	15	15	15	15	15	15
U Q	15	15	15	15	15	16	15	15	18	16	17	20	23	24	22	20	17	21	16	15	15	15	15	16
L Q	15	15	15	15	15	15	15	15	15	15	16	17	18	17	17	16	16	15	15	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT OKINAWA

JAN. 1993

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	A	A	38	48	51	34	30	38	84	87	111	157	154	166	167	162	146	142	110	89	90	66	27	37
2	34	34	40	41	43	34	26	36	66	78	111	97	105	95	102	105	108	105	91	42	61	86	80	32
3	32	32	37	57	32	26	32	38	76	90	92	107	138	111	143	146	146	121	110	106	84	62	43	34
4	31	32	34	36	34	N	A	31	88	99	82	82	100	112	87	87	94	89	90	65	52	58	59	
5	28	40	38	31	36		N	34	77	80	80	105	111	118	111	111	124	137	110	85	73	74	66	34
6	34	A	34	32	26	26	A	32	66	85	86	100	111	106	107	117	117	107	80		66	66	38	28
7	34	34	34	35	41	N		34	72	82	108	111	120	108	122	111	105	105	87	87	86	73	54	36
8	29	29	A	A	35	34		37	64	105	88	86	89	108	111	107	101	90	77	54	60	54	35	38
9	34	A	25	35	50		N	34	80	90	107	111	136	144	157	144	121	107	107	81	75	81	34	A
10	A	34	35	35	31	A	A	37	90	90	83	87	100	117	144	119	143	111	79	87	78	54	34	37
11	35	32	26	26	40	29	30	43	78	89	90	111	102	105	111	111	111	90	66	66	67	A	34	42
12	38	34	34	37	29	26	A	18	80	105	121	111	105	120	143	146		152	130	87	90	81	53	42
13	34	31	29	28	31		A	37	74	77	90	90	111	118	116	120	121	111	109	90	61	74	53	34
14	A	34	28	A	28	28		30	70	92	90	104	107	105	142	166	157	146	105	76	87	84	53	37
15	34	34	34	31	A	32	36	37	71	83	84	87	104	111	139	145	165	146	144	90	74	80	66	34
16	A	A	A	A	43	34	35	43	88	100	90	110	111	143	161	158	153	141	107	84	90	107	87	66
17	62	60	54	54	54	52	41	55	87	104	105	90	90	108	120	111	122	111	111	77	67	86	62	
18	38	37	35	32	35	32	26	36	86	90	105	88	90	104	104	98	120	121	108	86	85	87	65	43
19	35	34	34	35	44	36		32	76	90	108	90	95	103	90	80	87	90	95	65	52	52	34	31
20	28	32	38	32	A	A		35	74	90	105	86	90	111	127	122	118	112	107	78	84	87	87	60
21	43	54	53	66	34			30	66	90	90	89	87	87	88	87	77	88	95	73	53	54	52	34
22	25	32	25	30	26	N	26	37	65	85	90	90	90	101	100	101	102	107	90	72	66	80	52	35
23	31	34	38	36	20	A	23	32	65	90	88	88	84	82	105	95	87	95	80	60	55	54	53	34
24	34	34	34	31	31	30	30	37	66	84	90	78	80	82	91	94	102	105	76	71	53	66	53	34
25	35	32	28	32	36	31	28	34	78	99	90	108	95	105	122	120	120	104	90	54	66	76	58	34
26	39	52	58	40	N	N		26	105	85	90	120	116	118	105	105	105	107	120	87	78	85	76	52
27	50	34		28	29	29	26	35	66	82	105	107	104	104	110	107	101	121	110	78	52	53	34	35
28	35	34	31	31	29	N	26	37	86	90	110	91	118	171	145	111	143	146	138	87	83	84	66	43
29	34	32	26	30	35	31	N	32	66	75	80	87	107	111		166	157	145	111	78	53	37	32	31
30	31	31	28	32	31	29	26	34	66	85	87	93	86	100	91	92	101	110	107	87	87	87	80	72
31	66	34	25	28	31	N	N	35	66	86	110	90	104	128	111	N	107	111	124	90	87	88	53	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	28	28	28	18	15	31	31	31	31	31	31	31	30	30	30	31	31	30	31	30	31	28
MED	34	34	34	32	34	31	28	35	74	90	90	91	104	108	111	111	118	111	107	80	73	75	53	36
U Q	38	34	38	36	40	34	32	37	84	90	107	108	111	118	142	144	143	137	110	87	85	85	66	42
L Q	31	32	28	31	30	29	26	32	66	84	88	88	90	104	104	101	102	105	90	71	60	58	35	34

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

JAN. 1993

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	33	32	32	G	G	G	G	G	G	35	G	G	58	45	42	G	G	G	24	32	36	G	38	25
2	G	G	G	G	G	G	G	G	29	G	39	43	41	68	G	61	62	39	29	G	G	G	G	G
3	G	G	G	G	G	G	G	G	G	44	46	72	71	114	93	71	38	36	38	30	36	G	G	G
4	G	G	G	G	G	G	32	69	35	44	48	G	48	70	79	G	40	38	32	23	32	24	G	
5	G	G	G	G	G		G	G	30	G	G	42	48	65	67	44	58	49	38	25	G	G	G	23
6	G	38	30	26	G	G	24	G	32	39	39	43	44	45	57	64	61	56	44	33	27	G	G	G
7	G	G	G	G	G	G		32	G	G	G	G	43	55	43	41	36	44	43	34	35	33	32	27
8	G	24	26	32	G	G		G	30	G	42	48	51	78	52	43	G	49	32	G	G	G	G	26
9	28	90	36	33	G	G	G	G	G	G	G	43	44	50	42	42	58	36	25	26	24	G	30	40
10	34	29	30	30	36	38	24	24	39	38	44	50	56	66	65	40	38	33	41	36	32	26	28	G
11	G	G	G	33	G	23	G	G	G	G	G	46	44	50	G	40	41	34	29	30	G	33	31	G
12	26	G	G	30	24	32	33	24	34	39	46	60	57	61	47	41	70	60	41	25	G	G	G	G
13	G	G	G	G	G		34	32	36	35	40	46	45	43	43	41	40	G	G	G	G	G	G	29
14	27	G	G	38	29	G		G	34	43	46	48	48	71	72	70	47	58	39	59	32	23	G	G
15	G	G	29	23	30	G	G	G	G	G	G	G	42	43	44	40	40	34	40	11	G	G	G	G
16	82	69	58	71	42	33	30	33	G	35	48	76	94	85	59	58	G	G	39	G	34	G	G	G
17	G	G	G	G	G	G	G	G	32	55	40	50	54	45	57	G	45	40	37	36	G	G	G	27
18	G	G	24	G	G	G	G	G	G	42	50	69	59	52	51	70	37	60	43	41	26	G	G	G
19	G	G	G	G	G	G		G	G	G	39	G	71	42	60	40	37	34	48	30	G	G	G	G
20	G	G	25	G	30	24		G	32	43	43	66	58	43	78	84	60	34	G	G	G	G	G	G
21	G	G	G	G	G			G	29	G	G	44	45	58	G	G	G	34	33	G	G	G	G	G
22	32	G	28	26	26	G	G	G	44	G	G	G	G	51	45	57	83	90	43	34	36	33	24	G
23	G	G	G	G	27	29	30	25	G	G	G	41	50	60	61	55	50	41	27	23	G	G	G	G
24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	43	G	G	G	32	G	G	G	G	G
25	G	G	G	G	G	25	24	G	G	G	G	42	G	43	G	44	42	66	57	30	28	26	G	G
26	G	G	G	G	G	G		G	G	41	40	G	46	44	44	G	37	G	29	30	G	25	G	G
27	G	G		G	G	G	G	G	29	36	40	80	62	59	G	45	42	33	G	G	G	G	G	G
28	G	G	G	G	G	G	G	G	G	G	G	41	G	G	G	G	47	47	40	28	30	24	G	G
29	G	G	G	G	G	G	G	G	G	G	G	46	48	51		41	G	G	31	28	G	G	38	32
30	30	23	G	G	G	25	26	G	G	G	G	42	44	42	43	40	G	G	G	G	25	G	24	G
31	G	28	G	G	G	G	G	G	32	37	43	48	52	45	49	48	51	56	29	30	29	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	30	31	31	28	24	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	30
MED	G	G	G	G	G	G	G	G	G	G	39	43	48	51	46	41	40	36	33	28	G	G	G	G
U Q	26	23	26	26	24	23	25	G	32	39	43	50	57	65	60	57	51	49	41	32	32	24	24	23
L Q	G	G	G	G	G	G	G	G	G	G	G	G	44	43	42	40	36	33	29	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT OKINAWA

JAN. 1993

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	15	15	14	15	16	15	15	15	15	15	15	15	16	17	15	18	20	15	15	15	14	15	15	14
2	15	15	15	15	15	15	16	15	15	16	16	17	20	22	22	14	14	15	15	15	15	16	16	15
3	16	15	15	15	15	15	15	15	23	22	21	23	22	21	17	16	15	14	15	15	15	15	15	15
4	16	15	15	14	14	15	18	15	18	18	24	22	23	22	20	20	16	15	14	15	15	15	15	
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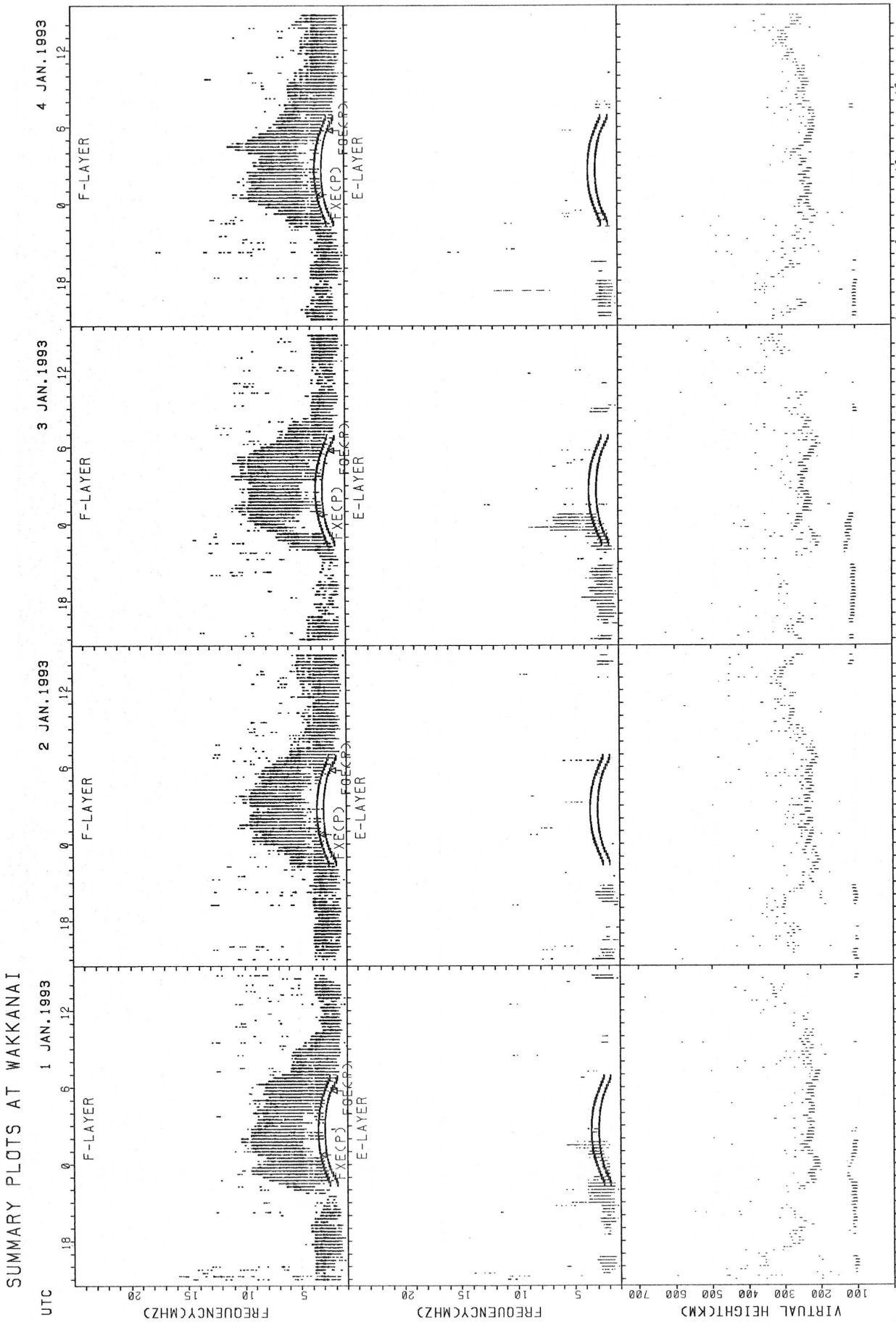
COMMUNICATIONS RESEARCH LABORATORY, JAPAN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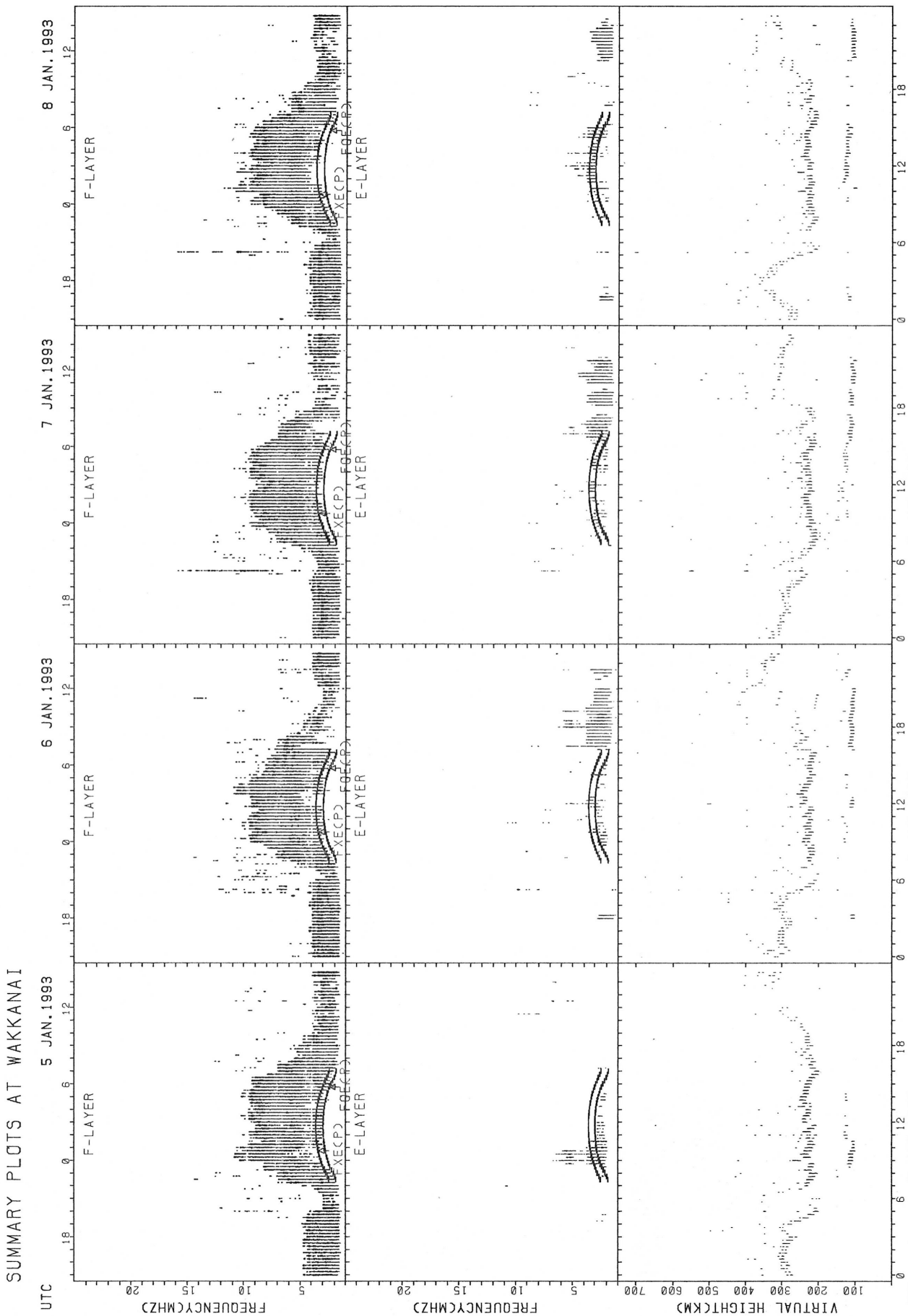
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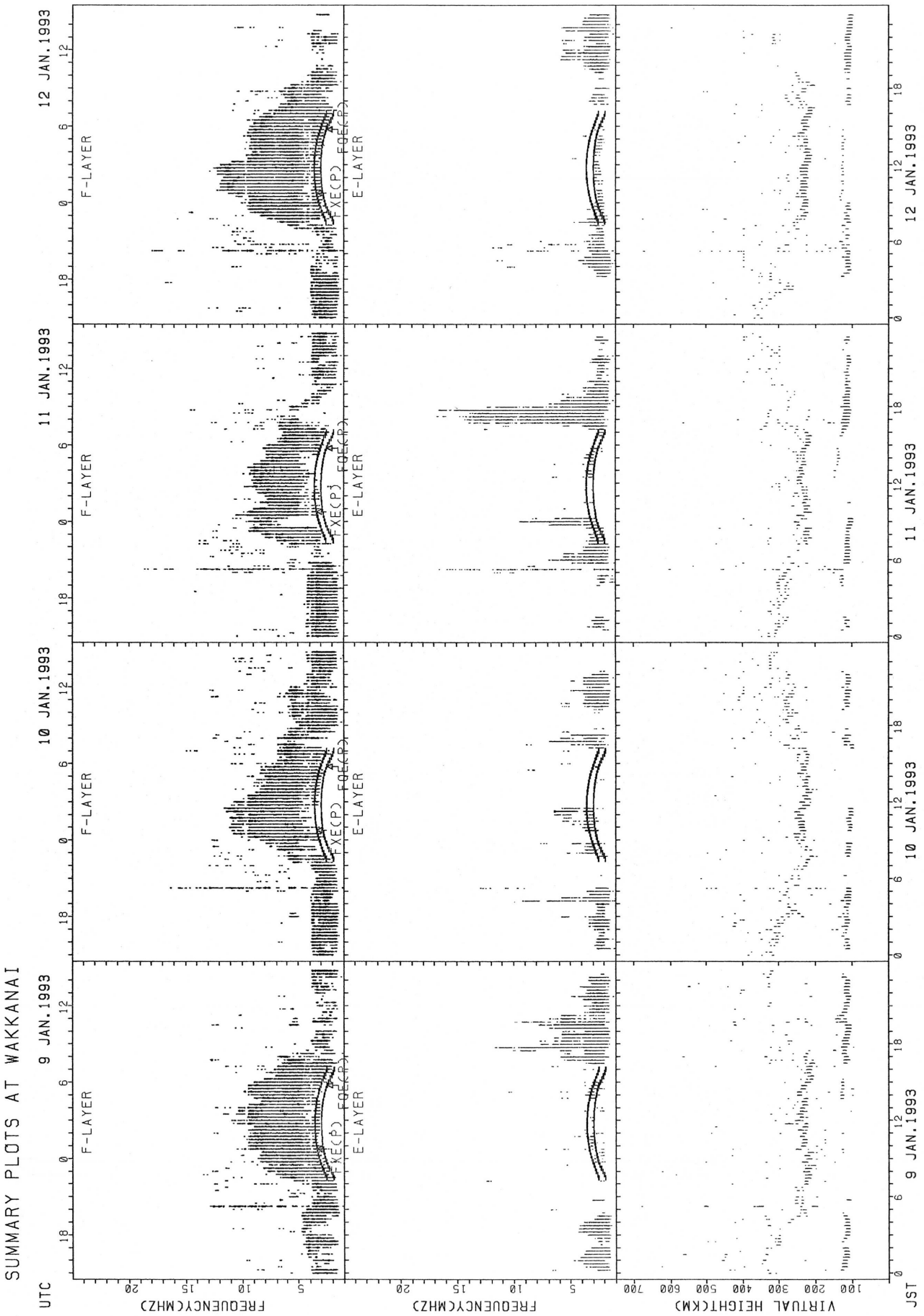
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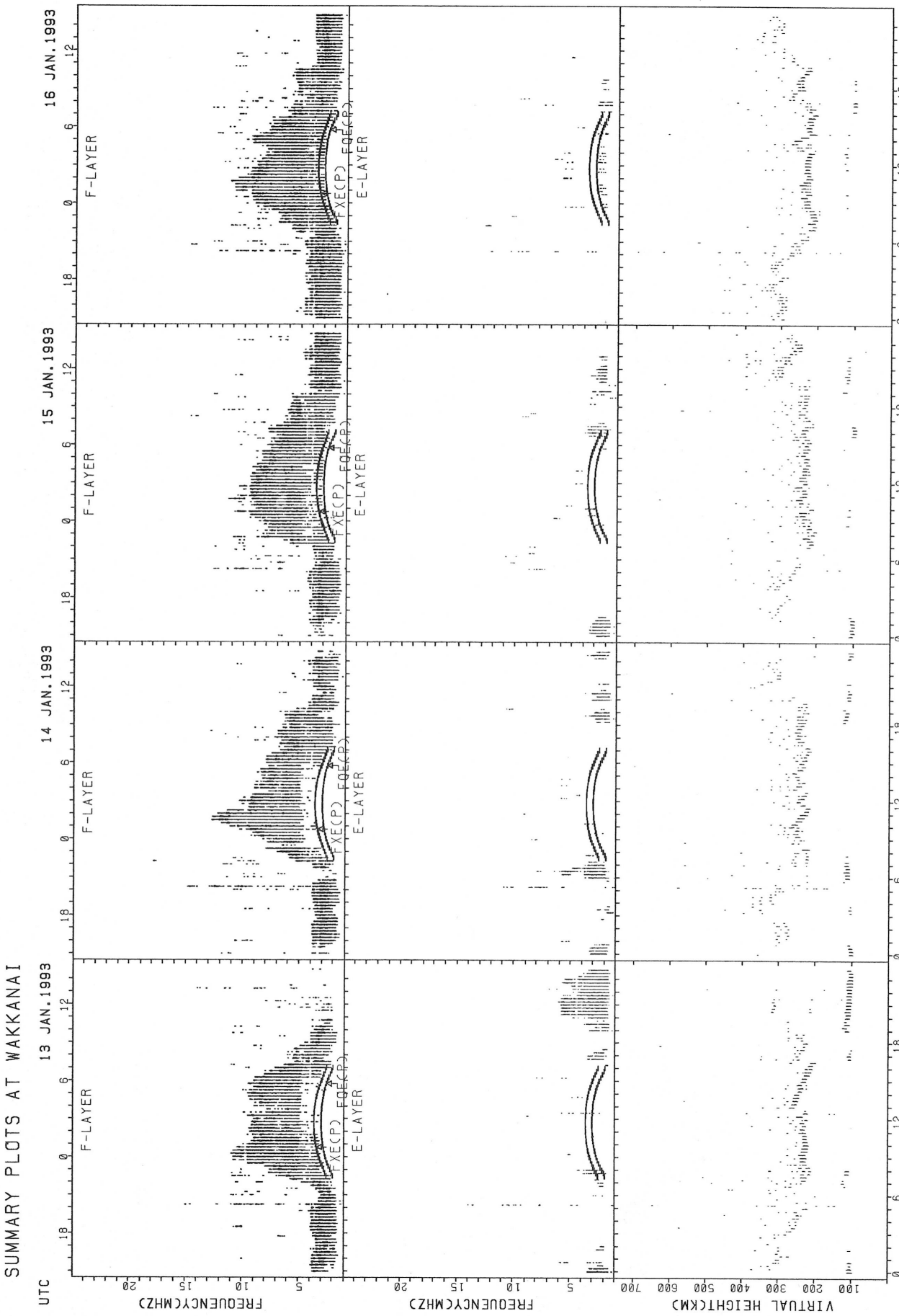
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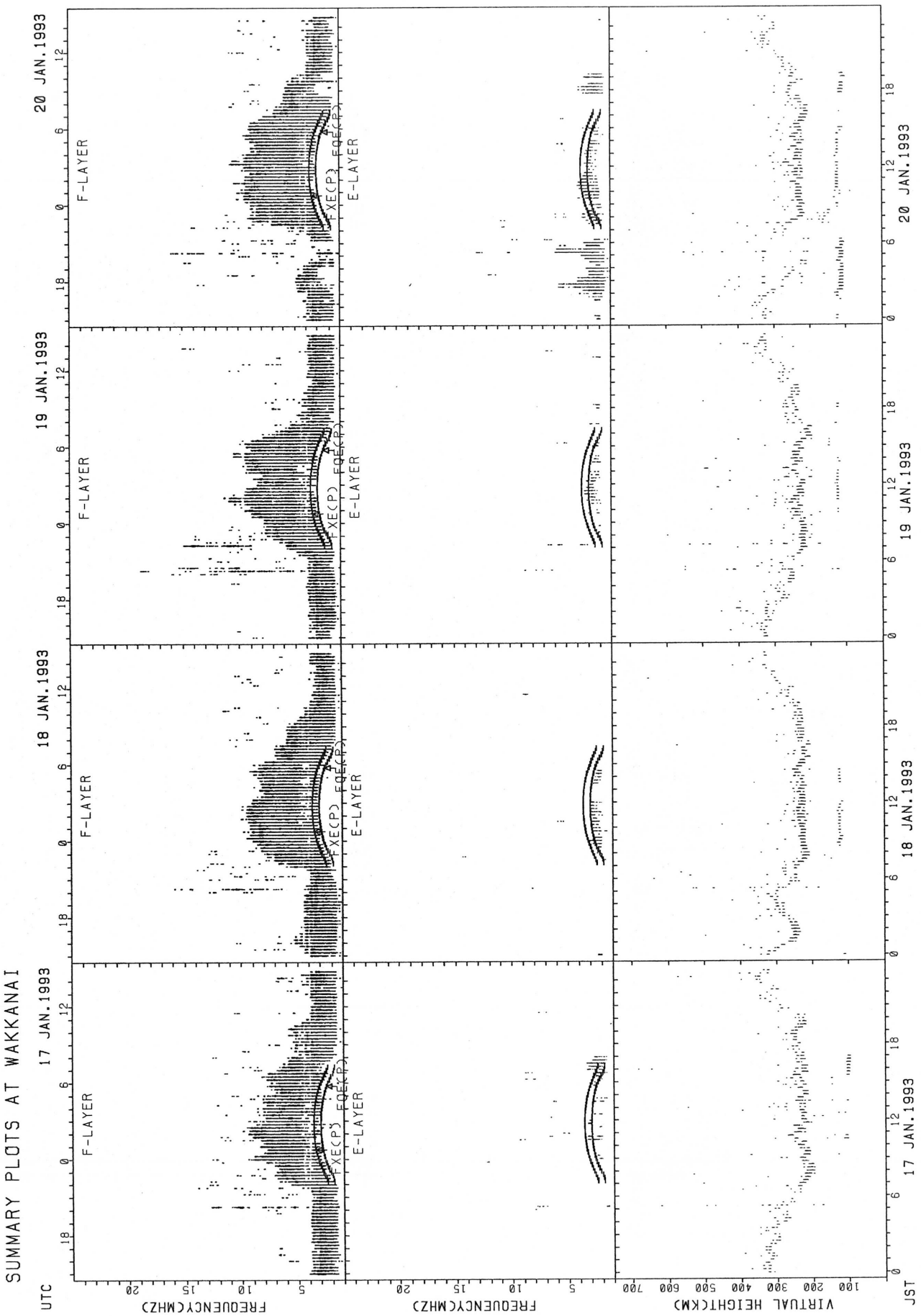
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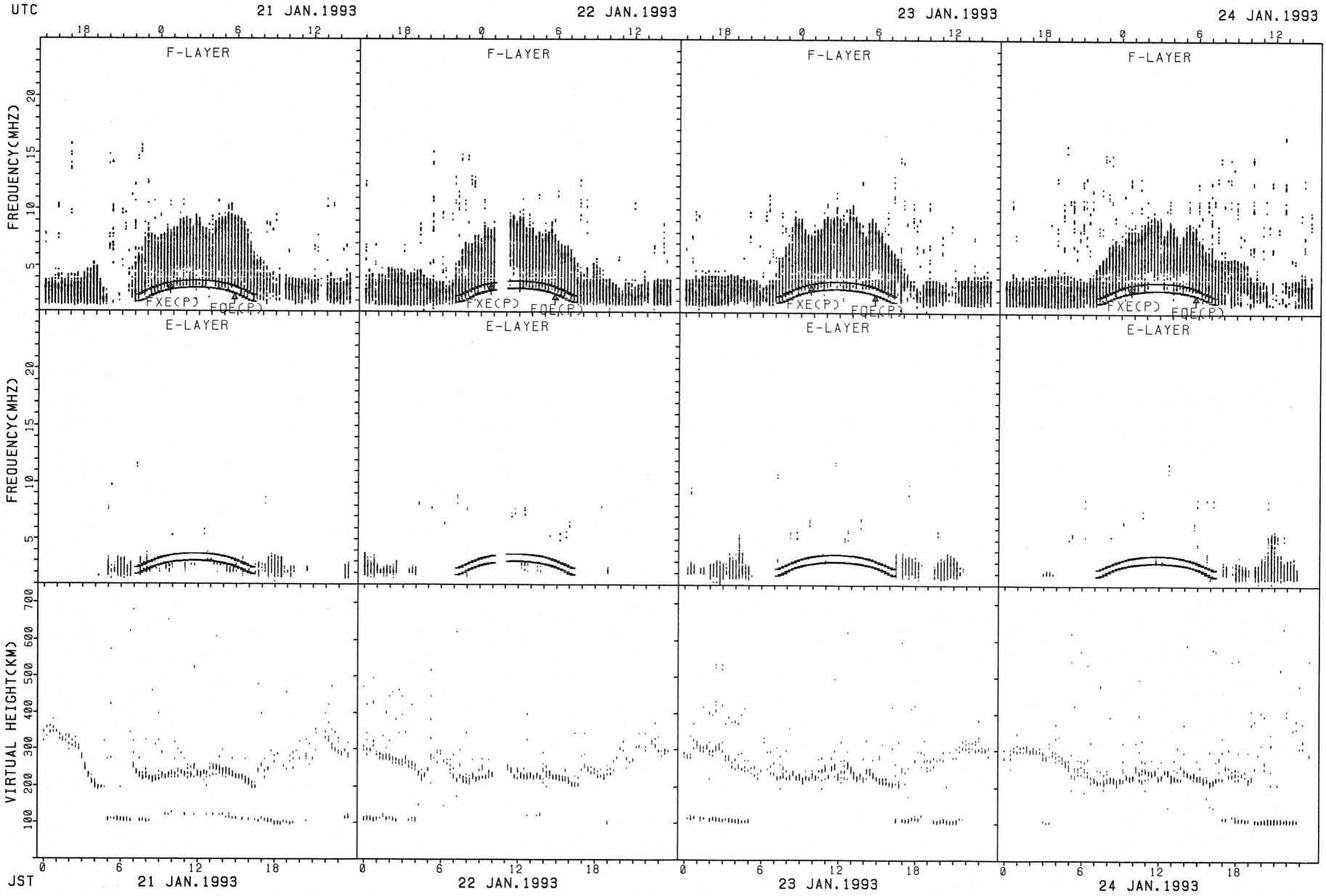

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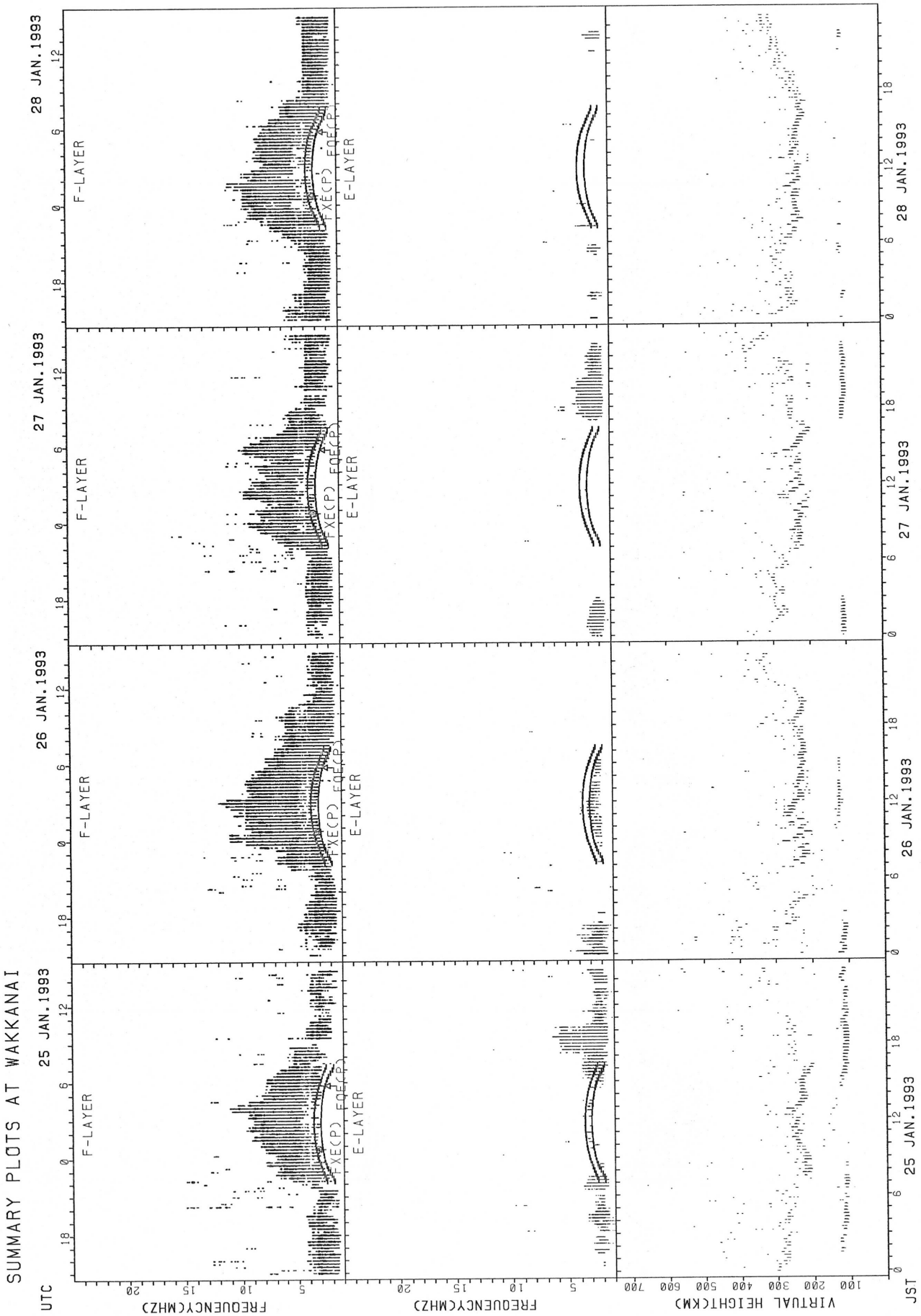
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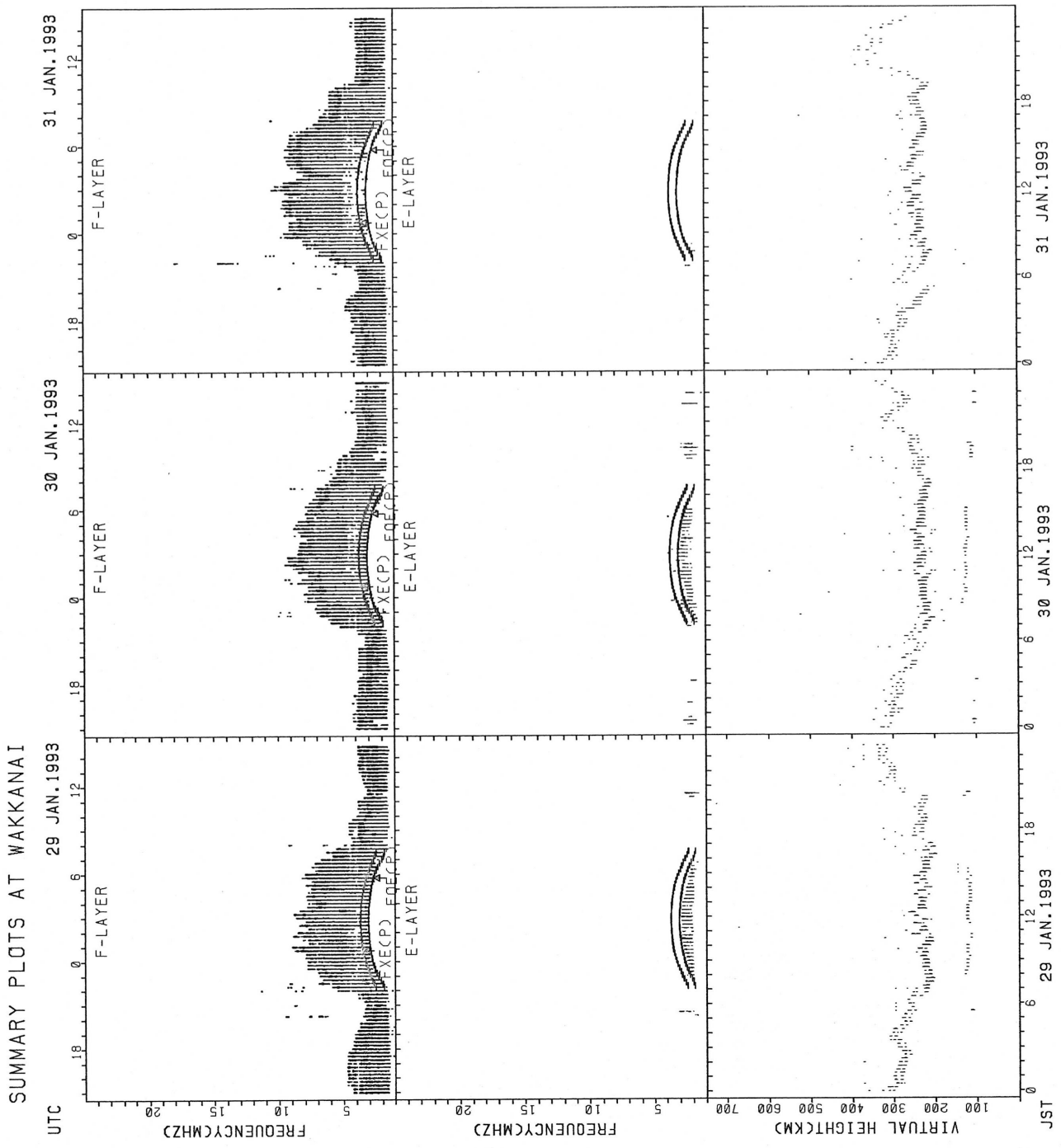
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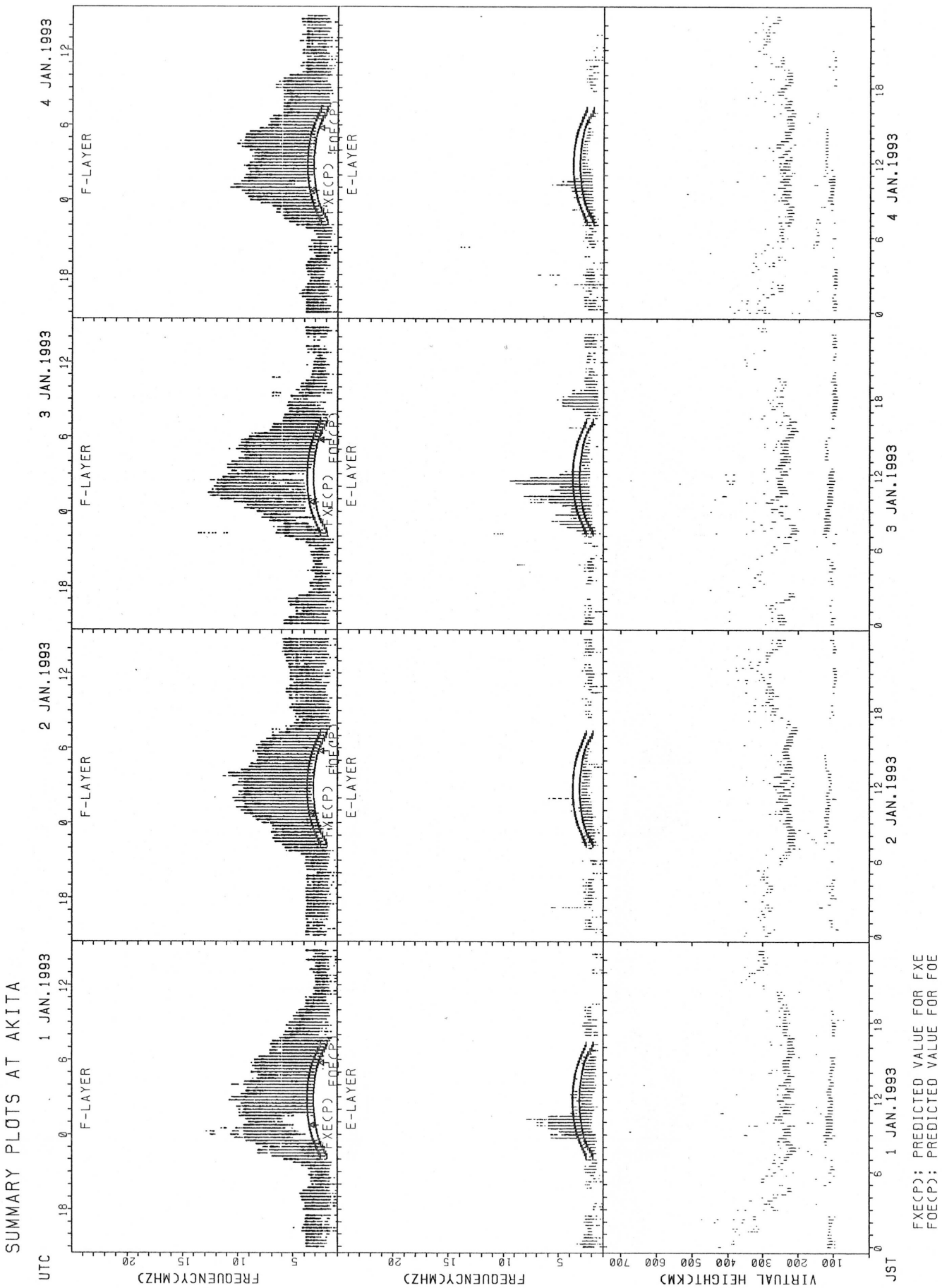
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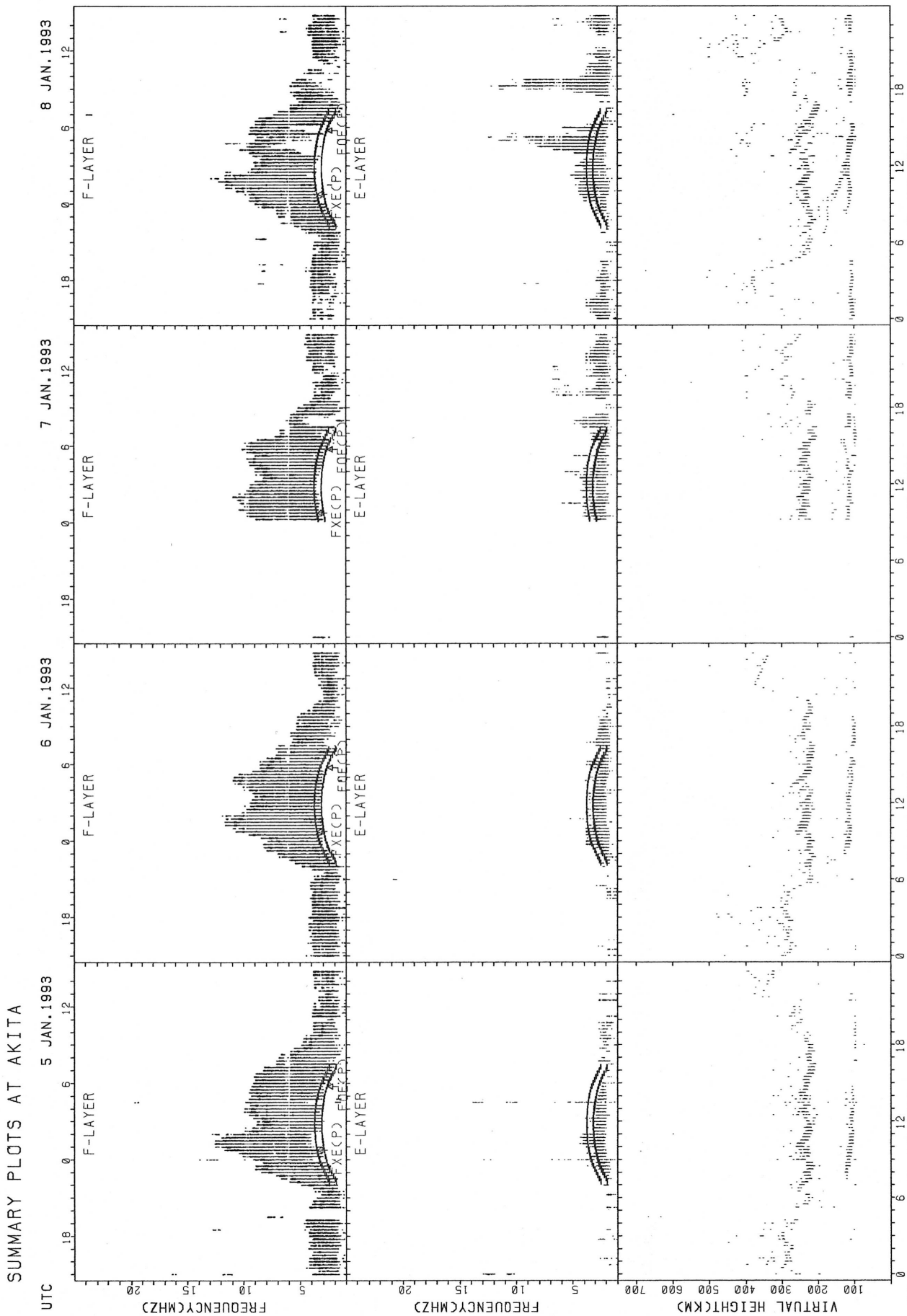
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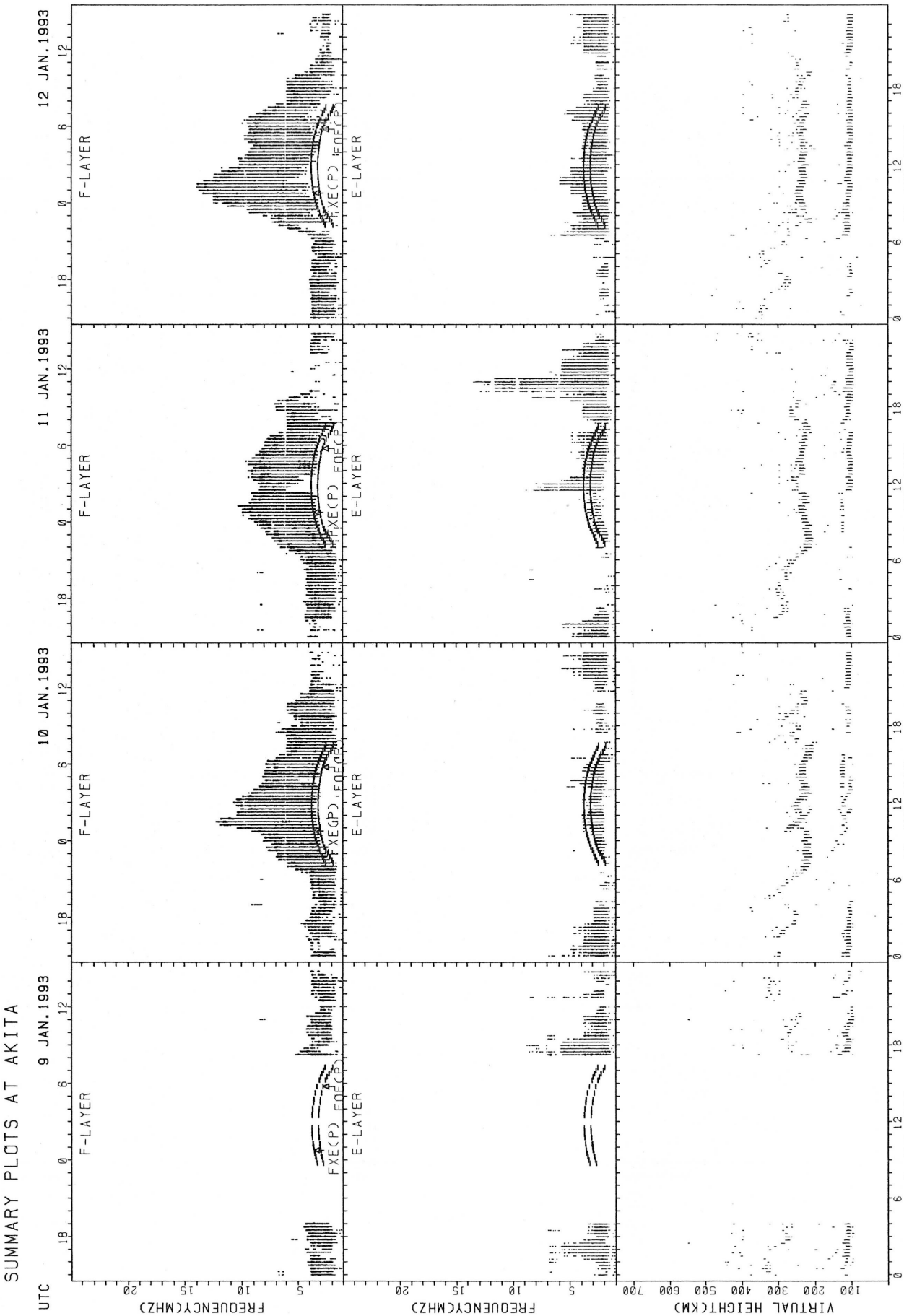
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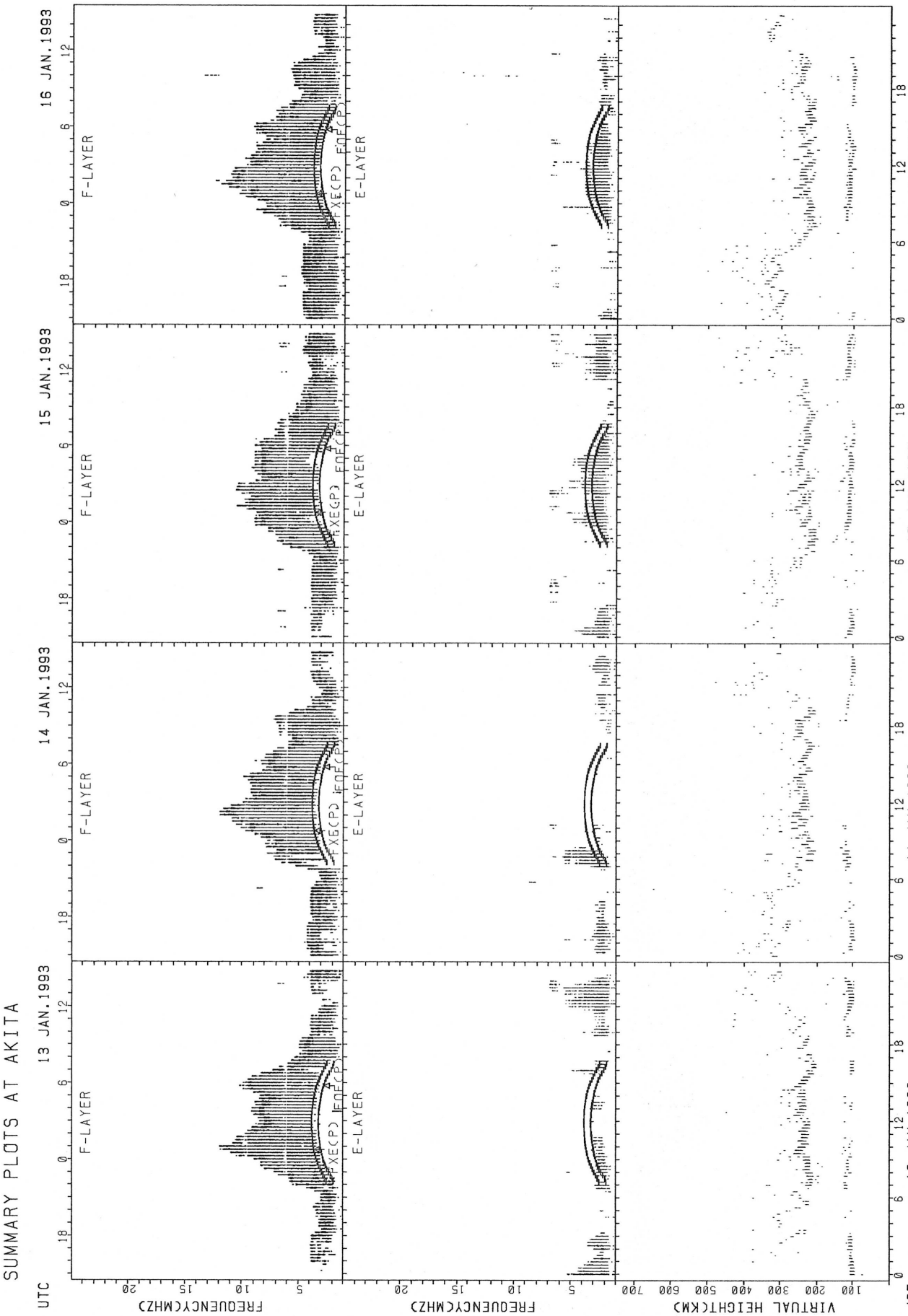
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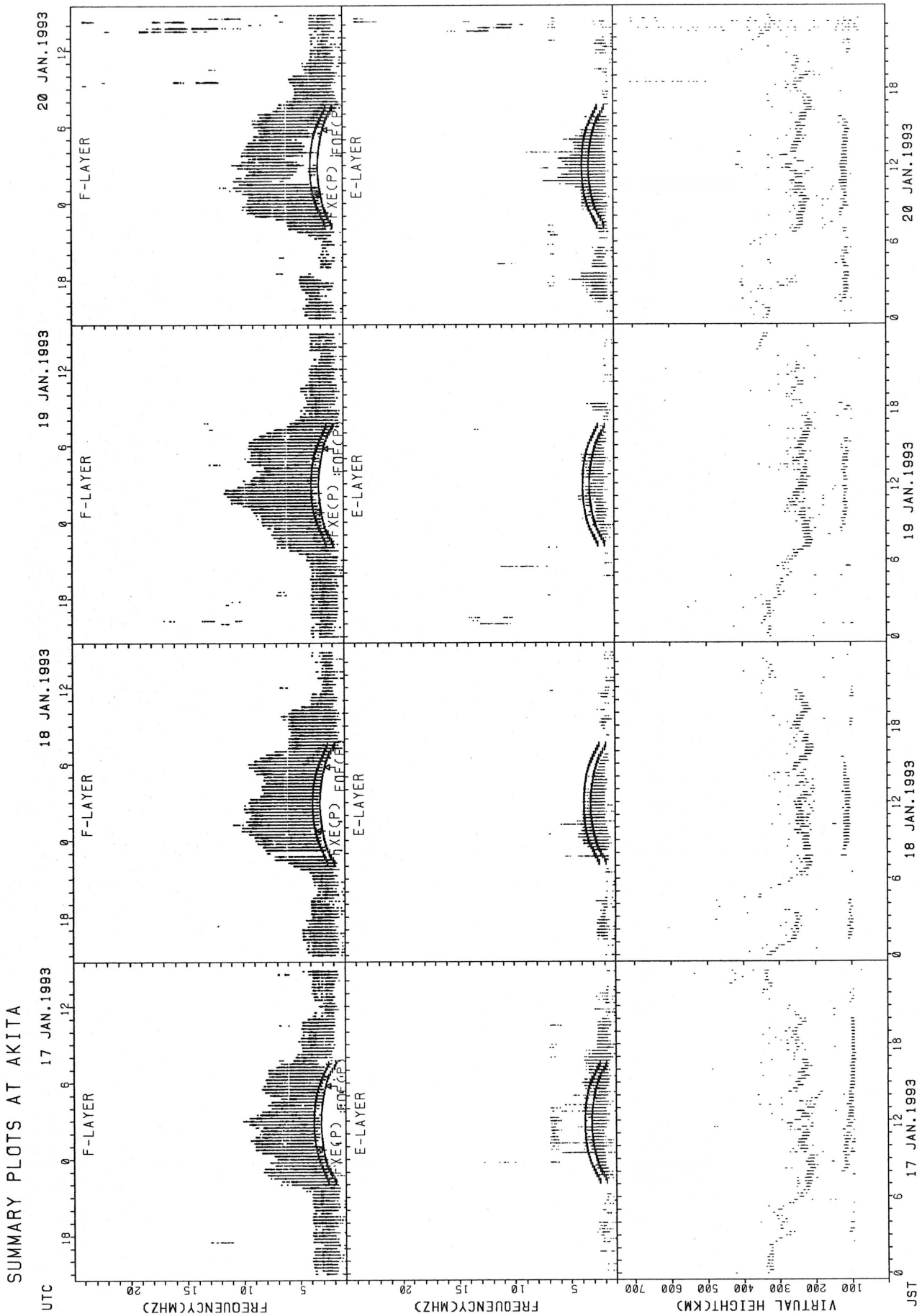
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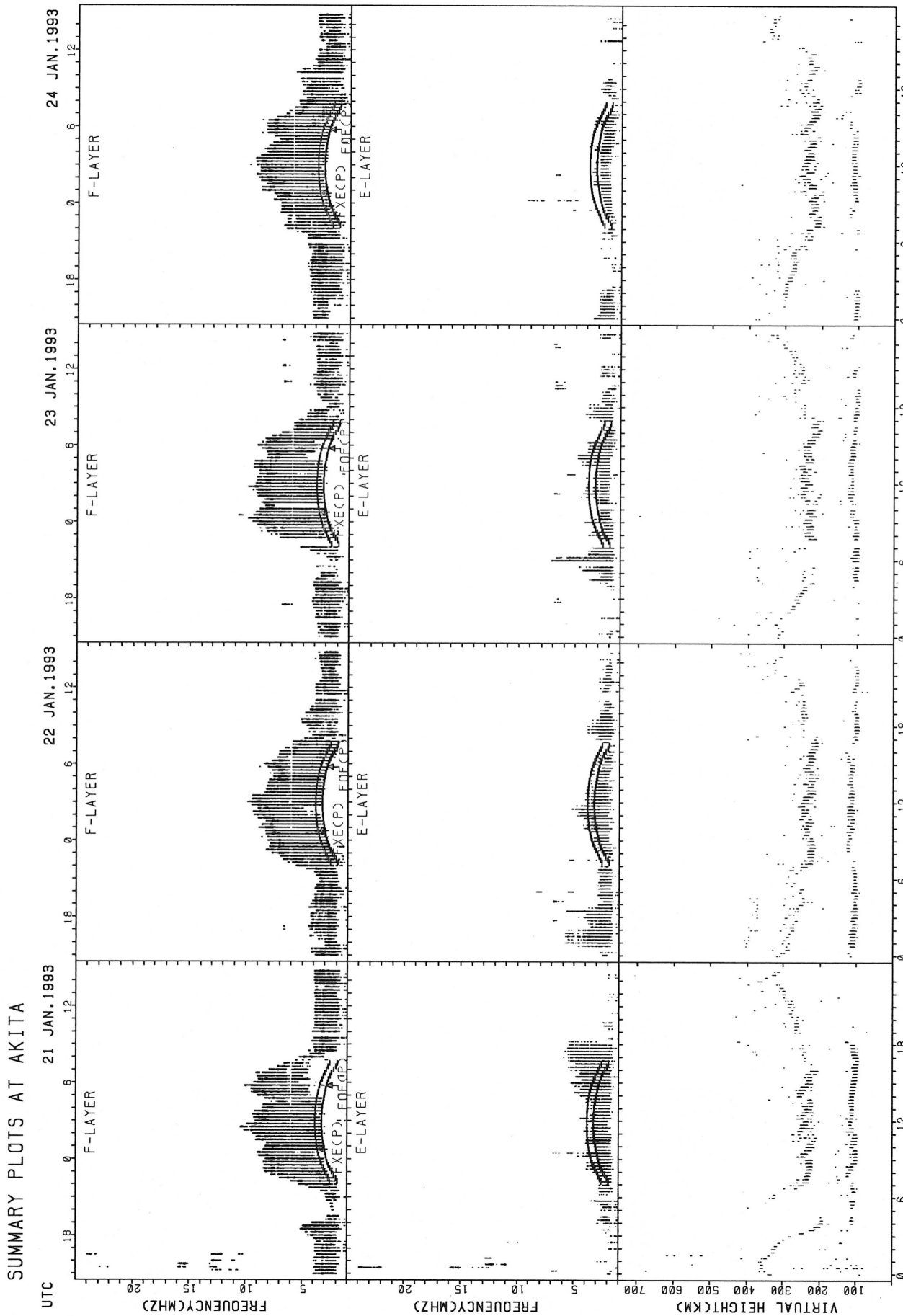
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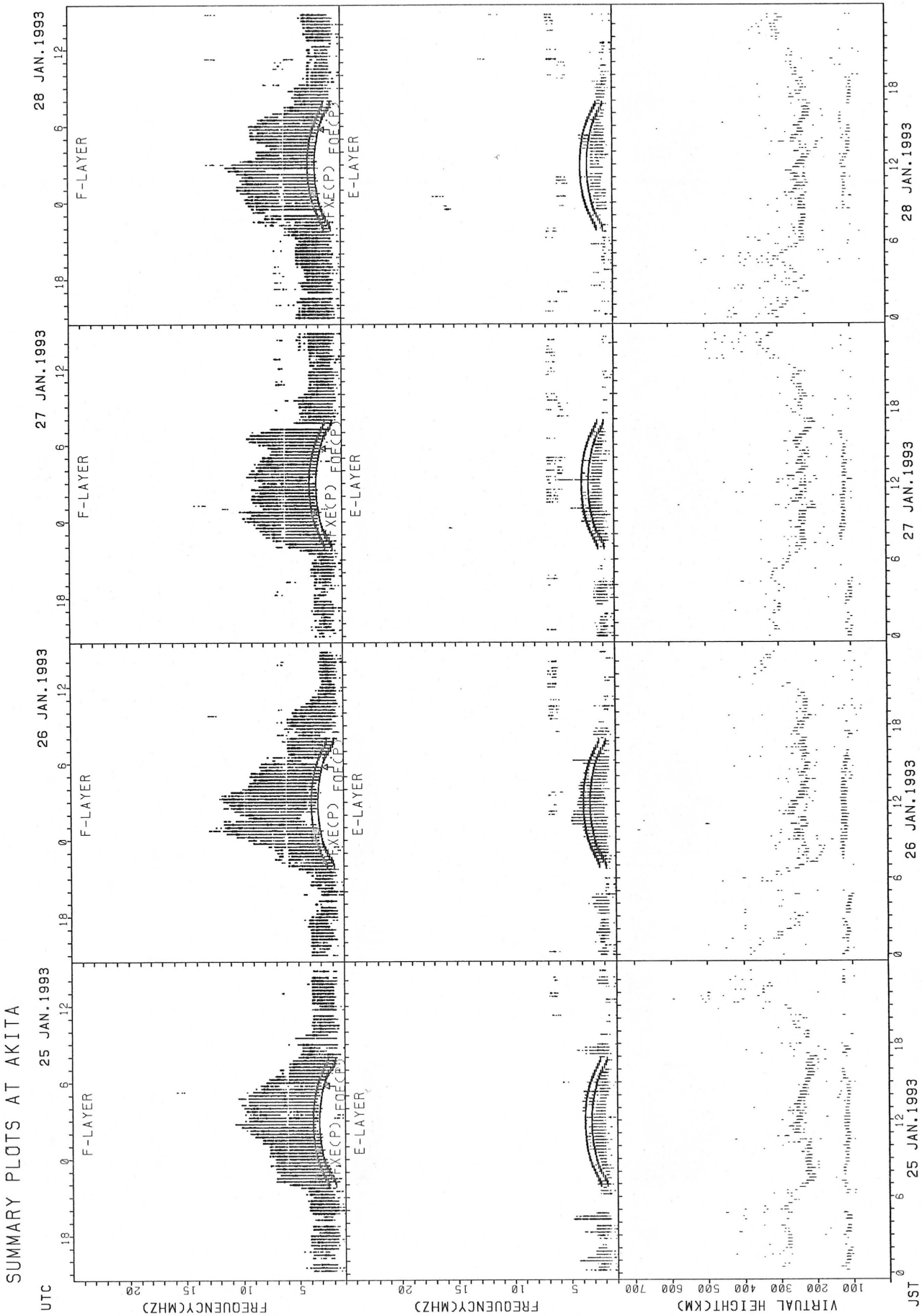
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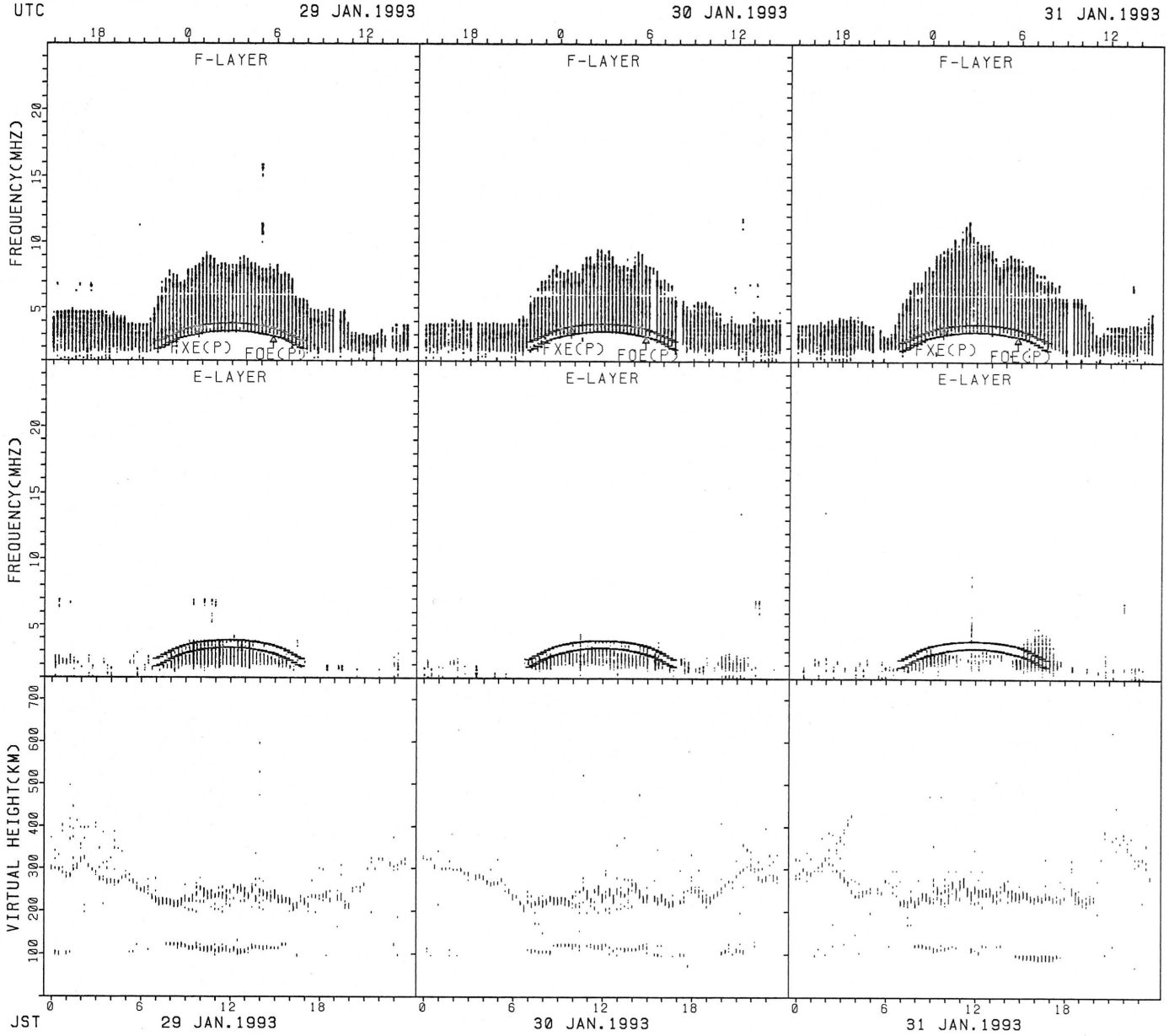

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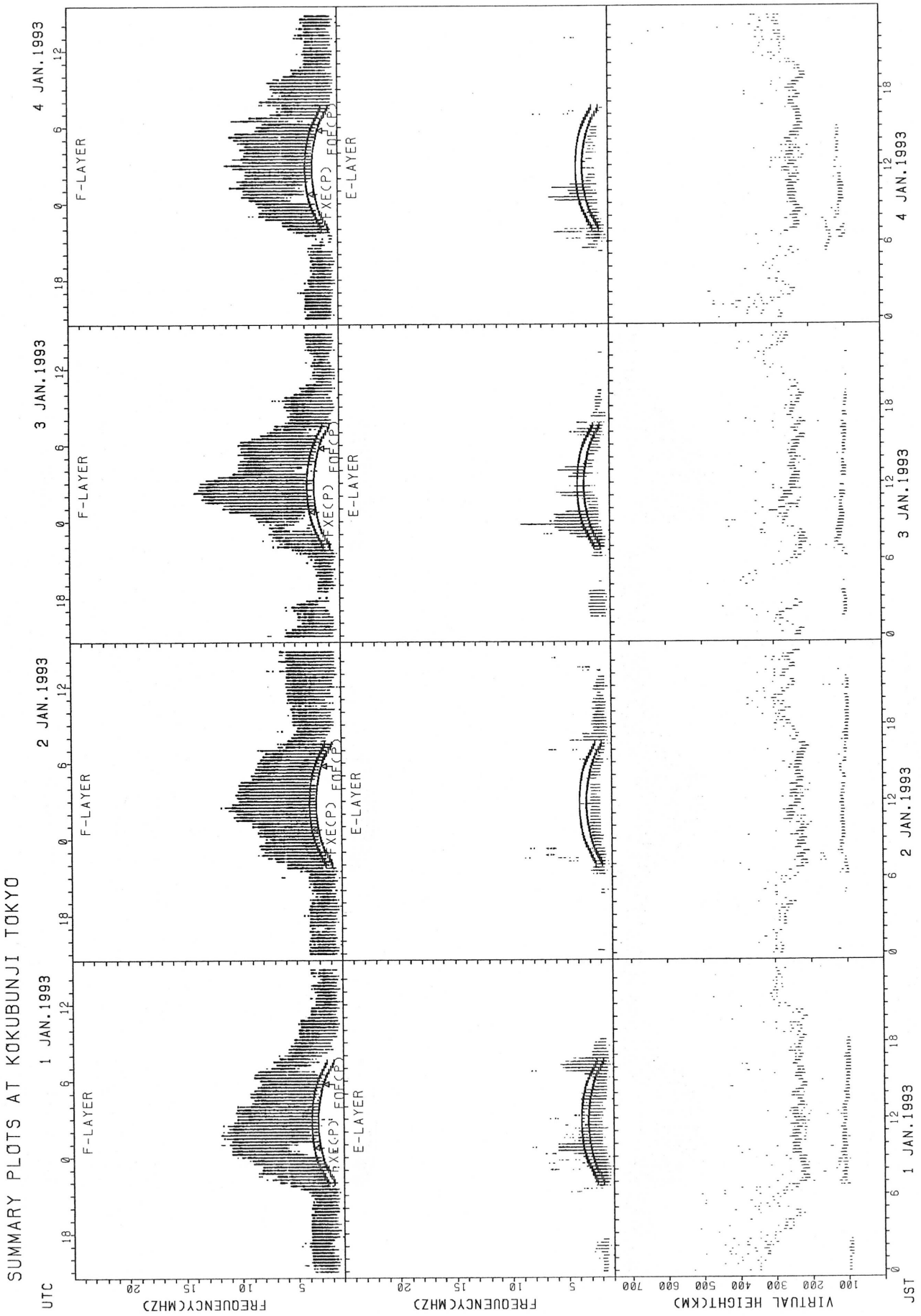
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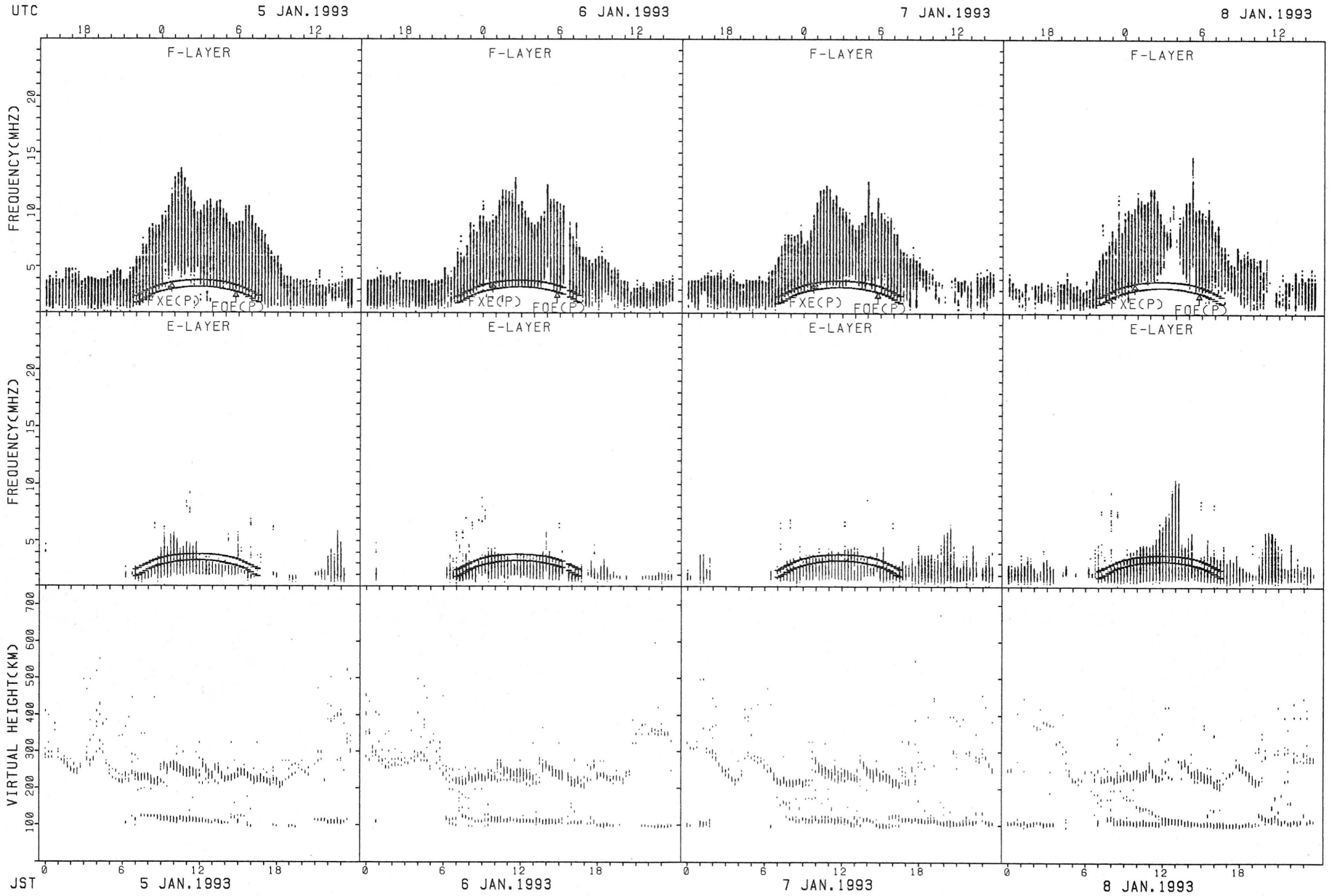

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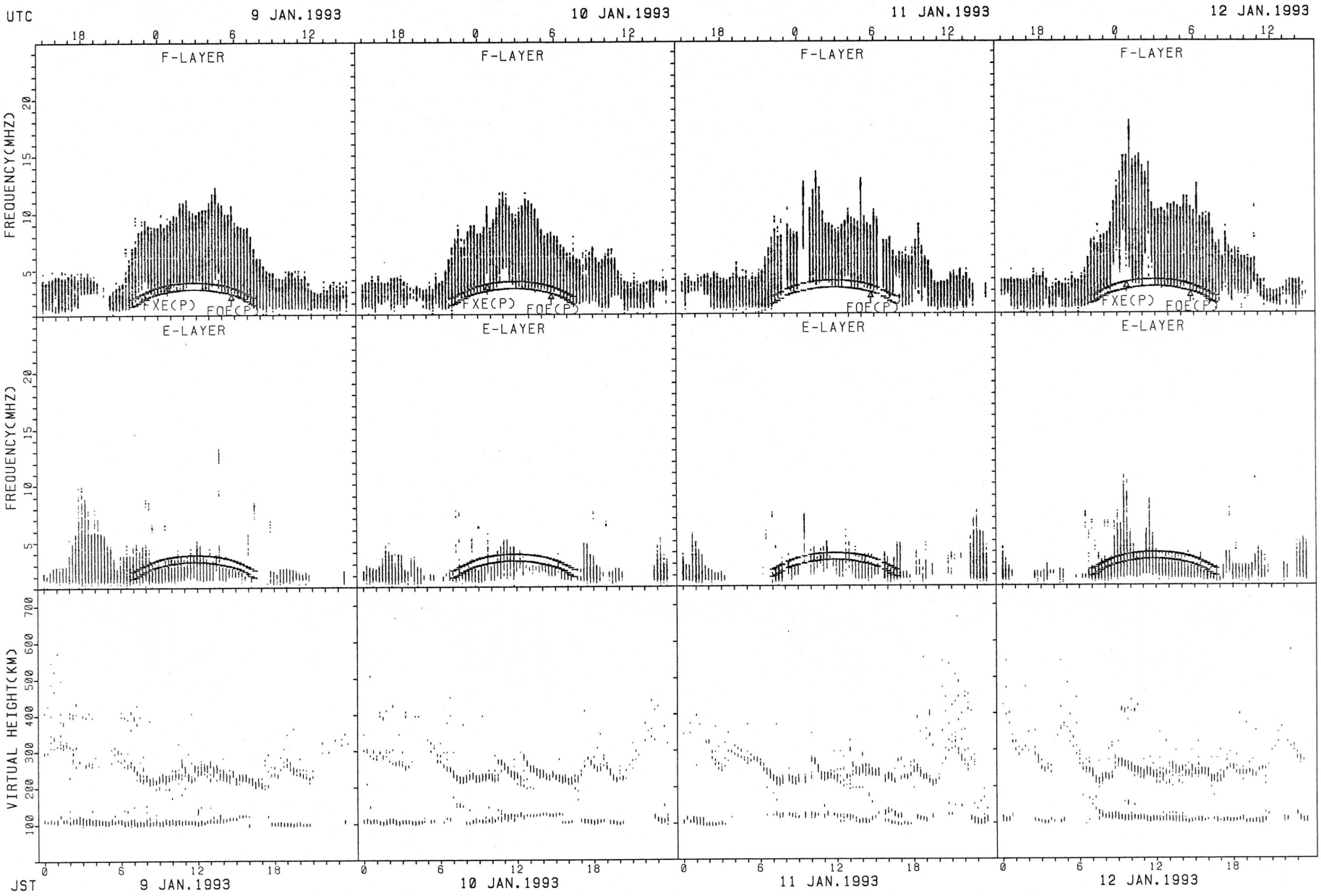

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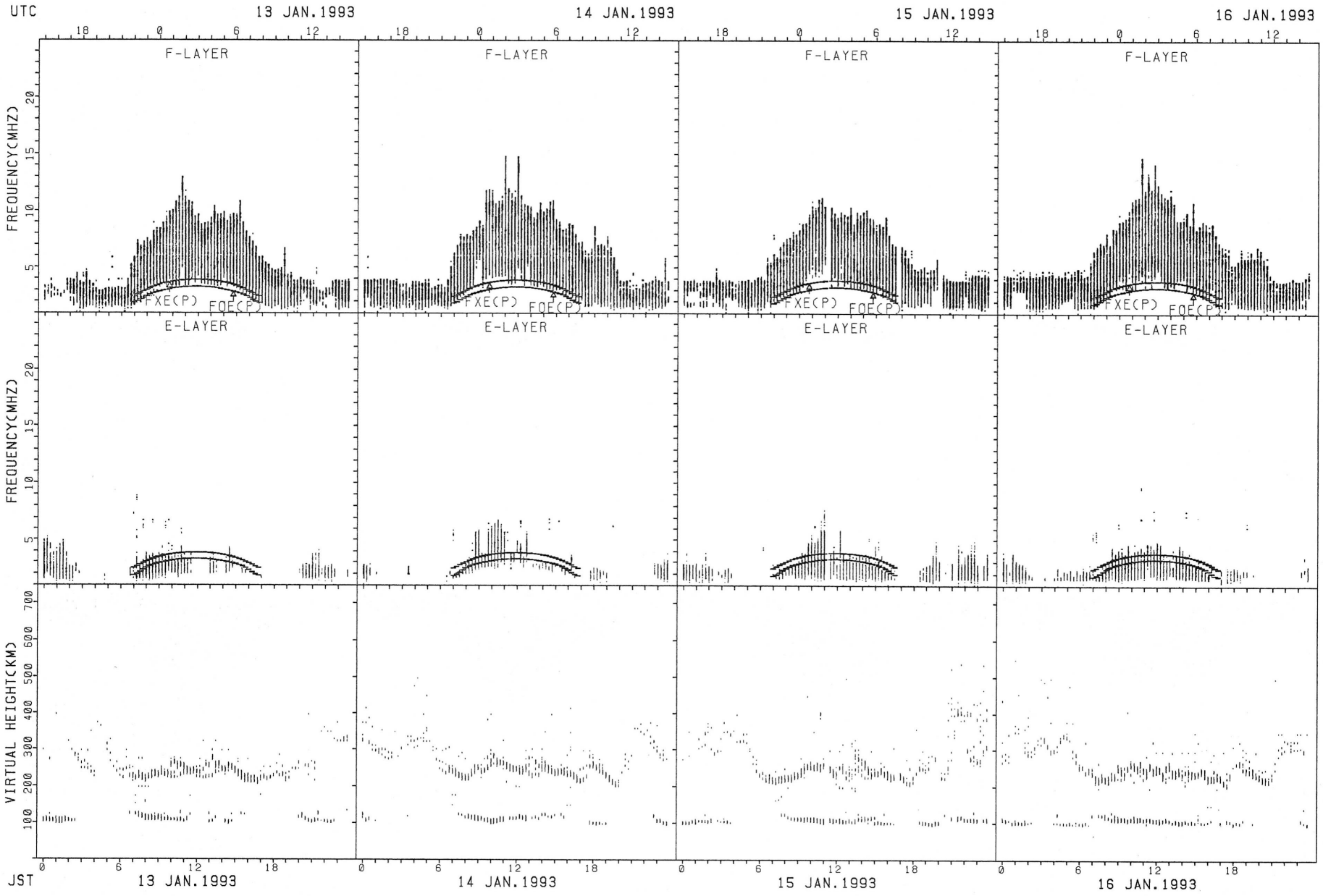

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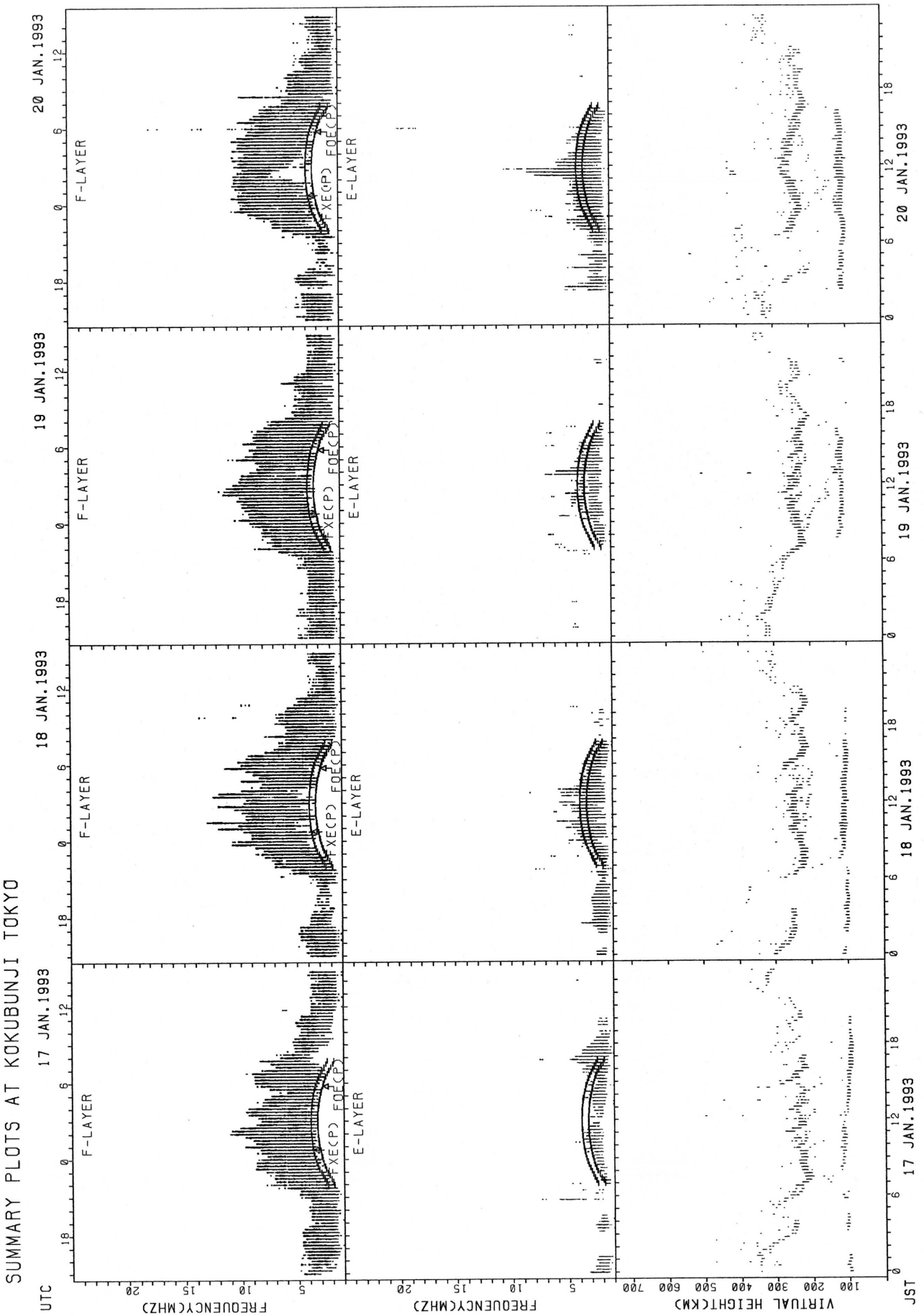
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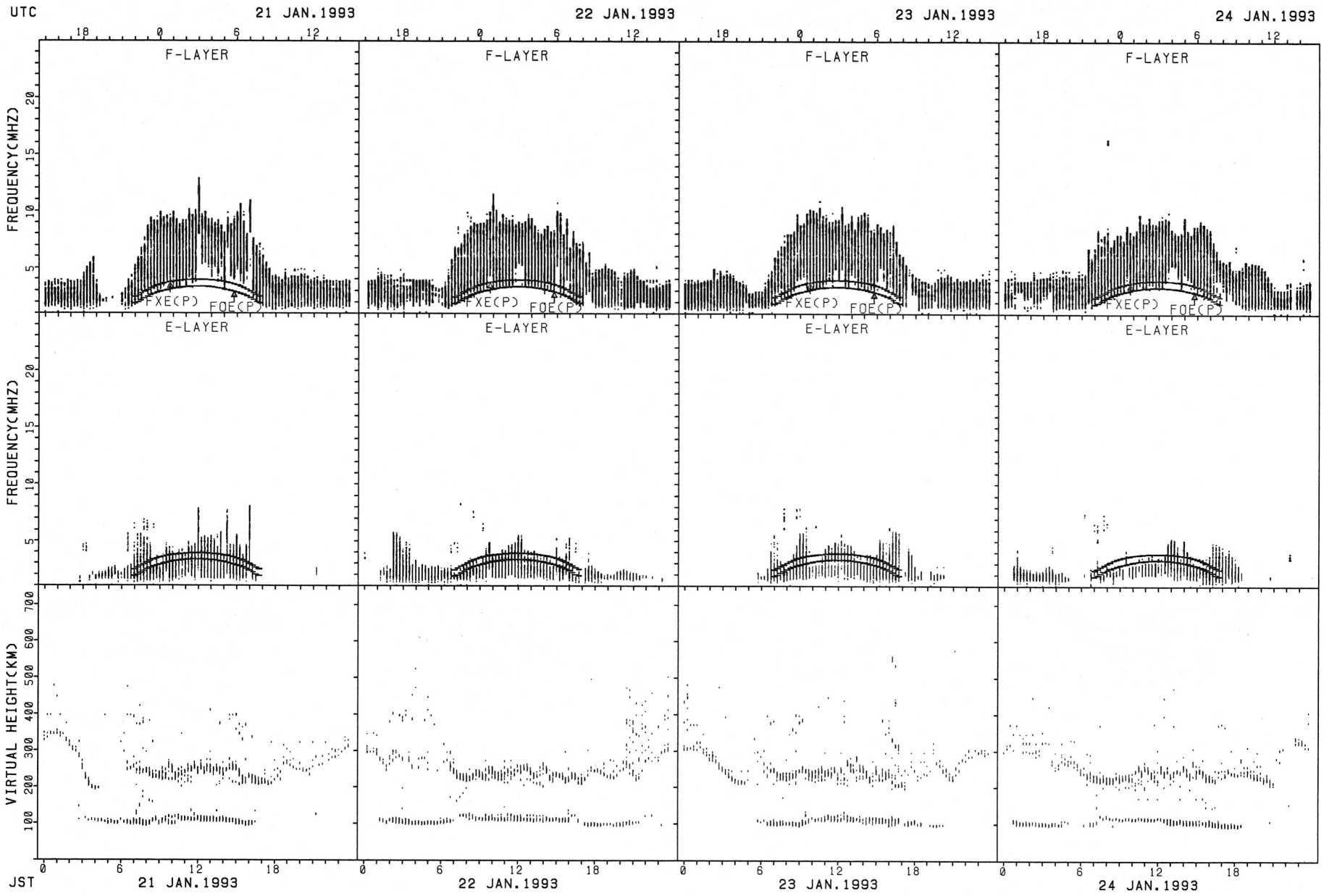
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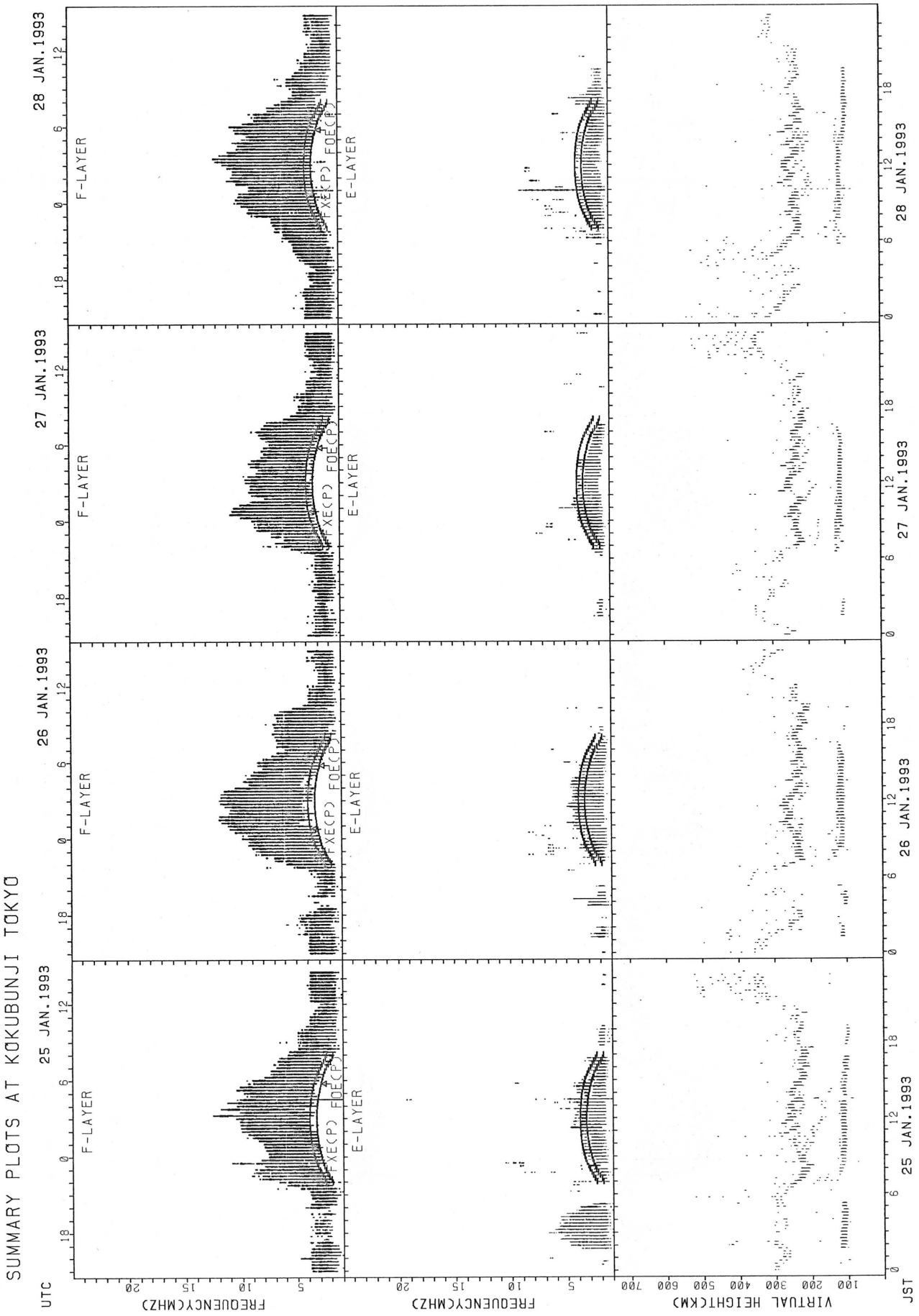
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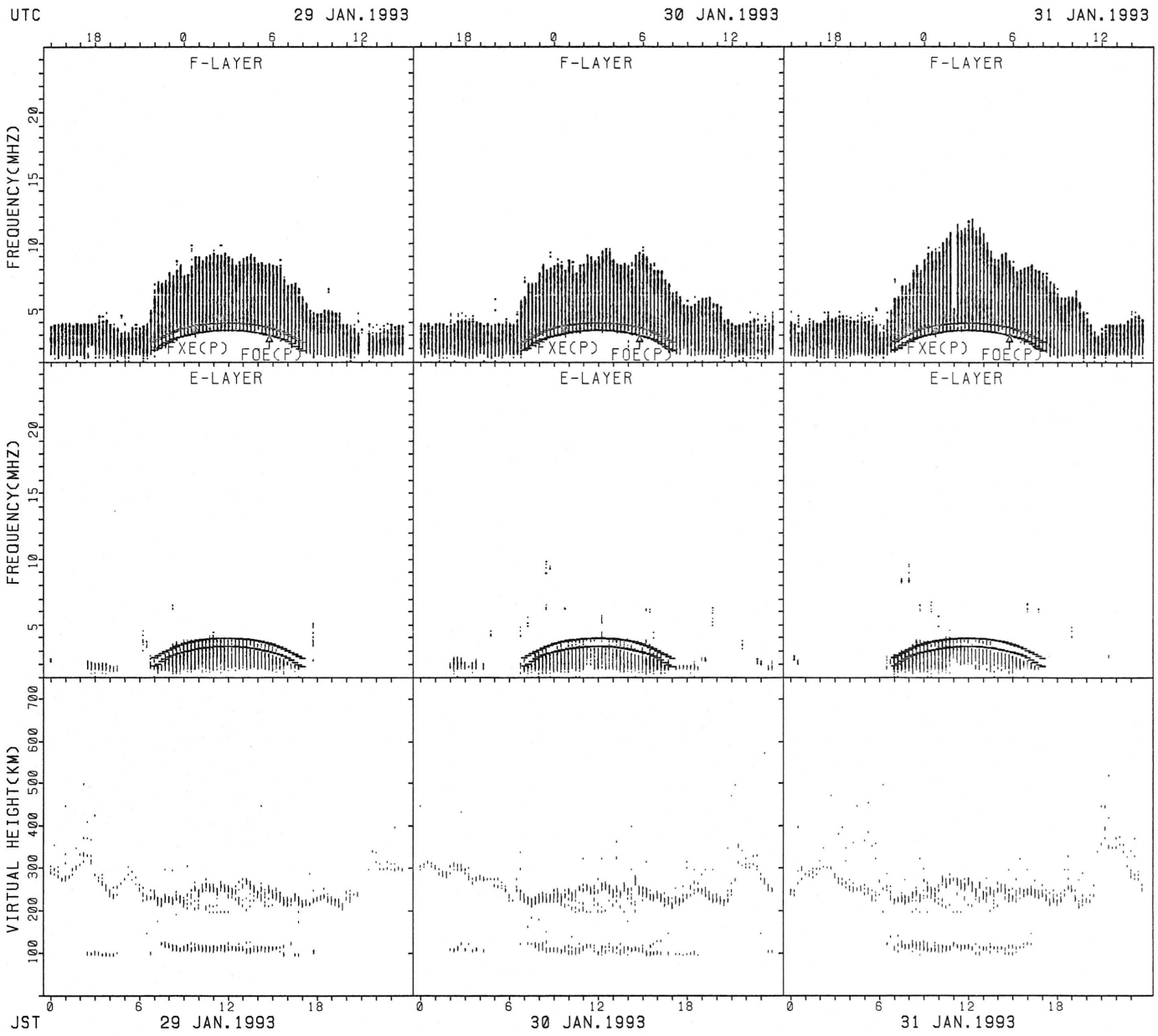

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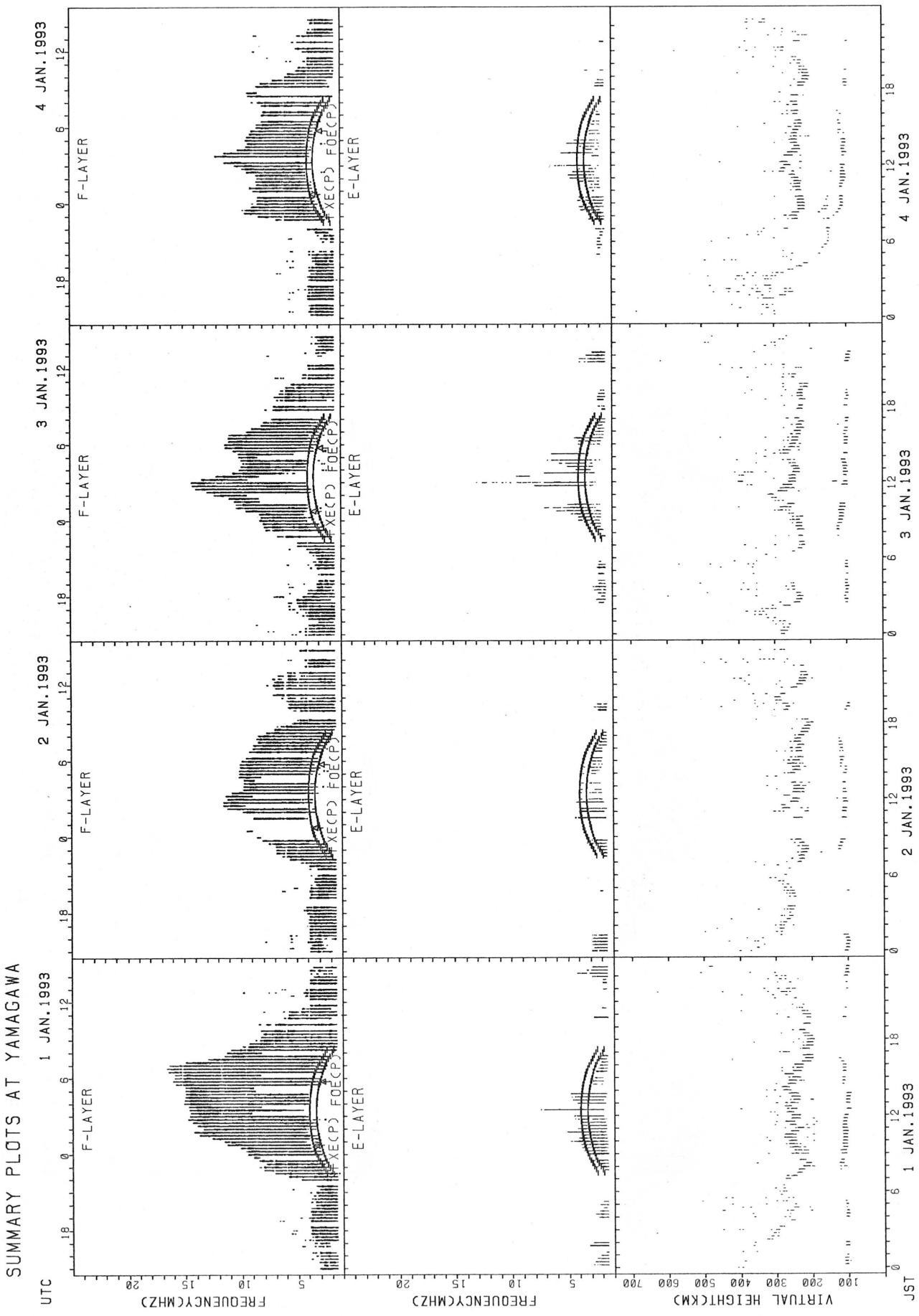
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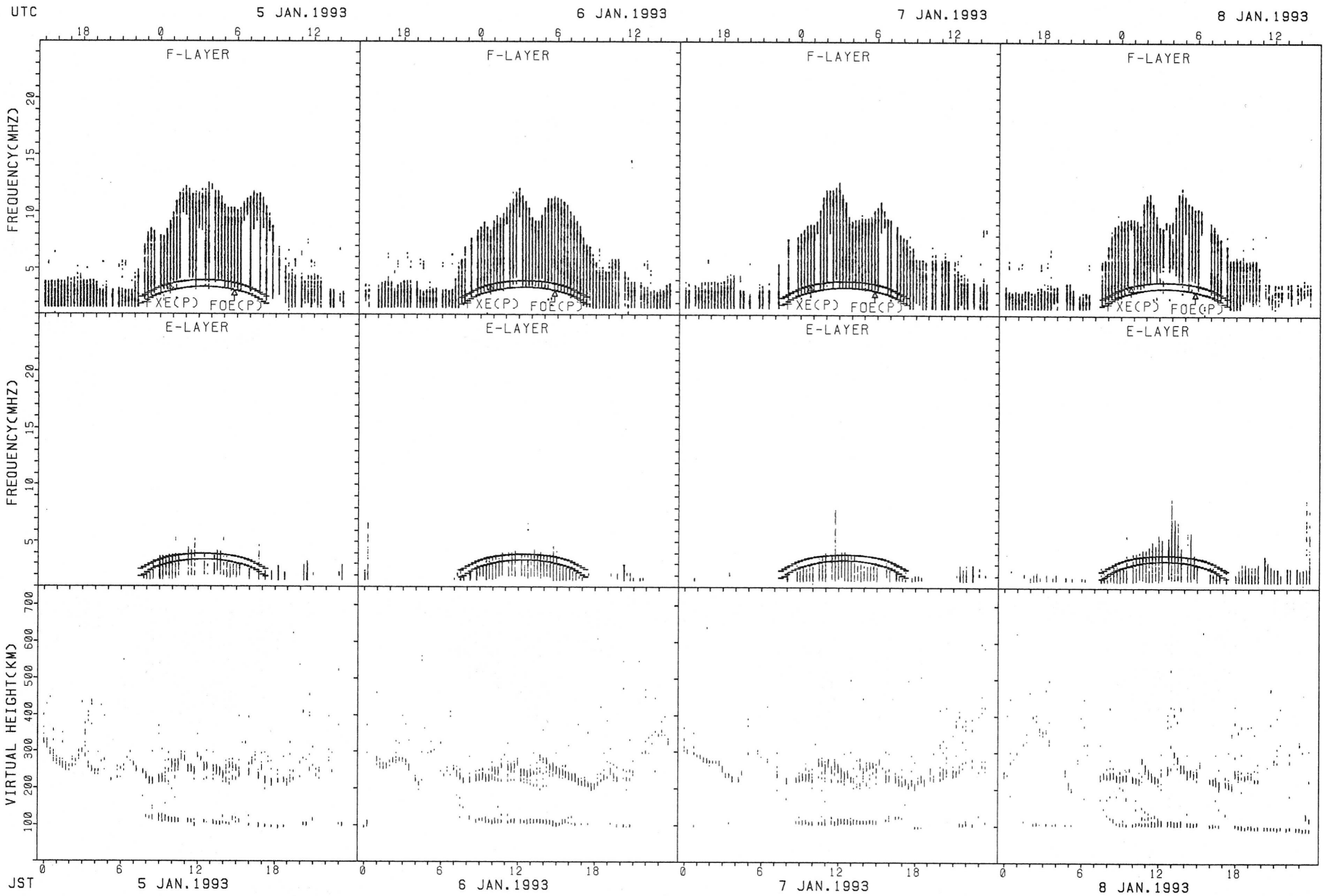
SUMMARY PLOTS AT YAMAGAWA



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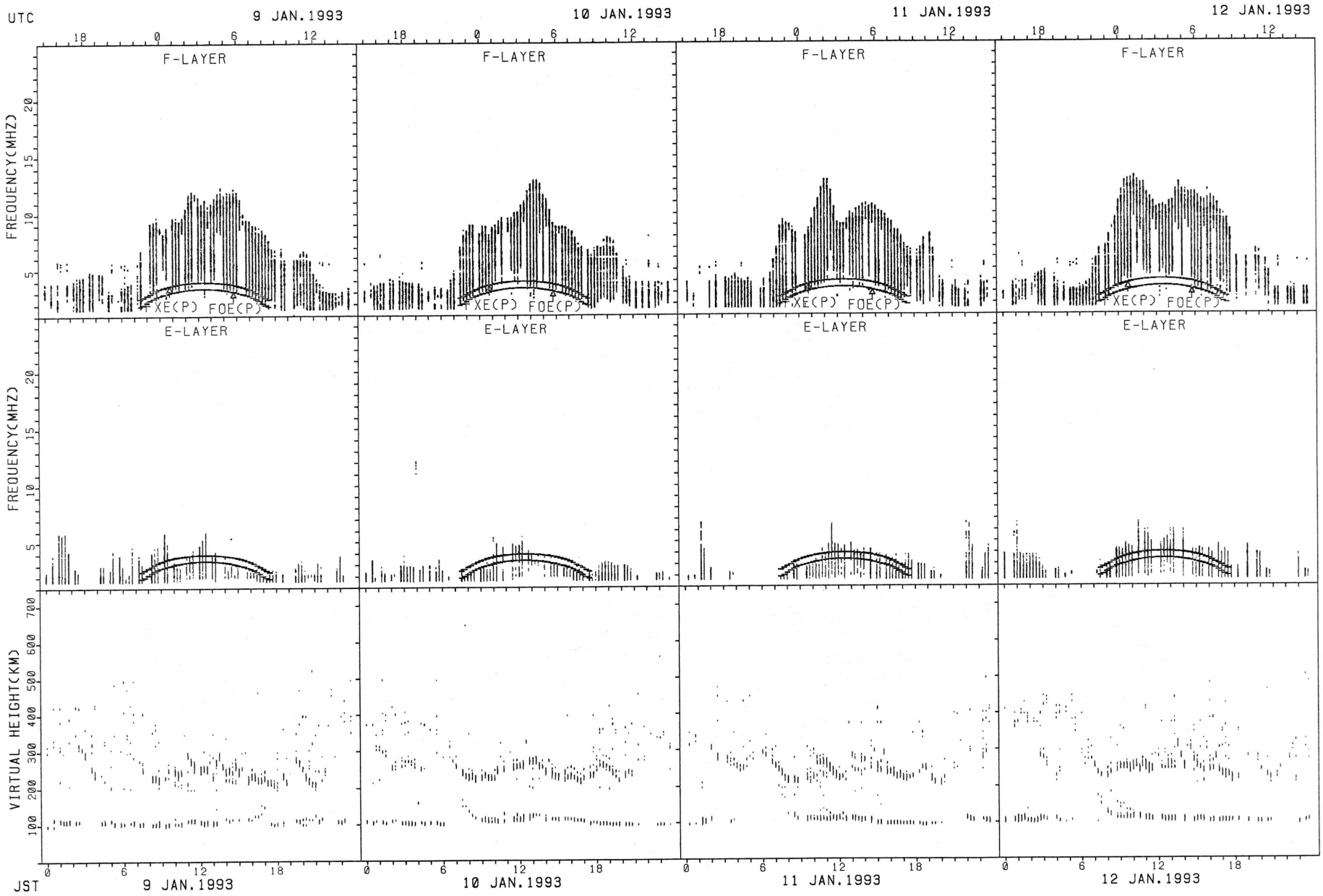
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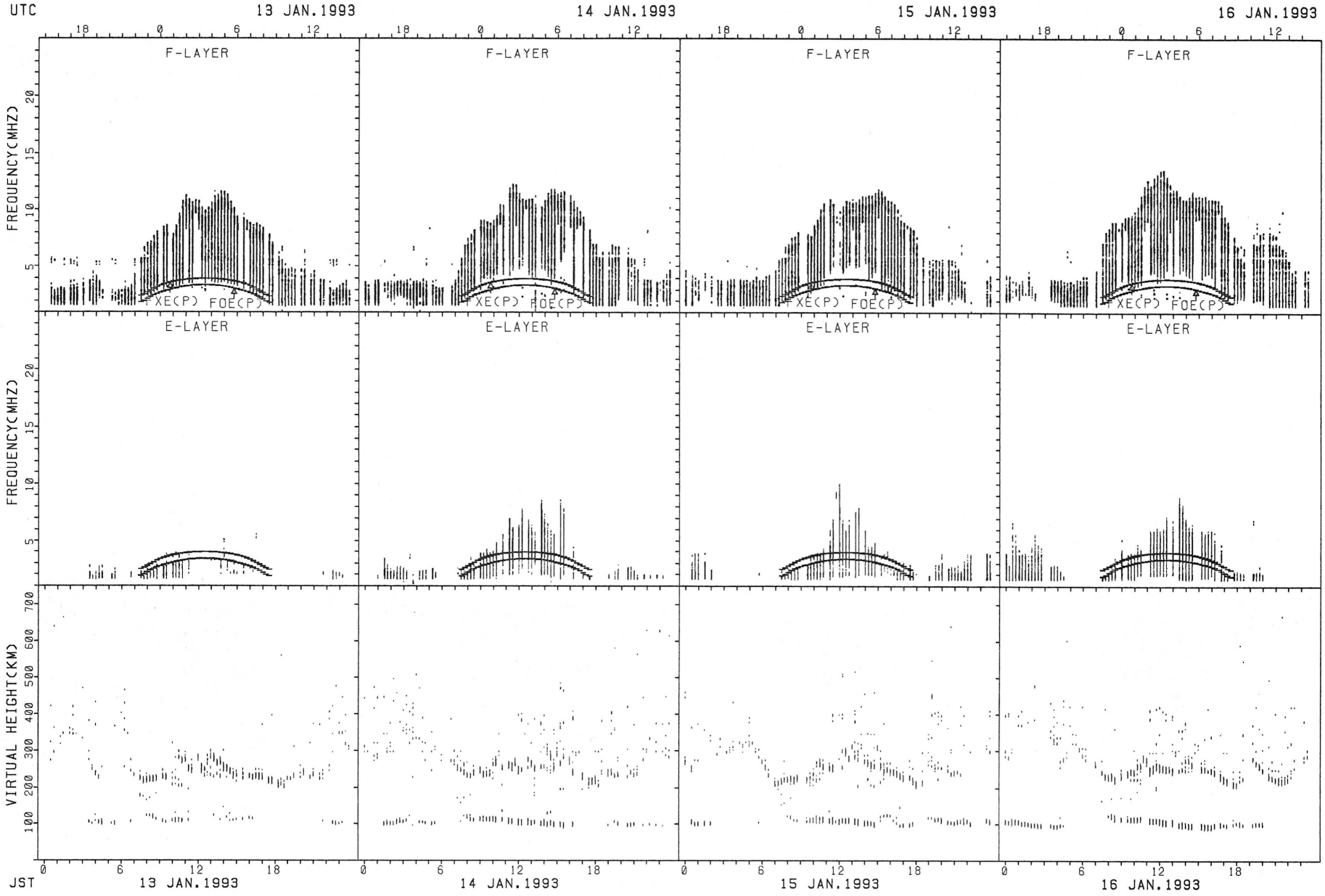
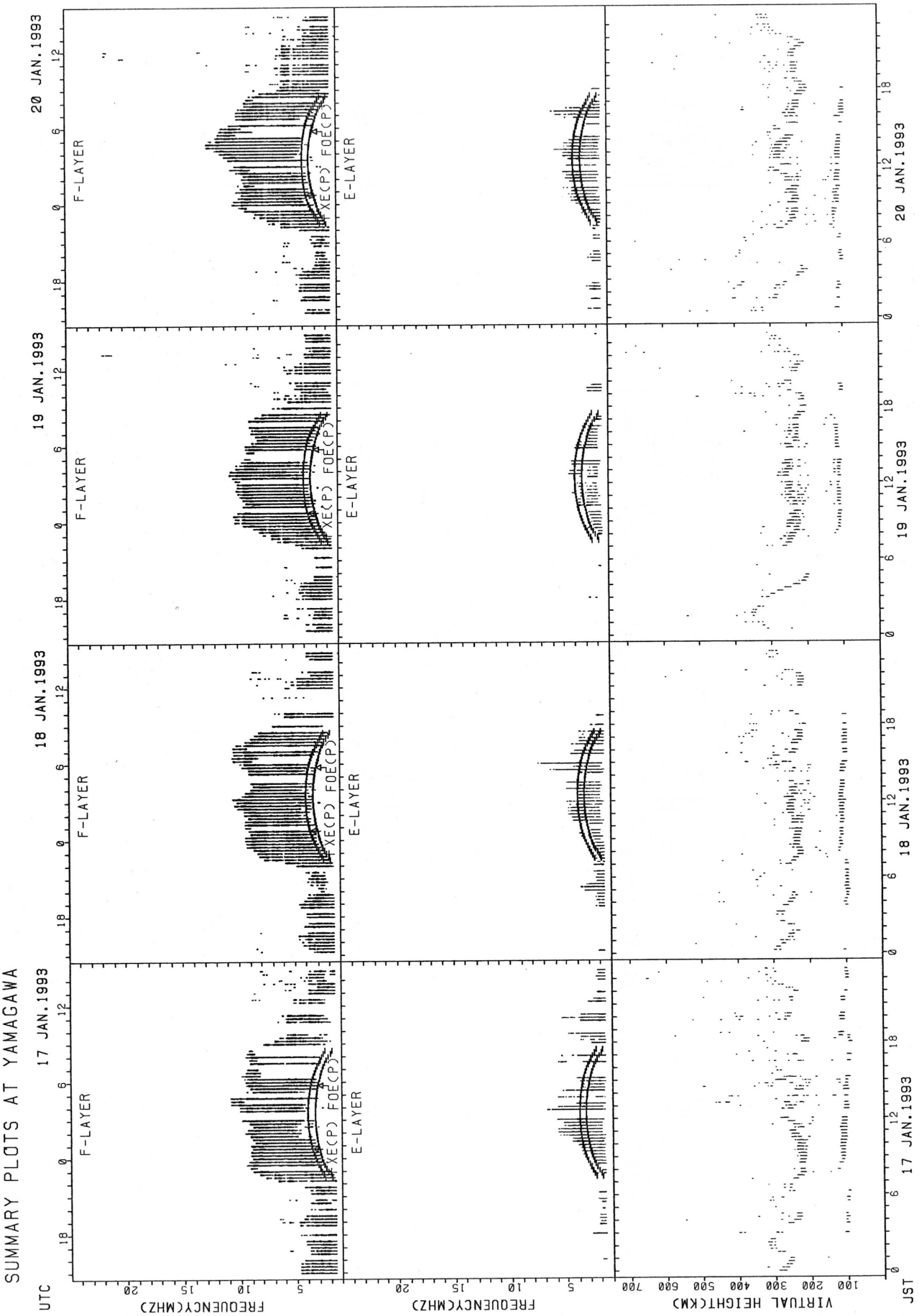
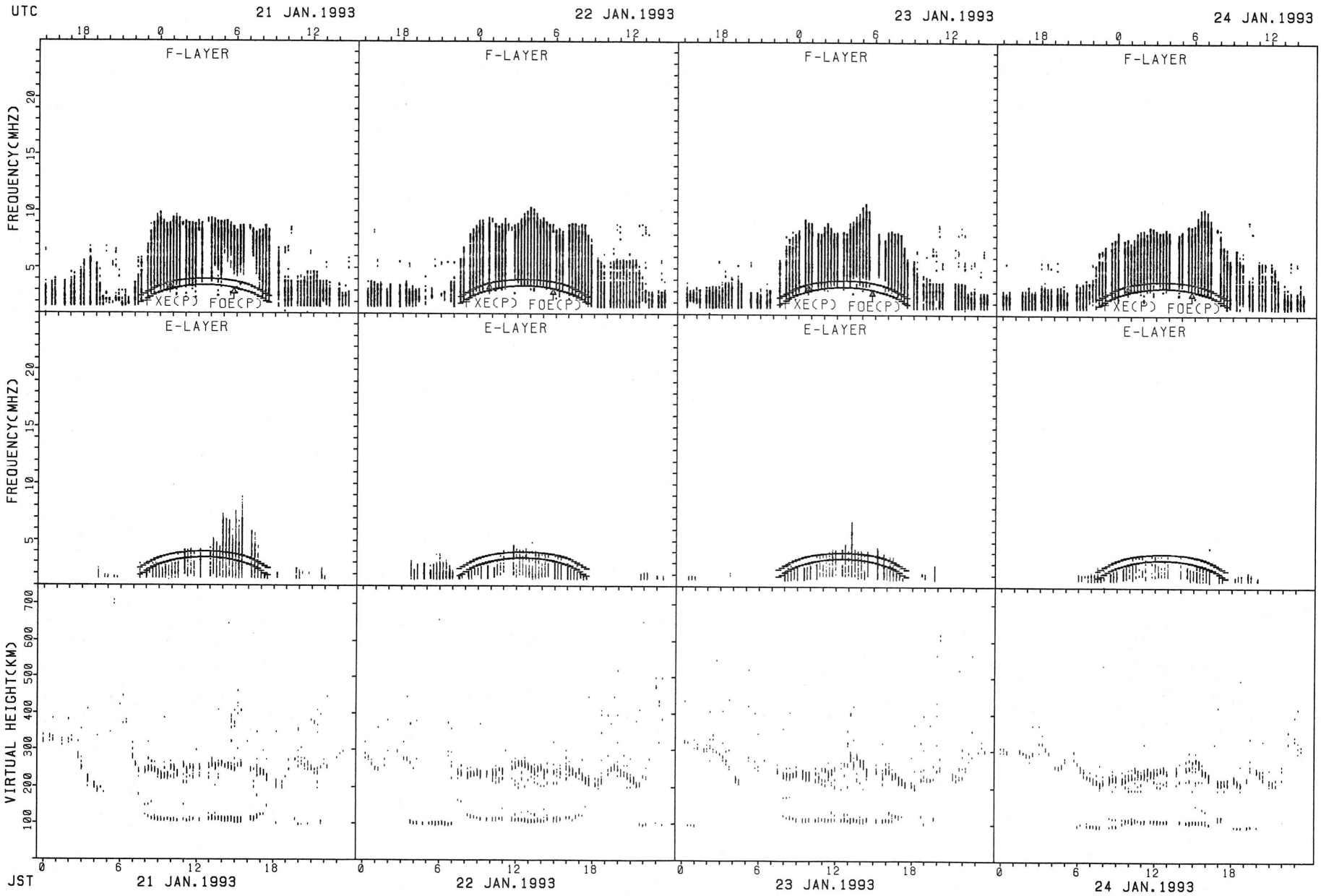
SUMMARY PLOTS AT YAMAGAWA



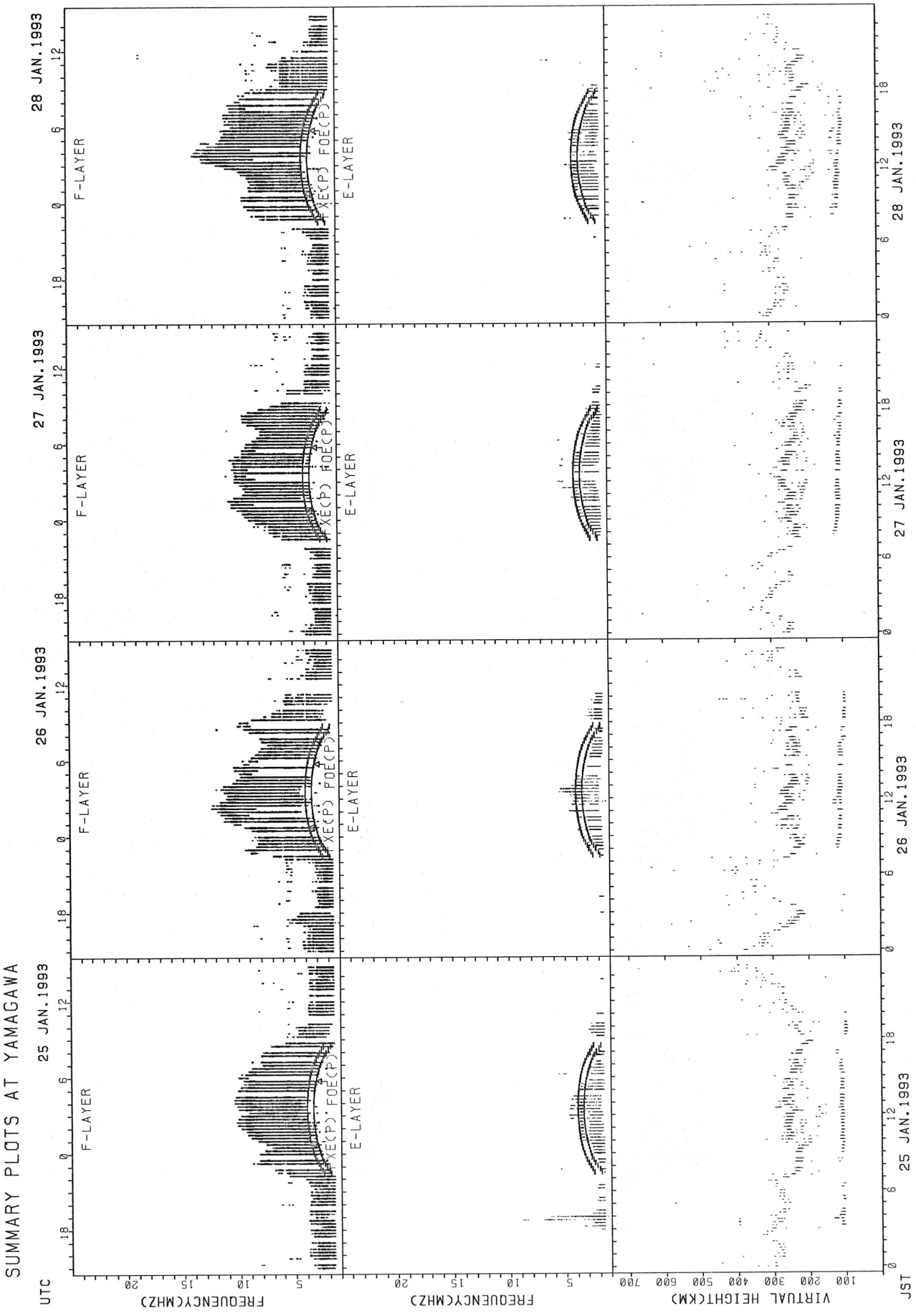
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
17 JAN.1993
18 JAN.1993
19 JAN.1993
20 JAN.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

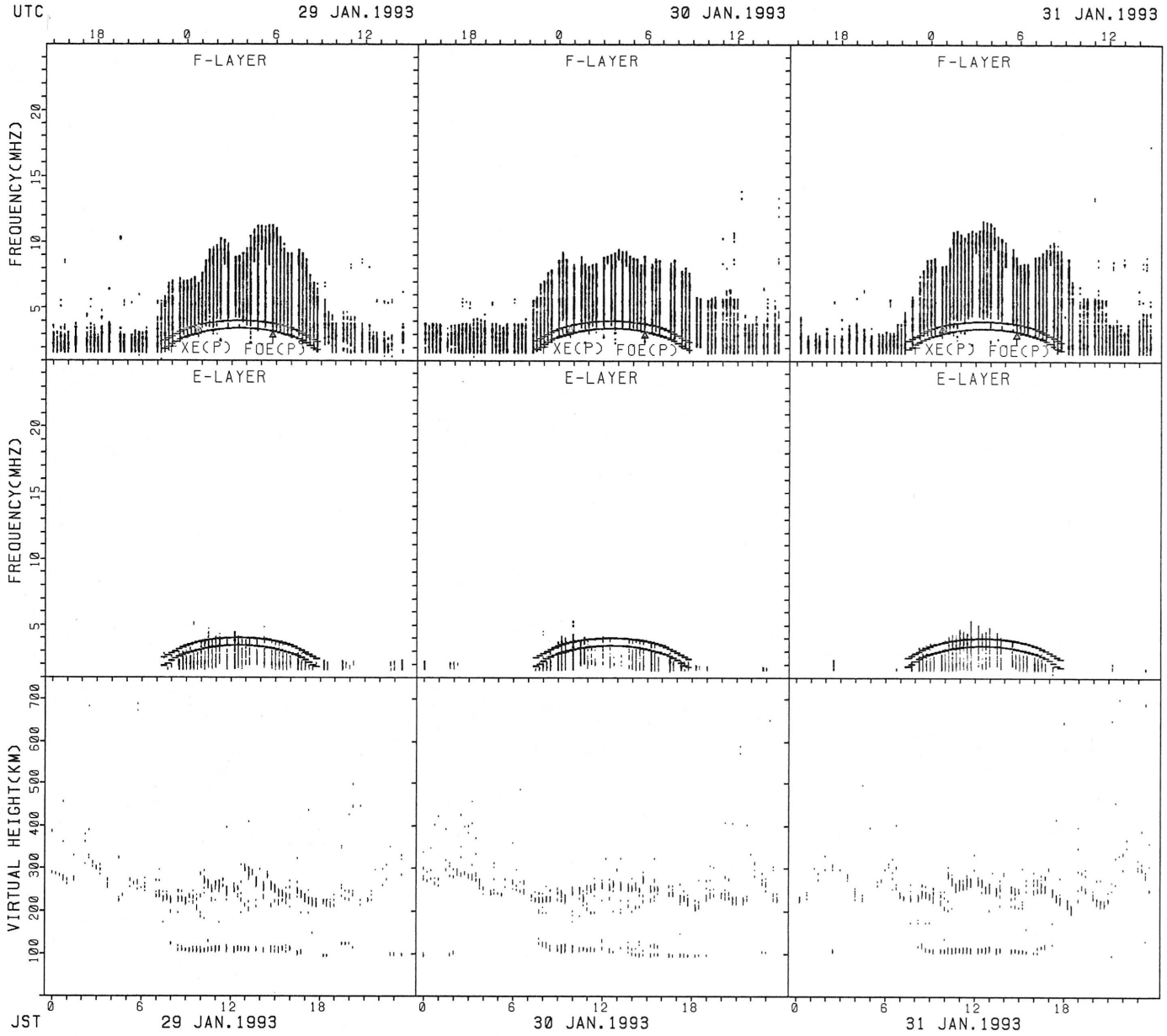
SUMMARY PLOTS AT YAMAGAWA



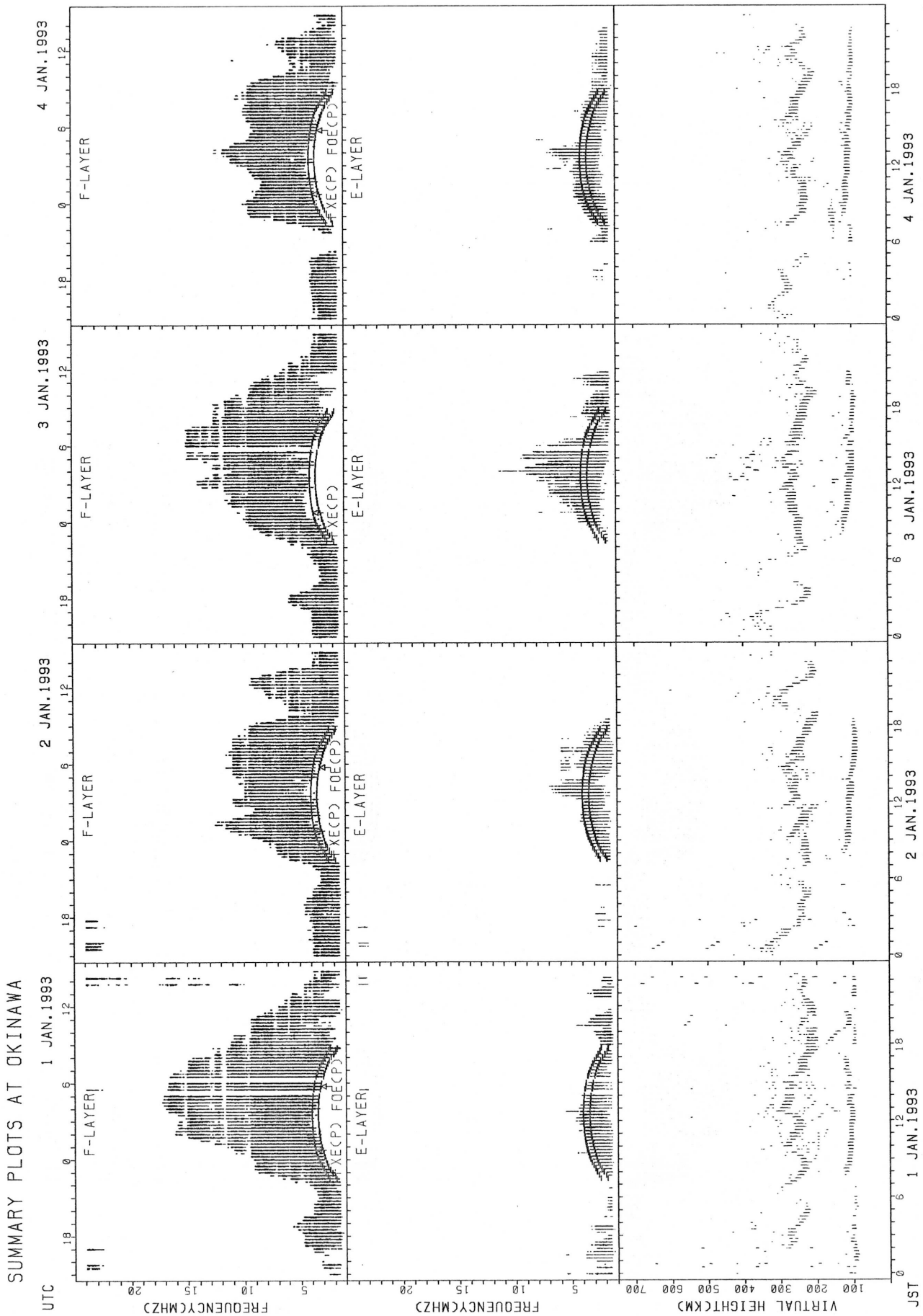
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
25 JAN.1993
26 JAN.1993
27 JAN.1993
28 JAN.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

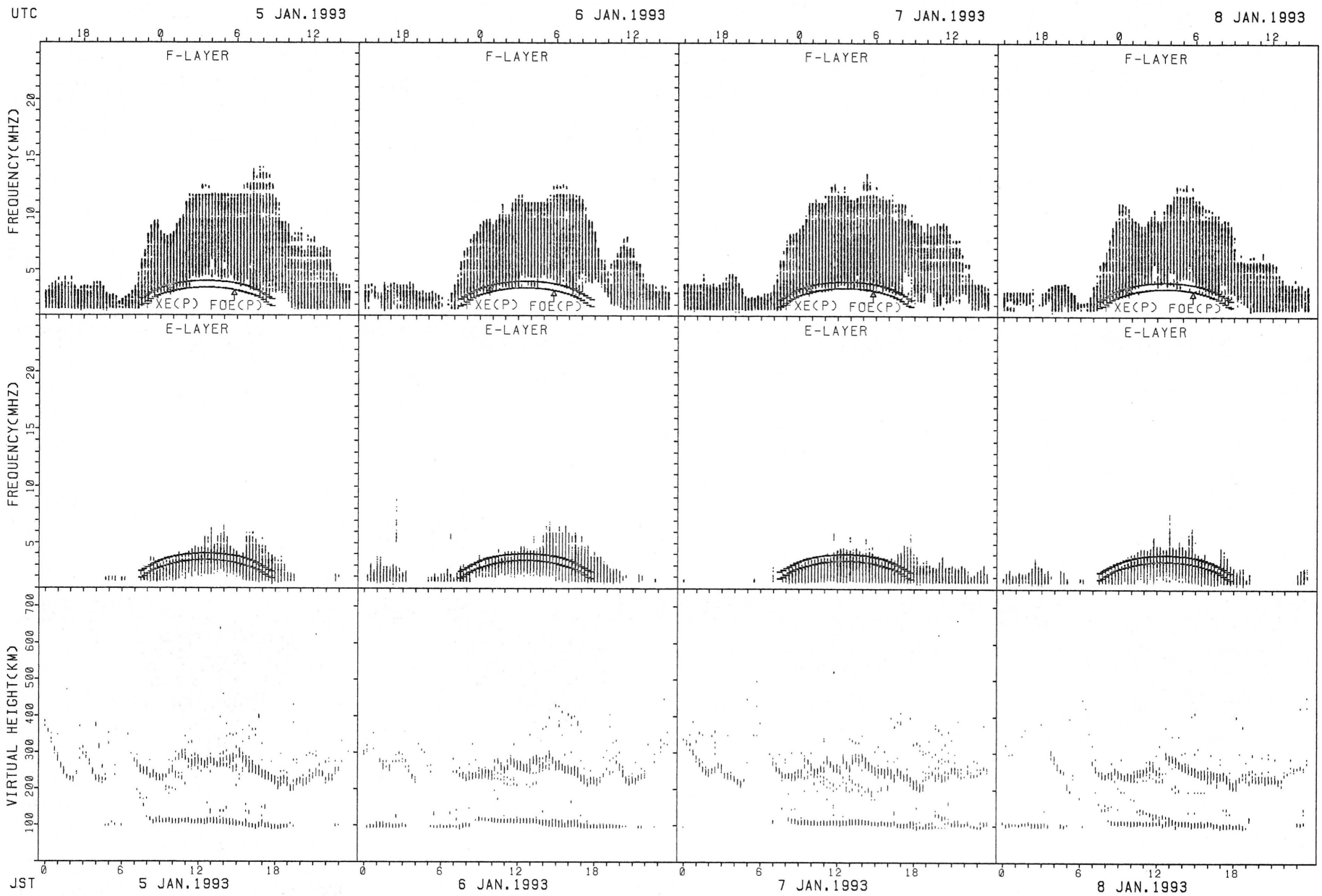
SUMMARY PLOTS AT YAMAGAWA



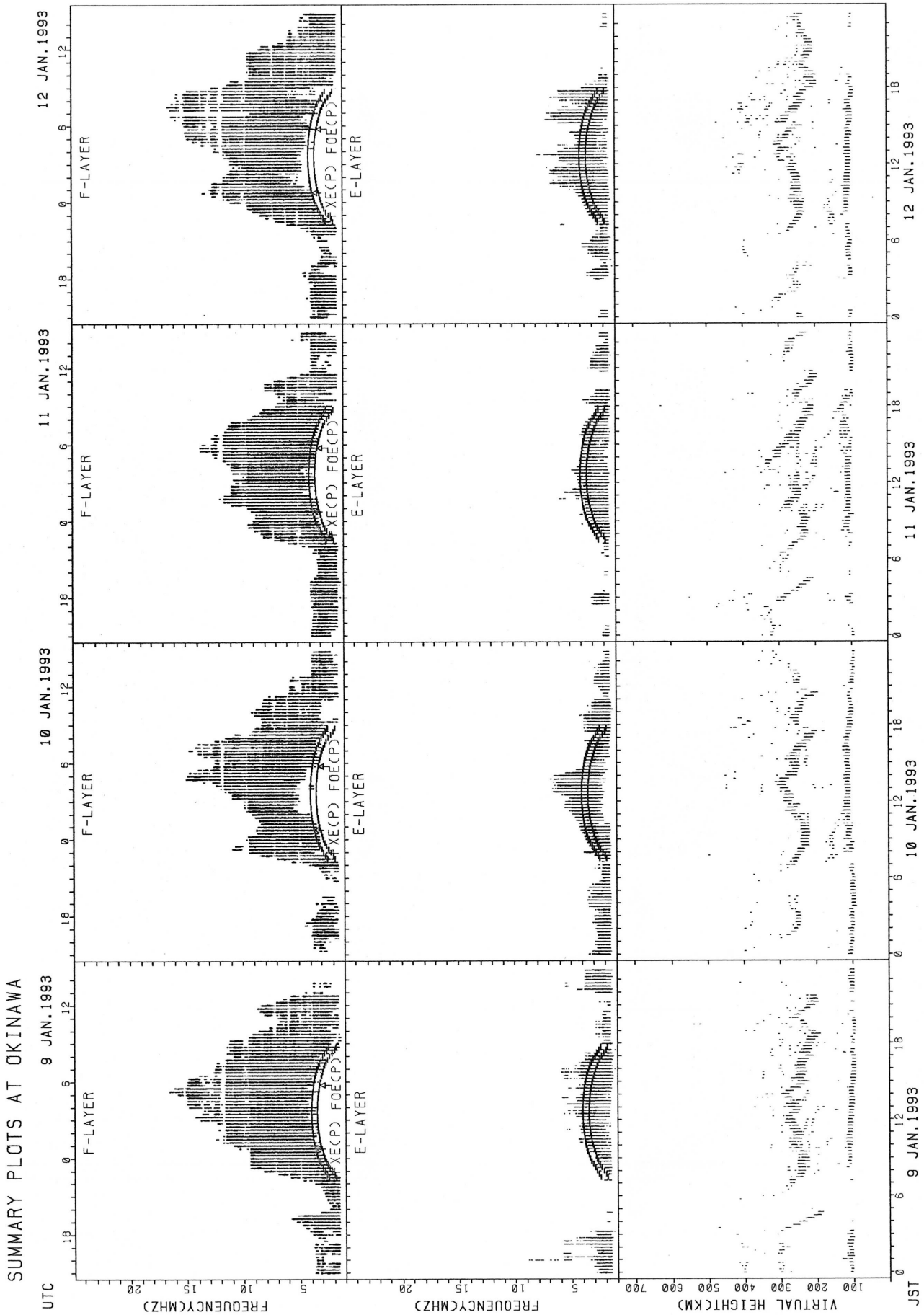
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
1 JAN.1993
2 JAN.1993
3 JAN.1993
4 JAN.1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

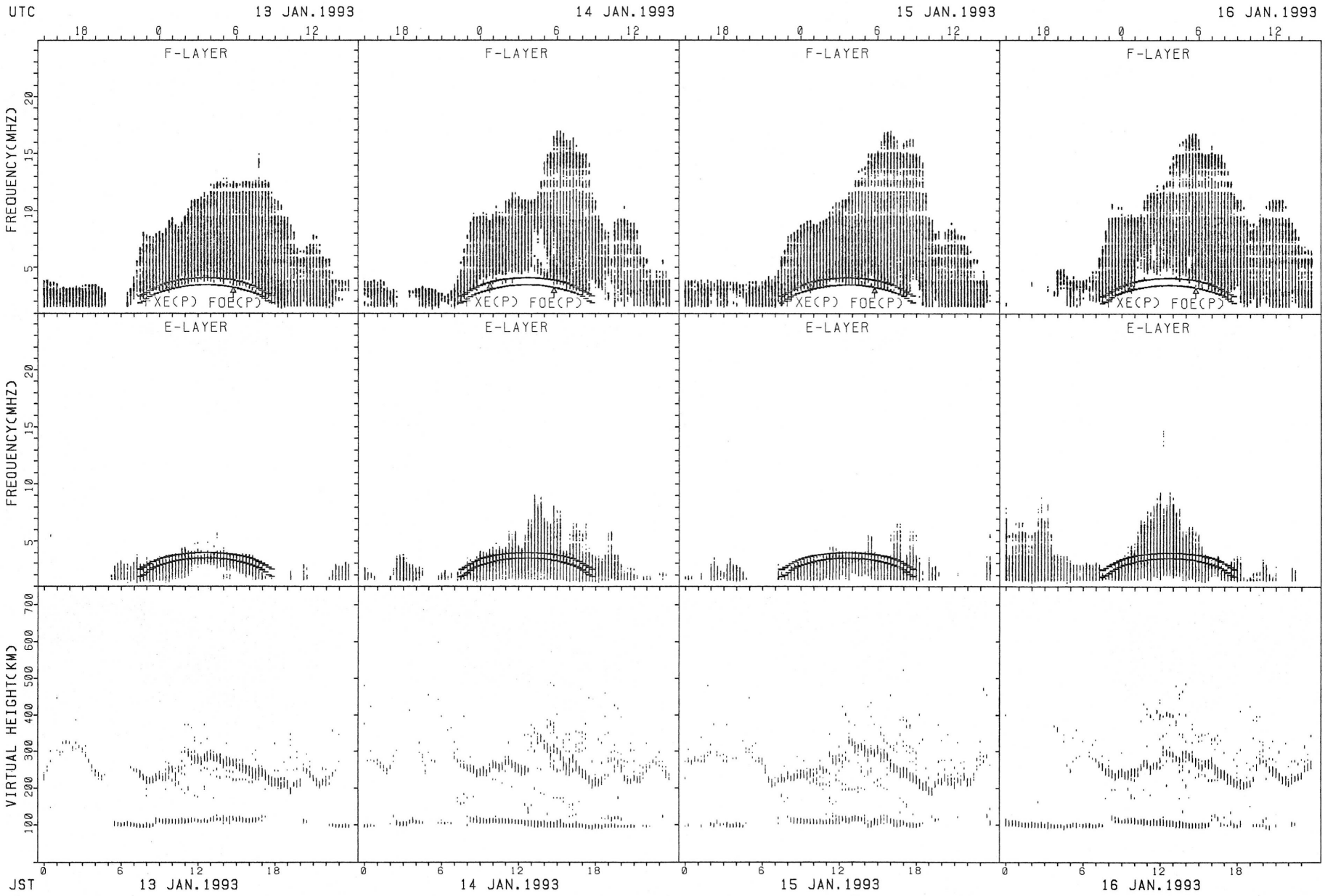
SUMMARY PLOTS AT OKINAWA



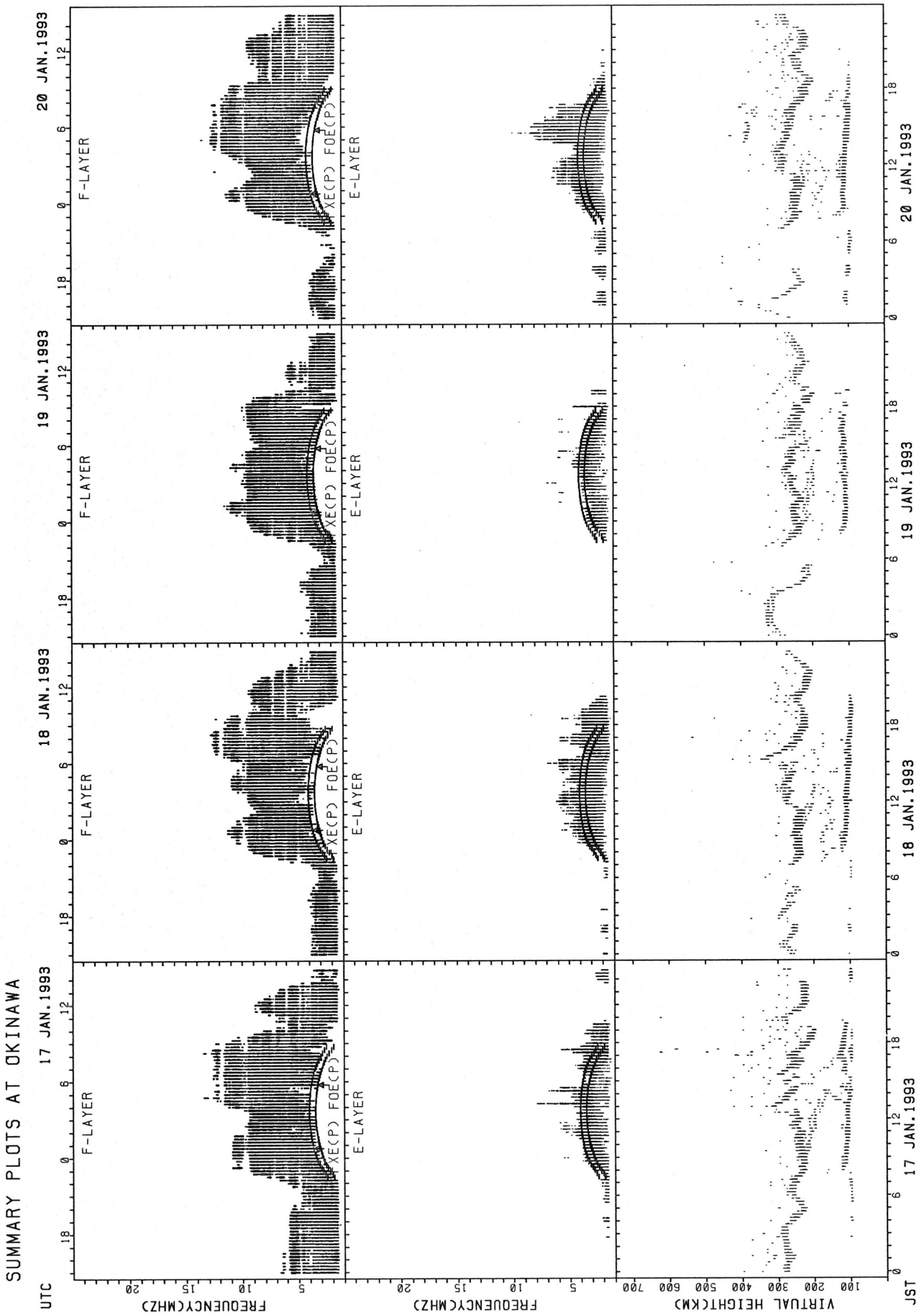
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
9 JAN.1993
10 JAN.1993
11 JAN.1993
12 JAN.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

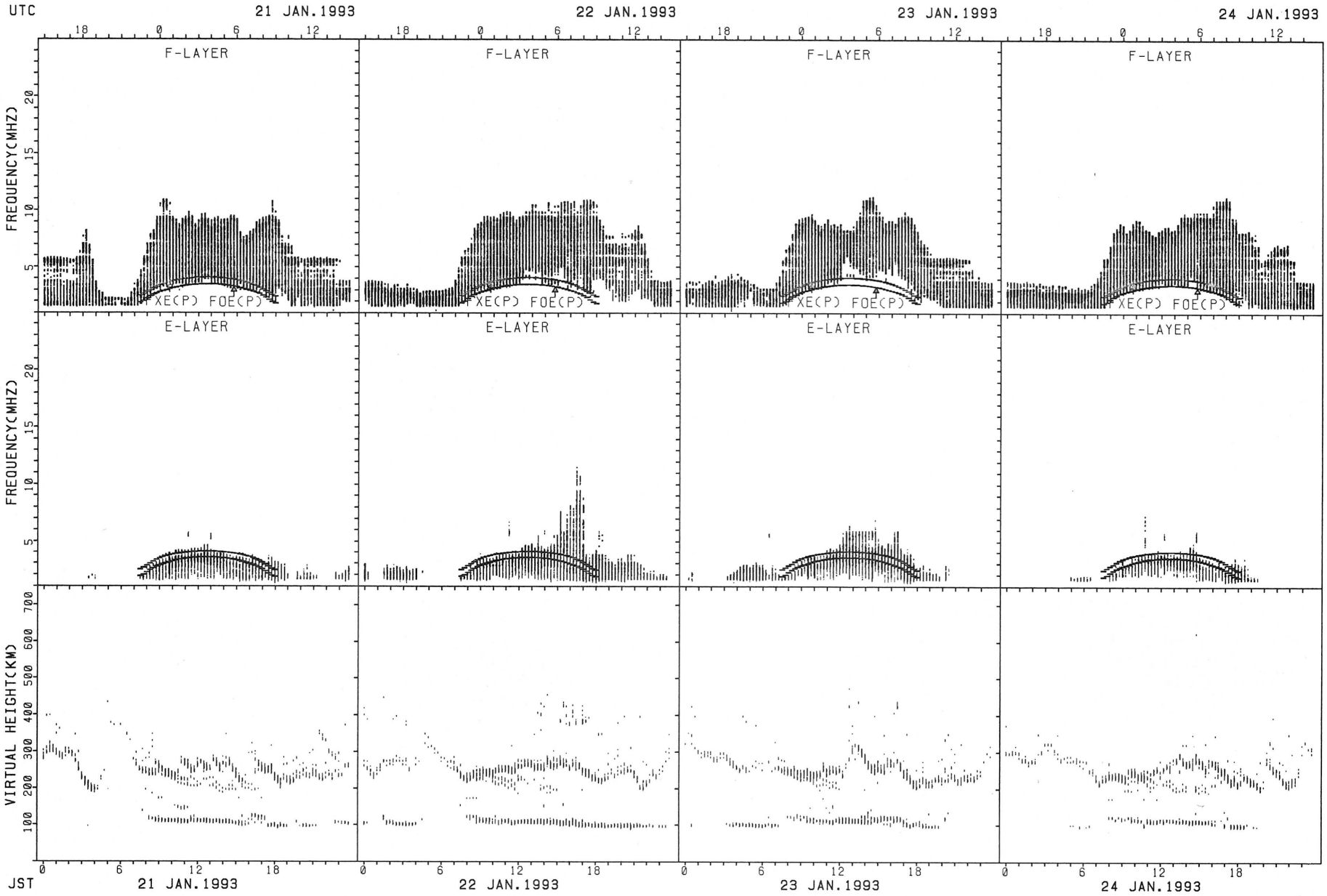
SUMMARY PLOTS AT OKINAWA



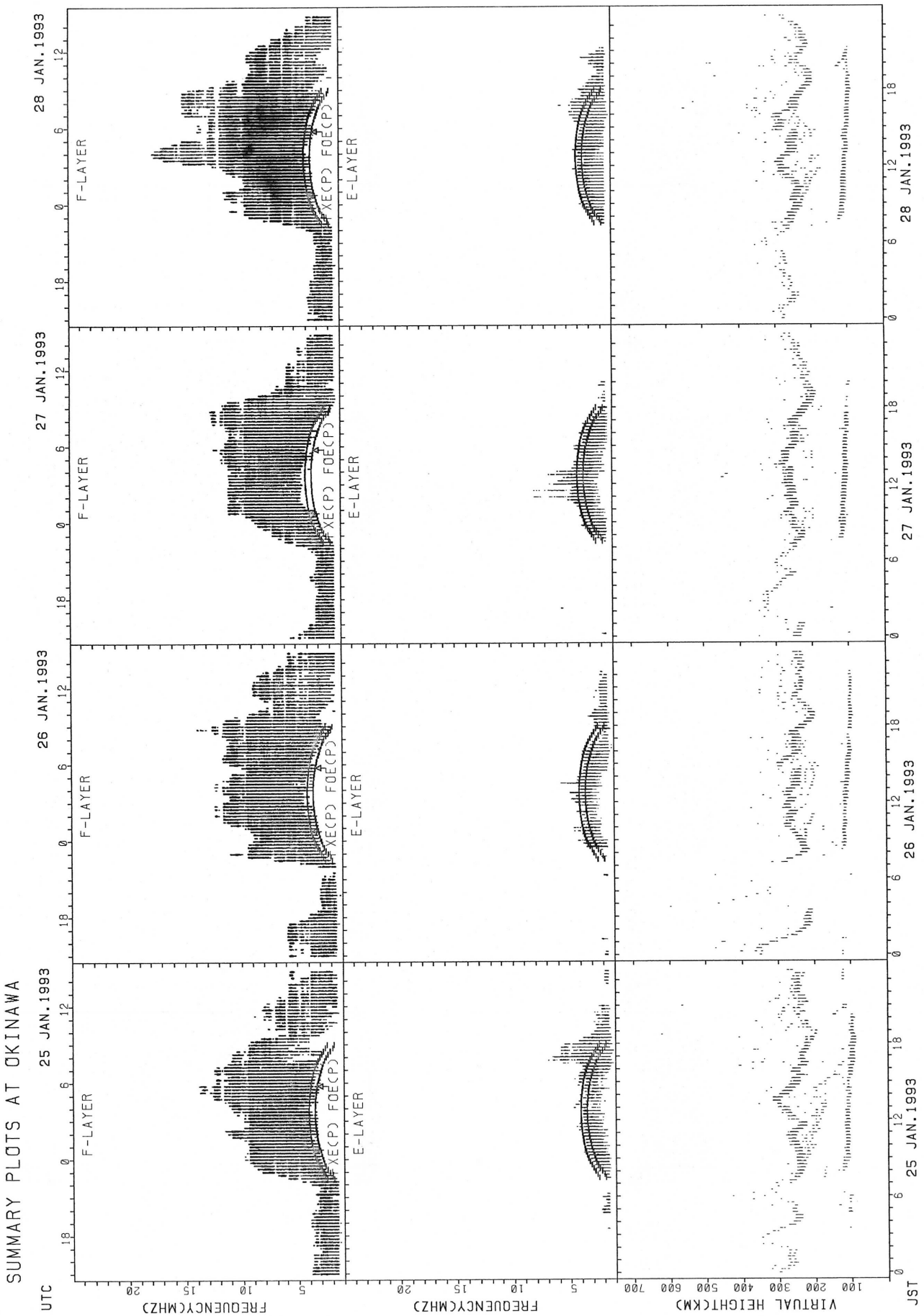
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
17 JAN.1993
18 JAN.1993
19 JAN.1993
20 JAN.1993
UTC
JST
F-LAYER
E-LAYER
XE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

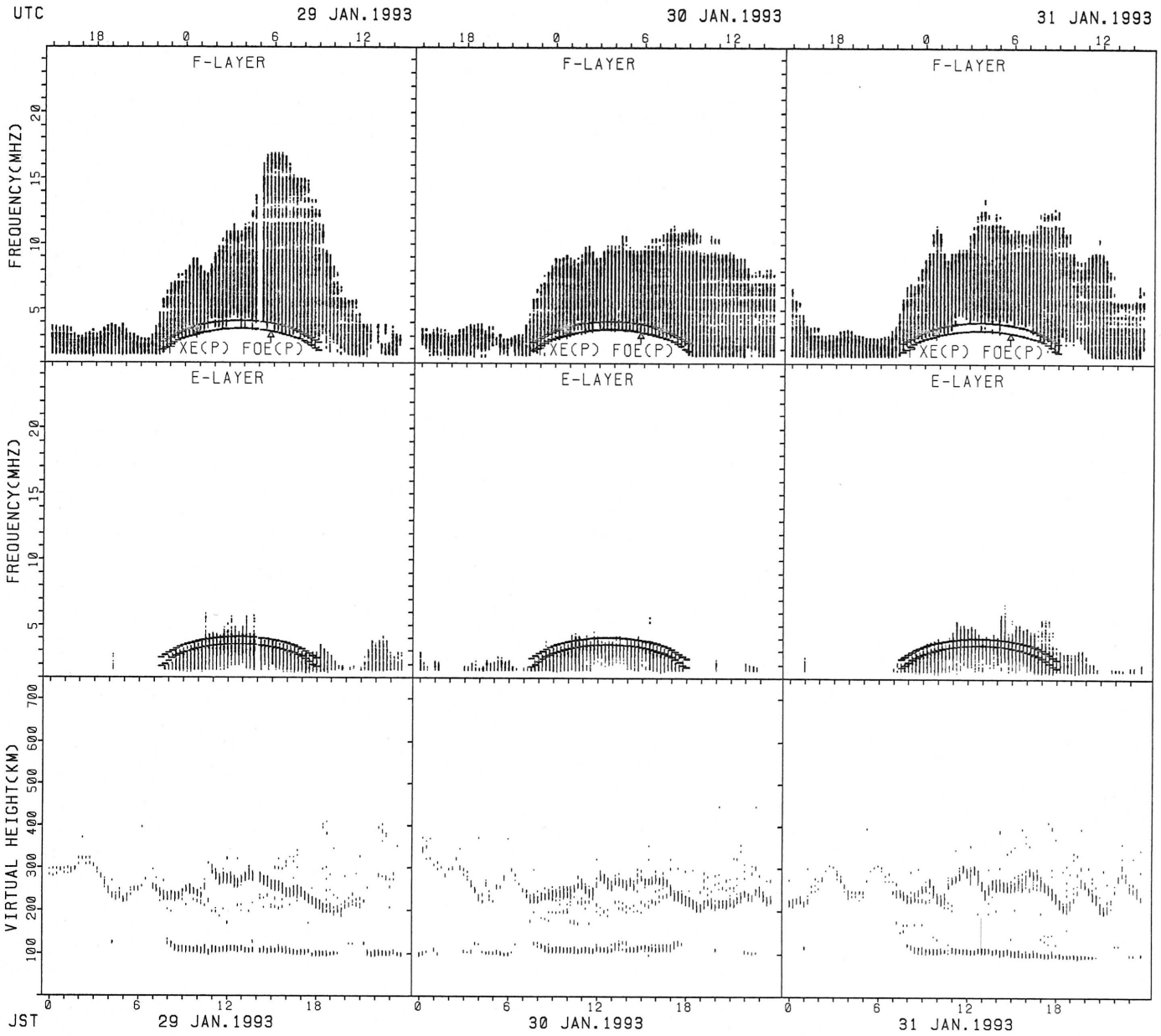
SUMMARY PLOTS AT OKINAWA



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


SUMMARY PLOTS AT OKINAWA
UTC
25 JAN.1993
26 JAN.1993
27 JAN.1993
28 JAN.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



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

MONTHLY MEDIANS OF H'F AND H'ES

JAN. 1993 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									23	31	31	31	31	31	29	29	10							
MED									236	242	236	236	238	242	248	238	242							
U Q									242	248	246	246	252	266	254	246	266							
L Q									232	230	232	230	230	234	237	232	236							

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	10		12		10	10												13	13	14	14	14	13	
MED	111		112		111	111												113	115	115	111	113	111	
U Q	115		119		113	113												117	125	117	115	115	114	
L Q	105		108		109	109												110	108	107	109	109	109	

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									17	28	29	30	29	29	29	28	12							
MED									244	242	242	241	240	250	256	248	242							
U Q									250	248	254	250	247	259	266	261	249							
L Q									236	234	237	236	236	238	243	239	232							

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	15	15	12	11			13	12	12	13	14	14	10	12	13		15	15	13	11	13		11
MED	107	109	111	107	107			113	134	121	115	121	119	113	112	107		105	107	107	107	111		109
U Q	115	117	111	113	109			118	175	137	119	125	127	119	118	114		111	133	116	117	113		115
L Q	104	107	107	105	105			107	118	115	113	117	107	105	108	105		103	103	102	105	104		105

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									29	31	30	30	31	30	31	31	24							
MED									234	242	245	246	244	242	248	242	238							
U Q									244	248	256	252	258	250	256	246	246							
L Q									226	234	240	242	238	232	238	238	228							

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	12	10	13	12	10			17	15	15	20	23	16	16	13	11	13		17	10				
MED	110	107	107	106	106			109	125	117	114	113	119	115	113	111	105		103	103				
U Q	113	109	111	113	109			138	149	119	119	121	128	120	118	115	113		105	109				
L Q	105	103	103	104	103			106	113	113	112	113	116	112	107	105	101		101	101				

MONTHLY MEDIANS OF H'F AND H'ES

JAN. 1993 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									22	25	24	27	24	23	25	24	27	24						
MED									240	236	247	254	251	254	252	248	248	245						
U Q									252	244	259	264	259	268	268	256	256	255						
L Q									234	232	239	244	244	242	248	242	240	232						

H'ES

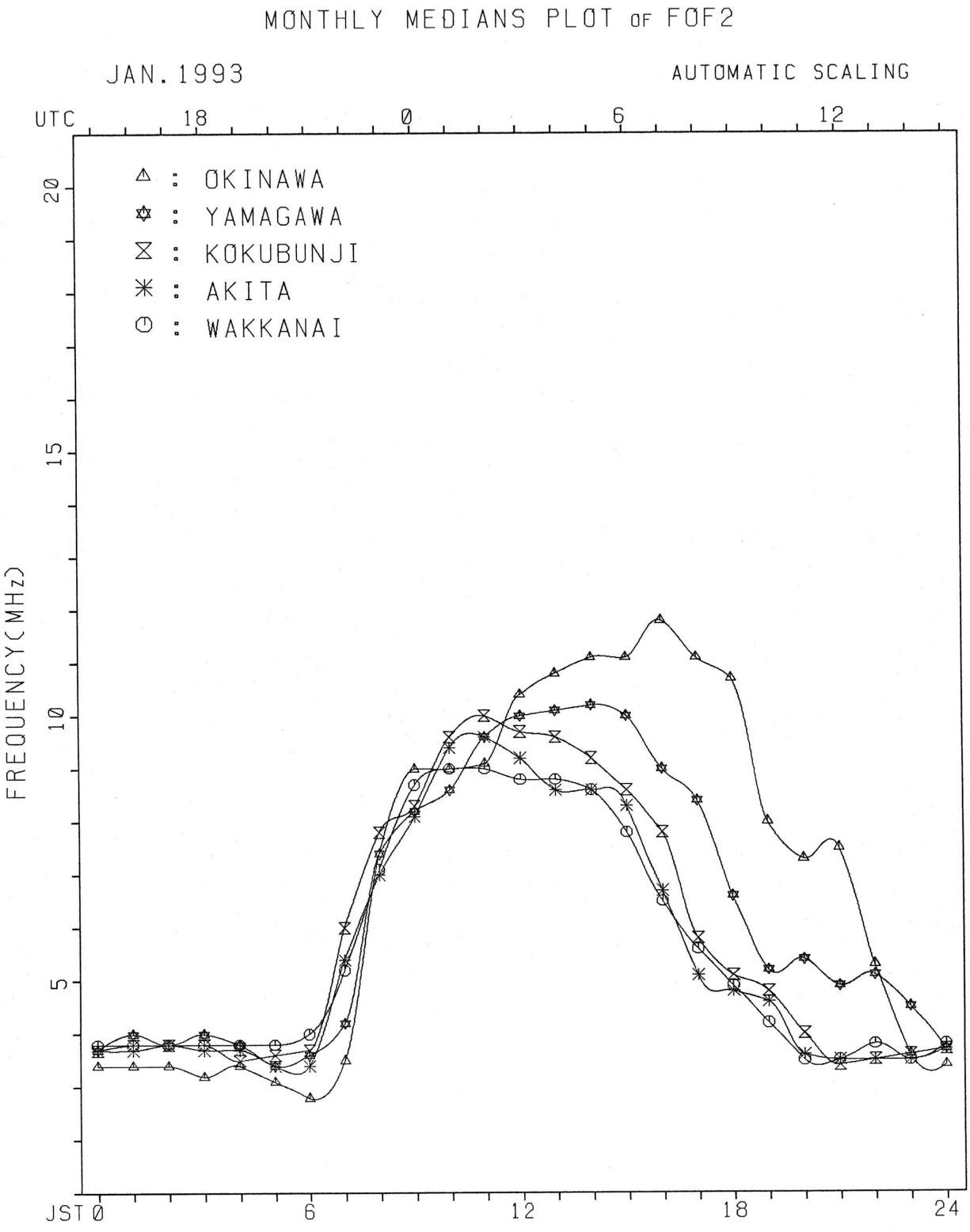
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT										10	17	16	22	21	15									
MED										115	115	113	115	113	111									
U Q										117	119	120	119	114	117									
L Q										113	112	112	111	106	107									

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									29	31	31	31	16	12	29	31	29	31	29	14	14	15		
MED									248	240	238	254	265	271	264	262	256	238	228	229	273	260		
U Q									259	248	254	262	274	285	277	282	267	248	231	242	292	262		
L Q									245	232	232	242	250	258	258	252	246	230	221	222	248	246		

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT			10	10					15	15	17	23	27	29	25	24	24	24	27	21	15			
MED			105	105					143	131	115	115	115	113	113	111	106	110	99	101	103			
U Q			109	107					155	163	128	131	131	123	123	119	119	117	105	110	109			
L Q			103	103					113	119	113	113	111	109	107	105	100	101	99	99	97			


MONTHLY MEDIANS PLOT OF FOF2
JAN. 1993
AUTOMATIC SCALING
UTC
18
0
6
12
△ : OKINAWA
✡ : YAMAGAWA
⧖ : KOKUBUNJI
✳ : AKITA
⊖ : WAKKANAI
FREQUENCY(MHz)
20
15
10
5
JST 0
6
12
18
24

IONOSPHERIC DATA STATION KOKUBUNJI

JAN. 1993 FXI (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	X 39	40	41	X 38	40	35	X 37											X 63	X 56	X 49	X 41	X 34	X 36	X 37
2	X 38	X 38	X 39	X 40	X 38	X 38	X 39											X 57	X 51	X 55	X 58	X 61	X 63	X 62
3	X 63	X 46	X 50	X 33	X 30	X 31	X 36											X 55	X 60	X 52	X 36	X 33	X 36	X 39
4	X 40	40	X 42	X 36	X 35	X 37	X 28											X 72	X 69	X 60	X 42	X 41	X 45	X 41
5	X 43	X 43	X 47	X 41	40	X 42	40											X 79	X 60	X 43	X 41	X 37	X 35	40
6	X 39	X 42	X 42	X 40	X 38	X 38	X 41											X 59	X 59	X 50	X 39	X 33	X 36	X 39
7	X 41	X 41	43	X 41	X 37	X 39	X 40											X 63	X 55	X 43	X 39	X 39	X 43	X 44
8	X 43	X 36	X 38	X 38	X 37	X 36	X 31											X 60	X 60	X 58	A	X 36	X 40	X 42
9	X 40	X 42	46	48	47	X 36	X 35											X 60	X 48	X 46	X 45	X 33	X 35	X 37
10	X 39	X 41	X 45	X 42	X 36	X 36	X 39											X 59	X 67	X 63	X 51	X 39	X 38	X 42
11	X 43	X 42	X 46	X 42	X 43	X 43	X 45												X 67	X 64	X 37	40	45	A
12	X 41	X 40	X 38	X 44	X 34	X 37	X 40												X 66	X 58	X 46	X 32	X 34	X 41
13	X 38	X 36	X 40	X 37	X 33	X 33	X 32												X 48	X 45	X 42	X 37	X 36	X 38
14	X 39	X 40	X 40	X 37	X 38	X 37	X 36												X 71	X 75	X 40	X 34	X 39	X 41
15	X 40	X 40	X 41	X 39	X 38	X 39	X 41												X 49	X 48	X 51	41	44	45
16	43	X 42	X 44	X 41	X 43	X 44	X 46												X 55	X 65	X 68	X 40	X 39	X 42
17	X 45	X 43	X 45	X 46	X 41	X 40	X 44												X 55	X 51	X 51	X 40	X 37	X 40
18	X 41	X 44	X 47	X 39	X 35	X 35	X 37												X 61	X 66	X 49	X 35	X 35	X 38
19	X 39	X 39	X 40	X 39	X 39	X 40	X 43												X 47	X 45	X 51	X 44	X 38	X 39
20	X 42	X 43	X 43	X 47	X 33	A	X 31												X 53	X 56	X 45	X 38	X 37	X 40
21	X 39	X 39	X 40	X 47	X 35	X 26	X 29												X 43	X 42	X 45	X 41	X 40	X 40
22	0 X 41	X 43	X 42	X 41	X 38	X 36	X 35												X 48	X 51	X 40	48	37	X 35
23	X 37	X 38	X 40	X 43	X 39	X 29	X 32												X 43	X 38	X 44	X 41	X 40	X 43
24	X 42	X 43	X 42	X 43	X 42	X 42	X 43												X 53	X 56	X 53	X 35	X 34	X 37
25	X 39	X 42	X 41	X 43	X 41	X 40	X 39												X 46	X 47	X 40	X 33	40	39
26	X 38	X 39	X 44	X 42	X 34	X 33	X 33												X 71	X 66	X 40	X 34	X 31	X 35
27	X 39	X 33	X 35	X 34	X 35	X 35	X 34												X 47	X 47	X 39	X 35	37	39
28	41	41	X 41	X 34	35	48	54												X 53	X 53	X 45	X 36	X 36	X 37
29	X 40	X 42	X 40	X 40	X 40	X 36	X 37												X 48	X 50	X 40	S	X 34	X 38
30	X 38	X 39	X 41	X 42	X 41	X 40	X 40												X 53	X 58	X 54	X 39	X 41	X 45
31	X 42	X 40	X 41	X 43	X 42	X 41	X 34												X 65	X 66	X 45	X 37	X 38	X 45
	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	30	31											10	31	31	30	30	31	30
MED	X 40	X 41	X 41	X 41	X 38	X 37	X 37											X 60	X 55	X 52	X 44	X 37	X 37	X 40
U Q	X 42	X 42	X 44	X 43	X 41	X 40	X 41											X 63	X 61	X 60	X 51	X 40	X 40	X 42
L Q	X 39	X 39	X 40	X 38	X 35	X 35	X 34											X 59	X 48	X 47	X 40	X 34	X 36	X 38

JAN. 1993 FXI (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JAN. 1993 FOF2 (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	33	F 33	F 34	32	33	27	31	61	77	96	107	109	100	95	89	80	69	57	50	43	35	28	30	31
2	32	32	33	34	32	32	33	55	S 74	67	85	98	96	96	86	80	68	51	45	49	52	55	57	56
3	57	40	44	27	24	25	30	57	66	77	109	128	128	95	91	93	66	49	54	46	H 30	27	30	33
4	V 34	F 31	36	30	29	31	22	48	73	78	91	87	87	V 87	98	75	61	66	63	54	36	35	39	35
5	37	37	41	35	F 32	36	F 33	50	78	84	118	115	92	96	88	84	86	73	54	37	35	31	29	F 32
6	33	36	36	34	32	32	35	54	73	84	92	112	98	83	103	95	72	53	53	44	33	27	30	33
7	35	35	F 36	35	31	33	34	57	73	66	102	114	95	77	95	92	74	57	49	37	33	33	37	38
8	37	30	32	32	31	30	25	50	73	84	107	117	84	81	104	95	80	54	54	52	A	30	J R 34	36
9	34	36	F 37	F 39	F 37	30	29	60	86	83	90	105	95	106	103	88	76	54	42	40	39	27	29	31
10	33	35	39	36	30	30	33	62	71	77	81	112	89	106	81	74	59	53	61	57	45	33	32	36
11	37	36	40	36	37	37	39	74	76	79	99	96	78	88	93	83	70	58	61	58	31	F 33	F 34	I A 39
12	35	34	32	38	28	31	34	67	75	110	V 134	129	98	97	98	94	91	66	60	52	40	26	28	34
13	32	30	34	31	27	27	26	49	67	81	98	108	85	88	90	93	72	52	42	39	36	31	30	32
14	33	34	34	31	32	31	30	56	74	77	92	114	109	91	95	88	77	62	65	69	33	28	33	35
15	34	34	35	33	32	33	35	54	71	76	93	94	88	81	95	82	73	64	43	42	45	F 32	F 34	F 37
16	J F 38	36	38	35	37	38	40	60	71	85	103	114	114	107	83	79	76	64	48	59	62	34	33	36
17	39	37	V 38	40	35	34	38	65	74	78	80	106	H 81	90	70	83	74	56	49	45	45	34	31	34
18	35	38	41	33	29	29	31	57	75	81	98	92	92	81	78	94	72	57	55	60	43	29	29	32
19	33	33	34	33	33	34	37	62	72	84	90	95	99	84	89	78	77	56	41	39	45	38	32	33
20	36	37	37	41	27	I A 25	25	59	76	91	91	99	95	90	92	81	79	58	47	50	39	32	31	34
21	33	33	34	41	29	20	23	49	81	84	94	88	94	89	76	92	74	53	37	36	39	35	34	34
22	35	V 37	36	35	32	30	29	54	75	84	91	83	85	89	79	76	63	57	42	45	34	F 36	F 27	29
23	31	32	34	37	33	23	26	53	74	83	96	90	Z 85	83	94	84	77	56	37	32	38	35	34	37
24	36	37	36	37	36	36	37	58	71	73	73	86	86	81	80	81	76	51	47	50	47	29	29	31
25	33	36	35	37	35	34	33	62	75	V 72	76	96	V 102	100	95	86	65	53	40	41	34	R 27	F 31	F 32
26	32	33	38	36	28	27	27	60	77	93	105	105	113	100	85	79	V 62	64	65	60	34	28	25	29
27	33	27	29	29	29	29	28	58	69	84	99	H 86	89	V 80	75	67	79	55	41	41	33	29	F 28	F 29
28	32	F 33	35	28	F 26	F 39	F 44	60	77	96	85	101	109	H 106	H 91	101	77	55	47	47	39	30	30	31
29	34	36	34	34	34	30	31	58	74	70	85	88	84	83	79	78	64	54	42	44	34	I S 28	28	32
30	32	33	35	36	35	34	34	58	71	78	82	79	86	82	78	87	74	58	47	52	48	33	36	39
31	36	34	35	37	36	35	28	51	66	84	90	U R 103	110	102	83	77	77	73	59	60	39	31	32	39
	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	30	31	31	31
MED	34	34	35	35	32	31	31	58	74	83	92	101	94	89	89	83	74	56	48	46	38	31	31	34
U Q	36	36	38	37	35	34	35	60	76	84	102	112	100	97	95	92	77	62	55	54	45	34	34	36
L Q	33	33	34	32	29	29	28	54	71	77	85	90	86	83	80	79	68	53	42	41	34	28	29	32

JAN. 1993 FOF2 (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JAN. 1993 FOF1 (0.01MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											L	L	L	L	L	L								
2												L	L	L	L									
3											U L 470	U L 410	L		L									
4										L	L	L	L	L	L	L								
5										L	L	L	L	L	L									
6												L	L	L	L									
7										L 350	L	L	L	L	L	L								
8									L		L	L			L	L								
9										L		L	L	L	L	L								
10											L	L	L	U L 470	L	L								
11											L	L	L	L 550										
12											L	L	L	L	L									
13											L	L	L	L	L	L								
14											L	L	L	L	L									
15											L	L	L		L	L								
16										L	L	L	L	L	L									
17										L	L	460	L	L	L	L								
18											L	L	L	L	L	L								
19									L	L	U L 440		L	L	L									
20										L	L	L	L	L	L	L								
21										L	L	L	L	L	L 390									
22										L	L	L	L	L	L	L	L							
23											L	L	L	L	L	L								
24									L		L	U L 440	L		L	L								
25									L	L	L	L 430	L	U L 460	L	L	U L 280							
26										L	L	L	U L 500	U L 440	L	L								
27										L	L	U L 650	U L 500	L	L	L								
28									L	L	L	L	U L 500	U L 470	U L 440	L								
29										L	L	U L 490	U L 480	L	L	U L 380								
30										L	U L 490	U L 460	L	L	L	L	L							
31									L	L	L	U L 480	U L 500	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										1	3	8	5	5	2	1	1							
MED										L 350	U L 470	U L 460	U L 500	U L 470	L 415	U L 380	U L 280							
U Q											U L 490	U L 485	U L 500	L 510										
L Q											U L 440	U L 435	U L 490	U L 450										

JAN. 1993 FOF1 (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JAN. 1993 FOE (0.01MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								150	H 235	A 280	A	325	330	320	300	250	A							
2								B	225	275	R 305	320	320	U R 315	R 305	270	A 180							
3								A	A	A	305	325	B	B	R	A	A							
4								A	240	A	A	325	R 330	R 325	I R 300	265	185							
5								B	230	A	A	A	A	315	285	270	U S 185							
6								B	245	275	310	325	330	325	305	265	195							
7								B	210	275	320	A 320	A 320	A 310	300	265	A							
8								B	220	270	H 320	330	330	320	A	255	A							
9								A	225	270	305	320	325	315	305	260	200							
10								165	H 240	275	295	320	325	320	310	285	A 205							
11								B	240	275	310	330	340	325	300	270	230	B						
12								175	A	A	A	330	330	325	305	265	205	B						
13								B	A	305	325	330	350	340	R 320	285	B	B						
14								160	270	A	A	A	A	R 335	320	280	H 215	B						
15								B	230	275	A	A	330	325	305	270	200	B						
16								B	240	A	A	335	A	325	315	270	215	B						
17								160	240	280	A	330	340	R 325	A	270	A	B						
18								145	240	280	A	A	340	320	305	270	210	B						
19								B	220	270	310	330	330	320	305	285	A	B						
20								A	215	275	315	330	A	A	A 320	A	225	B						
21								A	A	265	A	320	A	A	310	A	A	B						
22								155	235	275	320	335	A	305	290	270	225	B						
23								A	250	A	305	320	320	310	305	A	230	B						
24								A	H 225	270	R 310	325	325	A	A	260	H 220	B						
25								180	H 240	275	A	A	330	A 315	310	270	A	B						
26								165	230	275	310	325	A 335	325	305	A	H 225	B						
27								170	A 225	290	320	A	A	320	310	270	230	B						
28								A	240	280	U S 310	325	330	320	305	275	A	B						
29								165	240	290	A	A	335	330	310	285	225	B						
30								H 180	A 230	290	320	340	340	R 325	310	275	230	B						
31								175	245	A	A	335	340	325	310	270	H 230	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								13	27	23	18	24	23	27	27	26	21							
MED								165	235	275	310	325	330	320	305	270	215							
U Q								175	240	280	320	330	340	R 325	310	275	228							
L Q								158	225	275	305	322	325	315	305	265	200							

JAN. 1993 FOE (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JAN. 1993 FOES (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	20	20	J A 21	E B 13	E B 13	E B 14	E B 13	J A 21	J G 22	30	J A 54	J A 36	G	G	J A 34	G 25	J A 50	J A 23	J A 22	E B 13	E B 15	E B 15	E B 14	E B 14
2	E B 14	E B 15	E B 14	E B 13	E B 12	20	E B 14	24	G	30	G	G 29	G 30	G	G 28	G 27	26	J A 29	J A 23	J A 21	25	22	E B 14	E B 15
3	E B 15	E B 14	J A 22	J A 22	E B 13	E B 15	E B 14	J A 21	J A 40	J A 65	G 30	J A 47	E B 35	J A 50	G 30	29	J A 37	18	23	21	E B 14	E B 13	E B 15	E B 16
4	E B 15	E B 16	E B 13	E B 13	E B 13	E B 14	J A 18	J A 44	26	30	J A 43	G 28	G	G	G	G	G	E B 16	E B 13	E B 14	E B 15	E B 13	E B 13	E B 13
5	E B 13	E B 15	E B 13	E B 15	E B 13	E B 14	E B 13	J A 20	G	J A 39	J A 45	J A 45	34	G 27	G 24	J A 52	20	E B 14	21	20	E B 14	22	J A 27	J A 46
6	E B 13	20	E B 13	E B 13	E B 13	E B 15	E B 13	J A 21	G	G	J A 37	G	G	G	J A 35	G	23	J A 19	21	21	E B 13	E B 14	21	22
7	20	J A 33	J A 17	E B 13	E B 13	E B 15	E B 13	E B 14	27	30	35	35	35	39	G 28	G 23	25	J A 24	J A 44	J A 34	J A 50	28	J A 21	J A 24
8	J A 24	J A 24	J A 22	J A 30	J A 15	E B 13	E B 14	J A 37	J A 37	34	39	42	J A 61	J A 100	J A 51	J A 36	J A 35	33	J A 24	23	57	J A 42	J A 43	J A 28
9	23	J A 24	J A 36	J A 93	J A 74	J A 44	J A 33	J A 33	J A 36	G 25	G	G 29	J A 48	34	G	G	J A 41	E B 15	J A 19	J A 22	J A 19	19	E B 13	E B 15
10	24	J A 22	J A 39	J A 35	J A 27	20	E B 15	G	J A 21	G 21	G	45	34	G	G	G	25	20	J A 31	E B 13	J A 21	E B 13	E B 13	J A 35
11	J A 28	J A 49	J A 23	24	20	E B 13	E B 14	J A 20	27	30	37	40	G 21	G 32	37	29	J A 31	J A 44	21	J A 27	E B 13	J A 24	E B 13	J A 73
12	J A 34	20	E B 13	22	J A 18	E B 14	E B 13	J A 21	J A 28	60	J A 54	G 29	G 29	G	G 24	G 23	G 20	J A 18	J A 22	27	J A 38	E B 14	J A 28	J A 42
13	J A 44	J A 37	J A 21	20	E B 13	E B 13	E B 13	E B 13	J A 33	J A 33	G	36	G	G 29	G 25	G	E B 21	E B 14	E B 13	E B 13	J A 19	J A 35	J A 21	20
14	J A 22	21	E B 13	20	E B 15	E B 13	E B 13	G	G 26	J A 53	J A 54	J A 53	36	G 33	G	G 26	G	E B 14	J A 20	21	20	E B 13	E B 13	J A 26
15	J A 22	J A 25	J A 21	21	E B 16	E B 13	E B 13	E B 15	G	32	J A 49	J A 70	36	G 20	32	J A 39	23	E B 14	E B 14	J A 21	31	J A 26	J A 35	J A 23
16	J A 26	J A 26	21	E B 13	18	22	22	J A 19	G	J A 38	39	G 33	J A 42	G	G 30	G 21	G 21	18	J A 21	J A 19	E B 14	E B 13	E B 15	E B 14
17	J A 23	J A 21	E B 13	E B 13	J A 20	20	J A 41	G	G	30	33	36	G	G	31	32	J A 33	J A 34	30	22	J A 20	E B 15	E B 14	E B 15
18	J A 20	E B 13	J A 19	J A 22	J A 23	J A 21	20	20	G	32	J A 40	J A 36	J A 51	43	G	J A 33	J A 22	E B 13	22	21	E B 14	E B 15	E B 14	E B 14
19	E B 14	E B 14	E B 14	E B 13	E B 13	E B 14	E B 13	E B 16	G	G	G	39	38	J A 53	J A 36	J A 32	23	E B 15	20	E B 14	E B 14	E B 14	E B 15	E B 14
20	E B 13	E B 14	E B 15	J A 21	J A 35	35	27	J A 30	J A 34	J A 43	J A 42	J A 45	J A 47	J A 42	J A 43	J A 35	G	E B 16	E B 13	E B 13	E B 13	E B 13	E B 15	E B 14
21	E B 15	18	17	E B 13	21	27	J A 20	J A 33	J A 47	30	J A 37	35	J A 45	J A 50	J A 32	53	49	E B 16	E B 13	E B 15	E B 14	E B 14	E B 13	E B 13
22	E B 15	E B 13	J A 21	J A 39	J A 27	26	24	J A 17	26	30	35	39	J A 51	37	33	30	J A 47	E B 15	B J A 21	21	J A 19	22	20	E B 13
23	E B 14	E B 13	E B 13	E B 13	E B 13	E B 15	19	J A 26	G 22	J A 51	G	39	J A 42	J A 42	G	32	J A 43	19	J A 22	19	20	E B 14	E B 13	E B 14
24	E B 13	J A 31	J A 20	J A 21	22	20	E B 13	J A 17	G	G	G 28	G 30	35	J A 48	J A 38	29	J A 33	38	J A 30	E B 14	E B 13	E B 14	E B 15	E B 13
25	E B 14	21	J A 42	J A 67	J A 52	J A 28	E B 14	G	G	G	33	J A 35	39	36	37	34	J A 24	16	24	21	E B 13	E B 16	E B 14	E B 13
26	19	E B 13	25	18	J A 26	21	E B 15	G	J A 29	G	37	37	J A 42	J A 41	32	29	G	E B 15	E B 14	E B 13	E B 14	E B 14	E B 14	E B 13
27	E B 13	E B 13	22	E B 13	E B 13	E B 14	E B 14	G	G 23	32	J A 50	34	35	G	G 30	G	26	E B 13	E B 13	E B 14	E B 15	E B 13	E B 13	E B 13
28	E B 13	E B 13	E B 13	E B 13	E B 14	E B 13	20	J A 22	G	G 27	G	G	G	G	G 23	31	30	37	J A 22	J A 17	E B 15	E B 13	E B 13	E B 14
29	E B 13	E B 13	E B 14	21	20	E B 13	E B 13	G	G 24	J A 32	J A 34	J A 38	G	G	G	G	G 16	E B 15	E B 14	E B 14	E B 13	S	E B 15	E B 13
30	E B 13	E B 16	21	22	E B 14	E B 14	E B 13	G	24	G	G 22	G	G 25	G	34	30	G 22	20	21	E B 13	E B 13	E B 16	E B 14	E B 13
31	E B 14	E B 14	E B 13	E B 14	E B 13	E B 13	E B 14	J A 22	G 25	J A 32	J A 34	39	G 34	G	G	G 19	G	E B 17	E B 14	E B 13	E B 14	18	E B 13	E B 13
	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	30	31	31
MED	E B 15	18	19	20	E B 15	E B 15	E B 14	J A 20	G	30	35	36	35	G	G	29	24	17	21	19	E B 15	E B 14	E B 14	E B 14
U Q	J A 23	J A 24	J A 22	J A 22	J A 22	21	20	J A 22	J A 28	J A 34	J A 42	J A 40	J A 42	J A 42	J A 34	J A 32	J A 33	J A 23	J A 23	J A 21	20	22	J A 20	J A 23
L Q	E B 13	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	G	G 26	G	G	G	G	G	G 30	G	G	E B 15	E B 14	E B 14	E B 14	E B 13	E B 13	E B 13

JAN. 1993 FOES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JAN. 1993 FBES (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 14	E B 13	E B 14	E B 13	E B 13	E B 14	E B 13	G	G 17	G	32	G 30	G	G	G 23	G 24	28	17	E B 15	E B 13	E B 15	E B 15	E B 14	E B 14
2	E B 14	E B 15	E B 14	E B 13	E B 12	E B 13	E B 14	E B 15	G	30	G	G 28	G 29	G	G 25	G 22	21	22	18	18	E B 14	E B 15	E B 14	E B 15
3	E B 15	E B 14	19	19	E B 13	E B 15	E B 14	16	29	41	G 25	G 25	E B 35	46	U G 30	29	24	17	E B 13	E B 16	E B 14	E B 13	E B 15	E B 16
4	E B 15	E B 16	E B 13	E B 13	E B 13	E B 14	16	18	26	30	34	G 27	G	G	G	G	G	E B 16	E B 13	E B 14	E B 15	E B 13	E B 13	E B 13
5	E B 13	E B 15	E B 13	E B 15	E B 13	E B 14	E B 13	16	G	30	35	33	33	G 27	G 23	G	G	E B 14	E B 15	E B 13	E B 14	E B 15	15	18
6	E B 13	E B 14	E B 13	E B 13	E B 13	E B 15	E B 13	E B 15	G	G	G 24	G	G	G	G 23	G	21	E B 14	E B 15	E B 14	E B 13	E B 14	E B 14	E B 13
7	E B 14	E B 13	E B 13	E B 13	E B 13	E B 15	E B 13	E B 14	27	30	33	35	34	36	G 26	G 19	22	20	15	15	19	18	16	E B 13
8	16	17	17	17	E B 13	E B 13	E B 14	G	G	32	37	37	49	77	33	G 22	30	24	20	E B 15	A A 57	16	26	E B 14
9	E B 13	E B 13	16	25	22	22	E B 13	17	G 18	G 18	G	G 28	35	34	G	G	G	E B 15	16	16	E B 13	E B 14	E B 13	E B 15
10	E B 14	E B 13	22	18	20	E B 16	E B 15	G	G	G 20	G	42	34	G	G	G	24	18	20	E B 13	19	E B 13	E B 13	E B 14
11	16	25	17	E B 13	E B 13	E B 13	E B 14	E B 15	25	30	36	38	G 20	G 31	35	28	26	19	E B 17	21	E B 13	E B 13	E B 13	A A 73
12	18	E B 14	E B 13	E B 13	E B 13	E B 14	E B 13	20	25	32	33	G 28	G 28	G	G 21	G 20	G 17	15	17	18	24	E B 14	16	E B 13
13	18	20	16	E B 13	E B 13	E B 13	E B 13	E B 13	24	G 21	G	35	G	G 28	G 24	G	E B 21	E B 14	E B 13	E B 13	E B 13	17	E B 13	E B 13
14	E B 13	E B 13	E B 13	E B 13	E B 15	E B 13	E B 13	G	G 23	37	38	36	35	G 32	G	G 25	G	E B 14	19	E B 14	E B 14	E B 13	E B 13	E B 13
15	17	17	15	E B 13	E B 16	E B 13	E B 13	E B 15	G	31	34	35	35	G 19	32	G	22	E B 14	E B 14	18	U A 30	E B 13	16	16
16	16	20	E B 13	E B 13	E B 13	E B 14	E B 15	E B 14	G	34	32	G 31	34	G	G 24	G 20	G 17	16	18	E B 14	E B 14	E B 13	E B 15	E B 14
17	22	17	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	30	33	35	G	G	31	32	26	29	25	20	18	E B 15	E B 14	E B 15
18	E B 14	E B 13	E B 13	17	17	17	E B 13	G	G	31	34	34	G 31	33	G	G 21	G 17	E B 13	E B 14	E B 14	E B 14	E B 15	E B 14	E B 14
19	E B 14	E B 14	E B 14	E B 13	E B 13	E B 14	E B 13	E B 16	G	G	G	36	36	37	G 29	G 26	22	E B 15	E B 14	E B 14	E B 14	E B 14	E B 15	E B 14
20	E B 13	E B 14	E B 15	18	20	A A 35	16	18	G 20	G 20	G 27	39	35	34	G	30	G	E B 16	E B 13	E B 13	E B 13	E B 13	E B 15	E B 14
21	E B 15	E B 14	E B 13	E B 13	E B 12	16	15	16	26	30	32	34	38	38	G 30	45	41	E B 16	E B 13	E B 15	E B 14	E B 14	E B 13	E B 13
22	E B 15	E B 13	E B 14	17	19	17	18	G 14	25	29	33	G	36	34	30	30	G 16	E B 15	15	E B 13	16	E B 13	E B 13	E B 13
23	E B 14	E B 13	E B 13	E B 13	E B 13	E B 15	E B 14	21	G 21	40	G	36	36	36	G	30	G 19	16	18	E B 13	E B 14	E B 14	E B 13	E B 14
24	E B 13	17	E B 13	E B 14	E B 13	E B 14	E B 13	15	G	G	G 27	G 29	35	46	33	28	G 17	23	17	E B 14	E B 13	E B 14	E B 15	E B 13
25	E B 14	E B 14	15	21	18	16	E B 14	G	G	G	32	34	37	34	35	33	22	16	E B 14	E B 13	E B 13	E B 16	E B 14	E B 13
26	E B 13	E B 13	16	17	22	E B 14	E B 15	G	25	G	34	35	36	35	32	27	G	E B 15	E B 14	E B 13	E B 14	E B 14	E B 14	E B 13
27	E B 13	E B 13	E B 13	E B 13	E B 13	E B 14	E B 14	G	G 23	31	G	34	34	G	G 28	G	25	E B 13	E B 13	E B 14	E B 15	E B 13	E B 13	E B 13
28	E B 13	E B 13	E B 13	E B 13	E B 14	E B 13	E B 13	17	G	G	G	G	G	G	G 20	G 23	25	27	19	17	E B 15	E B 13	E B 13	E B 14
29	E B 13	E B 13	E B 14	E B 13	E B 13	E B 13	E B 13	G	G 19	G 25	30	33	G	G	G	G	G 15	E B 15	E B 14	E B 14	E B 13	S	E B 15	E B 13
30	E B 13	E B 16	E B 14	E B 13	E B 14	E B 14	E B 13	G	G 22	G	G 20	G	G 24	G	34	30	G 15	E B 17	E B 13	E B 13	E B 13	E B 16	E B 14	E B 13
31	E B 14	E B 14	E B 13	E B 14	E B 13	E B 13	E B 14	E B 14	G 19	31	32	G	G 30	G	G	G 18	G	E B 17	E B 14	E B 13	E B 14	E B 13	E B 13	E B 13
	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	30	31	31
MED	E B 14	E B 14	E B 14	E B 13	E B 13	E B 14	E B 14	G	G	30	32	34	34	G	G	G	21	E B 16	E B 15	E B 14	E B 14	E B 14	E B 14	E B 14
U Q	15	16	15	17	16	15	14	16	25	31	34	35	35	35	31	29	24	18	18	16	15	E B 15	15	E B 14
L Q	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G 23	G	G	G 31	G	G	G 25	G 23	G 19	E B 15	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13

JAN. 1993 FBES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JAN. 1993 FMIN (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

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

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

IONOSPHERIC DATA STATION KOKUBUNJI

JAN. 1993 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	270	F 285	F 300	295	310	320	295	345	355	320	340	340	330	350	345	320	350	330	335	325	345	295	295	300
2	290	285	295	305	305	280	330	340	S 340	350	325	325	335	340	340	345	350	320	290	300	295	305	280	295
3	335	300	330	280	275	285	335	360	360	335	325	330	330	315	315	330	330	305	330	340	H 300	290	285	305
4	V 310	F 300	330	300	275	335	305	340	360	345	340	355	340	V 330	335	355	335	335	325	350	320	300	305	295
5	300	290	325	285	F 275	325	F 350	340	350	330	330	335	315	325	340	330	345	340	350	335	320	300	270	F 265
6	305	310	315	310	300	305	335	350	350	365	320	340	340	320	315	350	365	330	340	340	345	275	265	275
7	290	275	F 310	320	330	325	325	350	365	365	325	345	350	335	340	345	375	340	345	330	280	295	300	300
8	340	290	270	275	285	340	330	345	360	340	345	335	355	A 325	340	345	360	325	315	350	A	290	J R 295	300
9	285	270	F 285	F 315	F 345	340	295	335	365	345	325	345	320	320	340	340	350	330	335	305	335	325	270	280
10	290	295	315	325	275	280	305	345	335	355	335	340	320	335	345	350	350	310	320	305	345	290	275	270
11	280	280	290	300	280	300	320	350	355	320	320	370	335	305	315	335	350	320	320	365	305	F 270	F 320	A
12	260	280	280	320	255	265	320	350	350	315	V 340	345	320	320	320	325	345	325	320	335	345	300	275	315
13	320	270	290	315	330	295	355	345	355	335	320	350	345	310	330	335	355	325	320	345	330	320	270	280
14	275	290	300	285	285	270	320	330	360	345	320	320	330	315	315	320	330	315	315	350	320	275	270	290
15	290	285	285	285	270	270	345	355	350	345	345	325	320	305	320	330	345	330	315	310	A	F 280	F 275	F 315
16	J F 290	295	290	270	285	270	320	340	370	355	325	345	325	335	315	325	350	345	285	320	340	325	285	285
17	270	270	V 295	300	295	295	325	375	360	340	340	355	H 320	335	350	330	355	320	310	300	325	315	270	280
18	295	305	330	335	275	275	310	360	365	340	350	330	335	350	315	330	350	325	300	345	340	300	285	285
19	280	280	285	285	295	300	310	365	350	345	335	320	335	360	320	335	345	360	325	290	320	330	300	280
20	280	280	280	320	380	I A 350	260	345	345	340	335	330	320	325	335	335	350	335	305	340	300	315	280	270
21	280	270	285	315	410	275	285	310	340	340	350	330	340	355	340	340	345	340	315	310	310	305	295	290
22	290	V 285	305	300	310	315	295	340	355	350	355	340	335	355	330	330	335	345	300	325	310	F 315	F 300	305
23	285	280	305	320	365	330	295	350	365	335	345	345	Z 325	320	350	355	350	360	330	320	310	330	290	285
24	285	280	290	280	315	300	320	360	375	365	340	335	330	370	345	340	365	350	310	315	340	325	275	285
25	290	305	295	300	315	295	290	355	385	V 340	335	325	310	325	330	365	345	345	310	350	340	R 295	F 270	F 285
26	265	285	320	345	280	275	270	325	330	340	310	325	325	345	340	355	V 325	330	330	355	325	325	270	280
27	320	280	275	285	310	285	305	360	340	335	355	H 285	340	V 325	350	345	345	340	325	345	345	305	F 295	F 265
28	290	F 300	335	300	F 300	F 300	F 325	375	330	340	330	350	330	H 315	H 310	350	350	350	310	340	325	335	290	290
29	290	295	290	310	335	295	320	355	355	355	350	345	340	325	330	340	340	340	315	350	345	I S 315	285	290
30	285	300	295	295	300	310	335	355	355	355	365	335	330	350	335	335	340	330	310	320	335	305	285	300
31	325	300	280	305	310	320	345	355	345	330	315	U R 325	335	335	325	330	325	325	320	315	335	250	265	290
	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	29	31	31	30
MED	290	285	295	300	300	300	320	350	355	340	335	335	330	325	335	335	350	330	320	335	325	305	285	288
U Q	300	300	315	315	315	320	330	355	360	350	345	345	340	345	340	345	350	340	330	345	340	320	295	300
L Q	280	280	285	285	280	280	295	340	345	335	325	325	320	320	320	330	340	325	310	315	310	290	270	280

JAN. 1993 M(3000)F2 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JAN. 1993 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9H)

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											L	L	L	L	L	L								
2												L	L	L	L									
3											U L 340	U L 375	L		L									
4										L	L	L	L	L	L	L								
5										L	L	L	L	L	L									
6												L	L	L	L									
7										L 410	L	L	L	L	L	L								
8									L		L	L		A	L	L								
9										L		L	L	L	L	L								
10											L	L	L	U L 355	L	L								
11											L	L	L	L 370										
12											L	L	L	L	L									
13											L	L	L	L	L	L								
14											L	L	L	L	L									
15											L	L	L		L	L								
16										L	L	L	L	L	L									
17										L	L	380	L	L	L	L								
18											L	L	L	L	L	L								
19									L	L	U L 405		L	L	L									
20										L	L	L	L	L	L	L								
21										L	L	L	L	L	L 395	A								
22										L	L	L	L	L	L	L	L							
23											L	L	L	L	L	L								
24									L		L	U L 390	L	A	L	L								
25									L	L	L	L 415	L	U L 365	L	L	U L 420							
26										L	L	L	U L 360	U L 405	L	L								
27										L	L	U L 335	U L 355	L	L	L								
28									L	L	L	L	U L 350	U L 390	U L 380	L								
29										L	L	U L 355	U L 350	L	L	U L 375								
30										L	U L 370	U L 400	L	L	L	L	L							
31									L	L	L	U L 350	U L 340	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										1	3	8	5	5	2	1	1							
MED										L 410	U L 370	U L 378	U L 350	U L 370	L 388	U L 375	U L 420							
U Q											U L 405	U L 395	U L 358	U L 398										
L Q											U L 340	U L 352	U L 345	U L 360										

JAN. 1993 M(3000)F1 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JAN. 1993 H'F2 (KM) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											240	245	245	230	250	230								
2												255	240	235	235									
3											270	255	240		250									
4										235	240	240	240	245	255	225								
5										255	255	235	250	230	230									
6												245	240	230	265									
7										210	270	240	240	230	245	230								
8									230		240	255			A 250	235								
9										230		250	260	270	240	215								
10											225	260	235	250	235	230								
11											280	225	230	305										
12											250	235	230	250	250									
13											265	250	245	260	245	240								
14											270	265	250	260	L 270									
15											245	250	240		265	235								
16										250	260	250	240	250	240									
17										225	230	260	240	240	235	265								
18											245	255	250	245	265	260								
19									220	235	250		240	230	255									
20										240	240	260	255	250	245	240								
21										240	250	245	245	250	235	255								
22										240	240	240	250	245	265	240	225							
23											240	240	235	250	250	245								
24									220		235	260	260	230	265	255								
25									210	225	250	245	260	255	260	225	215							
26										240	265	255	255	225	235	240								
27										240	235	355	260	250	235	230								
28									260	240	235	250	265	230	225	250								
29										225	240	250	250	255	245	235								
30										235	245	250	270	240	250	245	235							
31									225	275	250	275	265	235	250	235								
	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									6	17	28	30	30	28	30	22	3							
MED									222	240	245	250	245	245	250	238	225							
U Q									230	240	258	255	255	250	255	245	235							
L Q									220	228	240	245	240	230	235	230	215							

JAN. 1993 H'F2 (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JAN. 1993 H'F (KM) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	350	330	300	290	260	270	280	225	215	225	210	210	220	210	225	210	215	205	225	230	215	265	290	290
2	285	295	280	270	245	315	250	210	210	220	210	215	235	H 220	215	230	220	230	260	280	285	245	275	260
3	230	265	255	E A 290	330	330	240	220	215	A 245	235	210	230	230	220	230	220	220	240	215	235	275	320	270
4	275	320	250	280	280	240	275	230	230	230	225	235	240	220	230	235	225	240	240	210	235	270	265	280
5	285	280	250	280	285	240	220	230	225	220	A 240	230	215	230	220	230	220	220	210	235	240	265	330	395
6	280	270	260	265	285	255	235	220	225	225	230	220	220	215	220	230	210	205	230	220	215	325	350	340
7	310	320	290	235	220	285	260	220	215	210	H 195	235	225	225	240	235	210	220	220	230	285	A 290	290	270
8	240	305	345	360	315	220	230	225	230	230	235	A 240	230	A	A 245	225	215	225	260	220	A	300	A	275
9	285	320	310	A 300	240	A 260	280	250	225	H 205	H 180	200	215	225	230	220	H 220	205	230	265	240	235	295	320
10	305	290	280	260	A 330	315	275	235	220	225	230	I A 240	215	200	240	230	215	240	260	260	215	255	330	335
11	310	A 365	295	250	295	270	265	225	215	220	225	235	220	H 200	240	235	225	225	245	A 220	225	305	260	A
12	380	310	300	260	H 300	340	265	230	225	250	230	225	215	210	210	235	230	215	245	225	240	290	330	280
13	265	355	315	250	230	295	230	220	220	230	225	235	230	230	250	245	220	220	230	220	250	250	300	310
14	330	300	280	290	310	325	250	245	225	235	240	225	205	H 210	H 230	240	235	215	250	225	H 205	250	340	290
15	275	310	320	295	320	320	235	215	220	225	230	225	210	H 210	240	235	230	225	215	240	A	265	330	265
16	265	310	290	320	290	320	255	235	220	225	215	225	H 205	H 210	215	230	220	220	245	240	225	220	305	310
17	320	320	315	255	250	285	250	220	220	200	H 195	205	215	H 205	210	260	215	220	260	260	235	255	315	325
18	300	265	250	240	A 350	350	275	220	215	230	220	220	210	210	200	H 205	220	220	245	225	215	235	320	305
19	315	325	315	310	285	280	270	225	220	205	H 190	230	235	235	210	220	225	210	230	250	250	230	260	320
20	320	305	320	250	230	I A 350	360	245	235	225	220	A 245	205	230	215	230	225	210	230	230	255	225	315	325
21	330	340	315	255	195	E A 360	315	250	245	230	225	210	230	I A 225	210	A	A 225	215	215	270	255	260	265	285
22	290	300	270	280	260	260	305	245	225	H 225	230	220	220	225	205	235	220	215	250	235	235	230	250	275
23	305	310	280	255	220	235	285	240	225	A 250	H 205	220	220	240	235	215	235	210	230	240	260	225	265	300
24	300	320	305	305	260	270	245	225	225	H 200	205	200	220	A	H 185	240	225	225	235	240	230	210	325	320
25	300	265	290	A 300	265	280	280	235	230	210	205	H 190	245	225	235	225	215	215	235	220	240	315	365	335
26	360	325	255	230	E A 370	285	340	245	230	H 210	225	225	230	210	225	225	H 220	245	215	210	245	225	355	315
27	255	305	325	300	265	315	275	235	225	230	225	H 205	H 195	220	215	220	235	220	235	225	235	250	290	345
28	310	280	250	305	265	285	250	225	225	H 205	195	H 195	H 195	210	215	H 205	225	225	255	225	230	230	310	310
29	285	270	305	285	240	260	250	230	H 215	210	210	200	190	215	230	215	215	215	225	220	230	S	310	300
30	300	300	290	290	275	260	230	225	225	225	210	205	H 200	215	230	230	230	215	230	250	220	240	310	280
31	245	290	300	280	245	240	245	225	220	230	220	210	220	215	220	225	240	240	220	250	225	360	350	285
	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	29	31	30	31	31	31	31	29	30	30	30
MED	300	305	290	280	265	282	260	225	225	225	220	220	220	215	220	230	220	220	235	230	235	252	310	302
U Q	315	320	315	300	300	320	280	235	225	230	230	230	230	225	235	235	225	225	245	250	248	275	330	320
L Q	275	290	270	255	245	260	245	220	220	210	H 205	205	210	210	215	220	215	215	225	220	225	230	290	280

IONOSPHERIC DATA STATION KOKUBUNJI

JAN. 1993 H'E (KM) 135°E MEAN TIME (G.M.T. + 9H)

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

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

JAN. 1993 H'E (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

JAN. 1993 H'ES (KM) 135°E MEAN TIME (G.M.T. + 9H)

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	100	100	95	B	B	B	B	130	110	140	110	110	G	G	105	105	100	105	100	B	B	B	B	B
2	B	B	B	B	B	105	B	105	G	190	G	115	115	G	110	110	130	105	100	105	95	100	B	B
3	B	B	105	105	B	B	B	115	120	110	115	110	B	105	110	105	105	110	100	100	B	B	B	B
4	B	B	B	B	B	B	140	110	155	110	110	115	G	G	G	G	G	B	B	B	B	B	B	B
5	B	B	B	B	B	B	B	115	G	120	110	110	110	110	110	110	110	B	100	100	B	115	110	110
6	B	115	B	B	B	B	B	115	G	G	115	G	G	G	110	G	150	110	105	105	B	B	100	100
7	100	110	120	B	B	B	B	B	150	150	E G 180	155	160	125	120	100	120	115	115	120	120	105	110	135
8	110	110	110	105	115	B	B	110	150	E G 180	155	140	120	115	115	120	110	105	105	110	120	115	110	135
9	115	115	125	110	110	110	110	110	110	110	G	110	135	140	G	G	100	B	105	105	105	105	B	B
10	110	110	110	110	110	115	B	G	110	110	G	120	135	G	G	G	150	110	110	B	105	B	B	110
11	110	110	95	100	120	B	B	120	155	150	125	140	110	120	170	E G 175	130	120	125	110	B	125	B	105
12	120	115	B	110	110	B	B	170	115	120	115	115	110	G	110	105	110	110	110	105	105	B	110	125
13	110	110	110	110	B	B	B	B	115	115	G	E G 190	G	110	110	G	B	B	B	B	120	110	110	115
14	120	110	B	110	B	B	B	G	120	115	110	110	120	120	G	120	G	B	100	105	115	B	B	110
15	100	105	110	110	B	B	B	B	G	185	115	105	160	110	E G 170	105	155	B	B	100	105	115	110	110
16	115	105	105	B	105	105	100	120	G	115	115	115	110	G	105	105	105	105	100	110	B	B	B	B
17	100	100	B	B	110	110	120	G	G	160	115	170	G	G	130	180	100	95	95	95	95	B	B	B
18	115	B	105	105	100	105	105	105	G	135	115	115	105	115	G	110	110	B	105	110	B	B	B	B
19	B	B	B	B	B	B	B	B	G	G	G	150	155	125	120	115	120	B	105	B	B	B	B	B
20	B	B	B	110	110	110	110	105	110	115	115	125	120	120	120	110	G	B	B	B	B	B	B	B
21	B	120	115	B	115	105	115	110	100	160	120	150	120	115	115	105	100	B	B	B	B	B	B	B
22	B	B	115	110	105	105	110	115	E G 185	155	160	145	120	125	120	E G 200	110	B	105	100	105	110	115	B
23	B	B	B	B	B	B	110	105	105	100	G	125	125	120	G	115	110	120	110	130	100	B	B	B
24	B	110	105	105	110	110	B	105	G	G	120	120	175	110	110	170	110	100	100	B	B	B	B	B
25	B	110	115	110	110	110	B	G	G	G	110	110	165	160	150	125	105	110	105	100	B	B	B	B
26	130	B	110	120	105	115	B	G	140	G	130	120	120	120	120	115	G	B	B	B	B	B	B	B
27	B	B	110	B	B	B	B	G	120	160	110	110	115	G	115	G	190	B	B	B	B	B	B	B
28	B	B	B	B	B	B	115	145	G	110	G	G	G	G	100	100	95	95	95	100	B	B	B	B
29	B	B	B	100	100	B	B	G	115	110	115	115	G	G	G	G	100	B	B	B	B	S	B	B
30	B	B	115	115	B	B	B	G	115	G	105	G	105	G	180	E G 190	110	110	110	B	B	B	B	B
31	B	B	B	B	B	B	B	115	120	130	125	125	120	G	G	105	G	B	B	B	B	105	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	14	16	18	17	15	12	10	19	20	25	24	28	23	18	23	24	25	16	22	18	12	10	8	10
MED	110	110	110	110	110	110	110	115	116	120	115	116	120	120	115	109	110	110	105	105	105	110	110	110
U Q	115	112	115	110	110	110	115	120	145	158	122	140	135	125	120	122	125	110	110	110	118	115	110	125
L Q	100	108	105	105	105	105	110	105	110	110	110	110	110	110	110	105	102	105	100	100	102	105	110	110

IONOSPHERIC DATA STATION KOKUBUNJI

JAN. 1993 TYPES OF ES 135°E MEAN TIME (G.M.T. + 9H)

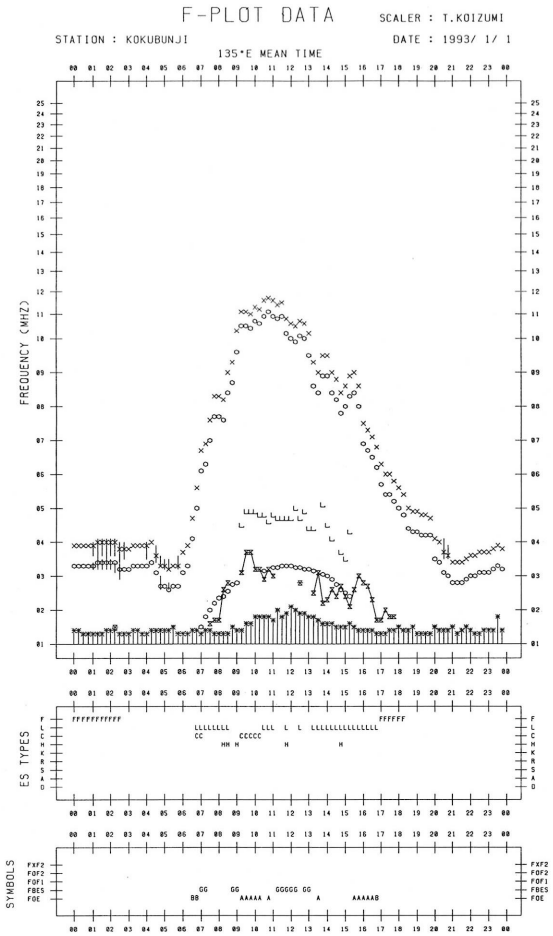
LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

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

JAN. 1993 TYPES OF ES COMMUNICATIONS RESEARCH LABORATORY, JAPAN

f-PLOTS OF IONOSPHERIC DATA

KEY OF F-PLOT	
I	SPREAD
⬡	FOF2, FOF1, FOE
×	FXF2
✳	DOUBTFUL FOF2, FOF1, FOE
⧖	FBES
⌊	ESTIMATED FOF1
↑, Y	FMIN
∧	GREATER THAN
∨	LESS THAN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SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/ 1
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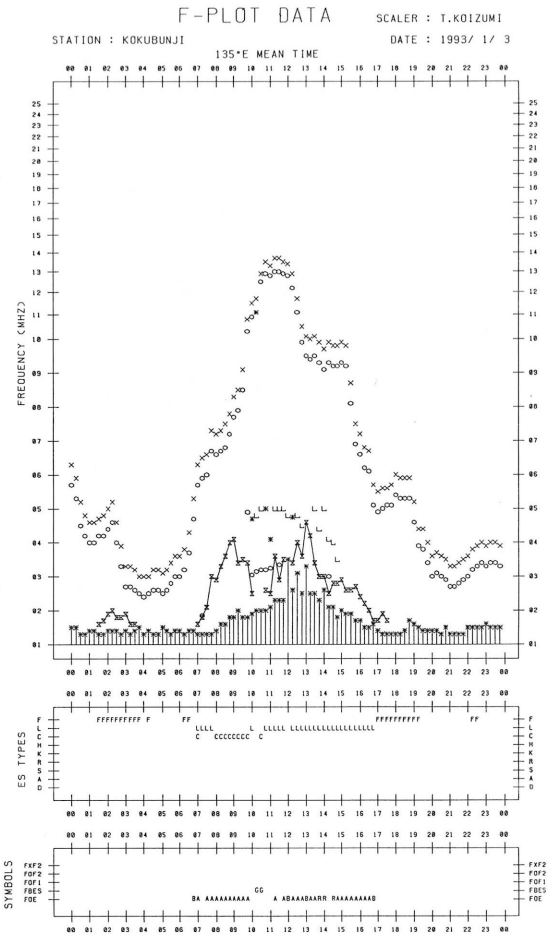
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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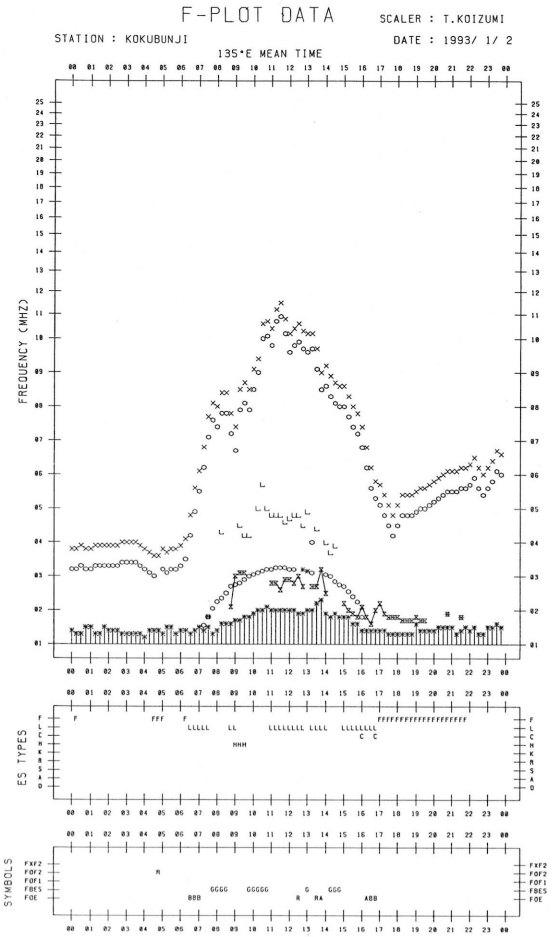
STATION : KOKUBUNJI
DATE : 1993/ 1/ 3
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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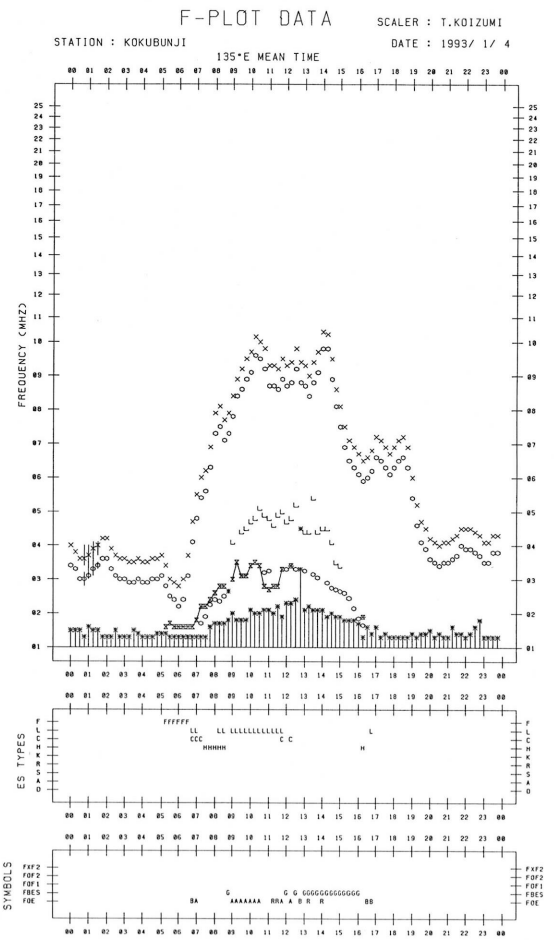
STATION : KOKUBUNJI
DATE : 1993/ 1/ 2
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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STATION : KOKUBUNJI
DATE : 1993/ 1/ 4
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FREQUENCY (MHZ)
ES TYPES
SYMBOLS
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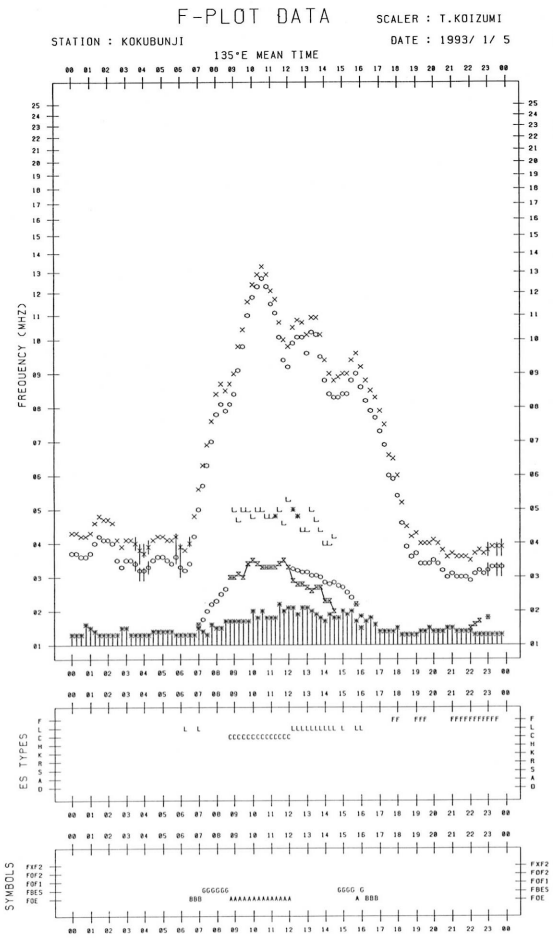
FOF2
FOF1
FBES
FOE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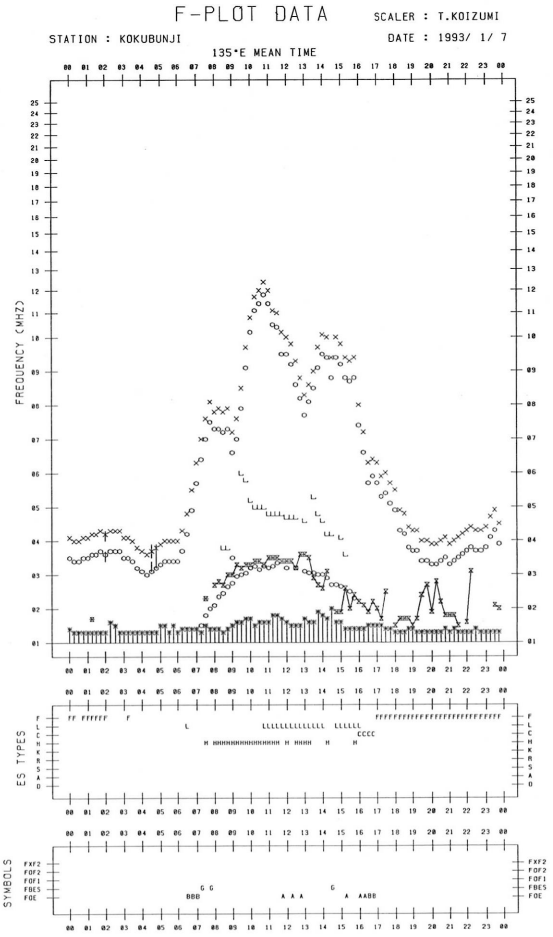
STATION : KOKUBUNJI
DATE : 1993/ 1/ 5
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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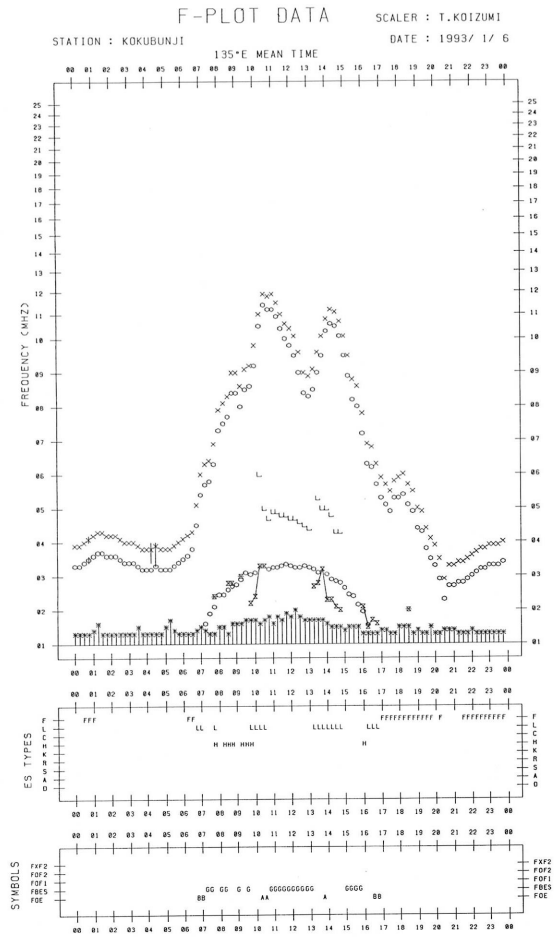
STATION : KOKUBUNJI
DATE : 1993/ 1/ 7
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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STATION : KOKUBUNJI
DATE : 1993/ 1/ 6
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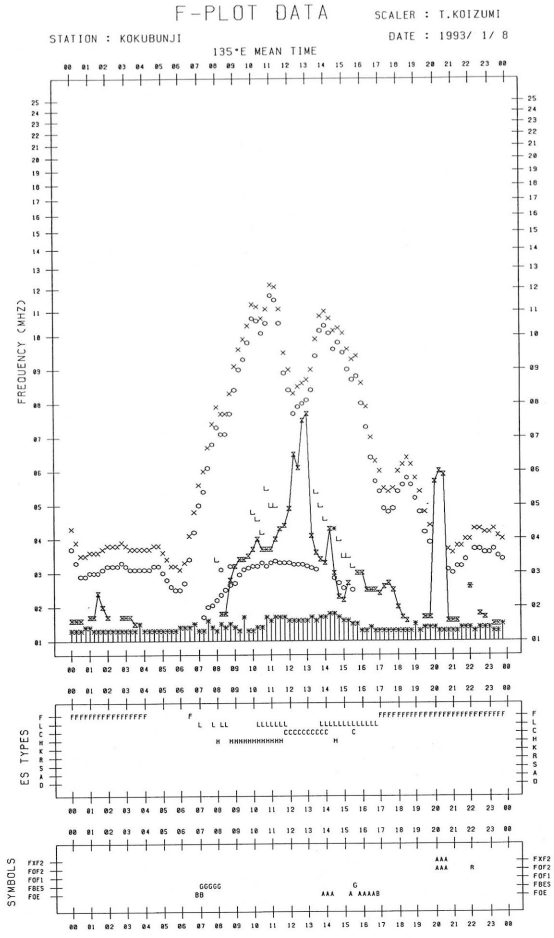
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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STATION : KOKUBUNJI
DATE : 1993/ 1/ 8
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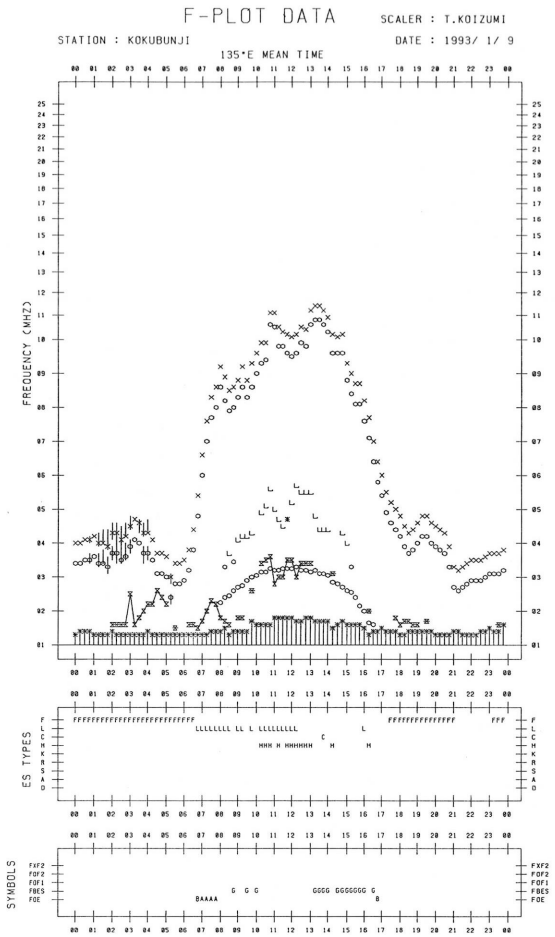
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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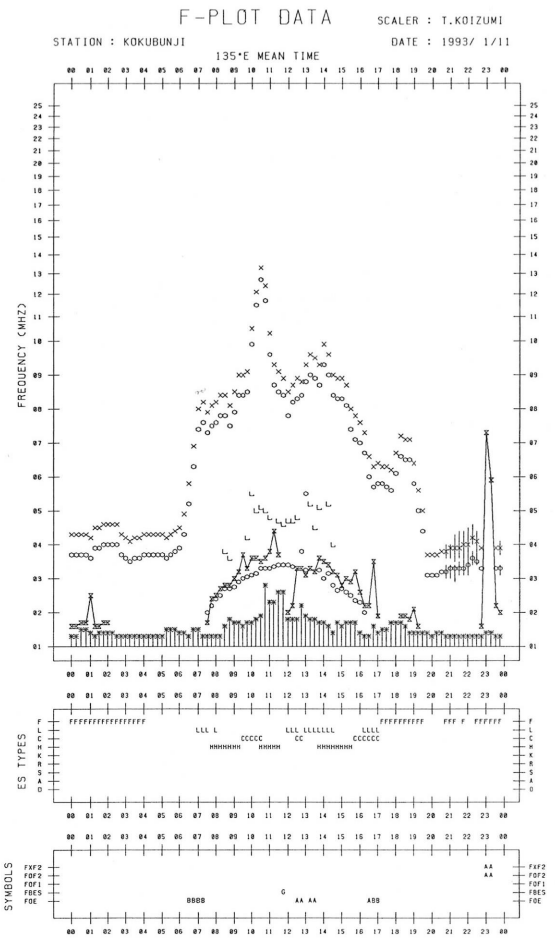
STATION : KOKUBUNJI
DATE : 1993/ 1/ 9
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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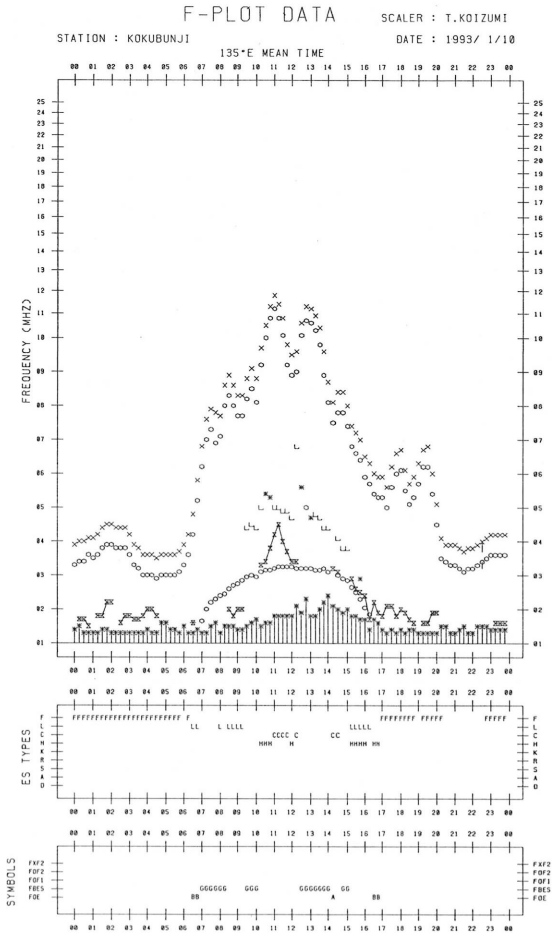
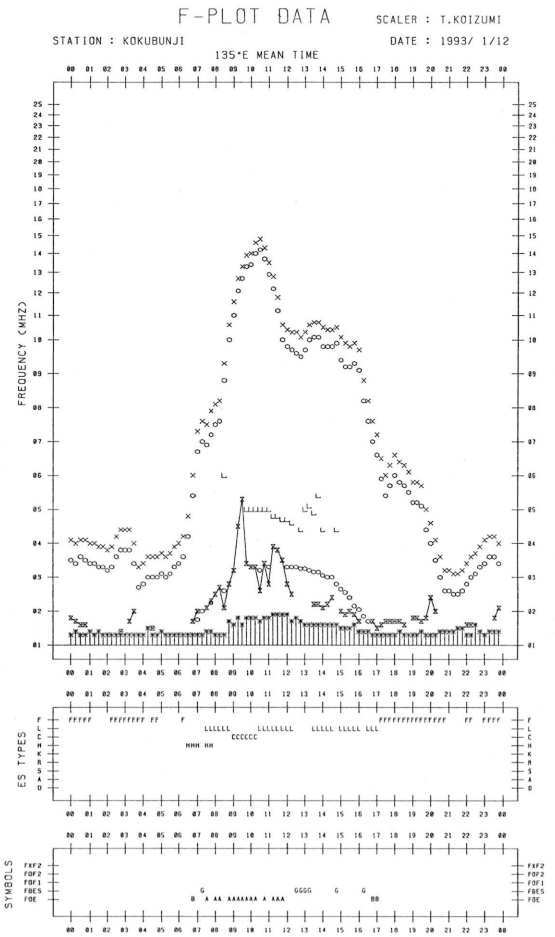
STATION : KOKUBUNJI
DATE : 1993/ 1/11
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/10
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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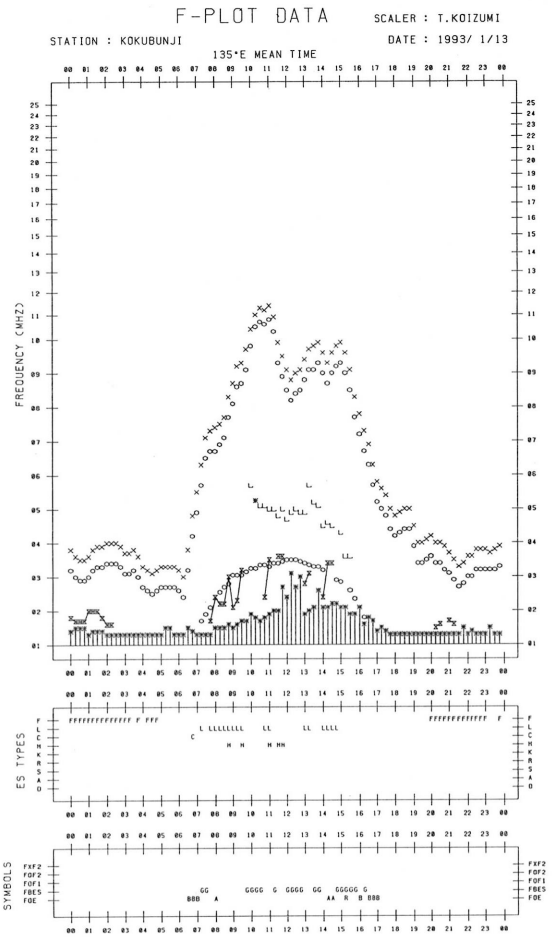
STATION : KOKUBUNJI
DATE : 1993/ 1/12
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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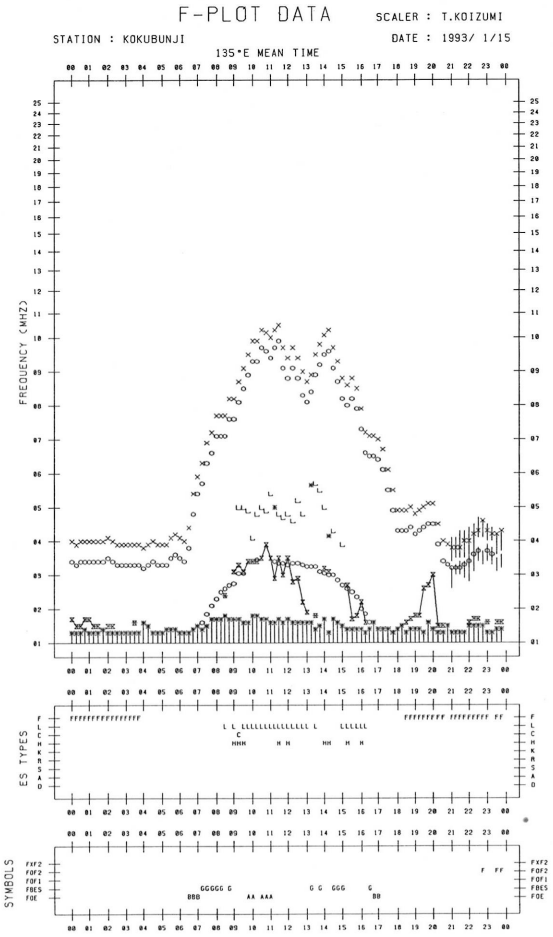
STATION : KOKUBUNJI
DATE : 1993/ 1/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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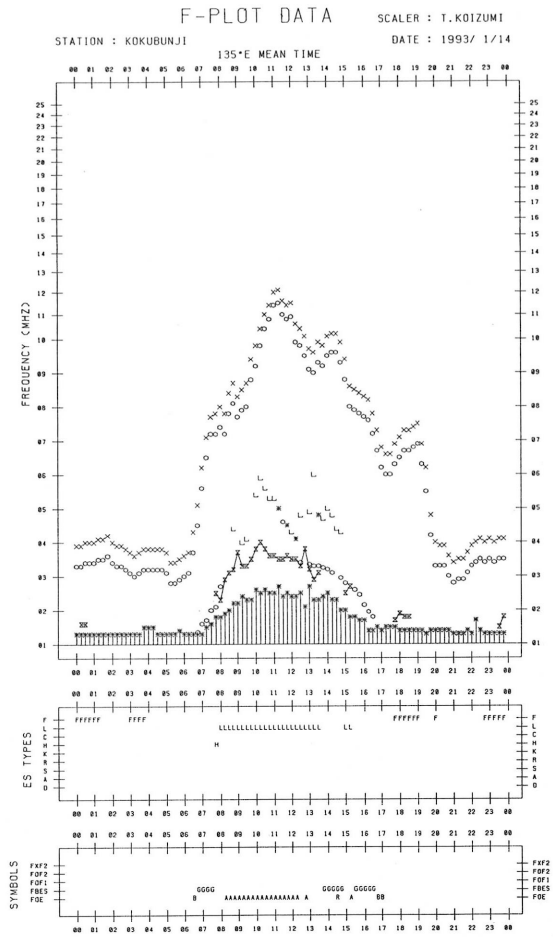
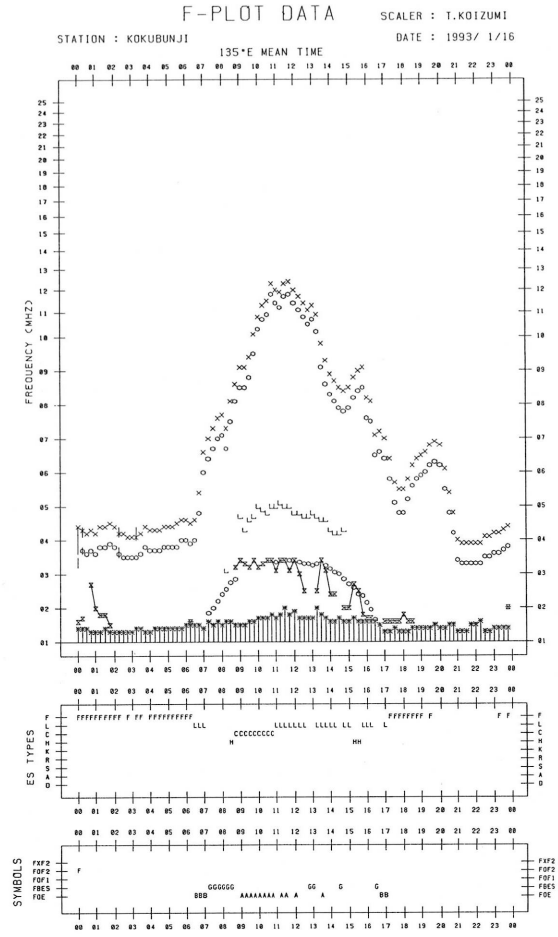
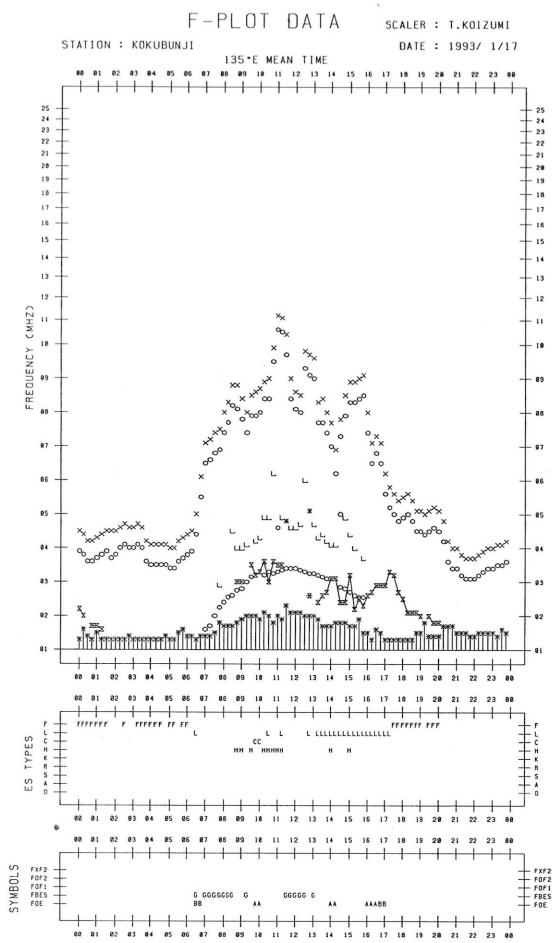
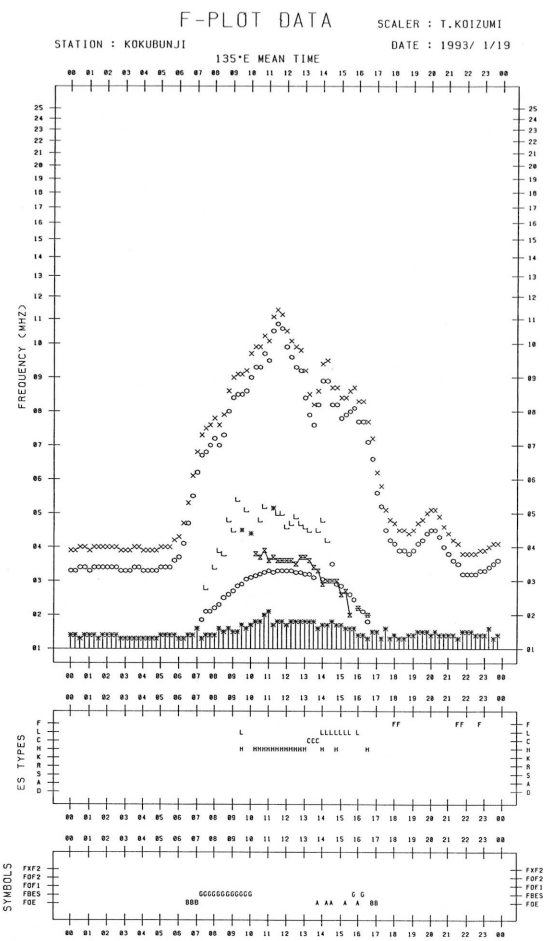
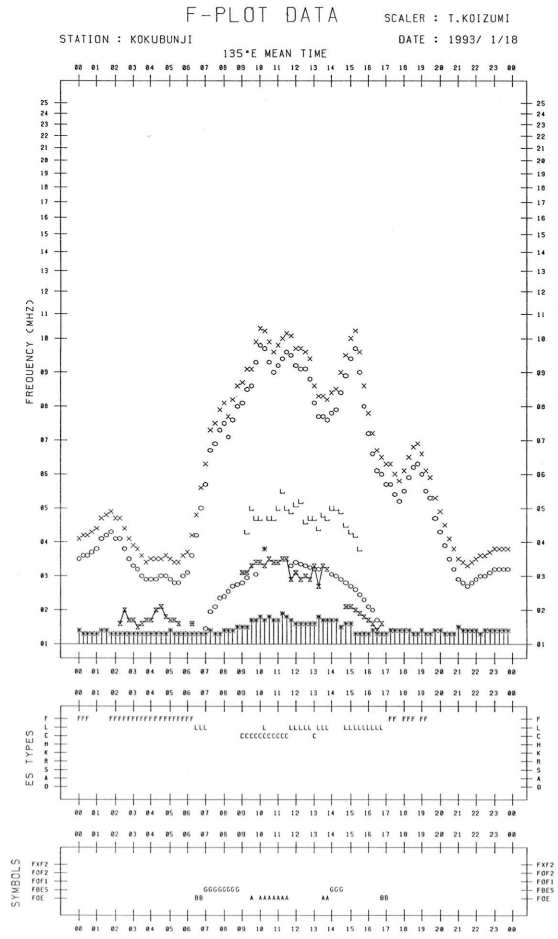
STATION : KOKUBUNJI
DATE : 1993/ 1/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

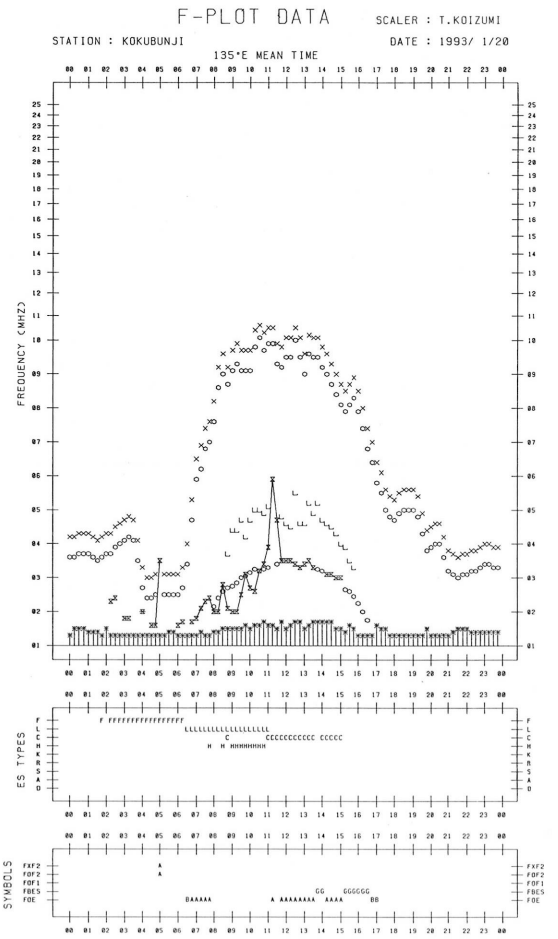

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

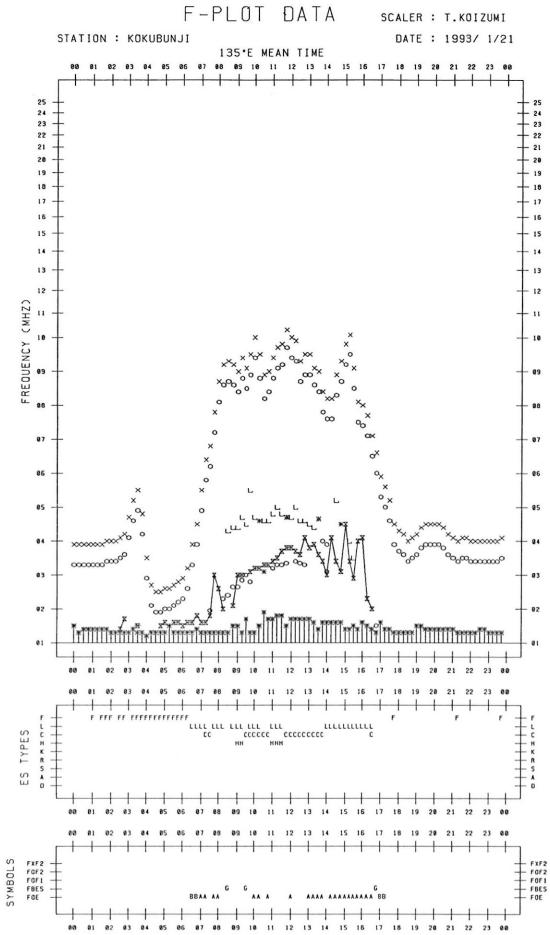

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

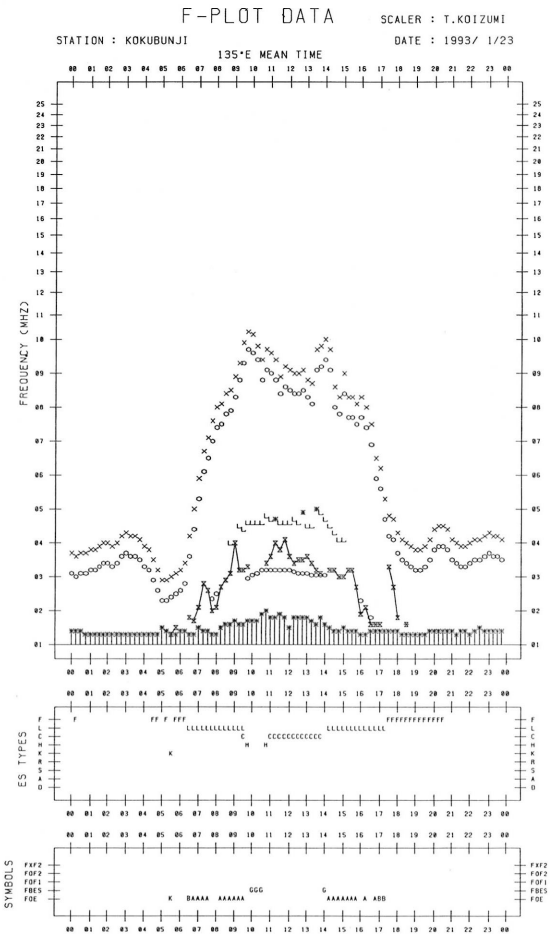

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

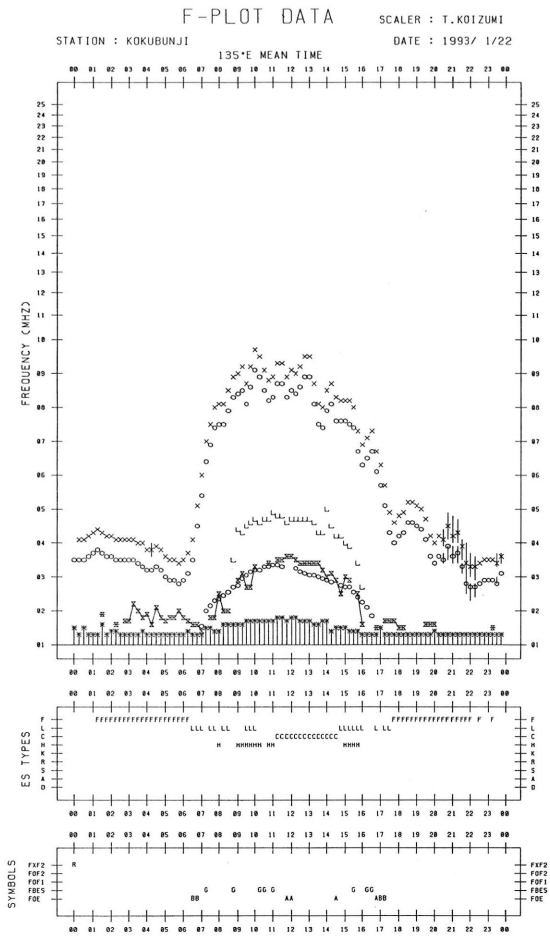

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

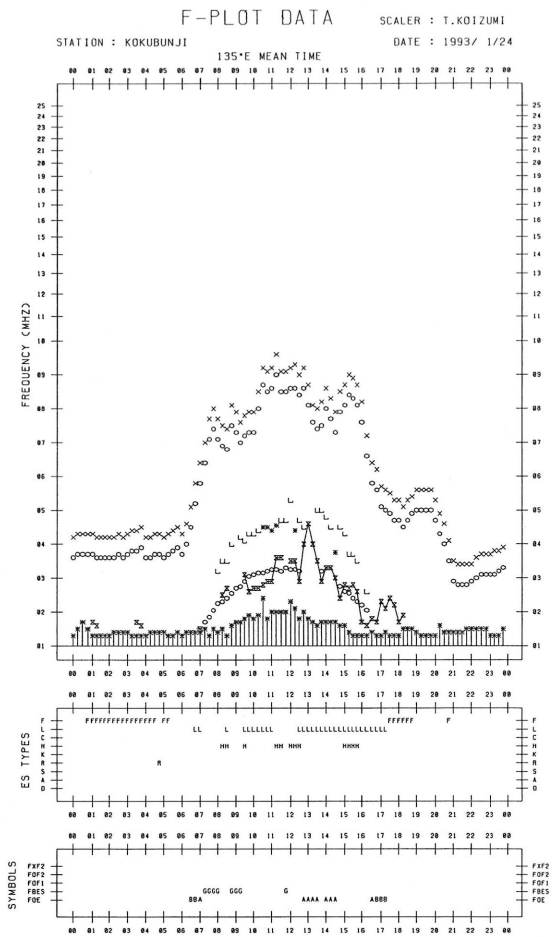

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

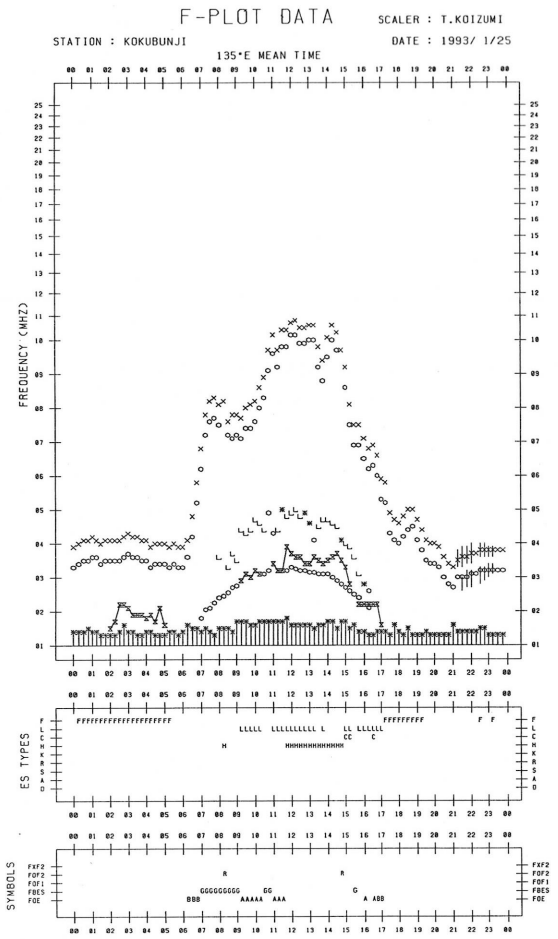

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

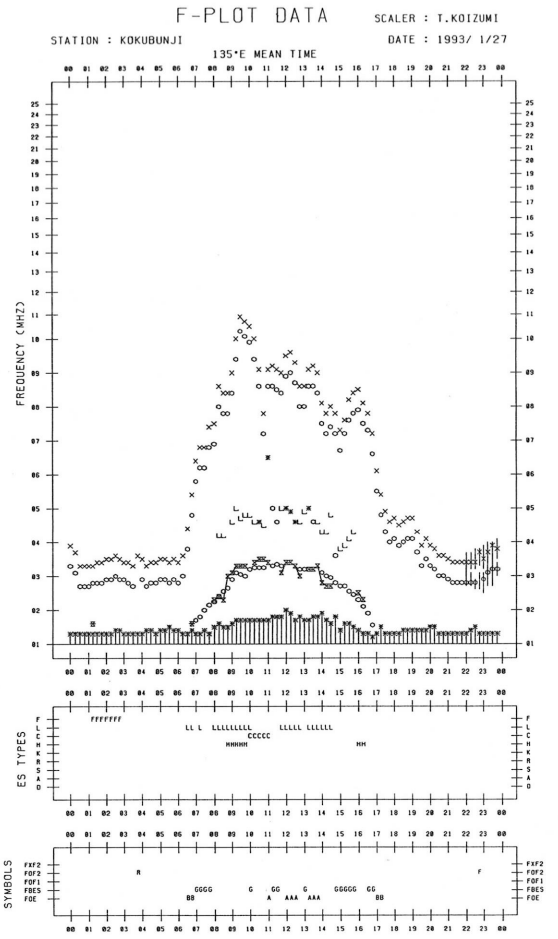

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/21
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

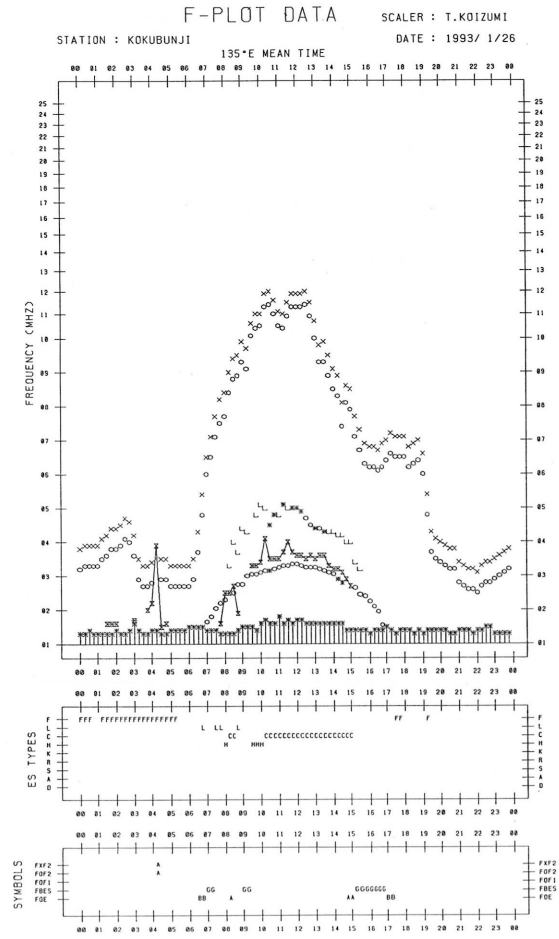

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/23
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

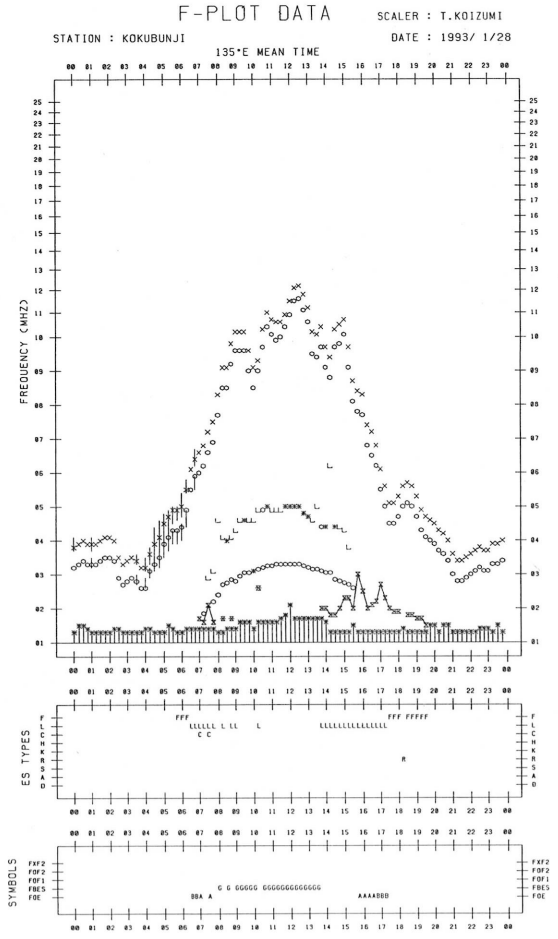

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/22
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

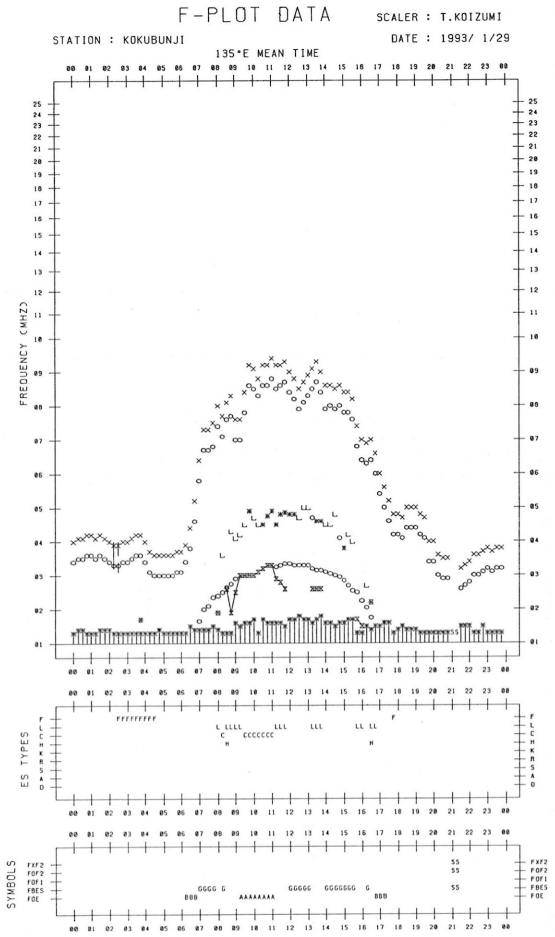

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/24
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

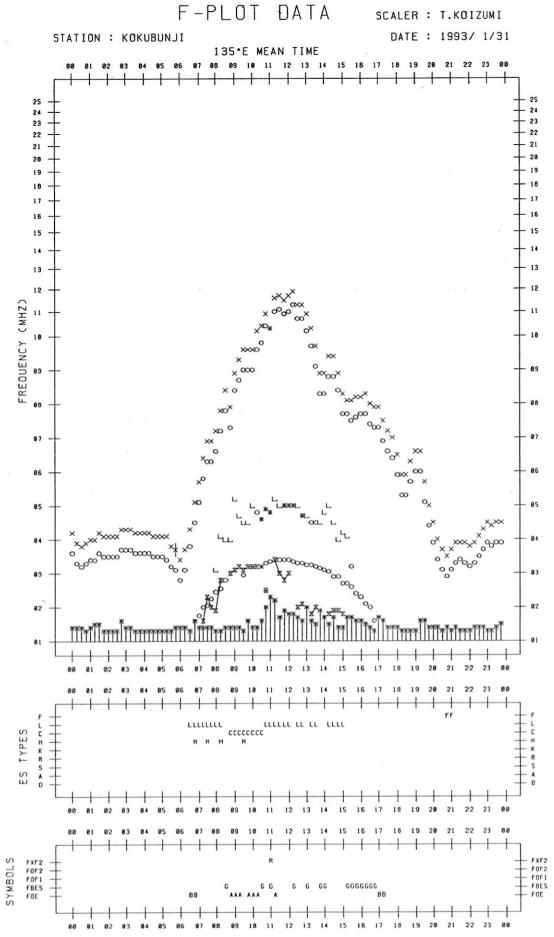

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/25
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

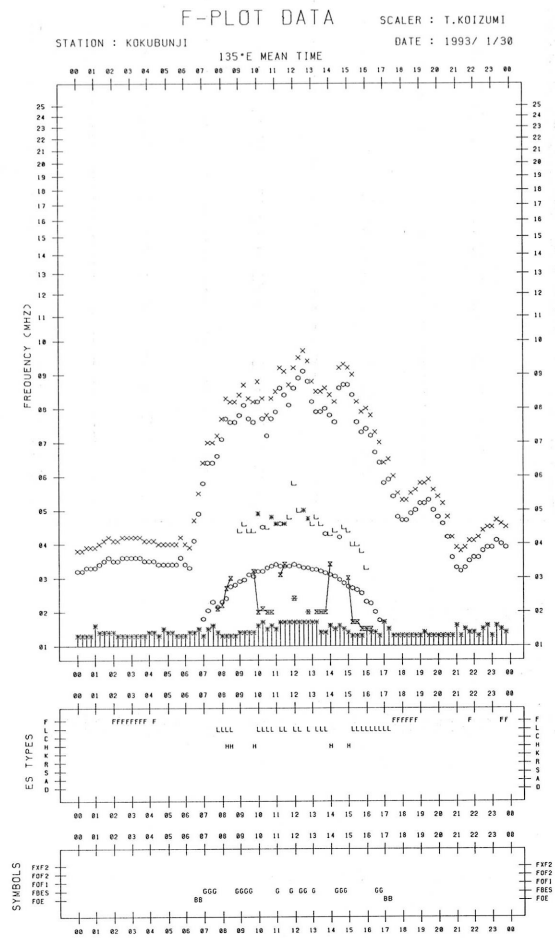

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/27
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/26
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/28
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/29
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/31
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 1/30
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

B. Solar Radio Emission

B1. Daily Data at Hiraiso

200 MHz

Hiraiso January 1993

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

Notes: No observations during the following periods.

7th 2150 - 2357 12th 0210 - 0640

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

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso January 1993

Single-frequency observations

Normal observing period: 2150 - 0755 U.T. (sunrise to sunset)

JAN. 1993	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
2	200	46 C	0533.4	0533.5	4.0	450	100	0
	100	46 C	0538.6	0538.8	6.0	540	300	WL
	100	46 C	2339.0	2341.0	6.0	60	15	0
	200	46 C	2340.2	2341.3	2.0	50	15	0
7	200	43 NS	0130	0352	240D	120	25	ML
	100	46 C	0203.0	0204.8	6.6	110	40	WL
	200	46 C	0204.6	0205.0	2.0	240	50	WL
8	200	44 NS	0000E	0224	300D	40	25	SL
13	200	44 NS	2300E	0543	510D	50	20	0
16	200	43 NS	0007	0127	113	100	20	WL
17	200	44 NS	0000E	0350	300D	120	20	WR
23	200	27 RF	0320	0350	53	20	12	WL
27	200	8 S	0443.2	0443.4	0.7	750	-	0

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

C. RADIO PROPAGATION

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

JAN 1993 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

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

C. RADIO PROPAGATION

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

JAN 1993 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

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

C. Radio Propagation

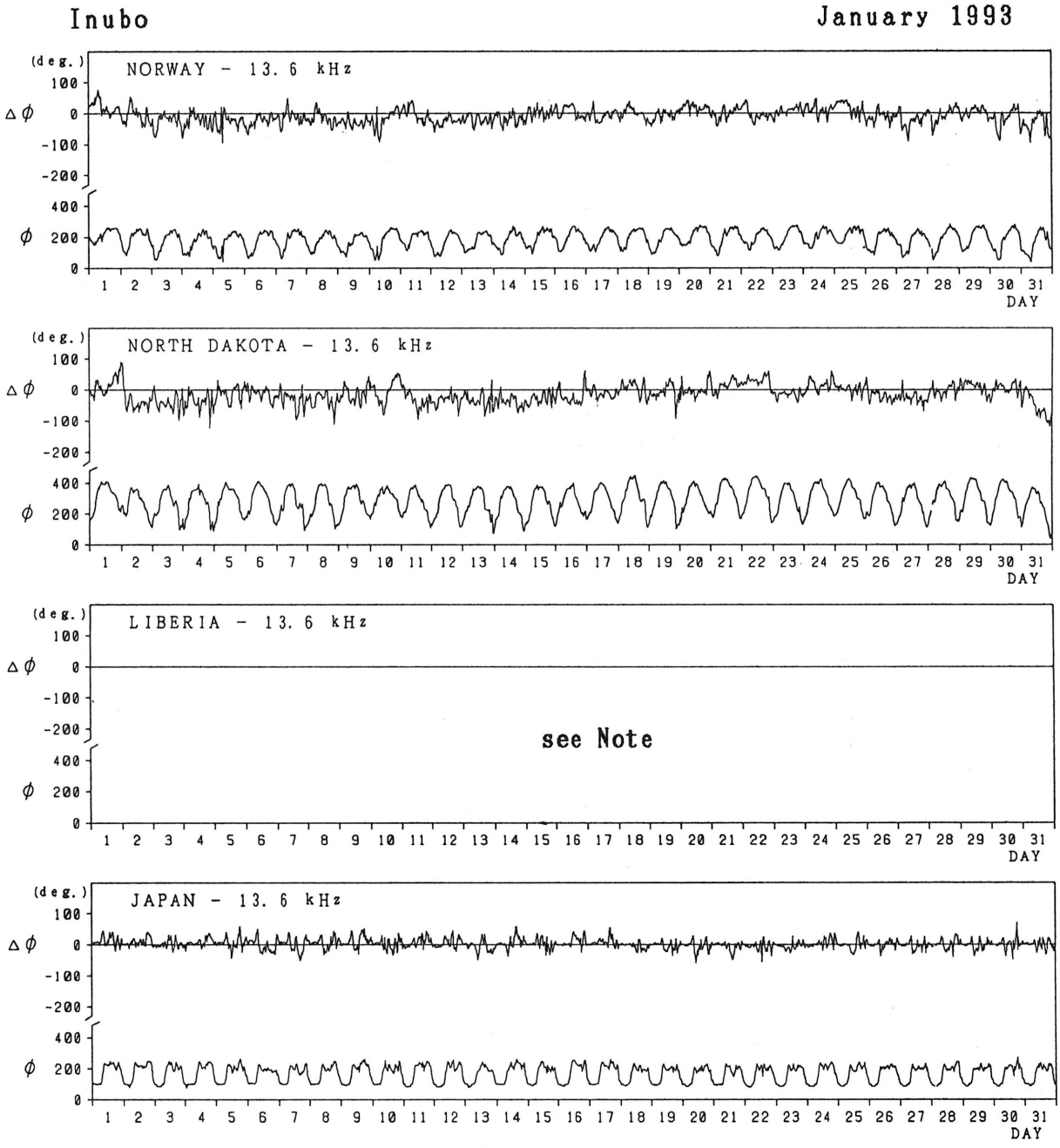
C2. Radio Propagation Quality Figures at Hiraiso

Hiraiso Time in U.T.

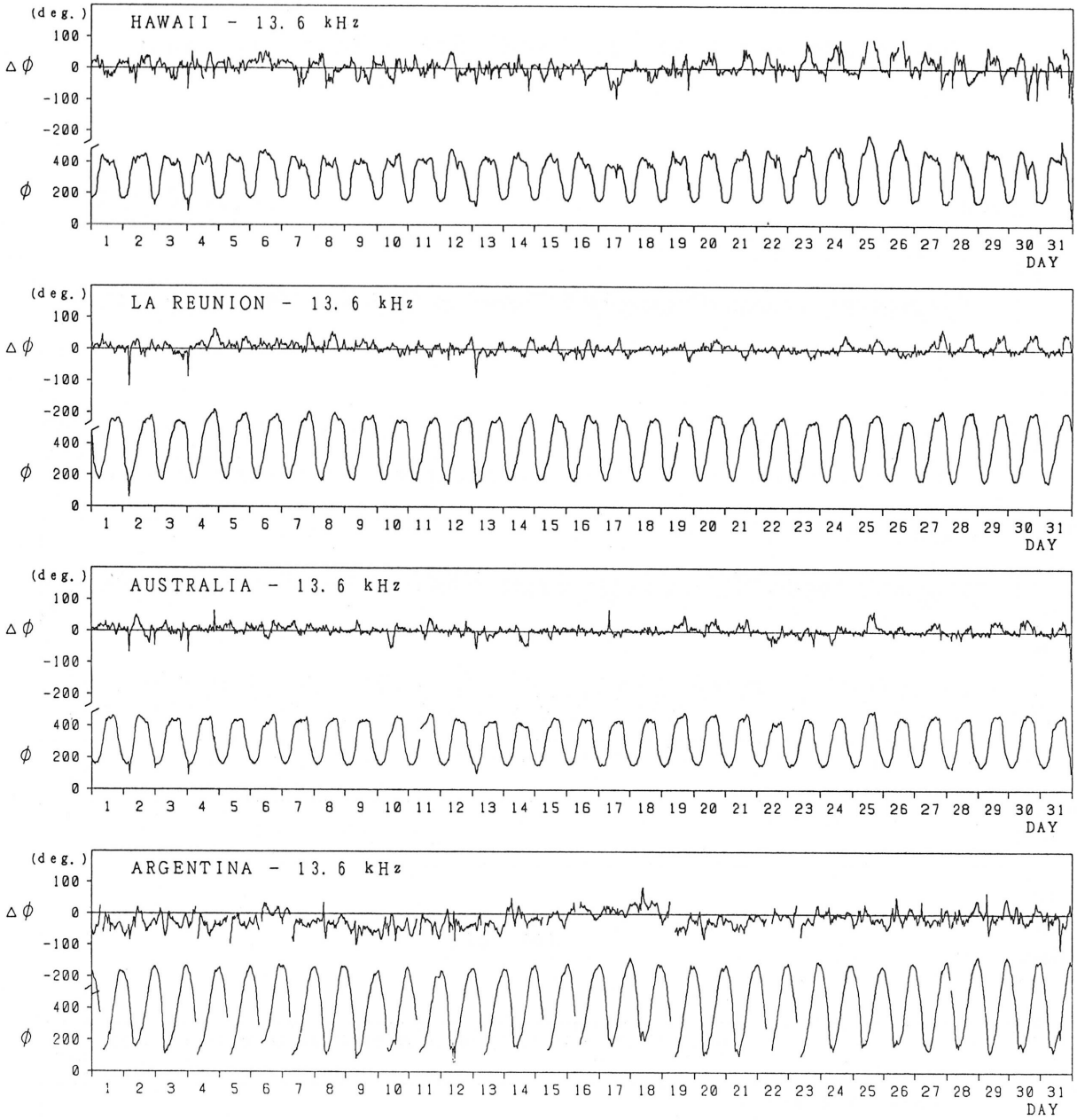
Jan. 1993	Whole Day Figure	W W V 00 06 12 18 / 06 12 18 24	W W V H 00 06 12 18 / 06 12 18 24	Conditions 00 06 12 18 / 06 12 18 24	Principal Geomagnetic Storms Start h m	End h	Range nT
1	5-	4U - - 5U	4 5 - 5	N N N N			
2	4+	5U - - 4U	4 5U 5U 4	N N N N			
3	4-	4U - - 4U	4 3U - 4	N N N N			
4	4o	4U 5U - 3U	4 4U - 4	U U U U			
5	4-	3U - - 5U	3 4 - 3	N N N N			
6	5-	5U - - 4U	5 4U - 5	N N N N			
7	4+	5U - - 5U	4 3U - 4	N N N N			
8	4+	5U - - 4U	4 4U - 4	N N N N			
9	4+	3U - - 5U	4 5U - 4	N N N N			
10	4+	5U - - 4U	4 5U - 4	N N N N			
11	4+	4U - - 4U	4 5U - 4	N N N N			
12	4o	3U - - 4U	4 5U - 4	N N N N			
13	4-	3U - - 4U	4 3U - 4	N N N N			
14	4-	3U - - 4U	4 5U - 3	N N N N			
15	4-	4U - - 4U	3 4U - 3	N N N N			
16	4o	4U - - 4U	4 4U - 4	N N N N			
17	4-	4U - - 4U	3 4U - 4	N N N N			
18	4+	5U - - 5	4 4U - 4	N N N N			
19	4o	5U - - 4	4 3U - 4	N N N N			
20	4+	5 - - 5	4 3U - 4	N N N N			
21	4o	5U - - 4	4 3 - 4	N N N N			
22	4o	4U - - 5	4 3U - 4	N N N N			
23	4-	5U - - 4	4 2U - 4	N N N N			
24	4-	3U - - 4	4 3U - 4	N N N N			
25	4-	3 - - 5	4 3U - 3	N N N N	07.6	---	109
26	4+	5U - - 5U	4 4 - 4	N N N N	---	22	
27	4+	4U - 5U 5U	4 4 - 4	N N N N			
28	4-	3U - - 4U	4 3U - 4	N N N N			
29	4o	3U - - 4U	4 5U - 4	N N N N			
30	3+	3U - - 4U	4 2U - 4	N N N N			
31	4o	4U - - 4U	4 4U - 4	N N N N	01.0	---	107
2/1					---	22	

C. Radio Propagation

C3. Phase Variation in OMEGA Radio Waves at Inubo



Inubo January 1993



Note: As for LIBERIA-13.6kHz, no record during 18 October 1992 - 31 January 1993, due to the maintenance of transmitter.

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

NONE

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso — Time in U.T.

Jan. 1993	S W F								Correspondence	
	Drop-out Intensities(dB)					Start	Dur.	Type	Imp.	Solar * Flare	Solar Burst
	CO	HA	AUS	MOS	BBC						
2			15			0422	43	2	1	x	-
4			15			0045	21	2	1	x	-
13			30			0213	105	3	2+	-	-
31		40	18			2244	38	3	1+	x	-

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

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Jan. 1993	S P A								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	Ω/AU	Ω/H	Ω/ND	Start	End	Max.
2	17	—	138	96	61		0422	0654	0434
2		—		61	38		2340	0055	2352
4		—	54	89	71	37	0047	0150	0057
6		—		4			0019	0034	0024
7		—	9				0833	0914	0847
11		—		9	9		0042	0058	0046
11		—	11	10	6		0226	0248	0232
12		—	29	12			0622	0654	0631
12		—	20				0858	0926	0908
12		—	15				1035	1118	1046
13		—	79	54	38		0212	0426	0256
13		—	9				0908	0928	0912
14		—	17				0932	1014	0940
16		—	6	9	9		0126	0142	0132
16		—	42				0752	0824	0758
16		—	12				0956	1020	1002
31		—	22	106	94		2250	0006	2302

IONOSPHERIC DATA IN JAPAN FOR JANUARY 1993
F-529 Vol.45 No.1 (Not for Sale)

電離層月報 (1993年1月)
第45巻 第1号 (非売品)
1993年5月25日 印刷
1993年5月31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
☎ (0423) (21) 1211(代)

Queries about "Ionospheric Data in Japan" should be forwarded to:
Communications Research Laboratory, Ministry of Posts and Telecommunications,
2-1 Nukui-Kitamachi 4-chome, Koganei-shi, Tokyo 184 JAPAN.