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IONOSPHERIC DATA IN JAPAN

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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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INTRODUCTION

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

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

A. IONOSPHERE

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

A1. Automatic Scaling

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

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

a. Characteristics of Ionosphere

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

b. Descriptive Letters

The following descriptive letters are used in the tables.

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

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

C Impossible measurement because of any failure in observation.

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

N Impossible automatic scaling because of complex echoes.

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

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

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

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

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

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

d. Reliability of Automatic Scaling

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

e. Summary Plot

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

A2. Manual Scaling

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

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

a. Characteristics of Ionosphere

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

b. Symbols

(i) Descriptive Letters

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

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

(ii) Qualifying Letters

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

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

(iii) Description of Types of *Es*

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

The types are:

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

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

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

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

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

B. SOLAR RADIO EMISSION

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

B1. Daily Data at Hiraiso

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

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

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

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

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

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

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

B2. Outstanding Occurrences at Hiraiso

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

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

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

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

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

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

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

C. RADIO PROPAGATION

C1. H.F. Field Strength at Hiraiso

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

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

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

C2. Radio Propagation Quality Figures at Hiraiso

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

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

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

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

C	artificial accident,
S	propagational accident,
U	inaccurate.

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

N	normal,
U	unstable,
W	disturbed.

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

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

C3. Phase Variation in OMEGA Radio Waves at Inubo

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

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

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

C4. Sudden Ionospheric Disturbances

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

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

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

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

Types of fade-out are as follows:

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

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

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

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

b. Sudden Phase Anomaly (SPA) at Inubo

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

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

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

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

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

Transmitting Stations

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

HOURLY VALUES OF FOF2 AT WAKKANAI

SEP.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	58	53	53	49	50	58	82	96	104	90	95	90	90		97	90	91		81	80	70	74	74	68
2	67	70	67	60	56	64	89	100	105	100	95	96	84	88	94				89	81	81	71	74	65
3		57	56	58	52		68	84	86	84	88	N	92		89	88	88	86		80	73	78	78	62
4	67	67	64	61	67	56	86	82	85	103	86		83	90	84	84			88	80	76	78	73	64
5	62	64	63	63	56	60	78	89	94		91	100	97	89	85	86	84	83	71	82	78	70	72	73
6	72	65	62	62		65	76	86	89	93	88	85	90	89	94	92	94	94	93	86	76	71		61
7	68	58	58	59	55	64		85	91	104	102	94	90	94	87			73	93	86	62	66	62	66
8	66	62	60	60	57	70	86	101	97	99	97	92		95	97	96	90	90	90	86	79	62	63	59
9	62	57	60	56	53	51	70	91	98	102	86	89	86	81	90	90	88	87	92		72	66	58	57
10		59	62	60	58	54	61	88	96	96	90	79	90	91	91	88		92	82	79			68	
11	60	62			55	51	67	97	119	97	88	84	82	84	87	90	78	86	92	92	89	90	72	63
12	64	56	52	49	49		67	61		67				N	64	67	71	73	70	64		54	52	44
13	43	46	46	53	44	53	67		76	69	73	89	84	88	82	86	88	89	86	62	66	62	58	58
14		51		53	55	53	72		90	87	91	86	82	90	90	86	87	72	78	74	70	65	62	
15	56	54	54	52	57	56	63	72	85	88	91	92	91	92	90		91	86	84		73	60		58
16		54	56	46	45	50	56	68	63	71	83	87	85	79	78	76	78	74	70		66	58	42	53
17	54	52	52	49	48	57	70	80	87	86	91	87	88	88	86	80	82	90	91	78	71			61
18	58	48				43	34		57	58							54	56	67	62	54		38	47
19	51	50	51	51	42	47	70	76	88	86	77	77	87	75	80	81	91	85	93	84	67	58	58	56
20	56	53	56	54	42	52	61	73	91	92	93	94	88	84	92	96	96	88	84	74	62	63	57	60
21	55		53	54	59	60	62	71	82	90	90	90	96	90	94	91	96	92	84	64	63	60	58	55
22	55	59	51	55	48	51	62	82	95	102	91			94	92	94	87	97	88	86	72	58	58	60
23	58	60	54	54	55	60	68	67	85	98	98	106	96	92	90	91	94	89	91	87	70	64	64	65
24	54	56	60	56	55	51	83	90	106	104	100	96	99	97	95	98	98	101	90	79	76	68	66	63
25	63	62	63	61		56	83	97	102	121	106	102	107	103	108	104	100	103	90	77	66	68	70	66
26	66	57	53	60	57	67	85	86	112	121	114	113	112	112	112	104	101	100	87	82	74		72	62
27	64	64	59	63	64	64	86	109	116	124	122								84	82	76	72	72	62
28	66	63	63	63	58	64	83	97	128	118	91		109	104	100	112	104	109	75	81	75	78	72	64
29	66	64		67	67	60	82	103	111	119	122											73	65	64
30	66	65	71	64	61	66	87	96	110	118	117	114	96	108	110	114	114	125	84	82	74	76	73	70
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	27	28	29	27	29	29	28	22	24	24	27	24	24	25	28	26	27	26	27	28
MED	62	58	57	57	55	56	70	86	94	97	91	91	90	90	90	90	90	89	86	80	72	67	65	62
U Q	66	63	62	61	58	64	83	97	105	104	99	96	96	94	95	96	96	95	90	84	76	73	72	64
L Q	56	53	53	53	49	51	65	76	85	86	88	87	85	88	86	86	85	84	81	77	66	62	58	58

HOURLY VALUES OF FES AT WAKKANAI

SEP.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	G	G	G	35	G	G	G	G	G	G		G	40	52	74	G	44	38	39	G	G
2	G	G	G	G	G	G	G	37	54	68	63	57	57	G	G				36	77	90	43	35	66
3		35	28	33	39		41	53	56	62	62	53	G		G	G	G	37		80	33	55	G	G
4	G	G	G	25	G	G	33	38	G	54	G		G	G	G	G			G	G	G	G	G	38
5	24	G	G	G	G	G	35	44	39		G	G	G	G	G	90	78	42	56	64	60	66	59	30
6	33	31	24	G		G	G	G	G	G	42	G	G	G	42	G	G	40	40	72	44	34		38
7	42	33	24	G	G	G		G	44	68	G	G	G	G	G		37	69	40	G	G	29	G	G
8	G	G	G	G	G	G	G	38	G	60	G	G		G	G	G	36	G	31	G	29	27	G	G
9	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		G	G	G	G
10		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		G	G	G			G	40
11	36	G			G	G	G	G	G	G	45	G	G	G	G	G	G	36	30	G	G	G	G	G
12	G	G	33	35	28		G	G		G		G	G	G	G	G	G	44	36	37		G	G	G
13	G	G	G	G	27	33	59	G	65	G	G	G	G	G	G	G	G	G	G	G	G	G	G	25
14		G		G	G	G	G		G	57	G	G	G	G	G	G	G	G	G	G	G	G	G	
15	G	G	G	G	G	G	33	G	40	G	G	G	G	G	G	G	G	G	G		33	34		G
16		G	82	G	G	G	44	45	39	G	G	G	G	G	G	G	G	G	G		G	27	24	G
17	G	G	G	G	G	G	G	G	60	G	G	G	G	G	G	G	G	G	G	G	G			G
18	G	29				G	G		38	49	G		G		G		G	34	33	G	G		G	G
19	G	G	G	G	36	G	G	G	G	G	G	G	44	G	G	39	62	G	G	31	G	26	G	G
20	G	G	G	G	G	36	G	G	G	G	G	G	G	G	G	41	42	G	G	G	G	G	G	G
21	G		G	G	G	G	G	45	G	G	G	G	G	G	G	G	G	48	40	G	G	G	G	G
22	G	G	G	G	G	G	G	G	G	G	G			G	G	G	G	G	G	32	G	G	G	25
23	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
24	G	G	G	G	G	G	42	G	39	G	G	G	G	G	G	G	G	39	G	G	G	G	26	G
25	G	G	G	G		G	G	G	G	53	G	G	G	G	G	G	G	37	41	G	38	G	G	G
26	G	G	G	G	24	G	G	35	G	G	G	G	G	G	G	G	G	G	G	G	G		G	G
27	G	G	G	G	G	G	G	G	G	G	G								G	G	G	G	G	G
28	G	G	G	G	24	32	31	43	G	G	G		G	G	G	G	G	30	G	G	G	G	G	G
29	G	G		G	G	G	G	G	G	G	G											G	G	G
30	G	G	G	G	G	G	48	48	G	G	G	G	G	G	G	G	G	G	24	35	27	G	G	G
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	29	26	28	27	28	29	28	29	29	29	24	26	25	28	25	25	26	28	26	27	26	27	29
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
U Q	G	G	G	G	G	G	34	38	39	51	G	G	G	G	G	G	18	39	34	35	33	29	G	13
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT WAKKANAI

SEP. 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	16	16	15	15	15	17	18	20	24	39	29	27	39		36	27	21	17	21	14	15	15	15	14
2	15	14	14	15	14	16	16	23	27	28	33	30	35	28	36				16	16	16	14	14	15
3		14	14	14	14		18	20	24	26	35	29	30		36	24	22	22		15	14	16	17	15
4	14	15	14	15	15	18	16	18	23	26	28		41	46	27	26			20	15	15	15	15	16
5	15	15	14	15	15	17	17	21	26		39	27	28	39	45	27	18	18	15	14	16	15	15	14
6	16	16	15	15		17	24	18	24	18	36	35	48	34	28	27	20	17	16	21	15	16		16
7	15	15	15	15	16	16		23	24	24	27	47	39	27	22		29	23	22	20	17	21	18	16
8	16	17	16	17	17	20	27	24	27	34	51	46		49	48	22	20	18	17	17	20	18	17	16
9	17	18	17	17	17	18	26	32	41	40	48	49	48	49	48	34	32	26	18		17	16	17	16
10		17	15	16	17	17	24	21	45	45	49	44	49	46	48	44		26	17	18			17	21
11	21	18			20	21	23	30	38	46	33	48	46	48	49	33	30	20	21	20	18	17	16	17
12	16	18	16	17	15		17	28		49		90	50	47	46	40	29	20	18	21		21	18	17
13	17	20	17	17	16	17	18	90	36	46	26	46	42	52	39	44	28	27	22	21	18	16	17	21
14		17		18	21	24	26		29	35	49	50	50	49	35	33	28	27	18	17	17	18	20	
15	18	18	15	18	16	20	18	29	28	45	47	48	50	39	42	40	28	26	17		18	18		17
16		17	29	17	16	16	22	26	33	35	53	49	46	47	43	33	29	20	21		18	28	27	26
17	21	18	16	18	17	20	24	30	29	35	44	48	49	52	49	36	30	24	20	18	18			20
18	17	20				21	23		30	24	80		90		50		29	20	17	16	17		22	20
19	16	17	17	18	17	17	29	29	34	48	48	46	38	50	49	28	22	24	18	15	18	17	16	17
20	17	20	16	20	16	20	24	28	40	44	46	46	48	46	38	32	23	22	18	17	16	16	16	16
21	16		17	16	17	18	22	18	33	43	46	45	44	46	41	28	30	22	20	20	17	18	23	17
22	17	18	16	17	17	21	24	28	39	40	44			43	43	39	20	23	15	15	15	15	16	16
23	16	15	17	15	15	16	26	29	39	35	44	39	40	36	40	32	27	18	16	15	16	16	15	15
24	16	15	16	15	15	17	20	21	23	39	40	47	39	40	38	33	27	17	15	15	15	15	17	17
25	16	16	16	17		16	27	29	41	33	50	46	42	43	39	34	20	18	20	18	17	17	20	17
26	16	14	15	15	15	17	23	21	26	40	44	49	48	42	38	33	27	26	15	16	15		16	15
27	16	15	15	15	15	16	23	30	23	27	27								15	15	16	16	15	15
28	15	15	15	15	15	17	22	23	39	30	45		42	38	39	20	18	17	16	16	15	16	15	14
29	15	15		15	15	15	21	28	21	38	43											15	15	16
30	16	15	14	15	14	15	17	28	39	36	38	44	42	27	35	33	22	23	16	14	16	15	15	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	26	29	26	28	27	28	29	28	29	29	29	24	26	25	28	25	25	26	28	26	27	26	27	29
MED	16	16	16	16	16	17	23	27	29	36	44	46	43	46	40	33	27	22	18	16	16	16	16	16
U Q	17	18	16	17	17	20	24	29	39	43	48	48	48	48	47	35	29	24	20	18	18	18	18	17
L Q	16	15	15	15	15	16	18	21	24	29	34	41	39	38	36	27	20	18	16	15	15	15	15	15

HOURLY VALUES OF FOF2 AT AKITA

SEP.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	52	58	53	52	52	60	84	89	90	108	93	91	94	90	102	97	97	92		66	65	A	76	73
2	66	66	68	66	62	64	85	102	99	87	101	97	98	90	96	90	88	99		74	66	71	70	70
3	68	64	A	A	56	60	78	90	96	90	86	97	103	90	90	90	84	87	88	72	A	A	78	66
4	54	67	63	67	60	63	86	97	87	91	97	100	93	91	90	90		82	84	84	80	66	78	66
5		66	66	66	58		76	106	97	101	92	101	97	97	86	88	85	85	86	66	79	66	71	66
6	73	54	67	64	54	67	82	86	85	92	99	98	98	94	93	97	107	98	88	85	56	52	65	65
7	52	66	52	62	62	66	78	88	97	102	103	108	104	96	103	104	111	84	88	83	52	66	54	72
8	64	54	64	64	62	62	85	102	104	98	100	107	104	112	107	112	103	97	91	84	82	66	54	66
9		64	63	65	54	53	66	97	90	90	88	86	90	91	88	97	93	85	88	82	66	63	66	66
10	52	66	68	64	52	52	72	87	102	88	90	90	90	88	89	87	93	84	89	79	78	72	74	66
11	52	60	58	54	52	52	68		126	102	82	83	92	92	86	88	81	84	89	88	84	86	66	
12	67	58	63	55	52	52	73	71	64	83	91	90	90	78	83	78	N	84	88	58	A	53	54	52
13	48	46	48	47	40	46	62	66	91	88	92	84	90	93	90	84	87	89	88	66	58	52	54	61
14	52	52	58	54	52	49	70	97	96	104	96	93	90	86	89	89	88	86	82	80	66	54		63
15	63	52	54	54	51	53	66	81	93	85	90	90	104	102	92	90	98	91	87	82	72	52	52	52
16	53	54	52	48	47	50	67	78	86	86	92	104	102	93		78	83	86	80	72	66	53	A	48
17	50	52	49	52	50	51	73	83	86	94	86	100	102	93	90	88	88	91	87	83	72	65	54	66
18	52	52	51	37	49	45	52		52	64	60	59		61	61	62	65	70	67	72	59	42	46	42
19	50	47	50	47	44	48	58		89	84	78	76	80	88	86	90	108	97	88	77	62	52	51	52
20	53	48	48	50	49	46	64	82	90	102	99	84	96	94	97	98	44	86	87	80	63	59	53	52
21	57	52		52	50	52	68	79	87	90	94	92	101	102	98	98	102	103	86	63	59	58	52	53
22		52	51	50	48	52	68	86	103	104	102	103	112	90	97	100	88	106	92	87	63	52	53	58
23	52	62	52	53	52	52	77	86	90	111	111	114	110	103	97		100	101	86	86	69	62		63
24	52	52	53	51	C	C	C	C	C	C	102	101	104	107	105	106	107	108	95	80	78	66	67	66
25	69	54	64	63	52	58	84	88	103	108	115	110	109	108	106	108	109	103	86	79	66	64	66	68
26	52	62	58	52	65	65	82		113	121	114	116	111	114	112	112	103	92	86	66	66	72	72	67
27	67	69	66	66		64	86	111	111	121	114	122	126	118	117	108	108	103	87	70	52	71	66	66
28	65	62	67	66	57	59	80	107	112	119	108	111	120	108	110	110	112	102	80	71	66	67	65	65
29	54	68	54	66	63	62	76	88	102	110	112	117	113	109	104	109			86	72	66	77	66	52
30	60	62	63	54	54	52	53	97	100	103	112	114	110	94	109	110	114	110	84	A	66	68	66	64
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	30	28	29	28	28	29	25	29	29	30	30	29	30	29	29	27	29	28	29	28	28	27	29
MED	53	58	58	54	52	52	73	88	96	98	96	99	102	94	96	97	97	91	87	79	66	64	66	65
U Q	65	64	64	64	57	62	82	97	102	106	103	108	109	103	104	107	107	101	88	83	72	67	70	66
L Q	52	52	52	51	50	51	66	82	88	88	90	90	92	90	89	88	87	85	86	70	62	53	54	52

HOURLY VALUES OF FES AT AKITA

SEP.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	30	G	G	G	G	G	38	52	47	52	57	49	G	45	G	49	73	38		31	48	58	57	38
2	34	32	33	29	G	G	34	G	51	66	67	G	56	44	G	40	46	58		31	G	24	68	82
3	48	46	94	90	59	37	35	46	50	48	82	61	G	G	G	54	G	42	40	29	85	59	58	46
4	38	31	G	G	26	24	34	41	46	58	G	49	46	50	52	G		44	67	29	39	G	27	29
5	30	25	G	G	G		G	48	49	45	50	52	G	57	50	60	43	68	34	26	40	32	30	29
6	29	28	G	G	G	G	33	40	G	G	G	55	54	50	G	G	55	51	41	65	58	30	30	30
7	23	G	G	G	G	G	31	48	56	47	G	58	62	58	G	41	40	36	29	33	48	28	G	G
8	30	24	G	G	G	G	32	36	G	G	43	59	G	G	52	46	41	51	29	37	26	28	26	30
9		G	G	G	G	G	G	37	G	G	G	G	G	G	42	G	37	31	G	G	G	G	G	G
10	G	G	G	G	G	G	30	G	G	G	G	G	G	G	G	45	44	46	G	G	93	40	34	G
11	G	G	G	G	G	G	30		G	G	G	59	G	G	G	G	40	37	28	31	G	27	G	33
12	28	G	G	27	31	29	34	40	41	44	G	G	G	43	47	41	59	57	41	50	69	40	32	G
13	G	G	G	G	G	30	41	45	92	60	79	54	45	54	G	G	44	33	32	27	29	28	G	30
14	G	G	27	G	G	G	G	37	G	50	48	G	G	G	42	G	42	G	G	35	38	30	38	24
15	24	25	G	24	G	G	29	38	43	G	G	G	G	G	G	G	G	G	G	G	32	44	G	G
16	31	23	27	G	G	G	G	49	50	58	48	G	G	G		G	G	34	G	G	G	G	36	29
17	32	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	25	28	G	24	29	28
18	32	26	G	G	G	G	36	40	40	G	G	69	G	G	48	G	G	32	31	28	G	G	G	G
19	G	G	G	G	32	G	G		G	48	G	G	G	G	G	G	G	34	33	30	29	G	G	G
20	G	G	G	G	24	G	50	50	45	G	78	61	61	54	G	44	G	37	32	56	45	36	G	G
21	G	G		G	G	G	G	G	44	57	55	G	G	54	G	G	G	G	G	29	48	41	38	31
22	23	26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	36	34	33	G	G	G	G
23	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		G	31	27	G	24	24		G
24	G	G	G	G	C	C	C	C	C	C	62	G	G	G	G	G	40	32	31	G	G	22	G	G
25	G	G	G	G	G	G	G	37	G	G	G	G	G	G	G	41	34	29	G	G	G	G	G	G
26	G	G	G	G	G	33	29	G	40	G	G	G	G	G	45	G	G	34	28	G	G	G	G	G
27	G	G	G	G		G	32	G	G	G	G	G	G	G	G	G	G	31	G	G	G	G	G	G
28	G	G	G	G	G	G	29	47	51	48	G	G	G	G	G	G	G	30	G	G	G	G	G	G
29	G	G	G	G	G	G	G	G	G	G	43	G	G	43	41	48			G	G	G	G	G	G
30	G	G	G	G	G	G	G	G	38	G	G	G	G	51	55	85	66	68	69	46	30	32	30	25
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	29	30	28	28	29	27	29	29	30	30	30	30	29	29	28	29	28	30	30	30	29	30
MED	G	G	G	G	G	G	29	37	40	G	G	G	G	G	G	G	36	34	28	28	28	26	G	G
U Q	30	25	G	G	G	G	34	46	48	49	50	54	G	50	43	44	43	45	33	33	45	32	33	30
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	31	G	G	G	G	G	G

HOURLY VALUES OF FMIN AT AKITA

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

SEP.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		52	57	59	52	60	87	103		107	96		102	96	98	102	94	95	94	71	65	66	72	74
2		76	68	67	56	68	88	106	98	97		106	103	100	99	102	103	104	97	81	67		72	61
3	73	70	71		57	53	87	102	97	94	92	102	105		100	97	89	92	87	72	71	74	73	
4	72	66	65	65	58	60	83	93	92	96	96	104	102		97		95	88	89	84	80	69		75
5	72	72	72	72	67	68	84	101	100	101	105	108	98	92	98	92	84	90	96	82	78	86		78
6	81	72		69	65	67	84	86	90	94	101	100	99	100	102	103	107	105	95	85	66	71	76	74
7	98	68	68	61	58	67	75	97	114	104	102	114	114	112	110	84	112	105	106	78	49	67	72	76
8	71	71	70	67		63	85	106	106	94	101	111	123		121	121	116	110	110	97	86	79	72	71
9	68	68	69	66	52	58	82	101	93	83	81	86	91	96	92	98	95		98	81	68	69	71	71
10	66	72	70	75	56	49	76	95	104	84	89	94	89	89	97	96	100	94	92	86	76	74	77	
11	66	63	60	56	52	57	72	114	116	101	83	81	97	92	85	92	88	84	87	99	92	87	64	65
12	68	67	57	57	56	63	72	86	75	102	116	126	109	104	93	83	84	90	95	58			52	55
13	52	47	46	50	51	43	71	79	92	102	91	92	86	86	96	91	96	86	92	78	62	57	58	69
14	54	63	57	56	52	54	73	90	102	102	100	106	104	94	97	85	96	89	93	80	65	68	61	64
15		52	54	49	53	56	70	92	102	90	85	94	102	108	104	104	104	115	97	83	68	50	55	54
16	57	57	54	48		54	82	84	102	93	86	108	118	111	92	85	82	91	84	76	58	46	54	51
17	56	53	49	54	48	49	74	88	77	101	102	116	121	112	104	100	98	101	100	84	72	73	69	71
18	69	59	52	57	48	48	73	77	74	78	67		68	67	67	64	64	75	78	74	89	48	49	44
19		48	51	50	39	47			92	91	79	73	84	85	89	97	110	112	96			56	51	55
20	54	52	52	54	48	45		86	87	102	96	95		110	110	105	111	104		72	66	60	62	58
21	54	55	57	55	55	47		96	90	94	97	101	110	108	108	106	106	108	97	66	56	57	54	
22	60	58	68	54	51		66	91	114	104	104	103	116		105	106	106	109	102	92		72	58	62
23	59	64	60	N	54	56	76	96	100	91	119	122	114	112	111	99	103	106	104	87	82	67	71	
24	58	54	57	56	56	57	81	102	101	103	100	113	107	114	111	107	108	115	98		69	67	70	70
25	67	67	70	67	61	61	88	88	100	102	111	112	110	111	117	116		105	101	84	71	71	71	
26	63	53	52	59	66	60	85	112	115	107	118	126			122	112	110	98	100	81	70	71	73	71
27	64			63	59	57	90	116	118	114	122	117	136	138	132	118	116	117		65	63	70	72	66
28	70	N		62	54	57	85	104	100	120	117	120	123	120	115	116	114	114				77	71	66
29	64	69	62	60	68	52	86	84	101	110	114	118	122	112	113	110	114	87	93	74	76	78	70	67
30	66	66	67	59	54	91	93	88	111			118	114	112	115		112	112	87		73	71	68	67
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	28	27	28	28	29	27	29	29	29	28	28	28	25	30	28	29	29	27	26	26	28	28	25
MED	66	64	60	59	54	57	82	95	100	101	100	107	106	108	103	101	103	104	96	81	70	70	70	67
U Q	70	68	68	65	58	62	86	102	105	103	108	116	115	112	111	106	110	109	100	84	76	73	72	71
L Q	58	53	54	54	52	50	73	87	92	93	90	97	98	93	97	92	94	90	92	74	65	63	58	59

HOURLY VALUES OF FES AT KOKUBUNJI

SEP. 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	58		24	G	G	24		40	42	51	G		G	G	49	47	51	116	59	82	61	59	38	41
2	51	44	29	32	32	G		G	G	G		52	58	50	49	45	53	47	38	30	31	37	32	30
3	25	G	G	24	G	G	34	38	66	47			G		44		44	40	31		51	G	46	G
4	G	G	23	30	31	G		54	50	54	58	49	G	46	G		G	38	49	40	40	34	44	27
5	29	24	24	23	G	G		G	G	G	G	54	49	53	55	G	44	55	54	43	40	33	34	G
6	24	G		G	G	G	31	G	44	G	50	58	64	52	G	54	50	42	40	44	32	G	31	32
7	30	G	G	G	26	G	30	36	81	53	G	G	G	G	G	G	55	58	40	50	52	39	29	G
8	G	G	G	G	G	G	G	37	G	G	G	G	G		43	48	47	36	26	23	24	41	33	31
9	G	G	G	G		G	29	G	G	G	G	G	G	G	G	G	G		26	G	G	G	G	G
10	G	G	G	G	G	G	31	41		G	44	G	46	G	G	60	54	48	30	33	G	30	28	
11	G	G	G	G	G	G	31	36	40	G	G	G	G	G	G	G	G	36	44	29	G	32	31	32
12	29	26	29	G	24	37	53		41	44	G	G	G	G	G	G	G	G	38		55	53	47	32
13	28	G	G	G	G	G	51	57	50	47	56	61	46	47	G	G	G		54	33	32	24	31	28
14	28	25	24	G	G	G		39	42	G	44	48	G	G	G	G	G	37	58	49	40		24	24
15	24	25	24	G	G	G		G	48	G	44	G	58	G	G	G	G		34	25	G	G	34	44
16	28	25	G	G	G	G	G	G	46	50	57	57	G	G	G	G	G	50	G	G	G	G	G	G
17	28	37	36	28	27	G			43	G	G	G	G	G	G	G	37	37	36	40	41	28	24	31
18	24	30	36	G	G	G	32	38	40	G	58	G	G	G	G	G	G	G	29	32	118	G	28	G
19	G	G	G	G	G	G	32	G	G	G	48	G	G	G	G	G	G	35	28	40		28	G	G
20	G	G	G	G	28	28	30	G	82	59	G	G	G	G	G	G	40	40		G	38	33	G	G
21	G	G	G	G	G	G	G	G	G	52	50	53	55	76	50	G	36	32	G	26	G	G	G	32
22	27	G	G	G	G	G		34	G	G	G	G	G		44	G	G	36	30	29	G	28	G	G
23	G	G	G	G	G	G	G	35	39		G	G	G	G	G	G	G	34	25	23	24	G	G	G
24	G	G	G	G	G	G	32	G	G		47	G	G	G	G	G	G	34	27		G	G	G	G
25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	36	31	G	G	G	G	G	G
26	G	G	G	G	G	G	43	G	G	G	G	G		G	G		G	29	24	G	G	G	G	G
27	G	G	G	G	G	G	30	G	G	G	G	G	G	G	G	G	G	33		G	G	G	G	G
28	G	G		G	G	23	30	38		G	G	G	G	G	G	40	46	32	29		G	23	G	G
29	G	G	G	G	G	G	G	G	G	G	G	52	44	G	50	49	37		34	34	35	G	G	G
30	G	G	G	G	G	G	30	58	49	68	98	G	46	43	59		57	64	60	73	53	34	31	33
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	29	28	30	29	30	22	28	28	28	28	28	29	27	30	26	30	26	28	26	29	29	30	29
MED	G	G	G	G	G	G	30	18	40	G	G	G	G	G	G	G	18	36	32	31	31	24	26	G
U Q	28	24	24	G	G	G	32	38	47	48	49	50	46	43	44	40	46	47	42	40	40	33	32	31
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	33	26	23	G	G	G	G

HOURLY VALUES OF FMIN AT KOKUBUNJI

SEP.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	18	15	16	15	16	15	16	21	20	32				23	21	18	17	16	15	16	15	16	14
2	14	14	14	14	14	15	16	15	18	21		32	32	30	29	24	17	15	16	15	14	18	15	15
3	15	14	14	15	15	26	16	18	18	27	20		29		27	17	16	17	16	15	15	15	15	17
4	15	15	14	14	14	16	18	16	16	18	21	23	33	38	16		18	16	15	15	14	15	18	14
5	15	15	14	15	14	15	15	16	21	24	28	30	33	30	27	18	17	15	14	15	15	15	15	16
6	16	16		17	15	15	15	16	18	24	21	22	14	27	23	21	17	15	14	15	14	15	16	15
7	15	15	14	14	14	15	15	16	18	24	26			29	26	44	17	15	14	15	14	15	14	15
8	15	15	14	15	14	15	24	16	21	24			23		20	21	16	14	17	15	15	16	15	15
9	15	14	15	15	22	15	15	15	20	24	22	30	28	23	28	18	16		17	22	15	15	15	15
10	15	15	14	14	14	14	18	16	16	20	26	24	26	24	22	17	16	16	14	14	15	15	16	
11	15	14	15	14	14	15	15	16	17	22	22		28	23	21	17	17	15	14	14	16	14	15	14
12	14	15	15	15	16	15	15	16	18	21		27		18	20	18	16	15	15	15	15	15	15	15
13	15	15	18	15	14	15	15	16	20	24	24	21	22	23	27	21	20	15	15	15	15	15	15	15
14	15	15	15	14	15	15	16	16	18	22	23	22	21	28	27	17	16	15	15	14	14	15	15	16
15	15	14	16	15	16	15	15	17	18	23	23	53	22	21	18	20	22	16	16	16	17	16	16	15
16	15	16	23	16		15	27	17	18	32	34	27	30	26	22	15	16	16	41	14	14	15	16	17
17	15	16	15	15	16	15	14	17	16	26	29	29	29	29	22	18	16	14	14	14	14	15	15	15
18	15	14	17	15	18	15	16	14	20	18	29		28	22	20	17	15	15	15	15	16	15	15	16
19	18	15	14	15	15	15	17	15	17	17	18	28	20	20	18	17	15	16	15	15		15	15	14
20	15	15	15	15	14	14	14	22	21	22	23	29	24		22	18	16	15		14	15	15	15	16
21	17	15	15	15	15	15	15	17	17	23	29	23	38	35	22	18	16	16	15	15	16	15	17	16
22	15	16	16	14	15	14	14	15	18	15	39	40	26		23	16	16	16	14	15	15	16	15	16
23	15	15	15	16	15	14	17	14	17	20	39	26	24	23	21	20		15	16	15	14	15	15	15
24	15	14	14	15	15	15	17	14	18	14	36	18	18	30	22	22	16	15	14		15	14	15	15
25	15	15	14	14	15	15	17		20	26				39	23	21	15	15	15	14	15	15	15	15
26	21	18	15	14	14	14	15	16	22	24	32	63		26	21		16	15	15	15	16	15	14	15
27	14	14	14	15	15	15	17	15	17	20	29	39	39	39	24	20	17	16		15	14	15	15	15
28	15	15		15	14	15	15	16	18	20	24	30	33	27	24	16	16	16	14		21	15	15	15
29	15	15	15	14	15	15	21	15	17	28	27	26	32	27	18	33	15	15	15	15	15	15	15	15
30	15	14	14	14	15	15	15	16	22	22	23		30	26	26		16	15	14	15	15	15	14	15
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	28	30	29	30	30	29	30	30	26	22	25	25	30	27	29	29	28	28	29	30	30	29
MED	15	15	15	15	15	15	15	16	18	22	26	28	28	27	22	18	16	15	15	15	15	15	15	15
U Q	15	15	15	15	15	15	17	16	20	24	29	30	32	30	26	21	17	16	16	15	15	15	15	16
L Q	15	14	14	14	14	15	15	15	17	20	23	23	22	23	21	17	16	15	14	14	14	15	15	15

HOURLY VALUES OF FOF2 AT YAMAGAWA

SEP.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	66	69	A	63	57	61	80	89	86	96	96	58	112	108	113		105	104	98	81	66	A	74	39
2	74	78	80	66	66	62	78	103	84	93	93	105	110	108	109	112	117	116	96	86	80	69	75	79
3	71	71	74	67	66	63	76	88	90	94	83	98	114	111	111	108	102	95	85	84	82	80	76	83
4	81	76	72	68	66	60	78	88	86	86	96	104	101	96	106	110	102	108	104	93	81	75	78	79
5	71	73	71	66	59	62	66	90	103	101	72	105	103	107	113	107	95	100	108	104	84	77	84	86
6	88	86	66	67	64	58	68	80	90	87	92	110	108	108	108	114	111	107	111	88	80	80	84	86
7	81	84	80	78	66	54	66	85	104	102	101	112	115	116	120	127	125	116	111	104	88	81	77	81
8	84	80	82	79	66	60	66	89	102	91	96		127	124	122	120	118	116	124	124	91	89	81	76
9	82	78	73	71	62	53	59	86	90	80	81	95	106	108	107	102	105	103	106	88	80	78	82	84
10	80	80	83	78	52	45	54	86	108	80	84	96	106	111	105	109	109	110	108	102	84	86	72	80
11	70	66	68	66	57	54	54	102	107	99	82	84	101		104	102	95	90	97	113	110	82	67	42
12	71	66	54	50	54	53	66	108	81	90	122	118	118	124	125	98	93	100	104	76	A	A	53	A
13	52	41		54	46	33	50	80	88	92	92	91	103	116	112	111	110	102	104	84	71	34	64	62
14	64	66	57	54	52	47	59	86	90	83	92	114	124	110		100	107	106	105	85	67	64	59	64
15	66	52	45	48	48	42	54	89	99	90	86	102	112	118	117	112	119	128	110	97	76	70	43	57
16	70	66	60	54	N	49	62	88	86	93	102	118	125	129	116	108	110	110	115	78	66	58	63	60
17	59	54	52	51	52	49	65	83	92	87	110	122	134	132	130	126	111	116	111	96	82	79	67	66
18	66	67	57	58	53	44	52	77	88	121	114	117	118	84	83	83	87	86	96	86	65	58	46	52
19	42	54	58	47	42	38	52	80	97	87	77	81	97	112	109	116	121	130	111	85	87	66	64	63
20	62		53	54	44	N	54	88	88	90	91	100	108	117	118	117	113	123	127	88	64	66	68	64
21	54	62	63	57	54	44	52	78	94	97	85	105	118	130	134	130	122	126	116	85	65	71	76	78
22	77	76	76	57	58	47	51	88	117	107	88	114	118	132	122	122	118	122	130	103	85		69	75
23	80	76	73	58	59	58	61	87	104	106	117	127	134	118	126	116	116	112	106	104	97	75	64	66
24	68	54	63	59	58	58	64	89	106	100	101	114	116	126	130	125	114	117	121	88	75	76	77	76
25																								
26																								
27											116	135	151	163	162	147	138	122	104	79	65	73	74	77
28	66	66	59	59	52	51	62	87	110	108	110	120	132	138	139	136	127	118	116	90	84	85	82	78
29	66	69	67	57	54	54	63	88	93	106	108	126	137	137	130	130	124	122	126	105	88	88	88	86
30	98	79	80	66	61	53	58	87	104	89	100	121	128	129	125	120	122	122	112	86	78	78	77	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	27	26	25	27	26	26	27	27	27	27	28	27	28	27	27	27	28	28	28	28	27	25	28	27
MED	70	69	67	59	57	53	62	88	93	93	94	110	116	117	117	114	112	114	109	88	80	76	74	76
U Q	80	78	75	67	62	58	66	89	104	101	105	118	126	129	126	125	120	122	115	102	85	80	77	81
L Q	66	66	57	54	52	47	54	85	88	87	85	98	107	108	109	108	105	103	104	85	67	67	64	63

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

SEP.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	32	30	33	25	G	G	G	36	42	46	46	G	G	G	G		68	68	40	63	48	112	65	34
2	33	32	25	31	28	G	G	35	44	55	48	G	54	G	46	44	54	59	43	59	33	40	25	32
3	25	G	G	G	G	23	G	G	50	G	44	G	72	66	56	62	58	55	61	33	53	26	31	38
4	43	30	28	28	G	G	G	48	43	46	G	61	82	G	G	44	44	37	39	58	24	39	24	37
5	38	23	G	G	G	G	32	G	46	51	79	100	53	G	93	44	G	36	34	30	G	G	G	41
6	G	26	26	G	G	29	30	35	41	48	52	56	45	54	68	49	53	68	70	69	38	59	G	G
7	23	G	G	G	G	G	25	32	42	42	G	G	50	G	G	42	46	41	46	29	G	37	37	34
8	29	26	G	G	G	G	G	32	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
9	G	G	G	G	G	G	G	G	G	G	G	G	G	G	57	G	48	42	43	G	G	G	26	G
10	G	G	G	G	G	G	29	43	43	47	56	G	52	57	66	64	68	58	59	60	40	G	24	G
11	G	G	G	G	G	G	G	40	43	45	48	46	G	G	G	G	44	40	36	28	29	24	G	G
12	38	29	G	G	G	25	37	46	59	58	44	45	G	G	G	52	39	40	94	30	69	56	35	48
13	26	37	34	29	27	25	G	G	39	50	84	60	68	64	66	G	G	45	39	45	43	28	58	28
14	38	27	36	34	32	30	24	33	40	44	43	45	G	G	58	G	G	38	35	29	37	G	G	24
15	G	24	24	G	G	G	G	32	40	49	46	G	46	G	G	G	G	38	41	60	28	32	31	G
16	32	G	G	G	G	G	G	G	40	43	G	49	49	G	48	46	39	G	G	G	G	G	G	32
17	32	G	G	29	25	G	G	32	43	47	48	G	G	G	G	G	G	G	31	34	G	G	34	33
18	G	G	24	G	G	23	26	34	41	46	56	G	G	G	G	G	40	G	G	32	G	G	G	G
19	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	39	G	30	G	G	32	G	24
20	G		G	28	34	30	28	33	41	48	44	G	G	G	G	G	44	42	52	65	32	G	G	G
21	G	G	G	G	G	G	G	G	41	48	G	50	54	G	52	58	47	35	31	G	32	24	33	30
22	37	G	G	G	G	G	24	G	38	41	44	48	G	G	G	G	41	37	29	28	50	43	30	30
23	G	G	G	G	G	G	G	G	G	42	G	G	45	G	G	42	38	G	28	24	G	30	G	G
24	G	G	G	G	G	G	G	32	41	50	G	G	G	G	G	G	G	G	28	G	G	G	G	G
25																								
26																								
27											G	G	G	G	44	G	44	46	28	G	G	G	G	G
28	G	G	G	G	G	G	G	33	40	43	44	46	G	G	50	44	47	G	32	52	39	29	25	G
29	G	G	G	G	G	53	37	G	G	G	G	G	52	G	58	G	42	44	39	28	28	48	26	G
30	G	G	G	G	G	G	G	34	45	79	60	46	56	G	52	50	82	50	35	25	31	G	G	G
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	26	27	27	27	27	27	27	27	27	28	28	28	28	28	27	28	28	28	28	28	28	28	28
MED	G	G	G	G	G	G	G	32	41	46	44	G	23	G	22	G	43	39	36	30	28	25	24	12
U Q	32	26	24	25	G	23	26	35	43	49	48	47	52	G	56	46	47	45	43	55	38	38	31	32
L Q	G	G	G	G	G	G	G	G	39	42	G	G	G	G	G	G	19	G	29	12	G	G	G	G

HOURLY VALUES OF FMIN AT YAMAGAWA

SEP.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	15	15	15	15	15	15	15	16	17	24	24	35	23	39		17	15	15	15	15	15	15	15
2	15	15	16	15	15	15	18	16	16	18	32	34	33	34	32	22	22	20	15	15	15	15	15	15
3	15	15	15	15	15	15	16	16	17	18	22	28	40	39	40	22	22	18	15	15	15	15	15	15
4	15	15	15	16	16	15	18	15	15	17	20	28	30	26	43	24	26	17	18	16	15	15	16	15
5	15	15	15	15	15	15	15	15	17	17	22	36	23	41	32	21	18	16	15	15	15	15	15	15
6	15	16	15	15	15	15	15	15	17	17	36	39	28	28	22	22	17	15	15	15	15	15	15	16
7	16	15	15	15	15	15	16	15	17	20	24	44	44	34	39	20	21	16	16	15	15	15	15	15
8	15	15	15	15	15	15	16	16	16	21	39	40	21	23	24	20	17	18	16	15	15	15	15	16
9	15	15	15	15	15	15	16	16	17	20	22	38	45	32	21	18	16	16	15	15	15	15	16	16
10	15	15	15	15	15	15	15	16	16	20	20	34	24	23	22	18	16	15	15	15	15	15	15	17
11	15	15	15	15	15	15	15	15	16	20	20	33	30	33	27	21	18	16	15	16	15	15	16	15
12	15	15	16	15	15	15	15	15	16	22	22	32	39	23	23	17	16	15	15	15	16	15	15	15
13	15	15	15	15	15	15	16	16	16	18	29	29	32	22	18	18	15	16	15	15	15	15	15	15
14	15	15	15	15	15	15	16	16	16	17	22	20	20	23	18	17	18	16	15	15	15	15	15	15
15	15	15	15	16	15	15	16	15	17	17	27	20	20	17	17	23	17	16	15	15	16	16	16	15
16	15	15	15	15	16	15	16	17	17	18	21	29	36	20	33	17	15	15	20	15	15	15	16	15
17	15	17	15	15	15	15	15	15	17	18	22	33	40	17	16	16	15	15	15	17	17	18	15	15
18	15	15	16	15	15	15	15	16	15	17	22	22	22	41	41	17	20	17	16	15	16	15	16	15
19	15	15	15	15	15	15	16	15	16	18	24	41	40	24	40	22	17	16	15	15	15	15	15	15
20	15		16	15	15	15	15	15	16	20	24	29	32	27	27	23	18	16	15	16	15	15	15	16
21	16	15	15	15	15	15	16	16	18	23	35	36	35	34	27	22	17	16	15	15	15	16	15	15
22	15	15	15	15	15	15	15	15	16	18	28	32	44	41	40	36	18	16	15	15	15	15	15	15
23	15	15	15	15	15	15	16	15	17	22	40	23	42	28	24	20	16	16	15	15	15	15	16	15
24	15	15	15	15	15	15	15	16	16	20	39	40	40	45	28	36	18	17	15	15	15	15	16	15
25																								
26																								
27											39	40	44	20	20	17	21	16	15	15	15	15	15	15
28	15	15	15	15	15	15	15	16	16	21	29	38	33	35	22	17	17	16	16	15	15	15	15	15
29	15	15	15	15	15	15	15	15	16	22	23	26	43	26	23	39	18	16	15	15	15	15	15	16
30	15	15	15	15	15	15	15	15	17	22	35	36	35	41	38	26	18	17	15	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	27	26	27	27	27	27	27	27	27	27	28	28	28	28	28	27	28	28	28	28	28	28	28	28
MED	15	15	15	15	15	15	15	15	16	18	24	33	35	28	27	21	18	16	15	15	15	15	15	15
U Q	15	15	15	15	15	15	16	16	17	21	33	38	40	34	38	23	18	16	15	15	15	15	16	15
L Q	15	15	15	15	15	15	15	15	16	17	22	28	29	23	22	17	16	16	15	15	15	15	15	15

HOURLY VALUES OF FOF2 AT OKINAWA

SEP.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	80	78	67	59	60	63	72	81	77	96	105	104	123	128	N	134	123	112	104	85	79	A	78	81
2	84	84	86	80	60	52	65	89	85	84	94	105	119	121	120	135	134	111	104	103	88	82	86	86
3	85	76	84										120	135	135	131	122	102	105	106		85	82	88
4	88											105	105	105	113	108	121	120	108	87	84	82	76	78
5	78	79	80	65	60	61	60	85	103	112	96	106	112	116	125	128	115	121	122	110	111	90	128	145
6	144	130	88	80	64	61	66	77	90	94	97	105	121	121	127	120	116	118	111	104	67	142	161	168
7	141	170	145	110	86	51	56	85	90	91	107	109	128	127	139	145	146	122	104	A	126	90	110	88
8	134	80	130	89	66	54	60	87	94	93	94	111	132	138	128	130	136	143	143	130	111	126	88	88
9	86	137	146	110	85	55	56	82	88	75	89	100	111	118	121	112	111	110	106	90	83	89	86	103
10	86	86	86	85	62	42	49	83	66	86	87	110	126	142	124	112	121	120	122	108	111	88	86	84
11	90	85	84	81	66	66	59	88	101	91		107	110	133	134	117	111	107	106	100	104	A		66
12	78	80	50	51	60	51	65	108	84	70	137	128	134	146	164	145	139	126	110	88	76	75		53
13	72		64	52		34	42	56	89	102	96	112	144	162	163	146	124	112	108	88	72	58	A	60
14	66	75	67	56	54	48	53	86	94	85	97	126	158	163	153	142	121	128	110	88	74	69		80
15	77	80	60	54	50	52	61	96	89	85	93	116	120	134	145	142	146	147	120	104	90	88	90	86
16	87	89	83	74	65	62	78	86	85	96	105	111	140	143	162	162	165	167	163	88	91	88	86	83
17	84	82	80	77	76	62	54	80	87	96	106	119	132	160	164	158	146	146	140	107	88	88	86	82
18	82	78	75	57	54	36	43	74	90	114	102	128	132	100	102	111	107	102	104	104	90	75	64	66
19	52	64	66	46	43	43	43	85	100	88	80	93	105	130	137	138	145	147	137	110	140	89	108	90
20	88	86	79	69	55	37		80	88	90	86	104	121	128	131	121	122	134	143	105	88	90	88	78
21	84	76	67	69	60	48	43	80	88	96	90	102	134	146	152	148	159	158	144	128	140	165	168	169
22	138	145	107	88	60	34	54	87	109	107	104	118	155	164	164	162	161	154	152	122	120	132	110	109
23	122	110	84	80	66	80	53	83	102	113	121	138	162	165	157	146	144	130	124	131	130		86	87
24	88	83	84	84	66	58	62	88	102	102	87	118	N	145	145	145	143	143	130	88	88	88	86	86
25	84	85	79	74	59	57	54	82	88	97	113	120	137	150	165	164	157	145	142	142	162	144	164	166
26	145	142	108	111	87	87	84	131	102	103		141	157	168	175	170	148	138	122	89	104	84	86	86
27	87	85	88	83	66	54	62	90	101	107	121	145		178	175	174	171	145	104	103	88	88	86	110
28	103	88	84	68	54	48	37	88	105	111	N	127	148	175	176	158	172	168	164	146	145	144	147	128
29	101	110	110	68	58	50	52	80	96	103	105		159	164	167	162	145	146	158	162	164	163	161	178
30	140	129	141	87	66	54	54	82	88	90	100	118	135	141	140	139	136	140	131	104	90	110	90	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	28	29	28	27	28	27	28	28	28	25	28	28	30	29	30	30	30	30	29	29	27	26	30
MED	86	85	84	76	60	53	56	85	90	96	97	112	132	142	145	142	138	132	122	104	90	88	87	86
U Q	103	110	97	84	66	61	62	88	101	103	105	123	142	162	164	158	146	146	142	116	123	126	110	110
L Q	82	79	71	62	58	48	52	80	88	89	91	105	120	128	127	128	121	118	106	88	86	84	86	81

HOURLY VALUES OF FES AT OKINAWA

SEP.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	24	28	26	28	G	G	G	37	45	64	71	49	G	G	G	44	51	57	44	39	G	32	G	39
2	38	26	26	25	G	G	G	32	40	46	51	56	49	54	70	77	61	88	55	31	70	40	29	29
3	G	G	G										G	58	58	55	47	52	39	28		28	G	G
4	G											G	G	G	56	49	52	61	43	33	33	28	24	G
5	G	G	G	G	G	G	G	35	55	49	66	88	85	68	G	G	G	37	30	26	11	G	G	G
6	36	25	G	G	G	G	G	32	147	70	51	52	58	50	59	64	73	48	43	83	70	42	31	28
7	G	G	G	G	G	G	G	39	G	G	G	G	49	G	G	G	52	50	78	124	48	30	32	38
8	32	26	G	G	G	G	G	34	37	G	G	G	G	G	G	G	G	37	32	G	G	G	G	G
9	G	G	G	G	G	G	G	58	38	G	48	52	56	57	56	51	52	72	54	79	32	40	34	33
10	29	G	G	G	G	G	28	39	56	57	66	G	54	63	58	68	58	69	38	40	28	38	34	24
11	28	30	24	G	G	G	G	35	45	48	44	48	50	56	47	G	G	48	56	64	39	112	110	28
12	G	25	25	23	G	24	44	39	49	66	68	48	G	G	G	G	G	40	61	37	35	40	39	33
13	39	25	24	25	G	28	G	33	G	44	50	48	67	79	56	46	50	51	46	49	58	40	59	40
14	40	24	28	34	26	22	G	32	45	64	46	63	50	58	G	G	45	41	77	127	49	70	40	24
15	G	G	G	G	G	G	G	G	38	G	G	G	46	G	G	G	G	36	32	29	G	G	G	G
16	G	32	34	37	36	35	36	39	40	50	49	47	52	G	48	48	44	G	G	G	G	G	G	G
17	33	G	G	G	G	G	G	31	42	50	48	51	49	G	G	G	G	G	29	37	31	33	G	G
18	G	G	G	28	G	G	25	39	44	50	48	49	G	57	G	G	46	43	45	48	41	G	G	G
19	24	25	G	G	G	G	G	G	38	G	50	50	G	G	48	46	G	G	37	37	32	28	30	G
20	G	22	24	G	G	26	25	37	44	46	G	65	G	50	48	43	72	79	40	59	28	41	37	33
21	28	G	G	G	G	G	G	33	41	G	52	56	61	60	56	46	42	46	28	G	24	G	G	G
22	G	G	G	G	G	G	G	33	41	41	G	G	50	G	G	G	46	44	51	116	84	39	36	39
23	31	G	G	G	G	G	G	31	G	G	45	G	G	G	G	G	40	40	38	50	38		G	24
24	24	G	G	G	G	G	G	32	40	64	G	G	G	G	G	G	40	42	32	37	22	G	G	G
25	G	G	G	29	G	G	G	35	46	41	G	G	G	G	51	G	40	41	34	40	30	34	G	G
26	G	G	G	G	G	G	G	32	37	G	G	G	G	G	G	G	45	44	42	86	39	G	G	G
27	25	28	G	G	G	G	G	G	39	71	G	G	G	G	G	G	G	G	32	31	32	28	25	28
28	29	G	G	G	G	G	G	31	44	44	G	G	G	G	G	43	41	36	28	39	33	24	G	G
29	G	G	G	G	G	G	G	32	78	45	G	G	46	G	44	G	42	42	G	33	G	G	G	32
30	30	26	G	G	G	G	G	32	40	48	48	45	G	46	44	76	60	69	43	32	31	46	36	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	30	29	29	28	28	28	28	28	28	28	28	29	30	30	30	30	30	30	30	30	29	29	30	30
MED	24	G	G	G	G	G	G	33	41	46	47	47	24	G	22	G	44	44	40	38	32	30	12	24
U Q	30	25	24	24	G	G	G	37	45	53	50	51	50	57	56	48	52	52	46	59	40	40	34	32
L Q	G	G	G	G	G	G	G	32	38	G	G	G	G	G	G	G	G	37	32	31	23	G	G	G

HOURLY VALUES OF FMIN AT OKINAWA

SEP.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	14	15	16	15	15	14	17	16	21	30	38	36	28	28	22	16	14	14	15	15	16	15
2	15	15	15	15	15	15	15	15	15	18	24	26	28	32	29	23	23	23	15	14	15	15	16	15
3	15	15	15										29	29	28	26	23	17	14	15		15	15	15
4	15											24	17	28	33	27	26	18	15	15	15	15	15	15
5	15	15	15	15	15	15	15	15	14	15	24	26	27	28	27	21	20	16	15	14	16	16	17	15
6	15	15	15	14	15	15	16	15	15	17	23	28	27	28	24	26	18	16	14	15	15	15	15	16
7	15	15	15	15	14	15	15	14	18	23	26	27	27	28	26	26	29	16	15	15	14	15	15	15
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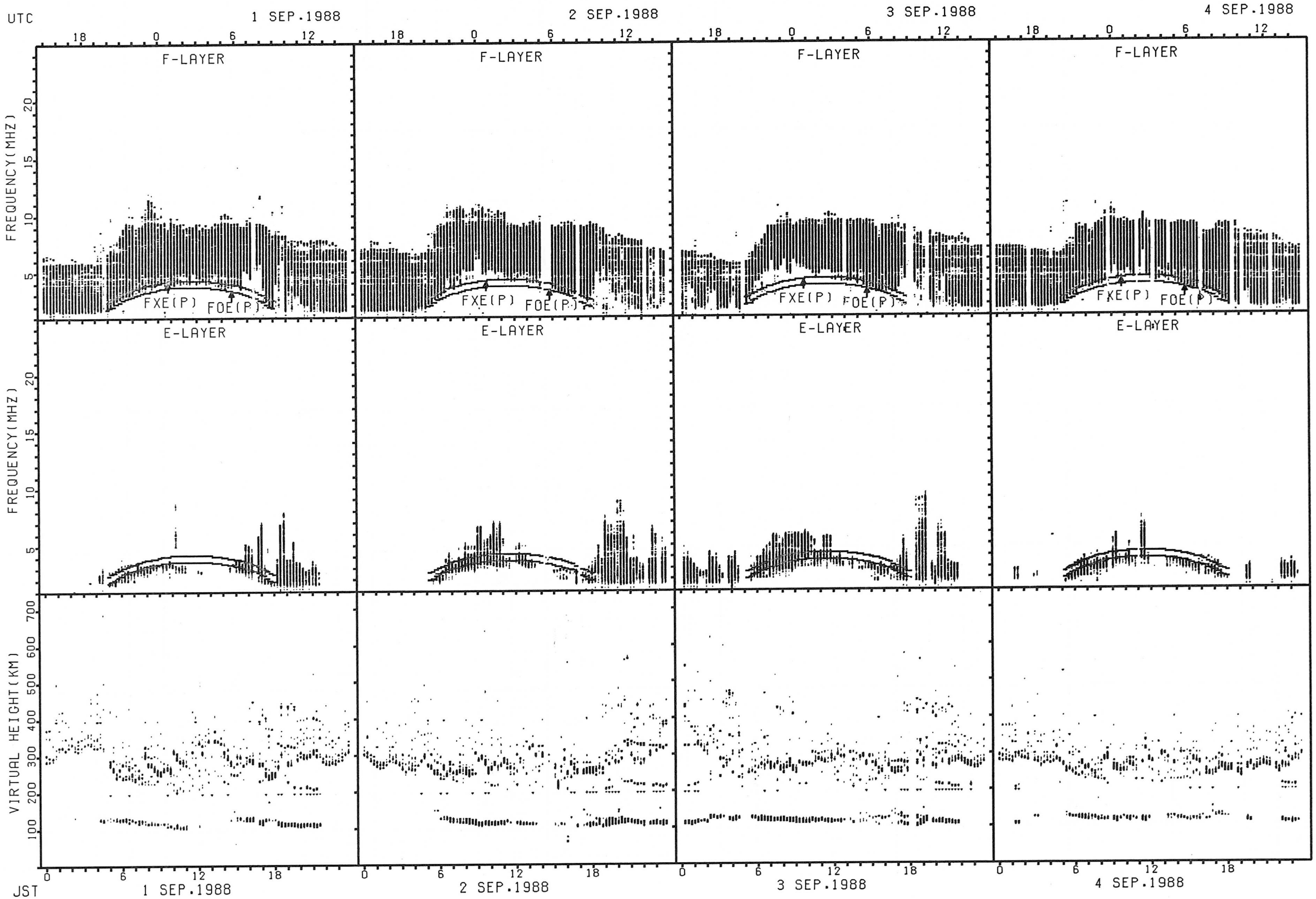
COMMUNICATIONS RESEARCH LABORATORY, JAPAN

STATION: WAKKANAI



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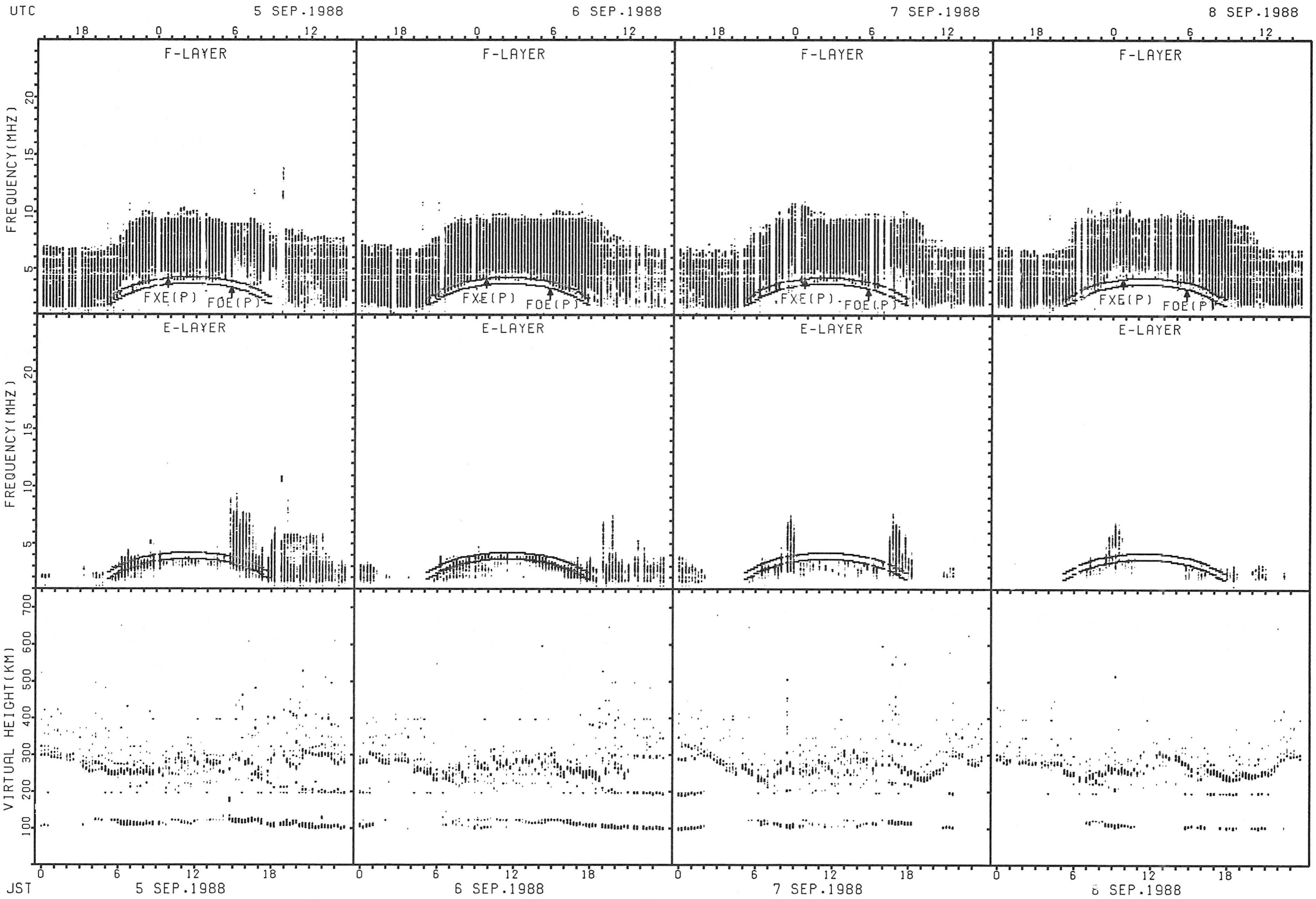
FOE(P): PREDICTED VALUE FOR FOE

STATION: WAKKANAI



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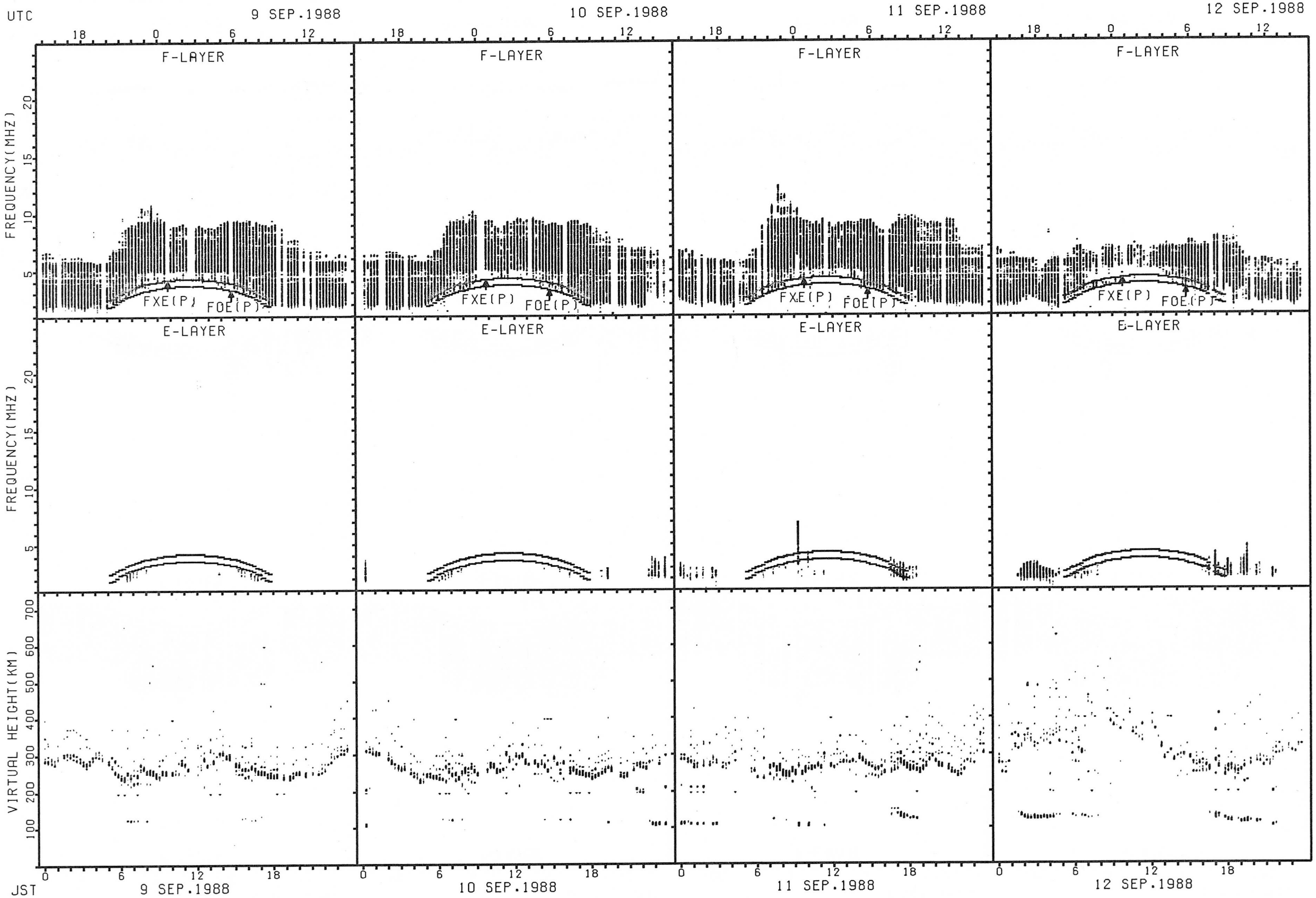
STATION; WAKKANAI



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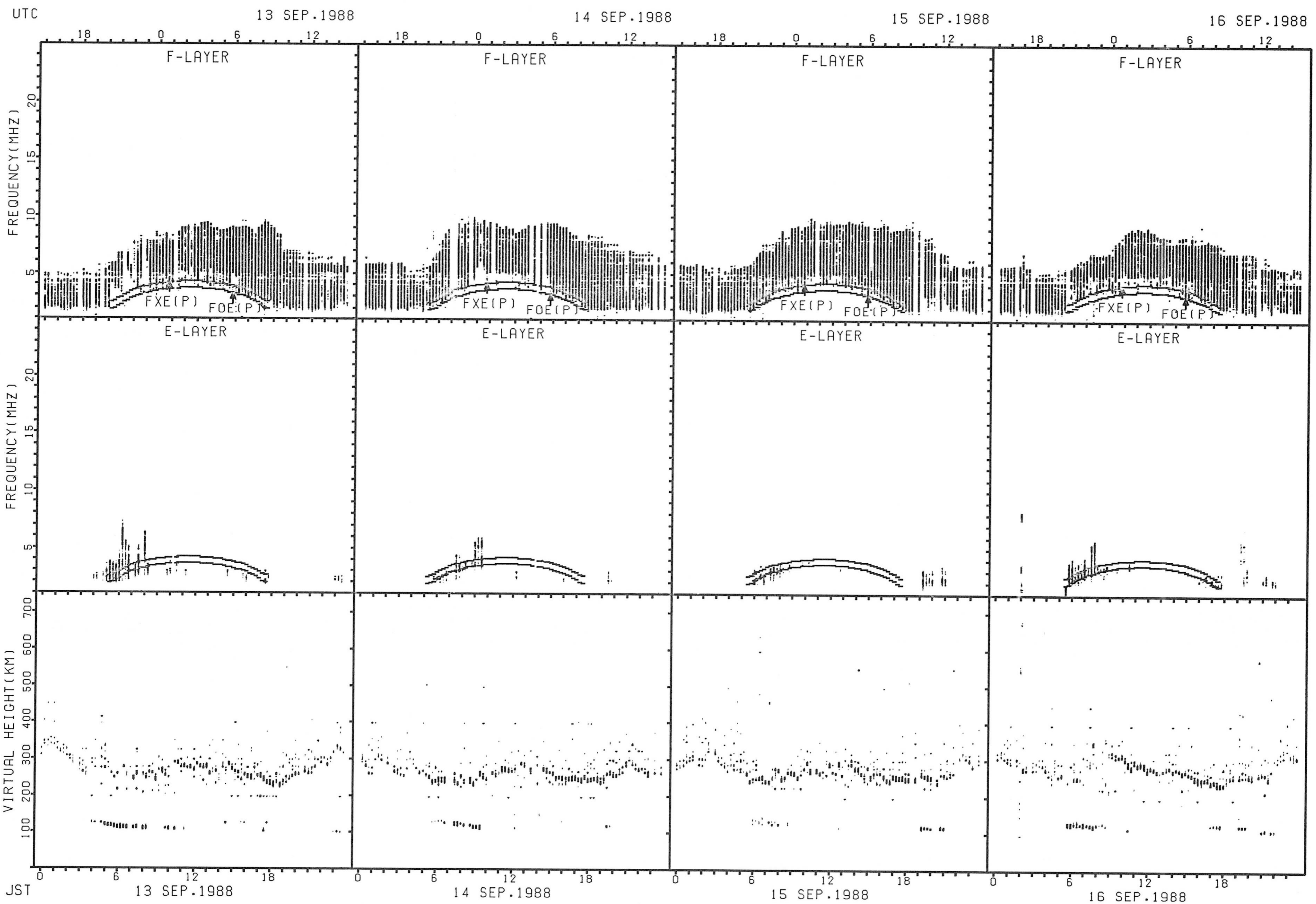
STATION; WAKKANAI



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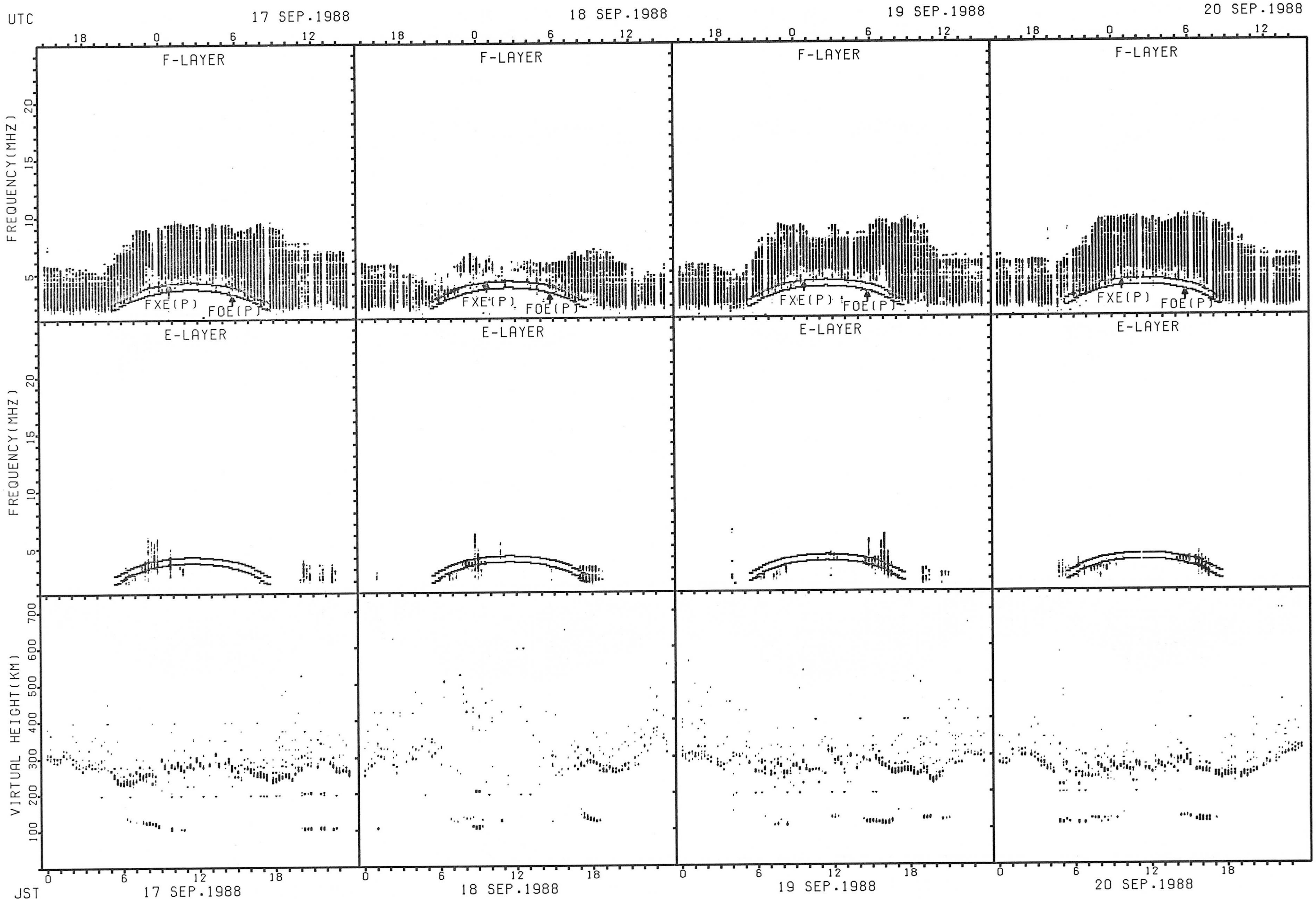

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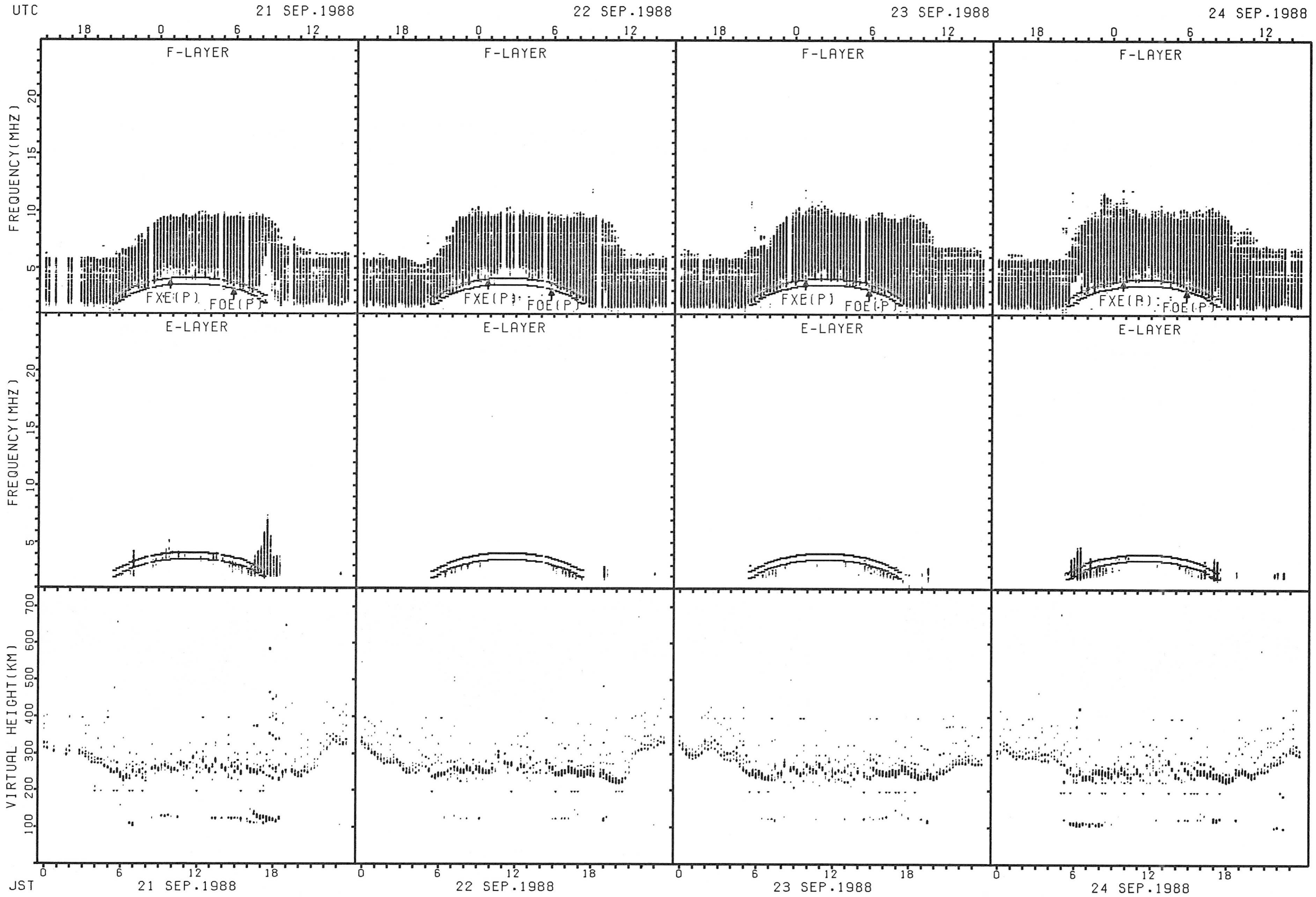
STATION; WAKKANAI



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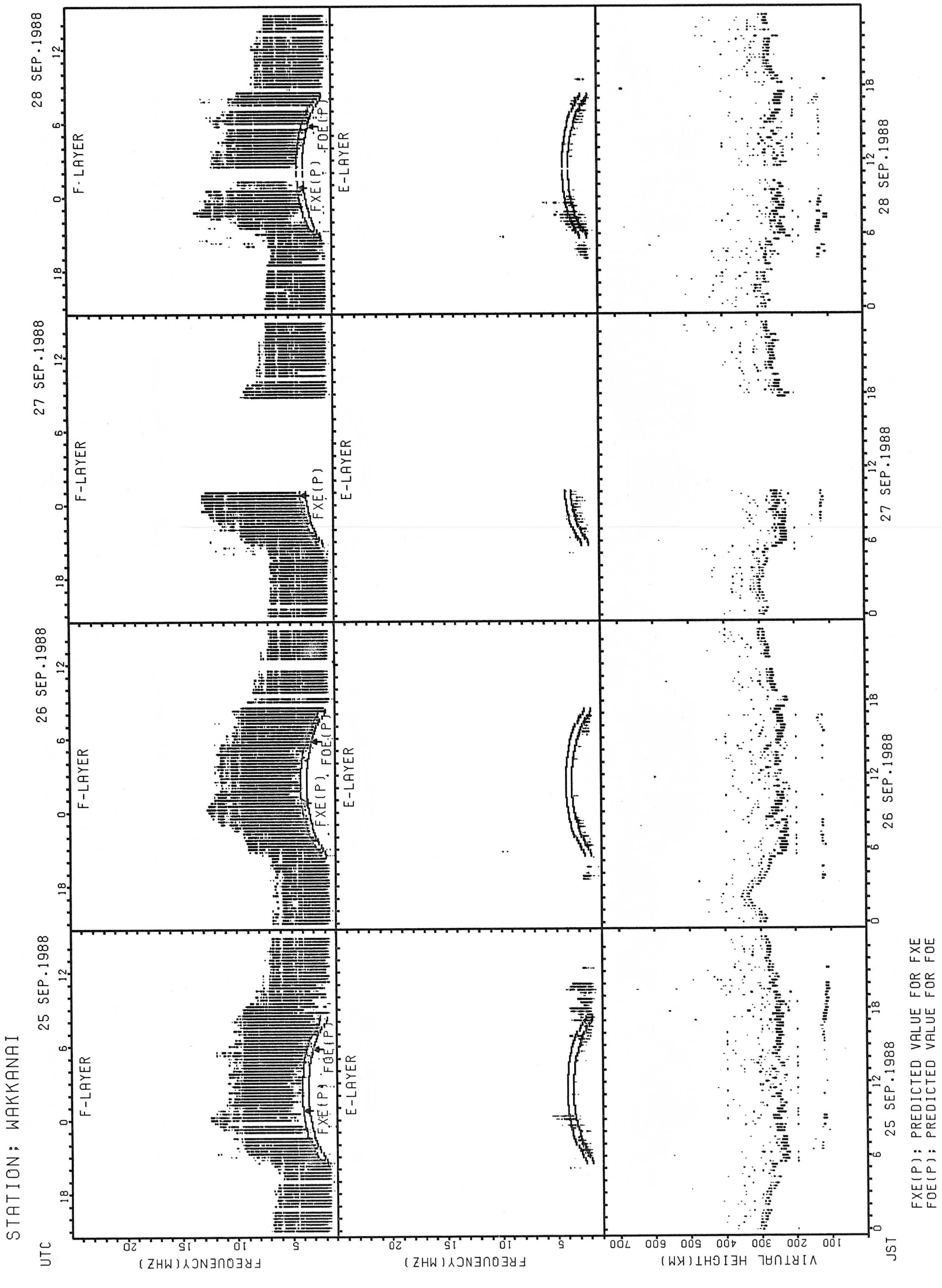
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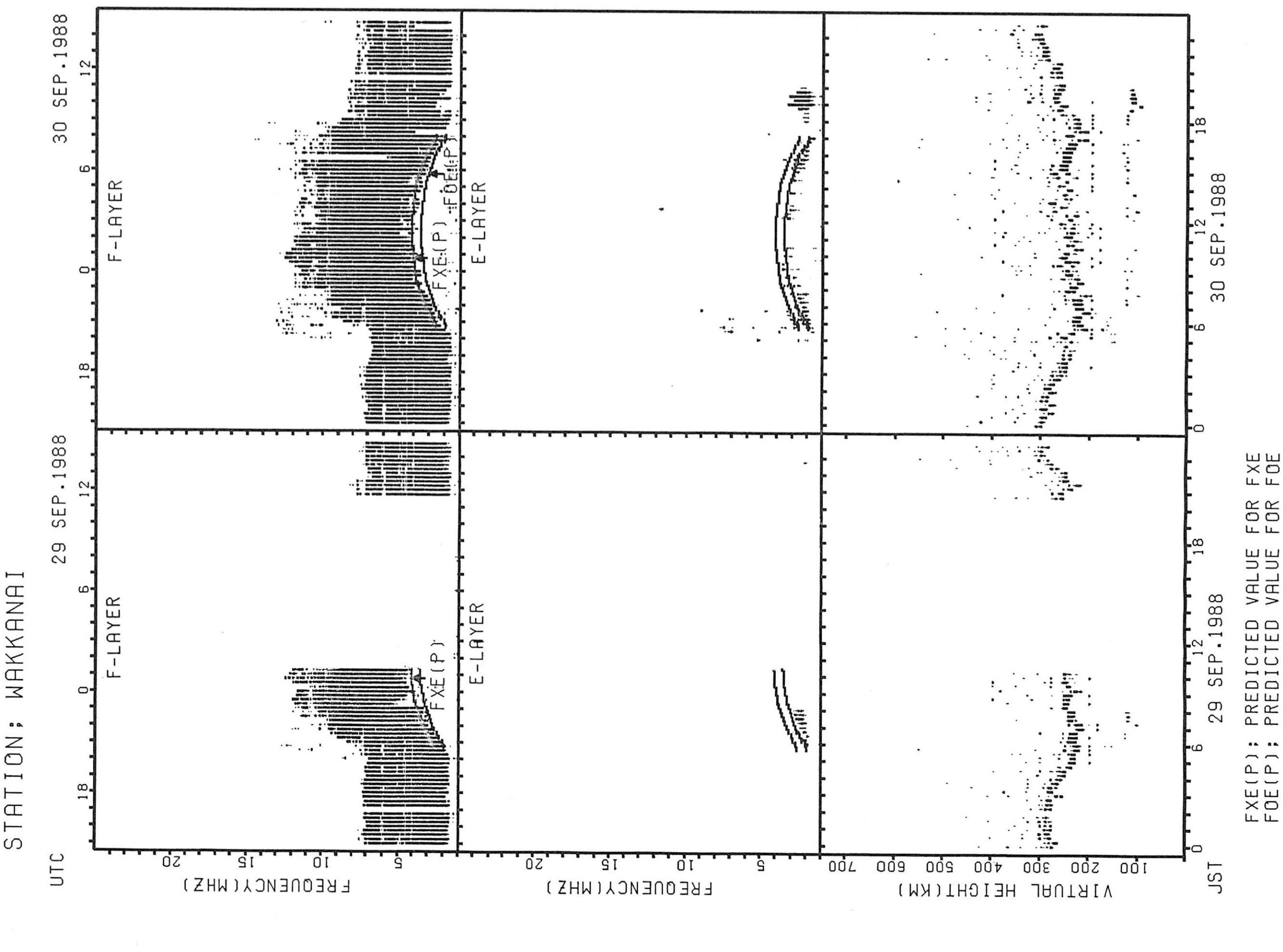
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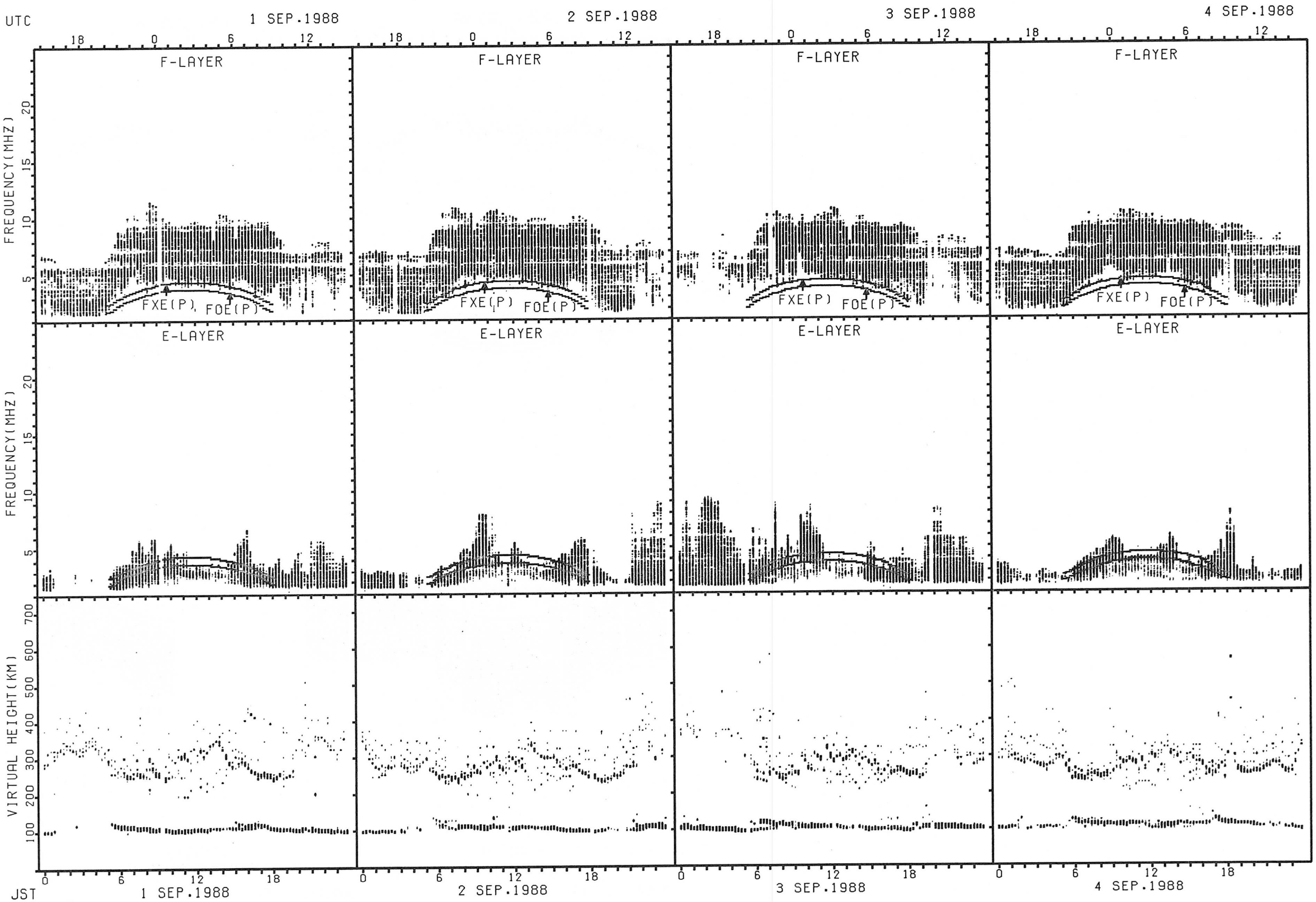
STATION; AKITA



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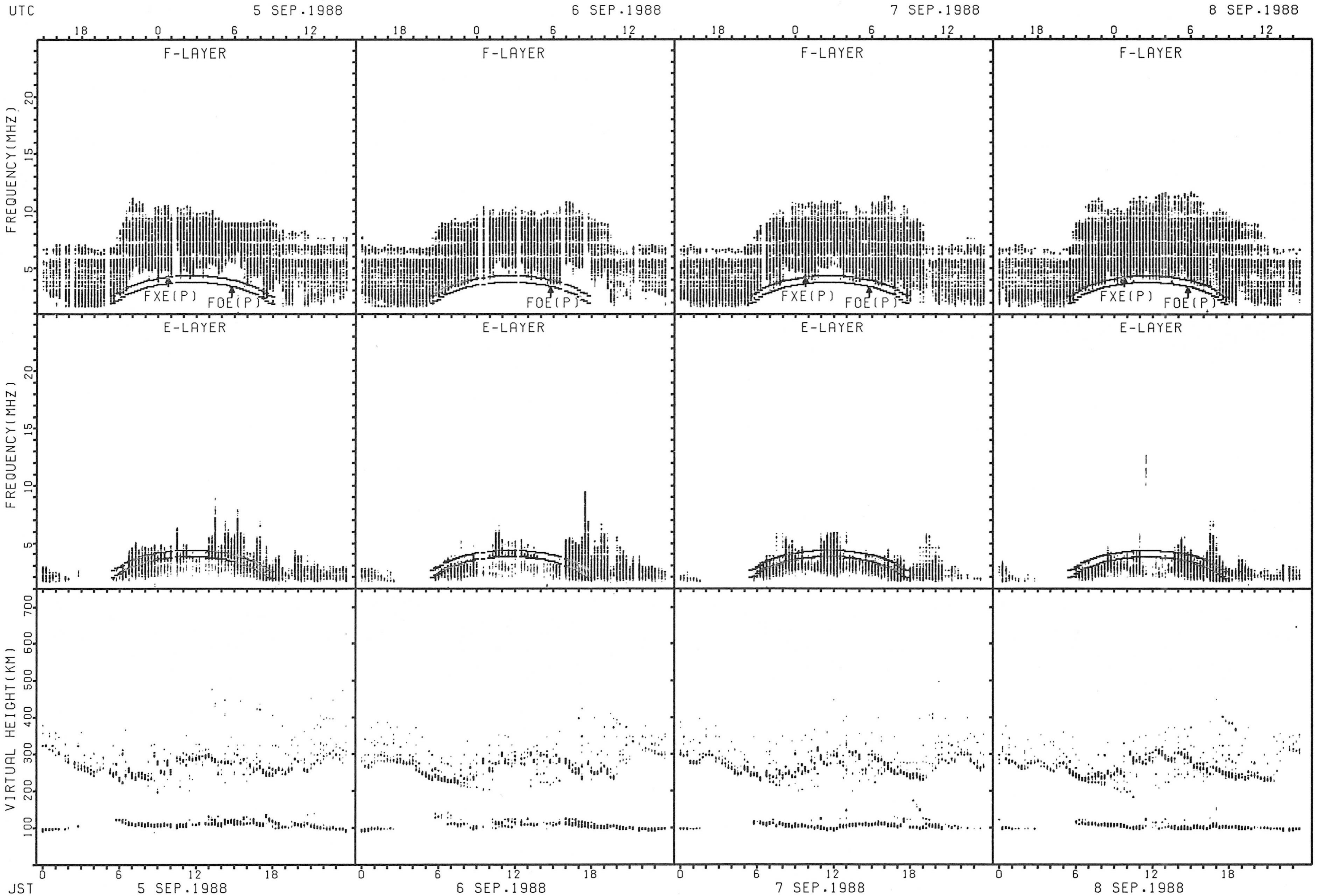

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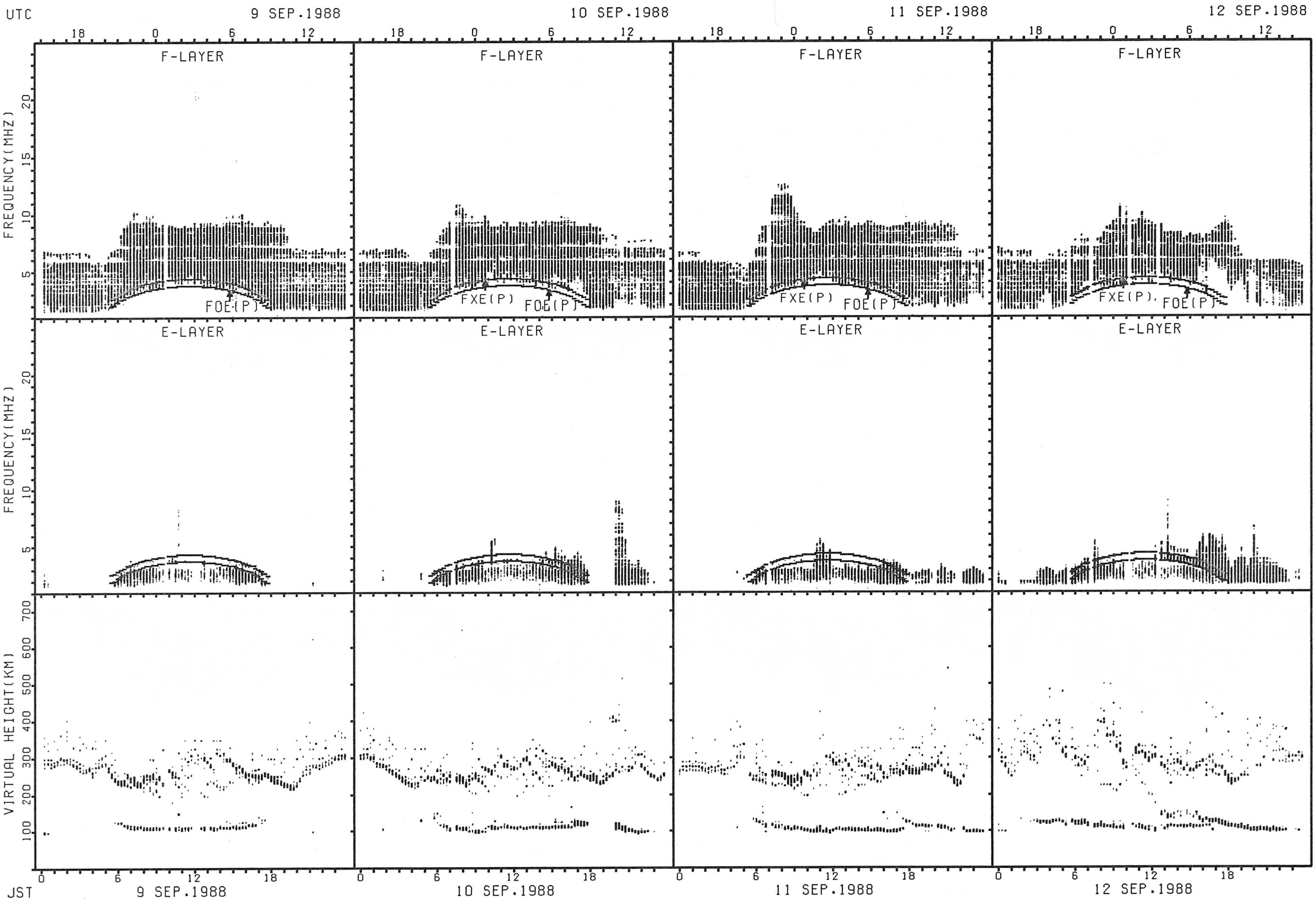
STATION; AKITA



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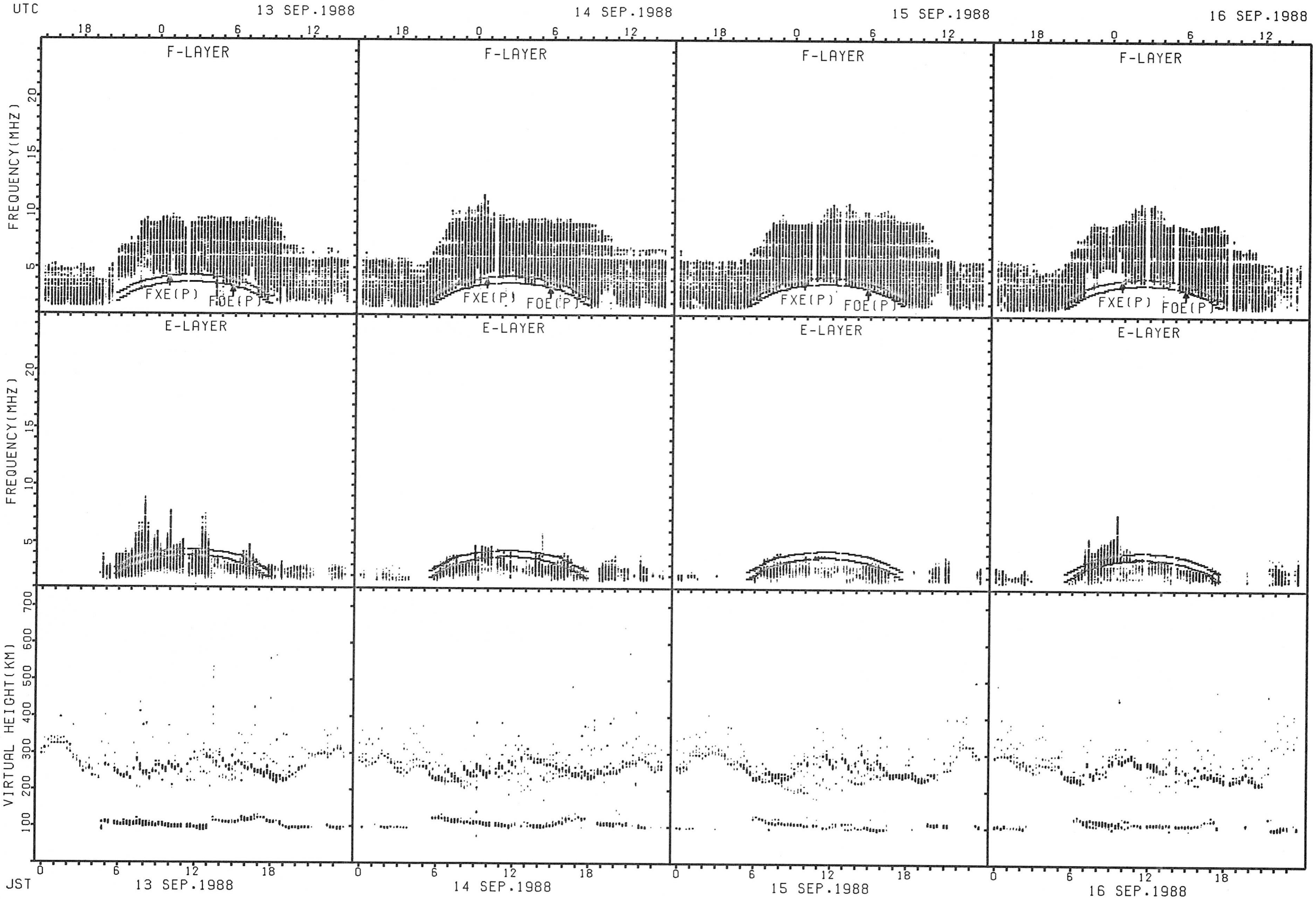

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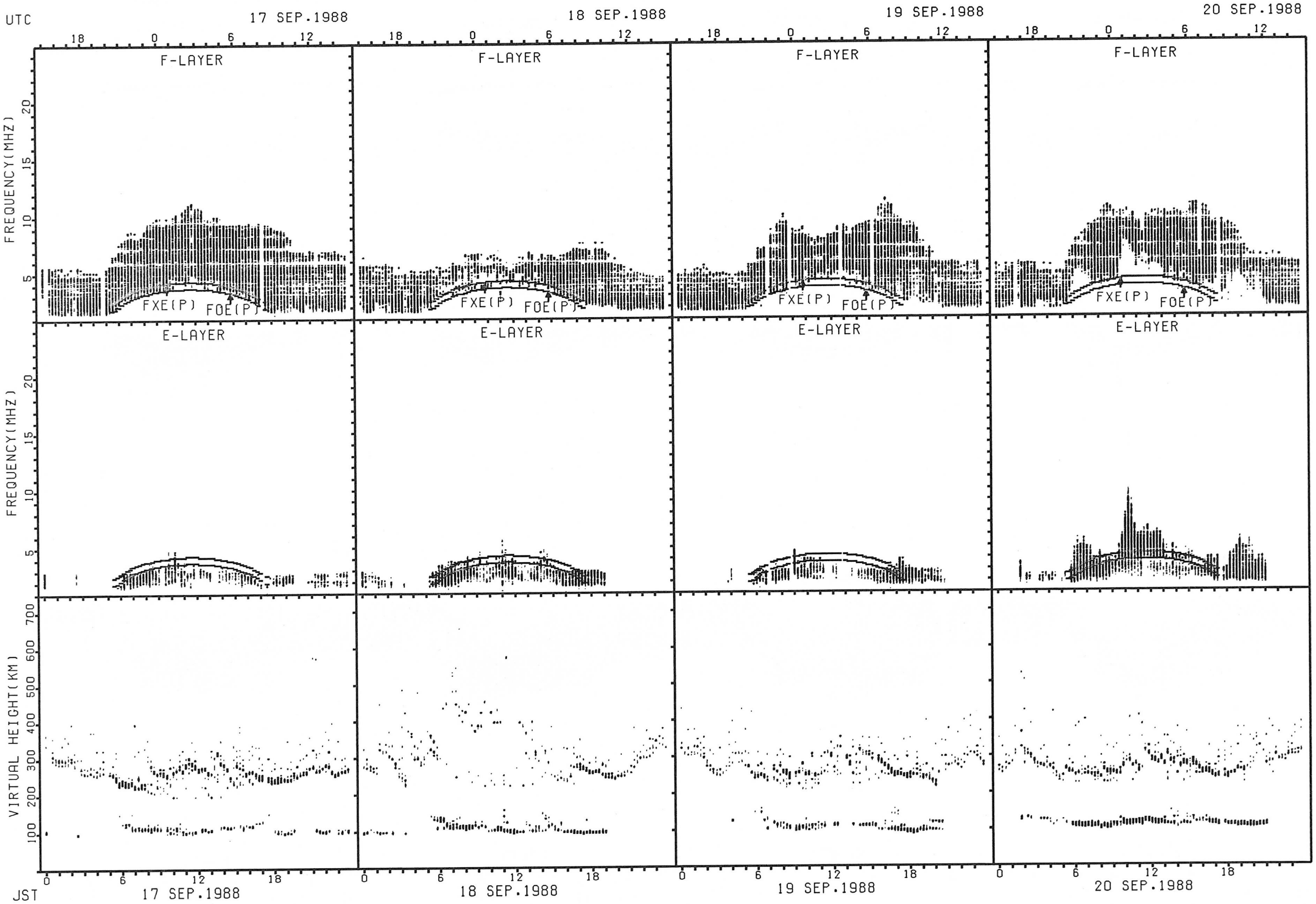

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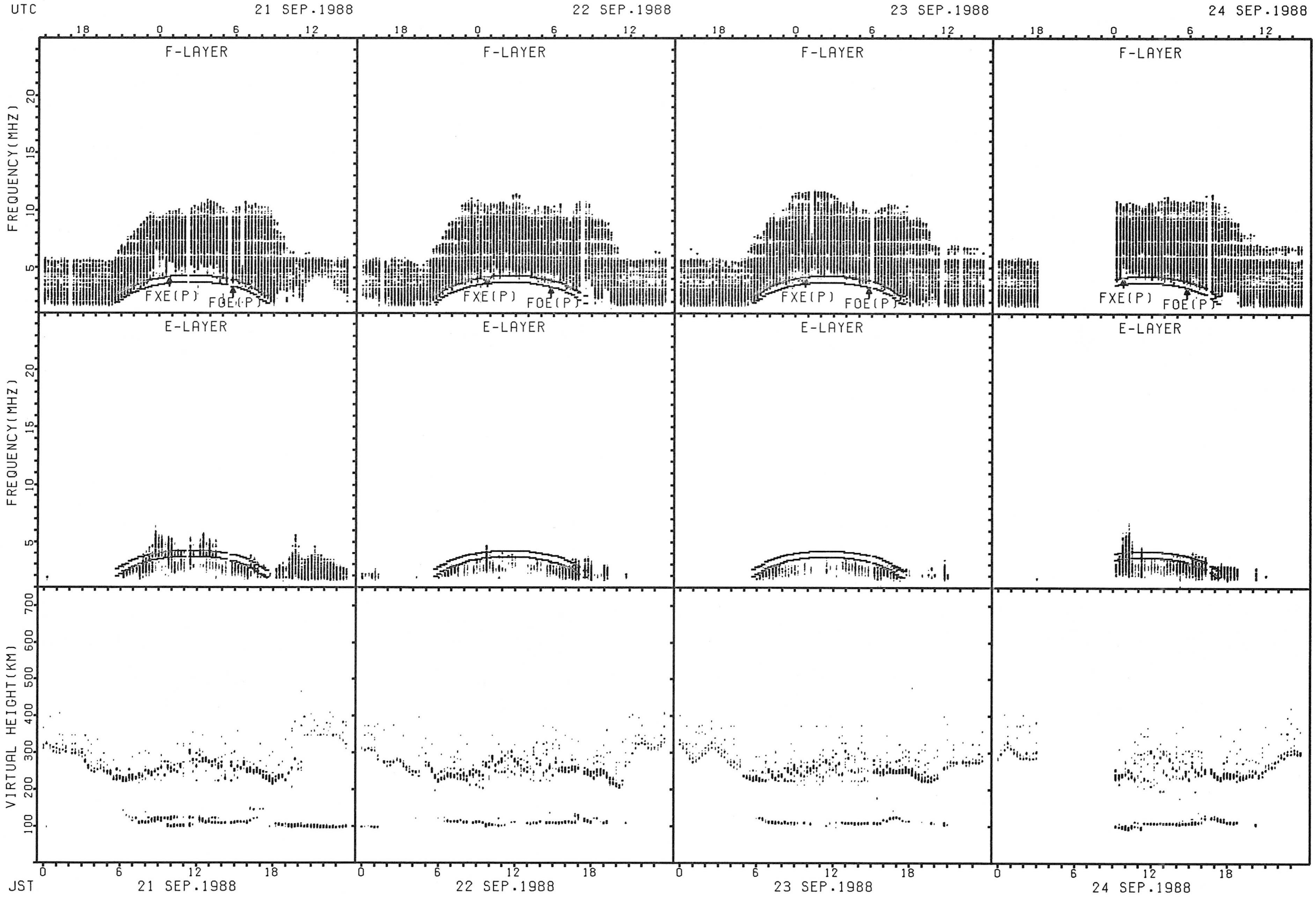

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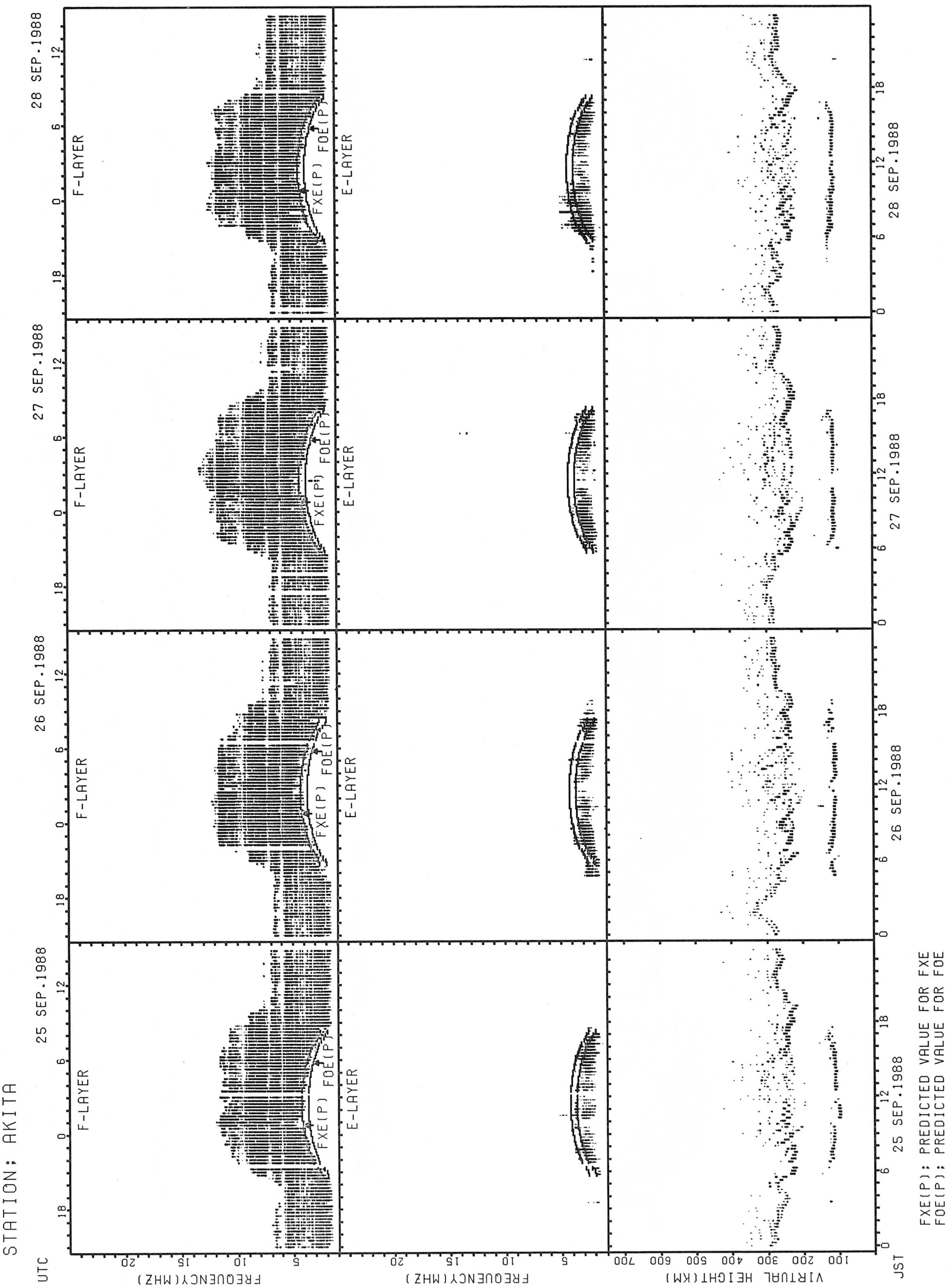
STATION; AKITA
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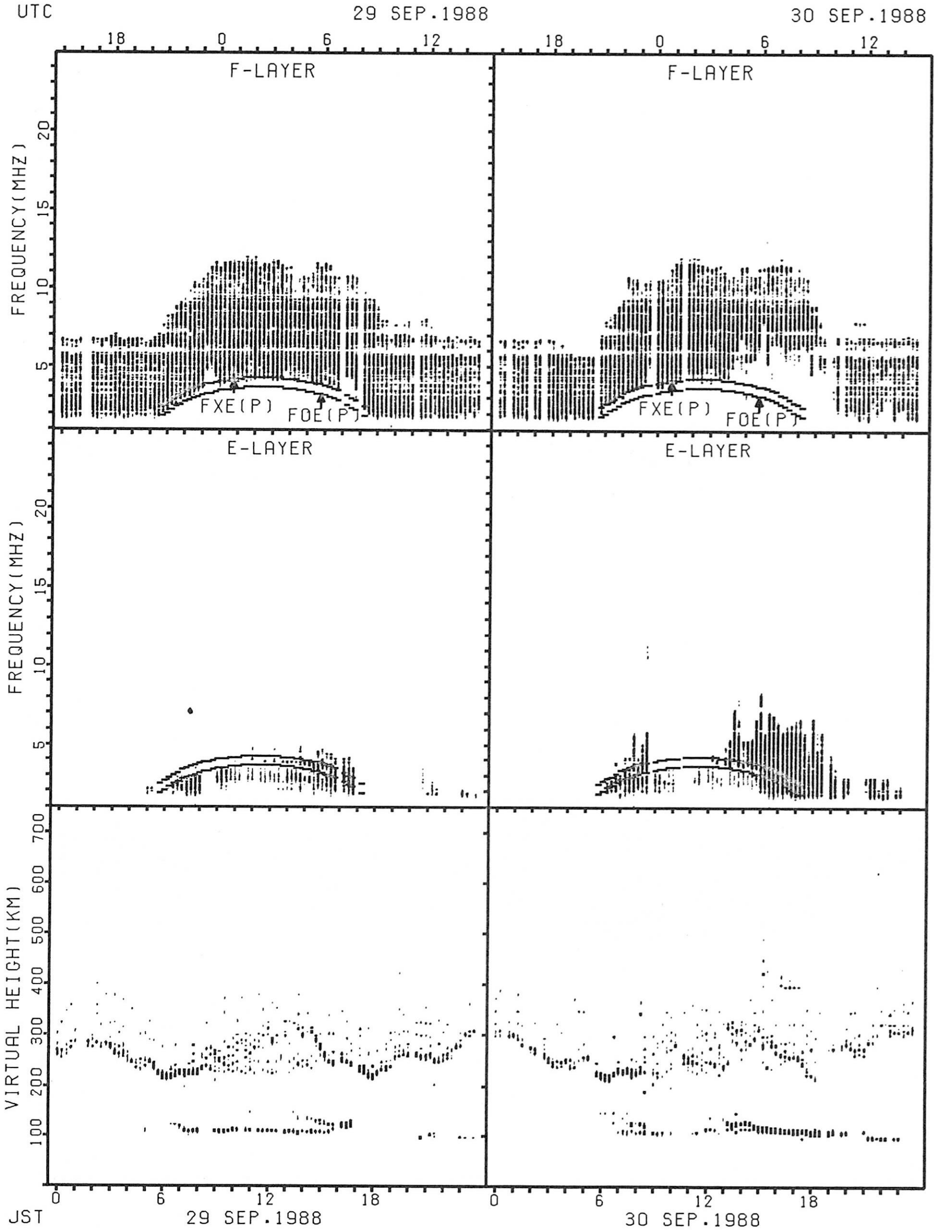
STATION; AKITA



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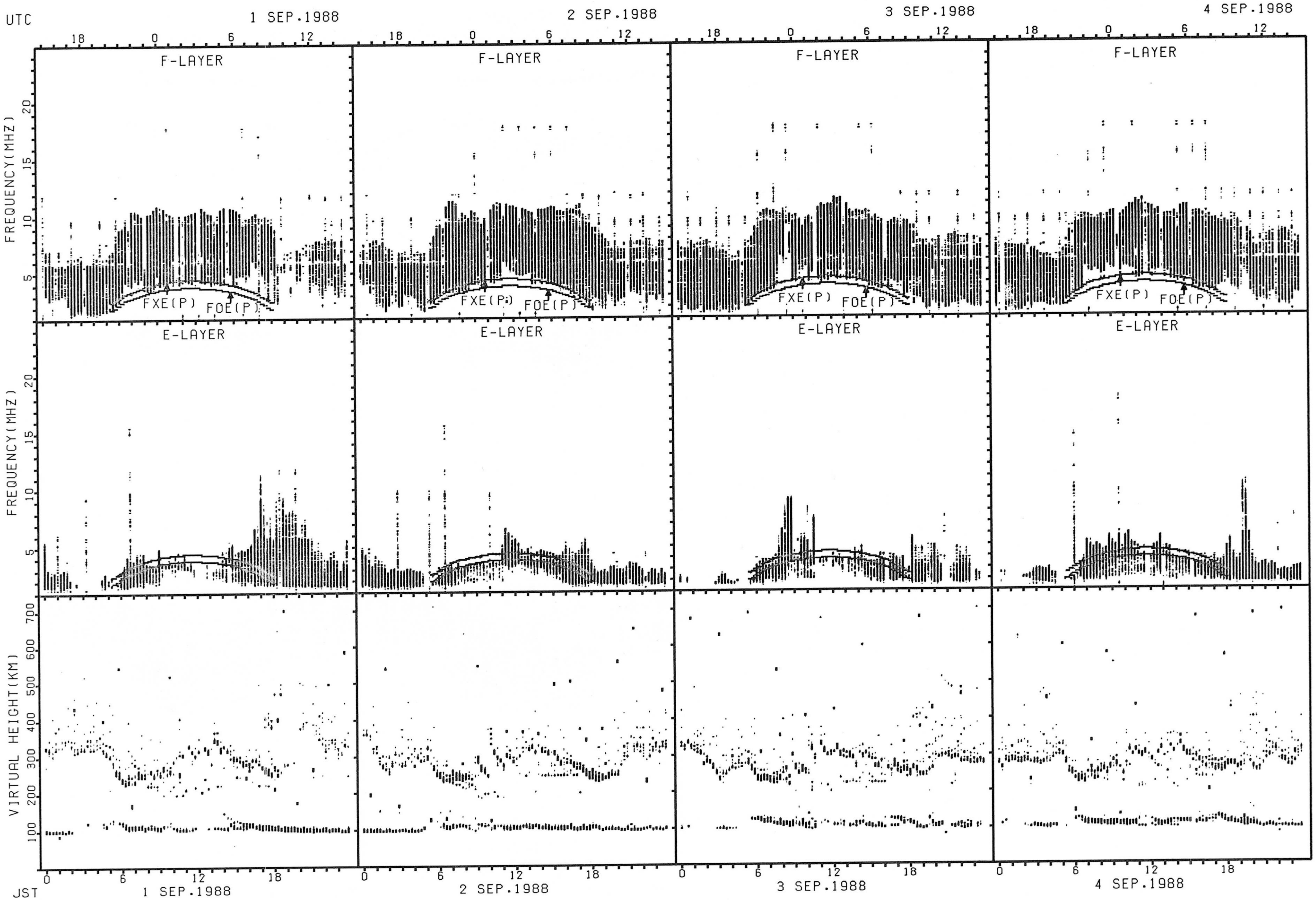
STATION; KOKUBUNJI TOKYO



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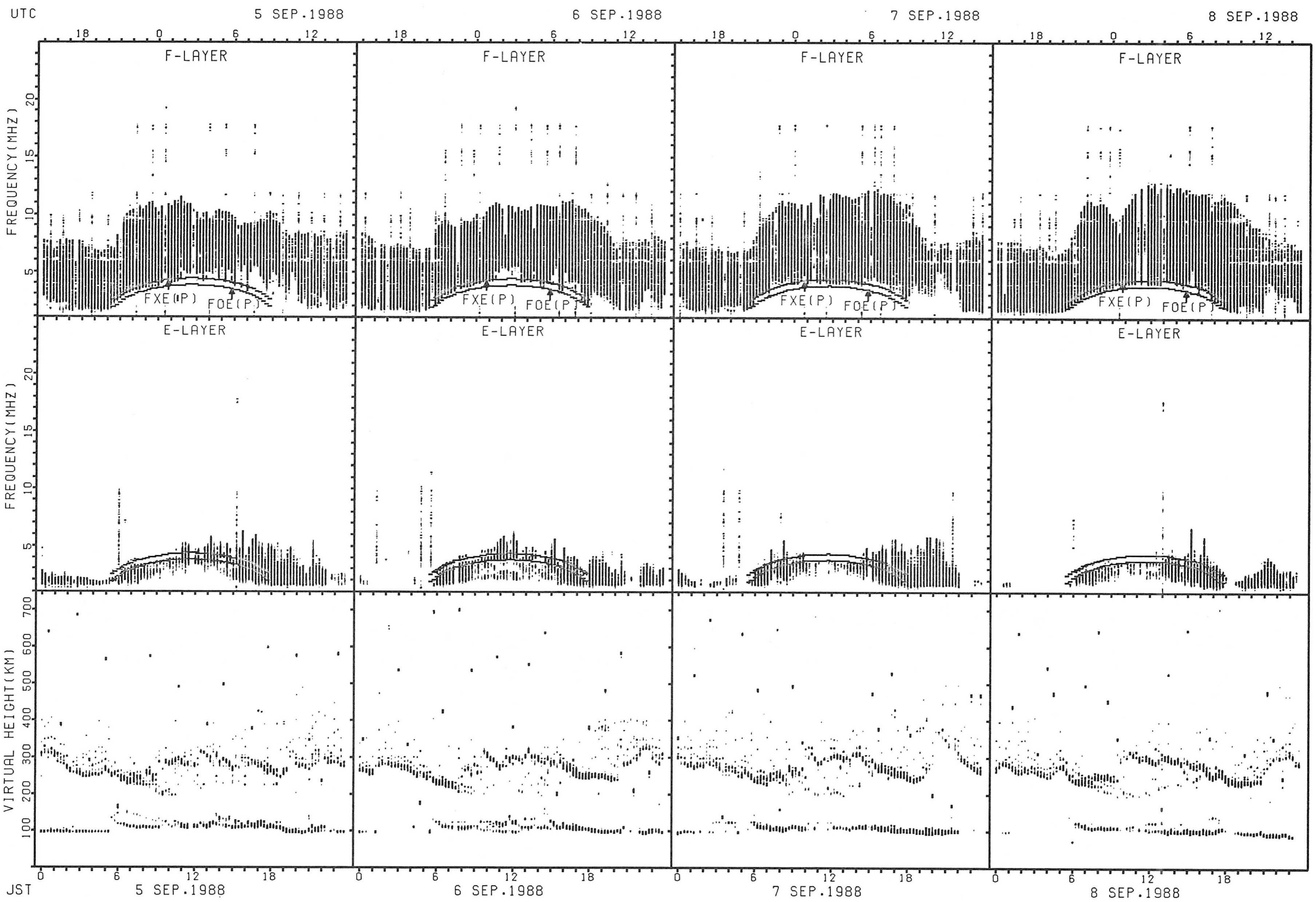
STATION; KOKUBUNJI TOKYO



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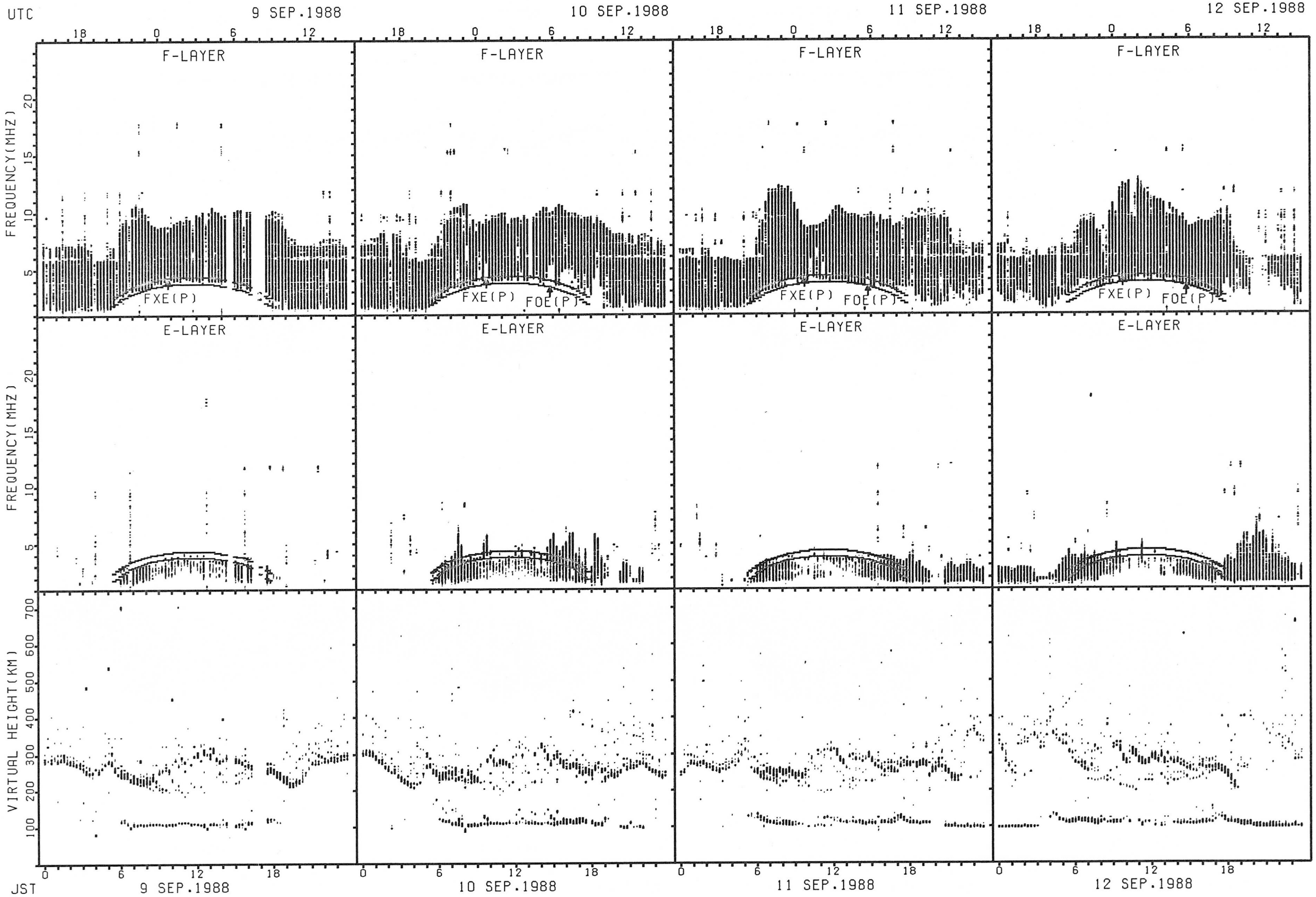

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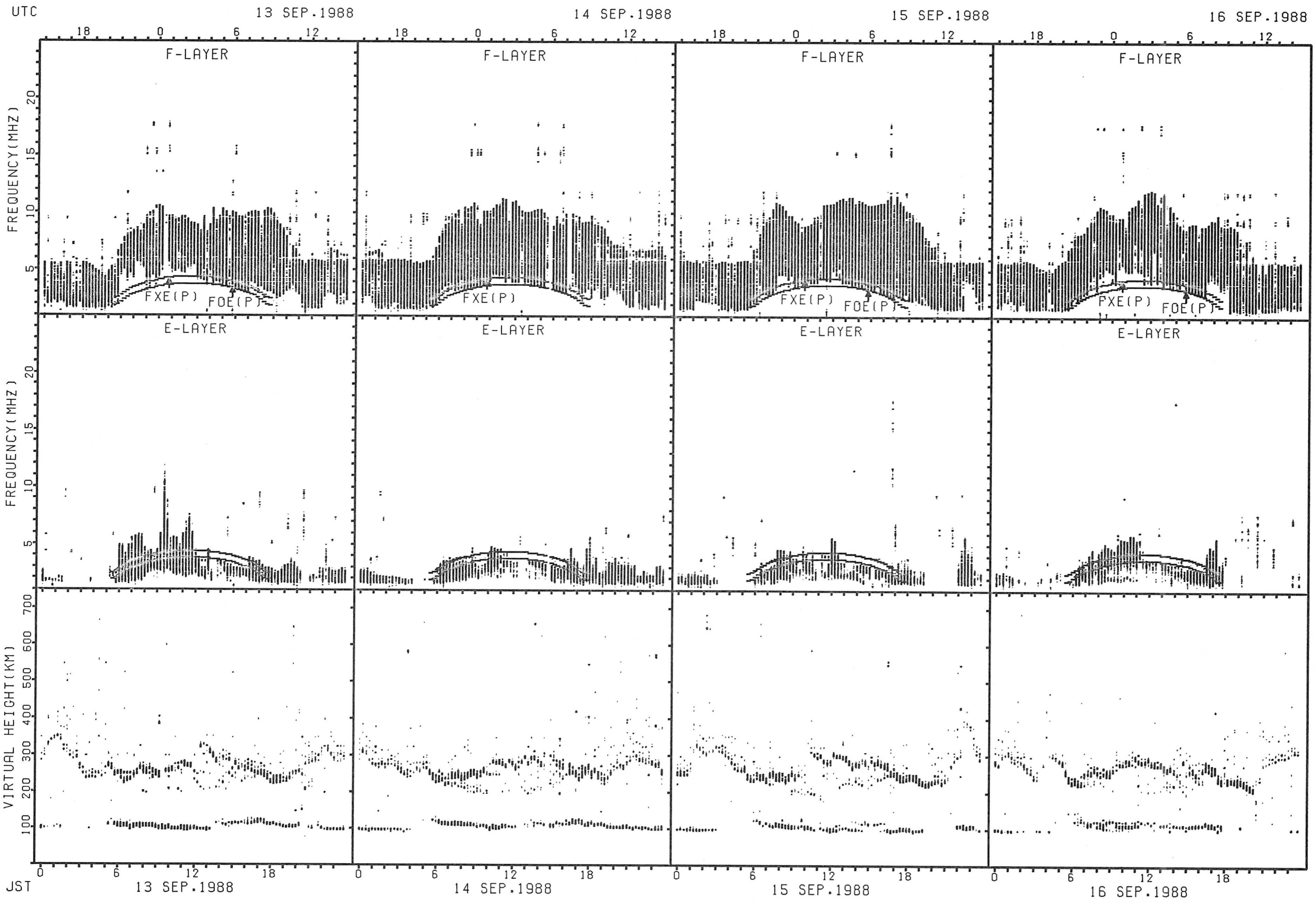
STATION: KOKUBUNJI TOKYO



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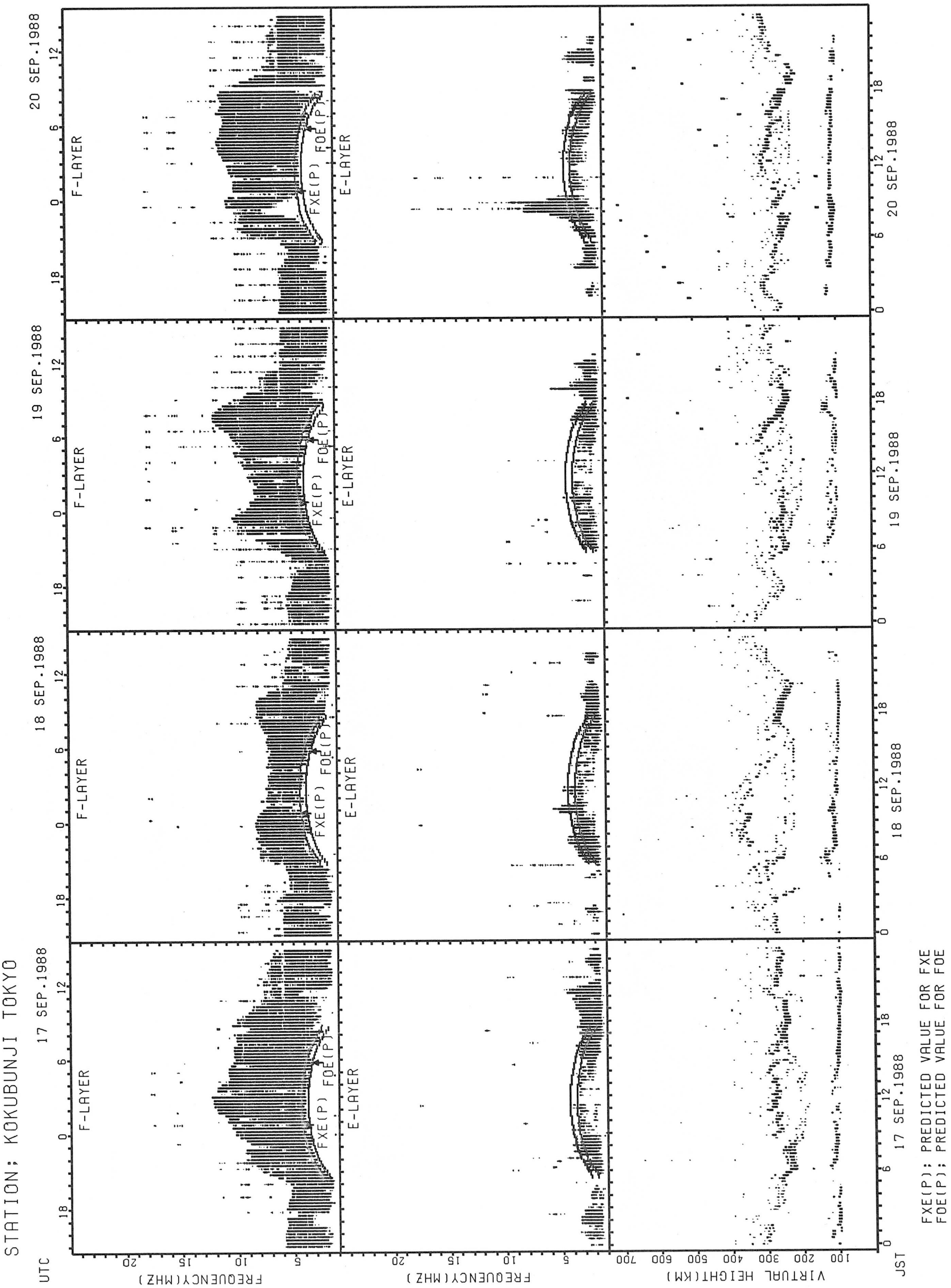

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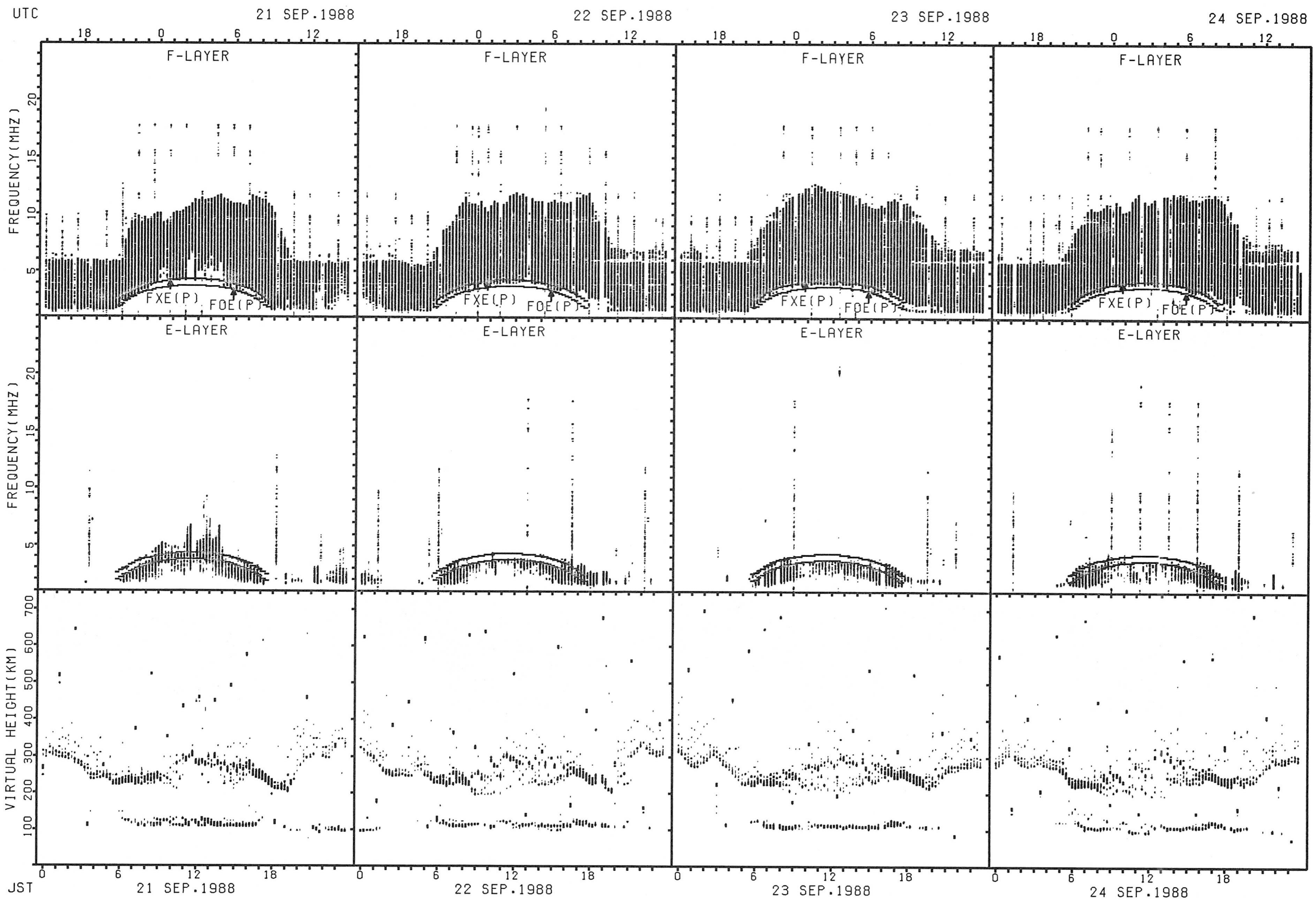
STATION; KOKUBUNJI TOKYO



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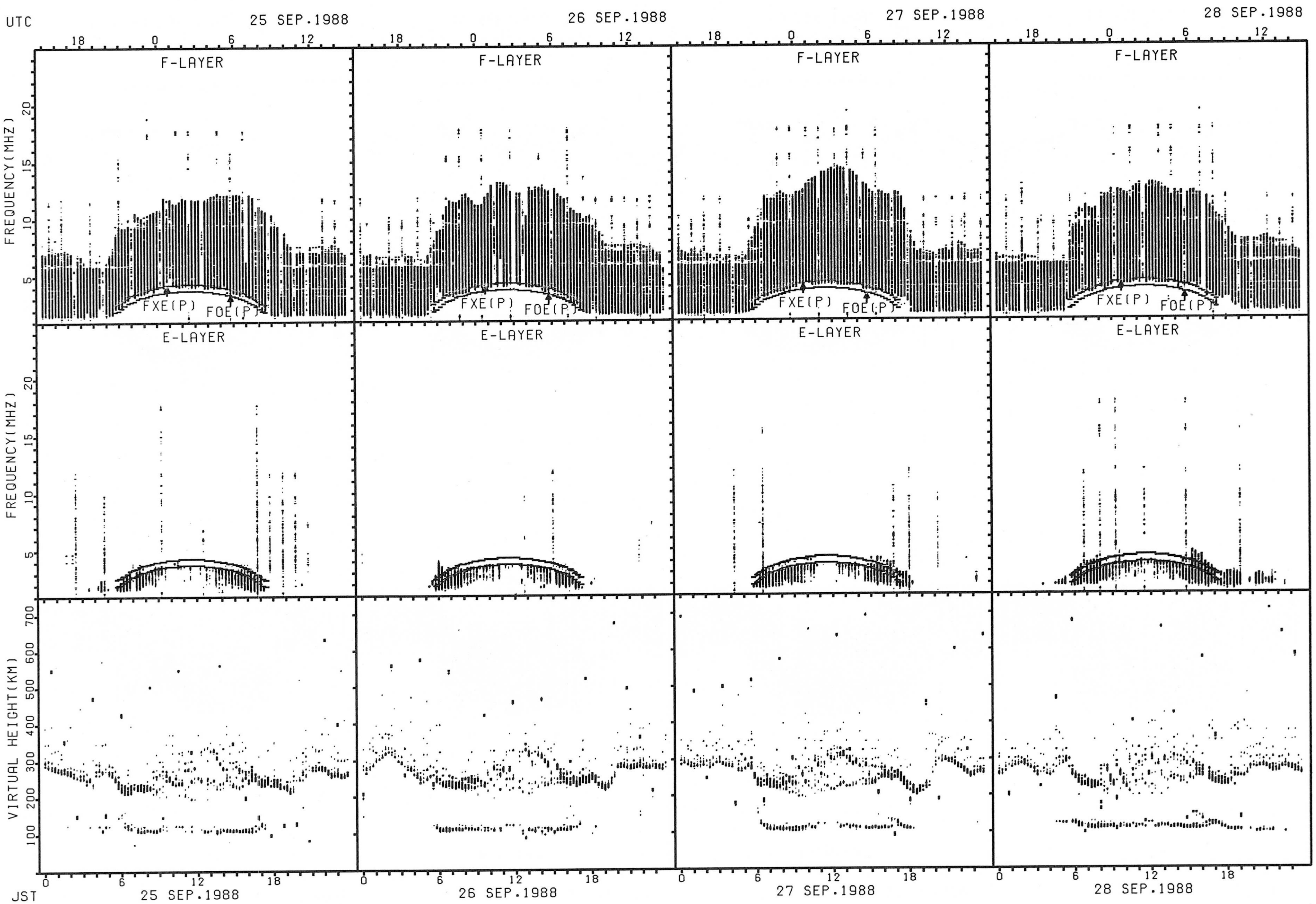
STATION; KOKUBUNJI TOKYO



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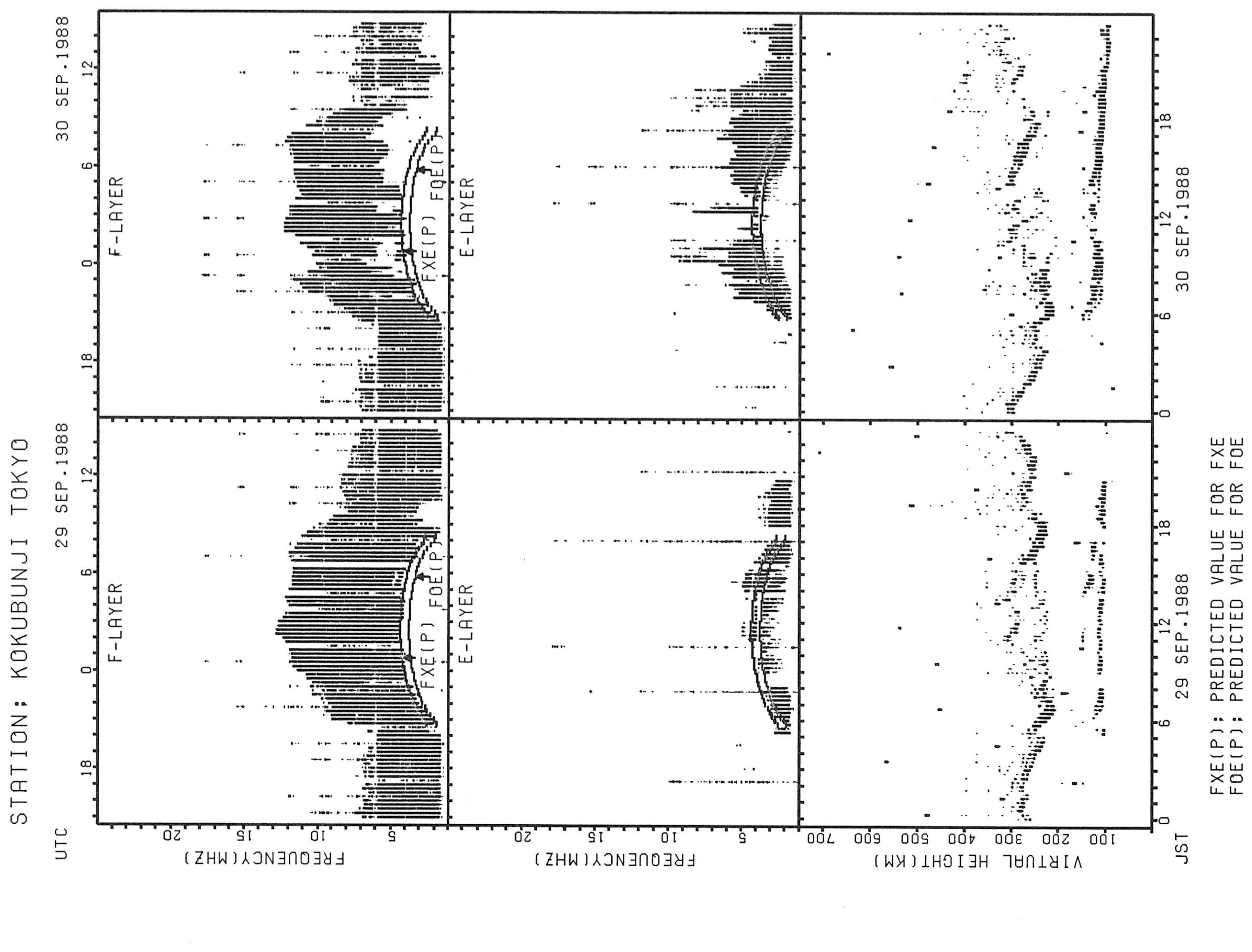
STATION; KOKUBUNJI TOKYO
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E-LAYER
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JST
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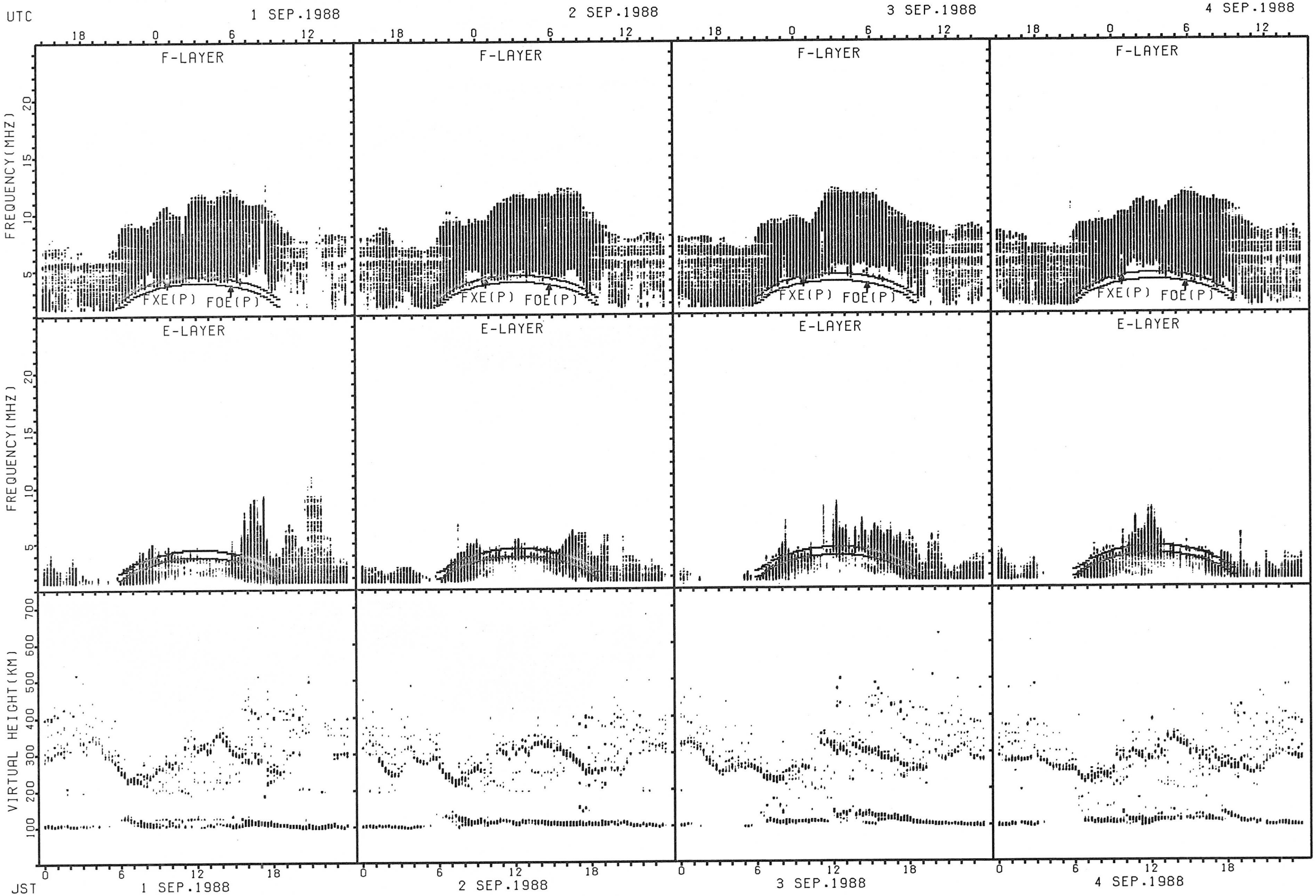
STATION; YAMAGAWA



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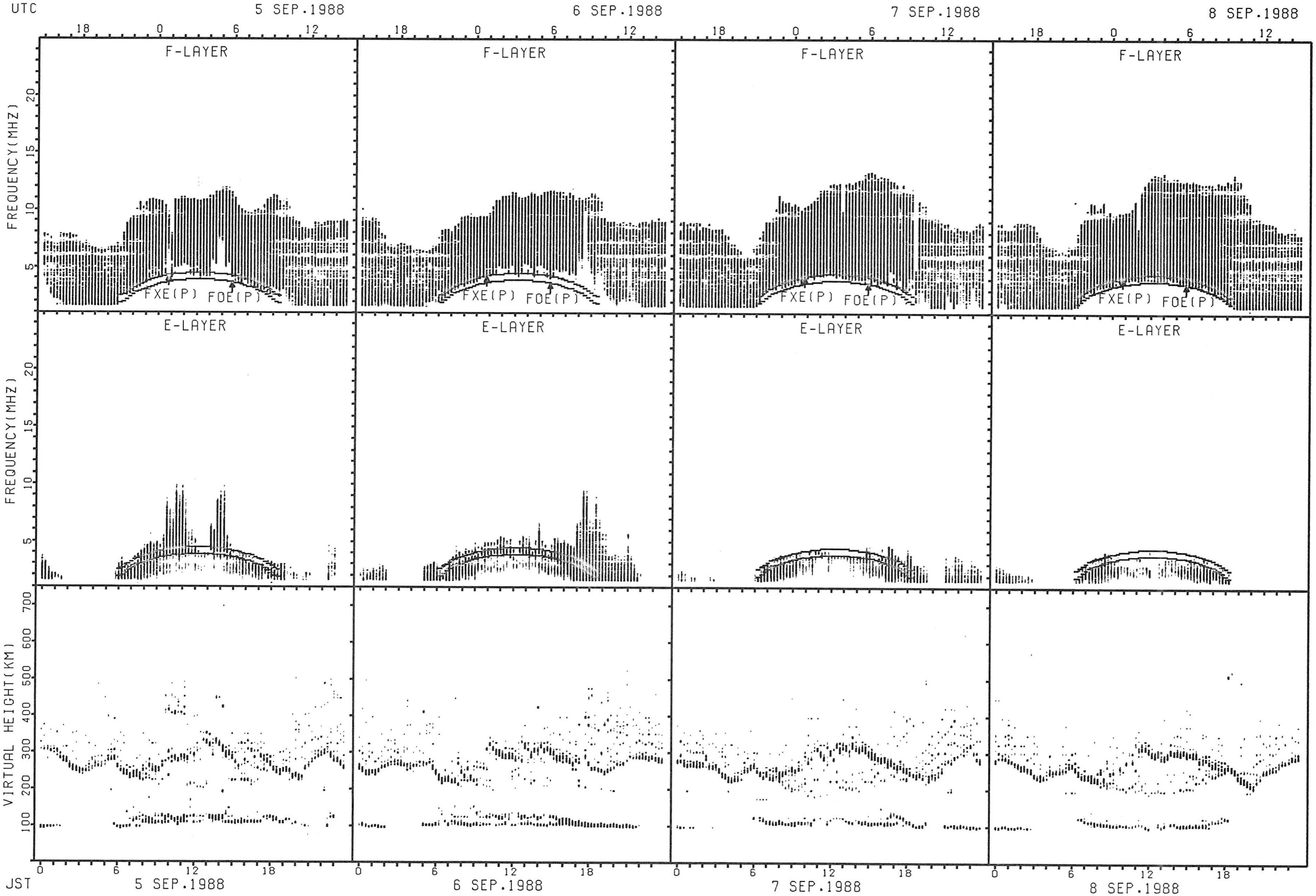

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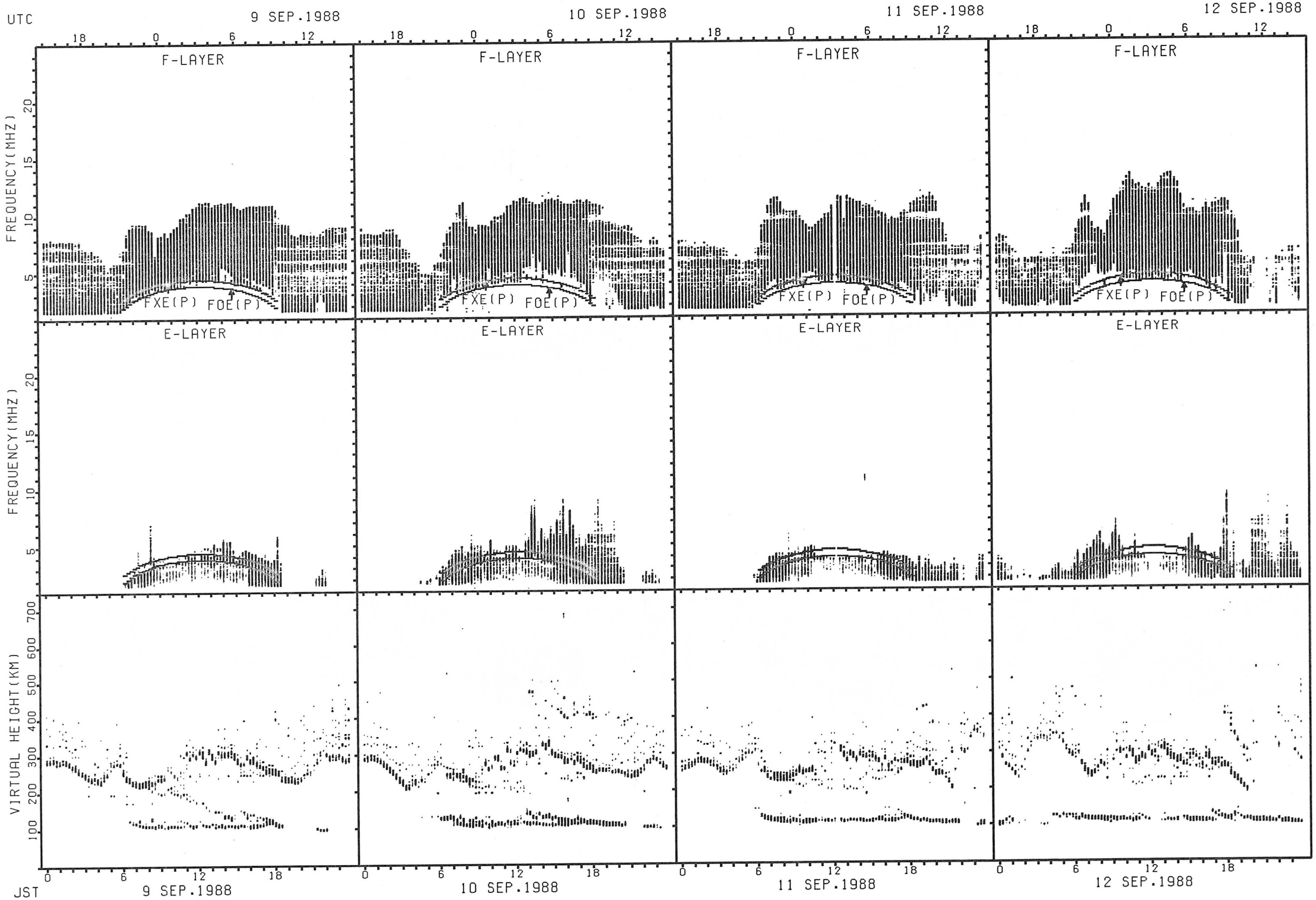

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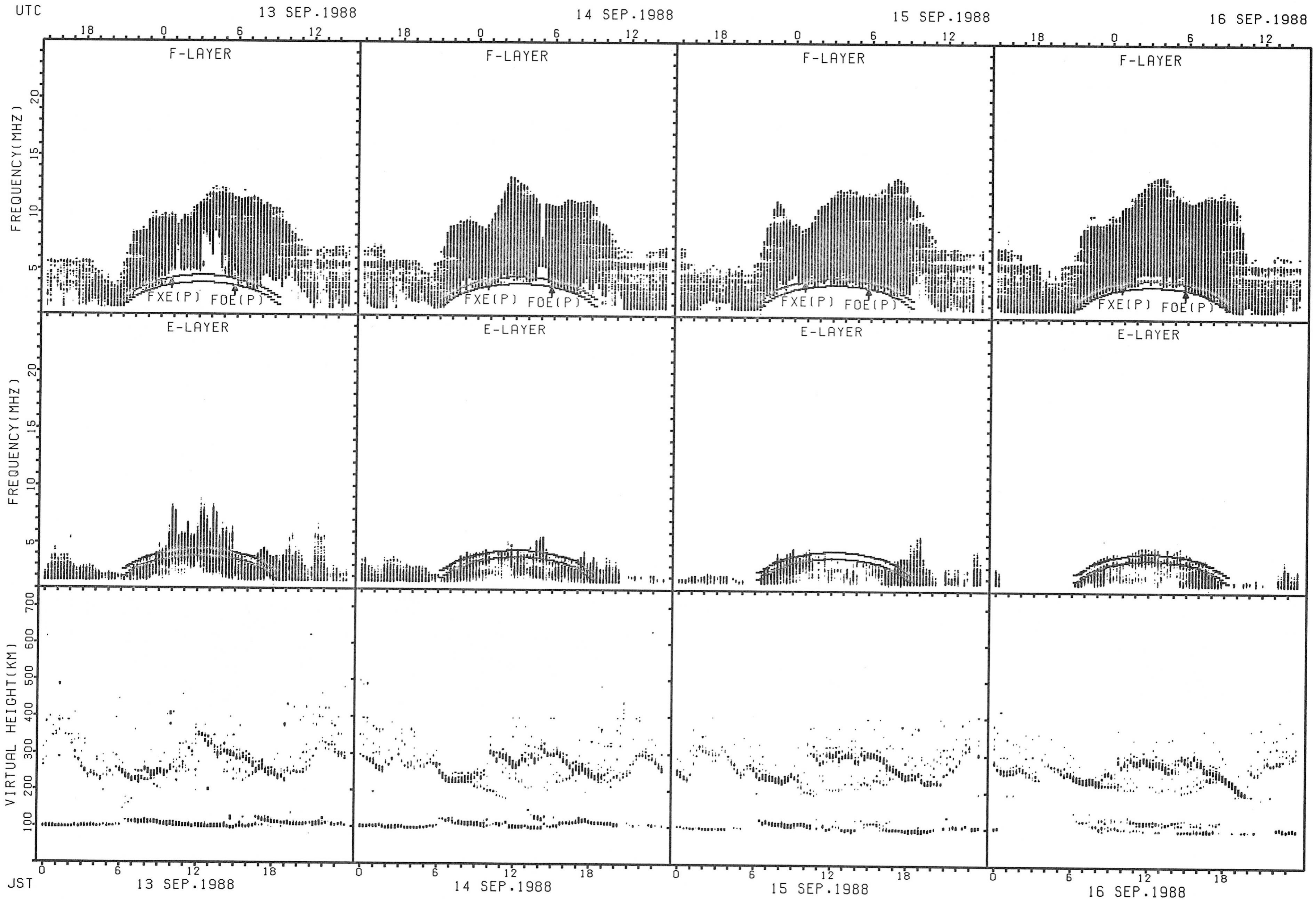

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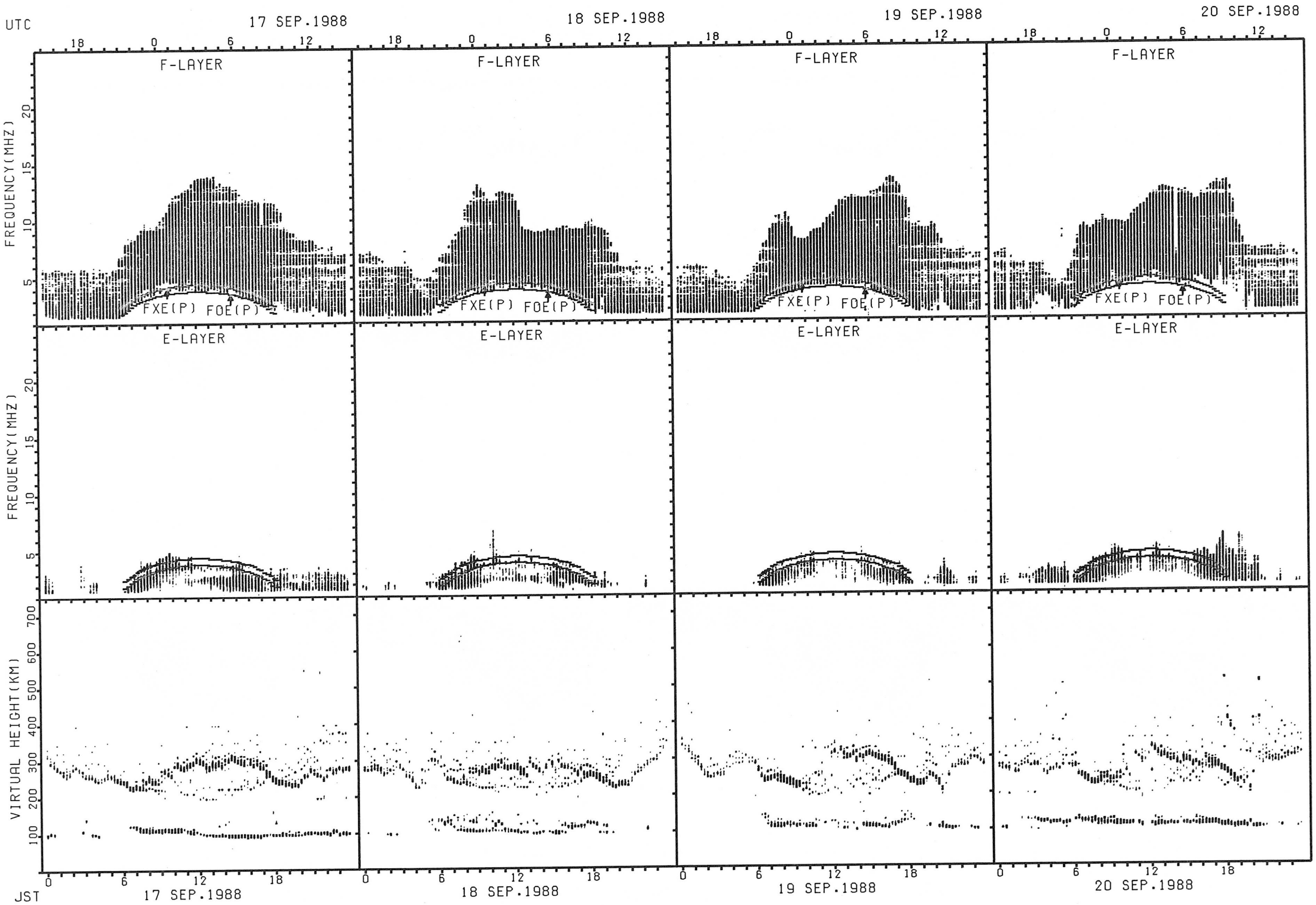

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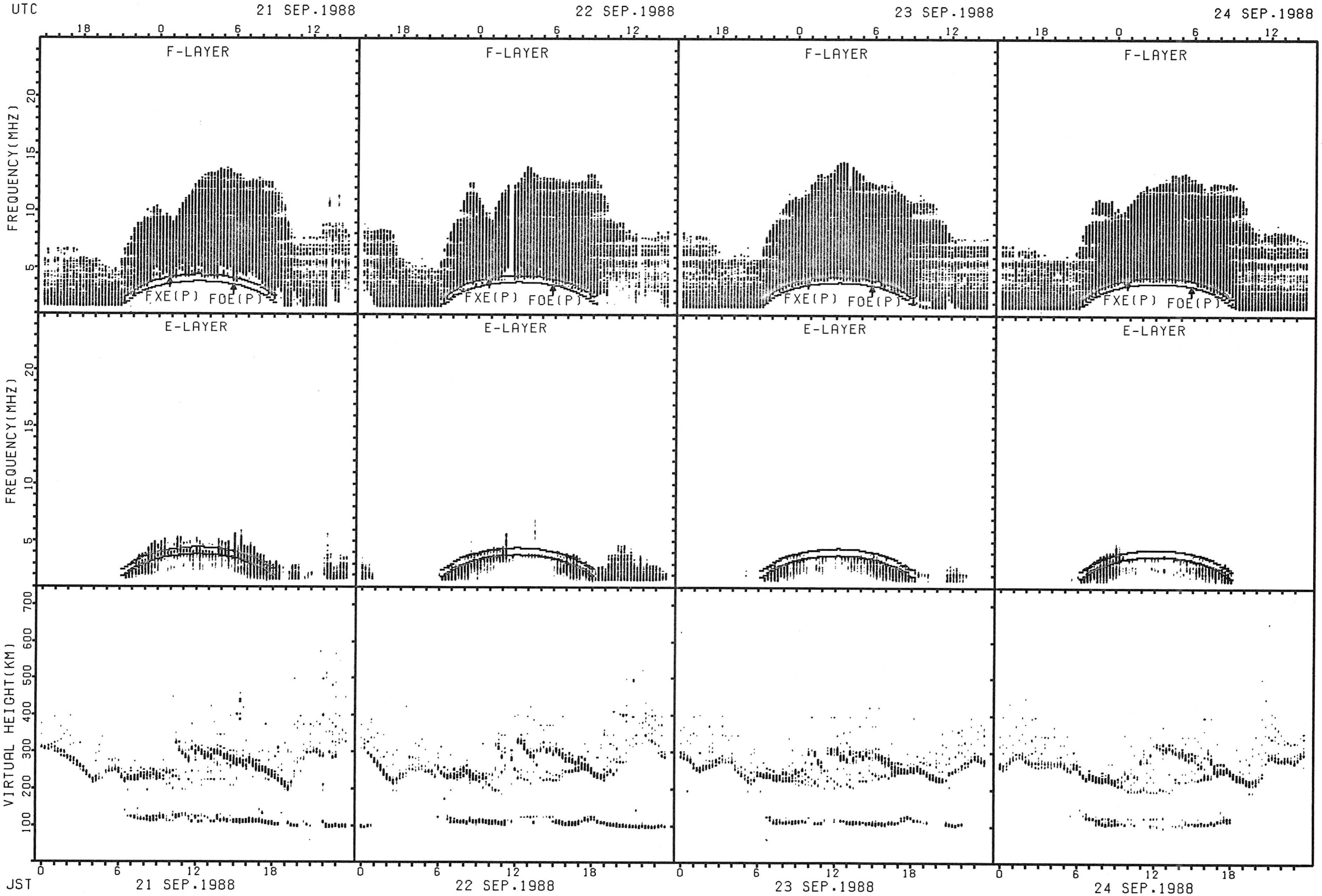
SUMMARY PLOTS AT YAMAGAWA



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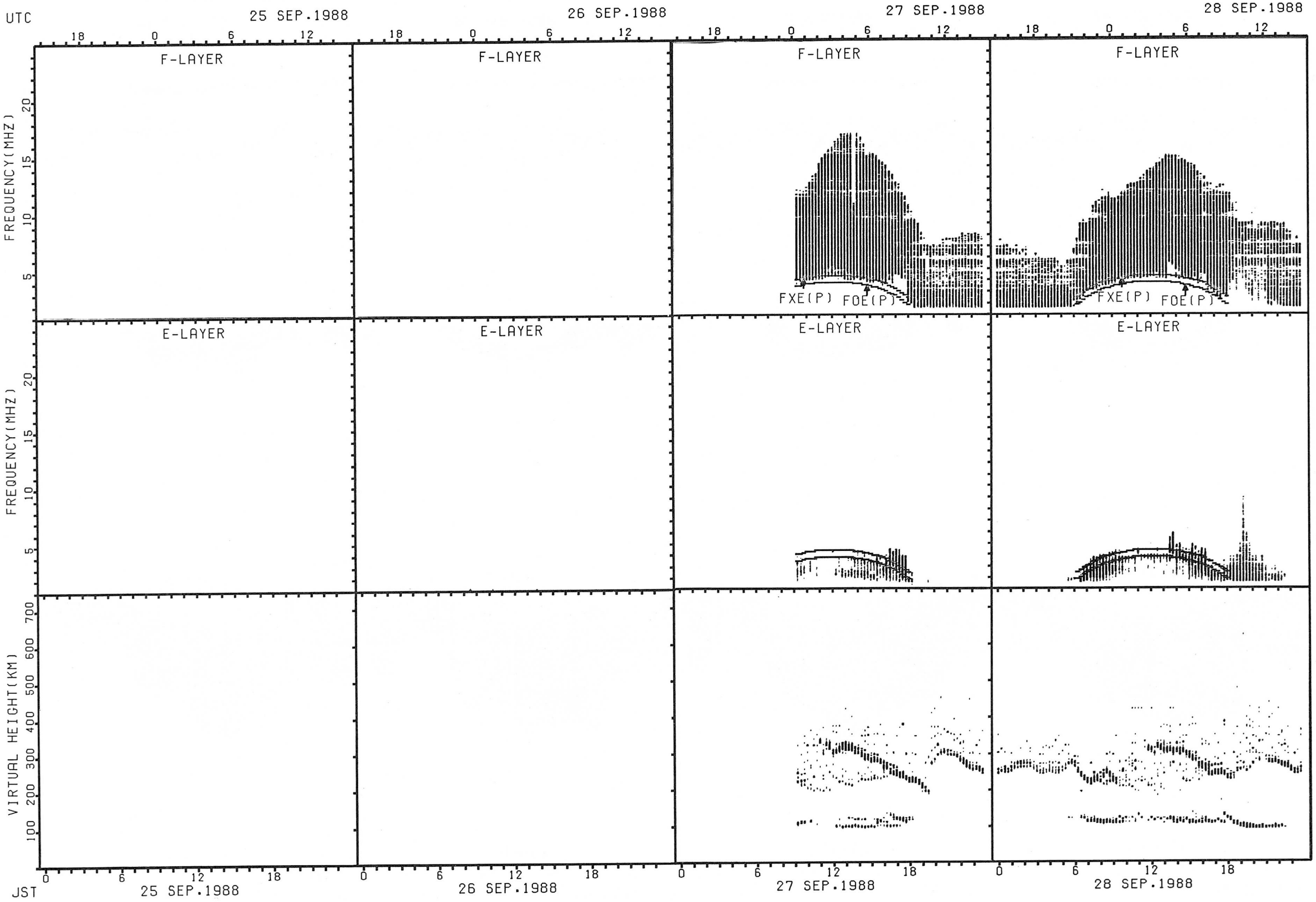
STATION; YAMAGAWA



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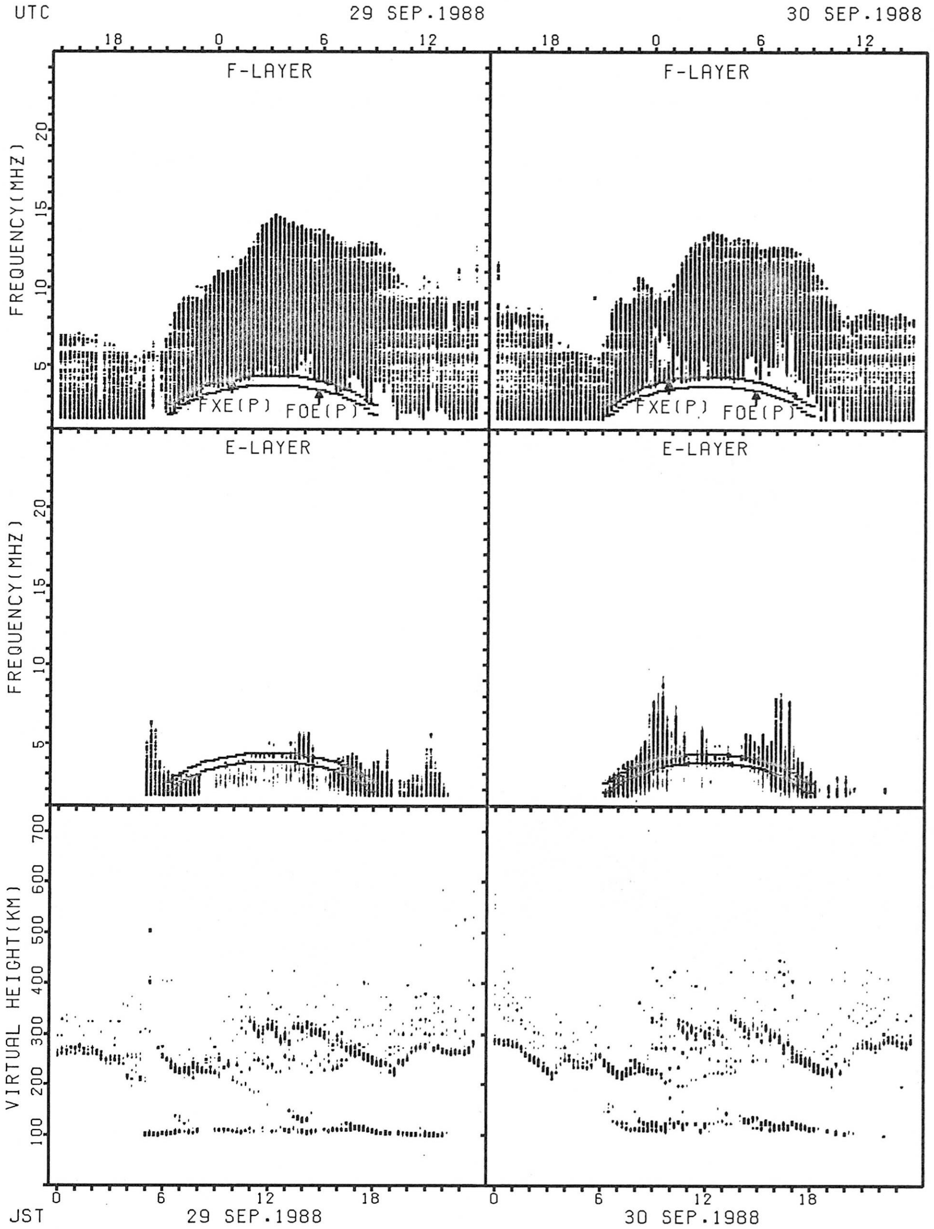

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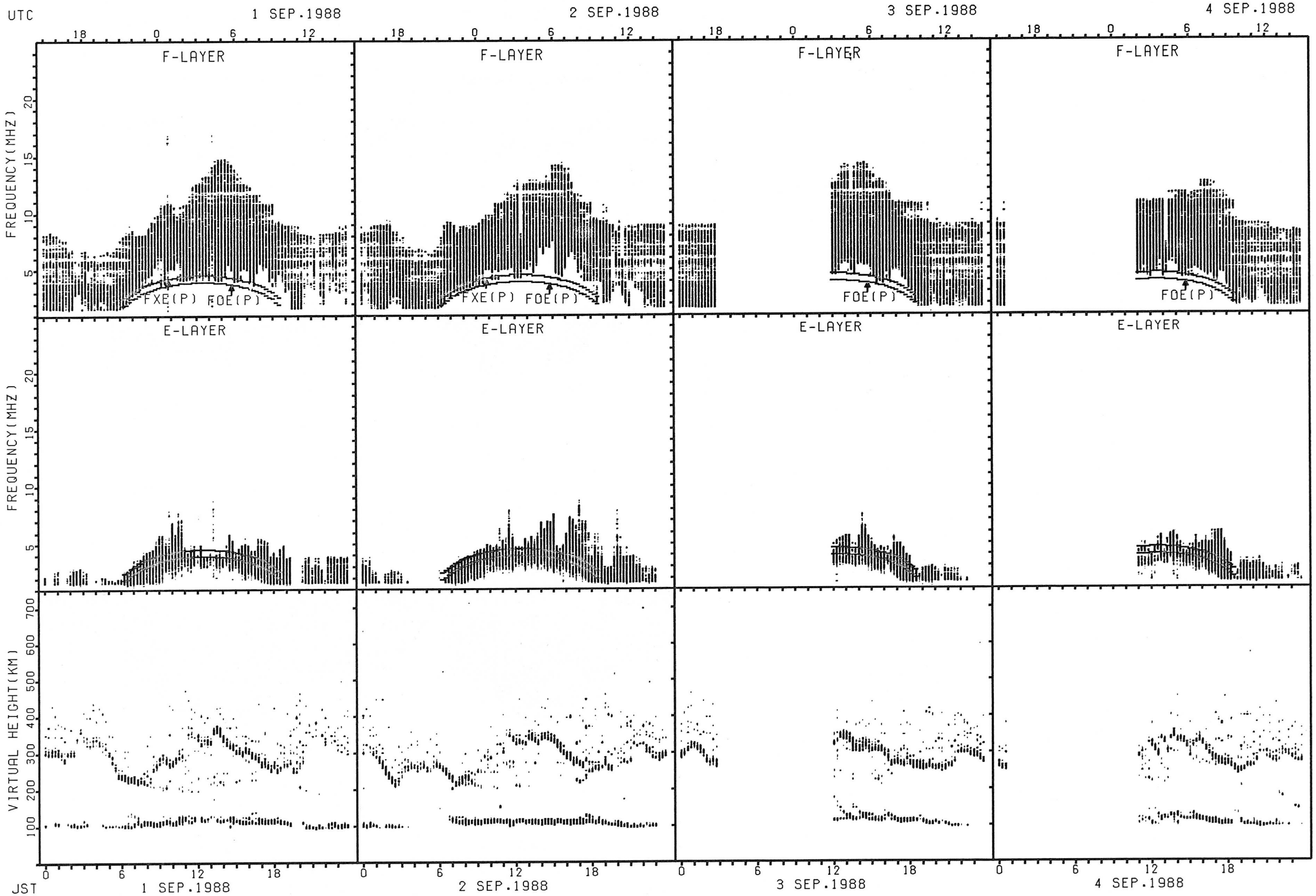
STATION; OKINAWA



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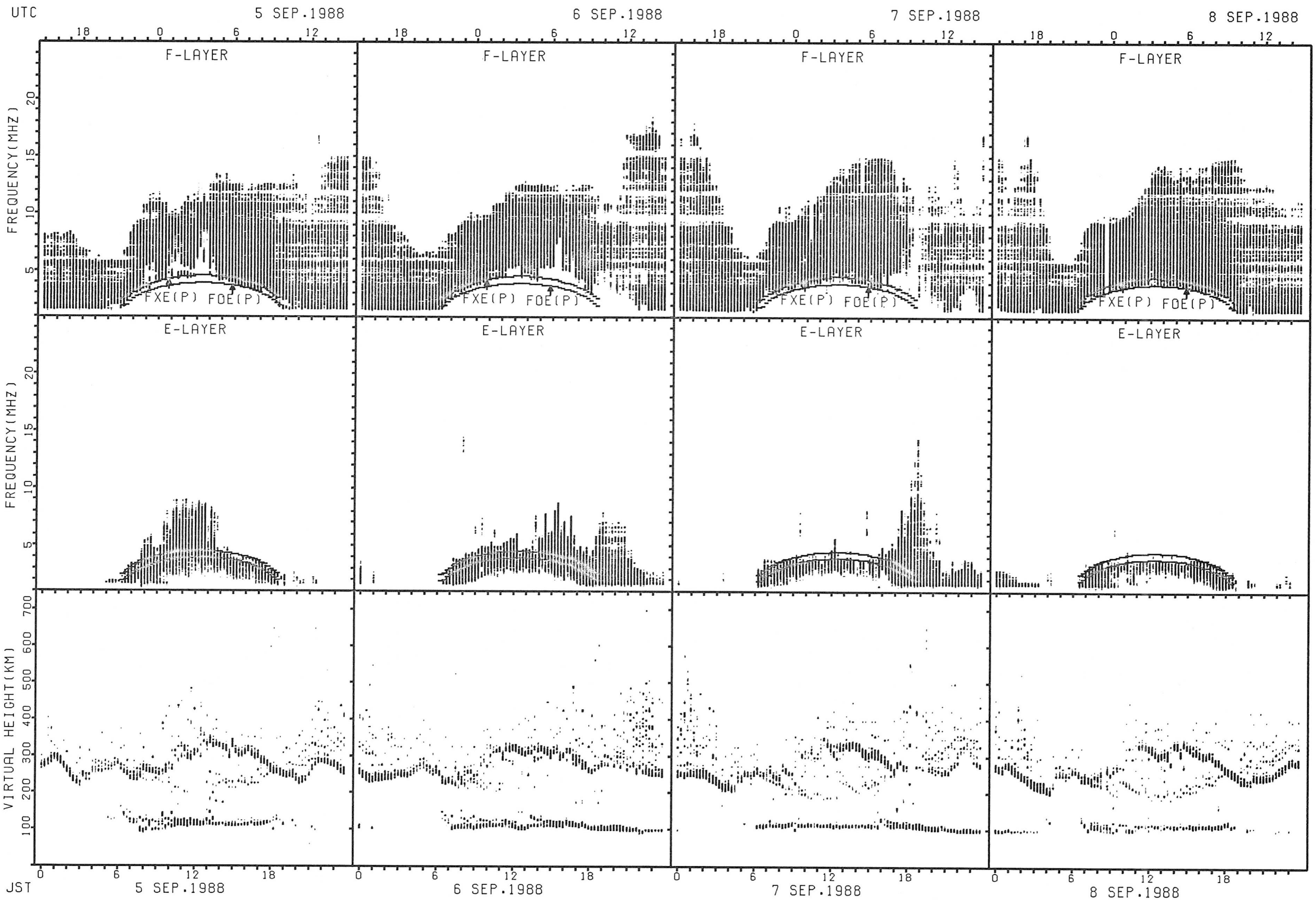

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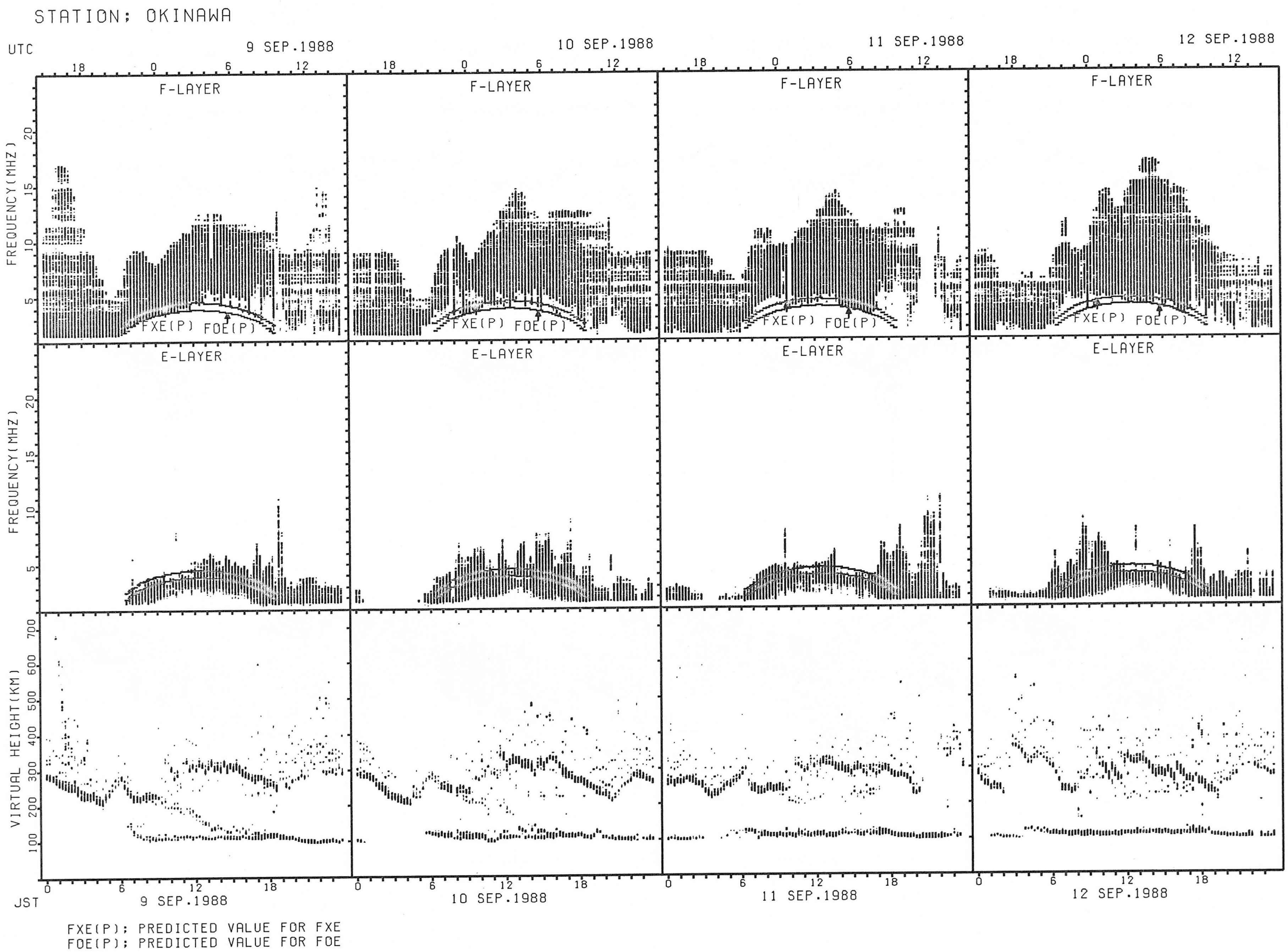
STATION; OKINAWA
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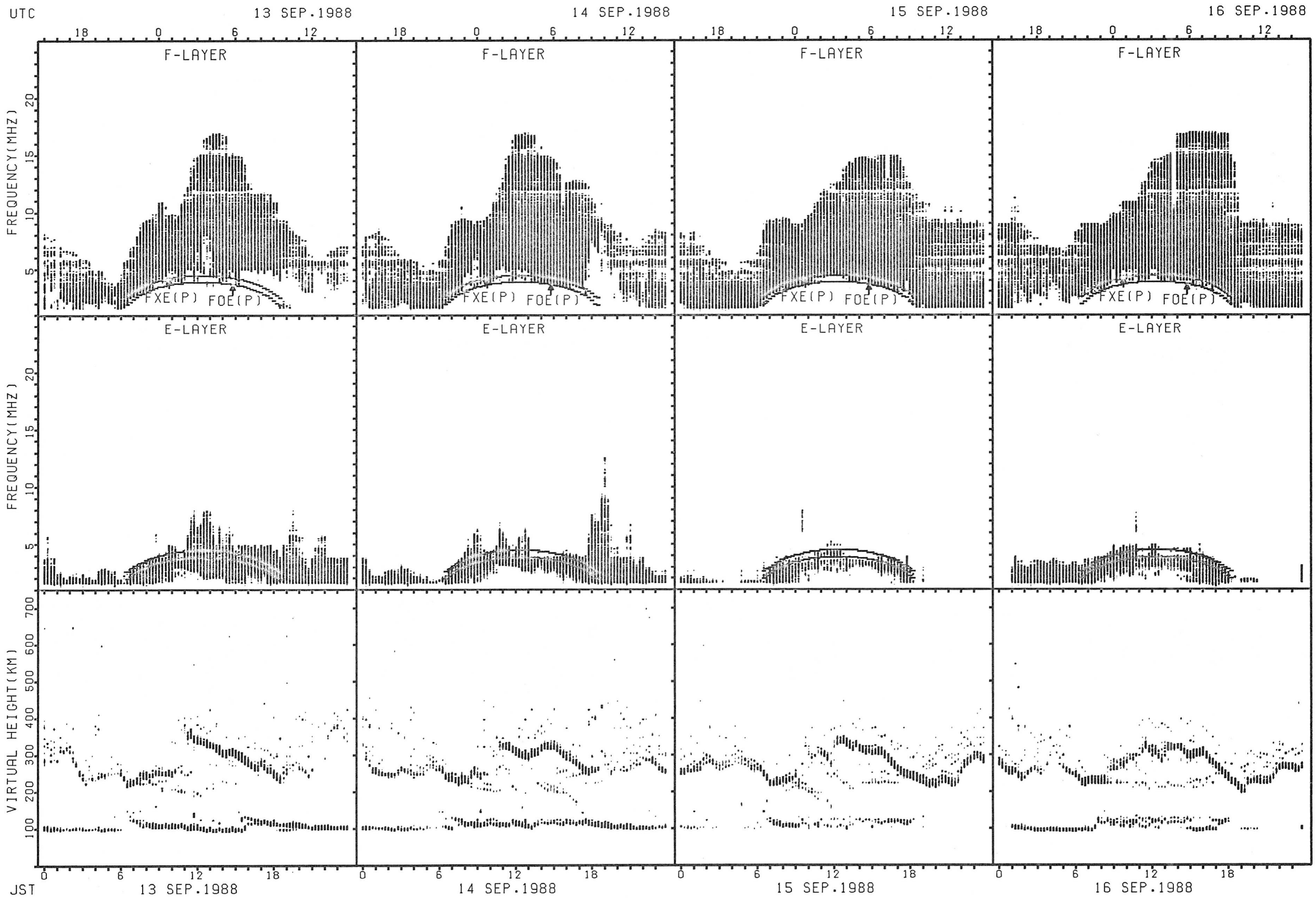
STATION; OKINAWA



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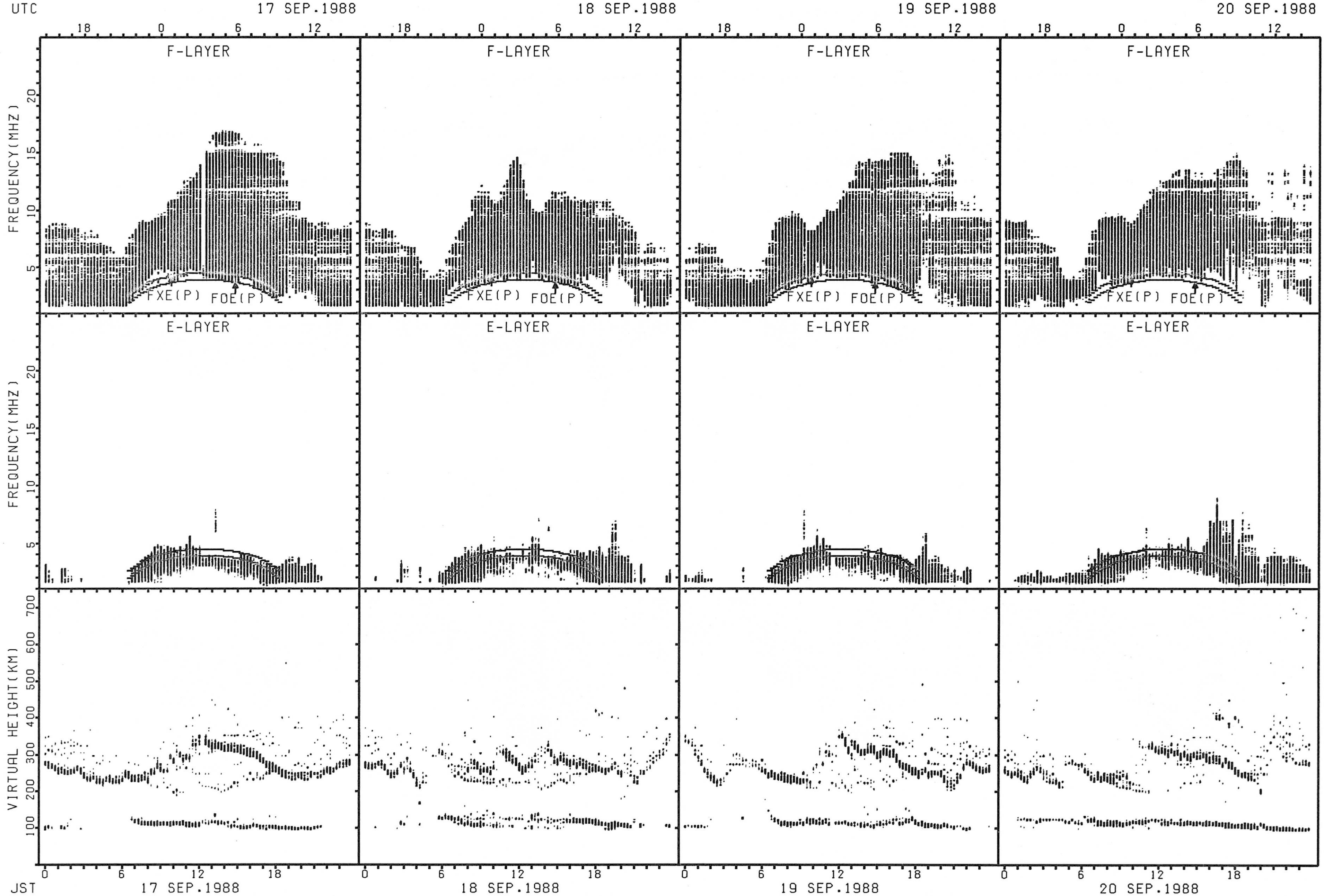

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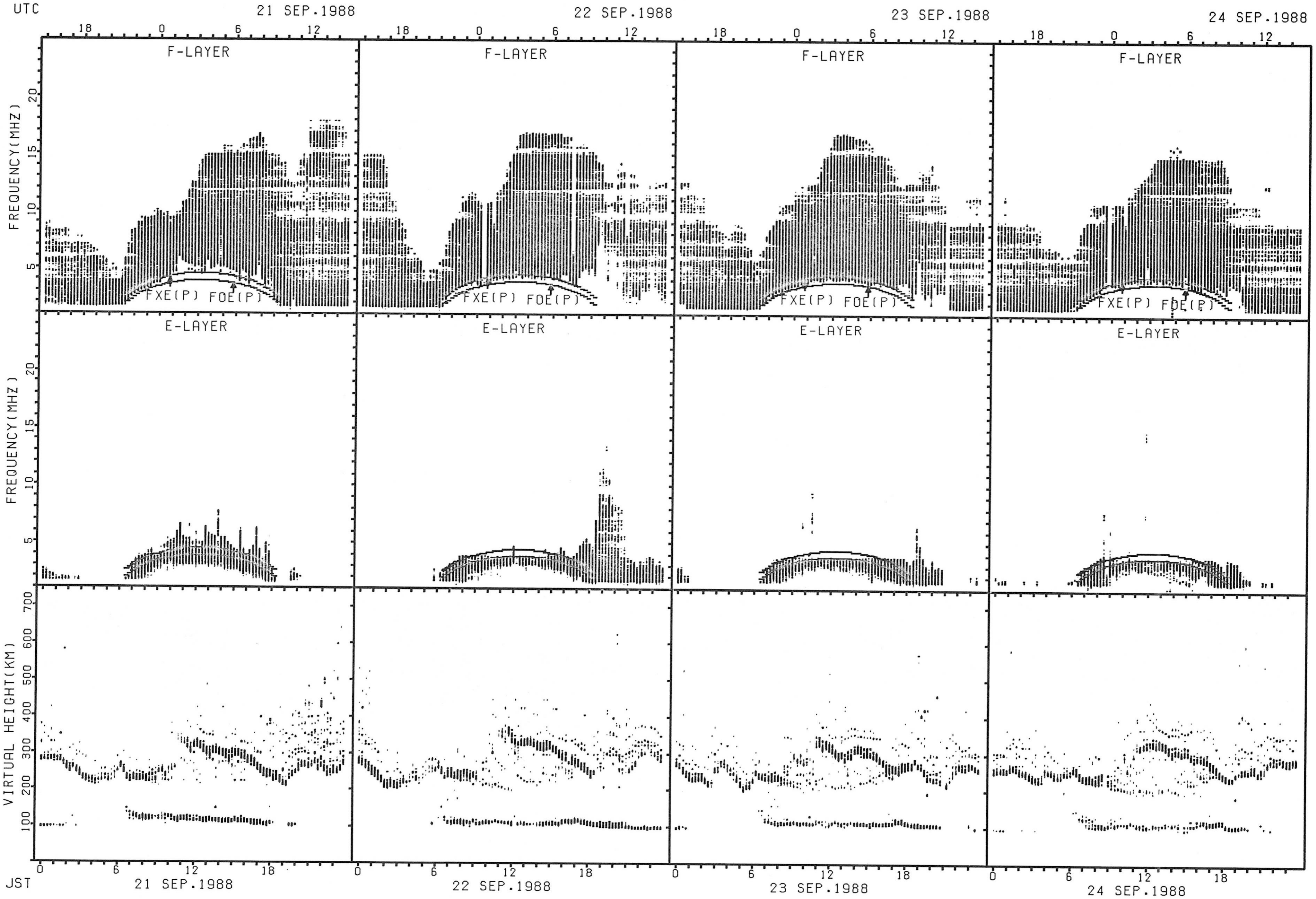

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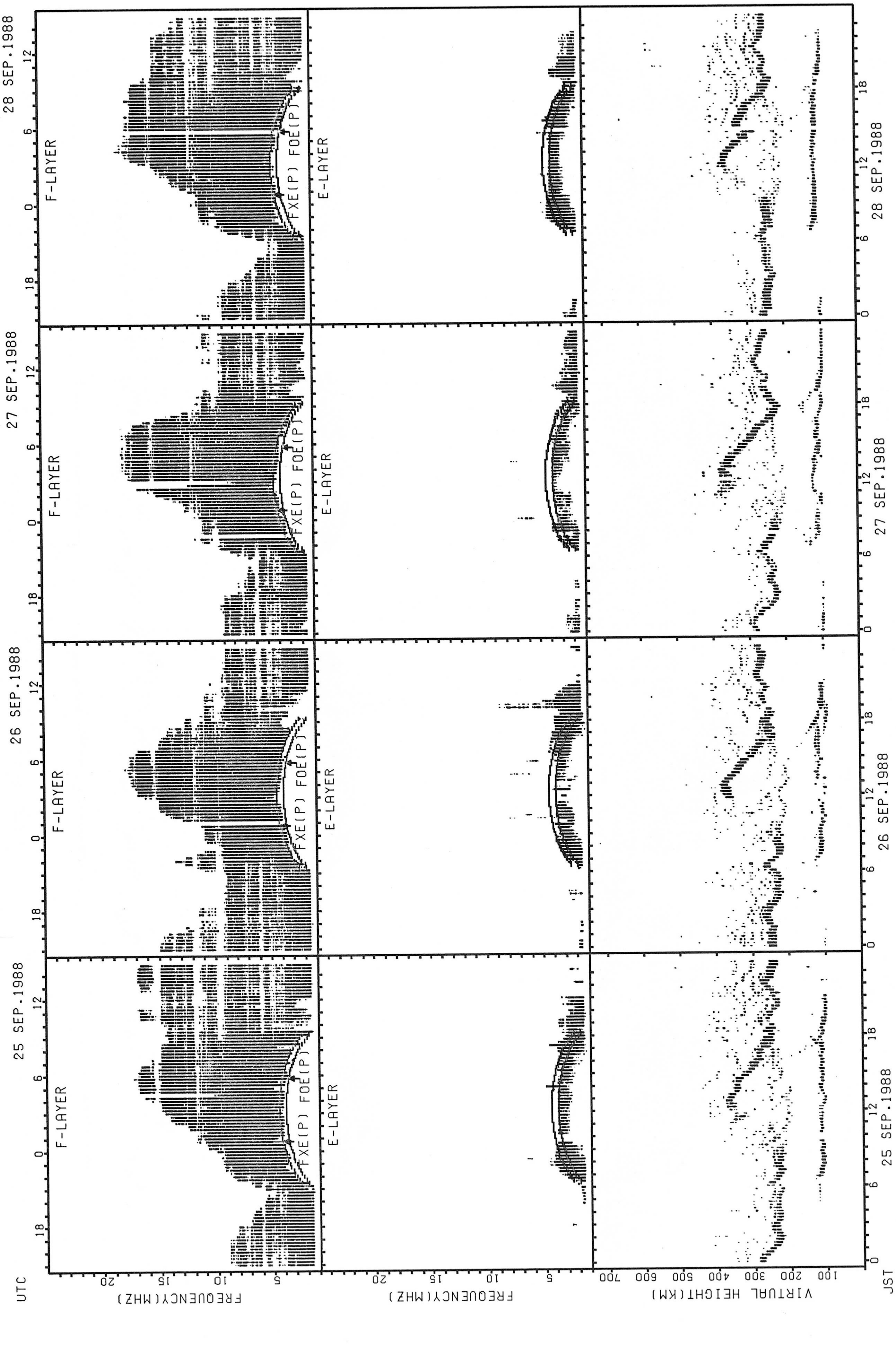

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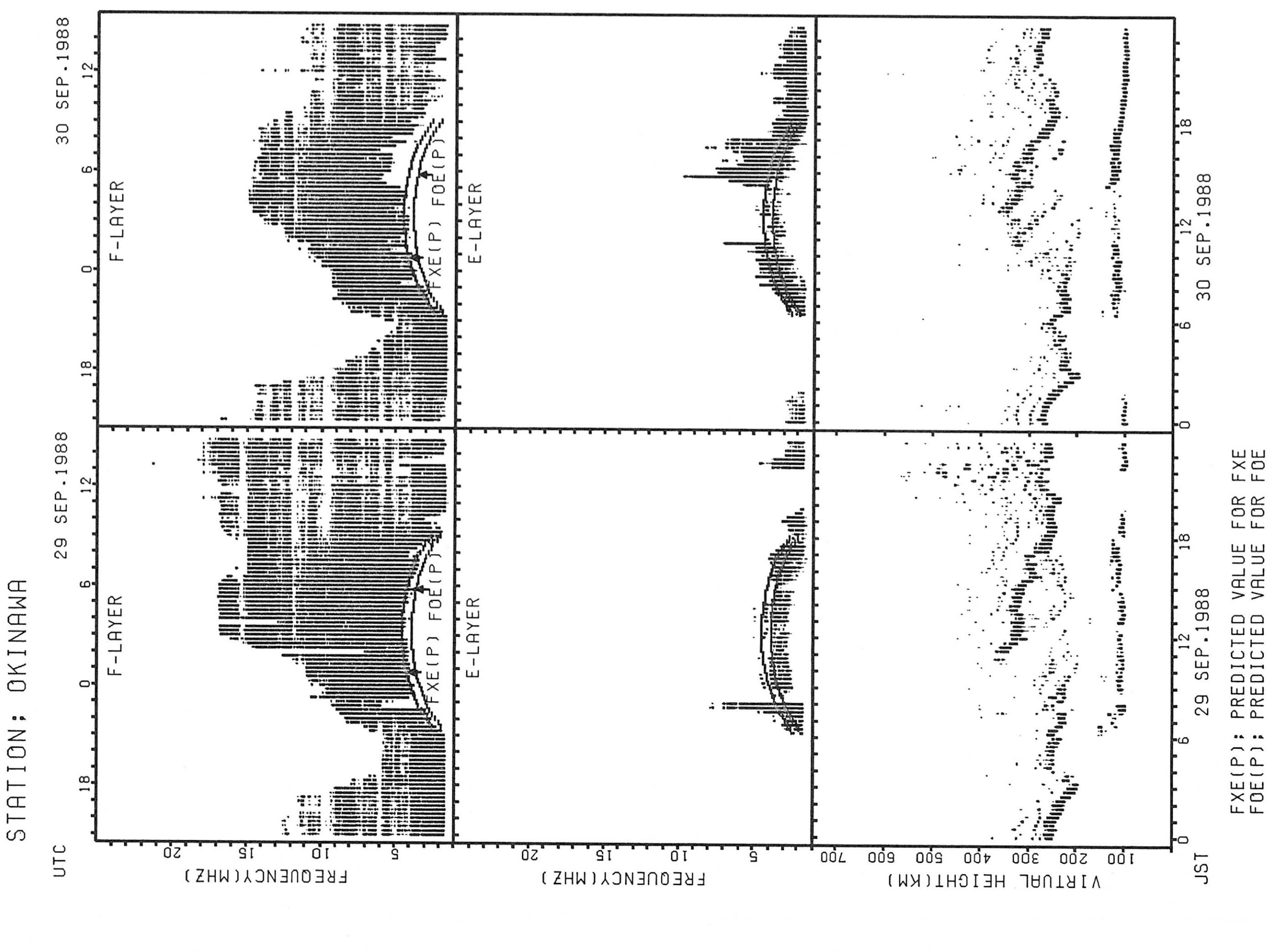
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FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

MONTHLY MEDIANS OF H'F AND H'ES

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

STATION WAKKANAI LAT. 45.4N LON. 141.7E

H'F

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MED							262	254	253							272	270	267	270	284	310			
U Q							287	271	259							291	288	272	276	304	318			
L Q							250	243	242							262	260	252	260	266	298			

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							17	23	21	13	12				11	18	20	20	13	12	11	11		
MED							131	125	119	115	113				125	127	126	128	119	120	117	115		
U Q							138	127	126	121	119				260	135	134	146	127	202	145	117		
L Q							122	119	115	112	109				119	125	120	118	111	114	111	107		

STATION AKITA LAT. 39.7N LON. 140.1E

H'F

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							20	28	29							29	29	31	26	15				
MED							265	250	240							284	274	272	268	282				
U Q							280	265	258							299	283	278	278	308				
L Q							258	241	236							276	266	262	258	264				

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	15	11					24	31	30	30	28	28	22	28	29	31	31	28	19	20	18	20	15	15
MED	103	101					122	119	114	112	108	113	111	113	111	113	119	123	109	107	107	108	103	101
U Q	107	105					138	125	119	115	113	118	115	119	117	123	137	133	115	110	111	110	107	107
L Q	97	99					114	113	111	109	104	107	107	109	109	111	113	112	105	102	105	103	99	97

STATION KOKUBUNJI LAT. 35.7N LON. 139.5E

H'F

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							27	30	29							28	30	31	29	21	11			11
MED							256	246	242							283	272	256	258	274	328			368
U Q							276	252	257							293	276	272	269	288	348			394
L Q							248	234	235							271	268	252	249	263	280			338

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	16	10					28	28	31	31	26	23	26	25	31	27	30	31	26	23	18	18	18	14
MED	101	101					138	113	113	117	119	115	113	113	113	113	118	119	110	107	105	105	102	101
U Q	105	107					155	119	119	119	125	117	123	122	119	119	125	127	115	115	107	119	103	103
L Q	99	99					121	111	111	111	113	109	107	112	111	105	113	113	105	103	101	103	99	99

MONTHLY MEDIANS OF H'F AND H'ES

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

STATION YAMAGAWA LAT. 31.2N LON. 130.6E

H'F

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	12	12	14					31	31	30						14	31	31	31	30	13	13	13	10
MED	342	313	309					238	236	243						287	282	266	250	257	284	320	346	333
U Q	349	350	322					248	248	258						300	286	278	268	278	311	366	366	372
L Q	202	193	266					230	230	230						280	274	258	248	234	253	271	333	318

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	17	15	13	11		10	14	31	31	31	27	24	25	27	28	29	30	31	30	24	20	19	18	17
MED	103	101	105	123		108	121	121	119	115	113	114	119	115	119	113	119	119	117	111	106	105	104	103
U Q	224	308	314	280		125	155	149	131	125	123	123	133	127	127	122	131	131	123	114	110	109	113	115
L Q	101	101	99	103		101	109	119	113	113	111	110	110	109	113	111	115	113	111	105	103	105	101	100

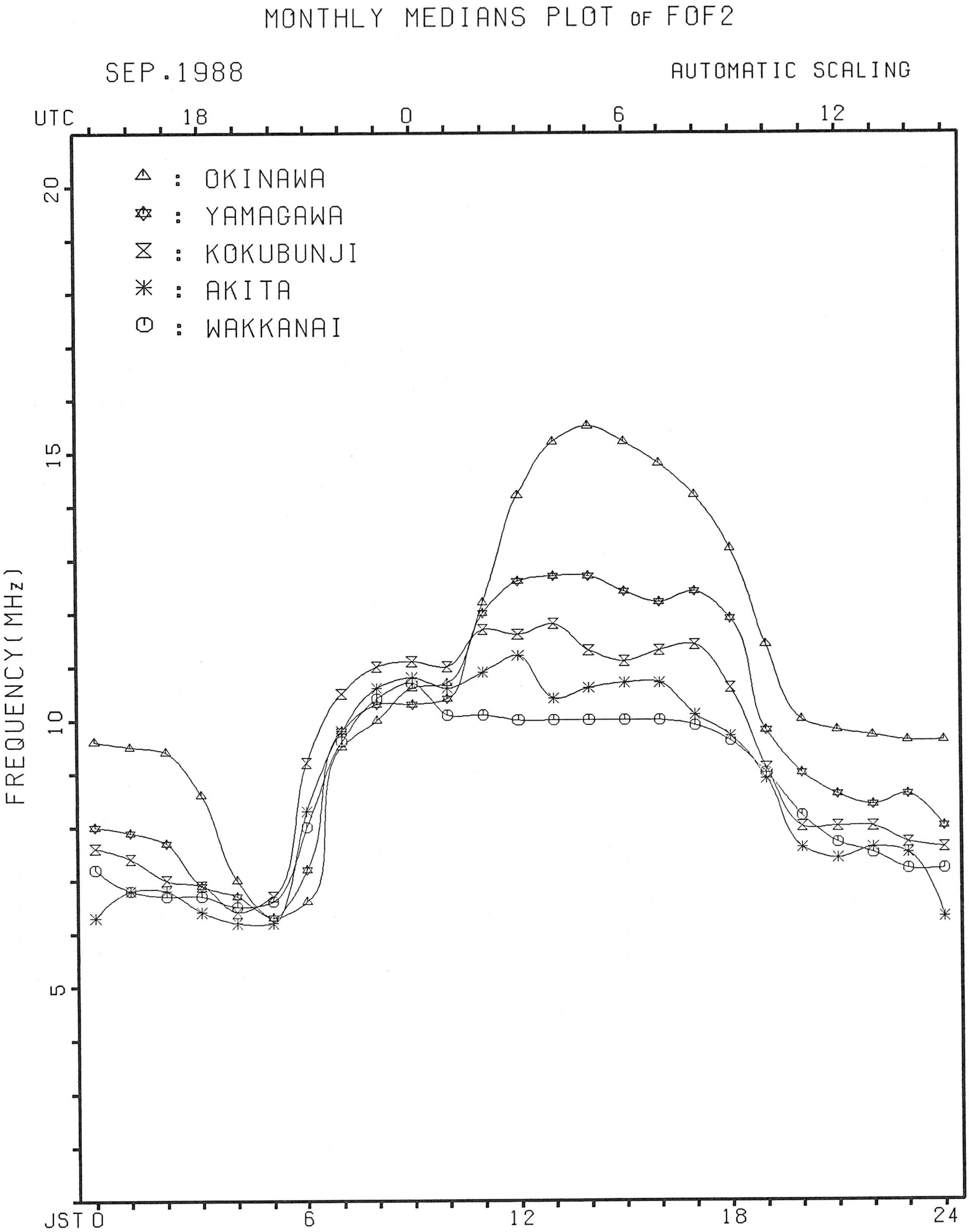
STATION OKINAWA LAT. 26.3N LON. 127.8E

H'F

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	23	22	15				30	31	29							31	31	31	30	27	25	21	26
MED	310	294	280	270				245	238	250							290	272	260	273	286	302	328	316
U Q	328	322	310	306				254	244	260							304	280	268	288	310	355	338	344
L Q	291	268	260	258				230	230	239							284	264	250	256	262	290	312	292

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	17	14						31	31	31	28	30	31	30	31	31	31	31	30	28	24	22	16	17
MED	103	105						125	119	119	116	119	115	117	119	119	117	119	114	110	107	103	100	103
U Q	106	107						137	133	121	125	125	127	133	127	121	125	125	119	115	109	105	104	105
L Q	99	103						119	113	113	112	113	113	113	115	113	113	113	111	108	103	101	99	100


MONTHLY MEDIANS PLOT OF FOF2
SEP.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

SEP. 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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	S	X 72	X 68	X 68	X 65	X 70														X 80	X 76	X 76	X 81	X 81
2	X 76	X 81	X 75	X 72	X 72	X 71														X 88	X 77	S	X 81	X 82
3	X 80	X 80	X 80	X 74	X 68	X 71														X 79	X 81	X 84	X 83	S
4	X 78	X 76	X 74	X 69	X 64	X 68														X 94	X 83	S	X 82	X 84
5	X 80	X 79	X 80	X 78	X 71	X 72														X 87	X 86	S	S	X 85
6	X 87	X 78	S	X 76	X 72	X 73														X 91	X 79	X 80	X 81	X 84
7	S	X 78	X 72	X 72	X 69	X 69														X 87	X 75	X 78	X 81	X 84
8	X 80	X 81	X 76	X 73	X 68	X 69														X 105	X 94	X 85	X 79	X 78
9	X 76	X 75	X 73	X 73	X 67	X 66														X 88	X 76	X 76	X 79	X 79
10	X 78	X 80	X 82	X 80	X 64	X 60														X 91	X 82	X 83	X 81	X 80
11	X 71	X 69	X 63	X 64	X 60	X 57														X 105	X 103	X 99	X 74	X 73
12	X 74	X 67	X 68	X 68	X 67	X 74														X 66	X 60	O X 64	X 61	X 62
13	X 57	X 55	X 57	X 55	X 51	X 49													X 101	X 83	X 66	X 66	X 66	X 69
14	X 64	X 69	X 65	X 64	X 58	X 59													X 96	X 83	X 74	O X 69	X 70	X 72
15	X 71	X 59	X 62	X 60	X 62	X 63													X 102	X 92	X 76	X 63	X 64	X 63
16	X 66	X 64	X 63	X 56	X 53	X 61													X 91	X 84	X 68	X 58	X 60	X 60
17	X 60	X 61	X 58	X 59	X 56	X 57													X 105	X 90	X 77	X 80	X 76	X 76
18	X 71	X 67	X 65	X 66	X 56	X 57													X 84	X 82	X 63	X 57	X 55	X 54
19	X 54	X 55	X 55	X 51	X 46	X 50													X 102	S	X 75	X 65	X 65	X 64
20	X 64	X 60	X 58	X 59	X 54	X 52													X 110	X 82	X 68	X 68	X 68	X 66
21	X 64	X 65	X 64	X 63	X 61	X 59													X 103	X 71	X 64	X 66	X 68	X 65
22	X 66	X 66	X 67	X 60	X 57	X 59													X 113	X 92	X 70	X 69	X 70	X 71
23	X 70	X 72	X 69	X 64	X 63	X 65													X 112	X 100	X 79	X 74	X 73	X 71
24	X 69	X 66	X 65	X 64	X 63	X 65													X 107	X 90	X 81	X 77	X 77	X 76
25	X 75	X 75	X 75	X 69	X 65	X 66													X 109	X 90	X 78	X 78	X 80	X 80
26	S	X 68	X 68	X 68	X 69	X 67													X 105	X 82	X 79	X 78	X 79	X 77
27	X 73	X 72	X 70	X 67	X 67	X 67													X 101	X 75	X 72	X 75	X 78	X 72
28	X 69	X 67	X 66	X 65	X 64	X 66													X 90	X 78	O X 81	X 83	X 80	X 77
29	X 71	X 70	X 69	X 69	X 68	X 64													X 101	X 84	X 87	X 84	X 78	X 74
30	X 74	X 75	X 72	X 68	X 62	X 62													X 99	X 77	X 79	X 80	X 76	S
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	30	29	30	30	30													18	29	30	27	29	28
MED	X 71	X 70	X 68	X 68	X 64	X 65													X 102	X 87	X 77	X 76	X 77	X 75
UQ	X 76	X 76	X 73	X 72	X 68	X 69													X 107	X 91	X 81	X 80	X 80	X 80
LQ	X 66	X 66	X 65	X 63	X 58	X 59													X 99	X 82	X 72	X 67	X 68	X 68

SEP. 1988 | FXI (0.1 MHZ)

IONOSPHERIC DATA

SEP. 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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	I S 70	66	62	62	59	64	90	102	97	108	100	96	103	100	104	104	95	A	94	74	70	70	75	75
2	70	75	69	66	J S 66	65	89	109	101	100	96	108	105	102	103	105	100	106	98	82	71	I S 74	75	J S 76
3	74	74	74	68	S 62	S 65	86	99	97	97	95	103	109	R 106	101	98	92	91	91	73	75	78	77	I S 78
4	72	70	68	63	58	62	90	95	93	98	97	106	102	97	96	101	97	90	90	88	77	I S 74	76	78
5	74	73	74	72	65	66	84	101	103	99	103	109	97	94	93	92	88	91	98	81	80	I S 79	I S 78	79
6	81	72	I S 70	70	66	67	85	88	90	97	104	101	104	100	106	103	108	104	99	85	73	74	75	78
7	I S 74	72	66	66	63	63	79	98	107	107	105	114	115	113	114	116	115	108	106	81	69	72	75	78
8	74	75	70	67	62	63	85	107	106	96	104	119	124	125	121	119	115	109	110	99	88	79	73	72
9	70	69	67	67	61	60	81	101	95	84	83	91	93	98	95	98	97	I C 95	99	82	70	70	73	73
10	72	74	76	74	58	54	74	98	104	86	91	96	92	91	97	98	99	93	94	85	76	77	75	74
11	65	63	62	58	54	51	73	111	120	103	81	82	97	95	90	94	88	84	94	99	97	93	68	67
12	68	61	62	62	61	68	76	92	81	105	120	126	110	Z 106	95	81	86	90	100	60	54	58	55	56
13	51	49	51	49	45	43	68	79	92	102	93	91	85	97	98	95	94	98	95	77	60	60	60	63
14	58	63	59	58	52	53	73	91	99	105	99	108	107	97	100	92	95	96	90	82	68	63	64	66
15	65	53	56	54	56	57	62	94	102	91	86	98	108	110	102	105	106	111	96	86	70	57	58	57
16	60	58	57	50	47	55	75	86	103	95	96	110	117	113	92	87	84	91	85	78	62	52	54	54
17	54	55	52	53	50	51	74	89	78	99	107	116	120	111	106	98	99	101	99	84	71	74	70	70
18	65	61	59	60	50	51	72	78	81	83	73	70	68	67	67	66	67	76	78	76	57	51	49	48
19	S 48	49	49	45	40	44	57	82	93	91	80	78	87	90	91	98	113	112	96	I S 75	69	59	59	58
20	58	54	52	53	48	46	71	94	94	104	96	97	100	108	109	105	111	107	104	76	62	62	62	60
21	58	59	58	57	55	53	66	93	91	97	96	102	109	110	111	105	108	110	97	65	58	60	62	59
22	60	60	61	54	51	53	76	89	110	107	107	106	116	110	108	109	106	111	107	86	64	63	64	65
23	64	66	63	58	57	59	75	96	103	112	121	121	118	115	111	102	107	108	106	94	73	68	67	J S 65
24	63	60	59	58	57	59	82	100	101	109	99	115	108	114	114	111	111	112	101	S 84	75	71	71	70
25	69	69	69	63	59	60	89	99	98	106	113	115	112	115	118	119	119	108	103	84	72	72	74	74
26	I S 66	62	62	62	63	61	85	113	117	110	120	129	119	124	124	120	112	100	99	76	73	72	73	71
27	67	66	J S 64	61	61	61	88	114	118	117	125	131	140	141	132	120	118	118	95	69	66	69	72	66
28	63	61	60	59	58	60	90	106	105	122	117	123	125	121	117	117	116	101	84	72	S 75	77	74	71
29	65	64	63	63	62	58	85	88	101	111	114	121	123	116	116	113	J R 115	106	95	78	81	78	72	68
30	68	69	66	62	56	56	76	90	113	99	105	122	116	111	111	110	114	114	93	71	73	74	70	I S 72
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30	30	30	30	30
MED	66	64	62	62	58	59	78	96	101	101	100	108	108	109	106	104	106	104	96	81	71	72	72	70
UQ	70	70	68	66	62	63	85	101	105	107	107	119	117	114	114	111	113	109	100	85	75	74	75	74
LQ	60	60	59	57	52	53	73	89	93	97	95	97	100	97	97	98	95	93	94	75	66	62	62	63

SEP. 1988 | FOF2 (0.1 MHZ)

IONOSPHERIC DATA

SEP. 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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								L	L	L	L	510L	L	L	L	L	L	A	A					
2								L	L	580L	600	L	L	620L	560L	560L	L	L						
3								L	A	530L	L	600L	L	540L	L	L	L	L						
4									L	L	L	560L	L	560L	L	L	L							
5								L	L	L	520L	540L	L	530L	L	L	L	A						
6									L	L	560L	L	L	560L	530L	L	A	L						
7								L	L	L	500L	L	L	540L	560L	L	440L							
8								L	L	L	L	L	560L	L	L	L	L	L						
9								L	L	500L	L	L	540L	510L	L	490L	L	C						
10								L	L	L	L	530L	L	L	550L	L	L	A						
11								L	L	L	L	L	L	L	L	L	L	L						
12								L	L	540L	500L	530L	L	510L	L	L	L	L						
13								L	L	L	530L	530L	L	L	L	L	L							
14									L	450L	L	L	550L	560L	L	L	L							
15								L	L	L	L	530L	L	L	L	L	L	L						
16								L	L	L	L	L	570L	530L	L	L	L							
17									L	L	L	550L	560L	530L	L	L	L	L						
18								460L	460	490	510	500	540L	520L	L	L	L	L						
19								L	L	L	L	L	550UL	L	L	L	L	L						
20									A	L	L	L	490L	L	510L	L	L							
21								L	L	L	L	L	520L	L	L	L	L							
22								L	L	L	L	490L	L	L	L	L	L							
23								L		L	L	L	L	590UL	L		L							
24										L	L	L	L	640UL	L	L	L							
25									L	L	L	L	L	L	L	L	L							
26								L	L	L	L	B	L	610UL	610UL	L								
27									L	L	L	L	L	L	L	L	L							
28										L	L	L	610L	620UL	L									
29									L	L	L	L	L		L	L	L							
30								A	L	L	L	L	L	L	L	A	A	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								1	1	6	7	11	10	16	6	2	1							
MED								460L	460	515L	520L	530L	550L	550L	555L	525L	440L							
UQ										540L	545L	545L	560L	600L	560L									
LQ										490L	505L	520L	540L	530L	530L									

SEP. 1988

FOF1 (0.01 MHZ)

IONOSPHERIC DATA

SEP. 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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							240	275	315	A	R	A	380	385	375	350	320	A	B					
2							220	290	335	365	390	A	A	A	A	A	A	A	A					
3							A	305	A	365	A	380	R 390	R 385	380	350	320	265	B					
4							225	285	330	A	A	A	A	A	A	A	315	250	B					
5							220	290	335	350	375	370	A	A	335	345	305	235	A					
6							220	285	330	365	370	385	395	370	365	340	300	A	B					
7							225	290	A	380	385	385	390	375	370	A	A	A	B					
8							225	A	335	355	380	R 390	390	390	360	A	A	245	B					
9							215	290	320	355	370	390	380	370	370	335	310	I C 230	B					
10							215	290	325	350	365	380	385	380	365	340	295	225	B					
11							205	A	A	340	365	380	380	370	355	320	290	235	B					
12							A	A	320	A	365	A	375	365	350	320	285	220	B					
13							A	A	A	A	A	A	A	A	345	320	285	220						
14							A	A	A	A	A	A	380	360	350	325	290	A						
15							205	290	315	350	370	B	A	370	355	335	290	A						
16							215	275	320	350	365	375	370	A	350	325	290	215						
17							210	280	A	A	360	A	380	375	350	330	A	A						
18							A	280	340	355	375	380	U A 370	360	350	320	285	225						
19							200	290	325	355	375	380	380	360	350	320	285	225						
20							A	A	A	A	375	385	390	380	360	320	275	U A 225						
21							205	280	330	360	380	385	380	370	355	335	285	210						
22							220	285	345	360	380	395	395	395	380	335	295	A						
23							190	A	335	360	375	385	385	370	360	330	290	210						
24							200	285	335	365	375	380	I S 385	380	370	335	285	195						
25							200	295	330	370	A	390	390	380	365	330	295	225						
26							A	285	330	365	380	B	400	385	360	R	275	225						
27							H 225	280	335	360	370	385	395	385	370	335	280	195						
28							A	A	A	370	380	390	400	385	370	335	285	A						
29							190	280	330	370	375	395	395	385	360	330	280	165						
30							185	275	330	355	365	380	400	385	375	340	275	175						
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							22	22	22	23	24	21	25	25	28	25	26	21						
MED							215	285	330	360	375	385	385	380	360	335	290	225						
UQ							220	290	335	365	380	390	395	385	370	335	295	230						
LQ							200	280	325	355	368	380	380	370	352	325	285	210						

SEP. 1988 | FOE (0.01 MHZ)

IONOSPHERIC DATA

SEP. 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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	JA 51	JA 25	23	JA 27	EB 14	JA 17	G	33	37	JA 44	G 36	44	G 34	JA 44	42	40	44	JA 111	JA 53	JA 75	JA 57	JA 50	JA 31	JA 35
2	JA 44	JA 38	JA 22	JA 26	JA 25	20	G	G 27	G	G	G 22	JA 47	JA 51	43	42	40	JA 46	JA 41	JA 35	JA 25	JA 26	JA 31	JA 26	JA 23
3	JA 19	EB 14	EB 14	JA 19	19	EB 19	27	34	JA 58	41	JA 50	G 35	41	42	JA 42	37	37	36	23	JA 30	JA 44	EB 15	JA 41	JA 22
4	EB 14	EB 15	JA 18	JA 24	JA 24	19	G	JA 47	JA 44	JA 46	JA 52	42	42	JA 49	38	36	33	31	JA 42	JA 33	JA 32	JA 27	25	JA 21
5	28	JA 19	JA 17	22	20	20	G	32	34	33	42	46	JA 43	45	JA 47	39	37	JA 48	JA 46	JA 36	JA 33	JA 23	JA 28	JA 20
6	JA 19	EB 14	EB 16	EB 15	18	EB 15	24	31	37	40	43	51	JA 62	47	G	JA 50	JA 44	JA 35	JA 34	JA 41	JA 24	JA 23	23	JA 27
7	JA 25	20	18	21	JA 19	EB 15	G 21	G	JA 35	JA 47	G 32	G	G	G 34	G 35	38	JA 48	JA 52	JA 33	JA 47	JA 45	JA 40	JA 21	EB 15
8	EB 14	20	EB 13	EB 14	EB 14	EB 15	G	31	G 31	JA 39	G 34	G	G 29	48	JA 39	JA 42	JA 40	JA 29	JA 20	21	23	JA 35	JA 26	JA 24
9	EB 15	EB 14	EB 14	EB 13	ES 17	EB 15	G 20	G	G	G	G	G	G	G	39	36	32	C	18	EB 17	EB 15	EB 15	20	EB 15
10	EB 14	EB 15	EB 13	EB 14	EB 14	EB 14	G	35	36	39	46	40	46	G	44	JA 54	JA 49	JA 41	JA 28	JA 26	EB 15	JA 23	JA 22	EB 15
11	EB 15	EB 13	EB 14	EB 14	19	20	25	32	35	G 31	G 27	G 25	G	G	JA 49	G	35	29	JA 36	JA 23	EB 15	JA 26	JA 25	JA 25
12	JA 23	JA 21	JA 23	20	JA 17	JA 30	JA 35	JA 38	JA 38	37	G	39	G	G 24	G	G 25	32	25	JA 32	JA 48	JA 49	JA 45	JA 37	JA 26
13	JA 22	19	EB 16	JA 16	20	21	JA 43	JA 84	JA 48	JA 41	49	JA 66	45	46	G	G	31	30	23	JA 26	JA 24	JA 20	JA 28	JA 21
14	JA 24	JA 19	22	20	18	22	25	33	36	36	39	JA 41	40	G	G	G	32	JA 31	JA 52	JA 22	JA 32	JA 30	23	JA 19
15	22	JA 19	23	20	EB 15	EB 15	G	32	JA 41	G 33	JA 45	EB 41	JA 52	G 26	G 27	G	31	27	JA 28	24	13	EB 15	JA 30	JA 36
16	JA 21	JA 20	EB 16	JA 19	JA 16	EB 15	G	32	41	43	JA 50	JA 52	39	39	G 21	G 20	30	JA 42	21	EB 13	18	EB 15	EB 15	JA 20
17	21	JA 31	JA 29	JA 23	JA 20	JA 28	G	G	JA 37	34	G 24	40	G	G	G	G 30	30	JA 30	JA 29	JA 34	JA 35	JA 23	22	JA 24
18	JA 20	21	21	EB 15	EB 18	19	JA 27	33	38	39	JA 52	G	40	G	G 27	G	G 21	G 21	JA 22	JA 24	JA 21	EB 16	JA 22	EB 16
19	EB 16	EB 14	EB 13	EB 15	EB 14	EB 15	23	G	G	G 24	42	40	G 26	G	G	G 26	32	28	JA 22	JA 33	JA 22	JA 21	EB 15	EB 15
20	EB 15	EB 15	20	EB 15	JA 21	JA 21	JA 23	33	JA 76	JA 53	40	G	42	40	39	34	33	JA 31	JA 30	JA 19	JA 30	JA 24	JA 21	EB 15
21	EB 15	17	EB 15	EB 15	EB 15	EB 15	G	G	35	45	46	47	JA 49	JA 79	JA 48	G	G 27	26	EB 14	20	21	18	EB 16	JA 30
22	JA 21	JA 17	JA 24	EB 14	EB 15	JA 17	G	G	G	G	G	G	G	G	G	G 21	33	JA 28	JA 23	JA 26	21	JA 23	23	JA 17
23	EB 15	EB 14	EB 15	EB 15	18	19	G 18	29	G 32	G	G	G	G	G	G	G	G	27	JA 19	22	22	18	EB 15	EB 15
24	EB 15	EB 14	EB 15	EB 15	EB 15	19	25	31	G	39	45	G 30	G 27	G	39	35	32	26	JA 20	JA 25	EB 15	JA 18	EB 15	EB 15
25	EB 15	EB 14	EB 15	EB 13	EB 15	20	24	G	G	G	43	G	G	G	G	G	G	G	EB 16	EB 14	EB 14	EB 14	EB 15	EB 15
26	18	EB 17	EB 15	EB 13	EB 14	EB 13	JA 36	G 27	G	G	G	EB 64	G	G	G 20	G	G	G	JA 17	EB 15	JA 17	EB 15	EB 13	EB 15
27	EB 14	EB 13	EB 15	EB 15	EB 15	EB 14	G	G	G	G	G	G	G	G	G	37	34	25	JA 20	EB 15	EB 13	EB 14	EB 15	EB 15
28	EB 15	EB 15	EB 15	EB 15	EB 14	22	24	JA 34	JA 36	G	G	G	G	G	G	36	39	JA 26	JA 22	JA 21	EB 16	22	EB 15	EB 15
29	EB 15	EB 14	EB 15	EB 14	EB 14	19	19	G	35	40	G	45	43	41	46	42	34	23	JA 31	JA 29	JA 33	EB 15	EB 15	EB 15
30	EB 14	EB 14	EB 14	EB 14	EB 13	EB 14	24	JA 50	36	JA 61	JA 82	41	45	42	53	JA 59	JA 50	JA 57	JA 52	JA 65	JA 47	JA 30	JA 24	JA 28
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30	30	30	30	30
MED	17	EB 16	EB 16	EB 15	EE 16	19	20	32	36	38	40	38	36	G 25	G 31	34	33	29	JA 26	JA 25	JA 22	JA 22	22	JA 20
UQ	JA 22	JA 20	21	20	19	20	25	33	JA 38	41	46	44	43	43	42	39	39	JA 36	JA 34	JA 33	JA 33	JA 27	JA 26	JA 24
LQ	EB 15	EB 14	EB 15	EB 14	EB 14	EB 15	G	G	G	G	G	G	G	G	G	G	31	26	JA 20	21	17	EB 15	EB 15	EB 15

SEP. 1988 | FOES (0.1 MHZ)

IONOSPHERIC DATA

SEP. 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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	27	23	18	15EB	14EB	15EB	G	29	37	41	35G	40	31G	28G	40	37	42	111AA	53	49	34	30	20	21
2	27	22	16	18	20	15EB	G	25G	G	G	22G	41	49	41	39	37	33	29	18	18	19	28	20	18
3	15EB	14EB	14EB	15EB	14EB	19EB	26	34	57	41	42	33G	36G	42	30G	37	34	30	22	23	20	15EB	19	18ES
4	14EB	15EB	13EB	19	18	15EB	G	37	39	42	45	41	40	41	37	36	33	30	27	24	19	21	19	17
5	20	15EB	16	15EB	14EB	15EB	G	32	34	37	39	42	39	42	42	36	34	38	32	19	22	17	28US	15EB
6	18	14EB	16EB	15EB	14EB	15EB	24	31	36	38	41	48	47	43	G	38	43	31	18	30	18	15EB	17	19
7	21	16	14EB	14EB	13EB	15EB	19G	G	33	31G	31G	G	G	34G	31G	38	38	29	23	35	24	27	18	15EB
8	14EB	15EB	13EB	14EB	14EB	15EB	G	31	27G	27G	33G	G	29G	41	G	35	32	19G	14EB	14EB	15EB	30	24	23
9	15EB	14EB	14EB	13EB	17ES	15EB	19G	G	G	G	G	G	G	G	38	35	G	C	17	17EB	15EB	15EB	15EB	15EB
10	14EB	15EB	13EB	14EB	14EB	14EB	G	33	34	39	40	40	41	G	39	46	37	33	21	15EB	15EB	14EB	19	15EB
11	15EB	13EB	14EB	14EB	15EB	15EB	24	31	34	31G	26G	24G	G	G	G	G	33	27	33	19	15EB	20	22	20
12	20	18	19	14EB	13EB	24	24	30	26G	35	G	38	G	23G	G	24G	31	25	28	23	38	27	26	18
13	17	14EB	16EB	14EB	14EB	14EB	23	30	35	40	39	42	40	39	G	G	30	29	22	25	22	15EB	18	18
14	19	17	15EB	15EB	14EB	15EB	23	33	34	36	39	41	40	G	G	G	31	25	26	16	26	18	16EB	15EB
15	15EB	16	17	14EB	15EB	15EB	G	G	36	32G	41	41EB	48	25G	25G	G	31	26	23	21	15EB	15EB	15EB	22
16	19	15EB	16EB	15EB	15EB	15EB	G	31	37	41	47	46	39	37	21G	20G	30	28	21	13EB	13EB	15EB	15EB	14EB
17	19	18	26	18	18	15EB	G	G	34	34	23G	39	G	G	G	29G	29	28	25	27	33	15EB	15EB	19
18	14EB	15EB	17EB	15EB	18EB	15EB	23	32	G	38	40	G	39	G	26G	G	18G	20G	20	18	16EB	16EB	14EB	16EB
19	16EB	14EB	13EB	15EB	14EB	15EB	G	G	G	23G	40	G	26G	G	G	25G	31	26	19	25	18	17	15EB	15EB
20	15EB	15EB	15EB	15EB	14EB	17	23	31	64	42	G	G	G	40	38	34	32	22G	15EB	15EB	17	14EB	14EB	15EB
21	15EB	15EB	15EB	15EB	15EB	15EB	G	G	35	42	43	42	42	40	39	G	26G	25	14EB	15EB	15EB	15EB	16EB	17EB
22	18	17	15EB	14EB	15EB	15EB	G	G	G	G	G	G	G	G	G	21G	33	25	19	17	19	15EB	14EB	15EB
23	15EB	14EB	15EB	15EB	15EB	15EB	16G	29	25G	G	G	G	G	G	G	G	G	24	17	14EB	14EB	15EB	15EB	15EB
24	15EB	14EB	15EB	15EB	15EB	15EB	25	31	G	39	41	29G	25G	G	38	35	32	24	18	19	15EB	15EB	15EB	15EB
25	15EB	14EB	13EB	13EB	15EB	15EB	23	G	G	G	42	G	G	G	G	G	G	G	16EB	14EB	14EB	14EB	15EB	15EB
26	18	17EB	15EB	13EB	14EB	13EB	23	24G	G	G	G	64EB	G	G	19G	G	G	G	15EB	15EB	15EB	15EB	13EB	15EB
27	14EB	13EB	15EB	15EB	15EB	14EB	G	G	G	G	G	G	G	G	G	36	33	25	18	15EB	13EB	14EB	15EB	15EB
28	15EB	15EB	15EB	15EB	14EB	15EB	22	31	34	G	G	G	G	G	G	36	36	23	22	19	16EB	15EB	15EB	15EB
29	15EB	14EB	15EB	14EB	14EB	14EB	16G	G	35	40	G	44	42	41	41	41	34	23	18	17	16	15EB	15EB	15EB
30	14EB	14EB	14EB	14EB	13EB	14EB	24	50	36	57	41	41	42	41	46	59	45	57	48	39	28	21	19	28US
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30	30	30	30	30
MED	15EB	15EB	15EB	15EB	14EB	15EB	18G	30	34	36	37	34U	30G	24G	23G	34	32	26	20	18	16	15EB	16EB	15EB
UQ	19	16	16EB	15EB	15EB	15EB	23	31	36	40	41	41	40	41	38	37	34	29	25	24	22	20	19	18
LQ	15EB	14EB	14EB	14EB	14EB	15EB	G	G	G	G	G	G	G	G	G	G	30	24	18	15EB	15EB	15EB	15EB	15EB

SEP. 1988 | FBES (0.1 MHZ)

IONOSPHERIC DATA

SEP. 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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	15	E S 18	13	15	14	15	14	16	18	19	19	24	28	24	19	19	17	15	15	16	15	15	16	15
2	15	13	13	14	14	15	15	15	17	19	20	17	25	19	26	21	18	14	14	15	15	17	14	14
3	15	14	14	15	14	19	16	16	17	24	20	25	27	25	24	17	15	16	15	15	15	15	16	E S 18
4	14	15	13	13	13	15	16	16	17	18	18	22	18	E S 36	17	18	18	15	16	15	15	14	15	14
5	14	15	13	15	14	15	15	15	19	22	21	18	25	22	22	17	17	14	14	14	15	14	14	15
6	13	14	16	15	14	15	15	15	17	21	17	19	19	26	18	18	15	15	14	16	13	15	14	13
7	15	14	13	14	13	15	15	15	17	18	23	20	24	21	22	25	16	15	13	14	14	16	14	15
8	14	15	13	14	14	15	17	16	18	23	24	34	21	21	19	19	15	15	14	14	15	15	14	13
9	15	14	14	13	E S 17	15	14	15	18	22	21	22	23	21	21	16	17	C	14	17	15	15	15	15
10	14	15	13	14	14	14	14	16	16	18	19	24	21	18	19	17	17	16	13	15	15	14	14	15
11	15	13	14	14	15	15	14	15	17	18	21	20	24	21	20	16	17	15	14	14	15	14	15	15
12	13	14	14	14	13	15	15	16	18	21	25	23	29	18	19	17	16	13	13	15	15	15	15	14
13	14	14	16	14	14	14	15	15	18	21	22	21	22	17	20	19	17	14	15	15	14	15	13	15
14	15	14	15	15	14	15	15	16	18	20	22	19	20	21	19	17	15	15	15	13	14	14	16	15
15	15	14	14	14	15	15	14	16	16	18	19	41	20	19	19	20	21	16	16	16	15	15	15	16
16	14	15	16	15	15	15	16	17	17	20	18	19	21	18	18	15	16	15	16	13	13	15	15	14
17	15	14	14	14	14	15	14	16	16	17	18	21	19	23	19	18	16	13	13	14	13	15	15	13
18	14	15	17	15	18	15	15	14	19	19	26	25	23	20	19	17	14	15	15	15	16	16	14	16
19	16	14	13	15	14	15	15	15	15	16	17	18	19	17	18	16	15	16	14	14	14	14	15	15
20	15	15	15	15	14	13	14	22	17	20	22	23	23	22	19	17	14	15	15	15	14	14	14	15
21	15	15	15	15	15	15	16	16	16	21	25	22	26	27	19	17	16	15	14	15	15	15	16	17
22	15	15	15	14	15	15	15	15	17	21	28	28	23	25	22	17	17	15	14	13	14	15	14	15
23	15	14	15	15	15	15	15	14	16	19	25	22	22	21	18	19	18	13	13	14	14	15	15	15
24	15	14	15	15	15	15	15	14	17	23	31	18	18	26	20	19	15	14	13	15	15	15	15	15
25	15	14	15	13	15	15	16	18	18	22	34	23	28	22	20	19	15	14	16	14	14	14	15	15
26	14	17	15	13	14	13	15	17	20	23	23	64	31	25	16	25	16	15	15	15	15	15	13	15
27	14	13	15	15	15	14	15	15	16	20	18	24	26	25	25	18	16	15	14	15	13	14	15	15
28	15	15	15	15	14	14	14	16	18	19	22	22	31	22	20	15	15	15	13	14	16	15	15	15
29	15	14	15	14	14	14	14	14	17	21	21	22	21	24	18	21	14	14	14	14	14	15	15	15
30	14	14	14	14	13	14	15	16	19	21	20	32	26	22	22	18	15	13	13	15	15	15	12	14
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30	30	30	30	30
MED	15	14	14	14	14	15	15	16	17	20	21	22	23	22	19	18	16	15	14	15	15	15	15	15
UQ	15	15	15	15	15	15	15	16	18	21	24	24	26	24	21	19	17	15	15	15	15	15	15	15
LQ	14	14	13	14	14	14	14	15	17	19	19	20	21	20	19	17	15	14	13	14	14	14	14	14

SEP. 1988 | FMIN (0.1 MHZ)

IONOSPHERIC DATA

SEP. 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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	I S 280	275	270	275	270	280	325	315	310	290	295	290	275	280	275	295	295	A	305	320	265	270	280	280
2	270	285	295	290	J S 285	280	315	315	325	310	290	290	285	285	285	295	295	305	320	305	295	I S 290	285	J S 290
3	275	275	285	305	S 295	S 300	250	325	315	315	280	280	290	R 305	290	300	300	310	310	310	285	280	285	I S 300
4	285	285	285	300	285	285	335	315	320	305	290	290	300	300	280	300	300	310	305	305	305	I S 295	285	290
5	280	280	295	305	300	300	315	320	315	300	295	305	305	290	295	310	300	295	315	305	285	I S 290	I S 290	280
6	300	295	I S 300	300	300	305	325	340	310	300	290	300	290	290	300	295	295	310	305	315	295	285	280	280
7	I S 290	295	290	295	305	305	325	315	315	300	285	290	285	290	285	295	295	305	315	320	290	270	275	290
8	290	290	305	305	315	300	320	330	320	320	280	285	290	290	285	285	290	300	305	315	315	300	290	285
9	285	290	290	300	305	295	320	335	335	320	315	305	300	290	300	300	305	I C 310	315	330	305	290	285	285
10	275	285	305	320	320	300	325	325	320	325	300	310	290	285	285	290	305	310	310	315	295	295	290	310
11	305	295	305	315	300	280	315	320	325	325	315	300	285	305	300	305	310	300	300	290	295	320	290	260
12	270	305	275	265	255	275	295	300	280	270	285	295	290	Z 305	305	310	315	310	325	315	285	290	280	285
13	285	275	285	305	320	305	335	335	320	330	310	305	315	290	295	305	300	320	325	325	315	290	285	290
14	285	295	300	300	305	300	330	315	325	320	305	295	305	290	295	295	305	315	310	320	310	305	280	295
15	305	295	285	275	285	305	315	320	335	320	305	290	290	285	295	295	300	315	315	325	315	315	285	270
16	295	290	300	315	285	295	335	315	320	320	300	290	290	305	310	300	310	315	315	325	345	290	290	285
17	285	290	285	300	305	305	340	335	345	310	300	295	295	295	290	295	300	310	315	315	300	295	295	305
18	300	295	285	315	280	290	315	280	270	270	275	295	290	290	315	300	310	305	305	315	330	300	290	280
19	S 285	280	305	315	300	315	325	320	320	325	330	295	295	290	300	285	295	315	320	I S 320	320	285	290	280
20	295	295	285	295	320	320	315	335	315	310	300	295	295	290	295	300	300	305	320	320	295	280	285	285
21	285	285	285	300	310	325	330	335	335	320	305	285	295	290	295	300	300	320	325	340	285	275	280	280
22	285	290	310	305	300	310	325	320	330	305	290	285	285	295	290	290	295	310	320	320	315	280	265	280
23	275	290	285	285	290	310	330	320	320	305	295	295	290	290	295	300	300	315	315	320	320	290	290	J S 285
24	285	275	285	285	295	305	330	320	320	305	300	290	280	280	285	295	300	305	320	S 320	300	285	285	285
25	285	295	300	305	295	300	330	325	320	305	310	290	285	275	285	285	295	305	305	320	280	290	290	305
26	I S 295	285	270	285	295	300	320	320	315	305	285	285	285	275	280	290	305	300	305	320	285	290	290	285
27	280	285	J S 290	285	290	295	320	335	315	290	285	280	270	270	280	290	295	305	335	300	275	275	290	300
28	300	285	290	305	300	285	320	335	315	280	295	285	280	280	315	280	300	305	320	295	S 295	290	295	290
29	295	290	290	300	305	315	330	325	320	290	285	275	280	275	285	285	J R 290	305	315	295	285	295	305	300
30	280	285	305	310	305	305	340	320	320	305	280	280	280	290	285	290	290	315	310	305	280	290	280	I S 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	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30	30	30	30	30
MED	285	290	290	300	300	300	325	320	320	305	295	290	290	290	292	295	300	310	315	318	295	290	285	285
UQ	295	295	300	305	305	305	330	335	325	320	305	295	295	290	300	300	305	315	320	320	315	295	290	290
LQ	280	285	285	290	290	295	315	315	315	300	285	285	285	285	285	290	295	305	305	305	285	285	280	280

SEP. 1988

M(3000)F2 (0.01)

IONOSPHERIC DATA

SEP. 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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								L	L	L	L	415L	L	L	L	L	L	A	A					
2								L	L	390L	380	L	L	385L	380L	375L	L	L						
3								L	A	395L	L	400L	L	375L	L	L	L	L						
4									L	L	L	395L	L	385L	L	L	L							
5								L	L	L	395L	390L	L	390L	L	L	L	A						
6									L	L	390L	L	L	380L	395L	L	A	L						
7								L	L	L	395L	L	L	405L	395L	L	A							
8								L	L	L	L	L	395L	L	L	L	L	L						
9								L	L	395L	L	L	415L	415L	L	390L	L	C						
10								L	L	L	L	400L	L	L	380L	L	L	A						
11								L	L	L	L	L	L	L	L	L	L	L						
12								L	L	375L	395L	395L	L	380L	L	L	L	L						
13								L	L	L	390L	390L	L	L	L	L	L							
14									L	395L	L	L	390L	395L	L	L	L							
15								L	L	L	L	405L	L	L	L	L	L	L						
16								L	L	L	L	L	395L	395L	L	L	L							
17									L	L	L	405L	395L	395L	L	L	L	L						
18								360L	370	380	375	380	385L	380L	L	L	L	L						
19								L	L	L	L	L	395UL	L	L	L	L	L						
20									A	L	L	L	395L	L	375L	L	L							
21								L	L	L	L	L	380L	L	L	L	L							
22								L	L	L	L	400L	L	L	L	L	L							
23								L		L	L	L	L	395UL	L		L							
24										L	L	L	L	400UL	L	L	L							
25									L	L	L	L	L	L	L	L	L							
26								L	L	L	L	B	L	395UL	375UL	L								
27									L	L	L	L	L	L	L	L	L							
28										L	L	L	400L	395UL	L									
29									L	L	L	L	L		L	L	L							
30								A	L	L	L	L	L	L	L	A	A	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								1	1	6	7	11	10	16	6	2								
MED								360L	370	392L	390L	400L	395L	395L	380L	382L								
UQ										395L	395L	402L	395L	395L	395L									
LQ										380L	385	392L	390L	382L	375L									

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

IONOSPHERIC DATA

SEP. 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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								255	275	265	290	285	320	L 310	330	305	265	A	EA 270					
2								265	255	290	340	270	285	325	320	310	285	270						
3								235	255	265	L 335	330	310	290	310	285	L 275	260						
4									260	290	280	305	285	295	L 295	295	275							
5								245	L 260	245	290	285	285	310	285	275	L 285	A 270						
6									L	275	310	275	310	310	300	290	280	260						
7								260	260	265	H 260	290	310	300	305	285	270							
8								240	250	245	L 320	310	305	310	295	300	285	255						
9								230	230	255	260	285	300	300	290	290	275	C						
10								250	250	250	305	280	310	320	330	305	270	260						
11								250	250	240	255	270	320	270	290	290	270	275						
12								265	315	325	280	285	295	280	285	265	270	265						
13								240	265	260	260	280	260	285	L 280	270	270							
14									245	250	260	285	285	310	290	L 295	275							
15								245	245	260	260	305	295	305	280	280	280	255						
16								255	260	255	290	300	295	280	265	265	260							
17									230	275	275	290	285	285	305	280	275	260						
18								355	355	360	375	345	350	330	290	L 300	260	280						
19								255	260	250	255	L 300	315	315	285	310	285	255						
20									EA 280	255	245	285	290	290	285	275	280							
21								245	245	255	270	L 300	290	300	285	275	280							
22								250	240	260	260	L 270	305	280	290	300	280							
23								240		260	275	275	295	305	290		275							
24										270	H 245	285	L	320	275	270	265							
25									235	L 265	245	300	260	L 290	285	L 295	275							
26								245	240	250	H 260	EB 280	265	320	315	295								
27									240	245	L 270	290	L 310	310	285	L 280	270							
28										H 240	250	290	310	305	300									
29									245	L 270	L 275	315	295		305	280	275							
30								A 235	260	L 285	L 260	285	275	295	310	295	265	255						
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								20	26	30	30	30	29	29	30	28	28	13	1					
MED								243	251	260	270	285	295	305	290	290	275	260	EA 270					
UQ								255	260	270	290	300	310	310	305	293	280	270						
LQ								240	245	250	260	280	285	290	285	278	270	255						

SEP. 1988 | H'F2 (KM)

IONOSPHERIC DATA

SEP. 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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	EA 315	325	325	325	325	310	240	235	225	220	H 210	195	205	220	230	235	A	A	A	EA 280	A	EA 360	305	310
2	330	300	260	270	290	300	250	235	220	200	220	H 190	A	230	225	235	235	A	240	230	230	EA 305	300	305
3	310	315	285	235	265	275	235	230	A	210	225	H 200	H 185	235	225	220	220	250	250	240	285	295	285	275
4	275	285	285	270	280	305	240	235	235	245	240	210	205	220	210	230	240	EA 260	260	260	240	A 290	285	265
5	305	300	275	260	255	270	255	230	225	215	205	225	220	215	A 260	235	220	A	265	250	285	270	IS 300	285
6	265	265	280	275	265	250	235	225	215	215	220	A	A 265	230	210	235	A	A	255	A 255	235	290	300	300
7	295	280	270	280	255	255	240	235	220	210	H 205	210	210	200	215	260	A	A 255	245	A 240	A 265	A 335	295	275
8	265	275	260	260	250	275	240	230	215	210	210	200	210	220	215	225	235	240	250	230	230	A 270	A 285	300
9	280	290	275	265	255	285	245	230	215	210	H 180	H 195	195	195	230	225	240	IC 255	255	220	225	280	285	290
10	305	295	265	235	215	270	235	240	230	235	H 220	H 200	215	215	230	A	A	A	250	235	245	265	275	245
11	245	275	265	255	270	310	250	235	220	225	215	205	210	220	220	230	245	250	270	275	260	240	230	A 355
12	320	250	315	330	370	325	255	235	235	230	215	205	210	230	225	230	245	260	A 245	235	A	A 320	A 325	300
13	290	330	315	270	250	250	245	A 235	220	240	215	215	230	215	215	H 220	235	245	240	230	240	280	300	285
14	285	280	270	270	250	270	240	240	225	210	215	220	215	215	215	230	245	260	260	240	A 260	285	295	275
15	265	270	305	310	295	260	240	235	230	H 210	215	195	A	230	240	225	240	A	235	235	230	235	295	345
16	280	295	280	240	290	290	235	230	245	225	A	A	215	210	220	215	240	A 260	240	230	215	260	290	300
17	310	295	A 325	270	265	260	225	240	230	210	210	195	205	210	205	230	230	A	235	250	EA 285	275	265	265
18	270	275	310	250	325	295	255	255	235	230	230	225	220	225	220	225	240	265	255	240	240	275	300	315
19	330	310	265	260	270	285	240	245	225	215	210	205	205	230	H 210	230	255	260	240	245	235	285	280	305
20	265	280	300	270	240	250	250	240	A	A 245	215	210	210	230	230	H 220	230	260	240	215	245	295	295	300
21	310	305	305	275	240	245	230	230	230	230	230	220	225	235	215	215	235	250	225	215	260	305	305	320
22	310	290	260	260	255	260	240	225	235	205	210	205	H 210	240	230	230	245	255	230	240	230	285	330	310
23	310	280	290	300	270	230	225	230	225	215	225	220	220	210	230	H 250	255	255	250	230	225	260	270	275
24	285	310	290	285	280	265	240	235	225	H 220	220	225	210	200	240	240	235	255	235	235	235	270	295	300
25	295	275	270	260	270	270	230	235	230	215	225	210	210	220	240	230	245	240	240	225	255	280	275	265
26	275	300	325	300	265	255	240	235	220	215	215	B	225	215	230	240	240	240	255	220	285	280	280	285
27	290	285	280	305	285	285	235	230	220	215	H 195	220	225	230	235	235	EA 255	255	220	210	290	300	275	260
28	265	280	285	255	260	290	255	230	220	225	225	205	205	210	220	H 255	A 255	240	235	250	265	280	265	265
29	260	270	280	265	255	240	235	220	220	225	230	245	235	H 245	235	255	260	245	230	240	280	260	260	270
30	305	285	260	250	240	250	220	A	230	A 255	215	215	220	230	265	A	A	A	EA 255	EA 270	A 300	290	300	IS 310
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	29	28	30	29	27	28	30	30	28	25	22	29	30	28	30	30	30
MED	289	285	280	270	265	270	240	235	225	215	215	210	210	220	225	230	240	255	242	236	244	280	292	295
UQ	310	300	305	280	280	290	245	235	230	230	225	220	220	230	230	235	245	260	255	245	263	292	300	305
LQ	270	275	270	260	255	255	235	230	220	210	210	200	208	215	215	225	235	245	235	230	232	270	275	275

SEP. 1988 | H'F (KM)

IONOSPHERIC DATA

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

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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							120	115	115	A	115	A	E A 125	115	115	110	115	115	B					
2							120	E A 140	125	110	115	A	A	A	A	A	A	A	A					
3							A	120	110	120	115	E A 130	A	115	E A 130	E A 120	A 115	E A 125	B					
4							130	115	115	120	110	A	A	A	A	A	E A 135	120	B					
5							130	115	120	115	120	115	120	115	120	115	120	A 125	A					
6							130	115	110	115	120	120	E A 125	B 120	115	120	120	A	B					
7							E A 135	120	A	E A 135	E A 125	115	115	E A 135	E A 135	115	110	A	B					
8							125	A	E A 130	E A 130	E A 130	E B 125	A 120	E A 125	E A 125	A	A	E A 140	B					
9							E A 135	115	115	115	115	115	115	115	115	115	120	I C 125	B					
10							130	120	115	115	115	115	120	115	115	115	120	125	B					
11							125	115	110	E A 145	E A 125	E A 125	120	115	120	120	115	120	B					
12							A	115	E A 130	A	120	A	120	E A 120	115	A 125	E A 130	120	B					
13							A	A	A	120	A	A	A	A	115	115	115	120						
14							A	120	115	110	A	A	115	120	120	120	125	A						
15							125	125	115	A	E A 140	B	A	A 120	E A 125	120	120	A						
16							135	120	115	110	A 120	120	120	115	120	120	120	125						
17							130	115	110	110	120	A	110	120	115	E A 130	A	A						
18							135	E A 150	E A 135	E A 140	115	110	A	110	E A 125	110	A 115	E A 130						
19							135	115	115	A 120	E A 125	120	120	110	110	A 120	A 125	B 135						
20							A	A	115	115	120	120	115	120	115	115	115	A						
21							E B 145	120	120	120	120	E A 130	120	120	115	115	A	E A 135						
22							130	115	115	115	120	120	120	115	115	115	A 130	120						
23							135	A	E A 130	115	115	115	120	110	110	110	120	125						
24							130	115	115	120	E B 130	E A 120	S 115	120	110	115	115	125						
25							140	125	125	125	E B 120	115	120	115	110	115	115	125						
26							A	E A 135	120	120	115	B	120	120	115	120	115	135						
27							H 135	115	120	115	115	120	125	120	120	115	120	135						
28							A	A	115	115	115	115	120	115	115	115	115	125						
29							E B 140	120	115	120	120	120	115	115	E A 145	E A 125	115	E B 125						
30							E B 155	115	125	115	115	E B 130	125	120	115	115	115	125						
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	25	28	27	28	21	24	27	28	27	26	23						
MED							130	115	115	115	118	118	120	115	115	115	116	125						
UQ							134	120	120	120	120	120	120	120	118	120	120	126						
LQ							130	115	115	115	115	115	115	115	115	115	115	121						

SEP. 1988 | H'E (KM)

IONOSPHERIC DATA

SEP. 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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	110	110	110	105	B	135	G	120	115	110	110	105	110	125	135	125	115	110	110	105	105	105	105	110
2	105	105	110	105	110	115	G	120	G	G	105	110	105	110	110	105	110	105	110	105	105	100	105	105
3	110	B	B	110	100	B	125	125	115	120	110	115	115	E G 165	110	155	130	120	115	105	110	B	115	110
4	B	B	115	105	105	110	G	120	120	115	115	120	115	120	115	120	E G 170	135	115	110	110	110	105	110
5	105	105	105	105	100	105	G	145	145	125	130	115	115	115	135	140	130	120	120	120	105	110	115	110
6	100	B	B	B	115	B	150	140	130	135	130	120	130	140	G	135	130	125	115	105	105	120	105	110
7	95	105	105	125	125	B	120	G	110	115	110	G	G	105	110	115	110	105	105	100	120	105	105	B
8	B	105	B	B	B	B	G	115	110	115	115	G	110	135	130	110	105	105	115	105	100	100	100	95
9	B	B	B	B	S	B	115	G	G	G	G	G	G	G	E G 165	E G 155	155	C	120	B	B	B	110	B
10	B	B	B	B	B	B	G	150	145	155	135	E G 170	140	G	140	130	130	125	120	125	B	115	100	B
11	B	B	B	B	140	145	135	125	115	110	105	105	G	G	120	G	140	125	115	120	B	105	105	105
12	100	100	105	105	125	120	120	125	115	115	G	120	G	105	G	110	145	135	115	110	110	110	110	110
13	105	110	B	110	110	120	115	110	115	110	110	105	105	100	G	G	135	115	110	110	110	105	110	105
14	105	105	100	105	105	125	120	120	120	115	110	110	E G 180	G	G	G	135	125	125	120	110	115	110	110
15	115	110	105	105	B	B	G	E G 160	115	115	135	B	105	110	105	G	E G 155	100	105	105	105	B	110	115
16	105	105	B	105	105	B	G	130	130	120	120	120	130	130	110	110	E G 145	120	120	B	105	B	B	110
17	110	125	105	105	110	120	G	G	120	120	105	115	G	G	G	105	105	105	100	105	100	105	100	100
18	105	100	100	B	B	105	140	140	140	145	120	G	E G 170	G	105	G	105	100	100	100	105	B	115	B
19	B	B	B	B	B	B	E G 160	G	G	110	135	145	110	G	G	105	155	130	105	105	110	110	B	B
20	B	B	125	B	120	115	120	115	110	115	145	G	140	140	E G 140	140	125	115	135	110	110	110	105	B
21	B	105	B	B	B	B	G	G	150	125	125	130	120	130	125	G	115	130	B	110	100	105	B	110
22	100	105	110	B	B	120	G	G	G	G	G	G	G	G	G	105	145	120	115	115	115	115	120	110
23	B	B	B	B	125	130	125	115	110	G	G	G	G	G	G	G	G	115	115	115	115	120	B	B
24	B	B	B	B	B	110	165	155	G	140	130	100	105	G	E G 185	E G 165	135	120	115	110	B	105	B	B
25	B	B	B	B	B	125	160	G	G	G	125	G	G	G	G	G	G	G	B	B	B	B	B	B
26	110	B	B	B	B	B	110	115	G	G	G	B	G	G	105	G	G	G	105	B	115	B	B	B
27	B	B	B	B	B	B	G	G	G	G	G	G	G	G	G	140	140	120	110	B	B	B	B	B
28	B	B	B	B	B	125	120	115	115	G	G	G	G	G	G	E G 185	135	125	110	105	B	105	B	B
29	B	B	B	B	B	115	110	G	E G 180	150	G	150	150	155	140	130	135	120	110	110	110	B	B	B
30	B	B	B	B	B	B	150	130	E G 160	125	115	125	145	150	135	120	115	115	115	110	105	110	100	105
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	15	14	12	12	14	17	18	21	22	22	22	18	19	16	19	21	27	27	28	25	23	21	20	17
MED	105	105	105	105	110	120	121	122	116	118	118	116	115	125	U 118	120	132	120	115	110	110	110	105	110
UQ	110	110	110	108	125	125	145	135	135	125	130	122	135	139	135	135	138	125	115	110	110	110	110	110
LQ	102	105	105	105	105	115	120	115	115	115	110	110	110	110	110	110	115	112	110	105	105	105	105	105

SEP. 1988 | H'ES (KM)

IONOSPHERIC DATA

SEP. 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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F3	F1	F2	F1		F1		C2	C2	L2	L1	L2	L1	L1	H1	C1	C3	C3	C3	F4	F5	F3	F4	F4
2	F4	F4	F2	F3	F2	F1		L2			L1	L2	L2	L2	L2	L2	L2	L3	L1	F2	F3	F2	F3	F2
3	F2			F2	F1		L2	C2	C3	C1	CL11	L1	L1	H1	L1	HL12	HL11	CL21	C2	F3	F2		FF22	F1
4			F1	F3	F2	F1		C3	C2	C2	C2	CL11	CL11	C1	CL11	L1	HL11	C1	C3	F4	F3	F3	F1	F2
5	F3	F2	F2	F1	F2	F2		H1	H1	H1	H1	C1	C1	C2	H1	H1	C2	CL41	C2	FF32	F5	F2	F2	F1
6	F2				F1		H1	H2	H2	H1	HL11	CL31	HL21	H1		HL11	H3	CL32	L2	F5	F4	F1	F2	F2
7	F3	F2	F1	FF11	FF21		L1		L2	L1	L1			L1	L1	C1	C4	L4	L4	F5	FF23	F2	F2	
8		F1						L2	L1	L1	L1		L1	HL11	HL11	L3	L4	L3	L1	F2	F2	F4	F2	F4
9							LL11								H1	H1	H1		C1				F1	
10								H2	H1	H1	H1	H1	H1		H1	H3	H3	C4	C3	F2		F2	F2	
11					F1	F1	C1	C2	C2	L1	L1	L1			C1		H2	H3	C5	F3		F4	F3	F5
12	F5	F2	F5	F2	F2	F3	L2	C2	L1	C2		L1		L1		L1	HL12	H2	L3	F4	F5	F3	F3	F2
13	F2	F1		F1	F1	F1	C3	LC13	C2	C2	L3	L3	L2	L3			H1	C3	F4	F4	F2	F2	F2	F1
14	F2	F2	F2	F2	F1	F1	L1	C3	C2	C2	L2	L2	H1				H3	C2	F4	F3	F5	F3	F2	F2
15	F2	F2	F2	F1				H1	C2	L2	HL12		L3	L1	L2		H1	L2	F3	F2	F1		F2	F2
16	F1	F1		F1	F1			H2	H1	C2	CL31	C2	C1	C1	L1	L1	H1	C4	F3		F1			F1
17	F2	FF11	F3	F2	F2	F1			C2	C1	L1	L1				L3	L3	L4	F4	F5	F4	F1	F1	F2
18	F1	F1	F1			F1	C2	CL32	HL12	HL11	H2		HL11		L1		L1	L2	F4	F2	F1		F2	
19							H1			L1	HL22	HL11	L1			L2	HL11	C2	F3	F3	F2	F2		
20			F2		F2	F3	L1	L2	C4	C2	H1		H1	H1	H1	H1	H2	L2	FF11	F1	F3	F1	F1	
21		F1							H1	C2	C2	CL11	C2	C1	C1		L2	CL31		F1	F1	F1		F2
22	F2	F1	F1			F1										L1	HL12	C3	F3	F2	F2	F2	F1	F1
23					F1	F1	L1	L2	L2									C3	F2	F1	F1	F1		
24						F1	HL21	H2		H1	H1	L1	L1		H1	H1	H2	C3	F3	F3		F1		
25						F1	H2				C1													
26	F1						L3	L1							L1				F1		F1			
27																H1	H2	C3	F1					
28						F1	L2	L2	C1							H1	H3	C2	F3	F2		F1		
29						F1	L1		H1	H1		H1	H1	H1	HL21	HL21	H2	CL11	F3	F2	F1			
30							H2	H2	H1	C3	C2	C1	H1	H1	H2	H2	C4	C5	F5	F4	F5	F4	F4	F2
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																								

SEP. 1988 | TYPES OF ES

f-PLOTS OF IONOSPHERIC DATA

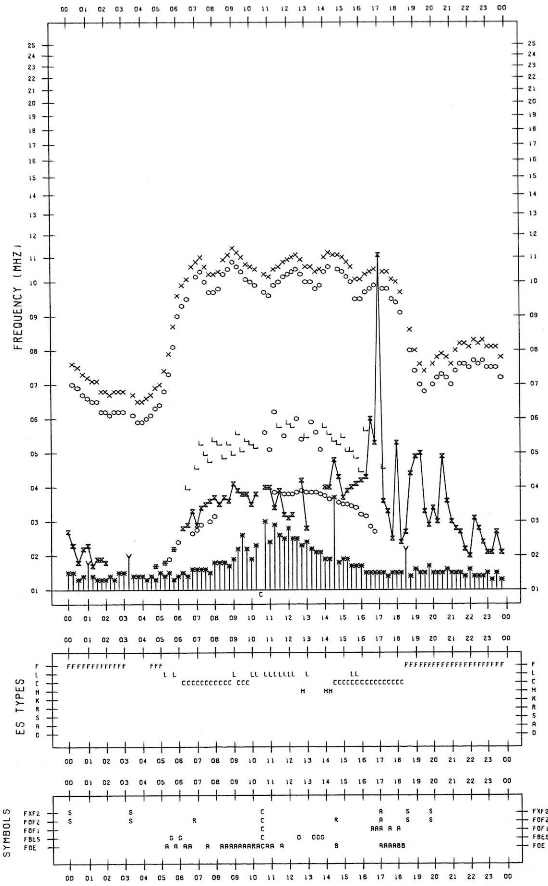
KEY OF F-PLOT	
!	SPREAD
⬡	FOF2,FOF1,FOE
×	FXF2
✳	DOUBTFUL FOF2,FOF1,FOE
⧖	FBES
L	ESTIMATED FOF1
↑,Y	FMIN
∧	GREATER THAN
∨	LESS THAN

F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1988/ 9/ 1

135°E MEAN TIME

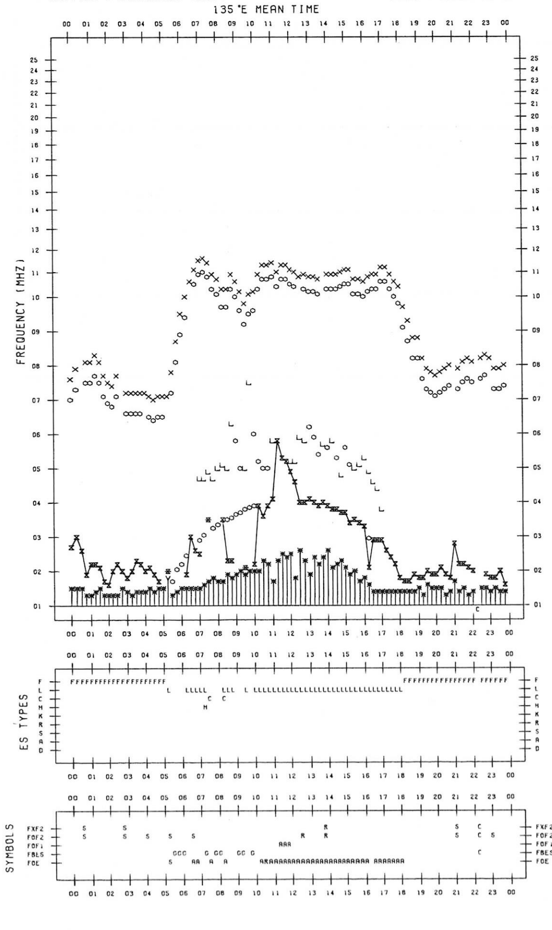


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1988/ 9/ 2

135°E MEAN TIME

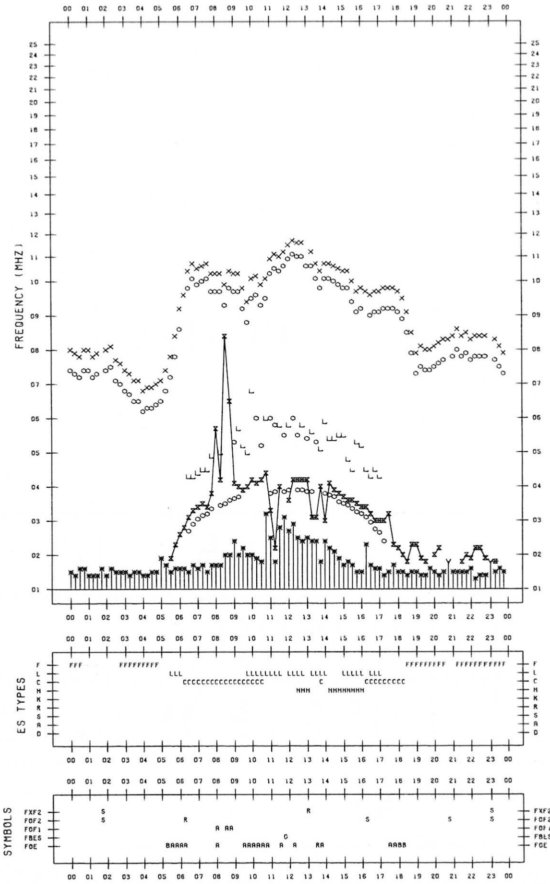


F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1988/ 9/ 3

135°E MEAN TIME

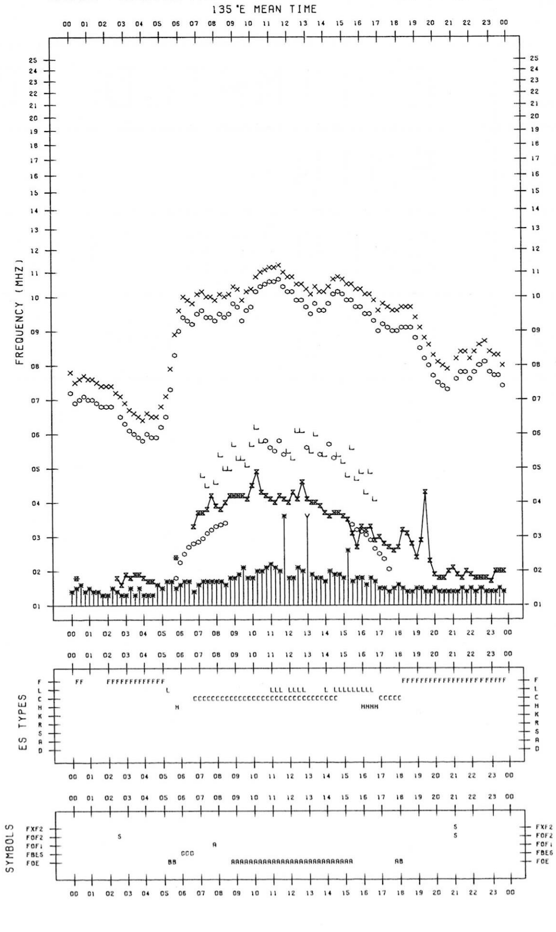


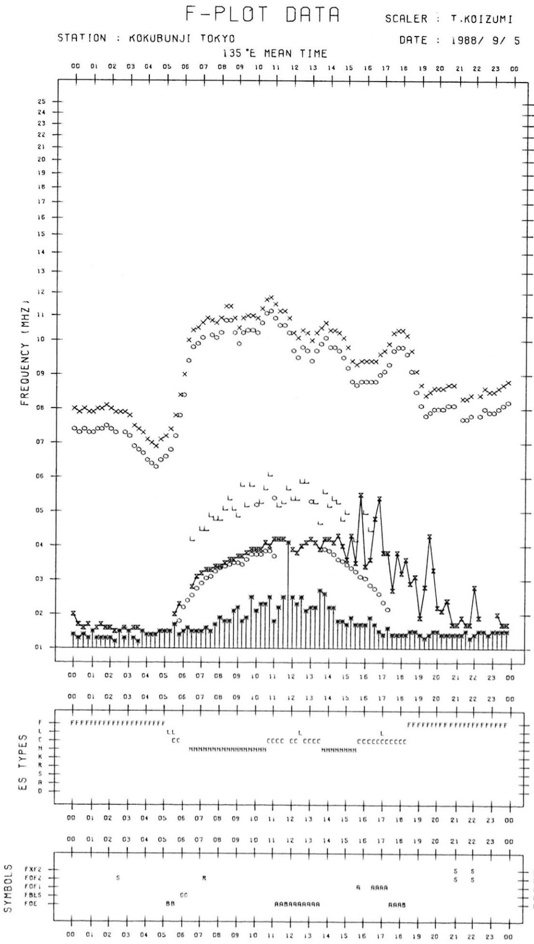
F-PLOT DATA

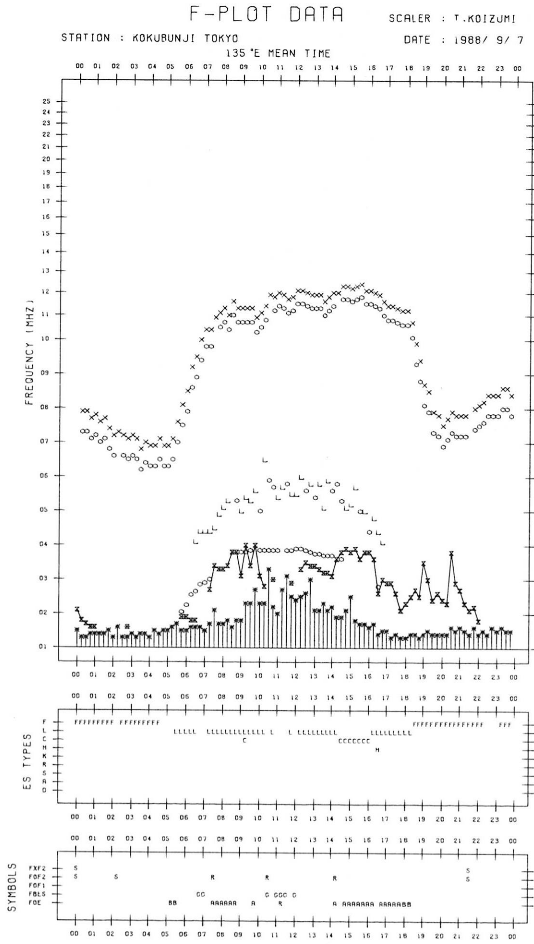
SCALER : T.KOIZUMI

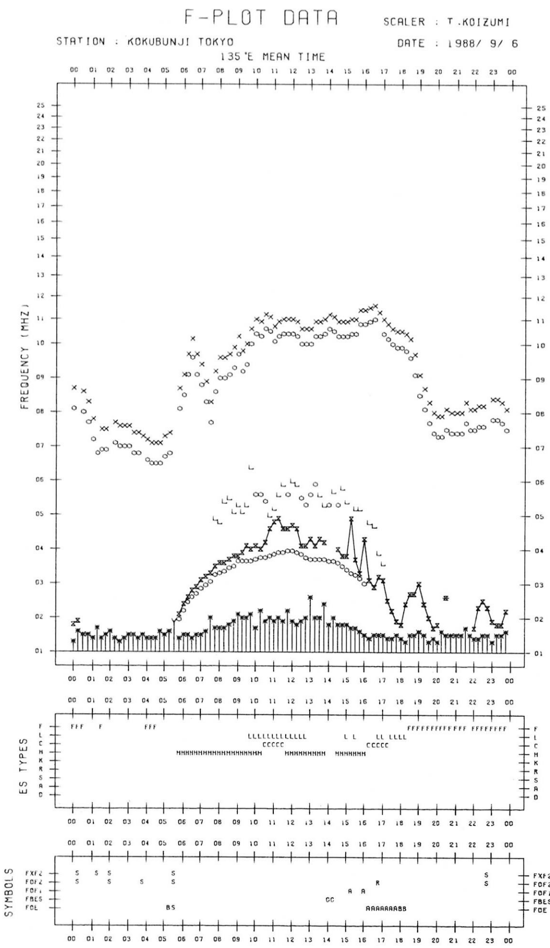
STATION : KOKUBUNJI TOKYO DATE : 1988/ 9/ 4

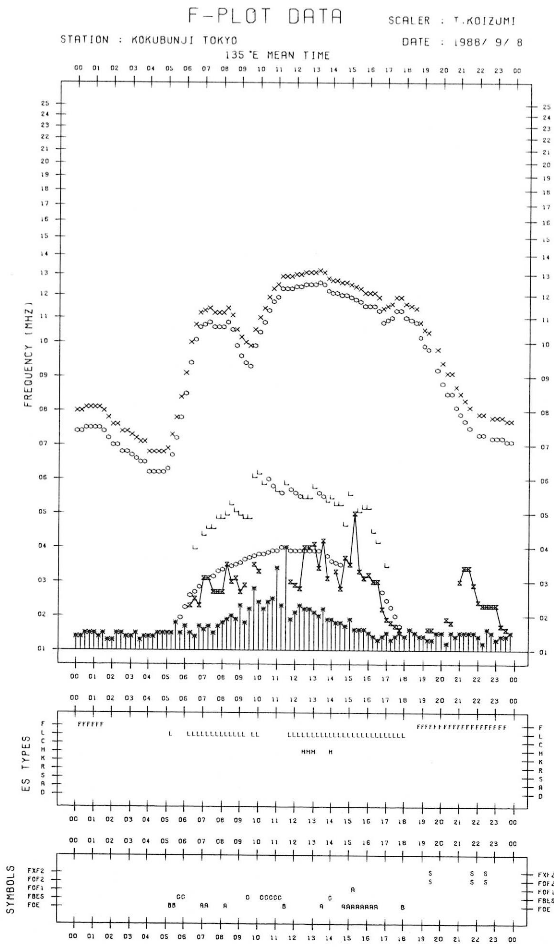
135°E MEAN TIME




F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 9/ 5
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 9/ 7
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


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


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 9/ 8
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

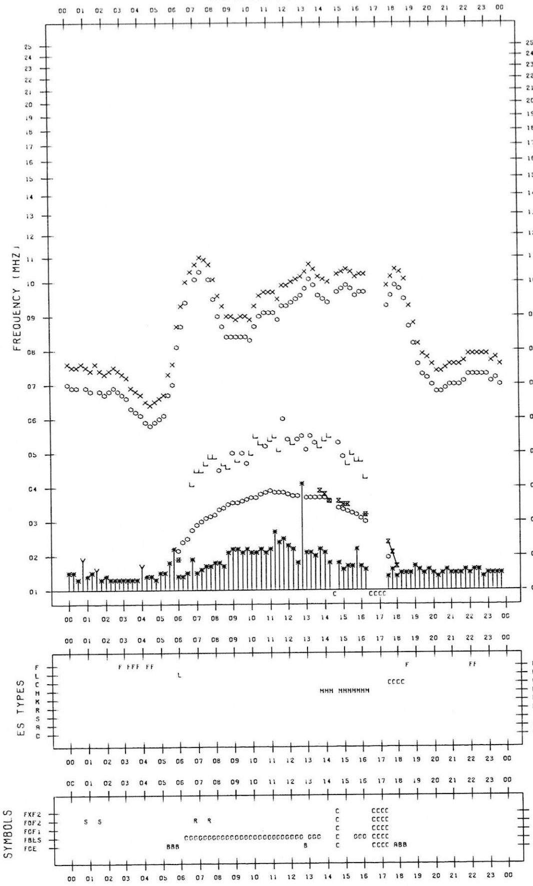
F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO

DATE : 1988/ 9/ 9

135°E MEAN TIME



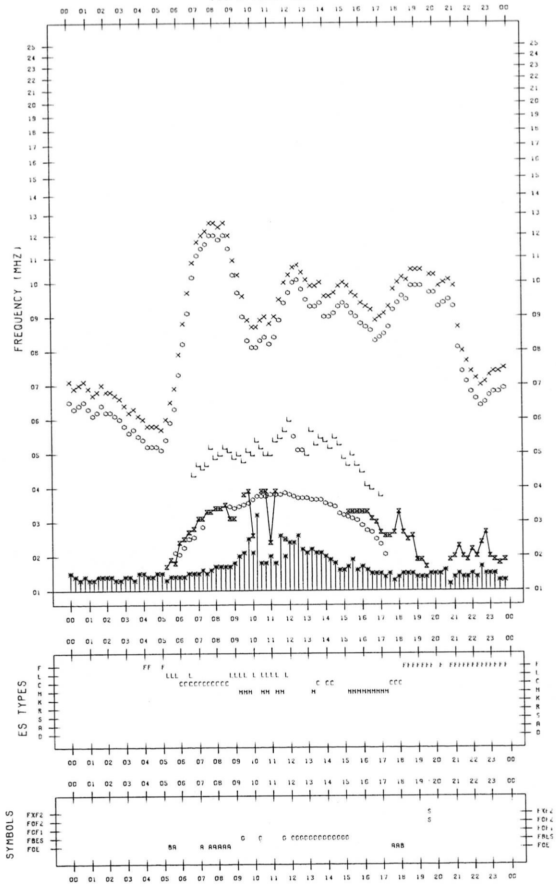
F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO

DATE : 1988/ 9/11

135°E MEAN TIME



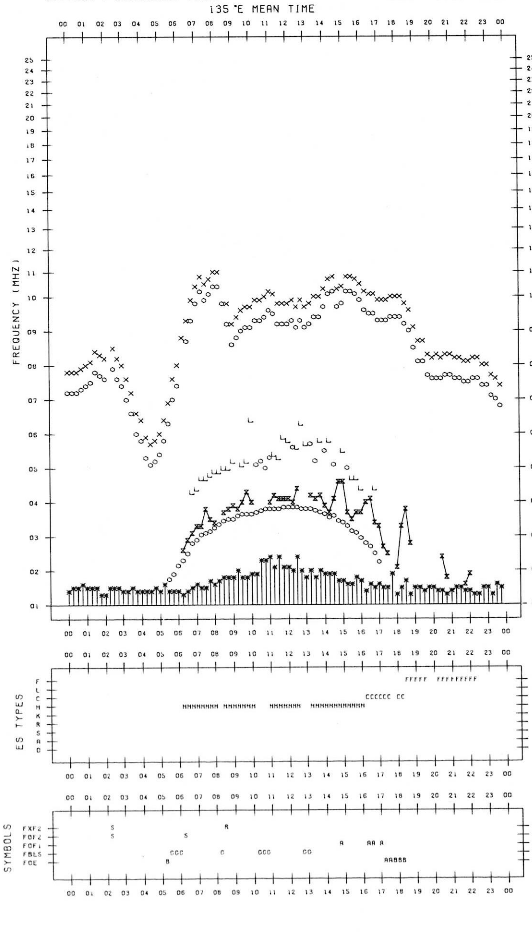
F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO

DATE : 1988/ 9/10

135°E MEAN TIME



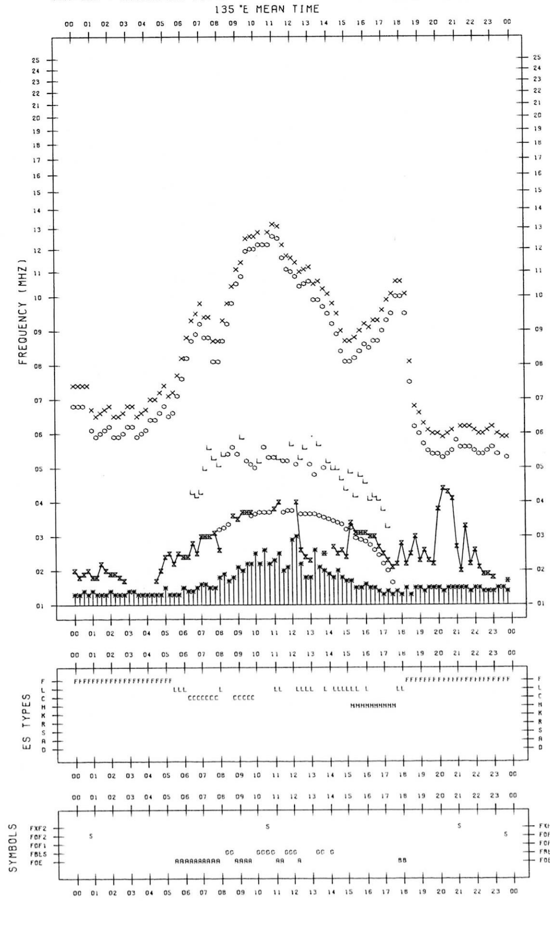
F-PLOT DATA

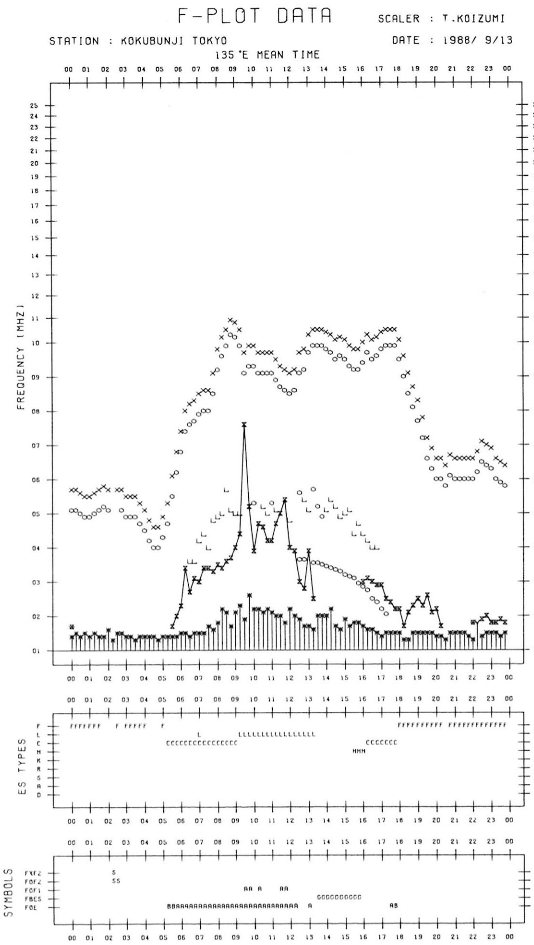
SCALER : T.KOIZUMI

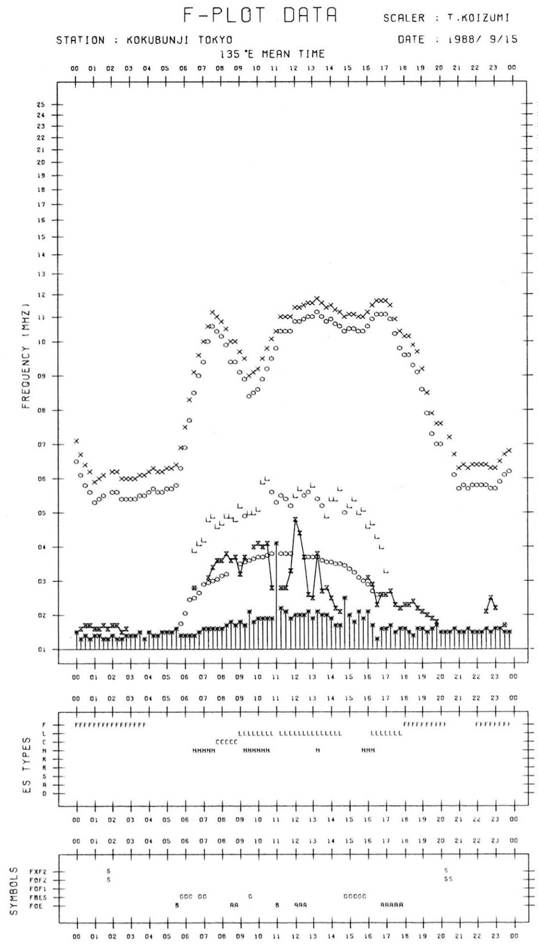
STATION : KOKUBUNJI TOKYO

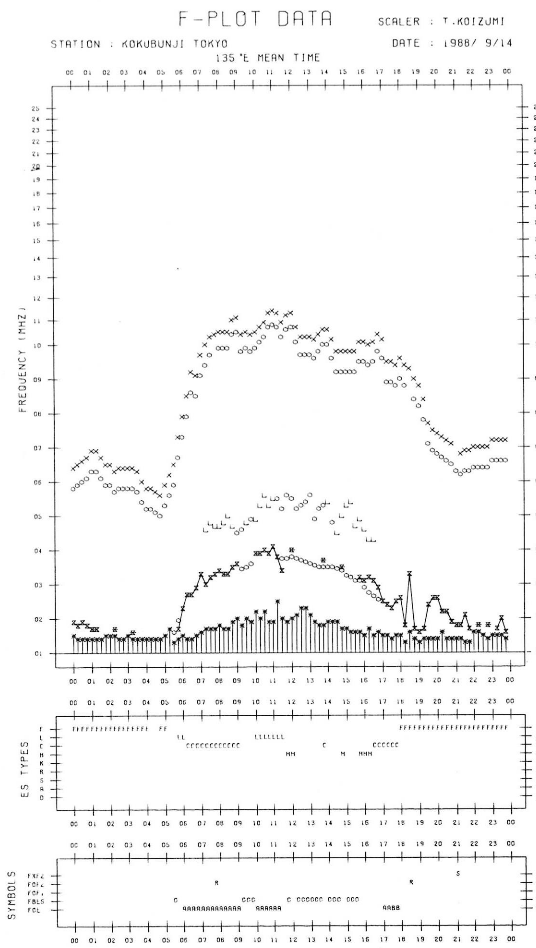
DATE : 1988/ 9/12

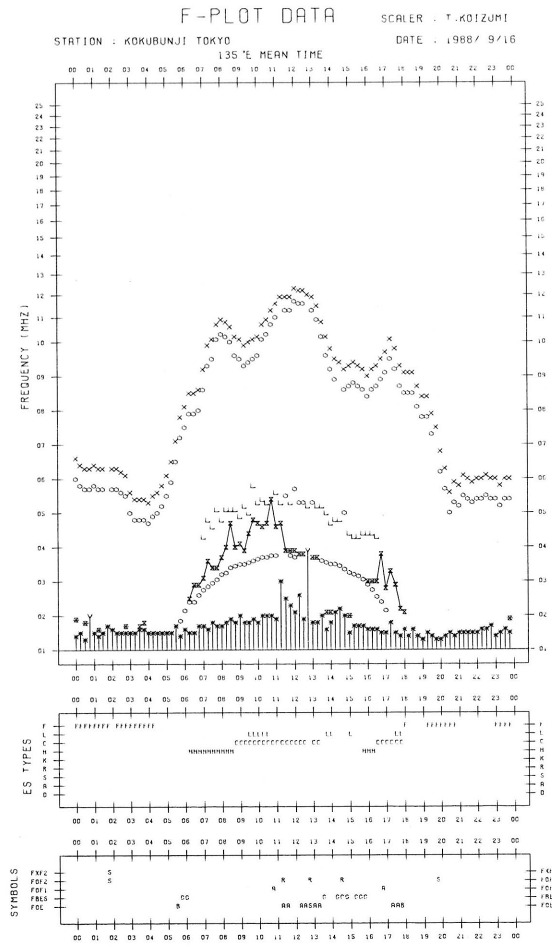
135°E MEAN TIME




F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 9/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 9/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 9/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 9/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

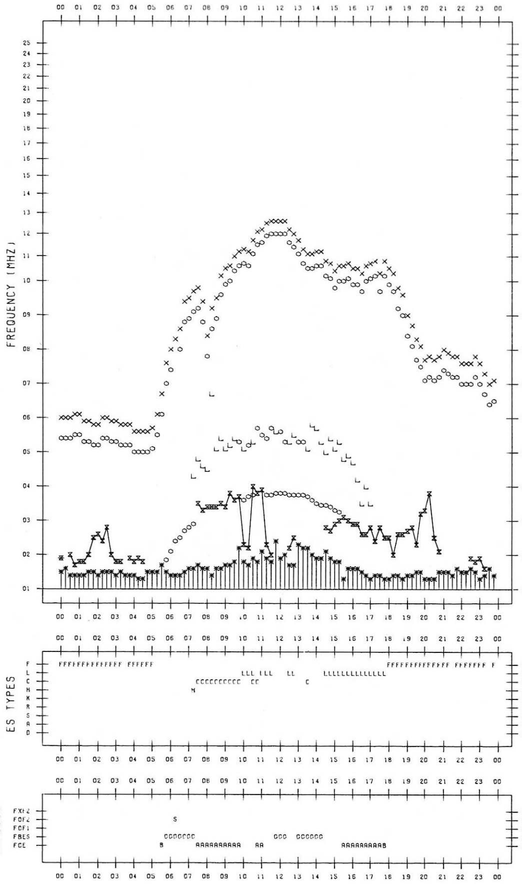
F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO

DATE : 1988/ 9/17

135°E MEAN TIME



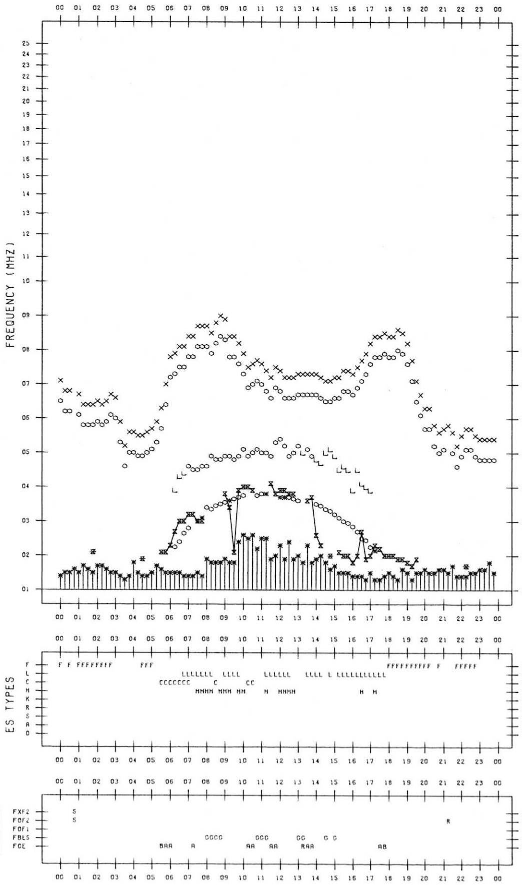
F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO

DATE : 1988/ 9/18

135°E MEAN TIME



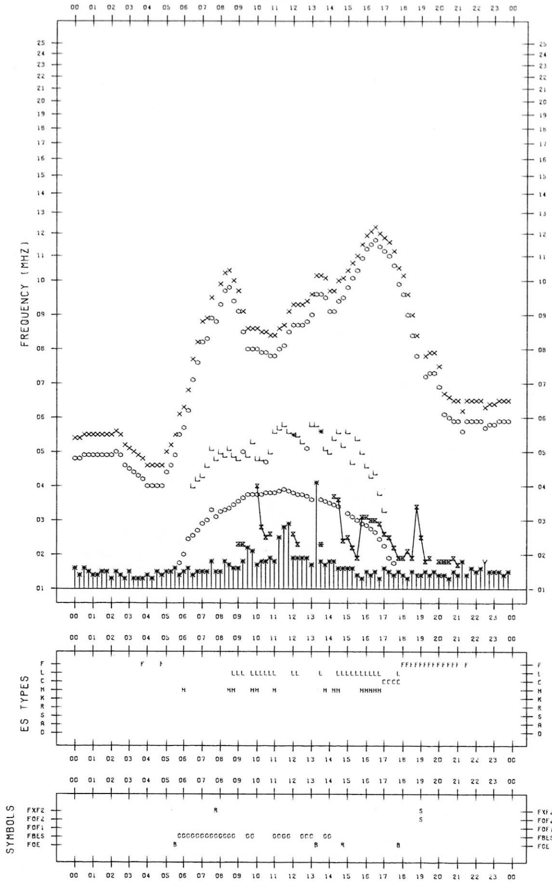
F-PLOT DATA

SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO

DATE : 1988/ 9/19

135°E MEAN TIME



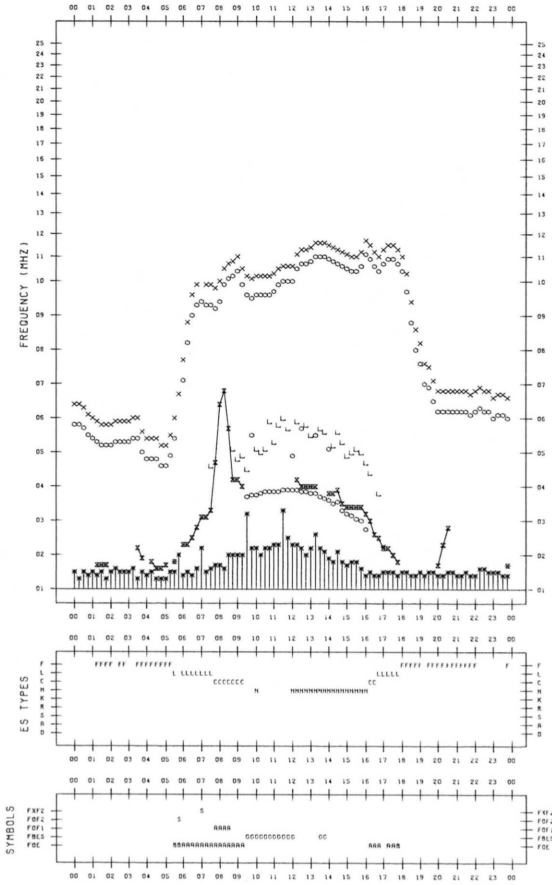
F-PLOT DATA

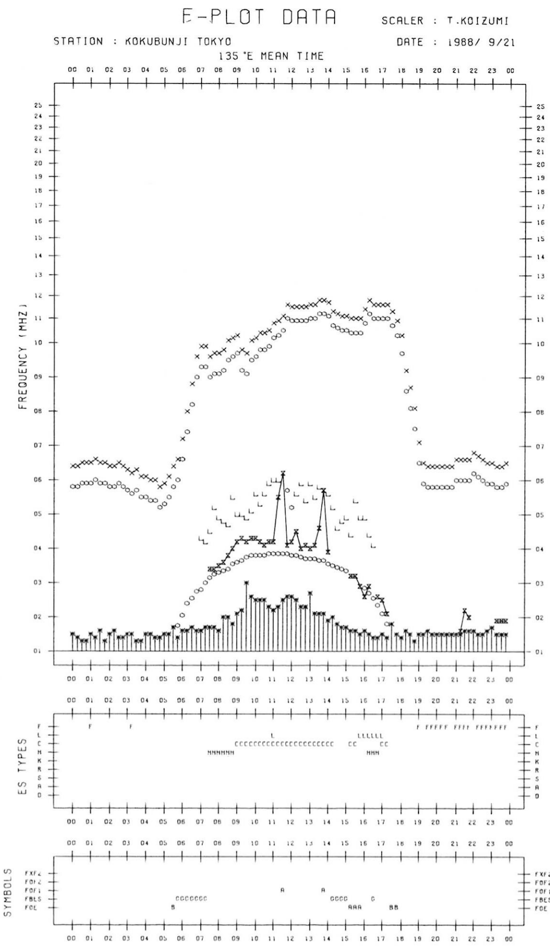
SCALER : T.KOIZUMI

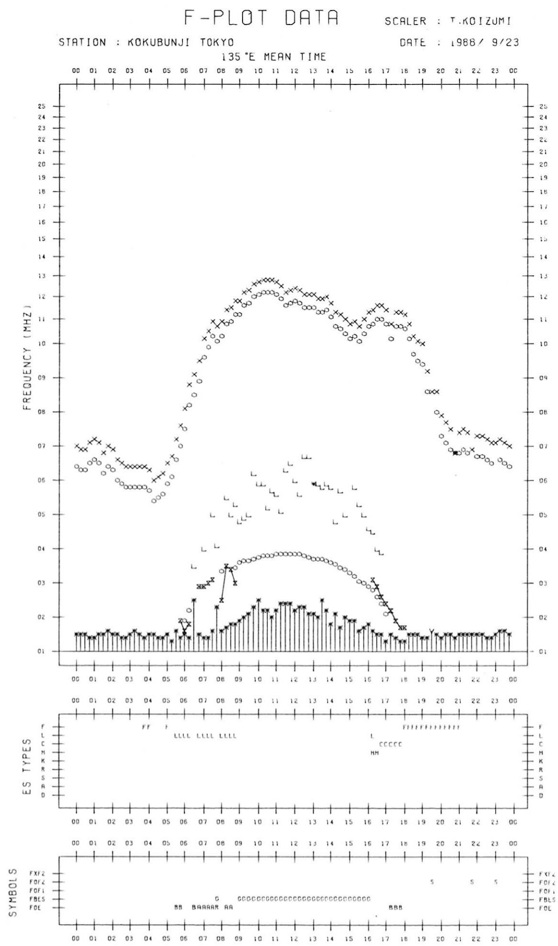
STATION : KOKUBUNJI TOKYO

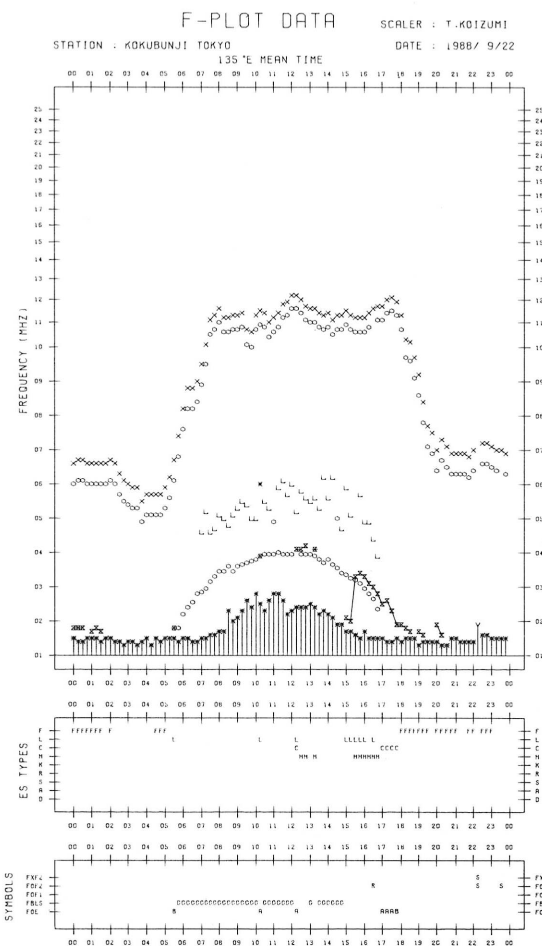
DATE : 1988/ 9/20

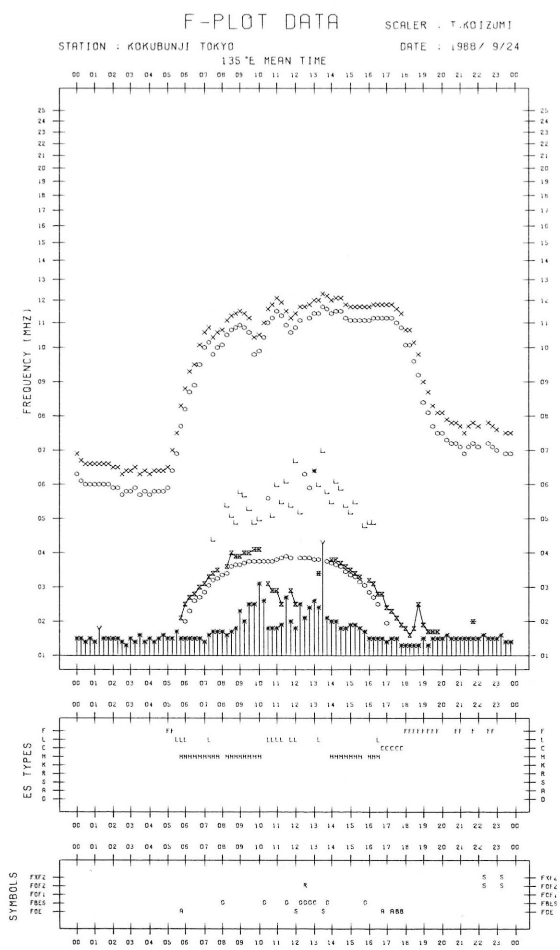
135°E MEAN TIME

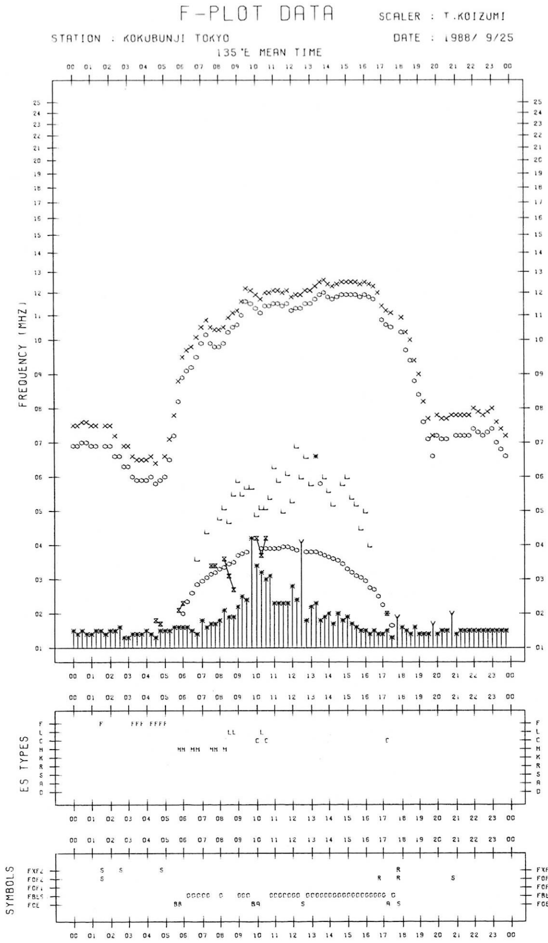


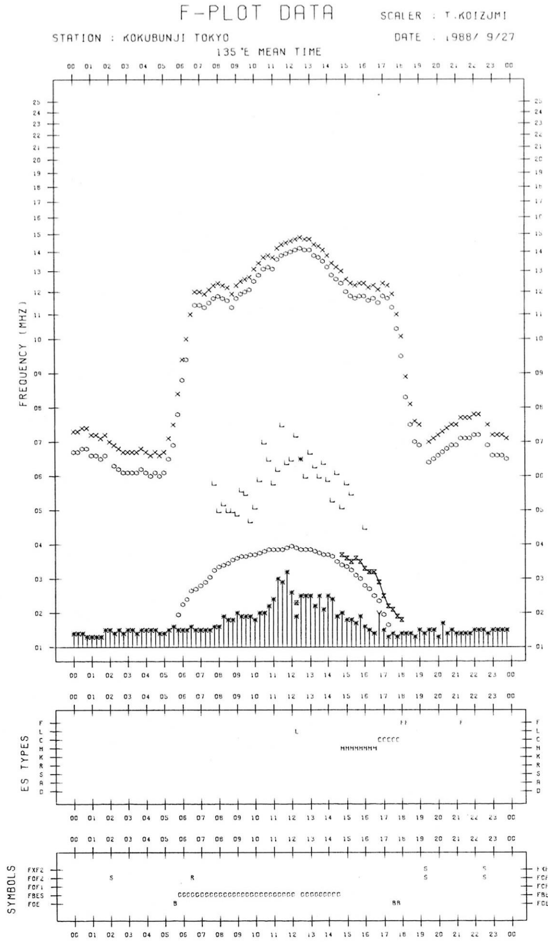

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 9/21
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

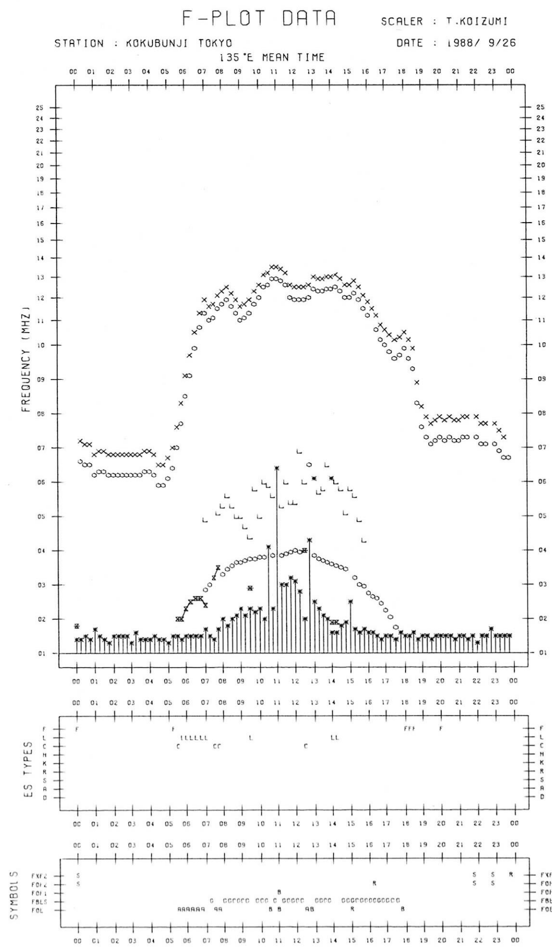

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 9/23
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

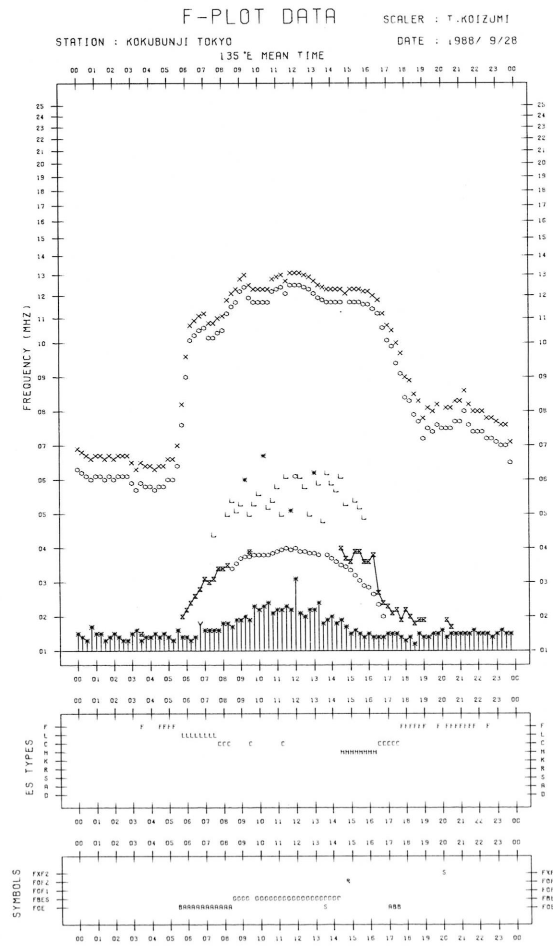

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 9/22
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 9/24
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 9/25
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 9/27
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

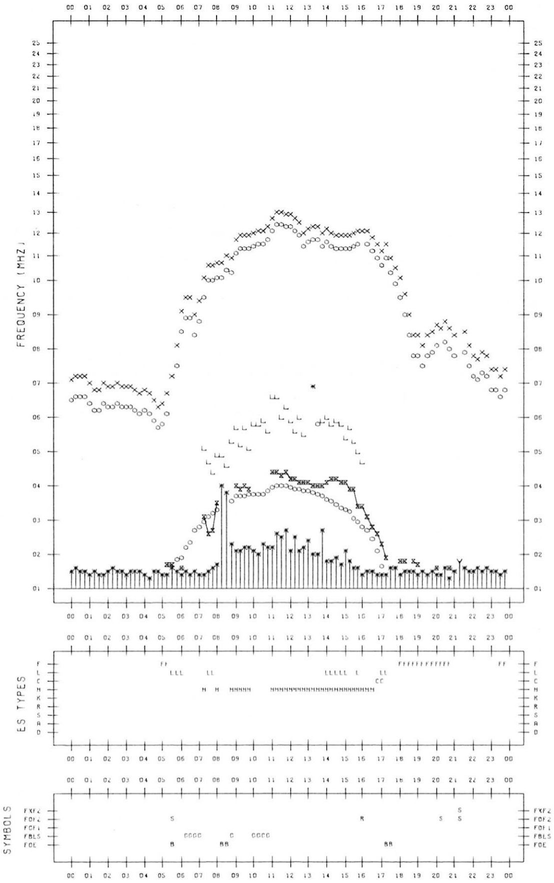

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 9/26
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1988/ 9/28
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

F-PLOT DATA SCALER : T.KOIZUMI

STATION : KOKUBUNJI TOKYO DATE : 1988/ 9/29

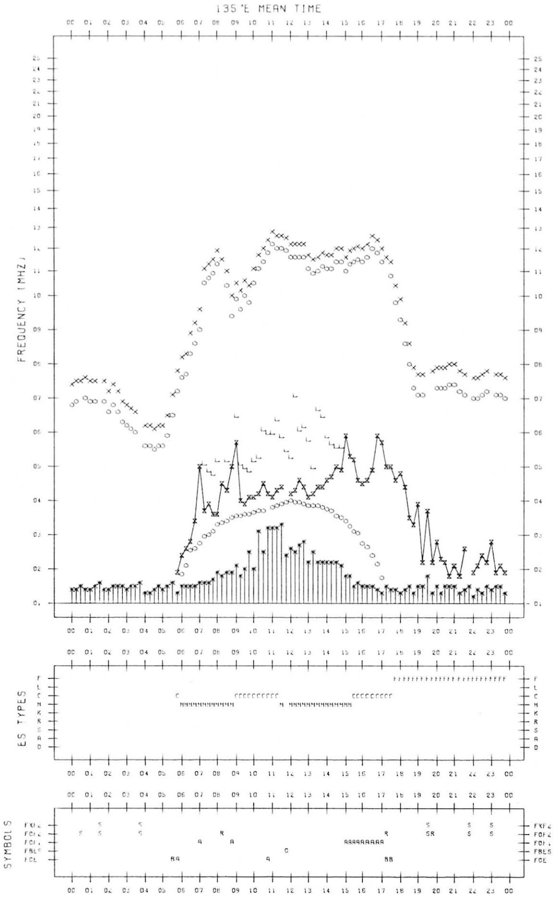
135°E MEAN TIME



F-PLOT DATA SCALER . T.KOIZUMI

STATION . KOKUBUNJI TOKYO DATE . 1988/ 9/30

135°E MEAN TIME



B.Solar Radio Emission

B1.Daily Data at Hiraiso

200 MHz

Hiraiso — September 1988

Single-frequency total flux observations at 200 MHz

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

Notes: No observations during the following periods.

14th 0645 - 15th 2332   21st 2030 - 22nd 0400
22nd 2030 - 2400

B.Solar Radio Emission

B1.Daily Data at Hiraiso

500 MHz

Hiraiso September 1988

Single-frequency total flux observations at 500 MHz

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

UT DATE	00-03	03-06	06-09	21-24	DAY
1	50	48	47	46	49
2	46	44	44	46	45
3	46	47	46	45	46
4	44	45	44	44	44
5	44	44	44	42	44
6	42	42	41	42	42
7	42	43	43	43	42
8	45	46	45	43	45
9	44	44	44	43	44
10	42	43	44	41	43
11	41	42	42	41	42
12	42	42	42	43	42
13	43	43	43	42	43
14	42	43	(42)	-	42
15	-	-	-	(40)	-
16	41	40	39	39	40
17	39	40	39	38	39
18	39	39	38	38	39
19	40	40	40	41	39
20	42	41	40	44	41
21	44	44	45	46	44
22	46	48	47	47	47
23	45	45	44	43	45
24	45	45	45	44	44
25	44	44	44	45	44
26	44	43	43	44	44
27	45	44	44	47	44
28	47	46	46	-	46
29	47	47	46	45	47
30	45	45	43	48	45

Note: No observations during the following periods:

14th 0630 - 15th 2300
28th 2030 - 2337

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso September 1988

Single-frequency observations
Normal observing period: 2025 - 0845 U.T. (sunrise to sunset)

SEP 1988	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY ($10^{-22}Wm^{-2}Hz^{-1}$) PEAK	MEAN	POLARIZATION REMARKS
1	200	44 NS	2010E	0017	300D	7	3	0
8	500	27 RF	0145	0157	75	6	4	0
	500	46 C	2242.0	2316.2	55	14	5	0
				2254.0		11		0
	200	42 SER	2055.2	2057.4	8.6	140	-	0
	100	46 C	2055.4	2057.0	2.6	730	-	-
10	100	42 SER	0631	0631.3	10.0	380	-	-
	200	42 SER	0631	0637	11.9	250	-	MR
	200	44 NS	2025E	2200	300D	9	3	MR
11	200	44 NS	2025E	0735	740D	17	6	WR
	100	43 NS	2230	2348	200	105	14	-
12	200	42 SER	0308.3	0314.5	12.5	120	-	0
	200	44 NS	2025E	0700	740D	115	36	SR
13	100	43 NS	0000	0300	540D	230	70	-
	500	46 C	0803.4	0810.3	13.0U	260	39U	0 SUNSET
				0805.7		40		WR
	100	44 NS	2025E	0406	740D	78	23	-
	200	44 NS	2025E	-	740D	-	30U	-
15	200	44 NS	2332E	0035	550D	54	25	MR
	100	44 NS	2332E	0125	550D	110	39	-
16	500	46 C	0241.3	0242.6	2.0	17	-	WR
	200	44 NS	2025E	0400	720D	11	7	MR
17	200	44 NS	2025E	2251	720D	13	4	MR
18	500	7 C	0640.3	0641.5	11.5	54	5	WL
				0646.0		3		0
	200	42 SER	2142.9	2142.9	23.1	320	-	0
	100	42 SER	2142.9	-	29.0	1000D	-	-
	500	45 C	2205.0	2205.6	1.5	170	-	0
	200	41 F	2322.2	2322.8	1.8	230	-	0
19	200	46 C	2141.0	2142.6	2.6	315	76	0
20	200	41 F	0227.3	0228.4	2.0	195	-	0
	500	41 F	0555.8	0556.2	0.9	51	-	0
	200	44 NS	2030E	-	720D	-	45	-
	100	44 NS	2030E	-	720D	-	67U	-
	100	42 SER	2052.7	2103.3	12.5	620	-	-
20	500	22 GRF	2101.5	2117.5	102	14	5	WL
	200	27 RF	2110.3	2130	76	110	64	SL
	100	27 RF	2110.6	2140.9	70	340	110	-
21	200	42 SER	0015.0	0024.1	30	280	-	SL
	500	27 RF	2150.5	2203	25	6	4	WL
	500	27 RF	2312.5	2333	48	7	3	WL
22	500	24 R	0112.5	0252.5	130	7	4	WL
	500	46 C	0320.5	0330.8	33.5	29	5	ML
	200	44 NS	0400E	0650	270D	80	41	ML
	500	24 R	0635	0700	63D	9	4U	WL SUNSET
23	200	44 NS	0000E	0048	500D	13	6	WL
	200	42 SER	0122.0	0151.6	31	100	-	ML
	200	42 SER	0409.2	0439.0	69	130	-	0
24	200	46 C	0017.5	0019.1	4.6	270	45	WR
	200	42 SER	0408.4	0435.0	54.8	35	-	MR
	200	43 NS	0455.0	0550	270D	15	3	MR
	200	27 RF	2224.4	2339	114	22	3	MR
25	500	46 C	0017.0	0025.8	47.5	76	9	0
				0034.5		21		0
	200	46 C	0027.7	0035.6	22.4	280	15	WR
	100	48 C	0033.7	-	18.5	1000D	600D	-
	200	27 RF	0418.5	0444.2	80.0	23	5	MR
	500	46 C	0538.9	0540.9	2.6	76	-	WR
	200	44 NS	2030E	-	630D	-	18	-
	100	44 NS	2030E	-	500D	-	43	-
	200	27 RF	2156	2307	119	220	72	SR
	500	46 C	2228.1	2335.4	105	65	11	MR
				2312.2		26		MR
	100	27 RF	2230	2312	132	710	225	-
26	200	24 R	2030E	0100	720D	8	4	MR
	100	24 R	2030E	-	720D	-	15	-
	200	42 SER	2205.3	2208.0	60	37	-	MR
27	500	41 F	0031.3	0039.5	25	17	-	0
	200	43 NS	0428	0708	300D	64	6	MR
	100	42 SER	0521	0712	165	620	-	-
	500	46 C	0639.0	0641.8	8.5	11	3	0
	200	44 NS	2030E	2324	720D	17	7	MR
	100	44 NS	2030E	0242	720D	130	65	-
	500	42 SER	2149.5	2150.5	16.5	20	-	0
28	200	42 SER	0017.2	0021.8	15.8	135	-	WR
	200	46 C	0356.8	0358.1	2.1	140	-	0
	200	48 C	2306.7	0027.1	168	850	120	WL
				2347.7		390		WL
	100	48 C	2309.1U	-	11D	1000D	-	-
	500	42 SER	2347.5	2348.2	9.0	810	-	0
	500	46 C	2358.0	0039.0	52.0	43	13	0
30	200	43 NS	0536	0717	165D	11	4	0
	100	44 NS	2030E	2219	720D	600	270	-
	200	44 NS	2030E	0607	720D	140	51	SL
	200	46 C	2210.5	2211.9	2.1	1100	-	0

C. RADIO PROPAGATION

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

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

C. RADIO PROPAGATION

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

SEP 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	0	2	4	15	17	22	26	21	21	20	13	17	18	23	1	5	30	13	21	16	14	8	2	2
2	0	0	5	11	17	22	24	28	20	22	13	10	ES 0	-9	4	19	23	17	22	12	12	-2	-3	-7
3	-3	1	8	13	21	22	25	33	30	24	20	17	13	15	17	-3	5	21	7	11	6	4	-2	1
4	0	0	5	12	17	26	24	27	25	32	21	19	11	15	-9	S	S	23	19	12	9	8	-1	0
5	2	0	7	11	18	19	25	27	24	22	21	23	19	23	17	ES -3	5	17	19	14	17	4	5	-1
6	-3	0	8	12	UC 17	21	28	26	25	24	25	28	20	15	3	-6	-10	8	6	16	11	6	-3	-2
7	-2	4	12	11	20	26	27	30	30	28	21	18	16	22	4	-3	-2	15	19	12	5	7	2	-3
8	-3	2	8	12	19	24	30	30	26	27	22	30	19	15	12	-8	-9	8	19	17	12	11	0	2
9	2	15	12	12	19	24	31	30	27	18	20	14	9	-2	-3	-9	2	19	27	19	12	11	5	4
10	1	4	6	19	20	24	26	28	27	22	17	21	18	17	21	ES -22	ES -22	20	20	10	14	10	5	10
11	0	3	7	11	21	20	26	25	24	26	31	22	12	24	5	26	0	22	-5	17	14	20	8	2
12	5	2	11	15	21	21	23	12	12	1	5	-3	-9	ES -9	-7	ES -22	ES -22	ES -22	-9	11	15	10	-1	7
13	4	0	0	17	20	19	23	24	15	12	27	ES -1	ES 2	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	19	14	7	4	11
14	4	4	9	16	20	23	21	22	8	19	23	20	17	ES 0	ES -22	ES -22	ES -22	ES -22	ES -22	6	3	6	8	7
15	2	4	10	13	21	23	28	27	30	21	21	26	4	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	9	13	8	17	11
16	5	5	7	13	24	22	20	11	18	19	-3	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	19	-9	19	11	5	3	3
17	-1	7	4	17	20	26	26	30	23	18	24	30	17	16	ES -22	ES -22	ES -22	32	ES -22	ES -22	10	-7	-2	7
18	5	3	11	12	19	19	-9	-1	7	20	9	ES -9	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	11	8	14	7	5
19	0	4	0	19	21	20	24	29	28	25	7	-3	-2	13	10	ES -9	ES -22	-9	-3	14	13	1	5	3
20	5	2	-3	11	20	23	31	22	22	29	17	21	20	-5	ES -22	-9	-3	21	2	12	8	10	5	-1
21	0	3	7	12	19	24	26	30	31	24	5	11	7	-5	-9	-9	0	21	28	14	11	7	12	0
22	-3	4	5	11	13	24	27	41	24	29	29	2	-3	-7	-7	0	-3	19	-7	15	5	7	-9	0
23	-2	5	8	8	19	24	29	29	24	27	32	24	12	ES -3	ES -22	ES -22	5	10	14	12	10	5	4	-1
24	ES -2	-3	9	14	20	20	28	25	28	26	28	29	-1	-5	ES -23	ES -23	ES -23	23	22	14	12	10	1	-5
25	ES -23	-2	5	10	18	23	29	1	2	26	21	17	10	0	-11	2	ES -23	20	21	10	7	5	0	1
26	0	6	2	11	20	22	31	24	26	25	18	15	21	17	-9	ES -23	1	15	22	9	3	3	2	3
27	2	4	-2	6	21	25	23	28	23	23	11	0	9	-9	ES -23	ES -23	ES -11	5	18	9	12	2	3	0
28	3	3	9	12	25	20	24	27	22	26	20	25	0	1	-3	ES -11	ES -23	20	20	14	9	5	3	ES -23
29	0	2	6	17	15	25	22	23	25	23	23	24	26	0	ES -11	ES -23	ES -23	22	22	10	10	13	-3	1
30	4	0	10	8	20	27	27	23	19	27	21	26	27	24	-1	-10	-7	22	18	2	5	1	2	-1
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	29	30	30	30	30	30	30	30
MED	0	3	7	12	20	23	26	27	24	24	21	18	12	0	-8	US -10	-10	18	18	12	11	7	2	1
UD	5	6	11	17	21	26	31	30	30	29	29	29	21	23	17	5	5	23	22	19	14	13	8	10
LD	ES -3	0	0	8	17	19	21	11	8	18	5	ES -3	ES -9	ES -22	ES -22	ES -23	ES -23	ES -22	ES -22	6	5	1	-3	-5

C. Radio Propagation

c2. Radio Propagation Quality Figures at Hiraiso

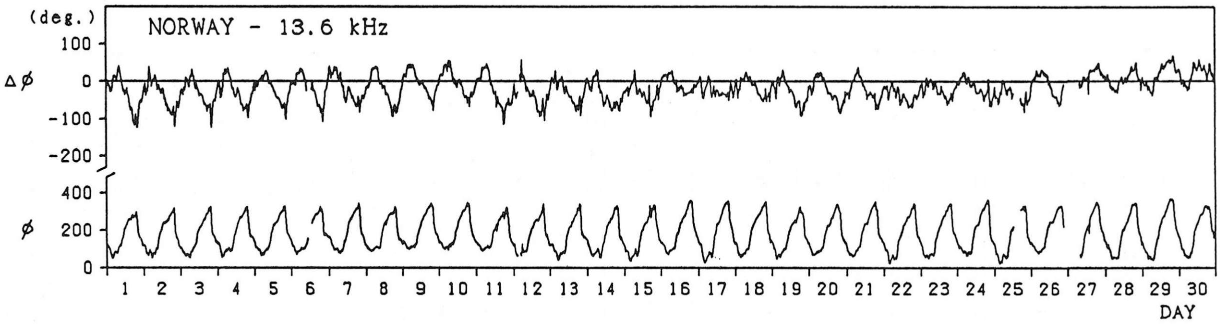
Hiraiso | Time in U.T

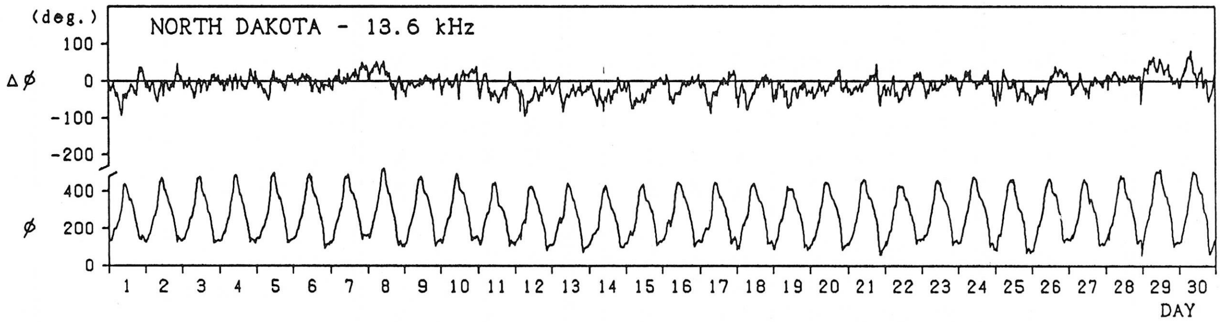
Sep. 1988	Whole Day Figure	WWV 00-06	WWV 06-12	WWV 12-18	WWV 18-24	WWVH 00-06	WWVH 06-12	WWVH 12-18	WWVH 18-24	Conditions 00-06	Conditions 06-12	Conditions 12-18	Conditions 18-24	Princial Geomagnetic Storms Start	Ene	Range
1	4+	4	S	5	4	4	4	5	4	N	N	N	N			
2	4o	4	4U	5	4	4	4	4	4	N	N	N	N			
3	4o	3U	S	5U	4U	3U	4	4	4	N	N	N	N			
4	4o	4	S	4U	5	4	4	4	4	N	N	N	N			
5	4o	4	4U	4U	4	4	4	5	4	N	N	N	N			
6	4o	4	5U	4	4U	4	4	4	4	N	N	N	N			
7	4+	4	4U	5	4U	4	4	5	4	N	N	N	N			
8	4o	4	4U	5	4	4	4	4	4	N	N	N	N			
9	4o	4	4U	5	4	4	4	4	4	N	N	N	N			
10	4+	4	5U	5	4	4	4	4	4	N	N	N	N	20.2	---	151
11	4o	4	4U	4U	4	4	4	4	4	N	N	N	N	---	---	
12	3o	2U	4U	3U	4	2U	2	2	4	N	U	U	U	---	09.0	
13	3+	3U	4U	3U	4	3U	3	2U	4	U	N	N	N			
14	4-	4	4U	3U	3U	4	4	3U	4	N	N	N	N			
15	3+	4	S	2U	4U	4	4	2U	4	N	N	N	N			
16	4-	4	4U	4U	5	4	2	2U	4	N	N	N	N			
17	4-	3	S	4U	4U	4	4	3U	3	N	N	N	N			
18	3-	3	3U	2U	3U	3	2	2U	4	N	N	N	N			
19	3+	3	S	4U	4	3	3	3	4	U	U	U	U			
20	4o	4	4U	3U	4	4	4	4	4	N	N	N	N			
21	4o	4	S	4U	4U	4	3	4	4	N	N	N	N			
22	3+	3	4U	4U	4U	3	3	3	3	N	N	N	N			
23	4o	4	4U	4U	4	4	4	4	4	N	N	N	N			
24	4o	4	4U	4U	4	4	4	3	4	N	N	N	N			
25	4o	4	4U	5	4	4	3	4	4	N	N	N	N			
26	4o	4	4U	4	4	4	4	4	4	N	N	N	N			
27	4o	4	5U	4U	4U	4	4	3	4	N	N	N	N			
28	4o	4	S	4U	4	4	4	4	4	N	N	N	N			
29	4o	4	4U	5	4	4	4	4	4	N	N	N	N			
30	4o	4	S	4	4	4	4	4	3	N	N	N	N			

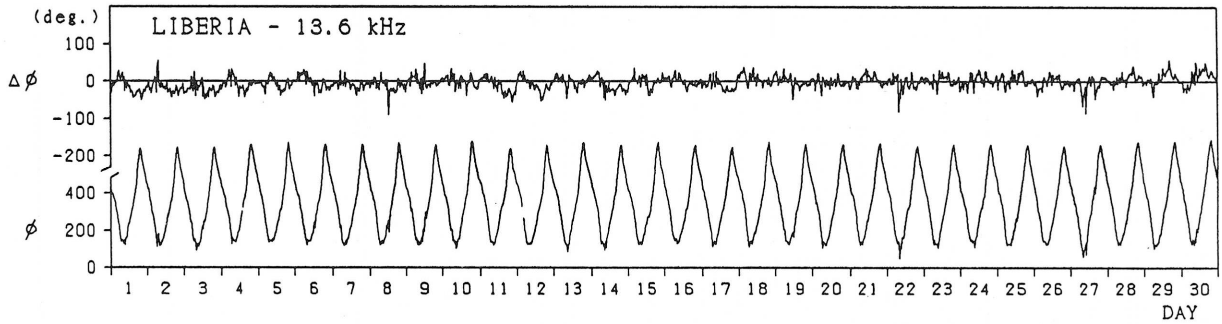
C. Radio Propagation

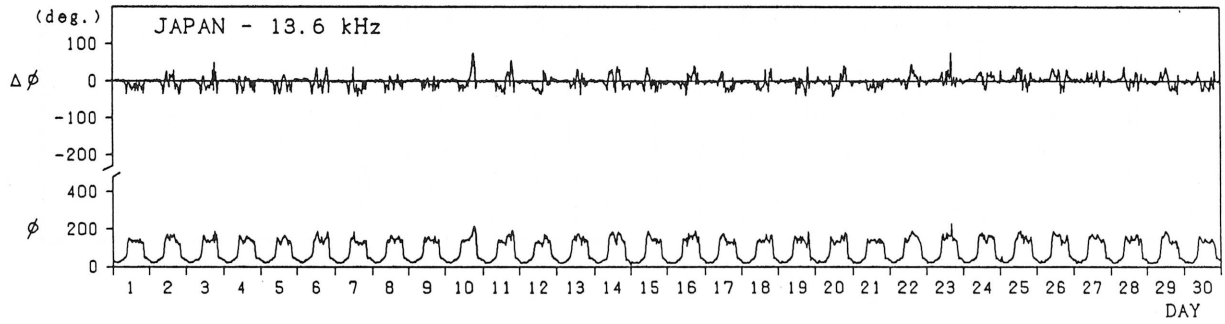
C3. Phase Variations in OMEGA Radio Waves at Inubo

Inubo September 1988

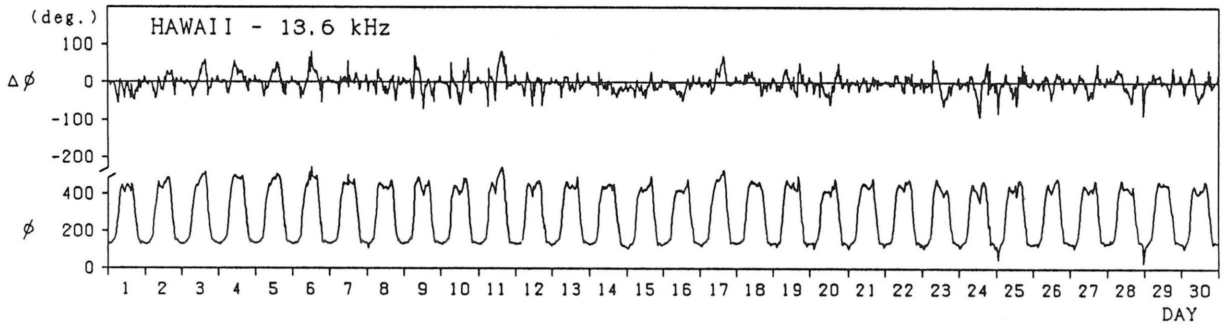


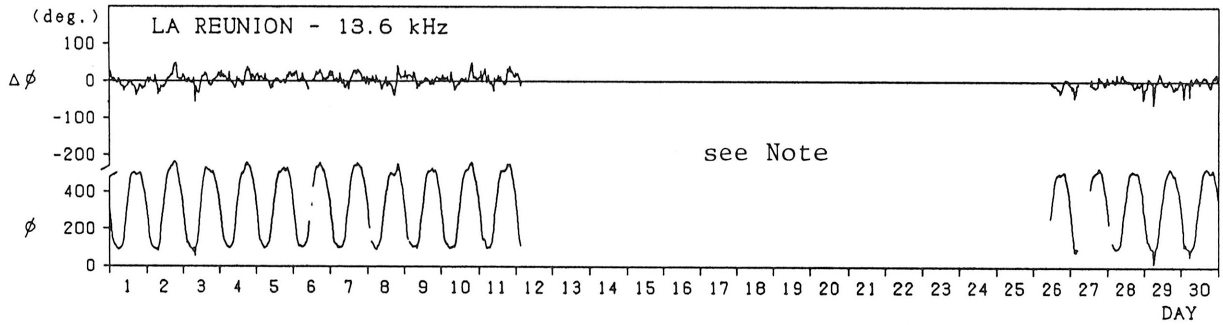


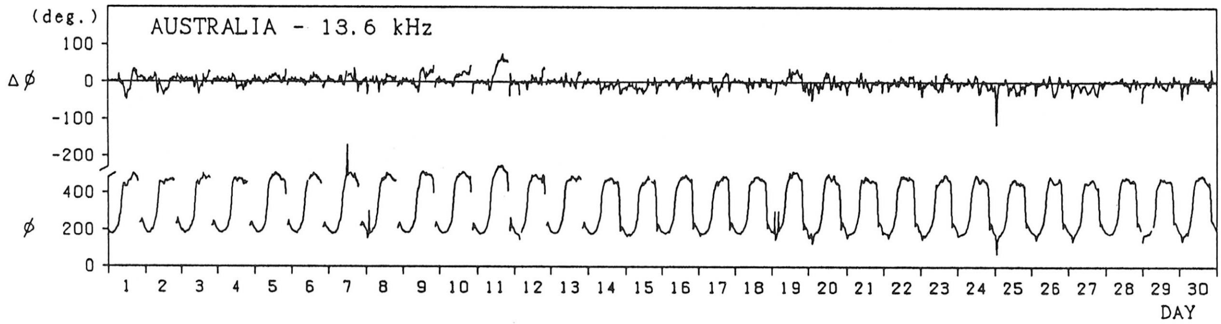


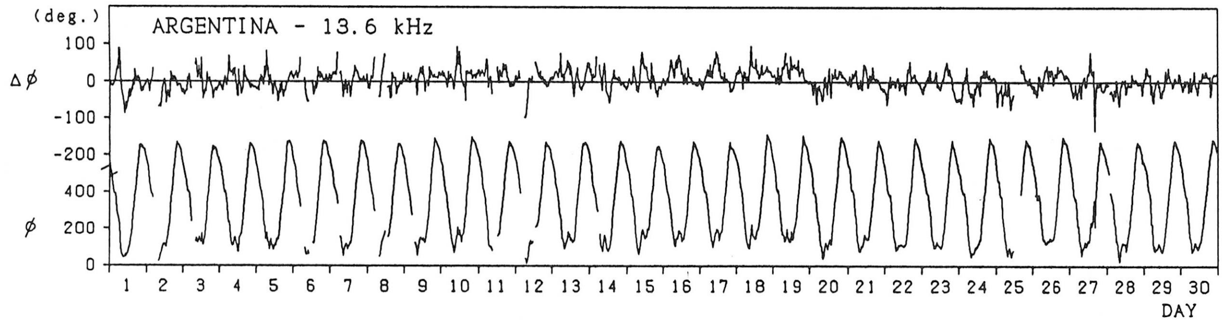


Inubo September 1988









Note: As for LA REUNION - 13.6 kHz, no record during September 12 - September 26, due to the maintenance of transmitter.

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

C. Radio Propagation

c4. Sudden Ionospheric Disturbance

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

Hiraiso

Time in U.T.

Sep. 1988	S W F									Corresepondence		
	Drop-out Intensities (dB)					Start	Duration	Type	Imp.	Solar Flare	Solar Noise	Geomag. Crochet
	CO	HA	1)	2)	3)							
8				10		1235	25	SL	1-	1233		
19	X	X	10	X	X	0222	18	SL	1-		X	
20			9			0216	28	G	1-	0222		
25			20	X	X	0033	42	G	2-	0024	X	
26			8			0245	32	SL	1-	0024		
27				7		0952	17	SL	1-	0952		
27				5		1611	18	SL	1-	1607		
28	X	X	12		X	2308	46	S	1-	2255	X	
29			X		14	0538	52	G	1	0544		
30	X	X	10			0059	23	SL	1-	0058		

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

b. Sudden Phase Anomaly (SPA) at Inubo

Inubo

Sep.	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
1					21	17	2051	2123	2057
2	15	34	27	10			0756	0848	0811
3	9		9	8			0408	0437	0415
3			18	14			0533	0618	0539
3	25	69	58	36			0708	0829	0720
3	18		26				0848	0941	0859
4				8	8		0052	0115	0102
5	16		17	10			0504	0542	0515
6				—	6	16	0259	0344	0310
8	15			48	29	20	0037	0144	0053
8		103					1234	1351	1249
8				6	11		2317	2349	2321
9	15		25				0741	0846	0756
10		39	27	6			0815	0935	0823
12			—	8			0722	0749	0729
18			—	6			0644	0707	0650
18			—		12		2152	2247	2158
19			—	—	8		0057	0126	0105
19	21	23	—	—	34	33	0225	0309	0238
19		80	—	—			1102	1205	1117
19	18		—		33	20	2142	2245	2146
20	10	27	—	68	38	30	0224	0357	0234
20			—	22			0517	0605	0522
20		34	—	26		15	0613	0709	0617
20			—	36	30	21	2339	0146	0012
21	11		—	14	8	10	2238	2257	2243
21	13		—	24	23	20	2327	0025	2332
22			—	35	16		0311	0351	0314
22	23	132	—	56			0805	0928	0815
22			—	14	28	17	2241	2346	2245
23			—	12	11		0019	0050D	0029
23		11	—	40	25		0050E	0146	0058
23		18	—	45	17	13	0205	0242D	0215
23			—	20*	11*		0242E	0339	0251
23			—	10			0527	0556	0533

Inubo

Sep. 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
23		52	—	9			0855	0949	0905
23			—	19	18	13	2357	0147	0021
24			—	10		12	0358	0425	0401
24			—	18	27	23	2250	2352	2307
25	34	34	—	93	77	46	0022	0246	0053
25			—		8	18	2154	2228	2210
26	10		—	—	15	16	0246	0345	0305
26		16	—	—			0439	0501	0443
27	—		41	—	23	24	0204	0314D	0229
27	—		29	21	6	11	0314E	0405	0329
27	—	21	—	18			0641	0715D	0650
27	—	15	—	18			0715E	0820	0725
27		74	—				0956	1100	1008
27		71				20	1612	1643	1620
27					13	16	2205	2247	2214
27					5		2341	2354	2347
28		29					1216	1249	1230
28	40	43	63	108	128	106	2257	0148	2315
29	30	86	101	56		18	0553	0710	0609
30	13	16	27	52	37	11	0101	0141D	0111
30		16	35	47	28		0141E	0240	0156
30			54	42			0501	0625	0517
30					17		1957	2113	2015

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