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IONOSPHERIC DATA IN JAPAN

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CONTENTS

COMMUNICATIONS RESEARCH LABORATORY
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INTRODUCTION

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

Station	Geographic		Geomagnetic		Technical Method
	Latitude	Longitude	Latitude	Longitude	
Wakkanai	45°23.5′N	141°41.2′E	35.3°N	206.5°	Vertical Sounding (I)
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

APR. 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	64	60	58	54	52	63	86	94	90	102	114	108	90	103	97	89	90	87	96	86	72	62	62	58
2	55	58	57	54	53	63	65	86	96															
3																								
4																								
5										84	73	67	90	87	101	80	88	84	82	69	71	66	66	60
6	58	53	55	53	43	54	A												47	43	51	51	48	44
7	43	43	43	43	42	43	54	57	67	68	80	74	73	74	68	72	84	79	67	63	62	52	53	54
8	53	48	58	43	40		55	60	67	77	80	68	87	87	80	80	73	75	76	78	77	72	51	52
9	60	47	44	42	38	44	60	58	59	70	78	83	87	94	84	73	72	77	71	66	66	66	62	63
10	55	54	53	45	46	60	61	77	83	84	80	106	97	88	87	86	88	86	70	66	65	66	64	61
11	54	55	64	54	48	53	62	87	90	106	110	110	95	90	86	88	86	76	73	77	74	66	C	C
12	C	C	C	C	C	C	C	77	85	89	87	88	90	91	90	89	86	89	72	67	63	63	66	62
13	61	58	58	58	58	63	62	74	86	88	87	90	83	84	82	80	77	79	86	87	87	73	73	65
14	72	66	61	53	47	53					A	60	64	66	67	73	68	66	62	61	66	64	61	58
15	58	54	53	52	48	53	75	70	70	75	90	79	84	87	84	76	86	C	86	87	70	62	62	54
16																								
17																								
18																								
19	61	54	53	47	46	63	76	89	76	86	73	77	90	111	94	97	93	94	73	78	73	72	72	62
20	64	54	50	52	52	64	64	60	60	56	67	66	68	70	70	71	74	76	61	58	62	61	60	63
21	64	54	48	40	37	32									58	64	62	58	64	72	65	62	66	53
22	58	38	40	38	41	50	A			A					58	60	64	66	67	66	62	A	A	52
23	52	48	48	45	32	40		A				64	66	71	68	70	66	66	57	57	60	65	54	52
24	51	52	46	44	43	54	62	70	70	79	63	68	71	78	74	72	71	72	66	70	66	66	65	62
25	59	61	57	54	54	63	66	72	70	69	84	83	88	88	85	90	88	70	70	73	64	73	64	64
26	72	60	58	54	54	63	71	73	86	90	88	83	76	80	75	90	75	74	76	81	72	68	66	66
27																								
28																								
29	66	64	65	62	57	62	74	83	87	74	80	80	87	77	83	83	84	77	83	88	89	73	72	71
30	65	64	57	66	58	60	84	69				63		63	57	66	67	65	62	67	65	63	51	55
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	21	21	21	21	21	20	16	17	16	16	16	19	18	19	21	21	21	20	22	22	22	21	20	21
MED	59	54	55	52	47	57	64	73	80	82	80	79	87	87	82	80	77	76	70	70	66	66	63	60
U Q	64	60	58	54	53	63	74	84	86	88	87	88	90	90	86	88	87	81	76	78	72	70	66	63
L Q	54	50	48	43	41	51	61	64	68	72	75	67	73	74	68	71	69	68	64	66	63	62	57	53

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT WAKKANAI

APR. 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	25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	26	G	G	G	G	G
2	G	G	G	G	G	G	G	G	G															
3																								
4																								
5										G	G	G	G	G	G	G	G	G	G	G	G	G	G	26
6	25	25	G	G	G	27	30										G	G	G	G	G	31	G	29
7	28	29	30	31	G	26	G	G	39	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
8	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
9	G	G	G	G	G	G	G	35	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
10	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
11	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	C	C
12	G	C	C	C	C	C	C	39	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
13	G	G	G	G	G	G	G	36	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
14	G	G	G	G	G	G		G	G	G	50	G	G	G	G	G	G	G	G	28	28	G	G	G
15	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	C	G	G	G	G	G	G
16																								
17																								
18																								
19	G	G	G	G	G	28	G	G	G	G	G	G	G	G	G	60	G	G	G	G	G	G	G	G
20	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	34	G	25	G	G	G	G
21	G	26	G	G	G	G	G		G	G	G	G			54	G	G	G	G	G	G	G	G	G
22	G	G	G	G	G	32	34		G	62	G	G	G	G	G	G	G	38	35	38	35	59	58	24
23	G	G	G	G	G	G	G	48	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
24	G	G	G	G	G	G	G	G	G	G	G	G	G	44	G	G	G	G	G	G	G	G	G	G
25	G	G	G	G	G	G	G	G	G	G	G	G	G	46	G	G	52	34	G	G	G	G	G	G
26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
27																								
28																								
29	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
30	G	G	G	G	G	G	G	G	G			G	G	45	G	54	61	39	45	37	34	32	G	G
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	22	21	21	21	21	21	20	19	21	20	20	21	20	20	21	21	22	21	22	22	22	22	21	21
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
U Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT WAKKANAI

APR. 1993

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	15	15	15	15	16	24	18	21	22	43	46	24	45	45	23	28	24	18	15	15	16	14	15
2	15	15	15	15	15	16	24	17	18															
3																								
4																								
5										27	48		46	50	46	32	18	24	18	15	15	15	15	15
6	15	15	15	15	15	16												34	20	16	15	16	17	16
7	15	15	15	15	15	17	27	30	23	49	29	48	48	47	47	22	30	24	20	15	15	16	15	15
8	16	15	15	15	15	17	24	20	18	46	46	47	50	49	48	45	30	27	20	16	16	15	16	16
9	15	16	15	16	15	18	27	18	27	28	52	49	46	46	48	27	21	17	18	15	16	15	16	15
10	15	15	15	15	14	17	24	18	16	47	49	46	28	28	47	30	20	24	17	15	15	15	15	15
11	16	15	15	15	15	17	27	32	26	41	46	46	47	46	45	23	29	26	18	15	15	15	C	C
12	C	C	C	C	C	C	C	18	23	28	48	48	29	46	47	33	30	24	18	15	16	15	15	16
13	16	15	15	14	14	16	26	20	20	22	26	28	23	49	21	23	20	29	20	15	15	15	15	16
14	15	15	15	15	15	18		18	21	21	32	48	53	30	28	21	20	28	17	16	15	15	16	15
15	15	15	15	15	15	16	26	18	18	45	50	45	48	48	26	32	30	C	16	15	17	16	16	17
16																								
17																								
18																								
19	16	15	15	15	15	14	27	18	21	48	50	50	C	C	C	52	C	56	18	17	16	16	16	16
20	16	16	15	16	15	21	27	18	47	50	28	48	53	47	47	21	20	17	21	17	16	16	16	16
21	16	16	16	15	16	20				32	27	29			48	49	32	28	18	16	16	16	17	16
22	17	17	16	16	17	15	26		24	29	23		32	28	24	47	20	23	16	16	15	15	17	15
23	16	16	15	16	15	21	27	21	22	23	24	28	28	27	46	27	21	28	20	15	16	16	17	17
24	15	16	15	15	16	23	28	21	47	53	53	32	56	53	47	26	39	29	22	17	17	16	18	17
25	16	16	16	16	16	18	20	24	45	28	50	53	53	50	48	44	24	21	17	17	16	16	17	17
26	16	16	16	16	16	21	27	20	47	48	48	48	57	50	48	46	32	28	18	17	17	16	16	17
27																								
28																								
29	17	16	17	16	15	22	29	44	48	48	48	49	48	49	46	46	20	28	16	16	16	16	16	17
30	16	16	16	16	15	21	29	20	22			51		36	49	33	29	24	17	16	16	15	16	16
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	21	21	21	21	21	21	18	19	20	20	20	19	18	19	20	21	20	21	22	22	22	22	21	21
MED	16	15	15	15	15	17	27	20	22	36	47	48	48	47	47	32	26	26	18	16	16	16	16	16
U Q	16	16	16	16	15	21	27	21	36	48	49	49	53	49	48	45	30	28	20	16	16	16	17	17
L Q	15	15	15	15	15	16	24	18	20	27	28	45	29	36	45	23	20	24	17	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

APR. 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	62	62	62	58	54	50	66	78	101	108	113	121	112	108	108	108	101	103	102	94	54	54	50	63
2	57	52	55	58	50	56	68	81	97	101	107	117	120	121	120	111	104	102	102	93	60	66	64	61
3	61	62	69	64	56	56	73	81	87	96	96	106	110	107										
4																								
5										73	81							95	97	80	71	79	74	80
6	69	72	58	63	69	81	74	80																
7																								
8																								
9																								
10																								
11																								
12																								
13																								
14																								
15																								
16																								
17																								
18																								
19																								
20																								
21																								
22																			71	80	94	58	45	57
23	58	57	57	43		43	55	58	64		71	78	92	88		83		69	67	61	59	44	57	50
24			52	43	48	51	64	70	70	87	80	A	102	102	103	98	92	83	A	A	63	57	67	59
25	66	58	55	53	56	54	70	72	77	80	90	101	112		107	102	95	87	85	84	74	A	72	70
26	69	67	64	30	57	58	70	91	98	91	83		93	96	101	96				94				70
27																								
28																								
29	70	68	70	69	52	56	76	81	86	86	88	96	93	88	93	96	97	98	100	93	68	69	71	95
30	94	68	69	58	60	68	74	84		A	A				90	87	84	81	80	86	82	A	73	68
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT			10	10		10	10	10																10
MED			60	58		56	70	80																66
U Q			69	63		58	74	81																70
L Q			55	43		51	66	72																59

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT KOKUBUNJI

APR. 1993

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	33	G	G	G	G	44	46	42	G	G	31	34	G	G	G	G	G
2	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	33	27	G	G	G	G
3	G	G	27	24	G	G	G	G	G	G	G	G	G	G										
4																								
5										44	50							81	78	81	80	80	81	81
6	78	81	78	78	78	81	80	78																
7																								
8																								
9																								
10																								
11																								
12																								
13																								
14																								
15																								
16																								
17																								
18																								
19																								
20																								
21																								
22																			G	G	G	42	31	29
23	G	G	G	G	G	G	G	G	39	G	59	58	G	56		G		G	36	45	32	76	32	G
24			G	G	G	G	G	G	G	G	G	43	G	G	58	G	G	41	69	45	G	24	G	G
25	G	G	G	G	G	G	G	G	G	51	58	57	51	55	84	47	52	36	55	53	54	45	34	G
26	G	G	G	G	G	G	G	G	G	102	52	G	G	G	G	G				55				G
27																								
28																								
29	G	G	G	G	G	G	G	G	G	G	G	G	G	G	46	43	48	46	44	36	28	G	G	G
30	G	G	G	G	G	G	G	G	G	52	55		G	G	61	G	59	70	45	40	52	67	68	51
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT			10	10	10	10	10	10		10	10									10				10
MED			G	G	G	G	G	G		G	26									42				G
U Q			G	G	G	G	G	G		51	55									53				29
L Q			G	G	G	G	G	G		G	G									27				G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT KOKUBUNJI

APR. 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	15	15	16	15	15	15	23	16	18	18	22	24	24	22	26	17	15	15	14	15	15	15	17	15
2	16	16	15	15	15	15	23	15	17	20	21	24	39	21	23	21	17	17	16	17	15	15	15	16
3	18	15	15	15	15	15	24	15	15	20	40	44	44	40										
4																								
5										17	24							15	22	16	16	17	16	15
6	16	15	15	18	20	21	16	16																
7																								
8																								
9																								
10																								
11																								
12																								
13																								
14																								
15																								
16																								
17																								
18																								
19																								
20																								
21																								
22																			30	17	14	14	14	14
23	14	14	15	14	18	16	33	17	45		36	40	58	38		44		30	17	14	14	14	14	21
24			15	24	16	18	35	36	39	46	48	33	53	52	35	44	35	21	18	14	15	24	20	20
25	15	15	15	15	14	21	34	18	44	36	42	39	40	39	37	33	22	20	21	14	17	15	15	14
26	40	15	14	18	16	20	34	20	43	36	40	52	54	54	43	43				17				15
27																								
28																								
29	14	15	14	14	14	20	32	33	24	45	47	37	52	52	29	27	21	20	16	15	14	20	16	15
30	14	14	14	17	23	33	33	34		35	38		67	49	42	49	14	15	15	14	14	14	14	14
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT			10	10	10	10	10	10			10									10				10
MED			15	15	16	19	32	18			39									15				15
U Q			15	18	18	21	34	33			42									17				16
L Q			14	15	15	15	23	16			24									14				14

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT YAMAGAWA

APR. 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	73	72	67	63	53	51	54	72	104		100	112	112	122	124	110	114	112	116	105		66	65	78
2	74	66	66	68	43	53	48		90			107	116	122	132	130			111	108		73	73	79
3	79	77	68	66	62	59	52	74	82	90	98	100	110	116	126	120	104	101	110	111	78		74	81
4	84		66	62		52		78	86	C	C	107	111	126	131	127	117		117	120	87	73	71	78
5	77	64	47	C	45	52	53		99		78	112	120	127	129	140	118	111	121	107	86	81	86	86
6	75	82	64		57		78	88	111	111	86	60	67	72	76	72	72	77		80	63		62	63
7	64	46	42	40		35	52	64		105	100		112	118	116	108		96	101	86		53	62	
8	66	62		60		37	57	72		88	95	102	112	124	117	104		108	117	111	71	A	66	66
9	74	64	62	54	35		52		88	108	111		118	116	118		82	86		87	77	64	66	67
10	66	64	72	54	45		53	63			92		126	112	115	128	114	96	90			86	66	66
11		54	54	50		40	57	73	87	87		100	111	122	118	103	95	95		96	77		67	57
12	67	67	74	62	51		54	70	78	77	81			116	109	112	115	112	100	A	66	67	66	67
13	62	53	58	52	50	47	62	74	77				105	90	96					107	86	86	66	89
14			61	48	66	74	66	73	76	84	91	101	112	112	111	107	102	91	85	86	66		66	62
15	84	86		54	54	54	54	61	78	92	105	100	105	103	103	116	114	107	105	109	86	53	68	80
16																								
17																								
18																								
19	85	85	85	51	69	58	66	77	78	82	80	90	110	117	108	104	101	87	83	87	87	85	67	
20	86	81	60	54	55	54	77	72	68	80	90	101	107	107	105	98	101	97	81	72	80	79	63	80
21	66	62	57		52	44	62	70	88	96	104	122	111	112	112	104	87	82	81	84	88	70		
22	N	54	49	51	46	50	61	64	73	80	86	98	116	118	112	88	85	83	82	86	80		57	66
23	62	A	62		36	34	54	65	70	82		90	100	110	103	102	93	87	87	84	66	A	A	A
24	65	62	66		44	29	64		73	90	94	97	111	130	140	136	122	118	87	80	A	64	66	74
25	73	66	67	74	52	52	64	66	72	86	94	99	122	122	123	122	116	112	107	97	89	77	79	76
26	77	73	74	67	58	57	76	95	84	87	78	89	108	121	126	122	112	105	97	97	81	74	66	66
27																								
28																								
29	73	76	82	66	52	52	70	88	85	82	86	88	91	103	106	107	112	111	105	90	82	81	77	83
30	78	85	74	66	70	64	70	81	72	82	86	92	110	107	116	111	102	94	90	103	80	52	62	63
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	22	22	23	20	21	21	24	21	22	19	20	20	24	25	25	23	21	22	21	23	20	18	23	21
MED	74	66	66	57	52	52	59	72	80	87	92	100	111	116	116	110	104	96	100	96	80	73	66	74
U Q	78	77	72	66	57	55	66	77	88	92	99	104	114	122	125	122	114	111	110	107	86	81	71	80
L Q	66	62	58	51	45	42	53	65	73	82	86	91	107	108	107	104	94	87	86	86	74	64	65	66

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

APR. 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	36		G	G	G	G	46	G	42	G	34	28		G	G	G
2	G	G	G	G	G	G	G		G			G	G	G	G	G			40	27	G	24	G	G
3	G	G	G	G	G	G	G	G	G	G	G	44	G	G	G	G	G	G	32	G	G		G	G
4	G		G	G		G		G	G	C	G	51	G	G	G	G	G		40	G	40	G	G	G
5	G	G	G	C	G	G	11	G	41		44	52	52	G	G	G	G	G	G	G	G	G	G	G
6	G	G	G		24		28	39	42	45	47	G	G	52	42	G	42	40		36	G		G	G
7	G	G	G	G		G	23	G		G	G		G	G	G	G		G	G	G		G	G	
8	G	G		G		G	G	34		G	G	G	G	G	G	61		58	50	31	24	30	G	G
9	G	G	G	G	G		G		G	G	49		G	G	64		47	G		G	24	24	G	G
10	G	G	G	G	G		G	34		G	44		G	G	G	G	G	G	G			G	G	G
11	G	G	G	G		G	G	G	G	G		G	G	G	46	42	49	44		G	G		G	G
12	G	G	G	G	G		29	36	38	G	G			52	G	58	G	G	G	83	30	40	G	G
13	25	28	G	G	G	G	G	G	38				G	G	G					G	G	G	G	G
14	G	G	G	G	G	G	G	G	G	G	G	G	G	53	49	48	G	G	G	43	30	G	33	24
15	89	43	G	70	30	G	39	40	G	49	47	43	50	G	G	G	G	G	G	G	39	G	G	G
16																								
17																								
18																								
19	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	47	41	57	27	G	G
20	G	G	G	24	G	G	28	36	41	45	G	G	G	G	44	G	44	G	36	G	G	G	G	G
21	G	G	G	G	G	G	G	G	38	46	42	G	60	56	G	G	G	G	G	G	G	G	G	G
22	G	G	G	G	G	G	G	G	G	45	45	G	G	G	G	G	G	G	G	G	40	G	G	24
23	31	26	G	G	G	G	G	G	43	48	G	G	60	94	49	52	G	G	G	40	34	26	30	32
24	G	G	G	G	G	G	33	G	G	48	52	G	G	46	G	G	G	G	G	G	58	33	G	G
25	G	G	G	G	G	G	G	G	44	G	G	G	G	G	G	G	G	G	G	25	G	G	G	G
26	29	G	G	G	G	G	G	G	G	G	G	55	G	G	G	G	G	45		32	40	G	33	G
27																								
28																								
29	G	G	G	G	24	G	32	G	G	G	G	G	G	G		G	48	44	50	31	30	G	40	G
30	G	G	G	26	G	G	38	44	48	G		G	56					G	G	G	38	39	40	41
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	24	24	23	21	21	24	23	22	20	21	20	24	24	23	22	20	22	20	24	22	22	25	24
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	27	G	G	G
U Q	G	G	G	G	G	G	28	34	41	45	44	22	G	23	44	G	42	G	38	31	39	26	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT YAMAGAWA

APR. 1993

LAT. 31.2N LON. 130.6E 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	16	15	15	15	15	15	15	16	16		36	41	44		28	21	17		16	15		15	15	15
2	15	15	15	15	15	15	15		16			44	44	42	39				16	15		16	15	15
3	16	16	15	15	15	15	16	15	16	20	38	43	43			38	34		15	16	15		15	15
4	15		15	15		15		16	16	C	C	36	46	44			21		16		15	15	15	15
5	16	15	15	C	15	15	17		15		27	33	33		40	21	20	16	15	15	15	15	15	15
6	15	15	15		15		15	15	16	17	34	C	53	32	42	26	20	15		15	15		15	15
7	15	15	15	15		15	18	15		40	46		48		45			16	15	15		15	15	
8	15	15		15		16	17	18		18	24	45	56	47	46	36		17	15	15	15	15	15	15
9	15	15	15	15	15		20		17	26	23		43	42	32		17	15		15	15	15	15	15
10	15	16	15	15	15		18	15			32		28	46	40	18	23	20	23			15	15	15
11		15	15	15		15	18	17	16	18			34	46	28	24	18	16		15	16		15	15
12	15	15	15	15	15		15	18	15	17	40			40		23		15		15	15	15	15	15
13	15	15	15	15	15	15	18	15	16					45						44	15	15	15	15
14	15		15	15	15	15	18	17	16	18	45	47	46	38	35	34	16	16	38	15	15		15	15
15	15	16		16	16	15	16	16		17	44	36	30	29	38	34	20	29	15	15	15	15	15	15
16																								
17																								
18																								
19	15	15	15	15	15	15	16	15	16	35	36	46	49	47	40	35	33	34	27	15	15	15	16	16
20	16	15	15	15	15	15	15	15	33	33	45	39	50	40	33	46	16	40	15	15		28	15	15
21	16	16			15	15	15	15	15	32	36	50	34	34	45	46	16	16	32	43	15	15		
22	16	15	16	15	15	15	21	32	18	30	36	52	50	50	47	46	33	16	15	15	15		16	16
23	15	16			16	15	15	18	17	34		51	46	40	36	35	17	16	15	15	15	15	18	15
24	20	16	15		15	15	16		24	30	36	35	54	34	52	45	39	45	16	24	39	15	18	15
25	16	16		15	15	15	15	44	22	43	52	50	54	53	49	38	35	17	15	15	15	16	15	15
26	16	16	16	32	15	15		17	18	46	42	38	53	54	50	39	49	16	42	15	15	18	15	16
27																								
28																								
29	16	15		15	15	15	16		18	46	47	23	49	53	49	49	34	30	29	16	15	28	15	23
30	16	16	16	16	16	16	15	16	17	24	46	49	39	51	49	45	35	18	16	18	16	15	15	28
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	24	23	19	20	21	21	23	20	21	19	20	18	23	21	21	20	20	20	20	23	20	20	24	23
MED	15	15	15	15	15	15	16	16	16	30	37	44	46	44	40	36	20	16	16	15	15	15	15	15
U Q	16	16	15	15	15	15	18	17	18	35	45	49	50	48	48	45	34	24	25	16	15	15	15	15
L Q	15	15	15	15	15	15	15	15	16	18	35	36	39	39	35	25	17	16	15	15	15	15	15	15

HOURLY VALUES OF FOF2 AT OKINAWA

APR. 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	101	100	105	78	62	59	54	92	123	132	123	123	142	154	166	153	144	146	N	130	104	103	104	
2	106	102	98	76	47	46	58	92	104	121	113	128	132	146	175	173	173	169	171	171		128	103	104
3	102		102	93	70	51	44	78	102	107	111	120	128	142	162	142	128	133	131	132	105	106	106	90
4	102	102	102		54	44	46	76	104	114	110	131	132	161	175	174	174	171	173	132	132	130	106	104
5	106	101	64	46	46	60	46	106	131	82	80	141	141	144	150	172	132	143		132	104	101	105	106
6	104	107	86	78	61	61	73	92	125	142	140	189	134	126	105	98	94	106	114	103	103	98	100	102
7	72	64	42	60	41	38	44	78	105	112	115	130	154	174	197	174	144	133	145		107	104	99	104
8	102	105	104		62	50	53	86	102	114	112	125	147	173	149	144	168	173	174	145	105	103	102	96
9	93	92	98	77	56	42	58	73	102		143	132	145	148	142	126	100	108	122	107	93	86	78	78
10	77	80	76	62	51	51	44	71	101	107	114	124	146	142	167	194	174	144	131	129	104		78	78
11	78	64		58	48		49	93	105	95	100	112	140	162	162	143	132	N	125	125	106	104	101	98
12	92	102	106	78	52	46	51	94	92	100	107	103	123	144	144	143	146	164	132	106	78	97	93	A
13	78		88	84	61	40	62	86	91	107	110	118	125	141	141	144	130	124	131	124	100		97	99
14	104	104	80	51		44	64	78	85	104	107	118	142	145	142	134	143	130	123	114	92	78	78	78
15	78	86	74	63	50	50	64	73	86	121	127	123	123	126	134	132	145	134	131	131	113	78	78	78
16																								
17																								
18																								
19	74	80	88	62	50	52	71	96	98	94	100	112	138	151	159	167	125	126	108	105	N	92	76	77
20	78	78	70	71	70	67	78	75	82	102		127	141	144	158	145	145	133	105	78		81	71	72
21	73	63	70	65	52	50	61	75	101	112	124	141	146	162	146	141	133		107	106	104	73	63	63
22	64	64	41	A	50	52	64	75	101	112	114	129	153											
23																	98	101	119	N	78	64	A	65
24	78	78	76	64	47	46	70	82	90	98	101	110	83	84	73	87	105	99	109	103	77	96	92	75
25	81	79	78	100	43	36	63	74	90	96	96	109	108	76	109	88	89	88	94	95	107	83	92	94
26	78	93	95	78	68	72	76	105	94	92	94	105	108	88	89	73	109		131	87	106	88	78	91
27																								
28																								
29		86	85	96	70	A	93	102	90	96	104	101	104	88	93	83	89	89		105	105	93	78	89
30	84	100	90	75	91	77	72	91	88	93	92	104	93	109	N		N	110	95	87	93	76	78	78
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	23	22	23	21	23	22	24	24	24	23	23	24	24	23	22	22	23	21	21	22	21	22	23	22
MED	81	89	86	75	52	50	62	84	101	107	110	123	136	144	148	143	132	133	125	110	104	94	92	90
U Q	102	102	98	78	62	59	70	92	104	114	115	129	143	154	162	167	145	145	131	131	106	103	102	99
L Q	78	78	74	62	48	44	50	75	90	96	100	111	123	126	134	126	105	107	108	103	93	81	78	78

HOURLY VALUES OF FES AT OKINAWA

APR. 1993

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	30	41	45	49	48	G	G	G	G	43	39	36	G	G	G	G	91
2	G	G	G	G	G	G	G	33	40	45	48	46	G	58	92	44	43	39	45	G	135	G	26	G
3	G		G	G	G	G	G	29	38	43	45	G	G	52	57	47	44	47	45	36	G	G	G	G
4	G	G	G		G	G	G	35	40	45	G	G	G	G	G	G	44	41	31	G	G	G	G	30
5	G	G	G	G	G	G	G	31	48	48	53	52	56	77	84	56	47	G		29	G	G	G	G
6	G	G	G	G	G	G	28	40	43	46	54	140	58	68	G	62	52	67	64	56	44	28	26	G
7	G	G	G	G	G	G	22	34	39	G	45	G	G	52	48	48	45	50	48		G	G	G	G
8	G	G	G		G	G	G	38	46	67	44	94	G	52	51	G	96	38	47	33	33	G	G	G
9	G	G	G	G	24	G	22	38	37		48	50	50	G	G	G	45	57	61	36	46	G	G	G
10	G	G	G	G	G	G	G	38	40	48	47	48	45	52	48	48	G	40	G	G	G		G	G
11	G	G		G	G	107	25	38	47	42	50	G	G	G	59	57	54	58	46	38	36	G	G	G
12	G	G	G	G	G	G	30	40	45	49	48	43	G	61	57	46	42	41	36	G	23	G	26	68
13	76		45	38	30	47	25	31	40	46	48	50	48	58	G	G	55	50	59	54	63	143	69	G
14	24	G	198	G	130	G	25	37	39	44	47	G	57	60	66	54	G	44	41	44	37	26	G	G
15	26	26	G	G	G	G	11	38	44	49	48	51	54	70	50	G	43	37	44	30	24	G	G	24
16																								
17																								
18																								
19	G	G	G	G	G	G	27	38	42	45	47	G	50	63	59	158	48	40	43	28	26	38	32	G
20	G	G	G	G	G	G	43	G	48	47	162	65	70	59	49	56	57	58	56	43		38	G	G
21	G	G	G	G	G	G	26	38	50	67	54	56	56	52	58	52	G	168	34	28	28	G	G	G
22	G	G	29	38	32	26	26	41	44	45	72	G	58	50										
23																	G	39	42	39	39	G	38	G
24	G	G	G	G	G	G	G	33	44	G	G	G	G	G	G	G	G	46	55	39	43	36	38	G
25	G	G	G	G	G	G	G	G	40	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
26	G	G	G	31	G	38	G	G	39	G	G	G	G	G	G	G	52	174	50	45	36	45	46	G
27																								
28																								
29	G	G	G	42	38	31	32	G	37	G	G	G	G	G	G	G	49	69		54	47	27	G	45
30	G	G	G	47	G	30	G	G	53	56	G	G	G	G	G	167	G	40	42	G	G	G	45	81
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	24	22	23	22	24	24	24	24	24	23	24	24	24	24	23	23	24	24	22	23	23	23	24	24
MED	G	G	G	G	G	G	16	34	42	45	48	22	G	52	48	46	44	42	44	33	28	G	G	G
U 0	G	G	G	G	G	13	26	38	45	48	49	50	55	59	58	56	50	57	50	43	43	28	29	12
L 0	G	G	G	G	G	G	G	29	39	42	22	G	G	G	G	G	G	39	36	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

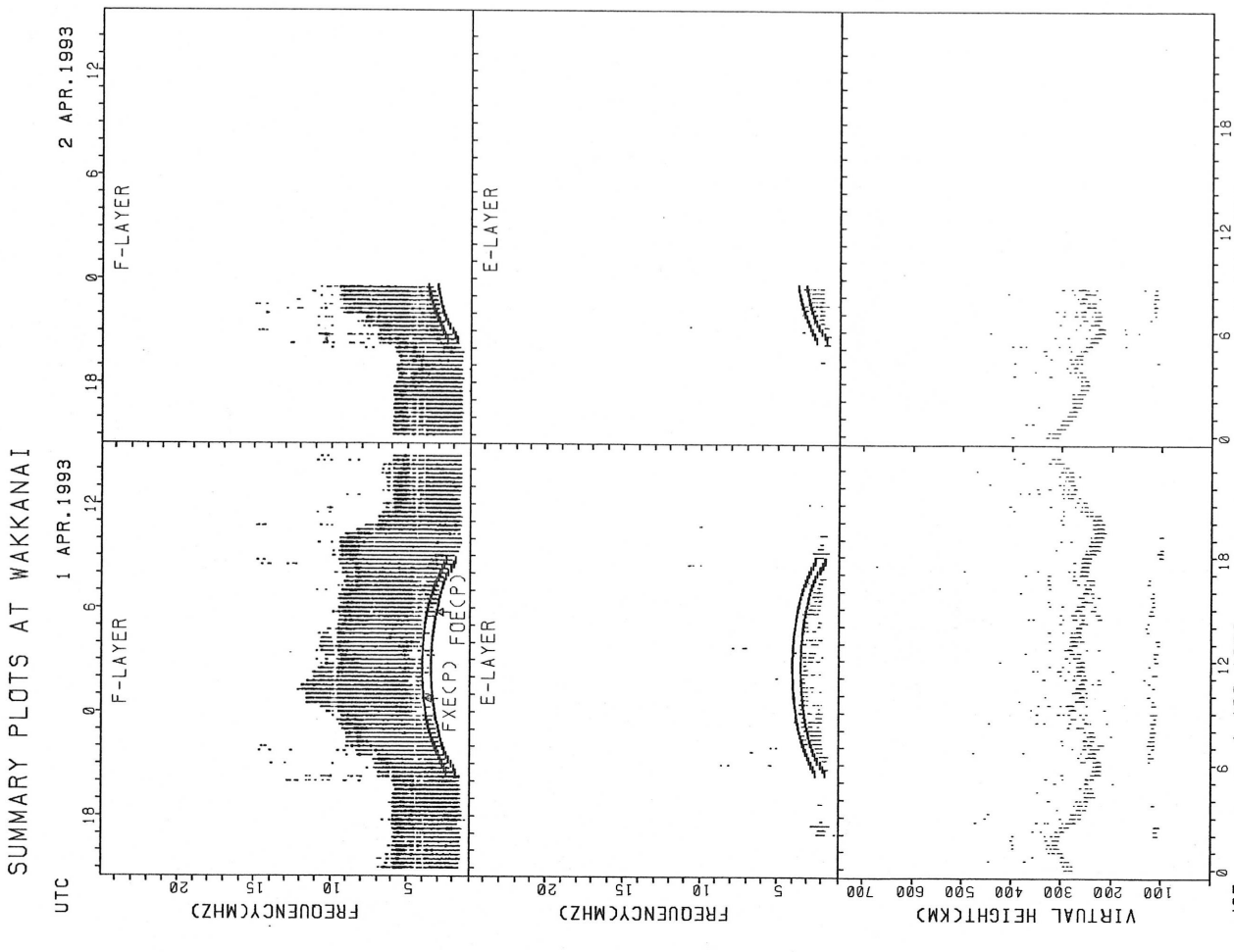
HOURLY VALUES OF FMIN AT OKINAWA

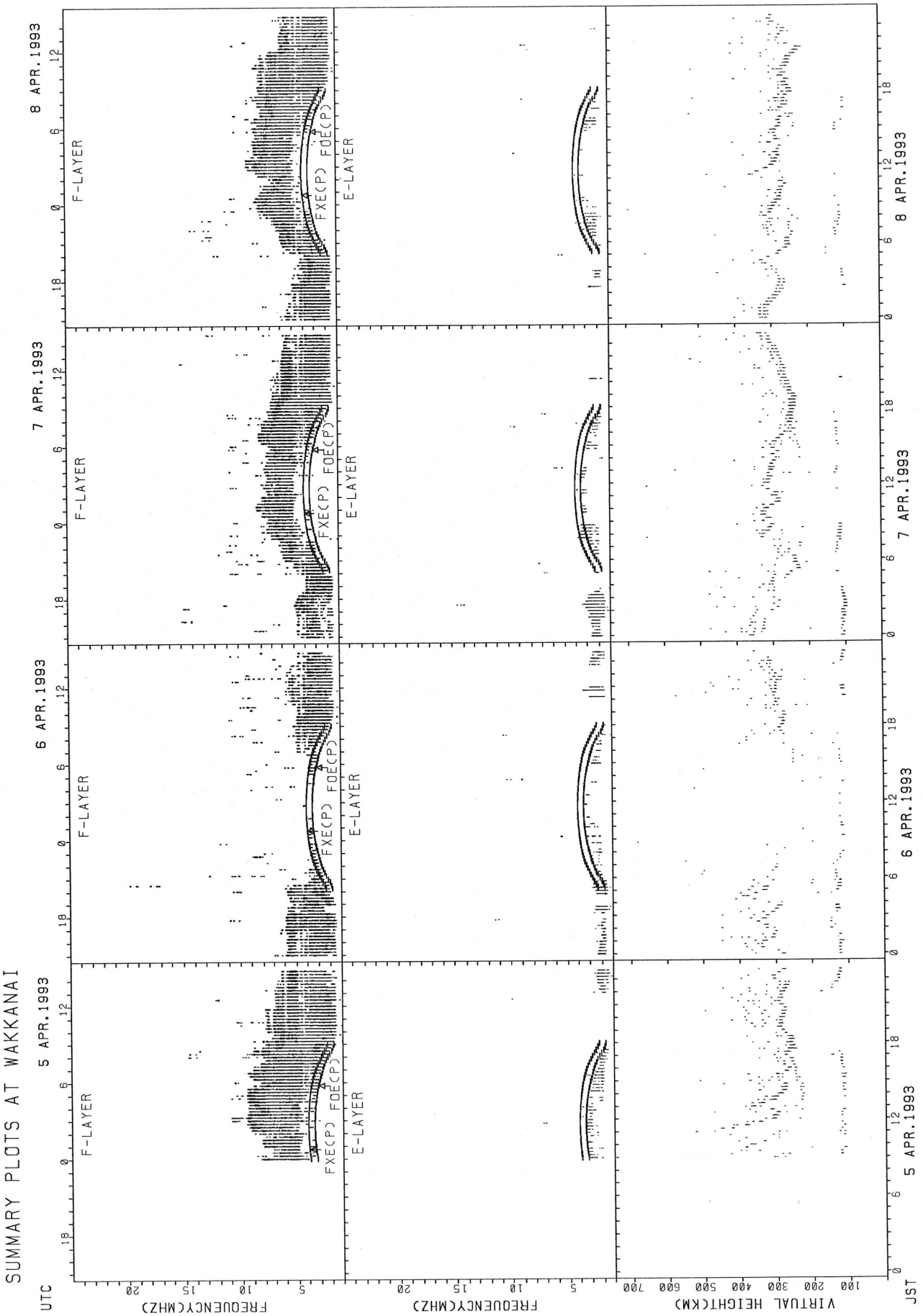
APR. 1993

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

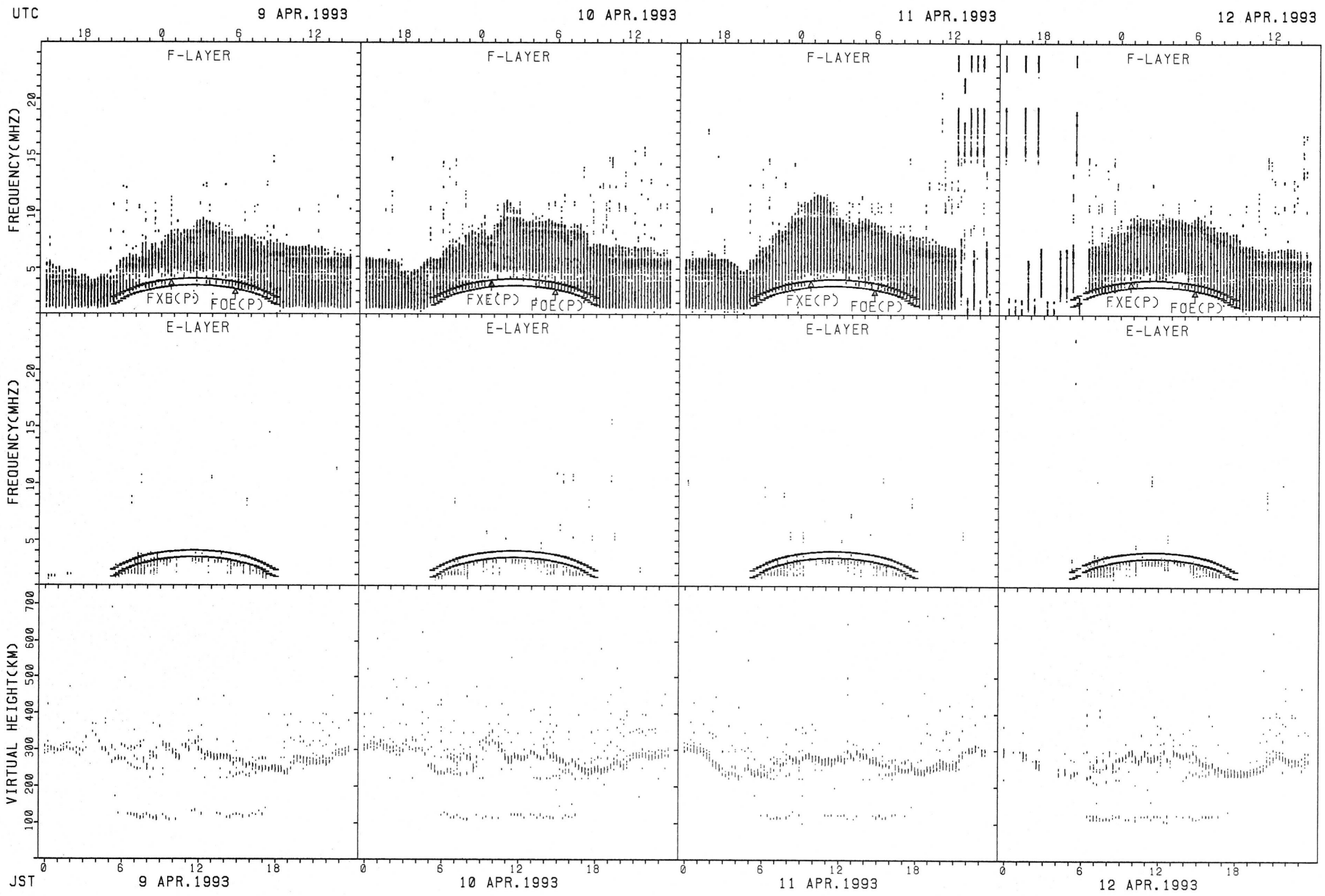
D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	17	16	16	16	15	16	16	16	15	17	24	26	29	32	32	27	18	16	15	16	15	16	16	16
2	16	16	16	15	16	16	16	16	18	20	27	28	30	29	30	26	17	16	16	16	16	16	16	16
3	16		15	16	16	16	16	22	15	18	24	28	28	34	34	32	22	18	16	16	16	16	16	16
4	16	16	16		15	16	16	15	17	23	29	29	32	32	29	29	24	17	16	16	17	16	16	16
5	16	16	16	16	16	16	16	16	16	21	29	30	34	30	29	26	20	15		14	16	16	16	16
6	16	16	16	16	16	16	16	18	17	23	28	14	30	29	27	28	23	16	16	15	16	15	16	16
7	15	16	16	16	16	15	16	15	22	28	28	44	50	35	35	29	17	16	16		15	16	16	16
8	16	16	16		16	16	16	16	15	24	26	30	60	46	45	34	27	21	16	16	16	16	16	16
9	16	15	16	16	16	16	16	16	16		30	28	28	30	30	27	27	17	16	14	16	16	16	16
10	16	16	16	16	16	16	16	16	17	22	28	29	36	21	29	27	27	17	16	16	16		16	16
11	16	15		16	16	15	16	16	17	24	29	33	34	34	30	28	23	18	16	15	16	16	16	16
12	16	16	15	15	16	16	16	16	17	18	20	33	29	33	33	28	24	17	15	16	16	16	15	15
13	16		15	15	15	15	16	16	16	27	28	30	30	32	26	28	27	17	17	14	16	15	16	16
14	16	16	16	15	20	15	16	16	20	22	28	30	29	29	32	28	23	16	15	14	15	16	16	16
15	16	15	15	15	16	16	15	16	16	22	24	30	33	28	29	21	23	16	16	15	16	16	16	16
16																								
17																								
18																								
19	16	16	15	16	16	16	16	16	16	22	27	29	30	29	28	21	20	20	15	16	16	15	16	16
20	16	16	15	15	15	16	17	17	17	29	28	30	29	30	30	26	18	15	15	15		16	16	16
21	16	16	16	16	16	16	16	17	17	26	29	32	38	39	34	30	40	14	16	14	16	15	17	16
22	16	16	15	15	15	15	16	16	16	20	30	27	29	33										
23																	45	33	22	15	15	17	15	32
24	18	18	16	16	16	20	18	16	20									39	26	23	18	16	18	
25	34	30	17	16	16	16	21	30									N	34	32	27	16	18	22	17
26	17	26	29	18	15	17	28	33	40								33	47	24	16	17	16	16	44
27																								
28																								
29	32	16	20	16	14	15	17	32									40	34		26	16	20	32	22
30	29	28	22	16	24	17	28	32	32	39		N				15		33	22	24	16	17	16	17
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	24	22	23	22	24	24	24	24	22	19	19	19	19	19	18	19	21	24	22	23	23	23	24	23
MED	16	16	16	16	16	16	16	16	17	22	28	30	30	32	30	28	23	17	16	16	16	16	16	16
U Q	16	16	16	16	16	16	16	17	18	26	29	30	34	34	33	29	27	27	17	16	16	16	16	16
L Q	16	16	15	15	15	15	16	16	16	20	26	28	29	29	29	26	20	16	16	15	16	16	16	16

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

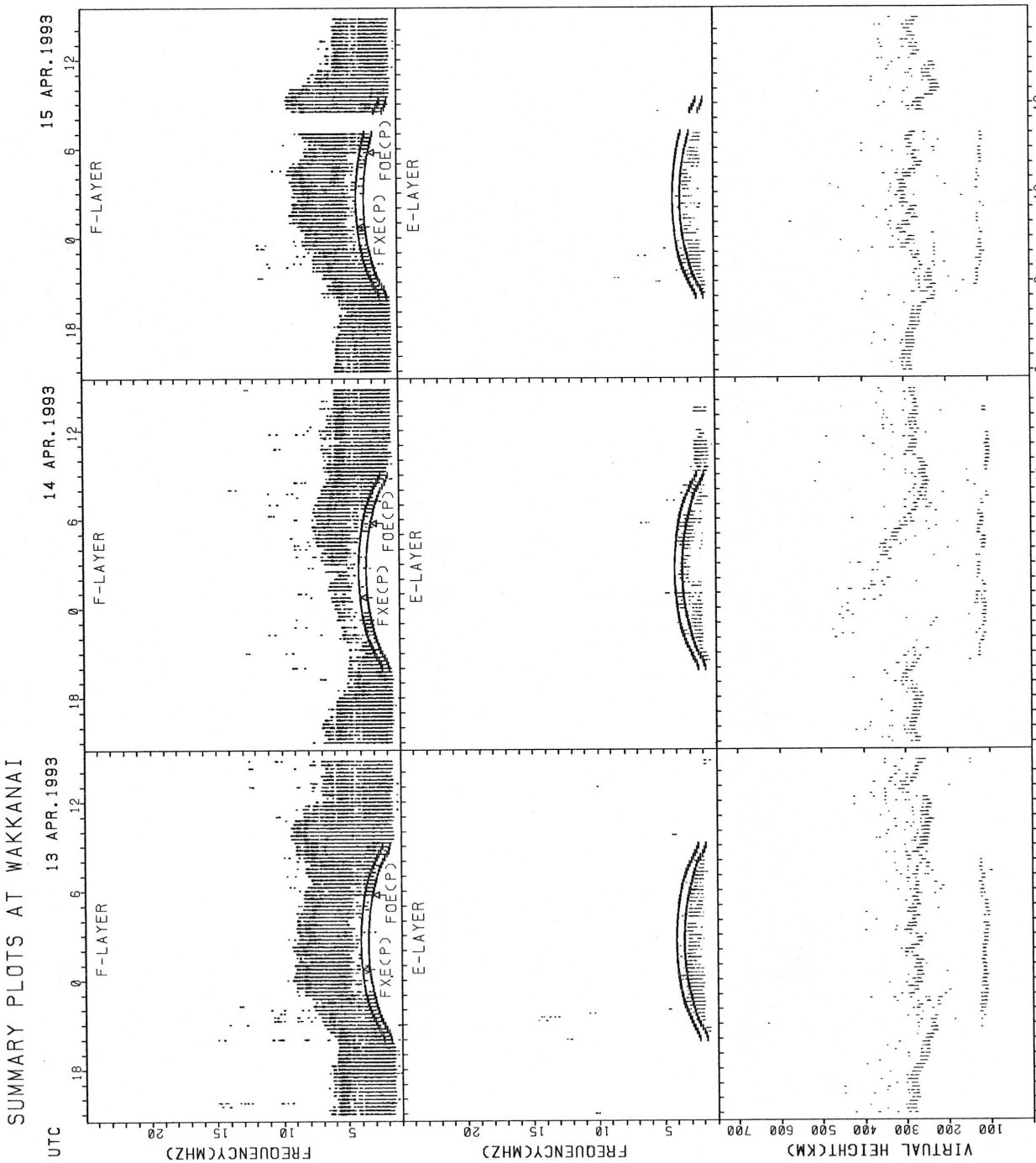

SUMMARY PLOTS AT WAKKANAI
UTC
1 APR.1993
2 APR.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
5 APR.1993
6 APR.1993
7 APR.1993
8 APR.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

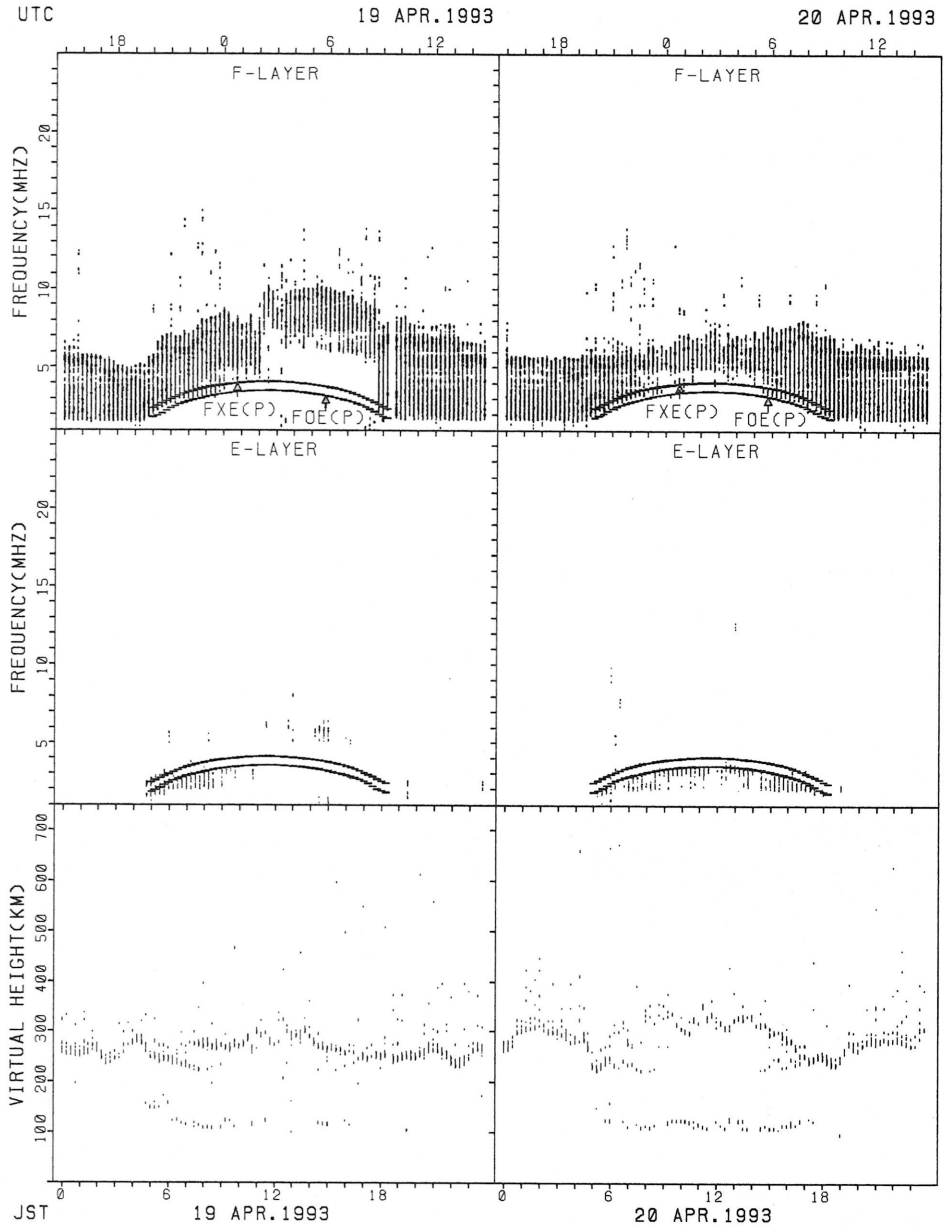
SUMMARY PLOTS AT WAKKANAI



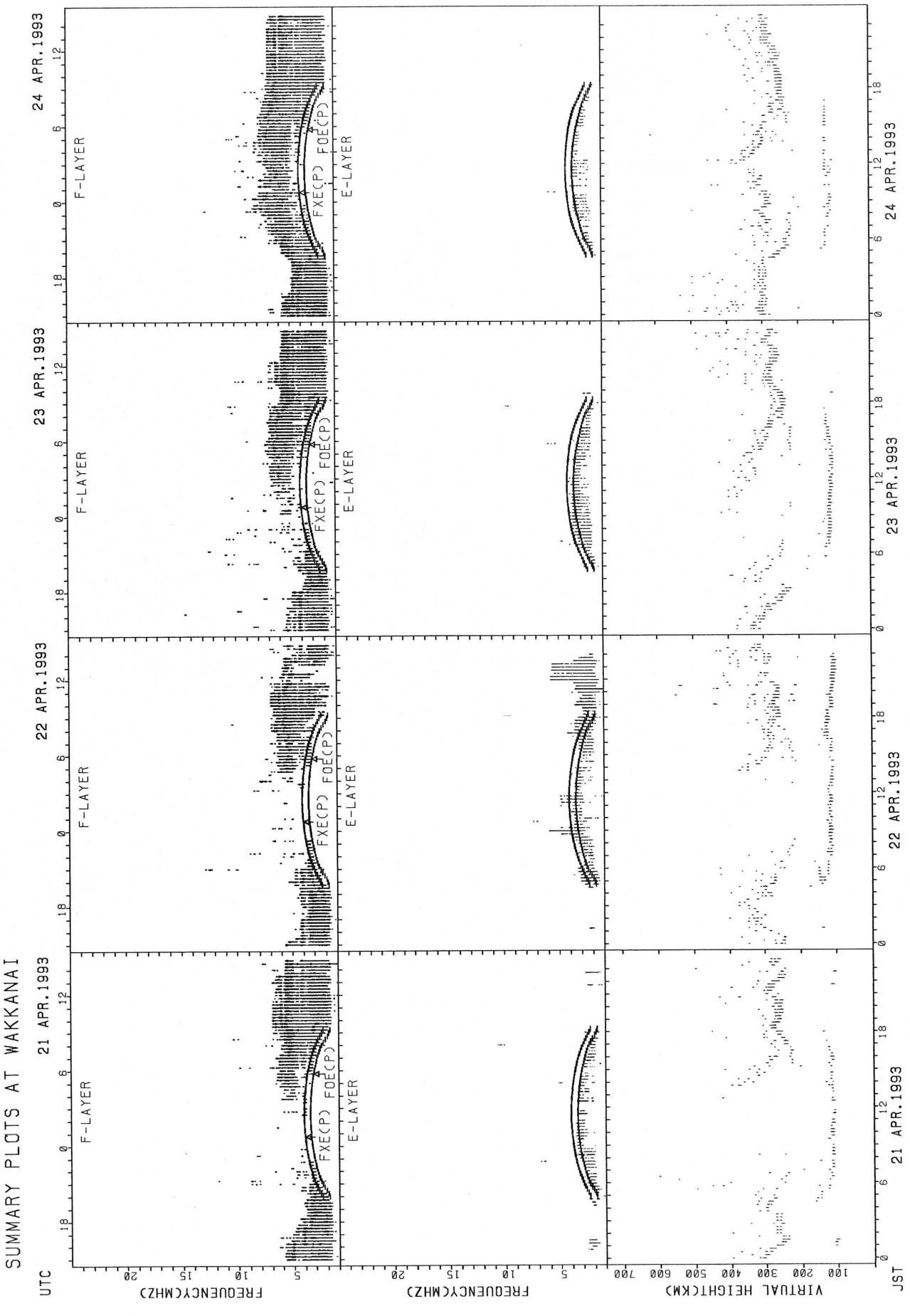
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

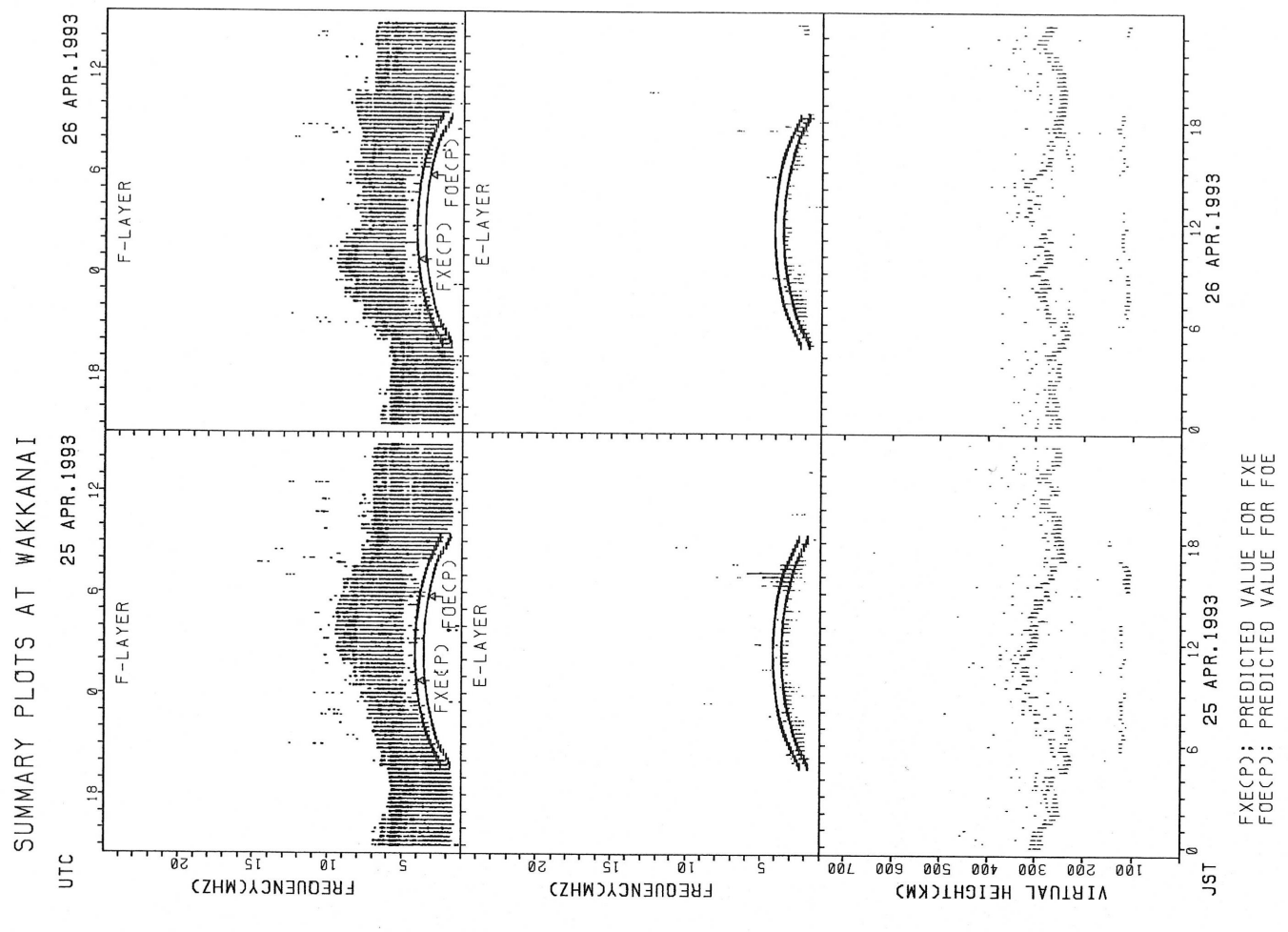

SUMMARY PLOTS AT WAKKANAI
UTC
13 APR.1993
14 APR.1993
15 APR.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

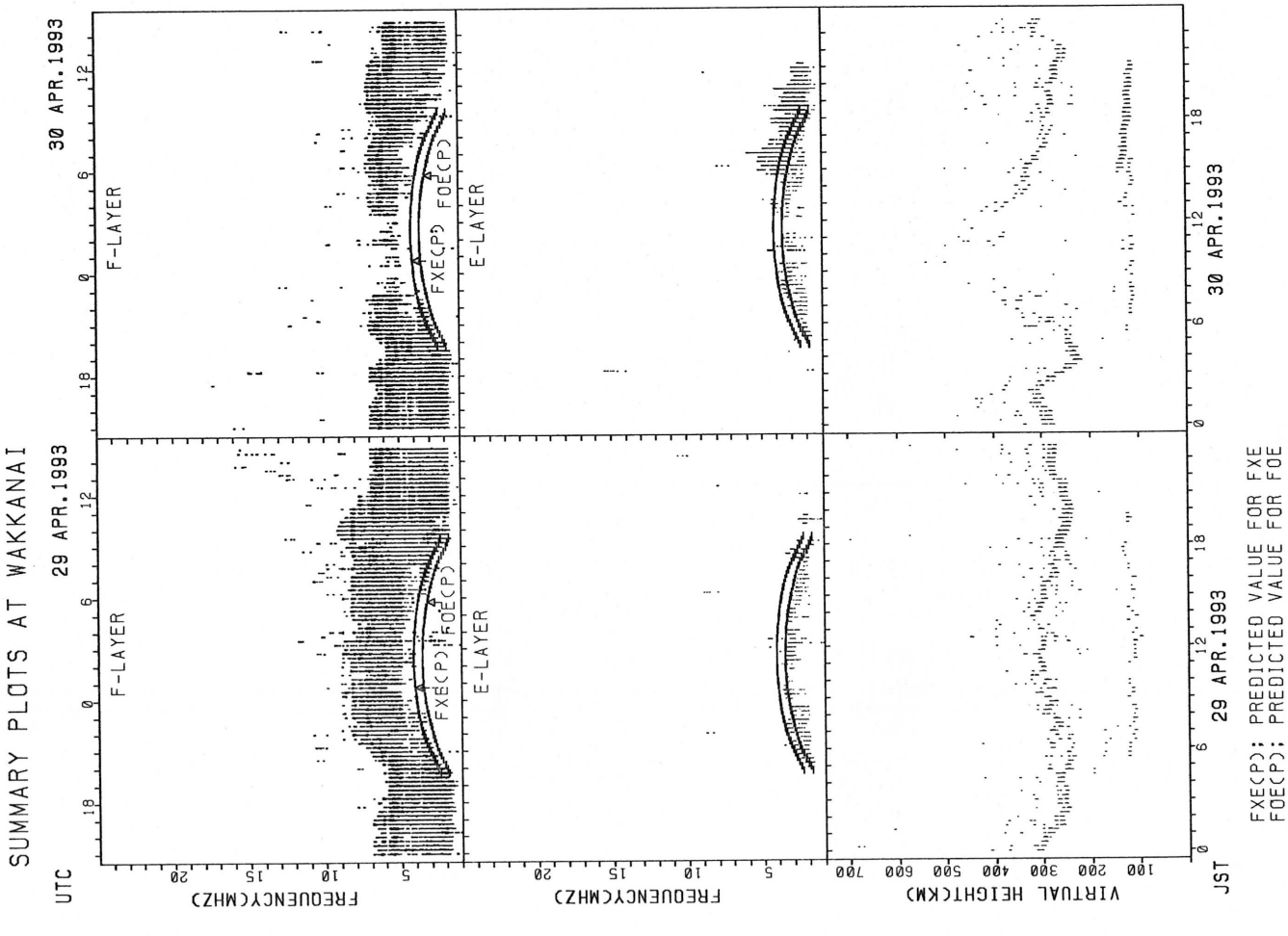
SUMMARY PLOTS AT WAKKANAI

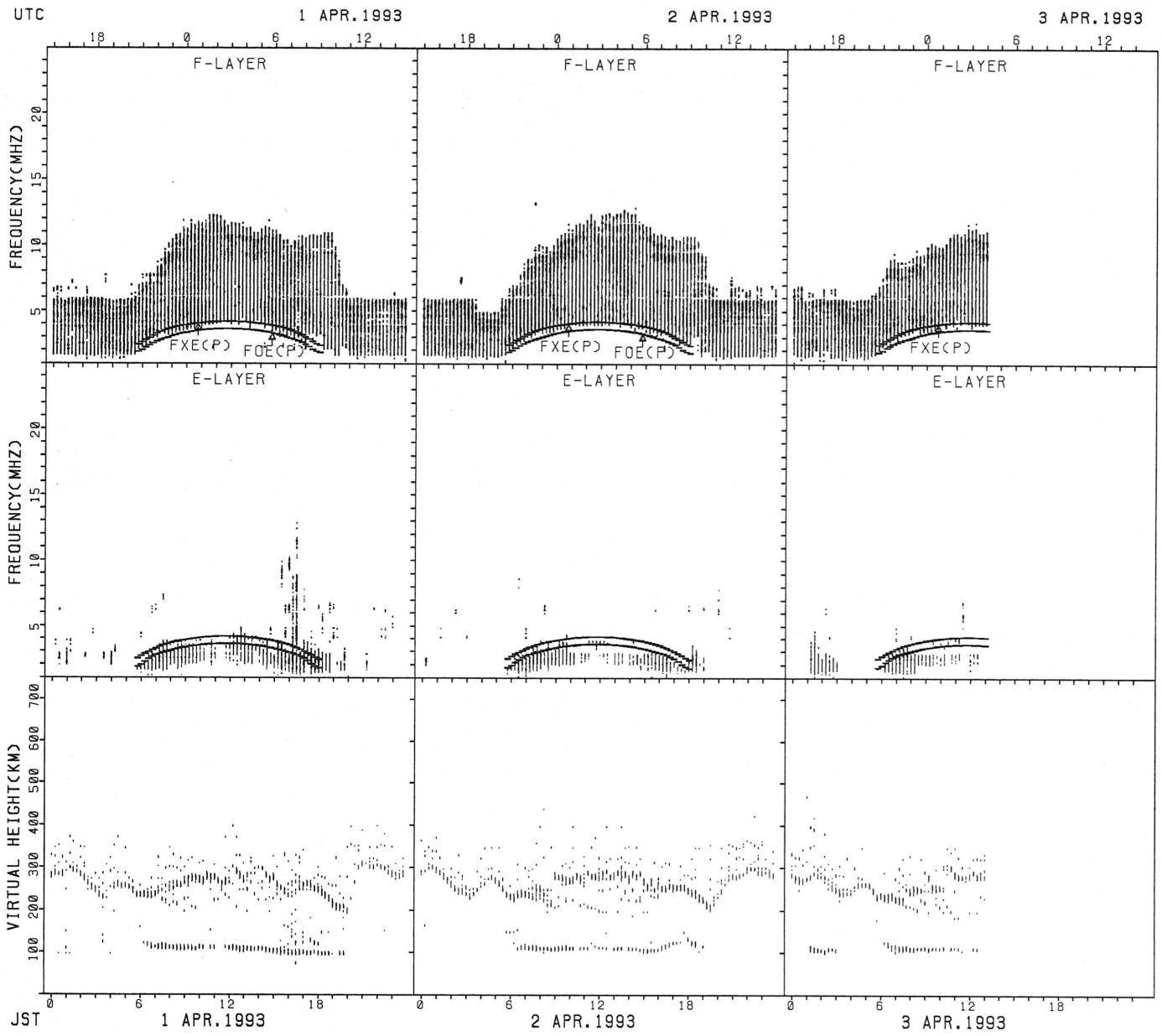


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

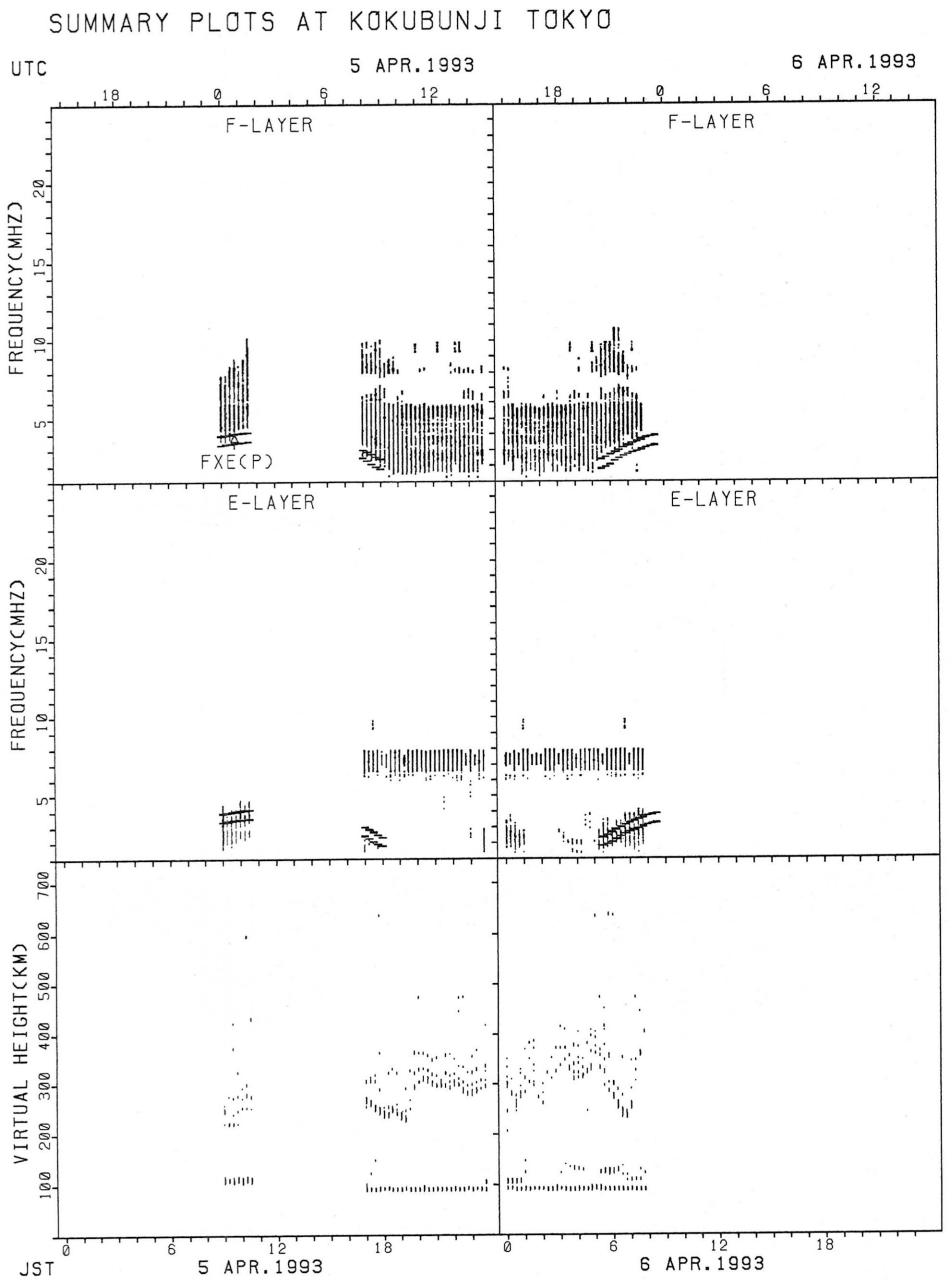

SUMMARY PLOTS AT WAKKANAI
UTC
21 APR.1993
22 APR.1993
23 APR.1993
24 APR.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
25 APR.1993
26 APR.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

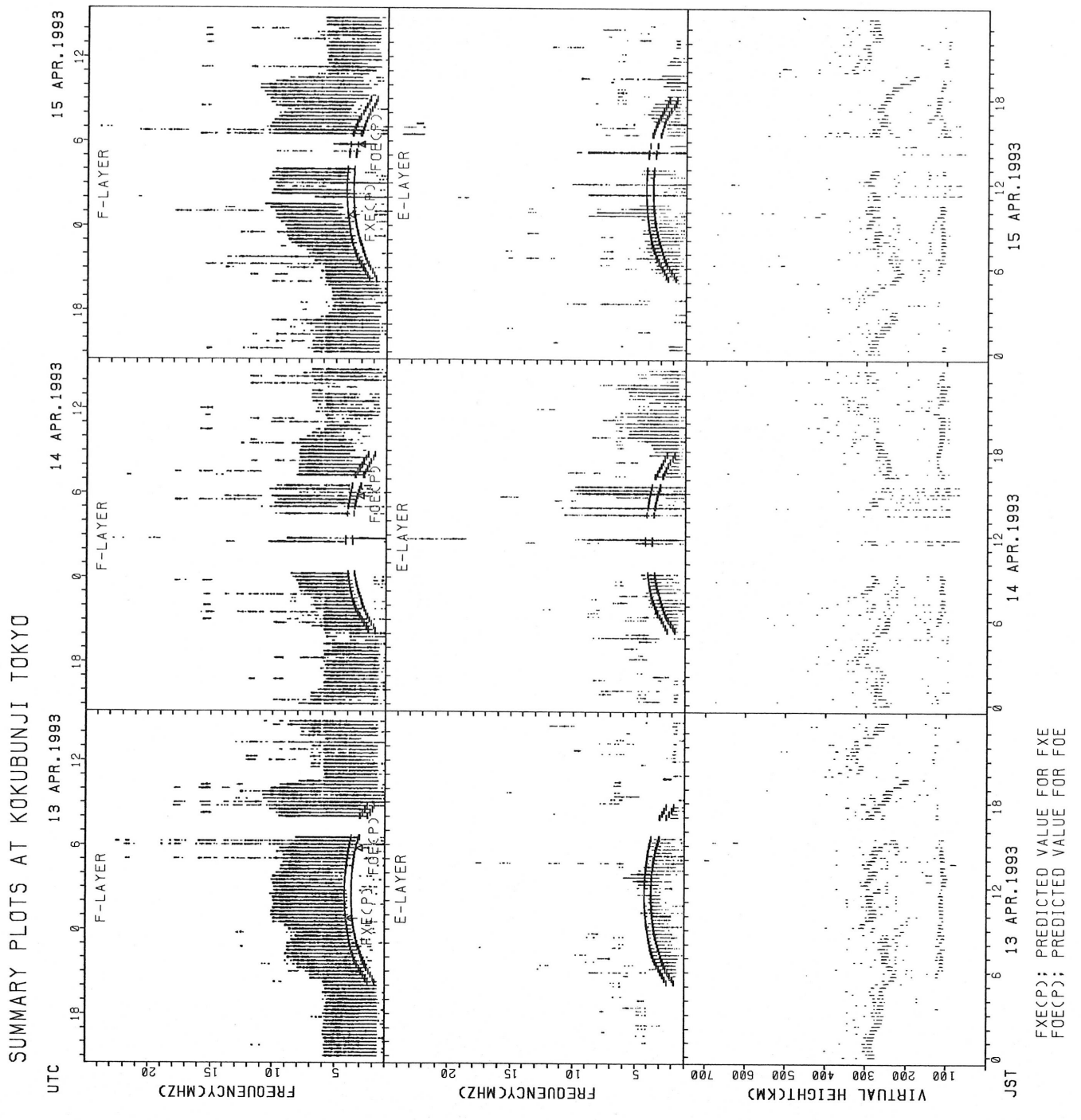

SUMMARY PLOTS AT WAKKANAI
UTC
29 APR.1993
30 APR.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE



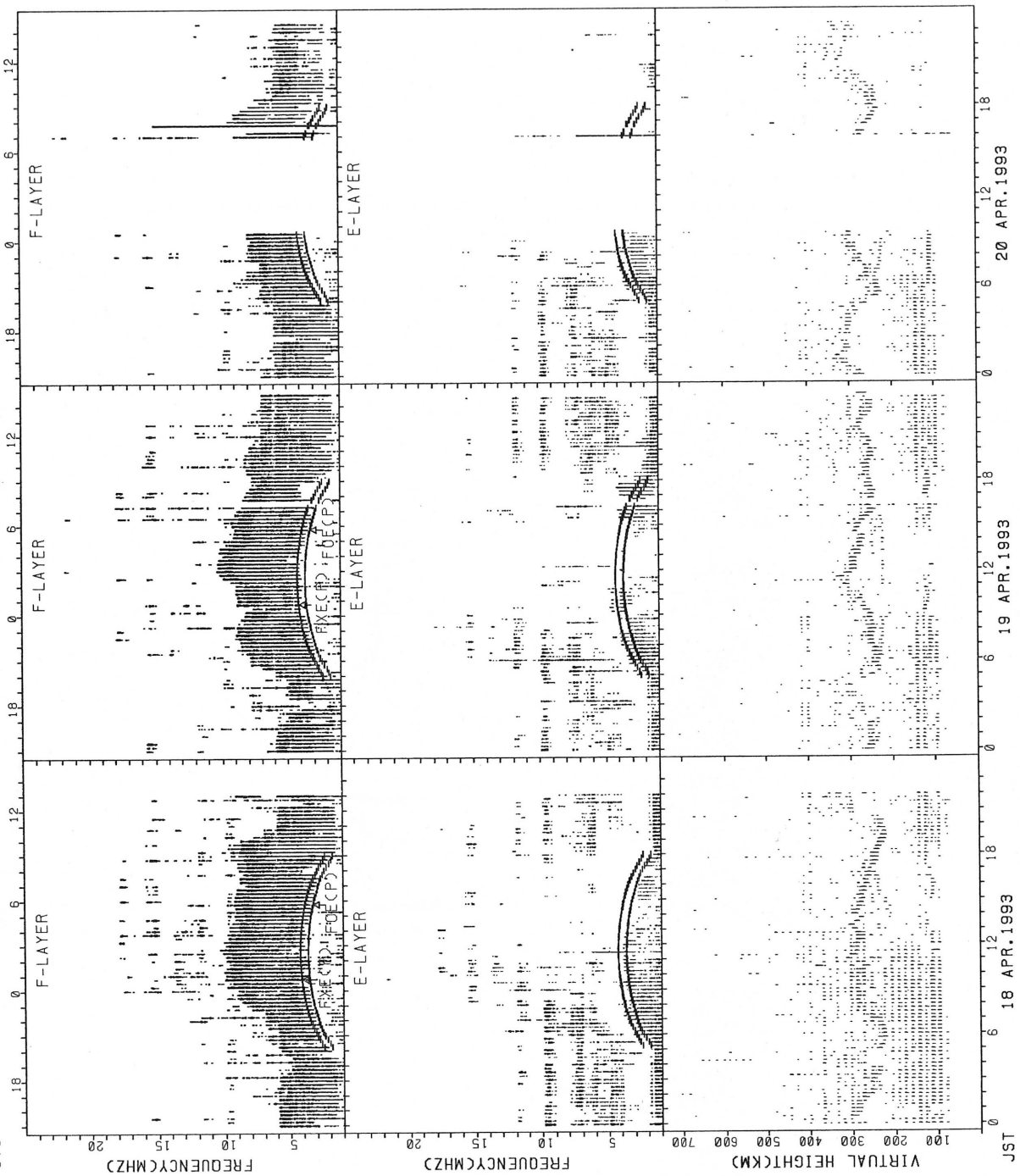
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

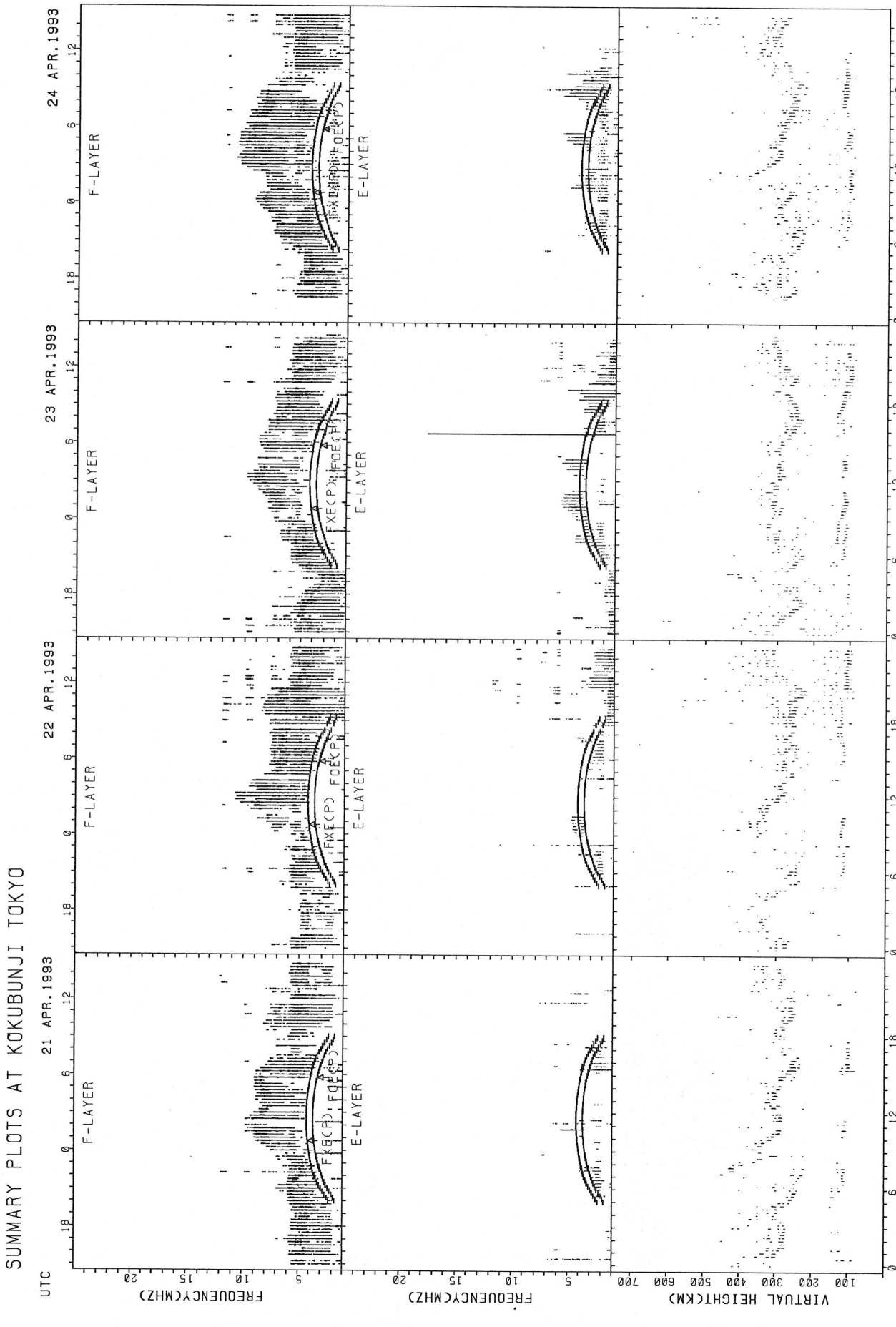


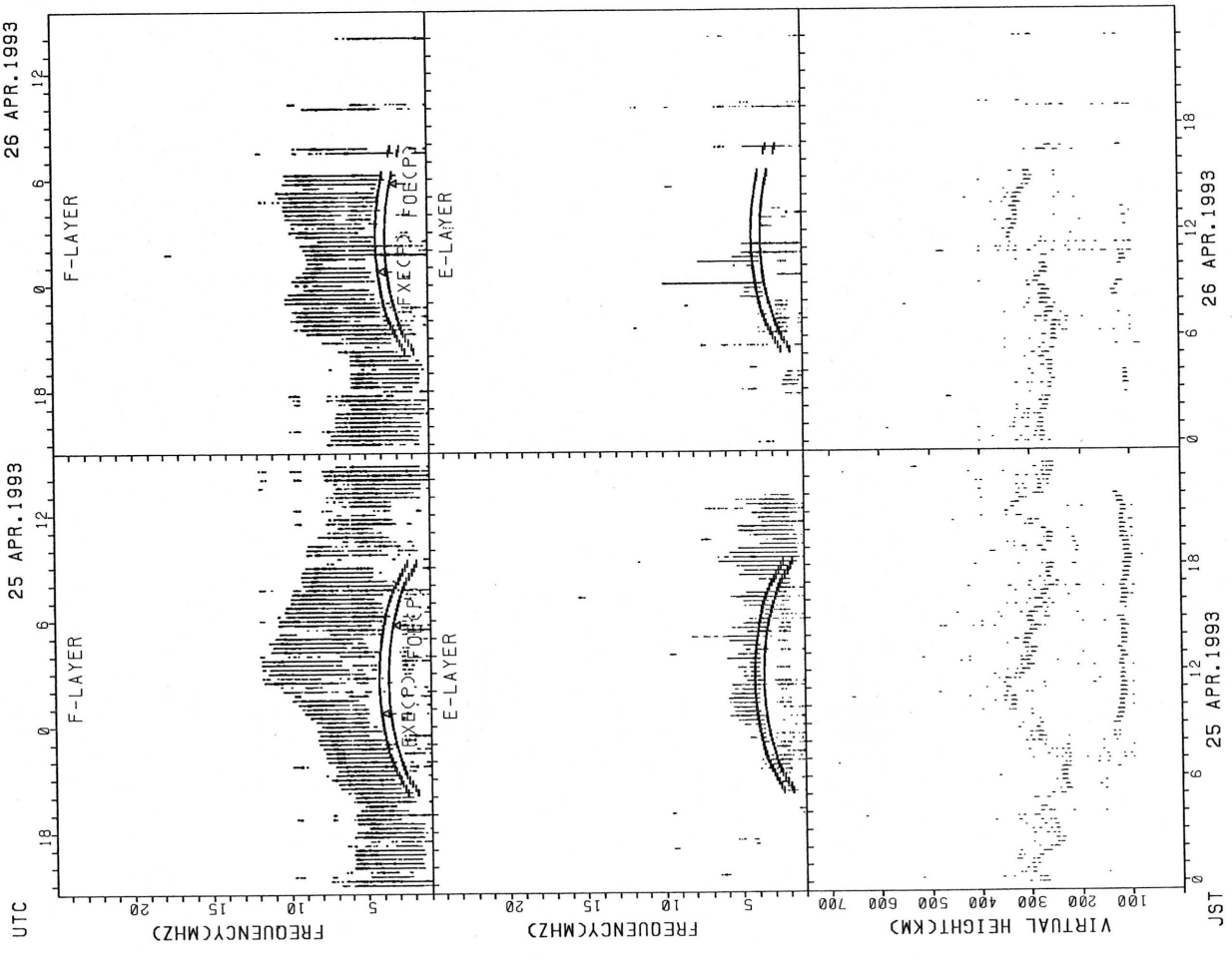
Notes : No data was collected on April 4, 1993 and from April 7 to 12, 1993 at Kokubunji.


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
13 APR.1993
14 APR.1993
15 APR.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

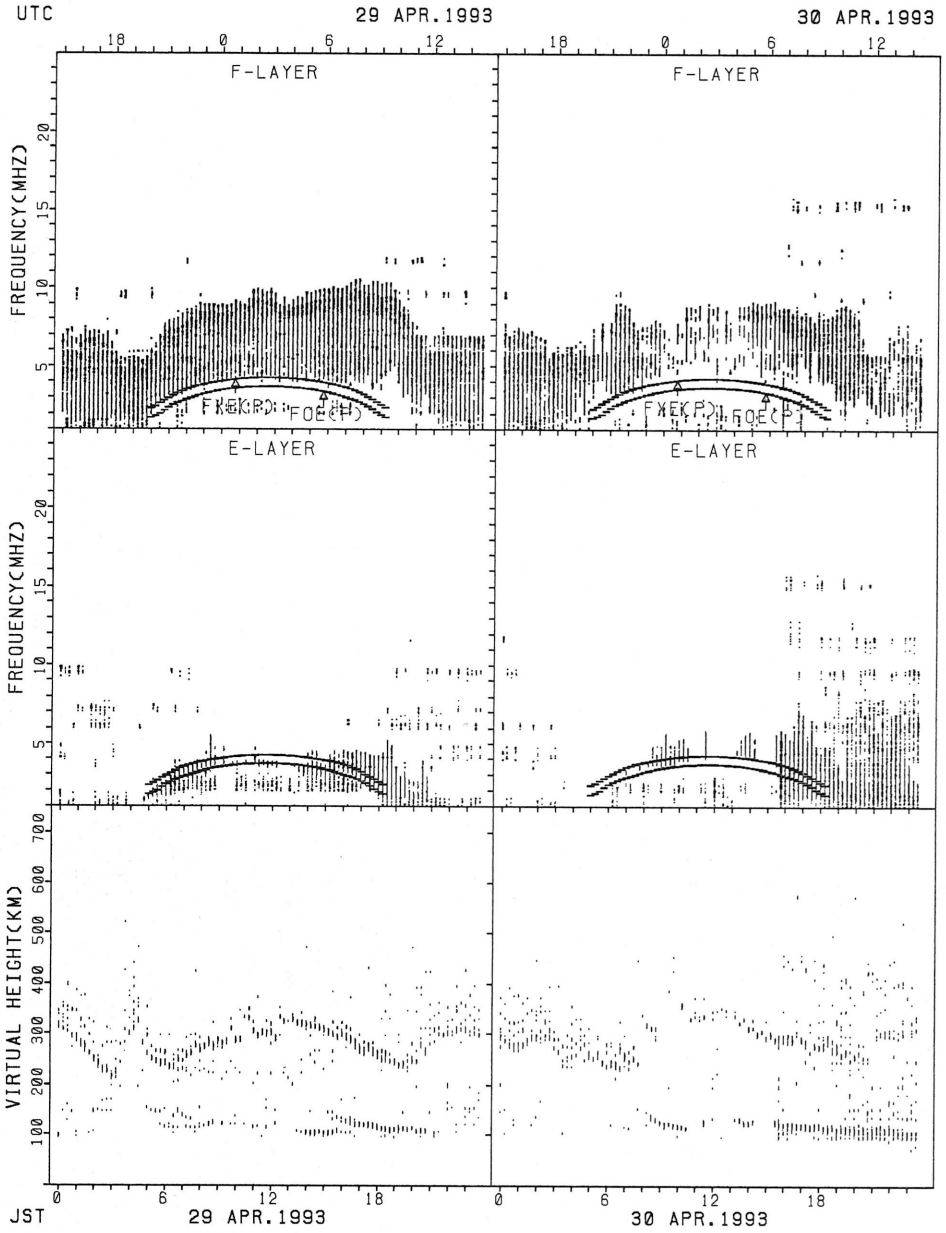
SUMMARY PLOTS AT KOKUBUNJI TOKYO



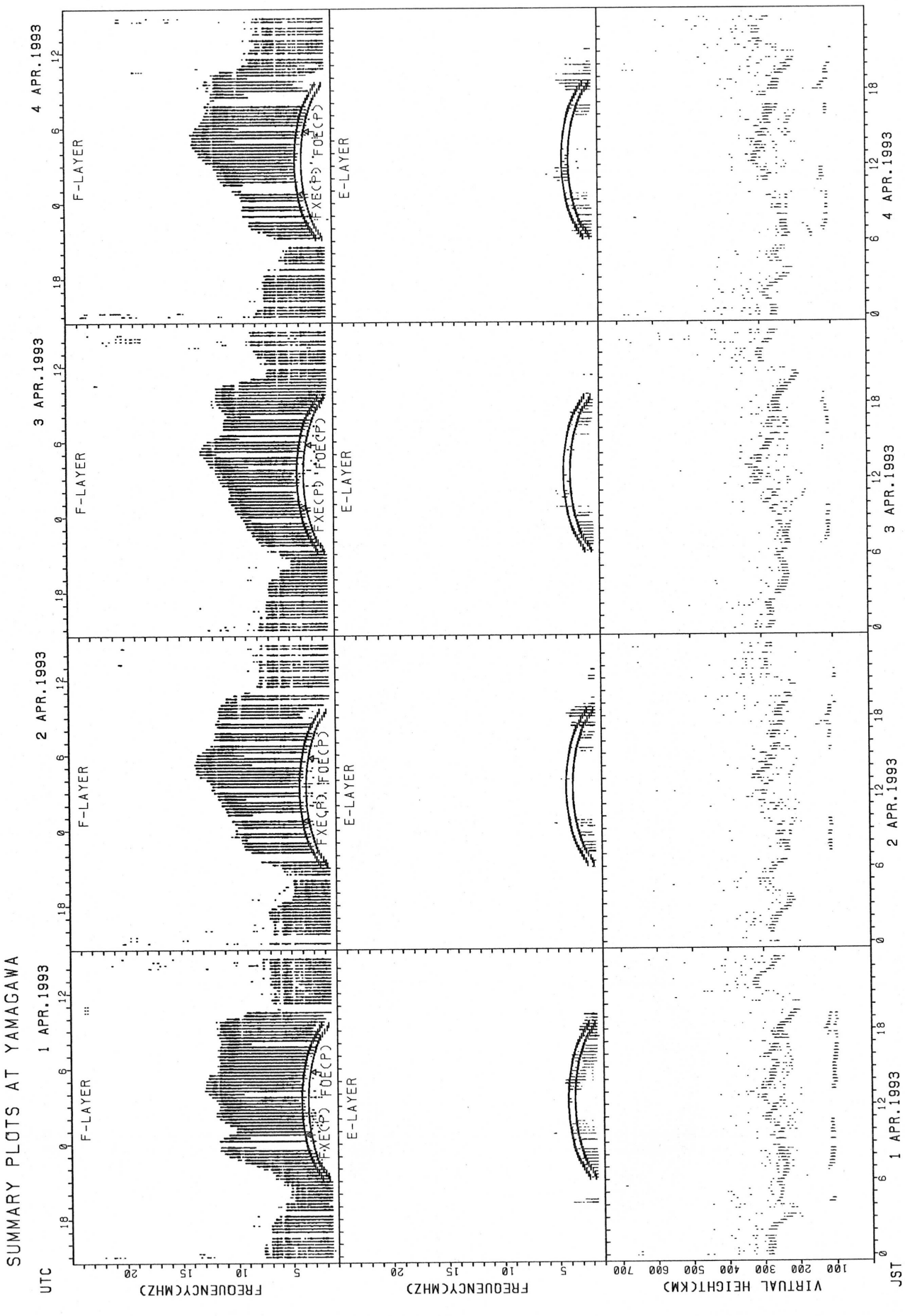

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
21 APR.1993
22 APR.1993
23 APR.1993
24 APR.1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
25 APR.1993
26 APR.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

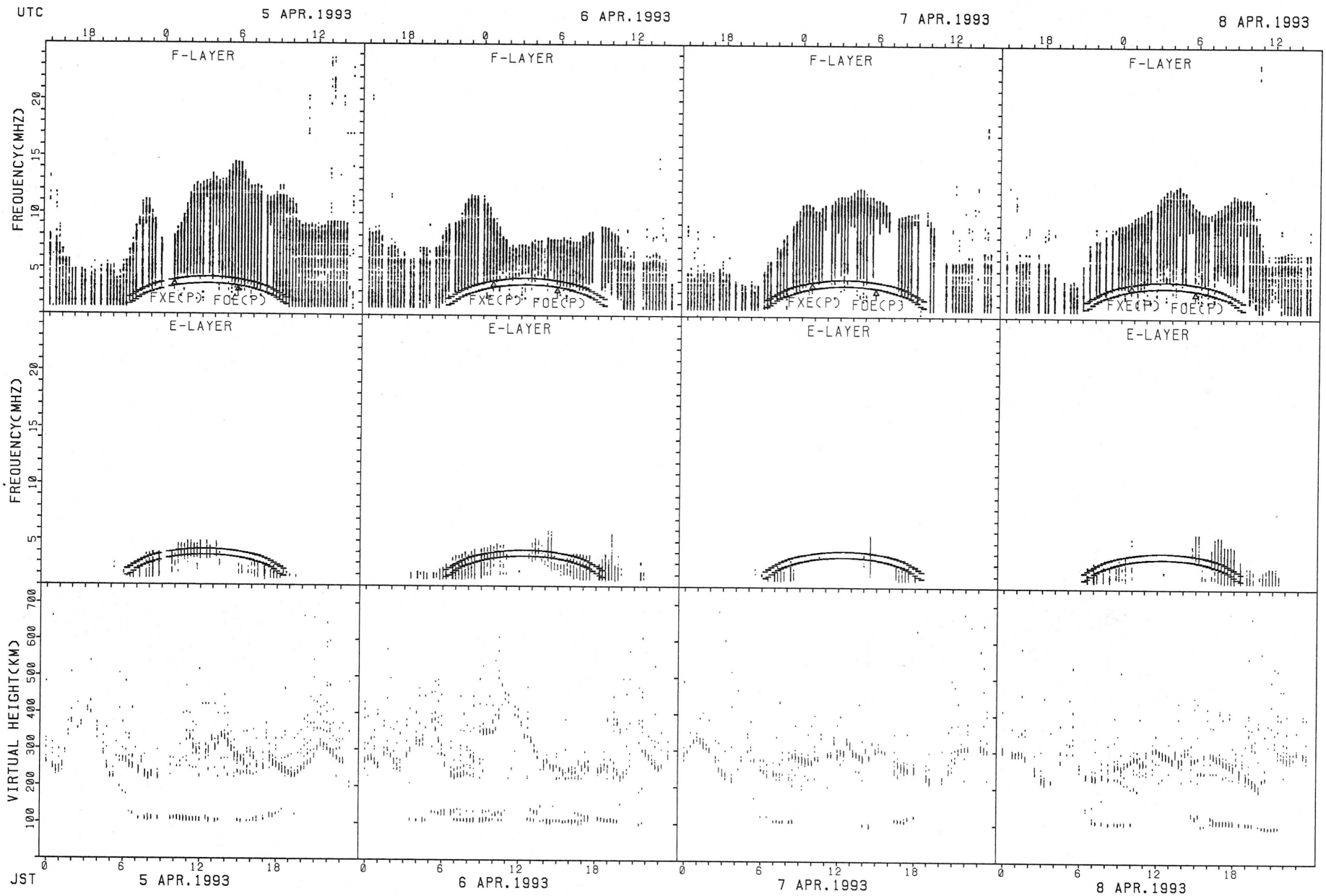
SUMMARY PLOTS AT KOKUBUNJI TOKYO



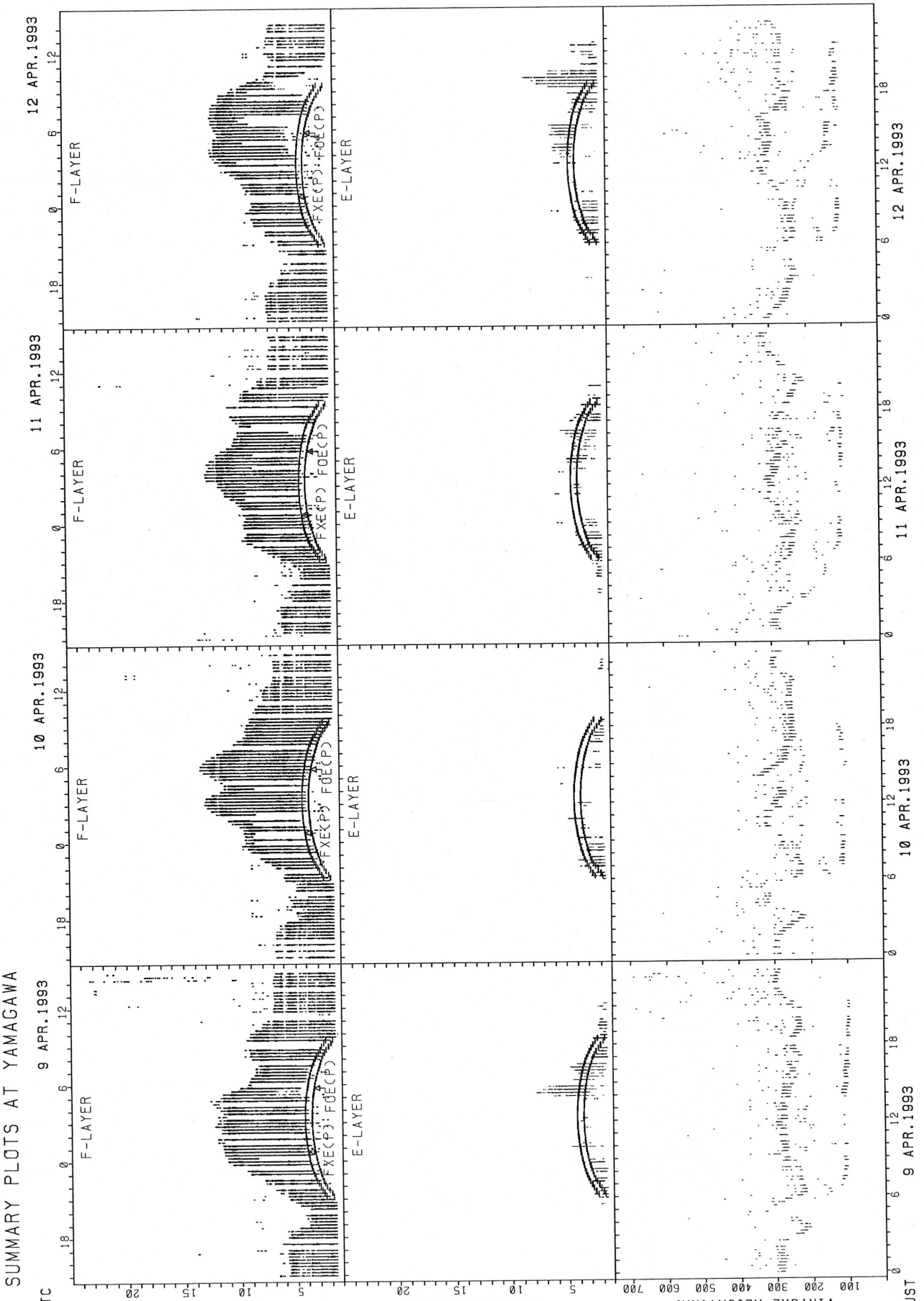
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

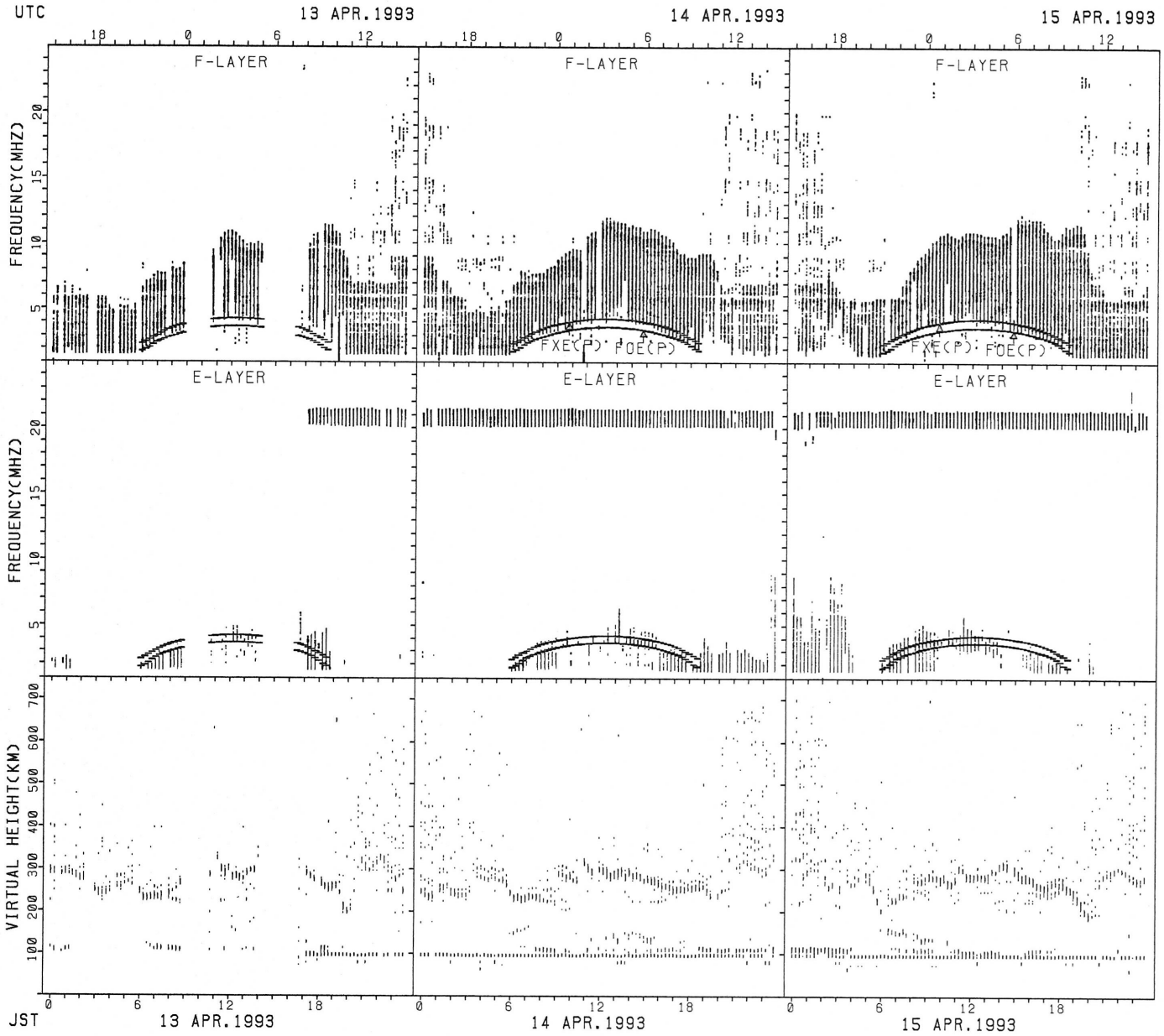
SUMMARY PLOTS AT YAMAGAWA



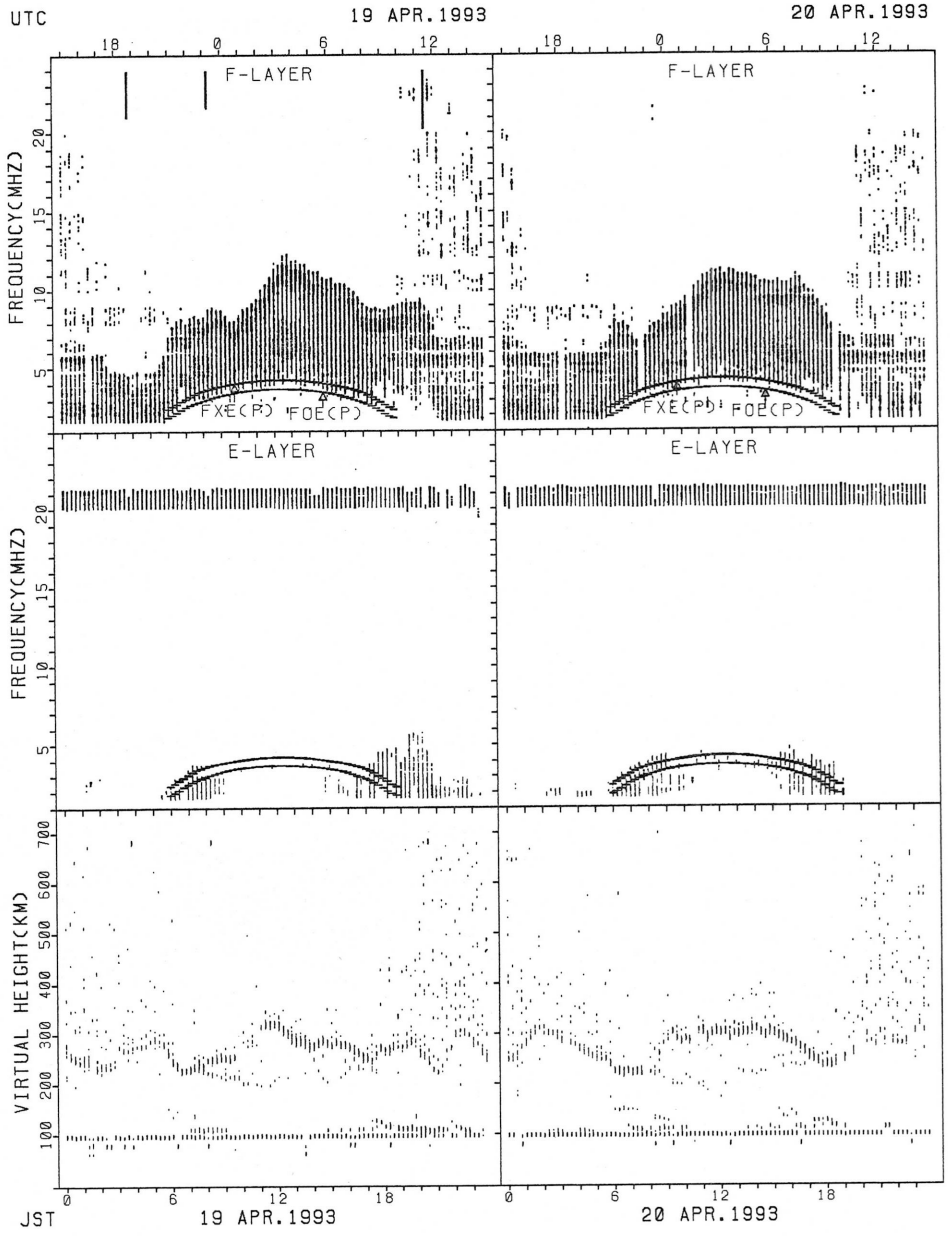
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

SUMMARY PLOTS AT YAMAGAWA

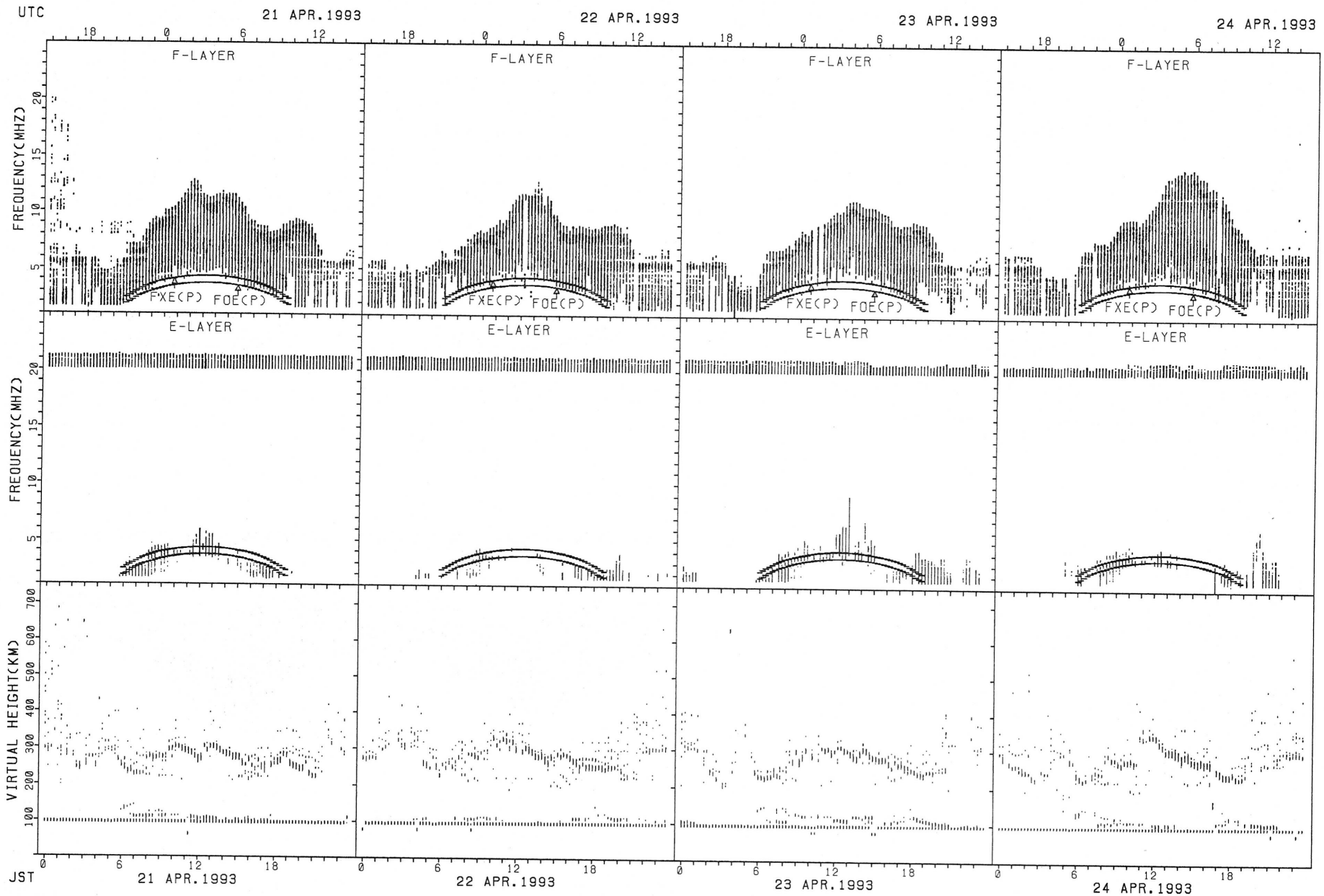


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

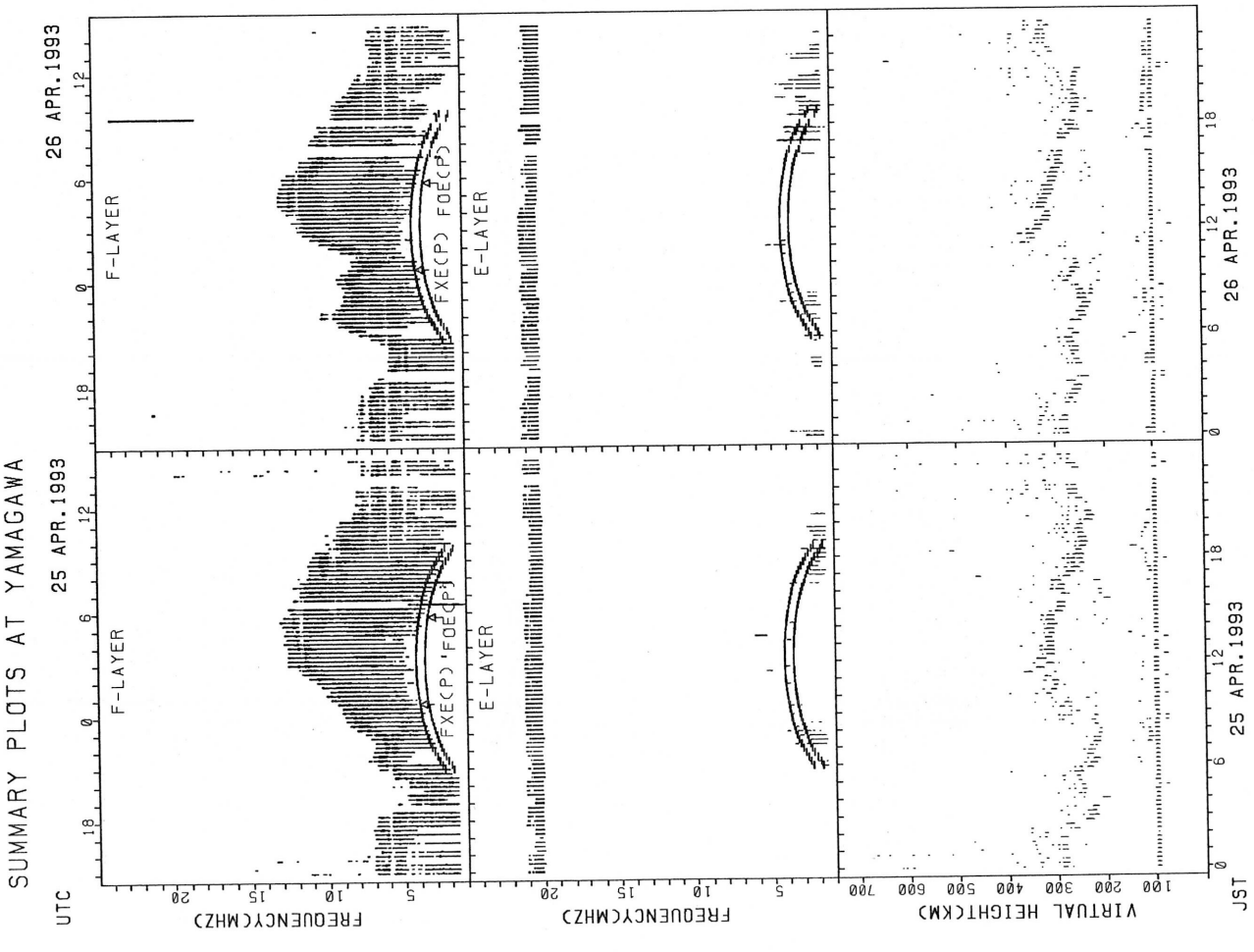


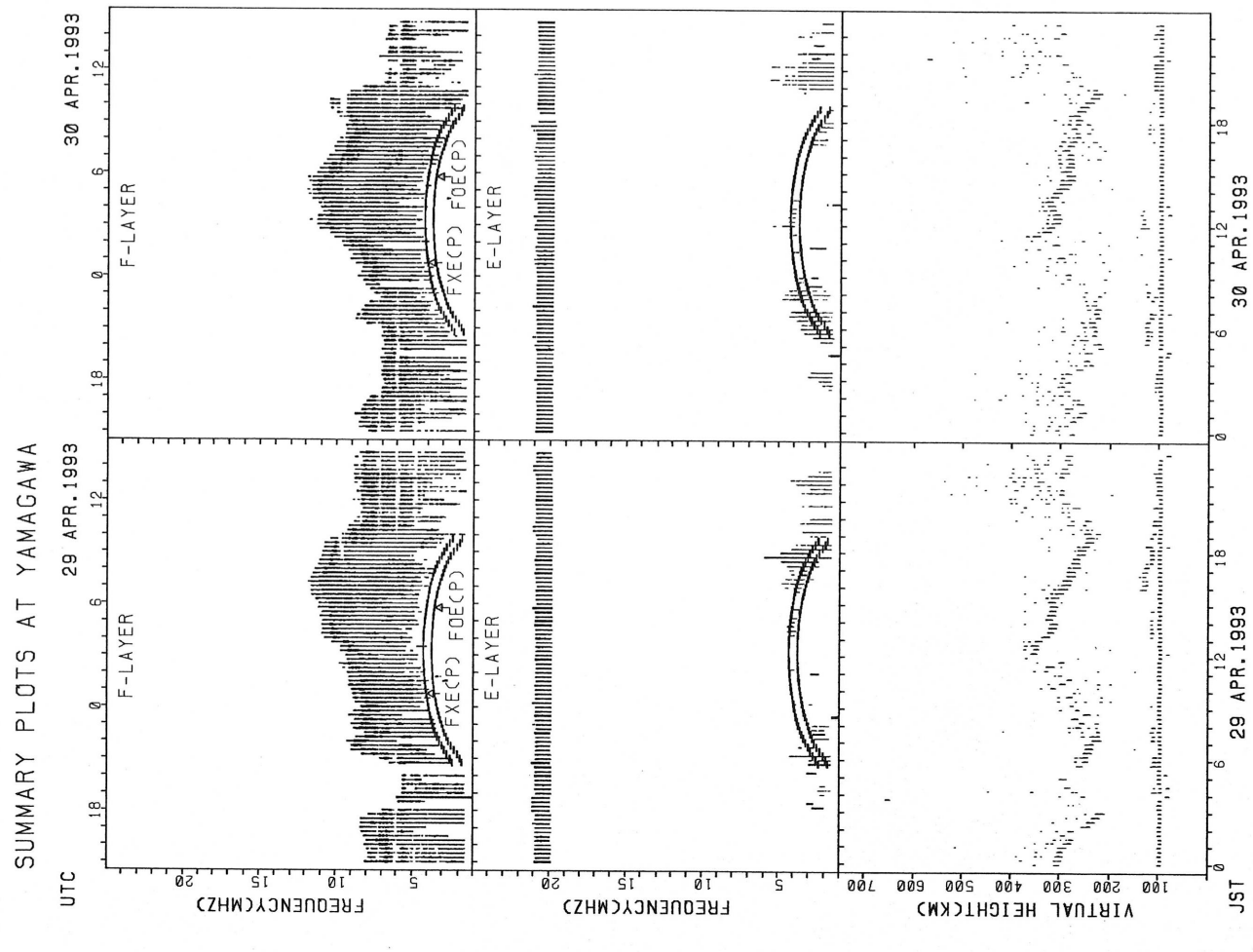
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

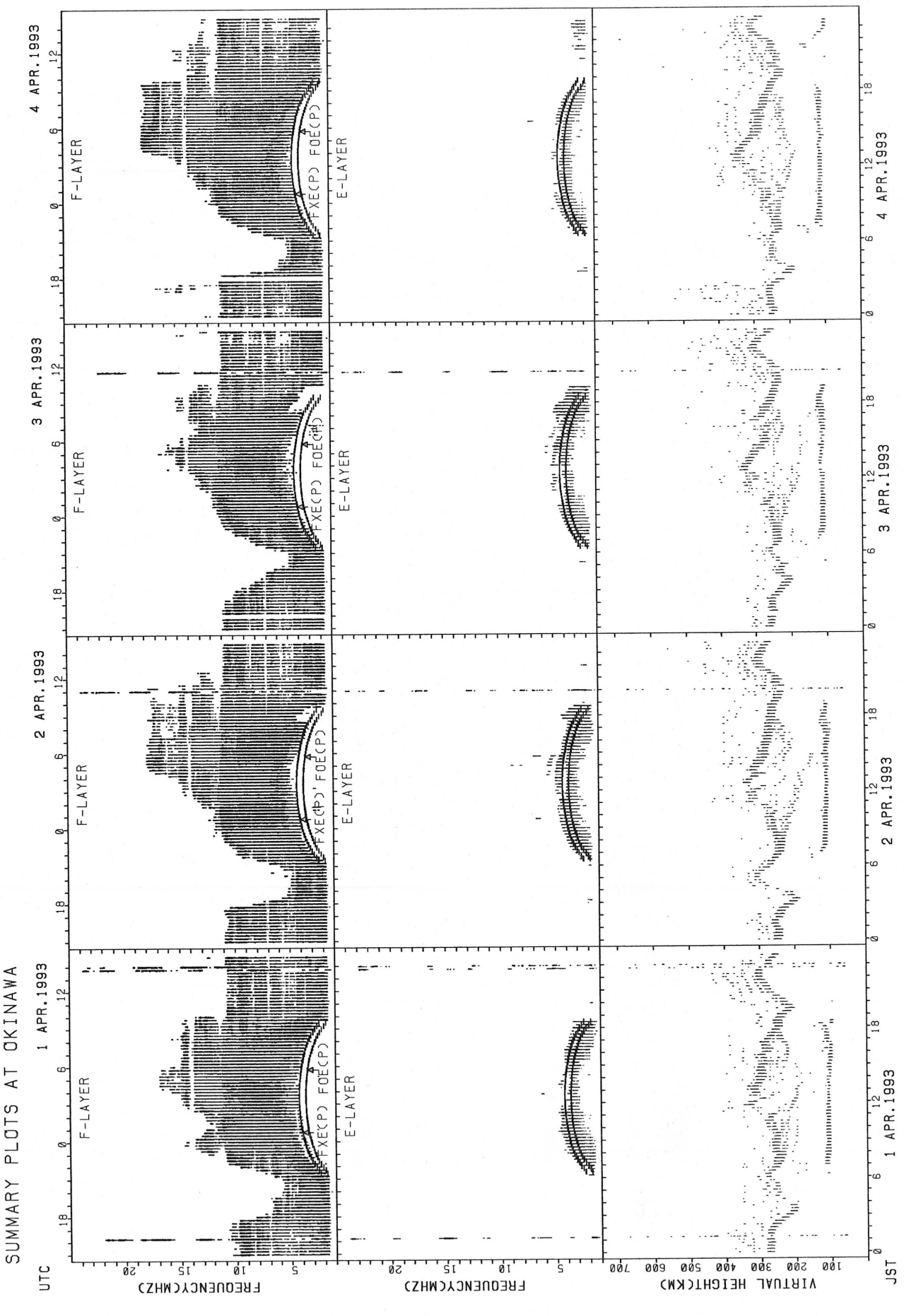
SUMMARY PLOTS AT YAMAGAWA



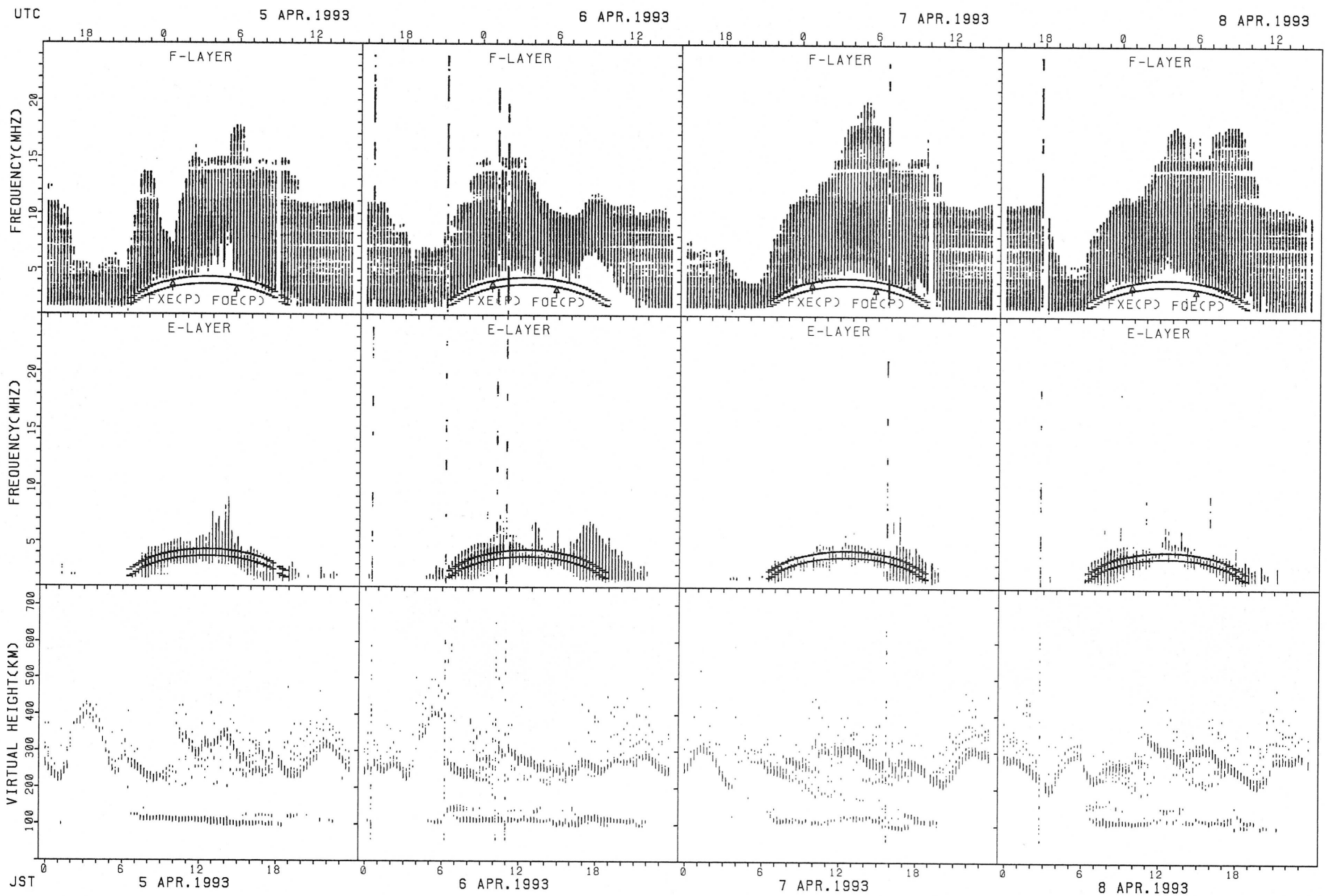
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

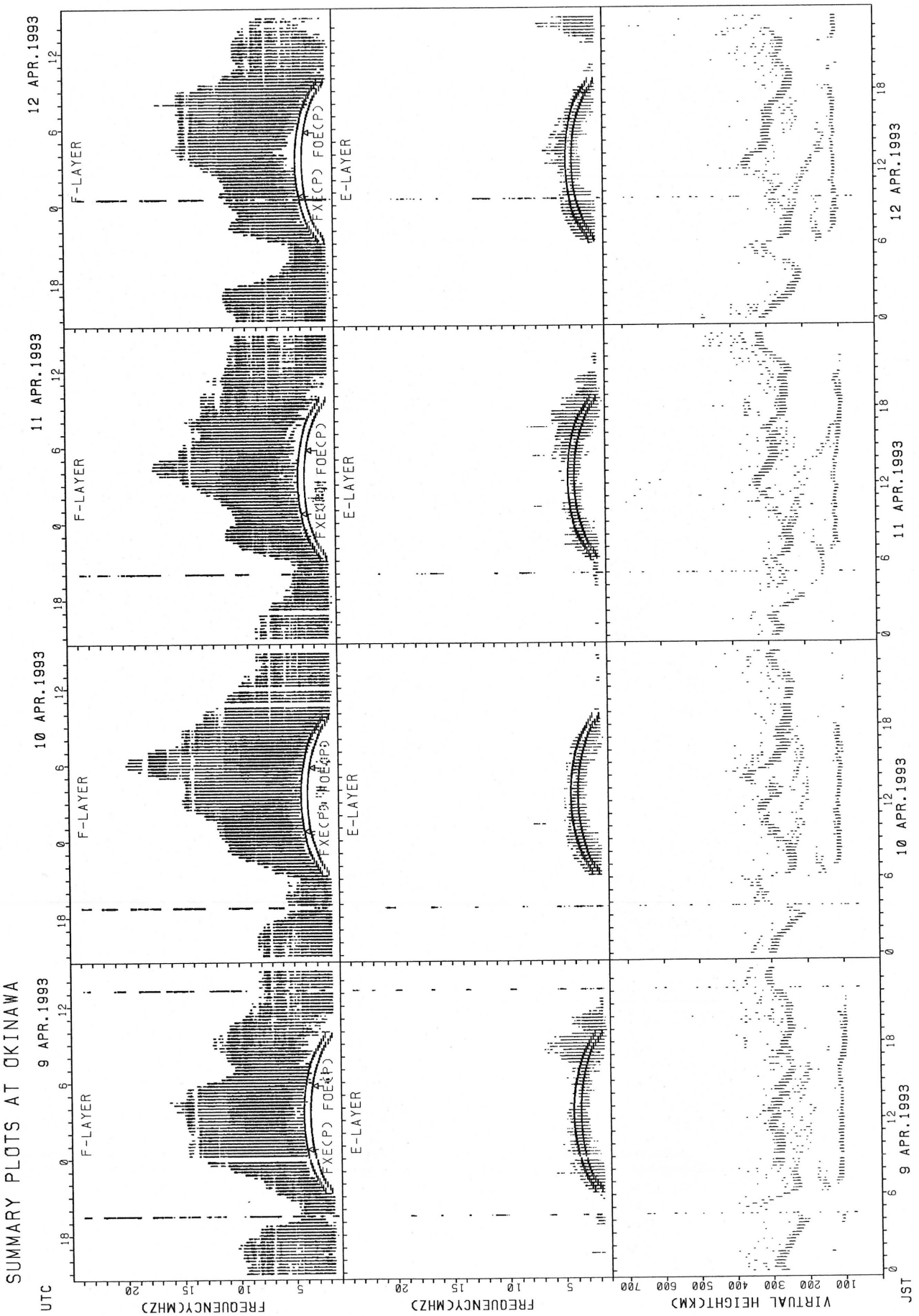

SUMMARY PLOTS AT YAMAGAWA
UTC
29 APR.1993
30 APR.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

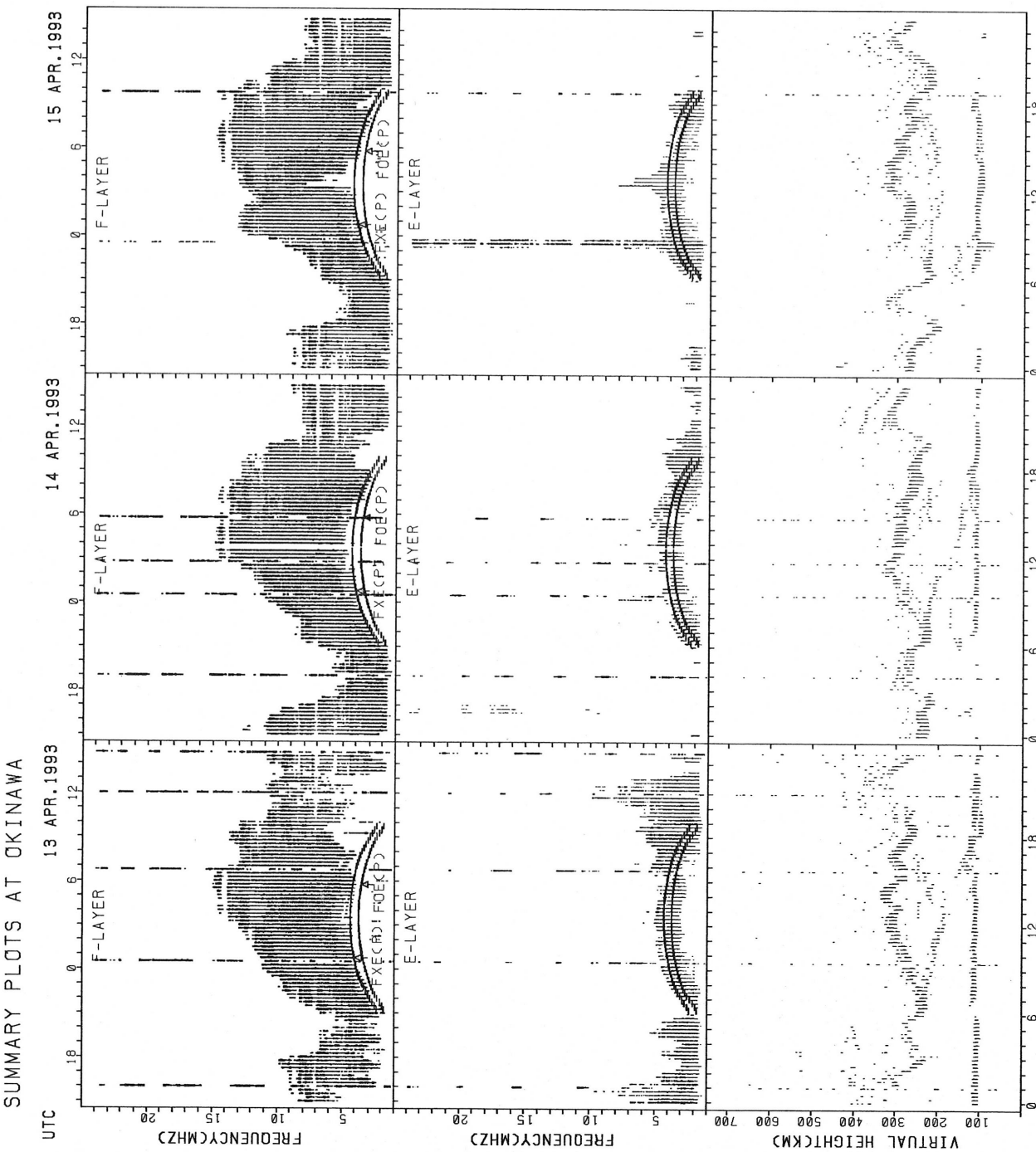

SUMMARY PLOTS AT OKINAWA
1 APR.1993
2 APR.1993
3 APR.1993
4 APR.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA

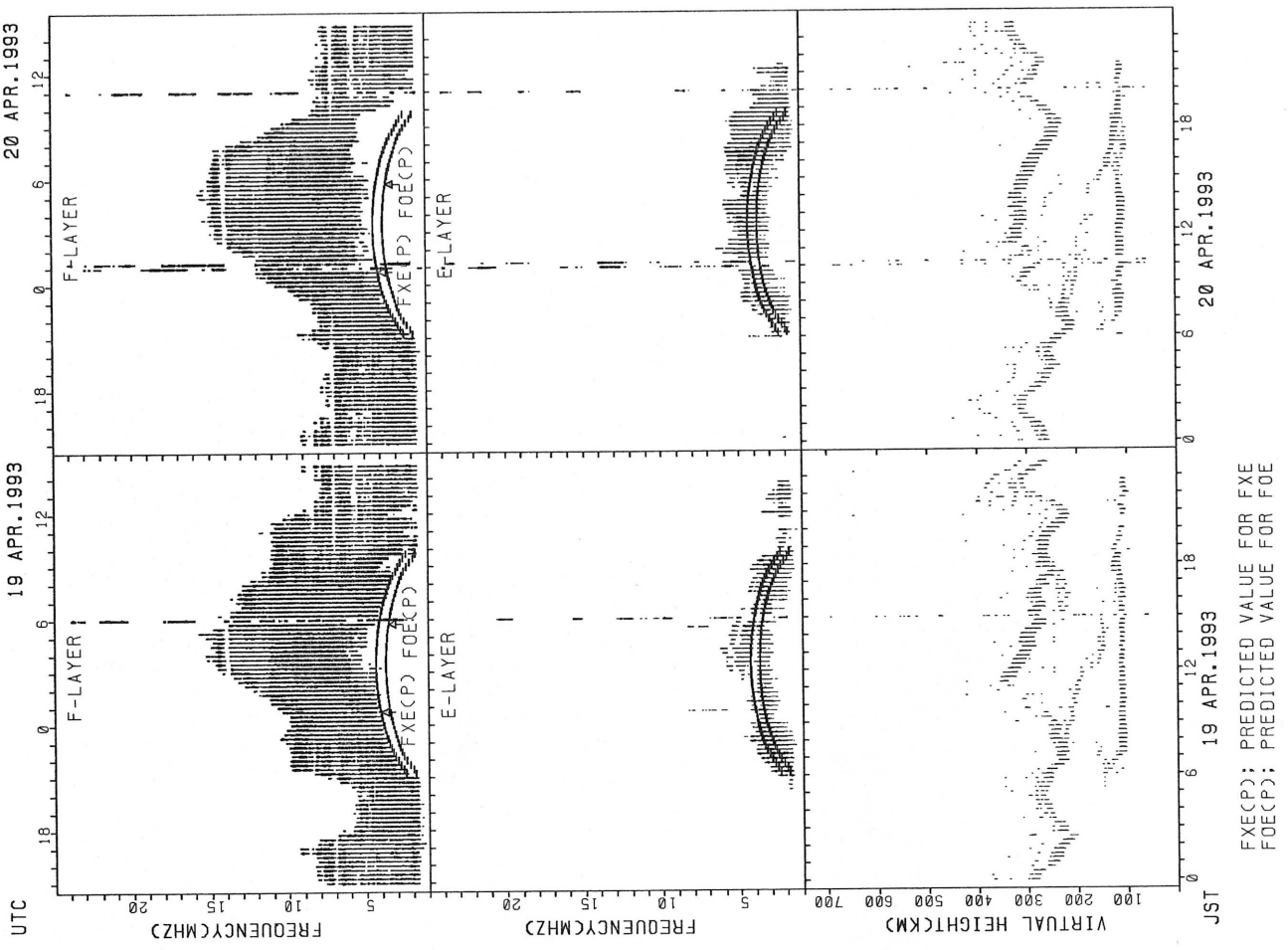


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

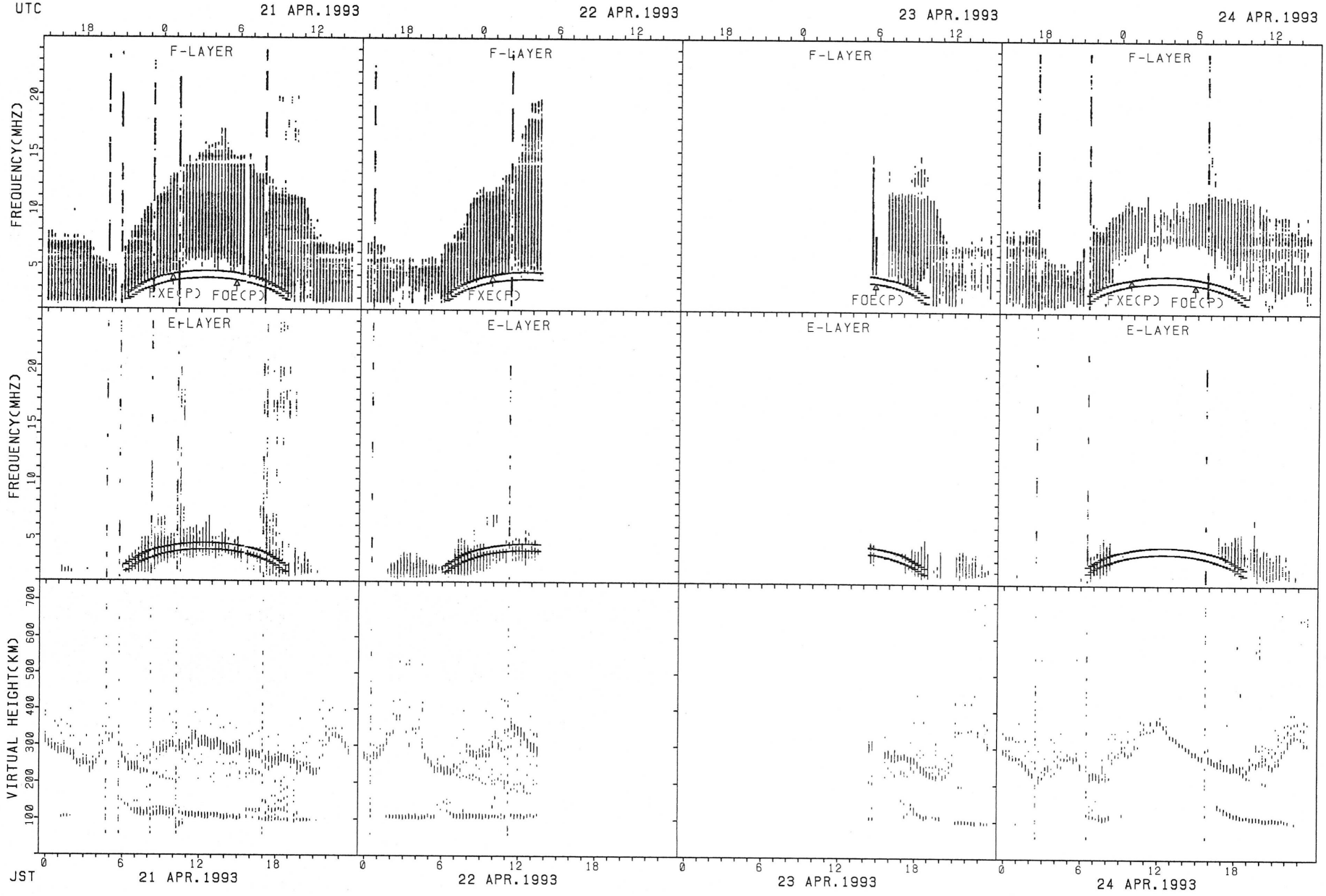

SUMMARY PLOTS AT OKINAWA
9 APR.1993
10 APR.1993
11 APR.1993
12 APR.1993
UTC
JST
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
13 APR.1993
14 APR.1993
15 APR.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

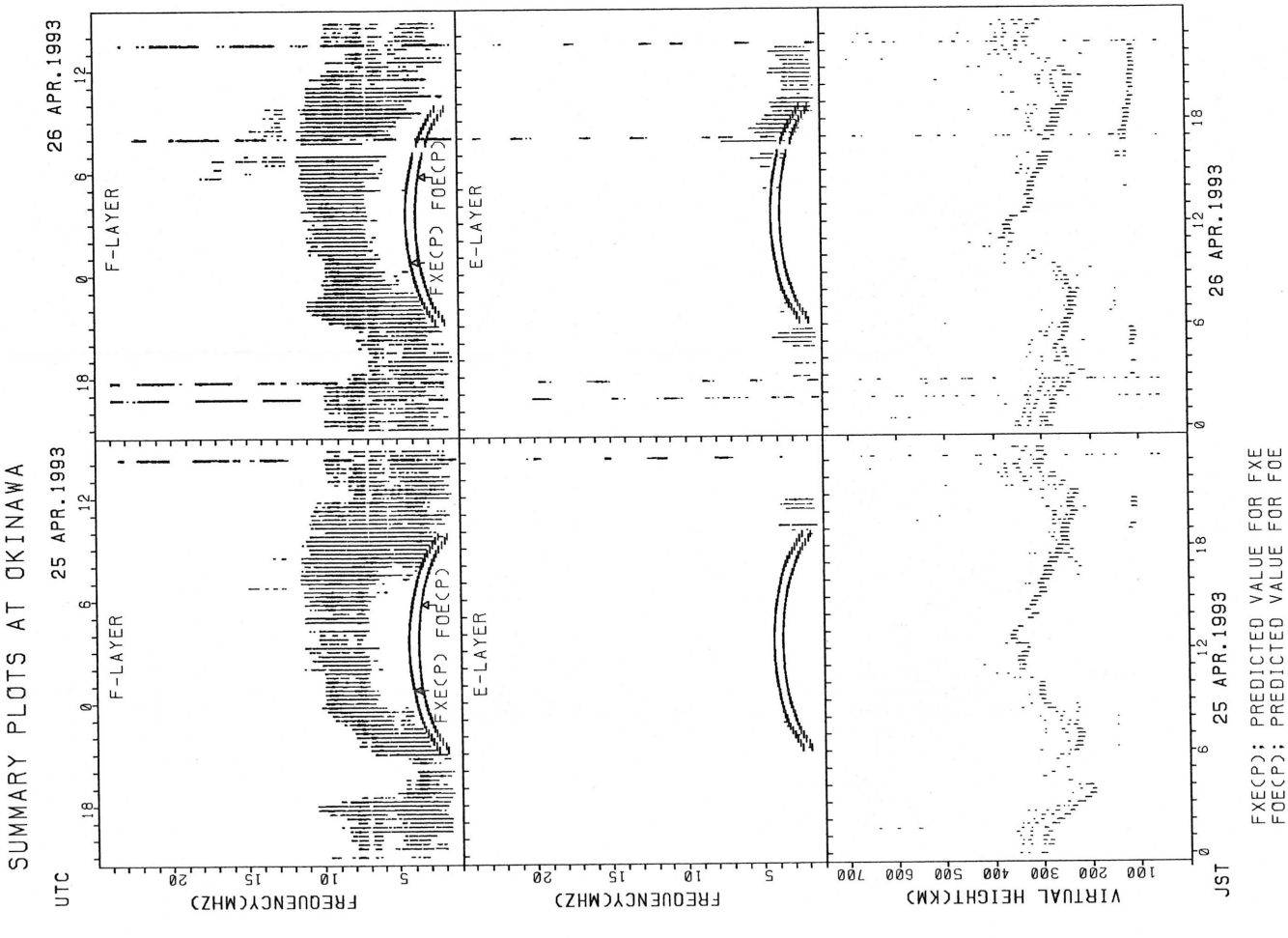
SUMMARY PLOTS AT OKINAWA

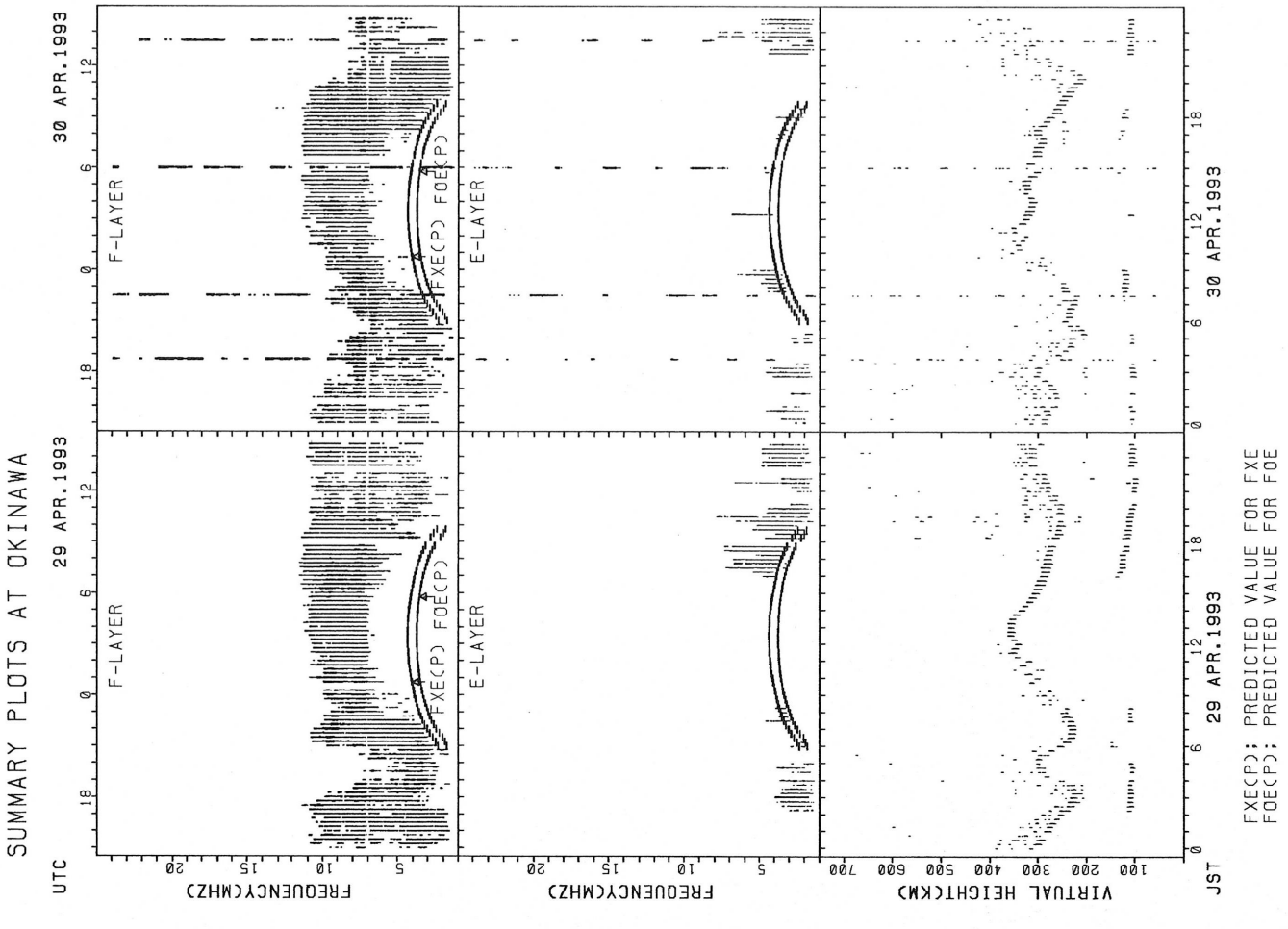


SUMMARY PLOTS AT OKINAWA



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


SUMMARY PLOTS AT OKINAWA
UTC
25 APR.1993
26 APR.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
29 APR.1993
30 APR.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

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

STATION WAKKANAI LAT. 45.4N LON. 141.7E

H'F

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							11	17	15								24	18	14	14	10			
MED							18	268	254								275	259	262	245	17			
U Q							266	286	288								291	280	282	284	292			
L Q							16	26	20								149	33	22	16	16			

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								10										11						
MED								119										127						
U Q								286										280						
L Q								22										17						

STATION KOKUBUNJI LAT. 35.7N LON. 139.5E

H'F

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							11	12	10								10	13	12	11				
MED							264	262	266								272	264	260	264				
U Q							276	276	290								284	281	292	288				
L Q							248	181	248								268	127	186	226				

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																		14	14	12				
MED																		124	117	115				
U Q																		266	266	192				
L Q																		101	107	113				

MONTHLY MEDIANS OF H'F AND H'ES

APR. 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	12							17	19	11							24	24	24	25	14			
MED	326							246	254	262							272	265	258	262	270			
U Q	362							256	276	274							284	274	270	271	332			
L Q	306							231	240	129							268	253	255	248	238			

H'ES

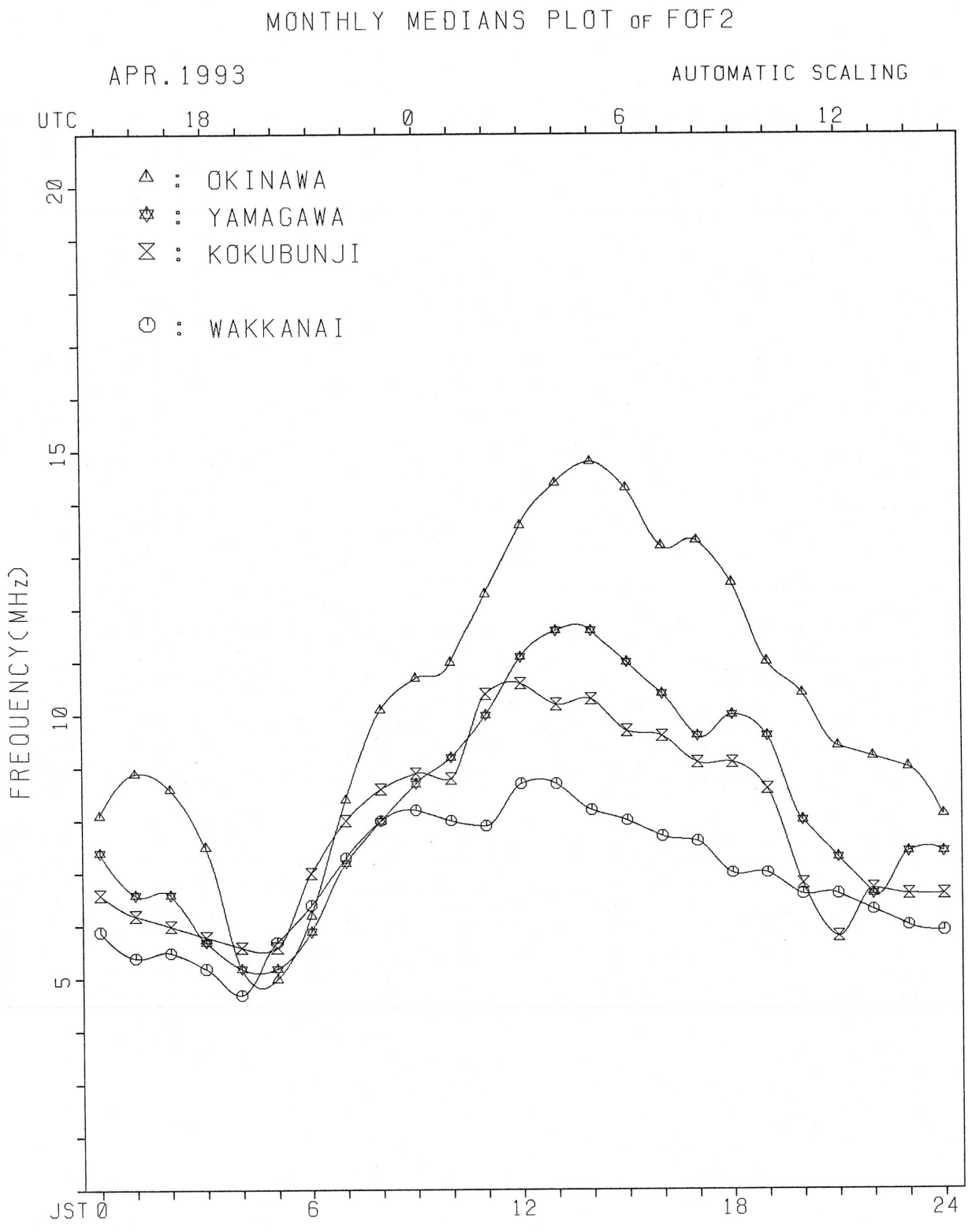
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							11	13	16	10							13	11	14	17	17	11		
MED							151	161	143	124							268	258	129	115	113	109		
U Q							270	243	242	268							279	276	258	258	151	252		
L Q							127	134	120	119							130	115	119	112	108	101		

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	20	23	20	13			10	27	31	27							27	28	28	29	31	22	18	16
MED	311	306	282	252			268	246	248	268							276	266	258	250	258	299	333	333
U Q	352	332	309	267			294	264	264	290							286	276	264	260	276	326	344	345
L Q	272	280	272	232			159	232	240	252							268	258	249	237	234	272	318	295

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	10		10				16	26	31	26	20	13	12	16	14	14	24	29	29	24	23	16	16	13
MED	281		275				155	161	121	124	113	111	115	153	140	134	122	129	121	118	113	138	138	115
U Q	354		312				173	242	171	264	116	115	148	172	157	155	274	219	257	249	262	290	325	333
L Q	113		151				129	137	115	113	111	110	110	112	109	113	113	117	115	113	109	109	109	110


MONTHLY MEDIANS PLOT OF FOF2
APR. 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

APR. 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

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	X 69	X 68	X 67	X 66	X 59	X 61														X 101	X 64	X 65	X 65	X 68
2	X 63	X 63	X 65	X 64	X 54	X 54														X 95	X 69	X 70	X 71	X 71
3	X 70	X 68	X 68	X 67	X 60	X 61														C	C	C	C	C
4	C	C	C	C	C	C														C	C	C	C	C
5	C	C	C	C	C	C														X 86	X 83	X 82	X 86	X 85
6	X 84	X 71	X 68	X 71	X 84															C	C	C	C	C
7	C	C	C	C	C															C	C	C	C	C
8	C	C	C	C	C															C	C	C	C	C
9	C	C	C	C	C															C	C	C	C	C
10	C	C	C	C	C															C	C	C	C	C
11	C	C	C	C	C															C	C	C	C	C
12	C	C	C	C	C															X 66	X 64	X 65	X 64	X 65
13	X 64	X 62	X 62	X 59	X 58															X 108	X 65	X 73	X 70	X 79
14	X 80	O X 69	X 64	X 58	X 60															X 81	X 69	X 70	X 72	S
15	X 71	X 70	X 70	X 59	X 56															X 112	X 57	X 61	X 63	X 62
16	X 62	X 61	X 64	X 55	X 42															X 87	X 66	X 64	X 64	O X 63
17	X 63	X 63	X 68	X 57	S															X 85	X 81	X 67	X 68	X 67
18	65	X 63	C	C	C															C	C	C	C	C
19	C	C	C	C	C															X 83	X 83	X 75	X 76	X 78
20	X 72	X 65	X 63	X 62	X 64															X 70	X 63	X 63	X 66	S
21	X 61	X 62	X 62	X 59	X 54															X 83	X 80	S	S	X 64
22	X 59	X 59	X 53	X 52	X 54															X 85	X 80	X 62	X 57	X 61
23	X 59	X 59	X 59	X 47	X 39															X 73	X 70	X 56	X 63	X 59
24	C	C	X 58	S	X 51															X 73	X 70	X 72	X 72	X 74
25	X 72	X 68	X 67	X 59	X 58															X 91	X 81	X 73	X 78	X 78
26	X 75	X 73	X 70	X 67	X 64															X 91	X 83	X 71	X 74	X 72
27	X 74	X 75	X 75	X 64	X 58															X 97	X 84	X 75	O X 77	O X 77
28	X 76	X 73	O X 71	X 66	X 64															X 98	X 86	X 75	X 76	X 76
29	X 75	X 74	X 76	X 63	X 56															X 96	X 81	X 75	X 76	X 77
30	X 78	X 77	X 70	X 68	X 66															X 90	X 82	X 68	X 72	X 67
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	20	20	20	19	19	3														21	21	20	20	19
MED	X 70	X 68	X 67	X 62	X 58	X 61														X 87	X 80	X 70	X 72	X 71
U Q	X 75	X 72	X 70	X 66	X 64	X 61														X 96	X 82	X 74	X 76	X 77
L Q	X 63	X 62	X 62	X 58	X 54	X 54														X 82	X 66	X 64	X 64	X 64

IONOSPHERIC DATA STATION KOKUBUNJI

APR. 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	64	62	61	60	53	55	69	82	99	109	113	119	111	109	108	107	98	R 102	108	95	58	59	59	62
2	57	57	59	58	48	48	67	84	97	99	108	116	R 118	119	R 119	110	104	101	103	89	63	64	65	65
3	64	62	62	61	54	55	75	84	87	95	96	105	108	106	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	75	79	C	C	C	C	C	C	99	99	80	77	S 75	80	79
6	78	64	62	65	78	86	R 99	80	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	C	104	109	I C 104	107	109	96	I C 84	60	58	59	58	59
13	58	56	56	53	52	53	66	78	83	79	95	93	C	C	C	C	C	C	J R 101	102	59	67	64	73
14	74	63	58	52	54	54	61	62	I C 66	76	I C 84	I C 94	96	I C 94	I C 94	96	I C 84	76	75	75	63	64	66	I S 66
15	65	64	64	54	50	52	59	66	78	85	94	I C 101	I C 98	97	I C 96	97	95	92	98	106	H 50	55	57	56
16	56	55	58	49	S 36	45	55	57	70	95	114	94	89	97	94	96	102	97	99	81	60	58	58	57
17	57	57	62	51	I S 34	39	63	71	80	79	79	89	92	89	90	78	81	79	78	79	75	61	63	61
18	F 57	57	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	C	84	84	98	99	92	84	84	80	72	77	77	69	U S 70	72
20	66	59	57	56	58	60	66	69	72	71	C	C	C	C	C	C	C	91	80	64	57	J R 57	60	I S 58
21	55	56	56	53	48	54	63	58	62	I R 68	84	93	88	81	84	85	72	65	67	77	74	I S 66	I S 58	58
22	53	53	47	46	48	57	57	I S 54	V 60	U R 63	73	J R 86	R 102	R 92	78	71	71	70	73	79	74	56	51	55
23	53	53	53	41	33	42	56	59	62	I S 71	72	R 81	92	87	I S 82	83	78	70	68	67	64	50	57	53
24	C	C	52	I S 48	45	50	64	69	74	87	80	84	101	R 101	104	98	91	U S 88	I S 82	67	64	66	66	68
25	66	62	61	54	52	57	67	71	76	80	89	J R 101	J R 114	J R 106	107	102	97	88	86	85	75	67	72	72
26	69	67	64	J S 61	58	60	I S 78	89	97	91	83	85	93	96	100	96	I C 95	90	91	86	77	65	68	66
27	68	69	69	58	52	59	76	80	82	85	87	99	110	117	117	113	108	97	94	91	78	69	71	71
28	70	67	U S 65	60	58	62	74	83	80	79	87	95	99	100	93	87	89	89	95	92	80	69	70	70
29	69	68	70	57	50	55	75	79	84	85	89	95	92	89	92	95	97	98	98	90	75	69	70	71
30	72	71	64	62	60	R 64	80	82	75	70	82	86	83	82	89	86	82	77	76	84	76	62	66	61
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	20	20	20	20	20	20	20	20	19	20	20	19	19	19	18	18	18	20	21	21	21	21	21	21
MED	64	62	61	55	52	55	66	74	78	80	86	94	98	97	94	96	93	90	86	81	74	64	65	65
U Q	69	66	64	60	56	60	75	82	84	89	94	101	108	106	104	102	98	97	98	90	76	68	70	71
L Q	57	56	56	52	48	51	62	64	70	73	81	86	92	89	90	85	82	78	76	76	60	58	58	58

IONOSPHERIC DATA STATION KOKUBUNJI

APR. 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	U L 540	U L 540	L	L	L	U L 520	L							
2									L	U L 540	L	L	L	L	L	L	L							
3									U L 450	L	U L 500	L 540	U L 550	L	C	C	C	C	C					
4								C	C	C	C	C	C	C	C	C	C	C	C					
5								C	C	L 410	L	C	C	C	C	C	C	C	C					
6								L	C	C	C	C	C	C	C	C	C	C	C					
7								C	C	C	C	C	C	C	C	C	C	C	C					
8								C	C	C	C	C	C	C	C	C	C	C	C					
9								C	C	C	C	C	C	C	C	C	C	C	C					
10								C	C	C	C	C	C	C	C	C	C	C	C					
11								C	C	C	C	C	C	C	C	C	C	C	C					
12								C	C	C	C	C	L 510	L 520	I C 520	L 480	U L 450	L						
13								L 430	U L 450	L	500	U L 520	C	C	C	C	C	C						
14								L		L 490	I C 500	I C 500	U L 510	A	C	L 470	C	L						
15									L	U L 480	L 490		I C 500	U L 535	I C 500	U L 500	U L 470	L						
16									L	L 500	L 480	U L 500	530	480	L 470	L 450	L	L 300						
17								L	L	U L 480	L 490	500	U L 500	L 490	L 500	L 450	U L 480	L						
18								C	C	C	C	C	C	C	C	C	C	C	C					
19								C	C	C	L	L	530	U L 515	U L 500	U L 500	U L 420	L						
20								L	U L 460	480	C	C	C	C	C	C	C	L						
21								L	460	460	500	510	520	L 500	500	L 490	L							
22								L	490	520	L 540	U L 520	510	500	490	L 450	L	L						
23								L	L 460	I S 500	U A 500	U L 520	530	L 530	A	U L 480	L	L						
24								L	U L 500	500	L 510		550	520	L 530	U L 500	U L 480	L						
25								L	U L 530	L	U L 560	550	520	530	L	L	U L 470							
26								L	U L 500	A	U L 500	L	540	L	510	L	C	L						
27								L	U L 505	L	L 520	540	U L 560	550	510	520	U L 470	L	L					
28								L	U L 470	L 530	L 550	L	540	L 550	L 530	U L 520	L	L	L					
29							L	L	U L 500	U L 510	L 530	510	540	U L 600	L	L 510	L 480	L						
30								L	L 520	L	L 510	Y	530	L	A	B	A	L						
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								1	13	13	17	12	17	13	11	14	8	1						
MED								L 430	U L 490	L 500	L 500	520	530	L 520	500	L 495	U L 470	L 300						
U Q									U L 502	L 515	L 535	540	540	L 542	L 520	L 510	U L 480							
L Q									L 460	480	L 500	505	U L 510	500	500	L 470	U L 460							

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

IONOSPHERIC DATA STATION KOKUBUNJI

APR. 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							200	255	310	340	R	R 370	A	A	R	330	285	U S 235	B					
2							H 205	H 270	315	R	R 350	365	360	360	R 360	340	290	250	B					
3							190	270	295	340	U R 355	R 375	B	R	C	C	C	C	C					
4							C	C	C	C	C	C	C	C	C	C	C	C	C					
5							C	C	C	A	A	C	C	C	C	C	C	240	B					
6						B	A	265	C	C	C	C	C	C	C	C	C	C	C					
7							C	C	C	C	C	C	C	C	C	C	C	C	C					
8						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
9						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
10						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
11						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
12						C	C	C	C	C	C	C	370	365	I C 355	340	290	250	C					
13						B	205	270	315		A	A 360	A	C	C	C	C	C	A					
14						S	195	275	I C 310	350	I C 355	I C 370	385	C	C	310	I C 280	245	150					
15						B	200	I S 275	315	340	350	I C 350	I C 355	365	I C 360	345	290	240	A					
16						B	200	270	310	330	350	R	360	370	A	A	280	A	A 160					
17						B	210	275	315	345	355	355	R	350	R 350	320	290	245	A					
18						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
19						C	C	C	C	C	350	A	R 360	U S 355	B	U R 330	305	255	B					
20						B	215	280	310	340	C	C	C	C	C	C	C	B	A					
21						B	235	285	315	B	B	A	B	B	B	340	R	R	A					
22						B	S	285	335	U R 350	A	A	B	R	355	330	285	250	A					
23						B	240	295	330	I S 345	355	B	B	A	S	B	325	250	175					
24						150	220	295	330	B	A	A	S	B	A	B	R	270	A					
25						145	235	290	S	B	B	B	B	A	A 355	A 335	A	A	B					
26						B	S	S	R	R 360	B	B	B	R	B	B	C	265	155					
27						155	B	B	R 325	B	B	B	A	A	B	B	325	B	175					
28						155	250	U S 285	R 340	355	R	B	B	B	370	355	320	U A 275	170					
29						H 175	235	U S 290	335	A	A	A	A	B	A	A	A 310	255	A					
30						170	B	295	330	R 335	A	A	B	B	B	B	305	255	A					
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						6	15	18	17	12	8	7	6	6	7	11	14	15	6					
MED						155	210	278	315	342	352	365	360	362	355	335	290	250	165					
U Q						170	235	290	330	350	U 355	370	370	365	360	340	310	255	175					
L Q						150	200	270	310	340	350	355	360	355	355	330	285	245	155					

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

IONOSPHERIC DATA STATION KOKUBUNJI

APR. 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	E B 14	E B 15	E B 15	E B 13	E B 13	E B 14	G	G	G	G	G	G	37	44	G 34	36	G 20	G 22	J A 27	E B 14	E B 13	E B 16	E B 14	E B 14
2	E B 14	E B 13	E B 13	E B 13	E B 13	E B 15	G	G	34	35	G	38	40	39	G	38	G 21	G	25	20	E B 13	E B 15	E B 15	E B 15
3	E B 15	E B 15	25	J A 17	E B 13	E B 14	G	G	G	G	39	G	E B 37	G	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	J A 38	J A 42	C	C	C	C	C	C	26	E B 17	E B 14	E B 13	E B 14	E B 13	E B 13
6	J A 33	J A 22	E B 13	E B 14	E B 14	E B 16	28	33	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	C	G	G	C	G	30	28	C	19	E B 14	E B 14	E B 15	E B 14
13	E B 15	E B 14	E B 15	E B 14	E B 15	E B 14	G	G	G	36	37	42	C	C	C	C	C	C	18	E B 13	E B 13	E B 13	20	E B 14
14	E B 14	18	17	E B 13	E B 14	E S 16	24	G	C	38	C	C	49	C	C	G	C	G	J A 34	J A 44	J A 55	J A 54	35	J A 48
15	J A 31	21	E B 14	E B 16	E S 20	E B 14	G	E S 30	36	38	J A 87	C	C	43	C	37	32	32	J A 31	19	E B 13	J A 20	19	E B 14
16	E B 14	E B 15	E B 14	E B 15	E B 13	E B 13	G	G	G	G	41	42	38	41	35	35	G	24	20	E B 13	E B 15	E B 15	E B 13	E B 14
17	E B 13	E B 14	E B 13	E B 13	E B 13	E B 14	G	30	34	G	G	G	G 29	38	G	G	G	G 17	27	22	E B 14	E B 14	E B 15	E B 13
18	E B 14	E B 14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	C	40	J A 43	G	G	E B 37	G	34	30	J A 35	22	18	21	E B 16	E B 14
20	E B 14	E B 14	E B 13	E B 13	E B 14	E B 13	27	31	34	G	C	C	C	C	C	C	C	E B 36	18	E B 19	E B 20	24	E B 20	E B 18
21	E B 15	E B 13	E B 14	E B 13	E B 16	17	G	G	34	E B 41	E B 41	J A 51	E B 50	E B 43	E B 40	G	G 24	G 23	29	E B 20	E B 14	S	S	E B 16
22	E S 31	E B 14	E B 16	E B 13	E B 21	E B 20	E S 44	G	G	G	41	42	E B 41	G	G	G	G	28	21	E B 15	E B 14	J A 30	J A 24	J A 22
23	E B 15	E B 13	E B 14	21	E B 14	E B 16	G	33	39	S	J A 53	J A 52	E B 43	J A 50	E S 36	E B 34	37	G	J A 31	J A 40	J A 25	J A 22	J A 24	E B 13
24	C	C	E B 13	E S 20	E B 15	G	G	33	36	E B 39	38	41	E S 42	E B 42	J A 51	E B 35	G	34	69	45	18	24	23	E B 13
25	E B 13	E B 14	E B 13	E B 13	E B 13	G	27	33	38	43	51	J A 51	46	47	J A 76	41	J A 43	28	53	J A 47	J A 47	45	J A 34	E B 14
26	E B 14	E B 13	E B 13	E B 15	J A 14	E B 17	E S 30	E S 34	G	J A 96	45	E B 42	E B 42	G 32	E B 41	E B 33	C	30	22	41	J A 43	J A 19	E B 13	E B 16
27	E B 14	E B 14	E B 14	E B 13	E B 13	G	E B 29	E B 33	40	E B 40	E B 43	E B 42	41	40	E B 38	E B 37	G	E B 30	G	J A 50	J A 47	J A 33	28	J A 44
28	J A 22	J A 21	J A 28	J A 23	E B 13	G	27	G	G	G	J A 34	E B 46	E B 41	E B 41	41	38	G	37	24	J A 21	22	J A 24	E B 13	20
29	20	E B 13	E B 13	E B 13	E B 13	G	27	35	38	41	39	42	40	E B 40	43	36	40	39	J A 37	35	J A 21	E B 18	E B 14	E B 15
30	E B 14	E B 13	E B 14	E B 13	E B 14	G	E B 32	33	36	50	J A 49	44	E B 45	E B 48	J A 55	E B 48	J A 52	J A 64	44	J A 33	J A 43	J A 53	J A 52	J A 32
31																		~						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	20	20	20	20	20	20	20	20	18	19	19	17	18	18	15	18	16	20	20	21	21	20	20	21
MED	E B 14	E B 14	E B 14	E B 13	E B 14	E B 16	G	G	34	E G 38	40	42	39	E G 40	37	G	G	28	27	21	E B 18	20	E B 18	E B 14
U Q	18	15	15	16	E B 14	G	E 28	33	36	41	J A 45	J A 45	E B 43	43	J A 43	37	36	33	34	J A 40	J A 34	J A 27	J A 24	J A 19
L Q	E B 14	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	G	G	G 37	G 40	G 37	G	G	G	G	G	20	E B 17	E B 14	E B 15	E B 14	E B 14

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 14	E B 15	E B 15	E B 13	E B 13	E B 14	G	G	G	G	G	G	U Y 37	38	U G 34	35	G 19	G 19	24	E B 14	E B 13	E B 16	E B 14	E B 14
2	E B 14	E B 13	E B 13	E B 13	E B 13	E B 15	G	G	34	35	G	37	40	38	G	37	G 20	G	24	17	E B 13	E B 15	E B 15	E B 15
3	E B 15	E B 15	E B 13	E B 13	E B 13	E B 14	G	G	G	G	39	G	E B 37	G	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	35	36	C	C	C	C	C	C	25	E B 17	E B 14	E B 13	E B 14	E B 13	E B 13
6	22	E B 14	E B 13	E B 14	E B 14	E B 16	26	27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	C	G	G	C	G	30	27	C	E B 13	E B 14	E B 14	E B 15	E B 14
13	E B 15	E B 14	E B 15	E B 14	E B 15	E B 14	G	G	G	34	37	41	C	C	C	C	C	C	17	E B 13	E B 13	E B 13	E B 14	E B 14
14	E B 14	15	15	E B 13	E B 14	E S 16	23	G	C	37	C	C	47	C	C	G	C	G	27	36	19	E B 14	23	41
15	E B 14	E B 14	E B 14	E B 16	E S 20	E B 14	G	E S 30	34	37	42	C	C	39	C	37	31	31	30	19	E B 13	15	E B 14	E B 14
16	E B 14	E B 15	E B 14	E B 15	E B 13	E B 13	G	G	G	G	40	41	37	38	35	32	G	24	18	E B 13	E B 15	E B 15	E B 13	E B 14
17	E B 13	E B 14	E B 13	E B 13	E B 13	E B 14	G	30	33	G	G	G	U G 29	37	G	G	G	G 16	26	15	E B 14	E B 14	E B 15	E B 13
18	E B 14	E B 14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	C	40	39	G	G	E B 37	G	33	28	31	16	E B 13	E B 14	E B 16	E B 14
20	E B 14	E B 14	E B 13	E B 13	E B 14	E B 13	27	31	33	G	C	C	C	C	C	C	C	E B 36	U Y 18	E B 19	E B 20	U Y 22	E B 20	E B 18
21	E B 15	E B 13	E B 14	E B 13	E B 16	16	G	G	34	E B 41	E B 41	47	E B 50	E B 43	E B 40	G	G 23	G 23	U Y 28	E B 20	E B 14	S	S	E B 16
22	E S 31	E B 14	E B 16	E B 13	E B 21	E B 20	E S 44	G	G	G	U Y 41	42	E B 41	G	G	G	G	U Y 28	21	E B 15	E B 14	20	E B 14	15
23	E B 15	E B 13	E B 14	15	E B 14	E B 16	G	31	36	S	50	46	E B 43	44	E S 36	E B 34	35	G	28	38	21	17	21	E B 13
24	C	C	E B 13	E S 20	E B 15	G	G	32	35	E B 39	37	41	E S 42	E B 42	50	E B 35	G	34	68	44	16	20	E B 13	E B 13
25	E B 13	E B 14	E B 13	E B 13	E B 13	G	U Y 26	33	37	41	49	46	46	44	50	41	40	28	46	42	36	35	20	E B 14
26	E B 14	E B 13	E B 13	E B 15	13	E B 17	E S 30	E S 34	G	65	44	E B 42	E B 42	G 32	E B 41	E B 33	C	29	22	34	18	16	E B 13	E B 16
27	E B 14	E B 14	E B 14	E B 13	E B 13	G	E B 29	E B 33	39	E B 40	E B 43	E B 42	U Y 41	U Y 40	E B 38	E B 37	G	E B 30	G	29	32	32	27	30
28	17	16	22	16	E B 13	G	27	G	G	G	U G 34	E B 46	E B 41	E B 41	41	37	G	35	23	19	E B 13	23	E B 13	E B 14
29	E B 13	E B 13	E B 13	E B 13	E B 13	G	27	34	36	39	39	42	40	E B 40	40	35	37	37	34	31	18	E B 18	E B 14	E B 15
30	E B 14	E B 13	E B 14	E B 13	E B 14	G	E B 32	33	36	46	45	U Y 44	E B 45	E B 48	55	E B 48	45	42	36	30	18	23	20	23
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	20	20	20	20	20	20	20	20	18	19	19	17	18	18	15	18	16	20	20	21	21	20	20	21
MED	E B 14	E B 14	E B 14	E B 13	E B 14	E B 16	G	E G 28	34	E G 35	40	42	39	E G 38	37	E G 34	G	27	25	19	E B 14	16	E B 14	E B 14
U Q	E 15	E B 14	E B 14	E 15	E B 14	G	E 27	32	36	40	43	45	E B 43	E B 42	41	37	34	32	30	32	18	21	20	16
L Q	E B 14	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	G	G	G 36	G 38	G 37	G	G	G	G	G	20	E B 14	E B 13	E B 14	E B 14	E B 14

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

IONOSPHERIC DATA STATION KOKUBUNJI

APR. 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

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	15	15	13	13	14	15	14	17	20	22	24	22	20	22	18	14	13	13	14	13	16	14	14
2	14	13	13	13	13	15	16	14	18	19	21	21	22	21	20	21	17	15	14	14	13	15	15	15
3	15	15	13	13	13	14	14	14	14	19	22	23	37	23	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	15	23	C	C	C	C	C	C	14	17	14	13	14	13	13
6	14	14	13	14	14	16	15	17	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	C	35	31	C	21	17	15	C	13	14	14	15	14
13	15	14	15	14	15	14	16	14	20	19	21	27	C	C	C	C	C	C	14	13	13	13	14	14
14	14	14	14	13	14	ES 16	14	18	C	18	C	C	32	C	C	17	C	14	12	15	14	14	13	15
15	14	14	14	16	ES 20	14	13	ES 30	15	20	24	C	C	22	C	17	13	14	13	15	13	13	14	14
16	14	15	14	15	13	13	14	15	16	16	27	22	27	21	25	16	18	13	15	13	15	15	13	14
17	13	14	13	13	13	14	15	14	16	18	22	25	25	27	30	ES 28	14	13	13	12	14	14	15	13
18	14	14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	C	27	29	30	32	37	20	17	14	13	13	13	14	16	14
20	14	14	13	13	14	13	15	14	16	17	C	C	C	C	C	C	C	36	13	19	20	17	20	18
21	15	13	14	13	16	13	18	16	21	41	41	34	50	43	40	31	17	20	17	20	14	S	S	16
22	ES 31	14	16	13	21	20	ES 44	18	21	30	36	36	41	33	32	23	20	14	13	15	14	14	14	14
23	15	13	14	13	14	16	15	15	22	S	24	38	43	33	ES 36	34	ES 21	19	15	13	15	13	14	13
24	C	C	13	ES 20	15	13	20	18	ES 29	39	33	30	ES 42	42	22	35	20	21	16	ES 15	13	12	13	13
25	13	14	13	13	13	13	ES 20	20	ES 34	36	39	38	40	32	25	27	20	19	19	15	16	14	15	14
26	14	13	13	15	12	17	ES 30	ES 34	23	25	39	42	42	31	41	33	C	20	12	16	13	13	13	16
27	14	14	14	13	13	13	29	33	ES 24	40	43	42	36	35	38	37	21	30	14	14	13	13	13	14
28	12	13	13	13	13	14	15	16	20	30	33	46	41	41	32	26	23	20	12	13	13	13	13	14
29	13	13	13	13	13	13	16	20	21	32	34	36	34	40	30	27	20	19	13	13	15	18	14	15
30	14	13	14	13	14	16	32	23	ES 25	23	35	35	45	48	40	48	15	14	13	15	13	14	13	14
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	20	20	20	20	20	20	20	20	18	19	19	17	18	18	15	18	16	20	20	21	21	20	20	21
MED	14	14	14	13	14	14	16	16	18	20	27	34	36	32	31	25	18	15	13	14	13	14	14	14
U Q	14	14	14	14	14	16	20	20	ES 23	32	36	38	42	40	38	33	20	20	15	15	14	14	15	15
L Q	14	13	13	13	13	13	15	14	16	18	22	24	30	23	25	20	16	14	13	13	13	13	13	14

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	285	280	285	295	285	295	335	320	320	305	305	305	290	300	290	310	300	R 310	325	350	270	265	270	285
2	280	280	305	320	285	295	335	335	330	305	300	295	R 295	295	R 295	305	310	315	325	335	285	285	270	275
3	295	285	290	310	290	300	350	340	325	305	290	310	295	290	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	325	300	C	C	C	C	C	C	310	315	315	255	S 275	260	280
6	285	260	270	250	265	240	R 315	310	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	C	285	295	I C 295	295	315	330	I C 315	295	270	280	285	280
13	285	280	290	290	300	300	335	330	340	295	310	310	C	C	C	C	C	C	J R 310	320	315	270	270	285
14	315	310	290	270	275	300	335	315	I C 320	325	C	C	315	C	C	320	I C 320	320	320	315	285	265	265	S
15	280	285	310	320	280	295	330	330	315	310	300	C	C	310	I C 310	315	310	320	315	335	H 285	275	280	285
16	290	285	315	325	S 310	330	350	345	310	280	330	320	305	310	310	310	315	315	335	335	290	280	280	265
17	285	280	320	345	I S 325	305	350	340	335	325	315	300	320	325	325	335	320	330	315	315	325	280	290	295
18	F 285	290	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	C	315	300	305	305	315	315	340	335	310	300	310	295	U S 280	300
20	295	270	275	270	280	300	340	340	340	325	C	C	C	C	C	C	C	320	335	325	280	J R 265	280	I S 275
21	270	275	290	285	280	290	340	265	275	I R 280	285	315	325	295	320	320	340	325	310	290	310	S	S	280
22	275	305	260	260	260	315	320	I S 310	V 300	U R 295	280	J R 285	R 310	R 305	345	320	330	325	310	305	325	290	280	275
23	265	280	315	280	285	300	345	325	325	I S 325	320	R 300	300	310	I S 305	305	330	320	320	310	315	295	280	285
24	C	C	305	I S 295	290	300	330	315	320	320	310	265	280	R 295	300	310	320	U S 330	I S 320	310	280	275	270	275
25	290	280	300	285	295	320	340	320	315	290	285	J R 290	J R 300	J R 315	290	290	305	305	315	295	300	280	280	280
26	280	275	290	J S 290	300	305	I S 315	330	325	310	310	275	290	290	290	290	I C 300	310	315	310	310	280	270	265
27	265	290	305	305	290	305	330	340	315	305	285	275	280	290	290	290	290	310	310	305	300	270	290	270
28	275	280	U S 310	280	275	310	330	330	330	315	305	290	295	300	300	300	300	310	310	320	310	280	270	270
29	270	275	310	325	275	295	340	325	325	315	315	305	305	280	290	295	300	310	315	310	295	265	270	275
30	280	290	275	285	295	R 325	320	340	295	305	265	290	300	285	305	310	315	315	290	300	310	275	270	275
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	20	20	20	20	20	20	20	20	19	20	19	17	18	18	17	18	18	20	21	21	21	20	20	20
MED	282	280	295	290	285	300	335	330	320	308	305	300	300	298	300	310	315	318	315	310	300	278	275	278
U Q	288	288	310	315	295	308	340	340	330	322	315	308	305	310	312	315	320	325	320	322	310	280	280	285
L Q	275	278	288	280	278	295	330	318	315	300	285	288	290	290	290	295	300	310	310	302	282	270	270	275

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

IONOSPHERIC DATA STATION KOKUBUNJI

APR. 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	U L 345	U L 350	L	L	L	U L 360	L							
2									L	U L 335	L	L	L	L	L	L	L							
3									U L 390	L	U L 390	H 360	U L 340	L	C	C	C	C	C					
4							C	C	C	C	C	C	C	C	C	C	C	C	C					
5							C	C	C	L 405	L	C	C	C	C	C	C							
6								L	C	C	C	C	C	C	C	C	C	C	C					
7							C	C	C	C	C	C	C	C	C	C	C	C	C					
8						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
9						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
10						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
11						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
12						C	C	C	C	C	C	C	L 365	L 345	I C 345	L 345	U L 365	L	C					
13								L 370	U L 380	L	370	U L 355	C	C	C	C	C	C						
14								L	C	L 360	C	C	A	C	C	L 355	C	L						
15									L	U L 375	L 370	C	C	U L 355	I C 355	U L 360	U L 340	L						
16									L	L 375	L 405	U L 375	345	385	L 375	L 380	L	L 375						
17								L	L	U L 380	L 375	395	U L 340	L 365	L 355	L 380	U L 335	L						
18						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
19						C	C	C	C	C	L	L	340	U L 360	U L 370	U L 345	U L 370	L						
20								L	U L 370	380	C	C	C	C	C	C	C	L						
21								L	365	390	360	A 355	B	L 375	365	L 345	L							
22								L	335	355	L 335	U L 350	355	380	360	L 375	L	L						
23								L	L 365	S	A	U L 365	370	L 360		U L 360	L	L						
24								L	U L 350	370	L 380	Y	350	355	A	U L 345	L	L	A					
25								L	U L 330	L	U L 340	360	A 350	350	L	L	U L 360							
26								L	U L 360	A	U L 385	L	375	L	360	L	C	L						
27								L	U L 355	L	L 385	360	U L 345	345	360	330	U L 360	L	L					
28								L	U L 375	L 360	L 370	L	355	L 355	L 350	U L 340	L	L	L					
29							L	L	U L 355	U L 355	L 355	395	360	325	L	L 330	L 340	L						
30								L	L 355	L	365	Y	345	L	A	B	A	L						
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								1	13	12	15	11	14	13	10	14	7	1						
MED								L 370	U L 360	L 372	L 370	360	350	L 355	360	L 350	U L 360	L 375						
U Q									U L 372	380	L 385	375	360	370	L 365	L 360	U L 365							
L Q									L 352	L 358	L 355	U L 355	345	348	L 355	L 345	L 340							

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

IONOSPHERIC DATA STATION KOKUBUNJI

APR. 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

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									260	275	275	280	280	270	300	280	270							
2									250	280	270	275	290	285	275	270	265							
3									250	300	255	285	285	305	C	C	C	C	C					
4							C	C	C	C	C	C	C	C	C	C	C	C	C					
5							C	C	C	250	300	C	C	C	C	C	C							
6								260	C	C	C	C	C	C	C	C	C	C	C					
7							C	C	C	C	C	C	C	C	C	C	C	C	C					
8						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
9						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
10						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
11						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
12						C	C	C	C	C	C	C	285	290	C	295	260	245	C					
13								260	260	260	285	290	C	C	C	C	C	C						
14								300	I C 305	280	I C 285	I C 285	280	C	C	275	I C 250	255						
15									275	270	275	I C 285	I C 285	290	I C 275	285	285	265						
16									285	305	255	275	310	285	275	285	270	250						
17								245	250	260	275	300	280	270	285	270	280	255						
18						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
19						C	C	C	C	C	290	300	305	290	280	285	250	250						
20								255	275	290	C	C	C	C	C	C	C	260						
21								L 435	425	I S 340	335	290	285	295	305	290	255							
22								L 270	365	R 405	360	340	300	290	260	275	275	275						
23								290	310	I S 325	295	315	320	295		295	265	250						
24								255	300	295	270	390	335	300	300	285	270	260	A					
25								L 275	290	285	340	350	310	300	305	300	285							
26								270	265	A 285	275	310	330	325	320	300	C	275						
27								240	280	290	305	330	325	320	300	300	275	265	260					
28								250	260	300	315	320	310	305	300	300	305	270	270					
29							245	255	270	290	290	310	305	345	320	310	300	270						
30								260	340	320	400	335	330	L 355	310	290	280	285						
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							1	15	19	20	20	19	19	18	15	18	17	15	2					
MED							245	260	275	290	288	300	305	295	300	288	270	260	265					
U Q								275	305	302	310	330	320	305	305	300	282	270						
L Q								255	260	278	275	285	285	290	275	280	262	250						

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

IONOSPHERIC DATA STATION KOKUBUNJI

APR. 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	280	290	285	250	260	260	235	240	215	210	210	H 195	H 210	200	230	230	235	255	250	215	205	310	305	285
2	290	300	260	240	260	270	230	240	230	210	210	215	H 200	H 200	220	245	235	255	245	225	235	280	300	290
3	285	270	285	250	240	260	235	225	215	210	210	H 185	195	H 195	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	220	215	C	C	C	C	C	C	260	240	235	305	300	300	285
6	295	285	265	340	310	365	275	240	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	C	H 195	225	I C 225	225	240	245	I C 235	225	270	280	285	300
13	285	290	285	265	260	260	235	225	H 210	215	200	240	C	C	C	C	C	C	270	250	200	310	325	285
14	255	265	270	270	300	290	250	240	I C 225	220	I C 230	I C 245	A	C	C	215	I C 220	H 220	250	A 265	270	285	330	A 305
15	285	285	255	230	305	265	215	235	235	225	A 240	I C 220	I C 210	H 225	I C 215	240	245	A 250	265	235	H 180	305	300	275
16	280	290	255	220	255	245	225	230	H 220	H 205	H 190	220	H 200	230	220	210	H 210	235	240	215	230	270	290	295
17	300	285	240	200	255	270	235	230	230	220	210	200	220	215	215	220	220	240	245	240	230	255	285	280
18	270	285	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	C	205	200	220	215	220	230	230	245	240	260	245	255	280	250
20	265	305	300	300	295	260	230	240	230	220	C	C	C	C	C	C	C	B	235	240	275	255	315	300
21	300	305	275	265	290	280	250	250	225	235	235	A	B	235	215	240	235	E Y 245	E Y 285	280	255	I S 255	S	275
22	320	265	330	320	355	280	E S 270	245	225	235	230	250	240	225	210	215	215	S	250	255	235	240	290	315
23	315	290	250	235	290	275	240	230	225	I S 230	A	235	225	235	E S 245	215	255	235	A 255	A 270	A 250	275	300	305
24	C	C	260	295	280	275	245	235	225	210	215	235	210	235	A	235	240	A	A	E A 290	280	310	310	300
25	275	290	250	250	260	240	235	225	230	235	E A 280	235	A	215	A	A 245	E A 255	250	260	A 280	275	340	285	270
26	265	280	275	260	260	270	250	225	245	A	230	220	205	Y	H 210	225	C	240	255	250	240	245	290	320
27	320	295	250	235	260	245	240	230	230	220	215	215	230	230	240	220	245	235	250	250	A 255	A 305	320	340
28	300	290	290	280	280	265	240	225	215	210	H 195	B	215	H 195	215	230	235	E A 260	270	240	235	260	305	315
29	310	290	250	215	305	265	245	235	225	215	210	200	220	215	H 200	235	245	A	260	245	240	285	305	310
30	295	275	290	280	240	260	240	235	230	A	A 265	Y	E B 260	B	A	B	A	A 255	A 270	270	240	300	305	310
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	20	20	20	20	20	20	20	20	19	18	19	16	16	16	14	17	16	16	20	21	21	21	20	21
MED	288	290	268	255	270	265	239	235	225	220	212	220	211	220	216	230	235	245	250	248	240	280	300	300
U Q	300	290	285	280	298	275	248	240	230	225	A 230	235	222	230	225	238	245	255	262	A 268	270	305	308	310
L Q	278	282	252	235	260	260	235	228	220	210	210	200	H 202	H 208	215	218	225	238	242	235	232	255	290	282

IONOSPHERIC DATA STATION KOKUBUNJI

APR. 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							B 160	115	115	110	115	115	A	A	A	A 130	125	A 140	B					
2							150	115	115	A	115	115	120	115	115	A 130	120	120	B					
3							135	115	115	115	115	115	B	115	C	C	C	C	C					
4							C	C	C	C	C	C	C	C	C	C	C	C	C					
5							C	C	C	A	A	C	C	C	C	C	C	A 120	B					
6						B	A	115	C	C	C	C	C	C	C	C	C	C	C					
7							C	C	C	C	C	C	C	C	C	C	C	C	C					
8						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
9						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
10						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
11						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
12						C	C	C	C	C	C	C	B	120	I C 120	115	115	115	C					
13						B	125	115	120	115	A	A	C	C	C	C	C	C	A					
14						S	125	120	I C 115	115	I C 115	I C 115	B 130	C	C	115	I C 115	115	B 140					
15						B	125	I S 115	110	115	115	I C 120	I C 125	110	I C 115	105	105	115	A					
16						B	120	115	110	110	120	A	E Y 130	115	A	A	120	A	A					
17						B	120	110	115	115	115	115	A	115	B 130	S 125	115	120	A					
18						C	C	C	C	C	C	C	C	C	C	C	C	C	C					
19						C	C	C	C	C	120	A	120	130	B	115	115	115	B					
20						B	120	110	110	110	C	C	C	C	C	C	C	B	A					
21						B	135	120	115	B	B	A	B	B	B	130	A 120	A	A					
22						B	S	120	120	120	A	A	B	125	125	120	115	115	A					
23						B	120	115	115	I S 115	120	B	B	A	S	B	120	130	B 140					
24					140	130	120	120	B	A	A	S	B	110	B	120	125	A						
25					140	E S 145	120	S	B	B	B	B	A	115	120	A	A	B						
26						B	S	S	135	120	B	B	B	A	B	B	C	125	B 140					
27					B 190	B	B	S 130	B	B	B	B	A	A	B	B	120	B	B 140					
28					160	120	115	115	120	A	B	B	B	135	125	125	125	130						
29					150	125	125	120	130	A	A	A	B	A	A	A	120	A						
30					E B 160	B	120	125	A 130	A	A	B	B	B	B	110	120	A						
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						6	15	18	18	14	9	6	5	8	8	11	15	15	5					
MED						150	125	115	115	115	115	115	122	115	118	120	120	120	B 140					
U Q						160	135	120	120	120	120	U C 115	130	122	128	A 130	120	125	B 140					
L Q						140	120	115	115	115	115	115	120	115	115	115	115	115	135					

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

IONOSPHERIC DATA STATION KOKUBUNJI

APR. 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

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	B	B	B	B	B	B	G	G	G	G	G	G	115	110	110	E G 195	110	105	125	B	B	B	B	B
2	B	B	B	B	B	B	G	G	150	135	G	145	140	155	G	E G 190	110	G	135	120	B	B	B	B
3	B	B	110	110	B	B	G	G	G	G	E G 180	G	B	G	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	115	110	C	C	C	C	C	C	140	B	B	B	B	B	B
6	110	125	B	B	B	B	125	125	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	C	G	G	C	G	125	150	C	105	B	B	B	B
13	B	B	B	B	B	B	G	G	G	120	120	175	C	C	C	C	C	C	130	B	B	B	135	B
14	B	130	140	B	B	S	150	G	C	140	C	C	135	C	C	G	C	G	120	120	115	130	110	110
15	130	115	B	B	S	B	G	S	140	140	120	C	C	145	C	E G 175	E G 195	140	120	115	B	110	100	B
16	B	B	B	B	B	B	G	G	G	G	165	140	170	150	115	115	G	105	160	B	B	B	B	B
17	B	B	B	B	B	B	G	150	150	G	G	G	110	175	G	G	G	105	120	100	B	B	B	B
18	B	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
19	C	C	C	C	C	C	C	C	C	C	120	120	G	G	B	G	140	135	120	100	105	115	B	B
20	B	B	B	B	B	B	165	165	160	G	C	C	C	C	C	C	C	B	130	B	B	120	B	B
21	B	B	B	B	B	150	G	G	130	B	B	110	B	B	B	G	105	105	105	B	B	S	S	B
22	S	B	B	B	B	B	S	G	G	G	120	120	B	G	G	G	G	150	125	B	B	110	110	105
23	B	B	B	115	B	B	G	160	135	S	120	115	B	120	S	B	170	G	125	120	115	105	110	B
24	C	C	B	S	B	G	G	135	130	B	110	110	S	B	115	B	G	130	120	120	120	115	115	B
25	B	B	B	B	B	G	170	145	140	130	120	115	120	115	115	120	115	115	110	110	120	120	130	B
26	B	B	B	B	110	B	S	S	G	120	120	B	B	110	B	B	C	145	130	120	120	115	B	B
27	B	B	B	B	B	G	B	B	125	B	B	B	125	120	B	B	G	B	G	130	120	120	120	115
28	110	115	110	115	B	G	170	G	G	G	120	B	B	B	160	E G 180	G	130	120	115	120	115	B	120
29	110	B	B	B	B	G	150	145	135	130	125	120	125	B	110	110	130	125	120	115	120	B	B	B
30	B	B	B	B	B	G	B	160	160	130	120	125	B	B	125	B	125	120	115	115	110	110	110	110
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	4	4	3	3	1	1	6	8	11	9	14	11	8	9	7	7	10	15	18	14	10	12	9	5
MED	110	120	110	115	110	150	158	148	140	130	120	120	125	120	115	E G 175	122	130	120	115	120	115	110	110
U Q	120	128	140	115			170	160	150	138	120	140	138	152	125	E G 190	140	140	130	120	120	120	125	118
L Q	110	115	110	110			150	140	130	120	120	115	118	112	110	115	110	105	120	110	115	110	110	108

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

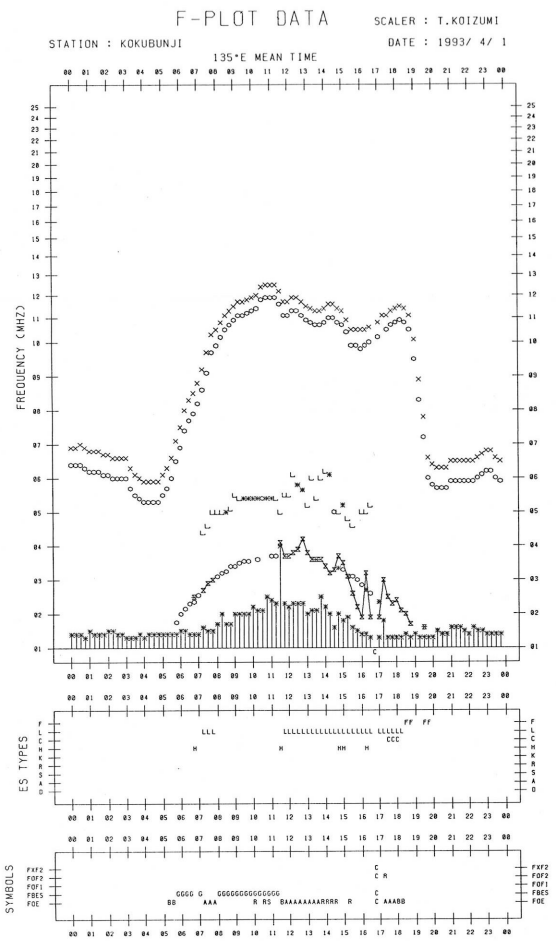
LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

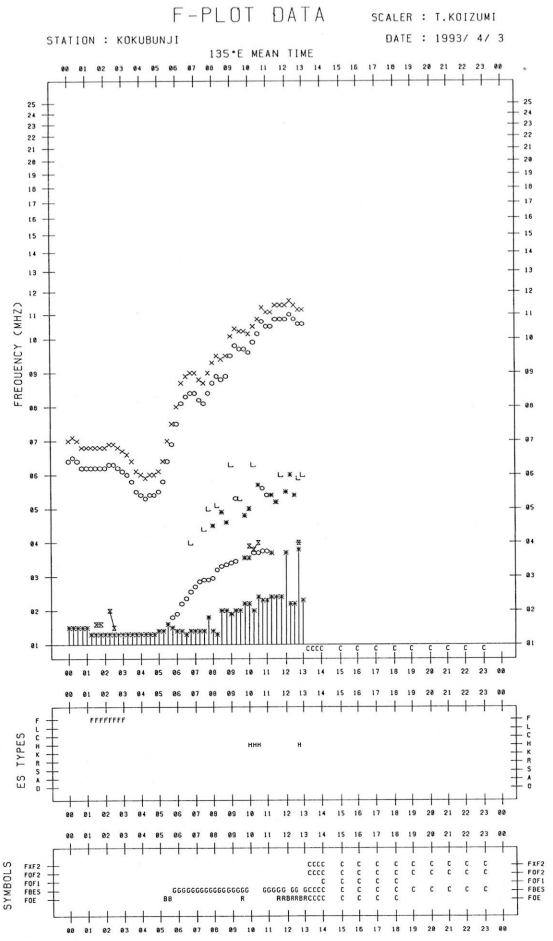
HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1													L 1	L 2	L 1	HL 11	L 1	L 2	CL 22					
2									H 1	CL 11		H 1	H 1	H 1		HL 11	L 1		C 2	F 1				
3			F 2	F 1							H 1													
4																								
5										C 1	L 1							HL 11						
6	F 3	F 1					C 1	C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

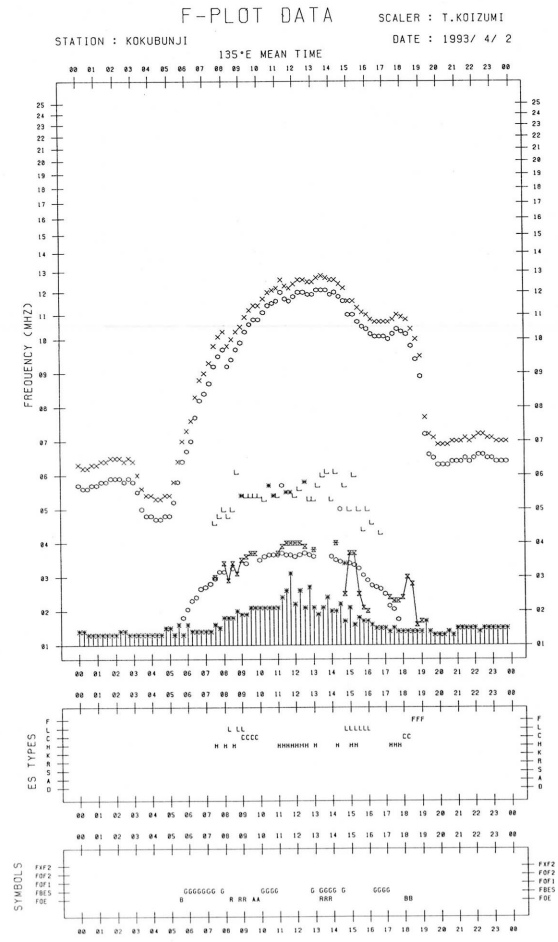
APR. 1993 TYPES OF ES COMMUNICATIONS RESEARCH LABORATORY, JAPAN

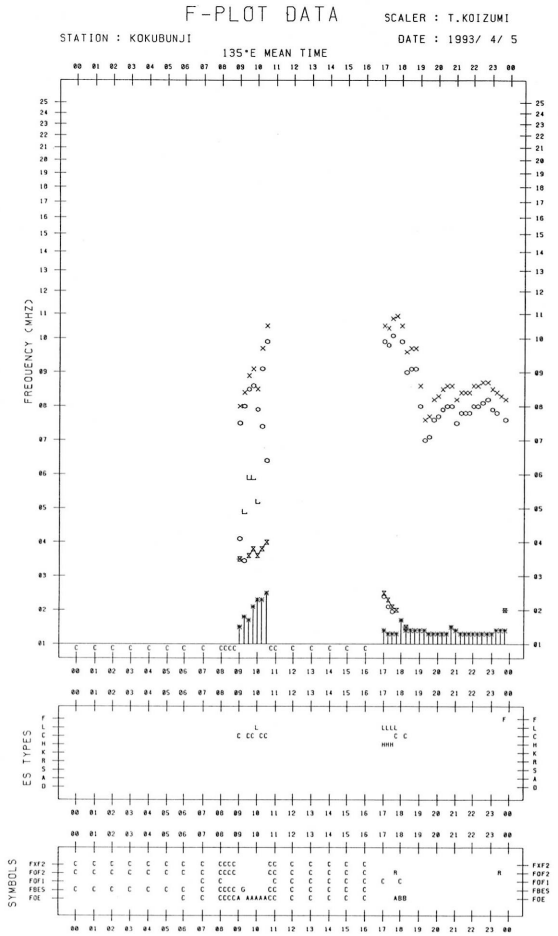
f-PLOTS OF IONOSPHERIC DATA

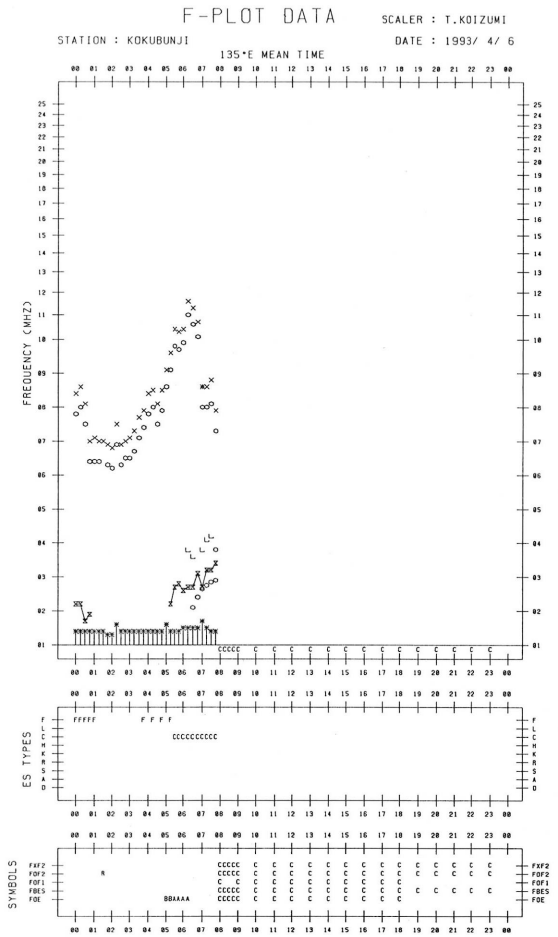
KEY OF F-PLOT	
I	SPREAD
⬡	FOF2, FOF1, FOE
×	FXF2
✳	DOUBTFUL FOF2, FOF1, FOE
⧖	FBES
⌊	ESTIMATED FOF1
↑, ↑	FMIN
∧	GREATER THAN
∨	LESS THAN


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/ 1
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

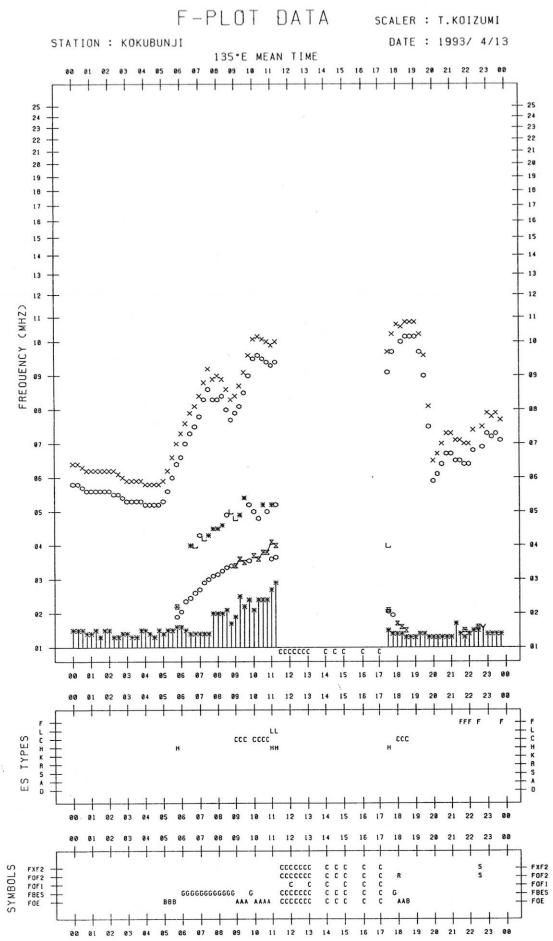

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/ 3
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

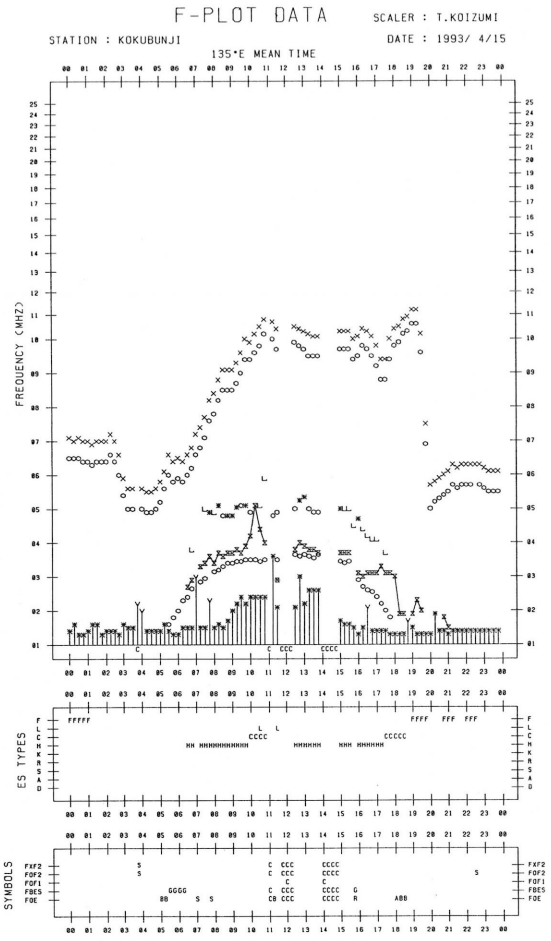

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/ 2
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

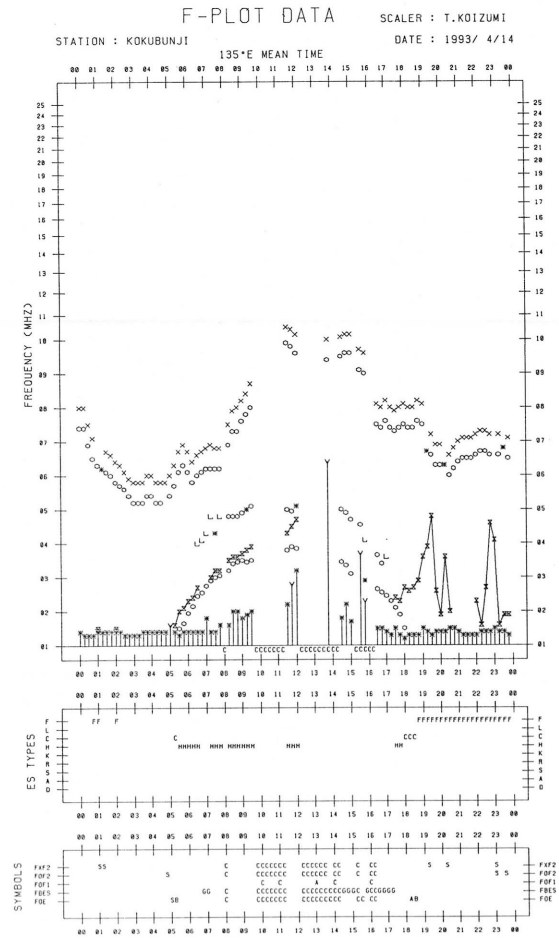


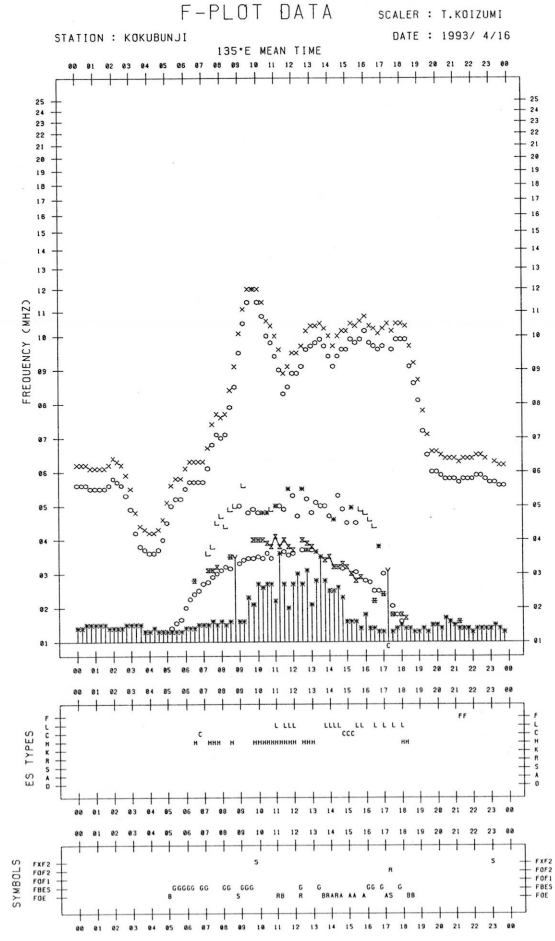


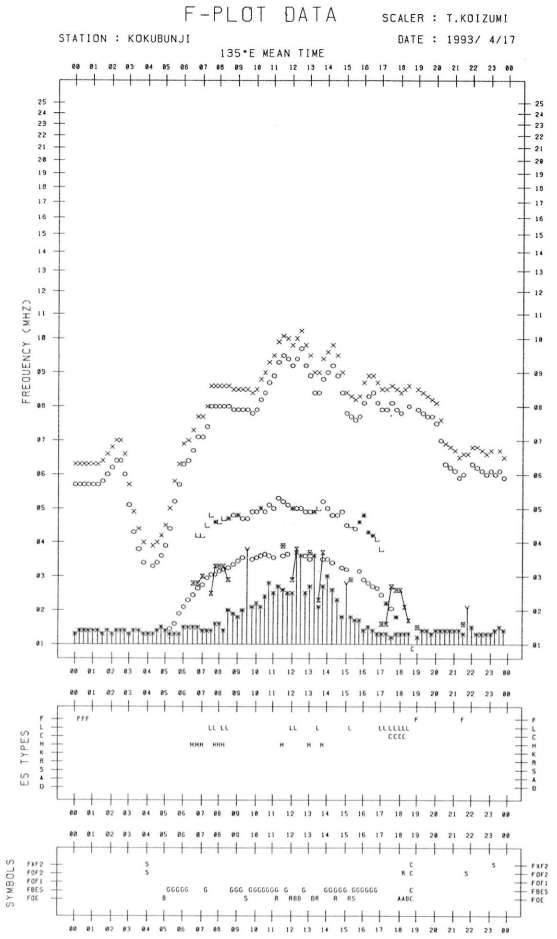
Notes : No data was collected on April 4, 1993 and from April 7 to 12, 1993 at Kokubunji.

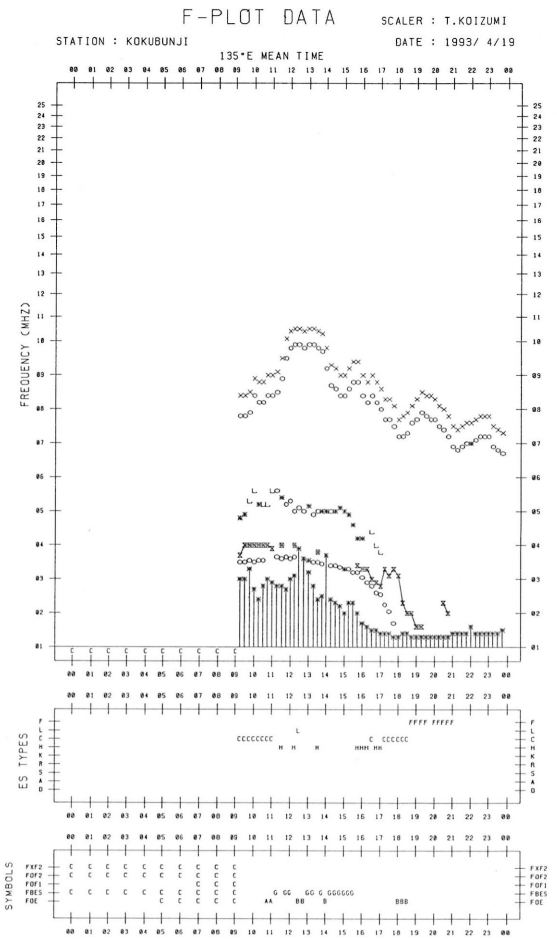

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

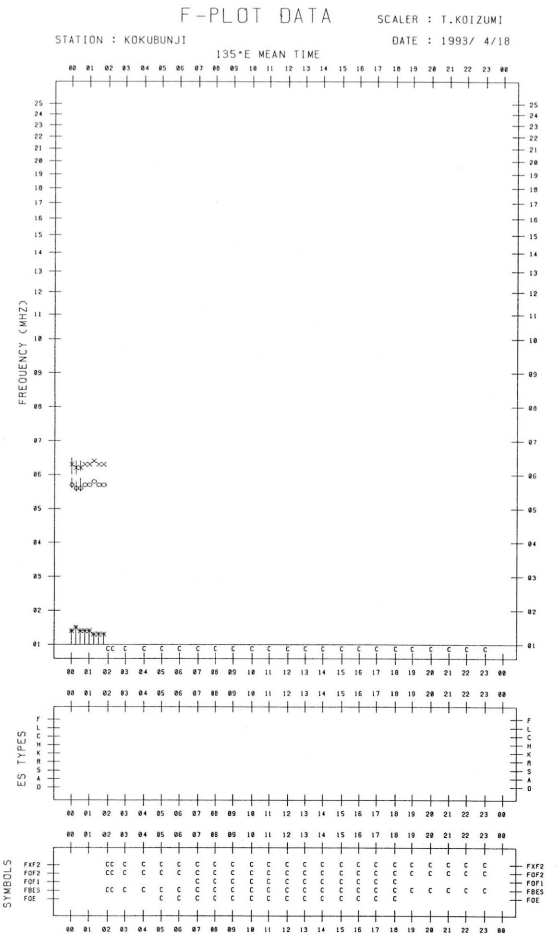

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

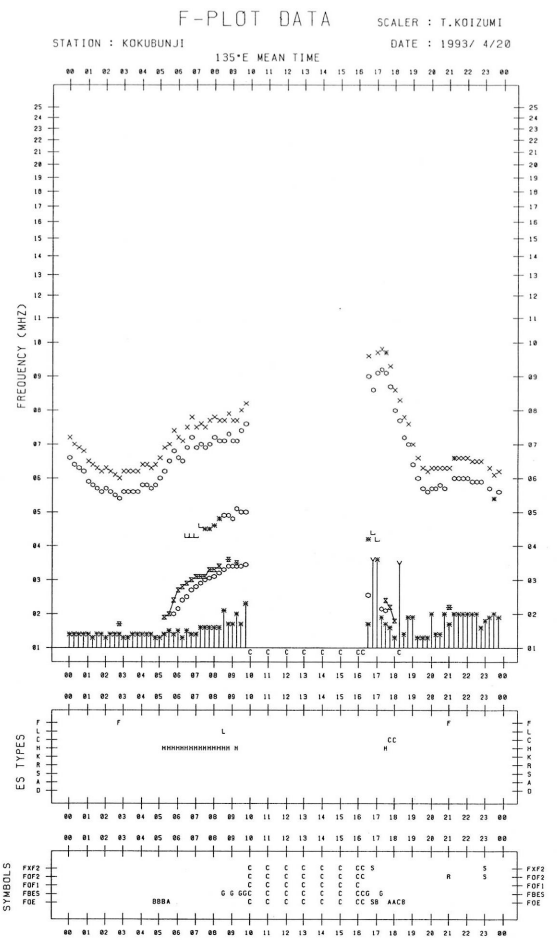

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

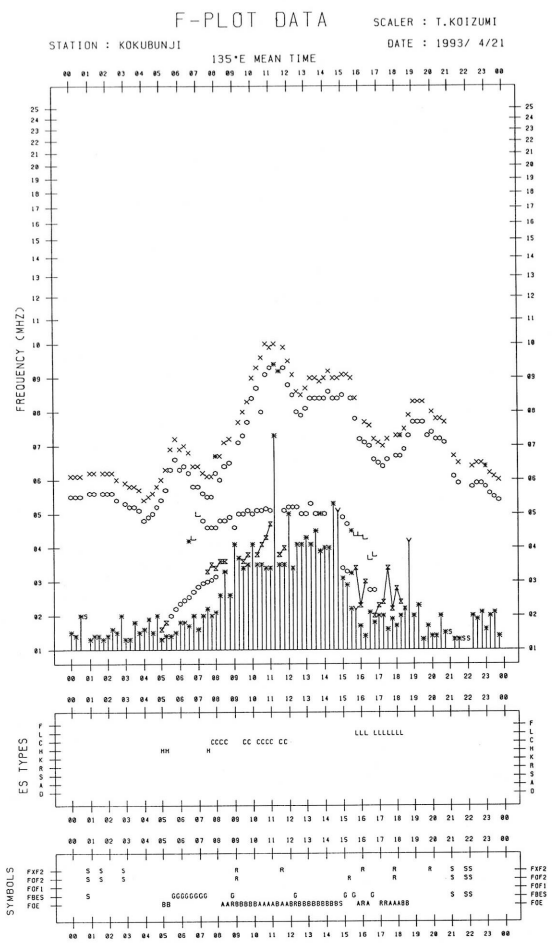

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

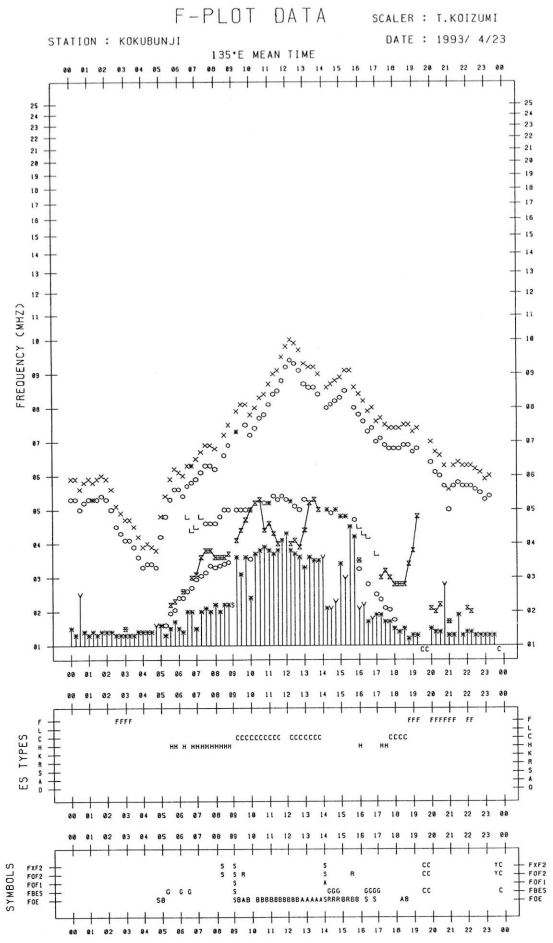

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

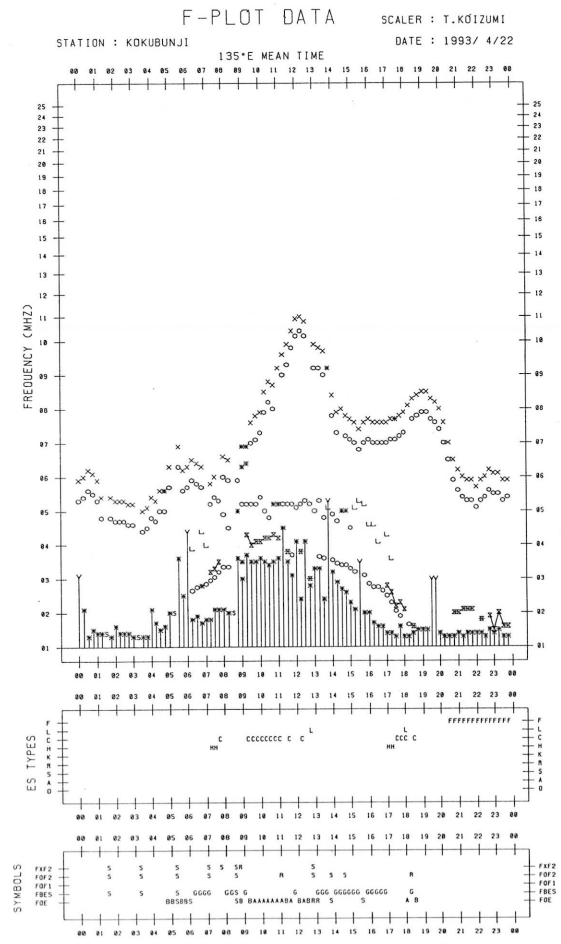

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

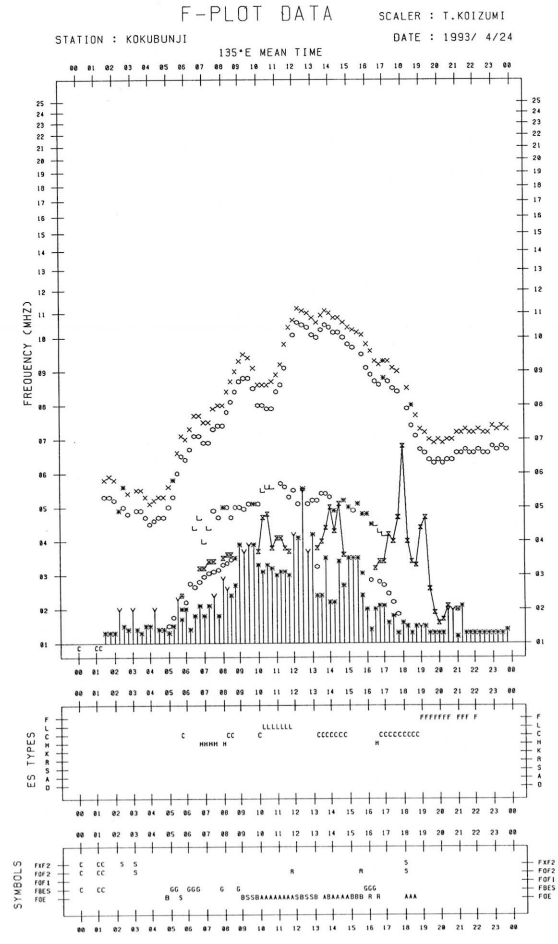

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

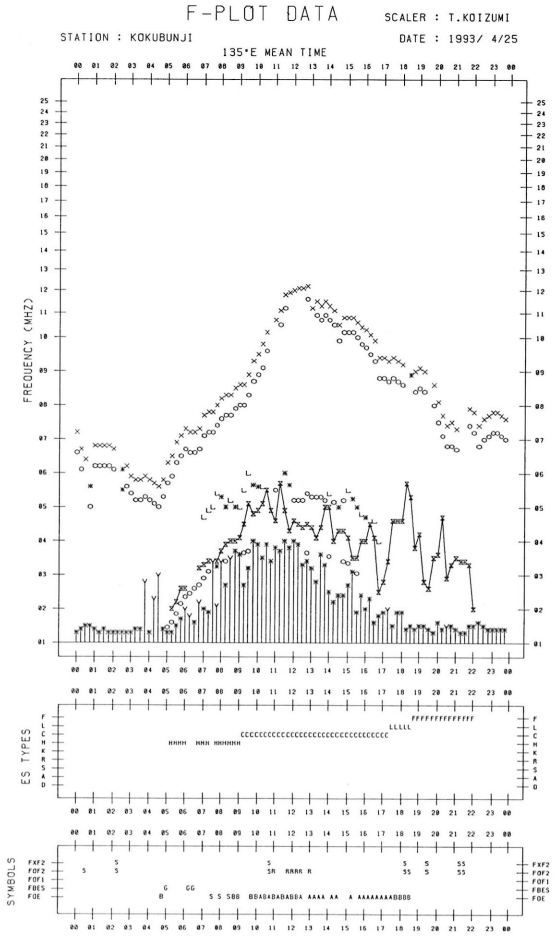

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

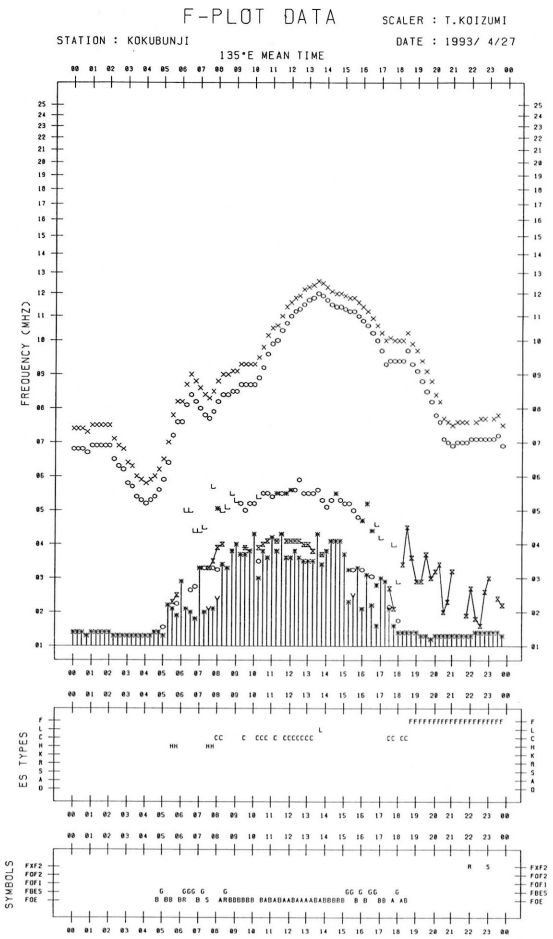

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/21
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

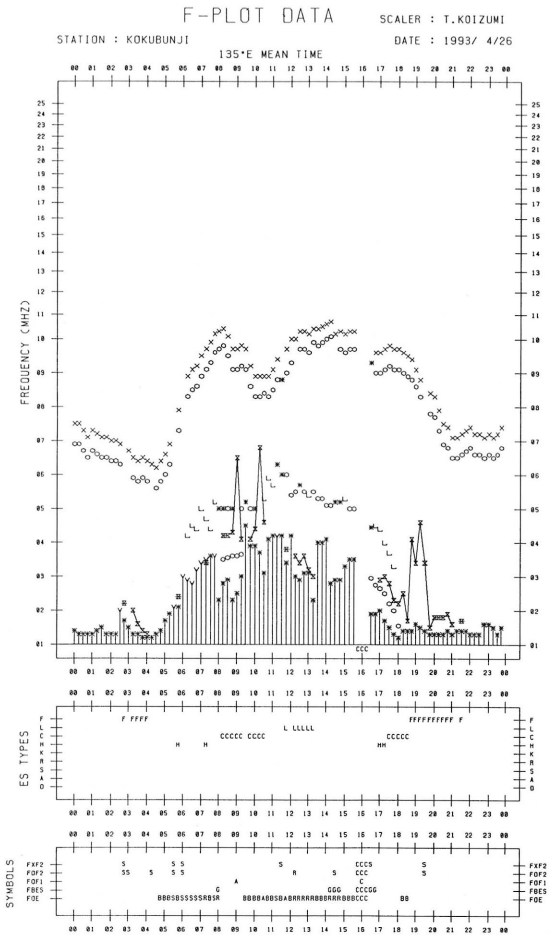

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/23
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

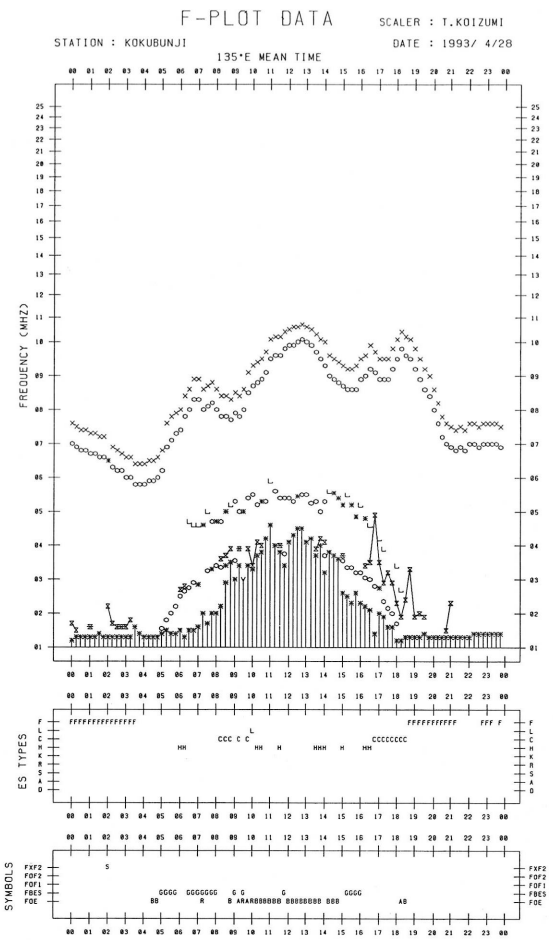

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/22
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

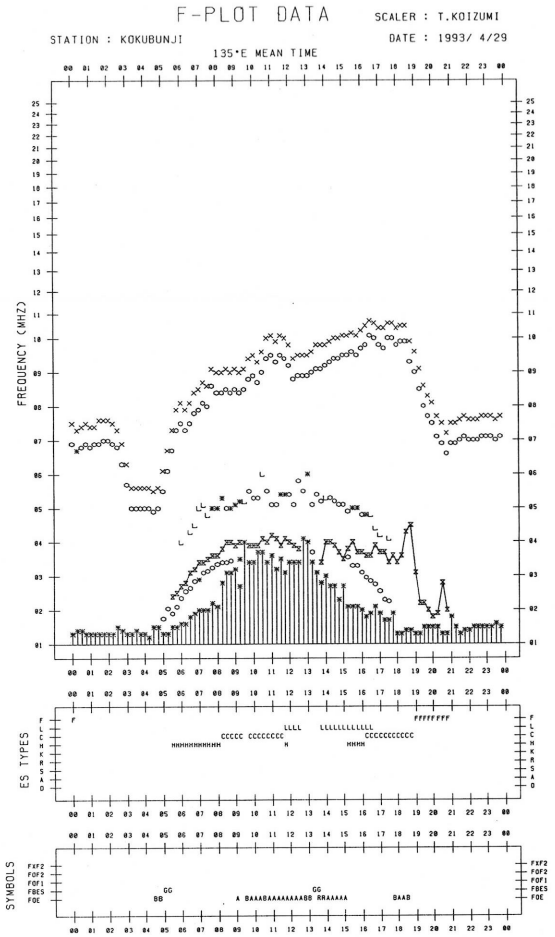

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/24
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

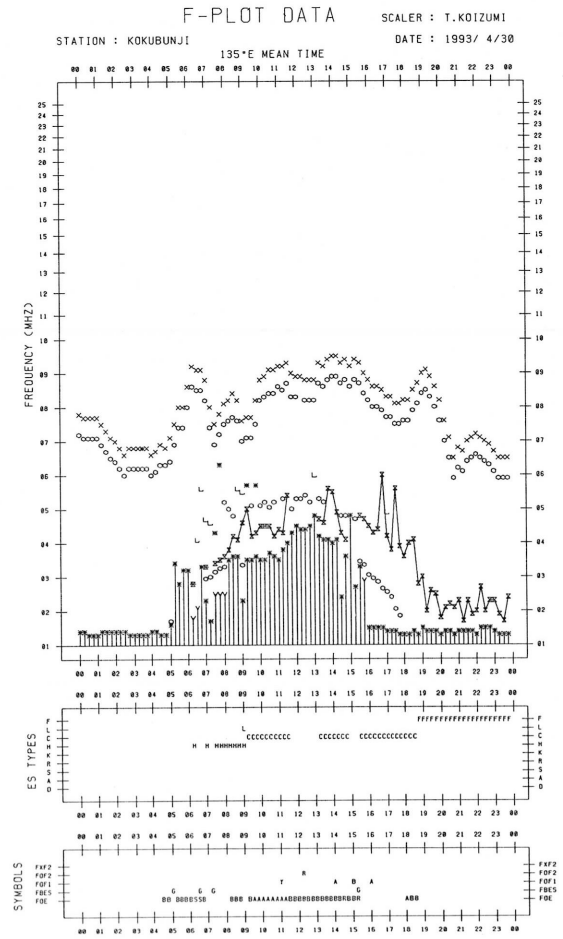

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/25
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/27
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/26
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/28
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/29
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 4/30
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)

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

C. RADIO PROPAGATION

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

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

C. Radio Propagation

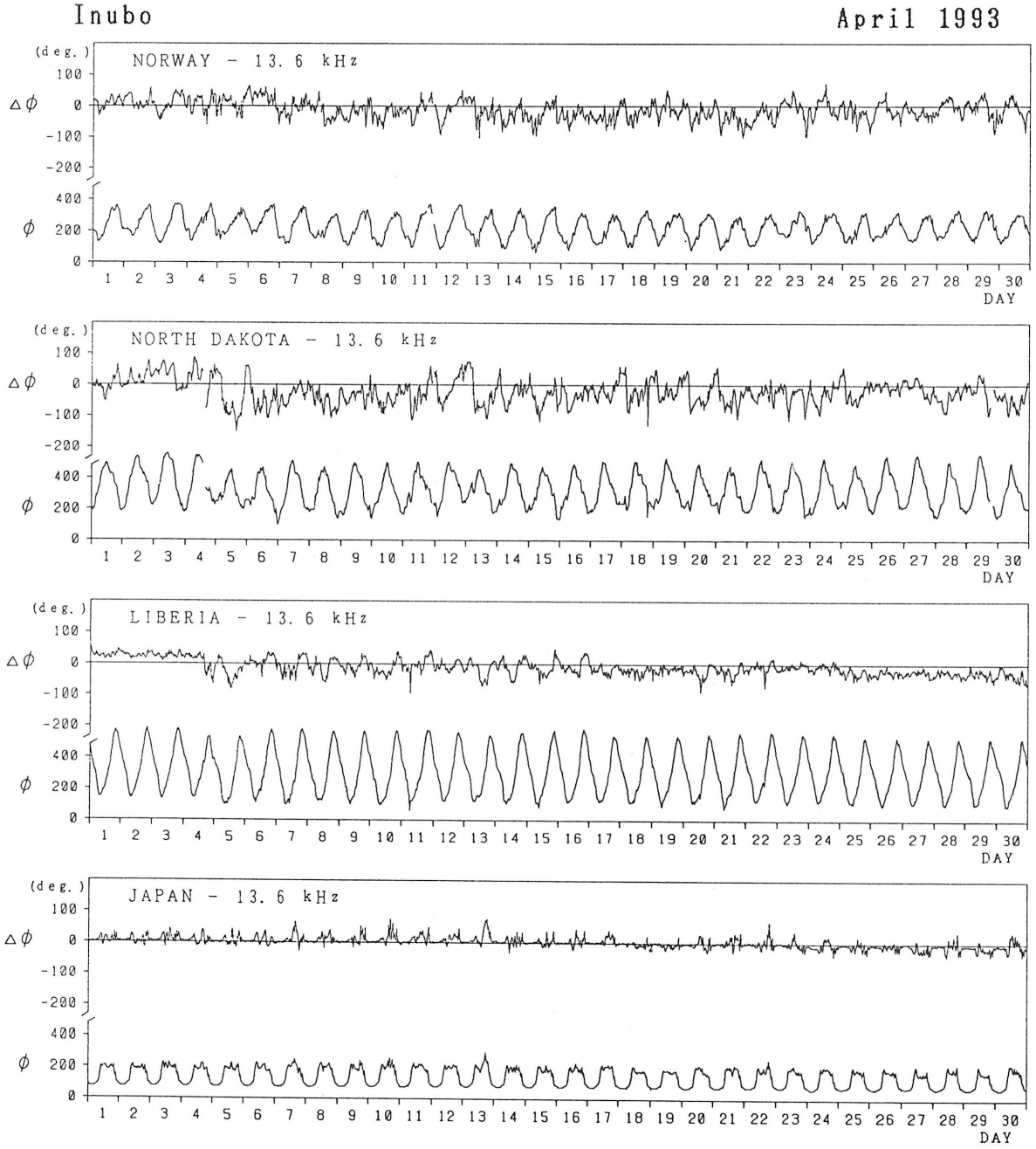
C2. Radio Propagation Quality Figures at Hiraiso

Hiraiso — Time in U.T.

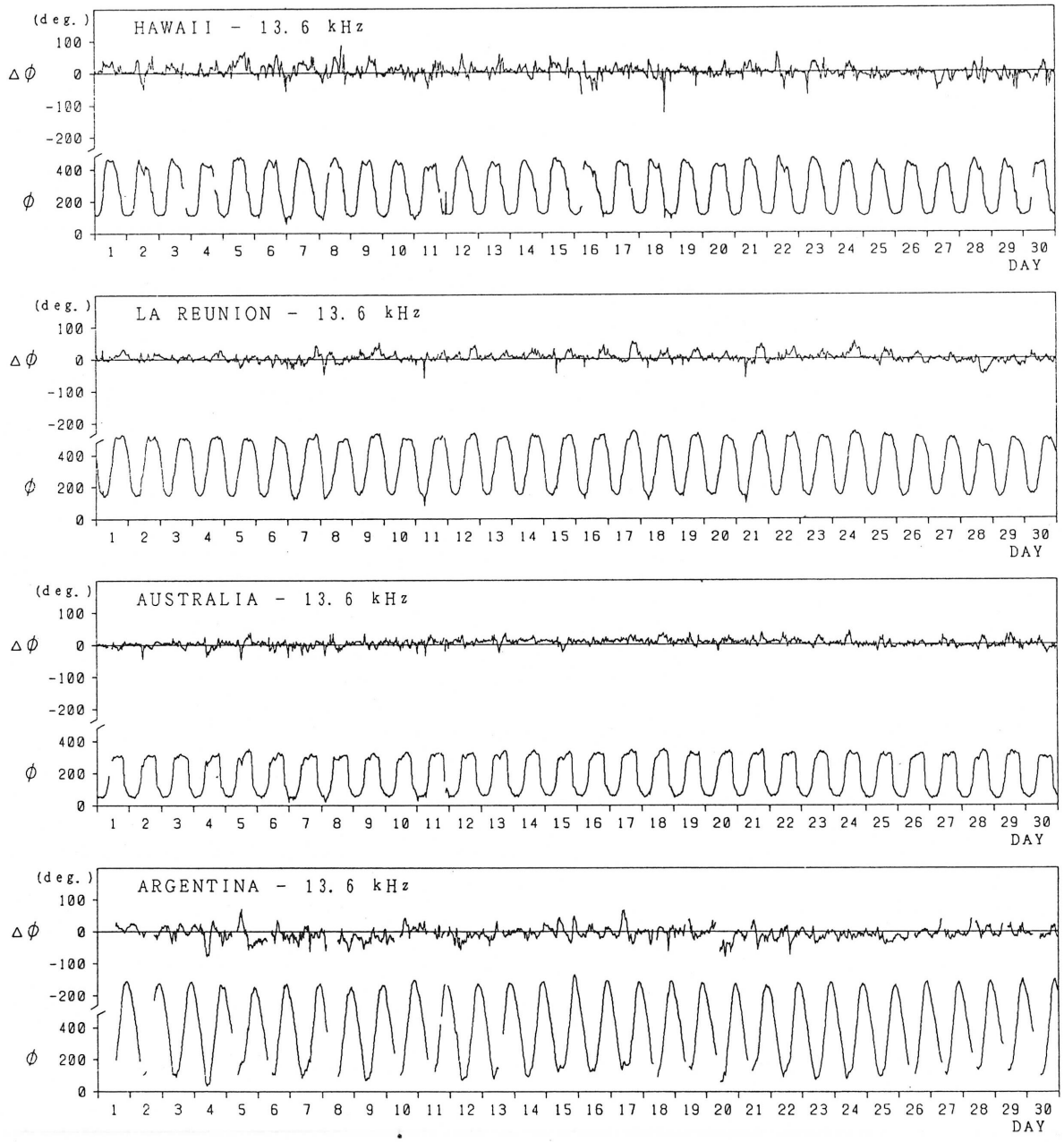
APR. 1993	Whole Day Figure	W W V 00 06 12 18 / 06 12 18 24	W W V H 00 06 12 18 / 06 12 18 24	Conditions 00 06 12 18 / 06 12 18 24	Principal Geomagnetic Storms Start h m	End h	Range n
1	4+	4u - 5u 5u	4u 4 4u 4	n n n n			
2	5-	5 - 5u 5u	4 5 5 4	n n n n			
3	4+	4 - 5u 5u	4 5 4 4	n n n n			
4	4o	5 - - -	4 4 3u 4	n n n n	1434		245
5	4-	3u - - -	4 4 5 3u	n n n n	--	--	
6	3-	2u - - -	2 3 3u 4	U U U U	--	18	SSC
7	3+	2u - - -	4 3 3u 4	n n n n			
8	4-	3u - - 5u	3 4 5u 4	n n n n			
9	4o	4 - 5u 5u	4 3 3u 4	n n n n			
10	4o	4 - 5u 4u	4 3 5 4	n n n n			
11	4o	3u - - 5u	4 4 4u 4	n n n n			
12	4o	4 4u 5u 5u	3 4 4u 4	n n n n			
13	4+	4u - 5u 5u	4 4 4u 4	n n n n	02.1	24	105
14	4-	3u - - 5u	4 3 3u 4	n n n n			---
15	4o	3u - 5u 5u	4 4 4u 4	n n n n			
16	4o	C - - 5u	C 3u 4u 4	n n n n			
17	4+	4 - - 5u	4 4 5u 4	n n n n			
18	3+	4u - - -	4 3 3u 3	n n n n			
19	4-	4u - 4u 5u	3 3 3u 4	n n n n			
20	3+	4 - - -	4 3 3u 3u	n n n n			
21	2+	2u - - -	3 2u 3u 2u	n n n n			
22	3-	2u - - -	3 2 3u 3	U U U U			
23	4o	4 - - -	4 4 4u 4	U U U U			
24	4o	4u - - 5u	4 3 4 4	U n n n			
25	4+	5 - - 4u	4 5 5 4	n n n n			
26	4+	4u - 5u 5u	4 4 4u 4	n n n n			
27	5-	4u - 5u 5u	4 5 5 4	n n n n			
28	5-	4u 5u 5u 5u	4 5 5 4	n n n n			
29	4+	4u 5u 4u 5u	4 5 5 4	n n n n			
30	5-	5 5u - 5u	4 5 5 4	n n n n			

C. Radio Propagation

C3. Phase Variation in OMEGA Radio Waves at Inubo



Inubo April 1993



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.

Apr. 1993	S W F								Correspondence	
	Drop-out Intensities(dB)					Start	Dur.	Type	Imp.	Solar * Flare	Solar Burst
	CO	HA	AUS	MOS	BBC						
6			10			0237	6	1	1-	0234	C
6			16			2342	16	1	1+	2343	↓
7			7			0257	13	1	1-	0255	
8		>32	16			0220	99	3	1+	0217	
10			11			1810	30	3	1	-	
10			8			2332	23	1	1-	2331	
11			8			0026	24	1	1-	0024	
20					9	1250	20	2	1-	1251	
22					10	1407	10	1	1-	1407	

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

Apr. 1993	S P A								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	Ω/AU	Ω/H	Ω/ND	Start	End	Max.
1	16	32	36	26	5		0430	0514	0438
3			7				0706	0720	0712
6	19	20	31	24	16	17	0235	0310	0244
6		52	11				1154	1254	1216
6				9	8		2212	2228	2220
6	32	42	14	45	43	59	2242	2336	2312
6	29	24	47	66	71	39	2344	0028	2348
7		20	32	30	19		0255	0330	0305
7			32	19	6		0416	0454	0424
7			14	11			0504	0538	0512
7			9				0616	0640	0624
7			7				0756	0820	0804
7		30	32				0938	1002	0948
7			7				1044	1100	1052
7		54					1358	1444	1412
8			32	34	27		0212	0424	0244
8					12		2034	2106	2046
10				11	23		2118	2144	2124
10	27	24	23	48	53	32	2333	0014	2338
11	17	20	32	44	43	44	0028	0118	0034
11	27	78	83	50	46		0614	0710	0620
12				4			0152	0216	0158
12			5	4			0232	0252	0236
12			5	4			0324	0342	0330
12				7	7		2306	2328	2312
15		39	61				0904	0948	0916
16					22		2004	2024	2012
17			5	5			0408	0428	0416
18		36	30	15			0548	0630	0608
18			12				0658	0722	0704
18		49	17				1000	1050	1012
18					108	147	1907	2020	1926
18				8	9		2216	2238	2222
18				4	4		2340	2354	2342
19		24	14	35*	27*		0000	0114	0026
19			17	13	7		0230	0300	0238
19			5	5	4		0328	0352	0334
19			11	4			0502	0550	0516
19			25	7			0604	0644	0608
19		32	31				0752	0832	0808
20			9	7	5		0216	0238	0224
20		60					1252	1322	1304
21			19	12			0426	0454	0434
21		54	61	17			0720	0812	0726
21			11				0852	0904	0856
22		69					1408	1456	1420
23			9	8	4		0237	0254	0242
25			10				0954	1020	1002
26			7	8			0324	0354	0338
26			6	6			0412	0444	0422

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