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# IONOSPHERIC DATA IN JAPAN

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CONTENTS



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# INTRODUCTION

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

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

## A. IONOSPHERE

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

### A1. Automatic Scaling

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

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

a. Characteristics of Ionosphere

| | |
|---|---|
| *foF2* | Ordinary wave critical frequency for the *F2* layer |
| *fEs* | Highest frequency of the *Es* layer whether it may be ordinary or extraordinary |
| *fmin* | Lowest frequency which shows vertical ionospheric reflections |
| *h'Es*<br>*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*<br>*foF1*<br>*foE*<br>*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*<br>*M(3000)F1* | Maximum usable frequency factor for a path of 3000 km for transmission by *F2* and *F1* layers, respectively |
| *h'F2*<br>*h'F*<br>*h'E*<br>*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 ($\phi$) 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

MAR. 1991

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 66 | 58 | 66 | 65 | 66 | 65 | 66 | 121 | 138 | 161 | 160 | 165 | 162 | 147 | 147 | 138 | 127 | 128 | 117 | 90 | 84 | 80 | 63 | 63 |
| 2 | 62 | 52 | 64 | 64 | 70 | 58 | 66 | 108 | 136 | 142 | 157 | 146 | 157 | 145 | 143 | 138 | 137 | 134 | 123 | 96 | 90 | 90 | 82 | 72 |
| 3 | 66 | 66 | 66 | 72 | 71 | 65 | 66 | 119 | 130 | 141 | 141 | 137 | 141 | 136 | 140 | 131 | 126 | 127 | 111 | 87 | 90 | 90 | 86 | 76 |
| 4 | 73 | 66 | 67 | 67 | 62 | 66 | 77 | 106 | 130 | 138 | 133 | 141 | 137 | 134 | 131 | 130 | 122 | 120 | 79 | 84 | 88 | 87 | 86 | 82 |
| 5 | 79 | 74 | 68 | 57 | 63 | 61 | 66 | 112 | 140 | 138 | 140 | 144 | 136 | 133 | 129 | 130 | 124 | 123 | 101 | 87 | 90 | 84 | 88 | 80 |
| 6 | 66 | 71 | 66 | 74 | 64 | 64 | 79 | 101 | 144 | 145 | 153 | 143 | 138 | 137 | 125 | 122 | 122 | 128 | 91 | 91 | 85 | 76 | 74 | 80 |
| 7 | 84 | 66 | 60 | 54 | 62 | 64 | 72 | 112 | 125 | 132 | 144 | 144 | 142 | 145 | 145 | 133 | 132 | 125 | 110 | 90 | 86 | 76 | 75 | 64 |
| 8 | 57 | 62 | 64 | 54 | 58 | 54 | 63 | 114 | 126 | 137 | 145 | 154 | 145 | 143 | 136 | 135 | 126 | 119 | 110 | 91 | 88 | 82 | 73 | 80 |
| 9 | 74 | 72 | 62 | 54 | 54 | 55 | 79 | 109 | 129 | 138 | 133 | 140 | 141 | 138 | 134 | 134 | 123 | 117 | 100 | 84 | 82 | 87 | 80 | 87 |
| 10 | 72 | 67 | 64 | 72 | 62 | 64 | 87 | 128 | 140 | 145 | 140 | 146 | 142 | 137 | 136 | 137 | 138 | 123 | 108 | 90 | 90 | 90 | 90 | 87 |
| 11 | 86 | 77 | 74 | 76 | 71 | 74 | 86 | 120 | 138 | 143 | 144 | 137 | 140 | 135 | 131 | 123 | 122 | 120 | 100 | 90 | 90 | 79 | 85 | 82 |
| 12 | 80 | 80 | 66 | 67 | 67 | 62 | 86 | 110 | 129 | 140 | 138 | 134 | 136 | 128 | 130 | 123 | 120 | 114 | 111 | 90 | 90 | 87 | 85 | 87 |
| 13 | 74 | 71 | 70 | 64 | 64 | 73 | 87 | 108 | 127 | 137 | C | C | A | A | 138 | 122 | C | 120 | 112 | 110 | 96 | 86 | 65 | 63 |
| 14 | 64 | 64 | 58 | 55 | 52 | 52 | 80 | 104 | 101 | 113 | 125 | 136 | 137 | 137 | 136 | 129 | 123 | 118 | 97 | 88 | 88 | 87 | 82 | 65 |
| 15 | 63 | 67 | 66 | 63 | 63 | 64 | 84 | 110 | 125 | 141 | 151 | 144 | 139 | 136 | 135 | 130 | 125 | 123 | 112 | 94 | 90 | 90 | 88 | 84 |
| 16 | 89 | 67 | 63 | 66 | 80 | 79 | 86 | 126 | 140 | 144 | 147 | 142 | 148 | N | N | 128 | 124 | 114 | 110 | 90 | 96 | 90 | 90 | 88 |
| 17 | 87 | 87 | 79 | 72 | 63 | 54 | 66 | 108 | 139 | 154 | 151 | 140 | 137 | 138 | 134 | 127 | 126 | 127 | 120 | 98 | 93 | 87 | 90 | 90 |
| 18 | 86 | 81 | 80 | 77 | 66 | 79 | 103 | 128 | 138 | 144 | 144 | 142 | 138 | 137 | N | 131 | 131 | 128 | 100 | 97 | 93 | 90 | 80 | N |
| 19 | 87 | 86 | 83 | 70 | 65 | 73 | 91 | 131 | 142 | 146 | 146 | 142 | 142 | 141 | 135 | 131 | 131 | 125 | 122 | 93 | 89 | 87 | 74 | 88 |
| 20 | 84 | 65 | 66 | 67 | 67 | 66 | 83 | 115 | 130 | 136 | 140 | 138 | 136 | 133 | 128 | 120 | 116 | 108 | 103 | 91 | 90 | 82 | 78 | 84 |
| 21 | 66 | 76 | 66 | 67 | 49 | 62 | 86 | 91 | 91 | N | 87 | 92 | 80 | 81 | 114 | 103 | 112 | 109 | 103 | 91 | 91 | 86 | 78 | 60 |
| 22 | 42 | 67 | 83 | 59 | 59 | 66 | 87 | 108 | 134 | 138 | 141 | 139 | 137 | 136 | 131 | 131 | 127 | 124 | 122 | 106 | 91 | 85 | 69 | 67 |
| 23 | 73 | 72 | 65 | 67 | 66 | 66 | 86 | 126 | 141 | 144 | 139 | 140 | N | 133 | 134 | N | 128 | 122 | 107 | 92 | 92 | 91 | 87 | 85 |
| 24 | 82 | 77 | 77 | 72 | 65 | 65 | 99 | 128 | 139 | 144 | 140 | 139 | 139 | 138 | 124 |  | 126 | N | 101 | 92 | 83 | 73 | 84 | 84 |
| 25 | 72 | 84 | 73 | 66 | 64 | 66 | 77 | 99 | 97 | 98 | 98 | 126 | N | 126 | 131 | 132 |  | 101 | 90 | 84 | 66 | 72 | 64 | 53 |
| 26 | 45 | 62 | 54 | 48 | 46 | 51 | 64 | 64 | 87 | 71 | 91 | 100 | 98 | 97 | 99 | 117 | 107 | 101 | 108 | 90 | 73 | 66 | 54 | 54 |
| 27 | 39 | 60 |  | 51 | 44 | 54 | 87 | 106 | 118 | 122 | 133 | 124 | 124 | 123 | 124 | 119 | 113 | 100 | 100 | 87 | 84 | 66 | 65 | 62 |
| 28 | 61 | 51 | 53 | 64 | 54 | 41 | 67 | 84 | 87 | 91 | 100 | 111 | 119 | 116 | 113 | 113 | 111 | 108 | 104 | 89 | 87 | 80 | 82 | 72 |
| 29 | 66 | 62 |  | 63 | 52 |  | 60 | 76 | 91 | 92 | 123 | 135 | 136 | 127 | 126 | 122 | 117 | 112 | 100 | 87 | 79 | 80 | 83 | 80 |
| 30 | 78 | 66 | 66 | 67 | 63 | 66 | 86 | 104 | 120 | 130 | 131 | 135 | 129 | 128 | 130 | 124 | 120 | 118 | 89 | 90 | 88 | 82 | 82 | 64 |
| 31 | 71 | 54 | 58 | 63 | 54 | 54 | 66 | 65 | 57 | 66 | 70 | 80 | 81 | 82 | 89 | 85 | 91 | 84 | 76 | 63 | 63 | 65 | 64 | 66 |
|  | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 29 | 31 | 31 | 30 | 31 | 31 | 31 | 30 | 30 | 30 | 28 | 29 | 29 | 29 | 29 | 30 | 31 | 31 | 31 | 31 | 31 | 30 |
| MED | 72 | 67 | 66 | 66 | 63 | 64 | 80 | 109 | 130 | 138 | 140 | 140 | 138 | 136 | 131 | 129 | 124 | 120 | 104 | 90 | 89 | 85 | 82 | 80 |
| U Q | 82 | 76 | 71 | 70 | 66 | 66 | 86 | 120 | 139 | 144 | 145 | 143 | 141 | 138 | 136 | 131 | 127 | 125 | 111 | 92 | 90 | 87 | 86 | 84 |
| L Q | 64 | 62 | 63 | 59 | 54 | 55 | 66 | 104 | 118 | 130 | 131 | 135 | 136 | 127 | 125 | 122 | 118 | 112 | 100 | 87 | 84 | 79 | 73 | 64 |

# HOURLY VALUES OF FES AT WAKKANAI

MAR. 1991

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 | 36 | G | G | G | 46 | G |
| 2 | 45 | 30 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 3 | G | 29 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 4 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 5 | G | G | G | G | G | G | 25 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 6 | G | G | G | G | G | G | G | G | G | G | 55 | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 7 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 34 | 36 |
| 8 | 33 | G | 28 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 9 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 10 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 11 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 12 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 13 | G | G | G | G | G | G | G | G | G | G | C | C | 180 | 180 | G | G | C | G | G | G | G | G | G | G |
| 14 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 15 | G | G | G | G | G | G | G | G | 39 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 16 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 17 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 42 | G | 28 | G | G | G | G | G |
| 18 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 19 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 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 | 31 | G | G | G |
| 21 | G | 28 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 27 |
| 22 | G | G | G | G | G | G | 32 | G | G | G | G | G | G | G | G | G | G | 35 | G | G | G | G | G | G |
| 23 | G | G | G | G | G | 28 | 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 | 25 | G | G | G | G | G |
| 25 | G | G | G | 33 | 29 | 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 | 24 | G | G |
| 27 | G | G | G | G | G | 27 | G | G | G | G | G | G | G | G | 56 | 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 | G | G |
| 29 | G | G | | 24 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 30 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 24 | G | G | G | G |
| 31 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 31 | G | 29 | 29 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 30 | 31 | 31 | 31 | 31 | 29 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| U Q | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 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 WAKKANAI

MAR. 1991

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 17 | 17 | 17 | 16 | 16 | 15 | 17 | 26 | 33 | 35 | 40 | 40 | 40 | 40 | 48 | 24 | 21 | 17 | 16 | 16 | 16 | 18 | 18 | 18 |
| 2 | 18 | 16 | 17 | 15 | 16 | 16 | 18 | 29 | 20 | 24 | 39 | 40 | 40 | 39 | 38 | 35 | 20 | 24 | 16 | 16 | 16 | 16 | 16 | 17 |
| 3 | 17 | 17 | 16 | 15 | 15 | 17 | 18 | 29 | 36 | 39 | 42 | 42 | 42 | 40 | 37 | 22 | 18 | 24 | 15 | 18 | 15 | 16 | 15 | 16 |
| 4 | 15 | 16 | 16 | 15 | 15 | 15 | 17 | 27 | 21 | 36 | 42 | 39 | 40 | 39 | 37 | 35 | 33 | 23 | 22 | 22 | 16 | 16 | 15 | 15 |
| 5 | 15 | 15 | 16 | 15 | 15 | 15 | 18 | 27 | 33 | 38 | 40 | 42 | 40 | 42 | 39 | 35 | 29 | 23 | 22 | 17 | 17 | 15 | 16 | 20 |
| 6 | 20 | 15 | 16 | 15 | 20 | 16 | 21 | 26 | 23 | 38 | 29 | 40 | 40 | 42 | 39 | 23 | 20 | 24 | 22 | 15 | 16 | 17 | 18 | 20 |
| 7 | 16 | 17 | 16 | 16 | 15 | 21 | 23 | 28 | 24 | 38 | 39 | 42 | 40 | 39 | 37 | 34 | 29 | 30 | 18 | 18 | 16 | 20 | 23 | 18 |
| 8 | 22 | 18 | 16 | 15 | 22 | 21 | 22 | 29 | 23 | 36 | 39 | 39 | 43 | 42 | 38 | 34 | 29 | 24 | 18 | 16 | 16 | 16 | 16 | 20 |
| 9 | 16 | 15 | 23 | 16 | 22 | 17 | 20 | 28 | 35 | 42 | 39 | 42 | 40 | 39 | 38 | 35 | 34 | 24 | 15 | 17 | 15 | 17 | 16 | 15 |
| 10 | 17 | 16 | 16 | 15 | 16 | 16 | 20 | 29 | 36 | 38 | 39 | 44 | 45 | 39 | 39 | 38 | 38 | 24 | 16 | 18 | 16 | 16 | 16 | 16 |
| 11 | 15 | 16 | 16 | 15 | 15 | 15 | 21 | 29 | 34 | 36 | 39 | 40 | 40 | 40 | 39 | 35 | 30 | 24 | 16 | 15 | 16 | 16 | 17 | 16 |
| 12 | 16 | 16 | 14 | 15 | 15 | 15 | 20 | 18 | 23 | 36 | 40 | 42 | 40 | 42 | 39 | 24 | 22 | 23 | 16 | 15 | 16 | 16 | 15 | 16 |
| 13 | 16 | 16 | 16 | 18 | 16 | 15 | 21 | 18 | 22 | 38 | C | C |  |  | 40 | 35 | C | 24 | 18 | 17 | 17 | 17 | 17 | 17 |
| 14 | 17 | 18 | 18 | 16 | 18 | 16 | 21 | 18 | 22 | 22 | 39 | 42 | 42 | 45 | 38 | 22 | 20 | 29 | 16 | 17 | 17 | 17 | 17 | 17 |
| 15 | 17 | 18 | 18 | 17 | 16 | 16 | 22 | 18 | 20 | 27 | 39 | 42 | 42 | 43 | 22 | 21 | 22 | 26 | 18 | 17 | 18 | 17 | 17 | 17 |
| 16 | 17 | 16 | 17 | 16 | 16 | 15 | 22 | 30 | 35 | 38 | 54 | 43 | 43 | 44 | 41 | 23 | 22 | 24 | 17 | 17 | 18 | 16 | 18 | 17 |
| 17 | 17 | 17 | 17 | 17 | 16 | 17 | 23 | 40 | 21 | 39 | 43 | 45 | 42 | 42 | 43 | 39 | 20 | 26 | 18 | 18 | 16 | 16 | 17 | 18 |
| 18 | 17 | 14 | 18 | 17 | 17 | 17 | 22 | 29 | 21 | 39 | 27 | 44 | 44 | 42 | 40 | 36 | 21 | 26 | 18 | 23 | 26 | 26 | 23 | 26 |
| 19 | 23 | 22 | 27 | 16 | 26 | 27 | 32 | 20 | 22 | 40 | 40 | 101 | 46 | 43 | 40 | 27 | 21 | 18 | 22 | 27 | 24 | 23 | 17 | 16 |
| 20 | 23 | 17 | 16 | 24 | 16 | 29 | 23 | 30 | 20 | 40 | 42 | 44 | 42 | 53 | 45 | 43 | 22 | 27 | 18 | 18 | 18 | 18 | 17 | 16 |
| 21 | 17 | 17 | 15 | 16 | 15 | 15 | 23 | 21 | 23 | 42 | 58 | 43 | 50 | 40 | 40 | 43 | 21 | 26 | 18 | 17 | 16 | 16 | 16 | 17 |
| 22 |  | 16 | 15 | 16 | 17 | 17 | 17 | 21 | 21 | 39 | 42 | 42 | 43 | 42 | 39 | 36 | 33 | 16 | 20 | 17 | 16 | 17 | 16 | 16 |
| 23 | 16 | 16 | 16 | 16 | 16 | 17 | 24 | 20 | 55 | 40 | 33 | 55 | 62 |  | 54 | 52 | 36 | 28 | 20 | 16 | 16 | 16 | 16 | 16 |
| 24 | 17 | 16 | 15 | 15 | 17 | 17 | 24 | 18 | 21 | 43 | 50 | 45 | 52 | 43 | 39 | 35 | 30 | 26 | 17 | 16 | 17 | 18 | 17 | 15 |
| 25 | 18 | 16 | 17 | 17 | 16 | 16 | 21 | 21 | 21 | 37 | 40 | 46 | 53 | 45 | 30 | 39 |  | 27 | 20 | 17 | 17 | 18 | 18 | 18 |
| 26 |  | 16 | 18 | 18 | 16 | 18 | 23 | 32 | 23 | 40 | 40 | 41 | 49 | 39 | 42 | 26 | 23 | 27 | 18 | 17 | 16 | 18 | 17 | 16 |
| 27 |  | 17 |  | 17 |  | 15 | 32 | 18 | 35 | 40 | 49 | 49 | 49 | 40 | 24 | 27 | 20 | 26 | 22 | 16 | 16 | 20 | 18 | 16 |
| 28 | 17 | 17 | 16 | 28 | 16 |  | 24 | 20 | 23 | 43 | 44 | 42 | 48 | 39 | 41 | 23 | 20 | 27 | 27 | 17 | 16 | 23 | 16 | 16 |
| 29 | 27 | 16 |  | 16 |  |  | 24 | 18 | 22 | 44 | 29 | 40 | 42 | 40 | 38 | 39 | 48 | 27 | 20 | 23 | 22 | 16 | 17 | 17 |
| 30 | 16 | 22 | 18 | 16 | 21 |  | 30 | 33 | 35 | 39 | 42 | 42 | 42 | 43 | 42 | 41 | 39 | 28 | 20 | 17 | 16 | 17 | 15 | 23 |
| 31 | 16 | 27 |  | 22 |  | 17 | 24 | 32 | 22 | 40 |  | 40 | 58 | 40 | 46 | 38 | 30 | 18 | 21 | 15 | 15 | 15 | 17 | 17 |
|  | 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 | 31 | 28 | 31 | 28 | 28 | 31 | 31 | 31 | 31 | 29 | 30 | 30 | 29 | 31 | 31 | 29 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | 17 | 16 | 16 | 16 | 16 | 16 | 22 | 27 | 23 | 39 | 40 | 42 | 42 | 42 | 39 | 35 | 22 | 24 | 18 | 17 | 16 | 17 | 17 | 17 |
| U Q | 17 | 17 | 17 | 17 | 17 | 17 | 24 | 29 | 34 | 40 | 42 | 44 | 48 | 43 | 41 | 38 | 31 | 27 | 20 | 18 | 17 | 18 | 17 | 18 |
| L Q | 16 | 16 | 16 | 15 | 15 | 15 | 20 | 20 | 21 | 36 | 39 | 40 | 40 | 39 | 38 | 24 | 20 | 24 | 16 | 16 | 16 | 16 | 16 | 16 |

# HOURLY VALUES OF FOF2 AT AKITA

MAR. 1991

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 | N | 51 | 51 | 51 | 44 | 56 | 86 | 111 | 137 | 146 | 138 | 138 | 140 | 137 | 146 | 143 | 131 | 120 | 117 | 73 | 87 | 79 | 70 | A |
| 2 | A | 67 | 53 | 67 | 66 | 59 | 68 | 106 | 138 | 138 | 141 | A | 149 | 142 | 136 | 137 | 120 | 134 | 117 | 88 | 86 | 84 | 90 | 79 |
| 3 | 79 | 68 | 52 | 76 | 66 | 64 | 83 | 120 | 134 | 135 | 133 | 136 | 135 | 136 | 134 | 131 | 127 | 120 | 110 | 90 | 87 | 85 | 84 | 78 |
| 4 | 65 | 68 | 53 | 68 | 52 | 47 | 63 | 100 | 126 | 121 | 131 | 129 | 137 | 132 | 129 | 118 | 121 | 116 | 114 | 93 | 87 | 88 | 87 | 85 |
| 5 | 51 | 52 | 55 | 50 | 50 | 45 | 30 | 111 | 131 | 120 | 133 | 133 | 130 | 121 | 126 | 121 | 124 | 116 | 111 | 87 | 91 |  | 57 | 85 |
| 6 | 52 | 53 | 52 | 53 | 52 | 53 | 75 | 110 | 137 | 140 | 138 | 137 | 131 | 120 |  |  | A |  | 112 | 102 | 93 | 79 | 110 | 74 |
| 7 | 73 | 66 | 62 | 44 | 62 | 57 | 84 | 131 | 131 | 130 | 135 | 134 | 138 | 145 | 142 | 137 | 132 | 117 | 111 | 85 | 86 | 70 | 54 | A |
| 8 | A | 52 | 56 | 48 | 51 | 47 | 49 | 88 | 131 | 138 |  | 110 | 137 | 143 |  | 134 | 130 | 120 | 108 | 86 | 86 | 69 | 52 | 60 |
| 9 | N | 61 | 30 | 44 | 42 | 44 | 79 | 109 | 131 | 131 | 136 | 136 | 137 | 133 | 136 | 130 | 121 | 112 | 88 | 91 |  | 66 | 87 | 84 |
| 10 | 52 | 56 | 54 | 50 | 57 | 53 | 80 | 120 | 138 | 138 | 138 | 136 | 137 | 134 | 129 | 120 | 130 | 112 | 88 | 85 | 87 | 86 | 87 | 86 |
| 11 | 86 | 79 | 73 | 66 | 52 | 66 | 88 | 112 | 131 | 131 | 136 | 136 | 132 | 134 | 155 | 133 | 122 | 118 | 82 | 87 | 88 | 79 | 80 | 71 |
| 12 | 52 | 52 | 56 | 58 | 47 | 54 | 79 | 85 | 118 | 130 | 140 | 142 | 131 | 120 | 121 | 121 | 112 | 111 | 114 | 86 | 90 | 89 | 69 | 71 |
| 13 | 58 | 52 | 52 | 52 | 52 | 66 | 86 | 110 | 131 | 138 | 138 | 135 | B | 136 | 138 | 121 | 110 | 110 | 113 | 96 | 90 | 65 | 27 | 66 |
| 14 | 48 | 55 | 52 | 54 | 47 | 53 | 80 | 112 | 121 | 133 | 137 | 142 | 137 | 137 | 118 | 132 | 130 | 111 | 111 | 92 | 86 | 87 | 79 | 64 |
| 15 | 52 | 58 | 52 | 53 | 52 | 54 | 84 | 112 | 130 | 137 | 138 | 136 | 136 | 133 | 114 | 117 | 117 | 111 | 113 | 82 | 99 | 89 | 58 | 86 |
| 16 | 87 | 67 | 66 | 67 | 77 | 66 | 86 | 118 | 136 | 138 | 136 | 136 | 132 | 133 | 115 | 117 | N | 112 | 110 | 87 | 87 | 88 | 88 | 87 |
| 17 | 86 | 86 | 85 | 64 | 66 | 52 | 79 | 117 | 138 | 138 | 138 | 137 | 103 | 115 | 130 | 118 | 117 | 121 | 117 | 105 | 90 | 88 | 85 | 90 |
| 18 | 86 | 86 | 85 | 54 | 70 | 67 | 85 | 130 | 138 | 138 | 138 | 137 | 135 | 132 | 134 | 112 | 114 | 114 | 112 | 89 | 87 | 88 | 86 | 86 |
| 19 | 86 | 86 | 85 | 80 | 52 | 66 | 86 | 131 | 138 | 138 | 158 |  | 134 | 134 | 121 | 119 | 119 | 122 | 112 | 92 | 104 | 87 | 90 | 87 |
| 20 | 84 | 83 | 75 | 44 | 31 | 43 | 86 | 111 | 137 | 137 | 160 | 134 | 137 | 132 | 126 | 132 | 120 | 112 | 111 | 93 | 64 | 61 | 65 | 66 |
| 21 | 86 | 69 | 66 | 64 | 54 | 52 | 86 | 88 | 87 | 98 | 114 | 120 | 117 | 130 | 118 | 118 | 116 | 109 | 111 | 90 | 90 | 89 | 81 | 45 |
| 22 | 37 | 71 | 49 | 58 | 52 | 66 | 84 | 118 | 136 | 138 | 135 | 134 | 136 | 134 | 87 | 131 | 133 | 120 | 120 | 93 | 87 | 68 | 71 | 71 |
| 23 | 69 | 36 | 70 | 64 | 64 | 43 | 86 | 121 | 119 | 138 | 137 | 133 | 130 | 114 | 104 | 132 | 118 | 112 | 111 | 90 | 88 | 90 | 86 | 84 |
| 24 | 86 | 86 | 77 | 52 | 54 | 54 | 86 | 121 | 136 | 138 | 137 | 132 | 108 | 130 | 130 | 97 | 115 | 120 | 90 | 50 | 70 | 71 | 84 | 88 |
| 25 | 60 | 66 | 65 | 35 | 40 | 49 | 52 | 79 | 118 | 111 | 132 | 135 | 138 | 137 | 136 | 136 | 128 | 118 | 89 | 92 | 68 | 61 | 57 | 56 |
| 26 | 43 | 44 | 52 | 52 | 44 | 44 |  | 85 | 100 | 109 | 111 | 93 | 114 | 114 | 109 | 121 | 110 | 94 | 87 | 90 | 145 | 65 | N | 43 |
| 27 | 36 | A | 70 | 56 | 51 | 62 |  | 120 | 130 | 116 | 138 | 114 | 134 | 133 | 131 | 122 | 118 | 110 | 87 | 87 | 86 | 52 | 43 | 53 |
| 28 | 52 | 48 | 35 | 52 | 47 | N | 80 | 88 | 108 | 112 | 121 | 120 | 136 | 135 | 134 | 127 | 114 | 110 | 112 | 87 | 68 | 60 | 49 | 68 |
| 29 | 60 | 52 | 53 | 52 | 52 | 52 | 85 | 93 | 120 | 118 | 155 | 147 | 136 | 137 | 136 | 131 | 114 | 109 | 112 | 102 | 71 | 64 | 80 | N |
| 30 | 32 | 65 | 66 | 62 | 64 | 64 | 82 | 74 | 118 | 120 | 120 | 133 | 136 | 133 | 136 | 120 | 122 | 122 | 111 | 85 | 39 | 65 | 83 |  |
| 31 |  | 56 |  | 44 | 42 | 91 |  |  |  |  | 93 | 88 | A |  | 112 | 114 | 115 | 97 | 88 | 70 |  | A | A | A | A |
|  | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 26 | 30 | 30 | 31 | 31 | 30 | 28 | 30 | 30 | 30 | 30 | 29 | 29 | 30 | 29 | 30 | 29 | 30 | 31 | 31 | 29 | 29 | 29 | 26 |
| MED | 60 | 63 | 56 | 53 | 52 | 54 | 84 | 111 | 131 | 136 | 137 | 135 | 136 | 133 | 130 | 122 | 120 | 113 | 111 | 89 | 87 | 79 | 80 | 76 |
| U Q | 86 | 69 | 70 | 64 | 62 | 64 | 86 | 120 | 137 | 138 | 138 | 136 | 137 | 136 | 136 | 132 | 127 | 120 | 113 | 92 | 90 | 88 | 86 | 86 |
| L Q | 52 | 52 | 52 | 50 | 47 | 49 | 79 | 93 | 120 | 120 | 133 | 130 | 131 | 130 | 118 | 118 | 115 | 111 | 90 | 86 | 86 | 65 | 57 | 66 |

# HOURLY VALUES OF FES AT AKITA

MAR. 1991

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 | G | G | G | G | G | 27 | G | G | G | G | G | G | G | 43 | G | 47 | 42 | 31 | G | G | 26 | G | 28 | 32 |
| 2 | 33 | 30 | G | G | G | G | G | G | 38 | 50 | G | 101 | G | G | G | G | G | G | G | G | 25 | G | G | G |
| 3 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 37 | G | G | G | G | G | G | G |
| 4 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 5 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 43 | G | G | G | G | G | G | G | G |
| 6 | G | G | G | G | G | 25 | 28 | G | G | G | G | G | G | G |  |  | 180 |  | G | G | G | G | G | G |
| 7 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 45 |
| 8 | 42 | 28 | G | G | G | 24 | G | G | G | G |  | 51 | G | G |  | G | 37 | G | G | G | G | G | G | G |
| 9 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 10 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 11 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 45 | 32 | G | G | 33 | G | G |
| 12 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 13 | G | G | G | G | G | G | G | G | G | G | G | G | B | G | G | 42 | 38 | G | G | G | G | G | G | G |
| 14 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 40 | 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 | G | G | G | G | G |
| 16 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 17 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 49 | 40 | 28 | G | G | G |
| 18 | G | G | G | G | G | G | G | 34 | 38 | G | G | G | G | G | G | G | 40 | 31 | G | G | G | G | G | G |
| 19 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 30 | G | G | G |
| 20 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 40 | 37 | 38 | 28 | G | 25 | G | 28 |
| 21 | 27 | G | G | G | 26 | G | G | G | G | 44 | G | 51 | G | G | G | G | G | 33 | 32 | 26 | G | G | G | G |
| 22 | G | 24 | G | G | 24 | G | G | 35 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 23 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 34 | G | G | G | G | G | G |
| 24 | G | G | G | G | G | 29 | G | G | G | G | G | G | G | G | G | G | 38 | G | 27 | 33 | 26 | G | G | G |
| 25 | G | G | G | G | G | G | G | G | G | G | G | G | G | 52 | G | 42 | 41 | 40 | 31 | G | G | G | 28 | G |
| 26 | G | 32 | 24 | G | G | G | G | G | 38 | G | 57 | 53 | G | G | 49 | G | G | G | G | G | G | 28 | 26 | G |
| 27 | G | 25 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 28 | G | G | G | G |
| 28 | G | G | G | 31 | 28 | G | G | G | G | G | G | G | 47 | G | G | 49 | 40 | G | G | G | G | G | G | G |
| 29 | G | G | G | G | G | G | 31 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 30 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 44 | G | G | G | G |
| 31 | G | G |  | G | G | G | G | G | G | G | 51 | 56 | 85 | G | G | G | G | G | G | 27 | 36 | 23 | 26 | 24 |
|  | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 30 | 31 | 29 | 30 | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| U Q | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 38 | G | G | G | 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 AKITA

MAR. 1991

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 16 | 16 | 17 | 18 | 16 | 17 | 20 | 27 | 33 | 22 | 24 | 23 | 66 | 48 | 66 | 26 | 22 | 17 | 18 | 17 | 18 | 17 | 16 | 16 |
| 2 | 16 | 16 | 18 | 17 | 15 | 15 | 18 | 24 | 18 | 24 | 23 | 121 | 46 | 45 | 39 | 26 | 21 | 24 | 16 | 16 | 18 | 16 | 16 | 16 |
| 3 | 16 | 16 | 15 | 18 | 16 | 16 | 18 | 27 | 20 | 23 | 26 | 46 | 46 | 45 | 28 | 22 | 23 | 26 | 16 | 16 | 16 | 16 | 16 | 16 |
| 4 | 16 | 16 | 16 | 16 | 16 | 16 | 18 | 16 | 20 | 39 | 45 | 46 | 48 | 44 | 44 | 38 | 23 | 27 | 16 | 18 | 15 | 16 | 16 | 16 |
| 5 | 16 | 15 | 15 | 17 | 17 | 18 | 20 | 28 | 18 | 38 | 67 | 46 | 46 | 46 | 48 | 22 | 18 | 18 | 17 | 18 | 17 | 18 | 17 | 17 |
| 6 | 18 | 18 | 18 | 16 | 16 | 16 | 17 | 18 | 23 | 36 | 67 | 49 | 45 | 27 | | | 14 | | 20 | 16 | 16 | 16 | 21 | 16 |
| 7 | 16 | 17 | 18 | 20 | 17 | 16 | 20 | 28 | 20 | 22 | 40 | 46 | 67 | 67 | 46 | 24 | 23 | 35 | 18 | 17 | 15 | 18 | 17 | 17 |
| 8 | 16 | 16 | 18 | 15 | 18 | 18 | 21 | 18 | 21 | 22 | | 27 | 48 | 45 | | 21 | 20 | 20 | 18 | 17 | 17 | 16 | 18 | 16 |
| 9 | 17 | 16 | 16 | 16 | 17 | 17 | 20 | 29 | 21 | 24 | 43 | 43 | 45 | 43 | 39 | 36 | 35 | 27 | 17 | 18 | 17 | 18 | 16 | 17 |
| 10 | 16 | 16 | 16 | 17 | 17 | 17 | 20 | 17 | 21 | 22 | 24 | 45 | 47 | 29 | 41 | 24 | 22 | 26 | 18 | 16 | 16 | 16 | 16 | 16 |
| 11 | 16 | 17 | 16 | 18 | 16 | 17 | 20 | 28 | 22 | 24 | 23 | 45 | 66 | 26 | 24 | 26 | 35 | 17 | 17 | 16 | 16 | 15 | 16 | 16 |
| 12 | 16 | 15 | 15 | 16 | 15 | 20 | 20 | 29 | 20 | 23 | 46 | 48 | 44 | 42 | 42 | 24 | 20 | 26 | 18 | 17 | 16 | 16 | 18 | 17 |
| 13 | 16 | 17 | 18 | 17 | 18 | 16 | 20 | 17 | 20 | 22 | 69 | 50 | B | 45 | 43 | 21 | 21 | 16 | 18 | 17 | 16 | 16 | 17 | 17 |
| 14 | 16 | 16 | 16 | 16 | 17 | 17 | 21 | 17 | 18 | 23 | 66 | 24 | 24 | 24 | 23 | 18 | 20 | 26 | 20 | 16 | 21 | 18 | 17 | 17 |
| 15 | 16 | 16 | 16 | 17 | 18 | 16 | 22 | 17 | 18 | 21 | 26 | 67 | 68 | 67 | 68 | 26 | 21 | 28 | 20 | 17 | 17 | 16 | 16 | 16 |
| 16 | 16 | 16 | 17 | 16 | 16 | 17 | 22 | 17 | 20 | 22 | 66 | 68 | N | 32 | 47 | 26 | 22 | 27 | 20 | 16 | 16 | 17 | 16 | 16 |
| 17 | 17 | 16 | 16 | 16 | 16 | 16 | 22 | 35 | 26 | 22 | 26 | 48 | 64 | 76 | 46 | 38 | 18 | 28 | 17 | 16 | 17 | 17 | 18 | 18 |
| 18 | 17 | 16 | 17 | 16 | 15 | 16 | 23 | 16 | 20 | 23 | 26 | 66 | 49 | 45 | 29 | 24 | 22 | 29 | 20 | 17 | 17 | 18 | 17 | 16 |
| 19 | 16 | 15 | 16 | 15 | 16 | 16 | 23 | 20 | 23 | 26 | 68 | 101 | 48 | 45 | 44 | 28 | 24 | 21 | 20 | 17 | 16 | 20 | 16 | 16 |
| 20 | 17 | 18 | 16 | 17 | 17 | 17 | 27 | 32 | 20 | 71 | 46 | 35 | 46 | 74 | 24 | 45 | 20 | 17 | 17 | 18 | 18 | 17 | 18 | 18 |
| 21 | 17 | 18 | 17 | 17 | 16 | 16 | 18 | 30 | 21 | 30 | 68 | 38 | 68 | 29 | 27 | 72 | 35 | 18 | 17 | 17 | 16 | 16 | 17 | 20 |
| 22 | | 16 | 16 | 17 | 17 | 18 | 23 | 18 | 22 | 42 | 50 | 48 | 46 | 46 | 24 | 23 | 21 | 18 | 21 | 15 | 18 | 17 | 17 | 16 |
| 23 | 17 | 17 | 18 | 17 | 16 | 17 | 39 | 18 | 73 | 43 | 50 | | 76 | 79 | 76 | 48 | 38 | 21 | 20 | 18 | 17 | 17 | 17 | 16 |
| 24 | 16 | 16 | 17 | 17 | 17 | 16 | 21 | 21 | 22 | 28 | 52 | 49 | 75 | 48 | 44 | 22 | 21 | 28 | 18 | 16 | 18 | 18 | 17 | 16 |
| 25 | 17 | 17 | 18 | 20 | 16 | 20 | 24 | 18 | 20 | 26 | 68 | 45 | 30 | 28 | 27 | 24 | 17 | 16 | 16 | 18 | 17 | 17 | 18 | 17 |
| 26 | 18 | 15 | 15 | 17 | 16 | 16 | 23 | 18 | 20 | 24 | 26 | 30 | 44 | 48 | 21 | 28 | 22 | 16 | 20 | 16 | 16 | 17 | 17 | 18 |
| 27 | | 17 | 20 | 16 | 17 | 18 | 27 | 28 | 20 | 26 | 71 | 49 | 48 | 50 | 40 | 27 | 36 | 21 | 18 | 16 | 16 | 17 | 18 | 17 |
| 28 | 21 | 16 | 15 | 15 | 15 | 18 | 24 | 21 | 22 | 26 | 29 | 29 | 26 | 27 | 41 | 22 | 21 | 16 | 20 | 17 | 18 | 16 | 17 | 21 |
| 29 | 16 | 15 | 16 | 16 | 18 | 16 | 26 | 17 | 18 | 24 | 40 | 33 | 46 | 45 | 46 | 36 | 50 | 17 | 20 | 16 | 17 | 16 | 18 | 16 |
| 30 | 16 | 17 | 16 | 16 | 16 | 17 | 27 | 22 | 24 | 24 | 44 | 45 | 68 | 68 | 74 | 64 | 23 | 17 | 17 | 15 | 18 | 16 | 17 | 18 |
| 31 | 21 | 18 | | 17 | 16 | | 27 | 38 | 36 | | 40 | 40 | 46 | 131 | 68 | 28 | 35 | 28 | 20 | 17 | 17 | 20 | 20 | 20 |
| | 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 | 30 | 31 | 31 | 30 | 31 | 31 | 31 | 30 | 30 | 30 | 29 | 31 | 29 | 30 | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | 16 | 16 | 16 | 17 | 16 | 17 | 21 | 21 | 20 | 24 | 44 | 46 | 47 | 45 | 42 | 26 | 22 | 21 | 18 | 17 | 17 | 17 | 17 | 16 |
| U Q | 17 | 17 | 18 | 17 | 17 | 17 | 24 | 28 | 22 | 28 | 66 | 49 | 66 | 50 | 46 | 36 | 24 | 27 | 20 | 17 | 18 | 18 | 18 | 17 |
| L Q | 16 | 16 | 16 | 16 | 16 | 16 | 20 | 17 | 20 | 22 | 26 | 38 | 45 | 32 | 27 | 23 | 20 | 17 | 17 | 16 | 16 | 16 | 16 | 16 |

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

# HOURLY VALUES OF FOF2 AT KOKUBUNJI

MAR. 1991

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 | 81 | 70 | 67 | 66 | 68 | 72 | 83 | 117 | N | 141 | 144 | 144 | 141 | 140 | 140 | 137 | 134 | 131 | 127 | 101 | 87 | 86 | 87 | 80 |
| 2 | 54 | 77 | 74 | 77 | 55 | 62 | 67 | 106 | 140 | 140 | 141 | 141 | 141 | 141 | 140 | 137 | 140 | 131 | 127 | 100 | 99 | 102 | 102 | 90 |
| 3 | 92 | 83 | 71 | 79 | 73 | 66 | 80 | 114 | 130 | 132 | 135 | 132 | 140 | 141 | 135 | 131 | 129 | 126 | 122 | 103 | 104 | 102 | 100 | 86 |
| 4 | 78 | 73 | 63 | 70 | 62 | 52 | 63 | 101 | 116 | 122 | 130 | 135 | 138 | 136 | 130 | 126 | 124 | 122 | 117 | 104 | 104 | 101 | 98 | 90 |
| 5 | 92 | 74 | 62 | 60 | 54 | 52 | 67 | 104 | 122 | 120 | 124 | 128 | 132 | 130 | 137 | 132 | 130 | 123 | 117 | 100 | 89 | 84 | 87 | 85 |
| 6 | 68 | 58 | 64 | 70 | 67 | 63 | 70 | 116 | 138 | 142 | 141 | 140 | 133 | 132 | 131 | 131 | 127 | 126 | 127 | 107 | 90 | 83 | 85 | 82 |
| 7 | 84 | 74 | 68 | 55 | 54 | 63 | 80 | 125 | 136 | 136 | 140 | 140 | 144 | 140 | 144 | 141 | 133 | 129 | 121 | 110 | 104 | 87 | 87 | 80 |
| 8 | 71 | A | 74 | 62 | 56 | 51 | 70 | 105 | 125 | 140 | 141 | 140 | 140 | 137 | 138 | 138 | 129 | 126 | 120 | 104 | 102 | 88 | 85 | 88 |
| 9 | 93 | 77 | 67 | 50 | 55 | 51 | 73 | 106 | 123 | 133 | 138 | 137 | 140 | 140 | 137 | 134 | 128 | 121 | 113 | 98 | 90 | 94 | 90 | 86 |
| 10 | 84 | 76 | 72 | 68 | 66 | 57 | 80 | 120 | 138 | 140 | 141 | 137 | 138 | 136 | 128 | 132 | 130 | 117 | 107 | 99 | 99 | 102 | 96 | 87 |
| 11 | 93 | 87 | 86 | 77 | 71 | 74 | 87 | 118 | 130 | 137 | 137 | 140 | 140 | 136 | 141 | 136 | 128 | 123 | 116 | 101 | 96 | 88 | 91 | 97 |
| 12 | 83 | 81 | 80 | 67 | 57 | 58 | 81 | 111 | 118 | 128 | 136 | 136 | 136 | 131 | 131 | 123 | 121 | 114 | 118 | 104 | 90 | 87 | 85 | 92 |
| 13 | 90 | 82 | 74 | 67 | 70 | 70 | 88 | 113 | 131 | 140 | 139 | 140 | 133 | 138 | 138 | N | 118 | 123 | 127 | 117 | 104 | 83 | 77 | 76 |
| 14 | 75 | 81 | 73 | 65 | 52 | 54 | 74 | 111 | 131 | 136 | 138 | 141 | 140 | 139 | 137 | 132 | 130 | 118 | 104 | 98 | 90 | 90 | 87 | 87 |
| 15 | 81 | 70 | 67 | 66 | 64 | 66 | 84 | 110 | 127 | 136 | 137 | 140 | 138 | 138 | 133 | 131 | 119 | 116 | 113 | 102 | N | 90 | 95 | 87 |
| 16 | 87 | 86 | 70 | 72 | 78 | 74 | 86 | 115 | 131 | 138 | 138 | 138 | 140 | 136 | 128 | 125 | 123 | 114 | 113 | 102 | 100 | 94 | 90 | 102 |
| 17 | 96 | 87 | 86 | 75 | 67 | 52 | 67 | 122 | 135 | 138 | 137 | 139 | 140 | 135 | 131 | 128 | 128 | 132 | 124 | 107 | 97 | 102 | 104 | 104 |
| 18 | 102 | 87 | 85 | 79 | 79 | 74 | 100 | 128 | 137 | 137 | 141 | 138 | 140 | 137 | 135 | 131 | 131 | 127 | 117 | 104 | 97 | 105 | 90 | 90 |
| 19 | 101 | 84 | 87 | 81 | 70 | 67 | 88 | 121 | 137 | 140 | 136 | 132 | 138 | 136 | 131 | 126 | 122 | 124 | 122 | 108 | 101 | 90 | 103 | 102 |
| 20 | 98 | 86 | 80 | 76 | 82 | 82 | 102 | 130 | 144 | 145 | 146 | 146 | 139 | 139 | 142 | 140 | 135 | 133 | 120 | 108 | 98 | 88 | 87 | 89 |
| 21 | 85 | 80 | 77 | 67 | 64 | 58 | 87 | 118 | 131 | 136 | 138 | 138 | 141 | 135 | 135 | 132 | 130 | 124 | 118 | 112 | 103 | 88 | 89 | 67 |
| 22 | 53 | 78 | 82 | 65 | 63 | 65 | 84 | 123 | 135 | 137 | 139 | 139 | 141 | 141 | 140 | 140 | 140 | 137 | 133 | 107 | 91 | 100 | 88 | 86 |
| 23 | 87 | 90 | 79 | 83 | 77 | 69 | 92 | 130 | 140 | 140 | 136 | 138 | 137 | 137 | 137 | 136 | 130 | 124 | 113 | 91 | 90 | 100 | 89 | 91 |
| 24 | 89 | 91 | 86 | 72 | 70 | 63 | 88 | 121 | 131 | 142 | 142 | 140 | 141 | 131 | 132 | 95 | 120 | 134 | 111 | 87 | 79 | 80 | 87 | 85 |
| 25 | 67 | 80 | 77 | 66 | 72 | 64 | 77 | 96 | 118 | 140 | 124 | 138 | 145 | 137 | 139 | 139 | 142 | 127 | 112 | 107 | 87 | 87 | 90 | 87 |
| 26 | 75 | 86 | 77 | 77 | 68 | 67 | 78 | 105 | 133 | 135 | 135 | 141 | 137 | 130 | 128 | N | 123 | 116 | 114 | 102 | 70 | 73 | 73 | 67 |
| 27 | 61 | 74 | 66 | 55 | 55 | 54 | 81 | 127 | 141 | 137 | 141 | 144 | 144 | 141 | 139 | 133 | 129 | 124 | 120 | 108 | 90 | 78 | 82 | 78 |
| 28 | 73 | 68 | 70 | 72 | 64 | 52 | 86 | 113 | 127 | 136 | 135 | 137 | 139 | 146 | 141 | 138 | 134 | 128 | 118 | 103 | 85 | 81 | 84 | 86 |
| 29 | 78 | 72 | 73 | 67 | 60 | 58 | 90 | 112 | 125 | 131 | 136 | 141 | 145 | 140 | 137 | 138 | 133 | 130 | 118 | 98 | 82 | 86 | 90 | 88 |
| 30 | 90 | 87 | 74 | 66 | 54 | 60 | 90 | 112 | 118 | 121 | 124 | 135 | 140 | 139 | 139 | 136 | 137 | 133 | 127 | 107 | 90 | 88 | 90 | 87 |
| 31 | 87 | 86 | 51 | 72 | 67 | 54 | 78 | 80 | 75 | 92 | 105 | 120 | 127 | 122 | 125 | 113 | 113 | 104 | 98 | 82 | 77 | 74 | 81 | 83 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 29 | 31 | 31 | 31 | 31 | 30 | 31 | 31 | 31 |
| MED | 84 | 80 | 74 | 68 | 66 | 63 | 81 | 114 | 131 | 137 | 138 | 139 | 140 | 137 | 137 | 132 | 129 | 124 | 118 | 103 | 90 | 88 | 89 | 87 |
| U Q | 92 | 86 | 80 | 76 | 70 | 67 | 88 | 121 | 137 | 140 | 141 | 140 | 141 | 140 | 139 | 137 | 133 | 130 | 122 | 107 | 100 | 100 | 91 | 90 |
| L Q | 75 | 74 | 67 | 66 | 56 | 54 | 74 | 106 | 125 | 133 | 135 | 137 | 138 | 135 | 131 | 129 | 123 | 121 | 113 | 100 | 89 | 84 | 85 | 83 |

# HOURLY VALUES OF FES AT KOKUBUNJI

MAR. 1991

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

| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G | G | 27 | 26 | G | G | G | G | G | G | G | G | G | G | 56 | 52 | 42 | 32 | G | G | G | 30 | G | 27 |
| 2 | 24 | 29 | 29 | G | G | G | G | G | G | G | G | 53 | G | G | G | G | G | G | 26 | G | G | G | G | G |
| 3 | G | G | G | G | G | G | G | G | G | G | 55 | G | G | 57 | G | G | 43 | 46 | 43 | 40 | 30 | 26 | G | G |
| 4 | G | G | G | G | G | G | G | 36 | G | G | G | G | G | G | G | G | G | 30 | 25 | G | G | G | G | G |
| 5 | G | G | G | G | G | G | G | 48 | G | G | G | G | G | G | G | G | G | 56 | G | G | G | G | G | G |
| 6 | G | G | G | G | G | G | G | 34 | 39 | G | G | G | G | G | G | G | G | G | 30 | 26 | G | G | G | G |
| 7 | G | G | G | G | G | 26 | 24 | 33 | G | G | G | 47 | G | G | G | G | 40 | G | G | G | G | G | G | G |
| 8 | G | 60 | 25 | 26 | G | G | G | G | G | G | G | G | G | G | G | G | G | 34 | 36 | G | G | G | G | G |
| 9 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 46 | G | G | G | G | G | G | G | G |
| 10 | G | G | G | G | G | G | G | G | G | G | G | 53 | G | 45 | 44 | 45 | 40 | 32 | G | G | 25 | G | G | G |
| 11 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 50 | 50 | 43 | 32 | G | 25 | 27 | 35 | 33 |
| 12 | G | G | G | G | G | G | G | 32 | G | G | G | G | G | G | G | 44 | 43 | 34 | G | 49 | 33 | G | G | G |
| 13 | G | G | G | G | G | G | G | 32 | G | G | G | G | G | 48 | G | 44 | 40 | 32 | G | G | G | G | G | G |
| 14 | G | G | 30 | G | G | G | G | G | 38 | G | 44 | 45 | G | G | G | G | 38 | G | G | G | G | G | G | G |
| 15 | G | G | G | G | G | G | G | G | G | G | 50 | G | G | G | G | 43 | 38 | 31 | G | G | G | G | G | G |
| 16 | G | G | G | G | G | G | G | G | G | 48 | G | G | G | 47 | 44 | G | 48 | 34 | 24 | 26 | 32 | G | G | G |
| 17 | G | G | G | G | G | G | G | G | 41 | G | G | G | G | 44 | G | G | G | G | G | 25 | G | 27 | G | G |
| 18 | G | G | G | G | G | G | G | 34 | 41 | 44 | G | G | G | G | G | G | 40 | 32 | G | G | G | G | G | G |
| 19 | G | G | G | G | G | G | G | 34 | G | 43 | G | G | G | G | G | G | G | 36 | G | G | G | 58 | G | G |
| 20 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 32 | G | G | G | G | G | G |
| 21 | 25 | G | G | G | G | G | G | G | 44 | G | G | 51 | G | 50 | G | G | G | G | 25 | G | G | G | G | G |
| 22 | G | G | 24 | 26 | 24 | G | 29 | 34 | 40 | 48 | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 23 | G | G | G | G | G | G | G | 34 | G | G | G | G | G | G | G | 43 | 38 | 32 | 26 | 46 | G | G | G | G |
| 24 | G | G | G | G | G | G | G | G | 41 | G | G | G | G | G | G | G | 37 | G | G | 29 | 29 | 27 | G | G |
| 25 | G | G | G | G | G | G | G | G | 40 | 46 | 52 | 52 | 47 | 75 | 49 | 41 | 43 | 54 | 40 | 35 | G | G | G | G |
| 26 | 24 | 26 | 27 | 25 | 24 | G | G | G | 40 | G | G | G | G | 55 | 52 | 46 | 38 | 44 | 40 | 25 | G | G | 27 | 43 |
| 27 | 27 | 27 | G | G | G | G | G | G | G | G | G | G | G | G | 59 | 51 | G | 36 | G | G | 37 | G | G | G |
| 28 | G | G | G | G | G | G | G | G | 40 | G | G | 55 | 47 | G | G | 42 | 39 | G | 24 | 30 | G | G | G | 32 |
| 29 | G | G | G | G | G | G | G | G | G | G | G | 48 | G | G | G | G | G | 37 | 59 | 25 | G | G | G | G |
| 30 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 30 | 27 | 44 | G | G |
| 31 | G | G | G | G | G | G | G | G | G | 52 | G | G | 46 | 50 | G | G | G | G | G | G | 55 | 34 | 56 | 50 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 37 | 32 | G | G | G | G | G | G |
| U 0 | G | G | G | G | G | G | G | 33 | 40 | G | G | 45 | G | 45 | G | 44 | 40 | 36 | 26 | 26 | 25 | 26 | G | G |
| L 0 | 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 KOKUBUNJI

MAR. 1991

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 | 15 | 15 | 15 | 16 | 17 | 27 | 18 | 20 | 22 | 24 | 40 | 34 | 40 | 27 | 17 | 16 | 15 | 15 | 15 | 15 | 15 | 14 |
| 2 | 15 | 16 | 14 | 16 | 15 | 15 | 16 | 18 | 16 | 21 | 21 | 24 | 28 | 28 | 29 | 21 | 18 | 16 | 16 | 15 | 15 | 15 | 15 | 15 |
| 3 | 15 | 15 | 15 | 15 | 15 | 15 | 17 | 16 | 18 | 20 | 26 | 28 | 45 | 42 | 28 | 18 | 16 | 16 | 15 | 15 | 15 | 15 | 16 | 16 |
| 4 | 15 | 15 | 15 | 15 | 15 | 15 | 17 | 16 | 16 | 21 | 40 | 34 | 33 | 33 | 29 | 32 | 18 | 14 | 16 | 15 | 15 | 15 | 15 | 16 |
| 5 | 15 | 15 | 14 | 15 | 15 | 16 | 18 | 16 | 18 | 27 | 40 | 42 | 44 | 42 | 41 | 15 | 20 | 16 | 17 | 16 | 18 | 15 | 15 | 15 |
| 6 | 15 | 15 | 15 | 15 | 15 | 15 | 17 | 16 | 17 | 38 | 24 | 41 | 43 | 42 | 27 | 20 | 16 | 17 | 14 | 16 | 16 | 16 | 16 | 15 |
| 7 | 15 | 15 | 15 | 15 | 16 | 15 | 18 | 15 | 18 | 18 | 22 | 42 | 46 | 26 | 21 | 29 | 20 | 33 | 16 | 16 | 16 | 15 | 16 | 15 |
| 8 | 16 | 14 | 15 | 15 | 14 | 16 | 20 | 16 | 18 | 21 | 23 | 26 | 41 | 43 | 39 | 21 | 17 | 16 | 14 | 15 | 15 | 15 | 16 | 16 |
| 9 | 15 | 15 | 16 | 16 | 16 | 15 | 20 | 16 | 18 | 22 | 23 | 41 | 41 | 33 | 24 | 20 | 22 | 17 | 18 | 15 | 15 | 15 | 15 | 15 |
| 10 | 15 | 15 | 15 | 15 | 15 | 16 | 20 | 16 | 18 | 20 | 22 | 28 | 28 | 33 | 24 | 22 | 20 | 16 | 17 | 16 | 15 | 15 | 15 | 15 |
| 11 | 15 | 15 | 14 | 15 | 15 | 15 | 20 | 17 | 17 | 22 | 22 | 22 | 23 | 42 | 27 | 18 | 15 | 17 | 16 | 16 | 15 | 15 | 15 | 15 |
| 12 | 15 | 14 | 14 | 15 | 14 | 16 | 20 | 15 | 20 | 20 | 42 | 44 | 43 | 33 | 28 | 22 | 17 | 15 | 17 | 16 | 15 | 15 | 15 | 15 |
| 13 | 15 | 14 | 15 | 15 | 15 | 15 | 20 | 16 | 16 | 17 | 23 | 26 | 151 | 34 | 24 | 24 | 18 | 16 | 17 | 15 | 15 | 15 | 15 | 15 |
| 14 | 16 | 15 | 15 | 15 | 15 | 16 | 22 | 15 | 18 | 21 | 24 | 26 | 29 | 27 | 22 | 20 | 15 | 14 | 18 | 16 | 15 | 15 | 15 | 15 |
| 15 | 15 | 15 | 15 | 15 | 15 | 15 | 21 | 14 | 16 | 20 | 21 | 41 | 43 | 43 | 33 | 20 | 18 | 16 | 17 | 16 | 15 | 16 | 15 | 15 |
| 16 | 15 | 15 | 15 | 15 | 14 | 15 | 21 | 15 | 16 | 20 | 46 | 32 | 33 | 28 | 26 | 20 | 18 | 14 | 18 | 16 | 15 | 15 | 16 | 15 |
| 17 | 16 | 15 | 15 | 15 | 14 | 16 | 23 | 35 | 18 | 20 | 23 | 43 | 32 | 30 | 40 | 22 | 16 | 15 | 18 | 16 | 15 | 16 | 15 | 16 |
| 18 | 15 | 15 | 15 | 14 | 15 | 14 | 22 | 16 | 20 | 20 | 23 | 26 | 42 | 35 | 30 | 24 | 20 | 16 | 18 | 16 | 15 | 15 | 15 | 15 |
| 19 | 15 | 15 | 15 | 14 | 15 | 15 | 23 | 16 | 20 | 24 | 28 | 85 | 45 | 43 | 24 | 21 | 17 | 17 | 20 | 16 | 16 | 16 | 16 | 15 |
| 20 | 15 | 15 | 15 | 16 | 15 | 15 | 16 | 16 | 20 | 40 | 23 | 22 | 26 | 53 | 32 | 44 | 21 | 16 | 20 | 16 | 16 | 15 | 16 | 16 |
| 21 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 18 | 18 | 22 | 45 | 30 | 35 | 32 | 21 | 39 | 17 | 15 | 17 | 16 | 15 | 15 | 16 | 15 |
| 22 |  | 15 | 17 | 14 | 15 | 16 | 16 | 16 | 17 | 27 | 34 | 34 | 33 | 29 | 24 | 23 | 20 | 15 | 20 | 15 | 15 | 15 | 16 | 15 |
| 23 | 15 | 15 | 15 | 15 | 15 | 15 | 23 | 16 | 50 | 22 | 26 | 64 | 73 | 74 | 75 | 45 | 28 | 17 | 16 | 16 | 16 | 15 | 16 | 15 |
| 24 | 15 | 15 | 15 | 15 | 14 | 15 | 23 | 15 | 18 | 26 | 46 | 45 | 48 | 36 | 28 | 21 | 17 | 16 | 16 | 16 | 15 | 15 | 16 | 15 |
| 25 | 15 | 15 | 15 | 17 | 16 | 15 | 24 | 16 | 18 | 21 | 28 | 35 | 30 | 30 | 23 | 22 | 16 | 14 | 14 | 15 | 15 | 15 | 16 | 15 |
| 26 | 16 | 14 | 14 | 15 | 14 | 15 | 23 | 16 | 20 | 18 | 26 | 29 | 40 | 29 | 21 | 17 | 20 | 16 | 16 | 16 | 16 | 16 | 15 | 14 |
| 27 | 15 | 14 | 15 | 15 | 15 | 16 | 23 | 15 | 16 | 20 | 26 | 27 | 42 | 24 | 39 | 20 | 16 | 15 | 21 | 16 | 15 | 16 | 15 | 16 |
| 28 | 16 | 15 | 15 | 14 | 15 | 17 | 26 | 18 | 21 | 40 | 30 | 23 | 28 | 28 | 21 | 20 | 20 | 15 | 16 | 15 | 16 | 15 | 15 | 14 |
| 29 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 15 | 17 | 20 | 21 | 35 | 34 | 42 | 22 | 20 | 42 | 16 | 17 | 15 | 15 | 15 | 15 | 15 |
| 30 | 15 | 14 | 15 | 15 | 15 | 15 | 17 | 16 | 17 | 21 | 27 | 43 | 26 | 43 | 40 | 40 | 35 | 18 | 21 | 15 | 14 | 15 | 15 | 15 |
| 31 | 15 | 14 | 16 | 14 | 16 |  | 18 | 15 | 21 | 22 | 21 | 29 | 38 | 29 | 29 | 22 | 20 | 16 | 20 | 16 | 15 | 15 | 16 | 15 |
|  | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 30 | 31 | 31 | 31 | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | 15 | 15 | 15 | 15 | 15 | 15 | 20 | 16 | 18 | 21 | 24 | 32 | 40 | 33 | 28 | 21 | 18 | 16 | 17 | 16 | 15 | 15 | 15 | 15 |
| U Q | 15 | 15 | 15 | 15 | 15 | 16 | 23 | 16 | 20 | 22 | 30 | 42 | 43 | 42 | 33 | 24 | 20 | 16 | 18 | 16 | 16 | 15 | 16 | 15 |
| L Q | 15 | 15 | 15 | 15 | 15 | 15 | 17 | 15 | 17 | 20 | 22 | 26 | 30 | 29 | 24 | 20 | 17 | 15 | 16 | 15 | 15 | 15 | 15 | 15 |

# HOURLY VALUES OF FOF2 AT YAMAGAWA

MAR. 1991

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 | 86 | 82 | 84 | 80 | 82 | 66 | 66 | 88 | 122 | 144 | 143 | 145 | 151 | 146 | 144 | 142 | 140 | 138 | 132 | 121 | 106 | 107 | 102 | 90 |
| 2 | 100 | 86 | 83 | 86 | 64 | 58 | 60 | 86 | 125 | 148 | 136 | 150 | 151 | 146 | 142 | 140 | 140 | 140 | 130 | 111 | 117 | 110 | 111 | 110 |
| 3 | 108 | 88 | 86 | 84 | 84 | 66 | 65 | 86 | 111 | 124 | 136 | 139 | 145 | 145 | 146 | 141 | 140 | 142 | 142 | 137 | 142 | 144 | 134 | 121 |
| 4 | 138 | 137 | 86 | 84 | 80 | 58 | 51 | 79 | 106 | 124 | 131 | 136 | 143 | 140 | 140 | 140 | 138 | 135 | 133 | 135 | 139 | 146 | 127 | 111 |
| 5 | 110 | 85 | 81 | 72 | 64 | 60 | 53 | 86 | 107 | 120 | 121 | 129 | 136 | 142 | 147 | 146 | 144 | 138 | 131 | 122 | 108 | 110 | 85 | 85 |
| 6 | 84 | 66 | 61 | 65 | 64 | 58 | 63 | 101 | 131 | 137 | 146 | 135 | 146 | 145 | 146 | 142 | 138 | 136 | 137 | 125 | 111 | 105 | 104 | 86 |
| 7 | 86 | 86 | 83 | 64 | 64 | 62 | 72 | 93 | 122 | 133 | 135 | 144 | 148 | 151 | 156 | 147 | 146 | 148 | 148 | 146 | 146 | 145 | 154 | 110 |
| 8 | 87 | 86 | 85 | 88 | 60 | 64 | 63 | 85 | 112 | 137 | 153 | 145 | 141 | 142 | 142 | 140 | 141 | 136 | 136 | 127 | N | 136 | 111 | 110 |
| 9 | 104 | 86 | 72 | 54 | 51 | 60 | 61 | 91 | 118 | 136 | 145 | 146 | 146 | 147 | 150 | 147 | 150 | 144 | 140 | 130 | 126 | 110 | 108 | 110 |
| 10 | 108 | 86 | 87 | 86 | 71 | 62 | 78 | 104 | 125 | 135 | 146 | 146 | 149 | 150 | 140 | 140 | 137 | 131 | 124 | 130 | 111 | 110 | 110 | 110 |
| 11 | 108 | 86 | 86 | 86 | 68 | 66 | 66 | 101 | 118 | 132 | 133 | 135 | 142 | 142 | 146 | 146 | 142 | 138 | 129 | 128 | 130 | 128 | 134 | 135 |
| 12 | 110 | 87 | 90 | 86 | 75 | 57 | 57 | 87 | 108 | 127 | 135 | 138 | 137 | 142 | 142 | 142 | 138 | 132 | 130 | 128 | 112 | 110 | 110 | 85 |
| 13 | 110 | 88 | 83 | 84 | 66 | 63 | 66 | 89 | 111 | 138 | 142 | 141 | 142 | 141 | 147 | 138 | 132 | 141 | 145 | 136 | 130 | 121 | 107 | 110 |
| 14 | 103 | 106 | 88 | 85 | 63 | 58 | 68 | 90 | 120 | 132 | 140 | 146 | 147 | 146 | 141 | 138 | 135 | 121 | 120 | 111 | 102 | 108 | 103 | 107 |
| 15 | 84 | 84 | 78 | 76 | 62 | 58 | 63 | 91 | 110 | 132 | 137 | 140 | 145 | 147 | 146 | 140 | 134 | 124 | 122 | 111 | 111 | 124 | 110 | 110 |
| 16 | 106 | 89 | 76 | 77 | 78 | 66 | 67 | 90 | 125 | 131 | 141 | 141 | 142 | 142 | 137 | 132 | 126 | 122 | 111 | 111 | 108 | 108 | 110 | 110 |
| 17 | 107 | 86 | 88 | 88 | 74 | 53 |  | 90 | 110 | 126 | 134 | 139 | 137 | 132 | 130 | 128 | 128 | 131 | 116 | 110 | 105 | 107 | 111 | 110 |
| 18 | 103 | 88 | 86 | 84 | 77 | 67 | 70 | 100 | 122 | 131 | 142 | 137 | 136 | 140 | 138 | 136 | 138 | 132 | 127 | 110 | 107 | 117 | 111 | 107 |
| 19 | 108 | 101 | 88 | 86 | 77 | 62 | 66 | 101 | 122 | 134 | 134 | 134 | 138 | 141 | 132 | 128 | 124 | 124 | 123 | 111 | 102 | 106 | 107 | 110 |
| 20 | 113 | 86 | 77 | 76 | 80 | 77 | 80 | 111 | 146 | 146 | 146 | 156 | 157 | 156 | 152 | 152 | 146 | 142 | 138 | 130 | 121 | 109 | 111 | 107 |
| 21 | 109 | 88 | 86 | 86 | 77 | 71 | 85 | 107 | 134 | 138 | 146 | 152 | 148 | 145 | 142 | 141 | 137 | 134 | 127 | 124 | 109 | 105 | 105 | 85 |
| 22 | 79 | 86 | 86 | 83 | 59 | 64 | 67 | 106 | 131 | 137 | 140 | 147 | 156 | 156 | 155 | 155 | 147 | 153 | 145 | N | 114 | 112 | 110 | 108 |
| 23 | 111 | 110 | 111 | 102 | 87 | 83 | 83 | 110 | 142 | 134 | 140 | 145 | 145 | 147 | 147 | 142 | 135 | 131 | 130 | 121 | 111 | 114 | 122 | 118 |
| 24 | 110 | 96 | 85 | 81 | 66 | 59 | 66 | 103 | 123 | 135 | 143 | 143 | 141 | 140 | 138 | 107 | 134 | 135 | A | 102 | 90 | 87 | 90 | 86 |
| 25 | 81 | 80 | 76 | 74 | 81 | 63 | 66 | 82 | 128 | 143 | 121 | 144 | 152 | 147 | 141 | 146 | 142 | 130 | 124 | 130 | 111 | 111 | 106 | 110 |
| 26 | A | 90 | 100 | 86 | 86 | 87 | 86 | 106 | 141 | 153 | 146 | 161 | 157 | 151 | 146 | 153 | 146 | 143 | 137 | 137 | 108 | 84 | 86 | 71 |
| 27 | 85 | 85 | 67 | 80 | 66 |  | 63 | 103 | 145 | 157 | 150 | 145 | 158 | 161 | 158 | 147 | 150 | 147 | 148 | 135 | 110 | 88 | 97 | 97 |
| 28 | 86 | 83 | 78 | 81 | 61 | 78 | 77 | 107 | 122 | 146 | 134 | 145 | 153 | 159 | 162 | N | 157 | 151 | 142 | 129 | 112 | 109 | 104 | 108 |
| 29 | 89 | 86 | 84 | 77 | 63 | 54 | 66 | 88 | 111 | 124 | 141 | 148 | 150 | 145 | 145 | 147 | 145 | 136 | 129 | 110 | 108 | 89 | 110 | 107 |
| 30 | 108 | 112 | 86 | 76 | 60 | 60 | 66 | 102 | 107 | 114 | 124 | 135 | 145 | 154 | 152 | 149 | 145 | 141 | 130 | 127 | 106 | 102 | 106 | 101 |
| 31 | 86 | 107 | 68 | 67 | 74 | 65 | 76 | 90 | 103 | 124 | 136 | 146 | 147 | 143 | 139 | 132 | 121 | 118 | 111 | 90 | 80 | 84 | 79 | 86 |
|  | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 30 | 31 | 31 | 31 | 31 | 30 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 31 | 30 | 30 | 30 | 31 | 31 | 31 |
| MED | 105 | 86 | 85 | 83 | 68 | 62 | 66 | 91 | 122 | 134 | 140 | 144 | 146 | 145 | 145 | 142 | 140 | 136 | 130 | 126 | 111 | 110 | 110 | 108 |
| U Q | 109 | 90 | 86 | 86 | 78 | 66 | 72 | 103 | 128 | 138 | 145 | 146 | 151 | 150 | 147 | 147 | 145 | 142 | 138 | 130 | 117 | 117 | 111 | 110 |
| L Q | 86 | 86 | 78 | 76 | 63 | 58 | 63 | 88 | 111 | 127 | 134 | 138 | 142 | 142 | 140 | 138 | 135 | 131 | 124 | 111 | 107 | 105 | 104 | 90 |

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

# HOURLY VALUES OF FES AT YAMAGAWA

MAR. 1991

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 | 56 | 56 | G | G | 44 | 41 | 36 | 34 | G | 25 | G | G |
| 2 | G | G | G | G | G | G | G | G | G | 45 | G | G | G | G | G | G | G | 36 | G | G | G | G | G | G |
| 3 | G | G | G | G | G | G | G | G | 50 | G | G | G | G | G | G | G | G | 38 | G | G | G | G | G | G |
| 4 | G | G | G | G | G | G | G | G | G | 40 | G | G | G | G | G | G | 42 | G | 31 | G | G | G | G | G |
| 5 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 6 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 42 | G | G | G | G | G | G | G |
| 7 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 8 | G | G | 44 | 30 | 31 | 26 | 34 | G | G | 41 | 43 | G | G | G | G | G | G | G | 30 | 29 | G | G | G | G |
| 9 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 40 | G | G | G | G | G | G | G |
| 10 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 48 | G | 38 | G | G | G | G | G | G |
| 11 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 48 | 44 | 57 | 44 | G | G | G | G | G | G |
| 12 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 45 | G | 42 | 43 | 41 | G | G | G | G | G |
| 13 | G | G | G | G | G | G | G | 39 | G | 40 | G | G | G | G | 54 | 48 | 43 | G | G | G | G | G | 33 | 32 |
| 14 | 23 | G | G | G | G | G | G | G | G | 40 | 43 | G | G | G | G | G | G | 38 | 39 | 29 | 28 | G | G | G |
| 15 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 40 | G | G | G | G | G | G | G |
| 16 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |
| 17 | G | G | G | G | G | G | | G | G | G | G | G | G | G | G | G | G | G | 29 | 32 | G | G | G | G |
| 18 | G | G | G | G | G | G | G | G | G | 41 | G | G | G | G | G | G | 42 | 39 | 34 | G | G | G | G | G |
| 19 | G | G | G | G | G | G | G | G | G | 42 | 54 | G | G | 56 | G | G | G | G | 32 | 39 | 26 | G | G | G |
| 20 | G | G | G | G | G | G | G | G | G | G | 43 | G | G | G | G | G | G | 40 | G | 29 | G | G | G | G |
| 21 | G | G | G | G | G | G | G | G | G | 44 | G | G | 56 | 57 | 56 | G | 66 | G | 39 | G | 25 | G | G | G |
| 22 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 36 | G | G | G | G | G | G |
| 23 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 56 | G | 38 | 62 | 68 | 57 | 39 | 40 | G |
| 24 | G | G | G | G | G | G | G | G | G | G | G | 46 | G | G | G | G | G | 44 | 94 | G | G | 45 | G | G |
| 25 | G | G | G | G | G | G | G | G | G | G | G | G | G | 56 | 58 | 51 | G | 60 | 58 | 58 | 48 | 24 | 75 | 23 |
| 26 | 47 | 31 | 33 | 35 | 27 | 28 | G | G | 41 | G | 48 | G | G | G | 55 | G | G | G | 42 | 42 | G | G | G | G |
| 27 | G | 49 | G | G | G | G | G | G | G | G | G | 45 | G | G | G | 51 | 52 | 48 | 38 | G | 32 | 30 | G | 28 |
| 28 | G | G | G | G | G | G | G | G | G | G | G | G | 52 | 58 | 52 | G | 43 | G | 29 | 28 | 33 | G | G | G |
| 29 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 62 | 65 | 57 | 72 | G | G | G |
| 30 | G | G | G | G | G | G | G | G | 38 | 41 | G | G | G | G | G | G | G | G | 36 | 31 | 31 | G | G | G |
| 31 | G | G | G | G | G | G | G | 39 | G | 49 | G | G | G | G | G | G | G | G | G | 34 | 32 | 24 | 36 | 45 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 29 | G | G | G | G | G |
| U O | G | G | G | G | G | G | G | G | G | 40 | G | G | G | G | G | G | 42 | 40 | 39 | 32 | 28 | G | G | G |
| L O | 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 YAMAGAWA

MAR. 1991

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

| HD | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 23 | 18 | 36 | 40 | 42 | 42 | 40 | 52 | 42 | 27 | 17 | 16 | 15 | 15 | 15 | 15 | 15 |
| 2 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 18 | 16 | 24 | 24 | 43 | 45 | 43 | 42 | 39 | 24 | 17 | 22 | 15 | 15 | 15 | 15 | 15 |
| 3 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 22 | 39 | 44 | 49 | 45 | 45 | 40 | 27 | 16 | 22 | 15 | 15 | 15 | 15 | 15 |
| 4 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 24 | 18 | 22 | 40 | 42 | 44 | 44 | 44 | 44 | 22 | 17 | 15 | 16 | 16 | 15 | 15 | 15 |
| 5 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 18 | 38 | 42 | 43 | 46 | 45 | 44 | 40 | 35 | 18 | 22 | 15 | 15 | 15 | 15 | 15 |
| 6 | 15 | 15 | 15 | 16 | 15 | 15 | 15 | 22 | 22 | 39 | 43 | 43 | 46 | 43 | 46 | 43 | 23 | 23 | 23 | 15 | 16 | 15 | 15 | 15 |
| 7 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 17 | 20 | 37 | 43 | 42 | 45 | 40 | 39 | 23 | 41 | 23 | 15 | 15 | 15 | 15 | 15 |
| 8 | 16 | 15 | 15 | 15 | 15 | 15 | 16 | 24 | 17 | 22 | 24 | 43 | 44 | 45 | 43 | 39 | 36 | 18 | 15 | 15 | 15 | 15 | 15 | 15 |
| 9 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 18 | 32 | 24 | 40 | 43 | 44 | 44 | 43 | 42 | 38 | 33 | 15 | 15 | 15 | 15 | 15 | 15 |
| 10 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 24 | 20 | 27 | 39 | 42 | 44 | 44 | 42 | 35 | 35 | 20 | 23 | 16 | 15 | 15 | 15 | 16 |
| 11 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 20 | 24 | 40 | 43 | 44 | 45 | 46 | 44 | 27 | 23 | 23 | 15 | 15 | 15 | 15 | 15 |
| 12 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 26 | 16 | 21 | 41 | 44 | 44 | 44 | 38 | 41 | 28 | 17 | 17 | 15 | 15 | 15 | 15 | 15 |
| 13 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 26 | 16 | 21 | 40 | 36 | 95 | 36 | 36 | 36 | 23 | 18 | 15 | 15 | 15 | 15 | 16 | 14 |
| 14 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 18 | 18 | 23 | 24 | 43 | 47 | 46 | 40 | 35 | 28 | 20 | 16 | 15 | 15 | 15 | 15 | 15 |
| 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 17 | 22 | 42 | 44 | 46 | 44 | 43 | 41 | 23 | 18 | 16 | 15 | 15 | 15 | 15 | 15 |
| 16 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 26 | 17 | 38 | 48 | 42 | 46 | 46 | 45 | 39 | 26 | 18 | 23 | 15 | 15 | 15 | 15 | 15 |
| 17 | 15 | 15 | 15 | 15 | 15 | 15 |  | 32 | 18 | 22 | 42 | 49 | 48 | 46 | 45 | 47 | 22 | 18 | 15 | 16 | 16 | 15 | 15 | 15 |
| 18 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 27 | 20 | 22 | 42 | 44 | 46 | 46 | 22 | 34 | 27 | 16 | 23 | 15 | 15 | 15 | 15 | 15 |
| 19 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 17 | 21 | 28 | 39 | 69 | 38 | 38 | 45 | 43 | 24 | 22 | 16 | 15 | 16 | 15 | 15 | 15 |
| 20 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 16 | 40 | 43 | 43 | 44 | 58 | 44 | 46 | 36 | 18 | 17 | 15 | 15 | 15 | 15 | 15 |
| 21 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 16 | 17 | 29 | 46 | 46 | 40 | 36 | 34 | 45 | 27 | 18 | 16 | 15 | 15 | 15 | 15 | 15 |
| 22 | 15 | 15 | 14 | 15 | 15 | 15 | 16 | 16 | 17 | 38 | 44 | 44 | 46 | 45 | 34 | 43 | 28 | 21 | 26 | 15 | 15 | 15 | 15 | 15 |
| 23 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 42 | 22 | 41 | 55 | 56 | 81 | 74 | 48 | 43 | 20 | 16 | 15 | 15 | 15 | 15 | 15 |
| 24 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 29 | 17 | 42 | 47 | 50 | 52 | 48 | 44 | 34 | 35 | 18 | 15 | 15 | 15 | 15 | 15 | 15 |
| 25 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 17 | 36 | 42 | 44 | 47 | 39 | 35 | 35 | 37 | 18 | 15 | 15 | 15 | 15 | 16 | 15 |
| 26 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 15 | 20 | 35 | 34 | 44 | 45 | 45 | 40 | 42 | 26 | 14 | 17 | 16 | 16 | 16 | 15 | 17 |
| 27 | 15 | 15 | 15 | 16 | 15 | 15 | 15 | 29 | 20 | 36 | 34 | 44 | 42 | 45 | 42 | 43 | 34 | 17 | 16 | 15 | 16 | 15 | 15 | 15 |
| 28 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 22 | 24 | 42 | 45 | 39 | 36 | 34 | 40 | 20 | 16 | 15 | 15 | 16 | 15 | 16 | 15 |
| 29 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 18 | 16 | 36 | 39 | 44 | 44 | 45 | 45 | 44 | 54 | 29 | 15 | 17 | 15 | 15 | 15 | 15 |
| 30 | 15 | 15 | 15 | 15 | 15 | 15 | 17 | 16 | 17 | 22 | 42 | 43 | 45 | 45 | 45 | 44 | 36 | 16 | 15 | 15 | 15 | 15 | 15 | 15 |
| 31 | 15 | 15 | 15 | 15 | 15 | 15 | 17 | 28 | 17 | 27 | 41 | 45 | 50 | 45 | 44 | 43 | 36 | 17 | 24 | 15 | 15 | 15 | 15 | 15 |
|  | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 18 | 17 | 24 | 41 | 44 | 45 | 45 | 43 | 42 | 27 | 18 | 16 | 15 | 15 | 15 | 15 | 15 |
| U Q | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 26 | 20 | 36 | 42 | 44 | 47 | 45 | 45 | 44 | 36 | 20 | 23 | 15 | 15 | 15 | 15 | 15 |
| L Q | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 17 | 22 | 39 | 43 | 44 | 43 | 40 | 39 | 24 | 17 | 15 | 15 | 15 | 15 | 15 | 15 |

COMMUNICATIONS RESEARCH LABORATORY, JAPAN

# HOURLY VALUES OF FOF2 AT OKINAWA

MAR. 1991

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 | 138 | 130 | 108 | | | | | | | 146 | 154 | 145 | 157 | 156 | 154 | 146 | 146 | 142 | 146 | 135 | 140 | 146 | 164 | 146 |
| 2 | 145 | 129 | 126 | 121 | 66 | 52 | 43 | 77 | 108 | 144 | 145 | 146 | 149 | 146 | 145 | 146 | 146 | 144 | 136 | 134 | 146 | 161 | 164 | 139 |
| 3 | 146 | 139 | 110 | 90 | 87 | 80 | 54 | 77 | 106 | 111 | 139 | 146 | 158 | 152 | 146 | 145 | N | N | 163 | 175 | 198 | 198 | 187 | 170 |
| 4 | 171 | 163 | 145 | 130 | 110 | 66 | 47 | 66 | 106 | 120 | 141 | 146 | 153 | 158 | 158 | 161 | 165 | 171 | 170 | 188 | 190 | 198 | 177 | 183 |
| 5 | 165 | 145 | 131 | 107 | 90 | 80 | 54 | 78 | 108 | 119 | 137 | 139 | 146 | 153 | 155 | 164 | 166 | 163 | 162 | 176 | 163 | 166 | 141 | 108 |
| 6 | 87 | | 80 | | | | | | | 135 | 145 | 140 | 156 | 164 | 170 | 165 | 161 | 164 | 164 | 168 | 170 | 166 | 146 | 145 |
| 7 | 129 | | | | | | | | | 136 | 145 | 147 | 164 | 167 | 170 | 170 | 170 | 183 | 194 | 189 | 198 | 198 | 196 | 184 |
| 8 | 164 | 145 | 146 | 145 | 90 | 73 | 67 | 87 | 108 | 142 | 156 | 146 | 144 | 151 | 146 | 146 | 156 | 161 | 157 | 171 | 199 | 194 | 168 | 145 |
| 9 | 142 | 87 | 80 | 66 | 54 | 59 | 54 | 86 | 121 | 142 | 146 | 153 | 156 | 161 | 171 | 171 | 182 | 177 | 183 | 177 | 196 | 196 | 188 | 171 |
| 10 | 164 | 145 | 158 | 128 | 86 | 80 | 84 | 108 | 131 | 140 | 146 | 156 | 163 | 164 | 146 | 146 | 143 | 145 | 142 | 157 | 146 | 141 | 146 | 141 |
| 11 | 128 | 110 | 88 | 90 | 86 | 67 | 58 | 90 | 128 | 135 | 142 | 145 | 145 | 147 | 162 | 167 | 169 | 164 | 164 | 170 | 176 | 172 | 199 | 184 |
| 12 | 198 | 161 | 160 | 141 | 90 | 83 | 54 | | 108 | 128 | 140 | 139 | 143 | 145 | 155 | 162 | 162 | N | 160 | 161 | 167 | 160 | 169 | 146 |
| 13 | 162 | 145 | 120 | 108 | 86 | 80 | 78 | 87 | 110 | 144 | 145 | 137 | 142 | 146 | 150 | 146 | 146 | 166 | 164 | 171 | 175 | 175 | 181 | 180 |
| 14 | 176 | 165 | 145 | 128 | 88 | 64 | 74 | 101 | 130 | 142 | 146 | 148 | 161 | 164 | 168 | 164 | 164 | 157 | 145 | 144 | 145 | 138 | 141 | 121 |
| 15 | 110 | 110 | 97 | 75 | 85 | 64 | 53 | 86 | 108 | 141 | 142 | 143 | 158 | N | 177 | 178 | 170 | 158 | 145 | 157 | 166 | 184 | 170 | 168 |
| 16 | 163 | 141 | 87 | 86 | 85 | 72 | 53 | 85 | 122 | 141 | 141 | 142 | 146 | 158 | | | | | | | | 169 | 146 | 145 |
| 17 | 145 | | | | | | | | | | | | | | | | | | 130 | 131 | 145 | 161 | 177 | 163 |
| 18 | 138 | | | | | | | | | 128 | 136 | 137 | 135 | 146 | 151 | 160 | 160 | 146 | 145 | 146 | 160 | 170 | 171 | 165 |
| 19 | 163 | | 127 | 110 | 88 | 62 | 37 | 86 | 108 | 132 | 135 | 137 | 145 | 146 | 152 | 147 | 145 | 137 | 131 | N | N | 138 | 166 | 142 |
| 20 | 142 | | | | | 66 | 63 | 97 | 138 | 140 | 145 | 147 | 152 | 162 | 167 | 167 | 165 | 163 | 147 | 145 | 163 | 162 | 145 | 128 |
| 21 | 84 | 86 | 90 | 86 | 79 | 66 | 54 | 90 | 126 | 135 | 141 | 114 | 146 | 144 | 157 | 157 | 158 | 146 | 145 | 158 | 170 | 179 | 171 | 166 |
| 22 | 85 | 110 | 121 | 88 | 86 | 80 | | 89 | 130 | 142 | 140 | 148 | 161 | N | 171 | 180 | 178 | 176 | 171 | 163 | 164 | 164 | 179 | 163 |
| 23 | 170 | 168 | 145 | 134 | 88 | 87 | 80 | 90 | 135 | 134 | 142 | 146 | 145 | 157 | 160 | 157 | 146 | 145 | 138 | 138 | 139 | 167 | 167 | 146 |
| 24 | 142 | 110 | 109 | 86 | 79 | 58 | 54 | 90 | 122 | 138 | 137 | 143 | 142 | 144 | 145 | 132 | 155 | 127 | 105 | 109 | 86 | A | 87 | 86 |
| 25 | 85 | 80 | 76 | 71 | 72 | 74 | 43 | 73 | 129 | 146 | 102 | 148 | 147 | 147 | 143 | 147 | 141 | 131 | 137 | 145 | 141 | 140 | 122 | 126 |
| 26 | 86 | 103 | 104 | 85 | 86 | 87 | 84 | 90 | 144 | 160 | 141 | 160 | 164 | 146 | 158 | 165 | 162 | 145 | 160 | 146 | 124 | 87 | 128 | 97 |
| 27 | 90 | 86 | 86 | 86 | 87 | 67 | 54 | 88 | 145 | 163 | 146 | 147 | 160 | 171 | 172 | 164 | 169 | 176 | 170 | 161 | 146 | 145 | 130 | 142 |
| 28 | 128 | 85 | 79 | 86 | 81 | 80 | 66 | 95 | 106 | 130 | 138 | 146 | 147 | 169 | 177 | 177 | 187 | 187 | 179 | 177 | 177 | 176 | 167 | 166 |
| 29 | 166 | 163 | 121 | 88 | 74 | 62 | 66 | 86 | 108 | 120 | 146 | 154 | 151 | 157 | 162 | 164 | 161 | 153 | 146 | 146 | 162 | 164 | 146 | 146 |
| 30 | 158 | 161 | 138 | 85 | 63 | 53 | | 88 | 108 | 122 | 129 | 140 | 160 | 170 | 171 | 174 | 169 | 165 | 155 | 145 | 146 | 146 | 139 | 130 |
| 31 | 127 | 122 | 86 | 65 | 66 | 55 | 63 | 88 | 107 | 138 | 146 | 146 | 151 | 160 | 146 | 146 | 142 | 137 | 137 | 111 | 103 | 99 | 87 | 110 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 25 | 27 | 25 | 25 | 26 | 24 | 25 | 26 | 30 | 30 | 30 | 30 | 28 | 29 | 29 | 28 | 27 | 30 | 29 | 29 | 30 | 31 | 31 |
| MED | 142 | 130 | 110 | 88 | 86 | 67 | 54 | 88 | 116 | 138 | 142 | 146 | 151 | 156 | 158 | 162 | 162 | 158 | 151 | 157 | 163 | 165 | 166 | 146 |
| U Q | 164 | 153 | 138 | 124 | 88 | 80 | 66 | 90 | 130 | 142 | 146 | 147 | 158 | 163 | 170 | 167 | 169 | 166 | 164 | 171 | 175 | 176 | 177 | 166 |
| L Q | 127 | 106 | 87 | 85 | 76 | 62 | 53 | 85 | 108 | 130 | 139 | 140 | 145 | 146 | 148 | 146 | 146 | 145 | 142 | 144 | 145 | 146 | 141 | 130 |

# HOURLY VALUES OF FES AT OKINAWA

MAR. 1991

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

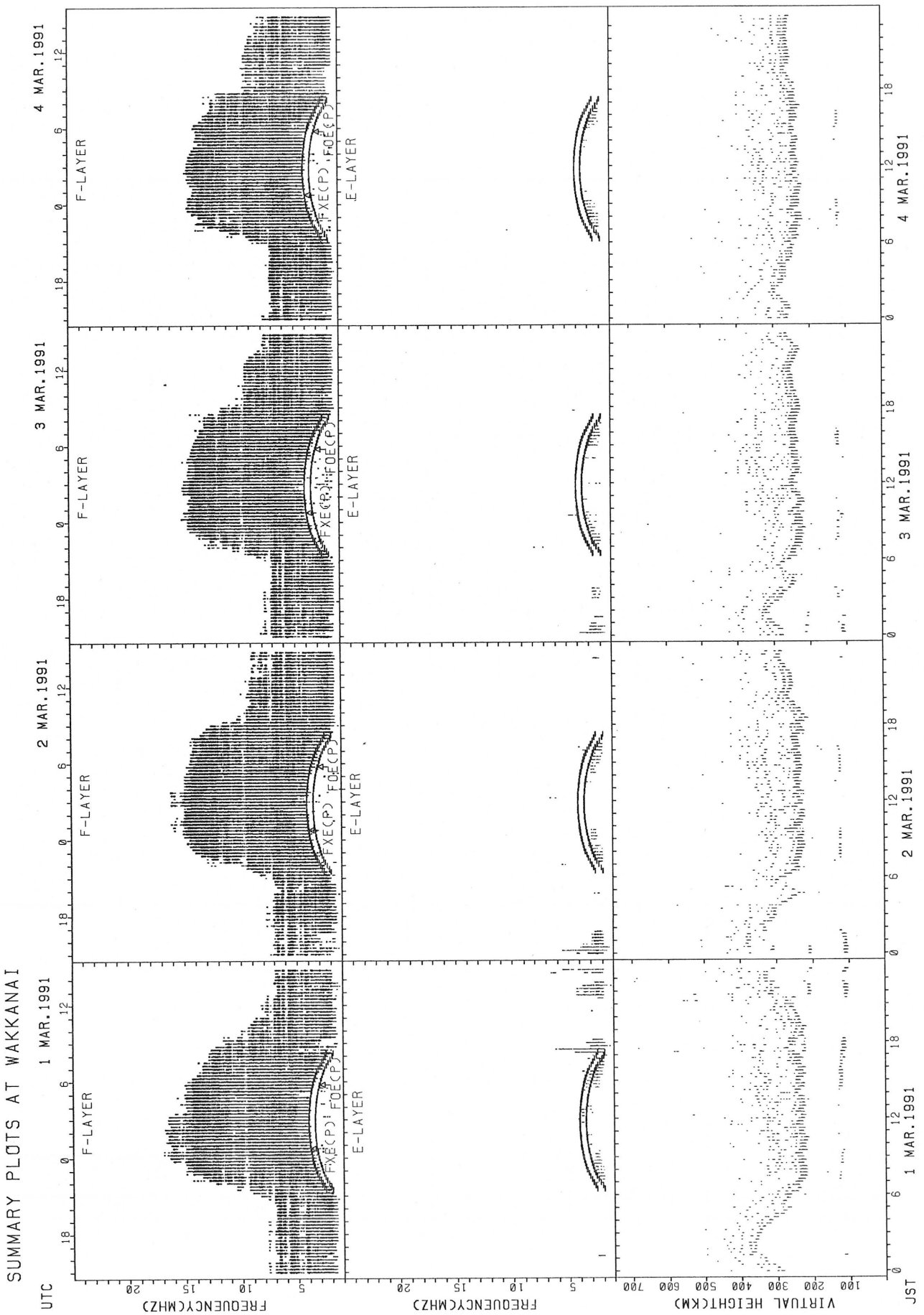
| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G | G | G | | | | | | | G | G | G | G | 81 | 51 | 68 | 51 | G | 42 | 32 | 32 | 24 | G | G |
| 2 | G | G | G | G | 11 | 27 | G | G | G | G | G | G | G | 64 | 45 | 48 | 42 | 40 | G | G | G | G | G | G |
| 3 | G | G | G | G | G | G | G | G | 35 | G | 43 | G | G | G | 60 | 79 | 54 | 50 | 34 | G | G | G | G | G |
| 4 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 44 | 39 | 36 | 32 | G | G | G | G |
| 5 | G | G | G | G | G | G | G | G | G | G | 68 | G | G | G | G | G | G | 38 | G | G | G | G | G | G |
| 6 | G | | G | | | | | | | G | G | G | G | G | G | G | G | 40 | 50 | 27 | G | 28 | G | G |
| 7 | G | | | | | | | | | G | G | G | G | G | G | 52 | G | G | G | G | G | G | G | 23 |
| 8 | G | G | G | G | G | G | G | G | G | 40 | 47 | 53 | G | G | 54 | G | 50 | 47 | G | G | G | G | G | G |
| 9 | 28 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 35 | G | G | G | G | 23 |
| 10 | G | G | G | G | G | G | G | G | G | G | G | 47 | 47 | 56 | 55 | 57 | 51 | 42 | 40 | 36 | G | G | G | G |
| 11 | G | G | G | G | G | G | G | G | 36 | G | G | G | 68 | G | G | G | G | 40 | G | G | G | G | G | G |
| 12 | G | G | G | G | G | G | G | G | G | G | G | 83 | G | G | G | G | 44 | 40 | 30 | G | G | G | G | G |
| 13 | G | G | G | G | G | G | G | G | G | 40 | G | G | G | G | G | 66 | G | 48 | 40 | G | G | G | 23 | 41 |
| 14 | 45 | 37 | G | G | G | G | G | 31 | 40 | G | 44 | G | G | 60 | G | G | G | 44 | 45 | 58 | G | G | G | G |
| 15 | G | G | 23 | G | G | G | G | 28 | G | G | G | G | G | G | G | G | G | 44 | 37 | 33 | G | G | G | G |
| 16 | G | G | G | G | G | G | G | G | G | G | G | 46 | G | G | | | | | | | | G | G | G |
| 17 | G | | | | | | | | | | | | | | | | | | G | 29 | G | G | G | G |
| 18 | G | | | | | | | | | 40 | G | G | G | G | G | G | G | G | 43 | 32 | G | G | G | G |
| 19 | G | | G | G | G | G | G | 29 | G | G | 52 | G | 64 | 56 | G | G | G | 40 | 39 | 33 | G | G | G | G |
| 20 | G | | | | | G | G | G | G | G | G | G | G | G | G | G | 48 | 45 | G | 32 | G | G | G | G |
| 21 | G | G | G | G | G | G | G | 30 | G | G | G | 46 | G | G | G | G | G | 39 | 34 | 29 | G | G | G | G |
| 22 | G | G | G | G | G | G | G | 29 | G | G | G | G | G | G | 47 | 44 | G | 40 | G | 26 | G | G | G | 26 |
| 23 | G | G | 24 | G | G | G | G | 32 | G | 41 | G | G | G | G | G | 56 | G | 100 | 37 | 30 | G | G | G | G |
| 24 | G | G | G | G | G | G | G | G | 38 | G | G | G | G | G | G | G | G | 44 | 39 | G | G | 33 | 28 | 25 |
| 25 | G | G | G | G | G | G | 23 | 30 | G | G | 45 | G | G | G | G | G | G | 39 | 38 | 33 | G | 29 | 24 | 36 |
| 26 | 37 | 45 | 41 | 33 | 37 | 32 | G | 29 | G | 42 | 44 | G | G | 47 | G | G | G | G | G | 28 | 28 | G | 30 | G |
| 27 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 48 | 50 | 40 | G | G | 28 | G | G |
| 28 | G | G | G | G | G | G | G | G | 83 | 42 | G | G | 69 | G | G | 57 | G | G | G | G | G | 28 | 66 | 26 |
| 29 | 30 | 27 | G | G | G | G | G | 33 | G | 42 | 46 | G | G | 52 | G | G | 71 | 58 | 44 | 32 | 40 | 58 | 36 | 32 |
| 30 | 30 | G | 28 | G | G | G | | G | G | G | G | G | 48 | G | G | G | G | G | 31 | G | G | 26 | 27 | G |
| 31 | G | G | G | G | G | G | G | 30 | G | G | 62 | G | 58 | G | G | G | G | G | G | 43 | 33 | 24 | 24 | 23 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 25 | 27 | 25 | 25 | 26 | 25 | 26 | 26 | 30 | 30 | 30 | 30 | 30 | 29 | 29 | 29 | 29 | 30 | 30 | 30 | 31 | 31 | 31 |
| MED | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | 40 | 34 | 28 | G | G | G | G |
| U 0 | G | G | G | G | G | G | G | 29 | G | G | 44 | G | G | G | G | 50 | 46 | 44 | 40 | 32 | G | 24 | 23 | 23 |
| L 0 | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G | G |

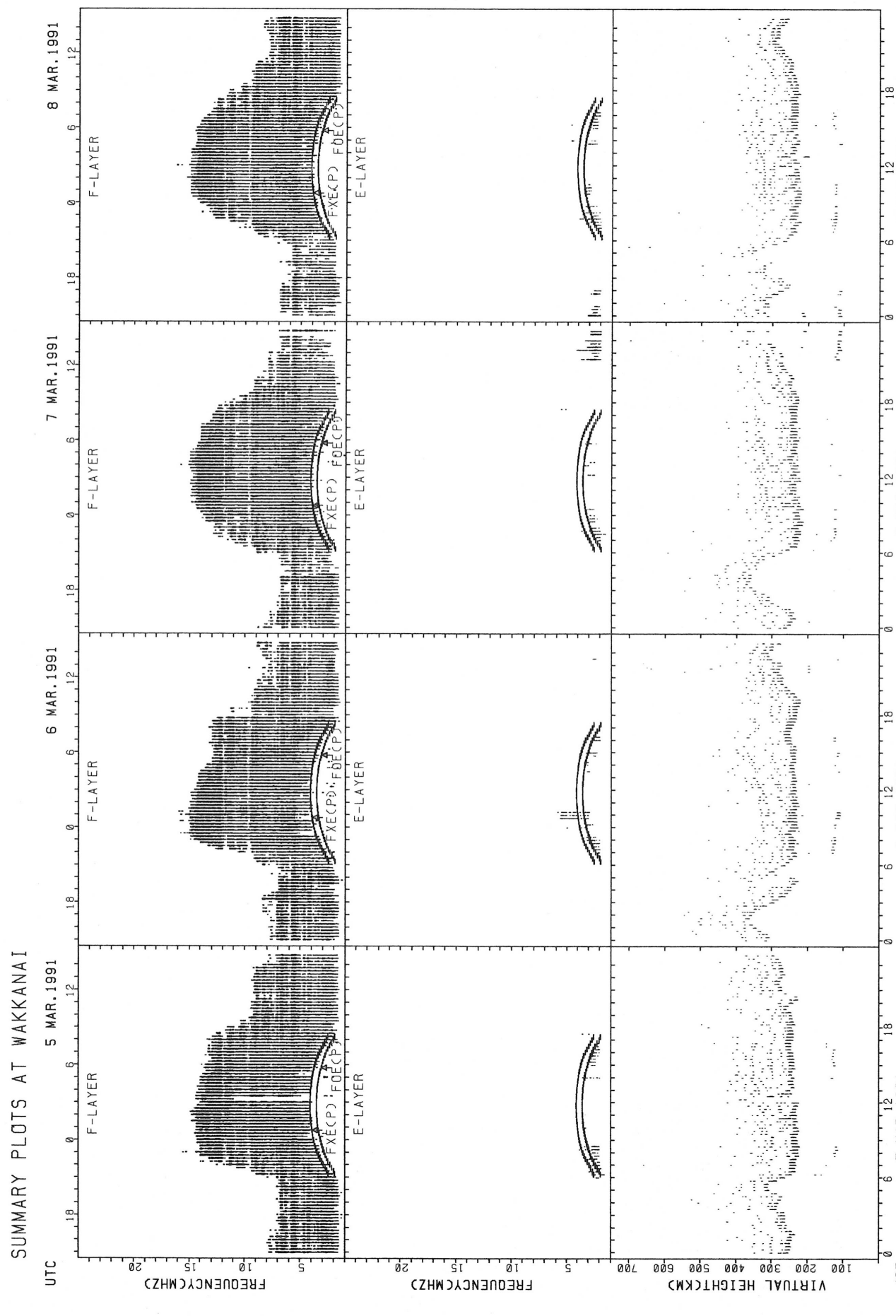
# HOURLY VALUES OF FMIN AT OKINAWA

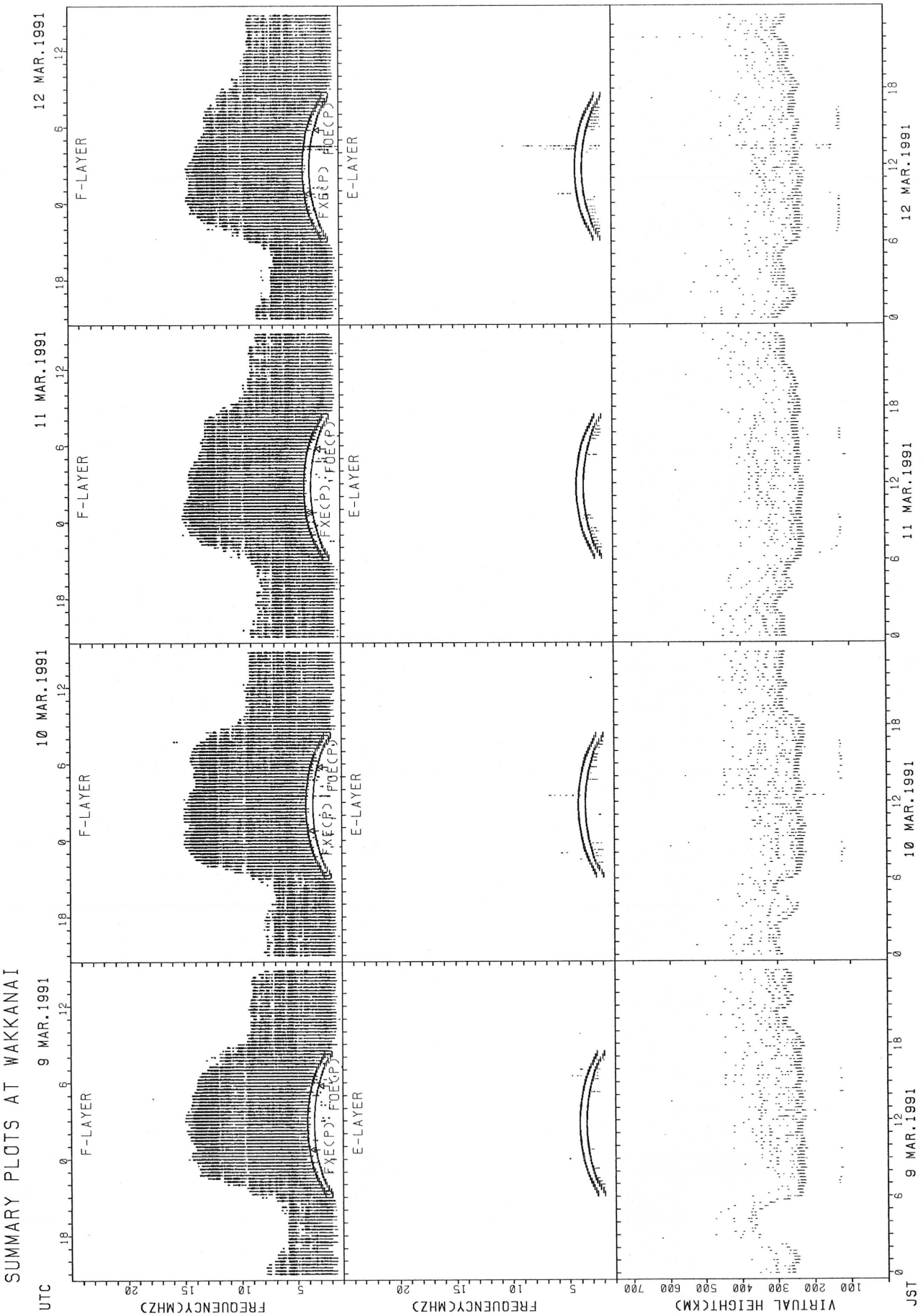
MAR. 1991

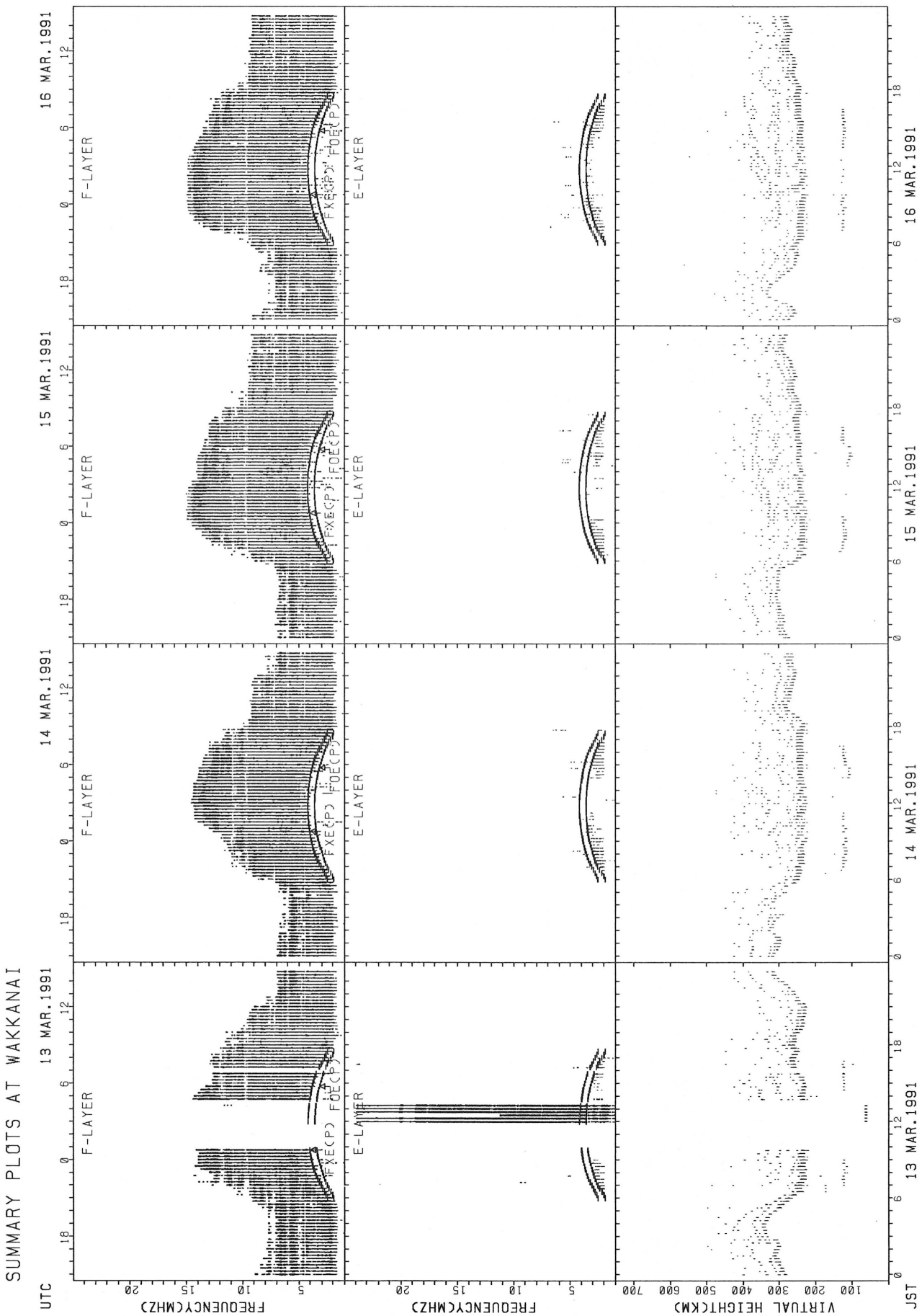
LAT. 26.3N LON. 127.8E SWEEP 1MHz TO 25MHz AUTOMATIC SCALING

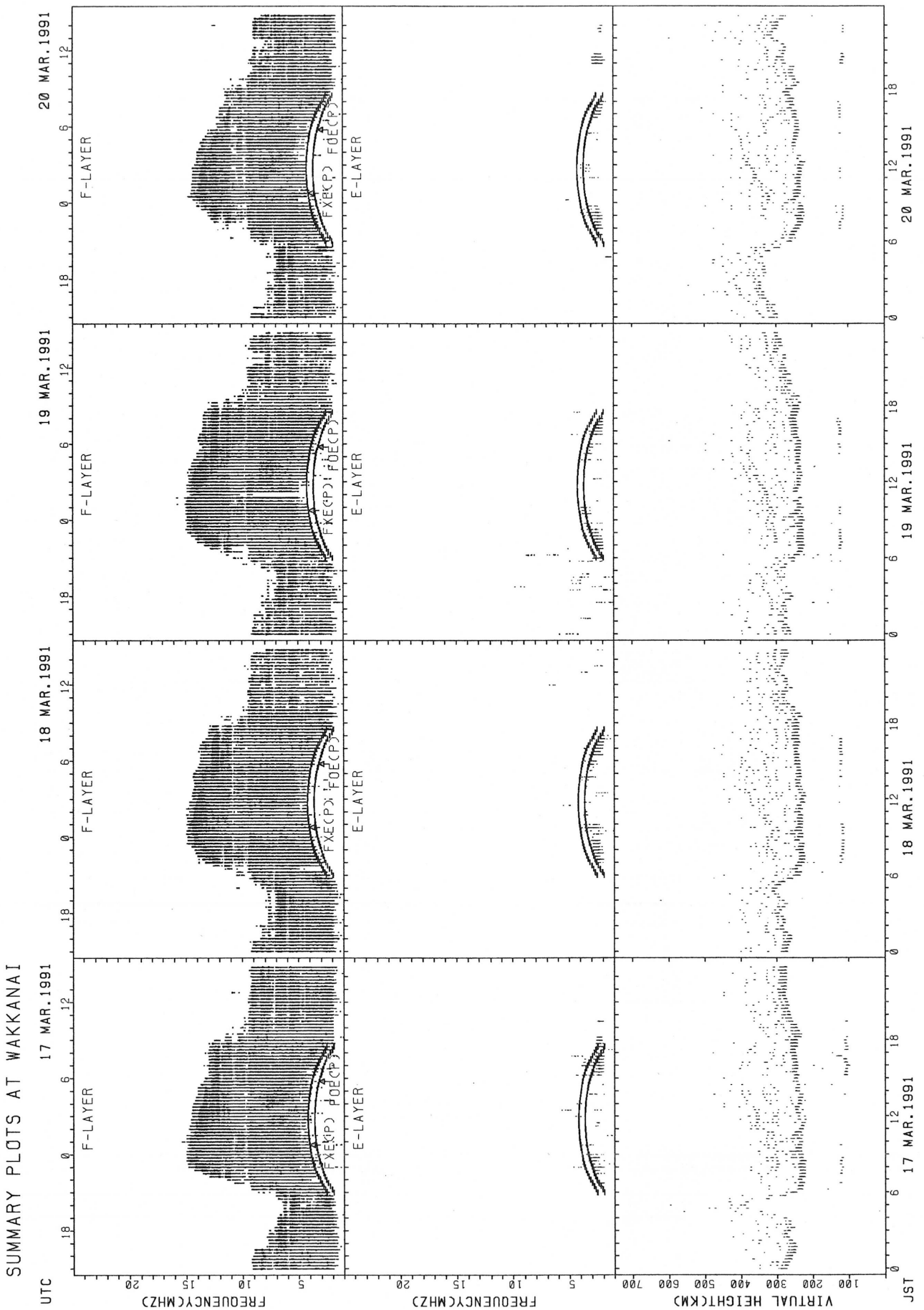
| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 15 | 15 | 15 | | | | | | | 24 | 26 | 29 | 63 | 28 | 44 | 29 | 24 | 58 | 15 | 15 | 15 | 15 | 15 | 15 |
| 2 | 15 | 52 | 15 | 15 | 15 | 15 | 15 | 52 | 15 | 23 | 26 | 56 | 29 | 30 | 28 | 27 | 24 | 20 | 50 | 15 | 15 | 15 | 15 | 15 |
| 3 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 22 | 23 | 28 | 30 | 46 | 35 | 29 | 29 | 26 | 20 | 16 | 15 | 15 | 16 | 15 | 50 |
| 4 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 24 | 21 | 26 | 46 | 44 | 30 | 33 | 34 | 34 | 26 | 20 | 16 | 15 | 15 | 16 | 15 | 15 |
| 5 | | 15 | 15 | 15 | 46 | 15 | 15 | 23 | 16 | 24 | 28 | 29 | 46 | 46 | 46 | 35 | 27 | 27 | 24 | 15 | 15 | 15 | 15 | 50 |
| 6 | 15 | | 15 | | | | | | | 27 | 27 | 29 | 45 | 30 | 49 | 32 | 48 | 23 | 18 | 15 | 16 | 16 | 18 | 15 |
| 7 | 15 | | | | | | | | | 24 | 24 | 43 | 43 | 45 | 33 | 28 | 28 | 38 | 26 | 17 | 15 | 59 | 15 | 15 |
| 8 | 15 | 16 | 16 | 15 | 15 | 15 | 15 | | | 24 | 26 | 28 | 29 | 46 | 29 | 29 | 29 | 22 | 49 | 15 | 15 | 15 | 15 | 15 |
| 9 | 15 | | | | 15 | 15 | 15 | 16 | 17 | 20 | 26 | 30 | 44 | 46 | 42 | 30 | 39 | 26 | 17 | 15 | 15 | 15 | 15 | 15 |
| 10 | 15 | 15 | 15 | 15 | | 15 | 15 | 23 | 18 | 26 | 29 | 45 | 46 | 48 | 30 | 29 | 28 | 24 | 17 | 21 | 18 | 17 | 15 | 15 |
| 11 | | 15 | 15 | 15 | 15 | 15 | 15 | 17 | 21 | 24 | 28 | 28 | 44 | 36 | 30 | 28 | 27 | 24 | 17 | 15 | 62 | 15 | 15 | 15 |
| 12 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | | 33 | 24 | 28 | 48 | 46 | 45 | 34 | 29 | 26 | 20 | 17 | 16 | 16 | 15 | 15 | |
| 13 | | | 15 | 15 | 15 | 15 | 15 | 23 | 16 | 23 | 28 | 28 | 118 | 46 | 45 | 33 | 55 | 22 | 16 | 43 | 16 | 16 | 15 | 15 |
| 14 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 24 | 18 | 24 | 27 | 28 | 33 | 45 | 44 | 30 | | 22 | 16 | 15 | 15 | | 16 | 15 |
| 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 17 | 26 | 28 | 48 | 50 | 46 | 88 | 27 | 24 | 20 | 15 | 15 | 15 | 17 | 15 |
| 16 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 26 | 22 | 23 | 52 | 46 | 48 | 47 | | | | | | | | 15 | 15 | 16 |
| 17 | 15 | | | | | | | | | | | | | | | | | | | 15 | 15 | 16 | 63 | 15 |
| 18 | 15 | | | | | | | | | 18 | 28 | 32 | 45 | 49 | 48 | 32 | 20 | 16 | 16 | 17 | 16 | 15 | 15 | 15 |
| 19 | 15 | | 15 | 15 | 15 | 15 | 15 | 15 | 20 | 60 | 29 | 81 | 44 | 48 | 46 | 45 | 28 | 22 | 18 | 15 | 15 | | 15 | 15 |
| 20 | 15 | | | | | 15 | 15 | 18 | 17 | 45 | 27 | 44 | 48 | 62 | 46 | | 29 | 24 | 27 | 15 | 18 | 23 | 16 | 16 |
| 21 | 16 | 16 | 49 | 15 | 15 | 15 | 15 | 16 | 22 | 28 | 49 | 29 | 50 | 45 | 52 | 47 | 30 | 24 | 16 | 16 | 16 | 16 | 16 | 16 |
| 22 | 18 | 15 | 15 | 16 | 15 | 15 | 21 | 16 | 21 | 28 | 45 | 48 | 49 | 48 | 33 | 28 | 44 | 26 | 27 | 18 | 15 | 16 | 20 | 15 |
| 23 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 16 | 47 | 24 | 29 | 55 | 59 | 121 | 66 | 48 | 48 | 24 | 21 | 15 | 15 | 15 | 15 | 16 |
| 24 | 15 | 16 | 15 | 15 | 16 | 15 | 16 | 26 | 21 | 30 | 50 | 47 | 56 | 50 | 50 | 45 | 27 | 22 | 17 | 16 | 16 | 15 | 15 | 16 |
| 25 | 62 | 15 | 15 | 15 | 15 | 15 | 15 | 18 | 17 | 21 | 27 | 29 | 34 | 30 | 29 | 47 | 22 | 23 | 23 | 15 | 16 | 15 | 16 | 15 |
| 26 | 16 | 15 | 15 | 14 | 15 | 15 | 15 | 15 | 18 | 22 | 26 | 30 | 44 | 45 | 44 | 28 | 26 | 79 | 83 | 15 | 15 | 15 | 15 | 15 |
| 27 | 15 | 51 | 17 | 15 | 15 | 15 | 15 | | 21 | 22 | 26 | 30 | 32 | 44 | 56 | 28 | 27 | 22 | 16 | 15 | 15 | 15 | | |
| 28 | 15 | 15 | 17 | 16 | 15 | 16 | 15 | 15 | 18 | 24 | 84 | 46 | 34 | 32 | 30 | 28 | 26 | 18 | 15 | 15 | 15 | 15 | 15 | 15 |
| 29 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 18 | 20 | 24 | 29 | 48 | 39 | 38 | 43 | 49 | 26 | 17 | 14 | 15 | 15 | 15 | 15 |
| 30 | 15 | 15 | 15 | 15 | 15 | 15 | | 15 | 17 | 20 | 26 | 28 | 29 | 49 | 46 | 44 | 28 | | 16 | 15 | 15 | 15 | 15 | 15 |
| 31 | 15 | 15 | 15 | 15 | | 15 | 91 | 16 | 16 | 23 | 26 | 27 | 44 | 45 | 47 | 40 | 27 | 24 | 14 | 15 | 15 | 15 | 15 | 15 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 28 | 23 | 26 | 24 | 23 | 26 | 25 | 23 | 25 | 30 | 30 | 30 | 30 | 30 | 29 | 28 | 28 | 28 | 29 | 30 | 30 | 29 | 30 | 29 |
| MED | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 18 | 24 | 28 | 30 | 45 | 45 | 44 | 31 | 27 | 24 | 17 | 15 | 15 | 15 | 15 | 15 |
| U Q | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 23 | 21 | 26 | 29 | 46 | 48 | 48 | 46 | 43 | 29 | 25 | 23 | 16 | 16 | 16 | 16 | 15 |
| L Q | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 16 | 17 | 22 | 26 | 29 | 34 | 36 | 31 | 28 | 26 | 22 | 16 | 15 | 15 | 15 | 15 | 15 |

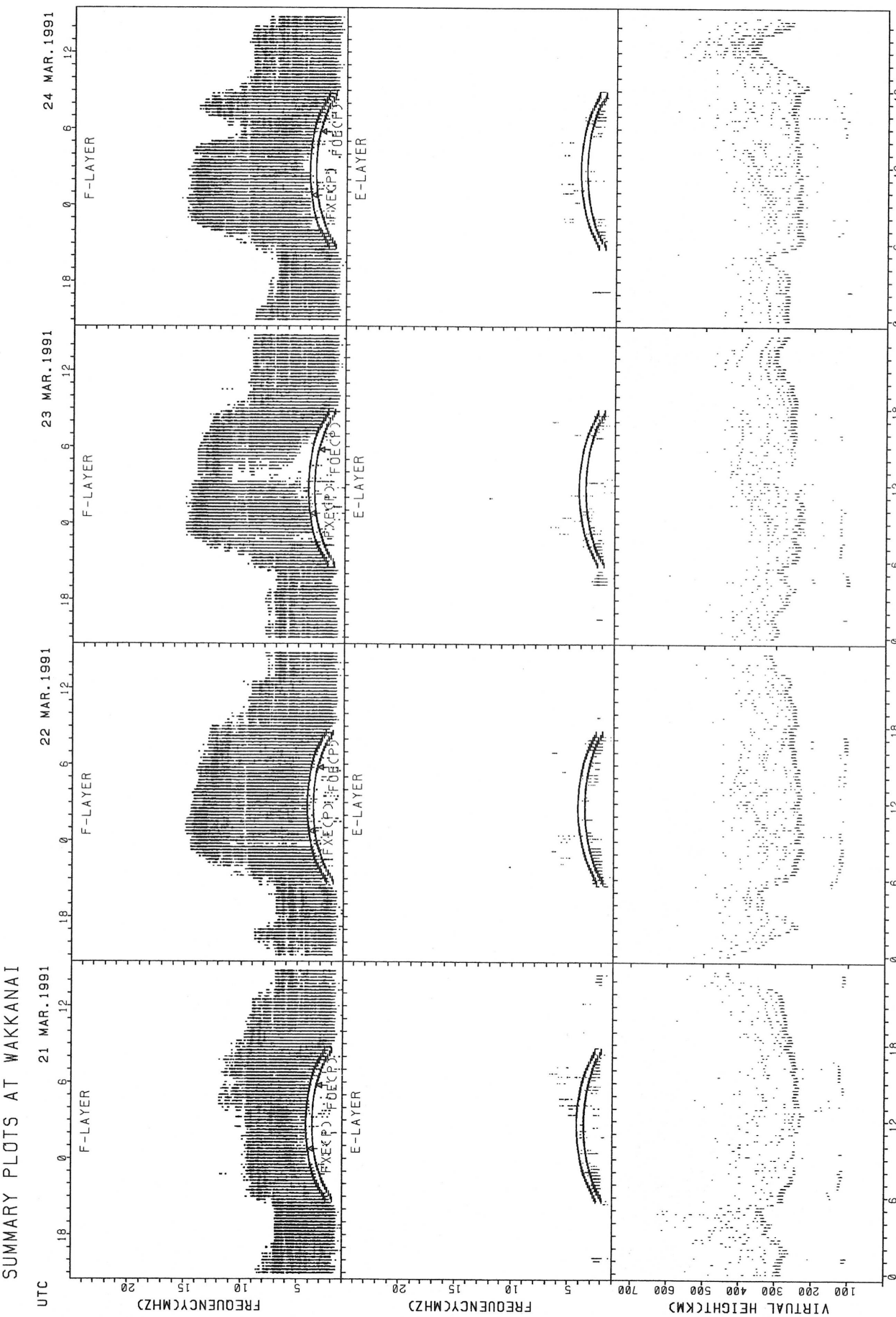

SUMMARY PLOTS AT WAKKANAI
UTC
1 MAR.1991
2 MAR.1991
3 MAR.1991
4 MAR.1991
F-LAYER
E-LAYER
FXE(P), FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
5 MAR.1991
6 MAR.1991
7 MAR.1991
8 MAR.1991
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
9 MAR.1991
10 MAR.1991
11 MAR.1991
12 MAR.1991
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
JST
13 MAR.1991
14 MAR.1991
15 MAR.1991
16 MAR.1991
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P)
FOE(P)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
17 MAR.1991
18 MAR.1991
19 MAR.1991
20 MAR.1991
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
21 MAR.1991
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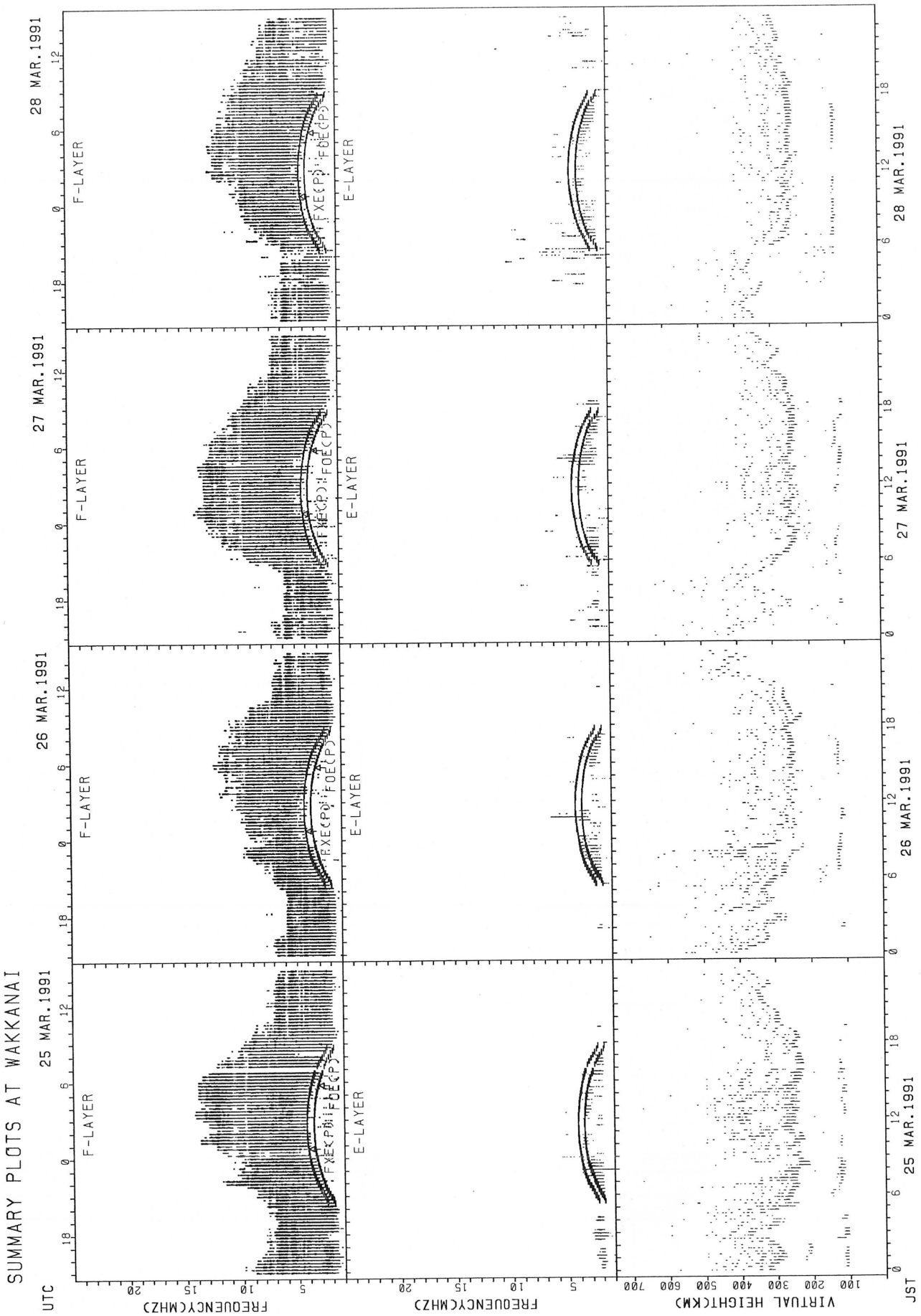
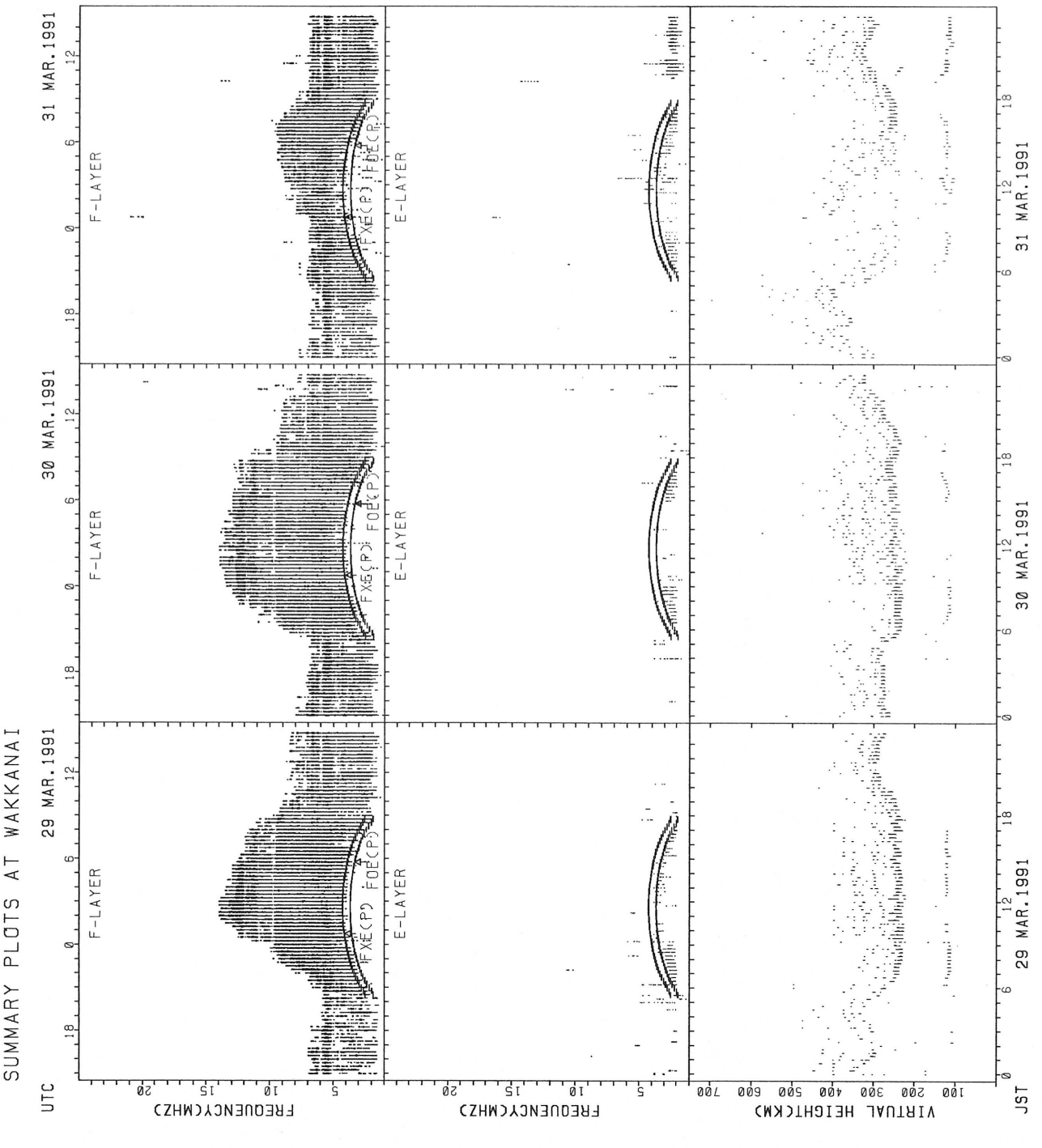
23 MAR.1991
24 MAR.1991
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P)
FOE(P)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT WAKKANAI
UTC
25 MAR.1991
26 MAR.1991
27 MAR.1991
28 MAR.1991
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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31 MAR.1991
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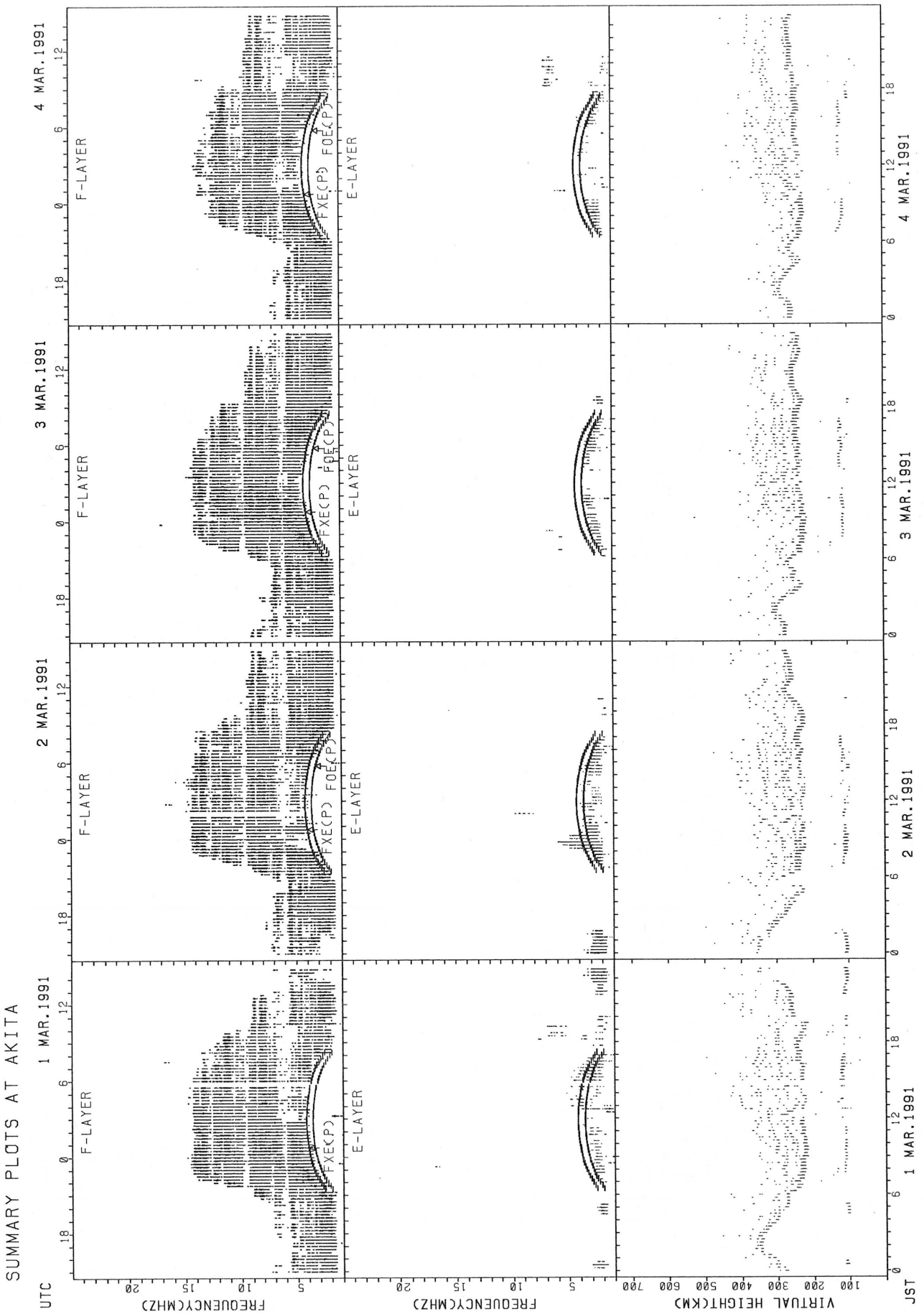
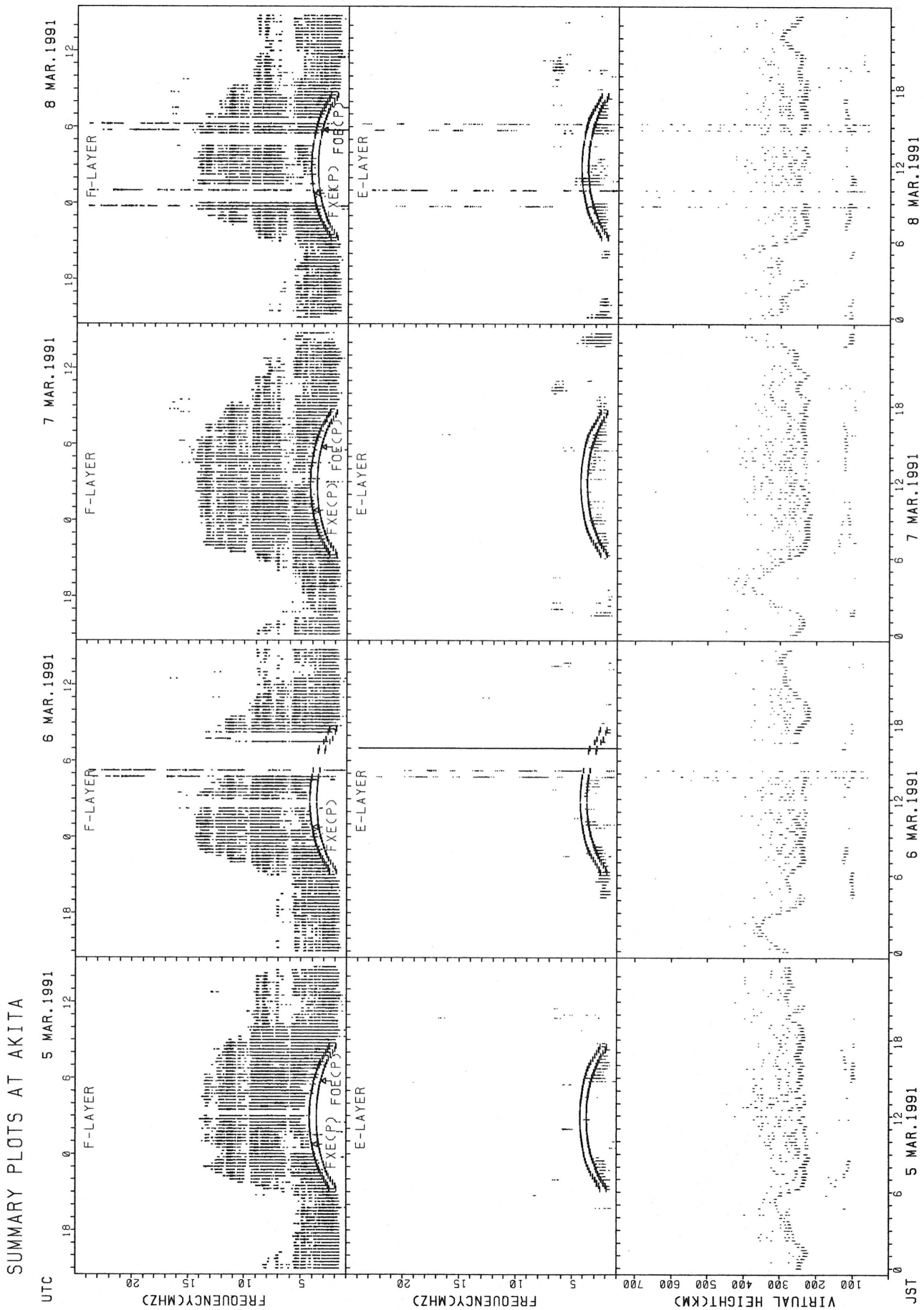
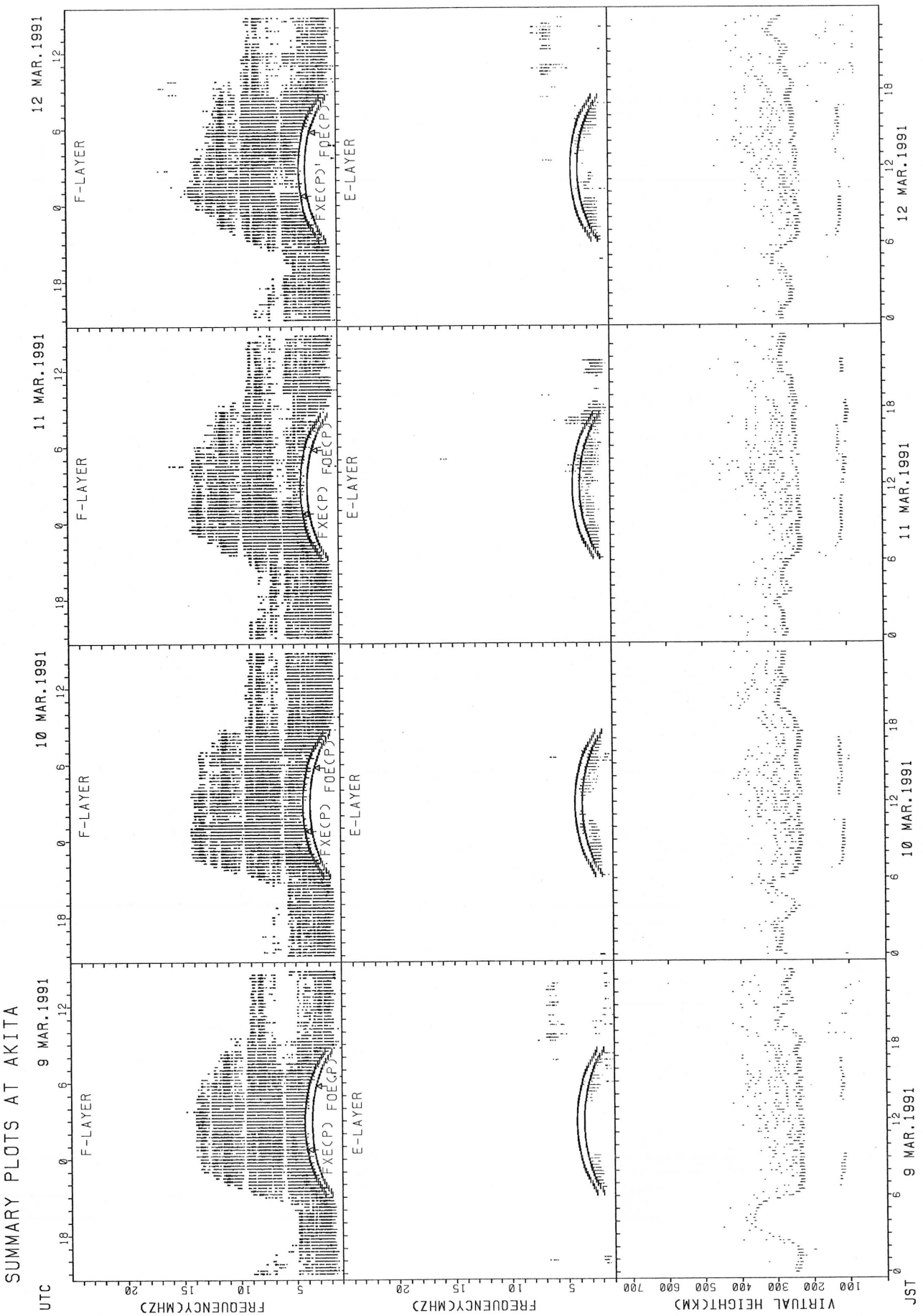
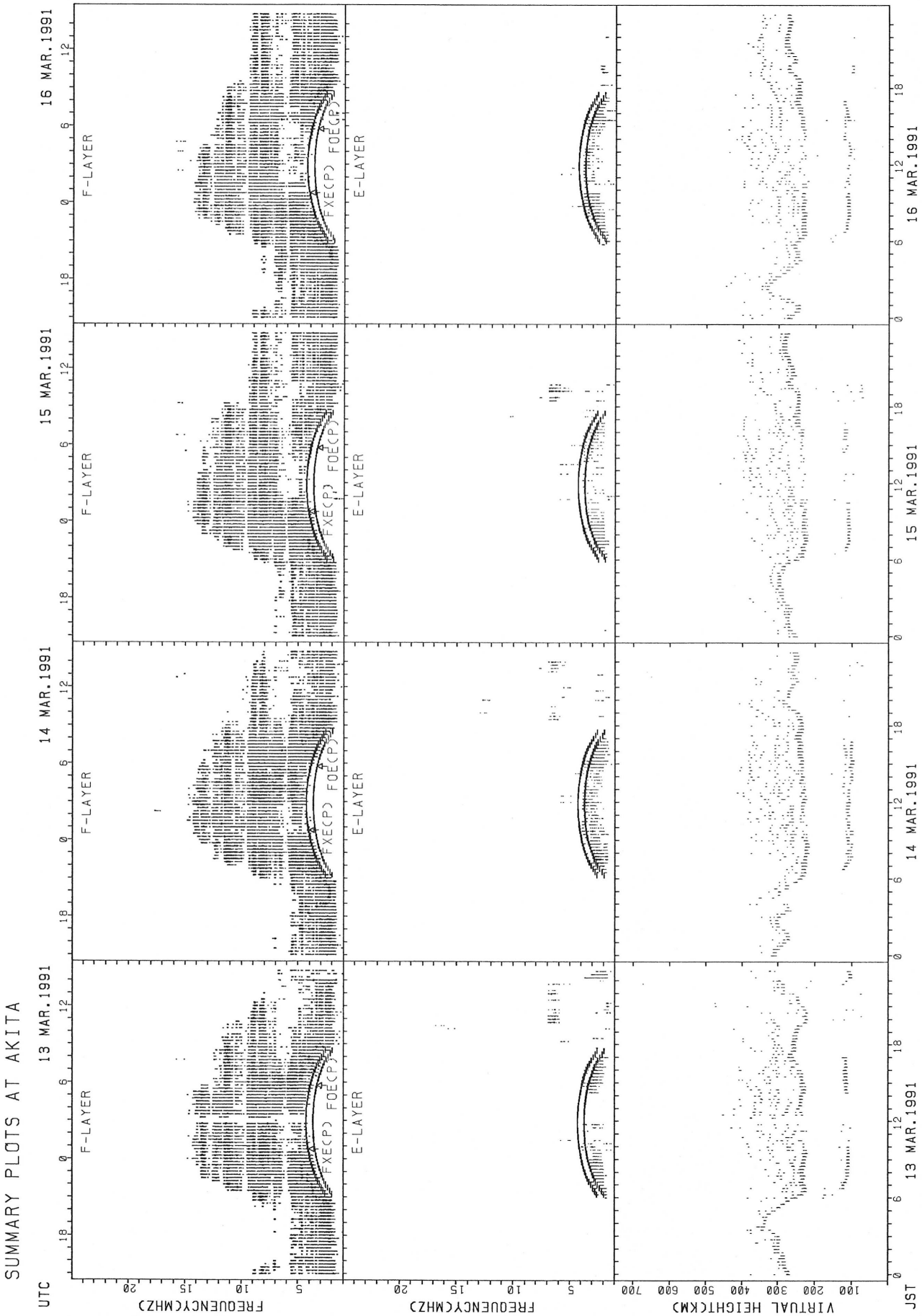
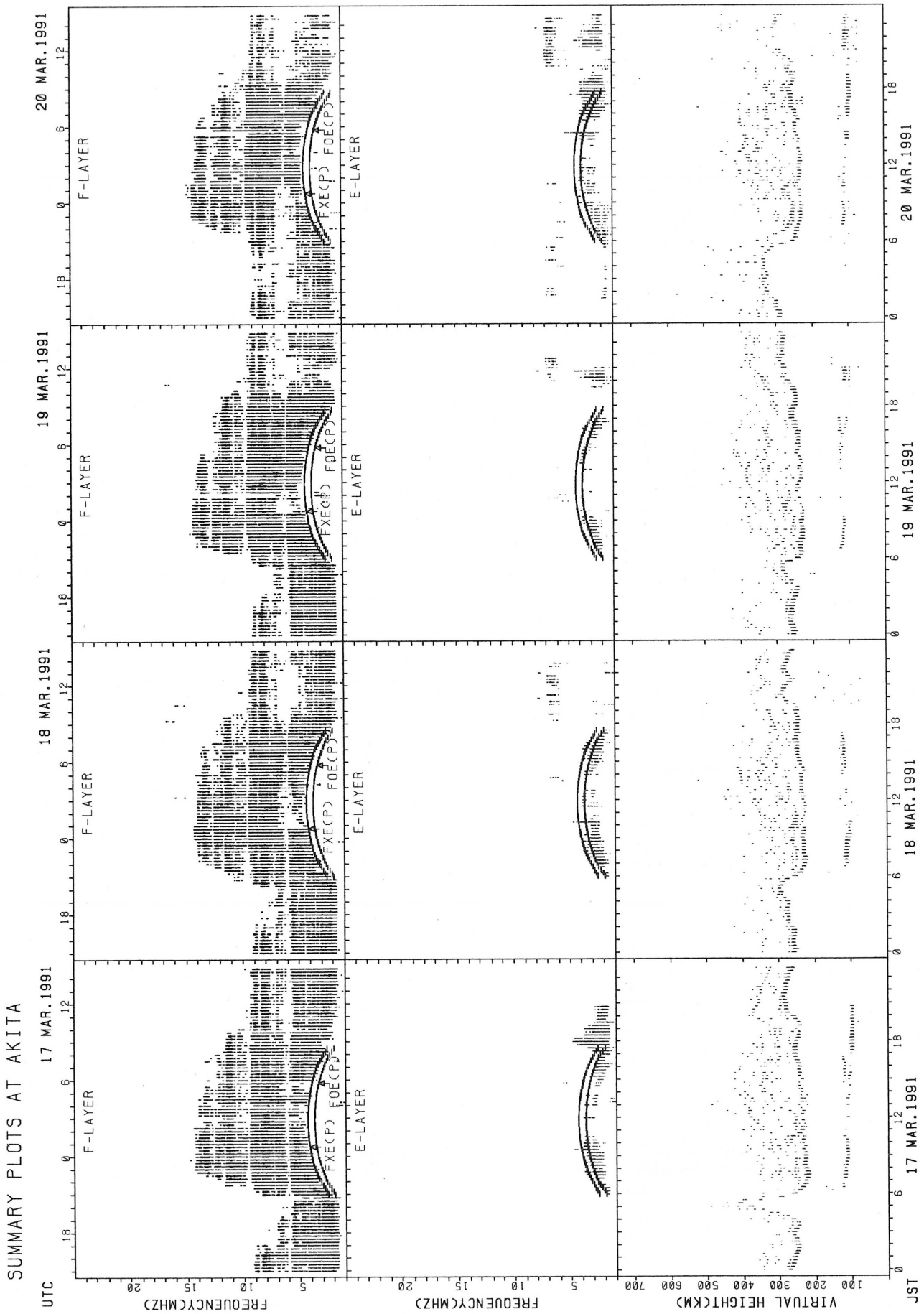
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
1 MAR.1991
2 MAR.1991
3 MAR.1991
4 MAR.1991
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

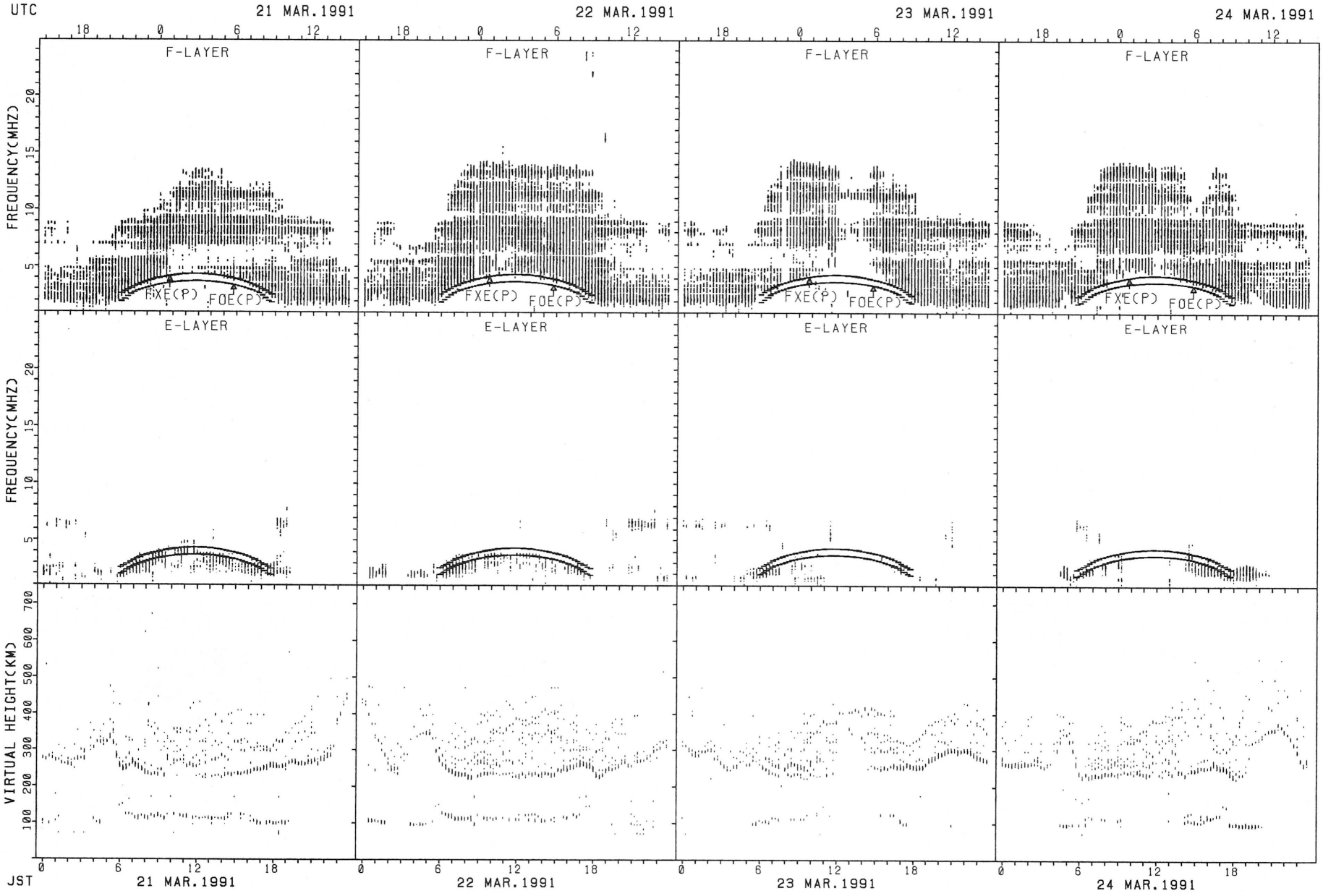

SUMMARY PLOTS AT AKITA
UTC
JST
5 MAR.1991
6 MAR.1991
7 MAR.1991
8 MAR.1991
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
UTC
JST
9 MAR.1991
10 MAR.1991
11 MAR.1991
12 MAR.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

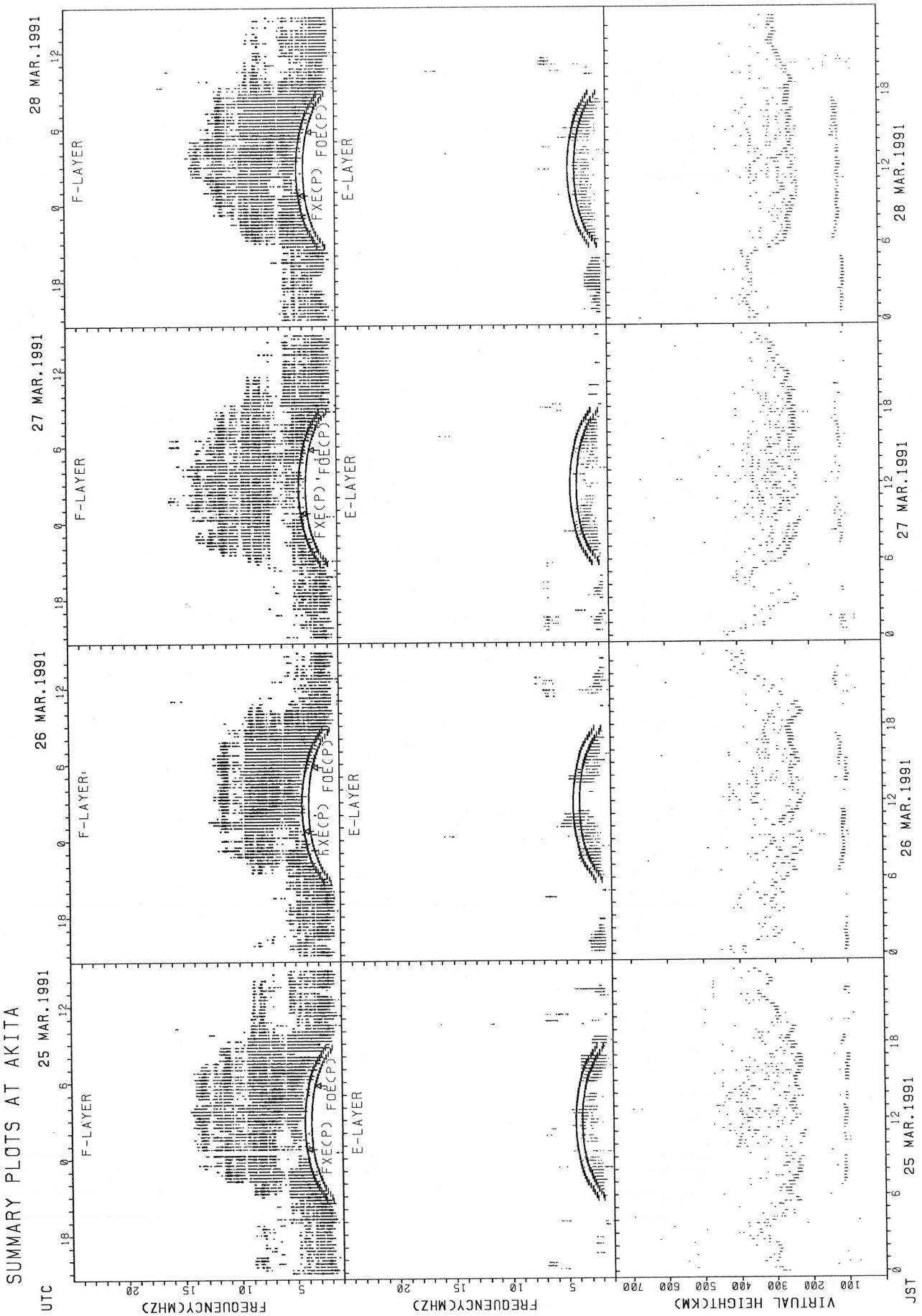

SUMMARY PLOTS AT AKITA
UTC
13 MAR.1991
14 MAR.1991
15 MAR.1991
16 MAR.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT AKITA
17 MAR.1991
18 MAR.1991
19 MAR.1991
20 MAR.1991
UTC
JST
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

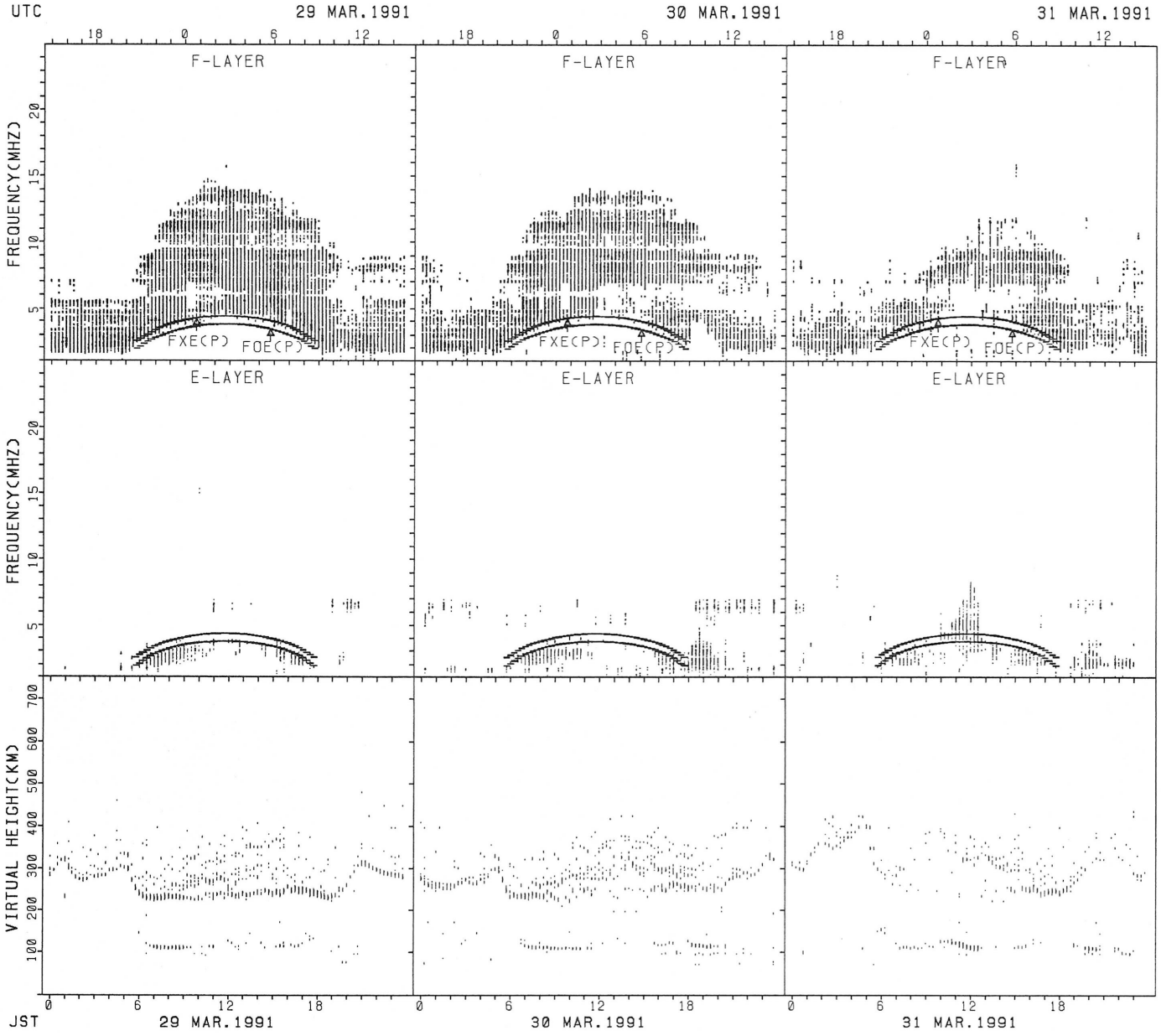
SUMMARY PLOTS AT AKITA



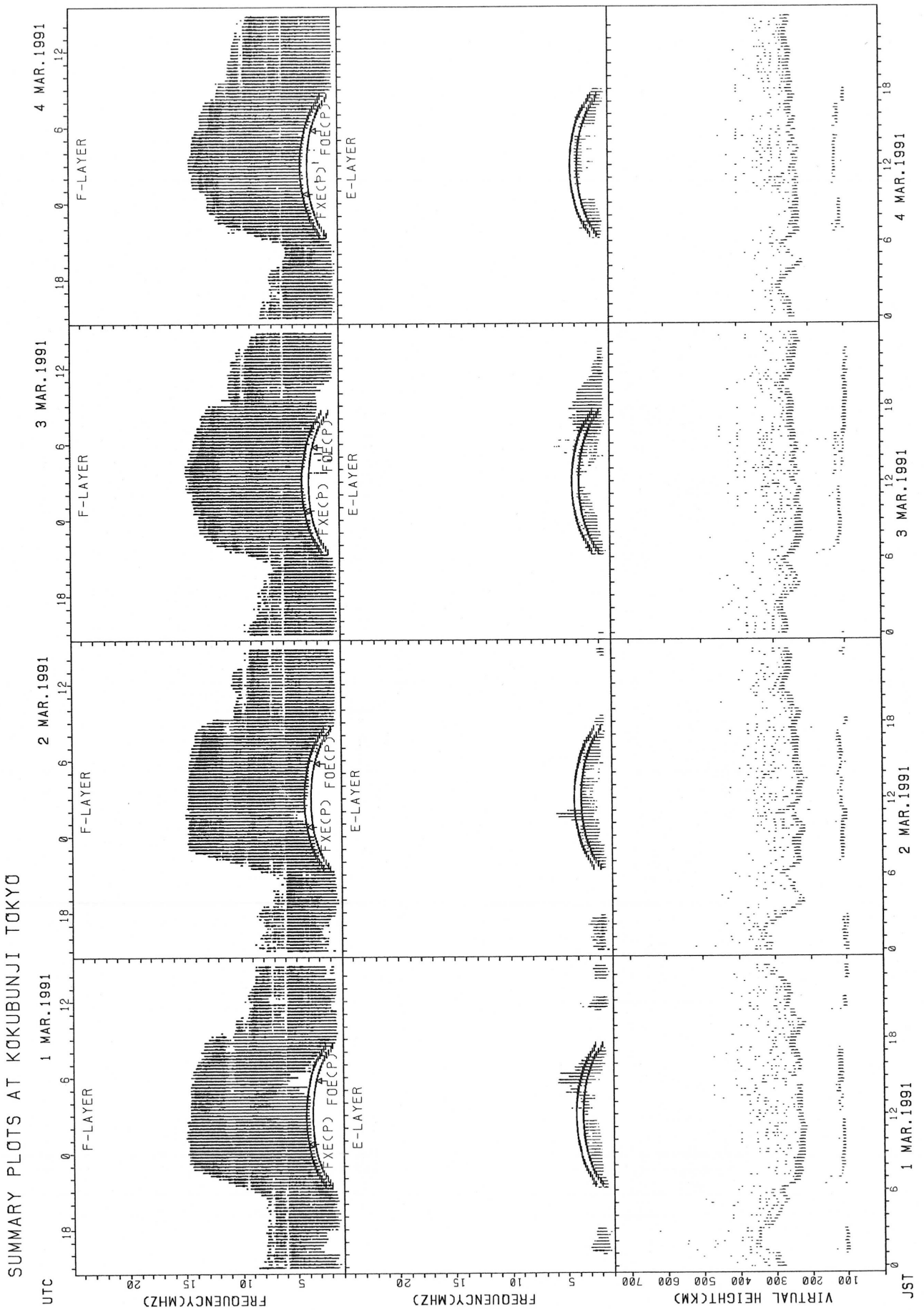

FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

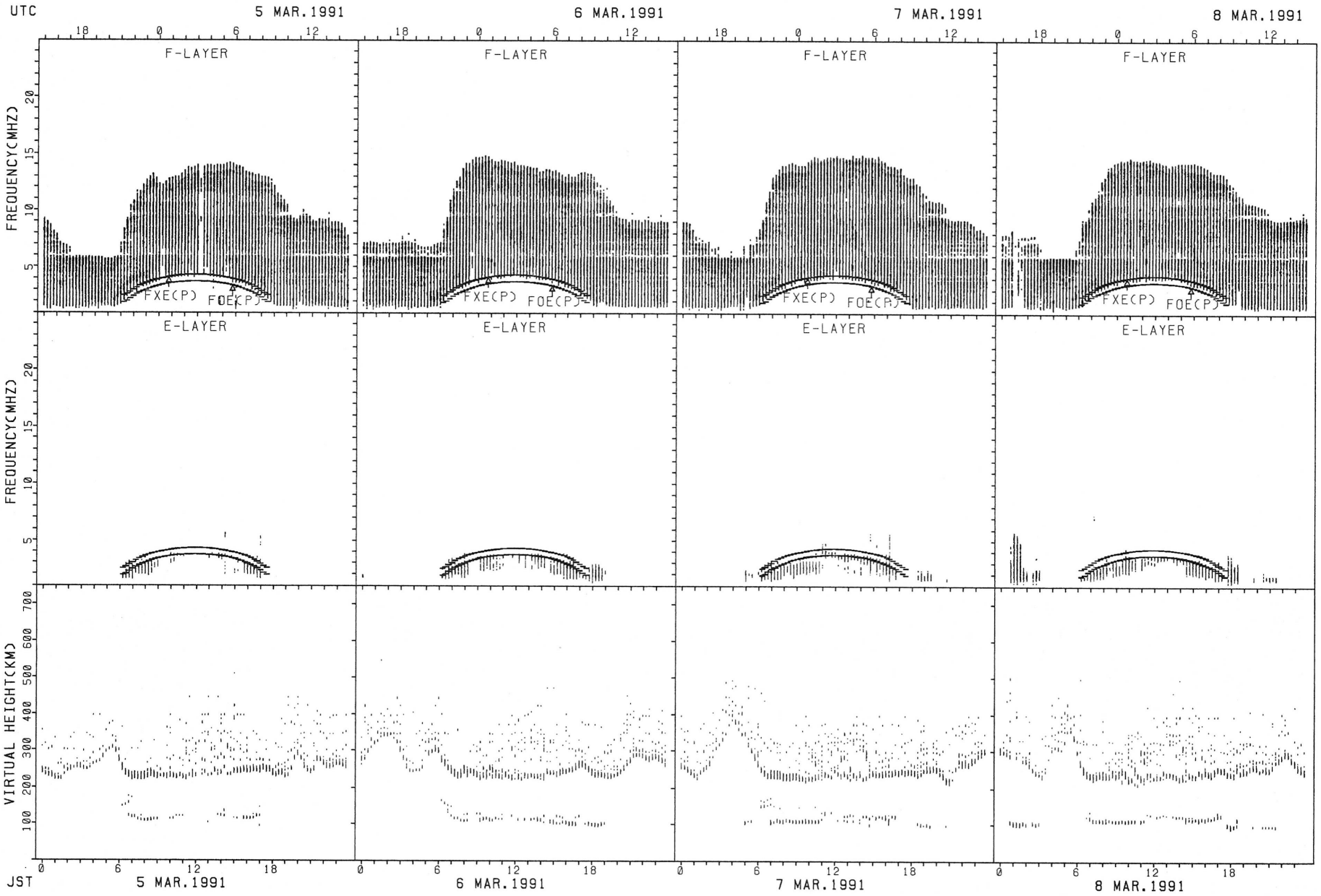

SUMMARY PLOTS AT AKITA
UTC
JST
25 MAR.1991
26 MAR.1991
27 MAR.1991
28 MAR.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

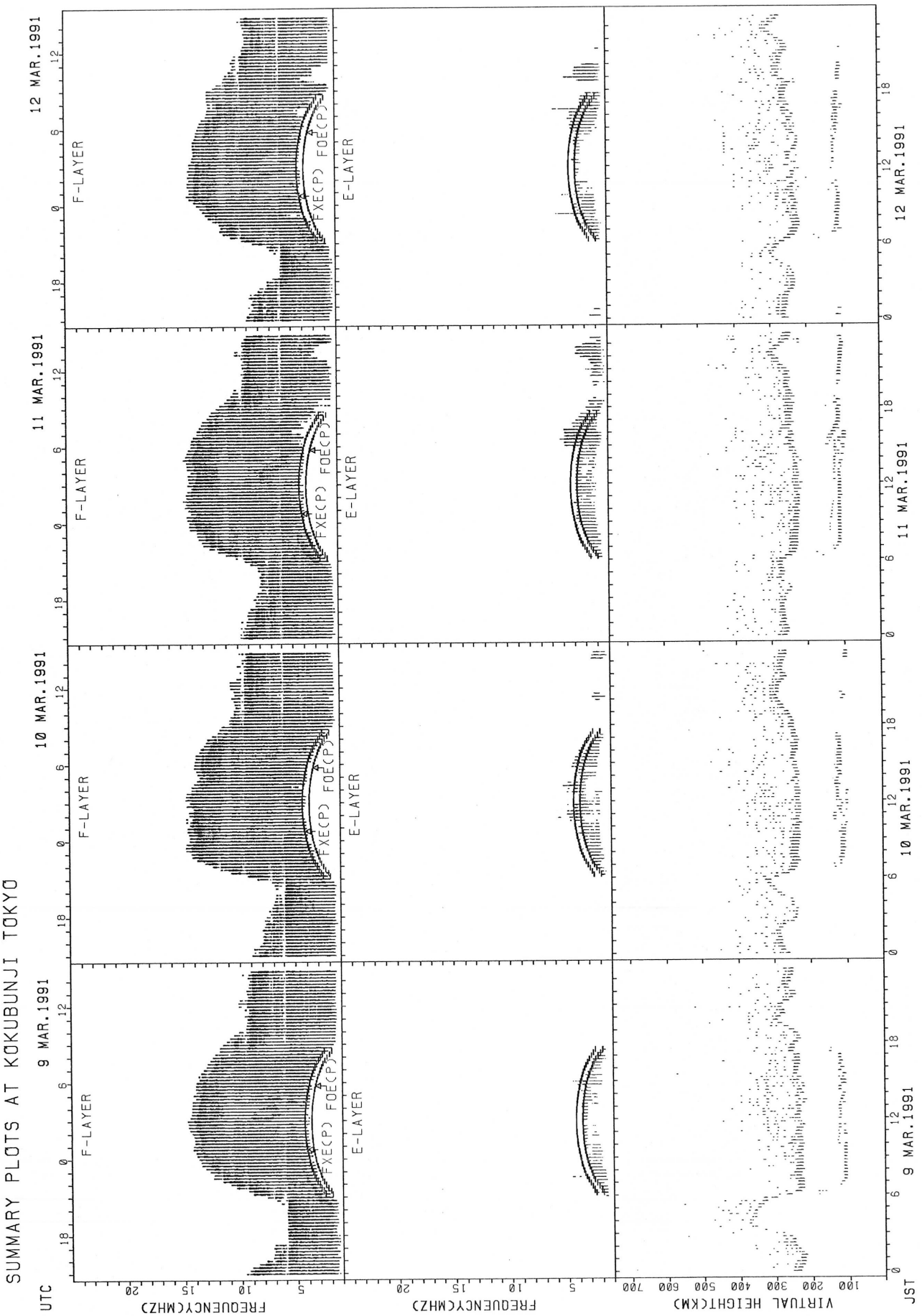
SUMMARY PLOTS AT AKITA

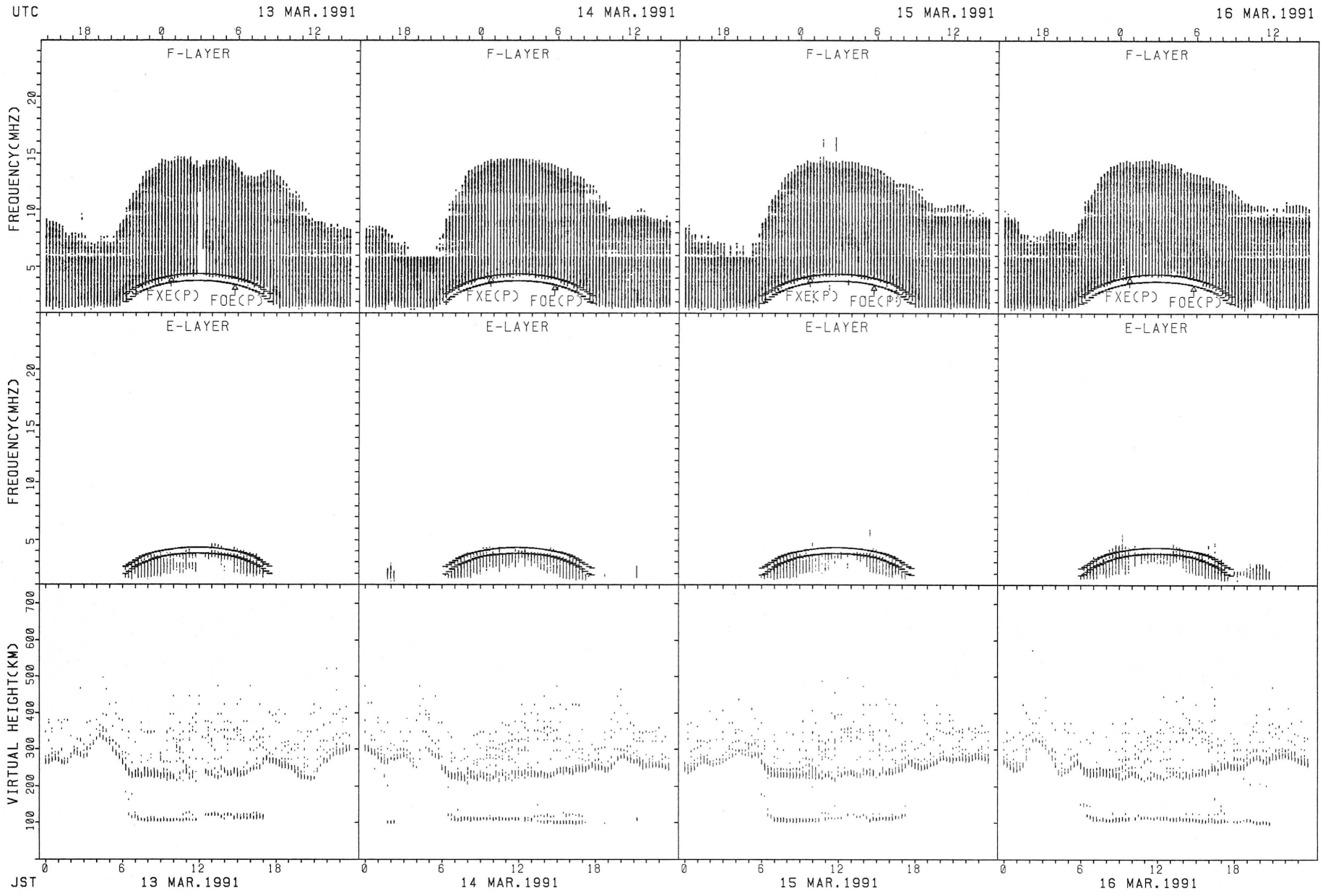



FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

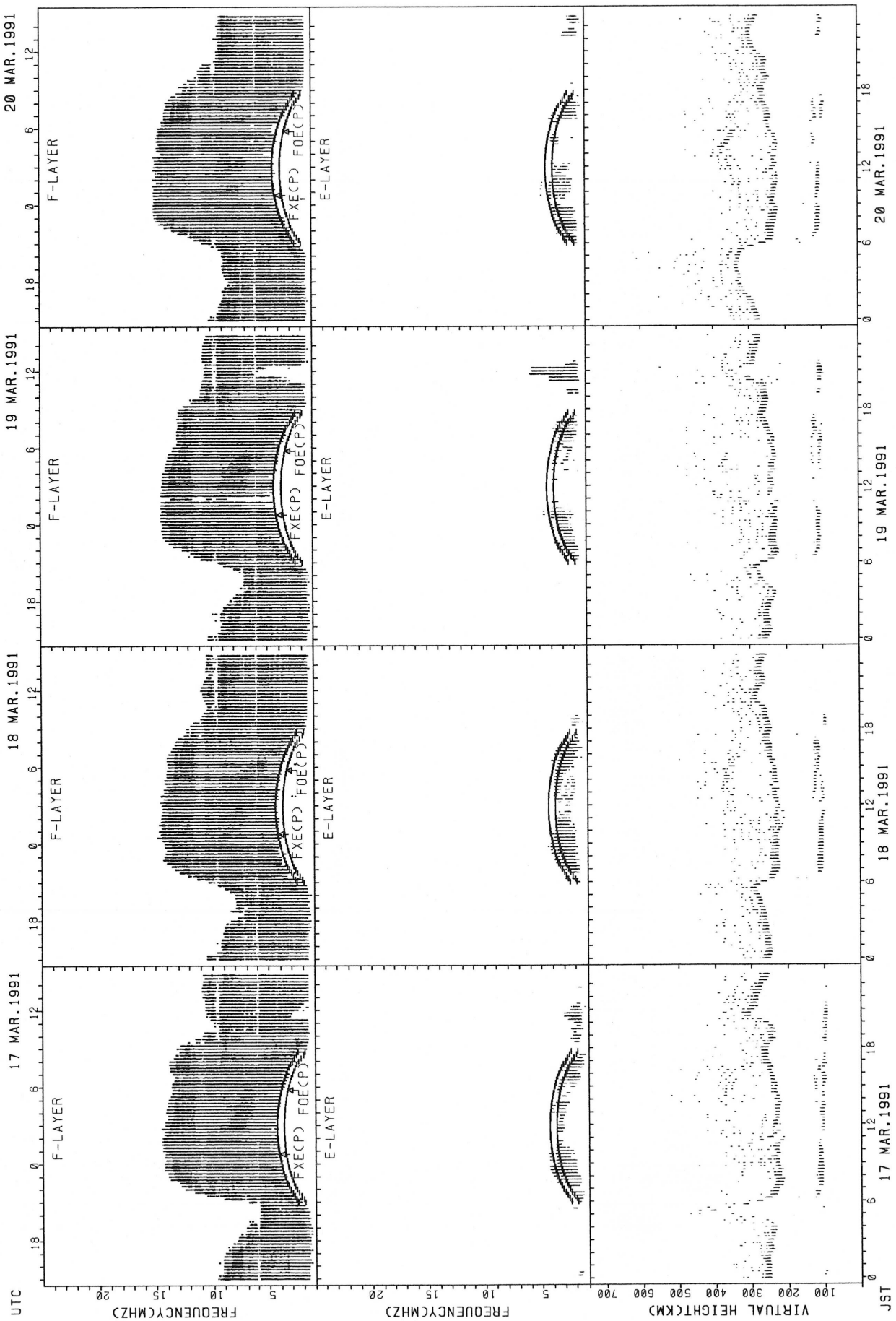

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
1 MAR.1991
2 MAR.1991
3 MAR.1991
4 MAR.1991
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

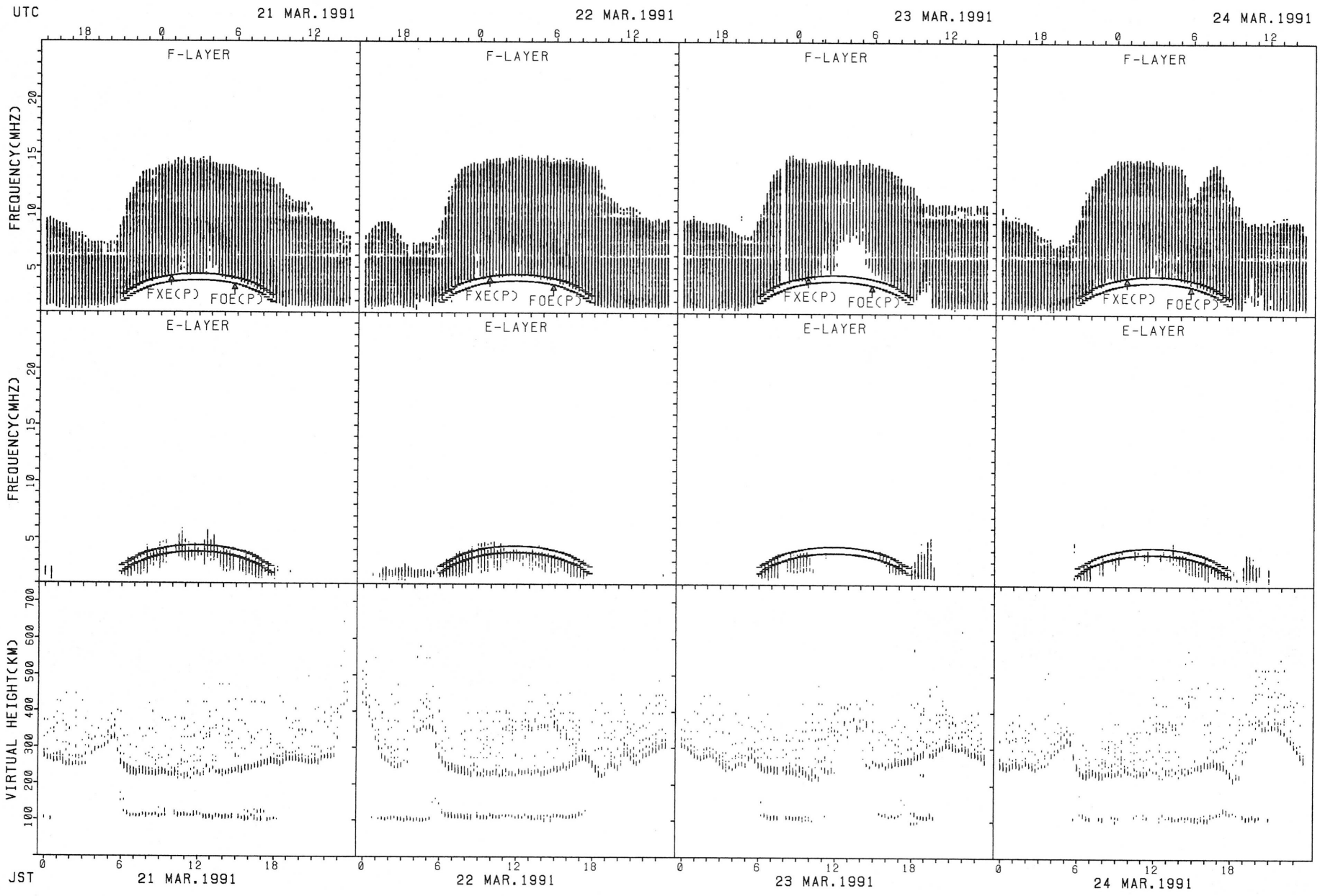

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
5 MAR.1991
6 MAR.1991
7 MAR.1991
8 MAR.1991
F-LAYER
FXE(P)
FOE(P)
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

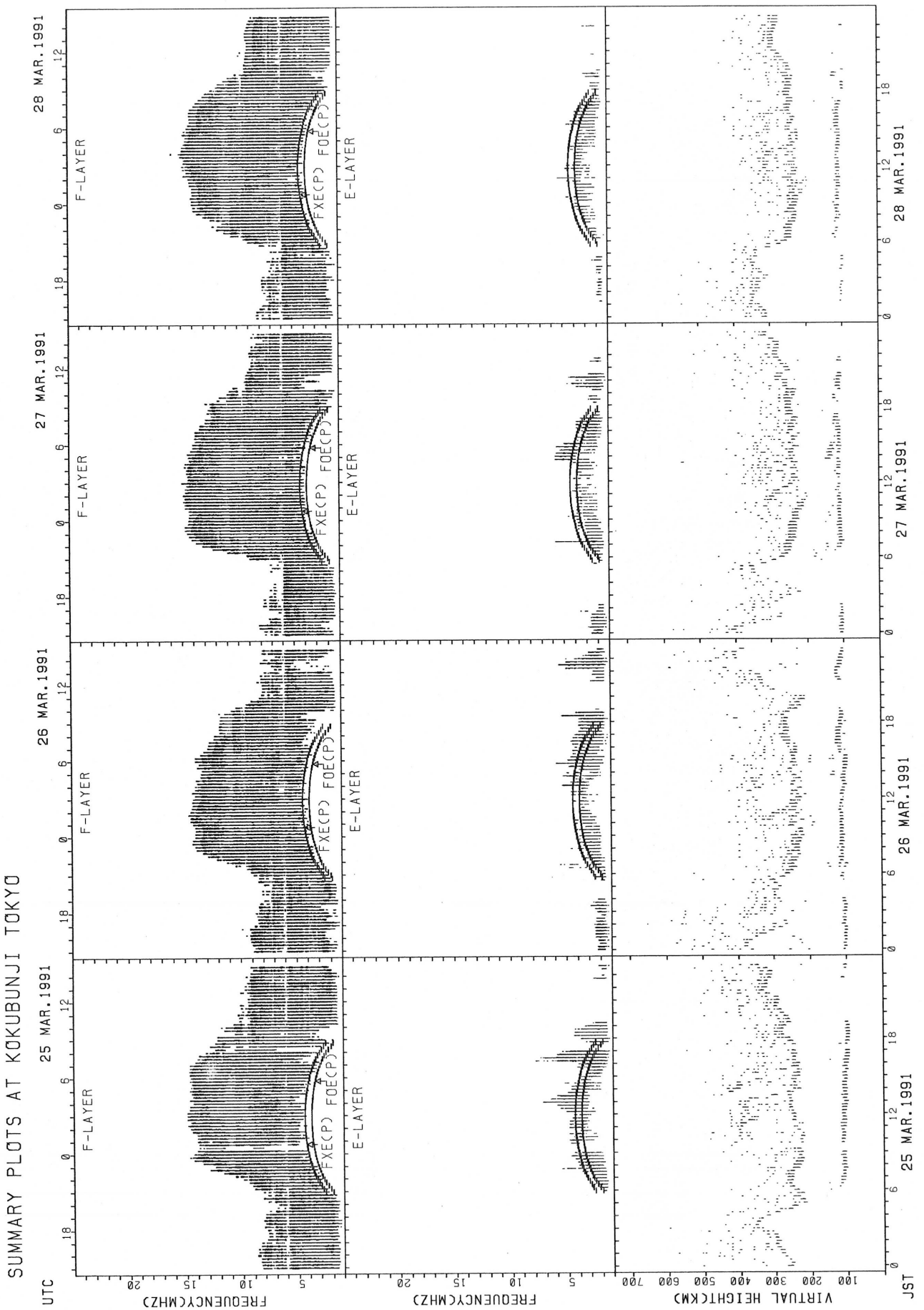

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
9 MAR.1991
10 MAR.1991
11 MAR.1991
12 MAR.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

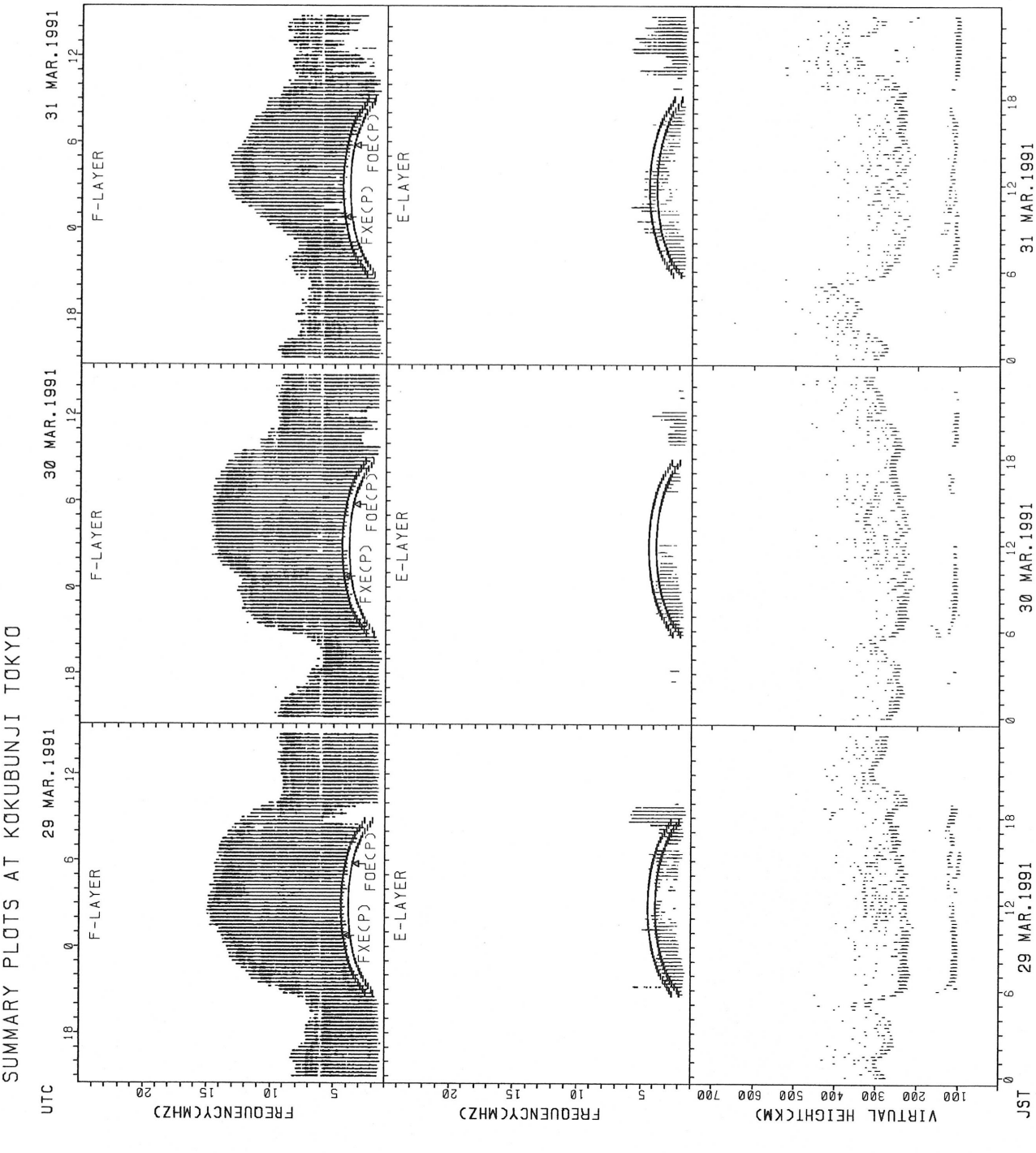


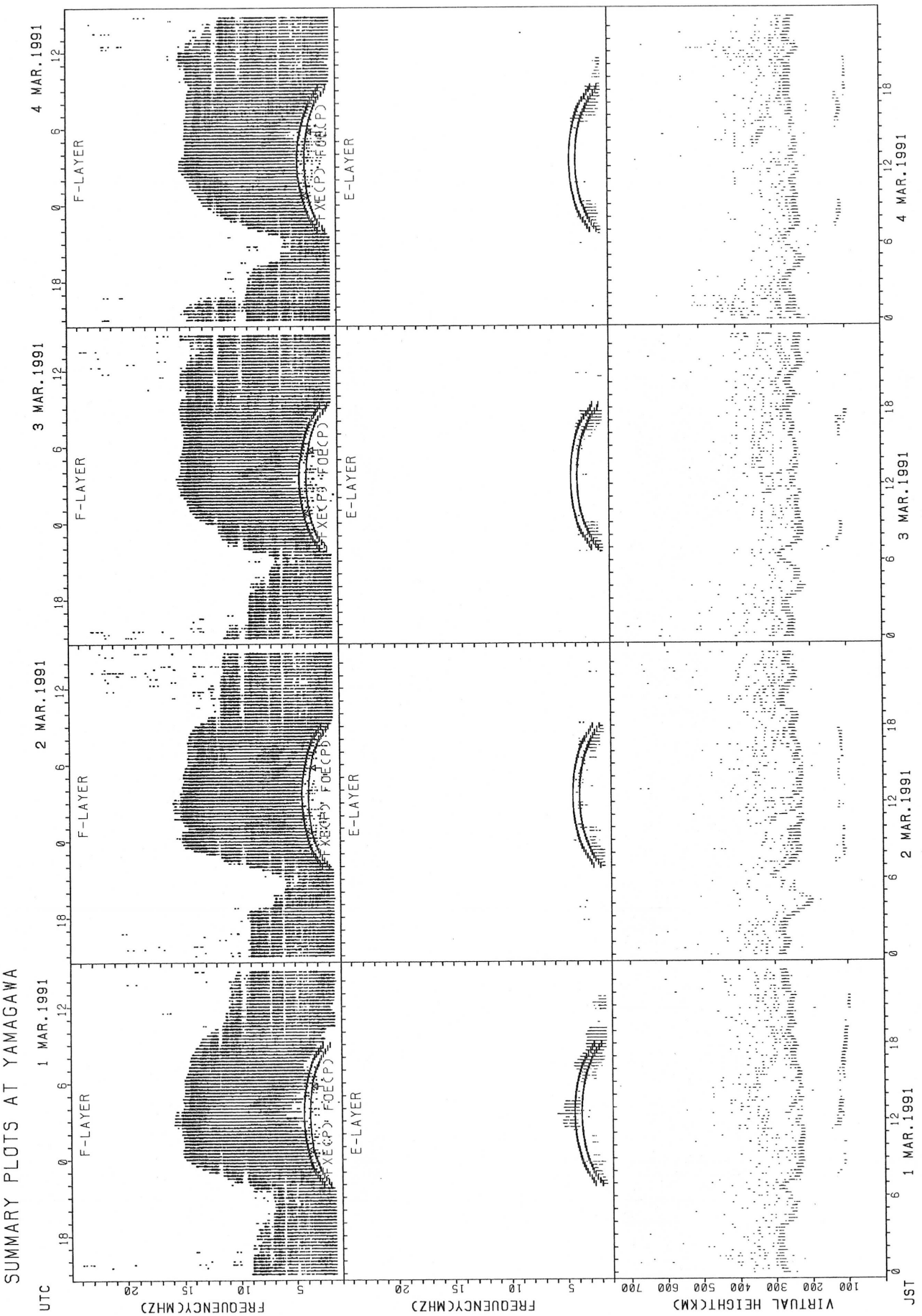

FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

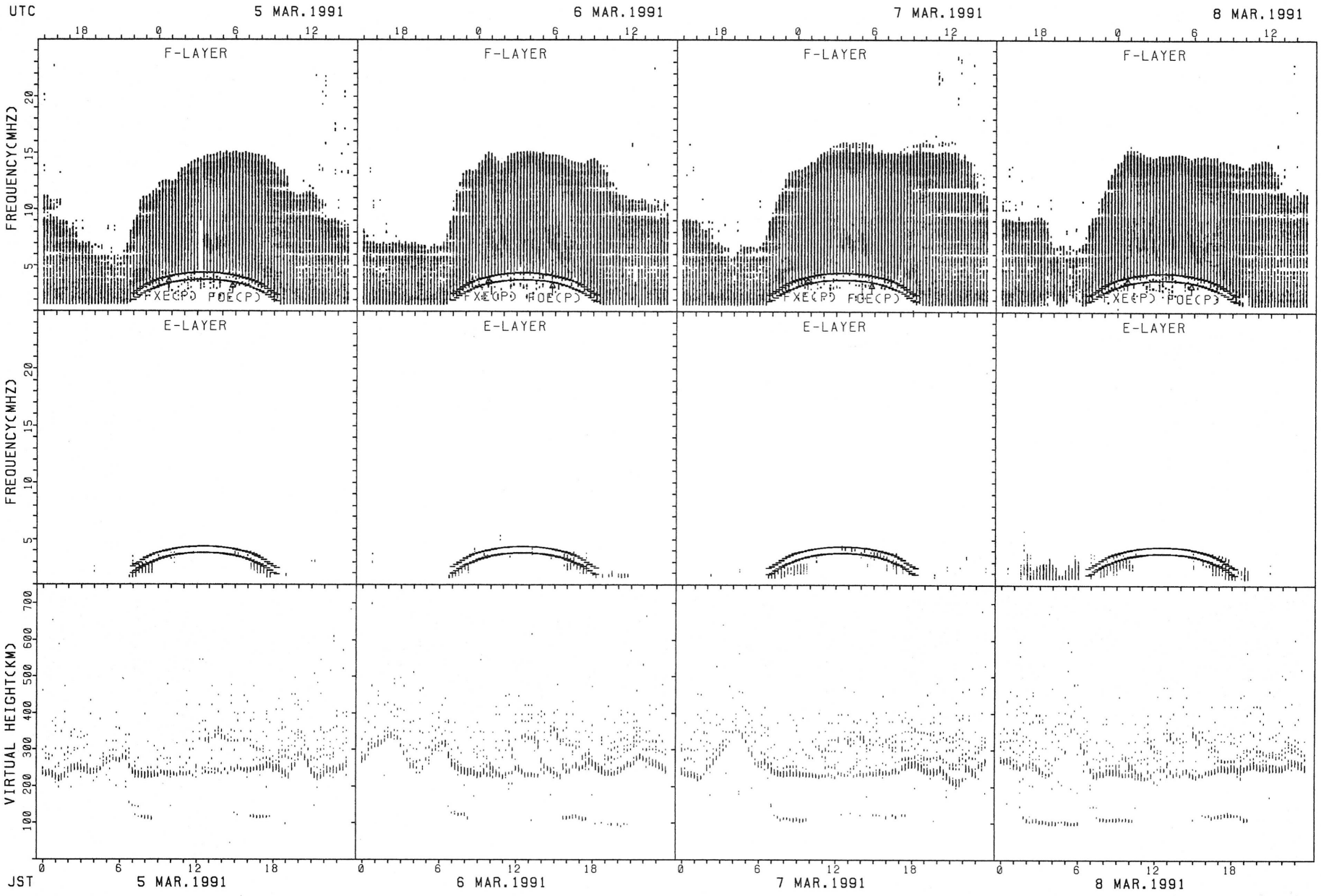

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
17 MAR.1991
18 MAR.1991
19 MAR.1991
20 MAR.1991
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

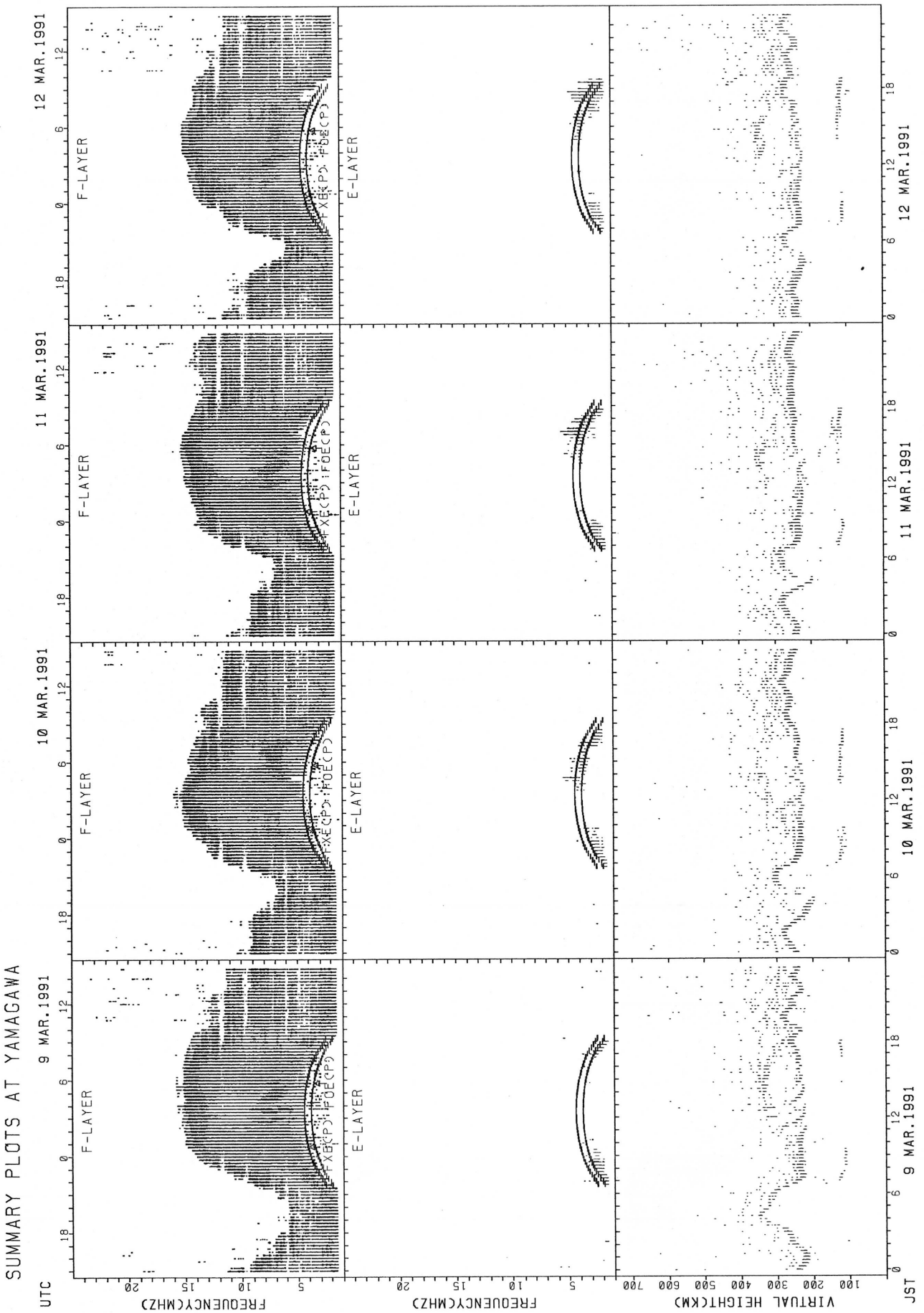

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
21 MAR.1991
22 MAR.1991
23 MAR.1991
24 MAR.1991
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P)
FOE(P)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

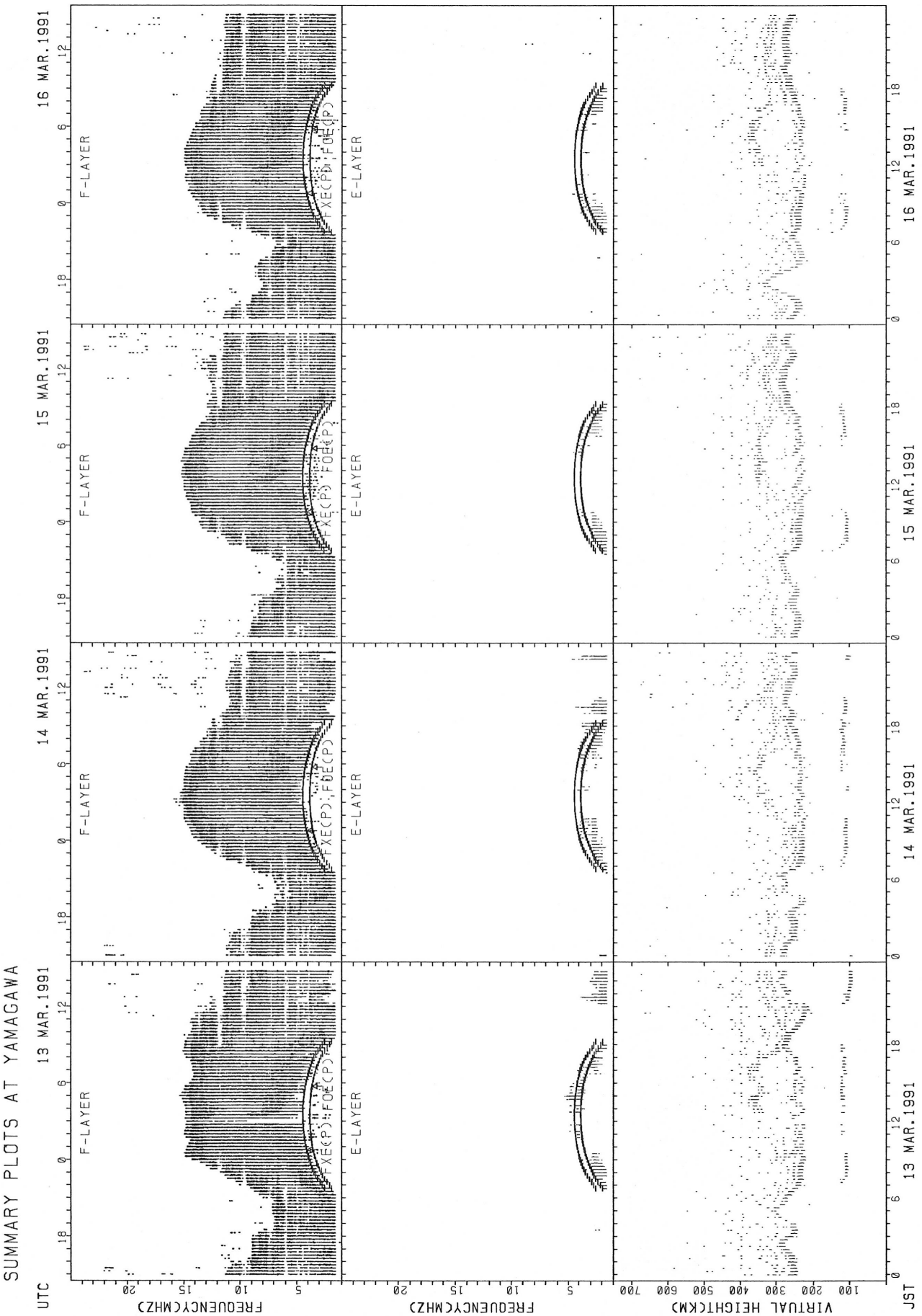

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
25 MAR.1991
26 MAR.1991
27 MAR.1991
28 MAR.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

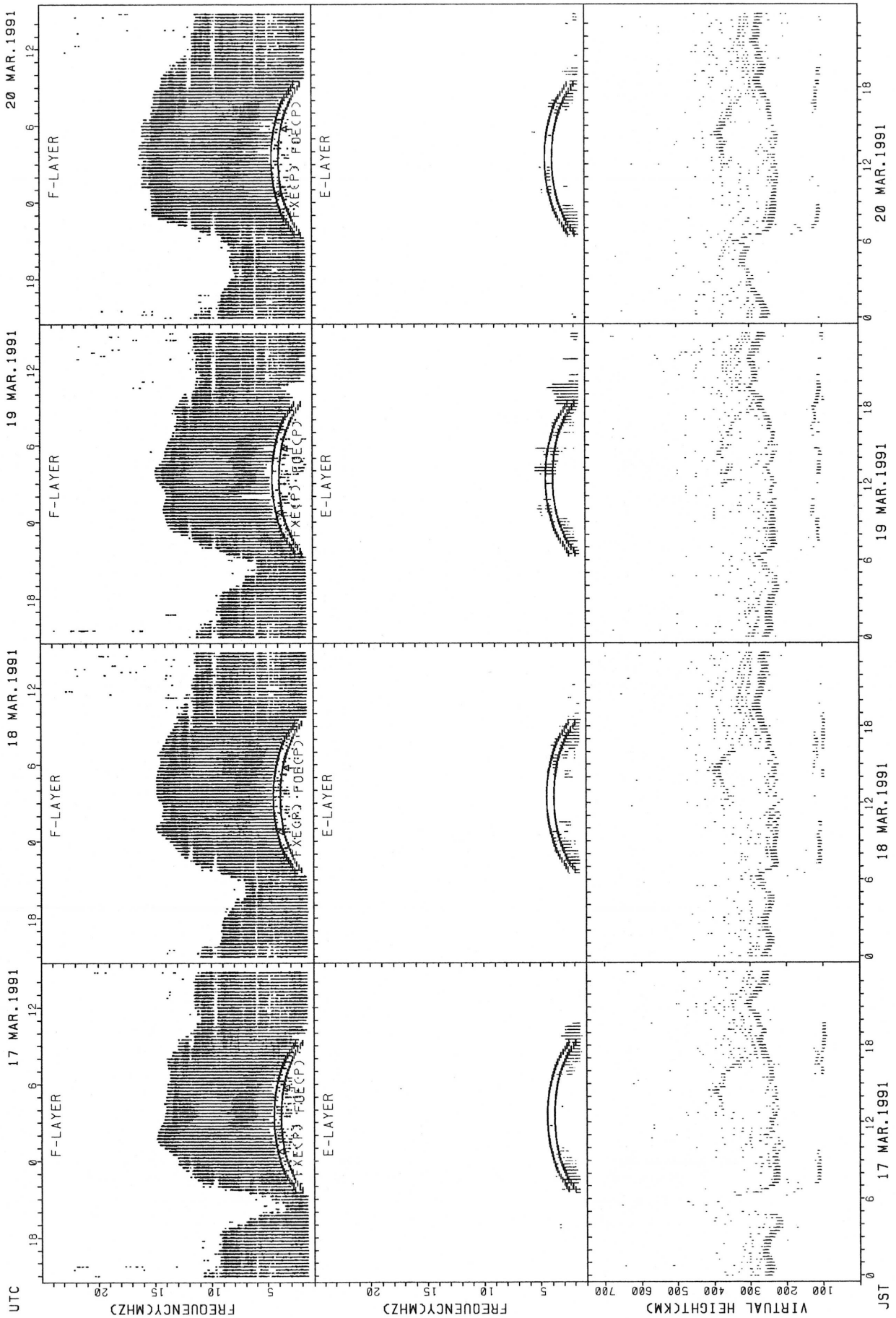

SUMMARY PLOTS AT KOKUBUNJI TOKYO
UTC
29 MAR.1991
30 MAR.1991
31 MAR.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
1 MAR.1991
2 MAR.1991
3 MAR.1991
4 MAR.1991
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

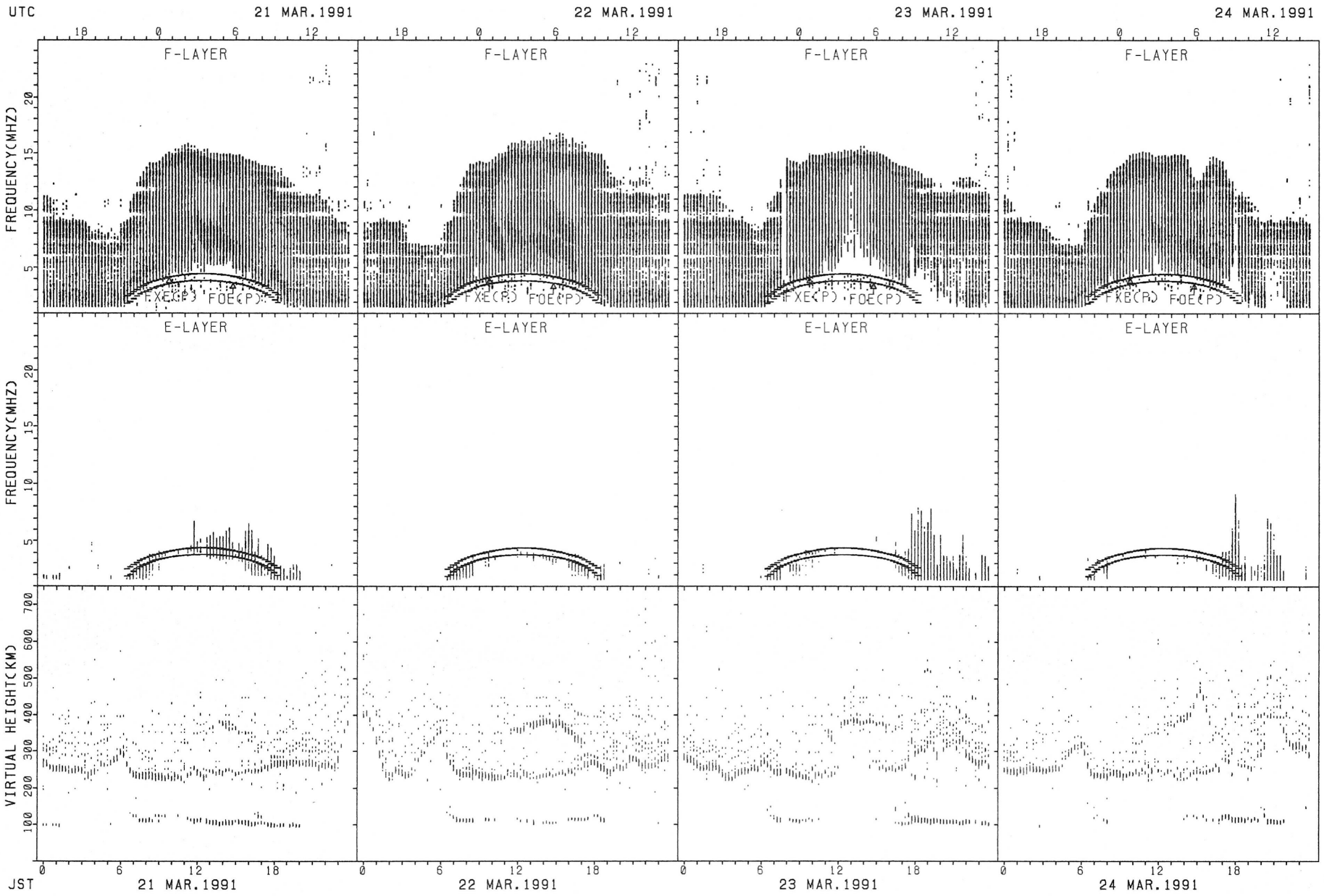

SUMMARY PLOTS AT YAMAGAWA
UTC
5 MAR.1991
6 MAR.1991
7 MAR.1991
8 MAR.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
9 MAR.1991
10 MAR.1991
11 MAR.1991
12 MAR.1991
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); FOE(P)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

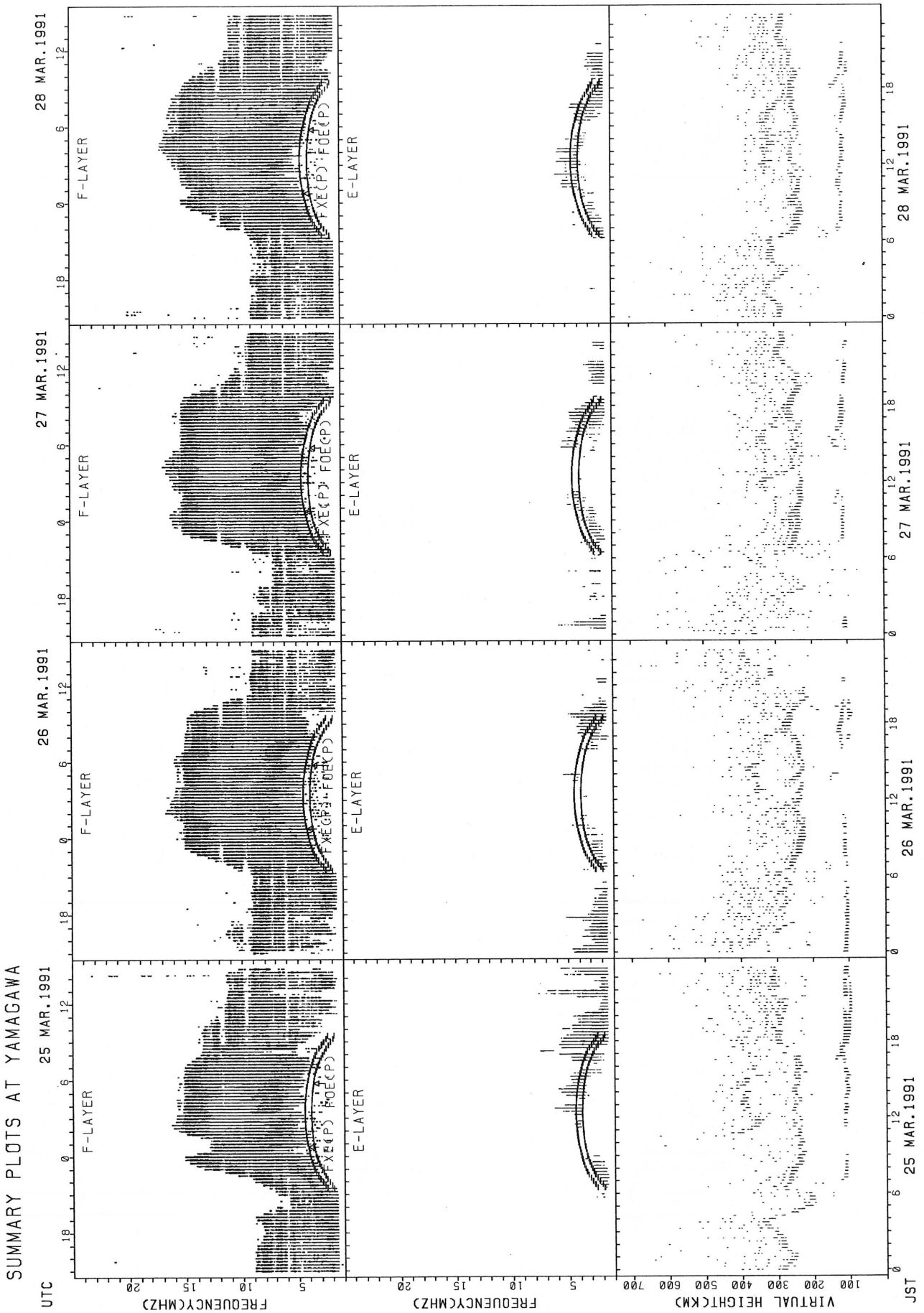

SUMMARY PLOTS AT YAMAGAWA
UTC
13 MAR.1991
14 MAR.1991
15 MAR.1991
16 MAR.1991
F-LAYER
E-LAYER
FXE(P), FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
17 MAR.1991
18 MAR.1991
19 MAR.1991
20 MAR.1991
F-LAYER
E-LAYER
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); FOE(P)
UTC
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

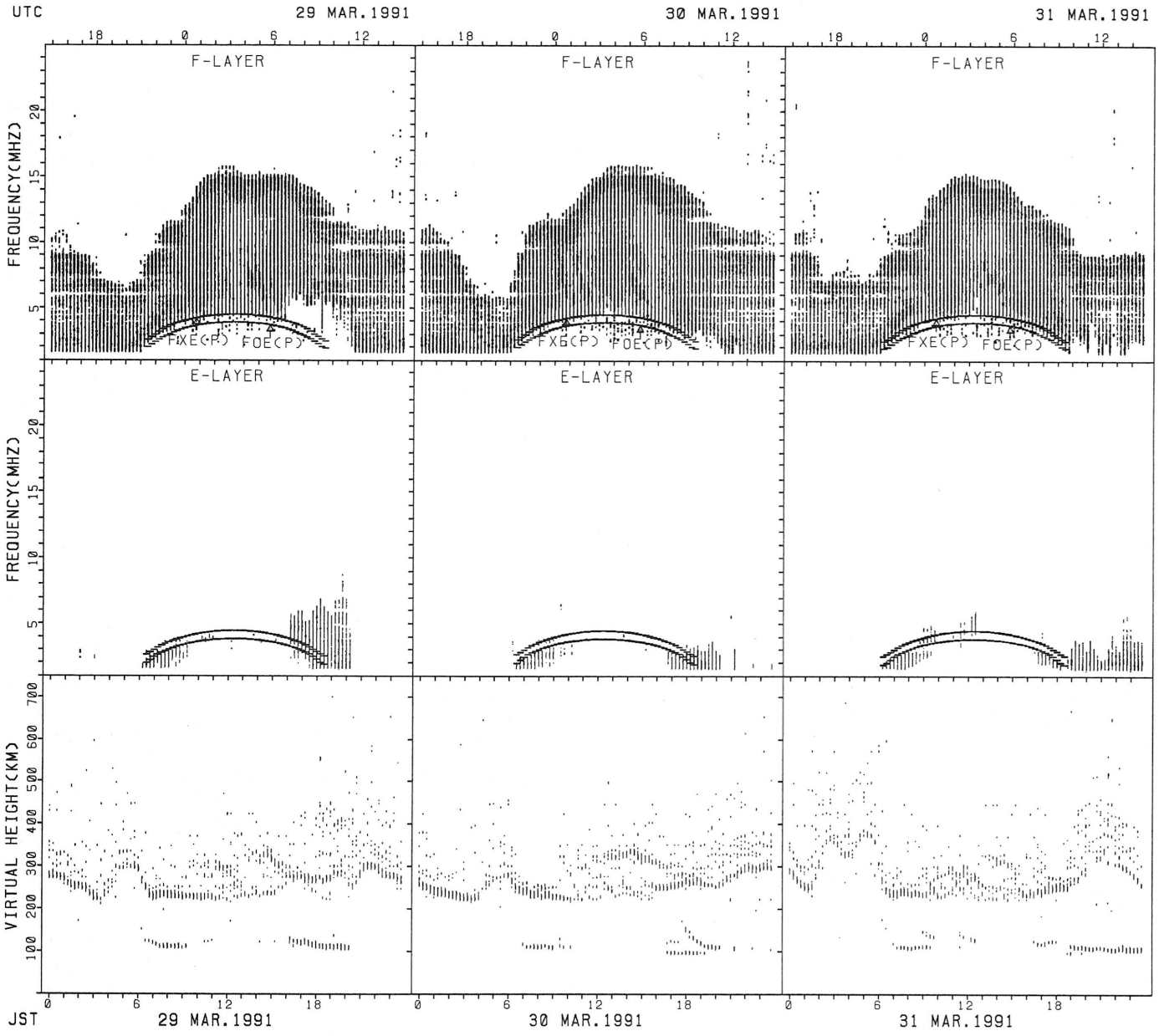
SUMMARY PLOTS AT YAMAGAWA



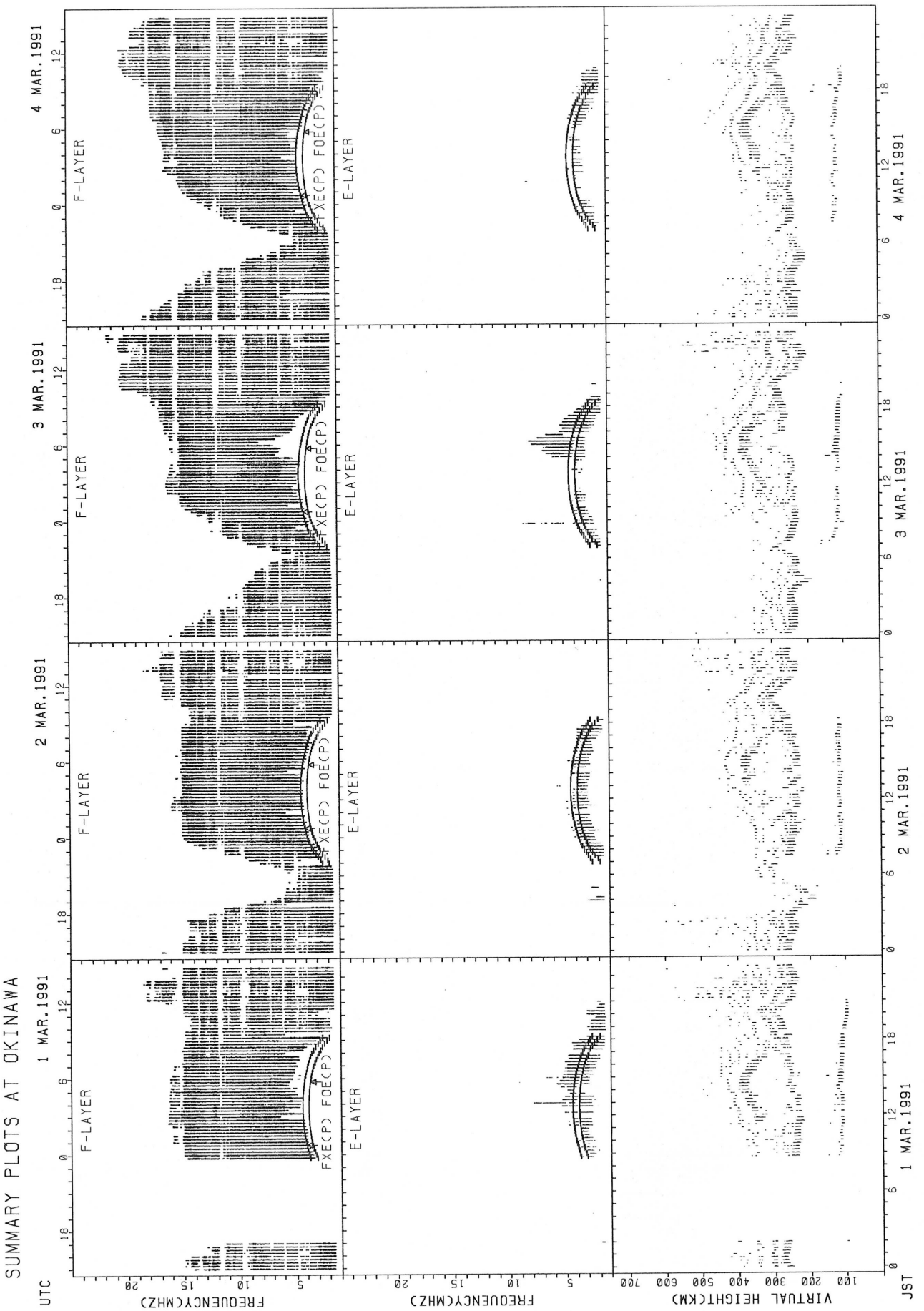

FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE


SUMMARY PLOTS AT YAMAGAWA
UTC
25 MAR.1991
26 MAR.1991
27 MAR.1991
28 MAR.1991
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

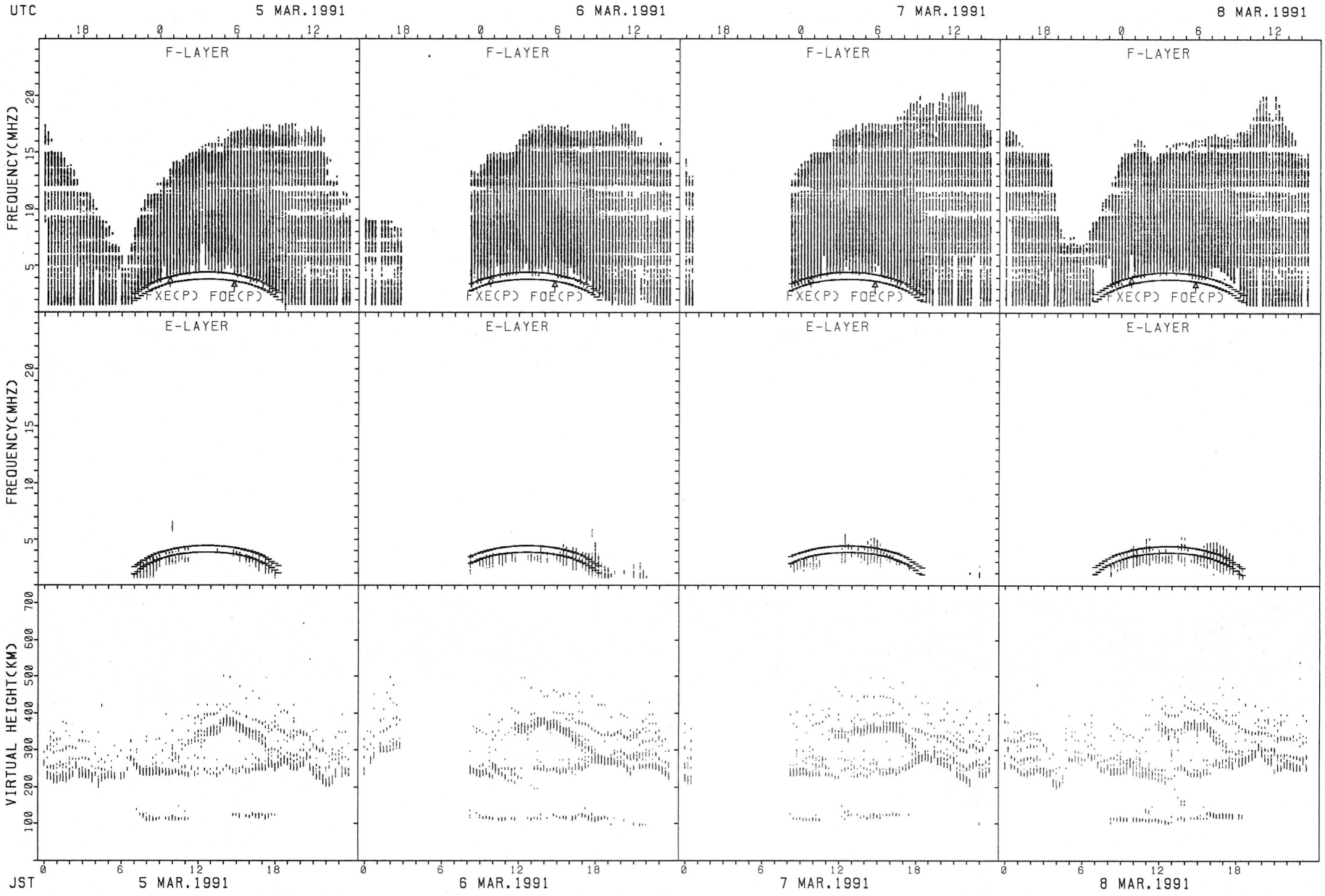
SUMMARY PLOTS AT YAMAGAWA



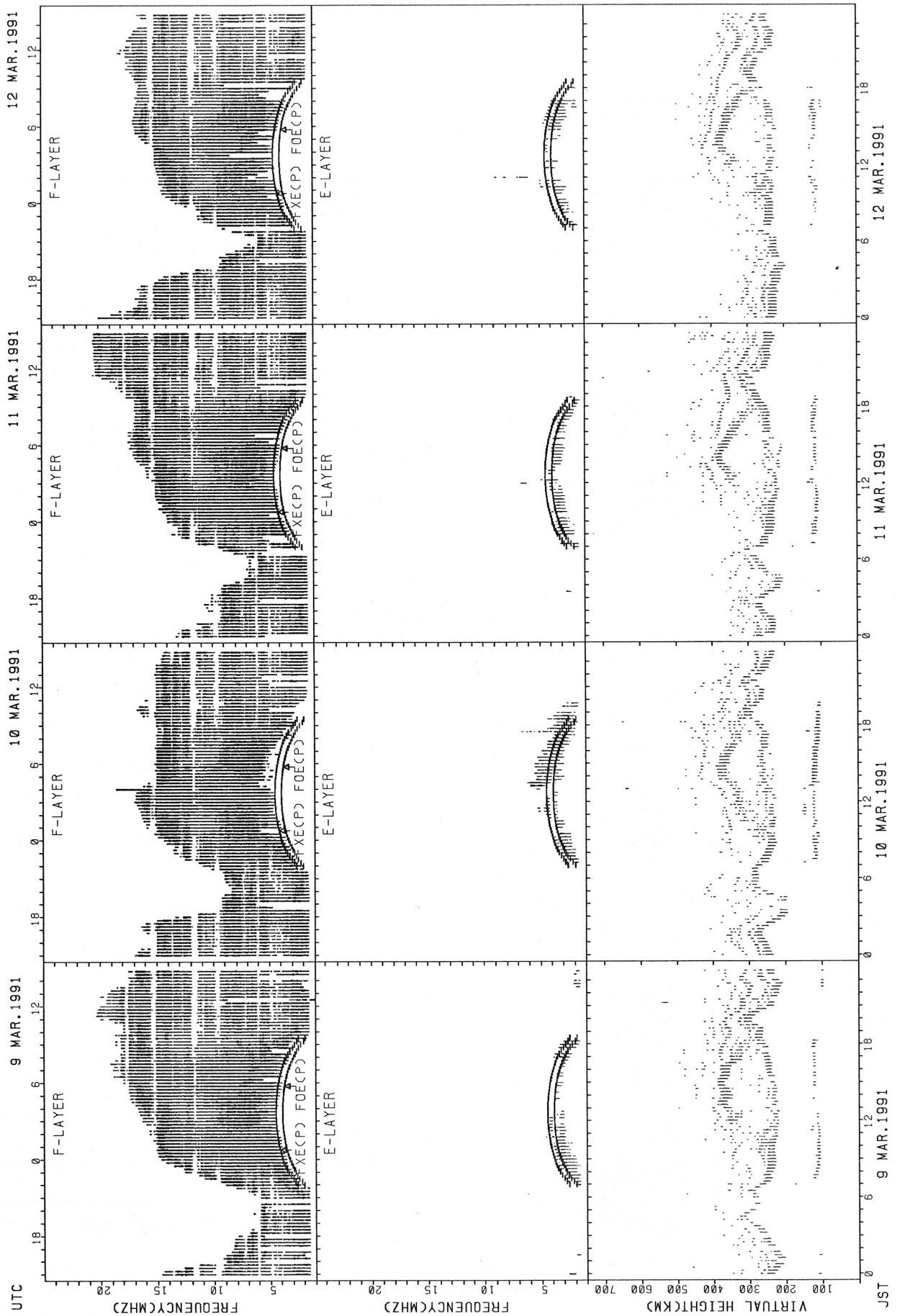

FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

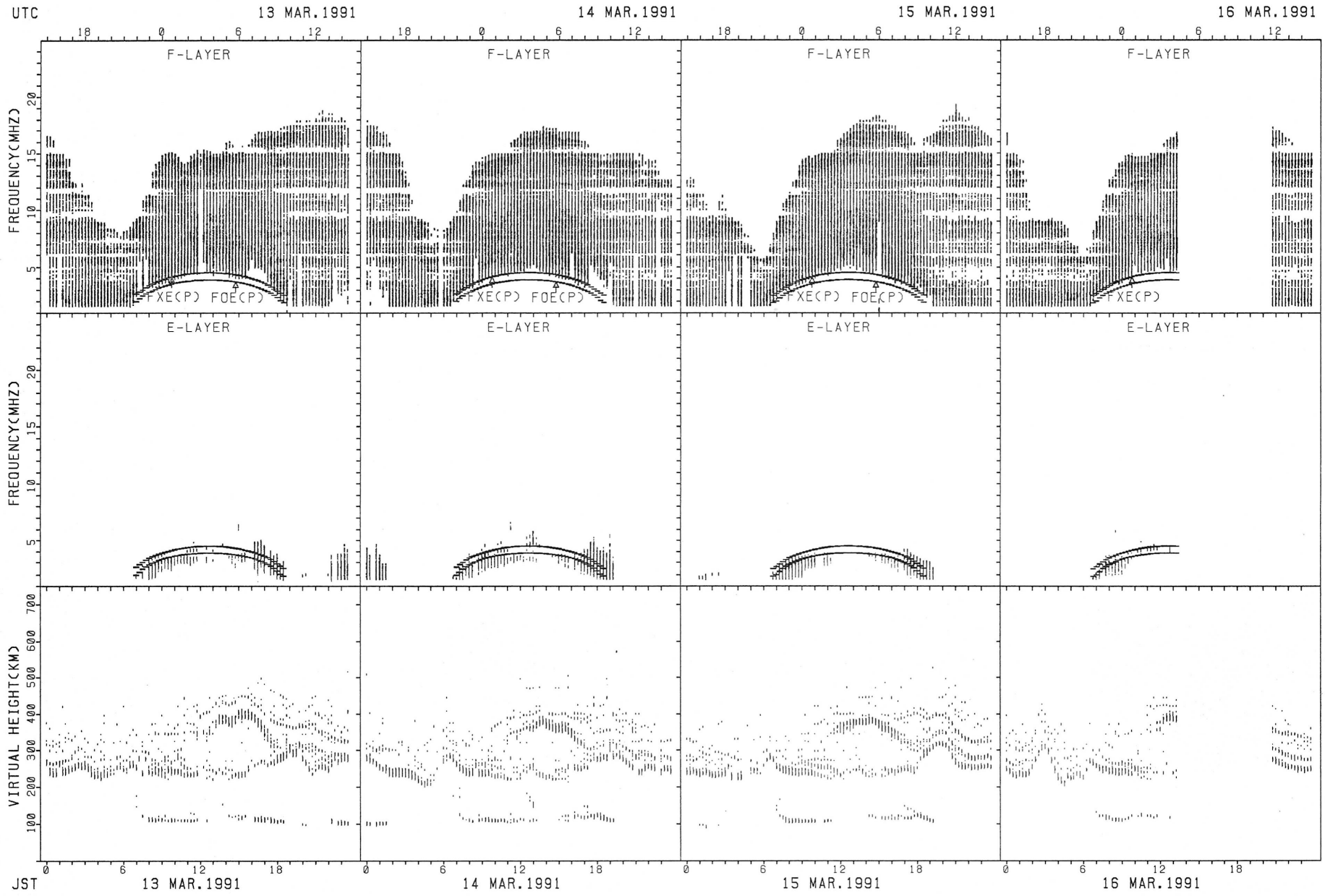

SUMMARY PLOTS AT OKINAWA
1 MAR.1991
2 MAR.1991
3 MAR.1991
4 MAR.1991
UTC
JST
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA

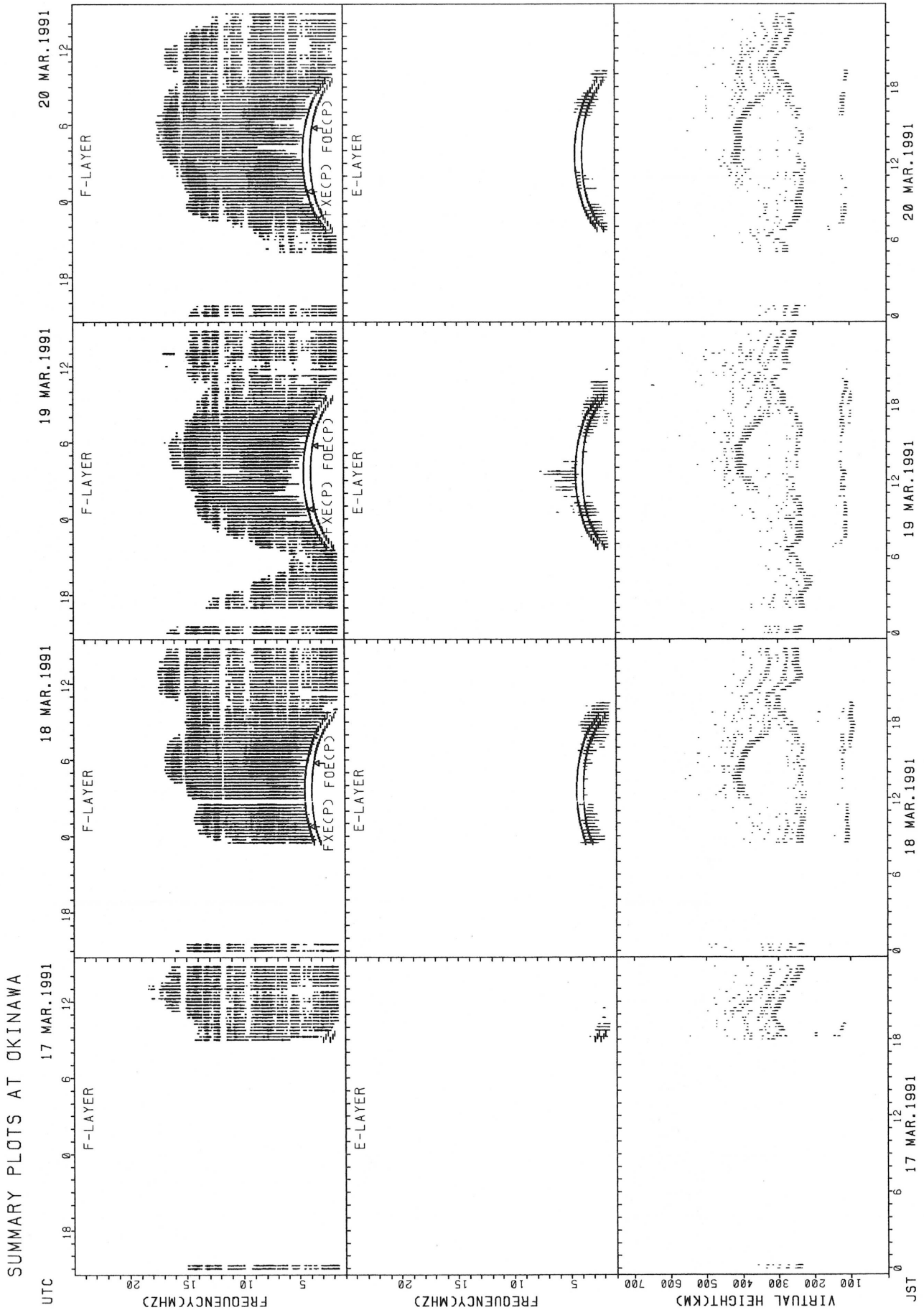



FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE

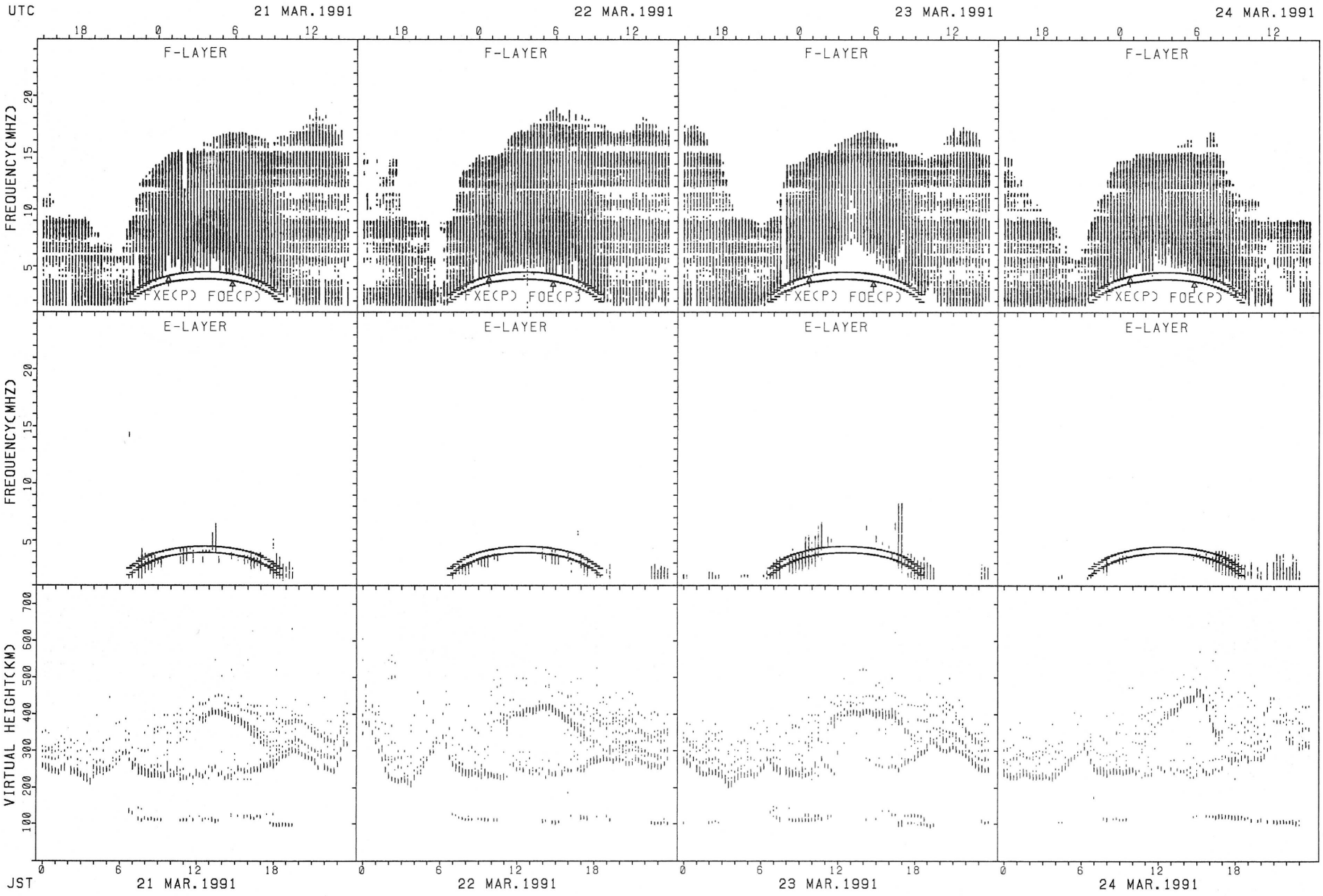

SUMMARY PLOTS AT OKINAWA
UTC
9 MAR.1991
10 MAR.1991
11 MAR.1991
12 MAR.1991
F-LAYER
E-LAYER
FXE(P) FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P); PREDICTED VALUE FOR FXE
FOE(P); PREDICTED VALUE FOR FOE



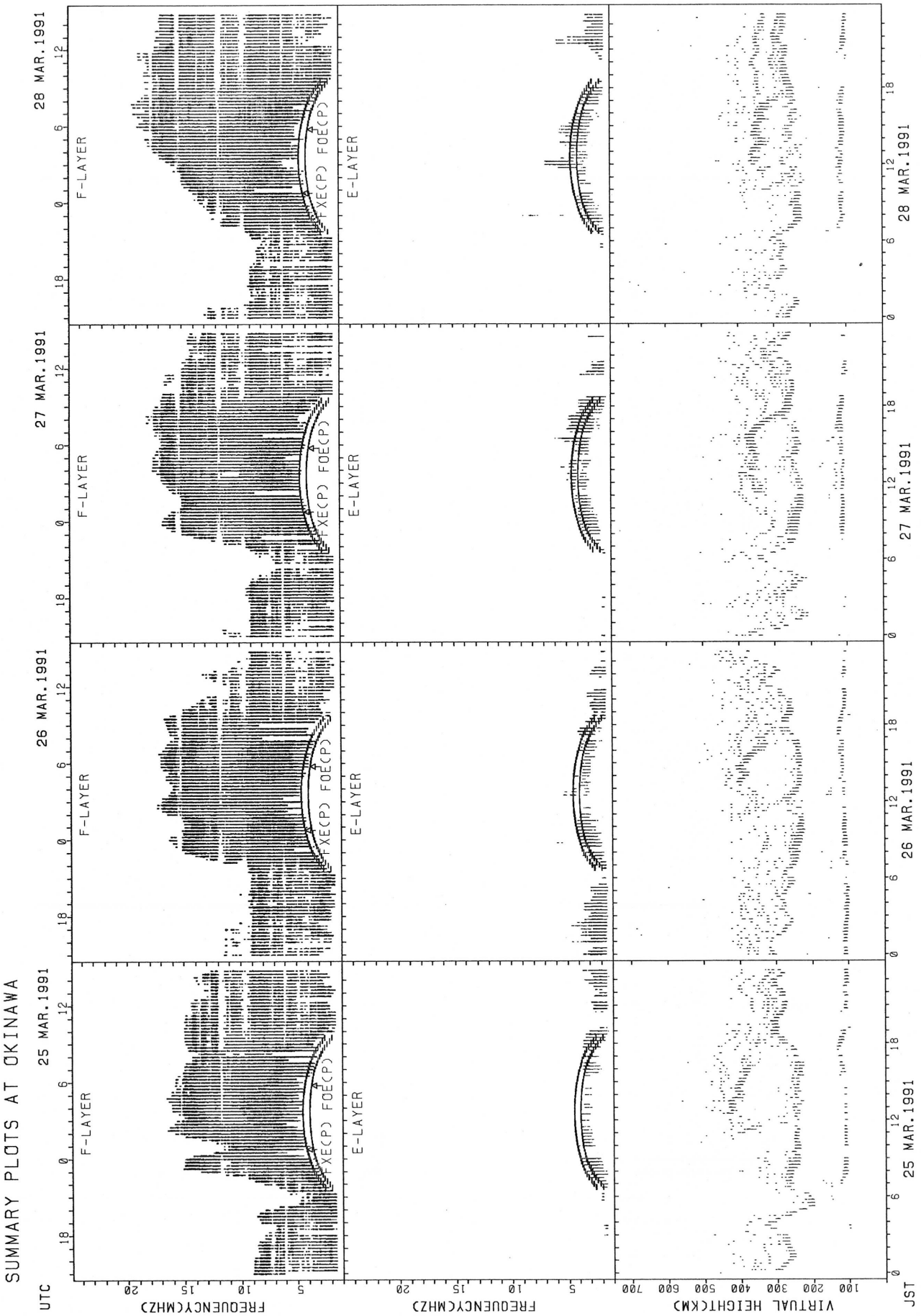

FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

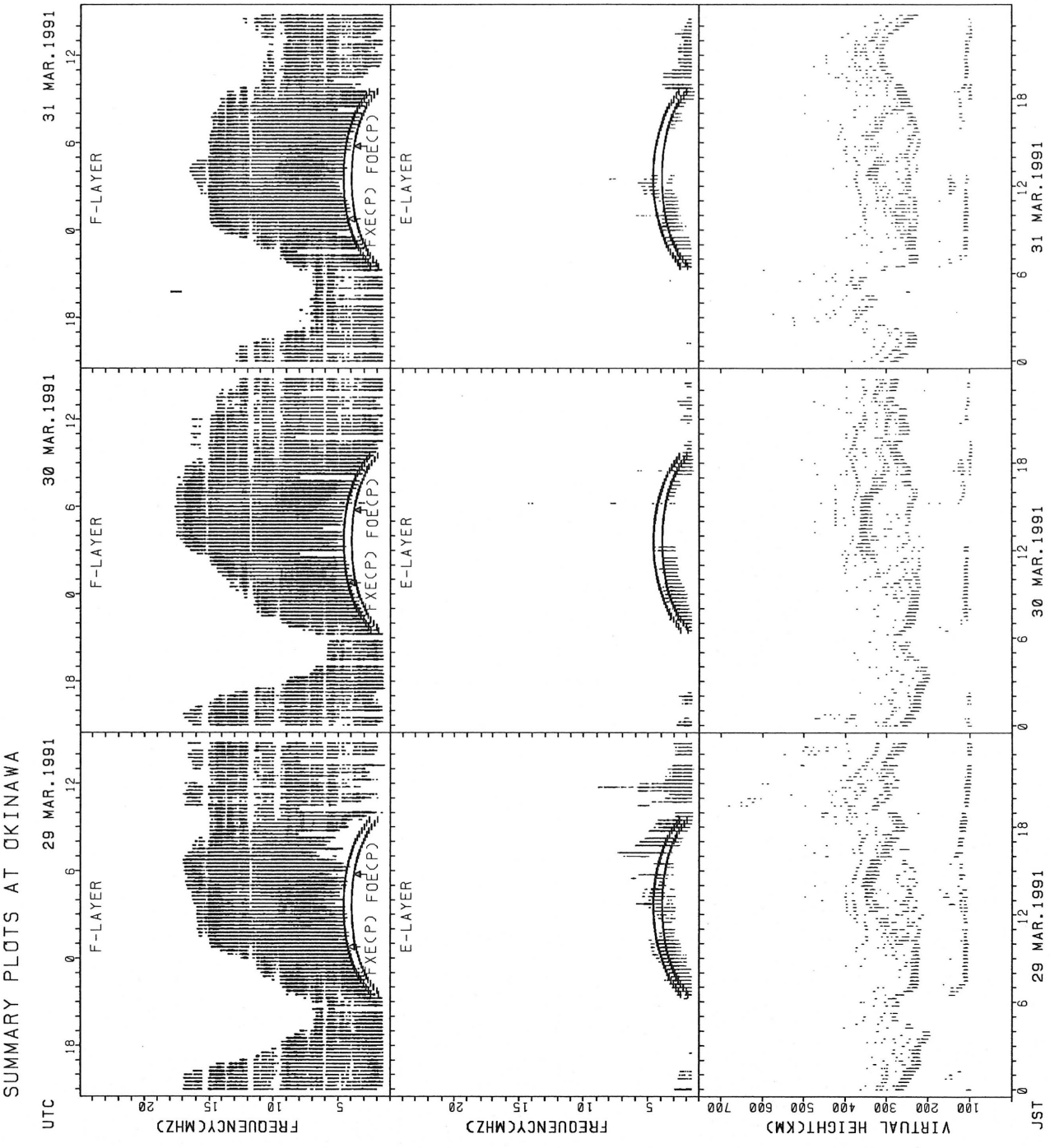

SUMMARY PLOTS AT OKINAWA
UTC
17 MAR.1991
18 MAR.1991
19 MAR.1991
20 MAR.1991
F-LAYER
E-LAYER
FXE(P)
FOE(P)
FREQUENCY(MHZ)
VIRTUAL HEIGHT(KM)
JST
FXE(P): PREDICTED VALUE FOR FXE
FOE(P): PREDICTED VALUE FOR FOE

SUMMARY PLOTS AT OKINAWA




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


SUMMARY PLOTS AT OKINAWA
UTC
25 MAR.1991
26 MAR.1991
27 MAR.1991
28 MAR.1991
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
UTC
29 MAR.1991
30 MAR.1991
31 MAR.1991
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

# MONTHLY MEDIANS OF H'F AND H'ES

MAR. 1991 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 | 14 | | | | | | 21 | 28 | 29 | 25 | | | | | 18 | 31 | 31 | 31 | 31 | 28 | 21 | 21 | 16 | 12 |
| MED | 337 | | | | | | 304 | 249 | 240 | 240 | | | | | 255 | 264 | 266 | 270 | 274 | 299 | 318 | 324 | 345 | 335 |
| U Q | 360 | | | | | | 328 | 263 | 248 | 267 | | | | | 270 | 280 | 272 | 282 | 284 | 316 | 335 | 341 | 354 | 347 |
| L Q | 326 | | | | | | 274 | 246 | 236 | 236 | | | | | 248 | 252 | 252 | 264 | 268 | 289 | 307 | 313 | 320 | 326 |

## H'ES

| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CNT | | | | | | | | | | | | | | | | | | | | | | | | |
| MED | | | | | | | | | | | | | | | | | | | | | | | | |
| U Q | | | | | | | | | | | | | | | | | | | | | | | | |
| L Q | | | | | | | | | | | | | | | | | | | | | | | | |

## 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 | 30 | 29 | | | | | 10 | 29 | 29 | 29 | 29 | 17 | | | | |
| MED | | | | | | | | 264 | 246 | 248 | | | | | 275 | 298 | 296 | 288 | 300 | 318 | | | | |
| U Q | | | | | | | | 272 | 258 | 260 | | | | | 308 | 328 | 325 | 296 | 311 | 349 | | | | |
| L Q | | | | | | | | 255 | 238 | 237 | | | | | 268 | 280 | 273 | 276 | 287 | 301 | | | | |

## 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 | | | | | | | |
| MED | | | | | | | | | | | | | | | | | 120 | | | | | | | |
| U Q | | | | | | | | | | | | | | | | | 121 | | | | | | | |
| L Q | | | | | | | | | | | | | | | | | 117 | | | | | | | |

## 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 | 23 | 15 | 11 | | | | 19 | 31 | 30 | 31 | | | | | | 30 | 30 | 31 | 31 | 30 | 27 | 25 | 27 | 24 |
| MED | 322 | 334 | 342 | | | | 292 | 246 | 238 | 240 | | | | | | 285 | 284 | 282 | 280 | 298 | 326 | 342 | 338 | 324 |
| U Q | 354 | 348 | 368 | | | | 316 | 254 | 244 | 252 | | | | | | 310 | 304 | 300 | 292 | 310 | 350 | 357 | 354 | 361 |
| L Q | 298 | 306 | 316 | | | | 286 | 238 | 232 | 236 | | | | | | 276 | 270 | 270 | 274 | 282 | 310 | 325 | 320 | 308 |

## 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 | 10 | | | | | | | 12 | 16 | 19 | 13 | 12 | | | | |
| MED | | | | | | | | 117 | 115 | | | | | | | 118 | 118 | 117 | 101 | 110 | | | | |
| U Q | | | | | | | | 143 | 119 | | | | | | | 124 | 120 | 121 | 110 | 117 | | | | |
| L Q | | | | | | | | 109 | 111 | | | | | | | 114 | 114 | 107 | 97 | 104 | | | | |

# MONTHLY MEDIANS OF H'F AND H'ES
## MAR. 1991 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 | 27 | 25 | 23 | 19 | | | | 31 | 31 | 31 | 19 | | | | | 24 | 31 | 31 | 30 | 31 | 29 | 28 | 28 | 29 |
| MED | 294 | 298 | 322 | 304 | | | | 262 | 242 | 242 | 248 | | | | | 349 | 328 | 294 | 276 | 292 | 310 | 323 | 310 | 322 |
| U Q | 334 | 316 | 342 | 316 | | | | 278 | 250 | 250 | 252 | | | | | 370 | 348 | 332 | 292 | 312 | 329 | 336 | 327 | 332 |
| L Q | 284 | 281 | 302 | 286 | | | | 250 | 236 | 234 | 242 | | | | | 263 | 268 | 280 | 268 | 276 | 293 | 292 | 300 | 305 |

H'ES

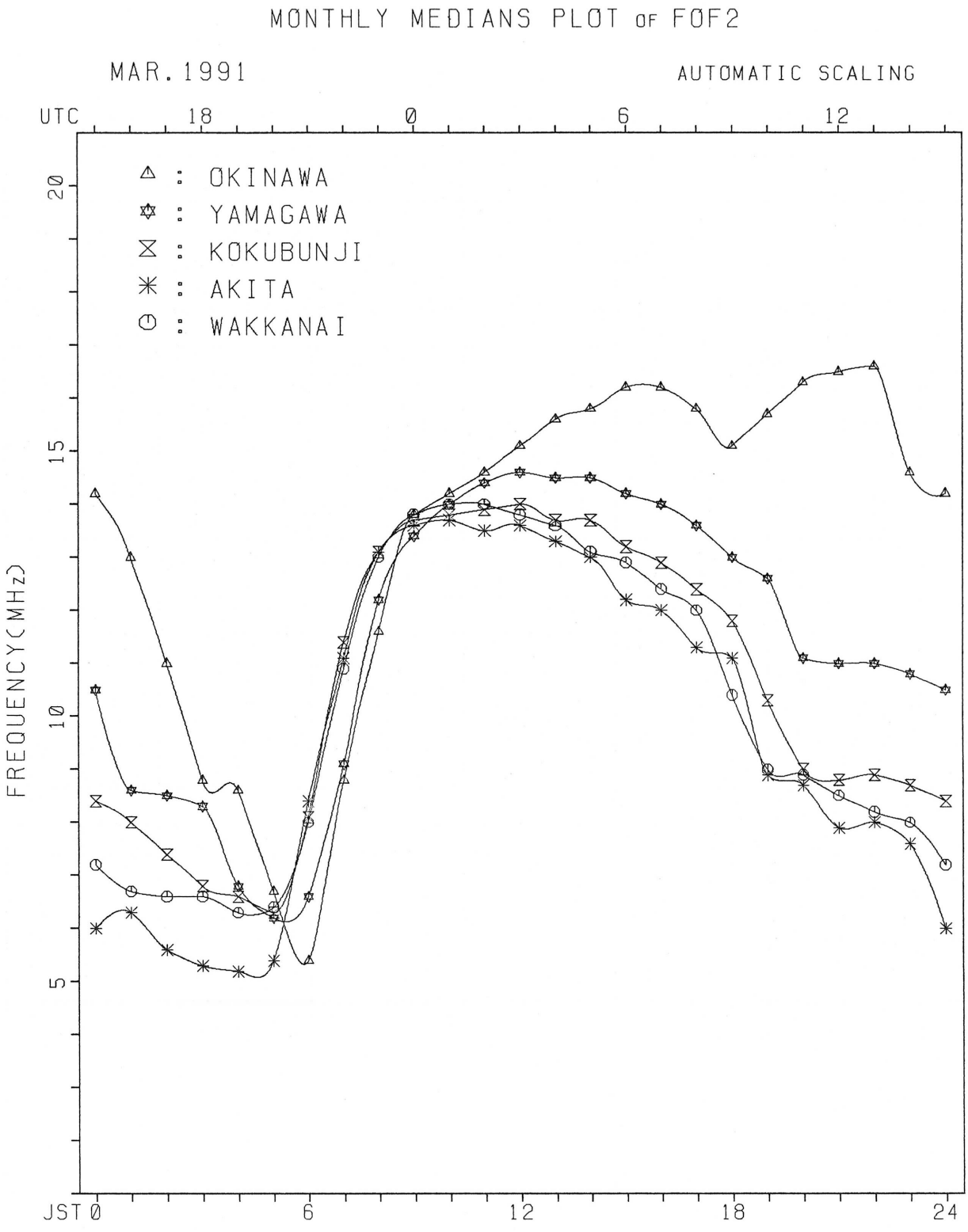
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CNT | | | | | | | | | | 10 | | | | | | | 12 | 15 | 17 | 13 | 10 | | | |
| MED | | | | | | | | | | 115 | | | | | | | 118 | 119 | 115 | 109 | 111 | | | |
| U Q | | | | | | | | | | 119 | | | | | | | 122 | 121 | 122 | 113 | 113 | | | |
| L Q | | | | | | | | | | 111 | | | | | | | 115 | 117 | 110 | 104 | 109 | | | |

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 | 28 | 23 | 21 | 22 | 13 | | | 23 | 26 | 30 | 26 | | | | | 14 | 29 | 29 | 31 | 30 | 29 | 28 | 30 | 30 |
| MED | 272 | 262 | 274 | 262 | 270 | | | 288 | 246 | 252 | 254 | | | | | 367 | 356 | 348 | 300 | 300 | 318 | 295 | 290 | 279 |
| U Q | 284 | 274 | 298 | 290 | 282 | | | 306 | 270 | 266 | 290 | | | | | 372 | 379 | 374 | 324 | 320 | 338 | 310 | 302 | 298 |
| L Q | 265 | 256 | 257 | 254 | 240 | | | 274 | 240 | 242 | 248 | | | | | 356 | 341 | 317 | 284 | 288 | 301 | 282 | 280 | 272 |

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 | | | 10 | | | | | | 12 | 23 | 20 | 18 | | | | |
| MED | | | | | | | | 143 | | | 117 | | | | | | 119 | 121 | 119 | 112 | | | | |
| U Q | | | | | | | | 165 | | | 121 | | | | | | 136 | 125 | 124 | 117 | | | | |
| L Q | | | | | | | | 137 | | | 111 | | | | | | 115 | 119 | 111 | 103 | | | | |


MONTHLY MEDIANS PLOT OF FOF2
MAR. 1991
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 STATION KOKUBUNJI

MAR. 1991 FXI (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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 | X 88 | X 81 | X 79 | X 80 | X 80 | X 81 | | | | | | | | | | | | | X 134 | X 112 | X 100 | X 98 | X 94 | X 88 |
| 2 | X 85 | X 85 | X 86 | X 87 | X 75 | X 69 | | | | | | | | | | | | | X 134 | X 112 | X 105 | X 112 | X 107 | X 97 |
| 3 | X 95 | X 90 | X 84 | X 86 | X 81 | X 75 | | | | | | | | | | | | | X 130 | X 111 | X 113 | X 108 | X 104 | X 91 |
| 4 | X 83 | X 78 | X 73 | X 75 | X 66 | X 58 | | | | | | | | | | | | | X 123 | X 112 | X 111 | X 106 | X 104 | X 98 |
| 5 | X 95 | X 81 | X 68 | X 67 | X 60 | X 59 | | | | | | | | | | | | | X 124 | X 107 | X 101 | X 93 | X 95 | X 92 |
| 6 | X 77 | X 77 | X 74 | X 77 | X 74 | X 70 | | | | | | | | | | | | | X 133 | X 117 | X 97 | X 92 | X 95 | X 91 |
| 7 | X 90 | X 81 | X 73 | X 69 | X 68 | X 70 | | | | | | | | | | | | | | X 117 | X 111 | X 95 | X 95 | X 88 |
| 8 | X 82 | X 84 | X 78 | X 70 | X 66 | X 64 | | | | | | | | | | | | | | X 111 | X 109 | X 98 | X 96 | X 101 |
| 9 | X 100 | X 81 | X 74 | X 60 | X 63 | X 64 | | | | | | | | | | | | | | X 104 | X 102 | X 104 | X 98 | X 97 |
| 10 | X 90 | X 83 | X 83 | X 77 | X 74 | X 68 | | | | | | | | | | | | | | X 106 | X 107 | X 108 | X 103 | X 102 |
| 11 | X 101 | X 95 | X 91 | X 84 | X 82 | X 81 | | | | | | | | | | | | | | X 107 | X 102 | X 98 | X 99 | X 100 |
| 12 | X 90 | X 87 | X 85 | X 71 | X 65 | X 66 | | | | | | | | | | | | | | X 112 | X 103 | X 99 | X 92 | X 96 |
| 13 | X 97 | X 89 | X 82 | X 80 | X 76 | X 79 | | | | | | | | | | | | | | X 124 | X 111 | X 93 | X 90 | X 87 |
| 14 | X 85 | X 86 | X 78 | X 73 | X 64 | X 67 | | | | | | | | | | | | | | X 105 | X 101 | X 101 | X 101 | X 95 |
| 15 | X 88 | X 79 | X 76 | X 74 | X 70 | X 71 | | | | | | | | | | | | | | X 111 | X 105 | X 106 | X 105 | X 102 |
| 16 | X 100 | X 91 | X 79 | X 80 | X 84 | X 81 | | | | | | | | | | | | | | X 109 | X 106 | X 104 | X 106 | X 107 |
| 17 | X 103 | X 95 | X 91 | X 82 | X 74 | X 65 | | | | | | | | | | | | | | X 116 | X 105 | X 110 | X 113 | X 115 |
| 18 | X 107 | X 97 | X 91 | X 84 | X 84 | X 83 | | | | | | | | | | | | | | X 113 | X 106 | X 113 | X 108 | X 107 |
| 19 | X 105 | X 95 | X 94 | X 86 | X 75 | X 75 | | | | | | | | | | | | | | X 117 | X 111 | X 108 | X 109 | X 108 |
| 20 | X 104 | X 96 | X 90 | X 88 | X 91 | X 91 | | | | | | | | | | | | | | X 118 | X 108 | X 100 | X 98 | X 99 |
| 21 | X 97 | X 89 | X 85 | X 78 | X 76 | X 76 | | | | | | | | | | | | | | X 117 | X 111 | X 103 | X 98 | X 84 |
| 22 | X 80 | X 91 | X 90 | X 75 | X 74 | X 76 | | | | | | | | | | | | | | X 119 | X 106 | X 106 | X 100 | X 94 |
| 23 | X 96 | X 98 | X 90 | X 91 | X 84 | X 79 | | | | | | | | | | | | | | X 110 | X 108 | X 111 | X 109 | X 108 |
| 24 | X 106 | X 96 | X 92 | X 83 | X 78 | X 77 | | | | | | | | | | | | | | X 98 | X 94 | X 95 | X 98 | X 98 |
| 25 | X 86 | X 90 | X 86 | X 79 | X 84 | X 75 | | | | | | | | | | | | | | X 117 | X 105 | X 102 | X 101 | X 100 |
| 26 | X 91 | X 98 | X 89 | X 88 | X 84 | X 82 | | | | | | | | | | | | | | X 112 | X 86 | X 84 | X 84 | X 82 |
| 27 | X 80 | X 82 | X 79 | X 79 | X 70 | X 73 | | | | | | | | | | | | | | X 117 | X 99 | X 90 | X 89 | X 86 |
| 28 | X 84 | X 79 | X 77 | X 79 | X 74 | O X 73 | | | | | | | | | | | | | | X 108 | X 95 | X 91 | X 93 | X 91 |
| 29 | X 85 | X 84 | X 80 | X 75 | X 69 | X 75 | | | | | | | | | | | | | | X 103 | X 90 | X 93 | X 97 | X 95 |
| 30 | X 97 | X 93 | X 81 | X 73 | X 66 | X 66 | | | | | | | | | | | | | | X 117 | X 103 | X 102 | X 100 | X 95 |
| 31 | X 98 | X 92 | X 78 | X 83 | X 79 | X 75 | | | | | | | | | | | | | | X 91 | X 85 | X 85 | X 88 | X 89 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | | | | | | | | | | | | | 6 | 31 | 31 | 31 | 31 | 31 |
| MED | X 91 | X 89 | X 82 | X 79 | X 74 | X 75 | | | | | | | | | | | | | X 132 | X 112 | X 105 | X 101 | X 98 | X 96 |
| U Q | X 100 | X 95 | X 90 | X 84 | X 81 | X 79 | | | | | | | | | | | | | X 134 | X 117 | X 108 | X 106 | X 104 | X 101 |
| L Q | X 85 | X 81 | X 78 | X 74 | X 68 | X 67 | | | | | | | | | | | | | X 124 | X 107 | X 100 | X 93 | X 95 | X 91 |

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# IONOSPHERIC DATA STATION KOKUBUNJI

MAR. 1991 FOF2 (0.1MHZ) 135° E MEAN TIME (G.M.T. + 9H)

LAT.35° 42.4'N LON.139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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 | 82 | 75 | 73 | 74 | 74 | 75 | 86 | 117 | 140 | 149 | 150 | 153 | U R 154 | R 148 | 145 | 145 | 135 | 131 | 128 | 106 | 94 | 92 | 88 | 82 |
| 2 | 79 | 79 | 80 | 81 | 69 | 63 | 70 | 105 | 145 | R 149 | 150 | I R 155 | U R 152 | 148 | 147 | 142 | 139 | 136 | 128 | 106 | 99 | 106 | 101 | 91 |
| 3 | 89 | 84 | 78 | 80 | 75 | 69 | 79 | 114 | 129 | 132 | 134 | 136 | 143 | 145 | 139 | 136 | 133 | 129 | 124 | 105 | 107 | 102 | 98 | 85 |
| 4 | 77 | 72 | 67 | 69 | 60 | 52 | 63 | 97 | 119 | 123 | 129 | 135 | 141 | 137 | 134 | 130 | 128 | 124 | 117 | 106 | 105 | 99 | 98 | 92 |
| 5 | 89 | 75 | 62 | 61 | 54 | 53 | 68 | 104 | 123 | 119 | 125 | 131 | 136 | 135 | 138 | 135 | 130 | 127 | 118 | 100 | 95 | 87 | 89 | 86 |
| 6 | 71 | 71 | 68 | 71 | 68 | 64 | 72 | 115 | 138 | 144 | R 147 | 141 | 137 | 135 | 132 | 131 | 127 | 130 | 127 | 111 | 91 | 86 | 89 | 85 |
| 7 | 84 | 75 | 67 | 62 | 61 | 64 | 81 | 125 | 136 | 136 | 143 | 146 | R 151 | R 147 | 150 | 146 | 137 | 133 | 125 | R 111 | 105 | 89 | 89 | 82 |
| 8 | 76 | S 78 | 72 | 64 | 60 | F 57 | S 71 | 105 | 129 | 141 | 149 | R 148 | 144 | 138 | 140 | 139 | 133 | 129 | 119 | 106 | R 103 | 92 | 90 | 95 |
| 9 | 94 | 75 | 68 | 54 | 57 | 58 | 73 | 105 | 122 | 133 | 140 | 140 | 145 | 141 | 138 | 135 | 129 | 122 | R 113 | 98 | 96 | 98 | 92 | 91 |
| 10 | 84 | 77 | 77 | 71 | 68 | 62 | 80 | 119 | 140 | 141 | 144 | 142 | 146 | 141 | 131 | 135 | 131 | 122 | 111 | 100 | 101 | 102 | 97 | 96 |
| 11 | 95 | 89 | 85 | 78 | 76 | 75 | 90 | 118 | 129 | 138 | 140 | 142 | 139 | 138 | 143 | 137 | 131 | 125 | 116 | 101 | 96 | 92 | 93 | 94 |
| 12 | 84 | 81 | 79 | 65 | 59 | 60 | 80 | 108 | 118 | 128 | 137 | 138 | 136 | 132 | 131 | 128 | 121 | 119 | 119 | 106 | 97 | 93 | 86 | 90 |
| 13 | 91 | 83 | 76 | 74 | 70 | 73 | 90 | 114 | 131 | 143 | 144 | 147 | 139 | 145 | 145 | 133 | 126 | 128 | 128 | 118 | 105 | 87 | 84 | 81 |
| 14 | 79 | 80 | 72 | 67 | 58 | V 61 | 78 | R 111 | 129 | 137 | 145 | R 147 | R 148 | 146 | 139 | 134 | 129 | 123 | 116 | 99 | 95 | 95 | 95 | 89 |
| 15 | 82 | 73 | 70 | 68 | 64 | 65 | 84 | 109 | 127 | 136 | 139 | 141 | 140 | 140 | 135 | 131 | 125 | 119 | 115 | 105 | 99 | 100 | 99 | 96 |
| 16 | 94 | 85 | 73 | 74 | 78 | 75 | 91 | 115 | 130 | 139 | 142 | 142 | 141 | 139 | 131 | 128 | 125 | 119 | R 113 | 103 | 100 | 98 | S 100 | 101 |
| 17 | 98 | 89 | 85 | 76 | 68 | 59 | 73 | 121 | 136 | 141 | 143 | 147 | 141 | 139 | 135 | 133 | 132 | 134 | 129 | 110 | 98 | 104 | 107 | J R 109 |
| 18 | 101 | 91 | 85 | 78 | 78 | 77 | 98 | 128 | 138 | 139 | 147 | 144 | 145 | 140 | 138 | 135 | 133 | 129 | 118 | 107 | 100 | 107 | S 102 | 101 |
| 19 | 99 | 89 | 88 | 80 | 69 | 69 | 96 | 121 | 138 | 139 | 140 | 141 | 140 | 139 | 134 | 129 | 125 | 126 | 125 | 111 | 105 | 102 | 103 | 102 |
| 20 | 98 | 90 | 84 | 82 | 85 | F 83 | S 101 | 129 | 148 | 153 | 154 | R 156 | 154 | R 149 | 151 | 147 | 137 | 133 | 125 | R 112 | 102 | 94 | 92 | 93 |
| 21 | 91 | 83 | 79 | 72 | 70 | 70 | 93 | 119 | R 131 | 136 | 143 | R 147 | 146 | 142 | 137 | 133 | 130 | 128 | 123 | R 111 | 105 | 97 | 92 | 78 |
| 22 | 74 | 85 | 84 | 69 | 68 | 70 | 91 | 124 | 135 | 141 | 146 | 148 | 149 | 149 | 148 | 145 | 145 | 144 | 137 | 113 | 100 | 100 | 94 | 88 |
| 23 | 90 | 92 | 84 | 85 | 78 | 73 | 93 | 129 | 147 | 147 | 141 | 146 | 145 | 144 | 144 | 141 | 134 | 127 | 118 | 104 | 102 | 105 | 103 | 102 |
| 24 | 100 | 90 | 86 | 77 | 72 | 71 | 94 | 120 | 134 | 146 | 148 | 147 | 144 | 143 | 138 | 113 | 130 | 137 | 113 | 92 | 88 | 89 | 92 | 92 |
| 25 | 80 | 84 | 80 | 73 | 78 | 69 | 78 | 95 | 125 | 141 | 136 | 149 | 154 | U R 156 | 147 | 149 | 145 | 129 | 119 | 111 | 98 | 96 | 95 | 94 |
| 26 | 85 | 92 | 83 | 82 | S 78 | 76 | 84 | 109 | 134 | 138 | 141 | 145 | 139 | 137 | 132 | 136 | 125 | 119 | 116 | 106 | 80 | 78 | 78 | 76 |
| 27 | 74 | 76 | 73 | 73 | 64 | S 67 | 85 | 127 | 143 | 143 | 147 | 151 | 147 | 148 | 144 | 136 | 133 | 125 | 125 | R 111 | 94 | 84 | 83 | 80 |
| 28 | 78 | 73 | 71 | 73 | 68 | U R 67 | 88 | 113 | 128 | 135 | 135 | 140 | 146 | R 153 | 146 | 141 | 137 | 131 | 120 | 102 | 89 | 85 | 87 | 85 |
| 29 | 79 | 78 | 74 | 69 | 63 | 69 | 91 | 112 | 126 | 130 | 137 | 148 | 151 | 145 | 141 | 140 | 136 | 129 | 120 | 97 | 84 | 87 | 91 | 89 |
| 30 | 91 | 87 | 75 | 67 | 60 | 60 | 90 | 112 | 118 | 121 | 125 | 139 | 144 | 145 | 146 | 146 | 141 | 136 | 128 | R 111 | 97 | 96 | 94 | 89 |
| 31 | 92 | 86 | 72 | 77 | 73 | 69 | 79 | 80 | 75 | 93 | 108 | 123 | 131 | 126 | 127 | 118 | 114 | 105 | 98 | 85 | 79 | 79 | 82 | 83 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | 85 | 83 | 76 | 73 | 68 | 69 | 84 | 114 | 131 | 139 | 142 | 145 | 144 | 142 | 139 | 135 | 131 | 128 | 119 | 106 | 98 | 95 | 92 | 90 |
| U Q | 94 | 89 | 84 | 78 | 75 | 73 | 91 | 121 | 138 | 143 | 147 | 148 | 148 | R 147 | 145 | 141 | 136 | 131 | 125 | R 111 | 102 | 100 | 98 | 95 |
| L Q | 79 | 75 | 72 | 68 | 61 | 61 | 78 | 108 | 126 | 133 | 137 | 140 | 140 | 138 | 134 | 131 | 127 | 123 | 116 | 101 | 94 | 87 | 89 | 85 |

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# IONOSPHERIC DATA STATION KOKUBUNJI

MAR. 1991 FOF1 (0.01MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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 | | | | | | | | | | | | L | L | L | L | L | | | | | | | | |
| 2 | | | | | | | | | | | | L | L | L | L | L | L | | | | | | | |
| 3 | | | | | | | | | | | L | | | U L 680 | | L | L | | | | | | | |
| 4 | | | | | | | | | | L | L | L | L | L | L | | | | | | | | | |
| 5 | | | | | | | | | | | | L | L | L | L | | | | | | | | | |
| 6 | | | | | | | | | | | L | L | | | L | L | | | | | | | | |
| 7 | | | | | | | | | | | L | L | L | L | L | L | L | | | | | | | |
| 8 | | | | | | | | | | | L | L | L | | L | L | | | | | | | | |
| 9 | | | | | | | | | | | L | | | L | L | L | | L | | | | | | |
| 10 | | | | | | | | | | L | | | L | L | L | L | | | | | | | | |
| 11 | | | | | | | | | | | | L | L | L | L | | | | | | | | | |
| 12 | | | | | | | | | | L | L | L | L | L | L | L | | | | | | | | |
| 13 | | | | | | | | | | L | L | | B | U L 720 | L | L | L | | | | | | | |
| 14 | | | | | | | | | L | | | L | L | L | L | L | | | | | | | | |
| 15 | | | | | | | | | | | | L | L | L | L | L | | | | | | | | |
| 16 | | | | | | | | | | | | L | L | L | L | L | L | | | | | | | |
| 17 | | | | | | | | | | | | L | L | L | L | L | L | | | | | | | |
| 18 | | | | | | | | | | | L | L | L | L | U L 760 | L | L | | | | | | | |
| 19 | | | | | | | | | | | | B | L | U L 785 | L 750 | L | L | | | | | | | |
| 20 | | | | | | | | | | | L | L | L | L | L 755 | L | L | | | | | | | |
| 21 | | | | | | | | | | | | L | L | L | L | L | L | | | | | | | |
| 22 | | | | | | | | | | | L | L | L | U L 800 | L | L 725 | L | | | | | | | |
| 23 | | | | | | | | | | | L | L | L | L | L | L | L | | | | | | | |
| 24 | | | | | | | | | | L | | L | L | L | L | U L 710 | L | | | | | | | |
| 25 | | | | | | | | | | | L | U L 855 | L | U L 850 | 775 | L | L | | | | | | | |
| 26 | | | | | | | | | | L | L | L | L | L | L | L | | | | | | | | |
| 27 | | | | | | | | | | | L | L | L | L | L | L | | | | | | | | |
| 28 | | | | | | | | | | | L | L | L | L | L | L | L | | | | | | | |
| 29 | | | | | | | | | | | | L | | L | L | L | | | | | | | | |
| 30 | | | | | | | | | | L | L | | | L | L | L | L | | | | | | | |
| 31 | | | | | | | | | | L | L | L | L | L | L | L | L | | | | | | | |
| | 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 | | 5 | 4 | 2 | | | | | | | | |
| MED | | | | | | | | | | | | U L 855 | | U L 785 | L 758 | L 718 | | | | | | | | |
| U Q | | | | | | | | | | | | | | U L 825 | 768 | | | | | | | | | |
| L Q | | | | | | | | | | | | | | U L 700 | L 752 | | | | | | | | | |

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# IONOSPHERIC DATA STATION KOKUBUNJI

MAR. 1991 FOE (0.01MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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 | | | | | | | B | H | | | | | | | B | | U A | A | | | | | | |
| | | | | | | | 240 | | 300 | 340 | 360 | 375 | 395 | 380 | | 350 | 295 | | | | | | | |
| 2 | | | | | | | B | | | | | A | | | | | | | | | | | | |
| | | | | | | | 240 | | 310 | 340 | 370 | | 390 | 390 | 375 | 355 | 300 | 200 | | | | | | |
| 3 | | | | | | | B | H | | | | | B | | | | A | A | | | | | | |
| | | | | | | | 255 | | 315 | 355 | 380 | 400 | | 395 | 385 | 350 | | | | | | | | |
| 4 | | | | | | | | | | | | A | | | | | | | | | | | | |
| | | | | | | | 145 | 255 | 310 | 365 | 380 | | 405 | 400 | 385 | 360 | 305 | 220 | | | | | | |
| 5 | | | | | | | | H | | | | A | A | R | | | | | | | | | | |
| | | | | | | | 150 | 270 | 320 | 355 | 365 | | | | 380 | 350 | 310 | 240 | | | | | | |
| 6 | | | | | | | B | | | | | | | | | | | | | | | | | |
| | | | | | | | 250 | | 325 | 365 | 390 | 390 | 400 | 385 | 380 | 355 | 310 | 230 | | | | | | |
| 7 | | | | | | | | | | | | S | | | | | | R | B | | | | | |
| | | | | | | | 150 | 265 | 310 | 340 | 375 | 385 | 385 | 380 | 380 | 360 | 315 | 245 | | | | | | |
| 8 | | | | | | | | H | | | | | | | | | | | B | | | | | |
| | | | | | | | 135 | 250 | 315 | 350 | 380 | 385 | 380 | 375 | 375 | 340 | 310 | 240 | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | B | | | | | |
| | | | | | | | 135 | 260 | 300 | 345 | 375 | 380 | 380 | 390 | 385 | 340 | 315 | 240 | | | | | | |
| 10 | | | | | | | B | | | | | | | | | | | R | B | | | | | |
| | | | | | | | 260 | | 310 | 350 | 380 | 395 | 405 | 395 | 390 | 360 | 320 | 240 | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | A | B | | | | | |
| | | | | | | | 170 | 270 | 325 | 360 | 370 | 395 | 400 | 390 | 375 | 360 | 325 | | | | | | | |
| 12 | | | | | | | | | | U R | | | R | | | | | A | B | | | | | |
| | | | | | | | 160 | 255 | 325 | 355 | 385 | 395 | 390 | 400 | 400 | 370 | 320 | | | | | | | |
| 13 | | | | | | | B | | | | | | B | A | | A | | | B | | | | | |
| | | | | | | | 245 | | 320 | 350 | 380 | 390 | | | 375 | | 320 | 235 | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | | B | | | | | |
| | | | | | | | 170 | 260 | 325 | 350 | 380 | 390 | 390 | 395 | 385 | 355 | 315 | 240 | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | B | | | | | |
| | | | | | | | 180 | 270 | 325 | 355 | 385 | 405 | 400 | 410 | 390 | 365 | 320 | 230 | | | | | | |
| 16 | | | | | | | | | | A | B | A | R | R | | | | | B | | | | | |
| | | | | | | | 185 | 270 | 330 | 365 | | | 405 | 390 | 390 | 365 | 325 | 240 | | | | | | |
| 17 | | | | | | | | U R | | | A | | | | B | | | | B | | | | | |
| | | | | | | | 155 | 305 | 340 | 375 | | 390 | 410 | 395 | | 370 | 330 | 250 | | | | | | |
| 18 | | | | | | | | H | | | R | | R | | | | | | B | | | | | |
| | | | | | | | 150 | 290 | 340 | 380 | 385 | 385 | 400 | 400 | 395 | 375 | 330 | 255 | | | | | | |
| 19 | | | | | | | H | | | | U A | B | | | | | | | B | | | | | |
| | | | | | | | 205 | 275 | 340 | 370 | 370 | | 410 | 400 | 395 | 370 | 335 | 260 | | | | | | |
| 20 | | | | | | | | | | | | | | B | | B | | | B | | | | | |
| | | | | | | | 205 | 280 | 335 | 380 | 395 | 385 | 400 | | 400 | | 335 | 250 | | | | | | |
| 21 | | | | | | | | | | | A | A | R | A | | | | | A | | | | | |
| | | | | | | | 205 | 295 | 345 | 385 | 405 | | 420 | | 385 | 370 | 325 | 255 | | | | | | |
| 22 | | | | | | | | | | | | A | | | | | | | B | | | | | |
| | | | | | | | 185 | 300 | 340 | 375 | 390 | | 415 | 400 | 390 | 365 | 320 | 265 | | | | | | |
| 23 | | | | | | | | | B | | | B | B | B | B | R | | | B | | | | | |
| | | | | | | | 175 | 285 | | 365 | 380 | | | | | 415 | 365 | 280 | | | | | | |
| 24 | | | | | | | | | | | B | A | B | A | A | | | | B | | | | | |
| | | | | | | | 170 | 280 | 340 | 380 | | | | | | 355 | 310 | 260 | | | | | | |
| 25 | | | | | | | | | | | A | A | A | A | A | | | A | A | | | | | |
| | | | | | | | 175 | 280 | 325 | 355 | 380 | | A | A | A | 350 | 305 | | | | | | | |
| 26 | | | | | | | A | | | A | | R | R | A | | A | | | B | | | | | |
| | | | | | | | | 270 | 335 | 355 | 390 | 400 | | | 375 | 355 | 320 | 245 | | | | | | |
| 27 | | | | | | J K | | H | | | A | A | R | | | | | A | | | | | | |
| | | | | | | 130 | 175 | 270 | 315 | 355 | 375 | | 395 | 385 | 385 | 350 | 310 | 230 | 145 | | | | | |
| 28 | | | | | | | R | | | | R | A | A | | | | | H | B | | | | | |
| | | | | | | | 195 | 275 | 340 | 370 | | | | 395 | 380 | 355 | 335 | 255 | | | | | | |
| 29 | | | | | | | H | | | | | A | R | | | | B | | B | | | | | |
| | | | | | | | 210 | 280 | 330 | 360 | 380 | | | 385 | 385 | 360 | | 255 | | | | | | |
| 30 | | | | | | | U A | | | | R | R | | B | B | | | | B | | | | | |
| | | | | | | | 210 | 280 | 340 | 365 | 385 | 395 | 400 | | | 360 | 335 | 260 | | | | | | |
| 31 | | | | | | | | | | | | | | | | | | | B | | | | | |
| | | | | | | | 190 | 280 | 340 | 370 | 385 | 395 | 400 | 385 | 370 | 355 | 315 | 250 | | | | | | |
| | 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 | 24 | 31 | 30 | 31 | 27 | 18 | 22 | 22 | 25 | 29 | 29 | 26 | 1 | | | | | |
| MED | | | | | | J K 130 | 175 | 270 | 325 | 360 | 380 | 390 | 400 | 392 | 385 | 360 | 320 | 245 | 145 | | | | | |
| U Q | | | | | | | 192 | 280 | 340 | 370 | 385 | 395 | 405 | 400 | 390 | 365 | 328 | 255 | | | | | | |
| L Q | | | | | | | 152 | 255 | 315 | 350 | 375 | 385 | 390 | 385 | 378 | 352 | 310 | 240 | | | | | | |

MAR. 1991 FOE (0.01MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

# IONOSPHERIC DATA STATION KOKUBUNJI

MAR. 1991 FOES (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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 | E B 13 | 20 | 26 | J A 19 | E B 13 | E B 14 | E B 16 | G | G | G | G | G | G | 41 | 48 | 44 | 34 | 24 | E B 13 | E B 13 | E B 13 | J A 22 | E B 13 | J A 21 |
| 2 | J A 16 | J A 23 | J A 27 | E B 15 | E B 13 | E B 14 | E B 15 | G | G 28 | G 31 | G 31 | J A 47 | G | G | G 22 | G | 32 | 23 | J A 19 | J A 14 | E B 13 | E B 15 | E B 15 | J A 14 |
| 3 | J A 16 | E B 13 | E B 13 | E B 14 | E B 13 | E B 13 | E B 14 | G | G | G | G | G | E B 42 | G | G 27 | G 24 | J A 36 | J A 42 | J A 39 | J A 34 | J A 23 | J A 20 | 21 | E B 14 |
| 4 | E B 13 | E B 13 | E B 13 | E B 14 | E B 13 | E B 14 | G | G | G | G | G | 40 | G | G | G | G | G 30 | 23 | J A 18 | E B 14 | E B 14 | E B 14 | E B 15 | E B 14 |
| 5 | E B 14 | E B 13 | E B 13 | E B 13 | E B 13 | E B 14 | G | G | G | 37 | 39 | 38 | 40 | G 37 | G | G | G | G | E B 16 | E B 13 | E B 16 | E B 14 | E B 15 | E B 14 |
| 6 | E B 13 | E B 13 | E B 13 | E B 13 | E B 13 | E B 14 | J A 18 | 28 | G | G | G | G | G | G | G | G | G 27 | G 17 | J A 23 | J A 21 | E B 14 | E B 14 | E B 15 | E B 13 |
| 7 | E B 14 | E B 13 | E B 14 | E B 13 | E B 14 | J A 19 | 20 | G 23 | G | G | G | 42 | 41 | G | G | G | 34 | G | E B 14 | J A 19 | E B 14 | E B 15 | E B 14 | E B 14 |
| 8 | E B 14 | J A 53 | 22 | J A 21 | E B 13 | E B 13 | G | G | G | G | G | G 35 | G 33 | G | G | G | G | 27 | 29 | E B 14 | E B 14 | 20 | E B 15 | E B 14 |
| 9 | E B 13 | E B 14 | E B 15 | E B 13 | E B 13 | E B 13 | G | G | G | G | G | G | G | G | G | J A 41 | G | G | E B 16 | E B 14 | E B 13 | E B 14 | E B 14 | E B 14 |
| 10 | E B 14 | E B 13 | E B 14 | E B 13 | E B 14 | E B 15 | E B 17 | G | G | G | G 25 | 48 | 42 | 45 | G | 39 | G | G | E B 15 | E B 15 | J A 18 | E B 15 | E B 14 | E B 14 |
| 11 | E B 14 | E B 13 | E B 13 | E B 14 | E B 14 | E B 13 | G | G | G | G | 39 | G | G | G | G 24 | 43 | 44 | J A 37 | J A 25 | J A 17 | J A 17 | 25 | J A 29 | 31 |
| 12 | E B 14 | E B 13 | E B 13 | E B 13 | E B 13 | E B 14 | G | G 24 | G | G | G | G | G | G | G | G 22 | 37 | J A 28 | 16 | J A 42 | J A 25 | E B 13 | E B 14 | E B 13 |
| 13 | E B 15 | E B 13 | E B 13 | E B 13 | E B 14 | E B 13 | E B 18 | G | G | G | G | 42 | E B 90 | 41 | 39 | 37 | G | G 22 | E B 16 | E B 13 | E B 13 | E B 14 | E B 13 | E B 13 |
| 14 | E B 14 | E B 13 | J A 24 | E B 13 | E B 14 | E B 14 | G | G | G | G | G | G 38 | 41 | G 37 | G 29 | G 29 | G 27 | G 20 | E B 16 | E B 13 | E B 14 | E B 13 | E B 14 | E B 14 |
| 15 | E B 14 | E B 13 | E B 13 | E B 13 | E B 13 | E B 13 | G | G | G 27 | G | G | G | G | G | G | G | G | 25 | E B 15 | E B 14 | E B 14 | E B 14 | E B 13 | E B 14 |
| 16 | E B 13 | E B 13 | E B 12 | E B 13 | E B 13 | E B 14 | G | G | 35 | 47 | E B 45 | 41 | G 40 | G 33 | G 39 | G 34 | G 26 | 27 | 23 | J A 23 | 31 | E B 14 | E B 15 | E B 14 |
| 17 | E B 15 | 20 | E B 14 | E B 13 | E B 13 | E B 13 | G | G | G | G | 40 | G 35 | G 38 | G 37 | E B 41 | G 26 | G 22 | G 19 | E B 15 | J A 19 | 20 | J A 20 | E B 13 | E B 14 |
| 18 | E B 14 | E B 13 | E B 13 | E B 13 | E B 13 | E B 13 | G | G | G | G | G | G | G 29 | G 25 | G | G | G | G | E B 16 | 20 | E B 13 | E B 14 | E B 13 | E B 14 |
| 19 | E B 14 | E B 13 | E B 13 | E B 13 | E B 14 | E B 13 | G | G | G | G | 41 | E B 82 | G 35 | G | G 30 | G 31 | G 24 | 29 | 19 | E B 14 | J A 19 | 57 | E B 13 | E B 14 |
| 20 | E B 15 | E B 13 | E B 13 | E B 16 | E B 13 | E B 14 | G | G | G | 41 | 43 | 41 | G 37 | E B 52 | G | E B 41 | G 20 | 31 | E B 17 | E B 14 | E B 15 | E B 14 | E B 14 | 19 |
| 21 | J A 18 | E B 13 | E B 13 | E B 13 | E B 14 | E B 13 | G | G | J A 39 | 41 | 44 | 44 | G 42 | J A 44 | G 36 | G | G 27 | G 22 | J A 21 | E B 16 | E B 14 | E B 13 | E B 15 | E B 15 |
| 22 | E B 12 | E B 14 | 22 | 24 | J A 17 | J A 15 | 22 | G | G | 43 | 42 | 42 | G | G 35 | G 27 | G 21 | G | G | E B 16 | E B 15 | E B 14 | E B 14 | E B 14 | E B 13 |
| 23 | E B 14 | E B 14 | E B 12 | E B 13 | E B 13 | E B 14 | G | G | E B 46 | 39 | G 26 | E B 50 | E B 52 | E B 71 | E B 67 | G | G | 31 | 21 | 42 | J A 19 | E B 14 | E B 14 | E B 13 |
| 24 | E B 14 | E B 13 | E B 14 | E B 13 | E B 13 | E B 13 | G | G | J A 36 | 40 | E B 45 | 42 | E B 45 | 42 | 39 | G | G | G | 21 | J A 22 | J A 23 | J A 20 | E B 13 | E B 13 |
| 25 | E B 13 | E B 14 | 17 | E B 14 | E B 13 | E B 14 | G | G | 35 | 41 | J A 47 | 46 | J A 42 | J A 69 | J A 42 | G 32 | J A 36 | J A 50 | J A 35 | J A 30 | J A 13 | 20 | E B 15 | J A 19 |
| 26 | 22 | 25 | J A 21 | J A 18 | 22 | E B 14 | 20 | G | G | 36 | G | G | G 36 | 54 | 44 | 43 | 37 | J A 37 | J A 35 | J A 18 | E B 14 | E B 13 | J A 20 | J A 35 |
| 27 | J A 20 | 25 | J A 15 | E B 14 | E B 14 | J K 13 | G | G | G | 40 | 40 | 43 | G | G | J A 53 | 44 | 35 | 30 | 17 | E B 14 | J A 26 | E B 13 | E B 14 | E B 14 |
| 28 | E B 15 | 18 | 20 | 18 | 20 | E B 15 | G | G | G | 39 | G 38 | J A 48 | 46 | G 36 | G 31 | G | G | G 23 | 23 | J A 23 | E B 14 | 20 | E B 14 | J A 26 |
| 29 | E B 14 | E B 13 | E B 13 | E B 13 | E B 13 | E B 13 | G | 31 | 34 | 38 | 40 | 41 | G 39 | G | G | 39 | E B 36 | 30 | J A 52 | J A 18 | E B 14 | E B 14 | E B 13 | E B 14 |
| 30 | E B 14 | E B 13 | E B 13 | E B 14 | E B 13 | E B 14 | 25 | G | 37 | G | 41 | 41 | G | E B 42 | E B 40 | G | G | G | 20 | J A 22 | J A 20 | 41 | 20 | E B 13 |
| 31 | E B 13 | 18 | E B 15 | E B 13 | E B 13 | E B 14 | 24 | 30 | G | 45 | 43 | 43 | 45 | 43 | 39 | G | G | G | E B 17 | E B 13 | J A 48 | 32 | J A 48 | J A 44 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | E B 14 | E B 13 | E B 13 | E B 13 | E B 13 | E B 14 | G | G 24 | G 28 | G 31 | G 38 | 40 | G 42 | G 37 | G 39 | G 34 | G 30 | 23 | 18 | 16 | E B 14 | E B 14 | E B 14 | E B 14 |
| U Q | 15 | 18 | 17 | 14 | E B 14 | E B 14 | 17 | G 24 | 28 | 40 | 41 | 43 | 42 | 42 | 39 | 39 | 34 | 30 | J A 23 | J A 22 | J A 20 | 20 | 15 | J A 15 |
| L Q | E B 13 | E B 13 | E B 13 | E B 13 | E B 13 | E B 13 | G | G 24 | G 28 | G 31 | G 38 | 38 | G 40 | G 37 | G 36 | G 34 | G 30 | 23 | E B 16 | E B 14 | E B 14 | E B 14 | E B 13 | E B 14 |

MAR. 1991 FOES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

# IONOSPHERIC DATA STATION KOKUBUNJI

MAR. 1991 FBES (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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 | E B 13 | E B 13 | 16 | E B 13 | E B 13 | E B 14 | E B 16 | G | G | G | G | G | G | 41 | 48 | 43 | 33 | 23 | E B 13 | E B 13 | E B 13 | 16 | E B 13 | 17 |
| 2 | 15 | 18 | 20 | E B 15 | E B 13 | E B 14 | E B 15 | G | G 25 | G 30 | G 30 | 40 | G | G | U G 22 | G | G | G 18 | E B 14 | E B 14 | E B 13 | E B 15 | E B 15 | E B 14 |
| 3 | E B 13 | E B 13 | E B 13 | E B 14 | E B 13 | E B 13 | E B 14 | G | G | G | G | G | E B 42 | G | G 26 | G 23 | 32 | 31 | 27 | 30 | 18 | E B 13 | 16 | E B 14 |
| 4 | E B 13 | E B 13 | E B 13 | E B 14 | E B 13 | E B 14 | G | G | G | G | G | 40 | G | G | G | G | G 29 | G 20 | 16 | E B 14 | E B 14 | E B 14 | E B 15 | E B 14 |
| 5 | E B 14 | E B 13 | E B 13 | E B 13 | E B 13 | E B 14 | G | G | G | 37 | 39 | U Y 38 | U Y 40 | U G 37 | G | G | G | G | E B 16 | E B 13 | E B 16 | E B 14 | E B 15 | E B 14 |
| 6 | E B 13 | E B 13 | E B 13 | E B 13 | E B 13 | E B 14 | G | 27 | G | G | G | G | G | G | G | G | G 24 | G 17 | 16 | 17 | E B 14 | E B 14 | E B 15 | E B 13 |
| 7 | E B 14 | E B 13 | E B 14 | E B 13 | E B 14 | 16 | G | G 21 | G | G | G | 41 | 41 | G | G | G | 33 | G | E B 14 | E B 13 | E B 14 | E B 15 | E B 14 | E B 14 |
| 8 | E B 14 | 34 | E B 13 | E B 13 | E B 13 | E B 13 | G | G | G | G | G | G 34 | G 33 | G | G | G | G | 26 | 19 | E B 14 | E B 14 | E B 14 | E B 15 | E B 14 |
| 9 | E B 13 | E B 14 | E B 15 | E B 13 | E B 13 | E B 13 | G | G | G | G | G | G | G | G | G | G | G | G | E B 16 | E B 14 | E B 13 | E B 14 | E B 14 | E B 14 |
| 10 | E B 14 | E B 13 | E B 14 | E B 13 | E B 14 | E B 15 | E B 17 | G | G | G | U G 25 | 43 | 41 | 43 | G | 37 | G | G | E B 15 | E B 15 | E B 14 | E B 15 | E B 14 | E B 14 |
| 11 | E B 14 | E B 13 | E B 13 | E B 14 | E B 14 | E B 13 | G | G | G | G | 38 | G | G | G | G 24 | 40 | 40 | 26 | 21 | E B 14 | E B 13 | 17 | 26 | 23 |
| 12 | E B 14 | E B 13 | E B 13 | E B 13 | E B 13 | E B 14 | G | G 23 | G | G | G | G | G | G | G | G 21 | 34 | 24 | 15 | 39 | 20 | E B 13 | E B 14 | E B 13 |
| 13 | E B 15 | E B 13 | E B 13 | E B 13 | E B 14 | E B 13 | E B 18 | G | G | G | G | 41 | E B 90 | 40 | G | 37 | G | G 21 | E B 16 | E B 13 | E B 13 | E B 14 | E B 13 | E B 13 |
| 14 | E B 14 | E B 13 | 18 | E B 13 | E B 14 | E B 14 | G | G | G | G | G | G 36 | 41 | G 34 | G 29 | G 29 | G 26 | G 19 | E B 16 | E B 13 | E B 14 | E B 13 | E B 14 | E B 14 |
| 15 | E B 14 | E B 13 | E B 13 | E B 13 | E B 13 | E B 13 | G | G | G 25 | G | G | G | G | G | G | G | G | 24 | E B 15 | E B 14 | E B 14 | E B 14 | E B 13 | E B 14 |
| 16 | E B 13 | E B 13 | E B 12 | E B 13 | E B 13 | E B 14 | G | G | G | G | E B 45 | U Y 40 | G 34 | G 33 | G 36 | G 33 | G 24 | 27 | E B 12 | E B 14 | 21 | E B 14 | E B 15 | E B 14 |
| 17 | E B 15 | E B 14 | E B 14 | E B 13 | E B 13 | E B 13 | G | G | G | G | U Y 39 | G 34 | G 37 | G 37 | E B 41 | G 26 | G 20 | G 18 | E B 15 | E B 14 | E B 14 | 17 | E B 13 | E B 14 |
| 18 | E B 14 | E B 13 | E B 13 | E B 13 | E B 13 | E B 13 | G | G | G | G | G | G | G 29 | G 25 | G | G | G | G | E B 16 | E B 14 | E B 13 | E B 14 | E B 13 | E B 14 |
| 19 | E B 14 | E B 13 | E B 13 | E B 13 | E B 14 | E B 13 | G | G | G | G | 41 | E B 82 | G 35 | G | U G 30 | U G 31 | G 23 | 27 | 17 | E B 14 | E B 14 | 48 | E B 13 | E B 14 |
| 20 | E B 15 | E B 13 | E B 13 | E B 16 | E B 13 | E B 14 | G | G | G | 41 | 41 | U Y 41 | G 36 | E B 52 | G | E B 41 | G 20 | G 21 | E B 17 | E B 14 | E B 15 | E B 14 | E B 14 | E B 14 |
| 21 | E B 13 | E B 13 | E B 13 | E B 13 | E B 14 | E B 13 | G | G | G | 40 | 44 | 43 | G 41 | 41 | G 34 | G | G 24 | G 20 | 17 | E B 16 | E B 14 | E B 13 | E B 15 | E B 15 |
| 22 | E B 12 | E B 14 | E B 16 | E B 13 | E B 13 | E B 13 | 20 | G | G | 40 | G 37 | 41 | G | G 35 | G 27 | G 21 | G | G | E B 16 | E B 15 | E B 14 | E B 14 | E B 14 | E B 13 |
| 23 | E B 14 | E B 14 | E B 12 | E B 13 | E B 13 | E B 14 | G | G | E B 46 | 39 | U G 26 | E B 50 | E B 52 | E B 71 | E B 67 | G | G | 30 | 20 | 29 | E B 14 | E B 14 | E B 14 | E B 13 |
| 24 | E B 14 | E B 13 | E B 14 | E B 13 | E B 13 | E B 13 | G | G | G | 39 | E B 45 | U Y 42 | E B 45 | 42 | U Y 39 | G | G | G | 19 | 17 | 20 | 16 | E B 13 | E B 13 |
| 25 | E B 13 | E B 14 | E B 14 | E B 14 | E B 13 | E B 14 | G | G | 34 | 39 | 42 | 43 | 42 | 43 | 40 | G 31 | G 23 | 30 | 25 | 23 | E B 14 | E B 13 | E B 15 | E B 13 |
| 26 | 17 | 17 | E B 13 | 16 | E B 13 | E B 14 | 19 | G | G | 36 | G | G | U G 36 | 45 | 43 | 42 | 35 | 32 | 34 | E B 13 | E B 14 | E B 13 | 17 | 26 |
| 27 | 15 | 16 | E B 13 | E B 14 | E B 14 | K 13 | G | G | G | 38 | 39 | 41 | G | G | 47 | 41 | 34 | 27 | G | E B 14 | 18 | E B 13 | E B 14 | E B 14 |
| 28 | E B 15 | E B 13 | E B 14 | E B 13 | E B 13 | E B 15 | G | G | G | 38 | U G 38 | 42 | 42 | G 35 | G 31 | G | G | G 20 | 17 | 17 | E B 14 | E B 14 | E B 14 | E B 14 |
| 29 | E B 14 | E B 13 | E B 13 | E B 13 | E B 13 | E B 13 | G | 30 | 34 | 37 | 39 | 41 | U G 39 | G | G | G | E B 36 | 27 | 34 | 15 | E B 14 | E B 14 | E B 13 | E B 14 |
| 30 | E B 14 | E B 13 | E B 13 | E B 14 | E B 13 | E B 14 | G 21 | G | 36 | G | 41 | 41 | G | E B 42 | E B 40 | G | G | G | 18 | 17 | 17 | 39 | E B 14 | E B 13 |
| 31 | E B 13 | E B 13 | E B 15 | E B 13 | E B 13 | E B 14 | 23 | 29 | G | 43 | 41 | 42 | 44 | 43 | 39 | G | G | G | E B 17 | E B 13 | 33 | 24 | 39 | 38 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | E B 14 | E B 13 | E B 13 | E B 13 | E B 13 | E B 14 | G 21 | G 23 | G 25 | G 30 | G 37 | 40 | G 41 | G 37 | G 36 | G 33 | G 29 | G 21 | 16 | E B 14 | E B 14 | E B 14 | E B 14 | E B 14 |
| U O | E B 14 | 14 | E B 14 | E B 14 | E B 14 | E B 14 | G 21 | G 23 | 25 | 38 | 41 | 42 | 41 | 42 | 39 | 33 | 32 | 27 | 19 | 17 | 16 | 15 | 15 | 14 |
| L O | E B 13 | E B 13 | E B 13 | E B 13 | E B 13 | E B 13 | E B 21 | G 23 | G 25 | G 30 | G 37 | G 36 | G 39 | G 37 | G 34 | G 33 | G 26 | G 21 | E B 15 | E B 14 | E B 14 | E B 14 | E B 13 | E B 13 |

MAR. 1991 FBES (0.1MHZ) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

# IONOSPHERIC DATA STATION KOKUBUNJI

MAR. 1991 FMIN (0.1MHZ) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

| H / D | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 13 | 13 | 13 | 13 | 13 | 14 | 16 | 15 | 19 | 18 | 21 | 23 | 32 | 27 | 40 | 25 | 17 | 15 | 13 | 13 | 13 | 12 | 13 | 13 |
| 2 | 13 | 16 | 14 | 15 | 13 | 14 | 15 | 13 | 16 | 21 | 19 | 22 | 27 | 26 | 18 | 17 | 18 | 15 | 14 | 14 | 13 | 15 | 15 | 14 |
| 3 | 13 | 13 | 13 | 14 | 13 | 13 | 14 | 14 | 17 | 18 | 24 | 27 | 42 | 31 | 22 | 18 | 15 | 15 | 14 | 15 | 13 | 13 | 13 | 14 |
| 4 | 13 | 13 | 13 | 14 | 13 | 14 | 13 | 15 | 16 | 21 | 33 | 35 | 33 | 32 | 27 | 30 | 17 | 13 | 13 | 14 | 14 | 14 | 15 | 14 |
| 5 | 14 | 13 | 13 | 13 | 13 | 14 | 13 | 15 | 18 | 27 | 28 | 35 | 35 | 34 | 32 | 18 | 20 | 16 | 16 | 13 | 16 | 14 | 15 | 14 |
| 6 | 13 | 13 | 13 | 13 | 13 | 14 | 17 | 16 | 17 | 32 | 25 | 24 | 33 | 26 | 27 | 18 | 16 | 14 | 13 | 14 | 14 | 14 | 15 | 13 |
| 7 | 14 | 13 | 14 | 13 | 14 | 13 | 13 | 15 | 18 | 18 | 21 | 26 | 28 | 22 | 21 | 24 | 18 | 18 | 14 | 13 | 14 | 15 | 14 | 14 |
| 8 | 14 | 14 | 13 | 13 | 13 | 13 | 13 | 13 | 17 | 18 | 22 | 25 | 23 | 34 | 30 | 20 | 17 | 16 | 13 | 14 | 14 | 14 | 15 | 14 |
| 9 | 13 | 14 | 15 | 13 | 13 | 13 | 13 | 16 | 17 | 18 | 22 | 24 | 33 | 32 | 24 | 18 | 21 | 17 | 16 | 14 | 13 | 14 | 14 | 14 |
| 10 | 14 | 13 | 14 | 13 | 14 | 15 | 17 | 15 | 17 | 18 | 21 | 20 | 20 | 24 | 24 | 20 | 18 | 16 | 15 | 15 | 14 | 15 | 14 | 14 |
| 11 | 14 | 13 | 13 | 14 | 14 | 13 | 13 | 16 | 17 | 21 | 22 | 21 | 20 | 25 | 21 | 18 | 16 | 16 | 15 | 14 | 13 | 13 | 13 | 14 |
| 12 | 14 | 13 | 13 | 13 | 13 | 14 | 14 | 16 | 18 | 19 | 27 | 30 | 34 | 32 | 27 | 16 | 16 | 13 | 13 | 15 | 14 | 13 | 14 | 13 |
| 13 | 15 | 13 | 13 | 13 | 14 | 13 | 18 | 15 | 16 | 17 | 23 | 23 | 90 | 33 | 19 | 20 | 17 | 15 | 16 | 13 | 13 | 14 | 13 | 13 |
| 14 | 14 | 13 | 14 | 13 | 14 | 14 | 14 | 14 | 17 | 18 | 23 | 24 | 28 | 26 | 22 | 18 | 14 | 13 | 16 | 13 | 14 | 13 | 14 | 14 |
| 15 | 14 | 13 | 13 | 13 | 13 | 13 | 14 | 13 | 16 | 20 | 22 | E S 24 | 32 | 37 | 31 | 19 | 17 | 14 | 15 | 14 | 14 | 14 | 13 | 14 |
| 16 | 13 | 13 | 12 | 13 | 13 | 14 | 13 | 14 | 16 | 17 | 45 | 28 | 29 | 27 | 24 | 19 | 16 | 14 | 12 | 14 | 14 | 14 | 15 | 14 |
| 17 | 15 | 14 | 14 | 13 | 13 | 13 | 13 | 22 | 17 | 21 | 23 | 33 | 32 | 30 | 41 | 22 | 15 | 14 | 15 | 14 | 14 | 14 | 13 | 14 |
| 18 | 14 | 13 | 13 | 13 | 13 | 13 | 13 | 16 | 20 | 18 | 22 | 25 | 26 | 22 | 19 | 21 | 17 | 16 | 16 | 14 | 13 | 14 | 13 | 14 |
| 19 | 14 | 13 | 13 | 13 | 14 | 13 | 14 | 14 | 18 | 23 | 22 | 82 | 33 | 37 | 24 | 21 | 17 | 17 | 14 | 14 | 14 | 13 | 13 | 14 |
| 20 | 15 | 13 | 13 | 16 | 13 | 14 | 15 | 16 | 20 | 31 | 23 | 21 | 23 | 52 | 31 | 41 | 15 | 13 | 17 | 14 | 15 | 14 | 14 | 14 |
| 21 | 13 | 13 | 13 | 13 | 14 | 13 | 15 | 16 | 18 | 19 | 38 | 30 | 33 | 27 | 20 | 28 | 18 | 14 | 13 | 16 | 14 | 13 | 15 | 15 |
| 22 | 12 | 14 | 16 | 13 | 13 | 13 | 14 | 17 | 16 | 23 | 30 | 33 | 32 | 24 | 23 | 20 | 18 | 14 | 16 | 15 | 14 | 14 | 14 | 13 |
| 23 | 14 | 14 | 12 | 13 | 13 | 14 | 14 | 15 | 46 | 20 | 22 | 50 | 52 | 71 | 67 | 40 | 26 | 16 | 15 | 14 | 14 | 14 | 14 | 13 |
| 24 | 14 | 13 | 14 | 13 | 13 | 13 | 14 | 14 | 18 | 23 | 45 | 37 | 45 | 33 | 24 | 20 | 17 | 15 | 14 | 14 | 14 | 13 | 13 | 13 |
| 25 | 13 | 14 | 14 | 14 | 13 | 14 | 15 | 17 | 18 | 21 | 24 | 32 | 27 | 31 | 21 | 21 | 16 | 13 | 12 | 13 | 14 | 13 | 15 | 13 |
| 26 | 13 | 13 | 13 | 13 | 13 | 14 | 14 | 16 | 19 | 18 | 24 | 28 | 32 | 28 | 21 | 18 | 18 | 16 | 14 | 13 | 14 | 13 | 13 | 12 |
| 27 | 13 | 13 | 13 | 14 | 14 | 13 | 14 | 15 | 15 | 20 | 20 | 22 | 25 | 23 | 25 | 20 | 15 | 14 | 13 | 14 | 13 | 13 | 14 | 14 |
| 28 | 15 | 13 | 14 | 13 | 13 | 15 | 16 | 17 | 20 | 30 | 31 | 20 | 25 | 27 | 20 | 18 | 18 | 15 | 14 | 14 | 14 | 14 | 14 | 14 |
| 29 | 14 | 13 | 13 | 13 | 13 | 13 | 14 | 15 | 18 | 18 | 20 | 26 | 31 | 22 | 20 | 18 | 36 | 16 | 16 | 13 | 14 | 14 | 13 | 14 |
| 30 | 14 | 13 | 13 | 14 | 13 | 14 | 14 | 17 | 17 | 20 | 23 | 26 | 22 | 42 | 40 | 23 | 21 | 17 | 16 | 13 | 13 | 14 | 14 | 13 |
| 31 | 13 | 13 | 15 | 13 | 13 | 14 | 14 | 15 | 20 | 20 | 22 | 25 | 33 | 27 | 25 | 21 | 20 | 15 | 17 | 13 | 14 | 13 | 15 | 14 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | 14 | 13 | 13 | 13 | 13 | 14 | 14 | 15 | 17 | 20 | 23 | 26 | 32 | 28 | 24 | 20 | 17 | 15 | 14 | 14 | 14 | 14 | 14 | 14 |
| U Q | 14 | 13 | 14 | 14 | 14 | 14 | 15 | 16 | 18 | 21 | 27 | 32 | 33 | 33 | 30 | 22 | 18 | 16 | 16 | 14 | 14 | 14 | 15 | 14 |
| L Q | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 14 | 17 | 18 | 22 | 23 | 26 | 26 | 21 | 18 | 16 | 14 | 13 | 13 | 13 | 13 | 13 | 13 |

# IONOSPHERIC DATA STATION KOKUBUNJI

MAR. 1991 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9H)

LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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 | 270 | 250 | 240 | 240 | 250 | 260 | 270 | 290 | 300 | 290 | 280 | 270 | U R 270 | R 270 | 260 | 260 | 260 | 270 | 280 | 270 | 270 | 270 | 280 | 260 |
| 2 | 260 | 250 | 260 | 280 | 260 | 270 | 260 | 290 | 300 | R 290 | 280 | I R 280 | U R 280 | 270 | 270 | 260 | 270 | 270 | 280 | 280 | 260 | 270 | 280 | 280 |
| 3 | 280 | 270 | 260 | 260 | 280 | 280 | 290 | 320 | 310 | 300 | 290 | 270 | 270 | 270 | 270 | 270 | 270 | 280 | 280 | 270 | 280 | 280 | 290 | 290 |
| 4 | 280 | 280 | 270 | 280 | 310 | 280 | 300 | 310 | 300 | 300 | 280 | 280 | 270 | 270 | 270 | 270 | 270 | 280 | 270 | 280 | 280 | 280 | 280 | 290 |
| 5 | 300 | 290 | 280 | 280 | 270 | 260 | 290 | 320 | 310 | 310 | 280 | 280 | 270 | 260 | 260 | 270 | 270 | 270 | 280 | 270 | 250 | 270 | 270 | 270 |
| 6 | 260 | 240 | 230 | 250 | 260 | 250 | 260 | 310 | 300 | 300 | R 290 | 280 | 270 | 260 | 260 | 260 | 270 | 270 | 280 | 280 | 270 | 260 | 260 | 260 |
| 7 | 280 | 280 | 270 | 250 | 230 | 250 | 280 | 310 | 300 | 290 | 280 | 280 | R 270 | R 270 | 270 | 270 | 270 | 280 | 270 | R 280 | 280 | 270 | 270 | 260 |
| 8 | 250 | S 270 | 280 | 280 | 250 | F 240 | S 270 | 310 | 290 | 290 | 290 | R 280 | 270 | 260 | 260 | 270 | 270 | 270 | 280 | 270 | R 280 | 270 | 260 | 280 |
| 9 | 300 | 300 | 280 | 250 | 240 | 240 | 290 | 310 | 300 | 300 | 290 | 270 | 270 | 260 | 260 | 260 | 260 | 260 | R 270 | 260 | 260 | 270 | 270 | 280 |
| 10 | 270 | 260 | 260 | 260 | 260 | 250 | 260 | 300 | 300 | 300 | 280 | 270 | 260 | 260 | 250 | 250 | 260 | 260 | 260 | 260 | 260 | 260 | 260 | 270 |
| 11 | 280 | 270 | 270 | 260 | 260 | 270 | 280 | 310 | 310 | 290 | 270 | 280 | 270 | 260 | 260 | 260 | 270 | 270 | 280 | 270 | 260 | 260 | 270 | 290 |
| 12 | 290 | 280 | 290 | 290 | 260 | 260 | 300 | 330 | 300 | 290 | 290 | 270 | 270 | 260 | 260 | 260 | 260 | 260 | 270 | 270 | 260 | 270 | 250 | 260 |
| 13 | 280 | 270 | 250 | 250 | 240 | 250 | 280 | 300 | 300 | 290 | 270 | 270 | 260 | 260 | 260 | 260 | 250 | 260 | 280 | 270 | 280 | 260 | 250 | 260 |
| 14 | 260 | 270 | 280 | 260 | 250 | V 250 | 290 | R 300 | 300 | 280 | 280 | R 270 | R 270 | 260 | 260 | 260 | 270 | 270 | 270 | 280 | 260 | 270 | 270 | 280 |
| 15 | 290 | 270 | 270 | 260 | 260 | 260 | 280 | 300 | 300 | 290 | 280 | 270 | 260 | 260 | 250 | 260 | 260 | 260 | 270 | 270 | 260 | 270 | 270 | 270 |
| 16 | 280 | 290 | 240 | 250 | 270 | 280 | 300 | 300 | 300 | 280 | 280 | 270 | 260 | 250 | 250 | 250 | 260 | 260 | R 270 | 260 | 270 | 260 | S 270 | 280 |
| 17 | 280 | 280 | 290 | 280 | 270 | 230 | 270 | 310 | 290 | 280 | 260 | 260 | 250 | 250 | 240 | 240 | 250 | 260 | 270 | 270 | 250 | 260 | 260 | J R 280 |
| 18 | 290 | 280 | 270 | 280 | 270 | 260 | 290 | 310 | 300 | 280 | 280 | 260 | 250 | 250 | 250 | 240 | 250 | 260 | 260 | 270 | 250 | 270 | S 270 | 270 |
| 19 | 290 | 280 | 280 | 280 | 260 | 270 | 300 | 300 | 300 | 280 | 270 | 260 | 260 | 250 | 250 | 250 | 250 | 260 | 270 | 270 | 260 | 260 | 260 | 270 |
| 20 | 270 | 260 | 240 | 230 | 240 | F 250 | S 280 | 290 | 290 | 280 | 270 | R 270 | 260 | R 260 | 250 | 250 | 250 | 260 | 260 | R 270 | 260 | 250 | 260 | 260 |
| 21 | 270 | 260 | 260 | 250 | 240 | 250 | 280 | 300 | R 300 | 290 | 280 | R 270 | 260 | 260 | 250 | 260 | 260 | 260 | 270 | R 270 | 270 | 260 | 260 | 220 |
| 22 | 210 | 240 | 260 | 260 | 230 | 230 | 250 | 290 | 280 | 270 | 270 | 260 | 250 | 250 | 250 | 240 | 250 | 260 | 270 | 260 | 250 | 260 | 260 | 250 |
| 23 | 250 | 270 | 250 | 260 | 260 | 260 | 280 | 300 | 290 | 280 | 260 | 260 | 250 | 250 | 250 | 250 | 250 | 260 | 260 | 260 | 250 | 250 | 250 | 270 |
| 24 | 280 | 270 | 280 | 260 | 250 | 250 | 290 | 300 | 280 | 280 | 270 | 260 | 250 | 250 | 240 | 220 | 230 | 250 | 250 | 240 | 230 | 220 | 230 | 250 |
| 25 | 230 | 240 | 240 | 230 | 240 | 230 | 260 | 280 | 280 | 280 | 240 | 250 | 250 | U R 240 | 240 | 250 | 250 | 250 | 260 | 260 | 250 | 250 | 230 | 240 |
| 26 | 220 | 230 | 230 | 230 | S 230 | 240 | 260 | 260 | 280 | 280 | 260 | 270 | 260 | 260 | 250 | 250 | 260 | 260 | 270 | 280 | 250 | 230 | 230 | 220 |
| 27 | 210 | 240 | 230 | 250 | 240 | S 240 | 250 | 290 | 290 | 290 | 270 | 280 | 270 | 270 | 270 | 270 | 270 | 270 | 280 | R 290 | 270 | 260 | 260 | 250 |
| 28 | 240 | 240 | 240 | 250 | 240 | U R 250 | 280 | 300 | 290 | 300 | 290 | 270 | 270 | R 280 | 270 | 270 | 270 | 280 | 280 | 280 | 260 | 260 | 260 | 270 |
| 29 | 260 | 250 | 270 | 250 | 250 | 250 | 300 | 310 | 290 | 290 | 280 | 280 | 280 | 270 | 270 | 270 | 280 | 290 | 280 | 290 | 250 | 250 | 270 | 270 |
| 30 | 290 | 300 | 300 | 280 | 260 | 260 | 310 | 300 | 310 | 290 | 270 | 270 | 270 | 260 | 260 | 270 | 270 | 270 | 270 | R 280 | 260 | 260 | 260 | 250 |
| 31 | 260 | 270 | 230 | 230 | 230 | 220 | 270 | 280 | 280 | 270 | 270 | 270 | 280 | 270 | 270 | 280 | 280 | 290 | 290 | 270 | 240 | 240 | 250 | 270 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | 270 | 270 | 260 | 260 | 250 | 250 | 280 | 300 | 300 | 290 | 280 | 270 | 270 | 260 | 260 | 260 | 260 | 260 | 270 | 270 | 260 | 260 | 260 | 270 |
| U Q | 280 | 280 | 280 | 280 | 260 | 260 | 290 | 310 | 300 | 290 | 280 | 280 | 270 | 270 | 270 | 270 | 270 | 270 | 280 | 280 | 270 | 270 | 270 | 280 |
| L Q | 260 | 250 | 240 | 250 | 240 | 240 | 270 | 290 | 290 | 280 | 270 | 270 | 260 | 250 | 250 | 250 | 250 | 260 | 270 | 270 | 250 | 260 | 260 | 260 |

MAR. 1991 M(3000)F2 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

# IONOSPHERIC DATA STATION KOKUBUNJI

MAR. 1991 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9H)

LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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 | | | | | | | | | | | | L | L | L | L | L | | | | | | | | |
| 2 | | | | | | | | | | | | L | L | L | L | L | L | | | | | | | |
| 3 | | | | | | | | | | | L | | | U L 300 | | L | L | | | | | | | |
| 4 | | | | | | | | | | L | L | L | L | L | L | | | | | | | | | |
| 5 | | | | | | | | | | | | L | L | L | L | | | | | | | | | |
| 6 | | | | | | | | | | | L | L | | | L | L | | | | | | | | |
| 7 | | | | | | | | | | | L | L | L | L | L | L | L | | | | | | | |
| 8 | | | | | | | | | | | L | L | L | | L | L | | | | | | | | |
| 9 | | | | | | | | | | | L | | | L | L | L | | L | | | | | | |
| 10 | | | | | | | | | | L | | | L | L | L | L | | | | | | | | |
| 11 | | | | | | | | | | | | L | L | L | L | | | | | | | | | |
| 12 | | | | | | | | | | L | L | L | L | L | L | L | | | | | | | | |
| 13 | | | | | | | | | | L | L | | B | U L 300 | L | L | L | | | | | | | |
| 14 | | | | | | | | | L | | | L | L | L | L | L | | | | | | | | |
| 15 | | | | | | | | | | | | L | L | L | L | L | | | | | | | | |
| 16 | | | | | | | | | | | | L | L | L | L | L | L | | | | | | | |
| 17 | | | | | | | | | | | | L | L | L | L | L | L | | | | | | | |
| 18 | | | | | | | | | | | L | L | L | L | U L 300 | L | L | | | | | | | |
| 19 | | | | | | | | | | | | B | L | U L 300 | L 300 | L | L | | | | | | | |
| 20 | | | | | | | | | | | L | L | L | L | L 300 | L | L | | | | | | | |
| 21 | | | | | | | | | | | | L | L | L | L | L | L | | | | | | | |
| 22 | | | | | | | | | | | L | L | L | U L 300 | L | L 300 | L | | | | | | | |
| 23 | | | | | | | | | | | L | L | L | L | L | L | L | | | | | | | |
| 24 | | | | | | | | | | L | | L | L | L | L | U L 200 | L | | | | | | | |
| 25 | | | | | | | | | | | L | U L 300 | L | U L 300 | 300 | L | L | | | | | | | |
| 26 | | | | | | | | | | L | L | L | L | L | L | L | | | | | | | | |
| 27 | | | | | | | | | | | L | L | L | L | L | L | | | | | | | | |
| 28 | | | | | | | | | | | L | L | L | L | L | L | L | | | | | | | |
| 29 | | | | | | | | | | | | L | | L | L | L | | | | | | | | |
| 30 | | | | | | | | | | L | L | | | L | L | L | L | | | | | | | |
| 31 | | | | | | | | | | L | L | L | L | L | L | L | L | | | | | | | |
| | 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 | | 5 | 4 | 2 | | | | | | | | |
| MED | | | | | | | | | | | | U L 300 | | U L 300 | L 300 | L 250 | | | | | | | | |
| U Q | | | | | | | | | | | | | | U L 300 | L 300 | | | | | | | | | |
| L Q | | | | | | | | | | | | | | U L 300 | 300 | | | | | | | | | |

MAR. 1991 M(3000)F1 (0.01) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

# IONOSPHERIC DATA STATION KOKUBUNJI

MAR. 1991 H'F2 (KM) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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 | | | | | | | | | | | | 310 | 315 | 335 | 350 | L 330 | | | | | | | | |
| 2 | | | | | | | | | | | | 280 | 270 | L 340 | 315 | L 325 | L 310 | | | | | | | |
| 3 | | | | | | | | | | | 260 | | | 315 | | 305 | L 285 | | | | | | | |
| 4 | | | | | | | | | | 255 | L 315 | 280 | L 325 | L 320 | L 310 | | | | | | | | | |
| 5 | | | | | | | | | | | | 305 | 320 | 330 | L 330 | | | | | | | | | |
| 6 | | | | | | | | | | | 255 | 305 | | | 350 | L 335 | | | | | | | | |
| 7 | | | | | | | | | | | 300 | L 300 | L 320 | 300 | 315 | L 320 | L 300 | | | | | | | |
| 8 | | | | | | | | | | | 305 | 310 | 330 | | 340 | 320 | | | | | | | | |
| 9 | | | | | | | | | | | 260 | | | 350 | 340 | 350 | | L 310 | | | | | | |
| 10 | | | | | | | | | | 255 | | | 350 | L 325 | 355 | L 340 | | | | | | | | |
| 11 | | | | | | | | | | | | L 300 | L 305 | 355 | 325 | | | | | | | | | |
| 12 | | | | | | | | | | 260 | 255 | L 315 | L 315 | L 360 | 335 | L 320 | | | | | | | | |
| 13 | | | | | | | | | | 280 | L 320 | | B | 335 | 340 | L 335 | U L 330 | | | | | | | |
| 14 | | | | | | | | | 240 | | | L 315 | 310 | 350 | 340 | 355 | | | | | | | | |
| 15 | | | | | | | | | | | | 305 | L 350 | 350 | L 360 | 350 | | | | | | | | |
| 16 | | | | | | | | | | | | 315 | L 340 | 355 | 355 | L 360 | L 325 | | | | | | | |
| 17 | | | | | | | | | | | | L 325 | 360 | 365 | 370 | L 360 | L 355 | | | | | | | |
| 18 | | | | | | | | | | | L 305 | L 340 | 365 | 370 | 370 | 360 | L 335 | | | | | | | |
| 19 | | | | | | | | | | | | E B 320 | 360 | 370 | 370 | L 360 | 355 | | | | | | | |
| 20 | | | | | | | | | | | L 300 | L 320 | 360 | 365 | 360 | 355 | 355 | | | | | | | |
| 21 | | | | | | | | | | | | L 310 | L 345 | 350 | 360 | 355 | L 345 | | | | | | | |
| 22 | | | | | | | | | | | 305 | 350 | L 360 | 365 | 370 | 375 | 335 | | | | | | | |
| 23 | | | | | | | | | | | U L 355 | 355 | 355 | L 380 | 380 | 360 | 355 | | | | | | | |
| 24 | | | | | | | | | | 310 | | L 340 | 370 | 360 | 385 | L 465 | U L 400 | | | | | | | |
| 25 | | | | | | | | | | | L 380 | 400 | 385 | 390 | 410 | 365 | L 330 | | | | | | | |
| 26 | | | | | | | | | | L 300 | L 340 | 280 | 355 | 360 | L 360 | 355 | | | | | | | | |
| 27 | | | | | | | | | | | 315 | 290 | 335 | 320 | 305 | 325 | | | | | | | | |
| 28 | | | | | | | | | | | 240 | L 310 | 320 | 310 | 315 | 310 | 310 | | | | | | | |
| 29 | | | | | | | | | | | | 285 | | 330 | 315 | 310 | | | | | | | | |
| 30 | | | | | | | | | | 260 | L 305 | | | L 335 | 335 | 325 | 310 | | | | | | | |
| 31 | | | | | | | | | | L 325 | L 310 | 305 | 310 | L 340 | L 315 | L 305 | 255 | | | | | | | |
| | 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 | 8 | 18 | 26 | 25 | 29 | 30 | 28 | 17 | 1 | | | | | | |
| MED | | | | | | | | | 240 | 270 | 305 | 310 | 340 | 350 | 345 | 345 | L 330 | L 310 | | | | | | |
| U Q | | | | | | | | | | L 305 | L 315 | 320 | 360 | 362 | 360 | 360 | 355 | | | | | | | |
| L Q | | | | | | | | | | 258 | 260 | 300 | 318 | 330 | 325 | 322 | 310 | | | | | | | |

MAR. 1991 H'F2 (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

# IONOSPHERIC DATA STATION KOKUBUNJI

MAR. 1991 H'F (KM) 135°E MEAN TIME (G.M.T. + 9H)

LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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 | 280 | 300 | 330 | 325 | 300 | 275 | 285 | 240 | 240 | 225 | 225 | 220 | 230 | 230 | 235 | A 250 | A 240 | 240 | 250 | 225 | 250 | 270 | 260 | 300 |
| 2 | 305 | 315 | 310 | 260 | 215 | 250 | 275 | 230 | 235 | 225 | 230 | 225 | 225 | 220 | 225 | 235 | 240 | 240 | 240 | 235 | 250 | 275 | 260 | 250 |
| 3 | 265 | 265 | 280 | 260 | 230 | 250 | 260 | 230 | 220 | 225 | 220 | 230 | H 230 | 235 | 240 | 230 | 240 | 245 | 250 | 255 | 260 | 240 | 240 | 225 |
| 4 | 240 | 250 | 270 | 265 | 225 | 250 | 260 | 220 | 230 | 230 | 230 | 225 | 230 | 225 | 235 | 250 | 250 | 240 | 250 | 250 | 255 | 250 | 260 | 260 |
| 5 | 240 | 225 | 250 | 260 | 265 | 300 | 275 | 225 | 225 | 230 | 230 | 230 | 230 | 235 | 240 | 245 | 250 | 250 | 240 | 235 | 295 | 245 | 265 | 270 |
| 6 | 265 | 320 | 350 | 300 | 250 | 280 | 305 | 245 | 245 | 235 | H 210 | H 230 | 225 | 230 | 225 | 240 | 240 | 260 | 240 | 235 | 240 | 275 | 285 | 285 |
| 7 | 260 | 230 | 255 | 320 | 385 | 335 | 265 | 230 | 225 | 230 | 220 | 225 | 240 | 230 | 235 | 235 | 235 | 240 | 245 | 250 | 255 | 215 | 265 | 280 |
| 8 | 300 | A 310 | 275 | 230 | 305 | 330 | 300 | 230 | 235 | 235 | 220 | H 215 | H 230 | 240 | 225 | 230 | 245 | 255 | 240 | 245 | 255 | 250 | 285 | 270 |
| 9 | 240 | 225 | 250 | 285 | 365 | 350 | 265 | 230 | 230 | 230 | 230 | 235 | 235 | 240 | 230 | 240 | 245 | 240 | 250 | 255 | 295 | 290 | 250 | 265 |
| 10 | 265 | 285 | 285 | 245 | 250 | 295 | 295 | 245 | 240 | 235 | 235 | 230 | H 230 | 235 | 235 | 245 | 240 | 240 | 250 | 265 | 290 | 290 | 270 | 270 |
| 11 | 265 | 270 | 270 | 270 | 255 | 270 | 265 | 230 | 230 | 230 | H 230 | 220 | 220 | 230 | 230 | 250 | 245 | 245 | 240 | 250 | 250 | 265 | A 295 | 270 |
| 12 | 255 | 260 | 250 | 235 | 245 | 295 | 265 | 230 | 225 | 225 | H 220 | H 205 | H 210 | H 235 | H 220 | 235 | 240 | 255 | 260 | A 275 | 270 | 260 | 275 | 305 |
| 13 | 270 | 270 | 280 | 280 | 335 | 320 | 265 | 230 | 230 | 230 | 225 | 240 | B | H 235 | 240 | 230 | 245 | 265 | 265 | 250 | 225 | 225 | 270 | 290 |
| 14 | 305 | 280 | 275 | 290 | 255 | 300 | 250 | 230 | 210 | H 210 | 225 | 220 | 225 | 235 | 230 | 240 | 240 | 245 | 255 | 245 | 280 | 270 | 255 | 260 |
| 15 | 250 | 260 | 260 | 270 | 290 | 290 | 265 | 230 | 230 | 230 | H 225 | 230 | 230 | 240 | H 235 | 230 | 240 | 250 | 255 | 255 | 275 | 275 | 270 | 280 |
| 16 | 270 | 250 | 305 | 315 | 260 | 245 | 255 | 235 | 240 | 225 | 240 | 225 | 230 | 235 | 230 | 235 | 240 | 255 | 255 | 265 | 275 | 280 | 290 | 270 |
| 17 | 260 | 260 | 250 | 255 | 240 | 360 | 280 | 230 | 230 | 230 | 230 | H 215 | H 220 | 230 | 230 | 235 | 250 | 260 | 265 | 250 | 265 | 295 | 290 | 270 |
| 18 | 255 | 255 | 260 | 265 | 270 | 285 | 265 | 230 | 230 | 230 | H 225 | H 210 | 225 | 235 | 235 | 240 | 250 | 255 | 250 | 260 | 280 | 280 | 265 | 275 |
| 19 | 260 | 250 | 255 | 245 | 245 | 270 | 260 | 225 | 235 | 235 | 230 | B | 240 | 240 | 235 | 235 | 245 | 255 | 260 | 260 | 265 | A 330 | 290 | 285 |
| 20 | 280 | 290 | 310 | 330 | 340 | 330 | 265 | 240 | 230 | 230 | 230 | 220 | 230 | 245 | 225 | 245 | 250 | 260 | 265 | 250 | 260 | 285 | 300 | 300 |
| 21 | 275 | 260 | 255 | 255 | 295 | 315 | 260 | 230 | 230 | 230 | 225 | 220 | 230 | 230 | 225 | 240 | 240 | 255 | 260 | 265 | 265 | 260 | 270 | 330 |
| 22 | 430 | 325 | 265 | 255 | 315 | 350 | 275 | 250 | 230 | 230 | 230 | 230 | 225 | 235 | 230 | 240 | 245 | 270 | 255 | 230 | 245 | 275 | 280 | 295 |
| 23 | 310 | 280 | 280 | 260 | 250 | 255 | 250 | 240 | 245 | 235 | 220 | B 245 | 240 | B | B | 265 | 250 | 260 | 265 | A 285 | 290 | 310 | 300 | 285 |
| 24 | 255 | 255 | 260 | 250 | 285 | 315 | 250 | 230 | 230 | 235 | 245 | 235 | 240 | 240 | 230 | H 235 | 260 | 260 | 230 | 245 | 335 | 365 | 355 | 310 |
| 25 | 260 | 280 | 295 | 340 | 320 | 220 | 245 | 255 | 240 | 230 | 225 | 230 | 250 | 255 | 235 | 235 | 240 | 240 | A 265 | 275 | 285 | 300 | 330 | 315 |
| 26 | 365 | 340 | 270 | 305 | 290 | 285 | 260 | 245 | H 235 | H 225 | H 195 | H 220 | 225 | 240 | H 225 | 245 | 240 | A 255 | A 270 | 235 | 220 | 330 | 365 | A 395 |
| 27 | 395 | 310 | 310 | 255 | 290 | 350 | 270 | 250 | 240 | 230 | 215 | 210 | H 220 | 235 | 255 | 240 | 245 | H 235 | 250 | 240 | 250 | 255 | 290 | 285 |
| 28 | 315 | 335 | 335 | 320 | 335 | 345 | 260 | 245 | 230 | 230 | 215 | H 205 | H 220 | H 215 | H 220 | H 230 | 250 | 240 | 250 | 245 | 250 | 280 | 290 | 285 |
| 29 | 280 | 305 | 270 | 265 | 265 | 320 | 240 | 225 | 230 | 230 | 225 | 225 | 230 | 215 | 235 | 245 | 255 | 250 | A 255 | 230 | 250 | 310 | 300 | 280 |
| 30 | 270 | 250 | 240 | 250 | 255 | 300 | 250 | 230 | 235 | 220 | H 215 | H 215 | H 210 | 230 | 230 | 245 | 245 | 260 | 260 | A 245 | 240 | A 315 | 290 | 305 |
| 31 | 300 | 280 | 345 | 360 | 345 | 405 | 280 | 255 | 245 | 240 | H 225 | 230 | H 235 | H 235 | H 220 | 240 | 240 | 235 | 250 | 255 | A 330 | A 345 | A 360 | A 305 |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 | 30 | 30 | 30 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| MED | 270 | 270 | 270 | 265 | 270 | 300 | 265 | 230 | 230 | 230 | 225 | 225 | 230 | 235 | 230 | 240 | 245 | 250 | 250 | 250 | 260 | 275 | 285 | 285 |
| U Q | 300 | 305 | 305 | 305 | 315 | 330 | 275 | 245 | 240 | 230 | 230 | 230 | 230 | 240 | 235 | 245 | 250 | 260 | 260 | 260 | 280 | 300 | 295 | 300 |
| L Q | 260 | 255 | 255 | 255 | 250 | 270 | 260 | 230 | 230 | 225 | 220 | H 220 | H 225 | 230 | 225 | 235 | 240 | 240 | 250 | 240 | 250 | 260 | 265 | 270 |

MAR. 1991 H'F (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

# IONOSPHERIC DATA STATION KOKUBUNJI

MAR. 1991 H'E (KM) 135° E MEAN TIME (G.M.T. + 9H)

LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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 | | | | | | | B 120 | 120 | 120 | 115 | 115 | 115 | B 125 | 120 | | B | B 120 | 115 | A | | | | | |
| 2 | | | | | | | B 110 | | A 130 | E A 130 | A 120 | A | 115 | 115 | R 120 | 110 | 115 | A | | | | | | |
| 3 | | | | | | | B 120 | 115 | 110 | 115 | 115 | | B | 125 | 120 | 120 | A | A | | | | | | |
| 4 | | | | | | | B 115 | 115 | 110 | B 130 | A | | 120 | 120 | 120 | 125 | A 135 | E A 130 | | | | | | |
| 5 | | | | | | | 135 | 115 | 110 | 115 | 120 | A | A | A | B 130 | 110 | 120 | 125 | | | | | | |
| 6 | | | | | | | B 120 | 115 | B 130 | 120 | 120 | | B 120 | 115 | 115 | 110 | A 120 | 120 | | | | | | |
| 7 | | | | | | | 155 | A | 110 | 110 | 110 | 115 | 120 | 110 | 110 | 120 | 120 | 130 | B | | | | | |
| 8 | | | | | | | B 115 | 115 | 115 | 120 | A 130 | | A 130 | B 130 | B 125 | 120 | 120 | 120 | B | | | | | |
| 9 | | | | | | | B 120 | 115 | 115 | 115 | 115 | | B 125 | 125 | 120 | 115 | 120 | 120 | B | | | | | |
| 10 | | | | | | | B 120 | 115 | 115 | 120 | 115 | | 115 | 120 | 120 | 120 | 120 | 120 | B | | | | | |
| 11 | | | | | | | B 160 | 120 | 115 | 115 | 115 | 115 | 115 | 115 | 120 | 120 | 125 | A | B | | | | | |
| 12 | | | | | | | E B 165 | A | 115 | 115 | 115 | 120 | E B 135 | B 125 | 125 | 120 | 115 | A | B | | | | | |
| 13 | | | | | | | B 120 | 110 | 110 | 110 | 110 | 115 | B | A | 115 | 120 | 120 | A 135 | B | | | | | |
| 14 | | | | | | | E B 180 | 110 | 115 | 115 | 115 | E A 140 | 115 | A 125 | 120 | A 120 | A 125 | 120 | B | | | | | |
| 15 | | | | | | | E B 165 | 110 | A 125 | 110 | 110 | 115 | 120 | E B 140 | 120 | 115 | 115 | 120 | B | | | | | |
| 16 | | | | | | | B 155 | 115 | 115 | 115 | B | A | 120 | 125 | A 130 | A 130 | A 125 | E A 135 | B | | | | | |
| 17 | | | | | | | B 145 | 125 | 115 | 115 | 115 | A 125 | A 130 | E A 130 | B | 120 | A 115 | A 120 | B | | | | | |
| 18 | | | | | | | B 150 | 115 | 115 | 110 | 110 | 110 | A 120 | 115 | 115 | 120 | 120 | 120 | B | | | | | |
| 19 | | | | | | | 130 | 115 | 115 | 115 | 115 | B | E R 130 | B 130 | E R 130 | E R 130 | A 120 | 120 | B | | | | | |
| 20 | | | | | | | 160 | 115 | 115 | 120 | 115 | 110 | A 125 | B | B 120 | B | 120 | A 125 | B | | | | | |
| 21 | | | | | | | B 155 | 115 | 115 | 115 | 125 | 120 | A | A | A 125 | 120 | A 120 | A 120 | A | | | | | |
| 22 | | | | | | | 140 | 115 | 110 | 115 | 120 | A | 115 | 120 | 120 | 115 | 115 | 120 | B | | | | | |
| 23 | | | | | | | 140 | 115 | B | 110 | 115 | B | B | B | B | B 130 | 125 | 120 | B | | | | | |
| 24 | | | | | | | B 140 | 115 | 115 | 115 | B | A | B | 115 | A | 115 | 110 | 120 | B | | | | | |
| 25 | | | | | | | B 140 | 115 | 115 | 110 | 115 | 120 | A | A | A | A 125 | A 125 | A | A | | | | | |
| 26 | | | | | | | A | 115 | 115 | 110 | 120 | 120 | A | A | 110 | A | 120 | 120 | B | | | | | |
| 27 | | | | | | | B B 150 | 110 | 110 | 110 | 115 | 115 | 115 | 115 | 115 | 110 | 115 | 120 | A | | | | | |
| 28 | | | | | | | E B 155 | 120 | 110 | 120 | A | A | A | A 125 | A 120 | 115 | 115 | A 120 | B | | | | | |
| 29 | | | | | | | 130 | 115 | 110 | 110 | 115 | 115 | A | 115 | 110 | E R 120 | B | 115 | B | | | | | |
| 30 | | | | | | | A | 120 | 115 | 115 | 115 | 115 | 115 | B | B | 120 | 125 | 120 | B | | | | | |
| 31 | | | | | | | 130 | 115 | 110 | 115 | 110 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | B | | | | | |
| | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| CNT | | | | | | | 20 | 29 | 30 | 31 | 28 | 22 | 21 | 23 | 25 | 29 | 29 | 25 | | | | | | |
| MED | | | | | | | B 145 | 115 | 115 | 115 | 115 | 115 | 120 | 120 | 120 | 120 | 120 | 120 | | | | | | |
| U Q | | | | | | | E B 158 | 120 | 115 | 115 | 120 | 120 | 125 | B 125 | 122 | 120 | A 122 | A 122 | | | | | | |
| L Q | | | | | | | 140 | 115 | 110 | 110 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 120 | | | | | | |

MAR. 1991 H'E (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

# IONOSPHERIC DATA STATION KOKUBUNJI

MAR. 1991 H'ES (KM) 135°E MEAN TIME (G.M.T. + 9H)

LAT.35°42.4'N LON.139°29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL 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 | B 110 | 110 | 110 | | B | B | B | G | G | G | G | G | G 140 | 120 | 115 | | 115 | 115 | B | B | B | 105 | B | 100 |
| 2 | 105 | 105 | 110 | B | B | B | B | G | 110 | 110 | 110 | 105 | G | G 110 | | G | 145 | 120 | 100 | 115 | B | B | B | 115 |
| 3 | 110 | B | B | B | B | B | B | G | G | G | G | G | B | G 110 | 105 | | 100 | 100 | 100 | 95 | 100 | 95 | 95 | B |
| 4 | B | B | B | B | B | B | G | G | G | G | G | 120 | G | G | G | G | 120 | 100 | 100 | B | B | B | B | B |
| 5 | B | B | B | B | B | B | G | G | G | E G 150 | 125 | 120 | 110 | 110 | G | G | G | G | B | B | B | B | B | B |
| 6 | B | B | B | B | B | B | B | 150 | G | G | G | G | G | G | G | G | 105 | 105 | 100 | 105 | B | B | B | B |
| 7 | B | B | B | B | B | 110 | 110 | 105 | G | G | G | 135 | 135 | G | G | G | 130 | G | B | 105 | B | B | B | B |
| 8 | B 105 | 105 | 110 | | B | B | G | G | G | G | G | 115 | 115 | G | G | G | G | 130 | 95 | B | B | 105 | B | B |
| 9 | B | B | B | B | B | B | G | G | G | G | G | G | G | G | G | 125 | G | G | B | B | B | B | B | B |
| 10 | B | B | B | B | B | B | B | G | G | G | 110 | 135 | 150 | 140 | G | 130 | G | G | B | B | 115 | B | B | B |
| 11 | B | B | B | B | B | B | G | G | G | G | 130 | G | G | G | 110 | 140 | 130 | 115 | 115 | 115 | 115 | 110 | 110 | 110 |
| 12 | B | B | B | B | B | B | G | 110 | G | G | G | G | G | G | G | 110 | 125 | 120 | 120 | 110 | 110 | B | B | B |
| 13 | B | B | B | B | B | B | B | G | G | G | G | 130 | B | 125 | 125 | 120 | G | 115 | B | B | B | B | B | B |
| 14 | B | B | 105 | B | B | B | G | G | G | G | G | 115 | 130 | 115 | 110 | 105 | 105 | 105 | B | B | B | B | B | B |
| 15 | B | B | B | B | B | B | G | G | 110 | G | G | G | G | G | G | G | G | E G 175 | B | B | B | B | B | B |
| 16 | B | B | B | B | B | B | G | G | 140 | 120 | B | 120 | 120 | 120 | 110 | 110 | 110 | 140 | 110 | 115 | 105 | B | B | B |
| 17 | B 110 | | B | B | B | B | G | G | G | G | 120 | 110 | 110 | 110 | B | 110 | 110 | 110 | B | 105 | 105 | 100 | B | B |
| 18 | B | B | B | B | B | B | G | G | G | G | G | G | 110 | 110 | G | G | G | G | B | 105 | B | B | B | B |
| 19 | B | B | B | B | B | B | G | G | G | G | 120 | B | 115 | G | 110 | 110 | 110 | 130 | 120 | B | 115 | 110 | B | B |
| 20 | B | B | B | B | B | B | G | G | G | E G 145 | 130 | 125 | 115 | B | G | B | 100 | 100 | B | B | B | B | B | 110 |
| 21 | 110 | B | B | B | B | B | G | G | 120 | 130 | 130 | 120 | 120 | 110 | 110 | G | 110 | 105 | 110 | B | B | B | B | B |
| 22 | B | B | 110 | 110 | 110 | 110 | 145 | G | G | 125 | 120 | 120 | G | 110 | 110 | 110 | G | G | B | B | B | B | B | B |
| 23 | B | B | B | B | B | B | G | G | B | 140 | 110 | B | B | B | B | G | G | 150 | 130 | 115 | 120 | B | B | B |
| 24 | B | B | B | B | B | B | G | G | 110 | E G 150 | B | 125 | B | 120 | 115 | G | G | G | 130 | 120 | 115 | 120 | B | B |
| 25 | B | B | 110 | B | B | B | G | G | 130 | 120 | 120 | 110 | 110 | 105 | 110 | 110 | 110 | 100 | 100 | 100 | 105 | 120 | B | 120 |
| 26 | 110 | 105 | 110 | 105 | 110 | B | 115 | G | G | 130 | G | G | 110 | 105 | 135 | 140 | 135 | 120 | 115 | 120 | B | B | 130 | 110 |
| 27 | 110 | 110 | 110 | B | B | B | G | G | G | 140 | 130 | 125 | G | G | 135 | 130 | 150 | 120 | 120 | B | 115 | B | B | B |
| 28 | B | 110 | 105 | 110 | 105 | B | G | G | G | 125 | 120 | 110 | 110 | 115 | 110 | G | G | 110 | 100 | 120 | B | 125 | B | 105 |
| 29 | B | B | B | B | B | B | G | E G 165 | E G 160 | E G 150 | 130 | 115 | 115 | G | G | 125 | B | 140 | 115 | 120 | B | B | B | B |
| 30 | B | B | B | B | B | B | 155 | G | E G 175 | G | E G 170 | E G 190 | G | B | B | G | G | G | 155 | 115 | 115 | 110 | 115 | B |
| 31 | B 115 | | B | B | B | B | 160 | E G 170 | G | 135 | 140 | 140 | 120 | 120 | 130 | G | G | G | B | B | 110 | 110 | 110 | 110 |
| | 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 | 5 | 8 | 9 | 5 | 3 | 2 | 5 | 5 | 8 | 14 | 16 | 20 | 16 | 15 | 16 | 16 | 17 | 22 | 18 | 16 | 13 | 11 | 5 | 8 |
| MED | 110 | 110 | 110 | 110 | 110 | 110 | 145 | U 128 | 118 | 127 | 121 | 120 | 115 | 115 | 110 | 112 | 110 | 115 | 112 | 115 | 115 | 110 | 110 | 110 |
| U Q | 110 | 110 | 110 | 110 | 110 | | 158 | E G 168 | E G 150 | E G 145 | 130 | 128 | 120 | 120 | 122 | 128 | 130 | 130 | 120 | 118 | 115 | 120 | 122 | 112 |
| L Q | 108 | 105 | 105 | 108 | 105 | | 112 | 108 | 110 | 125 | 120 | 115 | 110 | 110 | 110 | 110 | 108 | 105 | 100 | 105 | 105 | 105 | 102 | 108 |

MAR. 1991 H'ES (KM) COMMUNICATIONS RESEARCH LABORATORY, JAPAN

# IONOSPHERIC DATA STATION KOKUBUNJI

MAR. 1991 TYPES OF ES 135°E MEAN TIME (G.M.T. + 9H)

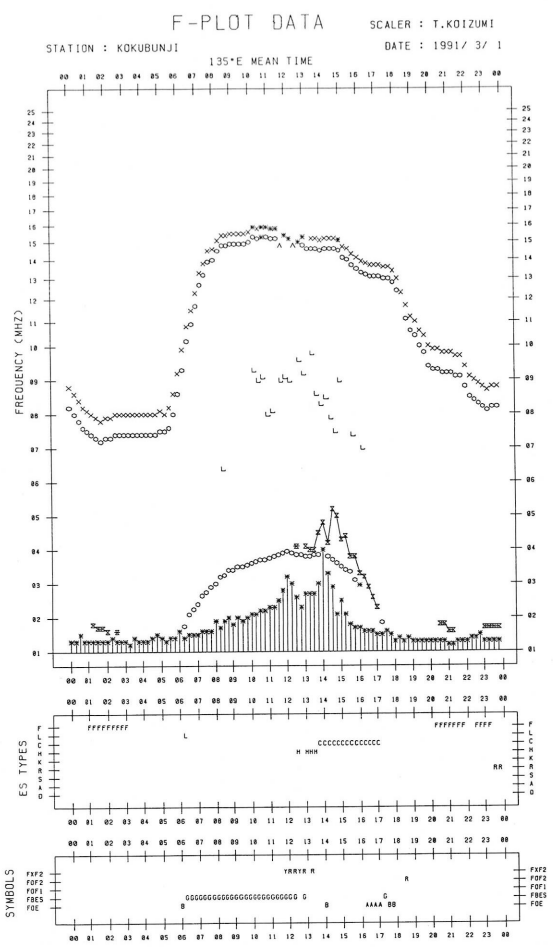
LAT. 35° 42.4'N LON. 139° 29.3'E SWEEP 1.0MHZ TO 25.0MHZ IN 24.0SEC IN MANUAL SCALING

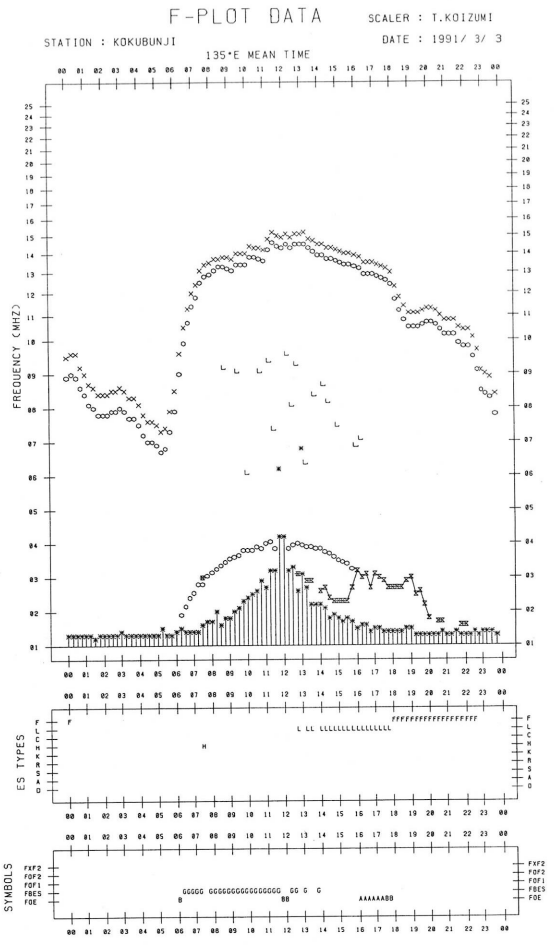
| D \ H | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | F 1 | F 2 | F 1 | | | | | | | | | | H 1 | C 1 | C 2 | C 2 | C 2 | | | | F 1 | | F 1 |
| 2 | F 1 | F 2 | FF 22 | | | | | | L 1 | L 1 | L 1 | L 2 | | | L 1 | | H 1 | L 1 | F 1 | F 1 | | | | F 1 |
| 3 | F 1 | | | | | | | | | | | | | | L 1 | L 1 | L 2 | L 3 | F 4 | F 5 | F 2 | F 2 | F 2 | |
| 4 | | | | | | | | | | | | L 1 | | | | | L 1 | L 2 | F 1 | | | | | |
| 5 | | | | | | | | | | H 1 | H 1 | L 1 | L 1 | L 1 | | | | | | | | | | |
| 6 | | | | | | | H 1 | H 1 | | | | | | | | | L 1 | L 1 | F 2 | F 1 | | | | |
| 7 | | | | | | F 1 | L 1 | L 2 | | | | H 1 | H 1 | | | | C 1 | | | F 1 | | | | |
| 8 | | F 4 | F 2 | F 1 | | | | | | | | L 1 | L 1 | | | | | C 1 | L 3 | | | F 1 | | |
| 9 | | | | | | | | | | | | | | | | C 1 | | | | | | | | |
| 10 | | | | | | | | | | | L 1 | HL 11 | HL 11 | H 1 | | H 1 | | | | | F 1 | | | |
| 11 | | | | | | | | | | | H 1 | | | | L 1 | HL 11 | HL 21 | C 2 | L 2 | F 1 | F 2 | F 2 | F 4 | F 4 |
| 12 | | | | | | | | L 2 | | | | | | | | L 1 | C 1 | C 2 | L 1 | F 3 | F 3 | | | |
| 13 | | | | | | | | | | | | H 1 | | L 1 | L 1 | C 1 | | L 1 | | | | | | |
| 14 | | | F 3 | | | | | | | | | L 1 | H 1 | L 1 | L 1 | L 2 | L 2 | L 2 | | | | | | |
| 15 | | | | | | | | | L 2 | | | | | | | | | H 1 | | | | | | |
| 16 | | | | | | | | | H 1 | C 1 | | C 1 | L 1 | L 1 | L 1 | L 1 | L 2 | HL 22 | L 2 | F 2 | F 3 | | | |
| 17 | | F 1 | | | | | | | | | C 1 | L 1 | L 1 | L 1 | | L 1 | L 1 | L 1 | | F 1 | F 1 | F 2 | | |
| 18 | | | | | | | | | | | | | L 1 | L 1 | | | | | | F 1 | | | | |
| 19 | | | | | | | | | | | C 1 | | L 1 | | L 1 | L 1 | L 1 | C 2 | L 1 | | F 1 | F 4 | | |
| 20 | | | | | | | | | | H 1 | H 1 | H 1 | L 1 | | | | L 1 | L 2 | | | | | | F 1 |
| 21 | F 2 | | | | | | | | L 1 | H 1 | C 1 | C 1 | L 1 | L 1 | L 1 | | L 1 | L 2 | L 2 | | | | | |
| 22 | | | F 2 | F 2 | F 2 | F 2 | H 1 | | | C 1 | L 1 | C 1 | | L 1 | L 1 | L 1 | | | | | | | | |
| 23 | | | | | | | | | | H 1 | L 1 | | | | | | | H 1 | HL 11 | F 4 | F 1 | | | |
| 24 | | | | | | | | | L 1 | H 1 | | C 1 | | C 1 | L 1 | | | | C 1 | F 2 | F 2 | F 2 | | |
| 25 | | | F 1 | | | | | | H 1 | H 1 | C 1 | C 2 | C 1 | L 2 | L 2 | L 1 | LH 21 | L 2 | L 3 | F 2 | F 1 | F 1 | | F 2 |
| 26 | F 3 | F 2 | F 2 | F 2 | F 2 | | L 2 | | | H 1 | | | L 1 | L 2 | H 1 | HL 13 | H 1 | C 3 | C 3 | F 1 | | | F 2 | F 5 |
| 27 | F 3 | F 2 | F 1 | | | K 1 | | | | H 1 | H 1 | C 1 | | | H 2 | H 2 | H 1 | C 2 | L 1 | | F 3 | | | |
| 28 | | F 1 | F 2 | F 2 | F 1 | | | | | H 1 | L 1 | L 2 | L 1 | L 1 | L 1 | | | L 2 | L 1 | F 1 | | F 1 | | F 1 |
| 29 | | | | | | | | H 1 | H 1 | H 1 | H 1 | C 1 | L 1 | | | CL 11 | | H 1 | L 3 | F 1 | | | | |
| 30 | | | | | | | HL 11 | | H 1 | | H 1 | H 1 | | | | | | | H 1 | F 2 | F 3 | F 4 | F 1 | |
| 31 | | F 1 | | | | | H 2 | H 1 | | H 2 | H 1 | H 1 | C 1 | C 1 | H 1 | | | | | | F 4 | F 5 | F 4 | F 6 |
| | 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 | | | | | | | | | | | | | | | | | | | | | | | | |
| U Q | | | | | | | | | | | | | | | | | | | | | | | | |
| L Q | | | | | | | | | | | | | | | | | | | | | | | | |

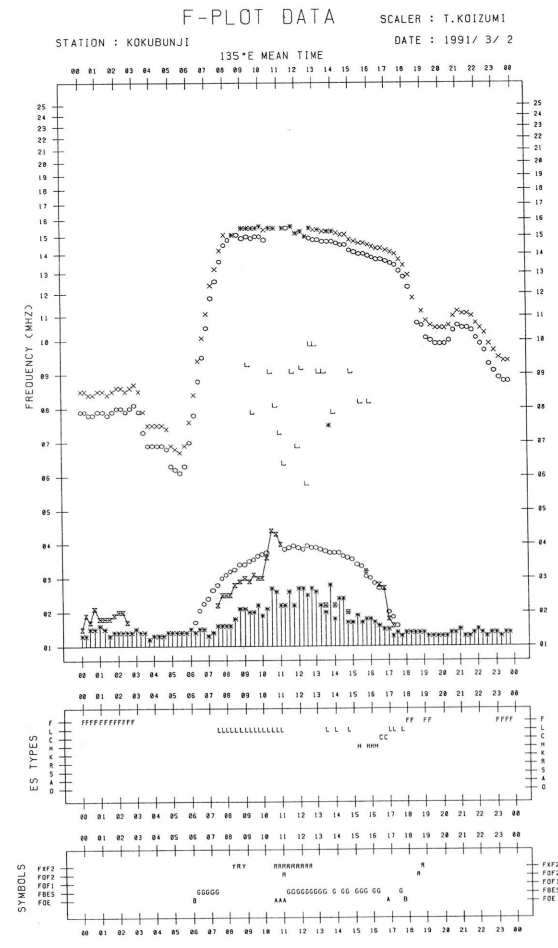
MAR. 1991 TYPES OF ES COMMUNICATIONS RESEARCH LABORATORY, JAPAN

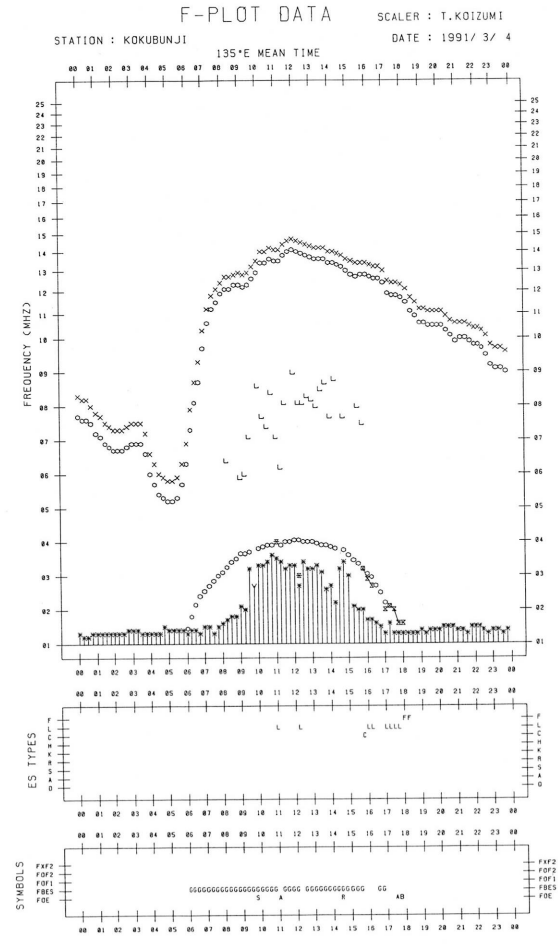
# *f*-PLOTS OF IONOSPHERIC DATA

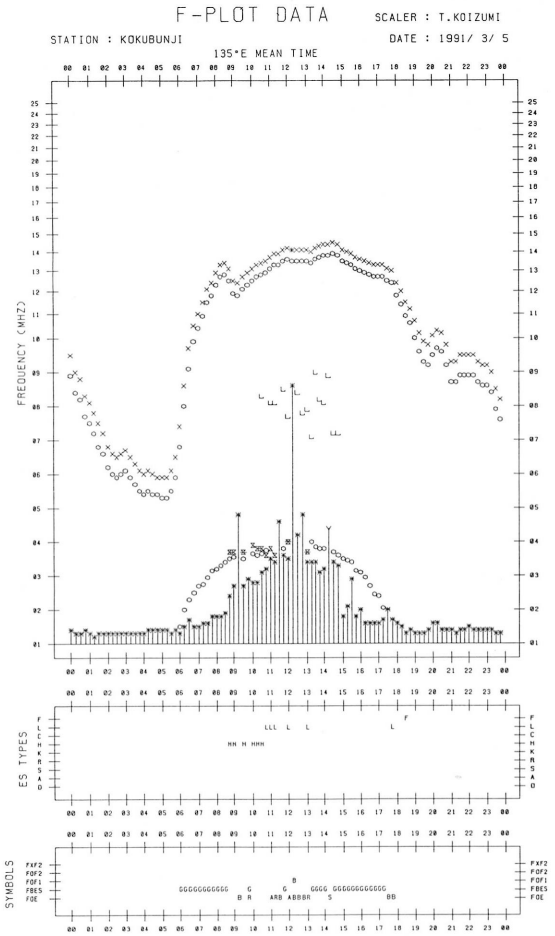
| KEY OF F-PLOT | |
|---|---|
| I | SPREAD |
| ○ | FOF2, FOF1, FOE |
| × | FXF2 |
| ✳ | DOUBTFUL FOF2, FOF1, FOE |
| ⧖ | FBES |
| ⌊ | ESTIMATED FOF1 |
| ↑, Y | FMIN |
| ∧ | GREATER THAN |
| ∨ | LESS THAN |

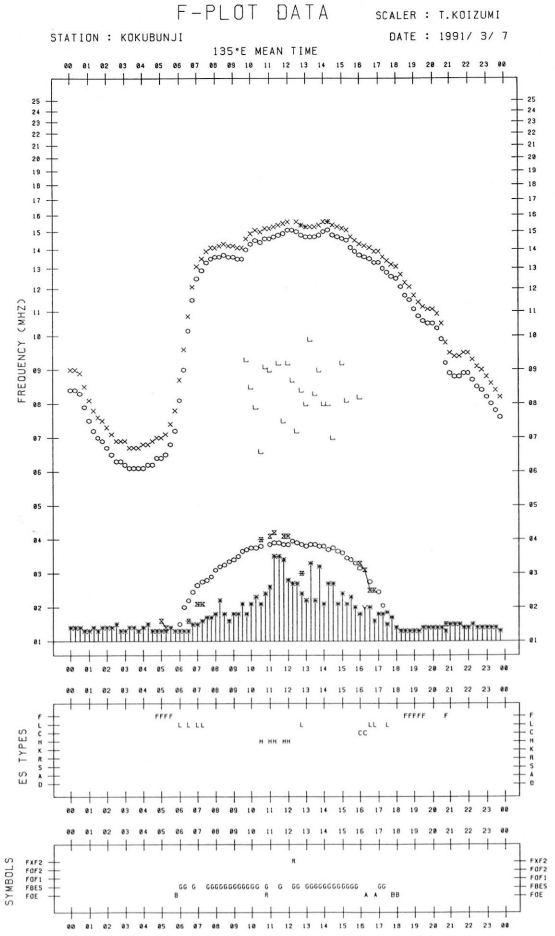

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/ 1
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

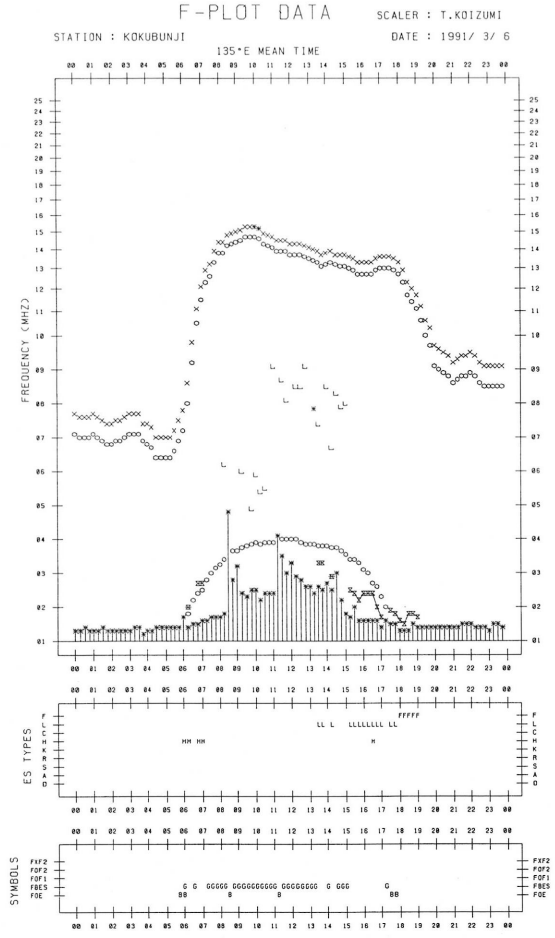

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/ 3
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

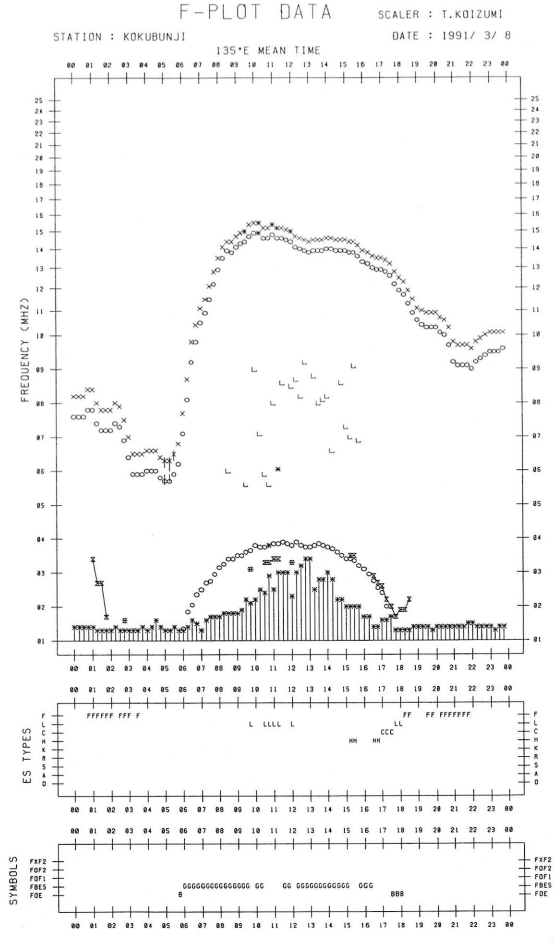

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/ 2
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

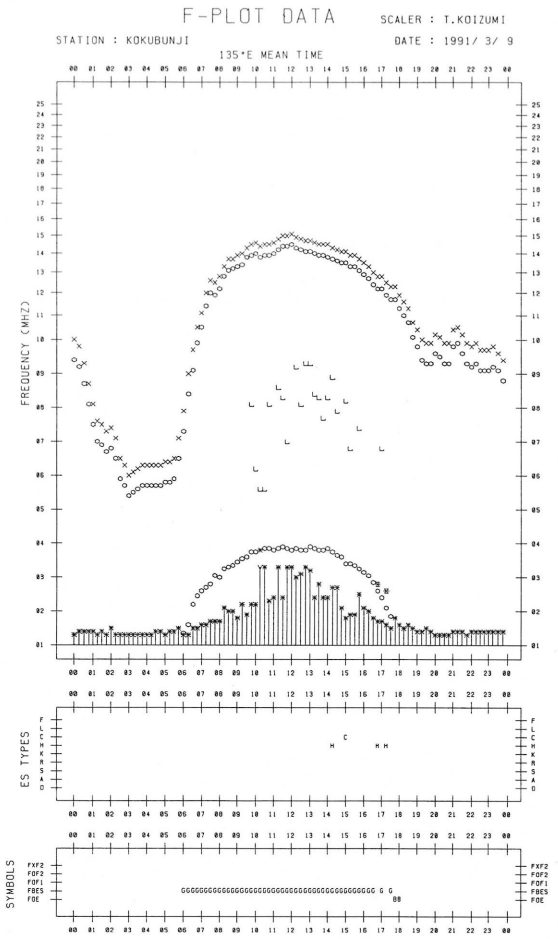

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/ 4
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

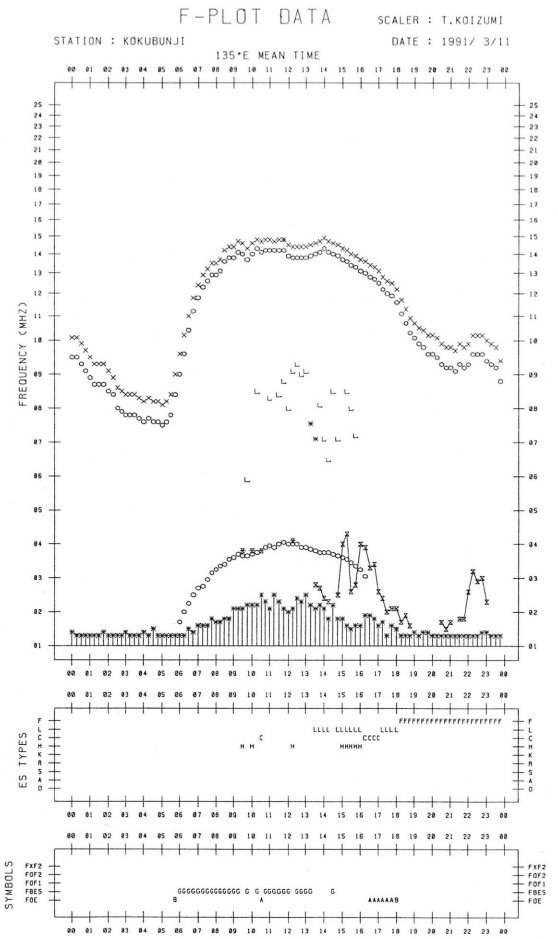

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/ 5
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

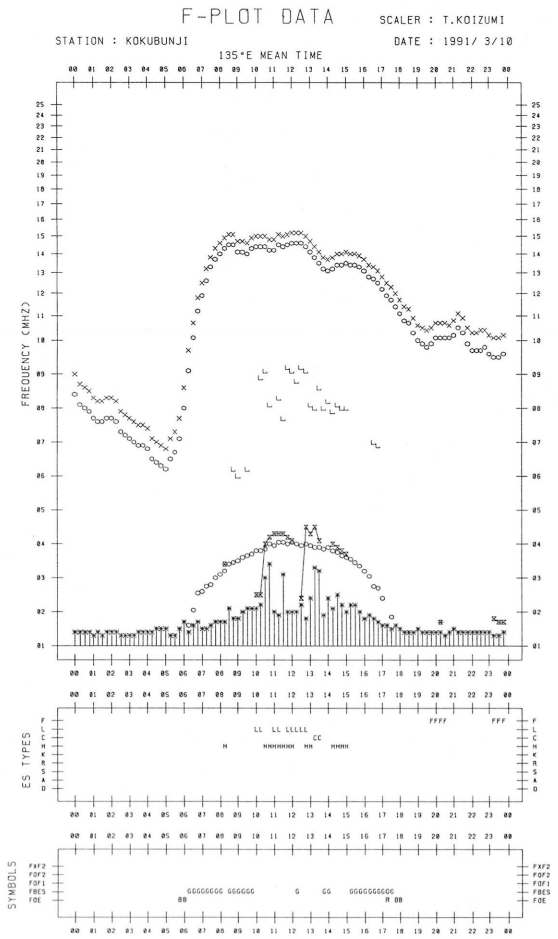

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/ 7
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

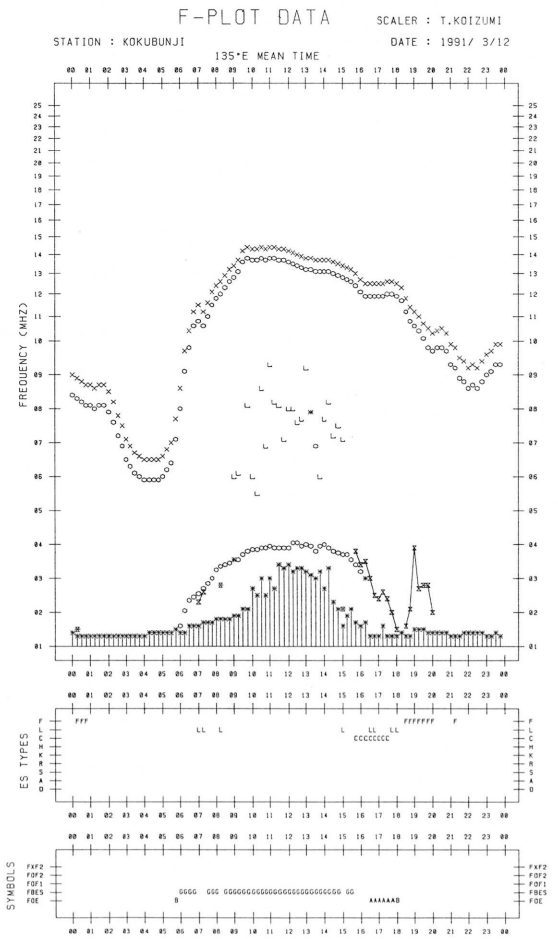

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/ 6
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

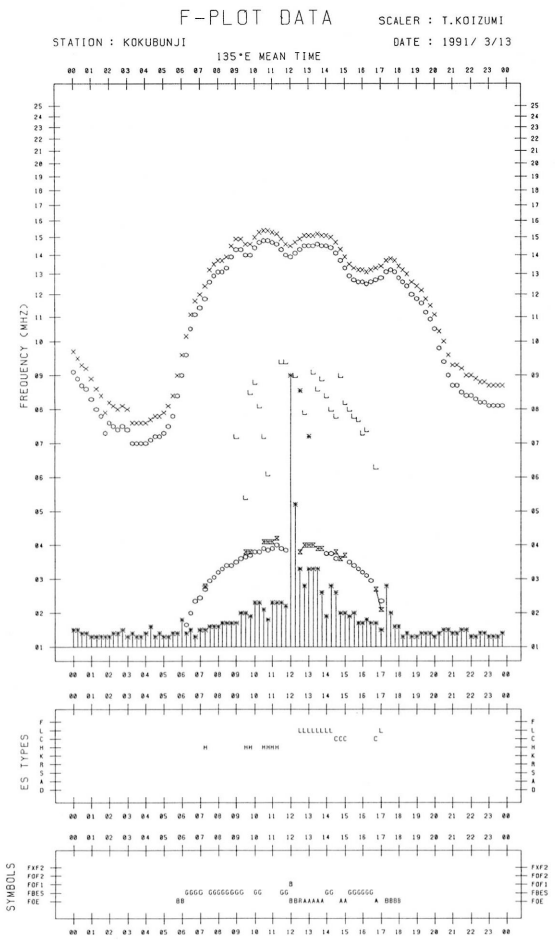

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/ 8
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS

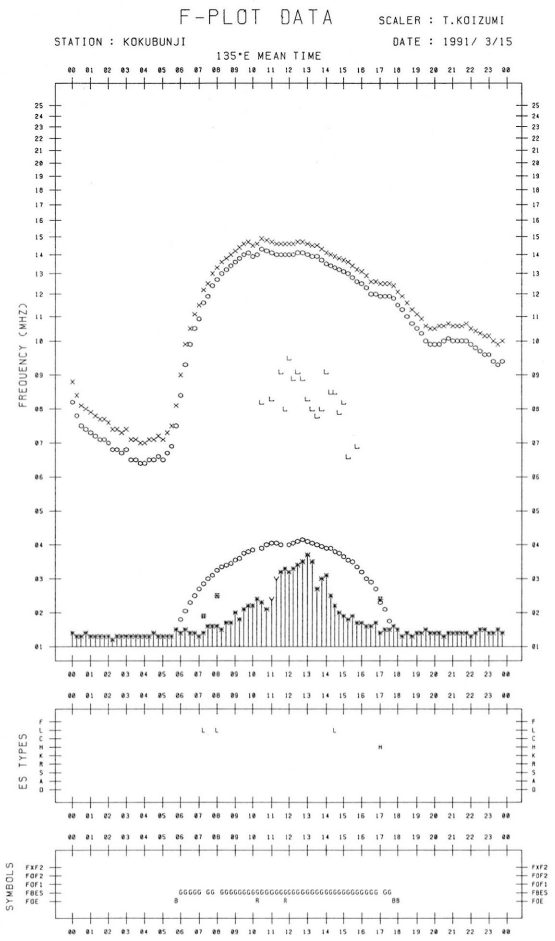

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/ 9
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

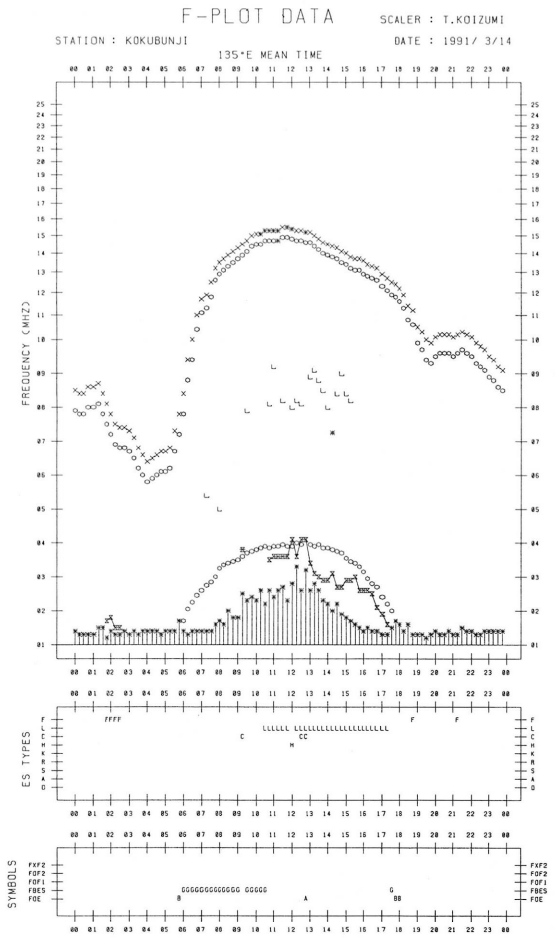

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/11
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

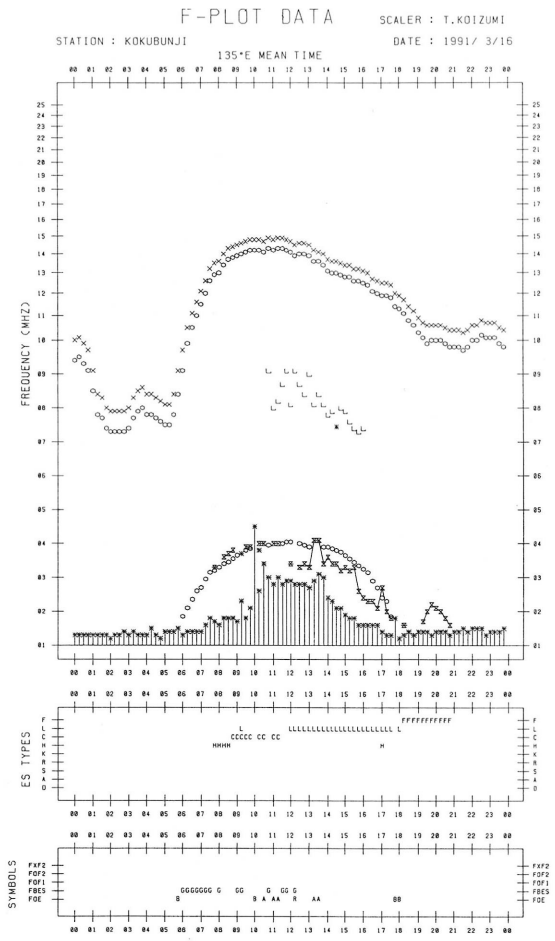

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/10
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

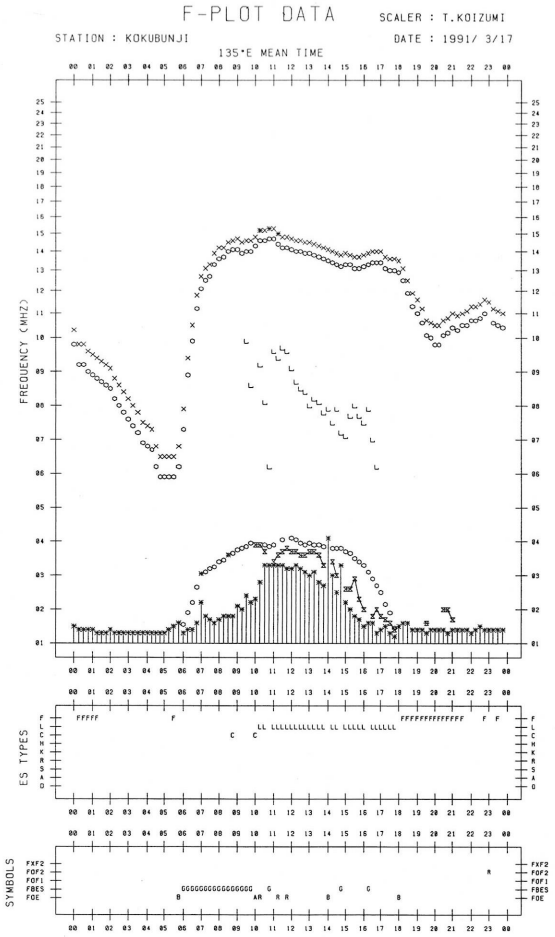

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/12
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

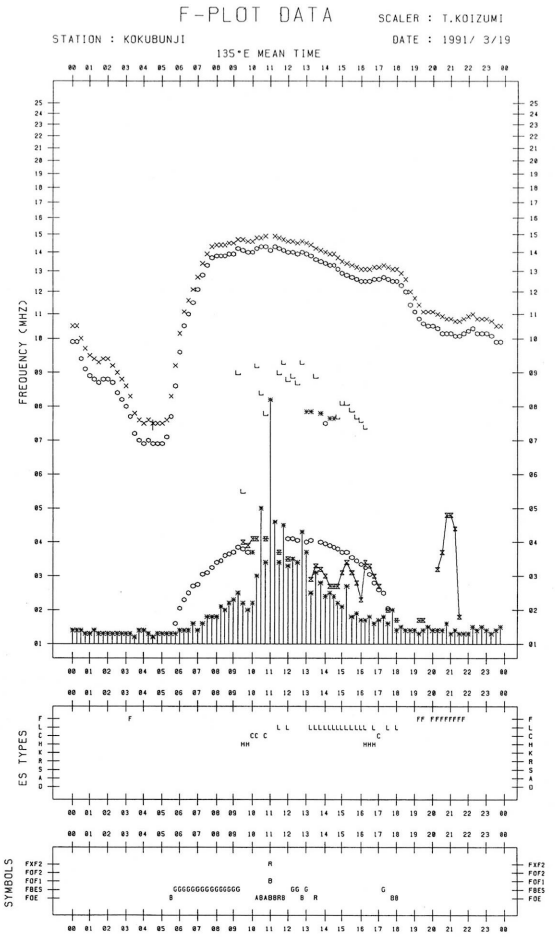

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/13
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

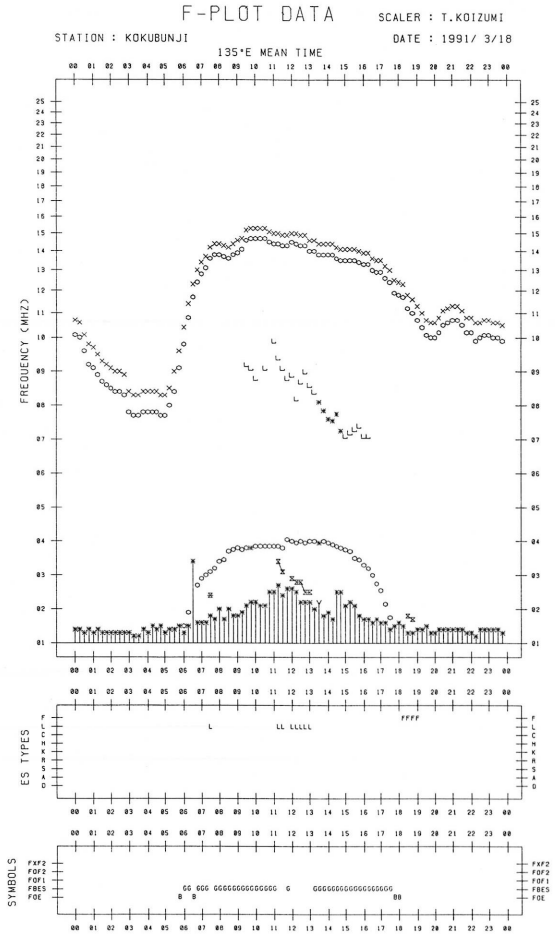

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/15
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

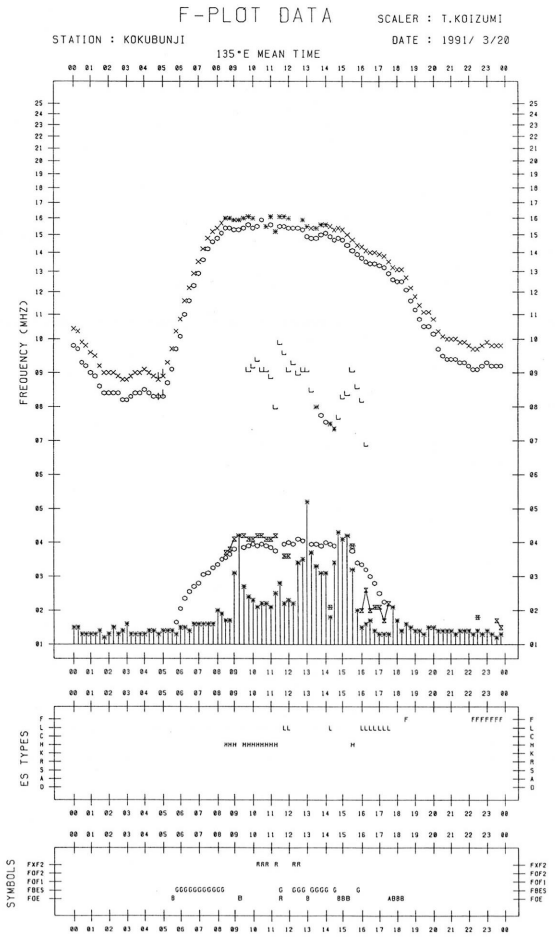

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/14
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

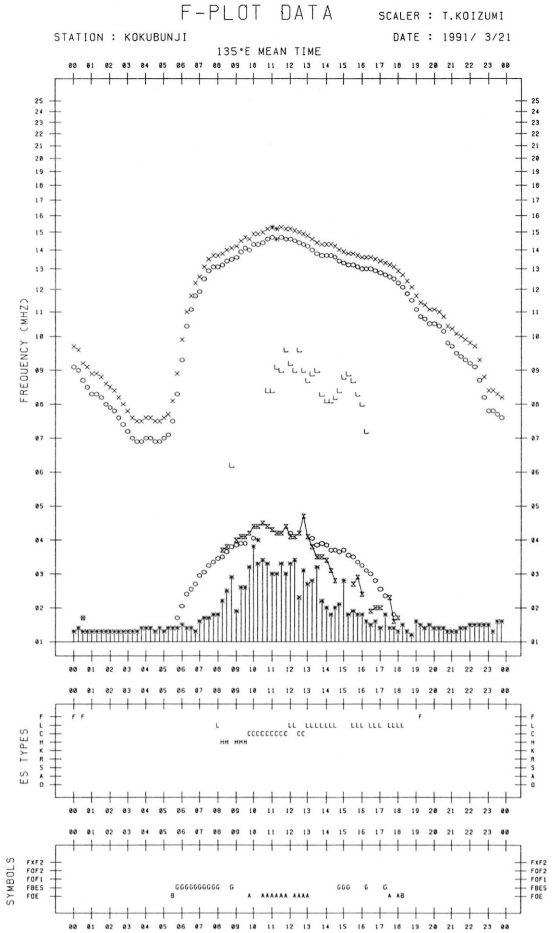

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/16
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

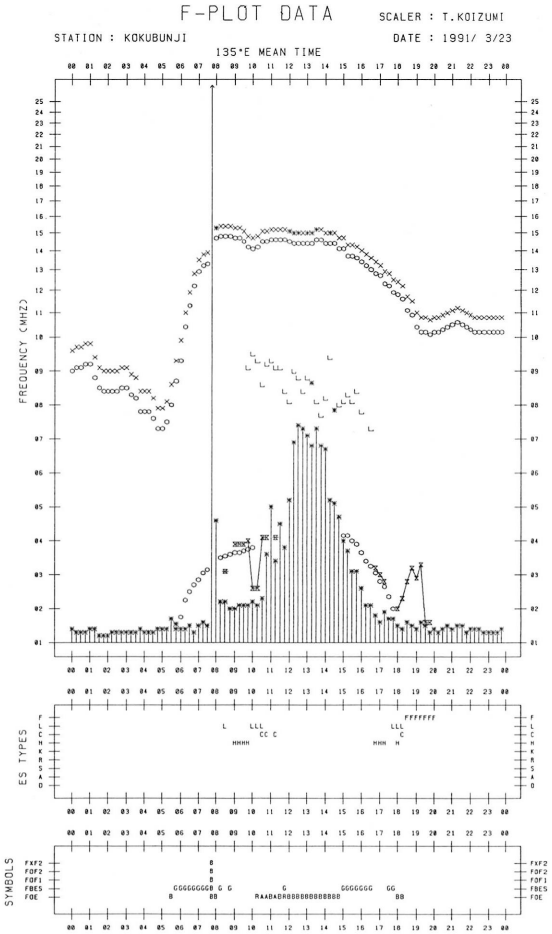

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/17
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

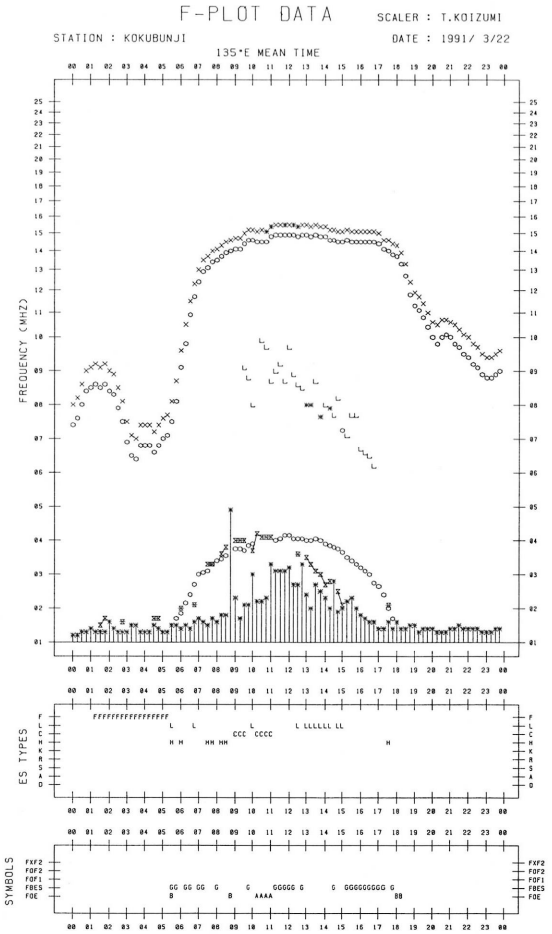

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/19
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

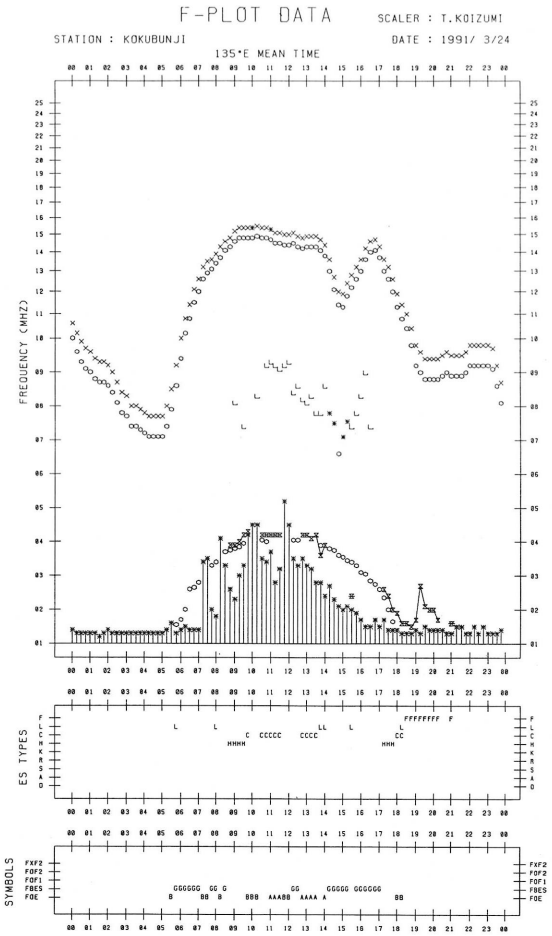

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/18
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

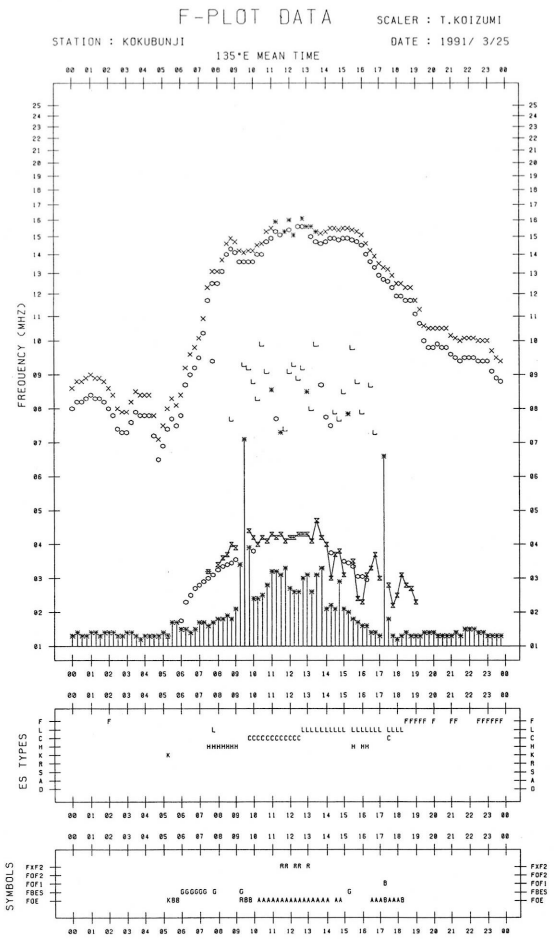

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/20
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

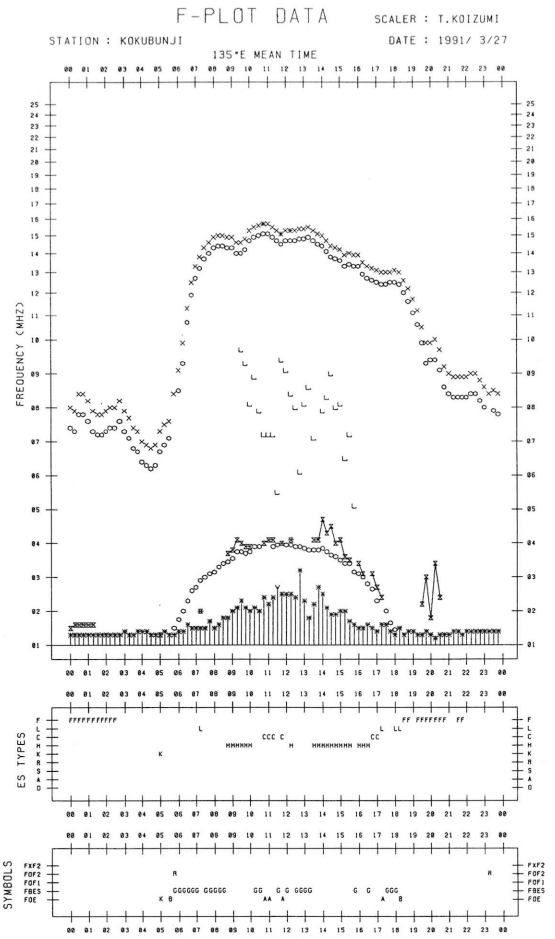

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/21
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

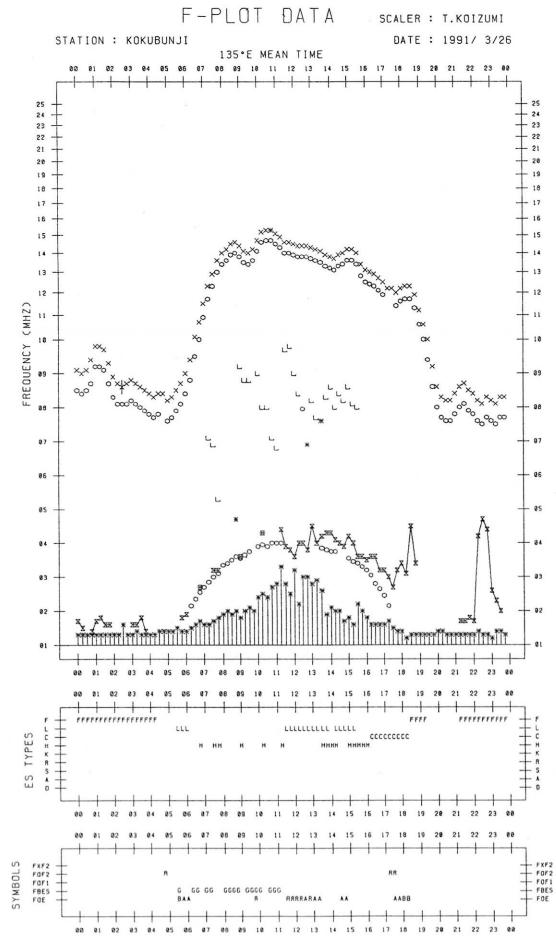

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/23
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

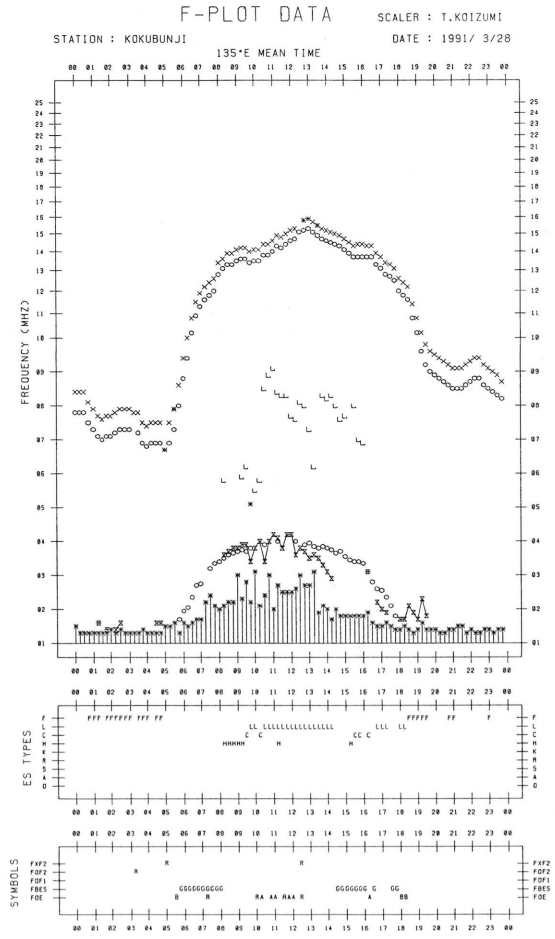

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/22
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

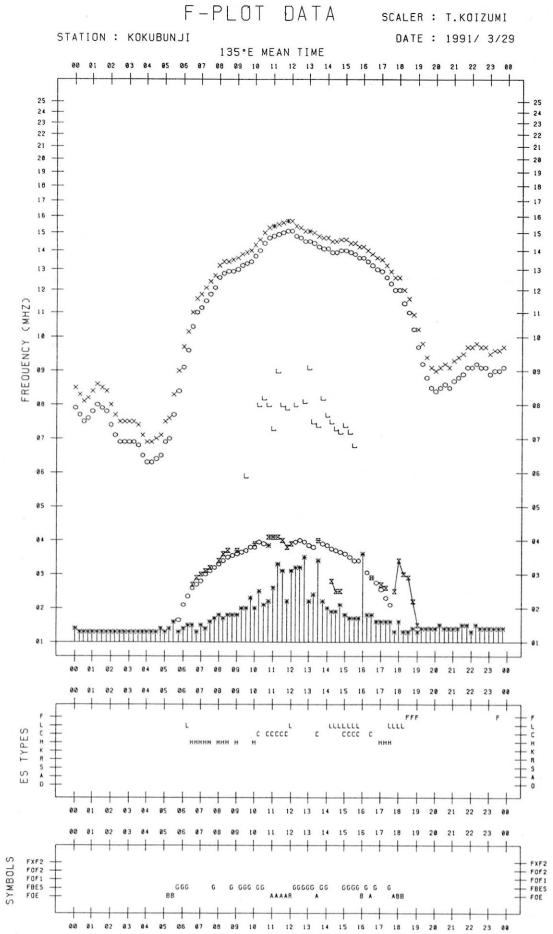

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/24
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

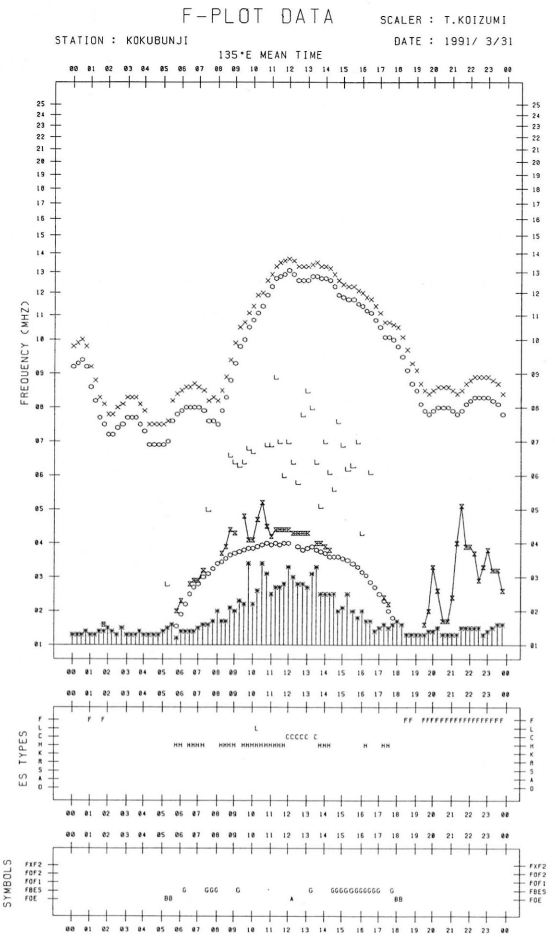

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/25
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

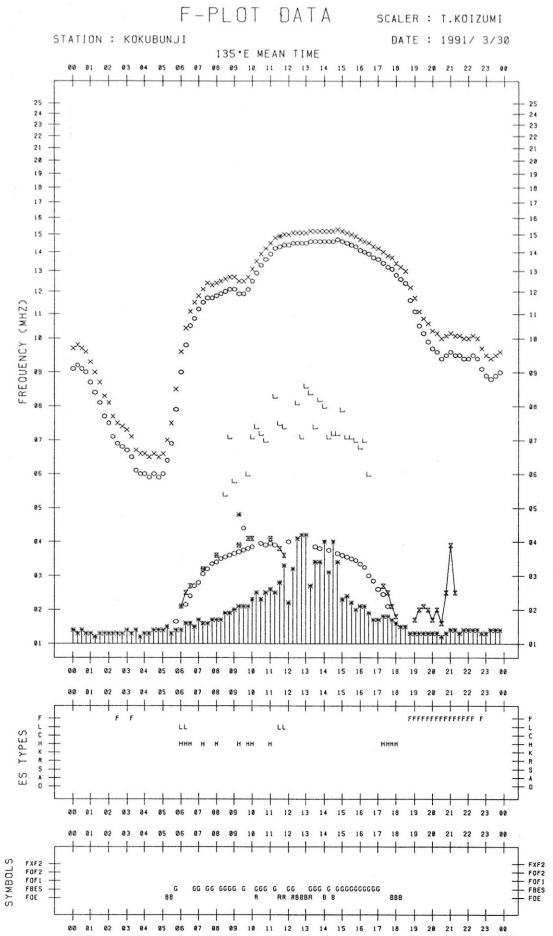

F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/27
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/26
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/28
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/29
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/31
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE


F-PLOT DATA
SCALER : T.KOIZUMI
STATION : KOKUBUNJI
DATE : 1991/ 3/30
135°E MEAN TIME
FREQUENCY (MHZ)
ES TYPES
SYMBOLS
FXF2
FOF2
FOF1
FBES
FOE

B. Solar Radio Emission

B1. Daily Data at Hiraiso

200 MHz

Hiraiso March 1991

| 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 | 10 | 10 | 10 | 12 | 10 | 0 | 0 | 0 | 1 | 0 |
| 2 | 11 | 11 | 12 | 12 | 11 | 0 | 0 | 1 | 0 | 0 |
| 3 | 12 | 12 | 12 | 14 | 12 | 0 | 0 | 0 | 0 | 0 |
| 4 | 12 | 12 | 12 | 11 | 12 | 0 | 0 | 0 | 0 | 0 |
| 5 | 11 | 12 | 12 | 12 | 12 | 0 | 0 | 0 | 0 | 0 |
| 6 | 12 | 11 | 11 | 12 | 11 | * | * | * | 0 | * |
| 7 | 12 | 12 | 12 | B | 12 | 0 | 0 | 0 | 1 | 0 |
| 8 | B | B | B | B | B | 1 | 1 | 2 | 2 | 1 |
| 9 | B | B | B | B | B | 2 | 2 | 2 | 2 | 2 |
| 10 | B | B | B | B | B | 2 | 1 | 1 | 2 | 2 |
| 11 | B | B | B | B | B | 3 | 3 | 2 | 2 | 3 |
| 12 | B | B | B | 14 | B | 1 | 1 | 1 | 1 | 1 |
| 13 | 17 | 15 | 14 | B | 15 | 1 | 0 | 1 | 1 | 1 |
| 14 | B | B | B | B | B | 1 | 1 | 1 | 1 | 1 |
| 15 | B | B | B | B | B | 1 | 3 | 1 | 3 | 2 |
| 16 | B | B | B | B | B | 3 | 3 | 3 | 3 | 3 |
| 17 | B | B | B | B | B | 3 | 2 | 2 | 3 | 3 |
| 18 | B | B | B | 18 | B | 3 | 2 | 2 | 0 | 3 |
| 19 | 17 | 16 | 16 | B | 17 | 0 | 0 | 0 | 0 | 0 |
| 20 | B | B | B | B | B | 0 | 1 | 2 | 2 | 1 |
| 21 | B | B | B | B | B | 2 | 2 | 2 | 3 | 2 |
| 22 | B | B | B | B | B | 3 | 3 | 3 | 3 | 3 |
| 23 | B | B | B | B | B | 2 | 2 | 3 | 3 | 3 |
| 24 | B | B | B | B | B | 3 | 3 | 3 | 3 | 3 |
| 25 | B | B | B | B | B | 3 | 3 | 3 | 3 | 3 |
| 26 | B | B | B | B | B | 3 | 3 | 3 | 3 | 3 |
| 27 | B | B | B | B | B | 3 | 2 | 3 | 3 | 3 |
| 28 | B | B | B | 23 | B | 3 | 3 | 2 | 0 | 3 |
| 29 | 24 | 17 | 14 | 14 | 19 | * | 0 | 0 | 0 | 0 |
| 30 | 14 | 14 | 14 | 12 | 14 | 0 | 0 | 0 | 0 | 0 |
| 31 | 12 | * | * | 13 | 12 | * | * | * | 0 | * |

Note: No observations during the following periods.

none

B. Solar Radio Emission

B1. Daily Data at Hiraiso

500 MHz

Hiraiso March 1991

| 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 | 57 | 57 | 57 | - | 57 |
| 2 | 58 | 58 | 60 | 59 | 59 |
| 3 | 57 | 56 | 56 | 58 | 57 |
| 4 | 57 | 57 | 57 | 59 | 57 |
| 5 | 59 | 59 | 58 | - | 59 |
| 6 | 58 | 57 | 56 | - | 57 |
| 7 | 58 | 57 | 57 | 62 | 57 |
| 8 | 62 | 61 | 60 | 61 | 61 |
| 9 | 61 | 62 | B | - | B |
| 10 | 63 | 62 | 62 | 61 | 62 |
| 11 | 62 | 59 | 57 | 62 | 60 |
| 12 | 61 | 60 | 57 | - | 60 |
| 13 | 63 | 62 | 58 | 62 | 61 |
| 14 | 61 | 60 | 59 | - | 61 |
| 15 | 62 | 61 | 60 | 64 | 61 |
| 16 | 64 | 63 | 60 | - | 63 |
| 17 | (68) | 64 | 63 | B | 64 |
| 18 | 76 | 68 | 66 | 68 | B |
| 19 | 73 | (78) | - | - | 72 |
| 20 | 65 | (66) | - | - | 65 |
| 21 | (67) | 68 | 67 | 74 | 67 |
| 22 | 74 | 69 | 69 | 71 | 72 |
| 23 | B | B | 78 | 66 | B |
| 24 | 69 | 67 | - | - | 67 |
| 25 | B | B | B | 77 | B |
| 26 | 73 | 74 | 77 | B | 75 |
| 27 | B | 77 | 75 | B | B |
| 28 | B | B | B | 59 | B |
| 29 | 59 | 58 | 72 | 60 | 61 |
| 30 | 58 | 68 | 57 | 56 | 61 |
| 31 | 55 | 54 | 55 | 50 | 55 |

Note: No observations during the following periods.

1st 2115 - 2347 5th 2115 - 2348 6th 2115 - 2347
8th 0300 - 0340 9th 2100 - 10th 0024 12th 2100 - 2349
14th 2100 - 2346 16th 2100 - 17th 0212 19th 0427 - 20th 0012
20th 0441 - 21st 0200 24th 0600 - 2350

B. Solar Radio Emission

B2. Outstanding Occurrences at Hiraiso

Hiraiso March 1991

Single-frequency observations

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

| MAR 1991 | FREQ. (MHz) | TYPE | START TIME (U.T.) | TIME OF MAXIMUM (U.T.) | DUR. (MIN.) | FLUX DENSITY ($10^{-22}$ Wm$^{-2}$Hz$^{-1}$) PEAK | FLUX DENSITY ($10^{-22}$ Wm$^{-2}$Hz$^{-1}$) MEAN | POLARIZATION REMARKS |
|---|---|---|---|---|---|---|---|---|
| 1 | 500 | 7 C | 0253.0 | 0254.0 | 1.3 | 30 | 10 | WR |
| | 500 | 28 PRE | 0437.5 | 0442.9 | 5.5 | 5 | 2 | 0 |
| | 500 | 45 C | 0443.0 | 0447.8 | 10 | 40 | 20 | 0 |
| | 100 | 42 SER | 0448.0 | 0455.3U | 24 | 1000D | - | - |
| | 500 | 46 C | 0456.5 | 0459.0 | 18 | 310 | 100 | MR |
| | 200 | 46 C | 0456.6 | 0458.6 | 16 | 68 | 24 | WR |
| 2 | 500 | 40 F | 0647 | 0657.3 | 19 | 29 | - | 0 |
| | 100 | 46 C | 0650.6 | 0650.6 | 4.0 | 140 | 50 | WL |
| | 200 | 46 C | 0653.2 | 0709.0 | 37 | 50 | 12 | 0 |
| | 100 | 46 C | 0702.0 | 0722.2 | 40 | 170 | 70 | WL |
| 3 | 500 | 7 C | 0134.0 | 0134.5 | 1.0 | 70 | 30 | 0 |
| | 500 | 46 C | 0210.0 | 0213.0 | 29 | 20 | 10 | 0 |
| | 200 | 42 SER | 0210.6 | 0213.1 | 14 | 220 | - | 0 |
| | 100 | 42 SER | 0212.3 | - | 13 | 1000D | - | - |
| 4 | 500 | 7 C | 0045.0 | 0045.0 | 1.0 | 2100 | 500 | 0 |
| 5 | 500 | 45 C | 0114.0 | 0118.0 | 9.0 | 7 | 3 | 0 |
| | 200 | 46 C | 0117.5 | 0120.8 | 4.0 | 24 | 4 | 0 |
| | 100 | 42 SER | 0117.8 | 0118.0 | 14 | 330 | - | WL |
| | 500 | 42 SER | 0222.3 | 0222.6 | 6 | 140 | - | WL |
| | 500 | 6 S | 0447.0 | 0447.5 | 1.0 | 500 | 150 | WL |
| | 100 | 42 SER | 0614.4 | 0617.2 | 4.6 | 300 | - | WL |
| | 500 | 6 S | 0618.4 | 0618.5 | 1.0 | 280 | 60 | WL |
| | 200 | 6 S | 0618.6 | 0618.6 | 1.3 | 2000 | 500 | 0 |
| 6 | 500 | 27 RF | 0205.5 | 0208.5 | 24 | 30 | 17 | WL |
| | 500 | 6 S | 0253.2 | 0254.0 | 3.0 | 7 | 3 | 0 |
| | 100 | 6 S | 0336.0 | 0336.6 | 1.5 | 3000 | - | WL |
| | 500 | 6 S | 0336.5 | 0336.7 | 1.5 | 6 | 2 | 0 |
| | 200 | 6 S | 0336.6 | 0336.6 | 1.0 | 570 | 150 | - |
| | 100 | 46 C | 0739.4 | 0741.5 | 4.0 | 700 | 200 | ML |
| | 200 | 46 C | 0740.0 | 0741.0 | 4.0 | 170 | 35 | - |
| | 500 | 7 C | 0741.0 | 0741.5 | 1.5 | 14000 | 1500 | WL |
| | 100 | 6 S | 2140.8 | 2141.4 | 1.6 | 1700 | - | WL |
| | 200 | 6 S | 2141.2 | 2141.2 | 1.3 | 27000 | 3000 | 0 |
| 7 | 100 | 46 C | 0452.6 | 0452.6 | 2.0 | 1000D | - | - |
| | 200 | 46 C | 0452.6 | 0452.8 | 2.6 | 500 | 70 | WL |
| | 500 | 46 C | 0748.0 | 0748.5 | 17 | 2500 | 100 | ML |
| | 200 | 42 SER | 0748.6 | 0753.3 | 6.6 | 900 | - | WL |
| | 100 | 42 SER | 0756.6 | 0757.4 | 4.6 | 1000D | - | - |
| | 200 | 44 NS | 2110E | 0746.6 | 690D | 30 | 8 | ML |
| | 200 | 48 C | 2316.8 | 2316.8U | 8.6 | 51000D | 1000U | WL |
| | 500 | 46 C | 2317.0 | 2317.0 | 10 | 300 | 60 | WR |
| | 100 | 46 C | 2317.1 | - | 6.6 | 1000D | - | - |
| 8 | 200 | 44 NS | 2110E | 2204 | 690D | 18 | 5 | ML |
| 9 | 500 | 46 C | 0635 | 0702.5 | 42 | 380 | 150 | WL |
| | 500 | 21 GRF | 0729.1 | 0739.0 | 36 | 120 | 40 | ML |
| | 200 | 44 NS | 2110E | 2301.6 | 690D | 50 | 10 | ML |
| | 100 | 44 NS | 2110E | 2314 | 690D | 100 | 50 | ML |
| 10 | 200 | 44 NS | 2110E | 0244 | 690D | 70 | 30 | 0 |
| | 100 | 44 NS | 2110E | 0430 | 690D | 30 | 10 | WL |
| | 500 | 42 SER | 2237.5 | 2239.7 | 7.0 | 300 | - | WL |
| 11 | 500 | 6 S | 0241 | 0242.2 | 2.0 | 15 | 6 | WL |
| | 500 | 6 S | 0329.0 | 0329.3 | 1.0 | 240 | 150 | 0 |
| | 200 | 46 C | 0402.6 | 0403.6 | 4.0 | 660 | 200 | ML |
| | 100 | 46 C | 0402.8 | 0405.3 | 4.0 | 1000D | - | - |
| | 500 | 6 S | 0403.5 | 0405.0 | 2.5 | 26 | 10 | WL |
| | 500 | 45 C | 0731.5 | 0732.0 | 9.3 | 2500 | 150 | ML |
| | 200 | 43 NS | 2330 | 2356 | 545D | 150 | 15 | WL |
| 12 | 100 | 42 SER | 0050.5 | - | 6.0 | 1000D | - | - |
| | 500 | 46 C | 0053.0 | 0053.0 | 10 | 50 | 15 | ML |
| | 200 | 6 S | 0053.2 | 0053.2U | 2.3 | 51000D | 2000D | WL |
| | 500 | 46 C | 0130.5 | 0134.2 | 44 | 15 | 6 | WL |
| 13 | 100 | 6 S | 0231.3 | 0231.3 | 2.0 | 500 | - | - |
| | 200 | 6 S | 0231.3 | 0231.3 | 1.6 | 13000 | 3000 | MR |
| | 500 | 46 C | 0231.6 | 0232.1 | 9.0 | 30 | 7 | WR |
| | 500 | 46 C | 0256.0 | 0256.5 | 13 | 600 | 30 | 0 |
| | 200 | 42 SER | 0714.3 | 0803.3 | 54 | 15000 | - | 0 |
| | 500 | 42 SER | 0732.0 | 0732.6 | 6.0 | 8000 | - | 0 |
| | 100 | 42 SER | 0732.3 | - | 60 | 1000D | - | - |
| | 500 | 46 C | 0803.5 | 0803.5 | 6.0 | 1000 | 150 | 0 |
| | 100 | 44 NS | 2110E | 2243.3 | 690D | 170 | 50 | SL |
| | 200 | 44 NS | 2110E | 0220 | 690D | 20 | 5 | ML |
| 14 | 500 | 6 S | 0754.0 | 0754.5 | 5.0 | 40 | 20 | WL |
| | 200 | 6 S | 0754.6 | 0755.0 | 2.6 | 75 | 20 | 0 |
| | 200 | 44 NS | 2110E | 0442 | 690D | 50 | 5 | ML |
| | 100 | 44 NS | 2110E | 0538 | 690D | 150 | 20 | SL |
| 15 | 100 | 44 NS | 2100E | 0200 | 700D | 600 | 150 | SL |
| | 200 | 44 NS | 2100E | 0332 | 700D | 150 | 10 | ML |

| MAR 1991 | 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 |
|---|---|---|---|---|---|---|---|---|
| 15 | 200 | 46 C | 2225.5 | 2226.0 | 4.0 | 1500 | 300 | WR |
| | 500 | 45 C | 2225.7 | 2227.1 | 13 | 115 | 40 | WR |
| | 100 | 46 C | 2226.0 | 2226.6 | 2.0 | 3000 | - | - |
| 16 | 100 | 42 SER | 0006.3 | 0008.3 | 2.6 | 11500 | - | - |
| | 500 | 42 SER | 0006.5 | 0008.2 | 6.0 | 120 | - | WR |
| | 200 | 42 SER | 0006.6 | 0008.0 | 2.6 | 20000 | - | MR |
| | 500 | 46 C | 0046.0 | 0048.0 | 18 | 6000 | 85 | WLMR |
| | 100 | 42 SER | 0046.0 | 0049.0 | 58 | 14500 | - | - |
| | 200 | 48 C | 0047.5 | 0049.3 | 10 | 20000 | 700 | MR |
| | 500 | 42 SER | 0732.5 | 0744.5 | 14 | 320 | - | O |
| | 100 | 44 NS | 2100E | 2332 | 700D | 250 | 50 | ML |
| | 200 | 44 NS | 2100E | 0226.6 | 700D | 50 | 5 | ML |
| | 100 | 42 SER | 2151.2 | 2152 | 11 | 1000D | - | - |
| | 200 | 46 C | 2151.2 | 2152.0 | 7.3 | 3000 | 400 | ML |
| 17 | 500 | 42 SER | 0530.0 | 0530.5 | 25 | 340 | - | O |
| | 200 | 44 NS | 2100E | 2346 | 700D | 100 | 10 | WR |
| | 100 | 44 NS | 2100E | 0114 | 700D | 400 | 60 | WR |
| | 500 | 48 C | 2123.6 | 2124.9 | 36 | 60000 | 300 | SL |
| | 100 | 42 SER | 2123.6 | 2125 | 10 | 1000D | - | - |
| | 200 | 42 SER | 2123.8 | 2125.0 | 5.3 | 7000 | - | WL |
| 18 | 500 | 45 C | 0023.2 | 0028.5 | 28 | 40 | 15 | WL |
| | 500 | 42 SER | 0147.5 | 0151.0 | 23 | 140 | - | WL |
| | 100 | 44 NS | 2100E | 2118 | 700D | 130 | 50 | WL |
| | 500 | 42 SER | 2140.0 | 2140.1 | 6.0 | 2300 | - | ML |
| | 200 | 42 SER | 2300.1 | 2304.2 | 6.0 | 5000 | - | WR |
| | 100 | 42 SER | 2301E | 2314.0 | 13D | 800 | - | - |
| | 500 | 41 F | 2302.5 | 2309.0 | 7.5 | 280 | - | WR |
| 19 | 500 | 46 C | 0117.2 | 0120.2 | 21 | 60 | 30 | WL |
| | 200 | 46 C | 0117.3 | 0117.3 | 2.6 | 2500 | 500 | O |
| | 100 | 42 SER | 0117.3 | 0127.0 | 13 | 800 | - | - |
| | 500 | 48 C | 0157.0 | 0157.5 | 3.5 | 10000 | 1500 | WL |
| | 200 | 48 C | 0158.6 | 0200.0 | 3.3 | 51000 | 2000 | WL |
| | 100 | 8 S | 0611.1 | 0611.4 | 0.6 | 12500 | - | - |
| | 200 | 6 S | 0611.3 | 0611.3 | 2.0 | 8000 | 2000 | WR |
| | 200 | 44 NS | 2100E | 0746 | 700D | 70 | 10 | MR |
| | 100 | 44 NS | 2100E | 0754 | 700D | 80 | 30 | WL |
| 20 | 200 | 6 S | 0326.0 | 0326.6 | 1.6 | 70 | 30 | WL |
| | 200 | 44 NS | 2100E | 0620 | 700D | 100 | 20 | MR |
| | 100 | 44 NS | 2100E | 0708 | 700D | 500 | 150 | SR |
| 21 | 100 | 46 C | 0549.2 | 0549.8 | 2.0 | 3800 | - | - |
| | 200 | 46 C | 0549.3 | 0549.4 | 2.6 | 500 | 150 | WR |
| | 500 | 7 C | 0549.5 | 0549.7 | 10 | 150 | 12 | O |
| | 200 | 44 NS | 2100E | 0318 | 700D | 120 | 20 | SR |
| | 100 | 44 NS | 2100E | 0425 | 700D | 700 | 550 | SR |
| | 200 | 6 S | 2337.3 | 2337.3 | 1.3 | 20000 | 3000 | WR |
| | 100 | 6 S | 2337.4 | 2337.4 | 1.3 | 10800 | - | - |
| | 500 | 46 C | 2337.5 | 2339.5 | 21 | 10000 | 200 | MR |
| 22 | 200 | 6 S | 0045.0 | 0045.0 | 1.3 | 2000 | 500 | O |
| | 500 | 7 C | 0046.0 | 0046.2 | 3.0 | 65 | 5 | ML |
| | 500 | 7 C | 0056.5 | 0056.8 | 1.0 | 135 | 35 | WR |
| | 200 | 42 SER | 0634.0 | 0638.0 | 5.3 | 3000 | - | WR |
| | 100 | 44 NS | 2100E | 2128 | 700D | 580 | 200 | SR |
| | 200 | 44 NS | 2100E | 0749 | 700D | 100 | 20 | SR |
| | 500 | 42 SER | 2112.7 | 2113.0 | 6.5 | 1000 | - | WL |
| | 100 | 48 C | 2243.3 | 2243.3U | 8.0 | 16000D | 4000U | - |
| | 200 | 48 C | 2243.3 | 2243.3U | 32 | 70000D | 2000U | O |
| | 500 | 48 C | 2243.5 | 2246.5 | 76 | 5800 | 400 | WL |
| 23 | 200 | 45 C | 0145.3 | 0202.3 | 64 | 300 | 100 | WL |
| | 500 | 48 C | 0151.0 | 0350.7 | 229 | 3000 | 200 | SR |
| | 100 | 44 NS | 2100E | 2125 | 700D | 800 | 650 | SR |
| | 200 | 44 NS | 2100E | 2216 | 700D | 800 | 100 | SR |
| | 500 | 42 SER | 2204.0 | 2211.1 | 16 | 900 | - | MR |
| 24 | 500 | 46 C | 0239.5 | 0244.7 | 12 | 400 | 100 | WL |
| | 500 | 45 C | 0409.5 | 0413.5 | 17 | 19 | 6 | WL |
| | 200 | 44 NS | 2100E | 0010 | 700D | 100 | 30 | SR |
| | 100 | 44 NS | 2100E | 0547 | 700D | 850 | 550 | SR |
| 25 | 500 | 46 C | 0012.0 | 0017.7 | 12 | 2000 | 200 | SR |
| | 500 | 46 C | 0044.0 | 0051.9 | 35 | 900 | 300 | SR |
| | 500 | 46 C | 0333.0 | 0344.6 | 46 | 380 | 150 | SR |
| | 100 | 46 C | 0804.6 | - | 8 | 1000D | - | - |
| | 200 | 46 C | 0805.2 | 0809.0 | 8.6 | 5000 | 600 | - |
| | 500 | 48 C | 0807.5 | 0812.0 | 15 | 3700 | 300 | WL |
| | 100 | 44 NS | 2100E | 0510 | 700D | 850 | 700 | SR |
| | 200 | 44 NS | 2100E | 0700 | 700D | 200 | 50 | SR |
| 26 | 500 | 42 SER | 0104.5 | 0104.9 | 10.5 | 130 | - | WR |
| | 200 | 44 NS | 2100E | 0003 | 700D | 150 | 20 | SR |
| | 100 | 44 NS | 2100E | 0825 | 700D | 900 | 550 | SR |
| 27 | 200 | 44 NS | 2100E | 2107 | 700D | 200 | 50 | SR |
| | 100 | 44 NS | 2100E | 2156 | 700D | 650 | 350 | SR |
| 28 | 500 | 42 SER | 2137.3 | 2137.6 | 6.5 | 580 | - | SR |
| | 200 | 46 C | 2326.6 | 2327.3 | 1.3 | 500 | 200 | O |
| 29 | 200 | 48 C | 0645.1 | 0650.0 | 7.3 | 12000 | 1000 | O |
| | 100 | 48 C | 0648.7 | 0652.1 | 8.6 | 16000D | - | - |
| | 500 | 48 C | 0658.8 | 0659.1 | 32 | 5000 | 100 | WR |
| | 500 | 42 SER | 2242.0 | 2248.8 | 58 | 4000 | - | SR |
| 30 | 500 | 41 F | 0421.0 | 0459.0 | 96 | 100 | - | MR |
| 31 | 200 | 42 SER | 0032.2 | 0038.9 | 9.3 | 1500 | - | O |
| | 500 | 42 SER | 0041.0 | 0046.6 | 7.3 | 450 | - | MR |

# C. RADIO PROPAGATION

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

MAR 1991 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

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

# C. RADIO PROPAGATION

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

MAR 1991 FREQUENCY 15 MHZ BANDWIDTH 80 HZ RECEIVING ANTENNA ROD 4.5 M

MEASURED AT HIRAISO

| UT DAY | 00H 46M | 01H 46M | 02H 46M | 03H 46M | 04H 46M | 05H 46M | 06H 46M | 07H 46M | 08H 46M | 09H 46M | 10H 46M | 11H 46M | 12H 46M | 13H 46M | 14H 46M | 15H 46M | 16H 46M | 17H 46M | 18H 46M | 19H 46M | 20H 46M | 21H 46M | 22H 46M | 23H 46M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -13 | -7 | 1 | 6 | 6 | 16 | 29 | 26 | 24 | 24 | 24 | 18 | 23 | 18 | -4 | -5 | -13 | 8 | 18 | 12 | 4 | 3 | -3 | ES -25 |
| 2 | -6 | -1 | -2 | 6 | 13 | 23 | 26 | 30 | 26 | 27 | 23 | 24 | 29 | 21 | 20 | -4 | -12 | 18 | 18 | 6 | 6 | 1 | -13 | ES -25 |
| 3 | ES -24 | -12 | ES -24 | -2 | 16 | 18 | 26 | 21 | 26 | 19 | 25 | 26 | 34 | 14 | -9 | ES -24 | ES -24 | 12 | 15 | 0 | 7 | -3 | ES -24 | -9 |
| 4 | ES -24 | ES -24 | -9 | 5 | 13 | 10 | 21 | 26 | 32 | 28 | 29 | 26 | 18 | 17 | 19 | -9 | ES -24 | 21 | 15 | -4 | -3 | -5 | -12 | ES -24 |
| 5 | ES -24 | ES -24 | -12 | -9 | 7 | 21 | 26 | 22 | 26 | 24 | 26 | 23 | 25 | 21 | 8 | -12 | ES -24 | 6 | 13 | 11 | 6 | ES -9 | 4 | 0 |
| 6 | -3 | -12 | -9 | 5 | 12 | 16 | 7 | 30 | 19 | 30 | 30 | 16 | 25 | 24 | 6 | -5 | -12 | 25 | 1 | 0 | 4 | ES 2 | -3 | ES -24 |
| 7 | ES -24 | -12 | -12 | 2 | 20 | 19 | 15 | 27 | 26 | 20 | 21 | 27 | 21 | 22 | 16 | 15 | -12 | 25 | 12 | -3 | ES -24 | -2 | -12 | ES -24 |
| 8 | ES -25 | -13 | -10 | 1 | 15 | 19 | 19 | 29 | 18 | 30 | 30 | 27 | 14 | 17 | 17 | -9 | ES -24 | ES -24 | ES -24 | -9 | ES -24 | -2 | ES -24 | -12 |
| 9 | ES -24 | -9 | -7 | 5 | 7 | 19 | 21 | 23 | 25 | 24 | 25 | 21 | 19 | 22 | 5 | ES -24 | -11 | 19 | 15 | 2 | 4 | ES -24 | -9 | ES -24 |
| 10 | -12 | ES -24 | -1 | 3 | 12 | 26 | 22 | 26 | 29 | 23 | 25 | 26 | 26 | 25 | 23 | 0 | 14 | 23 | 22 | 16 | 3 | 2 | 2 | -9 |
| 11 | -12 | ES -24 | 2 | 11 | 22 | 25 | 22 | 26 | 26 | 29 | 30 | 21 | 21 | 12 | -1 | ES -24 | ES -24 | 23 | 13 | 12 | 8 | 6 | ES -24 | ES -24 |
| 12 | ES -24 | ES -24 | -11 | 6 | 12 | 26 | 28 | 33 | 29 | 29 | 26 | 28 | 26 | 27 | 18 | 21 | -1 | 10 | 21 | 3 | 6 | 8 | 3 | ES -24 |
| 13 | -13 | ES -25 | -4 | ES 1 | 4 | 10 | 21 | -13 | -13 | 0 | 7 | 3 | 0 | ES -25 | ES -4 | ES -25 | -13 | 24 | 22 | ES -25 | 1 | 6 | -10 | -10 |
| 14 | ES -25 | -2 | -2 | 5 | 11 | 17 | 24 | 20 | 31 | 24 | 28 | 29 | 19 | 22 | 18 | ES -25 | ES -25 | 14 | 18 | 10 | 5 | ES -2 | -13 | ES -25 |
| 15 | -13 | -10 | -10 | -4 | 10 | 27 | 23 | 26 | 26 | 33 | 28 | 21 | 26 | 13 | 15 | 2 | ES -24 | 13 | 17 | 9 | -12 | -3 | -3 | -12 |
| 16 | ES -25 | ES -25 | -5 | 4 | 15 | 19 | 20 | 22 | 26 | 24 | 21 | 26 | 21 | 8 | 3 | ES -25 | ES 2 | 35 | 18 | 4 | -1 | ES -9 | -12 | ES -24 |
| 17 | ES -24 | ES -24 | -2 | 4 | 15 | 15 | 23 | 27 | 27 | 27 | 28 | 27 | 26 | 20 | 13 | ES -24 | 7 | 33 | 20 | 3 | 1 | ES -24 | ES -24 | ES -24 |
| 18 | ES -24 | -10 | -2 | 3 | 12 | 19 | 26 | 20 | 29 | 29 | 32 | 23 | 26 | 18 | 21 | -1 | 3 | 23 | 19 | 7 | 0 | ES -1 | ES -1 | S |
| 19 | ES -24 | ES -24 | ES -24 | 1 | 12 | 17 | 23 | 23 | 27 | 27 | 25 | 29 | 26 | 24 | 20 | 15 | 20 | 18 | 11 | 14 | -1 | -2 | ES -24 | ES -24 |
| 20 | ES -24 | -1 | -9 | -9 | 10 | 3 | 19 | 26 | 26 | 31 | 27 | 32 | 26 | 26 | 27 | 22 | 12 | 13 | 0 | -1 | -1 | ES -24 | -12 | ES -24 |
| 21 | -9 | -12 | -12 | 12 | 16 | 14 | 24 | 25 | 26 | 27 | 25 | 20 | 28 | 27 | -5 | ES -23 | 35 | 21 | 21 | -2 | ES -23 | -8 | ES -23 | ES -23 |
| 22 | ES -21 | ES -21 | ES -21 | 0 | 20 | 24 | 26 | 29 | 29 | 28 | 28 | 29 | 33 | 20 | 23 | 22 | 17 | 18 | 12 | -3 | ES -21 | ES -24 | ES -24 | ES -24 |
| 23 | ES -24 | ES -24 | ES -24 | ES -24 | ES -24 | -1 | 17 | 27 | 25 | 25 | 25 | 24 | 21 | 26 | 12 | 22 | 16 | 9 | 14 | -3 | -3 | ES -24 | ES -24 | ES -24 |
| 24 | ES -24 | ES -24 | ES -24 | -3 | 10 | 17 | 17 | 24 | 24 | 13 | ES -24 | ES -24 | 20 | 19 | 17 | -12 | ES -24 | 20 | 19 | -3 | -3 | -2 | ES -24 | ES -24 |
| 25 | ES -24 | ES -24 | -9 | -12 | 8 | 15 | 22 | 25 | 22 | 20 | 20 | 19 | 22 | 17 | 1 | ES -24 | ES -24 | 19 | 20 | 2 | 0 | ES -3 | ES 2 | ES -24 |
| 26 | ES -24 | ES -24 | 0 | -1 | 8 | 23 | 27 | 29 | 24 | 23 | 26 | 25 | 24 | -2 | 0 | ES -23 | ES -23 | 14 | 13 | -6 | ES -21 | -3 | ES -24 | ES -24 |
| 27 | ES -24 | ES -24 | 2 | -2 | 2 | 16 | 20 | 22 | 25 | 22 | 21 | 19 | 25 | ES -23 | ES -23 | ES -23 | ES -23 | 2 | 12 | 8 | 5 | ES -22 | ES -22 | ES -22 |
| 28 | ES -24 | ES -24 | -1 | -1 | 20 | 24 | 19 | 25 | 24 | 29 | 29 | 26 | 18 | 28 | 20 | 15 | 10 | 15 | 12 | 3 | -3 | -9 | -9 | ES -24 |
| 29 | ES -24 | ES -24 | -5 | 7 | 7 | 12 | 14 | 24 | 26 | 30 | 20 | 14 | 18 | 12 | 19 | 12 | 8 | 20 | 9 | -2 | 3 | -3 | ES -24 | ES -24 |
| 30 | ES -24 | -12 | -12 | -2 | 9 | 15 | 19 | 28 | 27 | 25 | 25 | 23 | 15 | 32 | 18 | 23 | 20 | 7 | 7 | -1 | 4 | -2 | -3 | ES -24 |
| 31 | ES -24 | ES -24 | ES -24 | 6 | 8 | 17 | 31 | 26 | 28 | 27 | 26 | 23 | 24 | 23 | 12 | -12 | ES -24 | 14 | 16 | -1 | ES -24 | ES -24 | ES -24 | ES -24 |
| CNT | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 30 |
| MED | ES -24 | ES -24 | -9 | 2 | 12 | 17 | 22 | 26 | 26 | 27 | 25 | 24 | 24 | 20 | 15 | -9 | US -12 | 18 | 15 | 2 | 0 | ES -3 | US -12 | ES -24 |
| UD | -9 | -2 | 1 | 7 | 20 | 26 | 28 | 30 | 29 | 30 | 30 | 29 | 29 | 27 | 23 | 22 | 20 | 25 | 21 | 12 | 6 | 6 | 2 | -9 |
| LD | ES -25 | ES -24 | ES -24 | ES -9 | 4 | 10 | 15 | 20 | 19 | 19 | 20 | 14 | 15 | -2 | ES -5 | ES -25 | ES -24 | 6 | 1 | -6 | ES -24 | ES -24 | ES -24 | ES -25 |

## C. Radio Propagation

### C2. Radio Propagation Quality Figures at Hiraiso

Hiraiso

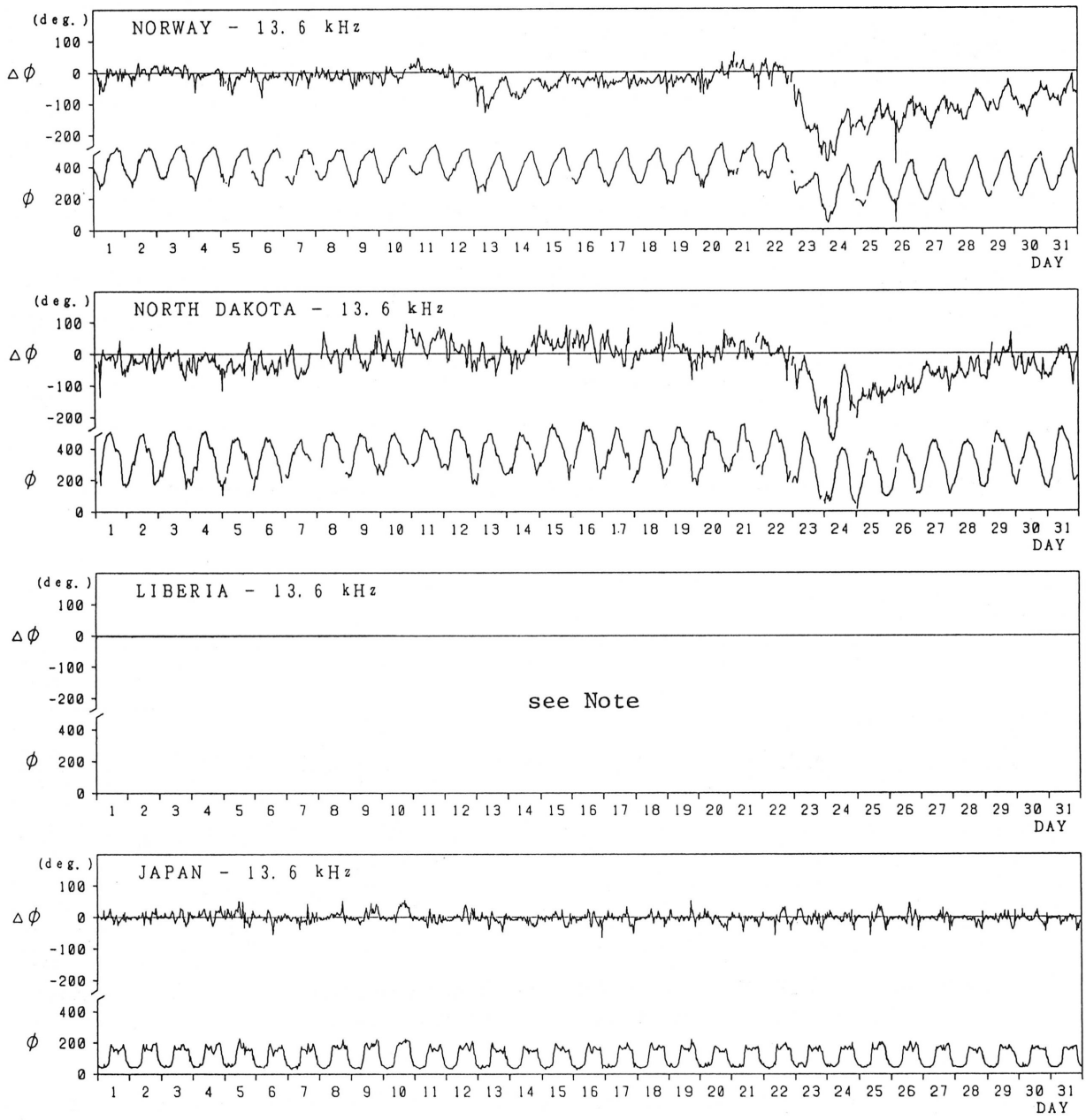
Time in U.T.

| Mar. 1991 | Whole Day Figure | W W V 00 06 12 18 \| \| \| \| 06 12 18 24 | W W V H 00 06 12 18 \| \| \| \| 06 12 18 24 | Conditions 00 06 12 18 \| \| \| \| 06 12 18 24 | Principal Geomagnetic Storms Start h m | End h | Range nT |
|---|---|---|---|---|---|---|---|
| 1 | 4o | 4 3 4 5U | 4 4 4 5 | N N N N | | | |
| 2 | 4o | 4 3 3 5U | 5 4 4 4 | N N N N | | | |
| 3 | 4o | 4 4 5 5U | 4 4 3 4U | N N N N | | | |
| 4 | 4o | 4 4 4 5U | 4 4 4 4 | N N N N | | | |
| 5 | 4+ | 4 5 5 5U | 4 4 4 5 | N N N N | | | |
| 6 | 4- | 3U 2U 4 5U | 4 4 4 4 | N N N N | | | |
| 7 | 4o | 4 3 4 5U | 4 4 4 3U | N N N N | | | |
| 8 | 3+ | 4 4 3 3U | 4 4 3 3U | N N N N | | | |
| 9 | 4o | 4 4 4 4U | 4 4 3 4 | N N N N | | | |
| 10 | 4o | 4 3 3 5U | 4 4 4 4 | N N N N | | | |
| 11 | 4o | 5 3 4 5U | 5 4 3 4 | N N N N | | | |
| 12 | 4+ | 4 4 4 5U | 4 4 4 5 | N N N N | | | |
| 13 | 4- | 4 5 4 4U | 4 2 3 4U | N N N N | | | |
| 14 | 4o | 4 5 4 5U | 4 4 3 4 | N N N N | | | |
| 15 | 4o | 4 3 4 5U | 4 4 4 4 | N N N N | | | |
| 16 | 4o | 4 4 4 5U | 4 4 4 4 | N N N N | | | |
| 17 | 4+ | 4 5 5 5U | 4 4 4 4U | N N N N | | | |
| 18 | 4+ | 4 5 5 4U | 4 4 4 4 | N N N N | | | |
| 19 | 4+ | 4 5 5 4U | 4 4 4 4U | N N N N | | | |
| 20 | 4o | 4 4 4 4U | 4 4 4 4 | N N N N | | | |
| 21 | 4o | 4 5 4 4U | 4 4 4 3U | N N N N | 0600 | 20 | 131 |
| 22 | 4o | 4 5 4 4U | 4 4 5 3U | N N N N | | | |
| 23 | 3o | 2U 4 3 3U | 2U 4 3 3U | N N N N | | | |
| 24 | 3o | 3 3 2U 3U | 3 3 4 4U | N N N N | 0341 | --- | |
| 25 | 3- | 1U 1U 2U 3U | 4 4 3 4U | U U U U | --- | --- | |
| 26 | 3o | 2U 1U 2U 4U | 4 4 3 3U | U U U U | --- | --- | |
| 27 | 3o | 2U 1U 3U 4U | 4 4 3U 4U | U U U U | --- | 20 | 503 |
| 28 | 3+ | 1U 2 3 3U | 5 4 4 4 | N N N N | | | |
| 29 | 3+ | 3 3 3 4U | 3 4 4 4U | N N N N | | | |
| 30 | 4o | 4 4 4 3U | 4 4 4 4 | N N N N | | | |
| 31 | 4- | 4U 3 4 4U | 4 4 4 3U | N N N N | | | |

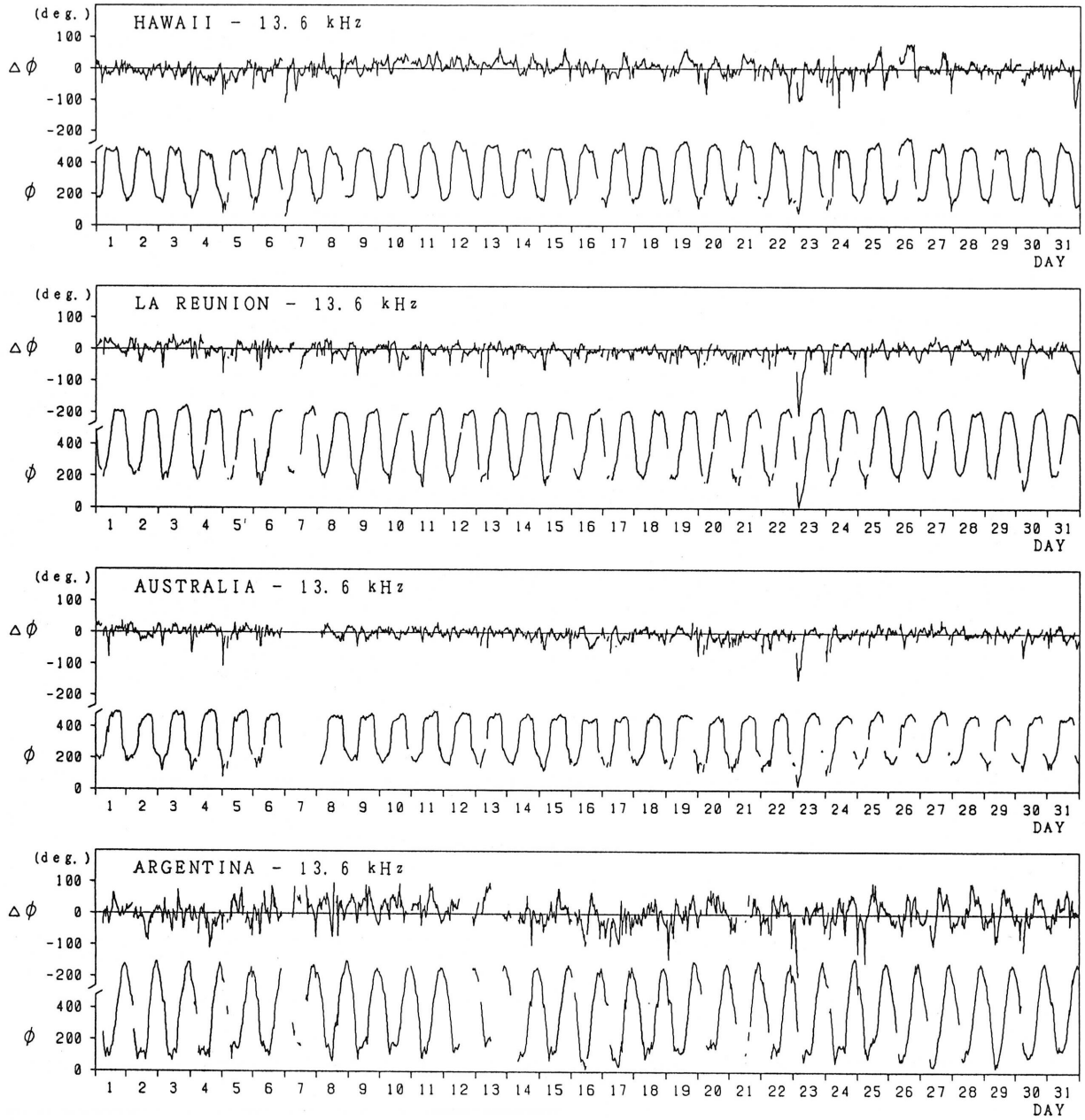
# C. Radio Propagation

## C3. Phase Variation in OMEGA Radio Waves at Inubo

Inubo March 1991



Inubo March 1991




Note: As for LIBERIA - 13.6 kHz, no record during July 09 1990 - March 31, 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.) |
|---|---|---|---|
| Mar.12/0830 | Mar.20/1600 | Mar.13/1059 | 124.2 |
| Mar.23/0229 | Mar.29/1916 | Mar.24/0436 | 309.6 |
| Mar.29/2122 | Mar.31/1814 | Mar.30/0425 | 108.0 |
| Mar.31/2028 | Apr.01/1835 | Apr.01/1127 | 91.0 |

C. Radio Propagation

C4. Sudden Ionospheric Disturbance

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

Hiraiso — Time in U.T.

| Mar. 1991 | SWF Drop-out Intensities (dB) | | | | | SWF Start | SWF Dur. | SWF Type | SWF Imp. | Correspondence: Solar Flare | Correspondence: Solar Noise |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO | HA | 1) | 2) | 3) | | | | | | |
| 1 | x | x | 25 | x | | 0440 | 59 | 2 | 2 | x | x |
| 2 | | | 10 | | | 0127 | 9 | 1 | 1- | x | x |
| 2 | | x | 7 | | | 0514 | 13 | 1 | 1- | x | |
| 3 | | | 19 | x | | 0225 | 93 | 2 | 1+ | | x |
| 3 | | | | | 10 | 1309 | 28 | 2 | 1- | x | |
| 4 | | | 16 | | | 0021 | 32 | 3 | 1+ | | x |
| 4 | | | 11 | x | | 0138 | 15 | 2 | 1- | | |
| 4 | x | x | 32 | x | | 0517 | 39 | 3 | 3- | | x |
| 4 | | | 29 | | 31 | 1359 | 18 | 1 | 2+ | | |
| 5 | | | 47 | 13 | 14 | 0003 | 17 | 1 | 3+ | x | |
| 5 | | | 7 | | | 0036 | 6 | 1 | 1- | | |
| 5 | | | 5 | | | 0056 | 17 | 2 | 1- | | |
| 5 | | | 15 | | | 0120 | 25 | 2 | 1 | | x |
| 5 | | | 14 | | | 0217 | 24 | 2 | 1 | | |
| 5 | | x | 25 | x | | 0300 | 43 | 2 | 2 | x | |
| 5 | 35 | 46 | 35 | 16 | | 0457 | 37 | 2 | 3- | | x |
| 5 | | | 11 | | x | 0614 | 30 | 2 | 1- | | |
| 5 | | | | 27 | 28 | 0910 | 14 | 1 | 2 | x | |
| 6 | | | 12 | | | 0203 | 42 | 2 | 1 | x | x |
| 6 | | | 16 | | | 0251 | 29 | 2 | 1+ | x | |
| 6 | | | 18 | | | 0525 | 18 | 2 | 1+ | x | |
| 6 | | | 16 | | | 0635 | 11 | 2 | 1+ | | x |
| 6 | | | 10 | | | 0654 | 11 | 1 | 1- | | |
| 6 | | | 8 | | | 0709 | 18 | 1 | 1- | | |
| 7 | x | | 12 | | | 0614 | 47 | 3 | 1 | x | x |
| 7 | | x | 51 | x | 28 | 0746 | 27 | 1 | 2 | | x |
| 7 | | x | 33 | x | 21 | 2315 | 18 | 1 | 3- | x | x |
| 8 | | 29 | 17 | x | x | 0230 | 13 | 1 | 1+ | x | x |
| 8 | | 27 | 6 | | x | 0339 | 19 | 2 | 1- | x | |
| 8 | | | | | 5 | 2032 | 24 | 3 | 1- | x | |
| 9 | | | 6 | | 6 | 0607 | 34 | 3 | 1- | x | x |
| 10 | | | 5 | | | 0130 | 17 | 2 | 1- | x | |
| 11 | | | 13 | 15 | 11 | 0731 | 19 | 1 | 1 | x | x |
| 12 | | | | | 15 | 1242 | 25 | 2 | 1 | x | |
| 13 | 20 | 20 | 10 | x | x | 0055 | 20 | 2 | 1- | x | x |
| 13 | 29 | 38 | 35 | x | | 0255 | 52 | 1 | 3 | x | x |
| 13 | | | 11 | 16 | x | 0729 | 18 | 2 | 1- | x | x |
| 13 | | | | 19 | 16 | 0802 | 26 | 2 | 1+ | x | x |
| 13 | x | x | | | 30 | 1545 | 16 | 1 | 2 | x | |
| 15 | | x | 10 | x | x | 0104 | 18 | 2 | 1- | x | |
| 15 | | | 15 | x | | 0328 | 26 | 2 | 1 | x | |
| 15 | | | 20 | | | 2229 | 27 | 1 | 1- | x | x |
| 16 | | | 44 | x | 10 | 0045 | 23 | 1 | 3+ | x | x |
| 16 | | | 9 | | | 0420 | 27 | 2 | 1- | x | |
| 16 | | | 19 | | 15 | 1048 | 27 | 2 | 1+ | x | |
| 16 | | | 19 | | | 2152 | 19 | 2 | 1+ | x | x |
| 17 | | | 15 | | | 0138 | 8 | 2 | 1 | x | |
| 17 | | | 10 | | | 0214 | 20 | 2 | 1- | x | |
| 17 | x | x | 18 | x | | 0453 | 29 | 2 | 1+ | x | |
| 17 | | | 6 | x | | 0528 | 20 | 1 | 1- | x | |
| 17 | | | 15 | 9 | 11 | 0927 | 25 | 2 | 1- | x | |
| 17 | | | 4 | | 8 | 1440 | 8 | 1 | 1- | x | |
| 17 | | x | 37 | | | 2123 | 16 | 1 | 3 | x | x |
| 18 | | | 12 | | | 0151 | 37 | 3 | 1 | x | |
| 18 | | | 7 | | | 0240 | 11 | 1 | 1- | x | |
| 19 | | | 32 | x | 10 | 0115 | 26 | 1 | 3- | | |
| 19 | | | 23 | x | 6 | 0156 | 64 | 1 | 2- | | x |
| 19 | | | 12 | | 3 | 0605 | 26 | 2 | 1 | x | x |
| 19 | | | | | 9 | 1104 | 18 | 1 | 1- | | x |
| 20 | | | 17 | x | 3 | 0008 | 26 | 2 | 1+ | x | |
| 20 | 24 | 25 | 22 | x | | 0325 | 20 | 2 | 2- | | x |
| 20 | x | x | 20 | x | | 0345 | xx | 2 | 2- | x | x |
| 20 | 13 | 12 | 26 | x | 16 | 0614 | 12 | 1 | 2- | x | |
| 20 | x | | | | 8 | 1039 | 11 | 1 | 1- | | |
| 21 | | | 26 | | 16 | 0037 | 58 | 3 | 2 | x | |
| 21 | | 29 | 12 | | 8 | 0207 | 38 | 3 | 1 | | |
| 21 | | | 12 | | | 0252 | 28 | 3 | 1 | | |
| 21 | | | | 20 | 12 | 0810 | 30 | 1 | 1- | x | |
| 21 | | | | 11 | 11 | 1032 | 23 | 1 | 1- | x | |
| 21 | 25 | | | | 9 | 1237 | 38 | 2 | 1- | x | |
| 21 | 17 | | | | 11 | 1342 | 22 | 2 | 1- | x | |
| 21 | | x | 8 | | 17 | 2337 | 33 | 1 | 1 | x | x |
| 22 | | | 16 | | 8 | 0148 | 18 | 2 | 1+ | | |
| 22 | 10 | 9 | 20 | | 13 | 0603 | 22 | 1 | 2- | | |
| 22 | | | | x | 24 | 0847 | 15 | 1 | 2- | x | |
| 22 | 8 | 10 | | | 4 | 1148 | 8 | 1 | 1- | x | |
| 22 | | | 35 | | 30 | 2243 | 32 | 1 | 3- | x | x |
| 23 | | | 25 | | 25 | 0150 | 190 | 2 | 2 | x | x |
| 23 | | | 9 | x | | 0238 | 29 | 2 | 1- | | x |
| 23 | | | | 14 | 28 | 1225 | 30 | 2 | 2 | x | |
| 23 | | | 25 | | | 2205 | 55 | 2 | 2 | x | |
| 23 | | | 28 | | 14 | 2303 | 40 | 2 | 2+ | x | x |
| 24 | | | 20 | | | 0241 | 39 | 2 | 2- | | x |
| 24 | | | | x | 19 | 1003 | 79 | 3 | 1+ | | |
| 24 | | | | | 13 | 1411 | 24 | 2 | 1 | x | |
| 24 | | | | | 15 | 2158 | 40 | 3 | 1- | x | |
| 25 | | | 44 | | | 0006 | 59 | 2 | 3+ | x | x |
| 25 | | x | 7 | x | x | 0339 | 8 | 1 | 1- | x | |
| 25 | | | 16 | | x | 0530 | 36 | 2 | 1+ | x | |
| 25 | 26 | | | 10 | 24 | 0806 | 24 | 1 | 2- | x | x |
| 27 | | | 20 | | | 2205 | 37 | 2 | 2- | x | |
| 29 | | | 14 | | | 0206 | 30 | 2 | 1 | x | |
| 29 | 45 | 50 | 44 | 17 | 28 | 0644 | 38 | 1 | 3+ | x | x |
| 30 | 39 | 33 | 16 | x | 6 | 0314 | 34 | 3 | 1+ | x | |
| 31 | | | 19 | x | 7 | 0027 | 35 | 2 | 1+ | x | |

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

(b) Sudden Phase Anomaly (SPA) at Inubo

Inubo

| Mar. | S | | | | P | | A | | |
|---|---|---|---|---|---|---|---|---|---|
| 1991 | Phase Advance (degrees) | | | | | | Time (U.T.) | | |
| Date | Ω/N | Ω/L | Ω/LR | NWC | Ω/H | Ω/ND | Start | End | Maximum |
| 1 | | — | | 10 | 7 | — | 0239 | 0314 | 0248 |
| 1 | 53 | — | 158 | 49 | 49 | 41 | 0438 | 0710 | 0501 |
| 1 | | — | | | 15 | | 2053 | 2112 | 2100 |
| 1 | 15 | — | 7 | 7 | 15 | 35 | 2314 | 2325D | 2319 |
| 1 | 21 | — | 23 | 50 | 58 | 57 | 2325E | 0006 | 2336 |
| 2 | 19 | — | 27 | 55 | 33 | 28 | 0127 | 0239 | 0131 |
| 2 | 18 | — | 24 | 23 | | 22 | 0454 | 0512D | 0503 |
| 2 | 32 | — | 98 | 76 | 29 | 46 | 0512E | 0649 | 0522 |
| 2 | 21 | — | 61 | 32 | | 11 | 0702 | 0814 | 0714 |
| 2 | | — | 18 | | | | 0837 | 0922 | 0857 |
| 2 | | — | | | 24 | 16 | 2119 | 2135 | 2125 |
| 2 | | — | | | 16 | 26 | 2210 | 2245 | 2219 |
| 3 | 11 | — | | 20 | 8 | 27 | 0135 | 0209D | 0159 |
| 3 | 22 | — | 71 | 82 | 42 | 51 | 0210E | 0508 | 0300 |
| 3 | | — | 42 | 29 | | | 0607 | 0751 | 0630 |
| 3 | 9 | — | 15 | | | | 1310 | 1403 | 1323 |
| 3 | | — | | | 7 | | 2114 | 2140 | 2122 |
| 4 | 42 | — | 66 | 96 | 79 | 65 | 0020 | 0136D | 0042 |
| 4 | 32 | — | 59 | 71 | 59 | 57 | 0136E | 0249 | 0143 |
| 4 | 26 | — | 54 | 39 | 23 | 23 | 0421 | 0518D | 0444 |
| 4 | 86 | — | 198 | 114 | 60 | 49 | 0518E | 0758 | 0535 |
| 4 | | — | 10 | | | | 0908 | 0942 | 0916 |
| 4 | | — | 50 | | | | 1032 | 1133D | 1043 |
| 4 | | — | 42 | | | | 1133E | 1236 | 1142 |
| 4 | 22* | — | 47 | | | 26 | 1359 | 1454 | 1406 |
| 4 | | — | | | 11 | | 2156 | 2218 | 2204 |
| 4 | | — | | 11 | 21 | 20 | 2241 | 2314D | 2257 |
| 4 | 17 | — | 19 | 58 | 60 | 39 | 2314E | 0002D | 2344 |
| 5 | 70 | — | 107 | — | 171 | 137 | 0002E | 0122D | 0011 |
| 5 | 17 | — | — | | 54 | 18 | 0122E | 0157D | 0136 |
| 5 | | — | 14 | — | 37 | | 0157E | 0216D | 0203 |
| 5 | 44 | — | 119 | — | 87 | 53 | 0216E | 0256D | 0229 |
| 5 | 110 | — | 297 | — | 173 | 108 | 0256E | 0438D | 0314 |
| 5 | 25 | — | 44 | — | | | 0438E | 0455D | 0444 |
| 5 | 115 | — | 293 | — | 120 | 62 | 0455E | 0610D | 0505 |
| 5 | 54 | — | 146 | — | | | 0610E | 0743D | 0632 |
| 5 | | — | 69 | — | | | 0743E | 0807D | 0751 |
| 5 | | — | 87 | 15 | | | 0807E | 0831D | 0812 |
| 5 | | — | 96 | 32 | | | 0831E | 0908D | 0839 |
| 5 | 36 | — | 307 | 100 | | | 0908E | 1136 | 0915 |
| 5 | | — | | | | 53 | 1715 | 1810 | 1724 |
| 5 | | — | | | 12 | | 1938 | 1951 | 1944 |
| 5 | | — | | | 23 | | 2030 | 2106 | 2040 |
| 5 | | — | | | 41 | 44 | 2136 | 2234 | 2147 |
| 5 | 11 | — | 11 | 15 | 24 | 20 | 2254 | 2325D | 2307 |
| 5 | 66 | — | 92 | 152 | 152 | 150 | 2325E | 0135 | 2331 |
| 6 | 31 | — | 78 | 75 | 55 | 50 | 0204 | 0251D | 0218 |
| 6 | 19 | — | 54 | 60 | 39 | 52 | 0251E | 0337D | 0302 |
| 6 | 11 | — | 30 | 41 | 21 | 39 | 0337E | 0418 | 0339 |
| 6 | 37 | — | 110 | 78 | 52 | 33 | 0525 | 0713 | 0536 |
| 6 | 43 | — | 164 | 92 | 17 | 20 | 0741 | 0909 | 0752 |
| 6 | | — | 70 | | | | 1038 | 1214 | 1057 |
| 6 | | — | | | 22 | | 1833 | 1849 | 1838 |
| 7 | — | — | 23 | 29 | 22 | 17 | 0142 | 0214D | 0158 |
| 7 | 17 | — | 28 | 43 | 19 | 18 | 0214E | 0312 | 0226 |
| 7 | 12 | — | 11 | 11 | 4 | | 0347 | 0409 | 0352 |
| 7 | 30 | — | 100 | 68 | 13 | 27 | 0617 | 0700D | 0632 |
| 7 | 32 | — | 130 | 70 | 17* | 16 | 0700E | 0743D | 0713 |
| 7 | 212 | — | — | 222 | 38 | 38 | 0744E | 0918 | 0754 |
| 7 | | — | 10 | | | | 1252 | 1309 | 1300 |
| 7 | 39 | — | | | | | 1335 | 1448 | 1353 |
| 7 | | — | | | 27 | — | 2016 | 2035 | 2023 |
| 7 | | — | | | 96 | — | 2036 | 2117 | 2045 |
| 7 | | — | — | 16 | 42 | — | 2216 | 2300 | 2227 |
| 7 | 61 | — | 95 | 183 | 179 | 59 | 2316 | 0056 | 2319 |

Inubo

| Mar. | S | | | P | | | A | | |
|---|---|---|---|---|---|---|---|---|---|
| 1991 | Phase Advance (degrees) | | | | | | Time (U.T.) | | |
| Date | Ω/N | Ω /L | Ω/LR | NWC | Ω/H | Ω/ND | Start | End | Maximum |
| 8 | — | — | 8 | 8 | 5 | — | 0142 | 0207D | 0146 |
| 8 | 24 | — | 69 | 67 | 46 | — | 0207E | 0323 | 0234 |
| 8 | 20 | — | 28 | 26 | 17 | 21 | 0338 | 0438 | 0349 |
| 8 | | — | 7 | | | | 0814 | 0837 | 0819 |
| 8 | | — | 28 | | | | 0909 | 0956 | 0920 |
| 8 | | — | 9 | | | | 1057 | 1125 | 1103 |
| 8 | | — | 58 | | | | 1144 | 1247 | 1153 |
| 8 | | — | | | 37 | 31 | 1920 | 1949 | 1930 |
| 8 | | — | | | 196 | 171 | 2024 | 2213 | 2032 |
| 9 | | — | 127 | 85 | | | 0549 | 0930 | 0657 |
| 9 | | — | 14 | | | | 1243 | 1319 | 1248 |
| 9 | | — | | | 83 | 81 | 2137 | 2242 | 2147 |
| 10 | | — | | 9 | 7 | 34 | 0133 | 0157 | 0142 |
| 10 | | — | 11 | 18 | 10 | 37 | 0219 | 0255 | 0228 |
| 10 | | — | 8 | 5 | | | 0522 | 0544 | 0530 |
| 10 | | — | 7 | 7 | | | 0601 | 0631 | 0609 |
| 10 | 22 | — | 79 | 43 | 6 | 16 | 0634 | 0707D | 0651 |
| 10 | 15 | — | 59 | 31 | | | 0707E | 0832 | 0712 |
| 10 | | — | 16 | | | | 1102 | 1140 | 1108 |
| 10 | | — | | | 12 | | 1813 | 1834 | 1820 |
| 10 | — | — | — | 22 | — | — | 2237 | 2305 | 2245 |
| 11 | | — | 10 | — | 6 | | 0036 | 0055 | 0045 |
| 11 | | — | 9 | — | 6 | | 0321 | 0341 | 0327 |
| 11 | 27 | — | 44 | — | | | 0643 | 0732D | 0721 |
| 11 | 66 | — | 158 | — | 6 | 9 | 0732E | 0857 | 0737 |
| 11 | | — | 5 | | | | 1038 | 1054 | 1043 |
| 11 | | — | | 14 | 27 | 37 | 2213 | 2251 | 2219 |
| 12 | | — | _ | 6 | 6 | | 0052 | 0110 | 0055 |
| 12 | | — | | 12 | 9 | | 0130 | 0156 | 0134 |
| 12 | 6 | — | 16 | 18 | 11 | | 0253 | 0321 | 0258 |
| 12 | 19 | — | 45 | 30 | 19 | | 0420 | 0439D | 0428 |
| 12 | 22 | — | 47 | 38* | 14 | | 0439E | 0548 | 0449 |
| 12 | | — | 8 | | | | 0754 | 0812 | 0759 |
| 12 | | — | 6 | | | | 0943 | 0955 | 0947 |
| 12 | 14 | — | 76 | | | | 1242 | 1406 | 1250 |
| 12 | | — | | 4 | 17 | 18 | 2225 | 2249 | 2232 |
| 13 | | — | | 6 | 6 | 13 | 0005 | 0030D | 0013 |
| 13 | | — | | 7 | 4 | 15 | 0029E | 0039D | 0032 |
| 13 | | — | | 41 | 33 | 52 | 0039E | 0215 | 0103 |
| 13 | | — | 11 | 8 | 7 | | 0141E | 0210 | 0156 |
| 13 | | — | 8 | 7 | 6 | | 0232 | 0245D | 0236 |
| 13 | 82 | — | 280 | 193 | 173 | 119 | 0245E | 0451 | 0306 |
| 13 | 44 | — | 165 | 100 | 12 | 24 | 0730 | 0801 | 0740 |
| 13 | 91 | — | 311 | 184 | 14 | 23 | 0801E | 0930 | 0809 |
| 13 | | — | | | | 58 | 1542 | 1626 | 1550 |
| 13 | | — | | | 20 | | 2041 | 2100 | 2047 |
| 14 | | — | 6 | — | 5 | | 0203 | 0218 | 0205 |
| 14 | 12* | — | 27* | — | 17* | | 0425 | 0505 | 0442 |
| 14 | | — | 11 | — | 3 | — | 0519 | 0542 | 0523 |
| 14 | | — | | | 15 | 31 | 1735 | 1806 | 1742 |
| 14 | | — | | | 81 | 88 | 1813 | 1846 | 1818 |
| 14 | | — | | | 13 | 17 | 2104 | 2126 | 2111 |
| 14 | 18 | — | 8 | | 71 | 57 | 2140 | 2234 | 2146 |
| 14 | | — | | | 6 | 7 | 2239 | 2303D | 2245 |
| 14 | | — | | | 13 | | 2303E | 2324 | 2307 |
| 15 | | — | | 10 | 7 | 15 | 0016 | 0028 | 0020 |
| 15 | | — | | 6 | 6 | | 0032E | 0104D | 0039 |
| 15 | 24 | — | 49 | 65 | 51 | 47 | 0103 | 0202 | 0110 |
| 15 | | — | 22 | 20 | 14 | | 0217 | 0247D | 0234 |
| 15 | | — | 45 | 42 | 29 | | 0247E | 0328D | 0305 |
| 15 | 17 | — | 86 | 58 | 50 | 22 | 0328E | 0403D | 0332 |
| 15 | 40 | — | 125 | 79 | 69 | 29 | 0403E | 0529 | 0410 |
| 15 | | — | 11 | 7 | | | 0530 | 0600 | 0539 |
| 15 | 10 | — | 29 | 24 | 11 | | 0606 | 0624D | 0612 |
| 15 | 8 | — | 38 | 20 | 11 | | 0624E | 0655D | 0634 |

Inubo

| Mar. | S | | | | P | | A | | |
|---|---|---|---|---|---|---|---|---|---|
| 1991 | Phase Advance (degrees) | | | | | | Time (U.T.) | | |
| Date | Ω/N | Ω/L | Ω/LR | NWC | Ω/H | Ω/ND | Start | End | Maximum |
| 15 | | — | 15 | 11 | | | 0655E | 0723 | 0703 |
| 15 | 26 | — | 109 | 59 | 8 | | 0739 | 0842 | 0746 |
| 15 | | — | 8 | | | | 0952 | 1016 | 0956 |
| 15 | | — | | | 17 | 28 | 2037 | 2055 | 2043 |
| 15 | | — | | | 8 | | 2204 | 2222 | 2209 |
| 15 | 40 | — | 41 | 65 | 103 | 92 | 2226 | 2355 | 2236 |
| 16 | | — | | 19 | 15 | 11 | 0007 | 0034 | 0014 |
| 16 | 104 | — | 192 | 220 | 196 | 218 | 0045 | 0226 | 0052 |
| 16 | | — | 22 | 18 | 11 | | 0305 | 0356 | 0322 |
| 16 | 17 | — | 58 | 51 | 26 | | 0423 | 0554D | 0436 |
| 16 | 12 | — | 24 | 24 | 9 | | 0554E | 0638 | 0603 |
| 16 | | — | 9 | | | | 0918 | 0944D | 0928 |
| 16 | | — | 15 | | | | 0944E | 1010 | 0952 |
| 16 | | — | 87 | | | | 1049 | 1239D | 1057 |
| 16 | | — | 14 | | | | 1239E | 1310 | 1249 |
| 16 | | — | | | 18 | 26 | 1803 | 1832 | 1811 |
| 16 | | — | | — | 39 | | 2006 | 2019D | 2017 |
| 16 | | — | | — | 52 | 18 | 2019E | 2047D | 2026 |
| 16 | | — | | — | 108 | 64 | 2047E | 2135D | 2058 |
| 16 | 39 | — | 28 | 80 | 164 | 168 | 2135E | 2328 | 2202 |
| 17 | | — | | | 6 | | 0017 | 0026D | 0021 |
| 17 | | — | | | 11 | | 0026E | 0043D | 0038 |
| 17 | | — | | | 12 | | 0043E | 0119D | 0052 |
| 17 | 23 | — | 66 | | 56 | 30 | 0140 | 0200D | 0154 |
| 17 | 35 | — | 120 | 85 | 74 | 38 | 0200E | 0305D | 0225 |
| 17 | | — | 47 | 47 | 26 | | 0305E | 0409D | 0309 |
| 17 | | — | 10 | 15 | 5 | | 0409E | 0432 | 0414 |
| 17 | 51 | — | 155 | 95 | 68* | 57 | 0452 | 0523D | 0510 |
| 17 | 37 | — | 120 | 79 | 49 | 53 | 0523E | 0706D | 0537 |
| 17 | 13 | — | 32 | 9 | | | 0706E | 0814 | 0722 |
| 17 | | — | 21 | 9 | | | 0820 | 0855 | 0827 |
| 17 | 10 | — | 107 | 21 | | | 0926 | 1013D | 0936 |
| 17 | | — | 24 | | | | 1013E | 1048 | 1019 |
| 17 | | — | 8 | | | | 1108 | 1130 | 1113 |
| 17 | | — | 5 | | | | 1135 | 1154 | 1142 |
| 17 | | — | 6 | | | | 1204 | 1220 | 1211 |
| 17 | | — | | | 42 | 24 | 1748 | 1830 | 1800 |
| 17 | | — | | | 25 | | 2033 | 2116D | 2045 |
| 17 | 45 | — | 15 | 35 | 212 | 188 | 2116E | 2248 | 2131 |
| 17 | 15 | — | 14 | 38 | 37 | 21 | 2318 | 0039 | 2335 |
| 18 | 24 | — | 21 | — | 23 | 43 | 0200 | 0242D | 0212 |
| 18 | 13 | — | 13 | — | 13 | 26 | 0242E | 0400 | 0246 |
| 18 | | — | 4 | — | | | 0427 | 0451 | 0436 |
| 18 | | — | 15 | — | | | 0501 | 0553 | 0521 |
| 18 | | — | 28 | — | | | 0605 | 0704 | 0617 |
| 18 | | — | 15 | | | | 0813 | 0837 | 0819 |
| 18 | | — | 10 | | | | 0917 | 0939D | 0924 |
| 18 | | — | 36 | | | | 0939E | 1027D | 0948 |
| 18 | | — | 45 | | | | 1027 | 1213 | 1038 |
| 18 | | — | 7 | | | | 1256 | 1316 | 1301 |
| 18 | | — | | | 20 | 64 | 1730 | 1809 | 1738 |
| 18 | | — | | | 27 | 37 | 2035 | 2101 | 2047 |
| 18 | 13 | — | 5 | | 79 | 86 | 2130 | 2227D | 2145 |
| 18 | 14 | — | 21 | 29 | 66 | 55 | 2224E | 2303D | 2239 |
| 18 | 11 | — | 23 | 34 | 53 | 38 | 2303E | 0036 | 2312 |
| 19 | 60 | — | 123 | 139 | 130 | 98 | 0117 | 0155D | 0123 |
| 19 | 71 | — | 206 | 163 | 143 | 118 | 0156E | 0325D | 0203 |
| 19 | | — | 16 | 26 | 16 | | 0326E | 0408 | 0330 |
| 19 | | — | 14 | 12 | | | 0439 | 0527D | 0458 |
| 19 | | — | 10 | 6 | | | 0527E | 0555D | 0536 |
| 19 | 30 | — | 122 | 81 | 31 | 29 | 0555 | 0733D | 0617 |
| 19 | | — | 36 | 12 | | | 0806 | 0828D | 0816 |
| 19 | 14 | — | 87 | 31 | | | 0828E | 0915 | 0836 |
| 19 | | — | 46 | | | | 1102 | 1221 | 1107 |
| 19 | | — | | | 12 | | 2219 | 2317 | 2237 |

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| Mar. | S | | | | P | | A | | |
|---|---|---|---|---|---|---|---|---|---|
| 1991 | Phase Advance (degrees) | | | | | | Time (U.T.) | | |
| Date | Ω/N | Ω/L | Ω/LR | NWC | Ω/H | Ω/ND | Start | End | Maximum |
| 19 | 43 | — | 63 | 112 | 101 | 75 | 2346 | 0145 | 0015 |
| 20 | 11 | — | 17 | 22 | 12 | 11 | 0245 | 0320 | 0252 |
| 20 | 38 | — | 124 | 85 | 60 | 38 | 0327 | 0345D | 0337 |
| 20 | 61 | — | 193 | 133 | 95 | 67 | 0345E | 0526D | 0358 |
| 20 | 68 | — | 198 | 132 | 54 | 26 | 0525E | 0613D | 0551 |
| 20 | 99 | — | 245 | 162 | 50 | 37 | 0613E | 0709D | 0618 |
| 20 | | — | 51 | | | | 0709E | 0836 | 0713 |
| 20 | | — | 9 | | | | 0847 | 0911 | 0852 |
| 20 | 15 | — | 62 | | | | 1040 | 1055D | 1045 |
| 20 | 13 | — | 65 | | | | 1055E | 1225 | 1103 |
| 20 | | — | | | 13 | 17 | 2029 | 2053 | 2040 |
| 20 | | — | | | 50 | 58 | 2111 | 2200 | 2122 |
| 20 | 17 | — | 14 | 26 | 33 | 40 | 2303 | 2329 | 2309 |
| 20 | 25 | — | 29 | 59 | 64 | 61 | 2332E | 0005D | 2345 |
| 21 | 16 | — | 18 | 38 | 50 | 34 | 0005E | 0038D | 0013 |
| 21 | 45 | — | 71 | 94 | 99 | 78 | 0038E | 0215D | 0059 |
| 21 | 21 | — | 46 | 45 | 40 | 34 | 0215 | 0301D | 0229 |
| 21 | 18 | — | 41 | 40 | 30 | 21 | 0301E | 0357 | 0311 |
| 21 | 22 | — | 41 | 40 | 16 | 15 | 0422 | 0504 | 0430 |
| 21 | 82 | — | 156 | 98 | 63 | 42 | 0547 | 0651D | 0559 |
| 21 | 29 | — | 60 | 40 | | | 0651E | 0728D | 0659 |
| 21 | 21 | — | 57 | 24 | | | 0728E | 0806D | 0740 |
| 21 | 94 | — | 165 | 75 | | | 0806E | 0945 | 0820 |
| 21 | 20 | — | 24 | | | | 0949 | 1030D | 1002 |
| 21 | 42 | — | 71 | | | | 1030E | 1214 | 1037 |
| 21 | | — | 7 | | | | 1244 | 1302 | 1247 |
| 21 | | — | | | 33 | | 1849 | 1921 | 1857 |
| 21 | | — | | | 147 | 160 | 2019 | 2131 | 2032 |
| 21 | 61 | — | 98 | 153 | 143 | 171 | 2336 | 0045D | 2347 |
| 22 | 7 | — | 8 | 32 | 29 | 46 | 0045E | 0055D | 0048 |
| 22 | 18 | — | 28 | 54 | 48 | 53 | 0055E | 0156 | 0102 |
| 22 | 10 | — | 8 | 8 | 4 | 10 | 0231 | 0252 | 0237 |
| 22 | 17 | — | 29 | 20 | 13 | 10 | 0330 | 0407D | 0340 |
| 22 | | — | 8 | 27 | | | 0408 | 0453 | 0416 |
| 22 | 29 | — | 68 | 33 | 13 | 18 | 0502 | 0554D | 0528 |
| 22 | 63 | — | 171 | 71 | 32 | 24 | 0554E | 0634D | 0609 |
| 22 | 24 | — | 115 | 54 | | | 0634E | 0807 | 0643 |
| 22 | | — | 9 | | | | 0813 | 0830 | 0818 |
| 22 | 121 | — | 232 | 118 | | | 0832 | 0933D | 0844 |
| 22 | 54 | | 87 | | | | 0933E | 1017 | 0936 |
| 22 | 22 | — | 26 | | | | 1147 | 1240 | 1152 |
| 22 | | — | | | 86 | 106 | 2007 | 2037D | 2023 |
| 22 | | — | | | 71 | 80 | 2037E | 2107D | 2044 |
| 22 | | — | | | 51* | 70* | 2107E | 2230 | 2112 |
| 22 | 131 | — | 144 | 234 | 264 | — | 2243E | 0037 | 2249 |
| 23 | 44 | — | 133 | — | 88 | 65 | 0139 | 0236D | 0159 |
| 23 | 70 | — | 210 | — | 90 | 75 | 0236E | 0727D | 0342 |
| 23 | | — | 101 | 8 | | | 0727E | 0948E | 0734 |
| 23 | | — | 12 | | | | 1120 | 1159 | 1130 |
| 23 | | — | 53 | | | | 1230 | 1346 | 1239 |
| 23 | | — | | | 37 | 46 | 1858 | 1916D | 1911 |
| 23 | 12 | — | | | 31 | 46 | 1916E | 1944 | 1922 |
| 23 | 37 | — | 47 | — | 143 | 99 | 2200 | 2305D | 2218 |
| 23 | 34 | — | 68 | — | 124 | 81 | 2305E | 0014D | 2318 |
| 24 | 31 | — | | — | 66 | 54 | 0014E | 0237 | 0054 |
| 24 | 58 | — | 182 | 126 | 100 | 76 | 0241 | 0338D | 0252 |
| 24 | 27 | — | 82 | 53 | 46 | 64 | 0338E | 0457D | 0349 |
| 24 | | — | 39 | 26 | — | | 0457E | 0628 | 0512 |
| 24 | | — | 133 | | | | 1008 | 1226 | 1029 |
| 24 | | — | | | 51 | | 1937 | 2034 | 1942 |

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| Mar. | S | | | | P | | A | | |
|---|---|---|---|---|---|---|---|---|---|
| 1991 | Phase Advance (degrees) | | | | | | Time (U.T.) | | |
| Date | Ω/N | Ω/L | Ω/LR | NWC | Ω/H | Ω/ND | Start | End | Maximum |
| 24 | 11 | — | 12 | 16 | 17 | 17 | 2309 | 2347 | 2317 |
| 25 | 78 | — | 140 | — | 178 | 109 | 0004 | 0241 | 0024 |
| 25 | | — | 5 | — | 2 | | 0306 | 0325 | 0311 |
| 25 | | — | 12 | — | 5 | | 0331 | 0403 | 0341 |
| 25 | | — | 5 | — | | | 0411 | 0427 | 0416 |
| 25 | | — | 4 | — | | | 0439 | 0453 | 0444 |
| 25 | 30 | — | 144 | — | 60 | 29 | 0527 | 0721 | 0539 |
| 25 | 96 | — | 435 | 227 | 27 | 40 | 0802 | 0934D | 0812 |
| 25 | | — | 26 | 78 | | | 0936 | 1000 | 0938 |
| 25 | | — | 27 | | | | 1121 | 1233 | 1139 |
| 25 | | — | | | 29 | 32 | 2003 | 2045 | 2035 |
| 25 | | — | | | 26 | 19 | 2142 | 2215D | 2209 |
| 25 | 19 | — | | 17 | 41 | 22 | 2215E | 2334 | 2229 |
| 26 | | — | | 6 | 4 | | 0108 | 0133 | 0120 |
| 26 | | — | | 8* | 4 | | 0140 | 0215 | 0148 |
| 26 | | — | 9 | 10 | 5 | | 0316 | 0342 | 0325 |
| 26 | | — | 8 | 9 | | | 0520 | 0540 | 0523 |
| 26 | | — | 6 | | | | 0822 | 0838 | 0826 |
| 26 | | — | | 33 | 210 | 104 | 2025 | 2223 | 2034 |
| 27 | | — | | | 4 | 20* | 0038 | 0118 | 0052 |
| 27 | | — | 12 | 16 | | | 0455 | 0539 | 0513 |
| 27 | | — | | | 18 | | 2119 | 2200D | 2135 |
| 27 | 32 | — | 21 | 21 | 101 | 49 | 2200 | 2308D | 2215 |
| 27 | 14 | — | 14 | 9 | 46 | 41 | 2308E | 0115 | 2318 |
| 28 | | — | | 9 | 6 | | 0154 | 0218 | 0157 |
| 28 | | — | 9 | 10 | | | 0327 | 0403 | 0334 |
| 28 | | — | 5 | | | | 0506 | 0534 | 0512 |
| 28 | | — | | | 27 | 21 | 2048 | 2127 | 2100 |
| 28 | | — | | | 12 | | 2135 | 2204 | 2144 |
| 28 | | — | | 10 | 10 | | 2218 | 2258 | 2225 |
| 29 | 16 | — | 62 | 60 | 42 | 22 | 0203 | 0313D | 0216 |
| 29 | | — | 6 | 13 | 6 | | 0313E | 0349 | 0319 |
| 29 | | — | 16 | 16 | 4 | | 0419 | 0458D | 0430 |
| 29 | | — | 24 | 22 | | | 0458E | 0536D | 0520 |
| 29 | | — | 76 | 66 | 30 | 13 | 0536E | 0641D | 0601 |
| 29 | 108 | — | 379 | 243 | 103 | 110 | 0641E | 0905 | 0652 |
| 29 | | — | 52 | | | | 1039 | 1228 | 1050 |
| 29 | | — | 6 | | 6 | | 2213 | 2228 | 2217 |
| 29 | | — | | 4 | 9 | | 2235E | 2251D | 2241 |
| 29 | | — | | 10 | 19 | | 2251E | 2334 | 2255 |
| 30 | | — | | 5 | 3 | | 0020 | 0041 | 0024 |
| 30 | | — | 8 | 14 | 7 | | 0236 | 0303 | 0246 |
| 30 | | — | 128 | 78 | 60 | 30 | 0319 | 0423D | 0332 |
| 30 | | — | 110 | 48 | | | 0423E | 0905D | 0531 |
| 30 | | — | 20 | | | | 0905E | 0923 | 0909 |
| 30 | | — | | | 22 | | 2031 | 2047 | 2037 |
| 30 | | — | | | 20 | | 2129 | 2216 | 2138 |
| 30 | | — | | 10* | 11* | | 2302 | 2330 | 2307 |
| 30 | | — | | 7 | 5 | | 2357 | 0007 | 0000 |
| 31 | | — | | 6 | 6 | | 0013 | 0027D | 0019 |
| 31 | 30 | — | 65 | 89 | 67 | 34 | 0027E | 0149 | 0041 |
| 31 | 14 | — | 54 | 51 | 33 | 18 | 0248 | 0353 | 0304 |
| 31 | | — | 9 | 8 | | | 0417 | 0440 | 0427 |
| 31 | | — | 6 | 5 | | | 0610 | 0641 | 0617 |
| 31 | | — | 13 | 6 | | | 0648 | 0713D | 0654 |
| 31 | | — | 14 | 6 | | | 0713E | 0732 | 0717 |
| 31 | | — | 124 | 47 | | | 0813 | 0956 | 0823 |
| 31 | | — | 34 | | | | 1123 | 1235 | 1134 |
| 31 | | — | | | | 30 | 1651 | 1713 | 1655 |
| 31 | | — | | | 132 | 63 | 1907 | 1937D | 1913 |
| 31 | | — | | | 103 | | 1937E | 0103 | 2034 |

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