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IONOSPHERIC DATA IN JAPAN

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CONTENTS

COMMUNICATIONS RESEARCH LABORATORY
MINISTRY OF POSTS AND TELECOMMUNICATIONS
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PREFACE

July, 1988

Ionospheric sounding in Japan dates back to 1931. Results of the work have been published monthly as "Ionospheric Data in Japan" since 1946. Observation, data coordination, and publication have been carried out successively by various organizations as dictated by reorganizations of government offices. Several progressive changes have been made in the observing system and data processing method.

Communications Research Laboratory, formerly Radio Research Laboratory, which has been operating ionospheric observatories since 1952, has just completed a new full-automatic system attached to traditional ionosondes for data collecting and processing of ionospheric observation. After extensive comparison of automatically-scaled parameters with manually-scaled values, it was decided to publish monthly reports based on the data processed with the new system beginning June 1988.

At present, the number of ionospheric parameters to be published is restricted to five because values of other parameters processed by the new system are not reliable. New daily plots called Summary Plots, made from quarter-hourly digital ionograms are published to present general ionospheric conditions. With respect to data obtained at Kokubunji, fourteen manually-scaled parameters are, as heretofore, being inserted along with *f*-plots to supplement those automatically-scaled.

We intend to improve the system to extend the ability of automatic scaling and to provide, on request, various digital data including ionograms in computer-readable form.

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Director General
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Ministry of Posts and Telecommunications

INTRODUCTION

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

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

A. IONOSPHERE

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

A1. Automatic Scaling

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

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

a. Characteristics of Ionosphere

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

b. Descriptive Letters

The following descriptive letters are used in the tables.

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

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

C Impossible measurement because of any failure in observation.

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

N Impossible automatic scaling because of complex echoes.

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

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

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

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

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

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

d. Reliability of Automatic Scaling

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

e. Summary Plot

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

A2. Manual Scaling

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

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

a. Characteristics of Ionosphere

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

b. Symbols

(i) Descriptive Letters

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

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

(ii) Qualifying Letters

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

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

(iii) Description of Types of *Es*

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

The types are:

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

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

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

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

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

B. SOLAR RADIO EMISSION

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

B1. Daily Data at Hiraiso

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

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

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

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

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

* Measurement impossible because of interference.

B Measurement impossible because of bursts.

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

B2. Outstanding Occurrences at Hiraiso

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

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

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

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

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

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

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

C. RADIO PROPAGATION

C1. H.F. Field Strength at Hiraiso

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

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

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

C2. Radio Propagation Quality Figures at Hiraiso

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

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

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

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

C	artificial accident,
S	propagational accident,
U	inaccurate.

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

N	normal,
U	unstable,
W	disturbed.

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

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

C3. Phase Variation in OMEGA Radio Waves at Inubo

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

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

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

C4. Sudden Ionospheric Disturbances

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

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

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

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

Types of fade-out are as follows:

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

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

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

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

b. Sudden Phase Anomaly (SPA) at Inubo

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

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

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

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

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

Transmitting Stations

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

HOURLY VALUES OF FOF2 AT WAKKANAI

JUN. 1988

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

HD	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1			57	56	55	62	72	71	A	A	A		A		A	A		63	A	A	75	80	77	72
2	67	58	56	52	52	67	82	73	70		A	A	A	A	71	A	68	64	66		51	A	74	
3		68	60	66	62	74	78	88	78	76	A	70	74	A	65	75	76	76	A	72	56	66	81	83
4	73	70	70		73	65	73	72	83	80	A	77		67	72	73	74	A	77	86	88	90	75	66
5	68	54	67	67	68	82	90	87	86	A	74	75	75	69	72	71	75	72	78	87	84	A	84	83
6	73	81	77	68	77	84	81		98	89	81	84	76	73	76	79	69	A	73	77	84	79	88	83
7	80	73	65	68	68	74	72	66	66	84	80	A				77	A		76	84	90	88	86	77
8	82	80	75	73	76	86	94	84	74	67	72	A	74	68	A	A	A	A	94	79	84	86	88	83
9	83	78	78	66	66	78	82	88		78	74	74	70	72	76	76	79	73	74	85	89	90	86	83
10	86	74	75	75	83	85	67	77	82	A	A	74	76	71	76	78	86	76	65	71	84	85	81	78
11	77	74	A	65	77	85	80	A	A	46	177	64					A	A	69	70	80	72	72	70
12	67	64	59	60	65	77	76	88	78	70	A	74		73	75	66	66	67	A	79	84	88	84	74
13	75	190	64	66	63	73	84	91	75	77	73		71	A	A	71	74	65	63	76	85	85	83	76
14	65	68	66	66	61	70	67	68	64	A	A		59	A		73	60	62	61	55	71	72	74	74
15	74	74	60	64	57	67	78	106	88	76	A	70	81	70	76	78	76	C	C	80	86	79	83	77
16	68	73	68	70	66	73	81	80	A	70	A	A	71	73	72	74	76	A	67	76	76	70	81	73
17	64	63	67	57	56	66	72	A	A	A		62		65	66	68	84	74	83	86	84	80	79	76
18	76	70	71	64	89	80	78	88	77	76	74	78	81	74	67	64	73	82	A	84	85	84	80	80
19	73	72	73	68	71	64	66	A	A	A		A	A		A	61	A	A		74	66	87	81	A
20	70	71	60	56	50	48	A	73	60	A				A		57	55	A	69	58	64	64	62	64
21	64	58	58	53	A	57	64	64	66				A			A		60	61	67	66	65	71	66
22	54	56	63	50	52	66	70	72	80	A	65	63		A		63	70	A	A	84	78	80	83	76
23	64	64	65	60	56	62		77	62	70	A	A	A		A	60	A		A	A	72	79	A	69
24	65	61	54	56	70	84	78	82	A	A	A		62	63		60	A	54	63	70	A	66	71	64
25	63	52	59	53	54	63	75	65	A	A	B	A		A	A	A	A	A		A		70	74	80
26	56		56	54	52	64	66	84	66	67	A	73	76	83	70	A	72	A	69	84		78	73	66
27	71	67	62	52	A	A	47	A		A	A	B	A	A	A	58	A	52	A	49	54	62	64	58
28	62	54	54	53	51	58	59	A	A		A	A	A			58	63	61	A	64		75	82	76
29	68	63	57	54	53	64	70	A	A	61		42					A	68	60	69	64	70	80	76
30	75	67		73	58	60	A	A	A	54	A	A	64		64	A	A		A	86	84	A	85	76
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	28	29	28	29	27	22	18	16		14	14	13	14	21	18	16	18	26	26	27	29	28
MED	69	68	64	64	62	67	75	78	76	73		74	74	71	72	71	74	66	69	76	82	79	81	76
U Q	75	73	69	67	70	79	81	88	82	77		75	76	73	76	75	76	73	76	84	84	85	83	79
L Q	64	62	58	54	54	63	67	72	66	67		64	70	67	67	60	68	61	63	70	66	70	74	69

HOURLY VALUES OF FES AT WAKKANAI

JUN. 1988

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						
				23	28	30	49	64	130	102	72		74		51	72			94	94	59	114	37	28
2		G	G	G	G	G				G					G		G							
	31						56	65	60		95	127	90	66		93		58	58	144	58	72	60	
3				G	G	G						G	G	G	G		G							
		34	30				48	72	69	59	71					56		62	65	35	58	58	37	29
4		G				G								G	G		G						G	G
	36		26		36		48	52	44	50	86	44				69		74	62	36	31	27		
5			G	G									G	G	G									
	32	32			29	40	51	56	52	80	68	67				43	59	38	40	70	33	78	58	58
6		G	G		G						G	G	G	G	G	G							G	
	32			33		53	39		40	56							53	69	74	34	68	37		26
7	G	G	G	G				G								G							G	G
					30	44	36		43	45	70	85					74		67	47	52	40		
8	G	G	G	G	G	G	G				G			G										G
								58	63	61		109	51		71	82	106	129	113	70	69	41	33	
9	G	G	G	G	G	G						G	G	G	G	G	G						G	G
							42	64		57	62							44	51	41	34	34		
10			G				G					G	G	G	G	G								
	29	25		23	46	31		50	58	82	68						52	52	61	72	68	65	71	58
11												G				G								
	39	50	59	38	37	55	78	118	72	62	158						53	64	37	34	55	58	72	26
12	G	G			G		G			G		G	G	G	G	G	G							
			30	23		52		51	42		67							62	69	44	40	27	44	32
13	G		G	G	G		G		G		G	B	G											
		130				34		40		72				80	75	50	57	52	39	33	28	53	34	40
14					G								G		G	G	G	G	G					
	55	82	58	47		41	47	60	59	66	64			74						36	37	37	58	39
15	G	G	G	G	G	G	G					G	G	G			74	C	C				G	G
								49	76	51	83				50	56				33	86	31		
16					G		G						G	G										
	53	59	58	33		52		50	80	72	60	134			65	57	50	95	44	58	83	77	60	70
17					G						G		G	G	G	G		G			G			G
	58	36	23	30		42	58	64	72	62		55					50		42	36		28	24	
18	G	G	G	G	G		G			G				G	G									
						33		40	41		57	60	55			53	48	58	69	65	41	52	30	54
19		G			G						G			G		G								
	26		26	26		44	63	88	91	107		70	56		56		171	127	116	70	114	138	86	58
20								G					G			G	G							
	69	67	68	40	49	50	60		58	82				55				62	80	75	64	64	36	29
21		G	G	G			G		G	G					G		G							G
	34				34	34		48					96			52		39	38	37	40	65	34	
22					G		G				G	G			G							G		
	33	49	44	32		40		58	55	65				60		53	82	82	75	58	58		37	58
23	G			G										G		G								
		51	35		36	34		68	66	52	62	104	77		73		65	72	86	170	125	54	83	34
24		G	G		G								G	G	G	G								G
	29			28		36	47	65	84	76	58						84	72	65	72	167	36	39	
25					G																			
	34	38	33	25		38	46	55	72	58		56	173	95	70	68	84	72		95	136	67	62	59
26				G										G										
	60		34		30	39	49	62	60	58	73	74	77		60	89	60	76	49	40		60	70	72
27																G								
	85	58	44	30	56	30	42	41		76	57		84	76	62		91	43	83	44	34	34	33	44
28		G	G	G	G																		G	G
	59					33	48	69	80		56	58	58			52	41	80	61	58		60		
29	G	G		G	G								G		G	G								G
			26			30	44	74	69	68		47					56	38	47	58	44	28	29	
30										G					G									
	28	29		26	32	42	47	58	85		76	74	64			101	168		142	104	97	84	87	69
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	28	29	29	30	30	29	29	28	29	26	24	26	23	26	30	29	27	28	30	28	30	30	29
MED	32	13	23	23	G	35	46	58	62	61	63	56	G	G	G	46	53	62	64	58	58	54	37	29
U Q	46	49	34	30	32	42	49	65	74	74	72	74	74	60	60	57	78	74	77	72	76	65	60	58
L Q	G	G	G	G	G	30	G	49	48	50	56	G	G	G	G	G	G	43	45	36	38	34	29	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT WAKKANAI

JUN. 1988

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

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT AKITA

JUN. 1988

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	A	A	A	A				A	A	N	A	A	A	A						A	A	A	A	
					57	78	71									67	65	67	70					67
2		A									A	A												A
	66		65	62	53	66	77	81	75	63			67	71	59	76	80	74	67	66	74	76	78	
3		A						A		A	A			A								A	A	A
	72		66	61	59	69	84		82			77	76		76	66	80	78	78	79	51			
4															A	A								
	52	76	68	65	66	66	66	80	78	81	80	77	77				81	80	83	83	88	83	80	66
5																	A	A	A	A				
	74		66	66	65	82	86	94	90	86	81	79	78	78	76	78					85	85	77	82
6							A										A			A				
	84	82	71	70	70	83		102	94	88	82	84	85	80	88				67		88	83	86	83
7													A	A				A						
	76	66	67	70		74	70	77	83	81	86	83			76	80	78		76	85	86	86	83	83
8								A						A						A	A		A	
	85	77	76	67	66	82	86		84	81	82	88	88		78	73	85	78	78			90		79
9																								
	84	82	81	67	68	68	81	90	91	88	81	81	86	78	82	80	78	78	83	83	88	88	87	84
10									A	A			A								A			
	86	87	78	82	80	69	84	86			83	81		83	78	81	88	90	80	65		78	66	77
11	A						A	A	A	A		A			A		A		A		A			A
		74	68	68	64	67					65		49	68		65		75		65		64		
12	A					A						A				A	A	A	A	A	A			
		78	76	74	71		80	89	83		80		89	84	77							84	78	66
13										A														
	67	74	67	63	61	67	84	85	80		74	76	75	78	84	77	75	71	70	76	83	84		66
14									A	A	A	A	A							A				
	66	66	52	62	66	68	68	71						54	67	76	74	66	63		64	66	70	63
15																				A	A			
	55	66	67	66	62	65	85	97	84	72	65	70	77	84	76	85	84	86	80			83	78	76
16		A	A					A	A		A				A									
	79			61	67	74	83			73		65	76	78		84	74	68		80	79		66	65
17				A			A	A	A	A	A		A											
	66	67	60		53	59						61		70	68	71	81	84	85	92	79	66	67	78
18														A	A			A	A	A				
		74	74		66	72	87	99	70	72	64	72	86			71	78				84	84	90	80
19	A							A		A	A		A			A		A			A	A	A	
		66	74	74	78	67	69		63			89		54	63		64		52	66				84
20	A					A				A	A	A		A									A	
		81	63	56	52		75	73	88				44		63	63	56	58	60	63				62
21				A				A	A	A	A	A			A									
	62	60	60		53	62	59						64	64		59	58	64	71	80	66	53	64	
22											A		A						A	A	A	A	A	A
	67	56	55	55	50	62	66	83	76	81		69		77	67	67	74	75						
23											A	A	A		A					A		A	A	A
	85	78	68	56	50	58	63	66	93	82				67		65	60		66		66			
24	A				A						A	A												
		66	54	58		63	74	83	77	68			65	67		71	67	80	76	68	57	66	67	66
25								A	A	A	A	A	A	A	A	A	A	A		A	A	A		
	54	55	60	54	48	63	82												82				75	74
26									A			A						A			A	A		A
	70	65	67	60	54	63	83	88		82	71		76	85	76	73	78		77	86			66	
27		A	A	A	A	A						A	A	A	A	A		A	A			A	A	
	68						51		45	53							57			52	50			66
28							A	A	N	A	A		A											
	63	66	57	57	55	64						60		63		64	67	55	68	71		78	77	83
29									A							A	A	A						A
	71	67	66	62	56	66	70			74	74		59	68	68				72	78	54	67	65	
30				A			A		A	A	A	A	A	A								A	A	A
	74	67	73		64	66		65							67	66	64	54	67	62	78			
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	23	24	27	24	27	27	25	18	18	16	14	16	18	20	19	23	24	19	23	19	18	19	19	21
MED	70	67	67	62	62	67	77	84	82	81	80	77	76	74	76	71	74	75	72	76	78	83	77	76
U Q	79	77	73	67	66	72	84	90	88	82	82	82	85	79	78	78	80	80	80	83	85	84	80	82
L Q	66	66	60	59	53	63	68	77	76	72	71	69	65	67	67	66	64	66	67	65	64	66	66	66

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT AKITA

JUN. 1988

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	92	140	70	69	69	42	90	109	104	89	116	96	81	73	G	57	G	G	54	86	94	83	95	29
2	37	58	41	38	30	36	37	G	56	60	56	61	53	69	44	G	71	56	38	G	72	86	83	70
3	54	84	57	50	54	84	46	57	72	112	95	49	G	45	G	G	43	58	83	58	53	72	90	68
4	36	37	40	G	44	30	G	60	58	80	52	65	56	G	66	94	G	G	70	66	57	G	G	G
5	G	26	G	G	G	38	56	58	74	78	74	74	44	56	46	59	80	144	118	145	103	59	54	68
6	49	51	34	50	G	54	84	71	78	65	G	G	50	73	86	107	106		91	91	68	84	46	G
7	30	33	G	G		36	35	54	55	61	61	64	84	90	84	60	50	92	138	126	116	45	41	30
8	G	G	G	30	30	30	50	62	65	54	55	46	57	114	50	72	91	44	50	93	94	83	61	G
9	32	29	G	24	G	29	38	49	61	73	56	69	50	88	74	74	G	59	56	66	84	56	58	32
10	41	40	34	28	29	54	69	92	128	85	90	60	94	52	50	54	45	50	58	34	57	69	58	91
11	76	64	55	48	44	30	69	80	81	125	62	104	92	88	47	45	73	81	166	128	58	37	58	91
12	78	34	41	43	39	67	72	71	69	G	85	89	64	54	60	73	74	102	69	68	58	58	90	48
13	46	37	36	38	34	33	54	50	61	77	69	63	52	G	G	48	54	50	48	58	43	67	81	58
14	46	37	32	31	G	36	47	54	78	86	61	78	56	G	53	54	58	58	36	34	31	G	112	90
15	59	48	35	28	G	29	G	48	59	57	68	60	109	63	44	50	53	82	70	93	39	59	G	72
16	91	145	91	59	57	58	59	68	155	74	135	50	54	59	108	69	G	56	127	40	42	129	48	60
17	84	81	47	70	50	33	92	83	73	90	65	57	99	64	70	54	47	40	50	49	29	34	31	40
18	38	30	31	G	34	33	48	46	53	48	49	50	54	91	116	58	56	84	143	94	53	69	69	58
19	58	41	59	44	24	39	54	91	67	96	96	137	133	92	61	76	73	95	62	58	73	68	90	39
20	72	58	41	40	31	64	84	58	66	128	54	61	G	53	54	44	G	44	G	59	93	85	58	32
21	48	38	44	38	39	37	42	91	47	78	72	66	49	57	78	51	53	G	48	58	50	70	71	35
22	29	30	37	33	G	35	44	58	62	60	68	58	92	90	53	50	72	79	103	95	85	141	112	84
23	32	G	G	G	G	34	42	73	70	58	96	88	141	135	78	60	68	79	82	72	58	72	84	89
24	72	40	72	37	50	36	59	59	70	57	73	83	56	58	G	43	48	40	34	G	25	G	38	34
25	28	29	30	30	G	33	48	96	108	128	130	72	81	69	79	58	81	60	80	85	92	59	38	58
26	69	48	48	58	33	58	61	77	95	53	74	58	G	56	49	54	62	71	40	47	49	94	65	90
27	90	91	86	90	58	82	G	52	50	43		58	58	57	50	56	54	50	57	32	53	59	92	30
28	81	41	33	29	26	37	58	80	84	91	53	53	45	G		G	50	G	48	47		72	39	38
29	G	27	30	36	29	34	54	71	80	46	G	G	G	G	82	95	88	118	40	36	59	59	39	83
30	49	32	38	56	59	56	72	54	65	68	89	73	54	73	61	64	52	57	57	53	39	92	88	81
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	29	30	30	30	30	30	29	30	30	30	29	30	30	29	30	30	29	30	30	30
MED	48	39	38	38	31	36	54	61	70	74	68	62	56	61	54	56	54	58	58	58	58	68	60	58
U Q	72	58	48	50	47	54	69	80	80	89	89	74	84	88	78	69	73	81	83	91	84	83	88	81
L Q	32	30	31	28	G	33	42	54	61	57	55	57	50	53	46	50	47	44	48	47	46	58	41	32

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT AKITA

JUN. 1988

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	17	15	15	15	15	17	17	18	20	24	26	24	30	24	24	21	21	21	16	15	15	16	16	16
2	15	15	15	15	15	17	17	18	22	26	27	38	39	38	26	21	26	23	18	20	16	15	15	16
3	16	15	15	15	15	15	18	20	23	21	33	32	27	26	24	23	21	18	16	17	15	16	15	15
4	15	16	15	15	15	16	15	20	20	34	35	34	38	27	33	26	48	26	17	15	15	16	16	16
5	16	15	15	16	16	17	16	21	21	23	33	30	32	30	30	27	23	16	16	15	15	16	16	16
6	15	15	15	15	16	15	16	18	21	26	22	38	33	36	33	27	22		15	15	16	16	16	16
7	15	15	20	15		17	17	18	21	23	27	26	36	28	23	24	23	17	17	18	16	16	16	15
8	17	16	15	15	15	18	16	18	22	21	36	26	37	36	22	23	22	18	18	16	15	16	15	15
9	15	15	15	15	16	15	16	21	22	24	24	35	23	34	23	24	22	18	18	15	15	15	16	16
10	16	15	15	15	15	16	17	20	22	26	24	28	24	27	28	21	21	17	16	15	16	15	16	15
11	15	15	15	15	15	15	16	18	22	22	23	23	30	26	23	22	21	18	15	15	15	16	18	15
12	15	15	15	15	15	15	15	17	23	23	33	35	27	33	24	22	17	16	17	15	15	16	15	15
13	15	15	15	15	15	15	17	17	21	28	23	35	26	56	23	23	20	16	15	16	15	15	15	16
14	16	15	15	15	16	20	18	18	18	22	21	22	35	26	24	24	20	16	16	16	16	18	16	16
15	15	15	15	15	17	16	16	17	21	21	22	21	33	26	23	22	18	18	17	16	15	16	16	16
16	15	15	15	15	15	15	16	17	23	20	23	32	24	28	27	23	21	16	16	15	15	58	16	17
17	15	16	15	15	15	18	16	22	21	22	36	22	35	35	26	23	17	18	16	15	16	16	16	16
18	16	16	15	16	15	15	16	21	21	21	27	23	26	26	27	23	21	17	20	16	15	16	15	15
19	15	15	16	15	16	17	16	17	18	24	22	23	32	36	26	35	20	20	16	15	15	16	15	15
20	16	15	15	15	17	16	22	18	35	23	26	45	24	30	30	24	18	17	18	15	16	16	15	15
21	16	15	15	15	15	16	16	16	21	33	51	35		34	28	23	22	17	16	15	15	15	15	16
22	16	16	15	16	16	16	17	18	18	24	37	24	24	23	27	24	21	17	16	16	17	16	16	15
23	16	15	15	18	17	16	16	17	24	22	23	26	38	30	27	21	21	20	16	18	16	15	16	16
24	16	15	16	15	15	15	17	18	22	21	38	36	36	27		36	22	21	16	17	16	16	15	15
25	16	15	15	15	16	16	20	26	23	22	23	34	27	41	26	23	36	18	17	15	16	16	16	15
26	16	15	15	15	15	15	17	21	22	24	27	39	27	42	42	24	22	21	18	16	16	15	15	16
27	16	16	16	15	15	16	16	23	35	48		40	42	40	36	36	24	18	16	15	16	16	16	16
28	16	15	15	15	15	16	16	21	23	24	38	33	27			22	21	21	16	15		16	15	15
29	17	15	15	15	16	16	20	23	22	24				33	26	20	17	28	15	15	16	16	15	15
30	15	15	15	15	15	15	17	20	22	24	22	33	34	33	30	28	23	18	16	16	15	16	16	16
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	29	30	30	30	30	30	28	29	28	29	28	30	30	29	30	30	29	30	30	30
MED	16	15	15	15	15	16	16	18	22	24	26	32	31	30	26	23	21	18	16	15	15	16	16	16
U Q	16	15	15	15	16	17	17	21	23	24	34	35	35	36	29	24	22	20	17	16	16	16	16	16
L Q	15	15	15	15	15	15	16	18	21	22	23	24	26	26	24	22	20	17	16	15	15	16	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

JUN. 1988

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT KOKUBUNJI

JUN. 1988

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	67	72	59	G	G	27	44	116	59	72	47	78	156	G	G	G	G	42	56	50	91	124		68
2		57	40	50	32	33	81	48	46		94	56	45	60	61	53	88	44	51	27	30	68	80	84
3	72	90	50	48	40	33	152	72	85	65	90	82	100	56	46	75	55	76	50	66	60	66	78	49
4	83	70	24	50	32	28	41	60	74	61	55		78	64	G	50	G	50	84	80	83	105	43	38
5	58	59	38	35	56	40	94	61	82	111	85	174	93	86	57	56	54	90	128	117	144	60	59	58
6	47	44	49	36	38	30	59	58	82	70	107	107	115	130	45		50	40	34	38	30	59	83	81
7	58	45	32	23	103	G	41	64	62	68	64	66	58	61	51	50	87	93	62	98	111	65	62	59
8	48	43	46	40	27	33	44	46	86	79	102	95	79	63	G	107		54	100	58	121	86	94	85
9	40	33	G	34	32	31	G	58	83	61	57	61	60	56	50	80	55	62		58	48	56	82	47
10	34	30	34	28	24	31	40	48	134	55	64	72	67	85		85	77	56	46	37	32	59	50	37
11	26	30	32	34	30	38	43	62	79	62	179	179	144	163	90	95	179	180	120	154	88	93	92	142
12	92	72	51	72	38	58	91	175	136	97	98	62	60	57	70	123	54	50	81	54	78	92	94	93
13	117	50	37	28	29	62	75	85	84	80	71	77	92	62	60	77	66	59	119	60	50	50	56	58
14	59	40	33	30	30	28	33	49	62	70	85	58	68	78	50	51	82	156	62	38	37	34	27	72
15	58	97	67	49	92	28	54	61	64	80	68	95	128	51	G	82	65	51	43	76	95	106	46	34
16	83	60	58	74	59	58	49	58	57	65	83	61	64	49	58	G	54	50	69	58	93	57	59	94
17	67	62	50	35	43	49	54	77	84	72	61	64	66	46	51	58	53	78	48	63	110	60	45	53
18	58	41	56	44	31	G	40	57	94	64	61	67	74	74	55	G	43	49	54	60	59	59	54	58
19	62	58	48	56	32	30	54	60	102	83	101	85	62	109	74	81	172	120	76	81	66	58	83	84
20	90	72	83	61	48	58	49	90	59	66	92	71	G	G	G	46	44	37	58	156	43	32	57	46
21	51	48	37	41	G	32	44	56	77	78	106	53	84	48	G	46	48	53	42	32	40	49	60	68
22	43	66	31	30	37	43	46	44	172	70	90	122	60	91	61	61	62	58	32	G	99	92	93	84
23	106	61	36	29	G	44	119	77	128	84	79	55	106	126	50	59	63	102	57	51	60	59	72	66
24	46	50	60	37	46	54	60	88	79	58	57	58	79	95	57	53	63	67	59	70	58	30	118	38
25	32	24	24	43	24	32	119	50	45	60	95	56	61	66	70	70	64	75	120	60	70	64	58	104
26	74	87	71	54	54	33	33	58	67	89	97	61	G	65	147	96	92	56	61	59	50	55	72	50
27	49	59	37	61	58	31	50	G	54	74	G	54		56	54	58	55	48	42	51	78			
28				34	28	28	43	58	74	81	180	58	56	74	60		G	109	47	51	120	68	58	58
29							48	57	147	105	46	56	52	G	51	58	58		60	144	34	30	46	71
30	71	59	61	32	60	44	56	56	51	60	50	58	111	68	52	156	G	41	44	38	44	72	68	89
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	28	28	29	29	29	30	30	30	29	30	29	29	30	29	28	29	29	29	30	30	29	28	29
MED	58	58	43	37	32	33	49	58	79	70	84	64	68	64	52	58	55	56	58	58	63	60	61	66
U Q	74	68	57	50	51	44	60	72	86	80	97	83	96	85	60	81	71	84	78	76	93	79	82	84
L Q	47	43	33	31	28	29	43	56	62	63	61	58	60	56	45	50	49	49	46	50	44	55	55	49

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT KOKUBUNJI

JUN. 1988

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

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT YAMAGAWA

JUN. 1988

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	75		82	80	64	64	A	84	81	74		80		A	89	97	91	90	96	86	66	A	67	A
2	77	80	64	65	51	55	77	87	75	62	60	65	73	81	86	91	89	90	87	90	A	80	81	81
3	76	80	80	66	74	80	77	75	68	69	74	82	85	95	95	95	91	89	A	A	78	A	82	78
4	84	79		64		62	77	85	78	A	78	75		90	87	86	100	100	A	A	A	94	77	82
5	83	86	80	85	83	79		80	A		A	A	84	91	103	111	90	81	78	82	87	85	85	A
6	76	84	82	78	78	81	82	85	A	A	A	A	86	88	94	97	94	85	85	80	87	90	83	81
7	77	82	86	79	80	81	84	86	80	84	A	80	85	92	94	93	94	92	A	87	90	88	88	86
8	86	90	86	86	86	84	84	85	83	84	90	97	98	101	94	101	105	108	107	88	86	83	87	88
9	82	86	84	79	64	57	68	79	81	77	78	87	96	A	97	94		89	86	86	88	103	88	87
10	86	86	85	85	77	62	62	96	86	80	68	85	93	87	95	100	107	95	84	A	A	A	87	A
11	84	87	81	80	66	66	69	84	90	92	84		88	92	94	91	103	96	78	65		80	85	83
12	83	83	85	83	83	77	66	68	A	A	70	A	84	78	88	81		A	89	A	A	A	A	A
13	83	84	79	A	70	78	79	76	A	A	71	A	87	94	94	93	100	A	86	A	89	80	81	77
14	76	75	78	66	65	66	82	80	81	76	86	74	86	86	88		110	91	72	63	64	70	66	66
15	65	63	62	61	58	63	82	84	70	64	61	67	81	86	90	92	110	95	86	74	80	76	72	83
16	84	76	77	75	67	67	68	76	76	74	80	A	80	84	91	97	102	89	86	90	100	66	63	76
17	77	A	64	A	66	57	A	A	72	63	64	A	74	70	75	80	89	99	103	88	77	77	77	A
18	77	84	77	76	71	74	82	89	58	64	70	74	80	90	91	94	91	102	90	A	88	87	79	80
19	80	82	81	78	88	76	54	62	68	78	78	78	80	78	86	89	N	A	76	85	86	76		
20				80	79	77	73	A	77	A		A	A	A	A	71	71	73	84	68		60	62	A
21	N						53	66	70	66	A	66	A	A	61	77	80	99	122	88	75	A	70	66
22	66	73	64	62	56	55	64	70	66	61	69	70	71	76		91	94	92	89	97	77	77	78	78
23	77	79	74	77	60	60	58	78	A	70	A	A	66	79		84	80	84	94	91	71	76	63	A
24	67	A	65	54	52	56	68	76	A	A		72	80	83	76	87	87	98	96	84	75	52	66	71
25		68		66	67	66	68	61	62	60	69	63		67	66	66	67	75	80	76	81	68	77	A
26	77	76	71	71	70	66	71	72	71	78	77	76	A	78	96	98	95	95	88	86	76		73	79
27	80	81	71	71	67	54	A	48	67	A	A	A	A	A	55	N	A	A	57	54		51	62	55
28	66	65	53	60		64	64	66	65	64	76	54	A	63	69	67	72	71	72	68	A	72	52	74
29	66	78	71	68	58	57	60	68	76	83	A	68	79	88	82	80	85	83	A	84	84	59	74	66
30	71	79	76	66	66	64	71	82	A	A	A	71	90	80	78	87	88	82	88	85	80	A	A	84
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	25	26	27	27	29	26	28	23	21	19	20	22	25	27	28	26	26	26	24	22	23	27	21
MED	77	80	78	75	67	66	70	78	75	74	74	74	84	86	89	91	91	90	86	85	80	77	77	79
U Q	83	84	82	80	78	77	79	84	81	79	78	80	87	90	94	96	100	96	90	88	87	85	83	83
L Q	75	76	71	66	64	58	64	69	68	64	69	67	80	78	78	82	87	84	80	75	76	68	66	72

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

JUN. 1988

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	58	29	26	26	86	89	82	54	50	53		85	101	131	70	52	47	52	63	53	61	84	58	105
2	129	87	32	57	31	24	44	50	57	82	57	57	71	61	62	79	62	59	58	57	92	33	33	48
3	72	58	70	46	91	58	88	71	60	69	76	51	92	56	67	61	75	80	167	162	61	151	40	58
4	59	40		54		30	38	61	58	116	90	70	57	85	65	53	65	62	104	98	86	112	70	68
5	83	91	68	60	57	39	80	92	102	127	96	125	71	58	57	51	50	47	51	56	G	G 109		90
6	82	59	58	83	35	40	32	53	90	152	126	184	90	61	G	60	58	G	56	57	31	40	45	48
7	48	38	24	G	G	G	40	53	62	74	80	66	86	81	89	54	74	60	93	74	58	83	45	46
8	90	66	70	49	42	35	48	78	81	78	48	63	69	52	48	44	40	43	G	48	34	91	39	59
9	69	59	70	48	46	44	33	38	48	61	74	44	59	94	48	55	62	108	93	86	92	57	38	30
10	32	24	G	G	G	G	60	40	48	44	104	59	60	84	92	90	84	43	54	90	88	43	56	93
11	59	45	54	46	31	24	32	40	60	86	66	107	72	G	G	G	60	G	60	65	G	59	29	41
12	36	24	39	28	26	71	49	94	115	92	87	150	86	60	86	103	146	127	93	133	151	69	104	92
13	44	125	54	90	59	44	51	72	83	92	80	83	51	95	84	86	64	108	76	91	37	58	46	58
14	44	40	24	G	G	G	G 41		45	50	103	55	77	78	71	46	49	G	45	43	40	24	G	G
15	41	71	33	23	G	G	31	38	54	79	56	56	46	50	G	58	56	52	40	48	42	37	83	45
16	147	92	80	46	40	40	86	60	57	50	76	81	63	56	G	44	G	44	58	38	61	69	53	54
17	70	84	84	71	71	134	110	95	71	57	67	69	63	63	61	58	40	50	49	56	41	30	38	72
18	58	86	30	G	32	G	30	43	46	46	66	70	52	G	G	51	62	79	95	88	91	32	G	G
19	26	78	37	G	G	G	36	48	80	52	150	69	66	68	G	69	113	180	86	66	84	72		
20				80	45	36	54	81	69	95	70	98	119	82	78	57	67	72	93	51	39	92	46	58
21	59						38	40	50	61	68	66	78	109	79	73	63	68	46	55	83	115	54	G
22	68	69	46	38	26	G	39	48	55	60	58	59	55	89	123	66	47	68	63	41	38	33	46	41
23	24	32	44	77	68	49	41	68	93	93	85	66	53	85	114	109	75	G	44	54	40	38	80	71
24	72	28	37	30	32	32	33	76	92	59	112	65	49	75	G	52	54	44	40	70	68	40	28	36
25	26	24	24	30	31	28	48	41	48	50	48	50	57	63	G	49	G	44	40	48	84	83	92	92
26	85	69	84	46	25	24	33	G	64	60	66	73	143	79	60	76	56	67	75	40	38	38	48	56
27	85	59	70	48	117	69	58	58	56	95	92	57	73	67	56	46	62	61	48	42	32	G	32	40
28	33	26	G	G	G	G	G	36	49	61	78	68	89	G	56	44	60	54	44	52	58	91	59	58
29	68	35	30	30	G	30	32	48	60	81	91	61	46	63	46	46	76	61	78	63	40	26	48	26
30	35	38	38	49	45	40	43	85	145	177	148	154	96	89	45	61	65	46	56	48	134	174	83	69
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	28	27	29	28	29	30	30	30	30	29	30	30	30	30	30	30	30	30	30	30	30	29	29
MED	59	58	39	46	32	32	40	53	60	72	78	67	70	68	58	56	62	56	58	56	58	58	46	56
U Q	77	74	70	55	51	44	54	72	81	92	94	83	86	85	78	69	67	68	86	74	84	84	64	70
L Q	38	33	30	24	13	G	33	41	50	57	66	59	57	58	G	49	50	44	46	48	38	33	38	40

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT YAMAGAWA

JUN. 1988

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	14	14	15	15	15	15	15	16	18		32	33	34	32	24	18	18	16	15	15	15	15	15
2	15	15	15	15	15	15	15	15	17	18	22	35	24	41	26	22	20	17	16	15	15	15	15	15
3	15	15	15	15	15	15	15	16	21	22	28	27	33	30	33	21	18	17	16	15	15	15	15	15
4	15	15		15		15	15	15	17	17	27	36	40	45	30	33	39	38	18	15	15	15	15	15
5	15	15	15	15	15	15	15	16	17	21	24	29	34	32	32	27	21	18	15	15	15	16	15	15
6	15	15	15	15	15	15	15	15	17	21	27	30	34	36	40	32	22	20	15	15	15	15	15	16
7	15	15	15	15	15	15	15	15	17	21	24	27	34	37	29	26	21	17	15	16	15	15	15	15
8	15	15	15	15	15	15	15	16	20	22	26	28	32	33	34	22	18	17	17	15	15	15	15	15
9	15	16	15	15	15	15	15	17	17	23	29	27	29	30	34	27	23	20	15	15	14	15	15	15
10	15	15	15	15	15	15	16	15	17	21	29	28	33	27	30	22	20	23	16	15	15	15	15	15
11	15	15	15	15	15	15	18	15	18	20	24	30	33	46	27	23	23	18	16	17	15	16	15	15
12	15	15	16	15	15	15	15	15	17	18	24	29	33	33	34	22	20	16	15	15	15	15	15	15
13	15	15	15	15	15	15	15	15	16	16	18	20	34	30	33	22	20	20	15	15	15	15	15	15
14	14	15	15	15	15	15	15	15	16	20	20	23	22	28	23	22	17	21	15	15	15	16	16	15
15	15	15	15	15	15	15	15	15	17	22	21	24	34	30	39	22	18	16	17	15	15	15	15	15
16	15	15	15	15	15	15	15	15	20	21	22	32	39	35	18	21	18	17	15	16	15	15	15	15
17	15	15	15	15	15	15	15	16	16	21	22	26	35	38	33	22	17	16	15	15	15	15	15	15
18	15	15	15	15	15	15	15	16	21	20	32	30	33	30	26	23	18	16	15	15	15	15	15	15
19	15	15	15	15	15	15	15	15	17	20	21	32	39	40	39	20	17	20	15	15	15	15		
20				15	15	15	15	15	17	20	22	22	32	33	22	21	20	17	16	15	15	15	15	15
21	15						15	15	16	17	23	22	35	34	24	24	26	17	15	15	15	15	15	15
22	15	15	15	15	15	15	15	16	18	24	23	32	34	33	28	26	20	17	17	16	15	15	15	15
23	15	15	16	15	15	15	15	15	23	21	27	34	36	39	36	23	21	22	16	15	15	15	15	15
24	15	15	15	15	15	15	15	16	17	23	27	33	30	34	57	36	23	18	16	15	15	15	15	15
25	15	15	16	15	15	15	15	16	21	20	29	30	33	33	29	29	52	21	17	15	15	15	15	15
26	15	15	15	15	15	15	15	16	22	26	29	38	37	39	39	27	21	21	18	15	15	15	15	15
27	15	15	15	15	15	15	15	17	20	27	30	33	43	42	39	39	22	18	16	15	15	15	15	15
28	15	15	15	15	15	15	15	15	16	33	34	35	34	52	43	38	23	20	17	17	16	15	15	15
29	15	15	15	16	15	15	15	16	20	17	42	33	34	34	33	30	21	36	16	15	15	15	15	15
30	15	15	15	15	15	15	18	15	16	21	29	33	38	40		23	21	22	18	15	15	15	15	15
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	28	27	29	28	29	30	30	30	30	29	30	30	30	29	30	30	30	30	30	30	30	29	29
MED	15	15	15	15	15	15	15	15	17	21	26	30	34	34	33	23	20	18	16	15	15	15	15	15
U Q	15	15	15	15	15	15	15	16	20	22	29	33	35	39	37	27	22	21	17	15	15	15	15	15
L Q	15	15	15	15	15	15	15	15	17	20	22	27	33	32	27	22	18	17	15	15	15	15	15	15

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT OKINAWA

JUN. 1988

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

H / D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	72	72	80	68	66	66		80	71	85		79	A	101	107	112		120	113	85	66		61	A
2	A	76	64	66	60	58	72	78	66	63	64	70	82	87		102	105	102	103	90	84	76	79	77
3	77	80	77	A	79	A	A	64	72	75	72	78	95	105	120	110	112	A	66	90	A	74	64	80
4	80	66	65	62	64	66	66	76	86	A	A	A	88	94	98	103		94	103	90	81	77	A	78
5	85	80	85		80	78	77	80	90	86	76	76	87	98	121	104	95	92	87	88	90	88	85	84
6	86	84	78	86	76	77	76	75	88	68	70	A	87	87	98	100	96	94	87	88	90	83	81	81
7	81	82	80	66	75	68	74	78	77	A	A	A	94	96	A	97	96	104	104	105	88	65	84	86
8	78	A	84	82	84	84	83	80	86	85	A	95	104	105	101	103	106	121	107	75	81	84	90	86
9	85	84	87	85	53	54	59	71	77	76	83	88	97	105	99	95	91	86	83	90	85	87	88	86
10	87	85	86	85	66	61	54	84	90	72	80	90	103	105	107	105	105	95	86	74	66	73	84	85
11	84	81	84	66	66	66	73	80	84	79	85	94	97	100	103	100	104	90	78	82	80	82	77	84
12	80	81	84	80	72		66	58	53	77	A	A	A	A	A	A	A	A	73	104	80	A	A	A
13	78	84	78	71	65	66	73	70	A	A	A	A	91	99	95	105	104	92	88	86	87	78	78	75
14	81	A	80	74	74	67	61	66	71	71	75	A	86	96	A	108	119	103	74	75	64	66	66	72
15	68	67	70	68	60	65	74	69	70	61	59	71	80	97	101	120	121	101	A	A	C	C	C	C
16	C	C	C	C	C	C	C	C	C	71		68	77	88	94	102	112	103	97	102	85	A	65	65
17	68	A	65	66	66	58	64	72	67		A	A	A	A	A	97	97	A	A	A		A	80	80
18	77	82	83	72	66	71	82	78	64	65	67	72	N	98	102	105	104	103	90	86		78	68	77
19	76	80	80	76	81	42	49	61	84	76	58	77	87	92	95	93	95		88	91	84	78	78	65
20	74	76	68	66	66	58	64	66	76	A	A	77	76	77	A	78	86	82	82	76	A	A	54	51
21	62	66	66	51	51	51	52	74	63	66	63	64	70	65	71	A	94	121	110	85	A	65	66	54
22	66	A	66	61	60	53	61	67	63	62	73	66	54	A	A	93	100	101	90	88	80	80	67	79
23	73	67	64	70	56	39	55	50	74	A	· 97	A		74	84	81	86	93	91	93	65	64	66	A
24	67	63	66	61	58	61	64	65	54	A	74	70	A	A	A	92	A	104	108	120	66	66	66	84
25	71	84	73	80	84	64	63	64	71	79	70	71	56	69	78	76	75	80	86	77	80	A	66	70
26	67	66	A	65	60	62	65	59	70	72	82	76	74	82	90	102	103	101	104	88	76	71	71	77
27	81	78	76	75	64	53	53	A	57	A	A	A		63	55	44	64	64	67	62	56	52	54	51
28	62	54	58	54	56	48	54	66	70	66	74	72	72	71	75	74	75	83	81	68	A	72		74
29	73	65	64	63	51	52	51	70	80	83	74	77	91	97	94	96	87	92	103	103	A	A	A	A
30	67	62							70	71	C	C	C	C	C	100			C	C	C	C		74
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	25	27	26	28	26	26	27	28	22	19	20	22	25	21	28	25	25	27	27	21	21	24	25
MED	76	78	77	68	66	62	64	70	71	72	74	76	87	96	98	100	97	95	88	88	80	76	70	77
U Q	81	82	83	76	74	66	73	78	82	79	80	78	94	99	102	104	105	103	103	91	85	81	80	84
L Q	68	66	66	65	60	53	55	65	66	66	67	70	76	79	87	93	89	91	82	77	66	66	66	71

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

JUN. 1988

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	26	G	43	58	60	96	76	104	90	48	65		53	42	52	59		40	69
2	59	58	89	66	49	39	42	45	61	66	58	57	63	69	G	74	72	79	85	40	38	56	49	68
3	40	66	68	91	90	91	86	90	60	64	59	60	46	80	75	73	61	106	91	83	92	33	38	60
4	45	24	61	57	39	31	34	59	64	85	115	84	60	57	47	46		66	40	40	24	84	86	58
5	37	40	83		26	82	45	72	65	59	64	60	88	66	68	45	44	44	42	40	49	28	G	29
6	81	36	43	G	G	G	G	39	49	56	90	178	G	81	68	88	G	55	49	39	28	32	45	40
7	39	28	G	G	G	24	29	35	59	96	102	150	78	116	58	72	46	43	36	40	59	38	27	30
8	91	83	71	85	58	37	G	40	110	83	137	61	64	58	48	46	48	50	36	36	48	28	33	32
9	32	84	91	39	33	40	45	58	49	62	82	58	86	64	G	65	83	91	164	83	87	32	39	30
10	29	G	G	G	G	G	29	39	51	62	49	51	62	56	85	68	76	56	60	66	70	84	40	39
11	41	60	48	57	41	40	43	40	60	50	78	51	47	G	50	G	50	58	55	90	40	32	33	G
12	G	32	49	33	29		29	40	50	61	128	143	144	122	118	178	150	114	72	58	66	66	86	144
13	68	60	59	39	27	30	31	44	80	107	142	92	81	91	58	72	61	83	72	90	42	38	38	33
14	28	27	38	34	33	28	28	36	77	64	50	78	79	71	180	134	63	70	47	35	38	37	24	G
15	G	G	G	26	G	G	G	35	41	G	51	59	G	48	57	85	72	86	116	38	C	C	C	C
16	C	C	C	C	C	C	C	C	C	71		67	60	54	G	44	46	56	74	40	39	58	57	38
17	69	59	66	42	31	38	50	59	95	144	126	89	144	148	96	55	71	119	165	168	166	92	59	33
18	40	32	G	G	G	G	G	39	47	47	49	46	G	G	48	G	48	G	37	32	22	66	55	G
19	G	38	40	37	34	29	33	48	48	50	69	G	G	52	52	58	58	65	41	49	29	65	32	34
20	38	37	37	37	42	40	50	55	61	96	123	58	78	78	115	57	48	49	61	45	115	45	30	40
21	53	59	38	32	29	31	32	48	46	61	64	68	82	60	66	97	114	58	92	59	90	32	25	G
22	39	69	58	58	66	36	G	47	68	63	66	55	64	110	114	97	108	72	72	58	38	40	30	32
23	39	30	38	42	58	30	48	58	55	109	90	105	136	68	54	91	59	80	55	53	126	66	84	68
24	56	46	39	33	G	G	32	46	49	91	80	72	80	112	145	159	170	91	72	48	34	40	24	28
25	36	33	34	34	34	32	39	50	62	71	61	67	66	85	75	G	G	50	38	32	31	59	40	69
26	72	90	86	60	56	34	29	58	50	56	55	58	47	G	64	61	70	63	81	48	G	58	48	40
27	40	59	39	49	38	32	40	83	71	86	108	63	G	46	G	48	G	47	44	58	G	G	24	G
28	G	25	G	G	G	G	31	33	42	42	44	G	47	59	54	99	47	40	37	52	58	91	59	58
29	68	41	G	G	G	G	35	58	71	95	107	64	88	98	48	63	66	75	68	73	93	91	167	72
30	38	29							60	55	C	C	C	C	C	62			C	C	C	C		32
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	28	27	28	27	28	28	29	30	28	29	29	29	29	30	27	29	29	29	28	27	28	29
MED	39	38	40	37	32	31	32	46	60	64	79	63	64	68	58	65	61	63	60	49	45	45	40	34
U Q	57	59	63	57	41	38	42	58	66	86	107	81	84	90	80	88	72	81	77	62	78	66	56	59
L Q	30	28	17	G	G	G	28	39	49	56	58	57	47	55	48	48	47	50	41	40	32	32	30	29

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT OKINAWA

JUN. 1988

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	15	15	15	15	15	20	26	27	28	32	30	30	27		21	17	15	15		15	15
2	15	15	15	15	15	15	15	15	17	22	24	26	29	28	28	24	22	18	15	15	15	15	15	15
3	15	15	15	15	16	15	15	15	20	23	24	29	32	30	29	26	23	15	14	16	15	15	15	15
4	15	15	15	15	15	15	15	15	18	23	27	30	28	31	30	27		36	16	14	15	15	15	15
5	15	15	14		15	15	15	15	17	26	24	29	35	28	29	26	27	17	16	15	15	15	14	15
6	15	14	14	15	15	15	22	16	23	26	29	28	30	33	33	29	24	22	18	15	14	15	15	15
7	15	15	15	15	15	15	15	17	18	24	28	30	32	33	32	28	28	17	15	14	15	15	15	14
8	15	15	14	15	15	15	23	16	17	24	27	30	32	32	29	27	26	22	17	15	15	15	15	15
9	15	15	15	15	15	14	14	15	22	26	27	28	28	28	30	27	26	22	16	15	15	14	15	15
10	15	15	15	15	15	14	15	16	24	26	26	29	28	32	28	28	27	27	16	15	14	15	15	15
11	15	15	15	15	15	15	14	15	21	23	27	28	30	29	27	27	23	21	14	15	15	15	15	16
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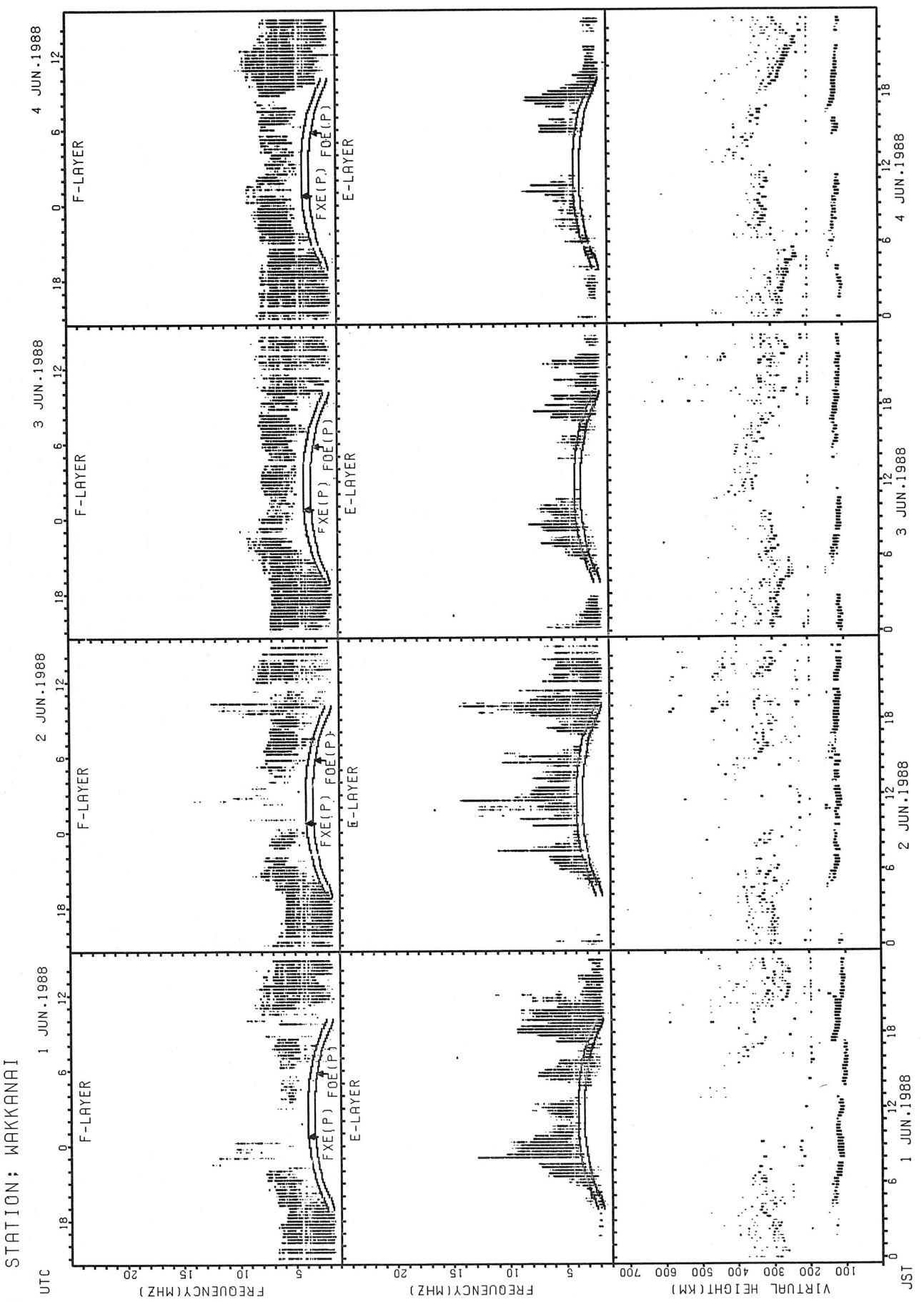
COMMUNICATIONS RESEARCH LABORATORY, JAPAN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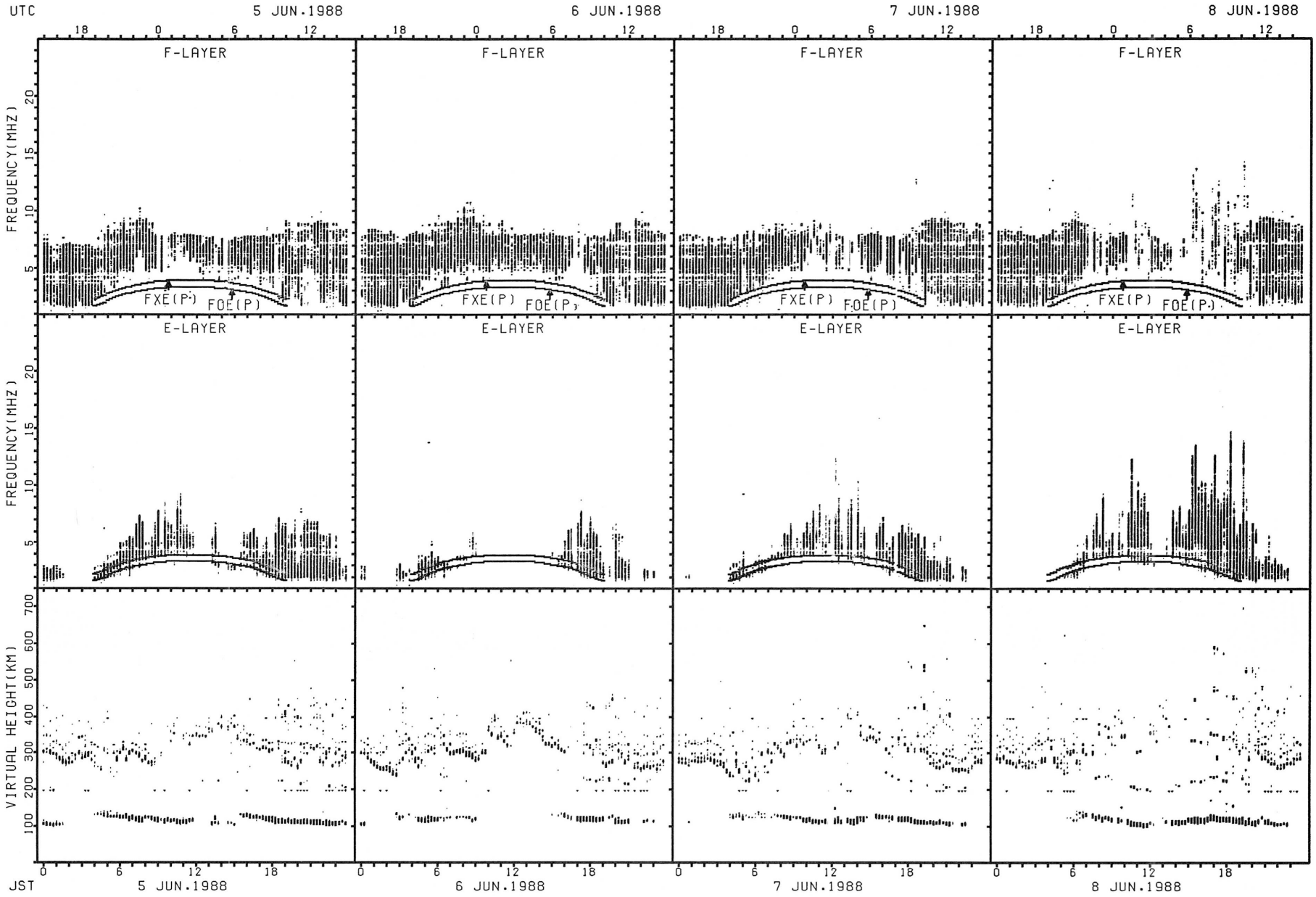

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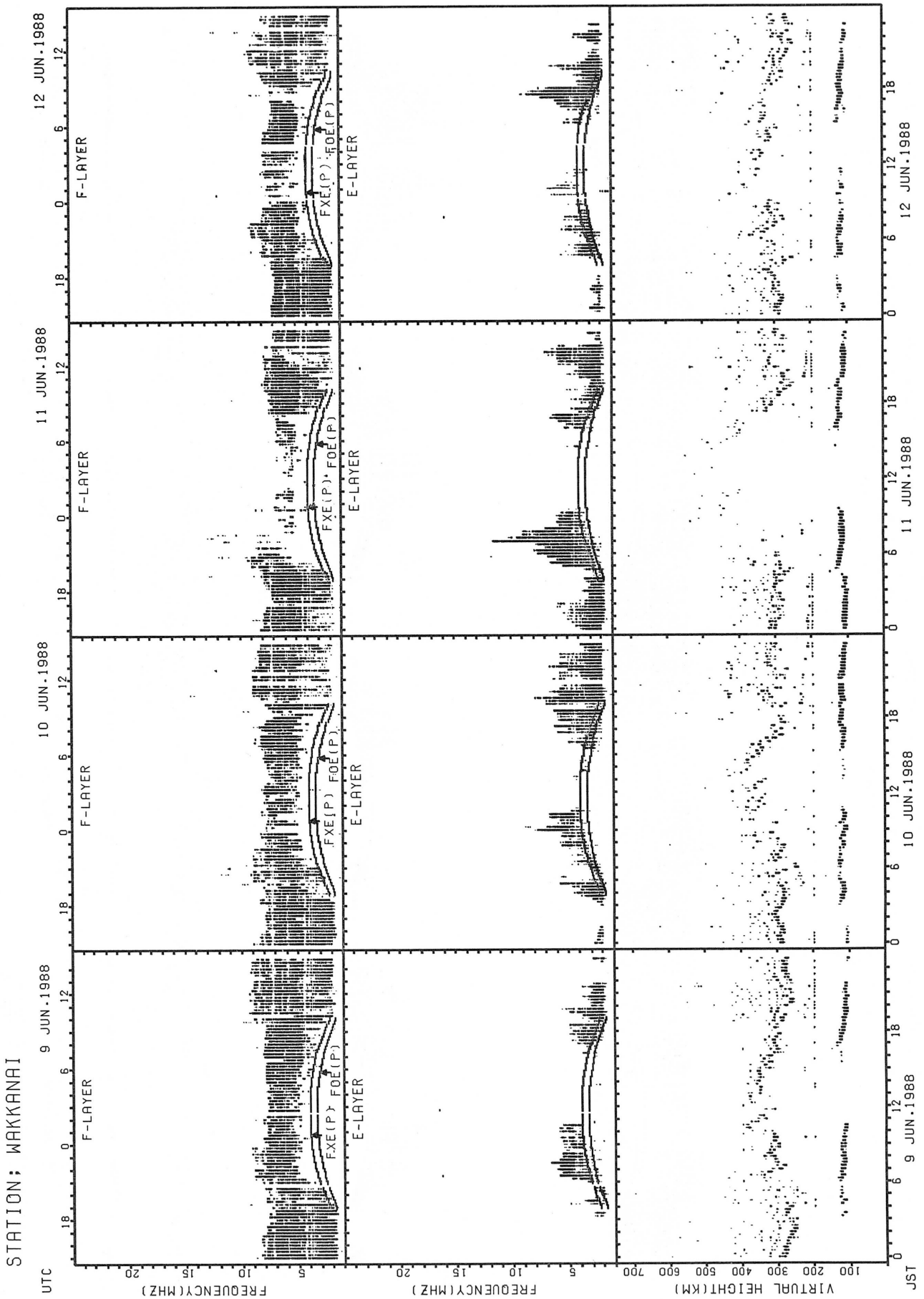
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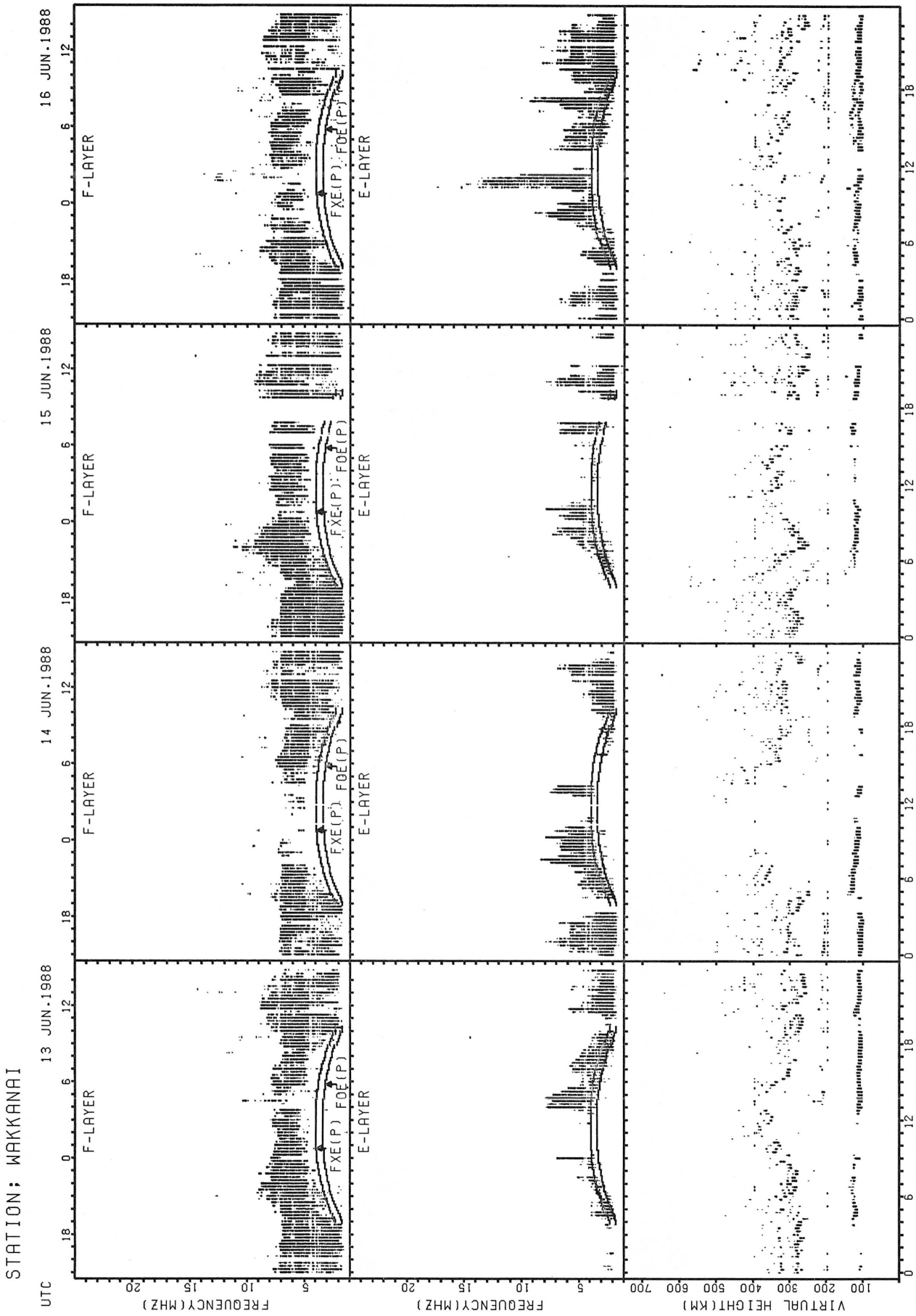
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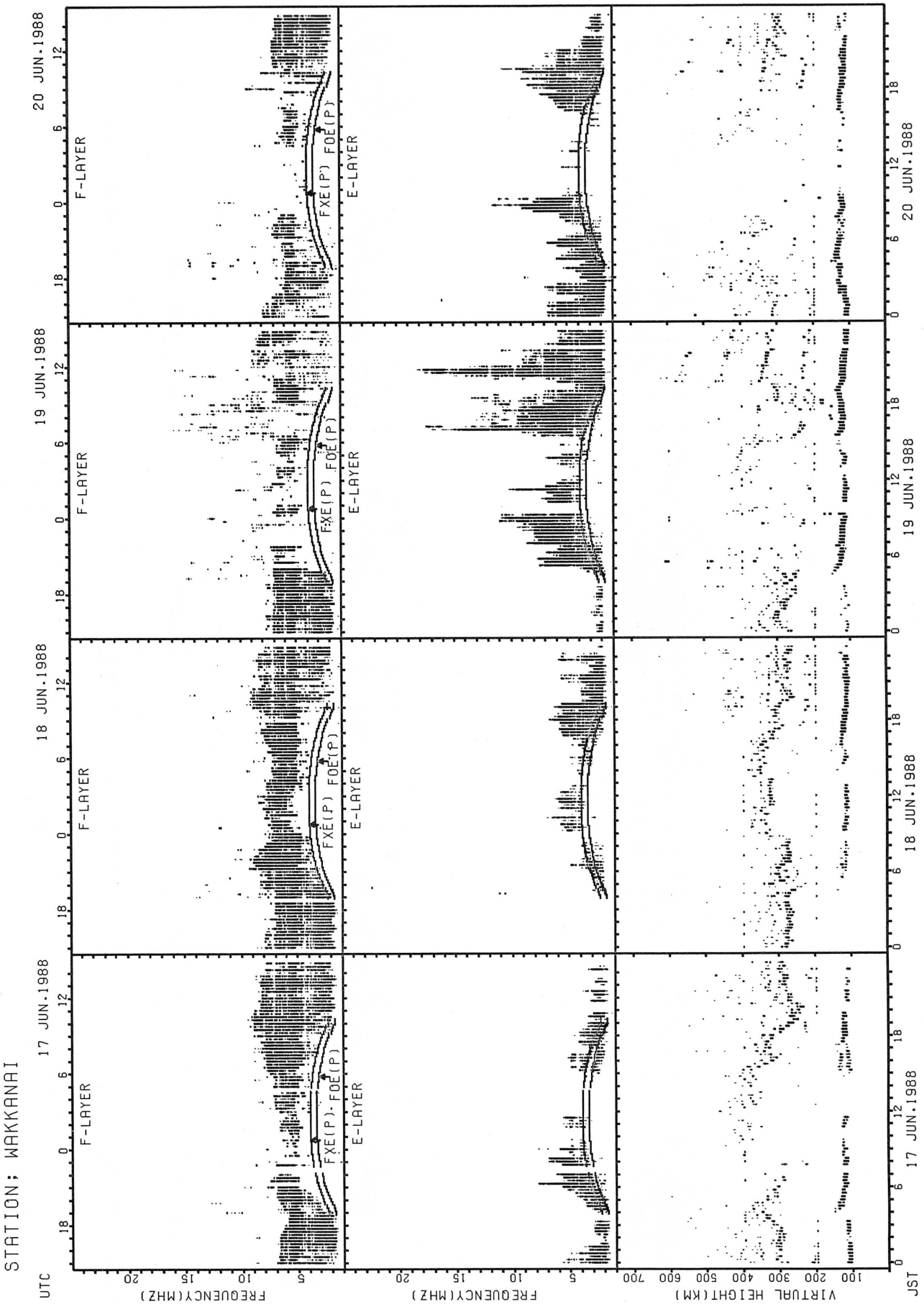
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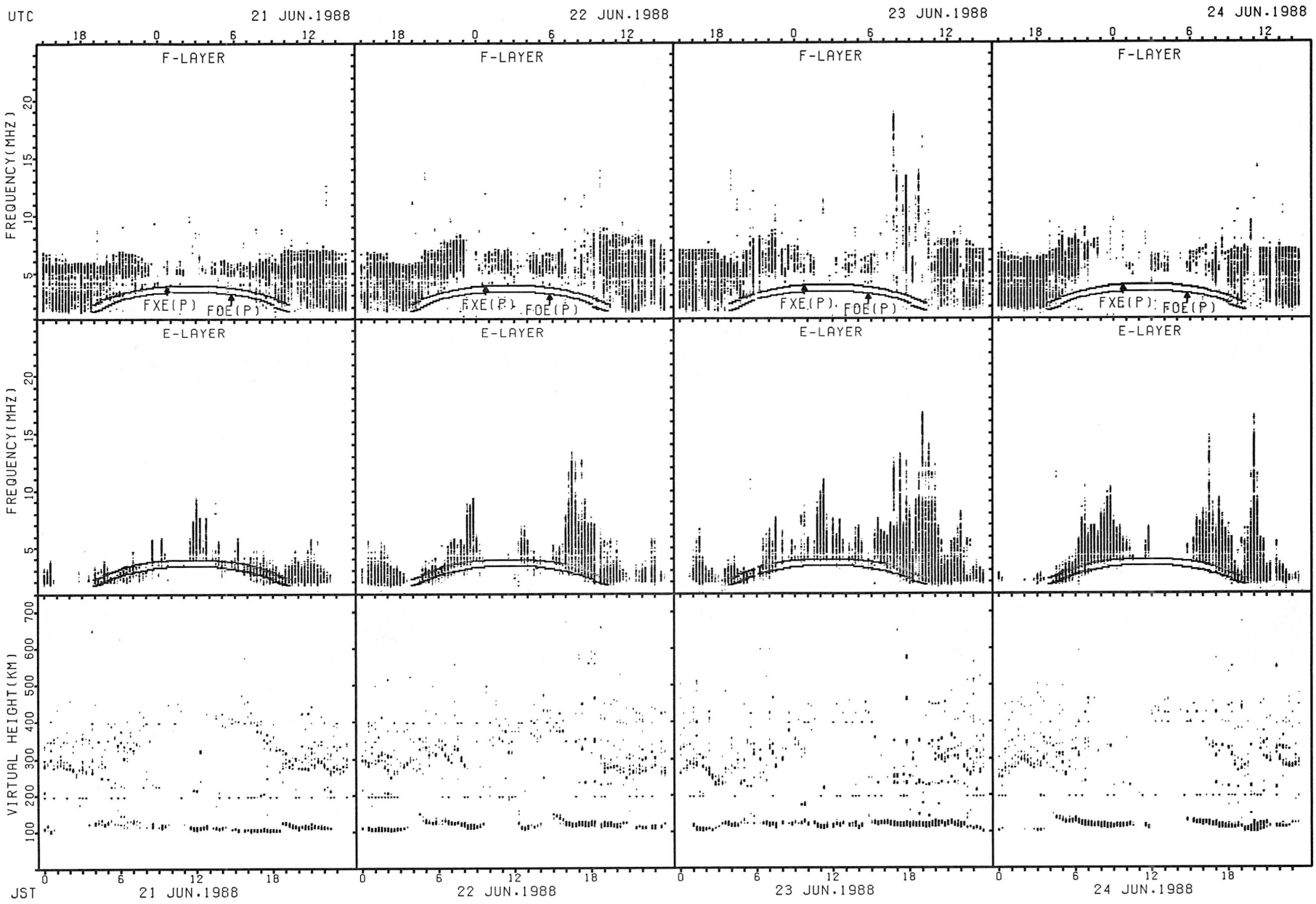

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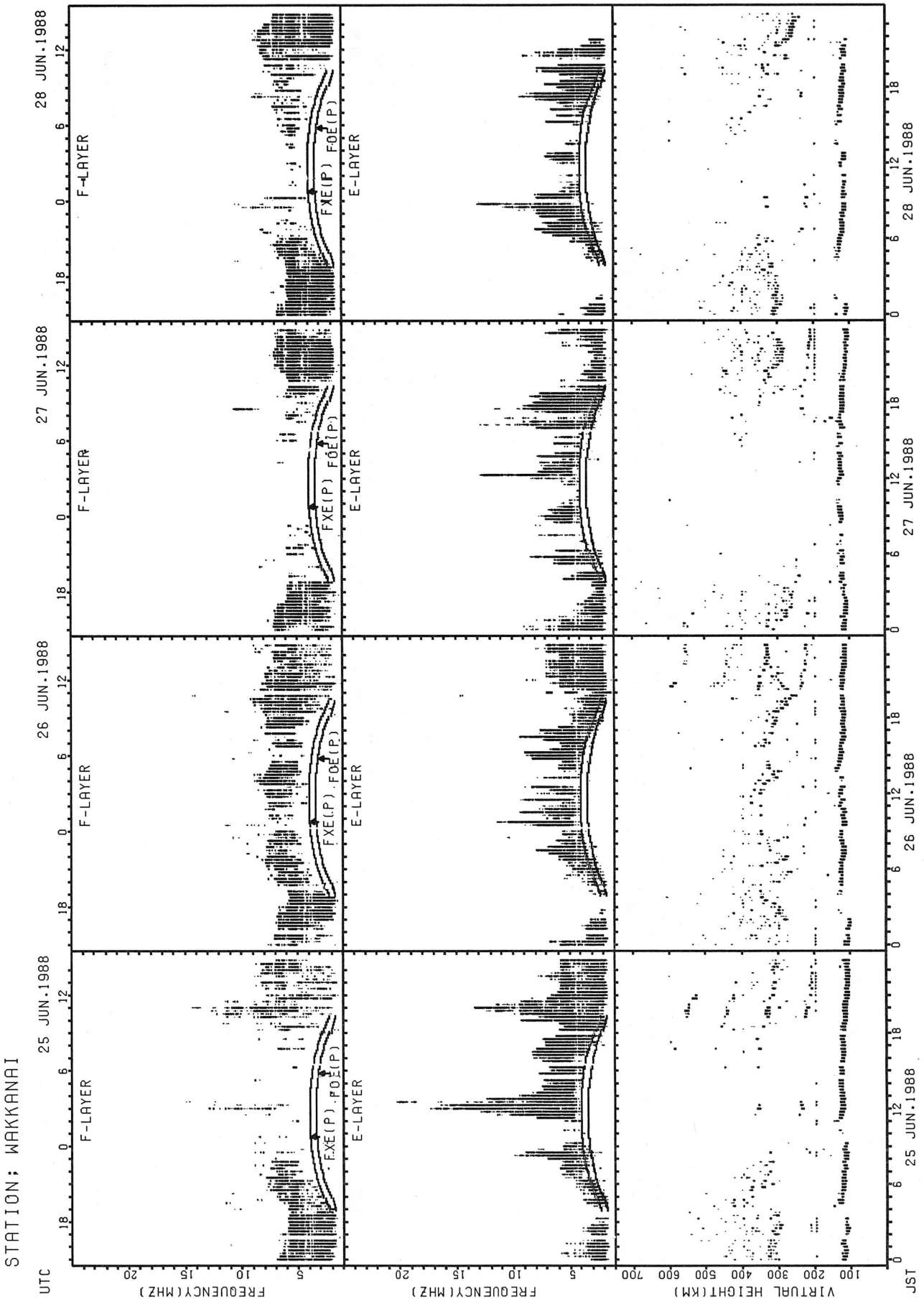
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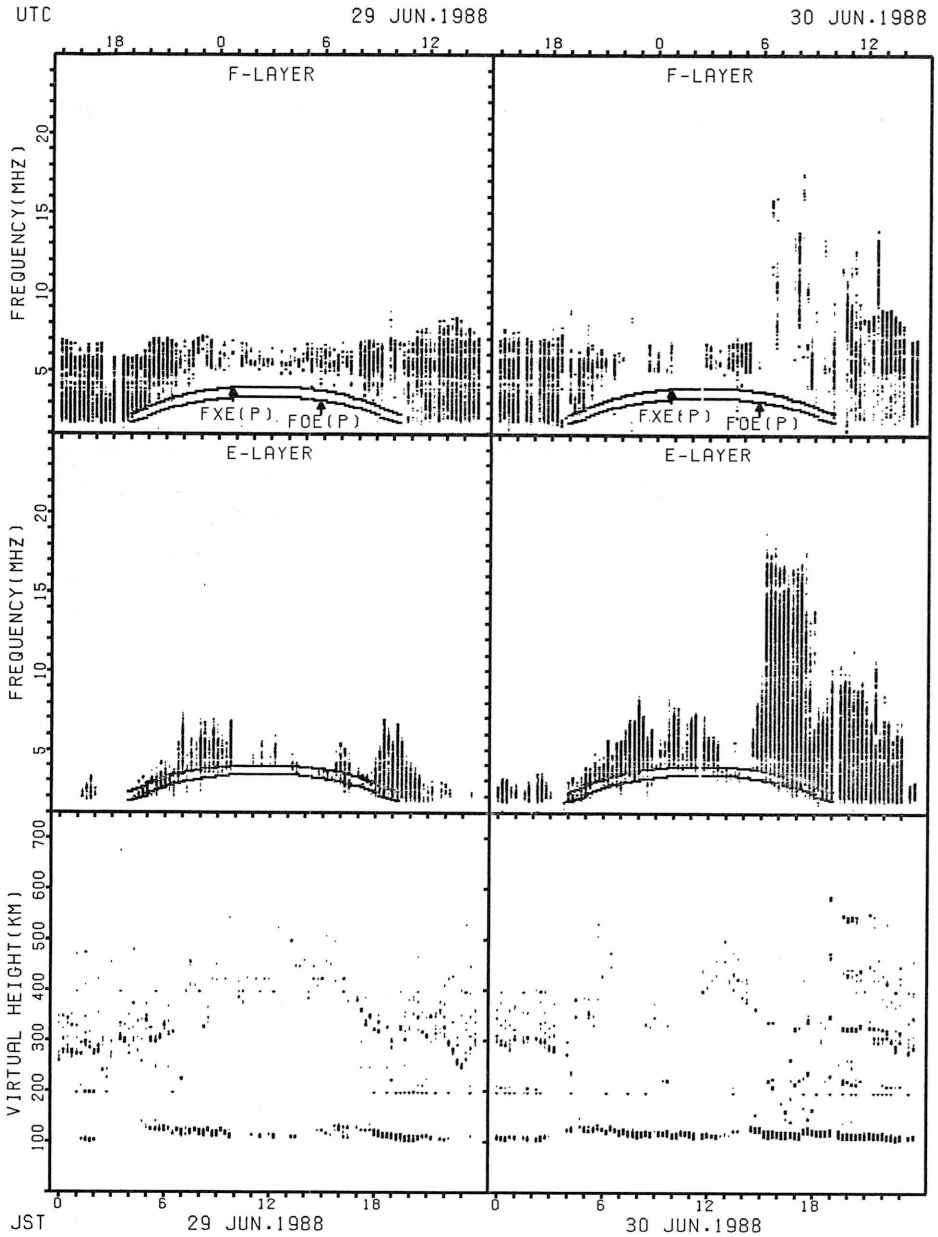

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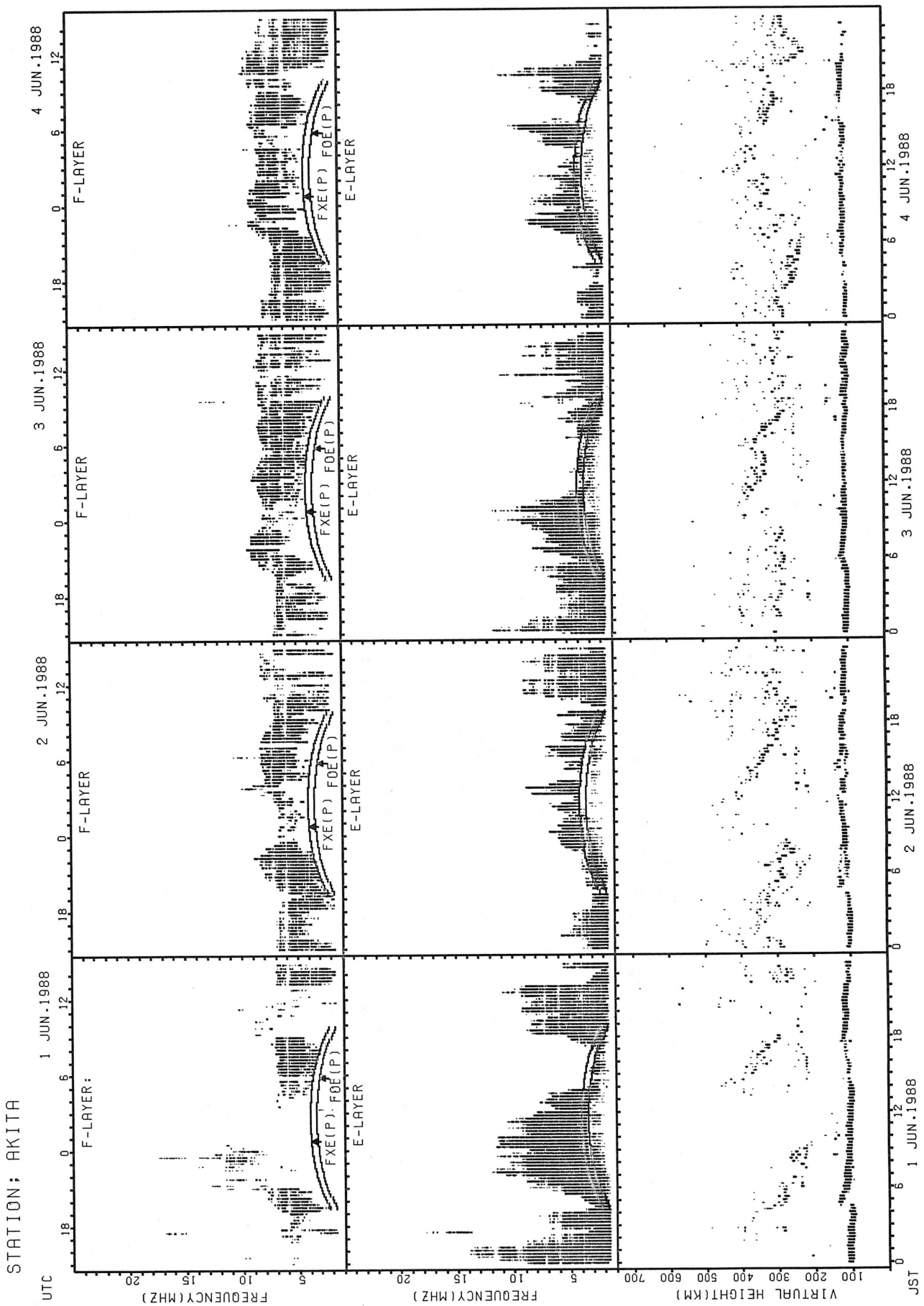
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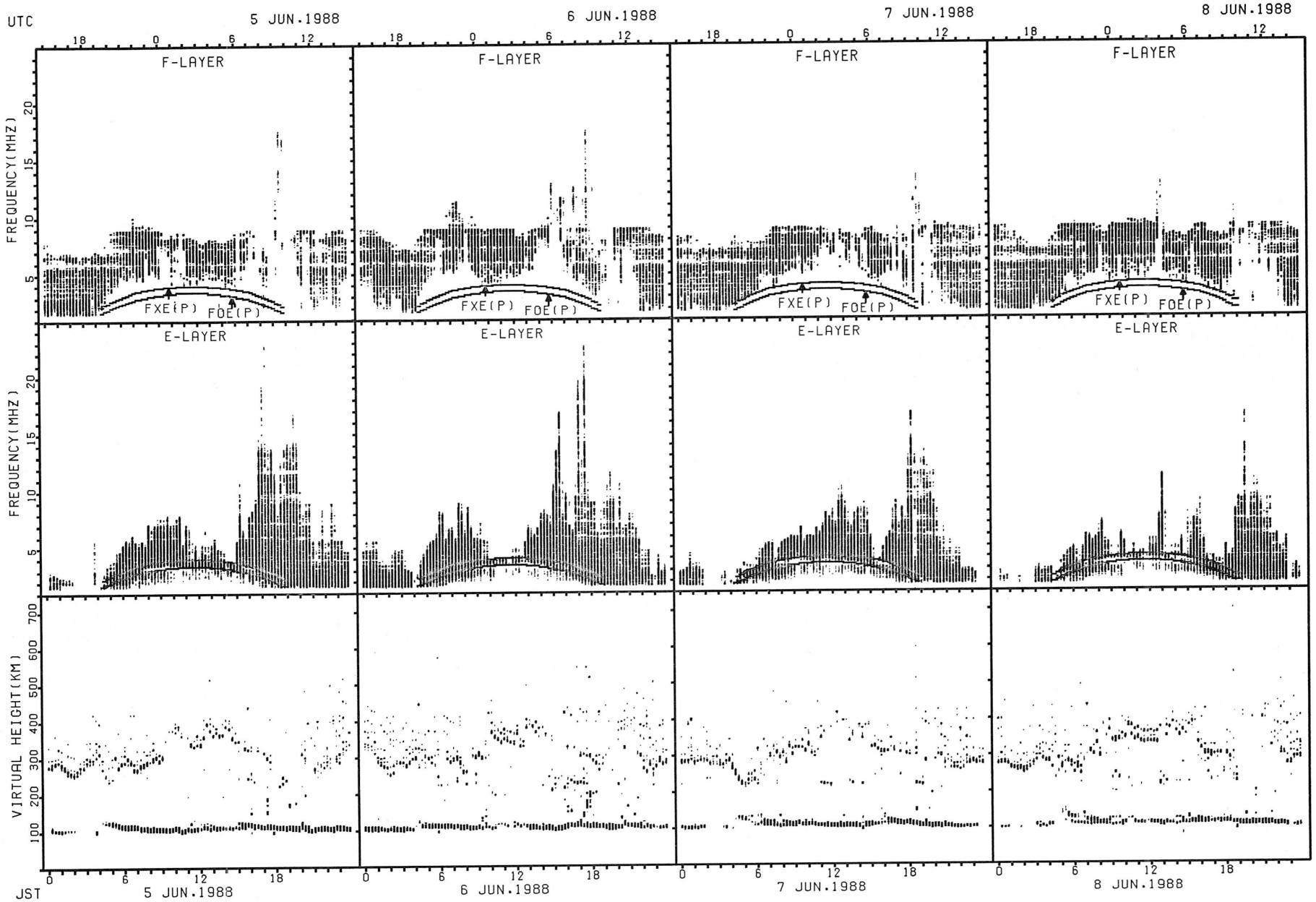

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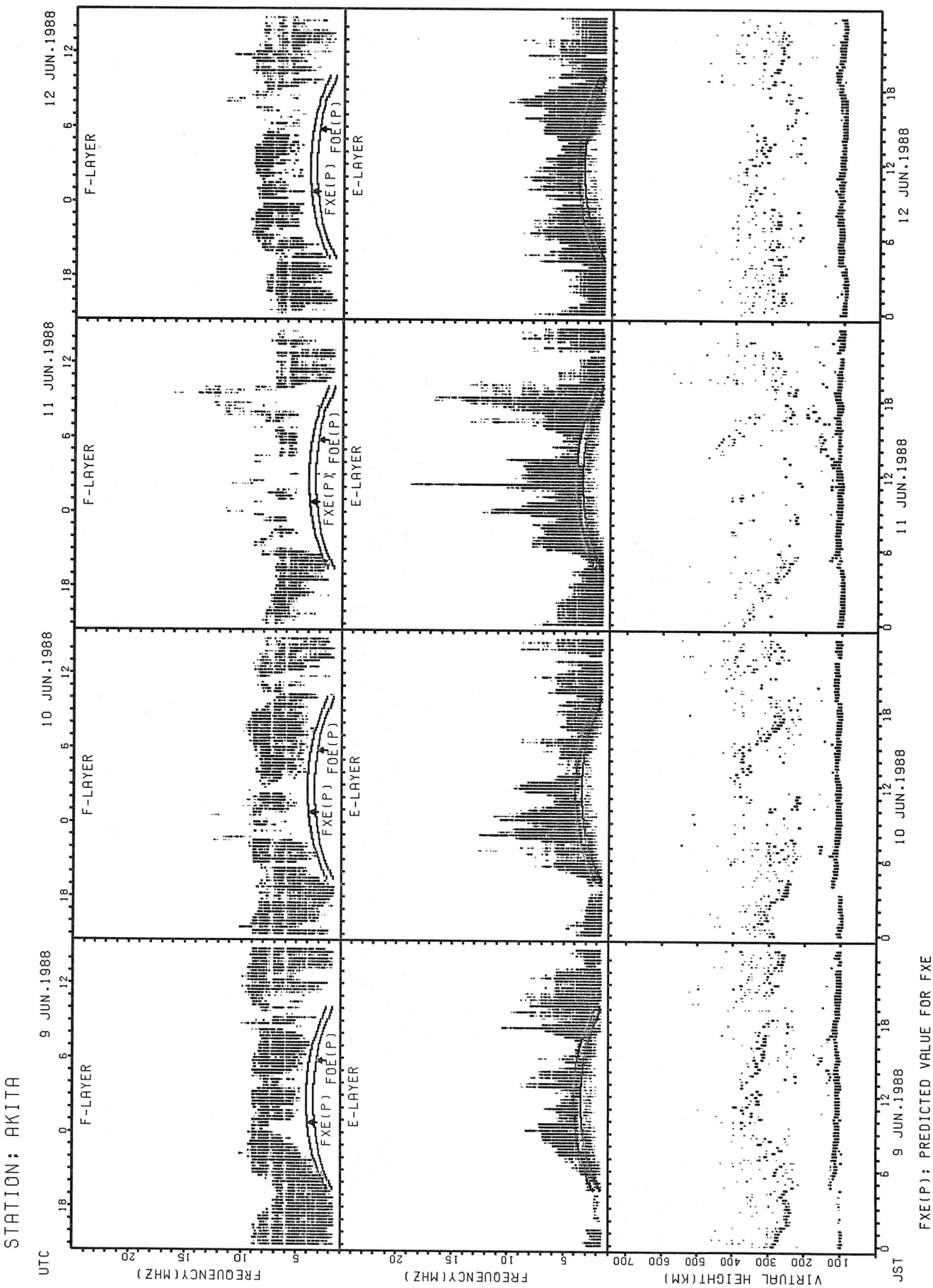
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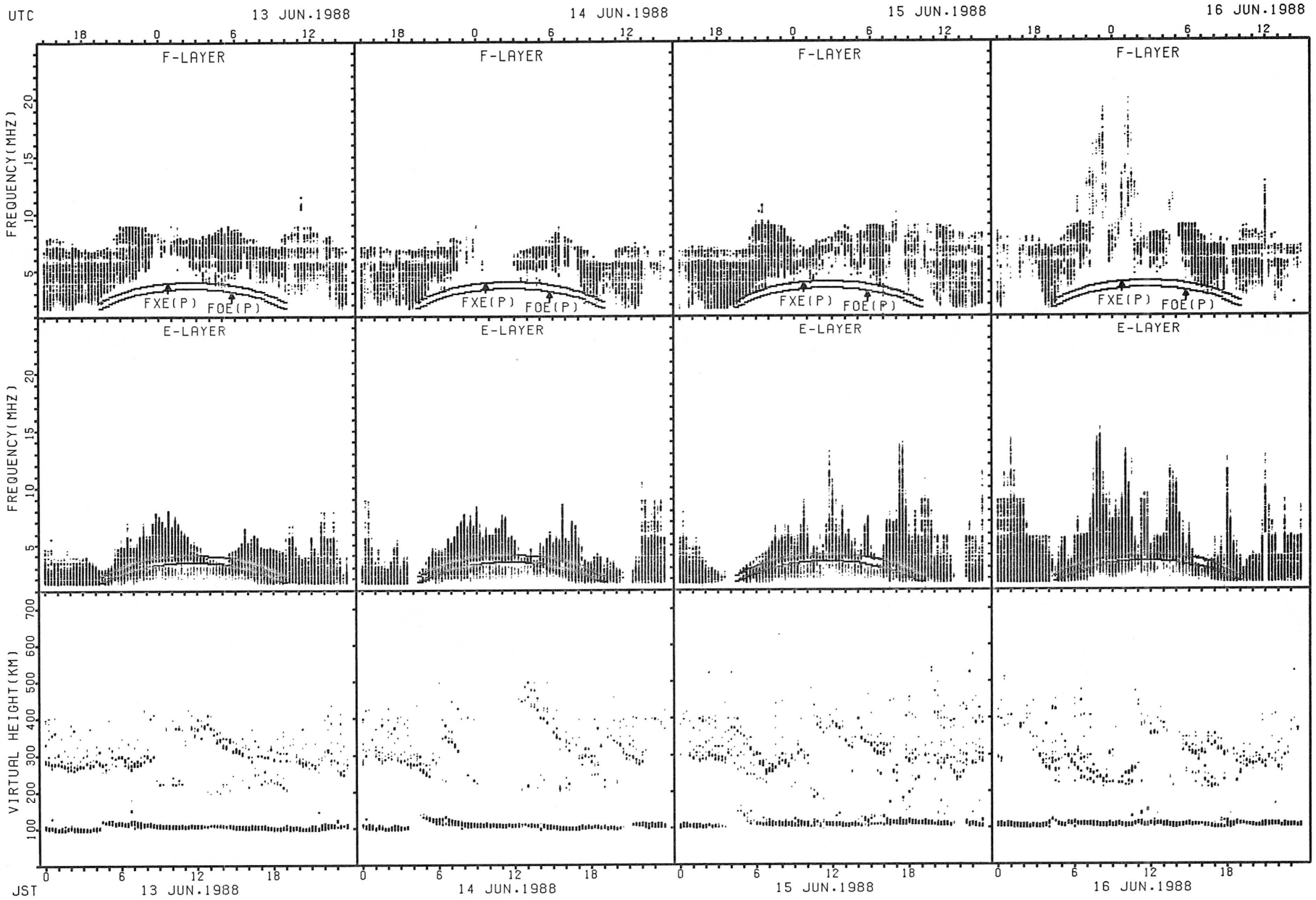

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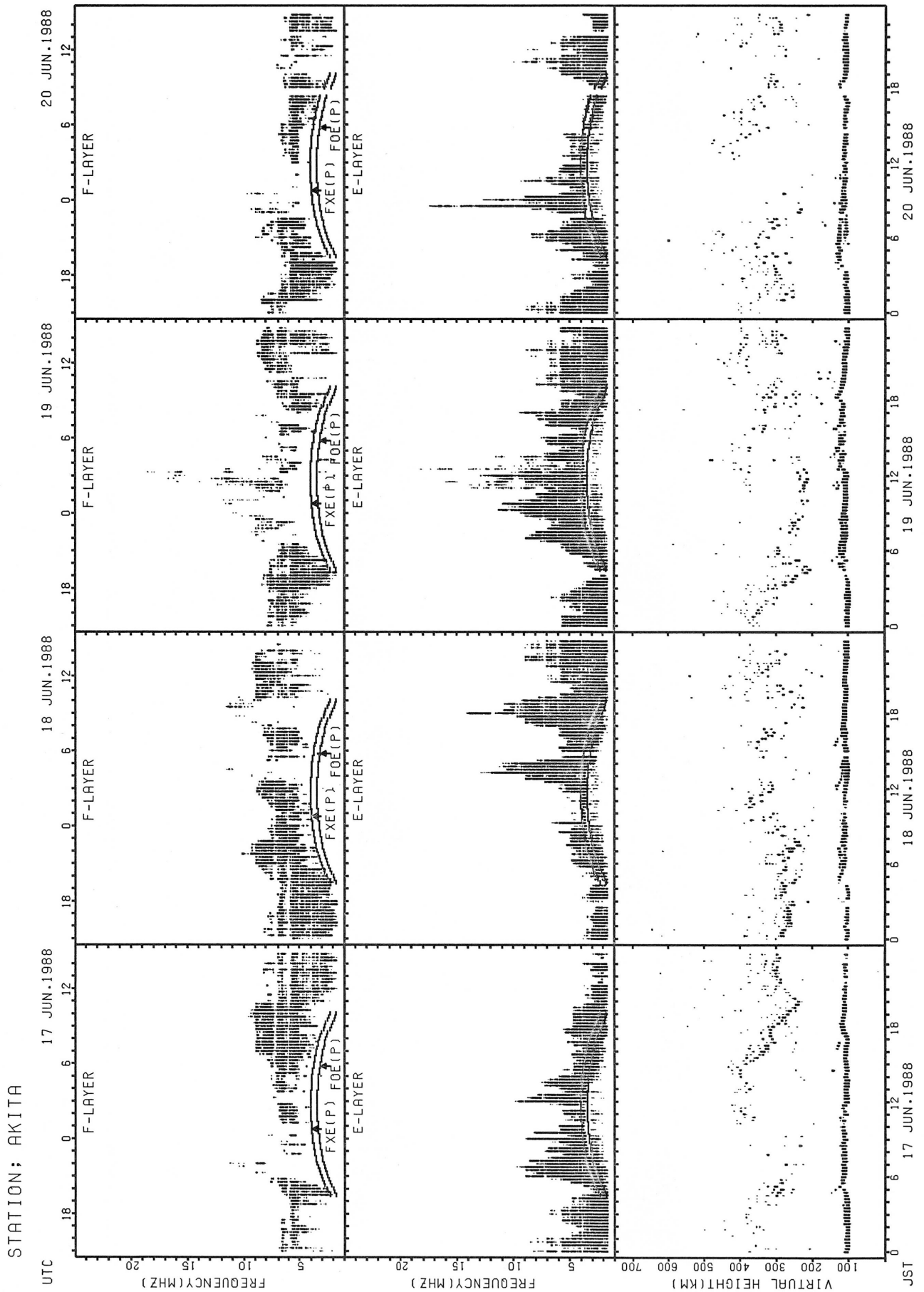
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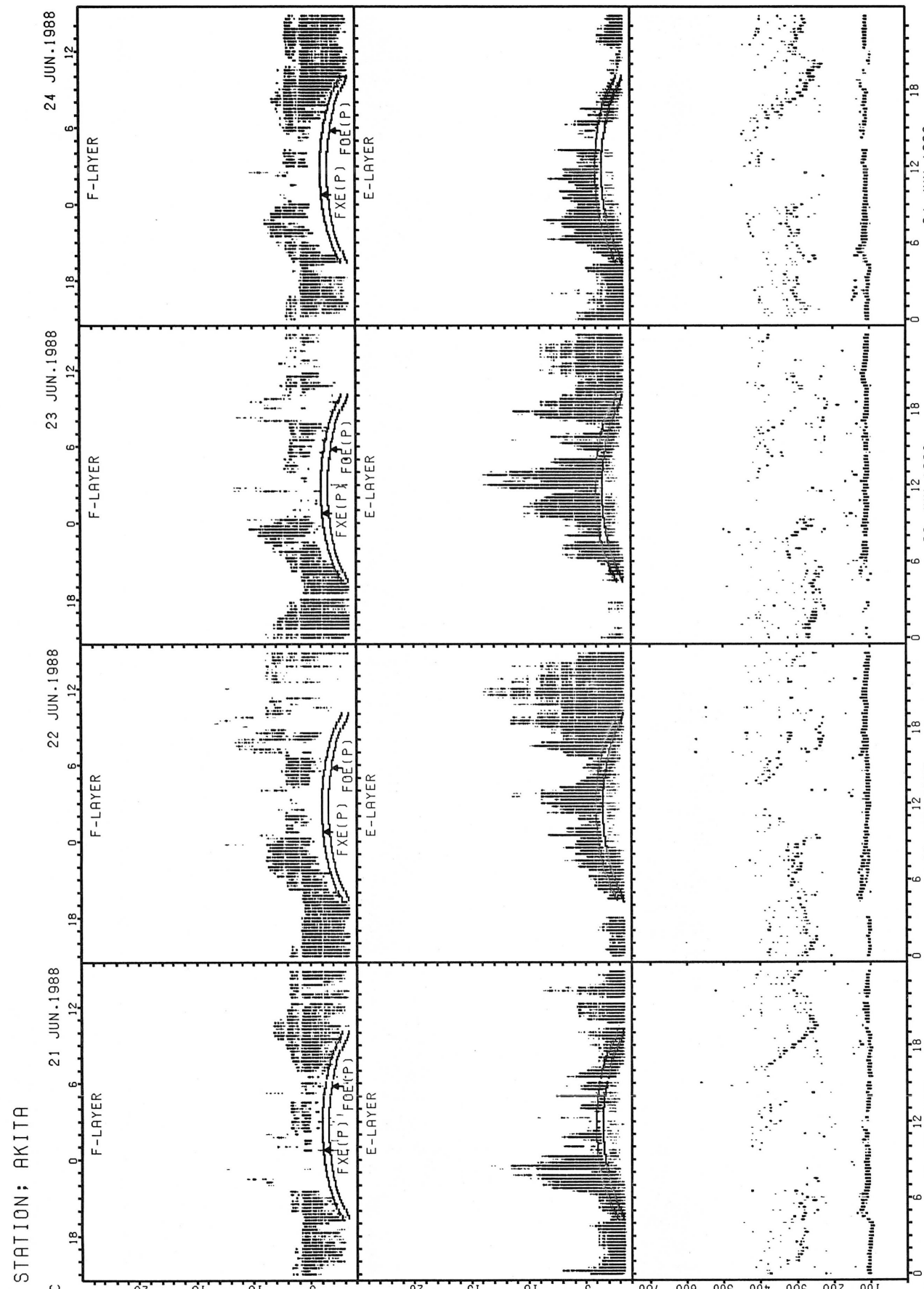
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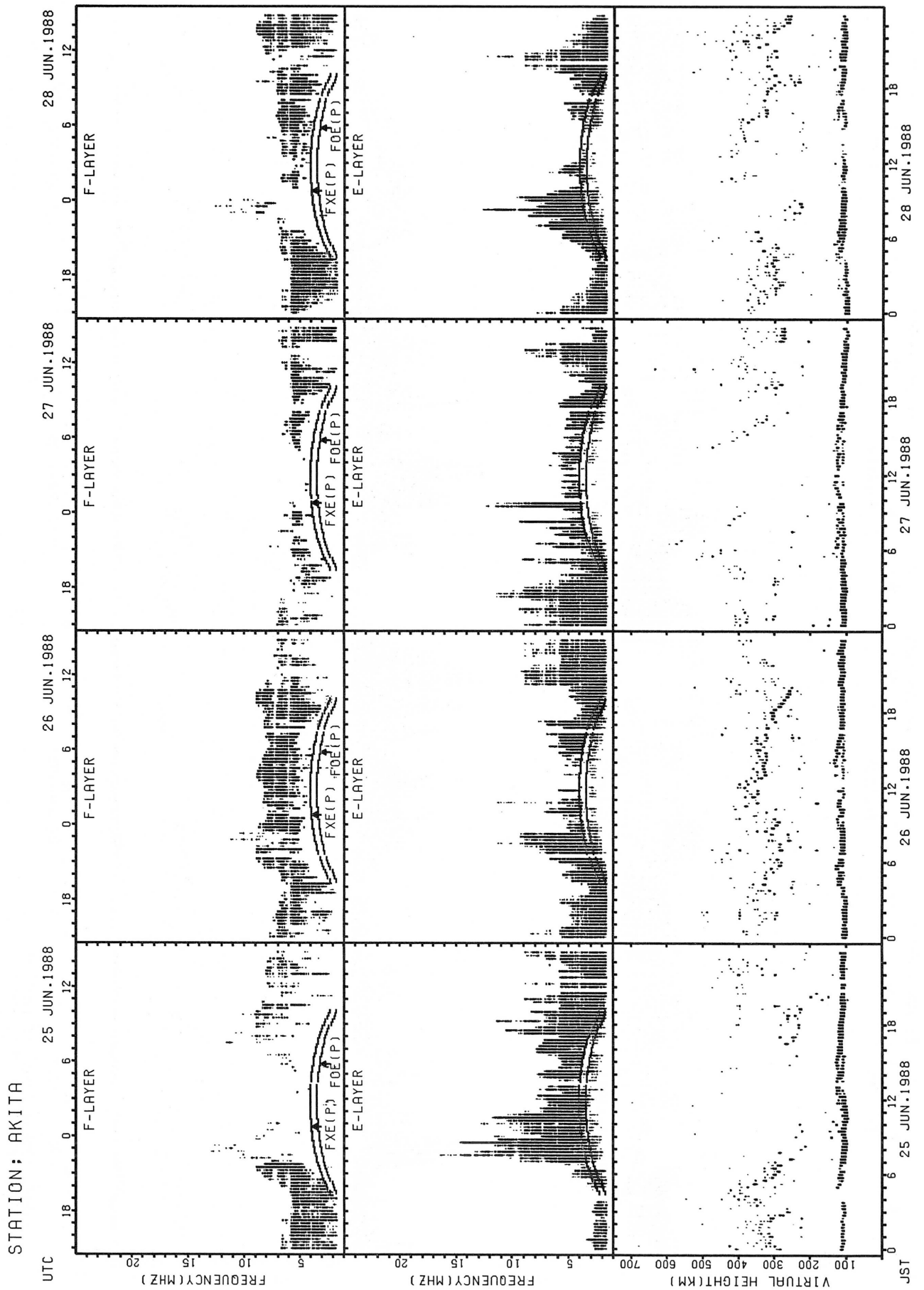
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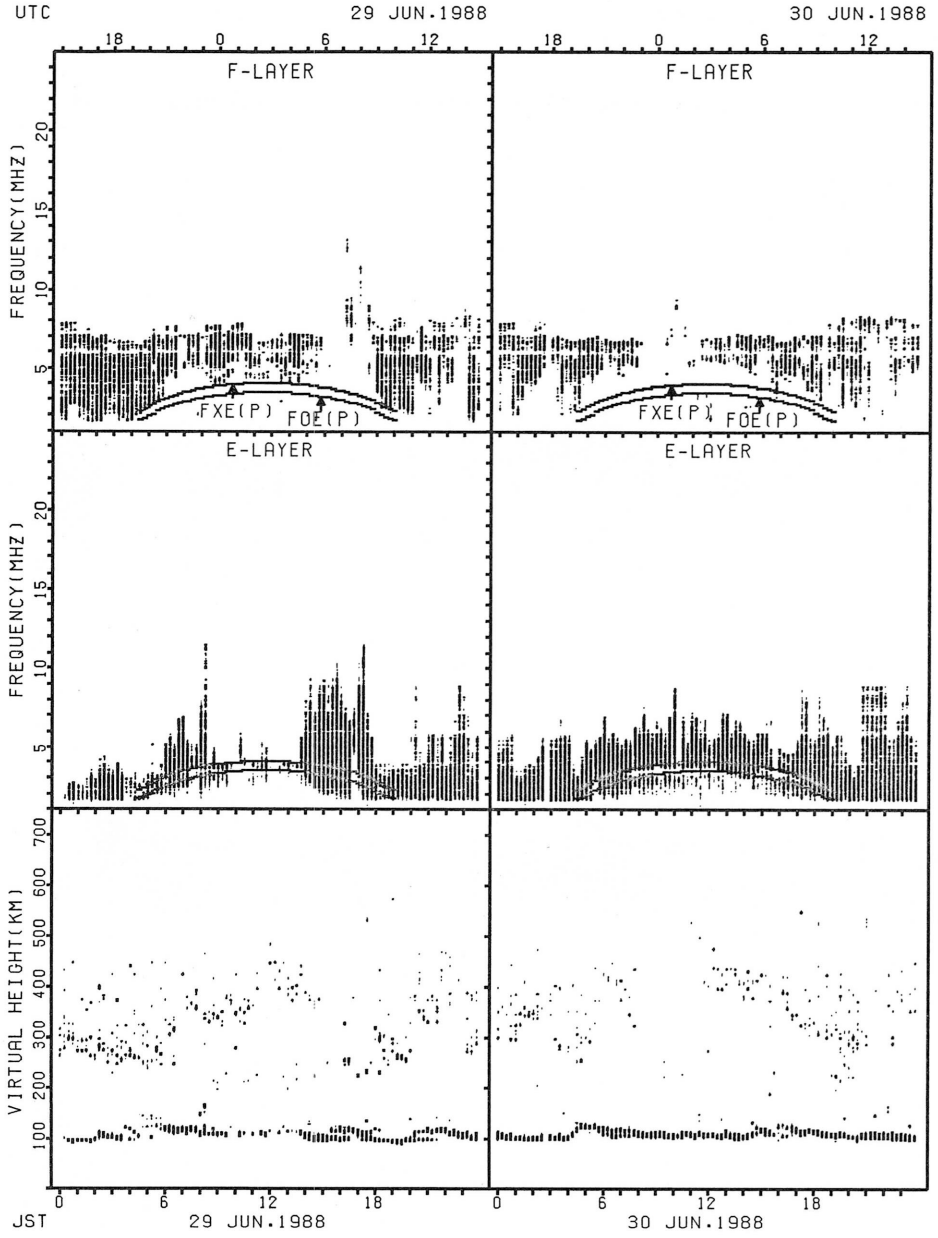

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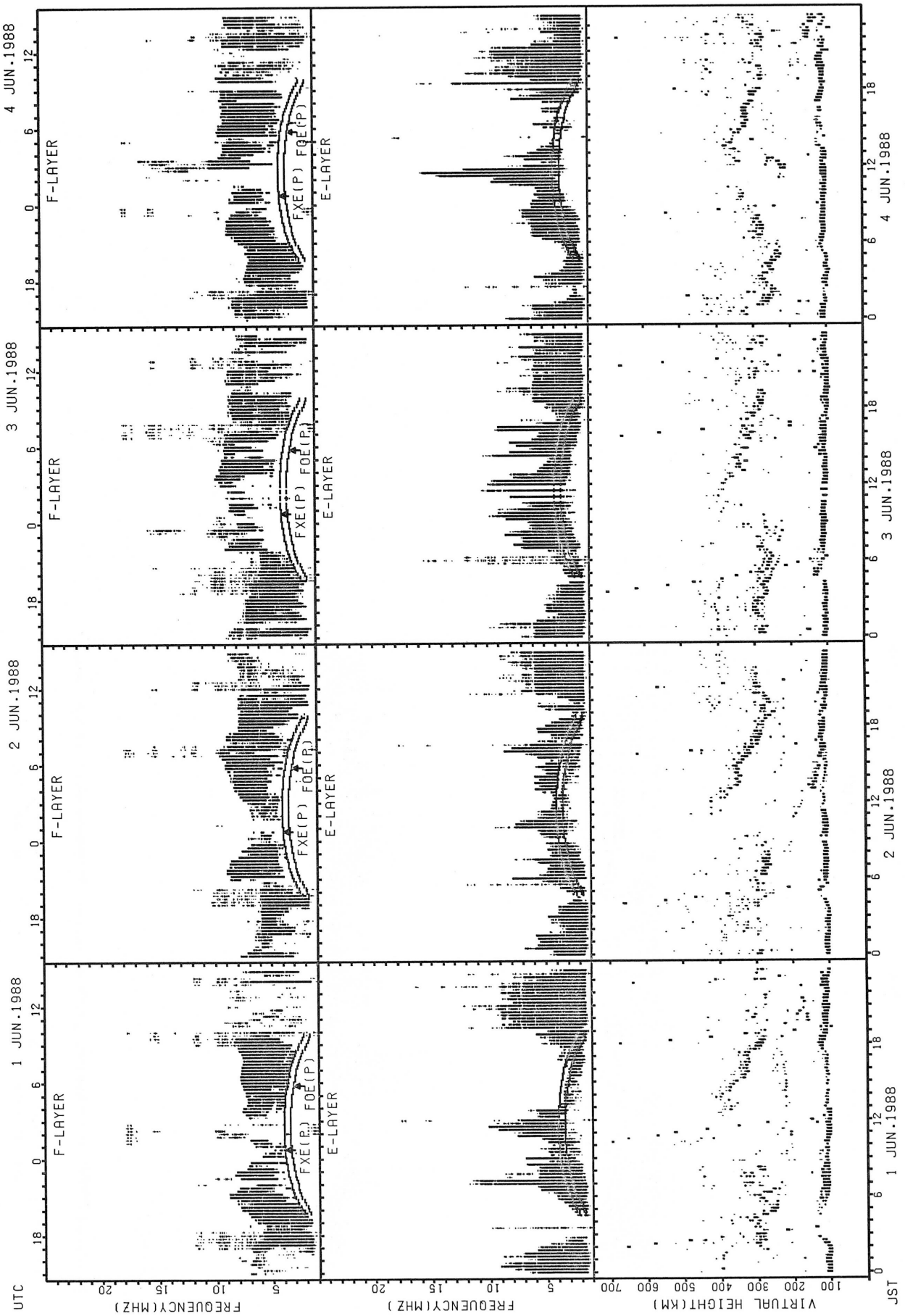
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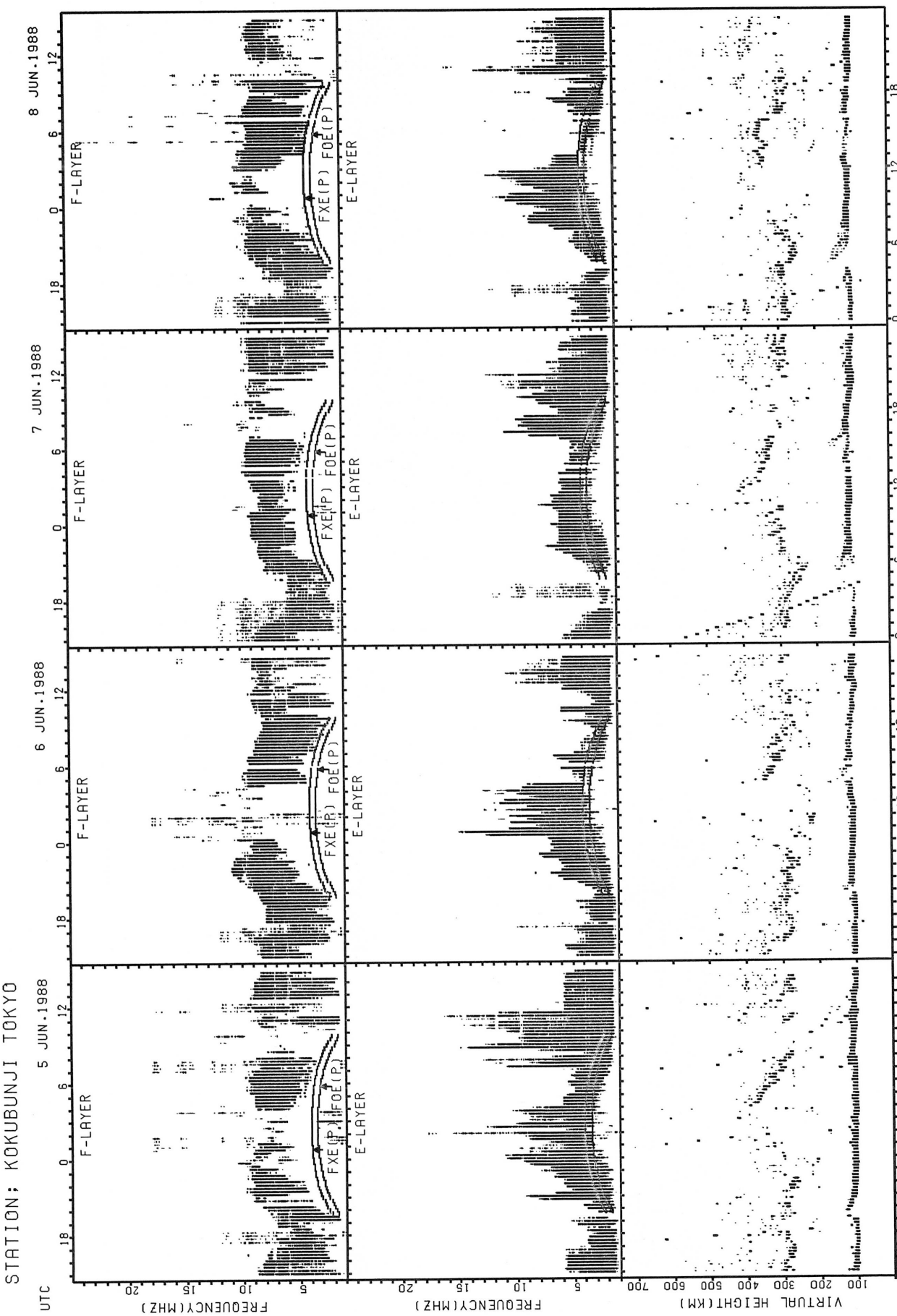
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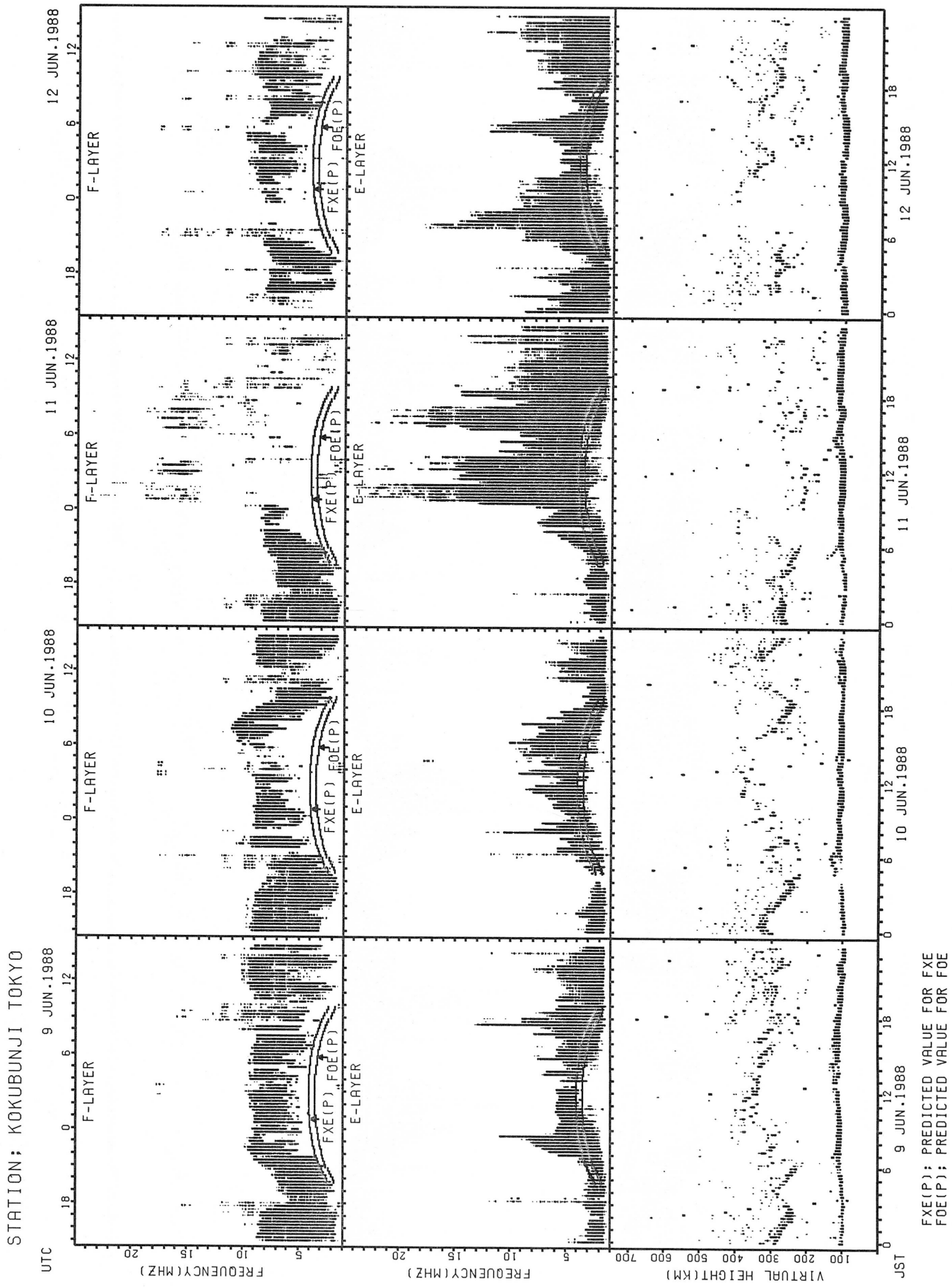
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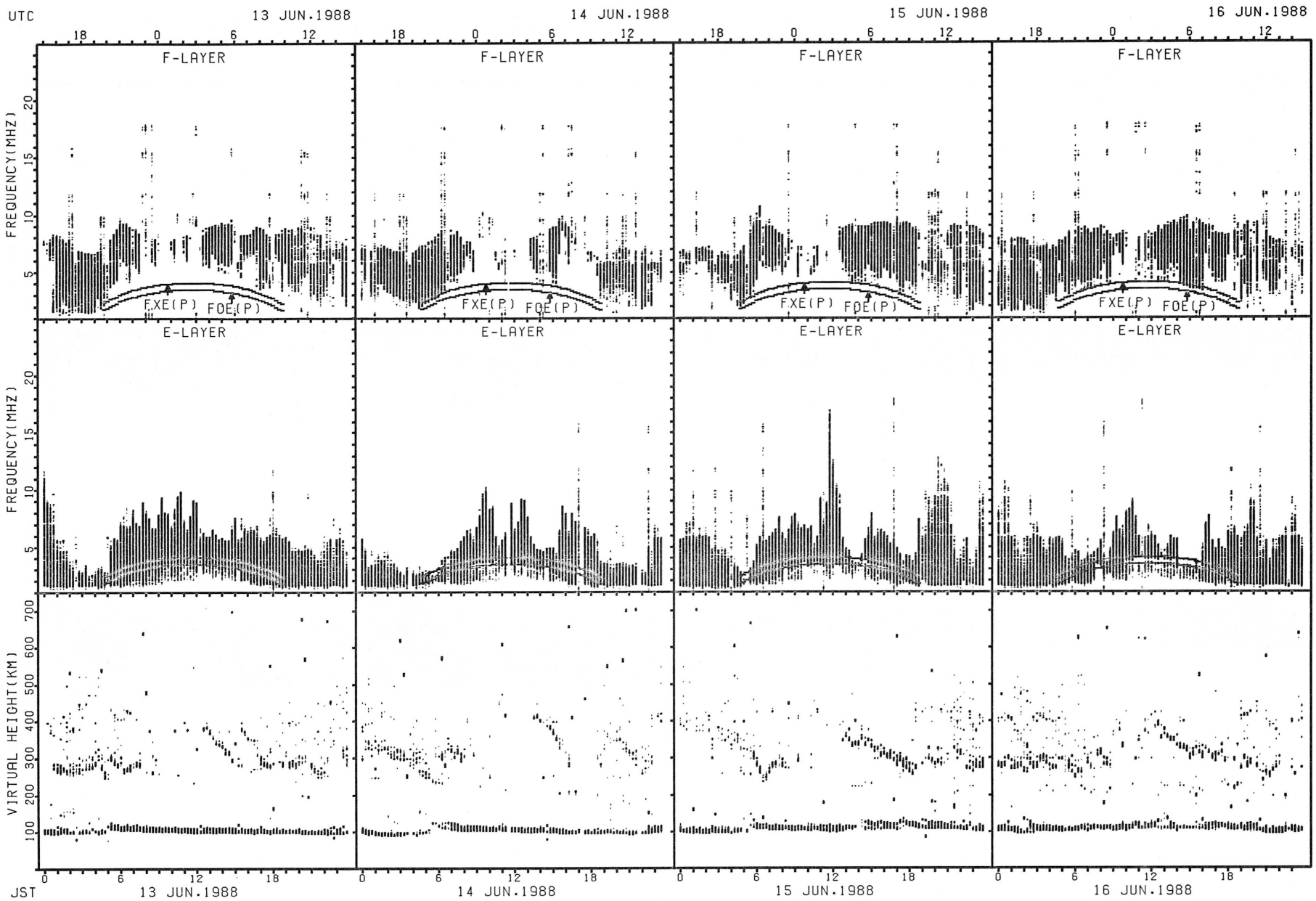

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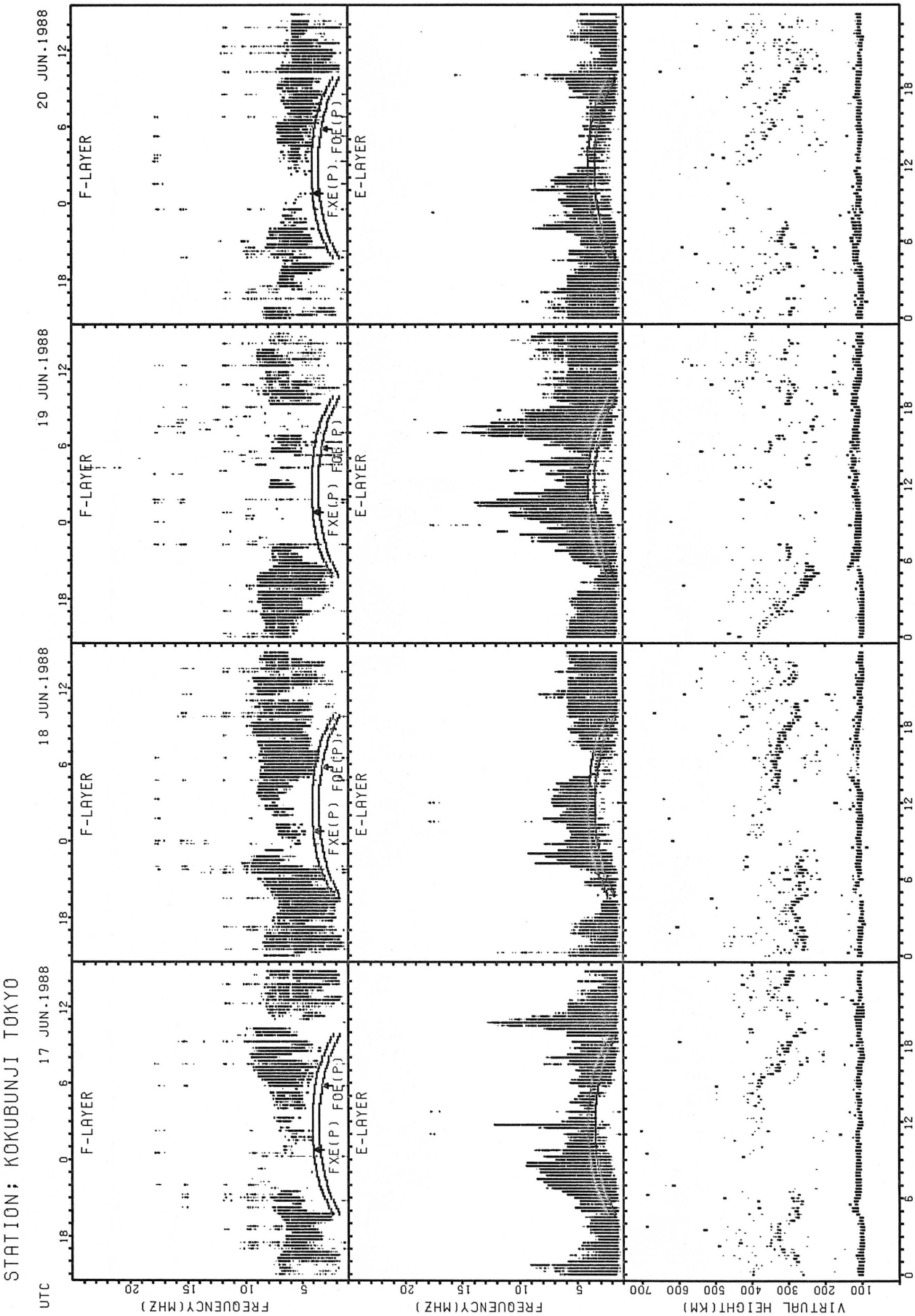
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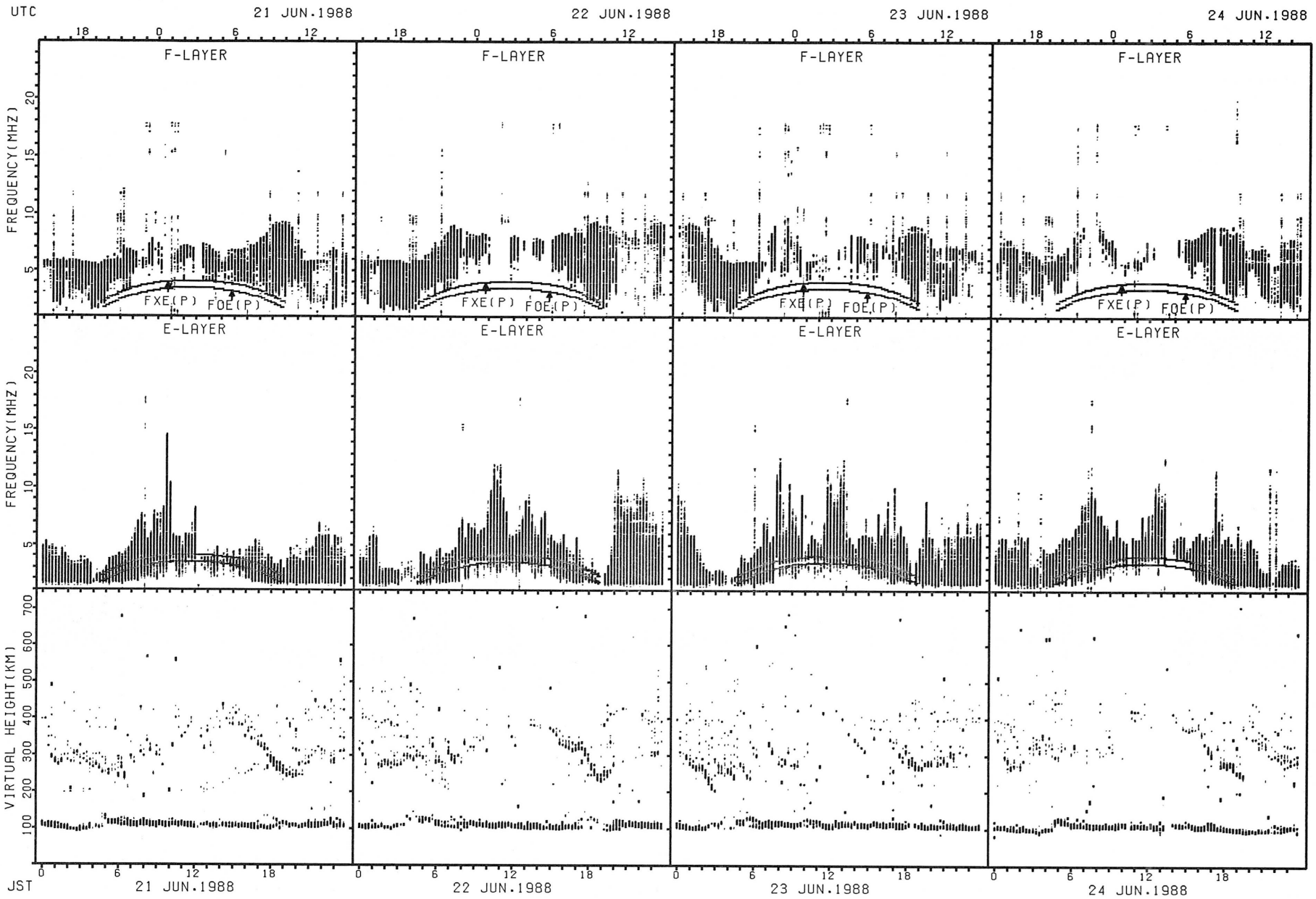
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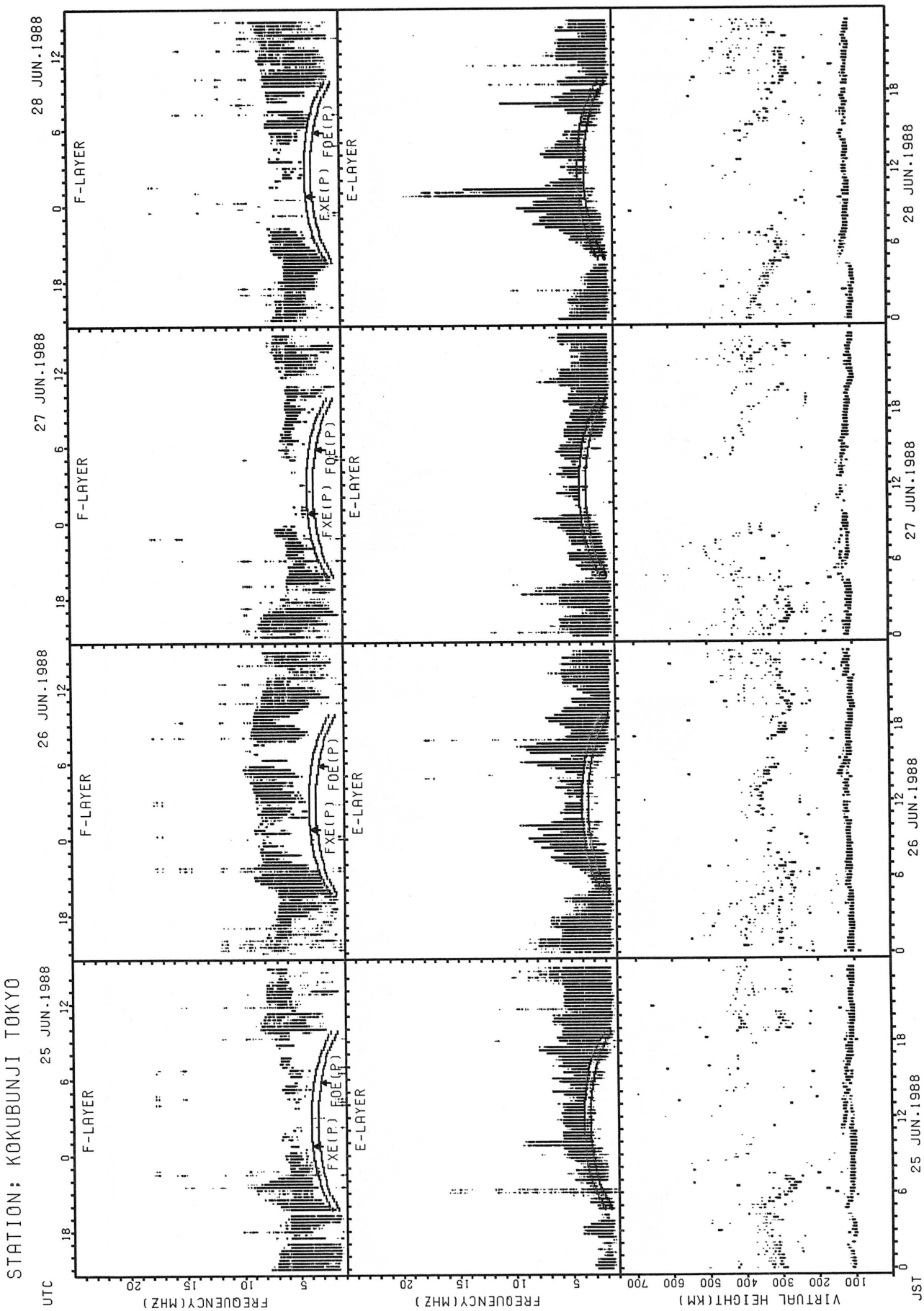
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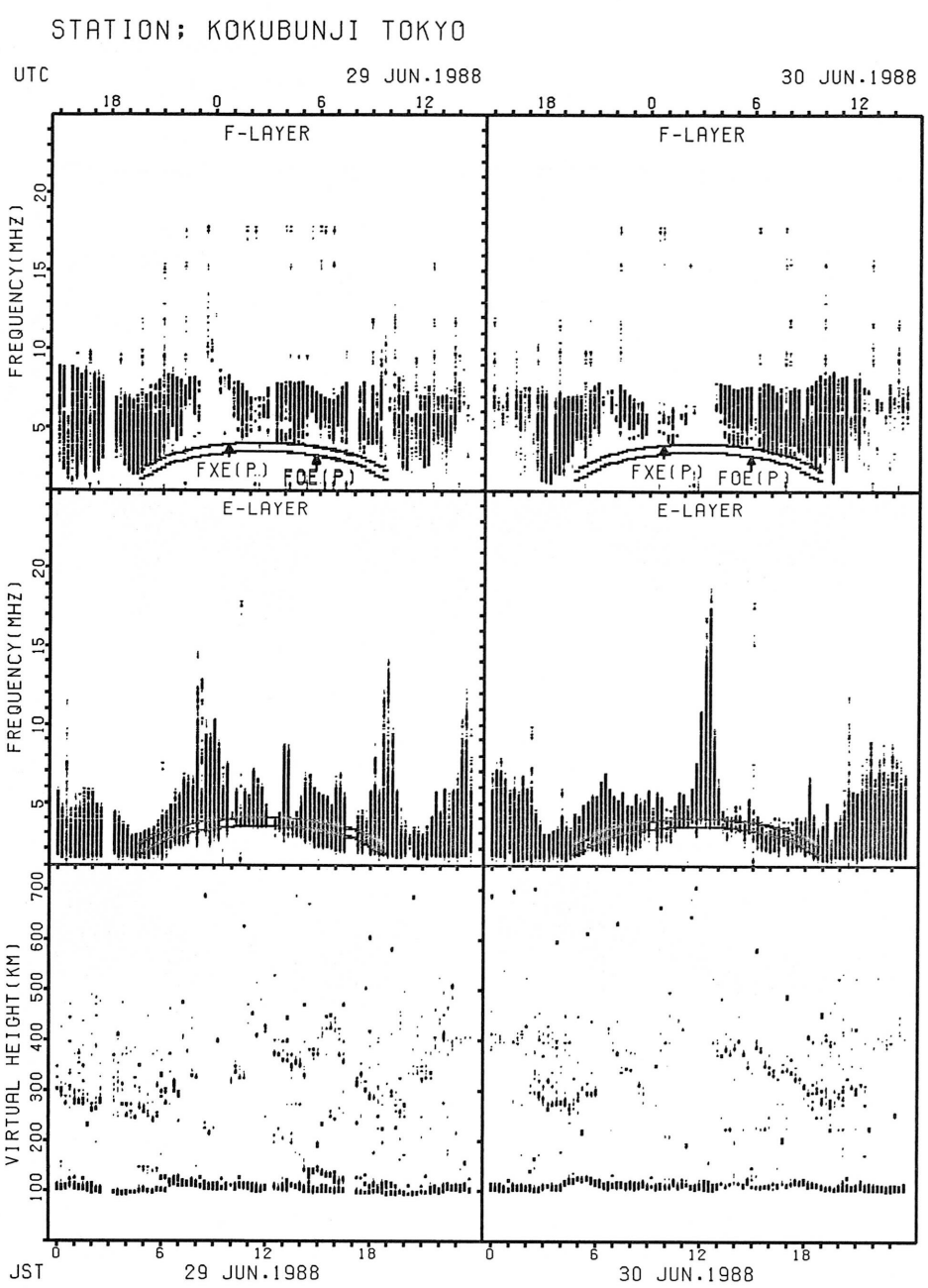
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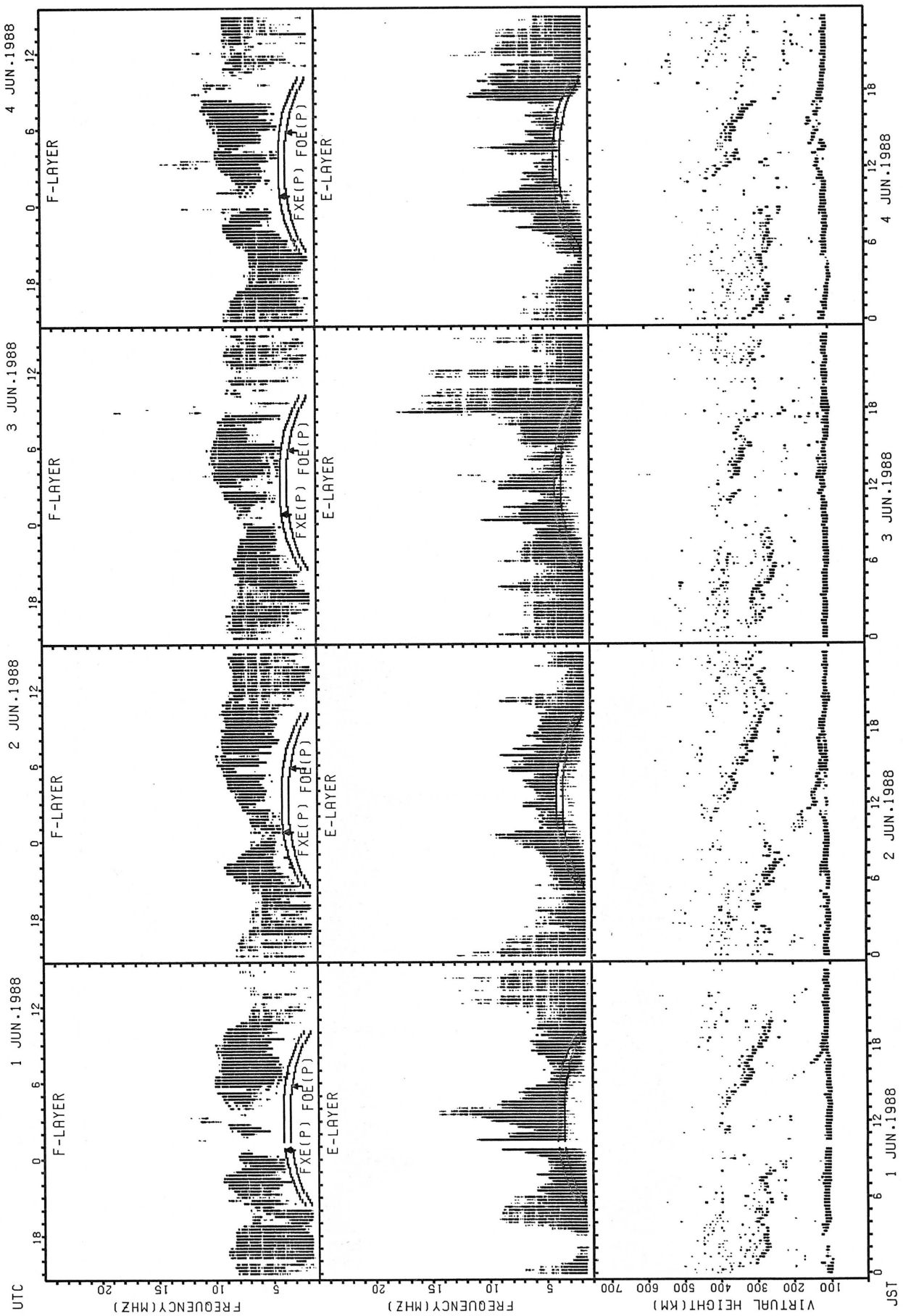
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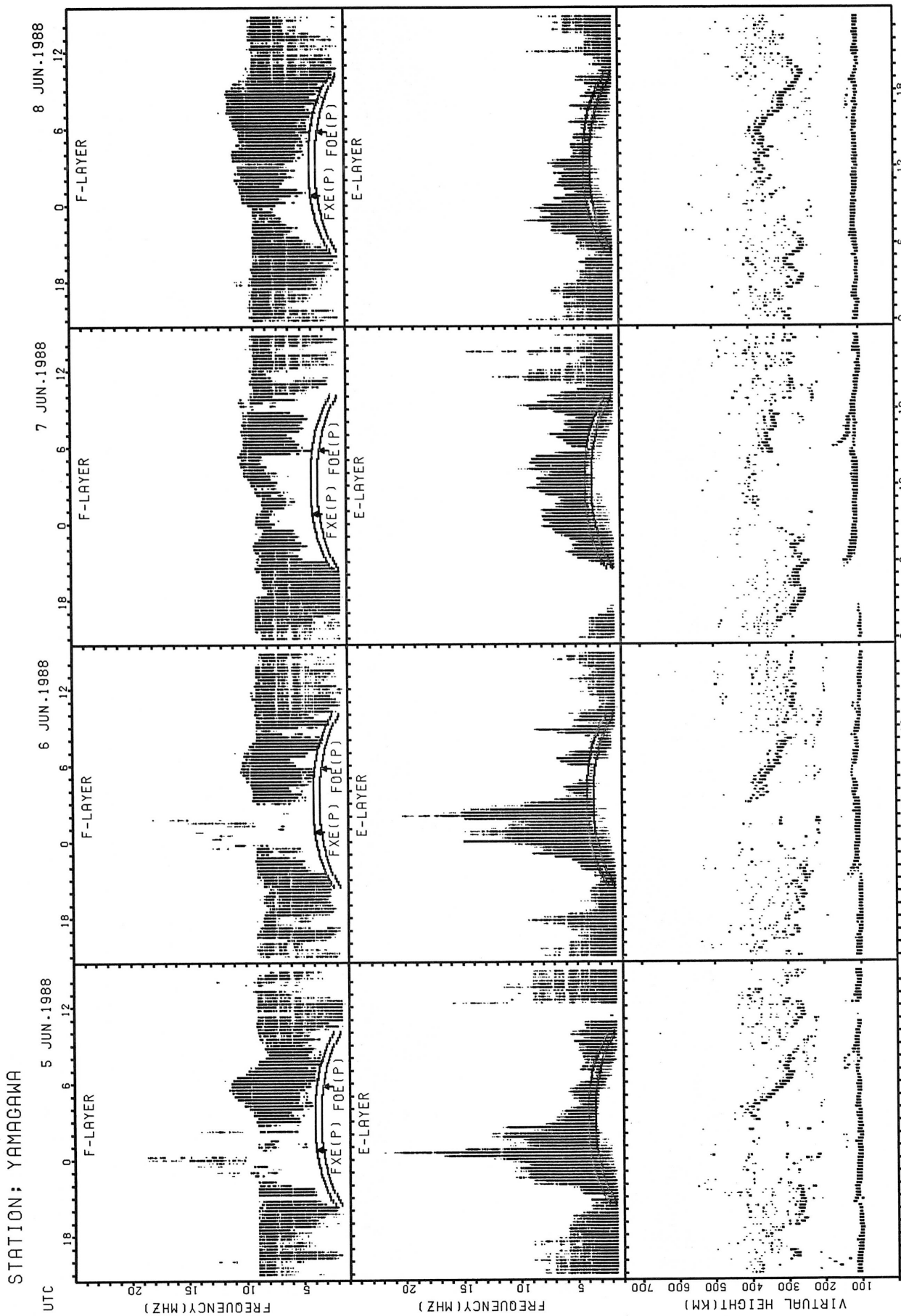
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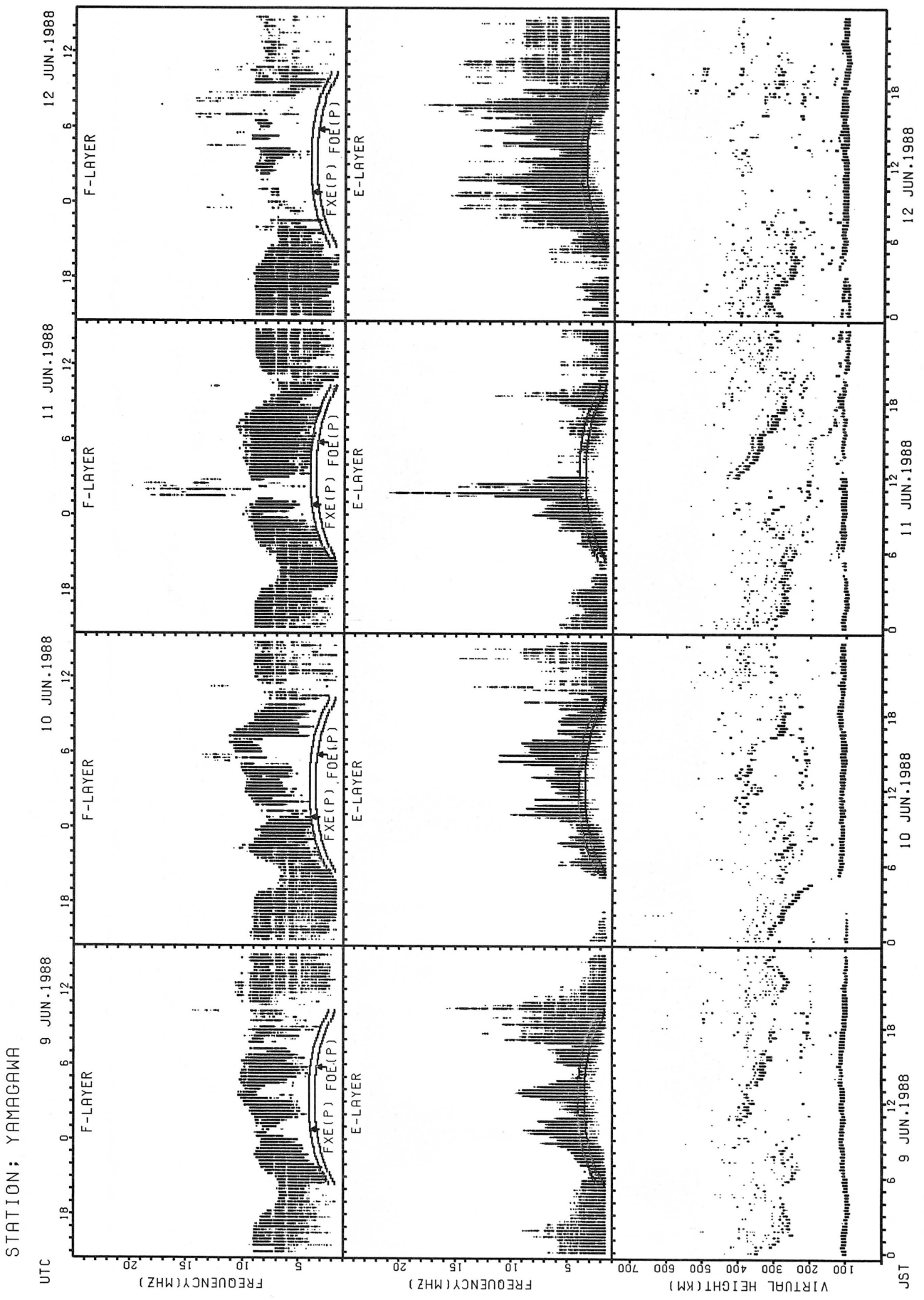
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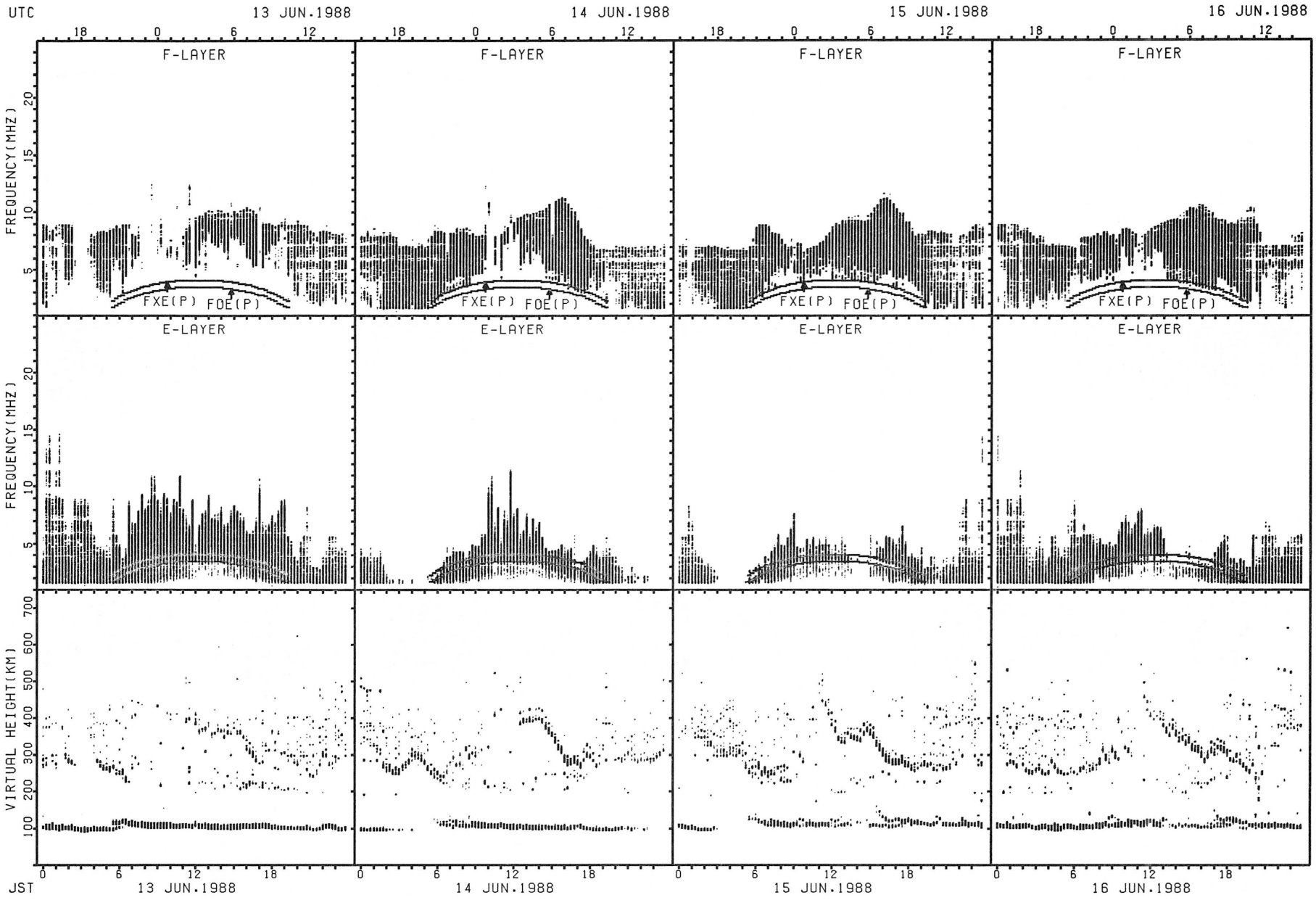

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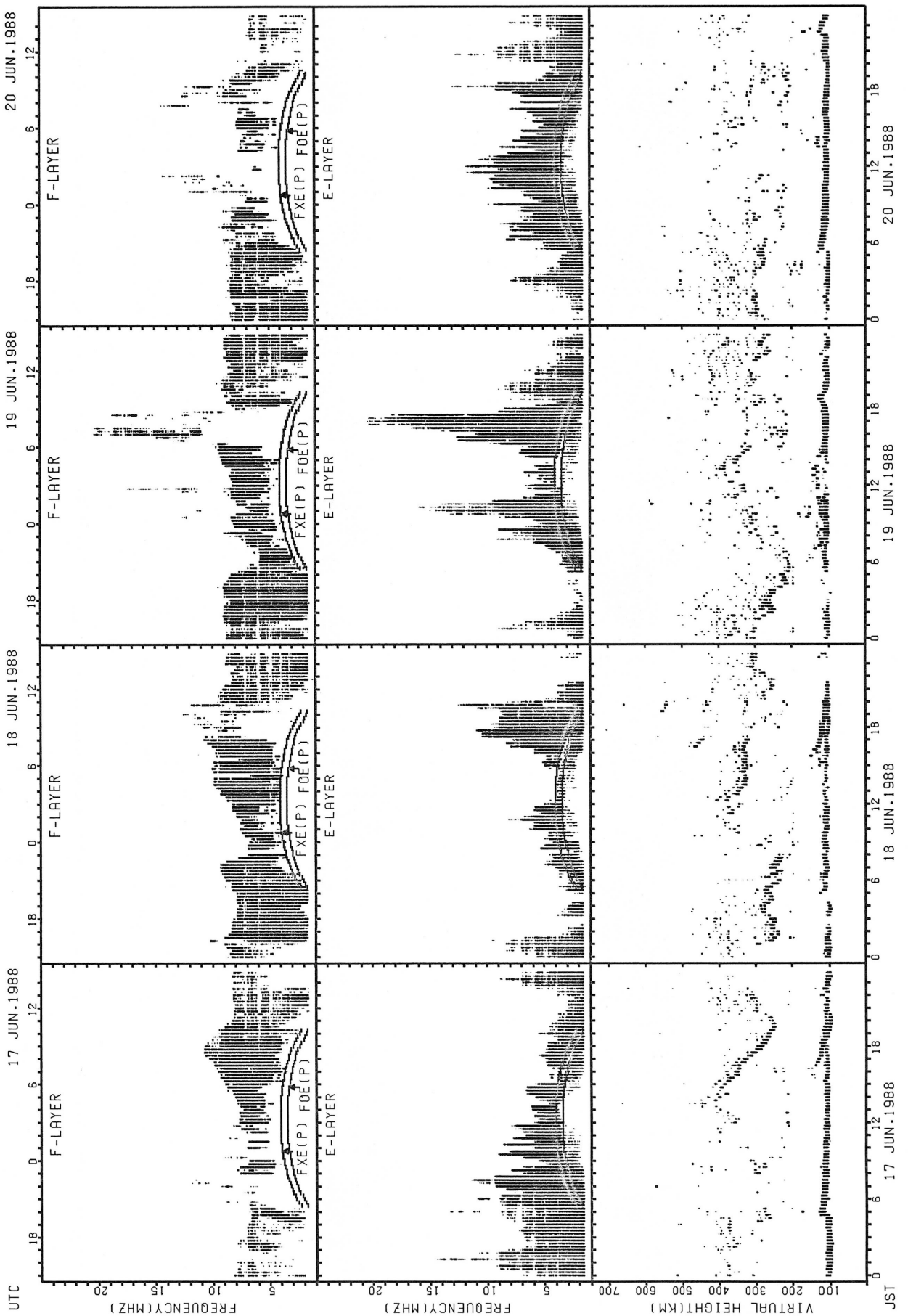
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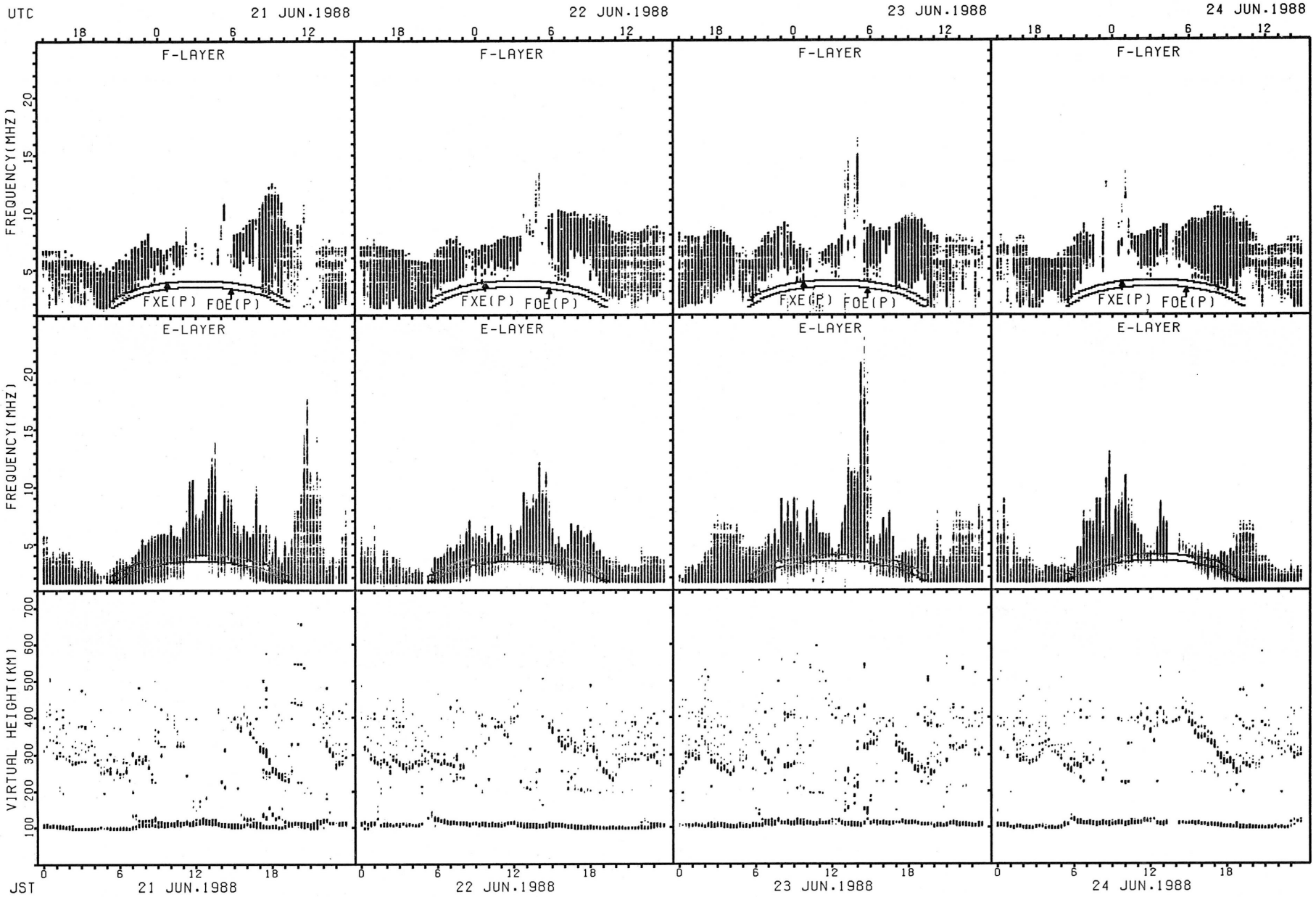

FXE(P); PREDICTED VALUE FOR FXE
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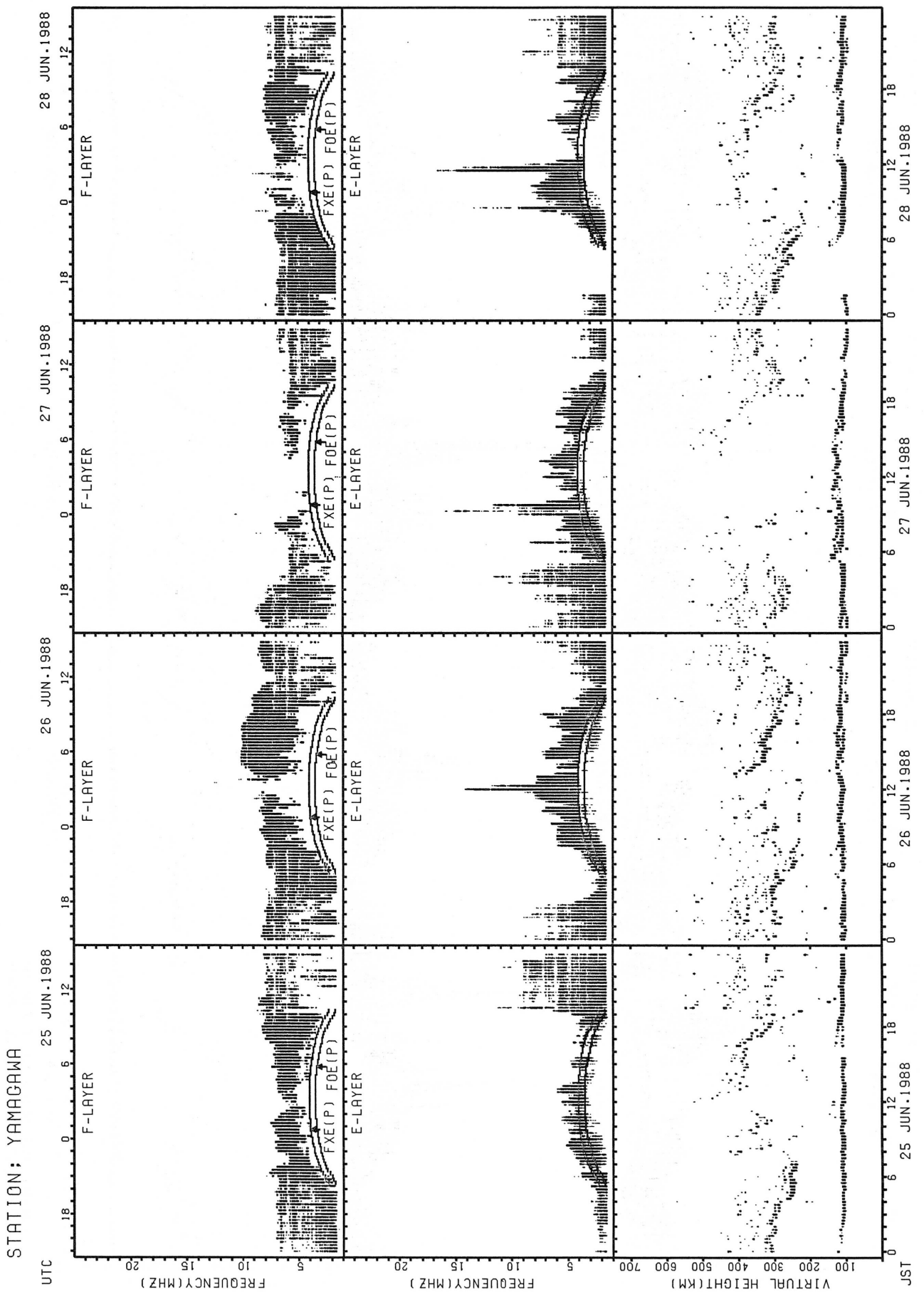
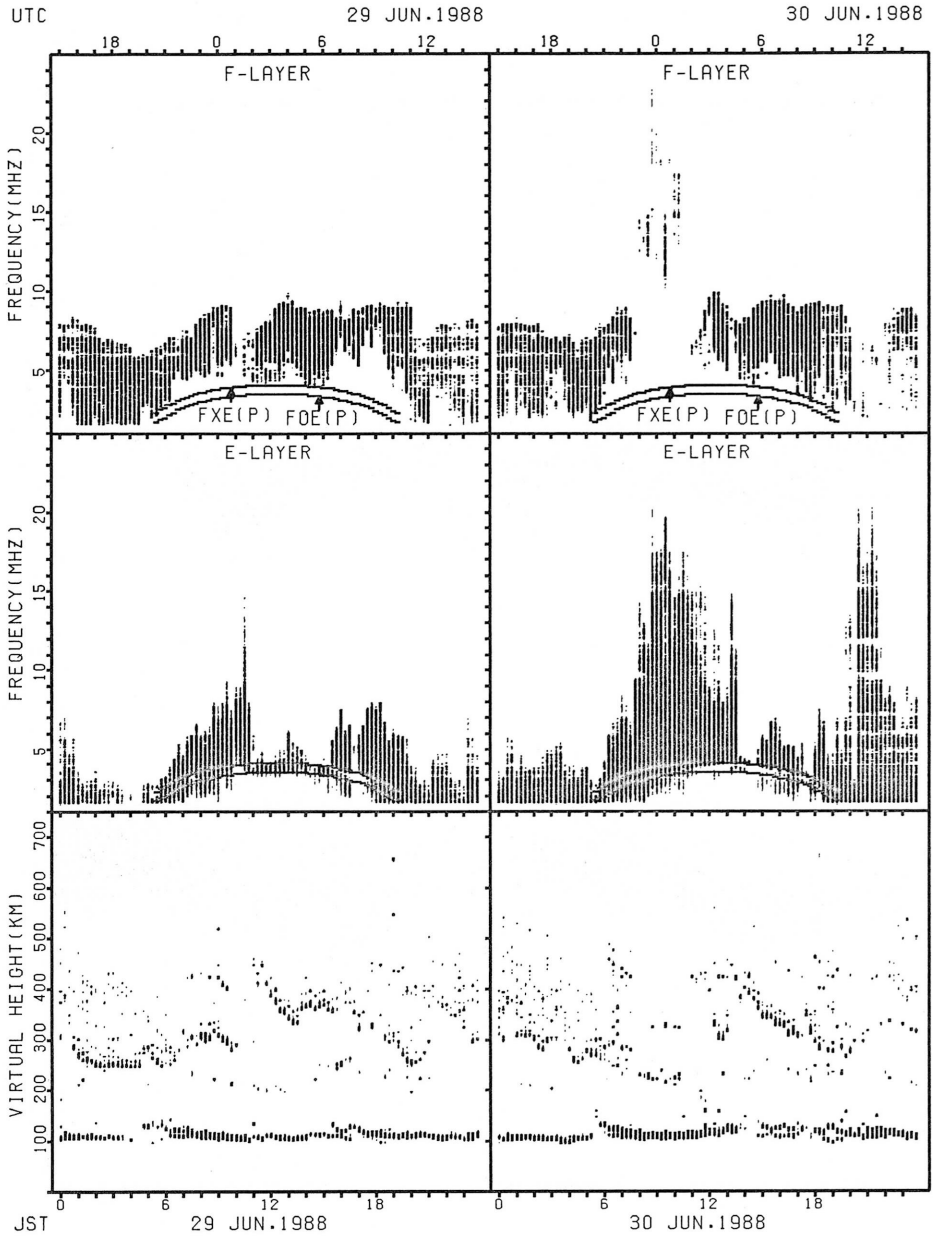
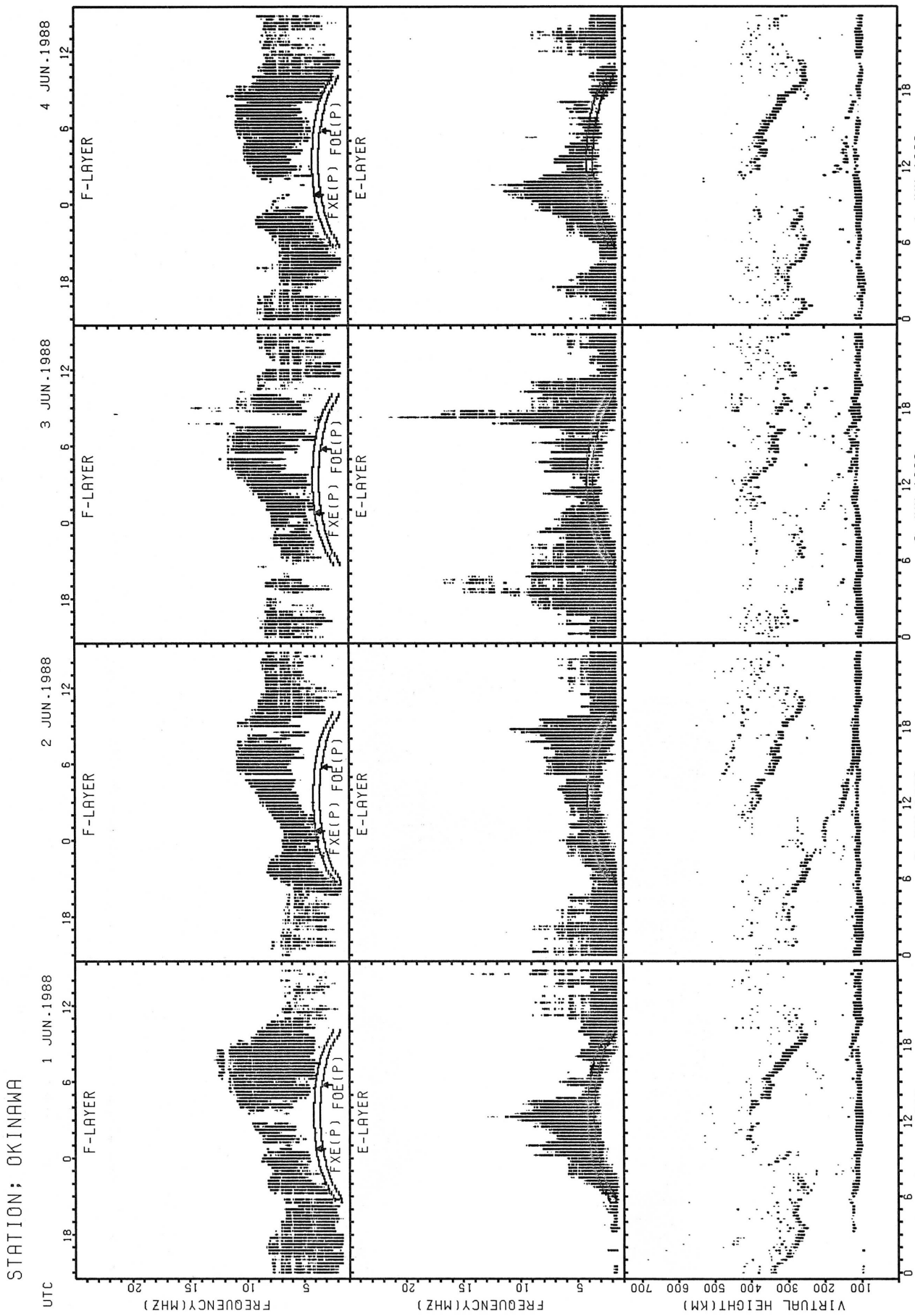
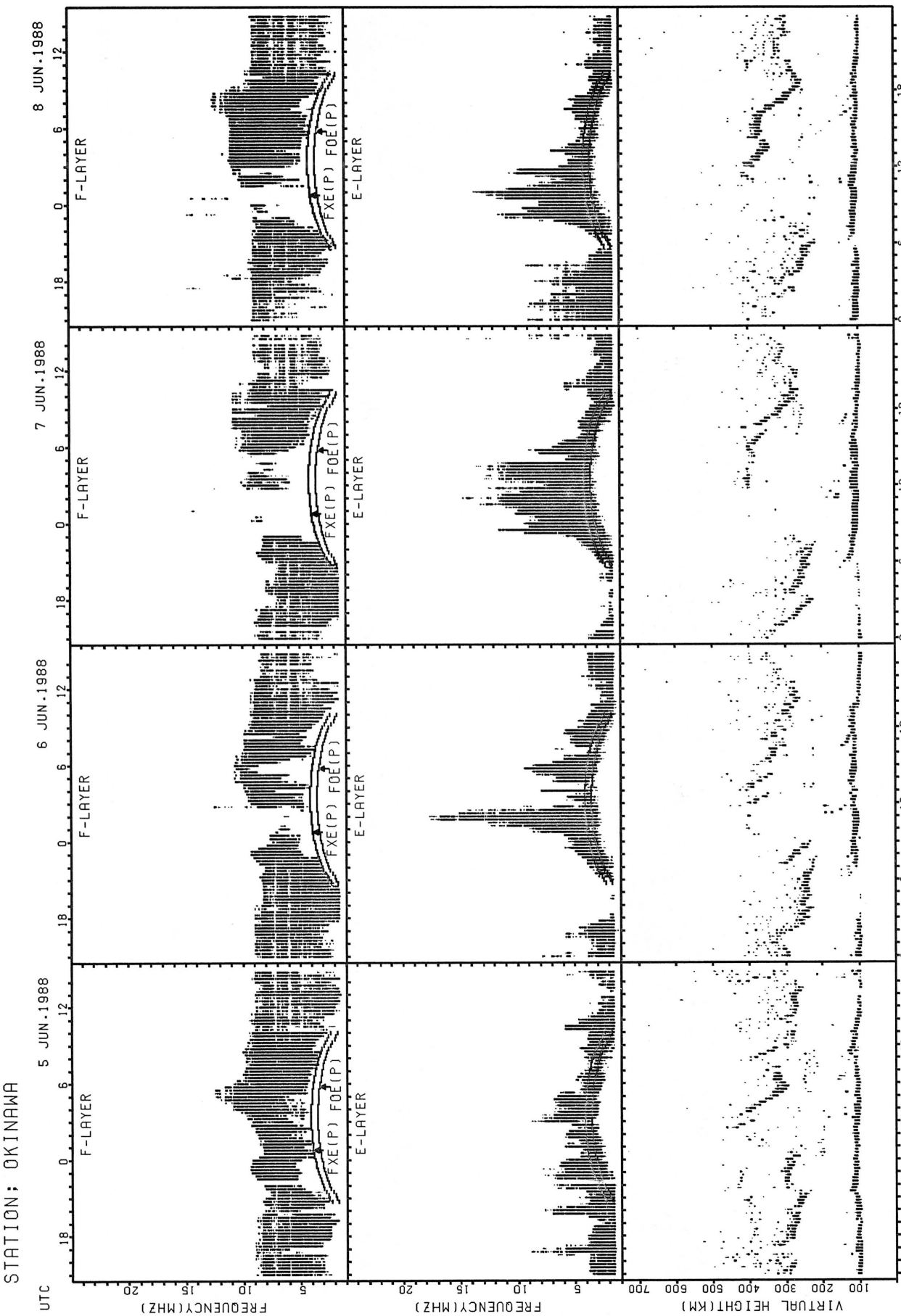

STATION: YAMAGAWA
UTC
JST
25 JUN.1988
26 JUN.1988
27 JUN.1988
28 JUN.1988
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

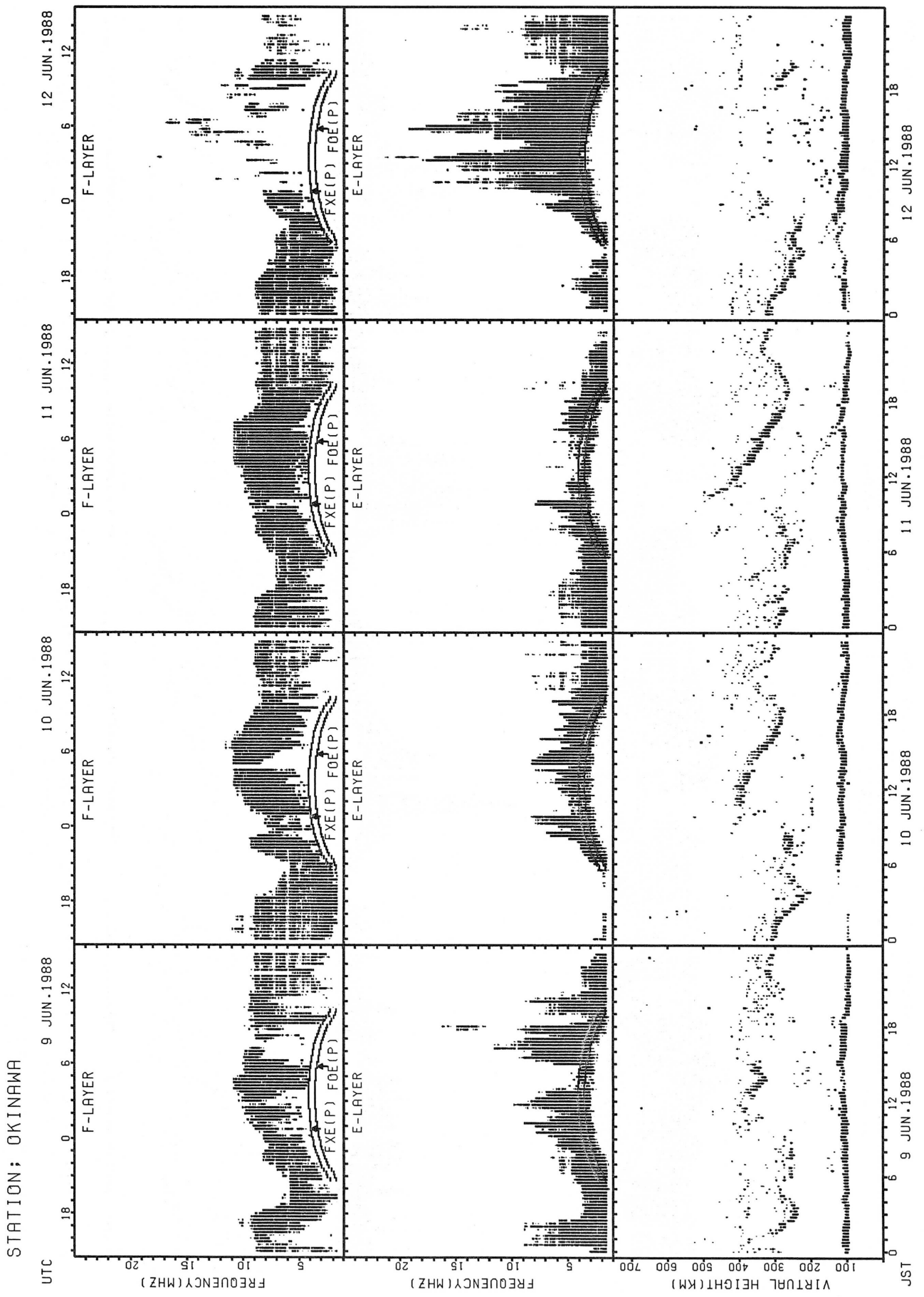
STATION; YAMAGAWA



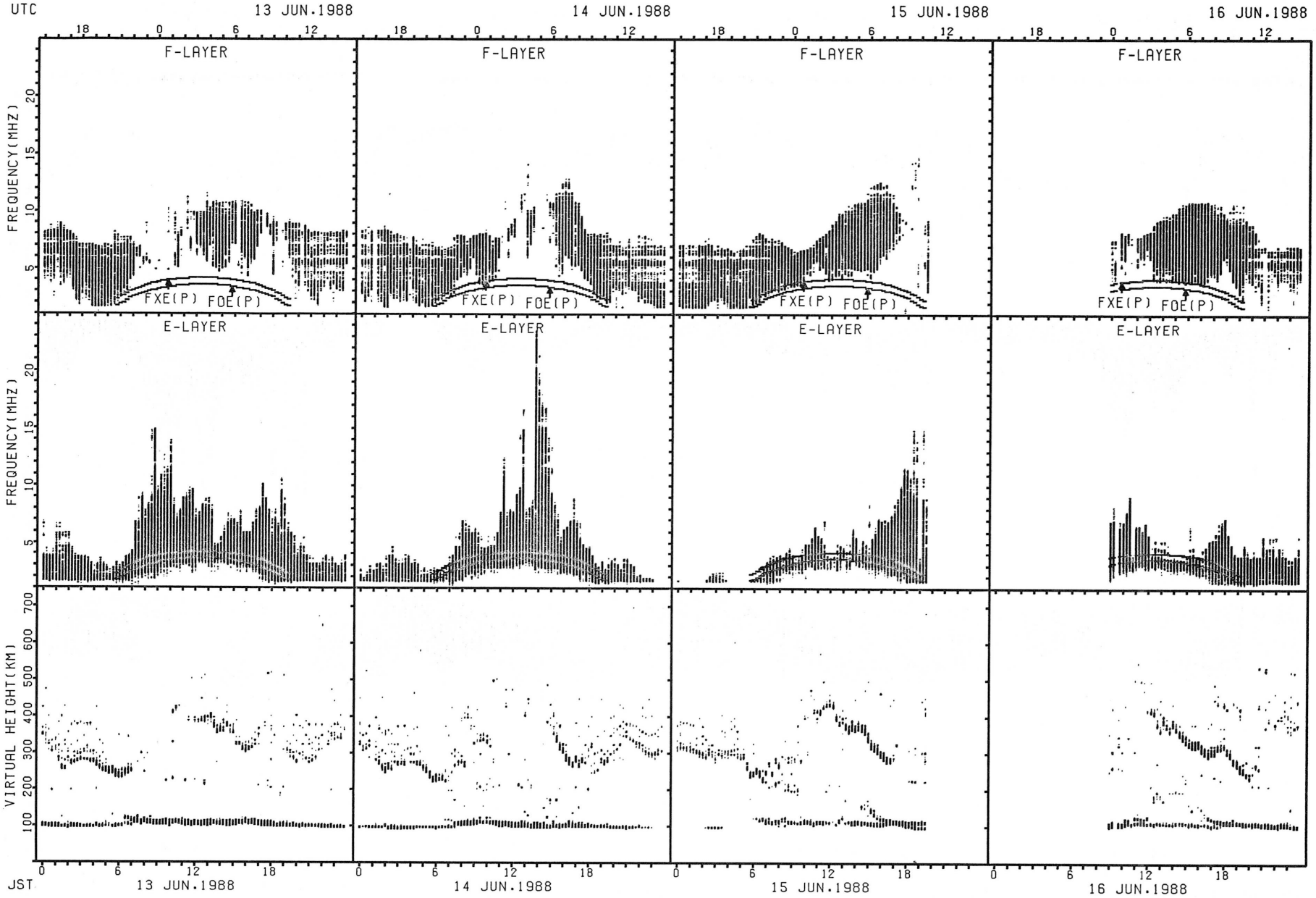
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


STATION: OKINAWA
UTC
JST
1 JUN.1988
2 JUN.1988
3 JUN.1988
4 JUN.1988
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

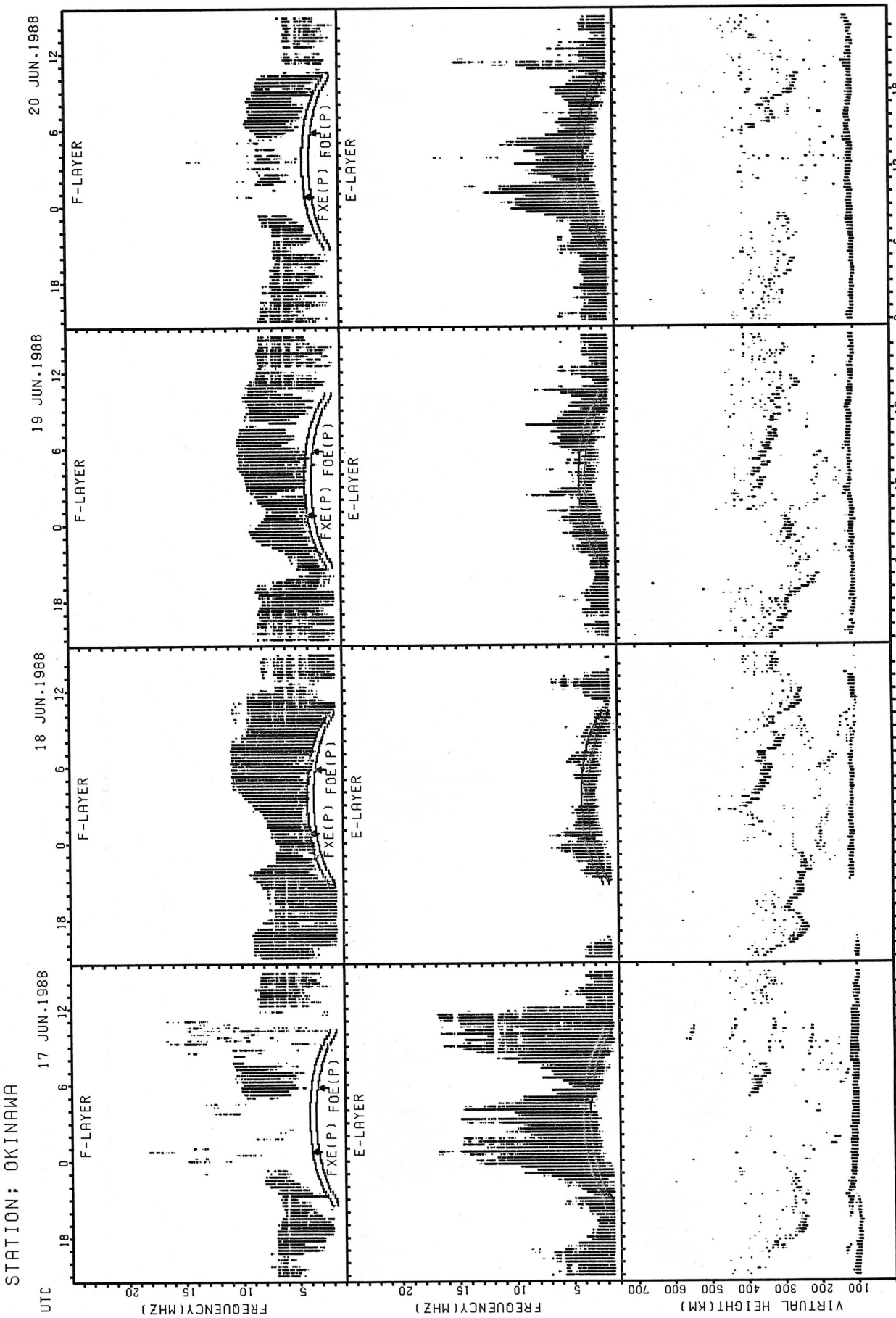

STATION: OKINAWA
UTC
JST
5 JUN.1988
6 JUN.1988
7 JUN.1988
8 JUN.1988
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


STATION: OKINAWA
UTC
9 JUN.1988
10 JUN.1988
11 JUN.1988
12 JUN.1988
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

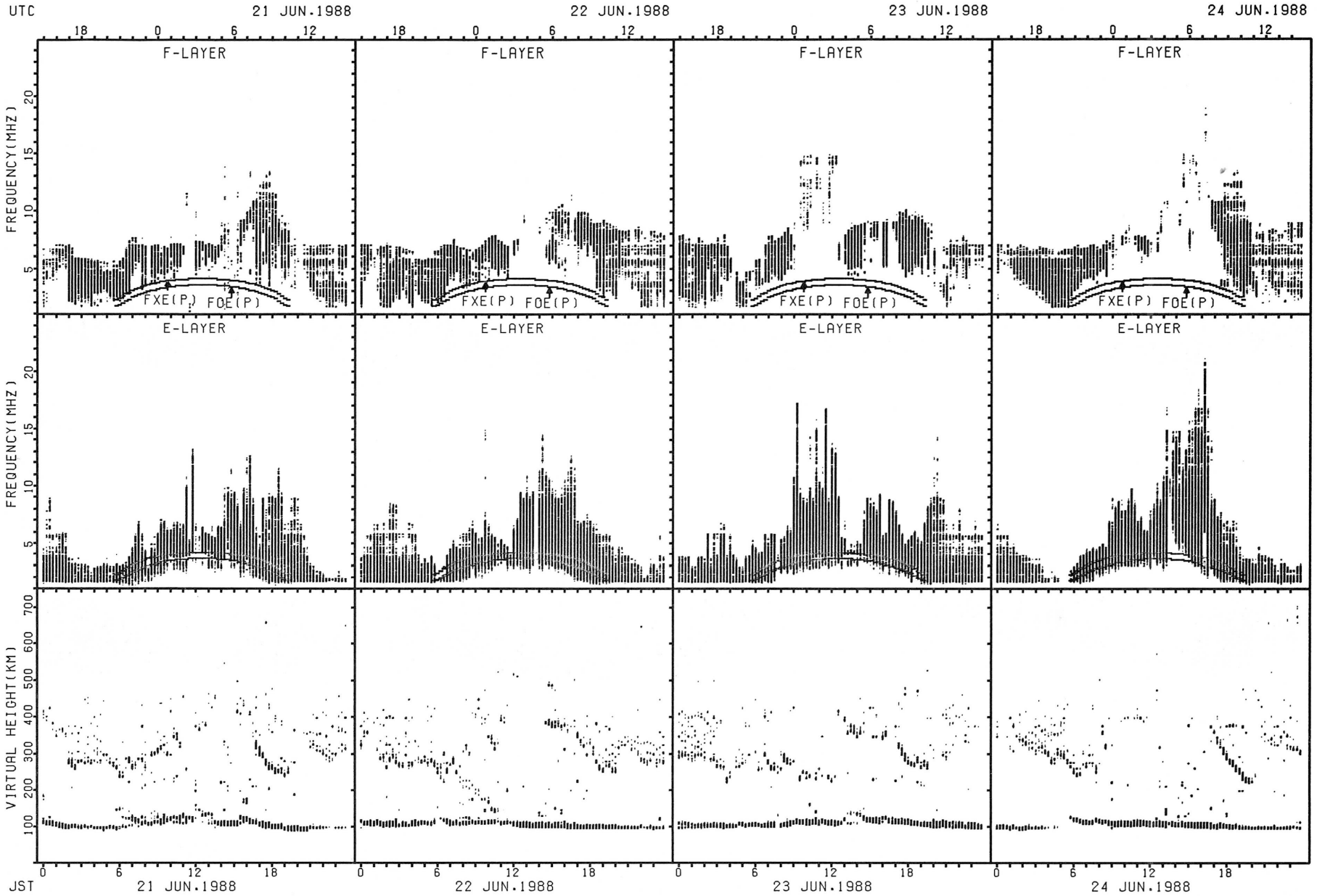
STATION; OKINAWA



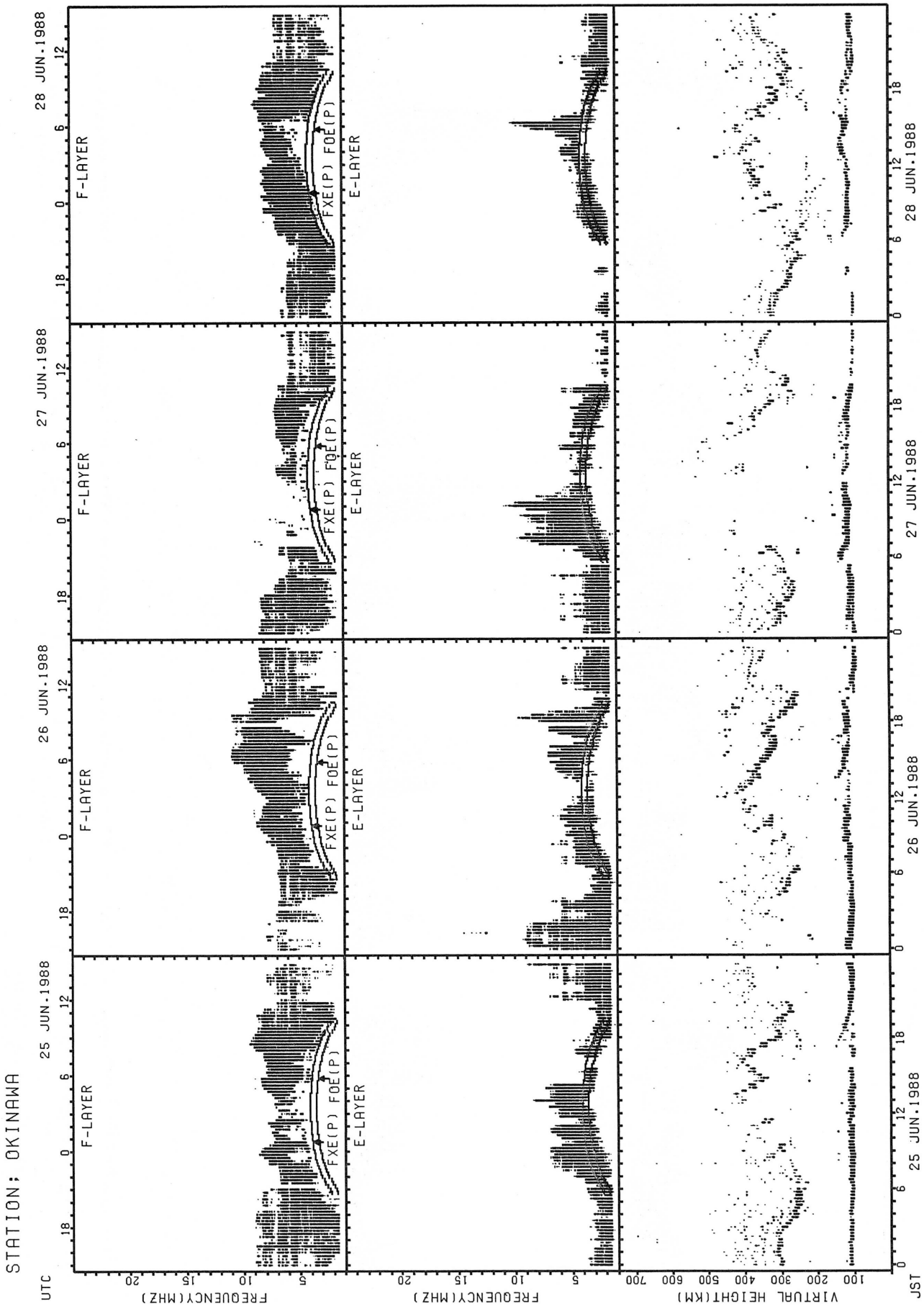
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


STATION; OKINAWA
UTC
17 JUN.1988
18 JUN.1988
19 JUN.1988
20 JUN.1988
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

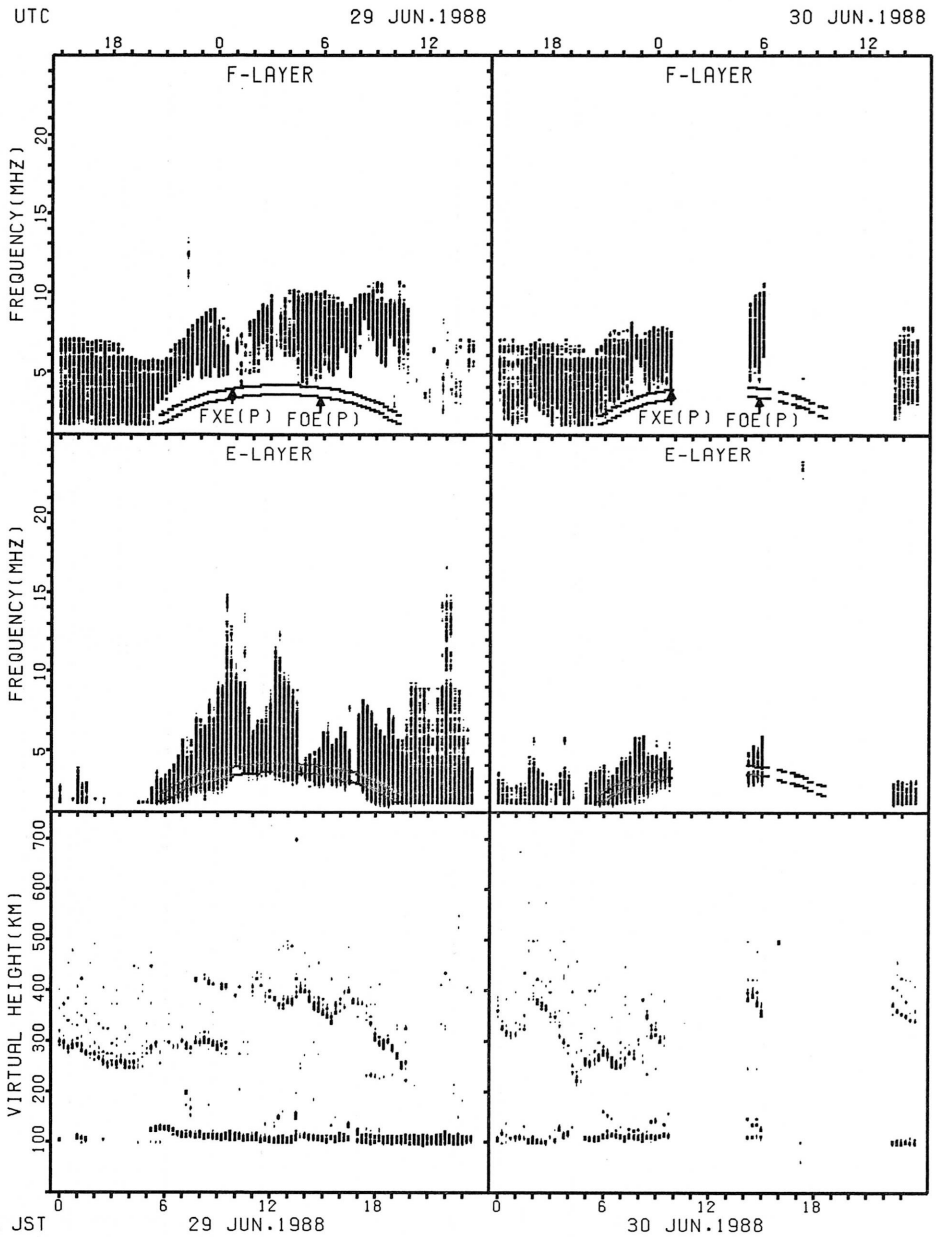
STATION: OKINAWA



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


STATION: OKINAWA
UTC
JST
25 JUN.1988
26 JUN.1988
27 JUN.1988
28 JUN.1988
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

STATION; OKINAWA



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

MONTHLY MEDIANS OF H'F AND H'ES
JUN.1988 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	13	11				10	18											14	13	17	18	20	18	11
MED	354	326				326	313											320	328	306	302	331	316	336
U Q	363	372				350	334											338	338	321	336	353	332	356
L Q	337	236				308	290											36	240	280	290	299	306	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	20	16	16	16	13	30	31	30	27	25	21	16	13		13	22	27	29	29	31	28	30	25	20
MED	111	112	112	115	125	128	125	121	119	117	115	115	117		117	118	123	123	119	119	116	117	113	113
U Q	118	129	115	126	135	133	129	125	123	119	118	120	123		124	125	131	129	125	123	119	119	117	117
L Q	109	109	109	110	117	125	121	119	115	115	111	112	112		110	113	117	119	117	115	113	113	111	111

H'F STATION AKITA LAT. 39.7N LON. 140.1E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							18	17										15	10	10	10			11
MED							305	296										320	302	302	305			334
U Q							318	328										330	328	316	318			348
L Q							262	279										230	220	274	276			328

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	28	29	26	26	22	31	31	31	31	31	29	31	30	30	29	31	30	30	31	29	31	28	29	28
MED	107	107	104	105	107	123	119	117	113	113	113	111	110	113	111	117	119	117	115	113	113	115	113	111
U Q	109	110	107	107	109	125	123	121	117	117	115	117	119	121	125	125	125	119	121	119	119	119	117	114
L Q	105	101	101	103	103	117	115	113	111	109	109	109	109	109	106	107	113	111	111	109	109	111	109	108

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	15	20	20	11	11	12	21	23									12	24	20	21	16	10	10	15
MED	356	331	315	334	346	308	312	292									308	300	294	296	341	341	353	352
U Q	384	370	379	358	368	335	342	336									321	323	320	337	358	354	392	404
L Q	334	297	283	260	274	286	268	274									295	275	269	269	327	314	322	326

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	30	31	30	30	28	30	31	31	31	30	30	30	29	31	31	29	28	30	30	30	31	31	30	31
MED	109	107	106	103	107	121	119	115	111	111	111	111	111	111	117	119	117	117	113	112	111	109	113	111
U Q	113	113	111	109	115	127	125	119	117	113	117	117	118	119	123	125	123	121	117	115	117	115	115	117
L Q	105	103	103	101	103	113	113	113	111	109	107	107	106	107	105	107	110	111	109	109	105	107	107	107

MONTHLY MEDIANS OF H'F AND H'ES

JUN.1988 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

H'F STATION YAMAGAWA LAT. 31.2N LON. 130.6E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	11	18	24	20	14	13	19	21	21									26	20	21	13	10	13	13
MED	382	351	319	319	332	286	276	282	274									311	287	282	310	332	356	360
U Q	400	366	341	365	366	336	304	312	291									324	310	332	349	352	369	376
L Q	354	300	287	308	260	271	266	261	239									300	280	239	284	314	336	343

H'ES

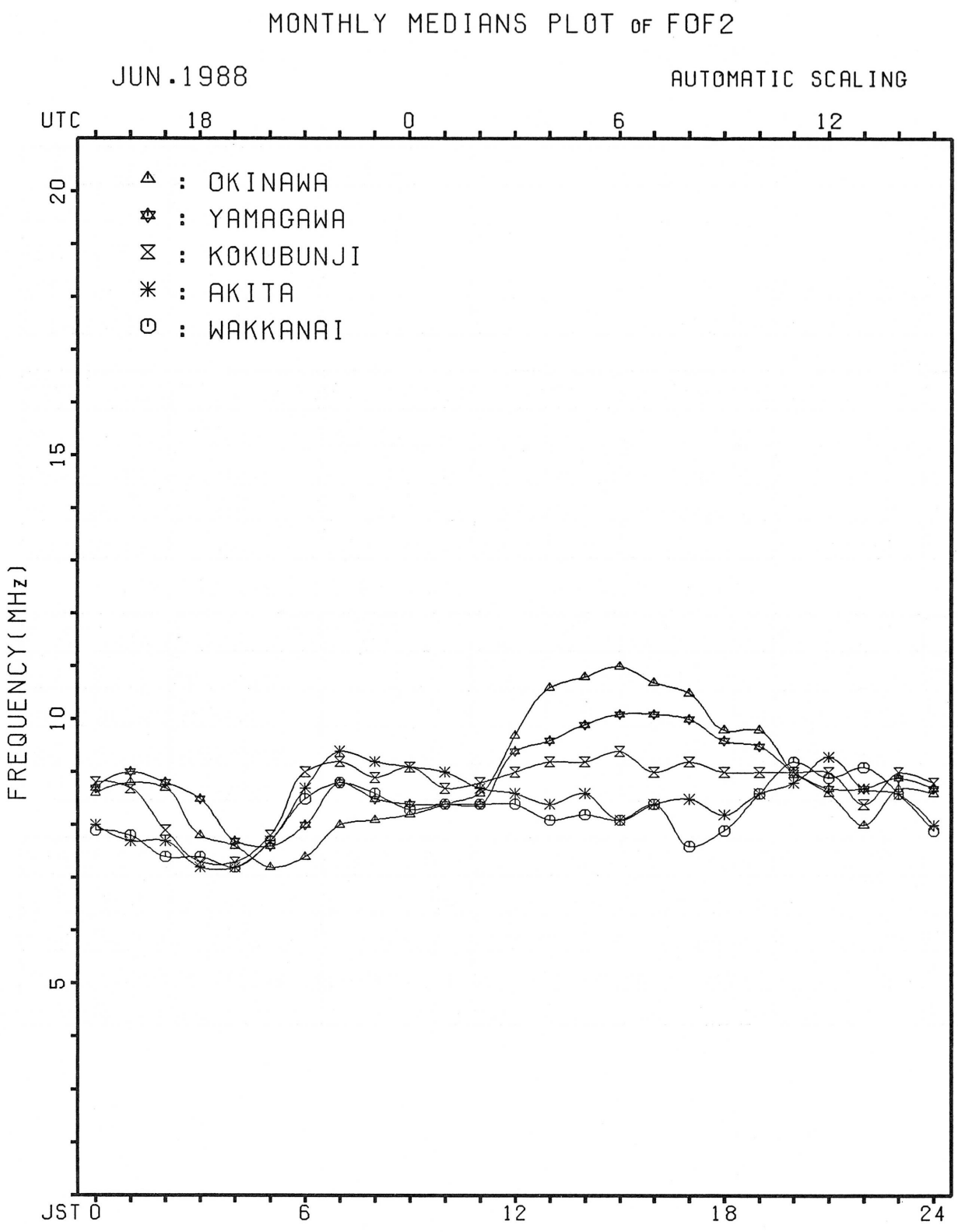
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	28	25	23	23	31	31	31	31	30	31	31	29	29	31	30	31	31	31	29	29	29	28
MED	111	109	109	107	107	109	117	115	115	113	111	113	113	113	113	115	119	119	115	113	111	111	109	110
U Q	117	113	113	109	111	121	125	121	117	117	113	119	119	123	123	127	123	127	119	117	114	113	116	113
L Q	107	105	103	104	101	103	109	113	111	111	109	107	109	107	108	107	109	113	107	105	103	107	104	106

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	14	15	20	17	14		13	19	18									22	25	23	18	12		12
MED	356	336	324	318	303		272	272	283									304	304	296	315	338		379
U Q	362	356	340	331	342		289	302	300									334	321	310	336	377		406
L Q	326	318	297	293	272		259	258	262									296	269	274	284	296		353

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	27	24	23	21	22	25	31	31	31	30	31	30	31	31	31	27	30	31	31	29	28	27	26
MED	107	109	110	107	105	106	111	119	115	113	112	113	118	115	111	117	119	116	115	111	107	109	105	105
U Q	119	113	121	121	118	109	128	131	125	119	119	125	131	135	137	125	131	123	125	115	117	113	111	113
L Q	101	99	103	101	99	101	107	111	113	109	107	109	111	107	107	107	113	113	111	105	103	100	97	99


MONTHLY MEDIANS PLOT OF FOF2
JUN.1988
AUTOMATIC SCALING
UTC
18
0
6
12
△ : OKINAWA
✡ : YAMAGAWA
⧖ : KOKUBUNJI
✳ : AKITA
⊖ : WAKKANAI
FREQUENCY(MHz)
20
15
10
5
JST 0
6
12
18
24

IONOSPHERIC DATA

JUN. 1988 | FXI (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	75	X 75	73	O X 66	X 66															X 86	X 80	X 66	A	84
2	81	66	66	64	61															X 80	X 80	80	82	86
3	90	77	74	74	70															X 88	X 90	X 89	A	80
4	84	X 84	X 76	X 76	X 70															X 98	93	A	93	91
5	91	X 84	X 77	X 72	X 73															X 87	96	96	X 95	91
6	89	90	S	81	X 79															X 86	X 92	X 92	90	X 91
7	89	87	S	S	X 72															O X 94	99	98	98	100
8	X 97	93	S	X 80	X 79															X 95	X 86	88	99	99
9	88	87	88	X 68	68															X 88	X 96	X 100	103	S
10	98	X 92	X 94	X 91	X 83															X 75	X 85	X 84	94	93
11	X 86	89	X 83	X 71	X 69															X 76	X 82	A	86	A
12	A	84	84	82	81	82														X 98	X 95	87	79	A
13	85	83	X 75	X 69	X 68															X 89	X 91	X 92	X 81	X 79
14	78	77	75	73	74															X 62	X 71	X 74	X 71	X 67
15	73	73	73	70	64																A	93	95	X 91
16	86	82	X 79	75	75	80															X 94	X 86	X 78	X 76
17	79	78	71	68	67																X 81	X 83	X 85	X 86
18	X 85	X 87	S	X 77	X 75																X 91	X 92	X 91	X 86
19	X 85	X 84	O X 88	X 90	X 90																X 86	S	97	S
20	87	S	73	76	74																X 69	X 67	X 66	X 61
21	X 66	X 65	X 62	X 59	X 57																X 79	X 64	67	X 69
22	67	X 64	X 61	X 59	X 58																86	87	90	91
23	99	101	S	73	X 59																X 77	X 75	X 76	X 69
24	71	81	71	67	63																X 72	X 72	X 75	X 80
25	X 78	X 71	X 66	X 67	X 63																X 82	X 78	X 81	X 78
26	S 78	80	77	73	70																X 87	X 81	X 81	81
27	84	88	79	67	60																X 64	X 67	74	78
28	73	X 67	66	66	X 64																O X 77	X 80	83	90
29	93	X 88	X 84	C	75																X 78	X 76	76	85
30	83	S	78	78	78																X 86	X 86	X 75	82
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	28	25	28	30	2														14	29	27	28	26
MED	85	84	75	72	X 70	81														X 88	X 86	X 84	82	84
UQ	89	88	X 79	76	X 75															X 94	X 91	X 90	94	91
LQ	78	76	71	X 67	X 64															X 30	X 79	X 76	X 76	X 78

IONOSPHERIC DATA

JUN. 1988 | FOF2 (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F 67	69	F 61	U S 60	60	72	84	76	78	A	62	68	68	73	69	74	73	73	79	80	74	60	A	F 76
2	F 72	F 58	F 57	F 54	F 52	59	83	82	70	68	A	64	70	77	81	86	89	84	75	74	74	F 72	F 72	F 74
3	F	F 64	F 65	F 64	F 62	68	83	87	79	72	81	85	93	91	88	84	84	80	82	82	84	83	A	F 70
4	F	78	U S 70	70	64	65	71	83	81	R 79	78	A	88	87	89	91	88	89	88	92	F 81	A	F 82	F 79
5	F 81	78	71	S 66	67	76	89	92	91	88	82	83	82	83	88	91	89	84	73	81	F 87	F 86	89	F 84
6	F	F 79	J S 79	F 72	73	82	98	105	94	87	A	A	A	A	95	92	83	83	77	80	86	86	F	85
7	F 81	F 77	S	S	U S 66	J R 72	73	80	83	84	87	79	85	91	93	90	84	81	85	88	F 88	F	F 91	F 89
8	91	F 87	S	S 74	73	82	90	86	85	88	A	101	97	94	89	87	94	88	81	89	S 80	F 79	F 85	F 89
9	F 77	F 79	F 81	62	F 60	67	H 77	91	91	89	87	89	93	90	91	H 90	83	84	83	82	90	94	F 95	I S 92
10	F 88	86	88	85	77	73	68	103	J R 90	87	90	86	89	88	88	97	106	102	86	69	S 79	S 78	F 75	F 85
11	80	F 81	S 77	65	63	67	V 78	75	79	79	A	A	A	A	71	A	A	A	A	70	76	A	F	A
12	A	F 74	F 77	F 74	F 71	F 74	87	85	85	81	82	87	95	87	82	83	74	77	80	92	89	F 79	F	A
13	F 78	F 72	69	63	62	S 69	91	83	74	73	75	77	A	86	92	82	81	84	77	83	85	86	75	73
14	F 67	F	F 65	F 61	F 60	71	81	82	69	64	A	63	67	74	78	84	91	I C 69	64	56	65	68	65	61
15	F 59	F 62	F 63	F 59	F 54	68	97	88	78	A	64	A	82	85	84	88	90	90	87	78	A	F 81	F 82	85
16	F 77	F 72	73	F	F	F 71	82	83	84	77	79	78	81	87	91	92	88	80	79	82	88	80	72	70
17	F 70	F 69	F 64	F 58	F 60	70	73	A	A	A	61	66	70	69	72	80	90	92	R 94	103	75	77	79	80
18	79	81	I S 75	71	69	75	88	V 95	80	62	71	73	81	85	83	81	82	87	95	89	85	86	J S 85	80
19	79	78	U S 82	84	84	79	70	73	A	68	78	78	74	72	78	75	73	66	A	79	80	I S 76	F 86	I S 78
20	F 76	I S 73	F 62	F 67	F 64	70	75	76	63	V 57	51	A	R 63	64	67	67	61	63	67	A	63	61	60	55
21	60	59	56	53	51	59	J R 66	62	67	71	A	68	A	V 67	61	63	65	72	84	92	73	58	F 59	63
22	F 58	58	55	53	52	57	70	82	75	78	76	A	78	V 74	75	74	80	82	90	86	F 74	F 74	F	F
23	F 88	F 89	S	F 63	53	56	60	71	93	U A 83	61	53	61	73	77	70	70	76	83	83	71	69	70	63
24	F 59	F 71	F 61	F 57	F 53	58	76	A	88	74	60	R 65	U A 63	A	I R 71	74	77	84	84	J S 80	66	66	J S 69	74
25	72	65	60	61	57	65	89	73	58	60	65	59	55	58	61	59	62	62	69	78	76	72	75	72
26	S 72	F 71	F 70	F 62	F	69	85	81	80	85	82	82	83	88	92	U A 82	78	89	86	83	81	75	75	F 73
27	F 75	F 79	F 63	J F 58	F 50	51	54	54	65	59	E G 47	A	E G 49	54	57	60	59	54	55	54	58	61	F 65	F
28	F 65	61	F 59	F 57	58	61	67	69	61	A	A	62	62	67	66	69	69	A	70	72	S 71	74	F 73	F 81
29	F 83	82	78	I C 66	F 64	68	I S 78	74	76	80	79	65	70	R 73	75	67	67	I C 74	75	79	72	70	F 66	F 75
30	F 74	I S 69	F	F 69	F 66	67	74	68	66	U R 56	61	61	A	74	71	76	72	69	72	79	80	80	69	F 73
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	29	26	28	29	30	30	28	28	26	23	23	25	27	30	29	29	28	28	29	29	27	24	26
MED	F 76	F 73	67	63	62	68	78	82	79	78	76	73	78	77	80	82	81	82	80	81	79	76	75	76
UQ	F 80	F 79	77	70	66	72	87	86	85	84	82	82	85	87	89	88	88	86	86	86	85	80	F 84	F 84
LQ	F 67	F 69	F 61	F 58	F 57	65	71	74	70	68	62	64	67	72	71	74	72	72	74	78	73	70	69	72

JUN. 1988 | FOF2 (0.1 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

JUN. 1988 | FOF1 (0.01 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							L 460		470	A	510	A	A	500	520	490	480	L 450	L					
2							A	L 460	480	L 520	A	520	530	U A 520	U A 520	500	A	L 430	A					
3						L	L	A	A	A	510	530	530	520	520	A	L 470	L 450	L					
4								L	A	A	520	A	U A 560	520	520	490	470	L	A					
5						L	A	A	A	A	520	A	L 540	550	520	500	470	410	A					
6						L	A	L	A	A	A	A	A	A	530	520	L 470	L 470	L					
7							L	A	L	A	A	A	540	510	510	500	A	A	A					
8							L	L	A	530	A	A	530	U A 540	510	510	470	L 440	A					
9								L	A	L 610	L 560	U A 520	530	530	520	530	L 470	A	A					
10						L	L	L	A	560	L	L 540	520	L 570	A	A	A	A						
11								A	A	U A 530	A	A	A	A	U A 550	A	A	A	A					
12						A	A	A	A	L 550	A	530	510	500	U A 520	A	L	460	A					
13						L	A	A	A	A	A	A	A	U A 530	510	A	490	L 420	A					
14						L	L 450		A	U A 550	A	500	A	A	470	460	A	C	A					
15						L	A	A	A	A	A	A	A	520	H 500	480	A	410	A					
16							L	470	480	A	A	510	510	490	490	480	450	L 420	A					
17						A	A	A	A	A	A	A	A	510	510	480	450	A	A					
18						L	U L 450	A	A	L 550	510	A	A	490	500	480	L 460	450	A					
19							A	L	A	A	U A 520	A	U A 530	A	490	510	A	A	A					
20						A	L 390	430	U A 460	A	490	A	480	490	460	470	440	430	A	A				
21						L	L	L	L 520	A	A	480	A	490	480	470	L 470	420	360					
22						A	L 410	440	A	A	470	A	490	A	490	470	A	420	L 380					
23							410	460	L 500	A	490	510	U A 520	490	480	A	A	420	L	A				
24						L	A	A	A	A	H 530	A	A	A	A	490	A	420	L 370					
25						L 340	400	450	490	480	A	500	U A 480	A	A	A	A	A	A	A				
26							L	L	A	A	A	U A 530	510	U A 540	520	A	A	A	A	A				
27						320	A	430	450	A	470	A	490	U A 490	470	A	U A 460	L	U L 400	A				
28							410	460	540	A	A	L 520	530	A	U A 510	500	L 490	A	A					
29							L	A	480	A	520	L 530	530	510	510	500	470	C	A	A				
30						A	A	A	470	A	510	490	A	510	H 490	L	460	L 440	L	A				
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						2	6	10	11	9	14	14	19	22	27	20	17	17	4					
MED						330	410	455	480	550	510	520	530	510	510	490	470	430	L 375					
UQ							L 410	460	495	L 550	520	530	530	530	520	500	470	L 450	L 390					
LQ							400	440	470	530	490	500	510	490	490	480	460	420	365					

JUN. 1988 | FOF1 (0.01 MHZ)

IONOSPHERIC DATA

JUN. 1988 | 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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1						200	275	325	345	370	A	A	A	A	370	355	330	290	230					
2						A	250	A	A	A	A	A	395	390	380	360	330	295	225					
3						195	275	320	355	A	375	A	A	A	A	375	U A 330	A	A					
4						A	A	A	A	A	A	A	A	A	390	365	A	A	A					
5						A	270	315	345	A	A	A	A	A	A	A	A	305	210					
6						B	U A 230	320	350	U A 360	A	A	A	395	385	370	340	A	A					
7						B	285	320	350	375	390	390	A	A	A	375	335	290	230					
8						205	275	315	335	360	A	A	A	395	380	365	320	285	A					
9						A	270	335	A	A	A	A	R	A	390	370	345	300	210					
10						A	265	320	355	A	A	A	A	A	A	A	A	A	A					
11						A	260	305	335	A	A	A	A	A	A	365	335	A	A					
12						A	A	A	A	A	A	A	A	A	A	A	330	280	205					
13						A	A	A	A	A	U A 380	A	A	A	A	A	A	A	A					
14						200	270	320	345	355	A	370	A	A	A	A	A	C	A					
15						195	270	310	335	U A 340	365	A	A	A	380	360	320	280	215	S				
16						B	A	A	A	A	380	385	390	380	A	345	325	280	220	B				
17						185	260	310	335	355	360	370	A	A	A	A	A	A	B	B				
18						205	265	310	A	A	A	A	A	U A 380	370	355	330	300	A	B				
19						A	270	315	340	355	365	380	390	385	370	350	325	280	205	B				
20						A	250	305	340	350	360	A	A	375	U A 365	A	A	275	205	S				
21						A	250	295	325	350	370	A	A	A	A	A	A	275	A	B				
22						A	255	300	A	350	A	A	A	A	A	A	A	270	225	B				
23						U A 200	265	300	345	360	370	385	A	380	365	A	330	290	A	B				
24						195	275	310	340	360	380	A	A	B	B	A	A	290	A	B				
25						195	A	A	A	A	A	A	395	395	380	365	B	295	A	B				
26						210	265	320	350	370	380	390	390	390	390	365	335	285	A	B				
27						200	275	320	360	380	390	395	405	400	385	370	340	290	A	B				
28						200	295	325	355	360	A	A	A	A	A	B	345	300	230	B				
29						A	280	330	360	A	B	A	A	385	U A 390	A	U A 335	C	A	B				
30						190	290	A	350	A	370	A	A	A	380	365	335	290	235	B				
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						14	25	23	21	16	14	8	6	12	16	17	19	21	13					
MED						200	270	315	345	360	372	385	392	388	380	365	330	290	220					
UQ						200	275	320	350	365	380	390	395	395	383	370	335	295	230					
LQ						195	265	310	340	352	365	375	390	380	370	360	330	280	210					

JUN. 1988 | FOE (0.01 MHZ)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

JUN. 1988 | FOES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	JA 61	JA 65	JA 54	EB 14	EB 15	24	JA 38	JA 112	JA 57	71	42	74	JA 70	47	G	G	G	34	JA 50	JA 44	JA 85	JA 123	JA 85	JA 61
2	JA 38	JA 50	JA 28	JA 44	JA 26	26	JA 74	JA 42	JA 40	47	JA 72	JA 54	44	53	54	45	JA 81	JA 40	50	20	JA 23	JA 53	JA 68	JA 76
3	JA 67	JA 85	JA 44	JA 40	JA 33	25	33	JA 64	JA 78	64	JA 74	JA 78	JA 98	JA 51	JA 43	JA 68	JA 49	33	JA 43	JA 65	JA 54	JA 60	JA 82	JA 42
4	JA 78	JA 61	23	JA 42	JA 26	28	44	JA 54	JA 61	JA 54	JA 48	92	JA 73	JA 57	42	43	39	44	JA 86	JA 72	JA 76	JA 105	JA 35	JA 44
5	JA 50	JA 51	JA 31	JA 28	JA 51	JA 33	JA 87	JA 56	JA 76	JA 107	60	JA 95	JA 89	JA 82	JA 50	JA 51	JA 47	JA 66	JA 124	JA 117	JA 144	JA 58	JA 51	JA 41
6	JA 41	JA 34	JA 44	JA 29	JA 32	23	JA 52	JA 50	JA 75	JA 62	107	107	115	JA 127	45	JA 56	44	34	27	JA 31	JA 23	JA 52	JA 76	JA 79
7	JA 51	JA 40	30	22	22	23	36	JA 58	JA 54	JA 61	JA 57	JA 59	JA 51	JA 54	44	44	JA 79	JA 88	JA 57	JA 92	JA 105	JA 58	JA 53	JA 52
8	JA 38	JA 36	JA 40	JA 36	JA 21	27	36	39	JA 78	JA 73	JA 97	JA 99	JA 71	JA 57	G	G 32	39	JA 48	47	JA 51	JA 86	JA 82	JA 88	JA 78
9	JA 33	JA 26	20	JA 28	JA 26	JA 24	G 20	JA 51	JA 76	JA 54	JA 50	JA 53	JA 53	JA 49	45	JA 53	JA 53	JA 58	JA 130	JA 51	JA 41	JA 50	JA 76	JA 41
10	JA 27	JA 26	JA 30	JA 23	25	25	32	46	JA 128	JA 49	JA 57	JA 68	JA 62	JA 82	JA 66	82	75	56	JA 39	JA 30	JA 29	JA 52	JA 49	JA 30
11	JA 22	JA 27	JA 25	JA 27	JA 24	JA 31	JA 37	JA 56	JA 71	62	D D 250	D D 250	JA 136	144	JA 83	JA 88	JA 228	211	JA 116	JA 157	JA 81	JA 88	JA 87	JA 142
12	JA 92	JA 65	JA 45	JA 65	JA 30	JA 52	JA 85	JA 169	JA 131	JA 87	JA 92	JA 61	JA 54	JA 50	JA 66	JA 118	JA 47	JA 43	JA 73	43	JA 70	JA 85	JA 87	JA 86
13	JA 116	JA 50	JA 27	JA 24	JA 24	JA 29	JA 69	JA 80	JA 76	JA 73	JA 66	76	91	JA 56	JA 53	JA 71	JA 59	JA 54	JA 58	JA 53	JA 44	JA 43	JA 44	JA 52
14	JA 52	JA 32	33	JA 23	JA 27	24	29	JA 42	JA 58	JA 64	84	50	JA 62	JA 71	JA 42	JA 44	JA 75	C	JA 55	JA 31	JA 31	JA 28	24	JA 74
15	JA 52	JA 74	JA 61	JA 43	JA 23	23	JA 48	JA 54	JA 57	80	JA 61	JA 87	JA 127	JA 46	40	JA 78	JA 57	JA 44	JA 36	JA 71	JA 100	JA 103	JA 34	26
16	JA 78	JA 54	JA 28	JA 72	JA 53	JA 52	JA 41	JA 52	JA 53	JA 58	JA 76	JA 54	JA 60	43	JA 51	G 29	JA 48	43	JA 65	JA 53	JA 83	JA 50	JA 51	JA 72
17	JA 62	JA 61	JA 43	JA 30	JA 38	JA 42	JA 47	77	83	70	53	JA 55	JA 60	45	44	JA 51	JA 45	JA 71	JA 42	JA 55	JA 104	JA 51	JA 38	JA 44
18	JA 52	JA 32	JA 48	JA 40	JA 23	G	33	JA 50	JA 86	JA 57	JA 55	JA 61	JA 68	JA 69	43	G	36	JA 45	52	JA 53	JA 55	JA 54	54	JA 51
19	60	JA 51	JA 41	JA 50	JA 26	JA 26	JA 49	JA 55	JA 95	JA 77	JA 96	84	JA 57	JA 71	JA 71	JA 75	JA 182	JA 118	77	JA 74	JA 58	JA 53	JA 77	JA 66
20	JA 74	JA 67	JA 79	JA 54	JA 35	JA 52	37	JA 85	JA 55	JA 58	JA 85	JA 68	39	45	39	39	JA 38	35	JA 51	JA 117	JA 36	JA 26	JA 50	39
21	JA 44	JA 41	JA 32	JA 34	JA 16	JA 26	37	JA 47	JA 74	JA 71	JA 101	JA 47	JA 77	43	37	JA 39	JA 41	JA 50	JA 35	28	JA 33	JA 42	JA 51	JA 61
22	JA 36	JA 59	JA 24	JA 23	JA 27	JA 36	JA 40	37	JA 69	JA 64	JA 76	JA 118	JA 53	JA 84	JA 54	JA 54	JA 54	JA 51	26	JA 24	JA 78	JA 75	JA 89	JA 78
23	JA 100	JA 54	JA 29	JA 22	EB 13	JA 36	39	JA 77	JA 125	JA 33	JA 48	JA 53	JA 100	JA 120	44	JA 52	JA 56	JA 50	JA 51	JA 43	JA 51	JA 51	JA 67	JA 62
24	JA 39	JA 41	JA 53	JA 31	JA 38	JA 48	JA 53	87	JA 74	JA 52	JA 50	50	JA 72	94	55	47	JA 56	JA 62	JA 54	JA 63	JA 51	JA 26	26	JA 32
25	JA 25	23	JA 17	JA 36	23	25	JA 29	43	39	JA 53	JA 88	JA 51	55	JA 59	JA 62	JA 64	JA 62	JA 68	60	JA 53	JA 61	JA 58	JA 51	JA 97
26	57	JA 81	JA 63	JA 39	55	JA 26	30	JA 52	JA 60	JA 83	JA 92	JA 55	43	JA 58	46	JA 92	JA 86	JA 49	JA 54	JA 51	JA 43	JA 49	JA 62	JA 44
27	JA 42	JA 51	JA 29	JA 52	JA 52	23	JA 43	37	JA 50	JA 69	41	47	45	52	47	54	47	JA 41	JA 35	JA 45	JA 72	JA 51	JA 42	JA 51
28	JA 52	JA 41	JA 38	JA 27	JA 21	JA 24	37	JA 51	JA 69	81	JA 175	JA 51	JA 49	JA 67	JA 53	EB 39	36	JA 102	JA 40	JA 48	JA 30	JA 61	JA 51	JA 50
29	57	JA 47	JA 51	C	JA 29	JA 25	38	JA 49	JA 120	JA 93	49	JA 51	JA 45	G	JA 47	JA 51	JA 52	C	JA 53	JA 141	JA 28	JA 24	JA 39	JA 65
30	JA 64	JA 52	59	JA 26	JA 37	JA 37	JA 50	JA 49	44	56	42	JA 52	JA 105	JA 62	44	43	35	35	JA 37	JA 35	JA 40	JA 52	JA 72	JA 81
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	29	30	30	30	30	30	30	30	30	30	30	30	30	30	28	30	30	30	30	30	30
MED	JA 52	JA 50	JA 36	JA 31	JA 26	JA 26	JA 38	JA 52	JA 72	JA 64	JA 69	JA 60	JA 62	JA 57	46	JA 51	JA 50	JA 50	JA 52	JA 52	JA 54	JA 52	JA 52	JA 56
UQ	JA 64	JA 61	JA 48	JA 42	JA 35	JA 36	JA 49	JA 64	JA 78	JA 77	JA 92	JA 84	JA 89	JA 71	JA 54	JA 68	JA 62	JA 64	JA 60	JA 71	JA 81	JA 61	JA 76	JA 76
LQ	JA 39	JA 36	JA 28	JA 26	JA 23	24	36	JA 48	JA 57	JA 57	JA 50	JA 52	JA 53	49	43	43	41	42	JA 40	JA 43	JA 36	JA 50	JA 44	JA 44

JUN. 1988 | FOES (0.1 MHZ)

IONOSPHERIC DATA

JUN. 1988 | FBES (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	48	48	E S 14	E B 14	E B 15	G	30	38	42	A A 71	41	64	57	38	G	G	G	31	33	37	60	50	A A 85	E B 15
2	31	27	20	22	17	20	60	36	35	39	A A 72	40	44	52	52	39	64	G	41	18	17	E B 15	18	44
3	47	48	25	24	24	24	31	51	69	53	43	43	43	39	40	64	37	30	30	25	41	50	A A 82	24
4	43	E B 14	16	22	19	23	29	40	50	54	46	A A 92	56	51	42	40	37	41	41	51	33	A A 105	E B 13	17
5	16	19	28	19	24	26	76	46	57	50	47	68	47	51	42	36	36	39	64	57	E B 14	41	E B 15	18
6	27	24	28	20	23	22	51	41	67	62	A A 107	A A 107	A A 115	A A 127	41	45	40	33	24	31	18	47	66	24
7	30	17	19	E B 14	E S U Y 16	23	32	48	48	57	55	56	46	46	42	42	73	64	55	69	45	40	36	26
8	21	20	26	23	16	25	34	36	63	40	A A 97	64	48	54	G	G 32	37	34	37	22	U S 45	23	46	51
9	18	17	E B 13	22	16	22	G 19	36	51	47	48	52	48	42	42	41	37	47	49	48	20	50	20	20
10	18	16	19	18	16	21	28	38	81	45	51	47	46	44	63	73	73	46	32	29	22	43	19	18
11	E B 14	E B 14	18	23	17	19	31	48	67	53	A A 250	A A 250	A A 136	A A 144	55	A A 88	A A 228	A A 211	A A 116	51	63	A A 88	59	A A 142
12	A A 92	49	20	22	E B 13	38	74	55	53	45	65	46	43	45	52	63	37	38	57	32	49	60	29	A A 86
13	50	16	E B 13	E B 14	16	25	55	56	63	62	58	66	A A 91	53	43	67	43	28	40	47	33	33	27	35
14	25	23	24	18	17	23	21	35	51	55	A A 84	46	60	65	39	36	67	C	55	26	27	28	17	26
15	18	30	32	20	E S 17	21	43	46	47	A A 80	57	A A 87	65	41	40	37	50	33	34	39	A A 100	39	31	E B 14
16	38	E B 14	E B 14	18	27	37	30	32	38	54	58	45	41	40	39	G 29	G	38	56	22	65	26	33	39
17	49	E B 15	21	22	25	39	44	A A 77	A A 83	A A 70	52	U A 51	53	43	40	42	41	61	36	48	40	35	22	18
18	36	E B 13	18	19	19	G	G	47	73	48	46	56	64	38	45	G	35	39	41	52	55	38	31	28
19	46	34	29	42	19	20	43	41	A A 95	64	52	74	54	65	44	41	70	50	A A 77	24	41	31	44	30
20	34	U S 67	52	32	24	44	32	37	46	53	42	A A 68	39	39	39	37	33	31	39	A A 117	21	22	26	23
21	28	20	23	21	E B 14	20	29	42	44	50	A A 101	40	A A 77	40	U Y 36	35	33	G 25	23	20	27	E B 14	21	E B 15
22	24	38	18	E B 14	E B 14	30	36	34	49	54	44	A A 118	43	63	47	38	52	37	25	17	25	54	42	55
23	61	39	16	19	E B 13	20	34	37	46	55	41	44	52	42	39	44	51	39	35	39	34	25	47	45
24	25	29	18	19	26	24	47	A A 87	74	50	41	50	U A 56	A A 94	55	43	49	30	28	31	39	E B 14	E B 15	21
25	16	E B 14	E B 13	26	E B 13	23	29	39	34	41	55	47	48	52	50	54	51	53	58	26	33	41	E B 15	53
26	45	17	39	18	22	G 16	28	41	52	68	69	53	42	54	44	U A 64	73	42	52	45	41	36	32	18
27	20	23	21	30	22	22	39	34	37	53	41	A A 47	42	49	43	52	46	38	32	27	47	24	25	E B 15
28	26	19	23	24	17	22	32	40	49	A A 81	A A 175	46	41	63	51	E B 39	35	A A 102	39	19	24	22	20	24
29	26	E B 14	20	C	20	G 16	30	41	40	73	49	43	43	G	39	40	42	C	37	59	21	19	34	48
30	43	40	41	16	18	34	46	47	40	51	40	42	A A 105	40	40	39	G	32	25	25	32	33	38	55
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	29	30	30	30	30	30	30	30	30	30	30	30	30	30	28	30	30	30	30	30	30
MED	29	20	20	20	17	22	32	41	50	54	52	52	43	48	42	40	42	38	39	32	34	36	30	25
UQ	45	34	26	23	22	25	44	47	67	62	69	68	60	54	48	52	52	46	55	48	45	47	42	45
LQ	21	16	18	18	E E 16	20	29	37	44	50	44	46	43	40	39	36	36	32	32	25	24	24	20	18

JUN. 1988 | FBES (0.1 MHZ)

IONOSPHERIC DATA

JUN. 1988 | FMIN (0.1 MHZ) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	13	13	14	14	15	14	16	15	18	22	21	23	22	30	22	23	20	16	17	13	15	15	15	15
2	14	14	14	13	13	14	14	15	18	32	22	25	22	24	21	20	18	17	15	13	13	15	16	15
3	15	14	13	15	14	15	15	17	22	21	26	22	24	26	23	20	17	18	13	14	13	14	13	14
4	14	14	14	13	15	14	16	16	17	31	25	32	27	27	33	21	32	23	15	15	13	14	13	13
5	14	14	14	14	13	15	16	16	16	21	25	32	30	23	23	20	17	15	15	15	14	15	15	15
6	14	13	14	13	13	16	16	15	18	23	19	24	31	28	26	21	18	17	16	14	14	13	15	15
7	14	14	13	14	ES 17	17	15	16	13	22	23	26	26	27	24	22	18	16	16	14	13	14	13	14
8	13	13	14	18	13	15	14	17	18	19	24	25	24	25	24	20	17	16	16	13	15	13	15	15
9	13	13	13	13	14	13	16	16	18	18	21	24	25	24	18	21	16	16	14	14	14	14	13	14
10	15	13	13	14	14	14	17	17	18	27	28	30	33	25	35	22	18	15	14	14	14	15	15	14
11	14	14	13	14	13	13	15	15	16	21	18	26	20	21	21	18	18	15	13	14	14	15	14	16
12	14	14	12	13	13	14	15	17	17	20	21	22	26	21	21	20	16	17	14	13	13	14	14	15
13	16	14	13	14	14	18	14	14	16	21	20	20	22	24	21	21	18	15	13	14	13	15	13	16
14	15	14	13	14	14	13	17	17	16	18	22	21	23	21	24	20	18	C	14	15	16	13	14	15
15	13	15	14	13	ES 17	13	15	16	16	20	26	22	23	24	25	18	20	14	14	ES 18	14	14	14	14
16	15	14	14	13	13	15	16	17	23	19	18	21	23	21	22	18	17	14	14	15	14	14	14	15
17	15	15	13	13	14	13	13	14	17	18	25	24	28	33	24	17	16	15	18	13	13	15	15	13
18	14	13	14	13	14	14	14	16	20	19	23	26	22	25	22	19	17	22	16	13	14	13	ES 18	14
19	16	15	14	15	13	14	14	16	16	17	18	21	22	25	19	20	17	16	14	15	13	17	13	14
20	14	17	14	13	13	14	16	16	19	21	17	21	35	20	18	24	18	15	13	ES 16	15	15	16	14
21	15	13	13	13	14	14	14	16	19	19	29	21	23	25	32	22	18	15	13	15	13	14	15	15
22	15	13	13	14	14	13	16	16	25	22	27	22	24	28	24	22	19	15	14	15	14	14	15	14
23	14	14	14	13	13	13	14	18	22	20	25	24	21	25	26	19	20	16	16	17	13	15	15	15
24	16	14	13	13	13	13	15	22	21	19	22	23	24	40	43	32	18	17	14	14	15	14	15	16
25	14	14	13	14	13	14	15	19	17	21	26	25	32	30	27	21	36	15	21	16	13	15	15	15
26	15	13	14	15	14	14	14	17	20	25	24	32	28	26	25	21	18	15	16	15	14	16	15	14
27	14	13	13	14	13	14	15	18	21	23	27	29	33	32	29	32	19	15	14	13	14	13	13	15
28	15	14	14	14	14	14	18	16	18	32	24	34	31	32	34	39	22	17	17	14	14	14	15	15
29	15	14	13	C	14	13	13	18	18	23	39	34	33	30	23	18	17	C	15	15	15	14	14	13
30	13	17	13	13	13	15	18	19	18	36	24	33	36	26	26	23	18	16	15	13	14	13	15	15
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	29	30	30	30	30	30	30	30	30	30	30	30	30	30	23	30	30	30	30	30	30
MED	14	14	13	14	14	14	15	16	18	21	24	24	24	25	24	21	18	16	14	14	14	14	15	15
UQ	15	14	14	14	14	15	16	17	20	23	26	29	31	28	26	22	19	17	16	15	14	15	15	15
LQ	14	13	13	13	13	13	14	16	17	19	21	22	23	24	22	20	17	15	14	13	13	14	14	14

JUN. 1988 | FMIN (0.1 MHZ)

IONOSPHERIC DATA

JUN. 1988 | 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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F 270	275	285	F U S 305	280	305	295	290	315	A	245	A	285	285	270	235	290	285	305	305	315	A	A	F 285
2	F 295	F 305	F 290	F 285	F 300	305	310	325	315	280	A	265	260	275	285	285	295	295	315	300	290	F 285	F 290	F 285
3	F	F 290	F 295	F 300	F 305	310	325	315	290	295	285	270	280	285	280	285	295	285	295	290	285	300	A	F 295
4	F	300	U S 315	300	305	325	315	320	305	R 295	270	A	275	280	280	285	285	285	300	300	F 280	A	F 285	F 290
5	F 285	290	300	S 285	280	290	290	315	285	290	285	275	270	265	270	290	300	315	A	280	F 290	F 280	285	F 295
6	F	F 285	J S 290	F 290	290	290	290	305	315	275	A	A	A	A	280	285	300	290	290	280	280	285	F	275
7	F 285	F 285	S	S	U S 305	J R 315	310	305	285	290	300	295	265	270	285	280	275	295	290	A	F 285	F	F 280	F 280
8	285	F 280	S	S 285	285	305	315	305	270	275	A	270	270	270	275	280	290	300	300	290	S 290	F 270	F 270	F 280
9	F 285	F 295	F 315	315	F 295	290	H 300	285	295	265	265	275	280	285	275	H 285	285	285	290	290	285	285	F 285	I S 280
10	F 280	270	280	290	310	290	320	295	J R 300	270	275	265	285	265	270	270	285	305	310	290	S 275	S 280	F 280	F 285
11	290	F 290	S 290	290	300	305	V 300	290	A	270	A	A	A	A	270	A	A	A	A	285	270	A	F	A
12	A	F 285	F 290	F 295	F 305	F 300	285	285	285	265	275	275	285	285	280	290	285	275	285	285	295	F 300	F	A
13	F 290	F 300	295	290	285	S 295	305	305	320	310	260	280	A	275	285	315	280	305	305	295	285	295	305	285
14	F 290	F	F 280	F 290	F 295	315	290	295	300	255	A	250	255	255	265	265	305	I C 300	A	290	270	285	290	275
15	F 270	F 290	F 290	F 280	F 290	275	300	315	320	A	285	A	280	270	285	280	295	300	315	305	A	F 285	F 280	285
16	F 295	F 295	300	F	F	F 295	310	300	295	280	280	285	265	265	275	290	290	295	290	290	290	315	285	290
17	F 270	F 295	F 305	F 285	F 290	315	320	A	A	A	290	270	285	275	280	265	285	285	R 290	315	285	280	270	275
18	280	295	I S 300	305	285	290	285	V 310	A	255	290	270	285	290	290	285	295	290	290	300	285	275	J S 280	280
19	270	275	U S 295	295	310	335	300	305	A	A	280	A	285	A	270	295	A	295	A	285	280	I S 285	F 290	S
20	F 285	S	A	F 290	F 300	285	285	310	285	A	220	A	R 265	260	285	300	285	295	295	A	315	285	290	280
21	275	300	290	300	305	315	J R 305	305	320	330	A	305	A	V 295	295	285	285	300	315	325	340	300	F 305	305
22	F 305	305	310	310	305	315	330	305	325	285	300	A	285	A	285	280	285	285	295	310	F 295	F 285	F	F
23	F 285	F 310	S	F 300	315	320	305	285	300	A	320	255	235	280	290	285	295	295	290	315	305	290	285	280
24	F 290	F 305	F 315	F 295	F 305	290	290	A	310	285	220	R 270	A	A	R	270	270	290	305	J S 325	285	275	J S 280	285
25	280	275	275	285	280	275	305	320	220	275	280	265	235	245	265	A	270	A	285	295	290	260	270	270
26	S 285	F 290	F 295	F 285	F 290	280	310	320	285	295	300	270	275	280	280	A	A	285	300	310	295	290	285	F 280
27	F 275	F 295	F 315	J F 310	F 300	265	245	240	285	A	G	A	G	220	250	280	285	275	275	300	A	275	F 270	F
28	F 275	280	F 280	F 280	290	295	310	305	245	A	A	255	245	A	270	275	230	A	290	295	S 295	285	F 275	F 280
29	F 290	290	300	I C 300	F 300	305	I S 300	300	290	A	305	290	265	R 280	285	285	265	I C 280	305	305	295	280	F 250	F 275
30	F 285	S	F	F 300	F 305	305	305	280	295	U R 230	280	265	A	285	280	285	290	280	290	300	285	290	280	F 270
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	27	25	28	29	30	30	28	26	21	23	21	24	24	29	27	27	27	26	28	28	26	24	25
MED	F 285	F 290	295	292	300	302	305	305	295	280	280	270	272	275	280	285	285	290	295	298	288	285	282	280
UQ	F 290	F 298	300	300	305	315	310	312	315	290	290	275	285	285	285	285	295	298	305	305	295	290	288	F 285
LQ	F 275	285	F 290	F 285	290	290	290	292	285	270	268	265	262	265	270	280	285	285	290	290	285	280	F 278	280

JUN. 1988 | M(3000)F2 (0.01)

IONOSPHERIC DATA

JUN. 1988 | M(3000)F1 (0.01) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							L 375		360	A	395	A	A	395	375	390	375	L 370	L					
2							A	L 365	L 390	L 395	A	405	365	A	A	375	A	L 380	A					
3						L	L	A	A	A	395	370	380	385	395	A	L 385	L 375	L					
4								L	A	A	360	A	A	A	395	365	365	L	A					
5						L	A	A	A	A	A	A	L 345	A	365	375	375	A	A					
6						L	A	L	A	A	A	A	A	A	365	A	A	L 355	L					
7							L	A	L	A	A	A	355	350	360	350	A	A	A					
8							L	L	A	395	A	A	A	A	400	390	375	L 365	A					
9								L	A	L 340	A	A	A	375	380	365	L 375	A	A					
10						L	L	L	A	365	L	L 365	370	L 360	A	A	A	A						
11								A	A	A	A	A	A	A	A	A	A	A	A					
12						A	A	A	A	L 335	A	A	385	A	A	A	L	345	A					
13						L	A	A	A	A	A	A	A	A	A	A	A	L 375	A					
14						L	L	370	A	A	A	A	A	A	390	370	A	C	A					
15						L	A	A	A	A	A	A	A	365	H 395	385	A	370	A					
16							L	395	395	A	A	A	395	395	385	395	395	A	A					
17						A	A	A	A	A	A	A	A	395	390	A	A	A	A					
18						L	U L 390	A	A	L 340	360	A	A	385	A	395	L 385	A	A					
19							A	L	A	A	A	A	A	A	A	350	A	A	A					
20						A	L 350	A	A	A	365	A	400	385	395	380	390	365	A	A				
21						L	L	L	L 380	A	A	400	A	415	415	395	L 390	370	365					
22						A	A	400	A	A	A	A	380	A	A	380	A	A	L 360					
23							375	A	A	A	380	395	A	370	375	A	A	A	L	A				
24						L	A	A	A	A	H 365	A	A	A	A	A	A	355	L 360					
25						L 340	360	A	395	380	A	A	A	A	A	A	A	A	A	A				
26							L	L	A	A	A	A	395	A	350	A	A	A	A	A				
27						325	A	355	375	A	385	A	380	A	350	A	A	L	A	A				
28							365	A	A	A	A	L 355	385	A	A	385	L 365	A	A					
29							L	A	365	A	A	L 400	395	395	350	350	A	C	A	A				
30						A	A	A	360	A	395	385	A	385	H 400	L	375	L 375	L	A				
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						2	5	6	8	7	9	8	13	14	19	17	12	12	3					
MED						332	365	372	378	L 365	380	390	380	385	385	380	375	L 370	L 360					
UQ							375	395	392	388	395	400	395	395	395	390	388	L 375	362					
LQ							360	365	362	L 340	365	368	370	370	365	365	375	360	L 360					

JUN. 1988 | M(3000)F1 (0.01)

IONOSPHERIC DATA

JUN. 1988 | H'F2 (KM) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							305	325	290	A	485	A	E A 385	370	405	360	335	330	290					
2							E A 310	265	280	365	A	420	425	370	350	350	320	305	280					
3						290	260	280	A	330	345	380	355	335	350	E A 350	310	320	300					
4								270	290	335	340	A	360	340	360	325	315	315	285					
5						L 300	A	265	A 325	310	310	E A 370	360	400	360	320	295	275	A					
6						295	275	265	A 280	E A 355	A	A	A	A	345	330	305	315	270					
7							L 265	285	320	315	305	E A 310	385	355	330	325	A	A	305					
8							260	275	E A 370	355	A	360	350	355	340	355	315	290	E A 285					
9								280	285	380	380	360	355	340	355	335	315	315	A					
10						315	L	305	E A 340	355	325	385	330	385	360	E A 365	E A 325	275						
11								E A 300	A	370	A	A	A	A	410	A	A	A	A					
12						285	A	E A 330	325	370	E A 380	360	330	310	340	E A 345	L 320	355	E A 330					
13						L	290	285	E A 310	E A 320	425	E A 390	A	370	335	A 315	345	295	A 290					
14						270	315	320	A 310	460	A	460	E A 485	E A 485	405	370	305	C	E A 355					
15						L 325	285	260	280	A	E A 380	A	E A 375	360	340	330	315	290	265					
16							270	290	310	A 340	E A 355	355	385	380	335	305	305	300	E A 330					
17						270	270	A	A	A	370	385	375	375	385	375	335	E A 335	310					
18						L 325	310	265	A	L	360	405	E A 355	330	330	335	315	315	305					
19							E A 285	290	A	A	375	A	360	E A 485	410	350	A	E A 325	A					
20						335	325	305	375	A	575	A	425	435	365	340	370	335	310	A				
21						L 295	275	L 310	305	285	A	325	A	340	350	365	365	310	270					
22						A 270	390	290	265	325	315	A	360	E A 405	355	365	330	320	290					
23							310	355	280	280	310	450	515	370	345	A 320	355	330	320	265				
24						L 315	310	A	E A 325	335	570	410	A	A	E A 410	375	375	310	280					
25						360	290	280	565	405	E A 390	435	515	E A 485	425	A	415	A	E A 335	285				
26							270	270	335	E A 350	E A 345	370	360	365	340	A	A	315	290	E A 275				
27						415	475	505	380	A	G	A	G	580	470	E A 390	375	L	380	E A 280				
28							295	320	490	A	A	L 425	485	A	405	385	360	A	A 325					
29							305	295	330	A	315	345	425	370	355	365	420	C	300	E A 310				
30						275	295	375	345	345	385	430	A	375	390	L 355	340	355	315	280				
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						16	24	28	25	21	23	21	24	26	30	27	26	23	25	6				
MED						298	291	289	312	342	355	382	368	366	355	342	328	315	295	272				
UQ						325	310	312	335	370	385	420	425	388	398	364	360	324	312	282				
LQ						280	271	272	288	320	324	360	356	355	340	328	315	302	285	E A 275				

JUN. 1988 | H'F2 (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

JUN. 1988 | H'F (KM) | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	A	E A 365	295	290	305	255	235	E A 250	E A 255	A	205	A	A	210	230	215	230	235	A	E A 270	A	A	A	285
2	E A 290	A 320	305	A 325	305	260	A	E A 245	215	H 205	A	195	245	A	A	230	A	225	A	260	260	295	290	E A 340
3	E A 360	E A 330	295	280	275	260	235	A	A	A	215	225	225	220	210	A	225	235	A	A 275	E A 325	E A 300	A	280
4	A	265	235	270	255	230	230	A	A	A	E A 255	A	A	A	215	240	240	A	A	E A 280	E A 310	A	275	300
5	280	280	A 275	295	320	E A 255	A	A	A	A	A	A	E A 270	A	E A 240	225	A 230	A	A	A	275	E A 325	270	270
6	A 340	300	A 275	270	290	265	A	E A 255	A	A	A	A	A	A	A 240	A	A	260	230	E A 290	275	U A 320	A	300
7	E A 310	285	285	280	265	260	230	A	A	A	A	A	E A 255	E A 265	E A 255	E A 265	A	A	A	A	E A 325	E A 305	A 320	305
8	280	285	E A 275	A 290	295	255	A	215	A	215	A	A	A	A	200	H 215	235	A 240	A	280	E A 300	E A 350	A 355	E A 330
9	A 305	275	245	260	280	260	H 225	235	A	E A 275	A	A	A	235	230	A 245	240	A	A	A	A 295	E A 320	285	265
10	310	305	305	260	240	255	235	E A 240	A	E A 255	A	E A 245	A 240	E A 240	A	A	A	A	A 255	E A 265	A 310	E A 320	330	300
11	265	275	275	A 285	250	245	230	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
12	A	A	A 295	295	255	A	A	A	A	A	A	A	220	A	A	A	240	E A 270	A	A 275	E A 310	E A 315	A	A
13	E A 335	260	260	265	290	245	A	A	A	A	A	A	A	A	A	A	A	230	A	E A 300	A 290	A 280	A 255	E A 315
14	A 300	A 310	A 310	290	275	250	235	230	A	A	A	A	A	A	A 215	230	A	C	A	E A 290	E A 345	E A 305	260	E A 340
15	A 350	A 310	A 320	A 320	310	260	A	A	A	A	A	A	A	A 240	H 210	220	A	235	A	E A 265	A	E A 305	E A 320	265
16	E A 300	265	270	265	A 265	A	E A 240	210	200	A	A	A	205	220	220	210	215	A	A	270	A	250	A E 310	E A 315
17	A	270	A 300	315	300	A	A	A	A	A	A	A	A	215	215	A	A	A	A	E A 260	A 310	E A 315	310	305
18	E A 320	260	255	270	285	235	215	A	A	E A 275	E A 250	A	A	A	A	210	220	A	A	A	A	E A 335	A 275	A 290
19	E A 350	A 330	A 305	A 295	250	225	A	A	A	A	A	A	A	A	A	E A	A	A	A	E A 290	E A 310	A	E A 315	E A 315
20	E A 325	S	A	E A 330	A 295	A	E A 260	A	A	A	E A 240	A	200	230	210	220	220	235	A	A	255	A 300	E A 315	E A 355
21	E A 345	280	A 285	A 280	270	255	230	A	225	A	A	200	A	195	190	205	215	230	245	255	A 250	240	E A 305	260
22	A 290	A	255	255	270	A	265	195	A	A	A	A	220	A	A	220	A	A	250	230	A 270	A	E A 325	E A 355
23	A	A 280	255	H 230	255	A 250	235	A	A	A	225	215	A	A 235	230	A	A	A	A	A	A 280	A 290	A	E A 360
24	E A 330	A 285	265	300	E A 305	E A 265	A	A	A	A	E A 240	A	A	A	A	A	A	260	A 255	A 255	A	320	290	290
25	295	310	315	A 315	320	270	250	A	H 210	230	A	A	A	A	A	A	A	A	A	A	E A 300	E A 385	300	A
26	A	300	E A 335	305	A 320	H 270	225	A	A	A	A	A	H 210	A	E A 260	A	A	A	A	A	A	E A 300	E A 310	A 310
27	330	280	250	E A 310	E A 300	290	A	255	225	A	205	A	235	A	E A 250	A	A	A	E A 300	A	A	E A 340	A 355	275
28	E A 350	320	320	325	285	275	245	A	A	A	A	E A 250	215	A	A	220	240	A	A	275	E A 290	A 285	325	315
29	305	275	260	C	255	255	245	A	240	A	A	205	215	205	265	E A 260	A	C	A	A	265	305	A	E A 365
30	E A 350	E A 360	E A 345	285	270	A	A	A	E A 255	A	210	225	A	225	H 205	E A 255	230	230	A 255	A	E A 295	E A 300	E A 315	A
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	24	27	29	29	30	24	18	10	8	6	9	8	13	13	19	17	13	12	7	18	22	25	23	26
MED	U A 290	282	280	288	278	255	234	U 220	218	U 224	215	211	218	222	215	220	230	235	A 252	U A 251	U A 274	E A 305	U A 292	U 286
UQ	E A 342	306	A 302	300	298	261	240	E A 250	236	E A 275	E A 240	230	232	A 232	232	232	240	244	A 255	E A 280	E A 310	E A 320	A 315	E A 330
LQ	292	275	260	270	265	249	230	215	212	215	210	202	215	215	210	215	220	230	248	U A 245	A 270	U A 270	282	285

JUN. 1988 | H'F (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

JUN. 1988 | H'E (KM)

135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1						130	120	120	115	115	110	110	110	120	120	115	115	115	E B 135					
2						130	115	110	110	210	110	120	115	120	115	115	120	120	130					
3						B 130	115	115	115	110	115	110	115	A	A	E A 140	A	A	A					
4						A	A 110		110	355	115	125	115	A	E B 130	120	A	120	120					
5						130	115	115	110	105	115	120	120	A	A	A	A	120	120					
6						B	110	115	115	115	110	115	E B 130	125	120	120	120	120	A					
7						B	A 120	115	115	115	120	115	120	120	115	120	120	120	120					
8						E B 145	115	110	115	110	115	A	A	120	115	E A 125	115	120	A					
9						A	A 120	115	115	115	110	115	115	115	110	115	120	115	E A 130					
10						120	E A 130	110	115	120	115	120	125	115	A	115	110	110	A					
11						A	110	115	105	110	A	A	110	115	110	115	120	110	115					
12						120	110	A	110	110	115	110	A	115	A	A	115	120	A					
13						A	115	110	110	110	110	105	110	A	110	110	A	A	A					
14						E A 130	E A 130	110	110	115	110	115	115	110	115	A	A	C	A					
15						120	115	110	110	115	E B 120	115	115	110	115	115	115	115	120	S				
16						B	115	A	115	110	110	120	120	115	110	E A 125	115	115	115	B				
17						E B 130	115	110	110	110	115	115	120	A	115	110	110	A	B	B				
18						115	110	110	105	105	110	115	115	A	115	115	115	115	120	B				
19						A	115	110	110	110	115	110	115	115	110	110	115	115	E B 125	B				
20						125	115	110	110	115	110	110	A	110	A	A	A	115	115	S				
21						A	115	110	110	105	L B 115	105	105	110	A	A	A	E A 125	A	B				
22						120	110	105	110	115	115	105	115	120	110	A	A	A	E A 130	B				
23						A	110	110	115	115	115	115	110	115	120	110	115	115	125	B				
24						115	110	115	115	110	115	115	115	B	B	E B 125	110	E A 140	115	B				
25						125	115	115	110	110	A	A	115	120	115	115	B	110	A	S				
26						E A 150	115	115	115	115	115	E B 125	120	120	115	115	110	110	A	B				
27						125	115	110	115	120	120	125	E B 130	125	125	E B 130	110	115	120	B				
28						130	115	120	115	E B 130	120	A	A	125	A	B	120	120	125	B				
29						A	A 120	115	115	115	B		A	115	A	A	A	C	A	B				
30						E B 125	120	110	110	A	110	130	A	120	120	115	120	115	120	D				
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						19	29	28	30	29	27	25	24	23	21	22	20	24	18					
MED						122	115	110	110	115	115	115	115	115	115	115	115	115	120					
UQ						129	115	115	115	115	115	120	119	120	118	118	120	120	122					
LQ						120	115	110	110	110	110	110	115	115	110	115	112	115	120					

JUN. 1988 | H'E (KM)

The Radio Research Laboratory, Japan

IONOSPHERIC DATA

JUN. 1988 | 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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	105	110	110	B	B	150	140	125	130	120	115	110	110	120	G	G	G	135	130	120	115	110	115	120
2	110	110	110	105	110	125	115	120	115	115	110	120	E G 180	145	140	135	125	130	125	120	115	110	115	110
3	110	110	110	110	110	130	125	115	115	115	110	110	105	110	105	130	125	105	105	130	105	110	115	110
4	110	110	110	110	110	105	110	110	115	110	110	110	110	110	135	120	130	120	115	115	115	115	155	120
5	120	110	110	110	110	130	115	115	115	110	110	105	110	105	110	110	155	120	115	115	130	110	125	110
6	110	105	110	105	105	130	115	120	110	115	110	110	115	115	140	130	120	120	120	115	115	105	120	125
7	105	105	105	105	125	130	140	125	120	115	115	115	115	115	120	155	130	120	115	115	115	115	115	115
8	105	110	105	110	115	140	130	130	120	115	110	115	120	120	G	110	125	120	110	110	110	105	110	110
9	110	105	105	100	110	105	110	130	110	110	115	115	115	120	135	120	130	125	120	110	105	105	110	105
10	100	100	110	110	110	120	130	120	115	120	110	110	115	115	110	105	105	105	105	100	115	120	120	105
11	105	110	100	100	100	110	140	115	110	115	110	110	110	120	115	130	125	105	115	135	115	115	115	120
12	115	110	110	110	115	115	105	105	110	110	115	115	125	110	105	105	140	120	120	115	115	110	110	110
13	110	105	110	100	110	125	115	115	115	110	110	105	105	110	105	105	110	115	105	100	105	100	110	110
14	110	100	95	95	100	150	155	125	115	120	110	110	110	110	105	105	105	C	100	105	105	100	100	110
15	105	115	105	100	120	E G 160	115	115	115	115	115	110	110	110	E G 155	125	125	130	120	120	115	115	115	110
16	110	110	105	110	110	110	110	105	110	115	120	130	125	135	110	115	140	125	115	115	115	110	110	110
17	105	105	105	105	105	120	120	115	115	115	115	115	110	115	115	110	110	100	120	115	115	115	110	110
18	110	110	110	105	100	G	125	120	110	110	110	105	135	110	125	G	E G 155	120	115	110	110	105	100	105
19	105	105	105	100	105	110	130	120	115	115	115	115	120	120	120	120	120	115	115	120	115	110	105	110
20	110	105	105	100	105	115	130	120	120	120	110	115	115	130	155	110	110	135	115	120	105	105	105	110
21	115	105	110	110	105	130	115	120	115	110	105	110	105	105	105	105	105	105	100	110	105	110	105	105
22	105	105	105	105	120	115	115	120	115	120	110	110	110	110	105	105	125	120	130	130	115	115	115	120
23	115	105	105	120	B	120	125	115	120	120	125	125	115	115	115	115	120	120	115	115	110	115	110	110
24	105	110	105	100	105	125	120	115	115	115	115	115	115	115	115	115	110	120	110	105	105	100	100	110
25	115	110	115	110	115	120	115	110	115	115	105	135	130	130	125	125	125	115	115	115	115	120	115	115
26	115	115	110	115	115	115	140	125	120	115	120	125	135	125	135	125	115	115	110	110	110	105	120	115
27	120	115	110	110	110	160	135	145	135	120	145	135	150	130	125	120	120	120	115	115	105	105	125	110
28	110	110	105	105	110	140	120	120	120	110	115	115	120	120	120	B	E G 155	120	120	115	115	115	115	110
29	110	125	120	C	105	105	130	125	125	115	115	115	105	G	115	100	125	C	115	115	105	105	110	105
30	110	105	105	110	120	125	125	120	115	120	115	120	120	115	130	130	E G 165	130	120	110	110	110	115	110
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	28	28	29	30	30	30	30	30	30	30	29	28	27	29	28	30	30	30	30	30	30
MED	110	110	108	105	110	122	122	120	115	115	112	115	115	115	116	115	122	120	115	115	115	110	115	110
UQ	110	110	110	110	115	130	130	125	120	120	115	115	120	120	130	125	128	122	120	120	115	115	115	115
LQ	105	105	105	100	105	115	115	115	115	110	110	110	110	110	110	108	115	115	110	110	105	105	110	110

JUN. 1988 | H'ES (KM)

IONOSPHERIC DATA

JUN. 1988 | TYPES OF ES | 135° E Mean Time (G.M.T. + 9 h)

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F5	F5	F3			H1	H1	H3	H2	C2	C2	C3	C2	C1				H2	C3	C2	F5	F4	F5	FF23
2	F5	F4	F5	F5	F3	C2	C4	C3	C2	C1	C3	C1	H1	H2	H2	H2	H3	H2	C5	F3	F3	F4	F3	F4
3	F5	F5	F4	F4	F5	H2	H2	C4	C4	C3	C2	C2	L2	L2	L2	HL32	CL22	L2	L3	FF23	F5	F5	F3	F4
4	F6	FF24	F2	FF23	F2	L1	L2	C3	C3	C2	C3	C3	C2	L2	C2	C2	C2	C1	C4	F5	F4	F6	FF32	FF22
5	FF23	F3	F4	F3	F4	C3	C4	C3	C4	C3	C2	C1	C2	L2	L2	L2	HL12	H3	C4	F5	FF24	F4	FF23	F4
6	F3	F3	F3	F4	F5	L2	C5	C4	C3	C3	C3	C3	C3	C2	H1	H2	C2	C2	C2	C3	F3	F5	F5	FF24
7	F5	F3	F4	F2	F1	C1	HL11	H3	C3	C3	C2	C2	C2	C2	C2	H2	H4	C5	C5	F5	FF25	FF24	FF34	FF34
8	F4	F4	F3	F3	F2	H2	H3	H2	C3	C2	C2	CL21	CL21	C2		L1	H2	C2	C3	F3	F3	F4	F5	F5
9	F2	F3	F2	F2	F2	L3	L1	H1	C3	C3	C2	C2	C2	C1	H1	C2	H2	C4	CL42	F4	F5	F5	F4	F3
10	F3	F2	F3	F3	F2	C1	HL22	C2	C3	C2	C3	C2	C2	C2	C2	C4	C3	C4	C3	F4	FF23	FF35	FF34	F3
11	F2	F2	F2	F3	F3	LH21	HL22	C4	C5	C3	C3	C3	C3	C2	C2	C3	C3	C4	C5	FF25	F5	F4	F5	F3
12	FF24	F4	F5	F5	F3	C5	C4	C4	C3	C2	C1	C2	CC12	C2	L3	L3	HL22	H3	CL42	FF35	F5	F5	FF24	F4
13	F5	F4	F2	F2	F2	C2	C4	C4	C3	C3	C3	C3	C3	C3	C3	C3	L3	CL22	L2	F5	F5	F5	FF24	FF34
14	FF22	F2	F6	F3	F2	HL21	HL12	C2	C3	C2	C3	C2	C3	C3	C2	L2	L5		L5	F4	F4	F3	F2	F5
15	F3	FF13	F4	F3	F1	H1	C4	C4	C3	C2	C3	C3	C2	C2	H1	H2	H2	H2	H3	C2	F3	F5	F6	F2
16	F5	F4	F4	F3	F5	L2	C2	LC12	C1	C2	C3	C2	C2	H1	CH21	L1	H1	H3	C5	C4	F5	FF25	FF25	F4
17	F6	F5	F3	F5	F4	C5	C4	C4	C5	C3	C3	C1	C2	C1	C2	C2	C3	L4	CL22	L5	F5	FF33	F3	F3
18	F4	F2	F2	F3	F2		H1	C3	C3	C3	C2	C3	HC11	LH22	C2		H1	C2	C4	C4	F6	F5	F2	F4
19	F4	F5	F3	F5	F3	LH21	H4	C3	C3	C3	C3	C2	C2	C2	C2	H2	C2	C4	C4	C5	F5	F2	F6	F3
20	F5	F4	F4	F5	F4	C4	H2	H2	C2	C2	C2	C3	C1	H1	HL11	L2	L3	H2	C4	CC12	F4	F4	F4	F6
21	F5	F5	FF24	FF13	F1	C2	C3	C3	C2	C3	C2	C1	C3	C2	C1	L2	L1	LH21	L2	C3	F3	F3	F4	F4
22	F5	F5	F3	F2	F1	C3	C3	H2	C2	C3	C3	C2	C2	C3	C3	L2	CL22	CL32	HL21	C1	FF32	F4	F5	F5
23	F6	F5	F2	F2		LH22	H2	H2	C2	C2	H1	H1	C2	C2	C2	C2	C2	C2	C3	C4	F5	F4	F4	F5
24	F3	F5	F5	F2	F5	C3	C4	C3	C3	C3	C2	C2	C2	C2	C1	C1	C3	CL22	C3	L3	F5	F3	F1	F4
25	F2	F2	F2	F4	F2	C2	C2	C2	C1	C2	L3	HL22	H2	H1	H2	H3	H2	C4	C3	C4	F4	F5	F4	F4
26	F3	F3	F5	F4	F4	LC11	CL12	C2	C3	C2	C2	H2	H1	H2	H1	H2	C3	C3	C4	C5	F5	F4	F4	F5
27	F4	F4	F5	F5	F3	H3	H2	H2	H1	C2	H1	H1	H1	H2	H2	H1	H3	H3	C3	C4	F5	F5	FF24	F4
28	F3	F3	F3	F4	F2	C1	C1	C3	C3	C2	C3	C2	L1	C2	L1		H1	C5	C3	C3	F3	F4	F4	F4
29	F5	FF23	FF14		F4	LH21	HL21	H3	C2	C3	C2	C1	L2		LH11	LH11	HL22		CL42	CL42	F4	F3	FF52	F5
30	F5	F3	F5	F3	FF23	C3	C3	C2	C3	L2	C1	C2	C2	C2	H2	H1	H1	H2	C3	C4	F4	F5	F5	F4
31																								

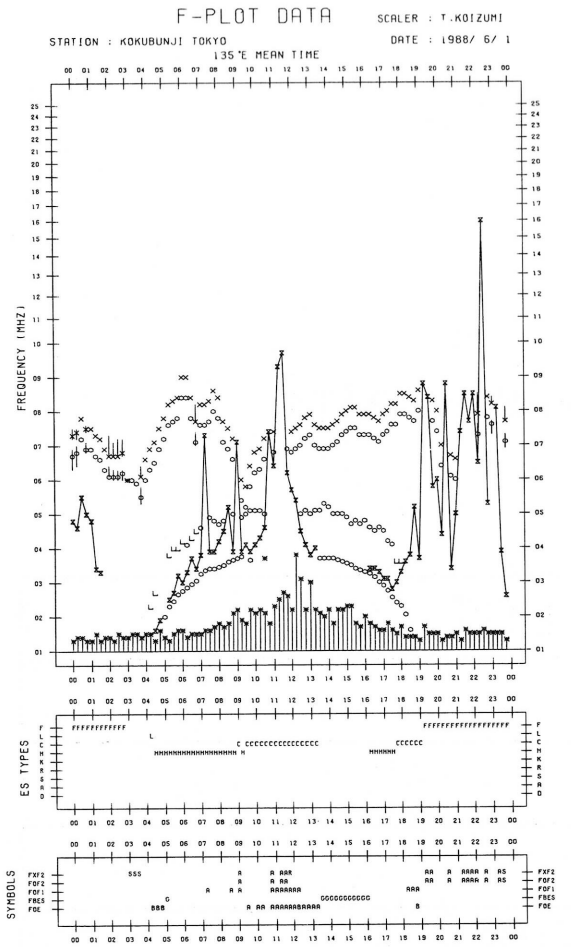
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
UQ																								
LQ																								

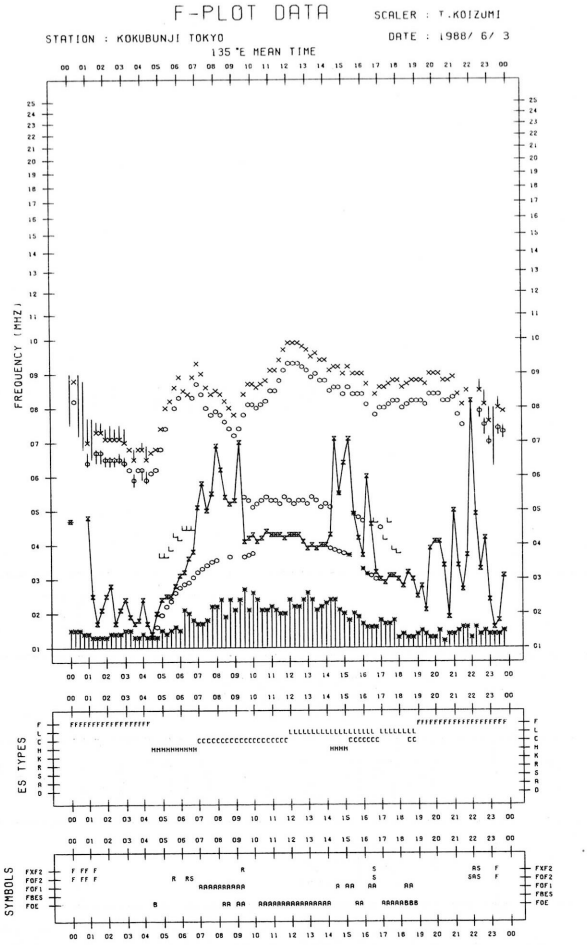
JUN. 1988 | TYPES OF ES

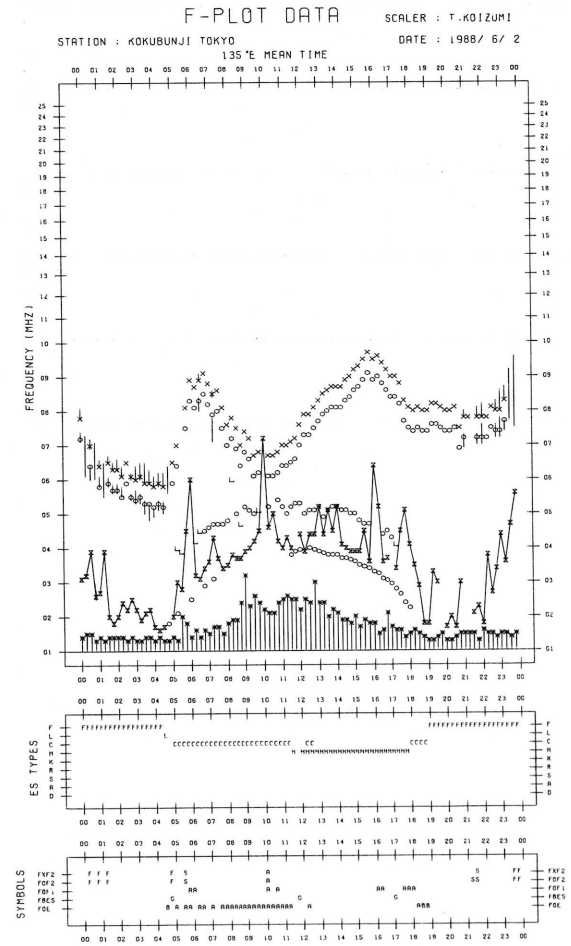
The Radio Research Laboratory, Japan

f-PLOTS OF IONOSPHERIC DATA

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


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/ 1
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/ 3
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE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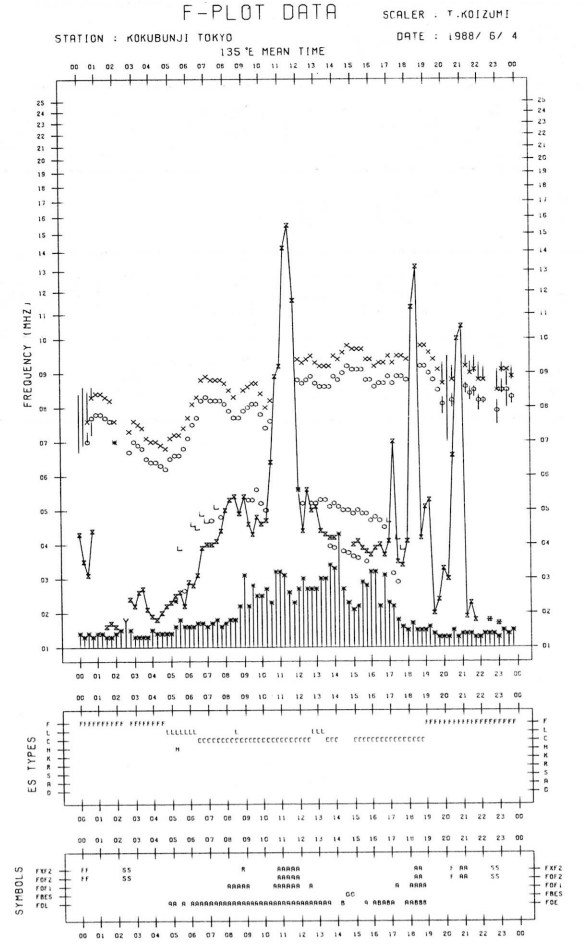
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/ 2
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE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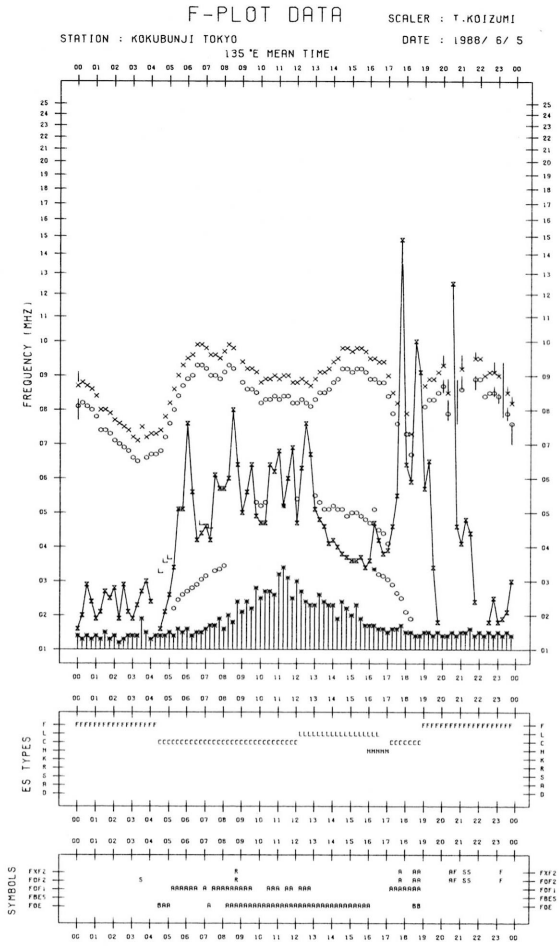
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/ 4
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FDF2
FDF1
FBES
FDE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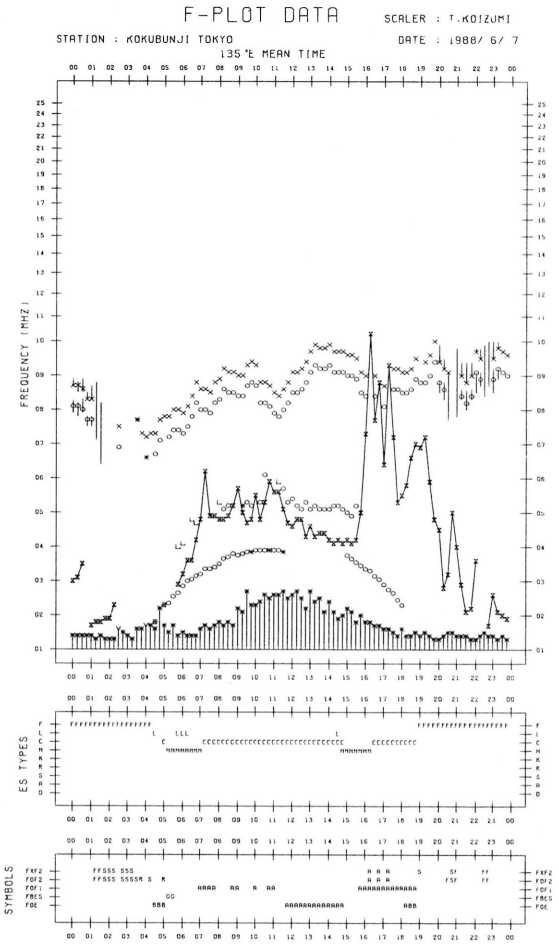
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/ 5
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS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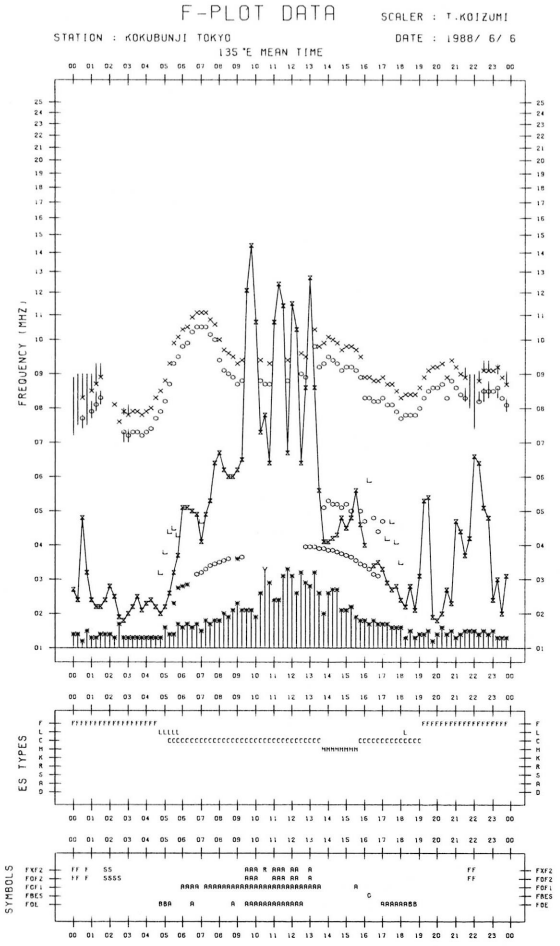
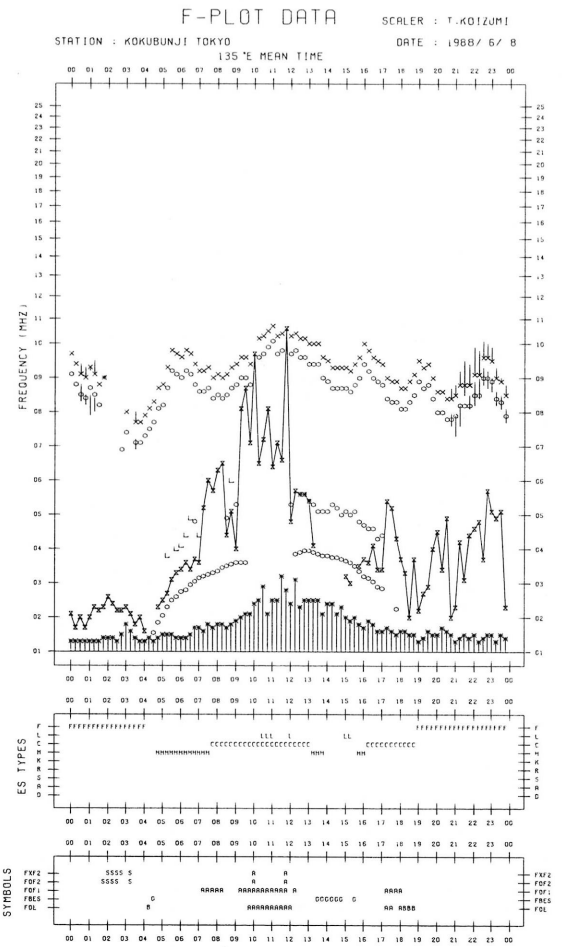
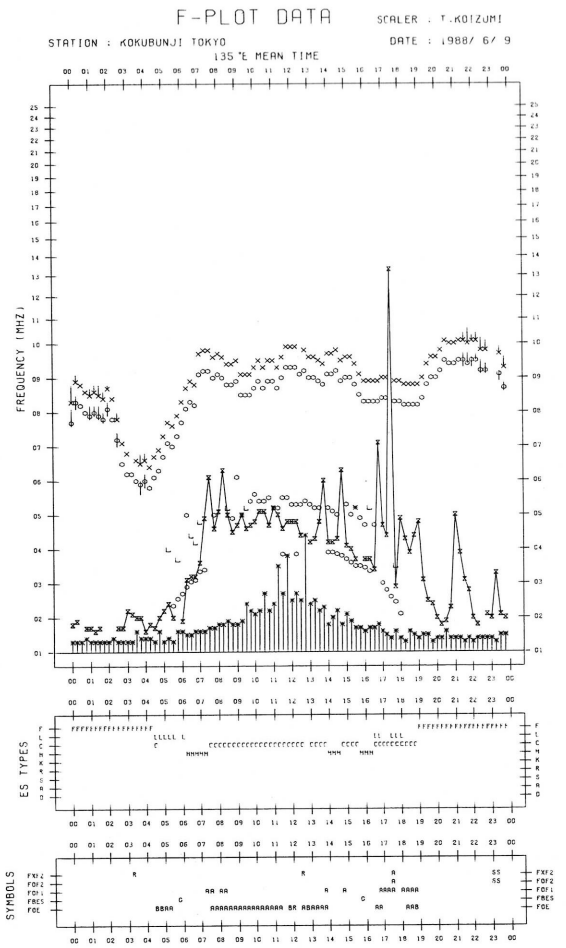
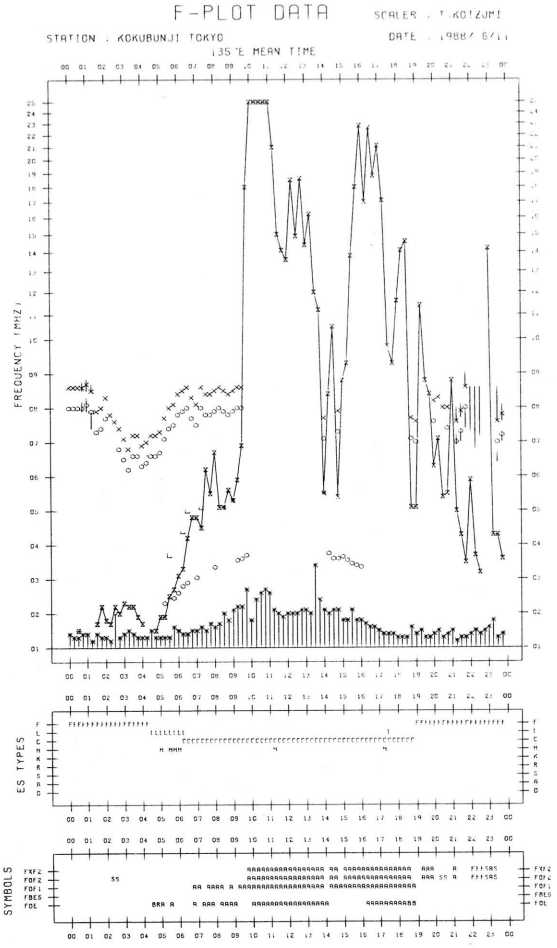
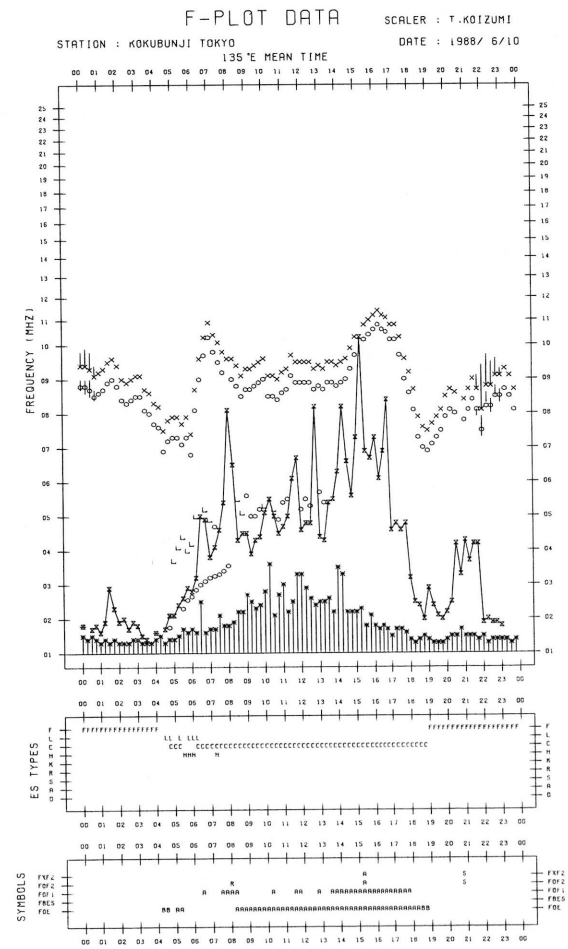
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/ 7
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

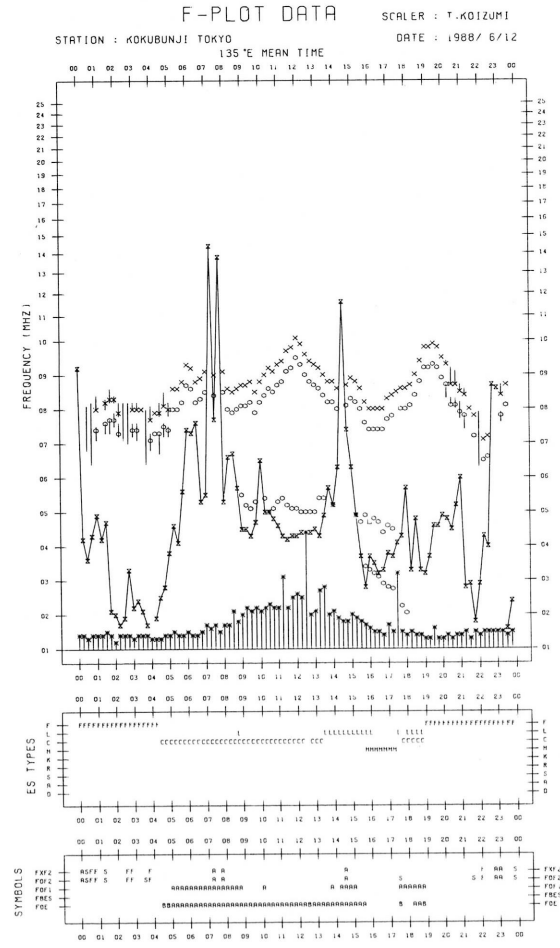

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/ 6
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

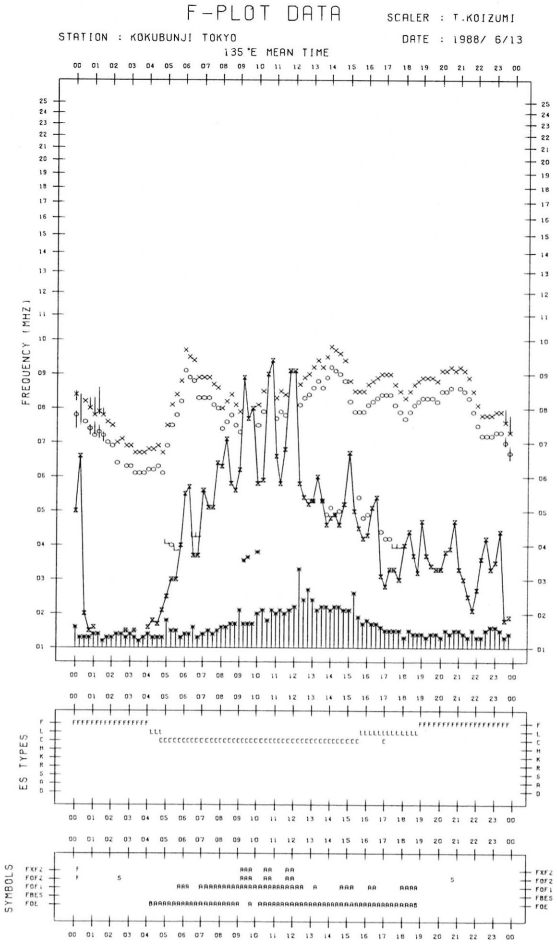

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/ 8
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

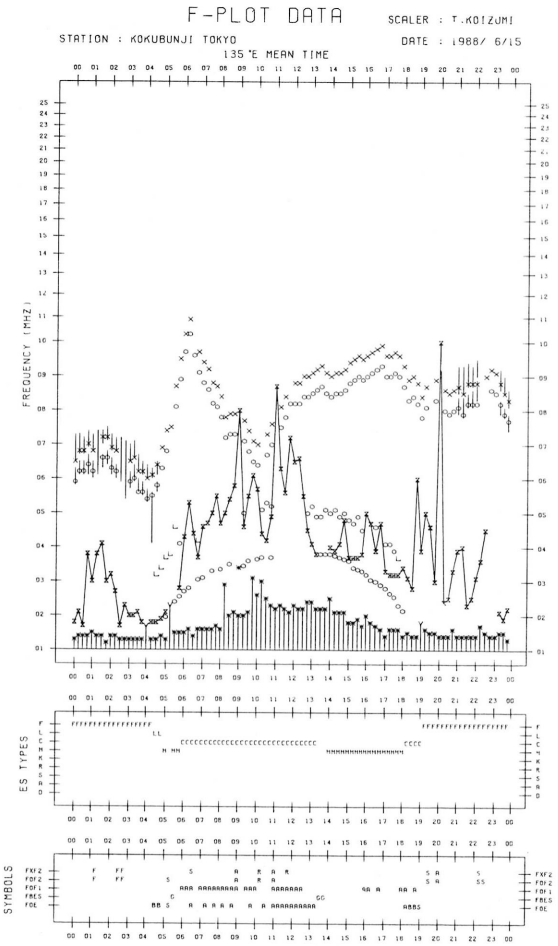

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/ 9
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

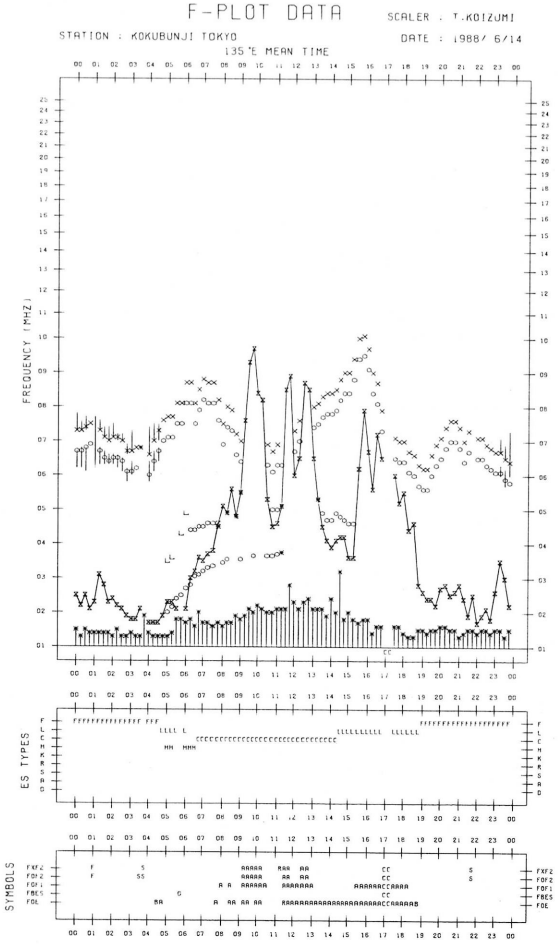

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/11
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

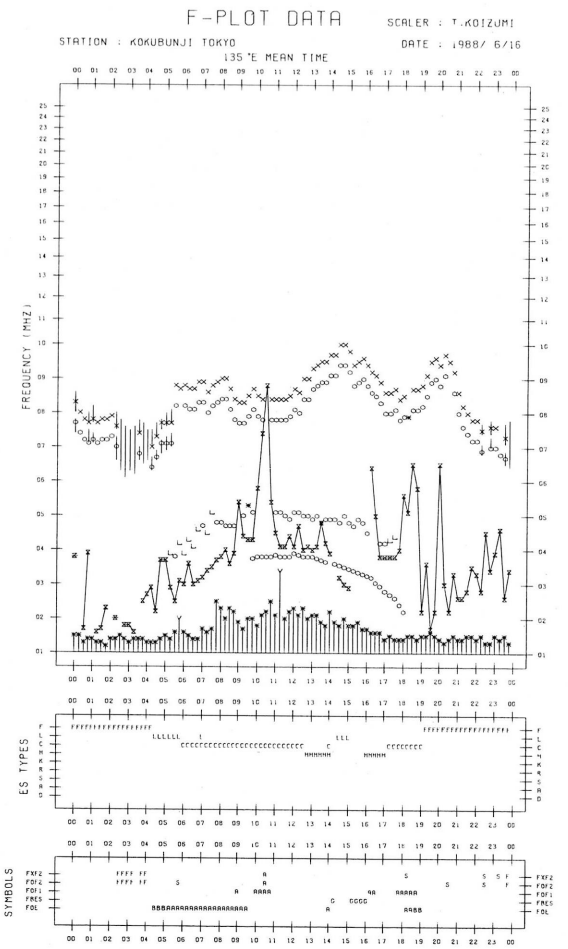

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/10
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

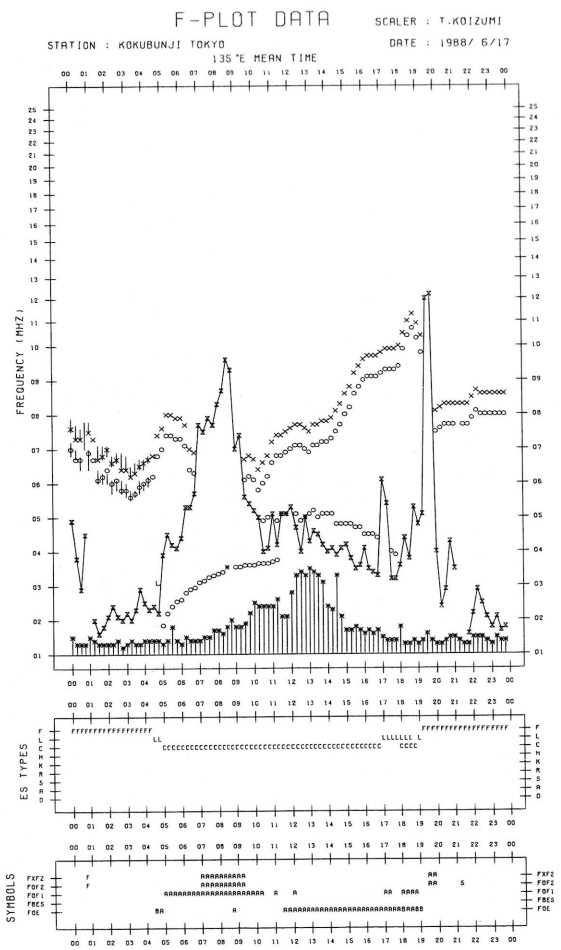

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/12
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

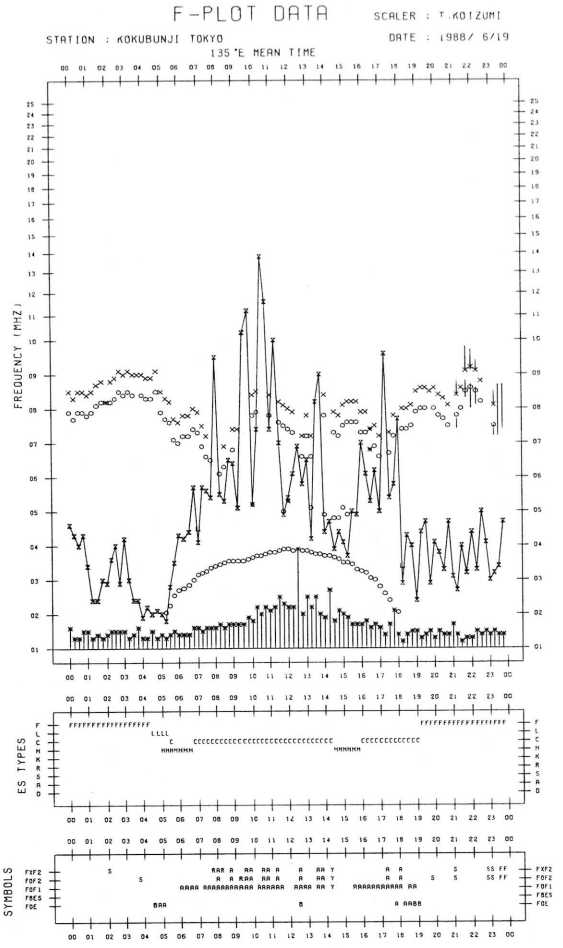

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/13
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

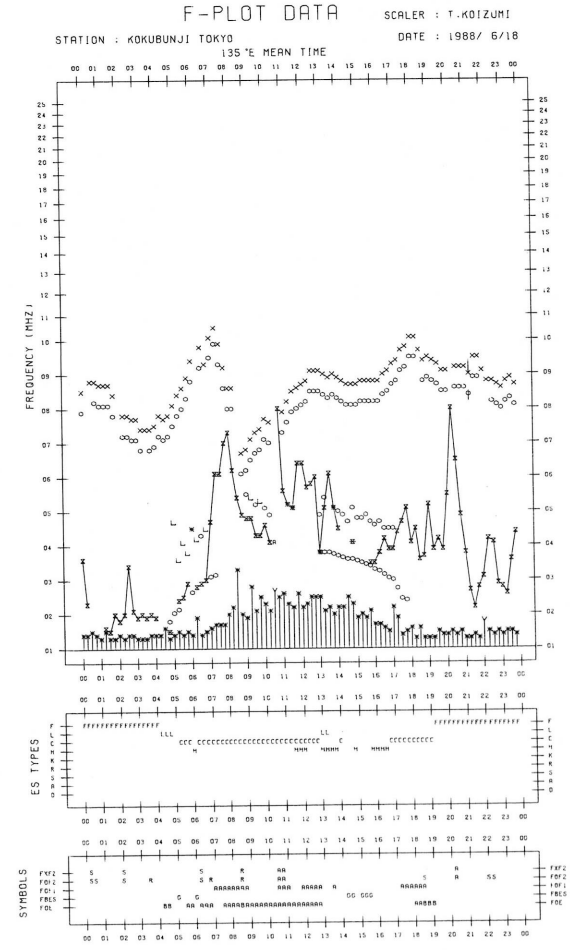

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/15
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

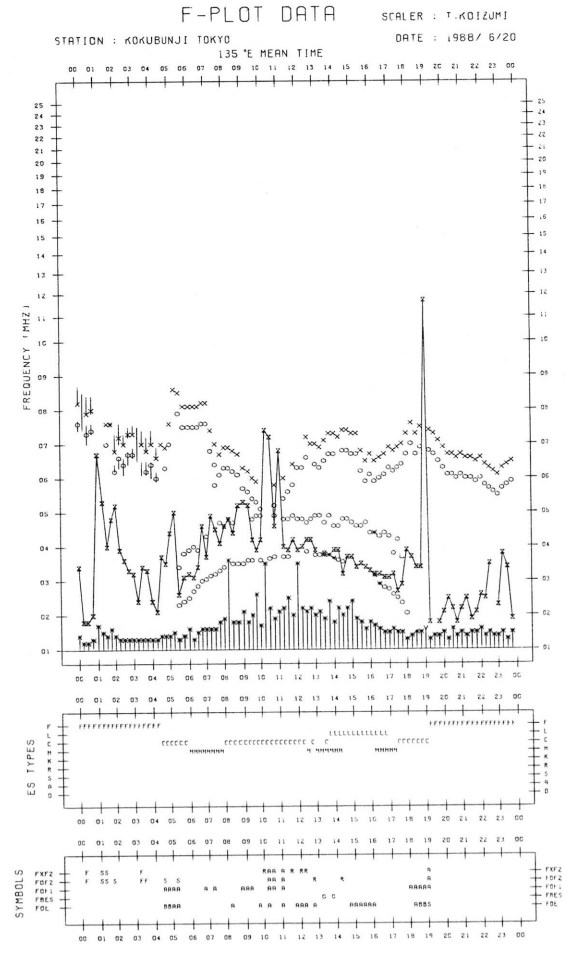

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/14
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

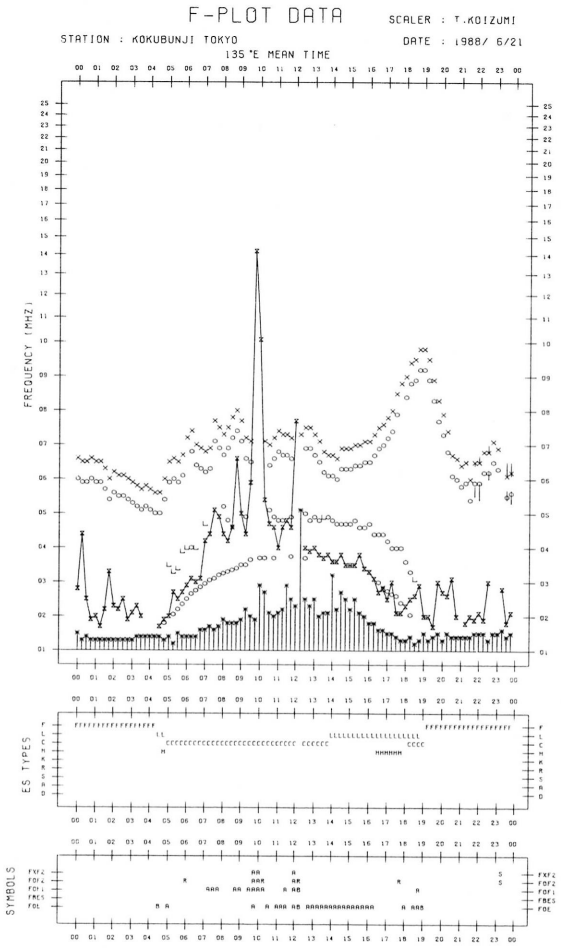

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/16
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

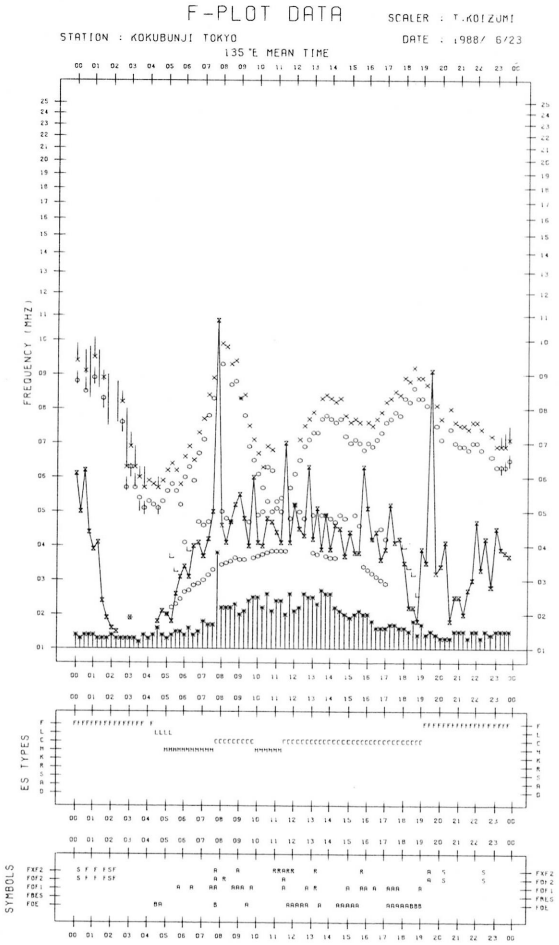

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/17
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

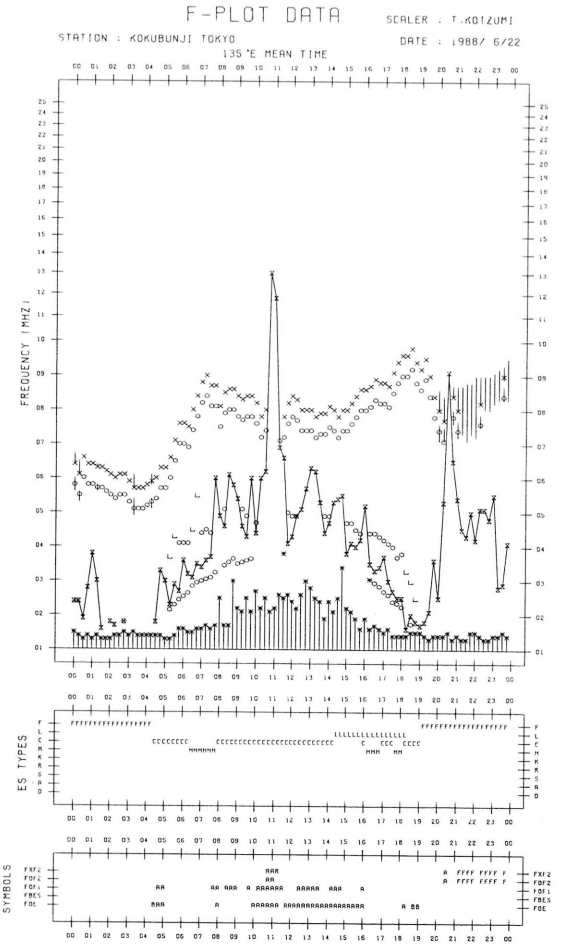

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/19
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

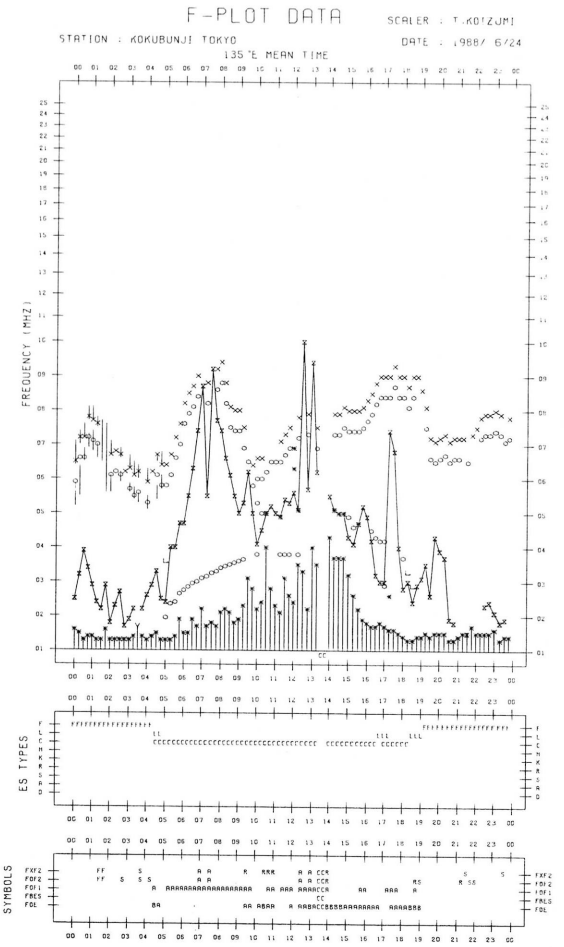

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/18
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

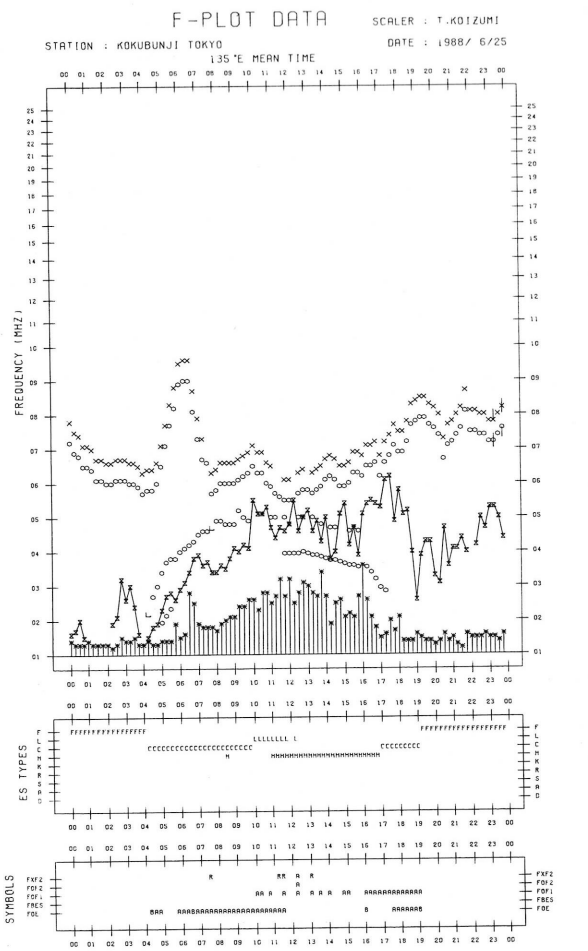

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/20
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

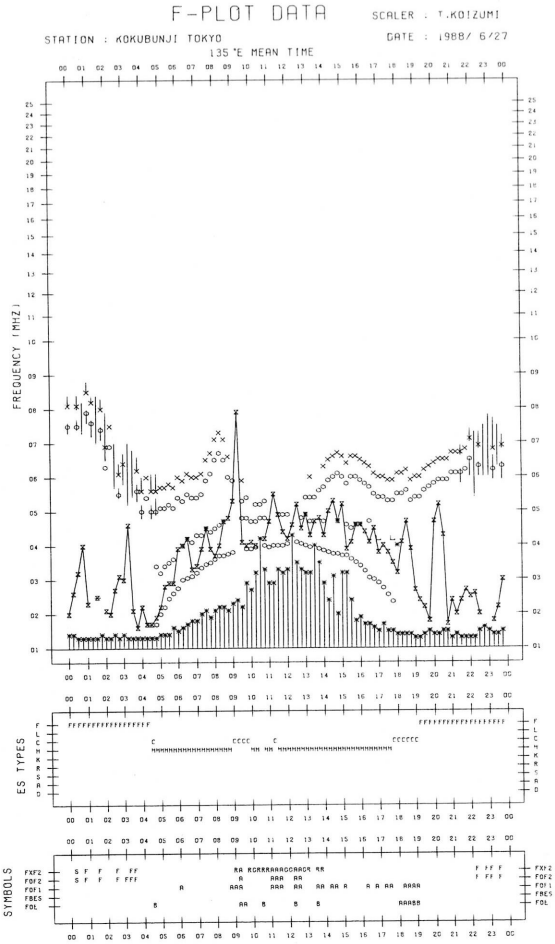

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/21
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

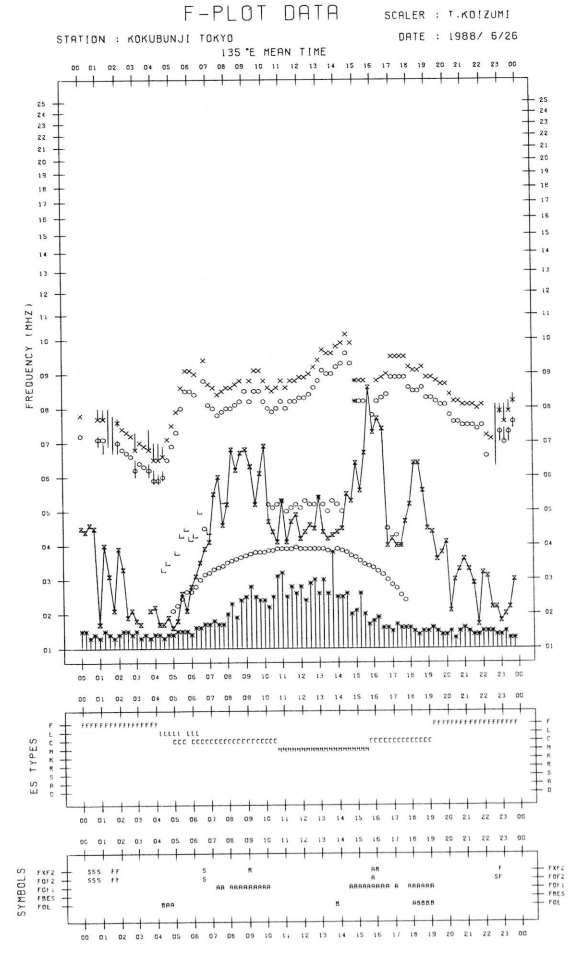

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/23
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

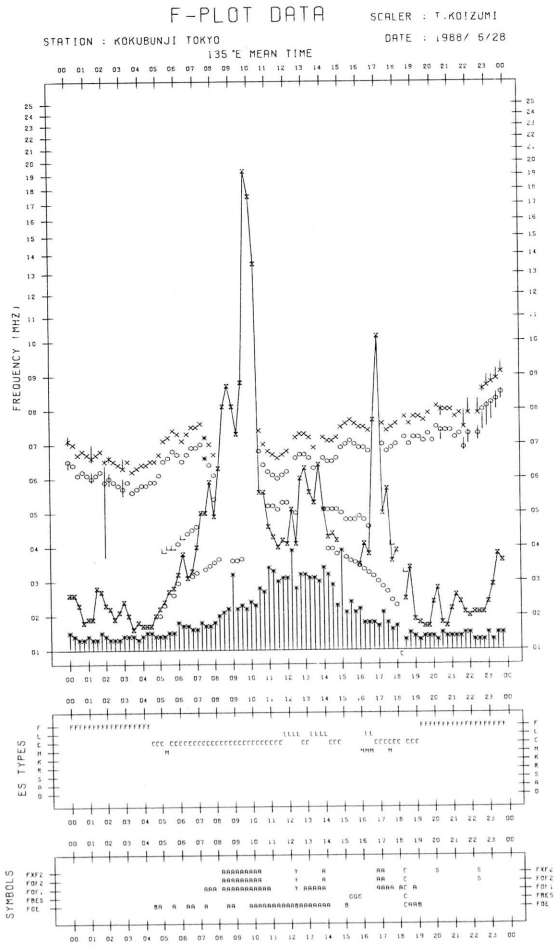

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/22
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

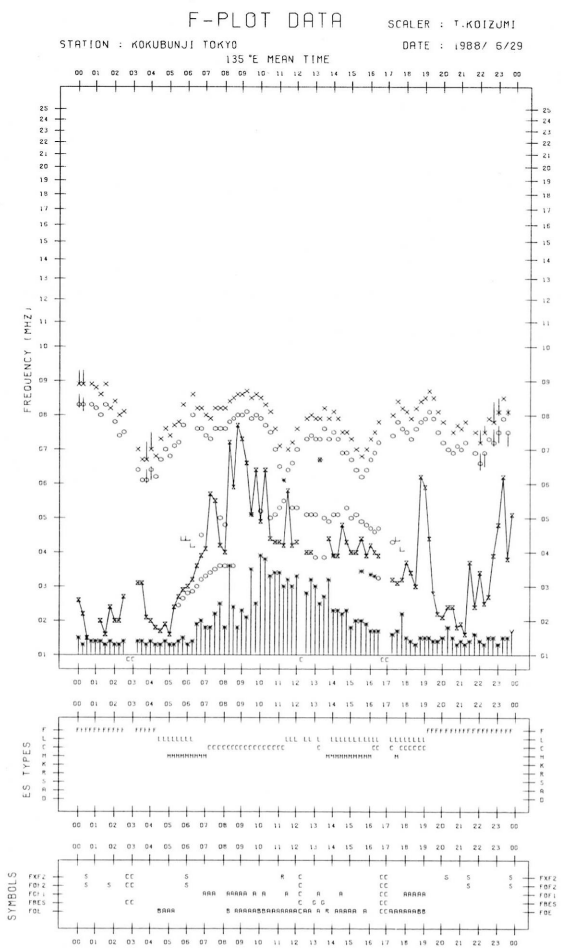

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/24
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

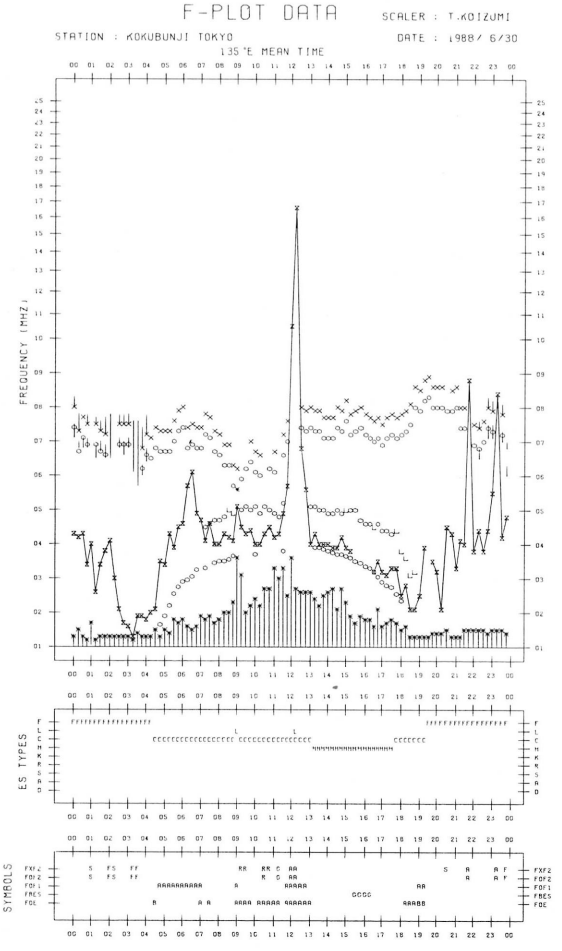

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/25
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/27
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/26
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/28
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/29
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 6/30
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

B.Solar Radio Emission

B1.Daily Data at Hiraiso

200 MHz

Hiraiso June 1988

Single-frequency total flux observations at 200 MHz

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

Notes: No observations during the following periods.

17th 1925 - 18th 0016
30th 0620 - 0950

B.Solar Radio Emission

Bi.Daily Data at Hiraiso

500 MHz

Hiraiso June 1988

Single-frequency total flux observations at 500 MHz					
FLUX DENSITY: 10^{-22} Wm^{-2}Hz^{-1}					
UT	00-03	03-06	06-09	21-24	DAY
DATE					
1	39	40	38	38	39
2	39	41	40	39	40
3	41	41	40	40	40
4	41	41	42	41	41
5	42	42	41	42	42
6	42	43	44	42	43
7	42	43	42	-	42
8	41	41	41	43	41
9	43	43	43	41	43
10	42	41	40	-	41
11	40	41	40	-	40
12	-	-	-	-	-
13	38	38	37	36	38
14	36	36	34	36	36
15	35	35	35	35	35
16	35	35	35	36	35
17	36	36	35	36	36
18	37	38	37	38	37
19	38	38	36	37	37
20	37	36	35	36	36
21	37	37	37	37	37
22	37	37	38	40	37
23	40	39	36	39	39
24	40	38	37	40	39
25	40	41	41	40	40
26	41	42	40	42	41
27	41	41	40	43	41
28	46	47	46	44	46
29	45	44	44	47	44
30	47	48	(47)	-	47

Note: No observations during the following periods:

7th 1925 - 2330
10th 1925 - 2335
11th 1930 - 12th 0955 12th 1925 - 2340
30th 0620 - 0955 30th 1950 - 2350

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso June 1988

Single-frequency observations

Normal observing period: 1925 - 0955 U.T. (sunrise to sunset)

JUN 1988	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22} Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22} Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
1	500	46 C	0425.0	0428.7	15	15	-	WR
	500	42 SER	0623.3	0658.0	47	26	-	WR
2	100	42 SER	0214.5	0218.2	5.9	315	-	-
	200	42 SER	0214.9	0220.1	6.0	73	-	WR
	500	22 GRF	0230	0403	500D	18	-	WR
	200	46 C	0332.3	0333.7	6.6	650	145	WR
	100	46 C	0332.3	-	6.2	1000D	585D	-
	200	42 SER	2238.9	2241.7	3.0	31	-	WR
	500	6 S	2331.1	2333.0	8.0	7	-	WR
	200	42 SER	2344.2	2344.9	10.6	320	-	0
	100	42 SER	2344.4	2344.9	10.6	610	-	-
3	100	46 C	0015.6	0016.4	2.0	895	-	-
	200	46 C	0144.6	0147.9	18.5	7	-	WR
	200	8 S	0529.0	0529.8	1.3	72	-	MR
	500	42 SER	0613.7	0621.7	18.0	24	-	WR
4	500	45 C	0426.4	0427.6	4.5	29	-	0
	200	46 C	0426.5	0427.9	4.0	7	-	0
	200	8 S	0503.3	0503.5	1.0	107	-	0
	100	43 NS	0530	0813	260D	130	62	-
	200	43 NS	0646	0830	180D	12	4	WR
	500	27 RF	0713	0733	46	11	3	WR
	200	46 C	0751.5	0753.5	5.3	185	67	WR
5	200	42 SER	0257.4	0257.9	2.1	210	-	0
	200	43 NS	0400	0830	340D	8	1	WR
	200	44 NS	1925E	2010	570D	7	2	WR
	200	45 C	0913.9	0914.3	2.1	360	-	0
6	200	44 NS	1925E	0543	850D	10	2	WR
7	200	44 NS	1925E	2136	850D	13	4	WL
8	200	44 NS	1925E	2225	850D	48	18	ML
	500	22 GRF	2019	2044	68	9	4	0
9	500	27 RF	0050	0127	95	15	5	0
	500	22 GRF	0345	0518	135	11	5	0
	200	44 NS	1925E	0240	850D	12	4	0
11	500	27 RF	0644.0	0656.5	35	8	3	0
	200	46 C	0656.1	0702.0	12.5	11	-	0
12	200	27 RF	0044.2	0108.6	79	12	4	0
15	100	42 SER	2224.4	2225.2	12.2	970	-	-
	500	42 SER	2224.5	2231.5	8.0	12	-	WL
16	100	27 RF	2116.5	2223.8	107	56	14	-
	200	27 RF	2140.3	2209.2	48	8	3	WL
	100	46 C	2208.6	2209.9	3.8	940	-	-
17	200	46 C	0002.0	0036.1	73	12	3	WL
	100	42 SER	0003.3	0010.7	7.9	215	-	-
	200	8 S	0010.3	0010.9	0.8	510	-	WL
	100	27 RF	0018.5	0056	118	74	18	-
	100	48 C	0335.0	0344.2	77	830	67	-
	200	46 C	0335.4	0344.2	70	760	16	WL
				0342.2		450		WL
	500	46 C	0339.5	0346.7	27.5	54	13	ML
				0350.5		54		0
18	200	44 NS	0016E	0820	600D	73	42	SL
	200	44 NS	1925E	0728	850D	150	78	SL
	100	44 NS	1925E	0751	850D	340	64	-
	500	22 GRF	2102	2117	180	8	3	0
19	100	8 S	0633.7	0634.9	2.0	760	-	-
	500	6 S	0635.0	0638.3	3.5	9	-	0
	100	44 NS	1925E	2011	640D	60	12	-
	200	44 NS	1925E	0000	850D	150	69	SL
20	100	44 NS	1925E	2330	850D	12	4	-
	200	44 NS	1925E	0013	850D	130	61	SL
	100	46 C	2316.2	2316.8	28	670	-	-

JUN 1988	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22} Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22} Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
21	500	46 C	0311.0	0311.3	8.5	64	-	0
	100	42 SER	0431.7	0444.9	17.0	560	-	-
	500	24 R	0432	0605	330D	37	16	WL SUNSET
	200	24 R	0435	0557	310D	580	130	SL SUNSET
	100	48 C	0450.0	0650.3	300D	830	560	- SUNSET
	100	44 NS	1925E	2123	850D	46	5	-
	200	44 NS	1925E	2125	850D	37	11	ML
	500	21 GRF	2100	2138	115	6	2	WL
	200	8 S	2129.7	2129.8	0.8	5000	-	0
	500	42 SER	2208.3	2341.2	108	1400	-	SL
	200	46 C	2229.7	2256.1	40	710	27	SL
				2238.3		70		ML
	100	42 SER	2234	2256	36	620	-	-
	100	46 C	2341.8	2343.5	2.0	890	-	-
	200	46 C	2342.2	2342.9	1.3	790	-	0
22	200	42 SER	0111.6	0122.4	11	280	-	0
	500	7 C	0119.0	0120.5	4.5	760	-	SL
	500	8 S	0331.0	0331.0	0.7	90	-	ML
	100	42 SER	0343.8	0347.6	21.0	710	-	-
	500	48 C	0347.0	0348.3	1.8	6100	1150	SL
	500	46 C	0518.0	0545.5	73	500	8	SL
				0524.5		90		SL
	100	46 C	0527.5	0547.5	59	830	96	-
				0537.6		580		-
22	500	42 SER	0729.5	0733.5	47.5	73	-	ML
	200	44 NS	1925E	2118.5	300D	7	3	WL
	500	23 GRF	2105	2124	85	5	3	WL
	500	22 GRF	2323	0117	170	8	4	WL
23	500	6 S	0729.0	0730.5	3.2	3	-	0
	200	42 SER	2335.0	2336.0	59	58	-	0
24	500	27 RF	0005	0037	98	4	2	0
	500	7 C	0419.5	0425.6	73	170	4	0
				0441.0		9		WL
	100	42 SER	0427.7	0451.9	25.0	335	-	-
	200	45 C	0631.7	0631.7	2.0	450	-	0
	100	46 C	0632.3	-	2.6	1000D	-	-
	200	42 SER	0656.8	0706.0	62	95	-	0
	200	44 NS	1925E	0610	870D	12	2	0
25	500	42 SER	0001	0033.0	38.5	150	-	0
	100	8 S	0031.7	0032.3	1.3	630	-	-
	200	8 S	0120.9	0121.3	0.9	140	-	0
	200	42 SER	0212.5	0214.0	10.0	6700	-	0
	100	46 C	0212.7	-	5.4	1000D	-	-
	500	46 C	0212.8	-	16.0	24D	-	0
	200	27 RF	0230.0	0316.5	125	34	6	0
	500	42 SER	0526.8	0527.5	5.4	42	-	0
	500	42 SER	0637.0	0705.0	67	540	-	0
	200	46 C	0704.6	0705.3	1.3	510	-	0
	100	46 C	0704.6	-	2.4	1000D	-	-
26	200	27 RF	0100	0234	185	8	3	WL
	200	46 C	0330.9	0332.2	1.8	440	-	0
	200	27 RF	2000	2048	240	13	6	0
27	200	43 NS	0500	0630	300D	7	4	0
	200	44 NS	1925E	0220	870D	25	10	MR
	500	42 SER	2300.0	2302.1	5.5	610	-	0
28	200	44 NS	1925E	2320	870D	37	8	MR
29	500	6 S	0028.5	0029.0	2.0	14	-	0
	500	41 F	o150.8	0152.0	2.8	340	-	0
	200	46 C	0257.4	0300.0	2.9	6000	-	WR
	200	42 SER	0610.6	0631.0	74	250	-	WR
	500	48 C	0732.5	0746.0	140D	3400	87	SL SUNSET
				0736.8		190		0
	200	48 C	0734.6	0739.1	139D	9000	394	0 SUNSET
				0805.3		800		MR
	100	49 GB	0735.2	-	145D	1000D	670D	- SUNSET
	200	44 NS	1925E	2008	680D	45	9	MR
	500	46 C	2142.0	2145.3	5.0	32	-	WL
	100	46 C	2142.9	2144.9	4.6	1000	180	-
	100	46 C	2253.2	2255.4	7.9	910	145	-
	500	46 C	2255.0	2258.0	9.0	93	14	WL
30	100	42 SER	0029.0	0030.8	4.8	1000D	-	-
	500	42 SER	0128.5	0130.6	7.9	36	-	0
	200	42 SER	0245.5	0336.8	51	2100	-	WR
	200	41 F	0405.9	0406.6	2.6	340	-	WR

C. RADIO PROPAGATION

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

JUN 1988 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	-15	ES -12	-10	-3	0	-2	12	17	4	0	13	-1	8	11	5	2	5	4	0	2	9	-4	0	-4
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3	C	C	-9	-6	-4	5	11	14	13	11	7	5	12	15	13	6	3	3	11	10	-4	-5	ES -9	-15
4	-8	-5	ES -5	-3	-3	4	11	11	10	11	12	15	18	15	9	5	6	3	-5	ES -4	-1	ES -7	-12	ES -12
5	ES -23	-5	-4	-8	0	6	9	17	20	20	17	21	20	18	19	11	7	0	4	2	ES -4	ES -3	-6	-6
6	-12	-9	-5	-6	-6	3	9	14	15	14	12	16	10	16	10	8	12	9	2	2	-4	-6	-7	-6
7	-9	-3	-6	-5	-4	9	11	15	13	10	-4	14	3	9	10	14	9	10	-5	6	2	-1	-5	-7
8	0	-6	-4	-4	2	12	15	13	2	8	-4	ES -6	6	13	12	9	12	6	2	1	-3	-3	-10	-6
9	-6	-6	-6	-3	-3	3	10	11	10	10	13	5	16	16	15	13	8	9	0	3	4	1	-1	-6
10	-7	-7	-1	-1	3	-2	9	9	ES -7	-5	ES -9	ES -3	ES -6	5	10	9	3	4	-1	-2	2	ES -3	ES -15	ES -24
11	ES -24	-9	-9	-11	6	5	9	2	9	-4	ES -2	ES -3	-6	-2	13	10	9	0	-5	1	4	-1	-4	-11
12	ES -24	-6	ES -9	-9	0	9	9	12	11	9	8	7	9	18	20	1	-3	0	3	-2	-3	1	1	-6
13	-15	-15	-9	-6	0	3	9	18	17	19	6	3	7	16	13	3	7	3	-5	2	5	-3	ES -6	-11
14	ES -24	-15	-9	-15	-6	-3	9	9	14	ES 0	ES -2	2	-5	3	2	-4	3	1	-3	ES 4	-2	1	-3	3
15	-8	4	-3	0	0	5	3	9	6	2	ES -3	ES -8	5	17	13	12	11	5	7	2	3	5	2	-4
16	-4	-1	-3	-5	6	10	6	-1	-3	4	5	-1	2	17	17	15	8	0	-3	-3	-3	-5	-3	-8
17	ES -23	-3	-1	5	-3	10	0	ES -1	7	16	-1	ES -5	ES -5	12	15	6	13	5	4	2	0	2	1	-5
18	ES -24	5	2	ES -24	-12	1	1	-2	ES 2	ES 0	ES -6	ES 0	-9	17	14	9	-6	3	0	6	2	ES -9	2	-11
19	ES -14	-3	3	-10	-11	1	1	-2	6	-5	ES -5	ES -5	-2	9	8	4	4	-2	ES -14	9	ES -5	-6	ES -11	-14
20	ES -23	ES -23	ES -23	-5	-8	4	8	-8	-8	-9	-8	ES -5	ES -14	ES -10	-1	-6	-8	0	2	1	ES -23	ES -23	-8	0
21	3	ES -23	ES -23	-14	-5	-2	2	3	8	3	10	0	-5	3	9	3	13	-1	-3	ES -23	ES -23	ES -6	-5	-6
22	3	1	-5	-4	1	6	17	17	17	19	-4	ES -5	ES -5	5	12	-4	4	0	4	-3	C	C	C	C
23	ES -22	-2	ES -22	-7	4	12	13	14	22	12	8	-2	2	13	7	-1	13	10	ES -13	-3	6	ES -9	7	-2
24	-3	-9	ES -9	-7	3	1	18	13	17	ES -3	1	ES -9	ES -9	16	8	ES -3	ES -9	ES -9	ES -22	-3	ES -22	ES -22	ES -22	-3
25	ES -9	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	1	ES -22	-9	ES -3	C	C	C	C	C	C	C	C	C	C	C	C
26	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
28	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
29	-7	ES -1	-13	ES -7	-3	4	4	10	9	15	-1	ES -22	4	10	11	11	-5	4	-1	2	ES -7	ES -22	ES -22	ES -22
30	ES -23	ES -14	ES -23	-3	-14	ES -23	ES -23	-9	3	US -2	ES -21	ES -21	ES -21	13	9	ES -8	ES -6	ES -6	ES -12	ES -6	-3	ES -21	ES -21	ES -21
CNT	25	25	26	26	26	26	26	26	26	26	26	26	25	25	25	25	25	25	25	25	24	24	24	24
MED	US -12	US -6	US -8	-6	-3	4	9	10	9	6	-1	US -2	2	13	11	6	6	3	-1	US 2	-2	ES -4	-6	-6
UD	0	1	-1	-1	4	10	15	17	17	19	13	15	16	18	17	13	13	9	4	6	6	2	2	0
LD	ES -24	ES -22	ES -23	ES -15	-12	-3	0	ES -8	ES -3	ES -5	ES -9	ES -9	ES -9	3	5	ES -4	ES -6	-2	ES -13	ES -4	ES -23	ES -22	ES -22	ES -22

C. RADIO PROPAGATION

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

JUN 1988 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	3	-1	6	9	14	17	23	25	25	28	24	23	21	22	21	21	22	15	10	15	12	8	2	-1
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3	C	-3	5	7	12	15	21	22	27	23	30	29	23	18	22	19	19	18	18	10	9	7	0	-5
4	-3	2	2	13	10	17	25	23	23	21	24	24	19	20	19	18	17	16	9	12	11	7	6	3
5	3	-3	12	13	17	20	26	28	28	25	27	23	27	21	22	23	25	14	28	16	11	11	2	5
6	2	3	3	10	17	20	21	26	26	27	24	25	21	24	21	19	27	16	15	23	15	8	2	7
7	9	1	5	8	15	17	23	26	26	26	25	22	26	23	22	26	27	22	20	18	15	10	3	9
8	6	7	10	12	15	18	24	26	26	26	26	26	24	27	26	24	21	21	25	11	11	4	2	1
9	2	-3	0	9	15	19	21	24	26	23	23	24	22	22	25	16	22	22	23	23	23	9	9	2
10	2	2	5	10	19	26	22	26	26	24	20	20	22	22	18	18	16	20	14	17	15	14	3	-7
11	-5	-3	1	3	11	13	19	22	24	23	21	20	18	12	17	15	12	20	12	15	15	6	3	-1
12	2	-1	7	7	12	17	20	22	27	25	26	26	26	17	20	20	15	18	9	18	15	9	9	3
13	1	1	3	12	14	19	21	23	26	24	24	29	29	25	16	16	8	18	19	18	19	8	2	6
14	2	1	2	2	10	20	22	22	17	20	31	31	24	26	21	20	15	17	3	11	16	9	1	12
15	14	10	9	15	17	20	23	23	22	22	19	20	26	19	22	17	27	16	13	17	12	19	6	13
16	13	5	10	9	18	21	24	29	28	28	22	19	27	23	24	21	22	19	17	15	13	10	10	0
17	-1	0	7	7	17	26	25	29	27	29	28	29	20	24	25	26	20	22	20	20	17	16	12	7
18	-1	-2	9	8	14	15	15	24	23	21	19	22	22	24	18	22	20	18	15	17	19	8	3	-3
19	4	4	3	4	13	18	21	24	25	30	25	22	31	24	20	22	23	24	14	20	17	3	3	9
20	9	6	-1	12	16	20	23	21	22	24	26	14	15	17	15	20	20	15	9	15	13	11	14	10
21	3	6	3	7	9	13	20	21	28	24	24	28	31	20	21	18	14	21	16	15	18	12	7	7
22	8	8	10	13	18	19	27	27	28	25	28	27	23	24	28	21	27	23	11	C	C	C	C	10
23	1	5	4	11	20	19	20	23	24	22	17	17	23	15	16	18	7	24	20	17	14	10	3	5
24	-1	1	6	11	ES -22	18	23	24	26	24	27	26	25	28	17	1	ES -9	11	11	17	12	-3	-3	2
25	-1	4	-3	-9	5	5	12	21	28	26	29	27	C	C	C	C	C	C	C	C	C	C	C	C
26	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
28	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
29	-1	2	5	6	16	21	20	19	29	26	19	23	27	26	22	20	24	11	19	22	-5	10	8	2
30	1	7	-4	9	14	21	19	25	23	23	17	23	23	24	11	10	14	19	0	10	8	-1	3	3
CNT	25	26	26	26	26	26	26	26	26	26	26	26	25	25	25	25	25	25	25	24	24	24	24	25
MED	2	2	5	9	14	19	22	24	26	24	24	24	23	23	21	20	20	18	15	17	14	9	3	3
UD	9	7	10	13	18	21	25	28	28	23	29	29	29	26	25	24	27	23	23	23	19	16	12	10
LD	-1	-3	-1	3	9	13	19	21	22	21	19	19	19	17	16	15	8	14	9	10	8	-1	0	-3

C. Radio Propagation

C2. Radio Propagation Quality Figures at Hiraiso

Hiraiso

Time in U.T.

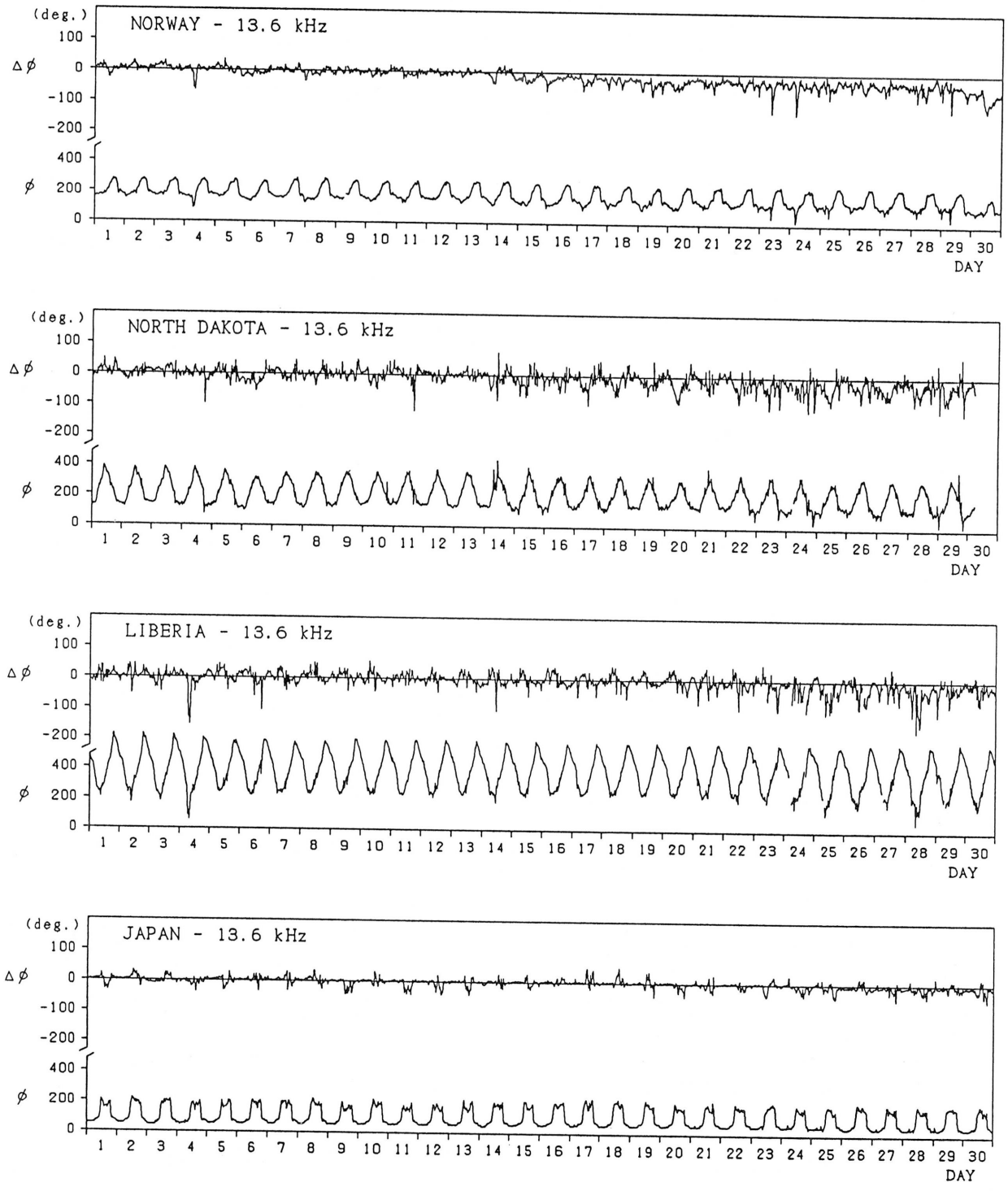
Jun.	Whole	W W V				W W V H				Conditions				Principal Geomagnetic Storms		
	Day	00	06	12	18	00	06	12	18	00	06	12	18			
1988	Figure	06	12	18	24	06	12	18	24	06	12	18	24	Start	End	Range
1	4o	4	4	4	4	4	4	4	4	N	N	N	N			
2	C	C	C	C	C	C	C	C	C	N	N	N	N			
3	4o	4	4	4	4	4	4	4	3	N	N	N	N			
4	4o	4	4	4	3U	4	4	4	4	N	N	N	N			
5	4o	4	5	4	4	4	4	4	4	N	N	N	N			
6	4o	4	5	4	4	4	4	4	4	N	N	N	N			
7	4o	4	4	4	4	4	4	4	4	N	N	N	N			
8	4o	4	4	4	4	4	4	4	4	N	N	N	N			
9	4o	4	4	4	4	4	4	4	5	N	N	N	N			
10	4-	4	3U	4	3U	4	4	4	4	N	N	N	N			
11	4-	4	4	4	4	3	4	3	4	N	N	N	N	NONE		
12	4o	4	4	4	4	4	4	4	4	N	N	N	N			
13	4o	4	5	4	4	4	4	4	4	N	N	N	N			
14	4-	3	4	3	4	4	4	4	4	N	N	N	N			
15	4o	4	4	4	4	4	4	4	4	N	N	N	N			
16	4o	4	4	4	4	4	4	4	4	N	N	N	N			
17	4o	4	4	4	4	4	4	4	4	N	N	N	N			
18	4o	4	3U	4	4	4	4	4	4	N	N	N	N			
19	4o	4	4	4	4	4	4	4	4	N	N	N	N			
20	3+	3	3	3	4	4	4	3	4	N	N	N	N			
21	4-	3	4	4	3	4	4	4	4	N	N	N	N			
22	4o	4	4	4	3	4	4	4	C	N	N	N	N			
23	4o	4	4	4	4	4	4	4	4	N	N	N	N			
24	4-	4	4	3U	3U	4	4	3	4	N	N	N	N			
25	3-	2U	2U	C	C	3	4	C	C	U	U	U	U			
26	C	C	C	C	C	C	C	C	C	U	U	U	U			
27	C	C	C	C	C	C	C	C	C	U	U	U	U			
28	C	C	C	C	C	C	C	C	C	N	N	N	N			
29	4o	4	4	4	3U	4	4	4	4	N	N	N	N			
30	3o	2U	2U	3U	2U	4	4	3	3	N	N	N	N			

C. Radio Propagation

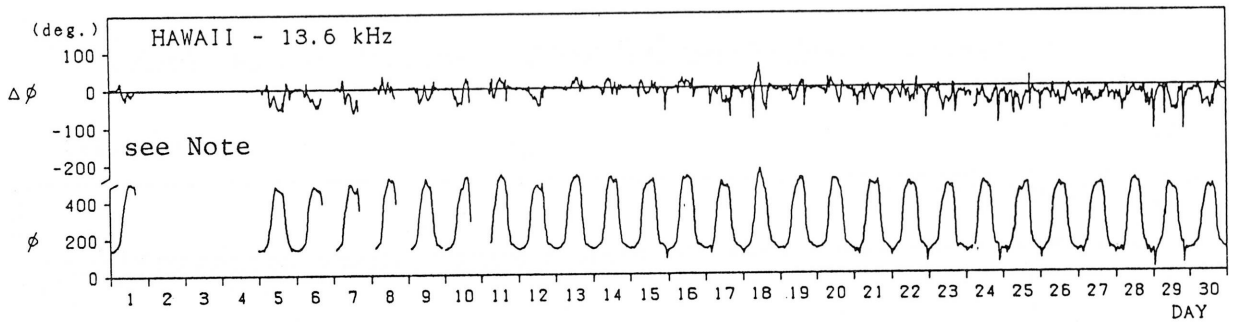
C3. Phase Variations in OMEGA Radio Waves at Inubo

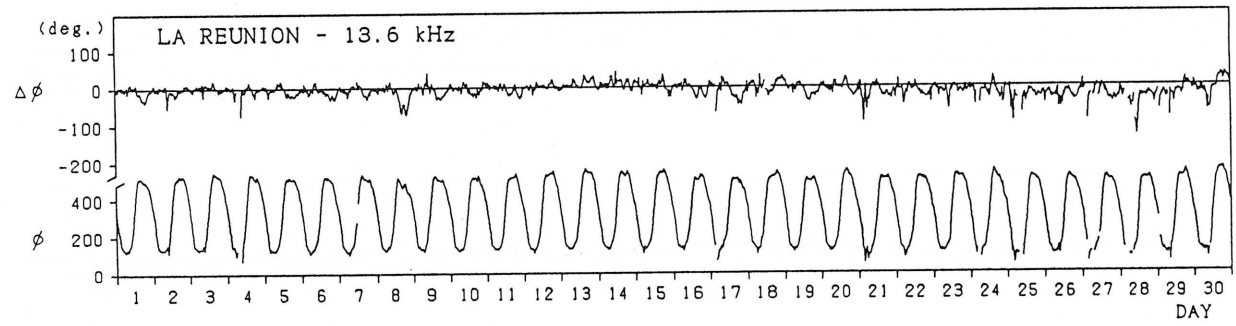
Inubo

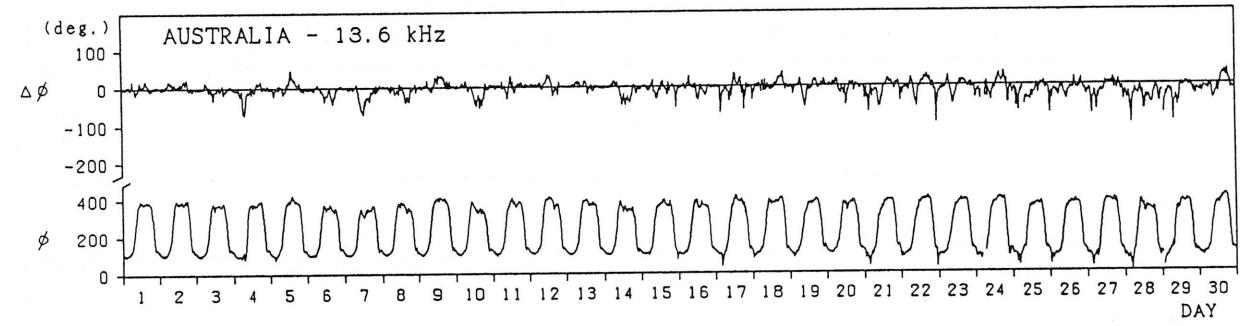
June 1988

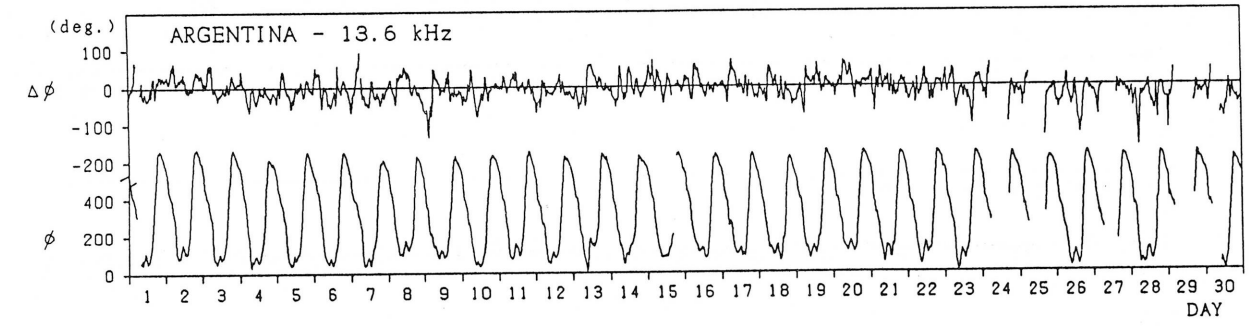


Inubo June 1988









Note:As for HAWAII - 13.6 kHz, no record during June 01 - June 04, due to the maintenance of transmitter.

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

Start (u.t.)	End (U.T.)	Max. (U.T.)	Max. Phase Deviation (negative value, deg.)
Jun.30/0940	Jun.30/1905	Jun.30/1146	75.9

C. Radio Propagation

C4. Sudden Ionospheric Disturbances

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

Hiraiso

Time in U.T.

Jun. 1988	S W F									Corresepondence		
	Drop-out Intensities(dB)					Start	Duration	Type	Imp.	Solar Flare	Solar Noise	Geomag. Crochet
	CO	HA	1)	2)	3)							
2				14	X	0857	//	SL	1			
3				6		0836	34	SL	1-	X		
4			10			0645	25	SL	1-			
4			7			0725	38	SL	1-			
15		X	15			2231	33	SL	1	X	X	
17		X	15			0345	41	SL	1	X	X	
21		X	14			0310	22	SL	1		X	
22			30	25		2240	12	SL	2+	X	X	
23			30	X		0909	46	G	2+	X	X	
23			X	11		1753	22	SL	1-	X		
24			37	X		0420	90	//	3	X	X	
24			27			2122	43	G	2	X		
25		X	15		X	0630	60	G	1		X	
26			7			0021	19	S	1-		X	
27			13			0550	25	G	1	X	X	
28			8	X	X	0345	25	SL	1-			
28			13	X	X	0441	29	SL	1	X	X	
28			5	X	X	0812	19	SL	1-		X	
28			X	16	X	0953	20	SL	1		X	
28				7	X	1111	34	SL	1-			
28			15	X		2220	//	G	1			
29			18			0047	18	SL	1+		X	
29			15			0257	23	G	1		X	
29	X	X	32	15	20	0733	47	SL	3-	X	X	
29	X	42			X	2014	//	SL	3+	X	X	
30		X		X	26	0904	29	S	2-	X		

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

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Jun. 1988	S P A								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
1				6	6		0125	0157	0132
1			31	10			0714	0759	0721
1			14	6			0840	0900	0849
2			8	10	—		0336	0407	0343
2	36	149	98	29	—		0901	1035	0913
3			20	21	—		0102	0141	0109
3	24	51	59	6	—		0836	1025	0850
4				21	—		0148	0217	0158
4	28	51	67	56	24	22	0428	0544	0440
4	69*	121*	163*	86*	—	15	0616	0731D	0701
4	80	151	199	84	—		0731E	0914	0747
5			22	27	15		0252	0335	0301
5					27	30	2007	2121	2015
5					11	8	2207	2251	2214
6		34	27	24			0452	0546	0504
7			22	—			0609	0716	0620
8			6	8	—		0518	0551	0529
8				13	—		2248	2320	2253
9	—		22	8			0710	0742	0721
11			20	10			0651	0724	0657
12			28	16			0616	0649	0622
15			31	8			0445	0524	0501
15	35	35	20	42	68	67	2228	0014	2246
16				9	10		0137	0213	0145
17	30	66	123	84	49	46	0343	0631	0408
17		26		16	24		2300	2351	2306
18	28	21	29	40	39	27	0013	0115	0017
18			61	43	19		0604	0731	0611
19			26	18	13		0225	0324	0235
19			18				0825	0900	0838
19				—	6		2341	2357	2345
20				5	6		2330	2350	2337
21	18	24	22	—	27	33	0049	0132	0058
21	21*		29*	—	19*		0222	0310	0245
21	46	77	104	—	47	36	0312	0414	0323
21			50	35			0526	0653D	0531
21			30	12			0653E	0747	0701
21	15				10		2201	2236	2211
21				6	8		2306	2326	2313
21	21	29	33	62	56	54	2343	0053	2347
22	16		24	22	13	21	0121	0152	0125
22	21	38	68	52	20	18	0522	0705	0542
22					6		2110	2138	2114
22					7		2141	2217	2147
22	63	49	47	80	113	110	2236	0019	2245

Inubo

Jun.	S				P		A		
1988	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
23	106	—	271	88			0916	1143	0926
23					6		2330	2356	2338
24	13			21*	21*		0019	0138	0030
24	11	19	16	19	16		0142	0205	0145
24	17	45	62	56*	29	25	0308	0356	0315
24	133	239	324	206	154	131	0415	0516D	0433
24	52	97	127	103	72	65	0516E	0705	0533
24	33	93	112	56*			0732	0854	0744
24			14				0859	0922	0905
24	24	—				79	1604	1644D	1612
24	29	204				117	1644E	1744	1649
24					20		1836	1905	1845
24					11	30	1922	1957	1927
24	48	42	34	31	116	157	2123	2255	2141
25	18*	24	22	32	25		0004	0052	0008
25	31	40	68	68	45	49	0213	0317D	0225
25	39	49	86	75	37*		0317E	0516D	0355
25			34	23			0516E	0618D	0540
25	72*	177	216*	104*	36		0618E	0818D	0654
25	34		139	44			0818E	1020D	0828
25			37				1020E	1100	1025
25			45				1115	1150	1120
25	12	130				63	1636	1751	1652
25					17		2001	2055	2012
25					8		2138	2218	2147
25					5		2247	2332	2256
26	38	30	47	62	49	45	0020	0119	0025
26				26	13	15	0145	0247	0204
26			16	14	4		0411	0448	0415
26			13	15			0521	0551	0528
26			17	16			0625	0649	0631
26		72	54	14			0835	0945	0856
26			31				1015	1038	1023
26			31				1058	1159	1105
26				8	11		2303	2338	2308
27				—	6		0045	0108	0047
27	40	69*	112*	—	64*	58	0249	0415	0312
27			20	—			0434	0455	0440
27	45	135	140	—	40	58	0553	0723	0609
27		79	63				0944	1051	0951
27					27	33	1954	2040	2004
27					8	25	2045	2117D	2056
27					10	13	2117E	2157	2119
27					6	22	2213	2238	2225
27			14	22	32	31	2302	2341D	2307
27	16*			22*	25*	27	2341E	0044	0001
28				10	6		0120	0136	0125
28	29	29	50	51*	36	37	0153	0253	0211
28	24	41	67	59	33	38	0347	0440D	0357
28	47	94	145	91	60	43	0440E	0606	0452
28	13		18	10			0632	0704	0645
28			35	14			0710	0803D	0719
28	47	140	125	54			0803E	0913	0822
28			37				0938	0955D	0944
28		109*	113				0955E	1048	1005
28		77	42				1125	1216	1133
28						48	1725	1820	1737
28					66	77	1959	2119	2005
28		15			31	34	2132	2227D	2142
28	22	24	21	35	50	55	2227E	2330	2239
29	70	90	104	128*	107	121	0030	0251	0054
29			18	18	10		0310	0345	0314
29			18	10			0438	0520	0453
29		35	29	18	21		0637	0715	0646
29	106		265	134	64	47	0731	0921	0743
29			27				1113	1144	1119
29	27	21			117	128	2017	2142	2027
29		17		—	21	19	2205	2254	2220
29				—	12		2258	2321	2305
29		14		18	17	16	2336	2356	2344
30				4	6		0058	0127	0105
30	10	17		25	19	27	0204	0249	0213
30			15	14			0454	0553	0459
30			14			—	0539	0554	0543
30		36	14	6			0627	0654	0639
30		81	67	14			0821	0901D	0831
30	54		248	95			0901E	1105	0910

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