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IONOSPHERIC DATA IN JAPAN

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CONTENTS

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INTRODUCTION

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

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

A. IONOSPHERE

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

A1. Automatic Scaling

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

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

a. Characteristics of Ionosphere

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

b. Descriptive Letters

The following descriptive letters are used in the tables.

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

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

C Impossible measurement because of any failure in observation.

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

N Impossible automatic scaling because of complex echoes.

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

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

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

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

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

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

d. Reliability of Automatic Scaling

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

e. Summary Plot

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

A2. Manual Scaling

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

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

a. Characteristics of Ionosphere

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

b. Symbols

(i) Descriptive Letters

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

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

(ii) Qualifying Letters

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

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

(iii) Description of Types of *Es*

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

The types are:

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

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

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

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

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

B. SOLAR RADIO EMISSION

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

B1. Daily Data at Hiraiso

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

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

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

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

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

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

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

B2. Outstanding Occurrences at Hiraiso

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

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

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

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

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

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

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

C. RADIO PROPAGATION

C1. H.F. Field Strength at Hiraiso

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

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

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

C2. Radio Propagation Quality Figures at Hiraiso

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

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

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

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

C	artificial accident,
S	propagational accident,
U	inaccurate.

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

N	normal,
U	unstable,
W	disturbed.

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

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

C3. Phase Variation in OMEGA Radio Waves at Inubo

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

In each of the four panels of the figure, the phase (ϕ) is shown in the lower part and the phase deviation ($\Delta\phi$) 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

MAR. 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	46	52	50	54	47	47	63	97	125	127	131	124	128	130	128	127	124	118	102	74	70	73	66	63
2	58	53	58	63	68	58	62	104	121	137	136	141	132	130	128	117	118	132	121	90	80	62	64	72
3	64	62	64	66	66	53	60	102	124	133	N	138	141	132	130	128	123	122	110	90	61	71	79	64
4	58		50	37	43	49	47	63	74	72	83	80	81	73	72	77	80	79	78	64	N	53	53	54
5	54	55	60	50	52	46	50	79	88		106	117	120	111	118	117	107	104	92	83	71	66	65	65
6	70	56	68	66	62		62	84	120	127	130	136	134	132	122	114	108	110	96	74	66	69	57	58
7		52	50	53	52	42	60	91	118	124	129	140	140	135	132	122	115	112	107	87	70	68	57	62
8	64	63	55	57	57	53	66	91	120	135	138	138	135	132	126	124	116	117	110	92	80	74	64	65
9	66	63	62	61	58	44	56	100	131	134	130	135	140		128	120	114	119	112	96	89	72	70	64
10	65	64	66	63	59	64	86	118	119	134	132	134	141	136	132	124	124	122	116	91	91	83	66	74
11	69	76	64	63	61	64	87	120	140	139	145	136	138	140	130	126	123	125	111	94	90	83	73	65
12	66	69	64	60	60	66	85	117	146	140	145	146	146	142	138	132	127	122	110	98	96	86	64	67
13	73	80	61	56	47	52	86	116	131	135	134	143	143	141	127	137	140	130	91	82	65	52	43	
14										66	88	86	87	75	67	72	64	68	65	66	64	N	58	53
15	52	66		67	66		80	N	160	141	161	150	140	140	136	127	119	120	104	95	71	62	56	63
16	57	62		52	51	47	65	108	130	141	136	134	134	130	122	114	108	110	100	89	63	58	66	N
17	78	C	C	C	C	C	C	C	C	C	C	C	119	116	104	104	95	92	92	66	62	63	53	53
18	56	50	52	41	46	54	78	90	C	94	90	95	98	102	100	97	92	97	87	84	70	61	54	51
19	45	40	42	43	43	44	66	91	100	112	122	128	129	124	123	118	106	104	111	88	83	64	66	34
20	51	41	35	58	50	42	54	65	62	66	72	78	76	76	82	79	82	85	86	73	63	58	52	52
21	55	53	52	41	46	52	78	99	116	122	132	128	124	125	124	114	108	108	103	90	84	78	74	64
22	66	64	65	66	60	52	83	117	134	138	139	138	138	132	128	126	122	118	116	97	92	76	73	60
23	62	N	46		52	53	72	89	121	129	133	136	135	135	126	122	122	123	108	91	84	77	68	56
24	54	N	42	43		38	62	84	118	106	117	130	116	102	102	102	100	92	88	74	80	63	64	64
25	58	62	63	63	56	62	82	94	114	126	128	128	128	125	126	120	121	122	110	97	88	83	79	79
26	74	71	62	64	62	65	84	111	122	120	131	133	133	131	130	127	127	121	111	87	81	72	72	66
27	72	84	66	63	60	57	85	100	122	130	128	128	130		125	122	124	126	110	86	96	90	75	71
28	72	65	62	50	56	64	64	67	81	95	112	118	116	111	106	114	108	108	107	86	53	46	64	64
29		62	58	58	47	61	68	94	116	120	129	128	138	136	143	139	131	120	110	90	62	76	66	61
30	62	55		A	60	51	66	86	90	108	112	124	130	130	120	123	122	114	116	102	87	82	66	66
31	73	74	71	66	51	50	66	90	97	116	104	121	133	123	124	120	116	106	109	91	84	71	80	76
	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	26	27	28	27	29	28	28	29	29	30	31	29	31	31	31	31	31	31	30	30	31	29
MED	63	62	60	58	56	52	66	94	120	127	130	132	133	130	126	120	116	117	108	89	80	71	66	64
U Q	69	66	64	63	60	61	82	106	127	135	135	138	138	135	130	126	123	122	111	92	87	77	72	66
L Q	55	53	50	50	48	47	62	87	107	110	112	124	120	113	118	114	107	104	92	82	65	62	57	57

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT WAKKANAI

MAR.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	G	G	G		G	G	G	G	G	G	G	G	G		G	G	G	G	G	G
2	G	G	G	G	23	G	G	G	G	G	G	G	G	G	G	50	G	34	G	33	30	G	G	G
3	G	G	G	G	G	G	G	G	G	G	G	58	82	70	52	G	40	42	44	28	G	G	G	25
4	24	G	G	G	G	23	28	G	G	G	G	G	G	G	G	G	G	38	31	G	G	29	26	28
5	24	G	G	G	G	24	26	37	44		G	G	G	G	G	G	G	29	G	G	G	G	G	G
6	28	G	G	G	G		26		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
7		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
8	G	G	G	G	29	G	G	G	G	G	G	G	G	43	G	G	38	36	35	33	G	G	G	G
9	32	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
10	G	G	G	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	40	42	G	G	G	G	G	G	G	G	G	G	G	G	G	G
12	32	26	G	G	G	G	G	G	43	G	G	G	G	G	G	G	G	G	28	G	G	29	28	G
13	33	G	G	G	G	G	G	G	G	42	G	G	G	G	G	G	G	G	G	29	G	G	26	
14		24	31							G	G	G	G	G	G	G	G	G	G	G	36	36	G	G
15	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	39	G	30	40	56	47	38	G	G
16	G	41		30	33	G	G	50	40	96	G	G	G	G	G	G	60	62	G	G	G	G	G	G
17	G	C	C	C	C	C	C	C	C	C	C	C	G	G	G	G	G	G	G	G	G	G	G	G
18	G	G	G	G	G	G	G	G	41	68	59	G	G	G	G	G	G	G	34	35	40	28	36	G
19	G	G	G	34	G	G	G	G	G	G	G	G	G	G	G	G	G	38	40	46	45	41	32	G
20	G	26	29	68	38	29	32	G	G	G	G	G	G	G	G	G	G	G	G	G	G	28	G	G
21	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
22	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
23	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	43	G	39	44	54	27	68	28
24	27	G	G	G	G	G	G	G	G	57	60	G	G	G	G	G	45	46	29	G	G	G	G	G
25	G	34	26	G	G	G	G	G	G	62	56	G	G	G	G	G	G	G	G	G	G	G	G	G
26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	35	G	G	G	G	G	G
27	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
28	G	G	G	G	G	G	G	G	G	52	62	G	G	G	G	42	G	42	45	35	41	63	54	56
29	68	36	36	36	30	G	G	44	44	G	G	57	60	44	G	56	53	44	66	69	71	38	37	37
30	29	37	38	69	36	33	G	62	47	43	G	50	54	G	G	G	G	G	G	G	G	G	G	G
31	G	G	24	G	23	G	G	G	46	57	55	60	G	G	G	G	47	G	28	30	G	34	30	35
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	29	29	29	28	29	27	29	29	30	30	31	31	31	31	31	30	31	31	31	31	31	30
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
U Q	25	G	G	G	12	G	G	G	40	42	G	G	G	G	G	G	G	36	34	33	30	29	26	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT WAKKANAI

MAR.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	16	15	15	15	15	16	18	21	24	23	24		40	35	33	20	16	15	15	15	16	15	17
2	15	15	15	15	15	16	16	26	33	34	38	39	44	49	40	27		18	18	18	21	20	17	17
3	17	17	17	14	14	16	18	20	21	21	40	27	26	36	26	21	18	18	18	18	17	18	18	17
4	17	17	N	N	N	17	14	18	22	20	23	36	50	44	34	30	22	18	17	16	17	17	17	17
5	17	15	15	15	15	16	17	18	18		26	38	36	26	22	21	18	22	16	16	17	18	18	17
6	16	15	15	15	16		17	24	20	34	49	42	38	40	36	33	30	23	17	17	16	17	18	18
7		15	17	15	14	18	18	29	22	36	40	43	42	40	40	35	39	23	17	16	16	18	17	17
8	18	16	15	14	20	17	18	28	34	39	38	42	41	24	45	23	21	21	17	18	15	17	18	18
9	18	18	17	16	14	18	18	27	22	26	38	40	44	14	40	35	30	23	18	18	16	16	15	15
10	14	14	16	15	20	16	20	18	20	45	39	40	45	48	39	23	21	26	17	15	16	16	18	17
11	15	17	16	16	17	16	23	22	32	36	42	49	48	46	40	35	32	24	17	17	17	18	16	18
12	16	14	17	15	15	15	21	18	23	36	42	42	42	41	36	21	20	24	17	16	15	15	18	14
13	18	16	16	17	17	16	22	21	23	28	39	44	42	54	38	23	33	24	17	17	N	N	N	
14		N	15							46	43	50	54	49	42	34	32	20	18	18	17	16	17	18
15	17	15	15	14	14	17	23	33	34	44	40	43	46	44	39	26	42	20	17	18	17	18	17	18
16	18	15		14	18	18	18	27	32	35	43	49	58	50	50	48	23	20	18	17	20	18	16	17
17	15	C	C	C	C	C	C	C	C	C	C	C	49	43	40	39	32	28	16	18	18	15	20	23
18	18	18	16	22	18	17	26	33	23	35	34	49	42	39	39	22	33	26	17	17	17	18	20	20
19	16	N	N	16	18	17	23	35	35	39	42	45	48	49	43	36	21	20	18	18	18	18	16	20
20	18	21	18	16	15	17	18	22	22			56	48	41	43	35	32	27	18	16	18	20	17	18
21	17	16	15	20	17	16	24	22	30	39	47	50	47	45	44	36	36	26	17	17	16	15	16	17
22	17	16	15	15	16	17	24	20	23	38	40	42	42	40	39	39	23	27	18	17	17	18	17	17
23	18	N	15	16	15	16	24	29	22	36	47	50	40	40	28	23	28	26	17	15	17	16	17	17
24	17	16	15	15		N	26	33	30	30	34	42	45	40	39	27	21	20	18	15	16	16	16	15
25	16	17	16	16	16	16	24	20	21	29	29	34	46	42	38	35	30	27	17	16	16	16	15	16
26	15	16	15	18	15	16	23	28	21	28	32	40	39	39	39	23	20	17	16	15	16	15	16	15
27	15	14	15	15	15	16	23	29	38	30	40	39	44	41	38	26	20	26	17	17	15	16	15	15
28	15	15	15	N	16	16	23	29	30	33	38	40	36	42	42	29	22	23	16	16	14	15	17	16
29	15	15	16	15	18	18	21	18	22	33	34	34	32	29	39	26	21	23	17	18	18	15	17	18
30	15	17	17	17	15	16	24	18	21	26	33	33	28	40	37	24	28	27	18	15	16	16	15	15
31	16	16	15	15	14	15	23	17	27	29	34	32	40	40	44	22	21	18	18	15	15	18	14	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	27	27	27	27	29	29	29	28	29	30	30	31	31	31	30	31	31	31	30	30	30	30
MED	16	16	15	15	15	16	22	22	23	34	39	42	43	41	39	27	23	23	17	17	16	16	17	17
U Q	17	17	16	16	17	17	23	29	31	37	42	45	47	45	42	35	32	26	18	18	17	18	18	18
L Q	15	15	15	15	15	16	18	18	21	28	34	38	40	40	37	23	21	20	17	16	16	16	16	16

HOURLY VALUES OF FOF2 AT AKITA

MAR.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	50	52	52	53	50	52	58	101	118	130	132	134	128	126	130	126	116	114	99	78	69	67	51	63
2	63	50	64	62	52	58	57		120	133	133	136	134	134	131	117	117	134	114	84	A	75	67	78
3	66	64	52	77	61	55	68	116	136	136	140	145	140	138	135	134	128	124	117	90	A	75	82	73
4	63	66	53	51		59		70	90	90	94	101	96	94	90	87	94	91	84	69	A	50	47	48
5	48	45	49	52	50	52	54	83	98	96	112	124	130	115	117	123	112	107	91	80	67	68	53	45
6	71	64	51	67	64	63	64	90	130	140	131	136	136	130	131	122	118	108	104	83	73	66	52	62
7	65	53	51	54	56	44	61	84	131	132		133		134	134	130	120	119	111	86	69	66	66	67
8	72	66	59	60	50	52	70	105	122	126	132	137	136	134					111	86	83	78	73	
9	62	68	67	69	58		57	88	130	131	131	123	138	138	130	118	116	123	112	91	90	83	79	78
10	66	66	78	65	67	66	86	113	124	135	140		134	134		C	132	124	111	88	88	87	76	78
11	74	80	72	64	62	74	88	121	131	140	138	138	139	132	130	130	126	120	110	90	89	83	83	82
12	75	80	76	66	66	66	86	124	136	140	138	137	138	138	137	133	127	121	116	87	90	88	85	80
13	86	83	75	62	54	52	83	120	131	137	140	138	140	132	130	141	140	128	90	83	68	69	48	40
14	51	52				A		93	106	77	100	96	94	75	59	77	48	A	A	64	52	62	49	51
15	49		56	42	40		52	95	125	136	140	147	138	138	146	138	131	129	111	104	84	77	70	75
16		66	57	53	55	56	80	124	134	A	140	140	140	141	130		117	114	110	99	88	87	84	56
17	87	84	62	45		50	80	106	124	134	127	120	132	129	116	114	104	95	104	86	66	A	61	67
18	62	54	62	53	53	54	78	111	134		130	133	130	126	120	115	N	108	103	89	83	68	66	63
19	53	46	48		50	50	68	97	115	120	130		140	137	132	125	118	111	108	91	84	65	76	53
20	50	42	52	A	64	66	67	90	110	103	109	107	101	97	90	88	90	93	96	80	63	62	54	52
21	59	52	51	43	44	55	79	106	114	131	134	133	133	130	130	117	117	116	111	92	84	78	80	76
22		72	67	70	59	54	77	111	126	135	138	139	139	138		131	127	124	120		90	77	78	76
23	66	54	54	63	62		76	112	122	138	136	138	140	138	136	126	126	131		92	87	89	86	A
24	69	66	55	52	31	38	N	88	116	128	125	138	134	119	116	111	117	109	86	66	77	78	73	67
25	54	65	65	61	63	62	84	103	113	128	136	136	137	130	128	129	124	130	111	93	84	88	86	86
26	78	76	71	66	65	67	88	114	118	120	133	138	138	133	131	134	132	130	116		80	84	86	84
27	87	90	77	62	63	60	83	110	110	131	130	135	131	134	130	129	128	133	119	108	87	87	81	78
28	71	74	58	48	54	65	65	71	92	110	138	138	138	126	124	132	124	117	108	91	A	66	A	54
29	66	50	68	64	A	54	82		122	134	134	138	140	138	147	138	138	121	118	88	55	A	66	62
30	72	64	66	51		64	81	86	107	114	124	135	140	140	134	124	134	130	110	N	80	79	52	66
31	74	80	81	70	53	47	67	107	116	135	130	134	138	131	132	134	124	117	109	86	79	78	81	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	29	30	30	28	26	27	28	29	31	29	30	29	30	31	28	28	29	29	29	28	27	29	30	29
MED	66	66	60	62	56	55	76	105	122	131	132	136	138	133	130	126	124	120	110	88	83	77	73	67
U Q	73	74	68	65	63	64	82	112	130	135	138	138	139	138	133	132	128	128	113	91	87	83	81	78
L Q	56	52	52	52	50	52	64	89	113	120	130	133	132	126	122	117	116	110	103	83	69	66	54	55

HOURLY VALUES OF FES AT AKITA

MAR. 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	23	25	28	G	G	G	G	G	39	G	50	G	G	G	G	G	G	33	22	G	G	G	G	G
2	G	G	G	G	G	G	G		G	G	71	G	G	G	G	60	55	43	30	36	66	40	36	G
3	G	G	G	G	G	G	G	G	G	52	51	50	G	G	44	41	47	45	48	128	117	38	32	G
4	G	34	28	26	28	G		40	40	G	G	G	G	G	46	60	46	42	115	55	136	32	G	26
5	G	33	30	G	G	G	24	34	37	45	56	48	G	G	G	40	36	G	G	G	48	44	60	31
6	32	30	28	25	G	G	24	32	G	G	G	G	G	G	G	41	37	G	G	G	G	G	G	28
7	28	G	G	G	G	G	G	G	38	G		G		47	44	G	G	G	24	G	G	G	G	24
8	G	G	29	26	G	G	G	48	68	44	48	62	53	G					G	G	G	G	G	
9	34	33	33	32	34	32	29	G	G	G	45	G	G	G	G	42	G	37	30	G	G	G	G	G
10	G	G	G	G	G	G	G	G	G	G	44		G	G		C	G	G	G	G	G	G	G	G
11	25	26	23	G	G	G	29	G	G	50	48	G	G	G	G	G	G	32	29	G	30	40	29	32
12	G	G	G	G	G	23	G	G	41	44	45	G	G	G	68	G	37	37	32	24	G	G	49	36
13	30	30	G	24	G	G	G	G	G	44	48	50	G	G	52	43	44	G	G	60	G	G	G	G
14	27	G	32	27	34	33	30	G	54	44	G	G	G	G	G	62	45	68	71	34	46	36	24	G
15	G		G	G	G		G	G	G	G	47	G	G	45	45	54	55	50	56	56	84	29	38	49
16		46	37	27	26	G	G	48	68	118	54	G	94	G	G		69	67	40	92	48	G	G	G
17	G	30	G	29		30	27	G	G	47	57	56	G	47	51	47	37	37	36	59	37	49	46	G
18	30	28	30	G	G	G	28	G	49		50	48	50	54	54	44	G	41	34	34	58	45	51	30
19	G	G	G		G	24	G	G	41	47	56		G	G	G	46	G	55	84	45	38	29	32	30
20	G	G	G	61	37	92	33	45	G	46	46	G	G	46	G	G	G	47	49	44	35	24	G	23
21	G	G	28	G	G	G	G	35	G	G	G	G	G	G	G	44	37	G	G	G	G	G	G	G
22		G	G	G	G	G	G	G	39	G	G	53	G	G		G	G	G	G		27	G	G	30
23	G	G	G	G	G		G	G	G	G	G	G	51	G	54	42	48	32		57	43	54	56	59
24	32	44	50	52	G	G	G	G	G	47	53	50	67	53	50	42	46	59	49	56	49	G	28	G
25	G	24	G	29	36	33	34	G	42	43	48	49	61	50	G	G	38	G	32	35	27	G	G	G
26	G	G	G	G	G	G	G	43	G	G	N	51	50	G	G	G	48	37	G		G	G	G	G
27	G	G	G	26	G	G	G	G	G	53	52	G	G	G	58	55	100	57	69	58	92	34	27	24
28	30	G	G	G	G	G	G	G	G	49	51	78	52	G	G	47	49	43	48	70	56	89	46	58
29	54	53	38	50	49	G	G		70	66	73	79	79	52	50	G	G	36	40	57	57	82	32	71
30	69	39	36	37		G	G	40	51	71	94	90	49	50	G	72	G	37	52	28	31	G	32	30
31	24	25	26	28	30	27	G	40	G	48	78	61	G	G	58	56	38	G	32	24	39	27	G	33
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	31	30	29	29	30	29	31	30	29	29	30	31	28	28	30	30	30	29	31	31	31	30
MED	G	12	G	12	G	G	G	G	G	44	48	G	G	G	G	42	37	37	32	35	37	24	24	24
U Q	30	30	30	28	27	23	24	37	41	48	55	52	50	46	50	50	47	45	49	57	56	40	36	31
L Q	G	G	G	G	G	G	G	G	G	G	44	G	G	G	G	G	G	G	G	G	G	G	G	G

HOURLY VALUES OF FMIN AT AKITA

MAR.1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	15	15	15	15	15	16	17	17	18	21	21	23	26	22	18	17	18	16	16	16	16	16	16
2	16	15	15	16	15	16	15		16	16	18	21	26	46	21	18	16	16	15	16	16	16	16	16
3	16	15	15	15	15	18	17	16	16	17	18	26	26	24	22	18	16	16	16	16	16	16	16	16
4	16	14	15	15	15	16		16	17	20	18	22	21	20	22	21	17	16	16	16	16	16	16	16
5	16	15	15	15	15	16	17	16	16	16	18	20	20	22	24	18	16	17	17	16	16	16	16	16
6	15	15	16	15	15	16	17	16	16	22	46	23	23	23	24	20	18	24	16	16	15	16	16	16
7	16	15	15	15	15	16	21	17	17	20		24		22	17	20	16	15	16	17	15	15	16	16
8	16	15	15	15	15	16	18	16	21	21	22	23	24	23					16	16	16	16	16	
9	16	15	15	16	15	15	18	17	17	17	21	22	26	22	20	21	21	15	17	17	16	16	16	16
10	16	15	15	15	15	16	18	16	16	38	21		32	41		C	17	24	16	17	16	16	16	16
11	17	15	15	15	15	16	16	20	22	28	35	46	35	48	30	24	16	15	16	16	15	15	16	16
12	16	15	15	15	15	16	20	17	18	20	20	24	24	24	23	20	16	16	15	16	16	16	17	16
13	16	15	15	15	15	16	23	16	18	20	21	33	30	52	24	21	21	16	17	16	N	N	N	N
14	20	18	15	15	15	15	15	20	22	23	43	43	65	43	24	48	17	16	16	17	18	15	17	16
15	16		16	15	16		22	18	18	22	22	26	27	34	23	21	29	20	16	15	16	17	16	15
16		15	15	15	15	15	24	18	20	22	22	33	43		44		22	17	16	16	16	17	16	16
17	16	15	16	21		15	17	17	17	22	26	30	35	26	30	27	18	23	15	18	16	16	16	16
18	16	15	15	16	18	15	16	18	23		26	23	24	27	28	21	23	16	16	16	16	15	15	16
19	17	16	N		15	16	23	24	21	23	26		35	44	30	22	18	18	15	16	16	18	16	17
20	20	N	15	15	14	14	16	17	20	23	23	24	26	24	23	22	21	16	15	16	15	16	16	17
21	17	15	15	15	15	16	24	17	21	24	44	45	44	22	40	17	21	17	18	16	16	16	16	16
22		15	15	15	15	16	23	17	17	22	24	27	26	48		21	17	16	21		16	16	16	15
23	17	15	15	15	15		24	16	18	17	22	26	23	26	23	23	18	18		16	16	17	17	16
24	16	15	15	15	15	N	26	18	21	23	26	24	18	30	16	20	18	16	15	15	15	17	16	16
25	16	15	15	15	15	15	16	16	18	21	23	23	28	24	20	21	16	16	16	16	16	16	17	16
26	16	15	15	15	15	16	24	16	16	17	21	23	22	27	23	23	20	16	17		17	17	17	16
27	16	15	15	15	15	16	22	18	17	18	23	28	28	26	20	21	17	15	15	16	17	15	16	16
28	16	15	15	N	N	16	23	16	17	20	23	36	26	24	20	22	18	16	16	17	16	18	15	17
29	16	15	15	15	15	16	24		18	21	22	27	29	27	26	20	18	16	18	15	16	16	16	16
30	16	15	14	15		18	22	16	20	21	21	23	21	26	26	18	17	16	15	16	15	16	15	16
31	16	15	15	15	14	17	24	16	16	18	24	23	26	24	26	17	16	16	15	17	15	16	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	29	29	30	29	28	28	30	29	31	30	30	29	30	30	28	28	30	30	30	29	30	30	30	29
MED	16	15	15	15	15	16	20	17	18	21	22	24	26	26	23	21	18	16	16	16	16	16	16	16
U Q	16	15	15	15	15	16	23	18	20	22	26	29	30	34	26	22	20	17	16	16	16	16	16	16
L Q	16	15	15	15	15	15	17	16	17	18	21	23	23	24	21	19	16	16	15	16	16	16	16	16

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

MAR. 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		53	69	59	54		62	106	120	130	138	140	132	130	130	134	122				75	83		
2	64	53		57	66	53	60	87	117	136	130	135	141	140	136	119		131	117	90	81	77	67	74
3	72	63	64	74		55		112	137	130	146	162				134	121	121	114	107	93	77	81	81
4	66						67	88	113	117	128	124	123	117	116	106	106	103	93	76	68			
5	52	48	50	50	42	44	56	79	108	116	128	131	140	131	122	119	121	110	101	80	80	75	65	
6	69	65	56	62		58	70		127	136	136	137		132	130	130	126	116	104	86	78	72		65
7	64	60	53		60	52		90	129	135	136	133	142	142	141		125	124	113	109	89	76	71	67
8	77	74	59	57	51		60	108	126	123	131	134	137	130	128	126	125	116	110	101	90			72
9	72		66	68	59	46	52	108	114	121	124	132	146		134	128		126	120	99	90	90	86	
10	80	81	81	68		66		111	120	131	141	144		136		131	133	126		95	92	90	77	78
11	77	78	82	70			86		126		138	142	137	131		132	128		112	91	93	88	86	84
12	78	81	78	64	63	65	94		134	140	138	148	154	146	137	132	126		123	104	99	98	91	92
																								N
13	90	88	83	64		58	79		123	142	142	144			144	143	146	133	112	90				
14				43	48			117	82	74	95						51	58				57	57	53
15	52		57	47		31	58	90	97	109	134	140		140	146	146	142	136	135	89	88	92		80
											N													
16	82	92	82		63	67	84	116	138	144		145	145	146	140	141			123	113	106	107	102	88
17		113	84	57	66	70	99	115	138	136	138	133		140	136	125	110	104	111	92		69	73	72
18	73	64	64	70	56	60	80	114	134	143	144	144		138	135	131		122	111	98	89		75	80
19	64		49	62	58	53	81	100	126	129	136	144		146	139	136	122	122	120	112	92	92	81	71
20				65	70	70		110	125	122	121	118	122	110	103		107	108	111	86	65	71		70
21	68	64	60		45		82	102	116	132	133	140		129	131	127	126	119	120	100	90	85	86	80
22	80	75	76	68	61	60	76	111	128	128	139	143	141	141	136	134	132		129	114	89	90	78	79
23	73			62	58	56	72	116	128	134	132	145						137	135	107	99	108	118	90
																				A				
24	84	83		65		48	78	100	120	138	135	132	144	137	127		126		100		90	93	85	74
25	75	74		72	59	58	76	98	114	130	138		140	135	132		132	134		104	96	92	92	89
														N										
26	84	82	76	73	71	70	92	109	113	121	136				137	138	139	135	112	87	89	92	88	
27	95	100	92	67	68	47	82	107	114	125	131	134	135	135	138	134	132	138	131	110		94	90	
28	77	80	52	54	54	80	85	81	114	120	142	137	140	141	140	140	138	134	118	99	76	72	76	74
	N	N																						
29			72		57	54	77	114	130	131	138	146	141		144		144	138	128	88	86	84	76	73
30		66		56	68	60		98	118	111	130	137	140	145	137	130	142	144	119		90	81	80	78
31	80	82	82	79		48	80	100	119	126	128	141		140						102	80	86	93	88
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	23	23	26	22	25	25	27	31	30	30	28	18	24	25	23	25	24	26	27	27	27	24	24
MED	75	75	69	64	59	58	78	107	120	130	136	140	140	138	136	132	126	125	116	99	89	86	81	78
U Q	80	82	82	68	66	65	83	112	128	136	138	144	142	141	139	136	135	134	123	107	92	92	89	82
L Q	67	64	57	57	54	50	64	98	114	121	130	133	137	131	130	127	121	116	111	89	80	76	75	72

HOURLY VALUES OF FES AT KOKUBUNJI

MAR. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	24	G	G	G	32	38	42	47	G	G	G	G	G	41	86	34		24	G		G
2	G	G	G	G	G	G	G	G	G	G	G	G	46	G	G	52	44	51	33	46	49	33	36	32
3	26	G	G	G	G	G	G	G	G	48	59	G		G	G	41			63	73	60	60		37
4	58	48	38	36	29	G	G	34	46	53	47	G	G		74	45	61	51	44	32	46	35	50	G
5	G	G	G	G	G	G	24	G	G	G	G	G	G	G	G		G	31	G	22		28	33	35
6	39	36	33	29	33	G	26	32	41	49	G	56	G	G	G	53	48	48	48	28	G	G	G	26
7	36	46	25		G	G	G	G	G	G	G	G	46	59	G	G	42	38	40	32		G	G	G
8	G	G	G	G	G	G	G	G	G	G	G	G	G	48	50	43	G	G	G	G		G	G	G
9	28	G	G	G	G	G	G	G	G	G	56	52	G	G	56	G	G	31	36	G	G	G	G	G
10	G	G	G	G	G	G			G		G		G	G	G		G	G	G	G	G	26	G	G
11	G	G	G	G	G	G	28	G	G	44	52	48	47	G	G	G	40	G	G	G	G	G		32
12	31	30	G	G	G	25	G	33	44	43	49	50	46	G	G	45	42	38	40	28	G	G		26
13	59	40	33	28	G		G	35	43	45	G	G	G	G	64	44	42	G	G	65	G	G	G	G
14	G	G		G	38		65		58	56	G	G		G	50		G	35	30	30	33	G	G	G
15	G	G	G	G		G	G	G	G	G	G	G	G	52	58	56	72	59	95	50	48	54	G	50
16	30	53	41	34	30	27	G	48	56	89	79	81	78	59	G	50	77	86	36	61	73	92	38	32
17	51	26	G	28	26	27	29	46	44	49	53	60	74	G	58	48	G	G	44	62		25	59	33
18	34	30	32	29	G	G		G	G	G	48	61	81	62	51	44	44	74	91	69	92	49	27	26
19	46	24	28	G	23	23	G	G	G	G	G	G	G	G	56	G		46	44	54	36	26	25	30
20	26	24	G	G	33	54	59	74	63	61	56	53	51	50	G	44	41	40	58	58	34	27	G	G
21	G	27	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	37	42	29	50	48	24	G
22	G	25	26	G	G	G	G	G	G	G	49	58	G	48	G	G	G	G	33	58	28	25	G	G
23	G	30	G	G	G		G	G	G		52	G						42	48	55	28	G	41	26
24	42	51		26	28	G	G	G		G	49	67	50	66	96	58	69	103		128	107	34	37	30
25	34	36	G	32	33	32	34	G	40	49	G	48	48		57		G	52		48	26	G	G	G
26	G	G	27	G	G	29	G	G	G	G	G	G	G	G	50	61	70	73	46	54	43	27	23	
27	26	25	G	G	24	G	35	48	48	69	66	68	70	69	54	50	63	38	60	60		59	57	43
28	31	G	G	27	32	G	28	G	G	46	50	52		G	51	54	48	60	62	42	55	54	60	52
29	38	35	48	42	27	G	G	37	48	47	51	56	95	102	G	G	G	40	33		28	30	33	58
30	61	49	52	41	36		G	G	51	58	69	52	55	50			G	G	34	36	24	28	G	28
31	24	G	26	30		29	G	G	G	48	81	80	66	56	61		43	43	30	59	35	36	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	29	30	29	27	29	29	30	29	31	30	27	28	29	24	28	30	29	29	26	31	27	30
MED	26	25	G	G	G	G	G	G	G	44	48	48	46	G	50	44	42	40	40	48	34	27	23	26
U Q	38	36	30	29	29	25	27	33	44	49	53	56	55	54	56	51	48	52	48	59	49	36	37	32
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	31	31	28	24	G	G	G

HOURLY VALUES OF FMIN AT KOKUBUNJI

MAR.1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	16	14	14	14	21	16	15	15	17	20	27	27		18	16	16	15	14		16	14		18
2	15	15	14	20	15	15	15	16	15	20	20	30	30	44	26	23	17	15	14	16	16	15	15	15
3	15	15	15	14	15	15	15	15	15	16	23	14		29	23	14	17	15	15	15	16	15	15	14
4	15	15	14	15	14	14	15	15	16	16	20	24	23	30	24	17	16	15	15	18	15	15	16	16
5	15	15	14	14	14	15	16	15	15	17	20	39	29	21	18	20	16	15	15	16	15	15	15	15
6	15	15	14	14	15	15	15	15	15	20	46	14	24		22	18	17	15	14	17	15	15	14	15
7	15	15	14		14	15	18	16	16	21		28	27	23	22	39	16	15	14	15	16	15	15	15
8	15	14	14	15	15	28	17	16	22	22	74	29	30	33	30	22	18	15	16	15	18	16	15	16
9	14	14	16	14	14	14	16	15	24	21	22	32	28	47	24	16	37	16	17	15	15	15	15	110
10	14	14	14	15	15	15		14		49	22		58	41	74	18	17	16	24	15	15	15	15	15
11	15	14	14	14	15	14	14	18	24	30	38	38	35	42	46	33	20	14	18	15	15	15	17	14
12	14	15	15	14	14	15	20	16	17	23	24	26	29	24	26	21	16	14	14	15	16	16	17	15
13	15	14	14	15	15	23	20	15	16	21	27	34	36	66	30	22	21	16	18	15	N	22	15	N
14	16	16		16	14		15	16	24	22	30	30		42	30		20	16	15	15	15	16	15	15
15	15	15	14	14		N	17	17	18	20	21		43	36	33	40	38	18	16	15	16	17	26	17
16	15	15	14	20	14	14	22	16	18	21	14	40	44	38	43	26	20	14	16	15	14	14	14	15
17	14	14	14	15	15	15	17	20	18	20	34	38	38	35	28	24	24	17	14	16		16	15	15
18	14	15	14	14	14	15	28	16	20		28	32	39	29	32	22	20	16	16	16	15	15	15	15
19	15	17	15	15	15	15	21	32	20	26	32	33	34	43	34	26	18	16	16	15	15	15	16	15
20	15	17	20	15	14	14	15	16	20	28	30	32	37	30	30	27	20	17	17	14	14	15	15	15
21	15	15	14	15	14	15	22	17	23	26	42	45	49	50	28	24	21	16	15	16	15	15	15	16
22	15	14	15	14	14	15	22	15	16	21	28	35	36	32	40	24	20	14	16	15	15	15	15	15
23	15	15	15	15	14	17	21	16	18	15	39							17	16	15	15	15	15	15
24	15	15		14	14	N	15	18	20	23	29	30	33	34	26	23	17	16	16	15	14	14	15	15
25	15	14	15	15	14	15	15	16	18	21		14	30	30	27		17	15		15	15	15	15	15
26	14	15	15	14	14	15	21	15	20	21	27	27	24	30	21	22	20	16	20	14	15	16	15	
27	14	15	14	14	14	16	16	15	16	21	21	33	26	30	23	21	17	16	15	14		14	15	15
28	15	16	14	15	15	15	16	15	16	22	36	26	27	26	21	20	17	15	15	15	15	14	15	15
29	15	14	15	14	14	17	15	16	18	21	30	33	32	30	32	20	16	16	14	15	15	15	15	15
30	15	16	14	14	15	14	16	15	20	23	24	29	28	27	22	40	17	16	15	18	16	15	15	16
31	15	15	15	14		15	22	15	18	20	32	30	40	30	33		20	14	16	15	14	14	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	29	30	29	28	30	31	30	30	29	28	28	28	30	27	30	31	30	30	28	31	30	29
MED	15	15	14	14	14	15	16	16	18	21	28	30	31	31	28	22	18	16	16	15	15	15	15	15
U Q	15	15	15	15	15	15	21	16	20	23	33	33	37	41	32	26	20	16	16	16	16	15	15	15
L Q	15	14	14	14	14	15	15	15	16	20	21	27	27	29	23	20	17	15	15	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF·FOF2 AT YAMAGAWA

MAR.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	79	64	66	54	34	41	58	83	111	133	138	137	140	139	137		132	124	126	111	87	88		84
2	80	54	53	70	74	35	35	66	103	124	126	136	146	150	151	N	138	135	130	126	121	103	84	84
3	84	71	67	73	67	53	46	88	114	110	123	145	149	151	155	154	145	137	130	121	90	87	85	80
4	66	60	66	62	52	67	77	108	126	142	152	145	154	144	145	139	136	132	114	108	88	89	78	76
5	70	68	77	78	54	44	42	71	110	124	132	136	146	146	140	143	144	132	110	103	86	85	71	56
6	76	72	53	60	52	53	52	78	107	136	140	136	141	150	140	146	144	134	123	108	88	90	86	78
7	73	66	53	52	59	36	N	68	110	142	132	141	146	151	145	138	128	132	130	108	78	84	85	86
8	83	85	66	59	52	47	46	83	117	126	125	136	140	141	140	141	132	126	122	110	108	89	86	86
9	79	71	81	74	66	41	38	87	106	97	111	142	157	145	140	132	138	140	136	122	112	110	106	86
10	86	85	86	84	66	66	66	97	111	122	130	145	146	142	143	141	140	137	134	119	104	88	86	85
11	86	86	86	79	63	64	69	86	106	128	144	150	147	156	160	150	145	138	126	111	111	107	102	104
12	85	86	80	73	64	60	65	88	115	126	132	141		146	143	141	137	138	136	122	109	145	142	110
13	80	88	85	73	60	60	67	85	111	140	145	150	164	182	180	183	168	157	145	110	105	89	108	47
14	71	86	52	51	61	85	A	90	87	73	85	84	60	58	A	58	74	70	77	84	81	76	74	82
15	46	73	79	66	48	37		76	100	120	145	140	130	140	156	148	151	112	143		110	90	85	
16	71	75	84	80	75	80	77	107	127	137	145	153	156	160	162	160	155	145	144	145	130	142	135	108
17	126	137	84	67	68	87	102	119	133	134	139	144		185	161	144	147	140	147	134	108	90	102	86
18	84	84	78	77	60	57	66	90	133	144	148	151	155	159	157	147	142	138	141	127	111	118	110	96
19	86	82	66	81	74	74		88	122	141	132	154	166	181	171	174	163	150	151	144	122	111	109	88
20	72	52	A	80	57	62	62	88	130	132	150	153		150	145	N	137	138	137	122	90	86	88	88
21	85	84	78	54	51	32	62	86	111	129	132	145	142	138	138	136	137	140	136	123	102	A	86	88
22	85	85	81	76	66	58	62	90	127	124	128	145	144	145	144	138	140	140	139	141	107	88	86	86
23	79	74	66	74	63	57	63	88	126	122	133	145	152	158	146	149	149	145	146	139	144	146	143	146
24	145	110	111	88	88	51	85	103	128	146	148	147	160	164	146	145	146	143	126	110	91	104	110	85
25	87	87	87	88	73	59	64	91	113	131	142	147	151	155	144	146	146	143	138	130	110	105	111	114
26	103	88	88	81	73	65	73	88	110	116	136	152	146	145	146	145	153	145	134	122	107	89	138	138
27	134	124	90	85	63	65	66	100	112	119	130	139	143	144	147	140	144	144	144	124	109	104	104	93
28	86	86	66	67		68	73	77	126	127	144	146	144	146	156	157	146	141	134	104	90	88	111	86
29	84	78	84	80	62	54	66	90	126	127	142	159	178	184	200	182	175	170	170	159	131	110	85	66
30	87	85	76	67	66	66	73	86	122	109	135	142	150	160	152	145	146	153	134	104	102	87	84	84
31	86	86	88	86	48	38	45	87	105	108	135	163	151	141	140	148	146	134	131	111	84	85	88	87
	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	30	31	30	31	27	31	31	31	31	31	28	31	30	28	31	31	31	30	31	30	30	30
MED	84	84	78	74	63	58	65	88	113	127	135	145	146	150	146	145	144	138	134	122	107	90	88	86
U Q	86	86	85	80	67	66	73	90	126	136	144	150	154	159	156	149	147	144	143	127	111	107	110	93
L Q	76	71	66	66	54	44	52	83	110	120	130	140	143	144	143	140	137	134	126	110	90	88	85	84

HOURLY VALUES OF FES AT YAMAGAWA

MAR.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	G	G	G	G	G	G	G	G	G	43	49	G	G	G	G	G	G	44	40	72	56	57	77	G
2	G	G	25	G	G	G	G	G	G	G	48	G	G	G	G	G	50	50	35	25	28	28	24	30
3	G	34	23	G	G	G	G	G	40	57	78	70	46	65	58	48	44	G	G	G	G	G	G	G
4	25	G	G	G	G	G	G	G	G	66	57	59	96	52	48	54	49	90	94	58	G	G	28	G
5	32	28	G	G	G	G	22	G	G	56	45	45	G	G	G	43	41	36	G	G	G	G	G	G
6	41	56	37	G	25	36	G	G	37	46	G	69	46	G	46	55	62	G	33	32	34	26	G	G
7	G	G	34	30	G	G	G	G	G	G	G	G	G	G	G	G	49	47	31	G	G	G	G	G
8	G	G	G	G	G	G	G	G	G	41	G	G	G	G	G	G	43	G	G	G	G	G	G	G
9	G	G	G	G	G	G	G	G	G	41	G	G	G	69	80	64	44	39	G	24	G	G	G	G
10	G	G	G	G	G	G	G	30	G	G	47	48	G	G	G	45	44	G	32	G	G	G	G	G
11	G	G	G	G	G	G	G	30	G	G	45	46	53	48	55	G	43	39	43	30	25	30	39	40
12	39	45	24	24	G	G	G	G	38	G	44	G	G	51	G	G	G	39	34	26	G	G	G	G
13	G	G	G	G	24	24	G	G	42	50	49	46	46	G	52	G	G	G	G	54	72	32	G	G
14	30	34	24	G	G	36	59	50	54	64	64	52	G	G	66	50	46	40	45	45	48	84	29	28
15	34	29	G	G	G	G		G	G	G	51	50	55	G	53	84	123	43	54		92	37	37	40
16	G	78	58	57	46	32	G	G	42	62	76	66	75	66	72	45	53	95	68	92	82	92	79	83
17	78	56	40	42	28	28	34	38	44	G	G	46	46	64	88	77	46	38	60	34	24	G	30	24
18	G	G	G	G	28	G	G	G	G	G	G	G	G	63	55	63	76	60	56	48	69	48	83	68
19	43	36	28	33	30	G	G	G	41	47	G	G	G	G	46	54	43	46	56	46	50	43	54	39
20	28	36	57	42	G	28	G	G	41	179	77	55	G	63	54	64	48	G	30	24	23	26	G	30
21	G	G	G	G	28	24	G	G	G	G	G	G	G	G	G	G	42	52	60	58	91	68	57	39
22	G	G	G	G	G	G	G	G	G	46	48	52	53	54	53	G	G	43	49	82	55	G	G	G
23	G	G	G	G	G	G	G	G	G	G	54	G	54	56	59	65	49	46	32	31	G	28	G	34
24	27	32	67	47	31	32	24	G	41	G	G	G	52	54	G	G	G	62	46	G	78	29	30	30
25	28	G	G	G	G	G	G	G	39	44	46	49	47	G	G	G	49	46	54	50	47	G	26	31
26	G	G	G	G	G	29	G	G	G	G	G	G	52	G	53	60	57	68	64	58	58	41	46	G
27	G	G	G	G	G	G	G	32	44	56	51	67	78	60	78	106	69	46	51	38	48	28	G	25
28	G	G	G	44	36	32	24	33	40	44	46	53	G	47	G	48	50	61	75	114	86	29	37	32
29	38	27	28	26	24	24	G	G	G	46	52	55	61	65	G	G	G	G	39	45	31	30	G	34
30	56	36	36	47	32	36	24	G	42	46	48	50	G	G	G	48	G	G	36	33	37	33	72	46
31	40	23	26	28	24	26	G	G	68	44	G	50	51	56	52	G	G	G	G	23	G	24	60	33
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31
MED	G	G	G	G	G	G	G	G	G	44	46	46	46	47	48	45	44	43	40	34	34	28	26	28
U Q	34	34	28	30	28	28	G	G	41	50	51	53	53	60	55	60	50	50	56	54	58	37	46	34
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	31	24	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT YAMAGAWA

MAR.1989

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

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT OKINAWA

MAR.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	109	85	85	67	59	32	52	77	103	130	142	146	148	147	148	159	162	155	164	162	162	118	120	110
2	88	88	77	86	63		31	63	103	119	128	140	152	157	170	170	165	165	166	165	178	162	146	111
3	110	87	83	85	66	60	55	84	110	104	122	142	146	158	163	168	157	146	145	145	140	107	86	86
4	82	65	60	62	52	67	80	90	110	131	146	157	158	161	158	161	161	158	145	146	162	144	125	139
5	110	88	88	88	66	43	34	66	90	130	136	145	151	158	162	164	184	170	161	156	164	144	111	85
6	88	86	81	81	62	55	35	75	112	144	146	145	144	168	177	179	177	168	159	163	162	174	167	128
7	87	87	84	66	68	46	32	63	104	142	145	143	157	170	168		157	154	146	122	107	111	108	122
8	88	90	72	68	59	46	34	78	112	121	131	136	142	150	156	154	148	138	137	127	130	122	122	88
9	85	86	85	83	61	41	21	84	104	88	105	145	147	147	146	153	159	163	154	139	165	164	163	142
10	124		100	87	65	79	66	85	110	119	135	140	158	156	164	160	157	156	156	146	163	162	145	144
11	131	122	118	83	86	66	72	81	105	131	145	148	164	165	176	179	170	163	149	146	176	155	168	172
12	144	122	112	96	84	60	31	86	105	130	136	142	149	162	162	156	164		164	166	178	170	195	165
13	164	165	112	84	62	54	61	76	108	138	142	146	163	155	162	176	168	146	154	144	146	141	157	
14	89	120	50	41	86	86	85	67	102	76	78	73	A	A	60	60	66	57	72	84	90	A	66	89
15	86	C	85	86	49	33	32	74	104	124	161	147	157	176	178	177	C	193	185	178	184	168	162	142
16	87	84	88	86	66	63	58	88	120	127	C	155	165	163	170	171	166	165	N	169	176	171	171	184
17	126	162	117	71	84	86	90	111	130	146	140	147	156	172	170	163	C	171	170	168	166	145	160	145
18	145	130	87	86	68	53	67	86	122	146	156	160	166	170	170	164	165	164	167	168	175	N	177	163
19	146	124	110	62	86	80		88	122	141	146	164	177	176	191	193	187	180	N	183	162	169	156	145
20	86	109	87	107	111	80	67	84	111	146	159	166	168	N	163	156	162	158	160	153	145	146	145	169
21	130	87	82	66	46	51	51	85	114	136	140	145	147	157	160	157	N		166	162	142	145	140	110
22	109	108	86	85	66	53	52	86	121	128	136	145	162	161	157	154	165	164	162	177	146	137	134	121
23	87	86	66	77	59	54	59	85	109	111	138	141	160	164	163	N	170	162	168	168	180	195	172	183
24	191	168	162	130	120	84	86	110	122	156	143	154	171	N	162	162	160	148	144	117	122	145	167	160
25	146	146	163	146	87	64	58	85	111	138	145	146	165	170	171	170	168	164	163	161	163	159	164	166
26	145	146	128	N	87	66	66	84	107	128	140	155	154	145	152		162	156	143	140	162	167	161	164
27	143	140	126	91	58	57	56	90	107	121	141	143	154		169	171	170	170	184	163	164	171	168	163
28	144	121	79	76		A	78	87	111	128	136	132	135	146	160	163	161	147	147	131	90	145	166	163
29	144	138	84	86	83	62	58	88	108	120	135	164	190	193	193	182		179	178	168	162	146	128	88
30	105	130	90	84	66	76	66	90	108	102	128	144	160	165	169	N	171	172	164	145	144	160	82	120
31	87	120	112	96	51			89	102		136	164	157	157	164	168	171	158	151	132	108	124	123	122
	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	29	31	30	30	28	29	31	31	30	30	31	30	27	31	27	27	29	29	31	31	29	31	30
MED	110	120	87	84	66	60	58	85	109	129	140	145	157	161	163	164	165	163	160	156	162	146	156	142
U Q	144	134	112	87	84	71	67	88	112	138	145	155	164	170	170	171	170	169	166	168	166	167	167	163
L Q	87	87	82	71	59	52	34	77	104	120	135	142	149	156	160	157	160	154	146	140	142	142	123	111

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

MAR.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	29	39	28	38	29	G	G	G	G	G	G	51	G	G	G	G	56	50	33	30	G	36	30	33
2	33	G	30	28	G		G	G	G	G	48	G	G	G	50	47	G	38	33	33	28	23	G	G
3	G	G	G	24	G	35	G	G	40	50	56	62	61	66	83	49	48	45	32	40	G	G	G	G
4	G	G	G	G	G	G	G	G	38	46	48	G	G	G	66	G	G	46	40	69	55	32	G	29
5	G	28	32	34	26	G	G	G	G	G	G	50	G	G	G	46	45	38	G	G	G	G	26	33
6	27	30	G	G	G	G	G	G	G	46	G	G	G	78	G	G	49	48	40	40	45	58	30	G
7	G	G	G	G	G	G	G	28	37	G	49	G	G	G	G	G	G	40	G	34	G	G	G	G
8	G	G	G	G	G	G	G	28	G	G	G	G	G	G	G	48	G	G	G	G	G	G	G	G
9	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	90	48	44	40	38	23	G	G	G
10	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	51	43	39	38	34	40	32	46	G
11	28	23	G	24	G	G	23	29	39	G	45	G	47	G	G	G	G	43	45	34	G	G	G	G
12	25	G	32	78	42	29	30	28	G	41	46	48	G	G	G	G	42	38	40	39	G	G	G	G
13	G	G	G	G	G	G	G	G	36	47	148	59	G	G	47	G	G	40	30	40	30	34	92	G
14	28	40	34	24	G	26	41	68	68	65	70	90	88	126	67	51	G	58	50	56	55	103	44	23
15	72	72	G	G	G	G	G	G	38	45	73	79	81	109	G	G	G	G	G	G	G	G	G	G
16	G	G	37	38	34	38	30	29	38	42	48	48	G	G	G	54	56	80	84	86	59	68	93	90
17	72	84	72	59	56	33	29	G	40	54	52	55	57	76	73	78	87	78	44	45	32	G	40	32
18	G	G	G	46	40	30	39	29	39	G	51	G	G	G	68	75	86	79	78	62	40	32	40	48
19	40	50	58	41	32	29	25	G	42	54	58	56	G	G	62	66	49	58	58	42	33	26	32	58
20	33	35	28	30	51	38	30	29	60	59	49	104	142	64	67	48	G	G	62	33	G	G	33	23
21	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	50	50	46	39	60	47	37	G	30
22	44	36	G	G	G	G	G	G	G	G	G	G	G	55	G	G	G	38	32	66	67	23	30	24
23	G	G	G	G	G	G	G	G	G	G	G	55	56	58	60	58	54	42	35	34	39	31	G	G
24	G	G	31	36	31	32	25	30	40	44	G	47	G	G	G	G	72	G	34	G	G	G	G	G
25	G	G	G	G	G	G	G	G	G	G	48	G	G	58	G	G	G	51	80	91	91	G	33	28
26	G	G	G	G	G	G	G	G	G	G	G	G	G	57	G	50	50	55	49	50	40	30	25	G
27	G	G	G	G	G	G	G	G	G	45	50	59	70		105	76	90	74	40	33	39	G	34	48
28	36	G	G	G	G	86	57	45	45	49	G	50	G	G	G	G	52	80	40	38	41	59	G	40
29	41	59	38	33	G	G	G	G	41	G	G	G	G	G	G	G	G	G	G	26	40	33	26	G
30	37	25	39	33	G	34	26	33	G	G	G	G	G	G	G	G	G	G	G	29	G	37	34	40
31	78	40	27	22	24	24	24	G	G	G	48	48	55	57	G	G	G	43	34	31	28	25	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	30	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31
MED	G	G	G	22	G	G	G	G	G	G	46	47	G	G	G	46	43	43	39	38	32	25	26	G
U Q	36	36	32	34	29	30	26	29	40	46	50	55	55	58	62	51	52	55	45	50	41	34	34	33
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	38	32	31	G	G	G	G

HOURLY VALUES OF FMIN AT OKINAWA

MAR. 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	16	14	15	15	24	23	15	17	23	27	28	43	30	26	17	14	18	15	15	15	15	15
2	15	15	15	14	15		23	23	26	22	28	27	43	48	27	23	26	20	16	15	15	15	15	15
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7	15	15	15	15	14	15	15	15	16	22	27	26	34	33	33	46	30	21	15	15	15	15	15	15
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9	15	15	15	15	14	15	15	22	15	23	26	28	44	30	44	30	27	21	15	15	15	16	15	15
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11	15	15	15	15	14	15	15	15	21	28	30	48	47	47	44	45	38	20	18	15	15	15	15	15
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15	15	15	15	14	15	N	N	16	20	23	26	29	39	42	45	29	48	35	29	15	15	15	15	15
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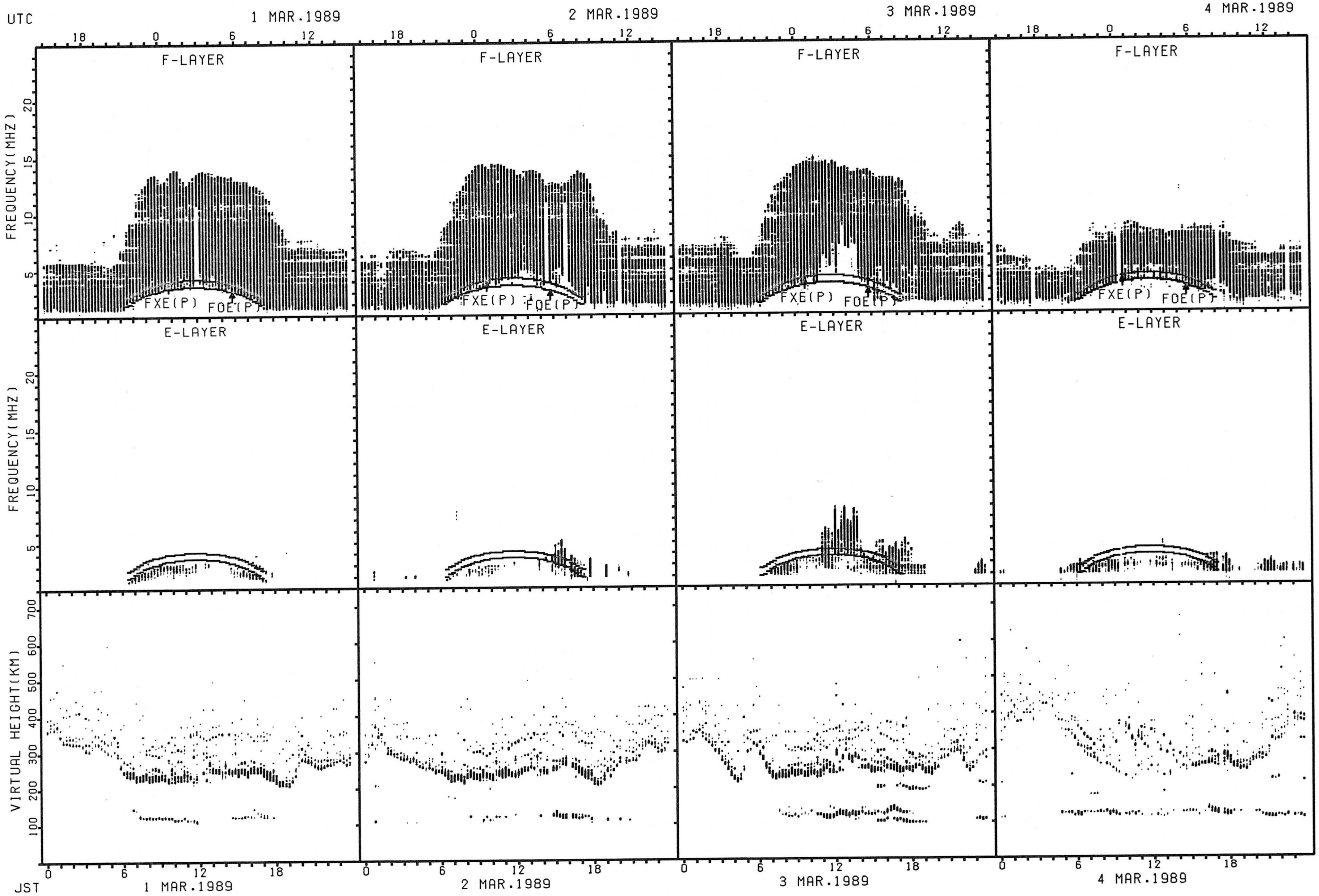
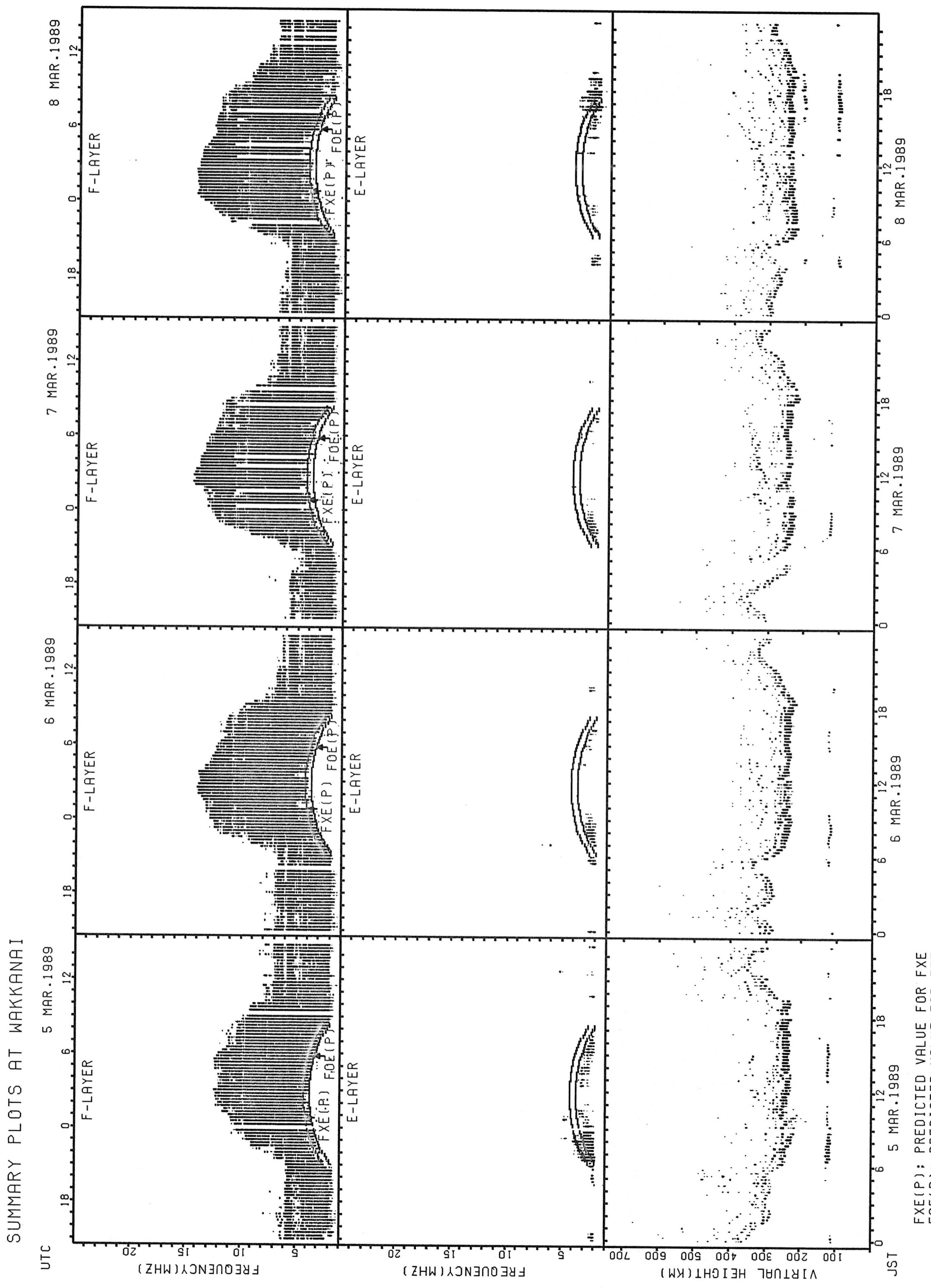
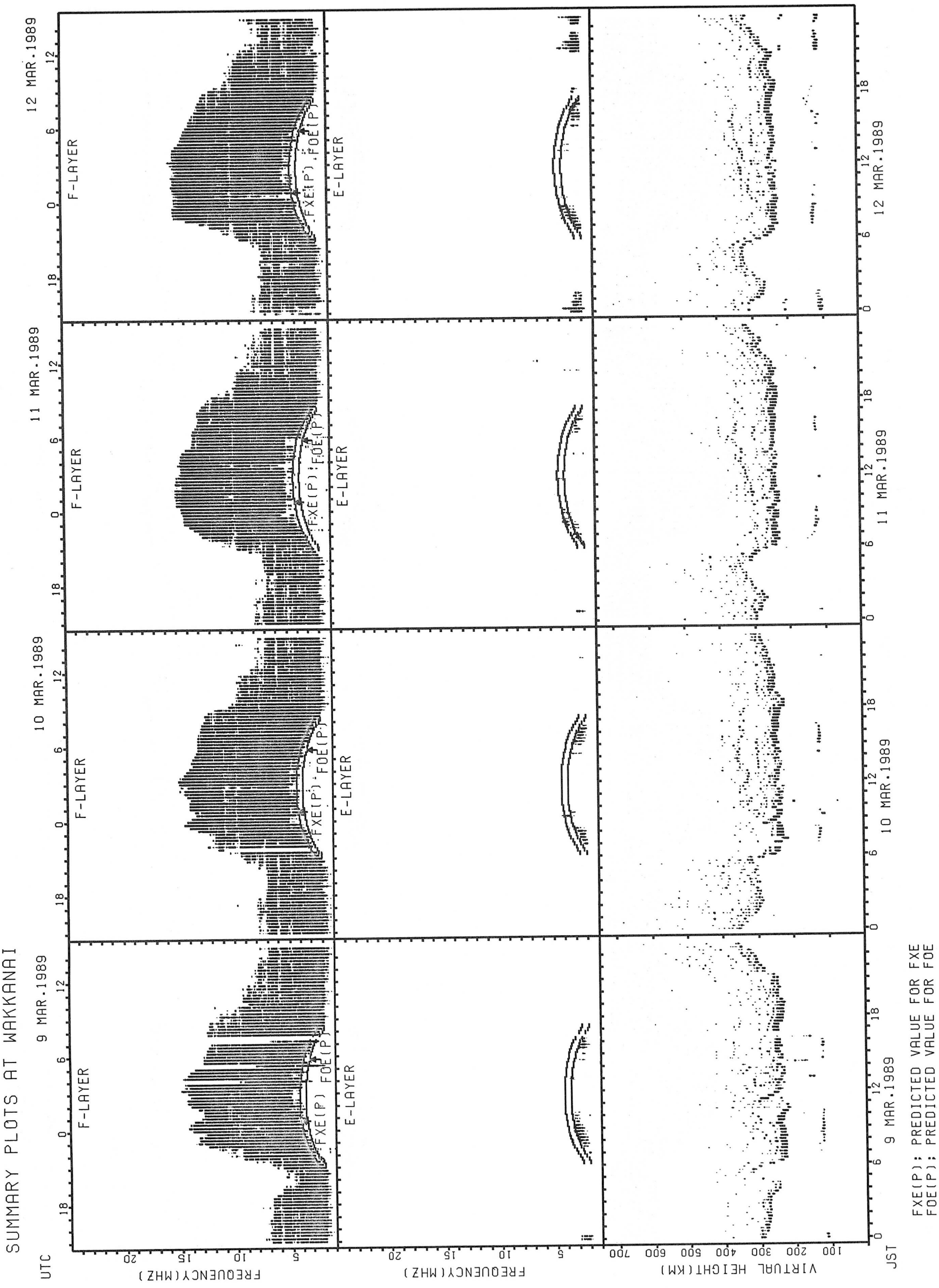
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	30	31	29	30	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31
MED	15	15	15	15	15	15	15	16	17	23	27	29	33	34	33	29	26	22	17	15	15	15	15	15
U Q	15	15	15	15	15	15	15	22	21	26	28	32	44	45	42	30	28	24	20	15	15	16	16	15
L Q	15	15	14	14	14	15	15	15	15	21	26	27	29	32	29	27	22	18	15	15	15	15	15	15

SUMMARY PLOTS AT WAKKANAI

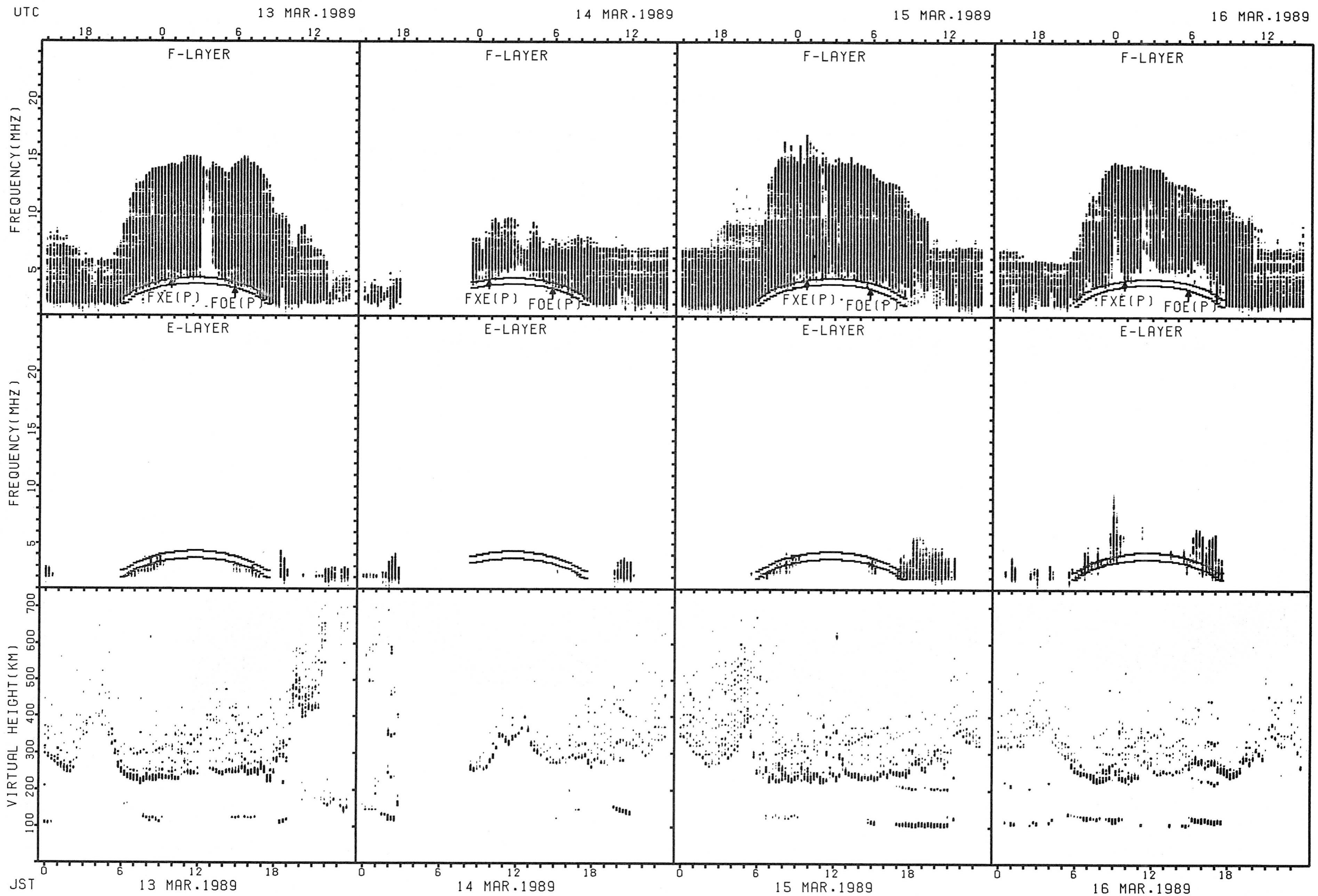


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
JST
5 MAR.1989
6 MAR.1989
7 MAR.1989
8 MAR.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

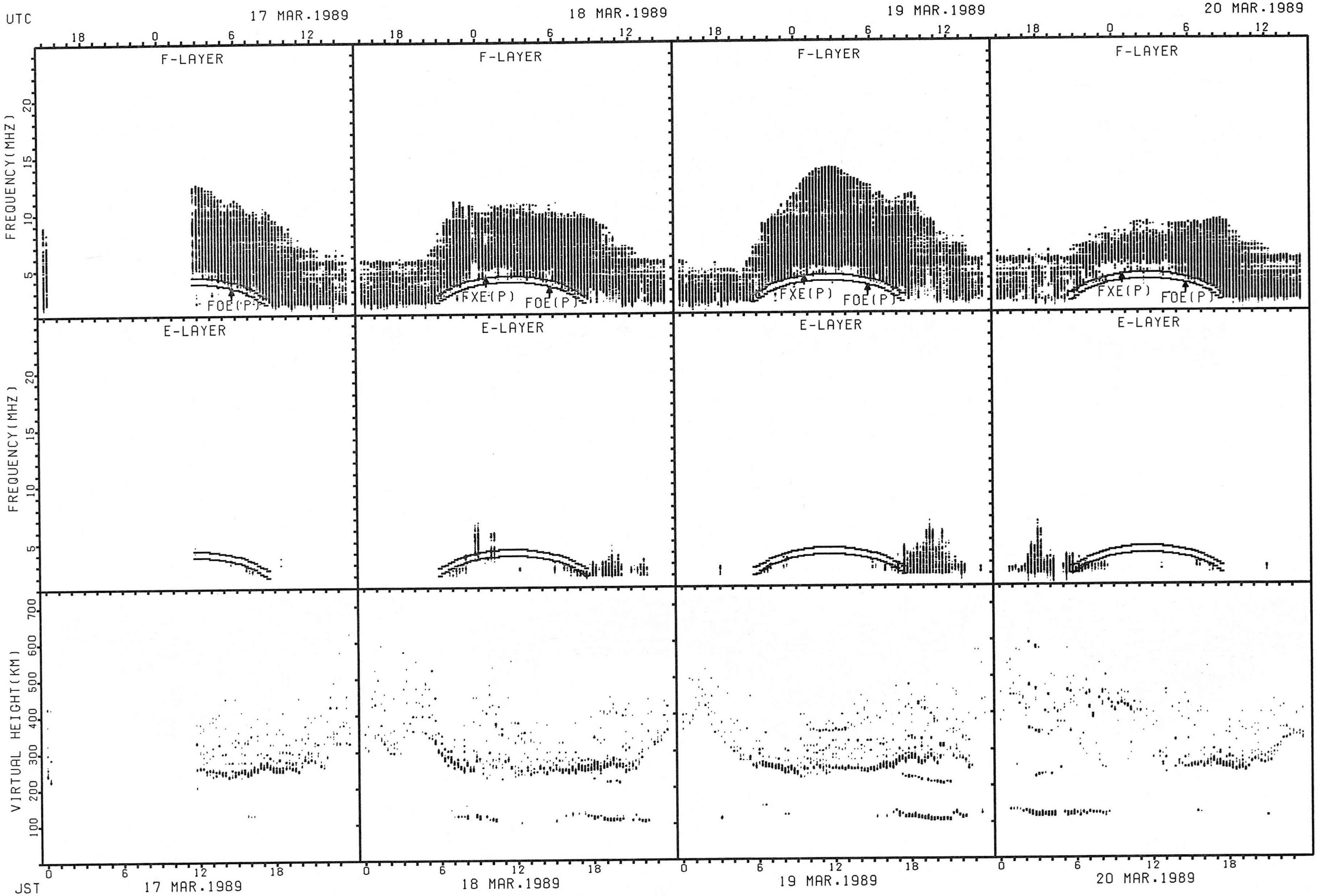

SUMMARY PLOTS AT WAKKANAI
9 MAR.1989
10 MAR.1989
11 MAR.1989
12 MAR.1989
UTC
18 0 6 12
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
5 10 15 20
VIRTUAL HEIGHT(KM)
100 200 300 400 500 600 700
JST
0 6 12 18
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI



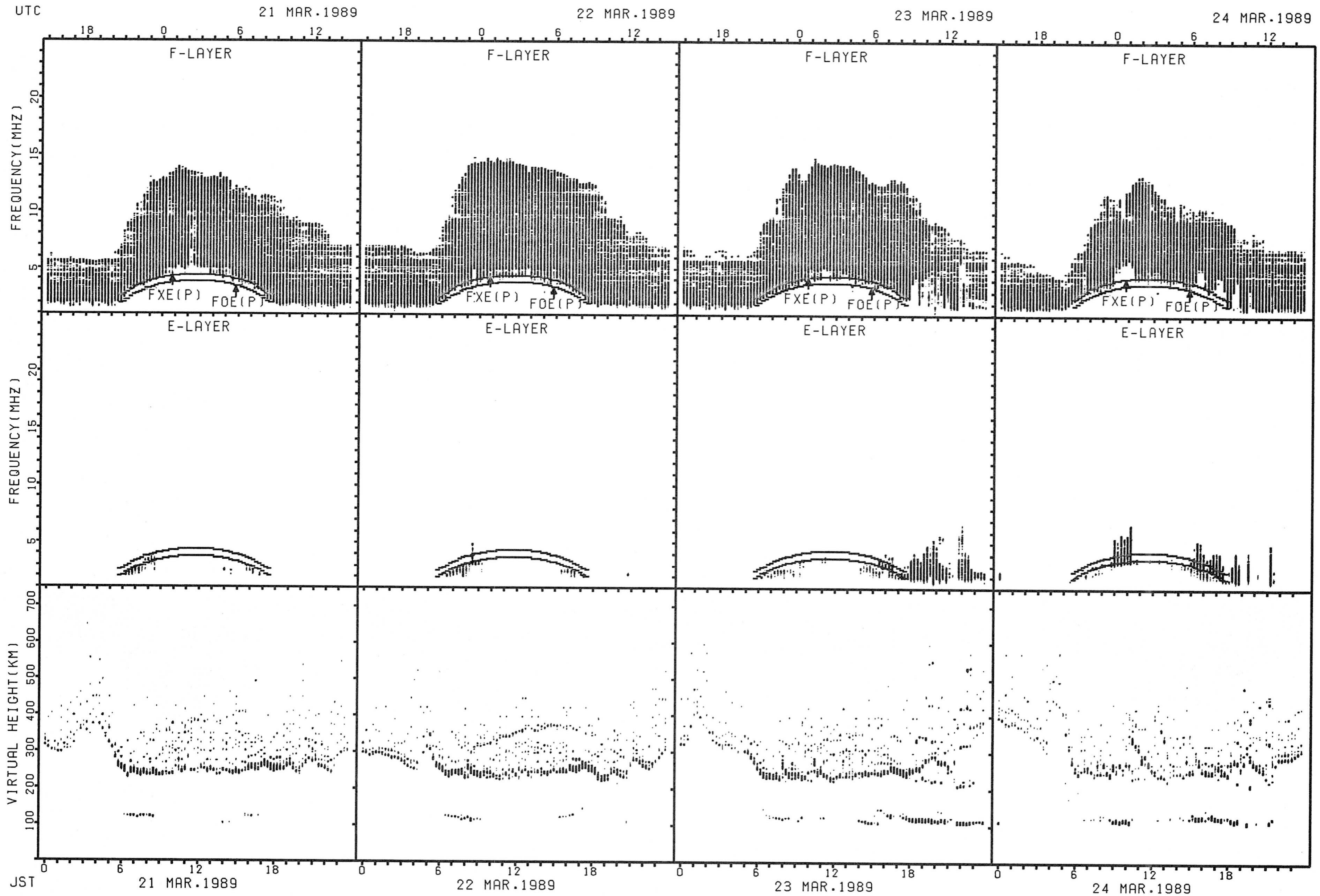
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI



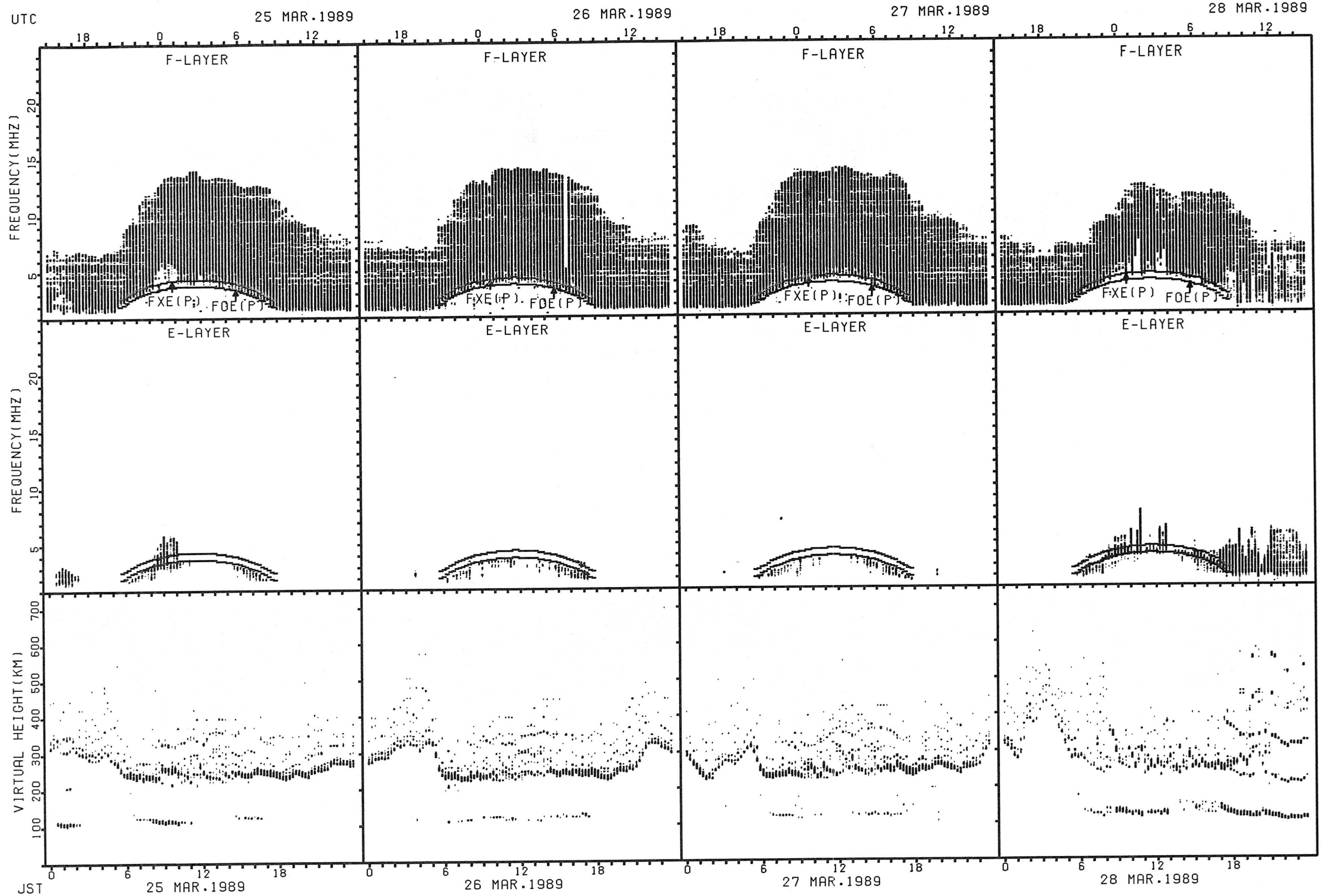
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI



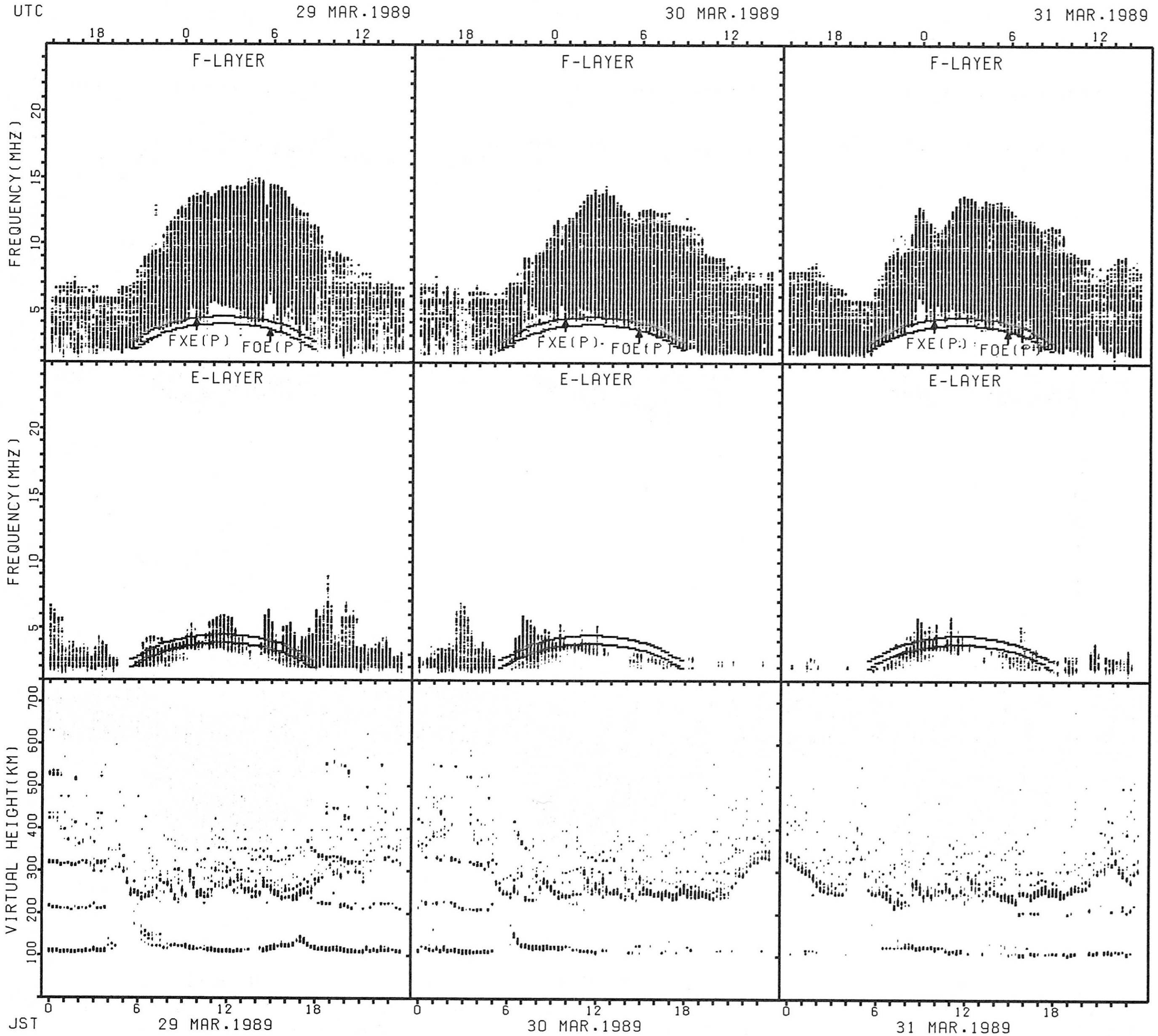
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI



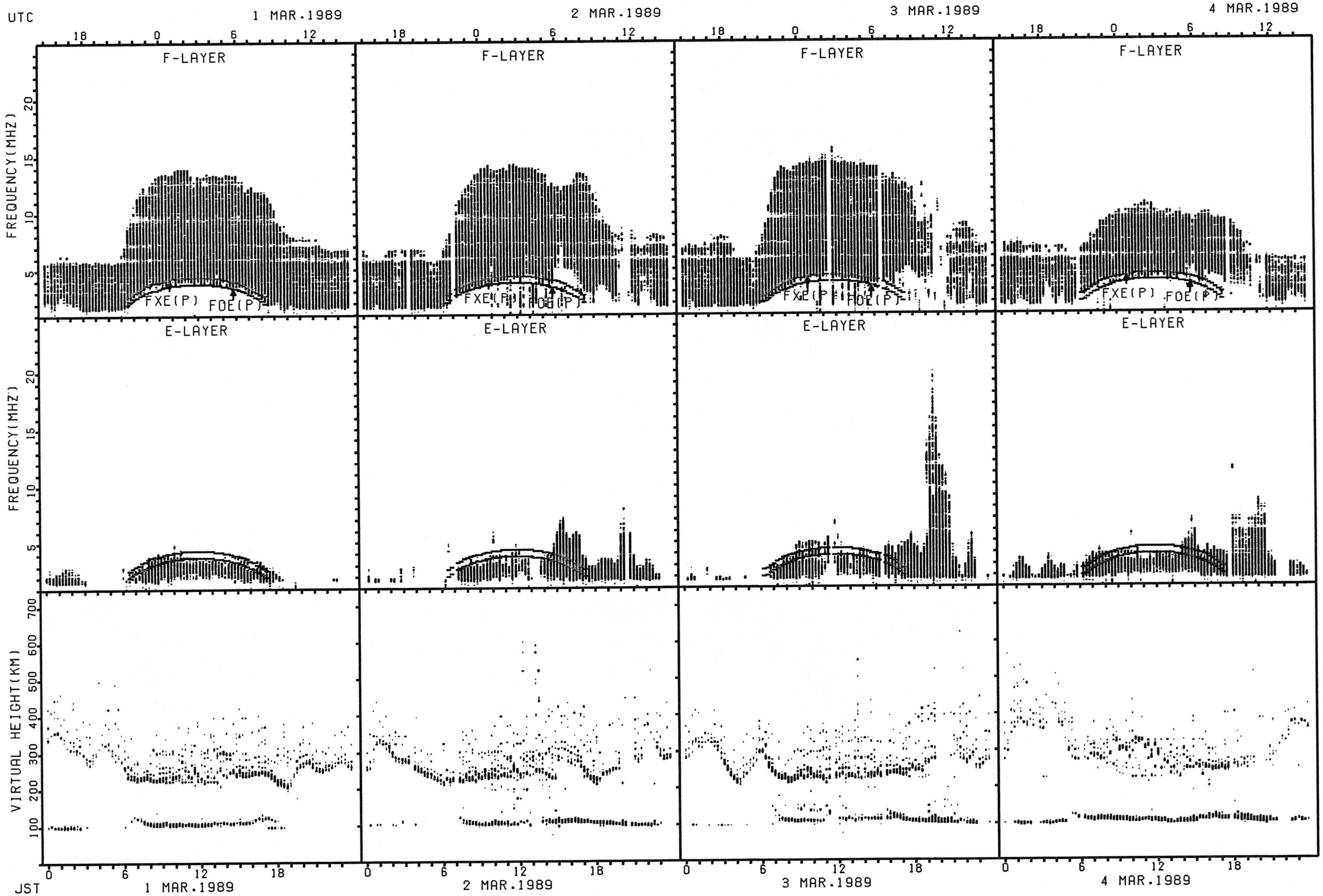
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI



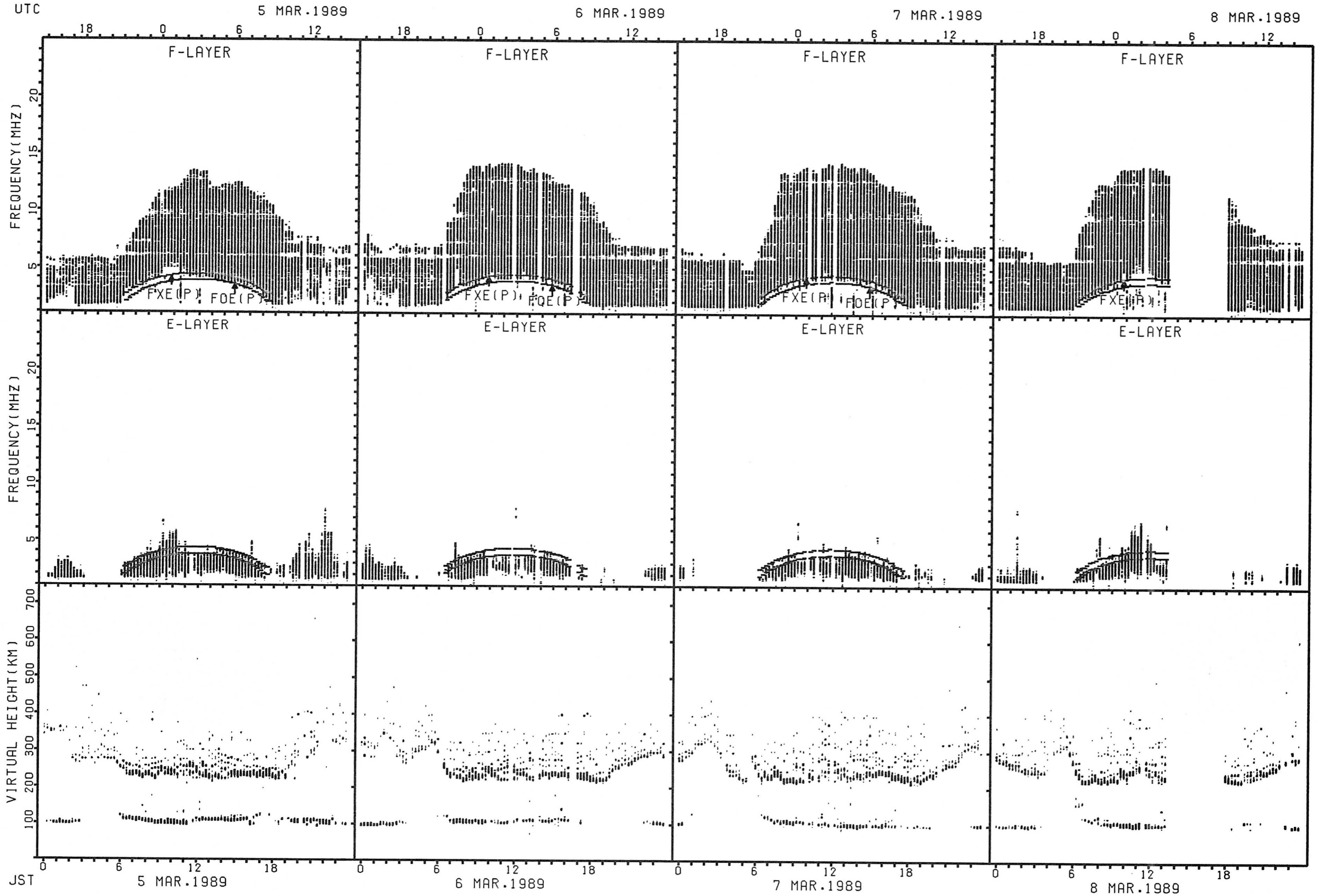
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



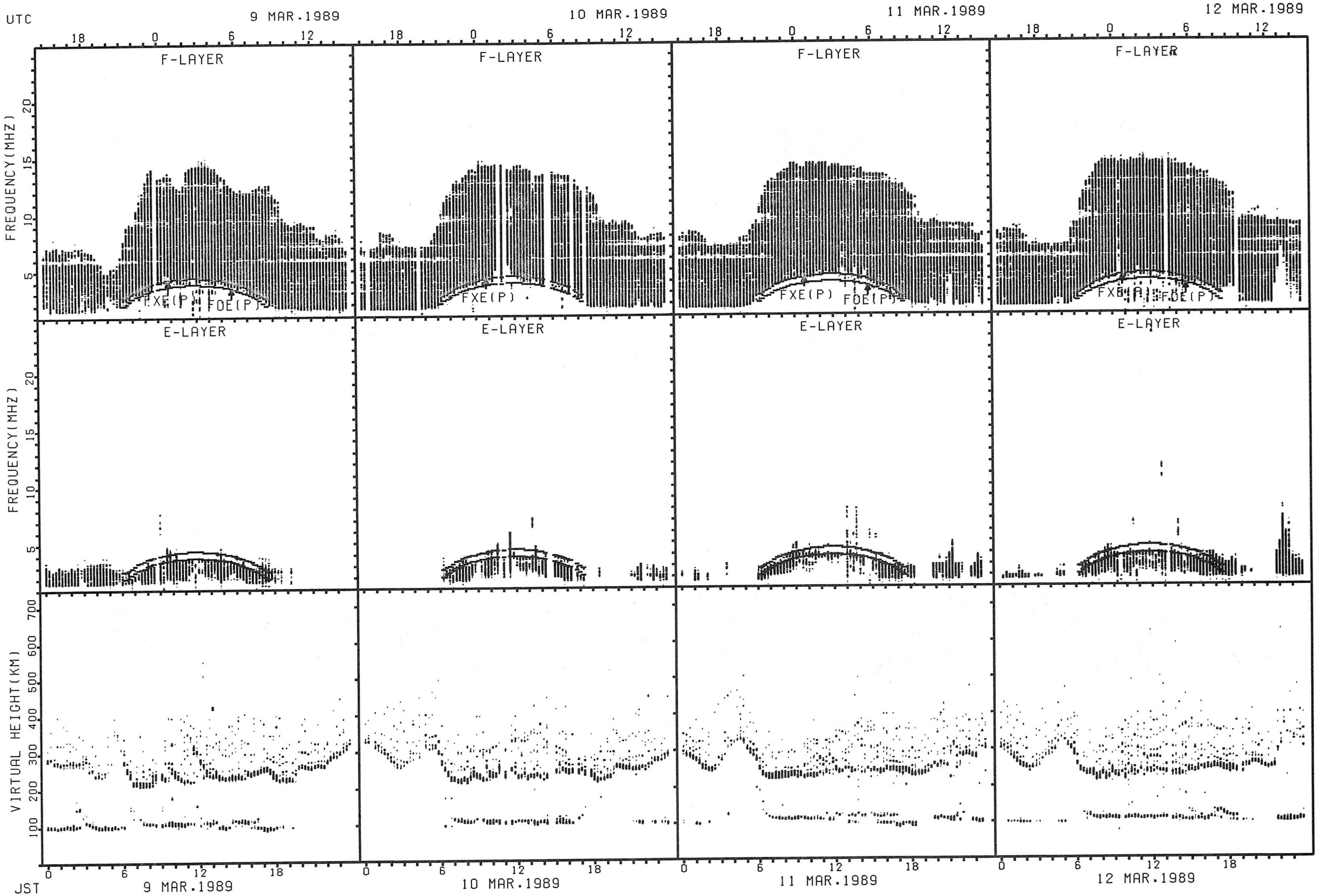
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



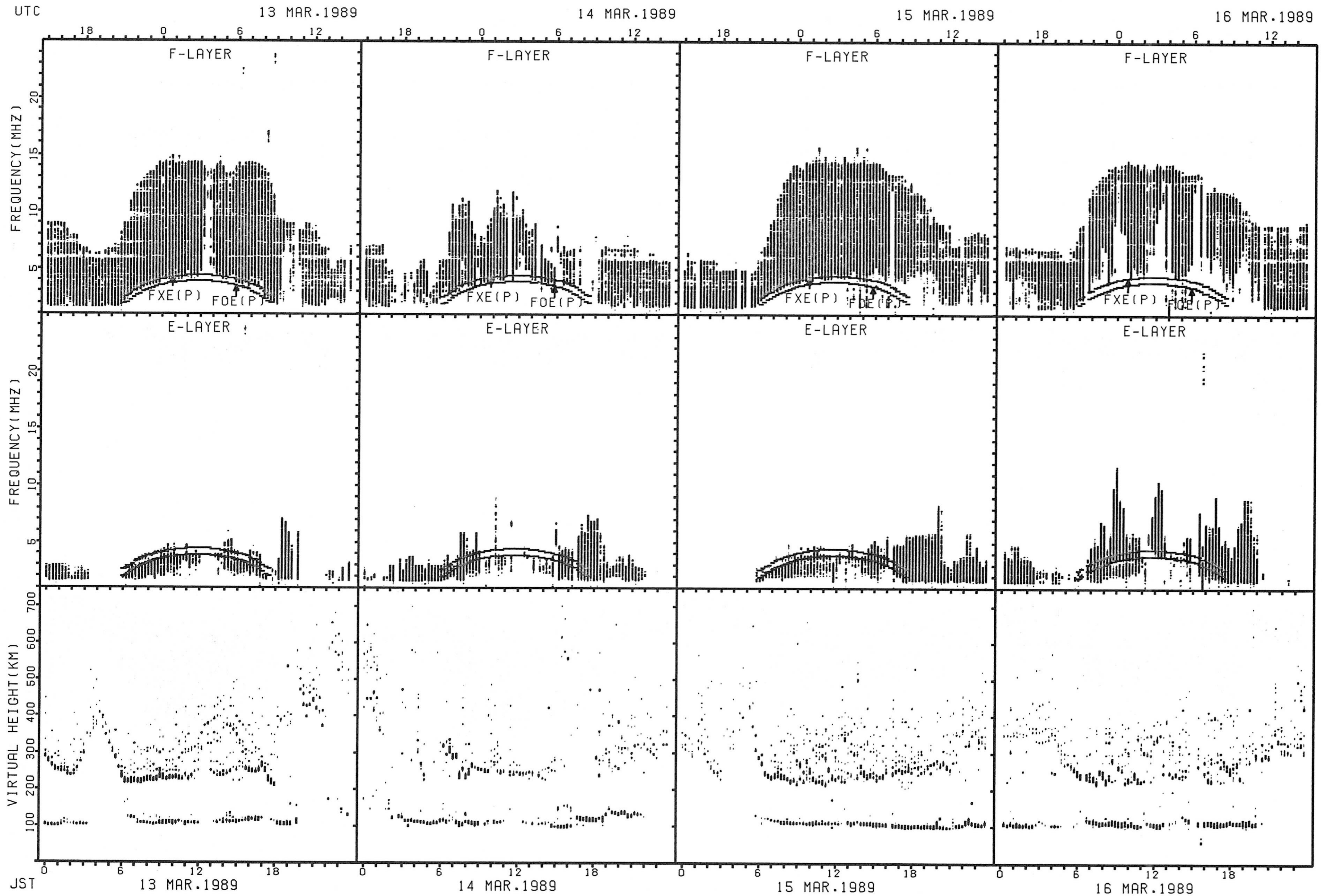
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



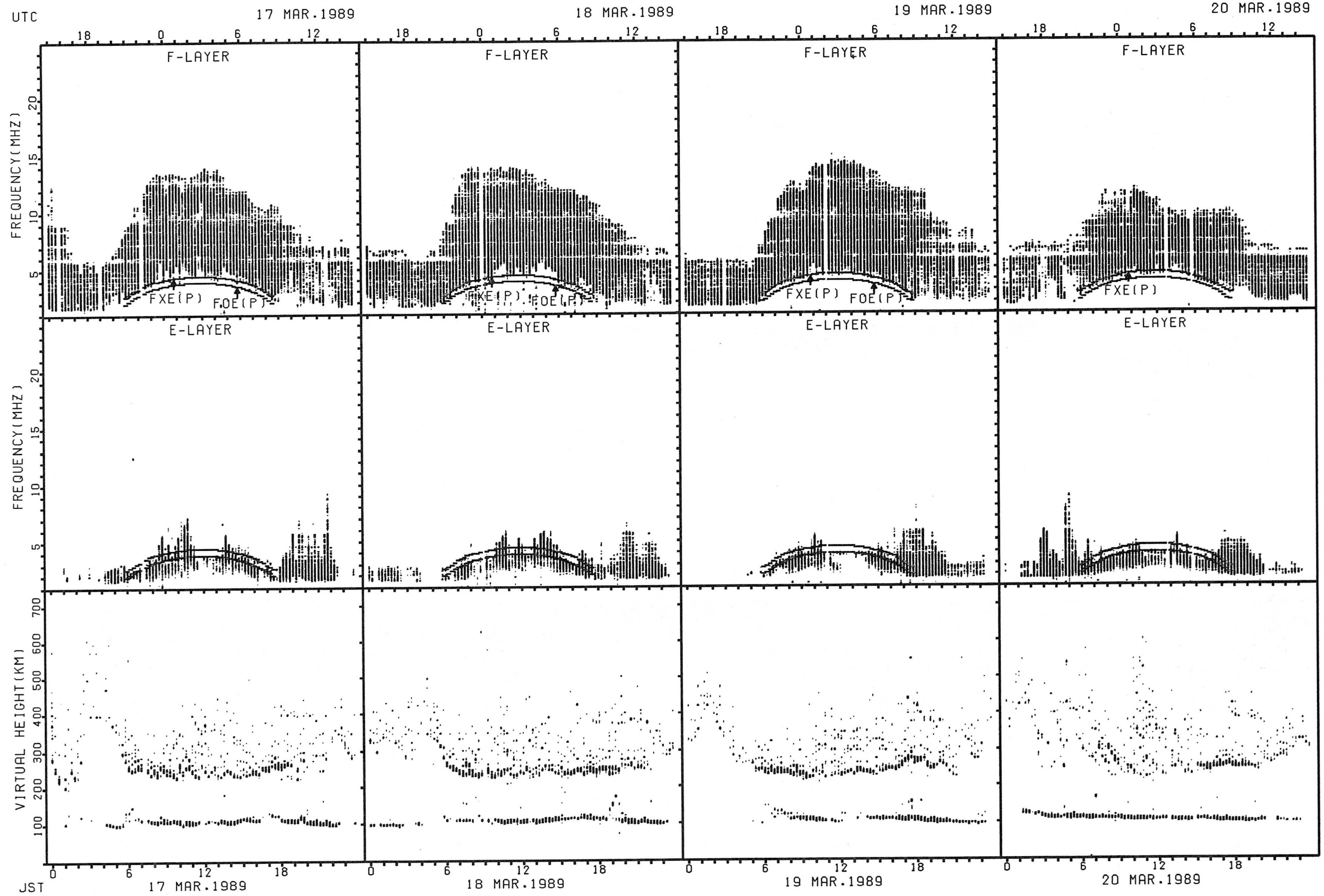
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



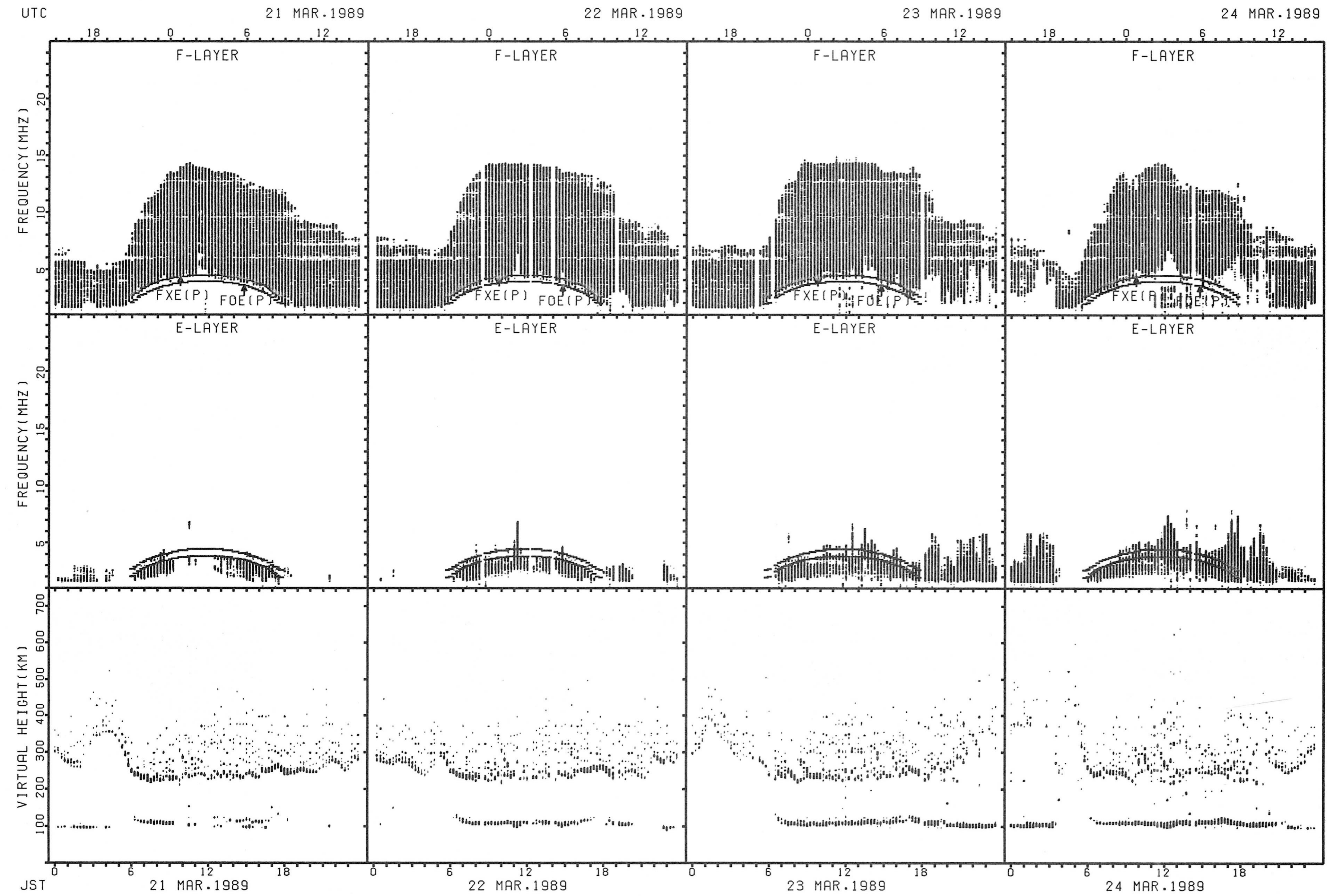
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



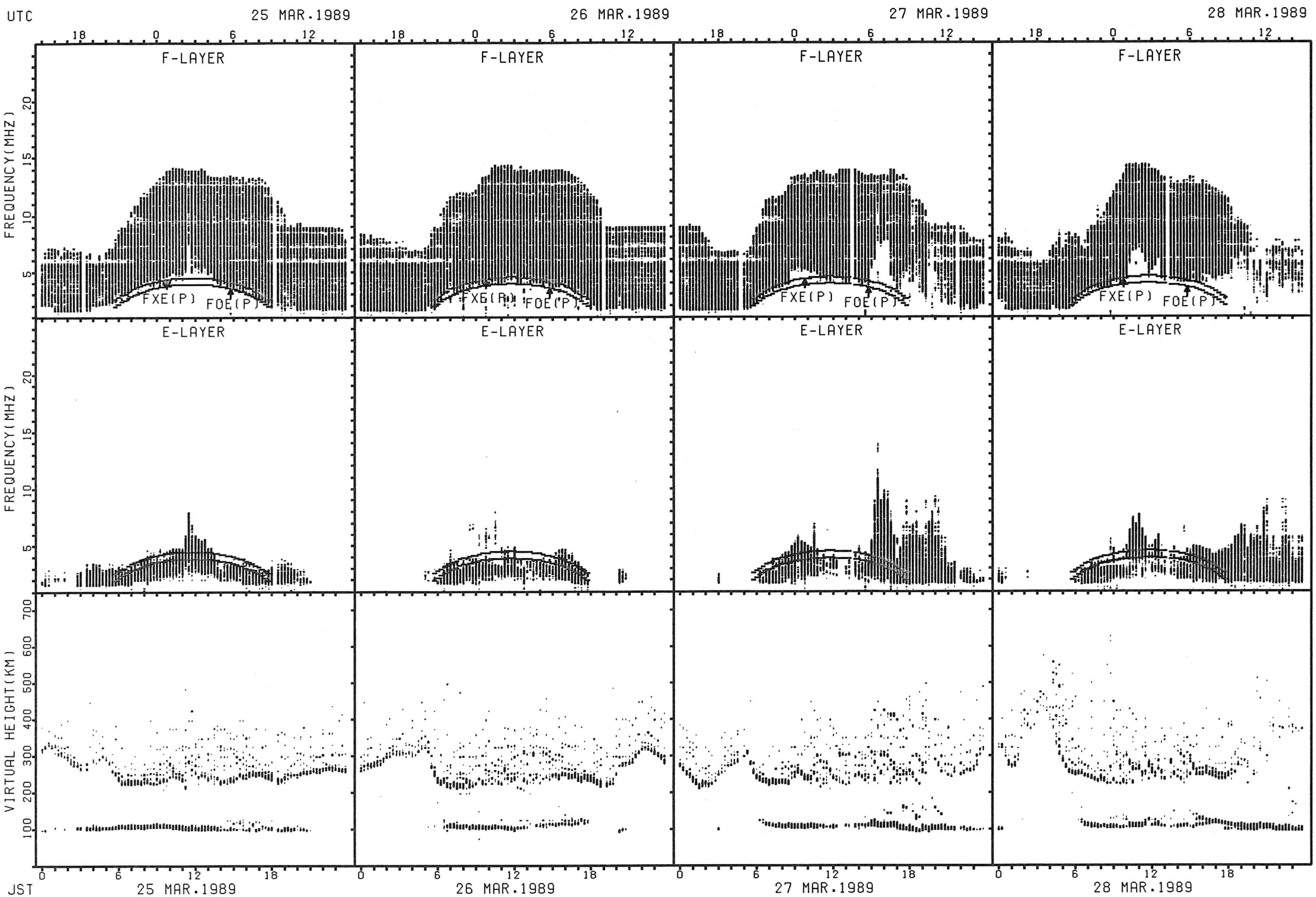
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



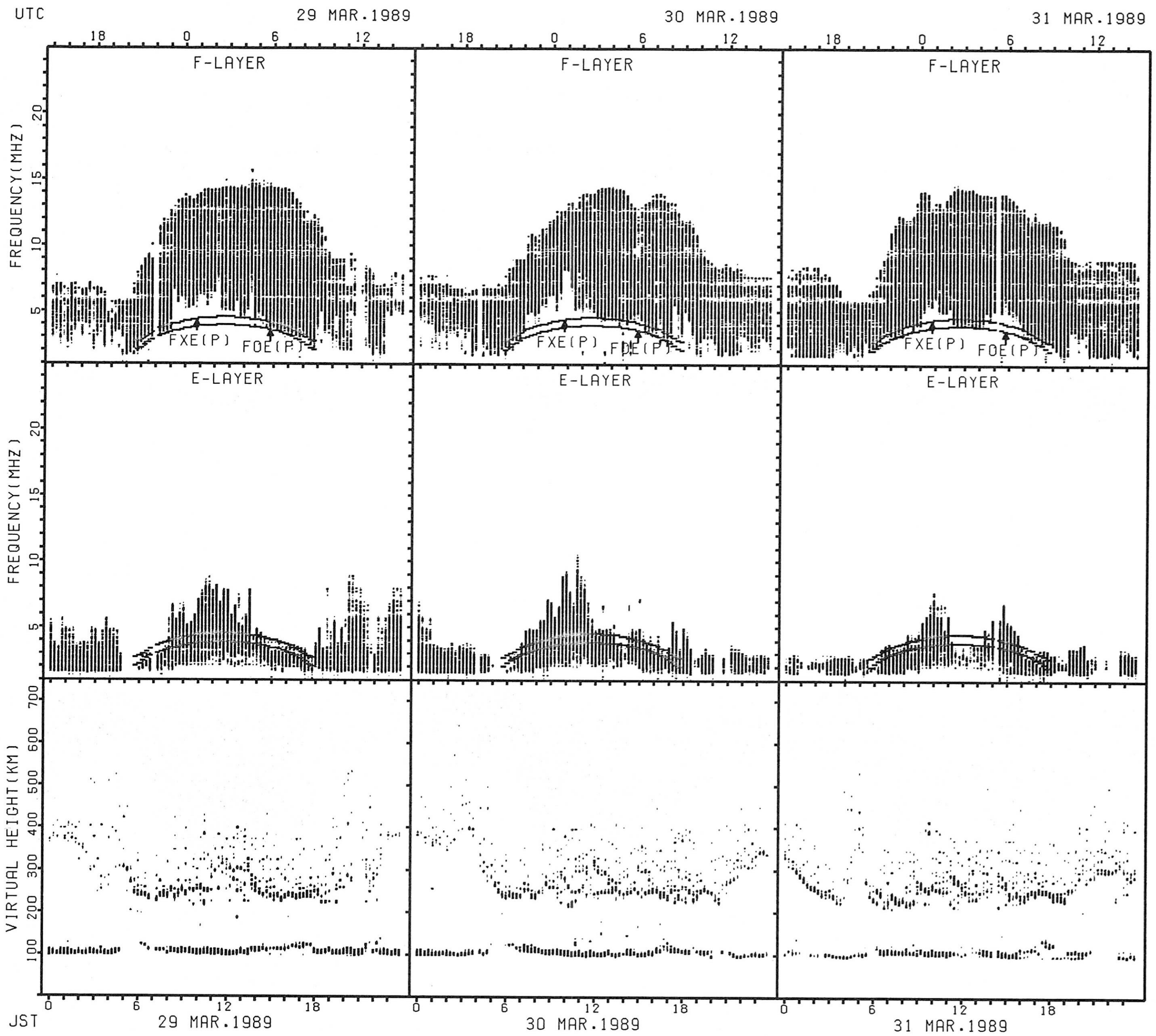
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



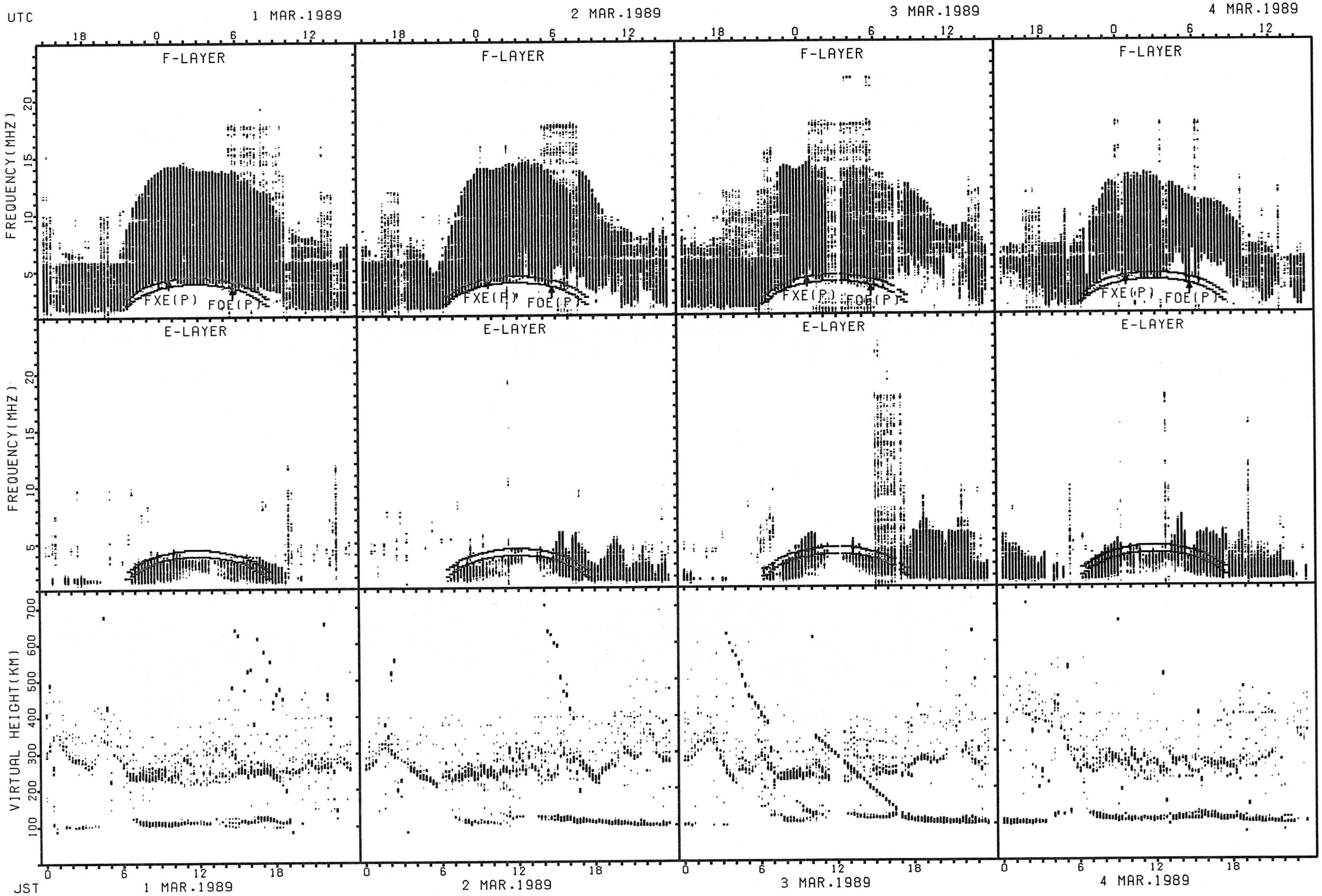
FXE(P): PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



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

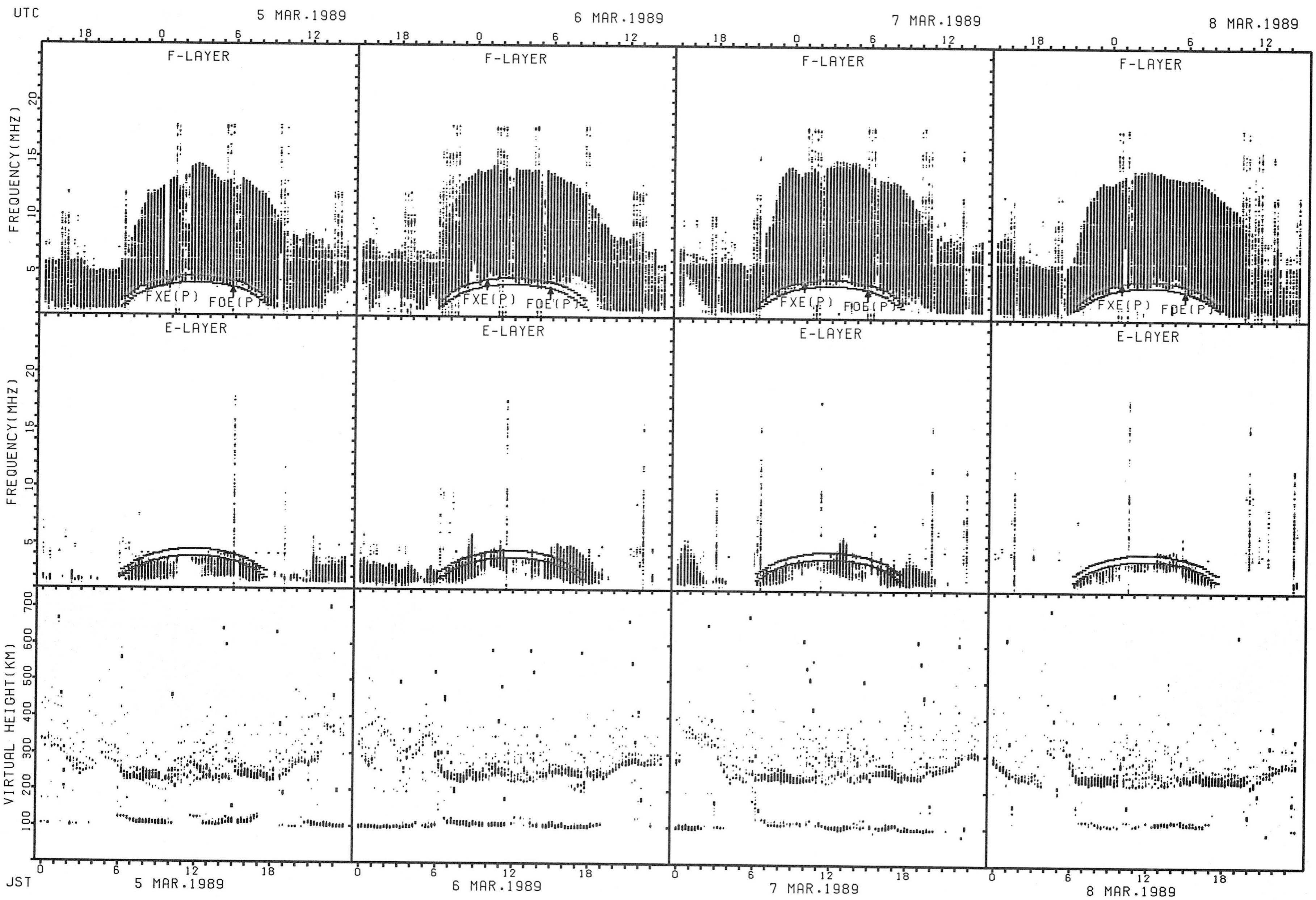
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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.

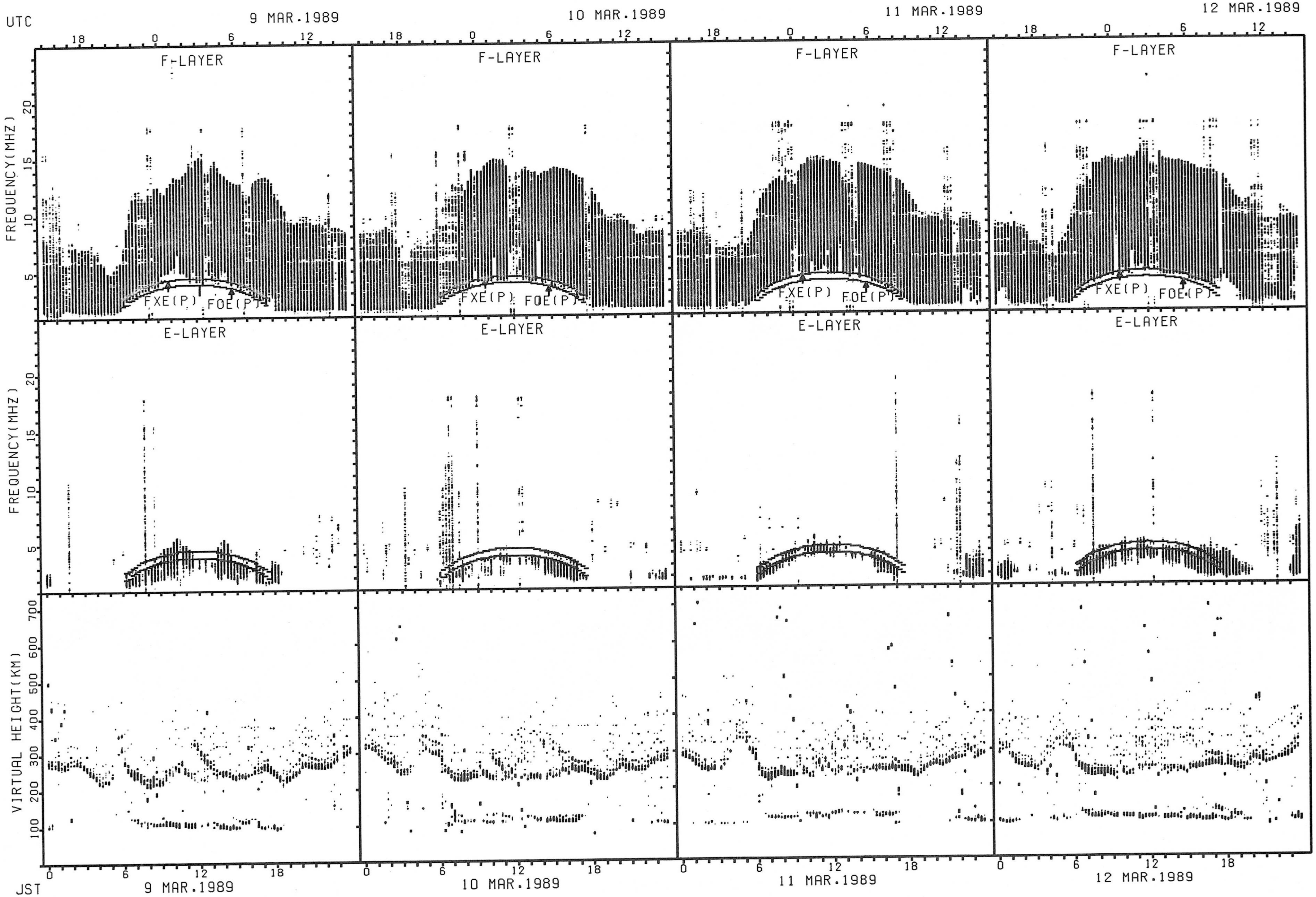
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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.

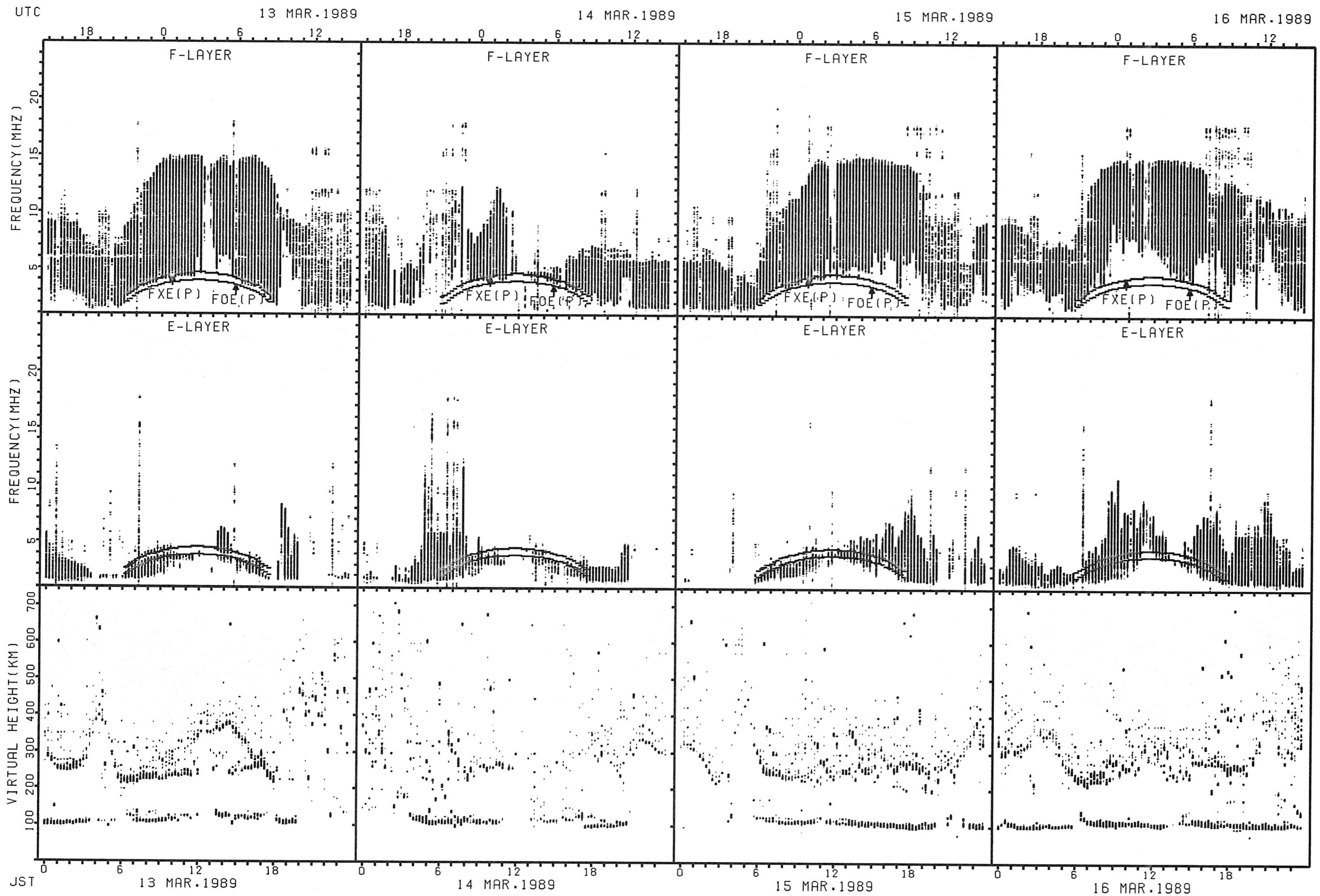
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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.

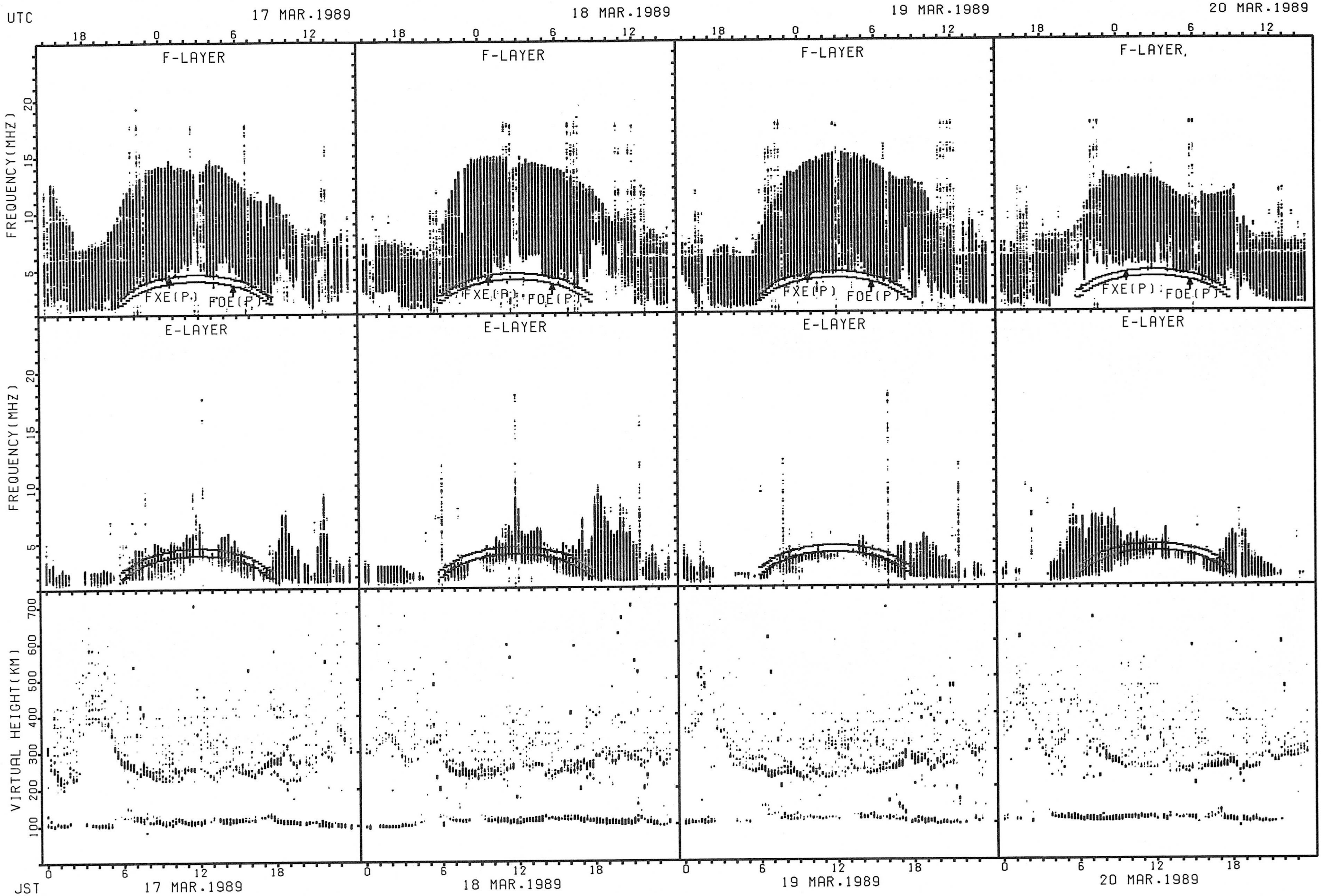
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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.

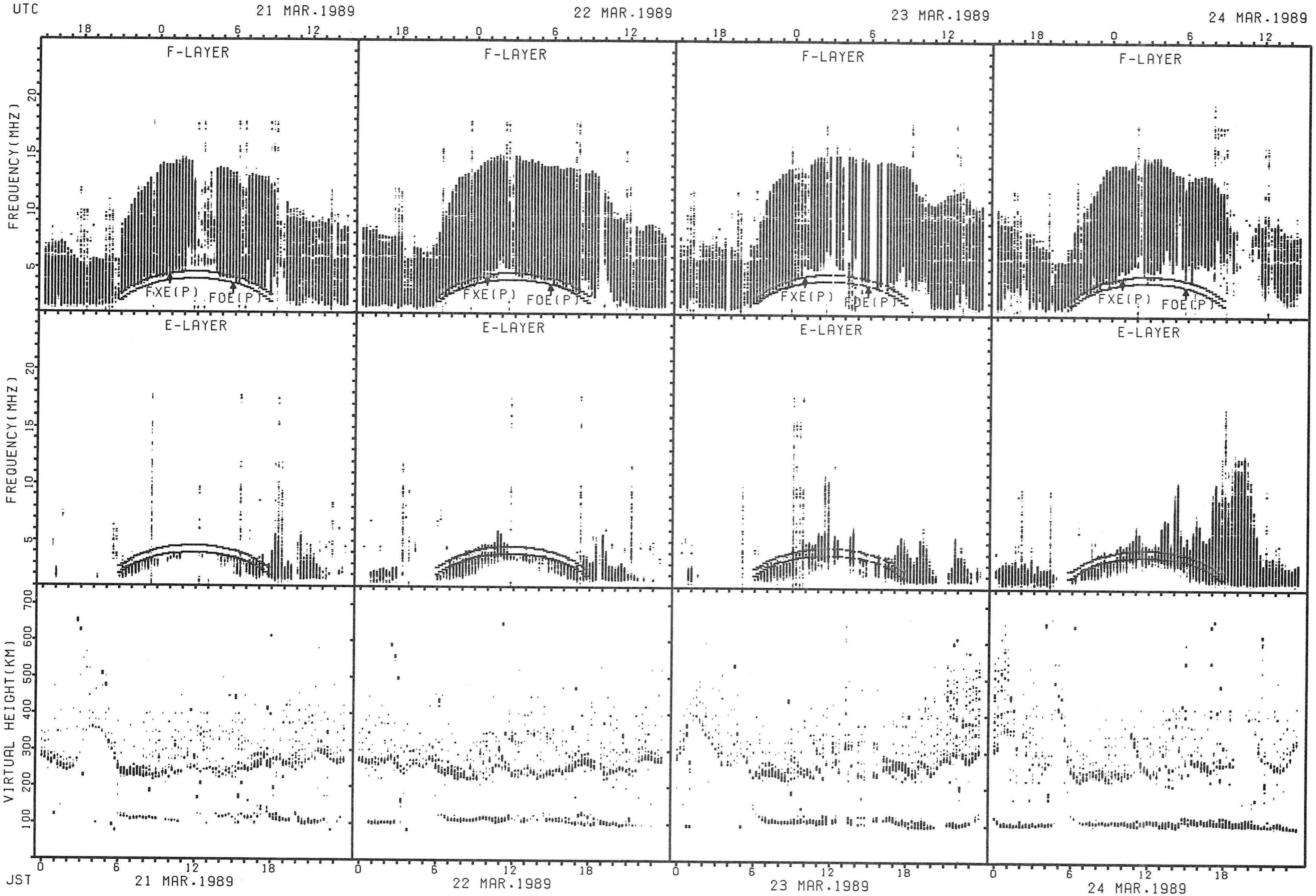
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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.

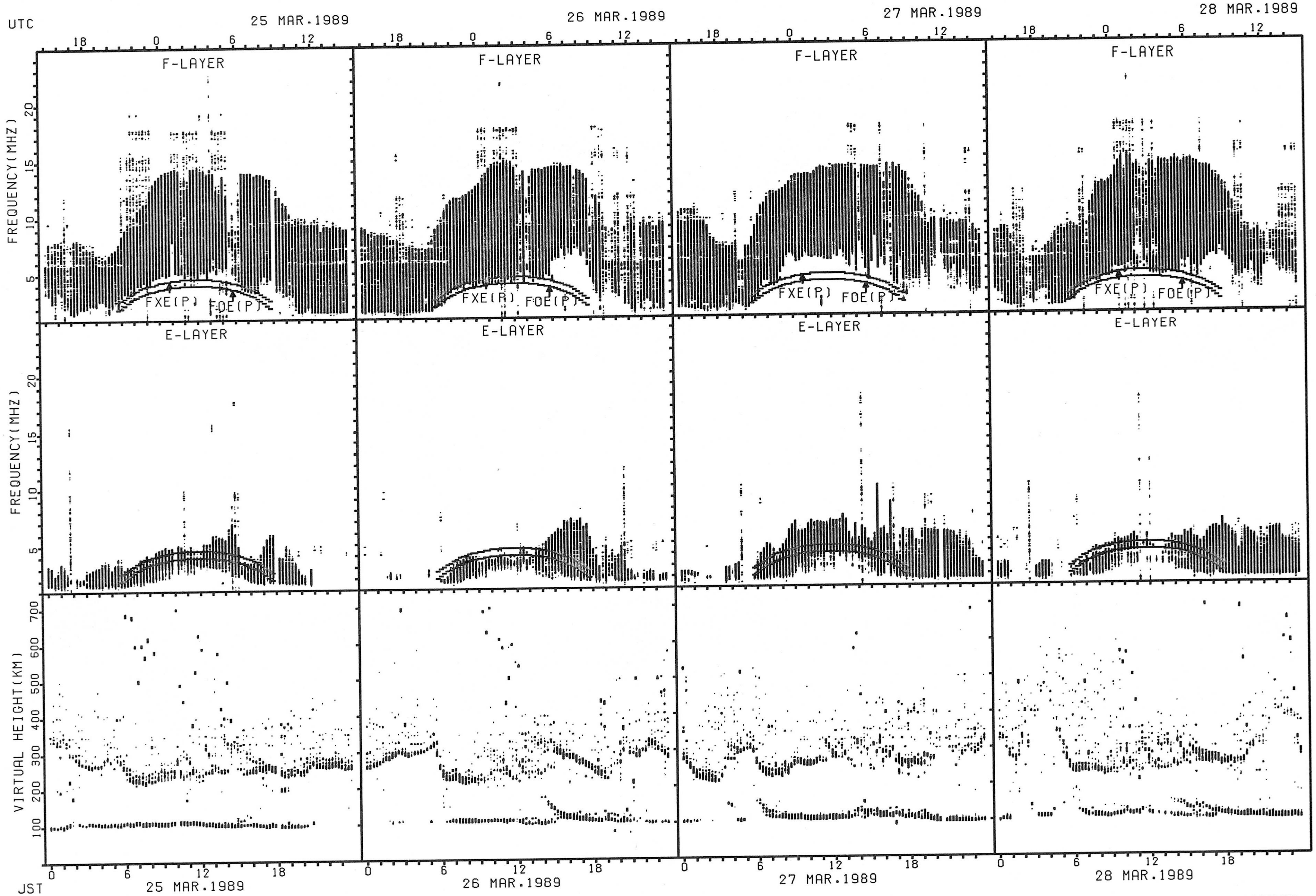
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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.

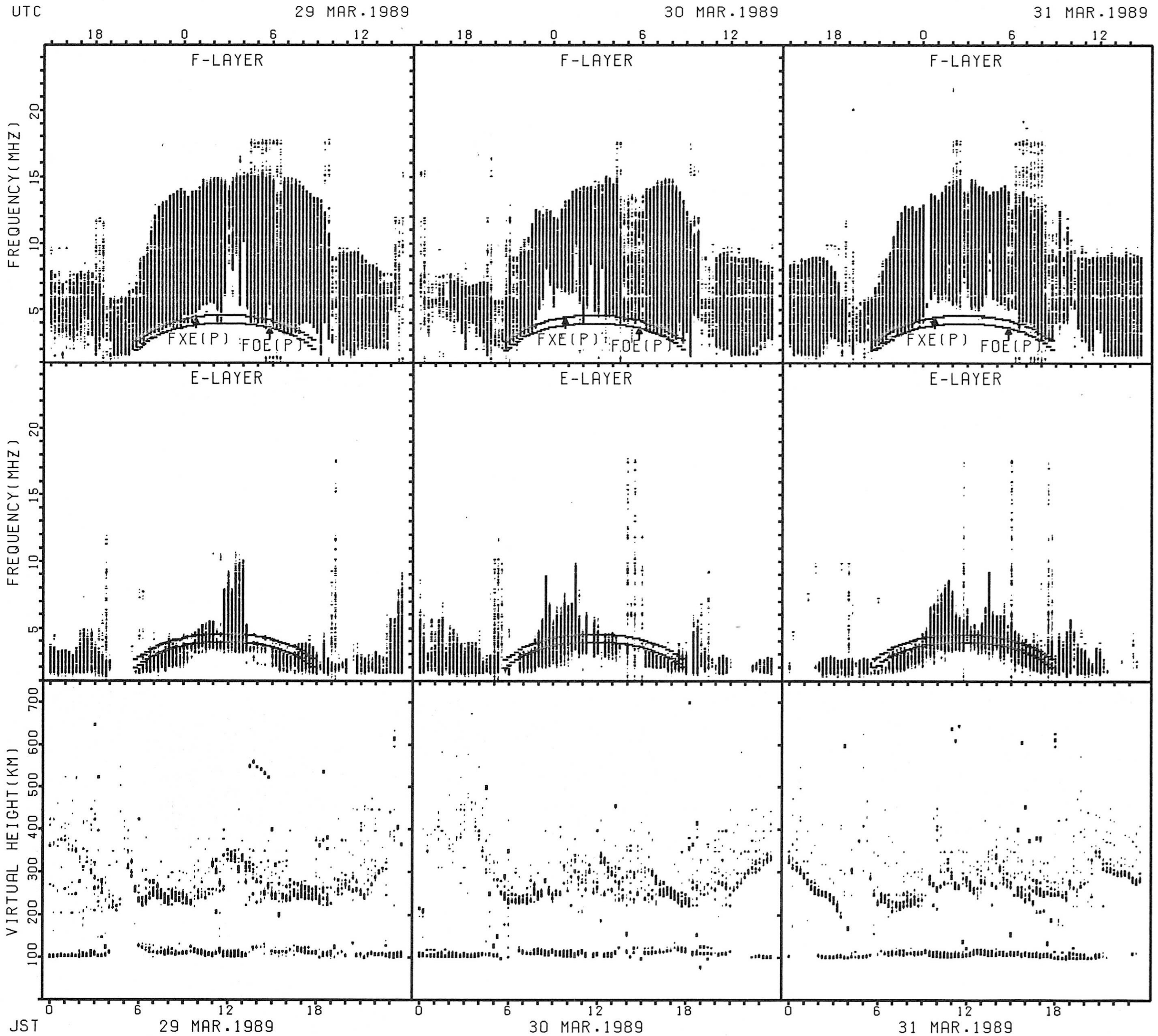
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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.

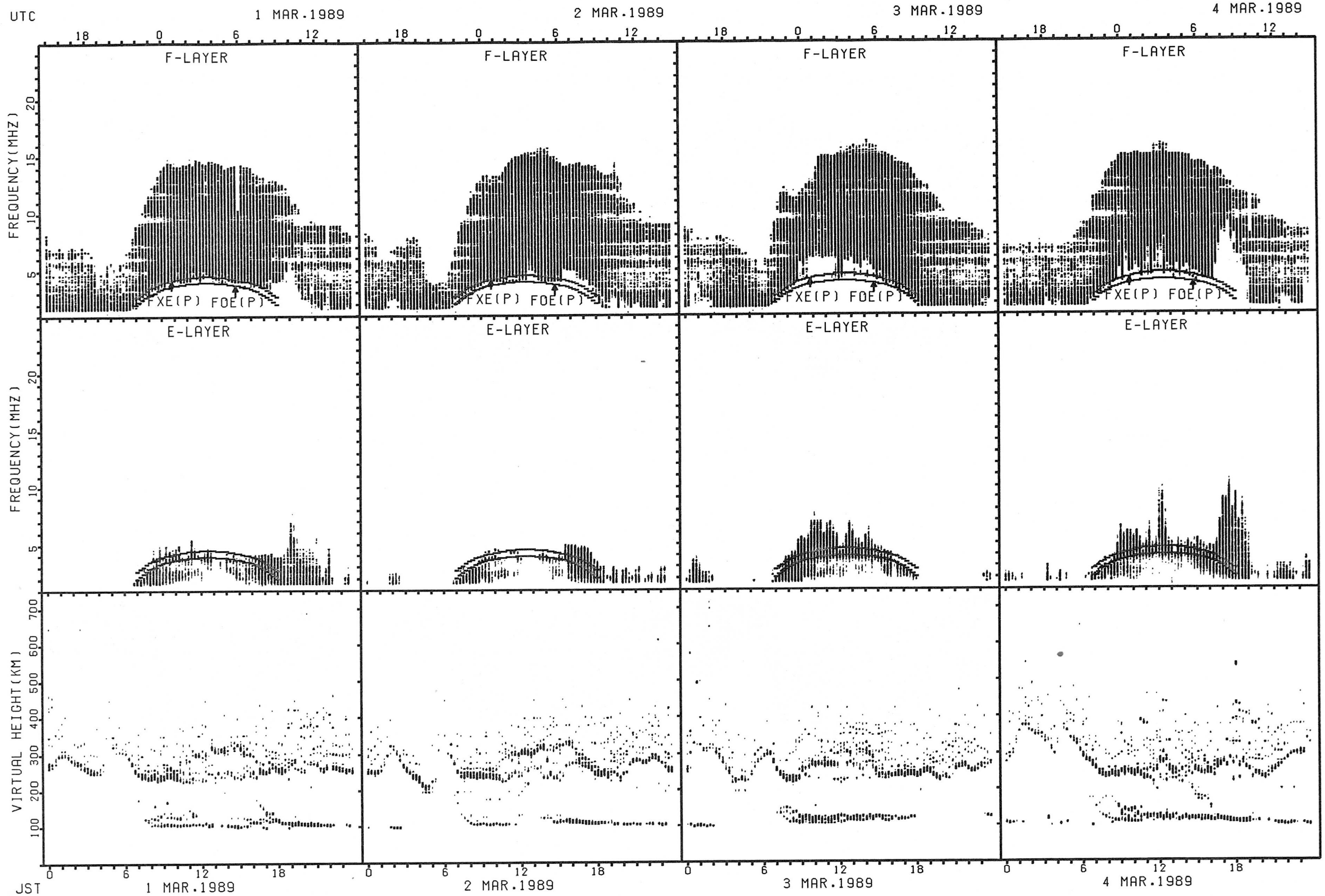
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

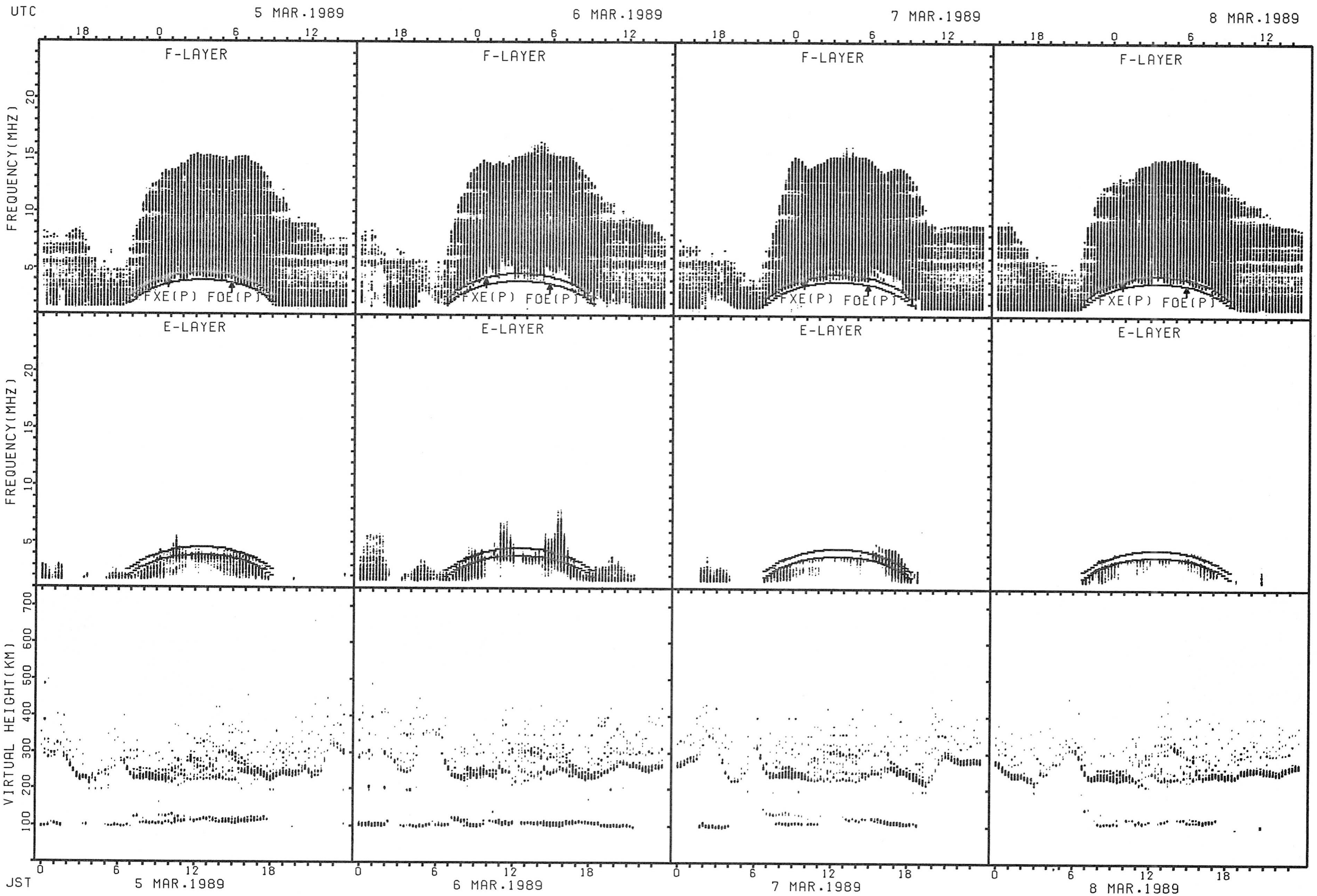
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT YAMAGAWA



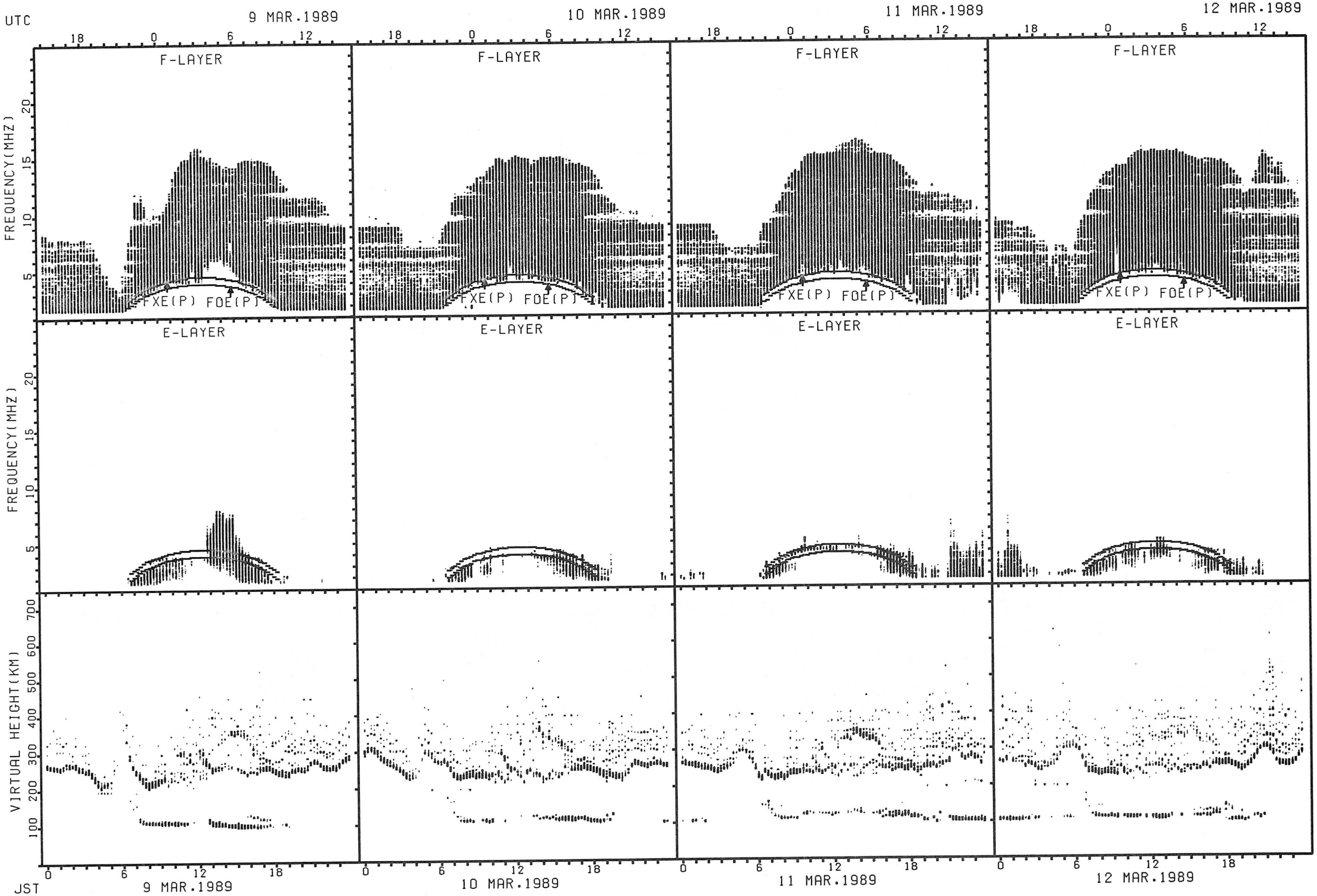
FXE(P): PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



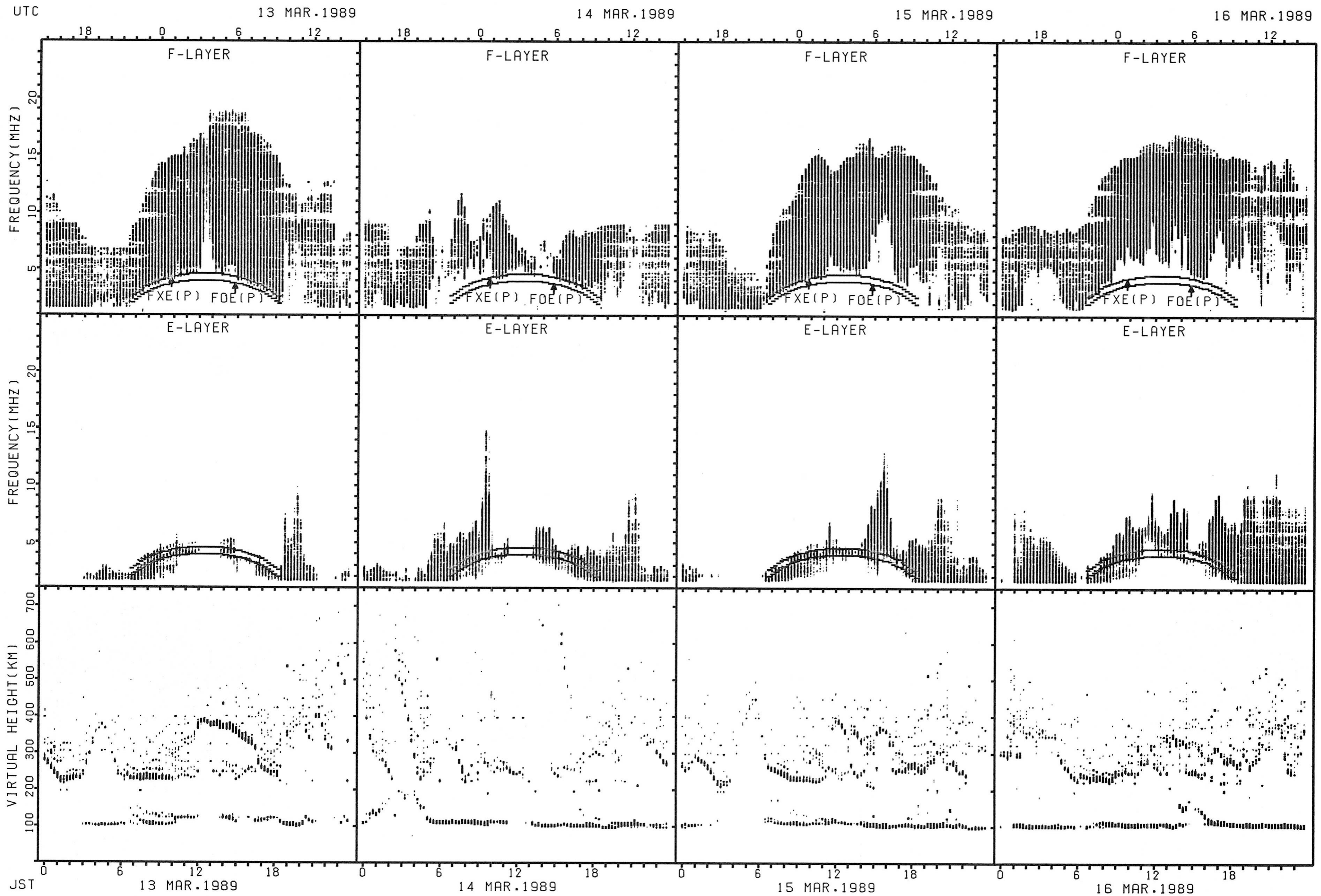
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



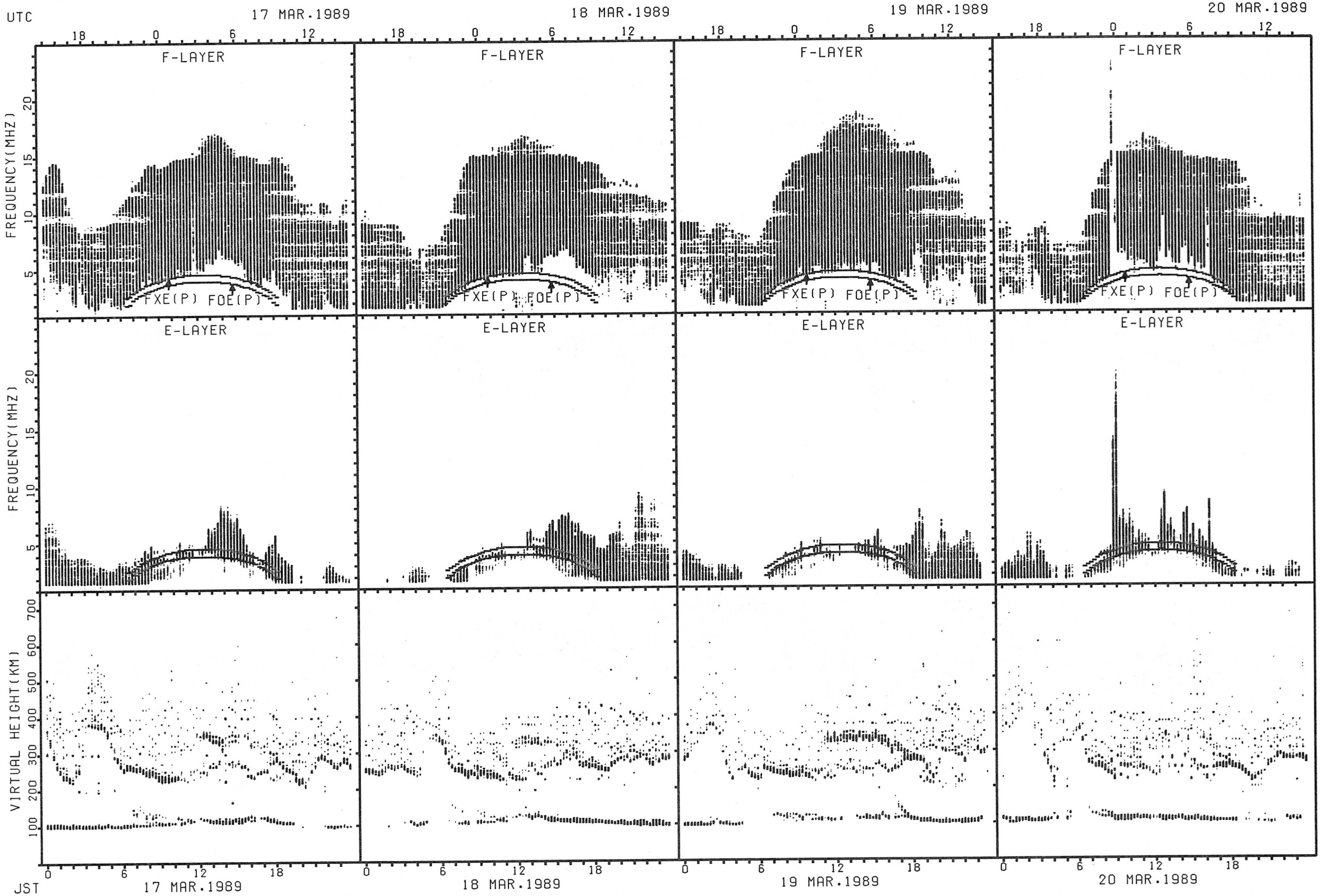
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



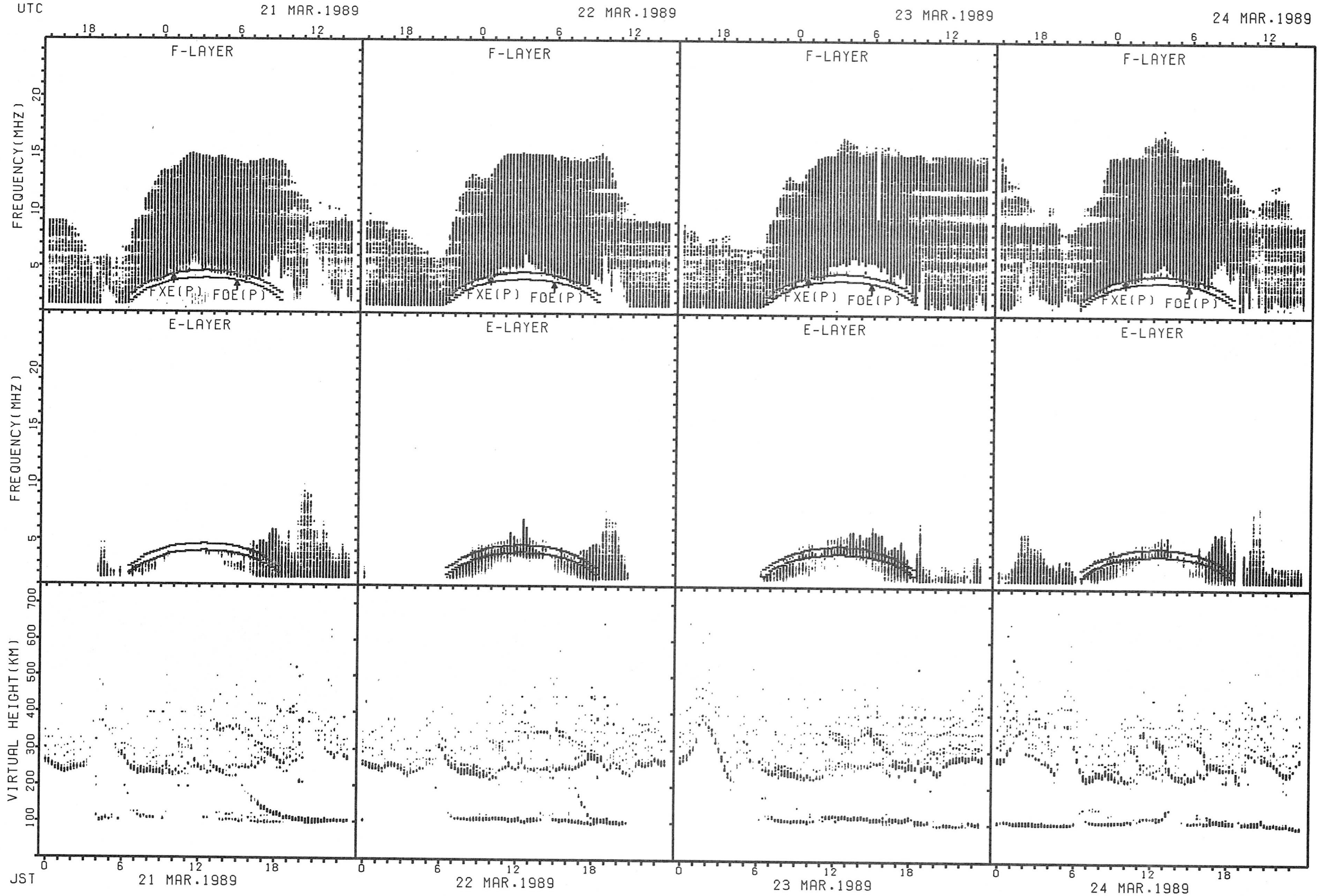
FXE(P): PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



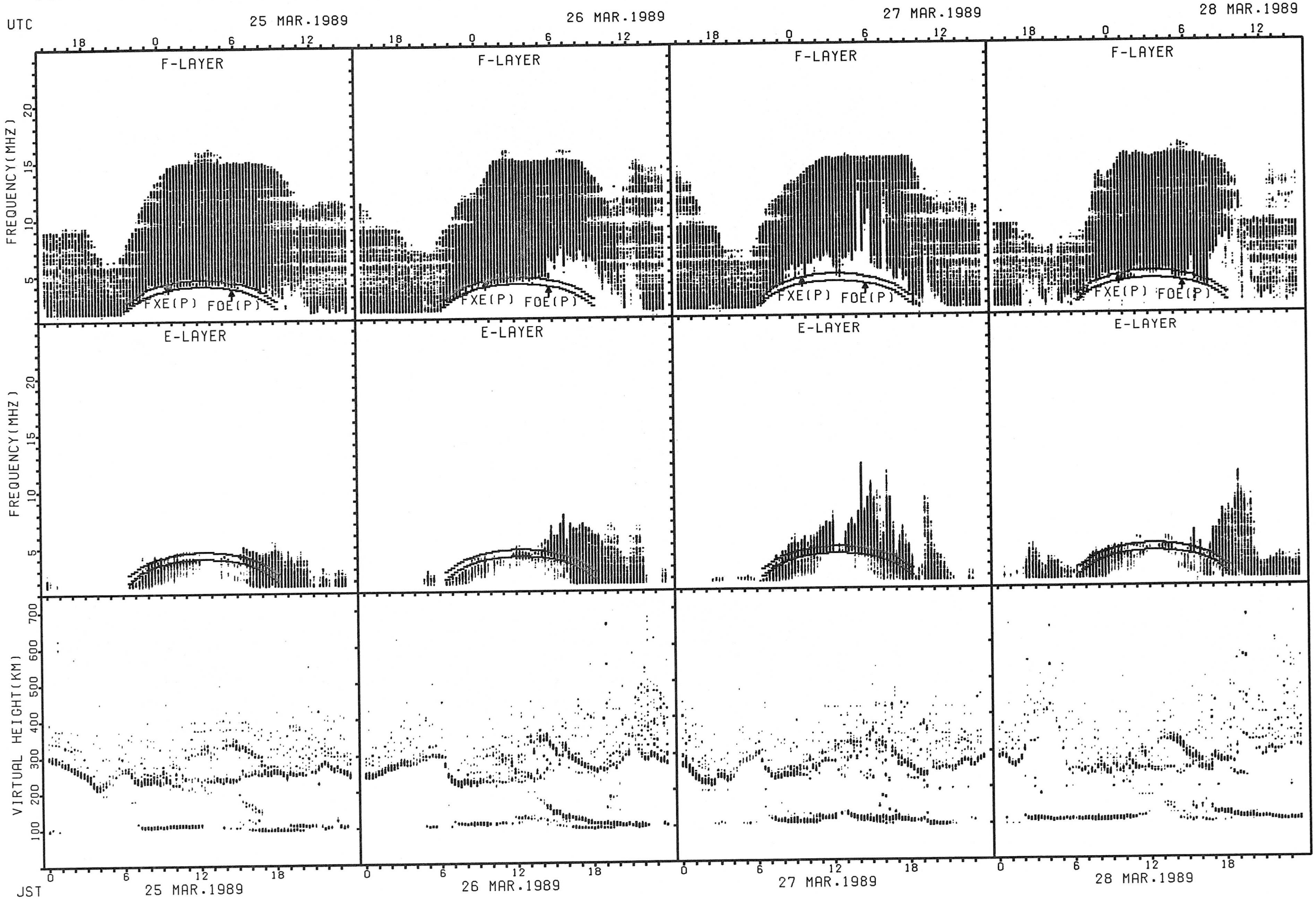
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



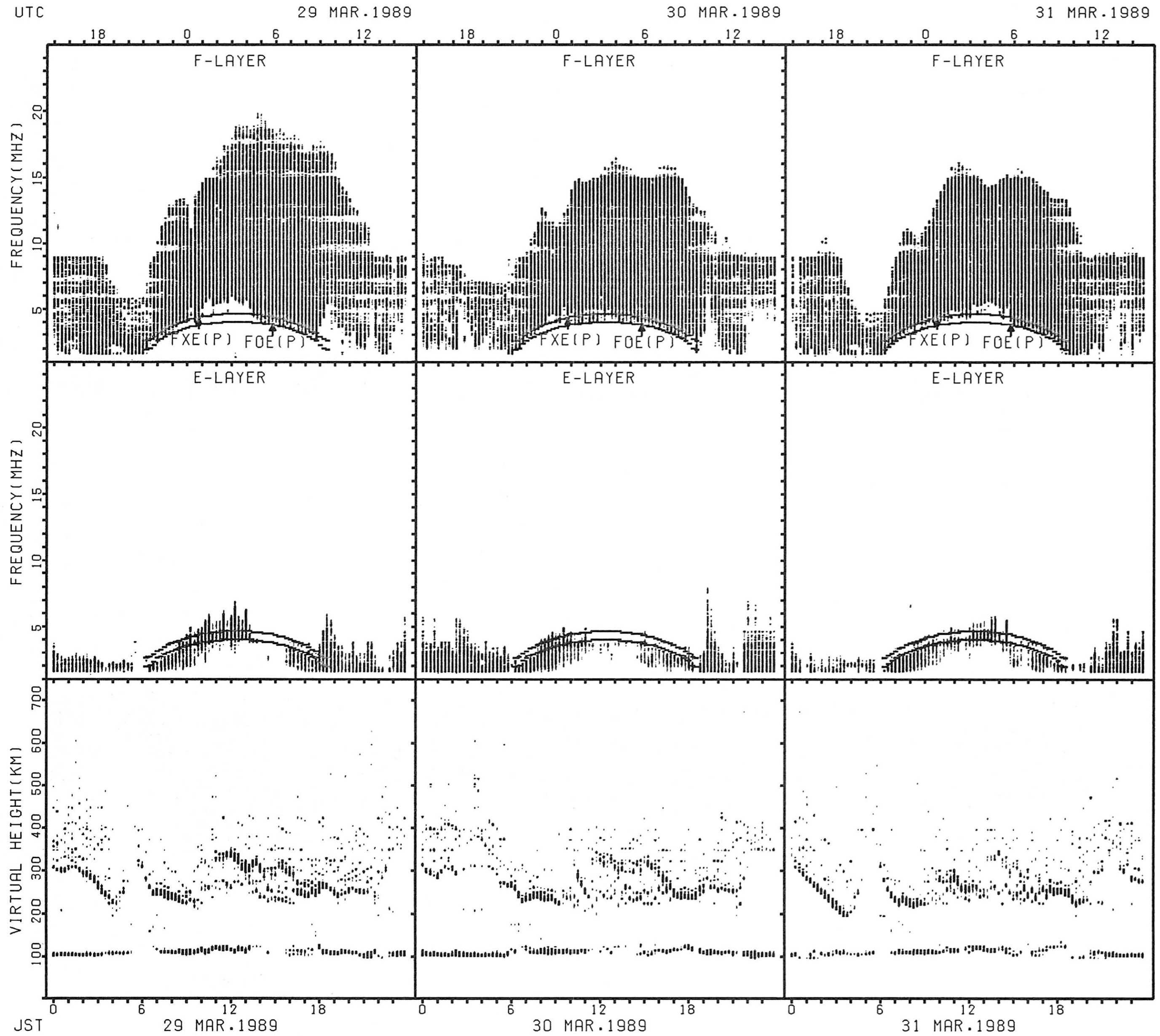
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



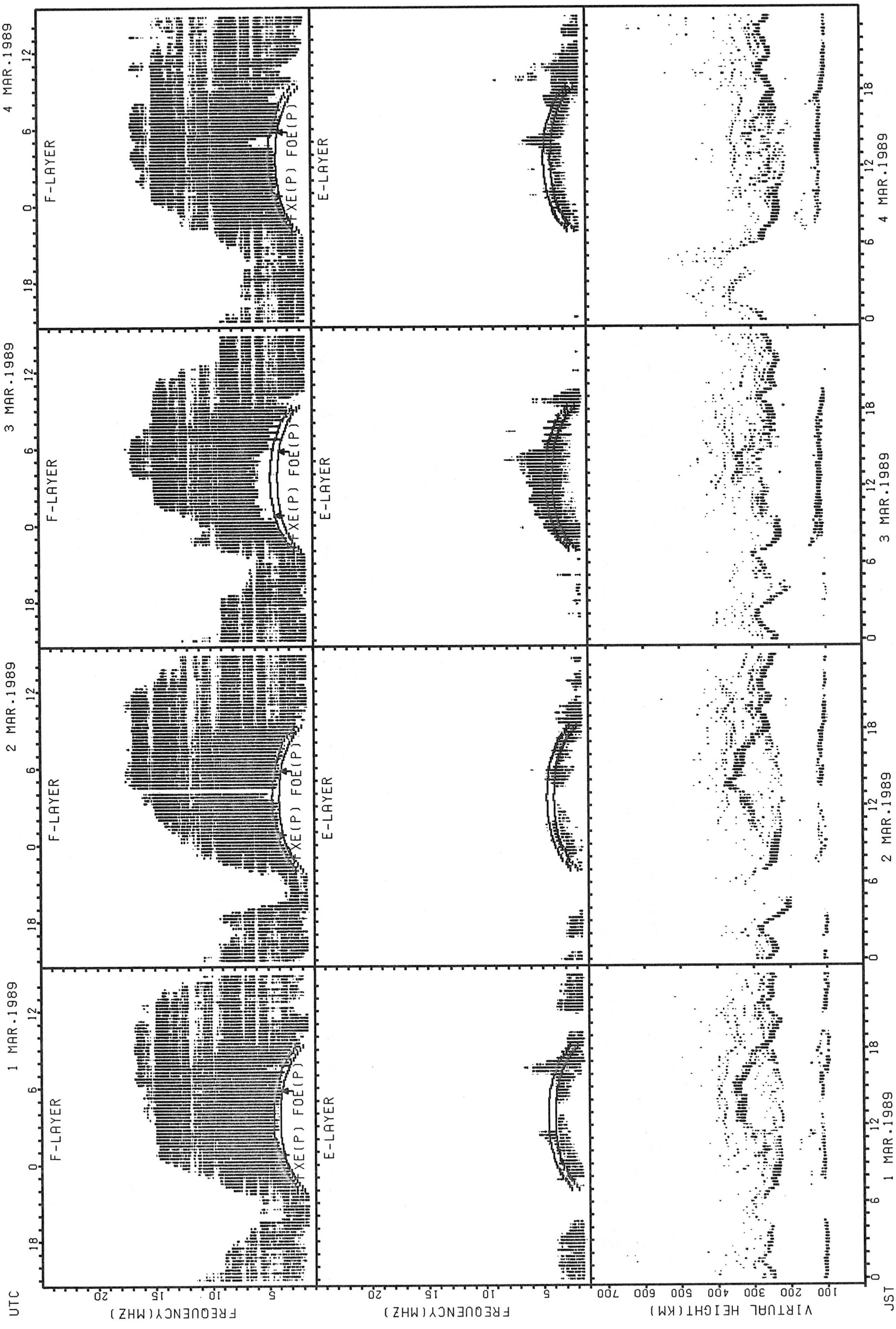
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT YAMAGAWA



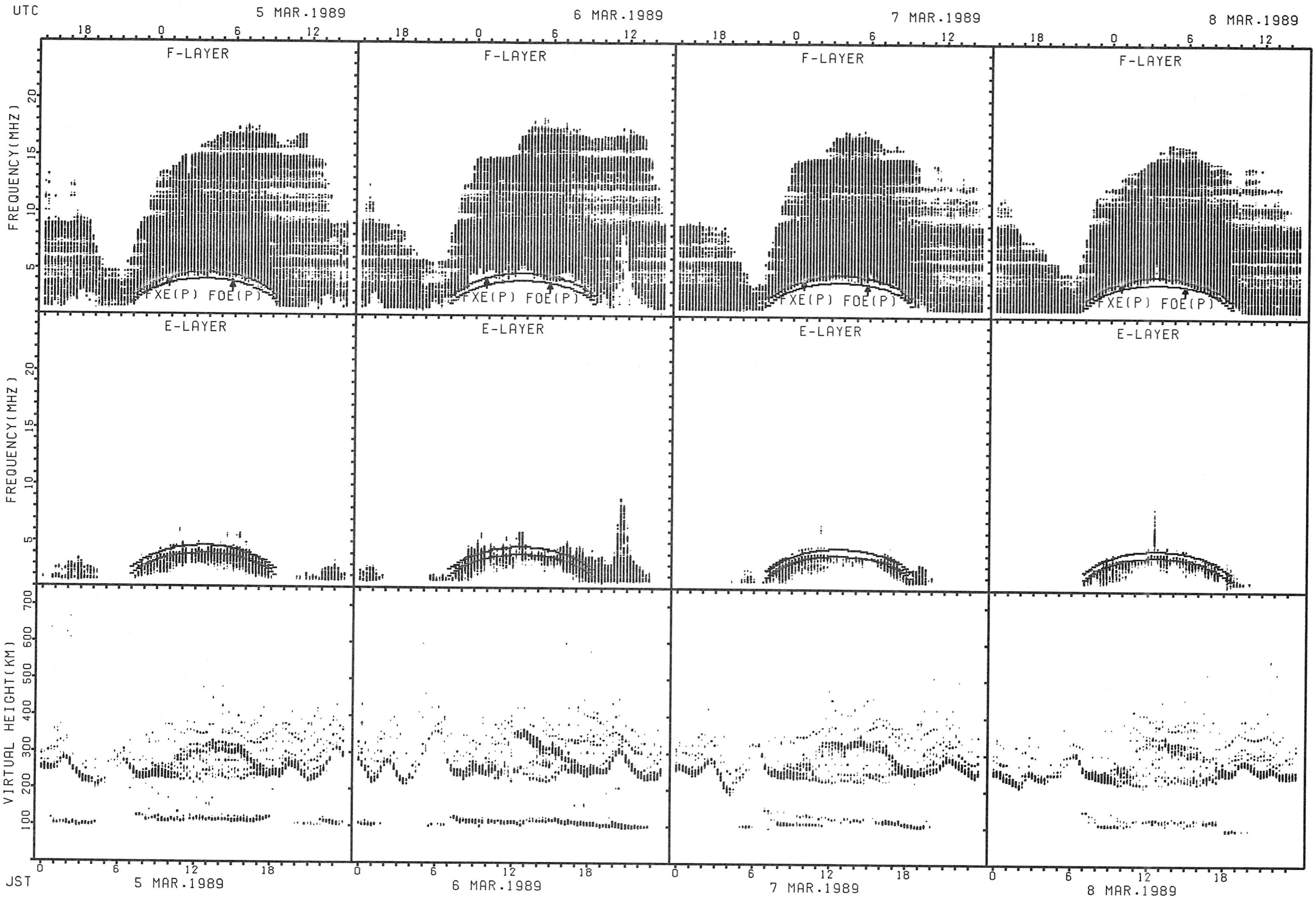
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



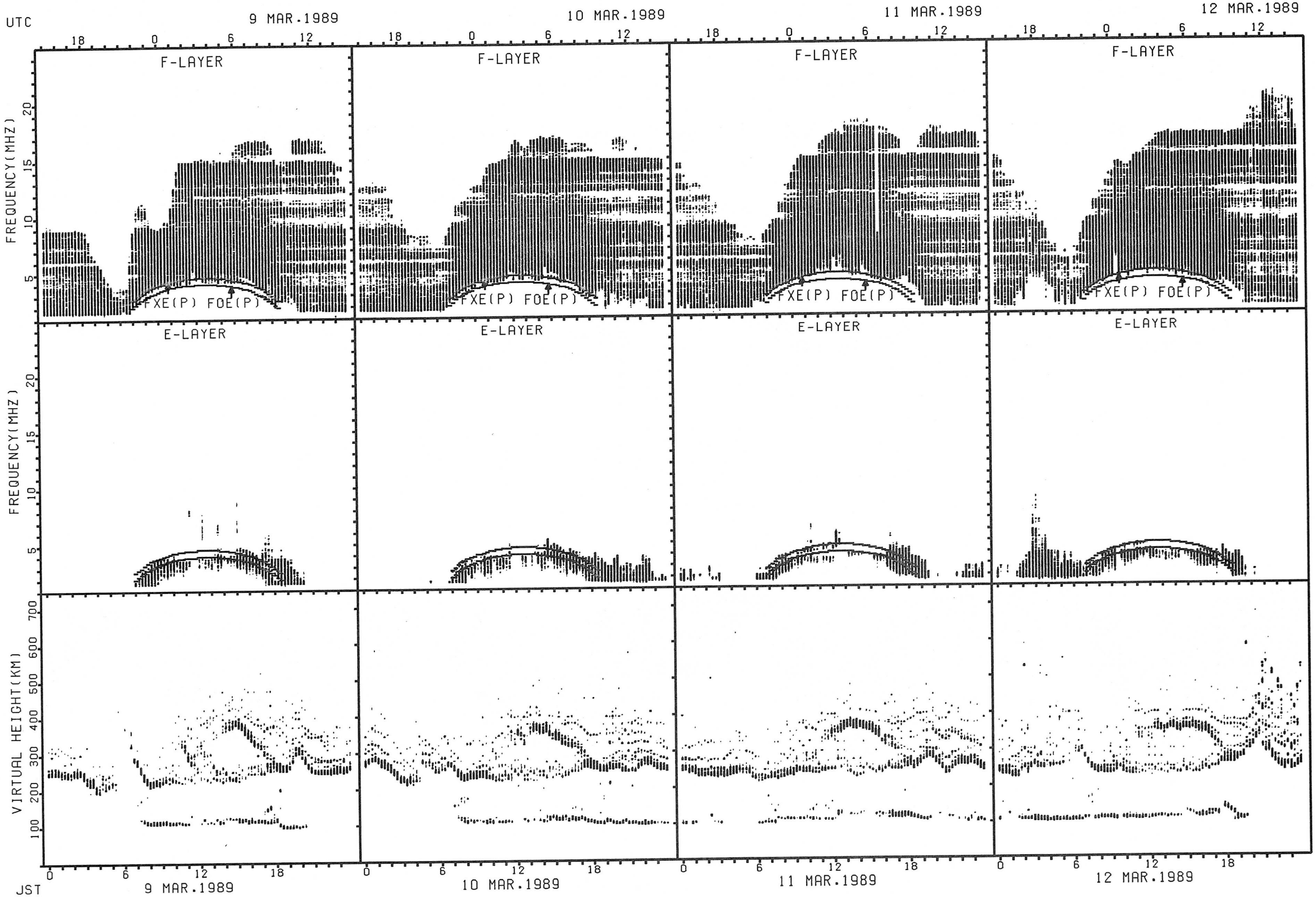
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



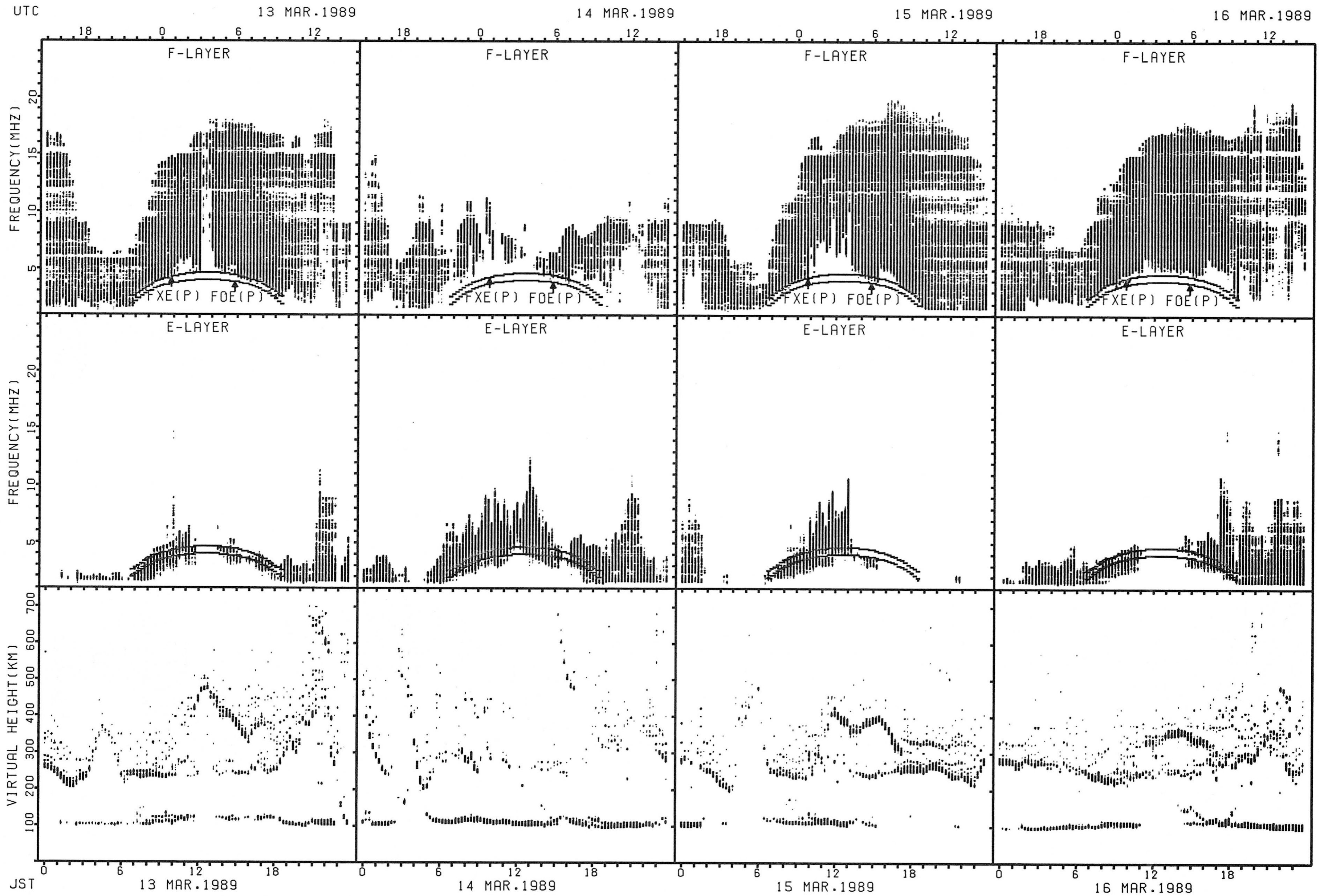
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



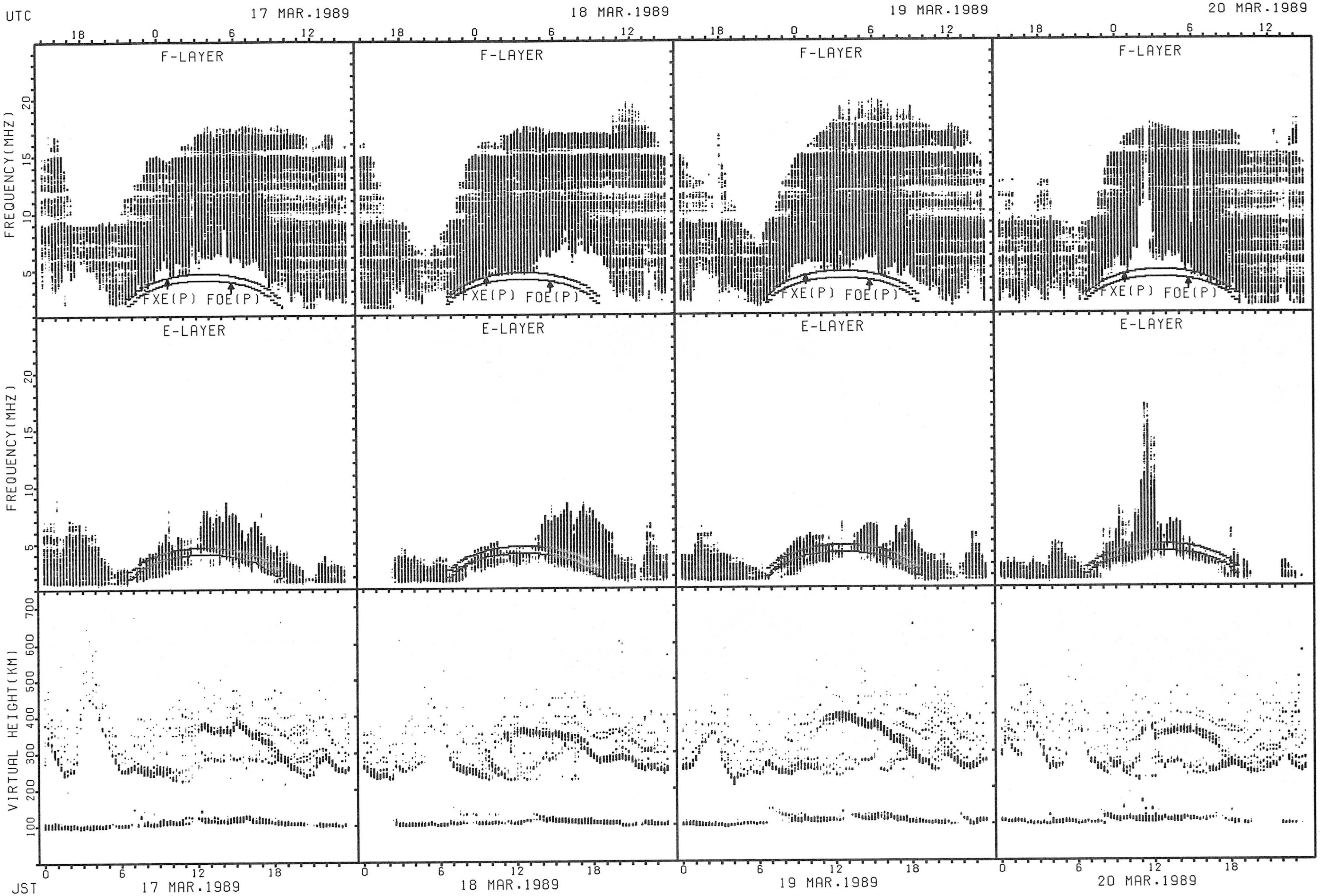
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



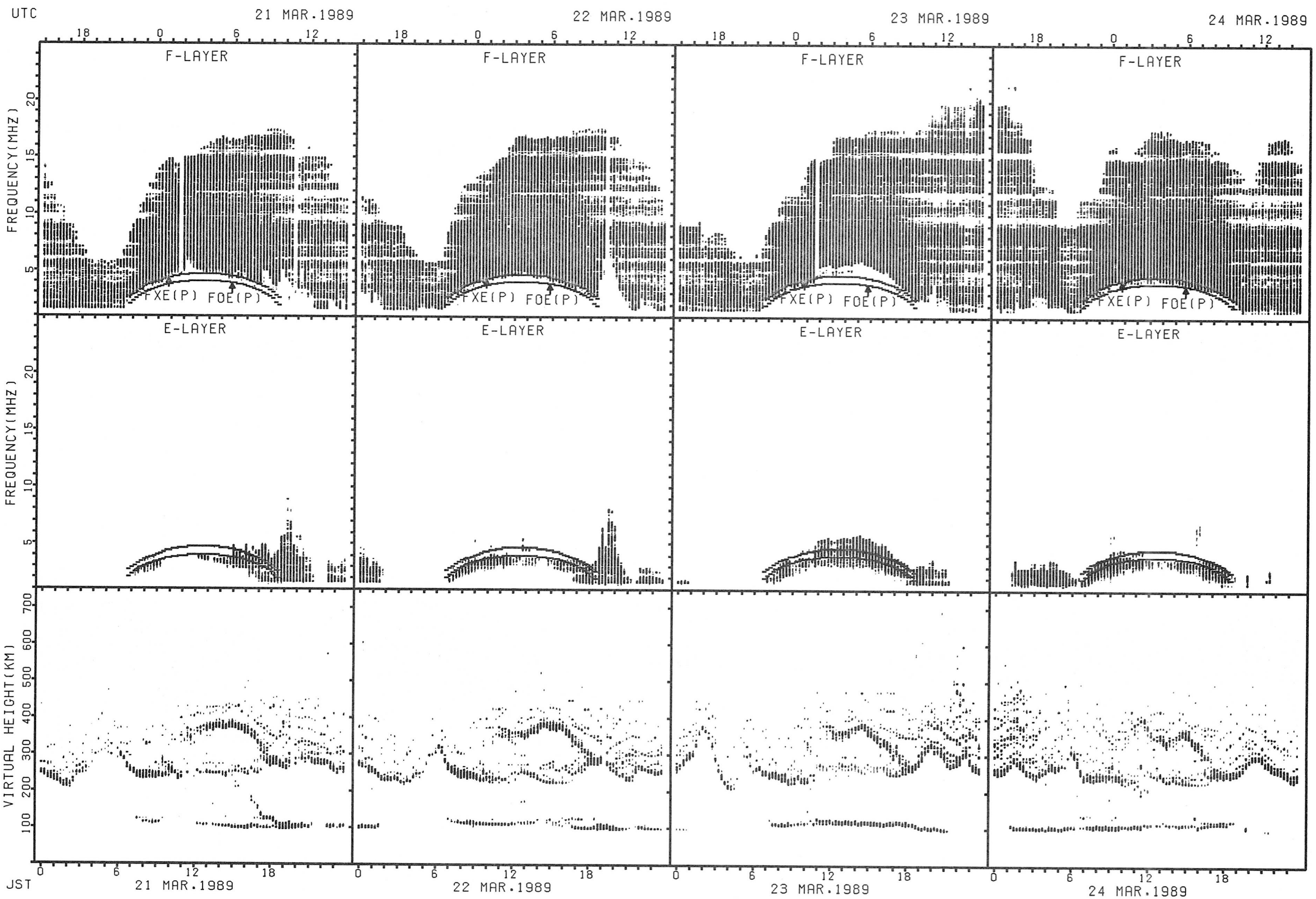
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



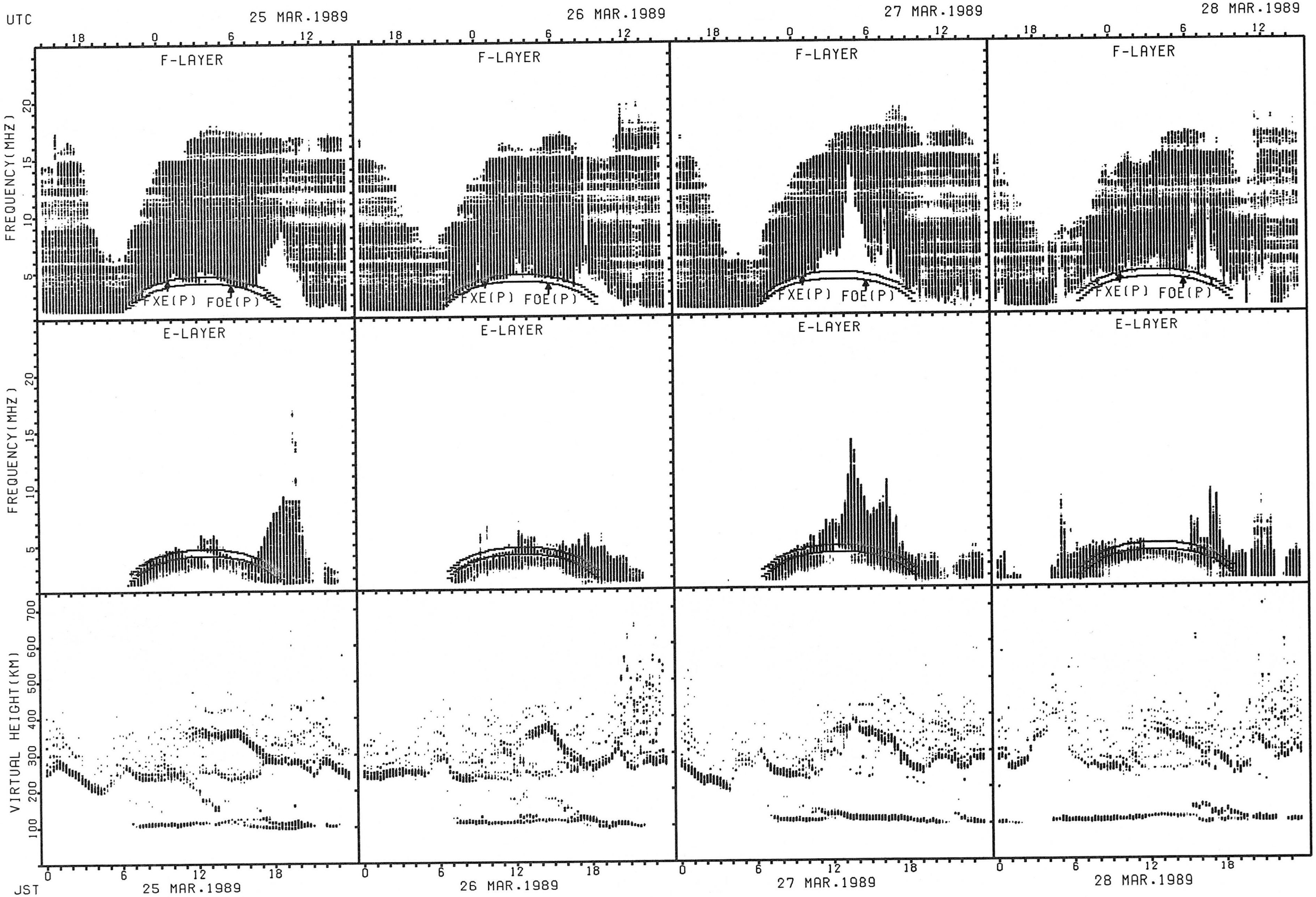
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA



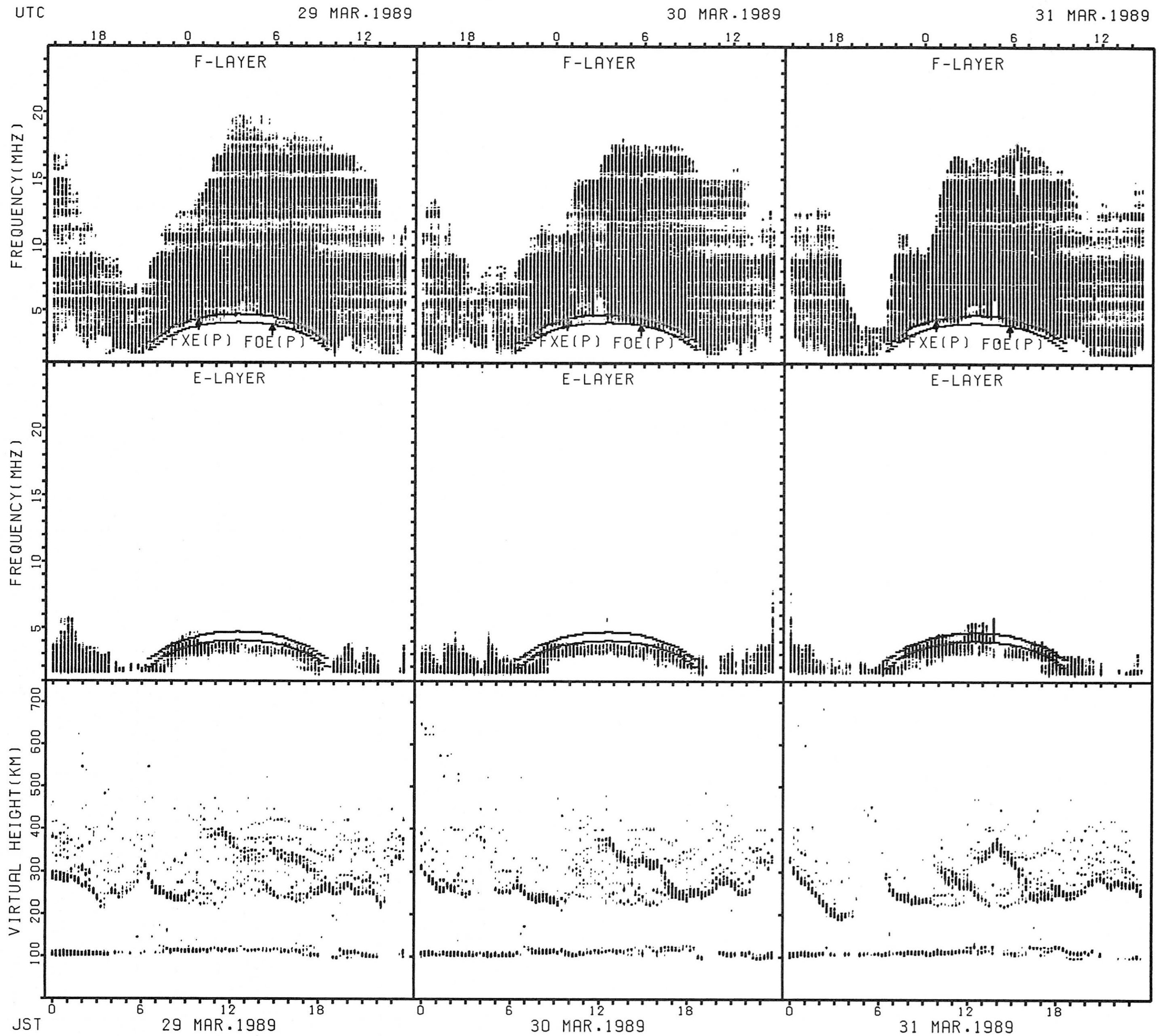
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

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

MAR.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							17	29	29	28	13				22	28	29	30	29	22	18			
MED							292	250	242	244	242				263	268	266	261	270	287	299			
U Q							310	281	267	257	263				274	283	284	282	289	300	320			
L Q							258	238	238	238	233				254	257	256	256	258	278	294			

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								10	16	17	10					10	11	12	12	11		11		
MED								151	126	123	120					126	123	122	118	115		115		
U Q								181	131	125	121					129	131	130	122	119		117		
L Q								129	122	118	117					117	119	117	114	111		113		

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							14	28	31	29					16	28	29	29	28	22	12			
MED							282	249	242	250					264	275	270	264	262	282	317			
U Q							308	264	250	264					268	300	279	282	271	296	330			
L Q							280	242	232	237					260	261	262	254	256	270	298			

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	13	15	15	15				13	17	23	24	18	16	14	18	22	21	23	23	22	21	16	16	17
MED	105	103	103	107				117	113	111	109	108	107	108	111	113	115	119	111	109	111	108	105	105
U Q	107	107	105	117				154	118	115	113	111	120	113	115	117	121	125	119	119	117	113	107	109
L Q	101	101	99	103				111	109	109	107	105	104	105	105	113	111	111	103	105	106	101	101	101

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	12	13	12				19	30	31	30					16	29	30	30	30	27	21	22	20	16
MED	368	332	336				294	252	240	246					274	280	276	262	260	280	324	348	349	346
U Q	409	347	389				360	266	270	258					281	319	290	280	270	290	338	370	374	381
L Q	335	267	299				272	240	232	238					261	259	262	256	254	262	309	318	312	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	19	18	12	13	13			15	18	21	20	22	19	15	22	19	20	24	25	25	21	20	14	17
MED	103	105	105	107	109			125	115	113	115	113	111	111	118	119	117	115	111	109	107	107	106	107
U Q	107	107	108	110	117			125	119	118	117	119	123	117	125	127	123	124	113	112	112	112	109	109
L Q	101	101	103	104	107			117	109	110	109	109	109	107	111	113	112	109	106	107	104	105	105	102

MONTHLY MEDIANS OF H'F AND H'ES

MAR.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	23	19	13	11				27	31	30	24		11			30	30	30	30	31	23	23	24	24
MED	328	324	306	318				260	242	244	244		256			279	290	269	260	274	304	328	309	316
U Q	346	354	339	358				274	254	256	257		258			330	316	286	278	290	314	352	338	334
L Q	312	298	295	272				252	234	240	242		252			260	264	262	254	256	288	318	299	306

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	14	14	14	11	12	13		11	21	21	20	23	20	20	22	21	24	25	25	25	21	20	17	18
MED	107	107	107	107	105	107		143	121	115	116	115	121	118	117	115	117	117	111	109	109	107	107	107
U Q	111	107	109	109	109	110		155	131	123	124	121	124	123	123	121	131	122	117	113	111	112	108	109
L Q	101	103	103	103	105	105		113	115	111	113	113	116	110	111	109	114	110	109	106	105	105	104	105

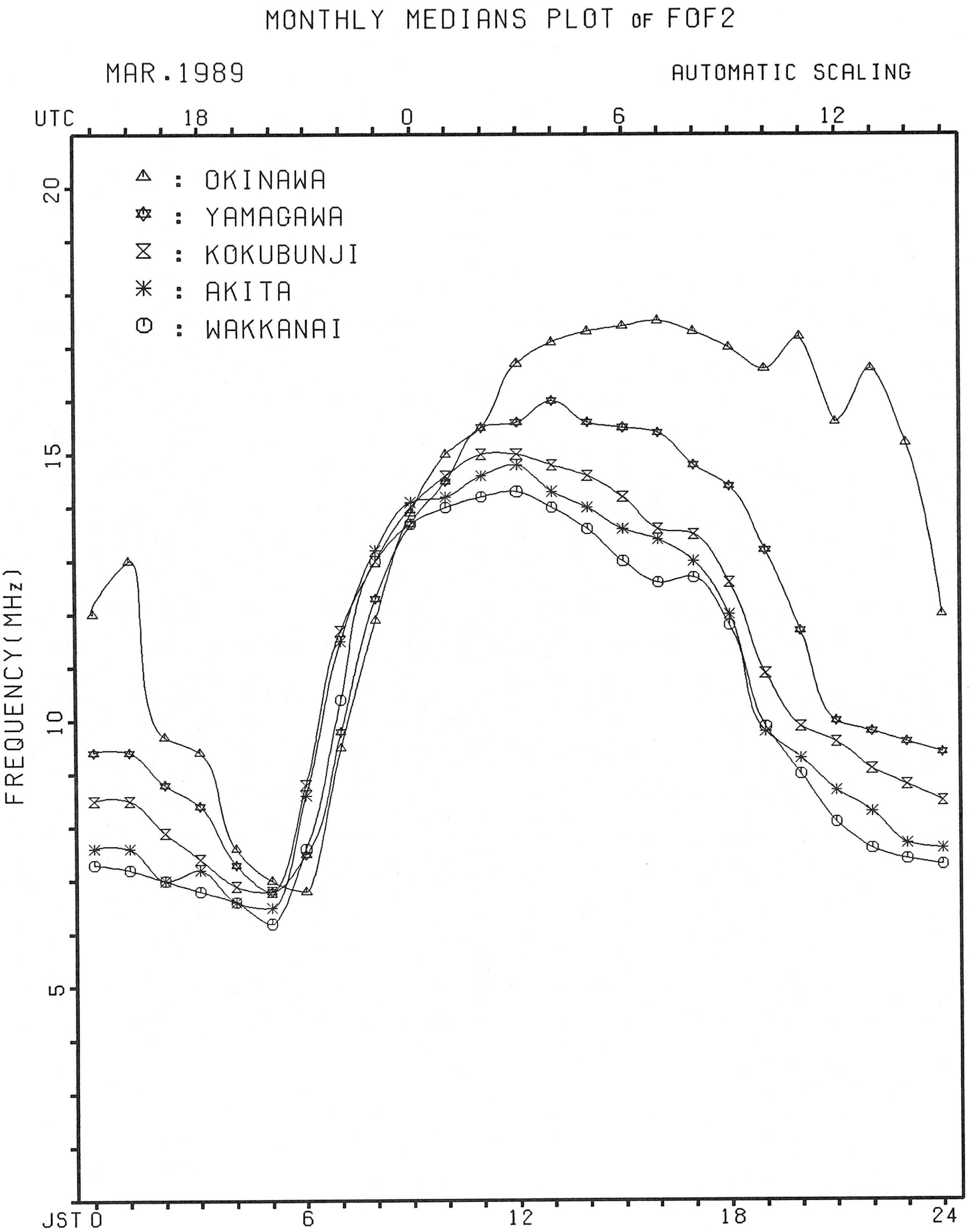
STATION OKINAWA LAT. 26.3N LON. 127.8E

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	30	29	24	22				23	31	30	31					28	30	29	30	30	31	29	29	30
MED	288	282	282	264				284	254	254	264					347	330	300	276	281	300	288	290	280
U Q	312	303	316	290				294	274	264	304					364	354	331	286	290	328	309	307	298
L Q	270	263	262	248				272	242	246	246					331	312	271	262	270	278	279	278	268

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	15	13	13	16	10	12	13	12	20	18	20	21	16	16	16	19	21	26	27	27	20	18	17	15
MED	109	107	107	104	103	105	105	126	131	119	115	117	119	119	117	117	115	124	115	107	107	106	105	105
U Q	111	109	109	108	107	108	111	150	140	123	125	121	125	135	123	121	123	127	123	109	109	109	109	109
L Q	105	106	102	100	101	104	103	107	120	113	113	113	116	118	115	113	114	115	109	103	105	103	104	99



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

IONOSPHERIC DATA

MAR. 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	67X	65X	69X	65X	61X	61X													111X	94X	82X	82X	76X	72X
2	73X	66X	69X	71X	72X	61X													123X	100X	88X	87X	81X	89X
3	81X	75X	76X	80X	71X	64X													123X	111X	93X	87X	91X	79X
4	75X	75X	75X	73X	72X	79X													101X	84X	72X	69X	S	64X
5	63X	61X	63X	59X	53X	51X													106X	85X	80X	82X	75X	73X
6	79X	73X	68X	71X	S	68X													114X	96X	84X	82X	82X	75X
7	74X	69X	65X	65X	66X	59X													122X	100X	87OX	83X	80X	76X
8	82X	82X	69X	65X	59X	59X													116X	105X	95X	87X	79X	81X
9	82X	74X	76X	75X	68X	51X													130X	107X	98X	98X	91X	90X
10	86X	86X	89X	75X	75X	77X													128X	107X	101X	97X	86X	87X
11	87X	86X	82X	70X	68X	69X													122X	101X	100X	97X	95X	94X
12	88X	89X	85X	75X	72X	74X													132X	113X	110X	108X	101X	100X
13	100X	96X	92X	75X	68X	66X														101X	96X	85X	72X	69X
14	S	81	S	54X	55	78X														75X	69X	69X	65X	65X
15	64X	67X	68X	53X	47X	42X														S	102X	97OX	S	91X
16	93X	93X	87X	73	74X	75X														120X	116X	114X	110X	100X
17	S	118	92	71X	73X	83X														101X	87X	81X	75X	81
18	76X	71X	74X	69X	66X	69X														105X	94X	90X	83X	81X
19	73X	65X	64X	71X	66X	62X														120X	98X	89X	90X	80X
20	75X	71X	74X	80X	79X	81X				130		131								92X	75X	77X	74X	73X
21	73X	74X	64X	57X	58X	59X														110X	102X	92X	93X	90X
22	88X	85X	80X	78X	71X	66X														124X	101X	91X	88X	89X
23	80X	80X	74X	76X	72X	71X														C	C	C	C	C
24	C	C	C	C	C	C														C	C	C	C	C
25	C	C	80X	79X	71X	70X														113X	102X	101X	100X	C
26	C	88X	85X	78X	76X	77X														103X	93X	102X	99X	100X
27	105X	104X	99	77	75	66OX	92													116X	102X	102X	96X	92X
28	87X	86X	68OX	68X	68X	86X	89	88	123	131										104X	84X	81X	82X	82X
29	81X	76X	81X	77X	65X	63X														105X	99X	93X	85X	81X
30	85X	78X	79X	72X	76X	74X														106X	96X	92X	91X	88X
31	88X	90X	90X	83X	60X	58X														105X	91X	94X	95X	97X

	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	29	29	30	29	30	2	1	1	2		1							12	28	29	29	27	28
MED	81X	78X	76X	72X	68X	67X	90	88	123	130		131							122X	105X	95X	90X	86X	82X
UQ	87X	86X	85X	77X	72X	75X													126X	110X	101X	97X	94X	90X
LQ	74X	71X	69X	68X	65X	61X													112X	100X	87X	82X	80X	76X

MAR. 1989 | FXI (0.1 MHZ)

IONOSPHERIC DATA

MAR. 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	61	59	63	59	55	55	63	103	122	133	139	142	134	134	133	133	125	117	105	88	76	76	70	S 66
2	67	60	63	S 65	66	55	54	87	120	136	134	138	146	144	140	126	127	135	117	94	82	81	75	83
3	75	69	70	74	65	58	66	116	138	133	148	R 151	I C 150	149	146	142	131	125	117	105	87	81	85	73
4	69	69	69	67	66	73	74	92	111	119	127	128	128	121	115	106	105	102	95	78	66	63	I S 57	58
5	57	55	57	53	47	45	52	84	112	119	128	131	142	133	125	128	125	114	100	79	74	76	69	67
6	73	67	62	65	I S 65	62	69	109	127	137	137	140	136	135	135	133	127	122	108	90	78	76	76	69
7	68	63	59	59	60	53	60	89	132	137	137	137	145	146	145	135	128	127	116	94	S 81	77	74	70
8	76	76	63	59	53	53	64	107	126	125	133	137	139	135	131	130	127	119	110	99	89	81	S 73	S 75
9	76	68	70	69	62	45	60	109	118	122	127	132	154	147	135	124	123	129	124	101	92	92	85	84
10	80	80	83	69	69	71	83	117	126	137	143	148	139	137	135	136	138	132	122	101	95	91	80	81
11	81	80	76	64	62	63	88	116	126	131	141	146	142	138	137	136	133	125	116	95	94	91	89	88
12	82	83	79	69	66	68	88	R 119	136	141	143	151	150	150	142	136	132	129	126	107	104	S 102	95	94
13	94	90	86	69	62	S 60	82	R 105	124	144	149	149	154	152	150	151	153	139	113	95	V 90	79	66	U S 63
14	I S 61	F	S	48	F 45	72	A	120	82	78	107	106	E G 57	J R 62	54	W	60	66	71	69	63	63	59	59
15	58	61	62	47	41	36	60	85	101	110	141	145	145	153	R 159	152	146	142	137	S	96	S 91	S	85
16	87	87	81	F 63	68	69	87	122	137	145	I R 148	151	154	154	150	144	134	S 121	125	114	110	108	R 104	94
17	S	F 104	81	65	V 67	77	102	I R 121	135	139	140	137	U R 138	144	136	126	114	107	112	95	81	75	69	F 74
18	70	65	68	63	60	63	S 78	116	137	146	146	147	143	142	138	134	I C 129	123	114	99	88	84	77	75
19	67	59	58	65	60	56	74	101	126	132	140	151	I R 156	155	147	138	129	123	124	114	92	83	84	74
20	69	65	68	74	73	75	85	112	127	F 123	V 127	F 118	126	115	108	106	107	109	110	86	69	71	68	67
21	67	68	58	51	52	53	78	105	118	135	137	145	132	R 134	132	129	128	125	121	104	96	86	87	84
22	82	79	74	72	65	60	78	114	128	133	144	146	146	142	139	I C 135	135	132	131	118	95	85	82	83
23	74	S 74	68	70	66	65	76	116	130	143	140	149	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	S 74	73	65	64	81	100	115	133	141	I C 141	143	140	135	135	136	135	I C 126	107	96	95	94	C
26	C	82	79	72	70	71	93	112	114	122	140	149	147	138	138	142	142	138	J R 119	97	87	96	93	94
27	99	98	F 86	F 65	F 66	R 60	F 82	110	116	127	131	137	139	139	133	137	139	140	131	110	96	96	90	86
28	81	80	62	62	62	80	F 80	F 79	F 111	F 116	148	R 152	145	143	142	142	138	133	121	98	78	75	76	76
29	75	70	75	71	59	H 57	80	118	131	134	141	153	R 164	R 168	171	R 153	147	141	130	S 99	93	87	79	75
30	79	72	73	66	70	68	84	97	120	115	130	140	144	154	R 143	136	144	146	120	S 100	90	86	85	82
31	82	84	84	77	54	52	73	104	124	127	131	148	149	140	138	I C 141	133	126	J R 122	99	85	88	89	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	27	28	29	30	30	30	29	30	30	30	30	30	29	29	29	28	29	29	29	28	29	29	28	28
MED	75	71	70	65	64	61	78	109	125	133	140	145	144	142	138	136	131	126	119	99	89	84	80	76
UQ	81	81	79	70	66	69	83	116	130	137	143	149	149	149	143	142	138	135	124	104	95	91	88	84
LQ	68	65	63	62	59	55	66	100	116	122	131	137	139	135	135	130	127	121	112	94	81	76	72	70

MAR. 1989 | FOF2 (0.1 MHZ)

IONOSPHERIC DATA

MAR. 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										L	L	L	L	L	L	L								
2										L		L	L		L	L	L							
3											L	L	C	L	L									
4									L	L	L	L	U L 520	L	A	L		A						
5									L	L	L	L	L	L	L	L								
6												L	L	L	L	L								
7										L	L	L	L	L	L	L								
8											B	L	L	L	L	L								
9										L	L	L	L	L	L	L	L							
10										L	L	L	L	L	L	L	L							
11											L	L	L	L	L	L								
12											L	L	L	L	L	L								
13										L	L	L	U L 770	L	L 760	L	L							
14							A	A			710	L 880	R 570	500	490	480	460	L						
15										L	L	L	U L 760	L	L	L	L							
16										L	A	L	L	L	L	L	A	A						
17										L	L	L	L	L	L	L	L							
18									L	L	L	L	A	L	L	L	C	A						
19										L	L	L	L	L	L	L								
20								A	L		L	U L 710	L	L										
21										L	L	L	L	L	L	L								
22									L	L	L	L	U L 770	L	L	C	L							
23										L		B	C	C	C	C	C	C	C					
24							C	C	C	C	C	C	C	C	C	C	C	C	C					
25										L	C	C	L	L	L	L	L		C					
26										L	L	L	L	L	L	L	A	A						
27									L	L	A	L	A	L	L	L	A							
28										L	L	L	L	L	L	L								
29										L	L	L	A	A	L	L								
30									L	L	L	L	L	L	L	L	L							
31									L	L	A	L	A	L	U L 710	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											1	2	5	1	3	1	1							
MED											710	L 795	U L 760	500	L 710	480	460							
UQ													U L 770		L 735									
LQ													U L 570		600									

MAR. 1989 | FOF1 (0.01 MHZ)

IONOSPHERIC DATA

MAR. 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							B	255	A	A	A	375	375	375	360	340	295	210						
2							B	240	315	345	370	390	400	B	375	345	A	A						
3							B	240	310	350	370	385	I C 400	395	380	360	320	A						
4							B	A	270	A	A	380	390	R 380	370	340	290	A						
5							B	250	295	330	360	385	395	385	375	350	295	235						
6							B	265	A	360	B	A	395	390	380	360	A	A						
7							B	260	325	360	380	395	A	A	380	R	U A 310	A						
8							B	250	320	355	B	395	400	A	A	A	300	225						
9							B	260	325	355	A	A	400	A	A	360	330	230						
10							B	270	330	B	365	400	400	405	B	360	315	240						
11							B	305	345	375	390	A	A	415	B	375	330	245						
12							B	265	A	A	A	A	410	395	385	370	320	255						
13							B	280	320	350	A	400	420	B	400	375	330	230	B		E B 160	E S 170	E B 155	J K 155
14	E B 170	E B 140		E B 140			B	A	295	A	390	395	B	U R 410	385	360	315	230	B					
15							200	295	335	365	390	A	A	A	A	A	A	A	B					
16							B	U A 280	A	375	390	A	B	A	R	375	325	A	B					
17							190	295	335	355	A	A	A	A	A	A	330	260	B					
18							S	280	340	370	A	A	A	A	395	375	I C 315	A	B					
19							B	290	335	380	A	415	430	R 420	A	375	335	255	B					
20							A	A	A	A	A	A	A	A	R	A	320	250	B					
21							195	300	340	U R 370	R	R 395	B	B	390	365	330	255	B					
22							170	285	330	360	385	A	A	A	385	C	320	255	B					
23							185	280	325	355	A	B	C	C	C	C	C	C	C					
24							C	C	C	C	C	C	C	C	C	C	C	C	C					
25							A	A	A	A	C	C	A	A	A	A	330	A	C					
26							180	280	A	360	R 375	A	390	A	U A 385	355	315	240	B					
27							200	280	330	U A 350	A 360	A	A	A	A	370	315	A	B					
28							185	270	315	345	365	385	A	390	370	350	310	245	B					
29							200	280	A	340	365	A	A	A	375	355	310	245	B					
30							195	285	315	A	A	A	A	A	385	S	310	H 255	B					
31							195	290	330	A	A	A	A	A	A	C	A	A	B					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	1	1		1			11	26	22	21	14	13	13	11	17	20	25	18			1	1	1	1
MED	E B 170	E B 140		E B 140			195	280	325	355	372	395	400	395	380	360	315	245			E B 160	E S 170	E B 155	J K 155
UQ							198	285	335	365	390	395	400	408	385	372	330	255						
LQ							185	260	315	350	365	385	395	388	375	352	310	230						

MAR. 1989

FOE (0.01 MHZ)

IONOSPHERIC DATA

MAR. 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	EB 15	EB 16	18	21	22	ES 16	EB 15	G	31	35	JA 41	G	G	G	G 26	36	34	30	JA 30	ES 16	23	EB 15	EB 14	ES 17
2	EB 15	EB 15	EB 14	ES 15	EB 15	EB 15	EB 15	G	34	41	42	G	45	EB 44	G	JA 47	JA 39	JA 47	JA 26	JA 41	JA 46	JA 28	JA 30	JA 26
3	JA 20	19	18	19	JA 16	EB 15	EB 15	G	34	41	52	43	C	G	G	G	35	DS 38	JA 57	JA 66	JA 53	JA 52	JA 81	JA 30
4	JA 51	JA 41	35	JA 31	JA 26	EB 15	EB 16	JA 30	JA 42	JA 47	40	G 33	G 31	G 36	JA 63	44	JA 54	51	JA 43	31	JA 39	JA 28	32	21
5	21	EB 14	18	18	EB 15	EB 15	JA 18	G 23	G 26	G 29	G	G	G 23	G 29	G 27	G	G 28	G	EB 15	21	22	JA 24	JA 30	JA 29
6	JA 32	JA 30	JA 27	26	JA 29	20	JA 21	G 25	JA 39	JA 45	EB 45	JA 50	G	G 26	G 31	JA 47	JA 45	47	JA 46	JA 25	EB 15	EB 15	EB 14	JA 22
7	JA 30	JA 43	JA 22	JA 22	EB 13	EB 15	EB 18	G	G	G 34	G	G	46	JA 53	G 27	G	35	JA 30	JA 34	JA 26	24	EB 16	EB 16	EB 14
8	EB 14	EB 13	JA 18	EB 16	EB 14	ES 20	EB 16	G	G	G	EB 75	G 35	G	41	42	37	G	G	EB 16	EB 15	ES 16	EB 15	EB 16	ES 16
9	JA 23	EB 14	EB 17	EB 14	EB 14	EB 15	EB 17	G	G	39	JA 48	45	G	37	JA 49	G 24	G	JA 26	JA 30	EB 16	EB 15	EB 15	EB 15	S
10	EB 14	EB 13	EB 13	EB 15	EB 14	EB 14	EB 14	G	G	37	40	42	G	G	EB 47	G	G	G	EB 17	EB 15	EB 15	JA 19	EB 15	22
11	EB 15	EB 13	JA 16	18	19	19	EB 15	32	37	43	45	JA 46	47	44	EB 42	G	G	G 22	EB 17	EB 14	JA 23	JA 23	19	25
12	JA 24	JA 26	EB 14	EB 15	20	JA 19	JA 23	30	38	41	JA 45	JA 43	G 40	G 35	G 35	JA 42	JA 37	32	JA 33	JA 21	JA 19	21	EB 16	JA 22
13	JA 58	JA 36	JA 30	JA 24	18	ES 17	EB 17	G 21	36	39	JA 43	G	G	EB 48	JA 58	G	G	G	EB 15	JA 57	EB 16	ES 17	EB 15	K 15
14	21	EB 14	S	21	JA 35	JA 110	62	JA 53	JA 54	JA 49	G 38	G	EB 51	G	43	G	G	23	30	JA 22	JA 26	EB 15	EB 15	EB 15
15	19	EB 16	EB 13	EB 14	EB 15	EB 14	G	32	G	G	41	43	42	46	JA 51	71	JA 65	JA 53	JA 88	JA 46	JA 41	JA 48	ES 18	JA 45
16	JA 24	JA 44	JA 34	JA 28	JA 23	JA 20	JA 21	JA 40	JA 50	JA 81	JA 72	JA 75	JA 70	58	G	42	JA 69	JA 77	JA 28	JA 57	JA 66	JA 86	JA 30	JA 26
17	JA 30	JA 18	EB 13	JA 21	JA 20	JA 20	23	39	37	41	JA 47	JA 55	JA 68	43	JA 51	JA 42	G	29	JA 38	61	34	24	JA 51	JA 26
18	JA 29	JA 25	JA 24	JA 22	JA 18	19	ES 21	31	G	G	41	JA 46	JA 82	JA 55	44	G	C	JA 66	JA 84	JA 61	JA 85	JA 46	JA 30	20
19	JA 40	22	JA 21	EB 14	22	21	EB 16	30	36	G	41	G	G 39	G	JA 50	G	G	37	JA 41	JA 46	JA 28	JA 19	23	JA 23
20	24	23	ES 17	EB 14	JA 26	JA 45	JA 54	72	60	JA 54	JA 48	JA 46	46	JA 47	G 38	37	34	34	JA 51	JA 51	32	26	19	EB 14
21	EB 14	JA 20	EB 13	EB 15	19	EB 16	G	G	G	G 33	G 36	G	EB 43	EB 42	G	G	G	31	JA 35	27	JA 20	JA 42	JA 20	EB 15
22	22	24	JA 20	JA 19	19	EB 14	G	G	35	39	41	JA 52	43	41	G	C	G	28	27	56	JA 21	JA 22	18	17
23	EB 14	JA 26	EB 16	EB 14	EB 14	ES 17	G	G	G	41	46	EB 80	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	EB 15	JA 26	JA 26	JA 26	JA 30	33	33	JA 42	C	C	41	JA 54	JA 50	JA 44	35	50	C	JA 41	24	EB 16	EB 15	C
26	C	EB 15	JA 21	EB 15	EB 13	JA 23	G	G	35	G	G	38	41	44	45	JA 54	JA 64	JA 66	JA 38	JA 48	JA 36	JA 20	21	JA 18
27	24	JA 19	JA 16	19	JA 22	EB 15	28	41	42	JA 62	JA 59	JA 61	JA 64	JA 62	48	43	62	JA 32	JA 53	JA 55	JA 61	JA 52	JA 42	JA 36
28	31	JA 18	EB 15	JA 20	JA 26	EB 15	G	G	37	38	44	43	44	41	45	47	40	JA 53	60	40	53	JA 40	59	JA 47
29	36	34	36	JA 33	JA 21	EB 13	G	30	JA 46	40	45	JA 50	JA 88	JA 96	41	39	G	33	25	JA 23	JA 22	JA 31	JA 26	JA 52
30	JA 53	JA 50	JA 42	JA 37	JA 29	JA 25	JA 23	G	JA 45	JA 51	JA 61	JA 49	JA 52	JA 44	G	ES 36	G	G	JA 27	36	23	JA 22	EB 16	JA 20
31	26	EB 15	JA 23	JA 22	27	28	G	G	G	41	JA 74	JA 76	66	JA 51	JA 54	C	JA 40	JA 36	32	JA 52	JA 28	JA 29	EB 15	JA 22
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	29	30	30	30	30	30	30	30	29	29	28	29	29	27	28	29	28	29	29	29	29	27
MED	24	19	18	19	20	EE 17	EG 16	G 22	35	40	43	43	42	42	42	37	34	32	JA 32	JA 40	JA 24	JA 23	19	JA 22
UQ	JA 30	JA 26	JA 23	JA 22	JA 26	JA 20	21	32	39	JA 43	JA 48	JA 50	52	JA 48	JA 49	44	JA 40	48	JA 44	JA 52	JA 39	JA 31	JA 30	JA 26
LQ	17	EB 15	EB 15	EB 15	EB 15	EB 15	G	G	G	G 34	41	G	UG 25	UG 32	G 26	G	G	28	26	22	21	E 17	EB 15	17

MAR. 1989 | FOES (0.1 MHZ)

IONOSPHERIC DATA

MAR. 1989 | FBES (0.1 MHZ)

135° E Mean Time (G.M.T. + 9h)

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	EB 15	EB 16	EB 13	EB 14	EB 14	ES 16	EB 15	G	31	35	36	G	G	G	G 25	35	33	28	27	ES 16	EB 15	EB 15	EB 14	ES 17
2	EB 15	EB 15	EB 14	ES 15	EB 15	EB 15	EB 15	G	34	40	40	G	44	EB 44	G	42	33	35	22	27	30	19	25	20
3	15	EB 16	EB 15	EB 14	EB 14	EB 15	EB 15	G	33	39	47	40	C	G	G	G	34	33	54	41	39	43	33	20
4	24	29	26	24	17	EB 15	EB 16	25	33	44	38	G 31	G 30	G 35	63	40	38	43	EB 14	23	25	18	US 31	EB 16
5	EB 15	EB 14	EB 14	EB 13	EB 15	EB 15	EB 15	G 18	G 24	G 28	G	G	G 23	G 28	G 26	G	G 25	G	EB 15	EB 15	EB 15	EB 15	18	21
6	20	24	18	20	20	EB 15	EB 15	G 22	33	G 34	EB 45	40	G	G 26	G 30	G 29	33	39	27	18	EB 15	EB 15	EB 14	EB 15
7	20	32	16	EB 16	EB 13	EB 15	EB 18	G	G	G 32	G	G	40	43	G 26	G	G 31	26	24	23	18	EB 16	EB 16	EB 14
8	EB 14	EB 13	EB 14	EB 16	EB 14	ES 20	EB 16	G	G	G	EB 75	G 33	G	40	41	36	G	G	EB 16	EB 15	ES 16	EB 15	EB 16	ES 16
9	EB 15	EB 14	EB 17	EB 14	EB 14	EB 15	EB 17	G	G	38	46	43	G	UY 37	39	G 23	G	G 19	25	EB 16	EB 15	EB 15	EB 15	S
10	EB 14	EB 13	EB 13	EB 15	EB 14	EB 14	EB 14	G	G	36	39	42	G	G	EB 47	G	G	G	EB 17	EB 15	EB 15	EB 15	EB 15	EB 15
11	EB 15	EB 13	EB 14	EB 14	EB 14	EB 13	EB 15	32	37	41	44	44	42	43	EB 42	G	G	G 19	EB 17	EB 14	EB 15	EB 15	ES 16	17
12	EB 14	18	EB 14	EB 15	EB 16	EB 13	EB 17	29	35	38	39	42	G 31	G 35	G 33	G 29	G 23	30	32	17	EB 14	EB 15	EB 16	EB 15
13	26	21	17	17	EB 15	ES 17	EB 17	G 19	36	38	40	G	G	EB 48	54	G	G	G	EB 15	53	EB 16	ES 17	EB 15	K 15
14	US 21	EB 14	S	18	30	48	AA 62	44	35	39	G 35	G	EB 51	G	41	G	G	27	21	20	23	EB 15	EB 15	EB 15
15	EB 15	EB 16	EB 13	EB 14	EB 15	EB 14	G	32	G	G	41	43	42	45	49	66	65	34	61	30	28	20	ES 18	23
16	17	39	28	26	18	16	20	35	40	63	69	63	68	52	G	42	67	63	25	29	18	35	29	18
17	20	17	EB 13	17	17	EB 15	23	38	36	41	44	53	51	43	49	39	G	29	34	51	25	17	30	21
18	19	20	21	16	EB 15	EB 14	ES 21	30	G	G	40	43	73	52	42	G	C	62	73	56	50	21	19	18
19	23	EB 15	16	EB 14	EB 14	EB 14	EB 16	30	35	G	41	G	G 38	G	42	G	G	37	18	34	25	18	19	20
20	17	16	ES 17	EB 14	24	32	41	64	44	47	45	42	44	42	UY 37	37	33	31	46	28	18	EB 15	EB 15	EB 14
21	EB 14	16	EB 13	EB 15	EB 14	EB 16	G	G	G	G 33	G 36	G	EB 43	EB 42	G	G	G	30	30	18	16	18	EB 15	EB 15
22	EB 15	16	17	EB 15	EB 13	EB 14	G	G	35	38	41	47	43	41	G	C	G	28	25	46	17	17	EB 14	EB 15
23	EB 14	19	EB 16	EB 14	EB 14	ES 17	G	G	G	39	44	EB 80	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	EB 15	20	21	EB 13	18	29	32	39	C	C	41	48	46	39	35	41	C	25	EB 16	EB 16	EB 15	C
26	C	EB 15	EB 14	EB 15	EB 13	EB 14	G	G	33	G	G	38	40	42	42	42	62	64	25	28	28	EB 16	EB 16	EB 15
27	16	15	EB 12	EB 13	EB 14	EB 15	22	37	39	48	57	59	57	57	45	41	52	26	18	20	48	36	31	27
28	20	16	EB 15	EB 15	19	EB 15	G	G	35	38	42	42	42	41	43	45	39	53	56	33	42	27	33	29
29	28	25	27	16	EB 13	EB 13	G	G	35	39	42	46	68	77	39	G	G	32	21	EB 15	19	EB 15	20	25
30	42	38	27	17	18	21	G	G	39	40	59	40	40	40	G	ES 36	G	G	19	34	EB 15	EB 14	EB 16	18
31	EB 15	EB 15	EB 14	18	20	19	G	G	G	39	55	47	59	40	47	C	31	26	32	44	23	21	EB 15	EB 15
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	29	30	30	30	30	30	30	30	29	29	28	29	29	27	28	29	28	29	29	29	29	27
MED	16	16	EB 15	EB 15	EB 15	EB 15		EG 18	33	38	41	41	41	40	40	G 29	G 28	30	25	25	18	EB 16	EB 16	17
UQ	20	20	17	17	18	EE 16	EB 18	30	35	40	44	44	46	44	44	40	34	37	32	34	25	19	20	20
LQ	EB 15	EB 15	EB 14	EB 14	EB 14	EB 14	G	G	G	G 33	39	G	G 26	G 35	G 26	G	G	26	18	17	EB 15	EB 15	EB 15	EB 15

MAR. 1989 | FBES (0.1 MHZ)

IONOSPHERIC DATA

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

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	16	13	14	14	ES 16	15	14	14	17	20	18	23	24	19	16	14	13	14	ES 16	15	15	14	ES 17
2	15	15	14	ES 15	15	15	15	14	14	16	17	21	20	44	22	19	17	15	14	15	15	14	13	14
3	15	15	15	14	14	15	15	14	14	16	17	21	C	26	20	18	15	17	15	14	16	15	14	14
4	13	13	14	14	13	15	16	15	15	16	17	22	19	26	22	16	16	14	14	16	14	14	16	16
5	15	14	14	13	15	15	15	15	15	15	18	30	21	17	13	18	16	14	15	15	15	15	14	15
6	15	15	14	14	13	15	15	15	14	19	45	23	20	21	18	19	17	14	13	16	15	15	14	15
7	15	15	13	16	13	15	18	15	16	19	22	22	25	21	20	32	16	13	14	15	14	16	16	14
8	14	13	14	16	14	ES 20	16	15	19	20	75	29	27	27	26	20	17	15	16	15	ES 16	15	16	ES 16
9	15	14	17	14	14	15	17	15	22	19	20	25	28	27	21	15	18	16	17	16	15	15	15	ES 68
10	14	13	13	15	14	14	14	15	18	35	20	18	31	27	47	18	17	16	17	15	15	15	15	15
11	15	13	14	14	14	13	15	17	21	23	26	37	33	33	42	26	18	14	17	14	15	15	ES 16	14
12	14	14	14	15	16	13	17	15	17	19	20	23	25	21	22	19	15	12	13	14	14	15	16	15
13	14	13	13	14	15	ES 17	17	14	14	20	21	30	32	48	26	19	17	15	15	15	16	ES 17	15	13
14	17	14	S	14	12	14	14	15	21	21	29	28	51	34	28	22	20	15	14	14	16	15	15	15
15	15	16	13	14	15	14	14	17	17	17	23	22	29	32	30	38	31	17	17	15	16	16	ES 18	15
16	14	14	14	16	13	13	15	15	17	20	21	35	44	35	32	20	20	16	16	14	14	14	13	15
17	15	13	13	14	13	15	14	18	18	18	20	33	33	30	24	23	21	14	15	16	14	13	13	13
18	13	13	13	13	15	14	ES 21	15	18	21	24	25	35	25	26	21	C	16	16	16	15	14	16	15
19	15	15	13	14	14	14	16	20	18	21	27	30	30	36	28	22	17	15	14	14	15	13	16	15
20	15	14	ES 17	14	13	14	15	16	18	23	24	26	32	28	25	22	18	17	17	13	12	15	15	14
21	14	13	13	15	14	16	15	16	20	22	30	36	43	42	25	18	18	13	15	14	14	14	15	15
22	15	13	13	15	13	14	14	15	17	19	25	26	27	27	23	C	18	13	13	14	14	13	14	15
23	14	13	16	14	14	ES 17	14	15	16	19	31	80	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	15	14	13	13	13	16	16	20	EC 79	C	29	31	26	22	17	15	C	16	16	16	15	C
26	C	15	14	15	13	14	14	15	18	18	22	24	21	28	18	16	18	15	17	14	15	16	16	15
27	13	13	12	13	14	15	16	15	15	17	20	23	23	24	20	17	16	14	16	14	14	13	13	14
28	14	13	15	15	14	15	14	14	15	18	27	24	ES 33	22	19	18	17	14	15	14	13	14	15	14
29	14	13	15	14	13	13	15	15	17	19	19	26	26	24	22	19	15	16	14	15	14	15	16	15
30	16	16	14	14	16	14	14	16	18	21	20	23	26	25	21	ES 36	17	15	13	16	15	14	16	16
31	15	15	14	13	13	13	15	15	17	19	27	21	34	26	27	C	20	15	16	14	13	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	28	29	29	30	30	30	30	30	30	30	30	29	28	29	29	27	28	29	28	29	29	29	29	28
MED	15	14	14	14	14	14	15	15	17	19	22	25	28	27	23	19	17	15	15	15	15	15	15	15
UQ	15	15	14	15	14	15	16	16	18	21	27	30	33	32	26	22	18	16	16	16	15	15	16	15
LQ	14	13	13	14	13	14	14	15	15	18	20	22	24	24	20	18	16	14	14	14	14	14	14	14

MAR. 1989 | FMIN (0.1 MHZ)

IONOSPHERIC DATA

MAR. 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	270	285	295	270	275	290	315	300	290	290	285	275	270	270	280	285	290	300	300	285	295	295	S 290
2	295	280	285	S 305	320	335	300	320	305	295	285	280	285	280	275	270	280	285	300	300	275	285	275	285
3	290	265	265	295	300	315	285	315	315	290	285	R 295	I C 290	285	285	285	300	300	300	300	295	285	280	300
4	280	245	250	250	240	275	285	285	290	305	295	290	300	290	300	300	305	305	315	305	305	290	S	265
5	275	275	285	320	300	290	305	320	320	315	305	300	295	290	285	295	300	305	305	305	285	290	280	265
6	285	290	265	285	I S 280	270	285	325	315	300	285	300	280	275	285	285	290	300	305	310	295	290	285	285
7	290	285	270	275	315	315	305	315	305	305	290	290	285	285	280	285	285	300	300	300	S 310	290	285	280
8	285	315	315	315	270	270	295	320	310	305	295	285	280	285	285	280	290	295	305	300	300	300	S 295	S 290
9	290	300	295	305	325	320	295	325	330	290	280	270	275	285	270	270	285	285	300	300	285	290	290	S
10	270	275	285	305	265	270	290	320	315	300	285	285	280	270	270	270	280	285	305	290	285	295	290	285
11	285	285	300	305	300	275	305	320	310	295	280	280	280	275	265	270	275	290	295	285	280	280	285	290
12	275	285	295	300	290	275	295	R 315	315	290	285	270	265	270	265	270	275	285	290	295	280	S 295	290	275
13	275	305	300	295	245	S 270	310	R 315	295	285	285	270	260	260	250	255	270	270	285	265	V 215	230	250	U S 210
14	S	F	S	230	F 260	335	A	285	310	290	230	220	G	J R 200	175	W	215	260	270	265	260	280	265	275
15	270	280	305	335	285	240	295	325	300	280	270	285	265	265	R 280	270	270	285	295	S	300	S 290	S	265
16	265	275	280	F 270	265	290	320	300	310	290	I R 280	275	270	275	270	270	280	S 285	300	300	280	270	R 270	265
17	S	F 315	310	235	V 245	265	290	I R 295	300	285	290	270	U R 275	270	275	275	285	285	295	300	285	285	300	F 265
18	290	280	270	290	270	265	S 290	305	305	290	285	280	270	270	270	280	I C 290	295	305	305	290	295	300	295
19	280	260	245	265	295	305	315	310	300	290	285	275	I R 270	270	270	270	285	285	295	305	290	285	265	290
20	260	235	250	270	270	270	265	285	295	F 275	V 265	F 270	265	270	285	285	295	300	305	310	295	285	290	290
21	285	300	315	285	255	270	315	320	295	285	280	275	270	R 265	260	265	270	285	295	290	285	280	275	290
22	285	295	285	300	290	300	300	310	305	280	280	275	270	270	270	I C 270	275	285	285	300	290	295	275	290
23	285	S 260	250	270	285	285	300	300	300	280	285	270	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	S 290	295	300	280	315	320	305	295	285	I C 280	270	275	270	275	280	290	I C 290	295	290	285	290	C
26	C	290	285	285	275	270	315	320	305	290	280	290	280	275	270	275	285	295	J R 310	315	285	285	275	275
27	285	310	F 320	F 305	F 295	R 285	F 305	315	310	290	295	275	280	275	275	275	280	290	295	300	285	285	285	290
28	270	295	255	240	235	285	F 320	F 310	F 300	F 290	290	R 290	290	275	280	285	285	295	310	305	290	285	265	265
29	265	260	275	295	320	H 270	315	335	305	305	275	275	R 270	R 275	275	R 285	280	295	290	S 305	285	305	285	270
30	275	270	270	245	260	295	310	315	320	320	285	280	275	285	R 285	285	285	300	315	S 315	285	285	275	275
31	270	285	310	330	305	260	320	310	310	290	290	290	290	280	265	I C 270	285	295	J R 300	305	275	270	275	280
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	28	29	30	30	30	29	30	30	30	30	30	29	29	29	29	29	29	29	28	29	29	27	27
MED	282	282	285	295	282	275	300	315	305	290	285	280	275	275	270	275	285	290	300	300	285	285	285	280
UQ	285	295	300	305	300	295	315	320	310	300	290	290	280	280	280	285	285	295	305	305	290	290	290	290
LQ	270	270	270	270	265	270	290	305	300	290	280	275	270	270	270	270	280	285	295	298	285	285	275	268

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

IONOSPHERIC DATA

MAR. 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										L	L	L	L	L	L	L								
2										L		L	L		L	L	L							
3											L	L	C	L	L									
4									L	L	L	L	U L 395	L	A	L		A						
5									L	L	L	L	L	L	L	L								
6												L	L	L	L	L								
7										L	L	L	L	L	L	L								
8											B	L	L	L	L	L								
9										L	L	L	L	L	L	L	L							
10										L	L	L	L	L	L	L	L							
11											L	L	L	L	L	L								
12											L	L	L	L	L	L								
13										L	L	L	U L 365	L	L 350	L	L							
14							A	A			340	L 350	R 345	335	335	350	350	L						
15										L	L	L	U L 375	L	L	L	L							
16										L	A	L	L	L	L	L	A	A						
17										L	L	L	L	L	L	L	L							
18									L	L	L	L	A	L	L	L	C	A						
19										L	L	L	L	L	L	L								
20								A	L		L	U L 370	L	L										
21										L	L	L	L	L	L	L								
22									L	L	L	L	U L 365	L	L	C	L							
23										L		B	C	C	C	C	C	C	C					
24							C	C	C	C	C	C	C	C	C	C	C	C	C					
25										L	C	C	L	L	L	L	L		C					
26										L	L	L	L	L	L	L	A	A						
27									L	L	A	L	A	L	L	L	A							
28										L	L	L	L	L	L	L								
29										L	L	L	A	A	L	L								
30									L	L	L	L	L	L	L	L	L							
31									L	L	A	L	A	L	U L 360	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											1	2	5	1	3	1	1							
MED											340	L 360	U L 365	335	L 350	350	350							
UQ													U L 375		L 355									
LQ													U L 365		342									

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

IONOSPHERIC DATA

MAR. 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										270	260	280	270	285	310	280								
2										265		305L	305		290L	320L	275							
3											280	250	I280C	265	260									
4									280	270	290	285	265	295	E275A	270		255A						
5									245	235	255	260	265	260	270	275								
6												260	260	265	270	275								
7										245	300L	265	290	300	305	285L								
8											E275B	285L	310L	265	305	275H								
9										270	275	345L	310	290L	340L	330L	295L							
10										270	290	260	305L	325L	325	325	280							
11											295L	300L	290	300L	340L	305L								
12											290L	325	315L	320	335L	335								
13										280	280	315L	360	365	375	365	315							
14							A	310			480	540L	G	750	835	W	590	L						
15										315	305	280	360	360L	315L	330L	320							
16										275	255	330	330	330	340	325	280A	E295A						
17										260	260	330L	325	320	325	320L	290L							
18									250	265	260	275	280A	330L	325	320	C	265A						
19										260H	260	320	315	335	330	330								
20								E325A	290		350L	365	360	350L										
21										290L	270	295	340L	350L	330L	355L								
22									235	245	315	315	345	330L	320	C	325							
23										290		E305B	C	C	C	C	C	C	C					
24							C	C	C	C	C	C	C	C	C	C	C	C	C					
25										260	E280C	C	320	280	340	310L	285		C					
26										300L	300L	275	275	310	320	310	285	270A						
27									250	285	255A	335L	275A	340	315	315	285A							
28										265	295	295	275	310L	320	310								
29										250	310L	325	325	330A	285	290								
30									245	250	300L	280	275	305	285L	305	280							
31									240	270	265	300	270	290	345	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								2	8	23	27	29	29	28	28	25	13	4						
MED								314	248	270	280	298	305	315	320	315	285	264A						
UQ									265	278	300	325	325	332	338	330	315	276A						
LQ									242	260	261	280	275	290	298	290	280	260A						

MAR. 1989 | H'F2 (KM)

IONOSPHERIC DATA

MAR. 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	300	330	290	265	305	315	270	235	235	235	225	210	215	230	235	250	250	250	A 235	235	250	260	260	270
2	255	305	305	265	245	220	240	235	245	240	240	H 210	245	255	230	245	E A 250	255	220	A 255	A 310	285	330	285
3	270	305	330	265	215	245	290	250	225	235	240	230	I C 220	220	235	240	245	A 235	E A 260	A 270	E A 275	E A 335	A 305	260
4	A 310	A 405	A 385	A 375	385	305	250	245	240	A	235	220	210	220	A	235	A 245	A	240	250	A 265	285	S	330
5	320	315	275	240	255	285	260	230	220	205	210	215	220	230	220	225	240	230	225	230	270	270	305	335
6	A 310	285	325	285	295	320	300	235	230	220	B 245	230	230	225	230	240	245	A 240	235	235	260	275	280	275
7	285	E A 335	325	315	255	240	260	245	240	235	235	230	225	235	230	240	255	245	235	230	260	260	275	300
8	290	255	235	240	H 275	340	280	240	235	240	B	235	230	225	240	245	245	235	235	240	245	245	270	280
9	270	270	275	255	225	240	275	245	215	225	A 250	235	240	235	235	235	245	255	235	225	265	265	260	I S 290
10	315	300	275	250	275	310	275	230	235	235	230	230	235	235	240	235	245	255	240	225	260	255	260	275
11	290	265	250	255	310	315	250	220	230	235	230	245	235	235	245	245	250	255	245	245	265	265	280	280
12	290	280	255	240	280	305	270	240	235	230	225	H 225	H 215	245	235	240	245	260	A 260	240	275	265	275	285
13	A 320	250	240	260	390	325	215	220	230	225	230	240	240	B 260	A 265	H 240	260	270	220	E A 375	465	455	370	555
14	410	H 275	S	460	E A 410	A 260	A	A	230	H 250	260	260	E B 280	280	E A 290	265	260	H 255	315	310	A 305	315	340	315
15	325	315	270	225	325	435	310	255	240	245	240	220	225	250	A 265	E A 260	A	255	E A 270	A 265	245	280	290	320
16	315	E A 330	305	E A 350	330	280	235	220	235	E A 260	A	E A 260	E A 285	260	235	240	A	A	260	A 250	280	A 335	A 315	300
17	305	220	230	375	395	335	265	255	245	225	240	A 255	A 245	235	A 250	250	240	265	270	E A 280	A 260	280	A 290	350
18	285	305	310	270	285	330	275	240	230	215	235	240	A	250	235	H 240	I C 250	A	A	E A 290	E A 305	260	265	275
19	315	370	410	335	265	250	255	235	240	235	215	230	235	H 235	250	H 240	255	A 265	270	A 260	A 270	260	310	295
20	340	420	385	300	A 310	E A 350	A	A	A	A 265	245	235	240	240	245	240	255	260	E A 265	240	250	275	275	280
21	290	260	250	290	360	335	260	240	230	H 225	230	245	E B 250	225	H 230	230	255	260	260	255	260	260	295	270
22	270	265	270	260	260	260	260	250	230	225	225	255	240	235	235	I C 240	245	265	270	A 260	230	250	280	285
23	285	355	370	310	270	305	240	250	240	235	A 240	B	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	290	265	260	270	240	230	225	230	C	C	230	A 245	250	E A 255	255	A 260	C	235	245	265	265	C
26	C	270	295	300	305	320	240	230	225	H 210	220	H 215	225	235	240	260	A	A	240	240	E A 290	290	300	305
27	275	220	220	225	275	305	250	230	230	A 250	A	A	A	A	240	245	A	260	235	240	A	E A 300	A 285	A 285
28	310	270	370	400	420	285	240	240	235	H 225	H 240	230	240	240	250	255	A 260	E A 265	E A 260	A 245	A	A 305	E A 355	E A 370
29	E A 355	E A 360	320	270	225	H 265	240	255	235	235	245	240	A	A	235	H 240	240	250	245	225	270	240	285	A 335
30	E A 360	E A 360	E A 335	370	360	280	240	235	250	245	A	215	225	245	230	235	235	250	240	A 250	255	255	290	310
31	320	290	250	225	A 255	A 360	235	H 215	225	H 225	A	E A 260	A	230	E A 255	C	245	260	250	E A 260	265	A 335	300	295
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	29	29	30	30	30	28	28	29	29	24	27	25	27	28	28	25	25	27	29	27	29	28	28
MED	302	288	290	266	280	305	258	238	235	235	235	230	232	235	236	240	245	255	242	242	262	268	286	290
UQ	318	318	325	312	328	322	272	245	240	238	240	241	240	245	248	246	255	260	258	A 255	272	288	304	315
LQ	285	270	255	255	260	265	240	230	230	225	228	222	225	230	235	240	245	250	235	235	258	260	275	280

MAR. 1989 | H'F (KM)

IONOSPHERIC DATA

MAR. 1989 | H'E (KM)

135°E Mean Time (G.M.T. + 9h)

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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							B	120	A	A	A	120	115	115	E A 120	A 115	115	120						
2							B	125	A 125	A 125	A 125	115	120	B	120	120	120	120						
3							B	130	120	110	120	120	I C 120	125	120	120	120	125						
4							B	125	115	110	110	E A 135	A 120	E A 135	115	115	115	115						
5							B	E A 140	E A 130	E A 130	110	B 125	120	A 120	A 120	115	E A 140	125						
6							B	E A 160	A	A	B	A	115	E A 120	E A 125	E A 130	A	A						
7							B	115	115	E A 140	120	115	A	A	A 120	B 125	A	A						
8							B	120	120	120	B	E A 135	115	A	A	A	120	120						
9							B	125	115	120	110	A	115	A	A	A 120	120	E A 135						
10							B	125	115	B	115	110	125	120	B	115	115	120						
11							B	E A 135	120	120	120	A	A	125	B	125	125	E A 125						
12							B	120	115	115	A	A	E A 125	E A 135	E A 125	E A 130	E A 130	E A 130						
13							B	E A 130	115	110	115	130	130	B	120	120	120	125	B		B	S	B	B
14	B	B		B			B	120	115	A	E A 135	125	B	130	125	120	120	130	B					
15							125	E A 150	115	120	120	115	A	A	A	A	A	A	B					
16							B	120	115	120	110	120	B	A	120	115	120	120	B					
17							120	120	115	115	110	A	A	A	115	A	120	125	B					
18							S	120	120	120	A	A	A	A	120	120	I C 120	120	B					
19							B	130	120	115	A	115	E A 135	E B 130	A	120	120	115	B					
20							A	A	A	A	A	A	A	A	A	A	A 125	E A 135	B					
21							125	120	120	E A 150	A	E B 130	B	B	120	115	120	120	B					
22							E B 140	115	110	115	120	115	A	A	120	C	120	E A 140	B					
23							125	120	115	115	120	B	C	C	C	C	C	C	C					
24							C	C	C	C	C	C	C	C	C	C	C	C	C					
25							A	A	A	A	C	C	A	A	A	A	E A 130	A	C					
26							E B 145	120	A	115	115	A	E A 140	A	A	A 120	120	125	B					
27							E B 165	120	115	115	110	115	115	115	A	120	120	125	B					
28							130	120	115	A	120	115	120	A 125	E A 125	E A 120	120	E A 130	B					
29							135	120	115	110	115	120	A	A	125	115	115	125	B					
30							130	120	120	120	115	120	A	A	120	S	120	H 120	B					
31							110	115	115	115	115	A	A	A	120	C	A	A	B					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							11	28	25	23	21	19	15	12	19	21	25	24						
MED							128	120	115	115	115	118	118	122	120	120	120	122						
UQ							134	124	120	120	120	122	122	128	121	120	120	126						
LQ							125	120	115	115	110	115	115	120	120	115	120	120						

MAR. 1989 | H'E (KM)

IONOSPHERIC DATA

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

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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	B	B	110	105	110	S	B	G	115	115	110	G	G	G	105	E G 190	145	125	115	S	105	B	B	S
2	B	B	B	S	B	B	B	G	E G 220	E G 205	E G 200	G	E G 175	B	G	120	115	110	110	110	105	105	100	105
3	105	110	110	100	105	B	B	G	E G 175	150	130	140	C	G	G	G	145	120	115	110	110	105	105	105
4	115	105	105	110	120	B	B	125	120	110	110	115	110	110	110	125	115	110	115	110	110	110	105	105
5	105	B	105	105	B	B	125	115	110	105	G	G	105	105	105	G	110	G	B	105	100	115	105	105
6	105	105	105	105	105	105	110	110	110	110	B	110	G	110	105	105	105	105	105	110	B	B	B	110
7	105	105	105	110	B	B	B	G	G	115	G	G	110	105	115	G	105	110	105	105	100	B	B	B
8	B	B	110	B	B	S	B	G	G	G	B	115	G	120	120	125	G	G	B	B	S	B	B	S
9	105	B	B	B	B	B	B	G	G	130	110	110	G	105	105	105	G	100	100	B	B	B	B	S
10	B	B	B	B	B	B	B	G	G	135	130	E G 170	G	G	B	G	G	G	B	B	B	110	B	105
11	B	B	105	100	100	105	B	E G 200	E G 155	130	120	115	125	140	B	G	G	100	B	B	135	105	120	105
12	105	105	B	B	110	110	115	140	125	120	115	110	110	110	110	110	105	135	120	115	110	105	B	110
13	105	105	110	110	115	S	B	115	125	125	120	G	G	B	125	G	G	G	B	110	B	S	B	B
14	165	B	S	195	125	125	110	115	115	110	115	G	B	G	E G 160	G	G	130	105	120	120	B	B	B
15	110	B	B	B	B	B	G	E G 170	G	G	135	120	115	115	115	115	115	105	110	120	115	115	S	110
16	105	115	105	105	110	115	115	125	120	125	120	120	110	110	G	140	120	115	115	115	110	115	110	115
17	135	105	B	110	105	105	150	130	135	120	115	110	110	125	115	120	G	140	120	110	110	110	100	105
18	100	100	100	105	115	120	S	E G 155	G	G	120	115	110	115	125	G	C	115	110	110	105	105	110	100
19	105	105	105	B	110	110	B	E G 155	130	G	115	G	115	G	120	G	G	140	110	110	105	100	105	105
20	110	110	S	B	115	110	110	110	110	110	115	115	115	125	115	110	E G 165	130	110	105	100	100	110	B
21	B	125	B	B	105	B	G	G	G	115	110	G	B	B	G	G	G	150	125	115	125	105	110	B
22	110	100	105	110	110	B	G	G	130	125	120	115	120	110	G	C	G	E G 170	120	110	105	110	105	100
23	B	100	B	B	B	S	G	G	G	125	115	B	C	C	C	C	C	C	C	C	C	C	C	C
24	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	B	115	110	110	110	115	110	110	C	C	110	105	110	105	E G 165	105	C	105	105	B	B	C
26	C	B	110	B	B	115	G	G	110	G	G	110	140	105	E G 170	140	125	120	115	125	110	105	105	115
27	105	110	110	115	115	B	155	130	125	120	105	110	115	110	130	130	120	120	115	115	105	100	100	105
28	105	105	B	115	115	B	G	G	130	130	125	120	125	E G 180	145	130	135	120	115	110	110	105	110	110
29	110	110	110	115	115	B	G	130	125	115	115	110	110	110	125	130	G	120	115	110	110	110	110	110
30	105	110	110	110	110	110	110	G	120	120	110	120	115	110	G	S	G	G	120	115	115	120	B	110
31	105	B	110	105	105	105	G	G	G	120	115	105	110	115	115	C	115	105	100	120	115	110	B	125
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	21	18	18	19	21	13	10	16	21	25	24	20	20	21	21	16	16	24	23	24	24	21	16	20
MED	105	105	108	110	110	110	112	U 122	122	120	115	115	111	110	115	121	116	119	115	110	110	105	105	105
UQ	110	110	110	112	115	115	125	U 139	128	125	120	119	116	115	122	130	U 131	129	115	115	112	110	110	110
LQ	105	105	105	105	105	105	110	115	115	115	112	110	110	110	110	110	112	108	110	110	105	105	105	105

MAR. 1989 | H'ES (KM)

IONOSPHERIC DATA

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

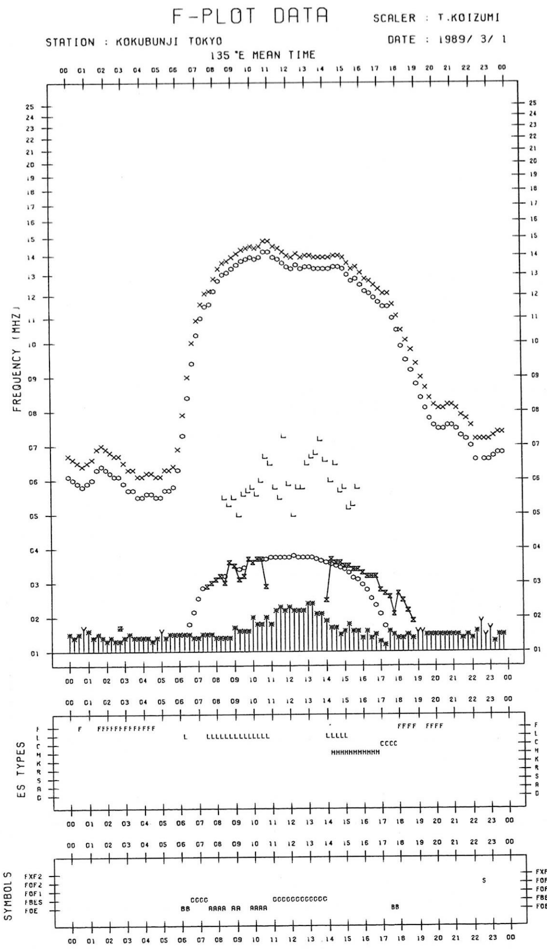
Station KOKUBUNJI TOKYO Lat. 35° 42'.4 N , Long. 139° 29'.3 E Sweep 1 MHz to 25 MHz in 24 sec in automatic operation

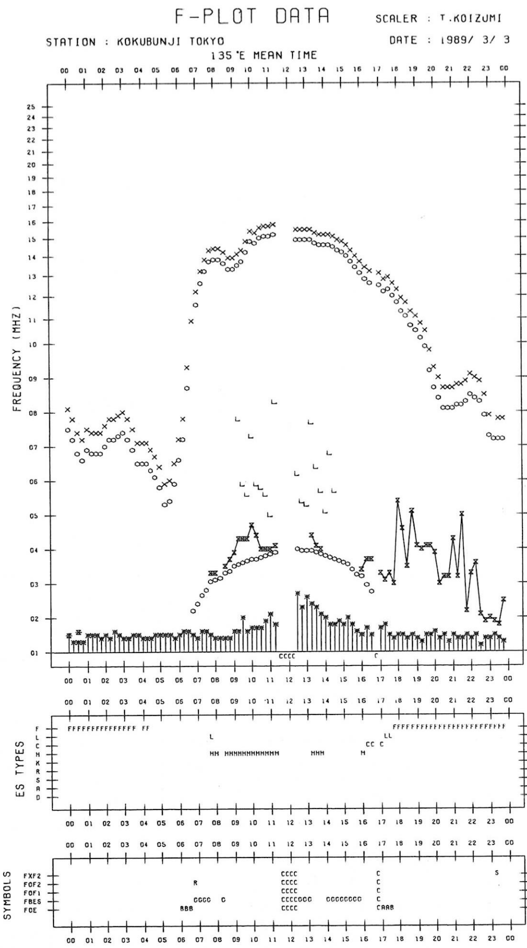
Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1			F 1	F 2	F 1				L 2	L 2	L 2				L 1	HL 11	H 2	C 3	FF 41		F 2			
2									H 1	HL 11	HL 11		H 1			C 2	C 3	C 4	F 5	F 4	F 5	F 5	F 4	F 4
3	F 2	F 2	F 1	F 2	F 1				H 1	H 2	H 3	H 1					H 1	C 3	F 5	F 6	F 4	F 5	F 5	F 3
4	FF 24	F 4	F 3	F 2	F 2			C 2	C 3	C 3	C 3	L 1	L 2	L 1	C 3	H 2	C 3	C 5	F 2	F 2	F 5	F 4	F 2	F 2
5	F 2		F 1	F 1			F 1	L 2	L 2	L 2			L 1	L 1	L 1		L 2			F 1	F 2	F 3	F 2	F 3
6	F 4	F 4	F 3	F 3	F 3	F 2	F 2	L 2	L 3	L 1		L 2		L 1	L 1	L 2	L 3	L 5	F 4	F 2				F 2
7	F 3	F 4	F 2	F 1						L 1			L 1	L 2	L 1		LH 21	L 3	F 3	F 2	F 1			
8			F 1									L 1		L 1	L 1	L 1								
9	F 2									H 1	C 2	L 2		L 1	L 2	L 1		L 1	F 2					
10										H 1	H 1	H 1										F 2		F 2
11			F 2	F 1	F 1	F 1		HL 11	H 1	H 1	C 2	C 1	L 1	H 1				L 1			F 1	F 1	F 1	F 5
12	F 2	F 3			F 1	F 2	L 1	C 1	C 2	C 1	L 1	L 2	L 1	L 2	L 1	L 2	LH 31	HL 22	FF 53	F 4	F 1	F 1		F 2
13	F 4	F 4	F 4	F 2	F 1			L 1	H 2	H 2	C 1				H 3					F 4	K 1	K 1	K 1	K 1
14	HK 11	K 1		HK 21	F 5	FF 25	L 5	C 2	C 2	C 1	L 1				H 1			C 1	LC 31	FF 21	FF 21			
15	F 1							HL 12			H 1	C 1	L 1	L 1	L 2	L 2	L 1	L 3	L 4	FF 23	F 4	F 1		F 2
16	F 2	F 4	F 4	F 2	F 3	F 2	L 2	C 2	C 3	C 3	C 3	C 2	L 1	L 2		H 1	C 4	C 3	C 2	FF 41	F 2	F 4	F 5	F 2
17	FF 23	F 4		F 2	F 1	F 2	H 1	H 2	H 1	C 2	C 2	L 2	L 2	L 1	C 2	L 1		H 1	C 4	F 5	F 4	F 2	F 3	F 2
18	F 2	F 3	F 4	F 4	F 2	F 1		H 1			L 1	L 2	L 2	L 2	C 2			C 3	L 4	F 5	F 5	F 3	F 2	F 1
19	F 3	F 1	F 2		F 1	F 2		H 1	H 1		L 1		L 1		L 1			H 3	L 2	FF 42	F 2	F 1	F 2	F 2
20	F 2	F 1			F 4	F 5	L 4	L 4	L 3	L 2	L 2	L 1	L 1	L 1	L 1	L 1	HL 12	HL 22	L 5	F 4	F 2	F 2	F 1	
21		F 1			F 1					L 1	L 1							HL 21	C 2	F 4	F 1	F 2	F 1	
22	F 1	F 2	F 2	F 1	F 1				C 1	C 1	C 1	C 2	L 1	L 1				HL 13	CL 22	F 4	F 3	F 2	F 1	F 1
23		F 2								C 1	C 1													
24																								
25				F 2	F 3	F 3	L 2	L 2	L 2	L 2			L 2	L 2	L 2	L 2	HL 12	L 4		F 4	F 2			
26			F 1			F 1			L 2			L 1	HL 11	L 1	HL 12	HL 21	H 4	C 5	L 4	FF 22	F 3	F 1	F 1	F 2
27	F 2	F 1	F 1	F 1	FF 11		H 2	H 3	H 3	C 3	C 3	C 3	C 2	C 2	CL 21	C 2	C 3	C 2	L 3	FF 22	F 5	F 6	F 5	F 3
28	F 2	F 1		F 2	F 3				C 2	HL 12	C 1	C 1	C 1	HL 11	HL 22	HL 22	HL 21	CL 51	L 5	F 6	F 6	F 5	F 4	F 4
29	F 6	F 6	F 6	F 5	F 1			C 1	C 1	C 1	C 2	C 2	L 3	L 3	CL 11	C 1		C 3	L 3	F 1	F 2	F 1	F 4	F 4
30	F 3	F 3	F 4	F 4	F 2	F 2	L 1		C 2	C 2	C 3	C 1	L 1	L 1					C 3	F 3	F 2	FF 21		F 2
31	F 1		F 2	F 3	F 2	F 4				C 1	C 3	L 2	L 2	L 2	C 3		L 2	L 2	L 2	FF 34	FF 25	F 5		F 1
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
UQ																								
LQ																								

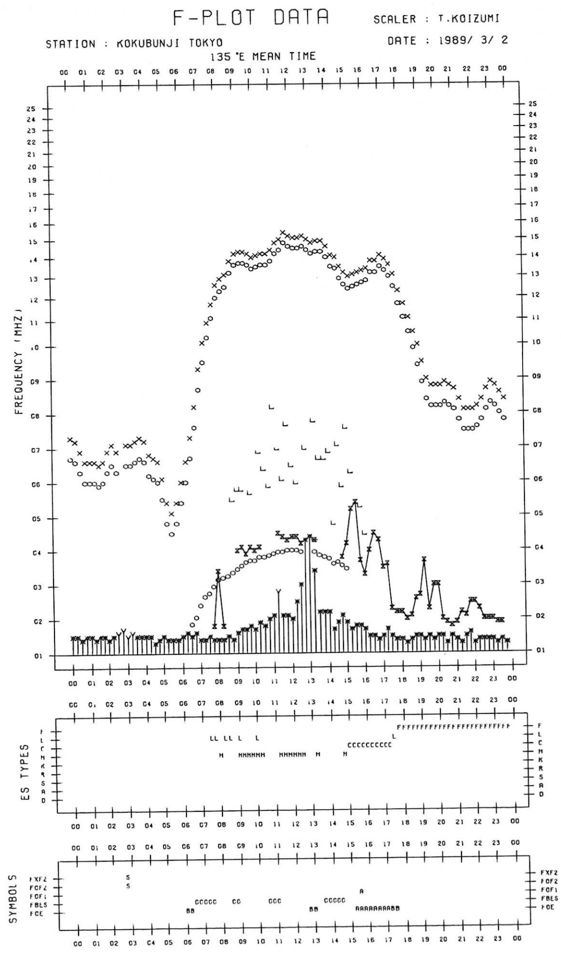
MAR. 1989 | TYPES OF ES

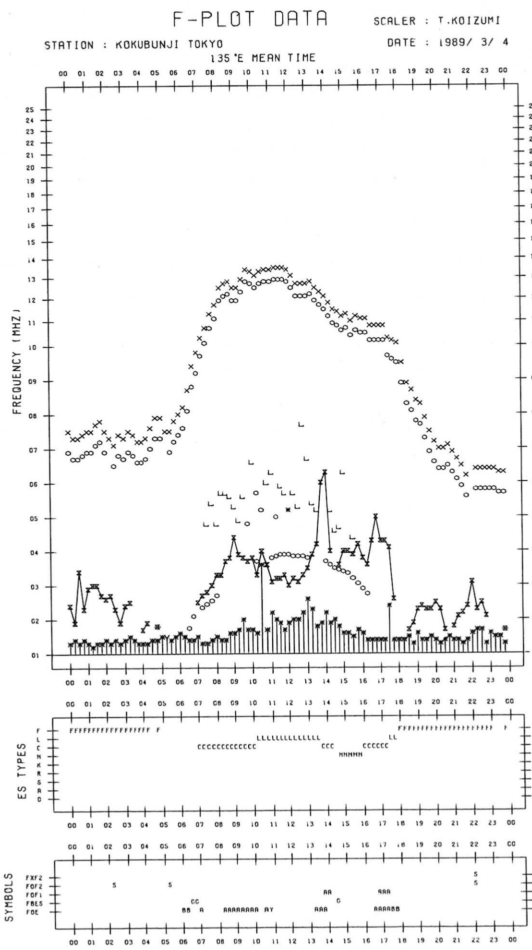
f-PLOTS OF IONOSPHERIC DATA

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


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 3/ 1
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


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

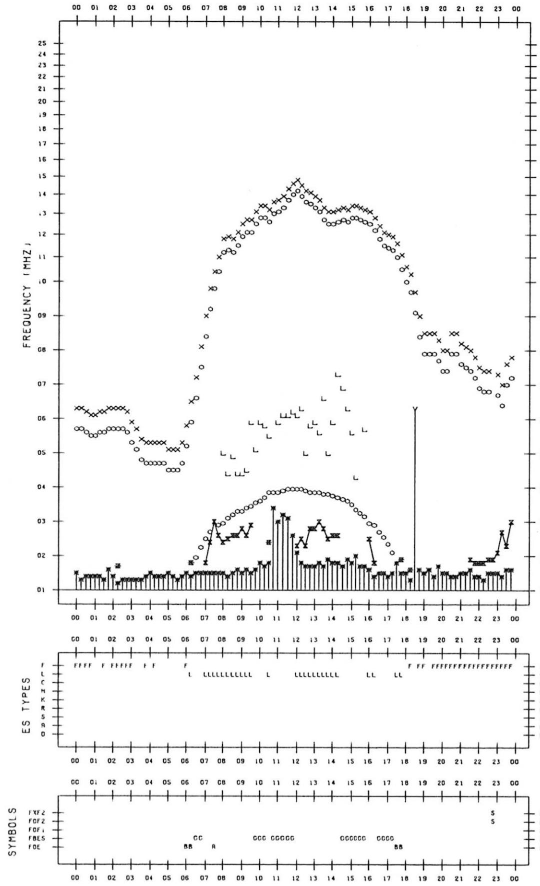

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 3/ 2
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


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

F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/ 5

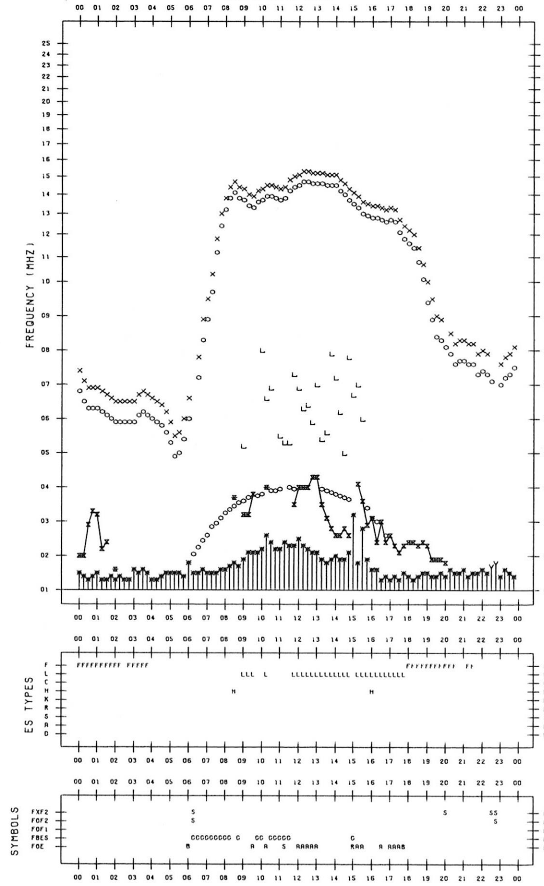
135°E MEAN TIME



F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/ 7

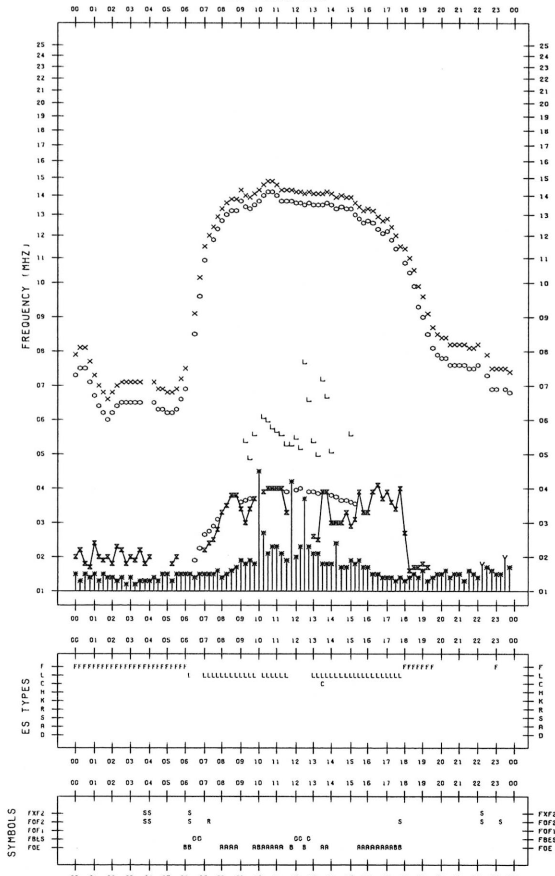
135°E MEAN TIME



F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/ 6

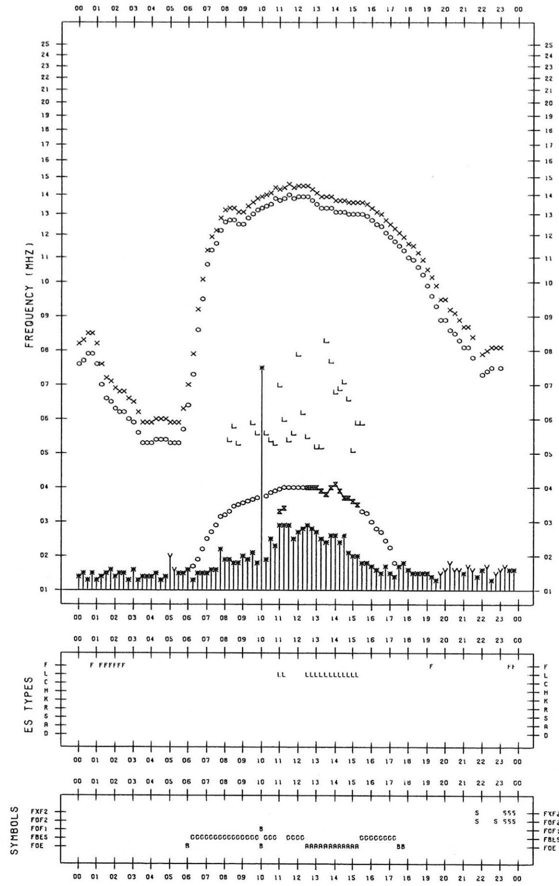
135°E MEAN TIME



F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/ 8

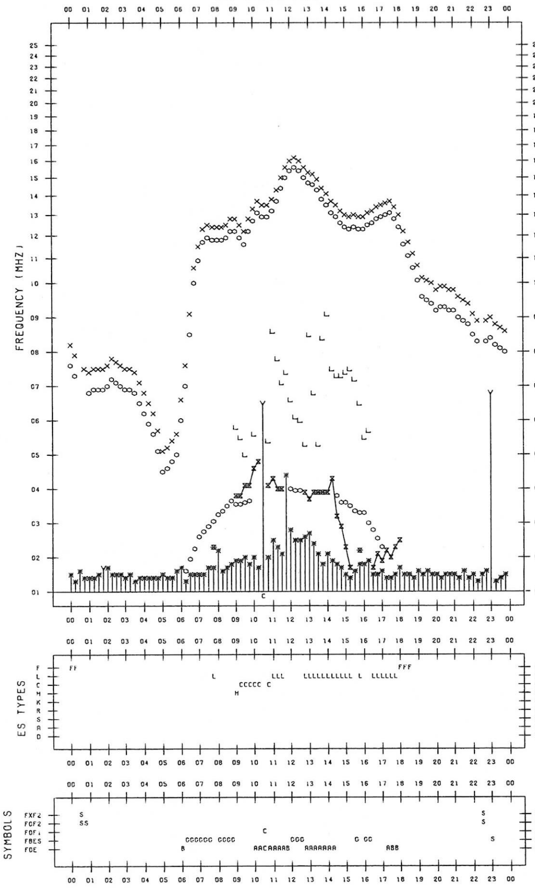
135°E MEAN TIME



F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/ 9

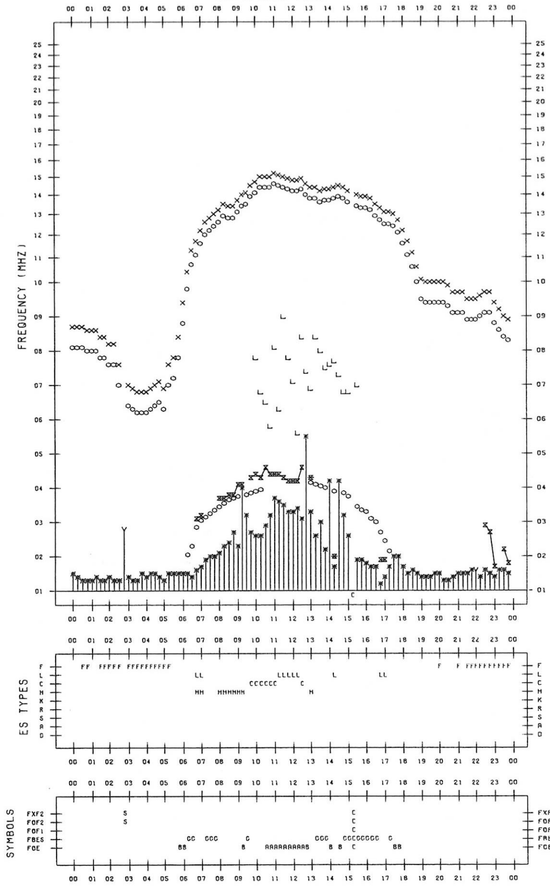
135°E MEAN TIME



F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/11

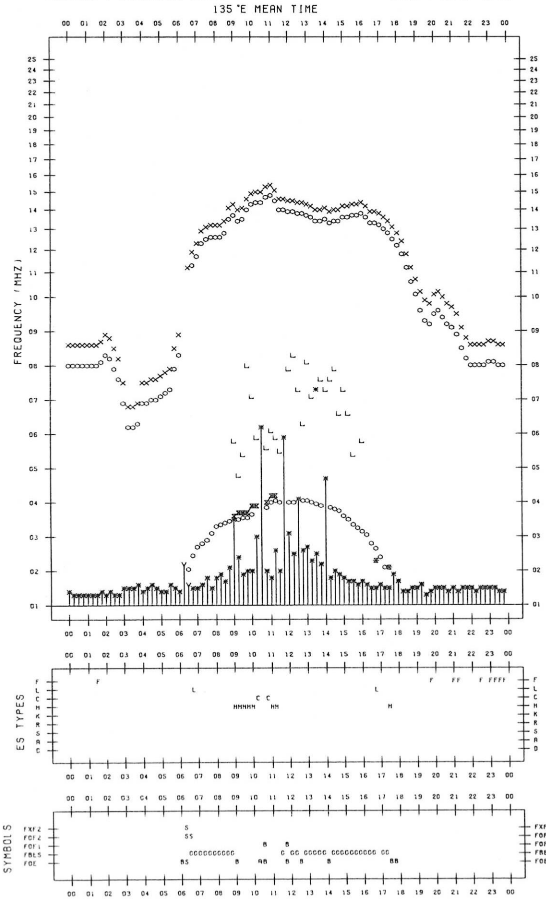
135°E MEAN TIME



F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/10

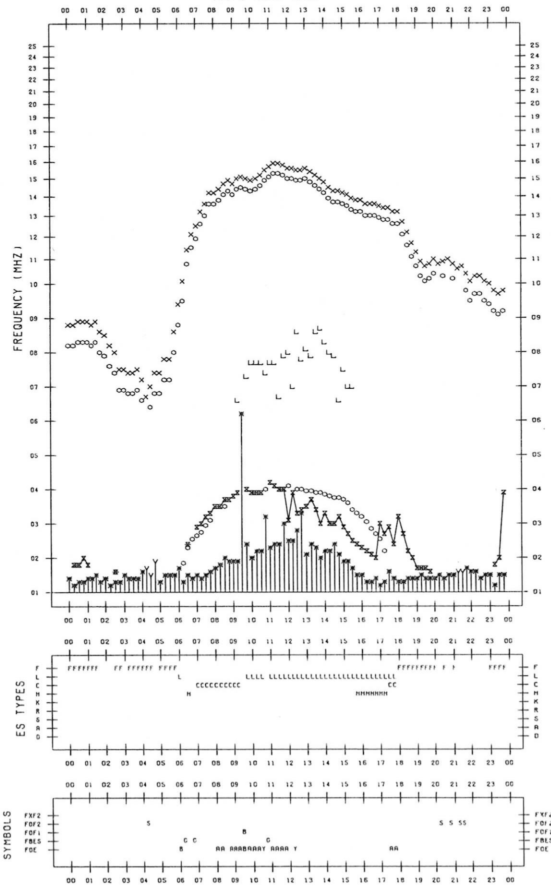
135°E MEAN TIME



F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/12

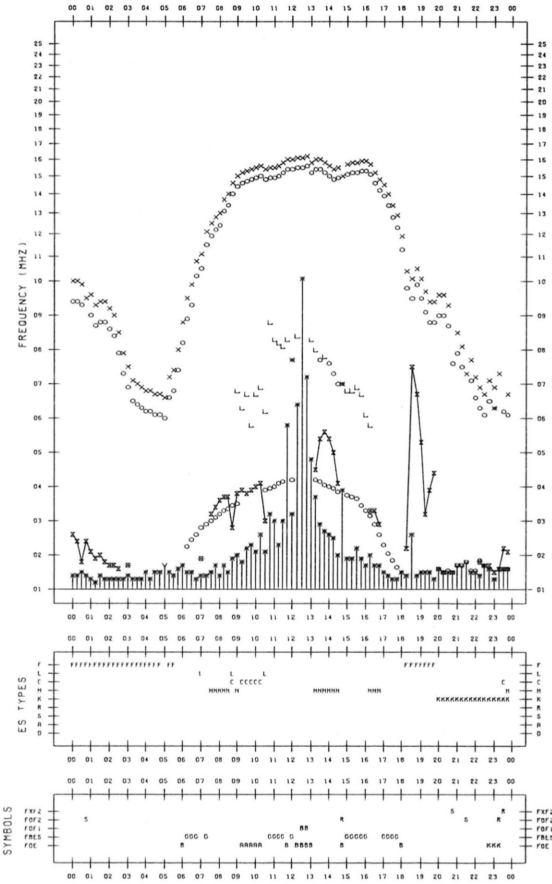
135°E MEAN TIME



F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/13

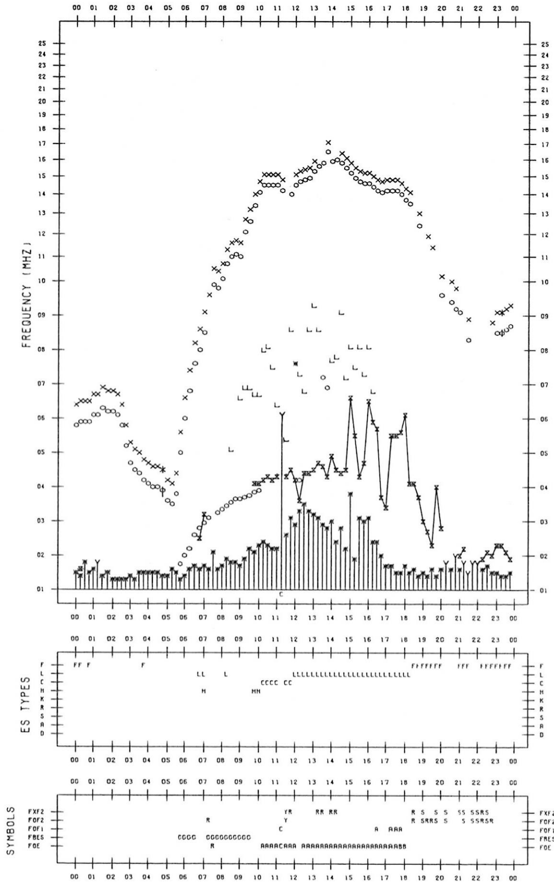
135°E MEAN TIME



F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/15

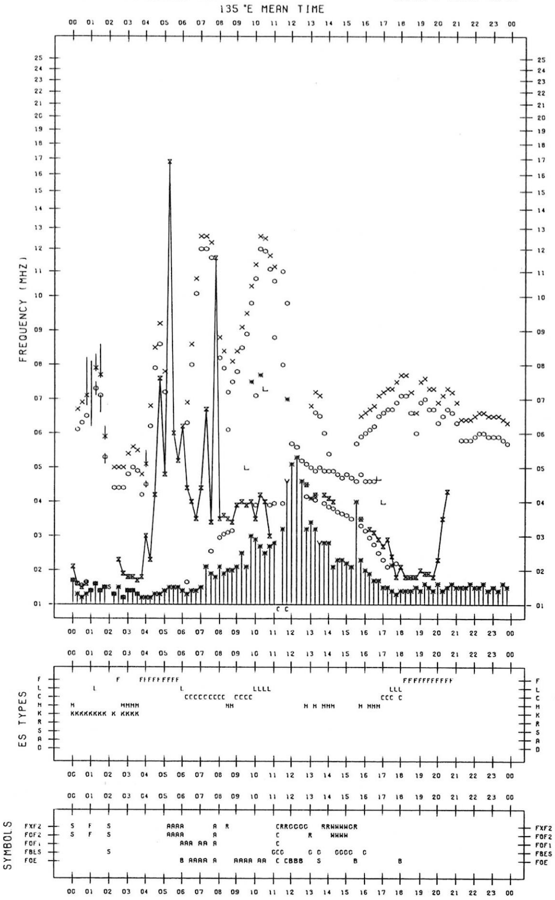
135°E MEAN TIME



F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/14

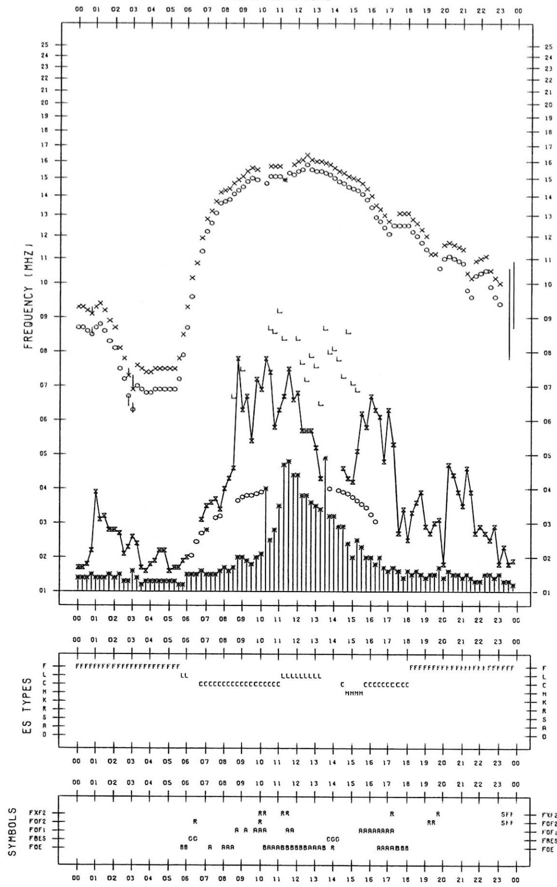
135°E MEAN TIME

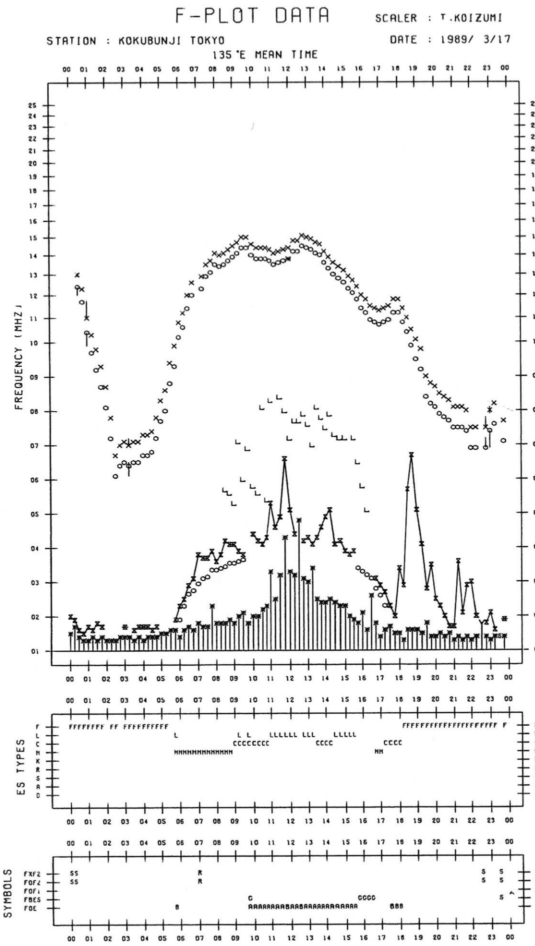


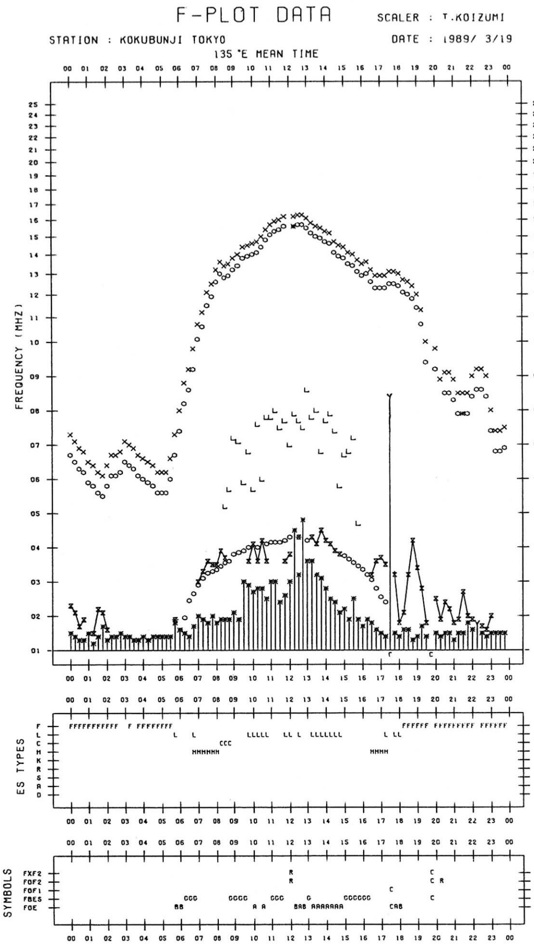
F-PLOT DATA SCALER : T.KOIZUMI

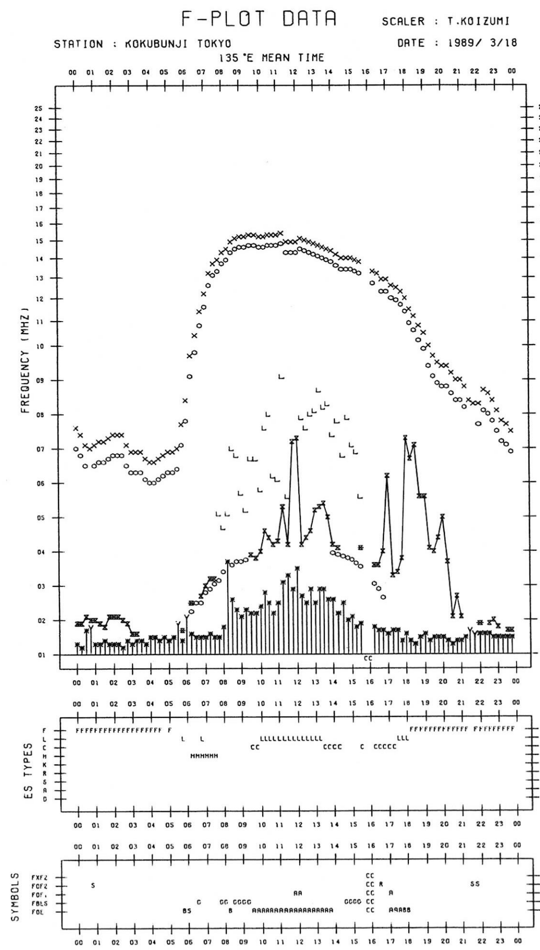
STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/16

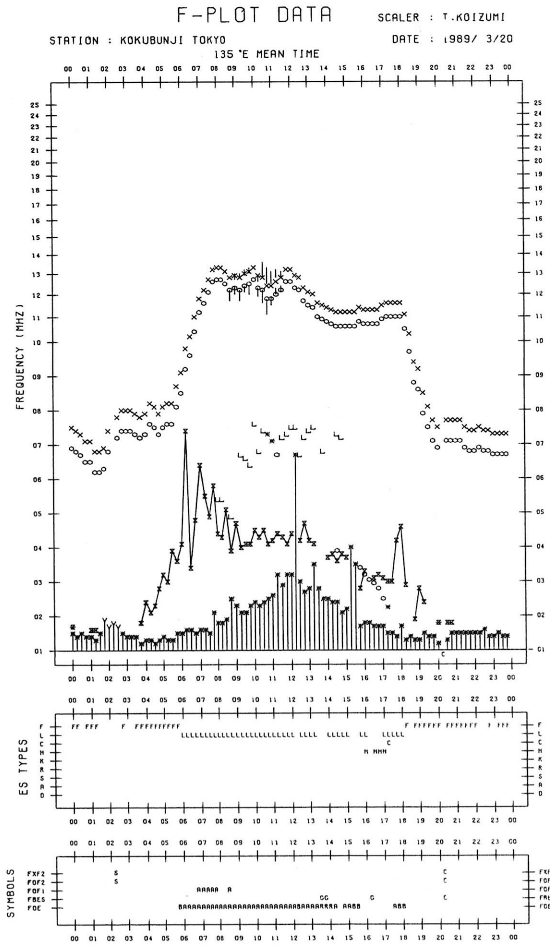
135°E MEAN TIME




F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 3/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 3/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

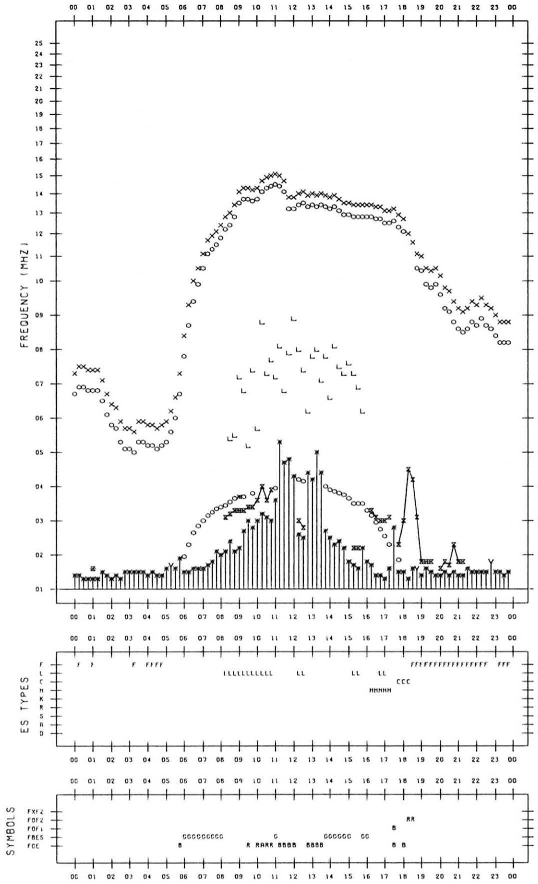

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 3/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 3/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/21

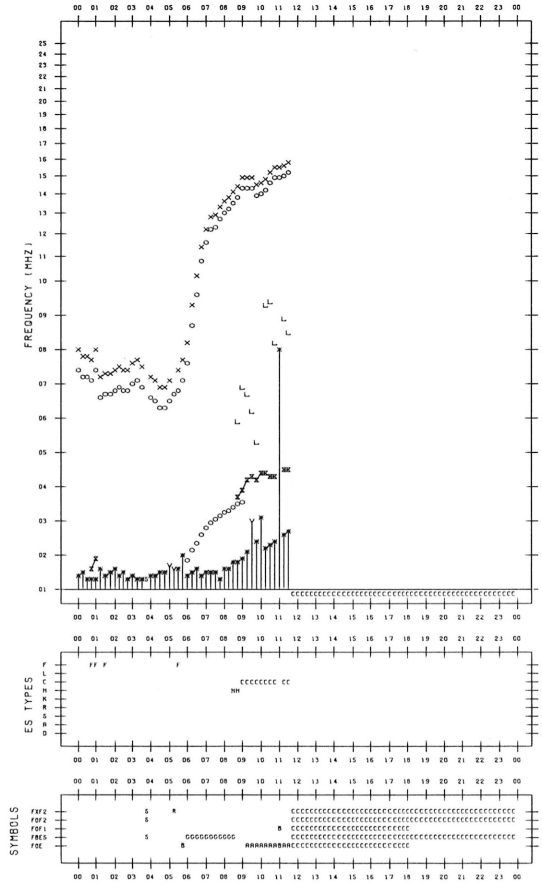
135°E MEAN TIME



F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/23

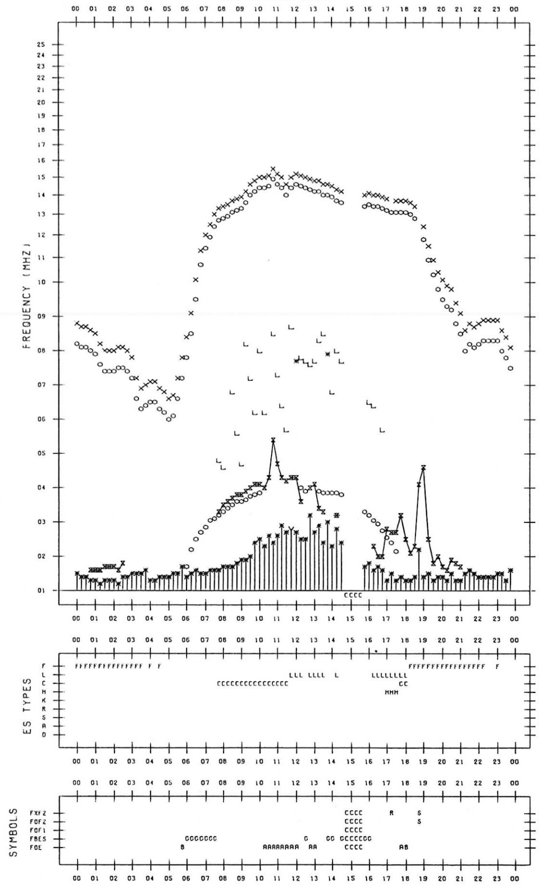
135°E MEAN TIME



F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/22

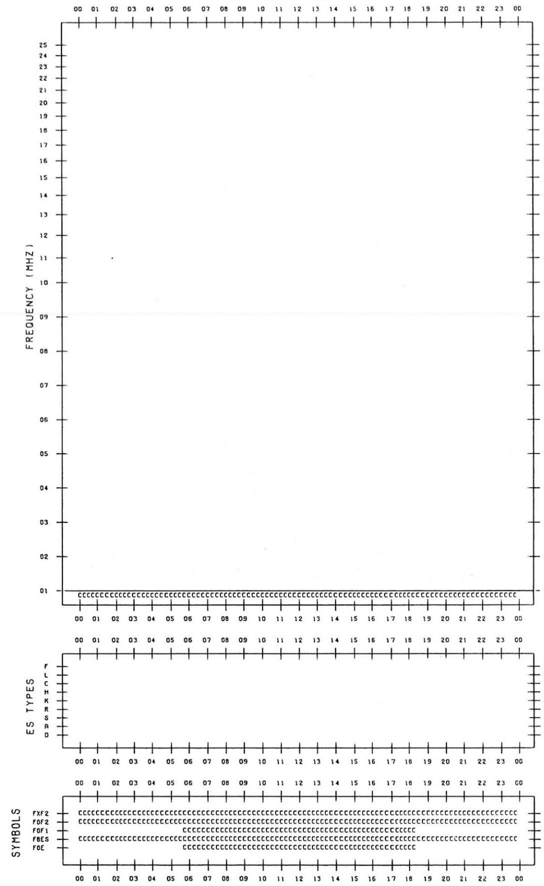
135°E MEAN TIME



F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/24

135°E MEAN TIME

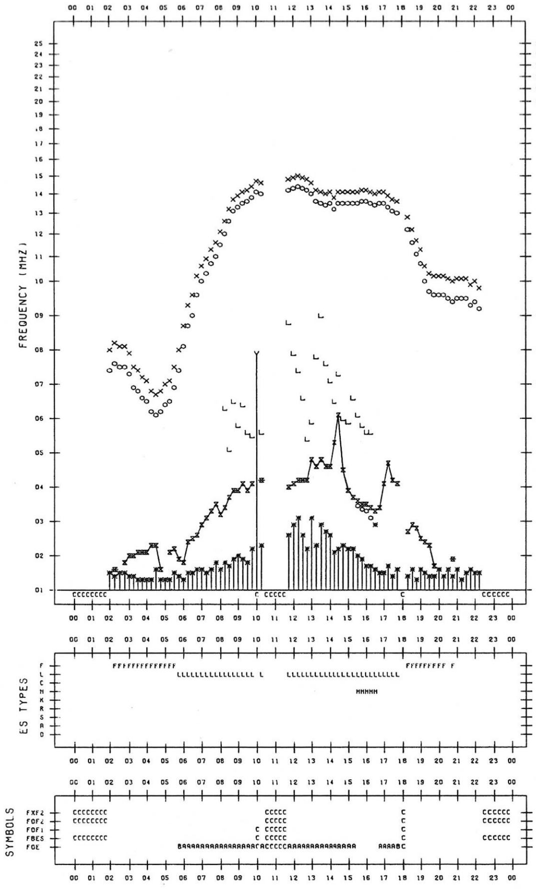


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/25

135°E MEAN TIME

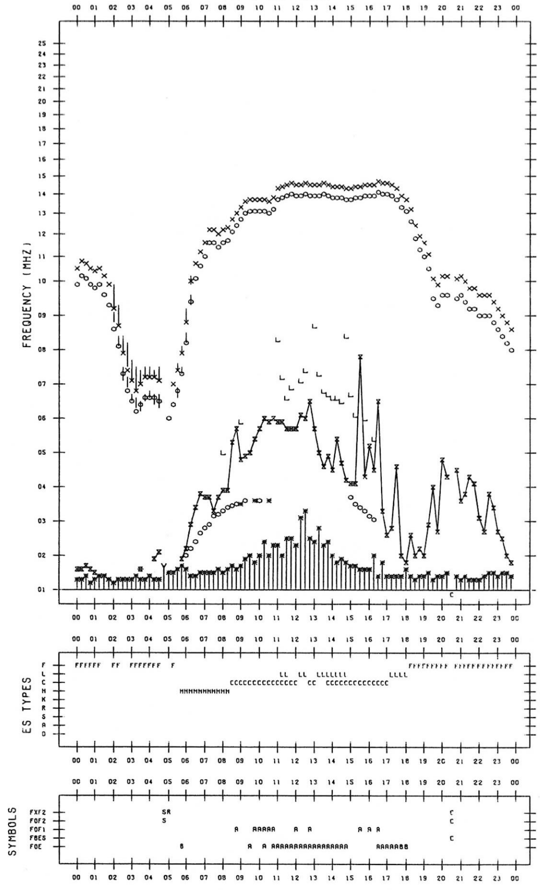


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/27

135°E MEAN TIME

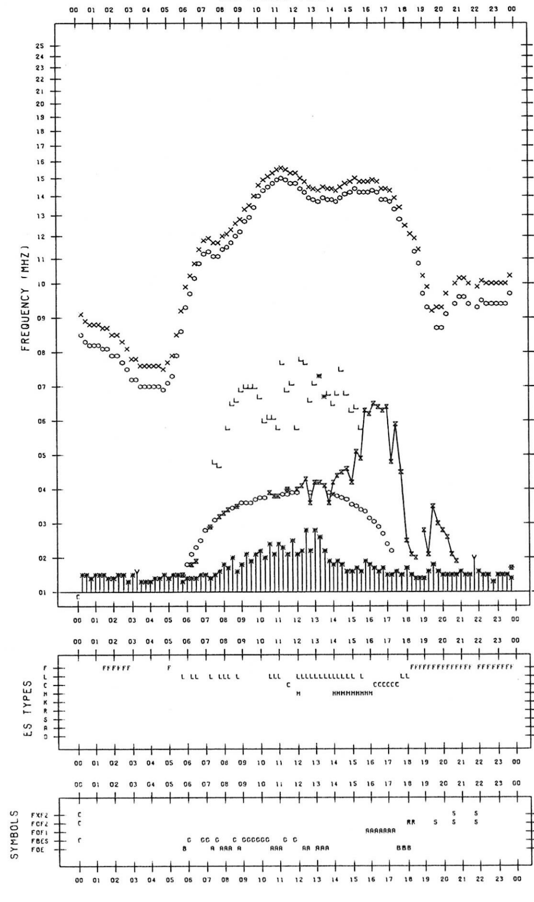


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/26

135°E MEAN TIME

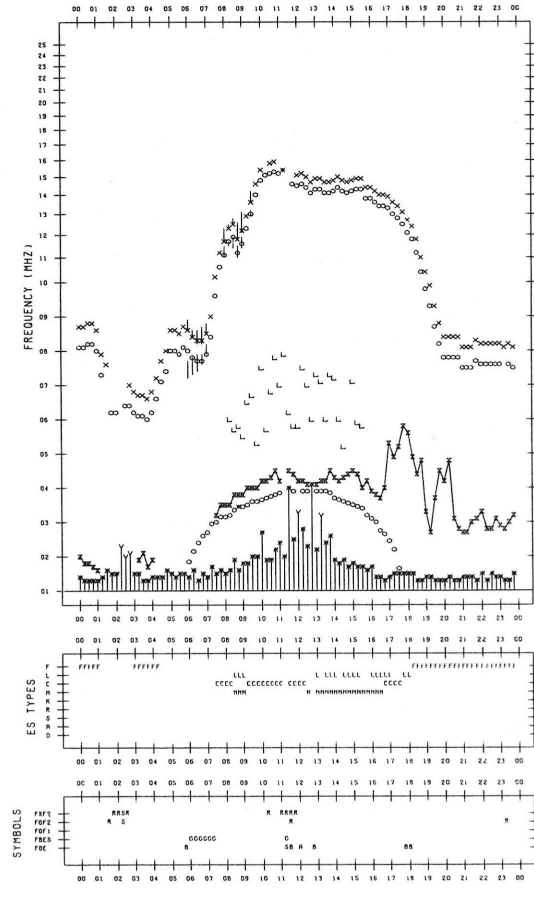


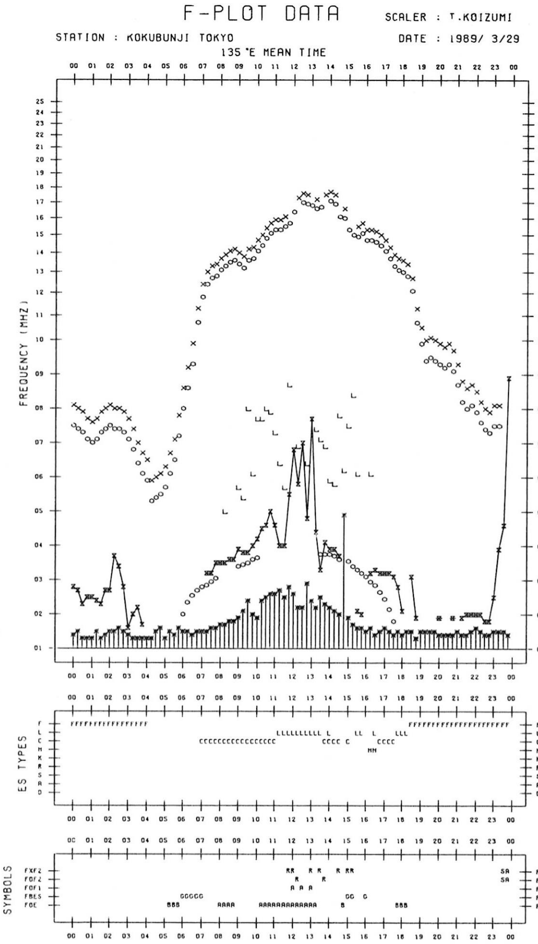
F-PLOT DATA

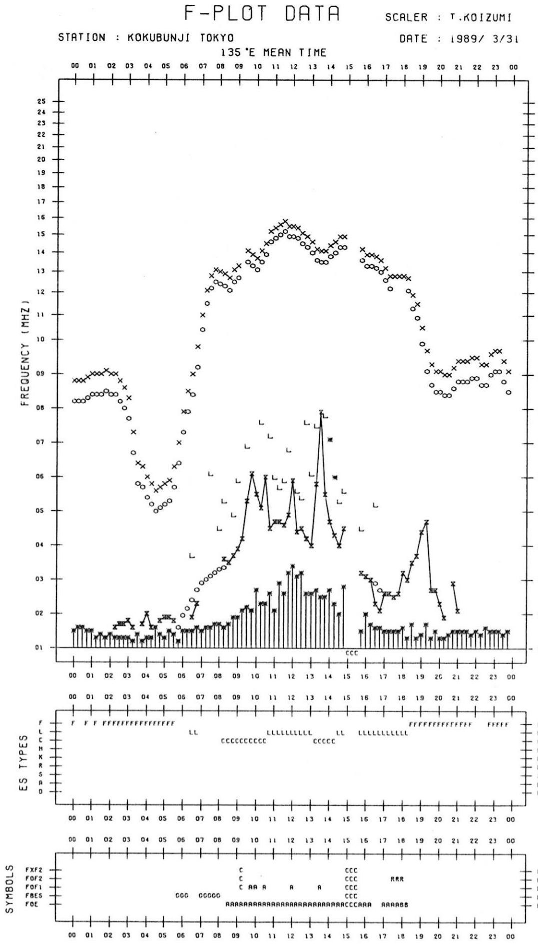
SCALER : T.KOIZUMI

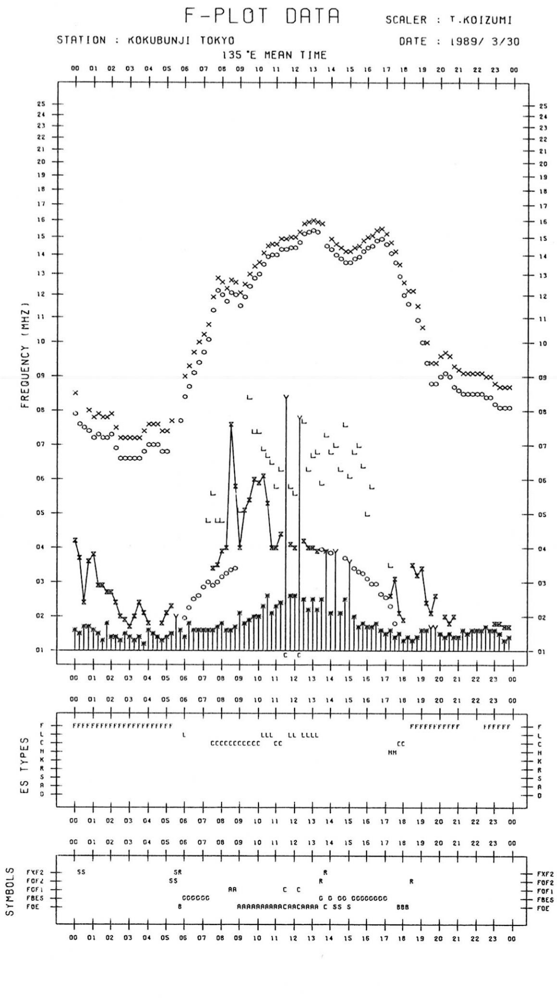
STATION : KOKUBUNJI TOKYO DATE : 1989/ 3/28

135°E MEAN TIME




F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 3/29
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 3/31
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/ 3/30
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

B.Solar Radio Emission

B1.Daily Data at Hiraiso

200 MHz

Hiraiso March 1989

Single-frequency total flux observations at 200 MHz

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

Note: No observations during the following periods.

none.

B.Solar Radio Emission

B1.Daily Data at Hiraiso

500 MHz

Hiraiso　　　　　　　　　　　　March 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	52	53	54	52	52
2	53	52	53	55	52
3	55	54	56	59	55
4	59	58	57	58	58
5	62	63	64	76	62
6	76	75	70	82	74
7	74	69	69	67	74
8	71	74	74	75	72
9	79	76	80	74	78
10	75	77	74	B	75
11	B	B	B	B	B
12	B	B	B	74	B
13	73	80	72	70	75
14	77	82	78	105	77
15	138	161	175	123	145
16	112	117	105	70	114
17	68	66	68	70	68
18	69	69	69	65	69
19	66	67	65	65	66
20	65	65	63	61	65
21	62	63	65	67	63
22	69	70	66	62	68
23	63	62	62	B	62
24	B	B	71	55	B
25	55	55	54	52	55
26	53	53	53	51	53
27	52	51	49	47	51
28	50	50	50	49	49
29	50	50	50	52	50
30	52	56	-	55	53
31	61	66	65	61	62

Note: No observations during the following periods:

30th 0545 - 0720

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso March 1989

Single-frequency observations

Normal observing period: 2100 - 0845 U.T. (sunrise to sunset)

MAR 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	100	43 NS	0250	0600	320D	620	240	-
	500	23 GRF	0300	0340	300	36	11	MR
2	200	44 NS	2100E	2207	680D	11	7	WR
3	200	46 C	0036.3	0038.0	5.4	75	14	0
	200	44 NS	2100E	0145	240D	33	9	MR
4	500	21 GRF	0027.0	0142.0	143	37	12	MR
5	500	42 SER	0654.1	0655.6	4.6	230	-	0
	200	44 NS	2100E	2236	690D	49	26	0
	100	42 SER	2110.6	2115.2U	10.0	1000D	-	-
	200	42 SER	2113.7	2119.4	11.2	510	-	0
	500	42 SER	2114.2	2133.7	20.0	405	-	0
	100	43 NS	2246	0042	198	80	37	-
6	500	21 GRF	0550	0617.5	135	80	20	0
	200	46 C	0600.3	0600.7	1.3	640	-	0
	500	46 C	0600.4	0600.6	1.2	550	-	0
	200	46 C	0626.4	0627.9	5.9	73	28	0
	200	41 F	0650.8	0654.3	10.6	64	-	0
	200	44 NS	2100E	2200	690D	25	16	0
	200	42 SER	2156.7	2239.6	57	275	-	0
	100	42 SER	2350.8	0002.4	15.8	340	-	-
	500	42 SER	2356.0	0009.2	14.0	67	-	0
7	200	42 SER	0000.7	0002.0	61	450	-	0
	500	46 C	0052.5	0053.0	10.0	180	-	0
	100	46 C	0101.1	0101.5	2.6	860	-	-
	200	46 C	0136.3	0152.1	38.3	124	21	0
	100	42 SER	0256.8	0301.3	6.2	970	-	-
	100	41 F	0329.0	0329.7	4.0	1000D	-	-
	500	41 F	0545.5	0549.9	6.5	320	-	0
	200	45 C	0556.4	0556.9	1.3	775	-	0
	500	46 C	0557.0	0557.5	3.0	6100	1500	0
		29 PBI		0600.3	18.0	15		0
	200	44 NS	2100E	0738	700D	70	26	WL
	200	42 SER	2137.6	2144.4	7.3	1300	-	0
	100	42 SER	2141.6	-	3.0	1000D	-	-
	500	42 SER	2222.8	2245.4	41.0	85	-	WL
7	100	41 F	2229.0	-	18.7	1000D	-	-
	200	48 C	2234.4	2235.8	17.8	5400	378	0
				2240.6		170		WL
	200	8 S	2250.4	2250.4	0.7	3800	-	0
8	200	42 SER	0037.0	0046.9	109	290	-	0
	500	42 SER	0116.6	0127.0	10.7	120	-	0
	200	42 SER	0246.9	0304.6	79	1600	-	0
	100	48 C	0304.0	0304.4	3.6	8000	-	WL
	500	27 RF	0304.4	0307.0	68	13	4	0
	200	42 SER	0448.2	0523.5	65	4500	-	0
	500	46 C	0455.5	0456.5	4.0	59	-	0
	100	42 SER	0521	0523.9	8.3	11000	-	0
	500	24 R	0641.8	0741.0	113D	11	4	0 SUNSET
	200	42 SER	0704.6	0710.0	51	230	-	0
	200	44 NS	2100E	0546	700D	49	28	0
	100	46 C	2140.9	2141.6	2.0	370	-	-
9	100	42 SER	0007.7	0009.2	52	450	-	-
	100	42 SER	0041.4	0043.6	6.7	3700	-	0
	100	8 S	0116.5	0117.2	0.9	3200	-	0
	100	41 F	0146.2	0153.5	11.9	2800	-	WL
	200	42 SER	0147.1	0151.5	10.6	1000	-	0
	500	42 SER	0152.0	0156.6	6.0	130	-	WL
	100	48 C	0237.0	0238.3	6.7	13200	-	WL
	500	46 C	0238.4	0242.0	15.5	50	14	WL
	100	43 NS	0300U	0620	340D	120	57	-
	500	42 SER	0302.5	0309.5	18.5	1200	-	0
	200	42 SER	0304.6	0317.8	18.5	4300	-	0
	100	42 SER	0317.5	0320.8	54	1900	-	0
	500	42 SER	0339.5	0410.0	35	165	-	ML
	200	8 S	0406.2	0406.6	0.5	13000	-	0
	200	45 C	0518.5	0518.8	1.1	4900	-	0
	200	42 SER	0637.0	0637.9	9.7	4400	-	WR
	200	41 F	0750.8	0752.1	7.3	520	-	ML
	100	44 NS	2100E	2314	700D	27	10	-
	200	44 NS	2100E	0350	700D	100	54	ML
	500	46 C	2120.5	2122.5	2.7	35	-	WL
	500	21 GRF	2216.5	2233.0	138	20	7	WL
	100	42 SER	2227.7	2331.4	135	7200	-	ML
	200	42 SER	2229.4	2229.6	10.6	2600	-	WL
10	200	42 SER	0039.6	0040.3	4.6	330	-	WL
	200	46 C	0101.2	0101.5	1.5	9400	-	WL
	100	42 SER	0101.3	0101.4	18.5	7700	-	WL
	100	42 SER	0134.0	0239.1	73	10000D	-	-
	200	42 SER	0201.0	0414.9	145	7000	-	WL
	100	42 SER	0314.5	0315.2	76	7400	-	WL
	500	46 C	0343.5	0344.5	1.1	175	-	WL
	100	41 F	0646.9	0654.8	11.2	2300	-	ML
	100	48 C	0701.3	0702.0	4.8	8600	1040	WL
	200	46 C	0702.0	0703.3	2.0	430	-	WL
	500	44 NS	2055E	0051	700D	228	64	ML
10	200	44 NS	2055E	0218	700D	930	404	SL
	100	44 NS	2055E	0217	700D	2700	1160	SL
11	100	41 F	0012.5	0015.7	5.3	13000	-	0
	200	41 F	0013.9	0015.4	4.0	8000	-	0
	200	42 SER	0324.7	0331.0	14.5	9500	-	WL
	500	44 NS	2055E	2125	700D	128	50	ML
	200	44 NS	2055E	2140	700D	1300	327	SL
	100	44 NS	2055E	2330	700D	640	540	SL
	500	46 C	2237.0	2237.5	1.5	720	-	ML
12	500	48 C	0015.0	0028.5	18.5	9300	420	ML
	100	48 C	0015.8	-	14.6	-	-	-
	200	48 C	0016.1	0028.4	14.0	13750	1740	0
	500	46 C	0358.0	0359.0	2.1	1400	-	SL
	500	42 SER	0445.0	0542.5	75	2200	-	SL
	200	42 SER	0507.9	0509.2	36.3	3900	-	ML
	200	8 S	0552.5	0552.8	0.6	7600	-	0
	200	46 C	0619.8	0620.6	1.3	9300	-	SL
	500	42 SER	0639.0	0702.0	59	790	-	SL
	200	42 SER	0725.5	0734.8	11.9	14500	-	ML
	100	42 SER	0725.7	0735.0	11.8	6200	-	SL
	200	48 C	0804.0	0825.1	22	23000U	1200U	0 SUNSET
				0820.8		5100U		WR
	500	48 C	0804.5U	0808.3	30D	4500U	590U	SL SUNSET
	100	48 C	0806.6U	0819.8U	16	14000D	-	- SUNSET
	500	48 C	2050E	2115.0	37D	4200U	950U	SL SUNRISE
	200	48 C	2050E	2115.8	30D	13000U	1070U	WL SUNRISE
	100	48 C	2050E	-	11D	15000D	-	- SUNRISE
	200	44 NS	2055E	0520	710D	700	240	SL
	100	44 NS	2055E	0524	710D	890	620	SL
	500	42 SER	2211.4	2215.0	24.5	130	-	0
	200	46 C	2301.7	2302.8	2.1	170	-	SL
	100	42 SER	2309.2	2319.9	13.2	7600	-	SL

MAR 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
13	500	46 C	0005.8	0006.7	1.3	1420	-	SL
	100	42 SER	0107.3	0128.8	47	8700	-	SL
	200	42 SER	0125.1	0146.9	33.7	840	-	WL
	500	42 SER	0146.0	0147.0	11.5	1320	-	WL
	500	46 C	0254.5	0325.2	71	825	40	SL
				0300.5		220		SL
	200	42 SER	0300.0	0331.0	43.6	5500	-	WL
	100	42 SER	0324.0	0331.0	20.0	11000	-	WL
	200	42 SER	0532.0	0532.1	4.2	34000	-	0
	200	46 C	0603.6	0605.0	5.5	280	110	ML
	100	46 C	0604.1	0604.8	5.6	2700	640	WL
	100	41 F	0646.5	0654.8	12.0	7300	-	SL
	500	41 F	0651.5	0715.3	24.0	1600	-	0
	200	44 NS	2050E	0400	710D	730	370	SL
	100	44 NS	2050E	0400	710D	1300	390	SL
	500	42 SER	2107.5	2113.0	11.5	205	-	SL
	100	42 SER	2221.8	2303.4	57	8000D	-	SL
	500	42 SER	2228.3	2303.5	49	630	-	SL
13	200	42 SER	2228.5	2303.6	50	10750	-	SL
	200	8 S	2313.5	2313.6	0.4	45000	-	0
14	500	21 GRF	0203.0	0254.0	168	160	35	ML
	200	41 F	0221.8	0222.7	3.2	4100	-	WL
	100	41 F	0221.8	0222.8	3.8	5500	-	WL
	500	46 C	0309.8	0311.8	3.5	410	215	SL
	500	42 SER	0632.5	0638.0	6.0	220	-	SL
	200	8 S	0823.0	0823.4	0.5	6200	-	0
	100	8 S	0823.8	0823.8	0.9	9300	-	WL
	200	44 NS	2050E	0200	710D	400	316	SL
	100	44 NS	2050E	0700	710D	980	650	-
15	100	8 S	0150.2	0150.8	0.8	11900	-	WL
	100	42 SER	0210.9	0211.9	38	250	-	SL
	100	42 SER	0340.0	0431.7	198	3400	-	SL
	500	42 SER	0347.0	0355.6	13.7	350	-	SL
	200	44 NS	2050E	0019	710D	920	390	SL
	100	44 NS	2050E	0236	710D	580	45	SL
16	200	44 NS	2050E	0211	710D	130	48	SL
	100	44 NS	2050E	0228	710D	140	26	-
	100	42 SER	2208	2215.8	73	570	-	-
17	100	42 SER	0111.9	0155.0U	86	2000	-	0
	200	42 SER	0122.6	0124.3	13.9	1700	-	ML
	500	42 SER	0209.2	0245.2	36.2	1100	-	WL
	500	46 C	0716.0	0716.8	10.0	334	7	WL
18	100	48 C	0203.6	0205.3	31.0	9000	-	WL
	200	48 C	0204.0	0205.3	23.1	11000	140	0
	500	46 C	0204.2	0206.0	21.5	170	47	ML
				0211.5		50		WL
	500	46 C	0323.8	0324.1	1.2	186	-	SL
	500	42 SER	0350.5	0350.7	8.5	35	-	ML
	200	8 S	0757.4	0757.7	0.3	2500	-	0
	200	44 NS	2045E	2300	520D	24	13	ML
19	500	46 C	0429.8	0431.8	3.5	7	-	WL
	500	41 F	2328.8	2335.6	8.0	6	-	0
20	100	46 C	2043U	2119.8	61	320	74	- SUNRISE
				2049.1		180		-
	200	46 C	2103.3	2109.2	23U	24	8U	0
	500	46 C	2342.3	2347.5	6.5	8	-	0
21	500	46 C	0400.9	0405.0	7.0	33	12	WR
	200	41 F	0401.1	0404.2	6.7	130	-	0
	500	46 C	0415.0	0502.0	67.0	58	5	MR
	500	46 C	0538.8	0541.0	6.5	25	-	WR
	200	46 C	0540.3	0540.6	1.8	290	-	0
	500	46 C	0632.2	0634.1	12.5	135	32	MR
	200	46 C	0632.3	0633.1	5.3	4100	-	0
	500	42 SER	0723.4	0726.7	17.0	145	-	MR
	200	44 NS	2040E	0618	720D	150	82	SR
22	500	46 C	0042.1	0043.0	2.3	30	-	MR
	200	46 C	0124.0	0124.2	0.9	740	-	SR
	200	44 NS	2040E	2109	720D	60U	25U	MR SUNRISE
22	500	42 SER	2146.3	2147.8	13	49	-	WR
	500	42 SER	2247.5	2252.0	4.8	42	-	WR
23	500	42 SER	0112.3	0127.0	15.5	27	-	WR
	500	42 SER	0503.8	0504.1	11.5	59	-	WR
	200	44 NS	2040E	2235	720D	170	65	WR
	100	44 NS	2040E	2300	720D	160	53	-
	100	42 SER	2103.6	2111.0	32	15300	-	WR
	200	41 F	2109.2	2109.6	4.6	12000	-	WR
	500	48 C	2115.5	0048.0	465	1400	350	WR
				2121.8		340		WR
				2146.0		150		WR
				2256.0		350		WR
	200	46 C	2118.3	2122.0	9.9	380	180	WR
	100	46 C	2152.8	2206.0	23.0	630	200	SR
24	100	46 C	0001.3	0002.8	2.1	970	-	0
	100	42 SER	0230.8	0232.3	3.4	480	-	0
	100	46 C	0331.5	0333.3	2.0	2100	-	0
	200	46 C	0331.8	0332.1	1.5	3100	-	0
	200	46 C	0541.3	0606.9	28.4	640	48	WR
				0548.4		66		MR
	200	46 C	0710.2	0747.8	57	135	65	SR
	200	44 NS	2035E	0315	720D	14	9	MR
	100	46 C	2036U	2039.0U	7.9	1700U	-	0 SUNRISE
	500	46 C	2047U	2050.5	12.5U	65	-	0 SUNRISE
	200	46 C	2050U	2052.7	56.0	430U	52U	0 SUNRISE
	100	27 RF	2100	2121	155	260	70	-
25	200	44 NS	2035E	2136	730D	27	13	MR
26	500	42 SER	0129.7	0130.1	10	157	-	0
	500	41 F	0335.8	0336.9	6.0	1100	-	0
27	200	41 F	2059.7	2101.7	3.5	350	-	0
	200	8 S	2222.6	2222.7	0.7	6400	-	0
	500	42 SER	2222.9	2223.0	5.1	55	-	0
	200	8 S	2237.9	2238.0	0.5	1300	-	0
	200	46 C	2316.9	2317.5	1.0	2100	-	0
28	200	8 S	0715.6	0716.2	0.9	840	-	0
	200	42 SER	2116.6	2117.2	3.0	115	-	0
	200	46 C	2219.8	2220.5	2.0	84	-	0
29	200	44 NS	2030E	0423	740D	35	10	0
30	500	27 RF	0344	0410	95	8	4	0
	500	42 SER	0349.8	0350	17	180	-	0
	200	44 NS	2027E	0500	760D	43	22	WL
31	200	8 S	0020.5	0020.7	0.8	475	-	ML
	500	46 C	0454.3	0457.5	4.4	37	-	WL
	100	41 F	0648.2	0648.8	4.1	260	-	-
	200	44 NS	2027E	-	760D	-	22U	WL

C. RADIO PROPAGATION

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

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

C. RADIO PROPAGATION

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

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

C. Radio Propagation

c2. Radio Propagation Quality Figures at Hiraiso

Hiraiso

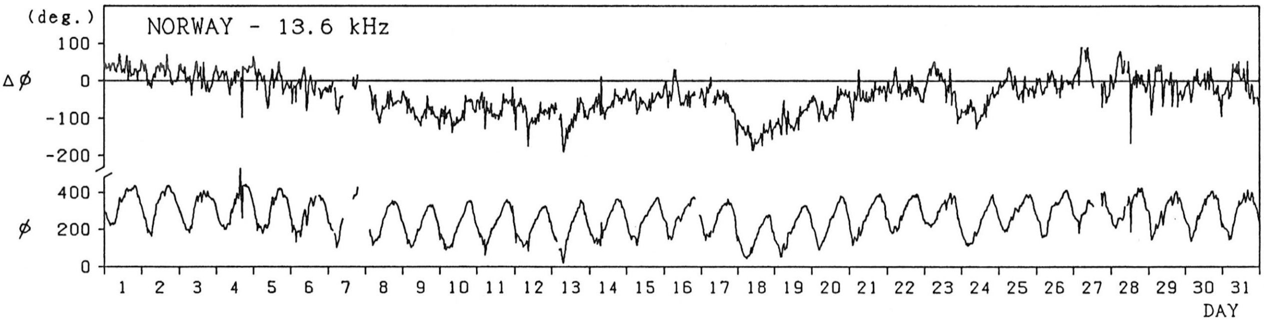
Time in U.T

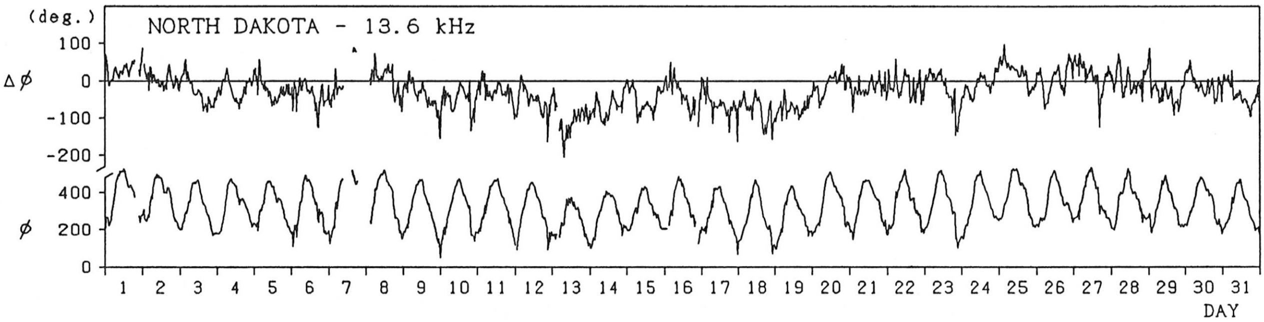
Mar. 1989	Whole Day Figur	WWV 00-06	WWV 06-12	WWV 12-18	WWV 18-24	WWVH 00-06	WWVH 06-12	WWVH 12-18	WWVH 18-24	Conditions 00-06	Conditions 06-12	Conditions 12-18	Conditions 18-24	Princial Geomagnetic Storms Start	Ene	Range
1	5-	5	5U	5	5U	4	4	4	5	N	N	N	N			
2	4+	5	5U	5	5U	4	3	4	4	N	N	N	N	01.4	---	138
3	4o	5	4U	3U	5U	4	4	3	3	N	N	N	N	---	21.0	
4	4o	5	4U	4	5U	4	4	2	4	N	N	N	N			
5	4+	5	4U	5	5U	4	4	3	4	N	N	N	N			
6	4-	4	3U	3U	S	4	4	3	4	N	U	U	U			
7	4o	4	4U	5	5U	4	4	3	3	U	U	U	U			
8	4o	4U	4U	4	5U	4	4	3	4	N	N	N	N	1755	---	132
9	4+	4	5U	4	5U	4	4	5	4	N	N	N	N	---	---	
10	4o	4	5U	4	S	4	4	4	2U	N	N	N	N	---	12.0	
11	4-	4U	4U	4	S	3	4	4	3	U	U	U	U			
12	4-	4	5U	4	S	3	4	4	2U	U	U	U	U			
13	3o	3U	4U	2U	S	3	3	3	3	U	U	U	U	0127	---	644
14	3o	2U	3U	3U	4U	3	3	2	3	W	W	W	W	---	---	
15	4-	3U	3U	4	4U	4	4	4	3	U	U	U	U	---	22.0	
16	3o	3U	3U	3U	4U	3	4	3	2U	U	U	U	U	0533	---	183
17	3+	3U	3U	3U	4U	3	4	3	3	U	U	U	U	---	21.0	
18	3o	3U	4U	3U	S	3	4	2U	2U	U	U	U	U			
19	3o	3U	4U	2U	3U	3	4	3	3	N	N	N	N	0425	24.0	128
20	3-	3U	3U	3U	S	3	3	2	2U	U	U	U	U			
21	4o	3U	4U	4	5U	3	4	4	4	U	U	U	U			
22	4o	4U	4U	4	4U	3	4	4	4	N	N	N	N			
23	4-	5	4U	3U	4U	4	4	3	2U	N	N	N	N			
24	4+	4	4U	4	5U	4	4	5	4	N	N	N	N			
25	5-	5	5U	5	S	4	4	5	5	N	N	N	N			
26	4+	4	5U	4	5U	4	4	4	4	N	N	N	N	2250	---	177
27	4+	4	5U	5	4U	4	4	5	4	N	N	N	N	---	---	
28	4o	4	4U	4	5U	4	4	4	4	N	N	N	N	---	---	
29	4o	3U	3U	4	4U	4	4	5	5	N	N	N	N	---	17.0	
30	4-	3U	3U	3	5U	4	4	4	4	N	N	N	N			
31	4o	3U	4U	3U	5U	4	4	5	4	U	U	U	U			

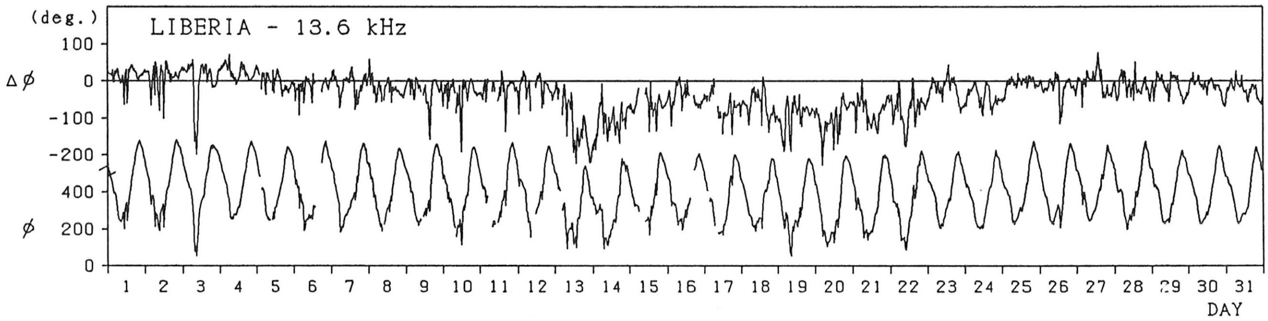
C. Radio Propagation

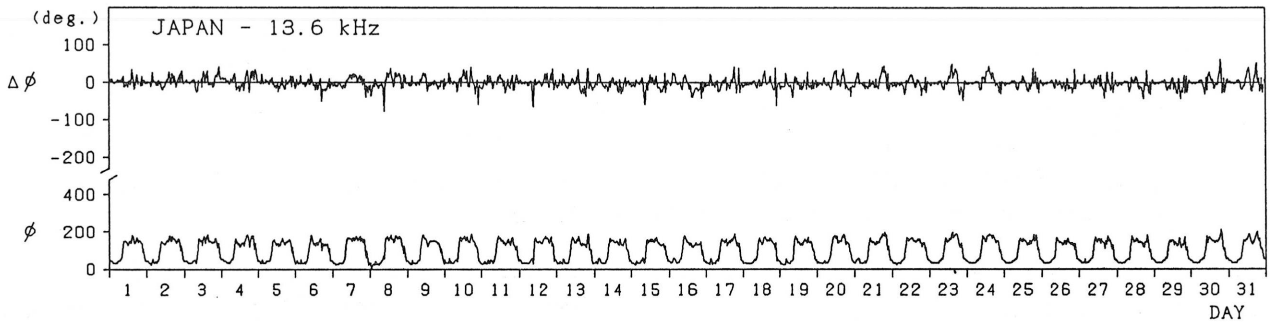
C3. Phase Variations in OMEGA Radio Waves at Inubo

Inubo March 1989

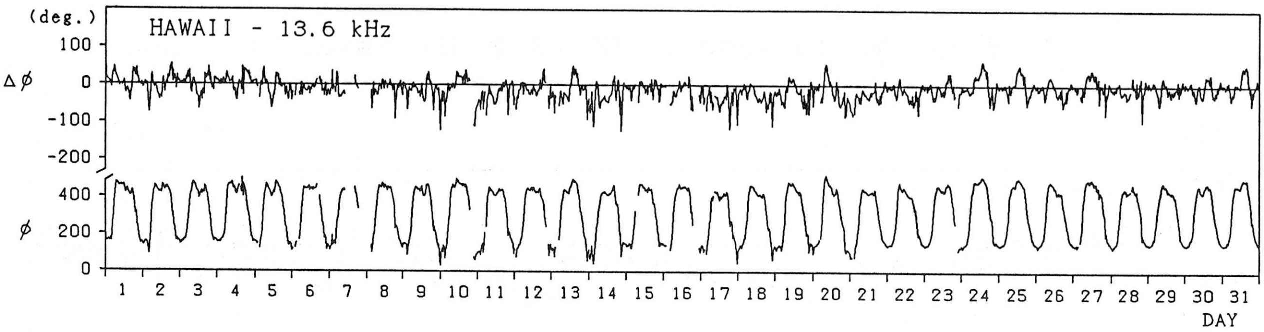


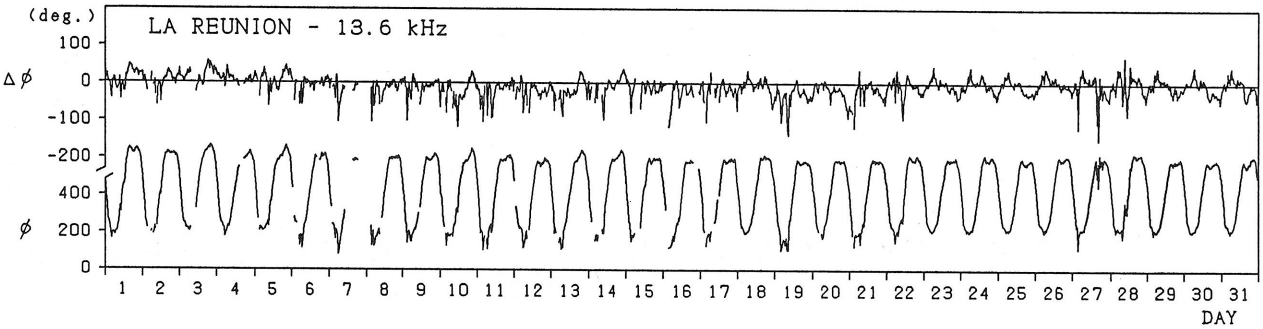


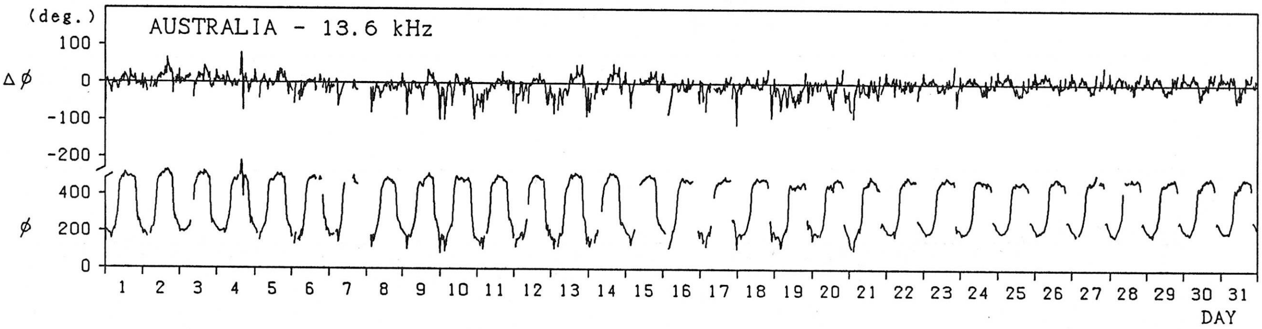


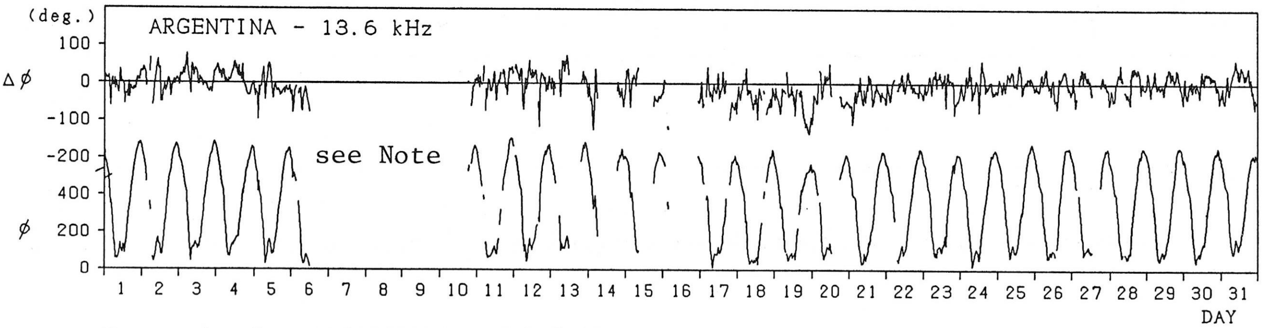


Inubo March 1989









Note: As for ARGENTINA - 13.6 kHz, no record during March 06 - March 10, due to the maintenance of transmitter.

Start (U.T.)	End (U.T.)	Max. (U.T.)	Max. Phase Deviation (negative value, deg.)
Mar.07/0900	Mar.11/0230D	Mar.10/0000	187.2
Mar.11/0230E	Mar.16/0630	Mar.13/0715	210.6
Mar.17/1745	Mar.22/0500	Mar.18/1345	203.4
Mar.23/1315	Mar.26/0730	Mar.23/2230	135.0

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso

Time in U.T.

Mar. 1989	S W F									Correspondence		
	Drop-out Intensities(dB)					Start	Duration	Type	Imp.	Solar Flare	Solar Noise	Geomag. Crochet
	CO	HA	1)	2)	3)							
1			10			0346	44	G	1-			
2	27	30	7		20	0332	34	S	3	x		
2	x		12			0614	36	SL	1	x	x	
3			19	10		1708	32	SL	1+			
5	x	x	18		x	0216	21	SL	1+		x	
6	x	x	22		17	0052	18	S	2-	x	x	
6	27	33	15		21	0314	26	S	3+		x	
6				35	14	1356	74	S	2+	x		
7			14			0548	28	SL	1	x	x	
7			x	12		1320	20	SL	1-	x		
7	x		x	29		1453	19	S	2	x		
7	20	22				2222	64	SL	2+	x		
8			9		8	0115	20	SL	1-	x	x	
8	25	32	11		x	0302	22	SL	3	x	x	
8			30	17	23	0830	38	SL	2+	x	x	
9	22	26	10	x	x	0238	18	SL	3-	x	x	
9	12	12	7		x	0312	22	S	2-	x	x	
9		x	7			0407	13	S	1-	x	x	
9			11			0456	16	S	1-	x	x	
9			x	13		1006	18	S	1			
9			x	17		1255	25	SL	1	x		
9			x	34		1525	25	SL	2+	x		
10	25	32	20	x		0234	40	S	3		x	
10			15	x		0346	28	SL	1	x	x	
11			7		x	0153	8	S	1-	x	x	
11			7		x	0201	10	S	1-		x	
11	10	15	12		13	0330	35	S	2-	x	x	
11			20		23	0520	40	SL	2-	x	x	
11				28	22	0900	15	SL	2	x		
12			22		25	0020	25	S	2-	x	x	
12			34	x	27	0819	22	SL	3-	x	x	
13			17		x	0134	11	S	1+	x	x	
13	30	x	10		x	0301	112	S	2+	x	x	
13			11		15	0625	28	SL	1-	x	x	
15			14			0237	//	G	1	x		
15		x	22			0624	76	S	2-	x	x	
16			38			0155	288	G	3	x	x	
16			x	17		1525	20	SL	1	x		
17	22		9	x	7	0235	68	S	2-	x	x	
17			7			0321	7	S	1-		x	
17			4			0331	6	S	1-		x	
17	x	x	19	15	12	0716	15	S	1+	x	x	
17			11			2311	12	SL	1-	x	x	
18			10			0208	32	SL	1-	x	x	
19			8			0337	9	S	1-		x	
19			7			0346	29	G	1-		x	
19	33					0621	38	SL	3-			
19			14			0701	23	SL	1			
19					8	0947	32	SL	1-	x		
20	29	34	12	x	x	0358	40	SL	3+	x	x	
21			15	x	x	0057	129	G	1	x		
26			x	16	x	1310	14	S	1	x		
27	28	29	21		12	0312	22	S	3	x		
28			x	23	22	1030	26	SL	2-			
29	20		5		x	0330	20	S	2-			
31			12			0457	25	SL	1	x		

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

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Mar.	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					5	21	0110	0134	0116
1	20	42	65	47	26		0347	0536	0416
1	16		11	10			0553	0610	0555
1	31	48	44	28			0612	0706	0616
1		93	59				1016	1123	1031
1		154	41				1207	1420	1219
1					25	—	2119	2145	2123
1				8	22	31	2224	2325	2231
2		16	17	42	41	32	2359**	0114	0009
2	11	15	22	28	14	12	0158	0252D	0212
2	13	39	73	64	42		0258	0334D	0328
2	60	120	188	128	109	37	0334E	0413D	0349
2	33	82	139	92	85	41	0413E	0549	0420
2	39	120	131	94	27	30	0616	0721D	0623
2			14	22			0721E	0751	0727
2	26	44	28	26			0804	0851D	0824
2	26	150	120	35			0851E	0953	0902
2		124	51				1149	1350	1200
2		12					1433	1516	1453
2					24		1839	1906	1846
2					17		2155	2224	2202
2					6		2251	2310	2257
3	12	6		18	19	16	0006	0041D	0016
3	7			20	18	17	0041E	0145	0044
3			6	7			0337	0404	0340
3			3	4			0409	0427	0412
3	13		9	6			0537	0610	0552
3	28	210	28	117	20		0705	0744D	0722
3	38	175	143				0744E	0826D	0754
3	36	227	174	124			0826E	0923D	0849
3		161	115				0923E	1044	0932
3					26	18	2124	2300	2151
4					3		0157	0217	0202
4	17	37	58	51	19	12	0457	0620	0506
4					16	21	2105	2119	2109
4		7		17	30	27	2212	2245	2216
5	10	12		19	21	18	0121	0159D	0136
5	52	76	130	109	102	67	0201	0341	0228
5		28	29	19			0632	0727	0645
5		31	24	10			0751	0834	0804
5		53	42	34			0835	0915D	0842
5		86	69	24			0915E	1052	0933
5		57	42				1040	1126	1055
5					29*		2046	2112D	2053
5					44	15	2112E	2133D	2119
5					80	54	2133E	2228	2138
5					7		2237	2256	2242
5	7	11		—	17		2314	2354D	2318
5	18	13	19	—	30	15	2354E	0019	0002
6	12	8	9	—	23	13	0019E	0036D	0024
6	30	15	39	—	45	36	0036E	0050D	0041
6	65	60	118	—	119	86	0050E	0250	0103
6	59	102	192	—	113*	80	0314	0400D	0326
6		24	60	—			0400E	0430D	0408
6		43	77	—			0430E	0600D	0500
6	36	103	108	—			0600E	0815	0638
6		26	16	—			0854	0930	0907
6		24	12				1012	1049	1019
6		75	31				1135	1221	1150
6		—	40				1358	1500	1410
6					31		2051	2116	2058
6	16	11	8	21	40	25	2216	2316	2228
6	43	20		—	30		2354	0101D	0016

Inubo

Mar.	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
7			18	—	10		0101E	0132	0111
7		14	23	—	8		0138	——	0150
7		11		—	8		0220	0246	0223
7			6	—	9	11	0333	0346	0336
7			8	—	10	—	0433	0451	0439
7	49	119	155	—	37	40	0528	0627D	0605
7	24	125	115	—			0627E	0720D	0635
7		66	43	—			0720E	0820D	0731
7	13	39	20	—			0820E	0852	0827
7		23	17	—			0902	0929	0919
7		56					1653	1807	1706
8	31	54	102		64	44	0304	0327D	0315
8	19	43	86		63		0327E	0425	0332
8	41	42	75	—	45	42	0447	0524D	0502
8	29	19	56	—	41	44	0524E	0622D	0534
8		31	23	—		12	0622E	0700D	0628
8		31	26	—			0700E	0722D	0704
8		27	19	—			0722E	0757	0727
8			12	—			0801	0823	0810
8	62	—	263	—			0828	1047	0840
8		52	5				1240	1300	1245
8		54					1314	1420	1325
9				6	4		0041	0118	0052
9		13	18	14	7	12	0150	0213	0156
9			7	11	8		0226	0238D	0229
9	49	68	127	96	93	57	0241	0312D	0251
9	34	39	66	63	56	24	0312E	0359	0322
9	24	32	52	39	45	16	0408	0452D	0414
9	33	45	73	44	49	17	0452E	0645D	0508
9			13				0645E	0704D	0649
9		14	7				0704E	0728	0716
9		28	30	18			0750	0806D	0758
9		44	42	27			0806E	0835	0813
9		28	31	19			0835E	0908D	0840
9		13	9				0908E	0930	0913
9		—	174				1006	1048	1015
9		89	12				1306	1336D	1314
9		64					1336E	1444	1350
9		188					1525	1706	1541
9					57	31	1921	2011	1935
9					10		2145	2217	2200
9					24	23	2219	2258	2223
9	35	38	36	72	96	66	2306	2336D	2324
9	42	61	53	96	111	111	2336E	0056D	2357
10	26	31	52	51	47	38	0105	0200	0119
10	13	19	24	29	17	13	0203	0236D	0214
10	51	86	142	113	90	69	0236	0343D	0247
10	27	48	84	60	59	36	0343E	0516	0404
10		28	35	22	17		0524	0611D	0543
10		54	36	18	13		0611	0702D	0641
10		44	30				0702E	0720D	0713
10		43	30	6			0720E	0736	0723
10	37	182	143	74			0743	0858	0800
10		55	28				0908	0932D	0919
10		94	55				0932E	1025	0943
10		71	39				1039	1106D	1046
10		220	120				1106E	1253	1141
10		55					1303	1400	1321
10		27					1434	1526D	1453
10		61					1526E	1626	1534
10					168		1859	2030D	1932
10					146		2030E	2139D	2039
10	12		13		108	21	2139E	0010D	2153
11	9			14	35	11	0010E	0029D	0015
11	19	15	18	31	45	29	0029E	0104D	0041
11		11	23	20	24	18	0104E	0141	0109
11	21	28	71	35	35*	31	0150	0253	0209
11	63	91	158	99	90	63*	0331	0455	0347
11	76	164	190	113	77	54	0517	0634	0535
11	30	90	91	63		19	0639	0747	0653
11		29	12	6			0803	0821	0808
11		38	26	9			0842	0901D	0851
11		—	226	72			0901E	0945D	0907
11		24	69				0945E	1013D	0953
11		38	58				1013E	1047	1016
11		32	15				1055	1123D	1104
11		78	13				1226	1315	1238
11		88					1402	1502	1415
11		148					1536	1703	1550
11					116	82	1934	2046	1940
11		21	22	40	61	31	2301	2341D	2321
11		17		17	34	15	2341E	0017D	2346
12	81	96	114	173	160	80	0017E	0145	0031
12		16	29	29	9	20	0147E	0241D	0153
12		12	23	38	19	15	0241E	0301D	0249
12			18	35	18	16	0301E	0358	0305
12	27	58	87	72	51	29	0524	0607D	0534
12	31	64	94	74	21	24	0607E	0653	0615
12		24	13	20			0700	0730	0708
12		72	65	32			0736	0819D	0750
12	81		296	161		17	0819E	1012	0830
12		12					1227	1320D	1234
12		28					1320E	1404	1326
12		113					1458	1606	1513
12		44					1624	1651	1628
12					171	118	2032	2207D	2103
12	27	20	17	37	79	50	2207E	2335D	2232
12	35	34	43	—	81	60	2335E	0024D	2341
13	9		19	—	13*	17	0024E	0113D	0030
13	31	39	73*	—	91	47	0113E	0230D	0140
13			17	—	23	15	0230E	0248D	0234
13	115	194	322	—	189	144	0250E	0447D	0328
13	38	37	84	—		24	0447E	0507D	0452
13			48	—			0507E	0551D	0512
13	41	18	41	—		11	0551E	0607D	0556
13		42	47	—			0607E	0625D	0614
13	95	173	140	—	30	32	0627E	0704D	0636

Inubo

Mar. 1989	SPA								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
13	107	219	144	—	13	21	0704E	0801D	0718
13		103*	35	—			0801E	0918D	0805
13		56*	35*	—			0918E	1040	0955
13		127	14				1108	1305D	1152
13		145	6				1305E	1411	1325
13		30					1708	1750	1719
13	21	27	31	—	—	27	2251	2343	2300
14		34*		—	70*	33	0002	0046D	0021
14	17	39	39	—	77	45	0046E	0149	0103
14	17	64	39	—	23		0202	0225D	0212
14		37	84	—	47	22	0225E	0240D	0235
14	36	55	191	—	112	56	0240E	0431D	0309
14		28*	29	—	19		0431E	0511D	0436
14	22	13	37	—	21	22	0511E	0605	0533
14	38	162	135	—	19	32	0618	0753D	0654
14		54		—			0753E	0837D	0809
14		61	64	—			0837E	0928D	0857
14		95	95	10			0928E	1027	0936
14		22*					1049	1121	1059
14		27					1303	1350	1311
14		78					1351	1514	1436
14		19					1550	1635	1605
14		60					1648	1753	1722
14		41*			62	20	1936	2030D	1950
14					118	59	2030E	2216	2103
14					5		2239	2258	2243
15		17		—	9*		0009	0051	0028
15				—	6		0122	0200	0140
15	24	30	77	—	39	32	0248	0400D	0317
15	13	14	40	—			0400E	0442D	0414
15	10	12	34	—			0442D	0459D	0448
15			40	—	30		0459E	0549	0506
15	81	—	267	—	74	38*	0622	0822D	0652
15	35	99	197	34			0822E	1020	0838
15		118	29				1200	1315	1222
15		87					1333	1430D	1348
15		57					1430E	1539D	1459
15		34					1539E	1619	1544
15		100					1652	1813	1701
15					11		2054	2110D	2100
15					50*	21	2110E	2245	2124
16	73	101	178	147	128	96	0155	0614D	0219
16	25	35	51	50			0614E	0652D	0624
16	25	43	19	25			0648E	0754	0658
16		27	16				0835	0924	0856
16		93	58				0954	1134	1008
16		53					1218	1328	1235
16		20			46		1752	1830	1802
16					42		1854	1914D	1902
16					110	49	1914E	——	1926
16		20	—	14	68	—	2206	2315D	2218
16	16	16	19	35	49	29	2315E	0000	2322
17				7	4	7	0017	0036	0024
17				14	5		0103	0147	0118
17	24	22	32	47	33	24	0156	0223D	0200
17	58	104	173	131	126	76	0221	0322D	0251
17	29	49	93	80	73	37	0322E	0425D	0336
17	20	20	22	26	34		0425E	0507	0435
17		17	36	34	17		0519	0559D	0537
17	26	46	58	45	20		0559E	0643	0603
17	99	—	242	161	41	48	0716	1017	0722
17	19	135	115				1106	1230	1123
17		113			58	65	1724	1920	1746
17	18				63		2002	2107	2020
17					8		2118	2139D	2121
17					20	15	2139E	2211D	2147
17					33		2211E	2310D	2247
17	58	48	50	82	118	75	2310E	0127	2318
18		14	46	51	32	20	0206	0313	0214
18		12		16			0334	0406	0342
18		32	15	9		16	0409	0450	0426
18			17	13			0453E	0603	0510
18		23	7				0737	0757	0746
18		13	8				0934	0954	0937
18		11	10				1010	1032	1017
18	28	36					1127	1158D	1137
18	24*	51					1158E	1244D	1209
18		105	13				1244E	1358	1251
18		36					1553	1622D	1601
18		38					1622E	1728	1633
18		34				17	1734	1810	1747
18					91	53	2029	2148	2036
18	45	20	37		123	90	2151	2259D	2208
18				6	15		2259E	2328	2303
19			15	49	35	23	0015	0133D	0043
19				18	6	11	0133E	0224	0149
19			9	14	8		0232	0250D	0241
19		38	10	28	15		0250E	0324D	0259
19	40*		102	78	59*		0326E	0402D	0352
19		85	105		65		0402E	0527D	0407
19		16	52	31	47		0527E	0621D	0536
19	33	76	98	44		27	0621E	0705D	0636
19	63	192	156	75		98	0705E	0739D	0714
19	67		122	52			0739E	0815D	0756
19	51	171	138	47			0815E	0945D	0826
19		52	54				0944	1036	1008
19		46	20				1127	1202D	1142
19		72	15				1202E	1319D	1214
19		62					1319E	1348	1326
19		51					1419	1456D	1430

Inubo

Mar.	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
19		50					1456E	1552	1516
19					19		1917	1934	1925
19					36		1939	2042	1945
19	20			—	102	66	2105	2238	2123
19	26	34	35	—	75	44	2329	0131	2348
20	21	34*	41*	—	21*	12	0249	0351	0312
20	57	97	192	—	88	43	0400	0526	0410
20		20	30	—			0604	0756	0629
20		18					1043	1106D	1048
20		28					1106E	1133D	1112
20		37					1133E	1152D	1142
20		98					1152E	1246	1205
20		48					1353	1418D	1405
20		86					1418E	1520	1430
20		85					1545	1653	1558
20					53		1854	1948	1914
20					72	80	2043	2220	2111
20				—	12	10	2232	2317	2251
20				—	9		2321	2339	2330
20		22		—	46	54	2345	0055D	0025
21	22	23	48	—	60	60	0055E	0147	0113
21	56	82	149*	—	108	102	0151	0342	0220
21		26	34	—	15	15	0406	0451	0413
21		18	13	—			0459	0534	0517
21	25		20	—	14		0543	0621	0550
21	45	120	124	—	24	38	0631	0730D	0642
21		28	35	—			0730E	0823	0746
21		50	52	—			0907	1008	0915
21		28		—			1502	1531D	1510
21		23		—			1531E	1602	1541
22	24	41	79	—	24	18	0513	0621	0522
22		20	24	—			0719	0754	0734
22		100	63*	—			0936	1207	1039
22		95					1536	1757	1600
22		36					1825	1934	1854
22					21		1910	1935	1920
22					70	38	1949	2044	2006
23				6	4		0151	0217	0201
23				5			0221	0256	0236
23			9	6			0537	0622	0548
23		23					0852	0946	0911
23	35	70					1356	1508	1408
23					158	115	1929	2124D	2005
23	23	7	14		95	88	2124E	2304	2135
24		17		8		13	0052	0135	0055
24			9	8	6		0230	0245	0237
24		16	13				0245	0308	0252
24			10				0950	1008	0959
24					73	54	2028	2207	2043
24				4	7		2241	2305	2245
24		23					1611	1702D	1627
24		33					1702	1751	1713
25			9	12	6		0242	0315	0248
25	24	26					1209	1314	1220
25		22					1546	1610	1552
25		13					1801	1836	1810
26	10	12		22	18	15	0050	0123	0055
26	16	16		29	21	18	0129	0215	0134
26			14	10			0522	0556	0530
26			13	6			0604	0631	0610
26		18	12				0854	0939	0903
26	22	131	12				1308	1404D	1319
26		33					1404E	1506	1413
27	8			—	11	8	0011	0100	0018
27			18	—	14	14	0225	0300	0229
27	90	115	157	—	96	78	0315	0502	0321
27			8	—		28	0726	0757	0730
27		39	—		—		1448	——	1457
27					83	26	1932	2026	1952
27					60	56	2037	2102D	2048
27				—	33	20	2102E	2159	2110
27				—	8	17	2304	2334	2310
28	12	16		—	27	33	0002	0058D	0013
28				—	24		0058E	0149	0103
28				—	16		0150	0227	0156
28		10	27	—	19	11	0233	0318	0237
28		11	21	—	15		0323	0352	0328
28	26	99	76	—			0754	0907	0809
28	62	—	121				1032	1127	1042
28		69					1225	1349	1252
28		20					1630	1707	1635
28					107	63	1928	2118D	1957
28				—	21		2118E	2155	2125
29		47		—			0109	0230	0125
29				—	11	10	0149	0222	0159
29		10		—	6		0252	0318	0257
29	25	33	51	—	26		0334	0453	0347
29			6	—			0538	0634	0550
29			12	—			0702	0738	0714
29		49					1043	1204	1108
30	31	16	21	25	11		0348	0418D	0359
30	20		10	18	9		0418E	0523	0433
30		21	22	10			0812	0845	0815
30		52					1302	1407	1309
31	30	46	73	62	33		0458	0610	0504
31		20					0909	0940	0918

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