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IONOSPHERIC DATA IN JAPAN

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CONTENTS

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MINISTRY OF POSTS AND TELECOMMUNICATIONS
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INTRODUCTION

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

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

A. IONOSPHERE

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

A1. Automatic Scaling

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

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

a. Characteristics of Ionosphere

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

b. Descriptive Letters

The following descriptive letters are used in the tables.

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

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

C Impossible measurement because of any failure in observation.

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

N Impossible automatic scaling because of complex echoes.

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

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

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

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

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

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

d. Reliability of Automatic Scaling

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

e. Summary Plot

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

A2. Manual Scaling

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

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

a. Characteristics of Ionosphere

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

b. Symbols

(i) Descriptive Letters

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

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

(ii) Qualifying Letters

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

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

(iii) Description of Types of *Es*

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

The types are:

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

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

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

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

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

B. SOLAR RADIO EMISSION

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

B1. Daily Data at Hiraiso

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

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

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

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

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

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

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

B2. Outstanding Occurrences at Hiraiso

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

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

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

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

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

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

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

C. RADIO PROPAGATION

C1. H.F. Field Strength at Hiraiso

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

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

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

C2. Radio Propagation Quality Figures at Hiraiso

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

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

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

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

C	artificial accident,
S	propagational accident,
U	inaccurate.

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

N	normal,
U	unstable,
W	disturbed.

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

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

C3. Phase Variation in OMEGA Radio Waves at Inubo

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

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

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

C4. Sudden Ionospheric Disturbances

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

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

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

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

Types of fade-out are as follows:

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

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

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

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

b. Sudden Phase Anomaly (SPA) at Inubo

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

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

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

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

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

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

HOURLY VALUES OF FOF2 AT WAKKANAI

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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	53	48	49	52	47	52	68	88		142	147	146	146	144	130	124	114	92	84	67	58	52	53	52
2	54	56	43	44	51	48	61		128	134	134	140	132	135	140	135	119	98	80	73	73	68	66	62
3	59	56	54	54	52	44	65	106	140	138	140	148	153	148	144	135	130	106	87	86	65	62	54	60
4	58	52	43	43	38	43	61	97	130	148	159	159	157	146	146	145	132	128	100	66	66	51	63	53
5	43	42	40	42	42	44	58	88	128	146	140	160	160	145	141	136	134	128	98	86	66	63	66	57
6	58	51	50	54	52	46	63	109	130	142	154	146	147	147	138	134	127	111	88	80	A	58	63	A
7	52	59	38	49	44	48	64	113	135	147	147	144	139	138	134	130	120	97	91	86	66	66	52	41
8	64	42	60	44	36	36	50	112	144	161	162	152	141	142	135	135	127	128	95	87	66	66	56	55
9	50	52	40	45		50	52	88	128	144	162	161	144	142	136	139	132	110	88	64	68	66	73	66
10	52	A	57	55	42	44	71	110	142	146	160	159	148	140	134	126	128	114	96	82	68	66	61	52
11	53	56	56	54	50	51	63	90	138	150	144	144	138	133	132	124	114	101	87	78	72	66	58	55
12	54	48	47	48	43	37	53	119	141	137	148	144	145	145	138	130	127	120	93	65	64	67	54	53
13	52	50	53	54	52	51	61	110	122	138	145	142	139	136	136	126	116	113	90	83	64	58	54	48
14	43	40	32	31	38	38	59	100	140	155	160	161	157	147	140	130	119	108	98	84	64	55	56	49
15	N	43	37	43	44	44	43	88	137	142	161	157	144	134	141	136	122	107	88	66	66	65	60	50
16	50	44	N	45	42	49	58	90	139	154	161	158	147	142	140	132	127	109	88	76	57	50	52	49
17	40	42	38	42	39	38	49	112	137	127	135	140	131		136	127	114	92	86	76	66	50	38	38
18	35	N		23		A	28		61	84	92	111	116	114	120	116	107	86	71	71	67	56	N	55
19	56	49	47	52	43	42	51	85	123	146	142	145	141	134	136	124	116	91	77	65		52	43	42
20	42	38	42	43	36	36	42	89	119	128		136	141	125	133	136	116	91	86	73	57	40	40	43
21	46	45	43	42	41	44	31	74	111	138	137	142	134	137	134	130	112	91	74	72	62	53	54	37
22	52	54	52	52	50	51	50	83	120	134	145	142	132	123	126	118	122	82		66	53	54	52	52
23	51	51	48	45	52	52	52	108	120	140	144	156	143	133	140	130	117	102	84	64	57	43	50	42
24	52	46	44	45	44	52	55	88	117	140	148	151	137	126	128	122	110	85	66	66	47	38	40	40
25	44	42	49	41	65		69	111	130	138	144	148	133	126	127	129	104	79	66	62	49	34	34	37
26			30	37		38	36	70	121	138	146	151	140	129	121	120	107	84	70	64	52	58	49	52
27	46	52	40	37	35	65	48	85	125	155	162	160	161	157	146	144	132	109	94	90	66	48	48	38
28	43	49	46	50	46	47	42	66	124	146	162	164	164	160	143	136	126	108	87	90	83	66	65	64
29	65	66	66	63	62	64	62	92	135	150	153	160	153	147	142	134	121	101	88	64	53	53	40	52
30	42	47	44	42	38	31	39	72	140	158	130	153	168	159	146	134	118	114	86	58	58	61	64	60
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	28	27	28	30	27	28	30	28	29	30	29	30	30	29	30	30	30	30	29	30	28	30	29	29
MED	52	49	45	45	44	45	54	90	130	142	147	150	144	140	136	130	120	104	87	72	64	57	54	52
U Q	54	52	51	52	51	51	62	109	138	148	160	159	153	146	141	135	127	111	92	83	66	66	62	55
L Q	43	43	40	42	39	40	48	86	121	138	141	144	138	133	133	126	114	91	82	65	57	51	48	42

HOURLY VALUES OF FES AT WAKKANAI

NOV. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	32	29	34	44	58	38
2	36	33	G	G	G	G	G	G	37	G	G	60	G	41	G	G	G	30	G	G	G	G	G	26
3	25	34	28	G	G	G	G	G	40	G	G	60	G	G	G	G	30	G	11	28	27	G	G	G
4	24	24	31	33	30	G	30	35	43	43	59	64	G	G	G	G	57	58	64	64	G	G	24	28
5	G	G	G	G	G	G	G	G	G	65	G	71	G	G	G	G	G	36	G	G	G	G	32	32
6	G	31	27	G	G	G	G	31	42	G	G	G	G	G	G	G	G	G	G	30	60	G	33	44
7	35	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
8	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	28	G	23	G	G	G
9	G	G	G	G	G	30	32	N	50	50	G	G	G	G	G	G	G	G	G	G	G	G	G	G
10	G	31	32	28	G	G	G	32	41		G	G	G	G	G	G	G	G	G	G	G	G	G	G
11	G	26	G	26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	24
12	G	G	G	G	G	G	G	G	G	G	48	63	57	G	G	G	36	29	47	34	G	28	29	36
13	30	G	G	31	G	G	G	32	38	G	48	G	G	G	G	40	36	G	G	G	G	28	G	G
14	24	G	G	G	G	G	G	G	G	39	G	G	G	G	G	G	G	G	G	G	G	G	G	G
15	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	35	40	36	G	G
16	G	29	28	G	28	G	G	G	36	G	G	G	G	G	G	G	25	58	30	G	30	33	29	G
17	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
18	G	G	G	30	32	69	G	G	39	G	G	54	G	G	G	G	G	32	G	G	G	G	G	G
19	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	34	G	G	G	G	G	G
20	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	30
21	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
22	29	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
23	G	G	28	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	G	G	G	G	G	G	G	G	G	G	G	G	27	G	G	G	G	G
25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
26			G	G		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
27	G	G	G	28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
28	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	32	G
29	G	G	G	G	G	G	G	G	G	G	53	G	G	G	G	G	G	G	G	G	G	G	G	G
30	G	G	G	G	G	G	G	G	33	G	G	G	G	G	G	G	G	G	G	G	G	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	29	29	30	30	29	30	30	29	30	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
U Q	12	12	G	G	G	G	G	G	37	G	G	G	G	G	G	G	G	G	G	G	G	G	G	24
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

NOV. 1989

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

DAY \ HR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	17	15	16	15	15	15	15	27	20	23	27	39	39	35	24	20	22	17	16	16	15	16	16	16
2	15	15	17	16	16	15	17	26	20	22	22	27	24	23	30	27	23	16	17	16	15	15	15	16
3	17	15	15	15	15	17	17	26	20	23	22	26	38	33	30	18	23	15	15	17	18	16	16	15
4	15	15	15	15	15	15	14	20	20	21	26	26	24	23	23	18	18	16	15	16	15	18	15	16
5	15	N	N	17	16	16	15	26	27	27	24	28	40	35	28	23	18	20	16	16	17	16	17	17
6	15	15	16	14	14	16	15	18	20	33	38	28	27	36	33	28	23	16	15	17	22	27	16	23
7	16	21	22	15	16	22	15	24	18	23	23	24	42	24	33	28	23	16	17	24	21	18	32	18
8	N	16	15	24	16	15	16	24	29	26	36	37	38	27	24	28	23	16	18	17	15	15	16	16
9	15	15	15	16	27	21	15	22	20	30	28	28	27	27	23	26	24	16	16	15	16	16	15	15
10	16	15	14	15	N	15	16	18	18	23	39	52	27	28	35	28	24	17	15	16	15	15	15	16
11	15	16	15	16	15	15	16	24	20	23	24	36	27	24	24	27	21	16	17	17	16	15	15	15
12	16	15	15	15	15	16	16	24	18	23	24	26	24	23	21	28	17	15	15	15	15	17	17	16
13	17	16	15	15	15	15	16	21	17	23	21	21	20	33	32	24	20	20	16	15	16	14	15	16
14	18	N	N	N	N	15	21	24	18	20	23	28	21	18	22	27	20	15	15	15	15	17	15	15
15	15	14	15	15	17	15	15	24	18	22	21	23	22	23	32	27	24	16	17	16	16	16	16	15
16	15	15	16	15	17	17	15	24	18	21	24	26	34	24	32	28	24	16	21	18	17	17	16	15
17	15	16	15	15	15	15	16	23	29	23	24	26	35	24	21	18	21	16	15	16	17	16	N	16
18	15	21	N	15	15	17	N	20	26	33	33	34	34	26	30	27	18	17	15	16	15	15	16	17
19	16	15	15	15	15	15	15	24	20	26	26	26	26	26	32	26	18	17	15	15	15	15	16	16
20	16	15	15	15	15	15	15	24	29	22	42	24	24	27	32	27	18	17	14	16	15	16	15	16
21	15	15	16	15	16	15	15	22	17	23	24	24	35	33	30	26	18	16	16	15	15	15	15	15
22	17	14	14	15	15	17	15	24	18	22	23	35	26	35	30	28	21	16	15	15	16	15	16	17
23	15	15	16	15	15	17	15	24	26	32	27	34	22	22	32	27	18	17	15	18	16	16	15	15
24	16	16	15	15	16	16	15	23	29	33	36	40	26	26	30	20	21	18	18	17	15	16	17	16
25	15	15	16	26	15		15	22	27	20	24	23	34	24	30	26	17	16	17	17	15	15	16	16
26			15	15		16	15	24	18	45	45	41	38	33	30	27	18	16	15	15	16	16	20	16
27	15	15	15	18	N	27	30	23	17	21	34	27	26	26	30	26	18	16	15	17	16	27	16	21
28	15	15	16	14	18	15	15	21	27	30	24	34	34	23	20	26	20	23	15	16	15	15	16	15
29	16	15	15	15	15	15	15	22	26	32	24	26	26	23	23	26	18	15	15	15	15	15	15	15
30	16	15	15	16	15	15	15	23	16	18	20	24	23	32	20	24	17	16	14	15	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	28	27	27	29	26	29	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30
MED	15	15	15	15	15	15	15	24	20	23	24	27	27	26	30	26	20	16	15	16	16	16	16	16
U Q	16	16	16	16	16	17	16	24	26	30	33	34	35	33	32	27	23	17	17	17	16	16	16	16
L Q	15	15	15	15	15	15	15	22	18	22	23	26	24	23	23	24	18	16	15	15	15	15	15	15

HOURLY VALUES OF FOF2 AT AKITA

NOV. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	58	50	52	52	55	61	80	105	130	136	138	141	137	140	135	133	114	106	90	81	N	60	60	
2			44		47	48	66	104	133	134	133	136	135	134	138	126	114	103	82	82	77	71	64	68
3	65	57	52	54	57	56	70	111	136	138	136	138	140	163	138	137	131	113	90	86	77	81	63	58
4	63	70	60	53	53	54	68	106	130	147	160	147	160	163	138	137	134	111	104	87	76	64	73	64
5	54	50	45	55	42	47	58	109	141	144	143	152	147	138	141	136	112	122	111	90	66	70	74	66
6	61	52	58	54	50	49	69	115	138	140	137	141	138	140	137	130	130	114	92	82	76	72	62	A
7	A	56	53	48	49	48	71	110	137	144	138	138	138	142	132	131	118	108	88	87	88	68	63	50
8	25	50	63	60	36	38	60	108	137	141	138	137	135	135	135	127	131	113	102	87	78	71	63	58
9	54	51	57	53	50	57	63	109	129	140	141	152	140	136	126	129	120	114	89	78	74	79	74	67
10	52	54	62	57	46	53	76	117	138	140	140	138	139	138	133	124	118	116	105	79	66	71	66	67
11	57	52	53	53	48	48	68	112	132	138	136	137	138	135	132	126	114	108	85	82	74	67		64
12	53	56	48	52	47	25	57	114	126	133	135	138	136	137	136	124	124	117	87	85	76	71	61	45
13	56	53	54	51	49	45	64	105	130	121	135	142	139	138	131	127	111	110	90	80	67	53	50	53
14	32	40	42	30	43	47	78	131	160	163	169	164	161	144	138	134	132	112	90	84	67	52	64	52
15	47	44	46	45	47	43	44	87	128	145	146	143	138	140	136	136	128	90	90	77	79	68	A	45
16	48	48	47	40	44	46	63	104	126	142	155	138	136	139	137	135	134	108	84	84	52	30	56	56
17		43	25	40	40	42	55	104	122	133	134	137	136	111	138	130	117	103	85	82	66	52	44	52
18	52	34		23			22		86	109	115	120	116	120	115	122	114	93	84	80	72	64	54	59
19	60		54	51	49	52	55	97	121	136	140	136	134	136	129	130	115	97	92	66	58	51	46	43
20	44	44	45	43	40	43	54	77	117	134	138	146		140	132	121	124	102	82	78	61	54	46	32
21	47	41	44	46	42	44	46	83	110	134	135	138	138	130	127	122	117	90	76	72	63	51	49	42
22	47	53	49	52	42	42	51	89	111	134	137	136	130	126	121	118	102	83	64	65	58	47	50	46
23	47	48	44	42	43	47	52	84	115	140	144	141	135	130	130	127	116	92	80	80	73	57	47	43
24	47	48	47	42	43	42	54	81	105	136	141	140	136	124	120	113	102	86	88	72	53	43	42	46
25	40	40		40	42	44	52	88	126	140	143	146	137	133	129	132	110	N	67	65	49	34	36	41
26	35	32	35	26	31	28	38	86	112	138	138	138	134	131	112	108	116	94	75	57	50	50	56	50
27	41	43	42	37	43	46	42	86	122	157	145	158	157	138	137	137	133	112	103	88	84	59	52	56
28	41	47	50	53	52	54	51	87	131	142	140	142	143	124	121	124	121	109	85	87	86	66	68	57
29	63	64	62	55	54	54	71	112	120	134	146	143	137	137	135	130	116	114	90	74	59	53	49	54
30	53	60	52	58	52	53	54	87	140	163	143	134	138	137	138	114	117	N	88	67	66	61	58	58
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	28	28	29	29	29	30	29	30	30	30	30	29	30	30	30	30	28	30	30	29	30	28	28
MED	52	50	50	51	47	47	58	104	128	139	139	139	138	137	134	128	117	108	88	80	67	60	57	54
U Q	57	53	54	53	50	53	68	110	136	142	143	143	139	140	137	133	128	113	90	85	76	70	63	58
L Q	44	43	44	41	42	43	52	87	120	134	136	137	135	131	129	124	114	95	84	74	60	52	49	45

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT AKITA

NOV. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	25	G	G	G	G	G	G	G	38	G	G	G	G	G	G	G	G	29	G	G	G	G	G	33
2	42	34	38	38	36	G	28	G	G	G	44	G	54	59	G	G	G	G	G	G	G	G	G	G
3	24	G	26	24	G	G	G		G	G	55	54	44	49	58	43	37	36	36	G	G	G	36	31
4	G	G	29	28	G	G	G	68	43	55	74	52	75	74	42	G	44	G	60	46	38	32	32	G
5	G	G	G	G	G	G	G	G	G	G	G	G	G	G	50	51	40	G	G	40	G	35	G	G
6	30	37	29	41	35	G	23	33	G	G	51	G	G	G	40	G	G	G	30	G	28	32	34	53
7	49	37	30	31	G	G	G	G	G	43	G	49	G	G	G	G	G	30	G	29	G	G	G	G
8	G	G	G	G	27	G	G	G	G	41	G	46	G	44	G	G	38	30	27	46	35	32	G	G
9	G	G	G	G	G	G	G	36	38	49	50	G	44	G	G	50	52	30	G	G	G	G	G	G
10	G	G	G	G	G	G	G	G	G		G	G	G	56	G	58	31	G	G	24	40	33	G	G
11	G	G	30	G	24	G	G	G	58	42	44	54	43	G	43	G	35	58	43	G	G	G		34
12	28	29	24	G	G	G	G	G	G	G	54	54	47	G	41	52	G	36	48	G	G	G	G	G
13	G	G	G	26	28	G	G	G	G	43	42	44	G	G	G	G	31	40	38	58	G	G	G	G
14	G	25	G	G	G	G	G	G	36	G	G	54	61	92	41	44	36	30	43	38	G	G	G	31
15	G	28	G	26	G	G	G	G	G	G	54	47	G	42	G	G	G	43	54	35	G	58	57	G
16	G	27	G	23	G	G	G	30	44	41	45	G	49	50	50	40	37	39	29	28	32	39	26	29
17	31	G	G	G	31	G	G	G	G	G	57	G	G	G	G	G	G	G	G	G	G	G	G	G
18	G	G		G			G	30	G	G		G	G	G	G	41	40	34	G	G	G	G	G	G
19	G	33	29	G	G	G	G	G	G	41	G	G	G	G	G	42	40	46	30	59	57	39	28	G
20	G	G	30	G	G	G	G	48	G	G	73	G	G	G	G	G	G	G	27	G	G	G	G	G
21	28	G	G	G	G	G	G	G	G	G	49	G	G	G	G	G	G	G	G	G	G	G	G	G
22	G	29	G	G	G	G	G	G	G	40	47	G	G	G	G	39	30	G	G	G	29	G	G	G
23	G	G	G	G	G	G	25	G	G	G	G	G	G	51	G	G	G	G	G	G	G	G	30	G
24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
25	G	G	28	29	31	26	G	G	G	G	G	G	G	G	G	G	29	G	G	G	G	G	G	G
26	G	G	G	G	G	G	G	G	G	G	42	G	G	G	G	G	G	G	G	G	G	G	G	G
27	G	G	32	G	G	G	G	G	35	G	42	54	G	42	G	G	G	G	G	G	G	G	G	G
28	G	G	G	G	G	G	G	32	G	39	G	G	45	G	G	G	G	G	G	G	G	29	27	G
29	29	25	24	29	G	G	G	G	G	39	G	G	G	54	G	G	32	23	G	G	G	G	G	G
30	G	G	G	G	G	G	G	G	38	G	G	44	G	G	G	G	G	G	G	G	G	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	30	30	29	30	29	29	30	29	30	29	29	30	30	30	30	30	30	30	30	30	30	30	29	30
MED	G	G	G	G	G	G	G	G	G	G	42	G	G	G	G	G	15	G	G	G	G	G	G	G
U Q	25	27	29	26	12	G	G	15	35	41	50	47	44	49	40	41	37	34	30	29	G	32	26	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT AKITA

NOV. 1989

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

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT KOKUBUNJI

NOV.1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		57	57	56		57	84	109	123	144	148	147	151	137		137	123	109	103	89	71	67		
2		52	51	47	44	45	70	103	122	150	133	141	136	140	141	122			87	82	84	80	65	63
3	63	58	75	59	50	54	70	120	128	138	143	141	146	158	149		132	125	106	92	88	79		54
4		71	67	58	62	60	79	112	135	152	146	144	168	149	154	145	144	133		A	86	83	80	64
5	55	49	41	57	52	48	62	109	145	148	144	146	146	146	140	135	133	126	116	106	90	84	93	72
6	66	65		58	51	50	67	116		144	144	142	145	145	141		129			90	86	90	82	68
7	68	68	52	48	48	44	72		142	142		141	144	146	133	135		124	102	100	102	87	77	62
8	49	52	61	67	38	43	66	114	135	139		129	137	136	134	131	122	116	106	94	93	81	69	57
9	56	53	54	52	50	50	72	114	132	141	142	146	141	138		125	122	115	86	80	79	78	80	77
10	58	51	58	58	44	46	80	114	134	145	144	144	146	142	139	131	120	126	114	91		97	80	82
11	83	73	60	58	46	47	65	115	135	143	136	136	146	136	138	127	122	113	103	89	83	81	74	76
12	59	54	54	51	44	46	76	114	130	128	137	138	145	143	140	129	121	114	95	89	84	82	76	73
13	62		47	55	52	47	66	106	127	138	141	144	148	148	131	134	121	110	106	86	78	74	63	66
14	51	50	48	49	57	72	103	137	166	168	160	156	155	145	138	138	131	118	105	92	80	63	62	66
15	52		48	56	50	44	52	94	122	153	151	147	146	148	145	143	131	114	101	88	90	81	58	48
16	48	47	42	40	42	47	68	111	132	146	150	148	143	144	140	141	139	120	90	88	86	89	64	50
17	48	46	40	48	48	50	72	102	112	136	140	139	138	143	143	135	120	117	94	98	91	70	61	55
18	60	43	39	38			44	72	121	128	142	137	135	130	138	126	114	99	92	82	81	69	54	67
19	66	59	54	54	43	48	60	103	130	145		143	140	136	130	129	121	103	96	75	66	75	55	39
20	42	53	48	56	47	38	52	92	110	135	144	140	127	142	137	134	132	114	88	81	82	72	59	44
21	49	46	54	52	44	37	54	91	109	136	140	138	134	129	138	126	120	100	87	80	81	58	42	47
22	41	48	48	48	36	40	54	102	118	131	136	135	130	128	130	122	105	84	82	81	66	49	47	57
23	47	47	42	37	39	45	53	92	118	145	146	146	141	136	126	123	118	98	79	83	93	54	54	53
24	46	48	43	42	36	40	50	91	112	120	150	142	132	130	121	118	114	90	87	82	66	48	42	43
25	47	41	38	36	37	39	49	100	127	139	146	142	137	141	133	130	133	106	81	66	67	56	45	
26																								
27											146	149	139	136	145	140	134	121	103	88	87	77	52	60
28	54	50	53	54	53	53	60	105	122	132	138	146	140	126	126	120	123	114	86	87	84	68	67	61
29	65	73	52	46	39	49	73	111	122	136	148	141	143	146	137	138	134	124	101	82	73	55	62	60
30	55	57	54	56	52	53	54	110	132	145	150	145	141	146	137	128	124	106	97	64	71	70	58	62
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	25	26	27	28	26	27	28	27	27	28	26	29	29	29	27	27	27	27	27	28	28	29	27	27
MED	55	52	52	53	46	47	66	109	127	142	144	142	141	142	138	131	123	114	96	88	84	75	62	61
U Q	62	58	54	56	51	50	72	114	134	145	148	146	146	146	141	137	132	121	103	90	87	81	76	67
L Q	48	48	43	47	42	44	54	100	121	136	140	139	137	136	133	126	120	106	87	81	75	65	54	53

HOURLY VALUES OF FES AT KOKUBUNJI

NOV. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	26	G	G	G		G	G	33	40	43	44	46	G			56	35	G	G	34	G	25		
2		27	30	31	30	27	26	G	G	46	44	G	G	G	57	51		G	G	G	G	26	31	G
3	26	30	38	G	G	G	G	G	G	42	50	G	70	60	110		60	33	G	G	G	G		G
4		36	G	48	37	29		G	52	48	54	49	66	69	78	60	65	72	G	107	28	28	25	44
5	32	27	24	G	G	39	G	G	57	57	G	G	G	54	51	53	43	36	30	G	G	G	G	34
6	42	G		30	24	G	24	G		44	46	47	44	44	G		G			32	G	G	23	25
7	30	51	35	31	G	G	24		G	G		45	52			42		24	27	28	24	G	38	G
8	G	G	G	26	26	32	G	32	38	43		47	46	46	51	49	49	44	41	49	44	30	G	49
9	G	G	G	26	G	G	24	36	38	47	45	46	G	G	G	39	31	27	G	G	G	G	G	G
10	G	G	G	G	G	G	G	35	G	46	48	G	45	44	42	40	32	34	24	G		23	40	G
11	G	G	G	G	G	26	25	G	G	G	44	G	47	G	41	58	49	G	24	G	G	G	G	G
12	G	33	30	31	G	G	23	33	G	G	48	59	51	47	44	48	34	G	27	32	26	G	G	G
13	G		28	G	G	G	G	G	G	49	46	46	52	44	42	40	33	G	G	G	G	G	28	G
14	G	24	29	G	G	G		32	41	41	46	48	50	44	50	54	47	34	44	40	74	29	28	23
15	G		20	26	24	G	28	G	G	G	45	G	G	48	51	G	G	G	G	G	G	G	G	G
16	G	G	G	G	G	28	G	G	40	51	61	45	45	50	47	54	G	G	G	G	G	G	G	31
17	36	G	23	G	G	G	G	33	G	G	G	G	G	G	G	38	36	G	G	G	G	G	G	G
18	G	G	G	G	G	G	24	G	G	G	G	56	G	G	G	39	G	27	21	30	29	30	39	G
19	26	G	G	G	G	G	G	G	40	G	G	53	46	48	59	41	G	G	24	45	55	27	29	34
20	G	G	G	G	G	G	G	G	40	55	43	54	50	53	47	40	G	G	G	24	38	26	35	G
21	29	G	26	G	G	G	G	G	37	G	49	44	G	G	G	G	G	G	G	24	G	G	G	G
22	G	G	28	G	G	G	29	G	G	50	44	G	G	G	G	G	30	29	26	G	G	G	30	G
23	G	G	G	G	G	G	G	G	37	G	45	44	G	43	G	G	G	26	28	25	25	G	G	G
24	G	G	G	G	G	G	G	31	37	G	43	44	G	59	G	G	35	25	G	G	G	G	G	G
25	G	G	G	G	G	G	27		G	G	G	G	G	43	G	G	31	30	24	G	G	G	G	
26																								
27											51	G	85	48	51	G	31	G	G	G	G		G	G
28	G	G	G	G	G	G	G	31	G	G	G	G	G	G	G	G	G	G	24	G	G	G	G	G
29	G	G	G	G	G	G	G	30	48	43	44	44	G	G	G	36	G	G	G	G	G	G	29	25
30	25	G	G	G	G	G	25	G	G	G	58	46	44	50	G	G	G	28	G	G	G	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	26	27	28	27	28	26	26	27	28	27	29	29	27	27	27	27	28	28	29	28	28	27	27
MED	G	G	G	G	G	G	G	G	G	42	45	44	44	44	42	40	31	12	G	G	G	G	G	G
U Q	26	24	28	26	G	G	24	32	40	46	48	47	50	50	51	51	36	29	25	31	25	25	29	25
L Q	G	G	G	G	G	G	G	G	G	G	43	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT KOKUBUNJI

NOV. 1989

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

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

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FOF2 AT YAMAGAWA

NOV. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	70	68	63	63	54	43	54	86	N	144	154	156	146	156	165	152	144		135	110	110	110	86	84
2	77	69	53	66	58	46	60	90	108	116	140	145	137	141	146	129	124		126	108	88	88	82	
3	66	51	59	60	59	40	40	86	107	123	146	153	149	158	157	143	136	134	111	108	104	90	78	65
4	65	71	71	54	54	53	67	86	122	145	146	155	152	162	160	158	152	142	136	126	108	103	88	76
5	67	48	45	62	32	37	54	87	131	150	158	152	153	158	153	145	143	145	136	127	117	104	92	86
6	72	73	62	53	43	28	26	87	126	135	145	147	145		152	147	143	139	129	120	127	107	88	84
7	79	76	50	46	46	33	45	88	123	134	145		147	161	152	145	141	140	137	135	145	146	115	86
8	71	67	74	65	42	42	37	98	122	136	137	130	140	145	145	142	136	129	130	110	120	110	86	66
9	54	64	56	57	44	47	58	104	124	142	145	146	153	146	145	136	N	119	116	109	89	90	87	86
10	74	61	54	58	41	30	56	102	127	152	155		148	157	155	145	144		143	143	159	152	159	142
11	128	104	77	67	51	43	47	90	136	145	148	140	145	147	146	145	140		124	120	110	111	87	85
12	77	79	63	63	47	32	46	88	111	124	141	147	147	153	141	138	128		112	108	110	111	109	88
13	84	78	64	53	48	41	37	80	122	146	148	146	148	157	157	147	143	141	130	119	110	107	102	83
14	79	81	66	47	61	81	111	144	170	180	170	176	168	159	160	146	146	137		107	109	97	86	68
15	66	63	54	51	51	28	37	82	117	141	152	152	155	162	162		151	144	136	121	107	108	88	86
16	66	58	52	53	52	47	56	88	127	142	155	150	154	164	167	169	168	159	160	144	142	110	87	86
17	83	83	86	80	76	65	62	84	105	136	145	146	144	152	157	122	119		134	125	142	144	N	85
18	86	61	51	46	31		45	85	127	137	154	158	158	146	145	139	122	126	108	109	102	80	62	66
19	67	63	60	58	53	42	39	80	124	144	156	148	151	154	151	148	142		122	122	105	95	80	62
20	53		58	62	58	36	31	76	107	136	145	148	148	151	139	140	144		116	107	104	104	84	62
21	48	41	53	N		67	37	76	110	140	138	127	130	140	144	132	122	122	112	107	108	86	71	66
22	56	66	53	42	40	36	38	81	116	126	138	136	135	135	136	137	123	112	N					
23						37	44	83	112	137	146	154	145	148	140	136	126	123						
24						30	68	79	112	125	128	141	142	137	137	138	132	121	111	109	86	82	66	60
25	62	48	53	42	38	37		77	139		150	151	156	160	152	155	164	163	146	128	125	97	84	64
26		50	69	34	32	29	38	80	105	130	129	139	138	122	129	126	126	124	114	87	80	84	78	63
27	38	38	28	41	35		51	79	102	130	144	141	141	143	142	139	141	137	124	107	109	88	78	67
28	84	68	68	64	62	38	52	88	111	121	128	154	141	123	127	125	137	124	108	88	99	84	63	68
29	67	67	53	50	47		63	84	108	130	144	148	148	138	140	143	140			88	88	77	70	70
30	66	62	52	63			54	87	111	132	151	148	151	146	146	141	134	132					66	
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	27	28	27	26	26	29	30	29	29	30	28	30	29	30	29	29	21	25	27	27	27	27	26
MED	67	66	57	57	48	39	47	86	117	136	146	148	148	151	146	142	140	134	126	110	109	103	86	73
U Q	79	73	65	63	54	46	57	88	126	144	152	152	152	158	157	146	144	141	136	125	120	110	88	86
L Q	65	58	53	47	41	33	38	80	109	130	141	143	142	142	141	136	127	123	113	107	102	88	78	66

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT YAMAGAWA

NOV.1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	46	43	30	34	48	26	G	G	G
2	31	29	29	G	G	G	G	G	G	G	G	G	G	G	54	58	G		G	30	G	G	G	33
3	G	G	G	G	G	G	G		G	G	48	G	51	N	50	68	44	37	44	G	G	G	G	G
4	G	G	G	26	G	G	G	G	39	46	G	G	G	46	G	45	50	45	94	33	G	G	G	G
5	G	G	G	G	G	G	G	G	G	G	50	48	54	62	44	43	G	G	G	G	G	G	G	G
6	G	G	G	G	G	24	G	31	G	42	45	G	G	G	G	81	56	G	40	G	G	28	G	G
7	G	G	G	G	G	G	G	30	38	44	G	G	G	G	G	48	48	50	41	33	30	G	G	G
8	G	G	G	G	G	G	G	32	38	G	G	G	G	G	44	43	G	G	G	G	G	G	G	G
9	G	G	G	G	G	G	G	31	G	G	G	G	G	G	48	46	52	31	G	G	32	25	G	G
10	G	G	G	G	G	G	G	30	G	G	G		54	46	48	46	40		G	G	G	G	G	G
11	G	G	G	G	G	G	G	31	G	40	G	46	G	G	G	45	46		G	G	G	G	G	G
12	G	G	G	G	G	G	G	G	G	43	45	48	50	51	46	G	44	G	58	25	G	G	G	G
13	G	G	G	G	G	G	G	G	G	42	46	50	G	G	G	41	G	G	26	G	G	G	G	G
14	G	G	G	G	G	G	G	G	G	48	50	54	63	56	52	45	38	G		G	G	G	G	24
15	24	G	G	G	G	G	G	G	38	G	G	48	51	52	44	G	G	G	G	G	G	G	G	G
16	G	G	G	G	G	G	G	G	37	42	47	47	G	49	61	68	G	37	59	42	30	G	G	G
17	G	G	G	G	G	G	G	G	G	G	53	G	G	G	48	G	38	G	29	23	G	G	24	G
18	G	G	G	G	G		G	G	G	44	48	G	52	G	55	G	46	G	41	30	26	G	G	G
19	G	G	G	G	G	G	G	33	G	G	48	61	G	51	51	57	44	G	G	30	32	94	39	G
20	36	G	G	G	G	G	G	G	G	G	G	G	G	G	G	50	G		G	G	G	G	G	G
21	G	G	G	G		G	G	G	G	G	53	G	G	G	G	G	G	G	G	G	G	G	G	G
22	G	G	G	G	G	G	G	G	G	G	43	G	G	55	G	G	G	31	G					
23						G	G	G	G	G	G	G	G	G	G	G	G	G						
24						G	G	G	G	40	G	G	G	G	G	G	G	G	24	G	G	G	G	G
25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	24	24	G	G	G	G
26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	52	41	G	43	26	G	G	24	G	G
27	G	G	G	G	G	G	G	28	G	42	46	45	49	48	44	44	G	44	29	G	G	G	G	G
28	G	G	G	G	G	G	G	28	G	G	G	G	G	G	G	G	G	41	44	G	G	G	G	G
29	G	G	G	G	G	G	G	G	G	G	47	G	G	G	G	G	G	G	G	G	G	G	G	G
30	25	33	32	24	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	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	28	28	28	28	27	29	30	29	30	30	30	29	30	29	30	30	30	26	28	28	28	27	28	27
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	G	22	43	G	G	24	G	G	G	G	G
U Q	G	G	G	G	G	G	G	29	G	42	47	46	49	48	48	46	44	37	40	27	G	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

HOURLY VALUES OF FMIN AT YAMAGAWA

NOV. 1989

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

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

HOURLY VALUES OF FOF2 AT OKINAWA

NOV. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	110	N	86	86	73	54	54	90	138	162	160	163	168	170		183	187	171	177	183	200	N	166	145
2	107	109	85	90	78	57	52	86	106	111	145	158	147	148	159	146	144	146	146	147	145	143	111	N
3	83	84	77	85	66	40	34	90	101	121	153	164	157	166	158	146	157	156	144	146	173	145	146	90
4	80	90	90	72	64	64	73	108	136	146	144	156	155	163	160	159	146	146	146	146	145	111	108	83
5	64	66	64	65	51	34	52	90	122	152	166	157	162	169	170	165	171	170	169	146	164	144	145	110
6	109	87	84	81	66	29	46	99	114	137	151	152	153	160	160	158	150	146	153	162	172	169	145	151
7	110	86	88	66	64	60	37	95	134	147	145	155	161	N	165	165	166	162	170	176	188	181	171	159
8	120	109	109	80	49	35	58	110	131	138	138	134	136	145	146	146	145	146	147	146	168	164	145	87
9	85	90	84	66	45	54	53	90	133	144	162	150	149	145	156	146	141	137	139	145	146	145	146	122
10	85	86	88	78	48	29	62	110	136	158	164	160	164	164	172	165	171	171	168	172	176	121	178	166
11	160	144	110	83	55	44	43	87	128	152	146	146	159	162	161		164	164	165	166	169	178	172	147
12	110	109	90	83	66	42	37	90	126	122	146	164	162	147	144	146	145	139	138	145	168	171	170	163
13	141	109	84	73	62	53	43	82	124	146	N	156	161	172	176	171	160	166	163	162	166		144	146
14	130	86	84	66	66	83	113	139	165	170	169	171	164		144		155	141	138	122	130	110	90	86
15	79	84	90	66	46		32	81	110	142		141	166	176	184	180	167	182	175	176	180	182	177	174
16	120	85	90		64	50	53	88	127	145	145	157	162	184	189	176	177	176	180	171	177	150	145	146
17	121	120	127	104	88	71	61	84	106	140	148	156	159	165	165	171		171	177	171	194	197	169	170
18	121	80	67	55	46	45	36	87	140	136	164	160	172	164	157	142	135	137	130	122	122	103	85	103
19	N	102	87	88	62	50	48	86	143	163	155	158	158	164	163	161	164	163	145	145	145		90	85
20	86	86	84	82	79	49	36	80	104	137	148	145	146	153	146	150	147	146	147	145	145	142	110	87
21	77	66	73	73	63	38	36	76	108	144	145	130	126	139	143	139	131	141	142	145	169	139	105	90
22	86	90	80	58	40	40	38	87	128	138	138	132	137	145	145	146	143	145	145	141	165	145	145	126
23	120	88	84	81	84	68	54	84	131	147	145	154	156	158	154	144	143		162	165	189	175	142	84
24	110	84	80	66	53	44	42	80	122	137	137	137	147	145	N	157	143	160	146	138	141	122	108	96
25	86	76	61	56	47	44	38	77	146	144	160	162	177	177	186	176	177	187	174	163	170	176	163	109
26	85	73	57	44	38	32	32	75	108	140	138	136	128	130	132	137	129	128	136	120	111	104	108	85
27	79	66	52	58	46	32	52	84	120	137	133	131	138	141	142	139	144	144	135	118	143	142	130	87
28	86	98	89	87	62	34	34	89	140	122	119	147	140	118	121	136	136	102	120	93	96	90	76	86
29	87	85	73	66	66		85	96	103	141	147	142		146	142	159	165	162	146	143	139	111	90	92
30	80	73	66	66	55	31	37	87	112	131	153	158	164	162	170	165	165	163	164	170	179	142	87	87
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	30	29	30	28	30	30	30	30	28	30	29	28	28	28	29	29	30	30	30	27	30	29
MED	87	86	84	73	62	44	44	87	126	142	146	156	158	161	158	158	150	156	146	146	167	144	144	103
U Q	120	100	89	83	66	54	54	90	136	147	157	158	163	165	167	165	165	168	168	166	176	171	163	146
L Q	84	82	73	66	48	34	37	84	110	137	144	142	146	145	144	146	143	142	142	143	145	121	108	87

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FES AT OKINAWA

NOV. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	G	G	G	G	94	48	G	48	42	44	44	37	G	G	G	G
2	G	G	G	G	26	29	G	30	G	50	G	G	51	51	G	65	45	G	G	G	G	G	G	26
3	G	G	24	G	G	G	G	G	G	G	G	50	G	G	54	68	40	39	26	24	G	G	G	G
4	G	G	G	G	G	G	G	G	39	41	G	52	49	G	G	47	51	38	32	30	G	G	G	G
5	G	G	G	G	G	G	G	G	G	G	50	G	G	60	59	60	39	G	G	38	G	G	G	G
6	G	G	G	G	G	24	G	G	40	G	G	G	G	G	50	64	41	G	G	G	29	G	G	G
7	G	G	G	G	G	G	G	G	40	48	48	G	G	G	49	46	40	G	G	G	G	G	G	G
8	G	G	G	G	G	G	G	28	72	G	G	56	54	51	G	G	40	G	37	G	G	G	G	G
9	G	G	G	G	G	G	G	G	G	G	G	51	G	46	46	44	39	33	26	44	25	G	G	G
10	G	G	G	G	G	G	G	G	G	G	49	G	57	53	75	68	41	G	G	G	G	G	G	G
11	G	G	G	G	G	G	G	G	36	G	G	46	G	G	G	47	40	G	G	G	G	G	G	G
12	G	G	G	G	G	G	G	G	G	G	54	52	G	G	G	G	51	50	61	39	G	G	G	G
13	G	G	G	G	G	G	G	G	G	42		50	G	G	G	G	G	G	26	31	G	26	G	G
14	G	G	G	G	G	G	G	G	39	41	52	62	71	67	60	G	44	31	G	G	22	G	G	G
15	28	32	29	G	G	G	G	G	G	G	G	G	57	55	58	54	G	32	34	36	34	G	G	G
16	G	G	G		G	G	G	G	36	44	62	48	51	66	64	79	64	38	32	26	G	31	28	G
17	G	G	G	G	G	G	G	G	G	G	G	G	50	G	G	G		36	37	G	G	34	34	28
18	25	G	G	G	G	G	G	G	38	47	53	59	G	G	60	46	G	G	G	G	G	G	G	G
19	G	G	G	G	G	G	G	G	G	G	66	51	G	56	60	78	45	47	33	G	G		G	G
20	G	G	28	G	G	G	G	G	G	G	G	G	G	G	G	59	G	G	G	24	38	G	G	G
21	G	G	G	G	G	G	G	G	G	G	52	G	G	60	G	42	G	G	G	G	G	G	G	58
22	24	G	G	G	G	G	G	G	G	G	G	49	G	46	73	G	41	G	G	26	31	G	G	G
23	G	28	32	33	G	G	G	G	G	G	G	G	G	63	G	43	50	40	38	32	G	G	G	G
24	G	G	G	G	G	G	G	G	G	40	G	G	46	G	G	G	G	G	24	G	G	G	G	G
25	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	36	26	25	36	G	G	G
26	G	G	G	G	G	G	G	G	G	G	G	G	G	G	55	90	56	G	23	29	G	G	G	G
27	G	G	G	G	G	G	G	G	G	62	46	48	G	92	50	44	G	G	25	34	G	28	G	G
28	G	G	G		G	G	G	G	G	40	G	50	G	G	45	42	G	G	G	G	G	G	G	G
29	G	G	G	G	G	G	G	G	G	42	G	G	G	G	G	G	G	G	G	27	G	G	G	G
30	G	G	24	G	G	G	G	G	34	G	G	G	G	46	G	G	38	37	32	G	G	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	30	30	30	28	30	30	30	30	30	30	29	30	30	30	30	30	29	30	30	30	30	29	30	30
MED	G	G	G	G	G	G	G	G	G	G	G	G	G	24	23	45	40	G	24	24	G	G	G	G
U Q	G	G	G	G	G	G	G	G	36	41	49	50	50	55	58	60	44	37	32	31	G	G	G	G
L Q	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

HOURLY VALUES OF FMIN AT OKINAWA

NOV. 1989

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	16	15	15	15	15	15	24	16	20	22	23	29	30	26	26	18	15	15	14	15	15	15	15
2	16	15	15	15	15	15	15	15	15	17	24	28	39	33	30	27	26	27	16	15	15	15	15	15
3	15	16	15	16	15	15	15	23	18	20	24	29	40	28	27	21	23	15	15	15	15	15	15	15
4	15	15	15	14	15	15	15	17	18	23	24	28	28	27	27	24	24	15	14	14	15	15	15	15
5	15	15	15	15	15	15	15	24	22	23	24	27	27	27	27	26	21	17	16	15	15	15	15	15
6	15	15	15	14	14	16	16	23	18	27	26	27	29	28	27	26	23	27	17	18	15	15	15	15
7	15	15	15	15	15	17	16	17	15	22	23	27	46	30	28	29	24	15	16	15	15	15	15	15
8	15	15	15	15	14	18	15	17	18	22	26	28	30	26	28	18	26	28	15	15	15	15	15	15
9	15	15	15	16	15	15	15	15	15	23	31	28	28	28	28	27	23	16	16	15	15	15	15	15
10	15	15	16	15	15	N	15	16	18	20	28	50	30	30	29	29	24	27	16	17	17	15	15	15
11	15	15	15	14	15	15	15	15	21	27	29	29	32	30	32	28	20	16	15	15	15	15	15	15
12	15	15	15	15	15	15	15	23	20	26	27	32	30	26	42	52	23	16	15	14	20	15	15	15
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31																								
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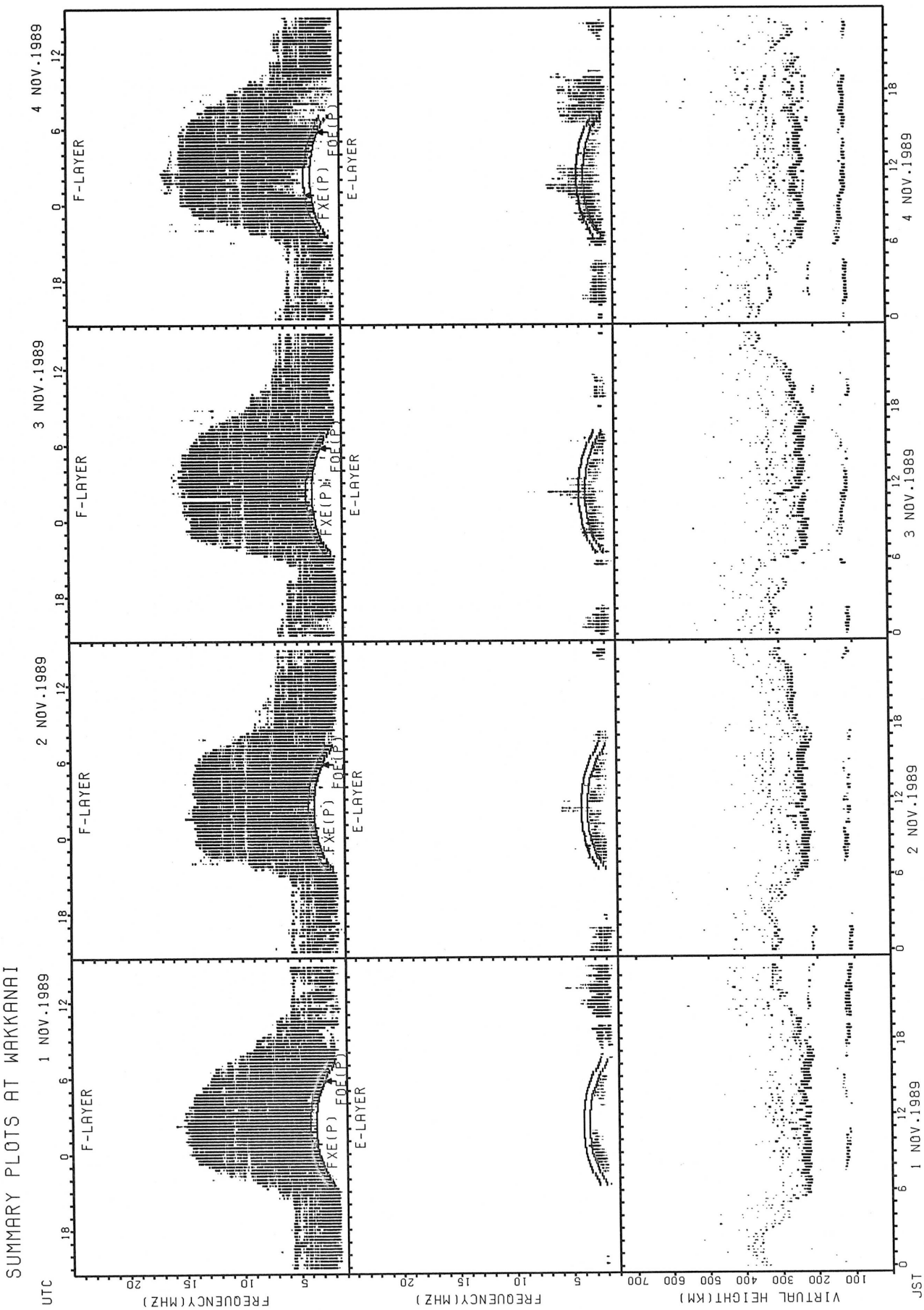
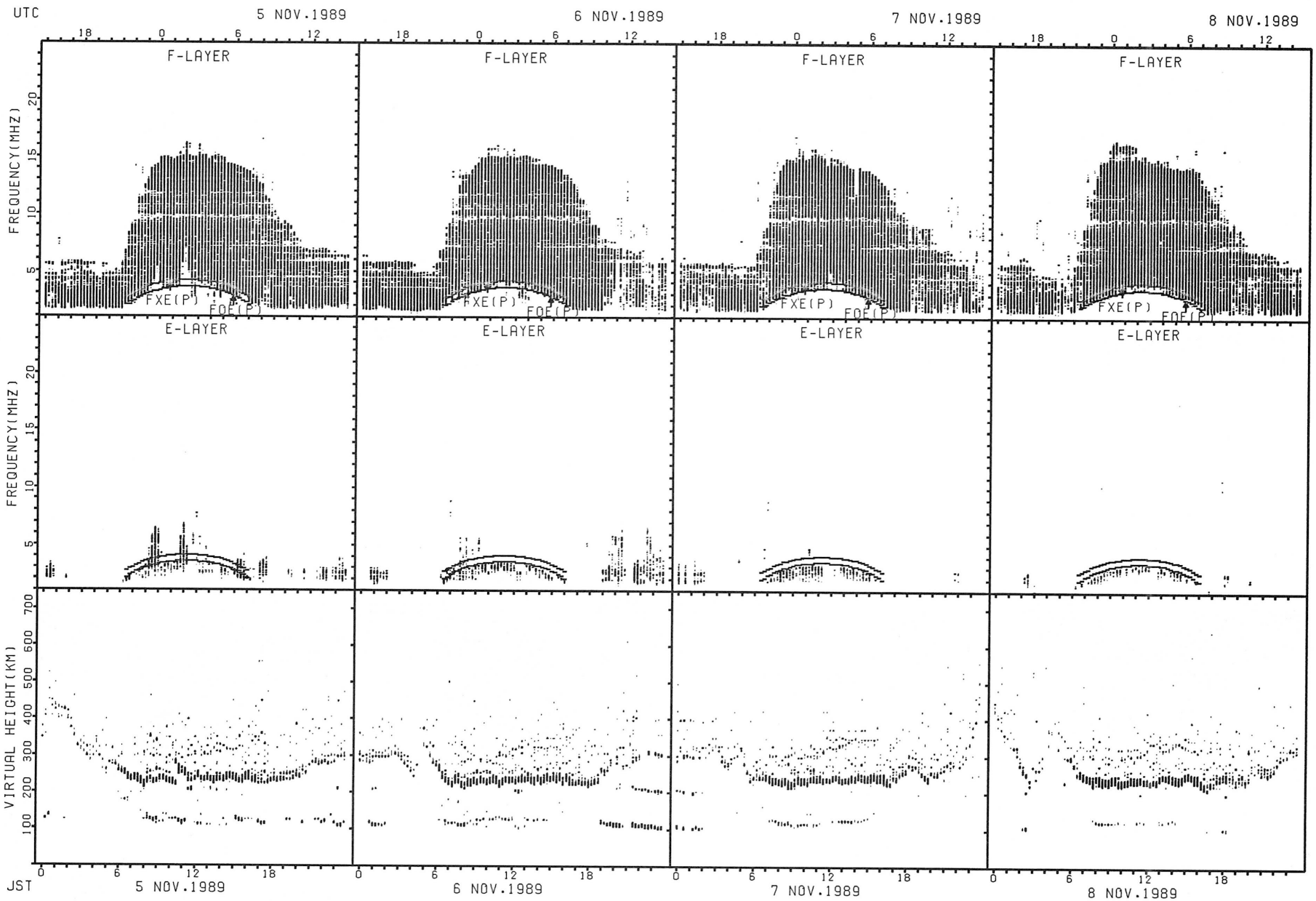
CNT	30	30	30	29	29	26	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30
MED	15	15	15	15	15	15	15	20	18	22	26	28	28	28	28	26	22	16	15	15	15	15	15	15
U Q	15	15	15	15	15	15	15	23	20	26	27	29	30	30	29	27	24	18	15	15	15	15	15	15
L Q	15	15	15	15	15	15	15	16	16	20	24	27	28	27	27	24	18	15	15	15	15	15	15	15

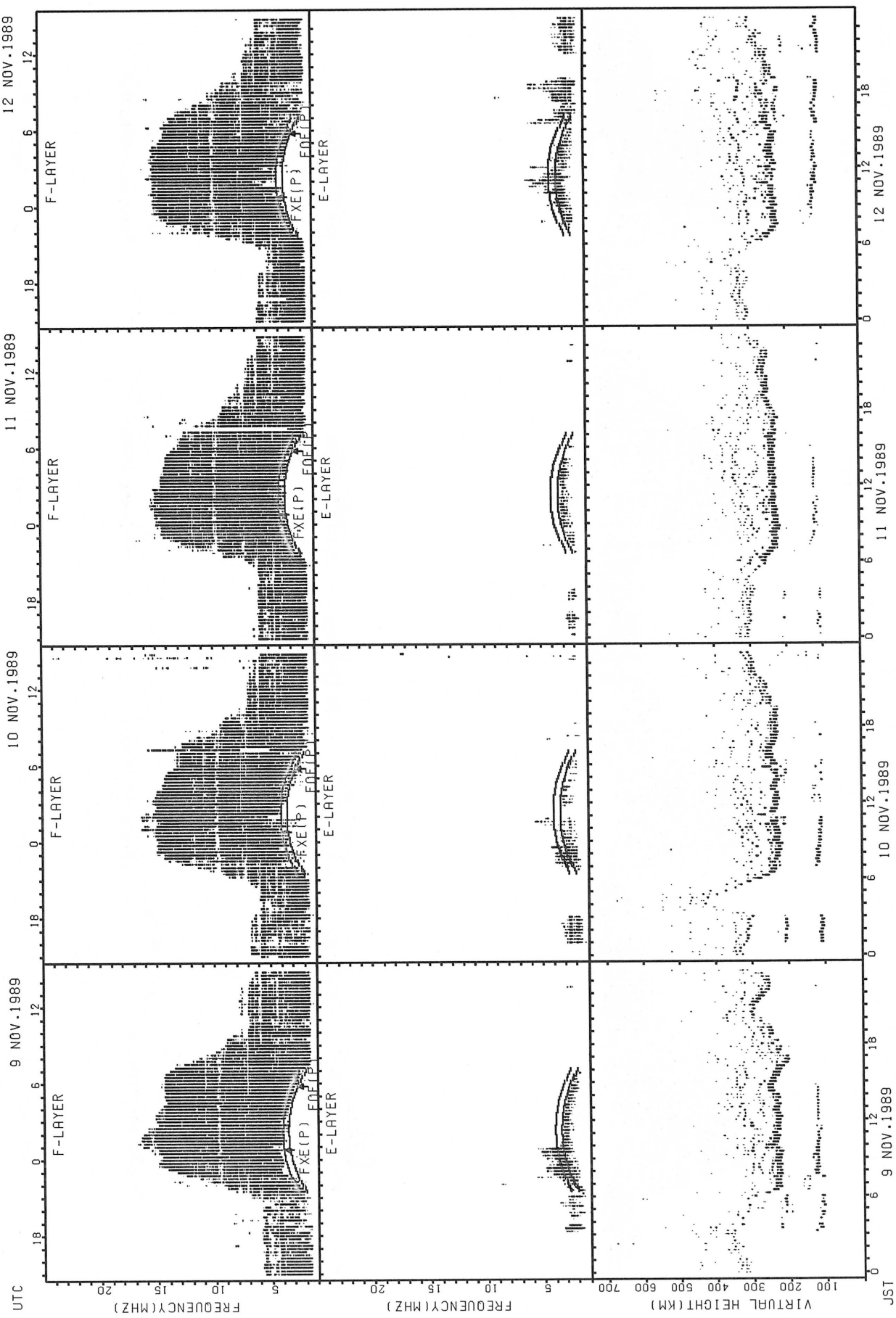
COMMUNICATIONS RESEARCH LABORATORY, JAPAN

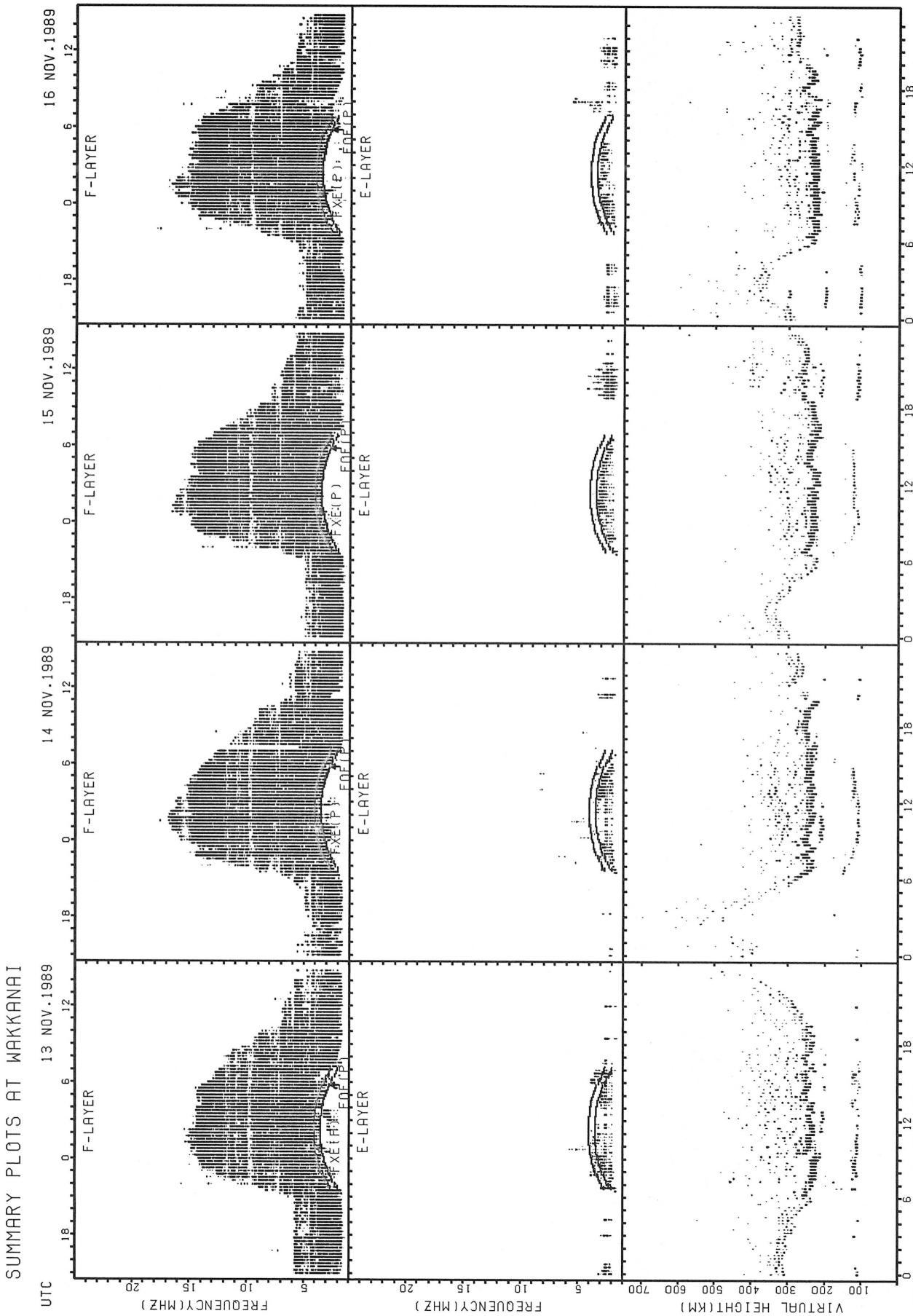

SUMMARY PLOTS AT WAKKANAI
UTC
1 NOV.1989
2 NOV.1989
3 NOV.1989
4 NOV.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT WAKKANAI



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


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


SUMMARY PLOTS AT WAKKANAI
UTC
13 NOV.1989
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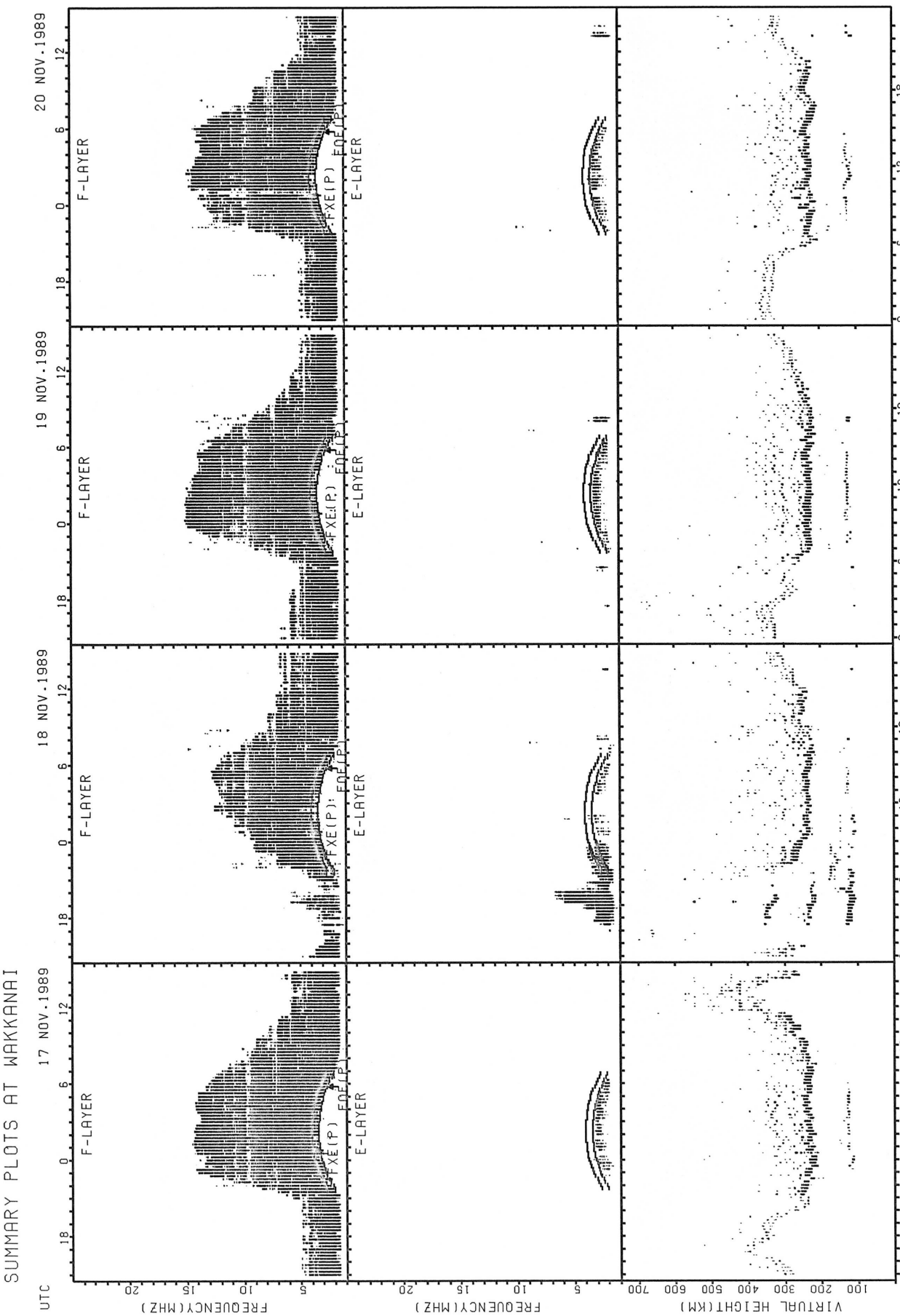
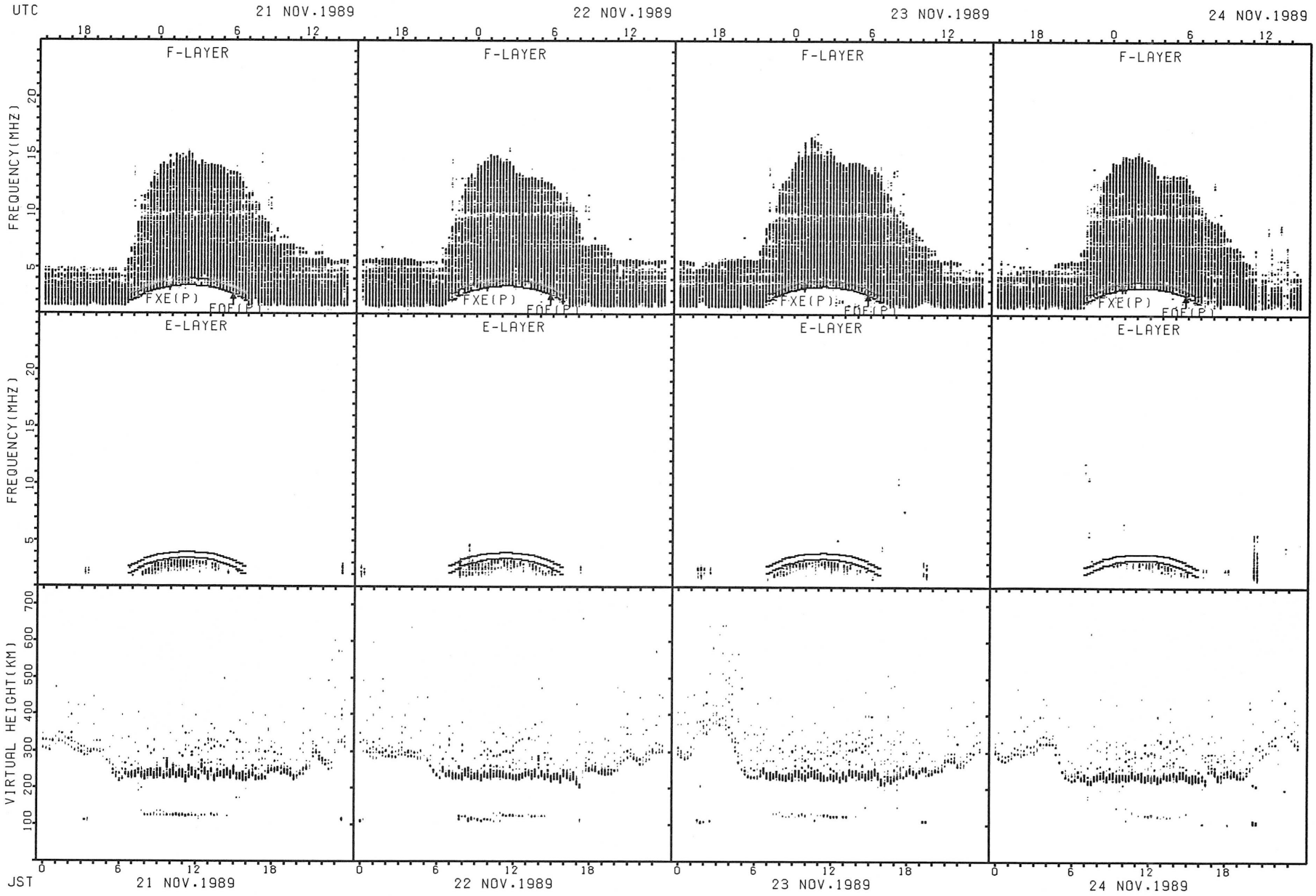
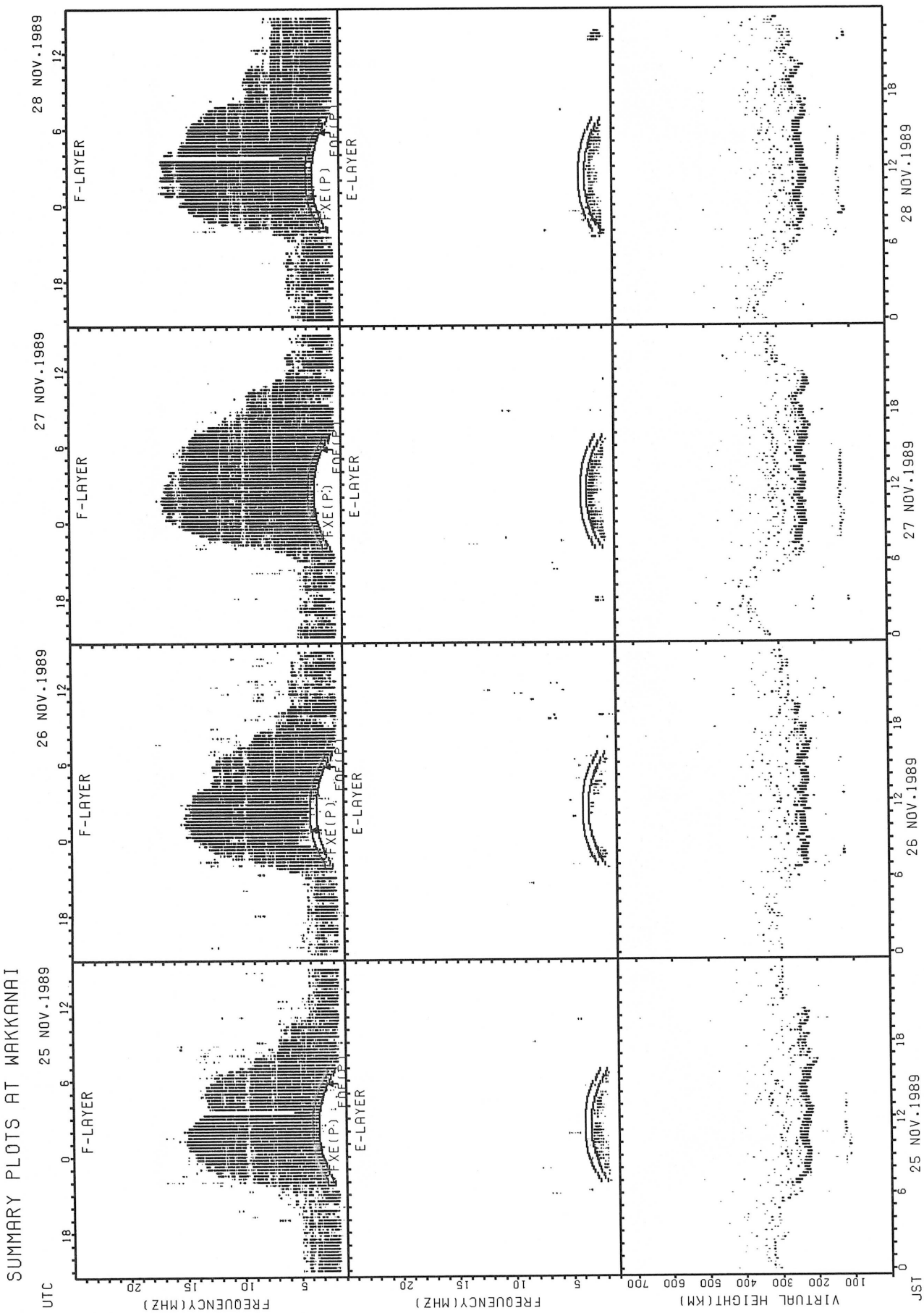
15 NOV.1989
16 NOV.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

SUMMARY PLOTS AT WAKKANAI



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


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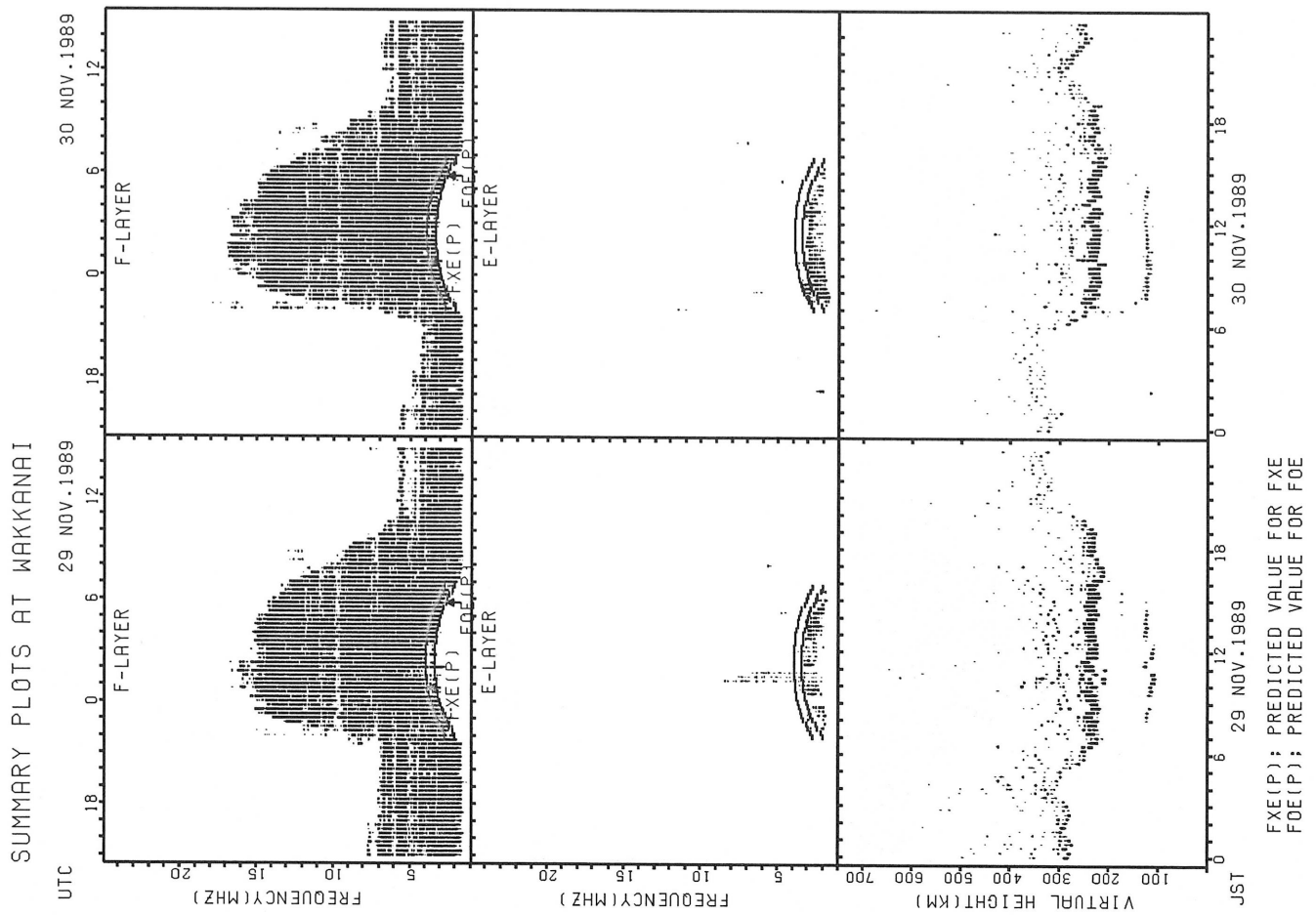
28 NOV.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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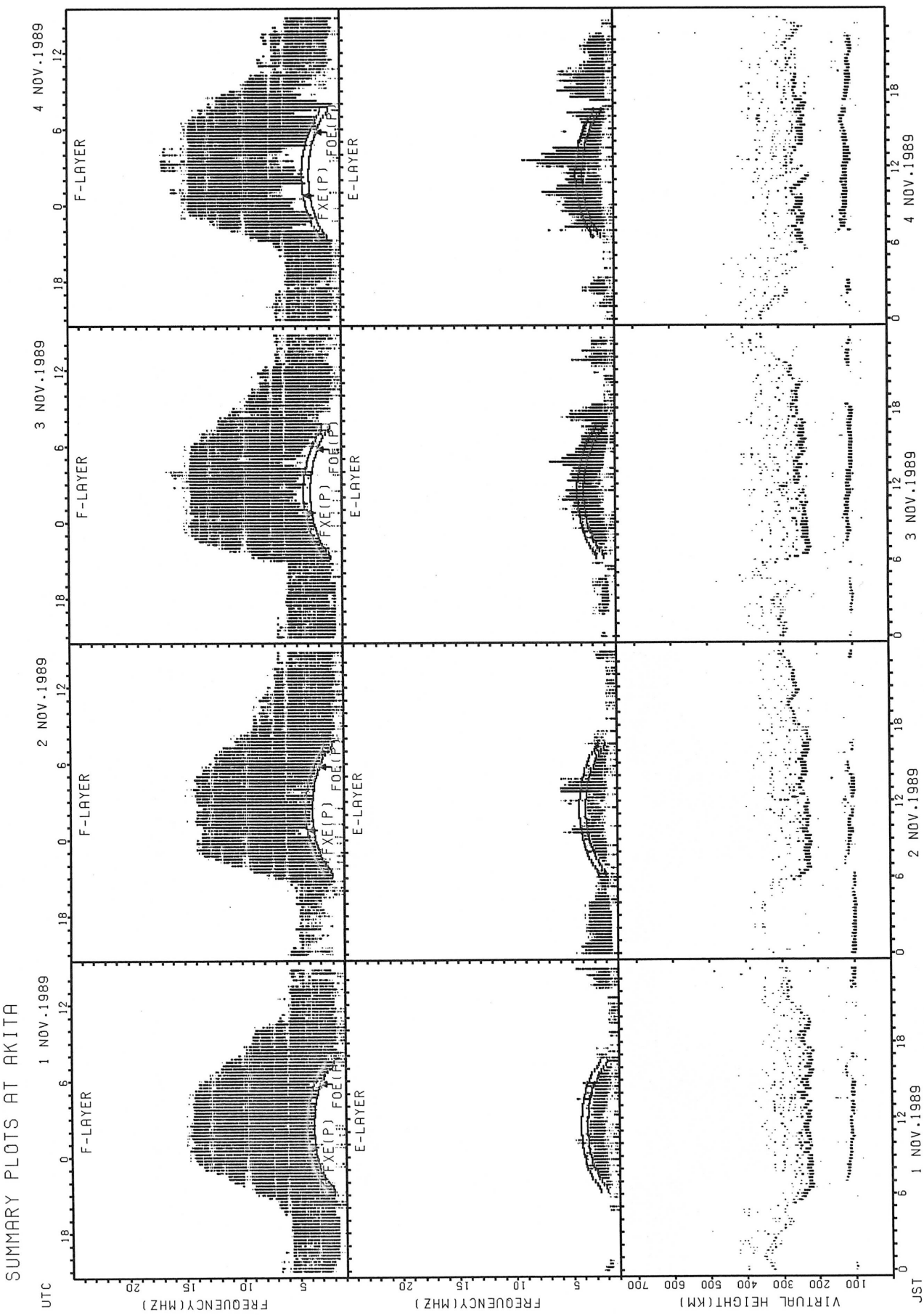
30 NOV.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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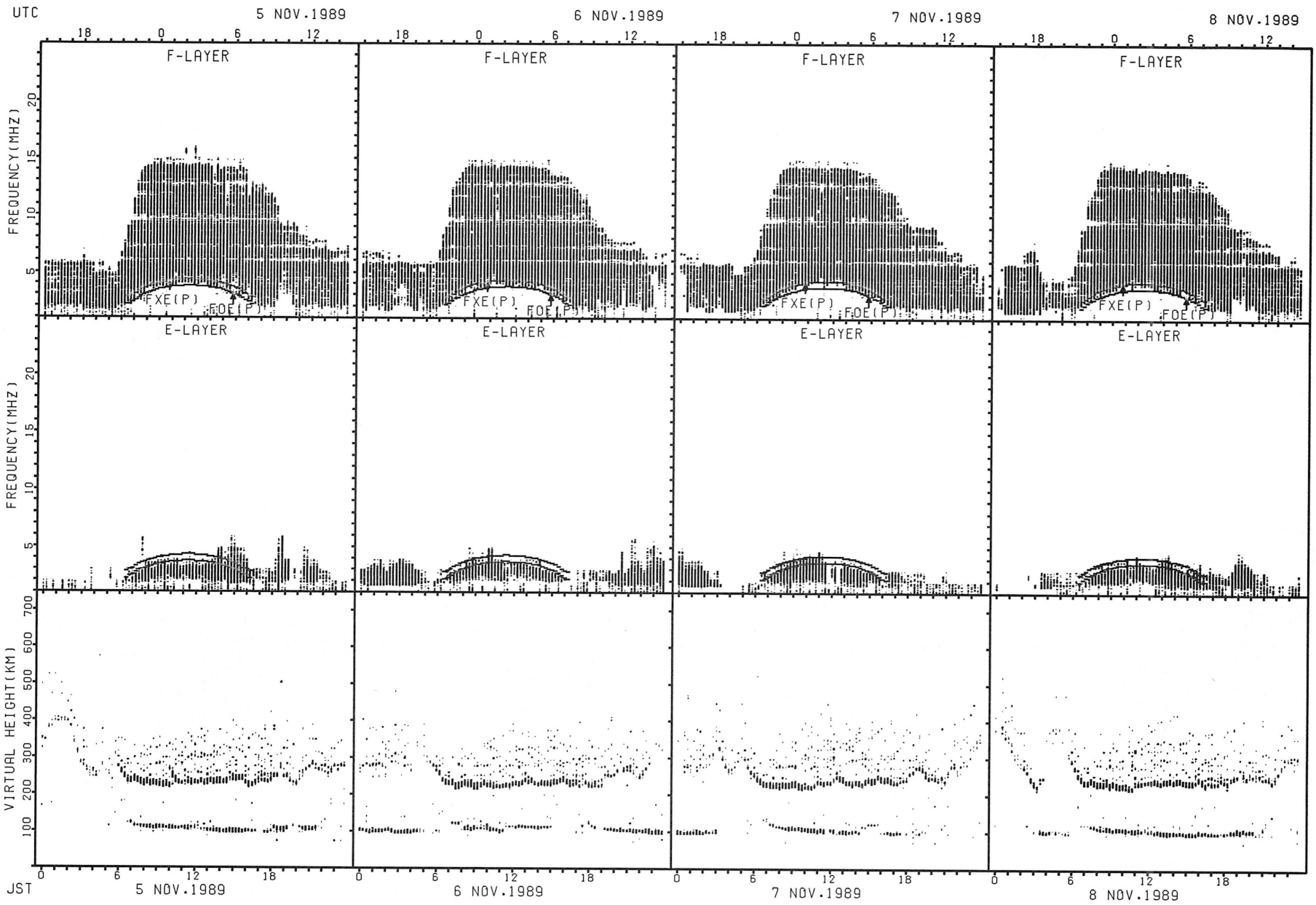
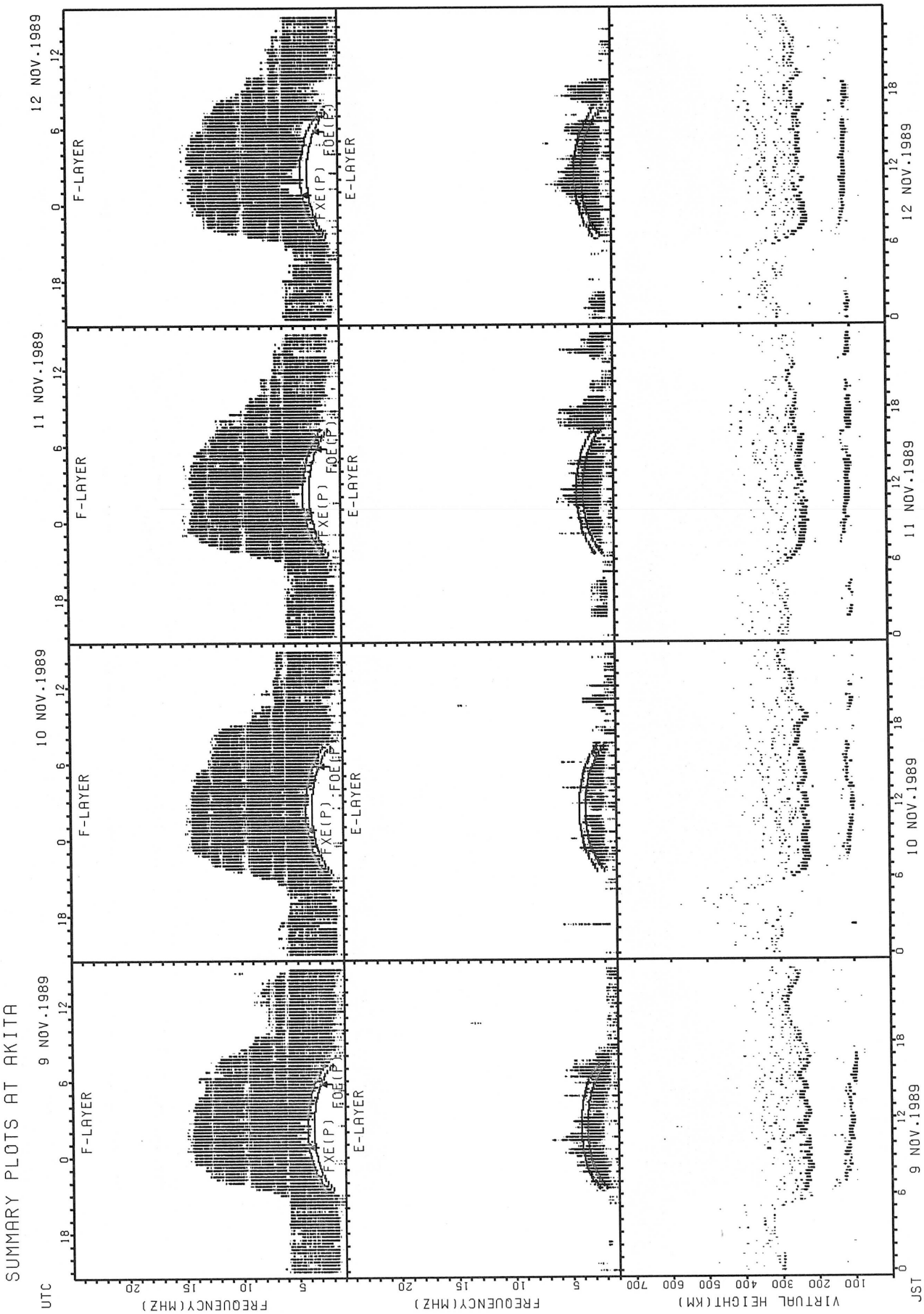
3 NOV.1989
4 NOV.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

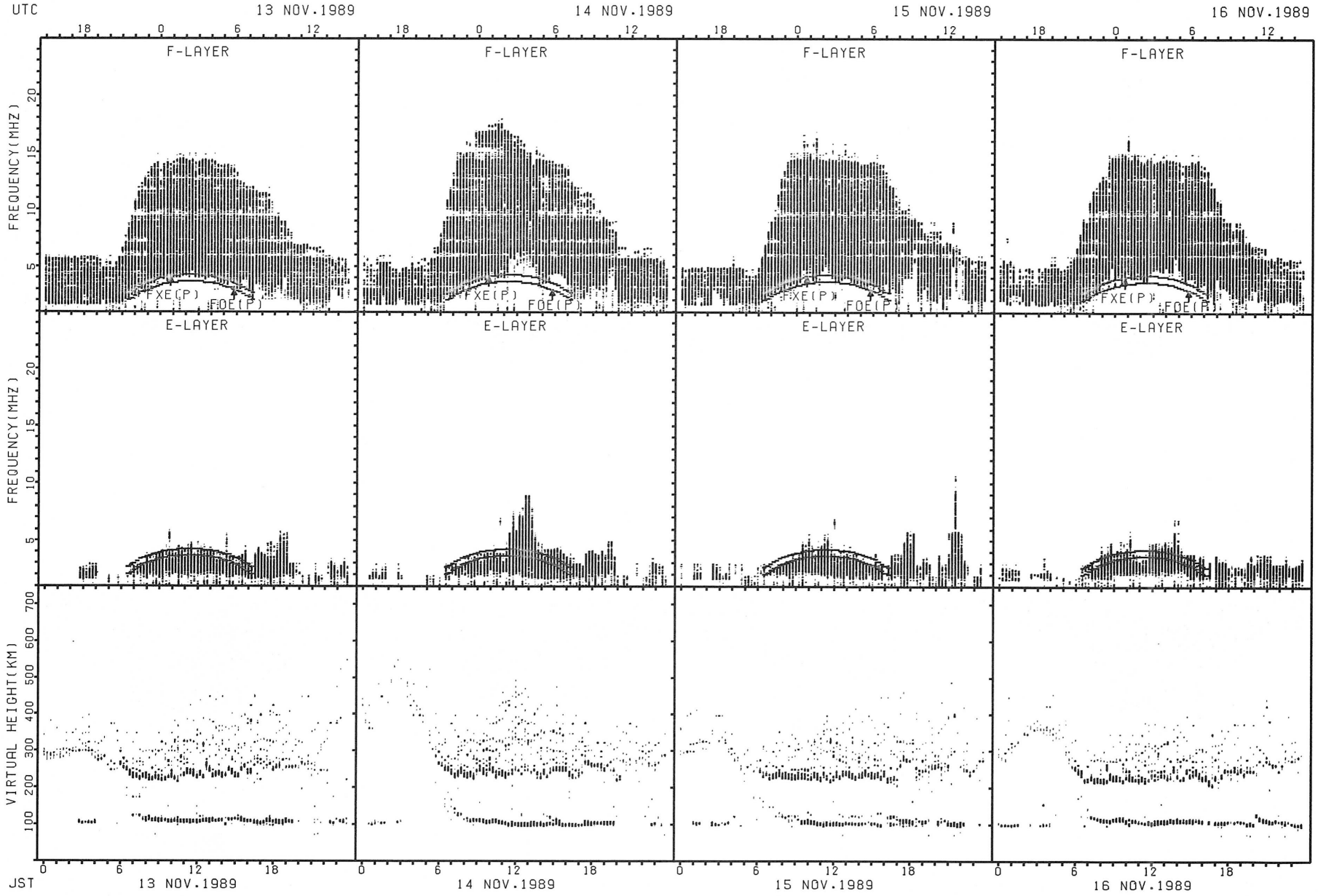
SUMMARY PLOTS AT AKITA



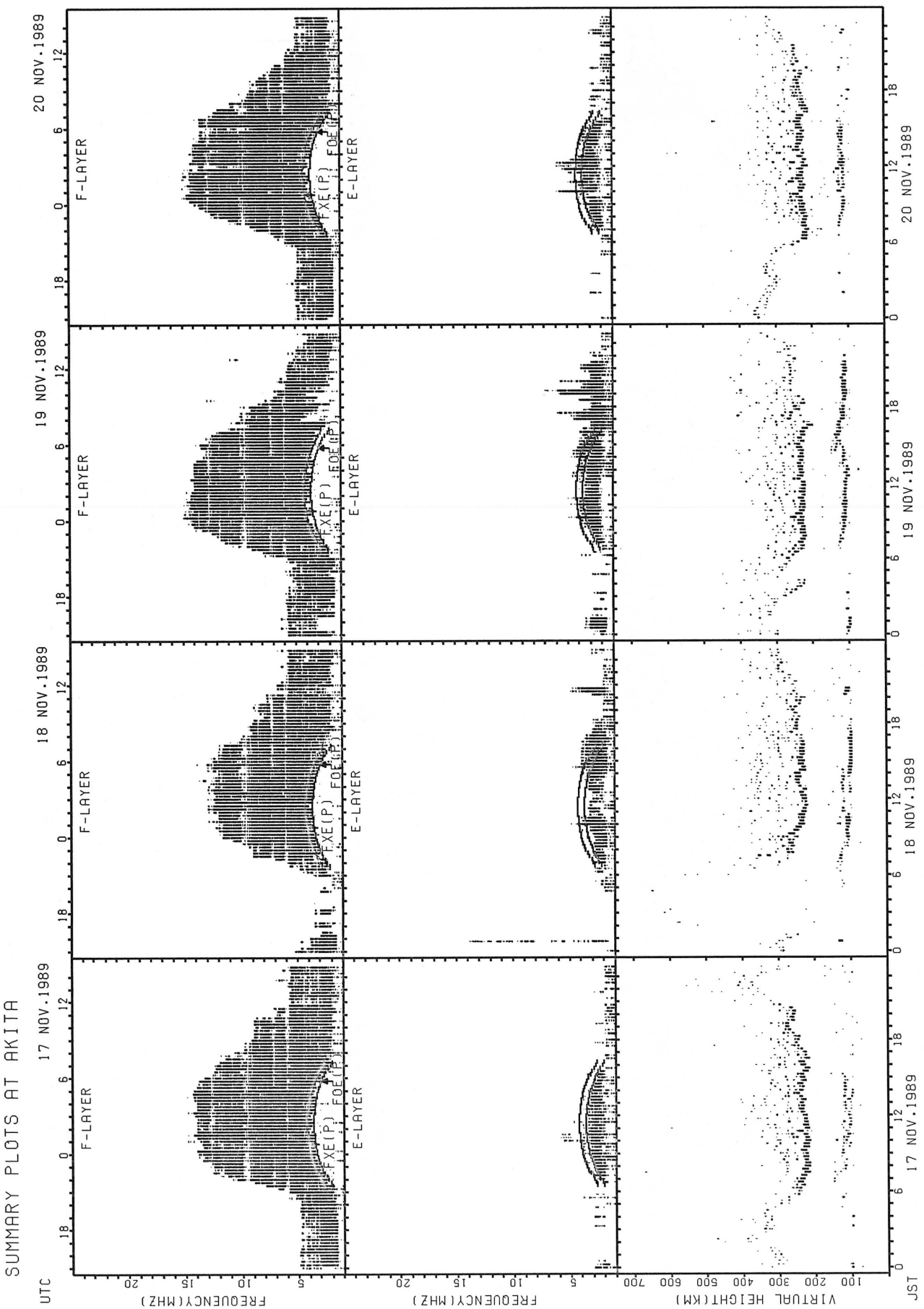
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


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

SUMMARY PLOTS AT AKITA



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


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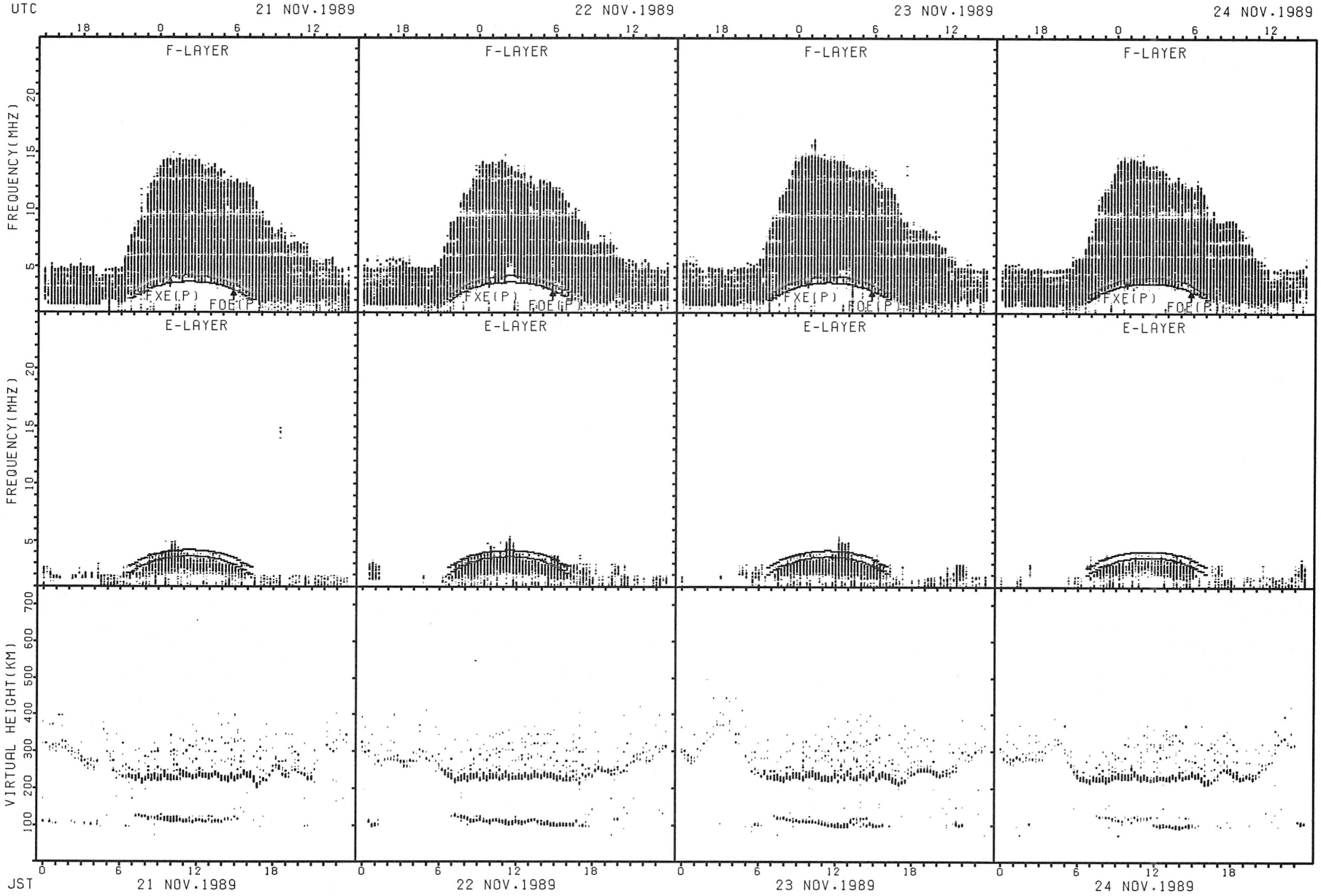
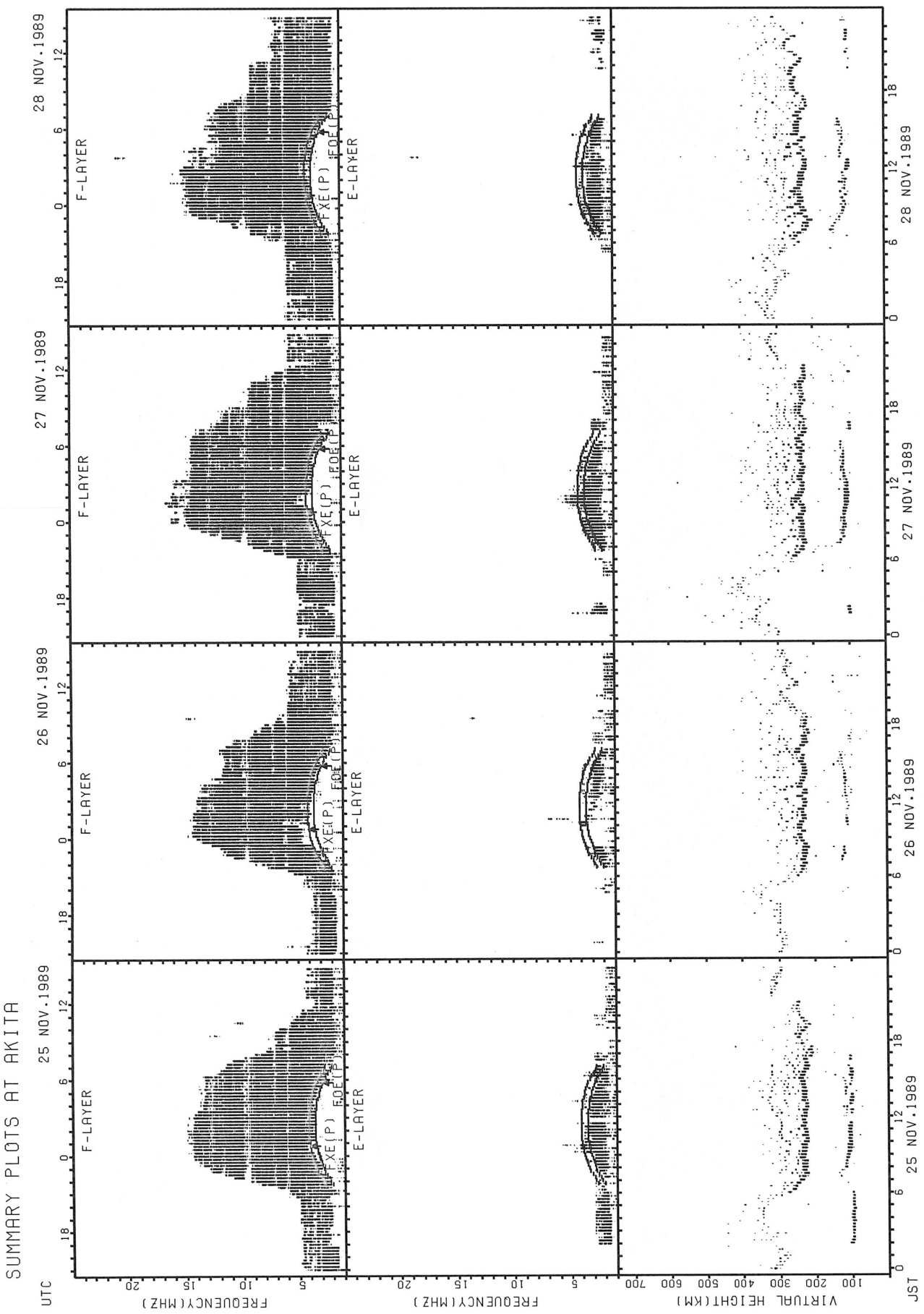
20 NOV.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

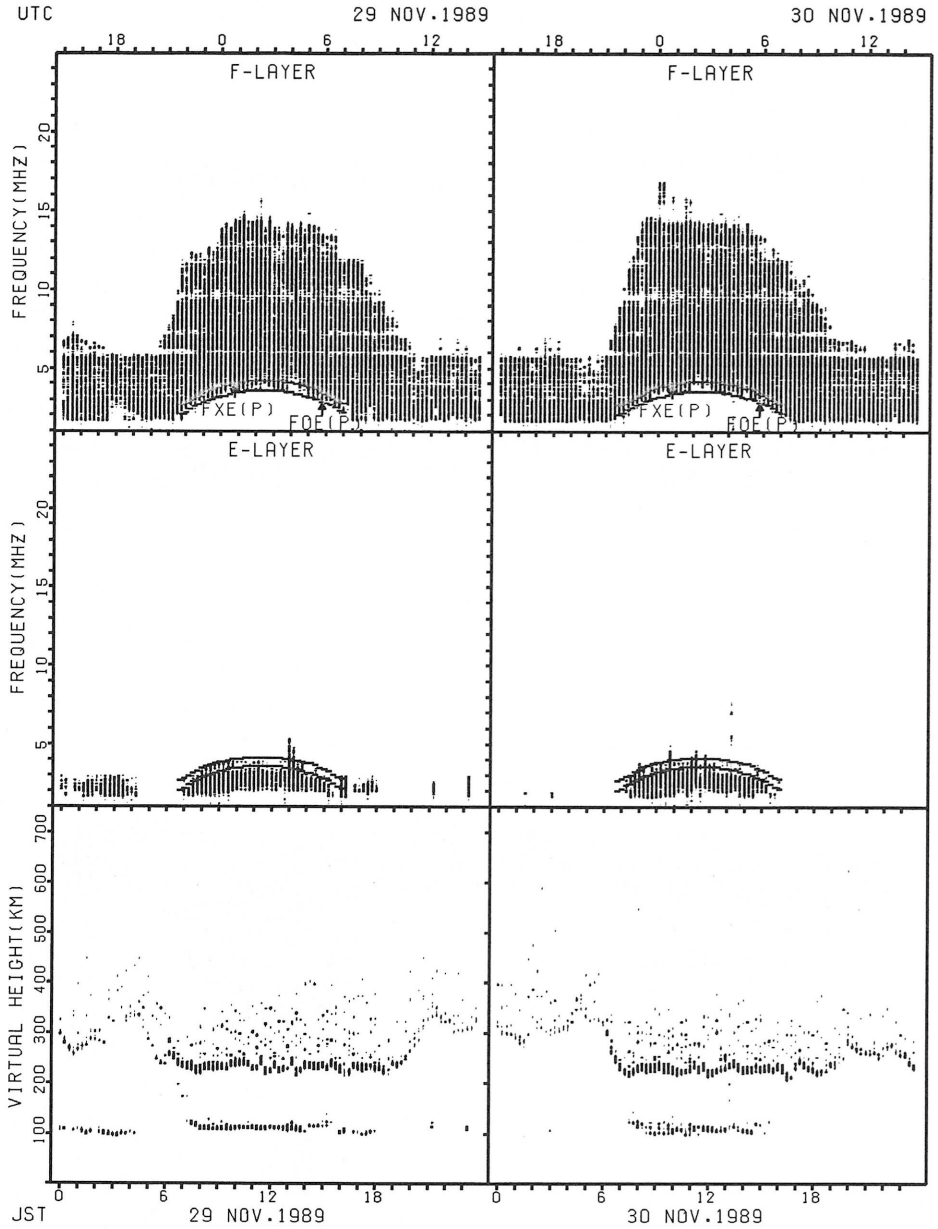
SUMMARY PLOTS AT AKITA



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

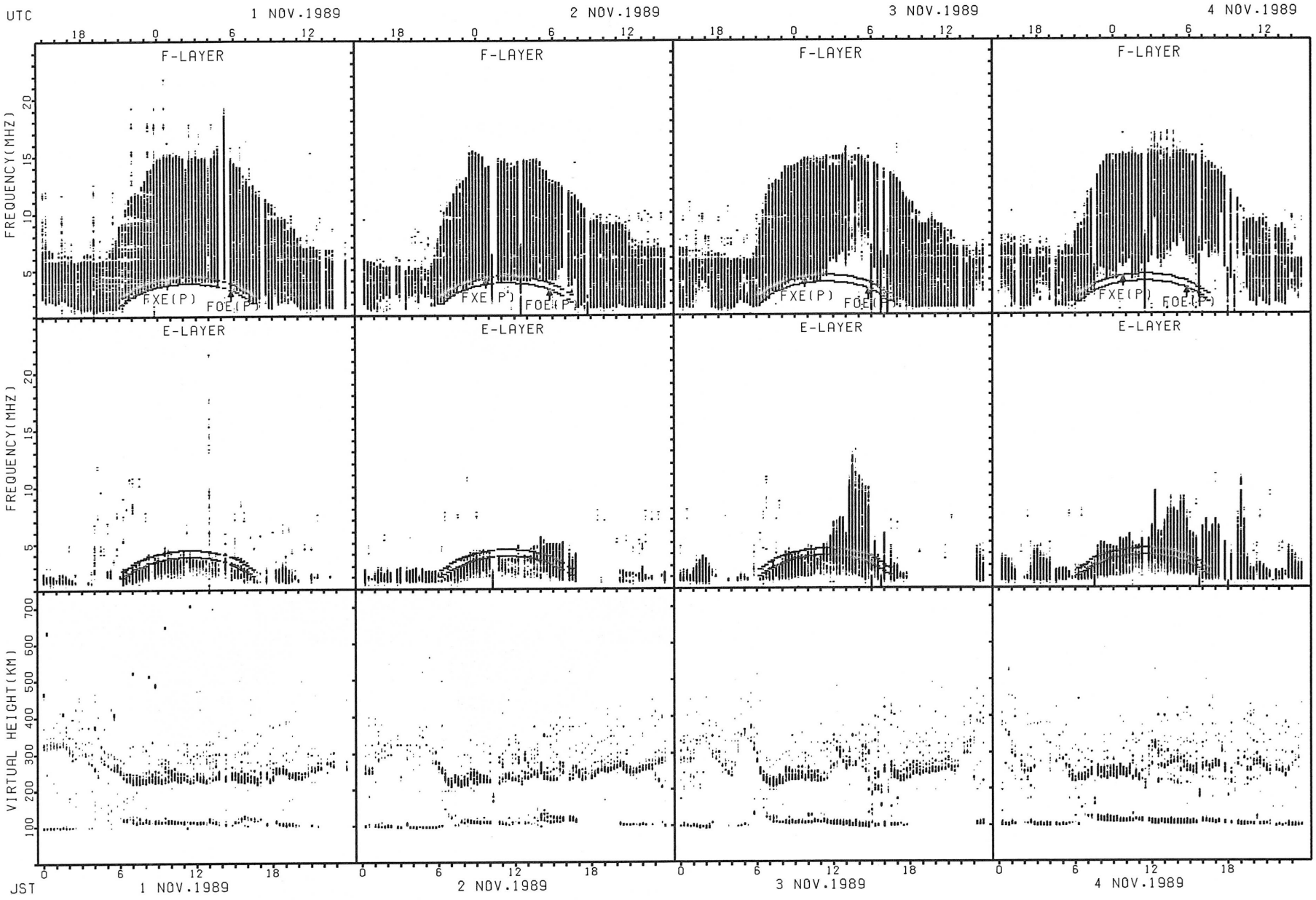

SUMMARY PLOTS AT AKITA
UTC
25 NOV.1989
26 NOV.1989
27 NOV.1989
28 NOV.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT AKITA



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

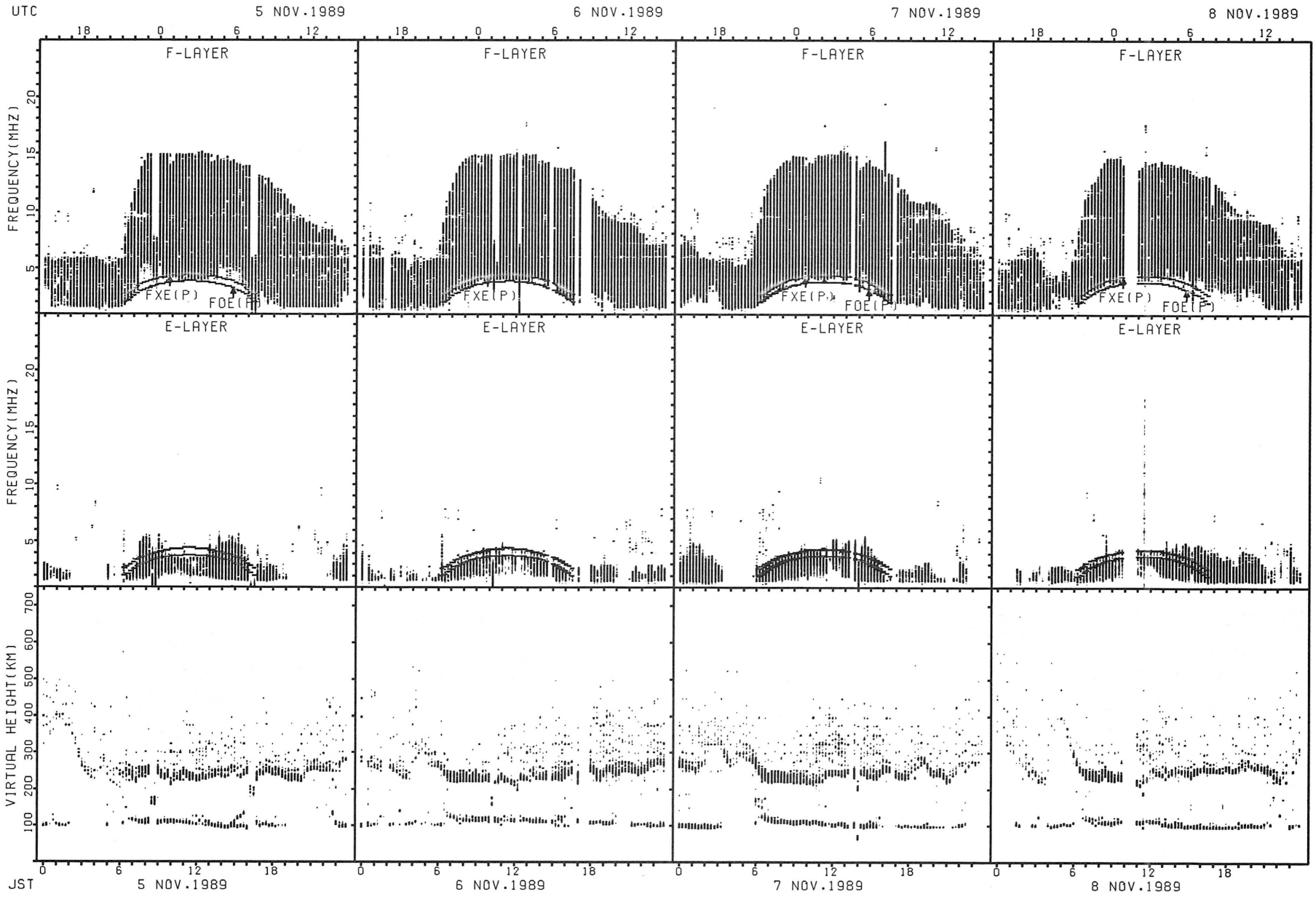
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

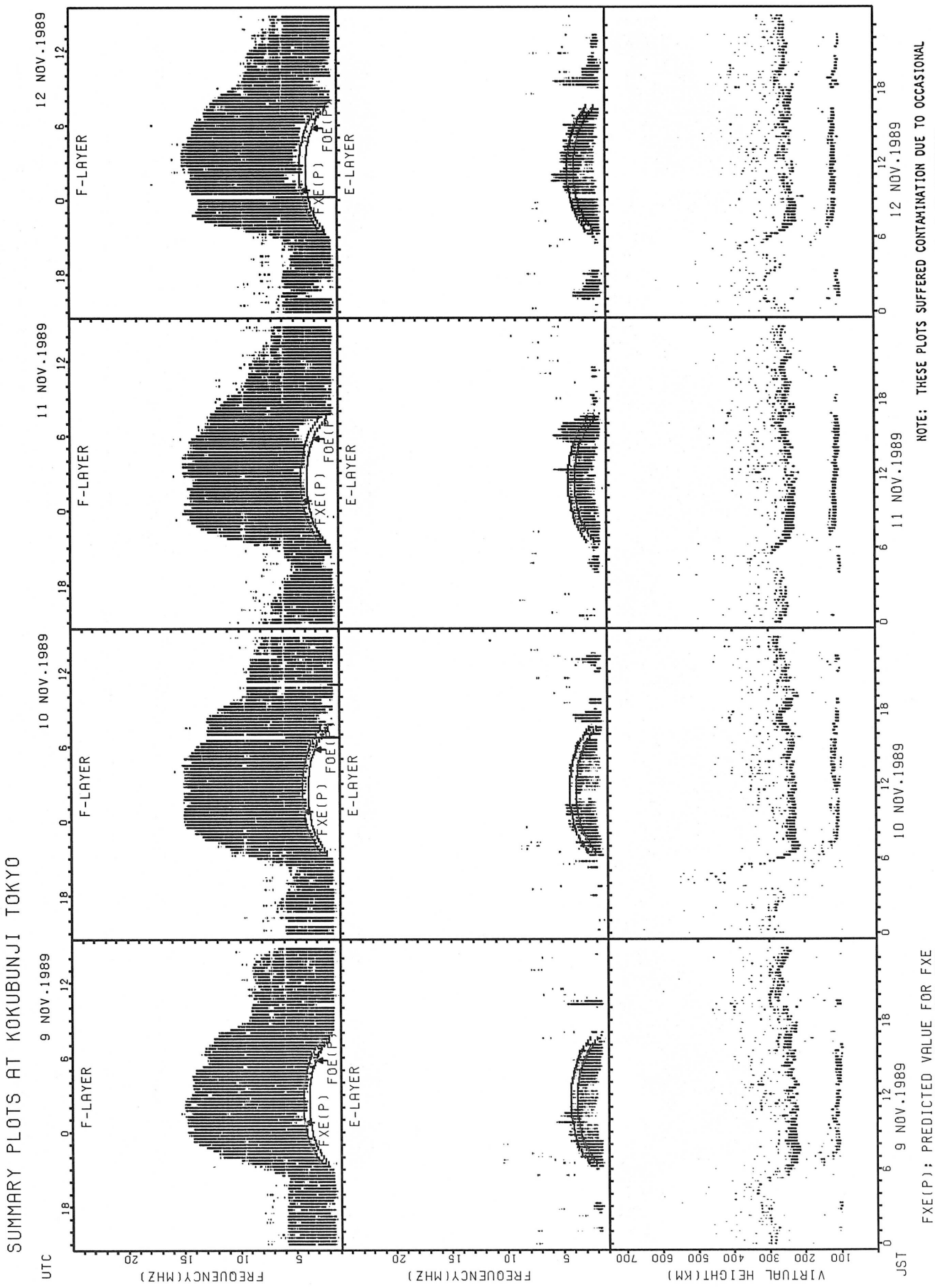
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT KOKUBUNJI TOKYO

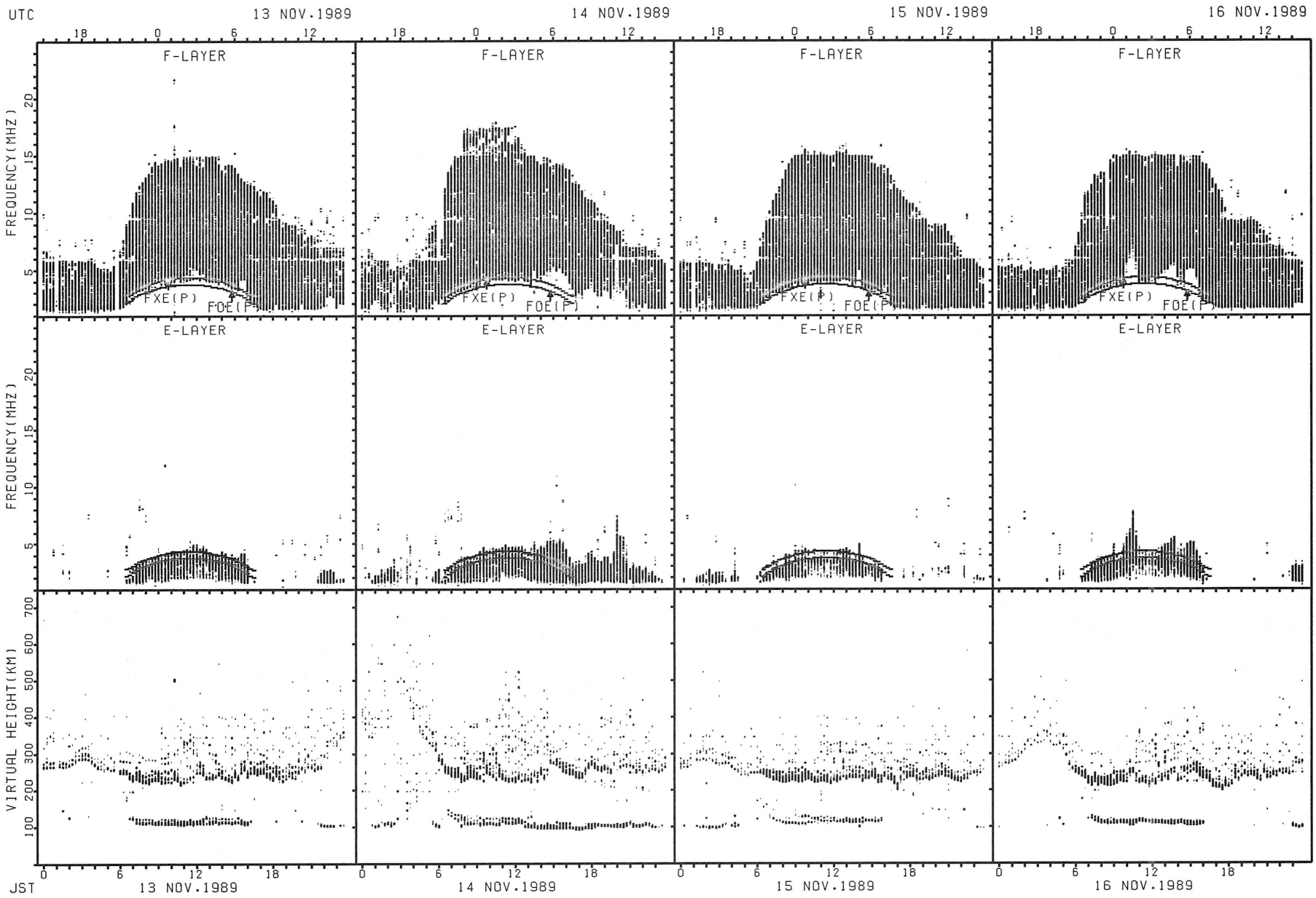


FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

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

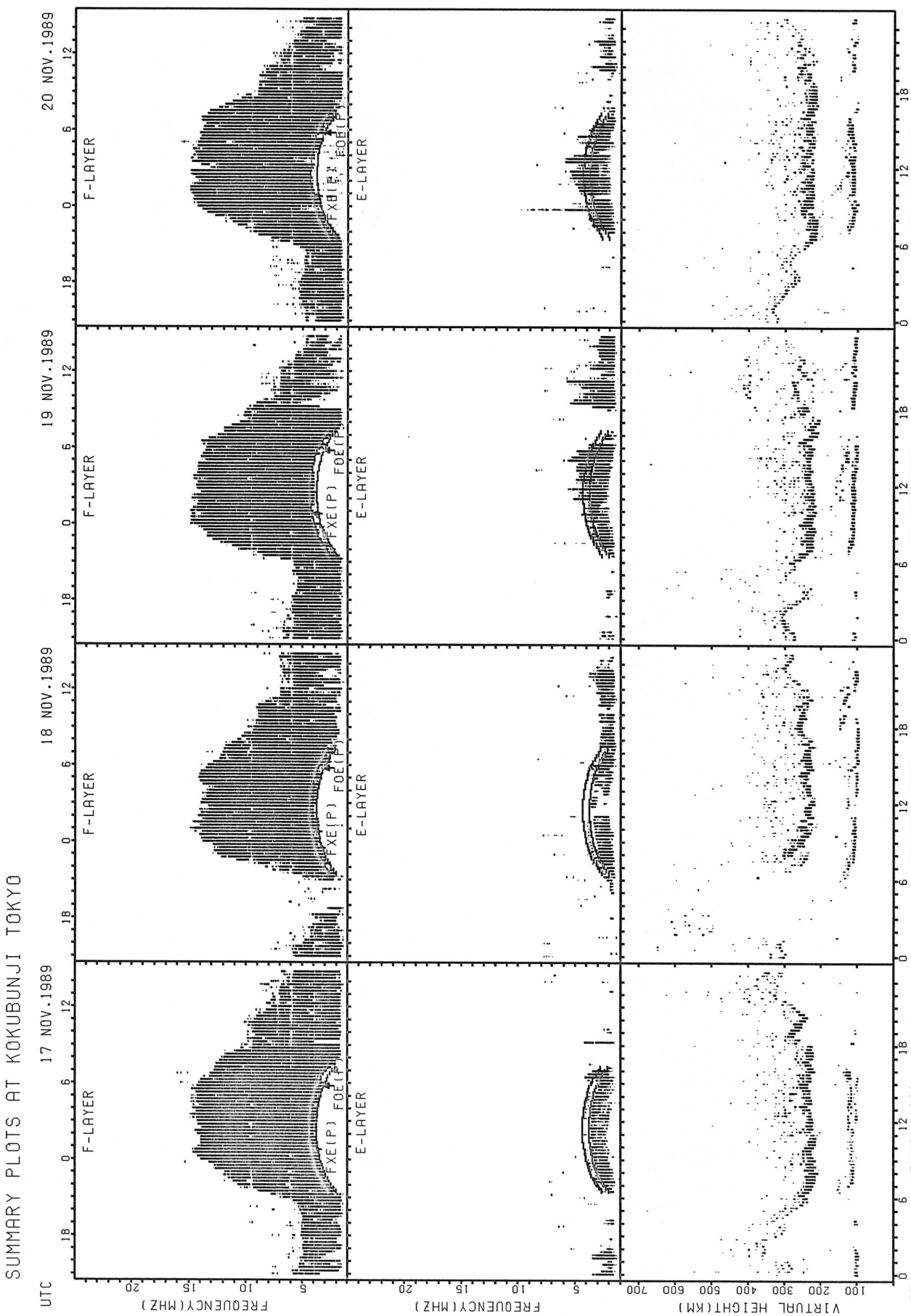

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
9 NOV.1989
10 NOV.1989
11 NOV.1989
12 NOV.1989
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL
MALFUNCTION OF THE IONOSONDE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

SUMMARY PLOTS AT KOKUBUNJI TOKYO

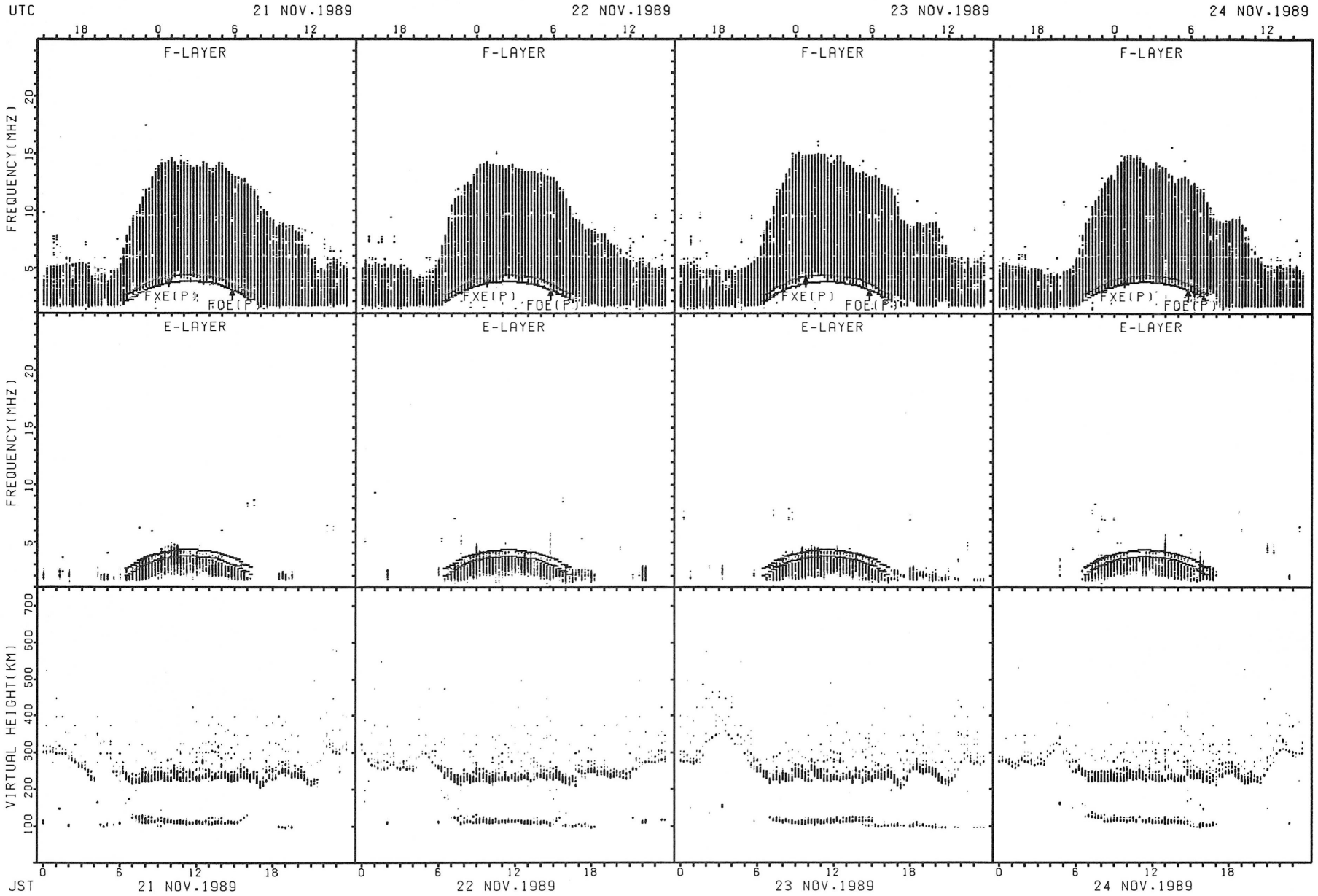


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

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


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

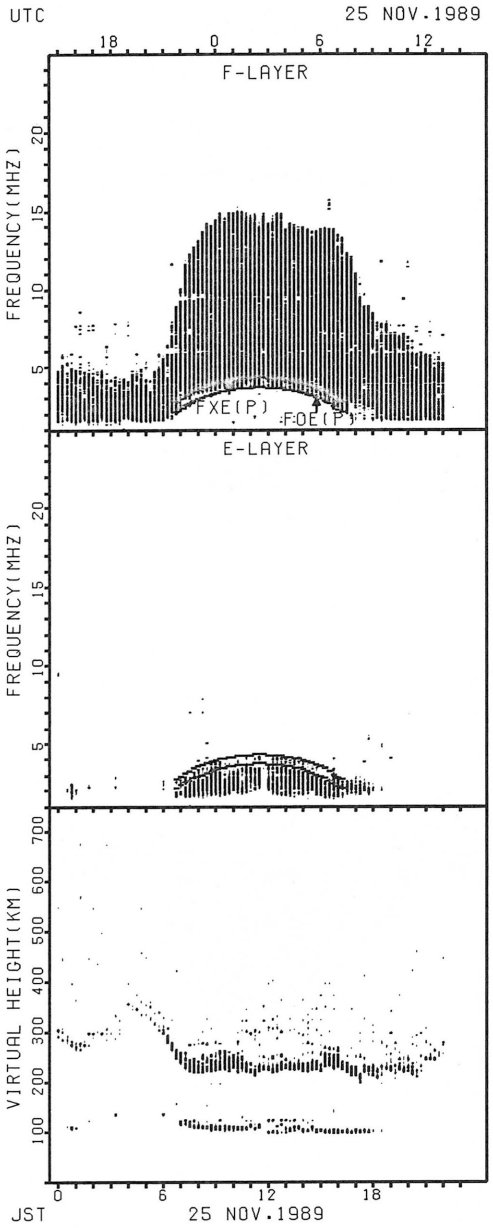
SUMMARY PLOTS AT KOKUBUNJI TOKYO



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

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

SUMMARY PLOTS AT KOKUBUNJI TOKYO



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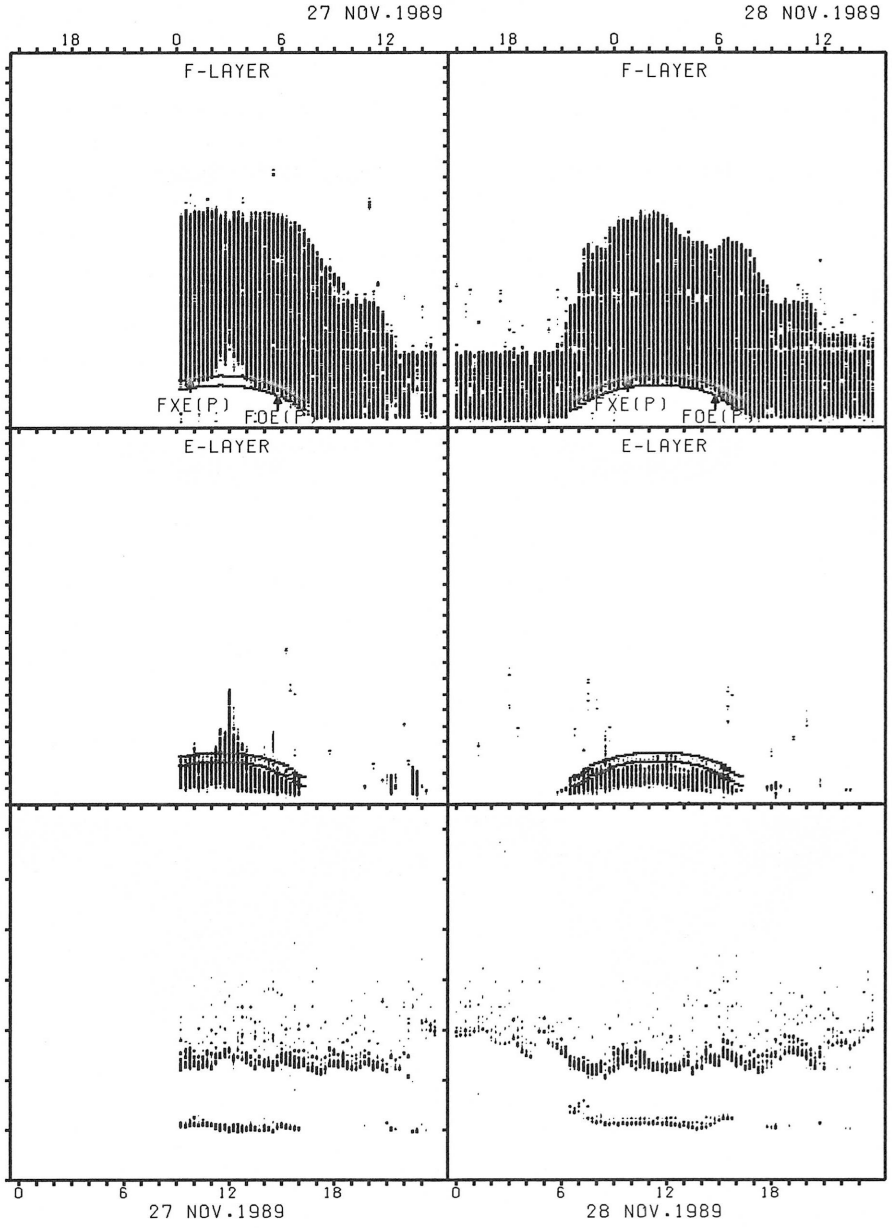
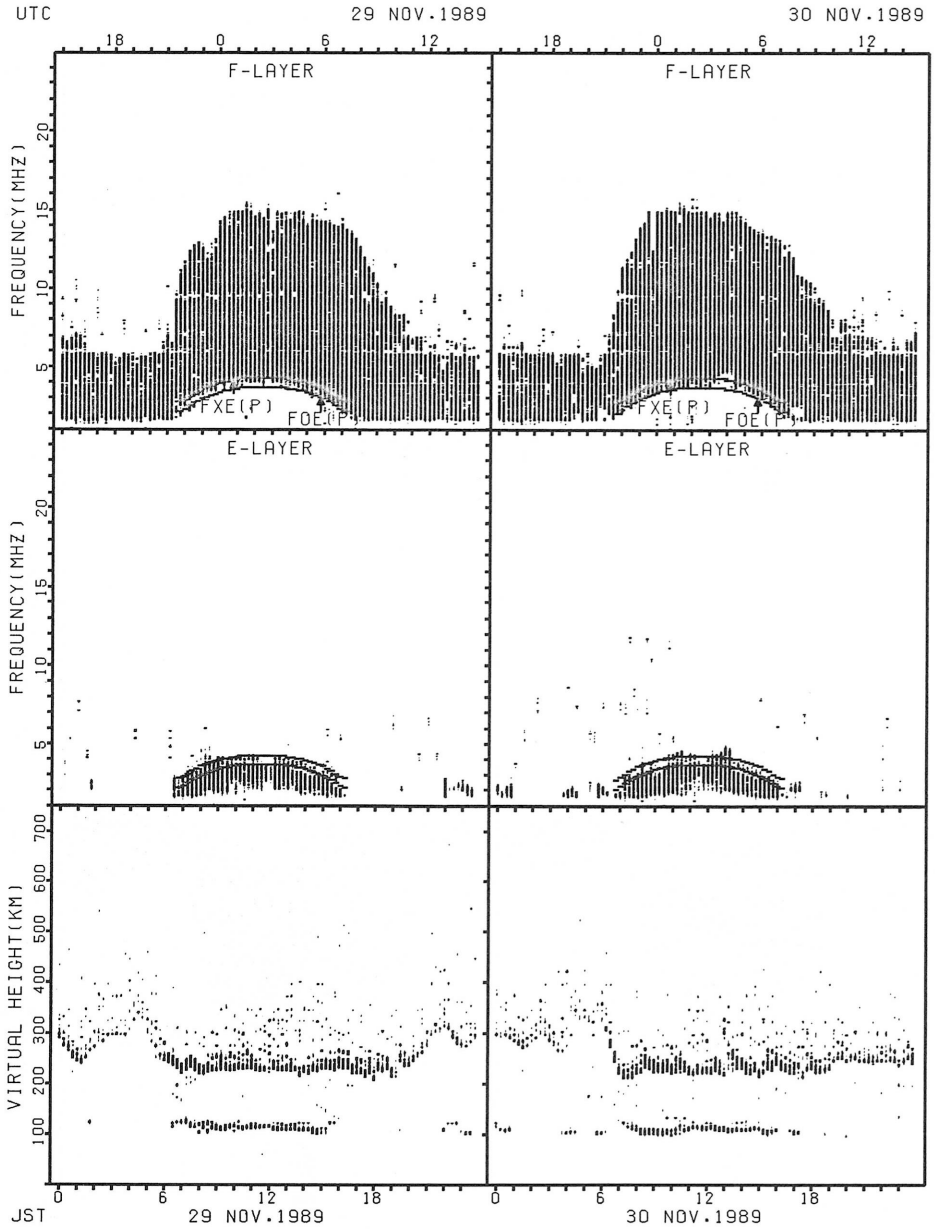
FOE(P): PREDICTED VALUE FOR FOE



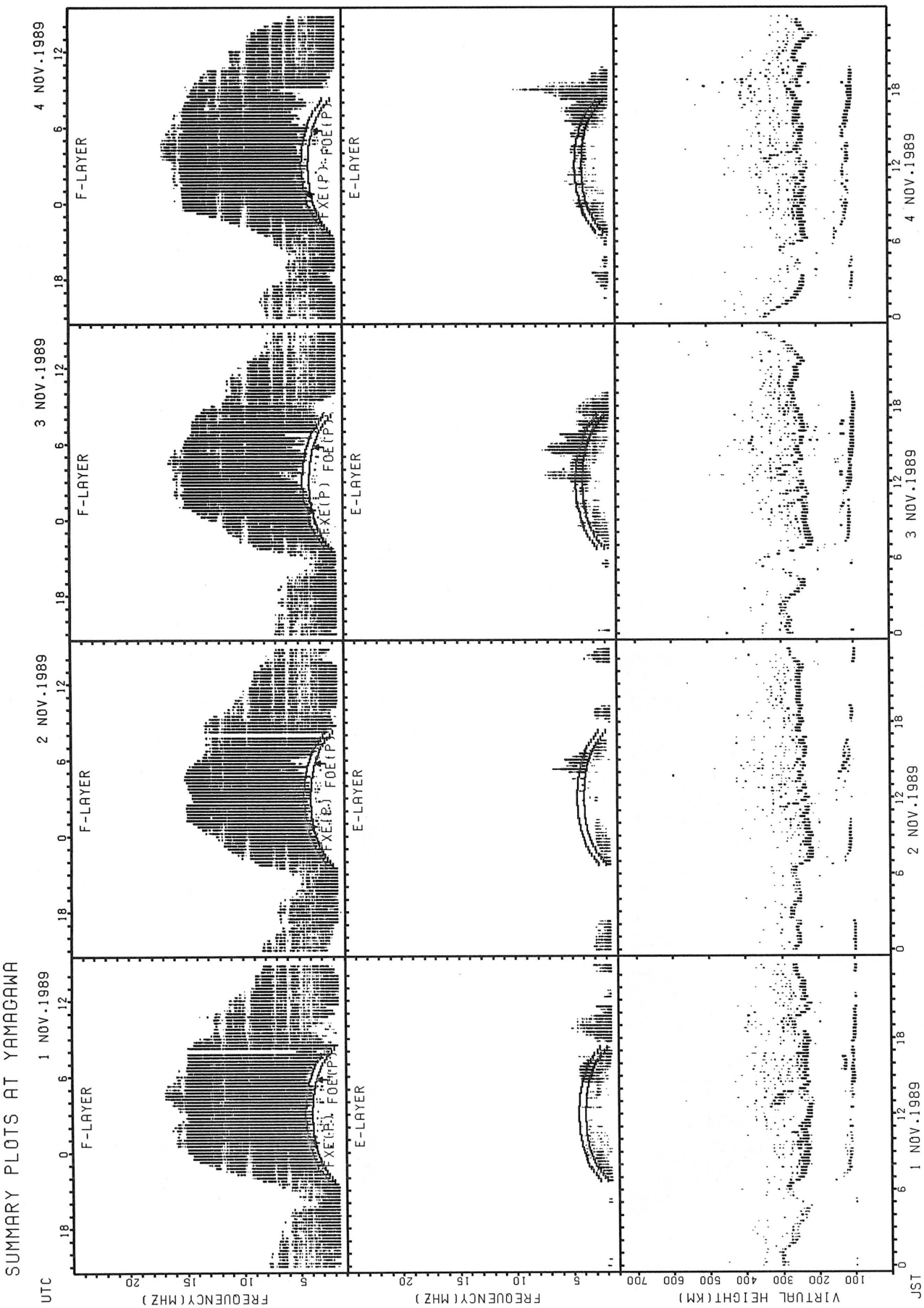
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.

SUMMARY PLOTS AT KOKUBUNJI TOKYO

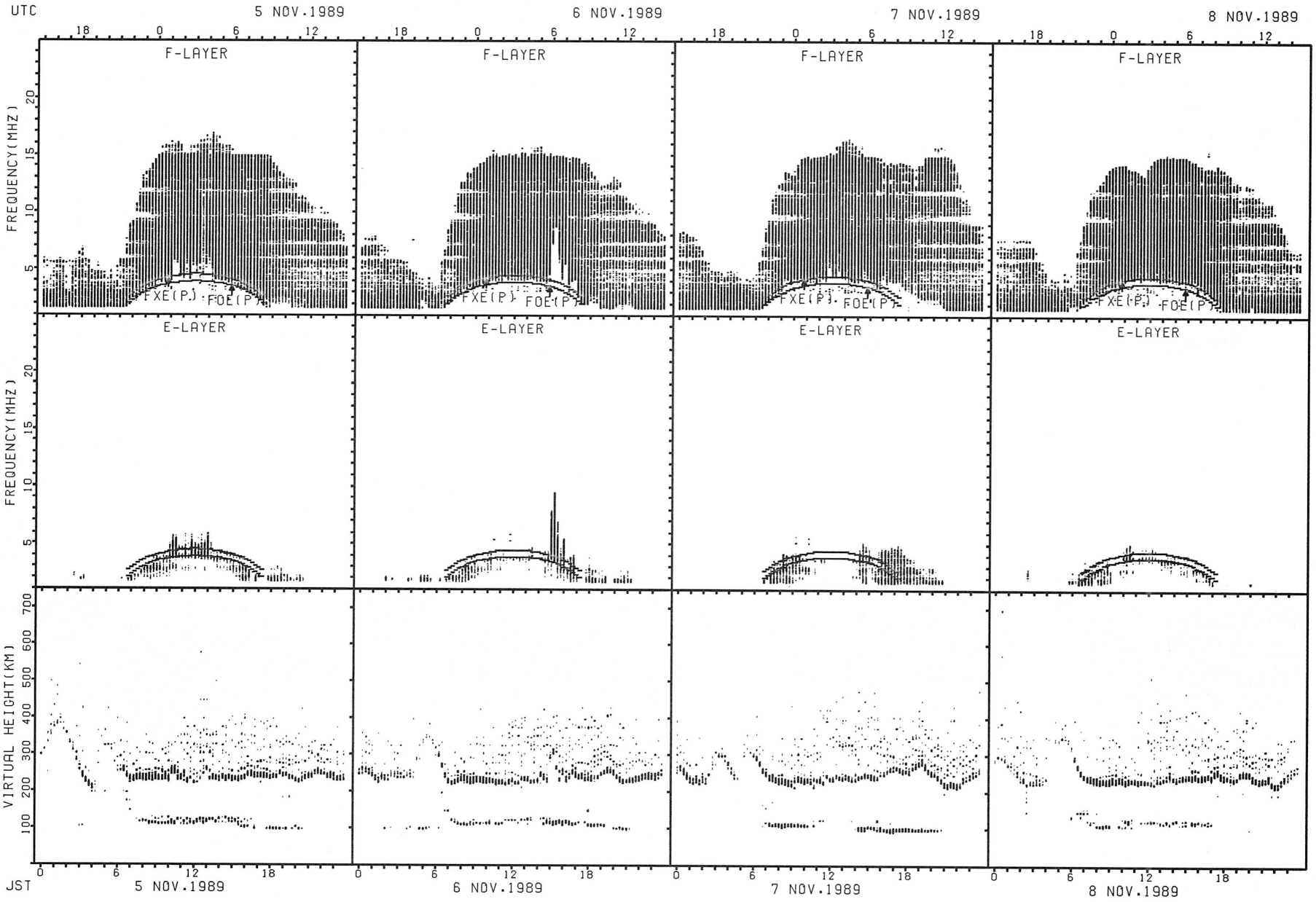


FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

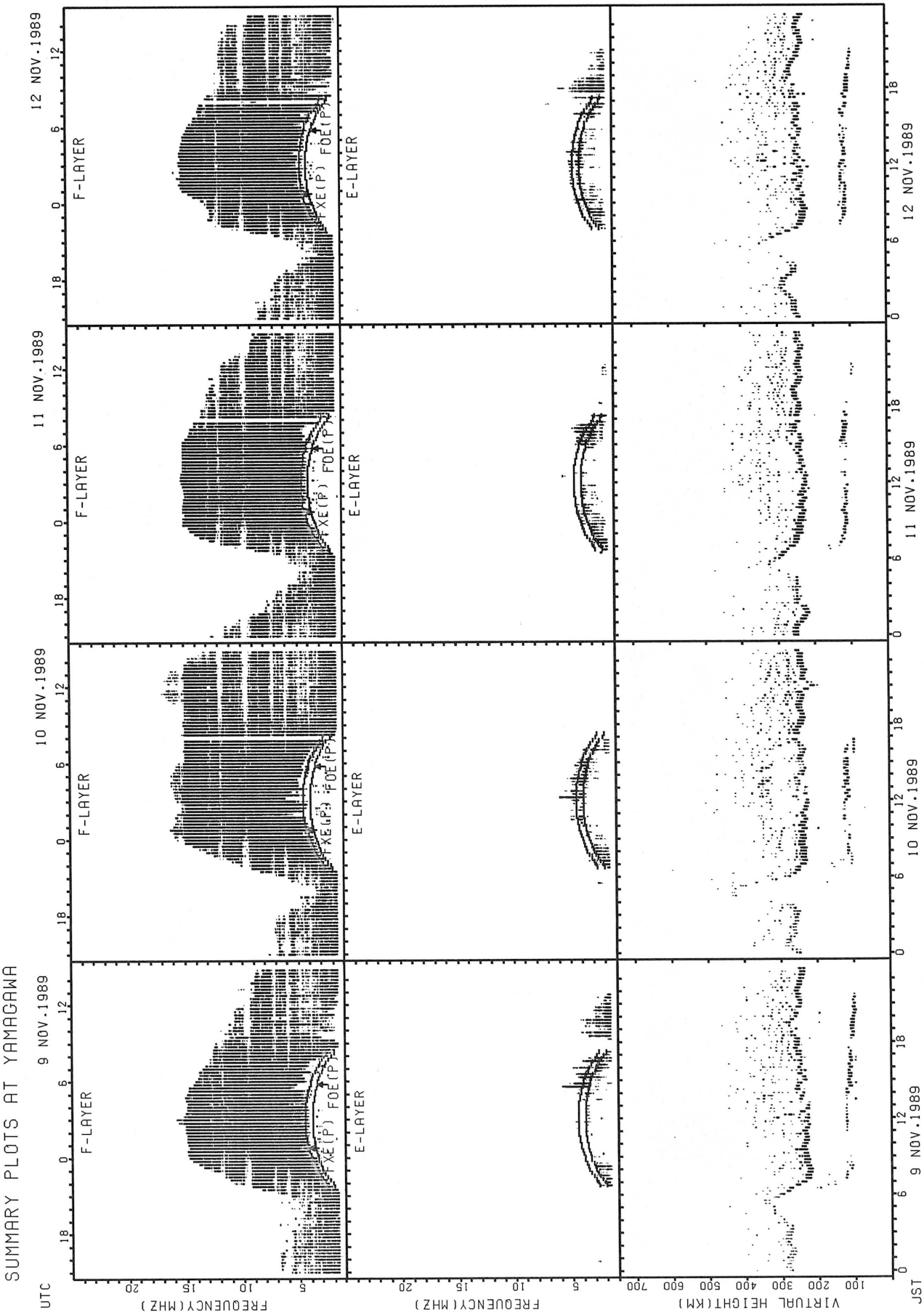
NOTE: THESE PLOTS SUFFERED CONTAMINATION DUE TO OCCASIONAL MALFUNCTION OF THE IONOSONDE AT KOKUBUNJI.


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

SUMMARY PLOTS AT YAMAGAWA



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


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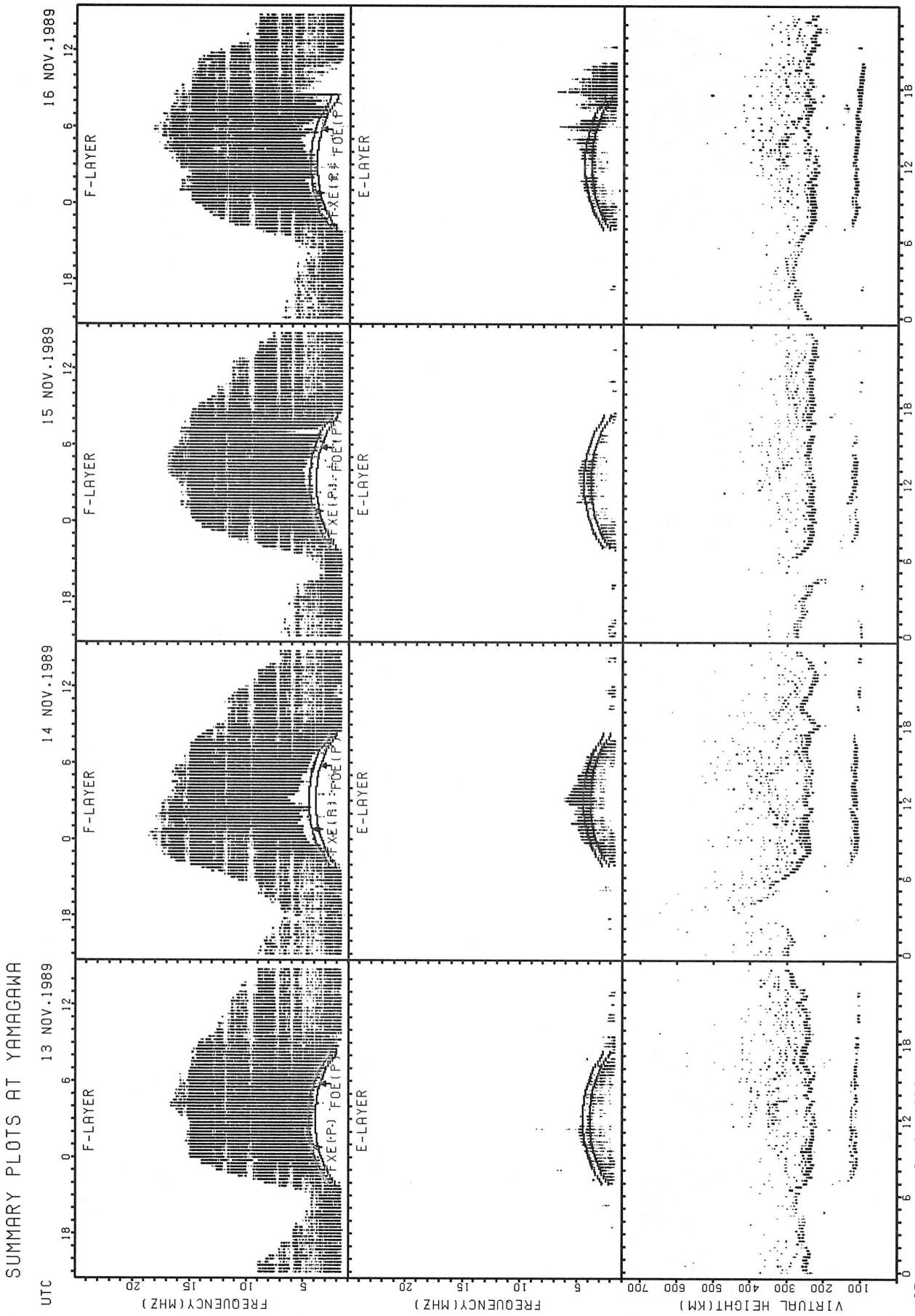
11 NOV.1989
12 NOV.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
JST
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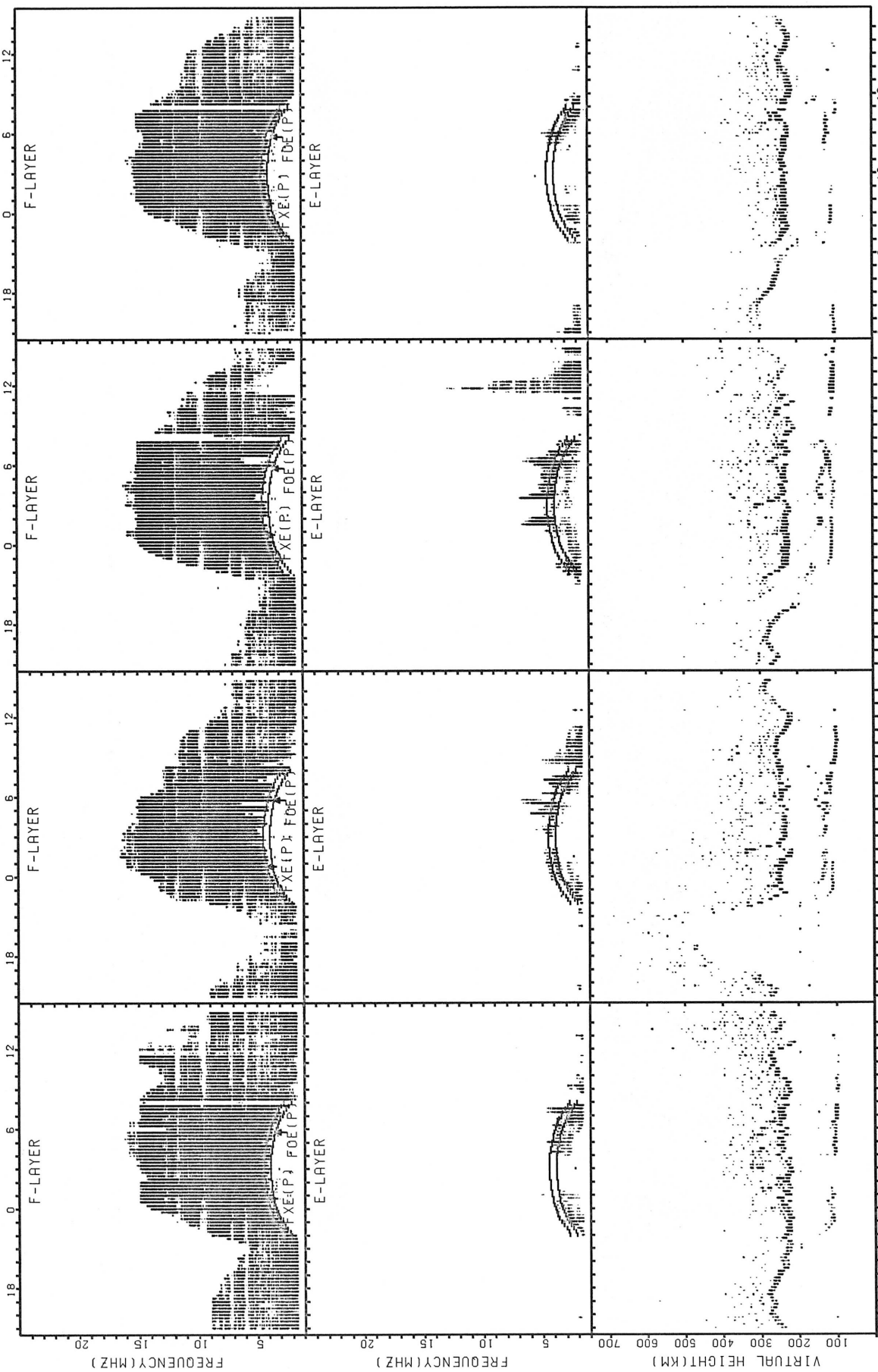
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
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F-LAYER
E-LAYER
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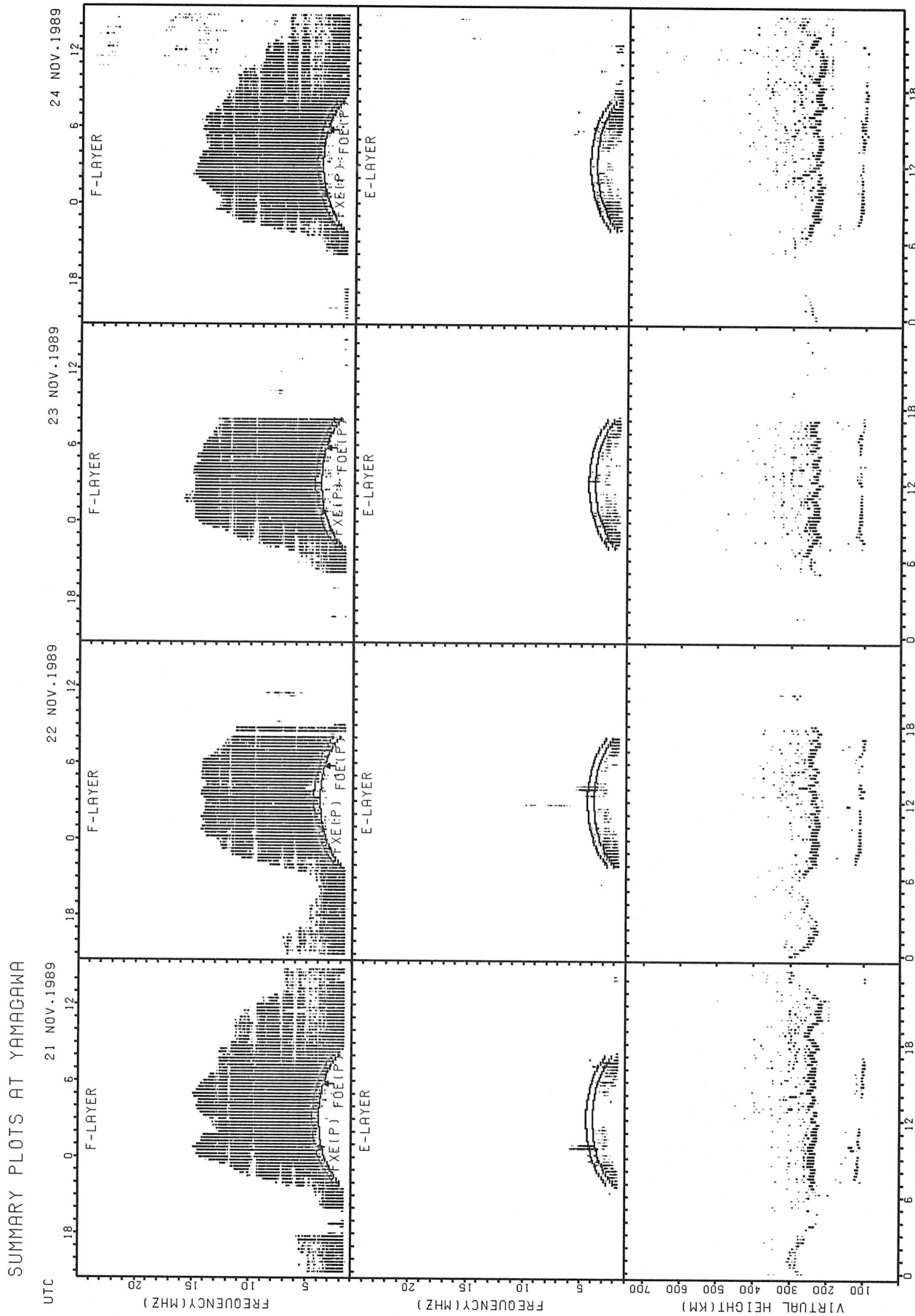
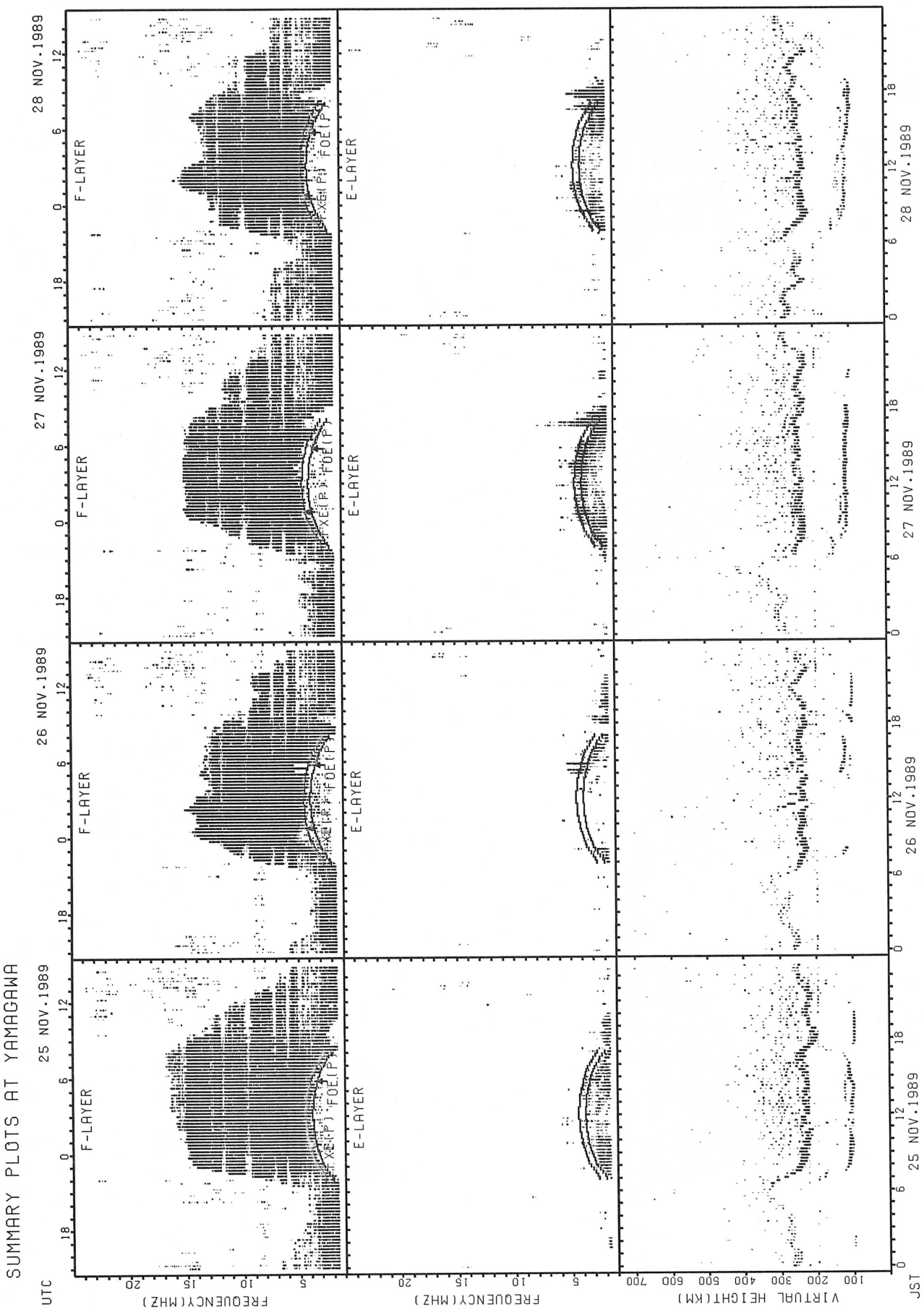
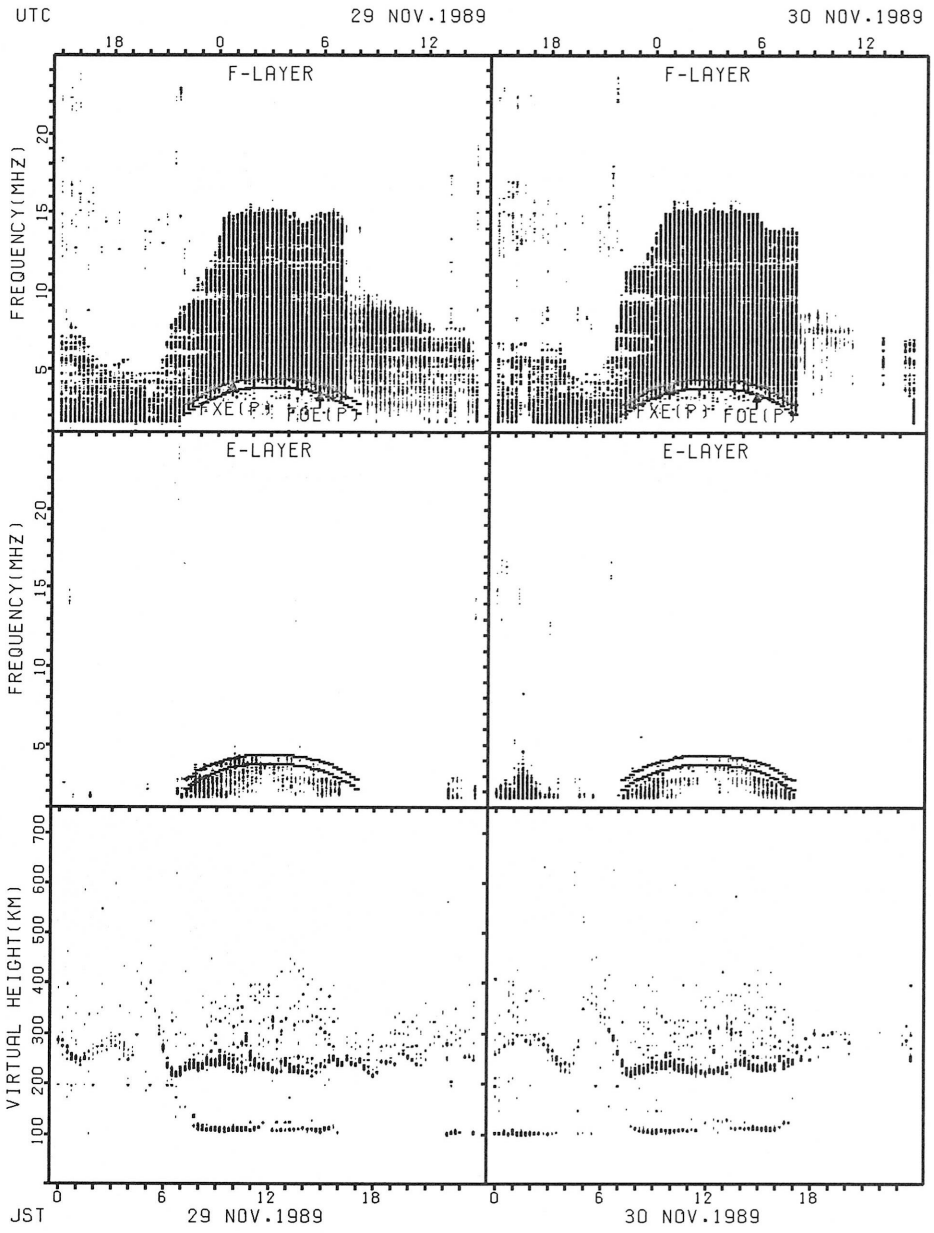
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

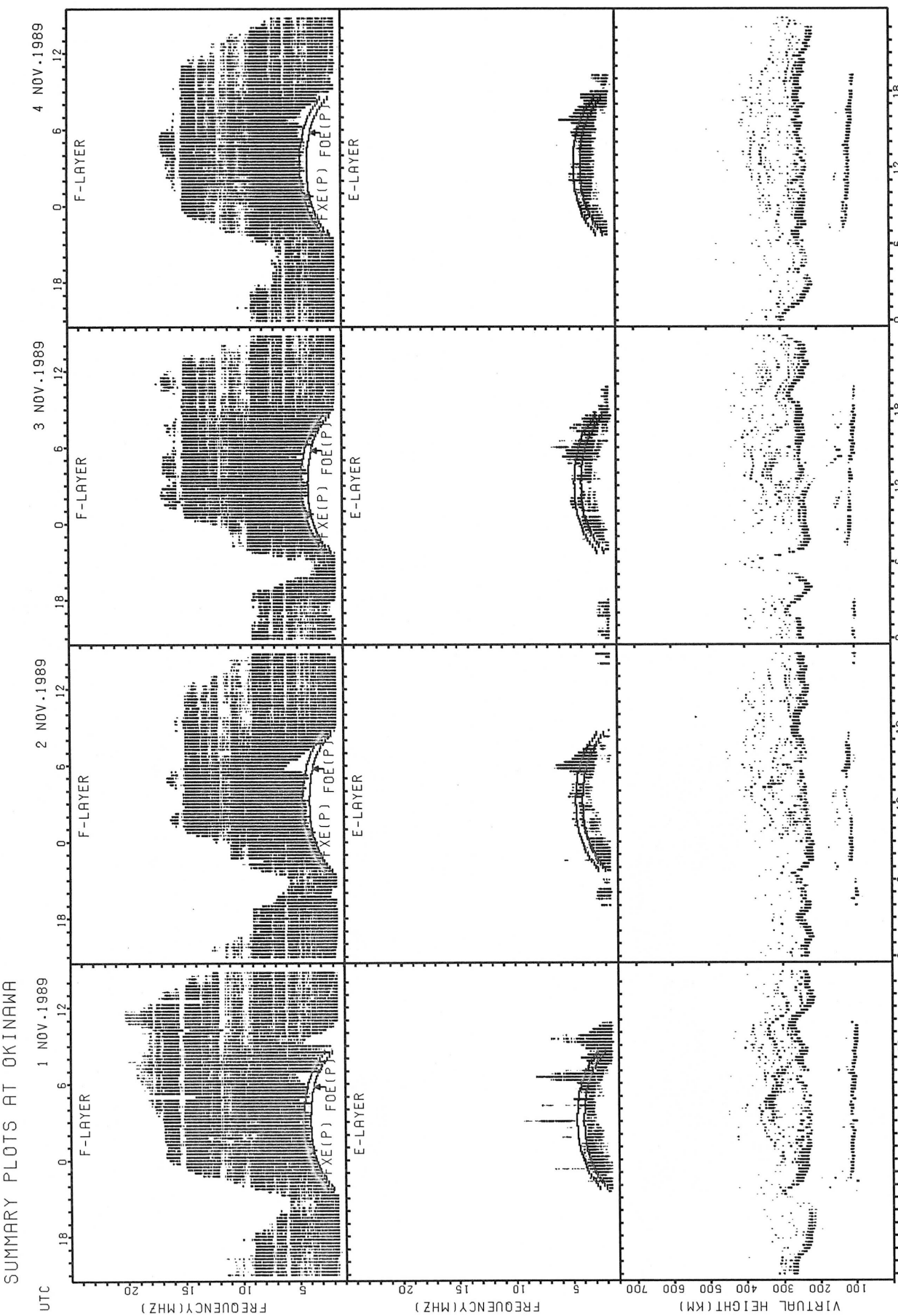

SUMMARY PLOTS AT YAMAGAWA
UTC
21 NOV.1989
22 NOV.1989
23 NOV.1989
24 NOV.1989
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

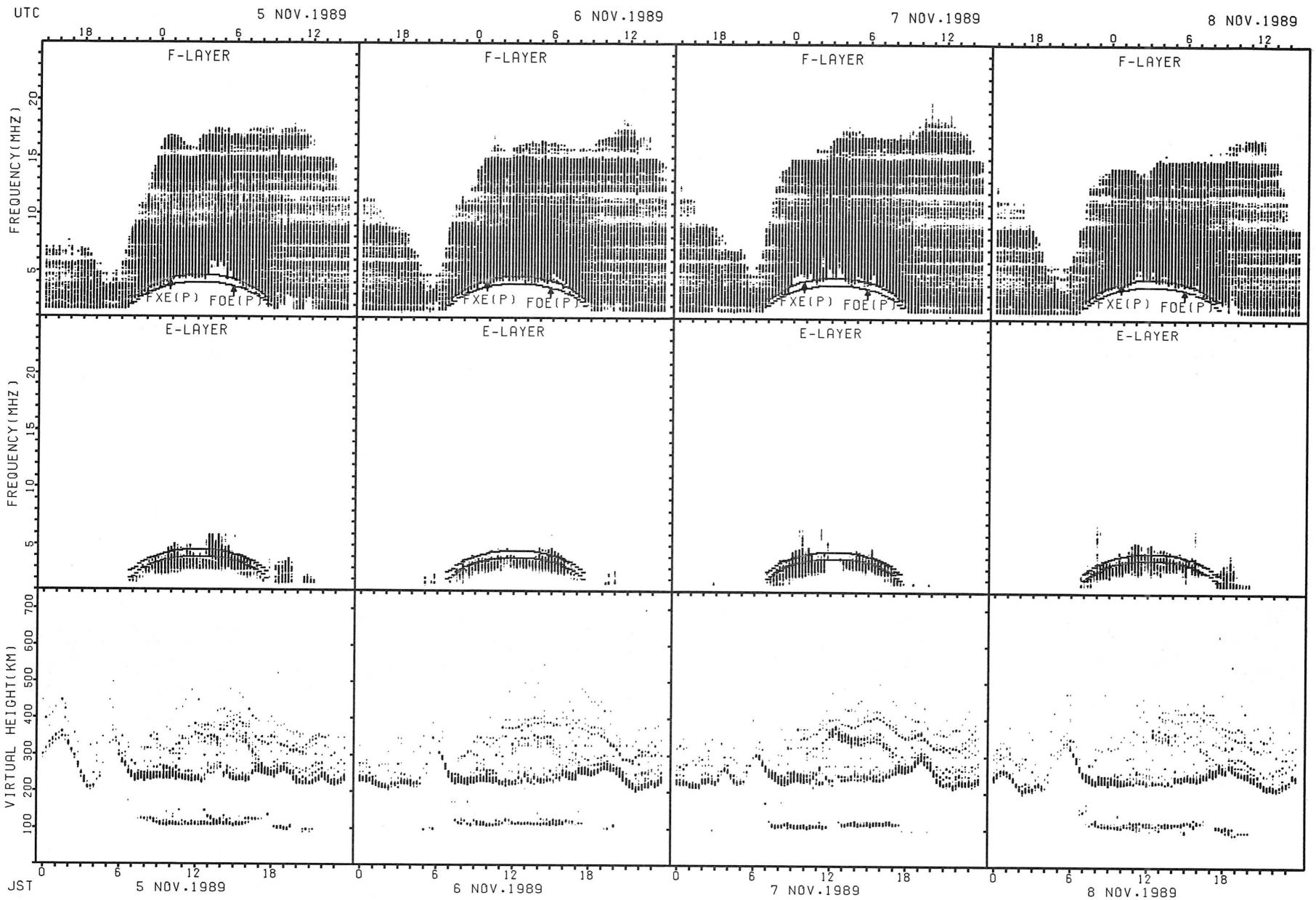
SUMMARY PLOTS AT YAMAGAWA



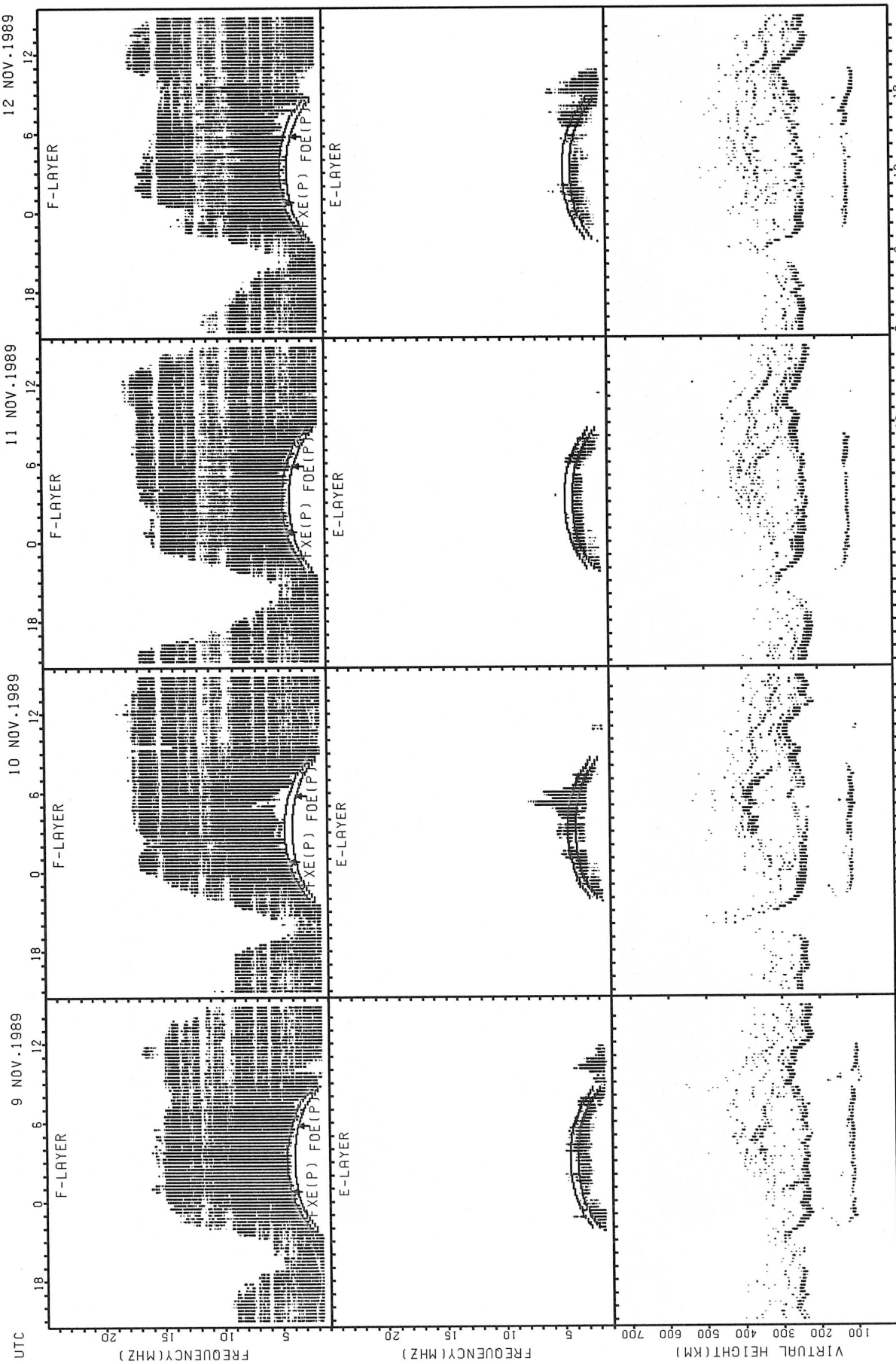
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

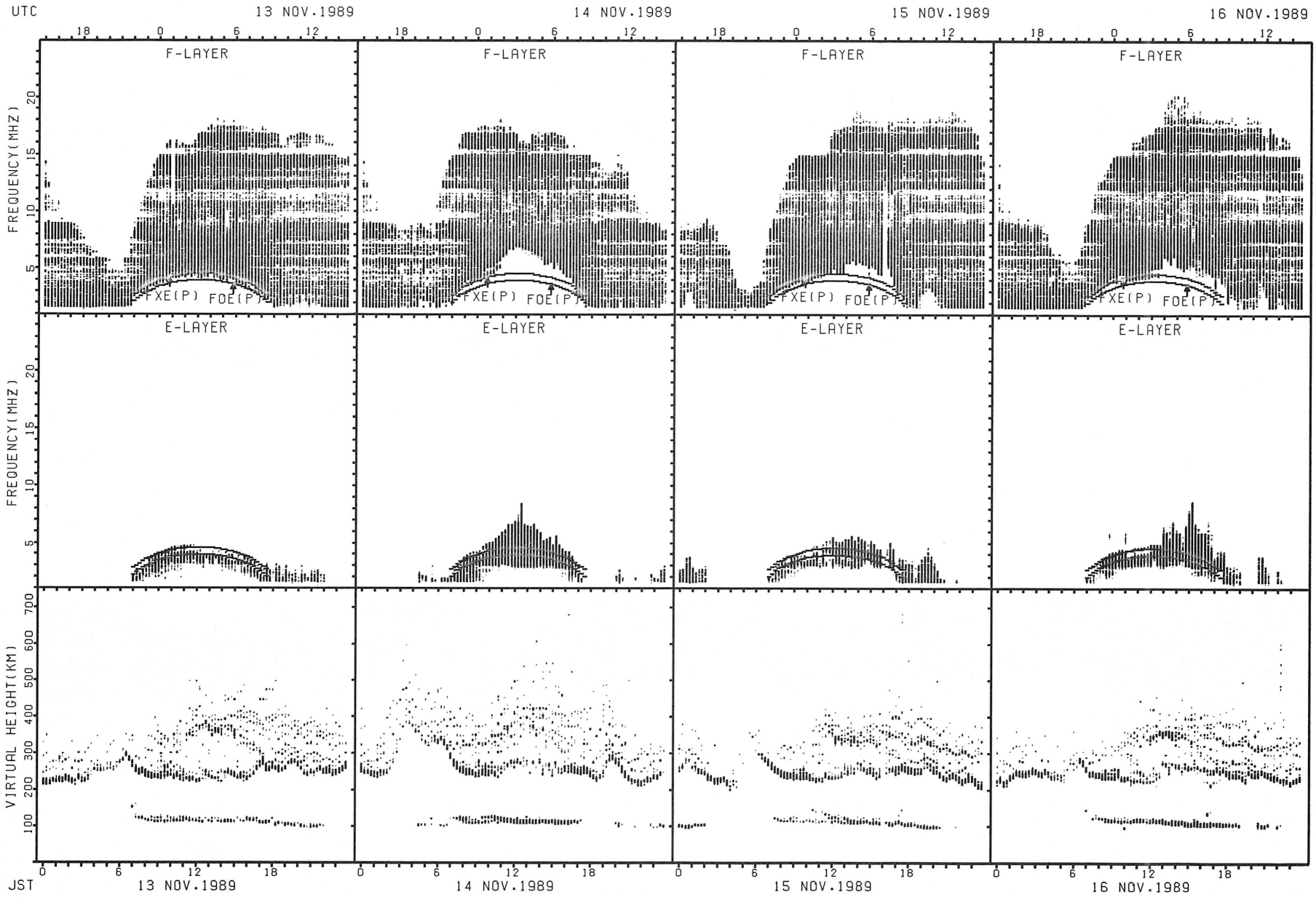
SUMMARY PLOTS AT OKINAWA



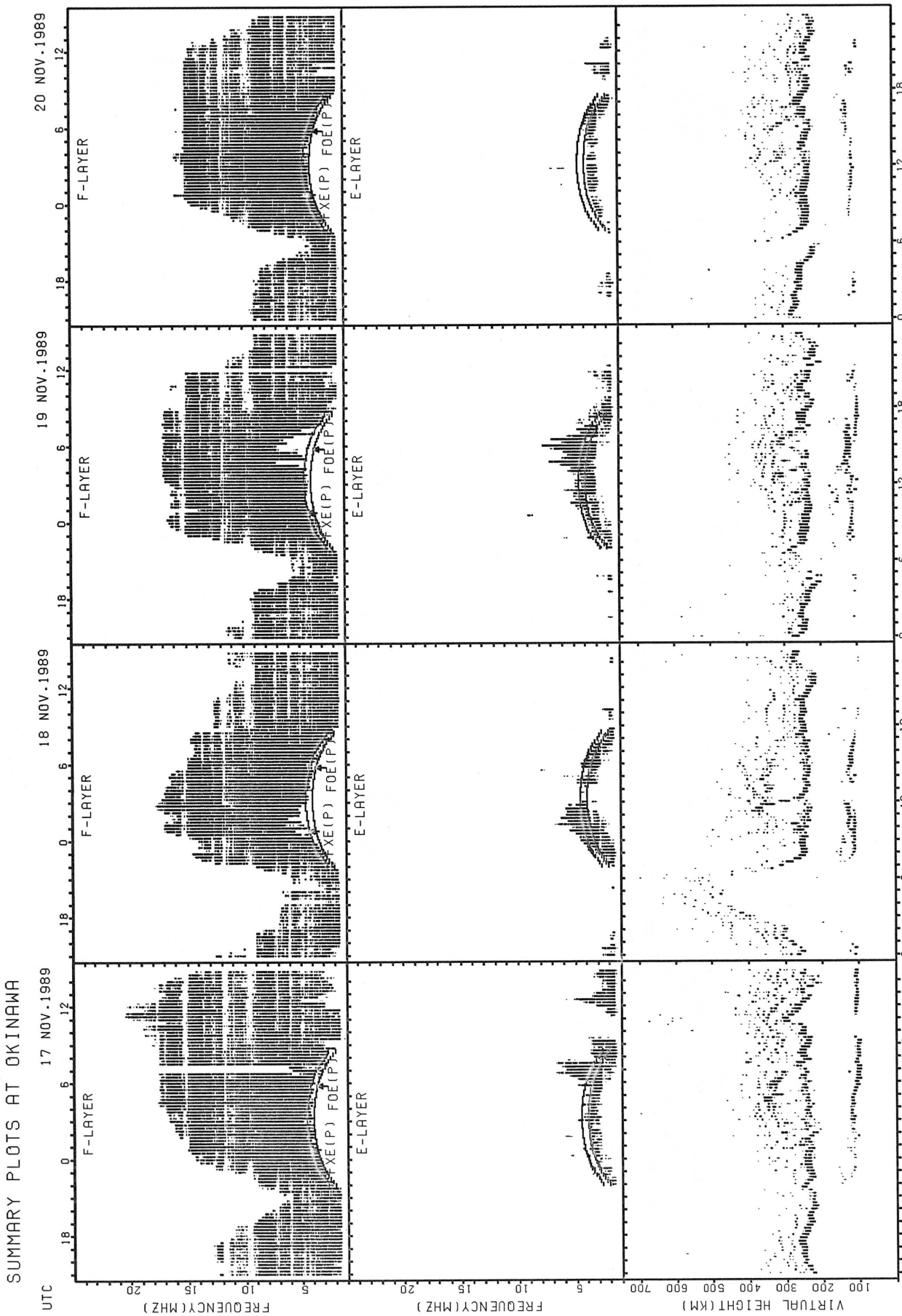
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

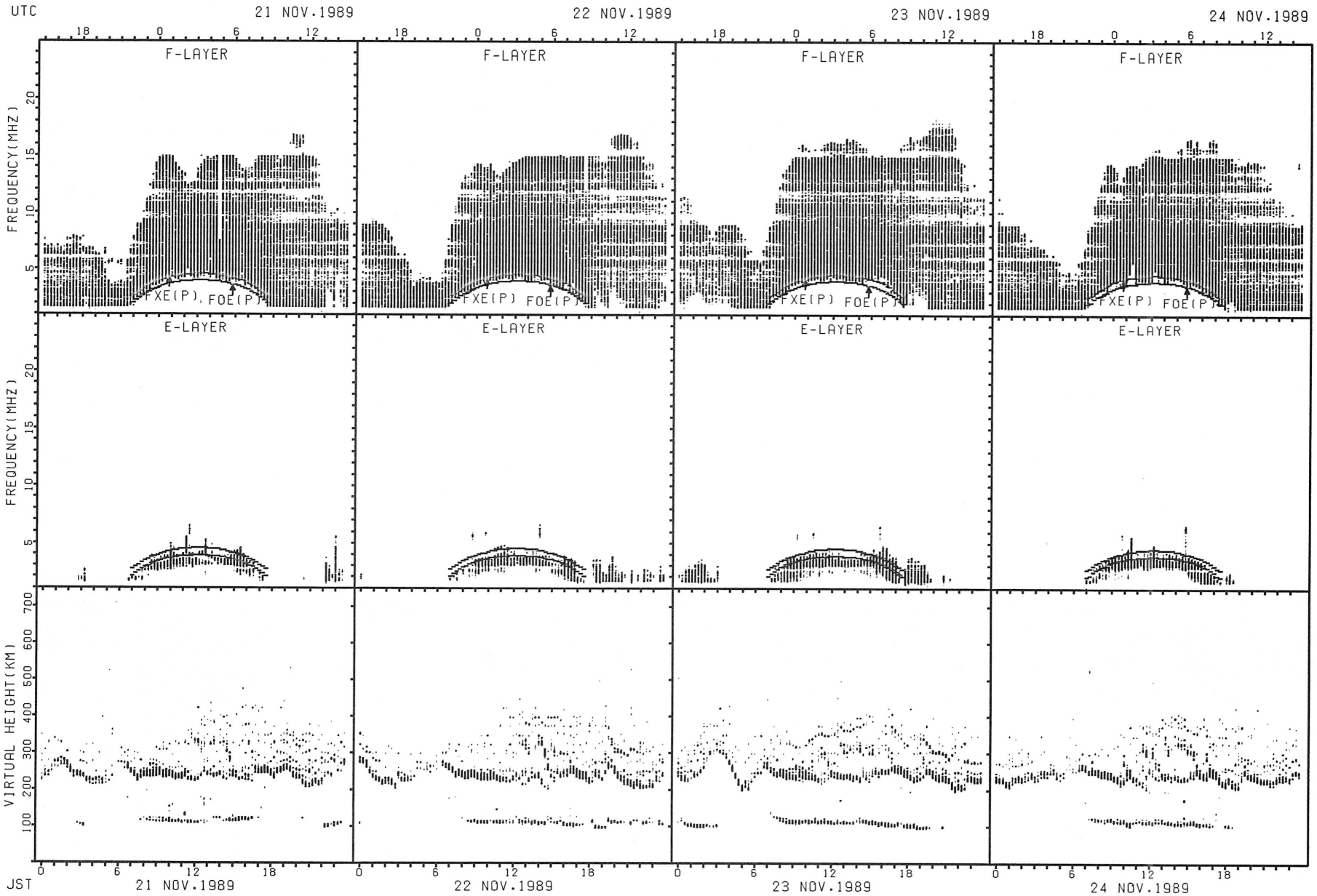
SUMMARY PLOTS AT OKINAWA



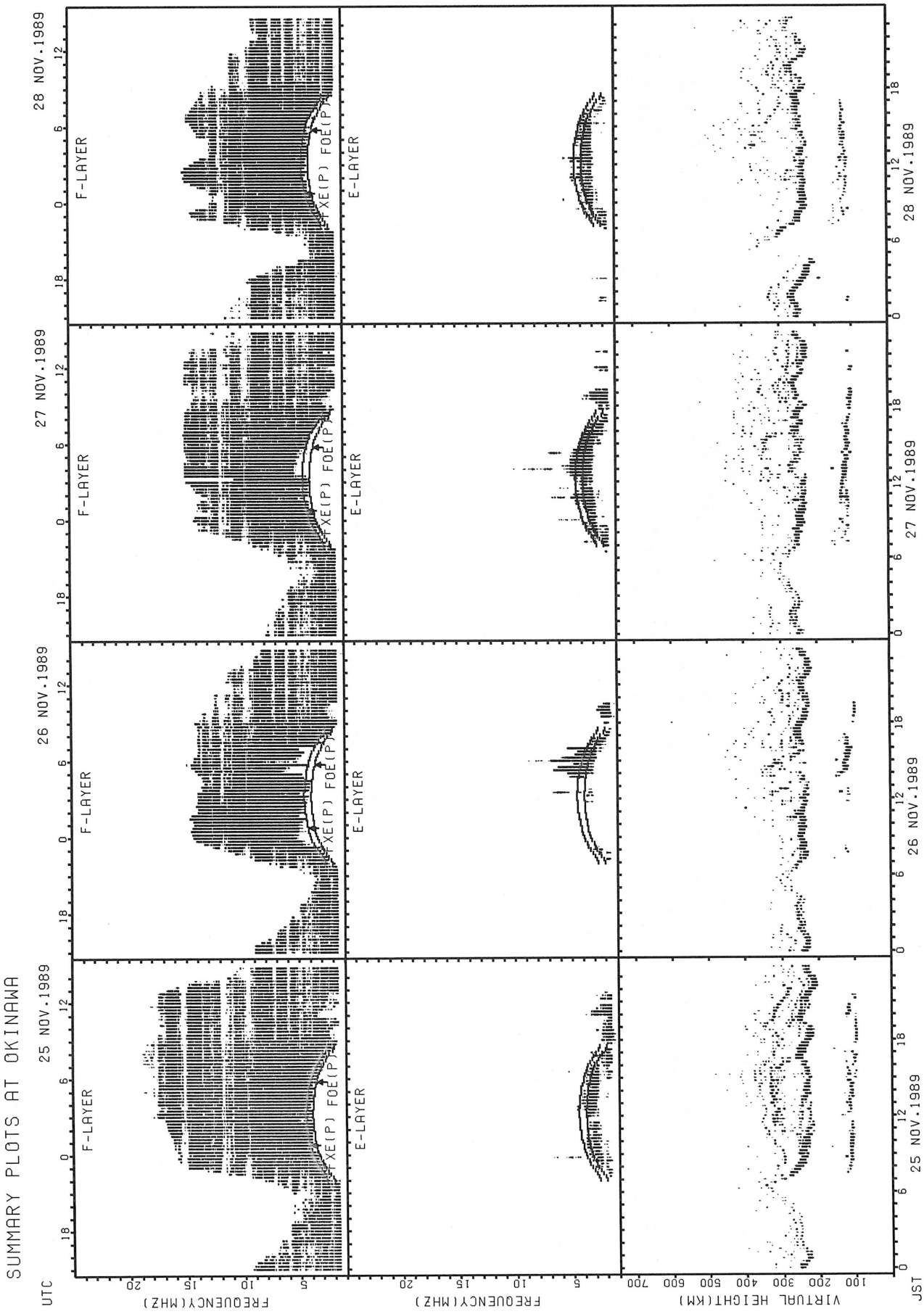
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


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

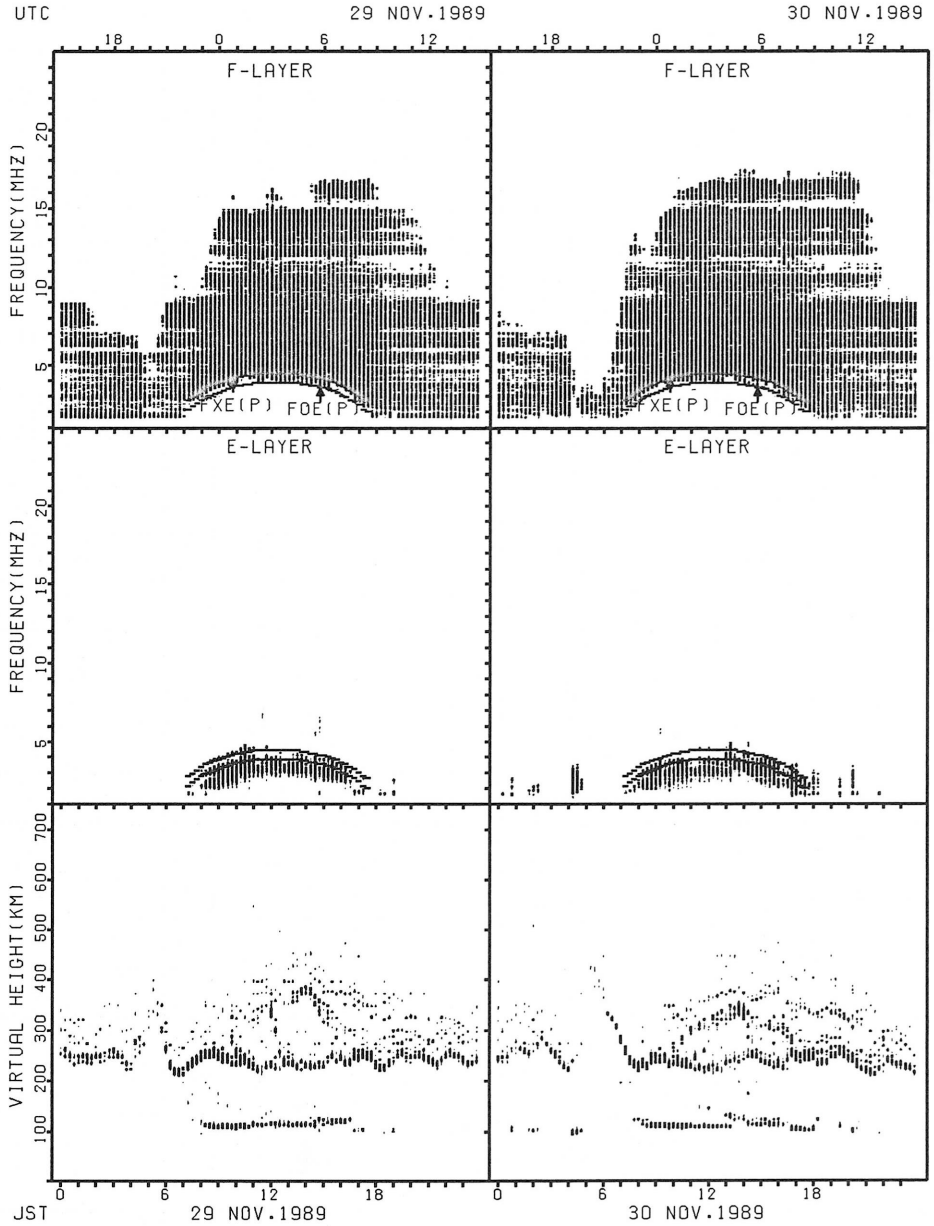
SUMMARY PLOTS AT OKINAWA



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


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

SUMMARY PLOTS AT OKINAWA



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

MONTHLY MEDIANS OF H'F AND H'ES

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

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								30	29	31	31	31	31	31	31	31	31	31	24	17				
MED								254	234	230	234	234	236	242	246	248	252	278	286	292				
U Q								272	244	246	244	242	242	284	252	254	262	286	299	314				
L Q								248	229	226	230	228	228	236	240	238	246	266	272	280				

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									11															
MED									123															
U Q									137															
L Q									115															

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								29	31	31	31	31	31	31	31	31	31	31	26	10				
MED								248	240	236	238	242	262	254	256	258	256	278	285	299				
U Q								260	246	250	250	254	292	274	264	266	270	292	310	308				
L Q								242	232	228	228	236	246	250	246	252	246	272	274	280				

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	10	11	13	11						12	17	12	10	12		11	16	15	13	11		10		
MED	107	103	105	101						114	113	108	109	107		103	108	107	109	107		109		
U Q	111	109	110	105						115	117	115	123	113		113	116	109	114	111		115		
L Q	103	101	102	99						112	111	105	105	105		101	103	99	102	105		105		

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								29	30	31	28	31	31	31	30	29	29	29	26	26	21	18		
MED								238	235	236	234	238	252	256	255	264	254	264	292	295	304	301		
U Q								245	240	248	245	256	266	304	270	282	274	285	304	312	316	324		
L Q								229	224	230	230	228	234	244	240	246	239	257	274	286	273	290		

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	10		12				14	14	17	18	25	20	17	20	17	21	19	17	16	14	11	11	14	11
MED	101		105				140	149	119	116	119	118	115	116	117	117	113	107	110	110	107	111	107	103
U Q	111		111				179	222	176	125	123	128	125	124	130	150	145	141	131	135	139	145	111	107
L Q	101		101				107	129	115	113	115	113	108	112	104	107	105	102	101	105	103	105	105	101

MONTHLY MEDIANS OF H'F AND H'ES

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

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								30	31	31	31	30	31	30	31	31	31	24	28	29	27	27	20	15
MED								271	236	240	242	242	246	255	254	260	264	266	268	288	280	276	287	322
U Q								278	244	256	250	252	252	270	314	278	280	280	287	307	302	314	315	400
L Q								254	230	232	234	236	236	248	248	244	254	257	260	276	270	268	276	292

H'ES

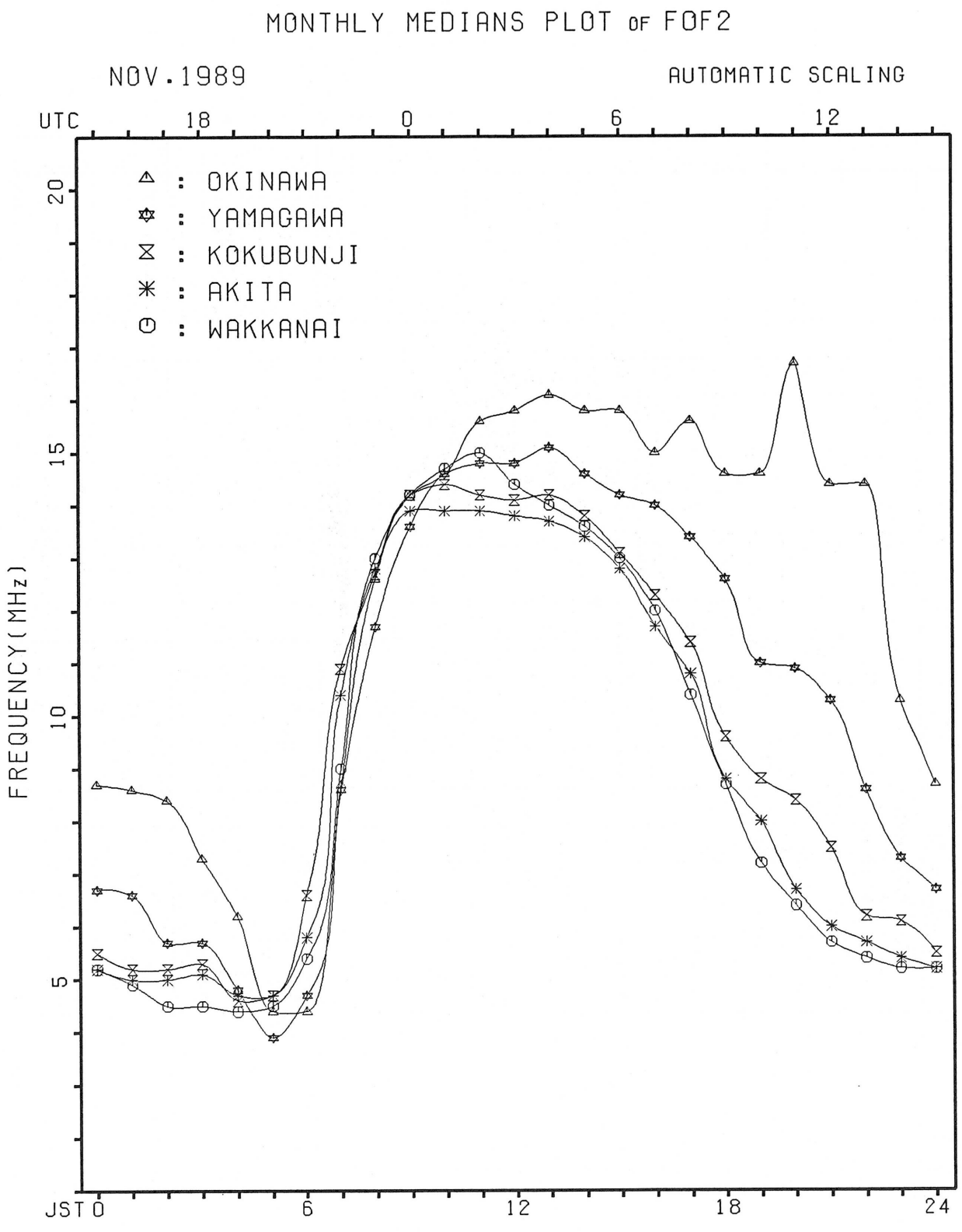
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								10		12	15	11		11	16	19	14	11	17	11				
MED								159		118	119	121		119	119	117	115	105	105	103				
U Q								167		120	131	137		121	128	119	123	115	109	109				
L Q								149		117	115	117		115	115	113	105	101	101	101				

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

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	22	19	14				30	31	31	31	31	30	30	30	29	30	30	31	31	31	30	30	31
MED	287	292	276	289				280	244	244	244	246	336	346	340	336	303	280	266	286	284	271	263	270
U Q	316	308	294	308				292	258	248	254	302	352	366	362	382	338	304	276	300	296	284	286	292
L Q	264	266	262	284				266	238	238	240	238	256	310	268	291	274	262	256	272	264	250	248	254

H'ES

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT										12	11	15	11	16	16	21	20	14	18	17				
MED										131	131	125	119	119	117	117	116	110	105	101				
U Q										155	137	137	125	138	132	123	119	113	109	106				
L Q										119	113	119	115	117	112	111	109	107	103	99				


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

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	X 69	X 67	X 66	X 64	X 62	X 65									C				X 107	X 96	X 81	X 76	X 71	X 67
2	X 64	X 57	X 55	X 54	X 53	X 54					C								X 99	X 94	X 93	X 84	X 76	X 73
3	X 71	X 66	X 67	X 67	X 63	X 58													X 113	X 102	X 94	X 88	X 76	X 69
4	X 75	X 79	X 75	X 68	X 68	X 68													X 125	X 108	X 94	X 90	X 87	X 73
5	X 65	X 62	X 54	X 66	X 60	X 57													X 122	X 113	X 98	X 89	X 87	X 77
6	X 71	X 73	X 57	X 63	X 57	X 58													X 114	X 98	X 92	X 90	X 82	X 74
7	X 75	X 69	X 60	X 55	X 57	X 54													X 115	X 109	X 109	X 92	X 82	X 71
8	X 60	X 61	X 67	X 67	X 43	X 46					C								X 112	X 102	X 98	X 90	X 79	X 66
9	X 65	X 65	X 63	X 61	X 59	X 61													X 96	X 91	X 88	X 86	X 88	X 86
10	X 63	X 66	X 67	X 65	X 57	X 57													X 121	X 98	X 98	X 95	X 90	X 84
11	X 82	X 74	X 68	X 64	X 56	X 57													X 111	X 98	X 91	X 85	X 77	X 75
12	X 67	X 65	X 61	X 59	X 54	X 52													X 106	X 97	X 92	X 89	X 83	X 74
13	X 69	X 64	X 60	X 60	X 58	X 54													X 114	X 96	X 89	X 85	X 77	X 73
14	X 64	X 64	X 60	X 55	X 64	S						179	168						X 114	X 100	X 88	X 73	X 70	X 67
15	X 59	X 57	X 57	X 56	X 55	X 47													X 112	X 102	X 90	X 86	X 67	X 57
16	X 54	X 55	X 52	X 51	X 52	X 55												X 128	X 102	X 96	X 96	X 83	X 72	X 65
17	X 58	X 54	X 51	X 51	X 51	X 55	X 68											X 124	X 104	X 103	X 100	X 80	X 78	X 67
18	X 65	X 53	X 47	X 42	X 38	X 40	46											X 108	X 101	X 91	X 85	X 71	X 66	X 68
19	X 68	X 67	X 64	X 58	X 56	X 56	X 66											X 109	X 102	X 79	X 79	X 70	X 61	X 48
20	X 51	X 52	X 54	X 56	X 48	X 48	X 61											X 121	X 96	X 87	X 82	X 71	X 68	X 52
21	X 50	X 54	X 54	X 56	X 44	X 45	X 57											X 108	X 93	X 88	X 83	X 82	X 83	X 56
22	X 54	X 56	X 53	X 54	X 44	X 46	X 58											X 92	X 84	X 81	X 69	X 57	X 56	X 55
23	X 54	X 55	X 48	X 47	X 48	X 51	X 63											X 106	X 88	X 88	X 91	X 63	X 56	X 57
24	X 55	X 53	X 52	X 50	X 45	X 47	X 58											X 96	X 94	X 91	X 87	X 83	X 83	X 51
25	X 53	X 51	X 47	X 44	X 45	X 46	X 57											X 115	X 86	X 78	X 71	X 63	X 56	X 58
26	X 54	X 48	X 39	X 41	X 38	X 39	X 51											X 115	X 90	X 74	X 67	X 68	X 61	X 60
27	X 51	X 50	X 50	X 49	X 51	X 52	X 58											X 126	X 111	X 97	X 96	X 78	X 61	X 65
28	X 63	X 58	X 60	X 62	X 62	X 61	X 67											X 119	X 94	X 95	X 93	X 74	X 74	X 66
29	X 73	X 70	X 61	X 57	X 58	X 59	X 76											X 129	X 105	X 87	X 77	X 64	X 68	X 64
30	X 64	X 65	X 59	X 63	X 59	X 58	X 64											X 115	X 103	X 81	X 79	X 73	X 66	X 66
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	29	14					1	1					15	30	30	30	30	30	30
MED	X 64	X 62	X 60	X 56	X 56	X 54	X 60					179	168					X 115	X 104	X 96	X 90	X 79	X 72	X 66
UQ	X 69	X 66	X 64	X 63	X 59	X 58	X 66											X 122	X 113	X 100	X 94	X 88	X 79	X 73
LQ	X 54	X 54	X 52	X 51	X 48	X 47	X 57											X 103	X 96	X 88	X 81	X 70	X 61	X 58

NOV. 1989 | FXI (0.1 MHZ)

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	S 63	60	60	59	56	60	85	112	126	144	R 156	152	152	U S 147	I C 146	140	126	113	101	91	75	69	55	60
2	57	51	48	48	46	48	69	106	123	I C 130	134	141	136	141	138	123	115	107	93	88	86	S 77	69	67
3	65	S 60	60	60	57	52	69	118	131	138	144	144	154	161	152	141	133	126	106	94	87	82	70	S 63
4	70	73	69	62	61	62	78	106	134	158	R 156	U S 158	168	U R 168	J R 164	S 154	146	134	119	103	88	84	81	67
5	58	57	58	59	55	51	S 61	114	147	150	152	153	154	155	146	139	136	126	116	106	91	83	81	71
6	66	66	61	57	51	51	69	119	141	145	150	145	148	149	145	135	132	123	108	94	85	83	75	68
7	69	64	53	48	51	49	75	121	139	144	141	145	149	153	145	136	131	125	108	103	103	86	75	65
8	54	56	61	61	H 38	40	64	118	134	143	I C 140	133	140	141	138	132	126	120	105	96	93	83	73	61
9	59	58	57	56	53	56	71	111	133	143	146	149	147	141	135	128	125	110	91	84	82	81	82	80
10	58	S 58	61	58	51	51	81	109	135	147	153	152	148	148	144	133	126	126	114	93	92	89	83	77
11	S 74	68	62	57	50	51	S 69	116	137	144	139	141	146	S 144	141	133	123	116	104	92	85	78	71	69
12	61	58	56	54	49	47	63	115	131	130	141	140	150	148	141	134	125	116	100	91	86	83	76	70
13	64	59	55	54	52	48	60	104	127	141	143	149	149	152	139	135	123	115	107	90	82	78	70	68
14	59	57	54	49	58	I S 70	102	141	169	R 174	J R 173	F 161	F 151	154	144	143	135	122	107	94	81	67	64	61
15	54	51	51	49	49	41	51	96	124	150	158	157	155	159	150	145	137	117	106	94	83	81	61	51
16	49	49	46	45	46	49	67	114	130	150	153	149	151	150	146	144	142	122	U S 97	91	90	76	65	59
17	52	47	44	45	44	49	62	103	115	136	140	141	141	147	146	137	124	117	98	97	93	73	72	61
18	S 60	47	42	36	33	36	H 34	S 79	122	133	146	138	137	132	139	130	118	103	94	86	79	66	60	62
19	S 62	S 61	58	53	51	51	58	101	129	146	145	145	143	141	136	131	122	103	96	S 73	73	64	55	43
20	S 44	47	48	50	43	42	55	91	S 111	140	149	143	147	145	141	134	134	S 115	90	82	75	64	52	46
21	S 46	47	47	50	39	39	52	90	115	135	143	139	136	133	139	126	119	S 101	87	81	76	56	47	51
22	49	49	47	49	38	40	53	101	118	133	136	136	133	130	129	125	104	87	78	74	63	51	50	48
23	48	50	43	42	43	45	56	92	121	148	R 153	152	142	138	129	126	118	99	82	82	85	57	50	51
24	50	47	46	44	40	42	52	91	114	129	147	143	138	133	123	119	111	91	89	84	60	S 46	47	45
25	47	44	41	38	39	41	50	97	127	144	155	144	144	140	135	134	R 132	108	80	72	64	H 57	49	52
26	S 48	41	34	35	32	33	45	89	111	127	146	135	135	123	124	115	116	108	83	67	61	62	56	54
27	45	43	44	43	F 41	46	51	89	117	148	155	153	148	143	147	144	137	120	104	92	91	71	56	58
28	57	S 52	54	56	57	55	S 62	107	122	134	144	148	142	129	126	125	126	113	89	89	87	68	69	61
29	67	65	56	51	53	54	71	115	121	139	156	U S 153	S 156	R 148	144	141	137	124	100	80	70	58	J S 62	59
30	58	58	53	57	54	52	57	109	134	S 154	158	155	R 149	149	140	131	126	109	S 96	S 74	73	68	60	60
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	30	30	30	30	30	30	30
MED	58	56	54	50	50	49	62	106	127	144	146	145	148	146	141	134	126	116	99	90	84	72	65	61
UQ	63	60	58	57	53	52	69	114	134	148	155	152	151	150	146	140	134	122	106	94	88	82	73	67
LQ	49	47	46	45	41	42	53	96	121	135	143	141	141	140	135	128	122	108	90	82	75	64	56	52

NOV. 1989 | FOF2 (0.1 MHZ)

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										L	L			L	C									
2										C	L	L	L	L										
3									L		L	L	L	L	A									
4												L	L											
5									L	L	L	L		L										
6													L	L										
7												L	L	L	L	L								
8											C	U L 770	L	L	L									
9												L	L	L										
10												L	L	L		L								
11													U L 720		L									
12													L	L										
13											L	L	L	L										
14													L	L	L	L								
15													L											
16										L			L	L	L									
17												L	L		L									
18									L			L	L 780	L	L									
19										L	L	L	L		L									
20											L		L		L									
21													L		L									
22										L				L										
23													L		L	L								
24												L	L	L	L									
25												L	L			L								
26									L				L											
27															L									
28										L	L		L	L	L	L								
29										L			L		L	L								
30												L		L	L	L								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT												1	2											
MED												U L 770	L 750											
UQ																								
LQ																								

NOV. 1989 | FOF1 (0.01 MHZ)

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							160	255	A	345	370	380	370	I S 360	I C 335	295	225	S						
2							A	255	305	I C 335	375	380	375	355	350	300	220	B						
3							B	235	300	345	365	380	A	A	A	A	A	B						
4							B	245	310	A	A	A	A	A	A	A	A	B						
5							B	230	A	U A 335	A	365	370	360	A	A	A	B						
6							A	240	315	360	375	380	370	365	A	300	225	B						
7							B	250	310	350	365	380	A	365	A	305	220	B						
8							B	255	310	A	C	A	A	380	A	A	A	B						
9						E B 130	B	265	320	365	A	385	375	375	345	A	A	B						
10							B	255	320	350	A	B	A	375	355	325	A	B						
11							B	245	310	345	375	A	385	355	345	A	A	B						
12							B	225	300	345	360	A	A	A	A	A	210	B						
13							B	225	300	A	A	A	A	365	350	290	A	B						
14				U B 130			B	235	310	340	A	A 380	370	375	A	A	A	B						
15							B	230	310	340	365	A	370	355	A 340	295	B	B						
16							B	235	A	A	A	B 375	365	A	345	A	A							
17								H 235	290	345	365	380	370	355	330	280	200							E 3 130
18	E B 140	E B 130	U B 130	K 145		J K 130	K 145	225	285	295	310	345	370	340	320	285	230							
19								220	300	R	355	375	365	360	325	280	215							
20								210	285	330	360	375	375	360	U A 340	A	H 225							
21								H 230	290	340	A	A	370	360	325	280	210							
22								H 225	295	330	365	375	375	355	325	275	H 210							
23								A	285	325	A	A	355	355	345	280	205							
24								A	280	335	355	385	375	A	335	275	230							
25								205	280	325	350	360	365	350	330	280	R 215							
26								200	290	B	A	380	380	345	335	295	A							
27								205	280	330	355	380	A	355	320	285	A							
28								180	280	335	350	355	370	345	320	275	205							
29								H 220	280	325	360	375	375	355	315	H 235	210							
30								H 200	280	330	345	A	A	A	330	275	200							
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	1	2		2	2	28	27	24	19	20	21	24	22	20	17							1
MED	E B 140	E B 130	U B 130	138		130	152	230	300	333	360	380	370	358	335	285	215							E B 130
UQ								245	310	345	365	380	375	365	345	295	225							
LQ								220	285	330	355	375	370	355	325	280	210							

NOV. 1989 | FOE (0.01 MHZ)

IONOSPHERIC DATA

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

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

Day \ Hour	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	JA 20	21	21	18	17	EB 13	G	G	34	G	41	JA 42	G	G	C	JA 54	30	JA 20	EB 13	JA 29	20	JA 19	JA 17	E 3 12
2	19	JA 21	JA 24	JA 25	JA 24	JA 20	JA 19	G	G	C	G	G	G	38	47	JA 44	JA 47	E 14	EB 15	EB 12	E 3 15	18	JA 24	19
3	EB 13	JA 23	JA 31	EB 12	19	JA 17	JA 23	G	34	G	44	G	JA 63	59	JA 104	70	JA 53	27	JA 19	EB 13	EB 15	EB 14	EB 14	EB 15
4	JA 27	JA 30	22	JA 42	JA 30	JA 22	21	G	JA 45	JA 41	JA 47	43	JA 60	JA 68	JA 73	JA 53	65	71	37	JA 104	JA 22	JA 22	24	JA 38
5	JA 28	JA 22	JA 21	EB 14	EB 13	JA 47	EB 15	26	JA 52	JA 51	38	G	G 29	JA 43	JA 46	JA 47	JA 40	JA 33	JA 24	JA 22	EB 13	EB 13	EB 13	JA 32
6	JA 36	JA 19	JA 26	JA 26	JA 22	JA 18	22	G	G	G	G	51	G	G	35	29	JA 22	JA 23	JA 24	JA 25	21	EB 13	22	24
7	JA 24	JA 45	JA 31	JA 26	EB 13	EB 13	EB 15	JA 24	G 29	G	G	JA 40	JA 47	JA 38	JA 40	JA 41	G 20	17	JA 22	JA 23	JA 19	EB 14	JA 35	EB 14
8	EB 14	EB 13	EB 12	JA 20	JA 21	JA 28	JA 22	G	G	38	C	39	JA 40	G	JA 46	JA 43	JA 43	JA 41	36	JA 43	JA 38	JA 25	JA 17	JA 44
9	EB 13	JA 22	EB 13	JA 21	EB 13	EB 13	EB 15	JA 30	36	40	45	G	G 35	G	G	JA 33	JA 30	JA 21	EB 14	JA 22	EB 14	EB 13	EB 13	EB 14
10	22	EB 13	EB 13	EB 13	EB 14	EB 14	EB 15	G	35	40	43	43	JA 39	G 37	3 23	G 33	26	33	22	EB 13	E 3 13	23	JA 35	EB 14
11	EB 13	EB 13	EB 13	EB 14	23	JA 23	JA 22	G	G	36	G	37	JA 40	G	G	JA 52	JA 43	EB 13	JA 18	JA 18	E 3 14	20	JA 21	EB 14
12	21	JA 30	JA 24	JA 29	EB 13	EB 13	EB 13	G	G	39	42	JA 53	JA 44	JA 44	38	JA 42	JA 29	EB 13	JA 22	JA 29	25	JA 17	22	EB 13
13	EB 14	EB 13	JA 22	EB 13	EB 13	EB 13	EB 14	G	G	JA 49	40	41	JA 46	41	39	34	28	EB 14	EB 13	EB 14	JA 20	EB 14	JA 22	ES 14
14	EB 14	22	JA 23	EB 13	EB 15	EB 12	JA 22	G	34	39	40	43	JA 43	G 37	JA 44	JA 48	JA 40	JA 32	JA 40	JA 34	JA 69	JA 23	JA 24	23
15	EB 15	JA 22	19	JA 21	22	EB 13	JA 23	G	G	39	39	39	G	43	44	33	EB 33	EB 15	EB 13	EB 14	JA 20	EB 13	3 14	22
16	20	EB 14	EB 13	EB 14	EB 15	JA 26	EB 14	G	JA 33	JA 46	JA 54	G 37	JA 41	JA 47	JA 42	54	23	JA 16	EB 14	EB 13	20	EB 13	EB 13	JA 28
17	JA 30	JA 19	23	JA 18	JA 20	EB 13	EB 13	27	G	G	G	G	G 25	G 24	G 23	G 22	29	E 15	JA 22	JA 21	JA 18	EB 14	JA 19	EB 13
18	EB 14	EB 13	EB 13	K 15	EB 17	EB 13	K 17	G	G	G	34	G	G 26	G 27	37	37	G 20	JA 23	24	24	22	JA 26	JA 33	EB 13
19	JA 22	EB 14	EB 14	JA 18	EB 14	EB 13	EB 14	G	JA 39	G	JA 40	JA 46	46	43	JA 53	42	G 19	E 3 14	JA 18	JA 41	JA 45	JA 22	JA 22	JA 31
20	EB 13	EB 13	EB 13	EB 13	EB 13	JA 16	EB 13	G	JA 33	JA 51	41	47	44	JA 47	42	JA 34	G	JA 18	EB 14	JA 20	JA 31	JA 21	JA 30	JA 21
21	JA 23	JA 19	JA 19	EB 12	JA 15	JA 18	JA 22	G	G	38	JA 43	39	G	G	G	G	24	EB 14	EB 13	22	EB 14	EB 14	EB 14	EB 14
22	EB 15	EB 13	JA 22	EB 12	EB 13	EB 13	JA 30	G	G	JA 48	G	G	G	G 34	G	31	G 20	JA 30	26	EB 14	EB 14	EB 14	JA 24	EB 13
23	EB 14	EB 13	EB 14	EB 13	EB 14	EB 13	JA 19	22	G	G	JA 43	JA 40	G	G	G	G 20	JA 22	JA 22	JA 23	JA 20	JA 22	20	EB 14	18
24	EB 13	EB 13	EB 13	EB 13	EB 13	EB 13	EB 14	23	34	G	G	G	G	JA 55	G	G 20	34	JA 20	EB 13	EB 14	EB 13	EB 14	EB 15	EB 13
25	EB 13	22	19	EB 13	EB 14	EB 14	EB 13	JA 43	G	G	G	G	G 28	G	JA 40	JA 40	JA 42	JA 32	JA 24	EB 13	E 3 14	EB 14	EB 13	ES 16
26	EB 14	EB 13	EB 14	EB 13	EB 13	JA 20	EB 14	G	G	EB 43	40	43	G	G	36	G	24	JA 23	JA 20	EB 15	EB 13	EB 13	19	EB 14
27	EB 12	EB 12	EB 13	JA 31	JA 21	ES 16	EB 13	G	G	JA 35	JA 46	G 36	JA 80	JA 47	G 27	G 25	JA 25	E 3 13	EB 13	EB 13	EB 14	JA 27	EB 13	JA 17
28	EB 13	EB 12	EB 13	EB 12	EB 12	EB 13	JA 18	G	30	G	G	G	G	G	G 24	30	G	EB 13	22	20	EB 13	EB 14	EB 14	EB 16
29	EB 13	EB 12	EB 12	EB 13	EB 13	EB 13	EB 14	G 22	JA 42	JA 37	G	G	G	G	G	G	G	EB 14	EB 13	JA 21	EB 13	EB 13	JA 22	JA 18
30	JA 21	EB 13	EB 12	EB 13	22	EB 13	JA 22	G	G	G 26	40	JA 41	44	JA 45	G	G	JA 22	JA 22	EB 14	JA 16	19	EB 13	EB 14	EB 13
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	29	29	30	30	30	29	30	30	30	30	30	30	30	30	30
MED	EB 14	EB 14	16	EB 14	EB 14	EB 13	15	G	G	36	40	39	G 32	G 37	37	34	26	20	20	JA 20	18	E 3 14	19	E 16
UQ	JA 22	JA 22	JA 22	JA 21	21	JA 18	JA 22	G 22	34	40	43	43	JA 44	JA 44	JA 44	JA 44	JA 40	JA 27	JA 24	JA 24	JA 22	JA 21	JA 24	JA 22
LQ	EB 13	EB 13	EB 13	EB 13	EB 13	EB 13	EB 14	G	G	G	G	G	G	G	G	G 25	22	EB 14	EB 14	EB 14	EB 14	EB 13	EB 14	E 3 14

NOV. 1989 | FOES (0.1 MHZ)

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	E B 13	E B 13	E B 13	E B 12	E B 13		G	31		G	G	G	G		G	27	E S 16	E B 13	20	18	E B 13	E B 14	E B 12
2	16	E B 16	E B 13	17	17	17	18	G	G	C	G	G	G	G	42	38	38	E B 14	E B 15	E B 12	E B 15	16	17	E B 13
3	E B 13	15	29	E B 12	E B 13	E B 13	E B 17	G	32	G	40	G	46	50	85	62	26	17	E B 15	E B 13	E B 15	E B 14	E B 14	E B 15
4	21	16	E B 13	25	21	16	E B 16	G	41	38	46	41	58	45	69	43	58	61	37	86	19	18	18	29
5	17	14	E B 14	E B 14	E B 13	E B 13	E B 15	26	32	U A 34	37	G	G 28	G 26	37	32	24	18	17	E B 13	E B 13	E B 13	E B 13	E B 14
6	24	E B 13	E B 13	E B 13	E B 12	E B 13	16	G	G	G	G	G	G	G	35	G 29	G 17	E B 13	21	21	E B 13	E B 13	E B 14	E B 13
7	15	28	18	16	E B 13	E B 13	E B 15	G 19	G 27	G	G	G 33	40	G 31	35	G 26	G 18	17	18	21	E B 14	E B 14	22	E B 14
8	E B 14	E B 13	E B 12	14	E B 13	E B 12	17	G	G	36	C	38	38	G	36	38	31	29	27	19	21	18	E B 13	32
9	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 15	G	34	38	45	G	G 33	G	G	31	24	15	E B 14	E B 13	E B 14	E B 13	E B 13	E B 14
10	E B 14	E B 13	E B 13	E B 13	E B 14	E B 14	E B 15	G	34	39	39	43	38	G 35	G 22	G 31	25	25	E B 14	E B 13	E B 13	E B 14	18	E B 14
11	E B 13	E B 13	E B 13	E B 14	E B 14	E B 15	E B 15	G	G	35	G	36	G 35	G	G	31	32	E B 13	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14
12	E B 14	E B 13	E B 12	E B 12	E B 13	E B 13	E B 13	G	G	39	40	40	41	37	35	34	G 19	E B 13	14	E B 14	17	E B 16	E B 15	E B 13
13	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	35	37	40	38	39	37	32	24	E B 14	E B 13	E B 14	E B 13	E B 14	17	E S 14
14	E B 14	E B 13	E B 13	E B 13	E B 15	E B 12	17	G	G	35	37	39	39	G 24	34	33	37	23	36	31	48	E B 12	15	14
15	E B 15	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	37	G	37	G	39	40	32	E B 33	E B 15	E B 13	E B 14	E B	E B 13	E 3 14	E B 15
16	14	E B 14	E B 13	E B 14	E B 15	E B 13	E B 14	G	30	35	37	G 37	G 36	37	G 32	44	23	E 3 14	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13
17	26	E B 13	E B 14	E B 13	E B 14	E B 13	E B 13	27	G	G	G	G	G 25	G 22	G 21	G 18	27	E B 15	E B 15	E B 13	E B 14	E B 14	E B 14	E B 13
18	E B 14	E B 13	E B 13	G 15	E B 17	E B 13	K 15	G	G	G	U R 33	G	G 25	G 25	36	31	G 19	18	19	22	19	E B 13	20	E B 13
19	16	E B 14	E B 14	E B 14	E B 14	E B 13	E B 14	G	G	G	G 30	40	38	40	40	33	G 17	E B 14	E B 15	27	38	E B 12	E 3 13	16
20	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G 26	39	43	41	40	G 34	30	G	E 3 16	E B 14	E B 13	24	19	21	E B 13
21	E B 13	E B 13	16	E B 12	E B 13	E B 12	E B 14	G	G	G	38	38	G	G	G	G	24	E B 14	E B 13	14	E 3 14	E B 14	E B 14	E B 14
22	E B 15	E B 13	E B 13	E B 12	E B 13	E B 13	E B 14	G	G	G	G	G	G	G 32	G	30	G 16	17	17	E B 14	F B 14	E B 14	E B 13	E B 13
23	E B 14	E B 13	E B 14	E B 13	E B 14	E B 13	E B 13	22	G	G	36	37	G	G	G	G 18	G 19	17	17	E B 13	E B 14	E B 14	E B 14	E B 13
24	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 14	23	30	G	G	G	G	36	G	G 20	G 18	17	E B 13	E B 14	E B 13	E B 14	E B 15	E B 13
25	E B 13	E B 13	E B 13	E B 13	E B 14	E B 14	E B 13	G 18	G	G	G	G	G 27	G	G 19	G 18	G 17	E B 14	E B 15	E B 13	E B 14	E B 14	E B 13	E S 16
26	E B 14	E B 13	E B 14	E B 13	E B 13	E B 14	E B 14	G	G	E B 43	39	G	G	G	36	G	23	E B 14	E B 14	E B 15	E B 13	E B 13	E B 13	E B 14
27	E B 12	E B 12	E B 13	E B 13	E B 12	E B S 16	E B 13	G	G	G 28	G	G 30	45	G 29	G 25	G 21	21	E B 13	E B 13	E B 13	E B 14	E B 13	E B 13	E B 13
28	E B 13	E B 12	E B 13	E B 12	E B 12	E B 13	E B 14	G	30	G	G	G	G	G	G 23	29	G	E B 13	E B 13	E B 13	E B 13	E B 14	E B 14	E B 16
29	E B 13	E B 12	E B 12	E B 13	E B 13	E B 13	E B 14	G 15	G	G 27	G	G	G	G	G	G	G	E B 14	E B 13	E B 14	E B 13	E B 13	E B 14	E B 13
30	E B 12	E B 13	E B 12	E B 13	16	E B 13	E B 14	G	G	G 25	37	37	36	40	G	G	G 16	14	E B 14	E B 13	E B 13	E B 13	E B 14	E B 13
31																								

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	29	29	30	30	30	29	30	30	30	30	30	29	30	30	30
MED	E B 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 14	G	G	G 26	33	G 32	G 30	G 26	G 34	30	22	E B 15	E B 14	E B 14	E B 14	E B 14	E B 14	E B 14
UQ	15	E B 13	E B 14	E B 14	E B 14	E B 13	E B 15	G	30	35	38	38	38	37	36	33	26	17	17	19	17	E B 14	15	E B 14
LQ	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13	G	G	G	G	G	G	G	G	G 18	G 17	E 3 14	E B 13	E B 13	E B 13	E B 13	E B 13	E B 13

NOV. 1989 | FBES (0.1 MHZ)

IONOSPHERIC DATA

NOV. 1989 | FMIN (0.1 MHZ) | 135° E Mean Time (G.M.T. + ? 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	13	13	13	13	12	13	13	15	17	21	18	21	19	E S 25	C	17	15	E S 16	13	13	13	13	14	12
2	14	16	13	13	13	13	13	16	16	C	17	20	20	18	17	18	15	14	15	12	15	12	12	13
3	13	14	12	12	13	13	17	15	16	16	18	21	23	18	19	15	13	16	15	13	15	14	14	15
4	13	13	13	13	13	13	15	13	17	13	18	21	21	22	20	17	16	14	13	14	13	14	13	16
5	15	13	14	14	13	13	15	15	17	16	19	19	19	16	17	15	13	14	14	13	13	13	13	14
6	13	13	13	13	12	13	13	15	15	17	17	21	23	22	17	13	13	13	12	13	13	13	14	13
7	13	14	12	14	13	13	15	14	14	17	18	19	26	16	15	17	15	13	13	13	14	14	13	14
8	14	13	12	13	13	12	16	14	17	17	C	21	21	19	13	15	16	13	13	14	14	15	13	15
9	13	13	13	13	13	13	15	16	14	13	33	19	18	21	17	14	14	13	14	13	14	13	13	14
10	14	13	13	13	14	14	15	14	13	13	21	41	15	17	17	18	16	13	14	13	13	14	15	14
11	13	13	13	14	14	15	15	15	14	16	17	19	23	17	18	16	15	13	14	14	14	14	14	14
12	14	13	12	12	13	13	13	14	14	16	17	20	19	18	16	18	14	13	13	14	13	16	15	13
13	14	13	13	13	13	13	14	14	17	17	17	17	19	17	17	15	14	14	13	14	13	14	13	E S 14
14	14	13	13	13	15	12	14	13	14	15	18	17	18	17	15	14	13	13	16	16	13	12	14	13
15	15	13	13	13	13	13	13	13	17	17	21	19	19	22	21	20	33	15	13	14	13	13	14	15
16	12	14	13	14	15	13	14	16	15	16	17	21	20	20	19	16	14	14	14	13	13	13	13	13
17	14	13	14	13	14	13	13	15	15	21	20	22	19	17	18	14	13	15	15	13	14	14	14	13
18	14	13	13	13	17	13	13	14	16	17	17	13	21	19	17	13	14	15	15	14	13	13	14	13
19	14	14	14	14	14	13	14	14	16	20	20	21	21	19	16	13	13	14	15	15	15	12	13	13
20	13	13	13	13	13	13	13	15	17	17	20	20	19	20	16	17	13	16	14	13	16	13	13	13
21	13	13	13	12	13	12	14	14	16	15	21	17	21	21	17	16	15	14	13	13	14	14	14	14
22	15	13	13	12	13	13	14	15	14	17	21	19	23	20	17	17	12	13	13	14	14	14	13	13
23	14	13	14	13	14	13	13	14	15	16	18	19	22	17	19	14	15	13	14	13	14	14	14	13
24	13	13	13	13	13	13	14	15	15	20	17	23	21	18	17	14	16	15	13	14	13	14	15	13
25	13	13	13	13	14	14	13	15	14	16	16	18	19	15	16	14	13	14	15	13	14	14	13	E S 16
26	14	13	14	13	13	14	14	13	16	43	34	27	26	21	16	17	16	14	14	15	13	13	13	14
27	12	12	13	13	12	E S 16	18	15	14	14	16	17	18	18	17	14	13	13	13	13	14	13	13	13
28	13	12	13	12	12	13	14	14	14	14	18	20	18	18	17	14	15	13	13	13	13	14	14	16
29	13	12	12	13	13	13	14	15	14	17	17	19	23	20	16	17	15	14	13	14	13	13	14	13
30	12	13	12	13	14	13	14	15	13	17	18	18	17	20	16	13	12	13	14	13	13	13	14	13
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	29	29	30	30	30	29	30	30	30	30	30	30	30	30	30
MED	13	13	13	13	13	13	14	14	15	17	18	20	20	18	17	16	14	14	14	13	13	14	14	13
UQ	14	13	13	13	14	13	15	15	17	13	20	21	22	20	18	17	15	14	14	14	14	14	14	14
LQ	13	13	13	13	13	13	13	14	14	16	17	19	19	17	16	14	13	13	13	13	13	13	13	13

NOV. 1989 | FMIN (0.1 MHZ)

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	S 280	260	265	255	280	270	310	330	310	300	R 315	290	285	U S 290	I C 290	290	290	300	300	305	295	285	285	300
2	305	275	280	280	275	270	315	330	320	I C 310	300	295	280	280	290	285	285	285	285	295	290	S 305	290	285
3	270	S 275	275	275	280	255	285	330	305	300	295	280	270	280	280	285	285	290	285	285	285	290	260	S 265
4	250	270	285	235	270	270	315	305	310	305	R 295	U S 285	280	U R 280	J R 285	S 285	290	300	300	290	275	295	295	295
5	245	230	235	275	265	260	S 295	320	320	310	305	290	285	280	280	280	285	285	290	300	300	290	285	295
6	290	290	290	305	265	270	305	330	325	320	300	285	280	280	275	275	285	290	290	285	290	300	300	280
7	295	305	290	280	280	270	305	330	320	310	295	280	270	270	265	270	280	280	270	280	285	300	280	270
8	235	250	280	315	H 245	255	290	325	310	310	I C 290	270	275	275	270	270	275	280	285	280	290	295	315	260
9	270	270	260	260	250	260	310	325	315	310	290	285	285	270	275	265	275	280	275	270	270	270	285	295
10	275	270	S 270	275	225	240	300	310	315	295	290	270	275	265	270	270	270	275	285	280	280	280	275	275
11	S 290	285	290	285	275	260	290	S 325	320	305	290	275	275	270	R 260	270	275	280	290	285	280	295	275	285
12	280	285	270	280	260	245	280	315	320	290	285	270	270	275	270	275	275	280	280	285	280	290	280	285
13	285	285	285	280	290	275	295	315	310	305	290	275	275	270	265	270	265	275	275	280	270	270	255	245
14	230	240	230	220	225	I S 245	270	285	290	R 290	J R 285	F 275	F 275	270	265	270	280	285	290	285	285	285	285	300
15	285	275	275	280	295	300	300	330	310	305	300	290	280	280	275	285	285	280	290	290	295	315	310	305
16	280	285	265	260	255	265	305	335	330	315	305	290	275	285	280	280	295	300	U S 290	290	300	295	295	275
17	280	280	245	270	265	275	305	335	320	305	305	295	280	280	280	290	285	295	285	290	305	265	230	240
18	S 265	255	210	220	205	200	H 230	S 230	290	275	285	275	260	265	275	280	285	280	290	280	310	280	265	275
19	S 290	S 280	270	285	245	265	290	320	325	315	310	290	285	280	290	290	295	295	305	S 305	300	300	310	285
20	S 265	260	275	290	260	270	300	330	S 315	310	300	300	290	285	285	290	300	S 305	305	295	315	295	290	280
21	S 285	275	280	305	265	270	295	330	325	315	310	300	285	285	295	290	300	S 290	290	295	305	325	260	265
22	265	285	290	290	320	275	300	330	325	320	310	305	290	285	290	295	305	295	300	310	315	300	285	285
23	285	285	255	245	255	280	300	315	315	315	R 305	300	290	290	285	290	295	305	290	305	320	310	270	285
24	285	300	290	300	270	270	305	335	325	315	310	305	285	290	285	290	295	290	300	325	320	S 280	275	285
25	280	295	270	280	255	260	290	320	315	310	305	290	295	295	285	285	R 295	315	310	310	315	H 270	270	280
26	S 300	295	290	285	270	290	310	340	335	315	320	300	300	280	295	290	290	300	295	310	275	300	285	300
27	280	275	255	255	F 235	260	305	325	310	305	300	285	280	285	275	285	290	290	295	290	310	305	265	260
28	270	S 270	270	265	290	280	S 305	325	325	315	285	295	290	270	280	270	280	290	275	285	295	280	280	275
29	275	310	260	265	255	255	295	325	315	300	295	U S 300	S 290	R 280	275	280	285	295	295	295	285	265	J S 255	270
30	265	275	270	270	265	260	260	325	310	S 310	300	285	R 300	285	285	285	295	295	S 310	S 300	290	295	290	295
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	30	30	30	30	30	30	30
MED	280	275	270	278	265	268	300	325	315	310	300	290	280	280	280	285	285	290	290	290	292	295	282	282
UQ	285	285	285	285	275	270	305	330	325	315	305	295	290	285	285	290	295	295	300	300	305	300	290	295
LQ	265	270	260	260	255	260	290	320	310	305	290	280	275	270	275	270	280	280	285	285	285	280	270	270

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

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										L	L			L	C									
2										C	L	L	L	L										
3									L		L	L	L	L	A									
4												L	L											
5									L	L	L	L		L										
6													L	L										
7												L	L	L	L	L								
8											C	U L 350	L	L	L									
9												L	L	L										
10												L	L	L		L								
11													U L 350		L									
12													L	L										
13											L	L	L	L										
14													L	L	L	L								
15													L											
16										L			L	L	L									
17												L	L		L									
18									L			L	L 345	L	L									
19										L	L	L	L		L									
20											L		L		L									
21													L		L									
22										L				L										
23													L		L	L								
24												L	L	L	L									
25												L	L			L								
26									L				L											
27															L									
28										L	L		L	L	L	L								
29										L			L		L	L								
30												L		L	L	L								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT												1	2											
MED												U L 350	L 348											
UQ																								
LQ																								

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

IONOSPHERIC DATA

NOV. 1989 | H'F2 (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										260	255			290 L	C									
2										I C 245	270	275	330 L	270										
3									275 L		255	305 L	325	290	280 A									
4												310 L	320											
5									255	260	305	255		290 L										
6													305	305										
7												310 L	345 L	310 L	360 L	310 L								
8											C	330	305	310	315									
9												310	310	335										
10												L	305	335		L								
11													320		340 L									
12													320	315										
13											265	320	310	310										
14													310 L	330	350 L	310								
15													290											
16										255			315 L	280	300									
17												300	285 L		310									
18									290			335 L	350	L	310									
19										255	255	290	300		260									
20											260		255		330 L									
21													285 L		270									
22										255				335 L										
23													275 L		L	290 L								
24												255	315 L	290	290 L									
25												285 L	305			285								
26									255				255											
27															300 L									
28										260	305 L		300	340 L	310	310								
29										260			260		L	290 L								
30												310		310	310 L	295 L								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									4	8	8	14	25	17	15	7								
MED									265	253	262	308	305	310	310	295 L								
UQ									282	260	288	310	320	330	322	310								
LQ									255	255	255	285	290	290	295	290 L								

NOV. 1989 | H'F2 (KM)

IONOSPHERIC DATA

NOV. 1989 | H'F (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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	305	310	295	305	260	270	255	220	220	225	230	235	235	230	I C 230	230	225	225	230	240	235	255	260	270
2	250	275	295	300	280	300	260	210	215	I C 215	220	220	230	235	250	230	235	240	230	255	265	250	255	265
3	280	285	A 315	275	240	335	275	210	215	230	230	R 225	A 245	A 250	A	E A 250	230	230	230	245	245	260	280	330
4	A 350	300	250	H 255	280	280	225	230	235	235	240	225	A 260	A 245	E A 270	240	A 250	E A 260	A 240	A	260	250	250	A 260
5	330	385	370	265	230	240	240	230	230	230	215	220	225	230	230	235	245	225	235	230	225	255	255	240
6	A 280	260	255	240	265	295	260	225	230	225	225	230	210	230	230	230	230	225	235	230	235	250	250	265
7	265	A 260	270	300	270	300	270	225	230	220	220	215	240	240	235	235	245	240	230	265	235	220	265	270
8	330	305	265	235	250	355	300	235	230	230	I C 230	220	235	240	235	240	235	245	250	240	255	250	225	E A 320
9	285	275	300	295	335	305	245	230	225	230	230	225	225	225	240	230	240	225	240	260	275	260	270	250
10	265	300	280	265	400	380	260	215	230	230	230	235	220	240	245	235	235	A 260	240	215	250	250	255	275
11	260	250	250	265	260	320	270	240	230	230	230	230	215	245	230	230	250	240	245	230	250	245	250	255
12	255	275	300	295	265	330	290	230	220	225	235	230	225	235	240	250	230	230	235	245	240	250	255	245
13	260	265	265	290	270	260	250	235	225	230	220	225	230	240	240	240	240	250	235	235	255	260	280	330
14	390	330	380	460	410	350	290	240	230	235	240	235	225	230	240	240	245	230	A 265	255	E A 305	250	240	260
15	255	270	280	270	260	245	250	240	225	230	230	230	230	230	235	240	240	H 205	240	230	240	235	225	250
16	260	280	310	330	330	310	250	220	220	210	220	220	220	225	230	240	235	210	210	235	240	230	255	250
17	A 300	290	350	320	300	280	240	225	210	210	220	220	225	230	230	240	220	225	225	270	250	270	325	330
18	305	315	500	530	570	535	H 435	275	235	250	H 230	225	220	H 230	240	225	235	220	260	250	235	235	290	290
19	270	290	305	260	230	300	275	225	225	225	215	220	225	230	235	220	215	210	235	A 250	E A 270	220	240	280
20	320	320	310	270	275	275	240	215	215	225	220	230	225	230	H 220	225	240	210	220	235	A 240	240	250	275
21	300	290	285	260	220	290	215	215	225	230	225	225	230	240	235	225	230	210	230	240	235	215	300	300
22	310	260	255	255	250	300	260	230	225	225	220	230	225	H 210	235	230	220	H 220	250	240	240	235	255	270
23	275	270	330	350	335	300	250	220	230	240	230	235	225	230	230	225	230	210	240	245	235	210	270	265
24	270	260	275	270	300	300	245	225	220	230	230	230	230	225	225	235	220	210	245	220	220	250	310	290
25	290	270	285	280	350	335	300	250	225	230	235	H 220	230	230	225	230	235	215	210	225	225	250	255	270
26	255	260	280	305	300	305	250	225	220	220	240	235	235	220	240	235	240	220	210	230	280	255	250	260
27	265	310	330	315	385	320	240	225	225	230	235	230	245	235	235	245	235	220	235	220	240	220	240	305
28	295	290	280	280	255	300	260	230	215	225	235	230	220	230	230	230	235	230	230	260	250	225	275	275
29	295	250	275	300	310	305	255	230	225	230	235	240	225	235	H 225	235	240	225	210	215	240	280	320	270
30	300	290	285	290	280	340	330	230	230	230	230	225	230	220	235	215	245	220	235	235	250	250	255	240
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	29	30	30	30	30	29	30	30	30	30
MED	282	282	285	285	278	300	258	228	225	230	230	228	225	230	235	234	235	225	235	240	240	250	255	270
UQ	305	300	310	305	330	330	275	230	230	230	235	230	230	240	240	240	240	230	240	250	252	255	275	285
LQ	265	265	275	265	260	290	245	220	220	225	220	220	225	230	230	230	230	215	230	230	235	235	250	260

NOV. 1989 | H'F (KM)

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							E B 155	120	120	120	115	120	115	120	I C 115	115	E A 130	S						
2							A	120	110	I C 110	110	110	110	110	A 115	115	120	B						
3							B	115	110	110	110	110	110	A	A	A	A	B						
4							B	125	115	110	110	115	115	A	115	A	A	B						
5							B	115	A	A	A	110	A 120	115	A	A	A	B						
6							A	120	115	120	115	115	115	115	110	A	A 125	B						
7							B	A 130	E A 130	110	110	E A 125	A	E A 125	A	E A 130	A 120	B						
8							B	120	110	110	I C 110	110	A	110	A	A	A	B						
9						B	B	130	110	110	125	110	A 120	105	110	A 110	A	B						
10							B	120	115	110	110	B	115	A 140	115	E A 140	A	B						
11							B	120	115	110	110	110	E A 135	110	110	A	A	B						
12							B	125	110	110	110	110	110	110	115	110	E A 140	B						
13							B	120	110	A	110	110	115	110	115	115	A	B						
14				B			B	135	115	110	110	115	110	A 120	A	A	A	B						
15							B	120	110	110	115	115	115	115	115	120	B	B						
16							B	120	110	110	A	E A 130	A	A	A	A	A							
17								120	110	110	110	110	A 115	115	A 115	A 115	130							3
18	B	B	3	B		B	K 130	120	110	110	110	110	E R 120	A 120	120	105	E A 135							
19								120	115	110	E A 135	A 125	110	110	A 110	A 120	E A 135							
20								120	115	A 120	110	110	110	A 125	110	A	120							
21								130	115	A 120	115	110	110	110	110	110	130							
22								125	110	115	110	110	115	A 125	110	A 120	E A 135							
23								A	115	110	110	A 110	115	110	115	115	E A 145							
24								A	115	115	110	115	110	110	110	A 115	E A 150							
25								E A 130	110	105	110	110	A 120	110	A 110	A 115	E A 140							
26								120	115	B	A	120	110	110	E A 135	120	A							
27								130	110	A 130	115	A 120	A	E A 130	E A 120	A 125	A							
28								140	120	115	120	115	115	115	A 125	120	130							
29								E A 150	120	115	115	115	120	110	110	110	135							
30								125	115	A 120	A 115	115	A	A	110	110	A 130							
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							2	28	29	27	27	29	25	26	24	21	17							
MED							136	120	115	110	110	110	115	111	112	115	A 125							
UQ								128	115	115	115	115	115	A 118	115	120	E A 135							
LQ								120	110	110	110	110	110	110	110	110	130							

NOV. 1989 | H'E (KM)

IONOSPHERIC DATA

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

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

Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	100	105	100	105	100	B	G	G	120	G	125	120	G	G	C	115	120	110	B	105	100	100	105	B
2	100	105	100	100	100	100	100	G	G	C	G	G	G	E G 175	130	130	120	B	B	B	B	105	105	110
3	B	100	95	B	100	105	115	G	E G 140	G	120	G	100	100	95	95	100	105	110	B	B	B	B	B
4	105	105	105	100	105	105	110	G	120	120	115	120	110	105	110	105	110	110	110	105	110	105	105	95
5	100	110	110	B	B	105	B	E G 150	110	110	115	G	105	110	100	105	95	105	105	105	B	B	B	105
6	105	110	100	110	105	110	105	G	G	G	G	105	G	G	115	110	100	110	110	110	110	B	110	100
7	100	100	100	100	B	B	B	120	110	G	G	110	105	100	100	110	105	105	100	100	100	B	100	B
8	B	B	B	105	105	105	110	G	G	120	C	115	115	G	110	100	100	100	100	115	105	110	115	100
9	B	110	B	105	B	B	B	110	150	130	120	G	110	G	G	110	100	120	B	115	B	B	B	B
10	105	B	B	B	B	B	B	G	E G 155	130	120	135	110	120	100	115	115	110	110	B	B	105	105	B
11	B	B	B	B	100	100	105	G	G	E G 160	G	115	105	G	G	105	105	B	110	120	B	110	105	B
12	110	115	105	105	B	B	B	G	G	125	115	110	115	110	115	110	110	B	110	110	105	110	100	B
13	B	B	120	B	B	B	B	G	G	110	120	115	120	125	150	140	110	B	B	B	120	B	105	S
14	B	105	110	B	B	B	105	G	120	130	125	130	120	105	100	100	110	95	105	105	100	110	105	100
15	B	105	100	100	105	B	120	G	G	130	130	120	G	120	115	E G 155	B	B	B	B	110	B	B	95
16	100	B	B	B	B	105	B	G	120	115	110	115	115	110	110	105	110	115	B	B	105	B	B	100
17	100	100	105	105	105	B	B	140	G	G	G	G	105	105	105	100	120	B	105	105	105	B	105	B
18	B	B	B	B	B	B	K 130	G	G	G	125	G	105	105	125	145	100	100	100	135	130	140	100	B
19	110	B	B	120	B	B	B	G	115	G	110	140	155	150	125	140	105	B	140	110	105	110	110	105
20	B	B	B	B	B	105	B	G	125	110	E G 170	135	135	130	130	115	G	115	B	100	110	110	105	110
21	110	115	100	B	115	105	110	G	G	115	120	115	G	G	G	G	E G 205	B	B	100	B	B	B	B
22	B	B	110	B	B	B	110	G	G	130	G	G	G	110	G	E G 155	105	115	95	B	B	B	110	B
23	B	B	B	B	B	B	110	120	G	G	115	110	G	G	G	105	105	105	100	105	100	105	B	100
24	B	B	B	B	B	B	B	130	130	G	G	G	G	120	G	105	100	110	B	B	B	B	B	B
25	B	110	110	B	B	B	B	115	G	G	G	G	100	G	105	105	100	105	105	B	B	B	B	S
26	B	B	B	B	B	115	B	G	G	B	120	150	G	G	E G 160	G	125	105	105	B	B	B	110	B
27	B	B	B	120	115	S	B	G	G	105	125	110	100	105	100	110	105	B	B	B	B	120	B	105
28	B	B	B	B	B	B	115	G	E G 160	G	G	G	G	G	110	135	G	B	110	110	B	B	B	B
29	B	B	B	B	B	B	B	120	110	115	G	G	G	G	G	G	G	B	B	115	B	B	110	110
30	120	B	B	B	110	B	110	G	G	110	130	120	120	110	G	G	110	105	B	105	100	B	B	B
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	13	14	15	12	12	11	14	8	14	17	19	19	19	19	21	26	26	19	18	19	16	13	18	13
MED	105	105	105	105	105	105	110	120	119	118	120	115	110	110	110	109	105	105	105	105	105	110	105	100
UQ	110	110	110	108	108	105	115	130	U 130	130	125	125	118	120	120	U 122	110	110	110	112	110	110	110	105
LQ	100	105	100	100	100	105	105	118	115	110	115	112	105	105	100	105	100	105	100	105	100	105	105	100

NOV. 1989 | H'ES (KM)

IONOSPHERIC DATA

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

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

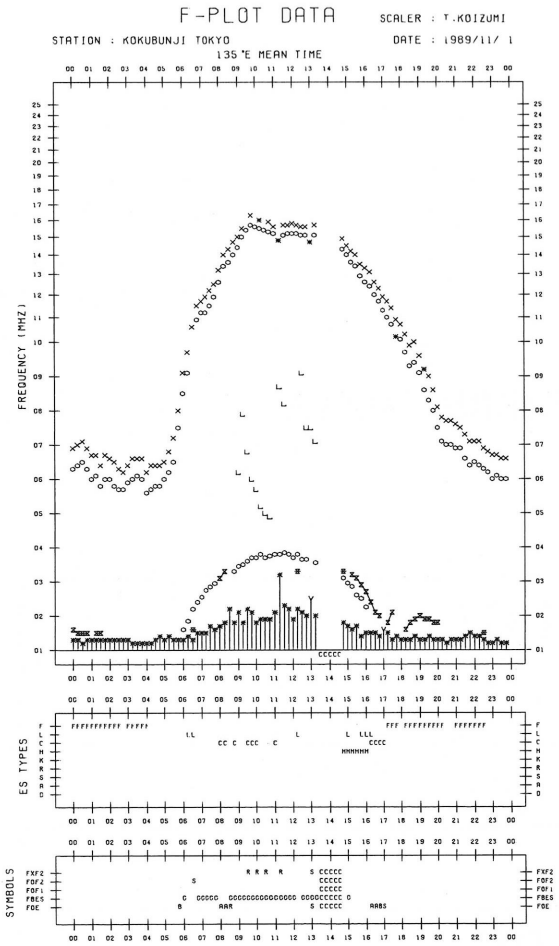
Hour / Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F 2	F 2	F 2	F 1	F 1				C 1		C 1	C 1				LH 11	HL 11	C 1		F 3	F 1	F 1	F 1	
2	F 1	F 2	F 2	F 3	F 2	F 2	L 2							H 1	HL 11	H 2	H 3					F 2	F 3	F 1
3		F 2	F 5		F 1	F 1	L 1		H 1		H 1		C 3	L 3	L 4	L 4	L 2	L 2	F 1					
4	F 6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

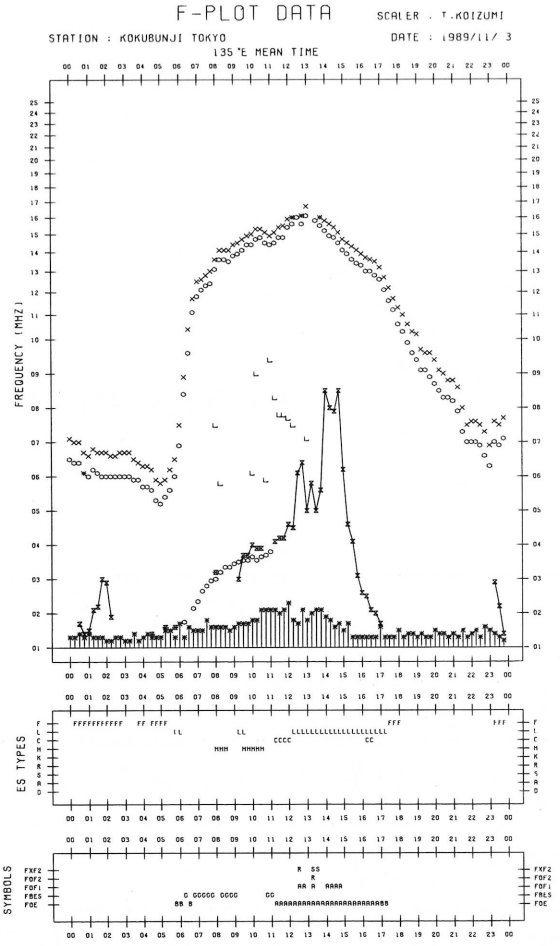
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																								
MED																								
UQ																								
LQ																								

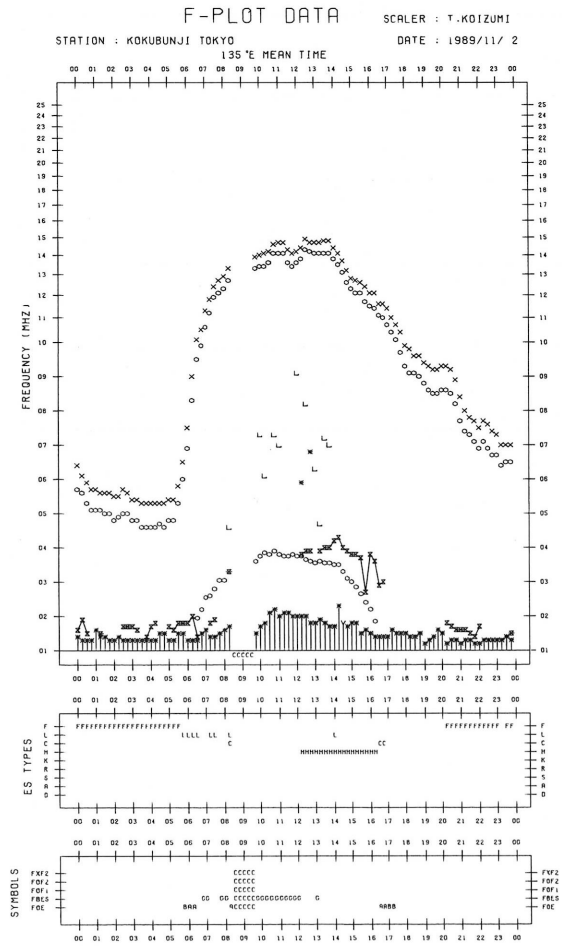
NOV. 1989 | TYPES OF ES

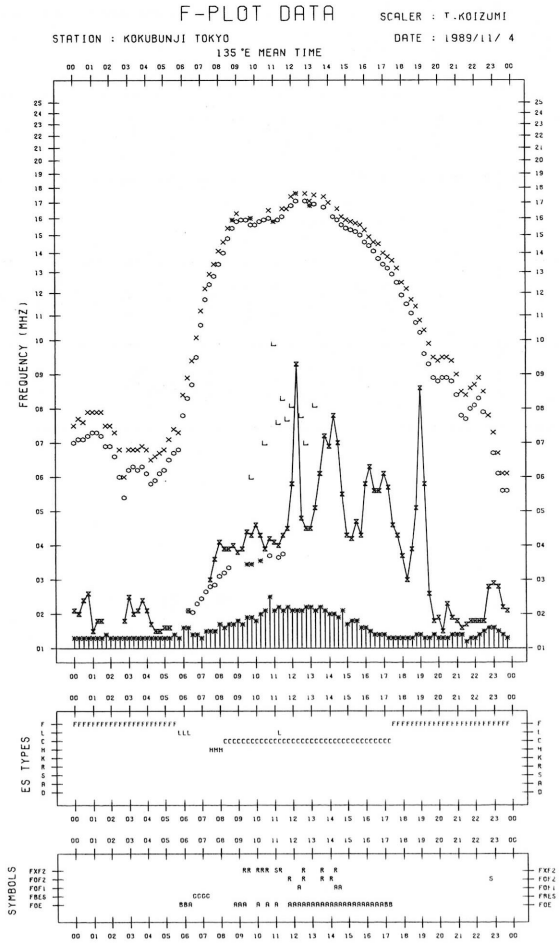
f-PLOTS OF IONOSPHERIC DATA

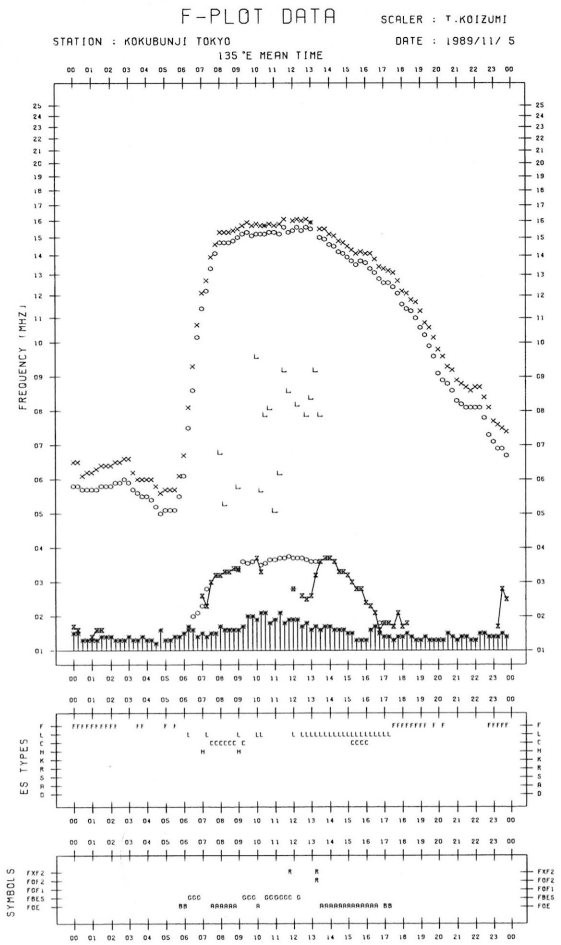
KEY OF F-PLOT	
I	SPREAD
○	FOF2, FOF1, FOE
×	FXF2
✳	DOUBTFUL FOF2, FOF1, FOE
⧖	FBES
⌊	ESTIMATED FOF1
⫯, ⫰	FMIN
∧	GREATER THAN
∨	LESS THAN

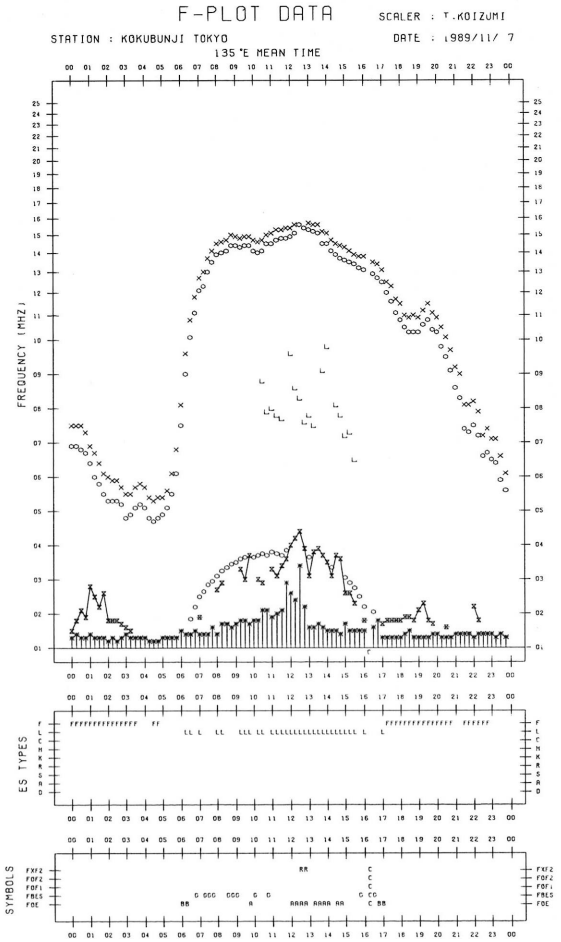

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/ 1
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

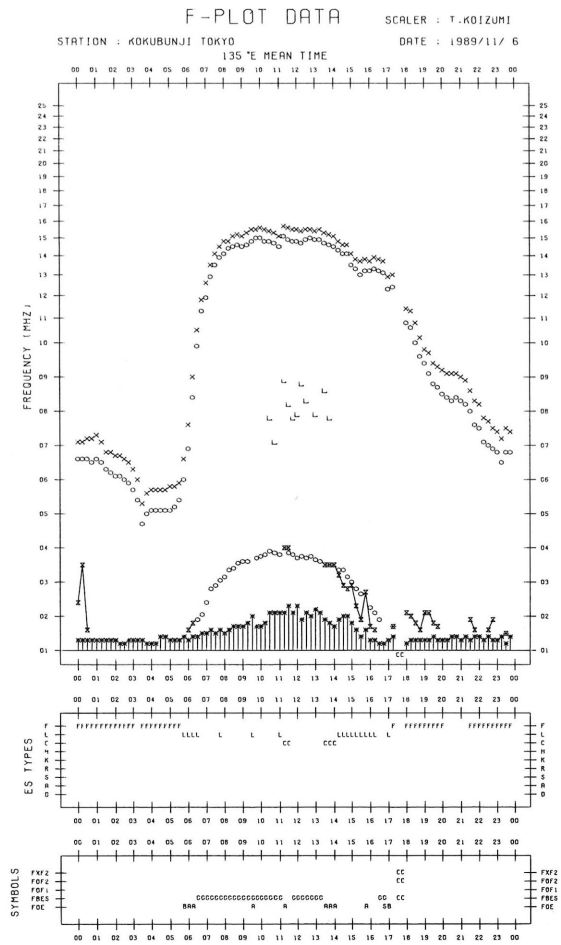

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/ 3
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

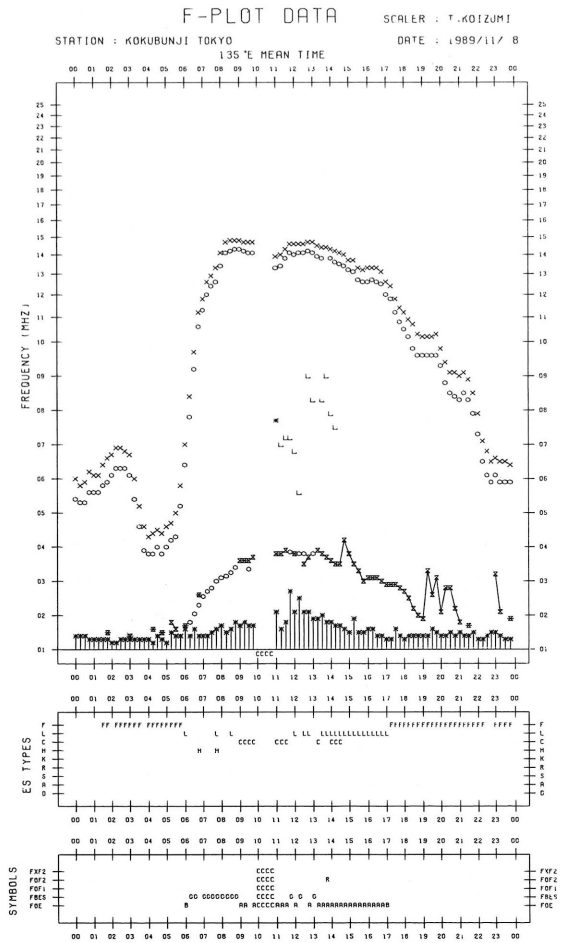

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/ 2
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

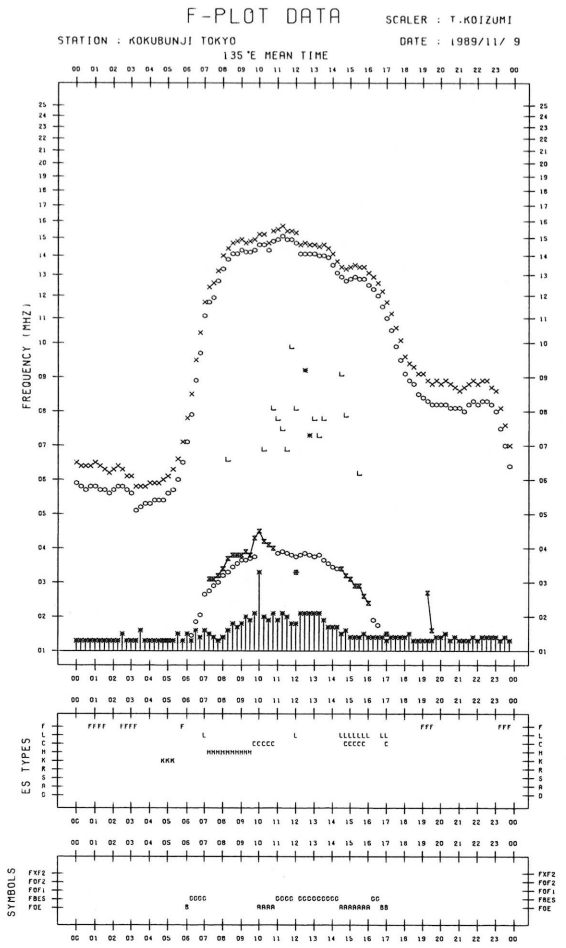

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/ 4
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

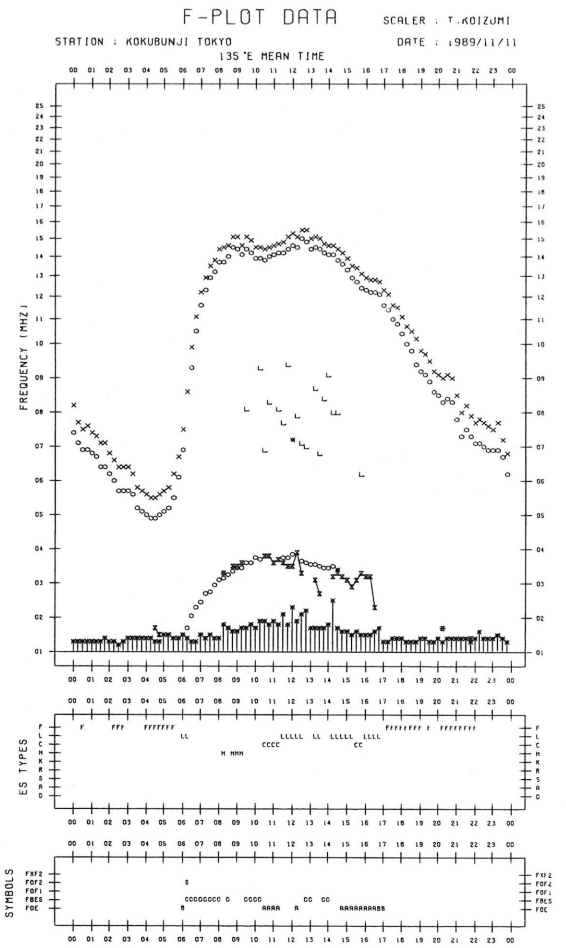

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/ 5
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

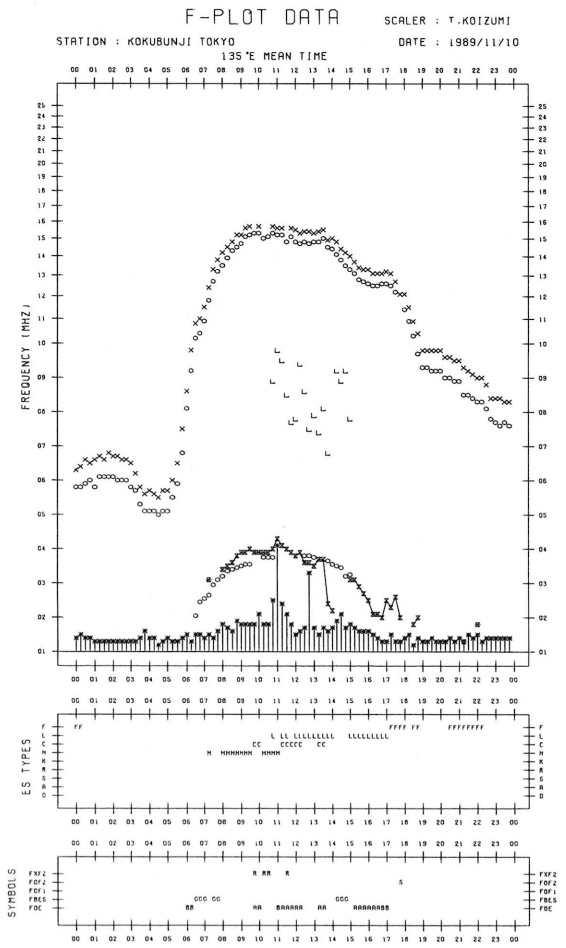

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/ 7
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

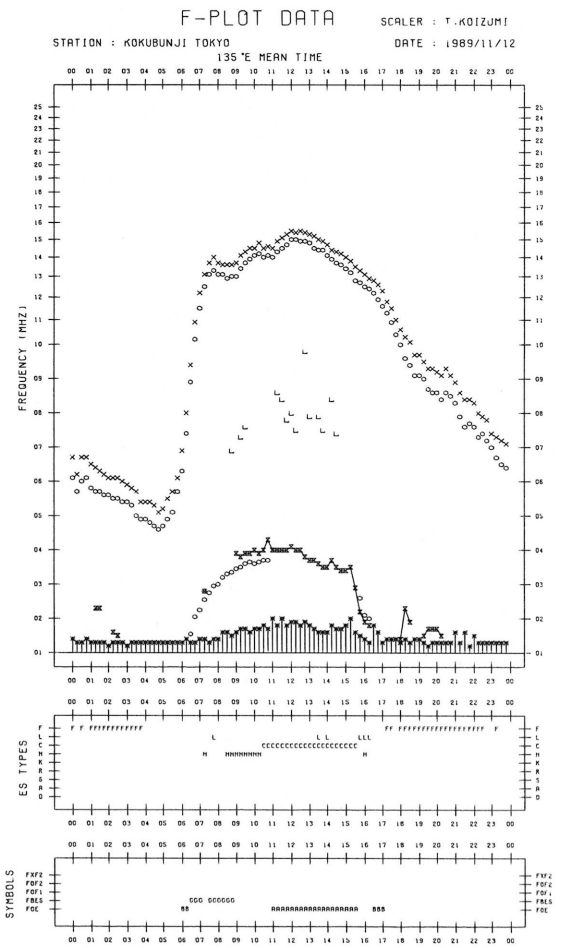

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/ 6
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

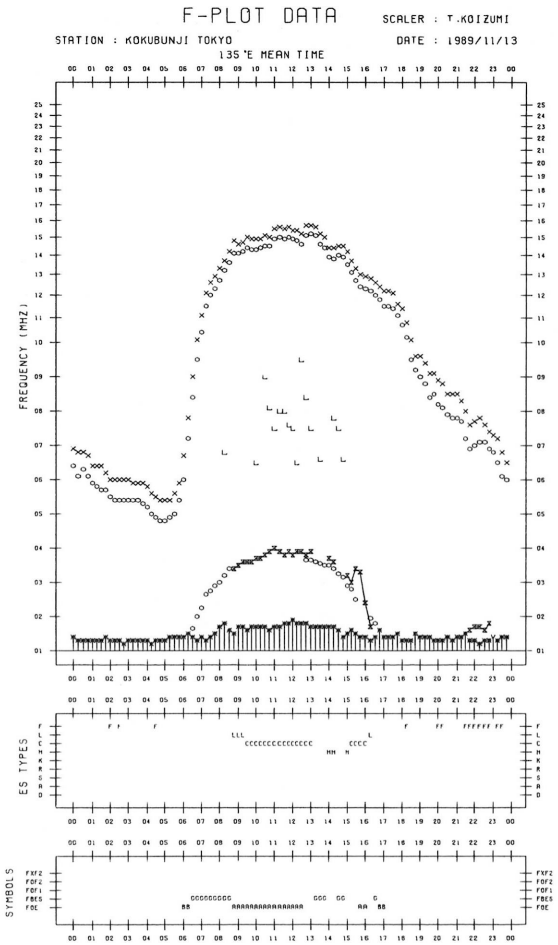

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/ 8
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

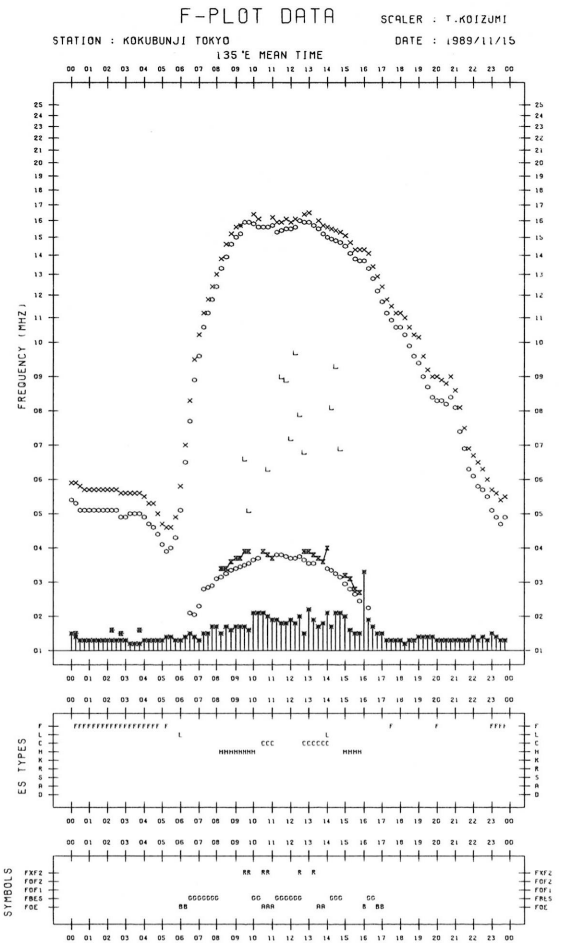

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/ 9
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

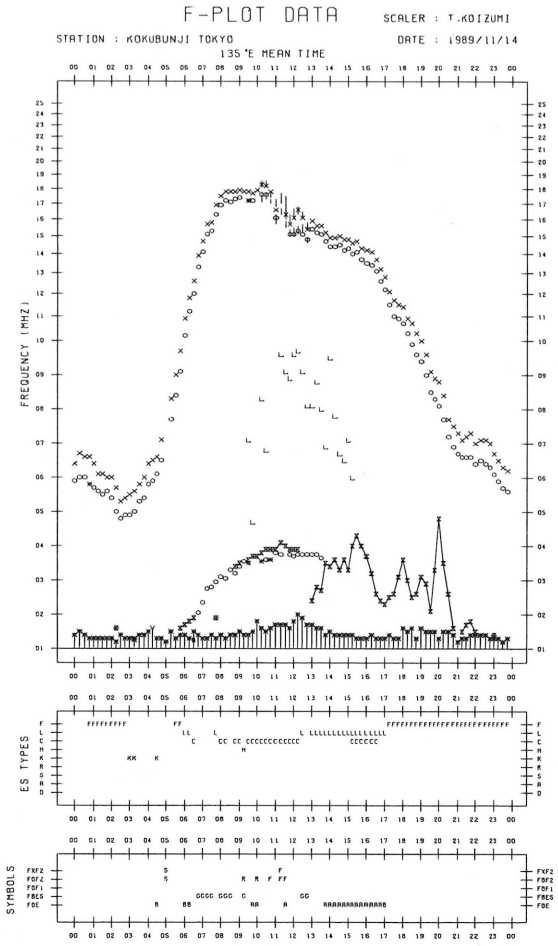

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/11
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

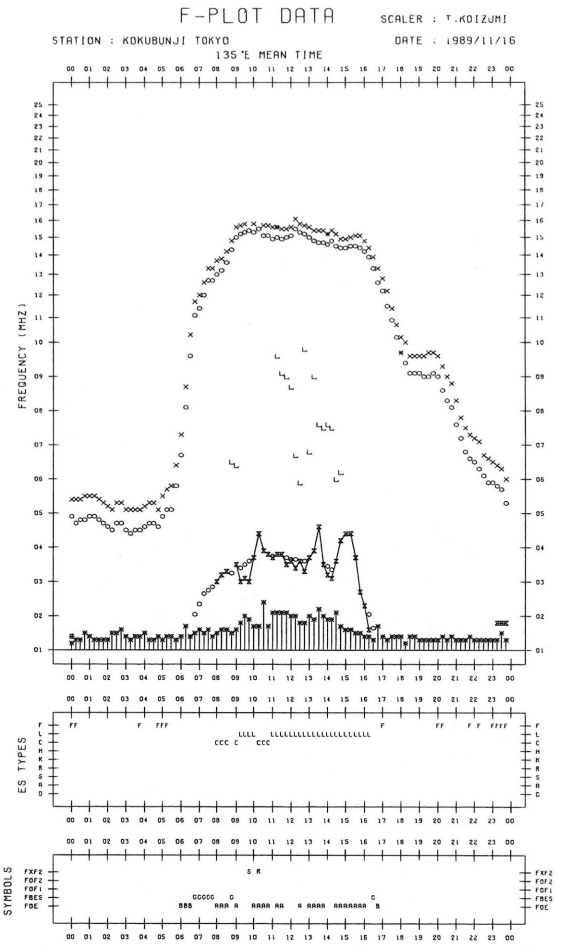

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/10
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

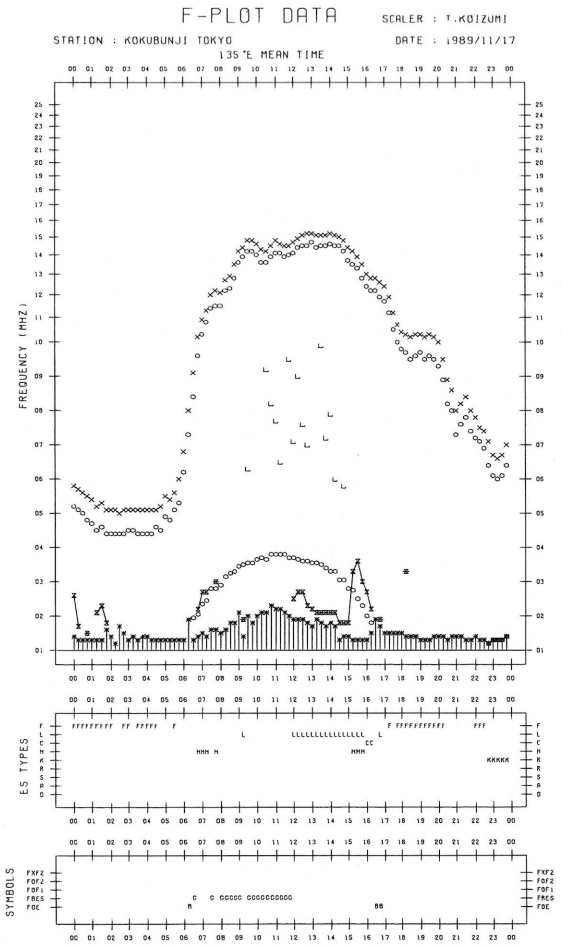

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/12
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

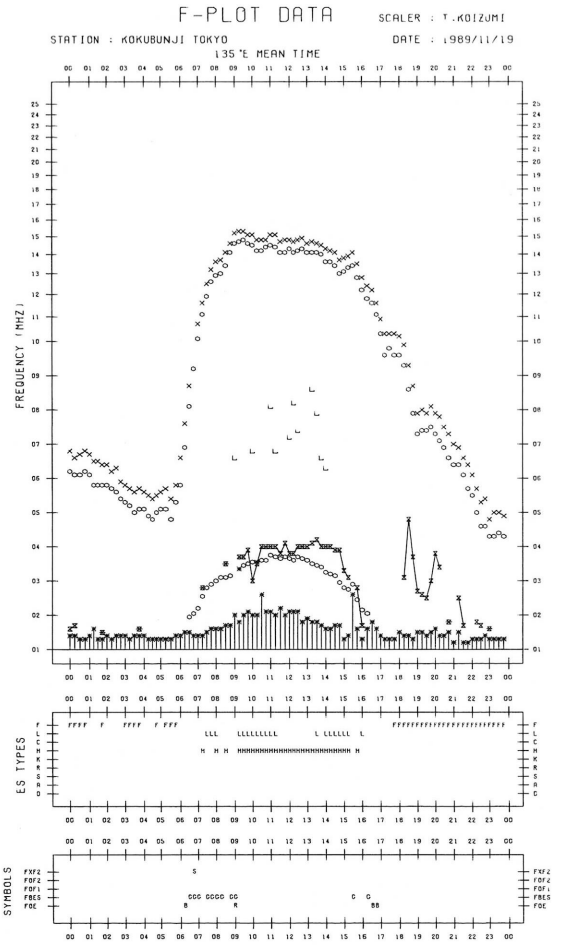

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

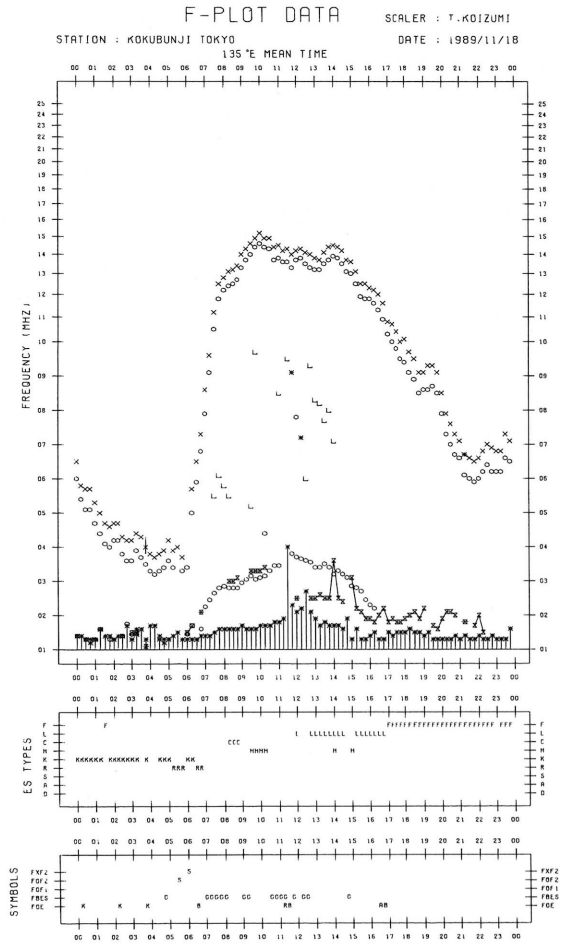

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

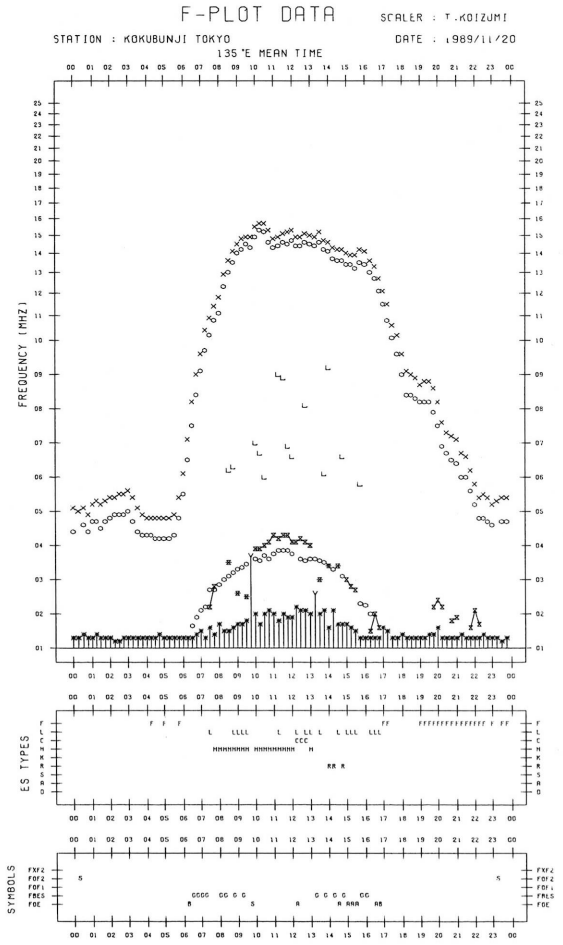

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

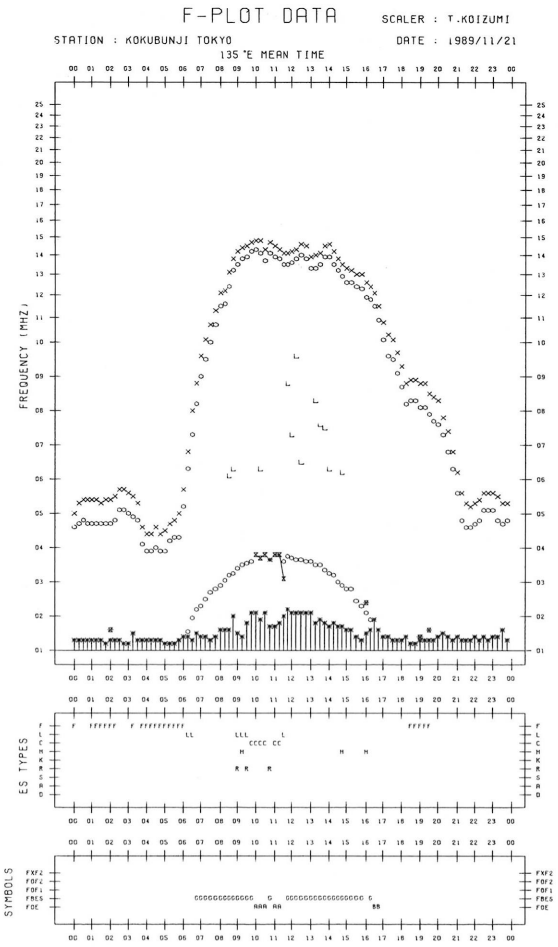

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

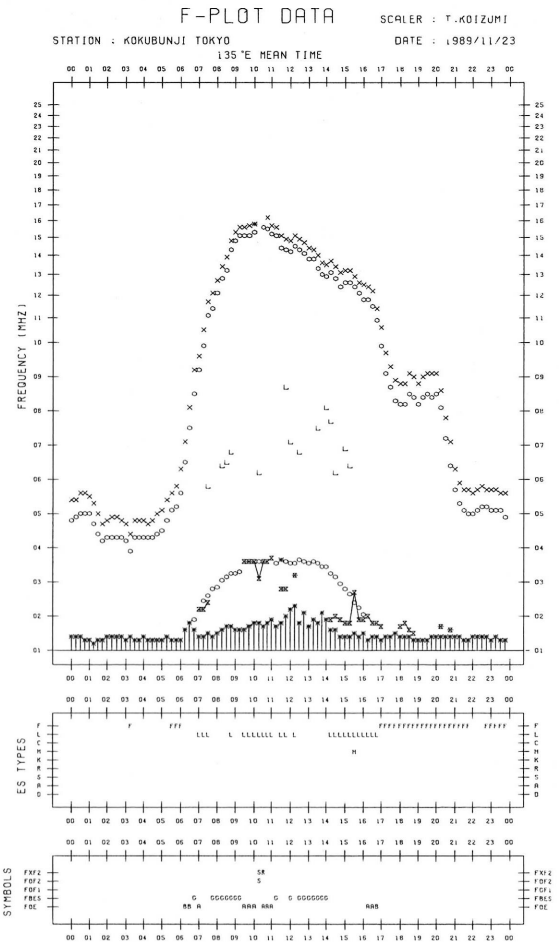

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

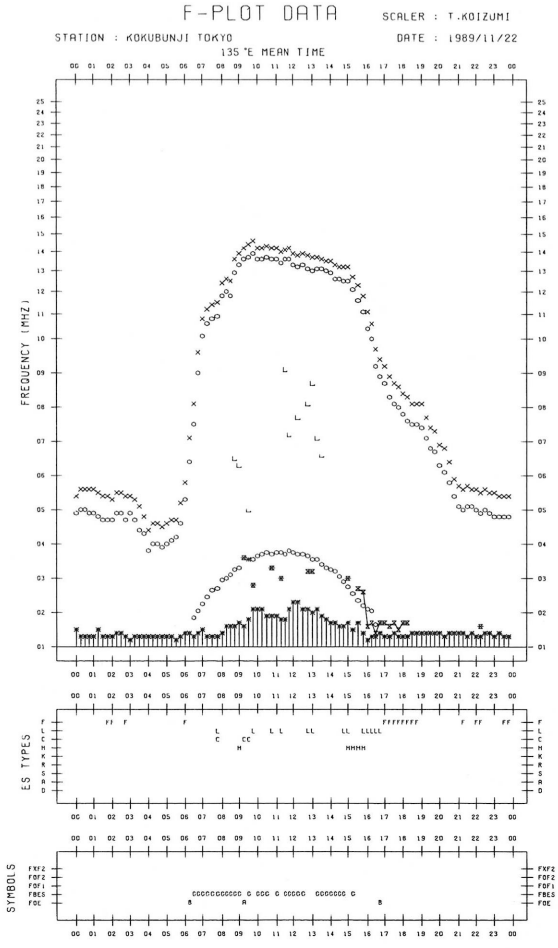

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

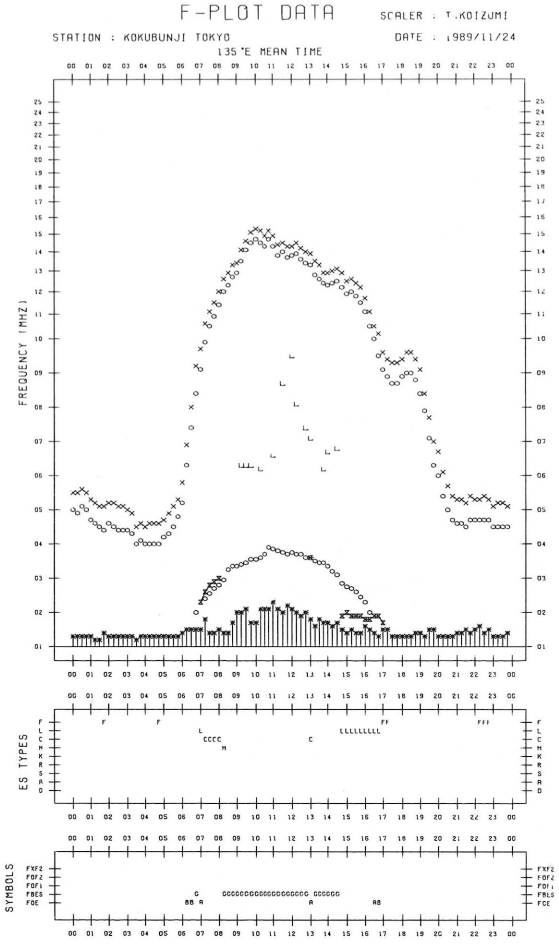

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

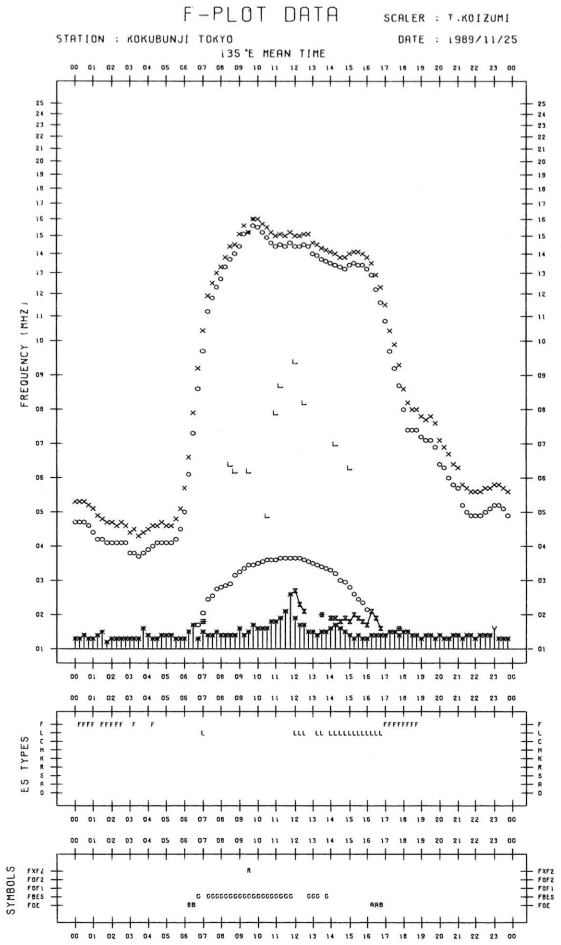

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

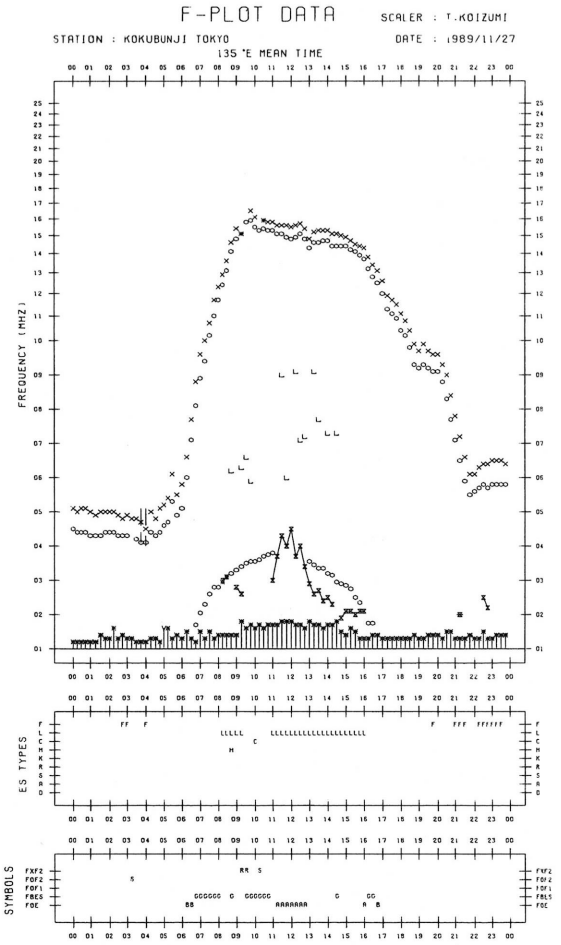

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/21
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

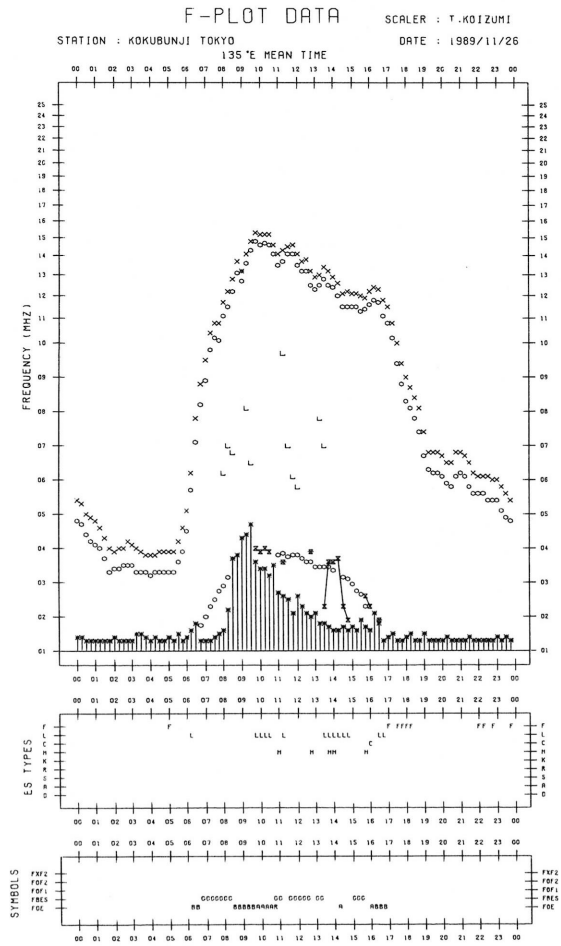

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/23
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

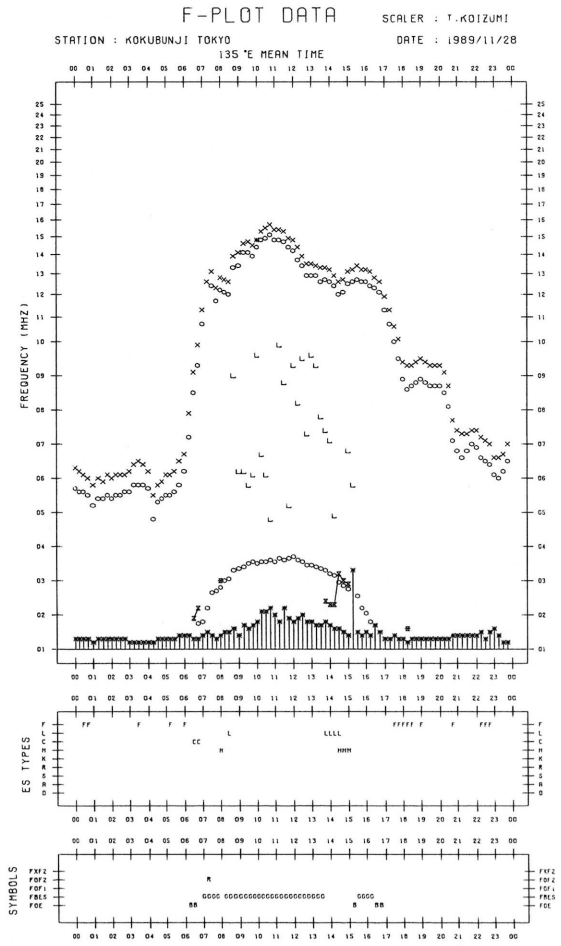

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/22
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

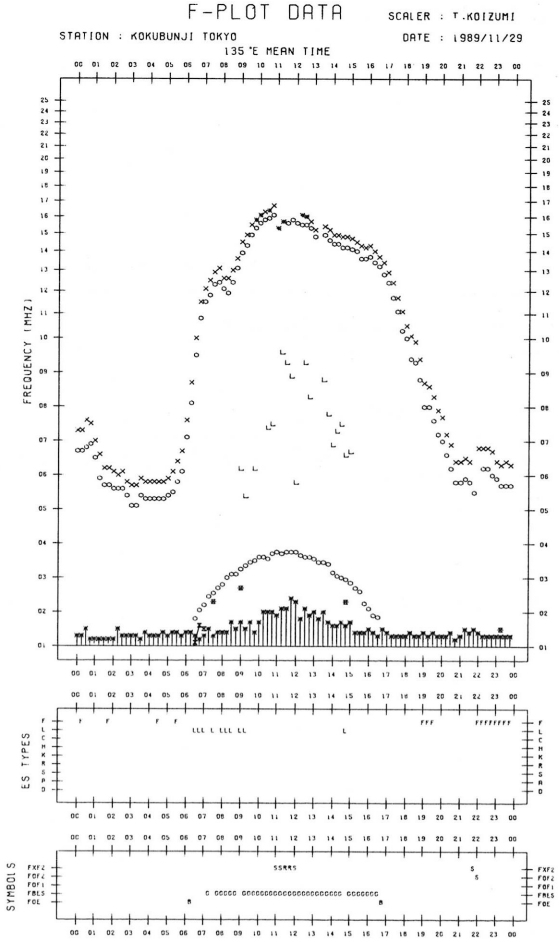

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/24
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

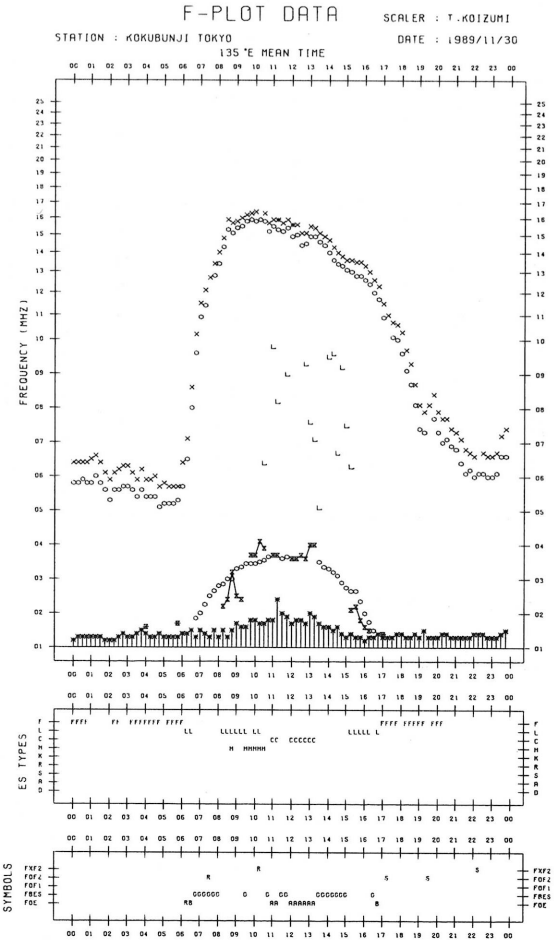

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/25
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/27
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/26
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/28
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/29
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FMES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI TOKYO
DATE : 1989/11/30
135 °E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FMES
FOE

B.Solar Radio Emission

B1.Daily Data at Hiraiso

200 MHz

Hiraiso November 1989

Single-frequency total flux observations at 200 MHz										
	FLUX DENSITY: 10^{-22}Wm^{-2}Hz^{-1}					VARIABILITY: 0 TO 3				
UT	00-03	03-06	06-09	21-24	DAY	00-03	03-06	06-09	21-24	DAY
DATE										
1	*	*	(*)	13	*	*	*	(*)	1	*
2	12	12	(12)	B	12	1	1	(1)	3	1
3	B	B	(B)	13	B	3	3	(3)	3	3
4	12	12	(16)	11	13	1	1	(1)	1	2
5	11	B	(B)	B	12	1	3	(3)	3	2
6	B	B	(B)	B	B	3	3	(2)	3	3
7	B	B	(B)	B	B	3	3	(3)	3	3
8	B	B	(B)	B	B	2	1	(2)	1	2
9	B	B	(B)	B	B	1	2	(2)	(2)	2
10	(B)	*	(*)	12	*	*	*	(*)	2	*
11	10	12	(11)	11	11	1	2	(1)	2	2
12	B	B	(13)	13	B	3	2	(2)	1	2
13	B	B	(B)	B	B	1	2	(2)	2	1
14	B	B	(B)	B	B	2	1	(1)	*	2
15	B	B	(B)	11	B	2	2	(3)	2	2
16	11	B	(B)	-	B	1	2	(1)	-	2
17	10	(10)	(*)	(10)	*	*	*	(*)	(0)	*
18	10	10	(10)	11	10	0	*	(*)	1	0
19	11	B	(B)	B	12	1	3	(3)	3	2
20	B	B	(B)	B	B	2	3	(2)	1	3
21	B	B	(B)	B	B	2	2	(1)	3	2
22	-	(B)	(B)	B	-	-	-	(*)	3	-
23	B	B	(B)	(B)	B	3	3	(3)	(3)	3
24	-	-	(-)	11	-	-	-	(-)	0	-
25	11	12	(12)	B	11	1	*	(*)	3	*
26	B	B	(B)	B	B	3	3	(1)	1	2
27	B	B	(B)	B	B	2	2	(1)	1	2
28	B	B	(B)	B	B	1	1	(1)	3	1
29	B	B	(B)	B	B	3	3	(3)	2	3
30	B	B	(B)	B	B	2	3	(3)	2	2

Note: No observations during the following periods.

16th 2117 - 2350. 21st 2330 - 22nd 0430
23rd 2330 - 24th 0735.

B.Solar Radio Emission

B1.Daily Data at Hiraiso

500 MHz

Hiraiso November 1989

Single-frequency total flux observations at 500 MHz					
FLUX DENSITY: $10^{-22}Wm^{-2}Hz^{-1}$					
UT	00-03	03-06	06-09	21-24	DAY
DATE					
1	53	53	(53)	58	53
2	57	56	(56)	-	57
3	53	52	(52)	56	52
4	B	55	(55)	-	B
5	57	56	(56)	-	56
6	58	57	(56)	-	57
7	58	58	(60)	58	59
8	58	58	(59)	59	58
9	61	59	(59)	62	59
10	62	60	(60)	-	61
11	59	59	(59)	59	59
12	59	58	(59)	63	58
13	61	61	(62)	-	62
14	62	61	(60)	57	61
15	60	59	(B)	62	60
16	59	57	(61)	54	60
17	54	55	(54)	59	54
18	59	60	(56)	57	58
19	57	56	(55)	63	56
20	62	61	(60)	59	61
21	59	60	(59)	64	59
22	(68)	B	(B)	61	B
23	68	65	(62)	66	64
24	B	66	(64)	57	B
25	B	62	(61)	62	61
26	-	(64)	(63)	68	63
27	(65)	62	(*)	59	65
28	(59)	61	(60)	62	60
29	B	B	(B)	B	B
30	B	B	(B)	61	B

Note: No observations during the following periods:

2nd 2120 - 3rd 0018. 4th 2104 - 5th 0018
5th 2104 - 2350. 6th 2105 - 2340
10th 2105 - 11th 0010. 13th 2110 - 14th 0015
21st 2300 - 22nd 0100. 26th 0025 - 0510

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso November 1989

Single-frequency observations

Normal observing period: 2120 - 0735 U.T. (sunrise to sunset)

NOV 1989	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) PEAK	FLUX DENSITY (10^{-22}Wm^{-2}Hz^{-1}) MEAN	POLARIZATION REMARKS
1	200	46 C	0308.9	0309.2	1.8	115	-	0
	500	46 C	0309.0	0310.3	3.0	48	-	0
	500	46 C	2135.2	2135.8	1.8	52	-	0
2	200	46 C	0416.2	0416.6	1.3	138	-	0
	100	46 C	0416.3	0417.0	1.4	104	-	-
	200	44 NS	2100E	0435	630D	29	13	MR
	200	46 C	2303.7	2304.1	1.5	180	-	WR
	200	46 C	2334.7	2335.0	1.1	610	-	0
	100	46 C	2335.0	-	2.0	1000D	-	-
3	100	46 C	0348.6	0349.2	4.0	1000D	-	-
	500	46 C	0351.3	0351.7	1.4	38	-	0
	100	46 C	0418.7	0419.0	4.0	1000	-	-
	100	44 NS	0430	-	180D	-	25	-
	500	46 C	0640.7	0644.8	13.5	88	-	0
	200	46 C	0641.7	0642.2	13.2	1400	140	0
	500	46 C	2324.0	0017.2	85.5	144	31	WL
4	500	41 F	0051.0	0135.5	96.5	33	-	WL
	200	41 F	0555.4	0611.6	17.2	65	-	0
	200	8 S	2253.8	2253.8	0.5	755	-	0
	100	46 C	2258.7	2301.1	10.6	1000	-	-
5	500	41 F	0020E	0043	65D	18	-	WL
	200	43 NS	0317	0403	250D	10	3	0
	500	41 F	0505	0523.5	56.5	240	-	0
	200	44 NS	2105E	2340	630D	16	9	WL
6	500	46 C	0122.3	0123.1	3.2	33	-	0
	500	46 C	0316.6	0317.0	1.0	18	-	0
	200	42 SER	0418.6	0418.9	4.0	1050	-	0
	500	42 SER	0419.0	0419.2	3.0	93	-	WR
	500	42 SER	0511.0	0513.7	15.0	390	-	WR
	200	42 SER	0512.9	0513.2	6.6	465	-	0
	200	44 NS	2105E	2243	300D	94	24	ML
7	200	46 C	0137.3	0138.9	3.8	2475	290	0
	100	46 C	0137.8	0138.3	6.9	2200	-	WL
	200	46 C	0229.0	0229.7	12.5	127	-	WL
	500	46 C	0229.3	0233.3	12.0	582	47	WL
	100	42 SER	0231.8	0240.3	13.9	920	-	-
	200	42 SER	0300.0	0318.0	22.4	3400	-	0
	100	42 SER	0302.0	0323.8	40.0	10300	-	0
	500	46 C	0306.0	0319.5	43.5	592	25	ML
				0308.3		82		WL
				0337.5		181		ML
	200	48 C	0323.1	0324.1	5.3	8500	770	0
	200	29 PBI	0328.4	0344.6	36	240	20	ML
	200	24 R	0420	0650	170D	90	35	SL
	100	43 NS	0500	-	150D	-	14	-
	200	44 NS	2108E	0100	620D	21	9	ML
	200	46 C	2315.2	2315.2	7.3	3080	255	0
	100	46 C	2315.2	2316.5	4.0	2900	-	0
	500	46 C	2316.0	2316.5	3.0	92	-	WR
8	200	41 F	0031.4	0035.3	6.1	255	-	SL
	100	42 SER	0127.7	0128.8	11.9	3800	-	0
	200	46 C	0136.4	0137.6	2.8	1100	327	0
	100	46 C	0355.4	0356.8	2.6	980	-	-
	200	46 C	0434.7	0436.3	4.0	85	-	ML
	100	46 C	0435.0	0436.3	6.7	1200	-	WL
	200	46 C	0515.2	0521.8	76.7	1300	37	0
				0601.5		740		WL
				0627.3		160		ML
	500	7 C	0517.5	0518.4	31.0	192	-	WR
				0529.5		14		WR
	100	41 F	0519.8	0520.5	11.2	960	-	-
	100	42 SER	0600.0E	0600.7	9.2D	2100	-	WL
	500	42 SER	0600.5	0601.0	27.0	402	-	MR
	100	46 C	0646.9	0647.8	3.7	3000	-	0
	200	44 NS	2110E	0045	620D	23	10	ML
9	500	8 S	0112.8	0112.8	0.7	2300	-	0
	100	42 SER	0230.4	0242.9	16.5	400	-	0
	200	46 C	0241.6	0242.9	2.0	145	-	WL
	200	46 C	0416.2	0417.2	3.3	105	-	0
	200	27 RF	2110E	-	135D	-	40	ML
	100	42 SER	2134.7	2148.2	17.8	4000	-	0
	200	42 SER	2142.8	2150.8	12.5	2360	-	0
	200	42 SER	2346.2	2347.5	5.2	290	-	0

NOV 1989	FREQ. (MHz)	TYPE	START TIME (U.T.)	TIME OF MAXIMUM (U.T.)	DUR. (MIN.)	FLUX DENSITY (10^{-22} $Wm^{-2}Hz^{-1}$) PEAK	FLUX DENSITY (10^{-22} $Wm^{-2}Hz^{-1}$) MEAN	POLARIZATION REMARKS
12	200	43 NS	0000	0046	300D	8	5	O
	500	41 F	0048.7	0048.8	1.8	196	-	WR
	500	46 C	0556.8	0600.0	17.0	942	32	O
	200	48 C	0557.3	0601.8	11.2	54000	5360	O
	100	48 C	0600.0E	-	10.6D	16000D	-	-
	200	29 PBI	0610.0	0612.3	51	120	23	WL
	500	29 PBI	0614.5	0626.5	65D	16	5	WL SUNSET
13	200	43 NS	0200	0543	230D	19	4	WL
	200	44 NS	2110E	0517	620D	17	3	ML
	200	41 F	2328	2350	205	60	-	SL
14	500	41 F	0015E	0030	163D	16	-	WL
	500	46 C	0417.3	0419.3	4.5	35	-	WL
14	200	44 NS	2110E	-	620D	-	25	-
15	500	24 R	0538.8	0642.5	105D	18	7	WL SUNSET
	200	48 C	0655.0	0655.2	28D	48000	3260	O SUNSET
	500	48 C	0655.0	0656.3	33D	9000	1200U	O SUNSET
	100	48 C	0655.6	-	15D	16000D	-	- SUNSET
16	200	43 NS	0242	0400	139	5	3	O
	500	41 F	0412.8	0414.5	6.0	620	-	WR
	500	27 RF	0510	0523	27.5	16	5	O
	200	27 RF	0520.5	0545	98	34	7	WR
17	200	46 C	0218.7	0222.4	6.6	340	-	O
19	200	43 NS	0200	0436	320D	7	3	O
	200	41 F	0245.5	0252.0	7.9	160	-	O
	100	46 C	0251.0	0251.6	1.8	1000D	-	-
	100	46 C	0524.4	0525.0	2.6	1000	-	-
	100	46 C	0620.1	0620.9	14.3	13000	-	O
	200	46 C	0620.1	0621.5	14.5	1245	56	O
	500	46 C	0620.8	0621.1	17.8	1035	45	O
	200	44 NS	2120E	0516	600D	13	5	O
	500	46 C	2247.0	2247.5	4.7	129	-	MR
20	500	42 SER	0029.9	0035.0	10.0	538	-	O
	500	46 C	0053.5	0057.5	5.0	138	-	SR
	500	21 GRF	0400	0440	105	15	6	O
	200	44 NS	2120E	0450	600D	21	5	MR
21	200	44 NS	2120E	-	600D	-	34	-
22	500	43 NS	0310	0500	250D	10	5	SR
	200	44 NS	2120E	0143	600D	170	29	SR
23	500	20 GRF	2332.5	0036.5	150	21	17	WR
24	500	27 RF	2335	0014	105	23	7	WL
25	200	46 C	0223.2	0224.4	3.3	750	-	O
	500	7 C	0224.2	0225.0	21.5	24	-	WR
				0233.5		9		O
	100	8 S	0224.3	0224.9	0.9	1000	-	-
	200	46 C	0448.2	0448.9	1.5	140	-	O
	500	46 C	0448.3	0449.5	4.0	36	-	O
	100	46 C	0509.8	-	3.3	1000D	-	-
	500	45 C	0510.0	0510.5	3.0	9	-	O
	200	46 C	0510.0	0510.6	2.0	2500	-	O
	200	44 NS	2120E	-	595D	-	22	-
	500	48 C	2241.5	-	105D	-	-	-
	200	48 C	2250.2	2315	135	305	97	WR
	100	48 C	2251.5	2326.4	270	820	290	-
				0011.2		640		-
				0100		310		-
26	100	44 NS	0318E	-	230D	-	30	-
	200	27 RF	2124E	-	89D	-	25	-
	200	44 NS	2124E	-	595D	-	17	-
	100	27 RF	2124E	-	66D	-	60	-
27	200	44 NS	2125E	0312	590D	26	13	MR
	100	41 F	2335	2352	37	1000	-	-
	200	46 C	2350.2	2356.2	16.5	227	-	O
28	200	42 SER	0348.8	0349.8	4.6	225	-	WR
	500	41 F	0349.0	0351.8	4.5	59	-	WR
	200	44 NS	2126E	0225	590D	150	78	SR
	100	44 NS	2126E	-	590D	-	71	-
	500	41 F	2239.5	2242.0	3.5	73	-	WR
	500	24 R	2351	0543	450D	29	16	MR
29	100	46 C	0100.0E	0102.4	29.7	610	230	-
	500	44 NS	2126E	2224.0	590D	44	15	MR
	100	44 NS	2126E	0507	590D	730	425	SR
	200	44 NS	2126E	0536	590D	500	247	SR
30	200	44 NS	2126E	2200	590D	350	144	SR
	100	44 NS	2126E	2200	590D	640	375	-

C. RADIO PROPAGATION

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

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

MEASURED AT HIRAISO

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

CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
MED	-6	US -3	-2	2	10	10	2	-4	US -7	ES -12	ES -15	ES -16	ES -15	ES -16	US -22	ES -22	ES -22	ES -22	ES -23	ES -23	ES -22	-10	-4	-6
UD	0	2	5	12	15	16	17	10	10	14	9	4	2	-1	14	7	4	2	-9	ES -21	-10	-1	2	0
LD	ES -24	ES -18	ES -14	-4	-2	-5	ES -15	ES -15	ES -22	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -15	ES -17

C. RADIO PROPAGATION

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

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

MEASURED AT HIRAISO

UT DAY	00H 45M	01H 45M	02H 45M	03H 45M	04H 45M	05H 45M	06H 45M	07H 45M	08H 45M	09H 45M	10H 45M	11H 45M	12H 45M	13H 45M	14H 45M	15H 45M	16H 45M	17H 45M	18H 45M	19H 45M	20H 45M	21H 45M	22H 45M	23H 45M
1	-1	3	4	10	14	20	23	26	24	20	20	25	2	-6	-11	ES -24	ES -24	-12	ES -24	6	7	10	0	0
2	4	4	7	14	20	23	23	29	25	22	23	30	11	20	-7	ES -24	ES -24	13	19	3	3	3	3	0
3	1	1	2	11	13	20	20	24	18	17	26	18	19	7	-3	19	24	18	12	10	13	7	2	1
4	-2	-1	5	13	18	20	22	24	21	24	23	21	26	-4	-9	-18	-18	-10	8	12	9	1	-1	-4
5	-5	1	2	15	18	24	25	25	19	17	16	10	2	-12	ES -24	ES -24	ES -24	22	ES -24	-1	7	5	-3	-5
6	1	-2	6	12	18	20	22	21	23	27	23	19	2	ES -13	-13	ES -13	ES -22	ES -22	ES -22	0	1	11	1	0
7	0	4	-13	10	19	23	26	31	32	26	27	27	17	3	-7	-7	13	27	ES -22	-5	ES -22	-9	-2	-9
8	1	0	4	18	24	27	28	27	23	23	25	26	19	-10	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	4	11	-9	ES -22
9	ES -22	-3	13	16	20	21	25	23	28	28	12	22	20	2	ES -22	ES -22	ES -22	13	ES -22	ES -22	2	-8	ES -22	-16
10	3	-2	1	12	15	24	30	26	18	23	23	22	4	-2	-9	-9	-9	18	-3	2	7	5	4	3
11	4	2	8	14	29	25	31	26	23	25	19	24	16	20	-4	ES -23	ES -23	7	7	5	8	4	5	3
12	-1	7	9	14	23	26	22	34	21	23	21	28	4	12	-1	-3	-10	13	20	19	12	10	6	1
13	3	5	12	15	18	25	27	24	24	21	27	0	-1	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	ES -22	6	11	9	-1
14	2	12	8	17	22	25	27	28	34	21	26	16	25	-2	ES -23	ES -23	ES -23	ES -23	ES -23	-1	4	-4	-2	3
15	3	2	10	12	18	20	26	26	23	28	25	19	8	-7	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	2	2	2	2
16	0	6	9	15	17	20	25	27	25	25	19	10	-1	-5	-18	ES -24	ES -24	ES -24	ES -24	3	6	9	-6	1
17	2	6	19	15	19	23	24	25	26	19	16	-5	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	7	2	-2	2
18	4	3	6	13	18	21	29	28	8	32	9	23	20	ES -23	-14	ES -23	ES -23	-6	ES -23	-5	2	-1	-3	-8
19	-6	-1	2	8	8	15	18	18	16	9	12	8	-13	ES -24	ES -24	ES -24	ES -24	ES -24	ES -24	-11	0	0	-2	-9
20	ES -24	-1	4	12	9	16	16	19	21	16	14	7	1	-15	ES -24	ES -24	ES -24	ES -24	ES -24	-20	4	ES -24	4	4
21	0	-2	4	10	19	19	21	25	18	28	14	14	-20	-20	ES -24	-11	ES -24	ES -24	ES -24	-7	5	9	3	1
22	1	1	3	15	18	18	21	23	14	11	4	6	10	-14	ES -23	ES -23	ES -23	ES -23	ES -23	-17	9	10	5	0
23	-1	0	6	14	21	18	33	27	25	28	23	12	-6	-12	ES -21	ES -21	ES -21	ES -21	ES -21	3	13	5	7	9
24	7	7	15	25	23	24	24	23	24	28	17	-3	-4	-10	ES -22	ES -22	ES -22	ES -22	ES -22	-3	15	13	7	4
25	7	7	-4	21	25	28	25	22	27	17	14	-4	-5	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-10	7	10	3	ES -23
26	ES -23	-12	5	11	17	25	21	24	24	20	-4	-5	15	ES -23	ES -23	ES -23	ES -23	ES -23	ES -23	-1	-4	4	4	5
27	1	3	15	12	23	22	21	33	23	28	22	-4	-11	ES -23	-11	ES -23	ES -23	-11	-14	ES -23	9	12	9	-3
28	2	4	10	14	15	20	26	22	29	13	28	22	18	ES -22	ES -22	ES -22	ES -22	-4	ES -22	6	6	14	4	11
29	3	9	13	23	23	25	32	30	24	17	14	8	-2	13	-11	ES -22	-18	-11	ES -22	1	6	8	4	1
30	7	12	18	15	22	24	29	32	24	29	28	21	33	28	-9	ES -22	ES -22	ES -22	ES -22	-1	15	9	4	0
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
MED	1	2	6	14	18	22	25	26	24	23	20	17	4	-10	US -22	ES -22	ES -23	US -22	ES -22	-1	6	6	3	0
UD	7	9	15	21	24	26	31	32	29	28	27	27	25	20	-4	-7	-9	18	12	10	13	12	7	5
LD	ES -22	-2	1	10	13	18	20	21	16	13	9	-4	-13	ES -23	ES -24	ES -24	ES -24	ES -24	ES -24	ES -23	0	-8	-6	-16

C. Radio Propagation

c2. Radio Propagation Quality Figures at Hiraiso

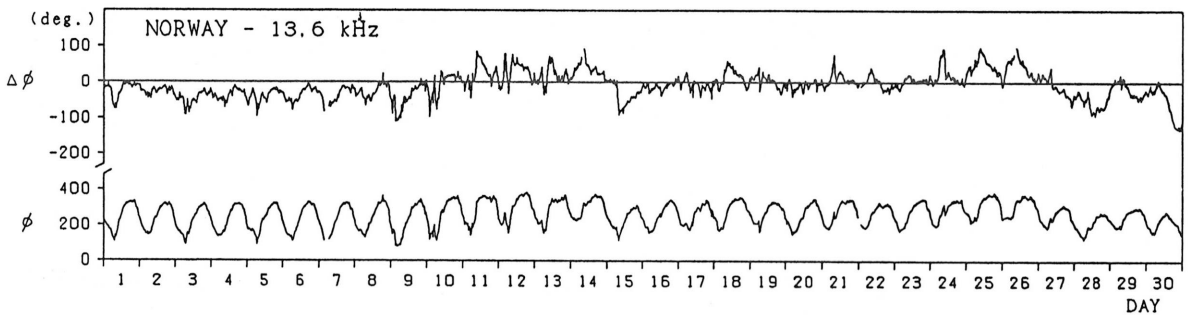
Hiraiso — Time in U.T

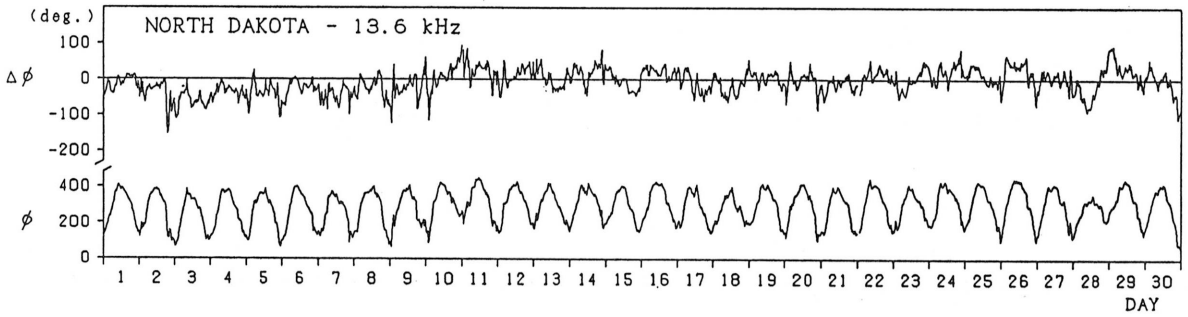
Nov. 1989	Whole Day Figure	W W V 00|06 06|12 12|18 18|24	W W V H 00|06 06|12 12|18 18|24	Conditions 00|06 06|12 12|18 18|24	Principal Geomagnetic Storms Start h m	End h	Range nT
1	4o	3 3U 5U 4U	4 4 4 4	N N N N			
2	4+	4 5U 5U 3U	4 4 5 4	N N N N			
3	4+	4 5U 5U 4	4 4 5 4	N N N N			
4	4+	4 4U 5U 4	4 4 5 4	N N N N			
5	4o	3 4U 5U 3U	4 4 4U 4	N N N N			
6	4o	3 4U 5U 4U	4 4 4U 4	N N N N			
7	4+	4 5U 5U 3U	4 5 5 3	N N N N			
8	4o	3 5U 5U 3U	4 4 4U 3U	N N N N			
9	4o	4 5U 5U 4	4 4 5U 2	N N N N			
10	4+	4 5U 5U 4	4 4 5 4	N N N N			
11	4+	4 5U 5U 4	4 4 5 4	N N N N			
12	4+	4 5U 5U 4	4 4 5 4	N N N N	2112	---	126
13	4o	4 5U 4U 5	4 4 3U 4	N N N N	---	---	
14	4+	5 4U 5U 4U	4 4 4U 4	N N N N	---	18	
15	4o	4 4U S 4	4 4 4U 4	N N N N			
16	4o	4 4U 5U 4	4 4 4U 4	N N N N			
17	3+	4 3U S 4U	4 3 3U 3	N N N N	0926	---	252
18	4-	2 4U 5U 4	4 4 4U 3	U U U U	---	24	
19	3o	4 3U S 3U	3 3 3U 3	N N N N			
20	3o	3 3U S 3U	3 3 4U 3	N N N N			
21	3+	3 3U 4U 3U	4 3 4U 4	N N N N			
22	3+	3 2U S 4U	4 3 4U 4	N N N N			
23	4o	3 4U S 5	4 4 4U 4	N N N N			
24	4-	4 2U S 4	4 4 4U 4	N N N N			
25	3+	4 3U S 3U	4 3 3U 3	N N N N			
26	4o	3 4U S 4	4 4 4U 4	U U U U			
27	4+	4 5U 4U 5	4 4 4U 4	N N N N			
28	4+	4 5U 5U 5	4 4 4U 4	N N N N			
29	4o	4 4U S 4U	4 4 5 4	N N N N			
30	5-	5 5U 5U 5U	4 5 5U 4	N N N N			

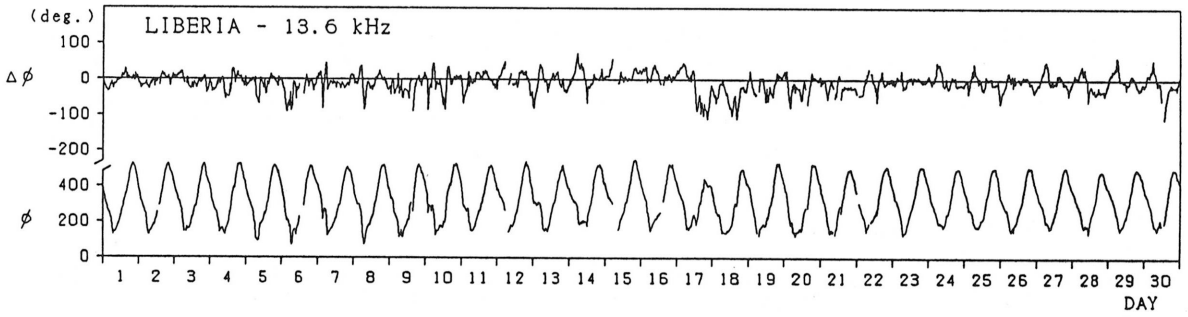
C. Radio Propagation

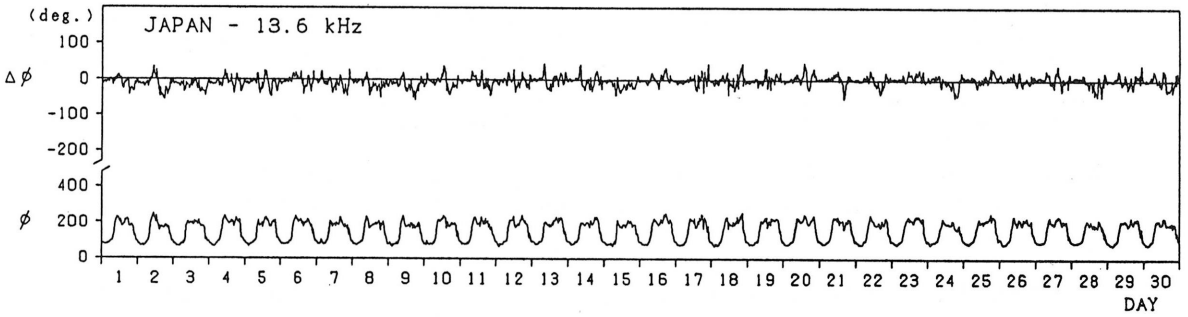
C3. Phase Variations in OMEGA Radio Waves at Inubo

Inubo November 1989

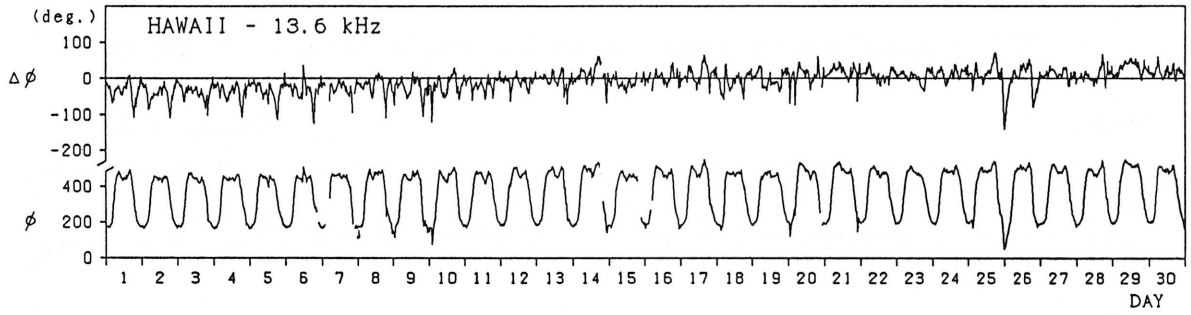


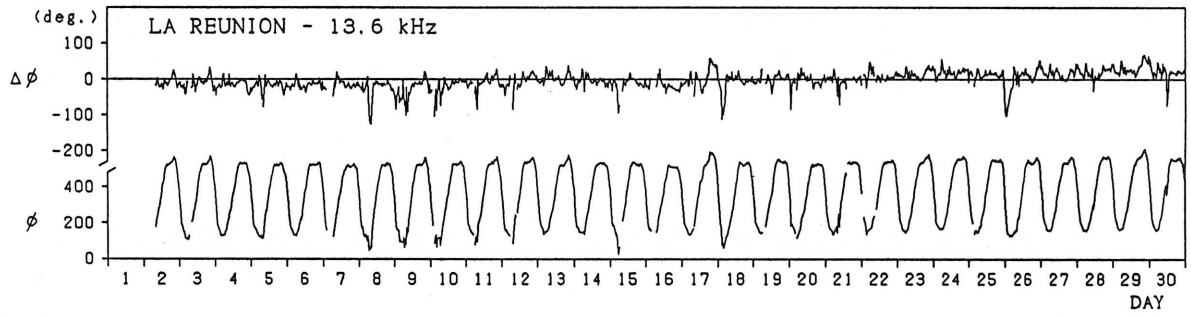


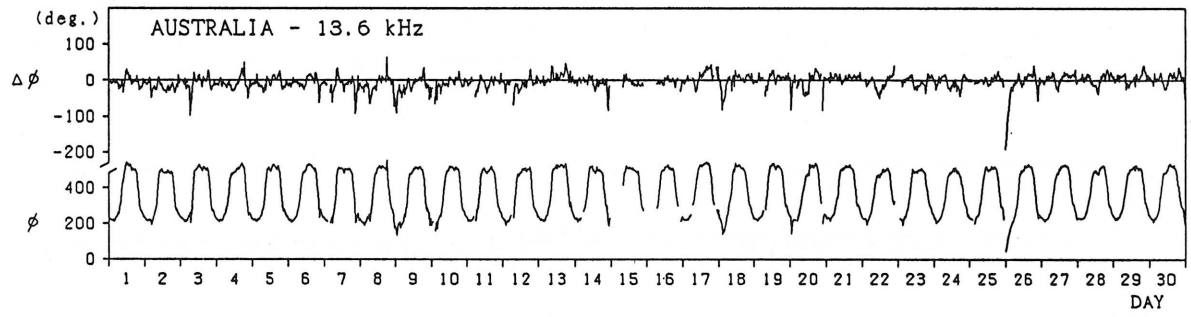


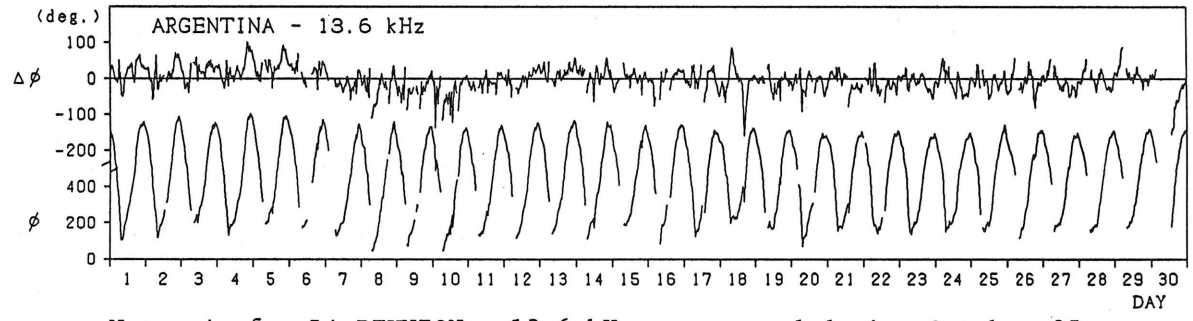


Inubo November 1989









Note: As for LA REUNION - 13.6 kHz, no record during October 25 - November 02, due to the maintenance of transmitter.

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

Start (U.T.)	End (U.T.)	Max. (U.T.)	Max. Phase Deviation (negative value, deg.)
Nov.08/2233	Nov.09/2145	Nov.09/0845	129.6
Nov.15/0717	Nov.17/2247	Nov.15/0906	171.0
Nov.20/0250	Nov.20/2200	Nov.20/0845	81.0
Nov.27/0112	Nov.30/1330D	Nov.28/1017	174.6
Nov.30/1330E	Dec.06/0230	Dec.01/1400	241.2

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso Time in U.T.

Nov. 1989	S W F									Correspondence	
	Drop-out Intensities(dB)					Start	Duration	Type	Imp.	Solar Flare	Solar Noise
	CO	HA	1)	2)	3)						
3			15			0644	14	SL	1		x
6					5	1210	15	SL	1-	x	
6		38				2038	50	SL	3+	x	
7	28	33	10	x		0222	40	G	3+	x	x
7	28	31	14	x		0314	38	SL	3	x	x
8	10		15	x	7	0602	25	SL	1-	x	x
8	20					0641	46	G	2-	x	
10			25	x		0148	52	SL	2	x	
10			15			0340	12	S	1	x	
11		x	32	x	12	0500	20	SL	3-	x	
12			41	x	15	0559	22	SL	3+		x
15			16		7	0525	36	SL	1+		
15			38		12	0654	36	SL	3	x	
16			24			0411	20	SL	2		
16			5		10	1320	13	SL	1-	x	
18			11			0218	17	SL	1-	x	
19			18	x	10	0820	17	SL	1+	x	x
20		25	38			0032	23	SL	3	x	x
20			24		x	0404	37	SL	2	x	
20	x	35				2122	44	SL	3+	x	
21			9		18	1343	7	S	1+	x	
22			7			0836	21	S	1-	x	
25	x	x	22	x	x	0240	40	SL	2-		
25	x	x	50	x		2323	237	G	3+	x	x
30			12		24	1203	82	G	2-	x	

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

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

Nov. 1989	S P A								
	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
1			—	18	8		0310	0400	0318
1			—	26*			0609	0714	0630
1		23	—				1514	1602	1519
1		9	—				1618	1644	1621
2			—	12	6		0333	0403	0339
2			—	42			0417	0604	0434
2		17	12				1024	1049	1032
2		113	17				1248	1405	1300
3			23	28	8		0238	0326	0248
3			11	14			0350	0416D	0400
3		11	12	13			0416E	0439D	0422
3			17	16			0439E	0515	0449
3	26	137	172	101	13	12	0643	0824	0652
3		36	21				1033	1101	1045
3					71		1955	2116	2001
3				10	—		2255	2321	2259
4				10	5		0012	0100	0019
4				8			0308	0345	0314
4			12	10			0355	0429	0401
4			11				0955	1020	1001
4					61	24	2120	2245	2128
4				6	13	14	2255	0012	2304
5			13	10			0536	0620	0555
5			28	12			0650	0720D	0657
5			99	49			0720E	0829	0732
5		37					1236	1313	1245
5		49					1322	1420	1342
5					15		2213	2257	2219
6				—	6		0014	0044	0022
6			24	—			0710	0749	0715
6			7	—			0806	0817	0811
6			15	—			0820	0843	0825
6		46	38	—			0910	1007	0927
6		111	34				1210	1329	1219
6		158	7				1336	1534	1355

Inubo

Nov.	S				P		A		
1989	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
6					104	52	2038	2145	2055
6				14	18		2258	2353	2305
6					5		2354	0017	2357
7	36	51	140	104	77	46	0231	0316D	0251
7	27	99	201	142	100	46	0316E	0539D	0323
7	—	—	117	56		—	0547	0707	0604
7			17	39			0729E	0816	0737
7		12					1247	1301	1252
7					71		1927	2005	1933
7					103	100	2025	2223	2048
7				9	11		2317	0017	2326
8	13	6	27	22	13	19	0113	0229D	0122
8	—	15	35	43	17	—	0229E	0327D	0247
8	13	16	35	46	14		0327E	0448	0334
8		11	35	16			0512	0558D	0529
8	35	119	164	99	23	25	0558E	0644	0611
8	19	37	89	53		10	0644E	0707D	0654
8		59	100	43			0707E	0745D	0731
8		55	103	39			0745E	0905	0757
8					97	29	1901	2007	1921
8					23		2019	2048	2026
8					15		2055	2135	2108
8	17	14		56	63	27	2315	2356D	2330
9		13		60	56	20	2356**	0044D	0017
9	32	26		61	70	54	0044E	0135D	0057
9			22	38	27		0135E	0230	0141
9	29	27	48	48	17	20	0316	0415D	0327
9			46	32		17	0415E	0442D	0425
9	13		57	34	10		0442E	0521D	0452
9			46	26			0521E	0612D	0526
9		64	74	41			0612E	0722D	0628
9	17	47	83	59			0722E	0807	0729
9		57	60	8			0822	0857D	0828
9		89	85	40			0857E	0932D	0903
9		56	55				0932E	1030D	0941
9		48	30				1030E	1109	1033
9		21					1217	1231D	1223
9		59					1231E	1322	1244
9		26					1401	1439	1411
9		106					1451	1647	1504
9	38						1731	1806	1735
9					47		2002	2049D	2030
9					39	30	2049E	2125	2057
9					38	43	2135	2219	2145
9	31	19	27	56	75	62	2238	2330D	2249
9	29	19	36	78	71	51	2330E	0128	2338
10	55	76	166	127	109	63	0144	0335	0159
10	66	44	103	69	54	51	0339	0510D	0345
10			73	31			0602E	0634D	0623
10			76	29			0634E	0745D	0641
10			36	10			0745E	0810D	0750
10		37	38				0810E	0853	0818
10	35	85	22				1126	1222	1142
10		59					1254	1324D	1307
10		32					1324E	1347	1332
10		20					1555	1635	1601
10		31				46	1647	1730	1655
10					50	41	1944	2012	1949
10					10		2159	2226	2202
11			9	13	7		0308	0333	0314
11	60	103	212	136	60	64	0500	0637D	0509
11		20	39	22			0637E	0707D	0643
11		29	71	31			0707E	0816	0722
11		62	48				0859	1018	0907
11		16					1232	1311	1236

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Nov.	S				P	A			
1989	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
11					31	23	1832	1853	1838
12		11	21	30	18		0144	0308	0158
12			12	11	9		0312	0358	0325
12		10	17	15			0500	0540	0510
12		—	10				0541	0558D	0553
12	68	—	274	158	53	31	0558E	0756D	0607
12	13	27	26	67			0756E	0843	0803
12		94	98				0905	1042	0920
12				7	9		2300	2334D	2309
12					7		2334E	2359	2341
13			23	—			0340	0435	0351
13				—	57		2009	2148	2025
13					17		2207	2237	2210
13				10	10		2336	0021	2348
14				9	5		0052	0131	0106
14			12	26	15		0148	0244	0202
14				8			0301	0326D	0308
14	13		16	18			0326	0358	0334
14		20	27	8			0641	0746	0652
14		46	17				1135	1227	1145
14					87	75	2139	2202D	2147
14				10	83	73	2202E	2319D	2221
14				6	12		2318	2333	2322
15				7	5		0034	0058	0040
15			30	42	26	16	0113	0220	0122
15			9	6			0244	0310	0252
15		17	34	31			0357	0444	0404
15			13	4			0456	0512D	0506
15	41	—	167	91	25		0512E	0654D	0543
15	76	—	360	202	17	27	0654E	0922	0702
15			15				1105	1137	1111
15		21					1411	1522	1422
15					106	21	1928	2104	1942
15				6	5		2253	2330D	2304
15				6	5		2330E	2352	2334
16				26	19		0002	0057	0022
16				4	4		0106	0126	0109
16			10	18	9	11	0127	0155D	0132
16			39	48	23	16	0155E	0255	0207
16	36	54	122	80	49	26	0414	0453D	0425
16	33		150	146		17	0453E	0808	0520
16		27	8				1101	1132	1106
16		157	27				1317	1518	1334
16	21	12	14	35	60	49	2235	2354	2243
17				12	6		0058	0139	0103
17			7	8			0326	0400	0336
17			17				0423	0514	0435
17			18	6			0706	0739	0713
17		77	113	22			0756	0856	0804
17		28*	11				0905	0946	0927
17		59					1234	1500	1310
18				18	10	15	0128	0147D	0141
18			11	35	16	18	0147E	0156D	0152
18			9	38	18	13	0156E	0218D	0206
18			79	83	54	28	0218E	0259D	0228
18			86	72	36	25	0259E	0511	0321
18			19	6			0531E	0630	0536
18			28	6			0730	0811	0741
18		21					1302	1334	1311
18		15					1535	1552D	1538
18		61					1552E	1802	1621
18				5	6		2340	0023D	2347
19				11	11		0026	0057	0031
19				8	5		0204	0220	0208
19			7	10			0342	0421	0352

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Nov.	S			P		A			
1989	Phase Advance (degrees)						Time (U.T.)		
Date	Ω/N	Ω/L	Ω/LR	NWC	Ω/H	Ω/ND	Start	End	Maximum
19	67	162	264	175	30	16	0616	0803	0627
19		74	32				1124	1220	1138
19		26					1609	1653	1613
20	52	44	121	—	120	70	0036	0207	0045
20			12	—			0222	0308	0240
20	38	45	161	—	77		0351	0530D	0421
20			16	—			0530E	0624	0535
20			18				0900	0955	0925
20		126					1405	1620	1435
20					188	65	2124	2323	2135
21			13	18	10		0253	0351	0306
21			16	10			0453	0523D	0458
21			17	6			0523E	0627	0531
21		27	83	19			0733	0841	0745
21		94	109	10			0909	1030	0920
21		169	37				1342	1459	1353
22			10	14	6		0252	0305D	0257
22	13	15	58	55	26	14	0305E	0451	0313
22			6	10			0646	0703	0651
22		125	92	46			0836	0920D	0847
22		54	48				0920E	1017	0924
22		29					1250	0332D	1256
22		80					1332E	1502	1342
22				6	8	10	2241	2259	2246
23				10	8		0057	0127	0105
23			19	18	12		0132	0215	0136
23			10	11			0318	0329D	0323
23			9	13			0329E	0423	0338
23			18	16			0432	0509E	0437
23			14	8			0509E	0551	0521
23			12	5			0708	0732	0713
23		11					1307	1330	1311
23				6			2209	2231	2214
24			30	28	16	16	0114	0154D	0127
24			19	26	13	16	0154E	0300	0202
24			18				0555	0722	0613
24		22					1356	1456	1415
24				14	21		2241	2338	2249
25	33	46	135	101	72	35	0238	0423	0246
25			11	6			0449	0500	0453
25			13	14			0508	0534	0517
25			16				0710	0741D	0721
25			21				0741E	0816	0749
25		17	6				1139	1233	1143
25		24					1247	1332	1303
25			114	190	170	103	2250	0523	2343
26			29	18			0639	0701D	0649
26			48	32			0701E	0758	0713
26			31				0845	0955	0859
26		27	23				1005	1050	1013
26					39		2147	2248	2156
27					11		2211	2257	2218
27				6	5		2342	0010D	2349
28				5	4		0010E	0032D	0016
28				14	8		0107E	0141	0112
28			10	10			0330	0405	0337
28			16	4			0413	0439	0420
28			13	6			0556	0619	0602
28		70	60				1013	1151	1028
29				10	5		0106	0138	0111
29		18					1211	1248	1223
29		14					1408	1439	1415
29	8				19	18	2139	2233	2147
30		10	21	22	11		0211	0259	0221
30		238	108				1155	1540	1220
30	15		23	76	78	52	2257	0051	2307

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