ISSN 0021-0382

F—485

IONOSPHERIC DATA IN JAPAN

FOR MAY 1989

VOL. 41 NO. 5

CONTENTS

COMMUNICATIONS RESEARCH LABORATORY
MINISTRY OF POSTS AND TELECOMMUNICATIONS
TOKYO, JAPAN

INTRODUCTION

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

Station	Geographic		Geomagnetic		Technical Method
	Latitude	Longitude	Latitude	Longitude	
Wakkanai	45°23.5'N	141°41.2'E	35.3°N	206.5°	Vertical Sounding (I)
Akita	39°43.5'N	140°08.0'E	29.5°N	205.9°	" (I)
Kokubunji	35°42.4'N	139°29.3'E	25.5°N	205.8°	" (I)
Yamagawa	31°12.1'N	130°37.1'E	20.4°N	198.3°	" (I)
Okinawa	26°16.9'N	127°48.4'E	15.3°N	196.0°	" (I)
Hiraiso	36°22.0'N	140°37.5'E	26.3°N	206.8°	Radio Receiving (S, P)
Inubo	35°42.2'N	140°51.5'E	25.6°N	207.0°	" (P)

A. IONOSPHERE

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

A1. Automatic Scaling

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

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

a. Characteristics of Ionosphere

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

b. Descriptive Letters

The following descriptive letters are used in the tables.

- A Impossible measurement because of the presence of a lower thin layer, for example *Es* (for *foF2*).
- B Impossible measurement because of absorption in the vicinity of *fmin*.
- C Impossible measurement because of any failure in observation.
- G Impossible automatic scaling because of too small ionization density of the layer (for *fEs*).
- N Impossible automatic scaling because of complex echoes.
- Blank No digital record because of trouble in the automatic data processing system, but existence of film record.

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

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

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

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

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

d. Reliability of Automatic Scaling

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

e. Summary Plot

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

A2. Manual Scaling

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

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

a. Characteristics of Ionosphere

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

b. Symbols

(i) Descriptive Letters

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

A Measurement influenced by, or impossible because of, the presence of a lower thin layer, for example *Es*.

B Measurement influenced by, or impossible because of, absorption in the vicinity of *fmin*.

C Measurement influenced by, or impossible because of, any non-ionospheric reason.

D Measurement influenced by, or impossible because of, the upper limit of the normal frequency range in use.

E Measurement influenced by, or impossible because of, the lower limit of the normal frequency range in use.

F Measurement influenced by, or impossible because of, the presence of spread echoes.

G Measurement influenced or impossible because the ionization density of the layer is too small to enable it to be made accurately.

H Measurement influenced by, or impossible because of, the presence of a stratification.

K Presence of particle *E* layer.

L Measurement influenced or impossible because the trace has no sufficiently definite cusp between layers.

M Interpretation of measurement questionable because the ordinary and extraordinary components are not distinguishable.

N Conditions are such that the measurement cannot be interpreted.

O Measurement refers to the ordinary component.

P Man-made perturbations of the observed parameter; or spur type spread *F* present.

Q Range spread present.

R Measurement influenced by, or impossible because of, attenuation in the vicinity of a critical frequency.

S Measurement influenced by, or impossible because of, interference or atmospherics.

T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.

V Forked trace which may influence the measurement.

W Measurement influenced or impossible because the echo lies outside the height range recorded.

X Measurement refers to the extraordinary component.

Y Lacuna phenomena, severe layer tilt.

Z Third magneto-electronic component present.

(ii) Qualifying Letters

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

A Less than. Used only when *fbEs* is deduced from *foEs* because total blanketing of higher layer is present.

D Greater than.

E Less than.

I Missing value has been replaced by an interpolated value.

J Ordinary component characteristic deduced from the extraordinary component.

M Mode interpretation uncertain.

O Extraordinary component characteristic deduced from the ordinary component. (Used for x-characteristics only.)

T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.

U Uncertain or doubtful numerical value.

Z Measurement deduced from the third magneto-electronic component.

(iii) Description of Types of *Es*

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

The types are:

f An *Es* trace which shows no appreciable increase of height with frequency.

l A flat *Es* trace at or below the normal *E* layer minimum virtual height or below the particle *E* layer minimum virtual height.

c An *Es* trace showing a relatively symmetrical cusp at or below *foE*. (Usually a daytime type.)

h An *Es* trace showing a discontinuity in height with the normal *E* layer trace at or above *foE*. The cusp is not symmetrical, the low frequency end of the *Es* trace lying clearly above the high frequency end of the normal *E* trace. (Usually a daytime type.)

q An *Es* trace which is diffuse and non-blanketing over a wide frequency range.

r An *Es* trace showing an increase in virtual height at the high frequency end similar to group retardation.

a An *Es* trace having a well-defined flat or gradually rising lower edge with stratified and diffuse traces present above it.

s A diffuse *Es* trace which rises steadily with frequency and usually emerges from another type *Es* trace.

d A weak diffuse trace at heights below 95 km associated with high absorption and large *fmin*.

n The designation 'n' is used to denote an *Es* trace which cannot be classified into one of the standard types.

k The designation 'k' is used to show the presence of particle *E*. When *foEs* > *foE* (particle *E*) the *Es* type precedes k.

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

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

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

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

B. SOLAR RADIO EMISSION

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

B1. Daily Data at Hiraiso

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

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

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

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

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

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

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

B2. Outstanding Occurrences at Hiraiso

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

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

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

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

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

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

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

C. RADIO PROPAGATION

C1. H.F. Field Strength at Hiraiso

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

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

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

C2. Radio Propagation Quality Figures at Hiraiso

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

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

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

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

C	artificial accident,
S	propagational accident,
U	inaccurate.

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

N	normal,
U	unstable,
W	disturbed.

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

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

C3. Phase Variation in OMEGA Radio Waves at Inubo

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

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

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

C4. Sudden Ionospheric Disturbances

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

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

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

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

Types of fade-out are as follows:

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

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

Correspondence of solar optical 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

MAY 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	66	85	76	63	62	78	90	102	100	106	88	104	102	104	104	102	101	102	95	87	90	90	88	66
2	76	76	72	66	66	64	83	97	97	90	A	107	109	110	108	105	100	104	100	99	85	88	83	66
3		64	75	67	64	79	97	81	96	90	104	105	110		111	106	94	98	102	92	83	84	70	66
4	75	82	77	73	79	87	91	86	90	84	86	85	100	103	101	104	98	92	88	93	84	68	73	67
5	66	72	61	68	62	83	88	97	112	103	122	110	107	121	122	107	104	106	106	90	86	87	85	84
6	83	79	73	82	86	87	97	117	112	104	110	114	110	101	106	106	103	104	103	107	96	87	84	94
7	86	84	68	66	72	78	86	90	99	113	104	97	94	94	93	100	93	92	103	98	90	80	77	62
8	66	73	66	54	51	55			A	B		A	61	70	71	73	74	71	69	71	70	66	65	77
9	66	70	67	66	73	78	81	78	82	81	N	85	88	92	91	92	90	87	86	82	84	84	85	88
10	86	74	65	80	67	90	95	104	107	107	106	108	N	102	90	96	95	92	96	96	88	82	86	83
11	84	84	72	78	81	90	92	97	91	101	110	N	108	95	106	107	100	95	93	96	88	89	89	84
12	85	81	78	75	86	80	105	103	99	105	108	107	110	103	99	96	96	102	101		82	N	85	87
13	75	70	71	73	72	81	84	74	76		N	80	82	81	84	82	83	80	84	84	71	82	80	84
14	81	81		66	66	83	90	90	A	89	93	90	94	87	94	86	91	93	95	84	66	73	79	71
15	73	74	64	54	62	66	66	64	56	A	55	59	70	73	70	71	68	76	84	88	66	76	77	77
16	65	65	64	62	64	65	64	65	A	A	A		53	61	61	75	75	73	74	74	66	63		69
17	64	64	68	65	66	82	88	66	64	A	51					70	70	69	72	71	66	71	74	76
18	68	65	75	66	79	86	85	80	86	79	73	80	75	71	82	76	81	84	78	72	72	80	76	66
19	70	74	72	71	66	79	92	81	68	78	70	79	78	74	74	75	74	82	83	89	76	90	63	74
20	62	72	67	70	77	87	88	85	86	79	76		80	A	62	81	A	78	89	64	86	86	87	88
21	87	66	73	66	53	55	66	71	66	A	50	56	A	58		60	70	65	63	66	70	64	77	68
22	66	67	68	60	51	53	64	A	A	A		A	51	47	57	70	71	70	65	N	68	76	76	64
23	64	66	68	66	65	77	78	67	A	66	A	A		51		61	68	71	67	74	68	76	66	66
24	67	61	57	57	58	64	66	A	A	A				64	56	55	57	65	60	68	65	78	64	66
25	61	62	58	52	42	52	58			49	A	A	A	57	65	64	64	A	64	68	74	74	76	73
26	64	60	59	61	58	58	60	63	74	72	78	72	80	81	76	78	80	77	78	74	69	80	67	73
27	77	72	65	64	67	76	83	81	79	80	88	75	87	84	84	85	80	81	86	76	80	86	81	77
28	71	76	70	68	71	75	84	82	74	79	78	84	88	79	90	90	89	86	87	87	76	65	85	78
29	87	85	74	65	59	68	70	76		62	A	A	53	69	74	72	73	72	A	77	79	75	75	67
30	60	66	68	68	61	64	63	63	62	67	60	75			75	76	78	79	79	74	80	81	80	84
31	77	72	73	75	71	78	74	83	86	87	81	89	93	85	90	82	87	88	86	86	84	84	84	91
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	31	30	31	31	31	30	27	23	23	21	21	24	27	28	31	30	30	30	29	31	30	30	31
MED	70	72	68	66	66	78	84	81	86	84	86	85	88	81	87	82	82	83	86	84	79	80	78	74
U Q	81	79	73	71	72	83	90	97	99	103	105	106	104	101	100	100	95	93	95	91	85	86	85	84
L Q	66	66	65	63	61	64	66	71	74	78	71	77	76	69	72	72	73	73	74	73	69	74	74	66

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT WAKKANAI

MAY 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	G	G	G	G	29	G	41	52	88	66	62	G	G	G	60	56	45	46	60	85	65	58	28	36
2	46	33	G	G	G	G	45	66	56	81	77	68	G	G	G	G	G	G	G	41	50	53	G	G
3	G	G	G	G	25	G	G	42	54	60	55	G	69		93	G	64	63	55	36	35	29	36	66
4	G	G	G	G	G	35	G	G	60	70	57	48	79	50	60	44	50	G	39	33	34	26	26	G
5	G	G	G	G	G	G	G	60	45	47	G	61	G	46	G	G	42	G	37	G	28	35	G	G
6	G	G	G	G	G	33	44	G	58	57	G	G	G	G	G	G	G	G	G	29	36	G	26	26
7	G	G	G	G	G	G	36	48	46	63	49	57	G	G	G	G	G	G	G	G	G	25	33	44
8	24	G	29	27	25	G	G	G	72	B	G	62	50	G	G	G	G	43	45	45	60	40	40	60
9	G	G	G	G	G	G	G	G	G	45	G	49	74	65	56	60	G	37	G	32	G	G	G	G
10	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
11	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	37	32	28	G	G	G
12	G	G	G	G	G	G	G	G	G	61	66	G	G	G	G	G	G	49	G	29	G	29	G	G
13	G	G	G	G	G	G	37	66	68	78	64	G	56	G	60	G	43	66	64	41	46	32	39	26
14	G	G	G	G	G	35	47	58	81	70	61	G	58	56	G	G	46	48	38	37	28	G	G	G
15	G	G	G	G	G	G	46	54	84	65	G	G	G	G	G	G	58	57	46	54	33	28	G	G
16	G	G	28	G	G	G	G	61	64	53	66	G	G	G	47	49	G	66	73	40	32	50	G	G
17	G	26	G	G	G	33	39	58	54	75	G	G		G	46	44	57	79	46	33	30	31	G	G
18	G	G	G	G	G	36	60	66	59	G	G	G	58	68	52	G	G	G	38	72	72	69	G	G
19	G	G	G	G	G	G	46	44	G	59	G	G	58	G	G	G	52	57	59	G	27	G	G	31
20	58	40	39	G	G	G	46	56	56	G	G	G	G	73	G	G	88	59	40	61	56	60	24	G
21	G	G	G	G	G	39	44	44	45	75	55	60	96	56	G	G	G	46	39	30	26	G	G	G
22	G	G	G	G	27	34	47	60	70	78	62	77	49	G	G	65	44	55	61	95	38	65	28	G
23	25	24	G	G	G	G	G	58	62	63	78	62	48	G	G	G	53	55	66	47	44	28	37	48
24	34	23	G	25	G	46	46	76	71	66	108	G	G	58	G	G	G	G	G	G	G	G	G	26
25	G	G	26	36	G	38	G	G	G	46	57	52	59	48	60	51	62	73	46	32	28	24	G	30
26	27	G	G	G	G	38	47	51	59	61	62	G	G	G	54	G	G	57	42	36	27	G	G	G
27	G	G	G	G	G	G	46	70	61	94	57	59	55	G	G	59	45	G	33	39	44	58	92	G
28	G	G	G	G	G	G	46	G	55	56	72	59	59	62	G	G	G	G	G	G	11	29	57	65
29	27	60	28	30	G	34	50	52	59	62	61	77	48	G	G	G	G	93	84	46	55	30	60	G
30	38	34	26	G	G	G	43	60	58	46	G	G	G	G	G	G	G	46	46	55	32	41	29	28
31	46	58	37	32	G	39	56	52	46	63	62	G	G	G	G	G	G	39	50	65	31	38	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	30	31	31	30	30	31	31	31	31	31	31	31	31	31	31
MED	G	G	G	G	G	G	43	52	58	62	57	G	24	G	G	G	G	46	40	36	32	29	G	G
U Q	25	23	G	G	G	35	46	60	64	70	62	59	58	50	52	44	50	57	55	47	44	41	33	30
L Q	G	G	G	G	G	G	G	G	45	47	G	G	G	G	G	G	G	G	G	29	27	G	G	G

HOURLY VALUES OF FMIN AT WAKKANAI

MAY 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	16	15	16	15	17	22	22	22	39	42	43	53	48	49	41	36	32	30	21	21	18	17	18	18
2	14	17	16	15	18	24	27	26	36	39	46	45	49	50	45	42	21	34	20	17	18	16	17	17
3	23	16	14	15	17	21	22	32	36	38	40	45	38		42	43	21	33	18	17	17	16	20	17
4	17	17	17	18	18	18	33	22	36	41	42	42	39	39	42	34	24	20	18	15	16	16	16	15
5	16	15	15	15	16	24	26	26	24	38	46	42	64	54	48	39	33	50	20	16	16	15	16	15
6	15	15	15	15	15	17	17	35	28	38	48	45	47	44	39	39	38	26	20	16	16	15	16	16
7	16	16	15	15	17	24	28	33	38	40	42	40	49	46	46	42	34	30	24	16	15	16	16	15
8	18	14	15	16	18	20	20		30	B		45	44		44	47	26	22	20	16	15	17	17	16
9	15	16	15	16	17	24	32	24	44	44	56	50	43	39	39	45	38	22	27	17	17	16	17	15
10	15	15	14	15	17	28	20	27	40	43	48	49	51	46	42	39	36	33	26	18	16	16	17	15
11	18	15	15	16	18	26	27	41	26	46	50	46	50	46	47	40	42	33	21	17	18	16	16	15
12	16	16	14	15	17	26	21	38	42	40	42	44	50	49	42	28	27	27	26	17	17	15	15	15
13	15	15	16	16	17	27	29	35	38	42	42		42	40	34	50	35	29	18	15	16	16	16	15
14	16	15	15	15	16	17	22	34	39	40	43	48	39	42	55	42	36	20	20	16	16	15	15	15
15	16	15	16	15	17	17	21	35	36	39	54			90	51	41	24	28	18	16	17	20	15	16
16	15	15	20	18	17	21	32	29	36	38	42	80		90	40	38	43	26	21	20	16	17	15	15
17	21	16	18	15	17	20	20	24	36	42						45	32	23	21	17	18	16	15	18
18	18	18	14	16	17	20	20	33	40		50		40	42	39	52	36	32	18	18	18	16	15	17
19	17	15	21	15	18	27	28	33	42	40			38	49	39	53	34	28	21	26	20	20	27	16
20	15	16	16	17	18	20	18	22	35	48				43	54	38	34	28	20	17	15	16	16	15
21	15	18	14	15	16	21	27	32	36	39	40	42	42	40			35	23	21	22	17	16	17	16
22	16	16	16	16	18	20	27	33	38	38	54	43			42	38	34	26	20	21	16	17	14	17
23	17	15	18	16	18	18	28	34	36	42	42	50	40			90	28	32	18	18	15	16	16	16
24	16	16	15	15	20	20	27	35	39	40	45	62		44			35	21	24	20	17	15	15	16
25	17	15	17	15	20	20	28			39	42	80	42	39	38		28	26	26	17	17	15	15	17
26	15	15	14	14	18	21	28	34	27	40	40	56	43	53	48	48	39	29	20	18	17	15	17	18
27	16	14	15	16	18	18	29	34	40	40	40	40	39	54	39	35	24	37	20	17	16	18	17	18
28	15	16	15	15	18	20	28	34	36	39	39	44	38	35	53	48	33	33	21	21	18	17	16	17
29	16	15	14	16	18	18	30	27	40	39	42	42	80		58	53	38	26	21	18	17	17	17	15
30	15	15	17	17	20	18	23	34	28	38					46	40	44	23	20	18	17	15	17	16
31	16	16	14	16	17	22	22	34	36	38	40	58	64	59	52	39	23	22	18	17	18	18	17	16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	29	30	29	26	24	24	24	27	28	31	31	31	31	31	31	31	31
MED	16	15	15	15	17	20	27	33	36	40	42	45	43	46	42	42	34	28	20	17	17	16	16	16
U Q	17	16	16	16	18	24	28	34	39	42	48	51	49	51	48	47	36	32	21	18	18	17	17	17
L Q	15	15	14	15	17	18	21	26	36	38	42	42	39	41	39	38	27	23	20	16	16	15	15	15

HOURLY VALUES OF FOF2 AT AKITA

MAY 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	84	80	85		66	74	86	104	107	113	109	110	110	113	114			108	110	102	88	84	78	84
2	84	85	72	68	66	83	107	93	100	108	116	117	121		111	128	111	114	110	104	88	81	82	83
3	80	77	66	76	68	80	101	90	114	115	120	130	128		132		114	114	110	90	81	88	87	84
4	73	80	76		74	84	88	88	98	100	112	114	117	132	116	112	108	107	110		85	80	84	82
5	79	79	67	71	68	86	86	108	109	111	123	130	117	132	136	125		116	115	91		84	84	86
6	86		84	79	77	87	112	110	116	118	115	114	116	114	116	116	112	110	110	87	89	88	87	86
7	87	87	83	83	83	88	101	104	113	121	116	112	110	112	113	114	108	108	111	97	88	87	86	86
8		87	81	64	52	61	N	64	A	A	71	A	A	A	82	82	81	79	A	76	66	76	A	
9	79	74	73	70	73	86	81	88	89	88	97	97	101	99	104		95	91	90	86		84	84	
10	85	79	77	81	80	90	104	102	107	102	113	114	114		106	108	106	105	104	90	84	85	84	
11	86	83	84	83	81	91	102	100		110	116	116	115	115	114	113	111	106	97			87	86	
12	89		80	80	84	91	90	100	108	114	113	115	117	112	N	108	110	A	112	A	A	84	84	90
13	85		80	74	76	77	90	92	96	92	90	91	A	102	100	103	94	93	N	85	A	78	N	87
14	86	82	75	66	68	84	96	99	100	94	102	99	107	99	108	104	101	106	108	A	66	A	85	
15	79	77	71	65	62	77	78	80	77	76	87	A	98		91	93	89	N	90	86	80	79	78	85
16	79	79	79	68	65	68	75	73	73	75		60	76	80	85	A	83	82	83	80	75	66	A	66
17			72	65	67	88	97	79	70		82	63		71	65		79	N		A	A	78	82	68
18	75	73	74	66	70	86	85		A	80	87	87	82	87	91	93	94	93	86	79	78		84	80
19	70	77	74	78	63	79	94	91	88	84	91	90	100	98	92	93	93	91	91	57	78	80	78	78
20	79	79	71	76	69	78	85	94	99	102	92	100	101	99	92	97	90	90	86	86	82	90	96	89
21		84	77	63	56	63			75	60	70	75	78	79	78	N	77	71	71		66	66		75
22	67	80	74	66	63	58	60	67	57	A	B			72	74	78	80	78	70	66	68	51	68	65
23	63	73	69	73	66	73	80	76	67	A	A	A	A	66	70	72		A		76		72	A	77
24	74		55	63	53	68	61	A	97	A	A	A	A	80	76	72	73	71	66	70	68	77	66	66
25	66	74	73	49	52	60	72	58	A	A	A	A	A		A	A	78	74	83	78	A	A	80	76
26	66	68	68	67	67	67	66	70	77	77	78	86	91	90	90	91	91	82	84	86	82		80	
27	79	77	76	71	71	86	84	88	96	84	90	91	88	93	95	97	94	89	89	82	77			85
28	82		78	72	71	83	85	90	89	87	100	98	100	100	98	105	A	98	86	86	79	82	83	85
29	86	83	84	62	60	75	78	76	68	A	77	82	79	79	92	92	86	A	84	91	A	A	64	67
30	77	68	76	83	67	65	66	62	A	A	71	80	83	84	84	92	87	81	86	80	80	78	80	79
31	84	79	78	74	74	75	84	92	93	91	88	100	92	A	102	101	A	90	87	84	A	86	86	86
	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	25	31	29	31	31	29	28	26	23	26	25	24	24	29	24	26	26	27	25	21	25	25	25
MED	79	79	76	71	68	79	85	90	96	94	94	99	101	98	95	99	94	92	90	86	80	81	84	83
U Q	85	82	80	77	74	86	96	99	107	111	113	114	115	112	112	110	108	107	110	90	84	85	85	86
L Q	74	75	72	65	63	68	78	76	77	84	87	86	89	80	84	92	83	82	84	78	71	77	79	75

HOURLY VALUES OF FES AT AKITA

MAY 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	45	33	44		24	G	G	50	56	70	91	91	75	61	60	58		44	83	65	G	G	58	58
2	58	37	34	25	29	G	46	55	86	78	106	81	G		89	74	92	49	72	85	49	72	58	48
3	38	33	29	G	28	28	47	44	54	59	62	136	92		75		G	69	74	90	94	84	26	29
4	27	37	34		G	31	50	52	54	G	54	110	93	78	77	62	88	68	74	126	69	30	32	36
5	G	G	G	G	26	G	50	63	67	58	G	G	70	54	G	50	140	52	76	31		G	11	G
6	G		G	23	33	30	G	44	50	49	G	G	70	48	56	44	74	55	44	38	29	G	G	28
7	30	28	G	26	G	G	42	50	58	68	63	G	G	G	G	G	G	G	G	G	G	G	26	44
8	44	36	26	32	G	40	42	50	62	97	54	75	92	91	71	50	G	G	69	33	33	34	70	
9	31	68	G	G	G	29	G	G	G	G	G	G	G	G	G		G	G	50	49		G	G	G
10	G	G	G	G	G	G	G	G	50	G	G	G	G		57	67	58	52	60	32	30	G	G	
11	G	G	29	G	36	G	44	55	G	47	G	G	G	55	G	G	G	44	44			31	35	
12	G		G	G	G	36	G	G	49	53	67	56	58	G	G	G	78	170	97	119	133	69	32	G
13	29	G	G	G	G	G	G	55	69	78	75	73	97	53	G	44	44	50	54	73	116	29	26	32
14	G	24	33	G	G	34	38	59	63	76	92	58	G	G	G	55	74	84	86	92	57	71	G	G
15	G	G	32	G	G	32	43	72	131	G	G	132	61		59	46	54	78	92	48	58	90	33	G
16	G	G	36	29	G	G	42	47	62	68	97	61	48	54	55	115	54	38	35	40	57	53	69	54
17		38	33	28	31	33	48	69	69		76	62	56	G	G	117	72	146	136	179	179	83	37	68
18	G	G	G	G	G	34	56		82	80	69	66	79	60	53	G	41	G	37	42	36	58	85	33
19	35	29	24	37	G	G	57	56	62	69	60	56	58	56	58	G	G	50	60	94	59	25	G	26
20	25	G	24	23	24	G	G	58	63	68	58	G	63	91	54	66	G	68	62	57	69	70	68	85
21		28	60	54	51	43			G	G	58	58	54	54	61	95	80	46	43	108	29	G		G
22	30	34	38	37	33	29	50	52	53	50	B	61	58	58	62	53	57	68	43	46	116	93	101	40
23	G	G	28	G	G	G	44	52	74	128	85	92	116	G	56	59	124	119	91	43		107	58	56
24	37		28	38	29	42	59	84	84	147	180	141	119	72	G	G	G	G	G	G	G	G	G	G
25	G	G	30	30	24	36	52	58	62	64	60	111	149	74	96	85	45	G	G	57	86	89	G	G
26	26	33	G	30	28	30	48	51	58	G	58	52	G	58	64	94	48	60	55	72	68		G	
27	G	29	22	G	G	34	G	57	72	74	53	54	G	74	73	75	83	69	58	51	59	59		69
28	25		25	25	G	33	41	57	106	72	51	G	65	54	54	62	143	44	49	36	40	38	37	69
29	49	42	40	33	G	32	50	57	59	65	73	48	66	95	73	74	54	92	92	54	136	91	38	36
30	57	46	29	44	G	G	43	51	86	85	53	G	G	G	G	50	59	60	51	34	40	33	48	52
31	37	33	29	24	G	32	43	50	60	72	80	G	G	180	G	71	149	115	70	70	58	32	45	32
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	27	31	29	31	31	30	29	31	30	30	31	31	27	31	29	30	31	31	30	27	30	29	27
MED	26	29	28	24	G	30	43	52	62	68	60	58	58	55	56	58	56	52	60	52	58	36	33	33
U Q	37	36	33	31	28	34	50	57	72	76	76	81	79	74	64	74	80	69	76	85	86	72	58	54
L Q	G	G	G	G	G	G	G	50	54	49	53	G	G	G	G	44	G	44	44	38	33	G	G	G

HOURLY VALUES OF FMIN AT AKITA

MAY 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		17	22	24	20	23	26	39	36	28	24	17	17		28	20	16	15	16	15	16
2	16	15	15	15	15	17	20	23	24	38	38	42	44		28	23	23	21	17	16	16	15	15	16
3	15	15	15	15	15	16	20	23	23	26	24	38	33		40		22	16	17	15	15	15	16	16
4	16	15	15		15	15	18	21	21	23	26	35	35	35	24	23	20	18	17	15	16	15	15	15
5	16	15	15	15	15	17	21	18	22	24	32	26	35	28	26	22		36	17	15		16	16	15
6	17		15	15	16	15	18	20	22	27	23	36	32	26	23	26	21	17	16	16	16	16	16	16
7	16	14	15	16	15	23	18	18	24	24	43	50	46	26	44	24	24	20	24	16	16	15	17	15
8	16	15	15	15	16	17	22	21	26	30	28	45	35	40	26	24	21	18	16	15	15	16	16	
9	15	15	15	15	15	16	20	21	24	22	44	28	26	35	48		21	20	20	15		16	16	17
10	16	15	15	15	15	24	17	20	21	22	39	47	30		34	21	20	17	16	15	15	15	17	
11	16	15	15	15	15	24	18	21	24	24	32	54	34	35	36	23	21	20	17			16	16	
12	16		15	15	16	16	16	18	21	23	26	39	27	27	43	26	22	20	17	16	18	16	16	16
13	17	15	14	15	15	17	16	18	21	23	23	24	38	34	44	26	24	20	17	15	15	15	16	15
14	17	15	15	15	15	18	17	18	24	38	30	28	39	38	N	26	26	15	18	16	15	16	16	15
15	16	16	15	15	15	17	16	20	21	24	50	42	33		27	27	20	17	16	15	16	16	17	18
16	16	15	15	15	15	17	17	17	24	26	26	39	39	39	29	26	23	16	15	16	16	15	16	15
17		15	15	15	16	17	16	17	20		26	27	35	24	45	24	23	17	15	16	16	15	16	16
18	16	15	15	15	16	17	17		22	23	33	28	28	26	21	24	20	18	17	16	15	16	15	16
19	18	15	17	15	16	18	17	18	21	24	28	38	38	30	26	20	20	18	21	16	16	16	16	17
20	17	16	17	15	16	18	20	23	22	23	39	52	26	28	24	20	20	20	16	16	15	16	17	16
21		15	15	15	15	18			23	24	26	38	38	35	24	28	27	17	17	15	16	18		17
22	17	15	15	15	15	16	26	23	36	28	B	44	39	39	41	38	24	20	16	16	16	16	16	15
23	17	15	15	15	18	17	17	20	26	38	27	39	40		36	27	22	21	17	16		16	17	16
24	17		15	15	15	18	18	21	23	23	27	38	34	35	N	22	26	22	24	20	16	16	16	16
25	17	15	15	15	16	17	16	28	22	26	40	30	40	29	36	28	24	22	17	16	16	16	16	16
26	15	15	15	15	15	16	16	18	21	23	29	39	54	38	24	32	21	17	16	16	16		18	
27	18	15	15	15	15	18	20	24	36	26	24	27	26	37	26	23	21	16	15	16	16	16		16
28	15		15	15	15	16	16	26	26	32	36	45	36	26	35	22	21	23	23	16	16	15	16	16
29	16	15	15	15	15	17	16	18	36	38	39	38	40	46	45	26	23	17	17	15	16	16	16	16
30	16	15	15	15	16	23	18	20	26	23	36	63	56	54	24	23	21	23	17	16	16	17	16	16
31	16	15	15	15	16	18	16	17	21	23	39	26	26	26	26	26	22	17	17	17	17	16	16	16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	27	31	29	31	31	30	29	31	30	30	31	31	26	29	29	29	31	31	30	27	30	29	27
MED	16	15	15	15	15	17	18	20	23	24	31	38	35	34	28	24	22	18	17	16	16	16	16	16
U Q	17	15	15	15	16	18	20	22	24	27	39	44	39	38	40	26	23	21	17	16	16	16	16	16
L Q	16	15	15	15	15	16	16	18	21	23	26	28	30	26	24	22	21	17	16	15	15	15	16	15

HOURLY VALUES OF FOF2 AT KOKUBUNJI

MAY 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		91	97	69	58	71	101	102	110	116		118	122	122	126	117	117	113	122	110	86	89	89	89
2	92		86	75		90	108		107	120	130	127			A	140	136	121	118	88		91	91	88
3	83	80	80	72	68	74	105	104	115	110	128		138	B	138		131	128	126	110	88	86	66	94
4	99	84	83	78	76	82	100	101	100	107	125	131	130		131	122	117	121	121	109	81			87
5	88	87	87	80	76	57	101	113	113	120	121	134	132	138	142		N	N	121	98	87	89	90	100
6	105	100	85	77	79	92	108	113	116	116	115	112		123		124	118	117		108	99	92	93	100
7	92	99	92	84	84	94	106	107	114	118	121	122	121	124	N	129	127	120		108	99	87	100	102
8	105	99	88	80	61	62	64	67	75		72	82		85	A	93	93	88		80	80	81	84	85
9	80	78	73	77	77	81	84	89	95	99		93	108	111	116		108	100	95	94	85	89	91	88
10	88	86	81	80	84	92	107	104	105	110		117				120	121	110	107	94	86	86	92	88
11	90	99	84	81	79	87	102	98	102	111			116	122	122	120	117	115	112	108	100	97	85	97
12	101	92	92	85	85	94	97	98	107	112	122	124	121	120	117		114			98	83		100	104
13	102	84	79	82	N	78	94	110	110	115	116	117	121	118	118	116	114	110	106	90	81	85	88	90
14	90	90	83	75	77	81	98	94	88	97	106	111	112		114	114		117	115	94	75	85	88	97
15	87	85	70	68	68	81	92	91	90	97	105	107	110	109	112	112	104	100		89	87	86	90	87
16	87	86	78	81	62	67	80	83	85	86	84	85	87		95	92	85	92	87	86	77		84	82
17	86	84	86	75		83	96	93	84	77		84	87	83		83	85		83	A		77		84
18	78	75	77	74	68	89	89	91	80	95	A	105	106	106	108	111	108	100	90	81	86		87	87
19	86	91	80	78	68	74	97	100	96	96	98	107	117	117	111		111	104	98	85	84		82	81
20		85	78	76	72	95	86	95	100	106						111	99	95	95	93	87	92	97	90
21	101	101	72	65	63	66	77	87	82	76	80	85	89	91	91	91	86	80				86		79
22		79	80	66	67	60	70	70				74	78	79	84	86	86	84	70	74			68	A
23			62	71		71	92	82	79				78	77	82		97			84	76	76	80	85
24	84		66	68		71	72	72	A					85		84	81	84	78	82	71	67	68	71
25		72	68		50	62	74	A	70	A		84	86	A	96	A	88	85		84	78	76	76	89
26	74	66	70	68	70	70		83	78	87	86	92	96	103	97	100	101	102	98	90	96	78	92	85
27	87		78	77	73	85	91	102	104	91	97	98	106	107	105	108	110	99	100	92	76			
28	92	84	84	80		82	87	88	96	98	108	96				110	111	107	A	88	81	82	90	90
29	99	88	85	71	74	78	82	77	72		85	91		98	105	107	94	96	100	93	80	82	80	
30	82	76	79	87	70	61	68	75	82	85	A	85	87	86			109		A			85	86	86
31	89	91	85	89	75	77	90	100	86	94	100	99	108		115	111	101		93	91	A	86		
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	27	31	30	25	31	30	29	29	25	19	26	23	21	21	23	29	25	21	28	25	24	26	27
MED	88	86	80	77	72	78	92	94	96	99	106	102	108	107	112	111	108	102	100	92	84	86	88	88
U Q	99	91	85	80	77	87	101	102	107	113	121	117	121	121	120	120	117	116	116	98	87	89	91	94
L Q	86	80	77	71	67	70	82	83	82	92	86	85	87	85	96	93	93	93	91	85	79	81	82	85

HOURLY VALUES OF FES AT KOKUBUNJI

MAY 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		40	28	G	G	28	42	61	64	52	61	61	61	64	58	61	90	91	88	77		44	27	48
2	49	32	33	46	29	G	43	52	62	57	64	75	56	96	150	88	56	44	62	61	140	58	29	30
3	26	28	G	34	G	G	G	77	64	72	68	67	76	B	G	G	G	69	73	70	91	62	58	52
4	G		G	G	G	31	44	55	61	66	52	73	60	50	55	72	81	63	66	55	71	164	56	47
5	43	31	29	G	23	102	42	65	61	G	G	54	56	G	G	G	48	G	49	73	29	G	G	G
6	G	26	G	G	G	G	38	44	53	50	G	81	74	G		52	55	53	70	84	32	G	29	G
7	G	26	33	25	G	G	41	50	58	60	70	58	55	G	G	G	G	G	31	25	G	G	G	28
8	47	26	G	G	28	31	44	50	58	62	72	74	78	71	150	54	49	37	38	71	54	34	33	
9	53	47	28	55	G	G	G	47	52	53	G	54	G	G	G	G	G	G	34	41	36	68	G	G
10	G	G	G	G	G	G	G	40	52	G	52	58		49		G	G	46	38	59	46	40	G	28
11	G	G	G	G	G	G	G	41	54	64	58	57	G	G	50	47	50	50	40	43	27	G	28	24
12	G	G	G	G	G	29	39	46	52	55	58	57	58	58	77	92	100	141	46	25	35	54	92	92
13	50	57	55	36	G	G	42	61	58	64	65	70	68	55	69	G	54	46	44	69	49		33	23
14	27	G	G	G	G	G	43	56	64	63	72	74	57	G	56	74	57	56	34	53	39	104	59	37
15	57	33	30	26	G	29	43	71	84	58	48	61	84	83	86	50	71	80	96	72	70	72	63	28
16	27	G	G	G	26	29	G	46	60	58	77	65	147	89	G	64	82	77		43	33	72	53	94
17	69	57	81	82	88	64	55	61	62	65	85	56	55	102	178	92	58	63	76	128	148	93	90	59
18	50	G	25	28	26	38	G	82	77	73	136	72	72	57	55	52	47	36	58	58	66	48	57	60
19	46	35	50	32	G	30	56	75	80	68	77	71	66	63	59	57	55	101	84	60	83	69	59	24
20	G	G	G	G	26	G		54	72	67	121	51			78	58	53	41	46	78	93	49	78	92
21	57	49	58	58	61	37	44	50	54	57	G	50	54	G	60	64	55	48	81	61	109	46	22	G
22	G	G	G	47	G	G	40	55	65	70	56	51	56	66	56	69	52	47		58	60	58	103	112
23	41	38	G	G	G	G	G	53	59	67	103	97	100	G	104	99	66	90	50	58	52	32	30	56
24	58	81	60	44	27	G	52	70	103	110	120	109	144	103		G	G	G	G	G	11	29	G	23
25		G	27		38	G	46	72	55	66		61	54	125	86	129	55	43	G	G	71	81	94	23
26	G	G	30	99	G	G	G	50	50	49	56	G	G	63	56	55	51	40	44	29	73	31	57	29
27	27	G	G	24	G	32	54	48	60	G	55	58	64	55	57	58	73	62	51	43	53	82	95	G
28	49	G	28	46		53	47	64	65	58	59	52	58		93	G	G	58	115	59	71	35	34	45
29	69	68	46	44	32	29	46	62	58	72	74	62	123	56	94	61	50	71	G	34	28	56	74	57
30	46	33	77	59	58	30	G	42	47	94	115	70	61	76	96	107	116	140	175	133	105	73	57	37
31	57	48	30	28	G	G	40	56	60	50	G	G	G	G	G	52	72	93	92	52	62	71		
	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	31	30	30	31	30	31	31	31	30	31	29	28	28	31	31	31	29	31	30	30	30	29
MED	43	27	28	27	G	G	42	55	60	62	62	61	60	56	58	57	55	53	50	58	57	55	54	30
U Q	51	40	33	46	27	31	44	64	64	67	77	72	75	73	89	72	71	77	78	71	73	72	63	56
L Q	G	G	G	G	G	G	G	48	54	53	52	54	55	G	52	G	48	41	38	43	35	34	28	23

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT KOKUBUNJI

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

HOURLY VALUES OF FOF2 AT YAMAGAWA

MAY 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	122	108	122	85	67	62	85	108	112	122	122	125	130	134	136	133	129	130	134	124	109	103	106	109
2	110	106	85	86	82	79	86	94	112	120	125	138	139	146		166	170	178	162	146	136	106	108	134
3	144	135	124	107	85	76	82	108	106	112	121	132	130		142	144	137	135	136	122	97	89	101	110
4	109	102	85	88	75	74	88	102	86	107	114	132	138	140	142	130	136	138	130	117	108	90	87	103
5	108	79	86	85	84	86	84	110	116	116	127	140	144	158	162	153	145	148	136	111	103	110	106	110
6	122	124	106	82	83	83	88	102	108	120	115	116	106	136	141	136	133	130	126	120	105	A	103	102
7	106	101	88	87	84	85	91	108	107	113	120	121	127	137	142	140	146	140	140	130	109	110	110	112
8	103	90	86	79	64	69	86	85	87	91	95	113	120	107	112	121	118	114	111	108	86	87	87	87
9	87	84	76	71	80	67	86	96	96	98	100	106	114	114	120	120	121	113	111	109	88	85	86	90
10	88	89	83	84	85	90	86	102	98	107	107	112	116	121	122	122	124	123	112	A	95	88	88	110
11	108	107	86	86	89	84	87	94	94	101	107	115	122	122	121	124	122	113	110	108	90	87		75
12	110	90	86	86	86	85	86	101	96	107	108	120	123	126	127	126	122		131	104	90	90	103	112
13	106	90	87	85	79	79	84	106	112	111	117	120	124	122	124	128	136	138	124	106	90	104	110	103
14	109	105	96	82	96	82	105	106	94	89	110	112	121	124	103	127	136	138	129	108		82	89	101
15	85	96	83	76	72	80	84	87	90	106	117	A	122	131	138	142	142	135	N	120	108	92	110	116
16	111	90	86	86	67	62	78	88	92	94	104	107	115	121	118	121	120	118	118	111	106	A	A	88
17	88	85	88	80	76	78	84	93	82	79	93	101	111		115	115	110	107	100	91	90	80	86	85
18	84	87	96	84	82	74	81	77	80	94	108	110	111	116	108	124	120	116	104	87	90	84	85	89
19	87	87	102	86	76	73	88	100	88	88	94	104	110	113	116	120	116	111	93	87	A	A	87	87
20	100	86	88	86	84	72	78	89	88	92	98	98	108	111	114	113	112	110	108	99	90	97	102	101
21	120	104	86	74	78	66	84		85	81	79	82	98	101	103	102	91	N	A	80		A	77	80
22	80	79	71	66	54	60	67	81	77	80	A	80	88	93	92	99	101	102	97	80	74	66	A	A
23	74	A	74	66		67	84	94	89	A	88	96	93	101	100	A	101	107	109	103	A	100	99	100
24	86	85	80	80	67	76	88	92	80	71	79	81	119	96	100	104	N	111	109	98	86	62	78	82
25	78	78	66		48	48	73	71	56		93	92	104	105	112	110	104	96	101	99	A	85	86	82
26	85	82	79	78	72	67	77	83	84	84	88	93	102	107	110	115	120	113	96	104	101	84	87	86
27	86	87	84	78	75	75	82	102	105	94	92	106	111	105	116	126	121	114	108	106	88	85	88	88
28	89	84	85	84	80	80	85	91	90	106	107	107	117	126		123	121	122	109	106	90	88	98	102
29	86	88	86	76	77	78	86	82	A	A	90	97	110	111	116	122	114	115	116	A	88	88	86	87
30	87	86	85	84	67	64	66	A	A		A	88	101	103	106	104	102			91	86	A	85	87
31	88	90	86	86	78	77	86	110	86	84	94	86	111	A	119	111	108	106	107	102	88	88	88	85
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	31	30	30	31	31	29	29	27	29	30	31	28	29	30	30	28	28	29	26	26	28	30
MED	89	90	86	84	78	76	85	94	90	98	107	107	115	118	116	122	121	116	111	106	90	88	88	95
U Q	109	102	88	86	84	80	86	104	105	111	116	120	123	128	131	130	136	135	129	114	105	97	103	109
L Q	86	85	83	78	72	67	82	87	85	88	93	96	108	106	109	115	112	111	107	98	88	85	86	87

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

MAY 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	33	33	30	G	G	G	37	46	57	50	G	57	G	56	57	58	59	60	64	94	69	38	27	68
2	48	54	46	33	24	G	31	52	77	77	100	75	119	78	76	62	63	55	50	42	32	38	94	90
3	58	82	59	61	52	G	39	66	60	62	68	60	58		G	G	G	G	38	49	59	148	108	68
4	79	G	G	G	G	24	G	57	56	55	G	49	84	G	G	G	G	45	45	28	32	26	39	69
5	91	65	51	34	G	G	34	43	64	83	62	57	54	G	G	G	G	G	38	55	24	G	G	G
6	G	G	G	34	G	G	34	43	50	55	51	G	58	95	57	55	54	68	73	93	94	30	24	28
7	G	G	G	G	G	G	32	43	60	74	82	67	81	55	53	G	G	G	G	G	G	25	G	G
8	48	36	32	29	32	44	56	48	58	62	72	65	82	81	53	G	G	G	G	72	49	40	91	34
9	30	23	G	G	G	G	G	45	52	60	53	G	49	56	G	G	G	46	40	59	38	40	59	G
10	G	G	G	G	G	G	G	38	52	58	62	53	62	G	50	58	45	71	56	144	91	48	38	40
11	30	23	G	G	G	G	G	42	55	59	70	64	G	G	53	G	G	G	43	45	41	39	48	29
12	28	28	27	G	G	G	G	45	54	61	68	69	G	58	56	G	68		57	31	69	59	48	28
13	G	58	51	36	32	32	31	42	57	78	72	74	78	G	66	54	43	41	48	92	80	45	56	39
14	57	41	30	26	28	G	33	48	66	80	77	77	G	G	56	68	93	86	70	69	180	79	58	72
15	48	33	26	G	25	26	35	40	44	93	72	142	124	64	G	G	61	80	101	91	90	36	44	84
16	44	34	38	38	24	G	32	40	71	59	70	77	G	G	58	G	86	95	89	43	58	95	158	70
17	57	40	G	G	G	G	31	38	54	86	110	54	87	84	G	G	51	43	44	39	25	32	65	82
18	91	92	70	38	42	37	39	46	51	72	100	89	69	95	66	81	53	84	42	32	42	59	57	91
19	41	68	38	25	G	G	30	G	66	73	65	72	149	60	66	G	73	64	80	84	114	177	150	29
20	128	59	44	46	37	G	33	44	60	81	63	85	94	73	64	G	G	48	48	62	36	32	44	91
21	78	73	88	43	40	32	50	88	83	79	73	76	81	58	83	G	142	118	135	58	49	59	35	32
22	30	39	27	28	23	G	36	52	62	77	136	94	69	89	49	59	63	82	G	40	39	47	90	92
23	133	128	32	32	110	42	40	69	85	92	81	60	61	61	134	193	54	68	53	109	90	58	48	48
24	34	29	G	24	39	G	G	48	54	126	151	82	101	90	58	G	G	G	G	G	G	G	40	33
25	27	G	G	26	G	G	42	66	59	115	106	96	73	74	70	47	G	G	G	37	130	57	127	40
26	G	86	G	38	43	30	G	38	56	60	74	54	G	54	G	G	G	45	39	33	39	G	45	66
27	G	32	26	44	37	39	40	46	52	72	60	62	73	52	54	58	52	43	40	34	32	34	68	59
28	72	38	34	31	G	22	39	48	64	83	54	55	G	52	71	61	G	G	48	43	69	91	90	57
29	46	33	24	68	31	29	31	61	82	97	69	94	103	96	83	76	98	78	55	27	69	53	45	57
30	58	G	41	27	28	29	50	103	150	134	131	72	54	63	66	100	105	149	180	133	40	95	56	39
31	32	G	G	G	25	G	34	53	70	60	61	109	62	116	70	58	43	40	36	31	40	40	72	40
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	30	31	31	31	31	31	31
MED	44	34	27	28	24	G	33	46	59	74	70	69	69	59	57	G	51	47	48	45	49	40	56	48
U Q	58	59	41	38	37	29	39	53	66	83	82	82	84	81	66	59	63	78	64	84	80	59	90	70
L Q	28	23	G	G	G	G	30	42	54	60	62	57	49	52	49	G	G	G	38	33	36	32	40	32

HOURLY VALUES OF FMIN AT YAMAGAWA

MAY 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	16	15	15	15	22	33	50	42	34	38	33	30	22	18	17	15	15	15	15	15
2	15	15	15	15	15	15	17	24	28	28	38	40	36	37	39	33	28	30	18	15	15	15	15	15
3	15	15	15	15	15	15	16	21	23	35	39	40	40		52	44	23	23	17	15	15	15	15	15
4	15	15	15	15	15	15	16	18	21	36	42	36	36	56	51	44	22	22	18	15	15	15	15	15
5	15	15	15	15	15	15	15	16	22	23	34	35	36	53	42	39	23	52	18	15	16	15	15	15
6	15	15	15	15	15	15	17	16	21	24	36	39	40	40	43	40	36	26	17	15	15	15	16	15
7	15	15	15	15	15	15	15	16	22	35	32	40	40	38	38	43	45	21	16	18	15	15	15	15
8	15	15	15	15	16	15	16	18	21	32	35	44	44	40	32	42	22	22	18	15	15	15	15	15
9	15	15	17	16	17	15	16	18	21	30	30	45	46	43	50	42	24	22	17	15	15	15	15	15
10	15	15	15	15	15	15	17	20	23	27	32	38	38	35	38	42	27	21	20	15	15	15	15	15
11	15	16	15	15	15	15	15	16	20	27	32	36	46	47	38	42	23	34	15	16	16	15	15	15
12	15	15	15	15	15	15	16	16	18	24	28	38	64	43	44	41	26		16	16	15	15	15	15
13	15	15	15	15	15	15	15	16	20	22	39	40	41	48	39	33	23	18	16	15	15	15	15	15
14	15	15	15	15	15	15	15	17	21	27	34	35	55	47	48	38	27	18	16	15	15	15	15	15
15	15	15	15	15	15	15	16	16	21	23	36	38	39	39	45	42	26	21	16	15	15	15	15	15
16	15	15	15	15	16	15	15	16	18	20	35	38	45	56	44	35	20	21	16	15	16	15	15	15
17	15	15	15	15	15	15	15	16	18	24	29	43	41	41	36	32	21	20	18	15	15	15	15	15
18	15	15	15	15	15	15	15	15	17	20	32	40	42	39	28	33	20	23	17	16	15	15	15	15
19	15	15	15	15	15	15	15	16	17	23	34	38	35	40	35	24	23	20	20	15	15	15	15	15
20	15	15	15	15	15	15	20	16	18	22	39	43	39	40	39	38	21	21	18	15	15	15	15	15
21	15	15	15	15	15	15	16	17	18	26	36	35	39	39	35	41	24	18	16	15	15	15	15	15
22	15	15	15	15	15	15	17	17	24	24	59	42	40	48	39	36	33	24	16	15	15	15	15	15
23	15	15	15	15	15	15	15	18	22	24	38	43	42	43	44	39	34	21	15	15	15	15	15	16
24	15	15	15	15	15	15	17	18	22	23	35	34	35	36	34	36	26	21	17	20	15	15	15	15
25	15	15	15	16	15	17	16	33	22	27	39	40	43	43	43	40	38	23	20	16	15	15	15	15
26	15	15	15	14	15	15	15	17	22	24	35	37	38	40	50	40	26	22	16	16	15	15	15	15
27	15	15	15	15	15	15	15	16	32	30	29	35	32	36	29	32	21	18	16	15	15	15	15	15
28	15	15	15	15	15	15	16	16	18	22	22	38	38	34	32	21	23	18	15	15	16	15	15	15
29	15	14	15	15	15	15	17	16	23	26	40	41	43	49	46	33	22	20	17	15	15	15	15	15
30	15	15	15	15	15	15	16	17	20	22	34	35	36	36	36	39	22	27	16	15	15	15	15	15
31	15	15	15	15	15	15	15	20	22	33	36	34	35	35	35	32	26	20	16	15	15	15	15	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	30	31	31	31	31	31	31
MED	15	15	15	15	15	15	16	16	21	24	35	38	40	40	39	39	23	21	17	15	15	15	15	15
U Q	15	15	15	15	15	15	16	18	22	30	39	41	43	47	44	42	27	23	18	15	15	15	15	15
L Q	15	15	15	15	15	15	15	16	18	23	32	36	36	38	35	33	22	20	16	15	15	15	15	15

HOURLY VALUES OF FOF2 AT OKINAWA

MAY 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	170	166	161	88	83	67	85	111	108	113	120	111	133	142	146	146	144	145	145	146		142		166
2	144	142	147	87	85	84	84	97	104	107	106	133	144	144	177	176	177	170		164	163	144	144	145
3	164	147	109	104	88	76	77	106	88	91	116	134	141	B	156	160	155	165	162	146	111	89	86	79
4	145	109	112	88	79	79	86	89	88	92	108	133	138	148	146	147	164	163	154	146	146	146	144	164
5	N	167	146	87	85	72	87	104	103	96	117	132	143	172	176	178	165	165	146	141	88	106	138	140
6	146	145	126	88	86	84	87	87	103	112	96	116	104	145	145	146	148	144	136	122	108	90	84	85
7	85	89	90	86	84	83	88	92	95	102	103	114	128	146	146	163	176	171	171	183	165	163	161	168
8	145	143	110	86	83	77	85	88	103	103	92	120	130	124	128	145	147	161	146	146	130		100	104
9	90	88	88	76	79	76	83	86	96	95	95	106	110	132	126	139	120	124	111	103	88	88	87	91
10	91	86	90	83	85	85	88	90	96	96	102	107	105		140	141	142	140	136	129	102	97	143	162
11	170	165	135	103	105	87	86	87	88	94	103	111	116	128	126	144	144	144	142	124	109	88	89	109
12	90	90	90	86	85	80	86	92	92	90	95	117	102	130	137	145	146	146	145		88	88	120	
13	129	N	85	93	85	85	85	104	102	102	114		122	124	127	146	142	148	142	120	107	137	87	88
14	108	87	86	83	80	78	86	94	93	88	108	103	121	127	127	131	146	146	146	128	90	123	88	113
15	104	91	87	80	77	77	78	84	90	99	119	124	137	146	160	171	174	170	166	151	145	146	161	168
16	171	146	124	87	88	66	67	88	88	95	104	117	131	140	136	141	145	146	147	133	130		140	111
17		90	86	98	80	79	84	60	82	81	89	98	120	117	130	132	117	121	107	104	90	88	88	90
18	87	86	87	85	85	66	A	74	A	64	96	106	111	A	128	137	133	121	92	86	88	90	107	88
19	87	90	89	89	77	76	84	86	85	86	N	96	121	121	137	140	147	140	103	90	87	89	88	87
20	86	84	90	84	84	66	71	86	88	88	91	A	103	107	98	116	122		122	121	90	76	87	86
21	84	108	86	70	71	76	80	90	92	A	A	100	98	A	128	A	109	111		88	A	72	64	A
22	77	76		66	58	37	60	84	87	95	90	91	A	105	105	108	127	122	103	91	87	82	82	86
23	80	78	78	77	76	66	78	97	87	A	82	A	96	95	108	109	104	118	112	103	103		104	143
24	83	87	88	78	67	72	85	88	84	82	A	102	98	102	80	141	145	147	155	139	124	85	87	87
25	90	92	84	A	44	45	61	77	A	86	A	107	104	99	A	130	120		120	109	110	102		103
26	84	86	71	79	77	66	80	86	80	84	88		A	N	106	135	142	155		A	A	A	111	112
27	137	144	142	83	85	78	78	90	97	83	A	96	98	106	129	144	142	140	127	104	104	88	89	88
28	87	86	83	86	85	76	82	88	90	A	A	107	A	145	144	146	146	144	144	139	88	87	90	86
29	84	87	85	78	77	75	81		86	A	90	105	118	A	118	142	142	142	146	130	88	102	84	90
30	85	98	86	80	67	59	60	89	104	A	A	A	106	119	112	A	117	112	A	A	102	102	85	84
31	N	92	86	86		77	88	88	80	77	91	95	89	123	118	120	122	122	126	120	84	90	89	85
	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	30	30	30	30	31	30	30	29	26	24	26	28	25	30	29	31	29	27	28	28	27	29	29
MED	90	90	88	86	83	76	84	88	90	93	99	107	117	127	128	142	144	144	142	126	102	90	89	91
U Q	144	143	112	88	85	79	86	92	99	99	108	117	130	144	145	146	147	158	146	143	117	123	129	141
L Q	85	87	86	80	77	66	78	86	87	86	91	102	103	112	118	133	122	123	120	104	88	88	87	86

HOURLY VALUES OF FES AT OKINAWA

MAY 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	67	42	33	44	32	23	G	50	49	73	G	85	72	76	52	62	75	110	137	142	84	58	29	34
2	35	28	23	G	G	G	G	43	60	68	70	68	G	98	61	G	G	41	G	G	G	G	23	G
3	68	88	65	42	37	G	G	42	70	67	74	84	70	B	G	G	72	61	52	103	124	69	40	58
4	40	59	58	48	42	39	G	52	56	59	85	G	G	G	51	G	G	41	40	29	G	32	G	69
5	46	46	41	46	38	G	G	49	79	57	49	68	79	G	50	G	G	G	48	36	93	59	38	32
6	G	22	G	G	G	24	59	71	70	G	G	66	75	71	77	65	G	73	53	47	86	84	91	G
7	37	G	G	G	G	G	G	44	57	72	73	52	G	G	66	G	G	G	G	30	G	G	G	48
8	65	50	32	24	44	40	69	68	62	63	56	52	85	G	G	G	G	G	G	G	G	38	48	39
9	G	G	G	G	G	G	G	49	51	46	59	61	G	51	G	G	44	40	35	32	32	36	38	51
10	26	G	G	29	28	32	G	59	46	G	G	G	G	G	G	G	G	40	G	G	G	G	G	33
11	G	G	G	G	G	G	G	G	44	G	64	49	G	G	G	G	G	G	34	G	G	G	32	58
12	38	25	G	G	G	G	G	42	56	61	62	84	63	G	G	58	53	68	83	72	G	40	33	G
13	25	G	G	G	G	G	G	41	48	G	57	64	50	G	G	51	G	42	38	42	66	42	59	38
14	40	31	G	G	34	31	G	G	59	66	60	89	63	G	G	51	67	41	G	28	G	G	G	38
15	G	24	G	G	G	G	G	40	47	69	G	G	77	55	G	G	G	42	37	32	28	G	G	40
16	29	40	33	30	G	G	G	G	43	50	53	G	G	53	69	58	69	61	45	40	40	40	G	34
17	40	39	34	28	28	G	G	37	46	56	48	G	60	81	59	51	60	70	62	40	25	45	33	G
18	25	G	G	G	32	41	67	48	71	68	72	84	73	90	53	92	89	51	81	60	66	68	40	48
19	40	32	29	28	G	G	33	42	70	61	83	74	60	86	59	72	112	150	92	51	40	58	151	33
20	58	38	23	23	G	G	G	39	G	44	65	80	51	G	G	G	51	G	52	40	38	40	36	30
21	25	G	92	28	29	30	39	50	82	111	89	75	77	90	69	134	70	57	74	74	94	160	80	57
22	33	33	103	40	28	33	40	46	54	62	G	70	102	94	63	64	64	60	39	32	30	38	G	58
23	48	58	59	38	30	22	G	48	67	152	83	141	73	G	55	53	51	41	75	G	G	46	33	G
24	G	G	G	25	G	G	32	41	54	77	117	88	89	142	68	G	G	G	38	32	24	54	135	36
25	34	31	27	90	32	G	51	52	71	84	134	58	77	87	112	G	68	G	39	68	85	72	58	66
26	44	G	G	69	58	39	46	G	43	51	72	66	86	62	G	61	103	154	G	179	170	93	60	37
27	G	32	30	24	G	G	33	94	76	65	91	60	68	80	68	67	66	91	40	G	37	48	41	38
28	34	32	32	31	G	33	30	48	60	104	91	59	85	77	68	62	62	57	58	144	23	G	67	70
29	48	41	40	33	26	29	28		57	101	78	101	95	101	90	100	67	44	39	G	46	59	48	68
30	58	40	38	25	G	G	G	39	87	112	138	91	91	G	70	88	87	88	81	150	37	48	69	37
31	26	26	G	G	G	G	G	36	45	50	56	G	57	90	98	57	49	43	49	38	31	G	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	30	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31
MED	35	31	27	25	G	G	G	44	57	63	65	66	70	58	55	51	53	43	40	38	32	42	38	38
U Q	46	40	38	38	32	31	33	50	70	73	83	84	79	87	68	64	69	68	62	68	66	59	59	57
L Q	25	G	G	G	G	G	G	39	47	50	53	52	50	G	G	G	G	40	35	28	G	G	G	32

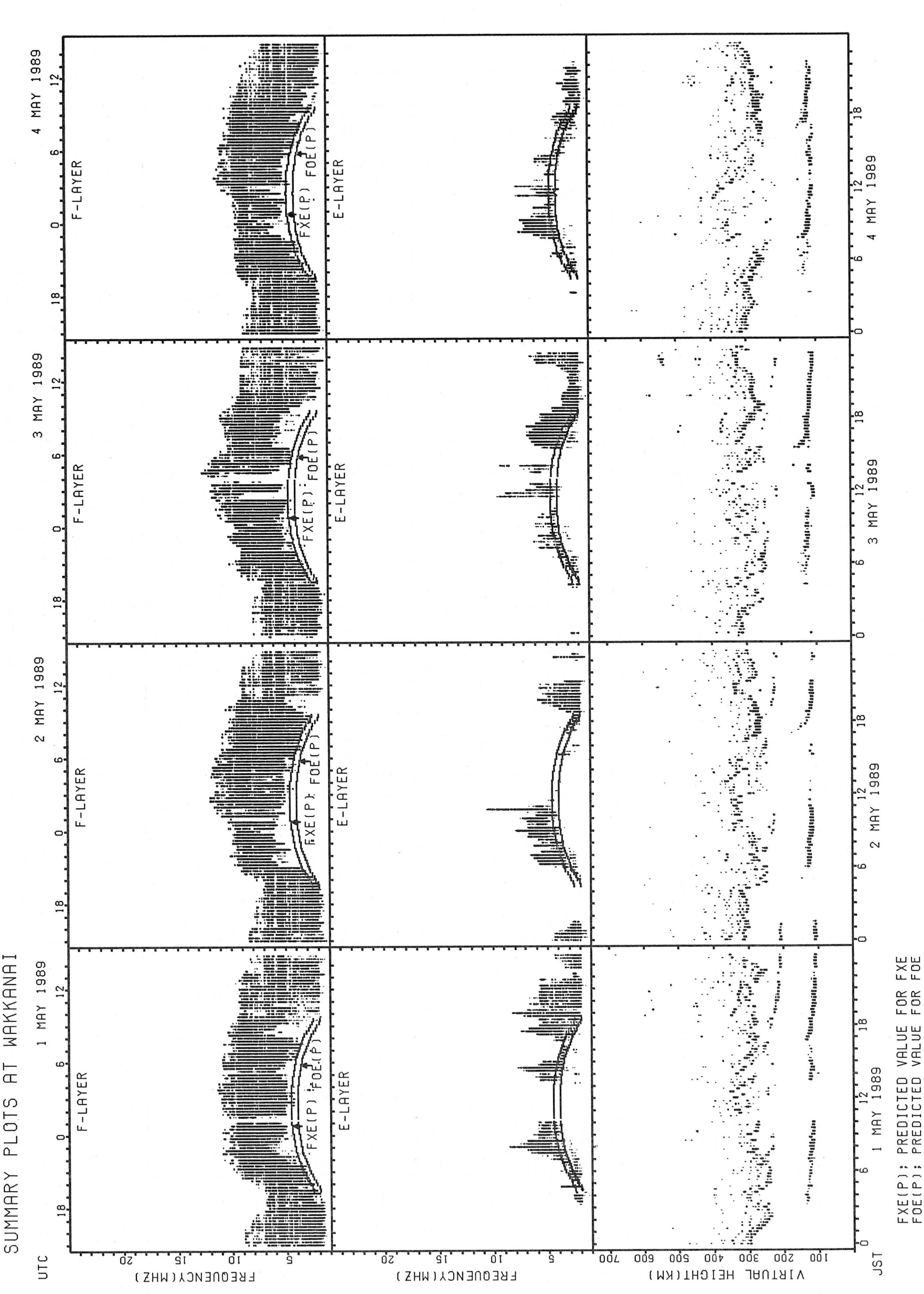
HOURLY VALUES OF FMIN AT OKINAWA

MAY 1989

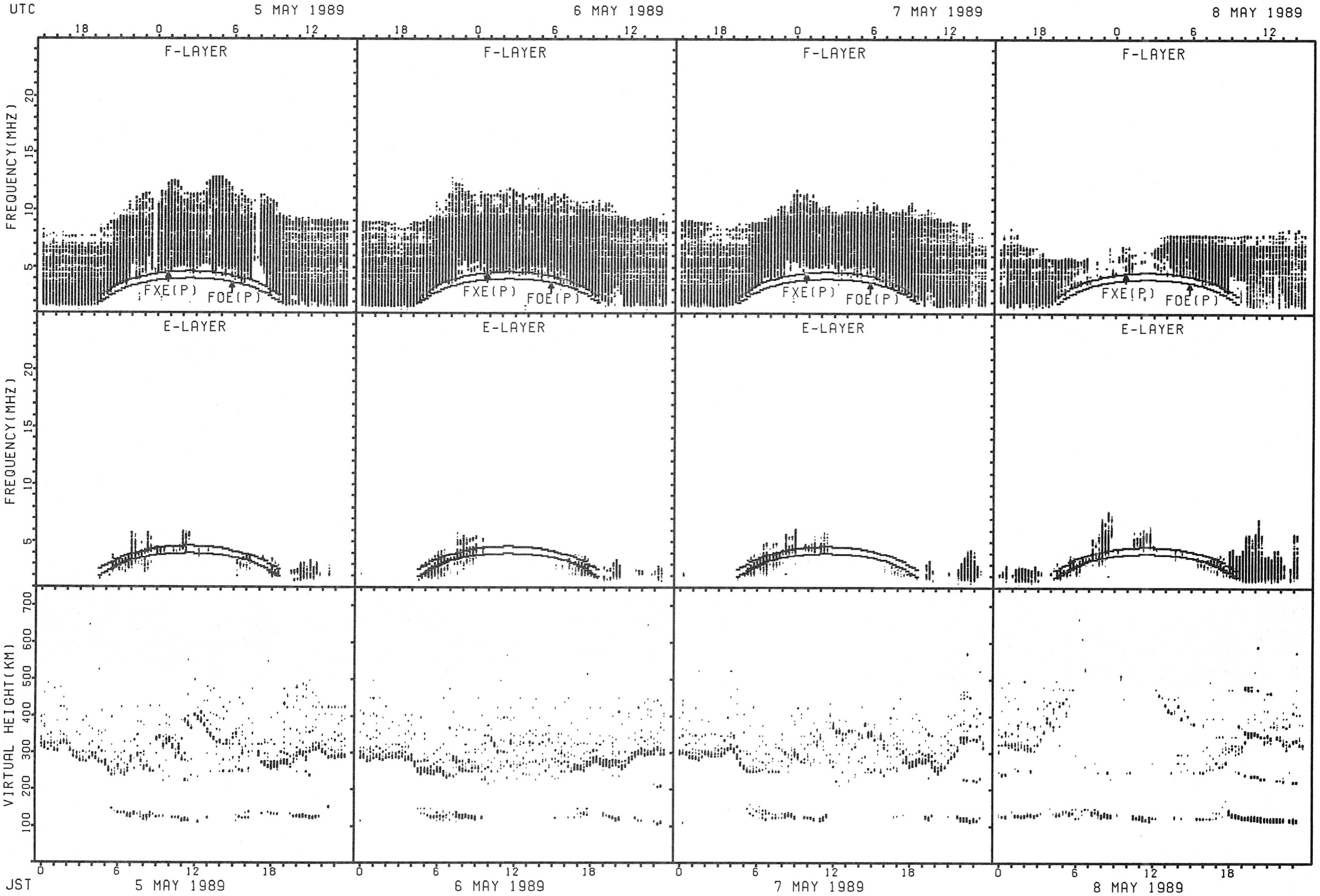
LAT. 26.3N LON. 127.8E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

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	15	15	15	15	15	15	18	21	27	28	52	45	45	34	30	32	27	26	17	15	14	15	15	15
2	15	15	16	15	15	15	24	24	27	28	30	46	58	46	45	33	28	28	27	23	16	23	15	15
3	15	15	16	16	15	15	15	27	27	28	30	46	32	B	79	59	29	28	23	16	15	15	15	14
4	14	14	17	15	14	15	15	26	27	28	30	57	57	60	60	32	28	26	26	14	14	14	15	15
5	15	15	15	15	15	16	15	16	18	28	32	32	35	32	32	46	30	62	20	14	14	15	15	15
6	15	15	15	15	15	15	15	18	27	28	28	29	32	45	30	29	46	24	26	15	15	15	15	15
7	15	15	15	15	16	15	15	17	26	28	30	32	29	N	35	48	29	23	27	15	15	15	15	15
8	15	15	15	15	15	15	15	26	27	28	29	46	45	60	32	29	28	27	28	24	15	15	15	17
9	16	16	21	16	15	15	15	16	26	27	28	30	30	29		54	28	27	16	15	15	15	15	15
10	14	15	15	15	15	15	27	23	26	26	29	33	34	64	45	29	26	24	17	22	15	16	16	15
11	16	16	16	15	15	15	16	16	23	27	29	33	30	64	30	29	27	27	16	15	26	15	15	15
12	15	14	15	15	15	15	15	15	26	27	28	32	44	65	53	29	27	26	18	15	15	15	18	15
13	15	15	15	15	15	15	15	21	27	28	29	27	32	34	28	33	28	27	18	15	15	15	15	15
14	15	15	21	16	14	15	16	18	27	28	35	35	35	33	32	29	38	21	28	15	15	15	15	15
15	15	15	15	15	15	17	23	20	26	29	29	39	41	42	36	33	26	23	16	15	15	15	15	15
16	15	15	14	15	15	15	21	14	21	23	28	28	30	48	30	28	26	23	17	15	14	15	15	15
17	15	15	15	15	15	15	26	17	24	26	28	31	32	29	30	56	28	23	16	15	15	15	15	17
18	15	15	15	15	15	15	14	15	23	27	29	28	33	33	32	26	27	24	14	15	15	15	15	16
19	15	15	15	15	15	15	15	16	21	26	28	29	42	32	28	28	26	27	16	15	14	15	15	15
20	14	14	16	15	15	15	23	20	24	28	29	45	33	61	60	29	26	26	21	15	15	15	14	15
21	15	15	15	16	15	15	16	17	23	28	28	30	32	32	30	30	27	24	16	14	15	15	15	15
22	15	15	15	15	15	15	15	16	28	30	72	45	45	46	45	32	28	27	18	16	15	15	15	15
23	14	15	15	14	15	15	15	14	27	27	29	45	33	69	46	32	28	24	17	20	15	15	15	15
24	15	15	15	16	26	15	15	24	26	28	30	32	33	42	33	29	27	26	17	15	16	15	14	15
25	15	15	14	14	15	N	16	24	23	28	28	29	47	32	49	54	29	26	17	15	15	15	15	15
26	15	15	15	15	15	15	15	22	26	29	33	36	45	45	59	45	28	26	17	15	15	15	15	15
27	16	15	15	15	15	15	15	16	29	28	30	34	34	34	36	32	26	17	15	14	14	15	15	15
28	15	15	15	15	15	15	15	15	23	26	28	29	32	28	29	30	27	29	22	15	15	15	15	15
29	15	15	15	14	14	15	15		26	28	29	30	45	58	55	32	29	26	17	20	15	15	15	15
30	15	15	15	15	15	15	24	18	26	27	30	32	33	34	30	32	29	27	17	14	14	15	15	15
31	16	15	15	15	15	15	24	24	28	28	34	30	33	35	33	29	27	21	17	15	15	15	15	15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	30	31	30	31	31	31	31	31	29	30	31	31	31	31	31	31	31	31	31
MED	15	15	15	15	15	15	15	18	26	28	29	32	33	42	33	32	28	26	17	15	15	15	15	15
U Q	15	15	15	15	15	15	21	23	27	28	30	45	45	59	46	33	29	27	22	15	15	15	15	15
L Q	15	15	15	15	15	15	15	16	23	27	28	30	32	32	30	29	27	24	16	15	15	15	15	15

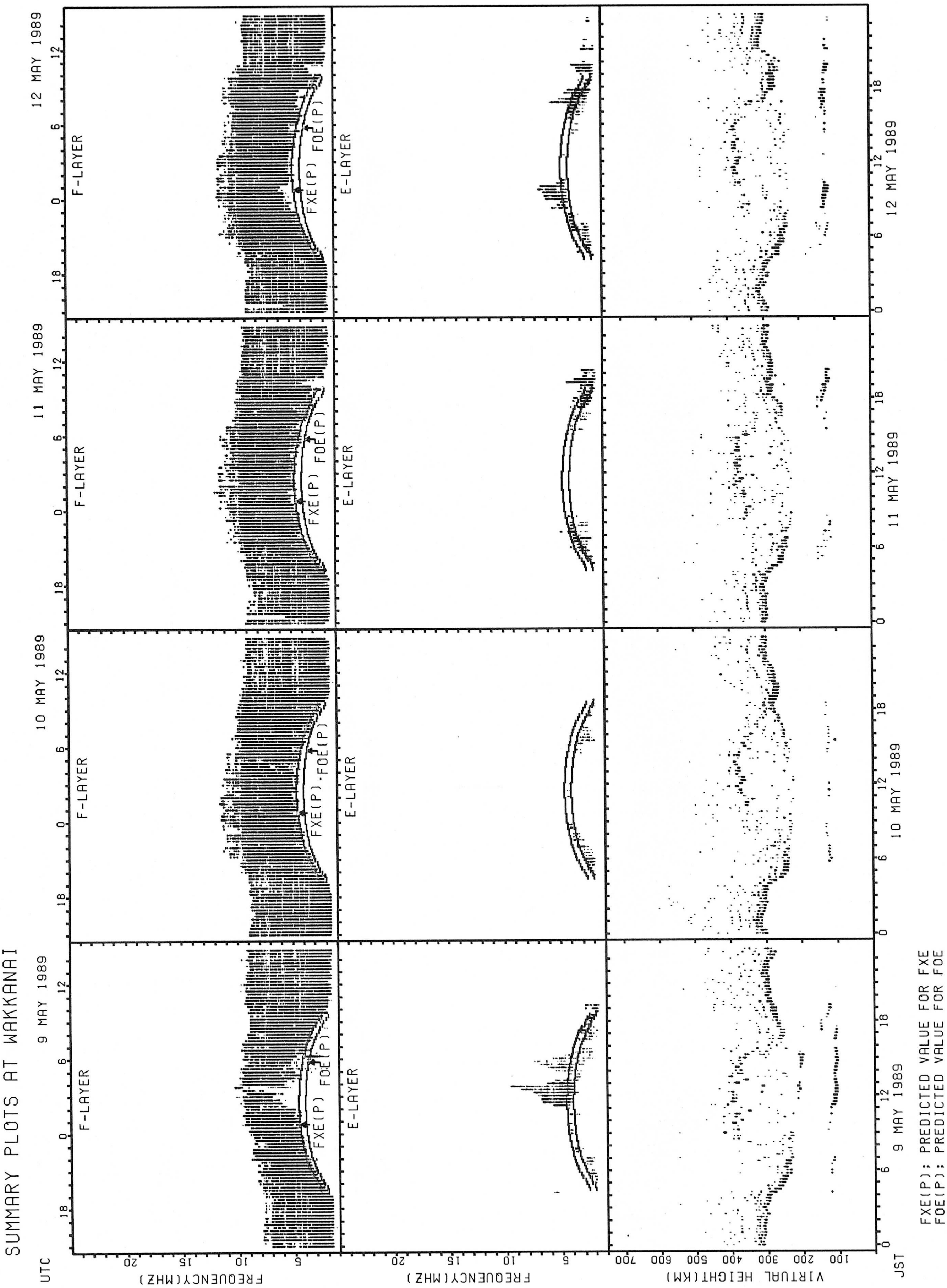
COMMUNICATIONS RESEARCH LABORATORY, JAPAN


SUMMARY PLOTS AT WAKKANAI
UTC
JST
1 MAY 1989
2 MAY 1989
3 MAY 1989
4 MAY 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

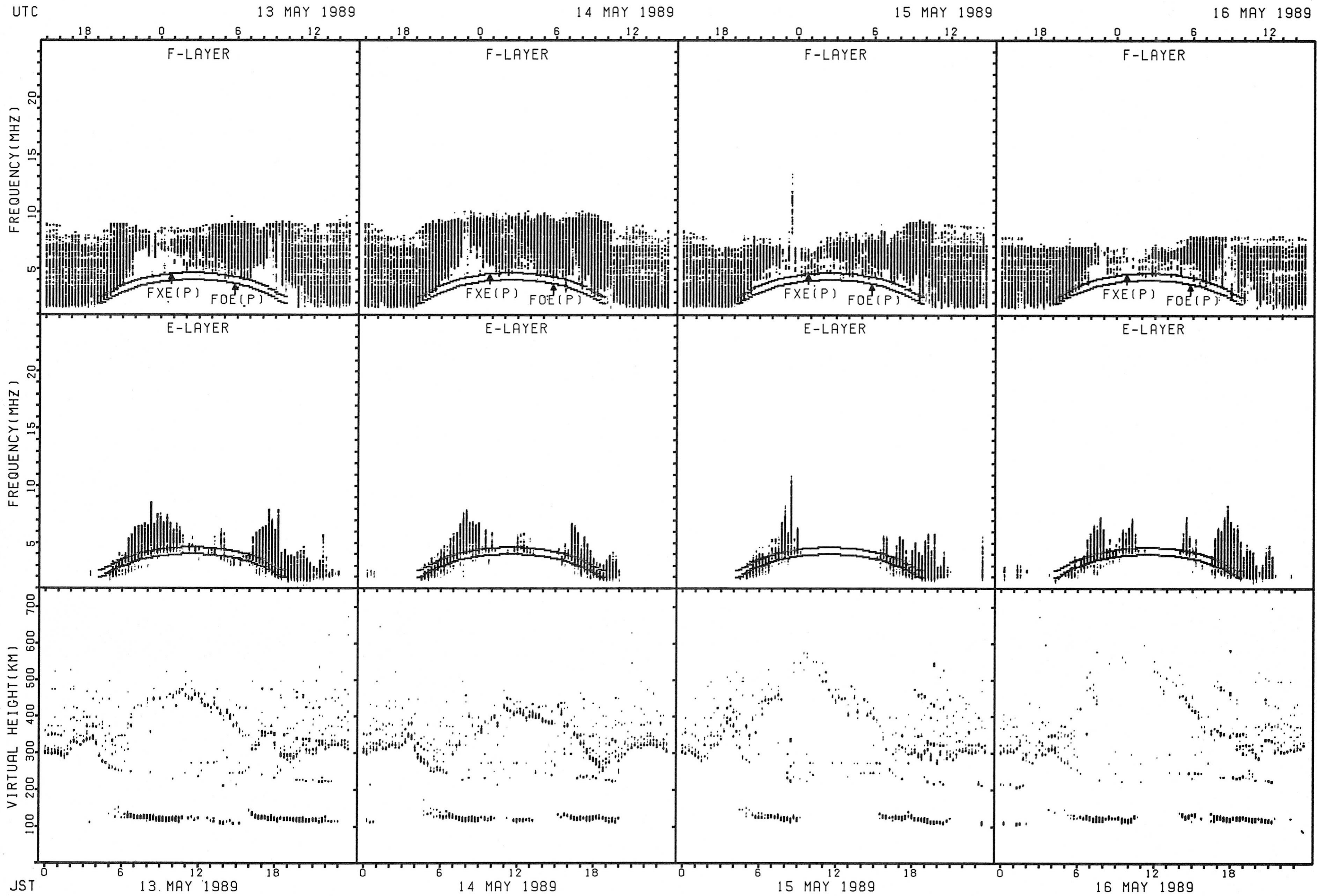
SUMMARY PLOTS AT WAKKANAI



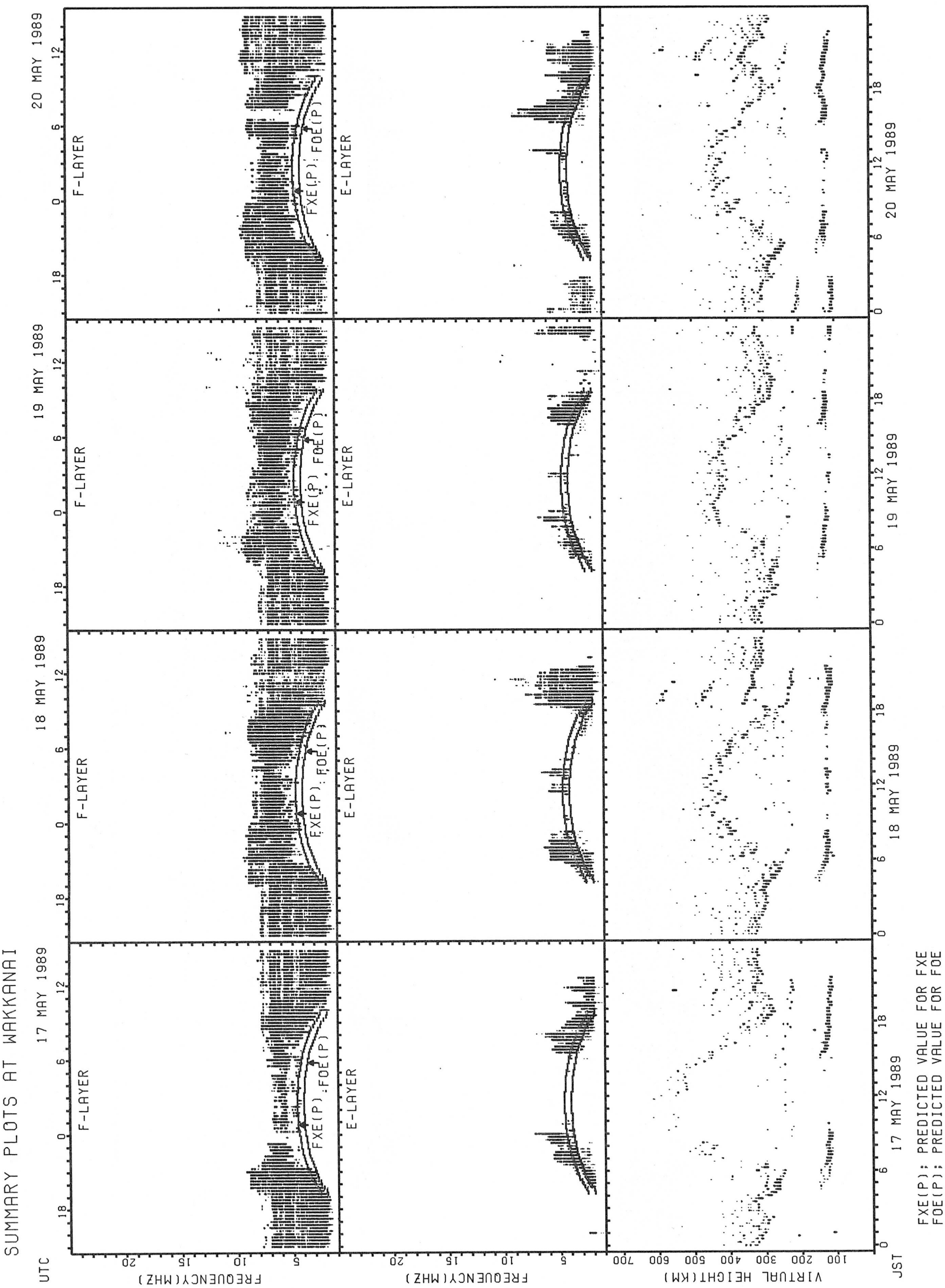
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
9 MAY 1989
10 MAY 1989
11 MAY 1989
12 MAY 1989
UTC
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
9 MAY 1989
10 MAY 1989
11 MAY 1989
12 MAY 1989
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

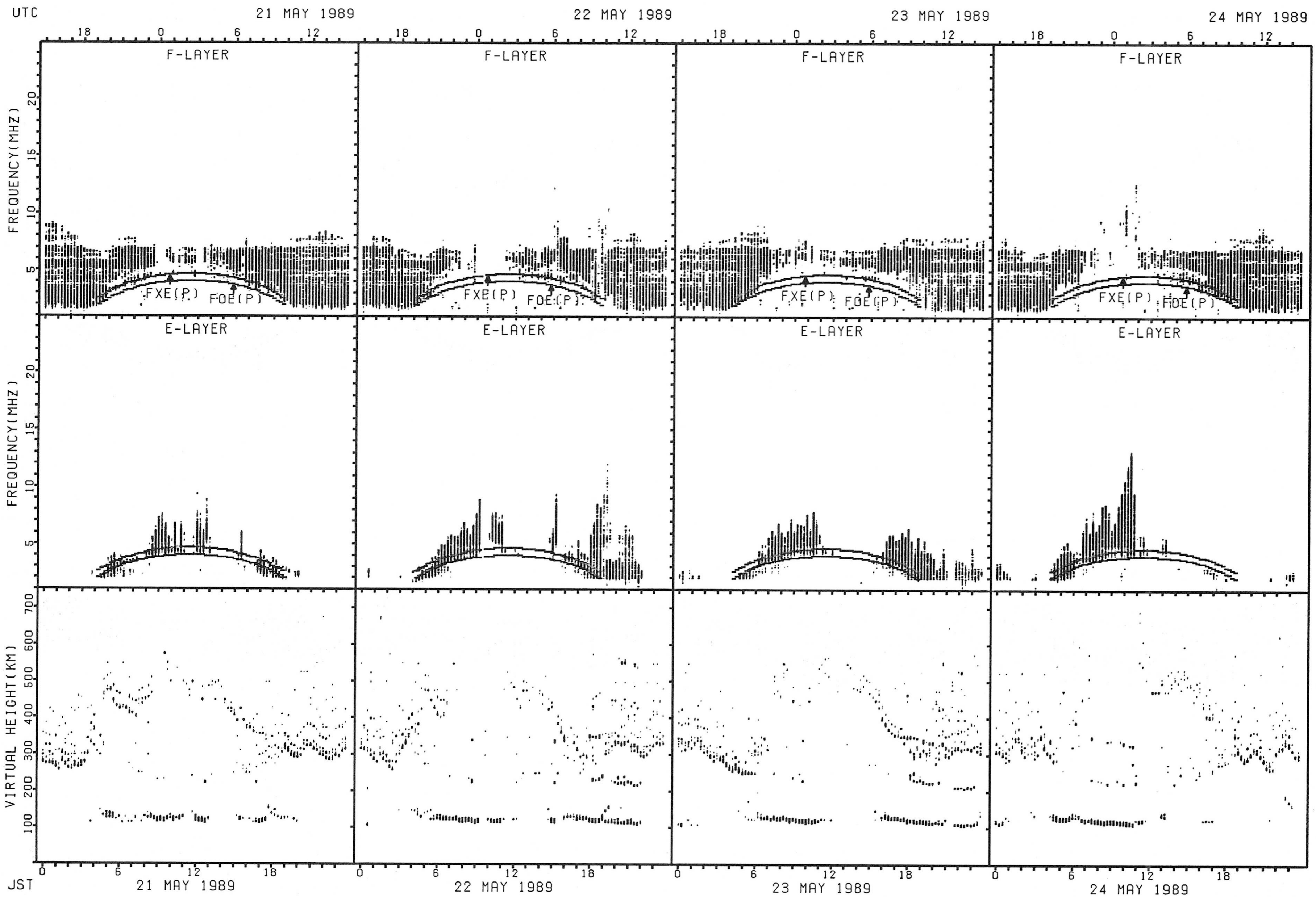
SUMMARY PLOTS AT WAKKANAI



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

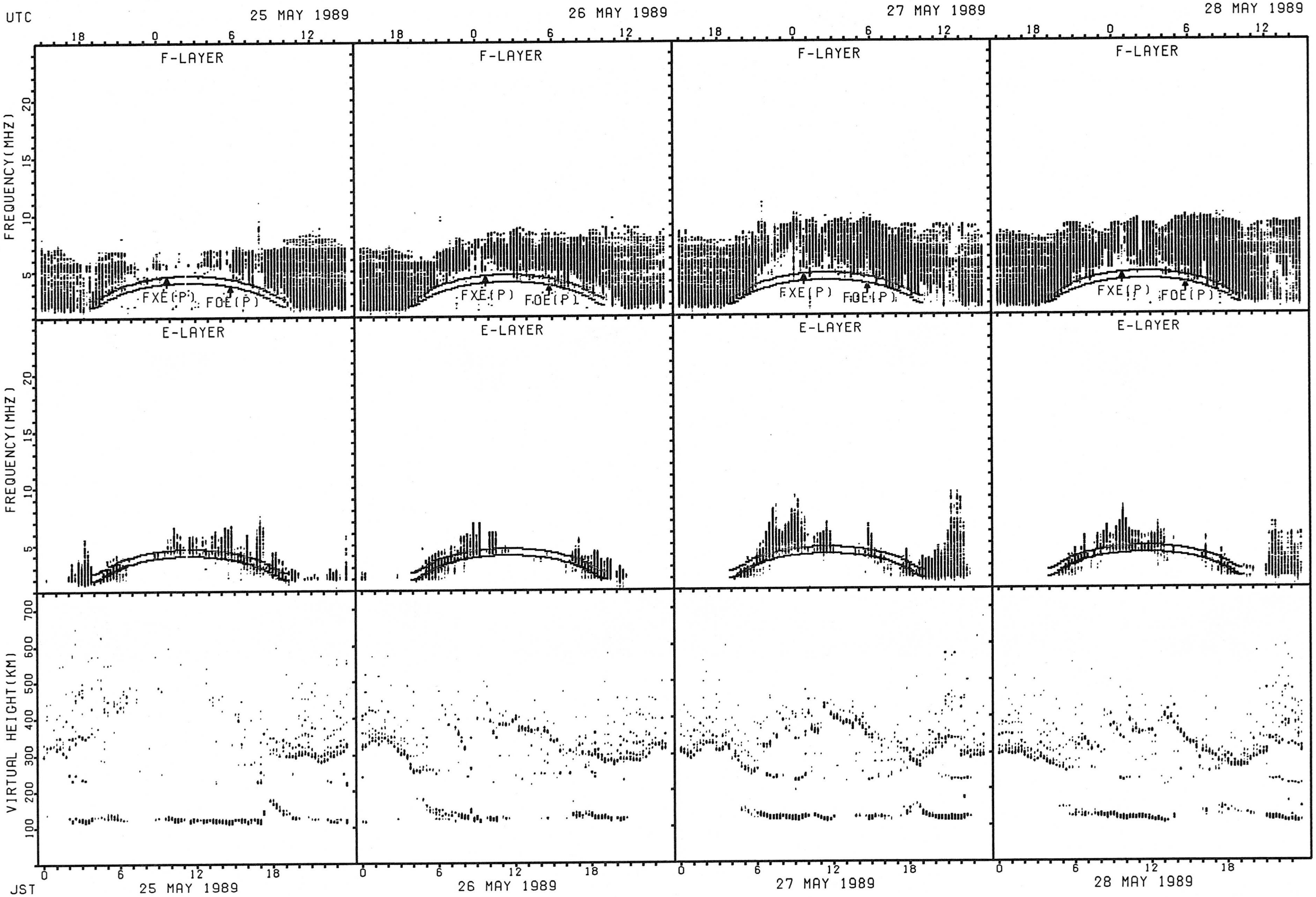

SUMMARY PLOTS AT WAKKANAI
17 MAY 1989
18 MAY 1989
19 MAY 1989
20 MAY 1989
UTC
JST
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI

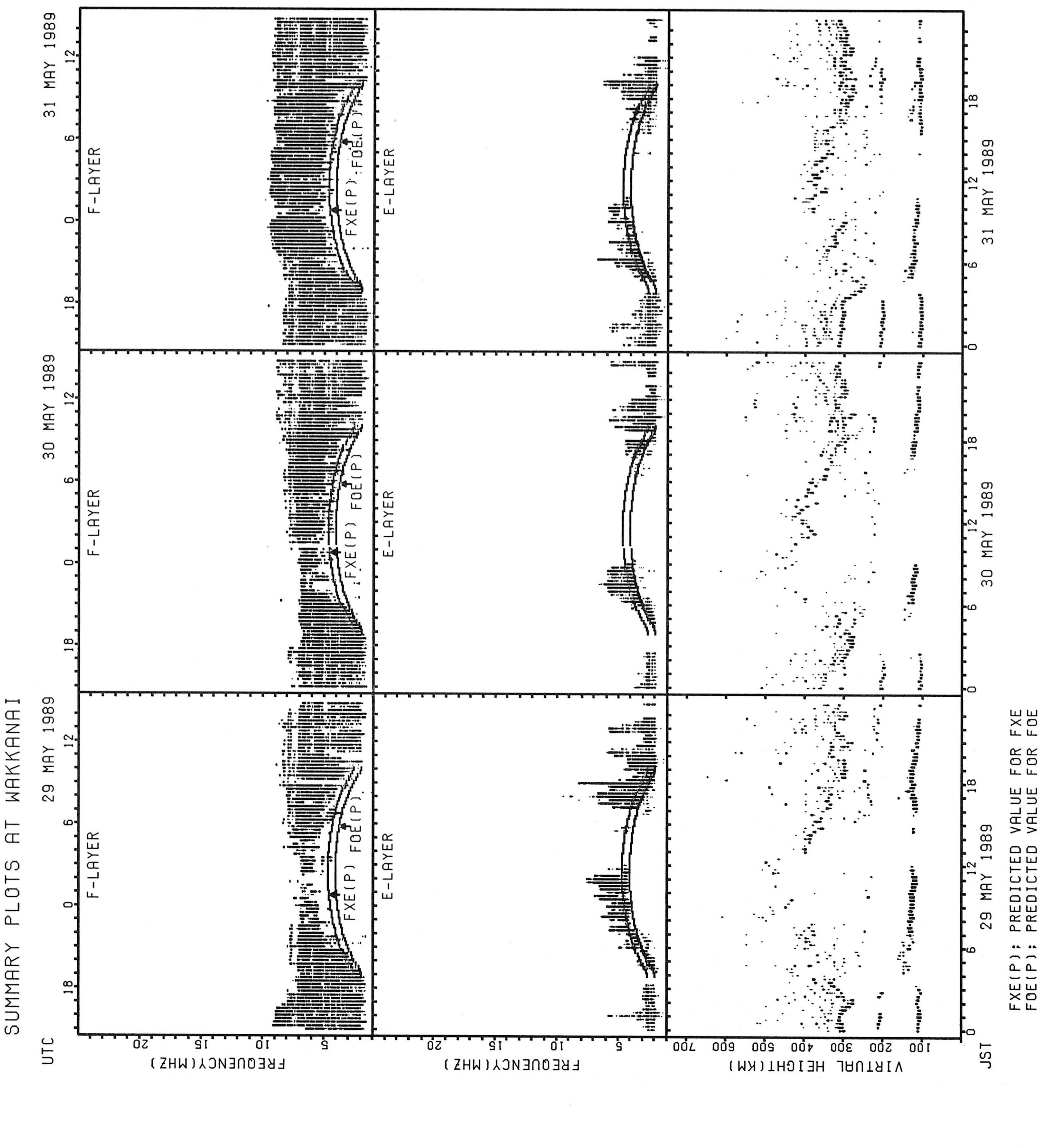


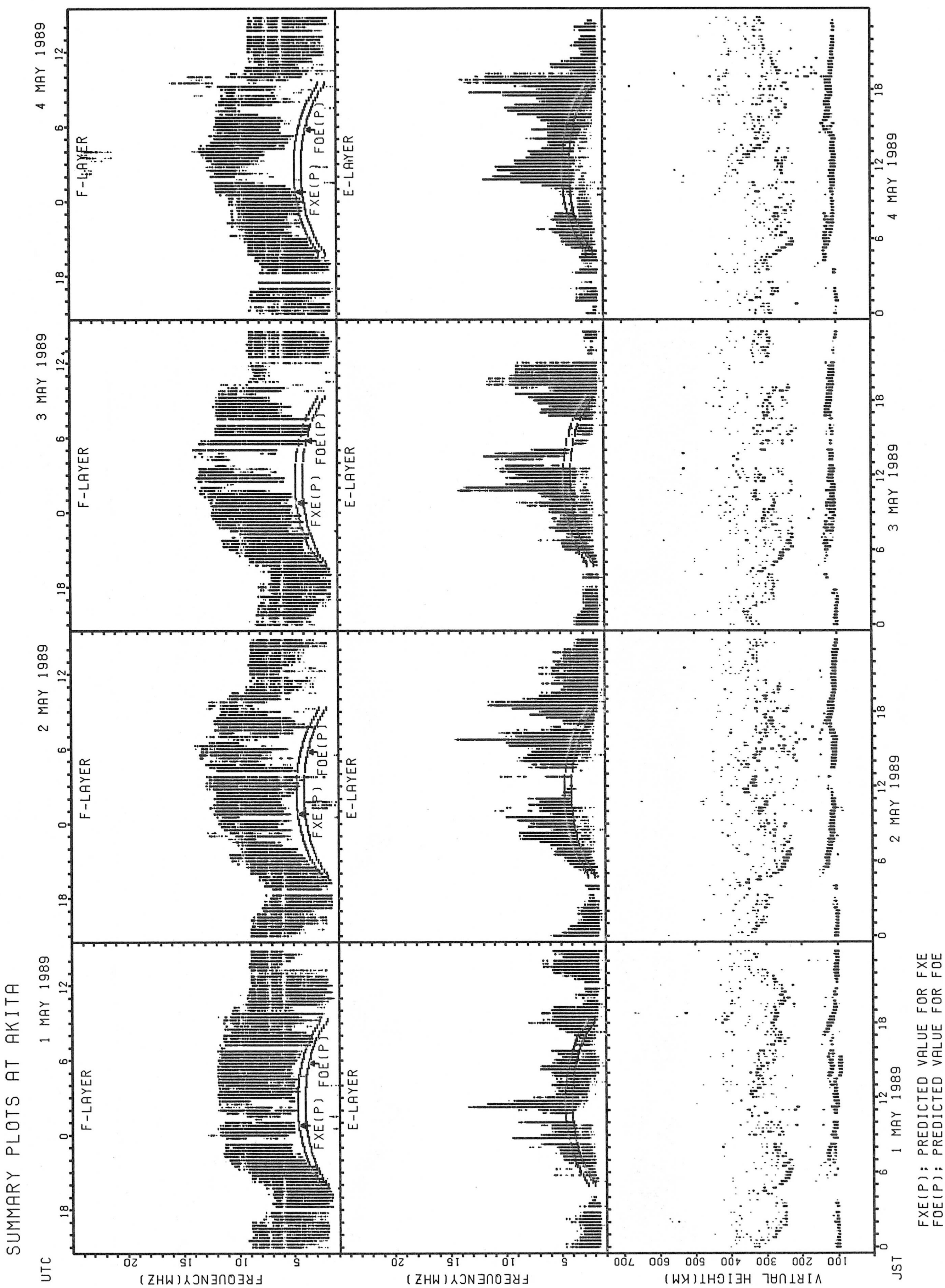
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI

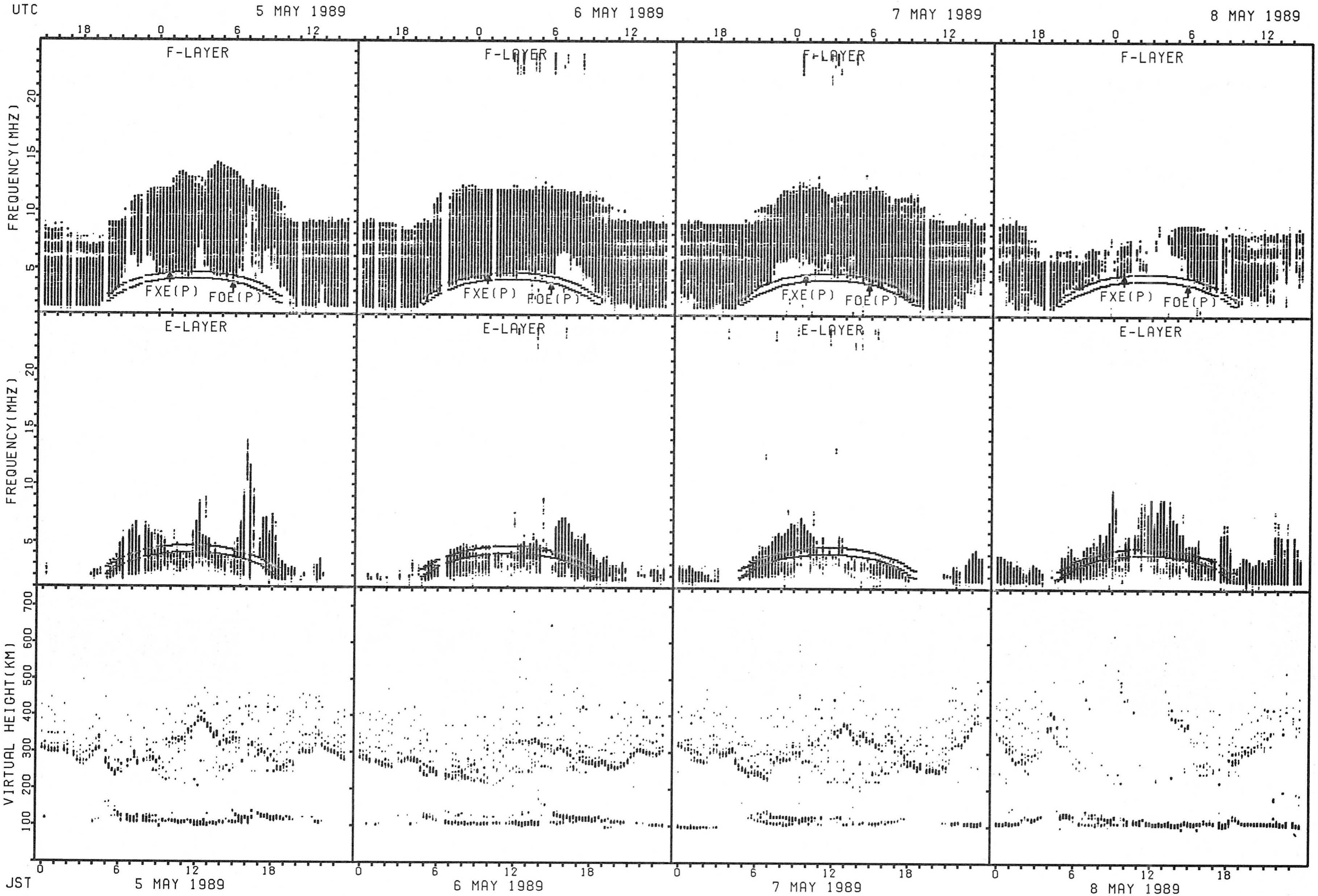


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

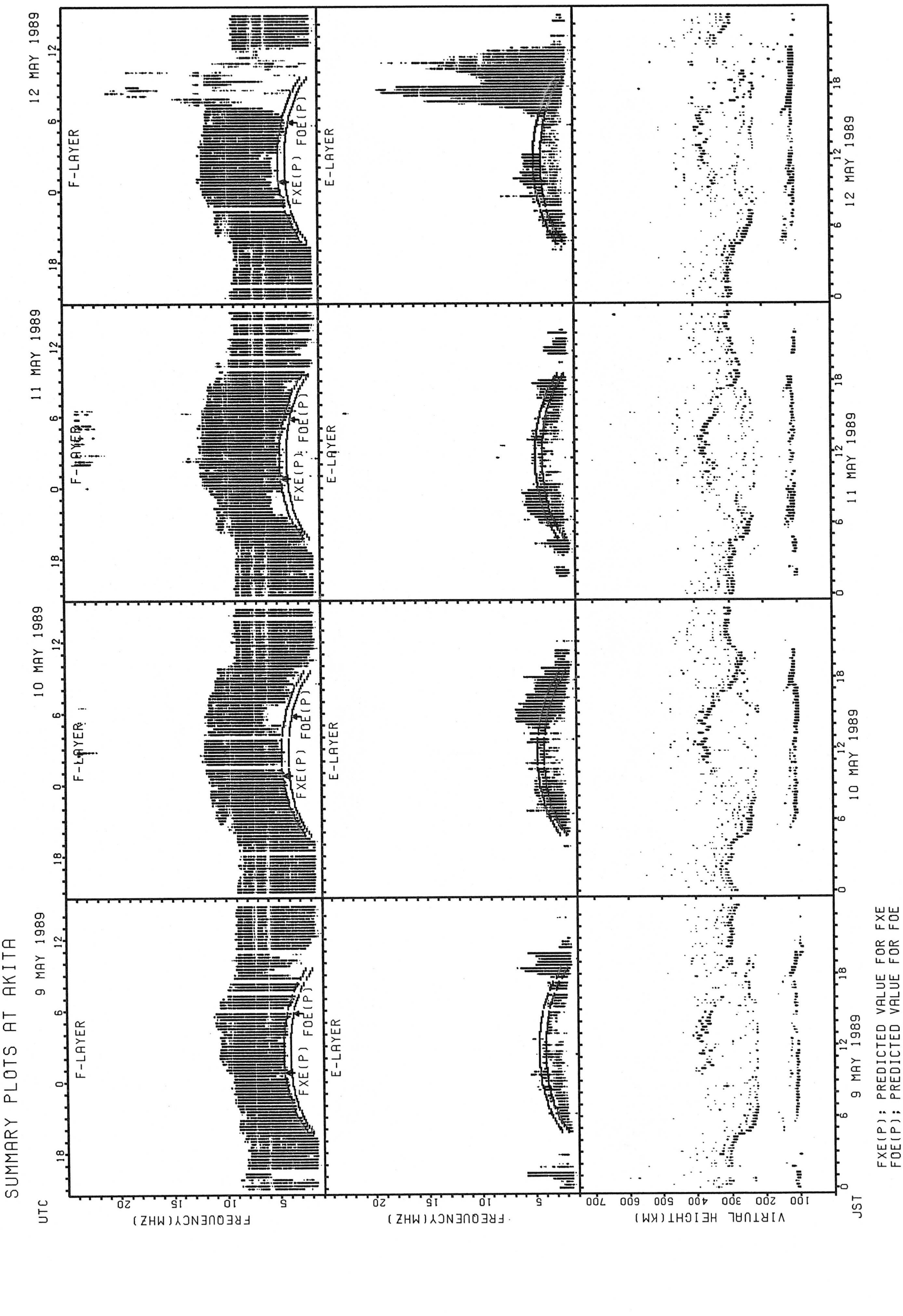

SUMMARY PLOTS AT WAKKANAI
UTC
29 MAY 1989
30 MAY 1989
31 MAY 1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

SUMMARY PLOTS AT AKITA

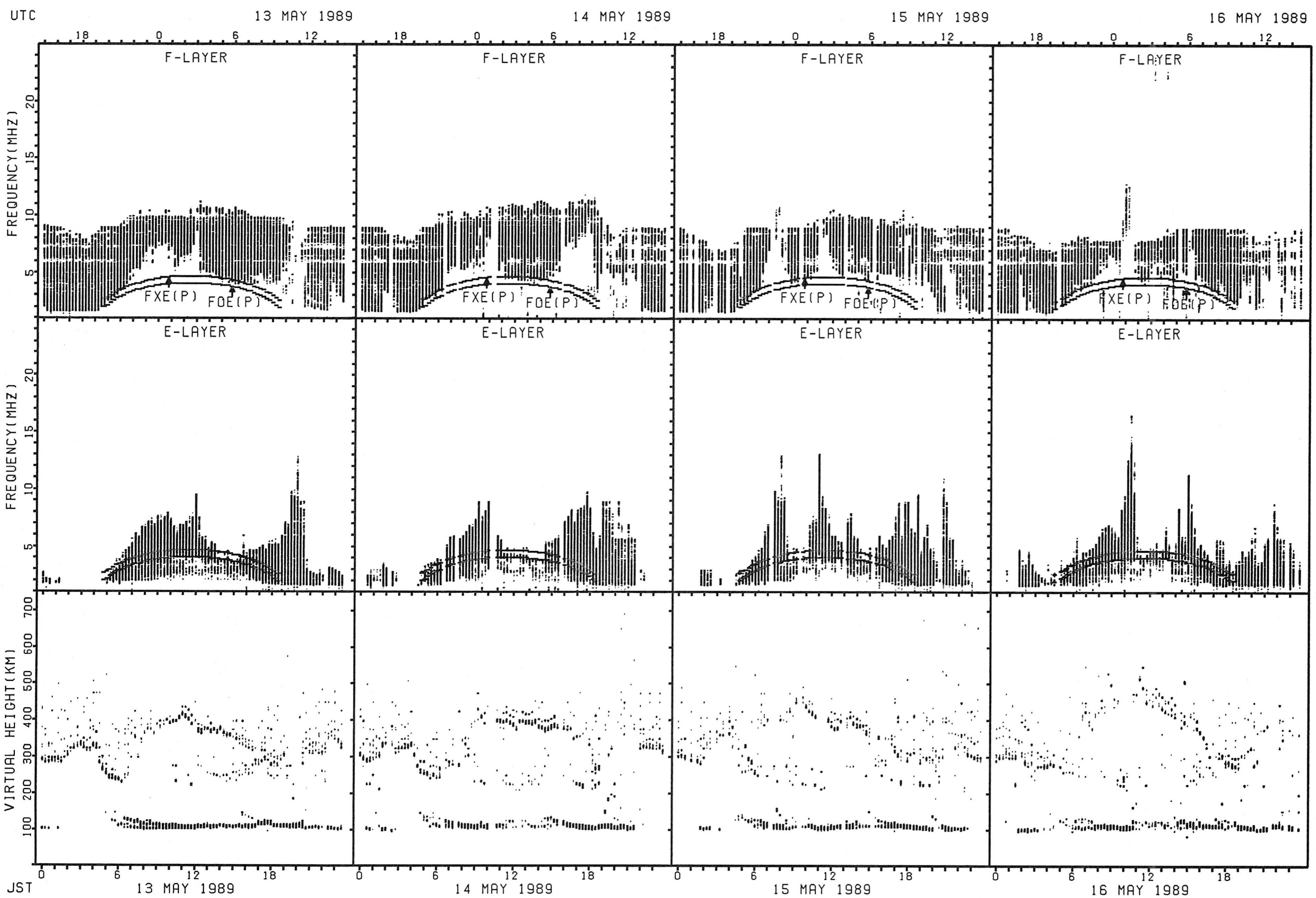


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE



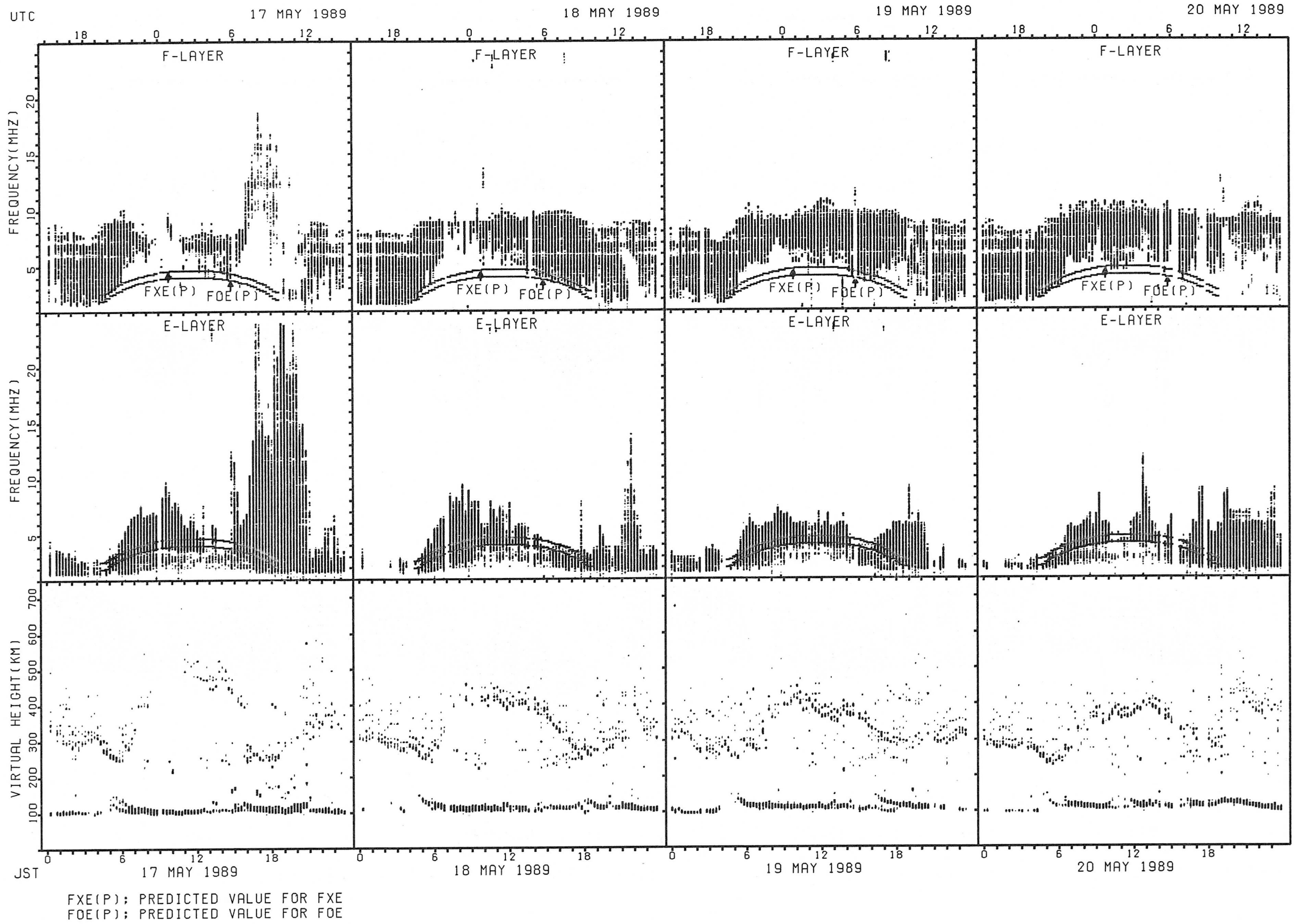
SUMMARY PLOTS AT AKITA
9 MAY 1989
10 MAY 1989
11 MAY 1989
12 MAY 1989
UTC
F-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
E-LAYER
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA

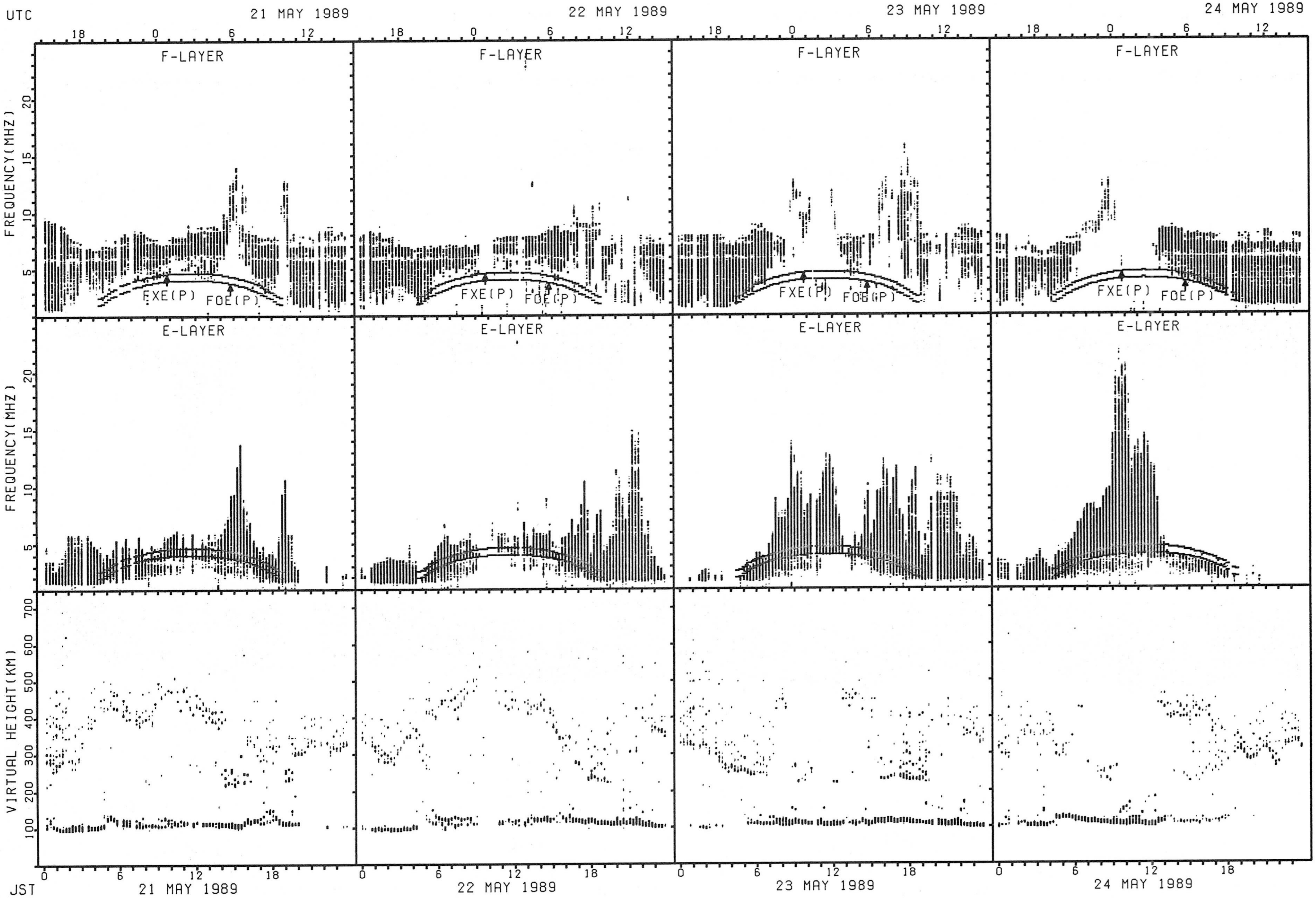


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

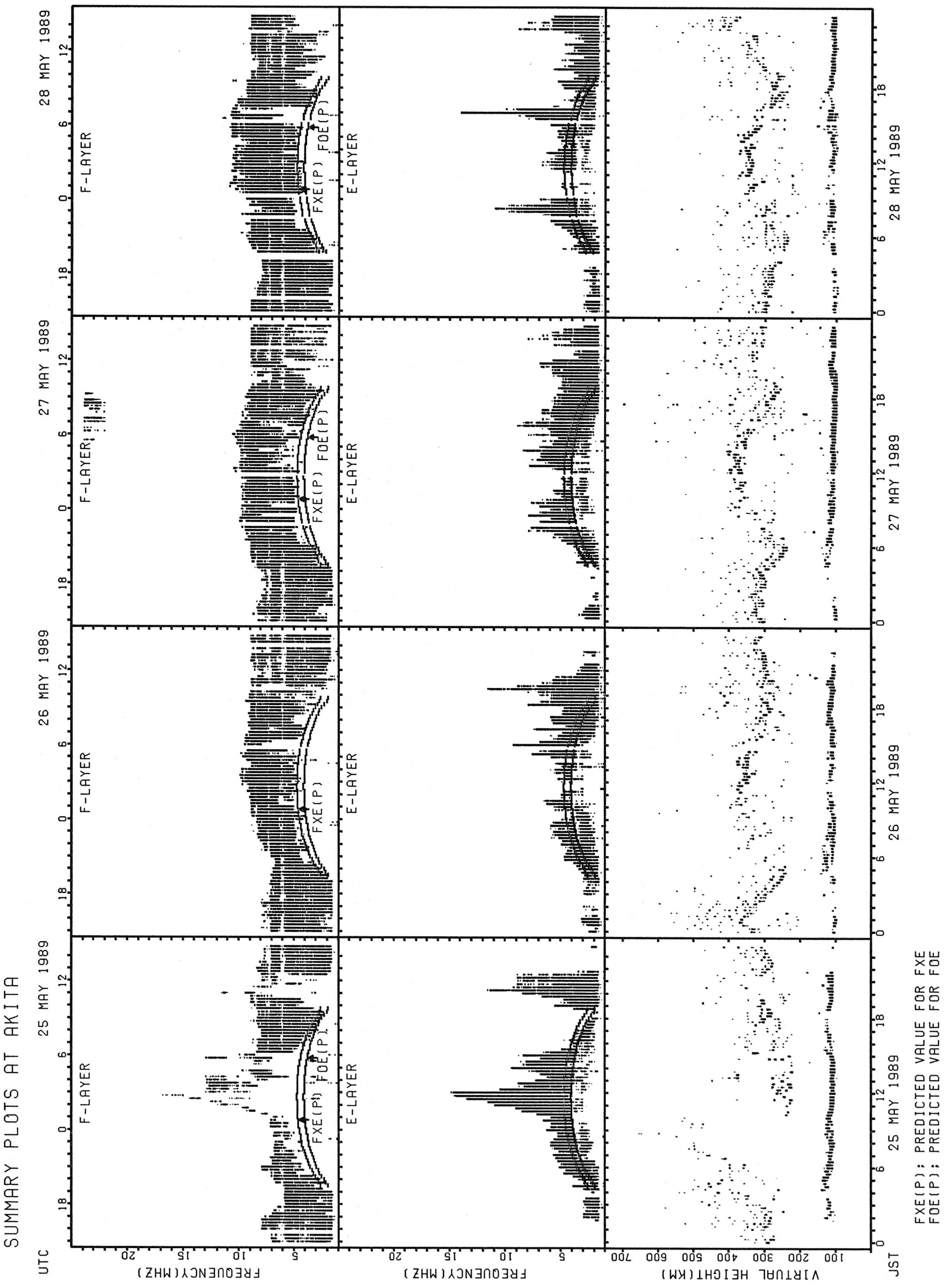
SUMMARY PLOTS AT AKITA



SUMMARY PLOTS AT AKITA

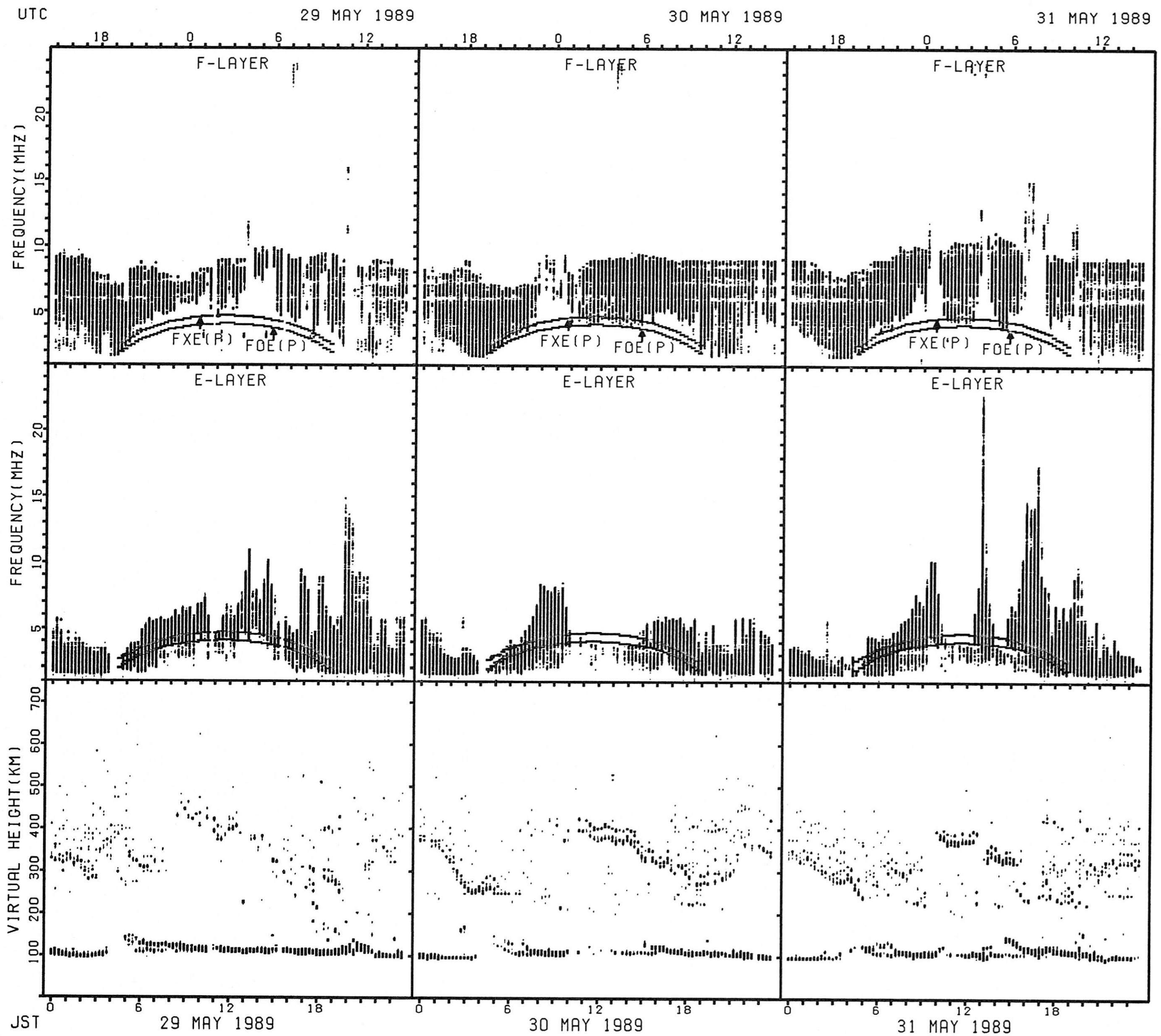


FXE(P): PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE



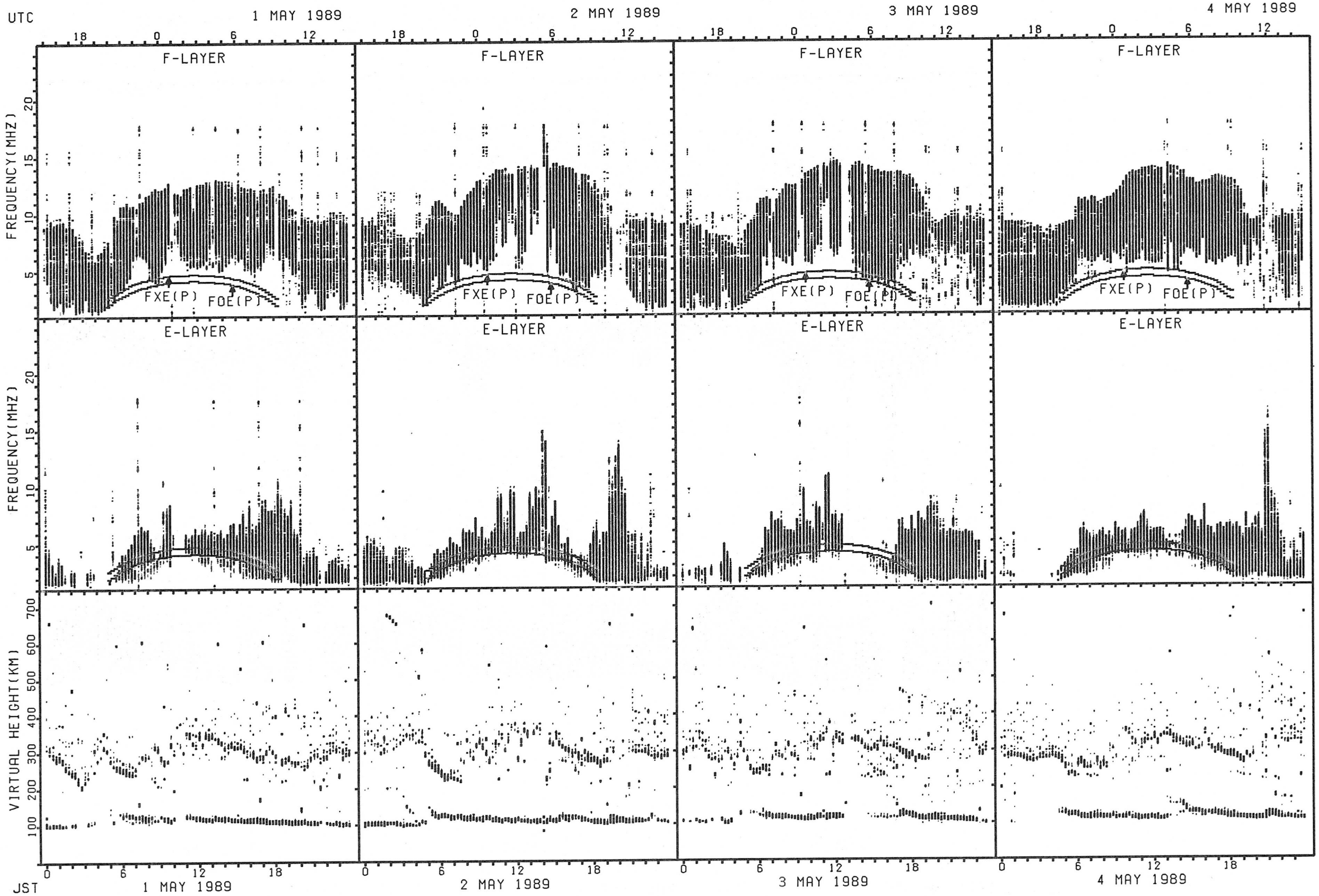
SUMMARY PLOTS AT AKITA
25 MAY 1989
26 MAY 1989
27 MAY 1989
28 MAY 1989
UTC
JST
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



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

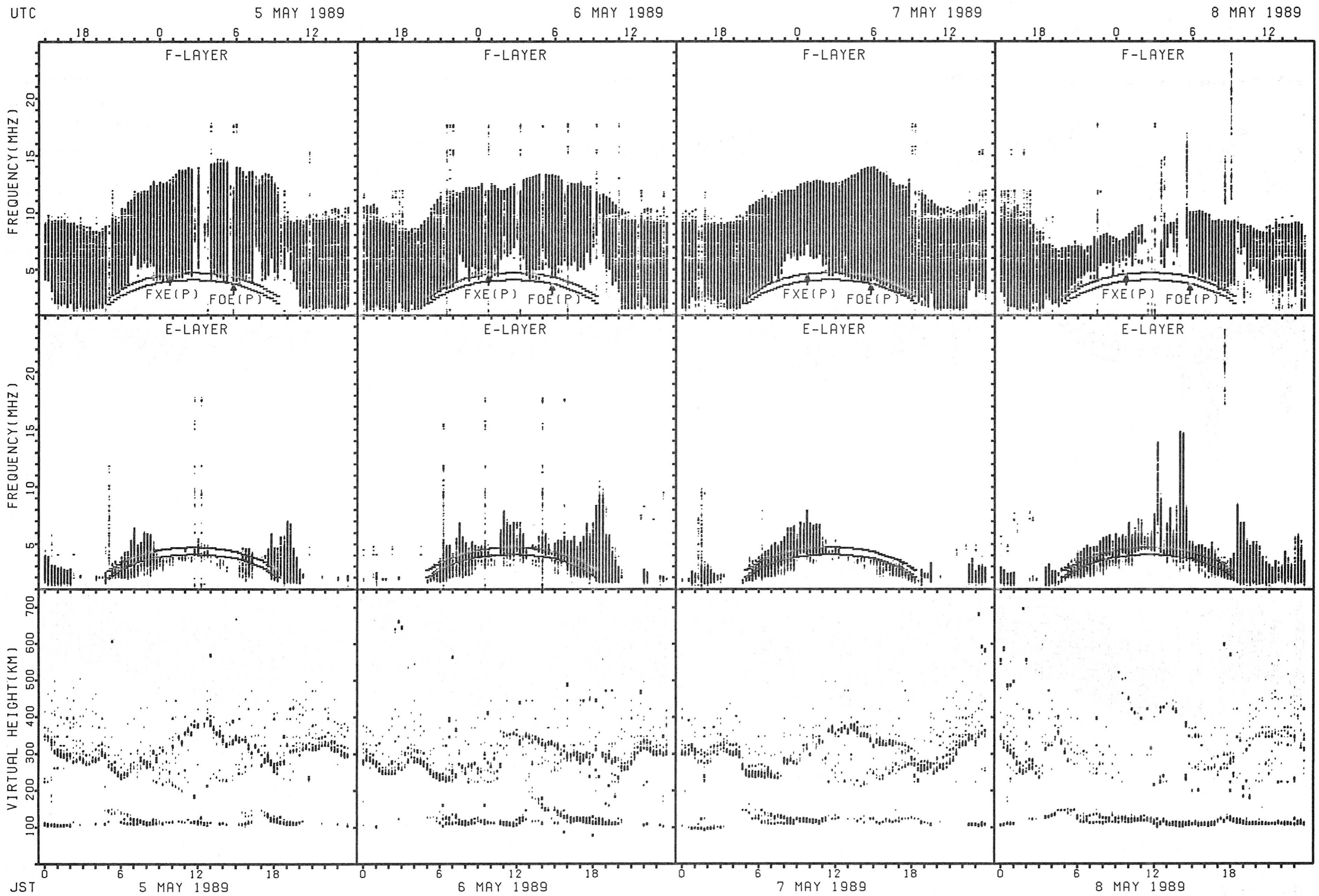
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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.

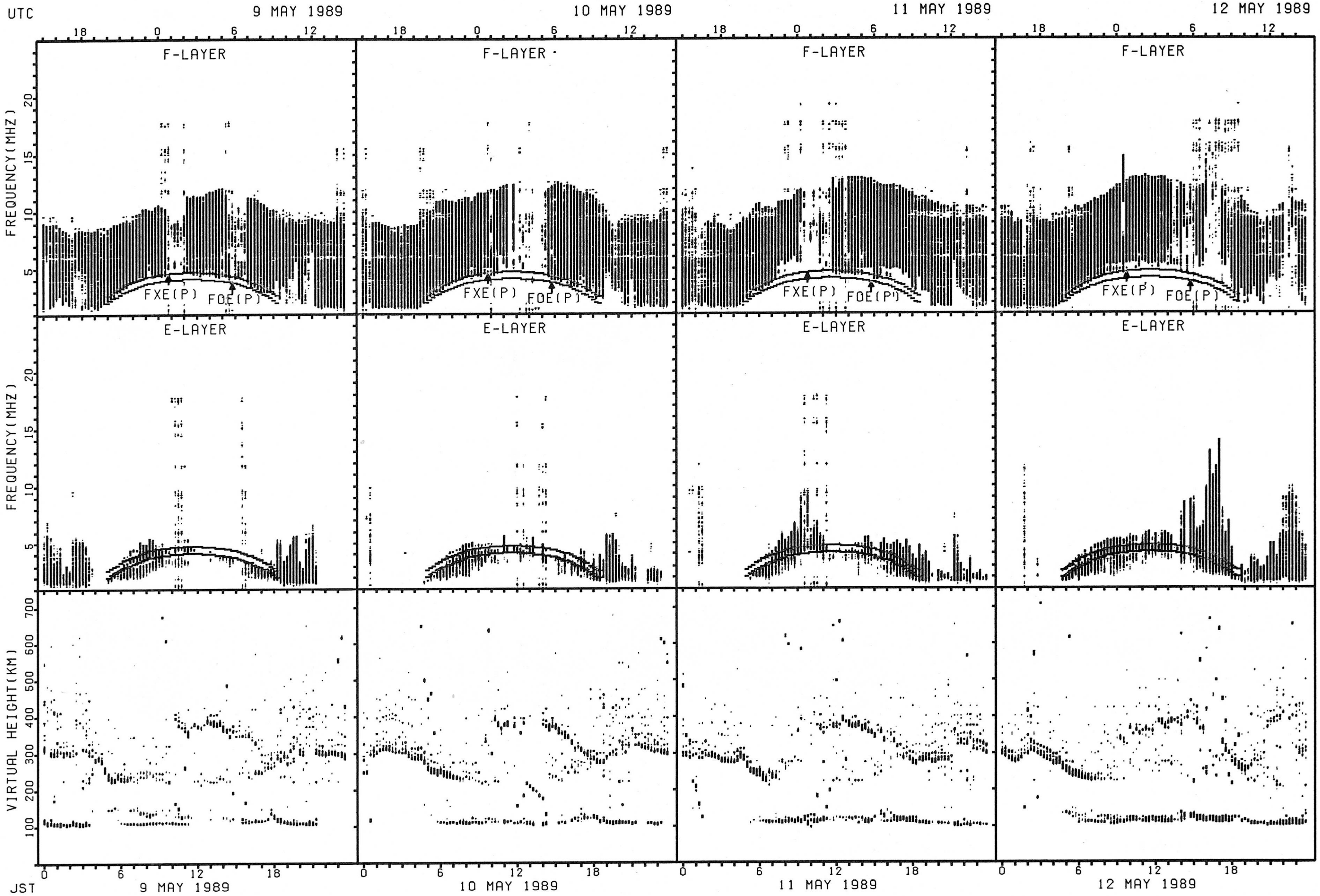
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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.

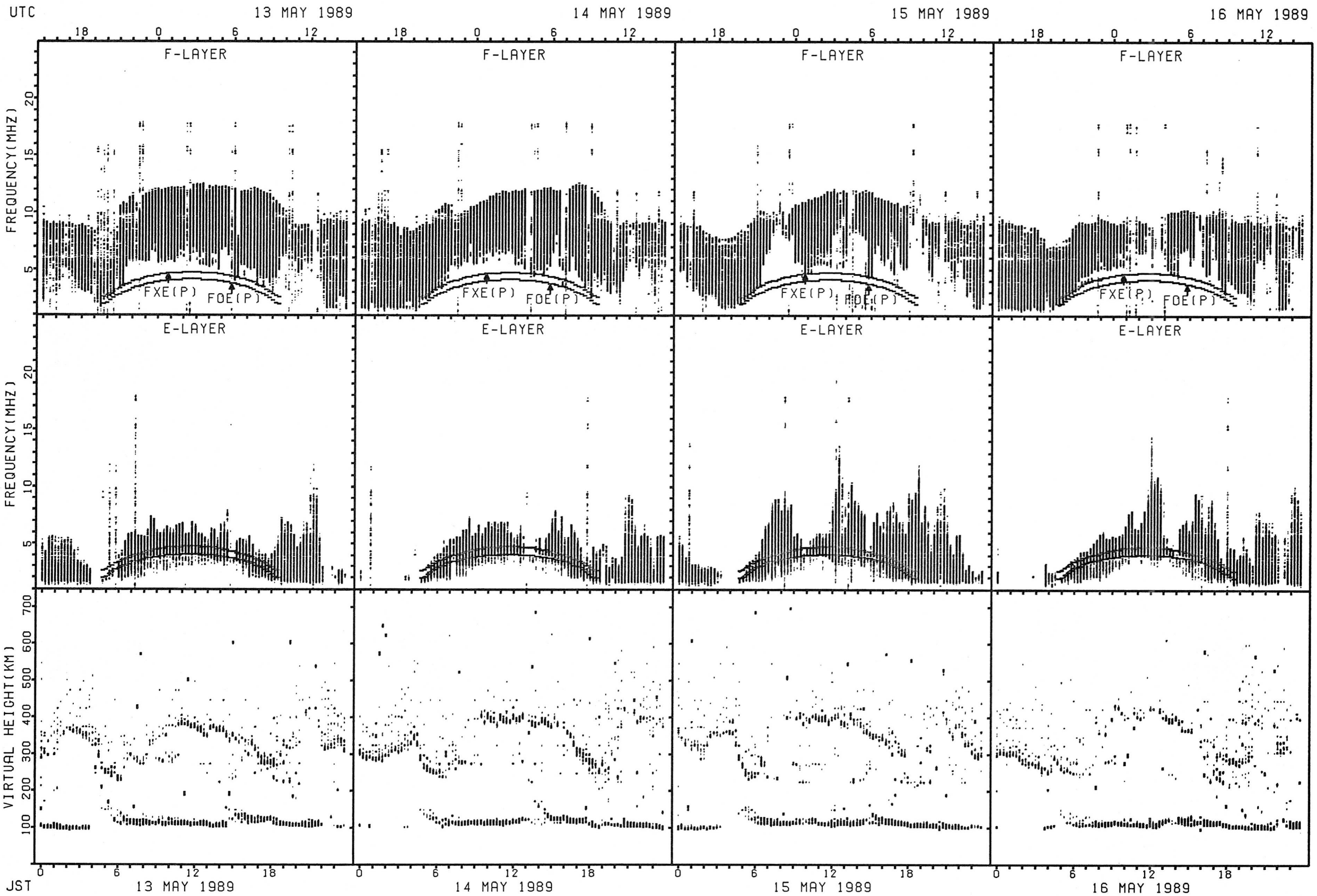
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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.

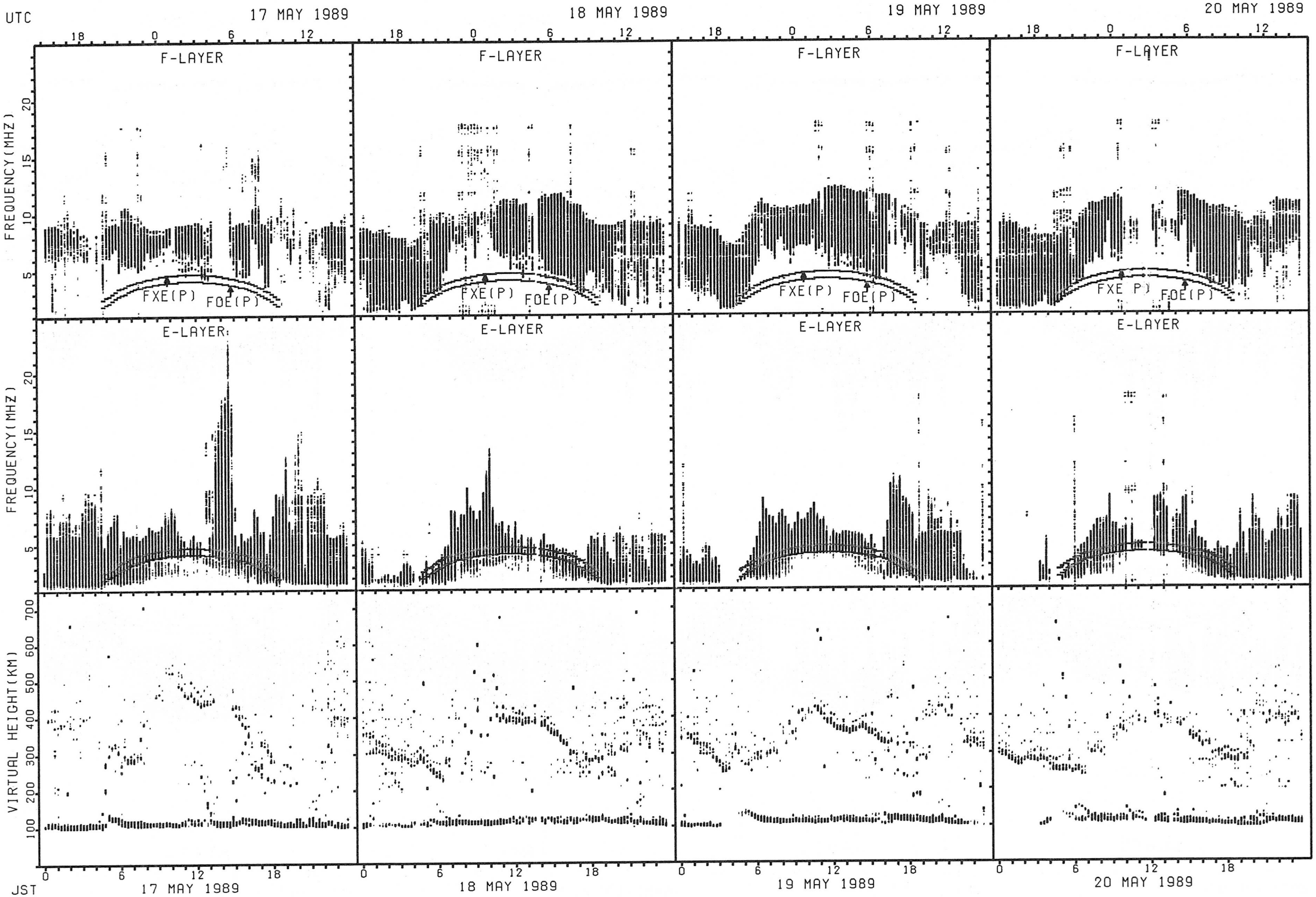
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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.

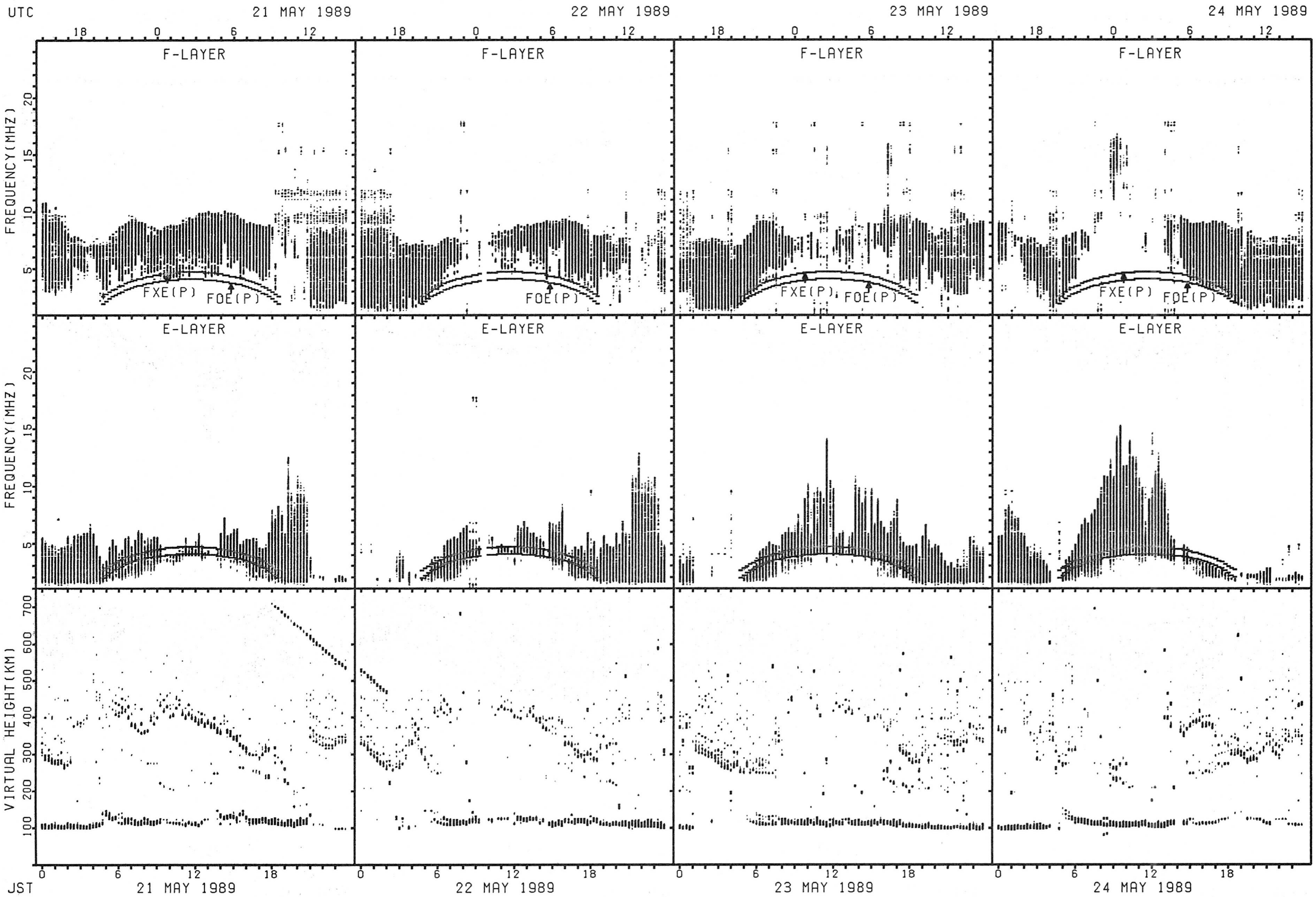
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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.

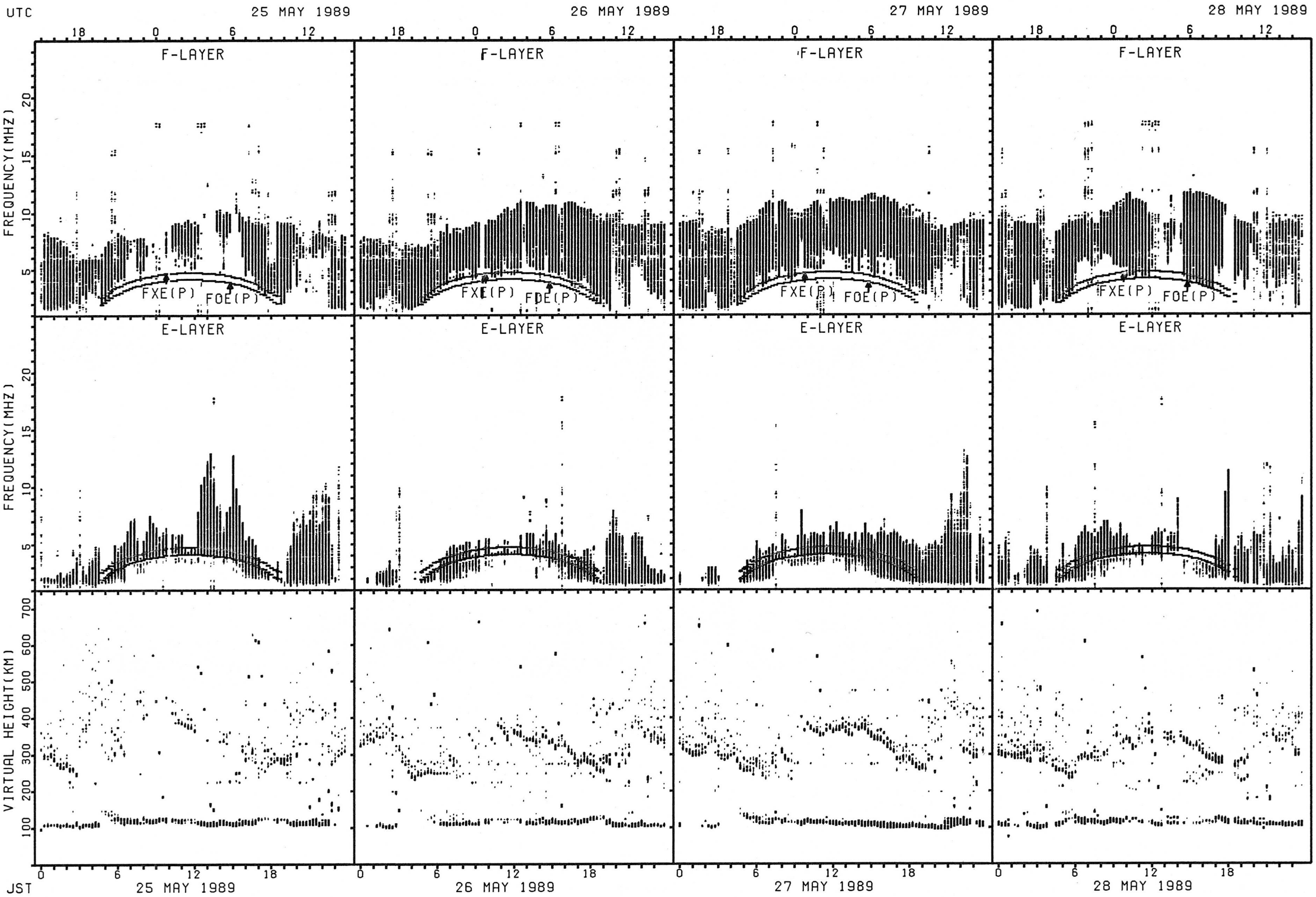
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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.

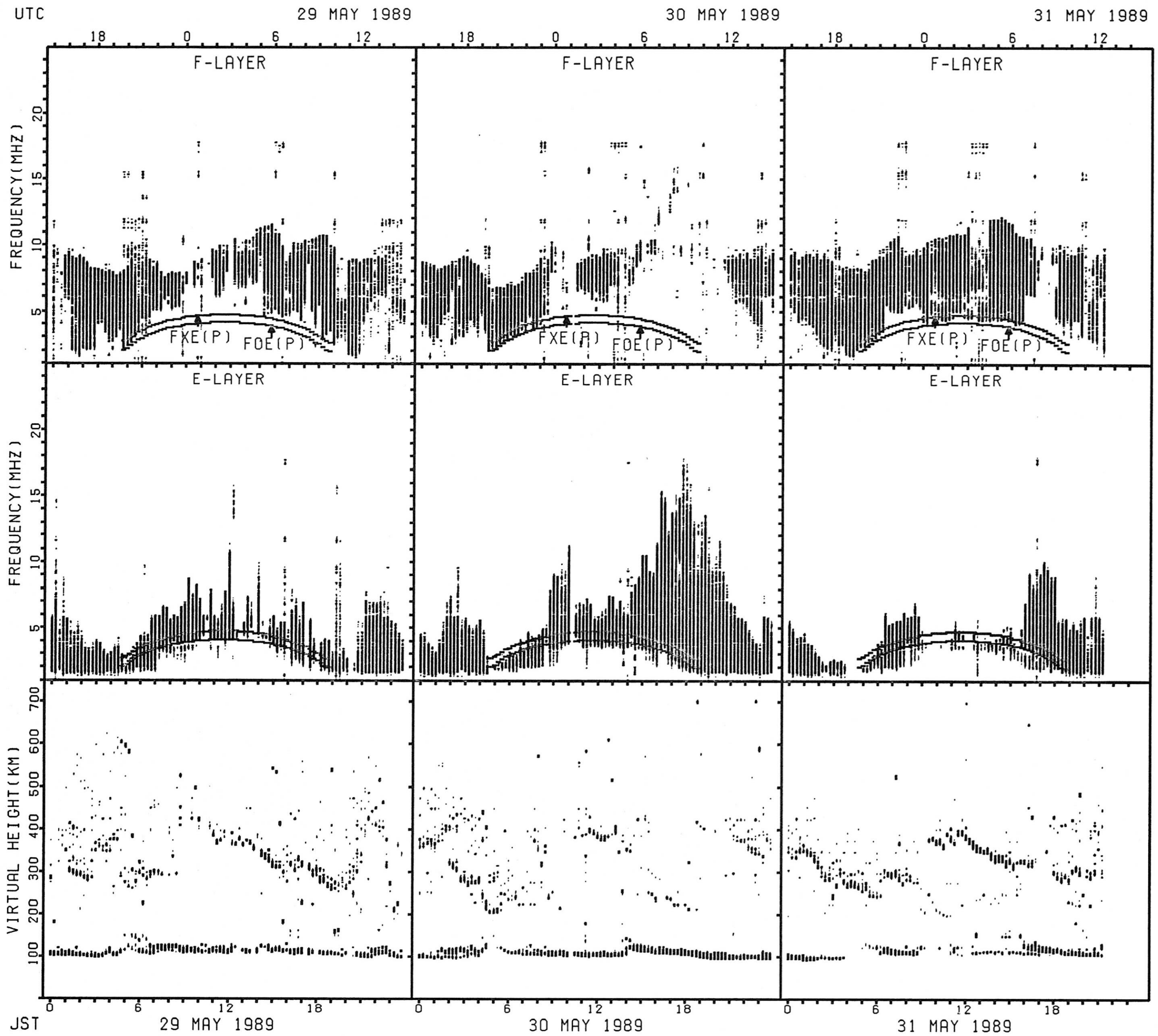
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

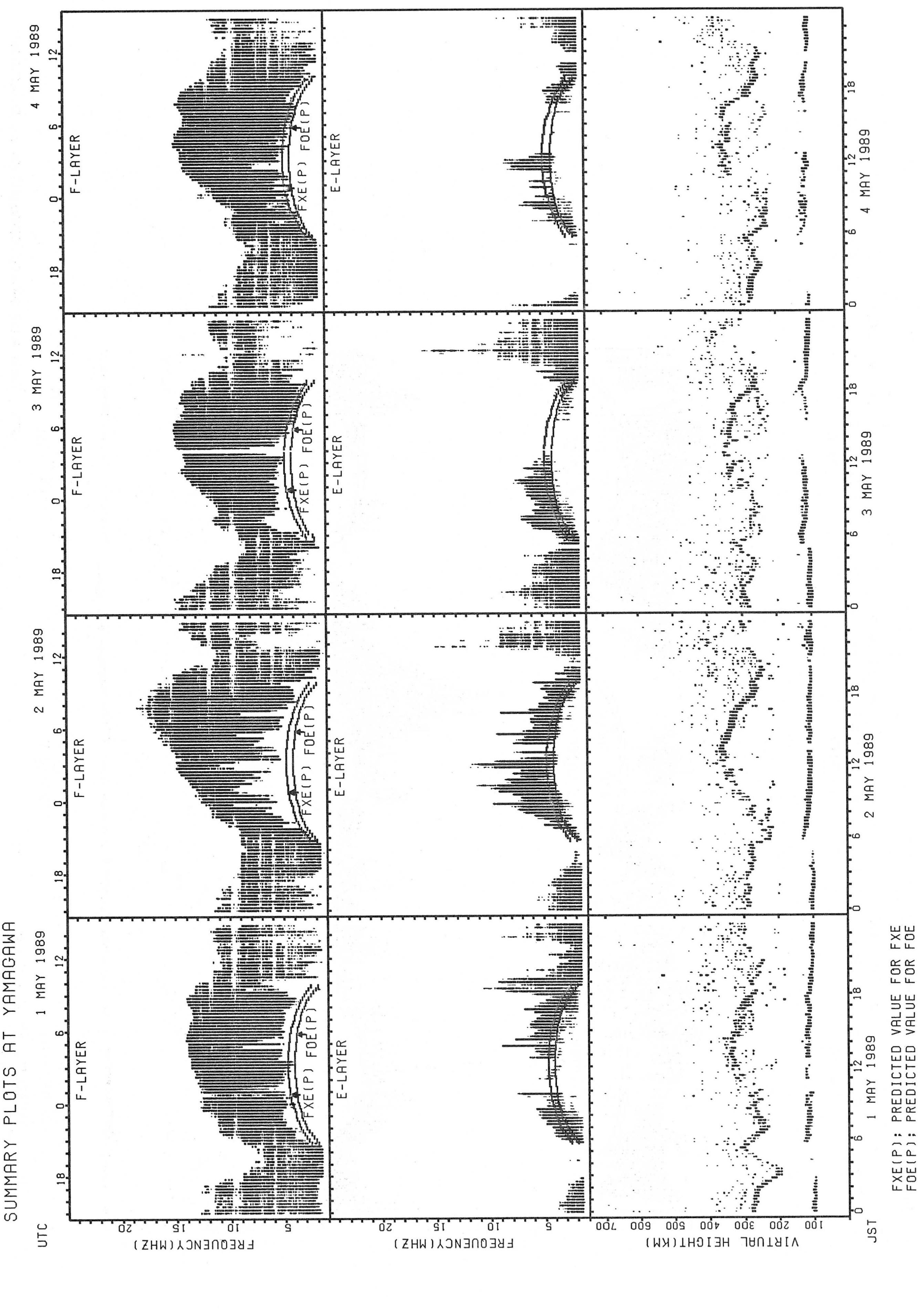
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT KOKUBUNJI TOKYO

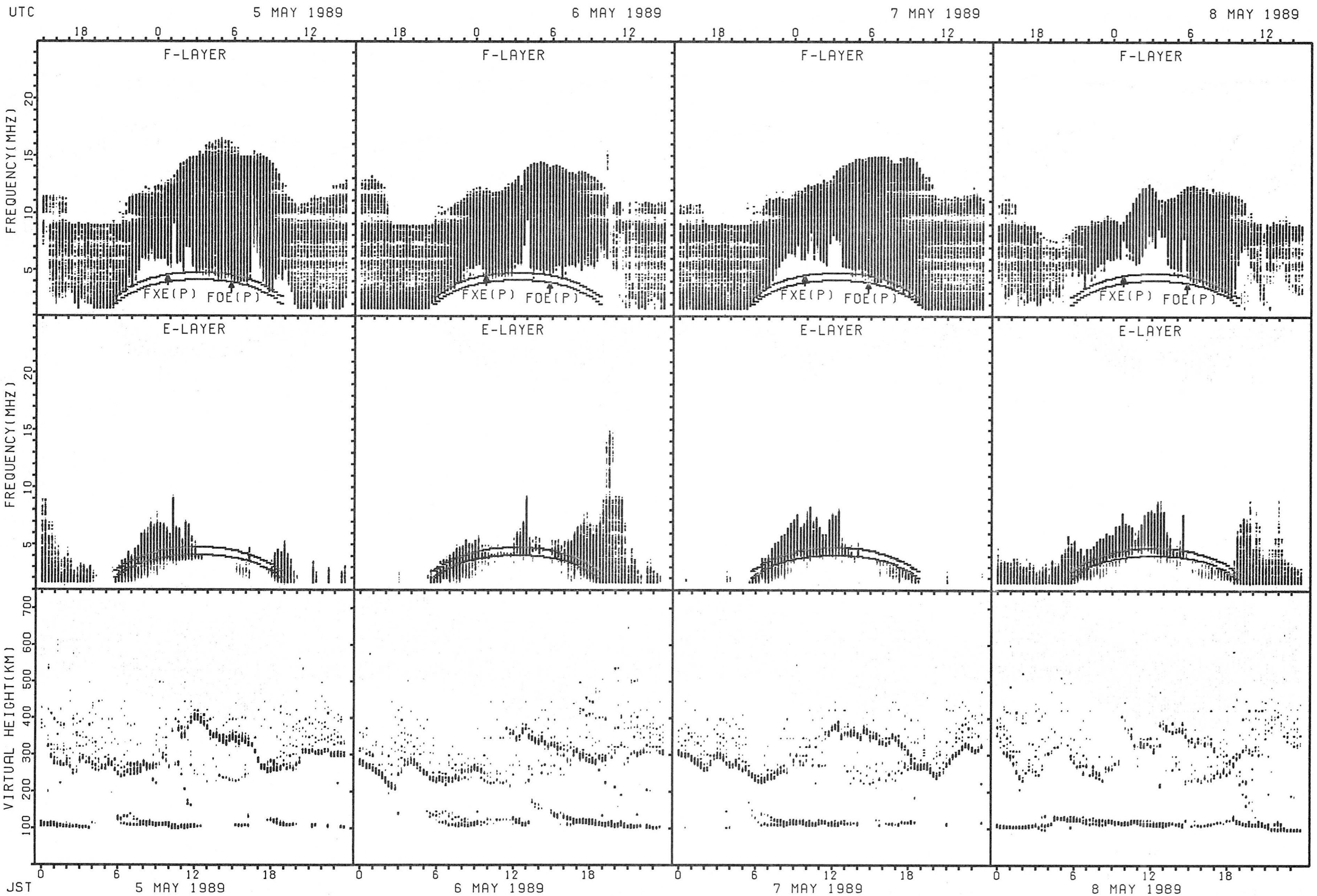


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

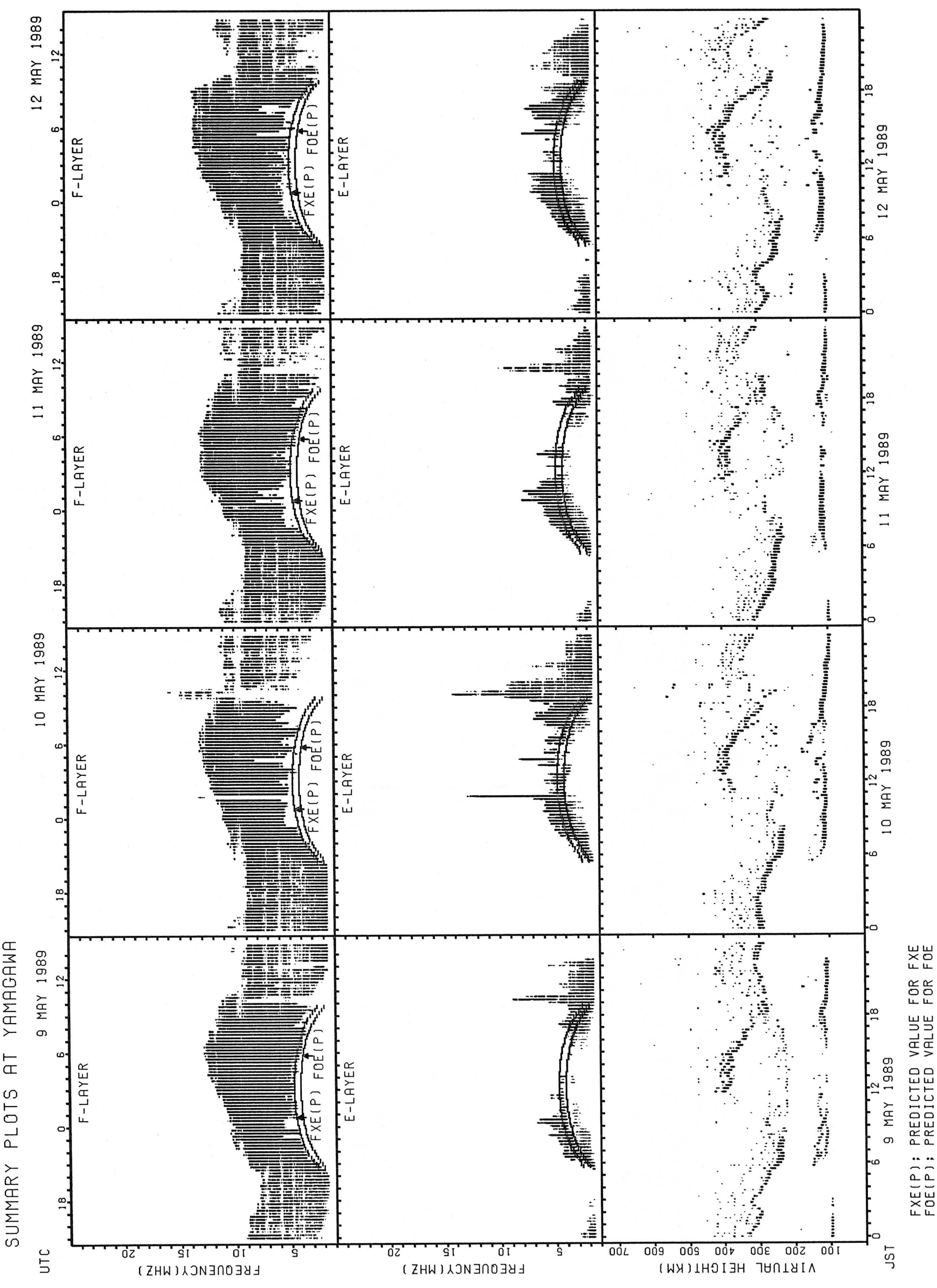
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.


SUMMARY PLOTS AT YAMAGAWA
1 MAY 1989
2 MAY 1989
3 MAY 1989
4 MAY 1989
UTC
18 0 6 12
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
5 10 15 20
VIRTUAL HEIGHT(KM)
100 200 300 400 500 600 700
JST
0 6 12 18
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA

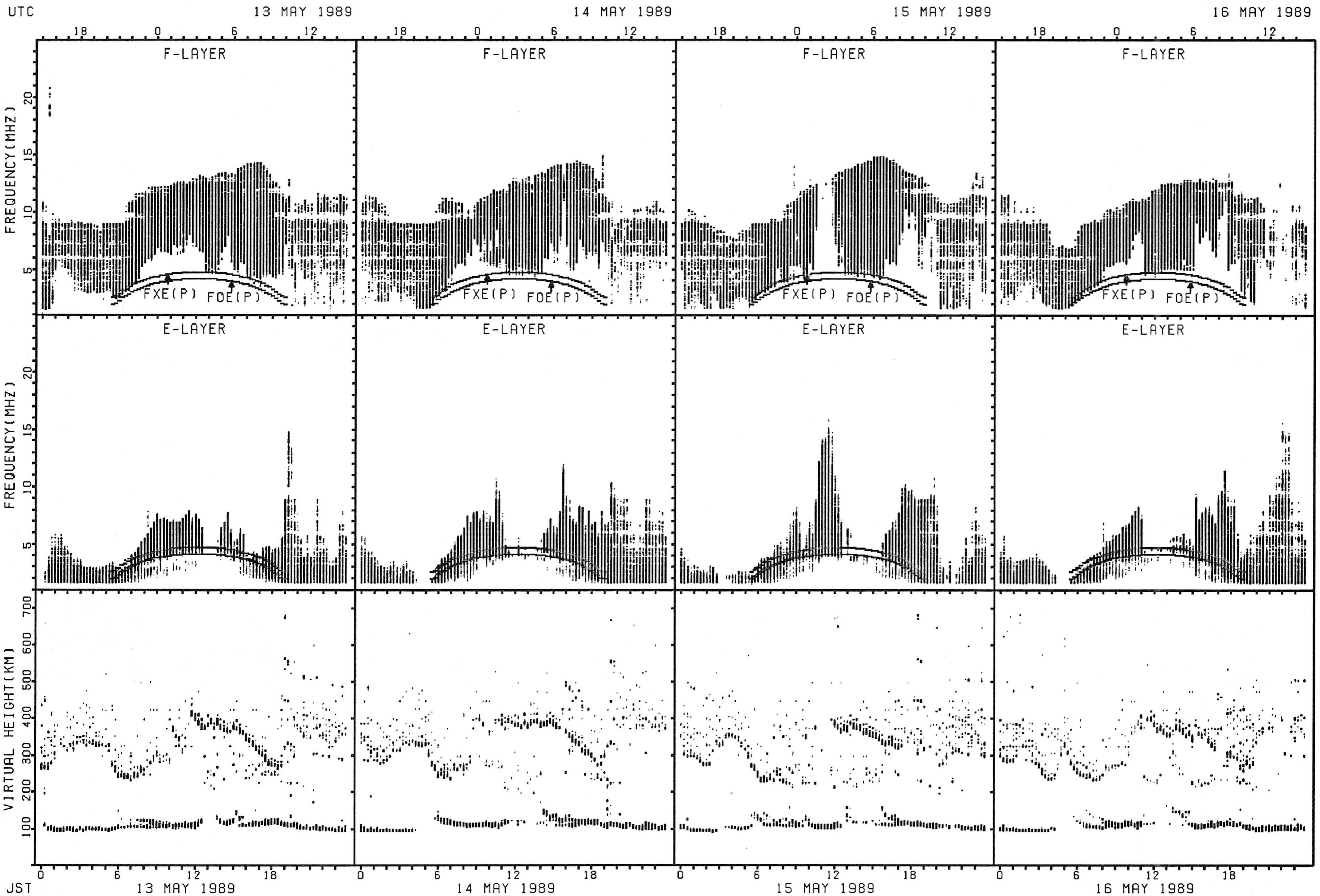


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE



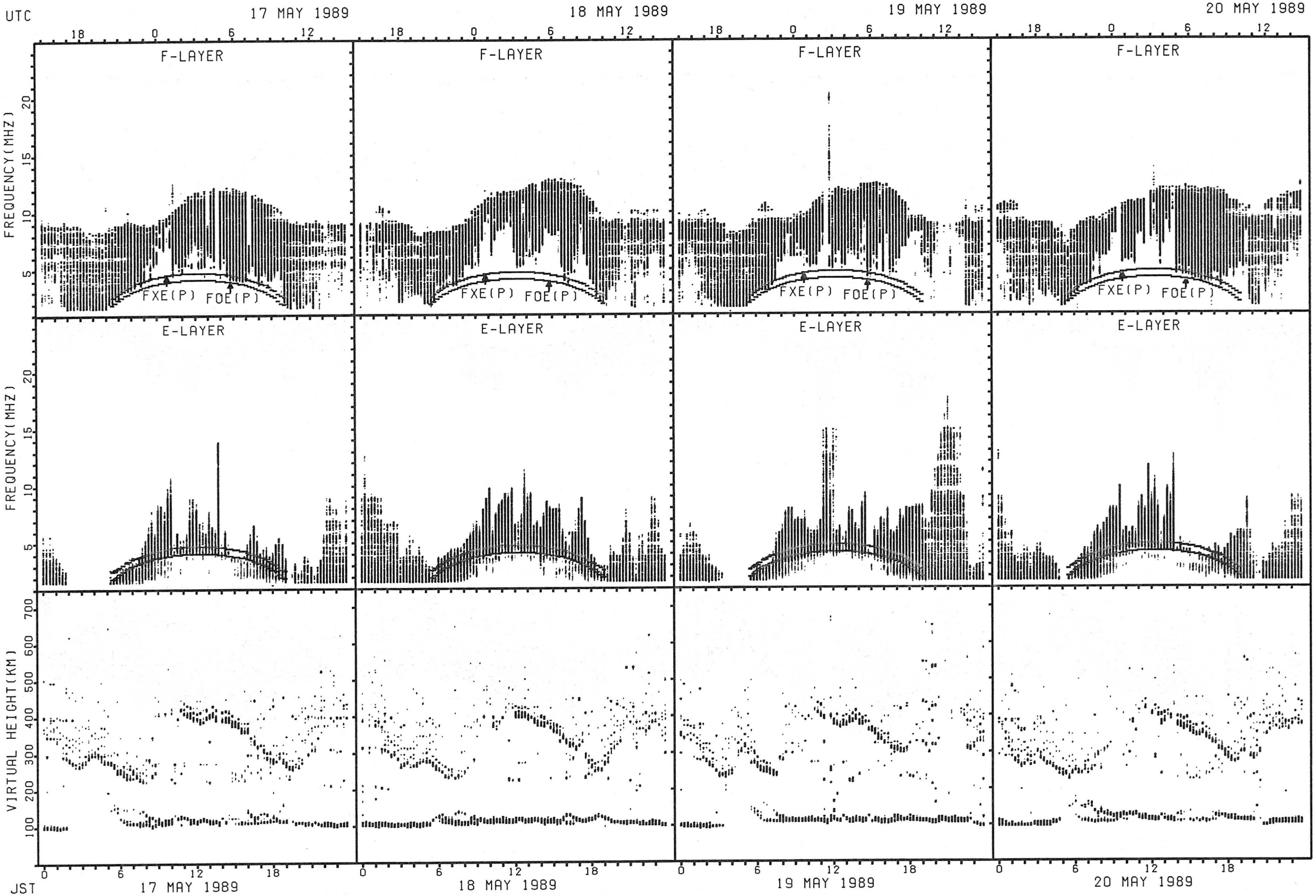
SUMMARY PLOTS AT YAMAGAWA
9 MAY 1989
10 MAY 1989
11 MAY 1989
12 MAY 1989
UTC
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



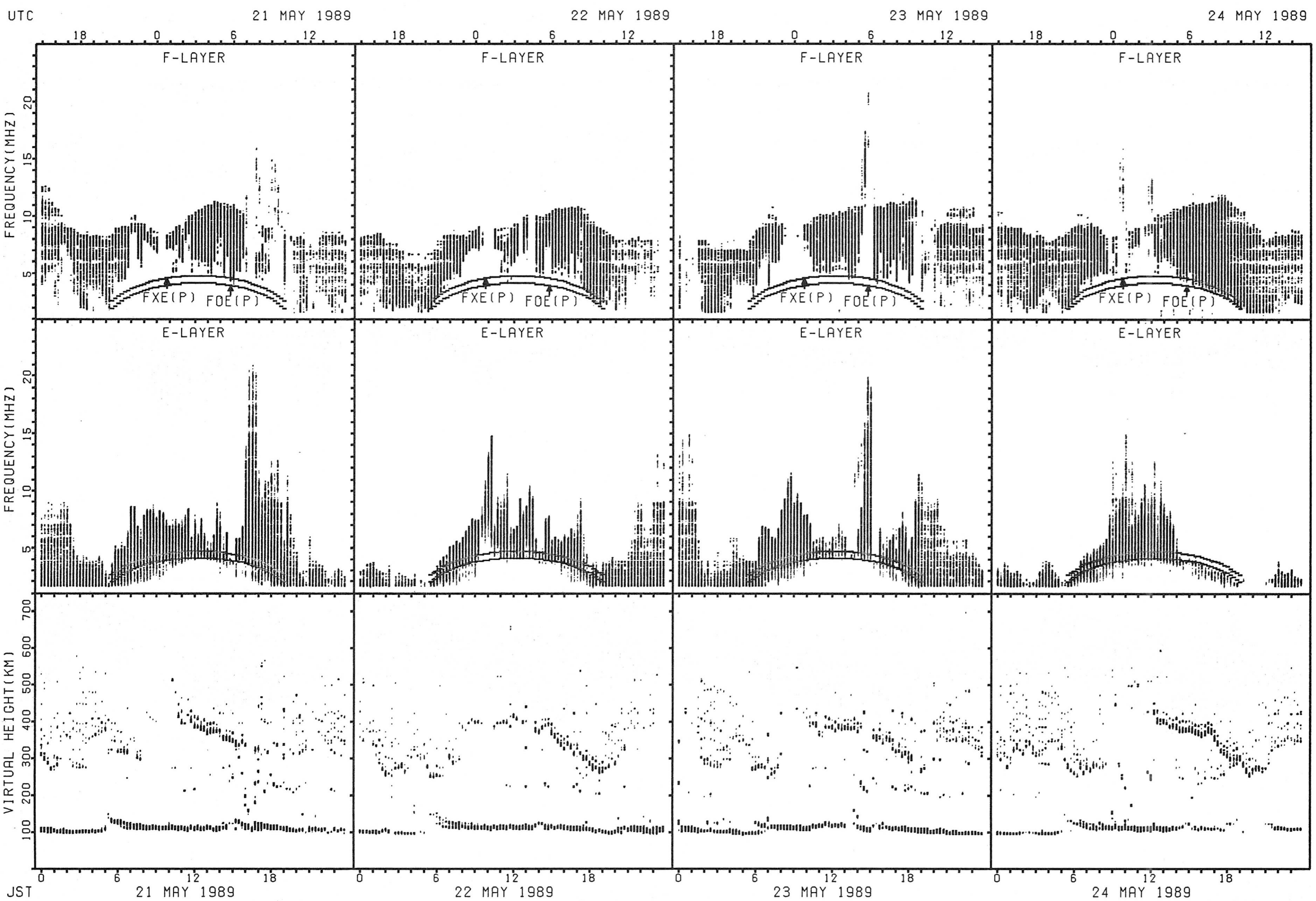
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



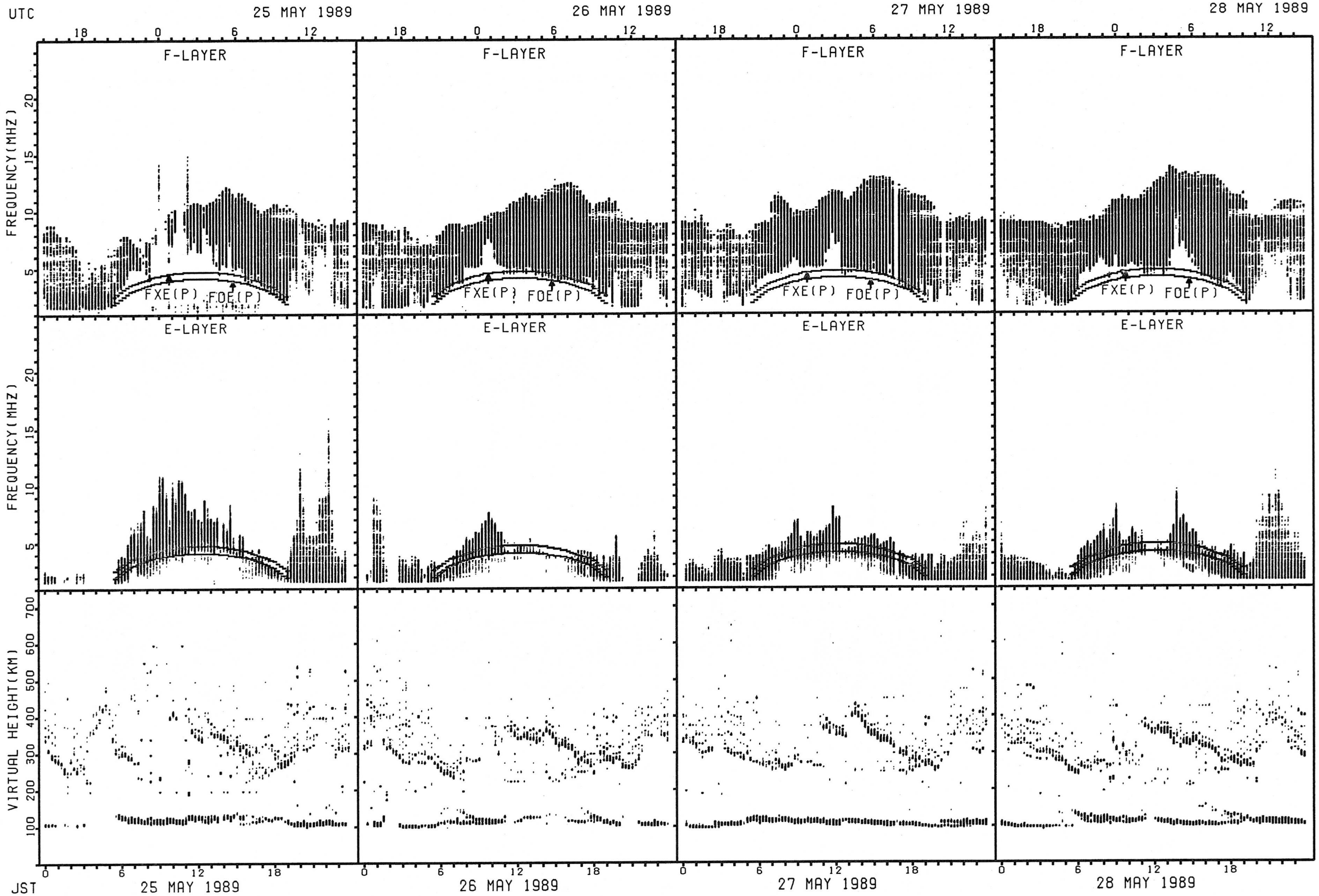
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



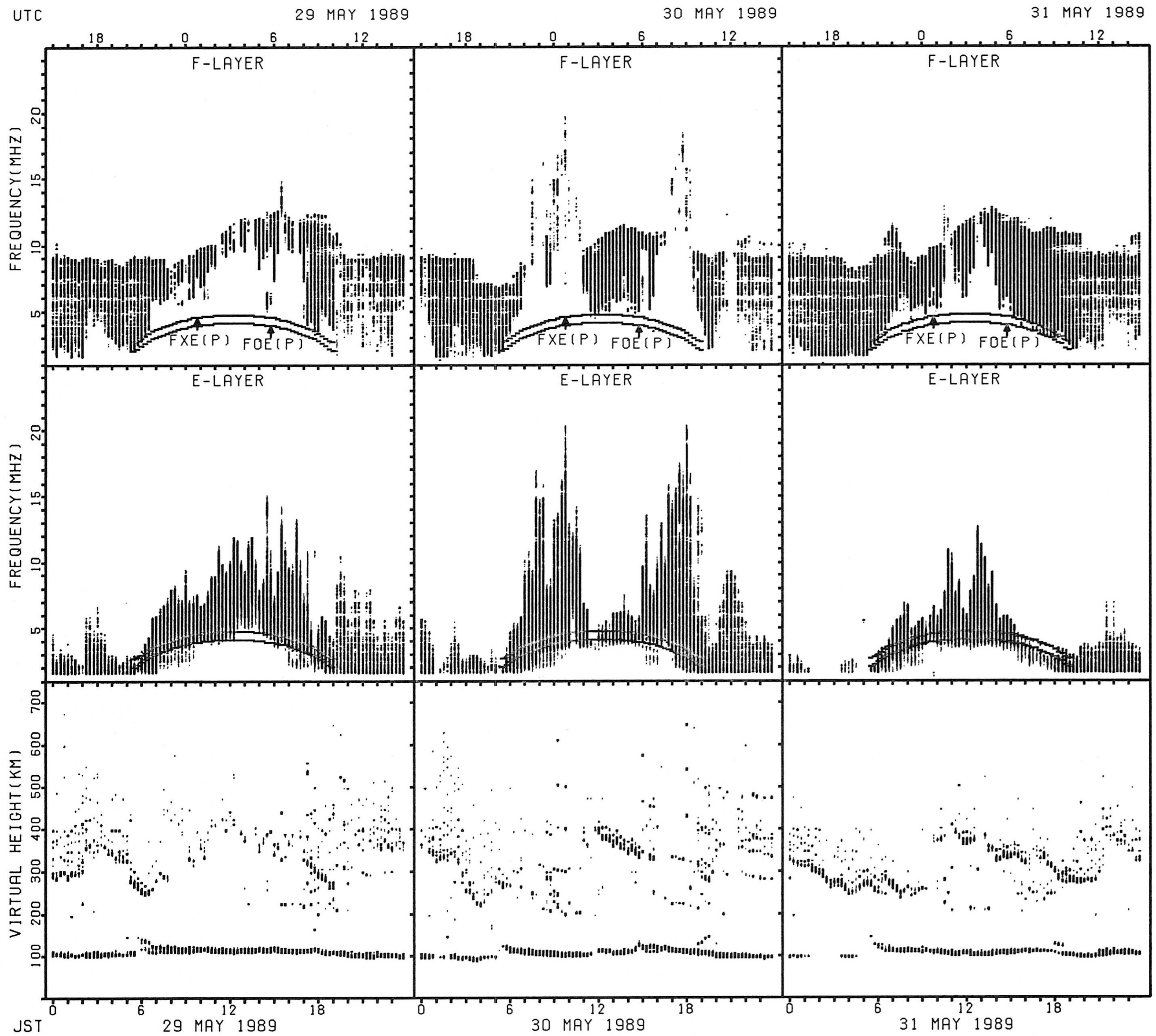
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



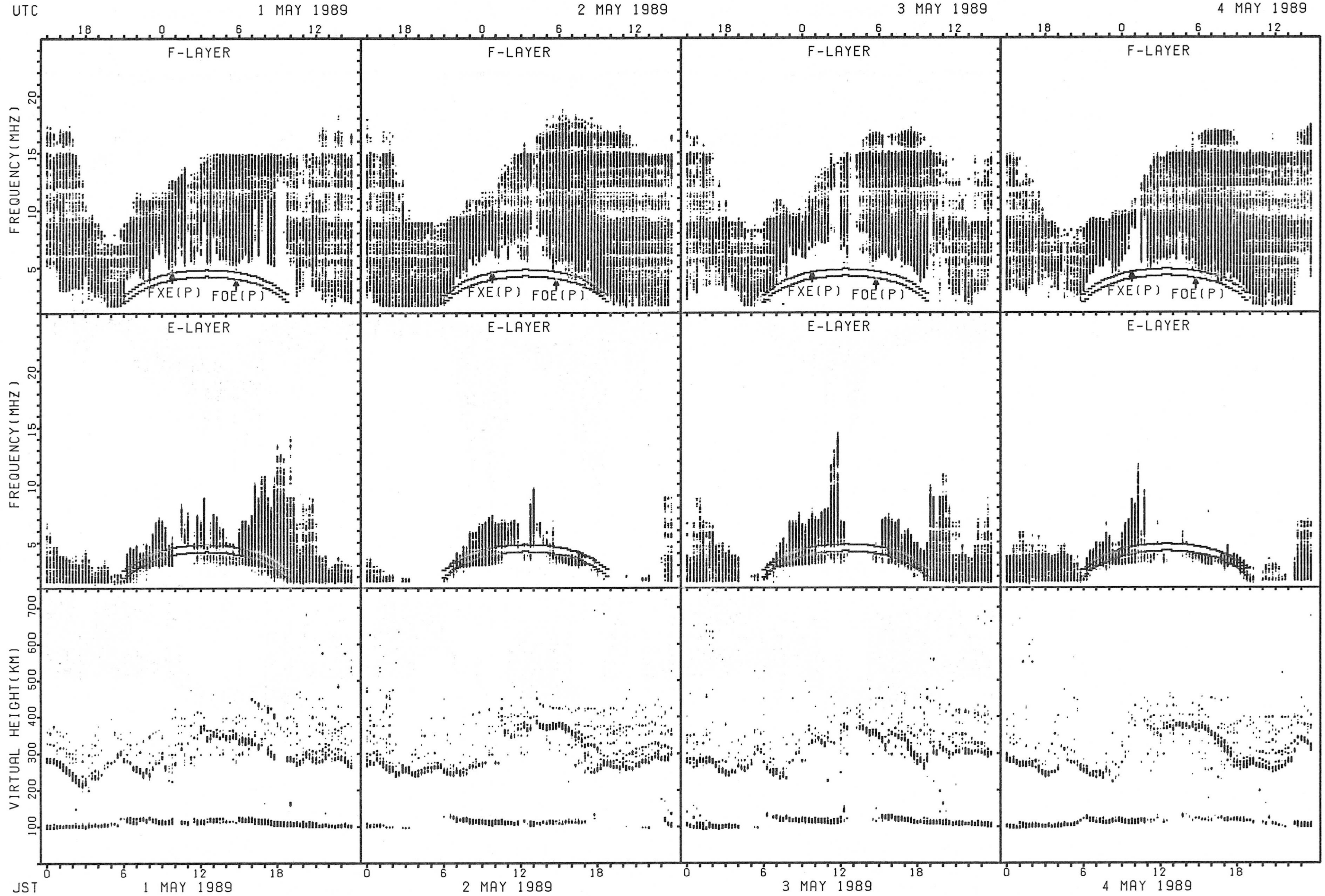
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



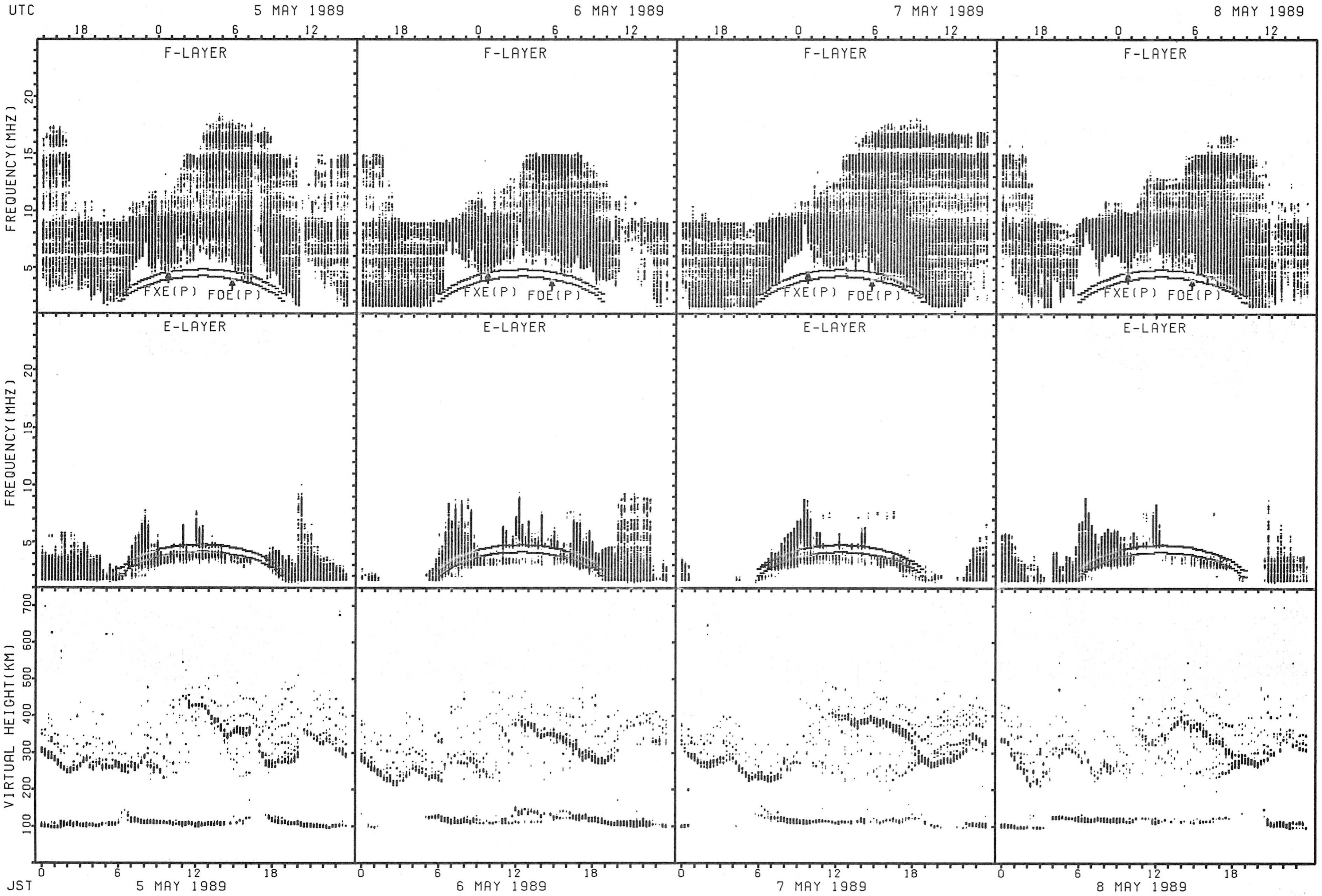
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



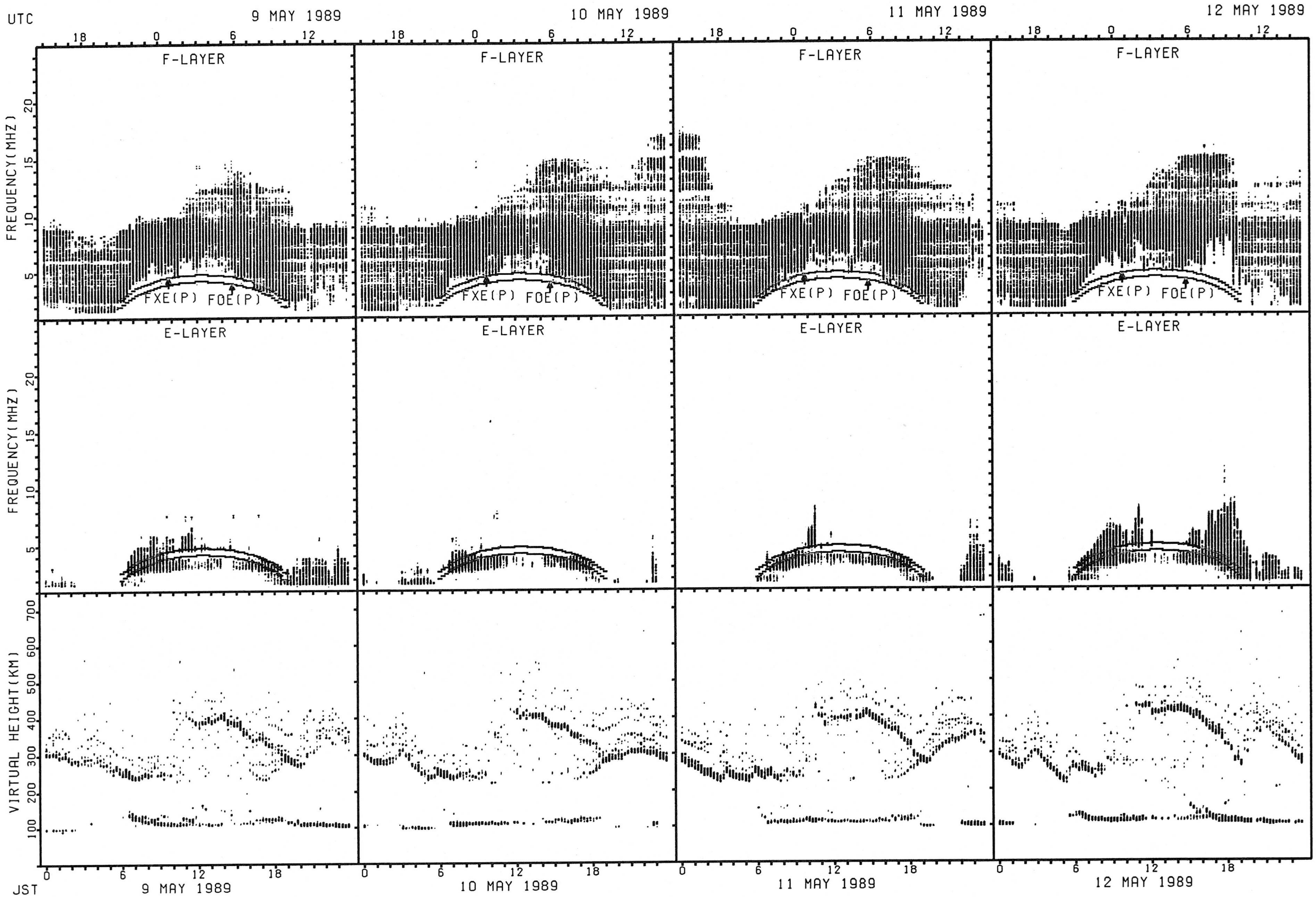
FXE(P): PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



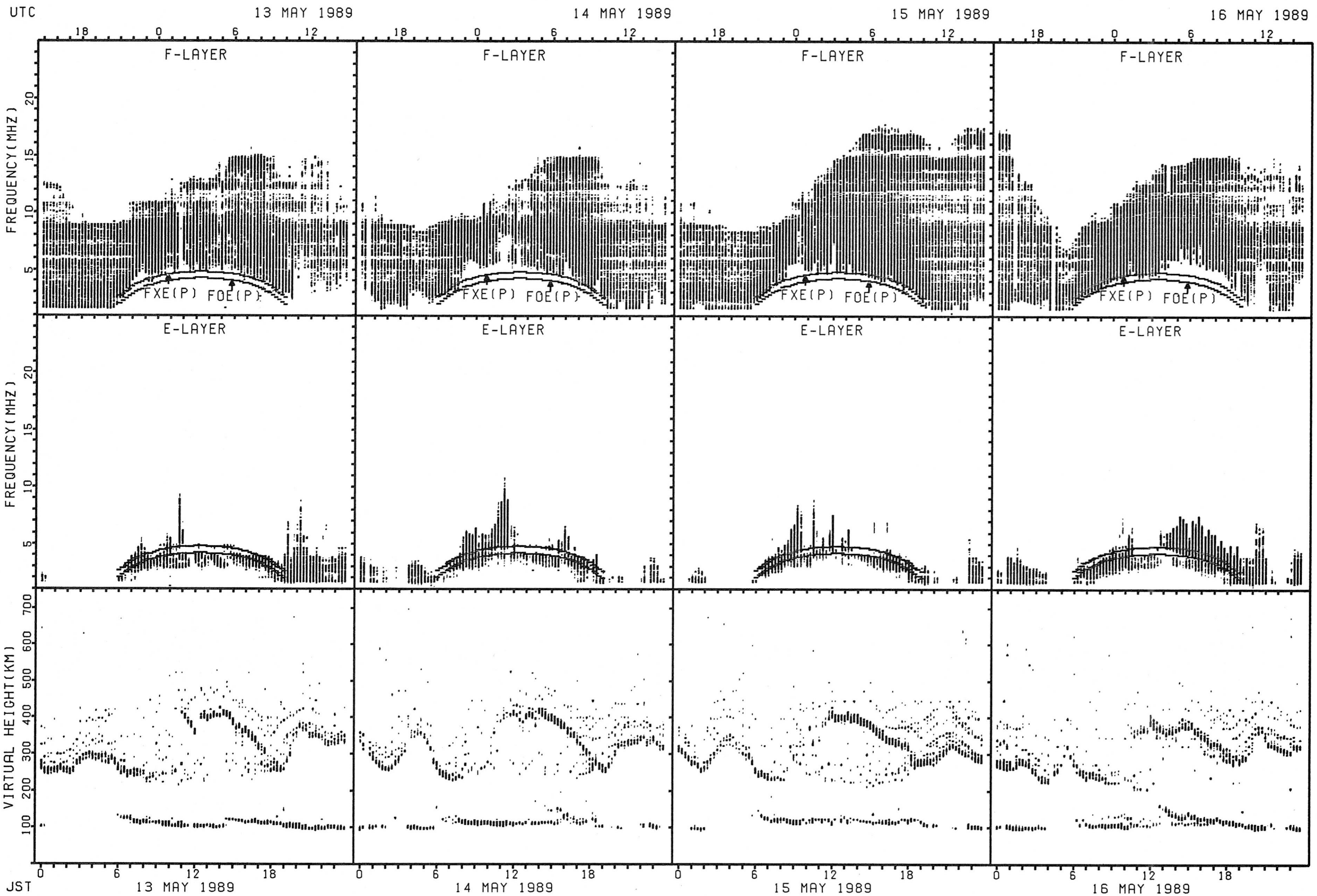
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



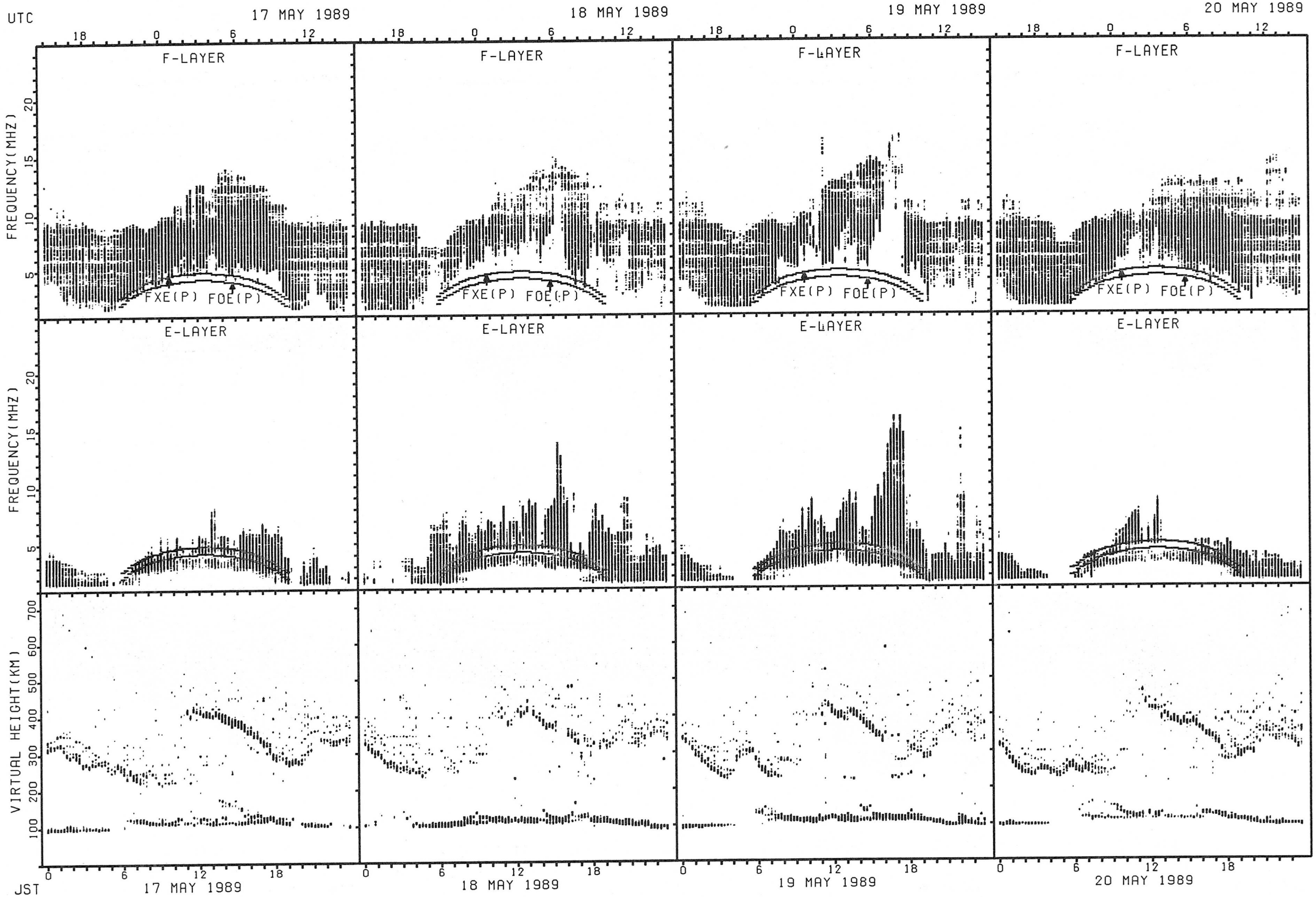
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



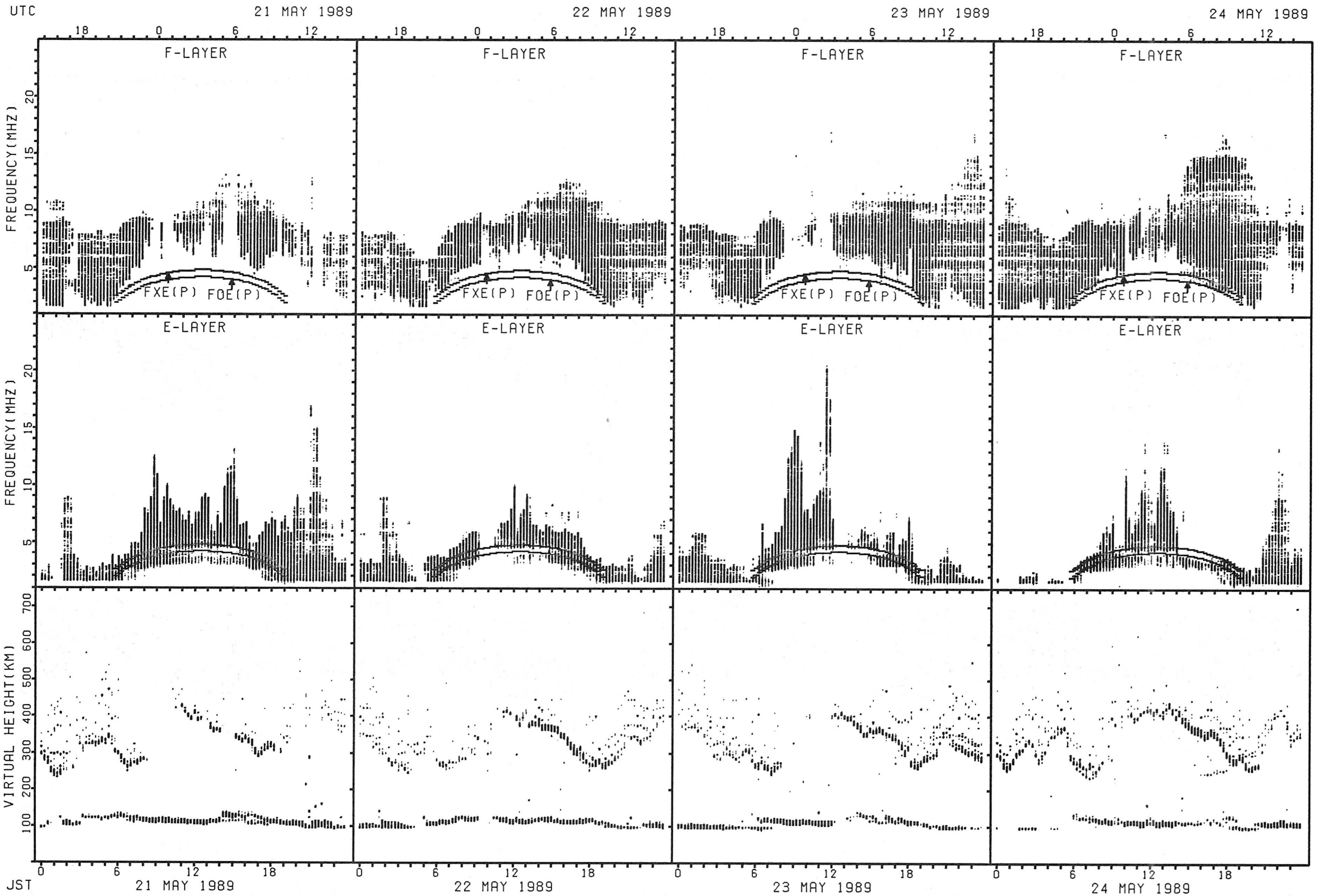
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



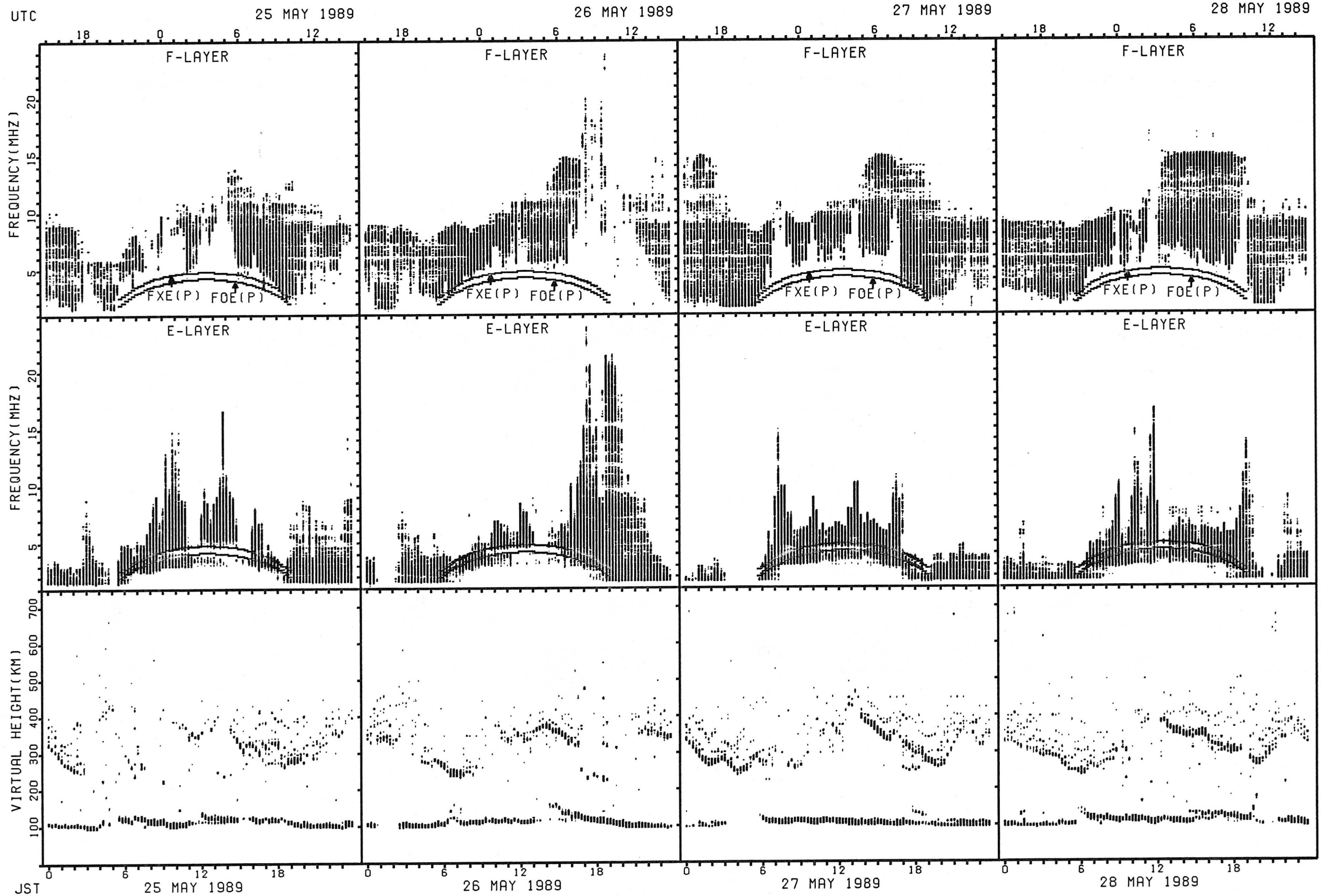
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



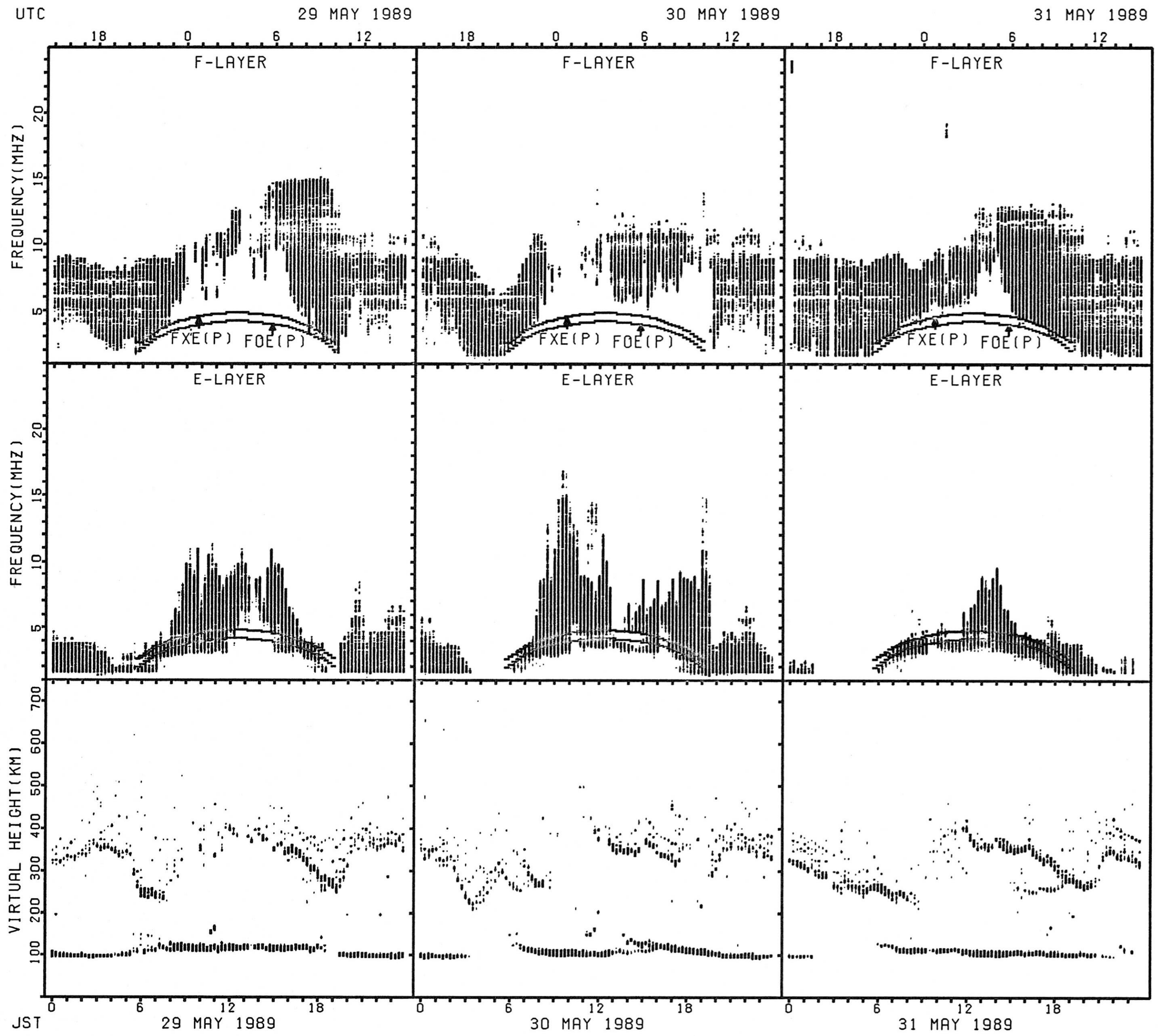
FXE(P): PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

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

MAY 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						15	16	16									16	19	21	22	15	13		
MED						306	303	303									335	320	310	303	332	356		
U Q						354	328	327									344	336	324	324	368	371		
L Q						284	273	280									308	294	291	294	298	338		

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						12	20	22	25	26	19	13	15	10	10		14	20	23	25	25	22	14	12
MED						137	132	127	125	122	121	121	123	122	127		128	127	125	125	121	121	119	118
U Q						143	135	129	127	125	125	125	125	125	141		131	131	137	129	124	123	123	119
L Q						132	131	123	122	119	117	119	115	117	115		125	123	123	121	119	119	117	114

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	12				14	21	23	14								23	24	28	22	12		10	10
MED	366	360				300	274	290	268								328	296	297	295	320		356	371
U Q	372	380				318	304	342	294								340	320	311	310	352		374	382
L Q	354	339				282	255	262	252								308	271	242	246	175		344	362

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	18	19	22	17	13	19	23	28	28	24	24	21	21	20	20	23	22	25	28	29	25	22	21	20
MED	105	103	101	105	109	133	125	121	117	115	114	113	113	111	114	121	120	119	116	113	115	114	109	106
U Q	109	107	107	119	111	137	129	126	122	119	118	117	116	116	120	141	121	125	117	118	120	127	115	110
L Q	101	99	99	100	105	127	121	117	115	111	111	111	107	109	107	109	115	114	112	111	111	109	107	103

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	19	16	14		15	23	19	17							12	30	29	25	26	12			17
MED	356	348	369	363		302	272	278	296							332	323	302	290	298	385			352
U Q	370	376	392	376		330	286	318	311							350	340	324	299	330	418			375
L Q	333	330	360	342		268	258	250	270							313	316	277	278	280	358			339

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	20	18	18	18	12	15	21	31	31	28	25	29	25	19	22	23	25	27	26	29	28	26	26	25
MED	107	105	108	105	113	139	127	121	117	116	117	115	115	113	115	117	119	119	116	113	113	111	113	111
U Q	111	111	111	111	116	143	131	125	121	121	120	119	119	121	121	131	127	121	121	114	115	115	119	115
L Q	104	101	103	101	107	129	125	117	115	115	113	113	111	111	111	111	114	115	113	110	109	107	109	108

MONTHLY MEDIANS OF H'F AND H'ES

MAY 1989 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

STATION YAMAGAWA LAT. 31.2N LON. 130.6E

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	19	24	26	18	14	12	26	29	21	17							27	30	27	28	21	12		19
MED	328	333	334	327	329	335	286	264	262	270							332	306	292	291	336	360		352
U Q	352	357	356	346	344	359	300	285	268	291							344	322	304	319	367	385		366
L Q	314	313	316	304	318	315	262	257	249	264							314	276	272	276	309	343		342

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	24	20	21	18	12	24	30	31	31	29	29	24	23	24	15	19	23	26	29	29	28	29	28
MED	107	103	102	103	104	109	127	122	117	115	113	115	113	115	115	117	121	119	117	113	111	109	109	108
U Q	112	107	107	107	107	128	132	127	121	119	117	119	121	121	130	133	131	121	123	115	113	111	115	113
L Q	102	99	99	99	99	102	122	119	115	113	111	111	111	109	111	107	111	113	115	111	107	104	105	105

STATION OKINAWA LAT. 26.3N LON. 127.8E

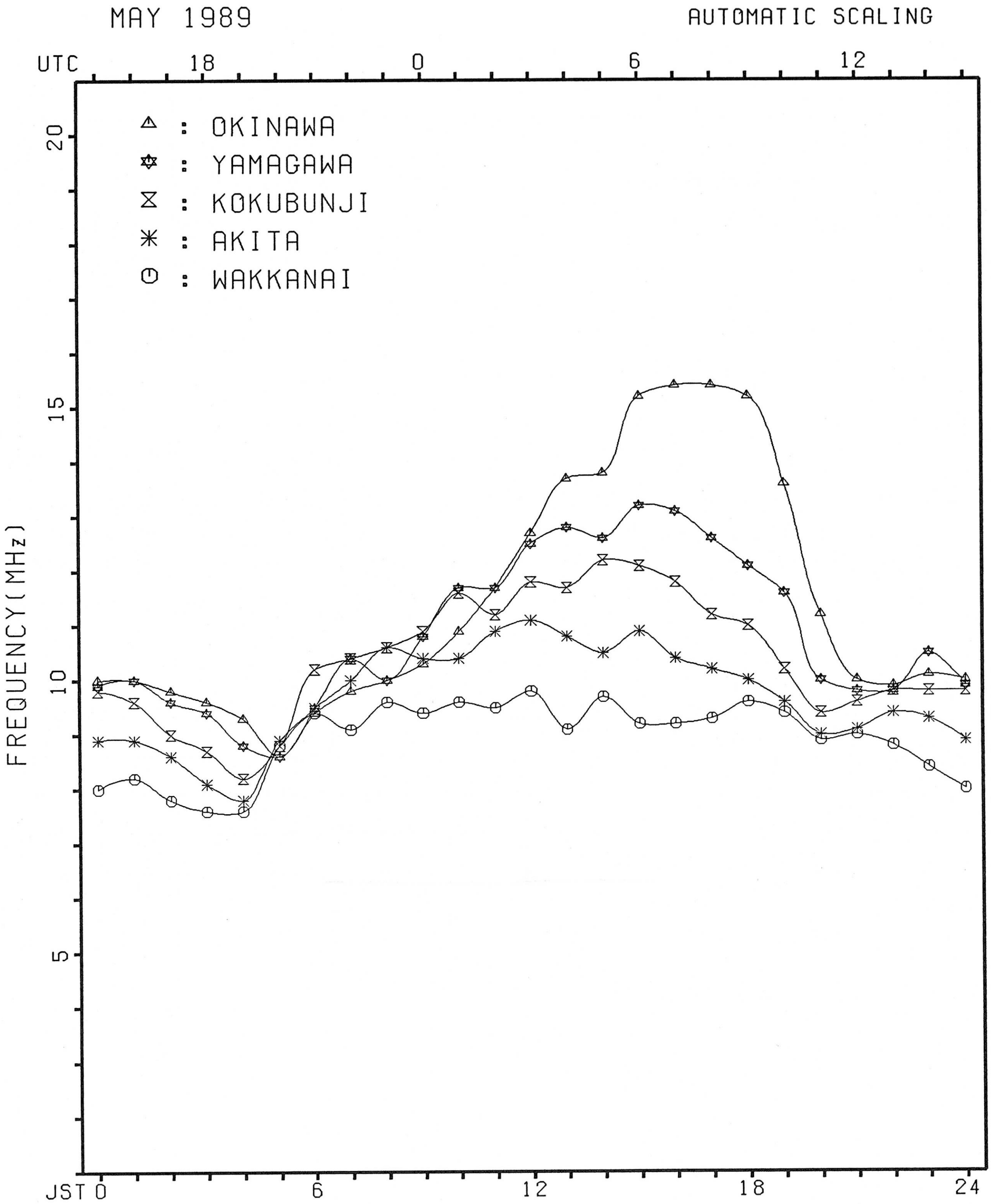
H'F

	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	28	28	28	20	15	10	23	27	27	20							27	27	28	28	27	16	17	21
MED	340	308	302	292	312	292	290	258	264	268							350	324	303	293	336	341	344	344
U Q	354	327	326	313	338	310	308	276	288	298							354	340	326	327	348	358	357	354
L Q	309	283	267	270	292	278	276	248	258	258							340	312	290	283	296	299	325	324

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	22	18	20	15	13	12	26	30	27	26	25	24	18	20	18	20	24	25	24	22	23	23	25
MED	103	101	103	101	103	105	123	119	117	115	113	115	112	116	119	124	125	119	117	113	110	107	107	103
U Q	106	103	107	107	107	122	131	125	121	119	117	118	118	127	128	133	128	125	120	117	117	113	119	109
L Q	99	99	99	99	99	100	112	117	115	113	111	111	109	109	112	119	119	115	112	111	105	103	101	101

MONTHLY MEDIANS PLOT OF FOF2



IONOSPHERIC DATA

MAY. 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

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	100X	101X	94X	78X	69X															116X	99X	99X	101X	S
2	98X	96X	87X	83X	83X															C	106X	100X	100X	97X
3	93X	86X	87X	82X	76X															116X	97X	99X	98X	103X
4	102X	92X	90X	87X	85X																C	97X	97X	98X
5	99X	100X	93X	89X	86X															104X	97X	102X	103X	106X
6	105X	108X	96X	87X	89X															117X	107OX	102X	106X	105X
7	102X	105X	94X	93X	94X															118X	108X	104X	106X	110X
8	102X	108X	97X	87X	73X															91X	88X	91X	92X	93X
9	92X	91X	85X	86X	87X															102X	97X	99X	99X	101X
10	98X	93X	89X	90X	89X															105X	99X	C	102X	102X
11	101X	97X	94X	90X	88X															116X	109X	106X	104X	104X
12	105X	99X	90X	95X	96X															110X	97X	102X	107	112X
13	107X	97X	93X	91X	88X															102X	91X	97X	100X	102X
14	104X	100X	94X	88X	87X															105X	88X	96X	99X	97X
15	97X	93X	85X	80X	80X															100X	95X	100X	100X	102X
16	98X	95X	89X	86X	73X															98X	93	92X	95X	96X
17	95X	96X	93X	85X	88X															A	82OS	87X	94	99
18	93	88X	87X	83X	79X															C	94X	98OX	99X	98X
19	95X	91X	89X	87	74X															94X	88X	93X	94X	93X
20	C	C	C	C	C	C	C													101X	95X	104X	112X	111
21	110X	106X	82X	77X	75X						91	97								83X	A	85X	88X	87X
22	86X	88X	85X	78X	74X															81X	78X	78X	80X	A
23	73S	S	80	80	63S	77														95X	84X	88X	93X	92X
24	96	S	79X	72X	71X	80														87X	82X	81X	79X	80X
25	C	C	C	C	C															96X	90X	112X	99X	111X
26	99OR	96X	89X	90X	85X															100X	92X	91X	93X	93X
27	95X	93X	86X	85X	83X															100X	89X	88X	97X	102X
28	100X	94X	94	89X	86X															94X	84X	95X	99X	98X
29	97OS	99	92	84X	83															C	C	C	C	C
30	C	C	C	C	C															92X	91X	96X	97X	100X
31	100X	96X	97X	S	86X															101X	C	C	C	C
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	26	28	27	28	2					1	1								26	27	28	29	27
MED	98X	96X	90X	86X	84X	78					91	97								100X	93X	97X	99X	100X
UQ	102X	100X	94X	89X	88X															105X	97X	101X	101X	104X
LQ	95X	93X	86X	82X	74X															94X	88X	91X	94X	96X

MAY. 1989 | FXI (0.1 MHZ)

IONOSPHERIC DATA

MAY. 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

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	94	95	88	72	63	75	103	105	114	118	121	120	123	125	126	124	120	118	120	110	93	93	95	I S 97
2	92	90	R 81	77	77	84	107	99	103	124	131	134	134	138	A	142	C	C	C	C	J S 100	94	94	91
3	87	80	81	76	70	80	104	108	118	120	131	141	142	B	141	135	131	130	129	110	91	93	92	97
4	96	86	84	81	79	82	100	105	105	110	126	131	134	134	134	C	C	C	C	C	C	91	91	92
5	93	94	87	83	80	88	99	111	118	124	127	135	134	142	148	138	132	130	124	98	91	96	97	100
6	99	102	90	81	83	95	112	112	118	120	122	118	125	127	130	129	121	122	118	111	U S 101	96	100	99
7	96	99	88	87	88	96	107	109	117	120	124	124	122	126	132	134	128	120	127	112	102	98	100	104
8	96	102	91	H 81	67	68	68	69	H 80	73	78	85	84	85	A	97	95	91	89	85	82	85	86	87
9	86	85	79	80	81	83	87	92	99	102	102	109	111	112	118	111	111	104	98	96	91	93	93	95
10	92	87	83	84	83	93	106	107	110	113	115	121	121	U S 121	123	124	122	116	111	99	93	I C 95	96	96
11	95	S 91	88	84	82	94	103	98	106	113	R 114	122	123	126	126	124	120	118	113	110	103	100	98	98
12	99	93	84	89	90	97	98	105	110	119	124	126	125	124	121	118	119	115	120	104	91	96	F 95	106
13	101	91	87	85	82	86	H 104	110	112	117	120	119	123	121	119	118	116	115	111	96	85	91	94	96
14	98	94	88	82	81	89	101	102	99	103	111	114	116	115	117	116	116	123	118	99	82	90	93	91
15	91	87	79	74	74	85	96	96	97	103	109	112	115	116	114	114	109	104	102	94	89	94	94	96
16	92	89	83	80	67	71	87	90	91	87	90	90	90	93	95	96	93	94	93	92	F 86	86	89	S 90
17	89	90	87	79	82	87	94	96	87	85	86	92	94	90	85	89	89	88	86	A	U S 76	81	F 85	F 87
18	F 82	82	81	77	73	83	94	95	92	98	A	111	109	110	111	114	112	105	C	C	88	U S 92	93	92
19	89	85	83	F 78	68	78	100	104	99	103	104	112	120	118	113	112	111	107	99	88	82	87	88	87
20	C	C	C	C	C	C	C	C	C	C	108	J R 111	I C 112	113	J R 110	111	104	101	99	95	89	98	106	F 103
21	104	100	76	71	69	71	81	88	86	80	F 83	F 85	94	97	95	94	87	83	82	77	U A 78	79	82	81
22	80	82	79	72	68	68	68	73	69	74	76	79	81	83	87	88	90	86	78	75	72	72	74	A
23	S 67	S	F 68	F 71	S 57	F 70	86	88	83	73	78	A	80	82	83	84	86	91	91	89	78	82	87	86
24	F 86	I S 80	73	66	65	F 72	78	75	A	A	A	74	83	91	92	88	87	90	81	81	76	75	73	74
25	C	C	C	C	C	C	C	C	C	A	86	86	88	A	97	A	88	86	83	90	84	106	93	R 105
26	93	90	83	84	79	73	81	88	83	85	91	96	102	106	101	103	103	101	99	94	86	85	87	87
27	89	87	80	79	77	87	94	105	107	95	100	105	109	109	106	112	111	104	102	94	83	82	91	96
28	94	88	F 87	83	80	85	94	94	96	100	112	107	U R 114	R 112	I S 113	114	111	107	A	88	78	89	93	92
29	S 91	F 91	F 83	78	F 75	79	85	81	75	75	86	94	100	102	C	C	C	C	C	C	C	C	C	C
30	C	C	C	C	C	66	68	75	85	88	A	86	93	92	101	99	102	A	A	86	85	90	91	94
31	94	90	91	I S 84	80	81	92	102	95	97	103	105	110	U R 119	118	111	102	I C 98	96	95	C	C	C	C
	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	27	28	28	28	29	29	29	28	28	28	30	31	29	28	28	28	27	25	26	28	29	29	28
MED	92	90	83	80	78	83	94	98	99	102	108	111	112	113	114	113	111	104	99	94	86	91	93	94
UQ	96	94	88	84	82	87	103	105	110	118	122	121	123	124	124	124	120	117	118	99	91	95	95	98
LQ	89	86	80	76	68	73	86	88	86	86	88	92	94	97	99	98	94	92	91	88	82	85	88	88

MAY. 1989 | FOF2 (0.1 MHZ)

IONOSPHERIC DATA

MAY. 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

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								A	L	L 490	A	U L 700	L 630	L	L	L	L	A	A					
2									L	L 630	L	A	L	A	A	A	C	C	C					
3								A	L	A	L	A	L	B	U L 640	L 590	L	A	A					
4							L		L		U L 660	L	U L 640	L	L	C	C	C	C	C				
5									A	L	L	L	U L 670	L 680	L 650	L	L							
6								L	L	L	L	L	A	U L 700	L	L	L		A					
7									L	L	L	L	U L 660	660	U L 620	L	L	L	L					
8								L 590		L 650	610	L	A	A	A	L	L	L						
9									L	L	L	660	L 690	660	630	U L 580	L 600	L						
10										L	L	U L 690	L	L	L	L 640	U L 590	L						
11								L		U L 670	L	L	L 710	620	U L 620	U L 610	L	L						
12									L	L	U L 700	L	L	L 710	L 630	570	A	A	A					
13								L	L	L	L	680	U L 650	U L 640	L	L 660	L	L						
14								L	A	L	660	L 660	650	650	L	A	U L 600	L	L					
15								A	A	L	U L 700	640	U L 660	L 640	A	U L 650	L	A	A					
16								L	U L 560	U L 650	620	610	590	600	630	L 610	A	A						
17						A		A	L	600	610	590	580	590	580	550	510	A	A					
18								A	A	A	A	U A 630	610	620	590	U L 570	L 560	L	C					
19							A	A	A	A	A	630	U A 590	L 590	L 630	L 600	L	A	A					
20								C	C	C	L	L	C	A	L	L	L	L	A					
21						L	450	480	520	L 570	570	580	L 580	600	570	A	L	L	A					
22						L	440	480	A	L 590	A	590	560	L 590	H 560	A	L 510	L	L					
23							L	L	L	550	U A 570	A	U A 560	560	A	A	A	A						
24							L	A	A	A	A	A	560	U A 570	570	570	530	L	L					
25						C	C	C	C	A	560	U A 580	580	A	L	A	L	L						
26										L	L	L 600	L 610	L	L	L	L	L	L					
27							A		L	L	L 640	U L 610	600	570	L 590	L 560	U L 540	A						
28								A	A	L	U L 620	U L 630	600	U L 610	A	L 550	L	L	A					
29							L	L	U L 590	L	A	590	A	L	C	C	C	C	C					
30						370	L	L	L	A	A	A	590	A	A	A	A	A	A					
31							L	L	A	L	L 600	H 610	570	L 600	550	L	A	C	A					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						1	2	3	3	9	13	18	23	20	15	14	8							
MED						370	445	480	U L 560	L 600	620	620	600	615	620	L 585	L 550							
UQ								535	U L 575	L 650	U L 660	660	L 650	655	L 630	L 610	L 595							
LQ								480	540	L 570	600	590	580	590	575	L 570	520							

MAY. 1989 | FOF1 (0.01 MHZ)

IONOSPHERIC DATA

MAY. 1989 | FOE (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

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						165	260	325	360	380	A	410	410	400	390	365	320	A	A					
2						B	245	310	355	380	395	410	A	A	A	A	C	C	C					
3						180	285	335	370	380	395	B	415	B	390	375	S 340	285	S					
4						165	260	320	350	365	375	380	B	A	405	C	C	C	C	C				
5						A	280	325	360	A	390	405	A	A	380	360	335	B	215					
6						195	275	325	350	380	390	400	B	410	410	380	340	290	A					
7						185	285	340	375	395	415	415	410	415	395	370	350	300	220					
8						A	280	340	375	400	415	430	435	405	380	A	A	300	210					
9						205	275	340	375	395	420	425	425	420	410	S	365	305	A					
10						195	280	340	380	395	410	415	A	A	A	390	355	315	230					
11						190	285	340	375	390	B	410	A	405	390	380	350	305	A					
12						185	280	335	365	390	400	410	UA 415	A	UA 410	395	A	305	A					
13						180	290	350	375	400	415	415	410	A	A	390	360	300	220					
14						185	290	340	375	400	410	A	415	IR 420	415	395	365	295	A					
15						A	280	340	360	390	400	A	A	UA 405	405	390	360	300	A					
16						170	280	330	360	385	400	405	A	A	395	390	345	A	A					
17						205	285	325	360	375	390	395	405	400	A	375	340	290	B					
18						A	275	320	360	385	A	410	405	390	390	370	335	290	C					
19						A	275	330	355	390	395	395	400	405	385	370	335	295	A					
20								C	C	C	390	S	C	390	B	A	A	A	A					
21						175	260	325	370	A	380	A	A	405	400	380	345	300	215					
22						200	280	330	365	385	B	B	405	400	A	A	A	305	A					
23						205	285	335	375	385	405	410	A	405	A	A	355	A	A					
24						210	290	340	365	385	395	A	UA 385	A	R	390	350	300	235					
25						C	C	C	C	395	B	415	415	395	A	365	330	305	B					
26						B	A	305	A	A	395	395	400	400	385	A	A	UA 300	A					
27						195	275	330	370	385	390	UA 405	A	390	365	A	A	A	A					
28						UA 185	295	330	355	375	390	395	385	A	B	365	335	290	215					
29						UA 185	285	335	380	390	400	405	405	B	C	C	C	C	C					
30						195	265	305	A	A	A	A	A	A	A	385	350	295	A					
31						175	280	330	A	375	A	410	405	415	400	380	340	C	225					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						22	28	29	26	26	24	23	18	19	19	21	22	21	9					
MED						185	280	330	365	385	395	410	408	405	395	380	345	300	220					
UQ						195	285	340	375	395	408	412	415	408	405	390	355	305	225					
LQ						180	275	325	360	380	390	402	405	400	388	370	335	295	215					

MAY. 1989 | FOE (0.01 MHZ)

IONOSPHERIC DATA

MAY. 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

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	46 JA	37 JA	23 JA	20	20 JA	21	35	55 JA	57 JA	45	70	54	54	58 JA	51	59 JA	83 JA	84 JA	93 JA	70 JA	54 JA	42 JA	26	33 JA
2	43 JA	44 JA	31 JA	42 JA	30	21 JA	38	49 JA	57 JA	51	60 JA	79	50 JA	95	161 JA	84 JA	C	C	C	C	139 JA	53 JA	27	25 JA
3	21 JA	21 JA	13 EB	29 JA	13 EB	G	32	70 JA	62 JA	66 JA	62 JA	70	74 JA	B	G	G	G	62 JA	72	61 JA	85 JA	56 JA	52 JA	49 JA
4	21	21	13 EB	14 EB	15 JA	25	36	51 JA	56 JA	59 JA	46	69 JA	53 JA	47 JA	49	C	C	C	C	C	C	166 JA	49 JA	33 JA
5	38 JA	25 JA	22 JA	22 JA	21	19	34	59 JA	54 JA	40	G	47	50	41	G	G	39	40	42 JA	65 JA	28	20	15 EB	21
6	21	19 JA	20	15 EB	14 EB	19 G	32	38	45	45	43	75 JA	70 JA	G	51	44	47	47 JA	70	54 JA	31	15 EB	27	16 EB
7	20	20 JA	27 JA	18 JA	14 EB	22	33	43	50	53 JA	63	53	47	G	G	G	G	G	24	18 JA	15 EB	15 EB	15 EB	28
8	25 JA	19 JA	19	13 EB	21 JA	24	36	43	50	54 JA	65 JA	71 JA	77	69	144 JA	47 JA	42 JA	36	32	64 JA	51	27 JA	32	29 JA
9	35 JA	41 JA	20 JA	51 JA	15 EB	G	30	40	47	46	46	49	46	G	G	G	G	G	29	34 JA	34	61 JA	14 EB	16 EB
10	16 EB	15 EB	13 EB	13 EB	15 EB	G	31	37	46	45	44	51	47	52	45 JA	G	G	38	37 JA	52 JA	43 JA	C	16 EB	23 JA
11	14 EB	18 ES	16 EB	14 EB	13 EB	G	G	38	48	59 JA	57	50 JA	46	43	44	40	42	43	34 JA	36 JA	25	19 ES	27	22
12	19	14 EB	14 EB	14 EB	13 EB	23	31	38	45	48	52 JA	50	51	53 JA	77 JA	89 JA	100	134 JA	39 JA	23 JA	29 JA	50 JA	92 JA	85 JA
13	26 JA	51 JA	50 JA	34 JA	17 ES	G	35	54 JA	50	57 JA	59 JA	64 JA	62 JA	53 JA	68	44	48	39	39 JA	69	42 JA	65 JA	27 JA	22
14	21 JA	16 EB	13 EB	15 EB	15 EB	22	36	50 JA	57 JA	57 JA	64 JA	67 JA	50	45	52	67 JA	50 JA	50 JA	27 JA	50 JA	33 JA	106 JA	54 JA	31 JA
15	52 JA	29 JA	25 JA	21 JA	15 EB	24	35	67 JA	77 JA	51	46	54	38 JA	59 JA	80 JA	50	66 JA	78	97	70	64 JA	64 JA	63 JA	26
16	22 JA	15 EB	14 EB	19	22 JA	21	32	39	53 JA	50	72 JA	58 JA	147 JA	64 JA	G	58	76 JA	79 JA	50 JA	42	27 JA	67 JA	41 JA	84 JA
17	63 JA	50 JA	80 JA	76 JA	82 JA	59 JA	49 JA	54 JA	56 JA	58 JA	83 JA	48	49	84 JA	172 JA	60 JA	52 JA	57 JA	76	123 JA	145 JA	65 JA	85 JA	53 JA
18	46 JA	20	24	27	26 JA	36	31	75 JA	76	66 JA	131 JA	66 JA	64 JA	50	49	46	40	31	C	C	61 JA	43 JA	52 JA	60 JA
19	41 JA	29 JA	43 JA	30 JA	24 JA	23	49 JA	68 JA	73 JA	70 JA	69 JA	63 JA	62 JA	56 JA	54 JA	51 JA	47	101 JA	76 JA	52 JA	73 JA	51 JA	53 JA	18 JA
20	C	C	C	C	C	C	C	C	C	C	56 JA	80 JA	C	79 JA	71 JA	51 JA	51	36	38	73 JA	87 JA	42 JA	73 JA	85 JA
21	49 JA	45 JA	51 JA	51 JA	53 JA	29	36	43	47 JA	52 JA	41	44	51 JA	45	54	57 JA	49 JA	44 JA	75 JA	59	111 JA	47 JA	21	20
22	14 EB	13 EB	17 JA	45 JA	19 JA	G	33	48 JA	57 JA	48	58	49	48	58	53 JA	65 JA	47 JA	39	41 JA	56	53 JA	50 JA	97 JA	119 JA
23	36 JA	23 JA	13 EB	14 EB	17 ES	G	32	46 JA	54 JA	60 JA	102 JA	93 JA	100 JA	45	103 JA	95 JA	63 JA	83 JA	49	51 JA	46 JA	32	26 JA	50 JA
24	50 JA	78 JA	54 JA	38 JA	21 JA	25	47 JA	63 JA	103 JA	103 JA	115 JA	109 JA	96 JA	98 JA	G	G	G	G	G	17	17	23 JA	21	22
25	C	C	C	C	C	C	C	C	C	60	53	57	48	124	80 JA	123 JA	48 JA	36	29 EB	18	66 JA	65 JA	50 JA	60 JA
26	40 JA	16 EB	16 EB	61 JA	51 JA	32 JA	42 JA	G	42	44	48	44	45	59 JA	50	49 JA	46 JA	33	40 JA	23 JA	65 JA	30	49 JA	27
27	20 JA	17	24	22	16 EB	25	49 JA	41	52 JA	43	49 JA	50	57 JA	47	52 JA	53 JA	69 JA	57 JA	46 JA	35 JA	47 JA	73 JA	79 JA	15 EB
28	43 JA	17 EB	24 JA	40 JA	21	46 JA	46 JA	57 JA	58 JA	51 JA	57 JA	47	51	48	94	G	G	51 JA	113	50 JA	51 JA	41 JA	41 JA	27
29	58	62 JA	42 JA	38 JA	26 JA	19	40	60 JA	51	67 JA	68 JA	55 JA	116 JA	54	C	C	C	C	C	C	C	C	C	C
30	C	C	C	C	C	23	29	36	41	94	109 JA	63 JA	55 JA	69 JA	58 JA	107	112 JA	134 JA	170 JA	130 JA	100 JA	69 JA	50 JA	31 JA
31	50 JA	41 JA	24 JA	27	22	21	33	49 JA	53 JA	43	43	48	36 G	39 G	43	44	65 JA	C	90 JA	49 JA	C	C	C	C
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	29	29	29	29	30	31	31	30	30	30	29	28	27	27	27	28	28	29	29
MED	36 JA	21 JA	22 JA	24 JA	20	22	35	49 JA	53 JA	52	58 JA	55	52	53	52	50	48	44	42 JA	52 JA	51 JA	50 JA	41 JA	28 JA
UQ	46 JA	41 JA	29 JA	39 JA	23 JA	25	38	57 JA	57 JA	60 JA	68 JA	68 JA	70 JA	64 JA	77 JA	60 JA	64 JA	70 JA	76 JA	64 JA	70 JA	65 JA	53 JA	50 JA
LQ	21	17 EE	15 EB	15 EB	15 EB	19 G	32	40	48	46	47	50	48	45	44	40	40	36	36 JA	36 JA	32 JA	31 JA	26	22

MAY. 1989 FOES (0.1 MHZ)

IONOSPHERIC DATA

MAY. 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

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	36	19	18	EB 14	EB 14	21	33	51	57	41	65	52	52	55	45	56	51	48	63	62	27	34	17	23
2	25	26	30	27	25	17	35	43	55	48	54	69	47	90	AA 161	73	C	C	C	C	97	30	21	20
3	EB 15	EB 13	EB 13	EB 13	EB 13	G	31	67	49	63	45	64	54	B	G	G	G	54	65	52	43	36	48	35
4	21	EB 15	EB 13	EB 14	EB 14	21	33	39	41	51	42	54	50	44	45	C	C	C	C	C	C	82	32	24
5	27	20	19	EB 14	EB 15	19	34	49	51	40	G	46	48	41	G	G	39	39	37	64	18	EB 15	EB 15	EB 15
6	ES 17	17	EB 14	EB 15	EB 14	G 17	31	34	41	41	42	63	70	G	49	44	43	44	64	47	24	EB 15	22	EB 16
7	EB 14	16	22	16	EB 14	22	31	39	48	49	61	47	46	G	G	G	G	G	24	17	EB 15	EB 15	EB 15	23
8	22	17	EB 14	EB 13	19	22	34	40	48	48	55	53	66	65	AA 144	45	38	34	32	62	42	24	24	23
9	EB 15	24	19	30	EB 15	G	30	38	43	44	46	L 49	45	G	G	G	G	G	28	28	25	36	EB 14	EB 16
10	EB 16	EB 15	EB 13	EB 13	EB 15	G	30	36	41	44	43	50	47	UR 52	45	G	G	38	26	45	40	C	EB 16	19
11	EB 14	ES 18	EB 16	EB 14	EB 13	G	G	38	42	53	55	44	44	43	43	39	41	40	32	28	19	ES 19	21	EB 16
12	EB 15	EB 14	EB 14	EB 14	EB 13	23	31	38	43	44	47	47	49	48	46	53	67	101	36	17	24	32	43	27
13	20	31	31	22	ES 17	G	34	51	48	54	58	60	52	43	59	G	42	35	35	67	40	22	17	EB 15
14	EB 14	EB 16	EB 13	EB 15	EB 15	22	35	41	56	54	58	61	47	UR 44	48	61	40	43	25	44	30	36	35	20
15	36	18	17	16	EB 15	23	33	64	71	49	44	52	54	52	71	43	51	68	92	66	49	36	32	19
16	17	EB 15	EB 14	EB 13	18	21	30	38	51	48	55	58	44	49	G	54	54	58	38	30	23	63	16	16
17	40	25	32	51	62	56	35	47	51	55	47	46	46	42	50	47	40	48	63	AA 123	48	21	31	24
18	22	EB 14	EB 16	17	EB 13	27	29	69	69	61	AA 131	63	51	44	44	42	38	G	C	C	33	21	28	30
19	21	20	25	22	EB 15	22	46	67	63	69	68	58	59	53	45	48	44	70	72	48	28	29	29	EB 15
20	C	C	C	C	C	C	C	C	C	C	55	49	C	77	55	46	41	33	35	54	38	29	48	64
21	32	27	31	40	43	26	33	39	41	42	41	42	44	43	53	55	44	35	64	59	44	17	EB 14	EB 15
22	EB 14	EB 13	EB 12	EB 13	EB 14	G	31	44	57	46	UY 58	47	45	55	45	54	37	38	27	51	53	26	43	AA 119
23	34	18	EB 13	EB 14	ES 17	G	31	38	42	49	57	AA 93	56	44	66	70	56	58	37	51	40	25	18	22
24	37	49	33	25	16	23	38	55	AA 103	AA 103	AA 115	64	49	57	G	G	G	G	G	17	16	20	EB 15	17
25	C	C	C	C	C	C	C	C	C	AA 60	53	57	48	AA 124	46	AA 123	41	G	EB 29	18	35	33	40	30
26	28	EB 16	EB 16	26	39	26	25	G	37	45	46	43	43	54	45	41	36	29	25	17	38	25	27	19
27	19	EB 13	EB 15	16	EB 16	23	38	38	51	42	44	49	55	45	44	42	44	42	31	25	37	39	22	EB 15
28	18	EB 17	EB 14	33	20	G 18	G	52	56	43	43	43	45	48	85	G	G	39	AA 113	32	49	25	23	19
29	28	38	22	23	15	17	37	37	48	57	68	52	98	54	C	C	C	C	C	C	C	C	C	C
30	C	C	C	C	C	22	29	35	38	73	AA 109	61	53	69	58	95	97	AA 134	AA 170	76	63	59	35	18
31	33	29	17	20	EB 15	UY 21	33	47	52	42	43	44	G 36	G 39	42	44	60	C	44	30	C	C	C	C
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	29	29	29	29	30	31	31	30	30	30	29	28	27	27	27	28	28	29	29
MED	21	18	EB 16	16	EB 15	21	33	40	49	48	54	52	48	48	45	44	41	39	36	47	38	28	23	19
UQ	30	24	22	24	18	23	34	51	56	55	58	60	54	55	55	54	48	51	64	60	44	36	32	24
LQ	EB 16	EB 15	EB 14	EB 14	EB 14	G 17	30	38	42	44	44	47	45	43	43	G	36	34	28	28	24	21	17	EB 16

MAY. 1989 | FBES (0.1 MHZ)

IONOSPHERIC DATA

MAY. 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	14	13	14	14	13	14	16	20	25	33	32	32	25	24	ES 30	18	19	17	17	15	13	12	15
2	12	13	14	14	14	13	16	20	22	26	32	38	30	33	37	27	C	C	C	C	15	15	15	14
3	15	13	13	13	13	14	15	19	21	26	24	43	29	B	32	22	21	18	ES 21	13	15	14	15	13
4	16	15	13	14	14	14	16	18	20	30	26	32	39	30	30	C	C	C	C	C	C	14	14	14
5	14	13	13	14	15	14	15	16	21	26	25	30	33	29	22	25	18	34	16	15	13	15	15	15
6	ES 17	13	14	15	14	15	15	18	17	28	24	28	43	25	22	22	21	18	18	14	15	15	14	16
7	14	13	13	13	14	14	17	17	21	30	29	33	28	27	26	24	20	17	15	13	15	15	15	13
8	13	12	14	13	13	16	17	20	20	25	25	37	32	26	25	24	17	17	16	14	13	13	14	13
9	15	13	13	13	15	17	16	16	21	27	ES 31	27	32	27	30	ES 32	19	16	16	14	14	15	14	16
10	16	15	13	13	15	15	15	21	19	25	26	28	31	32	25	32	20	17	15	15	15	C	16	15
11	14	ES 18	16	14	13	16	17	17	22	26	41	28	33	31	27	26	18	17	14	13	13	ES 19	15	16
12	15	14	14	14	13	15	15	21	18	21	22	28	26	29	23	18	20	18	15	13	14	13	16	13
13	13	13	14	13	ES 17	15	17	17	20	23	25	26	25	28	27	22	20	16	15	15	15	14	13	15
14	14	16	13	15	15	15	15	17	18	26	31	26	28	28	23	22	20	16	15	ES 30	13	15	13	14
15	13	13	13	13	15	14	14	17	19	21	26	28	26	26	29	19	18	15	16	14	14	13	15	16
16	13	15	14	13	13	14	16	16	17	24	23	31	30	35	23	22	21	16	16	16	15	13	13	14
17	12	14	12	13	13	16	13	16	19	21	19	21	23	21	21	18	16	14	17	15	15	15	14	13
18	14	14	15	14	13	13	14	15	20	20	25	24	25	24	24	17	17	17	C	C	14	ES 18	16	14
19	14	13	15	14	15	14	14	16	20	26	24	32	32	32	23	18	15	16	18	14	14	14	14	15
20	C	C	C	C	C	C	C	C	C	C	24	ES 42	C	30	37	21	18	15	14	14	15	14	14	16
21	13	13	12	14	14	14	16	19	20	24	27	33	31	34	25	26	17	16	16	13	15	14	14	15
22	14	13	12	13	14	16	16	16	25	30	44	41	26	26	32	22	20	17	ES 18	15	14	14	13	14
23	15	14	13	14	ES 17	16	16	17	18	25	26	35	35	33	34	27	20	17	14	13	13	14	13	13
24	12	14	13	14	13	14	15	18	18	21	33	24	31	32	30	25	18	16	16	14	13	13	15	13
25	C	C	C	C	C	C	C	C	C	31	41	32	31	34	29	26	20	18	29	13	14	16	15	15
26	15	16	16	15	15	14	16	17	24	29	26	26	36	31	32	25	16	16	17	14	14	15	16	14
27	13	13	15	13	16	14	16	17	29	26	26	28	31	23	27	20	17	15	14	14	15	13	14	15
28	13	17	14	13	17	13	17	18	17	23	26	32	30	ES 36	39	27	18	17	17	13	13	15	14	14
29	15	15	13	13	13	13	16	16	26	23	27	25	32	42	C	C	C	C	C	C	C	C	C	C
30	C	C	C	C	C	15	17	17	18	20	34	31	35	28	33	25	19	17	17	13	14	15	15	12
31	16	14	14	15	15	15	17	18	35	29	36	30	30	30	24	24	19	C	15	14	C	C	C	C
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	28	28	29	29	29	29	30	31	31	30	31	30	29	28	27	27	27	28	28	29	29
MED	14	14	13	14	14	14	16	17	20	26	26	30	31	30	27	23	18	17	16	14	14	14	14	14
UQ	15	14	14	14	15	15	16	18	21	27	32	32	32	32	32	26	20	17	17	14	15	15	15	15
LQ	13	13	13	13	13	14	15	16	18	23	25	28	28	26	24	22	18	16	15	13	14	14	14	13

MAY. 1989 | FMIN (0.1 MHZ)

IONOSPHERIC DATA

MAY. 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	285	310	310	280	280	305	300	280	295	290	265	270	265	275	285	280	285	300	305	310	285	280	IS 280
2	280	285	R 280	280	270	275	320	320	255	275	270	270	265	265	A	265	C	C	C	C	A	270	275	285
3	275	265	285	285	295	285	295	305	275	285	275	275	270	B	275	275	275	285	290	305	275	265	270	280
4	285	280	280	280	285	305	300	320	315	275	265	270	270	270	270	C	C	C	C	C	C	A	270	270
5	270	275	280	285	285	285	315	290	295	275	270	255	250	250	270	265	265	275	295	285	260	265	260	265
6	280	290	295	285	280	305	320	310	285	280	285	270	270	265	275	270	280	280	295	290	US 290	270	265	270
7	275	280	280	265	270	305	305	305	285	270	270	270	260	260	265	265	270	270	285	285	280	270	255	260
8	255	270	285	H 310	260	280	295	240	H 315	230	250	270	270	255	A	270	285	285	290	285	270	265	260	260
9	265	280	270	265	280	315	310	295	295	275	250	260	260	255	265	270	265	275	275	280	270	265	270	270
10	275	265	270	270	280	295	300	295	285	270	260	255	260	US 265	255	255	265	275	290	290	270	IC 270	270	270
11	275	S 275	280	285	285	295	320	315	300	260	R 275	265	260	255	255	265	270	275	280	275	275	265	265	260
12	270	285	270	275	285	305	315	295	280	260	260	255	250	255	255	260	260	A	290	285	275	255	F 255	275
13	280	280	265	260	260	285	H 310	280	275	265	265	255	260	260	265	265	270	285	295	290	275	255	265	265
14	270	280	275	270	255	285	300	295	305	265	250	250	250	250	250	255	260	270	285	290	265	250	260	255
15	270	270	270	250	250	295	295	285	285	245	255	250	255	255	265	270	280	280	A	290	275	255	265	270
16	275	275	285	285	305	305	285	280	270	260	270	265	255	255	255	265	280	285	290	285	F 270	260	265	S 260
17	265	270	280	275	275	305	305	295	270	240	235	245	245	250	255	255	280	275	280	A	US 265	250	F 265	F 260
18	F 270	270	275	285	285	300	300	305	265	250	A	250	255	260	265	265	285	280	C	C	270	US 265	270	265
19	260	270	275	F 295	270	280	295	290	285	245	250	255	265	260	265	270	280	285	295	295	265	265	265	265
20	C	C	C	C	C	C	C	C	C	C	270	JR 260	IC 260	265	JR 260	270	280	285	290	300	275	255	255	F 265
21	275	295	300	265	250	245	250	265	270	260	F 260	F 245	265	265	275	280	285	280	290	285	A	255	265	265
22	265	275	285	295	265	285	255	265	A	245	250	255	265	260	265	275	285	290	300	280	270	260	270	A
23	S 265	S	F 285	F 290	S 315	F 290	295	290	275	240	245	A	265	265	265	270	270	285	300	290	280	265	265	265
24	F 270	IS 265	260	285	265	F 290	270	275	A	A	A	235	250	265	275	270	270	270	275	280	285	255	275	260
25	C	C	C	C	C	C	C	C	C	A	265	270	275	A	285	A	290	290	320	295	285	290	275	R 275
26	280	265	265	270	290	300	315	320	320	260	270	265	265	270	270	270	275	285	295	285	290	265	260	260
27	265	270	265	270	275	285	300	285	285	270	255	265	265	265	260	265	270	280	285	295	270	255	265	270
28	270	270	F 270	275	285	285	295	290	290	270	265	270	UR 265	R 270	IS 270	275	285	295	A	295	265	265	270	270
29	S 285	F 275	F 280	270	F 255	270	290	300	265	245	270	265	A	265	C	C	C	C	C	C	C	C	C	C
30	C	C	C	C	C	305	300	265	275	285	A	265	265	265	280	A	A	A	A	270	260	255	265	260
31	270	260	270	IS 280	285	295	290	290	300	270	265	260	255	UR 280	280	285	285	IC 290	290	285	C	C	C	C
	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	27	28	28	28	29	29	29	27	28	28	30	30	29	28	27	27	26	24	26	26	28	29	28
MED	270	275	280	280	280	290	300	295	285	265	265	262	262	265	265	270	280	282	290	288	272	265	265	265
UQ	278	280	285	285	285	305	310	305	295	275	270	270	265	265	275	270	282	285	295	295	280	265	270	270
LQ	268	270	270	270	265	285	295	285	275	248	252	255	255	255	260	265	270	275	285	285	270	255	265	260

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

IONOSPHERIC DATA

MAY. 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

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								A	L	L 395	A	UL 350	L 340	L	L	L	L	A	A					
2									L	L 365	L	A	L	A	A	A	C	C	C					
3								A	L	A	L	A	L	B	UL 380	L 380	L	A	A					
4							L		L		UL 395	L	UL 355	L	L	C	C	C	C	C				
5									A	L	L	L	UL 350	L 375	L 380	L	L							
6								L	L	L	L	L	A	UL 395	L	L	L		A					
7									L	L	L	L	UL 370	365	UL 380	L	L	L	L					
8								L 355		L 335	A	L	. A	A	A	L	L	L						
9									L	L	L	375	L 380	380	370	UL 385	L 370	L						
10										L	L	UL 365	L	L	L	L 365	UL 370	L						
11								L		A	L	L	L 380	380	UL 380	UL 365	L	L						
12									L	L	UL 380	L	L	L 370	L 380	A	A	A	A					
13								L	L	L	L	A	UL 355	UL 380	L	L 370	L	L						
14								L	A	L	A	A	365	350	L	A	UL 365	L	L					
15								A	A	L	UL 385	340	A	L 345	A	UL 350	L	A	A					
16								L	A	UL 350	A	A	385	355	370	A	A	A						
17						A		A	L	A	350	370	365	380	A	A	355	A	A					
18								A	A	A	A	A	325	375	365	UL 370	L 375	L	C					
19							A	A	A	A	A	A	A	A	L 350	A	L	A	A					
20								C	C	C	L	L	C	A	L	L	L	L	A					
21						L	330	A	365	L 365	395	395	L 385	360	A	A	L	L	A					
22						L	355	A	A	L 350	A	335	350	A	H 365	A	L 370	L	L					
23							L	L	L	315	A	A	A	365	A	A	A	A						
24							L	A	A	A	A	A	A	A	S	365	365	L	L					
25						C	C	C	C	A	A	A	A	A	L	A	L	L						
26										L	L	L 375	L 375	L	L	L	L	L	L					
27							A		L	L	L 370	A	A	365	L 360	L 355	A	A						
28								A	A	L	UL 390	UL 385	365	A	A	L 395	L	L	A					
29							L	L	UL 335	L	A	A	A	L	C	C	C	C	C					
30						385	L	L	L	A	A	A	A	A	A	A	A	A	A					
31							L	L	A	L	L 395	H 395	390	L 365	375	L	A	C	A					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						1	2	1	2	7	8	10	16	16	12	10	7							
MED						385	342	L 355	350	L 350	L 388	372	L 365	368	L 372	L 368	L 370							
UQ										L 365	L 395	385	L 380	380	L 380	L 380	L 370							
LQ										L 342	L 375	350	352	362	365	L 365	365							

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

IONOSPHERIC DATA

MAY. 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

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								A 250	L 325	290	305	360	350	350	320	320	310	285	A 290					
2									L 420	335	315	305	355	EA 370	A	340	C	C	C					
3								265	320	275	330	335	335	B	320	310	310	300	285					
4							265		270		345	325	335	340	325	C	C	C	C	C				
5									270	270	325	365	380	385	340	350	325							
6								255	255	265	275	350	360	355	335	325	310		A 295					
7									295	L 325	A 325	L 345	360	365	355	330	330	330	310					
8								440		545	455	385	A 390	445	A	360	325	L 310						
9									L 295	L 325	L 395	380	385	395	365	355	360	325						
10										L 330	L 375	385	L 355	385	385	370	345	310						
11								250		365	L 315	360	375	375	370	345	L 355	325						
12									L	350	365	360	L 380	380	380	395	EA 370	A	275					
13								L	L 325	L 360	L 380	385	380	355	370	355	345	310						
14								260	270	L	405	405	400	405	385	370	375	320	275					
15								EA 320	EA 350	L	395	395	385	380	365	355	340	A 330	A					
16								L	360	400	400	405	420	405	400	365	315	EA 320						
17						EA 290		275	L 380	455	505	470	455	440	445	415	355	330	EA 340					
18								EA 320	EA 415	415	A	400	390	385	380	355	325	L 275	C					
19							280	EA 300	335	400	A 410	410	370	355	370	365	325	EA 325	EA 320					
20								C	C	C	350	380	C	EA 395	370	345	320	L 315	280					
21						L 410	410	380	365	405	405	415	395	385	360	350	320	L 330	EA 360					
22						305	405	390	A	460	Y 460	435	405	405	395	350	330	310	280					
23							L 280	L	L 340	475	470	A	415	415	415	A 405	375	340						
24							L	370	A	A	A	515	445	405	370	380	380	355	L 330					
25						C	C	C	C	A	405	380	360	A	325	A	285	L 300						
26										L	360	380	360	350	330	340	330	280	285					
27							265		310	L 330	385	360	365	370	370	350	330	A 290						
28								275	295	L	340	345	365	345	IS 345	325	310	275	A					
29							310	L 285	395	470	410	395	A	365	C	C	C	C	C					
30						290	L 290	385	355	EA 360	A	385	390	390	355	A	A	A	A					
31							L 295	290	285	360	370	385	395	360	330	330	325	C	EA 305					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						4	9	17	22	23	28	30	29	29	28	27	27	23	14					
MED						298	290	282	320	360	378	382	380	380	368	350	328	312	286					
UQ						358	310	370	358	410	405	400	395	395	380	365	348	328	EA 320					
LQ						290	280	265	295	326	335	360	360	358	338	340	320	300	280					

MAY. 1989 | H'F2 (KM)

IONOSPHERIC DATA

MAY. 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

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	305EA	285	240	215	280	280	255	A	A	210	A	265A	275EA	A	240EA	A	A	A	A	285EA	250A	290EA	290	290
2	300	305	310A	320A	325	290	255	235	260EA	245	285EA	A	255EA	A	A	A	C	C	C	C	A	310A	305	285
3	290	310	280	275	260	275	240	A	255A	A	240	A	280A	B	225H	230	230	A	A	270EA	310EA	345EA	350EA	325A
4	290	285	270	280	285	255	230	235	235	265A	205	280EA	260A	250	250	C	C	C	C	C	C	A	325A	325
5	330	300	290	280	280	270	235	250A	A	235	215	240	265	235	230	240	260	270	265A	A	305	315	325	310
6	300	275	260	260	285	265	230	230	245	230	230	A	A	H	280	260	275EA	280EA	A	285EA	265	275	330	300
7	305	290	280	305	305	250	250	240	275EA	260A	295EA	250A	240	230	215	245	235H	265	270	260	260	280	325	335A
8	345	290	260	240	320	310	280A	A	265EA	265A	A	290EA	A	A	A	270EA	260EA	250	280A	A	350EA	345A	350A	350A
9	320	305	300	360A	285	240	235	230	245	235	240	235	235	235	235	225	245	255	270	290	305	340EA	300	305
10	285	300	310	310	290	260	250	235	240	230	230	250	230	280UR	250	235	245	265	280	290EA	340EA	310IC	320	305
11	295	295	290	280	275	270	240	240	235	270EA	A	225	225	230	225	240	260	265EA	270	285EA	285	290	315	315
12	300	275	300	295	265	255	235	225	230	220	225	235	250A	245H	225	A	A	A	A	245	270	360EA	390EA	305A
13	290	305A	335EA	345	320	255	230H	A	A	280EA	A	A	260A	220	A	235	250	260	270EA	A	315EA	345A	320	320
14	305	290	295	310	330	265	255	250A	A	A	A	405	235	255ES	275EA	A	240	A	260A	270A	315EA	380EA	365EA	330
15	340EA	300	290	355	360	270	240	A	A	260EA	215	265	A	275EA	A	250H	A	A	A	A	A	355EA	340EA	315
16	300	300	275	270	250	260	250	255H	A	260	A	A	220	EA	235	A	A	A	280EA	270EA	295	A	310	310
17	355EA	330A	340EA	345EA	A	A	250	A	A	A	260EA	225	245A	230	A	A	255A	A	A	A	375EA	350A	350EA	340
18	320	305	295	280	270	265	240	A	A	A	A	A	295EA	225	235	235	240	240	C	C	335A	315	345A	340
19	325	315	300	260	290	270	A	A	A	A	A	A	A	A	255A	A	285EA	A	A	A	325EA	345A	335EA	320
20	C	C	C	C	C	C	C	C	C	C	A	255EB	C	A	A	A	255EA	255	A	300EA	325EA	360EA	365A	385EA
21	305	270	260	360EA	435EA	310EA	290EA	A	240	235	210	220	220	250EA	A	A	280EA	260A	A	A	A	345	325	320
22	325	295	260	270	330	285	250	A	A	255EA	A	285EA	260A	A	250H	A	240	A	265	A	A	350EA	370EA	A
23	360EA	325	300	275	260	260	255	250	260EA	315EA	A	A	A	235	A	A	A	A	285A	300EA	315EA	320A	310	320
24	335EA	A	375EA	285	330	265	A	A	A	A	A	A	A	A	S	250	250	265	270	300	285	325	290	335
25	C	C	C	C	C	C	C	C	C	A	A	A	A	A	A	A	260EA	225	270	270	290	285	335EA	325
26	330	330	315	305	300EA	260	255	235	235	A	235	225	225	A	260EA	255A	245	250	270	275	295EA	320	335A	340
27	335A	300	310	310	300	260	A	245	A	235	230	A	A	240	245EA	255EA	A	A	285	260	315EA	390EA	325	295
28	305	295	290	320EA	270	250	250	A	A	230	210	215	240A	A	A	210	240	A	A	265A	A	330	330	300
29	305	330A	290	320EA	345	275	265	255EA	275EA	A	A	A	A	A	C	C	C	C	C	C	C	C	C	C
30	C	C	C	C	C	210	235	220H	220	A	A	A	A	A	A	A	A	A	A	A	A	395EA	340EA	320
31	330A	340A	300	275	270	265	240	A	A	225H	210	210H	210	235	240	265A	A	C	A	280A	C	C	C	C
	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	27	28	28	27	28	26	16	15	20	16	18	20	16	18	16	20	14	15	18	22	27	29	28
MED	304	300	291	285	288	265	248	236	240	235	222	235	238	234	236	240	245	258	270	265A	279UA	315UA	320	320
UQ	326	308	302	314	321	271	255	249	260EA	254A	235	258A	258A	244	250	252	260EA	265	280	290EA	325EA	350EA	345EA	330
LQ	300	290	278	275	272	258	235	232	235	230	212	225	228	230	228	235	240	250	270	270	285	311	320	305

MAY. 1989 | H'F (KM)

IONOSPHERIC DATA

MAY. 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						135	120	120	120	120	125	125	120	115	120	E S 130	125	120	A					
2						B	125	125	120	120	120	E B 135	A	A	A	A	C	C	C					
3						130	125	115	120	120	120	B	125	B	E B 120	120	115	125	S					
4						130	120	120	115	125	120	120	B	A	120	C	C	C	C	C				
5						A	120	120	115	A	115	120	A	A	115	115	120	B	135					
6						E A 140	115	120	115	120	115	120	B	120	115	120	120	125	A					
7						E B 145	130	115	115	120	120	125	125	120	120	120	120	125	130					
8						A	125	120	115	120	120	130	125	120	120	115	115	130	130					
9						E B 150	115	120	115	120	115	115	120	115	125	S 125	120	125	135					
10						E B 150	120	115	115	115	115	120	120	120	A	130	120	120	130					
11						125	125	120	120	115	B	120	A	125	120	120	115	120	125					
12						135	120	115	115	110	115	115	115	115	115	115	A	120	130					
13						120	120	120	115	115	115	115	115	115	A	120	120	120	125					
14						135	120	115	115	120	125	115	120	120	120	120	120	115	A					
15						140	120	115	110	115	115	115	110	115	120	115	120	115	A					
16						E B 120	115	115	110	110	110	115	115	A	115	625	115	115	A					
17						130	120	110	115	110	110	115	115	115	110	115	110	115	B					
18						A	115	110	110	115	110	115	110	110	115	115	115	120	C					
19						135	115	120	115	120	115	E B 125	125	120	115	115	E A 125	120	A					
20								C	C	C	115	S	C	E B 125	B	115	A	A	A					
21						E B 145	120	120	115	115	120	A	125	E B 130	115	125	115	120	125					
22						E B 145	115	115	120	120	B	B	115	115	A	A	115	120	A					
23						140	115	120	115	115	115	125	120	125	125	115	115	115	A					
24						140	120	120	115	115	B 125	115	115	120	115	120	115	115	125					
25						C	C	C	C	120	B	115	115	115	115	115	120	120	B					
26						B	A	120	A	A	115	120	E B 135	120	E B 125	125	115	A	A					
27						135	120	115	120	115	115	120	120	115	120	115	A	A	A					
28						A	120	115	115	115	115	120	120	A	B	115	120	120	130					
29						A	120	115	120	120	120	115	E B 125	B	C	C	C	C	C					
30						E B 135	120	115	110	A	A	A	A	A	A	120	115	120	A					
31						E B 130	120	115	A	120	120	120	E A 130	E A 145	E A 135	120	115	C	E A 135					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						22	28	29	27	27	27	26	24	23	23	27	25	23	12					
MED						132	120	115	115	120	115	119	119	118	118	120	115	120	130					
UQ						E E 140	120	120	118	120	120	120	122	120	120	120	120	120	131					
LQ						130	118	115	115	115	115	115	115	115	115	115	115	118	125					

MAY. 1989 | H'E (KM)

IONOSPHERIC DATA

MAY. 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	105	110	105	115	115	140	130	130	125	125	120	125	120	120	130	120	115	110	110	110	110	105	110	105
2	110	105	110	100	100	110	120	120	120	120	110	115	115	110	115	115	C	C	C	C	115	120	110	110
3	110	110	B	110	B	G	155	120	120	115	115	125	115	B	G	G	G	130	115	115	115	115	110	110
4	110	100	B	B	140	125	120	120	115	115	115	110	115	110	145	C	C	C	C	C	C	120	115	110
5	110	110	105	115	110	115	135	120	110	125	G	135	115	115	G	G	125	140	130	115	115	125	B	115
6	110	105	135	B	B	130	140	130	115	125	120	115	115	G	160	150	130	130	120	115	115	B	115	B
7	105	105	100	100	B	145	145	135	130	130	115	120	130	G	G	G	G	G	155	115	B	B	B	110
8	110	115	125	B	130	150	130	130	125	130	125	125	115	115	110	115	115	150	120	120	110	115	110	115
9	120	115	115	115	B	G	E G 165	145	140	135	140	130	135	G	G	G	G	G	130	115	115	110	B	B
10	B	B	B	B	B	G	E G 155	145	125	120	125	115	115	115	110	G	G	130	130	115	115	C	B	110
11	B	S	B	B	B	G	G	135	125	120	120	120	125	130	120	120	130	120	115	110	110	S	110	110
12	105	B	B	B	B	140	140	130	120	115	115	115	115	115	145	130	120	115	120	120	105	110	120	115
13	105	105	100	100	S	G	135	120	120	120	115	115	115	110	110	145	130	135	120	115	110	110	115	110
14	110	B	B	B	B	150	130	120	115	120	120	115	120	140	160	130	130	120	115	115	105	120	110	110
15	105	110	105	105	B	140	130	115	115	120	120	115	110	115	115	160	130	115	110	110	110	110	105	105
16	105	B	B	110	105	140	130	135	115	120	110	110	115	115	G	120	120	115	110	105	100	105	120	110
17	110	110	110	110	115	130	135	120	115	115	115	115	120	125	110	115	130	115	115	115	115	115	110	105
18	105	110	110	105	110	110	150	120	115	115	110	110	115	120	120	115	120	E G 155	C	C	115	115	115	110
19	105	110	130	105	120	130	120	115	110	115	115	115	115	115	110	115	125	120	115	115	115	110	110	105
20	C	C	C	C	C	C	C	C	C	C	120	115	C	115	125	110	105	110	110	115	115	120	110	110
21	110	110	110	110	110	145	140	135	130	115	125	115	110	125	135	135	135	125	120	110	115	140	110	105
22	B	B	115	105	110	G	145	125	120	120	125	125	135	125	120	110	115	120	135	110	115	115	115	110
23	105	105	B	B	S	G	135	135	130	120	115	115	115	120	110	115	120	110	110	105	105	100	105	100
24	105	105	105	105	105	160	130	120	115	115	115	115	110	110	G	G	G	G	G	135	125	115	125	110
25	C	C	C	C	C	C	C	C	C	125	115	110	120	105	110	105	115	120	B	120	110	100	100	120
26	105	B	B	105	100	105	105	G	105	115	120	125	130	115	115	125	120	150	125	135	110	110	115	110
27	110	115	110	110	B	140	125	130	125	130	120	120	115	115	115	110	105	105	110	105	105	120	115	B
28	115	B	140	105	105	115	120	120	120	125	130	120	115	120	115	G	G	130	115	115	115	115	115	110
29	110	110	110	100	115	115	135	125	130	125	120	120	115	120	C	C	C	C	C	C	C	C	C	C
30	C	C	C	C	C	145	135	120	115	110	110	105	110	110	130	120	120	115	115	110	100	105	105	100
31	110	110	100	100	110	130	145	120	115	120	125	140	120	115	E G 160	150	140	C	125	120	C	C	C	C
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	20	19	20	16	22	28	28	29	30	30	31	30	27	24	22	22	24	25	27	27	25	25	26
MED	110	110	110	105	110	135	134	122	120	120	120	115	115	115	116	120	120	120	115	115	115	115	110	110
UQ	110	110	115	110	115	145	141	132	125	125	120	122	120	120	131	130	130	130	125	115	115	120	115	110
LQ	105	105	105	102	105	115	130	120	115	115	115	115	115	115	110	115	115	115	115	110	110	110	110	105

MAY. 1989 | H'ES (KM)

IONOSPHERIC DATA

MAY. 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

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	F 2	FF 23	F 2	F 1	F 1	H 2	H 2	H 3	H 3	C 1	C 1	C 1	C 2	C 2	C 2	C 2	C 2	C 3	L 4	F 4	F 4	F 4	F 2	F 2
2	FF 24	F 4	F 2	F 3	F 2	L 2	C 3	C 3	C 3	C 2	C 2	C 2	L 2	L 2	L 2	L 3					F 5	FF 25	F 3	F 2
3	F 2	F 2		F 2			H 1	C 4	C 3	C 2	C 2	C 1	C 2					H 3	C 4	F 6	F 5	F 4	F 5	F 3
4	F 1	F 2			F 1	C 2	C 2	C 3	C 2	C 3	C 1	C 2	C 2	LH 11	H 1							F 5	F 3	F 5
5	F 4	F 5	F 2	F 2	F 2	L 1	H 3	H 3	C 3	L 1		H 1	L 1	L 1			H 2	H 1	C 3	F 5	F 5	F 1		F 2
6	F 1	F 2	F 1			L 1	H 1	H 1	C 2	C 1	C 1	C 2	L 2		H 1	H 1	H 3	H 3	C 3	F 5	F 2		F 5	
7	F 1	F 2	F 3	F 1		H 1	H 2	H 2	H 2	H 2	H 2	C 2	H 1						H 1	F 1				F 3
8	F 5	F 3	F 1		F 3	C 1	H 2	H 2	H 2	H 2	H 2	C 1	C 2	C 3	C 2	C 2	C 2	H 1	C 4	F 6	F 5	F 5	F 4	F 5
9	F 2	F 5	F 2	F 5			H 1	H 2	H 2	H 1	H 1	H 1	H 1						C 2	F 5	F 5	F 5		
10							H 1	H 1	H 1	H 1	H 1	C 2	C 1	C 1	L 1			H 2	H 2	F 5	F 5			F 1
11								H 1	C 2	C 2	C 1	C 1	C 1	H 1	C 1	C 1	H 2	C 2	C 3	F 5	F 2		F 2	F 2
12	F 1					H 1	H 2	H 2	H 2	C 2	C 2	C 1	C 2	C 2	HC 11	H 2	C 4	C 4	C 2	F 2	F 5	F 5	FF 24	FF 25
13	F 3	F 4	F 3	F 4			H 2	H 3	H 3	H 2	H 2	C 2	C 2	C 2	L 2	H 1	H 2	H 3	C 4	F 6	F 5	F 4	F 2	F 2
14	F 2					H 1	H 2	C 2	C 3	C 2	C 3	C 2	C 2	C 1	H 1	H 2	H 2	C 3	L 3	FF 22	F 5	FF 24	F 5	F 3
15	F 4	F 3	F 2	F 2		C 1	H 2	C 5	C 3	C 2	C 1	C 2	C 1	C 2	C 3	H 1	H 2	C 5	C 2	F 5	F 6	F 5	F 5	F 3
16	F 4			F 1	F 2	H 1	H 1	H 2	C 3	C 2	C 2	C 2	C 1	L 2		C 3	C 2	C 4	L 2	F 5	F 3	F 5	F 2	F 2
17	F 4	F 4	F 4	F 4	F 5	C 4	CL C1	C 4	C 3	C 3	C 2	C 1	C 2	C 1	C 2	C 2	H 2	C 4	C 4	F 5	F 5	F 4	F 6	F 5
18	F 4	F 2	F 2	F 3	F 2	L 2	H 1	C 4	C 3	C 3	C 3	C 3	C 2	H 1	C 2	C 2	C 2	H 1			F 5	F 2	F 4	F 4
19	F 5	F 3	FF 24	F 3	F 1	C 2	C 4	C 3	C 3	C 2	C 2	C 2	C 2	C 2	C 2	C 2	HL 21	C 4	C 5	F 5	F 4	F 4	F 5	F 2
20											C 1	C 1			HC 12	C 2	L 3	L 3	LH 41	FF 35	FF 45	FF 34	F 5	F 6
21	F 5	F 5	F 4	F 5	F 5	CL 21	H 2	H 2	H 1	C 2	C 1	L 1	C 1	C 1	H 2	H 2	H 2	C 2	C 4	F 4	F 6	FF 11	F 2	F 2
22			F 1	F 2	F 1		H 3	H 3	C 2	C 1	C 1	C 1	H 1	H 3	CH 11	C 3	C 2	C 2	F 1	F 5	F 6	F 4	F 5	F 5
23	F 4	F 2					H 1	H 2	H 2	C 2	C 2	C 2	C 2	C 1	C 2	C 2	C 4	C 4	L 2	F 5	F 5	F 6	F 3	FF 33
24	F 5	F 3	F 5	F 4	F 2	H 1	H 3	C 3	C 3	C 3	C 2	C 2	C 2	C 2						F 1	F 1	F 5	F 1	F 2
25										C 2	C 1	C 1	C 1	C 2	C 2	C 3	C 2	C 1		F 1	F 4	F 4	F 4	FF 14
26	F 3			F 3	F 3	L 4	L 2		L 2	C 1	C 2	H 1	H 1	C 2	C 2	C 2	C 2	HL 22	C 3	F 2	F 3	F 4	F 4	F 4
27	F 3	F 1	F 2	F 2		H 2	H 2	H 2	H 2	H 1	C 2	C 2	C 2	C 2	C 2	C 2	L 4	L 4	L 3	F 4	F 5	FF 33	F 3	
28	F 5		FF 11	F 5	F 1	L 2	LH 22	H 3	C 3	H 1	H 1	C 1	C 2	C 1	C 2			H 2	C 3	F 5	F 5	F 2	F 4	F 4
29	F 2	F 5	F 4	F 4	F 2	L 1	H 2	H 2	H 2	H 2	C 2	C 2	C 2	C 1										
30						H 1	H 1	C 2	C 1	C 3	L 3	L 2	L 2	L 2	HL 11	H 4	C 3	C 4	L 4	F 5	F 5	F 4	F 4	F 4
31	FF 44	FF 24	F 4	F 2	F 1	C 1	H 2	C 2	C 2	C 1	C 1	H 1	L 1	L 1	HL 11	H 1	H 3		CL 41	FF 24				
	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																								

MAY. 1989

TYPES OF ES

f-PLOTS OF IONOSPHERIC DATA

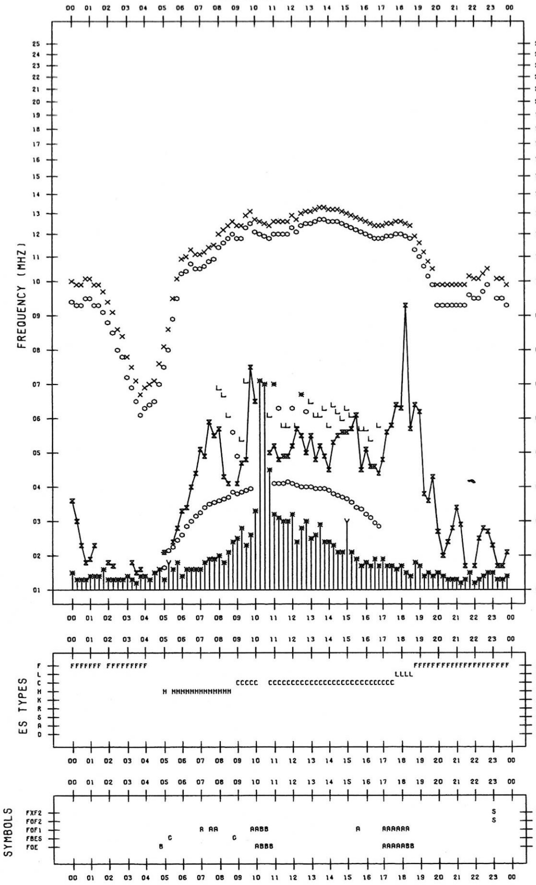
KEY OF F-PLOT	
|	SPREAD
⬡	FOF2,FOF1,FOE
×	FXF2
✳	DOUBTFUL FOF2,FOF1,FOE
⧗	FBES
L	ESTIMATED FOF1
Ϯ,Y	FMIN
∧	GREATER THAN
∨	LESS THAN

F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 5/ 1

135°E MEAN TIME

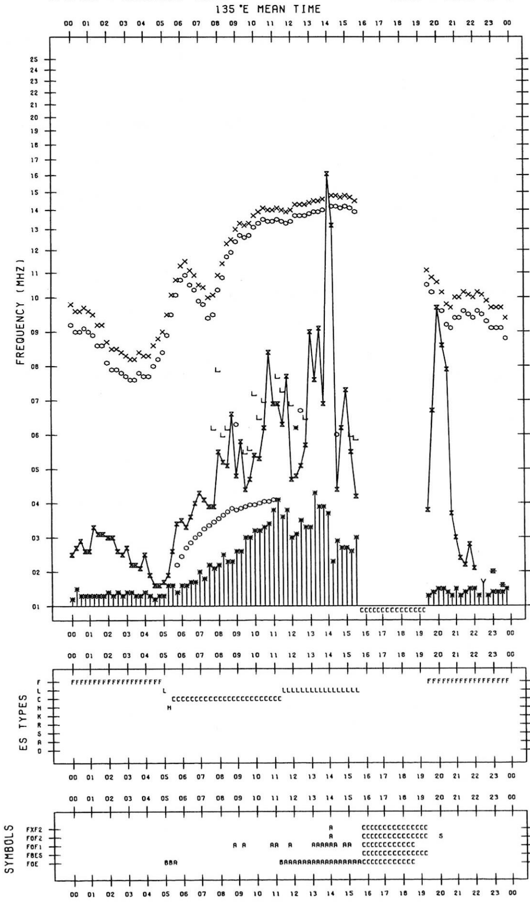


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 5/ 2

135°E MEAN TIME

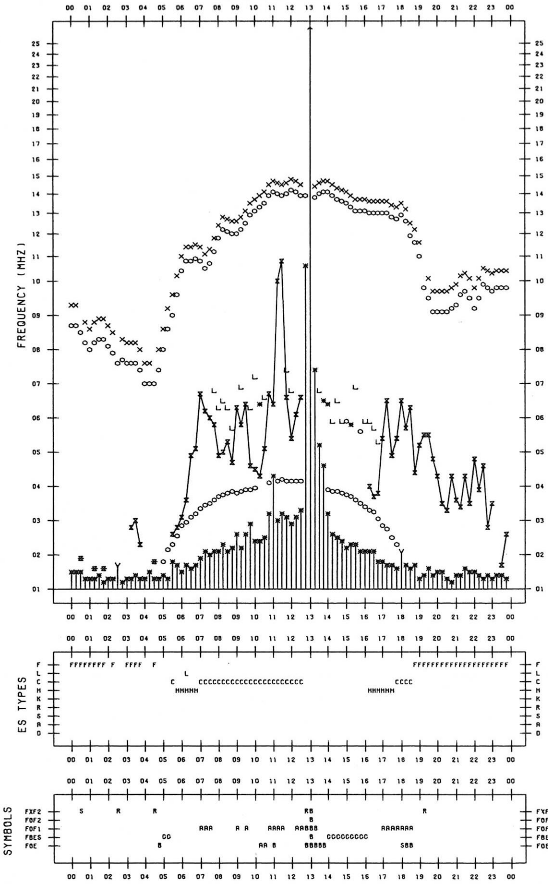


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 5/ 3

135°E MEAN TIME

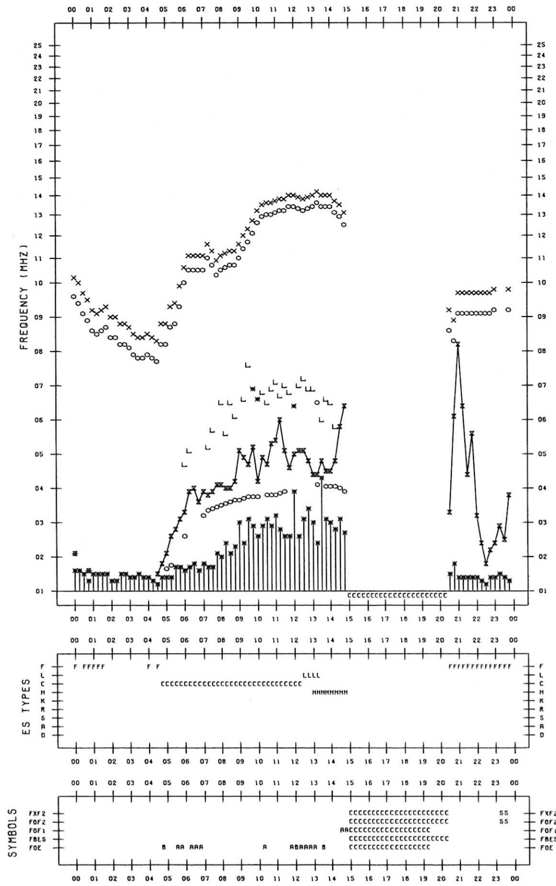


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 5/ 4

135°E MEAN TIME

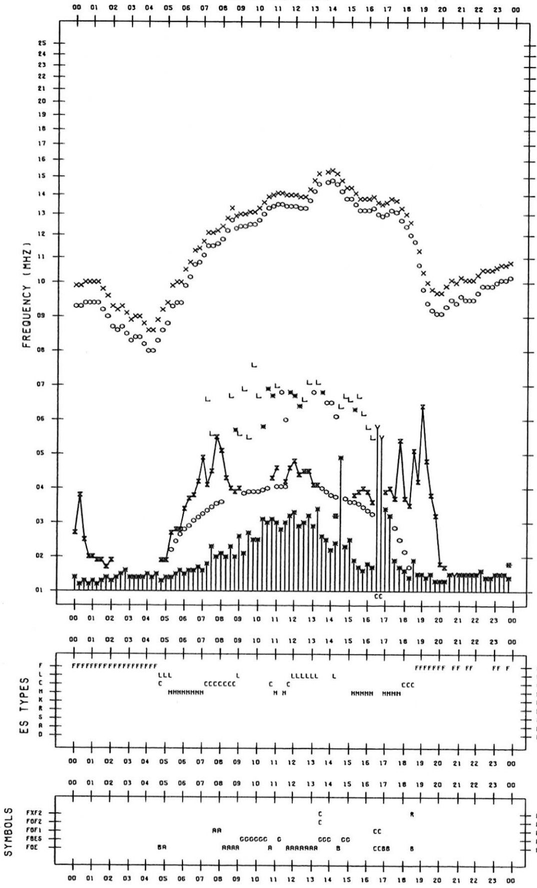


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 5/ 5

135°E MEAN TIME

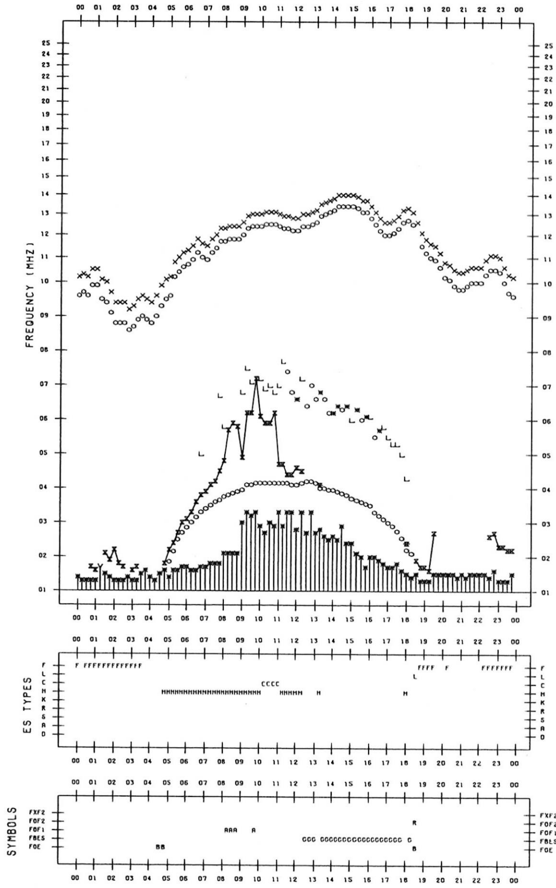


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 5/ 7

135°E MEAN TIME

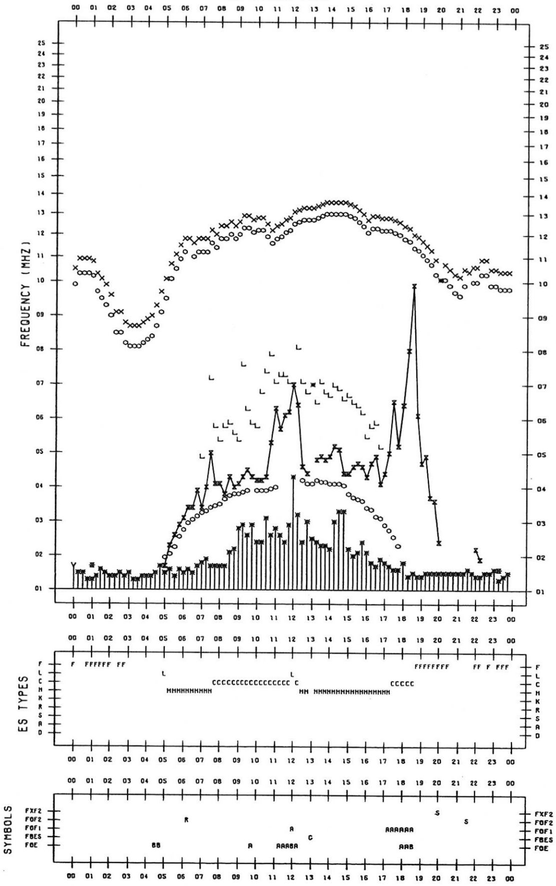


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 5/ 6

135°E MEAN TIME

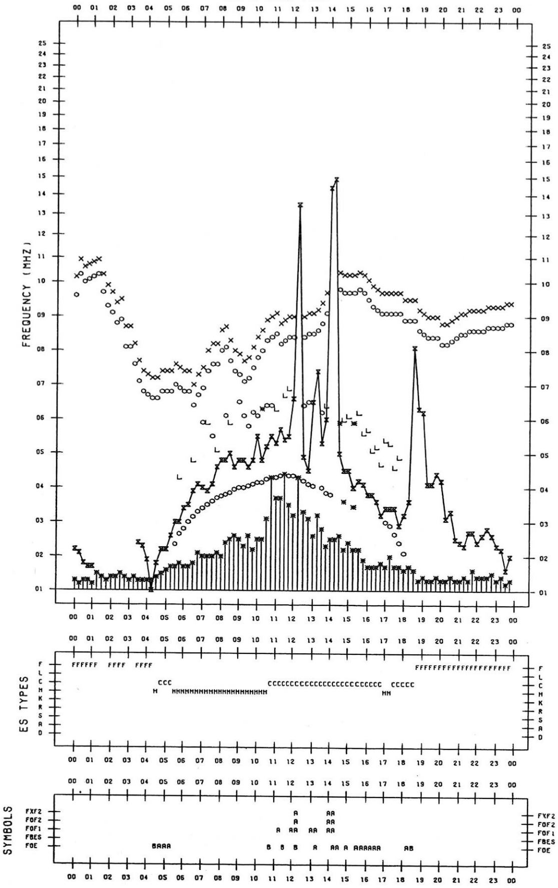


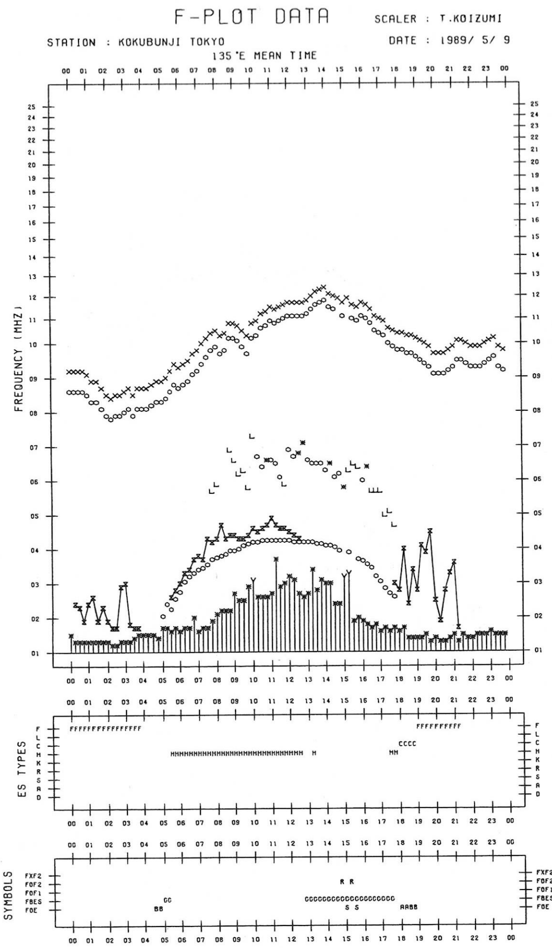
F-PLOT DATA

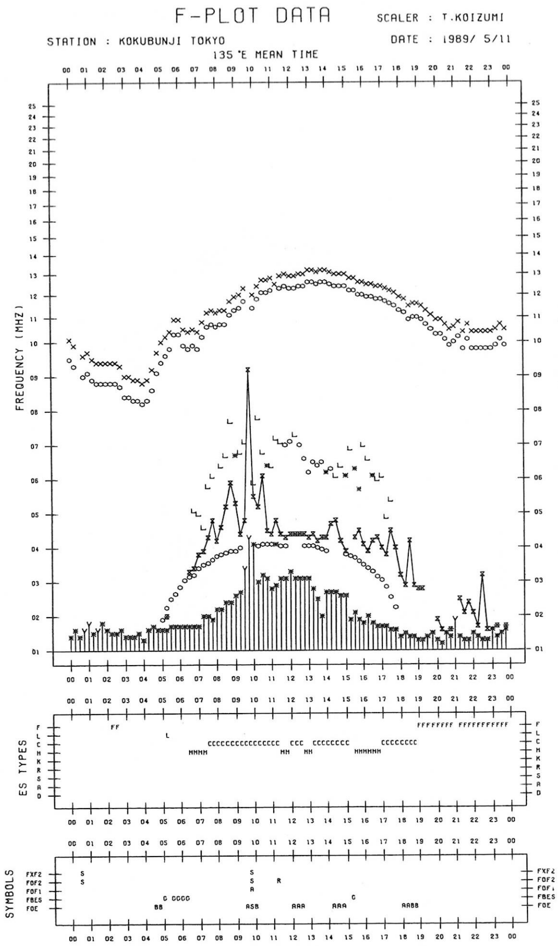
SCALER : T.KOIZUMI

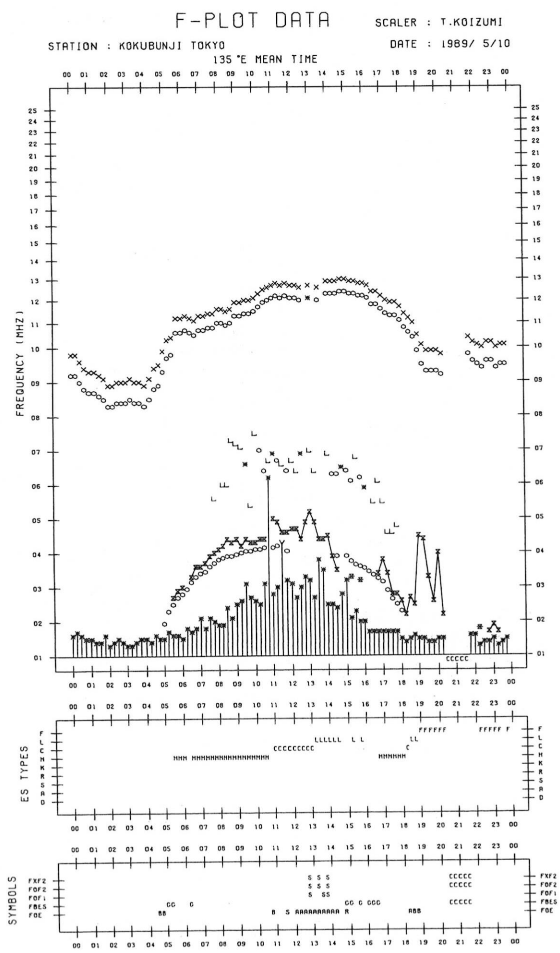
STATION : KOKUBUNJI TOKYO DATE : 1989/ 5/ 8

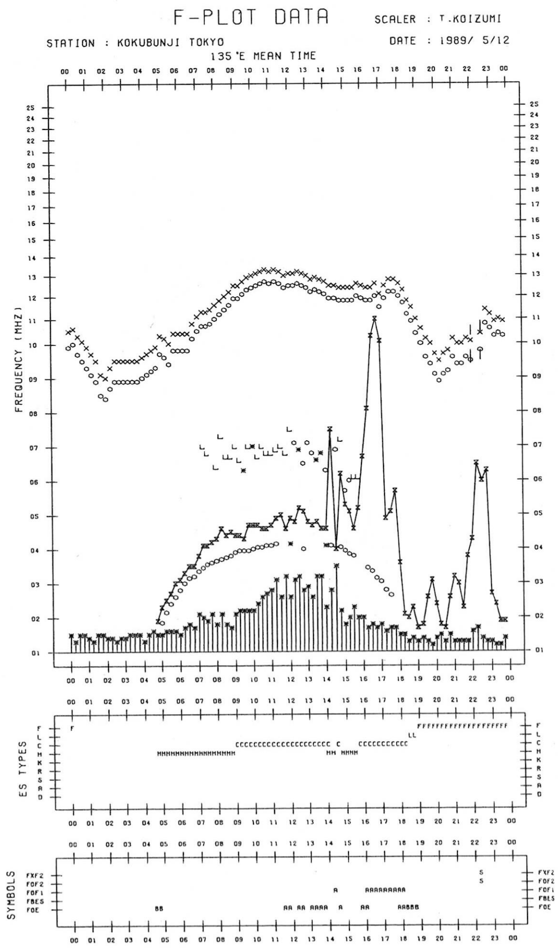
135°E MEAN TIME




F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 5/ 9
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 5/11
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

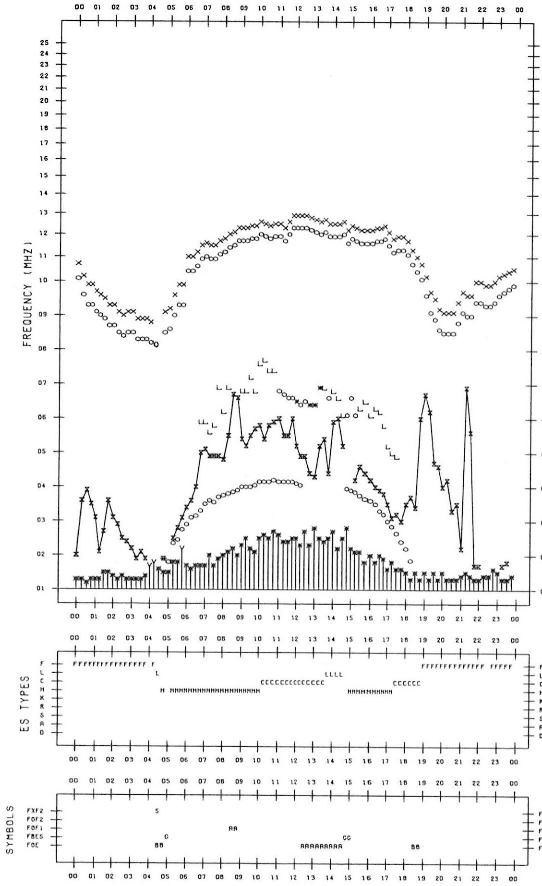

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 5/10
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 5/12
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 5/13

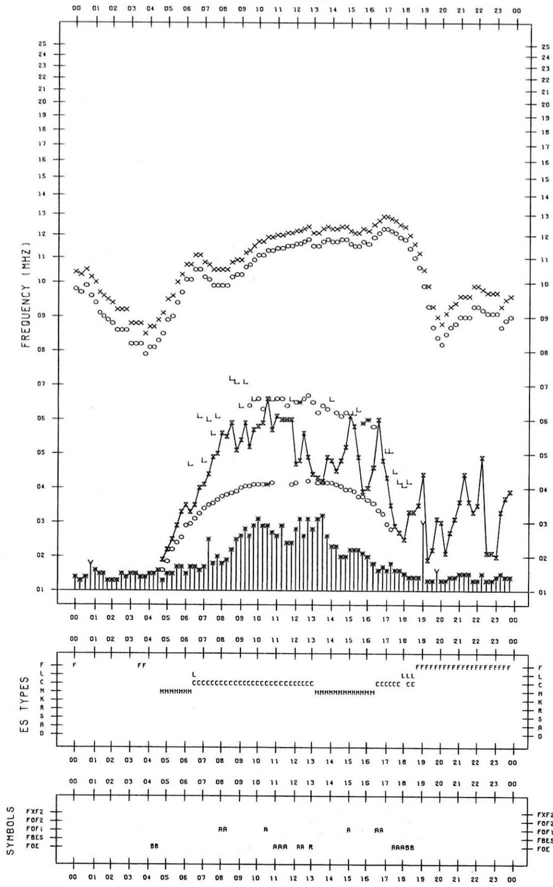
135°E MEAN TIME



F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 5/14

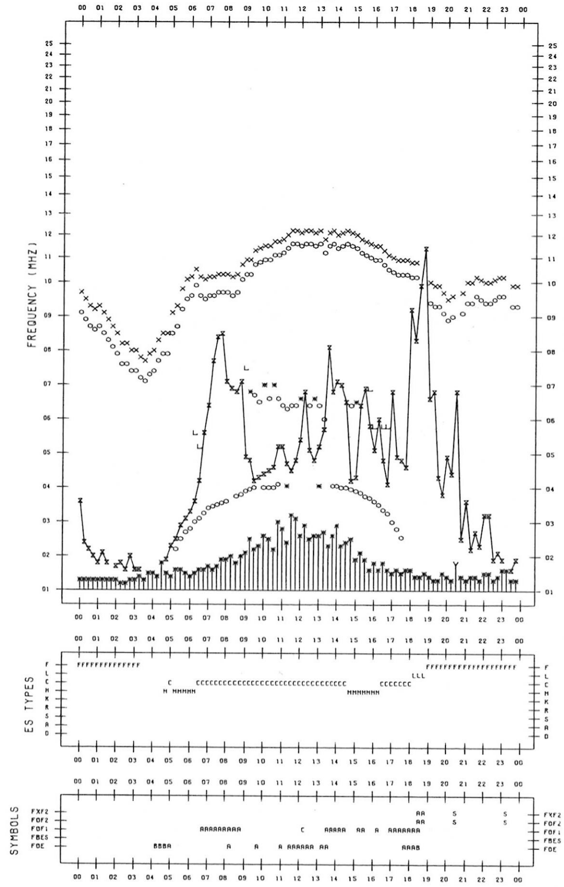
135°E MEAN TIME



F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 5/15

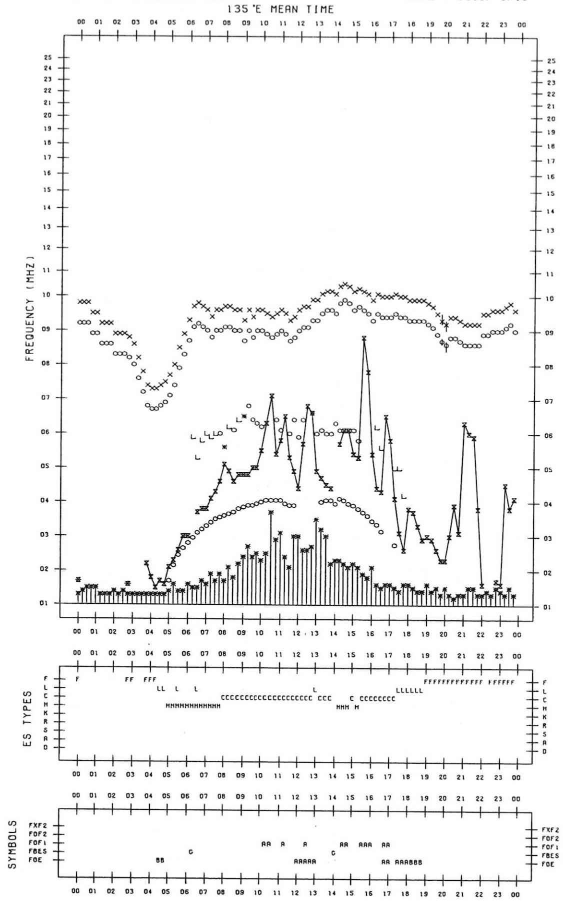
135°E MEAN TIME

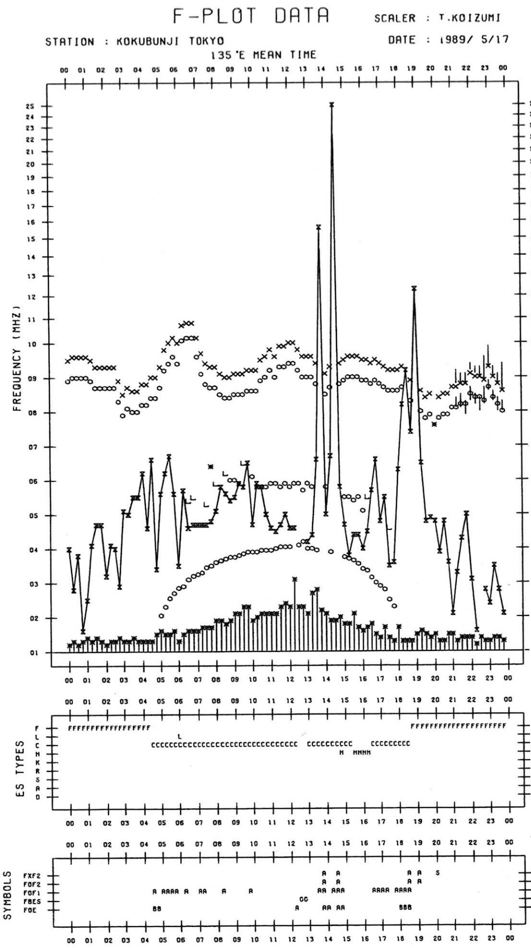


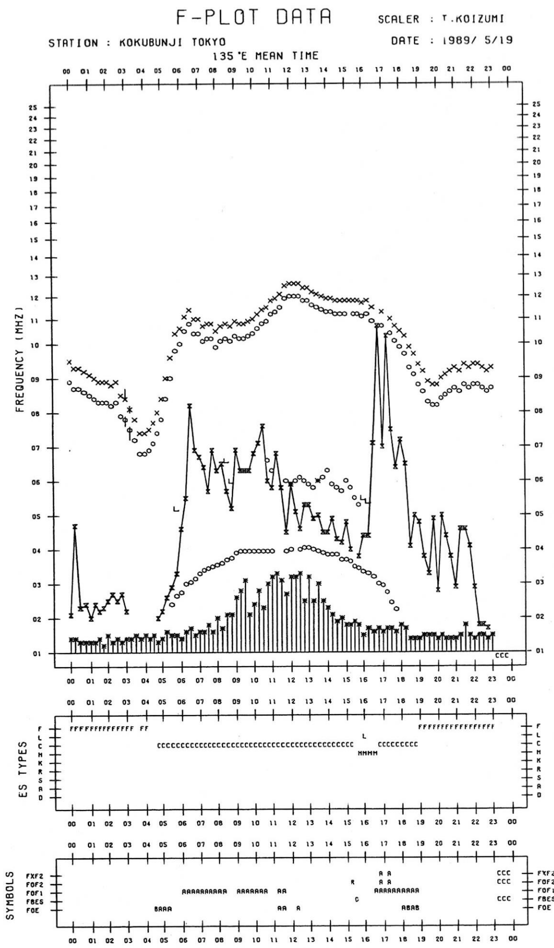
F-PLOT DATA SCALER : T.KOIZUMI

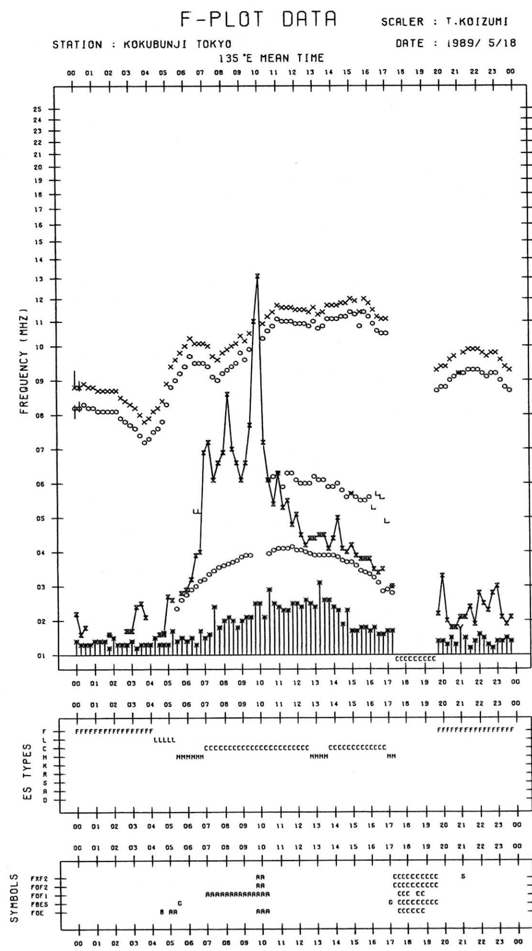
STATION : KOKUBUNJI TOKYO DATE : 1989/ 5/16

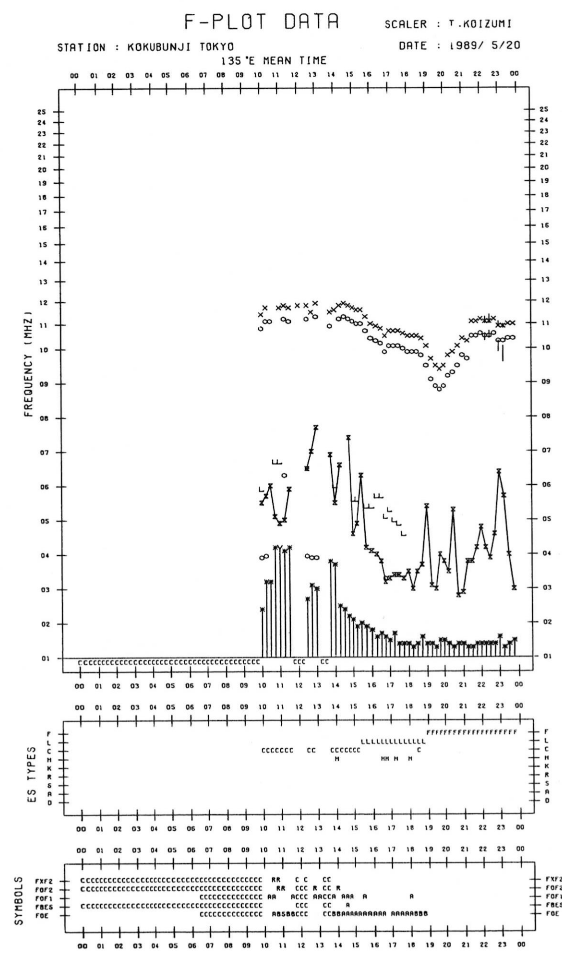
135°E MEAN TIME




F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 5/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 5/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 5/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

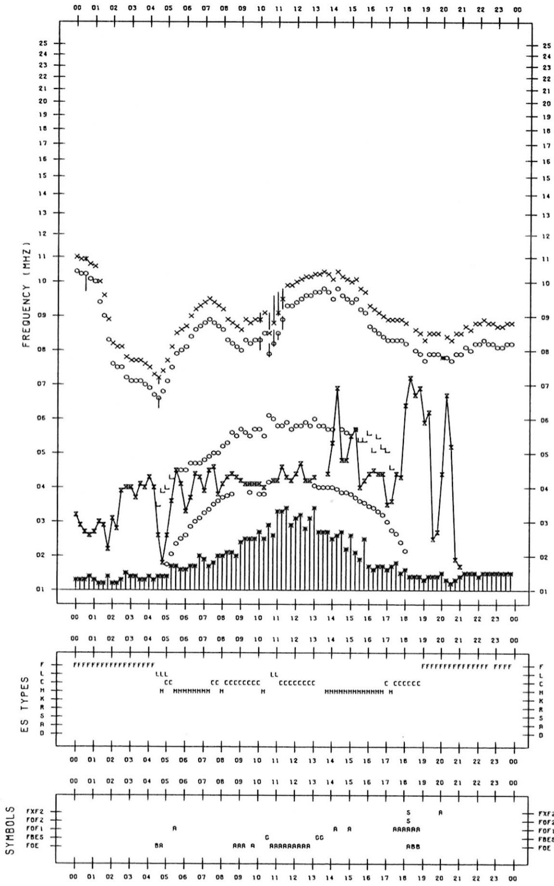

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 5/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO   DATE : 1989/ 5/21

135°E MEAN TIME

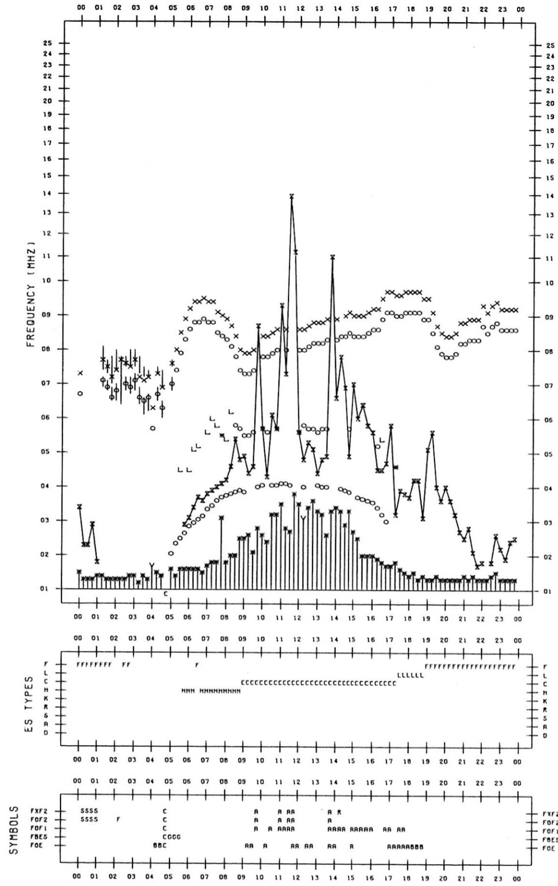


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO   DATE : 1989/ 5/23

135°E MEAN TIME

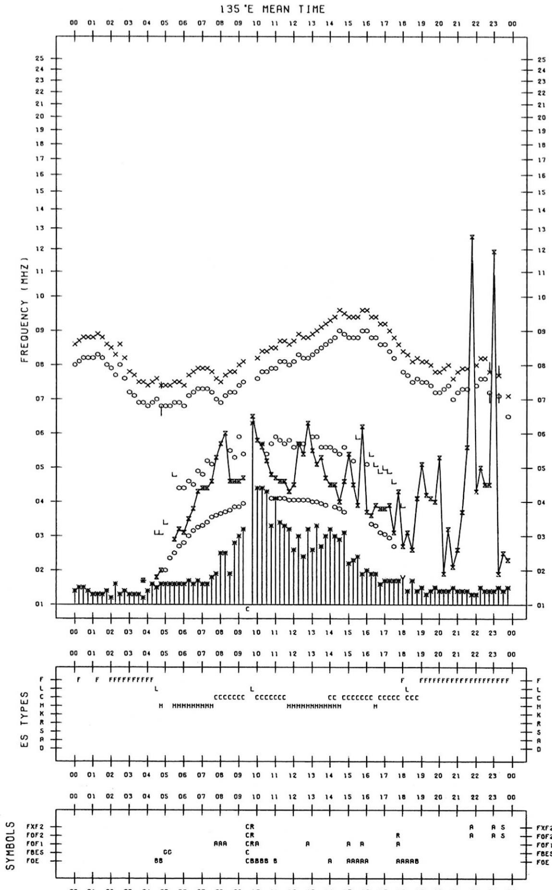


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO   DATE : 1989/ 5/22

135°E MEAN TIME

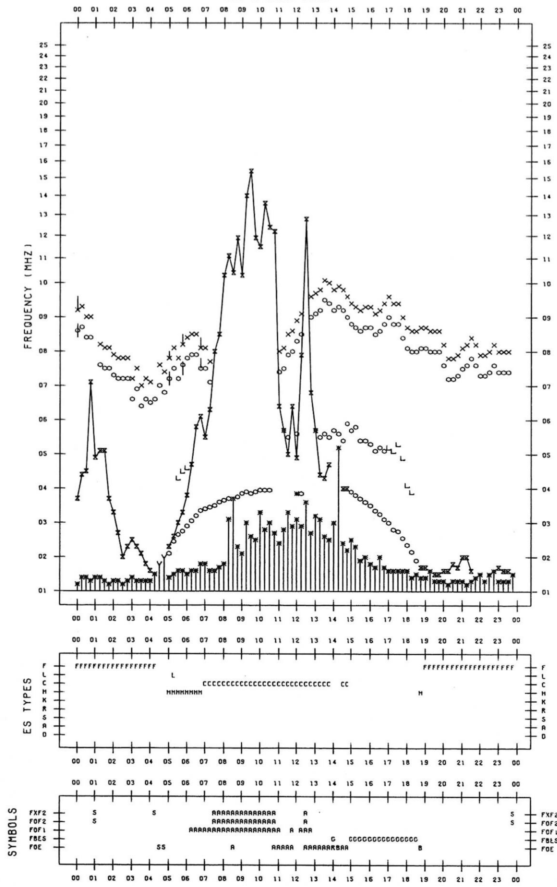


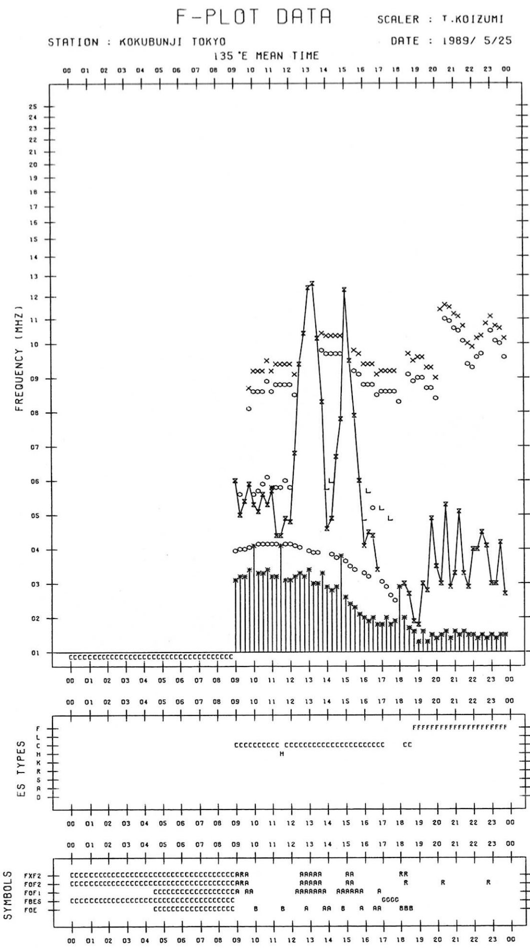
F-PLOT DATA

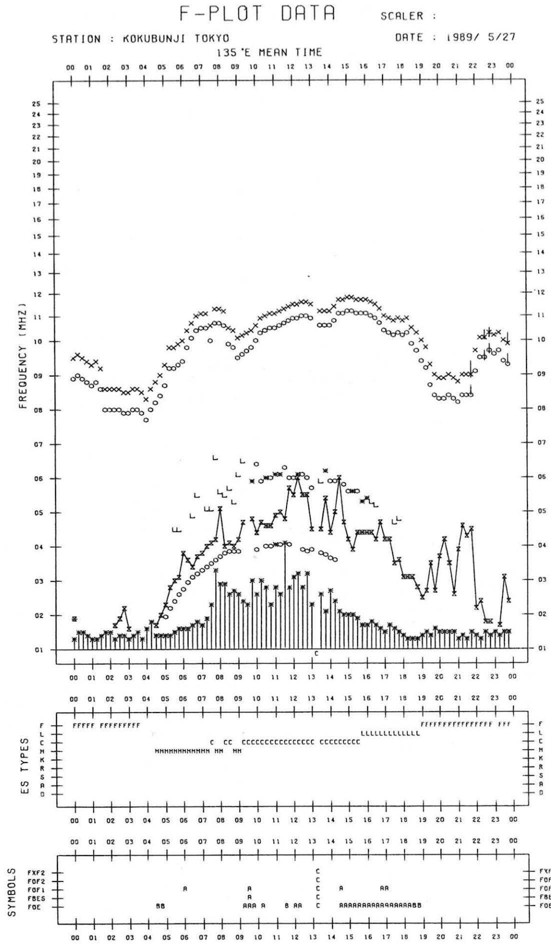
SCALER : T.KOIZUMI

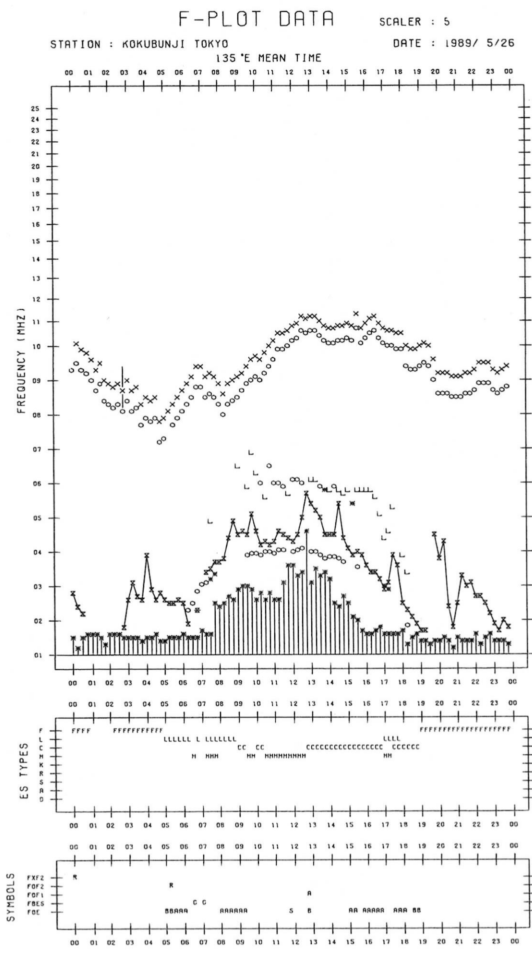
STATION : KOKUBUNJI TOKYO   DATE : 1989/ 5/24

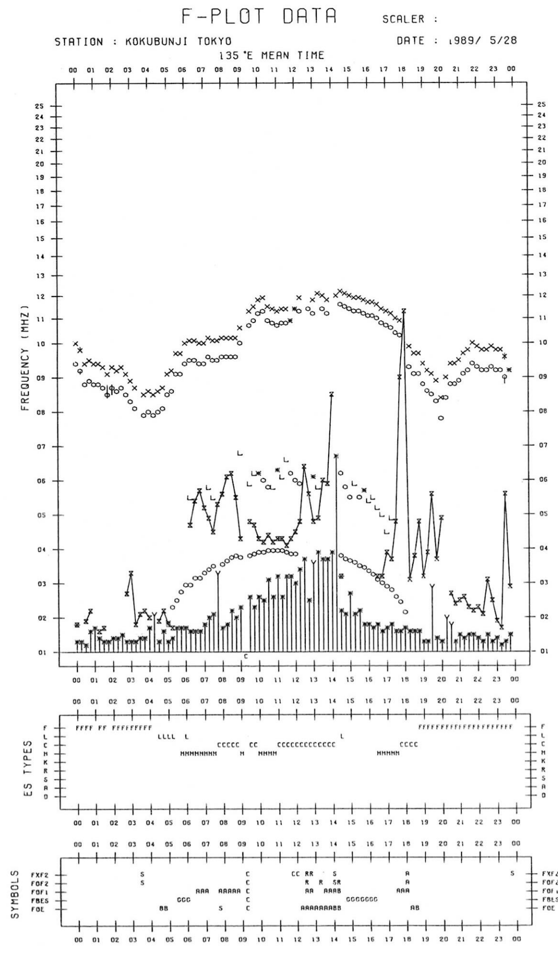
135°E MEAN TIME

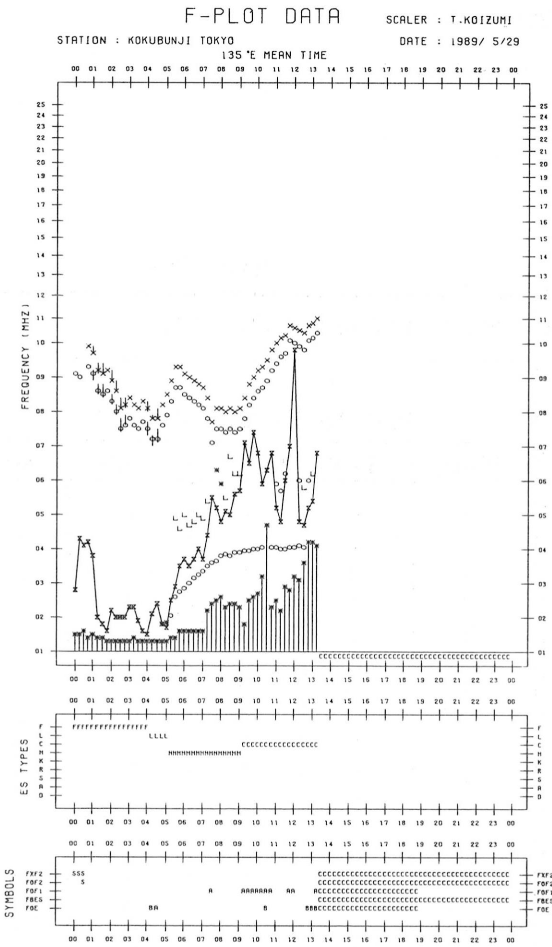


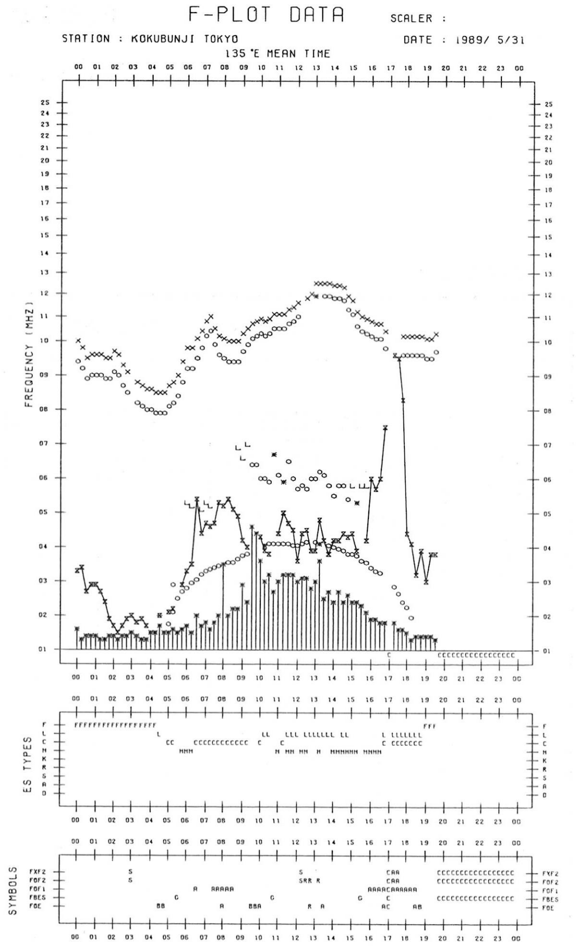

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 5/25
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

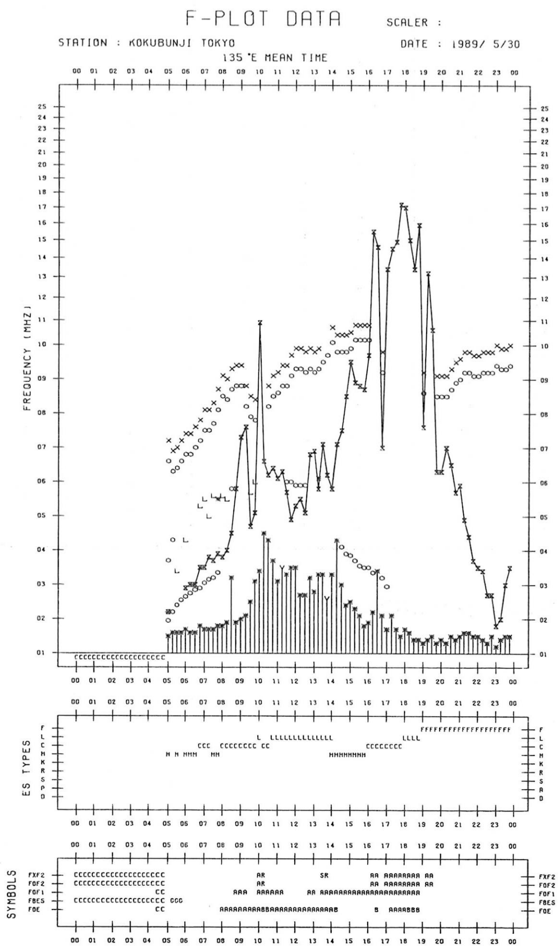

F-PLOT DATA
SCALER :
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 5/27
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : S
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 5/26
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER :
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 5/28
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 5/29
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER :
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 5/31
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER :
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 5/30
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

B.Solar Radio Emission

B1.Daily Data at Hiraiso

200 MHz

Hiraiso May 1989

Single-frequency total flux observations at 200 MHz

	FLUX DENSITY: $10^{-22}Wm^{-2}Hz^{-1}$					VARIABILITY: 0 TO 3				
UT DATE	00-03	03-06	06-09	21-24	DAY	00-03	03-06	06-09	21-24	DAY
1	(10)	10	10	(10)	10	*	*	*	*	*
2	12	11	10	B	11	*	*	0	3	*
3	B	B	B	B	B	3	3	*	1	3
4	B	15	14	B	B	2	1	1	3	1
5	B	B	B	B	B	3	2	2	1	2
6	B	13	12	12	B	1	0	0	0	1
7	12	12	12	B	12	0	0	*	0	0
8	13	13	13	12	13	*	*	*	0	*
9	12	12	12	12	12	0	*	*	0	0
10	12	13	12	12	12	0	0	0	0	0
11	13	12	B	13	13	0	0	2	0	1
12	14	14	13	B	B	*	(1)	0	1	*
13	B	B	B	13	B	2	1	*	0	1
14	14	14	B	B	14	1	1	(2)	2	1
15	B	B	B	B	B	2	2	1	(1)	2
16	(B)	B	B	B	B	(1)	1	2	1	1
17	B	13	13	B	B	1	1	0	1	1
18	13	12	12	12	13	0	0	0	0	0
19	B	B	B	B	B	2	3	1	2	2
20	(B)	B	B	B	B	*	2	2	2	2
21	B	B	14	B	B	(2)	2	1	1	2
22	B	B	B	B	B	2	1	1	1	1
23	B	B	B	B	B	1	2	1	2	1
24	B	B	B	B	B	2	1	1	2	1
25	B	B	B	B	B	2	2	2	0	2
26	B	B	B	13	B	1	*	1	1	1
27	13	13	13	B	13	*	*	*	2	*
28	(B)	*	*	B	B	*	*	*	2	*
29	B	B	B	B	B	3	2	2	1	2
30	B	B	B	13	B	2	*	3	1	2
31	13	13	12	11	13	1	2	(1)	1	1

Note: No observations during the following periods.

none.

B.Solar Radio Emission

B1.Daily Data at Hiraiso

500 MHz

Hiraiso May 1989

Single-frequency total flux observations at 500 MHz

FLUX DENSITY: $10^{-22}Wm^{-2}Hz^{-1}$

UT DATE	00-03	03-06	06-09	21-24	DAY
1	48	48	48	51	48
2	52	51	51	53	51
3	54	B	56	58	57
4	58	57	55	56	57
5	55	56	55	54	55
6	56	54	54	54	54
7	55	54	54	B	54
8	59	59	59	B	60
9	60	59	59	57	60
10	59	60	58	56	59
11	57	57	56	57	57
12	57	60	57	60	58
13	60	61	59	59	60
14	60	61	62	61	61
15	61	61	60	58	61
16	57	57	56	56	57
17	56	55	53	55	55
18	55	54	53	53	54
19	54	55	51	53	53
20	54	53	52	54	53
21	54	54	53	53	54
22	B	54	51	50	B
23	50	49	48	53	49
24	(53)	50	50	-	51
25	-	-	50	50	(50)
26	52	53	51	51	52
27	50	49	48	50	50
28	50	49	47	49	49
29	51	50	49	49	50
30	49	48	48	49	49
31	50	50	48	-	49

Note: No observations during the following periods:

24th 1933 - 25th 0445
31st 1930 - 2344

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso May 1989

Single-frequency observations

Normal observing period: 1940 - 0935 U.T. (sunrise to sunset)

MAY 1989	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY ($10^{-22}Wm^{-2}Hz^{-1}$) PEAK	MEAN	POLARIZATION REMARKS
1	500	46 C	0057.0	0057.4	32.5	105	7	0
	100	46 C	0057.2	0057.8	1.5	520	-	-
	200	46 C	0057.4	0100.5	4.3	135	-	0
2	200	41 F	0215.2	0221.1	12.5	25	-	0
	100	44 NS	1942E	2100	580D	210	40	-
	200	44 NS	1942E	0548	840D	43	21	WL
	200	8 S	2002.4	2002.9	0.9	780	-	0
	200	8 S	2055.8	2056.3	0.8	1600	-	0
3	500	27 RF	0223	0421.5	146	25	10	WL
	100	46 C	0339.3	-	23	1000D	280D	-
	500	48 C	0339.5	0354.9	22.0	7000	776	WR
	200	46 C	0340.6	0342.6	50	570	30	WRWL
				0355.8		300		0
	100	48 C	1938E	1945.5U	218D	1000D	300U	- SUNRISE
				2018.5		740		-
	200	46 C	1938E	2029	152D	135	43	SL SUNRISE
	500	41 F	2014.3	2015.2	2.0	93	-	SL
	200	8 S	2209.9	2210.2	0.9	240	-	0
	500	8 S	2209.9	2210.3	0.7	95	-	ML
	500	27 RF	2235	2319.5	125	13	7	0
	200	43 NS	2253	0005	264	27	8	WL
4	200	46 C	0059.3	0102.0	4.0	125	-	0
	500	46 C	0059.5	0100.5	3.4	245	-	ML
	500	8 S	0225.0	0225.5	0.8	60	-	WL
	500	46 C	0243.5	0244.5	11.5	795	57	ML
	500	46 C	0332.1	0334.5	31.0	29	4	0
				0347.0		8		0
	500	42 SER	0411.4	0417.5	23.5	1700	-	WL
				0411.9		254		WL
	200	48 C	0416.5	0417.8	10.6	30000	740	0
				0421.5		1500		0
	100	42 SER	0416.7	0417.2U	31.7	1000D	-	-
	200	42 SER	0523	0525.7	69	610	-	0
	100	41 F	0524.4	0525.7	2.0	1000D	-	-
	500	41 F	0524.7	0526.3	2.3	260	-	0
4	500	21 GRF	0610	0713	105	13	6	0
	200	42 SER	0737.3	0741.1	15	15000	-	0
	100	42 SER	0737.3	-	4.2	1000D	-	-
	500	48 C	0816.5	0819.3	19.5	8300	350	WL
				0822.5		74		WL
	100	42 SER	0818.5	0818.6	10.8	970	-	-
	200	46 C	0818.5	0818.7	20.8	930	81	0
	200	44 NS	1940E	2310	840D	37	13	0
	200	46 C	2219.1	2219.5	1.7	2400	-	0
	100	46 C	2219.1	-	2.6	1000D	-	-
	500	46 C	2219.4	2220.4	7.7	280	-	WL
5	200	42 SER	0136	0207.3	125	130	-	SR
	500	41 F	0241.5	0247.0	15.5	50	-	0
	200	42 SER	0404.0	0514.5	70	450	-	SR
	100	46 C	0437.6	0438.0U	2.6	960	340	-
	100	48 C	0722.4	0730.5	31.7	5600	380	WL
				0746.4		890		-
	200	48 C	0724.4	0728.8	36.3	4100	112	0
				0745.3		230		0
				0801.1		790		0
	500	46 C	0725.0	0734.5	47.0	465	80	SR
				0747.0		105		WR
	200	24 R	0810.6	0908	73D	70U	45U	MR SUNSET
	100	24 R	0811	0900	66D	650U	300U	- SUNSET
	500	46 C	0814.0	0814.2	5.1	25	-	WR
	200	44 NS	1940E	2144	340D	11	8	WR
	500	27 RF	2332.5	2342.5	65	13	5	0
6	200	8 S	0303.8	0304.2	0.8	257	-	0
	200	41 F	0442.9	0443.6	2.0	148	-	0
	100	46 C	0647.5	0648.6	3.0	530	-	-
7	200	44 NS	1940E	2003	140D	12	6	MR
	100	44 NS	1940E	0035	830D	80	32	-
	500	46 C	2215.3	2219.3	6.5	39	-	WL
8	500	46 C	0521.5	0522.1	3.0	40	-	0
	200	42 SER	2033.9	2040.3	27	140	-	MR
	500	21 GRF	2115	2256.5	145	8	4	0
9	200	8 S	2203.6	2203.7	0.8	700	-	MR
	100	8 S	2203.6	2204.2	1.0	750	-	-
10	500	46 C	0346.5	0351.0	10.0	131	-	0
	200	46 C	0346.9	0347.0	4.0	880	-	0
	500	46 C	0420	0425.5	9.5	16	-	0
11	200	43 NS	0517.0	0600	190	6	4	-
	500	42 SER	0605.8	0611.3	6.5	113	-	0
	100	42 SER	0605.9	0611.2	14.7	620	-	-
	200	42 SER	0606.0	0606.3	10.6	840	-	-
	200	46 C	2315.0	2315.9	1.9	270	-	-
	100	46 C	2315.5	-	2.0	1000D	-	-
	500	4 S/F	2315.7	2316.2	1.2	11	-	0
12	200	8 S	0657.7	0658.0	0.7	4500	-	-
	200	42 SER	0745.5	0745.7	6.6	1400	-	-

MAY 1989	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY ($10^{-22}Wm^{-2}Hz^{-1}$) PEAK	MEAN	POLARIZATION REMARKS
12	100	46 C	0745.6	0746.2	1.5	810	-	-
	200	44 NS	1940E	0134	830D	11	6	-
	200	8 S	2129.0	2129.0	0.3	685	-	-
13	200	42 SER	0008.6	0017.8	12.5	4200	-	-
	100	42 SER	0009.2	-	13.2	1000D	-	-
	500	8 S	0459.5	0459.6	0.6	49	-	WR
	500	42 SER	2116.5	2122.0	5.8	152	-	0
	100	42 SER	2142.9	2145.2	3.3	1000D	-	-
	200	8 S	2335.8	2336.0	0.8	4500	-	-
14	100	42 SER	0149.9	0150.6	22.4	1000D	-	-
	200	42 SER	0150.2	0210.7	20.7	510	-	-
	200	43 NS	0400	0600	330D	7	5	WL
	200	44 NS	1940E	2023	830D	18	6	MR
	500	41 F	2228.0	2229.0	2.1	29	-	0
15	200	44 NS	1940E	0212	830D	11	6	WL
	500	46 C	2126.7	2127.2	1.1	100	-	0
16	200	44 NS	1940E	0000	520D	8	4	WL
17	200	43 NS	2127.7	2200	68	7	3	WR
18	500	27 RF	0303	0313	40	4	2	0
	200	43 NS	2330	0449	510	15	6	WR
19	500	21 GRF	0400	0441.5	85	9	4	WR
	200	44 NS	1930E	0120	830D	17	7	0
20	200	42 SER	0700	0805.0	67	215	-	0
	200	48 C	0921.0	0923.1U	8.6	11000U	1960U	0 SUNSET
	200	44 NS	1930E	2037	720D	33	11	WR
21	200	44 NS	1930E	-	840D	-	8	MR
	200	42 SER	2113.2	2114.5	3.3	85	-	0
	500	42 SER	2246.0	2253.3	9.0	11	-	WR
22	500	48 C	0006.0	0138.5	150	21000	2400	SL
				0041.0		2950		WR
				0108.0		14000		SL
	200	48 C	0007.9	0138.0	132	2200	270	ML
				0028.7		225		WR
	100	48 C	0016.5	0040.3	404	490	77	-
				0049.6		430		-
				0152.1		310		-
	200	46 C	0625.5	0626.4	5.3	980	270	WR
	100	46 C	0625.9	-	3.1	1000D	-	-
	500	46 C	0626.5	0633.0	4.5	41	-	WL
	100	45 C	0804.3	0804.6	1.7	950	-	-
	100	44 NS	1930E	0734	840D	70	20	-
	200	44 NS	1930E	0743	840D	20	11	MR
23	100	42 SER	0022.4	0034.0	27.7	980	-	-
	200	42 SER	0033.0	0033.9	18.5	430	-	0
	500	42 SER	0033.6	0034.5	19	34	-	ML
	500	42 SER	0357.2	0400.5	5.0	510	-	WL
	500	8 S	0748.3	0748.7	0.7	36	-	0
	200	42 SER	0839.3	0839.8	9.2	870	-	0
	100	44 NS	1930E	0747	840D	310	128	-
	200	44 NS	1930E	0823	840D	44	23	MR
24	200	44 NS	1930E	0000	840D	17	12	C
25	200	24 R	1930E	0031.7	840D	12	8	WR
	200	46 C	2320.5	2322.4	7.9	84	-	0
	500	4 S/F	2320.8	2323.9	4.5	9	-	WR
26	500	41 F	0556.2	0558.3	6.0	288	-	0
	500	42 SER	0727.8	0739.8	21.0	55	-	0
27	200	44 NS	1930E	-	270D	-	5	0
28	200	46 C	0203.2	0204.0	1.2	95	-	0
	200	46 C	0724.3	0725.2	1.6	97	-	0
	200	44 NS	1930E	2357	840D	36	14	MR
	500	46 C	2206.2	2220.7	28.0	31	9	WR
				2210.5		23		WR
	200	46 C	2208.6	2210.7	23.8	145	16	WR
				2226.4		55		WR
	100	42 SER	2209.2	2210.8	19.1	420	-	-
29	500	41 F	0301.5	0305.0	3.8	26	-	MR
	200	46 C	0348.1	0349.5	3.6	310	-	WR
	100	46 C	0348.5	-	7.3	1000D	-	-
	500	46 C	0349.3	0350.0	4.0	32	-	MR
	500	42 SER	0426.7	0429.0	8.5	55	-	MR
	500	41 F	0458.0	0504.0	10.5	80	-	MR
	100	41 F	0500	0505.6	8.6	670	-	-
	200	43 NS	2100	0731.0	770D	38	10	SR
30	200	42 SER	2123.8	2155.4	35.0	505	-	WR
31	200	8 S	0224.8	0225.3	0.9	110	-	0
	100	42 SER	0651.3	0651.6	19.1	860	-	-
	200	42 SER	0651.5	0652.1	6.7	240	-	MR
	500	4 S/F	0656.6	0656.7	1.9	13	-	WR

C. RADIO PROPAGATION

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

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

C. RADIO PROPAGATION

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

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

C. Radio Propagation

c2. Radio Propagation Quality Figures at Hiraiso

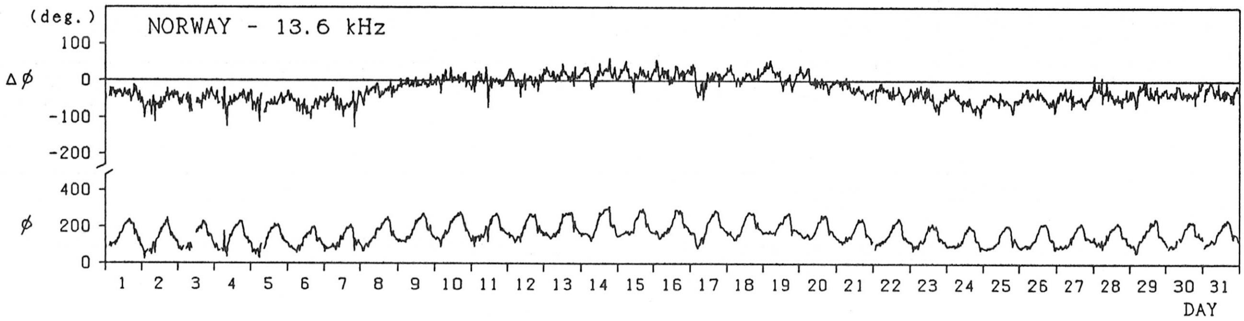
Hiraiso | Time in U.T

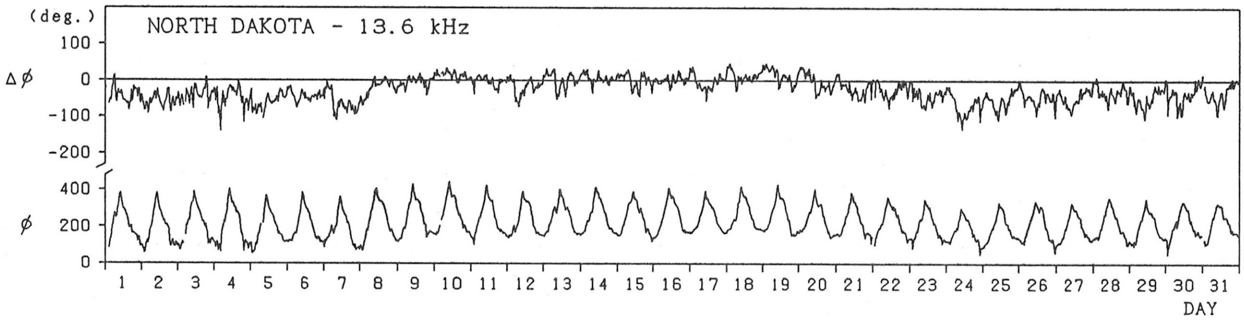
May 1989	Whole Day Figure	WWV 00-06	WWV 06-12	WWV 12-18	WWV 18-24	WWVH 00-06	WWVH 06-12	WWVH 12-18	WWVH 18-24	Conditions 00-06	Conditions 06-12	Conditions 12-18	Conditions 18-24	Princial Geomagnetic Storms Start	Ene	Range
1	4-	3U	4	3	3U	4	4	4	4	N	N	N	N			
2	4-	3U	3	4	4U	3	4	4	4	N	N	N	N			
3	3+	3U	3	4	4U	3	4	4	3	N	N	N	N			
4	4-	4	3	4	4U	4	4	4	3	N	N	N	N	2352	---	79
5	3+	4	3U	3U	2U	3	4	4	4	N	N	N	N	---	18.0	
6	4-	3U	3	4	4U	4	4	4	3	N	N	N	N			
7	3+	4	3	3	3U	4	4	4	3	N	N	N	N	0512	24.0	176
8	4-	4U	4	4	3U	3	4	4	4	U	U	U	U			
9	4-	3	5	4	2U	4	4	4	3	N	N	N	N			
10	4o	4	5	4	4U	4	4	4	4U	N	N	N	N			
11	4o	4	5	4	3U	4	4	4	4	N	N	N	N			
12	4o	4	4	5	5U	4	4	4	3	N	N	N	N			
13	4o	4	5	4	4U	4	4	4	4	N	N	N	N			
14	4o	4	4	3	4U	4	4	4	4	N	N	N	N			
15	4o	4	4	4	5U	4	4	4	4	N	N	N	N			
16	4+	5	4	4	4U	4	4	4	5	N	N	N	N			
17	4o	4	4	4	5U	4	4	4	4	N	N	N	N			
18	4o	5	5	3	4U	4	4	4	4	N	N	N	N			
19	4o	4	4	4	4U	4	4	4	5	N	N	N	N			
20	4+	4	5	5	4U	4	4	4	4	N	N	N	N			
21	4-	4	4	3	4U	4	4	3	3	N	N	N	N			
22	4o	4	4	3	4U	4	4	4	4	N	N	N	N			
23	4-	3U	4	4	4U	4	4	3	3	N	N	N	N	1346	---	198
24	3+	3	2U	2U	3U	4	4	4	4U	U	U	U	U	---	---	
25	3+	2U	3	3	4U	4	4	3	4	U	U	U	U	---	24.0	
26	4o	4U	4	4	5U	4	4	4	4	N	N	N	N			
27	4o	4U	4	4	4U	4	4	4	5	N	N	N	N			
28	4o	4U	4	4	4U	4	4	4	4	N	N	N	N			
29	4o	3U	3	4	5U	3	4	4	4U	N	N	N	N			
30	4+	4	4	5	5U	4	4	4	5	N	N	N	N			
31	4o	4	3	4	5U	5	4	4	4	N	N	N	N			

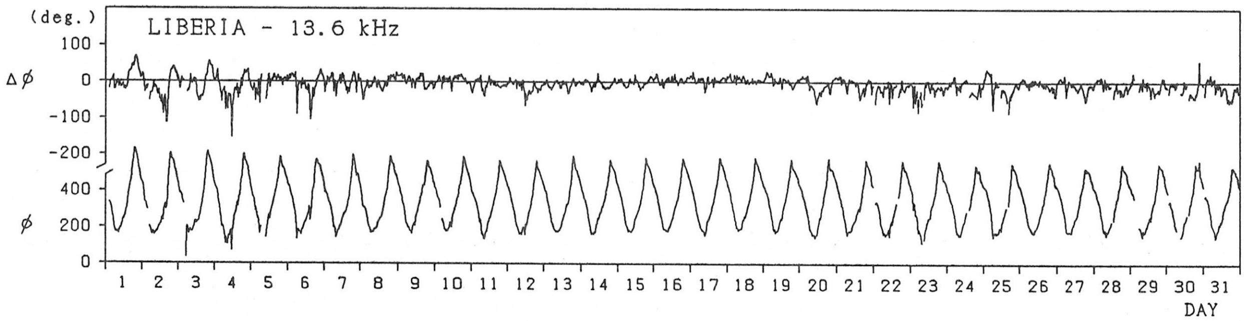
C. Radio Propagation

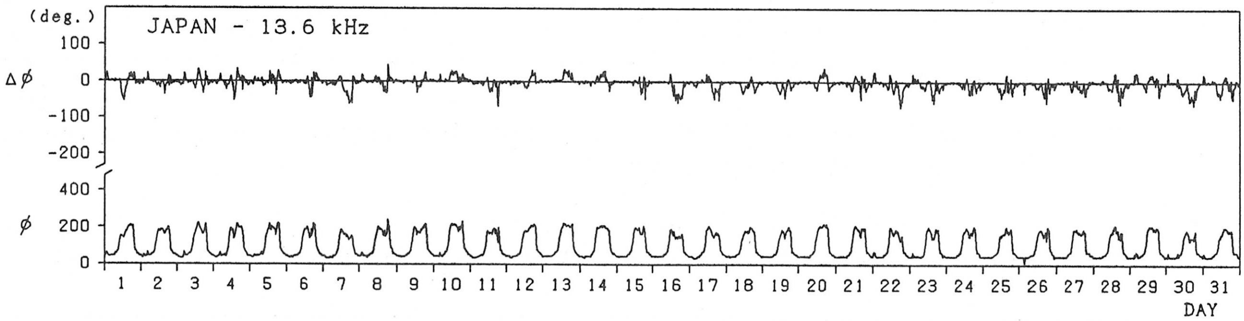
C3. Phase Variations in OMEGA Radio Waves at Inubo

Inubo May 1989

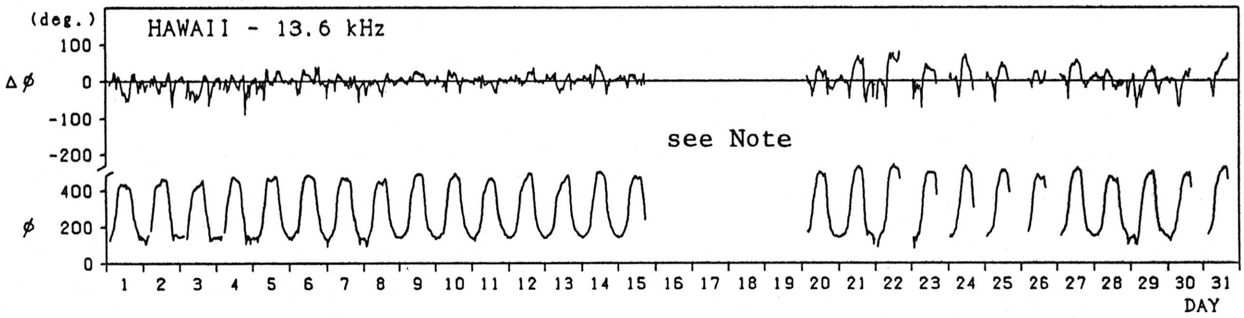


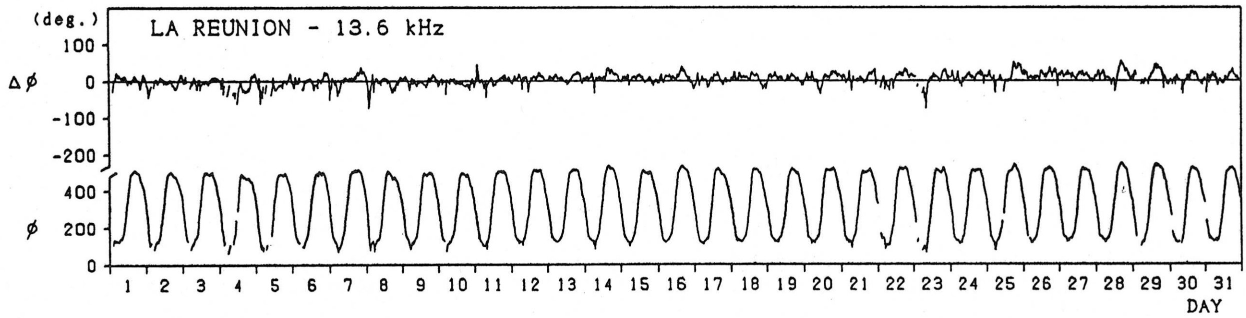


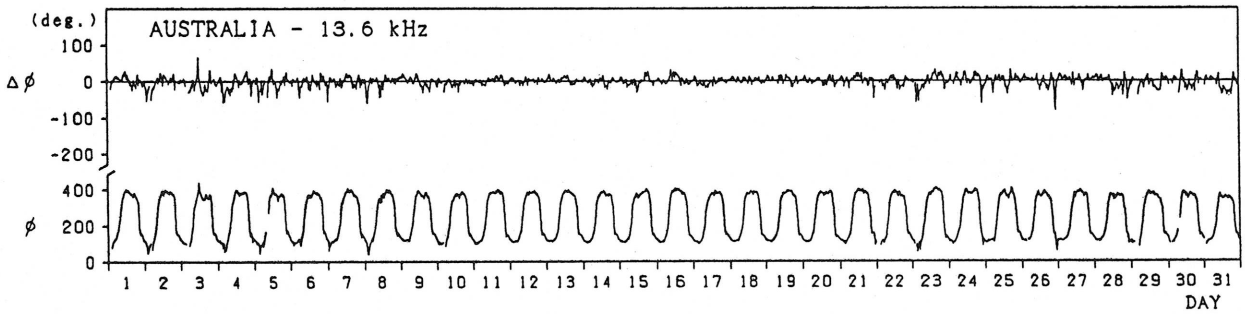


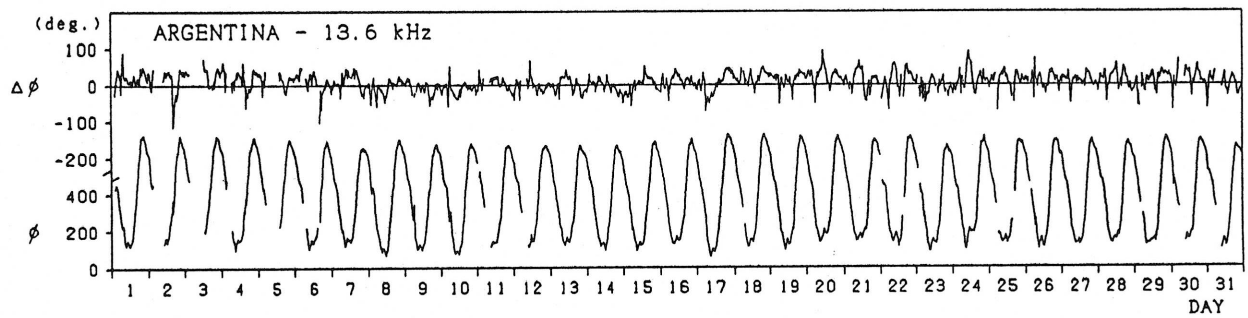


Inubo May 1989









Note: As for HAWAII - 13.6 kHz, no record during May 15 - May 20, due to the maintenance of transmitter.

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

Start (U.T.)	End (U.T.)	Max. (U.T.)	Max. Phase Deviation (negative value, deg.)
May 01/1900	May 04/0000D	May 02/0900	93.6
May 04/0000E	May 06/0032D	May 05/1100	102.6
May 06/0032E	May 09/0300	May 06/1210	118.8
May 20/1210	May 31/2215	May 24/1700	122.4

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso — Time in U.T.

May	S W F									Corresepondence		
1989	Drop-out Intensities(dB)					Start	Duration	Type	Imp.	Solar Flare	Solar Noise	Geomag. Crochet
	CO	HA	1)	2)	3)							
1		22	x		x	0052	88	SL	2+		x	
2		x	8		13	0411	36	S	1-	x		
3	x	x	13		x	0340	88	SL	1	x	x	
4			7			0100	13	SL	1-	x	x	
4			8			0245	19	SL	1-	x	x	
4			13			0330	25	SL	1	x	x	
4			13		x	0417	33	SL	1		x	
4			x	14	x	0820	13	S	1	x	x	
4			3			2220	10	S	1-	x	x	
5	x	x	5			0249	19	SL	1-	x	x	
5		x	15	7	8	0526	25	SL	1	x	x	
5		x	38	18	16	0725	66	S	3	x	x	
6			15			0508	17	SL	1		x	
6			12			0525	35	SL	1	x	x	
6				8		1448	25	SL	1-	x		
6	x			5		1701	10	S	1-	x		
7			5	x	10	0658	17	SL	1-	x	x	
7			10		x	2115	12	S	1-	x		
8	x	x	5			0131	42	SL	1-	x	x	
8			3		x	0214	30	SL	1-		x	
9	x	x	5	7	x	0457	12	S	1-			
10	x	x	10		10	0420	38	S	1-		x	
11				8	x	0750	23	SL	1-	x		
12				11	x	1059	26	SL	1-	x		
14			5	x	x	0652	21	SL	1-	x		
22	x	x	17	x	x	0010	88	SL	1+	x	x	
22			9		x	0431	11	S	1-	x		
22				6		0602	10	SL	1-	x	x	
23		x	11			0143	37	S	1-	x	x	
23			13		x	0302	44	G	1	x		
23			8			0350	27	SL	1-			
23			13	x	x	0347	63	G	1			
24			18		x	2142	//	SL	1+		x	
29	x	x	10			0249	11	SL	1-	x	x	
29	x	x	8		x	0320	42	S	1-	x	x	
29	x	x	5		x	0422	30	SL	1-	x	x	
30		x	16			0105	33	S	1+	x	x	
30	11	x	22	13	24	0713	27	SL	2-		x	
30				8	x	1312	20	S	1-			
31	x	x	24		x	0019	38	SL	2			

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

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

May	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
1	78	110	168	—	142	118	0055	0304	0114
1					12		2046	2109D	2053
1					32		2109E	2200D	2130
1					17		2200E	2233	2206
1				—	21		2247	2353	2312
2			63	—	36		0134	0304	0210
2			18	—	12		0315	0345	0318
2	48	105	175	—	70	47	0410	0618D	0422
2			17	—	19		0618E	0655	0626
2			24	—			0750	0830D	0801
2			23	—			0830E	0913	0838
2		52					1404	1509	1419
2		52					1611	1723	1633
2					84	75	1847	2043	1919
3	140	—	351	—	182	131	0324	0652	0358
3					44	47	1934	2046	2000
3					41	52	2056	2200	2106
3				14	22		2307	0001	2313
4			29	26	19		0102	0141	0107
4			48	45	23	42	0246	0333D	0255
4		34	103	84	46	39	0334	0418D	0342
4	90	—	250	155	112	72	0418E	0521D	0426
4		25	47	54			0521E	0552D	0530
4			38	33			0552E	0645	0600
4		61	76	48			0708	0739D	0718
4		44	56	38			0739E	0817	0742
4	34	—	152	75	6	26	0820	0849	0828
4		31	28				0958	1034D	1003
4		32	32				1034E	1100	1041
4		141	83				1103	1234	1128
4		36					1518	1610	1527
4		39					1616	1725	1627
4		19					1731	1807	1737
4					74	78	1905	2021	1925
4					45	50	2029	2127	2043
4			10	22	44	33	2219	2341	2225
5				26	16	33	0032	0054D	0045
5				26	18	66	0054E	0208	0108
5		44	66	82	41	24	0248	0341D	0254
5			35	44	19	22	0341E	0408D	0347
5		26	52	52	20	29	0408E	0513	0416
5		—	125	91	37	23	0523	0709	0535
5	138	—	372	206	66	102	0723	1057	0739
5		42*	13				1214	1244	1220
5					12		2342	0035	0002
6			20	22	12		0109	0241	0133
6			9	12	5	15	0251	0317	0256
6	—	27	83	65	23	17	0508	0528D	0516
6	—	124	165	108	48	30	0528E	0646	0539
6			24	11			0651	0733	0659
6		31	26				0849	0933	0856
6		107					1447	1648	1513
6		48					1701	1803	1713
6					34	24	1933	2045	1952
6					9		2117	2150	2119
6					10		2206	2227	2212
6				11	9		2257	2342	2301
7	26	27	44	59	51	40	2353**	0117D	0022
7	11		23	25	17	15	0117E	0215	0127
7			43	24*			0457	0547D	0533
7		38	51	35			0547E	0658D	0557
7	37	87	80	43		31	0658E	0817	0706
7					19		1913	1936	1915
7					18		1938	2012	1947
7					11	23	2021	2046	2028
7	33	41	18		69	47	2113	2302	2120
7			19	16	22	16	2341	0046	2348
8	24	41	34	—	69	48	0118	0222D	0147
8	9	33	60	—	47	46	0221E	0308D	0229
8			25	—	19	17	0308E	0347	0313
8		37	48	—	20		0515	0548	0530
8		25	22				1013	1053	1017
8					14*	18*	2108	2227	2132
9	26	39	61	52	20	23	0454	0615	0510
9		31*					1105	1201	1117

Inubo

May	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
9		46					1652	1815	1715
10		23	30	43	26	28	0029	0147	0032
10			19	26	11		0205	0229D	0210
10			22	32	12		0229E	0315	0233
10	55	87	120	84	48	44	0421	0638	0429
10		39	10				1103	1125	1114
11	—		—	21	—	—	0023	0112	0035
11				12			0124	0215	0139
11			26	10			0511	0611D	0530
11			40	16*			0611E	0718	0637
11	33	60	60	22			0752	0902	0801
11					6		2251	2326	2258
11				14			2304	2324	2307
12				18			0152	0225	0200
12			15	10			0641	0716	0649
12			23	6			0722	0809	0731
12		66	30				1059	1159	1119
12					6		2306	0012	2325
13				10	9		0017	0109	0024
13		28					1503	1558	1506
14			18	10			0552	0640	0557
14	27		44	25			0652	0737	0656
15	31	34	48	—	12	16	0533	0641	0541
17		42	18		—		0910	1010	0919
20				10	—		0355	0427	0404
20			11	14	—		0434	0518	0438
20				32			0645	0721	0653
20			23				0921	1022	0930
20					6		2125	2220	2135
21					5		0215	0255	0227
21			21	17	8	16	0316	0416	0326
21		51	59	40		14	0636	0745	0647
21		40*					1454	1612	1519
21		36				48	1737	1801D	1744
21		27				61*	1801E	1845D	1807
21					31	56	1845E	1951	1904
21	24	21	25	21	48	50	2235	0006D	2255
22	84	87	106	—	131	132	0006E	0325	0037
22	18	39	60	—	20	24	0429	0557D	0442
22	13	56	67	—	8	15	0557E	0742	0608
22		26	26	8			0753	0921	0801
22		55	24				1016	1108	1025
22		26					1202	1309	1229
22		82					1517	1700	1535
22					—	20	1938	2006	1949
22					—	8	2305	2321	2308
23	7	11		14	—	10	0005	0037	0014
23	53	78	107	—	85	77	0146	0258D	0151
23	22	42	58	—	23	25	0258E	0430	0330
23	35	64	90	67	31	26	0440	0534D	0458
23		25	66	44			0534E	0645D	0545
23			27	7			0645E	0706D	0656
23		70	64	18			0706E	0727D	0715
23		72	63	18			0727E	0759D	0736
23	37	110	105	28			0759E	0951	0809
23		46					1254	1351	1312
23					—	39	2003	2044	2015
23					—	39	2105	2211	2134
23				8	—		2321	2350	2330
24				10	—		0010	0037	0016
24				18	11	23	0217	0305	0237
24			9	8			0321	0342	0330
24			16	6			0347	0416	0357
24			8	8			0433	0502	0440
24			13	13			0612	0639	0616
24			17	6			0751	0832	0801
24		31	17				0850	1010	0856
24		99					1347	1542	1406
24	42	29	24		—	67	2130	2304	2155
24				6	—		2322	2335	2324
25				10	—	12	0010	0039D	0018
25				10	—	10	0039E	0100	0044
25	22	61	83	66	24		0509	0627D	0539
25			29	14			0627E	0709	0635
25			17				0840	0913	0846
25		86	41				1038	1157	1051
25		74					1523	1721	1602
25				13*	—		2323	0004	2333
26	—	—	—	10	—	—	0354	0415	0359
26			13	6			0558	0617	0605
26			—	14			0637	0704	0639
26			13				0826	0924	0831
26				19			0925	0947	0927
26					—	20	2052	2119	2103
26	39	31	37	56	—	70	2219	0031	2254
27			17	10			0457	0605	0509
28		23	16	8			0732	0824	0744
28		11		14			0825	0921	0830
28		173	31				1218	1359	1239
28	28		11		50*	46	2209	2300D	2233
28	23	11	13	14	50	45	2300E	0026D	2309
29				26	22	20	0024	0120	0040
29				6	5		0222	0235	0226
29	27	61	98	89	56	49	0246	0327D	0255
29	57	98	159	122	85	56	0327E	0415D	0346
29	78	111	189	131	81	50	0415E	0632	0435
29		32	26	6*			0735	0812	0746
29			14			14	0902	0934D	0905
29		25	20				0934E	1005	0937
29		31	16				1054	1136	1103
29		49					1309	1424	1331
29					24		1832	1929	1839
29				6	4		2217	2249	2220
30				—	13	10	0030	0105D	0042
30	71	114	158	—	138	129	0105E	0305	0113
30			21	—	7	21	0333	0421	0343
30			18	—			0428	0503	0437
30			13	—			0519	0617	0524
30	89	—	222	—	33	41	0713	0752	0723
30		34	31				0916	0958	0929
30		145					1308	1500	1330
31	45	61	77	97	—	71	0017	0207	0033
31			8	6			0403	0433	0415
31			13				0533	0604	0542
31			13				0717	0758	0735
31		33	23	13			0807	0855	0821

IONOSPHERIC DATA IN JAPAN FOR MAY 1989

F-485 Vol. 41 No.5 (Not for Sale)

電離層月報（1989年５月）

第41巻 第５号（非売品）

1989年９月８日印刷

1989年９月14日発行

編集兼 郵政省通信総合研究所

発行所 〒184 東京都小金井市貫井北町４丁目２－１

☎（0423）（21）１２１１（代）

Queries about "Ionosperic Data in Japan" should be forwarded to：

Communications Research Laboratory, Ministry of Posts and Telecommunications,

2-1 Nukui-Kitamachi 4-chome, Koganei-shi, Tokyo 184 JAPAN.