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IONOSPHERIC DATA IN JAPAN

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CONTENTS

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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

AUG. 1993

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

HD \ 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																								
2																								
3	57	52	54	54	51	54	A	62	59	A	77	60	58	64	63		68	58	62	70	78	76	67	55
4	52	52	52	52	52	53	A	83	78	79				61	61		60	79	73	80	77	78	69	63
5	54	53	52	44	35	50	A	58	A	A			61		56	A	A		63	A	77	84	54	41
6	34	35	A	44	A	A	A	59	A	A		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	A	A	A	63	52	A	35	43
9	A	43	43	35	A	44	A	66	67	A	A		A			67	56		63	A	66	54	A	58
10	A	48	44	47	43	46	57		62	61	C	C		67	56	59	A	A	A	39	66	66	66	54
11	51	46	43	46	44	40		A	A		A	A	A		C	C	C	C	67	72	64	66	66	54
12	52	44	25	45	44	A		58	83	68	A	62		70	62	A	89				A	62	57	54
13	53	47	47	47	47	50	A	A	A	A	A	A	A	A	A	60	61	61	64	60	A	A	A	52
14	52	48	52	48	A	52	A	A	A	72	A	62	A	A	58	61	60	67	A	A	73	70	60	54
15	53	51	48	47	37	53	63	64		81	A	58		81		56	A	A	67	65	62	52	A	62
16	53	48	43	41	35	A	A	A	A									62	71	76	74	70	54	50
17	25	42	43	40	30	A										A	A	A	A	A	A	54	53	52
18	52	52	51	50	40	32	52	51	69			64	65	59		A	64	63	69	77	73	66	A	60
19	54	52	44	44	42	A	A	A	A	A		A	A	A	A			A	A	50	58	58	54	54
20	43	37	35	35	35	38	A	A	A							58	A	A	57	58	60	58	A	53
21	52	42	38	35	35	43	46									60	55	54	59	62	63	60	57	43
22	52	43	43	42	42	50	63	A	A	79	56		58	66		64	63	57	58	64	64	53	52	53
23	48	37	43	44	44	A	A	69	61	57	62	A	A	A	61	62	67	70	A	58	60	54	54	52
24	54	50	30	44	47	52	65	58	62	58	65	59	58	67	67	61	64	55	63	63	63	62	60	58
25	34	50	38	48	45	53	56		61	61			78			83	60	62	52	67	66	54	63	52
26	51	51	51	47	47	51	70	67	A	A	A	A	61	75	62		59	60	A	59	65	67	28	54
27	28	40	43	45	44	44	60	78	58	62	A	56		63	65	66	67	66	59	73	76	73	54	52
28	50	44	44	43	36	41						A	A	A				A	70	39	A	A	43	36
29	A	43	38	40	34	47	64	57	61					A	62	61		63		54	73	72	66	53
30	43	48	43	37	31	A	53	53		56	62	54			60	60	70	65	60	74	72	66	55	50
31	48	A	A	46	48	51	73	83	72	64	66	C	A	66	60	67	62	66	72	77	66	66	62	54
	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	26	25	27	24	20	12	15	12	12				11	13	15	16	16	18	22	23	24	22	27
MED	52	48	43	44	42	50	62	62	62	63				66	61	61	62	62	63	64	66	66	56	53
U Q	53	51	49	47	46	52	64	69	70	75				70	62	66	67	66	69	73	73	70	63	54
L Q	45	43	40	41	35	43	54	58	61	59				63	59	60	60	59	59	58	63	56	54	52

HOURLY VALUES OF FES AT WAKKANAI

AUG. 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																								
2																								
3	40	43	54	40	36	G	38	38	53	68	G	61	45	G	G	G	38	38	33	40	58	41	54	59
4	24	G	G	G	G	29	39	38	G	G	G			G	G		G	G	36	34	39	40	40	30
5	G	G	G	22	23	31	32	38	60	51		G	G	G	G	41	50	G	50	80	71	58	59	30
6	40	40	70	50	44	41	50	53	60	52	G	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	48	33	50	78	60	38	50	33
9	60	37	32	36	46	38	61	G	108	61	59	G	52	G	G	G	G	G	34	40	56	45	58	57
10	39	G	G	28	G	G	31	G	G	59	C	C		G	G	80	79	59	136	54	40	38	39	38
11	40	27	G	25	27	G	G	42	62	G	59	78	59		C	C	C	C	61	90	113	69	36	40
12	34	48	34	30	25	37	G	G	40	G	58	65		G	G	88	150	159	158	152	65	65	66	32
13	28	32	33	.44	G	32	38	58	67	71	74	96	120	64	57	G	38	36	36	103	117	79	91	58
14	49	54	55	43	84	60	56	80	72	56	63	61	45	62	G	G	56	60	84	94	45	72	60	59
15	72	33	32	G	G	G	36	44	G	50	50	G		G	G	G	57	70	34	89	78	60	91	67
16	60	34	30	28	33	25	66	50	50		G			G	G		G	G	G	26	G	G	30	30
17	31	33	G	22	G	29	G	G	G	G	G			G		40	50	49	48	75	94	34	29	G
18	G	G	28	32	37	40	39	46	49			G	G	G	G	39	G	50	40	80	92	72	94	51
19	32	24	24	25	33	143	79	60	58	50	G	58	51	62	61	G		53	46	36	40	G	36	24
20	G	33	26	G	23	34	48	47	50	G	G		G	G	G	G	36	36	45	41	28	32	58	60
21	30	22	G	G	28	G	G	G	G	G			G	G		G	G	G	30	25	G	G	28	25
22	G	G	35	33	29	G	G	37	50	G	51		G	G		G	G	G	G	25	32	33	28	24
23	G	G	34	60	34	67	36	36	52	48	52	60	71	71	54	52	G	46	64	35	39	41	41	59
24	G	26	40	40	31	25	G	46	52	52	G	50	G	G	G	G	38	39	G	48	40	28	G	32
25	38	34	G	G	G	G	G	G	64	G	G	G	G	G	G	G	G	G	G	32	26	G	G	G
26	34	27	26	G	G	29	G	36	124	91	66	77	66	G	G		38	54	64	67	59	58	36	55
27	30	29	29	24	G	G	G	G	G	51	94	54	G	G	G	38	G	45	54	40	41	47	59	24
28	25	28	26	G	36	32	G	G				83	86	67		G	G	39	31	69	70	142	59	60
29	40	32	32	G	23	G	G	49	37		G		G	49	57	52	G	39	G	94	60	58	40	G
30	31	G	G	28	32	58	32	40	G	G	G	G		G	G	G	G	G	G	G	G	26	G	G
31	44	43	44	33	26	G	G	G	G	54	51	C	60	48	G	G	G	38	51	36	32	11	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	27	27	27	27	27	27	26	23	22	17	19	25	21	22	25	26	27	27	27	27	27	27
MED	32	29	29	28	27	29	32	38	50	50	26	58	45	G	G	G	G	38	40	48	45	41	40	32
U Q	40	34	34	36	34	38	39	47	60	56	59	71	60	48	G	40	49	50	54	80	70	60	59	58
L Q	24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	30	35	32	28	29	24

HOURLY VALUES OF FMIN AT WAKKANAI

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

HOURLY VALUES OF FOF2 AT KOKUBUNJI

AUG. 1993

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																								
2																								
3						46	59	71	81	86	52	A	A	74	74	83	76	67	A	81	75	78	72	65
4	57	A	55	48	48	57	70	84	84	A	A	72	72	70	73	73		A	A	100	84	71	69	A
5	58	51	61	54	62	63	A	58	A	A	A	A	85	78	72	50	A	95	A	70	86	54	A	A
6	A	58	A	44	48	A	76	68	A	A	A	A	A	A	A	71	A	A	A	55	A	70	A	A
7	A	A	A	46	44	44	A	93	A	51	A	50	81	87	91	77	76	A	66	62	61	A	A	62
8	56	61	54	A	51	A	A	54	54	A	A	A	A	A	A	51	52	60	78	58	68	A	A	38
9	40	42	38	40	A	A	57	75	66	62	A	47	A		63	72	66	68	69	75	79	64	62	66
10	59	42	53	44	45	37	60	78	72	75	53	A	72	85	77	A	A	63	74	82	67	70	66	62
11	A	A	56	57	56	A	62	84	62		50	56	58	66	67	A	74	67	75	81	72	57	55	67
12	A	A	57	54	46	42	67	84	A	65	A	54	A	68	76	80	A	90	61	85	69	61	A	A
13	A	82	52	49	67	57	57	59	53	70	66	A	52	68	76	85	76	73	77	63	61	63	A	60
14	56	59	56	56	54	46	47	61	A	A	A	A	A	A	74	68	65	73	70	77	77	A	52	59
15	A	54	60	57	47	A	51	76	68	58	68	71	A	75	A	73	66	76	77	100	92	62	73	61
16	A	51	47	48	44	A	45	44	55	A	59	A	A	70	70	58	68	62	68	84	78	72	66	54
17		57	62	57	54	42	58	62		69						63	68	55	A	68	54	43	43	42
18	A	54	56	50	44	54	57	74	A	A	A	73	A	74	74	66	73	69	80	92	86	82	64	62
19	60	55	47	53	52	45	57	76	70	62	53		A	58		54	52	50	69	51	A	55	63	55
20	42	39	43	46	36	42	57	62	58	66	A	A	A	67	68	62	71	58	67	68	67	67	68	51
21	52	A	A	A	42	50	52	58	A	50	63	56	51	70	73	76	66	73	69	67	68	62	62	63
22	54	57	48	48	38	38	58	76	71	76	67	60	67	67	A	A	95	A	83	99	54	53	A	68
23	45	55	60	46	A	58	62	58	70	65	62	A	A	72	72	68	68	73	61	67	47	58	57	57
24	60	51	46	A	48	47	68	69	A	72	67		58	A	77	91	78	72	78			57	64	60
25	57	53	49	57	46	59	53	75	77	85	A	63	46	72	75	77	75	82	82	69	58	55	53	63
26	57	52	50	57	47	45	78	74	66	63	60	77	70	68	72	67	A	A	93	A	A	66	80	A
27	A	42	44	42	41	50	79	85	82	63	A	A	A	67	48	A	A	77	82	67	88	85	73	55
28	56	A	A	44	43		59	47	A	A	A	A	A	A	53	A	55	59	N	62	60	A	A	59
29	A	A	51	A	A	42	58	A	A	A	51		66	46	76	70	62	74	84	83	67	84	73	61
30	54	52	52	64	54	49	62	53	62	60	58		60	73	62	65	76	82	73	66	66	50	41	61
31	56	29	41	43		51	39	78	53	55	63	65	60	68	75	80	76	71	91	79	83	81	81	84
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	17	21	24	24	24	22	26	28	18	19	15	12	14	22	23	24	22	24	23	27	25	25	21	24
MED	56	53	52	48	47	46	58	72	67	65	60	62	63	70	73	70	70	72	75	70	68	63	64	61
U Q	57	57	56	56	53	54	62	77	72	72	66	71	72	74	76	77	76	75	82	83	81	71	72	63
L Q	53	46	47	45	44	42	57	58	58	60	53	55	58	67	68	64	66	62	69	66	61	56	56	56

HOURLY VALUES OF FES AT KOKUBUNJI

AUG. 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																								
2																								
3						28	41	62	58	59	53	55	59	G	47	46	49	69	72	79	49	73	36	38
4	59	60	54	36	G	42	51	49	62	98	99	96	62	57	44	58	129	160	145	72	94	37	64	82
5	73	33	49	40	38	41	61	62	72	113	66	61	58	60	46	51	78	104	163	41	116	59	60	58
6	57	57	60	51	26	30	60	58	78	126	124	124	152	108	108	82	98	101	86	84	102	56	87	127
7	91	85	60	56	G	36	85	84	131	54	118	52	G	61	58	G	G	67	30	26	68	129	84	70
8	47	56	26	85	31	34	44	42	48	74	46	90	98	43	67	41	G	37	47	72	26	25	48	58
9	41	34	29	40	38	25	37	55	44	46	60	G	47	G	G	G	G	37	32	24	38	36	30	33
10	56	G	G	G	G	G	61	44	40	43	47	68	58	57	G	60	70	36	G	G	44	59	67	64
11	66	68	59	52	G	61	34	G	G	G	G	G	G	55	50	66	G	37	44	G	34	48	40	61
12	52	60	46	60	37	34	34	58	104	55	62	57	71	101	G	57	70	117	72	51	59	G	64	95
13	84	60	60	70	54	43	36	G	51	45	98	52	G	57	98	50	G	35	G	40	G	G	52	57
14	59	56	54	28	26	44	50	60	100	144	101	86	95	60	55	G	38	G	63	35	87	58	67	89
15	93	72	54	47	28	60	34	48	55	G	51	68	100	60	83	83	G	48	58	38	28	67	78	116
16	60	57	44	51	54	58	34	G	59	70	71	95	60	G	54	42	G	G	38	31	G	G	29	G
17	G	25	40	47	37	29	33	G	G	G						G	46	60	74	70	58	40	56	41
18	64	30	40	28	47	G	G	G	83	71	66	55	69	56	63	56	41	59	42	33	34	37	38	40
19	34	54	26	G	G	G	44	60	53	53	48	G	60	44	G	G	G	43	40	42	56	64	66	63
20	35	24	24	G	35	G	G	56	56	61	60	47	56	50	48	46	43	44	41	52	34	40	G	G
21	G	58	84	60	52	59	34	48	63	45	56	G	G	G	G	45	G	G	49	58	30	35	24	27
22	51	30	26	25	25	G	38	46	51	54	54	50	G	52	58	113	97	118	70	65	59	30	51	53
23	53	24	G	48	55	51	35	G	46	55	48	64	61	53	56	56	62	68	75	58	49	65	25	51
24	46	50	58	60	50	37	38	55	83	68	59	G	G	60	52	G	G	38	44	G	G	83	54	55
25	G	30	33	G	28	28	32	47	49	49	75	50	G	50	48	42	54	G	29	G	G	G	32	G
26	G	G	44	G	G	G	44	40	43	G	48	43	G	53	56	75	116	133	130	113	115	113	69	61
27	50	40	45	G	30	G	38	48	61	59	70	76	57	45	G	77	94	55	80	84	48	44	56	37
28	57	36	26	48	G	G	58	44	56	60	53	56	48	74	56	48	47	G	G	G	G	63	59	G
29	50	54	62	103	77	49	42	87	59	122	49	G	G	G	G	G	57	54	46	64	29	43	66	62
30	43	28	G	G	G	G	G	G	47	52	56		45	52	G	G	G	G	48	48	G	G	G	G
31	G	G	G	G		G	G	G	G	G	G	54	44	53	58	74	50	50	59	62	54	60	42	27
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	27	29	29	29	29	29	28	27	28	28	28	29	29	29	29	29	29	29	29	29
MED	52	45	44	44	30	30	38	48	56	55	58	55	56	53	51	48	46	48	48	48	44	44	54	55
U Q	59	57	56	54	47	43	47	58	67	70	70	68	61	60	58	63	70	68	73	67	59	63	66	63
L Q	38	29	26	G	G	G	34	G	46	45	48	43	G	44	G	G	G	35	39	28	27	32	34	30

HOURLY VALUES OF FMIN AT KOKUBUNJI

AUG. 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																								
2																								
3						14	15	17	26	29	22	36	32	50	32	32	35	16	15	14	14	14	14	14
4	15	14	14	14		15	14	16	24	30	33	33	33	33	29	20	17	15	14	14	35	15	15	15
5	14	14	14	14	34	14	14	17	20	27	23	27	29	27	26	35	21	16	14	14	15	14	14	14
6		15	15	15	15	14	16	18	32	34	23	32	22	28	28	23	18	18	14	14	15	14	14	15
7	15	14	14	14	15	14	16	20	29	32	33	34	33	38	24	46	40	26	18	15	14	14	16	14
8	14	14	15	15	14	15	16	18	20	33	27	32	32	33	29	22	18	14	17	16	15	15	15	15
9	14	14	15	14	14		14	14	18	26	30	48	33		45	46	20	14	14	14	14	14	15	14
10	14	14	14	14	14	18	15	15	27	24	33	33	35	28	42	18	14	14	16	16	15	15	15	15
11	15	14	14	14	14	15	14	15	18	43	46	46	50	38	35	34	33	17	16	15	15	15	15	15
12	14	14	14	14	15	15	14	18	20	34	34	39	39	39	49	24	22	20	15	16	17	14	15	14
13	14	14	.14	14	14	14	14	14	22	32	47	39	48	41	34	33	22	17	14	15	15	14	15	15
14	15	14	14	14	14	14	15	14	30	22	22	30	29	27	24	18	16	14	14	15	15	15	14	15
15	14	14	15	14	14	14	15	15	20	29	35	35	38	34	28	30	15	15	14	15	15	14	15	15
16	15	14	14	14	14	14	14	14	14	21	28	24	24	50	29	38	18	14	14	14	18	15	14	15
17	16	15	14	15	14	15	14		18	47						42	17	15	14	16	14	15	14	14
18	14	14	15	14	14	16	15	30	22	33	35	39	39	38	34	33	21	18	14	14	15	15	15	14
19	14	14	14	14	16	15	15	15	18		36		29	20	20	20	18	16	15	15	15	14	15	14
20	15	15	15	14	14	16	15	15	20	20	34	32	32	33	33	29	18	17	15	15	14	15	15	15
21	16	14	14	14	14	14	15	15	22	22	34	23		39	49	32	39	27	14	15	15	14	15	14
22	15	14	14	14	14	16	16	17	20	33	34	51	50	34	26	18	30	15	14	17	15	14	15	15
23	15	16	15	14	15	14	14	14	18	21	24	34	35	22	21	32	18	16	21	15	15	15	14	18
24	14	15	14	14	15	15	14	14	30	33	33	39	47	21	26	48	18	16	14			15	15	15
25	14	14	14	15	14	14	15	14	20	33	33	34	35	34	32	22	16	26	15	15	15	15	14	15
26	15	15	14	14	15	15	17	18	18	34	36	22	47	39	38	33	15	16	18	14	14	15	15	15
27	15	15	14	14	15	15	14	18	24	28	33	32	29	32	43	34	30	17	15	15	14	14	14	14
28	14	14	15	14	14	24	15	14	18	33	35	36	35	34	30	27	22	23	20	15	16	14	15	15
29	14	14	14	15	14	15	14	27	16	20	33	49	32	49	45	26	18	23	15	15	15	15	15	15
30	14	15	15	14	14	14	23	18	27	32	34		33	28	14	14	24	14	14	14	14	14	14	18
31		14	14	14		18	14	14	14	14	14	21	33	30	26	22	18	16	14	14	15	14	15	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	28	28	28	26	28	29	28	29	28	28	26	27	27	28	29	29	29	29	28	28	29	29	29
MED	14	14	14	14	14	15	15	15	20	31	33	34	33	34	30	30	18	16	14	15	15	14	15	15
U 0	15	15	15	14	15	15	15	18	25	33	34	39	39	39	36	34	23	18	15	15	15	15	15	15
L 0	14	14	14	14	14	14	14	14	18	23	27	32	32	28	26	22	17	15	14	14	14	14	14	14

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT YAMAGAWA

AUG. 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																								
2																								
3	54	64	60	54	52	A	47	60	88	80	59	A	72	86	77	78	N	A	A		A	A	59	62
4	A	79	54	68		48	53	70	78	A	A		71	A		81	83	82	90	83	85	A	85	A
5	A	A	58	64	48	55	43	A	71		A	A	74	80	64	A	69	77	71	74	77	A	A	A
6	A	47	A	A	40	52	66	A	A	A	A	A		A		A		85	83	83	84		54	A
7	A	A	A	54	52	52	A	62	A		59	65	78	88	97	90	87	73	70	65	57	62	62	50
8	52	A	57	42	43	34	A	A	A	A	A	A	A	A	A	A	57	65	73		A		96	
9	A	36	37		42	38	A	67		62	57	59	63			72	77	65	63	62	72	61		66
10	54															C	C	C	C					
11														68										
12																								
13				55																				
14																								
15																								
16																								
17																								
18											66	72	73	78	90	94	86	91	100	100	87	80	53	60
19	52	53		A	47	51	52		83	A		A	80	86	73	68	A	68	66	64	64	88	99	A
20	74	54	49	40	49	N	44	66		66	A	A	A	67	70	77	70	57	60	72	84	62	60	54
21	44	47	72	41	31	34	42	64	66	62	A	A	A	A	77	84	86	80	83	77	70	66	63	80
22	A	43	A	A	A	49	53	61	78	75	60	A	56	73	80	86	86	88	90	78	N	52	A	42
23	49		46	41	43	43	38	77	66	59	57	62	75	75	71	81	90	85	85	77		A	54	57
24	52	53	54	48	44	42	51	55	62	61	68	A	A	A	A	91	93	90	73	76	64	A		
25	A	50	62	55	53	37	53	66	80	80	64	64	A	70	76	85	91	95	86	82	65	67	66	80
26	62	55	52	54	54	53	58	76	57	65	74	72	71	71	66	70	72	84	87	84	73		A	A
27	A	51	53	47	52	55	67	74	66	63	67	75	78	67	64	70	78	88		87	74	64	A	A
28	A	53	50	54	46	39	44	52	A	A	A	A		A	A	68	73	67	64	A	A	49	A	42
29	38		51	53	34	37	50	65	52	52	A	64	77	80	76	72	74	76	73	78	82	77	57	58
30	61	51	A	53	43	40	56	60	62	68	65	70	76	84	78	83	91	95	92	90	52	A	A	A
31	53	53	29	48	31	43	50	76	68	67	63	72	78	85	87	98	94	90	86	88	87	75		54
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	12	15	15	17	18	18	17	16	14	13	12	10	14	15	15	18	18	20	19	18	16	12	12	12
MED	52	53	53	53	45	43	51	66	67	65	64	68	74	78	76	81	84	83	83	78	74	65	61	58
U Q	57	54	58	54	52	52	54	72	78	71	66	72	78	85	80	86	90	89	87	84	84	76	75	64
L Q	50	47	49	44	42	38	44	60	62	61	59	64	71	70	70	72	73	70	70	74	64	61	55	52

HOURLY VALUES OF FES AT YAMAGAWA

AUG. 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																								
2																								
3	90	30	38	G	46	58	32	36	69	57	83	76	61	54	56	45	168	173	156	146	185	92	80	54
4	54	34	32	30	G	G	30	45	49	89	72	G	63	74	115	74	51	36	92	78	90	152	59	110
5	91	91	46	40	26	32	31	109	70		146	103	76	44	60	58	45	41	48	79	114	65	88	89
6	58	38	40	70	40	32	G	80	74	70	125	89	124	174	164	128	133	72	48	58	81		84	82
7	78	110	68	G	25	40	50	55	68		69	53	G	54	G	G	45	G	G	28	G	24	43	71
8	39	59	44	33	39	25	40	52	53	59	50	50	51	84	52	108	67	G	44		40	G	G	G
9	30	25	32	G	34	25	45	57		39		G	G	G		G	G	G	34	33	30	58		33
10	69															C	C	C	C					
11														53										
12																								
13				59																				
14																								
15																								
16																								
17																								
18											G	G	68	57	G	60	54	83	84	54	37	34	24	G
19	G	G		47	G	G	G		55	115		96	58	52	88	42	67	46	40	48	46	48	166	53
20	83	29	G	67	30		26	34	G	62	69	62	66	64	78	48	45	46	41	40	30	G	30	25
21		G	G	41	32	30	G	32	38	50	66	85	62	88	71	52	73	44	36	G		G	G	40
22	39	G					G	G	G	55	52	50	56	G	G	82	88	51	36	33	40	40	59	53
23	69	G	28				G	G	44	49	50	53	52	G	50	48	68	81	41	41	G	57	49	40
24	28	32	40	38	38	28	25	40	45	76	82	98	92	70	153	92	61	61	46	39	40	29	33	G
25	79	G	31	G			26	G	43	48	46	57	56	51	49	G	46	38	G	26	G	27	26	G
26	G	G	G	G	26	23	33	G	G	G	G	G	G	52	58	64	62	64	80	60	58	G	84	78
27	71	G	48	71	59	24	G	40	58	58	70	58	84	64	51	55	57	125	148	94	48	36	43	91
28	82	40	40	36	33	G	G	39	61	62	62	94	G	62	76	54	63	47	90	95	54	38	30	33
29	82	G	26		29	26	G	39	41	48	68	52	G	43	G	G	G	G	48	38	38	32	G	39
30	59	38	70	25				40	42	49	55	53	48	G	51	G	65	G	83	G	52	77	59	69
31	59	23	G	41	33		26	39	49	72	62	54	52	93	83	57	74	71	40	33	60	41		32
	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	18	18	16	14	19	19	19	18	19	21	21	22	20	21	21	21	21	20	20	20	19	21
MED	64	27	35	37	32	26	26	39	49	58	66	54	56	54	57	54	62	46	46	40	43	37	43	40
U Q	80	38	44	47	38	32	32	52	61	70	72	87	67	70	80	69	70	71	83	69	59	57	80	74
L Q	39	G	26	G	26	23	G	32	41	49	50	50	24	44	49	21	45	18	38	33	33	25	26	28

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT YAMAGAWA

AUG. 1993

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1																								
2																								
3	15	15	16	15	15	15	15	15	39	26	33	29	32	29	35	32	23	16	16	15	39	15	30	15
4	15	16	16	16		16	15	29	16	22	34		46	30	30	27	24	16	29	15	15	15	15	15
5	15	15	15	15	15	15	15	28	16			30	29	28	27	24	17	15	15	15	15	15	15	15
6	38	16	30	15	15	16	33	15	17	26	24		33	32	29		18	16	15	24	15		16	16
7	15	15	24	38	15	15	24	15	24		30	43	53	40	50	24	16	16		15	22	15	15	15
8	22	43	16	15	15	15	16	24	16	22	36	33	34	33	45	21	36	16			15	26	15	
9	16	16	15		15	15	15	23		27	45	46	48	49		50	46	39	17	15	15	32		16
10	16															C	C	C	C					
11														39										
12																								
13				15																				
14																								
15																								
16																								
17																								
18											39	58	40	44	50	34	18	15	16	16	15	15	16	15
19	15	15		16	16	40	15		16			33	29	23	24	23	16	16	16	15	16	15	16	15
20	29	16	27	16	16	15	16	15	21	18	34	34	35	42	32	32	22	16	15	16	16	16	16	17
21	16	16		15	17	15	18	15	28	17	40	38	36	37	35	34	24	16	22		15	15	16	15
22	16	17				15	17	15	22	23	34	39	39	52	50	35		16	15	15	15	15	15	15
23	15		16	15	16	15	16	29	16	18	34	34	35	49	35	27		15	16	15		15	15	15
24	15	27	15	15	16	15	16	24	16	16	56	35	42	36	34	32	17	16	15	15	15	15	16	
25	24	15	15	15	16	15	15		16	18	27	35	34	35	33		18	16	27	15	22	16	16	15
26	16	15	15	15	15	15	15	16	16	18	23	58	49	39	48	35	39	16		16	16		15	16
27	15		16	36	16	15	16	15	28	16	30	29	29	29	39	34	24	15	15	15	24	16	16	15
28	18	15	15	15	15	15		15	15	36	34	34		35	35	32	18	16	38	15	15	15	15	15
29	15		15	15	15	15	16	16	17	28	34	36	26	33	18	21	22		15	16	26	26	15	16
30	16	18	17	15	26	15	26	15	16	30	33	40	33	46	26	21	15		15		16	17	16	15
31	16	16	15	15	15	16	15	16	16	24	33	40	33	38	32	26	16	33	15	15	16	15		15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	21	17	17	19	18	20	19	18	19	17	19	19	20	22	20	19	19	19	18	18	20	19	19	19
MED	16	16	16	15	15	15	16	16	16	22	34	35	34	36	34	32	18	16	16	15	16	15	16	15
U Q	17	16	16	16	16	15	17	24	22	26	36	40	41	42	42	34	24	16	17	16	19	16	16	16
L Q	15	15	15	15	15	15	15	15	16	18	30	33	32	32	29	24	17	16	15	15	15	15	15	15

HOURLY VALUES OF FOF2 AT OKINAWA

AUG. 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																								
2																								
3	A 54	75	75	64	61	40	61	74	A	A	A	91	103	95	75	90	88	85	90	80	30	38	54	
4	A 52	62	60	53	36	51	67	76	55	A	A	74	81	84	88	84	87	88	82	79	72	56	62	
5	A 62	60	A	38	59	41	A	A	A	A	A	A	74	A	67	76	82	85	88	64	54	A	A	
6	A	A	A	35	40	37	62	A	A	37	A	A	A	A	69	91	70	75	88	89	66	66	54	41
7	37	39	A	A	34	30	38	A	A	59	70	74	83	88	74	69	91	91	86	67	53	29	34	55
8	37	41	58	35	35	A	38	36	A	A		A	A				68	85	N 81		41	34	A	A
9	A 34	61	64	60	44	52	80	77	55			63	64		72	87	76	70	71	66	61	54	41	
10	54	A	54	53	53	46	A	66	87	A		70	81	85	91	70	74	91	92	88	72	62	54	A
11	28	47	42	34	32	34	54	54	55	64	66	67	64	78	74	71	71	77	77	83	73	52	42	52
12	36	47	40	47	47	43	46	60	66	67	64	66	A	81	90	90	90	92	N 90		89	77	52	47
13	61	66	62	62	54	33	A	61	72	64			75	85	88	91	92	92	81	90	73	58	A	61
14	39	62	52	54	51	40	47	62	56	60	64	68	83	88	87	87	82	87	84	78	53	52	47	38
15	50	34	48	47	35	A	A	55	70	74	74	70	75	A	A	86	93	93	80	90	85	74	60	62
16	61	54	60	54	41	46	42	52	A		64	60	72	64	62	65	76	85	82	82	60	66	A	A
17	42	38	38	36	36	36	A	54	56	56		74	90	77	84	87	73	72	88	87	54	A	34	34
18	A 35	38	35	37	28	35	54	56	65	67	66	80	91	85	95	93			74	85	78	61	47	
19	58	36	54	50	42	44	52	62	75	87	74	82	88	91	91	91	92	88	88	83	81	75	53	42
20	34	43	A	38	34	A	A	60	64	62	A	A	76	77	87	91	87	91	90	84	78	62	52	42
21	41	46	48	35	35	34	37	55	62	61	58	55	72	76	91	66	70	90	88	84	87	77	66	31
22	35	42	34	37	N	37	41	61	73	62	62		A	77	88	91	90	75	88	82	66	A	A	A
23	38	A	35	34	35	35	51	70	62	56	65	67	76		73	84	A	A	87	80	77	A	A	A
24	34	54	61	47	35	38	43	55	64	75	66	A	A	71	A	92	A	113	76	84	66	60	A	A
25	A	A	64	55	N	35	41	66	83	71	60	A	68	80	87	91	75	75	91	87	73	77	77	80
26	77	64	53	40		34	53	74	66	64		74	68	74	A	A	76	88	95	78	70	61	35	A
27	A	34	34	36	45	51	35	63	61	66	A	82	72	68	72	81	91	93	110	73	A	A	A	54
28	A	A	A	A	35	A		52	53	A	A	A	A	A	A	76	A	82	76	73	35	43	38	42
29	A	43	53	40	30	32	41	54	45	58	A	66	82	82	A	90	A	90	90	87	66	62	60	35
30	52	52	60	48	35	A	37	61	64	65	66		90	95	88	91	95	61	110	80	51	A	A	43
31	A	A	A	39	36	37	32	64	70	A	A	85	69	88	79	60			83	69	66	65	66	A
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	18	23	24	26	26	24	23	26	24	22	14	16	22	24	21	27	24	26	26	29	28	24	20	20
MED	40	46	54	44	36	37	41	61	65	63	66	69	76	80	87	87	86	88	88	83	68	62	54	45
U Q	54	54	60	54	47	44	51	64	73	66	67	74	83	88	89	91	91	91	90	87	78	73	60	54
L Q	36	38	41	36	35	34	38	54	58	58	64	66	72	75	74	71	74	77	82	78	62	53	40	41

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

AUG. 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																								
2																								
3	57	33	G	G	G	38	42	67	55	91	93	95	G	74	96	63	74	93	70	80	43	28	28	25
4	32	30	26	G	G	G	32	45	47	62	42	44	G	65	G	G	58	43	44	76	80	43	79	48
5	48	42	43	52	29	37	29	51	94	74	120	97	85	44	60	G	G	37	35	31	38	67	94	79
6	86	83	67	29	G	61	70	146	89	51	69	86	127	100	48	G	41	G	48	27	28	G	G	G
7	42	40	44	60	28	41	57	84	85	79	54	G	G	G	G	G	G	G	46	G	G	31	36	40
8	G	G	G	30	41	45	G	44	40	84	G	92	62			G	40	44	44	30	G	G	38	39
9	33	G	25	G	33	G	32	58	41	41	G		G	G		G	G	42	37	26	35	34	G	G
10	57	43	34	42	34	36	53	45	48	64	G	G	G	G	G	G	G	38	35	35	25	G	G	33
11	G	37	60	47	40	51	30	G	38	G	43	G	G	G	48	G	53	48	42	40	34	39	32	37
12	G	G	G	G	G	G	G	35	45	42	G	63	50	73	60	76	59	67	61	28	46	34	31	27
13	39	38	30	28	28	G	45	38	61	41			G	G	G	42	40	40	36	G	25	32	30	G
14	G	G	G	G	27	26	G	G	G	G	G	G	G	G	84	78	66	49	60	50	34	G	G	G
15	40	35	28	25	34	36	43	35	40	G	G	61	66	107	86	82	51	G	37	29	G	30	44	40
16	41	31	29	34	36	30	35	60	40	G	G	G	G	G	G	G	77	G	37	33	33	31	45	48
17	G	G	G	28	24	26	28	32	40	G	G	G	G	G	G	52	66	40	48	37	83	65	46	36
18	40	G	26	G	G	G	G	32	G	G	G	G	G	G	67	43	65	93	64	84	67	40	34	28
19	25	27	G	G	24	24	28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	40	60
20	37	41	40	33	29	33	39	33	42	51	66	70	65	G	61	G	68	50	45	42	33	G	G	G
21	G	G	G	G	G	G	24	33	G	G	57	G	46	77	57	G	61	70	59	90	82	48	41	25
22	G	25	G	G	G	G	24	G	G	G	G		58	G	59	G	42	44	47	50	83	82	69	50
23	33	40	40	37	36	24	G	G	G	G	G	G	G		60	76	125	124	38	56	41	68	90	81
24	43	36	25	27	34	25	G	39	42	51	50	62	68	69	85	79	129	90	45	34	34	41	39	40
25	49	40	G	25	G	G	G	G	36	74	44	58	50	60	62	43	40	52	76	69	40	40	39	40
26	26	G	G	G	G	G	G	33	G	G	G	G	50	65	79	78	52	62	70	56	40	42	41	40
27	40	35	38	33	28	G	44	46	45	57	72	64	48	G	G	45	82	86	81	48	89	65	44	40
28	69	67	64	48	34	66		46	48	75	68	84	98	89	96	67	118	84	60	40	40	38	33	G
29	40	32	G	G	G	G	G	30	G	G	55	51	51	G	79	G	86	53	G	50	66	24	G	G
30	G	28	G	61	31	30	G	G	39	50	57		G	G	G	52	94	76	51	35	G	79	56	48
31	50	68	60	59	33	34	36	38	61	76	84	G	77	G	44	74	66	51	43	28	34	42	43	33
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	29	29	29	29	28	29	29	29	28	25	29	27	27	29	29	29	29	29	29	29	29	29
MED	39	33	26	28	28	26	28	35	40	42	42	44	46	G	59	42	59	49	45	37	35	38	39	37
U Q	45	40	40	39	34	36	40	46	48	69	61	67	63	69	79	70	75	73	60	53	56	45	44	44
L Q	G	G	G	G	G	G	G	15	G	G	G	G	G	G	G	G	40	39	37	28	26	26	29	13

HOURLY VALUES OF FMIN AT OKINAWA

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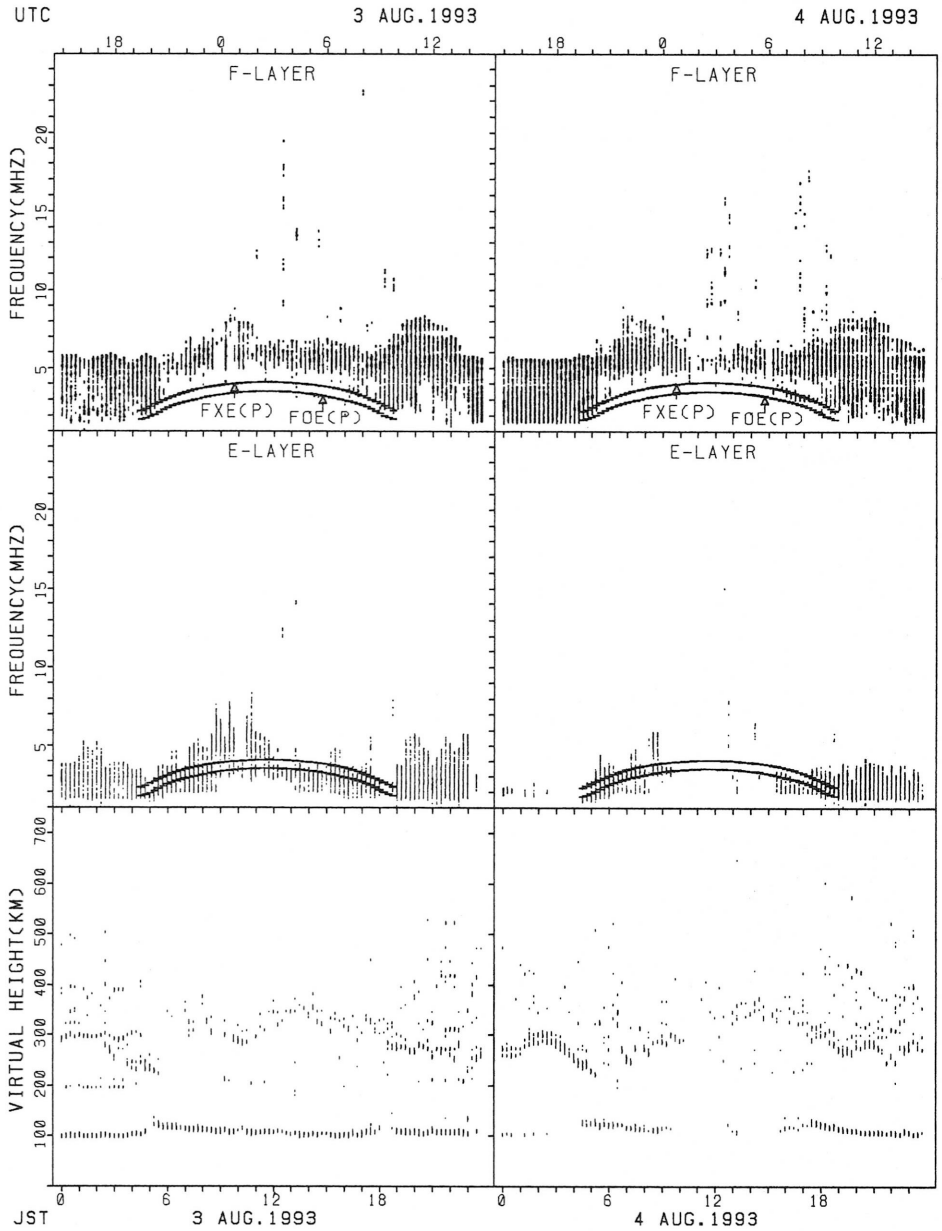
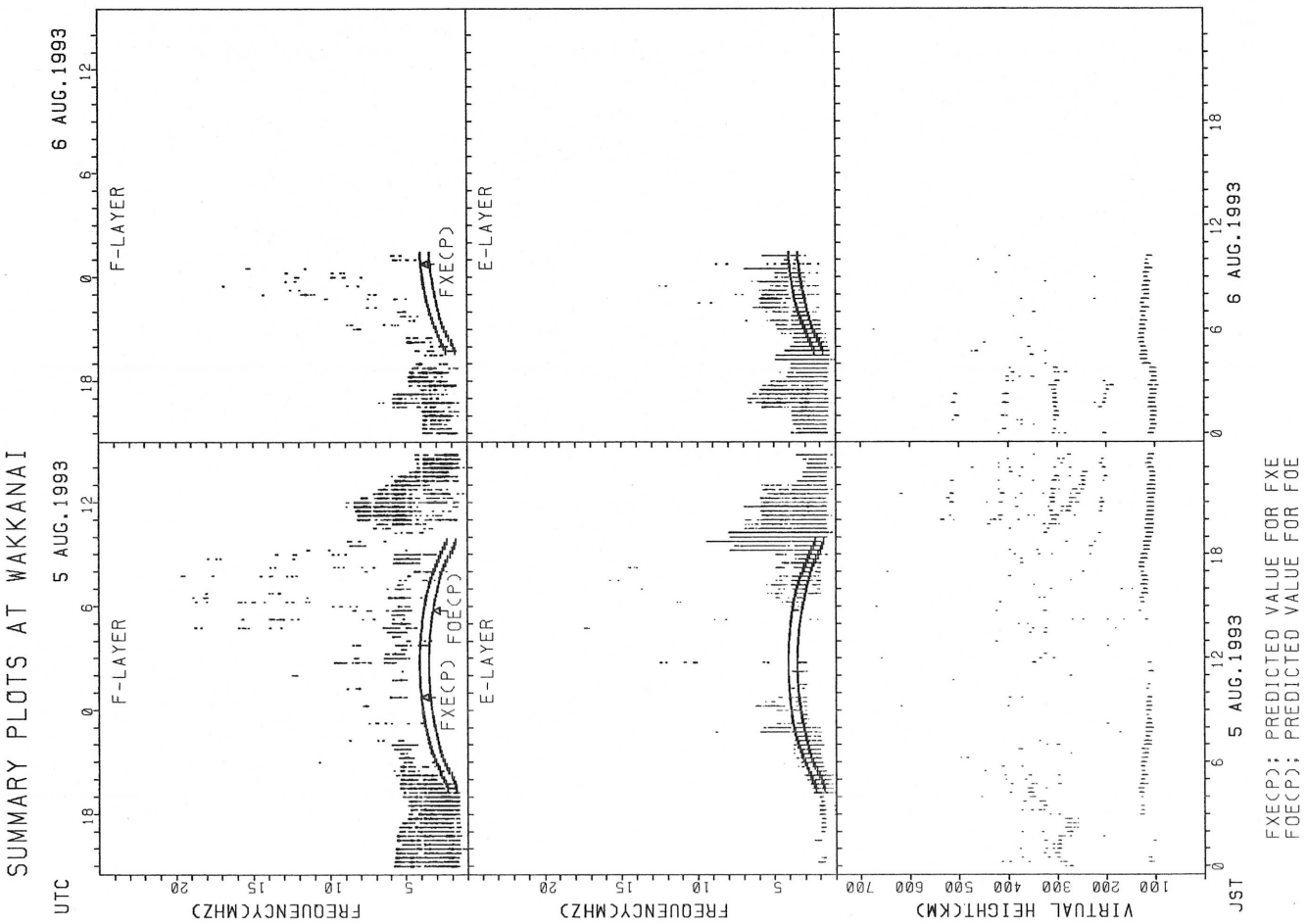
25	17	23	21	17	16	17	15	15	26	30	26	44	26	38	46	32	30	20	15	17	15	15	16	15
26	16	17	16	17	27	17	15	15	30	29	50	52	43	42	39	35	33	24	16	16	17	18	16	15
27	16	17	17	15	18	16	15	15	18	29	32	32	33	39	50	33	27	23	17	20	16	15	16	21
28	17	18	16	15	16	15		17	24	29	34	37	46	48	35	32	28	21	18	17	16	17	17	18
29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

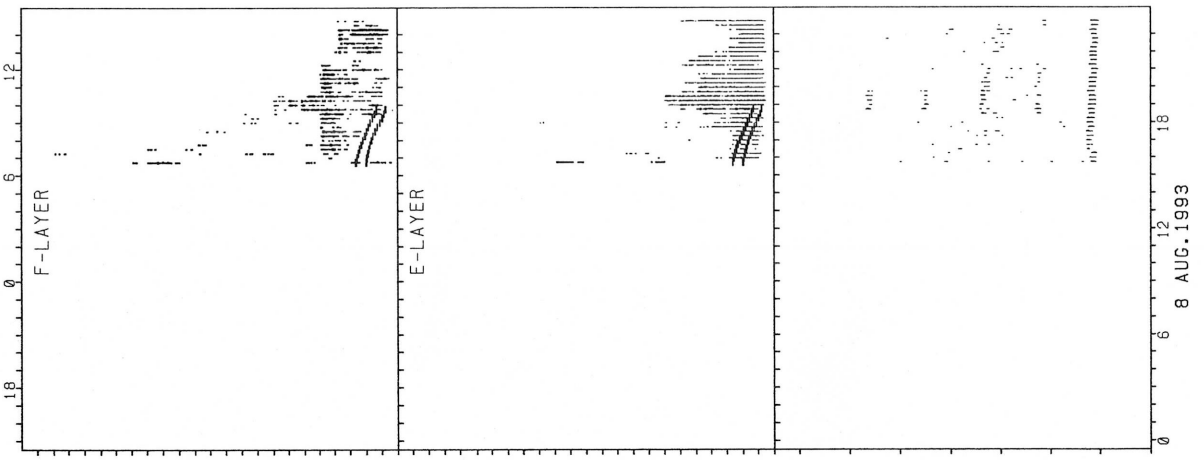
COMMUNICATIONS RESEARCH LABORATORY, JAPAN

SUMMARY PLOTS AT WAKKANAI

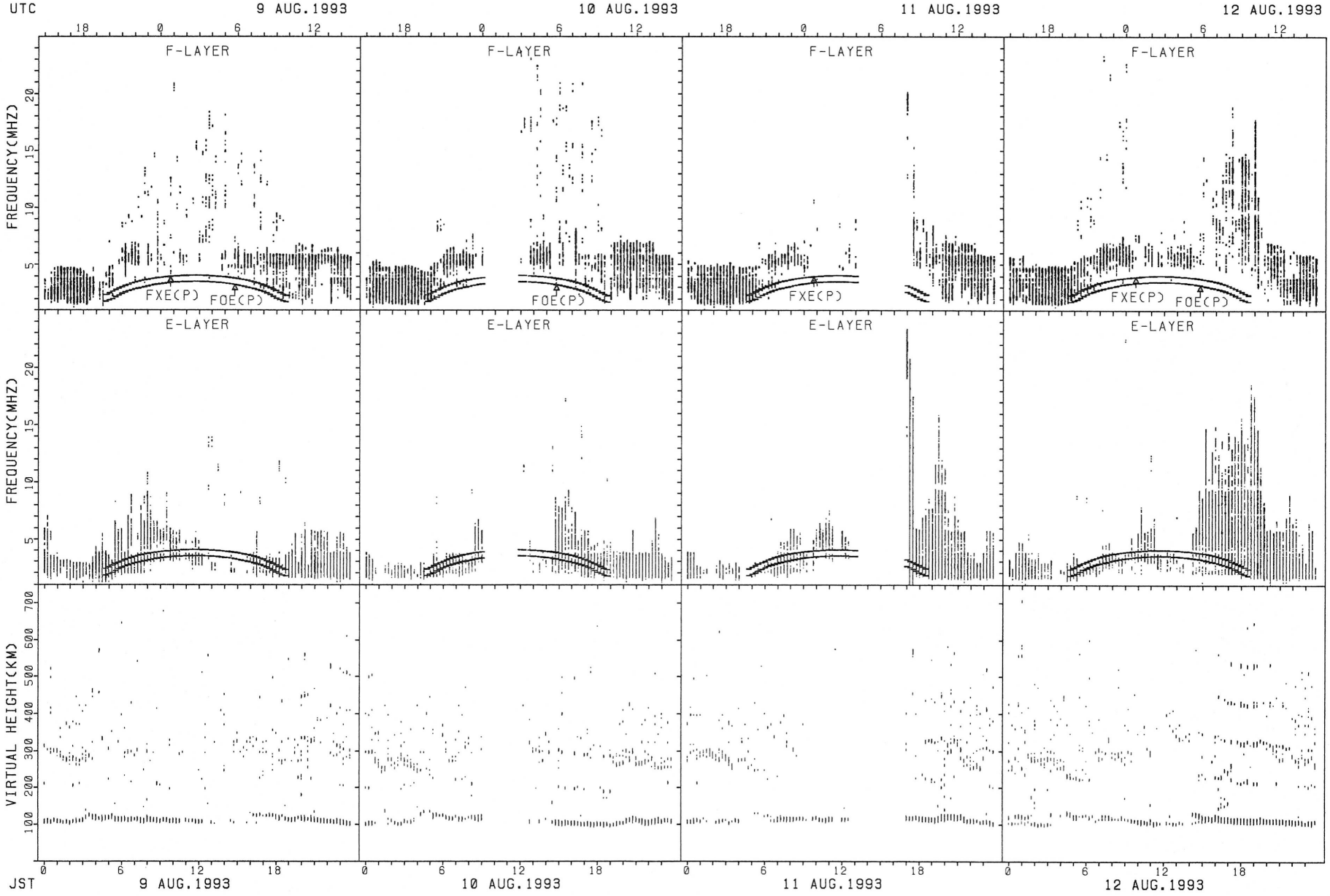


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

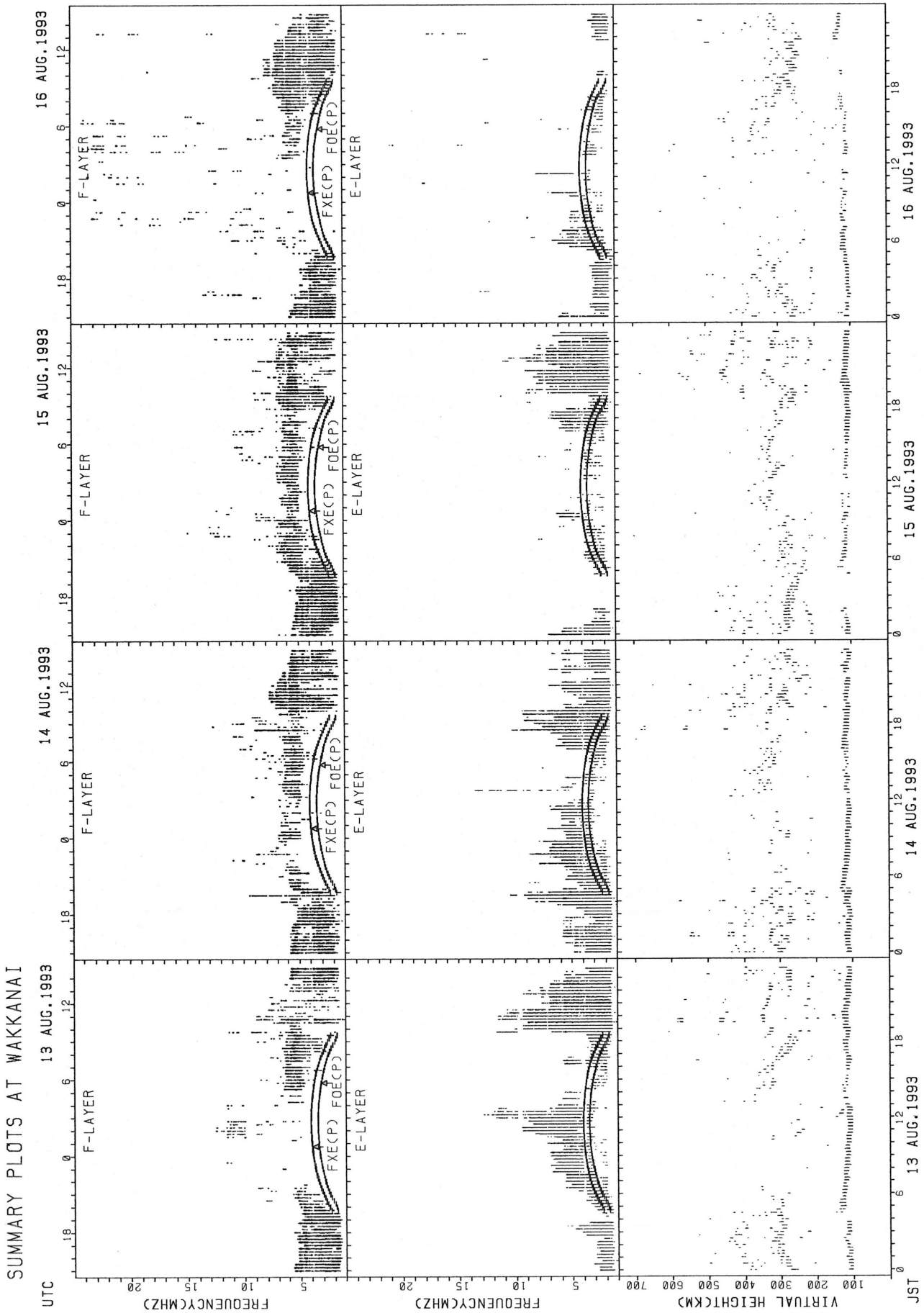

SUMMARY PLOTS AT WAKKANAI
UTC
5 AUG.1993
6 AUG.1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

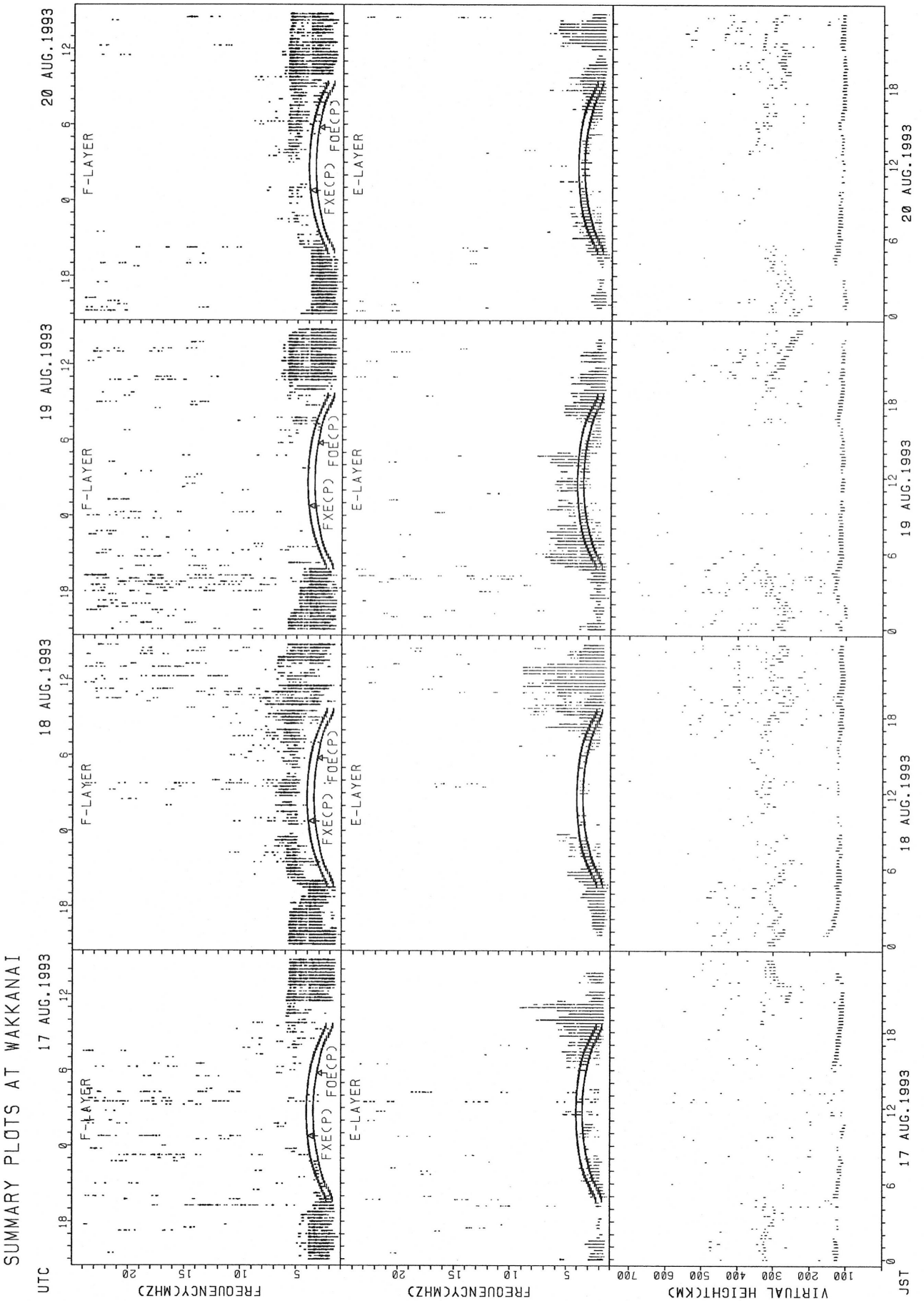

8 AUG.1993
F-LAYER
E-LAYER

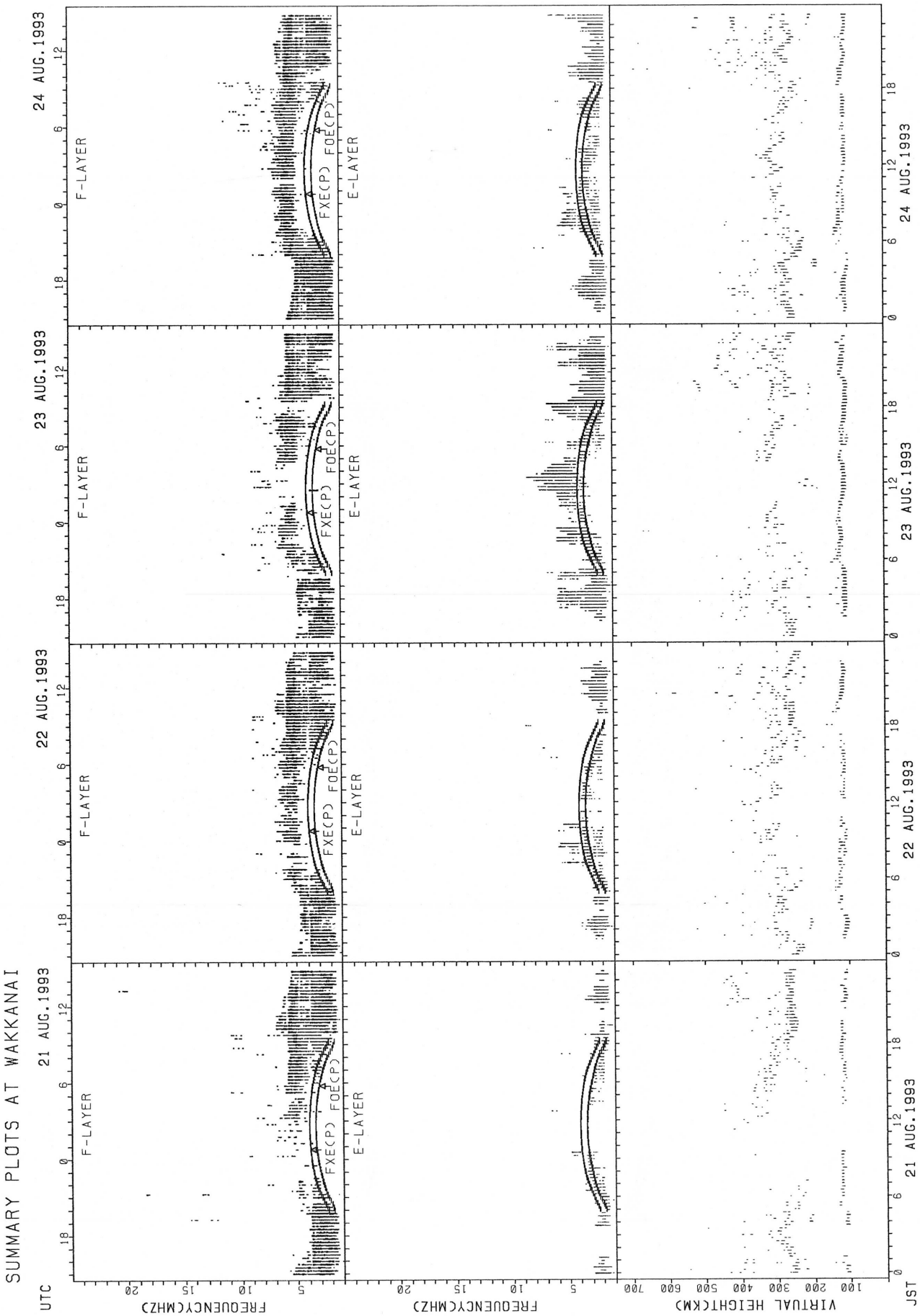
SUMMARY PLOTS AT WAKKANAI

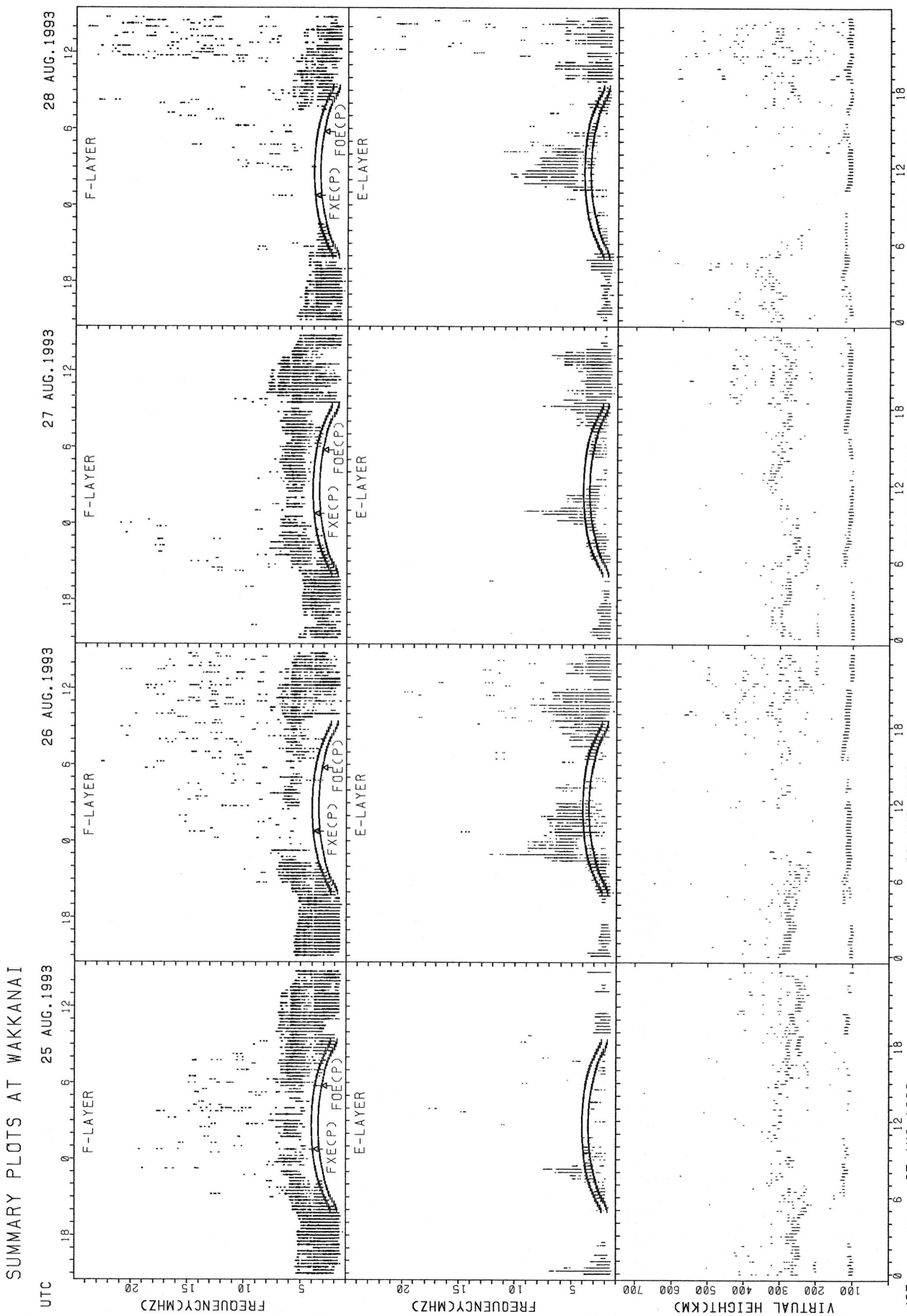


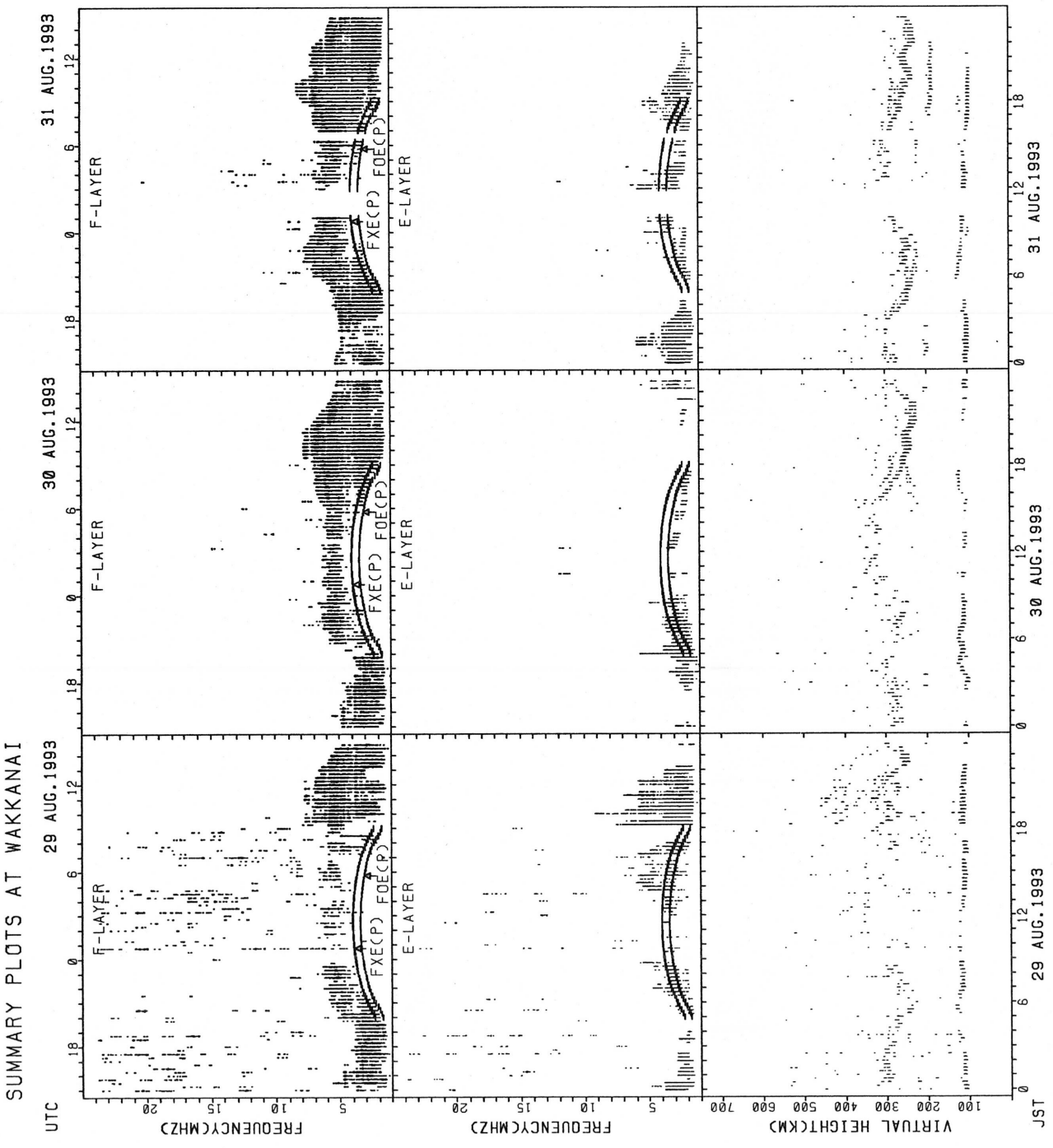
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

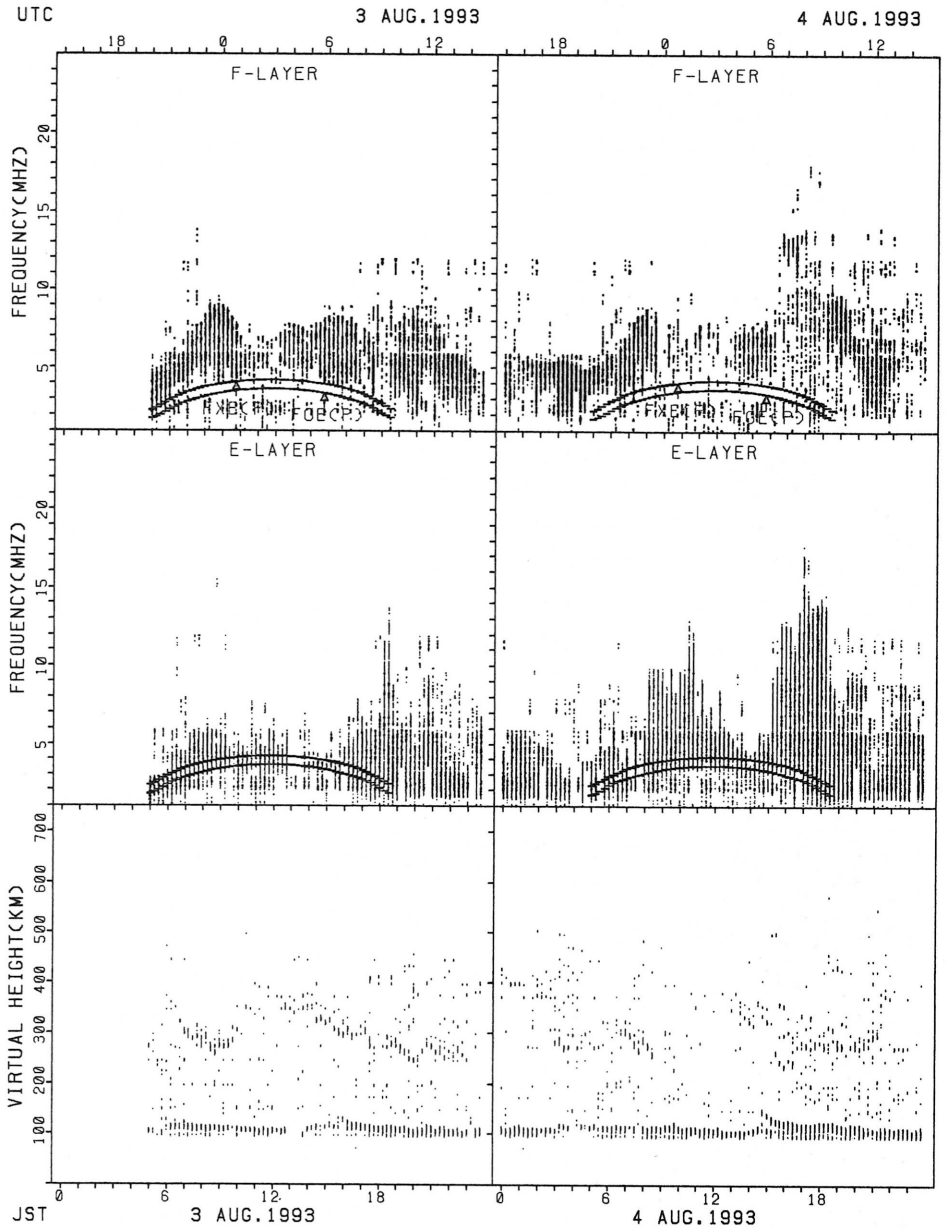

SUMMARY PLOTS AT WAKKANAI
UTC
17 AUG.1993
18 AUG.1993
19 AUG.1993
20 AUG.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

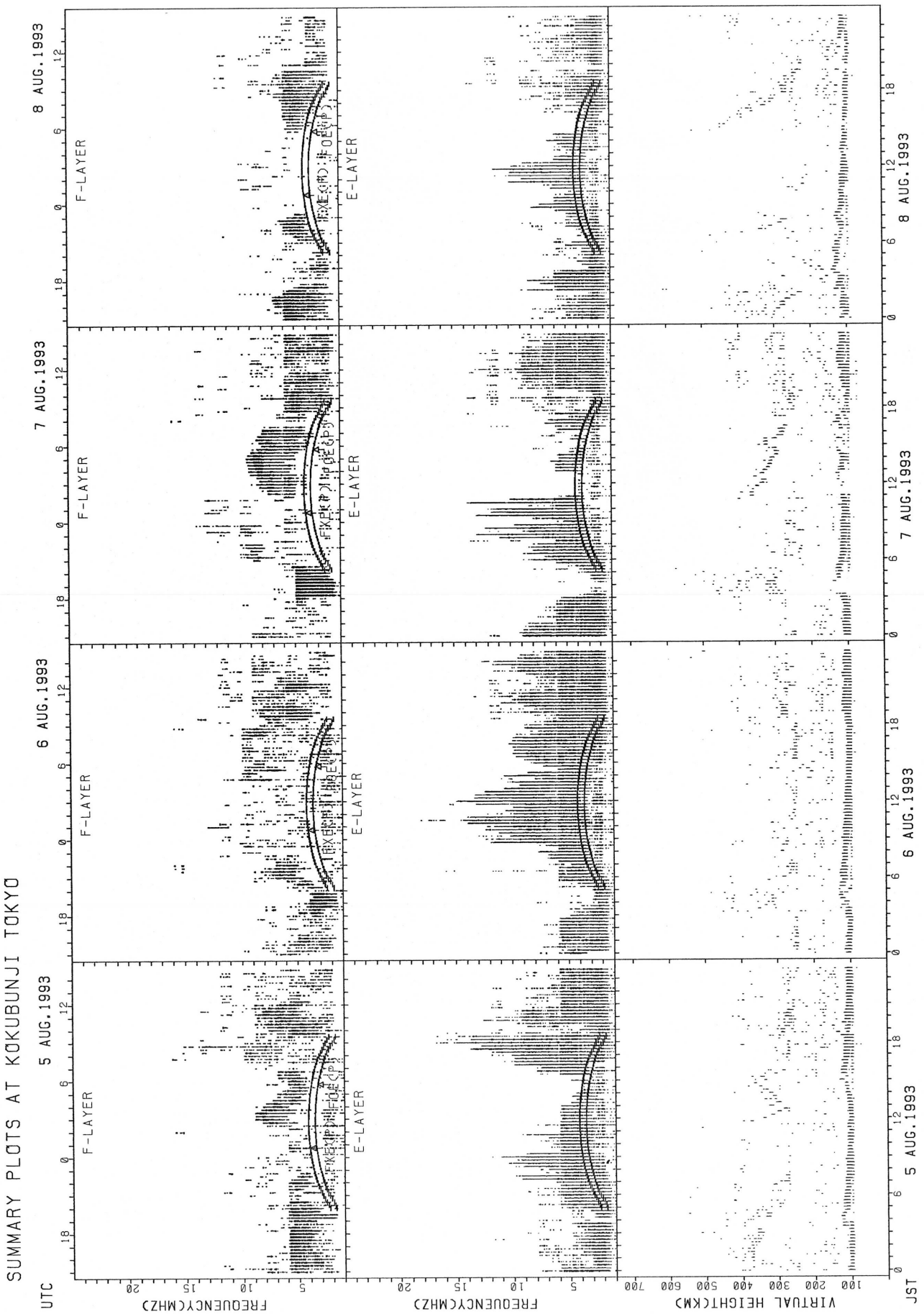

SUMMARY PLOTS AT WAKKANAI
UTC
25 AUG.1993
26 AUG.1993
27 AUG.1993
28 AUG.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

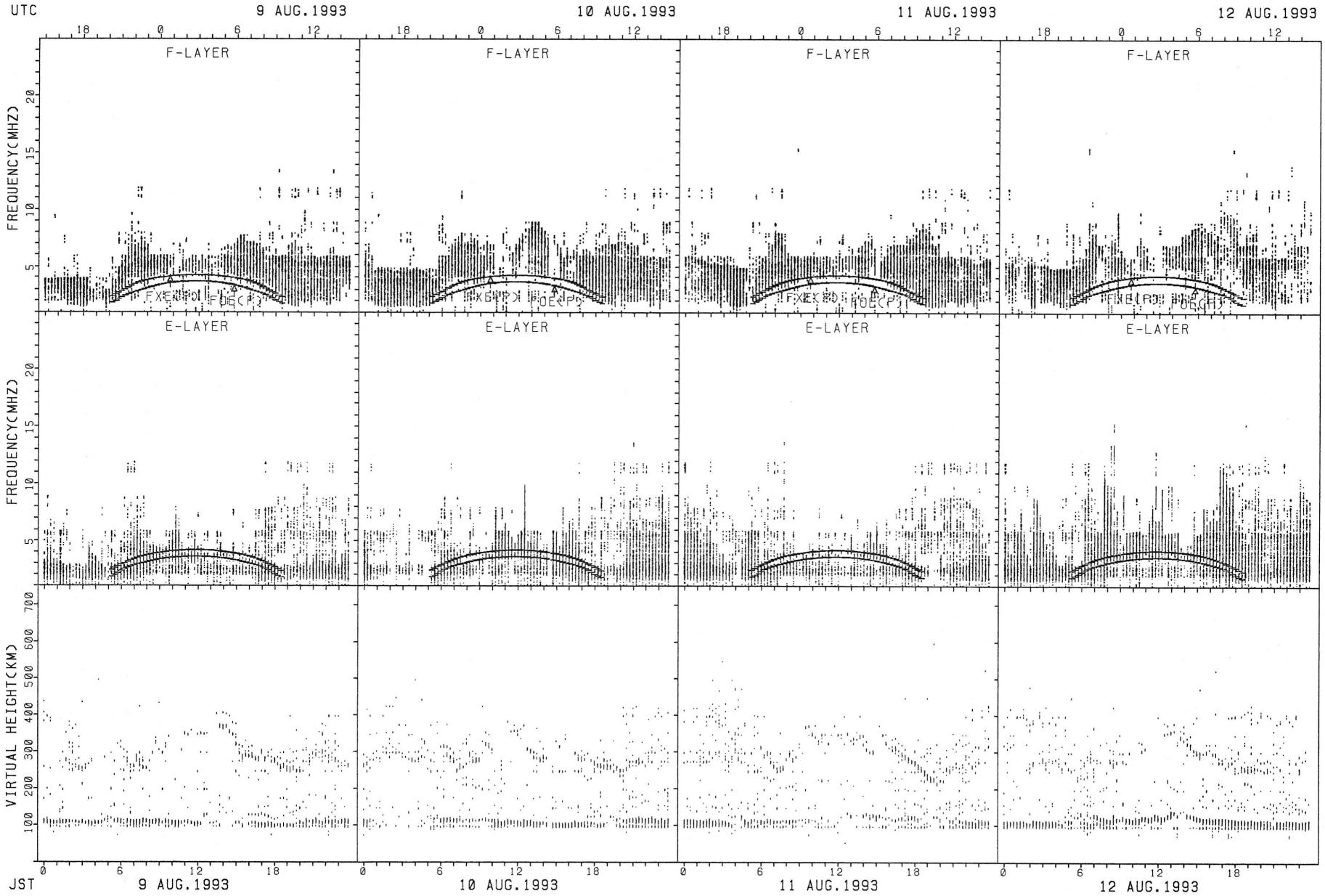
SUMMARY PLOTS AT KOKUBUNJI TOKYO



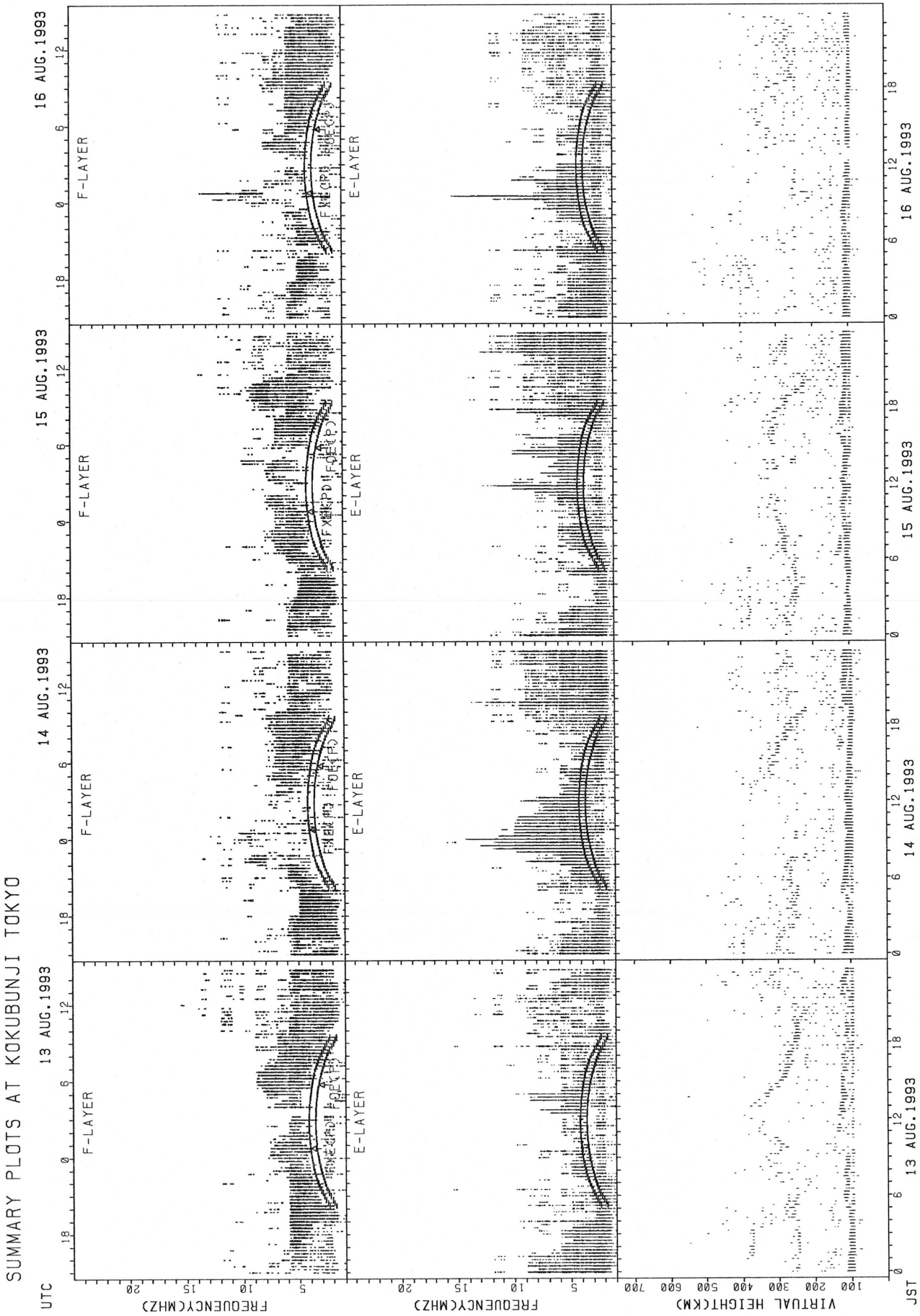
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

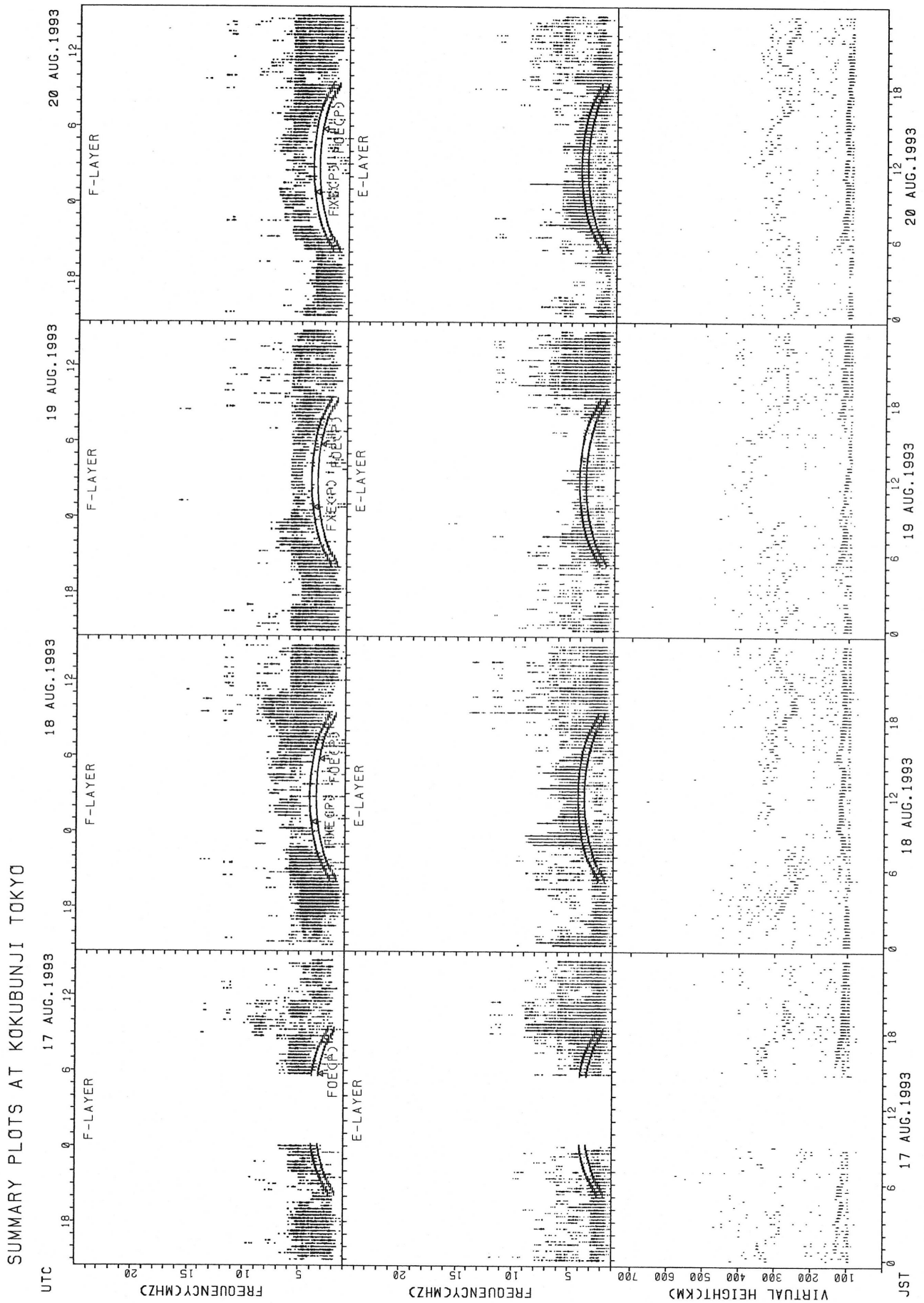

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
5 AUG.1993
6 AUG.1993
7 AUG.1993
8 AUG.1993
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

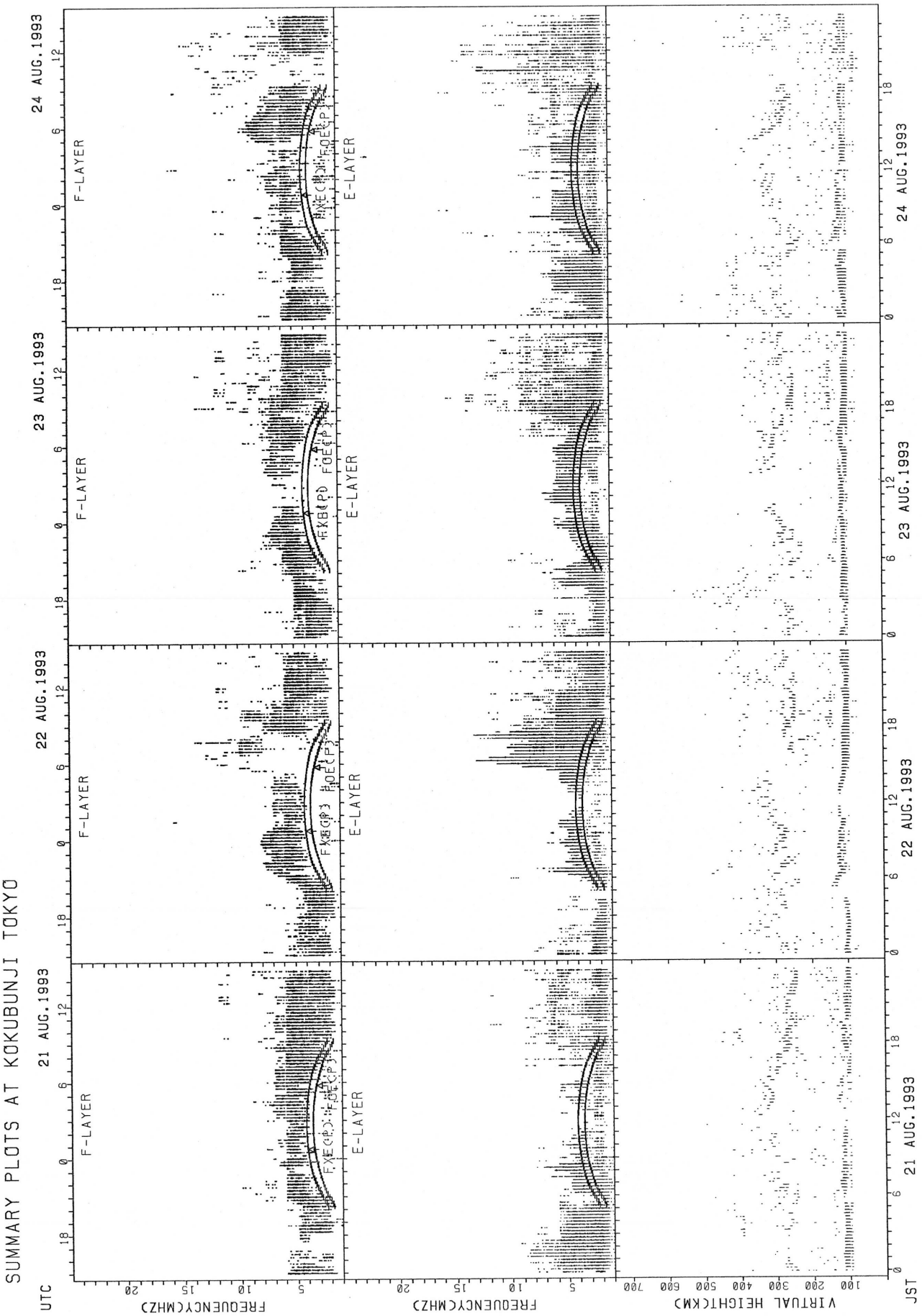
SUMMARY PLOTS AT KOKUBUNJI TOKYO

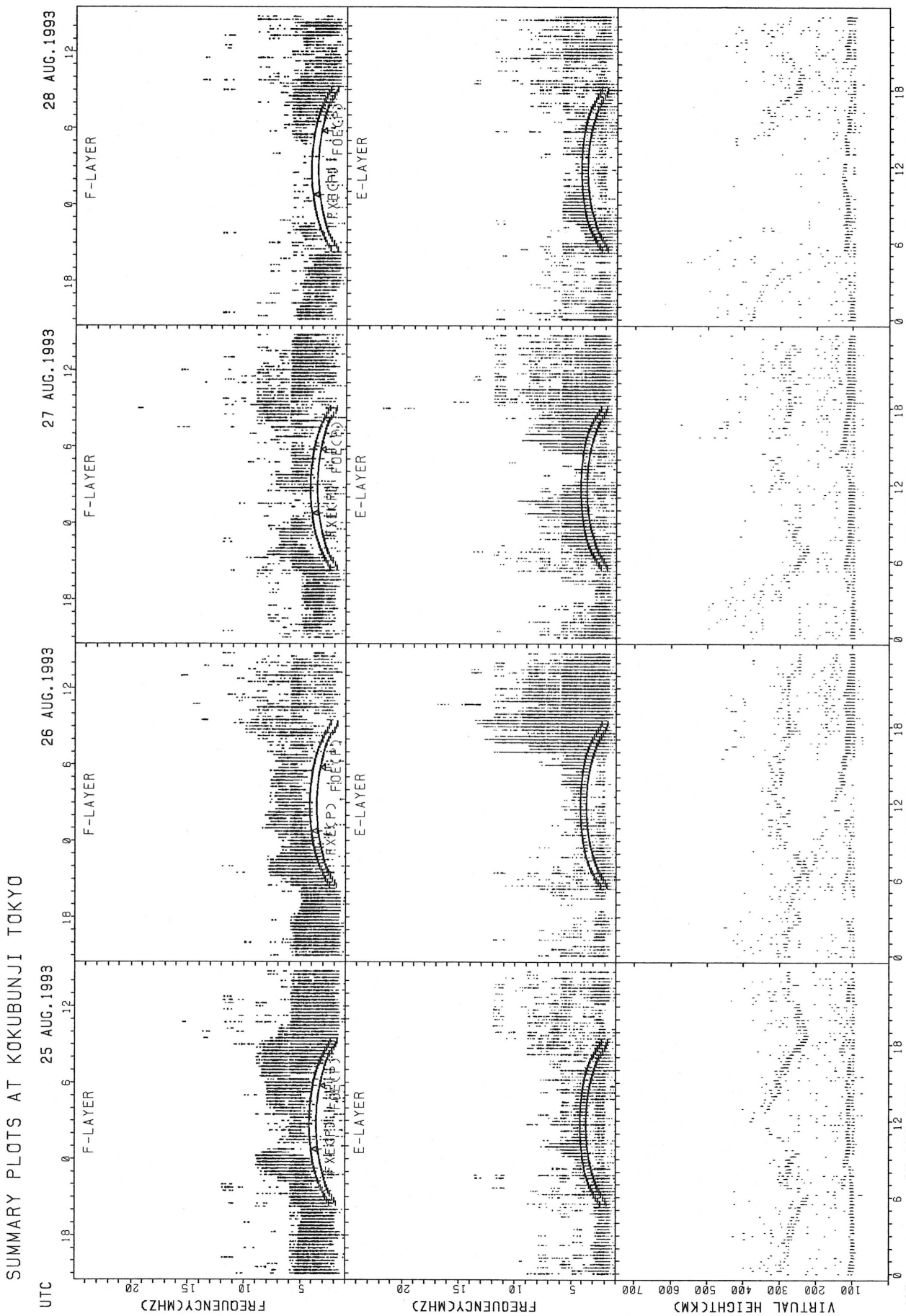


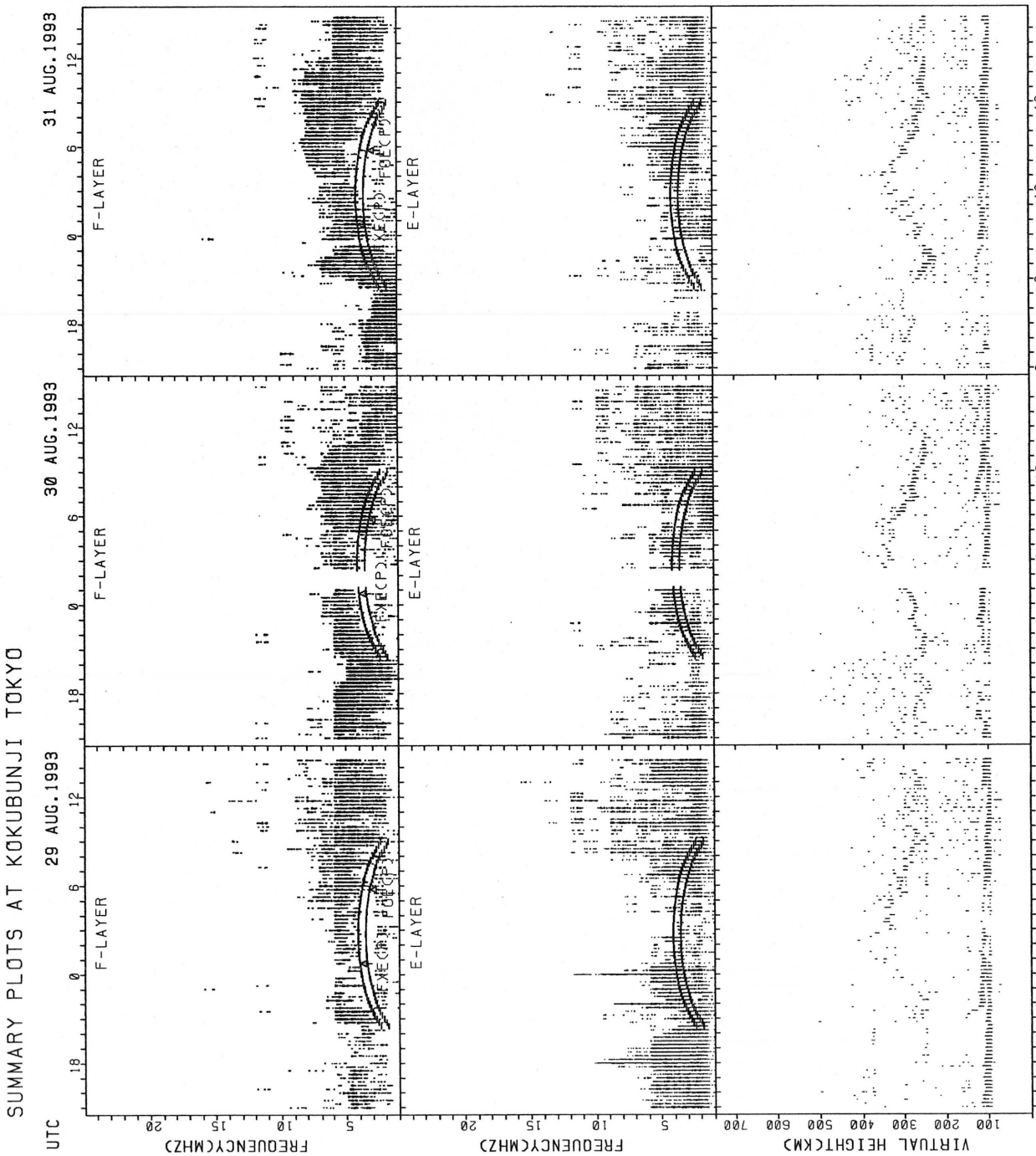
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

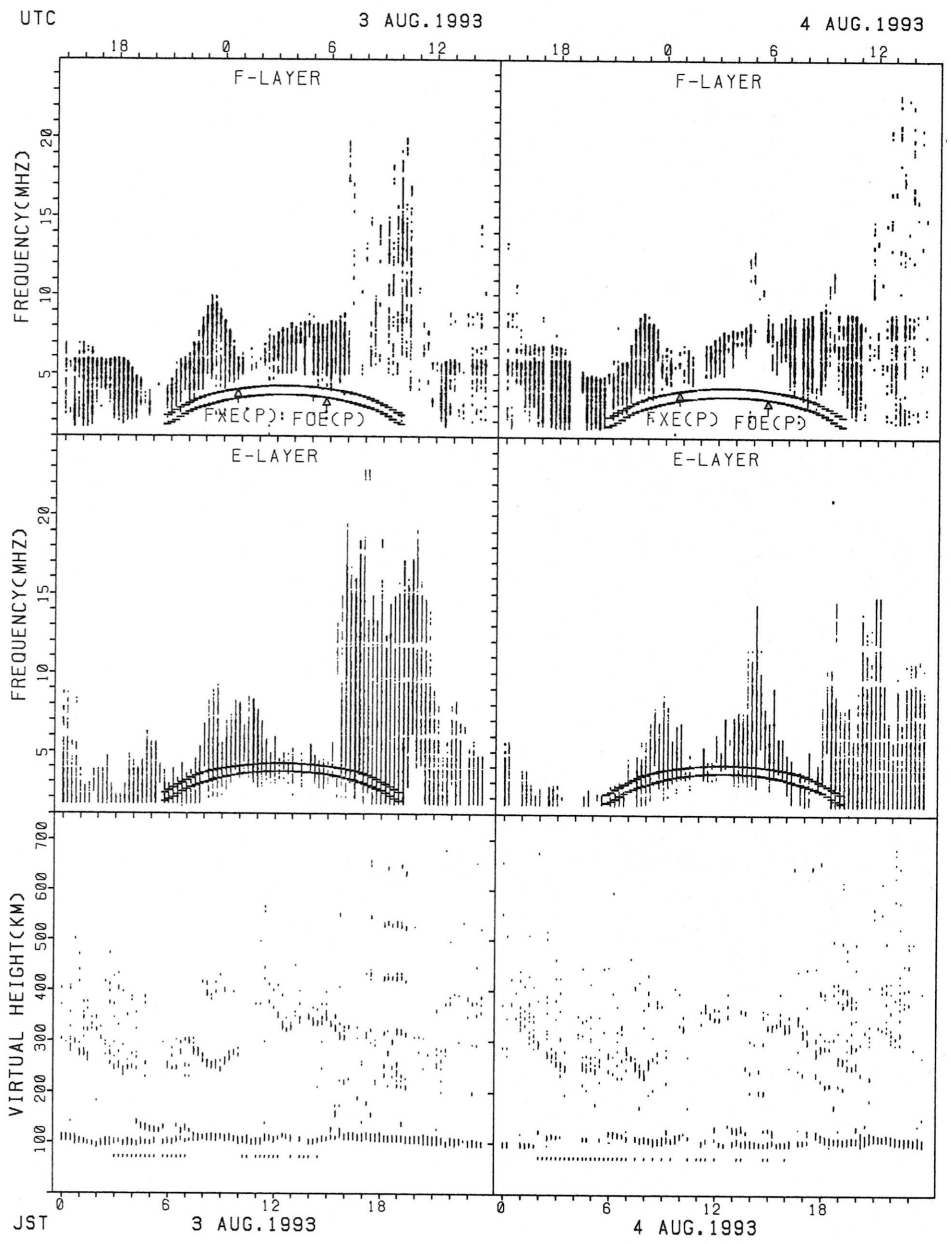

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
JST
17 AUG.1993
18 AUG.1993
19 AUG.1993
20 AUG.1993
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P)
FOE(P)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
29 AUG.1993
30 AUG.1993
31 AUG.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 YAMAGAWA



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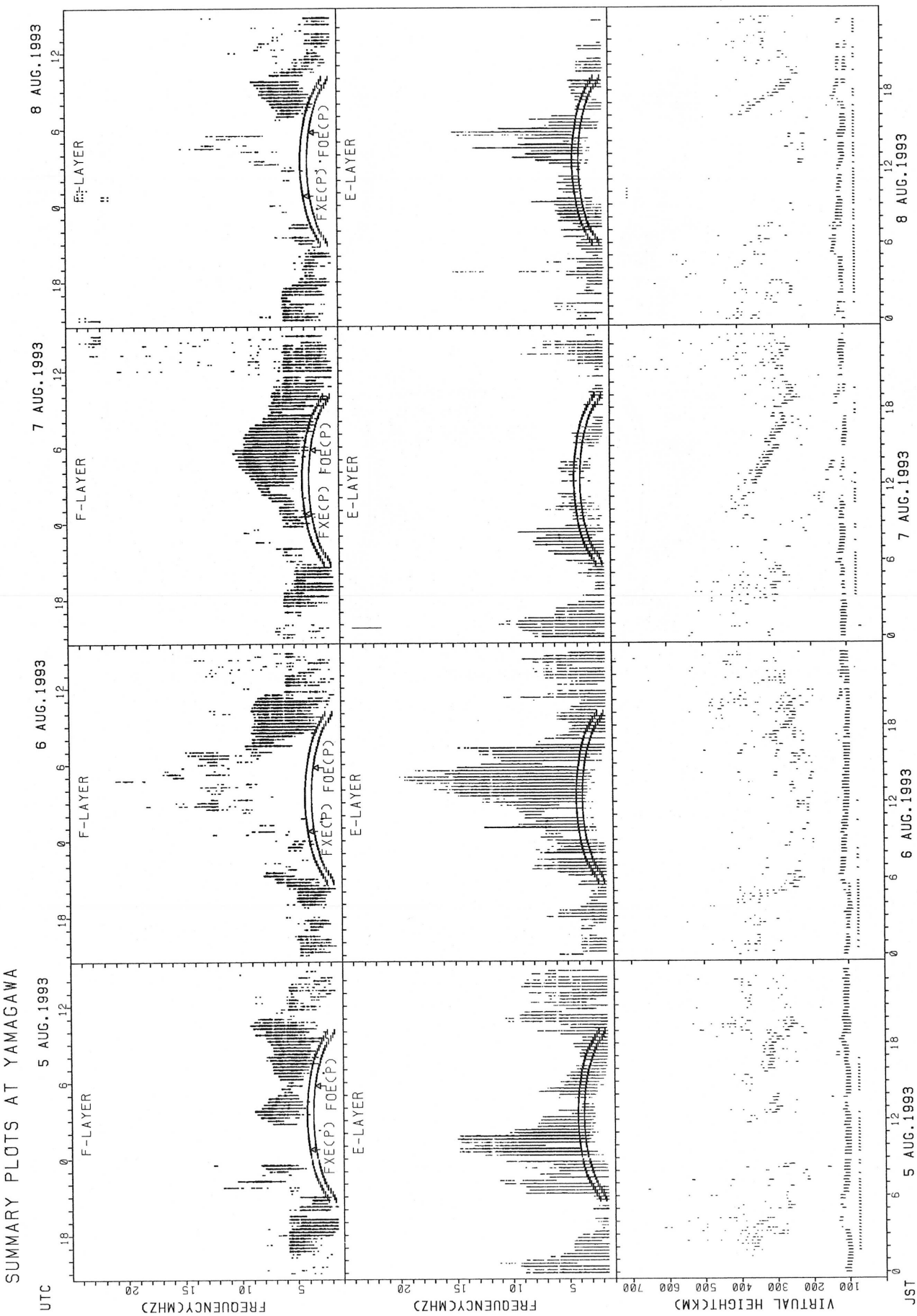
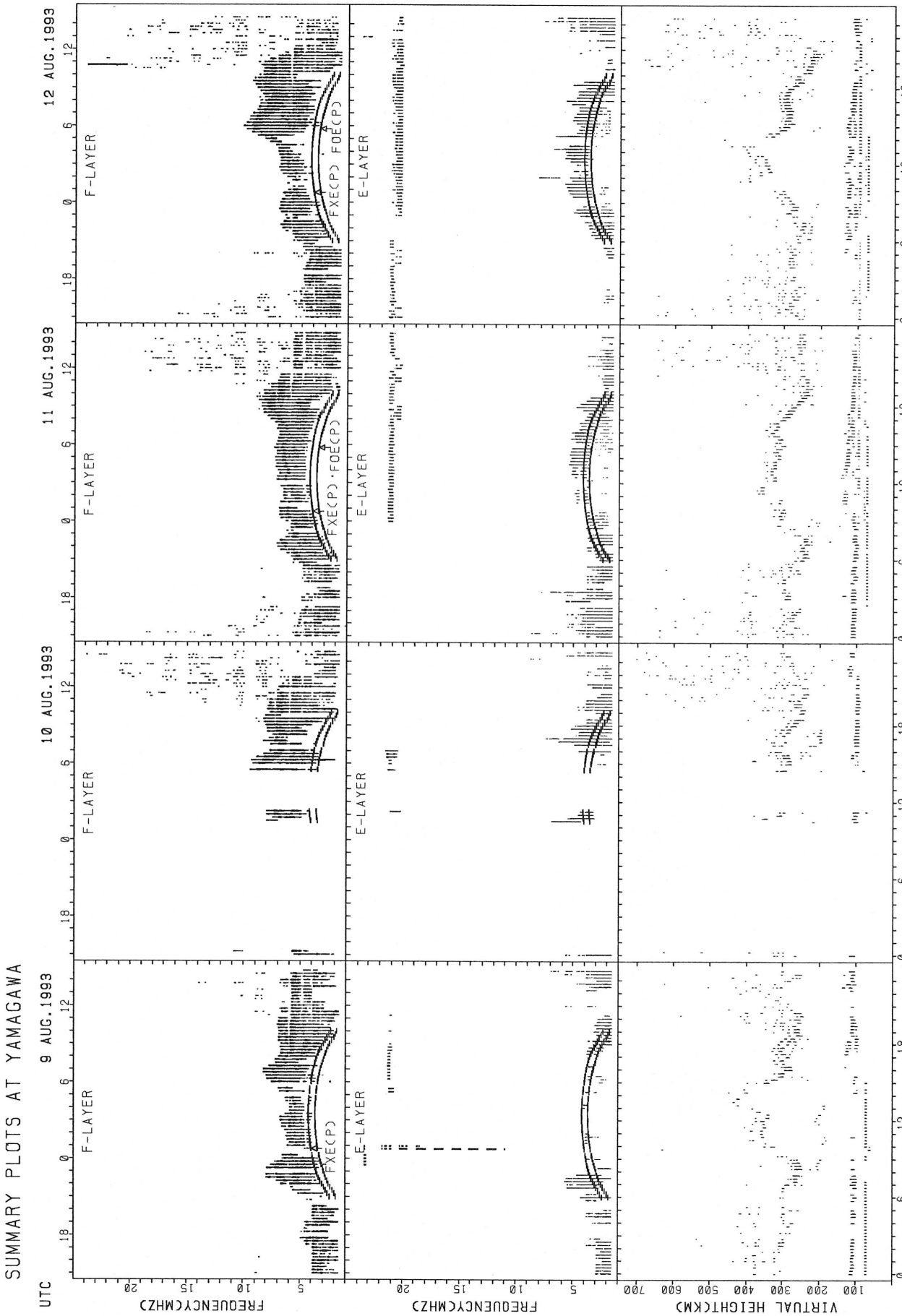
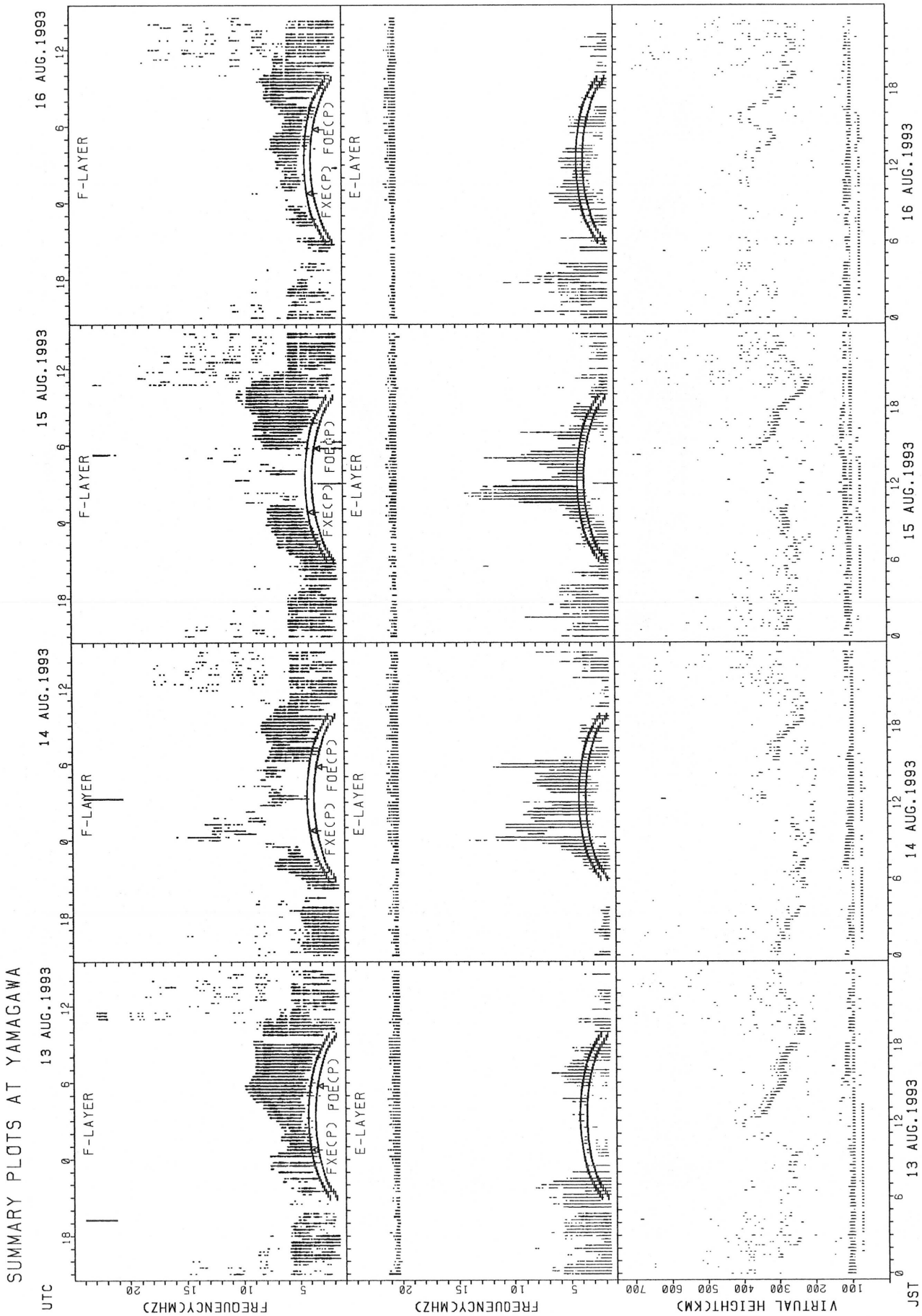
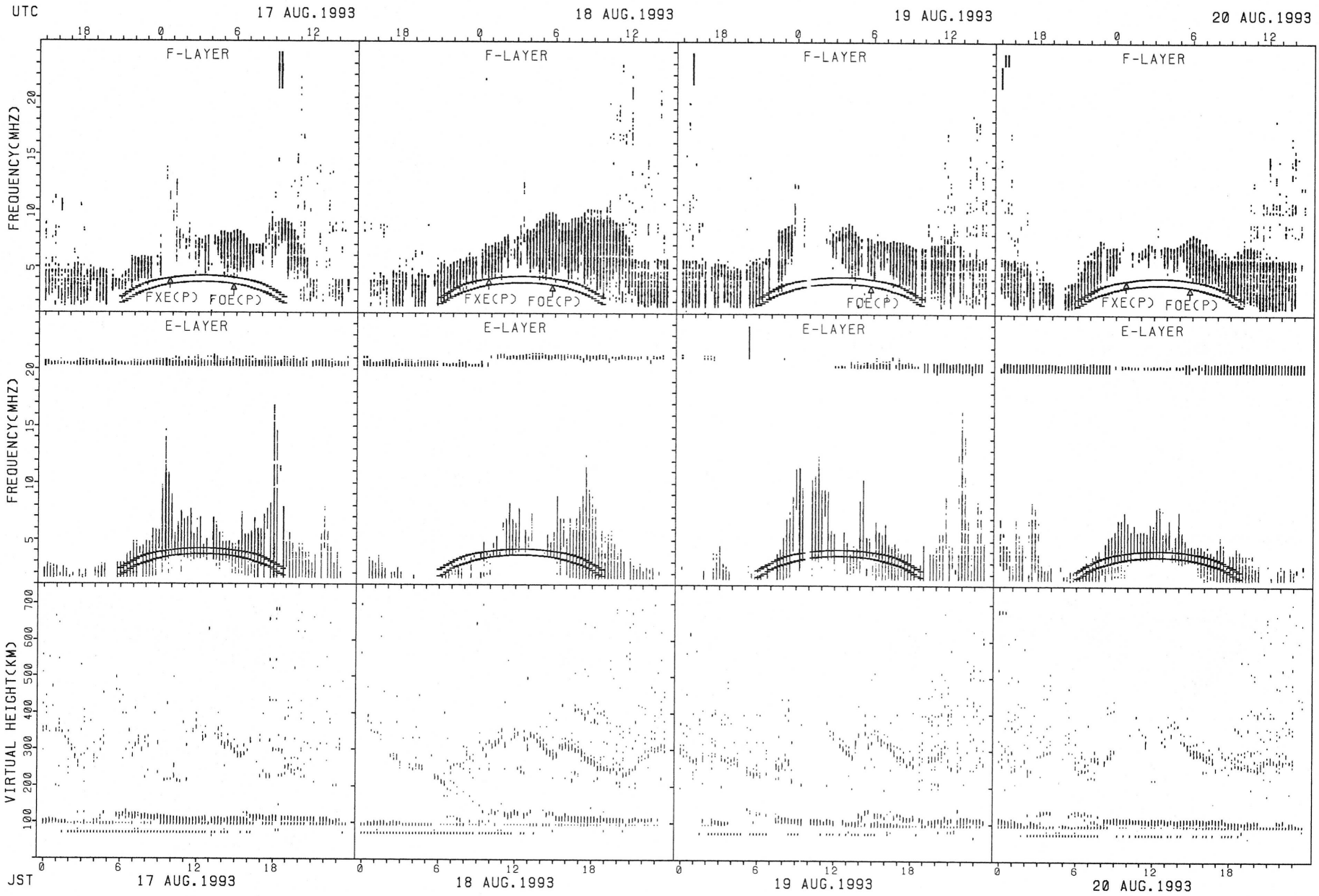
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
5 AUG.1993
6 AUG.1993
7 AUG.1993
8 AUG.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

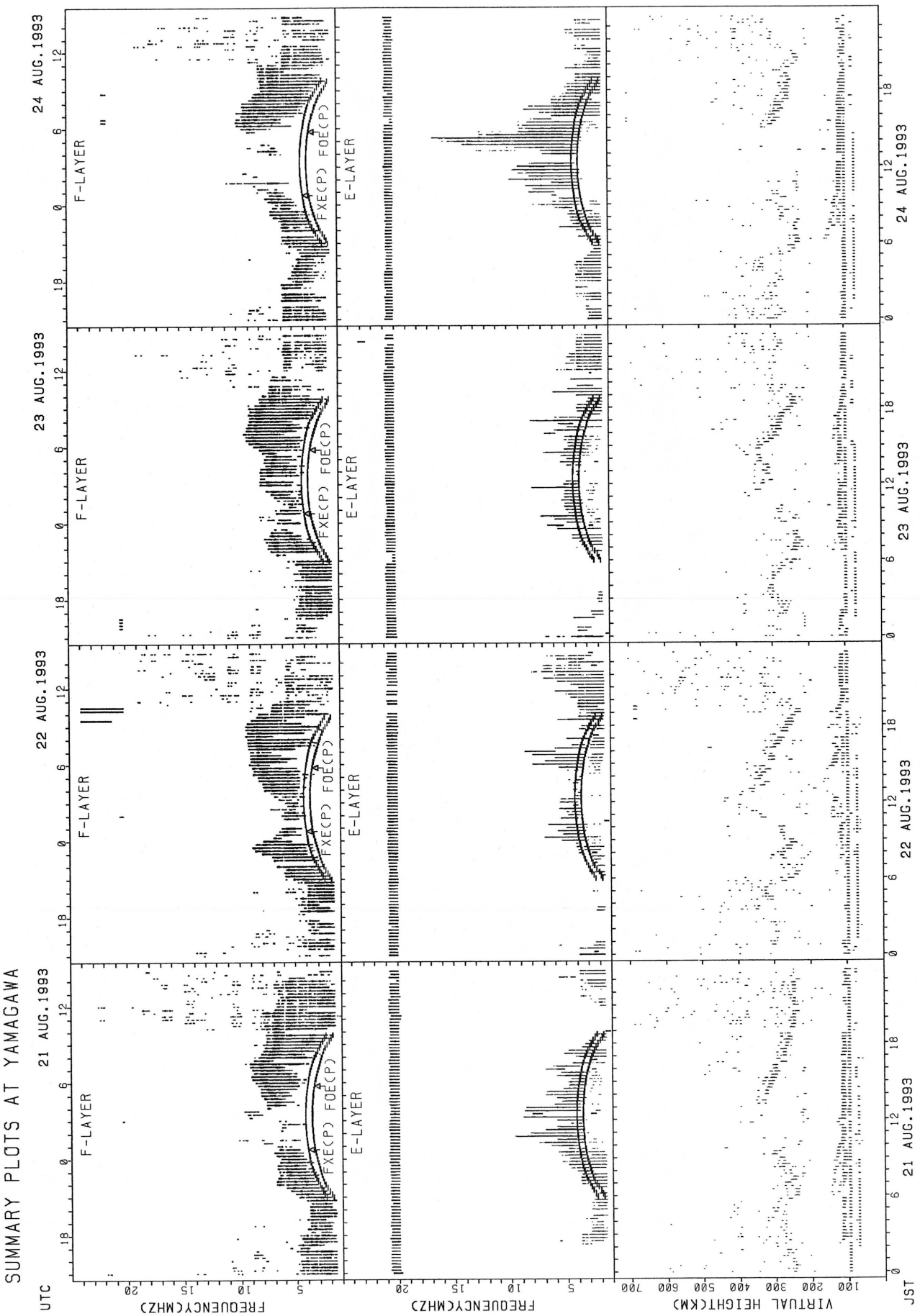

SUMMARY PLOTS AT YAMAGAWA
UTC
9 AUG.1993
10 AUG.1993
11 AUG.1993
12 AUG.1993
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
13 AUG.1993
14 AUG.1993
15 AUG.1993
16 AUG.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

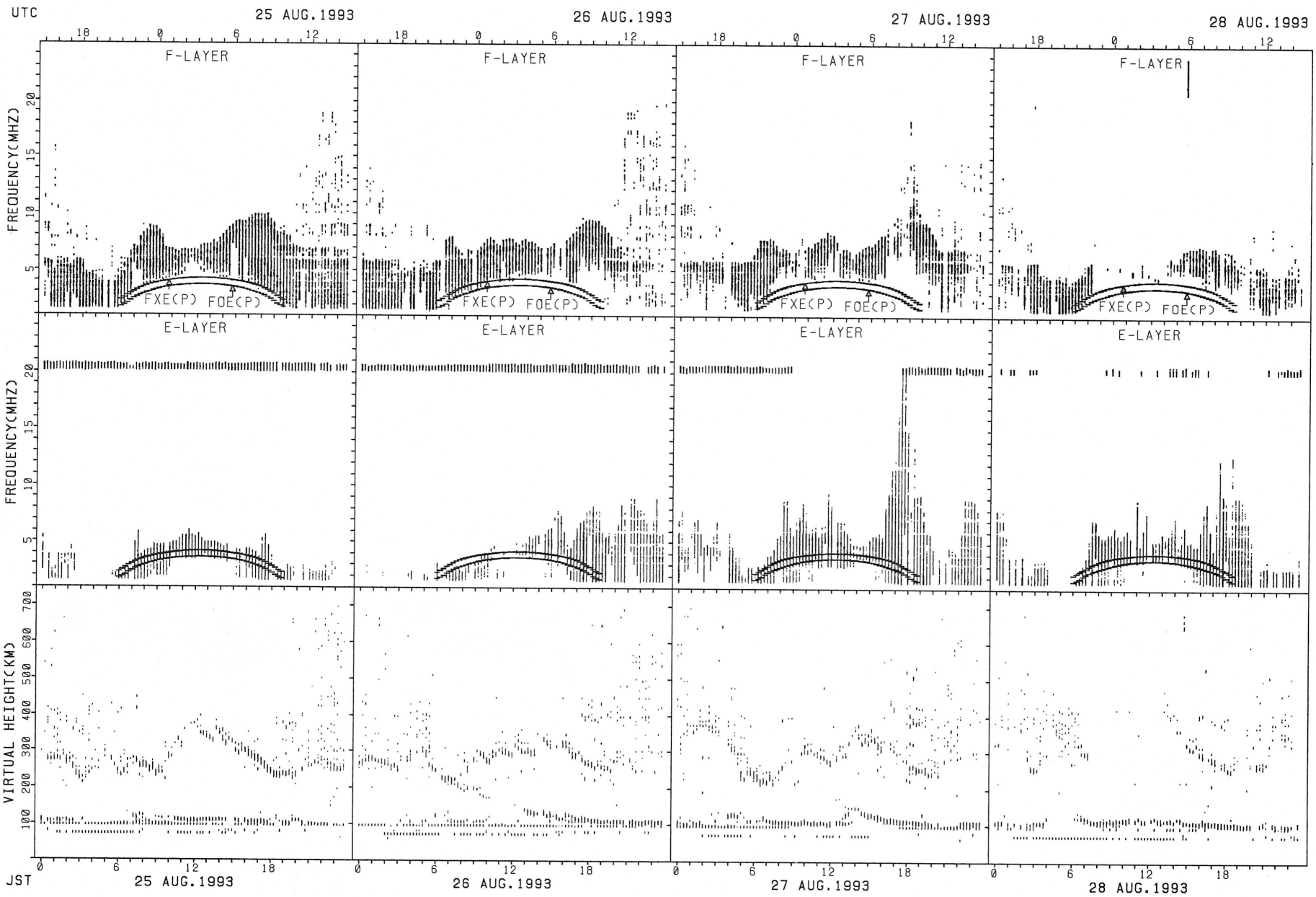
SUMMARY PLOTS AT YAMAGAWA



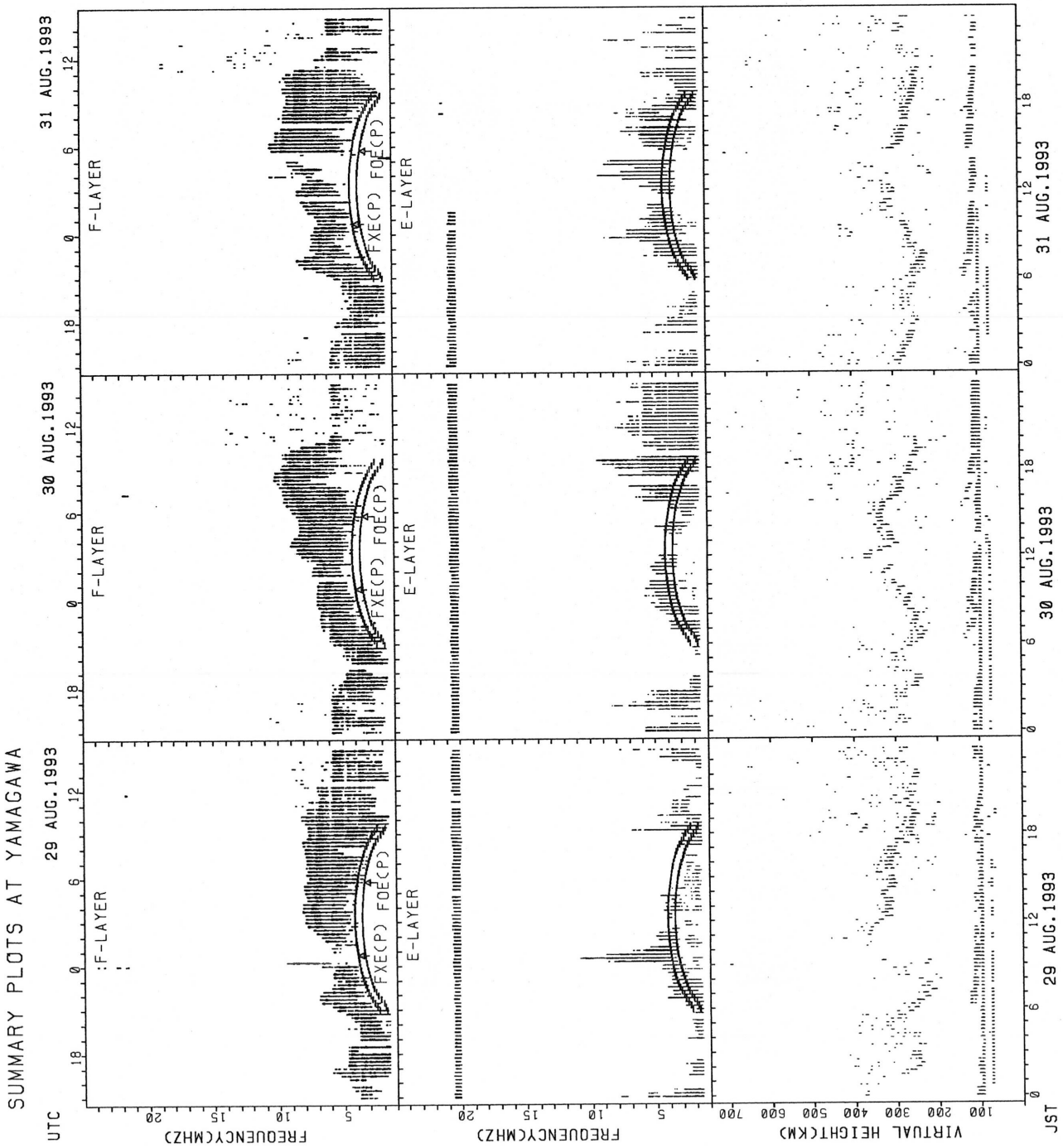
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
21 AUG.1993
22 AUG.1993
23 AUG.1993
24 AUG.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

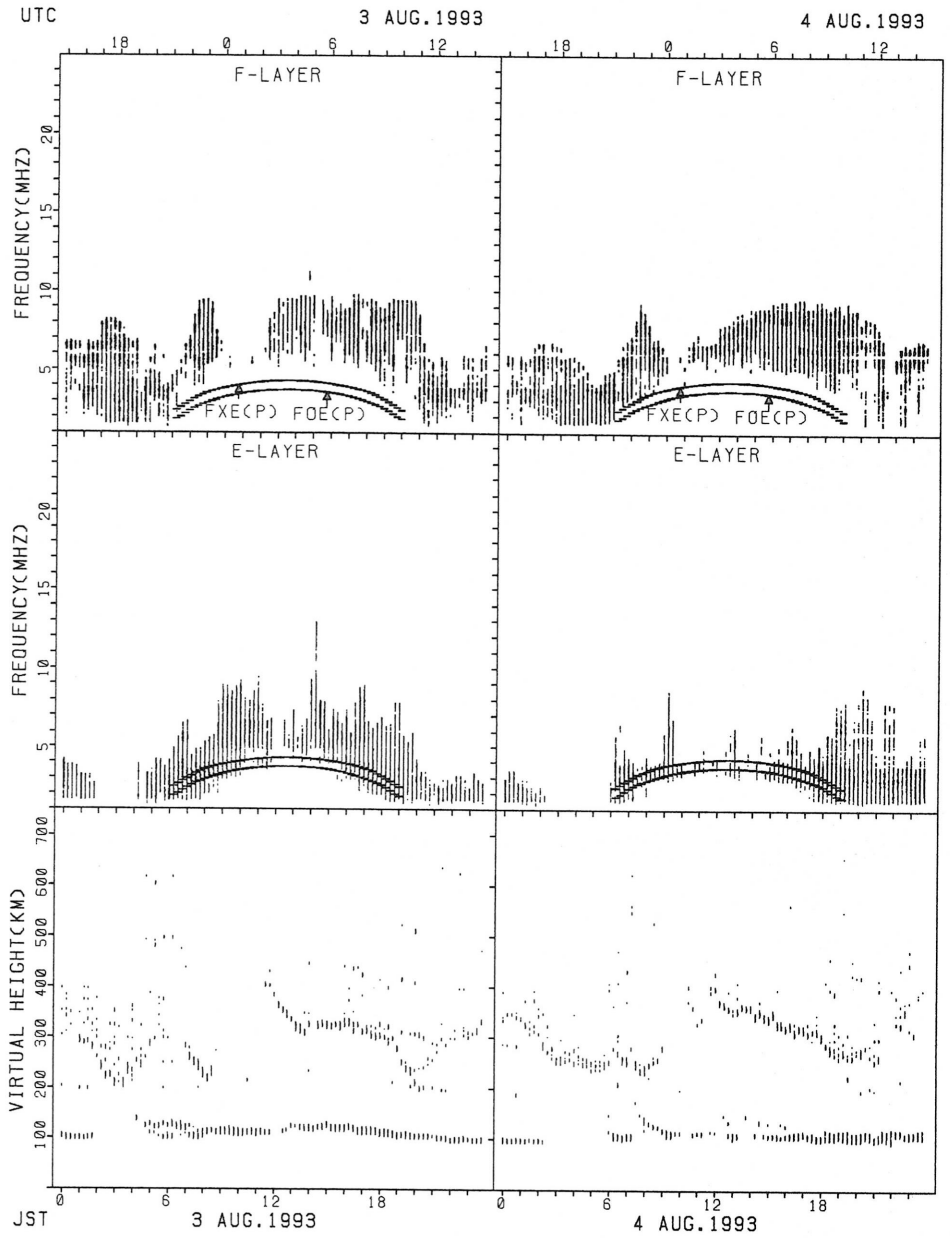
SUMMARY PLOTS AT YAMAGAWA



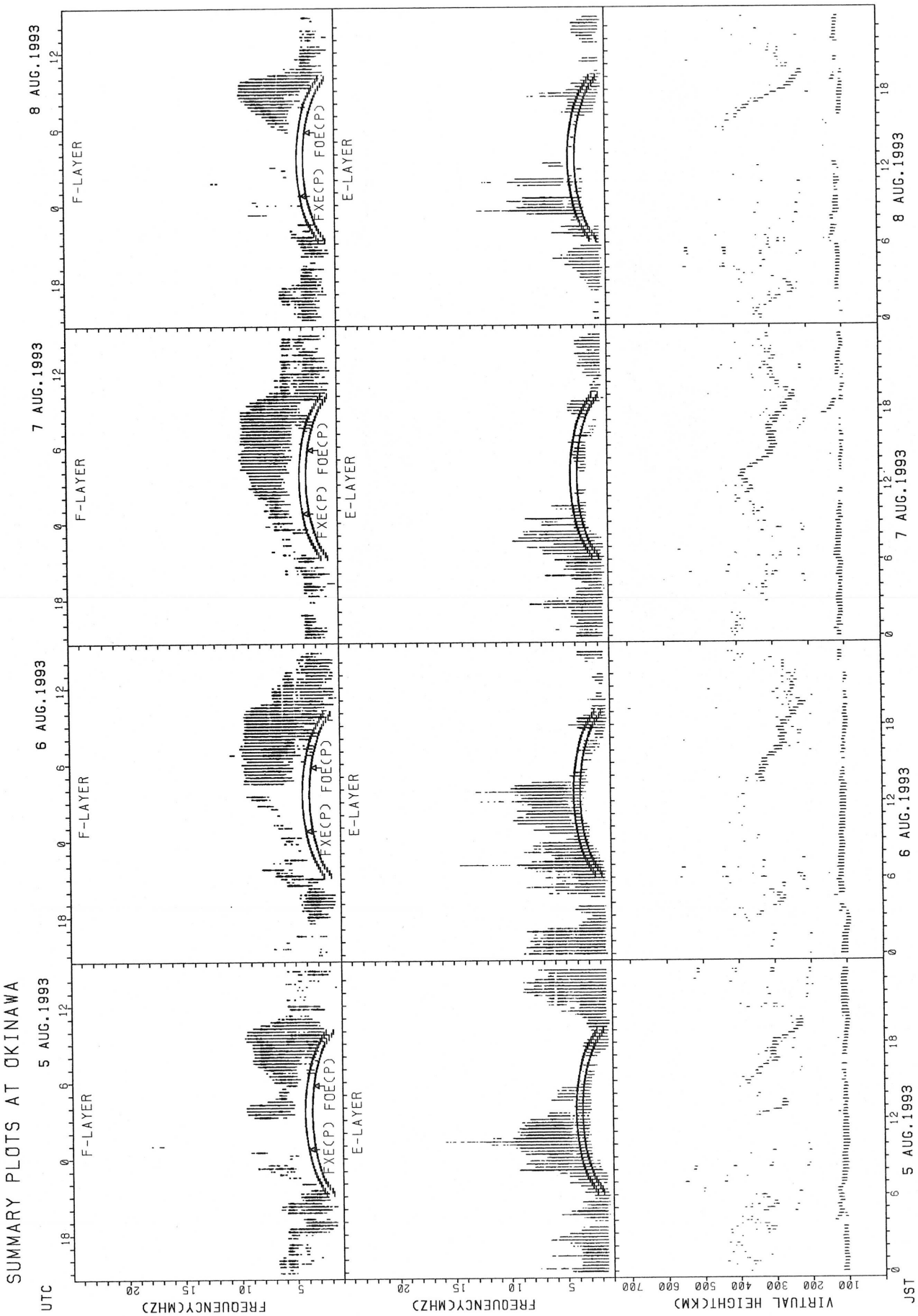
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

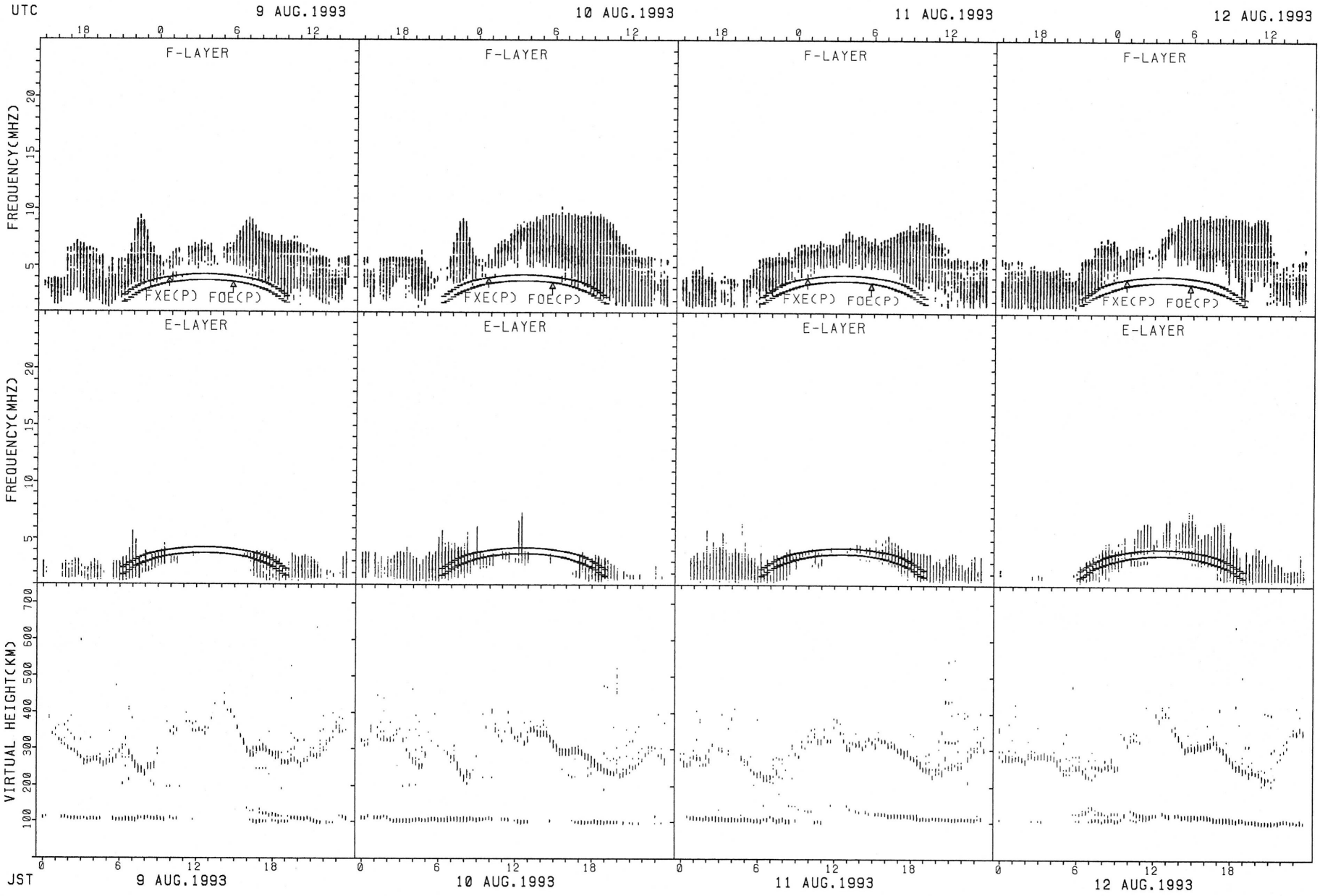
SUMMARY PLOTS AT OKINAWA



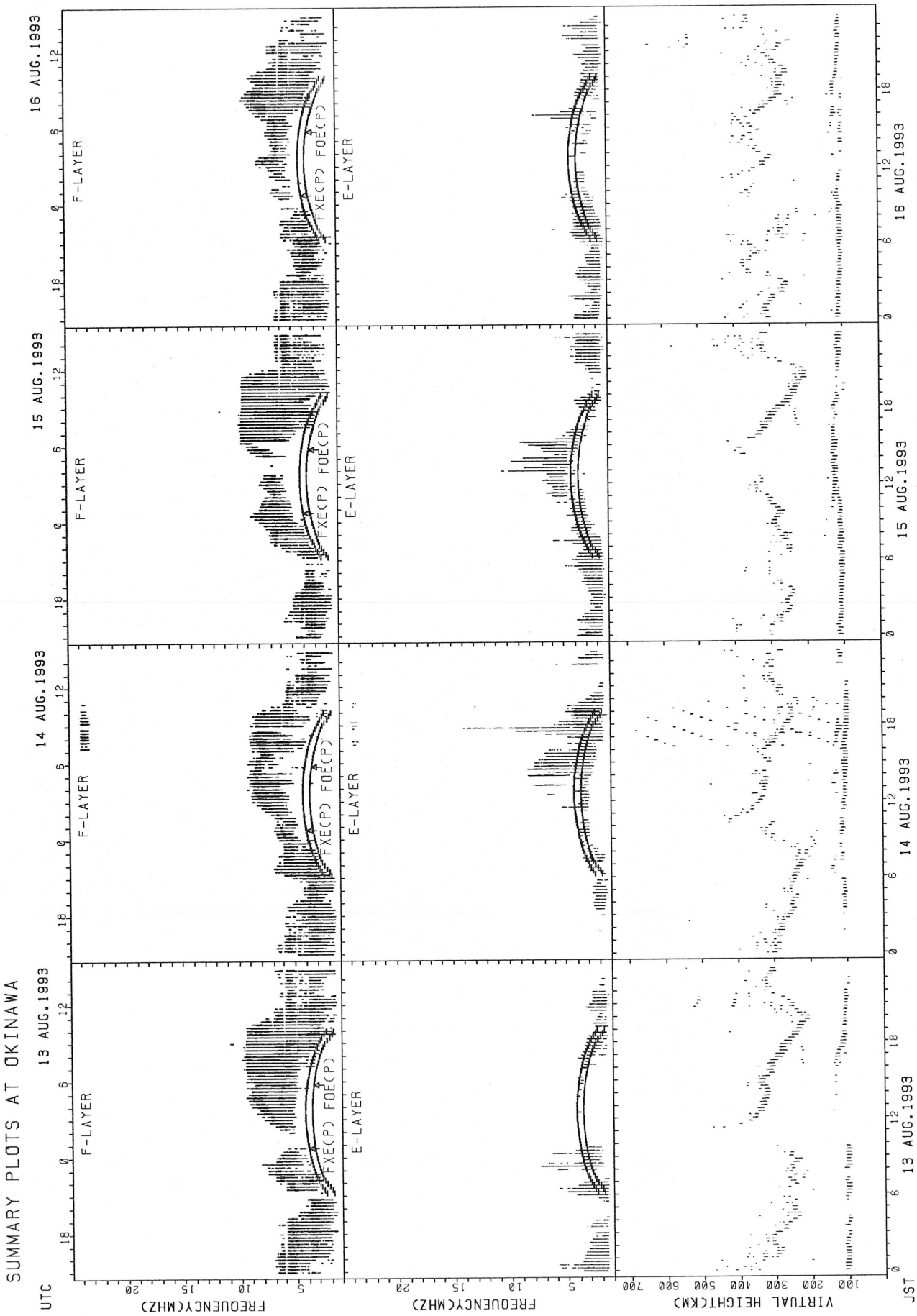
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
JST
5 AUG.1993
6 AUG.1993
7 AUG.1993
8 AUG.1993
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

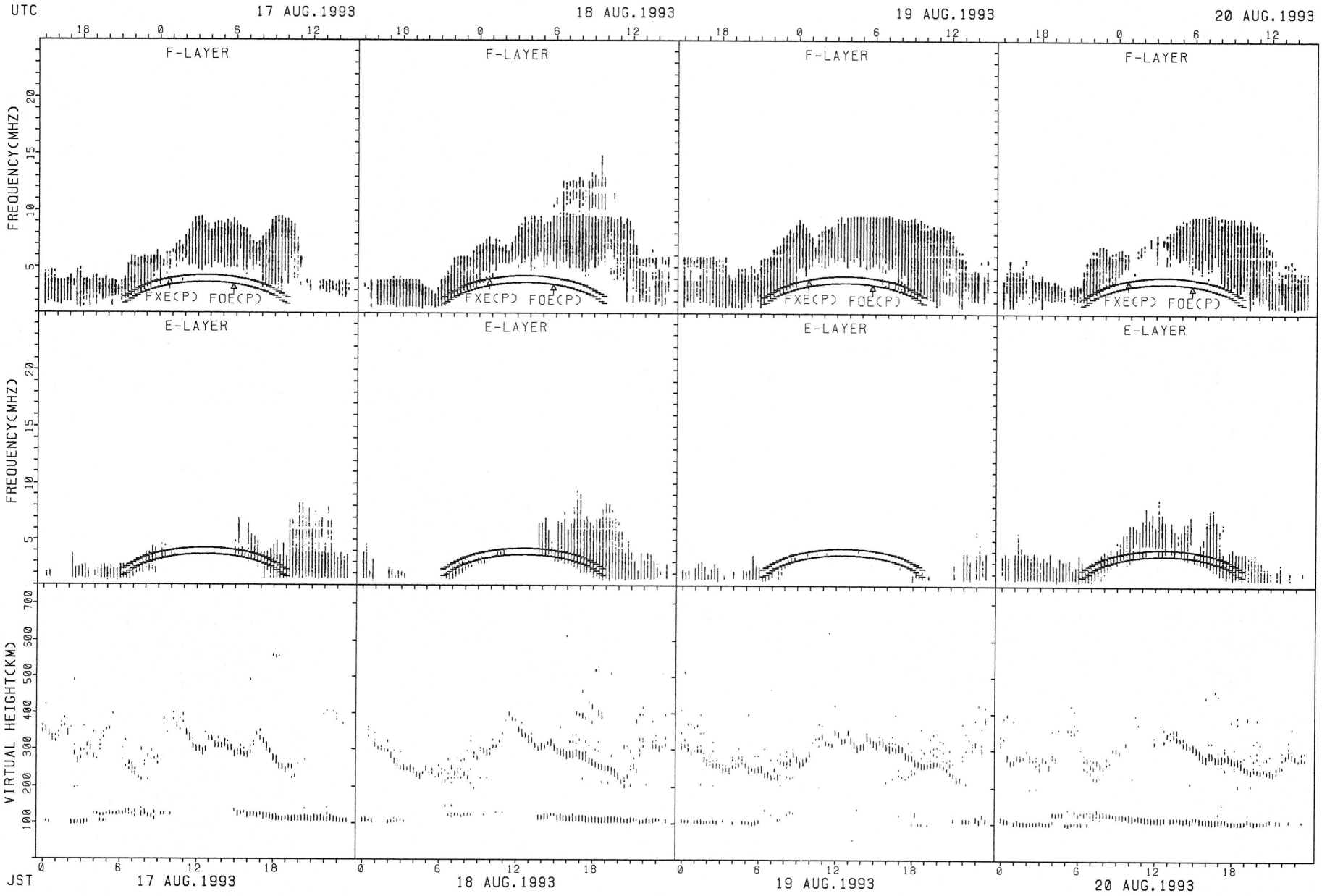
SUMMARY PLOTS AT OKINAWA



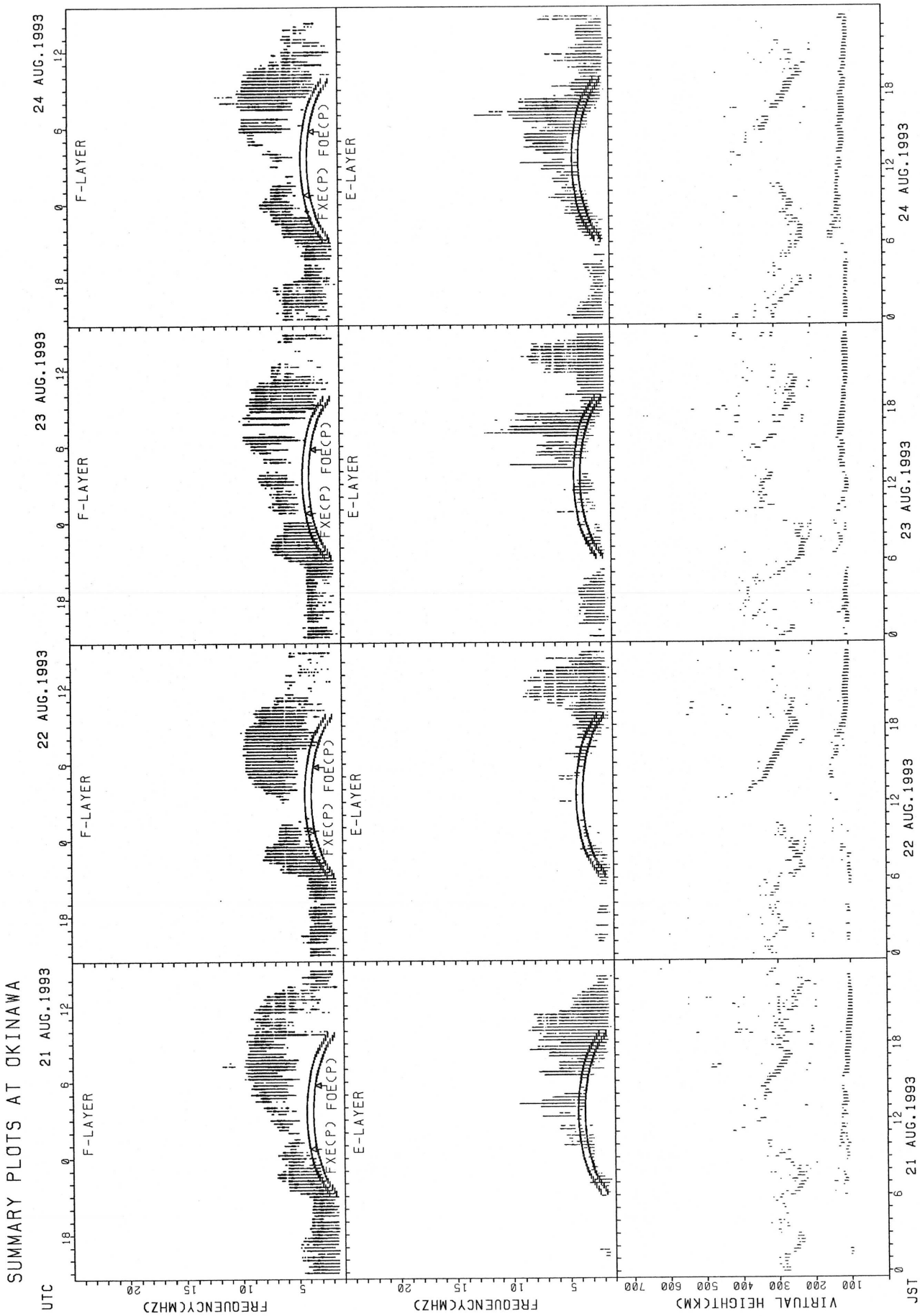
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

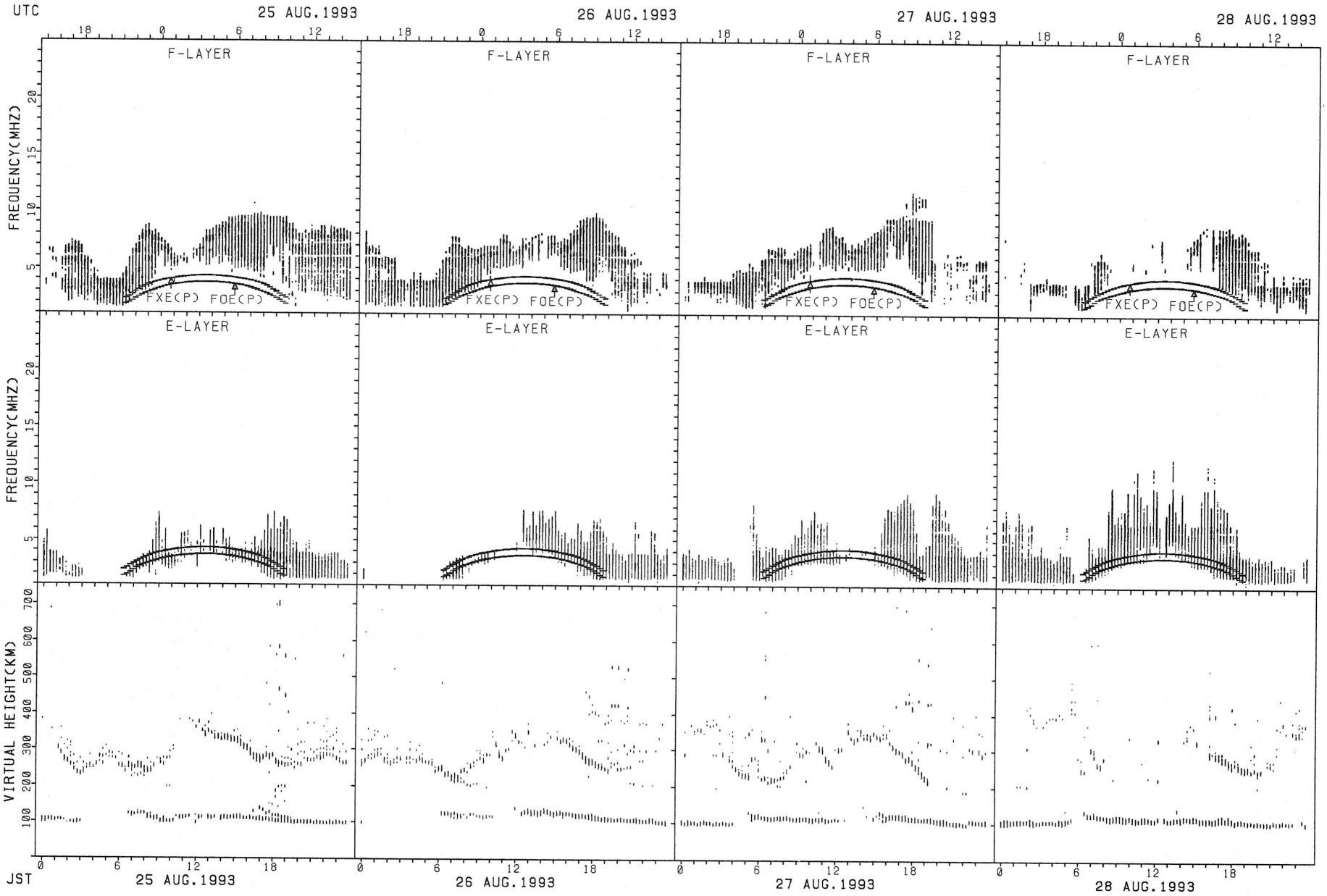
SUMMARY PLOTS AT OKINAWA



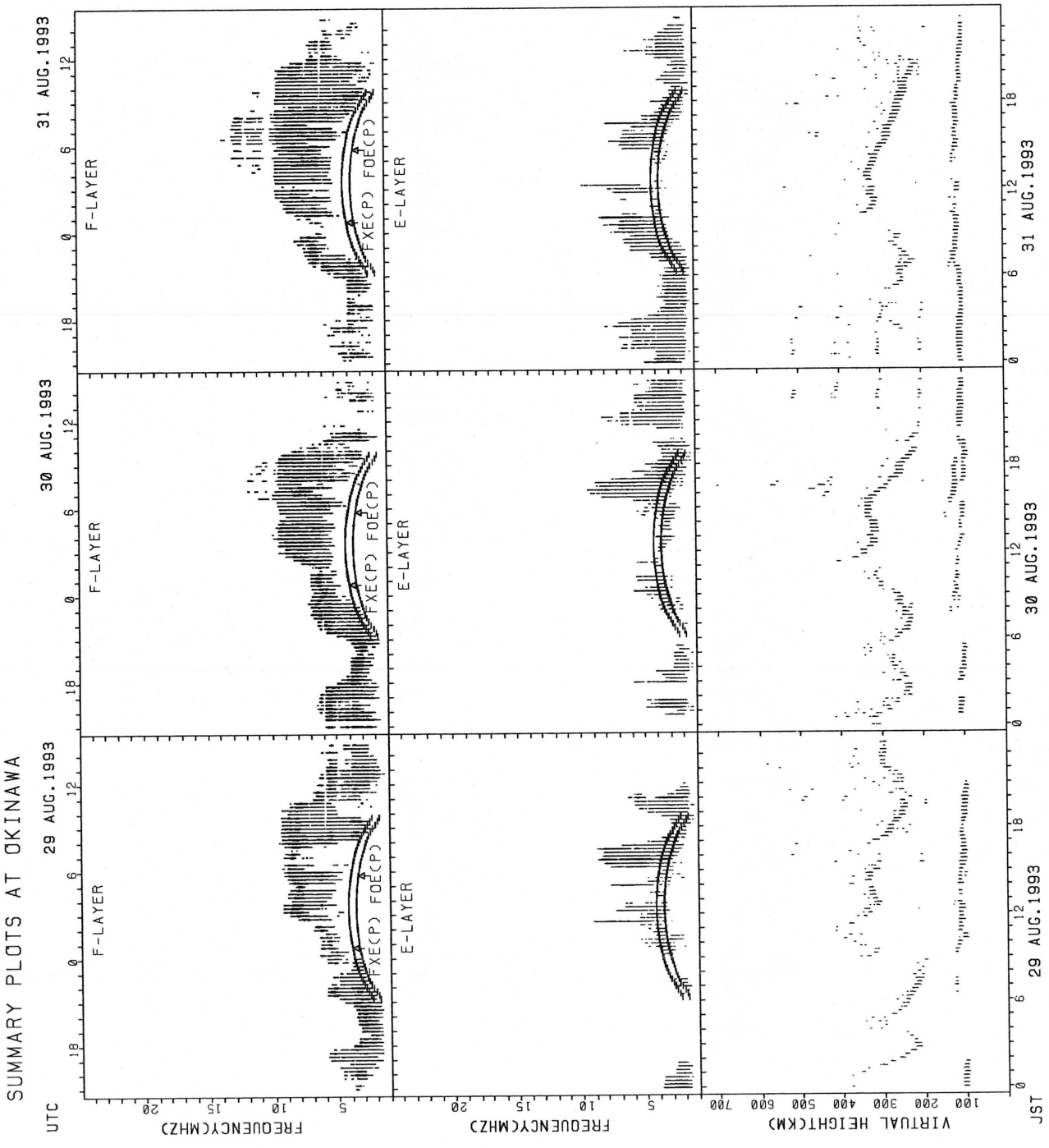
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

SUMMARY PLOTS AT OKINAWA



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


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

MONTHLY MEDIANS OF H'F AND H'ES

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

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																	11	11		14	10			
MED																	306	294		284	299			
U Q																	334	308		300	312			
L Q																	28	21		222	214			

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	21	20	19	19	19	17	15	18	18	14	11	12	10				12	18	21	26	24	22	23	22
MED	109	109	109	111	119	121	121	118	117	115	115	112	113				118	116	117	116	116	114	113	114
U Q	112	113	117	119	129	125	123	119	121	119	121	115	113				126	121	119	123	120	119	117	119
L Q	107	104	105	107	109	117	117	115	115	113	111	108	111				112	109	111	111	111	113	109	109

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								15									14	10	15	18	12	10		
MED								276									297	287	278	279	283	329		
U Q								298									316	318	308	312	331	352		
L Q								250									278	280	260	264	270	306		

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	23	25	24	20	19	19	25	21	26	24	26	21	19	23	20	21	18	23	26	24	23	24	27	24
MED	105	105	105	105	105	111	115	117	113	112	113	111	109	109	111	117	116	115	108	105	107	109	107	107
U Q	109	110	111	110	111	119	123	123	115	117	115	121	115	117	113	124	119	119	113	109	111	113	113	111
L Q	103	103	102	103	101	101	109	111	111	109	109	107	105	103	103	107	105	107	103	101	103	102	101	102

MONTHLY MEDIANS OF H'F AND H'ES

AUG. 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			10					15	18								17	24	22	21	15	10	10	10
MED			103					113	168								290	274	259	252	105	105	107	104
U Q			105					240	264								307	292	286	276	294	107	107	105
L Q			101					109	111								161	109	105	102	103	101	103	101

H'ES

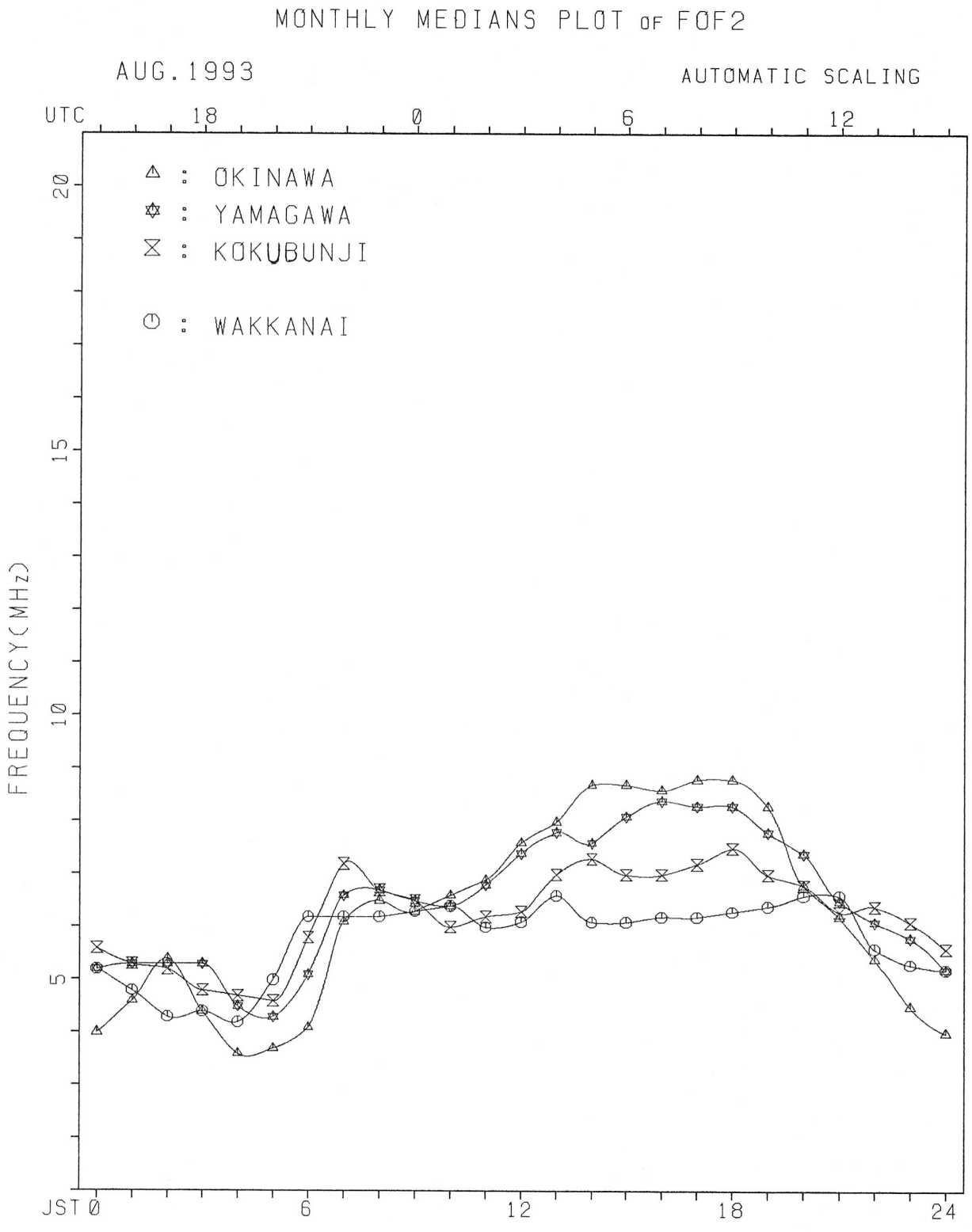
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	18	12	14	13	14	11	11	17	21	17	17	17	16	18	16	16	22	24	27	25	18	16	16	17
MED	111	108	107	109	109	111	119	117	111	115	113	111	109	112	112	115	110	111	109	107	109	107	108	109
U Q	115	112	109	114	121	125	127	122	118	117	117	114	115	123	120	125	115	118	115	111	109	111	114	112
L Q	107	105	101	104	103	101	103	111	109	110	109	107	108	107	104	109	101	108	105	102	105	104	104	103

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								12	14	10								28	28	28	17			
MED								261	252	281								291	268	252	270			
U Q								276	260	316								302	280	269	287			
L Q								229	232	262								273	261	245	237			

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	21	21	17	18	19	18	18	22	21	17	15	13	15	11	18	15	24	24	27	26	24	23	23	22
MED	109	107	109	105	107	107	111	120	115	113	113	115	113	115	117	117	118	113	111	111	108	107	107	108
U Q	111	111	109	109	111	113	119	123	123	118	117	119	125	123	125	123	122	120	119	113	113	113	111	111
L Q	104	103	103	103	103	103	105	111	109	110	109	109	111	109	111	113	112	111	109	105	105	103	103	103


MONTHLY MEDIANS PLOT OF FOF2
AUG. 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

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

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	C	C	C	C	C	51														C	C	C	C	C
2	C	C	C	C	C	56														C	C	C	C	C
3	C	C	C	C	C															X 82	X 82	82	X 66	X 53
4	60	58	55	56	53															X 99	X 81	X 77	72	74
5	60	63	64	61	X 57	61	55													X 78	X 87	69	X 54	A
6	X 41	X 40	A	X 40	43															0 X 83	X 83	X 71	X 68	A
7	A	A	X 51	50	51	50														X 62	X 62	A	64	61
8	61	65	62	39	38	41														X 67	X 55	X 41	X 41	X 40
9	41	42	X 42	X 41	X 35															X 71	X 69	X 69	X 65	0 X 67
10	X 58	X 48	X 47	X 47	X 47															X 76	X 77	X 69	X 61	X 60
11	62	X 58	54	53	52															X 82	X 67	X 63	X 61	X 57
12	X 55	57	56	53	X 48															X 77	X 69	X 62	61	A
13	A	62	60	60	62	62														X 68	X 70	X 59	X 55	59
14	61	56	57	50	50															X 75	68	62	61	A
15	A	57	55	54	45	48														X 93	X 80	60	60	60
16	61	59	57	52	50				59											X 76	X 69	X 68	X 69	X 59
17	X 59	X 55	X 58	X 54	X 54	43														X 71	X 60	X 45	49	48
18	A	X 48	50	53	53	55														X 86	X 75	X 65	X 64	64
19	62	60	X 54	X 51	X 53					61										X 58	62	62	62	57
20	X 49	X 45	X 40	X 39	X 39															X 67	X 66	X 66	X 66	X 61
21	X 60	49	50	51	45															X 70	X 71	X 66	X 64	X 63
22	X 54	X 52	X 49	X 48	X 45															X 78	X 70	X 61	X 59	X 61
23	X 54	X 49	X 47	51	50			63												X 70	X 62	X 61	X 64	62
24	X 58	57	55	54	52	54														C	C	X 60	65	62
25	57	X 54	X 54	54	X 51															X 72	X 67	X 63	X 61	X 60
26	X 58	59	X 57	X 55	X 51															A	A	X 74	X 84	60
27	50	49	45	48	46															X 80	X 72	X 68	X 70	63
28	58	56	X 49	50	X 42															X 54	X 51	51	53	53
29	50	54	50	A	A	44														X 78	X 73	X 73	71	X 63
30	61	X 62	X 58	X 59	52	50														X 90	X 75	X 65	X 61	X 59
31	X 56	X 55	57	X 52	50	50														X 82	X 80	X 73	X 66	X 67
	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	27	27	27	27	13	1	1	1	1										27	27	28	29	25
MED	58	56	54	52	50	50	55	63	59	61										X 76	X 70	X 65	X 64	X 60
U Q	60	59	57	54	52	56														X 82	X 77	X 69	X 66	X 63
L Q	X 54	X 49	X 49	X 48	45	46														X 70	X 66	X 61	60	58

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

IONOSPHERIC DATA STATION KOKUBUNJI

AUG. 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	C	C	C	C	C	F 44	R 67	91	U R 88	Y	R	C	73	88	87	I A 93	98	J R 100	93	C	C	C	C	C
2	C	C	C	C	C	F 50	A	70	Y	A	U R 66	Y	C	C	A	96	84	83	U A 79	C	C	C	C	C
3	C	C	C	C	C	39	50	65	79	85	J R 65	67	66	73	73	77	76	70	67	76	76	F 72	60	47
4	F 48	F 47	F 41	F 42	F 42	46	56	70	V 83	J R 79	I A 71	72	67	68	72	69	A	A	A	93	75	71	F 63	F
5	F 52	F 56	F 55	F 53	51	53	49	58	54	I A 62	60	S 55	85	76	64	J R 61	A	A	A	72	81	63	48	I A 39
6	35	34	I A 35	34	35	34	66	64	A	A	A	A	A	A	A	A	A	A	68	77	77	J R 65	62	A
7	A	A	J R 45	F 41	F 44	F 43	55	I A 65	I A 64	57	I A 61	68	79	87	89	75	74	I A 60	54	56	V 56	A	F	F 52
8	F 53	F 56	F 54	J F 33	30	F 34	I A 38	54	51	A	E G 45	A	A	Y	A	52	54	59	59	61	49	35	35	34
9	F 33	F 34	36	35	S 29	29	52	64	64	61	58	59	59	55	61	70	67	62	60	65	63	63	59	61
10	52	42	41	41	41	41	53	70	70	63	63	I A 62	70	84	76	63	60	61	62	70	71	63	55	54
11	F 54	52	F 46	F 45	F 44	42	55	73	62	55	61	R 61	61	62	67	I A 60	63	68	76	76	61	57	55	52
12	J R 49	F 48	F 46	F 45	42	42	55	74	68	62	61	63	I A 64	J R 66	74	78	73	I A 71	72	71	63	56	F 53	I A 54
13	I A 55	F 54	F 53	F .50	F 51	F 53	55	53	58	J R 64	68	60	58	67	75	83	77	66	65	62	64	53	49	J F 53
14	F 48	F 45	F 48	F 43	F 41	42	V 57	63	59	I A 60	63	I A 63	72	60	69	66	67	67	71	69	F 60	F 54	J F 53	I A 56
15	I A 52	F 48	F 47	F 46	F 35	F 42	51	66	65	65	67	69	68	74	68	67	65	66	77	87	75	F 49	F 53	F 51
16	F 54	F 51	F 47	F 42	F 42	I A 40	46	47	F 53	57	I A 58	60	U R 52	66	67	56	56	60	67	70	63	62	63	53
17	53	49	52	48	48	37	44	R 51	53	63	C	C	C	C	C	59	57	56	I A 60	65	54	39	F 38	F 41
18	I A 40	42	F 42	F 45	F 44	F 45	58	60	55	57	64	69	71	72	72	68	64	66	76	80	69	59	V 58	F 55
19	55	F 53	48	45	47	47	55	69	R 68	F 53	57	55	57	56	55	54	51	49	49	52	F 55	J F 56	F 52	F 48
20	43	39	34	33	33	37	51	55	62	64	68	57	61	67	66	60	R 64	55	54	61	60	60	60	55
21	54	F 41	F 43	F 44	36	39	51	55	58	57	R 62	55	61	67	65	65	J R 64	61	61	64	65	60	58	57
22	48	46	43	42	39	38	56	72	72	73	V 67	66	65	65	63	A	A	A	74	72	64	55	53	56
23	48	43	41	F 37	F 38	45	53	F 56	70	63	R 60	U R 58	62	71	71	66	67	68	69	64	56	55	58	F 54
24	52	F 46	F 45	F 43	F 43	F 46	57	60	I A 62	J R 63	66	70	J R 61	R 61	75	89	78	67	62	C	C	54	F 55	F 53
25	49	48	48	F 46	45	46	55	60	77	83	68	62	S 61	69	75	75	79	80	79	66	61	57	55	54
26	52	51	51	49	45	46	62	73	J R 63	61	77	76	70	69	71	66	A	A	S 73	A	A	68	77	F 52
27	F 40	F 39	F 36	F 37	F 38	42	65	70	66	59	R 67	A	70	R 64	63	A	A	76	87	J R 74	66	62	64	F 56
28	F 48	47	43	V 42	36	J R 34	41	48	54	A	A	U R 52	R	I A 50	54	57	55	58	55	48	45	F 43	F 42	F 44
29	42	F 48	F 41	I A 41	I A 36	33	51	I A 62	56	58	56	60	66	J R 67	71	70	66	69	65	72	67	67	F 62	57
30	F 55	56	52	53	F 44	F 42	52	55	61	63	60	I C 60	R 62	64	66	75	79	76	82	84	69	59	55	53
31	50	49	F 48	46	F 41	41	61	90	71	66	65	67	J R 64	67	74	79	76	73	81	76	74	67	60	61
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	28	28	28	31	30	31	29	26	27	25	26	27	27	28	25	26	29	27	27	28	28	27
MED	50	F 48	F 46	F 43	42	42	55	64	63	62	63	62	64	67	71	68	67	66	68	70	64	59	55	53
U Q	F 53	F 51	F 48	46	44	46	57	70	70	64	67	68	70	72	74	76	76	71	76	76	71	63	60	56
L Q	48	42	41	41	36	38	51	55	57	58	60	58	61	64	65	60	62	60	60	64	60	54	53	F 51

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

IONOSPHERIC DATA STATION KOKUBUNJI

AUG. 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																								
2											480													
3								430	450	470	460	U A 470	470	480	480	460	450							
4								L 440							U A 440	U A 440								
5								400	460				U A 480	470	450	440								
6																								
7										L 460		R 470	480		500	450	410		L					
8								370	410		R 450					420	410	370	L					
9							U L 380	L	L 430	460	460	470	470	470	460	450	430	L 400	L					
10						L	L	U L 430	U L 450	460	470		U A 500	480	460	L 470	U L 430	U L 400	L					
11							U L 385	410	L 440	U L 440	480	490	470	480	460		430	L 400	U L 320					
12							L	410		L		U A 460			460	450								
13							L	L	L	460	470	480	480	480	460	440	420	L 390	L					
14															460	440	420	U L 400	L					
15							L	L	450	460	480		480			U A 430	L 440	L 410						
16							340	410	U A 370				450	460		440	L 440	L 400	L					
17						L	340	400	420	440						430	420	U L 400						
18							L	410		460		480		480		450	L 440	U L 410						
19							U L 360	450	U A 420	440	U A 450	R 430	U A 460	450	440	420	L 410	U L 420						
20							L	440	440	470		470	480	R 470	470	460	420							
21							L	L 420		U L 460	450	L	470	460	470	440	410	L 380						
22						L		U L 420	460	U A 450	U A 430	490	470	470										
23									430	450	460			U A 450	480	U A 460	L 460							
24										460	460	490	480		L 480	450	L 440	L						
25								L	450	450		480	U L 490	460	U A 460	L 440	U L 430	U L 380						
26							L	L 410	U L 440	450	470	470	470	480	470									
27							L	L						470	U L 480			L						
28								360				440			U A 440	U A 420	L 410	L 350						
29							L				L 470	480	480	450	460	440								
30							L	L	U L 450	450	460		480	480	460	450	430	L						
31							L	L 410	L 430	L 460	L 480	U L 480	L 500	470	L 480		420							
	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							5	17	17	19	17	16	19	19	22	23	21	14	1					
MED							U L 360	410	440	460	460	475	480	470	460	440	430	L 400	U L 320					
U Q							U L 382	430	450	L 460	475	480	U 480	480	480	450	L 440	U L 400						
L Q							340	405	425	450	455	470	470	460	460	440	415	L 380						

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

IONOSPHERIC DATA STATION KOKUBUNJI

AUG. 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						B	A	B	A	A	A	C	B	B	A	A	B	A	B					
2						B	A	B	A	A	B	B	C	C	B	A	U A 300	A	A					
3						A	230	285	A	A	A	A	A 380	B	A	A	320	A	A					
4						A	A	A	A	A	A	A	A	A	A	A	A 305	U A 275	U A 200					
5						A	A	280	A	A	A	A	A	A	A	340	305	250	A					
6						A	A	A 270	310	A	A	A	A	A	A	A	A	A	A					
7						A	210	270	A	U A 320	A	A	A	A	U A 340	A	300	245	A					
8						A	225	270	305	A 330	A	A	A	A	A	A	A 295	235	A					
9						B	A	A	A	A	A	370	A	U R 375	360	340	305	245	A					
10						B	210	A	315	A	A	A	A	A	A	A	A	A	185					
11						A	A	275	315	R	U R 365	365	A	B	355	335	300	270	A					
12						A	220	275	315	A	A	A	A 380	A	B	345	310	A	A					
13						A	A	275	A	A	B	370	A	360	A 340	A	A	A	A					
14						A	A	270	A	A	A	A	A	A	A	R	300	260	A					
15						B	240	A	A	A	A 360	A	370	A	A	A	295	260	A					
16						A	220	A	A	A	A	A	A	A	A	R	300	250	A					
17						B	A	R 275	A	315	C	C	C	C	C	325	300	240	A					
18						A	225	270	U A 305	330	350	A	A	A	A	335	280	A	A					
19						B	205	255	305	A	A	A	A	A	A	R	295	260	160					
20						A	225	280	315	U A 335	A	A	A	A	A	A	A	A	A					
21						B	210	280	320	335	A	A 365	R	370	345	320	A	240	A					
22						B	200	270	315	340	A 345	A	B	350	345	A	A	A	A					
23						B	220	270	A	A	A	U A 345	A	A	A	A	A	A	B					
24						B	215	270	315	340	A	A	A	A	A	A	R 300	A	A					
25						B	A	270	300	325	A	A	A	A	A	A	A	R	A					
26						B	A	275	320	A	A	A	365	350	R 355	330	290	U A 240	A					
27						B	A	A	U A 275	A	A	A	A	A	365	340	U S 290	230	A					
28						B	A	245	A	A	U A 345	R	R	355	A	A	A	215	R 165					
29						B	A	A 275	A	A	A	A	A	B	B	R	A	A	B					
30						B	215	270	A	330	A	C	A	A	A	A	280	A	C					
31							C	C	C	A	A	A	A	A	A	A	A	A	B					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							15	22	14	10	5	5	4	6	8	9	19	15	4					
MED							220	270	315	330	A 350	365	375	358	350	335	300	245	175					
U Q							225	275	315	335	362	370	A 380	370	358	340	305	260	192					
L Q							210	270	305	325	A 345	355	368	350	A 342	328	295	240	162					

IONOSPHERIC DATA STATION KOKUBUNJI

AUG. 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	C	C	C	C	C	19	50	JA 70	JA 62	55	50	C	JA 55	JA 90	48	JA 133	JA 67	JA 125	JA 112	C	C	C	C	C
2	C	C	C	C	C	JA 42	JA 92	59	69	87	JA 57	62	C	C	98	JA 103	JA 81	JA 84	115	C	89	C	C	C
3	C	C	C	C	C	JA 21	28	JA 40	JA 52	JA 53	JA 51	JA 48	58	EB 37	46	38	43	JA 62	71	JA 63	JA 42	JA 65	JA 33	JA 33
4	JA 33	JA 52	JA 49	JA 29	25	JA 34	50	JA 42	JA 57	JA 93	JA 94	JA 78	JA 55	56	44	JA 52	127	JA 182	JA 139	JA 65	JA 90	JA 35	JA 50	JA 78
5	JA 53	JA 25	JA 48	JA 43	JA 34	JA 36	62	JA 49	JA 67	JA 112	JA 62	60	JA 52	JA 54	45	43	76	JA 96	JA 168	41	JA 111	JA 52	JA 55	JA 55
6	JA 50	JA 50	58	JA 46	JA 18	28	JA 54	JA 43	78	JA 120	125	JA 120	JA 144	108	JA 102	81	JA 93	JA 93	JA 82	JA 83	JA 95	JA 52	JA 81	JA 122
7	JA 85	JA 78	JA 54	JA 52	EB 11	JA 30	JA 78	77	JA 124	JA 47	JA 113	45	39	61	JA 52	38	33	JA 60	JA 24	22	63	JA 125	JA 76	JA 54
8	JA 42	JA 48	JA 19	JA 79	JA 24	JA 28	47	33	JA 43	73	40	89	JA 94	42	66	35	35	JA 31	JA 37	44	JA 17	23	44	37
9	JA 26	JA 28	23	25	37	JA 20	JA 29	54	JA 40	44	JA 54	41	41	G 32	G	38	34	31	25	JA 21	JA 21	JA 28	JA 25	JA 27
10	JA 44	18	EB 12	15	EB 12	16	42	37	G	35	39	66	56	JA 50	40	57	60	JA 30	21	18	21	JA 43	JA 54	JA 44
11	JA 54	JA 54	JA 47	JA 34	EB 12	61	34	G	JG 31	G	G	40	40	49	43	66	34	31	22	EB 13	EB 14	24	30	JA 50
12	42	JA 54	28	JA 54	JA 32	JA 26	27	JA 52	JA 98	45	JA 55	JA 52	70	JA 96	46	JA 51	JA 64	JA 111	JA 67	51	JA 53	15	JA 51	JA 85
13	JA 75	JA 55	JA 53	JA 53	JA 31	JA 22	28	G	JA 44	39	41	45	45	JA 54	JA 94	43	35	JA 29	20	JA 33	EB 13	EB 12	BJ 37	JA 45
14	JA 53	JA 54	JA 47	JA 20	JA 20	JA 21	JA 44	JA 53	JA 96	143	JA 95	82	JA 89	JA 54	JA 49	G 27	37	32	JA 51	33	JA 84	JA 56	JA 53	JA 92
15	JA 85	JA 64	JA 47	22	22	46	27	JA 41	JA 47	42	45	JA 62	JA 95	JA 54	JA 79	JA 63	34	JA 43	51	36	26	JA 49	JA 65	JA 110
16	JA 52	JA 52	40	JA 44	JA 32	JA 51	JA 22	33	JA 52	69	70	JA 92	JA 53	40	51	G 25	33	30	35	JA 27	EB 12	EB 12	28	18
17	22	JA 18	22	24	JA 23	JA 22	JA 27	G	34	34	C	C	C	C	C	36	39	JA 37	73	69	JA 49	JA 36	JA 50	JA 35
18	JA 58	JA 26	JA 35	26	21	19	G	G	84	JA 67	66	JA 50	JA 62	JA 51	JA 57	JA 48	G 28	JA 49	JA 36	JA 27	JA 31	JA 30	JA 33	JA 48
19	32	JA 35	JA 18	19	18	22	JA 37	JA 48	JA 46	JA 46	48	39	JA 53	41	36	G 25	G	35	31	41	JA 52	JA 56	JA 59	JA 55
20	JA 29	22	22	17	JA 29	JA 21	G	JA 51	JA 51	JA 54	JA 56	47	JA 51	50	47	JA 39	JA 36	42	40	50	33	25	EB 12	EB 15
21	EB 12	JA 51	JA 79	JA 55	JA 44	JA 55	27	JA 44	JA 57	39	JA 49	41	G 35	40	38	39	30	G	JA 43	JA 35	28	JA 32	JA 19	26
22	32	JA 22	24	JA 19	23	JA 16	30	JA 40	JA 44	JA 48	JA 48	43	EB 38	46	JA 51	113	95	120	JA 85	64	JA 51	28	34	JA 33
23	JA 47	JA 19	JA 18	JA 47	JA 49	49	31	32	40	JA 49	43	62	60	JA 52	JA 50	JA 49	JA 41	57	57	JA 43	JA 34	JA 49	24	JA 34
24	JA 36	JA 30	JA 54	JA 56	JA 45	JA 34	32	JA 48	77	JA 51	JA 52	40	45	JA 54	JA 45	41	G 27	JA 33	JA 38	C	C	JA 76	JA 47	JA 55
25	17	JA 22	31	JA 17	JA 22	26	JA 26	41	35	41	73	42	JA 43	42	47	35	JA 49	G 21	21	JA 21	19	EB 13	BJ 27	JA 23
26	EB 12	EB 12	JA 26	22	EB 14	EB 13	25	G 20	G 27	35	38	37	43	48	49	JA 68	JA 109	JA 127	JA 123	JA 106	JA 110	JA 101	60	JA 54
27	JA 44	JA 34	JA 30	20	JA 21	18	27	JA 42	JA 57	JA 52	JA 63	86	55	39	G	76	JA 87	JA 52	64	JA 78	34	JA 35	JA 44	33
28	50	JA 32	JA 19	JA 22	EB 11	23	49	JA 37	53	61	52	43	45	57	JA 47	JA 43	JA 43	G 20	G	EB 12	20	60	JA 35	JA 20
29	JA 44	JA 46	JA 53	JA 98	JA 73	JA 43	JA 24	JA 85	58	JA 116	JA 43	38	39	EB 40	EB 34	G 31	JA 51	JA 47	JA 30	JA 44	27	25	JA 53	JA 56
30	JA 34	JA 22	JA 22	EB 12	EB 11	21	24	G	JA 41	JA 44	JA 49	C	39	51	JA 38	37	33	33	JA 40	JA 41	42	C	33	C
31	37	JA 44	C	C	C	C	C	32	37	40	39	40	43	JA 47	48	JA 71	48	49	JA 54	JA 52	JA 40	JA 45	29	20
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	27	27	27	30	30	31	31	31	30	28	29	29	30	31	31	31	31	28	29	28	29	28
MED	JA 43	JA 34	JA 31	JA 26	JA 23	JA 24	30	JA 41	JA 52	49	52	48	52	50	47	43	41	JA 43	JA 43	JA 41	JA 34	JA 36	JA 44	JA 44
U O	JA 52	JA 52	JA 49	JA 52	JA 32	JA 36	47	JA 51	JA 67	69	63	64	JA 59	54	JA 51	66	JA 67	JA 84	JA 73	JA 58	JA 58	JA 54	JA 54	JA 55
L O	32	JA 22	JA 22	20	EB 18	21	27	G 32	40	41	43	41	42	42	43	37	34	31	30	27	21	25	30	30

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

IONOSPHERIC DATA STATION KOKUBUNJI

AUG. 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	C	C	C	C	C	U Y 19	42	65	57	U Y 55	48	C	53	84	U Y 47	A A 133	64	95	85	C	C	C	C	C
2	C	C	C	C	C	35	A A 92	53	U Y 69	A A 87	40	U Y 61	C	C	A A 98	82	69	62	U A 52	C	E C 80	C	C	C
3	C	C	C	C	C	19	26	34	42	43	41	47	40	E B 37	44	38	36	56	59	30	21	29	21	15
4	22	24	19	18	16	32	40	34	52	65	A A 94	51	50	49	44	44	A A 127	A A 182	A A 139	54	34	23	39	47
5	44	18	24	22	25	30	44	G 24	42	A A 112	48	47	48	41	41	41	A A 76	A A 96	A A 168	30	39	29	44	A A 55
6	27	26	A A 58	22	E B 13	21	45	42	A A 78	A A 120	A A 125	A A 120	A A 144	A A 108	A A 102	A A 81	A A 93	A A 93	43	36	62	29	45	A A 122
7	A A 85	A A 78	22	22	E B 11	19	48	A A 77	A A 124	43	A A 113	39	38	55	48	36	32	A A 60	20	15	21	A A 125	43	16
8	17	19	17	20	17	27	A A 47	31	36	A A 73	39	A A 89	A A 94	U Y 42	A A 66	34	32	G 20	25	33	17	22	17	24
9	18	20	E B 14	17	21	17	26	38	33	38	44	39	40	G 32	G	35	34	30	24	17	18	20	17	23
10	21	E B 11	E B 12	15	E B 12	15	35	35	G	35	39	A A 66	50	40	37	42	39	29	21	16	E B 13	E B 11	14	16
11	29	38	18	19	E B 12	30	26	G	G 28	G	G	39	39	45	42	A A 66	33	30	20	E B 13	E B 14	15	20	34
12	34	31	16	21	17	15	25	37	63	39	51	46	A A 70	50	E B 43	42	62	A A 111	51	26	35	14	36	A A 85
13	A A 75	44	31	34	17	16	27	G	40	37	40	42	43	39	41	41	33	28	20	17	E B 13	E B 12	18	22
14	17	16	15	15	15	17	35	49	53	A A 143	55	A A 82	55	47	38	G 25	35	32	28	23	23	33	27	A A 92
15	A A 85	24	29	E B 12	14	26	G 20	34	41	37	43	58	44	54	55	43	34	31	43	27	18	15	23	27
16	31	32	22	18	21	A A 51	G 18	29	37	48	A A 70	51	40	40	44	U G 25	33	27	29	19	E B 12	E B 12	18	E B 13
17	E B 13	15	15	13	19	17	24	G	33	34	C	C	C	C	C	35	35	34	A A 73	55	41	22	21	22
18	A A 58	18	18	16	E B 11	15	G	G	50	41	60	46	60	46	55	41	G 24	30	30	20	16	15	15	22
19	18	16	18	15	16	E B 14	26	43	42	35	45	37	46	39	U Y 35	G 25	G	34	31	30	25	16	17	20
20	20	15	13	14	14	E B 13	G	42	41	43	54	41	42	41	41	39	35	38	33	46	22	16	E B 12	E B 15
21	E B 12	24	34	25	15	19	24	33	55	37	37	40	U G 35	39	37	37	29	G	24	22	20	18	E B 13	16
22	28	20	19	14	17	E B 14	28	34	40	45	43	40	E B 38	41	50	A A 113	A A 95	A A 120	37	60	36	17	34	21
23	20	17	E B 14	E B 12	26	33	28	31	37	41	42	53	54	45	45	46	34	51	46	36	23	34	15	28
24	19	16	17	27	20	19	31	43	A A 77	42	42	39	43	44	40	36	G 20	31	35	C	C	18	23	16
25	E B 13	18	27	15	20	17	26	40	35	40	64	41	38	40	46	34	39	U G 21	20	16	E B 13	E B 13	17	E B 13
26	E B 12	E B 12	14	E B 12	E B 14	E B 13	24	G 20	G 26	35	37	37	42	45	43	54	A A 109	A A 127	55	A A 106	A A 110	37	33	41
27	30	17	21	E B 13	E B 14	E B 13	21	37	44	46	58	A A 86	55	37	G	A A 76	A A 87	33	62	34	26	25	27	25
28	29	17	17	17	E B 11	E B 14	36	34	51	A A 61	A A 52	41	42	A A 57	44	42	29	G 20	G	E B 12	E B 14	30	16	E B 12
29	21	30	28	A A 98	A A 73	21	24	A A 85	52	44	41	37	38	E B 40	E B 34	G 31	38	44	22	33	20	17	20	28
30	20	15	E B 14	E B 12	E B 11	E B 12	23	G	36	41	41	C	39	44	38	44	43	43	44	55	52	C	C	C
31	C	C	C	C	C	C	C	C	35	38	39	38	41	41	40	59	34	34	23	29	21	28	27	17
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	27	27	27	30	30	30	31	31	30	28	29	29	30	31	31	31	31	28	29	28	28	28
MED	21	18	18	17	16	18	26	34	42	42	44	44	43	42	43	41	35	34	33	30	21	19	20	22
U Q	A A 31	26	24	22	20	26	36	42	53	A A 55	55	A A 56	54	48	47	A A 54	A A 64	A A 62	52	36	36	29	30	31
L Q	E B 18	16	E B 15	E B 14	E B 13	E B 15	24	G 29	36	37	40	39	40	40	38	35	33	30	23	18	E B 16	15	17	16

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	C	C	C	C	C	15	22	32	33	35	36	C	40	37	36	31	32	23	20	C	C	C	C	C
2	C	C	C	C	C	13	20	30	22	35	39	38	C	C	38	20	20	14	12	C	E C 80	C	C	C
3	C	C	C	C	C	12	14	15	23	20	30	32	30	37	20	19	16	14	13	12	14	13	13	12
4	12	12	12	13	12	13	14	15	19	26	30	29	25	27	27	18	14	12	11	14	15	14	14	14
5	12	13	14	13	12	12	13	14	19	28	30	23	25	22	20	23	17	13	11	13	15	11	13	13
6	14	14	13	11	13	12	14	17	22	22	30	22	32	29	29	21	13	13	12	12	14	12	14	12
7	13	14	13	12	11	12	13	19	22	24	29	34	30	35	27	22	21	13	12	13	14	13	12	14
8	13	13	13	12	11	12	13	16	18	29	23	27	30	30	23	21	19	12	12	15	12	12	13	14
9	14	13	14	12	13	14	13	13	14	24	26	30	31	25	30	21	20	14	13	12	13	14	14	14
10	13	11	12	12	12	12	12	14	27	24	27	34	34	28	21	18	13	12	14	12	13	11	13	13
11	11	11	13	12	12	12	11	13	20	23	23	30	36	40	23	22	20	17	15	13	14	13	13	14
12	14	13	12	12	14	12	13	12	18	30	33	37	34	36	43	21	15	16	13	13	15	11	14	14
13	12	14	12	12	12	11	13	12	20	31	37	28	37	32	20	25	22	19	13	13	13	12	13	13
14	13	12	12	11	13	12	13	15	18	29	29	30	26	28	22	19	15	12	12	14	12	12	13	13
15	13	12	14	12	11	13	13	13	20	21	32	29	33	24	26	23	14	13	14	14	12	11	14	14
16	12	13	12	12	13	11	13	12	13	21	30	25	24	33	23	17	16	12	11	14	12	12	12	13
17	13	12	13	12	14	14	13	15	17	19	C	C	C	C	C	23	17	13	12	13	12	12	11	12
18	13	13	14	11	11	13	14	13	16	27	32	33	35	36	31	22	20	14	13	12	13	13	13	12
19	13	11	11	12	13	14	12	12	16	21	27	34	30	20	17	13	16	15	13	12	12	13	13	13
20	13	12	11	11	13	13	15	13	18	17	25	32	33	32	31	18	14	17	16	15	12	13	12	15
21	12	12	13	12	12	13	13	13	15	19	20	27	33	32	21	21	14	14	12	13	13	13	13	13
22	13	13	12	12	13	14	12	12	18	21	22	21	38	31	20	16	15	14	12	15	15	13	12	13
23	13	13	14	12	12	13	13	12	16	20	20	24	20	20	20	24	17	13	19	13	15	14	13	14
24	13	13	13	11	13	13	14	12	13	21	21	E S 35	28	23	20	19	16	12	12	C	C	13	14	13
25	13	14	13	13	11	12	13	13	18	18	22	20	26	28	30	20	15	13	14	13	13	13	13	13
26	12	12	12	12	14	13	13	13	19	19	32	20	20	20	22	20	15	13	12	12	13	13	13	13
27	14	12	14	13	14	13	12	14	17	29	33	31	28	27	29	27	20	13	12	11	14	12	13	14
28	13	13	14	14	11	14	13	12	15	17	24	24	20	29	27	22	19	15	13	12	14	12	13	12
29	12	15	14	13	13	14	12	14	14	16	20	28	30	40	34	26	17	13	12	13	13	12	14	13
30	13	12	14	12	11	12	12	16	20	28	27	C	31	28	22	20	20	21	E C 20	E C 30	E C 30	E C 30	E C 30	E C 30
31	E C 30	E C 30	E C 30	E C 30	E C 30	E C 30	E C 30	E C 30	E C 30	21	20	32	23	30	23	21	17	13	13	13	14	13	15	13
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	31	31	31	31	31	30	28	29	29	30	31	31	31	31	28	29	29	29	29
MED	13	13	13	12	12	13	13	13	18	22	28	30	30	29	23	21	17	13	12	13	13	13	13	13
U Q	13	13	14	12	13	14	14	15	20	28	32	32	34	34	30	23	20	15	14	14	14	13	14	14
L Q	12	12	12	12	12	12	13	12	16	20	23	24	26	26	21	19	15	13	12	12	12	12	13	13

AUG. 1993 FMIN (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

IONOSPHERIC DATA STATION KOKUBUNJI

AUG. 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	C	C	C	C	C	F 295	R 325	335	U R 355	Y	R	C	305	A 295	285	A	315	J R 320	315	C	C	C	C	C
2	C	C	C	C	C	F 325	A	345	Y	A	U R 310	Y	C	C	A	A 300	300	315	A	C	C	C	C	C
3	C	C	C	C	C	315	310	315	320	315	J R 310	290	290	290	280	300	305	305	300	295	310	F 305	295	285
4	F 275	F 275	F 285	F 300	F 310	325	305	310	V 310	J R 290	A	305	305	300	305	300	A	A	A	320	305	285	F 275	F
5	F 290	F 270	F 275	F 285	265	300	255	345	280	A	290	S 300	290	310	315	J R 310	A	A	A	295	315	325	A 285	A
6	280	285	A	285	290	330	320	345	A	A	A	A	A	A	A	A	A	A	295	315	280	J R 310	305	A
7	A	A	J R 265	F 300	F 275	F 285	A 310	A	A	375	A	290	285	285	305	300	330	A	320	305	V 295	A	F	F 285
8	F 290	F 305	F 330	J F 275	265	F 255	A	310	340	A	G	A	A	Y	A	280	280	310	320	315	335	270	265	285
9	F 285	F 295	315	325	S 300	320	315	330	355	325	320	300	310	270	300	310	320	320	315	305	305	285	280	325
10	310	295	285	295	305	300	295	330	310	340	330	A	300	320	320	325	315	325	320	300	315	305	295	280
11	F 300	295	F 295	F 300	F 290	285	305	345	315	310	310	R 310	310	310	310	A	310	310	315	330	320	300	290	285
12	J R 295	F 290	F 310	F 305	300	310	325	360	A 325	310	285	325	A	J R 295	295	305	320	A	315	310	300	285	F 295	A
13	A	F 285	F 295	F 285	F 300	F 330	330	320	300	J R 310	325	295	305	295	300	315	330	325	330	310	315	300	300	J F 270
14	F 305	F 300	F 295	F 325	F 315	330	V 335	340	325	A	310	A	315	300	320	320	320	320	325	350	F 310	F 275	J F 305	A
15	A	F 320	F 305	F 320	F 320	F 290	315	335	330	330	315	335	305	320	305	300	300	305	310	325	330	F 310	F 295	F 325
16	F 285	F 285	F 300	F 280	F 270	A	320	255	F 270	300	A	310	U R 230	295	310	315	290	310	285	295	285	280	295	280
17	260	255	275	275	300	265	245	R 270	270	330	C	C	C	C	C	310	300	295	A	320	340	290	F 275	F 275
18	A	285	F 290	F 300	F 300	F 325	345	345	335	300	320	315	300	300	315	320	315	300	295	310	305	300	V 285	F 285
19	295	F 290	305	280	285	300	295	315	R 290	F 280	290	270	305	295	315	290	320	295	300	295	F 275	J F 295	F 305	F 305
20	310	315	315	310	305	320	310	310	335	325	320	320	295	310	310	310	R 330	325	315	295	285	290	300	305
21	320	F 280	F 290	F 290	310	300	310	310	A 290	330	R 320	290	300	310	315	305	J R 320	320	325	305	305	295	300	320
22	305	295	285	300	290	295	310	345	325	340	V 325	315	315	310	305	A	A	A	315	315	330	280	275	305
23	310	310	300	F 275	F 295	345	350	F 315	340	340	R 325	U R 315	290	320	325	325	300	330	335	340	295	275	290	F 300
24	320	F 300	F 295	F 295	F 315	F 325	365	355	A	J R 350	320	330	J R 300	R 295	295	310	325	330	305	C	C	300	F 290	F 305
25	295	300	290	F 305	310	315	345	315	330	335	A 315	310	S 280	300	310	300	310	315	340	320	305	305	295	290
26	300	295	310	310	305	320	345	365	J R 350	330	325	330	315	300	315	300	A	A	S 310	A	A	305	335	F 300
27	F 290	F 285	F 305	F 295	F 310	320	345	370	340	330	R 320	A	315	R 325	320	A	A	300	330	J R 325	310	315	310	F 310
28	F 260	270	275	V 280	260	J R 240	275	320	A	A	A	U R 305	R	A	280	315	310	325	340	305	300	F 290	F 290	F 280
29	265	F 290	F 295	A	A	290	335	A	350	315	305	290	305	J R 305	295	310	315	310	320	300	290	295	F 305	285
30	F 290	300	305	320	F 300	F 285	350	340	335	345	330	C	R 310	300	300	305	320	300	315	325	320	290	285	285
31	280	290	F 295	305	F 295	295	325	355	370	340	330	320	J R 320	300	305	320	330	325	325	310	320	305	300	300
	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	27	27	27	27	30	29	29	26	24	24	22	25	26	27	26	25	24	27	27	27	28	28	24
MED	292	F 290	F 295	F 300	300	305	320	335	328	330	320	310	305	300	305	310	315	315	315	310	305	295	295	288
U Q	305	F 300	F 305	305	F 310	325	340	345	340	340	325	320	310	310	315	315	320	325	325	320	320	305	300	F 305
L Q	282	285	285	285	290	290	308	315	310	310	310	295	292	295	300	300	302	305	310	300	295	285	285	285

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

IONOSPHERIC DATA STATION KOKUBUNJI

AUG. 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							A	A	A	A	A	C	A	A	Y	A	A	A	A					
2							A		A	A	350	A	C	C	A	A	A	A	A					
3								360	A	A 350	410	A	355	380	A 340	355	335	A	A					
4							A	L 355	A	A	A	A	A	A	A	A	A	A	A					
5							A	375	A 340	A	A	A	A	360	A 365	370	A	A	A					
6							A	A	A	A	A	A	A	A	A	A	A	A	A					
7							A	A	A	A	A	R 400	390	A	A	360	370	A	L					
8						A	A	365	A 365	A	R 395	A	A	A	A	380	345	355	L					
9							U L 345	L	L 390	370	A	405	400	375	350	355	355	L 360	L					
10						L	L	U L 370	U L 380	395	360	A	A	385	375	L 350	U L 360	U L 345	L					
11						A	U L 360	380	L 390	U L 400	375	355	380	A 335	370	A	360	L 335	L					
12							L	A 375	A	L	A	A	A	A	B 355	A 360	A	A	A					
13							L	L	L	400	350	365	380	380	A	A 355	355	L 360	L					
14								A	A	A	A	A	A	A	365	395	375	U L 340	L					
15							L	L	A	380	375	A	375	A	A	A	L 350	L 340	A					
16						A	335	360	A	A	A	A	395	A 335	A	365	L 340	L 335	L					
17						L	335	340	375	365	C	C	C	C	C	350	340	A	A					
18							L	375	A	370	A	A	A	A	A	A 350	L 340	U L 340						
19							U L 330	A	A	370	A	R 370	A	405	380	385	L 365	U L 325						
20							L	A 360	A 370	A 365	A	390	355	R 380	365	350	365							
21							L	L 355	A	U L 380	370	L	385	360	H 355	375	370	L 345						
22						L		U L 360	A 345	A	A	355	H 400	370	A	A	A	A						
23									385	400	420	A	A	A	A	A	L 345							
24									A	A 360	410	365	375	L	L 330	380	L 360	L						
25								L	360	380	A	375	U L 375	380	A	L 380	A	U L 355						
26							L	L 380	U L 375	390	H 435	H 415	375	A 345	A 345	A	A	A	A					
27							L	L	A	A	A	A	A	380	U L 365	A	A	L	A					
28							A	A 335	A	A	A	375	R	A	A	A	L 335	L 350						
29							L	A	A	A	L 355	370	355	380	370	350		A	A					
30							L	L	U L 355	380	390	C	375	A 340	345	330	335	L						
31							L	L 365	L 370	L 385	L 375	U L 355	L 350	365	L 335	A	A 355	A						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							5	16	13	17	14	13	16	17	16	19	20	13						
MED							U L 335	362	370	380	375	370	375	375	360	360	355	L 345						
U Q							U L 352	375	L 382	392	410	395	388	380	368	380	362	L 355						
L Q							332	358	358	A 368	360	360	365	A 352	345	350	340	L 338						

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							290	265	250	Y	355	C	320	A	Y 310	A	290	A	A					
2							A		Y	A	345	Y	C	C	A	A	E A 330	A 295	A					
3								300	285	275	310	340	350	340	355	320	300	A	A					
4							A 310	305	285	E A 330	A	330	330	350	330	320		A	A	A				
5							A	285	405	A	385	355	340	315	320	345		A	A	A				
6							285	260	A	A	A	A	A	A	A	A	A	A	A 305					
7							A	A	A	255	A	365	335	330	305	325	280	A	265					
8						465	A	340	300	A	G	A	A	Y	A	420	395	315	270					
9							320	265	260	310	340	360	350	435	370	320	290	300	280					
10						L 315	335	275	275	275	310	A	350	305	285	305	305	280	270					
11						A 355	310	265	285	320	350	350	350	335	320	A	320	295	270					
12							265	245	A	L 315	375	315	A	360	335	305	310	A	285					
13							255	290	L	330	290	360	380	355	335	295	275	270	255					
14								275	320	A	E A 335	A	310	335	310	305	300	275	265					
15							315	275	280	300	325	A 300	335	305	335	315	310	305	A 275					
16						A	290	465	435	370	A	A 345	605	375	305	345	370	305	320					
17						390	535	440	435	305	C	C	C	C	C	325	340	335	A					
18							255	265	315	370	A	310	A 350	335	315	295	305	315						
19							325	300	350	380	385	445	385	390	355	370	315	365						
20							325	325	290	305	310	345	370	325	325	330	280							
21							L 315	320	A	310	320	L 400	375	330	320	315	305	295						
22						335		270	305	275	280	320	310	345	340	A	A	A						
23									275	285	315	A	385	315	305	300	335							
24									A	275	315	300	330	375	340	295	280	270						
25								295	275	275	A	325	380	330	315	305	295	270						
26							250	230	255	285	305	290	305	330	300	E A 325	A	A	A					
27							245	225	A 260	A 270	A 315	A	320	295	325	A	A	285	A 270					
28							E A 420	325	A	A	A	405	R	A	420	340	320	295						
29							285	A	E A 280	330	355	385	340	325	335	310	300	295						
30							260	255	280	275	295	C	335	350	330	310	275	285						
31							265	240	235	265	300	295	315	350	325	300	265	275						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						5	21	26	23	24	23	21	25	25	27	25	25	20	12					
MED						355	290	275	285	297	318	345	340	335	325	315	302	295	270					
U Q						428	322	305	315	325	355	362	372	352	335	328	320	305	282					
L Q						325	262	265	275	275	310	312	325	325	310	305	285	278	268					

IONOSPHERIC DATA STATION KOKUBUNJI

AUG. 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

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	C	C	C	C	C	Y 355	A	A	A	A	A	C	A	A	Y	A	A	A	A	C	C	C	C	C
2	C	C	C	C	C	A 290	A	A 250	A	A	230	A	C	C	A	A	A	A	A	C	C	C	C	C
3	C	C	C	C	C	255	245	240	A	A	205	A	A 255	205	A	225	265	A	A	280	250	270	250	235
4	A 350	345	320	280	255	275	A	215	A	A	A	A	A	A	A	A	A	A	A	A 270	260	300	E A 355	A 310
5	A	360	330	330	A 365	A 300	A	235	A	A	A	A	A	A 250	E A 270	235	A	A	A	A 285	270	235	A	A
6	A 375	E A 390	A	A 355	315	270	A	A	A	A	A	A	A	A	A	A	A	A	A	A 270	A	250	A 315	A
7	A	A	330	340	300	290	A	A	A	A	A	205	215	A	A	240	230	A	240	260	270	A	A	310
8	290	280	225	A 330	385	A	A	A 250	E A 270	A	210	A	A	A	A	220	240	250	255	A 265	220	E A 365	350	A 375
9	350	A 335	270	260	A	265	225	A 255	205	235	A	210	205	260	H 235	235	230	230	260	255	255	290	290	265
10	255	275	285	285	275	255	A	225	215	205	220	A	A	200	230	A	A	235	255	255	240	250	250	280
11	310	A 325	295	310	295	A	240	225	210	215	210	215	215	A	A 250	A	225	235	245	230	220	255	290	A 340
12	A 310	A 350	265	275	275	255	230	A	A	230	A	A	A	A	B	A	A	A	A	250	265	265	A 320	A
13	A	E A 370	A 325	A 345	300	265	A 240	215	A 265	205	265	255	240	205	A	A	230	225	245	230	245	255	270	340
14	275	295	265	240	255	260	A 265	A	A	A	A	A	A	A	225	225	240	240	A	225	255	A 345	305	A
15	A	270	A 295	240	235	A 325	240	230	A	H 205	A 255	A	E A 265	A	A	A	230	245	A	235	205	225	315	290
16	A 325	A 345	305	325	A 340	A	250	225	A	A	A	A	225	A	A	210	245	235	A	255	265	250	275	270
17	325	350	305	285	290	A 320	250	245	225	215	C	C	C	C	C	245	E A 270	A	A	A	A 255	A 300	365	A 375
18	A	310	310	285	275	245	230	215	A	295	A	A	A	A	A	E A 275	220	255	275	245	230	260	285	310
19	305	280	235	305	275	265	275	A	A	215	A	230	A	205	240	215	H 215	E A 270	E A 310	A 305	340	280	275	270
20	265	250	265	260	270	275	250	A	A 250	A 250	A	215	E A 265	220	240	245	245	A 275	A 270	E A 315	285	275	270	250
21	250	H 275	E A 370	A 325	255	305	245	235	A	245	250	240	215	H 235	H 215	215	225	235	260	265	260	275	250	250
22	290	285	315	290	280	285	250	A 260	A	A	A	265	H 180	240	A	A	A	A	A 260	A	A 255	270	E A 340	265
23	250	255	255	335	A	A 265	235	230	225	235	205	A	A	A	A	A	235	A	A 260	245	260	E A 335	280	A 295
24	255	265	290	A 320	A 265	250	230	240	A	E A 260	230	215	A 245	E A 265	E A 255	205	225	A 250	A 265	C	C	275	315	250
25	275	285	285	265	260	250	230	E A 255	225	230	A	230	210	235	A	215	A	235	245	230	240	250	280	270
26	280	280	275	250	270	255	225	210	205	190	H 175	H 180	A 245	A	A	A	A	A	A	A	A	A 285	245	A 325
27	A 355	310	355	290	280	255	225	A	A	A	A	A	A	205	225	A	A	A 265	A	245	265	265	280	265
28	A 365	345	335	305	315	H 295	A	A	A	A	A	A 265	240	A	A	A	225	230	250	245	265	E A 345	330	295
29	350	A 330	330	A	A	325	250	A	A	A	A 245	215	225	235	215	245	A	A	255	295	285	255	260	A 300
30	315	260	255	245	245	285	245	225	225	A 250	A 230	C	220	A	225	240	A 250	B 280	A 260	250	240	275	290	285
31	305	300	295	275	300	305	E C 250	230	215	220	205	240	225	A 250	E A 255	A	E A 255	A	250	255	250	255	285	260
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	23	27	27	27	25	28	22	21	12	17	14	14	17	14	13	16	19	17	18	25	26	28	27	25
MED	305	292	295	290	275	272	241	230	222	225	225	222	222	232	230	228	230	238	256	255	255	266	282	285
U Q	A 350	A 345	325	A 325	300	298	250	A 248	A 238	A 248	245	240	A 245	A 250	E A 252	242	A 245	A 260	A 260	A 270	265	A 288	A 315	A 310
L Q	275	275	265	265	262	255	230	225	212	210	205	215	215	205	225	215	225	235	250	245	240	255	270	265

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

IONOSPHERIC DATA STATION KOKUBUNJI

AUG. 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	A	B	A	A	A	C	B	A	A	A	B	A	B					
2						B	A	B	A	A	B	B	C	C	B	115	115	115	A					
3						A	A 125	110	A	A	A	A	A	B	A	110	A 130	110	A					
4						A	A	A	110	A	A	A	A	A	A	A	A	125	120					
5						A	A	E A 145	A	A	A	A	A	A	A	115	110	115	A					
6						A	A	115	115	A	A	110	A	A	A	A	A	A	A					
7						A	115	110	A	110	A	A	A	A	A	115	115	110	A					
8						A	120	115	115	115	A	A	A	A	A	A	A	A 130	A					
9						B	A	A	A	A	A	110	A	E Y 125	125	A	115	E A 135	A					
10						B	110	A	115	A	A	A	A	A	A	A	A	A	125					
11						A	A	110	A 130	115	110	115	A	B	115	120	120	120	A					
12						A	A 125	105	110	A	A	A	120	A	B	110	115	115	A					
13						A	A	110	110	A	B	130	A	120	115	A	120	A	A					
14						A	A	115	A	A	A	A	A	A	A	A 130	A 120	A 125	A					
15						B	E A 140	A	A	A	120	110	B 125	110	A	110	110	115	A					
16						A	E A 140	A	110	110	A	A	A	A	A	A	A 120	A 120	A					
17						B	A	115	110	110	C	C	C	C	C	115	110	115	A					
18						A	120	110	A 120	120	B 120	A	A	A	115	120	E A 145	A	A					
19						B	120	110	110	110	A	A	A	A	A	A	115	120	120					
20						B	130	115	115	110	A	A	A	A	A	A	A	A	A					
21						B	120	115	110	115	A	A	A	115	A 120	A 120	A	110	A					
22						B	115	110	115	115	110	115	B	B 125	115	110	A	A	A					
23						B	A	A 125	A	A	110	110	110	A	A	110	A	A	B					
24						B	120	115	110	110	110	A	A	A	A	A	A 120	A	A					
25						B	A	E A 135	A 120	110	110	110	A	A	A	A	A	A	A					
26						B	A	A 115	125	A	A	A	125	115	115	115	110	115	A					
27						B	125	115	110	A	A	A	A	A	115	B 130	115	120	A					
28						B	120	110	110	110	115	120	120	110	A	A	A	125	120					
29						B	A	110	A	A	A	A	A	B	B	A	A	A	B					
30						B	125	115	115	B 125	115	C	A	A	A	A	A 125	B 135	C					
31							C	C	C	A	A	A	A	A	A	A	A	A	B					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							16	23	20	14	9	9	5	7	8	15	18	19	4					
MED							120	112	112	110	110	110	120	115	115	115	115	118	120					
U Q							A 125	A 115	115	115	118	118	125	125	118	120	A 120	A 125	122					
L Q							120	110	110	110	110	110	115	110	115	110	115	115	120					

AUG. 1993 H'E (KM)

IONOSPHERIC DATA STATION KOKUBUNJI

AUG. 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	C	C	C	C	C	140	120	115	115	115	115	C	110	110	110	120	120	120	115	C	C	C	C	C
2	C	C	C	C	C	110	110	115	115	110	120	120	C	C	115	110	110	110	110	C	110	C	C	C
3	C	C	C	C	C	105	120	120	110	110	110	110	105	B	110	115	125	115	110	110	105	110	105	105
4	105	110	105	110	115	115	110	110	110	110	105	125	105	100	110	140	120	110	110	110	115	105	105	105
5	105	100	100	100	120	110	110	110	105	105	100	100	100	100	110	125	120	115	110	110	110	105	105	105
6	105	105	100	110	110	100	115	115	115	110	105	120	105	100	100	100	100	100	100	110	110	115	110	105
7	100	105	105	110	B	125	115	110	110	110	110	110	120	115	115	135	155	125	120	105	115	110	115	120
8	110	110	110	115	130	125	125	130	125	110	115	105	125	115	105	110	140	105	105	95	95	95	115	110
9	110	110	110	110	105	120	110	105	110	110	110	110	105	110	G	145	130	130	115	110	110	110	115	110
10	110	115	B	110	B	130	115	115	G	115	115	105	110	105	110	100	100	105	140	120	115	110	110	125
11	110	105	105	105	B	105	110	G	110	G	G	140	150	125	120	115	125	130	120	B	B	110	110	110
12	110	105	105	105	105	110	125	125	115	120	110	120	120	140	140	120	110	110	110	110	105	135	110	105
13	105	105	100	100	100	110	115	G	110	110	150	130	130	125	115	120	120	120	115	110	B	B	125	120
14	115	110	110	105	110	120	115	110	110	100	105	105	105	105	105	105	130	125	120	95	110	115	115	105
15	105	105	105	105	105	100	105	125	120	120	115	110	110	110	105	110	135	120	115	110	110	125	110	110
16	110	110	105	105	105	105	110	110	115	110	100	120	105	130	100	105	165	140	100	95	B	B	105	110
17	120	130	125	125	120	125	120	G	125	135	C	C	C	C	C	135	125	120	110	110	110	110	110	110
18	105	100	105	100	105	110	G	G	110	115	120	120	115	115	115	125	125	115	110	110	110	110	115	110
19	110	120	110	110	130	140	120	120	115	120	120	120	110	110	115	105	G	130	115	115	115	115	110	110
20	105	110	105	110	105	110	G	120	120	110	110	120	110	110	110	110	115	110	110	105	105	110	B	B
21	B	110	110	105	110	110	140	120	115	120	115	155	115	145	140	120	120	G	115	110	110	110	110	105
22	105	105	95	100	105	B	130	125	120	120	115	120	B	115	110	110	105	105	120	100	100	105	100	115
23	115	105	110	110	110	105	140	140	125	120	115	110	110	115	105	115	115	105	100	105	105	105	100	110
24	110	100	130	110	115	110	135	125	115	115	115	105	120	105	105	125	110	110	115	C	C	120	115	125
25	125	100	100	110	100	100	105	120	125	115	110	115	115	110	110	115	110	110	130	120	130	B	110	120
26	B	B	105	110	B	B	120	110	110	130	120	125	155	140	130	120	120	110	110	110	110	110	105	100
27	100	100	100	100	115	105	120	115	110	110	105	115	105	110	G	130	120	120	110	105	110	110	115	110
28	110	105	110	110	B	135	120	120	115	115	120	125	125	115	120	110	110	110	G	B	120	115	115	115
29	105	105	105	105	100	110	105	115	115	110	110	115	115	B	B	110	105	100	105	100	95	95	110	110
30	110	110	145	B	B	110	150	G	120	110	110	C	105	100	105	100	130	125	110	110	110	C	110	C
31	110	115	C	C	C	C	C	120	115	115	115	110	120	110	110	105	105	105	115	105	100	100	100	100
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	27	26	26	21	28	28	26	30	30	29	28	28	27	27	31	30	30	30	26	26	25	28	27
MED	110	105	105	110	110	110	118	118	115	112	115	118	110	110	110	115	120	112	110	110	110	110	110	110
U Q	110	110	110	110	115	122	122	120	120	120	115	120	120	115	115	125	125	120	115	110	110	115	115	115
L Q	105	105	105	105	105	105	110	110	110	110	110	110	105	105	105	110	110	110	110	105	105	105	105	105

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

IONOSPHERIC DATA STATION KOKUBUNJI

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

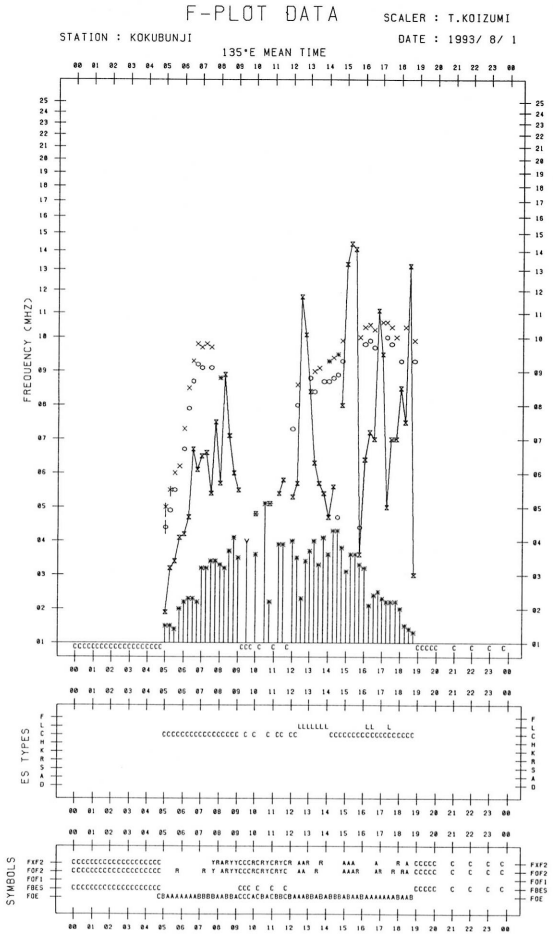
LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

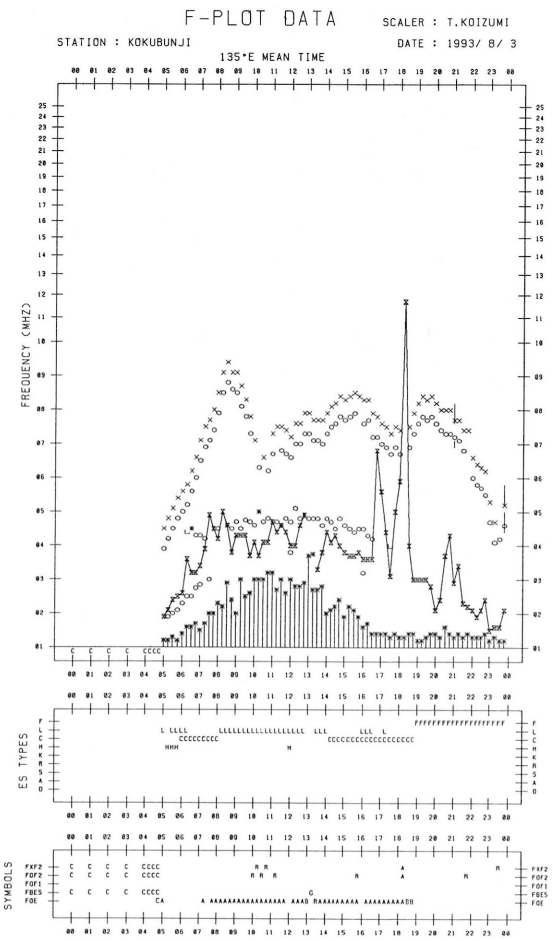
D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1						C 1	C 2	C 2	C 2	C 1	C 1		C 1	L 2	L 1	C 2	C 1	C 2	C 3					
2						C 2	C 2	C 2	C 2	C 2	C 1	C 2			C 2	C 3	C 2	C 2	C 4		F 1			
3						L 2	CL 21	C 2	C 2	L 2	L 1	L 2	LH 11		L 2	C 1	CL 11	C 2	C 3	F 3	F 3	F 4	F 3	F 3
4	F 3	F 3	F 3	F 2	F 1	C 3	C 3	L 1	C 3	C 2	C 2	CL 12	L 2	L 2	L 1	HL 21	CL 41	CL 52	C 4	F 4	FF 24	F 3	F 4	F 3
5	F 4	F 3	F 3	F 3	F 6	L 4	C 3	L 2	L 2	L 3	L 2	L 2	L 3	L 2	L 1	C 2	C 3	C 4	C 4	F 4	F 4	F 3	F 4	F 3
6	F 4	F 4	F 4	FF 24	F 2	L 2	C 3	C 2	C 2	CL 31	C 3	CL 13	L 3	L 3	L 3	L 3	L 3	L 3	L 3	FF 23	FF 42	FF 24	FF 32	F 4
7	F 5	F 3	F 3	F 3		C 3	C 5	C 4	C 4	C 2	L 3	L 1	C 1	C 2	CL 21	C 1	H 1	C 2	CL 11	F 2	FF 24	FF 32	F 4	FF 23
8	F 2	FF 22	F 2	F 3	F 2	C 4	C 2	H 1	H 1	C 2	C 1	C 2	CL 13	L 2	L 2	L 1	HL 11	LH 21	L 2	F 2	F 1	F 2	FF 22	F 3
9	F 3	F 4	F 2	F 2	F 4	C 2	C 2	L 2	L 1	L 2	L 2	C 1	L 1	L 1		HL 11	HL 11	HL 12	CL 21	FF 11	F 1	F 3	F 2	F 3
10	F 2	F 1		F 1		C 1	C 3	C 1		C 1	C 1	L 2	L 2	L 1	L 1	L 2	L 2	L 2	H 1	F 1	FF 11	F 2	F 2	FF 12
11	F 3	F 3	F 2	F 2		L 3	L 2		L 1			H 1	H 1	C 1	C 1	C 2	C 1	C 1	C 1			F 2	F 3	F 4
12	F 5	F 3	F 2	F 4	F 2	L 2	CL 11	C 1	C 2	C 1	C 2	C 2	C 1	HC 11	H 1	C 1	C 2	C 3	C 4	F 3	F 3	F 1	F 3	F 5
13	F 4	F 3	F 4	F 4	F 3	C 1	C 2		C 2	C 1	H 1	H 1	C 1	C 2	C 1	C 1	C 1	C 1	L 1	F 1			FF 11	F 2
14	F 2	F 2	F 2	F 1	F 2	C 1	C 2	C 3	C 3	L 3	L 2	L 2	L 3	L 2	L 2	L 1	CL 12	HL 12	CL 23	F 3	FF 32	FF 31	F 3	F 3
15	F 3	F 3	F 4	F 2	F 2	L 3	L 1	CL 11	CL 22	CL 11	C 2	C 2	C 1	C 2	L 3	L 2	H 1	C 1	C 3	F 3	F 1	FF 22	F 2	F 3
16	FF 22	F 3	F 4	F 2	F 5	L 2	L 1	L 1	C 2	C 3	L 3	CL 12	L 1	C 1	L 2	L 1	HL 11	HL 12	L 4	F 3			F 2	F 1
17	F 1	F 2	FF 22	F 2	F 3	C 2	C 2		C 1	H 1						H 1	C 1	C 2	C 4	F 4	F 3	F 4	F 3	F 4
18	F 4	F 4	F 3	F 2	F 2	L 2			CL 31	C 2	C 2	C 2	C 2	C 2	C 2	C 2	L 1	C 2	C 2	F 4	F 2	F 2	F 2	F 3
19	F 2	FF 12	F 1	F 1	F 1	H 1	C 2	C 3	C 2	C 1	C 1	C 1	C 1	L 1	C 1	L 1		C 2	C 2	F 3	F 3	F 2	F 3	F 3
20	F 4	F 2	F 1	F 1	F 2	L 1		C 3	C 2	C 2	C 2	C 1	C 1	C 1	C 1	C 1	C 2	C 3	L 2	F 3	F 4	F 2		
21		F 3	F 4	F 3	F 3	C 2	H 1	C 2	C 2	C 1	C 2	HL 11	L 1	H 1	HL 11	CL 11	CL 11		C 2	F 2	F 2	F 2	F 1	F 2
22	F 3	F 2	F 2	F 2	F 2	H 1	C 2	C 2	C 1	C 2	C 2	C 2		C 1	C 3	C 3	C 4	C 4	CL 13	F 5	F 4	F 2	F 3	FF 33
23	FF 21	F 1	F 1	FF 21	F 4	L 4	HL 22	HL 12	CL 12	CL 21	C 1	C 2	C 2	CL 21	LC 21	C 2	C 2	L 3	L 4	F 3	F 3	F 3	F 2	FF 22
24	F 2	F 2	FF 23	FF 32	F 2	CL 21	H 1	C 3	C 3	C 2	C 1	C 1	C 1	L 2	L 1	CL 11	L 1	L 2	L 3			F 2	F 3	FF 22
25	F 1	F 2	F 3	F 1	F 2	L 3	L 2	CL 22	CL 11	C 1	C 2	C 1	C 1	C 1	C 1	C 1	L 2	L 1	C 1	F 1	F 1		F 2	FF 12
26			F 2	F 1			C 2	L 1	L 1	CL 11	C 1	CL 11	HL 11	H 1	H 1	H 3	C 3	C 3	C 4	F 5	F 3	F 3	F 3	F 3
27	F 3	F 2	F 3	F 2	F 2	L 1	C 1	C 2	C 2	C 2	C 2	CL 13	L 2	L 1		H 2	C 2	C 2	C 3	F 3	F 2	F 3	F 4	F 5
28	F 4	F 3	F 2	F 2		C 1	C 3	C 2	C 2	C 2	C 1	C 1	C 1	C 1	C 2	C 1	C 2	L 1			F 1	F 3	F 2	F 1
29	F 2	F 2	F 3	F 4	F 3	CL 12	L 2	C 3	CL 21	CL 21	CL 11	C 1	C 1			L 1	L 2	L 2	L 3	F 3	F 2	F 2	F 2	FF 21
30	F 3	F 3	F 1			L 1	HL 11		C 1	C 2	C 2		C 1	L 2	L 1	L 1	HL 11	HL 11	CL 21	F 3	F 2		F 1	
31	F 1	F 1						C 1	C 2	C 2	C 1	C 1	C 1	C 2	L 2	L 3	L 2	L 2	L 2	F 3	F 3	F 3	F 2	F 1
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
U Q																								
L Q																								

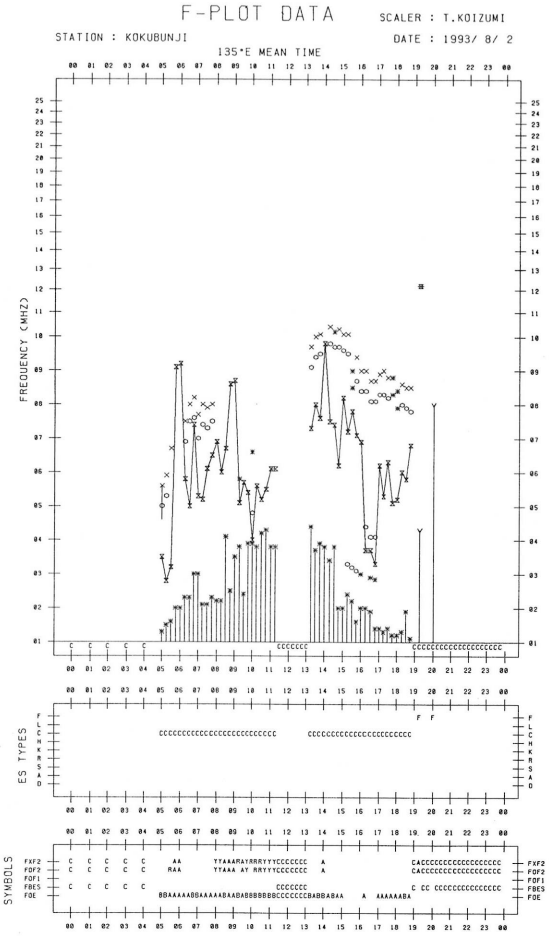
AUG. 1993 TYPES OF ES COMMUNICATIONS RESEARCH LABORATORY, JAPAN

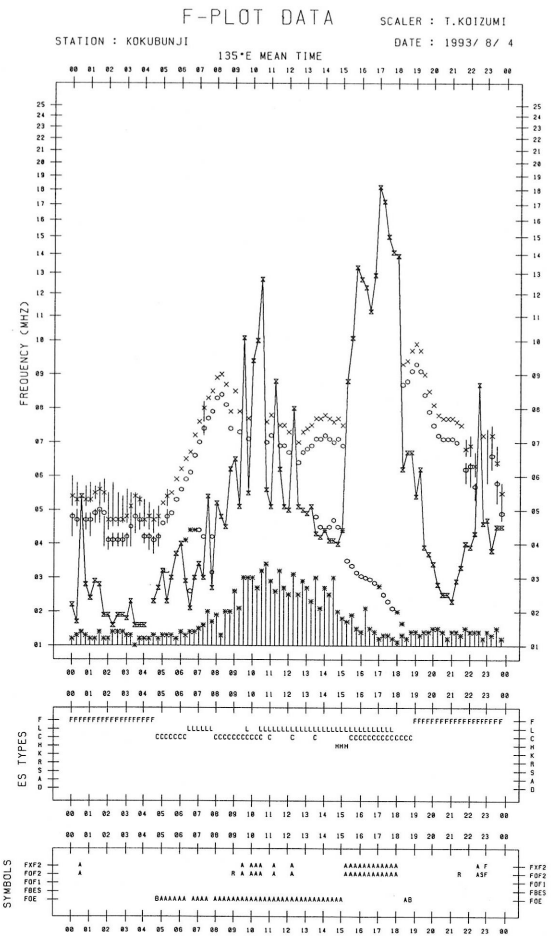
f-PLOTS OF IONOSPHERIC DATA

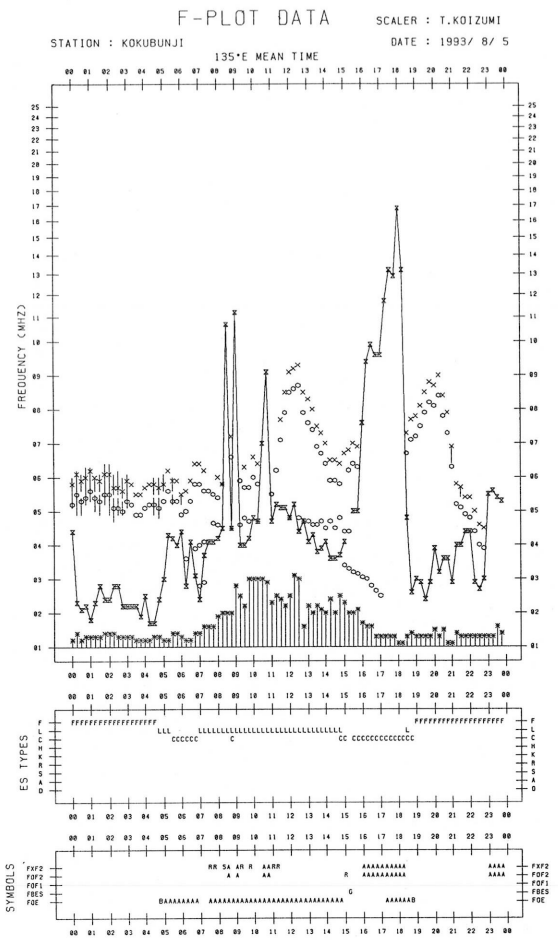
KEY OF F-PLOT	
|	SPREAD
⬡	FOF2, FOF1, FOE
×	FXF2
✳	DOUBTFUL FOF2, FOF1, FOE
⧖	FBES
⌊	ESTIMATED FOF1
↑, Y	FMIN
∧	GREATER THAN
∨	LESS THAN

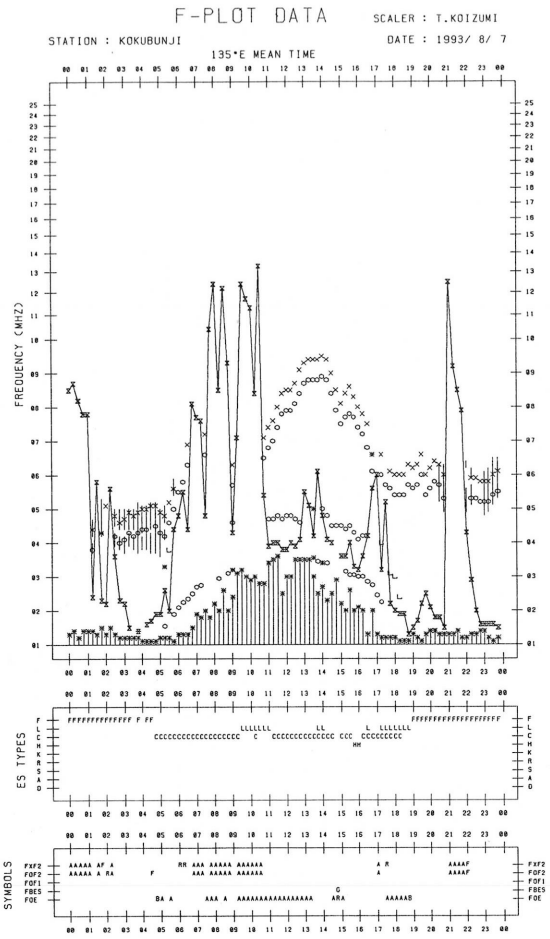

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/ 1
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

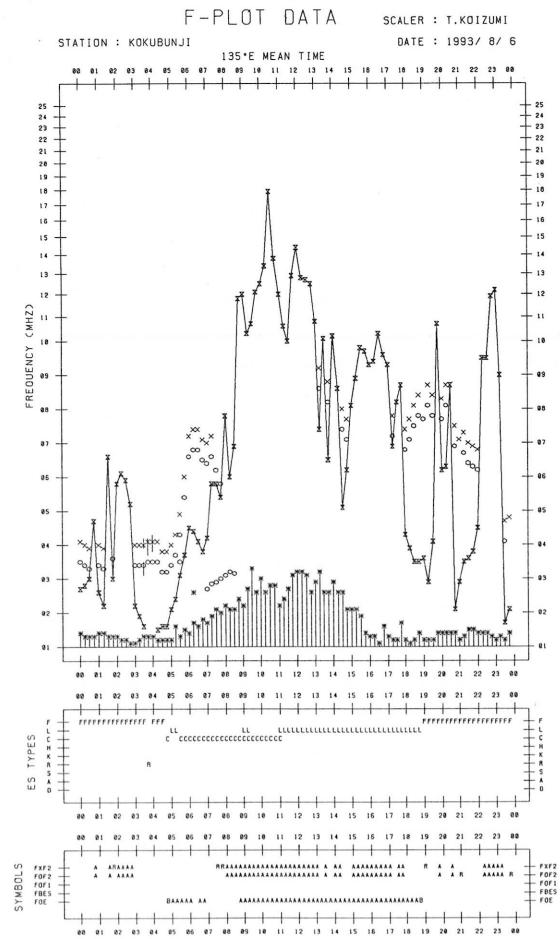

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/ 3
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

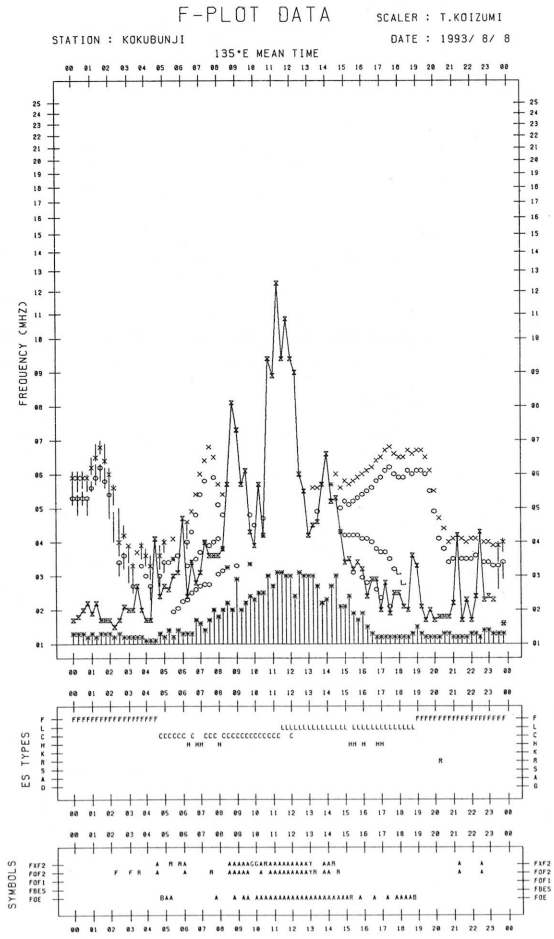

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/ 2
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

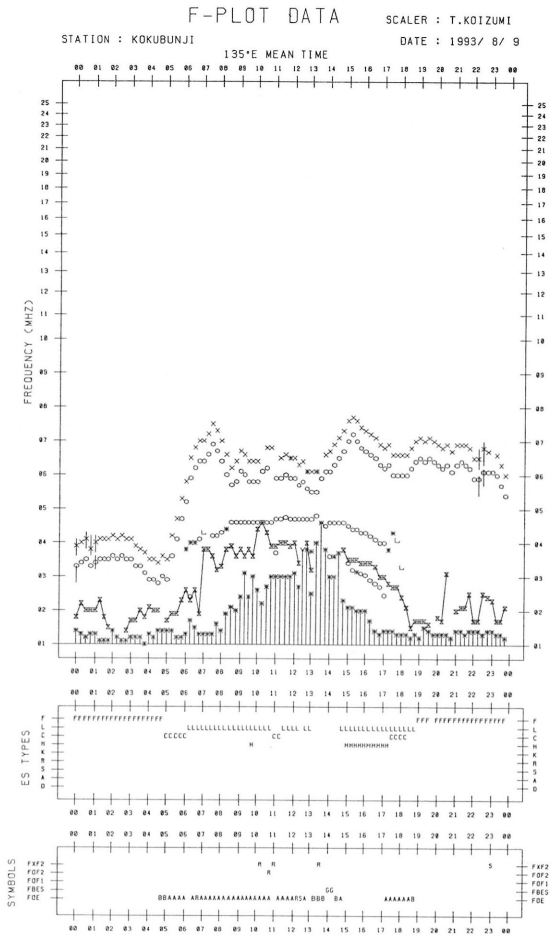

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/ 4
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

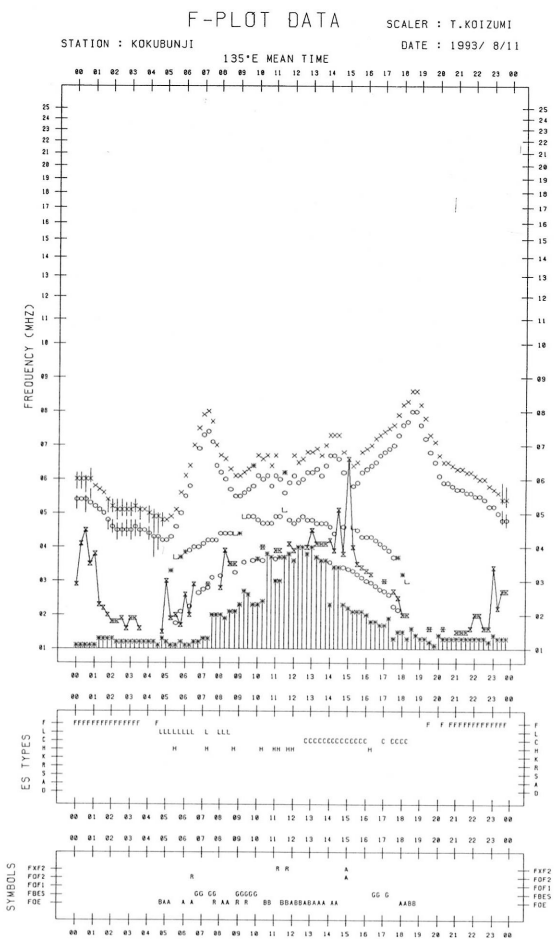

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/ 5
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

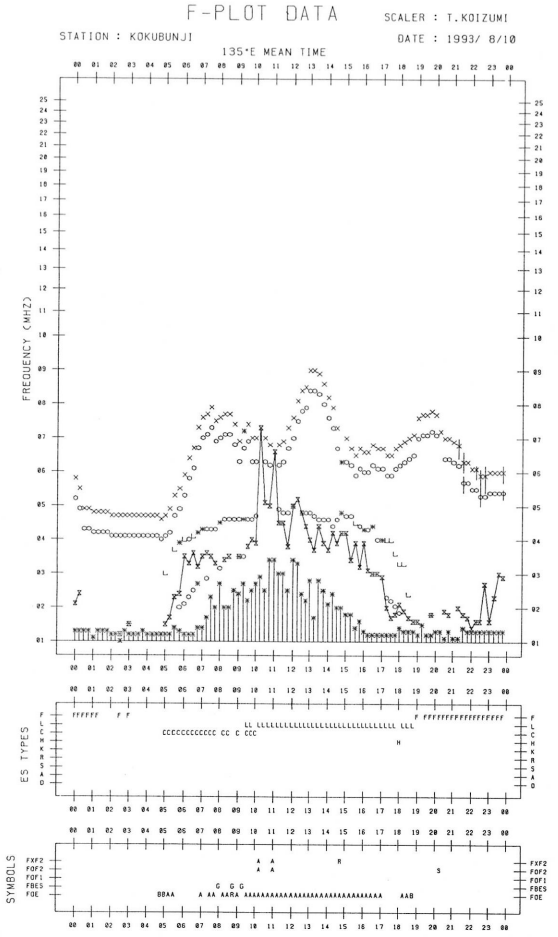

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/ 7
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

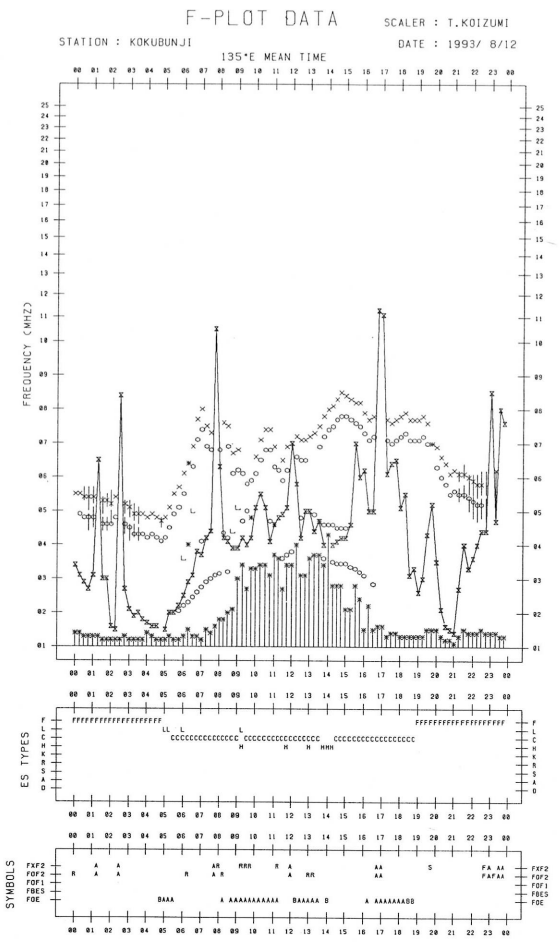

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/ 6
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

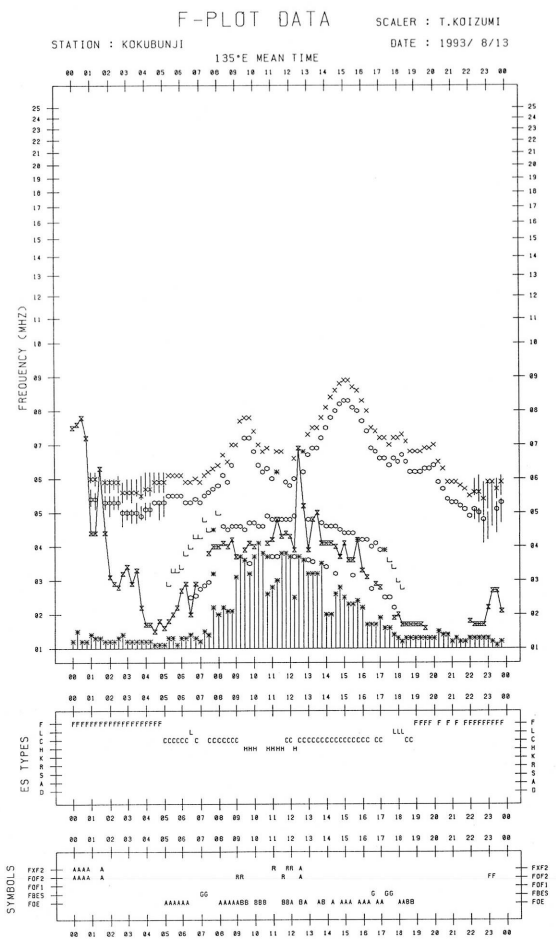

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/ 8
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

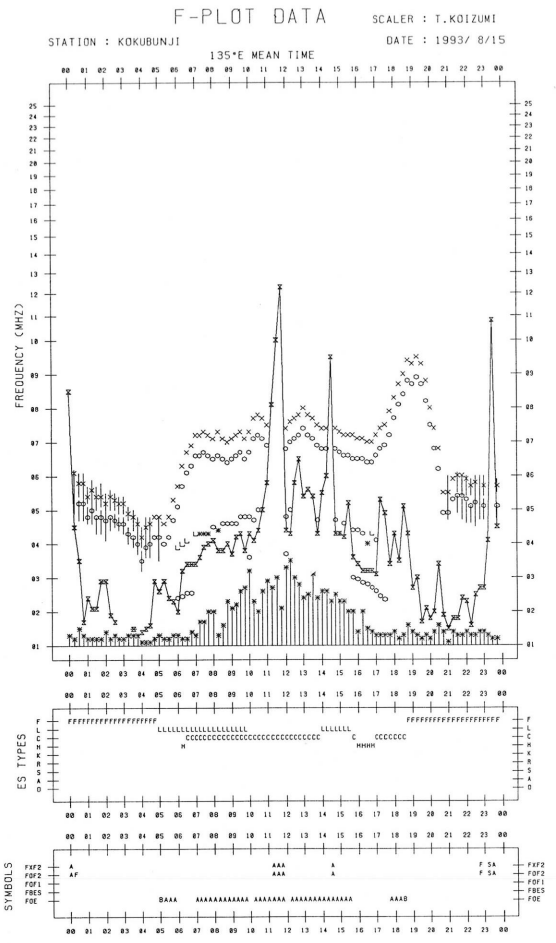

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/ 9
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

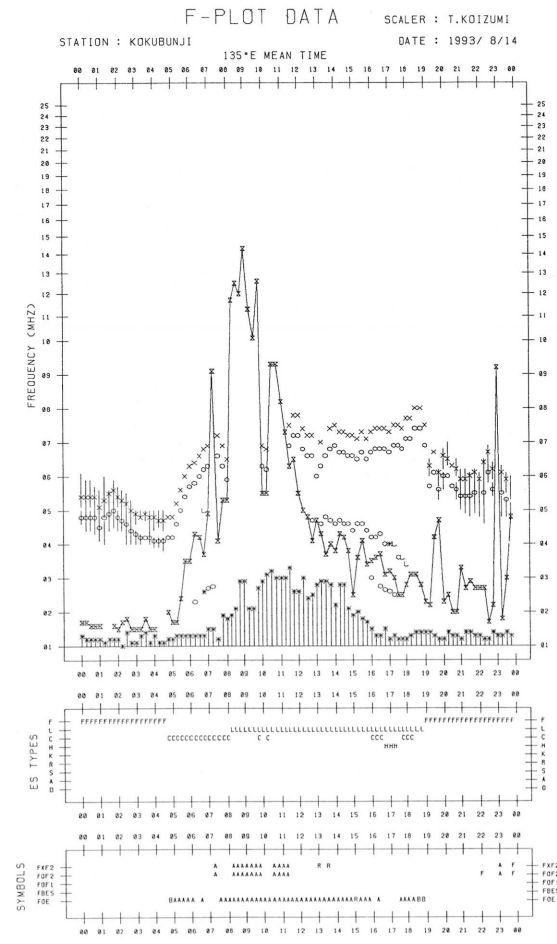

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/11
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

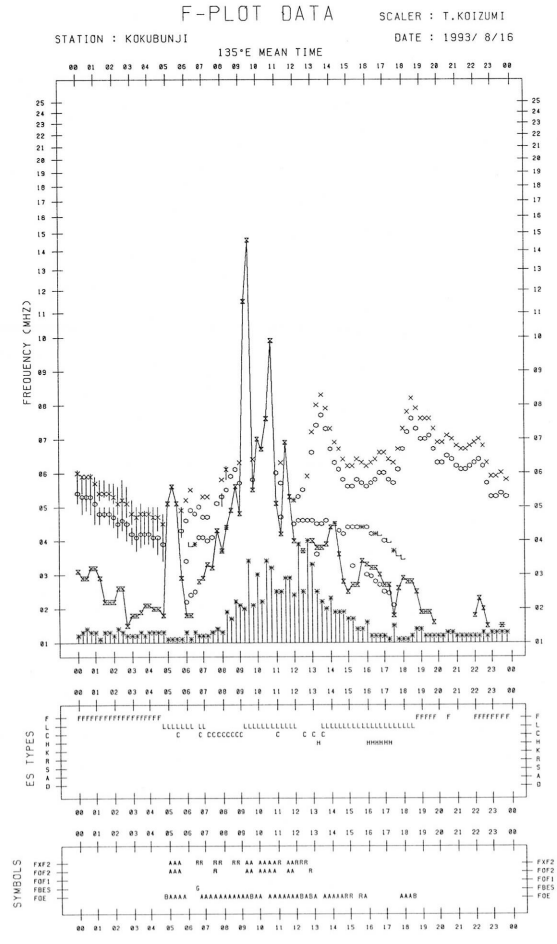

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/10
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

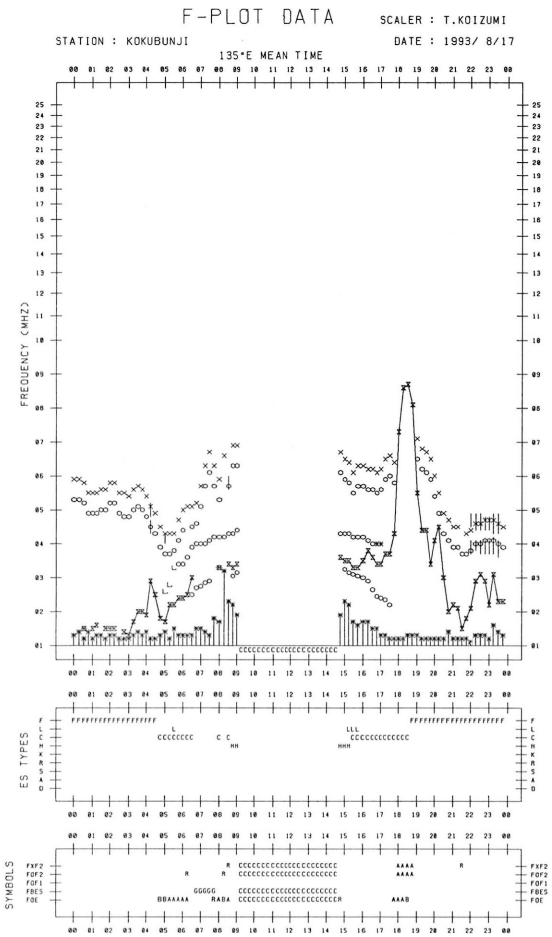

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/12
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

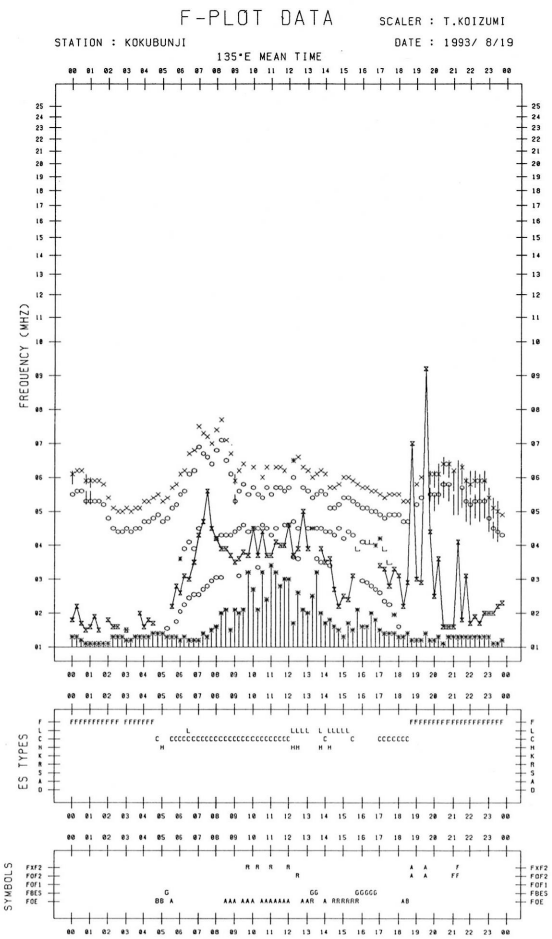

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

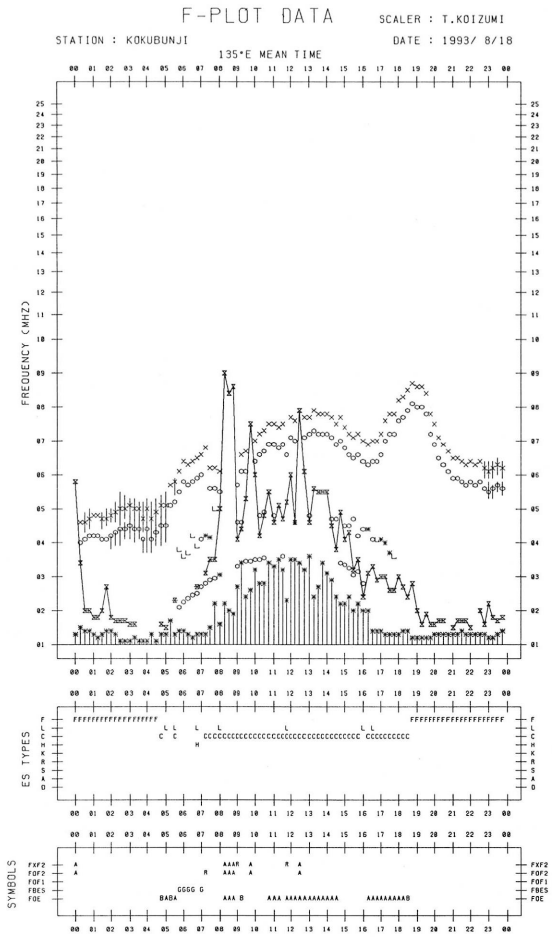

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

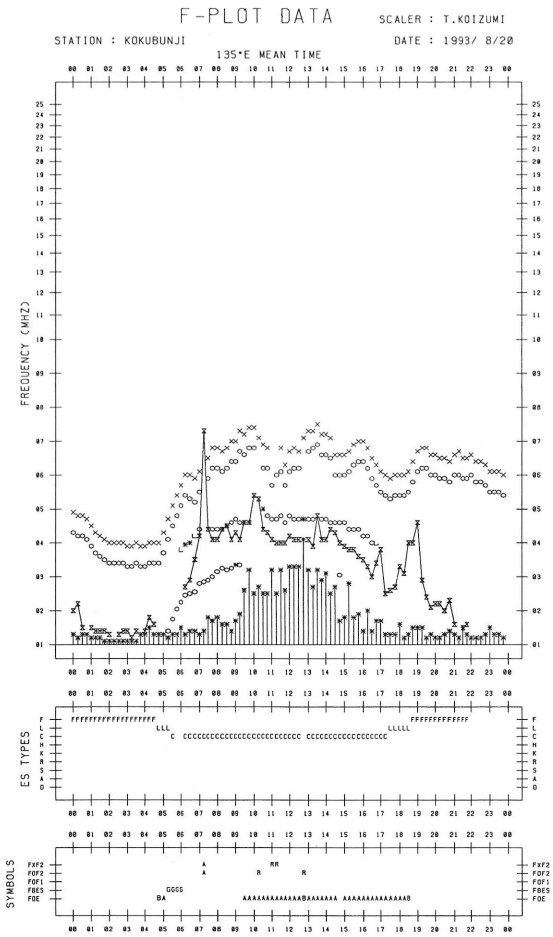

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

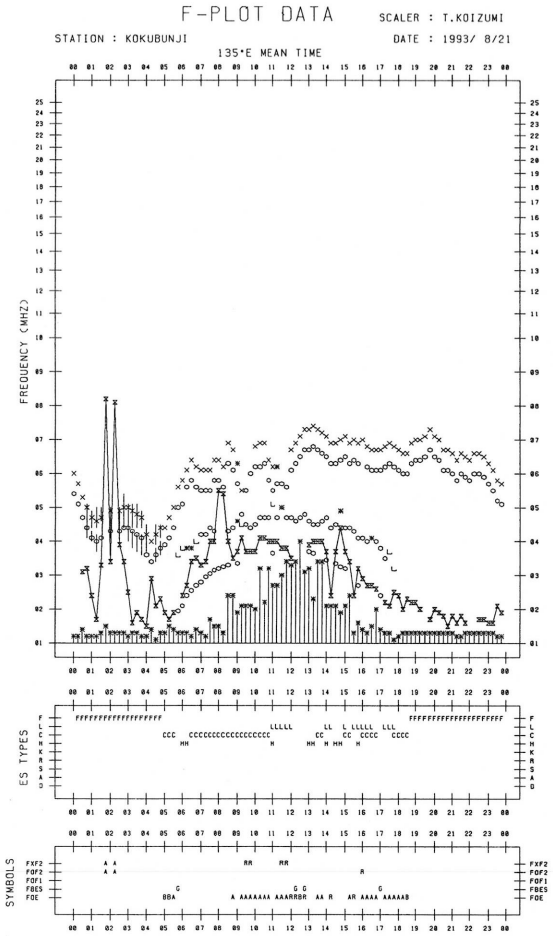

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

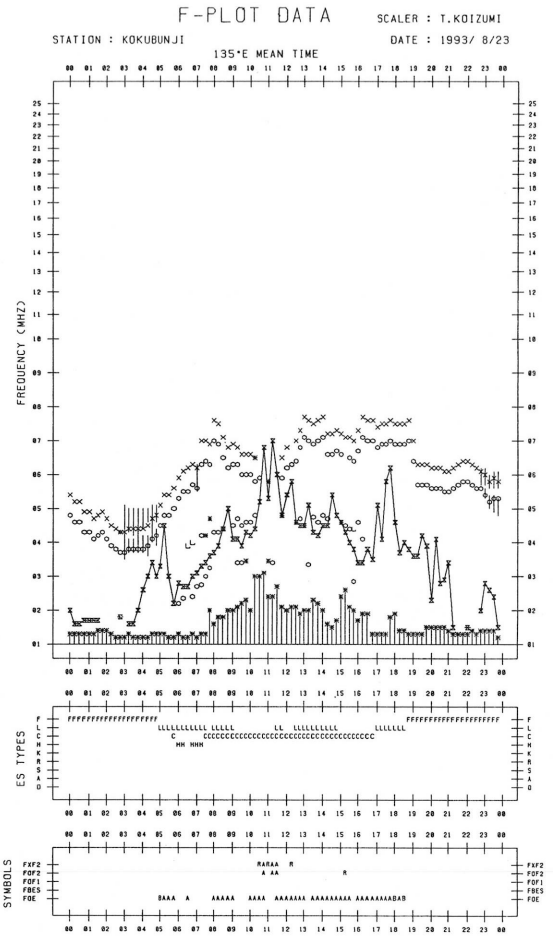

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

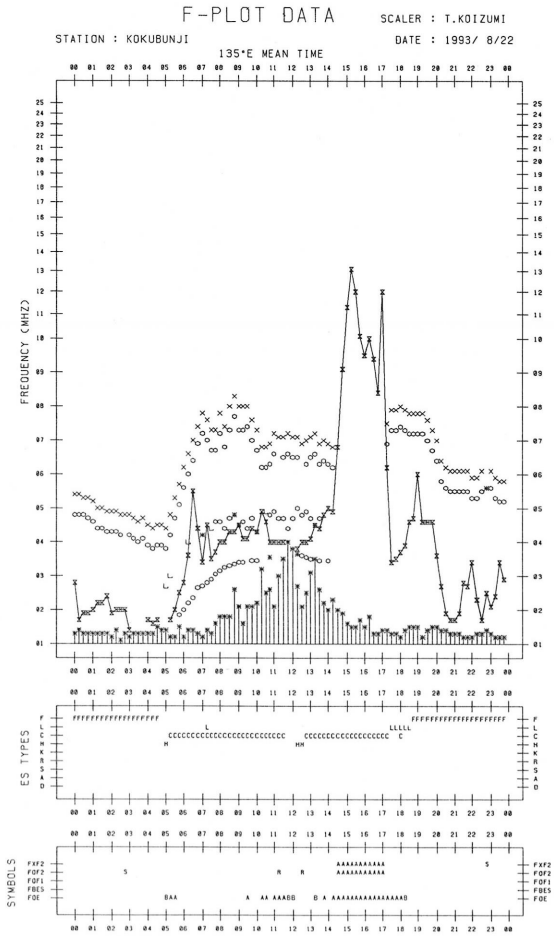

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

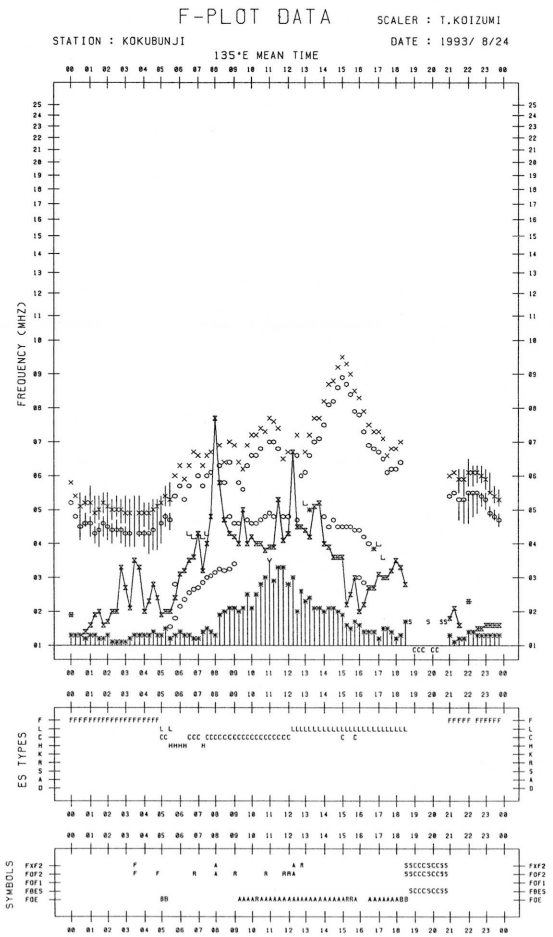

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

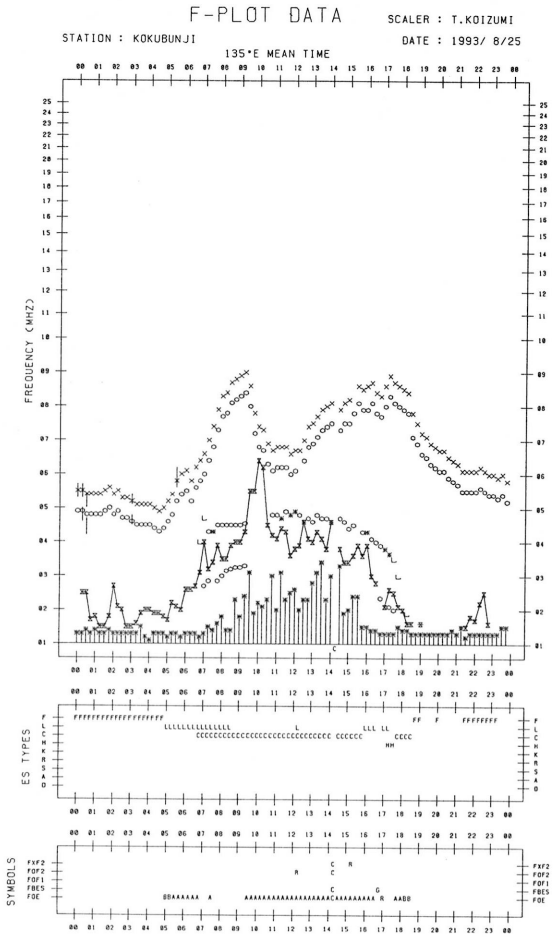

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

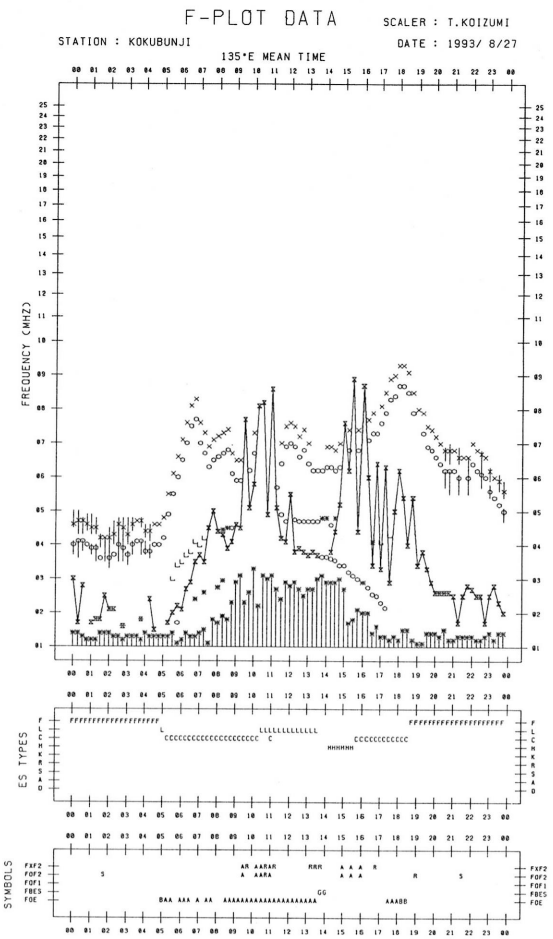

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/21
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

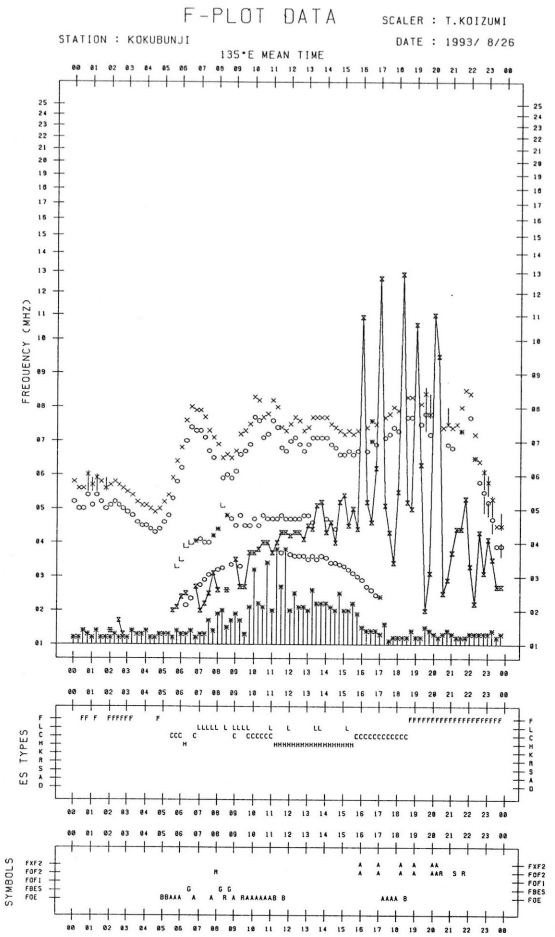

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/23
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

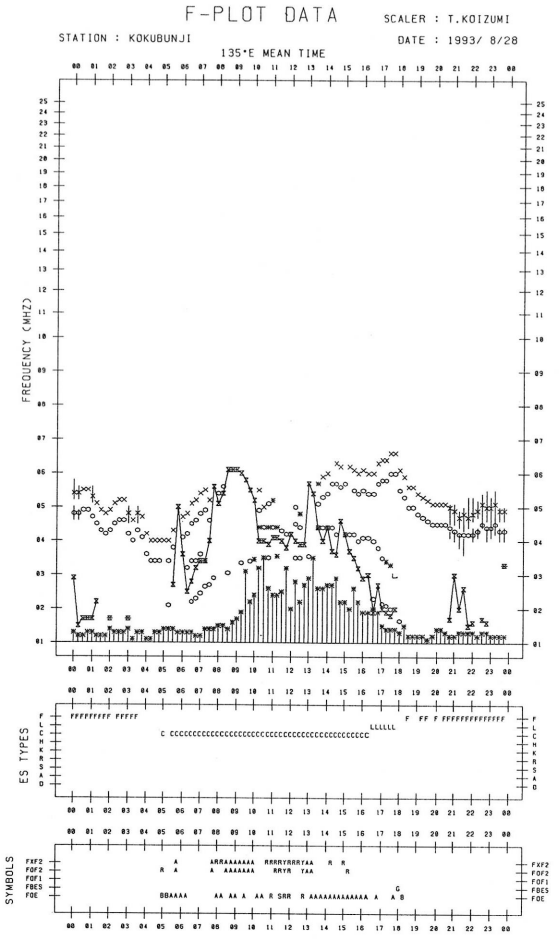

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/22
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

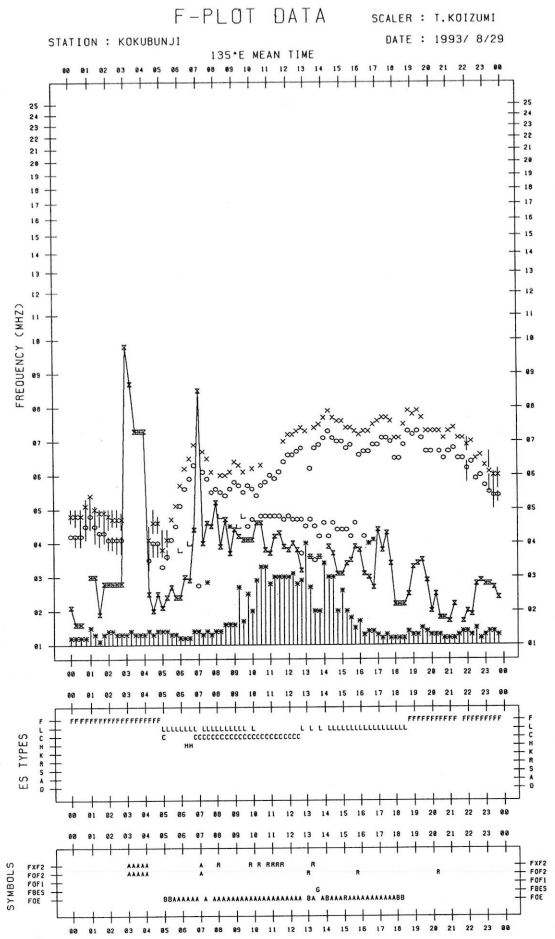

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/24
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

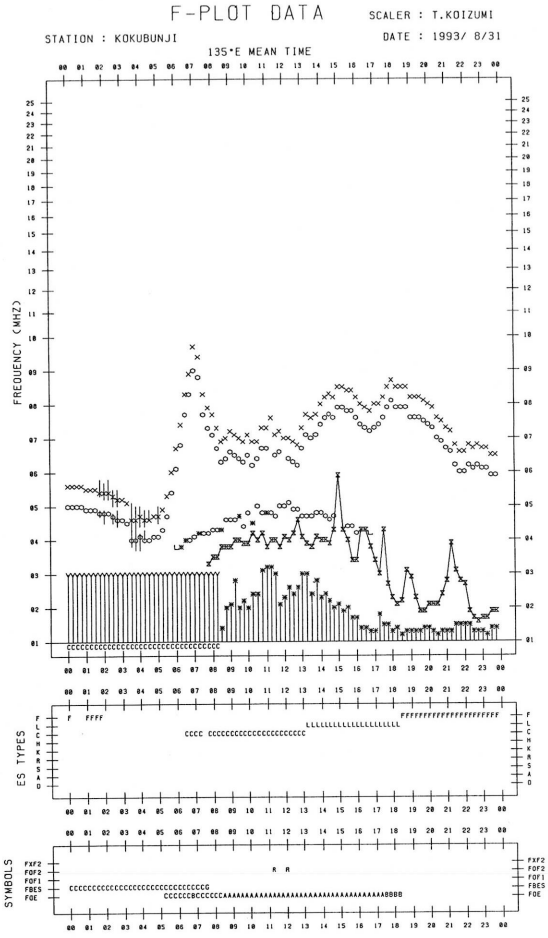

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/25
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

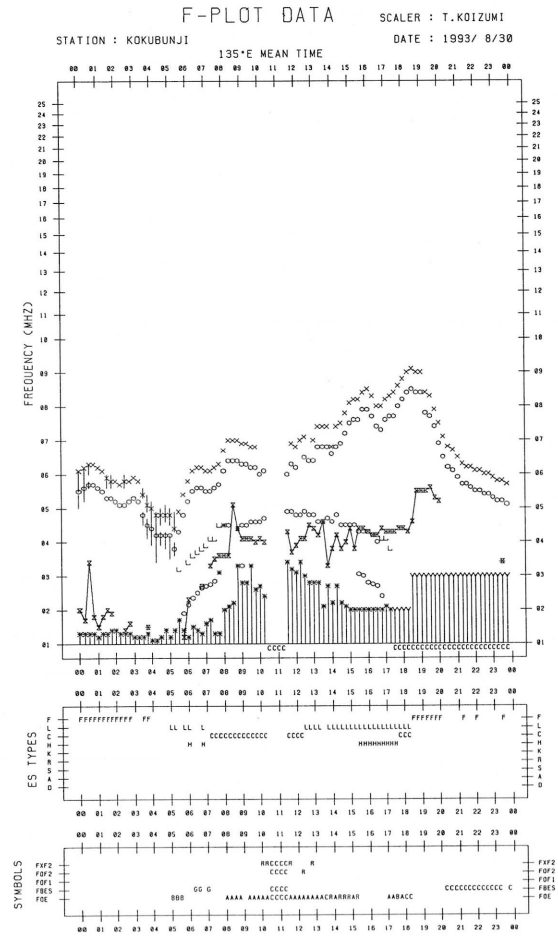

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/27
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/26
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/28
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/29
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/31
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1993/ 8/30
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

B. Solar Radio Emission

B1. Daily Data at Hiraiso

200,500 MHz

Not available until system improvement is completed.

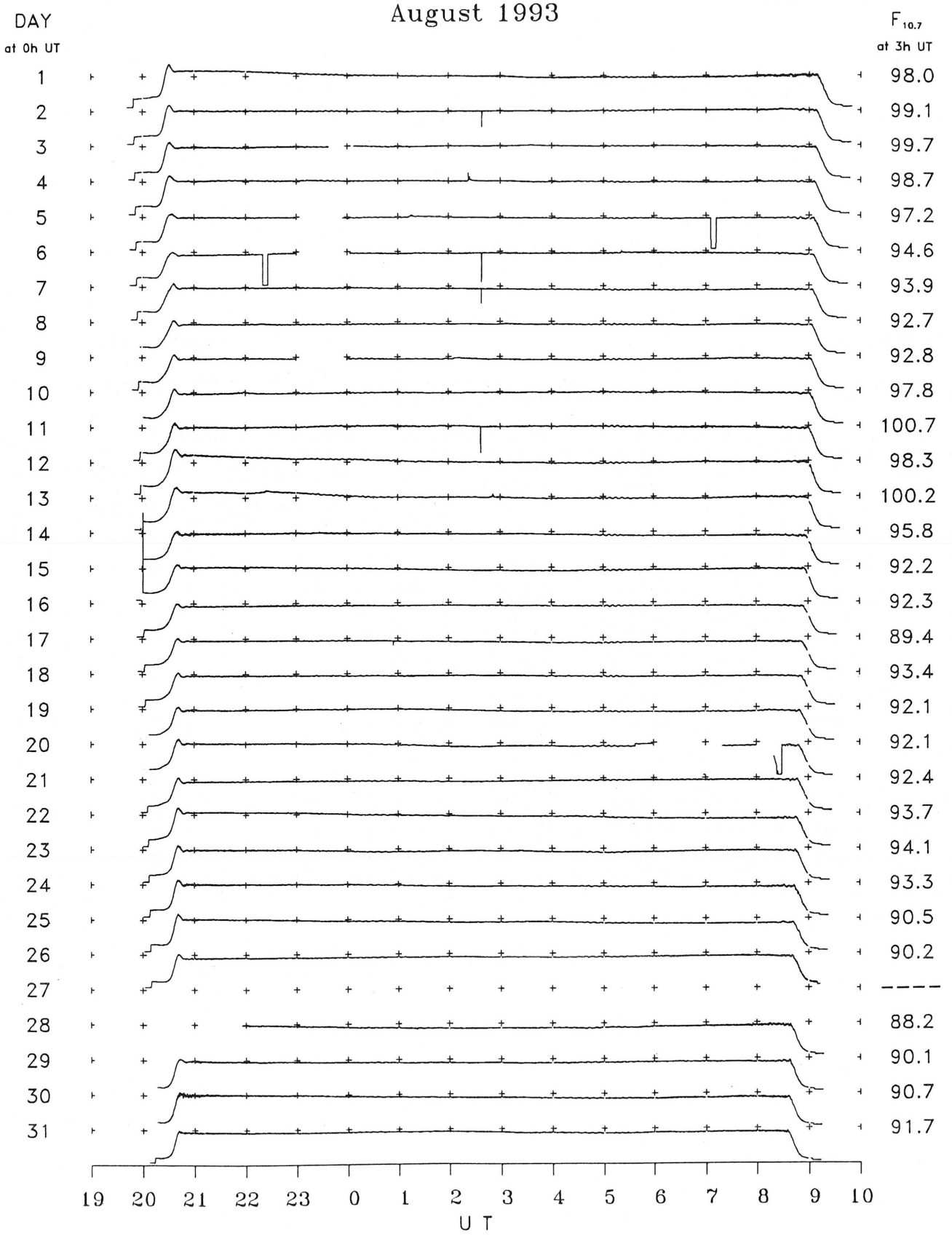
B2. Outstanding Occurrences at Hiraiso

Hiraiso August 1993

	Single-frequency observations Normal observing period: 2000 - 0930 U.T. (sunrise to sunset)							
AUG. 1993	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) PEAK	MEAN	POLARIZATION REMARKS
4	2800	45 C	0222.3	0223.0	4.0	18	10	WL
	500	8 S	2114.4	2114.6	0.6	25	16	0
5	2800	4 S/F	0112.4	0115.5	7.0	5	2	0
	2800	41 F	0556.8	0558.6	3.0	7	-	0
	2800	8 S	2204.0	2204.0	0.8	3	2	0
6	2800	1 S	0520.6	0521.9	3.0	6	3	0
9	2800	20 GRF	0204.8	0212.4	38	3	2	0
	500	8 S	2138.7	2139.0	0.4	8	-	0
	2800	1 S	2156.4	2158.8	3.0	5	3	0
12	2800	20 GRF	2216.5	2225.5	26	9	6	0
13	2800	4 S/F	0251.0	0252.0	2.0	17	9	0
14	500	8 S	0005.7	0005.8	0.3	9	6	0
	500	42 SER	0034.8	0035.0	4.0	100	-	WR
15	500	8 S	0600.8	0601.0	0.8	40	-	0
21	500	8 S	0011.1	0011.2	0.2	4	-	ML
	500	46 C	0833.2	0833.8	1.5	21	10	WL
22	500	46 C	0415.0	0415.3	1.3	29	9	WL

B. Solar Radio Emission

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



Note: A vertical grid space corresponds to a 100 sfu.
Elevation angle range ≧ 6°.

C. RADIO PROPAGATION

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

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

C. RADIO PROPAGATION

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

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

C. Radio Propagation

C2. Radio Propagation Quality Figures at Hiraiso

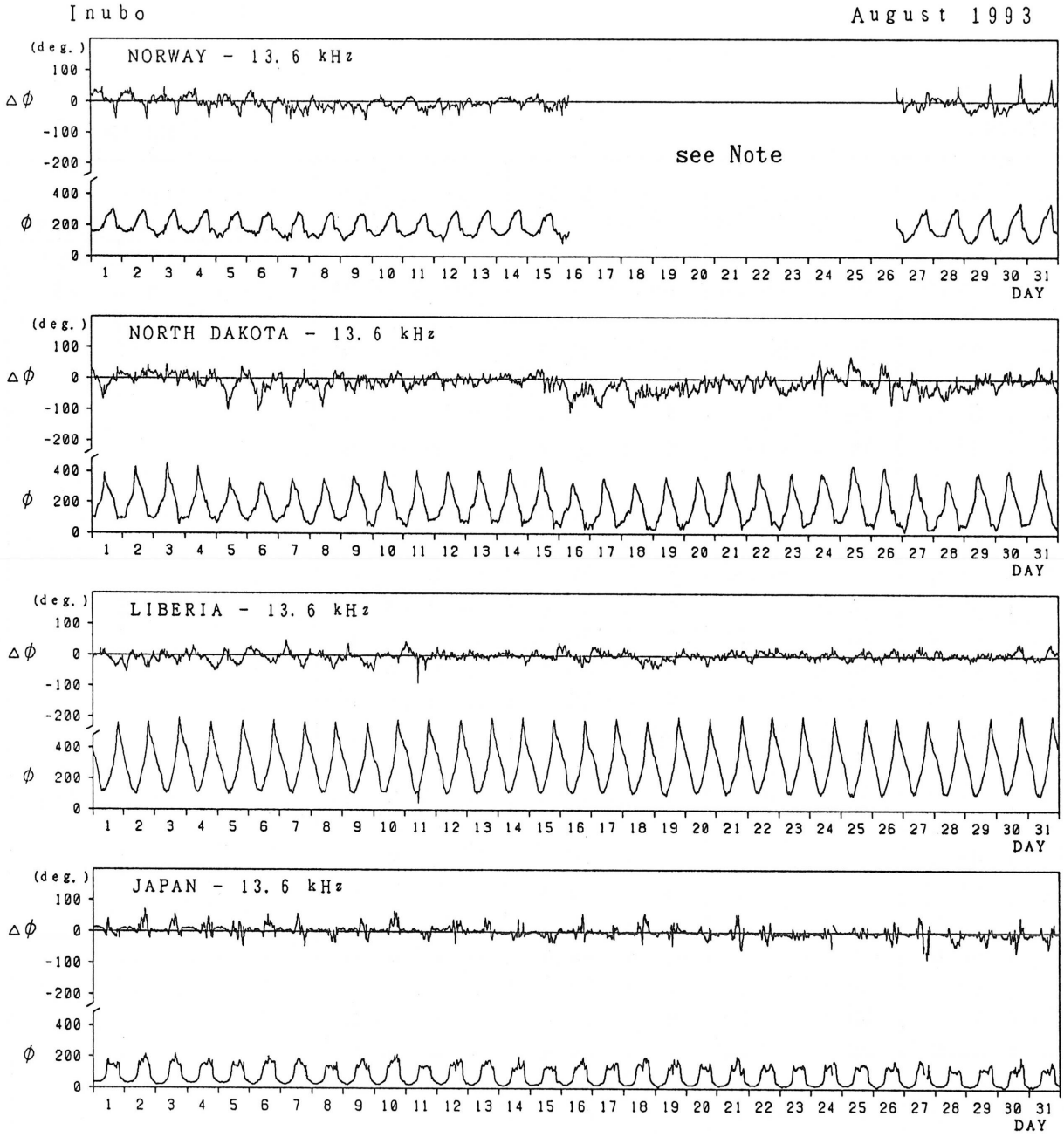
Hiraiso

Time in U.T.

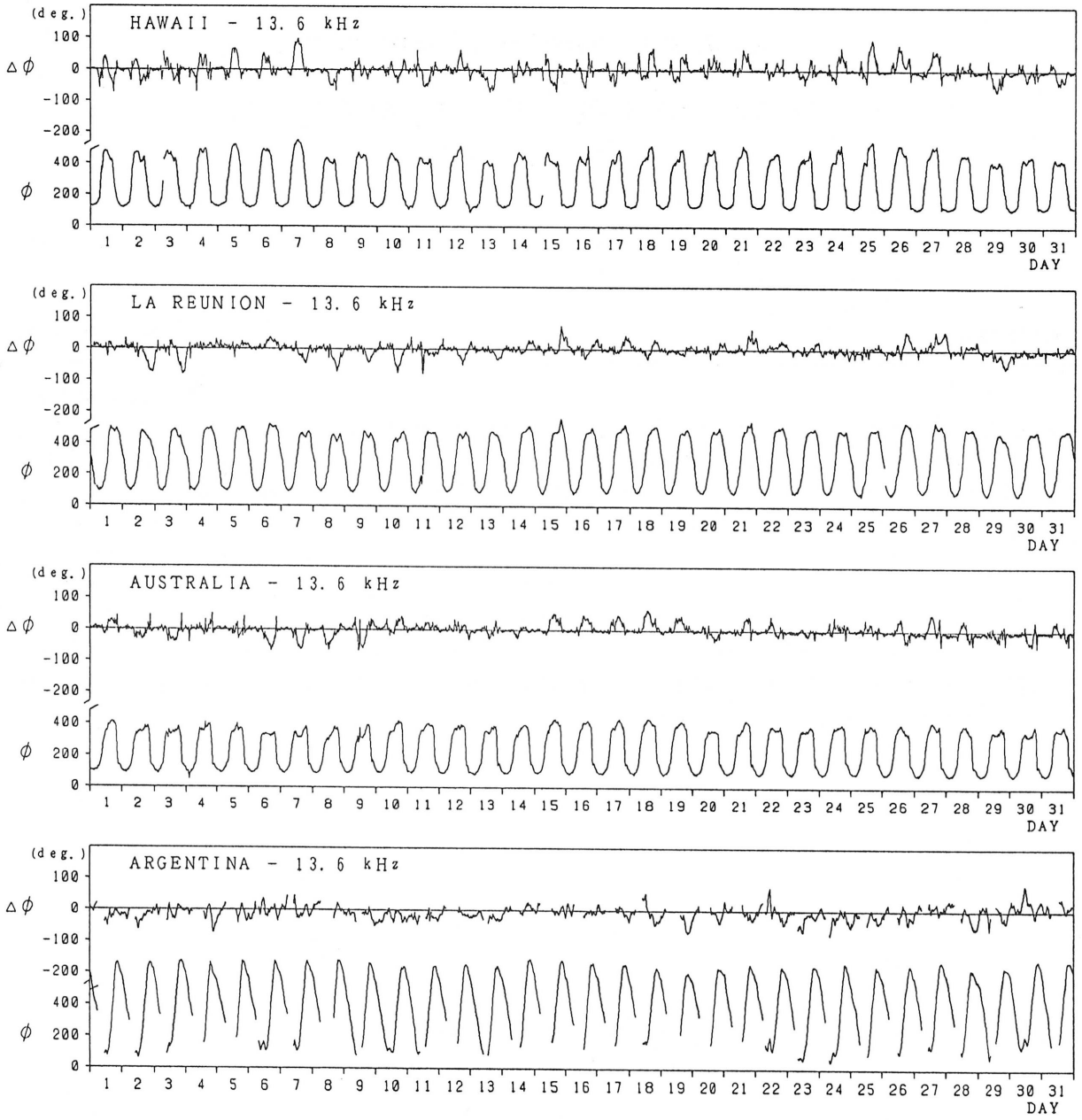
Aug. 1993	Whole Day Figure	W W V 00 06	W W V 06 12	W W V 12 18	W W V 18 24	W W V H 00 06	W W V H 06 12	W W V H 12 18	W W V H 18 24	Condition 00 06	Condition 06 12	Condition 12 18	Condition 18 24	Principal Geomagnetic Storms Start h m	Principal Geomagnetic Storms End h	Range nT
1	4+ u	5u	5u	5u	-	4	4	4u	4	n	n	n	n			
2	4o u	5u	5u	5u	-	4	4	4u	1u	n	n	n	n			
3	5- u	5u	5u	5u	5u	4	4	5u	4	n	n	n	n			
4	4+ u	5u	-	5u	-	4	4	4U	4	n	n	n	n			
5	3+ u	-	-	-	-	4	4	3u	3	n	n	n	n			
6	4+	5u	-	-	-	3	4	5	4	U	U	U	U			
7	4- u	5u	-	-	-	4	4	3u	3	U	U	U	U			
8	4- u	-	-	-	5u	3	3	3u	4	U	U	U	U			
9	4o u	5u	5u	-	-	4	3	4u	4	n	n	n	n			
10	4+ u	5u	-	-	5u	4	4	4u	4	n	n	n	n			
11	4+ u	5u	-	-	-	4	4	4u	4	n	n	n	n			
12	4+ u	5u	5u	-	-	4	4	4u	4	n	n	n	n			
13	4+ u	4	4	4u	4	5u	-	5u	-	n	n	n	n			
14	5- u	5u	5u	5u	5u	4	4	4u	4	n	n	n	n			
15	4+ u	4	4	4u	4	5u	5u	-	5u	n	n	n	n	15.3	----	116
16	4+ u	5u	-	-	-	4	5	5u	3	U	U	U	U	----	----	
17	3- u	-	-	-	-	3	3	1u	4	U	U	U	U	----	09	
18	3+ u	-	-	-	-	4	4	3u	3	U	U	U	U			
19	3- u	-	-	-	-	3	2	2u	4	U	U	U	U			
20	4o u	-	-	-	-	4	4	4u	4	U	U	U	U			
21	4o u	5u	-	-	5u	4	4	3u	4	U	U	U	U			
22	4+	5u	-	-	5u	4	4	4	4	n	n	n	n			
23	4o u	5u	-	-	5u	4	3	3u	4	n	n	n	n			
24	C	C	C	C	C	4u	C	C	C	n	n	n	n			
25	4+ u	5u	-	5u	5u	4	4	4u	4	n	n	n	n			
26	5- u	5u	-	5u	5u	4	4	2u	4	n	n	n	n			
27	4- u	5u	-	-	-	4	4	3u	2u	n	n	n	n			
28	3+ u	-	-	-	5u	2	2	4u	3	U	U	U	U			
29	4o u	5u	-	-	5u	4	4	4u	3	U	U	U	U			
30	4- u	5u	-	-	5u	4	4	1u	4	n	n	n	n			
31	4+ u	5u	-	5u	5u	4	4	4u	4	n	n	n	n			

C. Radio Propagation

C3. Phase Variation in OMEGA Radio Waves at Inubo



Inubo August 1993



Note: As for NORWAY-13.6kHz, no record during 16 August 0800 UT - 26 August 1900 UT, due to the maintenance of transmitter.

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

NONE

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso Time in U.T.

Aug. 1993	S W F								Correspondence	
	Drop-out Intensities(dB)					Start	Dur.	Type	Imp.	Solar * Flare	Solar Burst
	CO	HA	AUS	MOS	BBC						
4			5			0224	6	1 S	1-	x	C
11					8	1000	50	3 G	1-	x	C

NOTE CO:Colorade(WWV) HA:Hawaii(WWVH) AUS:Australia MOS:Moscow BBC:London
* Optical and X-ray Flares

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Aug. 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	Maximum
1			25	33			0639	0715	0643
2				9	9		0021	0055	0029
2			15				0905	0937	0917
3			9	13	11		0252	0314D	0301
3			7	11	9		0314E	0347	0327
4		27	34	41	32	24	0226	0302	0229
10				9	7		2324	2341D	2330
10				21	23	24	2334	0018	2349
11			16	14	12		0246	0316	0256
11			7				0542	0619	0548
11		108	81				1014	1139	1036
11		52					1634	1724	1651
11						22	1814	1850	1830
11				13	14		2335	0033	2353
12			8	33	34	33	2223	0003	2242
13	6		9	10	12		0251	0321	0256
13			10				0830	0855	0839
13				7	5		2321	2346	2329
14				8	4		0035	0100	0042
15			13				0557	0630	0603
17	—				5		2350	0011	2356
19	—		10				0808	0830	0815

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