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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)
Akita	39°43.5'N	140°08.0'E	29.5°N	205.9°	" (I)
Kokubunji	35°42.4'N	139°29.3'E	25.5°N	205.8°	" (I)
Yamagawa	31°12.1'N	130°37.1'E	20.4°N	198.3°	" (I)
Okinawa	26°16.9'N	127°48.4'E	15.3°N	196.0°	" (I)
Hiraiso	36°22.0'N	140°37.5'E	26.3°N	206.8°	Radio Receiving (S, P)
Inubo	35°42.2'N	140°51.5'E	25.6°N	207.0°	" (P)

A. IONOSPHERE

Ionospheric observations are carried out at the above five stations in Japan by means of vertical sounding using ionosondes. The ionosonde produces ionograms, which are recorded digitally on computer storage medium as well as graphically on 35 mm photographic film. The digitally-recorded ionograms are collected from each station by the central computer and reduced to numerical values and Summary Plots by the automatic processing system. The ionograms obtained at Kokubunji are manually scaled as well by experienced specialists to supplement automatically-scaled parameters.

A1. Automatic Scaling

Digital ionograms are automatically scaled by the pattern recognition method. The following five factors of ionospheric characteristics are published for the present. The reliability of these factors has been ascertained by comparison of the automatically-scaled parameters with the manually-scaled values of large amounts of test ionograms.

The published data consist of tabulations of hourly values of three factors (*foF2, fEs, fmin*) and monthly medians of two factors (*h'Es, h'F*), daily Summary Plots and monthly medians plot of *foF2*.

a. Characteristics of Ionosphere

foF2	Ordinary wave critical frequency for the *F2* layer
fEs	Highest frequency of the *Es* layer whether it may be ordinary or extraordinary
fmin	Lowest frequency which shows vertical ionospheric reflections
h'Es *h'F*	Minimum virtual height on the ordinary wave for the *Es* and *F* layers, respectively

b. Descriptive Letters

The following descriptive letters are used in the tables.

A Impossible measurement because of the presence of a lower thin layer, for example *Es* (for *foF2*).

B Impossible measurement because of absorption in the vicinity of *fmin*.

C Impossible measurement because of any failure in observation.

G Impossible automatic scaling because of too small ionization density of the layer (for *fEs*).

N Impossible automatic scaling because of complex echoes.

Blank No digital record because of trouble in the automatic data processing system, but existence of film record.

c. Definitions of the CNT, MED, UQ and LQ

Median count (CNT) is the number of numerical values from which the median has been computed. In addition to numerical values, the count may include a descriptive letter G.

Median (MED) is defined as the middle value when the numerical values are arranged in order of magnitude, or the average of the two middle values if there is an even number of values.

Upper quartile (UQ) is the median value of the upper half of the values when they are ranked according to magnitude; the *lower quartile* (LQ) is the median value of the lower half.

If CNT is less than 10, there are blank spaces left.

d. Reliability of Automatic Scaling

The results of the comparison between automatically-scaled values and manually-scaled ones showed that hourly values of *foF2*, *fEs* and *fmin* were scaled within a difference of 1 MHz from about 90, 90 and 99 %, respectively of the test ionograms.

e. Summary Plot

Daily Summary Plots which are made from quarter-hourly digital ionograms are published to present general ionosphere conditions. The upper and middle parts of a Summary Plot show the diurnal variation of the frequency range of the echoes reflected from the *F* and *E* regions, respectively. The two solid arcing lines indicate the predicted values of *fxE* and *foE* calculated by the method described in the CCIR report 340. The lower part shows the diurnal variation of the virtual height where the echo traces become horizontal.

A2. Manual Scaling

The published data consist of tabulations of hourly values of the ionospheric characteristics and figures of daily *f*-plot.

All symbols and terminology in the tables or figures of ionospheric data are used in accordance with the "URSI Handbook of Ionogram Interpretation and Reduction (Second Edition) 1972" and its revision of chapters 1-4, published in July 1978.

a. Characteristics of Ionosphere

fxI	Top frequency of spread *F* trace
foF2 *foF1* *foE* *foEs*	Ordinary wave critical frequency for the *F2*, *F1*, *E* and *Es* including particle *E* layers, respectively.
fbEs	Blanketing frequency of the *Es* layer, e.g. the lowest ordinary wave frequency visible through *Es*
fmin	Lowest frequency which shows vertical ionospheric reflections
M(3000)F2 *M(3000)F1*	Maximum usable frequency factor for a path of 3000 km for transmission by *F2* and *F1* layers, respectively
h'F2 *h'F* *h'E* *h'Es*	Minimum virtual height on the ordinary wave for the *F2*, whole *F*, *E* and *Es* layers, respectively
Types of *Es*	See below b. (iii)

b. Symbols

(i) Descriptive Letters

The following letters are entered after, or used to replaced a numerical value on the monthly tabulation sheets, if necessary.

A Measurement influenced by, or impossible because of, the presence of a lower thin layer, for example *Es*.
B Measurement influenced by, or impossible because of, absorption in the vicinity of *fmin*.
C Measurement influenced by, or impossible because of, any non-ionospheric reason.
D Measurement influenced by, or impossible because of, the upper limit of the normal frequency range in use.
E Measurement influenced by, or impossible because of, the lower limit of the normal frequency range in use.
F Measurement influenced by, or impossible because of, the presence of spread echoes.
G Measurement influenced or impossible because the ionization density of the layer is too small to enable it to be made accurately.
H Measurement influenced by, or impossible because of, the presence of a stratification.
K Presence of particle *E* layer.
L Measurement influenced or impossible because the trace has no sufficiently definite cusp between layers.
M Interpretation of measurement questionable because the ordinary and extraordinary components are not distinguishable.
N Conditions are such that the measurement cannot be interpreted.
O Measurement refers to the ordinary component.
P Man-made perturbations of the observed parameter; or spur type spread *F* present.
Q Range spread present.
R Measurement influenced by, or impossible because of, attenuation in the vicinity of a critical frequency.
S Measurement influenced by, or impossible because of, interference or atmospherics.
T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
V Forked trace which may influence the measurement.
W Measurement influenced or impossible because the echo lies outside the height range recorded.
X Measurement refers to the extraordinary component.
Y Lacuna phenomena, severe layer tilt.
Z Third magneto-electronic component present.

(ii) Qualifying Letters

The following letters are entered in the first column before a numerical value on the monthly tabulation sheets, if necessary.

A Less than. Used only when *fbEs* is deduced from *foEs* because total blanketing of higher layer is present.
D Greater than.
E Less than.
I Missing value has been replaced by an interpolated value.
J Ordinary component characteristic deduced from the extraordinary component.
M Mode interpretation uncertain.
O Extraordinary component characteristic deduced from the ordinary component. (Used for x-characteristics only.)
T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
U Uncertain or doubtful numerical value.
Z Measurement deduced from the third magneto-electronic component.

(iii) Description of Types of *Es*

When more than one type of *Es* trace are present on the ionogram, the type for the trace used to determine *foEs* must be written first. The number of multiple trace is indicated after the type letter.

The types are:

f An *Es* trace which shows no appreciable increase of height with frequency.
l A flat *Es* trace at or below the normal *E* layer minimum virtual height or below the particle *E* layer minimum virtual height.
c An *Es* trace showing a relatively symmetrical cusp at or below *foE*. (Usually a daytime type.)
h An *Es* trace showing a discontinuity in height with the normal *E* layer trace at or above *foE*. The cusp is not symmetrical, the low frequency end of the *Es* trace lying clearly above the high frequency end of the normal *E* trace. (Usually a daytime type.)
q An *Es* trace which is diffuse and non-blanketing over a wide frequency range.
r An *Es* trace showing an increase in virtual height at the high frequency end similar to group retardation.
a An *Es* trace having a well-defined flat or gradually rising lower edge with stratified and diffuse traces present above it.
s A diffuse *Es* trace which rises steadily with frequency and usually emerges from another type *Es* trace.
d A weak diffuse trace at heights below 95 km associated with high absorption and large *fmin*.
n The designation 'n' is used to denote an *Es* trace which cannot be classified into one of the standard types.
k The designation 'k' is used to show the presence of particle *E*. When *foEs* > *foE* (particle *E*) the *Es* type precedes k.

c. Definitions of the CNT, MED, UQ and LQ

Median count (CND) is the number of values from which the median has been computed. In addition to numerical values, the count may include certain descriptive letters.

Median (MED) is the middle value when the numerical values are arranged in order of magnitude, or the average of the two middle values if there is an even number of values.

Upper quartile (UQ) is the median value of the upper half of the values when they are ranked according to magnitude; the *lower quartile* (LQ) is the median value of the lower half.

B. SOLAR RADIO EMISSION

Solar radio observations at 100, 200 and 500 MHz are carried out at Hiraiso. The observation equipment consists of two parabolic antennas, one with 10-meter diameter for 100 and 200 MHz measurements and one with 6-meter diameter for 500 MHz measurements, each being equipped with a pair of crossed doublet antennas as a primary radiator, and three appropriate receivers. Each pair of the crossed doublet antennas is used as a polarimeter. Observations are continuously carried out almost from sunrise to sunset.

B1. Daily Data at Hiraiso

The three-hourly mean and daily mean values of the solar radio emission intensities at the base-level are tabulated separately for 200 and 500 MHz measurements. Here, the base-level intensity is defined as the intensity recorded during the time when no radio emission burst is taking place. The intensities are expressed by the flux density in 10^{-22} Wm^{-2} Hz^{-1} unit.

The table for 200 MHz measurements also presents the variability indices defined by the number of impulsive radio bursts within the three-hour intervals as follows:

0 quiet or no burst,
1 a few bursts,
2 many bursts,
3 very many bursts.

The daily variability index is defined as the daily mean of three-hourly indices.

The following symbols are used in the tables, when interference or radio bursts prevented measuring the base-level flux densities or determining the variability indices:

* Measurement impossible because of interference.
B Measurement impossible because of bursts.

Daily data within parentheses mean that the observation time does not exceed one third of the period.

B2. Outstanding Occurrences at Hiraiso

The table is a list of outstanding occurrences of solar radio emission bursts observed at Hiraiso during a month. Listed in the table are the date, frequencies, the type of event, the start time and the time of maximum, both in U.T. expressed in hours, minutes and tenths of a minute, the duration in minutes, the peak and mean flux densities in 10^{-22} Wm^{-2} Hz^{-1} unit, and the polarization.

The type of event is expressed by a combination of a numerical code and a letter symbol in accordance with the "Descriptive Text of Solar Geophysical Data, NOAA" as defined by H. Tanaka in the "Instruction Manual for Monthly Report of Solar Radio Emission, WDC-C2" in January 1975:

SGD Code	Letter Symbol	Morphological Classification
1	S	Simple 1
2	S/F	Simple 1F
3	S	Simple 2
4	S/F	Simple 2F
5	S	Simple
6	S	Minor
7	C	Minor+
8	S	Spike
20	GRF	Simple 3
21	GRF	Simple 3A
22	GRF	Simple 3F
23	GRF	Simple 3AF
24	R	Rise
25	R	Rise A
26	FAL	Fall
27	RF	Rise and Fall
28	PRE	Precursor
29	PBI	Post Burst Increase
30	PBI	Post Burst Increase A
31	ABS	Post Burst Decrease
32	ABS	Absorption
40	F	Fluctuations
41	F	Group of Bursts
42	SER	Series of Bursts
43	NS	Onset of Noise Storm
44	NS	Noise Storm in progress
45	C	Complex
46	C	Complex F
47	GB	Great Burst
48	C	Major
49	GB	Major+

The polarization is expressed by the polarization degree and sense as follows:

R or L	right- or left-handed polarization,
W, M or S	weak, moderate or strong polarization,
0	almost zero or unable to detect polarization due to small increase of flux,
00	polarization degree of less than 1 percent.

One of the following symbols may be attached after numerical values, if necessary.

D	greater than, or later than,
E	less than or earlier than,
U	approximate, or uncertain.

C. RADIO PROPAGATION

C1. H.F. Field Strength at Hiraiso

Field strength observation of 15 MHz standard waves transmitted from WWV and WWVH stations which are located respectively at Fort Collins, Colorado and Kauai, Hawaii, is carried out at Hiraiso. In order to avoid interference among the same frequency waves, the upper sideband of WWV or WWVH with the audio tone 660 Hz is picked up by the use of a narrow band-pass filter with 80 Hz bandwidth. Particulars of the transmitters and the receiver are summarized in the following table.

The tabulated *field strength* expressed in dB above one microvolt per meter is the average of quasi-peak values of the incident upper sideband field intensity in 45 seconds after the universal time indicated on the table. Abbreviated symbols are as follows:

CNT	number of observed values,
MED	median,
UD	value of the uppermost decile when they are ranked according to magnitude,
LD	value of the lowest decile when they are ranked according to magnitude,
U	uncertain,
E	less than,
C	influenced by, or impossible because of, any artificial accident,
S	influenced by, or impossible because of, interferences or atmospherics.

C2. Radio Propagation Quality Figures at Hiraiso

The tabulated six-hourly quality figures are calculated for standard waves WWV transmitted from Fort Collins and WWVH transmitted from Kauai.

Quality figures expressing radio propagation conditions range over five grades as follows:

1	very poor (very disturbed),
2	poor (disturbed),
3	rather poor (unstable),
4	normal,
5	good.

Whole day quality figure ranged in grades of 1o, 1+, 2–, 2o, 2+, 3–, 3o, 3+, 4–, 4o, 4+, 5–, 5o stands for an average of six-hourly quality figures of the two circuits. Abbreviated symbols are as follows:

C	artificial accident,
S	propagational accident,
U	inaccurate.

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

N	normal,
U	unstable,
W	disturbed.

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

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

C3. Phase Variation in OMEGA Radio Waves at Inubo

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

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

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

C4. Sudden Ionospheric Disturbances

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

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

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

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

Types of fade-out are as follows:

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

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

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

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

b. Sudden Phase Anomaly (SPA) at Inubo

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

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

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

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

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

Transmitting Stations

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

HOURLY VALUES OF FOF2 AT WAKKANAI

APR. 1989

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	66	66	74	63	54	64	75	72	88	62	70	90	104	101	106	100	101	100	101	84	68	64	58	62
2	54	51	55	49	38	42	59	69	76	85		104	107	108	112	111	107	102	105	90	87	76	67	65
3	64	67	64	57	58	62	81	90	104	119	120	133	140	134	133	123	118	110	110	96	87	80	72	71
4		61	57	62	57	66	72	84	96	114	122	121	127	132	126	124	120	111	106	90	87	73	70	86
5	84	78	64	66	N	58	68	94	101	112	109	116	130	120	118	111	105	104	100	91	76	77	64	65
6	67	65	66	64	62	67	73	79	89	104	110	113	128	132	129	117	108	110	103	84	88	77	79	66
7	64	67	65	64	63	66	90	103	114	125	128	126	127	128	127	127	111	107	106	97	90	81	73	62
8	73	71	62	61	58	62	70	62	65		61	81	90	100	100	97	88	87	86	78	74	71	64	65
9	63	64	64	53	54	65	75	88	101	108		116	118	115	114	106	102	96	91	88	88	77	66	80
10	81	71	66	64	54	63	87	89	98	103	113	119	126	119	121	109	105	104	104	96	85	77	66	73
11	72	64	66	66	65	73	90	110	110	125	125	122	123	122	117	111	112	111	112	100	90	82	87	86
12	67	80	58	64	67	84	88	117	127	121	122	131	132	126	122	118	111	112	107	106	86	68	77	90
13	80	78	77	66	63	73	112	132	136	126	124	124	119	124	121	118	111	111	108	105	90	76	79	76
14	73	65	65	64	66	71	77	76	79	C	C	87	92	100	103	96	92	90	91	87	79	73	66	66
15	62	63	66	66	51	58	64	86	81	100	88	99	102	110	106	99	95	101	98	88	80	71	56	66
16	62	57	A	A		53	60	62	62	55	A	82	91	92	93	90	91	89	92	89	78	57	66	65
17	65	55	58	52	60	60	64	86	100	103	111	115		112	101	101	99	102	106	95	76	70	64	63
18	64	58	66	57	51	57	75	87	84	86	85	86	100	96	94	92	102	95	94	83	70	70	69	66
19	71	67	68	64	55	72	97	117	122	121	121		119	118	120	113	108	115	118	110	90	80	66	72
20	78	78	74	62	64	79	88	100	96	96	90	100	104	111	109	108	105	101	110	103	66	73	61	74
21	65	70	72	63	60	65	103	116	122	126	110	108	118	120	120	108	106	104	104	97	88	88	84	66
22	81	72	81	66	67	84	110	118	118	127	126	122	122	125	126	124	120	115	113	108	88	84	86	80
23	66	64	73	66	66	88	111	114	116	116	118	122	126	124	121	118	114	108	113	108	87	84	78	74
24	68	67	61	64	63	72	90	91	97	104	108	111	114	118	123	118	120	110	111	N	84	66	75	76
25	78	74	66	62	64	79	88	90	88	79	64	75	87	84	84	89	84	86	88	91	87	75	65	62
26	59	62	63	52	44	63	76	92	94	94	85	86	120	122	95	94	100	105	94	86	71	67	63	64
27	67	61	65	55	52	54	71		66	84	80	91	81	89	86	100	86	85	80	77	82	74	80	64
28	63	61	61	62	60	80	84	85	86	83	83	91	100	106	100	108	100	95	93	89	83	78	74	66
29	62	66	60	51	30		54	60	A	63	63	69	73	77	80	78	82	81	84	86	70	75	66	62
30	66	59	65	54	49	67	90	88	108	96	101	106	108	115	107	111	107	102	108	100	92	90	87	84
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	29	29	28	29	30	29	29	28	26	29	29	30	30	30	30	30	30	29	30	30	30	30
MED	66	66	65	63	59	66	79	89	97	104	110	108	118	116	113	108	105	103	104	91	86	76	68	66
U Q	73	71	67	64	63	73	90	106	112	120	121	121	126	124	121	118	111	110	108	100	88	80	78	76
L Q	63	61	61	56	53	61	71	81	85	85	85	88	100	101	100	99	99	95	93	86	76	71	65	65

HOURLY VALUES OF FES AT WAKKANAI

APR. 1989

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	27	G	G	G	G	G	31	G	45	G	G	G	G	G	G	G	G	G	G	36	36	G	G	26
2	G	28	29	28	G	G	G	G	G	G	G	G	G	G	G	G	38	46	G	40	G	G	G	G
3	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	34	38	95	35	33	29
4	97	G	G	32	G	G	G	G	G	54	G	G	G	G	G	G	G	G	34	40	G	G	G	G
5	G	26	29	25	G	G	G	G	G	G	G	G	G	G	G	G	G	35	30	G	G	G	G	G
6	G	G	27	G	G	G	G	G	41	54	46	50	G	G	G	G	G	G	G	G	G	G	G	G
7	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	28	G	G	G	G	G
8	32	G	G	G	G	G	G	50	G	G	G	G	G	G	G	G	G	G	G	30	29	G	G	G
9	G	G	G	G	G	G	G	G	G	G		G	G	G	G	G	G	G	G	G	G	G	G	G
10	G	G	G	44	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
11	26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
12	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
13	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
14	G	G	G	G	G	G	G	G	G	C	C	G	G	G	G	G	G	G	32	29	26	G	G	G
15	G	G	26	26	30	G	G	G	G	G	48	G	47	G	G	G	G	G	G	28	44	26	58	50
16	34	51	60	65	40	29	G	G	54	57	69	G	G	G	G	G	G	34	36	35	32	29	58	G
17	G	G	G	G	G	G	G	G	42	G	G	G	G	G	G	G	G	G	41	G	G	G	G	G
18	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	41	32	28	27	G	G	G
19	G	25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	39	33	33	G	G	G	G
20	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	46	31	40	28	G	G	G
21	G	G	G	G	G	G	G	G	G	53	G	G	G	G	G	G	G	G	G	G	G	G	G	G
22	G	G	G	G	G	G	G	G	G	G	G	G	46	G	G	G	G	G	G	G	G	G	G	G
23	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	43	G	G	34	G	G	G
24	G	G	G	G	G	G	G	G	G	63	58	G	G	58	57	76	G	43	G	25	G	36	36	42
25	35	29	27	26	G	G	G	G	50	55	64	68	G	53	G	G	G	42	34	28	59	50	26	G
26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	46	43	G	48	26	G	G	G
27	G	G	G	24	24	G	G	G	G	G	G	G	G	G	G	G	G	46	G	34	26	G	G	G
28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	32	G	34	G	28	G
29	G	G	G	G	29	46	45	69	79	59	56	G	G	G	G	G	G	47	45	39	28	37	G	G
30	G	G	G	G	G	36	41	46	58	62	58	G	G	G	45	G	46	52	43	G	28	66	G	G
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	29	28	30	30	30	30	30	30	30	30	30	30	30	30	30
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	26	14	G	G	G
U Q	G	G	G	24	G	G	G	G	G	53	23	G	G	G	G	G	G	43	33	35	29	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

HOURLY VALUES OF FMIN AT WAKKANAI

APR. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	17	15	16	15	15	20	17	18	32	34	46	48	50	40	40	26	32	26	20	16	16	15	16	17
2	17	20	16	16	16	16	23	30	35	33	42	45	43	40	27	27	20	18	18	15	16	16	15	16
3	18	16	16	15	15	16	24	20	30	38	40	42	44	42	33	39	24	28	16	15	16	16	15	17
4	16	16	16	17	16	17	26	18	26	36	42	42	40	43	41	39	33	20	17	16	16	16	15	16
5	16	15	15	16	15	17	26	20	24	27	42	42	43	44	39	35	32	18	17	15	15	15	16	17
6	15	15	17	15	15	17	24	30	30	28	34	33	46	40	40	36	32	27	20	16	16	15	16	15
7	15	16	15	21	15	18	27	30	26	39	42	42	46	46	44	35	33	29	17	20	15	15	15	15
8	15	15	16	16	15	18	17	22	29				50	46	43	26	33	28	21	17	18	16	15	15
9	16	15	15	15	15	20	27	33	26	27		52	52	42	42	36	32	28	21	16	15	15	17	16
10	16	15	15	16	15	20	27	34	36	39	45	43	44	42	48	28	23	28	27	16	15	15	15	20
11	16	16	17	16	17	18	28	34	27	43	49	47	46	44	44	38	33	29	23	15	15	16	16	15
12	16	17	15	15	15	20	17	21	36	40	42	44	50	44	29	37	24	29	21	17	18	16	15	15
13	14	18	16	15	17	21	27	20	21	39	40	40	40	40	45	24	20	28	21	18	18	16	15	17
14	18	17	16	17	15	20	20	40	36	C	C	50	51	44	40	39	22	28	17	15	16	16	17	15
15	17	16	18	16	18	20	29	20	39	42	39	50	50	42	42	39	21	28	22	17	16	14	16	14
16	14	15	14	17	18	20	20	43	24	38	40	49	40	40	38	28	22	18	17	17	15	17	17	18
17	16	16	17	18	15	22	18	21	23	42	38	42	42	40	41	39	23	18	18	17	16	16	16	17
18	17	15	16	14	16	21	28	21	24	38	39	48	42	49	48	23	22	20	18	20	16	16	17	16
19	16	17	15	15	15	22	20	21	24	42	46	43	45	46	38	38	21	20	18	17	16	15	17	17
20	15	17	16	14	17	22	20	20	47	38	48	40	48	49	40	38	20	18	18	18	18	16	16	17
21	18	15	15	15	15	22	18	21	24	38	45	42	47	42	40	36	21	27	22	16	17	15	15	16
22	17	14	15	15	15	21	29	22	24	38	44	33	45	46	41	38	21	18	22	18	15	16	17	15
23	17	16	14	16	16	22	20	21	36	39	49	45	52	49	39	41	22	20	21	15	16	15	15	16
24	15	15	15	15	15	22	29	33	40	38	48	43	44	39	33	33	32	24	17	17	17	16	16	16
25	16	16	17	16	16	22	24	23	23	38	40	48	46	39	43	26	21	27	18	17	17	16	16	16
26	17	16	16	17	N	21	29	20	36	40	40	52	56	42	39	24	32	20	23	17	16	16	17	16
27	16	14	17	16	16	22	18	33	36	46	43	49	60	42	39	37	35	20	20	17	18	16	16	15
28	17	14	14	15	15	22	28	33	24	38	48	48	50	40	33	36	24	30	20	17	16	18	18	17
29	15	18	17	17	18	18	26	30	35	38	40		48	44	48	36	33	24	18	16	20	18	17	17
30	17	15	15	17	16	18	18	29	30	39	36	38	45	50	39	35	33	28	18	17	17	16	16	16
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	29	30	30	30	30	28	27	28	30	30	30	30	30	30	30	30	30	30	30	30
MED	16	16	16	16	15	20	24	22	30	38	42	44	46	42	40	36	24	26	19	17	16	16	16	16
U Q	17	16	16	17	16	22	27	33	36	39	46	48	50	46	43	38	32	28	21	17	17	16	17	17
L Q	15	15	15	15	15	18	20	20	24	38	40	42	44	40	39	28	21	20	18	16	16	15	15	15

HOURLY VALUES OF FOF2 AT AKITA

APR. 1989

LAT. 39.7N LON. 140.1E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	79	80	66	67	64	71	87	102	102	101	119	110	131	131	128	N	114	108	113	91	68	70	66	76
2	66	A	66	66	54	44	66	82	92	107	104	116	127		130	112	113	113	111	86	81	75	72	74
3	74	73	69		66	70	86	111	123	124	136	137	138	138	138	140	135	122		111	82	80	77	77
4	74	67	62	69	64	60	77	96	112	120	136	132	136	138	136	135	136	121	110	90	84	89	79	
5	92	67	79	72	66	78	84	114	122	127	138	134		133	129	121	113	109	110	106	78	78	74	75
6	66	67	66	71	66	71	85	110	118	126	129	137	134	140	134	130	118	114	110	88	80	81	78	80
7	80	72	71	69	66	71	88	108	129	124	133	135	134	138	135	130	121	114	109	97	86	89	81	76
8	83	83	67	67	66	69	78	73	68	86	93	118	131	131	124		104	104	105	87	82	68	67	
9	76																							
10										120	122	137	136	130	132	128	121	112	112	85	84	82	80	73
11	75	75	76	73	70	78	84	114	122	126	118	126	132	129	116	122	116	120	115	104	84	80	85	86
12	90	83	62	64	66	84	104	109	128	129	131	130	136	132	126	122	121	124	121	103	87	85	86	88
13	85	85	84	79	66	77	109	129	136	124	121	116	116	122	125	126	122	114	108	89	88	80	84	86
14	80	72	76	66	70	79	111	95	106	109	115	126	128	135	134	123	112	104		90	81	76	74	78
15	72	76	86	75	53	60	78	88	88	112	107	130	125	117	122	113	104	111	115	92	78	N	N	76
16	78	69	77	64	52	54	68	75	76	79	86	94	104	102	108	102	102	100	104	87	76	66	66	69
17	74	54	52	53	52	64	86	100	113	107	132	134	133	134	120	114	111	113		93	70	54	68	68
18		73	79	66		58	83	104	109	115	118	122		124	117		114	115	104	84	62	67	76	66
19	77	67	71	68	66	71	100	108	112	120	131	131	127	132	131	124	122	126	131	110		86	84	83
20	85	85	82		79	88	111	122	112	113	120	126	133	131	130	125	115	121	121	102	83	75	78	51
21	77	79	71	67	64	69	98	122	122	117	116	118	114	129	138	118	N	113	114	110	88	84	79	84
22	85	82	84	71	77	84	111	109	113	116		122	130	133	130	130	130	126	114		88	89	87	84
23	86	87	86	82	66	88		108	114	116		126	125	136	130	120	122		112	111	88	90		74
24	73	67	72	52	66	77	88	105	114		118	123	127	134	138	133	130	126	121	109	84	84	81	82
25		83	80	67	67	78	103	102	102	102	103		114	115	111	110	100	103	103	91	88	86	78	67
26	68	66	66	64	52	59	87	84	84		108	95	121	126	113	117	111	115	110	85	66		70	66
27	68	75	67	53	54	58	73	68	78	94	88	94		102	102	112	97	92	89	89		80	71	78
28	70	66	66	66	67		99	110	114	117	117	112	118	122	112			103	103	88	81	81	77	78
29	82	52	53	59	51		62	61	58	72	75	80	86	87	87	89	90	93		93	84	76	66	69
30	67	66	74	54	64	69	86	101	110	116	107	121	124	127	127	122	115	113	114	108	88	89	86	88
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	28	26	27	26	27	28	28	27	27	28	26	28	29	25	27	28	25	28	27	27	27	27
MED	77	73	71	67	66	71	86	104	112	116	118	124	128	131	128	122	115	113	111	92	83	80	78	76
U Q	83	82	79	71	66	78	100	110	120	124	131	131	133	134	133	129	122	120	114	105	87	86	81	83
L Q	72	67	66	64	54	60	78	91	97	107	107	116	121	123	116	113	111	106	106	88	78	75	71	69

HOURLY VALUES OF FES AT AKITA

APR. 1989

LAT. 39.7N LON. 140.1E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	33	31	41	33	G	G	30	G	G	G	97	46	53	60	G	G	G	G	G	30	59	54	30	26
2	32	85	58	35	29	24	G	G	47	54	56	54	50		45	G	G	36	37	25	G	29	G	G
3	G	G	G		G	G	G	G	G	48	53	G	54	57	G	42	G	40		58	32	92	57	58
4	56	40	29	29	36	33	G	G	G	55	G	G	G	G	G	G	G	48	62	29	30	38	48	25
5	G	G	G	G	G	G	G	38	45	61	68	G		G	G	G	G	G	G	G	G	G	24	37
6	36	33	28	G	G	G	G	G	G	G	G	G	G	71	G	G	G	G	37	37	36	58	36	G
7	G	G	28	G	G	G	33	G	G	48	54	G	G	G	G	G	G	G	28	29	G	G	G	G
8	G	26	G	G	G	G	G	G	43	55	65	82	G	G	G		39	G	G	35	G	28	28	
9	32																							
10										49	50	G	G	68	68	43	G	G	32	37	G	G	G	G
11	G	G	25	G	G	G	G	37	G	G	G	G	G	G	G	G	G	G	40	28	G	G	G	G
12	G	G	G	G	32	G	G	G	G	G	49	G	G	49	48	G	54	40	36	G	G	G	G	G
13	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	45	36	G	G	G	24	G
14	G	G	G	G	G	G	G	G	G	52	68	53	G	G	G	G	G	41		G	G	G	G	G
15	G	33	G	G	29	G	G	G	G	G	58	60	53	51	G	44	41	G	G	G	42	48	28	G
16	37	G	48	41	34	G	G	52	52	54	57	63	56	G	G	G	G	36	41	40	39	34	G	G
17	37	32	29	25	G	G	36	G	G	52	50	51	51	G	G	G	G	G	G	37	47	G	G	31
18		G	G	33		G	G	G	48	55	59	63		G	G		G	G	32	48	41	26	G	G
19	G	G	G	G	G	G	G	G	48	50	53	G	G	G	G	55	50	G	37	36		G	G	G
20	G	G	G	G	G	G	G	G	48	50	54	G	G	G	G	G	G	48	44	26	28	31	55	31
21	G	27	G	G	G	G	G	G	G	65	50	G	53	G	G	43	G	43	33	33	G	G	G	G
22	G	26	G	G	G	G	G	38	50	80	G	50	G	G	G	G	G	56	34	G	29	58	29	G
23	G	G	G	G	G	G		G	54	51		G	G	G	G	G	46	G	32	38	45	40		46
24	31	28	G	G	G	G	37	58	89		65	58	92	58	55	G	G	37	55	57	31	32	64	57
25		36	40	34	33	31	38	46	53	56	57		72	61	55	G	G	G	G	34	38	68	37	39
26	24	G	G	G	G	G	G	G	50		G	G	G	G	G	54	G	40	31	40	40	45	24	G
27	G	G	G	G	G	G	50	44	G	47	G	G		G	G	G	G	G	G	41		26	49	G
28	38	32	36	32	G		G	46	46	179	G	G	51	G	G	G		43	36	43	26	G	38	G
29	G	G	G	29	G	32	G	42	51	51	55	G	104	G	53	G	G	42	81	36	24	G	46	26
30	33	G	24	G	G	30	39	53	58	64	56	G	G	62	59	52	48	66	73	69	72	58	58	40
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	28	28	27	27	27	27	28	28	27	28	28	26	28	29	27	28	29	27	29	27	29	28	28
MED	G	G	G	G	G	G	G	G	44	51	54	G	G	G	G	G	G	36	34	35	29	28	26	G
U Q	33	31	28	29	G	G	30	40	50	55	57	52	53	54	23	42	G	42	40	40	40	46	42	31
L Q	G	G	G	G	G	G	G	G	G	47	G	G	G	G	G	G	G	G	G	25	G	G	G	G

HOURLY VALUES OF FMIN AT AKITA

APR. 1989

LAT. 39.7N LON. 140.1E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

APR. 1989

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	77		85	65	66	68		110	120	127	134	129	135			131		126	120	101		77		80
2	66	68	72	70	60	52	81	84		127	125	131			N		126	123	120	108	81	82	78	81
3	75	72	76	66	70	71	99	120	118	123	131	142	146	146		146	144	138	130		91	80	81	84
4	77	70	66	72		66	79	105	117	128	130	139		145	138	144	143	137	121	102	92	97	93	90
5	100		80	81	68	78	84		134	137	142	144	140	139		131	117	120	117	108	92			76
6	76	81	72	78		76		118	126			139	139	142	140		132	125	115	93	81	80	81	85
7	86	79	81		70	71	101	124	127	126	131	139	140		140	138	136	123		111	90	109	78	78
8	85	98		75	78	81	87	98	86	113	125	144	141	137	138	128	118	115		98	81	76	69	71
9	76	82	72		69	66	102	112	115	126		142	145	143	140	143	136	129	126	112	83	84	99	84
10	81	99		73		66	90	115	118		133	138	138	139	138	138		127	128	102		82	86	84
11	84	81	79	76	68	81	84	113	122	124		136	136	135	132	124	127	128	122	116	89	80	87	92
12	92	81	66	68		85	105	114	131	132	131	138	140			136	135	137			88	91	106	107
13		97	95	80	77	83	112	129	127	123	124	128	132	131	134	140	126		116	112		84	86	92
14	86	80	74	78	70	79	113			129	138	140	146	146	145	137	123	118	123	112	87	84	87	88
15	N	82	96	81	63	67	88	101	105	111	120	136	138		N	127	118	118	122	105	80	84	78	
16	83	77	81	76	60		86	84	91	85	88	110	120	126	130	120	113	110	112	94	78	67	78	75
17	77	60	66	63		68	94	106	116	122		147	146	137	135	128	124	124		91	71	70	82	82
18	86	92	83	81	60	66	86	102	116	135	140	139	142	141	133	121	126	134	116	84		77	80	80
19	80	76	76				100	109	111	126	127	134	135		139	135	133	135	139	115	88	88	103	100
20	109	94	90			89	N	N	N			137	144	143	139	138	130	136		116	87	83	83	84
21	83	84	80	78	65		103	124	119	113	121	N	128	136	141						87		82	87
22	85	86	92	82		84	108	112	112		117	131	136	143	138	140	136	139	134	122	104	101	103	99
23	98	98	88	92	80	85	106	107	108	119	128	135		133	134	130		126		117	99	92	88	86
24		80	82	71	74	77	99	110	115	123	126	131	138	142	142	143	137	136	133	114	89	89	89	88
25	90	N	92	73	71	84	100	108		113	115	N	131	136	136	125	119	122	124	115	96	86	88	85
26	79	78	77		60		97	84	86	110	120	108	121		121	130	121	125	121	84	67	67	71	
27	69	82	72		70	65	77	87	94	98	111	103	102	121	120	118	106		108	89	80	78	75	81
28	93	77		72	67	80	101	106	114	115	121		127	126	120	120	125	114	110			78		82
29	84	80	67	60	49	69	69		73	84	87	101	102	102	104	99	N	108	101	102	91	77	83	90
30	77	82	80		63	77	98		102		124	132	136	136	133	129	127	124	124	116	101		99	
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	27	23	22	26	27	25	26	25	25	27	27	23	24	27	25	27	23	26	25	27	27	27
MED	83	81	80	75	68	76	98	109	116	123	125	136	138	137	137	131	126	125	121	108	88	82	83	84
U Q	86	86	85	80	70	81	102	114	120	127	131	139	141	143	139	138	135	135	126	115	91	88	89	90
L Q	77	77	72	70	63	67	86	101	105	113	120	131	131	133	132	125	120	120	116	98	81	77	78	81

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT KOKUBUNJI

APR. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	25	26		25	G		G	G	G	G	G	78	G	G	G	G	34	28	28	G	G	G	G
2	G	30	27	37	35	33		G	G	50	54	54	47	52	49	58	50	68	60	35	48	28	26	G
3	47	28	G	26	G	24	G	37	43	G	G	47	51	51	G	G	G	49	46		71	46	G	37
4	26	38	35	G	G	G		G	G	46	51	G	50	58	49	43	G	38	45	59	60	40	29	30
5	G		G	G	31	G			G	52		50	G	G	G	G	G	G	G	22	G	G	G	31
6	G	G	34	38	25	G	G	G	G	G	G	G	G	G	G	G	43	G	37	29	30	24	50	24
7	24	G	G	G	23	N	G	G	G	G	50	60	62		G	G	G	34	41	36	32	26	G	G
8	G	G	G	G	G	G	38	44	G	54	60	54	60	82	73	46	G	45	44	52	46	22	33	G
9	G	26	G	G	G		G	G	48	55		G	54	52	51	46	50	40	34	41		31	24	G
10	G	G	G	G	26	G	33	G	G	G	52	G	G	G	48	G		G	36	28	24	G	G	G
11	G	28	G	26	30	G		G	46	G		G	G	G	G	G	46	50	43	52	G	G	G	G
12	G	G	G	G	G	G	31	G	44	48	G	G	G		G	G		44			G	G	G	G
13	G	G	G	G	G	G	34	G	G	G	G	G	55	G	64	G	G	39	36	56	G	G	G	G
14	G	G	G	G	G	G	35	43	63	52	54	56	52	55	52	G	G	40	34	26	26	30	G	G
15	G	G	G	G	G	G		G	G	54	G	50	55	52	54	59	58	41	54	38	26	G	29	G
16	G	G	G	30	33		G	G	54		60	56	G	G	G	G	G	G	28	G	G	31	35	G
17	G	26	G	44	64	41	44	55	50	G	G		G	G	G	52	47	58	G	62	40	56	64	32
18	G	G	G	G	G	G	G	41	46	49	G	G	G	G	G	G	70	50	G	27		60	G	28
19	G	G	G	G	G	27	G	G	42	G	52	52	57	49	57	G	G	47	48	35	34	44	37	28
20	25	G	G	G	G					G	G	G	G	G	G	G	47	58	44	48	29	G	46	38
21		G	G	G	G	G	G	G	49	52	G	G	50	G	G	G	46	47		G	G	G	G	G
22	G	G	G	G		G	G	G	G	48	48	G	G	G	G	55	46	40	G	39	G	G	36	48
23	G	G	G	G	G	G	G	G	42	50	60	53	60	G	50	G	125	115		37	72	54	G	27
24		32	28	28	26	G	G	44	55	63	114	98	56	68	G	52	G	40	44	34	34	G	G	G
25	47	27	26	G	24	29	G	43	51	48		74	76	G	G	49	47	36	34	61	105	57	73	49
26	69	29	23	G	34	G	36	44	49	55	50	G	G	G	G	G	51	45	42	34	28	34	35	G
27	G	G	G	G	G	G	34	41	62	50	G	G	G	G	G	G	G	G	30		G	23		38
28	30	27	G	25	44	28	33	G	48	G	57	51	G	G	47	G	G	G	59	103	82	44	29	G
29	26	G	G	26	G	31		58	G	G	88	G	53	G	53	54	52		53	54	60	37	42	48
30	38	29	37		44	34	48	49	61	61	51	57	G	56	59	44	61	44	51	56	60	57	59	48
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	30	28	29	26	22	28	29	29	26	29	30	28	30	30	28	29	27	27	28	30	29	30
MED	G	G	G	G	G	G	G	G	43	48	50	G	48	G	G	G	44	40	41	37	30	27	26	G
U Q	25	27	23	26	30	27	34	43	49	52	54	54	55	52	51	46	50	48	46	54	54	44	36	32
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	34	30	28	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT KOKUBUNJI

APR. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	14	14	15	16	16	18	16	16	28	24	27	22	63	45	16	16	16	17	14	16	16	23	20
2	15	15	15	14	14	15	16	15	39	20	30	36	40	33	28	21	17	15	14	15	16	15	16	17
3	15	15	15	15	16	15	23	16	18	26	24	30	39	22	22	20	16	14	15	15	15	15	16	15
4	16	15	14	15	43	14	16	16	39	22	27	29	30	28	27	21	17	15	16	14	14	14	15	15
5	15	17	15	15	14	14	27	35	18	18	29	30	42	43	30	21	14	17	15	15	15	21	16	15
6	15	14	14	14	14	15	26	16	18	39	33	42	33	38	28	26	20	15	15	22	15	15	15	15
7	15	14	14	16	14	15	16	16	21	24	35	36	35	33	29	22	17	16	16	16	15	15	44	18
8	15	16	21	14	15	15	18	18	42	22	35	33	28	28	26	22	18	14	16	15	16	15	15	16
9	15	15	15	15	33	20	16	18	20	23			38	34	33	26	22	16	17	15	15	15	15	15
10	15	17	15	14	15	16	16	17	18	44	28	35	47	36	33	27	39	16	15	14	15	15	15	16
11	26	15	15	15	14	15	32	18	29	43		44	45	42	30	30	18	16	18	15	15	15	16	15
12	15	14	15	15	20	18	15	16	18	24	27	32	34	30	43	21	17	15	17		15	15	15	15
13	15	14	15	14	14	16	15	20	18	30	28	38	39	29	28	23	20	21	17	16	15	16	15	15
14	15	14	20	14	14	18	16	14	38	27	29	32	32	30	20	24	18	17	16	16	15	15	15	16
15	15	14	14	14	14	17	16	17	22	38	38	35	38	27	29	24	17	17	15	14	16	15	16	15
16	14	14	15	15	14	27	28	18	21	24	33	33	42	63	33	26	38	17	16	50	15	15	15	16
17	16	15	14	14	15	15	16	17	21	30	42	44	45	42	26	26	17	16	35	16	15	14	15	17
18	15	14	15	14	38	17	16	17	20	29	26	43	42	43	40	23	17	20	22	14	14	15	14	15
19	15	16	14	15	14	16	15	17	22	30	33	33	33	34	30	39	22	18	16	15	14	14	15	16
20	15	15	15	15	33	32	16	17	46	42	52	45	48	43	42	24	21	21	16	15	14	15	15	15
21	15	14	14	14	15	17	16	17	22	39	42	41	30	43	41	14	26	15	22	26	18	18	22	15
22	15	15	14	14	17	17	16	17	22	40	40	42	44	42	28	38	20	17	15	15	15	15	14	15
23	15	14	14	14	15	18	16	17	21	23	32	30	33	36	27	27	32	17		14	15	15	15	15
24	17	14	14	14	14	18	16	22	22	28	29	36	42	39	38	28	41	18	16	14	15	15	15	15
25	15	14	15	14	14	14	16	18	15	39	27	39	40	39	18	24	18	16	17	15	16	20	15	15
26	15	14	18	14	14	17	16	18	20	27	38	42	40	59	40	26	18	17	16	14	15	14	15	17
27	14	14	15	14	14	18	15	17	24	29	40	37	27	40	29	23	20	20	16	22	15	15	15	15
28	15	15	15	15	15	15	15	17	18		38	38	42	41	23	22	15	17	16	15	16	15	15	15
29	15	14	14	15	15	15	18	16	15	38	38	43	30	40	32	24	21	27	16	15	15	14	14	15
30	15	15	14	14	14	15	16	29	21	24	28	35	44	29	33	39	17	17	16	15	14	17	14	15
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	29	28	29	30	30	30	30	30	30	29	29	30	30	30	30
MED	15	14	15	14	14	16	16	17	21	28	32	36	39	38	30	24	18	17	16	15	15	15	15	15
U Q	15	15	15	15	16	18	18	18	22	38	38	42	42	42	33	26	21	17	17	16	15	15	16	16
L Q	15	14	14	14	14	15	16	16	18	24	28	32	33	30	27	22	17	16	15	14	15	15	15	15

HOURLY VALUES OF FOF2 AT YAMAGAWA

APR. 1989

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	85	77	86	75	65	62	79	105	126	133	133	136	138	152		142	145	142	137	128	88	81		88
2	85	67	81	83	58	57	64	86	112	131	132	137	148	148	148	146	150	145	141	134	107	83	87	88
3	81	77	77	66	67	68	78	102	109	123	130	138	146	159	162	170	168	164	155	145	127	88	88	88
4	105	87	86	84	78	62	64	96	123	130	132	136	155	161	160	158	160	154	143	126	116	111	122	108
5	123	86	86	78	74	74	79	102	120	137	150	147	148	152	151	146	146	137	134	131	110	87	82	86
6	86	86	85	88	87	66	82	110	118	121	124	137	150	154	160	168	160	153	146	132	108	110	110	108
7	107	96	86	80	65	66	80	111	118	119	122	143	151	156	150	147	144	139	136	126	86	100	87	86
8	86	86	78	67	68	67	84	117	122	127	134	150	152	152	150	143	144	139	130	127	91	80	A	80
9	79	79	71	63	53	51	77	87	107	126		146	151	156	154	161	N	154	149	145	129	108	104	110
10	90	86	88	85	63	63	77	101	107	124	135	136	144	144	146	146	145	143	139	126	107	105	111	109
11	105	104	86	85	73	72	82	109	112	117	123	136	145	143	141	143	145	143	135	125	88	88	87	104
12	105	88	77	66	74	78	84	112	127	135	134	138	142	141	145	146	148	152	155	140	132	127	146	146
13	144	126	110	74	87	82	88	127	126	120	118	123	131	137	141	141	134	127	123	123	108	86	88	83
14	84	87	84	79	74		83	111	120	131	140	148	144		150	156	147	142	142	129	104	106	111	110
15	118	105	111	106	72	63	77	104	112	110	123	141	142	142	140	140	132	130	140	131	103	84	87	88
16	104	88	86	86	63	63	83	88	111	115	125	138	146	148	150	N	140	132	126	125	98	88	86	106
17	107	84	62	77		70	84	102	108	120	138	154	149	151	161	154	146	140	136	126	102	113		121
18	120	113	118	108	80	78	85	106	125	138	150	145	154	149	144	138	141	145	132	104	88	84	96	102
19	86	88	86	86	81	75	85	101	105	114	126	135	137	142	144	150	146	146	146	132	109	107	107	122
20	110	110	87	89	78	86	104	106	104	116	128	140	150	159	113	155	157	158	155	156	143	130	110	108
21	86	102	105	86	84	69	87	111	108	107		134	142	145	146	141	138	136	146	148	111	88	101	104
22	105		103	88	86	84	90	110	102	107	110	131	141	147	149	143	144	150	145	138	111	110	116	120
23	121	121	110	112	88	87	88	104	99	114	126	134	141	144	146	142	134	133	136	132	110	112	108	111
24	104	101	109	85	85	86	88	107	112	122	124	134		148	145	145	148	146	140	125	111	109	109	111
25	108	105	88	85	78	80	107	94	102	108	118	134	142	147	143	146	136	140	150	140	104	87	84	86
26	90	80	86	81	62	60	78	87	78	113	122	113	118	131	135	141	140	140	128	101	75	76	78	81
27	74	78	76	69	65	67	71	87	87	112	125	114	120	141	142	134	132	118	134	141	86	84	84	85
28	83	84	65	73	67	66	89	85	110	116	117	128	137	133	134	133	137	131	123	116	99	90	90	86
29	103	104	86	73	67	60	77	86	86	102	112	132	131	130	126	122	122	127	122	128	113	88	84	86
30	86	82	86	80	66	63	83	91	107	122	122	134	142	136	134	141	144	144	144	144	127	127	130	130
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	29	30	30	29	29	30	30	30	30	28	30	29	29	29	29	29	30	30	30	30	30	27	30
MED	104	87	86	82	73	67	83	103	110	120	126	136	144	147	146	145	144	142	140	130	108	89	96	104
U Q	107	104	88	86	80	78	87	110	120	127	133	141	149	152	150	152	147	146	146	140	111	110	110	110
L Q	86	83	81	74	65	63	78	91	105	114	122	134	139	141	141	141	137	136	134	126	98	86	87	86

HOURLY VALUES OF FES AT YAMAGAWA

APR. 1989

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	40	26	32	G	G	28	24	G	G	42	G	G	G	49	G	G	G	37	G	23	24	G	G	G
2	G	G	38	41	G	25	29	G	G	G	G	G	G	G	G	44	43	40	38	80	79	G	G	G
3	37	46	40	25	35	G	26	G	G	G	G	G	G	G	G	G	G	40	40	G	33	40	32	40
4	43	35	29	G	24	G	32	G	G	G	49	G	67	62	G	61	G	46	47	43	41	55	32	24
5	G	G	32	G	32	24	G	G	39	48	64	G	G	G	G	G	G	G	G	28	26	G	G	G
6	G	28	30	23	G	G	G	G	G	G	G	G	G	G	55	G	45	50	60	66	46	24	G	29
7	40	30	29	G	G	G	25	G	G	44	54	50	G	54	59	48	72	40	41	47	41	28	26	G
8	G	G	G	G	G	G	G	G	46	53	G	G	G	51	G	G	G	G	55	57	49	92	111	33
9	31	32	25	G	G	G	G	39	44	51	G	G	G	59	52	46	64	68	41	G	24	24	G	G
10	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	37	41	47	G	36	33
11	29	25	G	G	G	G	G	38	41	G	52	G	G	G	49	81	48	39	36	37	58	31	G	G
12	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	45	62	81	40	29	32	G	G	G
13	G	38	G	37	G	G	G	G	G	47	G	G	G	62	G	G	G	G	47	45	65	G	G	G
14	G	24	G	G	G		G	39	55	57	76	58	69	65	79	58	47	50	32	35	28	46	41	G
15	G	24	G	G	G	G	28	G	40	G	G	G	57	G	55	51	46	G	34	G	25	G	G	G
16	G	25	G	G	G	G	37	G	G	51	51	G	G	G	G	G	G	G	G	42	58	69	43	59
17	44	30	31	G	49	55	45	37	44	46	55	G	G	G	53	G	G	G	G	30	43	53	72	70
18	31	G	G	25	26	28	G	G	42	45	G	G	G	G	54	71	G	G	53	60	46	82	25	G
19	G	24	G	G	G	33	32	36	45	45	50	G	G	G	G	G	51	54	51	41	40	56	46	33
20	24	G	G	G	G	G	G	38	50	52	52	G	G	48	G	G	G	43	42	60	58	38	45	G
21	G	G	G	G	G	G	G	G	G	48	55	G	G	G	G	G	G	G	33	42	34	G	G	G
22	G	G	G	G	G	G	31	40	79	55	69	97	54	G	G	G	G	G	36	45	30	36	38	25
23	26	G	G	G	G	G	G	G	G	52	52	62	73	92	62	51	G	G	G	49	G	G	G	30
24	33	43	37	38	31	G	28	42	50	70	64	80	59	58	G	G	48	50	47	28	28	31	G	28
25	39	24	33	48	46	31	41	44	62	57	58	52	59	84	G	G	56	75	128	G	68	40	34	69
26	49	81	50	30	G	G	G	46	58	58	54	63	52	G	G	G	G	G	G	G	G	G	40	28
27	25	G	G	24	G	G	40	G	44	54	53	53	56	62	G	G	G	G	40	38	33	26	41	G
28	G	G	24	30	G	G	28	38	G	G	77	G	G	G	G	51	69	66	72	33	33	57	45	34
29	40	37	32	38	32	24	46	50	45	56	58	61	62	60	G	G	G	44	38	32	G	48	29	24
30	G	38	38	27	G	G	32	48	52	52	52	52	G	60	126	85	78	109	110	144	114	59	G	46
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
MED	12	24	12	G	G	G	24	G	40	48	52	G	G	G	G	G	G	40	40	40	37	31	28	24
U Q	37	32	32	27	24	24	32	39	46	53	55	52	56	60	53	51	48	50	47	47	49	53	41	33
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	33	28	28	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT YAMAGAWA

APR. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	15	15	15	15	15	16	15	15	18	23	27	45	34	27	22	17	16	15	15	15	17	15	15
2	15	15	15	15	15	15	15	15	16	18	22	34	42	43	34	27	22	16	16	15	15	16	15	15
3	15	15	15	16	15	15	16	15	16	22	24	24	44	42	40	36	17	26	14	15	15	15	15	15
4	15	15	15	15	15	15	15	15	17	22	27	29	32	36	36	27	20	17	15	15	15	15	15	16
5	16	15	15	15	15	15	17	15	16	18	36	42	43	32	22	21	17	23	17	15	15	15	15	15
6	16	15	15	15	15	15	18	15	16	22	24	42	45	44	36	32	24	21	18	15	15	16	15	15
7	15	15	15	15	15	15	17	15	17	21	32	34	35	29	33	29	18	17	14	15	15	15	15	15
8	15	15	15	15	15	15	17	16	18	23	41	46	45	34	35	28	22	20	17	15	15	15	15	15
9	15	15	15	15	15	15	18	16	18	22		50	38	35	35	26	22	20	15	16	15	15	15	15
10	15	15	15	15	15	14	20	18	17	20	24	46	43	42	43	22	18	15	15	15	15	15	15	15
11	15	15	15	16	15	15	20	18	21	40	36	46	51	48	39	34	26	22	16	15	15	15	15	15
12	15	15	15	15	15	15	15	16	16	22	29	36	43	46	41	30	24	16	15	15	15	15	15	15
13	16	15	15	15	15	15	21	18	18	18	36	46	39	40	22	27	27	21	17	15	15	15	15	15
14	15	16	16	15	15		15	17	20	24	34	34	34	39	38	39	24	21	15	15	15	15	15	17
15	15	15	15	15	15	15	15	16	18	23	42	45	35	46	40	24	22	18	16	16	15	15	15	15
16	15	15	15	15	15	15	15	16	20	22	36	43	46	43	44	39	20	21	15	15	15	15	15	15
17	15	15	15	15	15	15	15	16	17	23	30	34	36	44	45	39	21	18	16	15	15	15	15	15
18	15	15	15	15	15	15	16	16	17	22	33	44	43	45	42	24	23	17	16	15	16	15	16	15
19	15	15	15	16	15	15	15	15	17	22	26	38	38	40	44	40	23	20	16	15	15	15	15	15
20	15	15	15	15	15	15	22	16	21	20	38	42	36	46	45	40	21	21	18	15	15	15	15	18
21	15	15	15	15	15	15	22	17	20	23	30	41	34	48	45	29	17	22	16	15	15	15	15	15
22	15	15	15	15	15	15	15	17	21	23	39	39	44	48	48	40	24	20	16	15	15	15	15	15
23	15	15	15	15	15	15	23	16	17	23	26	40	32	41	40	36	20	21	16	15	15	15	15	15
24	15	15	15	15	15	15	15	18	20	36	39	40	42	42	48	40	22	20	16	15	15	15	15	15
25	15	15	15	15	15	15	15	16	20	22	24	29	33	32	39	39	20	21	17	16	15	15	15	15
26	15	16	15	17	17	15	21	17	20	21	34	36	38	46	40	39	22	20	16	15	15	15	15	15
27	15	15	15	15	15	15	15	18	18	23	33	34	35	36	39	23	22	17	16	15	15	15	15	15
28	15	15	15	15	15	15	16	15	17	20	35	44	45	43	44	38	21	20	16	15	15	15	15	15
29	16	15	15	15	15	15	16	17	20	27	36	35	39	39	41	26	22	17	16	16	15	15	15	15
30	15	15	15	15	15	15	15	16	21	23	34	39	43	42	40	38	23	17	16	15	15	15	15	15
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	29	30	30	30	30	29	30	30	30	30	30	30	30	30	30	30	30	30	30
MED	15	15	15	15	15	15	16	16	18	22	33	40	40	42	40	31	22	20	16	15	15	15	15	15
U Q	15	15	15	15	15	15	18	17	20	23	36	44	44	45	44	39	23	21	16	15	15	15	15	15
L Q	15	15	15	15	15	15	15	15	17	21	26	34	35	36	36	26	20	17	15	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT OKINAWA

APR. 1989

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	121	93	91	88	66	62	65	88	120	121	119	139	144	155	161	156	157	158	158	148	123	90	90	119
2	111	88	91	85	65	53	54	85	108	127	135	138		160	162		182	186	180	168	160	146	145	130
3	86	87	91	54	74	54	75	91	111	123	130	141	146	170	176				181	164	166	164	145	144
4	144	131	85	110	84	62	54	84	121	129	122	139	160	177	184	194		184	178	166	166	168	169	177
5	176	166	144	92	88	69	84	88	110	138	145	157	164	171	176	169	N	171	172	168	162	146	142	145
6	145	163	164	141	122	88	98	104	119	122	121	144	158	N	176	172	191	195	193	177	177	166	192	171
7	167	175	159	129	87	66	74	89	119	119	146	144	157	165	180	N	177	177	164	174	163	132	108	110
8	90	84	112	88	63		79	99	120	125	143	143	167	163	164	172	169	166	162	146	116	90	87	87
9	84	90	85	79	64	58	67	88	103	133		142	146	171	173	181	184	186	183	131	166	170		169
10		170	177	143	84	66	65	89	103	127	140	128	142	154	167	167	164	162	162	146	146	170	168	146
11	147	140	138	107	74	67	74	103	108	108	131	141	144	164	170	170	178	177	172	159	147	166	145	136
12	140	103	88	80	80		76	96	124	131	136	142	144	146	162	162	172	177	162	164	167	N	193	197
13	197	189	164	109	88	88	90	110	120	105	104	123	132	145	143	147	133	144	141	141	110	91	84	90
14	88	66	88	78	76	66	62	90	106	97	129	142	148	145	147	164	162	N	155	141	106	142	136	172
15	166	160	160	144	85	66	66	100	112	92	117	142	135	146	144	146	147	164	160	164	145	147	146	142
16	140	108	N	88	66	55	60	87	103	120	124	145	159	163	163	165	166	169	164	146	143	164	171	N
17	172	122	86	84	80	77	78	87	113	111	128	145	162	168	176	168	167	164	160	146	148	172	176	184
18	183	182	175	139	88	88	88	108	121	135	143	144	158	167	164	162	168	157	144	91	91	89	108	110
19	88	110	93	87	85	80	80	88	90	111	122	130	140	144	146	162	163	163	162	145	163	166	168	164
20	180	172	144	85	88	88	87	90	91	108	126	141	162	178		180	188		188	174	176	170	164	135
21	129	124	131	109	92	82	77	97	94	92	105	138	146	152	146	146	154	166	171	166	145		146	
22	143	136	143	141	88	83	83	92	90	96	102	106	133	156	164	159	163	161	162	145	146	167	186	195
23	181	174	175	142	144	83	85	90	87	100	121	128	143	146	146	144	142	140	146	158	162	178	170	178
24	145	146	145	125	85	85	90	111	98	127	121	131	150	154	153	161	162	161	155	160	164	165		164
25	145	135	122	83	85	88	85	87	97	99	112	129	143	149	N	162	163	163	176	146	103	97	86	86
26	105	88	86	89	63	40	66	84	68	122	126	121	128	121	141	146		146	142	120	85	80	84	87
27	79	84	84	73	67	59	66	91	97	112	137	116	136	150	154	156	161	164	170	176	89	105	104	88
28	88	90	86	72	77	67	77	56	102	121	120	139		145	144	147	153	158	154	146	108	89	130	126
29	131	136	106		72	62	67	90	94	106	126	146	144	147	144	144	145	162	163	147	147	131		127
30	131	85	96	88	78	66	68	90	108	112	122	146	145	142	145	160	163	169	166	162	166	163	187	186
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	29	29	30	28	30	30	30	30	29	30	28	29	28	27	26	27	30	30	30	28	27	28
MED	140	128	112	88	82	66	76	90	107	120	126	141	146	154	162	162	163	164	162	153	147	155	145	143
U Q	166	163	152	127	88	83	84	97	119	127	135	144	158	166	171	169	172	177	172	166	164	166	170	171
L Q	97	90	88	83	72	62	66	88	97	106	120	130	142	146	146	147	157	161	158	146	116	101	108	114

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

APR. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	40	32	26	30	32	24	31	43	45	48	G	G	G	G	58	G	G	38	32	31	32	G	G
2	G	G	G	G	G	G	G	31	G	43	49	G	G	G	50	49	G	39	44	50	34	23	G	35
3	G	G	57	49	36	38	23	G	G	G	G	47	G	48	G				35	33	40	G	G	34
4	G	G	G	G	G	23	25	31	G	G	48	G	G	G	53	G		G	38	37	40	66	G	G
5	G	G	G	G	G	G	32	G	G	46	51	58	G	G	G	G	G	40	39	34	25	26	29	40
6	33	32	G	G	42	39	33	32	41	46	50	G	G	52	59	58	49	42	38	30	38	G	G	42
7	37	G	30	32	26	G	G	G	39	43	G	48	50	90	G	G	G	39	G	32	38	58	58	31
8	32	33	34	G	24	G	G	35	G	G	63	G	G	G	G	G	G	39	G	44	28	30	24	28
9	23	G	G	G	G	G	G	G	G	G		G	G	G	G	G	G	40	G	25	28	G	30	24
10	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	39	35	24	G	G	G	41
11	40	37	G	33	40	G	G	G	G	G	G	G	G	G	51	G	G	39	42	51	81	65	40	30
12	G	23	G	G	G		G	32	42	G	G	G	55	G	G	52	G	42	51	40	33	32	38	G
13	G	G	G	G	20	G	G	G	G	50	51	49	G	51	G	64	G	G	40	29	G	28	32	26
14	G	G	G	G	22	G	G	38	40	72	56	66	G	53	58	58	43	47	50	37	G	25	G	G
15	G	G	G	G	24	G	G	G	G	G	51	G	G	50	G	G	G	G	34	28	38	37	27	G
16	23	G	G	30	G	33	32	33	42	G	G	G	G	G	G	G	G	G	G	26	24	G	G	25
17	G	G	G	G	G	G	G	42	66	G	G	G	G	G	G	G	G	40	G	G	G	G	G	25
18	G	G	G	G	G	G	G	G	44	48	56	51	G	56	58	G	G	G	40	64	41	92	38	24
19	27	G	G	G	G	G	G	42	61	58	51	G	G	G	G	48	G	43	40	54	84	32	48	43
20	32	33	23	G	G	G	G	36	40	G	G	G	52	G	G	G	G	G	35	37	46	G	G	24
21	G	G	G	24	G	G	G	G	G	G	63	G	50	G	G	G	G	G	G	36	70	G	G	28
22	24	G	G	G	G	G	G	37	G	45	50	G	G	G	G	G	G	G	G	28	25	G	G	G
23	G	G	32	28	G	G	G	G	G	G	G	53	52	G	65	G	G	G	G	G	32	39	G	36
24	34	28	G	33	34	38	G	G	47	52	64	69	66	66	97	59	G	G	G	G	32	28	G	G
25	G	G	G	G	G	38	34	41	70	64	68	G	G	G	G	G	G	G	G	G	33	60	37	32
26	G	G	G	G	23	29	G	G	40	45	G	G	G	G	G	G	G	G	G	G	G	G	G	34
27	32	G	G	G	G	G	G	36	41	48	122	56	54	53	G	G	G	42	65	42	26	29	G	24
28	G	G	30	G	G	G	G	G	47	45	80	G	G	G	G	G	G	G	G	G	G	G	G	39
29	38	38	70	41	29	32	39	58	56	52	G	51	122	85	G	G	51	79	46	46	34	28	26	G
30	G	G	G	38	28	G	G	40	51	55	74	84	54	62	68	90	85	58	G	G	G	166	91	72
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	29	30	30	30	30	29	30	30	30	30	29	28	29	30	30	30	30	30	30
MED	G	G	G	G	G	G	G	31	40	44	50	G	G	G	G	G	G	39	35	32	32	28	G	27
U Q	32	23	23	28	26	30	23	36	44	48	59	51	50	52	51	50	G	41	40	40	38	37	32	35
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	24	24	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT OKINAWA

APR. 1989

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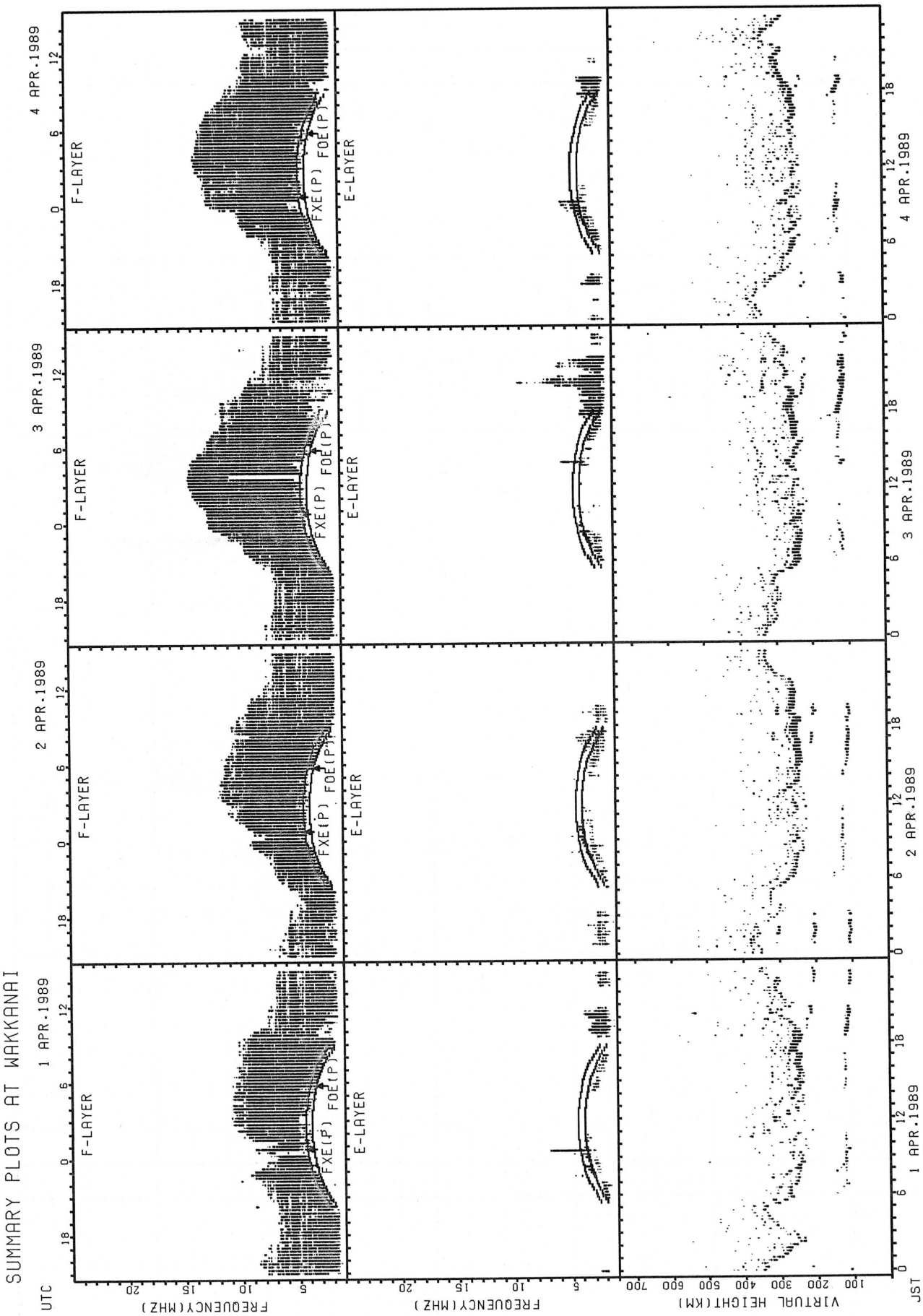
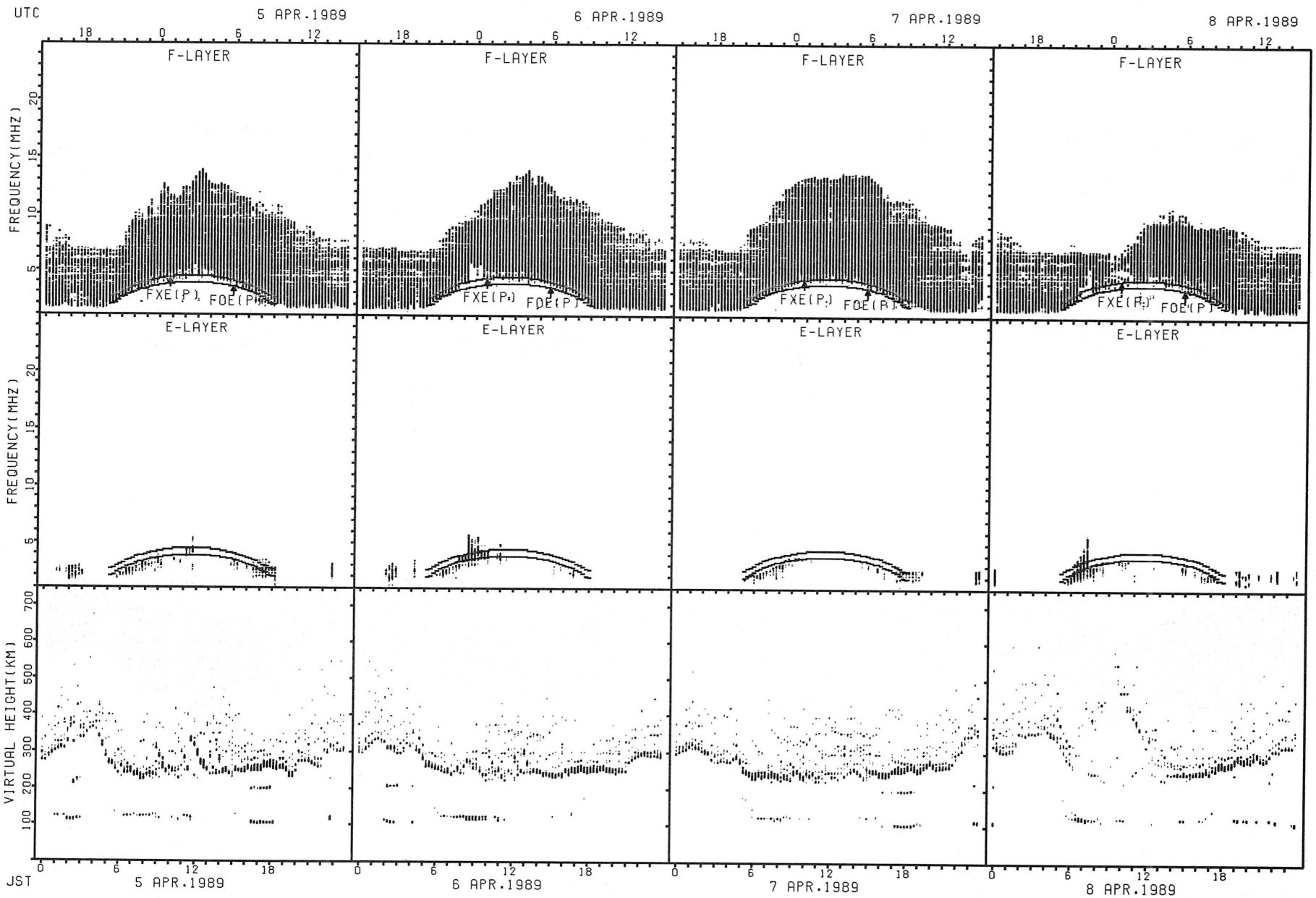
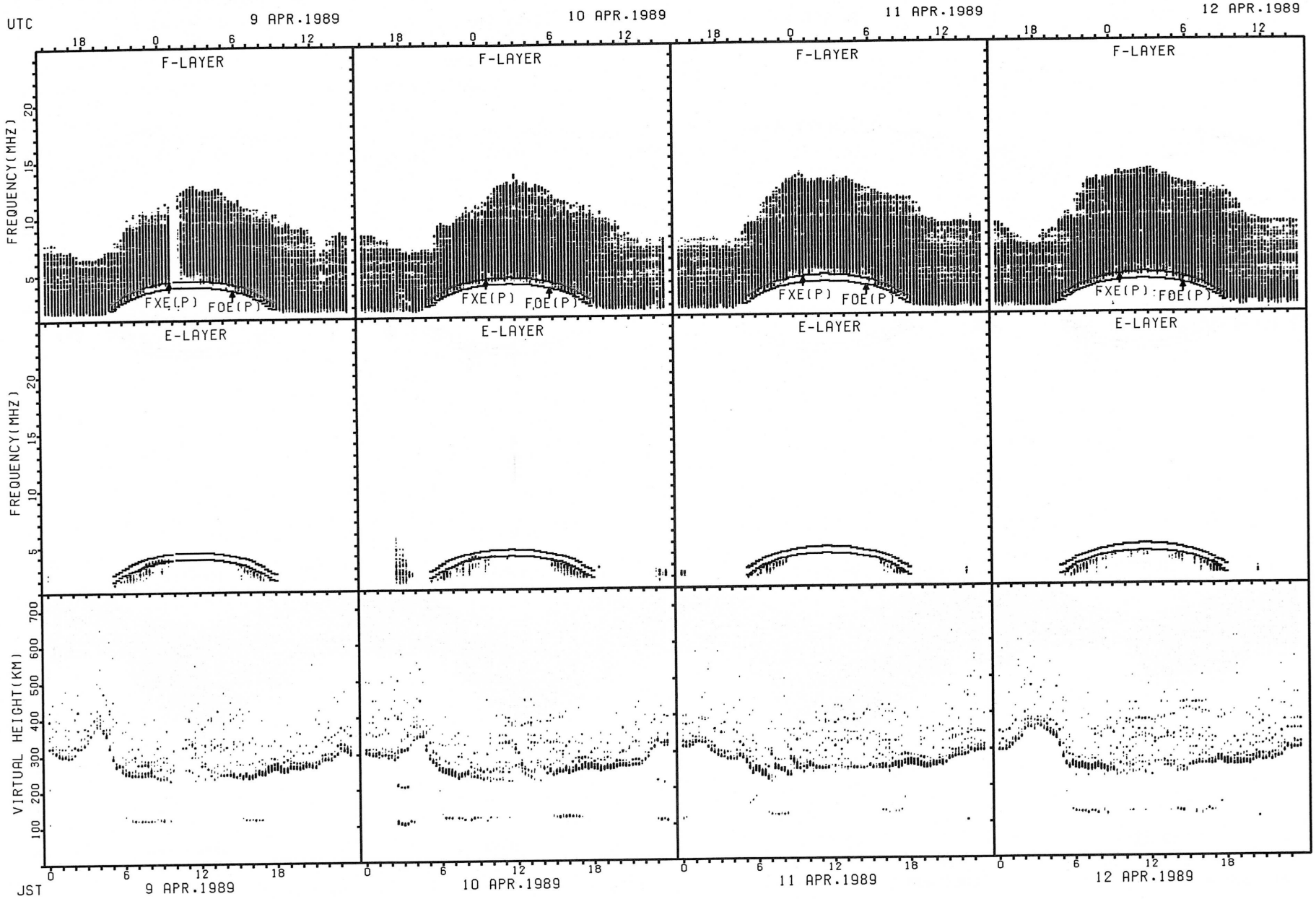

SUMMARY PLOTS AT WAKKANAI
UTC
1 APR.1989
2 APR.1989
3 APR.1989
4 APR.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI



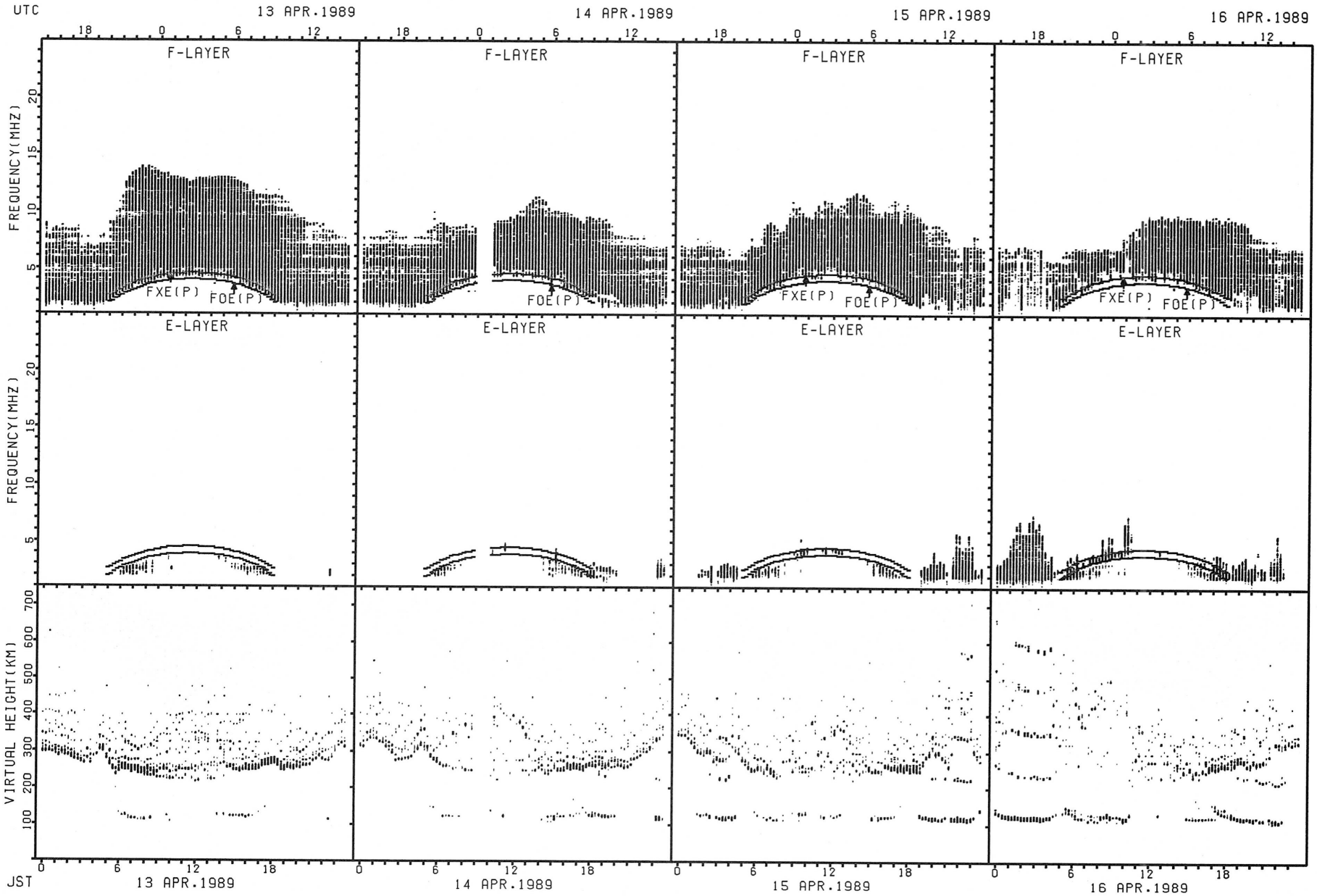
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI



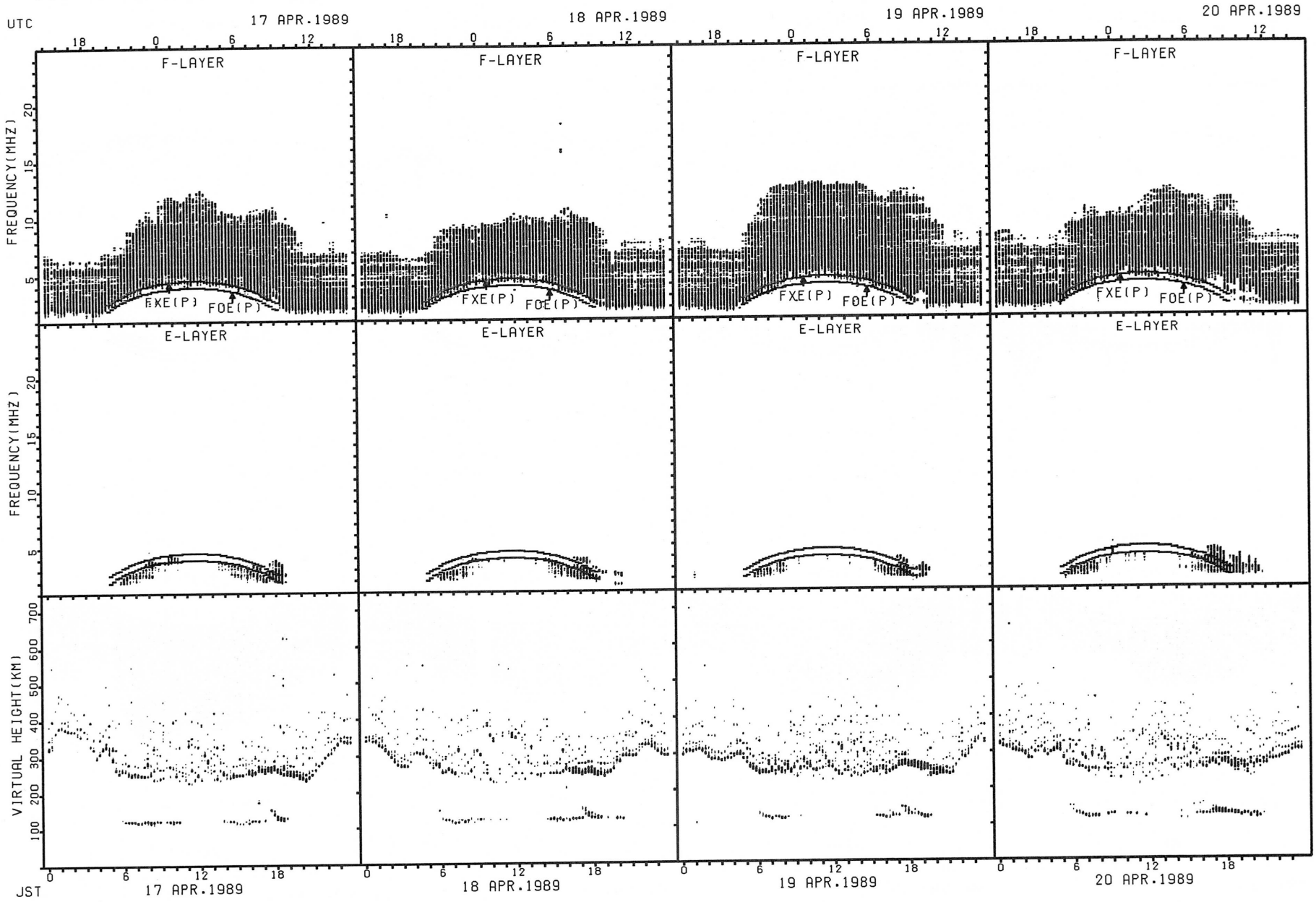
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI



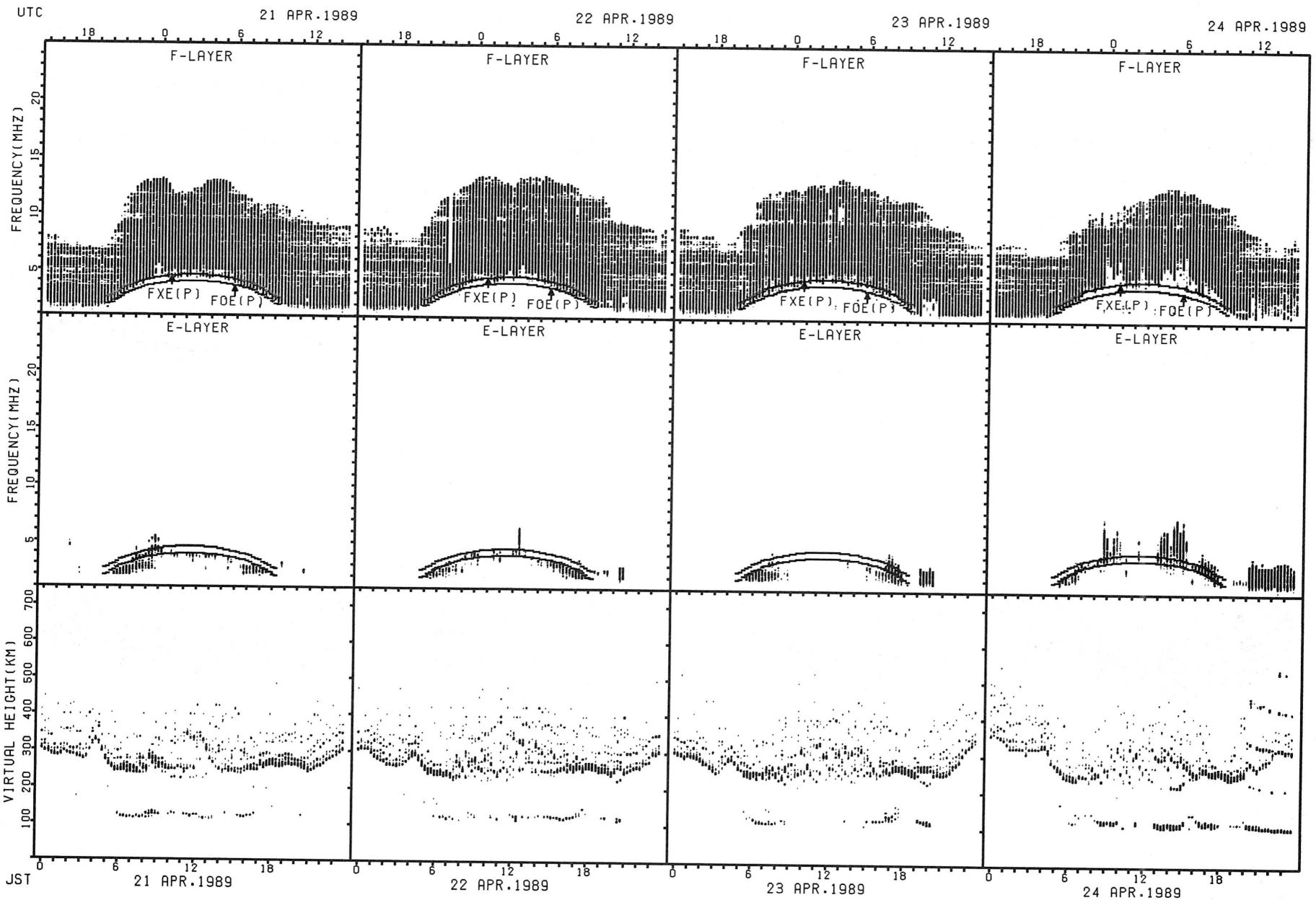
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI

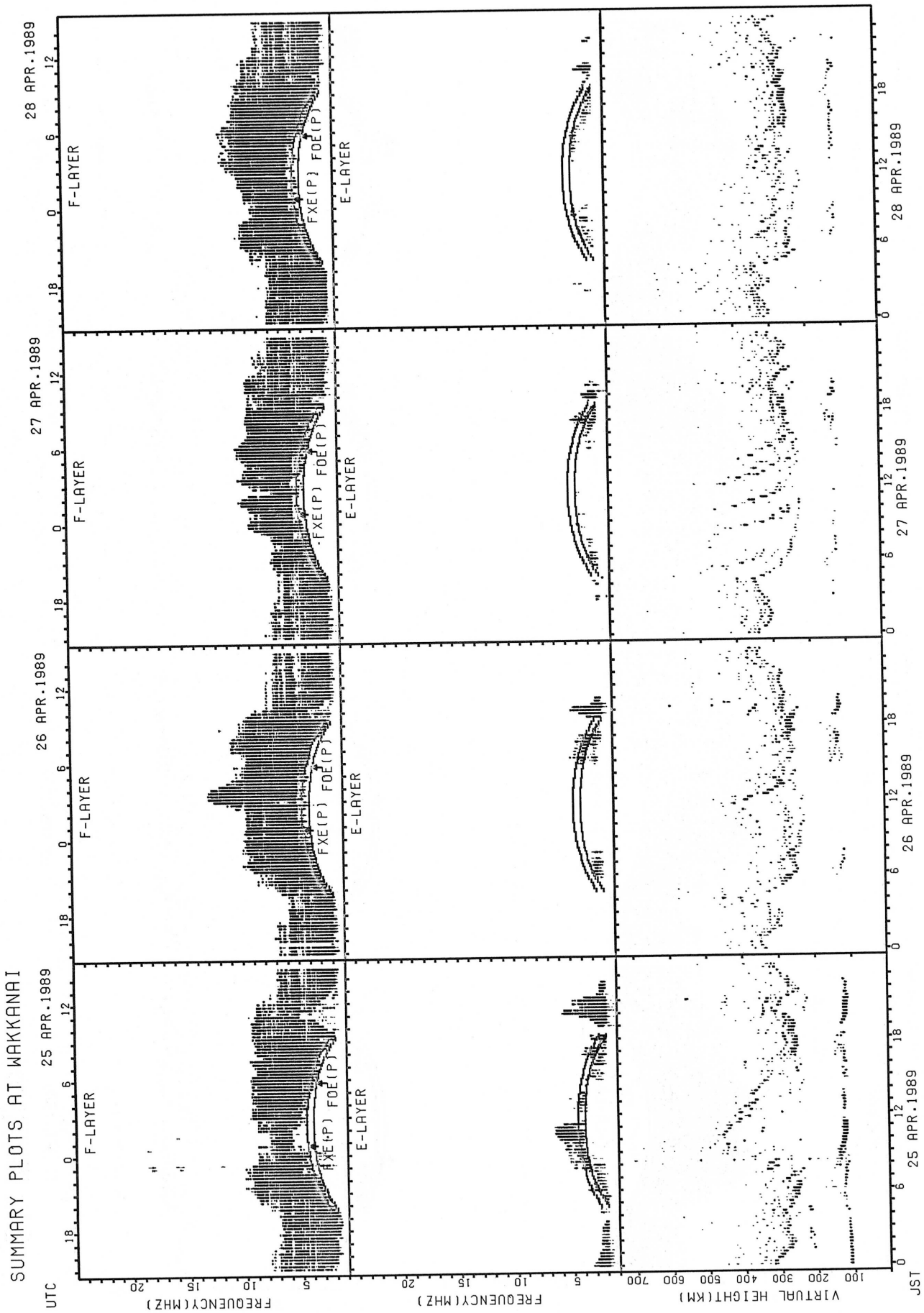


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

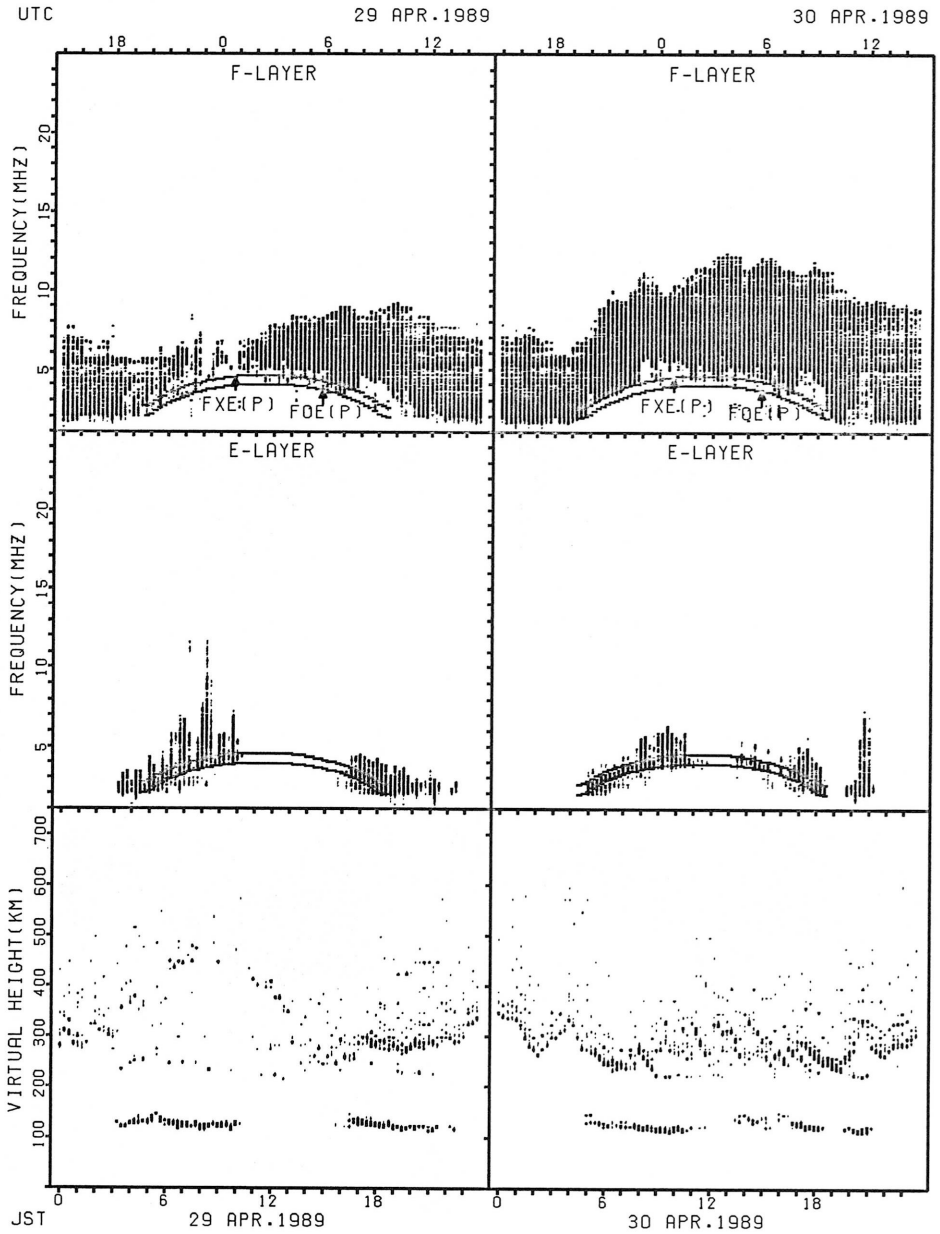
SUMMARY PLOTS AT WAKKANAI



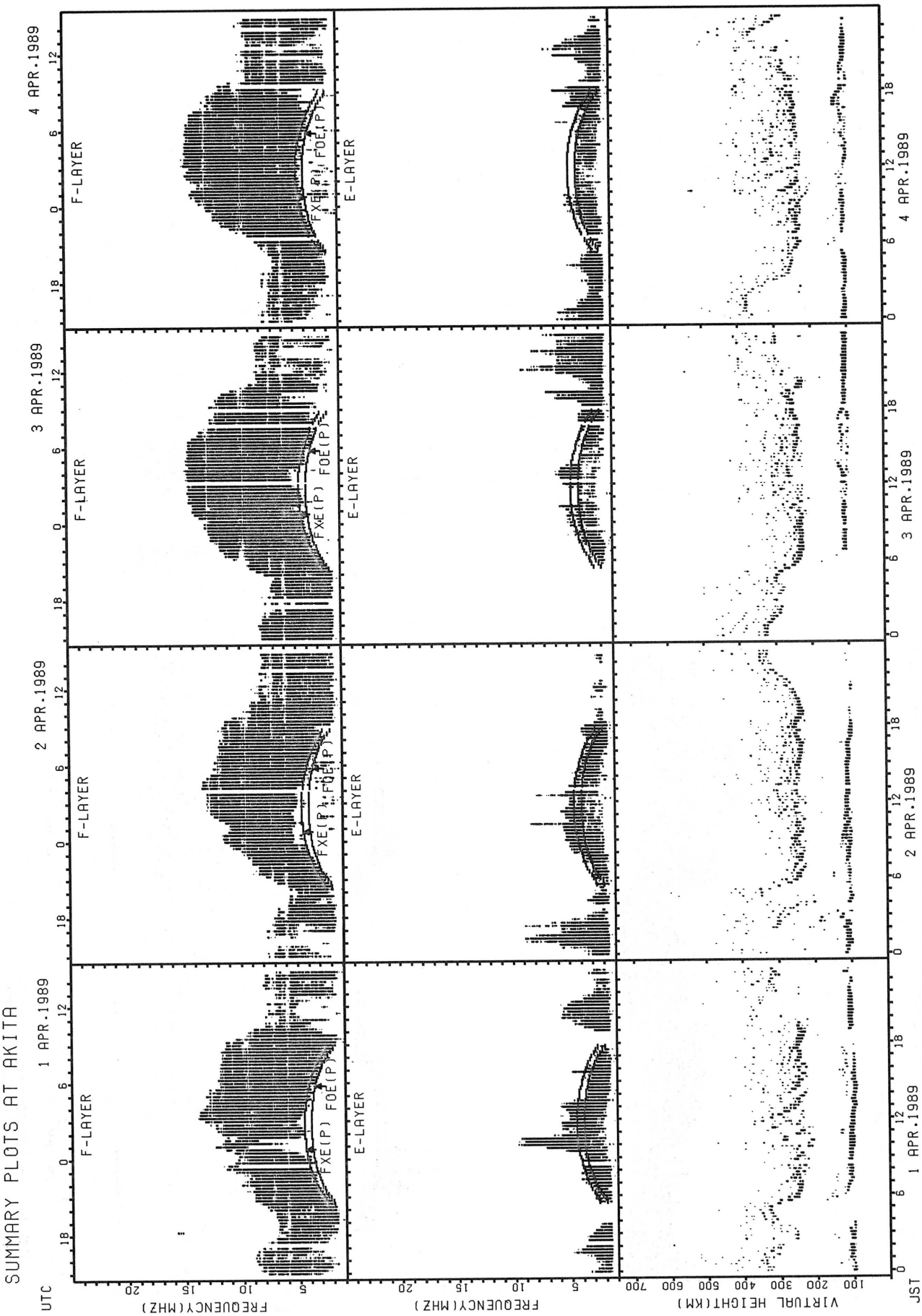
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
25 APR.1989
26 APR.1989
27 APR.1989
28 APR.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

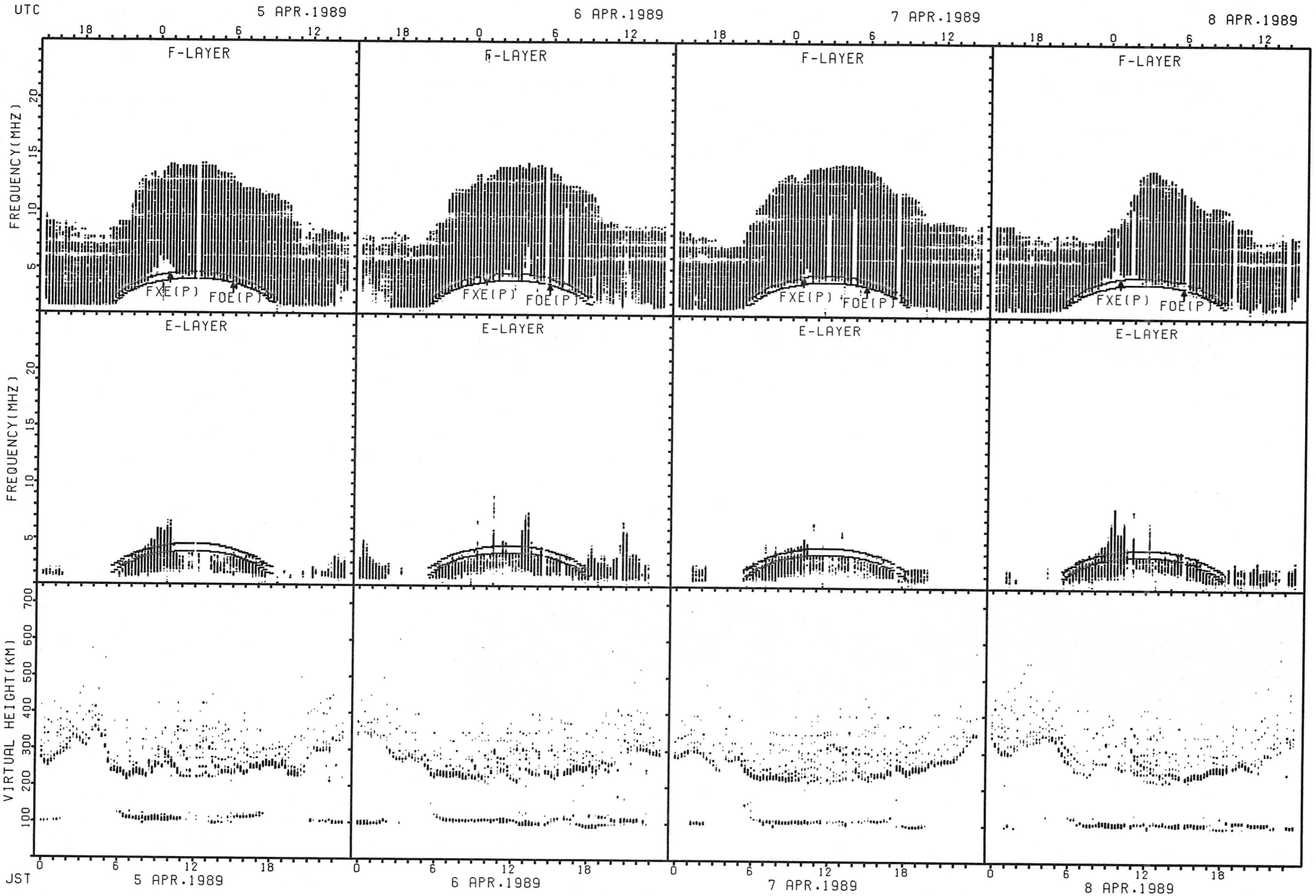
SUMMARY PLOTS AT WAKKANAI



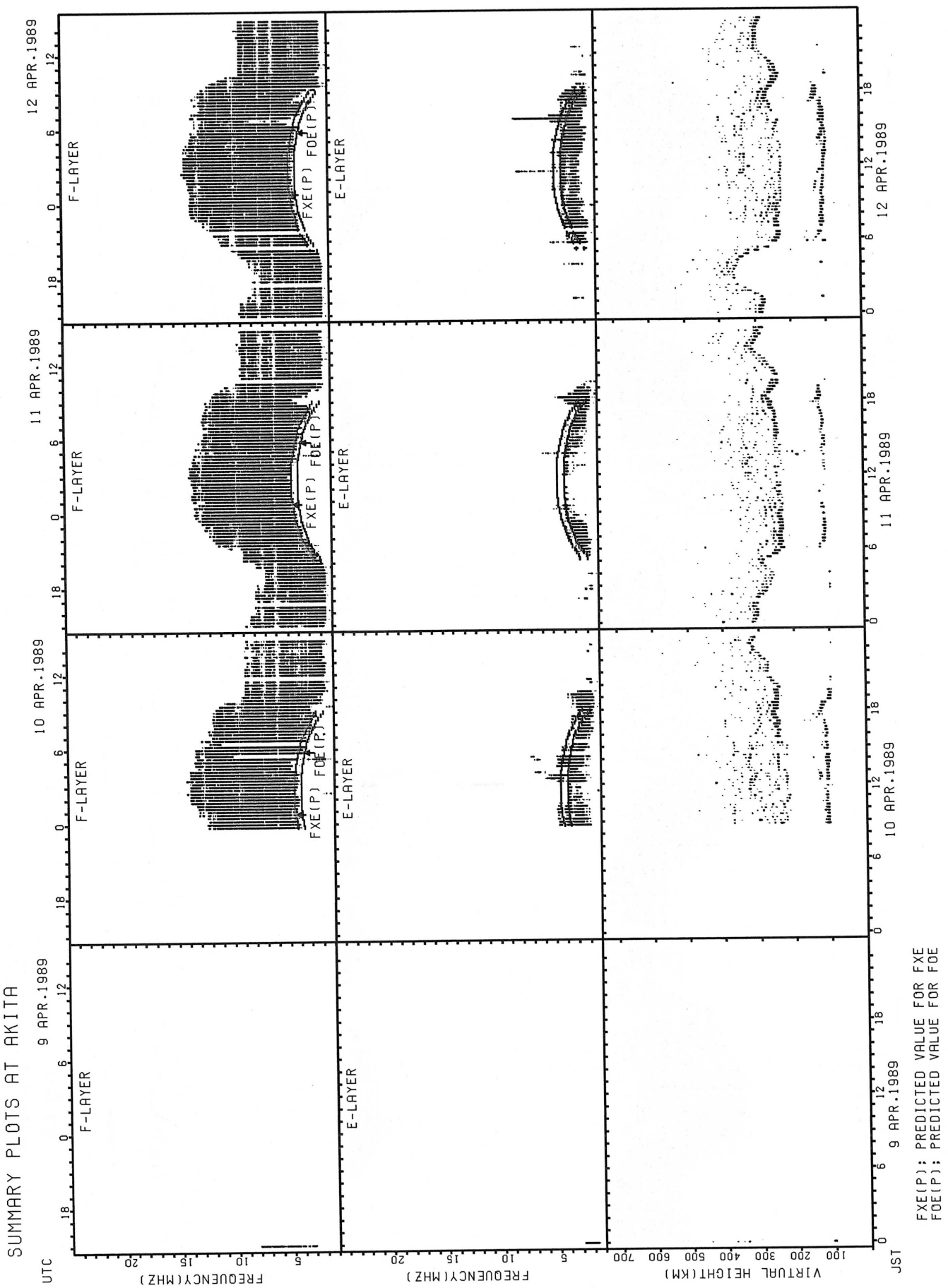
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
1 APR.1989
2 APR.1989
3 APR.1989
4 APR.1989
UTC
JST
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

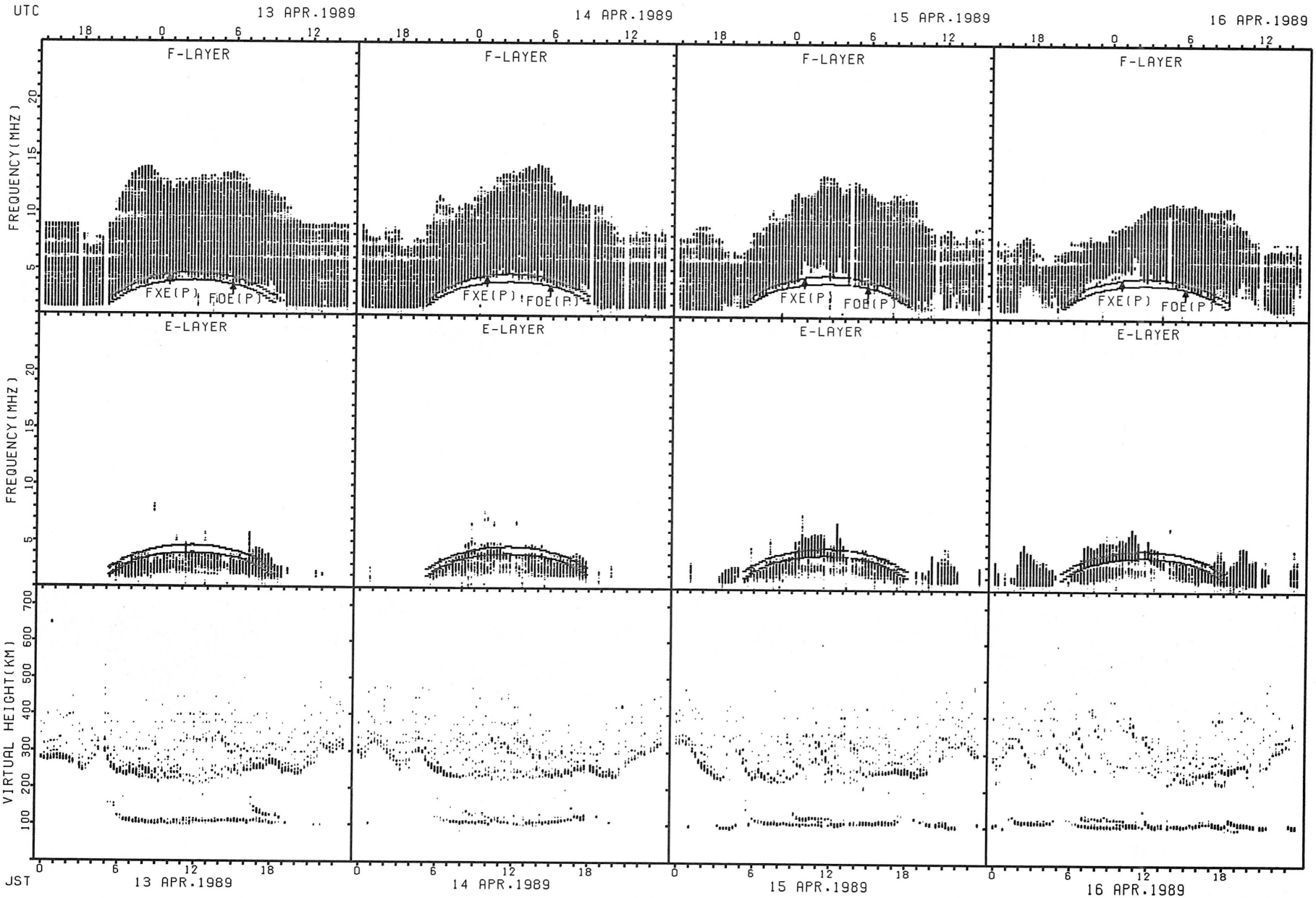
SUMMARY PLOTS AT AKITA



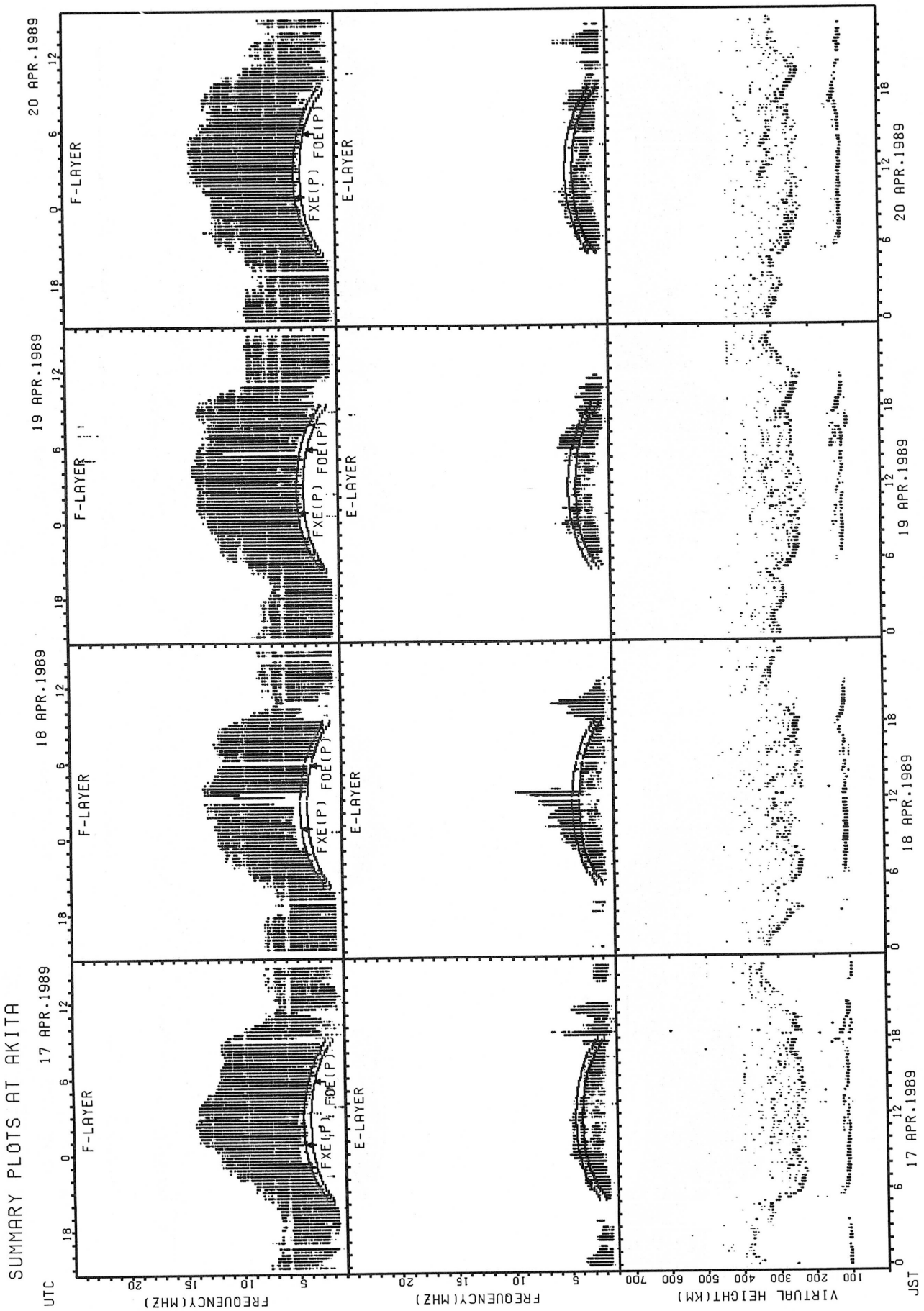
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
9 APR.1989
10 APR.1989
11 APR.1989
12 APR.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

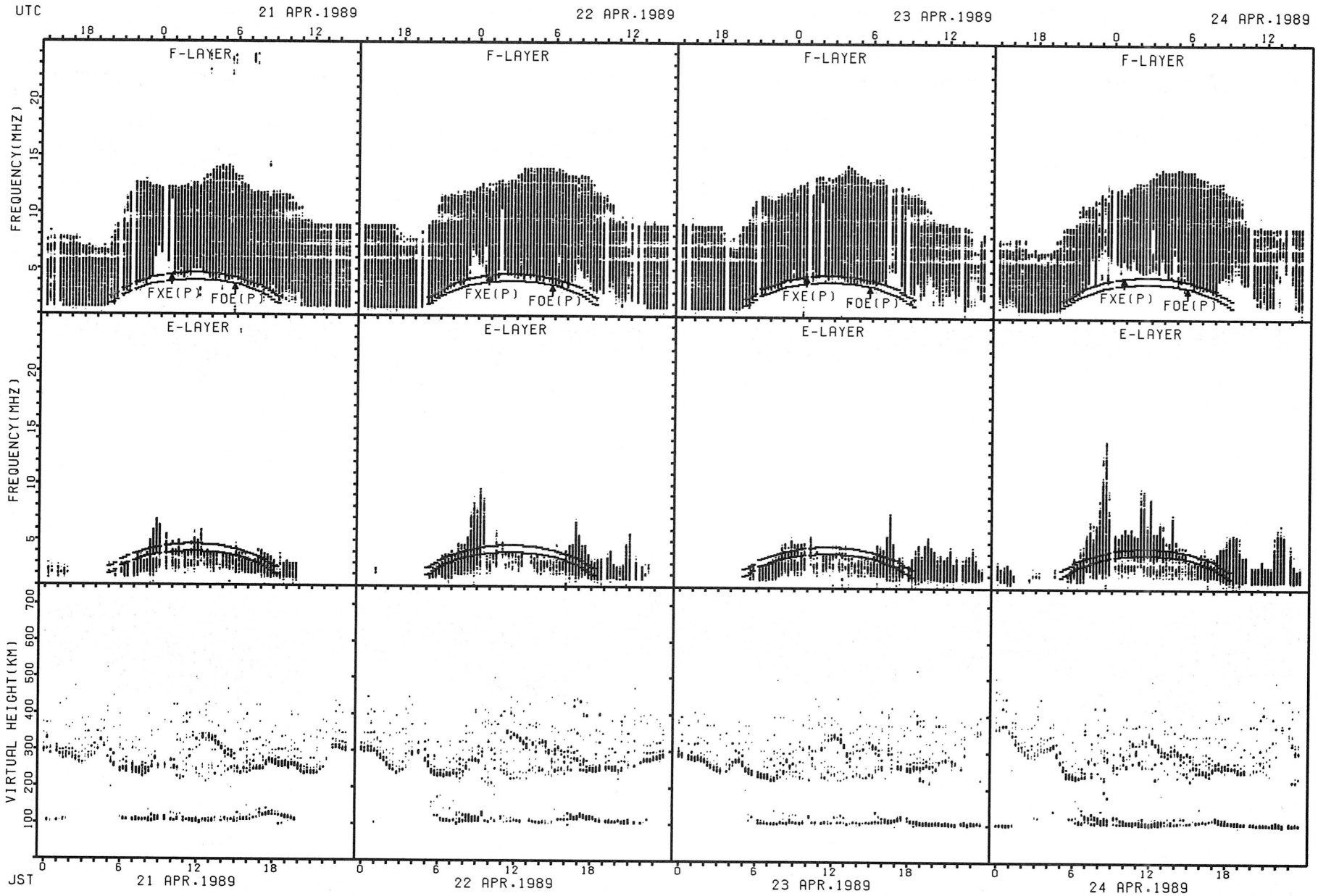
SUMMARY PLOTS AT AKITA



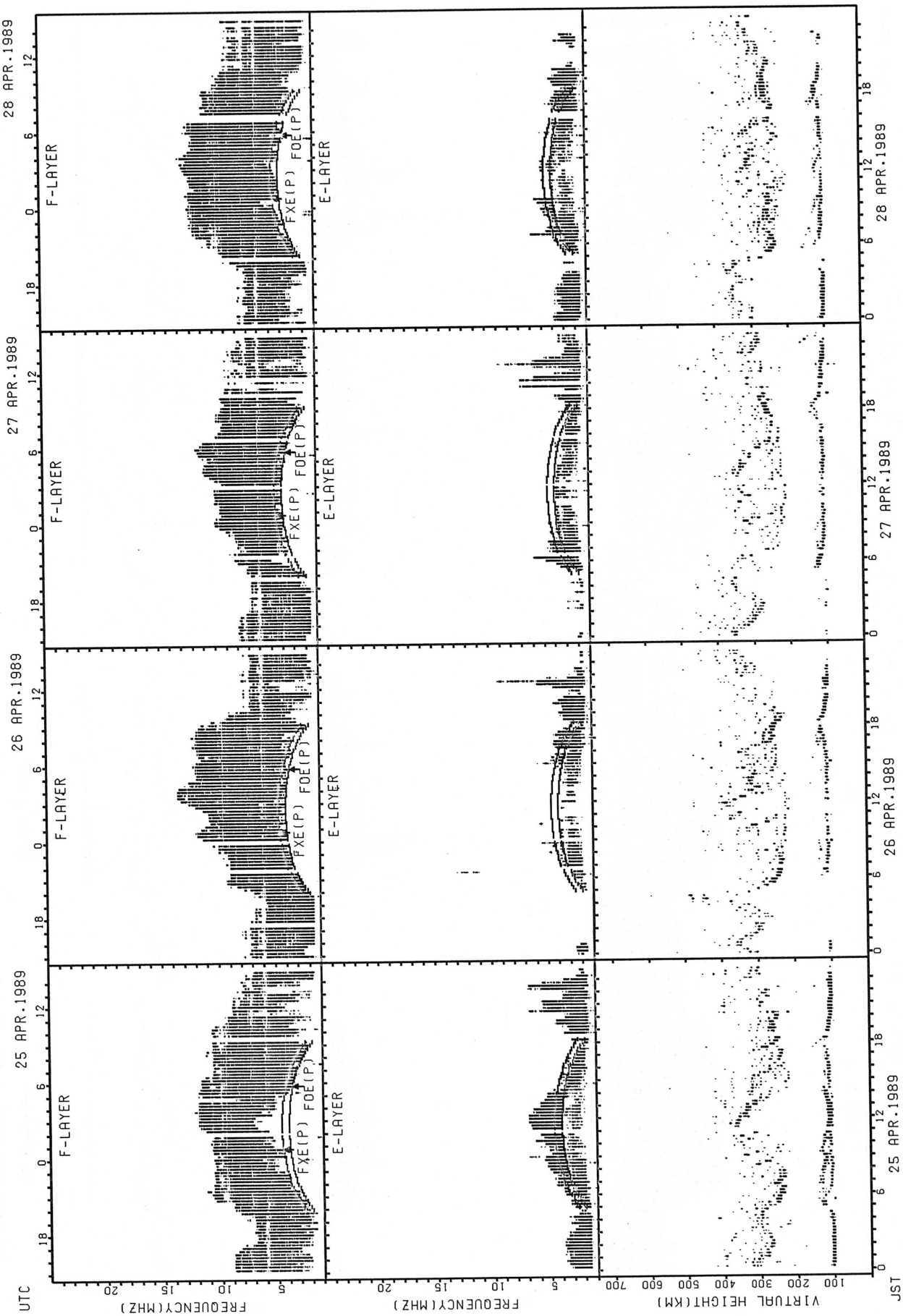
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
17 APR.1989
18 APR.1989
19 APR.1989
20 APR.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

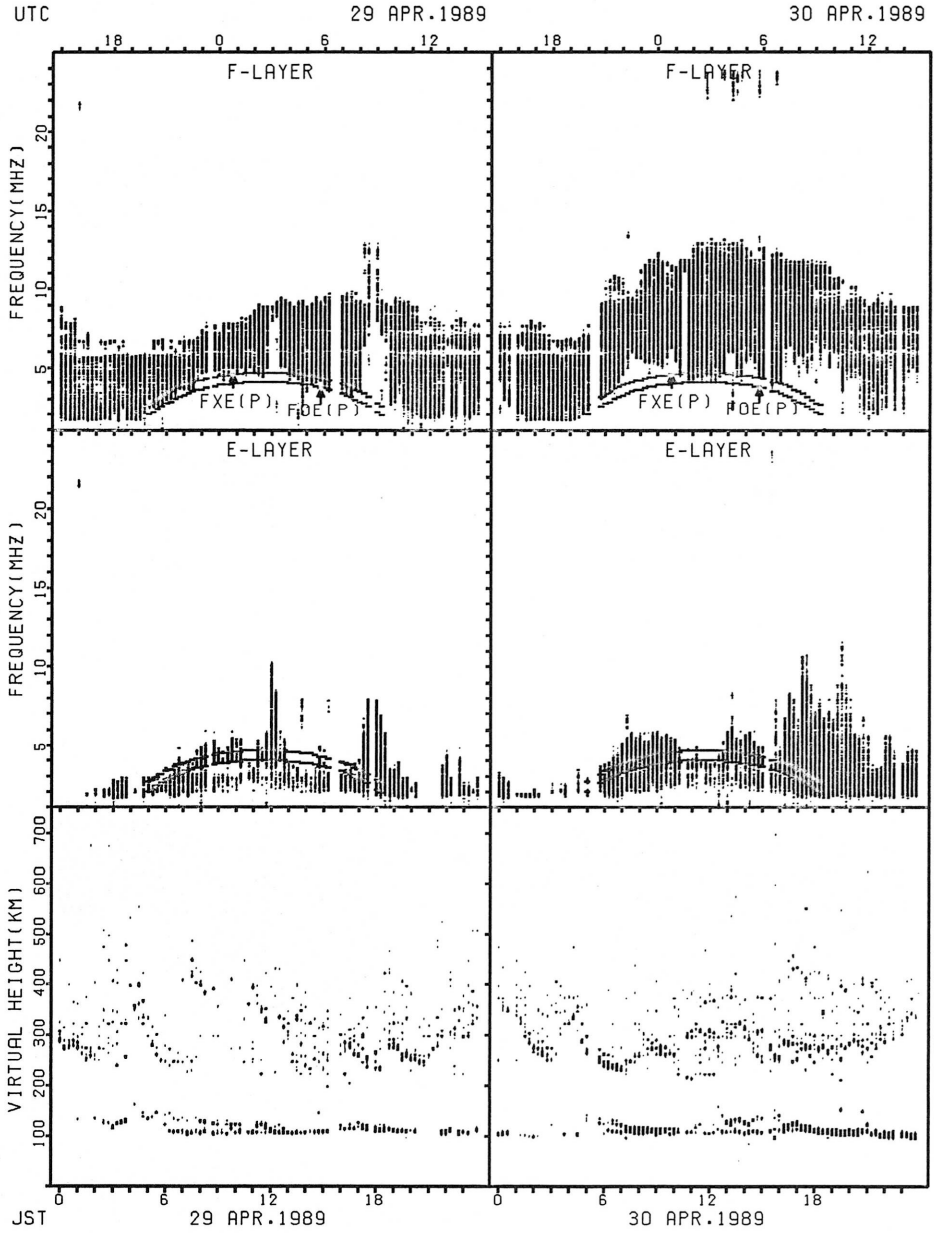
SUMMARY PLOTS AT AKITA



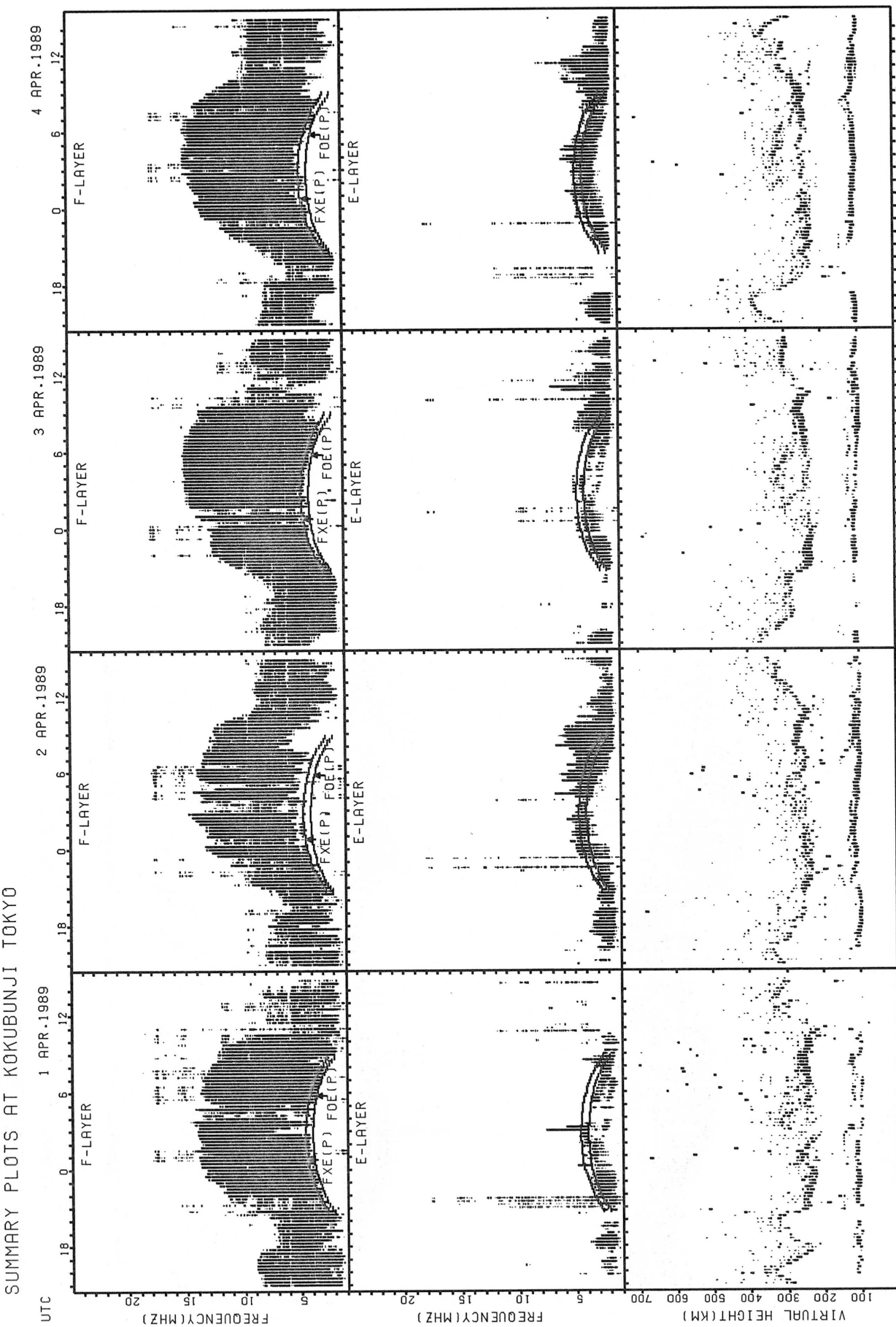
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
JST
25 APR.1989
26 APR.1989
27 APR.1989
28 APR.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

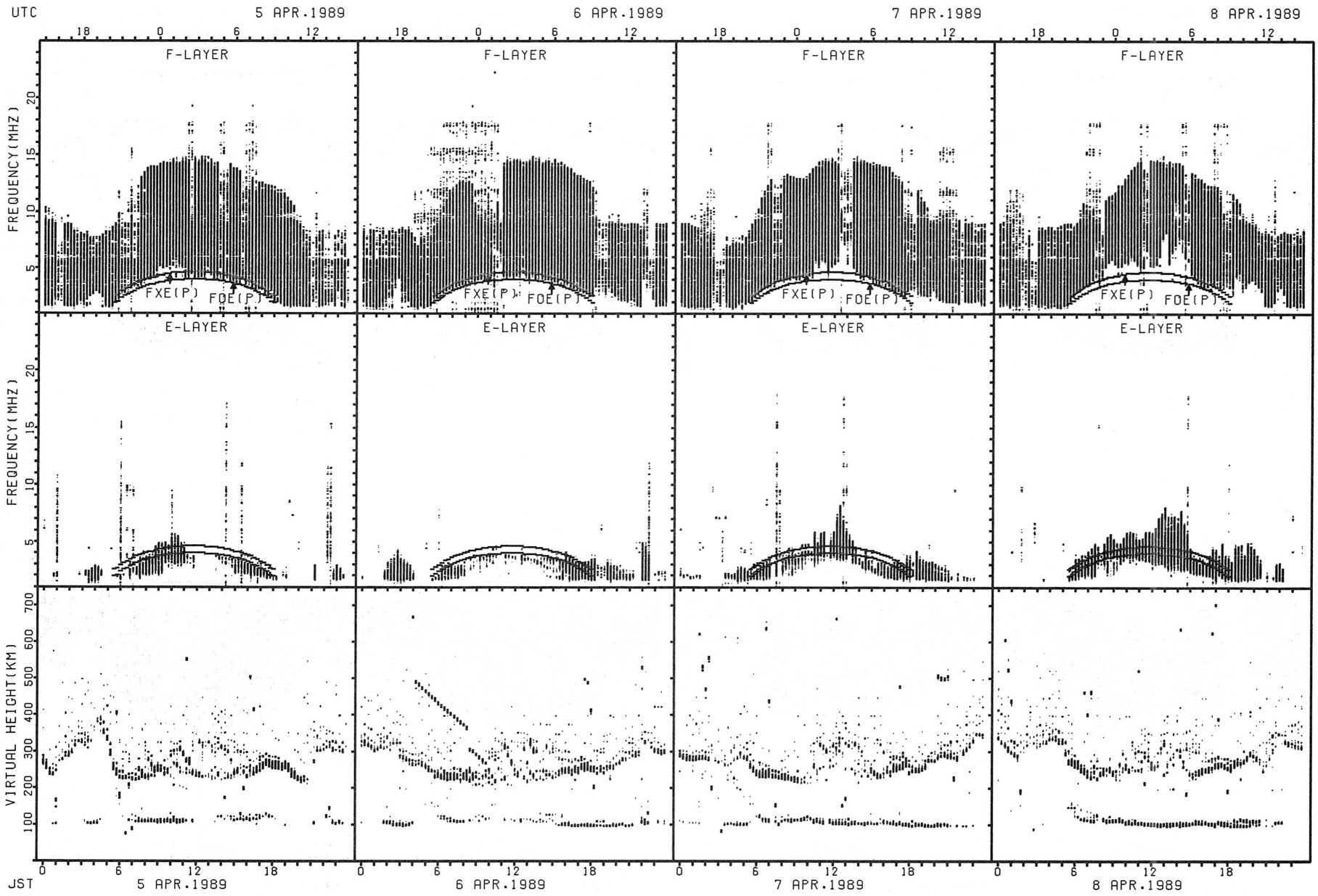
SUMMARY PLOTS AT AKITA



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

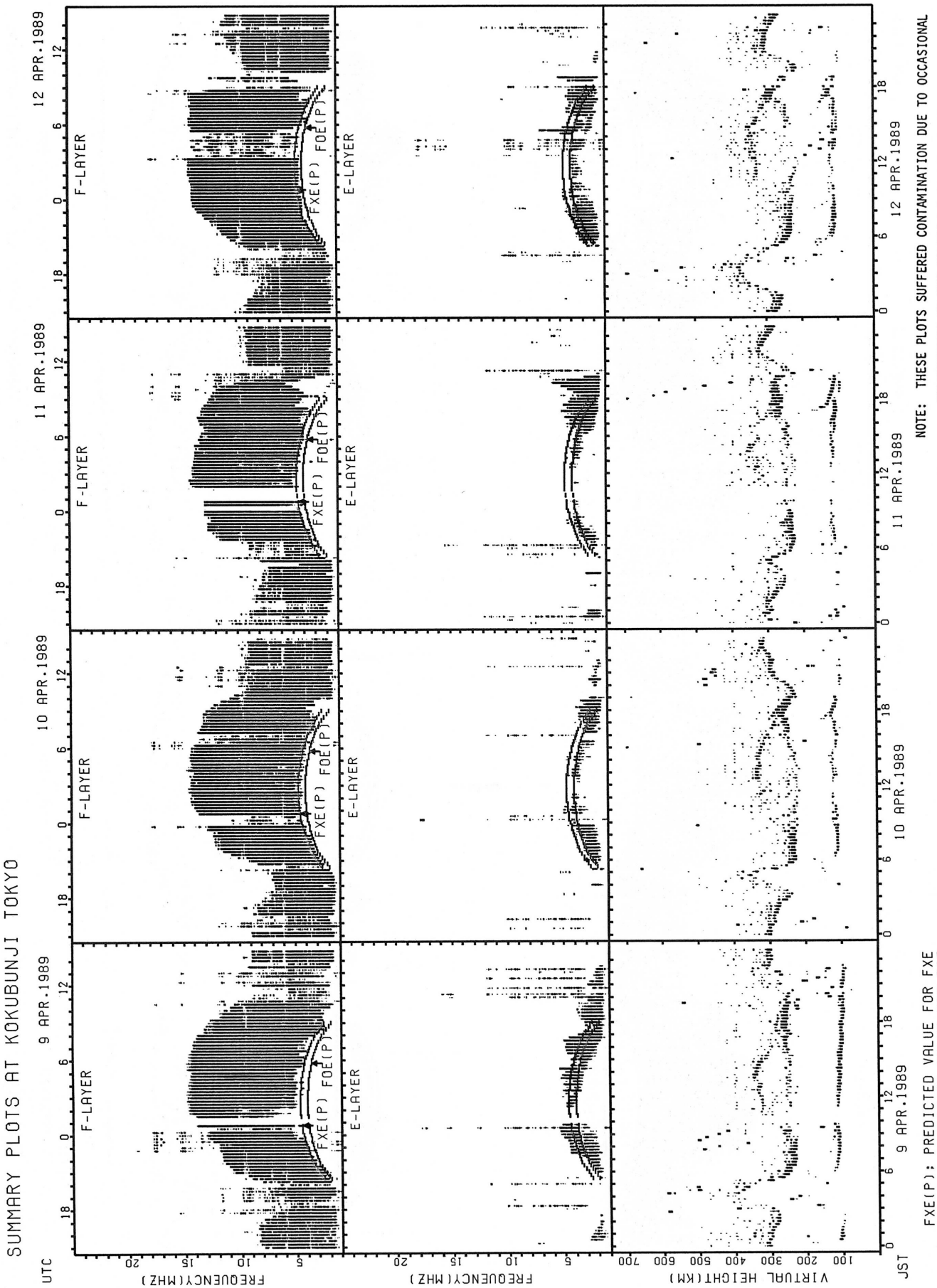

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
1 APR.1989
2 APR.1989
3 APR.1989
4 APR.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL
MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT KOKUBUNJI TOKYO

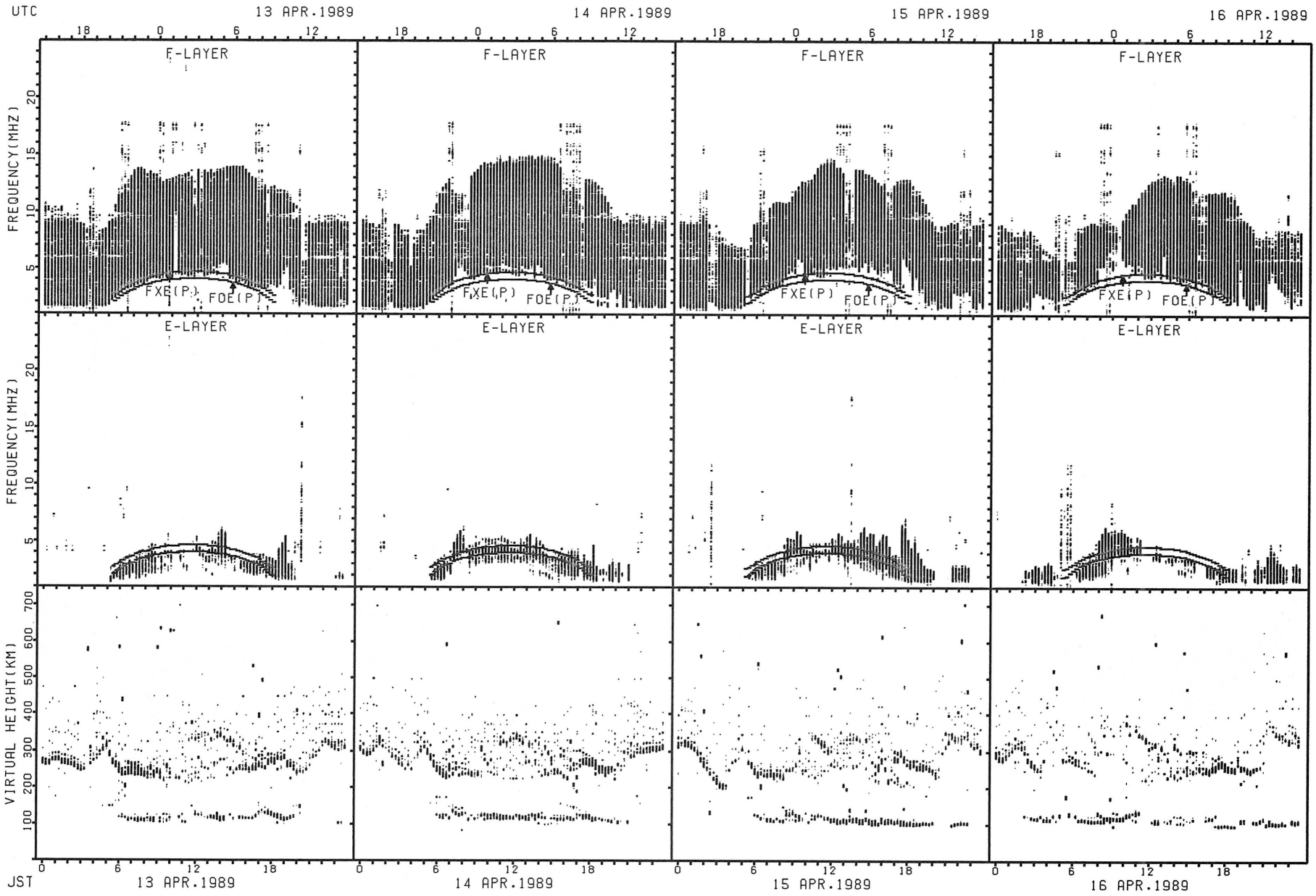


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

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

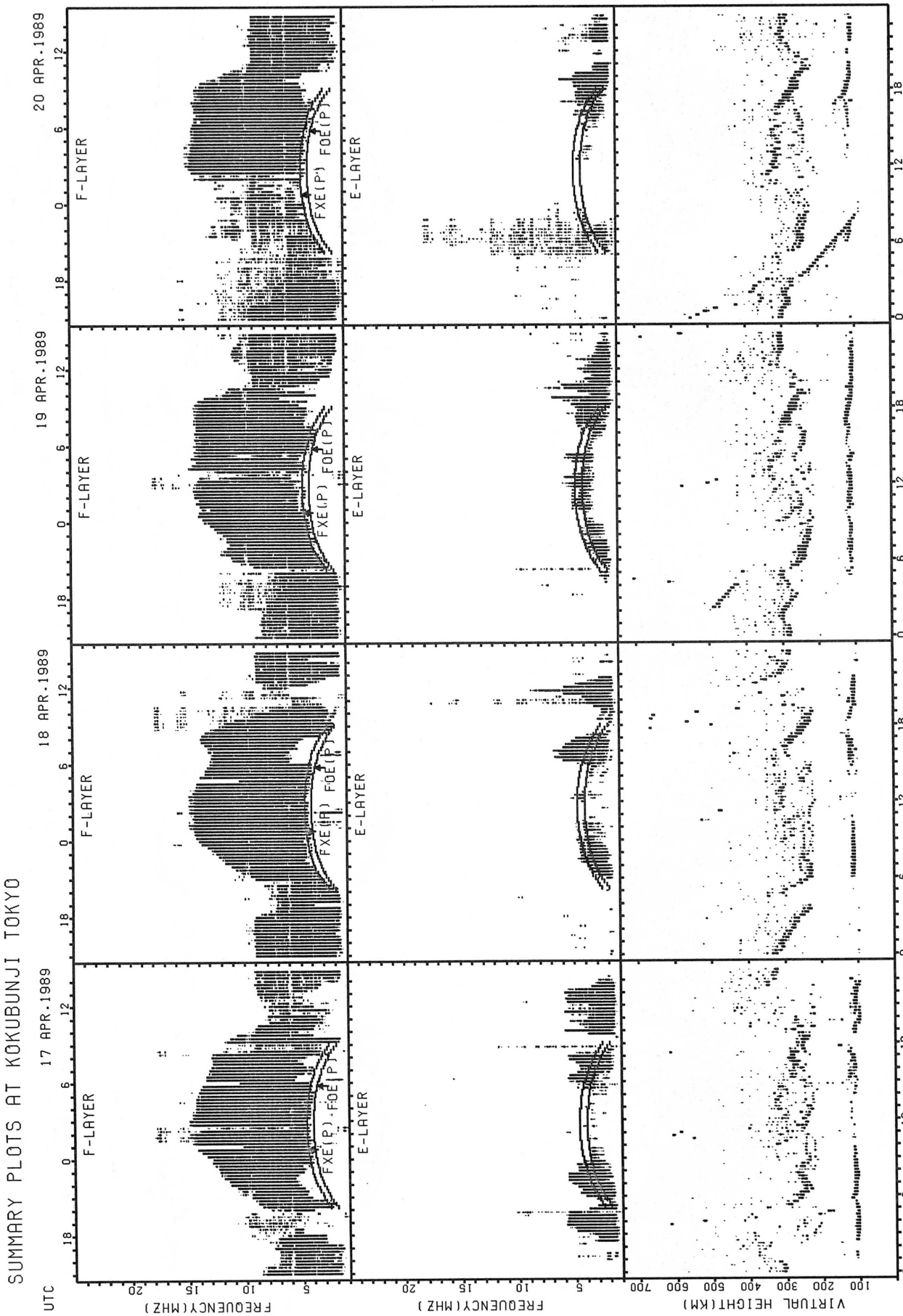

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
9 APR.1989
10 APR.1989
11 APR.1989
12 APR.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT KOKUBUNJI TOKYO

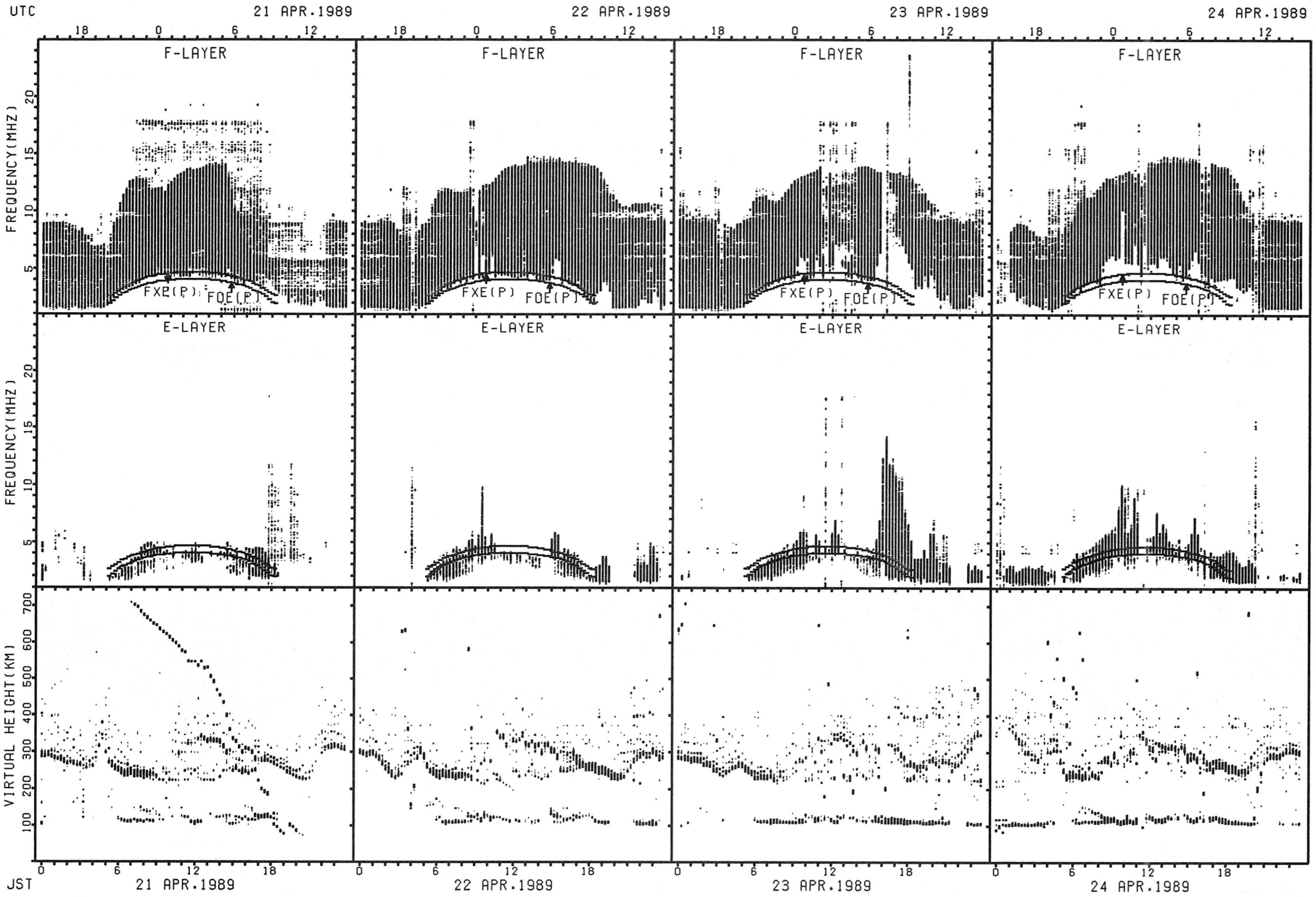


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

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

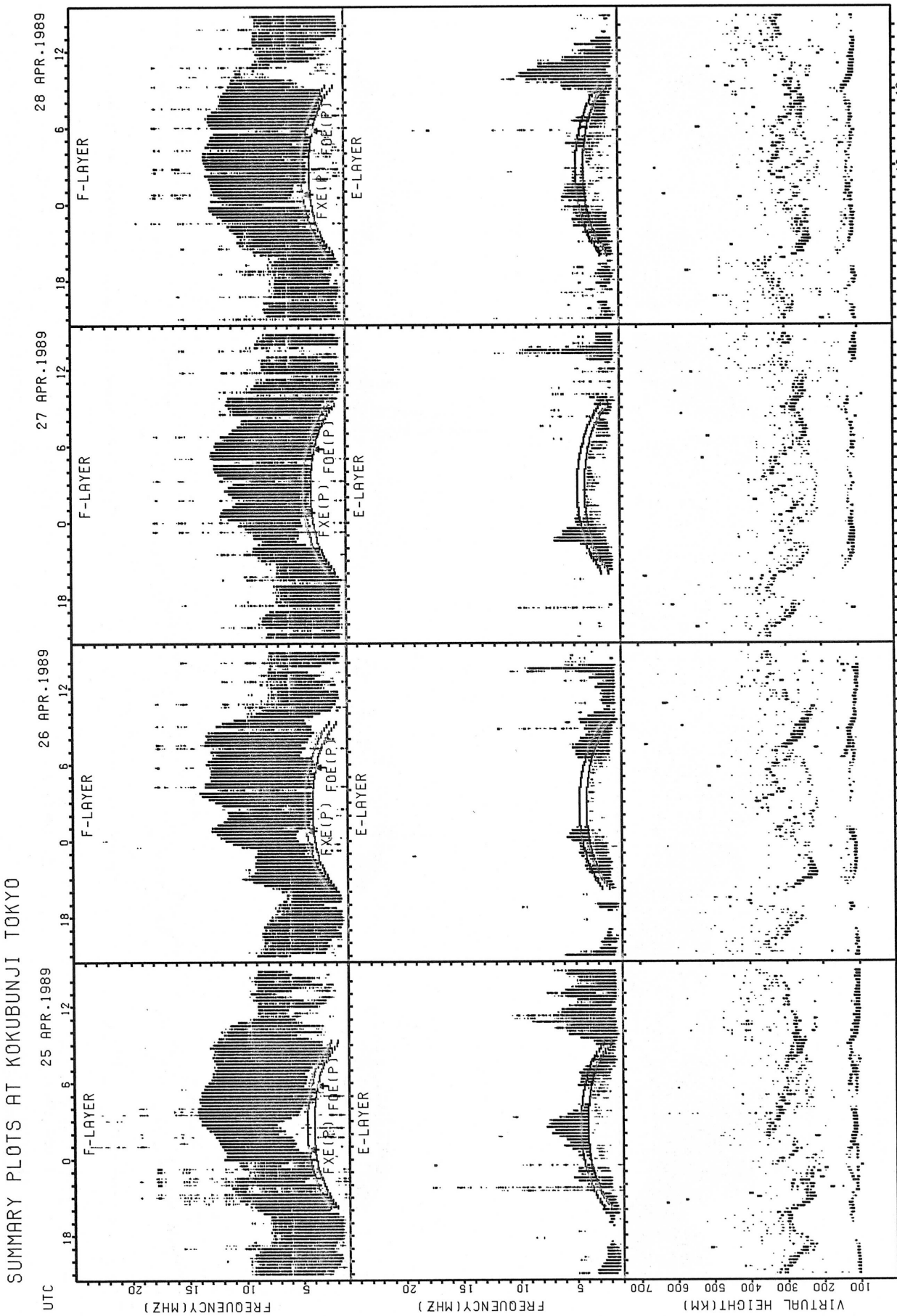

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
17 APR.1989
18 APR.1989
19 APR.1989
20 APR.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT KOKUBUNJI TOKYO

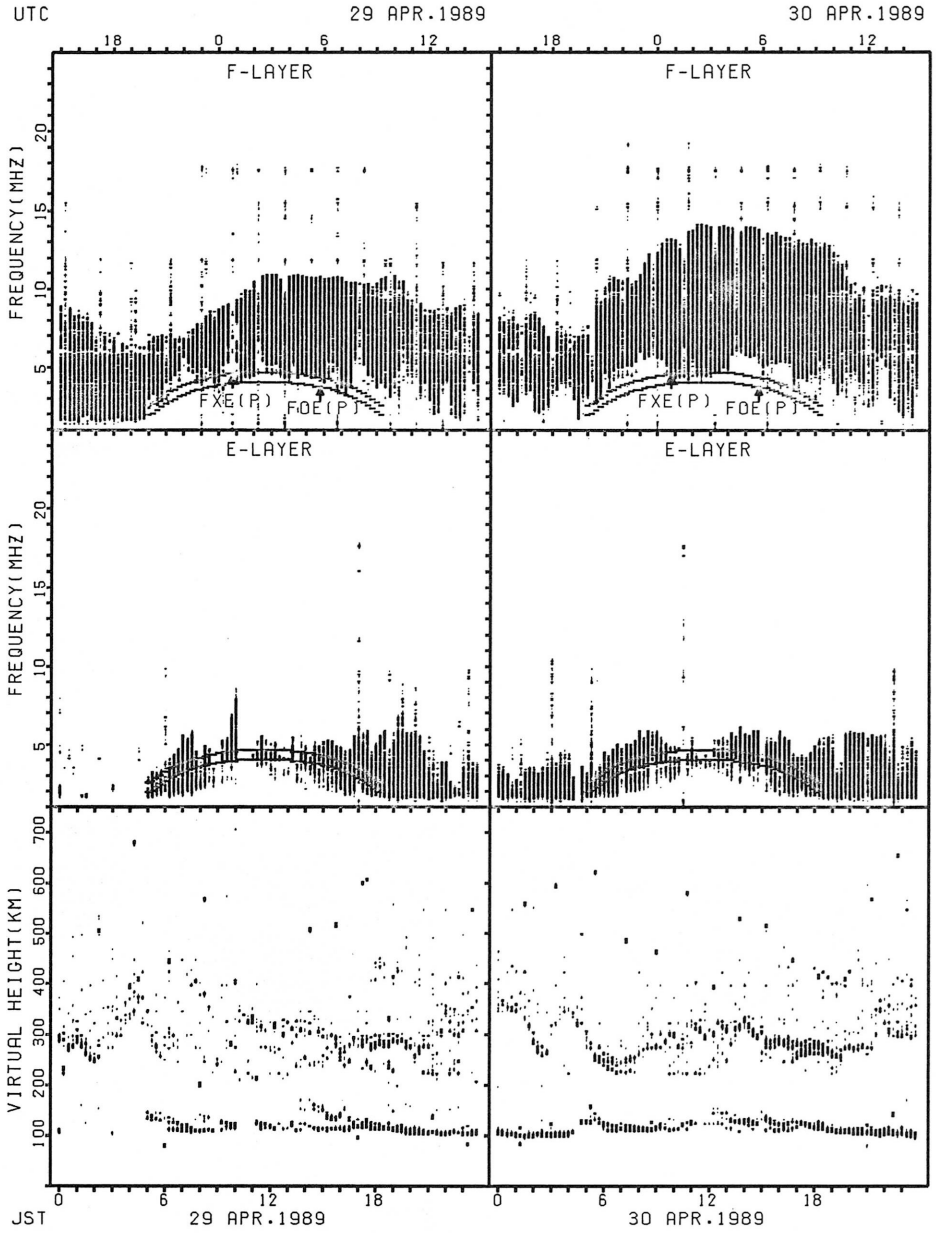


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

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


SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
25 APR.1989
26 APR.1989
27 APR.1989
28 APR.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL
MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

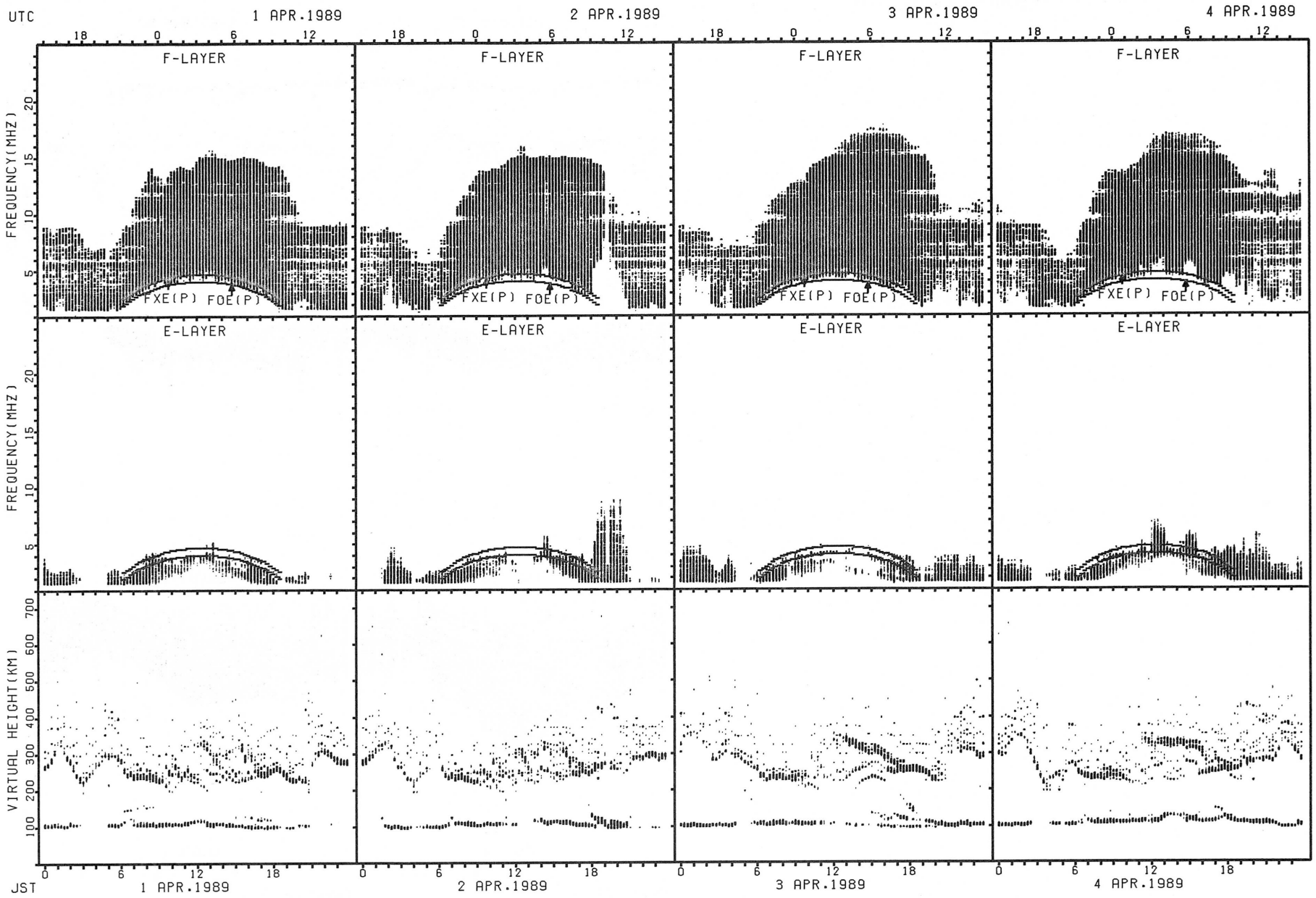
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

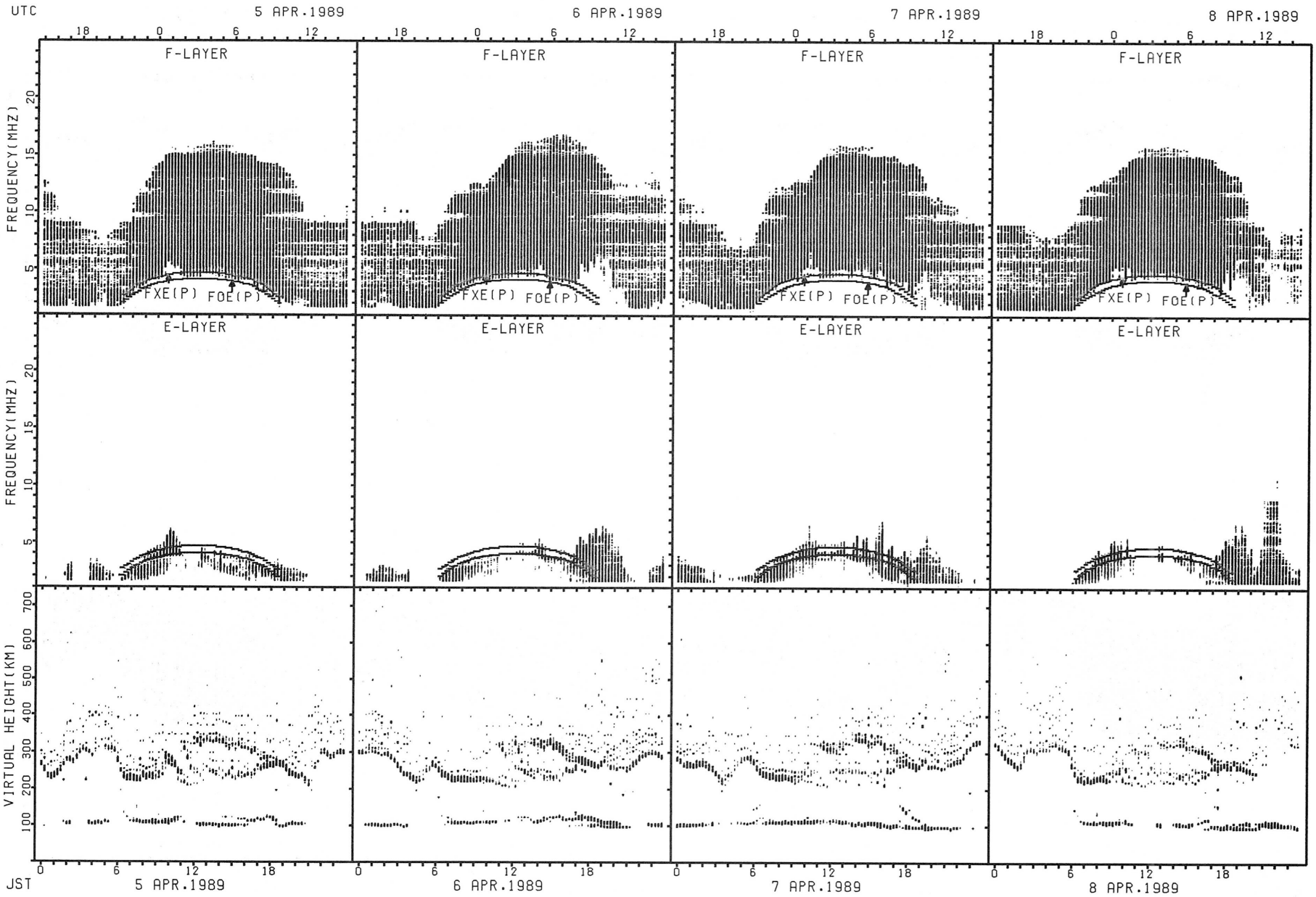
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT YAMAGAWA



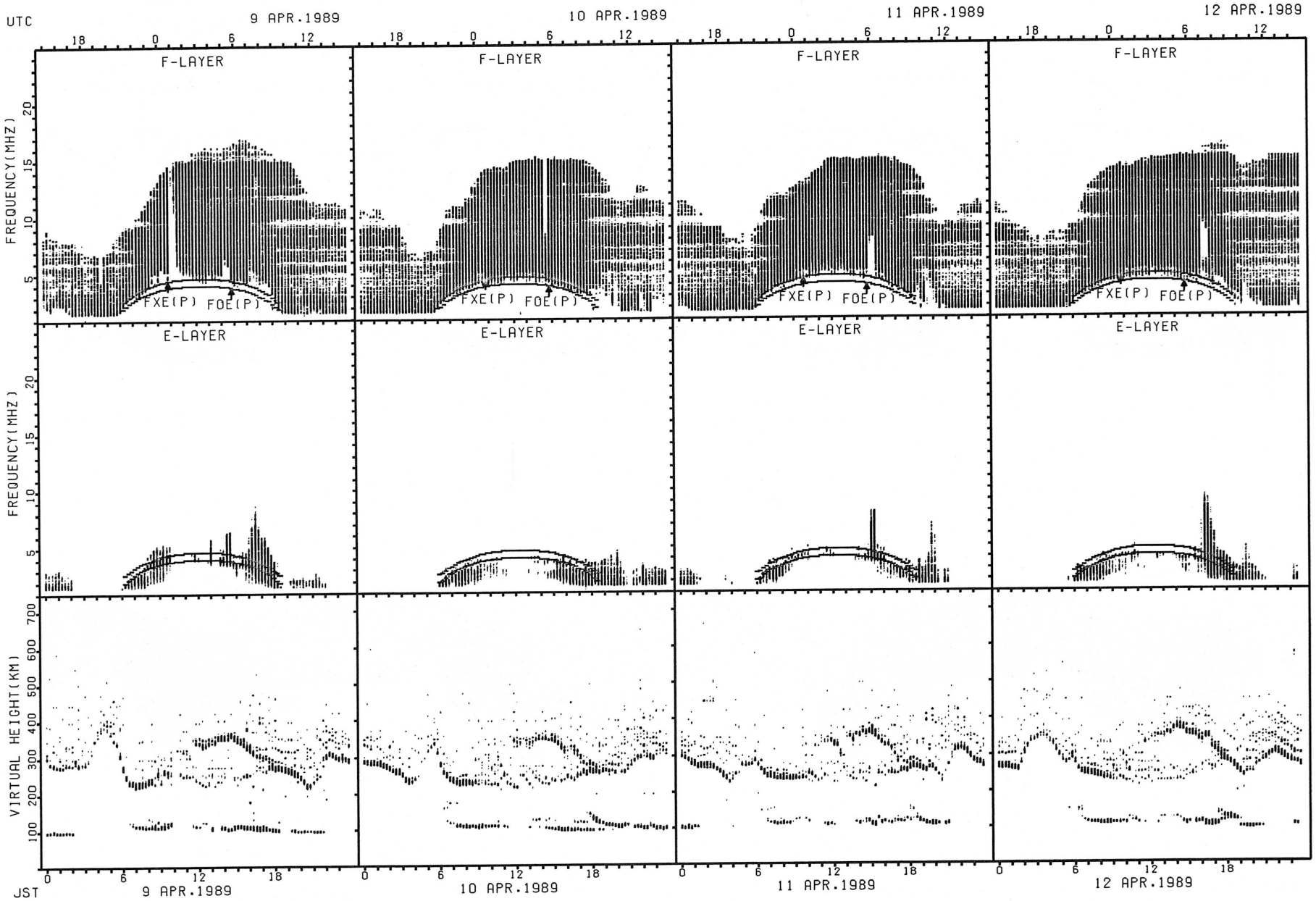
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



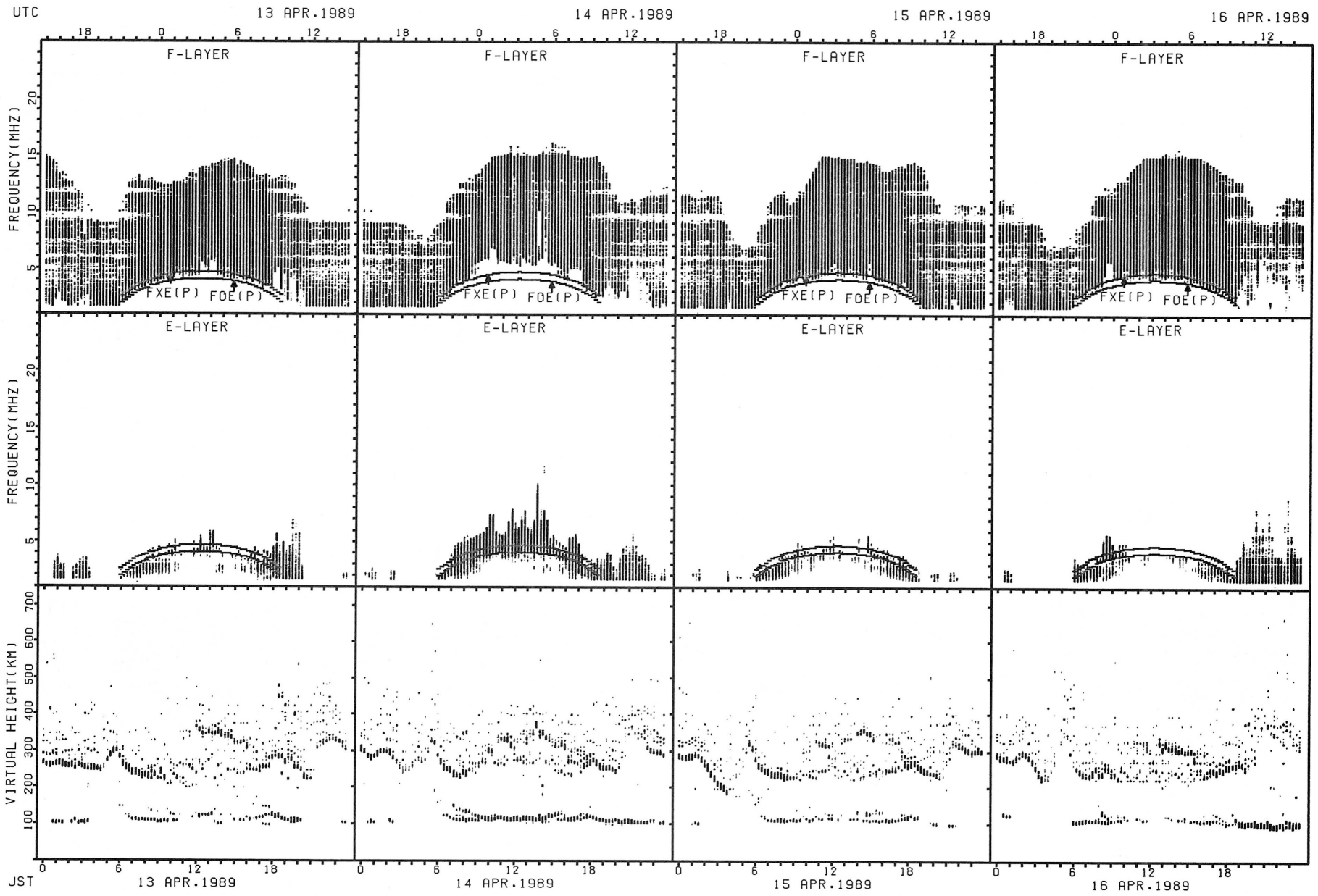
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA

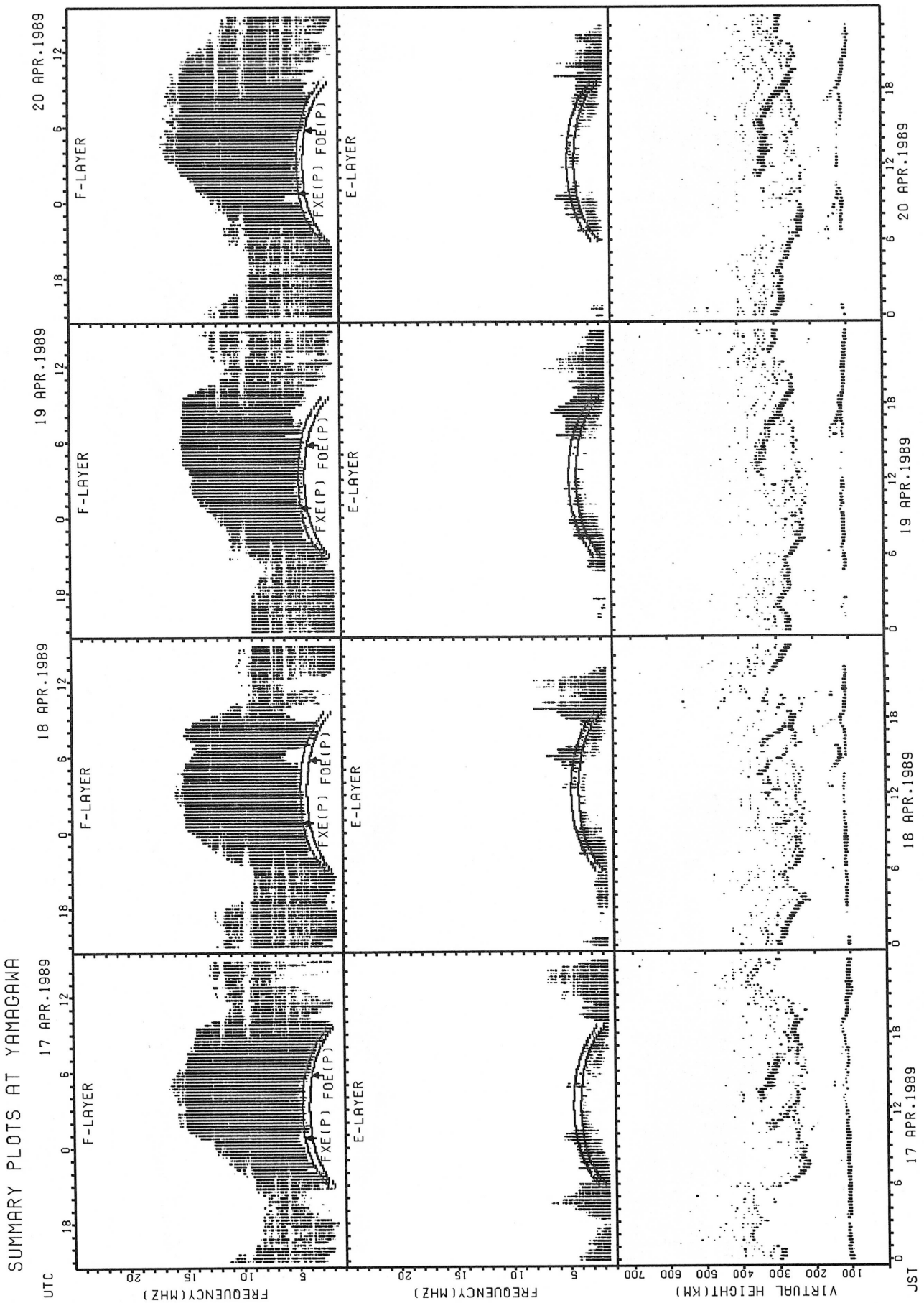


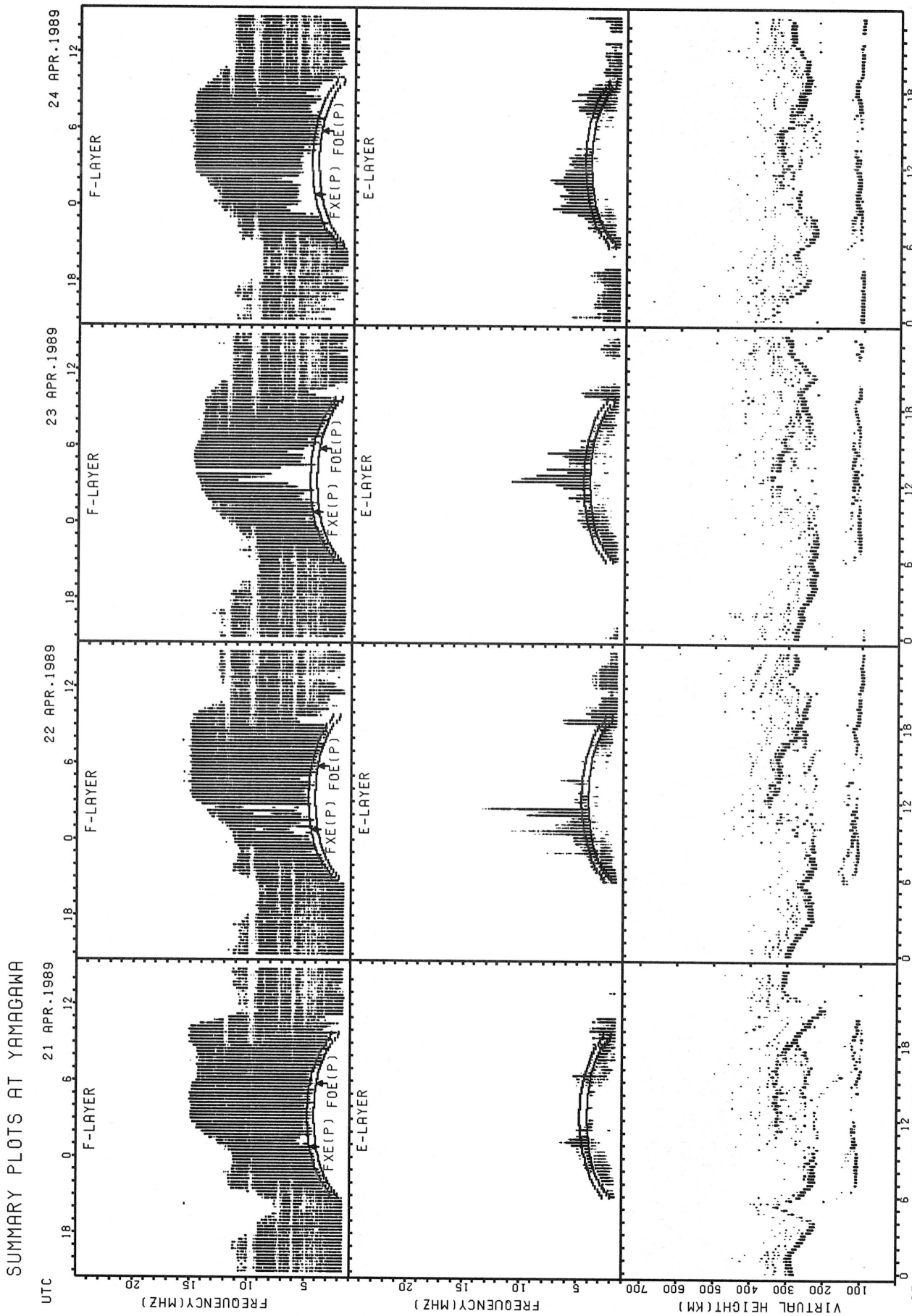
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

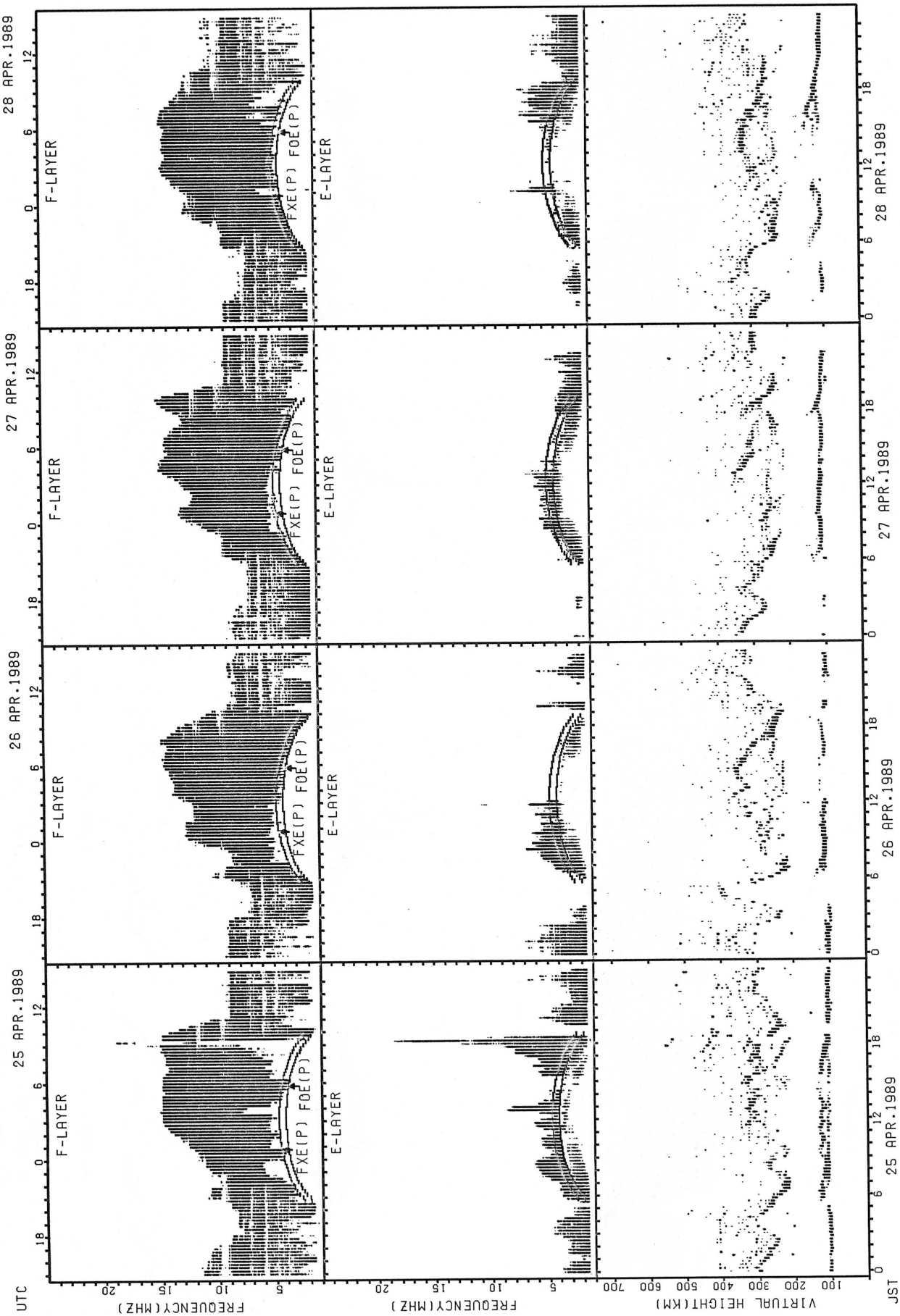
SUMMARY PLOTS AT YAMAGAWA



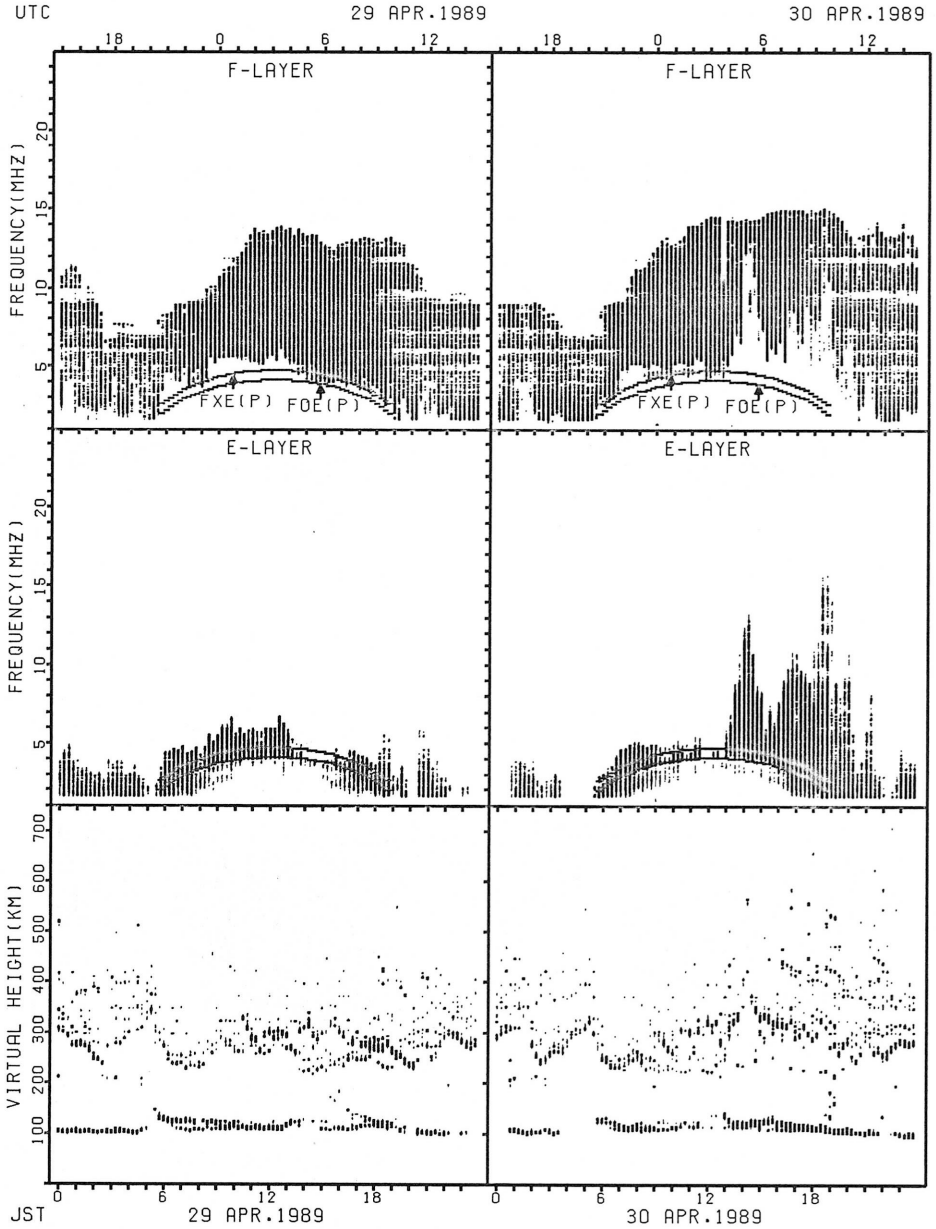
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
17 APR.1989
18 APR.1989
19 APR.1989
20 APR.1989
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

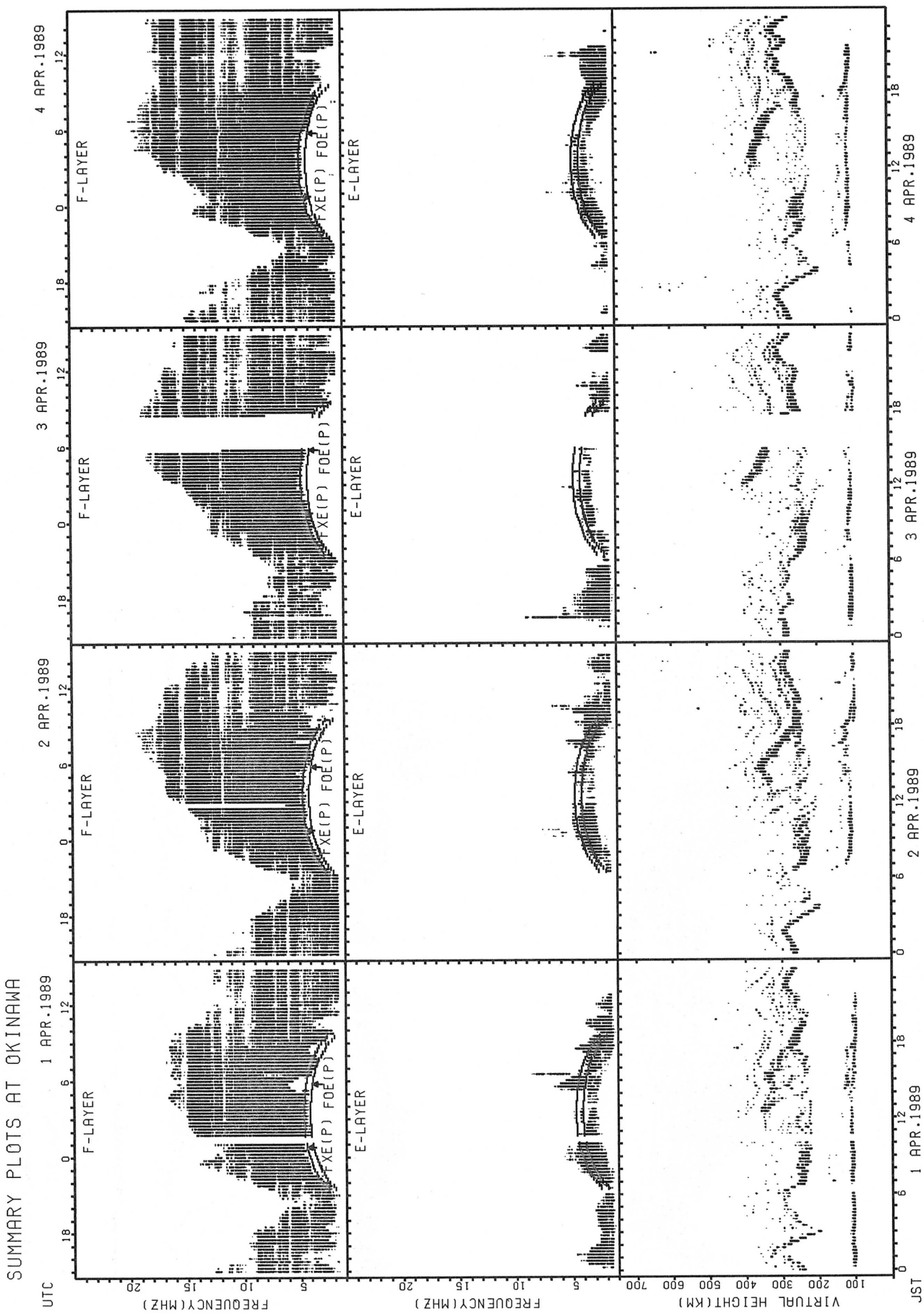

SUMMARY PLOTS AT YAMAGAWA
UTC
21 APR.1989
22 APR.1989
23 APR.1989
24 APR.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
JST
25 APR.1989
26 APR.1989
27 APR.1989
28 APR.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

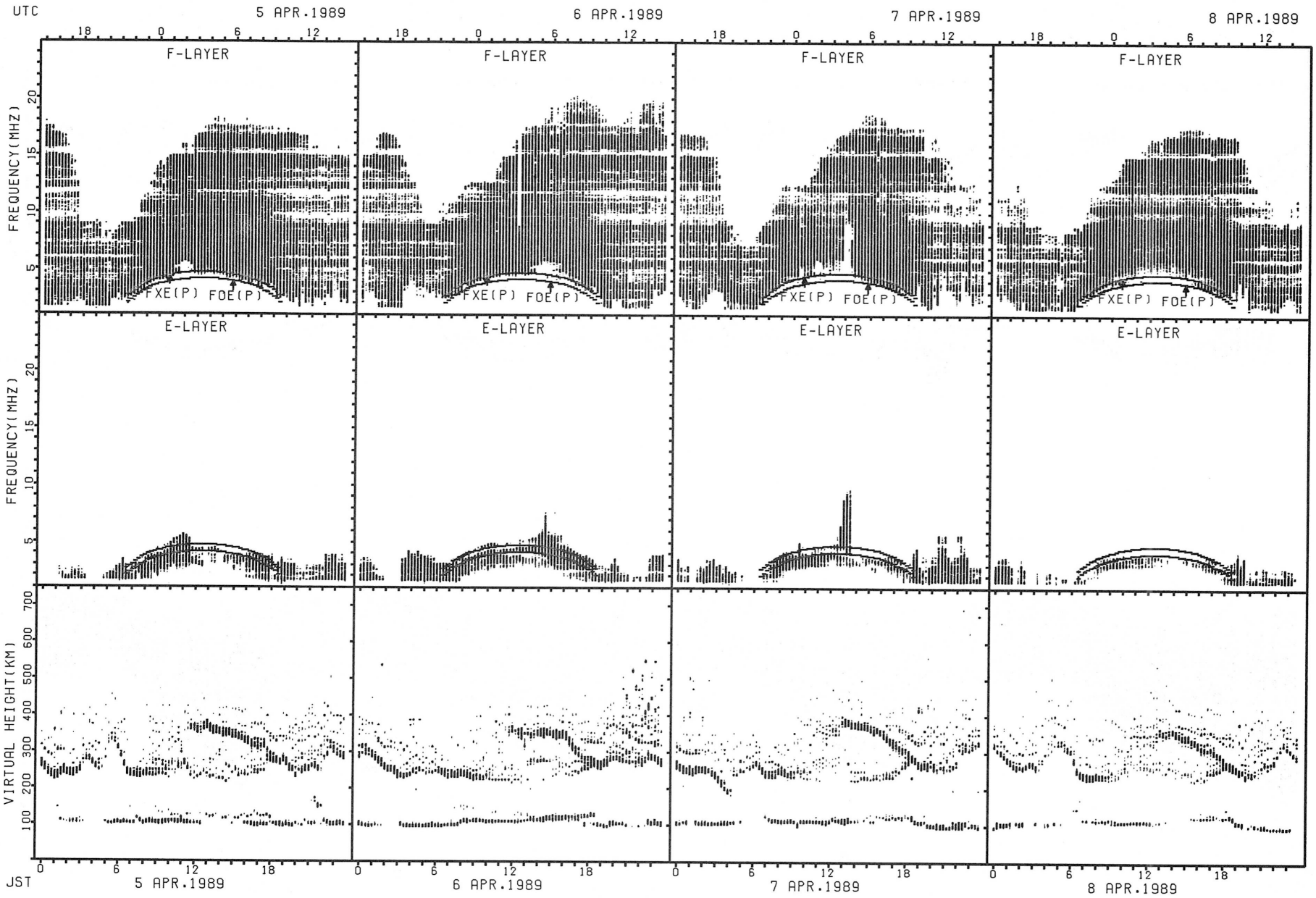
SUMMARY PLOTS AT YAMAGAWA



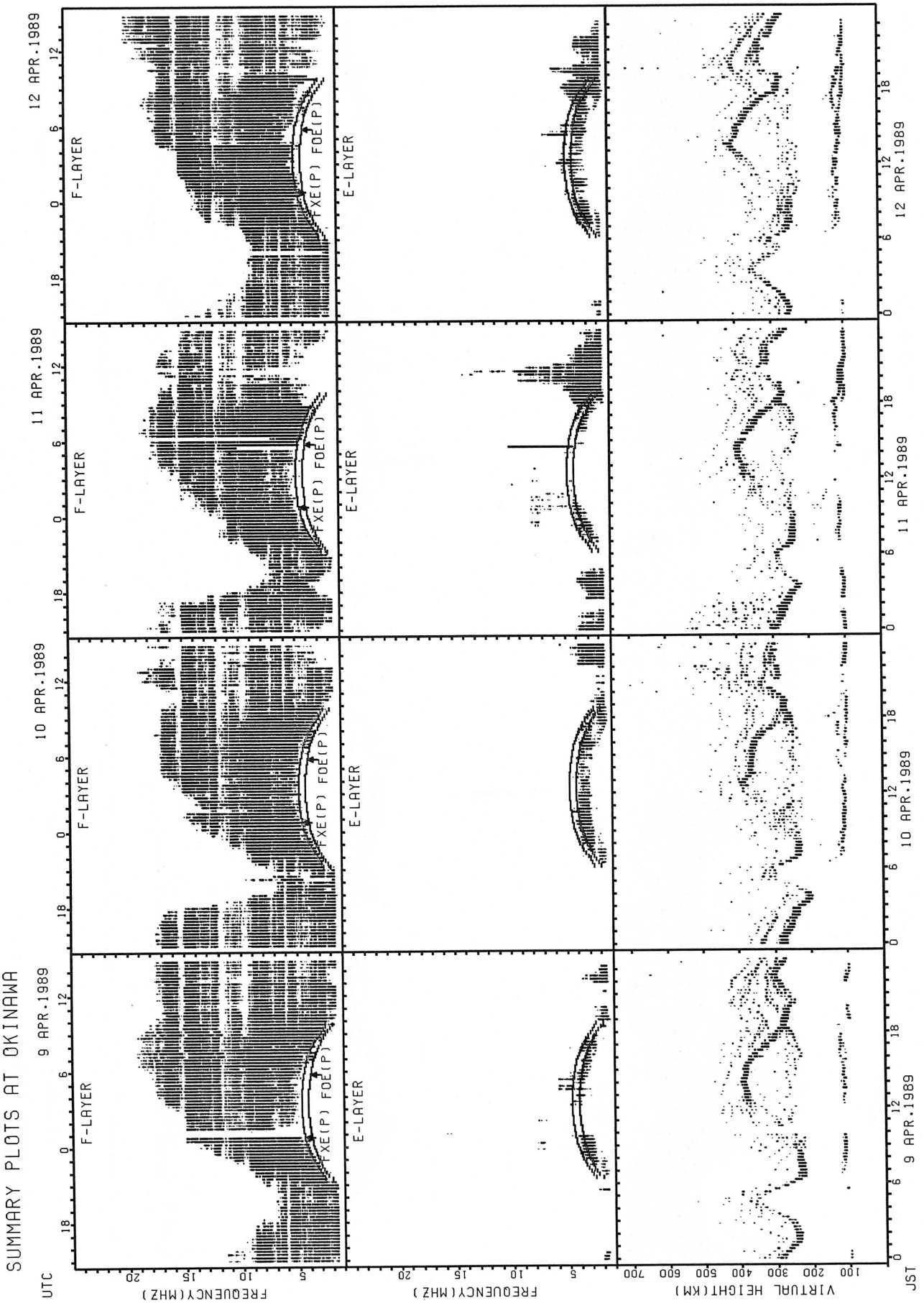
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
1 APR.1989
2 APR.1989
3 APR.1989
4 APR.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

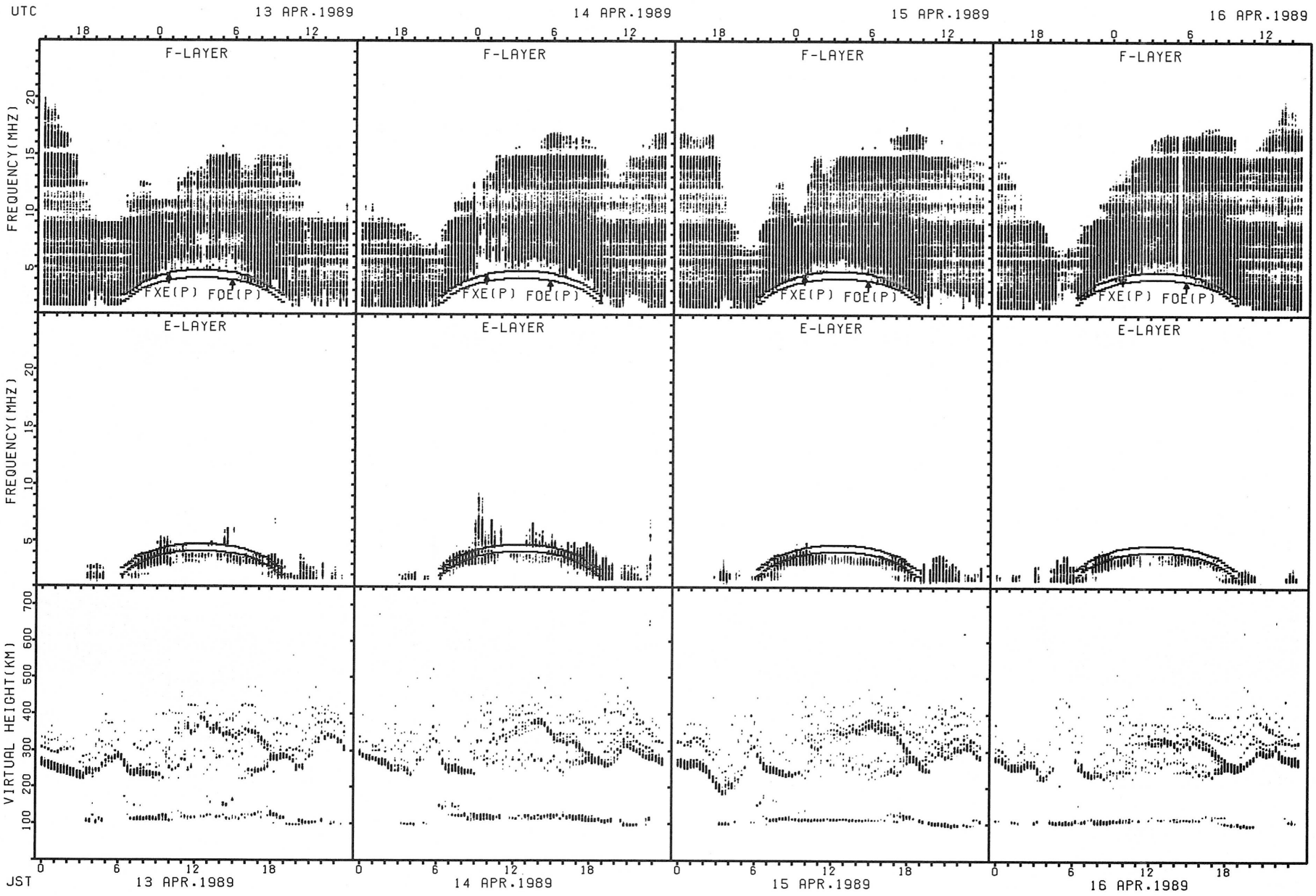
SUMMARY PLOTS AT OKINAWA



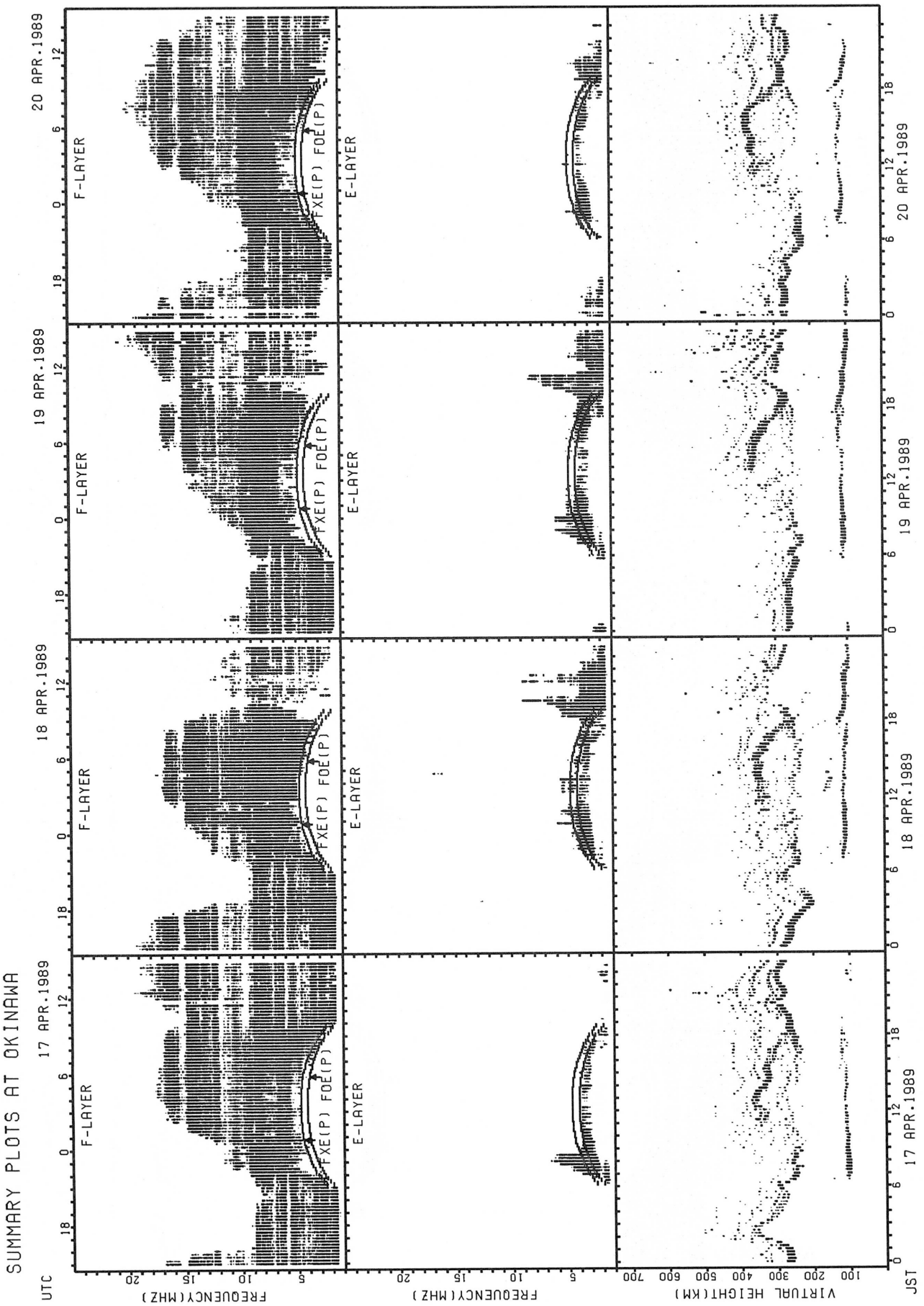
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT OKINAWA
UTC
9 APR.1989
10 APR.1989
11 APR.1989
12 APR.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

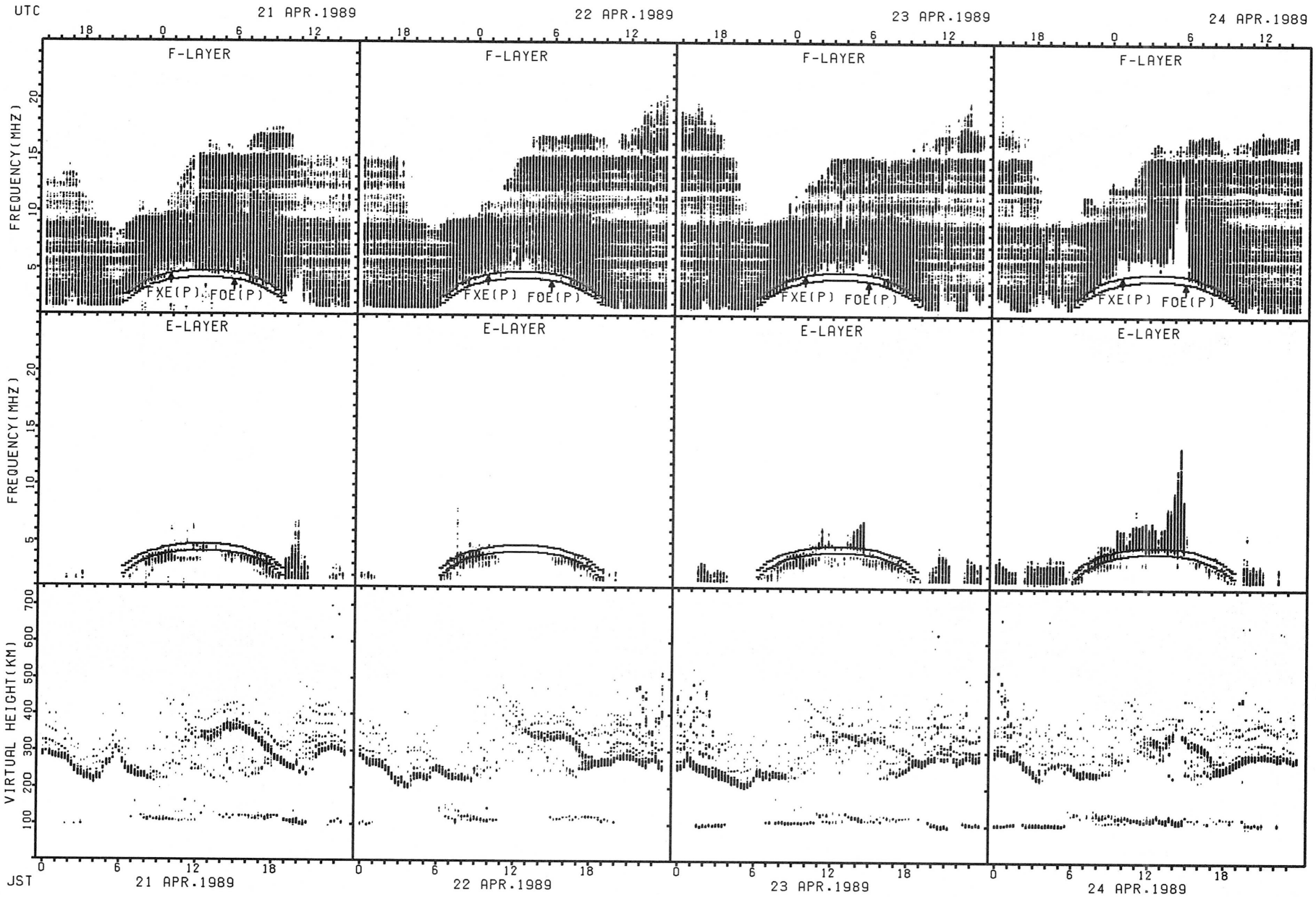
SUMMARY PLOTS AT OKINAWA



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

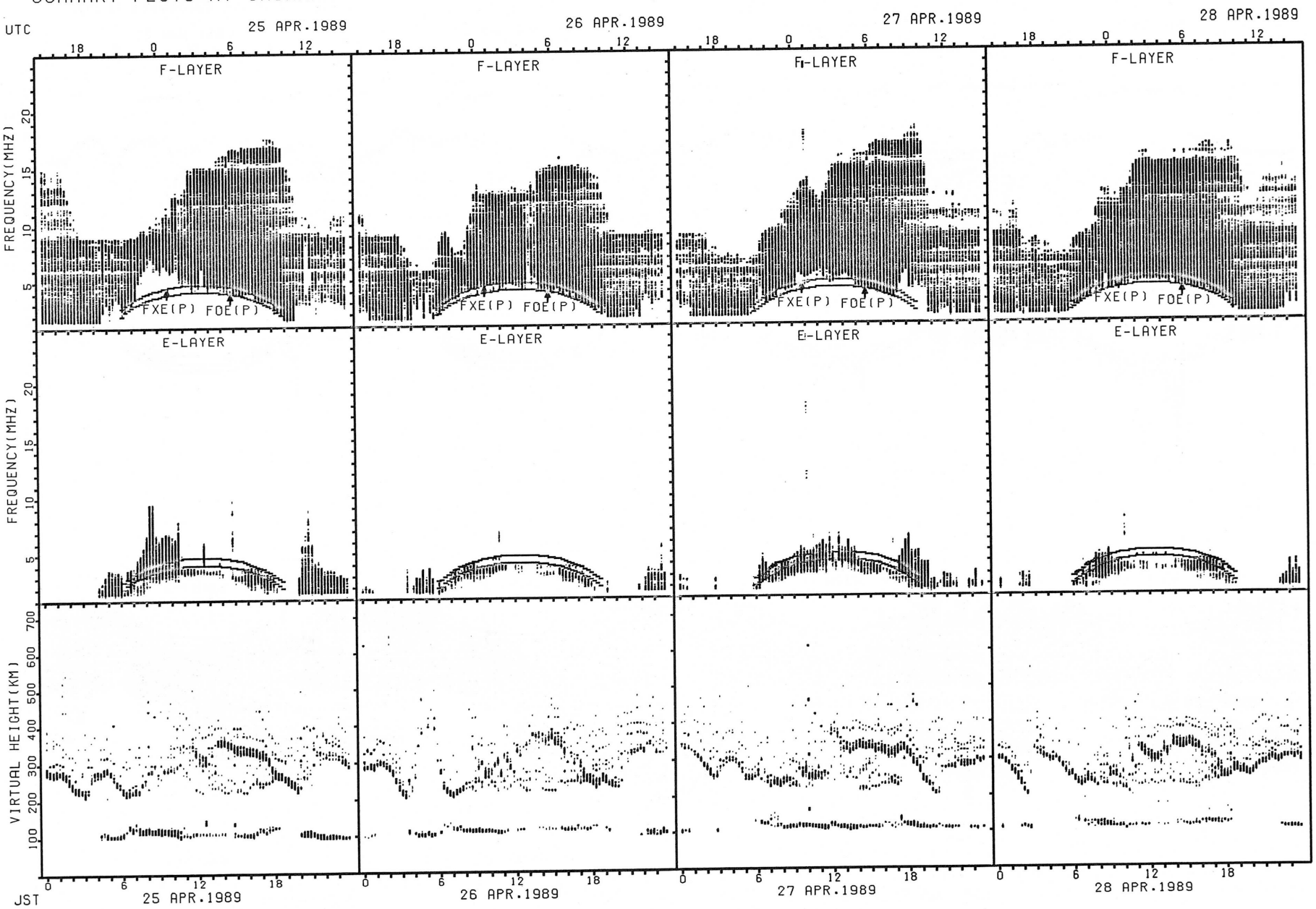

SUMMARY PLOTS AT OKINAWA
17 APR.1989
18 APR.1989
19 APR.1989
20 APR.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
UTC
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



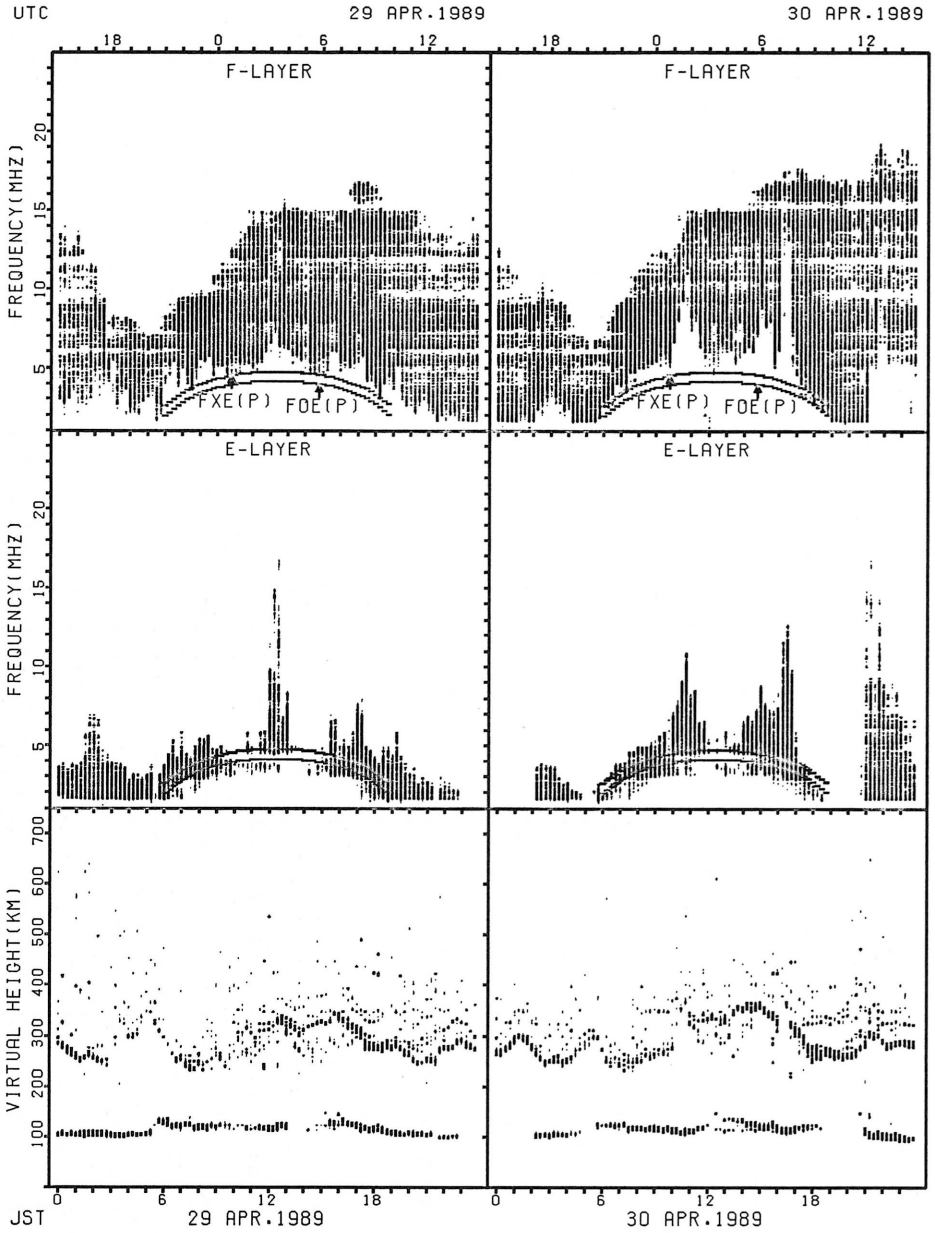
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



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

SUMMARY PLOTS AT OKINAWA



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

MONTHLY MEDIANS OF H'F AND H'ES
APR.1989 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

STATION WAKKANAI LAT. 45.4N LON. 141.7E

H'F

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							18	25	24							31	30	31	31	29	21	12		
MED							272	280	264							290	285	282	278	284	306	328		
U Q							348	293	281							326	308	292	290	306	326	357		
L Q							260	254	252							264	276	272	272	277	290	309		

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																		14	15	17	16			
MED																		134	129	125	122			
U Q																		139	133	129	126			
L Q																		131	125	121	120			

STATION AKITA LAT. 39.7N LON. 140.1E

H'F

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	11						19	26	25		13	12	12	11		27	29	29	27	29	19	12		
MED	350						262	255	264		268	268	265	290		294	286	284	274	282	302	345		
U Q	376						276	276	315		272	276	287	300		304	298	294	290	296	328	362		
L Q	328						256	250	247		264	251	257	278		274	274	275	270	271	270	319		

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	13	13	12	10				13	18	23	22	12	13	10		11		17	23	25	20	18	18	12
MED	109	105	108	114				131	125	117	115	118	113	115		125		129	119	113	112	111	107	107
U Q	114	108	114	123				187	129	121	123	121	120	127		268		136	127	119	114	113	111	110
L Q	106	102	104	105				118	119	113	111	111	109	107		113		124	113	107	109	107	105	104

STATION KOKUBUNJI LAT. 35.7N LON. 139.5E

H'F

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	20	17	17	13		10	29	29	29		18	14	12			31	30	31	31	28	24	18	16	21
MED	354	348	346	348		358	258	250	250		257	277	278			292	281	280	264	277	314	375	357	362
U Q	371	388	377	380		416	280	269	269		280	288	292			314	304	298	280	289	353	390	391	379
L Q	345	317	309	331		298	248	242	237		244	256	257			276	268	266	258	259	279	352	343	344

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	10	13		10	15		11	12	18	18	16	15	17	11	14	12	16	24	25	27	20	20	17	15
MED	107	111		107	109		137	122	120	119	118	117	115	115	117	126	123	120	117	113	111	109	109	107
U Q	113	118		109	117		161	137	131	125	127	125	124	129	129	137	139	127	126	117	113	112	109	109
L Q	107	106		101	107		125	114	113	117	116	111	109	109	111	108	111	109	106	111	107	104	105	107

MONTHLY MEDIANS OF H'F AND H'ES

APR.1989 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	29	21	22	19			22	31	29	27	13	16		10		10	31	31	31	31	30	21	23	27
MED	332	320	315	294			308	242	246	258	264	264		265		323	308	288	272	266	290	338	356	346
U Q	347	336	340	308			336	256	262	274	273	278		280		344	322	304	278	278	316	356	378	354
L Q	320	306	294	282			280	234	237	242	249	253		256		300	294	278	260	256	274	316	332	332

H'ES

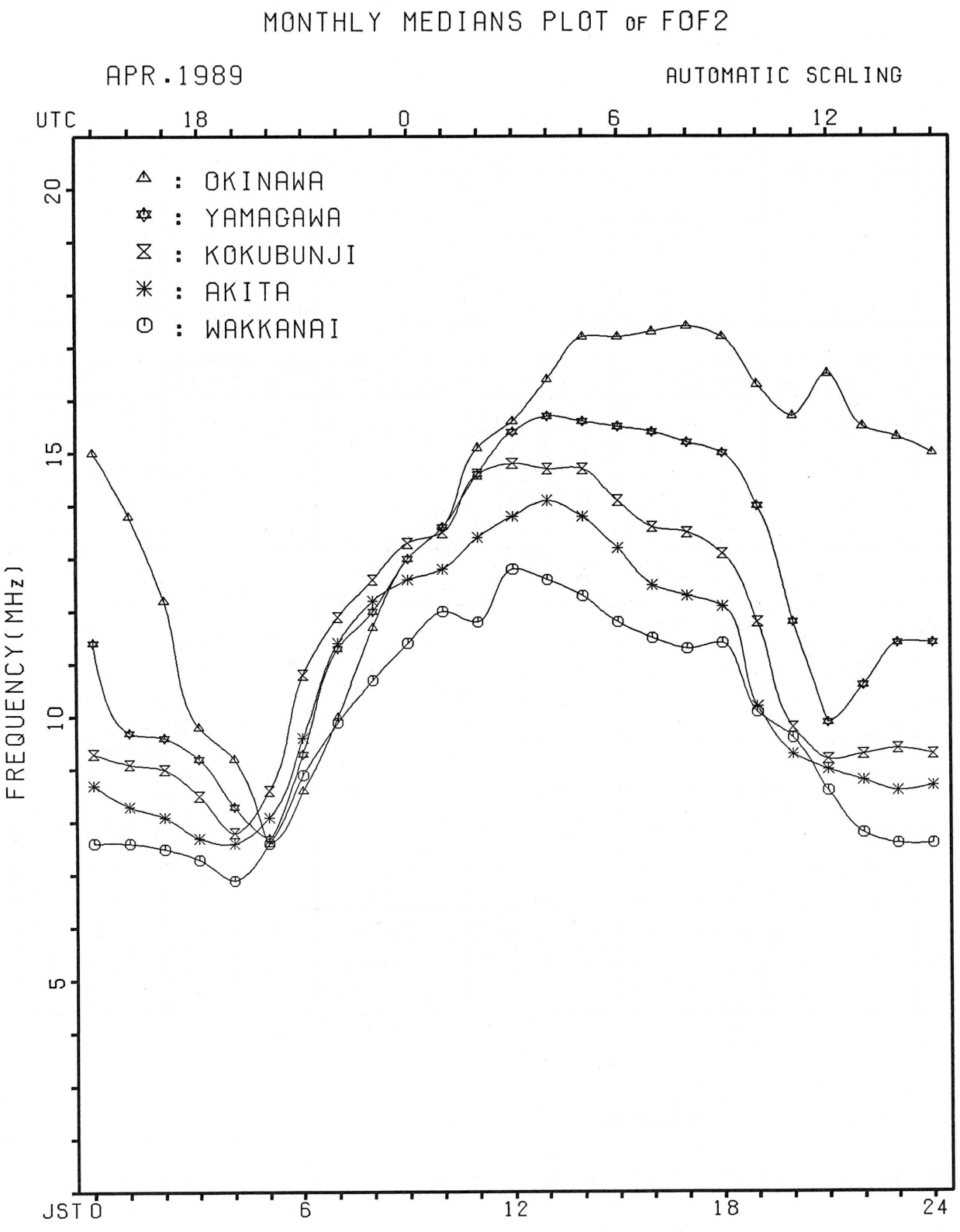
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	16	19	16	13			17	14	18	22	20	11	11	15	11	13	14	18	25	26	28	21	18	17
MED	105	107	105	107			113	125	119	119	119	117	119	117	121	119	121	120	123	113	110	109	107	107
U Q	107	109	107	107			139	155	123	121	121	121	125	125	143	130	137	133	129	115	112	113	109	109
L Q	103	105	103	105			108	117	113	115	113	115	113	111	113	112	119	113	118	109	106	101	101	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	30	30	30	25	15	10	15	31	29	30	19						29	30	31	31	30	29	29	30
MED	295	298	284	260	304	305	294	256	252	257	264						328	312	276	274	313	324	314	318
U Q	318	314	316	300	336	322	340	274	259	282	272						351	324	296	286	332	340	327	328
L Q	276	272	258	247	274	292	268	248	245	250	254						317	300	272	266	292	303	303	308

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	13			11	14	10		17	18	18	19	12	10	12	10	10		17	18	24	24	20	14	23
MED	105			105	106	107		141	117	119	121	119	124	128	123	124		125	121	110	105	106	103	103
U Q	107			109	109	107		157	125	125	133	121	165	165	125	139		143	129	113	110	110	111	109
L Q	98			103	103	105		110	111	115	113	113	121	118	117	119		123	115	101	104	103	101	101


MONTHLY MEDIANS PLOT OF FOF2
APR.1989
AUTOMATIC SCALING
UTC
18
0
6
12
△ : OKINAWA
✡ : YAMAGAWA
⧖ : KOKUBUNJI
✳ : AKITA
⏲ : WAKKANAI
FREQUENCY(MHz)
20
15
10
5
JST 0
6
12
18
24

IONOSPHERIC DATA

APR. 1989 | FXI (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42' 4 N, Long. 139° 29' 3 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	x 88	x 91	x 92	x 77	x 77	x 80														x 111	x 75	x 85	S	x 89
2	x 83	x 81	x 82	C	x 68	66														x 117	x 93	x 89	x 89	x 87
3	x 82	x 83	x 81	x 76	x 77	x 81														0 x 131	x 98	x 88	x 90	x 92
4	x 86	x 81	x 79	x 80	x 76	x 71														x 110	x 102	x 104	x 96	x 101
5	x 107	0 x 85	x 93	x 84	x 79	x 86														x 115	x 92	0 x 84	x 86	x 86
6	x 86	x 84	x 85	x 86	x 78	x 77														x 101	x 91	x 90	x 89	x 92
7	x 93	x 87	x 81	0 x 77	x 76	x 80														x 111	x 99	x 102	x 95	x 91
8	x 94	x 94	x 82	x 86	x 88	x 91														x 103	x 91	x 85	x 84	x 84
9	C	x 86	x 85	0 x 75	x 73	x 82														x 118	x 100	x 96	x 91	x 92
10	x 91	x 87	x 87	x 78	x 72	x 75														x 111	x 95	x 95	x 98	C
11	C	C	C	C	C	C														x 115	x 95	x 95	x 98	x 101
12	x 101	x 90	x 80	x 79	x 83	x 92														x 117	x 101	x 107	x 114	x 116
13	x 109	x 104	x 100	x 90	x 86															x 119	x 100	C	x 95	x 98
14	x 96	x 88	x 88	x 88	x 83															x 119	x 99	x 97	x 99	x 100
15	x 98	x 96	x 100	x 87	x 72															x 114	x 90	x 93	x 91	x 91
16	x 95	x 86	x 87	x 79	x 71															x 104	x 89	x 82	x 87	x 86
17	x 88	x 78	x 77	x 75	x 75															C	C	x 85	x 91	x 93
18	x 96	x 95	x 96	x 91	x 76															x 92	x 78	x 87	x 90	x 91
19	x 90	x 87	x 86	x 78	x 76															x 124	x 101	x 101	x 110	x 108
20	x 103	x 98	x 94	0 x 87	S															x 123	x 98	x 93	x 96	x 95
21	x 92	x 92	x 90	x 86	x 74															x 130	x 103	S	x 93	x 98
22	x 98	x 95	x 97	x 85	x 83															x 131	x 114	x 108	x 110	x 109
23	x 105	x 102	x 98	x 94	x 89															x 122	x 109	x 101	x 99	x 97
24	x 92	x 88	x 91	x 84	x 81															x 122	x 102	x 103	x 103	x 101
25	x 100	x 100	x 91	x 80	x 82															x 124	x 101	x 94	x 95	x 96
26	x 91	x 86	x 86	x 79	x 72															x 93	x 81	x 81	x 83	x 79
27	x 82	x 87	x 79	x 73	x 74															x 105	x 90	x 88	x 87	x 90
28	x 84	x 82	x 77	x 78	x 75															x 106	x 92	x 88	x 91	x 89
29	x 92	x 87	x 72	x 69	x 64															x 109	x 98	x 89	x 89	x 90
30	x 85	x 84	x 88	x 75	x 74															x 125	x 110	0 x 101	x 106	x 104
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	29	28	28	11														29	29	28	29	29
MED	x 92	x 87	x 87	x 80	x 76	x 80														x 115	x 98	x 93	x 93	x 92
UQ	x 98	x 94	x 91	x 86	x 82	x 84														x 122	x 101	x 101	x 98	x 100
LQ	x 87	x 85	x 81	x 77	x 74	x 76														x 109	x 91	x 88	x 89	x 90

APR. 1989 | FXI (0.1 MHZ)

IONOSPHERIC DATA

APR. 1989 | FOF2 (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42' 4 N, Long. 139° 29' 3 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	82	85	86	71	71	74	S 97	114	123	129	136	131	138	146	138	134	132	126	119	105	69	79	I S 76	83
2	77	75	76	I C 71	62	F 58	81	89	R 109	126	127	133	142	139	137	134	130	126	123	111	87	83	83	81
3	76	77	75	70	71	75	101	120	122	126	135	147	150	153	156	154	149	138	132	S 125	92	82	84	86
4	80	75	73	74	70	65	81	103	121	130	134	143	U R 152	152	147	148	144	138	122	104	96	98	90	95
5	101	S 79	84	78	73	80	90	R 110	134	139	144	147	145	144	138	135	127	122	118	109	86	S 78	80	80
6	80	78	79	80	72	71	93	116	129	125	128	142	145	145	143	142	134	126	120	95	85	84	83	86
7	87	81	75	71	70	74	98	123	129	126	131	142	146	R 145	143	138	136	126	123	105	93	96	S 89	85
8	88	88	76	80	82	85	94	98	96	114	129	146	149	146	139	133	122	118	R 113	97	85	79	78	78
9	I C 78	80	79	69	67	76	101	111	114	129	I C 137	R 149	150	148	146	147	141	133	125	112	94	90	S 85	86
10	85	S 81	81	72	66	69	90	116	120	R 127	134	142	144	144	143	140	131	128	127	105	89	89	92	C
11	C	C	C	C	C	C	C	C	C	C	C	136	137	135	132	128	128	128	122	109	89	89	92	95
12	95	84	74	73	77	86	105	117	130	135	135	139	142	140	138	137	136	137	S 138	111	95	101	108	110
13	103	98	94	84	80	87	116	131	130	126	126	128	133	131	135	136	129	123	119	113	94	I C 87	89	92
14	90	82	S 82	82	77	85	116	121	120	134	142	149	150	151	150	143	132	123	126	113	93	91	93	94
15	92	90	94	81	66	67	88	100	105	117	125	140	142	131	134	128	121	124	125	108	84	87	S 85	85
16	89	80	81	73	65	67	82	87	86	90	95	111	124	130	128	125	118	114	113	98	83	76	81	80
17	82	72	71	69	69	76	96	109	119	127	144	150	150	142	139	132	126	125	120	C	C	79	85	87
18	90	89	90	85	70	74	92	108	120	136	144	143	145	144	134	127	127	134	119	86	72	81	84	85
19	84	81	80	72	70	S 75	102	111	114	128	132	137	137	I C 142	142	139	135	138	140	118	95	95	104	102
20	97	92	88	S 84	I S 82	I S 95	U S 114	128	R 112	123	129	138	147	148	144	139	134	138	136	117	92	87	90	89
21	86	86	84	80	68	73	103	123	121	116	123	131	133	138	R 143	138	127	125	S 126	U S 124	U S 97	I S 84	J S 87	92
22	92	89	91	79	U S 77	87	111	114	112	110	121	131	138	145	145	145	140	142	137	125	108	102	104	103
23	99	96	92	88	83	90	108	108	111	123	129	135	133	140	138	133	130	130	126	116	103	95	93	91
24	S 86	82	85	78	75	81	97	111	118	127	131	134	143	147	147	147	144	139	134	116	96	97	97	95
25	94	94	85	74	76	87	105	112	H 106	118	117	126	137	140	136	129	124	125	127	118	95	88	89	90
26	85	80	80	73	66	67	95	89	88	113	125	112	124	134	126	130	125	129	121	87	75	75	77	73
27	76	81	73	67	68	69	79	86	89	104	113	106	106	121	124	121	109	99	109	S 99	84	82	81	84
28	S 78	76	71	72	69	83	101	108	118	122	122	125	126	130	123	123	123	113	109	100	86	82	85	83
29	86	81	66	63	58	63	69	66	74	82	90	100	105	102	104	101	102	99	101	103	92	83	83	84
30	79	78	82	69	68	72	97	103	107	122	129	135	137	136	137	132	129	127	127	119	104	S 95	100	98
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	29	29	29	29	29	29	29	29	29	30	30	30	30	30	30	30	30	29	29	30	30	29
MED	86	81	81	73	70	75	97	111	118	126	129	136	142	142	138	134	130	126	123	109	92	87	86	86
UQ	92	88	85	80	76	85	103	116	121	128	135	143	146	146	143	140	135	134	127	116	95	95	92	94
LQ	80	79	75	71	68	69	90	103	107	117	125	131	133	135	134	129	125	123	119	103	85	82	83	84

APR. 1989 | FOF2 (0.1 MHZ)

IONOSPHERIC DATA

APR. 1989 | FOF1 (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									L	L	L		A	L	L	L	L							
2									L	L	L 500	L	L	L	L									
3										L	L	L	L	L	L	L								
4								L	L	L	L	L	L	L	L	L								
5										L	L	L	L	L	L	L	L							
6										U L 530	L	L	L	L		L	L							
7										L	L	L	L	L	L	L	L							
8									L	L		L		A	L	L								
9										L	C	L	L	L	U L 720	L		L						
10											L	L	L	L	L	L								
11							C	C	C	C	C	L	L	L	L	L	L							
12									L	L	L	L	L	L	L	L	L	L						
13									L	L	L	L	L	L	L	L	L							
14								L		L	L	L	L	L	L	L	L							
15									L		L	L	L	L	L	L	L	L	A					
16										L	L	L 690	L	L	U L 660	L	L							
17									L	L	L	L	L	L	L	L								
18										L	L	L	L	L	L	L	L							
19									L	L	L	L	L	C	U L 610	L	L	L						
20										L	L	L	L	L	L	L	L	L						
21									L		L	L	L	U L 670	L	L	L	L						
22											L	U L 630	L	U L 600	L	L	L	L						
23										L	L	L 690	L	L 650	L	L	A	A	A					
24									L		L	L	U L 590	L	L	L	L							
25								L		L 610	L	L	A	L	L	L	L	L						
26							L		L	L	L 640	U L 770	U L 720	L	L	L	L							
27							L	L	L	L	U L 540	L	L	L	L	L								
28								L	L	L	L	U L 660	L	L	L	L	L							
29								A	U L 560	U L 610	L 630	580	L	L	L	L	L							
30										L	L	L	L	L	L	L	L							
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									1	3	4	6	2	3	3									
MED									U L 560	U L 610	L 585	L 685	U L 655	U L 650	U L 660									
UQ										L 610	L 635	L 690		L 660	U L 690									
LQ										U L 570	L 520	U L 660		L 625	U L 635									

APR. 1989 | FOF1 (0.01 MHZ)

IONOSPHERIC DATA

APR. 1989 | FOE (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station ROKUBUNJI TOKYO Lat. 35° 42' 4 N, Long. 139° 29' 3 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							S	285	325	360	380	395	400	B	R	360	310	265	B					
2							215	290	335	365	375	380	A	A	A	A	345	280	A					
3							210	A	325	360	A	A	380	390	385	370	325	A	B					
4							195	280	335	350	A	A	A	A	A	370	320	265	B					
5							210	305	345	A	A	A	395	395	380	355	325	260	B					
6							225	295	335	370	A	A	R	385	380	365	A	U A 255	B					
7							215	300	350	375	390	A	A	A	Y	360	320	275	B					
8							215	305	350	365	A	A	A	A	A	A	330	A	B					
9							230	310	355	370	C	B	A	A	A	A	A	A	A					
10							235	305	345	380	390	A	I R 390	A	A	375	S	H 275	B					
11							C	C	C	C	C	A	415	A	400	390	U A 350	U A 295	U A 190					
12							250	315	355	370	385	395	420	415	R	370	340	280	B					
13						B	245	310	350	380	390	A	405	395	A	365	320	280	B					
14						B	240	325	375	390	395	405	400	A	385	370	335	H 275	B					
15						B	240	315	355	380	395	400	A	A	A	A	A	A	B					
16						S	S	315	350	375	390	405	405	B	385	370	340	A	A					
17						B	A	A	A	A	400	R 415	R	415	395	385	340	275	S					
18						B	250	A	A	A	395	400	410	395	385	360	340	280	B					
19						B	255	315	360	380	A	A	A	C	A	365	330	280	B					
20						S	260	320	355	B	400	400	405	395	385	370	335	275	B					
21						B	250	310	345	380	400	410	A	410	400	365	335	280	S					
22						B	245	305	355	385	400	405	A	R 395	385	370	335	285	B					
23						B	260	315	360	380	390	400	410	405	390	370	335	U A 265	B					
24						B	260	325	365	385	A	400	410	405	390	370	340	280	A					
25						B	260	315	350	380	390	395	400	395	390	355	320	265	180					
26						B	250	305	350	370	385	395	400	B	385	360	330	275	180					
27						B	245	305	345	370	380	390	400	395	385	355	310	275	190					
28						B	255	310	345	A	375	385	390	S 400	385	360	330	280	190					
29						160	265	310	345	375	390	405	400	390	390	365	335	285	170					
30						160	260	315	345	375	390	400	415	410	400	370	345	275	175					
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						2	26	26	27	24	21	19	19	17	19	26	26	25	7					
MED						160	245	310	350	375	390	400	400	395	385	368	335	275	180					
UQ							255	315	355	380	395	405	410	405	390	370	340	280	190					
LQ							225	305	345	370	385	395	400	395	385	360	325	275	178					

APR. 1989 | FOE (0.01 MHZ)

IONOSPHERIC DATA

APR. 1989 | FOES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 15	J A 22	J A 20	J A 29	24	E B 15	23	G	G	G	45	45	J A 70	E B 39	G	G 23	G 20	30	20	J A 23	E S 18	E B 15	E S 20	E B 18
2	E B 16	E B 13	J A 20	C	J A 28	J A 25	G 19	G	38	45	47	47	47	45	43	J A 51	43	J A 61	J A 53	J A 28	J A 33	J A 22	J A 20	22
3	J A 40	J A 20	18	25	18	J A 18	G	J A 30	37	41	44	41	44	43	G 28	G 26	G 23	J A 47	J A 39	J A 28	J A 65	J A 41	E B 15	J A 30
4	J A 20	J A 31	J A 29	E B 15	E C 43	E B 13	G	G	37	40	J A 46	J A 42	J A 48	J A 50	J A 42	G 29	G	33	J A 37	J A 51	J A 50	J A 33	J A 23	J A 26
5	E B 15	23	21	22	28	E B 14	G	33	38	J A 46	J A 46	J A 44	G	G 30	G	G	G	G	19	21	E B 13	E S 17	E B 16	J A 25
6	20	E B 13	J A 21	J A 34	J A 20	20	G	G	G	39	39	40	38	G 36	G 32	G 20	J A 36	27	34	29	22	21	J A 44	23
7	22	20	18	20	22	J A 21	G	G	37	42	43	J A 52	J A 60	J A 55	35	G 29	G 28	G 27	35	J A 30	25	J A 20	E S 20	19
8	E B 16	E B 16	E S 18	E B 14	19	E B 15	29	36	41	47	J A 53	47	J A 52	81	72	46	G 30	J A 39	J A 39	J A 47	J A 39	21	J A 26	E B 17
9	C	J A 21	20	E B 15	E S 18	E S 16	G	G	40	47	C	47	48	45	43	39	47	33	28	34	23	J A 24	23	E B 15
10	E B 14	E S 17	E B 15	E B 14	J A 20	E B 15	G	32	36	42	44	44	G	43	42	G	E S 35	31	28	J A 21	23	21	19	C
11	C	C	C	C	C	C	C	C	C	C	C	43	G	41	G	G	J A 40	J A 47	36	J A 43	22	E B 16	E B 15	E B 15
12	E B 15	E B 14	E B 13	E B 14	E B 16	E B 16	G	34	39	41	41	G	G 30	G	G 29	G 26	37	36	32	E C 35	20	E B 14	E B 15	E B 16
13	E B 16	E B 14	E B 14	E B 14	E B 14	E B 15	28	32	38	G	42	42	47	43	J A 59	G	G	32	29	J A 49	E B 15	C	E B 16	22
14	E B 14	E B 14	E B 16	E B 13	E B 13	E B 17	G	37	J A 51	44	46	49	45	J A 50	45	G 20	37	32	27	19	J A 21	30	E B 16	E B 17
15	E B 15	E B 15	E B 13	E B 13	E B 13	E B 17	G	G	G	46	46	43	48	45	48	50	J A 51	41	53	35	J A 19	E B 14	J A 26	24
16	E B 15	E B 13	18	J A 26	32	E S 19	E S 26	33	47	50	J A 54	49	G 33	E B 63	G	G 24	G	30	27	E S 38	E B 16	J A 26	J A 29	20
17	J A 24	J A 19	21	J A 38	J A 58	40	J A 38	J A 49	49	40	G	G	G	45	G	45	39	J A 54	E S 23	C	C	39	J A 59	J A 29
18	19	J A 24	E B 15	E B 14	E C 38	23	G 23	34	40	43	43	44	45	G	G 27	42	J A 63	J A 43	21	J A 20	J A 36	J A 53	E B 15	J A 21
19	E B 15	E B 14	E B 13	E B 15	21	J A 22	27	33	37	40	45	45	J A 51	C	J A 55	38	34	39	J A 41	J A 28	33	J A 38	J A 31	J A 21
20	J A 21	E B 15	E B 15	E B 14	E S 21	E S 21	G 22	G	40	41	43	G	G	G	G	39	41	J A 51	J A 37	J A 41	J A 22	18	J A 39	J A 35
21	J A 25	E B 14	E B 14	E B 14	E B 15	E B 16	G	35	41	44	42	43	J A 44	43	43	39	39	40	E S 28	E S 19	E S 17	E B 15	E B 18	E B 16
22	E B 14	E B 14	E B 14	E B 13	E S 16	E B 17	28	35	39	50	48	42	44	G	G	48	38	34	21	J A 32	E B 16	E B 15	J A 30	J A 41
23	22	E B 15	E B 13	E B 14	E B 14	E B 14	G	34	G	44	J A 62	49	J A 53	45	44	39	J A 118	J A 110	67	36	J A 66	33	E B 14	26
24	27	J A 25	J A 22	27	J A 19	J A 24	30	39	48	J A 56	J A 124	J A 93	49	J A 61	44	45	42	33	42	33	33	20	E B 15	18
25	J A 26	26	24	E B 14	22	22	28	35	43	41	J A 56	J A 66	J A 69	45	G	41	41	30	28	J A 56	J A 117	J A 51	J A 74	J A 42
26	58	J A 21	22	E B 14	J A 26	E B 17	29	36	42	48	43	G	G	E B 44	G	G	44	39	J A 36	J A 27	J A 21	31	J A 29	19
27	E B 14	E B 13	E B 15	E B 13	E B 14	E B 18	29	35	J A 57	43	40	43	G	G	G	G	G	29	23	E S 20	18	21	J A 33	J A 32
28	J A 26	J A 21	E B 15	J A 20	J A 22	20	29	36	J A 41	39	47	44	42	G	45	42	G	G	J A 33	102	J A 76	J A 38	28	E B 15
29	J A 19	E B 13	E B 13	J A 25	E B 14	23	31	J A 51	37	40	J A 81	45	46	41	44	45	J A 47	J A 50	51	52	J A 57	35	J A 36	J A 41
30	J A 33	J A 22	J A 31	35	J A 38	26	J A 41	J A 44	J A 54	J A 55	44	J A 51	44	48	52	47	J A 56	37	J A 46	J A 48	J A 59	J A 50	J A 53	J A 35
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	29	28	29	29	29	29	29	29	28	30	30	29	30	30	30	30	30	29	29	29	30	29
MED	19	E B 16	E 18	E B 14	20	E E 18	G 22	34	39	43	44	44	44	43	38	38	38	35	34	J A 32	23	22	23	22
UQ	J A 24	J A 21	21	25	U 24	22	29	36	42	46	J A 48	47	48	45	44	45	43	J A 43	J A 39	43	J A 39	J A 35	J A 31	J A 29
LQ	E B 15	E B 14	E B 14	E 14	E B 16	E B 16	G	G	37	40	43	42	G 30	U G 33	G	G 20	G 22	30	27	J A 27	19	18	E B 16	E B 18

APR. 1989 | FOES (0.1 MHZ)

IONOSPHERIC DATA

APR. 1989 | FBES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42' 4 N Long. 139° 29' 3 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E B 15	16	15	20	18	E B 15	23	G	G	G	45	42	67	E B 39	G	G 23	G 20	27	18	16	E S 18	E B 15	E S 20	E B 18
2	E B 16	E B 13	16	C	22	19	G 16	G	36	43	45	44	46	43	42	39	38	57	40	20	23	15	18	E B 17
3	21	E B 15	E B 14	E B 14	17	E B 14	G	29	37	39	41	40	42	42	G 28	G 25	G 22	31	32	24	50	23	E B 15	22
4	17	22	19	E B 15	E C 43	E B 13	G	G	37	38	41	41	43	43	40	G 26	G	33	28	37	39	25	16	22
5	E B 15	E B 15	E B 14	E B 15	19	E B 14	G	32	36	44	41	41	G	G 30	G	G	G	G	E B 19	15	E B 13	E S 17	E B 16	18
6	E B 16	E B 13	E B 14	19	E B 13	E B 15	G	G	G	39	39	40	U Y 38	G 36	G 32	G 20	34	27	24	25	20	E C 17	28	E B 16
7	E B 15	E B 13	E B 13	E B 15	E B 13	18	G	G	36	40	42	52	50	51	35	G 28	G 25	G 22	26	24	23	17	E S 20	18
8	E B 16	E B 16	E S 18	E B 14	E B 15	E B 15	28	35	39	45	53	43	51	74	66	37	G 29	34	31	26	35	E B 15	21	E B 17
9	C	17	E B 14	E B 15	E S 18	E S 16	G	G	39	46	C	U Y 47	46	44	43	37	42	33	28	24	21	20	23	E B 15
10	E B 14	E S 17	E B 15	E B 14	E B 14	E B 15	G	32	36	42	44	41	G	43	40	G	E S 35	30	27	21	E B 15	E B 15	E B 15	C
11	C	C	C	C	C	C	C	C	C	C	C	43	G	41	G	G	G 34	G 29	34	41	E B 16	E B 16	E B 15	E B 15
12	E B 15	E B 14	E B 13	E B 14	E B 16	E B 16	G	G	38	40	40	G	G 29	G	G 28	G 26	37	35	30	E C 35	E B 15	E B 14	E B 15	E B 16
13	E B 16	E B 14	E B 14	E B 14	E B 14	E B 15	28	32	36	G	41	42	44	41	47	G	G	32	28	47	E B 15	C	E B 16	E B 14
14	E B 14	E B 14	E B 16	E B 13	E B 13	E B 17	G	36	45	43	43	46	43	44	41	G 20	37	32	26	18	18	21	E B 16	E B 17
15	E B 15	E B 15	E B 13	E B 13	E B 13	E B 17	G	G	G	46	44	43	46	44	44	50	41	32	45	24	E B 14	E B 14	E B 15	E B 16
16	E B 15	E B 13	E B 15	21	24	E S 19	E S 26	33	45	48	50	48	G 33	E B 63	G	G 24	G	28	23	E S 38	E B 16	E B 15	22	18
17	17	E B 14	E B 14	24	50	30	36	42	40	39	G	G	G	44	G	43	39	45	E S 23	C	C	35	45	18
18	E B 15	E B 15	E B 15	E B 14	E C 38	E B 17	G 22	33	38	40	42	42	43	G	G 27	39	50	40	21	18	34	43	E B 15	19
19	E B 15	E B 14	E B 13	E B 15	E B 14	17	G	33	37	40	42	43	45	C	40	38	34	38	37	26	30	23	23	18
20	E B 15	E B 15	E B 15	E B 14	E S 21	E S 21	G 21	G	40	39	42	G	G	G	G	39	40	21	34	28	20	16	20	20
21	17	E B 14	E B 14	E B 14	E B 15	E B 16	G	33	39	43	42	43	44	43	42	39	39	38	E S 28	E S 19	E S 17	E B 15	E B 18	E B 16
22	E B 14	E B 14	E B 14	E B 13	E S 16	E B 17	27	33	39	49	45	42	42	G	G	45	38	33	20	30	E B 16	E B 15	23	29
23	E B 15	E B 15	E B 13	E B 14	E B 14	E B 14	G	33	G	41	41	44	52	44	41	39	113	78	58	22	27	27	E B 14	18
24	21	21	19	18	16	E B 19	29	38	43	54	42	50	46	58	44	44	40	32	33	25	25	E B 15	E B 15	E B 15
25	26	18	17	E B 14	E B 14	21	G	35	42	40	54	64	67	42	G	41	39	29	26	32	55	33	36	38
26	39	18	16	E B 14	24	E B 17	28	36	40	43	42	G	G	E B 44	G	G	40	38	33	27	18	26	25	E S 17
27	E B 14	E B 13	E B 15	E B 13	E B 14	E B 18	27	35	50	40	40	42	G	G	G	G	G	29	22	E S 20	E B 15	E B 16	17	E B 14
28	E B 15	E B 15	E B 15	16	17	19	29	34	40	33	45	44	42	G	41	41	G	G	32	95	73	27	22	E B 15
29	17	E B 13	E B 13	E B 13	E B 14	23	29	50	37	40	42	43	44	41	44	42	36	47	34	44	37	28	34	32
30	21	20	21	25	26	23	36	42	52	46	42	44	43	47	50	44	39	36	35	39	29	24	42	20
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	29	28	29	29	29	29	29	29	28	30	30	29	30	30	30	30	30	29	29	29	30	29
MED	E B 15	E B 15	E B 15	E B 14	E E 16	E B 17	E G 16	33	38	40	42	43	43	42	38	37	36	32	28	24	20	17	18	E 18
UQ	17	E E 16	E E 16	E 16	U 19	18	28	35	40	44	44	44	46	44	42	41	39	33	34	U 32	30	25	23	19
LQ	E B 15	E B 14	E B 14	E B 14	E B 14	E B 15	G	G	36	39	41	41	G 29	U G 33	G	G 20	G 21	29	24	21	E B 16	E B 15	E B 15	E B 16

APR. 1989 | FBES (0.1 MHZ)

IONOSPHERIC DATA

APR. 1989 | FMIN (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	13	13	14	13	15	E S 18	15	14	21	20	22	21	39	32	16	15	14	15	13	E S 18	15	E S 20	18
2	16	13	13	C	12	15	13	15	23	18	25	30	38	25	22	19	18	14	13	15	15	13	16	17
3	14	15	14	14	14	14	16	14	16	23	21	26	25	21	20	18	13	13	15	15	16	15	15	15
4	14	13	13	15	E C 43	13	15	15	30	18	24	26	27	26	22	20	16	14	15	15	14	14	14	15
5	15	15	14	15	13	14	14	20	17	17	23	28	25	25	27	17	18	16	15	15	13	E S 17	16	13
6	16	13	14	14	13	15	14	14	17	19	27	35	28	31	23	17	16	14	14	E S 18	15	E C 17	15	16
7	15	13	14	15	13	14	14	16	17	20	29	29	29	28	21	21	16	14	15	16	15	14	E S 20	15
8	16	16	E S 18	14	15	15	14	17	27	21	35	33	25	27	23	22	19	14	15	15	17	14	15	17
9	C	13	14	15	E S 18	E S 16	14	18	19	21	C	42	38	32	32	22	20	16	16	16	15	14	15	15
10	14	E S 17	15	14	14	15	16	16	16	33	25	28	33	35	28	23	E S 35	15	15	13	15	15	15	C
11	C	C	C	C	C	C	C	C	C	C	C	30	33	32	28	24	18	15	14	15	16	16	15	15
12	15	14	13	14	16	16	15	15	16	21	20	24	26	23	26	20	17	15	17	E C 35	15	14	15	16
13	16	14	14	14	14	15	16	18	17	20	23	22	32	26	24	21	16	16	17	16	15	C	16	14
14	14	14	16	13	13	17	16	19	29	23	25	26	26	24	17	16	16	16	15	15	14	15	16	17
15	15	15	13	13	13	17	16	16	19	21	29	28	34	24	25	20	17	16	14	13	14	14	15	16
16	15	13	15	13	14	E S 19	E S 26	19	18	20	25	26	28	63	23	18	23	16	15	E S 38	16	15	14	15
17	14	14	14	13	13	15	15	16	20	28	26	32	32	35	22	22	16	15	E S 23	C	C	14	16	15
18	15	15	15	14	E C 38	17	16	16	18	23	25	22	30	24	22	21	14	16	18	13	15	15	15	14
19	15	14	13	15	14	12	15	16	18	23	30	30	30	C	30	22	22	17	16	15	14	13	15	14
20	15	15	15	14	E S 21	E S 21	15	17	25	37	34	27	32	32	29	19	18	18	18	15	14	13	13	14
21	15	14	14	14	15	16	15	16	18	29	33	27	26	27	23	22	18	16	E S 28	E S 19	E S 17	15	18	16
22	14	14	14	13	E S 16	17	15	15	18	34	24	31	30	26	22	22	17	16	14	14	16	15	13	15
23	15	15	13	14	14	14	14	18	19	22	26	27	27	27	26	20	22	16	16	14	15	15	14	14
24	E S 17	14	13	13	13	19	16	22	20	23	26	30	22	30	27	25	27	18	14	14	15	15	15	15
25	14	13	12	14	14	15	15	18	20	23	24	24	26	29	25	21	17	14	14	14	16	18	14	13
26	15	13	15	14	13	17	15	17	18	23	31	26	27	44	23	20	17	16	15	13	13	13	15	E S 17
27	14	13	15	13	14	18	14	16	20	26	27	25	25	22	18	18	16	17	14	E S 20	15	16	14	14
28	15	15	15	13	13	15	14	14	17	32	19	25	20	E S 27	21	16	16	14	15	13	16	14	14	15
29	13	13	13	13	14	12	16	15	20	23	21	27	25	25	21	21	16	16	13	14	15	12	13	15
30	15	13	12	14	13	13	15	17	19	21	25	27	26	26	26	28	17	16	14	14	13	E S 16	15	12
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	29	28	29	29	29	29	29	29	28	30	30	29	30	30	30	30	30	29	29	29	30	29
MED	15	14	14	14	14	15	15	16	18	23	25	27	27	27	23	20	17	16	15	14	15	14	15	15
UQ	15	15	15	14	14	16	16	18	20	23	28	30	32	32	27	22	18	16	16	16	16	15	16	16
LQ	14	13	13	13	13	14	14	15	17	21	24	26	25	25	22	18	16	14	14	14	14	14	14	14

APR. 1989 | FMIN (0.1 MHZ)

IONOSPHERIC DATA

APR. 1989 | M(3000)F2 (0.01) | 135° E Mean Time (G.M.T. + 9 h)

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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	285	255	285	325	270	270	315 S	320	305	295	295	300	275	285	290	285	285	300	300	310	330	270	270 I S	275
2	270	265	285	300 I C	310	275 F	310	325	305 R	305	305	285	295	285	285	290	285	295	300	315	305	275	275	270
3	270	270	285	275	280	285	315	320	315	295	280	285	275	275	275	280	285	290	295	315 S	315	280	275	285
4	275	265	265	285	315	310	320	325	305	300	285	275	275 U R	270	275	275	285	290	295	295	280	270	265	265
5	290	310 S	285	265	260	265	320	315 R	295	295	285	290	270	270	280	275	285	290	295	300	325	285 S	280	275
6	265	270	265	285	295	295	315	315	310	305	290	280	280	270	280	280	285	290	305	305	285	270	275	275
7	285	290	290	295	275	285	315	315	310	295	275	275	275	270 R	270	270	280	280	305	290	280	285	285 S	260
8	270	275	280	260	255	265	295	320	325	305	290	280	285	275	280	280	285	295	305 R	305	290	275	265	265
9	270 I C	275	285	280	245	260	305	305	305	290	280 I C	270 R	265	265	265	270	275	285	290	295	300	275	270 S	275
10	270	285 S	285	310	270	265	325	305	305	300 R	275	275	270	270	265	270	275	285	300	310	290	275	275	C
11	C	C	C	C	C	C	C	C	C	C	C	270	270	265	260	270	265	285	290	295	285	270	260	275
12	285	295	265	245	255	270	305	300	290	280	275	270	265	265	265	270	270	275	300 S	315	270	265	270	280
13	290	290	295	305	290	275	315	310	310	290	270	270	265	265	270	275	285	285	290	300	300	280 I C	260	275
14	275	270	270 S	285	275	265	305	310	310	285	280	275	270	270	275	280	285	295	300	300	295	275	270	275
15	270	270	305	335	290	275	325	310	305	285	285	270	275	275	270	270	275	280	290	295	305	260	270 S	265
16	290	280	270	315	275	265	280	290	305	280	255	265	275	275	280	285	300	290	305	305	300	270	265	265
17	270	255	250	255	255	270	310	300	290	275	270	275	275	270	280	275	285	295	315	C	C	265	265	265
18	270	275	290	300	270	270	325	300	285	285	280	280	280	280	275	275	270	290	310	305	280	260	275	285
19	285	280	285	300	290	285 S	320	320	290	280	290	280	280	280 I C	275	270	275	285	300	320	295	270	265	275
20	275	285	290	295 S	S	S	U S 300	320	315 R	290	280	270	275	280	280	275	275	290	300	310	305	280	285	290
21	285	290	290	300	295	270	310	315	305	295	265	270	270	270	270 R	285	285	280	290 S	305 U S	320 U S	S	295 J S	265
22	280	280	300	300	295 U S	290	320	320	310	305	285	265	270	270	270	270	275	285	295	310	295	280	280	280
23	285	290	290	310	295	300	320	320	300	275	270	270	270	275	280	270	270	285	290	295	290	285	280	270
24	260 S	255	275	285	270	290	315	305	285	285	280	265	280	270	275	285	285	285	300	315	290	275	275	275
25	285	290	315	285	280	290	320	315	325 H	275	270	265	270	280	280	280	280	285	290	295	310	280	280	275
26	275	260	280	285	255	260	335	320	285	270	270	260	260	285	270	270	265	285	305	315	270	255	270	265
27	255	270	295	255	260	280	290	295	285	290	295	280	285	275	285	285	300	285	290	315 S	300	270	270	280
28	285 S	290	270	275	260	295	325	300	285	295	285	280	275	280	280	280	295	295	300	A	A	270	270	265
29	280	285	305	270	265	280	295	300	270	270	270	285	285	280	285	295	300	300	290	285	300	275	265	275
30	265	260	285	285	275	290	315	305	290	285	285	275	275	275	270	280	285	285	290	295	300	295 S	275	280
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	29	29	28	28	29	29	29	29	29	30	30	30	30	30	30	30	30	28	28	29	30	29
MED	275	275	285	285	275	275	315	315	305	290	280	275	275	275	275	275	295	285	300	305	298	275	270	275
UQ	285	290	290	300	290	290	320	320	310	295	285	280	280	280	280	290	285	290	300	312	305	280	275	275
LQ	270	270	275	275	260	268	305	305	290	280	270	270	270	270	270	270	275	285	290	295	288	270	265	265

APR. 1989 | M(3000)F2 (0.01)

IONOSPHERIC DATA

APR. 1989 | M(3000)F1 (0.01) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42' 4 N, Long. 139° 29' 3 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									L	L	L		A	L	L	L	L							
2									L	L	L 385	L	L	L	L									
3										L	L	L	L	L	L	L								
4								L	L	L	L	L	L	L	L	L								
5										L	L	L	L	L	L	L	L							
6										U L 395	L	L	L	L		L	L							
7										L	L	L	L	L	L	L	L							
8									L	L		L		A	L	L								
9										L	C	L	L	L	U L 365	L		L						
10											L	L	L	L	L	L								
11							C	C	C	C	C	L	L	L	L	L	L							
12									L	L	L	L	L	L	L	L	L	L						
13									L	L	L	L	L	L	L	L	L							
14								L		L	L	L	L	L	L	L	L							
15									L		L	L	L	L	L	L	L	L	A					
16										L	L	L 355	L	L	U L 370	L	L							
17									L	L	L	L	L	L	L	L								
18										L	L	L	L	L	L	L	L							
19									L	L	L	L	L	C	U L 370	L	L	L						
20										L	L	L	L	L	L	L	L	L						
21									L		L	L	L	U L 380	L	L	L	L						
22											L	U L 385	L	U L 380	L	L	L	L						
23										L	L	L 375	L	L 375	L	L	A	A	A					
24									L		L	L	U L 380	L	L	L	L							
25								L		L 395	L	L	A	L	L	L	L	L						
26							L		L	L	L 375	U L 375	U L 390	L	L	L	L							
27							L	L	L	L	U L 395	L	L	L	L	L								
28								L	L	L	L	U L 390	L	L	L	L	L							
29								A	U L 375	U L 365	L 375	385	L	L	L	L	L							
30										L	L	L	L	L	L	L	L							
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									1	3	4	6	2	3	3									
MED									U L 375	U L 395	L 380	L 380	U L 385	U L 380	U L 370									
UQ										L 395	L 390	U L 385		U L 380	U L 370									
LQ										L 380	L 375	L 375		L 378	U L 368									

APR. 1989 | M(3000)F1 (0.01)

IONOSPHERIC DATA

APR. 1989 | H'F2 (KM) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									265	290L	270		295A	320	310	280	300L							
2									275	255	250	295	260	305	290L									
3										250	305L	280L	315	315	310	285								
4								250	260	245	320L	310	325	335	320	310								
5										265	305	300	340L	325	325	330L	290L							
6										240	290L	320	265	345L		315	295L							
7										245	260H	330	325	335	315	265H	305							
8									250	250		310		315A	320	305L								
9										280L	C	320	335	335	350	320		295L						
10											320L	335	325L	340	340	330								
11							C	C	C	C	C	330L	340	340	360	335	340							
12									280	270	295L	330	335	345	350	335	320	305						
13									240	260	350L	315L	335	345	345	320	275							
14								255		300L	270H	330	330	305	325	275	305							
15									295L		260H	335	310	330L	350L	340L	325L	295	265A					
16										335L	395	370	315	325	325	285L	265							
17									275L	325	330	305	320	335	295L	310								
18										300	270L	265	305	305	315L	295L	325							
19									300L	315	265	305	290	I C 335	315	325	310	295						
20										260	L	330L	320	320	315	315	320	300						
21									255		350L	290L	345L	335	335	305	310L	310L						
22											310L	345	340	325	325	315	300	280						
23										305L	305L	345	360	345	305	295	A	E A 315	280A					
24									295L		L	340L	315	325	310	300	295							
25								260		320	355	355	320	325	295	295	310	285						
26							235		345L	320	325	410	385	315	335	335	335							
27							310	270H	340L	285	285	315	275	335	325	270								
28								265	260	265	310	310	335L	320	305	320	285							
29								A	395	375	375	335	295L	330	310	310	280							
30										290	305	325L	315	315	330	310	290							
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							2	5	15	24	25	29	29	30	29	29	21	9	2					
MED							272	260	275	282	305	325	320	328	320	310	305	295	272A					
UQ								265	298L	310	325	335	335	335	335	320	320	302						
LQ								255	260	258	270	310	310	320	310	295	290	295						

APR. 1989 | H'F2 (KM)

IONOSPHERIC DATA

APR. 1989 | H'F (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42' 4 N, Long. 139° 29' 3 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	290	335	275	240	315	325	245	245	235	H 230	250	235	A	H 220	E R 245	225	250	H 245	260	235	210	310	325	315
2	310	335	290	C	255	295	245	240	240	230	220	230	235	235	240	255	250	E A 265	A 255	240	240	285	310	320
3	340	320	285	290	285	285	235	235	225	220	H 220	215	235	240	240	235	245	255	260	245	E A 260	A 285	310	295
4	310	350	350	285	E C 275	240	235	235	230	230	H 230	210	245	240	240	240	250	260	255	A 275	A 310	310	320	330
5	270	250	290	325	340	335	240	230	235	240	220	210	245	240	235	240	245	255	265	260	225	H 290	310	310
6	320	310	320	285	270	260	240	235	235	215	H 220	230	220	H 225	235	235	250	255	255	250	260	290	E A 340	305
7	290	280	280	270	270	285	245	240	230	225	220	E A 255	E A 260	255	230	230	240	255	265	260	265	285	285	325
8	340	300	305	315	335	325	265	245	240	240	E A 260	H 220	E A 265	A	A	250	245	A 265	260	260	E A 290	270	320	320
9	I C 310	310	285	305	400	350	255	235	235	245	C	Y 255	A 245	235	240	240	A 260	255	265	260	250	275	310	300
10	305	290	285	260	305	335	235	235	235	245	235	230	H 215	240	235	245	255	260	260	245	250	295	290	C
11	C	C	C	C	C	C	C	C	C	C	C	H 225	235	230	240	250	250	265	260	E A 275	250	285	325	305
12	280	265	330	370	360	310	250	240	235	230	225	225	215	230	H 230	240	255	265	270	E C 265	240	310	310	285
13	265	275	265	245	275	315	250	240	230	220	H 225	220	230	220	255	225	250	265	270	E A 285	240	I C 260	320	310
14	305	310	310	270	260	320	250	230	240	235	240	235	225	A 250	245	240	255	255	270	245	230	295	300	310
15	315	315	260	215	250	310	245	235	H 225	255	235	220	260	H 245	A 245	E A 275	260	270	A	255	240	310	315	320
16	285	300	310	250	E A 300	335	275	260	A	A	A	255	215	E B 285	235	250	235	H 255	260	E S 270	250	280	330	330
17	315	345	355	E A 365	A	E A 345	E A 265	240	240	H 225	220	H 225	255	240	235	255	260	E A 285	260	C	C	E A 345	A	330
18	320	305	275	255	E C 355	300	230	230	235	230	220	230	220	220	235	235	A	A 265	240	225	E A 325	E A 380	305	305
19	280	290	290	265	285	305	245	240	H 225	230	210	215	225	I C 230	235	245	240	A 275	A 265	240	245	A 310	320	305
20	305	285	290	270	315	300	250	245	240	230	H 240	H 215	215	H 220	240	245	250	270	260	245	230	265	290	295
21	290	285	270	265	265	300	250	245	235	235	H 225	220	H 230	225	235	255	250	260	280	260	235	230	295	315
22	295	295	260	240	270	290	240	240	235	E A 265	220	220	H 205	225	240	A 250	250	A 265	260	245	230	255	290	A 300
23	290	275	265	255	255	260	235	230	235	230	230	235	E A 270	235	245	235	A	A	A	255	A 265	275	270	310
24	345	355	310	285	310	275	240	235	240	A 265	230	260	225	A	230	E A 255	245	260	255	245	255	270	290	305
25	A 310	280	240	270	300	280	230	230	H 235	H 210	E A 270	A	A	H 220	235	240	255	250	265	A 265	E A 275	E A 300	A 320	A 325
26	E A 340	335	300	260	380	H 305	245	225	235	245	230	H 240	225	235	230	250	265	A 270	255	240	300	E A 350	330	325
27	345	320	275	315	340	310	260	A 255	A	240	215	225	220	220	230	235	240	245	270	255	250	300	295	300
28	300	280	310	310	345	265	245	235	235	210	235	215	H 210	230	240	250	250	250	260	A	A	E A 320	315	320
29	295	285	255	280	335	305	260	A	240	245	230	225	230	225	255	245	A 255	E A 270	E A 275	E A 290	A 270	A 275	E A 335	E A 315
30	330	335	285	285	A 330	280	250	235	E A 255	250	225	230	240	245	270	E A 260	260	265	A 265	A 255	250	260	E A 325	305
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	29	28	28	29	29	28	27	28	27	29	28	28	29	30	28	29	28	28	28	30	29	29
MED	305	300	285	270	297	302	245	235	235	230	225	225	228	231	238	242	250	260	260	250	246	283	310	310
UQ	318	320	310	293	336	318	250	240	239	244	232	232	240	240	240	250	255	A 265	265	260	258	302	320	320
LQ	290	285	275	258	269	285	240	235	235	228	220	220	220	225	235	235	245	255	260	245	240	275	295	305

APR. 1989 | H'F (KM)

IONOSPHERIC DATA

APR. 1989 | H'E (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42' 4 N, Long. 139° 29' 3 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							S 120		110	115	115	E A 135	E A 120	B	120	E A 125	E A 120	125	B					
2							E A 145	120	125	115	120	125	A	120	A	A	E A 130	E A 125	A					
3							140	A	E A 135	120	115	A	115	115	E A 130	E A 125	E A 125	A	B					
4							125	120	125	115	A	A	A	A	A	E A 120	115	120	B					
5							125	115	115	110	115	A	120	E A 125	125	115	120	125	B					
6							130	115	115	120	115	130	115	E A 135	E A 130	115	A	A	B					
7							135	115	115	120	120	120	A	A	A	E A 125	E A 130	E A 135	B					
8							125	120	120	115	A	A	A	A	A	A	E A 130	A	B					
9							125	120	115	115	C	B	A	A	A	A	A	A	A					
10							135	115	115	E B 130	120	115	120	A	125	120	S	120	B					
11							C	C	C	C	C	A	120	A	120	120	A	A	A					
12							125	115	115	115	115	115	120	115	R 120	120	120	120	B					
13						B	125	120	115	115	115	115	120	120	115	115	120	130	B					
14						B	130	120	125	120	120	120	120	115	120	120	120	120	B					
15						B	130	115	115	115	120	120	125	A	A	A	A	A	B					
16						S	S	115	115	115	120	120	E A 125	B	125	120	125	A	A					
17						B	125	A	A	A	115	120	125	130	115	120	120	125	S					
18						B	E A 160	A	A	A	115	115	120	115	A 120	115	A 115	125	B					
19						B	E A 150	120	115	120	A	A	A	C	A	125	125	125	B					
20						S	E A 140	115	120	B	120	120	120	E B 125	120	120	120	E A 125	B					
21						B	120	110	115	125	130	125	A	120	120	A 125	A 125	125	S					
22						B	125	120	110	E B 125	115	120	115	115	115	120	115	120	B					
23						B	120	120	115	115	120	115	120	120	115	115	120	120	B					
24						B	125	E A 135	120	120	115	125	110	125	120	120	125	125	125					
25						B	120	120	120	120	115	120	120	115	120	115	120	A 125	135					
26						B	120	115	110	115	130	115	120	B	120	120	120	125	E B 140					
27						B	125	120	120	120	125	120	115	115	115	115	115	125	B 140					
28						B	125	115	115	A	120	115	115	120	120	115	120	125	140					
29						140	120	120	115	115	115	125	120	120	120	120	120	125	120					
30						130	125	115	120	115	115	120	125	120	120	125	115	120	E B 130					
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						2	27	26	27	25	25	23	23	19	23	26	25	23	7					
MED						135	125	119	115	115	115	120	120	118	120	120	120	125	130					
UQ							128	120	120	120	120	121	120	121	120	120	122	125	140					
LQ							125	115	115	115	115	115	116	115	120	115	120	120	125					

APR. 1989 | H'E (KM)

IONOSPHERIC DATA

APR. 1989 | H'ES (KM) | 135° E Mean Time (G.M.T. + 9 h)

Station KOKUBUNJI TOKYO Lat. 35° 42' 4 N, Long. 139° 29' 3 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	B 115	110	115	100	B	150		G	G	G	E G 185	150	130	B	G	105	105	135	105	115	S	B	S	B
2	B	B 105	C	105	105	105		G	135	120	115	120	115	110	110	110	145	125	120	120	115	115	105	110
3	110	120	105	115	110	115	G	110	130	120	120	110	125	135	110	105	105	100	120	120	115	115	B	110
4	110	110	110	B	C	B	G	G	130	125	115	110	115	110	110	110	G 140	120	130		115	115	115	105
5	B	110	115	125	115	B	G	E G 155	145	115	115	115	G	110	G	G	G	G	125	105	B	S	B	110
6	110	B	110	100	110	115	G	G	G	135	125	125	120	120	115	105	105	E G 160	105	105	100	105	115	110
7	115	110	115	115	105	105	G	G	E G 140	130	120	115	110	105	115	110	110	105	105	105	100	105	S	105
8	B	B	S	B	110	B	145	135	130	120	110	110	110	110	110	110	105	110	110	120	110	105	110	B
9	C	110	105	B	S	S	G	G	130	125	C	125	120	110	115	110	110	105	110	105	105	105	95	B
10	B	S	B	B	110	B	G	E G 160	145	130	120	120	G	115	130	G	S	E G 160	125	115	105	110	105	C
11	C	C	C	C	C	C	C	C	C	C	C	130	G	130	G	G	125	110	125	120	125	B	B	B
12	B	B	B	B	B	B	G	E G 160	145	125	125	G	110	G	105	105	155	135	120	C	105	B	B	B
13	B	B	B	B	B	B	E G 165	E G 160	135	G	125	130	125	120	110	G	G	150	130	115	B	C	B	105
14	B	B	B	B	B	B	G	150	135	130	120	120	120	120	120	105	145	145	120	115	120	110	B	B
15	B	B	B	B	B	B	G	G	G	130	135	125	110	115	115	130	115	110	105	105	110	B	105	110
16	B	B	100	120	115	S	S	E G 160	125	125	125	135	110	B	G	110	G	125	105	S	B	120	110	110
17	115	115	115	105	115	115	120	110	110	120	G	G	G	E G 170	G	140	130	120	S	C	C	110	110	120
18	105	115	B	B	C	115	115	115	110	115	135	140	E G 150	G	105	140	125	130	E G 160	115	115	110	B	100
19	B	B	B	B	115	120	E G 170	E G 185	E G 170	125	115	110	110	C	115	E G 190	E G 165	120	120	115	115	110	110	110
20	115	B	B	B	S	S	120	G	135	125	125	G	G	G	G	E G 175	145	110	125	115	115	115	110	110
21	110	B	B	B	B	B	G	155	135	135	140	140	110	135	130	130	145	130	S	S	S	B	B	B
22	B	B	B	B	S	B	170	E G 155	140	130	130	130	120	G	G	140	140	130	130	115	B	B	110	110
23	110	B	B	B	B	B	G	E G 155	G	140	135	120	120	130	130	150	115	115	115	115	115	110	B	110
24	105	105	105	110	115	120	E G 165	140	130	125	115	115	125	120	125	125	130	125	120	110	115	115	B	115
25	110	110	110	B	125	125	E G 160	140	130	135	120	120	120	125	G	130	115	125	135	120	110	105	105	105
26	110	110	110	B	125	B	130	120	120	120	125	G	G	B	G	G	130	125	125	110	110	110	110	115
27	B	B	B	B	B	B	135	130	115	120	130	125	G	G	G	G	G	E G 160	130	S	120	115	110	120
28	110	115	B	105	110	150	150	135	130	110	120	120	135	G	155	E G 165	G	G	135	115	115	105	110	B
29	110	B	B	110	B	140	145	125	150	150	125	130	120	135	160	155	145	120	115	115	115	110	110	110
30	110	105	105	105	105	130	125	125	115	120	125	130	E G 170	135	130	140	125	130	120	115	110	110	110	105
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	15	13	14	11	16	12	16	21	25	27	27	26	23	20	20	24	23	28	28	25	23	22	18	21
MED	110	110	110	110	110	118	U 134	U 128	130	125	125	122	120	120	115	U 119	125	124	120	115	115	110	110	110
UQ	110	115	110	115	115	128	U 154	E G 155	138	130	126	130	122	131	130	138	144	132	125	115	115	115	110	110
LQ	110	110	105	105	108	115	122	125	130	120	120	115	110	110	110	110	112	112	112	110	110	105	105	105

APR. 1989 | H'ES (KM)

IONOSPHERIC DATA

APR. 1989 | TYPES OF ES | 135° E Mean Time (G.M.T. + 9 h)

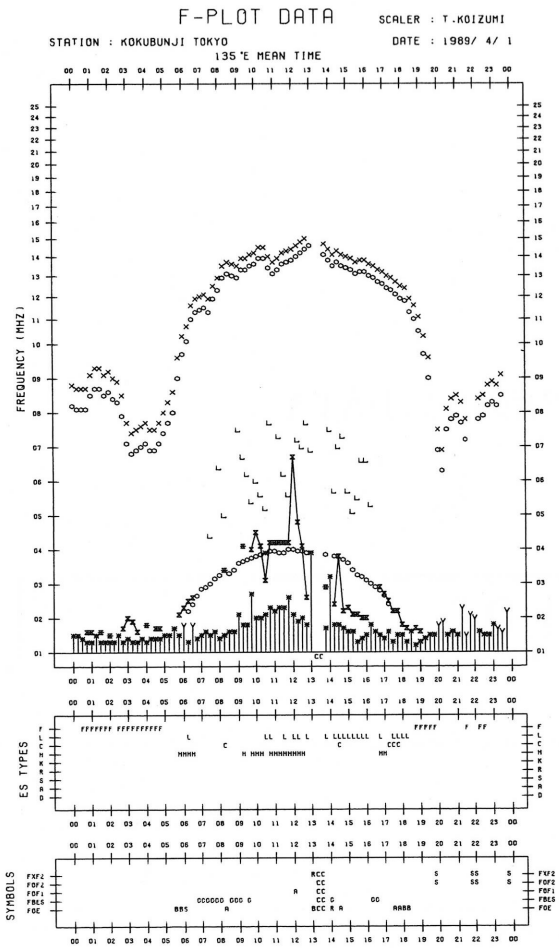
Station KOKUBUNJI TOKYO Lat. 35° 42' 4 N Long. 139° 29' 3 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

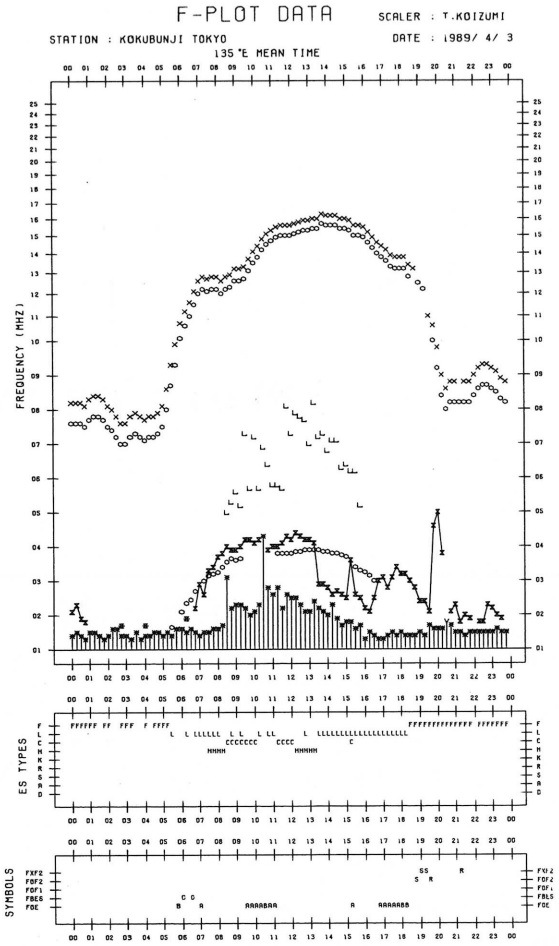
Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		F 1	F 1	F 5	F 1		H 1				H 1	H 1	HL 21			L 1	L 1	H 2	L 2	F 2				
2			F 2		F 5	F 4	L 1		H 1	C 2	C 2	C 1	L 1	C 2	L 1	L 2	HL 23	CL 42	CL 42	F 4	FF 32	F 2	F 2	F 2
3	F 3	F 1	F 1	F 1	F 1	F 1		L 3	HL 22	C 1	C 1	L 2	C 1	H 1	L 1	L 1	L 1	L 3	LL 31	FF 11	FF 52	F 3		F 3
4	F 2	F 3	F 3						C 1	C 1	L 2	L 1	L 1	L 2	L 1	L 1		H 2	L 4	FF 15	FF 53	F 2	F 2	F 2
5		F 1	F 1	F 2	F 4			H 1	H 1	C 2	C 2	L 2		L 1					C 2	F 2				F 2
6	F 1		F 1	F 2	F 1	F 1				H 1	C 1	C 1	C 1	L 2	L 1	L 1	L 2	HL 13	L 3	F 2	F 3	F 1	F 5	F 1
7	F 1	F 1	F 1	F 1	F 2	F 3			H 1	C 1	C 2	C 2	L 2	L 2	L 1	L 1	L 1	L 2	L 2	F 3	F 2	F 2		F 1
8					F 1		H 2	H 2	C 1	C 2	L 2	L 2	L 2	L 3	L 3	L 3	L 2	LL 31	LL 21	FF 32	F 5	FF 11	F 3	
9		F 2	F 2						H 2	H 2		L 1	L 1	L 2	L 1	L 2	L 3	L 3	L 3	F 3	F 1	F 3	F 1	
10					F 2			H 1	H 1	C 1	C 1	C 1		C 1	C 1			H 1	C 3	F 5	F 2	F 1	F 1	
11												C 1		L 1			LH 21	LH 21	CL 42	FF 42	FF 11			
12								H 1	H 1	H 1	C 1		L 1		L 1	L 1	HL 11	H 3	C 2		F 1			
13							H 1	H 1	H 1		C 1	C 1	C 1	C 1	C 2			H 2	C 3	F 5				F 2
14								H 1	H 2	H 1	C 1	C 1	C 1	C 2	CL 11	L 1	H 1	H 1	C 3	F 2	F 2	F 3		
15										H 2	H 1	C 1	C 2	L 2	L 2	HL 23	L 3	L 2	L 3	F 5	F 2		F 1	F 1
16			F 1	F 3	F 4			H 1	H 2	H 1	C 2	H 1	L 1			L 1		L 1	L 1			F 2	F 4	F 2
17	F 1	F 1	F 1	F 6	F 4	L 4	C 4	L 3	L 3	L 1				H 1		HL 11	H 2	C 3				FF 51	F 5	F 1
18	F 1	F 1				L 1	L 1	L 2	L 2	L 1	H 1	H 1	H 1		L 1	H 1	CL 31	C 2	H 1	F 2	F 3	F 4		F 4
19					F 1	L 1	HL 12	H 1	H 1	C 1	L 1	L 1	L 1		L 2	H 1	H 1	C 3	C 4	F 5	F 5	F 4	F 4	F 2
20	F 1						L 1		H 1	H 1	C 1					H 1	H 2	LH 12	C 3	F 4	F 2	F 2	F 3	F 3
21	F 2							H 1	H 1	H 1	H 1	H 1	L 2	H 1	H 1	CL 11	HL 11	H 1						
22							H 1	H 1	H 1	H 1	H 1	H 1	C 1			H 2	H 2	H 2	L 2	F 4			F 4	F 4
23	F 1							H 1		H 2	H 1	C 1	C 2	H 1	H 1	H 1	C 2	C 4	L 4	F 5	F 4	F 5		F 2
24	F 3	F 4	F 2	F 4	F 2	L 1	H 1	HL 11	H 1	H 2	C 1	C 2	H 1	H 2	H 1	H 2	C 1	C 2	C 4	F 4	F 2	F 1		F 1
25	F 4	F 4	F 2		F 2	L 3	H 1	H 1	H 1	H 1	H 2	H 2	H 2	H 1		C 2	C 2	CL 21	C 3	F 6	F 4	F 5	F 4	F 5
26	F 4	F 4	F 1		F 5		H 2	H 2	H 2	C 1	C 1						H 2	H 3	C 3	F 5	F 2	F 6	F 3	F 1
27							H 1	H 2	C 3	C 1	C 1	C 1						H 1	C 3		F 1	F 1	F 2	FF 22
28	F 1	F 1		F 2	F 2	H 1	H 2	H 2	H 1	L 1	C 1	C 1	H 1		H 1	H 1			C 4	F 6	F 6	F 5	F 3	
29	F 2			F 1		C 2	H 1	C 2	H 1	H 1	H 2	H 1	C 2	C 1	H 1	H 2	H 1	C 2	C 4	F 5	F 5	F 5	F 6	F 6
30	F 3	F 3	F 4	F 3	F 5	C 3	C 3	C 1	C 3	C 2	C 1	H 1	H 1	H 1	H 2	H 1	H 2	H 3	C 3	F 5	F 5	F 3	F 5	F 5
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
UQ																								
LQ																								

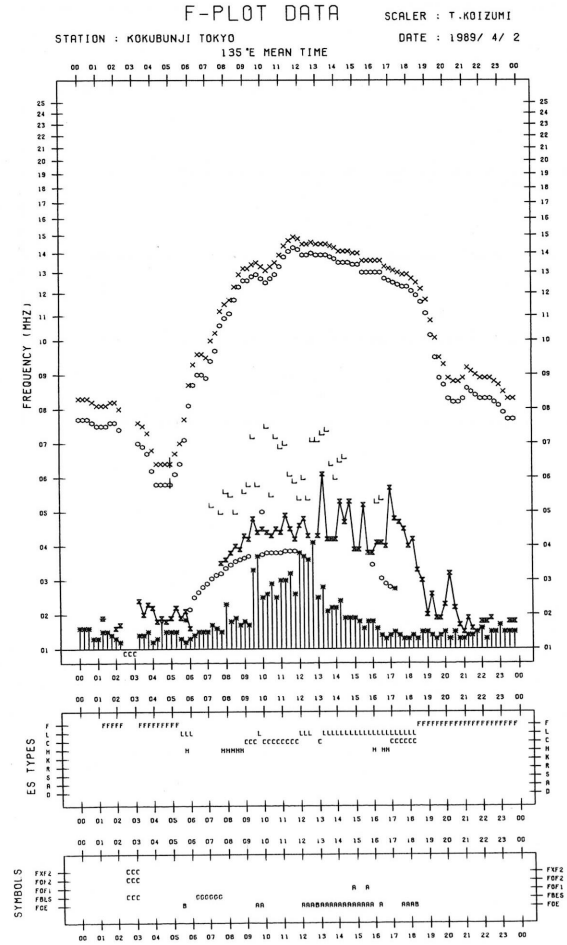
APR. 1989 | TYPES OF ES

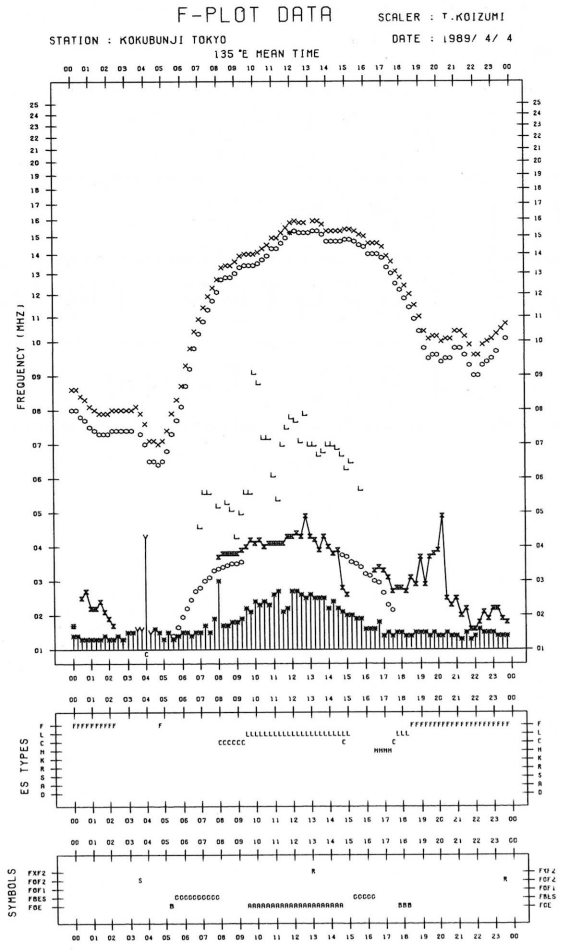
f-PLOTS OF IONOSPHERIC DATA

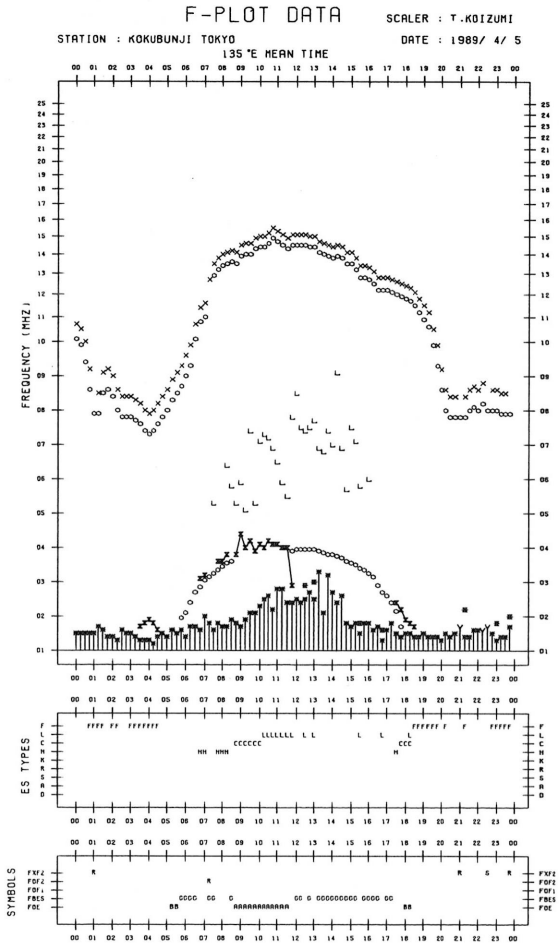
KEY OF F-PLOT	
I	SPREAD
○	FOF2, FOF1, FOE
×	FXF2
✳	DOUBTFUL FOF2, FOF1, FOE
⧖	FBES
∟	ESTIMATED FOF1
↑, ↑	FMIN
∧	GREATER THAN
∨	LESS THAN

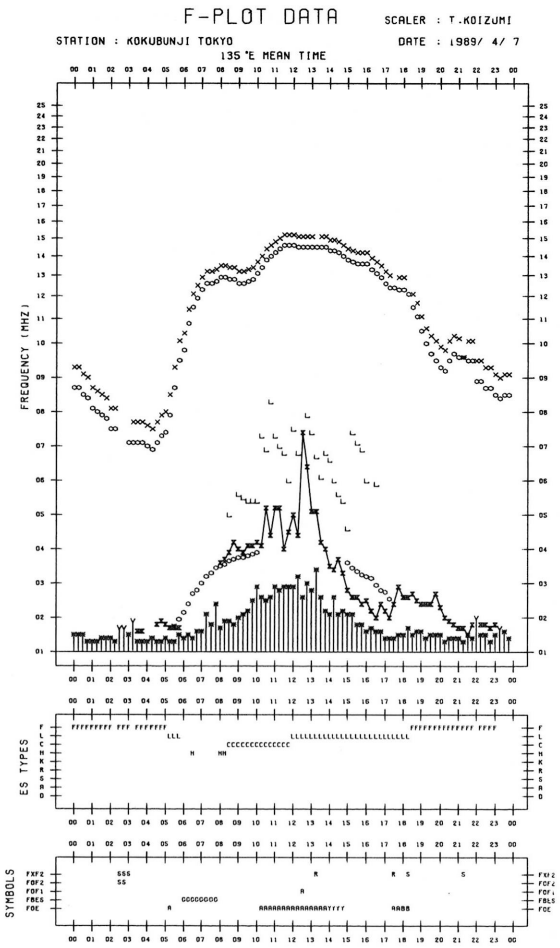

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/ 1
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

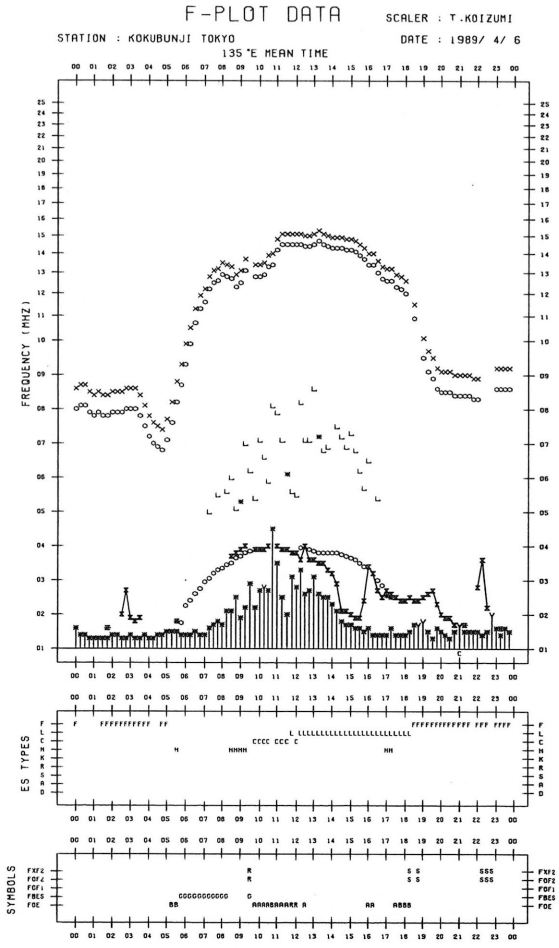

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/ 3
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

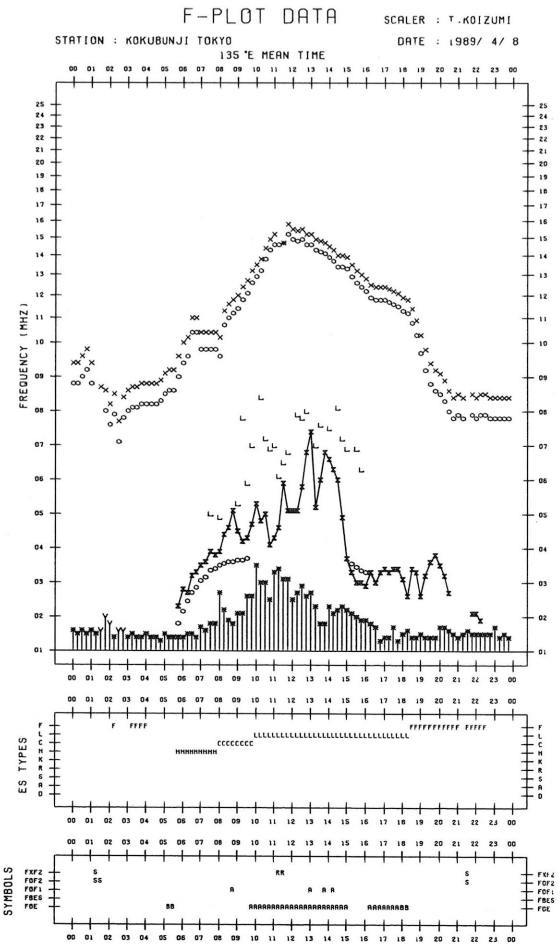

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/ 2
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

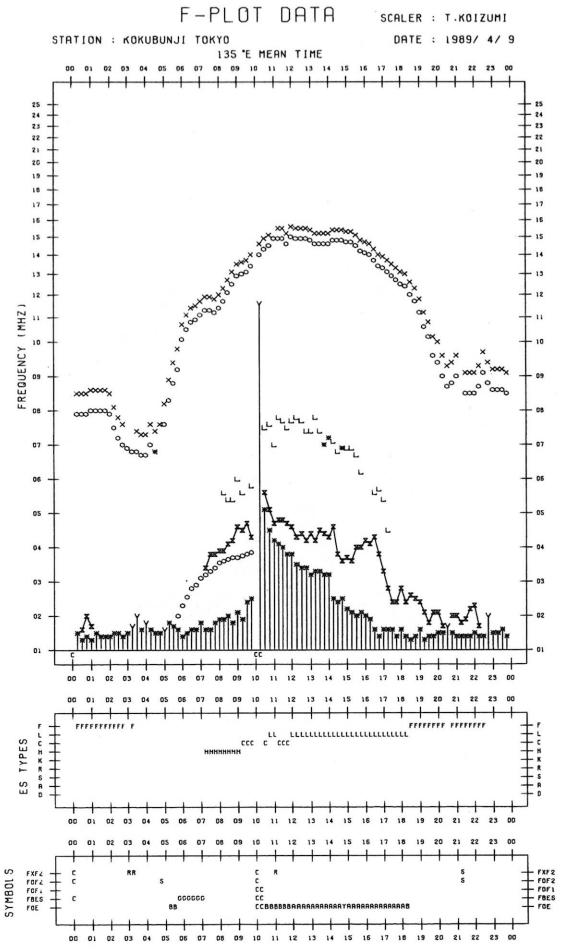

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/ 4
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

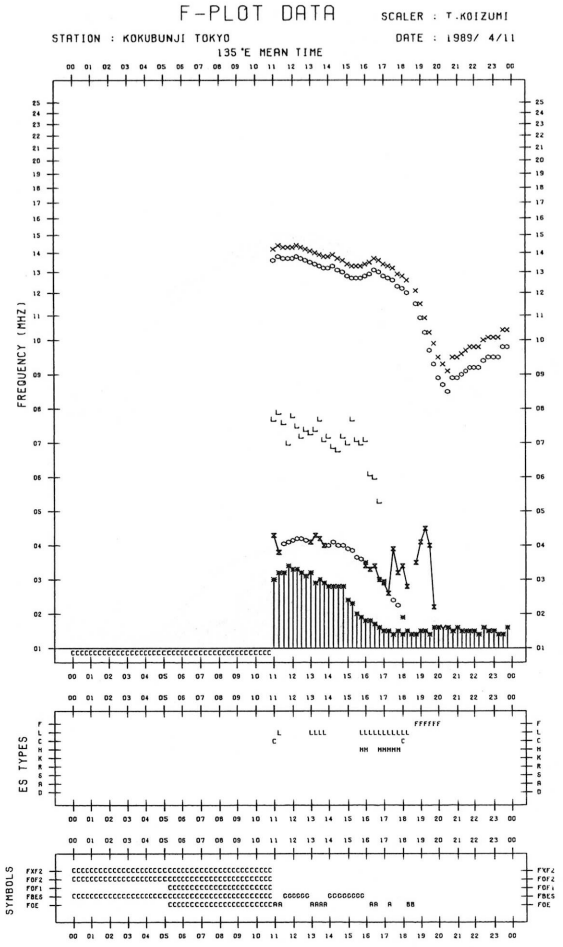

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/ 5
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

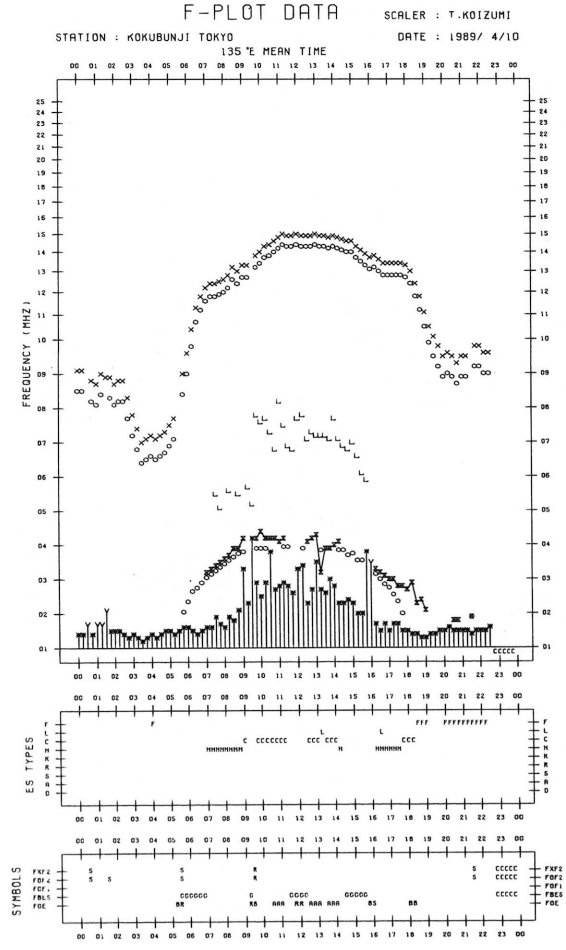

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/ 7
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

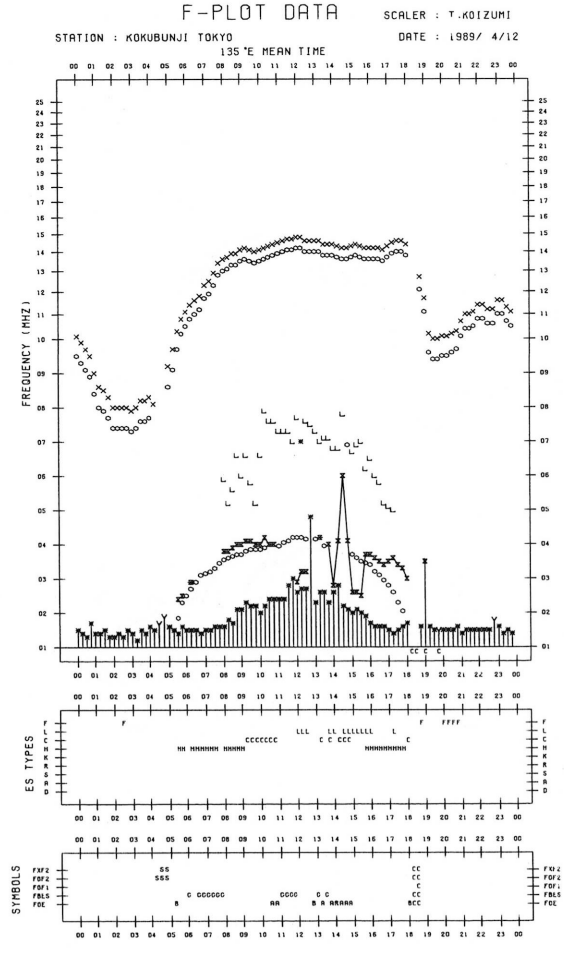

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/ 6
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

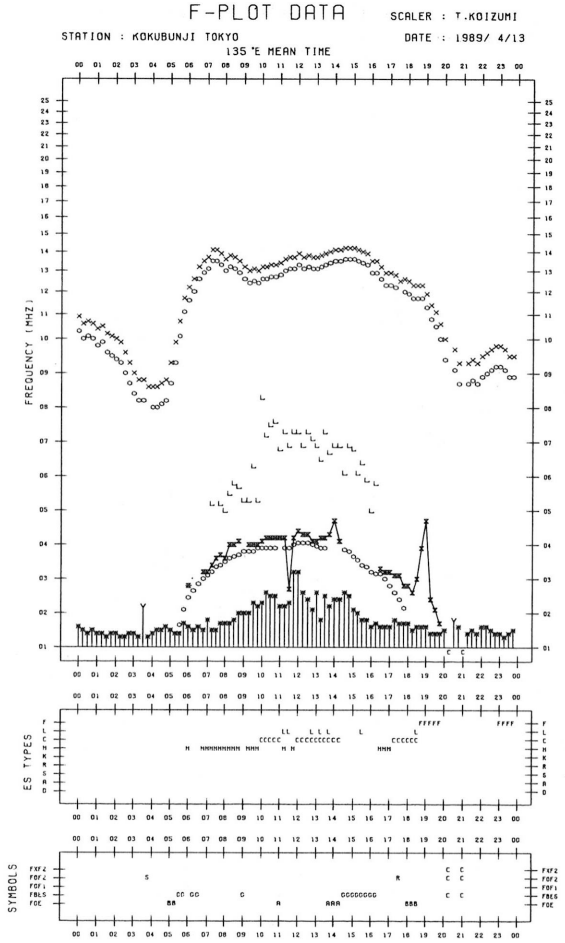

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/ 8
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

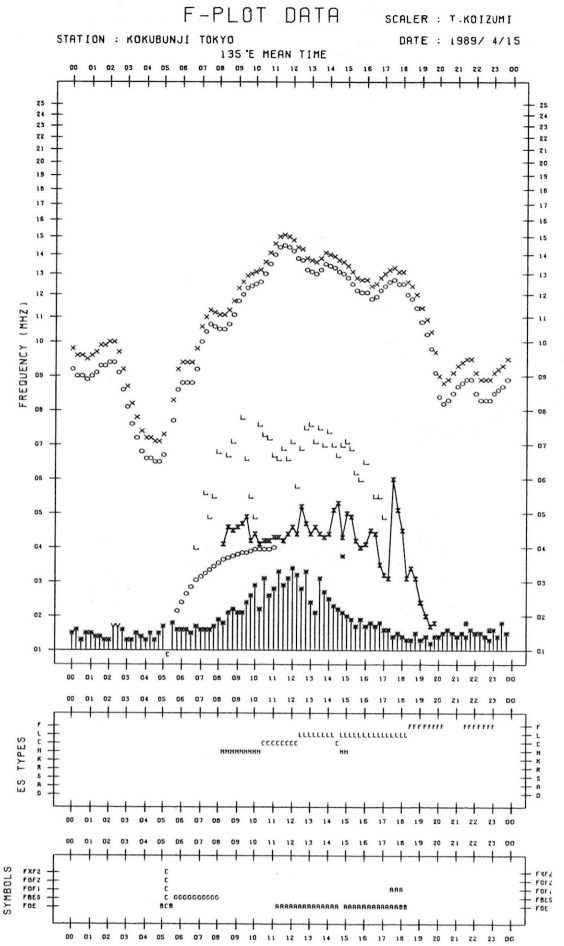

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/ 9
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

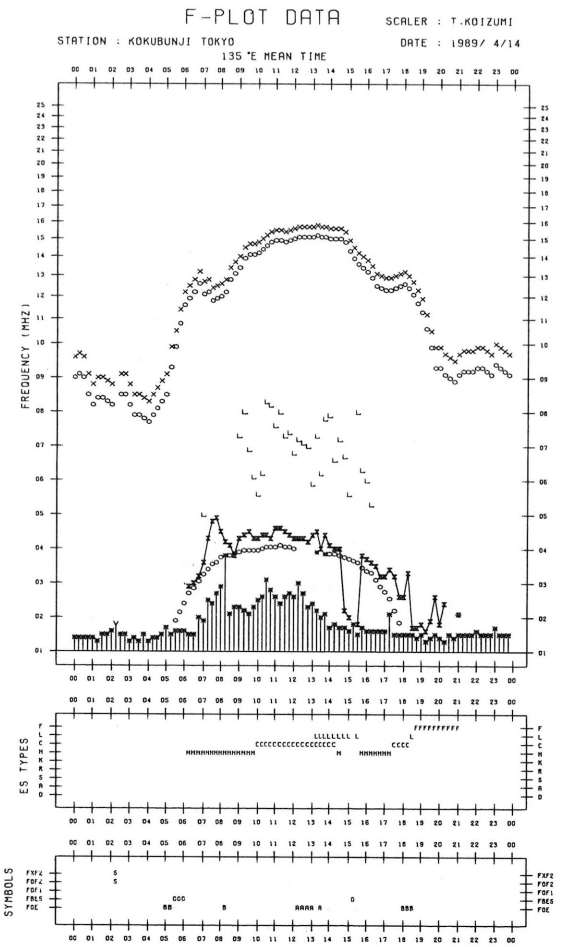

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/11
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

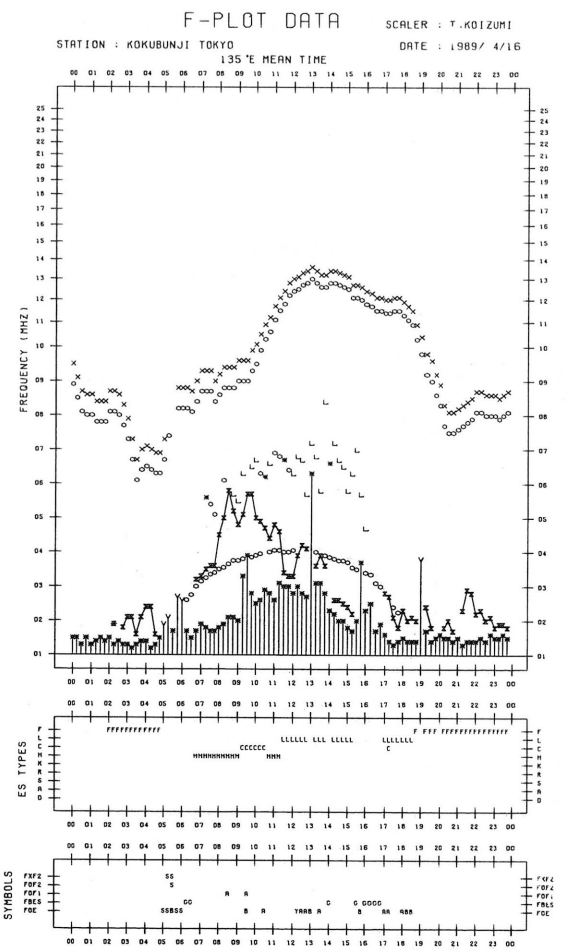

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/10
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

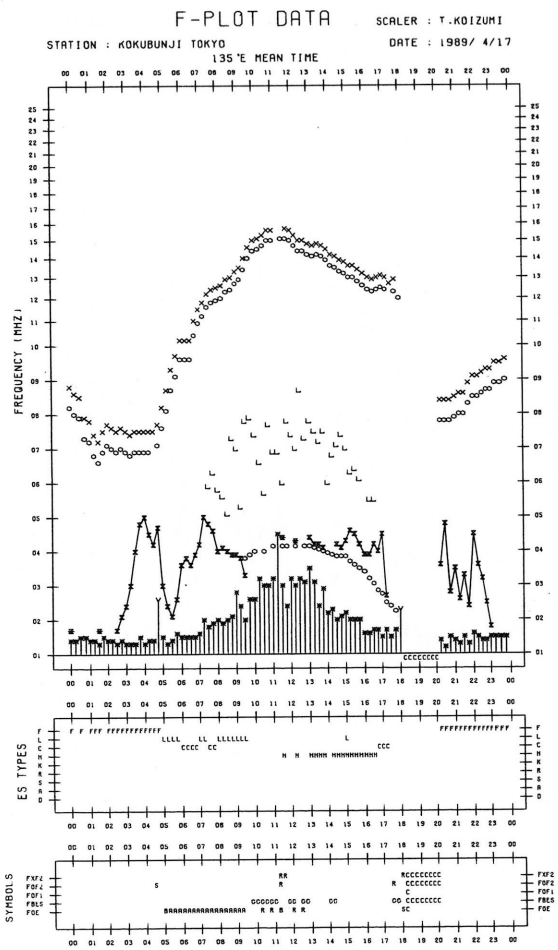

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/12
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

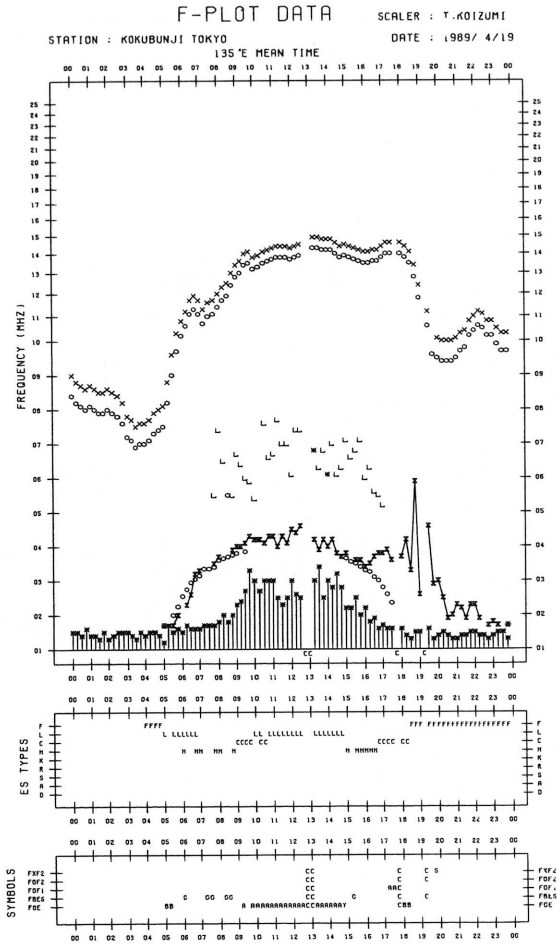

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/13
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

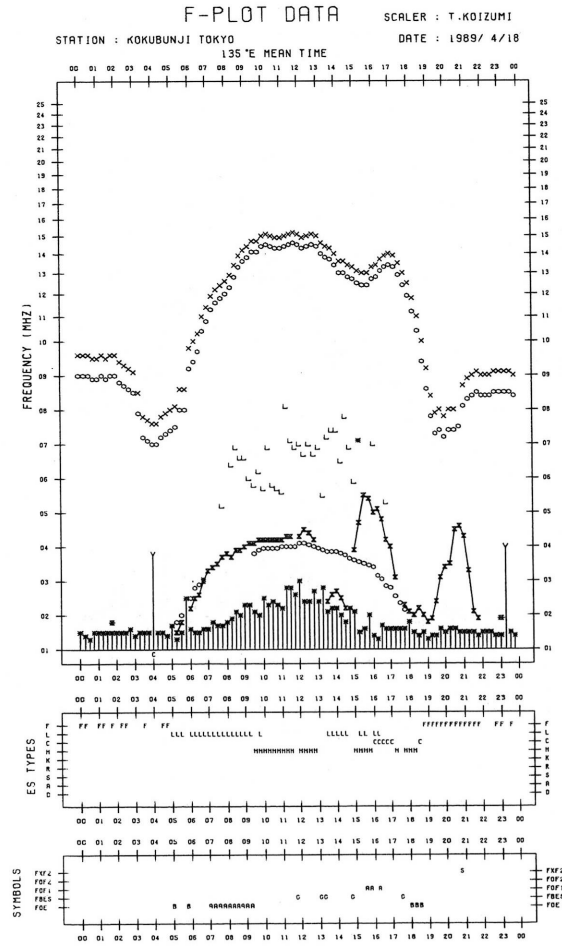

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/15
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/14
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/16
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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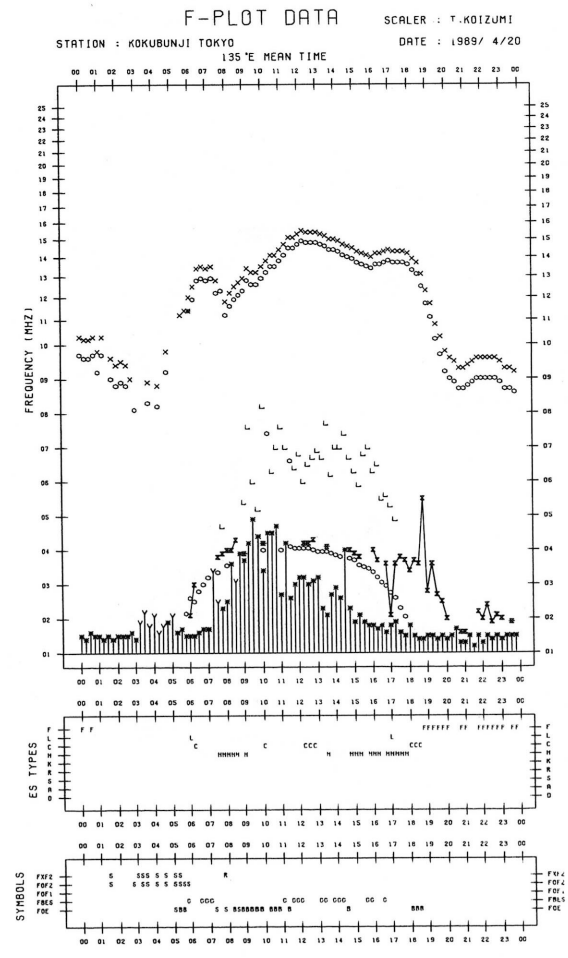
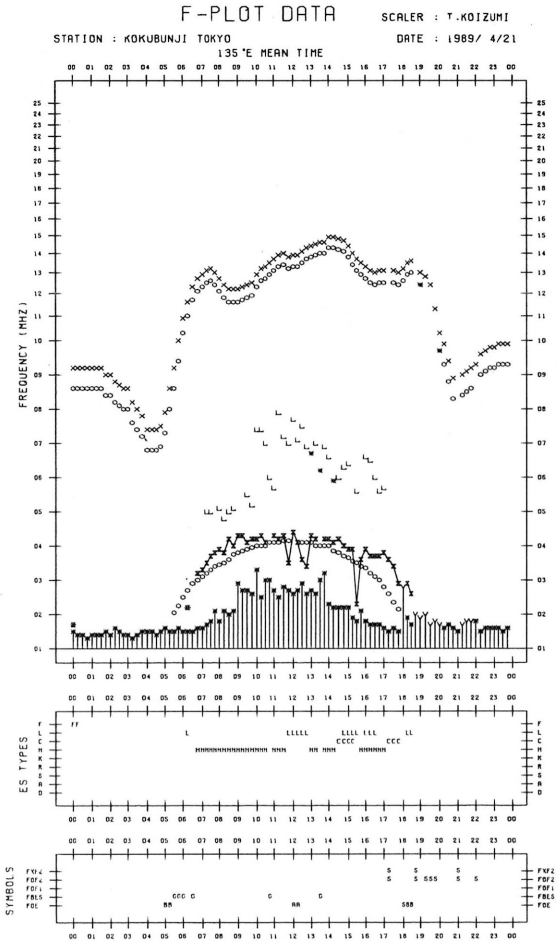
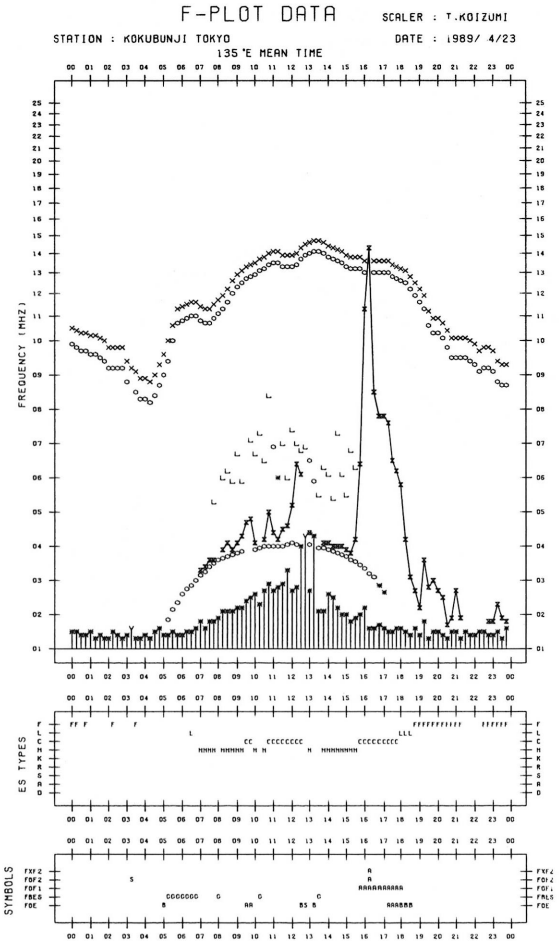
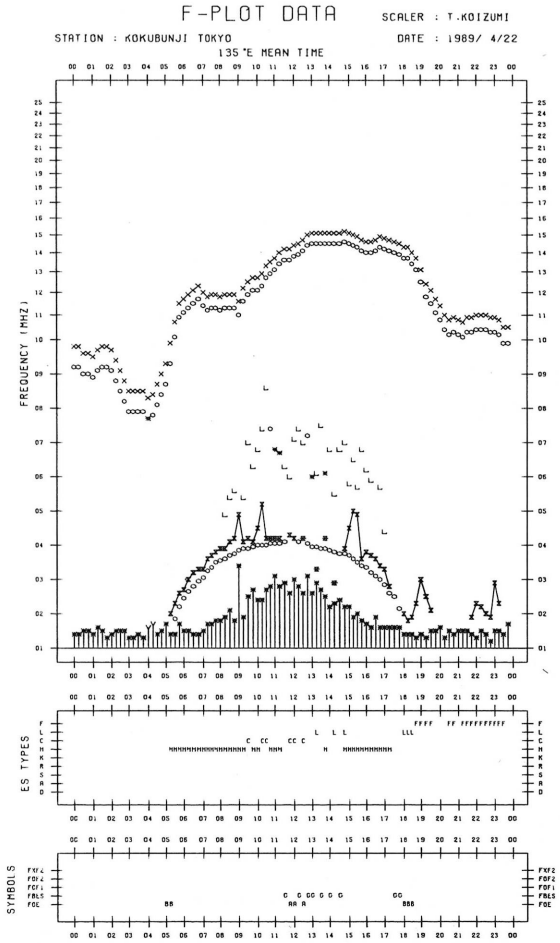
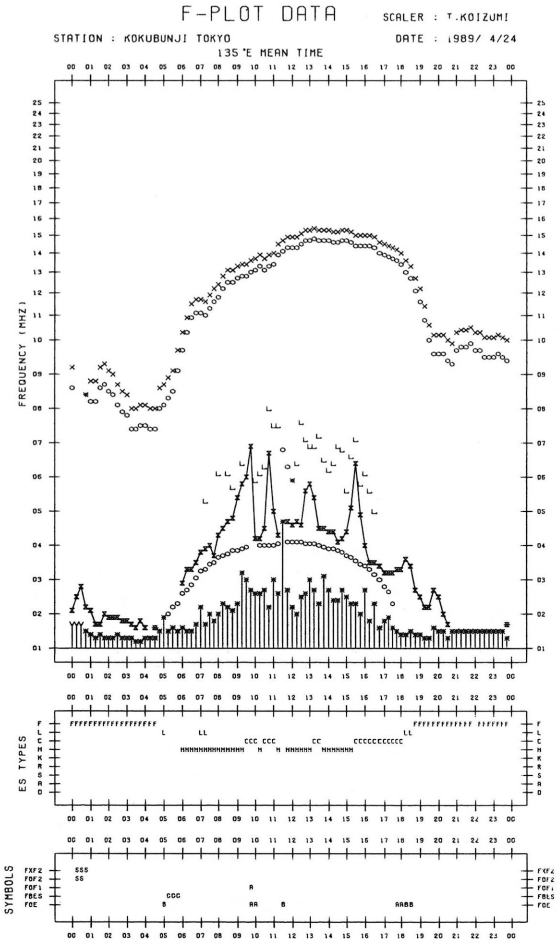
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

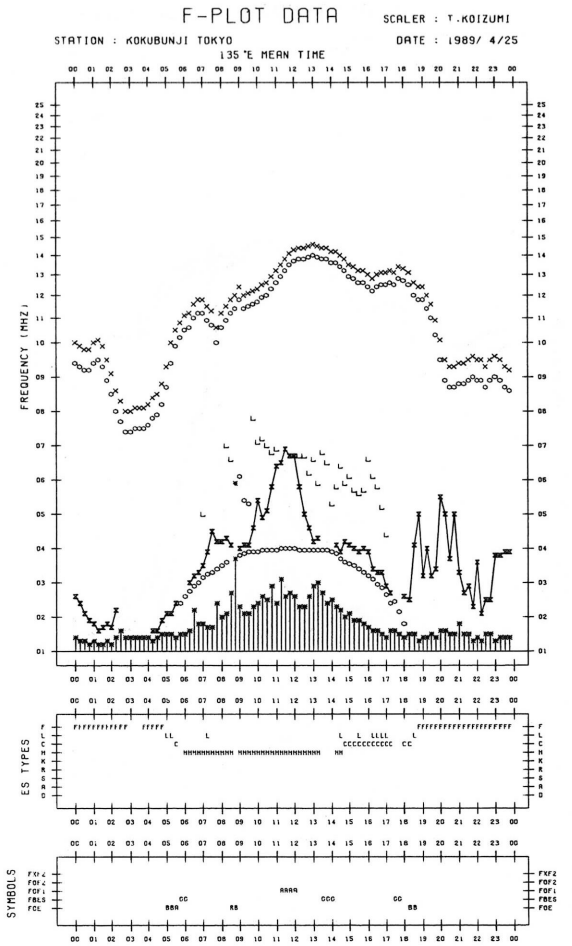

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

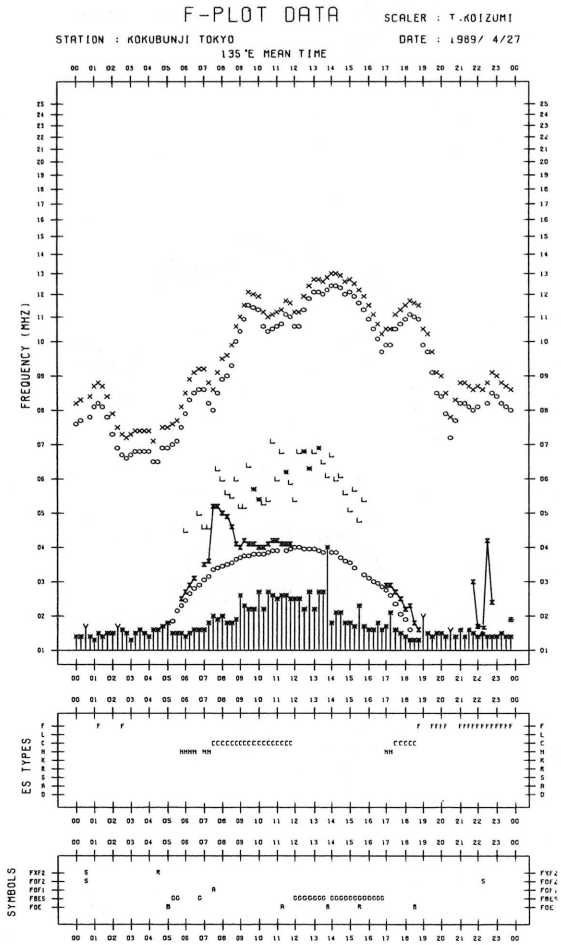

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/21
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

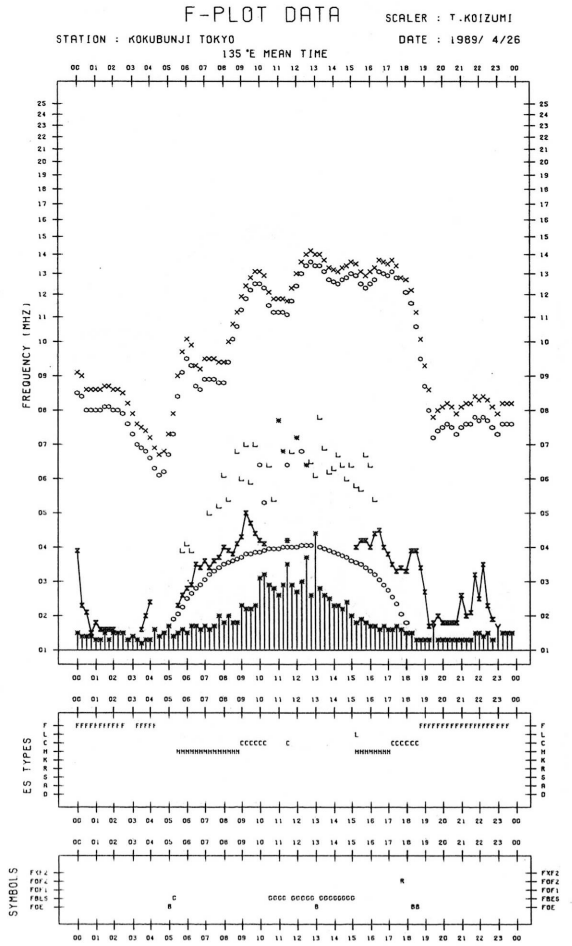

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/23
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

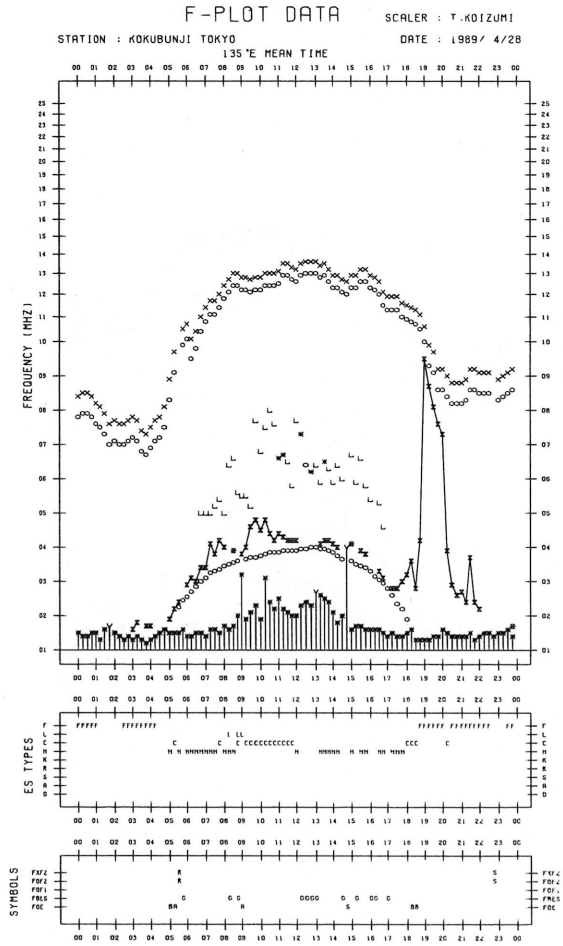

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/22
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

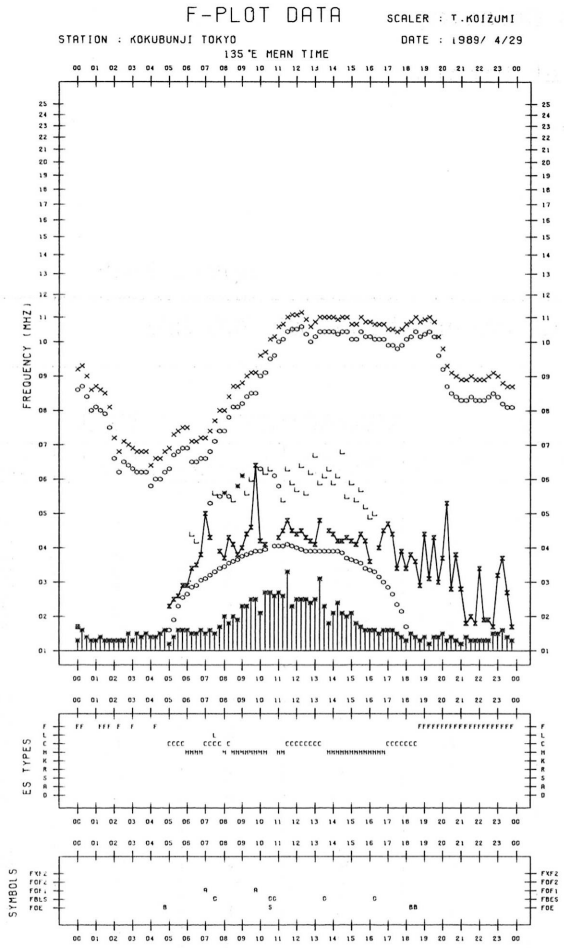

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/24
135 'E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

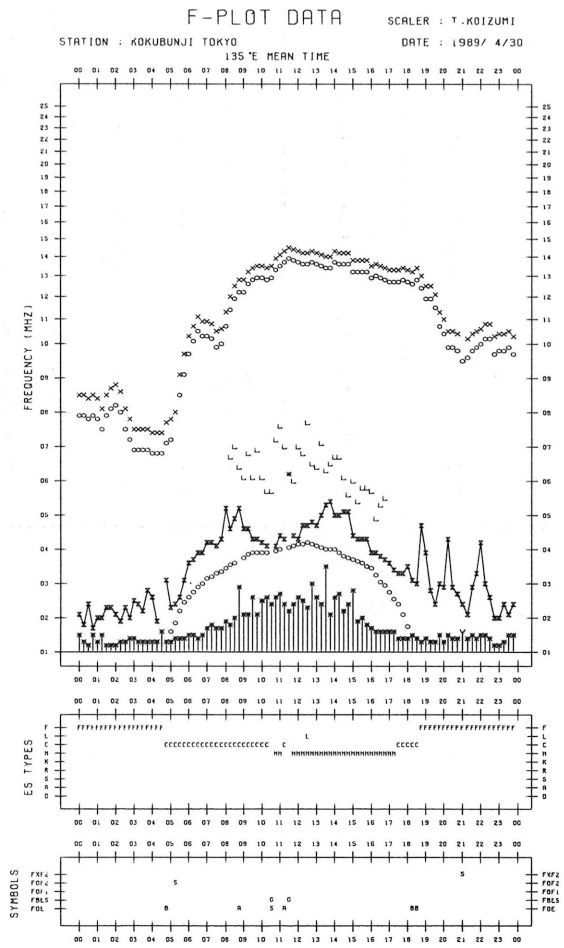

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/25
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/27
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/26
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/28
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/29
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 4/30
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

B.Solar Radio Emission

B1.Daily Data at Hiraiso

200 MHz

Hiraiso April 1989

Single-frequency total flux observations at 200 MHz

	FLUX DENSITY: 10^{-22}Wm^{-2}Hz^{-1}					VARIABILITY: 0 TO 3				
UT	00-03	03-06	06-09	21-24	DAY	00-03	03-06	06-09	21-24	DAY
DATE										
1	-	-	B	B	B	-	-	2	1	2
2	B	B	B	B	B	3	2	3	2	2
3	B	B	B	B	B	2	3	3	3	3
4	B	B	B	B	B	3	3	3	3	3
5	B	B	B	B	B	2	2	3	2	3
6	15	B	B	B	B	1	2	3	2	2
7	B	B	B	14	B	2	3	3	1	2
8	15	B	15	B	B	1	2	0	1	1
9	B	B	B	18	B	1	1	3	*	2
10	B	18	16	16	18	*	*	*	0	*
11	15	14	14	16	15	0	0	0	0	0
12	18	16	15	19	16	1	1	0	1	1
13	17	16	17	B	17	1	0	1	2	1
14	B	B	B	*	B	3	3	3	*	3
15	*	*	*	B	*	*	*	*	2	*
16	B	*	*	B	B	2	*	*	3	2
17	B	B	B	B	B	3	3	3	3	3
18	B	B	B	B	B	3	3	3	3	3
19	B	B	B	B	B	2	2	3	1	3
20	B	B	B	B	B	1	2	3	2	2
21	B	B	B	B	B	2	1	2	2	2
22	B	14	12	B	B	(3)	*	*	3	1
23	B	B	B	(B)	B	3	3	3	(3)	3
24	*	*	B	B	(B)	*	*	2	2	(2)
25	B	B	B	B	B	2	3	2	2	2
26	B	B	B	B	B	2	2	(2)	2	2
27	B	B	B	B	B	2	2	2	1	2
28	B	B	B	11	B	1	0	0	0	1
29	12	11	11	11	11	0	0	1	*	0
30	12	11	12	10	12	0	*	*	*	*

Note: No observations during the following periods.

1st 0000 - 0638

B.Solar Radio Emission

B1.Daily Data at Hiraiso

500 MHz

Hiraiso April 1989

Single-frequency total flux observations at 500 MHz					
FLUX DENSITY: $10^{-22}Wm^{-2}Hz^{-1}$					
UT	00-03	03-06	06-09	21-24	DAY
DATE					
1	66	72	64	B	66
2	-	-	-	-	-
3	58	57	56	66	57
4	67	65	66	62	66
5	62	62	60	62	62
6	62	64	70	64	64
7	64	62	66	61	64
8	65	64	63	65	63
9	66	66	64	63	65
10	65	65	66	63	65
11	65	65	63	62	64
12	62	62	61	63	62
13	64	64	63	67	64
14	68	67	62	60	66
15	62	62	60	58	61
16	60	61	60	B	60
17	B	B	B	71	B
18	70	71	69	-	70
19	65	64	B	-	B
20	56	57	55	56	56
21	55	55	54	51	55
22	54	55	54	54	54
23	54	54	53	53	54
24	55	52	B	47	54
25	49	48	46	47	48
26	48	47	47	46	47
27	46	47	46	48	47
28	48	48	48	50	48
29	50	51	50	48	50
30	47	48	48	47	48

Note: No observations during the following periods:

1st 0000 - 0115
2nd 0000 - 0900, 2024 - 2338
4th 0300 - 0408
18th 2005 - 2340
19th 2005 - 2340

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso April 1989

Single-frequency observations

Normal observing period: 2010 - 0915 U.T. (sunrise to sunset)

APR 1989	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN)	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
1	200	48 C	2024E	2200	340D	2500	940	SL
	500	48 C	2024E	2235.8	215D	700U	-	SL
	100	48 C	2024E	2251.5	340D	4800	690	SL
2	200	44 NS	0200E	-	430D	-	15	WL
	200	8 S	0602.0	0602.4	0.5	260	-	0
	200	44 NS	2024E	-	770D	-	12	WL
3	100	46 C	0206.6	0211.2	4.8	900	-	-
	200	27 RF	0238	0436	210	116	45	ML
	100	43 NS	0253	0440	230	125	63	-
	100	42 SER	0313	0436.3	168	480	-	-
	100	44 NS	2020E	2117	770D	840	330	SL
	200	44 NS	2020E	2120	770D	500	179	SL
4	500	46 C	0518.0	0531.0	35	11	5	WL
	200	44 NS	2020E	2200	770D	220	38	ML
5	200	42 SER	0107.9	0115.8	15.2	670	-	WL
	200	42 SER	0758	0800	35.6	305	-	0
	200	44 NS	2020E	2126	100D	24	4	0
6	200	43 NS	0148	0710	420D	130	16	WL
	500	46 C	0509.0	0512.8	8.5	9	4	0
	500	27 RF	0617.5	0718.0	113	30	15	0
	200	44 NS	2016E	0508	770D	35	13	ML
	200	46 C	2345.4	2346.2	1.2	170	-	WL
7	500	21 GRF	0406.5	0545.5	141	16	4	WL
8	500	20 GRF	0022.5	0034.5	55	9	4	WL
	200	42 SER	0049.5	0100	34.3	160	-	ML
	500	27 RF	0235.0	0307	68	8	3	WL
	200	27 RF	0247.0	0300	59	29	5	ML
	200	24 R	2015E	-	540D	-	7	WL
	500	42 SER	2106.8	2303.5	210	34	-	0
	200	46 C	2302.8	2306.3	4.6	16	-	ML
9	100	46 C	0044.6	-	11.9	1000D	-	-
	200	46 C	0044.6	0116.2	38.9	95	47	ML
				0056.1		65		WL
	500	46 C	0045.8	0057.5	38.0	132	25	0
	200	8 S	0054.5	0054.5	0.5	5000	-	0

APR 1989	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22} Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22} Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
9	500	4 S/F	0201.8	0202.4	5.5	12	-	WL
	200	46 C	0203.6	0203.7	4.0	670	-	O
	100	46 C	0203.8	0204.8	3.3	980	-	O
	200	43 NS	0507	0714	172	17	2	WL
10	200	41 F	0153	0229	67	54	-	WL
	500	27 RF	0153.5	0227	67	13	7	O
	500	23 GRF	0435	0529	140	15	8	O
13	500	27 RF	0134.5	0154.0	77	4	2	O
	200	8 S	0641.8	0642.0	0.3	280	-	O
	500	8 S	0642.0	0642.3	0.7	1400	-	O
	200	44 NS	2007E	0123	780D	40	17	WL
	500	27 RF	2252	2306	73	27	16	O
14	200	46 C	0010.6	0011.0	1.3	775	-	O
15	200	44 NS	2007E	-	240D	-	12	WL
16	200	42 SER	0322.4	0323.5	18.5	187	-	O
	500	46 C	0350.5	0351.3	1.5	54	-	O
	100	44 NS	2000E	2043	780D	320	85	-
	500	44 NS	2000E	2115	620D	80	30	MR
	200	44 NS	2000E	2300	780D	490	215	SR
17	500	41 F	0328.0	0330.0	3.5	74	-	O
	100	44 NS	2000E	2107	780D	580	89	SL
	200	44 NS	2000E	0100	780D	240	86	SL
18	200	44 NS	2000E	0611	780D	150	31	SL
19	200	46 C	0251.7	0253.0	2.0	85	-	MR
	500	23 GRF	0510	0602	160	33	10	WL
	100	43 NS	0512	0642	198D	120	30	-
	200	44 NS	2000E	2325	780D	8	4	WL
20	200	44 NS	2000E	2040	780D	23	6	WL
	500	8 S	2330.2	2330.3	0.3	190	-	O
21	500	46 C	0434.5	0435.0	4.5	235	-	O
	200	8 S	0800.1	0800.5	0.7	580	-	O
	200	44 NS	2000E	0000	270D	13	4	WL
	200	46 C	2314.2	2314.5	1.3	187	-	O
	100	46 C	2314.2	2314.5	1.3	250	-	-
	200	46 C	2348.3	2348.6	1.1	75	-	O
	500	46 C	2348.8	2349.6	3.1	296	-	WL
22	500	46 C	0132.8	0133.2	3.0	230	-	SL
	200	46 C	0133.0	0133.0	1.5	140	-	O
	200	46 C	0329.7	0331.4	6.6	885	-	O
	100	46 C	0330.4	0331.1	2.0	910	-	O
	500	46 C	0330.8	0331.7	6.0	215	-	SL
	200	27 RF	0345.5	0402.6	86	6	4	O
	100	42 SER	0543.9	0544.9	11.9	18000	-	O
	200	42 SER	0544.0	0544.2	11.9	16000	-	O
	500	42 SER	0544.8	0544.8	12.0	286	-	WL
	200	46 C	0823.8	0824.4	4.6	2100	-	O
	100	42 SER	0824.4	0826.4	4.0	670	-	WL
	500	46 C	0824.5	0825.8	6.0	56	-	WL
	200	44 NS	1955E	0600	780D	37	11	WL
	200	46 C	2021.3	2021.8	1.5	815	-	O
22	100	46 C	2021.3	2021.8	1.5	1500	-	O
23	500	42 SER	0635.0	0637.5	3.0	850	-	O
	200	44 NS	1950E	-	780D	-	7	O
24	500	46 C	0336.8	0338.0	2.4	37	-	WR
	500	27 RF	0535	0557.3	84	48	8	O
	200	44 NS	1950E	2230	780D	25	5	O
25	200	44 NS	1950E	2124	790D	29	17	MR
26	200	44 NS	1950E	0305	790D	28	17	MR
27	200	24 R	1950E	0100	790D	11	5	MR
28	500	46 C	0619.5	0630.7	17	23	4	O
29	500	42 SER	0450	0531.0	54	39	-	WL
	500	42 SER	0709	0747.5	65	50	-	WL
	500	42 SER	2040	2244.0	145	38	-	WR
30	500	21 GRF	0500	0600	105	12	4	WL

C. RADIO PROPAGATION

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

APR 1989 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

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

APR 1989 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

UT DAY	00H 45M	01H 45M	02H 45M	03H 45M	04H 45M	05H 45M	06H 45M	07H 45M	08H 45M	09H 45M	10H 45M	11H 45M	12H 45M	13H 45M	14H 45M	15H 45M	16H 45M	17H 45M	18H 45M	19H 45M	20H 45M	21H 45M	22H 45M	23H 45M
1	-15	-15	-2	1	9	14	19	24	19	24	19	29	21	20	18	18	20	21	11	8	6	-2	-3	ES -24
2	-9	-11	-4	3	11	16	23	21	24	22	27	29	14	25	21	22	15	16	22	9	10	0	-7	ES -24
3	-9	ES -24	-6	5	9	16	18	24	23	21	32	19	21	16	20	ES -24	-15	19	16	2	-1	-2	-6	-9
4	-5	-14	-8	3	12	17	20	23	24	27	23	25	24	25	23	25	11	14	11	4	4	-2	-5	-23
5	-9	-9	-1	0	13	17	16	22	23	26	26	24	22	19	23	15	15	16	24	7	1	-2	-11	-11
6	ES -24	-9	-3	3	9	14	20	21	22	27	27	22	23	19	17	23	17	16	17	8	-2	-5	-5	ES -24
7	ES -24	ES -24	-7	-2	9	14	18	22	22	26	19	22	22	29	21	22	15	13	2	-1	2	-1	ES -24	ES -24
8	ES -24	ES -24	-12	2	8	15	18	15	26	21	24	22	15	21	21	21	16	23	-5	5	-3	-15	-12	ES -24
9	ES -23	ES -23	ES -23	-3	4	16	23	23	27	23	29	24	23	22	32	26	23	13	-2	14	4	-2	ES -23	ES -23
10	ES -24	ES -24	-6	-1	9	19	17	20	28	25	24	26	24	20	25	22	23	18	14	2	2	ES -24	ES -24	ES -24
11	ES -24	ES -24	ES -24	-5	5	18	19	26	22	26	23	26	16	20	16	15	21	16	4	5	3	-6	-15	ES -24
12	ES -24	ES -15	1	2	8	15	23	22	24	27	25	24	22	26	26	15	22	22	17	10	11	1	-9	ES -24
13	ES -24	ES -24	-7	0	13	20	19	19	27	24	23	26	25	22	25	23	16	15	7	11	0	ES -24	ES -24	ES -24
14	ES -23	ES -14	-8	-2	13	17	20	22	25	21	21	25	21	25	-1	-3	27	17	16	4	2	-14	-14	ES -23
15	ES -23	ES -23	-8	3	7	19	20	20	24	26	26	13	13	14	19	16	23	26	14	10	-1	-6	ES -23	ES -23
16	ES -23	ES -23	-10	-2	6	17	18	19	25	27	26	31	21	16	15	12	-3	18	FS -14	3	-1	ES -14	ES -14	ES -14
17	ES -24	ES -24	-20	-3	7	17	22	23	23	26	23	20	18	22	19	14	6	21	3	10	-2	-9	-9	-20
18	ES -24	ES -24	-20	2	10	17	18	20	23	21	21	22	18	22	19	-4	-1	22	2	7	1	-15	-15	ES -24
19	ES -24	ES -24	-5	-1	8	12	16	21	22	26	22	24	22	15	24	22	24	20	4	4	-4	-9	-20	-20
20	ES -24	ES -15	-4	1	8	14	17	20	26	27	23	23	24	14	13	13	10	16	11	3	1	-1	-7	-11
21	ES -25	-10	-4	-2	0	16	19	20	20	23	23	22	19	21	19	23	20	17	4	5	5	-4	-12	-21
22	-19	ES -25	-8	-8	6	13	17	23	23	24	28	23	23	20	21	22	23	15	12	5	2	-5	-7	-8
23	-11	-10	-7	1	8	15	20	22	18	23	28	19	20	15	17	16	16	16	8	-2	-1	-12	ES -25	-19
24	ES -25	ES -21	-2	-2	5	11	20	19	22	28	22	22	22	19	14	18	17	15	-1	4	0	-7	-10	-11
25	-6	-10	-1	0	9	16	19	23	25	24	26	23	23	18	17	18	20	20	-1	-1	0	-6	-19	12
26	-11	-12	-8	-4	11	15	21	22	15	4	-4	-10	18	15	-11	-11	17	5	8	4	2	-2	-8	-13
27	ES -13	-7	-5	2	8	8	20	23	19	21	24	21	17	25	15	8	11	16	-2	4	9	-1	-7	-12
28	-7	-10	-6	-2	11	16	19	21	22	23	15	25	20	18	16	14	25	-1	-10	0	0	-4	-17	-10
29	-13	-12	-9	0	8	14	17	19	20	21	25	21	22	20	14	4	14	20	5	5	8	1	-8	-1
30	-6	-5	-4	9	8	14	16	19	20	17	25	24	19	23	9	18	12	21	0	5	-1	-5	-5	-8
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
MED	ES -23	US -15	-6	0	8	16	19	22	23	24	24	23	21	20	19	17	16	16	6	5	1	-5	-12	US -20
UD	-6	-9	-1	3	13	19	23	24	27	27	28	29	24	25	25	23	24	22	17	10	9	0	-5	-8
LD	ES -24	ES -24	-20	-4	5	12	16	19	19	21	19	19	15	15	9	-4	-1	13	-5	-1	-2	ES -15	ES -24	ES -24

C. Radio Propagation

c2. Radio Propagation Quality Figures at Hiraiso

Hiraiso

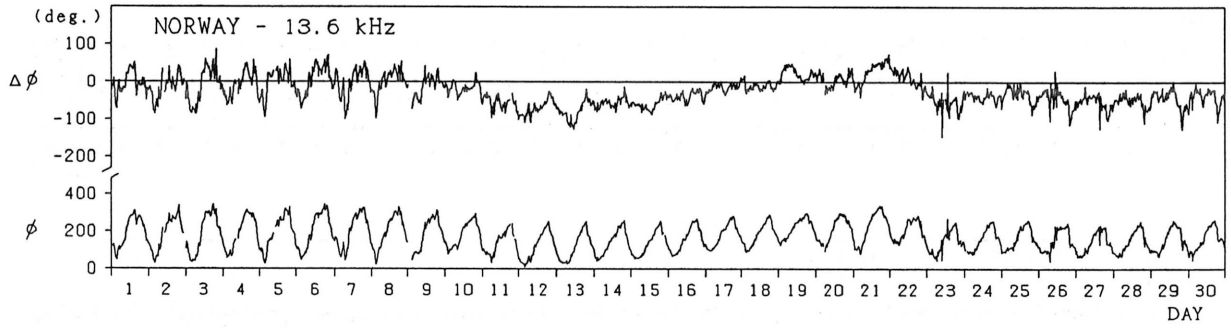
Time in U.T

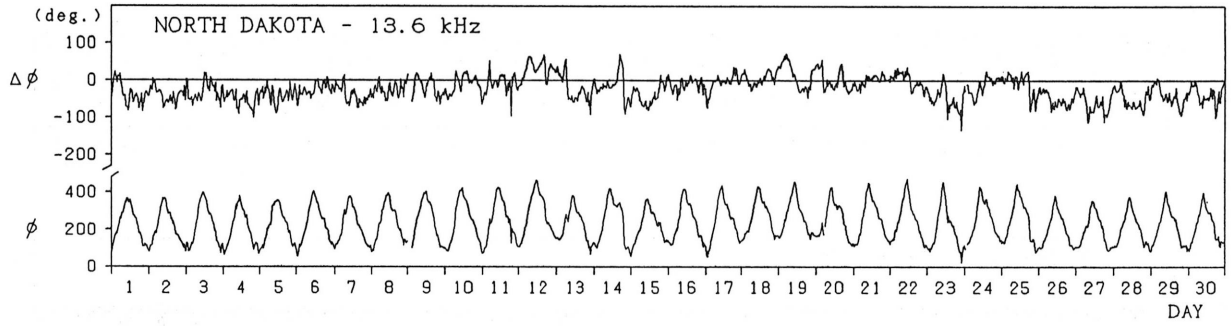
Apr. 1989	Whole Day Figure	W W V 00|06 06|12 12|18 18|24	W W V H 00|06 06|12 12|18 18|24	Conditions 00|06 06|12 12|18 18|24	Principal Geomagnetic Storms Start	Ene	Range
1	3+	3U 2U 3 S	4 4 4 4	U U U U			
2	4-	3U 3U 4 S	4 4 4 4	U U U U			
3	4-	3U 3U 4 S	4 4 3 5	N N N N			
4	4o	3U 4U 4 5U	4 4 4 4	N N N N			
5	4o	3U 4U 4 5U	4 4 4 4	N N N N			
6	4o	3U 4U 4 S	4 4 4 4	N N N N			
7	4o	4 5 4 4U	4 4 4 4U	N N N N			
8	4o	4U 4U 4 4U	4 4 4 4	N N N N			
9	4o	4U 4 4 S	3 4 4 4U	N N N N			
10	4o	4 5 3U S	4 4 4 4U	N N N N			
11	4o	4U 5 5 S	3 4 4 4	N N N N			
12	5-	5 5 5 5U	4 4 5 4	N N N N			
13	4+	5 5 5 5U	4 4 4 4U	N N N N			
14	4o	4 4 4 S	4 4 4 4	N N N N			
15	4-	3U 3U 4 S	4 4 4 4	N U U U			
16	4o	4U 4U 4 4U	4 4 4 3U	N N N N			
17	4o	4 4U 4 5U	4 4 4 4	U U U U			
18	4o	5 4 4 S	4 4 4 4	N N N N			
19	4o	4 4 3 4U	4 4 4 4	N N N N			
20	4+	5 5 4 S	4 4 4 4	N N N N			
21	4+	5 4 5 4U	4 4 4 4	N N N N			
22	4o	4 4 4 S	4 4 4 4	N N N N			
23	4-	3U 4U 4U S	4 4 4 3	N N N N			
24	4o	4 4 4 4U	4 4 4 4	N N N N			
25	4o	5 4 3U 4U	4 4 4 4	N N N N	10.3	---	171
26	3+	4U 3U 3U 4U	4 3 3 4	N N N N	---	---	
27	4o	4U 4U 3U 4U	4 4 4 4	U U U U	---	---	
28	4o	3U 4U 4 4U	4 4 4 4	U U U U	---	18.0	
29	4o	4 4 4 4U	4 4 4 5	U U U U			
30	4o	4 4 4 3U	4 4 4 4	U U U U			

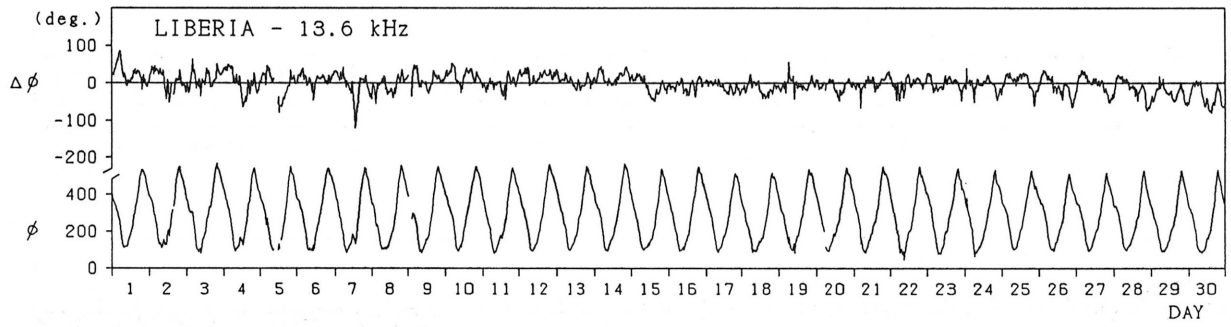
C. Radio Propagation

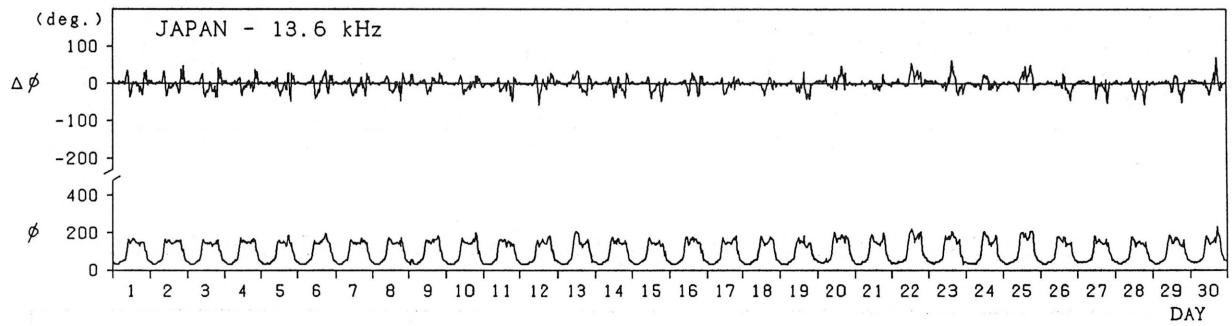
C3. Phase Variations in OMEGA Radic Waves at Inubo

Inubo April 1989

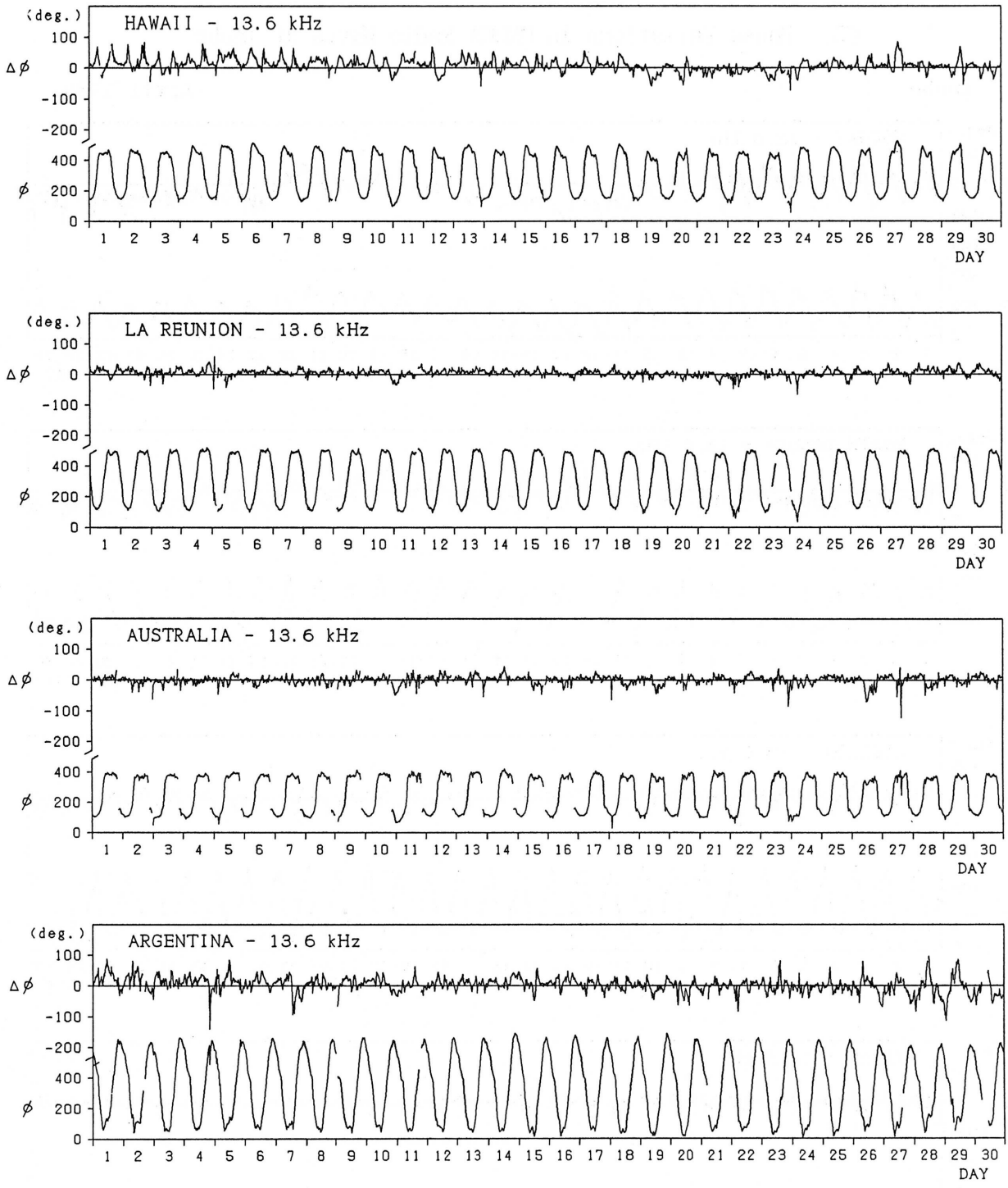








Inubo April 1989



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

Start (U.T.)	End (U.T.)	Max. (U.T.)	Max. Phase Deviation (negative value, deg.)
Apr.10/0641	Apr.19/0200	Apr.11/2332	163.8
Apr.22/1203	Apr.26/0830	Apr.23/1400	118.8

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso — Time in U.T.

Apr. 1989	SWF									Correspondence		
	Drop-out Intensities(dB)					Start	Duration	Type	Imp.	Solar Flare	Solar Noise	Geomag. Crochet
	CO	HA	1)	2)	3)							
5			5			0342	28	SL	1-	x		
5					14	0850	40	SL	1	x		
9	x	x	24		22	0045	117	SL	2	x	x	
13			19			2133	//	SL	1+	x		
20	3	10	14	8	x	0524	08	S	1+	x		
21			14		x	0435	25	S	1	x	x	
22			11		x	0332	25	S	1-	x	x	
22			8	6		0517	13	S	1-		x	
24			9	7	x	0620	20	SL	1-		x	

NOTES CO: Corado (WWV) HA: Hawaii(WWVH) 1): Australia 2): London 3): Moscow

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Apr. 1989	SPA								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
1				11	8	14	0034	0102	0043
1			23	7	7		0109	0136	0120
2			12	12			0502	0550	0517
2			15	6			0739	0846	0744
2		23					1123	1147	1132
2		33					1321	1428	1329
2		118					1536	1715	1549
2	106	56	68	—	121	106	2323	0117	2333
3			26	—	19		0613	0640	0616
3		45	41				0917	1018	0926
3		24					1208	1233D	1218
3		37					1233E	1255	1241
3					34		1932	2017	1945
3					10		2045	2111	2055
3	63	21	25	29	69	57	2205	2324	2213
4				—	13		0150	0219	0156
4			10	—			0424	0504	0432
4			11	—			0547	0631	0604
5	34	65	82	—	39	24	0343	0520	0355
5			11	—			0754	0824	0800
5	113	167	145	—			0853	1028	0909
5		27					1044E	1111	1049
5	56	109	42				1157	1300D	1207
5		30					1300E	1342	1307
5					13		2031	2109	2044
5	30	21	14	28	42	21	2306	0049	2314
6			10	9			0500	0521	0505
6	36		34	26	12		0530	0629	0537
6		33	—				1001	1121	1013
6					10		2039	2113	2046
7			8	5			0440	0504	0442
7			13				0822	0919	0836
7		43					1526	1600	1533
7					30		1949	2020	1953
7	15				5		2217	2249	2227
7	12		13	20	28		2304	0003	2313
8				10	6		0158	0250	0204
8			15	16	8	8	0318	0418	0322
8					33	24	2113	2240	2130
8					10	21	2318	0003	2325
9	151	211	243*	243	218	252	0045	0331	0109
10				—	13		2318	0057	2330
11		20					1204	1309	1225
11		51					1437	1600	1451
12			31	—		23	0606	0718	0615

Inubo

Apr.	S			P		A			
1989	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
13				6	4		0104	0130	0111
13			22	18			0500	0637	0526
13			8				0642	0716	0646
13					28	24	2048	2128D	2101
13	35	26			87	77	2128E	2257	2148
13				5	19	19	2257E	2330	2308
15				6	5		0033	0057	0038
15			7	6			0533	0555	0535
16			20	20	11	13	0353	0459	0358
16		38	17				0939	1020	0951
17			10	—	7		0327	0408	0334
17			4	—			0410	0428	0413
18			8	—	5	13	0252	0326	0258
18		28	23	—			0630	0726	0642
18					9		2028	2057D	2041
18	24				58	71	2057E	2230	2112
19	16	16	23	—	30	31	0020	0201	0036
19	19	30	41	—	13	23	0421	0528	0431
19	24	29	38	—		19	0537	——	0545
19	23	46	30	—			0943	1028	0949
19					7		2055	2121	2102
20				10	4		0118	0149	0128
20			8	10	4		0221	0243	0224
20	60	116	128	87	33	31	0522	0653	0530
20			15	11			0800	0835	0808
20				10	16		2347	0112	2357
21	34	98	112	—	43	34	0428	0633	0448
21			17	—			0656	0734	0703
21		48					1423	1519	1439
21					8		2212	2247D	2218
21					5		2247E	2330	2259
21		22	23	21	27	33	2348	0102	2354
22			24	8	5		0108	0127	0111
22		28	22	39	24		0133	0200D	0139
22		22	21	35	19	18	0200E	0240	0203
22		24	24	28	14		0248	0323	0251
22	57	76	95	71	46	38	0332	0459	0343
22	29	49	59	41	17	16	0517	0546D	0523
22	27	65	61	42	8	13	0546E	0710	0554
22		26	10	6			0714	0738	0720
22	32	67	55	14			0827	0948	0834
22		50	9				1257	1342	1307
22					8		2309	2322	2315
22				8	15		2323	0003	2331
23			22		14	24	0247	0330	0253
23			12	6			0524	0603	0532
23		48	37	29		23	0634	0711	0642
23	33	39	22		89	66	2140	2346	2159
24	27	43		—	62	40	2357**	0043D	0009
24				—	25		0043E	0135	0054
24			14	—			0335	0434	0359
24		49	67	—	15		0517	0621D	0538
24		55	77	—		12	0621E	0743	0629
24		37					1330	1356	1337
25		17	9	—			0408	0445	0414
25					15		2108	2130	2112
25				—	5		2301	2338	2305
26		17		—	17	20	0055	0139	0105
26				—	6	13	0146	0229	0158
26				8	11		2304	2328	2309
27					5		0125	0157	0133
27			9		8		0458	0535	0504
27					10		2104	2150	2109
29					15		0110	0212	0121

IONOSPHERIC DATA IN JAPAN FOR APRIL 1989

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