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IONOSPHERIC DATA IN JAPAN

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INTRODUCTION

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

Station	Geographic		Geomagnetic		Technical Method
	Latitude	Longitude	Latitude	Longitude	
Wakkanai	45°23.5′N	141°41.2′E	35.3°N	206.5°	Vertical Sounding (I)
Kokubunji	35°42.4′N	139°29.3′E	25.5°N	205.8°	Vertical Sounding (I)
Yamagawa	31°12.1′N	130°37.1′E	20.4°N	198.3°	Vertical Sounding (I)
Okinawa	26°16.9′N	127°48.4′E	15.3°N	196.0°	Vertical Sounding (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°	Radio Receiving (P)

A. IONOSPHERE

Ionospheic observations are carried out at the above four 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 descriptivel etter 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 I-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 transmisson 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 normnal *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 200, 500 and 2800 MHz are carried out at Hiraiso. The observation equipment consists of two parabolic antennas, one with 10-meter diameter for 200 MHz measurements and one with 2-meter diameter for 500 and 2800 MHz measurements, 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 are tabulated separately for 200 and 500 MHz measurements. 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 200, 500 and 2800 MHz 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.

B3. Summary Plots of $F_{10.7}$ at Hiraiso

The 10.7 cm solar radio flux at Hiraiso is plotted over a one month period. The 10.7 cm flux ($F_{10.7}$) is determined by adjusting the 10.7 cm radio flux measured at Hiraiso to the Pentincton 10.7 cm radio flux. The figure on the right-hand side shows the $F_{10.7}$ index estimated at Hiraiso.

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 600 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 for 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	innuenced 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.

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

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 par hour from JJY (Japan Standard Wave) staion. The conditions are denoted as follows:

N normal,
U unstable,
W disturbed.

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 ($\Delta\ \phi$) 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

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

HOURLY VALUES OF FES AT WAKKANAI

MAY 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	G	G	G	G	G	G	54	G	G	G	G	G	G	G	G	G	G	39	32	30	G	G	G
2	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	42	39	30	G	G	G	G
3	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	33	34	28	40	G	G	G
4	G	24	26	G	G	31	G	G	G	G	G	G	G	G	G	61	G	47	36	35	34	G	G	G
5	G	G	G	G	G	30	G	G	G	G	G	G	G	G	G	G	G	G	34	30	G	G	G	G
6																								
7	G	G	G	G	G	59	39	38	G	G			G	G	G	G	48	56	36	29	G	G	G	G
8	G	G	G	G	G	34	35	41	44	G	G		G	G	G	52	59	G	62	83	G	G	G	G
9	G	G	G	G	25	32	38	38	45	58	57	G	G	G	G	G	G	G	G	29	34	32	27	G
10	G	30	G	G	G	G	G	46	64	63	G	56	43	50	67	G	G	G	34	G	G	G	G	G
11	G	33	38	40	28	44	102	59	40	55	G	G	G	G	C	C	G	34	37	G	G	G	G	G
12	36	58	60	46	G	40	34	41	60	55	64	60		G	G		G	34	34	36	33	G	G	G
13		G	G	G	27	G	G	37	40				62			G	58	53	61	48	43	64	48	G
14	G	G	G	G	G	G	G	G	G	G	48	G	G	G	G	G		37	60	73	G		G	G
15	G	G	G	G	19			58		G	66	74	55	50	G	53	G	38	53	70	50		60	48
16	G	G	G	G	G	39	41	48	52	62	G	54	47		G	52	63	59	48	43	46	37	58	60
17	45	50	34	G	G	34	33	39	G	60	55	63	G	G	55		37	70	50	44		32	25	G
18	G	G	G	G	47	35	44	51	60		G	G	G	G	50	43	37	41	47	46	36	70	G	G
19	52	G	G	G	G	29	36	50	56	57	G	G	G	G	G	65	49	41	50	41		G	34	G
20	26	G	26	33	28	36	46	51	56	57	62	61	95	114	45	131	115	52	72	45	29	G	32	
21	26	G	G	G	G	33	G	56	64	54	G	61		94		87	61	83			55	G	39	58
22	52	36	G	31	34	36	41	54	82		50	G	G	G	G	G	68	44	44			G	G	G
23	G	G	G	G	G	34	G	52	56	68	72	52	G	G	G	G	56		45	42	28	G	G	G
24		G	G	G	G	32	34	48	53	46	G	G	G	G	G	41	53	50	44	41	34	G	26	G
25	G	G	32	30	G	34	43	52	48	54	55	55	60		126	94	90	93	138	93	80	59	79	33
26	33	G	G		G	38	56	64	116	70	53	56	G	43	G	G	G	36		42	G	31	G	G
27	G	G	G	G	G	36	36	54	62	50	80	82	61	80	51	44	63	38	38	50	41	30		
28	68	44	43		66	68	90	60		G							61	59	87	44	31	28		25
29	G	26	26		G	39	45	58	60	60		52	G	44	G	G	G	G	40	40	38	42	28	G
30	G		G	G	G	33	42	48	51	42	G	G	G	G	G	G	40	38	40	40	29	34	26	44
31	G	24	G	G	G	G	G	38	42		56	54	G	G	56	66	56	G	39	39	37	60		107
	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	29	30	27	30	29	29	30	28	26	26	26	27	26	26	26	29	29	28	28	27	28	27	28
MED	G	G	G	G	G	34	35	48	50	52	G	26	G	G	G	G	40	38	42	41	33	G	G	G
U Q	26	25	26	G	19	37	42	54	60	58	56	56	43	43	45	53	60	52	51	45	40	33	32	13
L Q	G	G	G	G	G	15	G	38	G	G	G	G	G	G	G	G	G	17	36	31	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT WAKKANAI

MAY 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	16	16	15	23	43	29	47	32	47	56	27	50	50	48	21	23	17	16	17	16	16	16
2	16	16	15	15	16	17	28			48	50	58	53	50	28	48	45	26	17	16	16	16	16	20
3	17	16	14	16	16	16	29	45	24	27	47	49	30	48	49	24	22	23	20	17	15	15	16	16
4	17	15	17	16	16	16	28	33	24	26	49	28	48	31	48	38	41	20	16	17	16	17	15	15
5	16	15	15	16	16	16	30	21	22	23	29	27	24	26	29	23	30	28	17	16	17	16	16	16
6																								
7	17	15	16	16	17	17	26	32	32	52			52	26	27	46	30	26	18	16	16	16	16	16
8	18	15	16	16	15	17	20	35	36	52	71		55	49	48	33	29	28	17	16	17	16	20	16
9	17	15	15	14	16	17	24	29	22	30	27	50	30	52	48	50	32	18	16	14	15	14	17	18
10	18	16	16	16	17	17	21	23	32	40		29	30	30	29	47	22	20	18	16	16	17	17	16
11	17	16	15	15	21	16	24	29	22	28	27	48	32	28	C	C	47	18	17	18	14	16	16	16
12	16	16	18	16	17	18	20	22	33		38	45		50			20	17	17	15	14	16	16	15
13		16	16	16	15	16	48	30	34				40			46	30	26	18	16	16	14	14	16
14	15	15	14	15	17	18	18	28	49	50	28	49			49	33		24	21	16	16		16	20
15	16	15	16	15	16			22		49	44	45	40	30		21	44	18	20	17	15		16	16
16	16	16	17	17	18	18	20	30	23	32	34	35	33			33	30	23	17	15	15	15	15	17
17	18	16	16	15	15	16	20	30	20	38	38	42	52	50	30		30	20	18	16		16	16	24
18	17	16	18	15	17	16	23	28	21		49	47	54	28	24	20	20	21	17	16	16	16	15	16
19	17	16	16	16	16	16	20	30	20	34	52	50	50	51	29	22	20	20	20	16		16	16	17
20	17	15	15	15	16	16	21	20	23	22	30	30	38	33	47	35	30	23	20	16	18	15	16	
21	17	15	16	16	17	17	18	21	33	33	48	39		29		22	29	26			15	16	16	15
22	16	16	16	16	17	16	17	20	28		31	28	27	47	47	22	21	18	17			16	16	16
23	16	15	15	15	17	16	18	20	33	33	26	28	49	29	26	23	20		21	16	17	17	16	16
24		15	15	16	17	15	18	27	30	29	50	50	50	50	28	22	22	17	18	16	15	16	16	16
25	16	16	16	16	17	16	21	17	26	38	40	40	34		27	30	32	17	18	16	16	16	16	15
26	16	15	15		17	18	20	20		36	42	42	55	32	28	22	20	21		16	16	16	16	16
27	16	17	16	16	17	17	27	29	22	39	36	39	42	34	32	26	21	17	18	17	15	16		
28	16	16	15		16	17	17	20									23	18	18	15	16	16		15
29	24	18	17		27	16	22	22	34	34		39			29	47	23	18	21	16	15	15	17	17
30	17		16	17	18	17	18	21	33	23	50	51	49	53	49	48	24	18	17	16	16	15	16	15
31	16	16	16	15	18	17	20	30	30		38	39	52	53	39	24	34	18	20	16	15	16		15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	30	27	30	29	29	29	26	24	25	26	25	24	23	26	29	29	28	28	27	28	27	28
MED	16	16	16	16	17	17	21	28	29	34	40	42	42	40	30	32	29	20	18	16	16	16	16	16
U Q	17	16	16	16	17	17	26	30	33	39	49	49	52	50	48	46	31	23	20	16	16	16	16	16
L Q	16	15	15	15	16	16	19	21	22	28	30	35	31	29	28	22	21	18	17	16	15	15	16	15

HOURLY VALUES OF FOF2 AT KOKUBUNJI

MAY 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	63	75	61	60	50	65	80		78											97		75		
2		180					209								101	97	91	91	100	116	69	69	70	75
3	60	57															103	A						
4					A								N											A
5	A																							
6																								
7																								
8	75	58	58	54	60	73	95	72	67	68	75	76	72	107	100	85	77	72	75	93	83	96	71	A
9	A	74	62	69	61	57	70	75	68	68	77	92	100	102	123	117	126	114	96	93	82	74	69	A
10	63	57	61	A	61	76	96	94	A	A	60	84	84	88	92	105	102	113	96	90	86	A	66	68
11	76	82	67	50	49	58	78	81	78	A	86	92	92	92	88	95	91	A		86	80	63	65	67
12	63	68	61	56	61	63	62	A	A	60	A	71	A	85	91	103	104		82	80	65	68	70	62
13	56	60	57	43	55	69	95	68	61	A	A	A												
14																			91	A	77	66	72	63
15	64	62	62		46	53	68	72			A	68	A	85	87	96	97	A	91	84	77	71	67	A
16	60	62	63	58	57	56	74	A	A	A	A	A	A	A	A	81	A	A	A	78	70	63	57	57
17	51	50	47	A	44	51	67	72	83	75			83	85	71	87	98	100	101	93	A	A	54	57
18	A	57	51	52	48	56	80	88	A	83	77	87	83	90	107	111	104	92	85	82	66	68	62	65
19	60	87	A	54	56	54	76	92	75	A	A					A		100	95	94	74	59	A	A
20	A	51	52	51	57	67	58	86	87	A	A	63	68	78	80	76	102	69	72	90	87	79	A	A
21	A	60	53	A	54	54	62	73	91	88	77	A	A	A	A	79	N	84	A	90	67			A
22	A	A	58	50	A	57	58	71	63	A	A	66	64	62	67	77	90	94	87	78	81	78	80	79
23	77	64	64	66	63	70	76	99	78	66	A	A	68	93	A	A		77	81	83	86	80	A	80
24	72	75	73	71	62	71	86	89	A	A	A	76	77	A	A		88	90	A	A	86	85	80	A
25	69	71		70	56		A	A	97		A	74	63	83	97	97	95	87	83	86	86	81	88	86
26	80	76	58	58	56	68	71	A	A	A	A	A	80	87	90	98	A	92	81	68	73	68	A	69
27	79	63	53	54	56	82	81	99	76	74	74	A	76	93	A	95	A	95	102	114	68	A	A	45
28	A	A	45	41	41	A	A	99	A	A	A	A	A	A	A	A	90		A	62	A	70	60	60
29	57	58	58	46	72	A	A	A	A	A	A	A	82	73	78	74	67	72	A	81	78	70	74	69
30	A	A	58	55	57	64	62	71	79	76	78	80	A	73	74	78	83	84	84	93	76	80	92	80
31	74	81	69	58	56	51	75	115	80	A	A	A	74	78	82	86	85	82	99	A	93	94	71	84
	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	22	20	23	21	22	18	15			12	15	17	16	19	18	18	18	22	22	21	18	17
MED	64	63	58	54	56	63	76	84	78			76	77	85	89	95	93	90	89	88	78	71	70	68
U Q	75	75	62	59	61	69	81	94	83			85	83	92	98	98	102	95	96	93	86	80	74	79
L Q	60	58	53	50	50	55	67	72	68			69	68	78	79	79	88	82	82	81	70	68	65	61

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT KOKUBUNJI

MAY 1993

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

DAY \ HOUR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	59	G	33	24	G	G	G	134	43										128	99		G		
2		G				G	G								50	47	G	48	70	37	66	49	G	G
3	G	G			31	G											108	136						G
4					106								179	172							G			48
5	45		G																					
6																								
7																								
8	G	G	G	G	G	G	37	38	50	54	52	54	62	70	46	G	46	47	40	41	G	G	40	89
9	97	62	41	46	26	40	40	49	55	72	62	49	73	59	50	G	G	G	G	33	70	64	50	61
10	56	98	59	61	65	41	98	86	63	84	75	76	86	115	62	47	41	53	43	34	37	81	70	G
11	66	37	34	63	51	34	44	64	89	77	99	82	60	68	50	48	64	114	130	162	131	143	40	36
12	G	24	24	24	G	G	47	67	81	59	70	60	91	73	53	41	38		53	62	62	44	29	G
13	G	48	G	24	G	33	G	48	133	58	79	150												
14																			78	103	76	61	42	24
15	G	G	G		G	25	42	60	G		55	55	54	G	G	70	70	102	90	G	G	G	G	69
16	50	61	49	G	G	57	55	91	73	75	100	168	79	56	46	68	101	114	110	108	57	59	43	26
17	33	54	40	59	41	G	G	49	46	G	G		G	G	G	G	54	38	56	33	71	85	30	62
18	69	60	35	82	71	G	42	67	71	78	64	81	81	G	57	59	57	55	37	44	35	33	59	90
19	60	96	94	57	G	33	57	72	89	106	124	118	101	136	129	160	G	76	83	60	67	95	78	69
20	95	57	55	28	G	40	40	57	83	101	85	61	54	64	74	71	58	52	34	94	84	95	97	59
21	72	42	81	65	36	G	G	46	67	66	70	64	84	86	84	76	96	76	111	56	84	114	93	69
22	60	72	44	48	96	60	64	61	56	57	69	50	44	47	G	G	61	59	55	60	65	55	41	57
23	30	G	G	37	G	35	44	77	92	58	70	65	63	104	125	114	117	73	61	49	71	85	82	54
24	25	G	55	G	G	35	60	85	82	61	89	60	56	84	91		58	62	136	114	53	59	96	105
25	49	36	67	94	49	56	84	146	106	108	101	58	52	56	65	72	56	55	59	53	62	62	95	58
26	55	G	G	G	36	32	60	85	112	74	119	109	86	97	92	97	130	69	37	40	50	67	98	G
27	47	28	G	G	60	56	62	72	49	58	65	60	66	62	103	92	108	130	85	71	60	51	50	33
28	46	52	53	41	27	62	83	118	117	164	165	112	64	104	89	104	76	150	114	52	62	42	33	49
29	G	32	26	30	G	52	98	81	80	83	83	62	62	G	48	44	44	45	72	40	62	52	28	27
30	96	73	73	28	G	47	38	70	62	56	58	52	64	65	50	52	58	48	64	63	64	73	62	24
31	60	30	29	29	G	G	G	52	60	64	86	59	52	65	64	52	56	61	92	96	63	28	G	50
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	26	25	23	26	26	25	24	24	22	23	22	23	23	23	22	24	23	25	25	25	25	24	26
MED	50	36	35	30	14	34	44	68	72	69	75	62	64	65	57	56	58	61	70	56	62	59	46	50
U Q	60	60	55	59	49	47	61	85	89	83	99	82	84	97	89	76	86	102	101	95	70	83	80	62
L Q	25	G	G	24	G	G	19	54	55	58	64	58	54	56	48	44	45	48	48	40	51	43	31	24

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT KOKUBUNJI

MAY 1993

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	14	14	15	15	18	16	15	17										14	14		38		
2		14					14								32	30	17	16	14	14	15	14	14	14
3	14	14				30											14	14						14
4																								14
5	14		14																					
6																								
7																								
8	14	14	15	14	14	14	16	32	33	35	35	35	35	36	33	35	20	17	14	17	14	14	14	14
9	14	14	14	14	14	14	15	15	23	20	35	34	35	32	28	34	39	30	14	14	14	14	14	14
10	14	14	14	14	14	14	15	14	18	23	34	34	34	33	27	18	15	28	16	15	15	15	15	15
11	15	15	14	14	14	15	16	16	17	23	35	34	34	32	33	29	20	24	15	14	15	15	15	15
12	15	16	15	17	15	15	17	16	21	33	34	35	34	32	29	28	18		14	14	14	14	14	14
13	15	14	15	15	14	14	18	18	30	34	34	34												
14																			18	24	16	23	15	21
15	14	18	14		28	20	39	33	N		43	42	43	63	64	36	33	30	30	30	29	20	30	18
16	15	15	15	23	26	29	30	32	34	38	42	46	43	42		36	33	33	33	29	15	15	18	18
17	15	15	14	15	14	35	42	20	33	62	53		54	40	27	18	18	16	14	14	15	14	14	14
18	14	14	14	14	14	20	14	16	16	22	32	34	33	29	20	20	14	14	14	14	14	14	14	14
19	14	14	14	14	14	14	14	17	16	29	23	33	33	33	29	23	18	18	14	14	14	14	14	14
20	14	14	14	14	14	14	14	15	17	27	28	32	32	18	34	30	18	14	14	15	14	14	14	14
21	14	14	14	14	14	14	15	20	20	20	23	38	33	36	32	20	14	14	14	15	14	14	14	14
22	14	14	14	14	14	14	14	14	15	20	28	26	28	34	49	41	23	17	15	14	14	14	14	14
23	14	14	14	14	14	15	15	15	18	30	33	34	32	30	29	26	30	18	14	14	14	14	14	14
24	14	14	14	15	14	14	14	18	18	29	29	29	30	29	27		23	29	18	14	14	14	14	14
25	14	14	14	14	14	14	17	18	24	33	37	36	40	38	38	32	22	21	18	15	14	14	14	14
26	14	14	14	16	14	14	15	14	33	34	35	38	35	32	28	24	20	18	14	14	14	14	14	14
27	14	14	14	14	14	14	15	20	33	28	37	34	36	34	33	24	33	15	14	14	14	14	14	14
28	14	14	14	14	14	15	14	20	35	34	44	38	44	38	33	35	35	18	14	14	14	14	14	14
29	15	14	14	14	14	16	16	21	26	38	39	38	35	38	36	32	29	17	15	14	14	14	14	14
30	14	14	14	15	14	14	17	22	33	24	38	38	35	35	32	30	30	17	14	14	14	14	14	14
31	14	14	14	14	17	14	14	21	33	35	35	38	41	40	38	36	29	17	15	14	14	15	20	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	26	26	25	23	24	25	25	24	23	22	23	22	22	22	22	22	24	23	25	25	24	25	24	26
MED	14	14	14	14	14	14	15	18	23	30	35	34	35	34	32	30	21	17	14	14	14	14	14	14
U Q	14	14	14	15	14	17	17	20	33	34	38	38	40	38	34	35	30	24	15	15	15	15	14	14
L Q	14	14	14	14	14	14	14	15	17	23	32	34	33	32	28	24	18	16	14	14	14	14	14	14

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT YAMAGAWA

MAY 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	58	56	60	54	55	58	70	75	72	77		85	96	107	112	116	122	111	101	87	78	76	64	84
2	61	72	66	61	52	55	73	72	A	72	82	94	108	111	112	112	113	112	111	111	87	74	73	72
3	73	77	67	A	52	54	78	78	73	81	80	91	103	111	123	121	127	123	116	106	96	84	80	77
4	77	78	72	72	56	47	A	71	78	86	101	105	107	117	121	112	105	105	117	111	85	86		62
5	79	73	85	68	55	52	76	67	67	74	84	96	103	112	111	125	125	120	111	117	A	A	81	85
6																								
7	86	86	62	54	62	62	66	75	81	71	66	78	111	124	126	133	135	128	117	110	84	72	78	80
8	85	54	A	61	50	54	72	68	62	67	76	68	A	110	111	91	91	96	87	105	90	84	77	67
9	A	72	62	63	64	58	66	59	A	71	A	93	104	126	138	157	171	167	153	111	90	80	A	A
10	65	A	52	55	51	51	64	77	A	A	70	82	109	106	111	134	138	122	121	108	87	73	72	80
11	83	86	75	72	66	72	A		81	A	90	102	101	104	A	A	107	104	102	86	87	99	A	66
12	73	65	83	66	67	65	74	66	76	76	81	75	81	97	106	112	118	103	A	A	72	70	66	66
13	78	60	53		60		61	A	A	67	A	A		91	95	88	94	86	75	80	74	64	66	76
14	72	66	62	52	50	50	52	66	72	70	67	69	74	86	92	98	103	105	A	89	90	A	86	79
15	84	84	63	53	A	A	66	80	77	67	A	77	88	92	100	105	110	111	111	103	84	80	78	76
16	78	A	79	54	44	43	66	90	66	A	A	129	95	91	100	105	112	106	98	102	78	77	82	87
17	85	67	62	53	52	60	62	81	84	A	96	A	91	A	87	95	111	114	112		A	82	A	74
18	A	78	72	66	66	55	77	71	70	A	A	75	79	99	110	111	108	A	98	85	A	A	68	65
19	66		78		62	58	77	90	A	A	A	A	A	80	A	A	105	104	A	88	77	66		52
20	58	62	62		66	46	55	74	81	76	68	68	77	82	85	A	84	84	86	90	81	60	A	A
21	A	87	76	73	A	A	53	72	90	A	67		A	90	A	95	99	102	88	84	66	66	63	63
22	55	62	51	54	52	N	89	72	A	64	A	A	A	A	85	96	105		A	A	A	A	A	A
23	74	66	66	65	62	62	67	78	71	71	A	74	A	A	A	98	A	A	96		A	88	86	87
24	87	87	86		77	82	80	81	A	A	A	89	96	106	111	110	A	120	90	A	90	A	84	86
25	86	86	84	57		66	72	89	A	A	A	A	75	91	111	112	112	108	104	88	80	78	82	92
26	87	77	77	74	72	66	74	73	74	A	A	75	74	86	98	101	104	112	101	97	84	A	76	A
27	A	77	66	64	52	52	66	59	A	68	A	77	86	95	110	111	107	105	122	123	81	50	42	48
28	38	64	63	54	42	A	A	69		A	71	66	A	63	65	67	72	68	66	61	64	63	64	66
29	66	62	62	A	53	48	62	73	71	70	70	74	A	A	A	A	A	80	81	84	76	74	A	77
30	84	66	63	62	56	53	60	71	81	82	81	86	87	84	88	91	97	99	87	A	A	79	81	77
31	75	74	76	63	A	54	72	86	73	68	66	70	77	86	91	90	91	90	98	72	90	85	90	88
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	27	29	24	26	25	27	28	20	19	17	24	22	26	25	26	27	27	26	24	24	24	22	26
MED	76	72	66	62	56	55	67	73	74	71	76	78	93	96	110	108	107	105	101	94	84	76	78	76
U Q	84	78	76	66	64	62	74	79	81	76	83	92	103	110	111	112	118	114	112	109	88	83	82	84
L Q	66	64	62	54	52	51	62	70	71	68	67	74	79	86	91	95	99	99	88	85	77	68	66	66

HOURLY VALUES OF FES AT YAMAGAWA

MAY 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	G	G	G	G	G	G	G	55	47	G	63		G	93	G	G	42	44		68	37	27	G
2		G	G	G	G	G	G	43	70	43	52	56	61	56	53	G	G	G	G	70	41	45	28	30
3	41	G	24	32	G	G	G	G	60	G	G	52	50	G	44	64	75	68	55	42	83	35	G	
4	29	G	58	34	G	40	32	G	50	54	93	54	46	G	G	G	G	44	43	44	G		G	G
5	G	G	G	G	G	G	G	G	44	51	58	46	64	G	55	G	54	73	86	72	127	66	30	41
6																								
7	G	G		G	G	G	34	44	49	42	43	G	G	G	G	73	54	60	72	91	134	70	40	33
8	33	32	31	30	32	26	G	43	45	43	G	59	149	48	61	53	73	60	48	36	31	39	48	55
9	68	58	38	36	24	34	44	59	84	58	128	G	G	46	G	50	G	50	G	29	40	71	92	28
10	58	41	36	32	44	53	55	86	73	86	62	48	53	G	44	G	G	40	36	G	37	G	79	58
11	71	40	24	G	36	40	86	140	70	92	84	90	81	149	144	137	99	57	55	92	85	41	57	G
12	44	58	71	56		G	G	41	61	65	69	61	63	85	100	80	72	88	110	93	59	46	G	36
13	40	30	25	G	G	G	48	111	60	64	125	95	G	49	65	75	81	75	61	48	57	92	48	53
14	G	30	40	G	G	G	50	42	51	49	50	52	50	G	64	86	82	84	98	111	68	149	80	43
15	40	40	40	33	28	40	32	56	66	64	64	G	59	44	44	42	G	42	43	54	41	G	36	37
16	32	28	44	44	35		G	G	59	71	107	60	G	53	60	58	56	53	72	96	79	82	78	40
17	31	G	30	G	24	29	G	53	69	93	73	100	84	102	59	G	53	71	87	152	110	60	93	44
18	41	40	26	23	G	G	G	52	71	107	78	70	73	58	80	56	64	116	78	69	159	133	84	G
19	40	G	G	G	G	G	32	57	78	96	69	100	91	103	176	126	83	68	94	78	57	36	G	25
20	44	48	58	G	57	51	44	56	51	54	56	72	61	52	69	98	46	50	49	30	G	44	89	82
21	106	68	58	80	84	58	32	58	70	72	56	104	145	84	101	61	57	45	G	46	80	57	48	41
22	49	34	59	92	44	89	91	65	94	62	70	106	118	116	114	63	87	126	158	155	154	167	128	83
23	60	68	58	G	G	G	G	45	60	59	88	72	95	101	58	64	97	93	91	128	112	60	160	28
24	70	44	32		G	32	45	44	87	102	89	84	67	93	74	60	160	78	117	125	150	128	80	68
25	82	93	110	46	G	27	52	94	112	153	154	109	61	47	51	G	G	44	46	32	26	131	78	82
26	70	43	44	25	35	41	35	69	74	140	104	77	72	64	64	60	43	G	G	28	35	38	45	92
27	85	G	G	26		G	33	71	116	135	148	83	68	82	70	58	84	101	54	54	38	38	32	33
28	23	40	30	G		27	72	60	117	63	56	G	76	G	45	G	59	G	38	30	33	29	G	G
29	43	33	31	28	35	23	33	56	62	66	73	71	78	94	102	101	85	64	54	54	71	68	90	80
30	40	44		G	G	G	G	50	54	63	84	85	64	64	59	76	87	105	84	26	87	84	67	58
31	28	92	G	92	60	30	31	40	62	53	G	G		57	52	72	G	81	72	71	92	70	29	46
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	28	29	27	29	30	30	30	30	30	30	28	30	30	30	30	30	30	29	30	29	30	29
MED	41	37	32	25	G	26	32	52	64	64	70	66	64	54	60	60	58	62	55	54	68	60	48	41
U Q	64	44	51	35	35	40	45	60	74	92	89	85	79	85	80	75	83	81	86	92	92	83	80	58
L Q	30	G	24	G	G	G	G	42	55	53	56	52	51	G	51	G	G	44	43	34	38	38	29	28

HOURLY VALUES OF FMIN AT YAMAGAWA

MAY 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	26	28	15	15	15	15	15	18	22	33	22	34	53	39	34	46	34	18	15	42	15	15	16	24
2	20	16	15		16	16	26	20	28	36	36	38	37	38	36	52	38			15	15	15	15	23
3	29	15	18	26	16	16	22	16	20	38	22	33	33	51	49	38	34	29	16	15		15	15	17
4	15		15	15		15	24	28	17	26	23	36	36	58	54	46	39	20	15	15		26		
5	16	16	15	15	15	34	26	15	16	30	34	35	35	48	39	50	27	29	17	15	15	15	15	15
6																								
7	15	15	15		29	15	15	15	16	34	35	58	50	51	34	34	34	17	15	15	15	15	26	16
8	16	15	23	15	15	15	15	28	33	33	33	34	35	38	38	35	28	17	15	15	15	15	17	15
9	15	15	26	15	15	15	15		16	33	34	50	32	32	53	34		15	39	15	15	28	15	21
10	15	15	15	16	15	15	15	16	17	28	35	35	34	49	33	35	34	16	16	42	15	34	15	15
11	15	26	15		15	15	20	16	43	30	34	35	39	35	35	32	30	16	15	15	15	15	15	24
12	15	30	16	15	28	15	15	16	32	34	36	37	36	35	33	32	27	16	15	15	15	15		16
13	15	15	16		15		15	16	30	33	33	36	66	40	39	35	34	22	35	15	15	15	15	15
14		15	15	15	15	15	16	15	22	34	34	35	34	40	42	36	34	20	16	15	15	27	15	15
15	15	15	15	15	21	15	15	16	48	38	50	50	37	34	35	30	22	28	16	16	15		15	15
16	15	21	16	15	15	26	16	20	30	33	34	34	47	39	38	35	33	18	16	15	15	15	15	15
17	15		24	35	16	15	15	16	17	23	34	35	54	46	35	52	35	32	15	39	15	15	15	16
18	28	15	15	15	15	15	29	16	22	30	35	34	35	36	34	32	33	23	17	15	32		16	33
19	17		15		16	16	16	16	32	35	35	37	38	35	35	38	33	23	16	15	15	15		16
20	16	16	15		27	15	16	17	46	32	36	43	35	35	35	22	34	16	32	15	36	27	15	27
21	16	15	16	16	21	27	15	16	30	33	36	36	36	43	38	33	30	16	22	15	15	24	15	15
22	15	15	15	15	15	15	15	16	16	22	34	34	34	34	33	39	17	21	15	15	15	16	15	15
23	16	16	16	16	15	15	27	40	27	29	34	34	34	33	50	35	35	17	15	15	16		15	22
24	15	15	15		34	15	16	16	16	22	34	35	36	33	35	29	33	16	15	14	15	15	27	15
25	15	15	16	15		15	15	29	20	30	32	33	33	33	32	38	26	22	16	15	15	15		15
26	15	15	15	15	16	34	27	16	16	33	35	39	34	34	33	34	29	32	27	20	15	15	32	26
27	15	15	15	15	15	15	15	28	28	22	33	34	35	36	35	30	34	20	26	15	15	15	15	15
28	16	15	15	16	15	15	15	16	24	36	35	36	43	53	33	52	24	34	16	15	24	15		28
29	15	15	15	21	15	15	16	16	21	35	36	38	38	36	34	34	27	20	15	15	15	15	15	22
30	15	15	27	15	15	23	15	23	20	34	35	35	36	34	33	34	27	16	15	18	15	15	15	15
31	15	24	15	29	23	16	16	32	24	28	51	41	54	40	39	38	22	17	45	15	23	15	22	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	27	30	23	28	29	30	29	30	30	30	30	30	30	30	30	29	29	29	30	28	27	25	29
MED	15	15	15	15	15	15	16	16	22	33	34	35	36	37	35	35	33	20	16	15	15	15	15	16
U Q	16	16	16	16	18	16	20	21	30	34	35	38	39	43	39	38	34	23	19	15	15	16	16	22
L Q	15	15	15	15	15	15	15	16	17	29	34	34	34	34	34	33	27	16	15	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT OKINAWA

MAY 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	75	A	A	73	78	90	77	85	87	92	100	103	108	87	106	99		99	99			100	77	82
2	104	102	102	102	52		73	77	84	A	97	101	107	93	93	123	109		93	94	102	80	A	86
3	106	N	105	93	76	86	91	75	83	105	103	106	106	92	87	88	87		92	96	A	86	87	87
4	85	86	86	99	78	38	48	74	88	97	103		A	88	89	89	88	99	106	106	97	103	N	102
5	97	96	93	100	78	69	68	78	77	92	100	103	106	88	108	93	N	95	N	86	99	103	89	84
6																								
7	A	86	73	68	61	64	72	91	101	76	80	67	82	A	N	89	88	99	99	92	A	A	94	101
8	94	76	73	74	75	73	66	77	78	74	A	90	95	'89	110	108	94	110	109	A	106	104	93	A
9	79	88	74	64	64	63	75	63	74	94	104	107		97	109	149	155	105	122	84	A	106	96	97
10	105	105	96	100	92		65		84	A	96	93	145	144	149	191	193	174	174	167	106	103	101	
11	A	101	105	93	85	A	92	104	A		102	124	A	134	162	174	173	155	154	132	124	A	A	106
12	123	106	101	79	78	78	82	83	90	99	91	A	112	150	151	145	167	132	127	100	102	82	101	102
13	106	103	102	94	87	74	65	88	75	88	94	82	111	142	141	124	141	144	131	124	106	98	78	79
14	96	92	90	75	70	62	70	85	77	A	85	A	90	103	118	125	123	N						
15																								
16																								
17															105	105	118	120	110	108	85	A	85	85
18	84	87	86	82	79	66	78	76	75	82	91	88	101	116	134	146	139	138	121	110	88	A	A	88
19	86	104	89	86	78	77	86	85	66	A	A	A	A	87	102	112	112	113	104	90	87	78	80	A
20	80	81	73	66	65	42	44	70	80	A	A	77	A	95	95	95	104		122	106	72	78	78	78
21	A	78	88	62	50	46	51	78	101	83	91		110	114	120	125	136	132	123	106	A	76	78	73
22	75	72	78	62	71	43	77	75	A	76	A	98	114	117	A	154	143	141	121	104	104		91	90
23	95	92	101	100	71	62	73	92	84	91	95	108	107	122	125	127	A	A	A	A	106	104	102	104
24	100	131	124	106	106	90	92	96	88	A	A	112	143	163	170	174	176	175	168	131	122	103	93	103
25	102	106	104	102	74	62	73	94	90	88	90	N	108	120	134	133	145	154	131	N	106	103	94	A
26	101	106	120	106	103	94	80	88	91	A	A		A	113	125	127	143	144	139	132	106	88	87	78
27	92	92	91	87	76	78	78	77	74	A	94	96	108	124	132	132	161	152	132	160	106	79	98	70
28	83	106	97	73	65	A	64	75	100	A	93	94	90	86	85		92	92	87	78	78	71	62	A
29	73	77	73	64	51	54	62	78	85	A	A	A	A	A	A	120	112	112	106	105	103	A	77	88
30	92	95	90	80		73	65	84	96	101	A	107	A	A	122	124	N	133		A	96	78	79	92
31	A	93	91	62	64	61	64	89	A		A	80	97	104	114	107	109		127		91	96	100	101
	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	25	26	27	26	23	27	26	24	15	18	19	19	24	25	27	24	22	24	21	22	21	23	22
MED	94	93	91	82	76	66	73	80	84	91	94	98	107	108	118	124	130	132	122	106	102	96	89	88
U Q	102	104	102	100	78	78	78	88	90	97	100	107	111	123	134	145	150	144	131	127	106	103	96	101
L Q	83	86	86	68	65	61	65	76	77	82	91	88	97	90	103	105	106	105	105	93	91	78	78	82

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

MAY 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	44	78	51	47	42	35	G	G	64	77	80	G	G	G	G	G	G	63	72	130		G	41	51
2	G	G	32	30	G	G	G	44	43	77	114	G	G	G	G	G	50	167	60	103	44	44	54	43
3	37	G	G	G	G	30	G	G	48	58	52	G	G	G	G	G	50	72	104	96	50	G	45	46
4	G	G	G	G	G	G	G	G	G	G	G		102	91	84	51	G	45	98	37	31	G	41	G
5	G	G	G	G	G	G	G	G	40	44	G	G	G	G	G	G	G	47	46	46	37	G	G	39
6																								
7	98	26	G	41	44	29	42	60	55	69	G	76	81	90	G	46	44	48	81	100	104	102	72	92
8	100	G	57	42	G	30	G	41	52	75	94	G	G	78	69	58	88	72	70	112	39	38	51	42
9	32	44	G	G	G	33	37	44	51	45	G	G		G	G	71	81	99	43	38	109	99	46	80
10	78	57	47	43	58		37	150	70	148	79	104	159	180	113	G	G	52	42	37	30	37	56	130
11	160	168	95	79	93	106	70	103	154	158	174	90	185	50	63	G	51	52	49	33	68	154	158	106
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14	97	83	46	42	38	26	32	66	70	105	55	104	81	71	64	64	82	56	134					
15																								
16																								
17															49	82	67	61	49	33	79	83	84	57
18	83	36	40	G	G	G	46	44	46	72	68	61	82	152	68	50	93	77	58	83	86	93	94	87
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23	68	49	44	48	G	50	40	59	90	112	178	170	179	80	101	94	130	157	138	135	112	106	109	107
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	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	27	27	27	26	27	27	27	27	27	26	26	27	28	28	27	27	28	26	26	27	27	27
MED	78	44	40	41	38	35	37	56	70	88	94	86	81	71	72	62	73	61	80	70	68	68	54	70
U Q	97	67	57	53	44	50	50	68	84	112	138	104	127	98	92	93	89	98	91	100	92	93	72	98
L Q	38	26	26	24	G	28	29	41	52	71	56	53	50	50	25	23	46	52	55	37	44	37	45	43

HOURLY VALUES OF FMIN AT OKINAWA

MAY 1993

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

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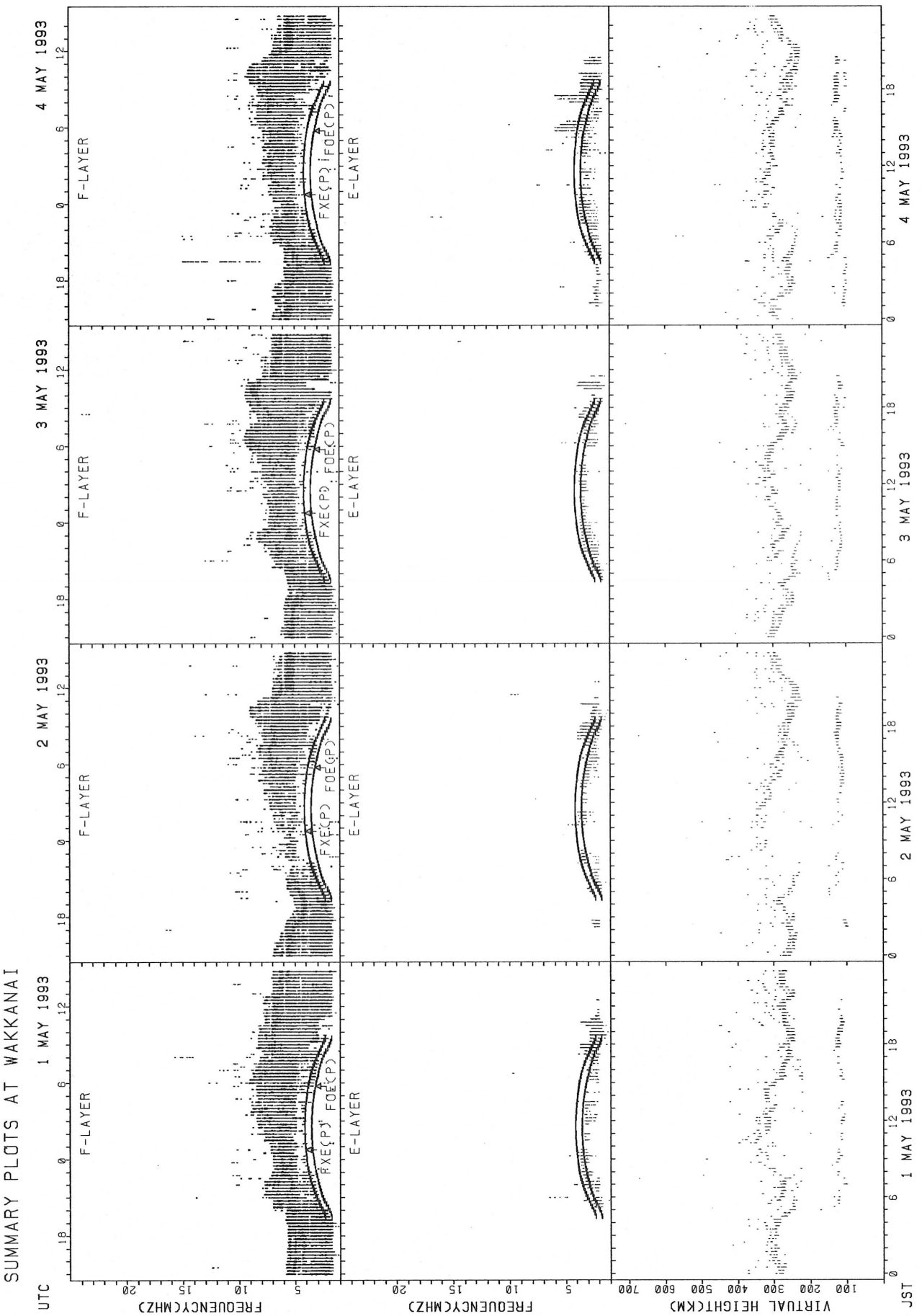
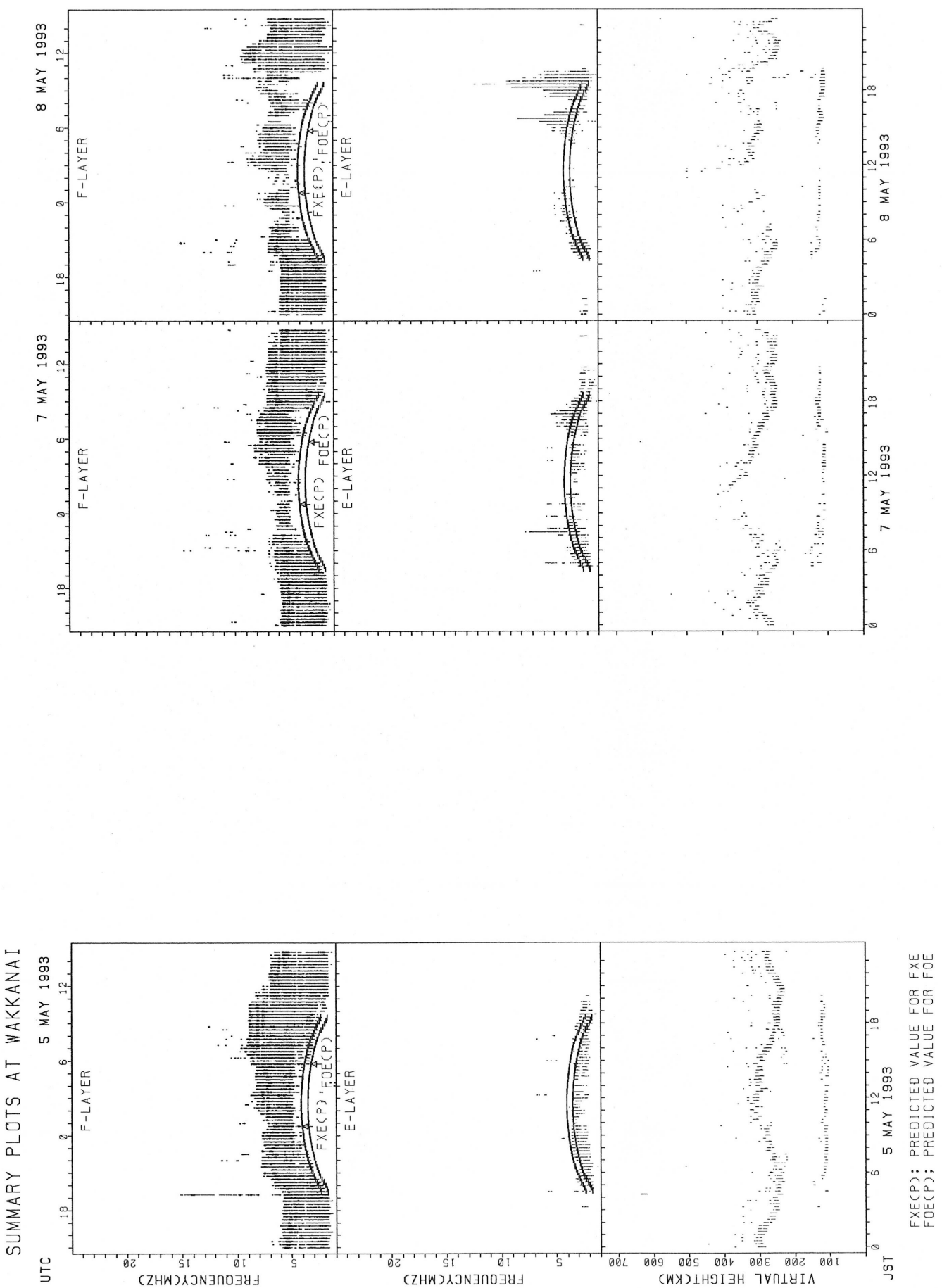
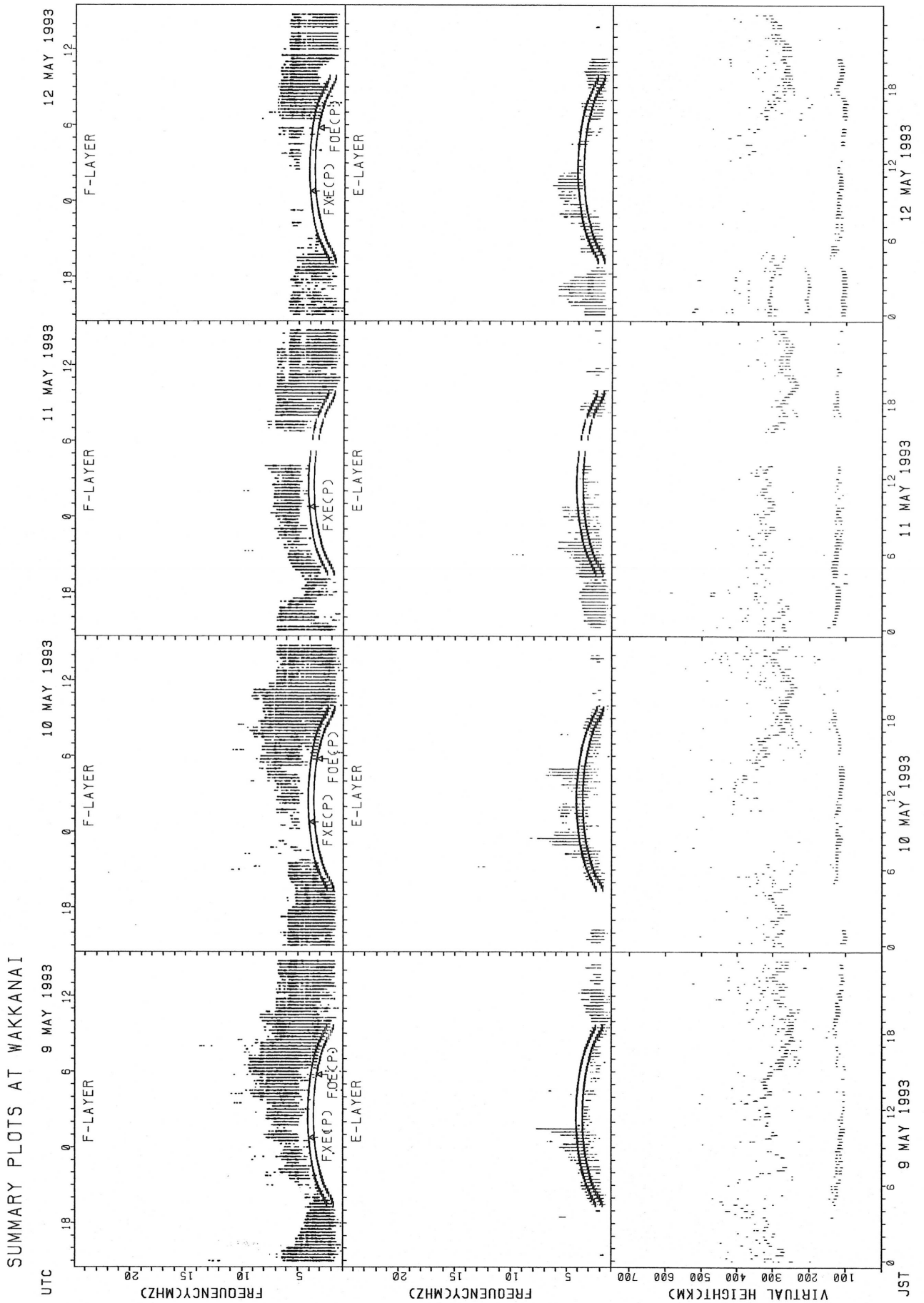
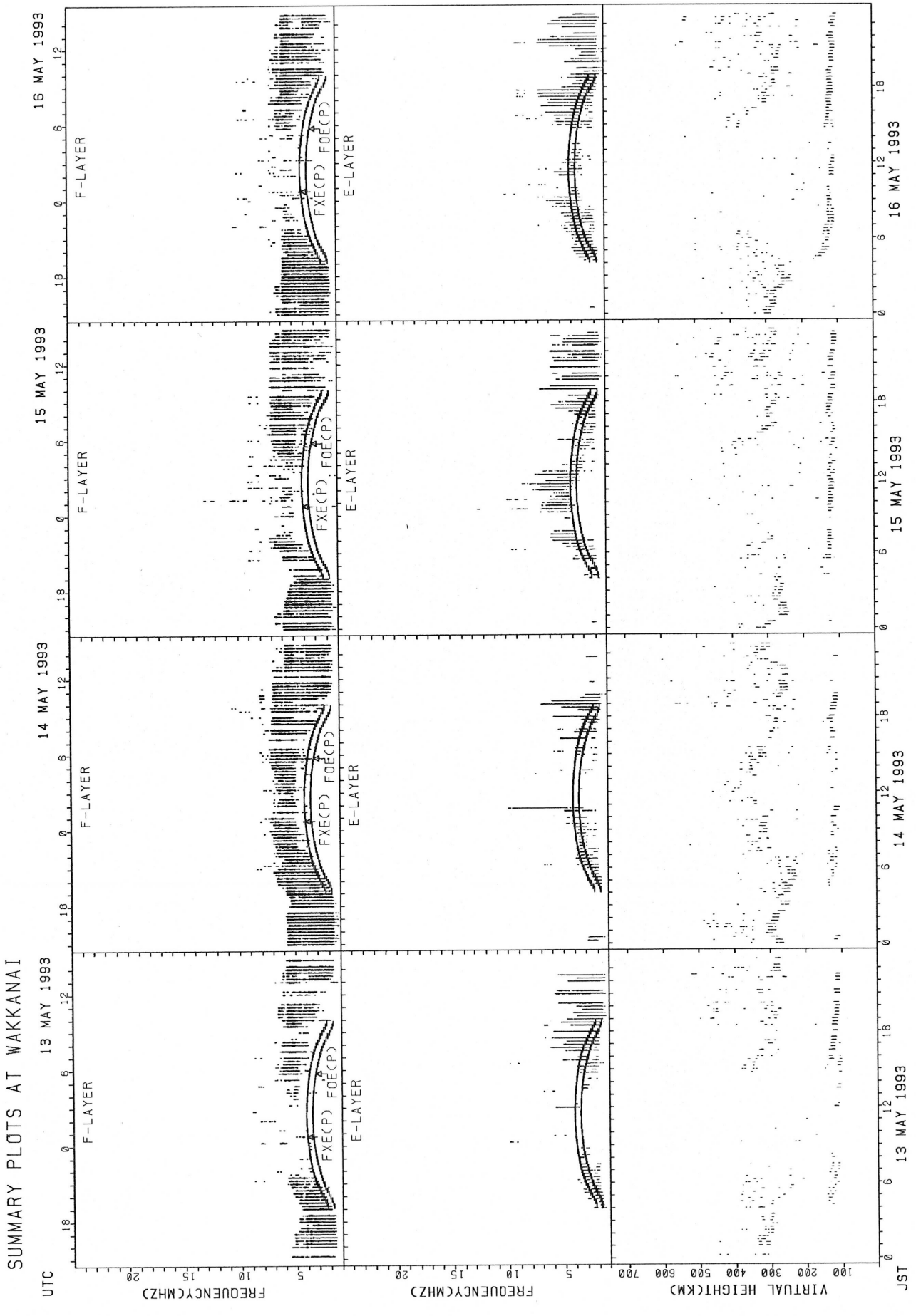
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	26	27	27	27	26	27	27	26	23	20	19	18	18	20	21	23	27	28	25	26	27	27	27
MED	15	15	15	15	15	15	15	16	18	21	29	32	33	34	32	29	22	18	16	14	15	15	15	15
U Q	16	16	16	16	17	16	16	26	30	27	31	34	33	35	33	32	26	30	22	17	17	16	16	16
L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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

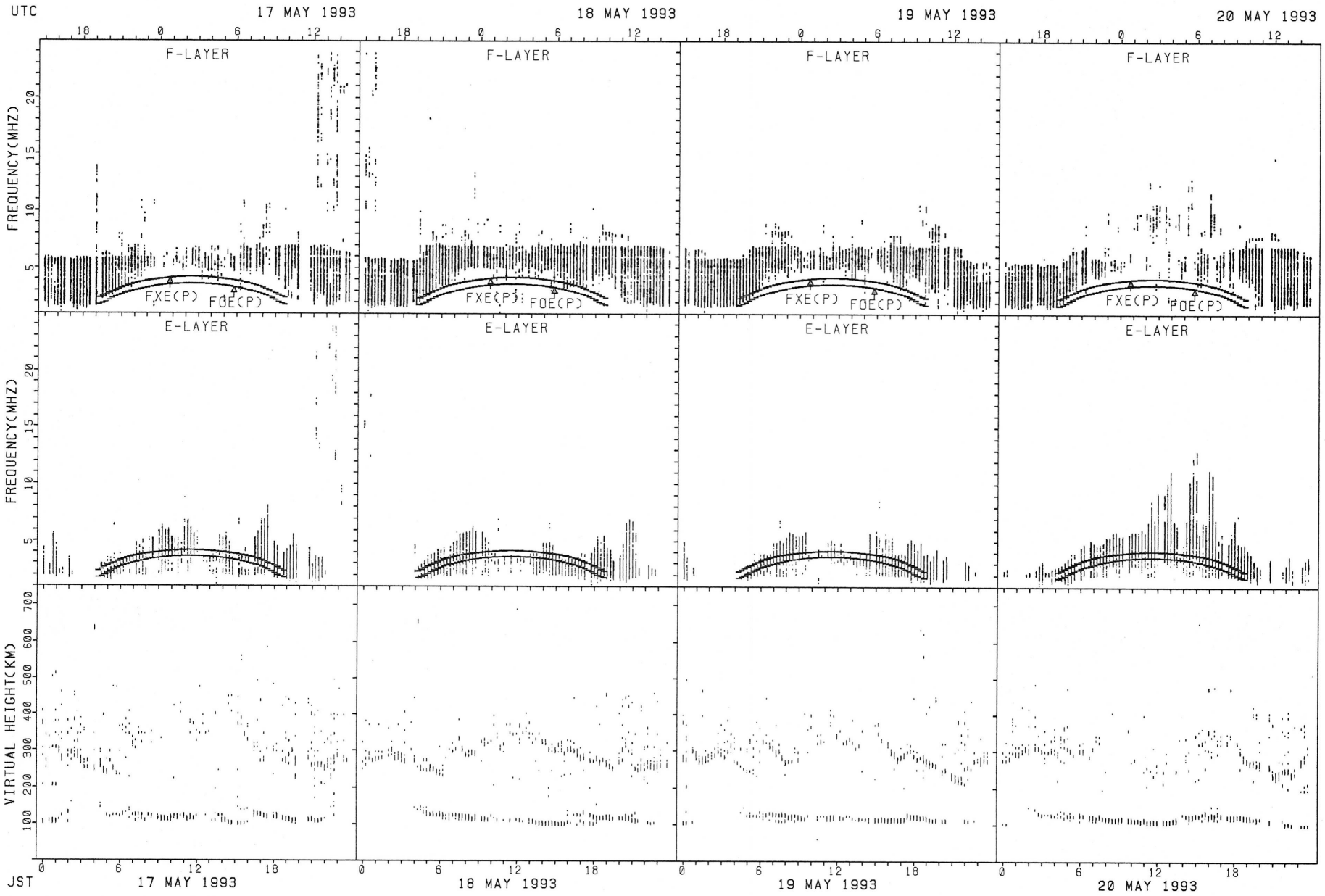

SUMMARY PLOTS AT WAKKANAI
UTC
1 MAY 1993
2 MAY 1993
3 MAY 1993
4 MAY 1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
5 MAY 1993
F-LAYER
FXE(P) FOE(P)
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE
7 MAY 1993
8 MAY 1993

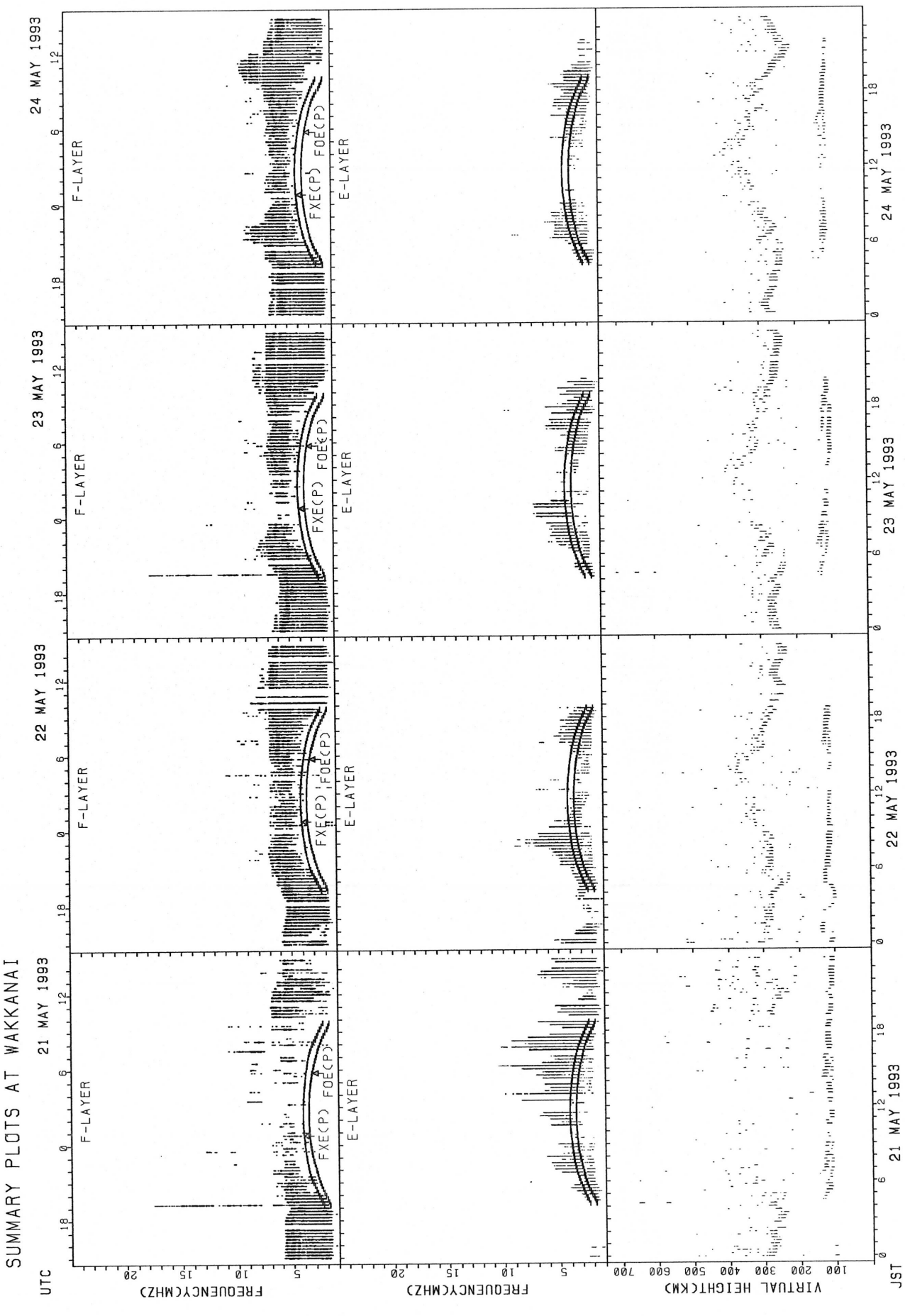

SUMMARY PLOTS AT WAKKANAI
UTC
9 MAY 1993
10 MAY 1993
11 MAY 1993
12 MAY 1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

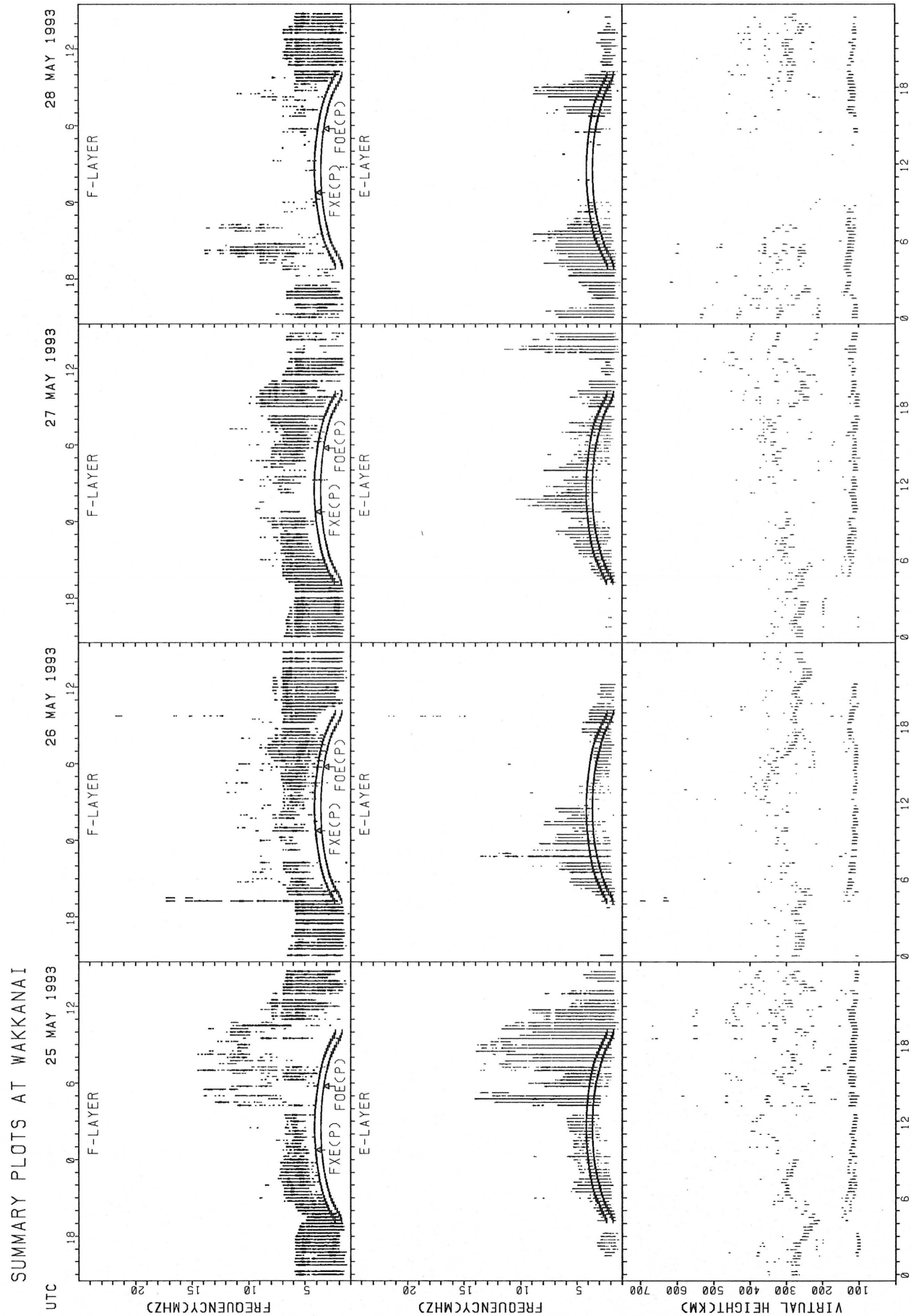

SUMMARY PLOTS AT WAKKANAI
UTC
JST
13 MAY 1993
14 MAY 1993
15 MAY 1993
16 MAY 1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

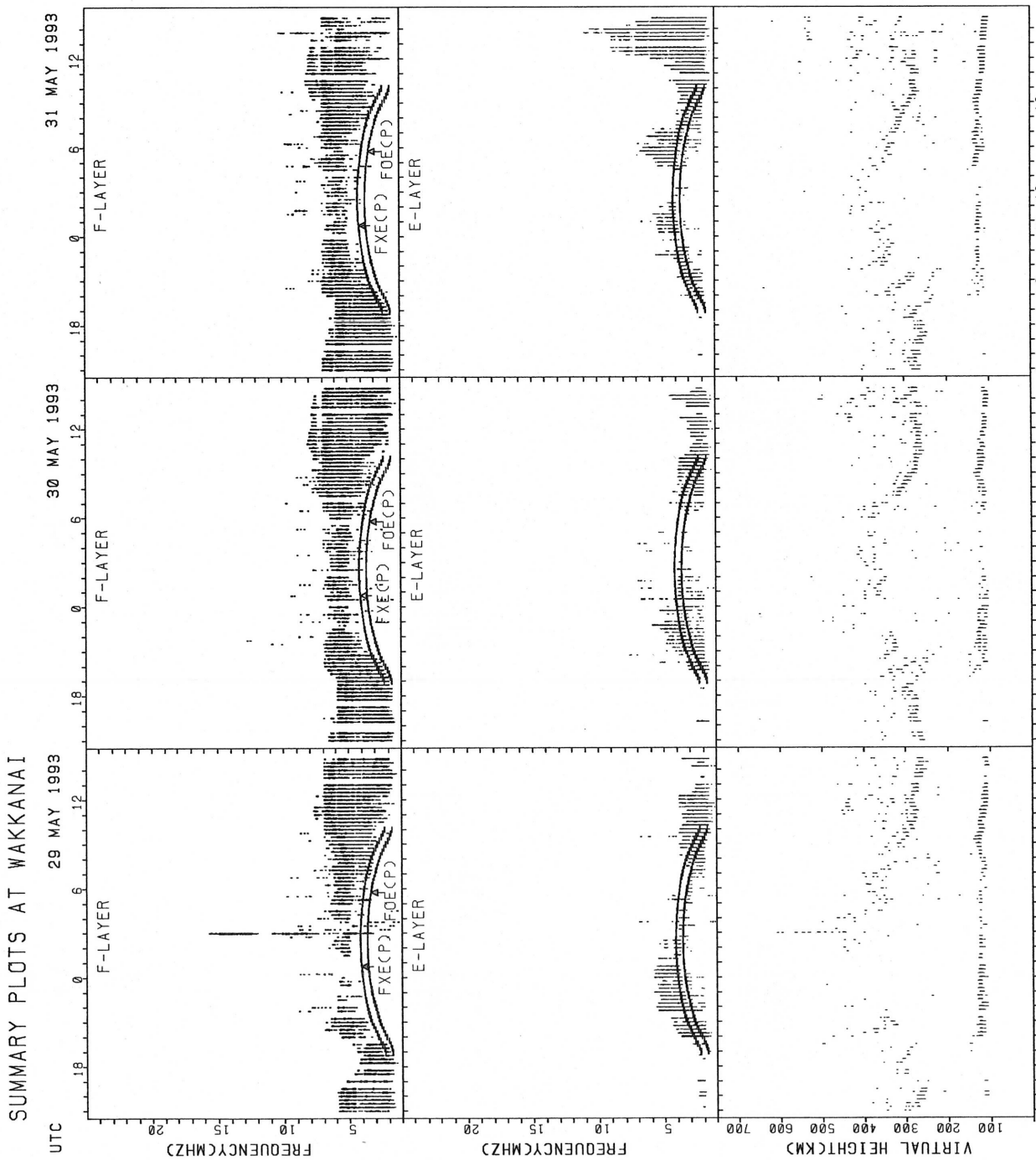
SUMMARY PLOTS AT WAKKANAI

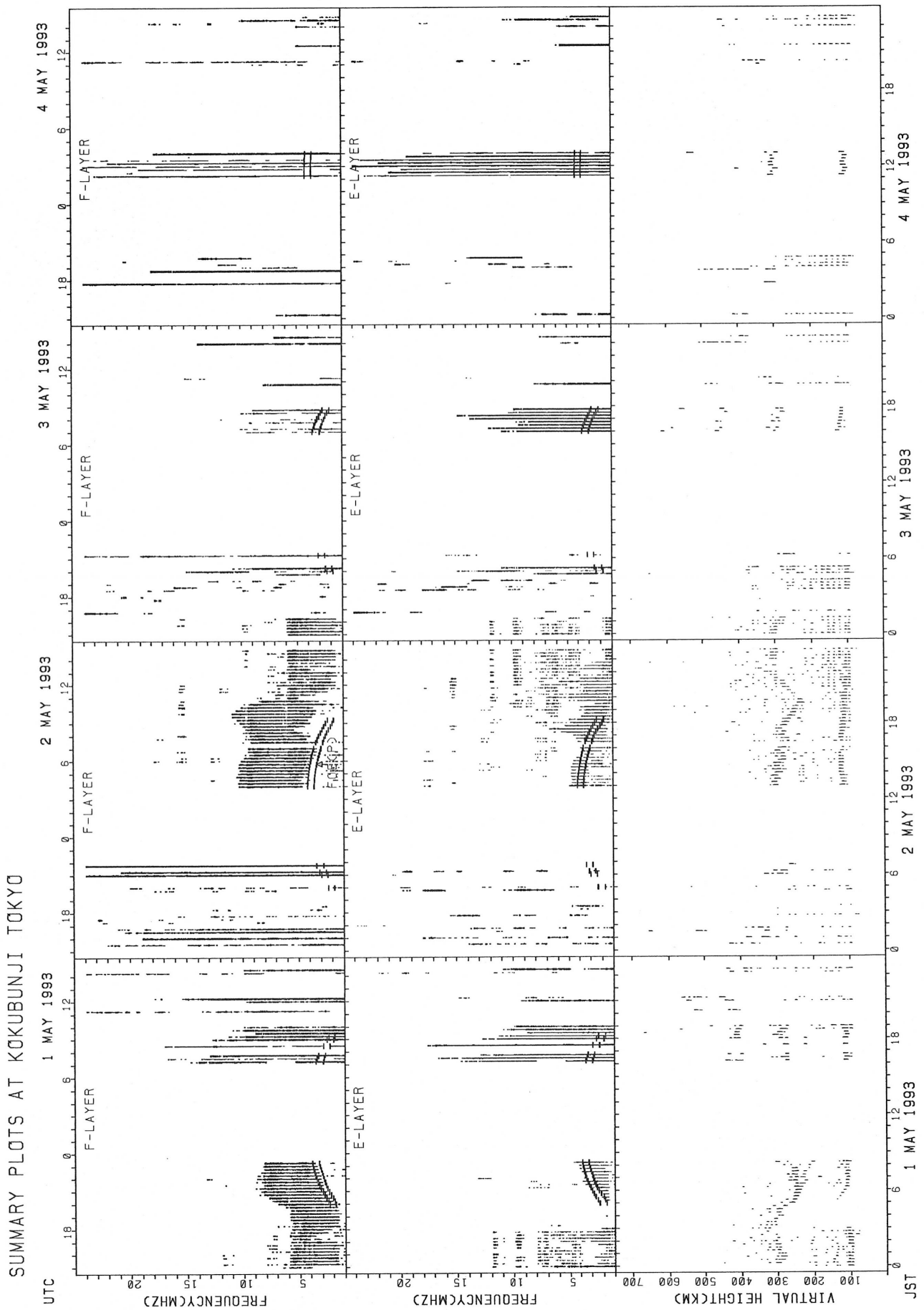


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

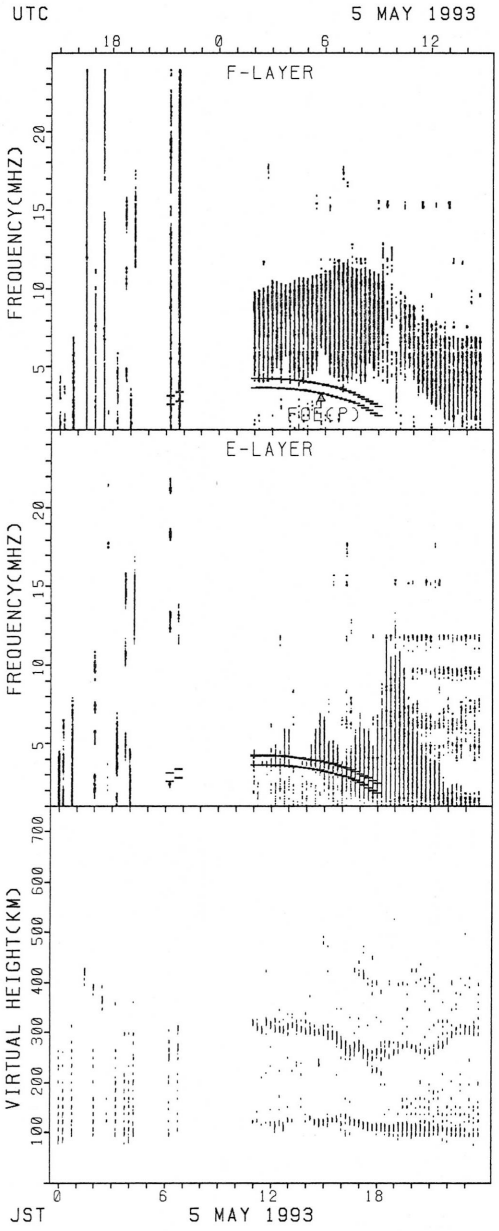

SUMMARY PLOTS AT WAKKANAI
21 MAY 1993
22 MAY 1993
23 MAY 1993
24 MAY 1993
UTC
JST
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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


SUMMARY PLOTS AT WAKKANAI
UTC
29 MAY 1993
30 MAY 1993
31 MAY 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 KOKUBUNJI TOKYO
1 MAY 1993
2 MAY 1993
3 MAY 1993
4 MAY 1993
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT KOKUBUNJI TOKYO



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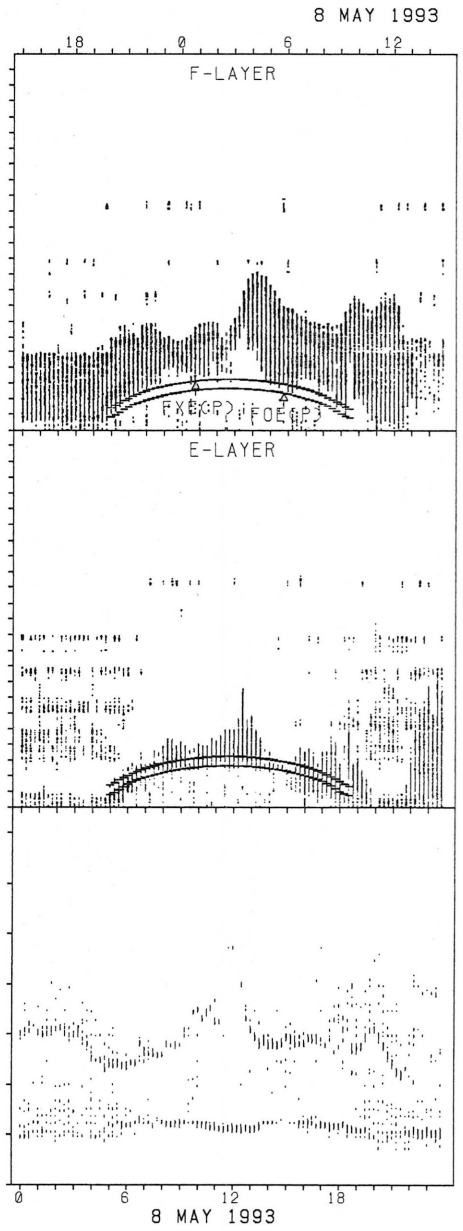
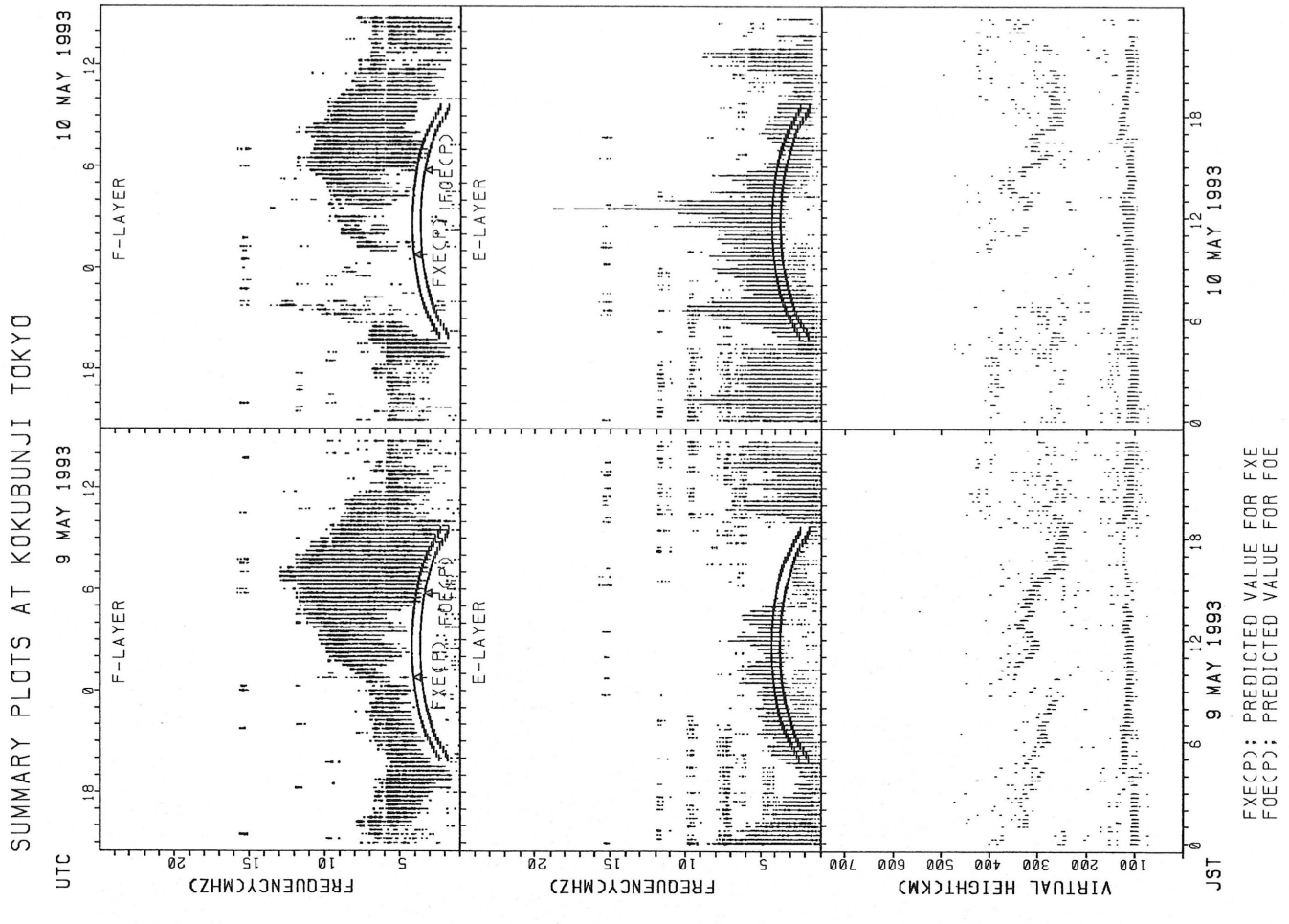
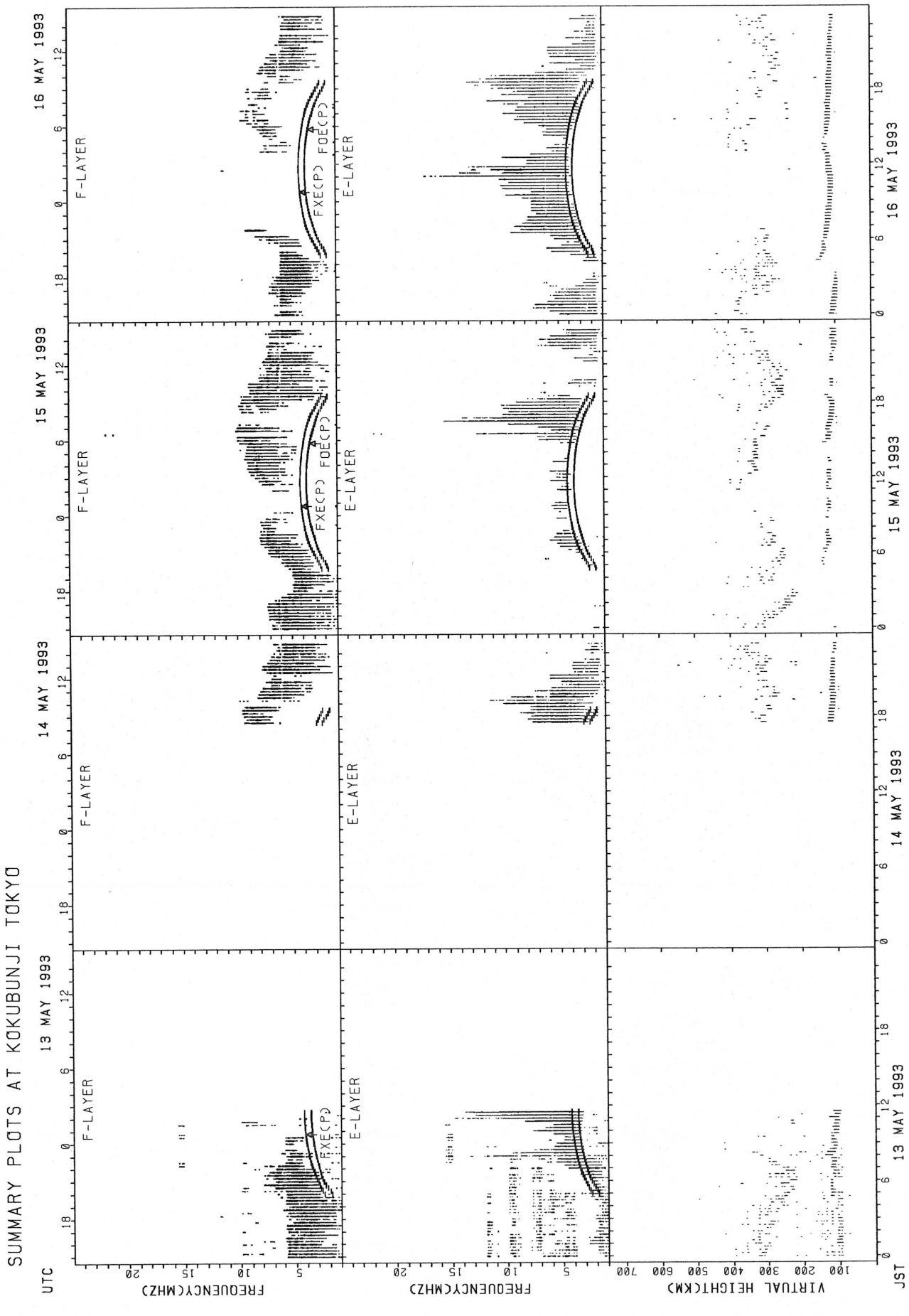
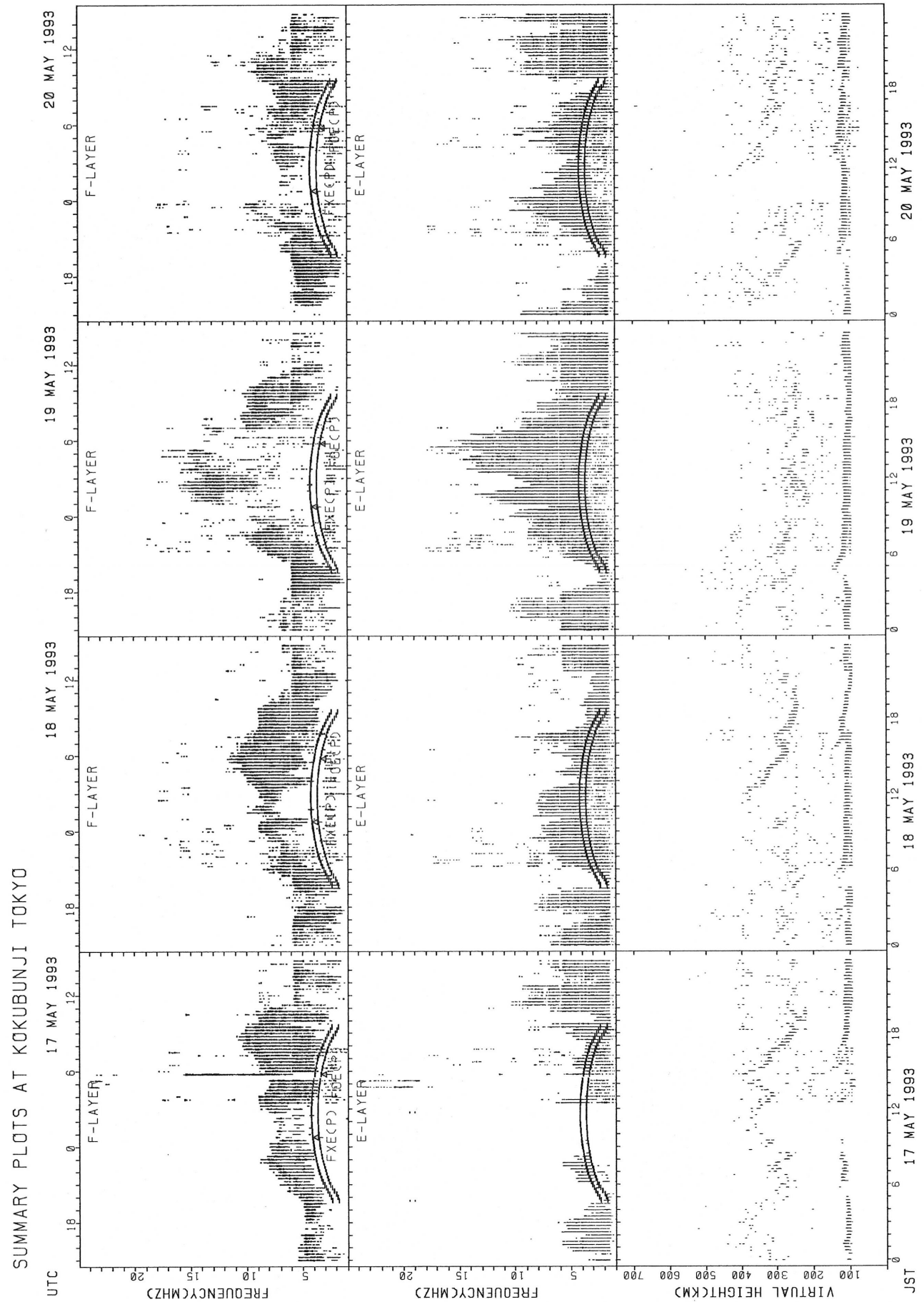
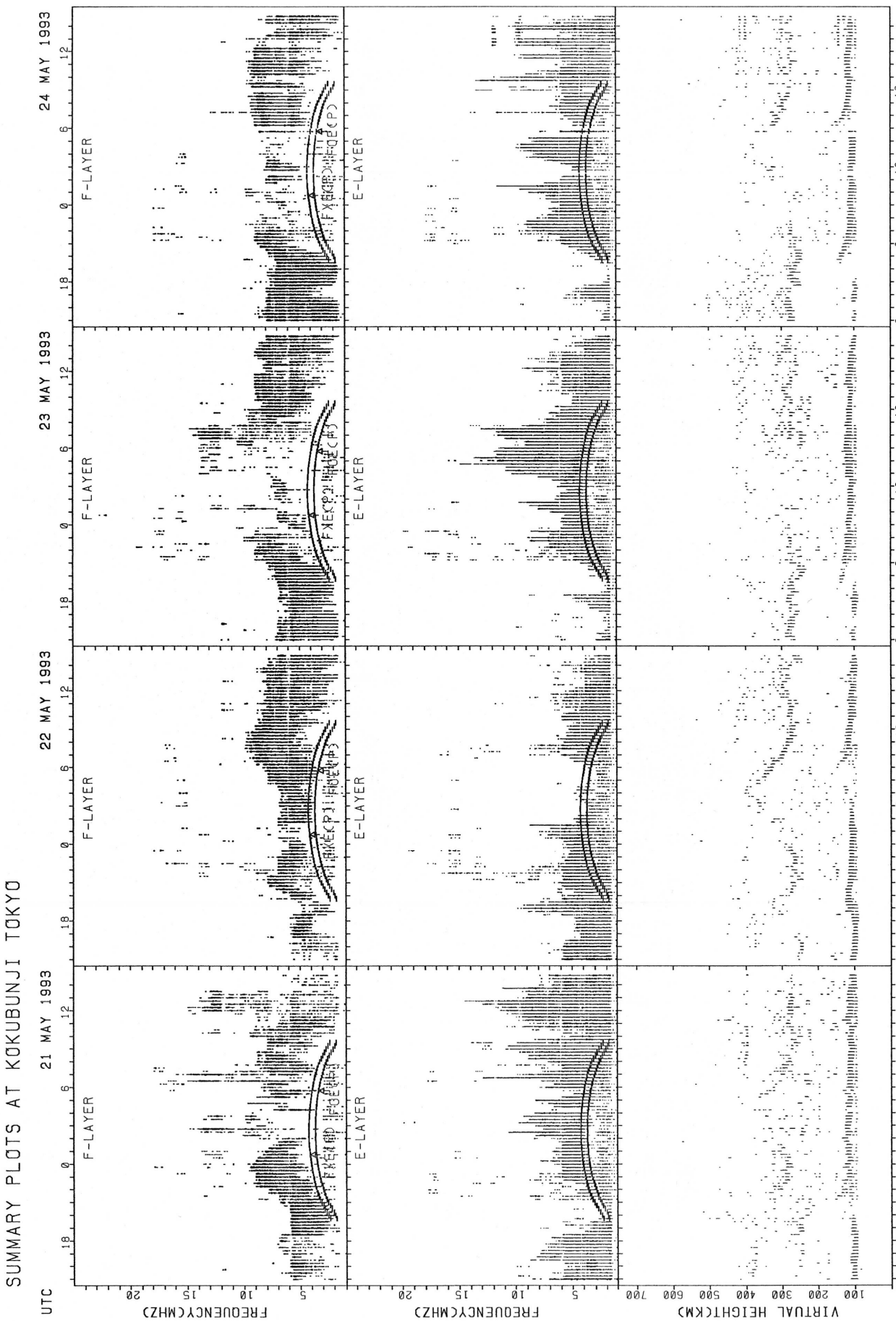
FOE(P): PREDICTED VALUE FOR FOE

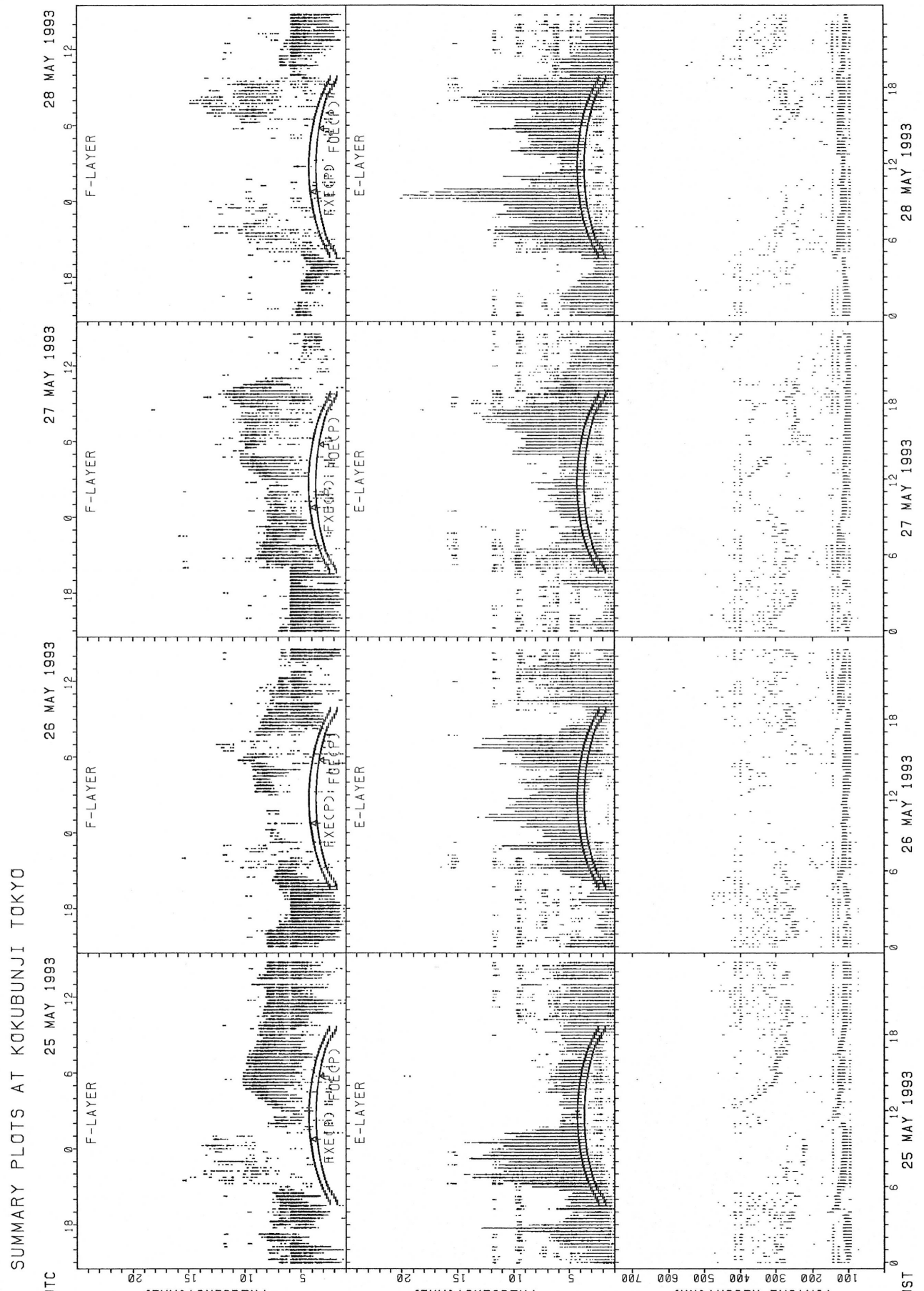


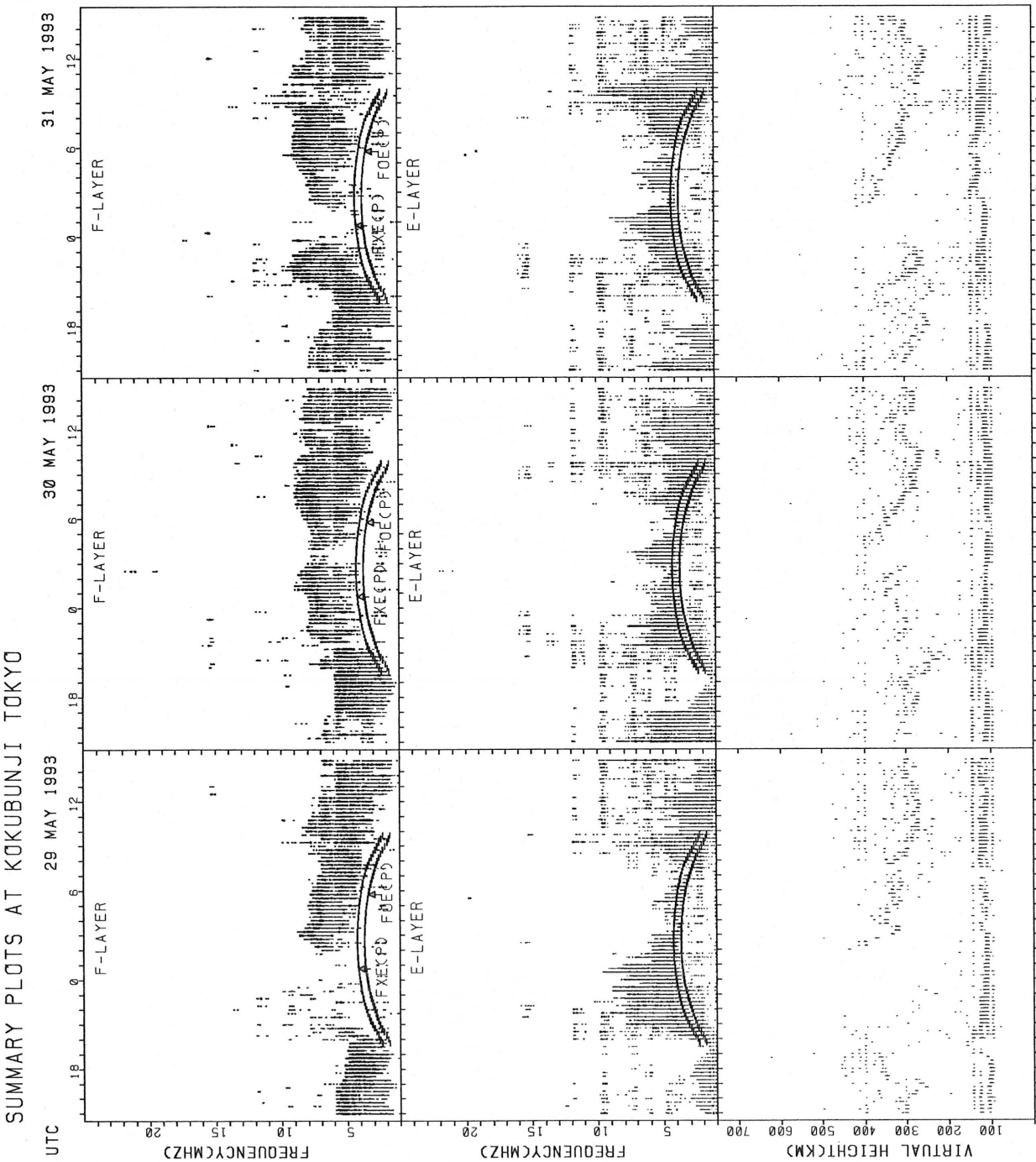

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
9 MAY 1993
10 MAY 1993
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); FOE(P)
JST
9 MAY 1993
10 MAY 1993
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

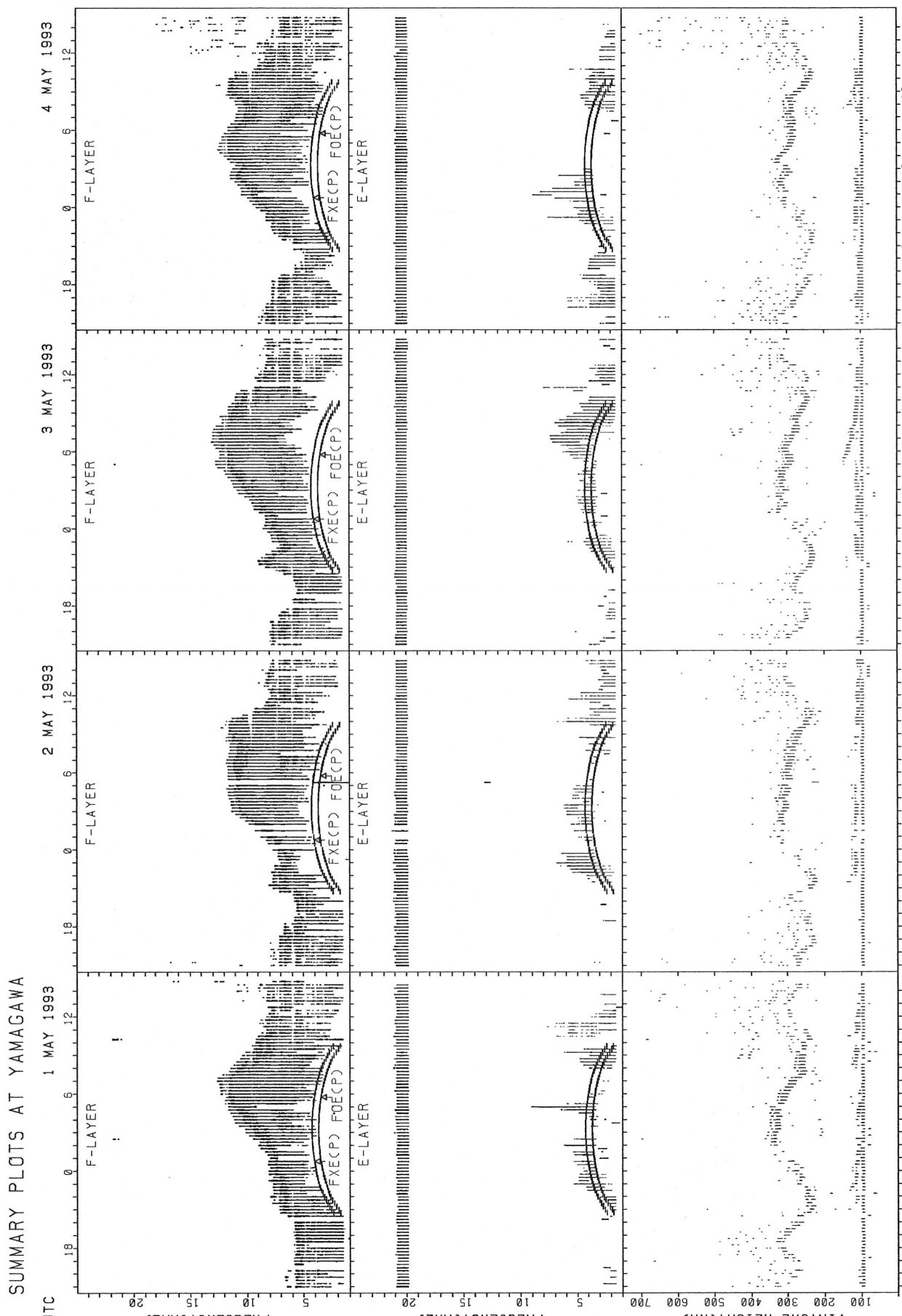

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
13 MAY 1993
14 MAY 1993
15 MAY 1993
16 MAY 1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
17 MAY 1993
18 MAY 1993
19 MAY 1993
20 MAY 1993
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
21 MAY 1993
22 MAY 1993
23 MAY 1993
24 MAY 1993
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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


SUMMARY PLOTS AT KOKUBUNJI TOKYO
29 MAY 1993
30 MAY 1993
31 MAY 1993
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P) FOE(P)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
JST
1 MAY 1993
2 MAY 1993
3 MAY 1993
4 MAY 1993
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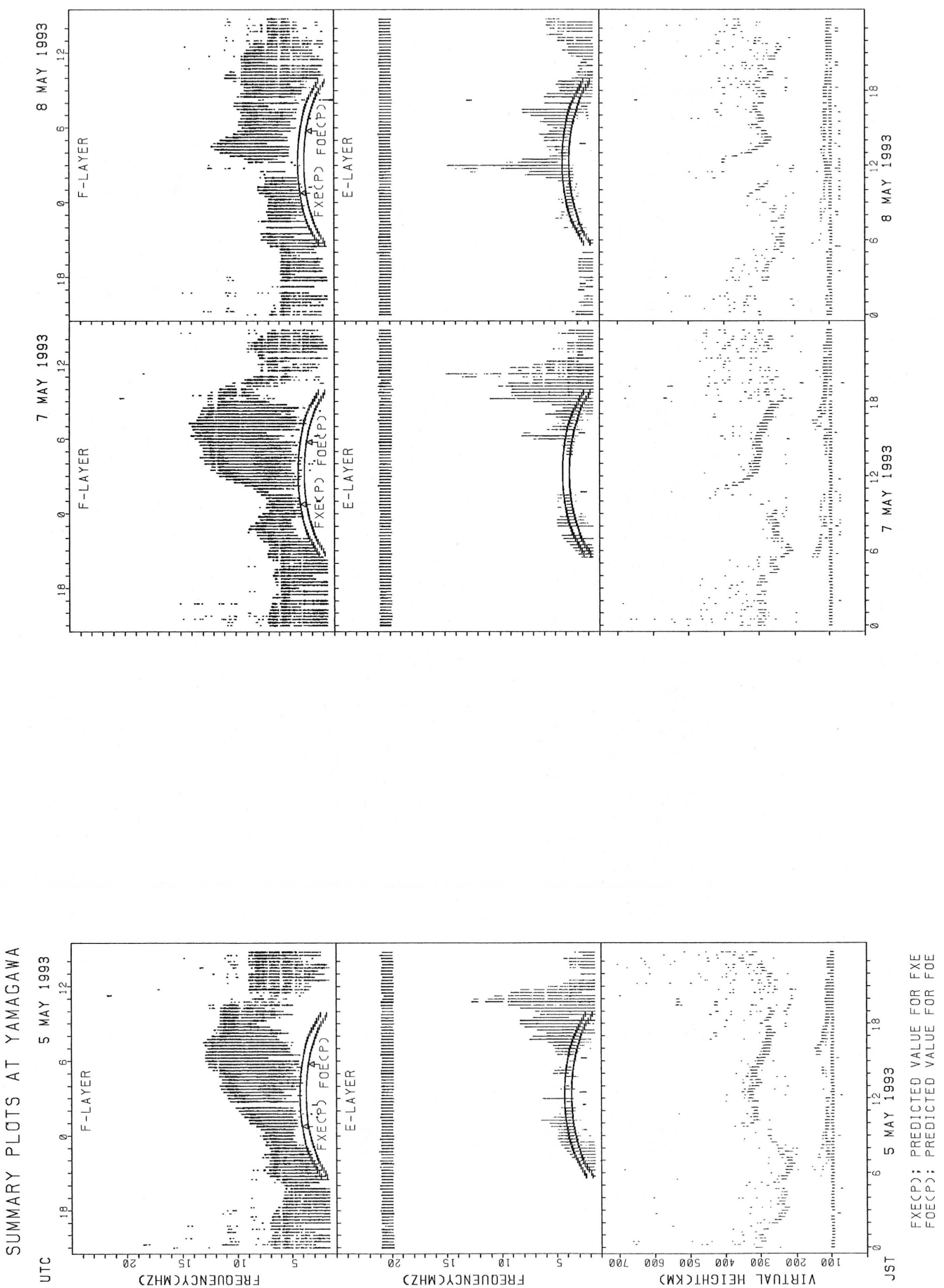
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE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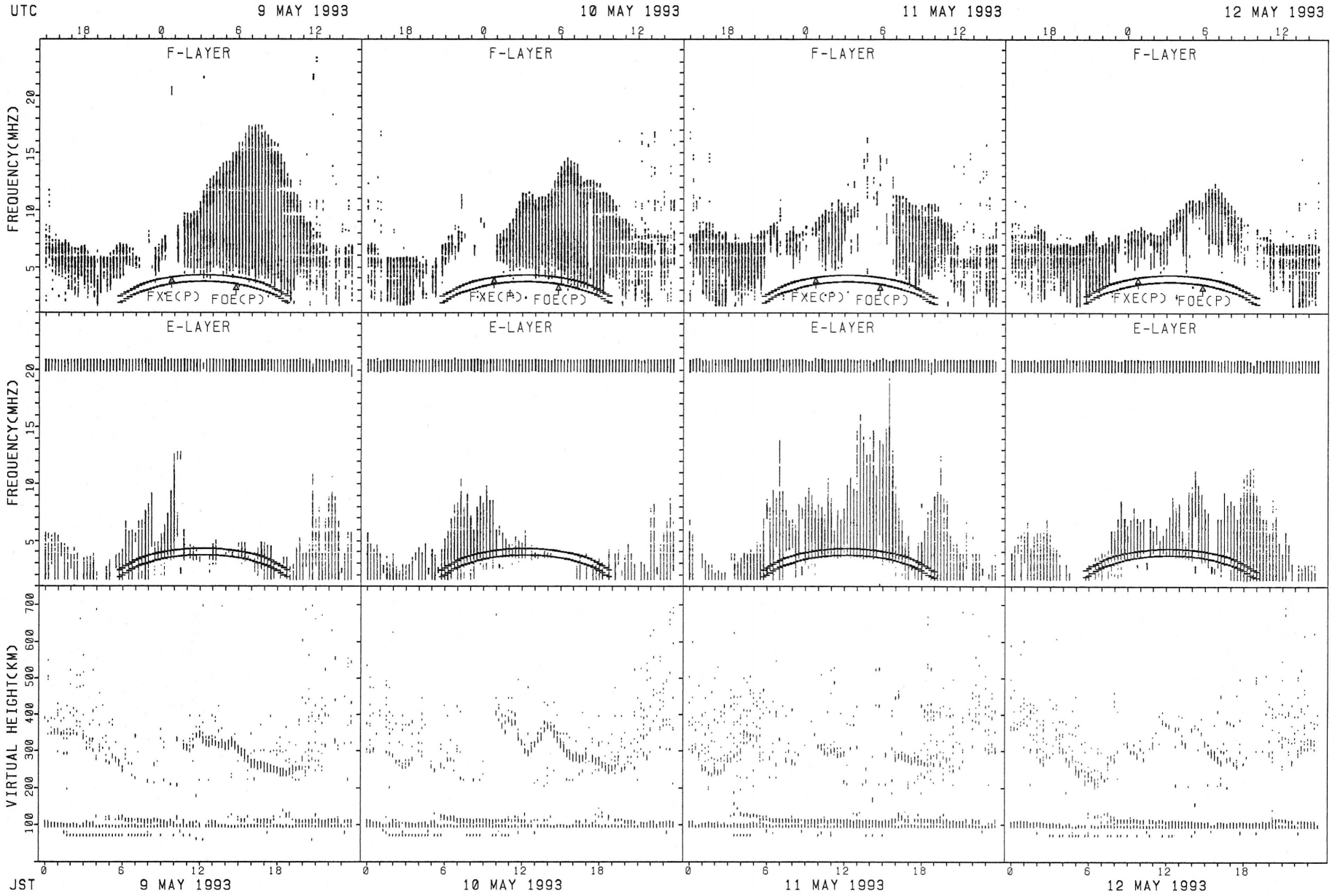
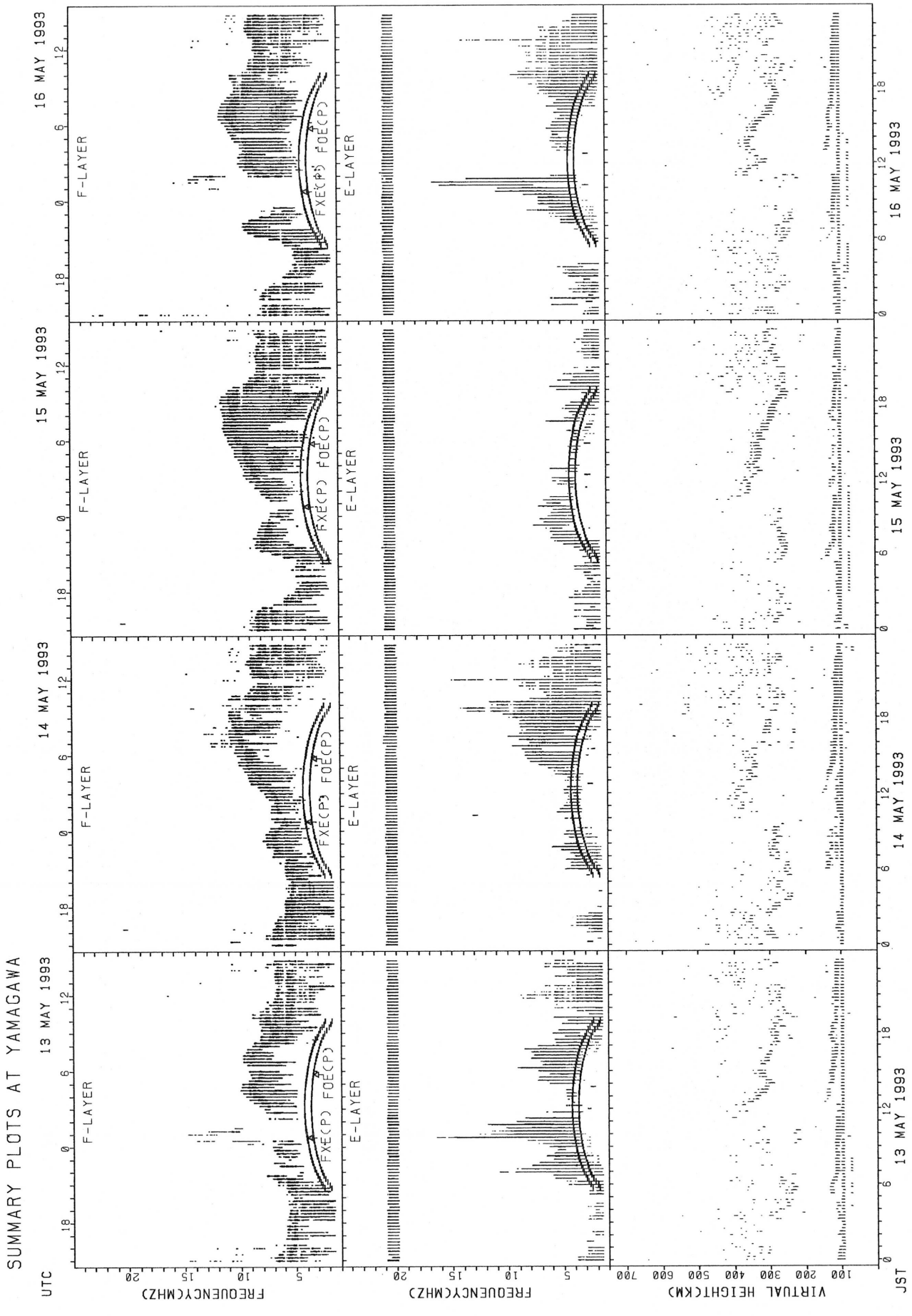
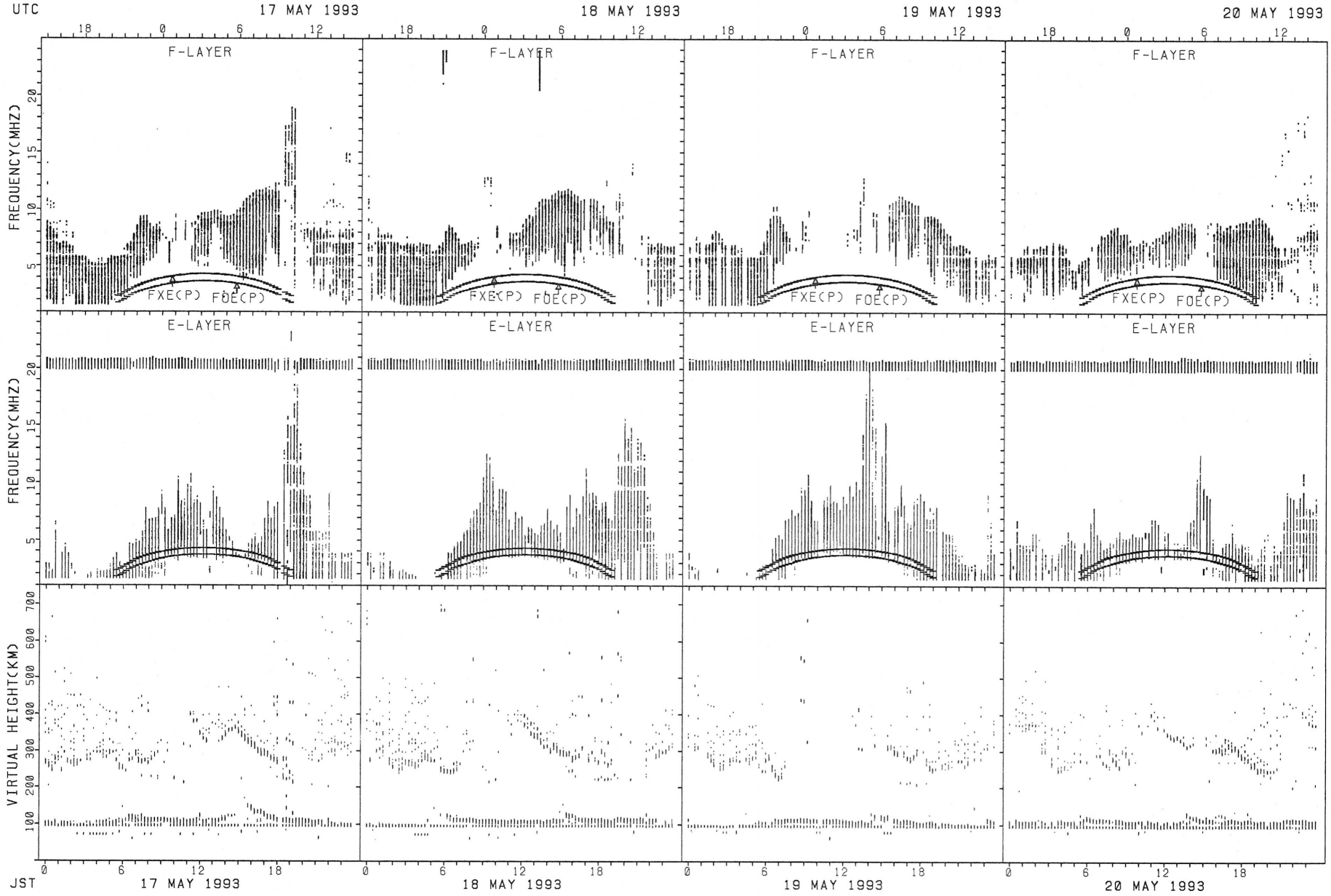
UTC
5 MAY 1993
F-LAYER
FXE(P) FOE(P)
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
7 MAY 1993
8 MAY 1993
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



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


SUMMARY PLOTS AT YAMAGAWA
UTC
13 MAY 1993
14 MAY 1993
15 MAY 1993
16 MAY 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
UTC
17 MAY 1993
18 MAY 1993
19 MAY 1993
20 MAY 1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
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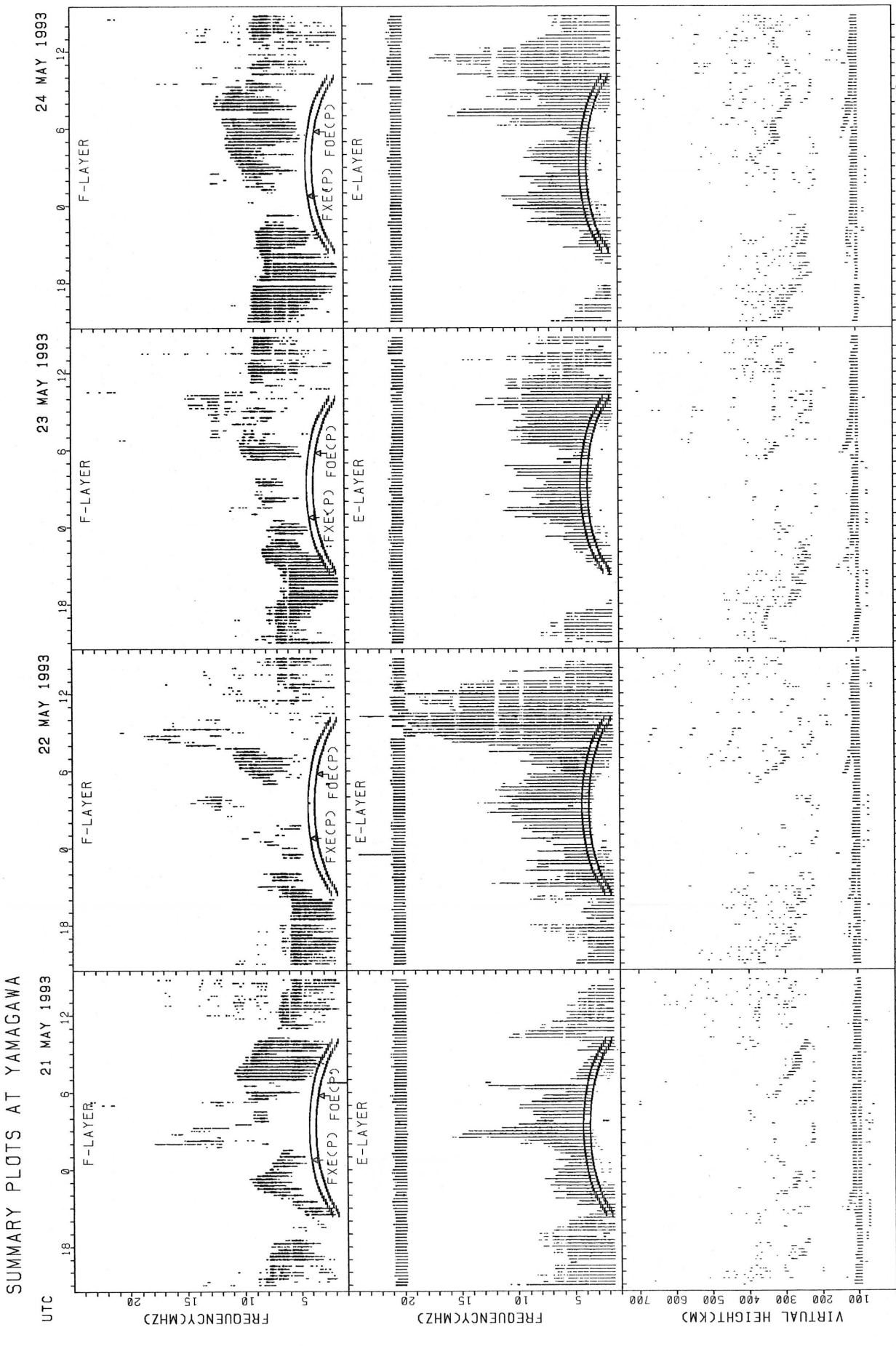
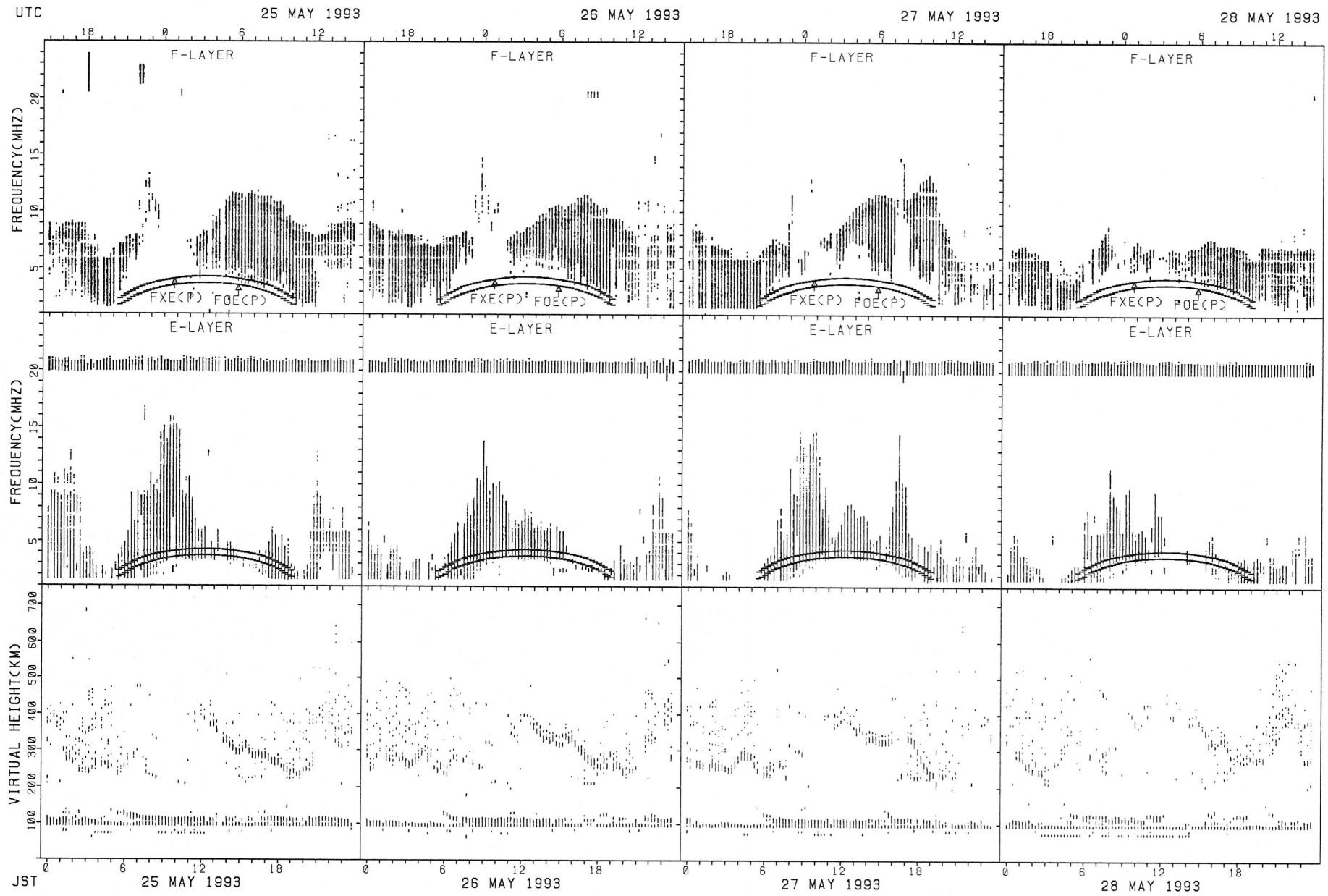
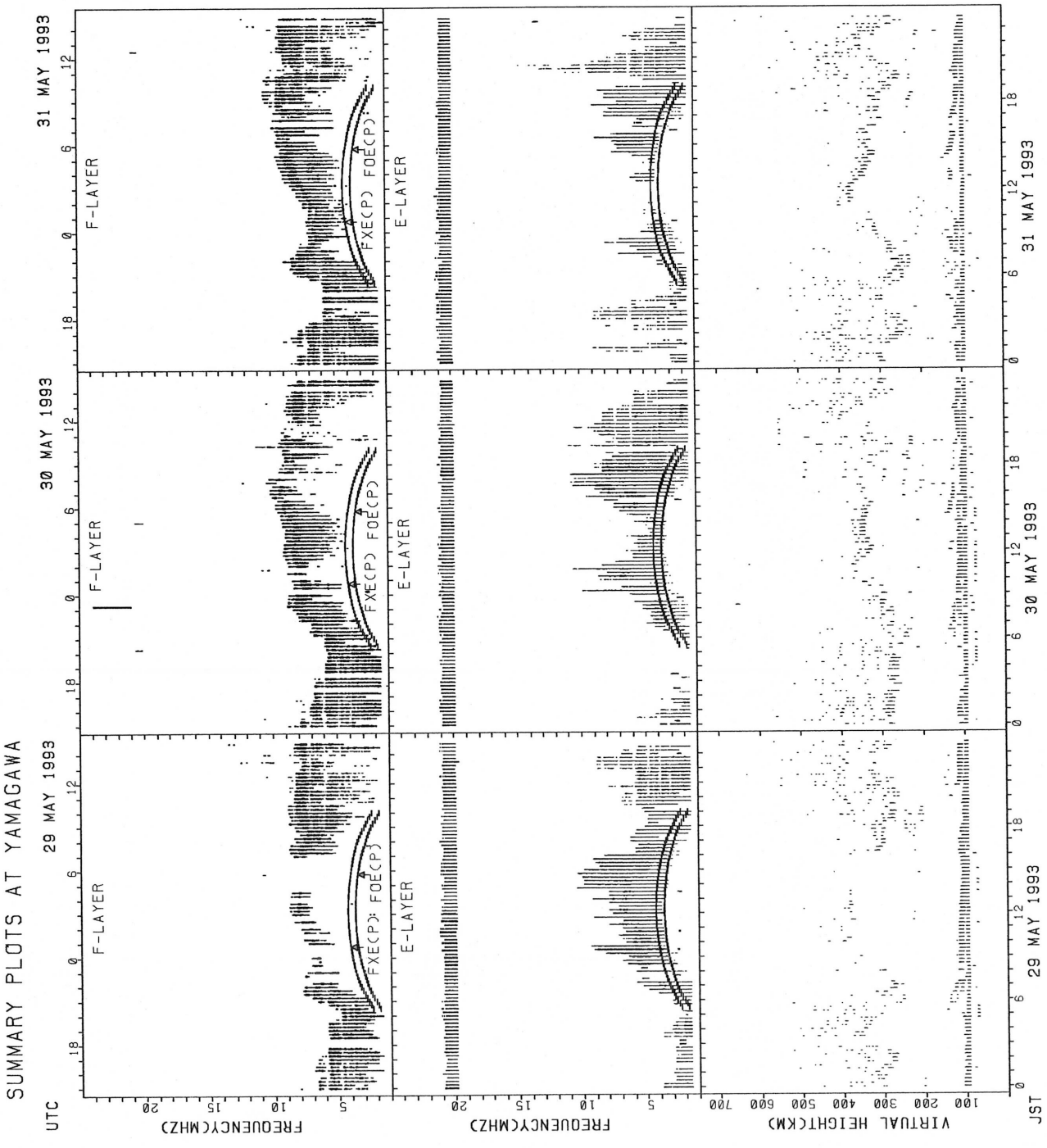
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

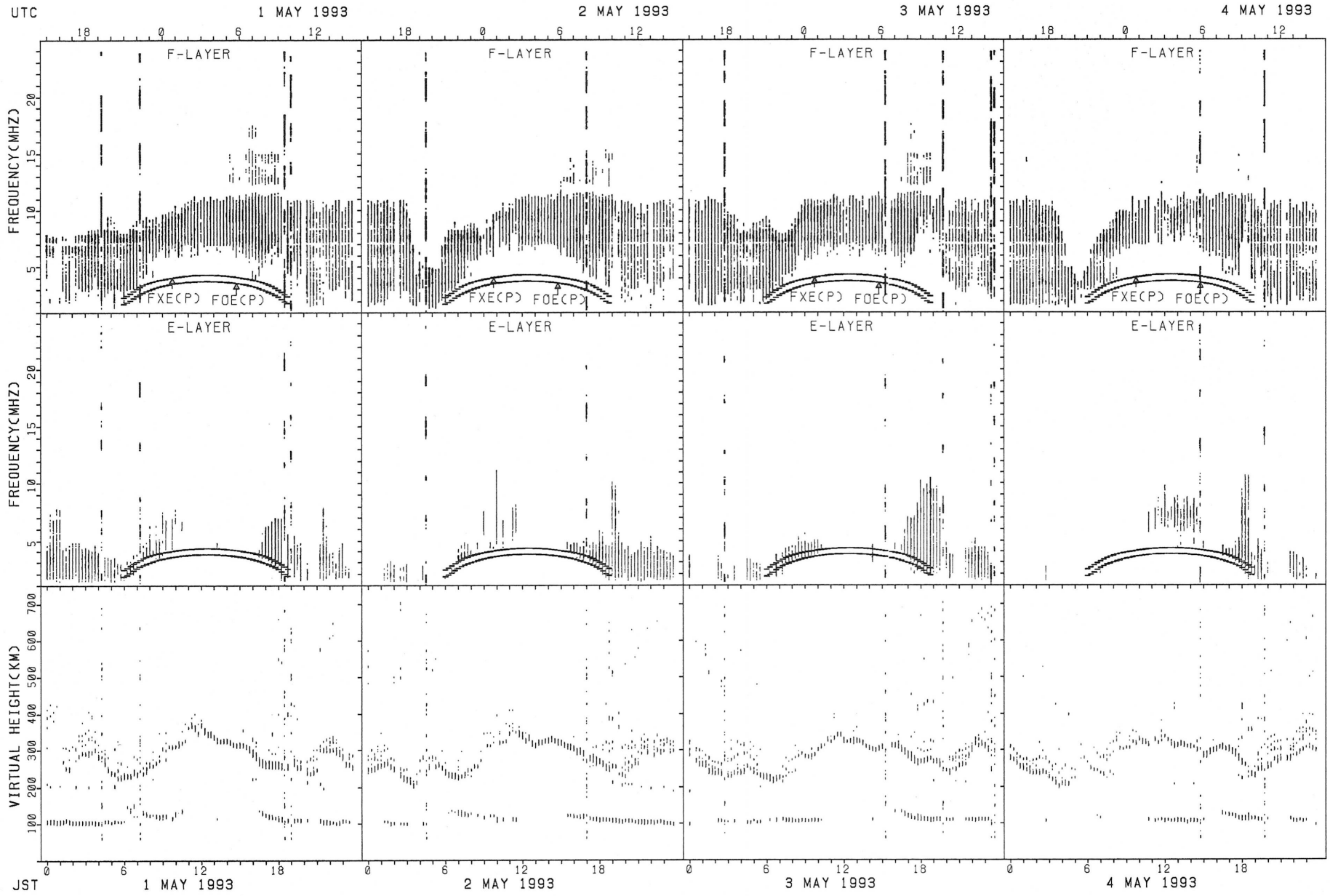

SUMMARY PLOTS AT YAMAGAWA
UTC
JST
21 MAY 1993
22 MAY 1993
23 MAY 1993
24 MAY 1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

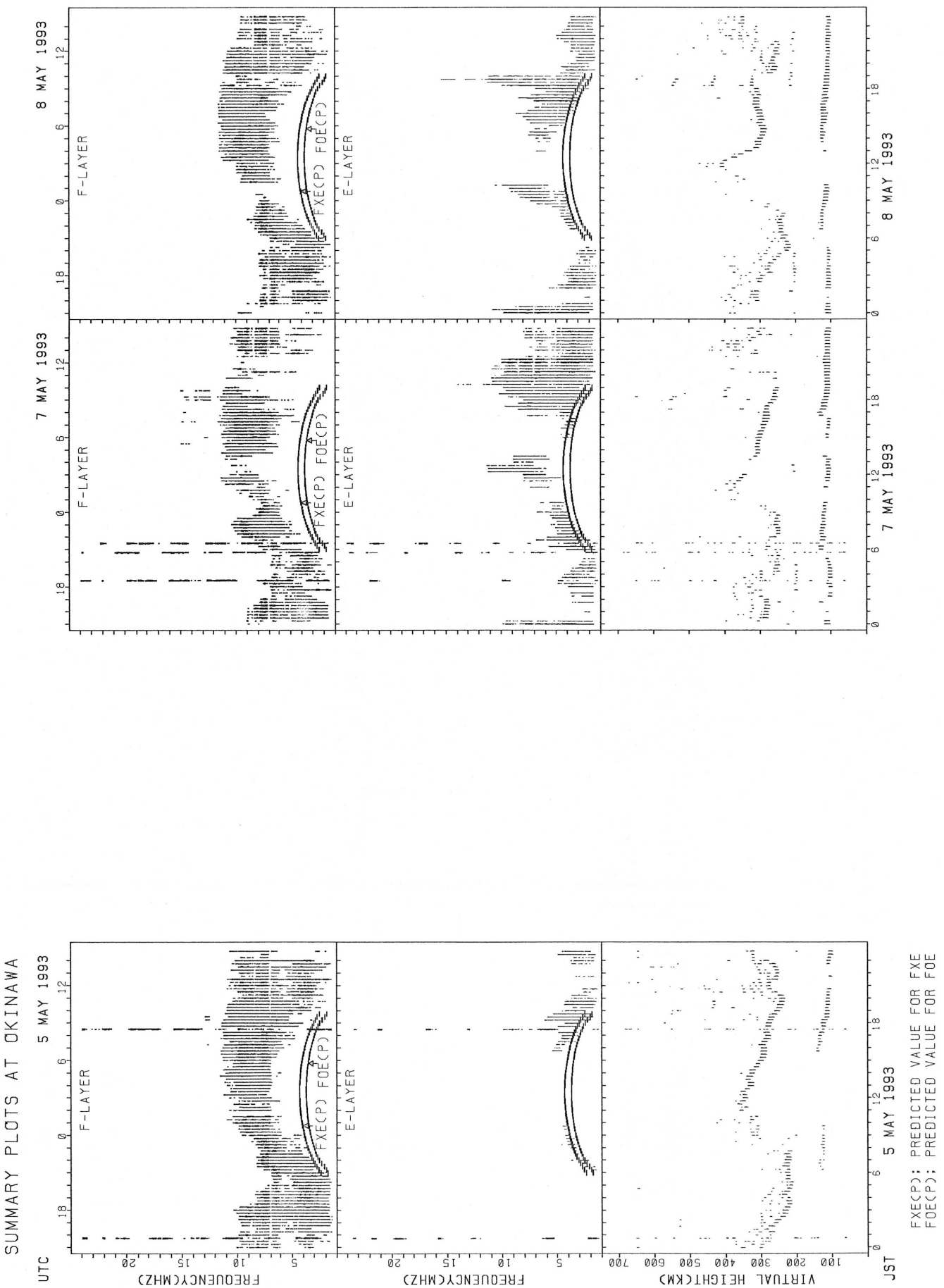
SUMMARY PLOTS AT YAMAGAWA

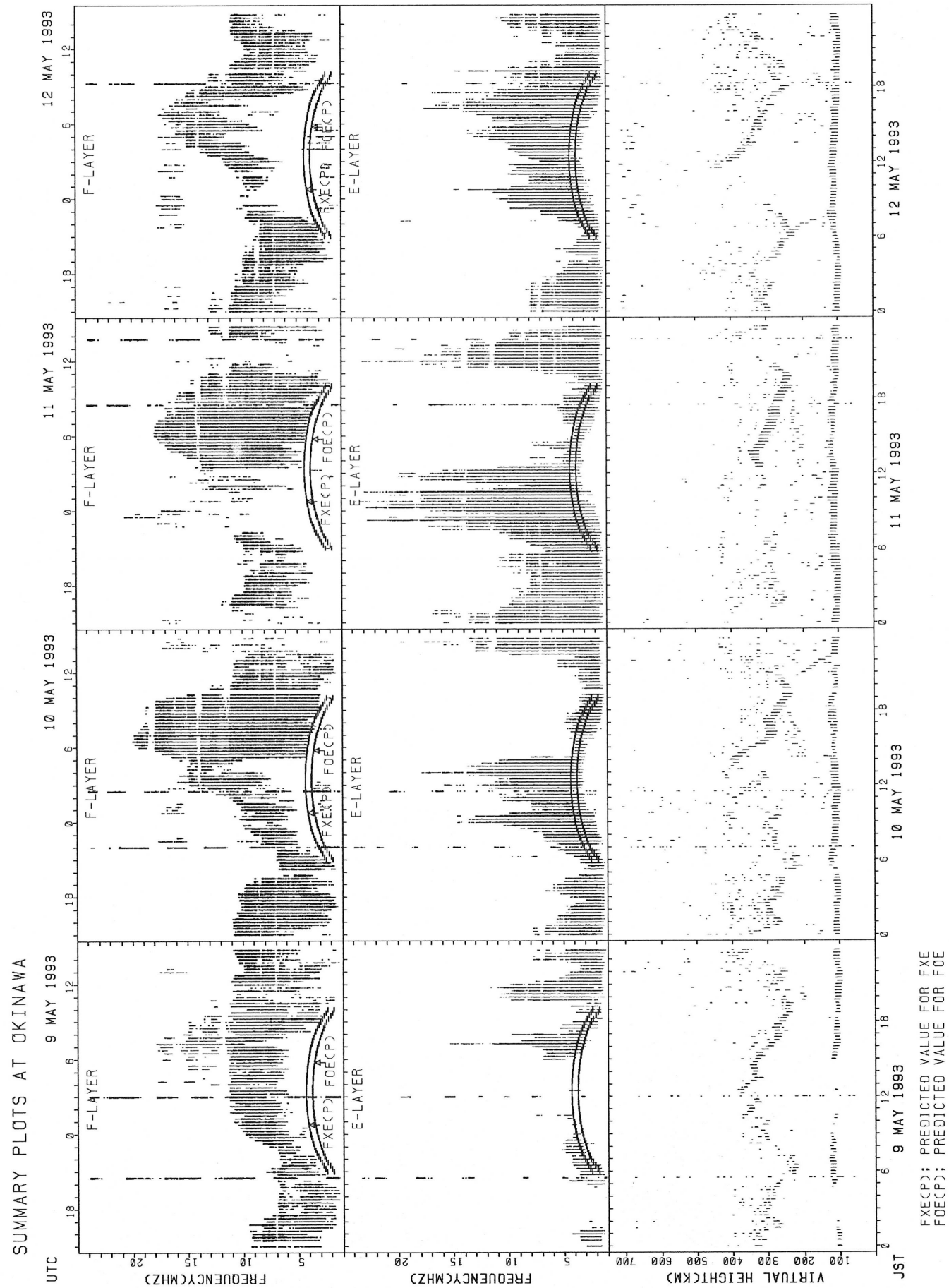


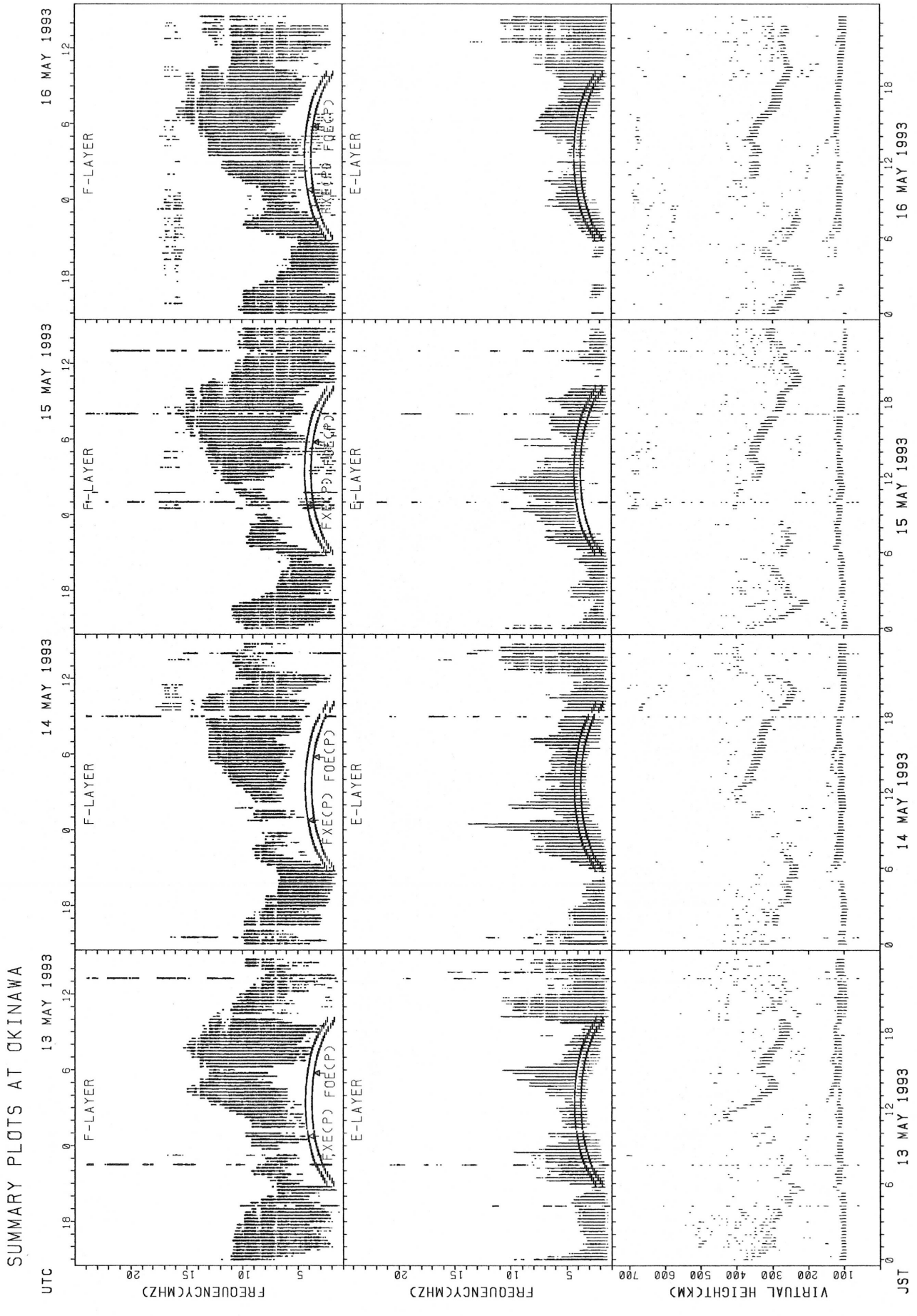
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
29 MAY 1993
30 MAY 1993
31 MAY 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

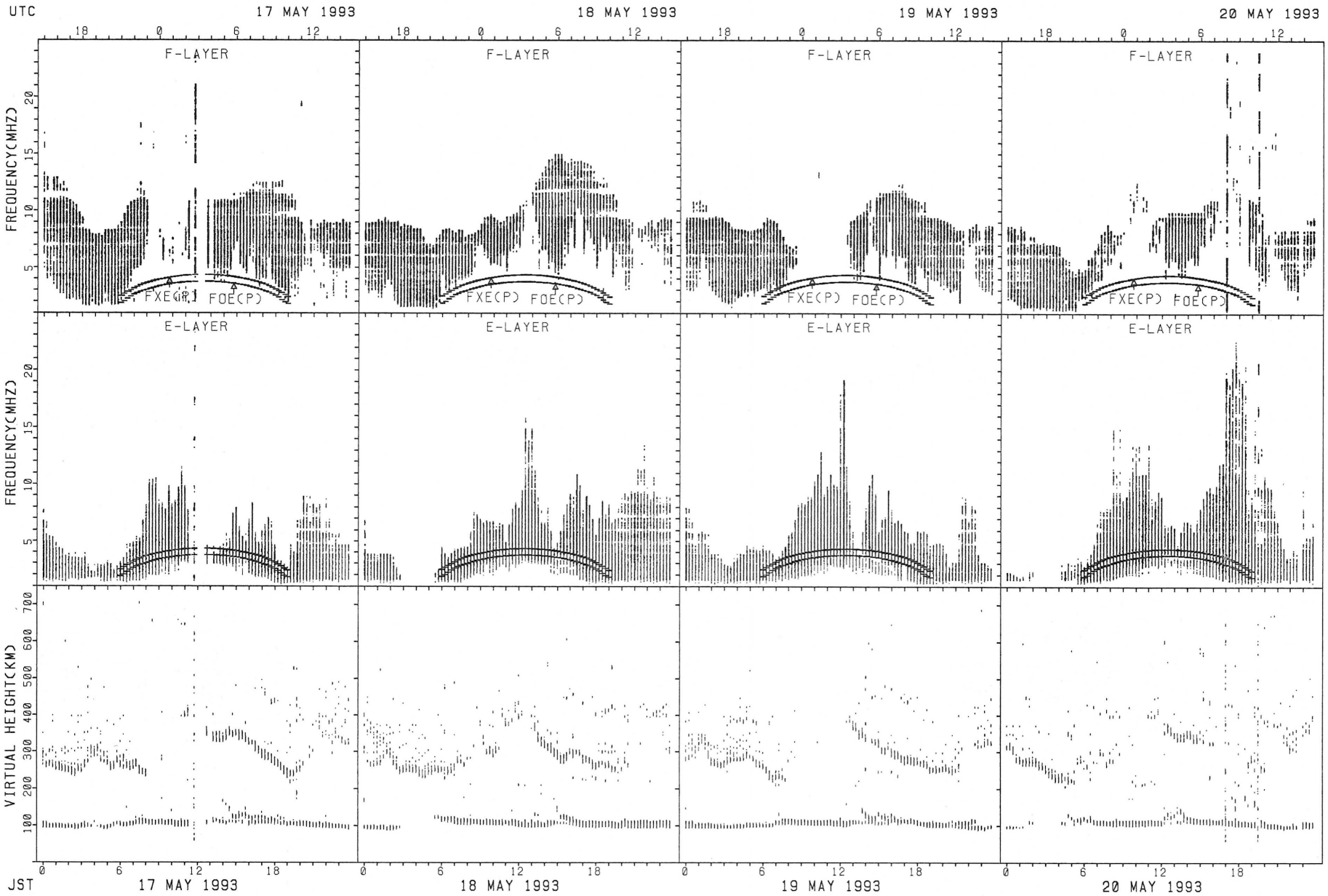

SUMMARY PLOTS AT OKINAWA
UTC
1 MAY 1993
2 MAY 1993
3 MAY 1993
4 MAY 1993
F-LAYER
FXE(P) FOE(P)
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
5 MAY 1993
7 MAY 1993
8 MAY 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

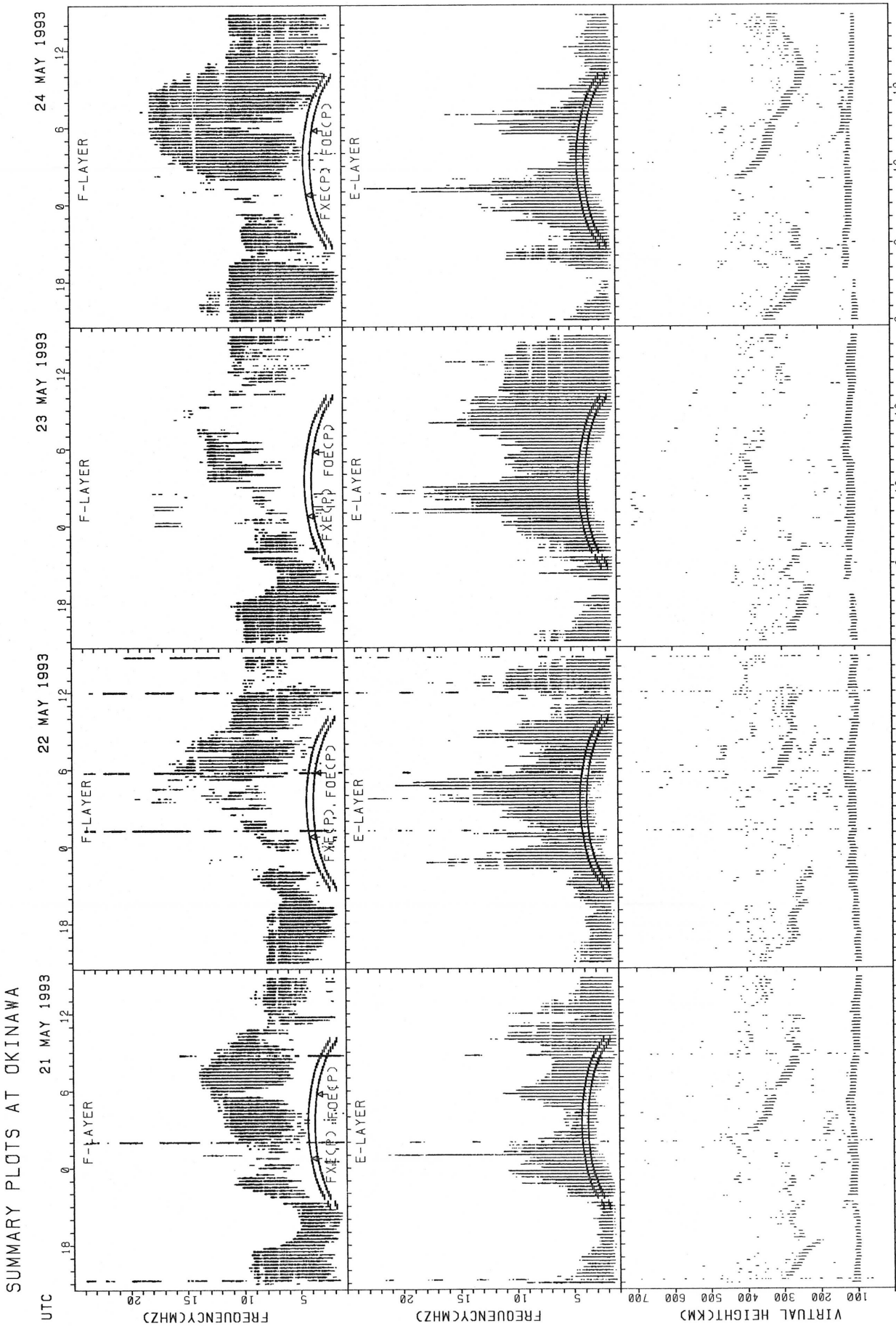

SUMMARY PLOTS AT OKINAWA
UTC
9 MAY 1993
10 MAY 1993
11 MAY 1993
12 MAY 1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

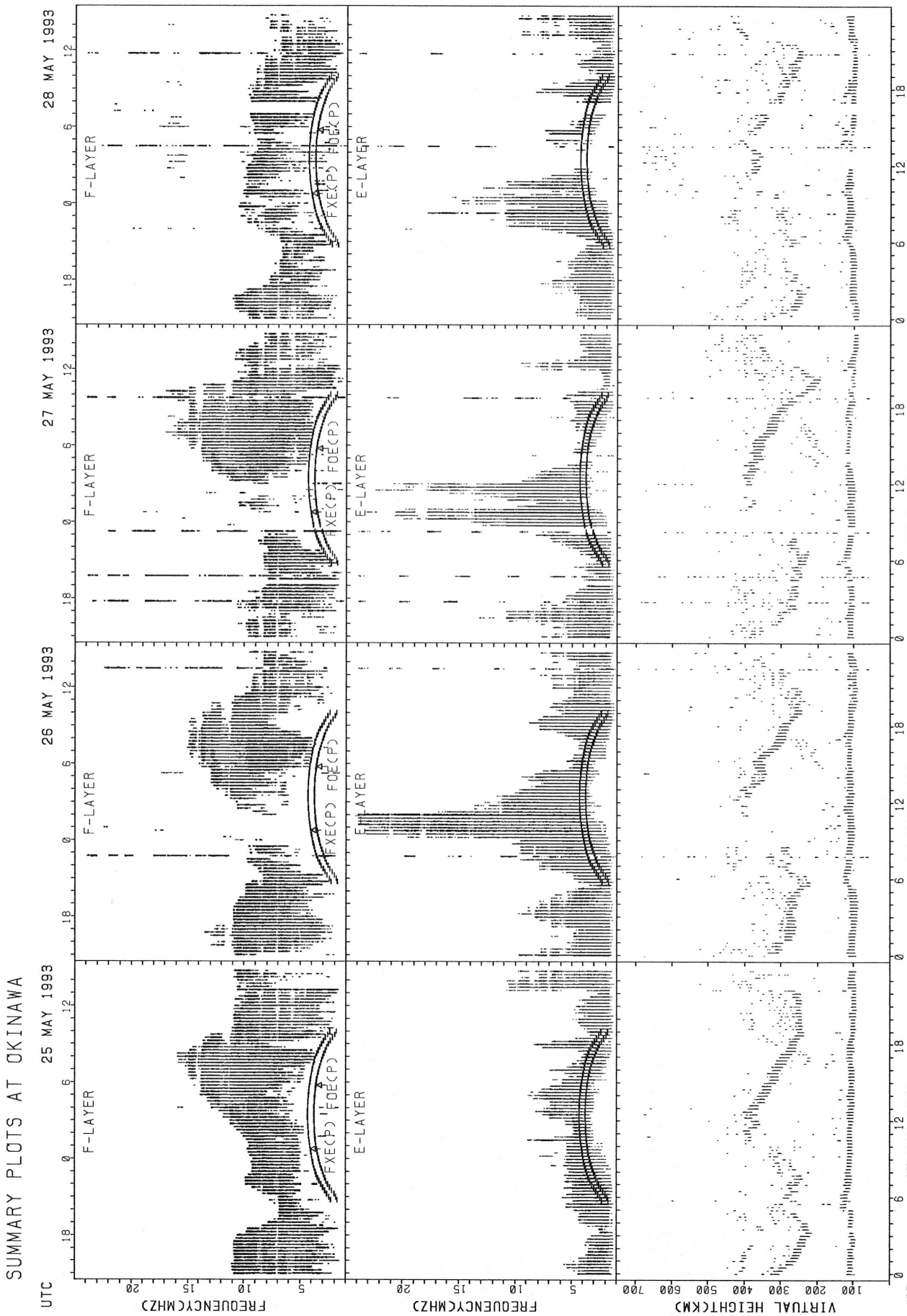

SUMMARY PLOTS AT OKINAWA
UTC
JST
13 MAY 1993
14 MAY 1993
15 MAY 1993
16 MAY 1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

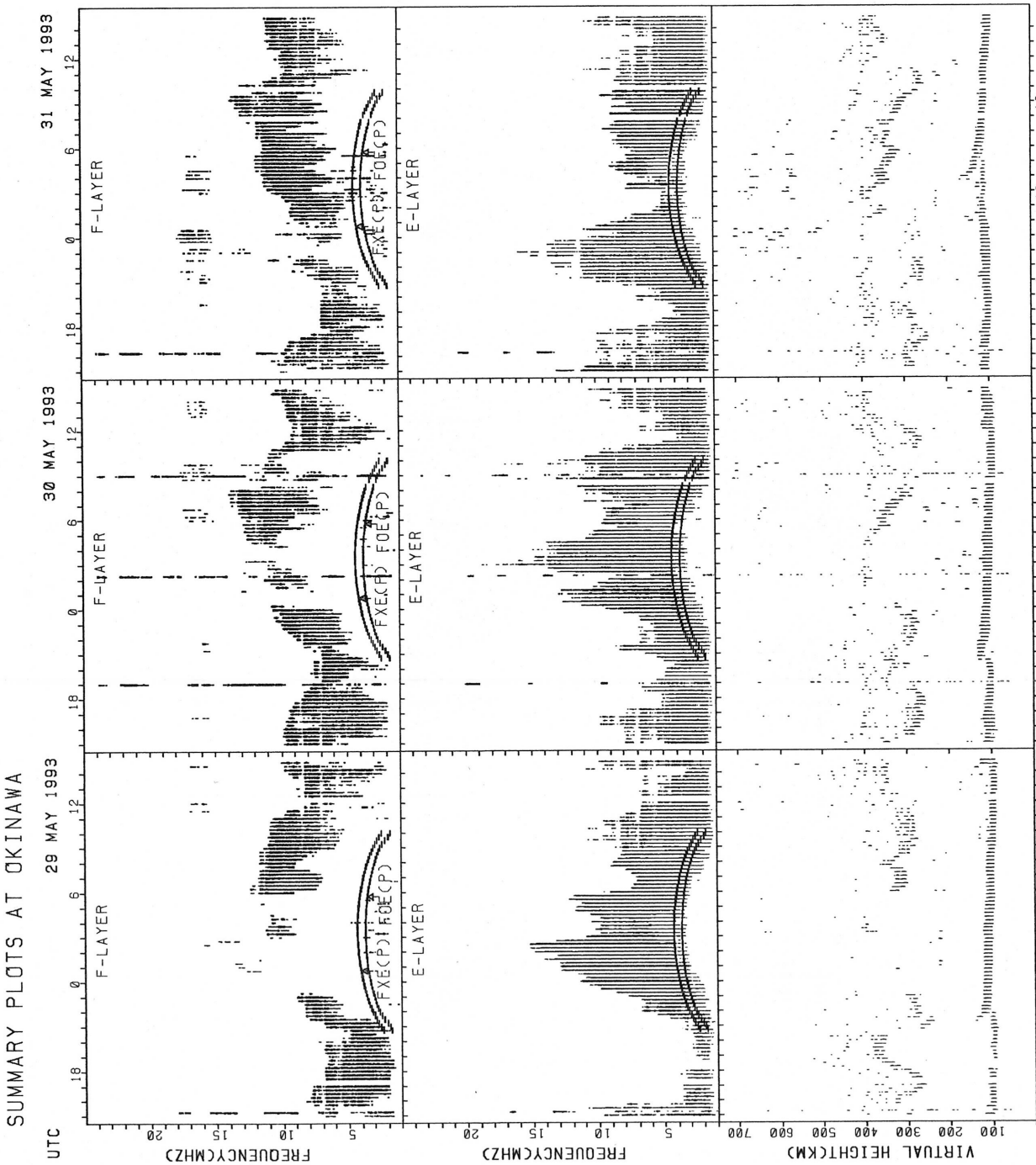
SUMMARY PLOTS AT OKINAWA



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


SUMMARY PLOTS AT OKINAWA
UTC
JST
21 MAY 1993
22 MAY 1993
23 MAY 1993
24 MAY 1993
F-LAYER
E-LAYER
FXE(P), FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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


SUMMARY PLOTS AT OKINAWA
UTC
29 MAY 1993
30 MAY 1993
31 MAY 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

MONTHLY MEDIANS OF H'F AND H'ES

MAY 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							10	18									19	17	15	13	13			
MED							298	307									310	288	288	280	286			
U Q							308	322									340	306	300	294	326			
L Q							274	276									278	279	278	271	266			

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						22	18	25	20	16	12	13				12	17	22	27	26	19	12	12	
MED						131	125	123	121	118	117	117				123	123	122	121	117	117	115	114	
U Q						139	127	126	124	122	120	119				128	127	125	125	119	119	117	117	
L Q						129	123	119	117	117	113	115				120	119	119	119	115	113	113	112	

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							16	21									19	20	23	22	18	12	10	10
MED							274	262									286	281	260	273	316	325	311	334
U Q							295	303									306	290	286	284	362	371	340	380
L Q							261	253									270	247	236	250	290	272	268	330

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	20	18	18	18	13	17	19	25	23	21	22	22	22	19	20	18	23	24	25	25	22	22	21	21
MED	106	105	105	105	107	129	123	117	113	111	109	112	109	113	119	117	117	117	113	113	113	113	111	107
U Q	109	107	107	107	130	135	127	121	117	113	113	115	113	125	122	121	127	121	115	119	115	115	113	111
L Q	103	103	103	101	102	124	119	113	111	108	109	107	107	107	108	115	113	113	110	109	109	109	106	101

MONTHLY MEDIANS OF H'F AND H'ES

MAY 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		13	11				15	22	14								20	28	24	25	21			
MED		346	330				258	269	281								284	282	266	264	280			
U Q		369	342				270	300	306								295	300	275	278	318			
L Q		316	308				250	258	264								277	270	239	251	261			

H'ES

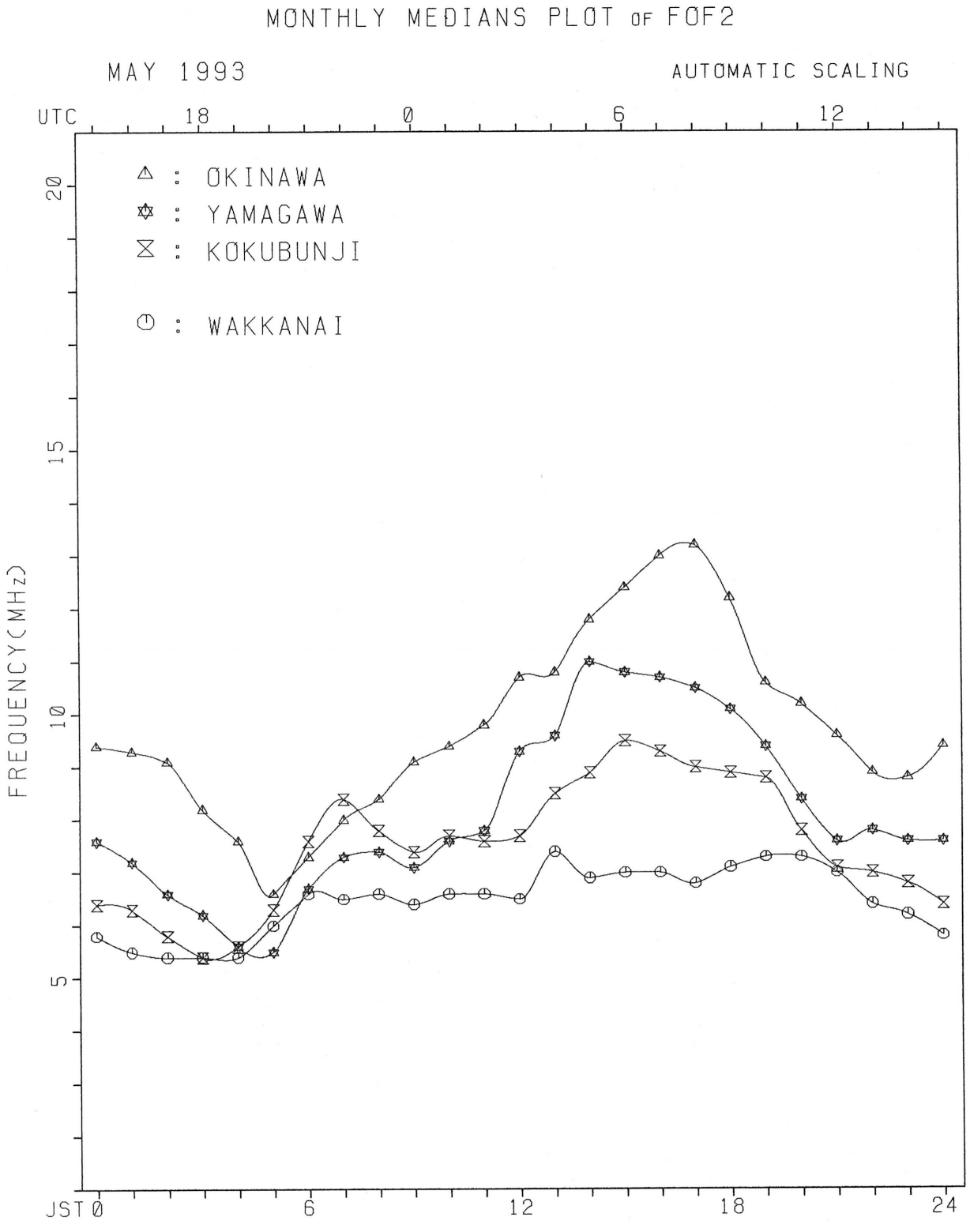
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	21	22	16	13	16	19	25	30	29	26	25	24	22	27	22	22	28	26	28	28	27	25	24
MED	107	105	105	103	109	108	121	121	115	113	111	109	110	108	111	119	118	115	113	110	111	111	111	107
U Q	110	109	107	108	116	117	133	124	119	118	113	114	113	119	119	121	123	121	115	112	115	117	116	110
L Q	105	103	99	102	103	106	119	115	111	111	107	107	107	107	107	109	117	113	111	104	109	107	108	103

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	21	27	27	24	21	14	24	26	23								23	30	29	28	25	21	18	15
MED	326	312	284	294	308	287	262	252	276								292	275	258	249	258	280	312	324
U Q	352	332	310	315	338	340	280	276	294								306	298	268	261	285	304	354	364
L Q	301	278	256	255	281	262	249	238	250								286	258	227	237	234	243	304	286

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	27	25	26	24	21	22	24	27	29	26	23	20	20	21	21	21	25	31	31	31	29	26	29	26
MED	113	107	105	105	105	109	120	121	119	113	111	111	112	115	123	119	117	121	113	109	109	109	111	113
U Q	125	121	115	107	124	117	127	125	125	119	123	114	119	132	127	125	123	131	119	113	115	117	116	117
L Q	107	103	101	101	103	105	115	117	113	109	109	107	109	109	113	112	111	115	111	105	106	101	107	103


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

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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 65	X 64	X 61	X 59	X 59															C	C	C	C	C
2	C	C	C	C	C															X 106	X 76	X 71	X 70	X 69
3	X 66	X 64	C	C	C															C	C	C	C	C
4	C	C	C	C	C															C	C	C	C	C
5	C	C	C	C	C															0 X 113	X 91	X 83	X 78	X 77
6	X 76	C	C	C	C															X 94	X 87	X 81	X 81	X 75
7	X 71	X 68	X 60	X 63	X 65															X 86	X 74	X 73	X 73	X 75
8	X 69	X 65	X 62	X 64	X 63															X 97	X 91	X 100	X 77	X 74
9	X 75	78	X 68	67	X 61															X 92	X 87	X 68	X 70	X 68
10	X 67	X 65	66	72	65	74														X 94	X 85	X 79	X 76	X 71
11	81	X 87	X 72	X 59	X 56															X 97	X 83	X 67	X 71	X 70
12	X 68	X 67	X 65	X 62	64															X 79	X 73	X 65	X 65	X 65
13	X 62	X 60	X 58	X 57	X 59															C	C	C	C	C
14	C	C	C	C	C															A	X 82	X 75	X 79	X 69
15	X 71	X 74	X 73	X 51	X 49															X 91	X 83	X 76	X 73	X 71
16	71	X 68	72	64	64															X 84	X 77	X 68	X 63	X 58
17	X 57	55	53	51	49															X 90	X 81	A	X 65	64
18	64	61	X 59	57	51															X 85	X 73	X 67	X 64	69
19	X 69	A	69	63	63	62														X 99	X 79	X 58	A	60
20	X 56	58	55	56	58															X 92	X 86	X 77	0 X 71	65
21	63	60	64	71	60	58														X 85	70	A	A	X 53
22	X 49	53	58	54	52	61														X 88	X 86	X 83	X 82	X 82
23	X 76	X 73	X 69	X 68	X 67	75														X 89	X 91	X 84	85	86
24	81	82	79	77	75															X 96	96	92	84	A
25	72	85	85	76	72	73														X 86	X 83	X 80	89	82
26	81	82	X 64	X 64	64	71														X 77	X 79	74	A	71
27	72	68	X 67	63	61		87													X 119	X 76	X 63	X 51	X 49
28	X 54	54	50	46	42															X 61	X 70	X 71	X 65	X 66
29	X 61	X 61	X 56	52	X 51															X 83	X 81	X 73	X 72	X 70
30	X 72	X 68	X 66	X 62	X 59															X 87	X 82	X 85	X 85	X 85
31	78	X 78	X 74	X 68	X 59															X 89	X 94	X 85	X 82	X 83
	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	25	25	25	25	7	1													26	27	25	24	26
MED	X 69	X 67	X 65	63	60	71	87													X 90	X 82	X 75	X 73	X 70
U Q	75	76	X 70	68	64	74														X 96	X 87	X 83	X 82	X 75
L Q	X 63	60	58	56	54	61														X 85	X 76	X 68	X 68	X 65

MAY 1993 FXI (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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	59	58	55	53	53	62	79	80	78	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	99	96	91	89	97	100	70	65	64	63
3	60	58	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	98	98	102	105	113	109	106	107	85	77	72	71
6	J R 70	C	C	C	C	C	C	C	C	79	79	88	94	101	107	101	92	89	82	88	81	75	75	69
7	65	62	55	57	59	73	69	75	71	65	66	75	93	108	102	102	105	98	93	80	68	67	67	69
8	63	59	56	58	57	66	69	71	66	65	73	74	78	106	98	83	76	71	76	91	85	94	71	68
9	69	F 70	62	F 58	55	54	62	62	64	64	76	91	98	105	110	116	125	111	98	86	81	61	64	62
10	61	59	55	F 63	F 55	F 64	A	A	57	I A 59	70	84	87	90	93	107	101	108	94	88	79	73	70	65
11	73	V 81	66	53	50	57	78	80	74	73	84	91	91	90	V 87	94	89	I A 91	I A 92	91	77	61	65	64
12	62	61	59	56	F 55	62	61	56	I A 60	59	66	69	74	90	R 93	103	102	87	81	73	67	59	59	59
13	56	54	52	51	53	62	69	62	54	57	A	58	C	C	C	C	C	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	93	90	I A 86	76	69	73	63
15	65	68	67	45	43	52	67	V 73	77	U R 67	U R 62	70	78	84	87	94	96	J R 92	93	85	77	70	67	65
16	F 62	62	64	55	F 57	56	73	78	A	A	A	A	71	72	71	80	85	I A 82	83	77	71	62	57	52
17	51	F 45	F 44	F 42	F 43	50	66	71	83	75	68	73	82	83	I C 75	80	89	99	102	84	75	I A 62	59	F 54
18	F 56	F 54	53	49	F 45	55	75	71	69	I C 82	79	85	84	93	105	107	96	87	83	79	67	61	58	F 62
19	63	I A 63	F 62	J F 56	F 55	F 54	V 73	93	79	I A 70	I A 64	A	A	A	A	A	I Y 96	101	93	93	73	52	I A 50	F 53
20	50	F 48	48	F 50	F 51	64	58	70	68	I A 66	I A 64	63	67	71	75	68	73	67	71	86	80	71	U S 65	F 57
21	F	F 54	F 55	J F 65	F 50	F 48	58	74	83	86	77	63	I A 68	68	I A 68	75	76	83	81	79	F 62	I A 61	I A 53	47
22	43	F 44	F 48	F 44	F 43	F 53	74	66	65	59	63	64	63	63	70	78	88	93	85	82	80	77	76	76
23	70	67	63	62	61	F 66	74	84	76	61	65	65	68	I A 72	77	A	A	76	79	83	85	78	F 75	F 77
24	F 71	J F 75	F 72	F 69	F 67	69	82	77	66	62	I A 69	74	75	72	75	82	87	89	I A 88	90	F 88	F 84	76	I A 70
25	F 65	F 60	F 74	F 64	F 52	55	R 64	A	A	A	A	71	67	84	97	95	92	87	81	80	77	74	F 81	F 74
26	F 72	73	58	58	F 55	F 63	68	67	I A 70	72	I A 75	I A 74	80	87	89	98	I A 89	87	79	71	73	F 64	I A 61	F 58
27	F 63	F 57	61	56	F 54	62	F 80	77	74	75	74	73	79	96	98	95	I A 90	I A 91	105	113	71	J R 57	45	43
28	48	F 46	F 44	F 39	F 34	I A 49	A	A	A	A	A	I A 60	55	A	A	A	60	A	A	55	64	65	59	60
29	55	56	50	F 46	45	48	57	I A 66	I A 65	I A 63	59	68	81	72	77	72	66	68	69	77	75	67	66	S 64
30	66	62	60	56	53	65	V 62	70	74	74	78	80	71	71	72	78	R 82	83	81	81	76	79	79	79
31	F 67	J R 72	68	62	53	56	77	92	79	66	I A 65	66	73	75	81	85	83	81	82	83	88	79	76	77
	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	26	25	25	25	25	23	22	22	22	21	23	24	23	24	23	25	26	26	27	27	27	27	27
MED	63	60	58	56	F 53	57	69	72	70	66	69	73	78	84	88	94	89	89	84	84	76	67	66	64
U Q	67	67	64	F 60	F 55	64	75	78	77	74	76	80	86	96	98	102	96	93	93	90	81	77	75	70
L Q	56	F 54	52	F 50	F 48	54	62	67	65	62	64	65	70	72	75	80	82	83	81	79	71	61	59	F 58

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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	C	C	C	C	C	C	C	C	C	C					
2							C	C	C	C	C	C	C	C	500	470	U L 460	L						
3							C	C	C	C	C	C	C	C	C	C	C	C	C					
4							C	C	C	C	C	C	C	C	C	C	C	C	C					
5							C	C	C	C	C	C	L 550	L 510	510		L 480							
6							C	C	C	L 480	490	L 520	530	510	500	L 490		L						
7								L	L	L 500	L 530		520	H 500	H 520	490	L 450	L						
8								U L 450	U L 460	L	520	500	L		480	L 480	L		L					
9							U L 360	L		L 500		500		U L 570	520	L 480	470	U L 440						
10											U A 480	500	U A 520	U A 490	510	480	U L 570	U L 420						
11							L				U A 540		520		L 500	470	L 440							
12						L	L			U A 480		U A 510		520	500	470	U L 480	L						
13								L	U L 480			500	C	C	C	C	C	C	C					
14						C	C	C	C	C	C	C	C	C	C	C	C							
15												510		520	480									
16							L							U A 510										
17							L	U L 470	465	500	490		510	480	I C 480	470	L 460	410						
18							L				490		510	490	U A 450	460	U A 445	U L 410	L					
19						L																		
20						L	L 490					520	R 500				440	U L 420	L					
21							L	U L 430		U A 470		L												
22									U A 440			490	500	500	480	470								
23										U L 460														
24												510	500											
25												U A 490	500	U A 480										
26															L 530				L					
27									U L 480			U A 520	U A 530											
28																								
29						U L 350						U A 530		500	500	480	470	U L 430						
30						L	L			L 510	520	510			510	500	460	L 420	L					
31						L	L 430	440	U A 480				520			480								
	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	4	6	8	8	14	13	13	16	14	12	7						
MED						U L 350	L 430	U L 445	U 472	L 490	505	510	520	500	500	480	L 460	U L 420						
U Q							L 490	U L 460	U L 480	L 500	525	520	525	515	510	480	L 475	U L 430						
L Q							U L 360	435	U 460	U L 475	490	500	500	490	480	470	448	410						

MAY 1993 FOF1 (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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	250	285	A 335	C	C	C	C	C	C	C	C	C	C					
2						C	C	C	C	C	C	C	C	C	U A 340	325	300	250	A					
3						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
4						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
5						C	C	C	C	C	C	C	A	A	355	340	310	260	A					
6						C	C	C	C	360	370	U A 355	R 370	U B	355	335	300	265	180					
7						170	245	295	330	350	375	370	380	365	A	A	A	270	U A 175					
8						160	250	325	345	350	A 365	R	A	A	A	335	320	270	A					
9						A	240	290	320	A 340	U A 345	350	360	350	340	335	310	270	A					
10						A	260	295	A 335	A	A	A	A	370	A	A	305	270	190					
11						170	245	285	A 325	340	U A 350	A 350	A	A	A	A	A	260	A					
12						180	250	300	335	A	A	360	A	A	A	A	A	260	A					
13						A	260	A	U A 330	U A 340	A	A	C	C	C	C	C	C	C					
14						C	C	C	C	C	C	C	C	C	C	C	C	B	A					
15						A 180	B	310	B	B	B	B	A	B	B	A	A	A	B					
16						A	U R 255	310	340	A	B	A	B	B	B	U A 345	A	A	A					
17						190	R 255	280	325	A	B	B	B	365	I C 355	340	305	A 265	A					
18						180	255	300	A	I C 335	U A 350	A	A	A	A	A	320	255	A 170					
19						160	255	A 290	U A 340	A	A	A	A 355	A	A	A	A	A	A					
20						A 170	235	280	U A 320	A	A	A	A	375	345	A	A 290	U A 260	A					
21						A	240	285	335	345	A	A	U A 380	A	345	335	A 300	A 265	A					
22						A	240	A 290	A	U A 340	A	A	R 370	360	355	335	310	265	A					
23						165	250	295	325	A	A	A 355	A	A	A	355	310	260	A					
24						185	255	295	325	A	A	A	A	A	A	A	320	265	A					
25						205	250	305	U A 335	A	A	A	405	385	365	345	A 310	270	U A 200					
26						A	270	305	335	A	A	A	A	A	A	A	A	A	A					
27						180	265	320	335	U A 350	A	A	A	A	A	A	A	A	A					
28						190	270	305	A	A	A	A	A	A	A	345	320	U A 280	210					
29						195	265	315	A 350	A	A	B	A	A	U A 345	A	A	290	205					
30						A	265	310	340	A 355	A	A	A	A	A	A	A	A	A					
31						195	265	315	345	U A 365	A	A	A	405	385	365	330	285	U A 200					
	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	24	24	21	12	6	6	7	8	11	13	16	20	8					
MED						180	255	298	335	348	A 358	355	370	368	355	340	310	265	195					
U Q						190	262	310	340	A 352	370	360	380	380	355	345	320	270	202					
L Q						168	248	290	325	340	U A 350	350	360	362	345	335	302	260	A 178					

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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	38	20	32	22	20	G	G	31	J A 36	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	43	40	G	J A 41	48	34	J A 44	J A 33	E B 16	E B 14
3	E B 14	E B 13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	41	J A 54	41	J A 64	J A 45	J A 55	49	106	72	41	J A 19	23
6	E B 13	C	C	C	C	C	C	C	C	G	40	41	G	41	40	36	J A 58	J A 40	J A 47	J A 52	J A 52	20	16	E B 14
7	E B 14	E B 13	E B 13	E B 15	E B 14	G	28	J A 45	J A 50	J A 45	J A 45	J A 66	G	40	41	42	30	36	68	J A 53	J A 29	22	J A 20	20
8	19	19	E B 16	E B 13	E B 14	J A 21	30	39	42	46	46	48	J A 54	69	39	G	39	J A 40	J A 33	40	E B 14	E B 13	40	J A 82
9	J A 81	J A 48	J A 32	J A 22	J A 19	J A 32	33	J A 42	J A 48	J A 49	59	42	J A 66	58	J A 44	G	G	G	21	J A 26	61	J A 42	J A 37	55
10	J A 51	J A 86	J A 53	J A 54	J A 57	J A 34	83	84	60	83	J A 68	J A 74	J A 80	J A 109	J A 56	J A 40	33	J A 47	J A 35	J A 28	J A 30	58	J A 63	E B 14
11	J A 54	33	J A 26	J A 52	J A 44	26	J A 38	J A 58	J A 82	J A 70	J A 93	J A 75	J A 53	J A 61	J A 43	40	J A 63	112	129	J A 166	J A 130	J A 74	J A 22	J A 31
12	E B 14	J A 16	22	22	21	23	J A 41	J A 59	J A 74	J A 53	68	J A 53	J A 86	J A 59	J A 51	34	J A 32	G	J A 47	J A 55	J A 45	J A 38	J A 21	E B 13
13	E B 14	J A 22	21	22	E B 13	J A 26	G	J A 42	J A 128	J A 51	J A 72	J A 145	C	C	C	C	C	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	J A 74	77	102	J A 70	J A 57	J A 35	23
15	J A 16	E B 13	E B 14	E B 13	E B 13	25	36	J A 53	E B 63	50	55	53	47	J A 43	41	68	J A 63	J A 95	J A 87	18	17	E B 14	26	J A 67
16	J A 44	J A 61	J A 46	19	E B 13	J A 50	J A 48	J A 84	72	75	J A 94	J A 164	J A 72	54	46	J A 62	J A 99	J A 108	J A 104	J A 104	J A 51	J A 53	J A 36	24
17	J A 24	J A 48	J A 38	J A 53	J A 34	G 17	31	J A 42	38	39	38	E B 51	E B 40	G	C	38	J A 47	32	J A 50	J A 27	70	75	28	J A 53
18	J A 63	J A 55	J A 31	J A 77	J A 64	G	36	61	J A 64	C	J A 58	J A 72	J A 74	37	54	J A 51	J A 51	J A 48	30	J A 36	J A 29	J A 27	J A 52	J A 86
19	60	J A 89	92	J A 55	J A 21	24	J A 51	J A 57	J A 84	J A 102	124	116	101	135	128	J A 163	36	79	J A 76	J A 53	J A 64	J A 53	77	J A 65
20	J A 87	J A 42	J A 41	27	18	J A 34	34	J A 50	J A 77	J A 95	85	J A 55	54	J A 59	J A 67	J A 66	J A 51	J A 46	J A 28	J A 88	J A 77	J A 89	J A 87	J A 51
21	J A 67	J A 41	J A 74	61	J A 31	21	G	39	J A 60	J A 60	J A 65	J A 55	81	J A 79	84	J A 67	J A 94	J A 73	J A 106	J A 49	J A 55	111	94	J A 64
22	J A 55	58	J A 38	J A 41	J A 88	J A 50	J A 56	J A 54	J A 48	J A 50	68	J A 43	G 36	40	38	36	J A 54	J A 52	J A 48	58	J A 52	J A 45	J A 22	J A 42
23	J A 24	18	21	J A 31	19	27	37	J A 57	J A 85	J A 53	69	65	63	J A 99	J A 129	114	116	71	J A 54	J A 44	J A 64	J A 77	J A 64	J A 46
24	J A 19	17	42	20	E B 12	28	J A 53	J A 71	J A 69	J A 54	89	J A 54	49	J A 76	J A 80	50	J A 51	J A 56	J A 131	J A 108	J A 48	J A 53	J A 88	J A 100
25	J A 28	J A 30	J A 62	J A 80	J A 43	J A 49	J A 78	J A 141	105	107	99	56	46	48	J A 58	J A 64	J A 49	J A 48	J A 52	J A 47	J A 53	J A 54	J A 52	J A 52
26	J A 48	20	19	18	J A 29	24	J A 54	J A 65	111	74	J A 115	108	J A 82	J A 90	J A 87	J A 93	J A 124	J A 63	J A 30	J A 34	J A 44	60	J A 87	20
27	J A 22	J A 21	19	E B 13	J A 53	J A 35	J A 43	J A 57	41	J A 52	63	J A 54	J A 58	61	102	91	108	J A 124	J A 78	J A 63	59	51	J A 43	J A 26
28	J A 38	J A 45	J A 46	J A 34	J A 22	59	J A 76	106	115	J A 144	149	J A 105	58	J A 92	J A 82	101	73	132	J A 111	J A 44	J A 55	J A 36	31	J A 27
29	20	J A 25	J A 19	J A 23	16	25	J A 74	80	79	82	80	J A 55	60	42	42	39	36	38	60	J A 33	45	J A 47	J A 22	26
30	J A 79	J A 57	J A 52	J A 21	E B 12	23	31	J A 63	J A 55	J A 49	J A 51	45	J A 57	63	J A 43	J A 45	J A 52	40	J A 43	J A 50	J A 42	J A 53	J A 36	22
31	J A 50	J A 24	J A 22	J A 23	E B 15	G	30	J A 46	J A 53	J A 58	85	58	J A 45	J A 59	J A 58	43	48	J A 53	72	J A 89	J A 48	J A 21	E B 16	J A 26
	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	26	25	25	25	25	25	25	25	24	25	25	25	25	25	26	26	27	27	27	27	27	27	27
MED	J A 38	J A 28	J A 32	J A 23	20	25	37	J A 57	J A 64	J A 54	68	J A 55	57	59	51	48	J A 51	J A 52	J A 52	J A 50	J A 52	J A 51	J A 36	J A 27
U O	J A 55	J A 48	J A 46	J A 52	J A 38	J A 34	J A 54	J A 68	J A 83	78	91	J A 74	J A 73	J A 78	J A 81	67	J A 63	J A 74	J A 78	J A 88	J A 64	58	J A 63	J A 55
L O	E B 19	19	20	E B 20	E B 14	G 21	30	J A 44	J A 49	50	56	52	46	42	42	39	36	40	J A 43	J A 34	J A 44	33	J A 22	E B 22

MAY 1993 FOES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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	26	E B 14	22	E B 14	E B 14		G	G 31	35		C	C	C	C	C	C	C	C	C	C	C	C	C	C
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	40	40	G	37	40	26	37	18	E B 16	E B 14
3	E B 14	E B 13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	40	46	38	62	41	40	40	104	47	27	17	17
6	E B 13	C	C	C	C	C	C	C	C	G	38	40	G	40	39	35	50	37	34	32	25	E B 13	E B 13	E B 14
7	E B 14	E B 13	E B 13	E B 15	E B 14	G	28	35	43	40	41	58	G	40	40	36	30	30	44	35	19	E B 13	16	E B 14
8	E B 13	E B 13	E B 16	E B 13	E B 14	G 15	28	35	39	42	43	45	51	60	38	G	36	38	25	32	E B 14	E B 13	31	40
9	54	30	19	E B 14	E B 13	30	31	34	46	41	52	42	62	52	43	G	G	G	20	17	40	30	35	43
10	31	37	35	31	17	31	A A 83	A A 84	55	A A 83	48	44	52	49	44	32	33	34	29	20	27	52	E B 15	E B 14
11	22	23	18	26	32	22	35	54	60	65	54	70	48	55	43	40	39	A A 112	A A 129	34	29	16	E B 14	29
12	E B 14	E B 13	15	16	E B 13	22	37	46	A A 74	48	57	51	64	42	40	33	32	G	34	42	25	16	17	E B 13
13	E B 14	E B 13	17	E B 14	E B 13	20	G	33	36	51	A A 72	42	C	C	C	C	C	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	72	69	A A 102	33	48	31	E B 13
15	16	E B 13	E B 14	E B 13	E B 13	U Y 23	35	51	E B 63	U Y 50	U Y 54	48	U Y 47	U Y 43	41	62	60	71	41	17	U Y 17	E B 14	24	42
16	30	40	36	U Y 19	E B 13	41	41	73	A A 72	A A 75	A A 94	A A 164	61	51	44	55	77	A A 108	69	44	34	32	26	22
17	20	16	28	33	23	G 16	U Y 31	40	37	U Y 39	U Y 38	E B 51	E B 40	G	C	37	37	31	42	20	56	A A 75	20	30
18	49	22	E B 13	16	29	G	33	54	50	C	40	68	45	36	45	42	45	36	29	28	26	24	19	24
19	43	A A 89	32	31	E B 13	23	45	55	62	A A 102	A A 124	A A 116	A A 101	A A 135	A A 128	A A 163	U Y 35	50	53	43	50	30	A A 77	38
20	43	27	20	17	E B 13	G 15	33	48	51	A A 95	A A 85	44	45	56	65	56	41	33	23	66	61	44	37	26
21	42	23	38	38	24	20	G	37	51	47	57	43	A A 81	65	A A 84	64	54	48	69	30	25	A A 111	A A 94	30
22	29	40	21	31	24	37	54	49	44	45	51	40	G 34	40	38	36	50	50	43	50	26	25	17	21
23	17	E B 13	E B 13	20	17	26	35	50	63	42	60	58	54	A A 99	65	A A 114	A A 116	48	46	40	26	46	41	36
24	E B 13	E B 13	27	17	E B 12	26	47	62	61	52	A A 89	48	42	63	66	U S 50	48	48	A A 131	74	34	28	20	A A 100
25	17	E B 13	43	40	22	40	60	A A 141	A A 105	A A 107	A A 99	49	44	48	56	51	47	44	47	36	31	35	39	21
26	31	E B 14	E B 14	E B 13	23	22	48	61	A A 111	66	A A 115	A A 108	62	64	49	67	A A 124	43	28	31	32	47	A A 87	E B 13
27	17	E B 13	E B 14	E B 13	32	29	37	52	41	50	57	52	53	55	91	81	A A 108	A A 124	61	48	44	U S 49	34	25
28	31	33	32	23	16	A A 59	A A 76	A A 106	A A 115	A A 144	A A 149	A A 105	49	A A 92	A A 82	A A 101	54	A A 132	A A 111	43	46	28	17	22
29	E B 14	20	16	18	14	24	53	A A 80	A A 79	A A 82	54	53	56	42	40	37	34	37	59	27	37	30	17	U Y 26
30	26	45	18	17	E B 12	21	30	55	49	46	46	43	55	56	42	42	42	34	34	34	35	33	20	E B 13
31	28	20	17	E B 13	E B 15	G	30	41	48	55	A A 85	54	45	57	55	43	47	49	61	57	17	18	E B 16	22
	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	26	25	25	25	25	25	25	25	24	25	25	25	25	25	26	26	27	27	27	27	27	27	27
MED	22	18	18	17	E B 14	22	35	51	51	50	57	51	49	52	44	42	44	43	43	35	32	30	20	22
U Q	31	30	30	28	23	30	48	A A 62	A A 68	A A 78	A A 87	A A 63	58	62	65	62	54	A A 50	61	48	40	46	35	30
L Q	E B 14	E B 13	E B 14	E B 14	E B 13	G	30	38	44	44	47	44	43	42	40	36	35	34	34	28	25	E B 18	E B 17	E B 14

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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	13	14	14	14	14	13	14	15	16	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	27	18	19	14	13	13	15	14	16	14
3	14	13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	34	27	30	29	21	13	16	14	15	13	13	13
6	13	C	C	C	C	C	C	C	C	27	28	26	34	37	27	16	16	15	13	13	14	13	13	14
7	14	13	13	15	14	14	15	14	20	23	25	31	26	24	26	22	17	16	13	13	13	13	13	14
8	13	13	16	13	14	13	13	23	22	26	31	24	29	34	24	27	18	16	12	16	14	13	13	15
9	13	15	13	14	13	14	14	15	17	20	25	32	31	24	27	16	17	17	13	13	13	13	15	14
10	14	13	13	15	13	14	14	15	16	20	20	34	30	33	27	17	16	14	13	14	14	14	15	14
11	14	15	13	13	12	13	13	14	17	21	27	29	34	31	30	25	19	20	14	14	15	13	14	14
12	14	13	13	14	13	14	13	16	20	23	31	25	28	26	25	21	15	17	14	13	14	14	14	13
13	14	13	14	14	13	13	16	20	18	24	22	33	C	C	C	C	C	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	28	16	17	16	19	13	13
15	13	13	14	13	13	15	30	26	63	47	41	39	41	40	37	35	31	25	23	15	13	14	14	14
16	13	14	13	13	13	17	17	22	30	26	40	34	41	40	40	28	30	28	16	17	16	15	14	15
17	13	13	13	13	13	13	17	20	23	34	36	51	40	27	C	21	16	15	13	14	15	14	15	15
18	14	14	13	13	13	13	14	16	16	C	27	27	34	26	31	20	15	13	14	14	14	14	14	13
19	14	14	14	13	13	13	15	16	16	17	22	30	31	32	29	23	15	16	12	14	14	14	14	14
20	14	14	14	13	13	13	14	15	14	29	26	31	32	27	24	17	15	13	13	14	13	14	14	13
21	14	14	14	14	14	14	15	19	17	21	25	32	30	27	29	16	14	13	13	15	15	14	13	15
22	14	14	14	14	14	14	14	14	14	18	22	25	24	31	27	25	16	15	15	15	14	14	14	14
23	14	13	13	14	13	13	14	14	16	27	31	30	30	26	31	30	16	14	13	14	13	14	13	13
24	13	13	14	14	12	13	13	17	16	27	26	28	26	30	26	E S 30	22	15	13	13	14	14	13	15
25	14	13	13	13	13	13	16	19	21	23	28	34	38	32	31	22	22	16	14	13	13	13	13	14
26	13	14	14	13	14	14	16	15	21	33	32	35	35	31	22	25	20	20	14	13	13	13	13	13
27	13	13	14	13	13	13	15	17	22	23	35	34	34	35	31	24	21	14	14	14	14	14	14	13
28	13	14	14	13	13	15	15	20	26	34	31	35	39	36	34	23	20	19	15	13	13	13	12	13
29	14	14	13	14	13	13	16	19	21	30	32	40	35	37	26	27	25	16	16	13	13	13	14	13
30	13	14	14	13	12	14	16	20	21	25	37	35	35	33	31	30	31	18	13	12	13	13	13	13
31	14	15	13	13	15	14	16	19	22	31	28	33	34	30	31	31	26	18	14	13	13	13	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	27	26	25	25	25	25	25	25	25	24	25	25	25	25	25	26	26	27	27	27	27	27	27	27
MED	14	14	14	13	13	13	15	17	20	26	28	32	34	31	29	24	18	16	14	14	14	14	14	14
U Q	14	14	14	14	14	14	16	20	22	30	32	34	35	34	31	28	22	18	15	14	15	14	14	14
L Q	13	13	13	13	13	13	14	15	16	22	25	28	30	27	26	20	16	14	13	13	13	13	13	13

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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

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	275	275	275	265	275	305	320	335	320	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	305	310	305	300	305	325	320	275	265	270
3	275	285	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	290	295	295	290	305	310	315	A	300	285	280	270
6	J R 270	C	C	C	C	C	C	C	C	320	310	275	280	280	305	305	305	320	310	310	295	280	285	280
7	280	270	260	275	285	330	320	335	325	325	300	285	275	300	285	295	295	310	315	320	280	270	285	285
8	270	275	270	275	300	320	340	345	345	290	290	300	240	295	315	315	315	295	260	295	260	315	280	275
9	280	F 285	260	F 265	280	290	320	325	335	315	295	305	290	275	280	290	310	315	315	300	300	285	285	275
10	280	260	265	F 300	F 285	F 315	A	A	A	A	275	285	275	280	265	285	280	295	310	300	275	275	270	260
11	275	V 310	295	290	275	305	310	315	335	320	305	315	310	310	V 295	320	310	A	A	320	325	275	275	275
12	285	280	280	280	F 285	290	300	290	A	290	295	310	275	270	R 280	295	295	320	320	305	295	280	275	270
13	265	265	265	265	295	310	345	330	315	290	A	250	C	C	C	C	C	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	305	305	A	290	275	280	260
15	275	290	320	285	290	315	325	V 310	320	U R 270	U R 245	285	290	295	285	290	305	J R 300	310	310	295	280	285	280
16	F 275	270	285	290	F 300	315	300	310	A	A	A	A	285	300	290	290	305	A	315	300	300	290	290	280
17	295	F 275	F 290	F 275	F 290	315	320	305	325	290	295	280	285	300	I C 285	270	275	300	315	320	315	A	290	F 270
18	F 275	F 290	305	285	F 265	295	340	320	285	I C 285	285	300	275	280	290	315	315	320	310	325	290	290	270	F 270
19	280	A	F 280	J F 295	F 290	F 285	V 300	325	340	A	A	A	A	A	A	A	Y	310	310	320	330	285	A	F 270
20	275	F 275	285	F 280	F 295	340	295	335	315	A	A	270	290	295	320	305	310	300	280	310	310	290	U S 295	F 280
21	F	F 295	F 300	J F 300	F 325	F 285	295	300	310	310	310	290	A	A	A	315	315	320	330	325	F 300	A	A	285
22	280	F 285	F 280	F 295	F 290	F 320	345	345	350	300	A 325	325	305	280	285	290	300	315	305	305	295	285	275	295
23	295	290	300	305	305	F 320	315	350	350	305	A 290	280	285	A	290	A	A	290	295	285	295	315	F 290	F 290
24	F 290	J F 280	F 295	F 295	F 300	315	325	350	315	315	A	305	300	295	A 280	285	300	295	A	285	F 305	F 300	295	A
25	F 280	F 285	F 320	F 300	F 315	340	A	A	A	A	A	300	270	275	290	305	305	310	305	305	300	280	F 285	F 305
26	F 300	305	295	300	F 285	F 320	330	A 315	A	A 315	A	A	275	285	270	295	A	300	300	310	280	F 290	A	F 315
27	F 290	F 290	295	310	F 290	305	F 330	325	320	290	295	285	265	280	A 290	285	A	A	290	335	325	J R 315	265	260
28	290	F 305	F 290	F 300	F 320	A	A	A	A	A	A	A	315	A	A	A	295	A	A	275	275	285	270	290
29	270	285	285	F 255	265	260	A 260	A	A	A	280	265	300	290	300	305	300	295	290	295	290	295	275	S 290
30	280	285	285	290	275	305	V 310	310	305	305	285	290	300	290	290	295	R 295	310	300	300	275	270	270	280
31	F 270	J R 285	290	305	275	275	290	330	330	325	A	275	285	285	290	295	295	300	300	300	295	280	275	275
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	25	25	25	25	24	22	21	18	18	16	21	23	21	23	23	22	23	24	25	27	25	24	26
MED	280	285	285	290	F 290	312	320	325	322	305	295	285	285	290	290	295	305	305	308	305	295	285	280	278
U Q	285	F 290	295	F 300	F 300	320	330	335	335	315	302	302	300	295	295	305	310	315	315	320	305	290	285	285
L Q	275	275	278	275	278	292	300	310	315	290	285	278	275	280	285	290	295	300	300	300	290	278	272	270

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

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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

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	C	C	C	C	C	C	C	C	C	C					
2						C	C	C	C	C	C	C	C	C	365	355	U L 355	L						
3						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
4						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
5						C	C	C	C	C	C	C	L 345	A	345	A	L 365	A						
6						C	C	C	C	L 390	390	365	355	380	345	L 340	A	L						
7								L	L	L 365	L 355	A	355	H 365	H 350	335	L 355	L	A					
8								U L 370	U L 375	L	360	A 345	L	A	365	L 350	L		L					
9							U L 365	L	A	L 365	A	395	A	A	A 335	L 350	340	U L 350						
10							A	A	A	A	A	A 350	A	A	A 310	350	U L 320	U L 340						
11							L	A	A	A	A	A	A	A	L 380	375	L 370	A	A					
12						L	L	A	A	A	A	A	A	345	355	365	U L 345	L						
13								L	U L 365	A	A	365	C	C	C	C	C	C	C					
14						C	C	C	C	C	C	C	C	C	C	C	C	A	A					
15								A	B	R	A	A	A	B 330	365	A	A	A						
16						A	L	A	A	A	A	A	A	A	R	A	A	A	L					
17							L	U L 345	360	365	370	B	355	385	I C 365	350	L 335	340						
18							L	A	A	C	370	A	350	365	A	A 355	A	A	L					
19						L	A	A	A	A	A	A	A	A	A	A	Y	A						
20						L	L 340	A	A	A	A	350	R 345	A	A	A	A	U L 335	L					
21							L	U L 355	A	A	A	L	A	A	A	A	A	A	A					
22						A	A	A	A	A	A	385	H 400	H 405	370	350	A	A						
23								A	A	U L 385	A	A	A	A	A	A	A	A	A					
24								A	A	A	A	A	370	A	A	A	A	A	A					
25							A	A	A	A	A	A	370	A	A	A	A	A	A					
26							A	A	A	A	A	A	A	A	A	A	A	A	L					
27								A	U L 360	A	A	A	A	A	A	A	A	A	A					
28						A	A	A	A	A	A	A	A	A	A	A	A	A	A					
29						U L 315	A	A	A	A	A	A	A	350	350	H 365	350	A	A					
30						L	L	A	A	L 345	A 335	385	A	A	350	335	A 345	L 355	L					
31						L	L 345	A 365	A	A	A	A	355	A	A	A 370	A	A	A					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						1	3	4	4	6	6	8	10	8	14	14	10	5						
MED						U L 315	L 345	U L 360	U L 362	L 365	365	365	355	365	352	350	L 348	U L 340						
U Q							U L 365	368	U L 370	L 385	370	385	370	382	365	365	L 355	L 352						
L Q							L 340	U L 350	360	365	355	A 350	350	348	345	350	L 340	338						

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

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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

H / D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								250	265	C	C	C	C	C	C	C	C	C	C					
2						C	C	C	C	C	C	C	C	C	285	275	285	280						
3						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
4						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
5						C	C	C	C	C	C	C	320	305	305	300	285	260						
6						C	C	C	C	265	290	315	340	330	290	290	290	260						
7								255	265	290	340	A 365	355	300	310	305	280	270	265					
8								260	260	L 280	350	330	470	310	280	295	285		340					
9							280	290	260	315	340	315	305	340	320	310	270	265						
10							A	A	A	A	400	345	345	315	360	320	315	295						
11							280	275	A 285	A 330	315	A 310	290	305	300	285	280	A	A					
12						310	300	E A 360	A	390	A 355	330	E A 400	340	320	300	290	260						
13								255	L 345	E A 390	A	510	C	C	C	C	C	C	C					
14						C	C	C	C	C	C	C	C	C	C	C	C	A 310	A					
15								280	B 315	R	E Y 540	380	360	335	330	330	290	A 310						
16						A 290	300	A	A	A	A	A	A	350	370	345	E A 360	A	A 310					
17							L 295	310	280	340	350	380	360	310	I C 350	370	325	290						
18							250	A 285	A 335	I C 320	305	A 325	360	340	315	280	275	275	260					
19						305	A 305	275	260	A	A	A	A	A	A	A	Y	280						
20						255	360	290	300	A	A	435	370	345	A 325	A 325	310	310	315					
21							270	310	290	275	A 305	L 330	A	A	A	A 325	A 295	280	A					
22						A 290	A 255	A 250	255	E A 280	A 305	315	365	400	370	330	300	275						
23								250	E A 260	285	A	E A 400	370	A	A 365	A	A	E A 300	290					
24								A 255	A	E A 320	A	330	320	E A 365	A	335	310	300	A					
25							A	A	A	A	A	350	395	365	315	290	295	285	E A 275					
26							A 270	A	A	A	A	A	E A 370	A 345	375	315	A	290	265					
27								A 265	275	300	340	375	400	345	A	E A 360	A	A	A 310					
28						A	A	A	A	A	A	A	A 345	A	A	A	A	A	A					
29						405	A	A	A	A	A	440	340	350	325	320	335	325	A					
30						295	245	A 305	300	325	350	345	320	370	370	350	310	280	280					
31						310	315	265	260	A 300	A	415	365	375	340	320	310	300	A					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						8	13	19	17	16	14	21	22	21	21	23	21	22	10					
MED						300	280	270	275	302	340	345	355	340	325	318	292	281	285					
U Q						310	302	290	300	328	350	390	370	358	362	330	310	300	310					
L Q						A 290	262	255	260	282	305	328	340	312	308	295	285	275	265					

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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	A 320	285	A 320	315	290	260	240	230	215	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	220	230	245	A	A 265	240	A 240	280	305	295
3	300	285	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	H 210	A	240	A	E A 265	A	245	A	280	255	275	300
6	300	C	C	C	C	C	C	C	C	220	210	200	230	200	250	225	A	A	A 260	260	265	260	270	250
7	280	295	305	310	280	235	245	235	A	220	210	A	230	215	215	230	240	A 255	A	250	270	300	285	275
8	300	300	315	305	255	240	235	240	230	A 245	235	A	A	A	235	230	A 250	E A 280	A 280	270	305	240	A 285	E A 345
9	E A 375	300	305	310	290	A 320	A	A 240	A	235	A	190	A	A	E A 270	220	230	250	250	235	A 280	255	320	A
10	A 295	E A 380	E A 350	295	280	250	A	A	A	A	A	A	A	A	A	A 225	235	E A 275	255	255	260	E A 340	280	335
11	315	255	260	A 295	E A 350	260	A 260	A	A	A	A	A	A	A	235	215	A 250	A	A	A 245	245	250	305	A 320
12	280	290	290	305	285	255	A	A	A	A	A	A	A	225	220	H 210	230	245	A 250	A 275	A 260	285	300	315
13	320	305	315	285	255	250	230	230	205	A	A	235	C	C	C	C	C	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	A	A	A	270	A	310	325
15	310	270	235	230	280	260	255	A	B	R	A	A	A	B	A 250	A	A	A	A 260	255	255	260	290	E A 345
16	335	A 360	A 295	270	260	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A 270	275	285	A 280	315
17	290	315	A 320	A	315	260	A 265	255	240	240	230	B	215	210	I C 225	245	A 260	265	250	235	A 290	A	280	A 360
18	A	295	255	295	E A 355	250	A 250	A	A	C	215	A	E A 270	220	A	A	A	A	A	240	250	285	330	340
19	A 365	A	A 335	A 330	280	250	A	A	A	A	A	A	A	A	A	A	Y	A	A 270	A 250	A 240	A 260	A	A
20	A	A 350	330	300	275	245	240	A	A	A	A	A 250	E A 280	A	A	A	A	A 260	245	A	A 310	A 305	E A 315	A 330
21	A	330	E A 340	290	250	235	235	A 260	A	A	A	E A 260	A	A	A	A	A	A	A	240	280	A	A	A 330
22	E A 350	A	300	A 315	310	A	A	A	A	A	A	200	H 200	H 180	210	230	A	A	265	E A 285	260	285	280	280
23	260	275	260	280	265	250	A 260	A	A	A 240	A	A	A	A	A	A	A	A	A	A 280	275	A 260	A 320	290
24	270	270	290	255	260	250	A 250	A	A	A	A	A	A 235	A	A	A	A	A	A	A	270	A 255	255	A
25	280	295	A 285	A 285	250	A 260	A	A	A	A	A	A	A 245	A	A	A	A	A	A	250	270	A 305	315	270
26	310	240	245	255	305	240	A	A	A	A	A	A	A	A	A	A	A	A	A 255	250	310	A 310	A	245
27	290	305	270	245	A 335	270	245	A	A 255	A	A	A	A	A	A	A	A	A	A	230	245	A	A	395
28	A 335	A 310	A 340	A 300	255	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	310	290	290
29	310	310	265	350	340	270	A	A	A	A	A	A	A	E A 260	230	H 200	230	A	A	270	A 290	270	295	Y 305
30	325	E A 350	285	270	305	250	220	A	A	A	A	220	A	A	240	A 260	A	240	A	260	A 300	310	305	280
31	350	300	270	250	260	250	240	E A 270	A	A	A	A	E A 260	A	A	E A 270	A	A	A	A	260	250	285	305
	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	25	24	25	22	15	8	5	6	5	7	10	7	13	13	10	8	13	21	26	23	23	24
MED	305	298	292	295	280	250	245	239	230	238	215	210	222	212	232	228	240	253	A 255	250	270	275	290	306
U Q	A 330	A 312	A 320	308	308	260	A 255	A 258	248	A 240	232	A 250	E A 260	225	245	238	A 250	E A 270	A 265	A 270	A 280	A 305	310	A 332
L Q	290	285	268	270	260	250	235	232	210	220	210	200	H 215	200	220	218	230	248	250	240	260	255	280	285

MAY 1993 H'F (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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						160	120	110	110	C	C	C	C	C	C	C	C	C	C					
2						C	C	C	C	C	C	C	C	C	115	115	120	120	A					
3						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
4						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
5						C	C	C	C	C	C	C	A	115	125	B 125	130	115	A					
6						C	C	C	C	120	120	115	B 135	B	125	115	115	120	120					
7						135	120	110	110	110	120	120	120	115	120	120	A	120	130					
8						125	A 130	120	115	115	120	120	120	A	125	125	120	120	A					
9						A	120	115	115	115	115	120	115	115	120	115	115	120	A					
10						A	120	115	115	110	110	A	A	B 130	A	A	115	115	B 135					
11						135	120	110	110	110	120	120	A	A	A	120	120	120	120					
12						140	120	110	115	115	A	120	A	A	A	A	A	115	A					
13						A	125	115	115	120	115	A	C	C	C	C	C	C	C					
14						C	C	C	C	C	C	C	C	C	C	C	C	B	A					
15						B 150	B	B 125	B	B	B	B	A	B	B	A	A	A	B					
16						A	125	120	B 130	120	B	A	B	B	B	130	A	A	A					
17						E A 145	120	115	120	A	B	B	B	120	I C 110	115	115	115	A					
18						140	120	115	115	I C 115	120	120	A	A	A	A	A 130	A 135	130					
19						140	115	110	110	110	115	B 120	120	A	A	A	A	A	A					
20						A 130	115	115	110	A	A	A	A	120	120	120	115	115	A					
21						A	120	115	115	115	120	125	120	120	120	110	110	110	A					
22						A	115	110	110	110	110	A	A 130	120	120	120	110	110	A					
23						B 140	120	110	110	120	A	B 120	115	A	A	115	110	115	A					
24						120	115	110	110	110	110	A	A	A	A	A	120	115	A					
25						130	120	120	115	115	115	A	B 130	B 120	B 120	120	120	120	120					
26						140	120	115	115	A	A	A	A	A	A	A	A	A	A					
27						135	120	115	115	120	A	A	A	A	A	A	A	A	A					
28						125	120	115	120	A	125	A	A	A	A	120	120	120	125					
29						130	120	120	120	120	120	B	A	A	115	A	115	115	125					
30						A	120	120	110	115	A	A	A	A	A	A	A	A	A					
31						140	120	115	115	120	120	115	125	125	125	130	130	120	125					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						18	24	25	24	20	16	11	10	10	13	16	18	20	9					
MED						136	120	115	115	115	120	120	120	120	120	120	118	118	125					
U Q						140	120	118	115	120	120	B 120	B 130	B 120	125	122	120	120	130					
L Q						130	120	110	110	110	115	120	120	115	118	115	115	115	120					

IONOSPHERIC DATA STATION KOKUBUNJI

MAY 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	105	110	105	110	110	G	G	150	130	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	115	115	G	120	115	115	110	110	B	B
3	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	120	110	145	120	125	120	110	110	110	110	110	110
6	B	C	C	C	C	C	C	C	C	G	130	120	G	160	175	E G 195	125	130	120	115	110	115	110	B
7	B	B	B	B	B	G	155	120	120	125	120	115	G	125	125	120	120	130	115	115	115	115	110	110
8	115	110	B	B	B	120	140	130	125	120	120	115	110	110	120	G	125	120	115	110	B	B	105	105
9	105	100	100	105	110	125	125	120	115	115	110	110	110	115	120	G	G	G	125	135	115	110	110	110
10	110	105	105	100	130	130	120	115	115	110	110	130	110	120	110	110	170	130	130	120	115	110	110	B
11	105	105	105	120	130	130	125	115	110	110	110	110	110	105	110	115	115	115	110	110	115	110	150	105
12	B	110	110	110	115	150	125	115	115	115	110	110	110	110	110	120	115	G	115	115	115	115	115	B
13	B	110	110	110	B	120	G	125	140	115	110	130	C	C	C	C	C	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	120	120	115	115	115	115	110
15	110	B	B	B	B	140	135	120	B	130	120	120	120	130	135	120	120	115	110	120	115	B	110	110
16	110	105	115	100	B	130	130	120	120	115	110	110	115	130	130	120	120	120	115	115	115	110	115	115
17	110	115	110	110	110	115	135	120	125	125	120	B	B	G	C	180	135	125	110	115	110	110	110	110
18	110	110	135	110	100	G	125	115	115	C	115	110	110	115	110	110	130	120	120	110	110	100	115	110
19	110	110	105	110	120	135	120	120	110	110	110	105	110	110	105	105	110	100	100	100	110	115	110	115
20	110	105	110	105	115	105	120	120	110	115	110	115	115	130	120	120	120	120	120	110	120	115	115	110
21	110	105	105	100	110	110	G	130	120	120	120	125	120	115	115	115	110	110	110	110	115	110	110	115
22	105	105	105	105	115	115	115	110	110	110	105	110	110	120	170	160	120	120	115	110	120	110	115	110
23	105	105	110	100	100	130	125	120	115	115	110	110	110	120	120	120	115	115	115	110	115	120	110	105
24	105	105	100	100	B	135	120	110	110	110	105	110	110	105	100	115	130	120	115	115	115	115	110	110
25	120	105	105	105	150	130	125	115	115	110	110	115	140	130	120	115	115	120	115	110	110	110	110	110
26	110	110	110	110	110	140	120	115	110	115	110	110	110	110	125	130	105	105	100	120	120	120	110	115
27	105	110	105	B	110	130	130	120	120	115	110	115	110	110	110	105	100	95	95	100	95	100	100	100
28	110	110	110	110	115	130	120	120	120	115	115	115	115	130	130	120	120	115	115	130	115	115	110	110
29	110	110	110	105	120	145	125	120	115	115	115	115	115	120	120	120	120	135	115	120	120	120	125	120
30	115	110	110	110	B	135	140	120	115	115	115	120	110	110	110	110	110	125	120	120	110	115	115	110
31	115	110	105	110	B	G	140	125	120	120	115	115	150	130	125	140	130	120	115	115	120	115	B	110
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	22	23	22	21	17	21	22	25	24	23	25	24	22	24	25	24	24	25	27	27	26	25	25	23
MED	110	110	108	110	115	130	125	120	115	115	110	115	110	118	120	120	120	120	115	115	115	115	110	110
U Q	110	110	110	110	120	135	135	120	120	120	118	118	115	130	128	120	125	122	120	120	115	115	115	110
L Q	105	105	105	102	110	120	120	115	112	110	110	110	110	110	110	115	115	115	110	110	110	110	110	110

MAY 1993 H'ES (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

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

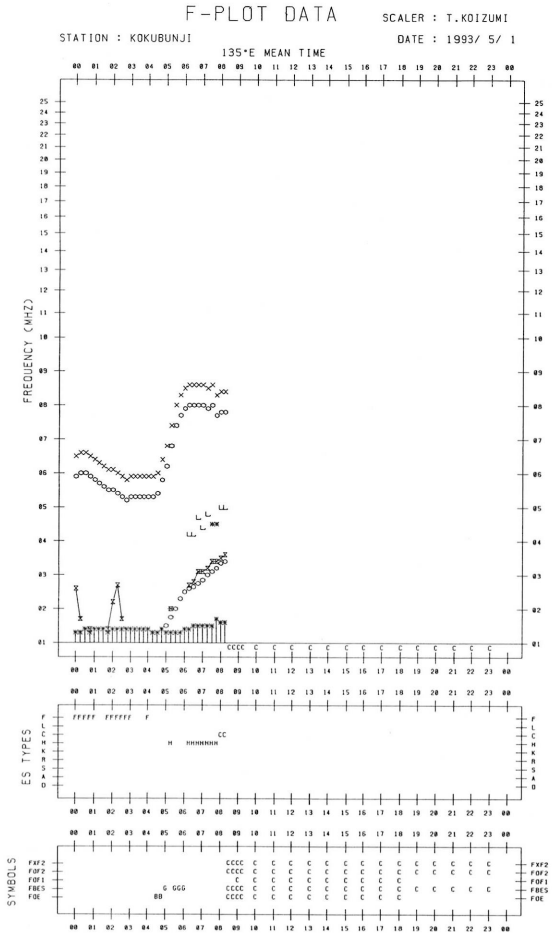
LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

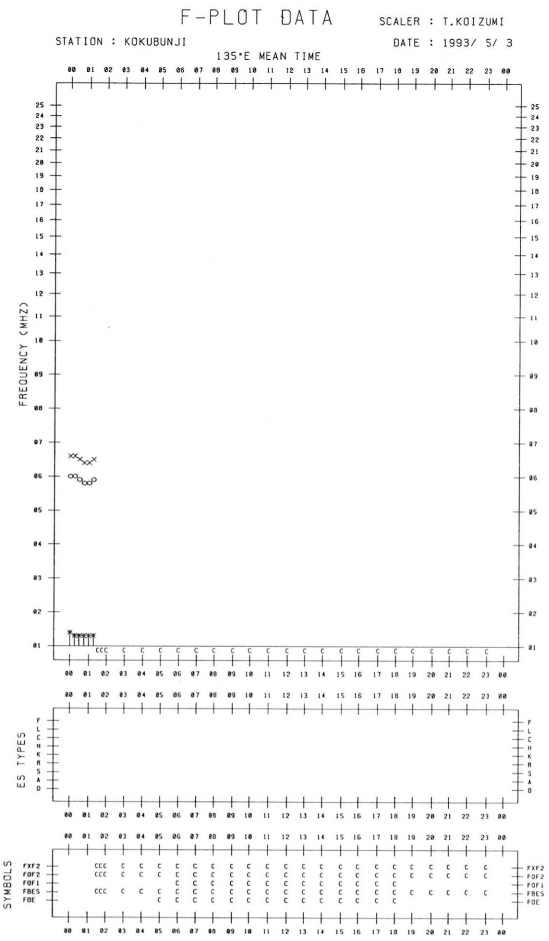
D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F4	F1	F5	F2	F1			H1	C1															
2															C1	C1		C3	C4	F4	F4	F2		
3																								
4																								
5													C1	C2	H1	C2	C2	C2	C4	F6	F4	F5	F2	F2
6											C1	C1		H1	H1	H1	H2	C2	C3	F3	F3	F1	F1	
7							H1	C2	C2	C1	C1	C2		C1	C1	C1	L1	C1	C4	F4	F3	F2	F2	F1
8	F1	F1				LH11	HL11	C1	C1	C1	C1	C2	C2	C2	C1		C1	C2	C2	F3			F4	F3
9	F5	F4	F3	F2	F1	C4	C2	C2	C3	C2	C2	C1	C2	C2	C2				L1	F2	F5	F6	F4	F5
10	F5	F5	F5	F3	FF12	C2	C4	C4	C3	C3	C2	HC12	C2	CL21	L2	L1	H1	H2	C2	F5	F3	F4	F2	
11	F2	F3	F2	F4	F4	C3	C2	C3	C3	C3	C2	C2	C2	L2	L2	L2	C2	CH41	C4	F3	F3	F2	F1	F4
12		F1	F1	F1	F1	H1	C2	C3	C3	C2	L3	C2	C3	C2	L2	L1	L1		CL22	F4	F3	F3	F3	
13		F2	F1	F2		C1		C1	HC21	C2	C2	CL22												
14																		C4	C3	F3	F2	F3	F6	F1
15	F1					H1	H1	C2		C1	C1	C1	C1	C1	C1	C2	C3	C2	C2	F1	F1		F2	F2
16	F3	F3	FF12	F1		C2	C2	C2	C2	C2	C2	C2	L2	C1	C1	C2	C2	C2	C2	F2	F3	F2	F2	F2
17	F2	F2	F3	F3	F3	L1	H1	C1	C1	C1	C1					H1	H2	C1	C2	F2	F3	F5	F2	F4
18	F5	F5	FF12	F2	F3		C2	C3	C2		C2	C2	C2	C1	L2	L3	HL22	CL32	C2	F4	F4	F3	FF23	F4
19	F5	F4	F3	FF43	F1	C2	C4	C2	C3	C3	C2	C3	C3	C3	L4	L4	L1	L3	L4	F3	FF24	FF24	FF52	F3
20	F3	F3	F3	F2	F1	CC11	C2	C3	C3	C3	C3	C2	C2	H2	C3	C3	C2	C2	C2	F4	F4	F3	F3	F4
21	F4	F4	F4	F4	F2	L2		H2	C3	C2	C2	C2	C3	C3	C3	C2	CC22	C3	C4	F3	FF42	F5	F5	FF23
22	F4	F4	FF23	FF22	FF22	C4	C5	C2	C2	C2	C3	L1	L1	C1	H1	H1	C2	C4	C3	F4	FF23	F2	FF21	FF23
23	F2	F1	F1	F2	F1	C2	C3	C3	C3	C2	C2	C3	C2	CL32	CL32	C3	C4	C3	C4	F4	F3	FF23	F4	F5
24	F1	F1	F2	F1		CL21	C4	C3	C3	C3	C3	L2	L2	L3	L3	L1	H2	C3	C4	F3	F6	F5	F4	F4
25	FF12	F2	F3	F3	FF13	C3	C5	C4	C3	C3	C3	C1	H1	H2	C2	C3	C2	C2	C4	F4	F4	F3	F4	F3
26	F4	F2	F1	F2	F4	CL21	C3	C3	C3	C2	C2	L2	L2	L2	CL12	LL22	LL33	L2	L2	F2	F3	F4	F6	F1
27	F2	F1	F1		F3	C2	C2	C2	C1	C2	C2	C2	L2	L2	L2	L3	L3	L3	L3	L3	F4	F3	F3	F3
28	F3	F2	F3	F4	F2	C4	C3	C3	C3	C3	C3	C2	C1	CL21	CL22	C3	C3	C3	C5	F3	F4	F2	F3	F3
29	F1	F4	F2	F2	F1	H2	C3	C3	C4	C3	C2	C2	L2	C1	C2	C1	C1	H1	C4	F5	F6	F4	F2	F2
30	F3	F3	F3	F2		C2	H1	C3	C2	C2	C2	L1	L2	L2	L1	L1	L1	CL22	CL22	FF32	F3	F2	F5	F2
31	F4	F2	F3	F2			H1	C2	C2	C2	C2	C2	H1	H2	C2	H1	C2	C3	C4	F3	F2	F2		F4
	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																								

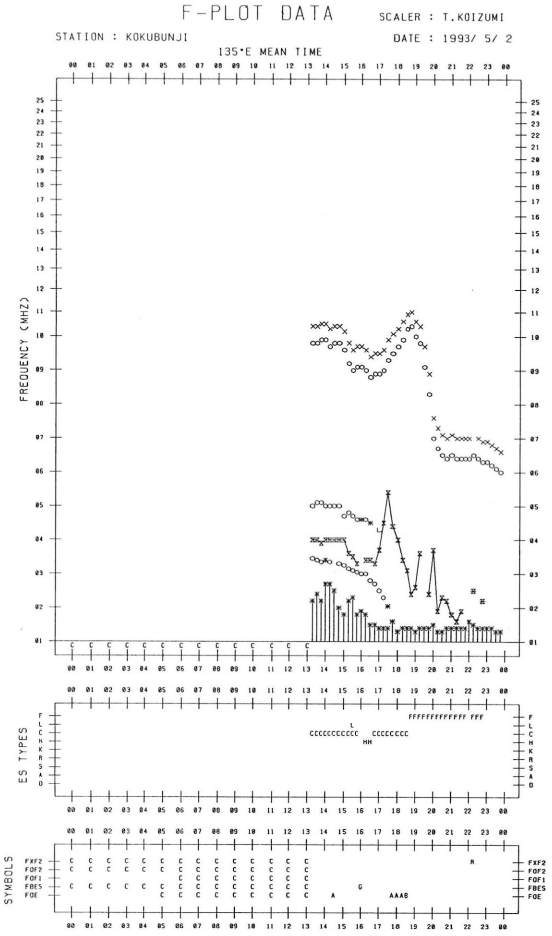
MAY 1993 TYPES OF ES COMMUNICATIONS RESEARCH LABORATORY, JAPAN

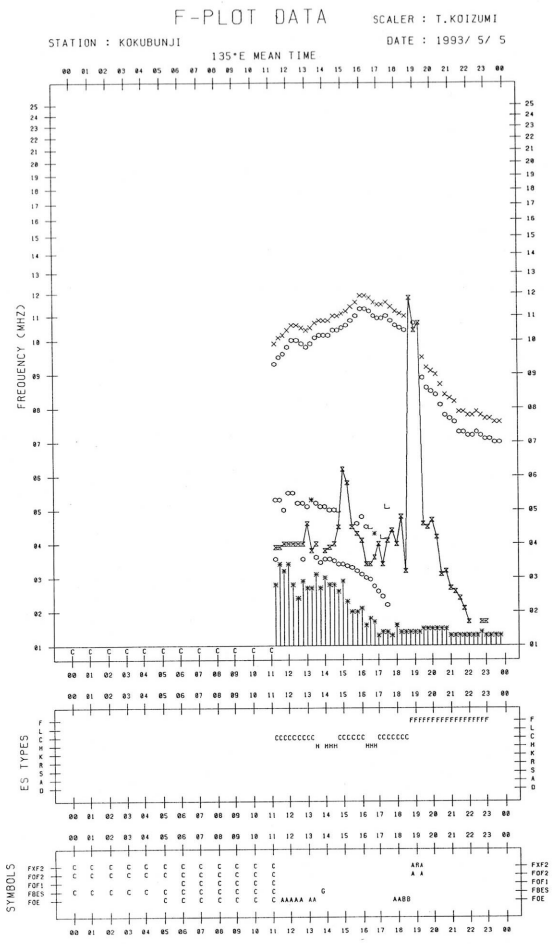
f-PLOTS OF IONOSPHERIC DATA

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


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/ 1
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/ 3
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/ 2
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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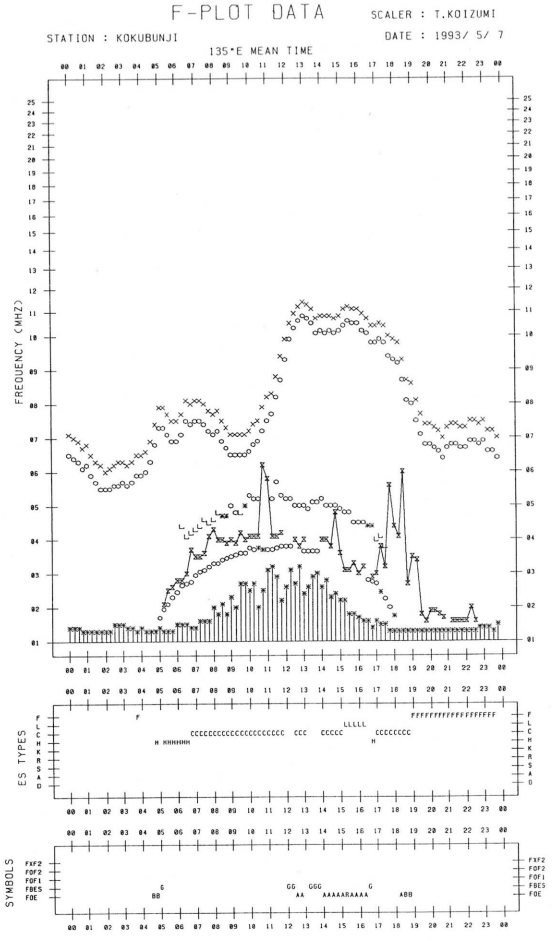
STATION : KOKUBUNJI
DATE : 1993/ 5/ 5
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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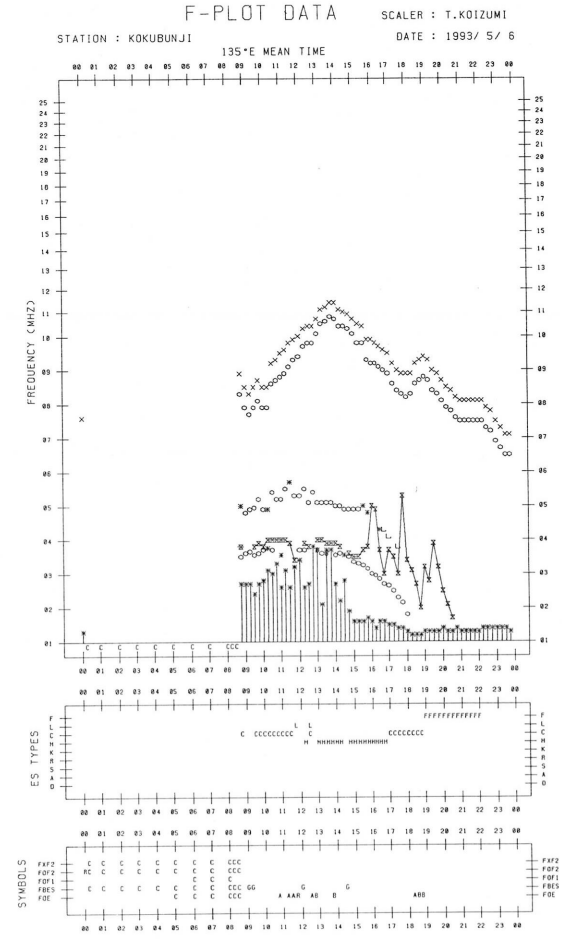
STATION : KOKUBUNJI
DATE : 1993/ 5/ 7
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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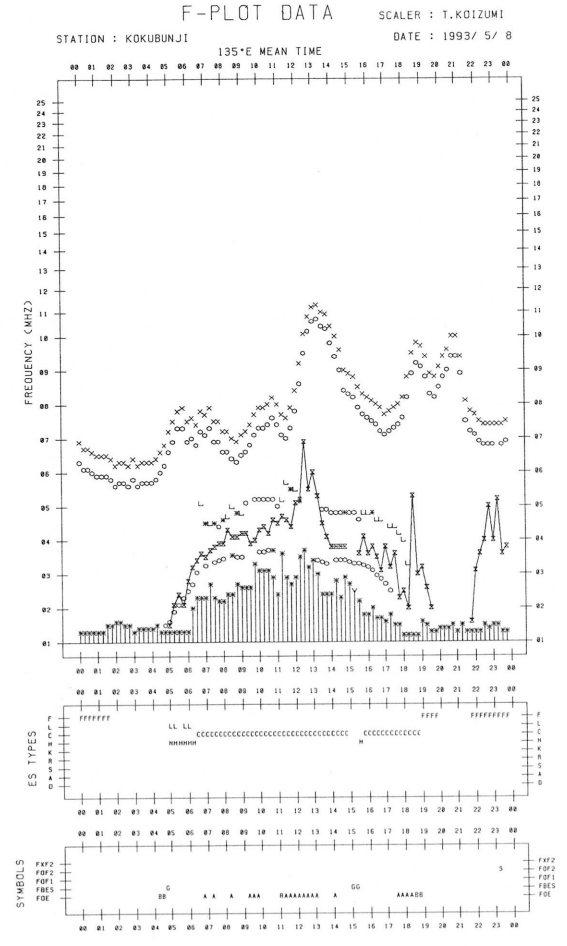
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/ 6
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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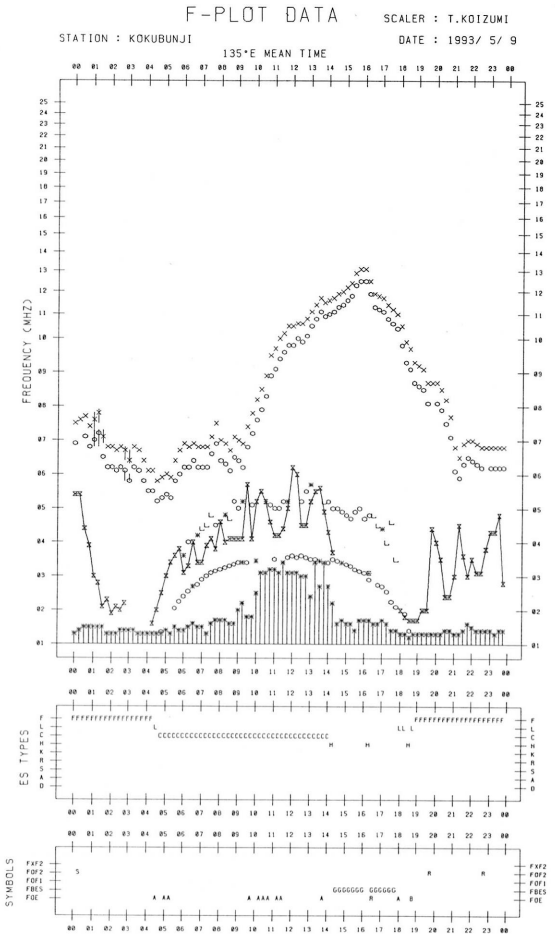
STATION : KOKUBUNJI
DATE : 1993/ 5/ 8
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE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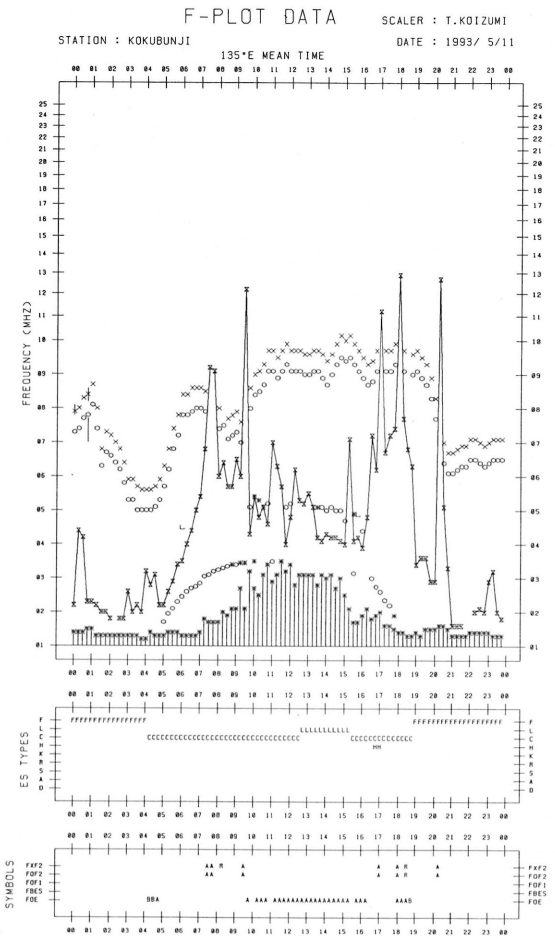
STATION : KOKUBUNJI
DATE : 1993/ 5/ 9
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
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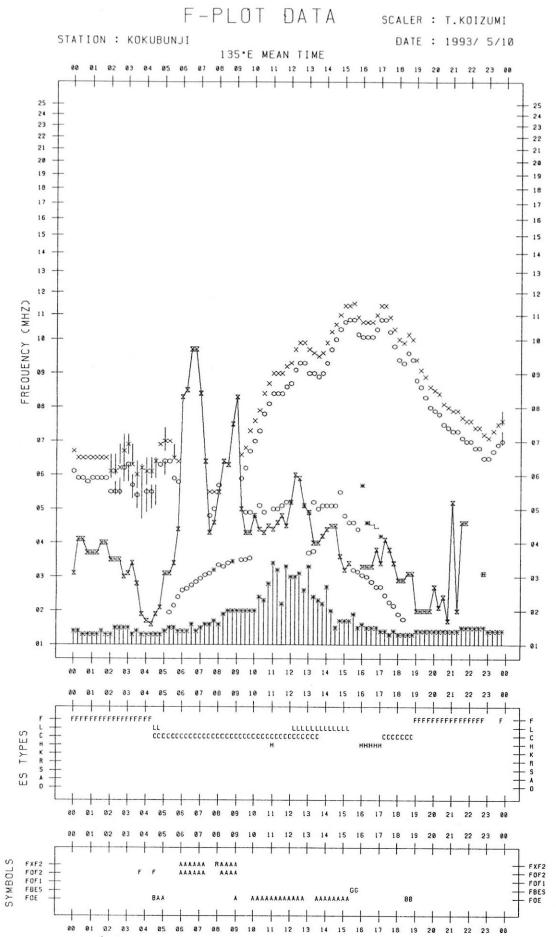
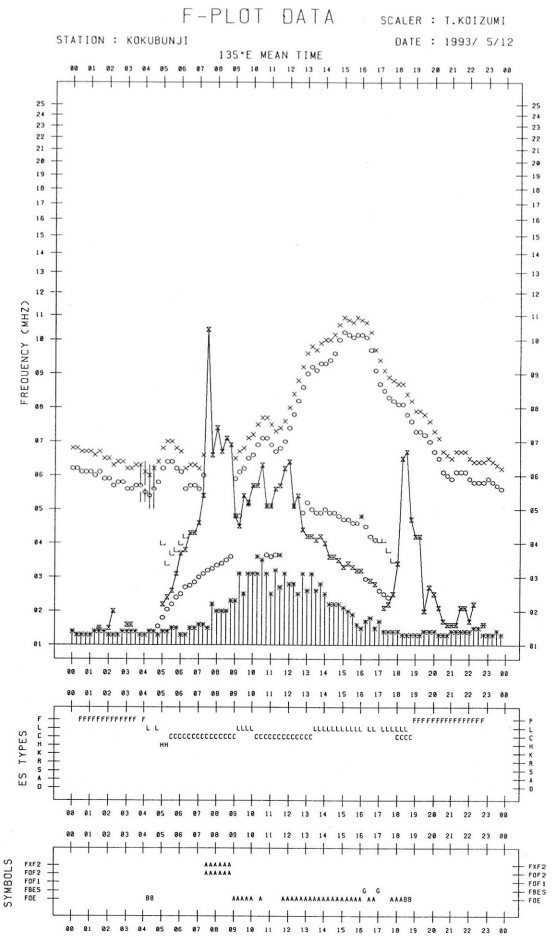
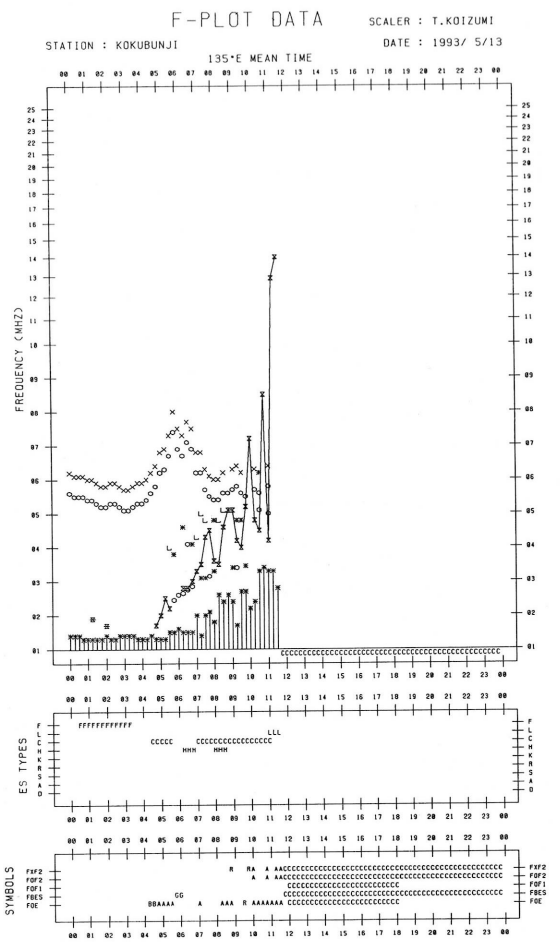
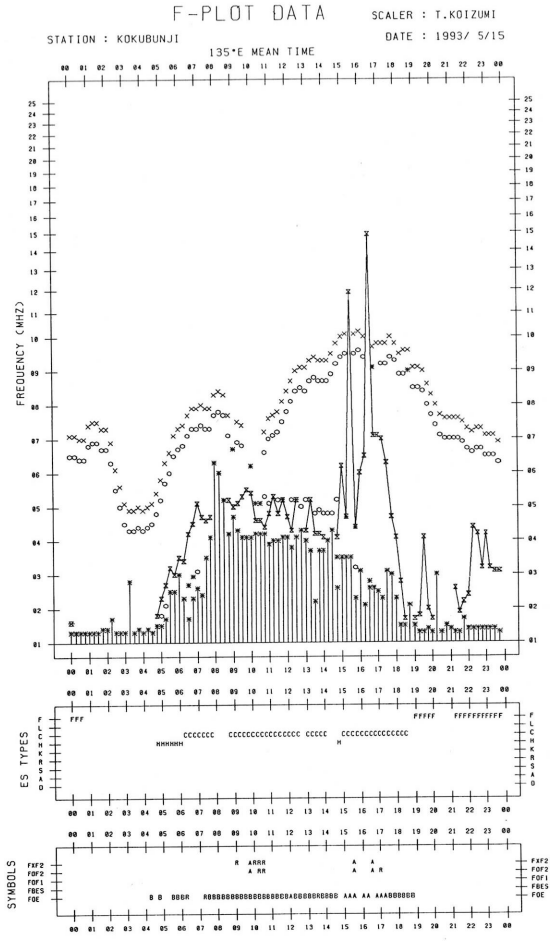
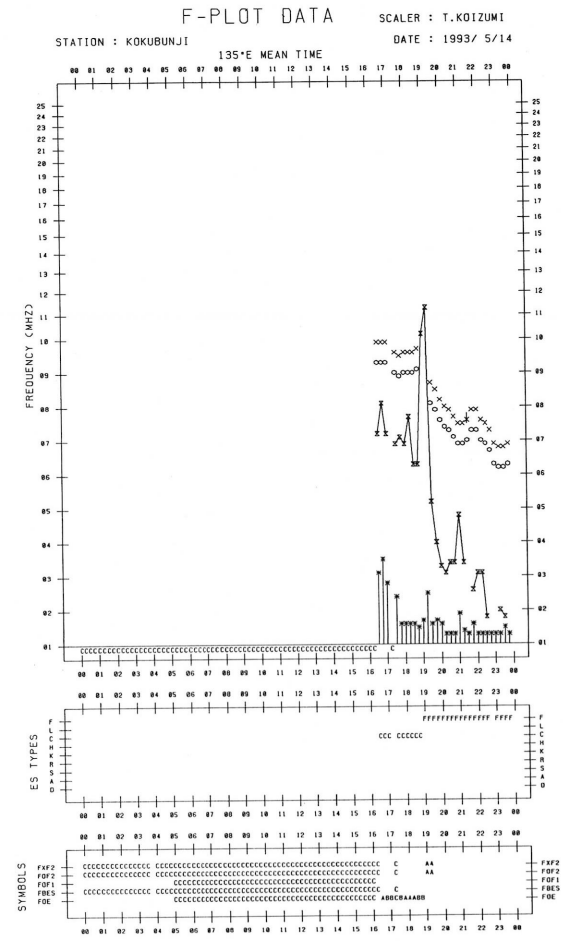
STATION : KOKUBUNJI
DATE : 1993/ 5/11
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

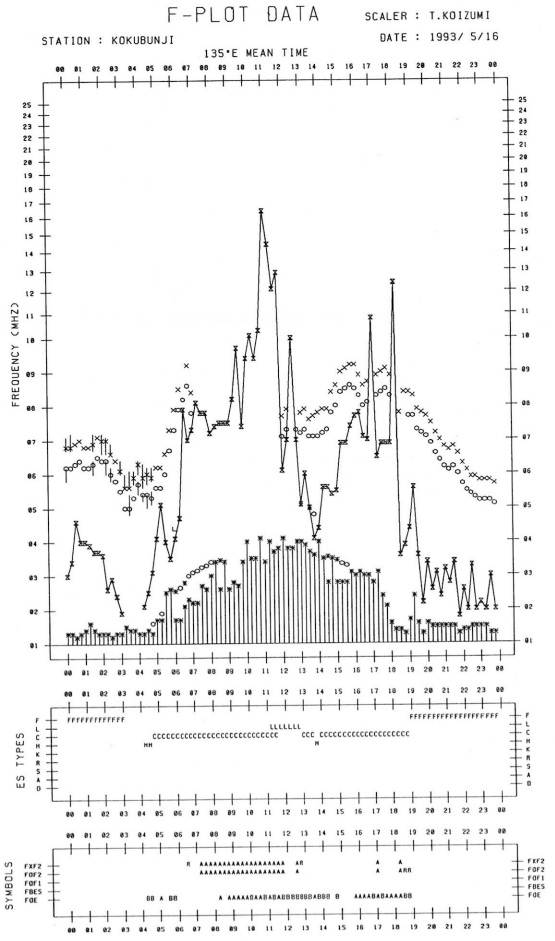

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/10
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

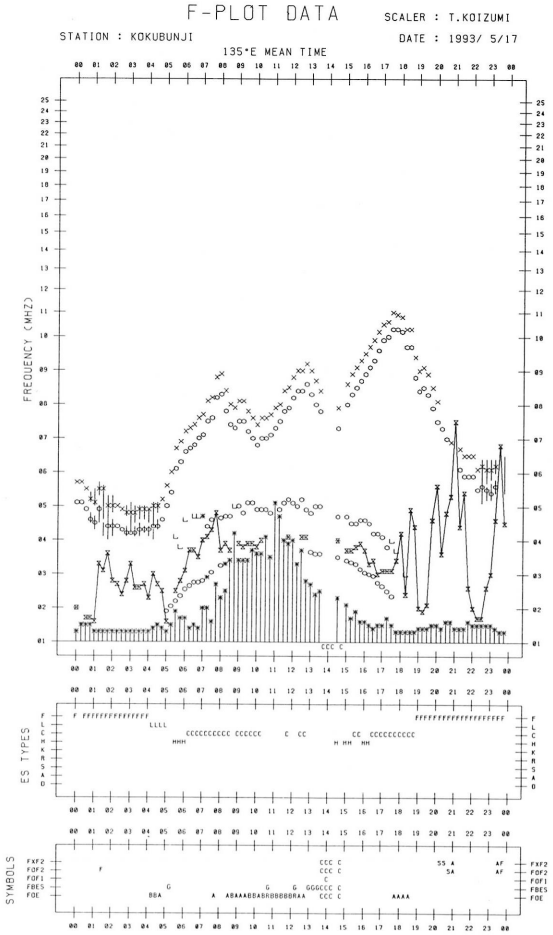

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/12
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

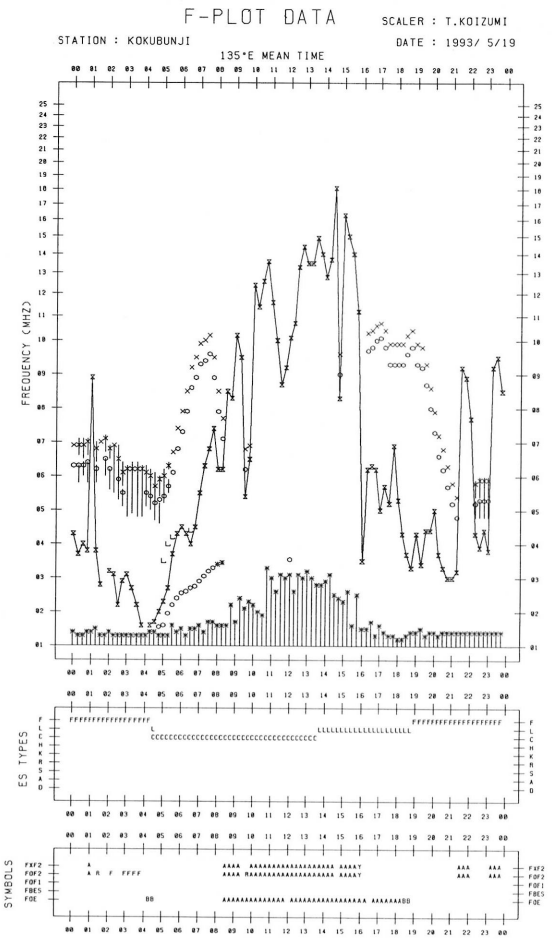

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

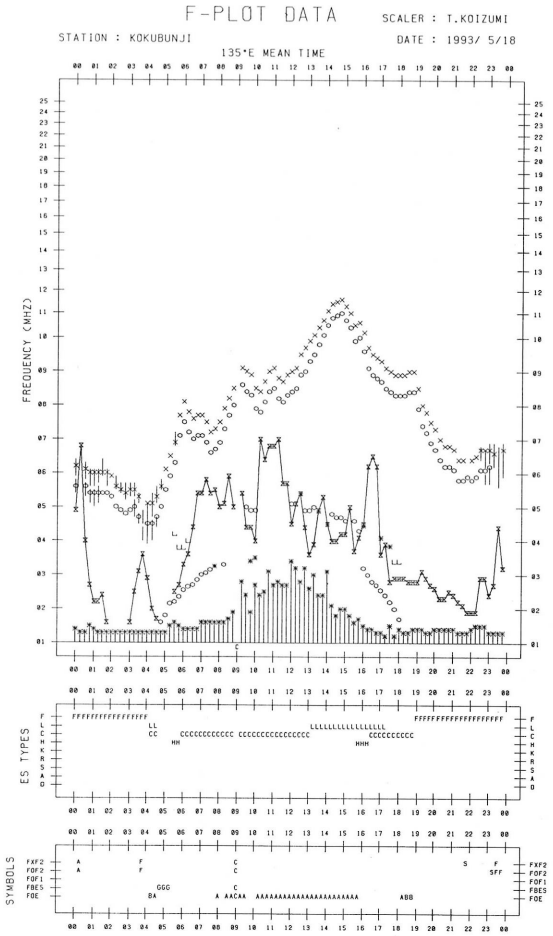

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

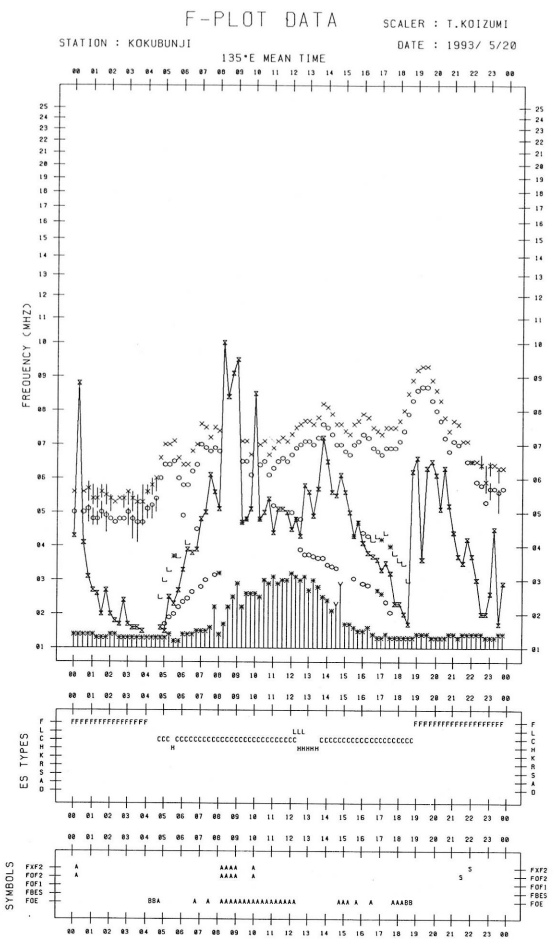

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

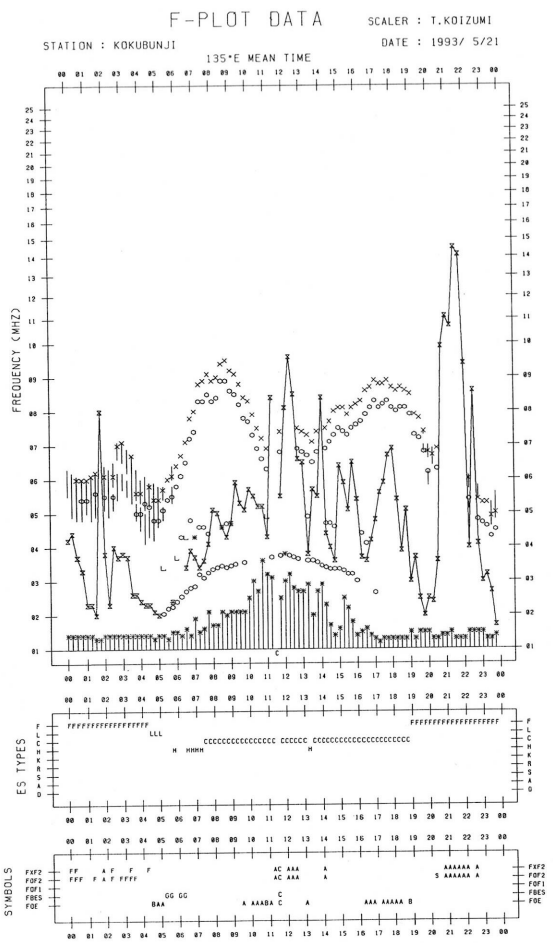

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

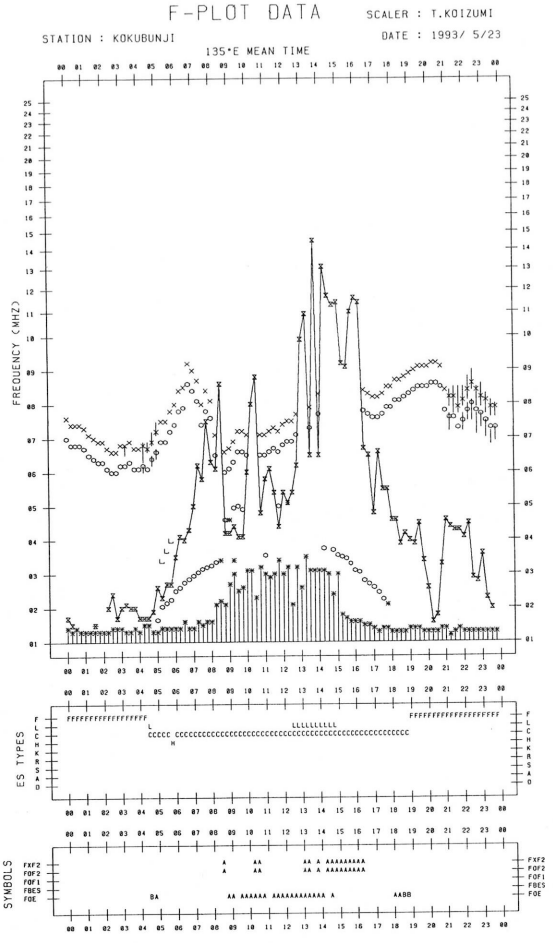

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

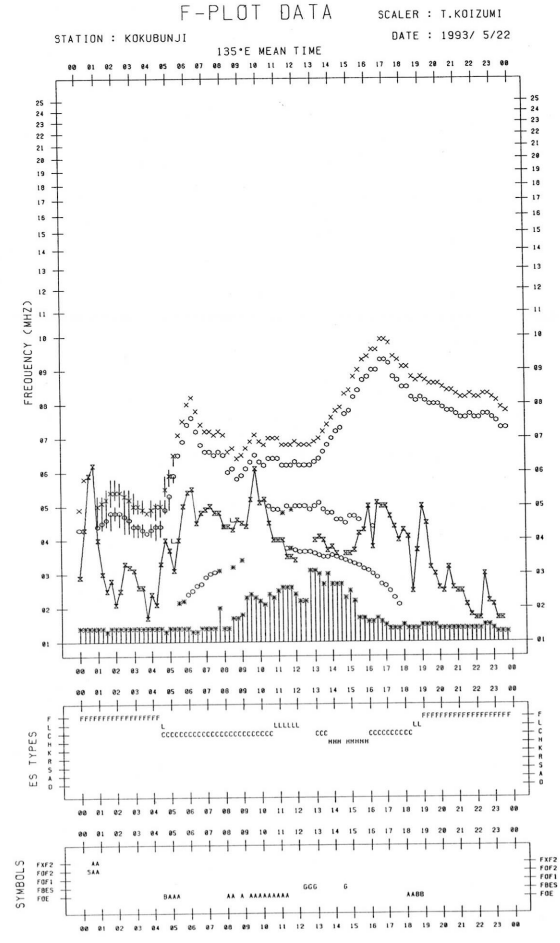

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

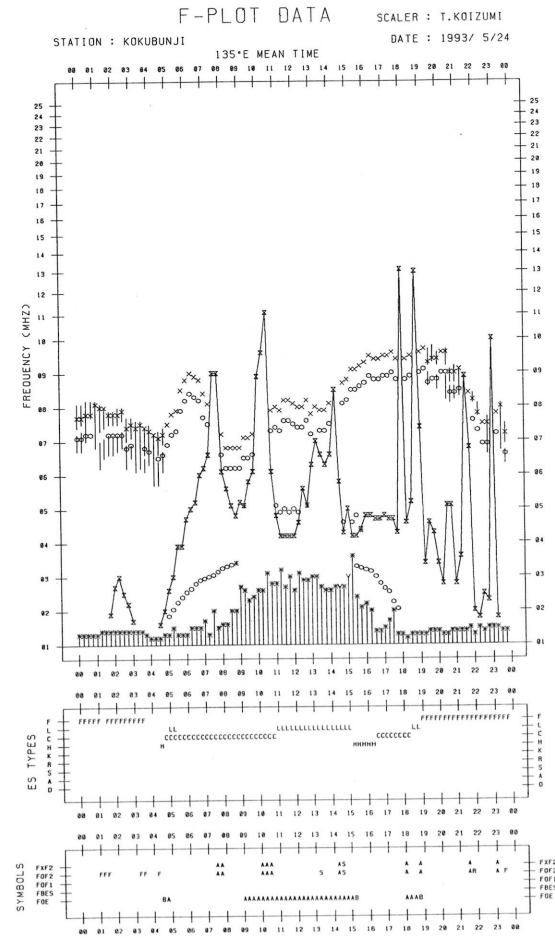

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

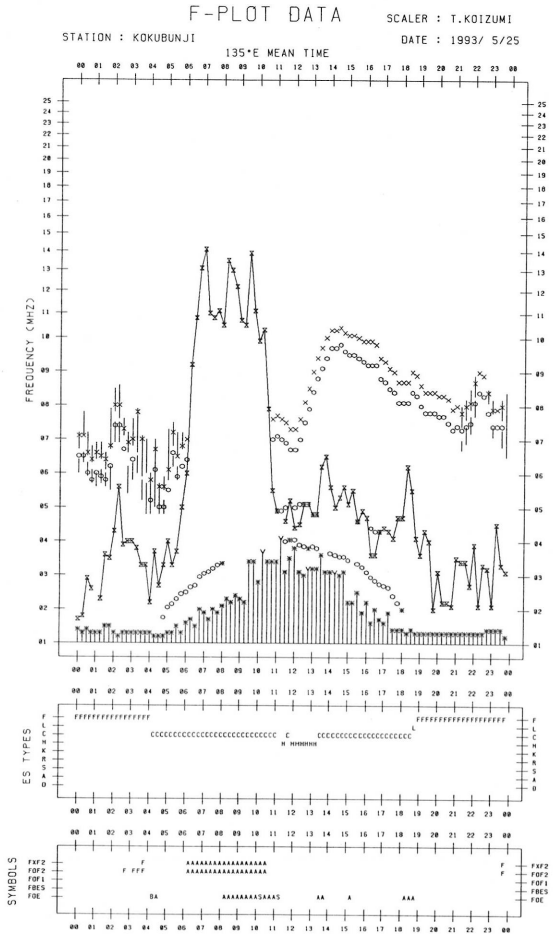

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

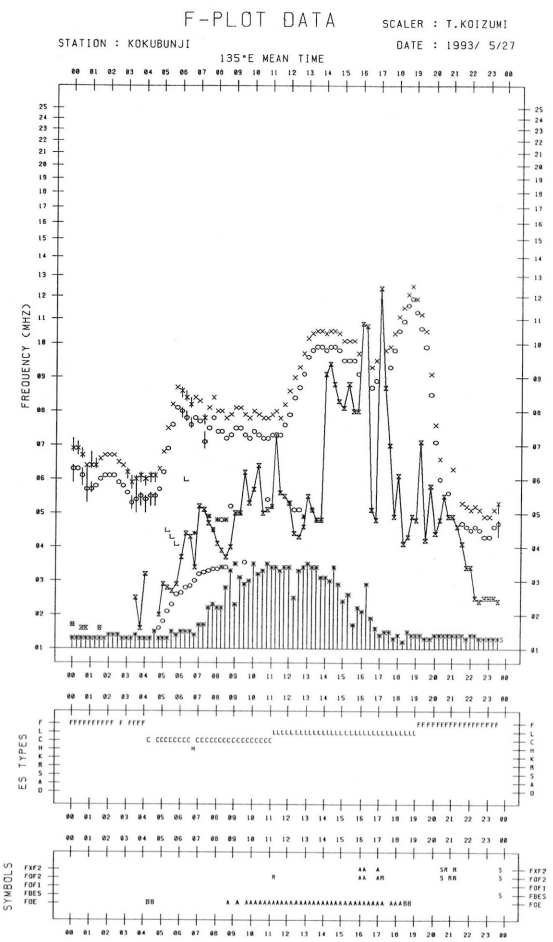

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/21
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

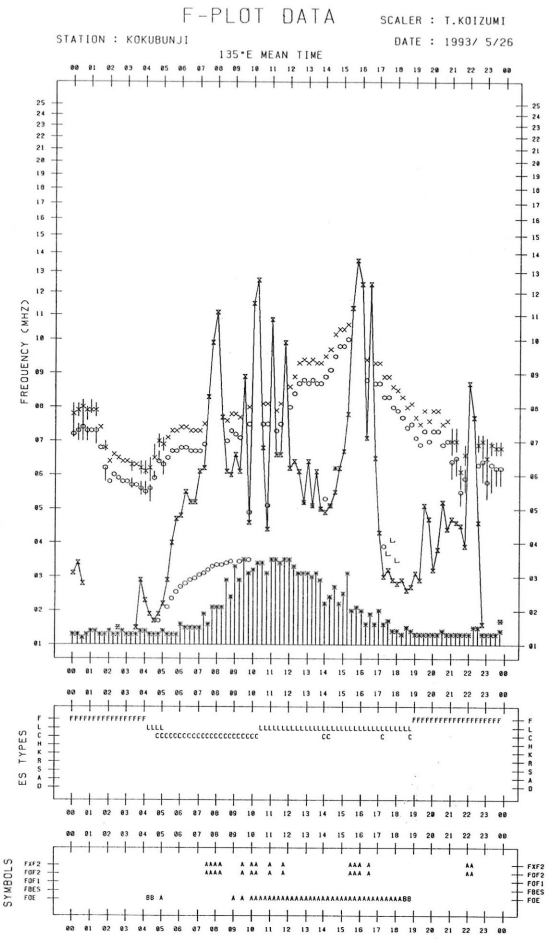

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/23
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

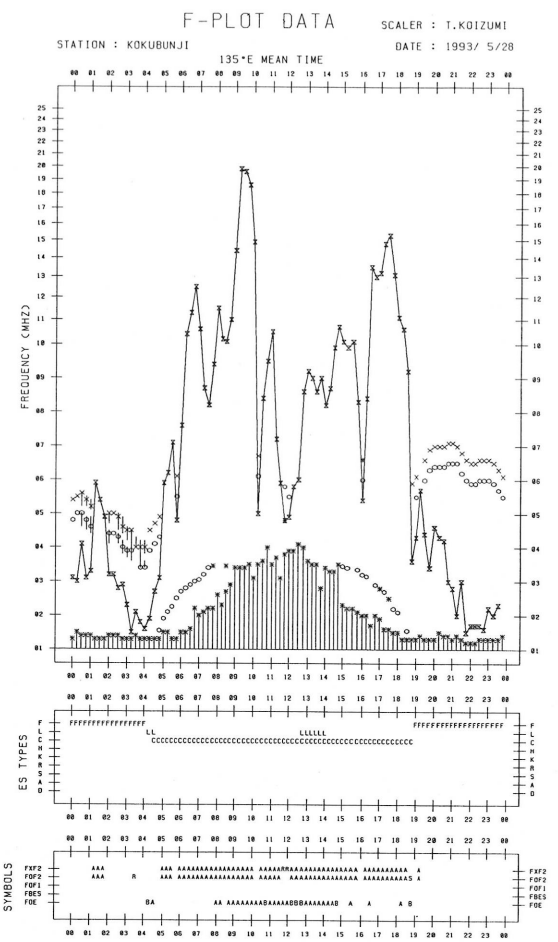

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/22
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

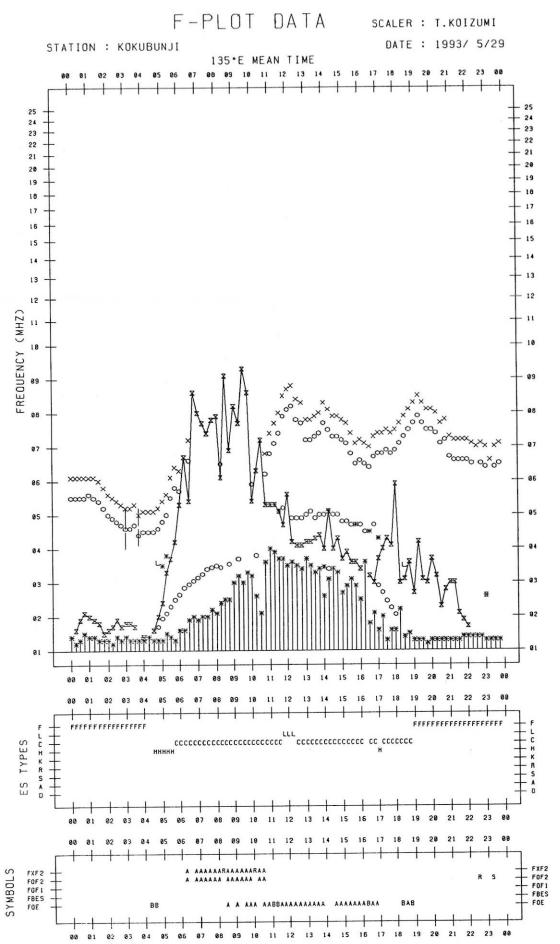

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/24
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

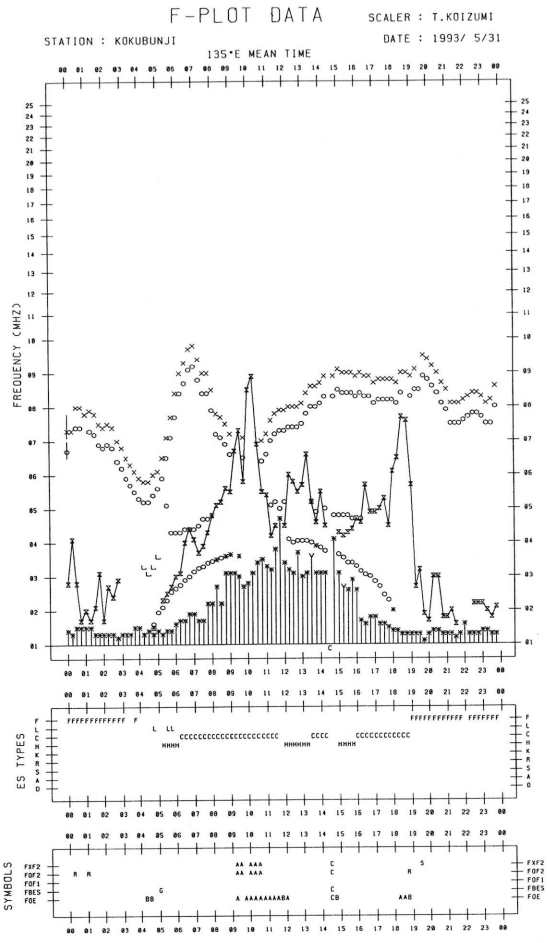

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/25
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

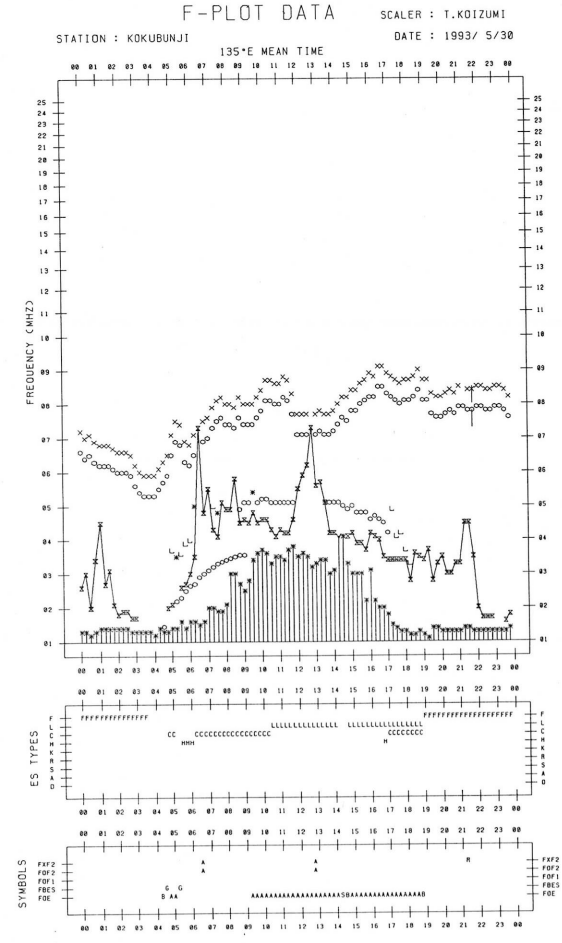

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/27
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/26
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/28
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/29
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/31
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 5/30
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

B. Solar Radio Emission

B1. Daily Data at Hiraiso

200, 500 MHz

No observations due to system replacement.

B2. Outstanding Occurrences at Hiraiso

200, 500, 2800 MHz

No observations due to system replacement.

B3. Summary plots of $F_{10.7}$ at Hiraiso

No observations due to system replacement.

C. RADIO PROPAGATION

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

MAY 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	0	-3	0	0	2	1	-5	ES -26	-5	ES -26	ES -26	ES -26	ES -26	ES -26	-5	0	ES -26	ES -26	ES -26	ES -26	-4	2	2	ES -26
2	ES -26	ES -26	ES -26	-8	-11	0	-3	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	3	ES -11	ES -26
3	ES -26	-11	-11	ES -26	-5	2	10	ES -26	ES -26	ES -26	ES -26	ES -26	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -7	ES -25	ES -1	ES -25
4	ES -25	-16	ES -25	ES -25	1	5	1	-16	ES -25	ES -10	-10	ES -25	ES -25	ES -25	ES -25	-10	-4	-4	2	-7	-7	ES -25	-1	ES -25
5	ES -25	-1	ES -25	ES -25	4	8	6	2	5	ES -10	ES -25	ES -25	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-4	-3	-2	-8
6	ES -26	ES -26	ES -26	1	3	7	7	1	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-8	ES -26	-8	ES -26	ES -26	4	ES -26	0	1	-8
7	-8	ES -26	ES -26	-7	ES -26	-11	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	ES -25	ES -25	-7	ES -25	ES -25	ES -25	ES -25	7	0	ES -25	-4	ES -25
8	-3	-5	-1	-13	5	2	-5	12	14	ES -26	ES -26	ES -26	ES -25	ES -25	ES -25	-2	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25
9	ES -25	ES -25	-7	ES -25	10	ES -25	ES -25	ES -34	ES -25	ES -25	ES -25	ES -4	ES -10	ES -25	ES -25	ES -25	-16	ES -25	ES -25	ES -25	ES -25	ES -4	ES 3	ES -4
10	ES -4	-4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
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	2	ES -26	ES -26	ES -26	ES -26	ES -26	ES -26	-8
12	ES -25	ES -25	-10	ES -25	-3	7	2	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-16	ES -25	ES -25	ES -25
13	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-19	-16	ES -25	ES -25	ES -25	ES -25	-12	7	ES 1	-16
14	-4	ES -25	ES -25	-16	-16	-10	-2	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-16	-10	ES -25	2	-10	ES -25	ES -25	-7	-10	ES -25	ES -25
15	ES -25	-21	ES -25	-16	-4	-5	0	-2	-16	ES -25	ES -25	ES -25	ES -25	ES -25	-10	ES -25	-3	-7	-16	-16	ES -25	ES -25	ES -4	ES -25
16	ES -25	ES -25	ES -25	-7	ES -25	-2	5	-16	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-7	-10	ES -25	6	-10	-10	ES -25	ES -25	-16	ES -25
17	-4	ES -25	-16	-2	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	1	ES -25	2	ES -25	ES -25	2	-4	-4	-4	-7
18	ES -25	ES -25	-16	ES -25	-4	6	1	6	8	8	-16	ES -25	ES -25	ES -25	ES -25	-5	9	1	ES -25	-4	-7	ES -25	ES -25	ES -25
19	ES -25	-7	ES -25	ES -25	-2	1	-4	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	-16	-4	ES -25	ES -25	ES -25	ES -25	-21	-10	ES -25	ES -25
20	ES -25	ES -25	ES -25	ES -25	-4	2	0	ES -25	ES 1	C	C	C	C	C	C	C	C	C	C	C	C	C	ES -25	ES -25
21	ES -25	-16	ES -25	ES -25	ES -25	C	2	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	11	-10	ES -25	-16	ES -25	-16	ES -25	ES -25	ES -25	-16
22	-16	ES -25	-10	ES -25	-4	6	-4	ES -25	3	ES -4	ES -25	ES -25	ES -25	ES -25	2	0	-7	-6	ES -25	-7	ES -25	-10	ES 1	ES -25
23	-11	ES -24	ES -24	ES -24	ES -24	-3	2	4	ES -24	-3	6	ES -24	ES -25	-4	-4	-7	10	-2	ES -25	-16	ES -25	-10	-16	ES -25
24	ES -25	-7	ES -25	-5	-7	-3	2	2	6	7	2	ES -25	ES -25	ES -25	ES -25	ES -25	7	-3	-10	ES -25	ES -25	ES -25	ES -25	ES -25
25	ES -25	ES -25	ES -25	-1	ES -25	-5	-1	8	5	-1	3	-1	-7	10	5	ES -25	5	-10	ES -25	-6	ES -25	ES -25	ES -25	ES -25
26	ES -24	ES -24	ES -24	ES -24	-15	-3	5	9	8	ES -24	ES -24	ES -24	ES -24	2	4	-5	ES -24	-2	ES -24	-9	-9	ES -24	ES -24	ES -24
27	ES -24	ES -24	ES -24	ES -24	ES -24	-5	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	10	3	-5	ES -24	-3	ES -24
28	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	-2	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
29	ES -24	ES -24	ES -24	ES -24	ES -24	-4	ES -24	ES -24	ES -24	-20	ES -24	ES -24	ES -24	1	12	-20	-15	8	ES -24	-9	3	0	ES -24	ES -24
30	ES -25	ES -25	ES -25	ES -25	ES -25	ES -25	2	-1	-5	ES 1	ES -25	ES -25	ES -24	7	ES -24	2	7	6	-6	-5	ES -24	ES -24	-15	ES -24
31	ES -24	ES -24	ES -24	ES -24	ES -24	-4	-9	0	4	-6	ES -24	ES -24	ES 3	5	9	2	4	-2	-9	ES -24	ES -24	ES -24	ES -24	ES -24
CNT	31	31	30	30	30	29	30	30	30	29	29	29	29	29	29	29	29	29	29	29	29	29	30	30
MED	ES -25	ES -24	ES -25	ES -24	-13	-3	-2	US -24	ES -24	ES -25	ES -25	ES -25	ES -25	ES -25	-16	US -24	-16	US -24	ES -25	-16	US -21	ES -24	ES -16	ES -25
UD	-4	-4	-7	-1	4	7	6	8	8	ES 1	2	ES -24	ES -10	5	9	0	7	6	-6	3	0	2	ES 1	ES -8
LD	ES -26	ES -26	ES -26	ES -25	ES -25	ES -25	ES -25	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 -25	ES -25	ES -25	ES -25

C. RADIO PROPAGATION

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

MAY 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	2	-5	1	6	8	20	15	13	10	16	14	12	18	10	15	11	14	ES -26	-17	6	1	0	3	-5
2	-8	0	5	7	13	18	14	20	16	17	9	19	12	10	-5	ES -26	5	13	-17	4	7	3	2	-3
3	-2	-7	0	8	16	16	20	19	16	7	9	9	3	-1	ES -25	ES -25	2	22	15	7	6	4	-1	-4
4	-4	-2	-4	3	8	15	18	15	5	8	17	11	9	ES -25	ES -25	ES -25	ES -25	21	-1	5	6	1	-4	1
5	2	3	4	6	14	15	19	18	17	17	15	16	19	11	7	5	10	19	3	7	-2	-1	1	-1
6	-1	-1	1	3	7	17	19	19	17	18	14	16	12	21	7	ES -26	-3	7	7	8	5	-3	-5	-3
7	-1	-3	5	5	10	13	19	16	8	7	7	7	9	13	-8	ES -25	ES -25	12	11	8	4	-7	-4	-3
8	-8	-7	1	2	9	14	11	6	4	13	14	-6	15	-4	ES -25	1	-10	ES -25	15	2	0	-2	3	-10
9	1	3	2	10	12	18	36	18	23	16	18	19	16	15	6	10	14	13	-2	1	1	ES 1	ES 1	1
10	-1	-2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
11	-2	-4	7	7	12	12	15	19	14	17	12	7	0	-8	ES -26	ES -26	-9	0	-11	5	ES -26	-22	ES -26	-5
12	-4	-3	-2	5	12	11	20	20	14	12	14	16	8	ES -25	ES -25	ES -25	ES -25	ES -25	7	8	8	5	-16	ES -25
13	ES -25	ES -25	ES -25	-4	5	11	15	16	12	13	11	11	2	-21	2	0	-10	1	6	3	5	1	1	5
14	-3	-4	-2	10	10	17	13	11	18	11	13	8	13	3	-16	2	13	-4	-7	2	1	2	ES -25	ES -25
15	-21	-16	-4	4	7	15	22	23	21	18	14	15	13	13	8	2	10	12	9	8	1	-4	ES -25	ES -25
16	ES -25	ES -25	-7	3	14	14	20	23	21	12	20	13	3	ES -25	6	14	6	-6	-10	8	10	1	-2	1
17	-4	2	3	5	8	18	15	21	23	15	17	11	14	13	1	-7	6	-7	1	12	11	2	3	2
18	-2	-4	3	8	12	15	15	16	15	16	15	12	10	7	6	-4	9	5	2	7	3	2	5	C
19	-4	-2	3	3	11	13	20	15	20	18	16	13	13	13	-4	3	2	1	3	11	10	1	1	-4
20	1	-4	-2	6	6	9	17	14	17	17	C	C	C	C	C	C	C	C	C	C	C	C	3	-4
21	-4	ES -25	-2	3	6	13	18	18	16	17	13	10	9	9	4	6	9	2	-1	8	8	2	-4	-16
22	-16	-6	-4	1	6	13	20	19	16	15	13	3	18	9	7	3	8	11	-16	3	1	0	1	ES -25
23	0	2	-6	3	3	15	19	19	20	22	22	19	22	13	14	13	11	5	3	8	2	3	-4	-3
24	26	-7	4	10	1	13	27	21	21	19	18	16	17	15	-4	3	23	15	9	20	-2	-4	-7	ES -25
25	ES -25	ES -25	6	3	7	15	19	19	20	21	10	14	17	14	11	9	18	9	6	7	2	3	-3	-3
26	-3	0	0	5	5	15	15	17	17	20	15	15	11	12	11	9	10	9	5	5	-6	5	4	ES -24
27	-3	2	2	5	7	9	12	13	19	23	15	10	7	4	2	ES -24	-11	10	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24
28	ES -24	ES -24	ES -24	ES -24	-7	7	10	15	17	13	12	15	4	10	0	5	0	ES -24	10	-1	3	-4	-1	-2
29	2	2	1	7	8	13	10	16	18	17	11	19	15	14	12	8	-1	7	7	18	11	1	-1	ES -24
30	-7	-1	3	2	8	9	16	15	16	15	22	14	20	17	15	17	11	23	-1	7	6	-1	-15	ES -24
31	-9	5	2	-9	8	9	17	21	25	21	21	12	15	15	5	12	10	16	22	4	4	-2	-2	2
CNT	31	31	30	30	30	30	30	30	30	30	29	29	29	29	29	29	29	29	29	29	29	29	30	29
MED	-3	-3	1	5	8	14	18	18	17	16	14	13	13	10	4	3	6	7	3	7	3	1	US -2	-4
UD	2	3	5	10	14	18	22	21	23	21	21	19	19	15	14	13	14	21	15	12	10	4	3	2
LD	ES -25	ES -25	-7	-4	3	9	11	13	8	8	9	7	3	ES -25	ES -25	ES -26	ES -25	ES -25	-17	1	-6	ES -7	ES -25	ES -25

C. Radio Propagation

C2. Radio propagation Quality Figures at Hiraiso

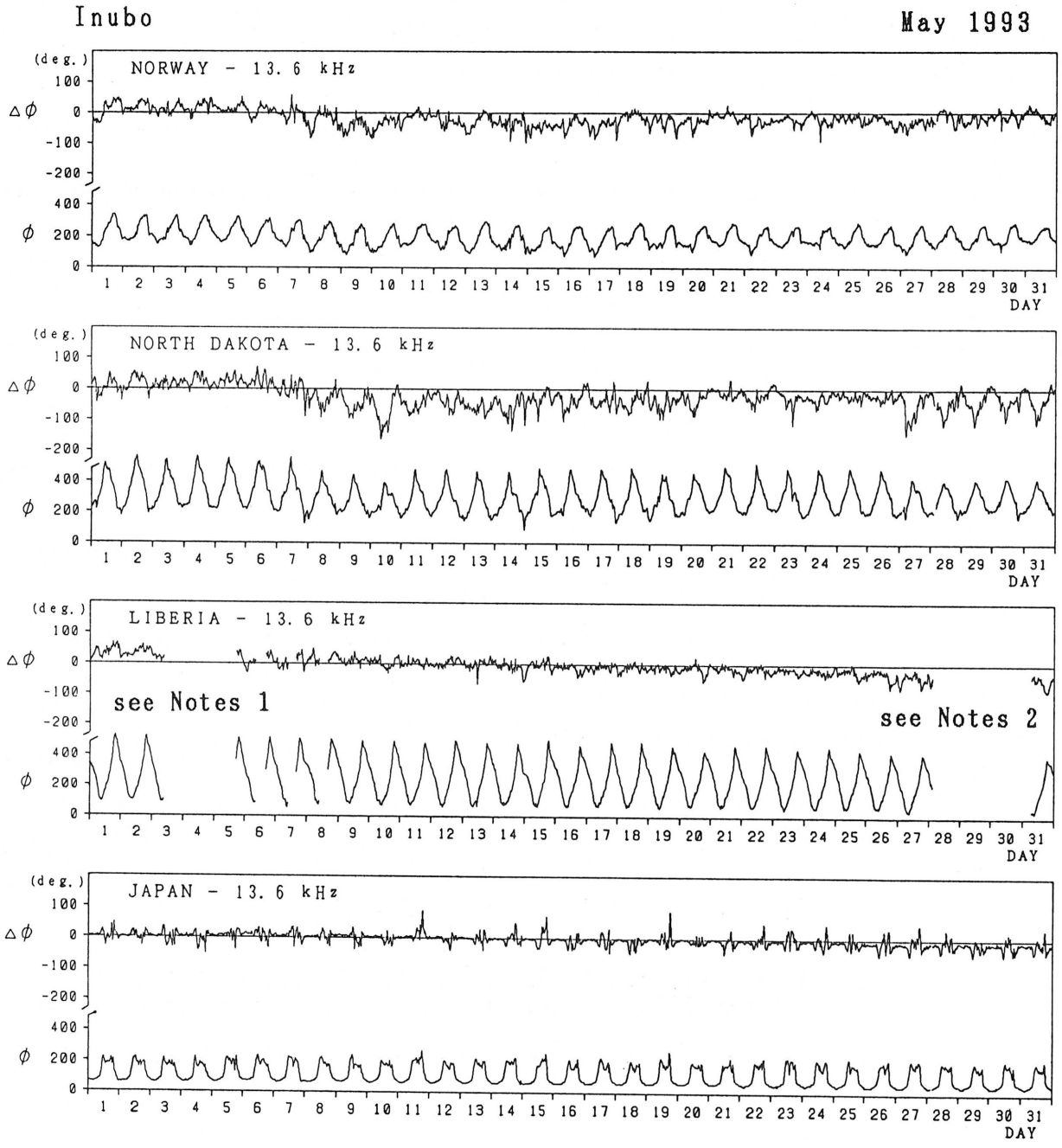
Hiraiso

Time in U.T.

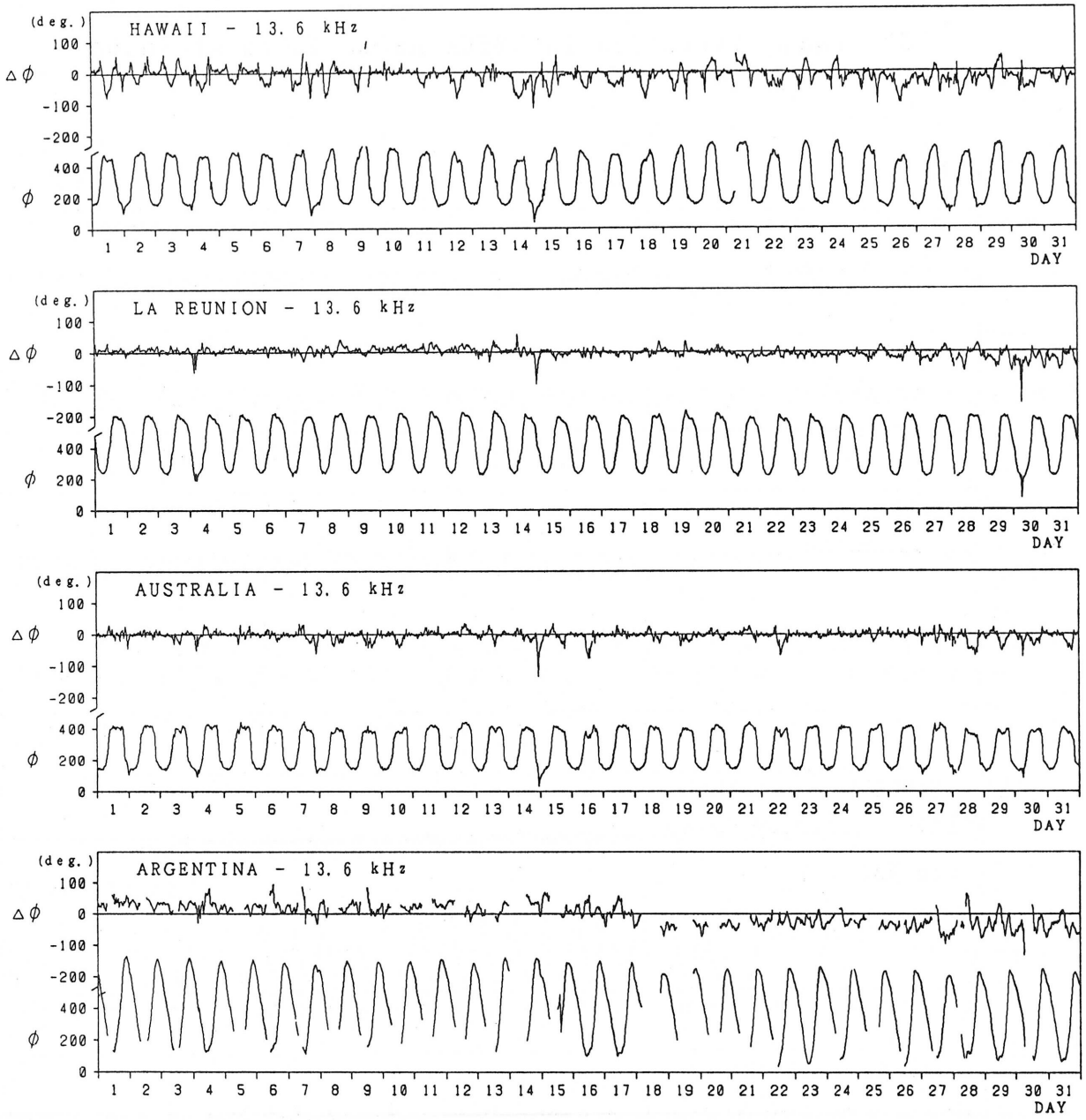
May 1993	Whole Day Figure	W W V 00 06	W W V 06 12	W W V 12 18	W W V 18 24	W W V H 00 06	W W V H 06 12	W W V H 12 18	W W V H 18 24	Condition 00 06	Condition 06 12	Condition 12 18	Condition 18 24	Principal Geomagnetic Storms Start h m	Principal Geomagnetic Storms End h	Range nT
1	4o	5	4	4	4	4	4	4	4	n	n	n	n			
2	4+	4	4	3	4	4	4	3	4	n	n	n	n			
3	4o	5	4	3	-	4	4	3	4	n	n	n	n			
4	4o	5	5	4	5	4	4	2U	4	n	n	n	n			
5	4+	5	5	3	5	4	4	4	4	n	n	n	n			
6	4+	5	5	4	5	4	4	4	4	n	n	n	n			
7	4-	4	3	4	5	4	3	3	4	n	n	n	n	19.2	----	109
8	4o	5	5	4	3	4	3	3	4	n	n	n	n	----	----	
9	3+	3	2	4	3	4	4	4	4	n	n	n	n	----	----	
10	C	C	C	C	C	C	C	C	C	n	n	n	n	----	24	
11	3+	2	3	4	4	4	4	2	3	n	n	n	n			
12	3+	5	3	3	3	4	4	2	3	n	n	n	n			
13	3+	2	3	4	5	3	4	3	4	n	n	n	n			
14	4-	4	4	5	4	4	3	3	3	n	n	n	n			
15	4o	4	5	5	4	3	4	4	3	n	n	n	n			
16	4o	4	5	5	5	3	4	3	4	n	n	n	n			
17	4o	4	3	4	5	4	4	4	4	n	n	n	n			
18	4+	5	5	4	5	4	4	4	4	n	n	n	n			
19	4o	4	-	4	4	4	4	4	4	n	n	n	n			
20	(4o)C	4	C	C	C	4	4	C	C	n	n	n	n			
21	4o	4	-	4	4	4	4	4	4	n	n	n	n			
22	4-	5	4	5	5	4	4	4	3	n	n	n	n			
23	4+	4	5	5	4	4	5	4	4	n	n	n	n			
24	4o	5	5	4	4	4	4	4	3	n	n	n	n			
25	4o	4	5	5	4	3	4	4	4	n	n	n	n			
26	4+	4	5	5	5	4	4	4	4	n	n	n	n			
27	3o	3	-	3	5	4	4	2	(1)	n	n	n	n			
28	3+	3	-	3	3	2	4	4	4	n	n	n	n			
29	4o	3	3	5	5	4	4	4	4	n	n	n	n			
30	4o	3	5	5	4	4	4	5	3	n	n	n	n			
31	4o	3	4	5	4	4	4	4	4	n	n	n	n			

C. Radio Propagation

C3. Phase Variation in OMEGA Radio Waves at Inubo



Inubo May 1993



Notes 1: As for LIBERIA-13.6kHz, no record during 3 May 1000 UT - 5 May 1700 UT, due to the maintenance of transmitter.

Notes 2: As for LIBERIA-13.6kHz, no record during 28 May 0300 UT - 31 May 0700 UT, due to the receiver trouble.

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.

May 1993	S W F								Correspondence	
	Drop-out Intensities(dB)					Start	Dur.	Type	Imp.	Solar * Flare	Solar Burst
	CO	HA	AUS	MOS	BBC						
4			11			0305	35	2 SL	1-	x	C
14			>32			2157	151	3 G	3-	x	C
28			16			0023	32	2 SL	1+	x	C
28			12			0203	25	2 SL	1	x	C
28			20			0259	25	2 SL	2-	x	C
28		>42				2038	94	3 G	3+	x	C
30		x	8			0508	52	2 SL	1-	x	C

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

May	S P A								
1993	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	Ω/AU	Ω/H	Ω/ND	Start	End	Max.
1	35	18	24	76	—	46	2252	0040	2314
3				7	—		0108	0146	0122
3			20	6			0636	0716	0644
3			9				0736	0802	0746
4	47*	—	77*	65*	47*	29*	0252	0404	0322
4	36	—	60	40	14	24	0444	0552	0454
6			6	5			0238	0256	0242
6			5				0626	0650	0636
6				11	11		2232	2258	2238
7				9	9		0154	0210	0158
7			25	13			0508	0600	0518
7			29				0732	0822	0750
7				37	90	78	2048	2350	2136
8			29	22	14		0312	0344	0318
8			29	17			0530	0608	0540
11				6	5		0000	0012	0004
11			9				0416	0434	0420
11					7		2152	2214	2202
13			11	17	11		0112	0148	0124
13	11		30*	19*	9*		0308	0424	0350
13			21	12	7		0442	0518	0448
13			15				0616	0638	0622
13			9				1034	1052	1040
13		62	24				1122	1152	1136
14				11	4		0034	0100	0042
14		23					1554	1614	1600
14	50	24	23	78	83	75	2200	2234D	2218
14	61	39	48	127	115	103	2234E	0152	2258
16			9	5			0500	0518	0506
19			29				0752	0830	0806
23		24	28	18	9		0407	0504	0416
25				17	12		0114	0148	0120
26				11	7		0017	0042	0022
26	19	24	20	30	24		0200	0240	0204
26		26	14				0930	0956	0934
26					9		2106	2128	2112
26				9	17		2156	2226	2202
27				9	7		0010	0028	0016
27	24	31	40	40*	32*	29	0104	0152	0124
27			18	11	7		0220	0246	0226
27			6	6			0342	0400	0348
27			5				0424	0454	0434
27			4				0508	0534	0518
27			15				0800	0834	0808
27	14			14	32	25	2132	2200	2138
27	12			22	27	35	2226	2310	2234
28	26		20	47	44	30	0023	0106	0031
28				14	15		0110	0156	0132
28	32	44	67	70	53	42	0202	0248	0208
28		—			61	39	2044	2216	2106
29		—		10	10		0110	0138	0116
30		—		5	5		0212	0246	0218
30	18	—	44	32	24	16	0405	0450	0416
30	58	—	121*	67*	36	28	0508	0624	0534
30		—	14				0648	0704	0656
30		—	22				0707	0738	0716
31		—	5	5			0351	0408	0356

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