

IONOSPHERIC DATA IN JAPAN

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« Real Time Ionograms on the Webhttp://wdc.nict.go.jp/index_eng.html »



NATIONAL INSTITUTE OF INFORMATION
AND COMMUNICATIONS TECHNOLOGY
TOKYO, JAPAN

INTRODUCTION

This Series contains data on ionosphere (I) and solar radio emission (S) obtained at the following stations under the

National Institute of Information and Communications Technology, Japan.

Stations	Geographic(WGS84)		Geomagnetic (IGRF-10(2005))		Technical Method
	Latitude	Longitude	Latitude	Longitude	
*Wakkanai/Sarobetsu	45°10'N	141°45'E	36.4°N	208.9°	Vertical Sounding (I)
Kokubunji	35°43'N	139°29'E	26.8°N	208.2°	Vertical Sounding (I)
Yamagawa	31°12'N	130°37'E	21.7°N	200.5°	Vertical Sounding (I)
Okinawa	26°41'N	128°09'E	17.0°N	198.6°	Vertical Sounding (I)
Hiraiso	36°22'N	140°37'E	27.6°N	209.1°	Solar Radio Emission (S)

*We moved the observation facilities at Wakkanai to Sarobetsu on February 2009. The new observatory is located at approximately 26km south from the old observatory. The observation at Sarobetsu commenced on March 6, 2009.

IONOSPHERE

Ionospheric observations are carried out at the above four stations in Japan by means of vertical sounding using ionosondes. The ionosonde produces ionograms, which are recorded digitally on a computer storage medium. 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 by experienced specialists to supplement automatically-scaled parameters.

A1. Automatic Scaling

Digital ionograms are automatically scaled by the pattern recognition method. The following five characteristics of the ionospheric are listed below. 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 (f_oF2 , fEs , $fmin$) and monthly medians of two factors ($h'Es$, $h'F$), daily Summary Plots and monthly medians plot of f_oF2 .

a. Characteristics of Ionosphere

f_oF2	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 iono-spheric reflections
$h'Es$ $h'F$	Minimum virtual height on the ordinary wave for the Es and F layers, respectively

b. Descriptive Letters

The following descriptive letters are used in the tables.

A Impossible measurement because of the presence of a lower thin layer, for example **Es** (for f_oF2).

C Impossible measurement because of any failure in observation.

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

N Impossible automatic scaling because of complex echoes.

Blank No digital record because of problems occurring in the auto matic data processing system, but existence of film record.

c. Definitions of 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 f_oF2 , 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 f_xE and f_oE 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 Hand-book of Ionogram Interpretation and Reduction (Second Edition) 1972 " and its revision of chapters I-4, published in July 1978.

a. Characteristics of Ionosphere

f_xI	Top frequency of spread F trace
f_oF2 f_oF1 f_oE f_oEs	Ordinary wave critical frequency for the F2 , F1 , E , and Es (including particle type E) layers, respectively
$fbEs$	Blanketing frequency of the Es layer, e.g. the lowest ordinary wave frequency visible through Es
$fmin$	Lowest frequency that shows vertical ionospheric reflections
$M(3000)F2$ $M(3000)F1$	Maximum usable frequency factor for a path of 3000 km for transmission by the F2 and F1 layers, respectively
$h'F2$ $h'F$ $h'E$ $h'Es$	Minimum virtual height on the ordinary wave for the F2 , whole F , E and Es layers, respectively
Types of Es	See below b. (iii)

b. Symbols

(i) Descriptive Letters

The following letters are entered after, or used to replace 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 by, 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 atmospheric.
- 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 part *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.

HOURLY VALUES OF fof2 AT Wakkanai

DEC. 2019

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

$\begin{matrix} H \\ D \end{matrix}$	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	31	29	28	39	28	28	N	42	51	54	52	57	62	42	52	52	44	28	26	28	30	30	33	31
2	34	34	32	34	32	29	26	34	48	59	56	54	50	51	53	48	37	26	N	N	28	29	32	34
3	34	34	34	34	31	29	N	40	48	48	52	55	52	51	50	46	45		28	32	36	36	34	34
4	34	32	32	34	32	32		38	27	54	46	56	58	N	45	51	39		N	28	34	34	34	32
5	32	29	28	28	26	25		32	38	28	50		A	50	51	37	35	A	N	29	34	30	34	28
6	28	31	28	29	34	34	32	42	47	50	50	52	56	51	54	54	42	26	N	31	30	34	34	34
7	31	29	29	28	26	26	N	36	60	28	33	53	55	48	50	52	A	A	A	A	A	34	37	34
8	32	31	29	28	26		N	29	N	49	48	52	49	51	34	49	37	26	28	29	A	34	32	34
9	34	34	32	32	30	30	28	39	48	32	52	56	54	29	40	49	34	A	A	28	36	32	32	38
10	34	34	34	31	29	30	28	37	44	49	45	55	28	49	47	49	35	24	30	34	32	34	38	40
11	48	44	36	36	34	29	28	32	50	34	46	57	48	37	51	30	41	23	106		30	28	A	28
12	A	28	34	A	34	40		26	49	27	43	54	41	52	37	41	A	A	A	A	34	A	A	34
13	36	41	42	36	35	34	A	34	44	37	50	58	48	45	54	54	34	A	A	26	31	30	31	34
14	34	32	32	31	34	29	39	36	44	46	35	54	55	52	50	48	38	A	A	A	A	A	A	34
15	32	30	31	32	31		A	84	47	49	49	52	57	46	53	40	40	30	A	34	36	32	35	34
16	34	34	34	35	31	28	28	40	52	50	60		55	50	51	52	32		A	34	40	34	A	34
17	A	34	32	40	28	26	A	A	43	49	54	50	51	48	50	32				29	34	34	34	34
18	32	29	28	28	N	A	A	32	32	29	54	47	55	52	49	46	30		N		31	32	30	32
19	30		28	N	25		N	34	27	64	49	57	62	57	51	54	44	30	32	32	31	A	A	50
20	42	32	31	30	40	39	30	38	54	55	45	58	57	60	48	50	38	A	A	34	34	31	33	34
21	32	32	30	32	34	31	26	32	43	54	60	58	55	53	51	57	41	A		31	32	35	34	42
22	34	36	36	39	40	40	39	38	40	54	59	57	58	48	55	49	34		37	41	44	34	32	31
23	31	31	31	30	28	29	28	34	36	56	55	54	55	54	55	45	35	29	34	35	34	26	30	31
24	30	34	35	34	36	36	25	41	49	51	55	58	49	45	56	49	44	32	24	34	A	35	34	37
25	32	34	34	34	34	34	A	A	41	51	51	58	54	55	55	44	41	30	37	45	40	43	46	48
26	51	A	47	46	38	34	32	34	54	64	60	56	54	51	54	42	34	31	31	37	35	34	34	34
27	34	34	A	32	30	29	N		51	54	58	33	54	56	49	45	32	32	31	34	36	37	A	34
28	34	34	31	31	29	30		34	49	51	48	63	61	51	54	50	41	29	A	A	A	A	29	31
29	32	32	32	31	31	32	29	28	47	49	52	54	54	43	50	44	42		30	32	35	34	35	35
30	34	37	41	32	32	32	32	34	48	54	52	58	51	53	50	48	37	28	32	32	31	34	34	34
31	35	34	34	32	32	31	29	36	44	52	59	50	46	56	58	50	38	A	A	A	A	31	32	32
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	30	29	30	27	17	27	30	30	31	29	30	30	31	31	29	15	15	23	25	27	25	31
MED	34	34	32	32	32	30	29	34	47	50	51	55	54	51	51	49	38	29	31	32	34	34	34	34
U Q	34	34	34	34	34	34	32	38	49	54	55	57	56	53	54	51	41	30	34	34	36	34	34	34
L Q	32	31	30	30	29	29	28	32	43	46	48	53	50	48	49	45	34	26	28	29	31	31	32	32

HOURLY VALUES OF fEs AT Wakkanai

DEC. 2019

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz 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	24	25	24	32	49	33	34	34	55	52	33	G	37	G	30	24	G	G	G	G
2	G	G	G	G	G	G	60	32	45	32	34	38	49	37	G	34	40	G	G	G	G	G	G	G
3	G	G	G	G	G	32	G	27	29	38	53	107	49	52	51	G	47		G	G	G	G	G	G
4	G	G	G	G	G	G		33	50	44	40	38	53	G	34	G	11		G		26	32	34	G
5	G	G	G	G	G	G		29	32	32	33		62	36	G	32	24	33	G	G	G	G	G	G
6	G	G	102	G	G	G	G	39	29	52	50	39	35	34	31	35	47	30	G	G	G		G	G
7	G	G	G	G	G	G	G		11	70	32	85	34	40	38	38	37	46	41	53	59	34	34	30
8	G	G	G	G	G	G	26	31	G	33	34	69	34	50	40	32	38	G	G	G		54	48	G
9	G	G	G	G	G	54	35	34	48	37	39	38	40	34	37	35	59	43	30	29	G	24	40	G
10	G	G	G	G	G	25	34	26	48	36	46	49	100	88	36	34	33	32	G	G	G	G	26	24
11	28	G	G	G	G	G	G		34	40	40	35	35	35	38	36	36	11	G	153	104	29	32	46
12	57	31	G	G	G	28		33	48	31	41	40	47	49	37	47	60	90	110	60	35	34	34	30
13	G	G	G	G	G	156	34	33	34	34	58	40	34	46	36	G	33	26	41	28	40	G	33	G
14	164	24	G	G	G	96	50	11	28	150	135	G	41	34	50	34	40	38	109	128	92	58	40	28
15	34	G	G	G	G	72	105	81	27	69	52	39	55	33	G	45	41	57	60	34	32	29	28	27
16	G	G	G	G	G	G	G	27	36	46	38	89	48	G	G	G	36		35	27	29	32	40	33
17	39	G	G	G	G	26	43	57	39	81	54	40	34	61	39	G	24		G	G	G	32	G	G
18	G	G	G	G	G	26	28	33	38	G	32	34	52	70	32	29	38		G		G	G	G	G
19	113		G	G	G		G	G	32	G	33	33	33	G	34	31	26	G	G	G		26	108	59
20	23	28	G	G	G	G	58	G	70	34		34	34	34	33	33	28	73	60	28	G	25	35	24
21	G	28	G	G	G	G	G	G	45	33	34	92	42	108	31	29	34	34	G	G	G	G	G	G
22	G	G	G	G	G	24		G	55	35	G	49	G	G	G	G	11		172	28	28		33	G
23	G	G	28	G	G	G	27	G	53		G	G	G	48	163	44	G	36	59	G	G	G	G	G
24	G	G	G	G	G	35	G	11	49	84	34	39	G	34	G	G	11	34	G	G	55	40	152	57
25	57	25	30	G	G	35	29	53	92	48	39	48	G	38	G	G	29	41	31	G	G	G	G	G
26	28	40	28	G	G	G	G	G		35	108	38	36	35	44	36	30	G	G	G	26	G	29	G
27	G	G	34	G	G	132		G	28	34	35	151	48	G	32	45	34	G	G		28		30	40
28	G	G	G	G	G	G		58	28	32	59	34	G	34	G	30	11	G		35	60	58	59	26
29	G	G	G	G	G	101	G	G	70	36	48	46	G	G	41	34	31	35		G	28	28	24	G
30	G	G	G	G	G	G	G		34	29	32	34	36	34	36	34	59	33	26	30	G	86	G	G
31	G	G	113	G	G	G	G		26	46	35	32	33	43	36	G	33	44	49	34	60	60	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	31	31	31	30	27	30	31	31	31	30	31	31	31	31	31	24	30	30	31	31	31	31
MED	G	G	G	G	G	12	G	32	39	35	38	38	40	36	34	31	35	32	G	26	26	25	24	G
U Q	28	G	G	G	G	32	35	34	48	46	50	40	49	50	37	35	41	42	41	34	35	34	35	25
L Q	G	G	G	G	G	G	G	11	29	32	34	34	34	34	G	G	24	G	G	G	G	G	G	G

HOURLY VALUES OF fmin AT Wakkanai

DEC. 2019

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

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

HOURLY VALUES OF fof2 AT Kokubunji

DEC. 2019

LAT. 35°43.0'N LON. 139°29.0'E SWEEP 1.0MHz TO 30.0MHz 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	28	26	A	A	34	26	N	40	45	52	52	64	59	58	54	50	44	36	28		34	27	A	34	
2	34	32	35	36	34	26	25	44	50	47	52	55	58	58	57	55	44	31			30	28	26	27	
3	27	26	N	26	26		N	39	45	55	51	54	48	53	48	47	42	32	25	27	28	34	32	30	
4	26	27	25	27	31	26	30	42	47	50	49	58	60	53	59	49	41	31	N		28	28	32	25	
5	31	31	27	27	27	N		35	47	N	55	56	56	54	45	46	44	27		31	26	27	27	26	
6	23	N	N	N	N			39	44	49	50	51	54	57	53	51	49	32	26		26	A		28	
7	27	27	28	26	26	N	N	46	47	51	48	52	54	54	55	36	52	30		27	30	30		26	
8	26	26		N	N		19	44	49	49	50	52	54	41	47	51	42			30		29	27		
9	27	27			28		A	A	48	51	49	56	52	62	193	51	44	31	27	27	A	A	A	A	
10	31	28	27	N			27	41	50	51	48	49	54	45	47	45	N	30	A	N	34	34	32	32	
11	32	32	30	27	26	N	26	51	54	48	48	49	48	54	48	48	47	34		N		26	N	48	
12	27	27	27	26	26	26		37	46	44	51	47	49	51	49	55	209	A	A	A	A	A	A	26	
13	27	A	30	23	28		N	43	49	51	53	55	A	119	47	51	51	A	A		27	25	27	25	
14	27	26	27	26	27	26		44	49	54	49	54	51	51	47	49	48	31		27	35	34	24	A	
15		27	27	28	26			43	53	49	A	A	A		52	47	48	44	34	32	32	34	31	28	
16	28	N	30	A		N	N	46	52	54		51	45	54	50	51	44	30	N	A		37	27	26	
17	27	28	30	30	27			43	48	48	47	51	56	53						28	25	32	23	24	
18	25	25	25	24	N	N		41	47	47									A		27	28	30	30	
19	27	27	27	N				54	51	49	56	59	59	62	N	52	42	N	28	24	A	A	A	26	
20	27	27	30	26	27		N	41	47	A	A	58	58	58	63	49	47	34	N	27	32	32	27	31	
21	A	A	27	A	27	N		43	41	44	59	65	49	47	52	46	44	38		34	34	N	58	A	
22	27	A	26	26	27	26	N	43	48	48	58	52	54	54	48	49	A	A	A		34	30		26	
23	A	25	27	A	A	A	A	42	48	49	53	55	52	51	48	53	46	27	26	A		30	26	N	
24	A	27	28	31				N	46	54	50	56	52	54	47	41	53	30	N	27	27	32	N	25	
25	27		N	N	25	N		42	51	47	N	56	63	51	54	50	39	A	N		37	34		38	
26	34	32	26	N	23	N	N	42	49	54	65	65	54	52	51	47	36	30	28	34	27	30	28	31	
27	31	27	27	32	N		N	37	43	48	57	58	58	59	48	47	39	26	A		36	30	30	31	
28	27	28	30	31	N		27	38	46	46	46	62	57	52	50	50	49	30		30	31	32	28	26	
29	A	26	A	26	N	N		36	A	A	53	59	51	48	46	51	44	34	N		28	30	32	28	32
30	27	27	30	34	26		26	34	44	47	65	55	59	49	47	50	45	35		26	31	A	A	28	
31	28	26	26	27	26		N	50	48	45	49	58	54	54	58	66	47	34	A	A	34	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	25	24	20	20	6	7	29	30	28	26	29	28	30	28	29	27	23	8	20	25	23	18	21	
MED	27	27	27	27	27	26	27	42	48	49	51	55	54	54	48	50	44	31	28	28	30	30	28	27	
U Q	28	28	30	30	27	26	30	44	49	51	55	58	58	57	54	51	48	34	28	31	34	32	31	31	
L Q	27	26	27	26	26	26	26	39	46	47	49	52	51	51	47	47	42	30	26	27	27	28	26	26	

HOURLY VALUES OF fEs AT Kokubunji

DEC. 2019

LAT. 35°43.0'N LON. 139°29.0'E SWEEP 1.0MHz TO 30.0MHz 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	
2	G	G	G	G		G	G	G	G					G							G	G	G	G	
3	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
5	G	G	G	G	G	G															G	G	G	G	G
6	G	G	G	G	G			G											G	G					G
7		G	G	G	G	G	G	G	G										G		G	G			G
8	G	G		G	G		G	G													G	G		G	
9	G	G			G														G	G	G				
10	G	G	G	G																	G	G	G	G	G
11	G	G	G	G	G	G	G	G	G													G	G	G	G
12	G	G	G	G	G	G																			
13	G		G	G	G		G																		
14	G	G	G	G	G	G																			
15		G	G	G																					
16	G	G	G			G	G	G																	
17		G	G	G	G																				
18	G	G	G	G	G	G																			
19	G	G	G	G	G																				
20	G	G	G	G	G		G																		
21	47	33	33	52	G	G																			
22	27	37	26	G	G																				
23	29	28	31	41	47	31	25																		
24	29	G	G	25																					
25	G		G	G	29																				
26	G	G	G	G	G	G	G	G																	
27	G	G	G	G	G																				
28	G	G	G	G	G																				
29		G	G	G	G	G																			
30	G	G	G	G	G																				
31	G	G	G	G	G																				
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	30	30	29	30	28	16	19	31	31	31	29	30	30	30	29	29	29	28	21	27	29	30	26	29	
MED	G	G	G	G	G	G	G	G	31	39	38	40	41	40	35	35	29	G	G	G	G	G	G	G	G
U Q	G	G	G	G	G	G	G	30	35	45	43	43	45	43	40	41	41	29	30	25	23	29	28	28	
L Q	G	G	G	G	G	G	G	G	G	33	G	G	G	G	G	G	27	G	G	G	G	G	G	G	G

HOURLY VALUES OF fmin AT Kokubunji

DEC. 2019

LAT. 35°43.0'N LON. 139°29.0'E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

$\begin{matrix} H \\ D \end{matrix}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	14	17	17	14	15	14	14	14	13	14	14	14	13	14	14	15	15	14		14	20	15	15
2	14	14	15	14	14	14	15	18	14	13	14	17	14	15	13	15	13	14			15	17	14	14
3	14	14	15	21	14		17	13	13	14	14	14	15	18	14	14	13	20	13	21	14	14	17	14
4	15	14	13	14	14	14	13	15	13	14	18	17	15	21	14	14	17	14	20		18	15	14	13
5	14	14	14	14	14	14		14	14	14	14	14	13	13	29	14	17	14		15	17	14	13	14
6	14	14	14	14	18			15	13	14	15	14	17	15	14	13	14	18	14		14	14		14
7	15	14	15	14	14	14	14	17	21	14	17	34	14	13	14	18	26	18		20	17	13		14
8	14	14		14	14		17	17	14	14	15	15	14	14	13	15	18			14	25	17	24	
9	21	14			20		13	14	14	13	17	14	15	14	13	14	14	14	20	17	13	14	13	13
10	14	13	13	13			14	14	14	13	14	14	14	13	14	13	13	15	14	15	14	13	13	13
11	14	13	13	17	14	14	14	18	13	13	14	17	15	14	13	13	17	14		22		13	15	14
12	14	15	13	13	13	13		14	14	14	13	15	15	17	15	13	13	14	15	14	13	13	14	15
13	13	15	13	14	14		17	17	14	14	15	14	17	14	13	13	14	14	14	15	14	14		15
14	14	13	14	13	13	14		14	13	18	14	17	17	14	14	13	14	14		14	14	15	14	
15		14	14	14	15			17	23	18	14	14	13	14	20	14	21	14	14	20	15	14	13	14
16	18	15	17	13		18	20	14	14	14		17	17	18	13	13	20	17	17	14	13	13		14
17	14	15	14	15	18			14	14	15	14	13	13	13						17	13	13	14	14
18	14	14	13	14	14	15		15	13	14									13	14	14	15	14	14
19	13	14	14	14	15			14	15	14	15	15	14	14	13	13	13	14	14	14	13	13	13	13
20	14	14	14	14	13		18	14	15	14	14	15	15	14	14	15	13	17	14	15	18	14	13	13
21	14	13	13	14	13	21		18	14	13	14	14	14	14	13	25	20	17		14	14	14	17	13
22	14	13	15	14	14	14	21	13	13	14	15	15	14	14	14	13	17	13	13	13	18		14	13
23	14	14	13	14	14	13	15	17	13	14	14	14	15	15	17	17	20	17	20	17		14	14	18
24	14	14	13	14				17	13	14	14	15	15	14	17	24	13	14	15	14	14	15	18	17
25	13		17	14	13	15		15	14	17	14	14	14	14	15	14	14	15	18	23	21	15		15
26	14	14	14	18	14	14	15	13	14	13	14	14	17	15	13	14	14	15	15	14	15	13	14	14
27	13	14	17	14	17		14	14	13	13	17	17	14	18	18	21	18	18	14	14	14	14	14	14
28	14	17	18	14	18		15	14	14	13	15	14	18	21	17	13	20	14		20	14	14	14	14
29	14	14	14	13	13	14		15	14	14	17	18	21	17	17	15	14	14	21	18	21	14	13	14
30	14	14	13	14	14		17	17	17	13	15	17	13	18	15	18	13	15		18	14	15	15	14
31	14	14	14	14	13		21	14	14	14	14	18	15	15	14	13	14	14	13	18	14	14	13	13
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	29	30	28	16	19	31	31	31	29	30	30	30	29	29	29	28	21	27	29	30	26	29
MED	14	14	14	14	14	14	15	14	14	14	14	15	15	14	14	14	14	14	14	15	14	14	14	14
U Q	14	14	15	14	14	15	17	17	14	14	15	17	15	17	16	15	18	17	17	18	17	15	15	14
L Q	14	14	13	14	13	14	14	14	13	13	14	14	14	14	13	13	13	14	14	14	14	13	13	13

HOURLY VALUES OF fof2 AT Yamagawa

DEC. 2019

LAT. 31°12.0'N LON. 130°37.0'E SWEEP 1.0MHz TO 30.0MHz 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	28	A	29	26	30		B	30	43	54	55	58	55	46	50	55	46	43	34	A	A	A	31	32
2	32	32	32	32	34	28	B	37	52	53	50	58	58	64	48	55	51	45	32	26	N	26	26	28
3	26	A	30	28	N	N	B	30	44	54	51	50	49	55	54	54	47	40	28	B	28	32	31	30
4	30	A	30	29	30	B	A	34	44	32	57	57	52	66	58	169	50	46	A	26	26	32	28	28
5	28	28	26	26	26	N	N	A	46	49	51	54	58	56	50	40	51	45	34	N	29	N	A	N
6	28	28	24	24	N	N	N	32	45	51	48	50	55	58	72	54	47	52	35	26	N	N	26	N
7	A	26	A	28	28	N	B	36	43	66	51	56	54	63	33	54	55	48	32	30	31	28	N	23
8	29	31	32	31	29	29	N	37	50	52	51	50	49	44	49	33	55	51	A	26	25	26	26	28
9	29	29	30	30	28	N	28	34	54	53	50	51	51	50	65	55	53	49	32	30	N	N	B	N
10	26	28	26	26	28	30	28	30	45	52	53	53	50	54	50	44	53	63	34	26	28	29	32	29
11	28	29	30	31	29	28	28	45	59	50	45	55	50	54	51	45	A	54	37	B	29		28	
12	28	28	26	28	29	N	N	32	42	46	55	54	52	57	40	51	54	36	A	A	A	A	N	A
13	A	A	29	28	29	N	B	34	51	53	56	57	52	56	52	145	51	54	32	B	50	A	A	N
14	B	26	28	26	A	26	A	34	23	48	53	51	51	54	52	41	49	50	34	N	30	30		B
15	A	A	26	N	A	N	A	54	55	N	52	A	39	A	A	50	46	42	32	34	30	34	32	A
16	29	26	26	26	A	26	49	34	52	50	55	59	52	45	51	53	54	42	32	28	31	189	N	A
17	25	29	28	49	49	26	N	34	52	51	48	52	52	A	58	A	50	38	A	A	28	28	28	28
18	26	25	25	N	N	26	N	27	51	49	29	59	52	55	50	59	54	46	A	A	A	28	N	A
19	28	28	N	B	B	N	N	37	54	57	52	55	64	72	69	58	A	A	A	A	31	29	N	26
20		A	29	28	28	N	N	34	49	51	A	54	58	56	42	44	44	50	45	A	30	30	28	25
21	39	26	28	29	26	49	B	31	52	54	45	54	60	44	79	50	51	47	44	A	A	A	A	A
22	A	A	A	N	29	28	N	30	44	48	52	54	A	51	A	A	30	41	30	59	31	30	A	25
23	28	N	A	A	25	N	B	28	49	46	51	A	65	A	35	54	55	A	A	A	30	B	N	A
24	28	32	34	26	N	A	A	29	54	54	51	57	65	55	50	47	57	50	34	49	26	28	N	N
25	26	28	25	N	29	33	B	30	53	49	44	49	51	51	49	54	46	43	34	B	32	35	N	B
26		28	26	29	31	29	32	36	26	51	54	65	52	44	39	48	50	45	34	30	159	A	34	34
27	32	30	31	34	31	26	B	30	48	51	48	70	65	64	47	50	48	N	A	A	A	A	28	28
28	30	30	29	N	A	N	A	31	44	49	48	45	71	51	63	48	49	50	25	A	A	32	32	A
29	26	28	26	25	28	26		28	40	45	51	61	51	50	50	50	51	38	34	N	28	29	31	29
30	29	28	29	32	26	A	N	26	42	50	51	62	66	50	50	48	53	44	35	A	49	25	189	28
31	28	32	34	32	34	49	B	29	53	N	44	48	65	57	46	72	38	54	34	30	28	28	26	31
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	24	23	27	24	22	15	5	30	31	29	30	29	30	28	29	29	29	28	23	13	22	20	17	16
MED	28	28	29	28	29	28	28	32	49	51	51	54	52	54	50	51	51	46	34	30	30	29	28	28
U Q	29	30	30	31	30	30	40	34	52	53	53	58	60	57	56	55	53	50	34	32	31	32	32	29
L Q	27	28	26	26	28	26	28	30	44	49	48	51	51	50	47	47	47	42	32	26	28	28	27	27

HOURLY VALUES OF fEs AT Yamagawa

DEC. 2019

LAT. 31°12.0'N LON. 130°37.0'E SWEEP 1.0MHz TO 30.0MHz 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	38	G	G	G	G	B	28	40	37	40	40	45	44	51	38	33	26	G	26	30	36	G	G
2	29	G	G	28	20	25	B	24	71	36	41	143	50	48	54	42	49	27	G	G	G	G	G	G
3	G	28	G	G	G	G	B	G	29	34	42	41	42	38	37	34	69	28	32	B	G	G	G	G
4	G	32	33	24	G	B	27	11	43	38	42	50	52	40	36	53	48	29	35	G	G	G	G	G
5	G	G	G	G	G	G	G	50	33	34	144	41	44	G	36	39	92	38	34	G	G	G	39	25
6	G	G	G	G	G	G	G	11	28	40	39	42	48	45	43	G	36	44	G	G	G	G	G	G
7	53	28	32	24	G	G	B	39	G	45	45	44	44	44	45	50	35	26	G	G	G	G	G	G
8	G	G	113	G	G	G	G	28	G	32	45	41	43	46	47	42	34	36	34	34	25	27	27	33
9	G	G	G	G	G	G	G	G	49	45	G	G	46	42	40	44	G	48	25	G	27	G	B	G
10	G	G	G	G	G	G	11	G	G	53	45	40	44	41	37	38	30	28	35	G	G	G	G	G
11	G	G	G	G	G	G	G	G	48	153	36	48	44	48	41	41	59	35	24	B	25	G	G	G
12	G	G	G	G	G	11	22	G	34	39	41	55	49	40	50	40	35	33	35	43	29	46	G	40
13	30	46	178	G	G	G	B	111	48	37	42	42	38	42	41	40	36	G	32	B	25	54	38	G
14	B	G	G	G	29	24	48	112	28	33	40	40	46	44	50	38	57	28	30	G	G	G		B
15	49	45	G	G	28	G	94	G	G	33	43	69	61	56	57	G	32	38	34	G	G	25	25	26
16	166	G	G	G	27	G	G	32	28	34	38	40	37	41	42	38	41	32	20	27	G	G	G	28
17	G	G	G	G	G	G	G	32	48	34	58	56	80	61	44	70	41	35	43	28	G	G	G	G
18	G	G	G	G	G	G	11	G	28	G	G	58	G	57	43	41	40	34	37	60	58	29	G	39
19	25	G	G	B	B	G	G	G	28	34	36	37	38	38	46	61	60	82	78	39	G	G	26	G
20		43	G	27	34	G	G	G	28	40	61	63	49	43	42	51	69	92	46	56	G	G	G	G
21	29	G	G	G	G	G	B	G	31	39	44	54	44	56	71	56	40	33	49	48	82	55	38	32
22	33	45	33	G	G	24	G	G	32	48	52	88	96	170	94	60	40	41	21	G	33	33	29	G
23	G	G	32	28	50	G	B	G	30	54	48	70	40	54	42	40	59	57	56	40	25	B	G	30
24	25	27	28	G	25	27	30	26	34	39	41	55	60	39	53	40	52	G	28	G	G	G	G	G
25	G	G	G	G	G	25	B	26	27	33	142	44	41	40	41	35	33	39	24	B	G	G	G	B
26		G	G	G	G	G	G	G	G	32	44	41	45	56	52	41	41	39	28	G	G	27	G	G
27	G	26	24	G	G	G	B	G	31	35	37	56	55	42	G	34	35	28	40	36	46	34	G	G
28	G	G	105	27	34	25	27	G	29	38	54	85	52	42	44	46	G	48	31	40	29	29	26	28
29	G	G	G	G	G	G	G	G	34	40	108	44	42	39	40	G	32	G	35	G	G	G	G	G
30	G	G	G	G	29	49	G	G	43	38	42	46	38	38	41	G	43	40	30	27	G	G	G	G
31	G	G	G	G	G	G	B	G	48	34	38	48	56	50	44	40	44	35	31	28	G	39	34	72
	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	31	30	30	30	21	31	31	31	31	31	31	31	31	31	31	31	31	27	31	30	29	29
MED	G	G	G	G	G	G	G	G	31	37	42	46	45	43	43	40	40	35	32	26	G	G	G	G
U Q	27	28	28	G	25	11	24	28	43	40	48	56	52	50	50	46	52	40	35	39	27	29	26	28
L Q	G	G	G	G	G	G	G	G	28	34	39	41	42	40	41	38	34	28	24	G	G	G	G	G

HOURLY VALUES OF fmin AT Yamagawa

DEC. 2019

LAT. 31°12.0'N LON. 130°37.0'E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

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

HOURLY VALUES OF fof2 AT Okinawa

DEC. 2019

LAT. 26°41.0'N LON. 128°09.0'E SWEEP 1.0MHz TO 30.0MHz 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	N	26	29	34	N	B	32	44	43	58	58	58	55	65	54	A	42	34	A	N	A	A	29	
2	30	28	29	31	28	B		32	48	52	73	56	76	85	66	54	60	50	42	30	28	29	30	37	
3	34	34	34	29	26	N	B	32	36	54	44	56	45	61	65	54	48	47	34	N	A	B	28		
4	28	28	28	26	B	A	A	31	53	48	52	62	66	76	72	71	81	53	41	32	N	26	N	N	
5	26	26	28	29	26	B	N	35	A	50	54	56	55	58	56	55	60	55	43	34	N	A	A	N	
6	N	26	N	N	N	N		31	48	47	53	54	49	60	61	58	50	51	72	40	A		N	N	
7	A	A	A	A	30	A	N	32	51	50	57	63	62	66	56	75	71	55	54	37	28	B	N		
8	A	26	26	29	30	29	N	37	50	52	50	54	43	57	A	57	54	58	51	59	A	31	28	A	
9	28	28	30	31	30	26	26		50	64	51	54	52	58	56	66	55	56	48	36	A	B	N	N	
10	N	N	26	26	28	29	N	30	48	52	52	52	50	53	59	50	41	58	53	A	32	28	30	34	
11	32	N	26	28	30	28	N	39	46	49	49	50	51	53	55	51	60	56	44	41	31	30	28	22	
12	28	N	26	26	29	31	B	31	41	45	52	60	50	58	68	58	57	55	32	59	A	34	A	N	
13	26	26	A	A	29	N	B	32	50	50	70	50	58	61	58	55	54	55	40	A	A	29	B	N	
14	B	N	29	28	28		N	32	47	48	51	60	53	52	43	60	60	51	45	A	A	A	34	28	
15	39	N	A	A	B	N	B	34	49	55	51	61	53	51	60	55	58	47	38	31	30	29	28	N	
16	N	N	N	N	B	N	N	32	43	50	55	58	56	60	64	71	60	76	44	A	A	B	31	22	
17	N	N	N	29		B	N	31	47	54	N	57	64	52	58	A	62	45	37	31	28	N	28	28	
18	N		N	N	N	B		30	46	51	55	60	48	50	54	58	74	51	48	A	30	A	A	30	
19	A	A	N	N	A	B		30	52	65	84	57	54	72	88	77	55	66	52	31	A	A	A	A	
20	28	A	26	24	28	25	29	34	54	54	52	49	58	54	64	63	59	55	51	50	A	A	A	A	
21	A	A	A	29	35	A	A	49	54	52	56	51	64	65	44	A	A	68	A	A	A	39	A	A	
22	A	30	32	A	31	29	N	28	48	51	50	58	A	58	A	A	A	A	A	A	40	42	38	34	
23	49	32	32	30	A	32	B	N	50	54	54	51	65	63	46	A	52	52	40	A	34	28	29	A	
24	N	29	27	N		A		N	52	55	62	51	A	66	A	A	51	A	A	A	A	A	A	B	
25	N	N	26	28	29	31	B	59	51	51	54	51	63	54	53	51	52	44	37	31	28	28	28	B	
26	N	N	N	N	A	N	B	N	51	44	43	63	68	67	69	50	55	62	A	A	A	32	32	49	
27	28	28	28	31	29	N		28	48	50	66	74	60	63	56	48	52	26	30	A	B	A	A	N	
28	26	B	N	26	26	N	B	28	44	A	54	72	84	91	81	74	54	62	43	31	N	30	26	N	
29	A	N	A	A	34	27		59	64	54	149	54	60	57	67	55	50	46	35	31	26	28	30	28	
30	28	28	28	26	29	B	B	N	42	50	49	62	71	70	58	52	54	52	47	32	B	N	59	29	
31	29	35	34	34	34	N		28	29	50	60	55	59	81	98	78	91	87	90	55	A	32	34	37	32
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	15	14	19	20	21	11	3	26	30	30	30	31	29	31	28	26	28	29	27	17	12	17	17	13	
MED	28	28	28	29	29	29	28	32	48	51	54	57	58	60	60	56	55	55	43	32	30	30	30	29	
U Q	32	30	30	29	30	31	29	34	51	54	57	60	64	66	66	66	60	58	51	40	32	34	33	34	
L Q	28	26	26	26	28	26	26	30	46	50	51	52	51	54	56	54	52	48	37	31	28	28	28	28	

HOURLY VALUES OF fEs AT Okinawa

DEC. 2019

LAT. 26°41.0'N LON. 128°09.0'E SWEEP 1.0MHz TO 30.0MHz 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	120	G	G	11	G	B	170	40	44	42	47	51	50	47	180	67	50	46	33	G	33	32	G
2	49	G	G	G	181	B		G	48	39	G	45	48	45	37	41	52	G	11	G	G	G	G	G
3	24	G	28	27	G	G	B		11	32	34	38	44	41	40	40	35	34	31	28	G	B	G	G
4	G	G	G	G	B	35	25	G	33	40	45	45	45	43	44	103	45	48	27	23	G	G	G	G
5	G	G	G	G	G	B	G	G	60	52	62	37	46	45	44	53	G	43	41	G		28	28	29
6	G	G	131	G	G	G	G	11	136	39	44	41	45	44	47	39	51	33	35	38	46	G	G	40
7	39	39	34	40	G	26	G	23	G	38	60	43	39	40	G	46	46	45	36	26	G	B	G	G
8	25	G	G	G	G	G	G	G	48	54	44	61	46	46	70	56	G	48	24	26	32	26	G	29
9	G	G	G	G	G	G	G		G	54	G	41	40	44	142	40	58	45	46	38	26	B	G	G
10	G	G	G	G	G	11	G	G	G	38	46	48	45	48	170	42	40	38	56	33	G	G	G	G
11	G	G	G	G	G	G	G	G	48	41	41	44	46	44	43	38	32	33	34	35	G	G	27	G
12	G	G	83	G	G	G	B	24	144	36	40	43	42	44	48	41	36	31	35	30	25	28	36	G
13	G	G	34	48	G	G	B	28	G	33	36	40	42	38	61	44	142	59	34	56	38	B	G	G
14	B	G	G	G	G		28	G	160	34	41	56	46	46	44	42	35	50	35	71	35	25	32	G
15	G	G	54	30	B	G	B	83	94	168	37	G	61	45	38	39	G	28	11	11	27	G	G	G
16	G	G	G	G	B	G	G	35	35	34	39	38	40	46	64	38	38	46	33	35	33	B	G	G
17	G	G	G	G		B	G	G	29	34	40	40	60	77	91	115	50	38	24	24	G	G	G	G
18	G	G	G	G	G	G	B	23	G	34	36	45	G	47	47	42	42	35	39	51	G	28	80	29
19	25	34	G	G	27	B	G	G	31	32	39	41	50	41	43	47	40	32	50	29	35	41	28	26
20	56	43	G	G	G	G	G	G	30	38	59	57	53	58	46	54	55	38	38	54	45	56	58	58
21	58	58	56	G	35	34	36	G	29	37	44	130	45	48	51	54	84	93	92	60	58	40	36	34
22	27	G	55	39	67	G	G	G	29	40	67	59	108	90	161	61	149	92	47	38	G	G	G	G
23	11	G	28	26	32	G	B	G	68	39	50	49	43	39	45	60	92	44	24	29	G	26	G	32
24	46	28	32	G	G	117	G	G	138	35	40	69	79	58	62	109	41	78	58	35	24	33	27	B
25	G	G	24	G	G	135	B	24	28	34	50	G	43	46	41	40	36	27	22	24	G	G	G	B
26	59	G	G	G	35	G	B	G	29	40	37	48	92	47	55	39	39	59	56	45	56	G	G	G
27	G	G	G	G	G	G	G	G	39	34	36	G	47	39	40	40	43	30	27	26	B	28	29	G
28	G	B	G	G	G	G	B	G	58	67	54	49	53	46	49	47	36	29	147	G	G	25	34	G
29	28	G	30	31	24	34	G	G	33	38	48	70	46	70	44	38	147	G	11	G	G	G	G	G
30	G	G	G	G	G	B	B	G	109	38	42	46	56	46	40	49	58	28	23	34	B	G	G	G
31	G	G	G	G	G	G	21	96	40	34	38	41	40	42	48	42	G	48	49	28	G	G	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	31	31	27	25	19	30	31	31	31	31	31	31	31	31	31	31	31	31	29	27	30	29
MED	G	G	G	G	G	G	G	G	35	38	41	45	46	46	47	42	42	38	35	30	24	G	G	G
U Q	27	G	32	G	24	18	G	23	60	40	48	49	53	48	61	54	58	48	47	38	34	28	29	13
L Q	G	G	G	G	G	G	G	G	29	34	38	41	42	43	43	40	36	31	24	24	G	G	G	G

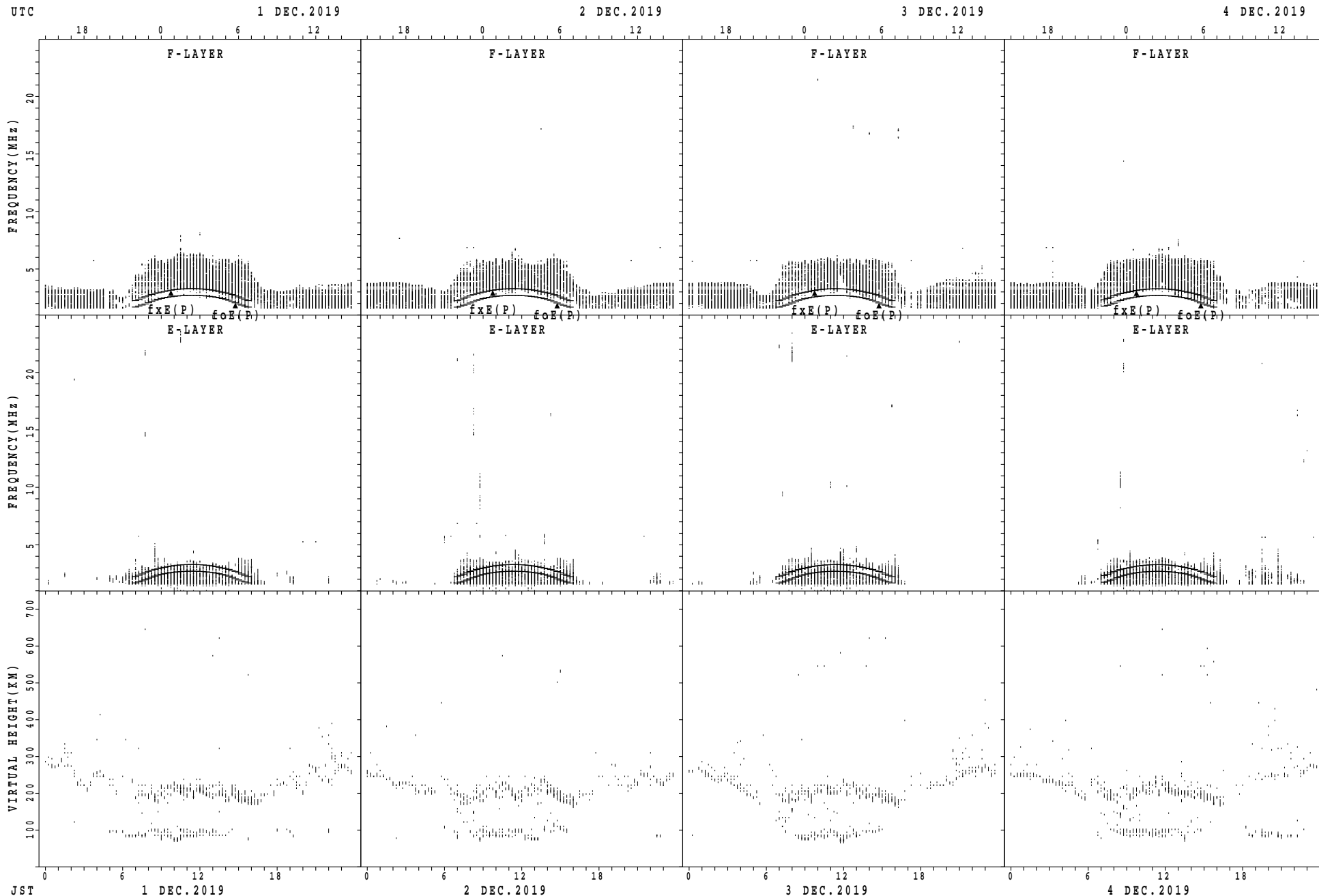
HOURLY VALUES OF fmin AT Okinawa

DEC. 2019

LAT. 26°41.0'N LON. 128°09.0'E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

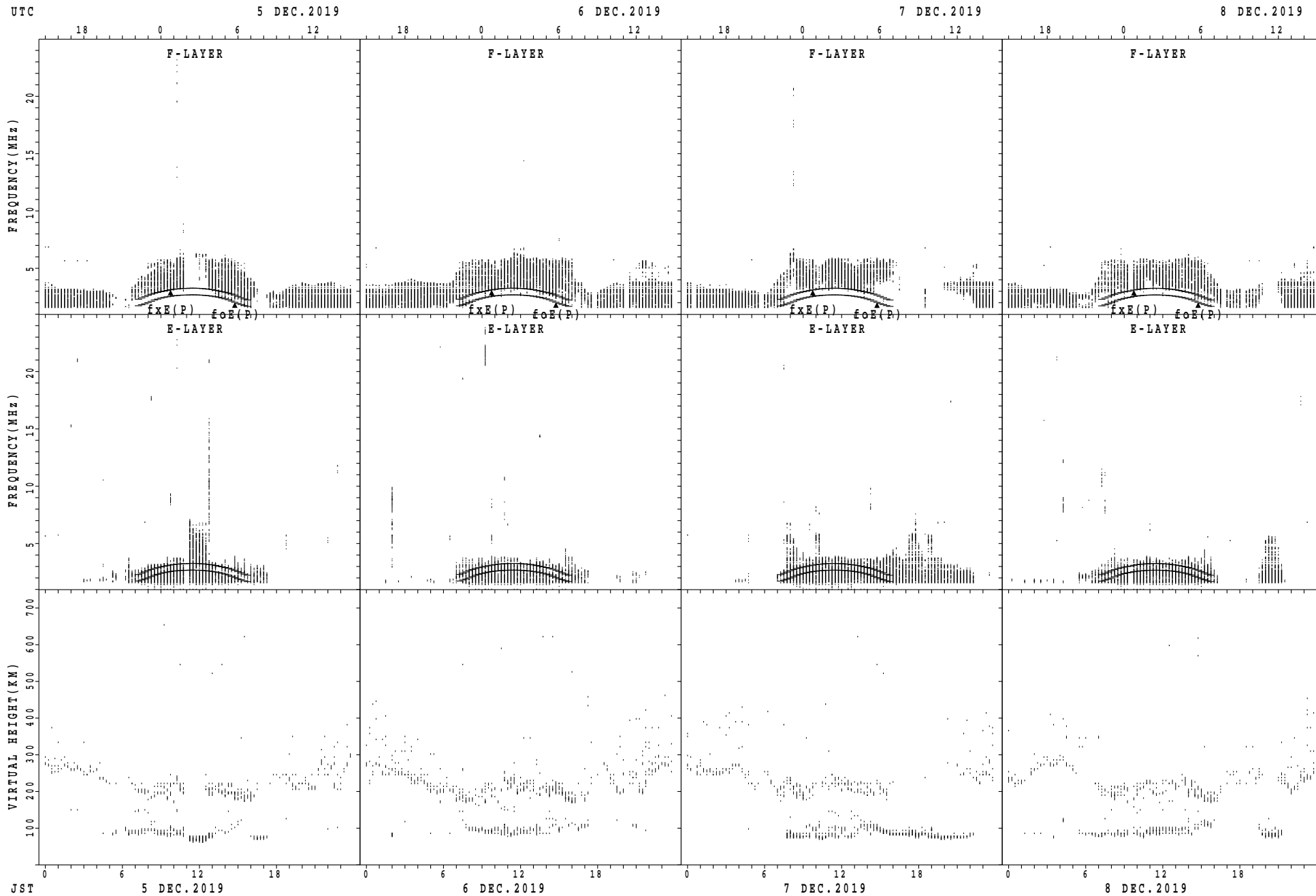
$\begin{matrix} H \\ D \end{matrix}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	14	14	14	14	15	B	14	14	14	14	14	14	14	14	14	14	14	14	15	18	14	14	14
2	14	15	15	14	14	B		14	15	14	14	14	15	14	14	14	14	18	14	14	16	14	14	14
3	14	14	14	14	14	14	B	14	14	14	14	15	16	14	16	14	14	14	14	14	14	B	14	17
4	14	15	14	15	B	14	14	14	14	15	15	14	15	15	14	14	14	14	14	14	14	14	14	14
5	15	14	15	14	14	B	15	14	14	14	14	14	15	14	14	14	14	14	14	14	14	14	14	15
6	16	14	14	14	14	14	16	14	14	14	14	14	14	14	14	14	14	14	14	14	14	66	15	14
7	14	14	14	14	15	15	14	14	14	14	14	15	14	15	15	14	14	14	14	14	14	B	15	66
8	15	15	15	14	14	14	14	14	14	14	14	15	15	14	15	14	14	15	14	14	14	14	15	14
9	14	15	14	14	14	14	14		14	14	14	15	14	14	14	14	14	14	14	15	14	B	15	15
10	14	14	15	16	14	14	121	14	15	14	15	15	15	15	15	14	14	14	14	14	14	14	14	14
11	14	14	14	14	15	14	15	15	15	14	14	14	14	14	16	14	14	14	14	14	14	14	14	14
12	14	15	14	14	14	14	B	15	14	14	14	15	14	17	15	15	14	16	14	15	15	14	14	15
13	16	14	14	14	15	16	B	15	14	14	14	15	15	14	14	14	14	14	14	14	14	14	B	14
14	B	15	14	14	14		14	14	14	15	15	16	14	16	16	14	14	14	14	15	14	15	14	15
15	15	14	15	14	B	14	B	14	16	14	15	15	18	16	14	14	15	14	14	14	14	15	14	15
16	20	14	14	14	B	15	14	14	14	14	14	15	17	16	16	14	14	14	14	14	15	B	14	15
17	17	15	15	14	B	15	14	15	15	14	14	14	15	14	14	14	14	14	15	14	15	14	15	14
18	14	15	14	15	15	15	B	15	14	14	14	14	15	15	14	14	15	14	14	15	14	14	14	14
19	14	14	14	15	14	B	14	14	15	14	14	15	14	15	15	14	14	14	14	14	14	14	14	14
20	14	14	14	14	18	14	14	15	14	14	14	14	14	14	15	14	14	14	14	14	15	14	14	14
21	14	14	14	14	14	14	14	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	15
22	14	15	15	14	14	14	16	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	15	14
23	15	15	14	14	14	14	B	14	14	14	14	14	14	14	14	14	14	14	14	14	15	15	15	14
24	14	14	15	14	15	22	66	15	14	14	14	14	14	15	15	14	14	14	14	14	15	14	14	B
25	16	17	14	15	15	15	B	14	14	14	14	14	14	14	14	14	14	14	14	14	17	15	14	B
26	16	15	14	14	14	14	B	15	14	14	14	14	14	14	14	14	14	15	14	14	14	15	14	14
27	14	14	14	14	14	15	15	14	16	14	14	14	14	14	14	14	14	14	14	15	B	15	14	14
28	14	B	14	15	14	15	B	14	14	14	14	14	14	14	14	14	15	14	15	14	18	15	14	15
29	14	14	14	14	14	14	131	15	14	14	14	14	15	14	17	17	15	16	14	14	14	14	15	14
30	18	14	14	14	14	B	B	15	14	14	14	14	14	14	16	14	14	14	14	14	B	14	15	14
31	14	14	15	14	15	14	14	14	15	14	14	14	15	15	15	14	14	15	15	14	14	17	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	30	30	31	31	27	25	19	30	31	31	31	31	31	31	31	31	31	31	31	31	29	27	30	29
MED	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
U Q	15	15	15	14	15	15	16	15	15	14	14	15	15	15	15	14	14	14	14	14	15	15	15	15
L Q	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14

SUMMARY PLOTS AT Wakkanai



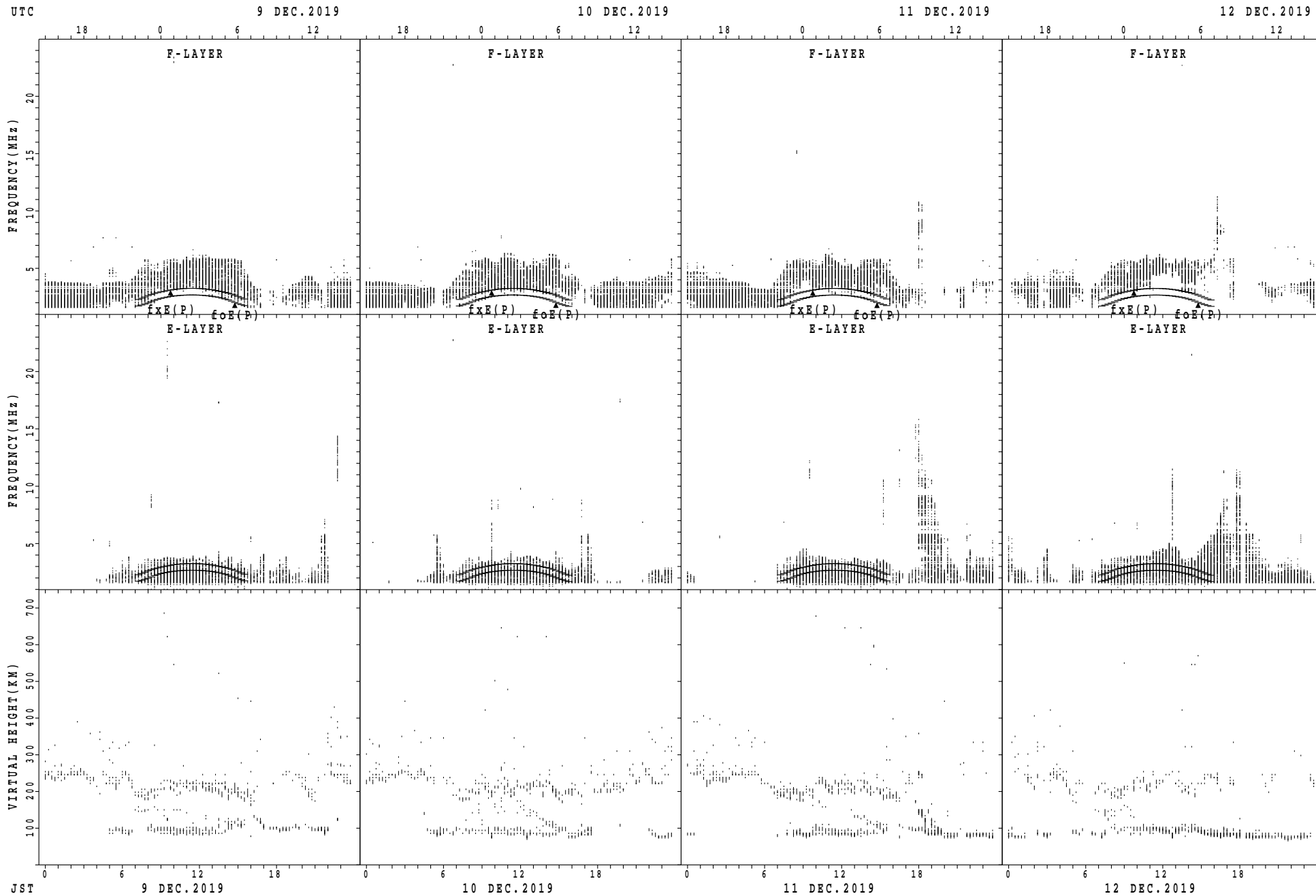
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $foE(P)$; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai



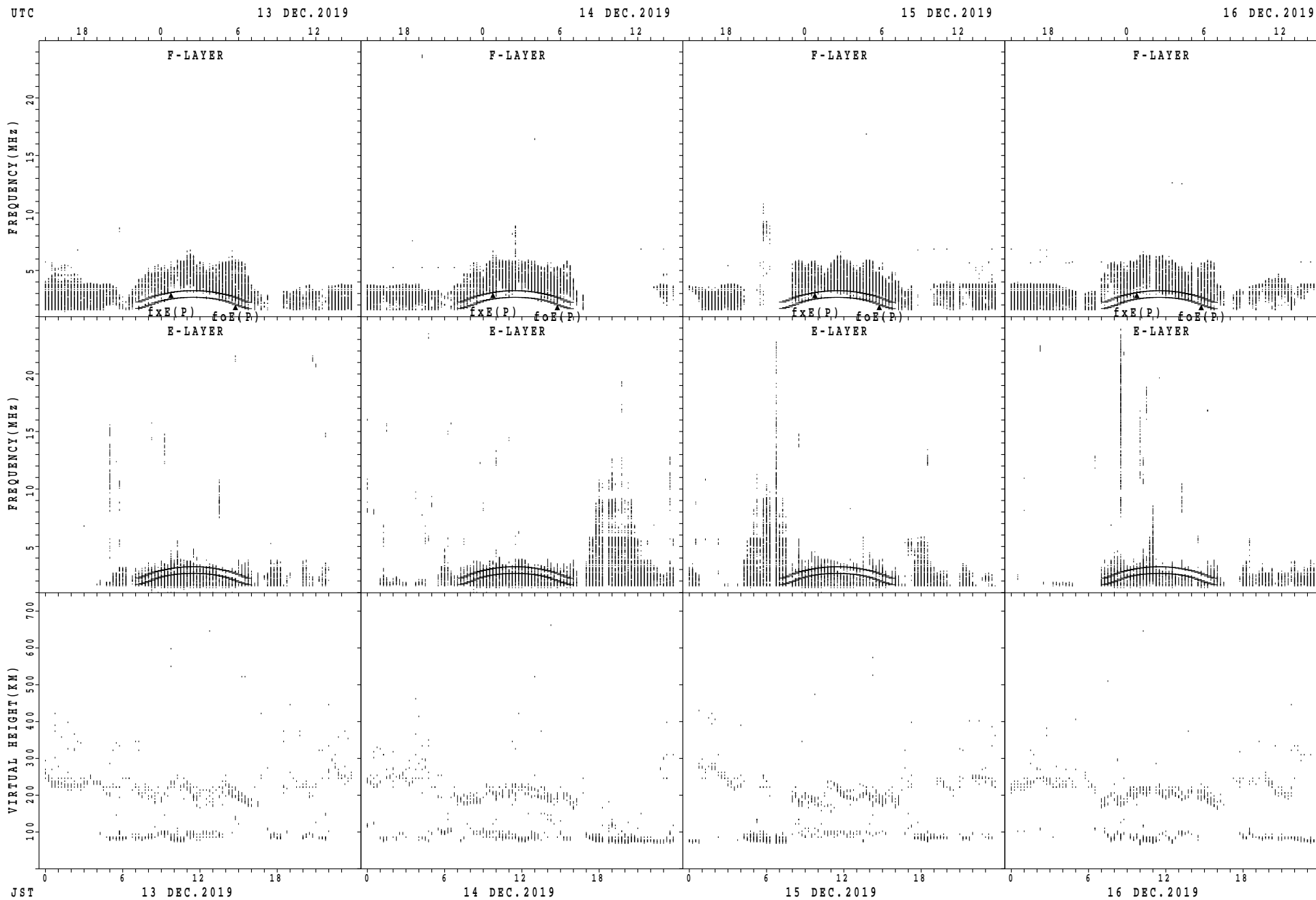
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai



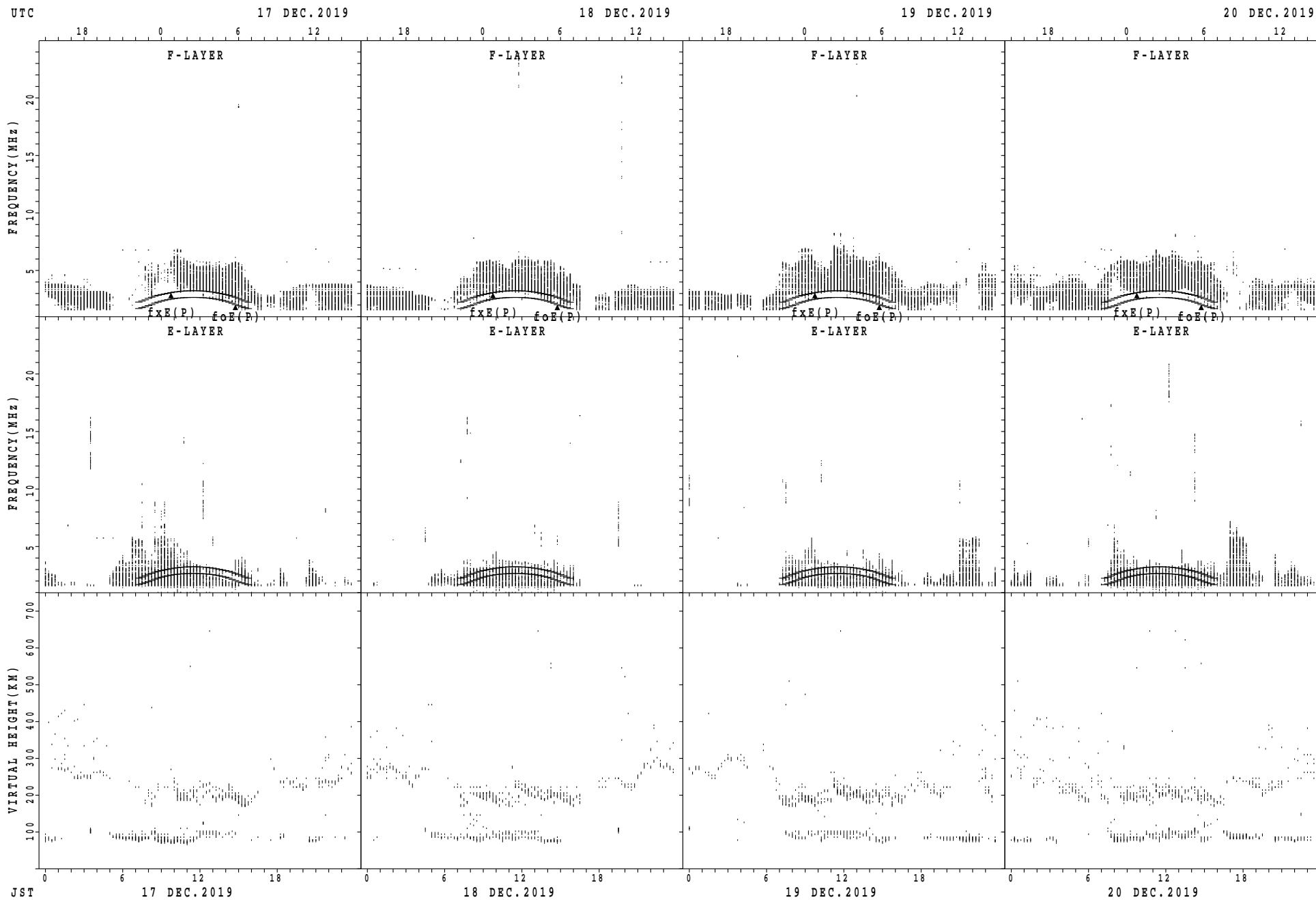
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai



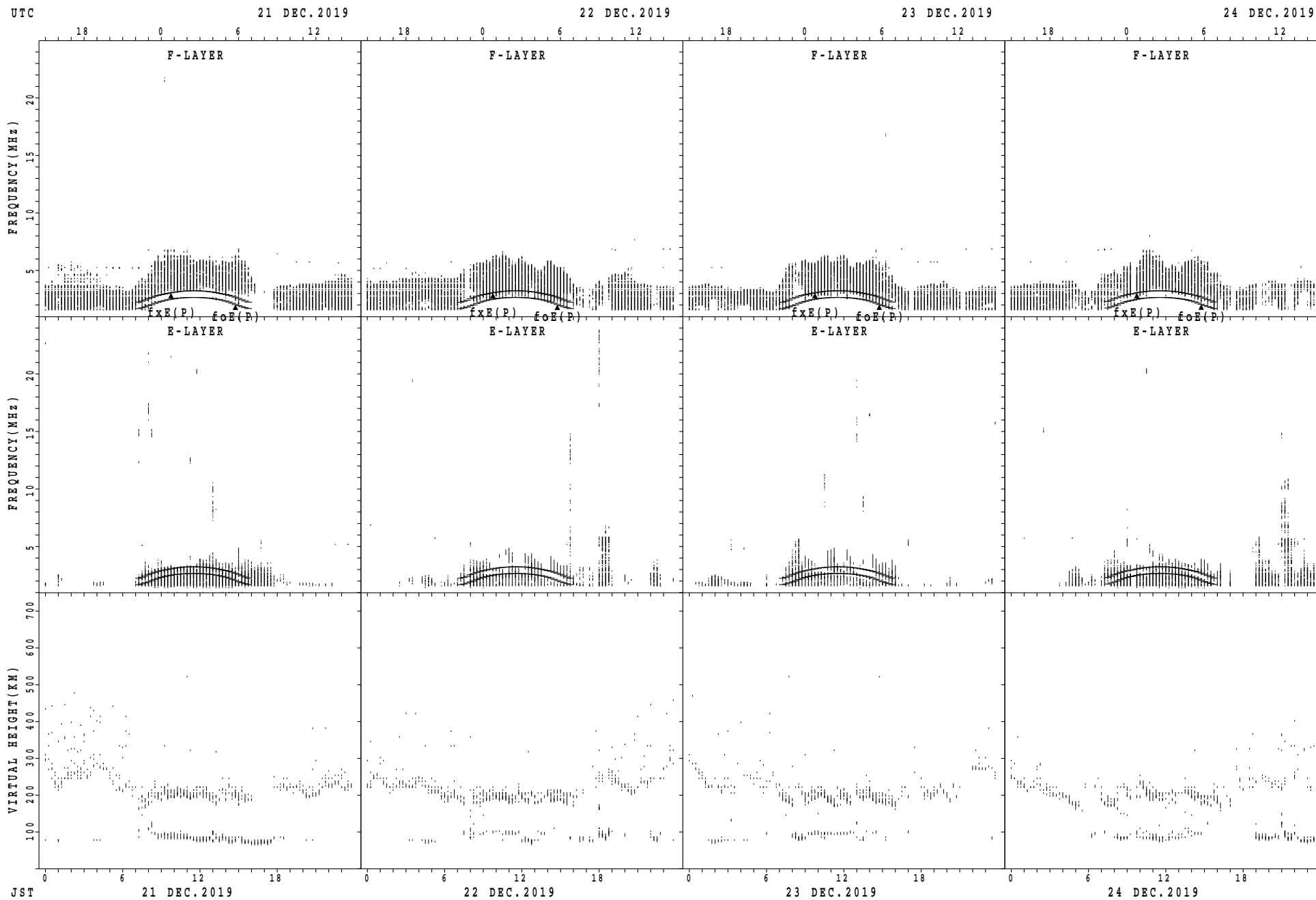
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai



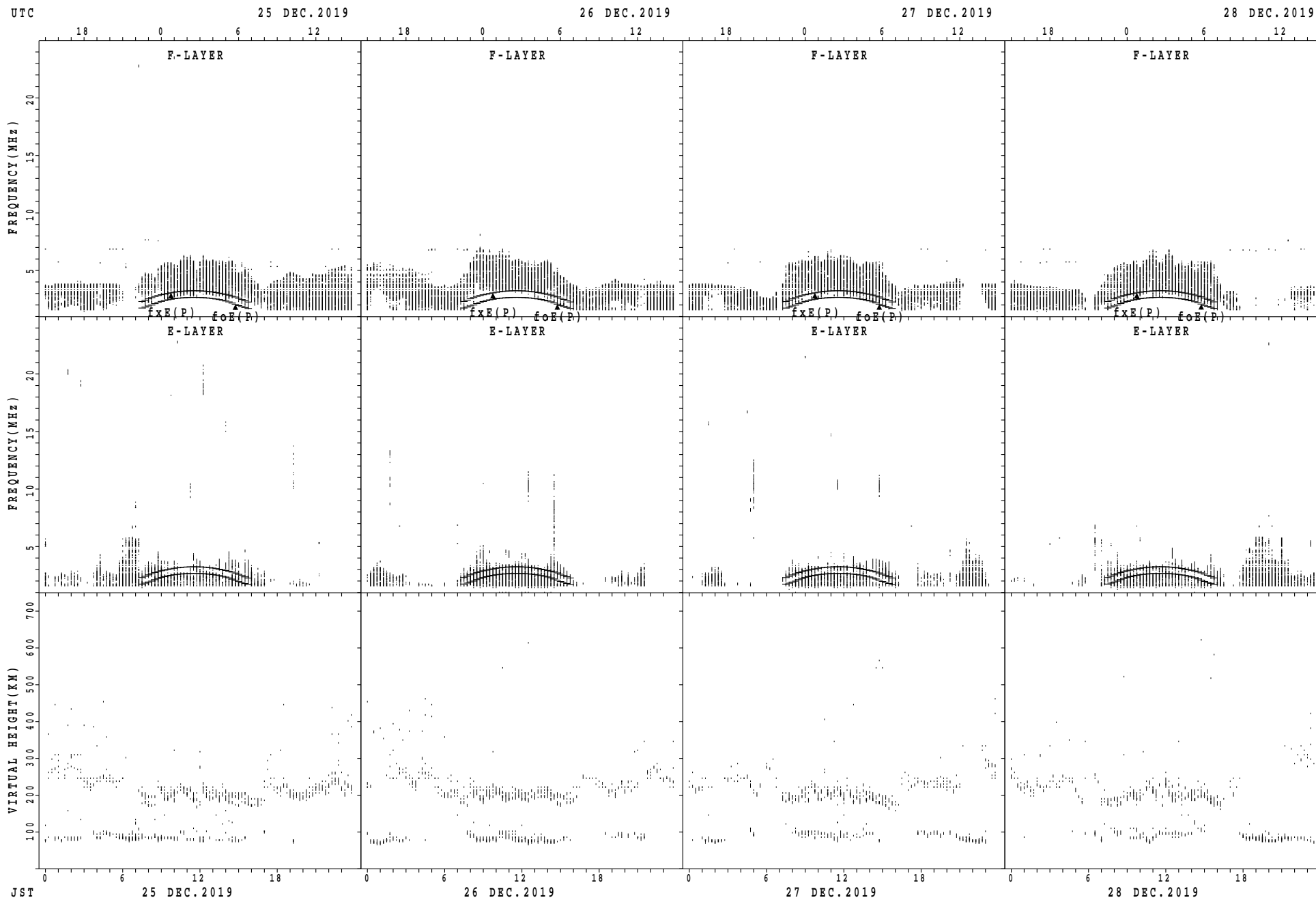
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $f_oE(P)$; PREDICTED VALUE FOR f_oE

SUMMARY PLOTS AT Wakkanai



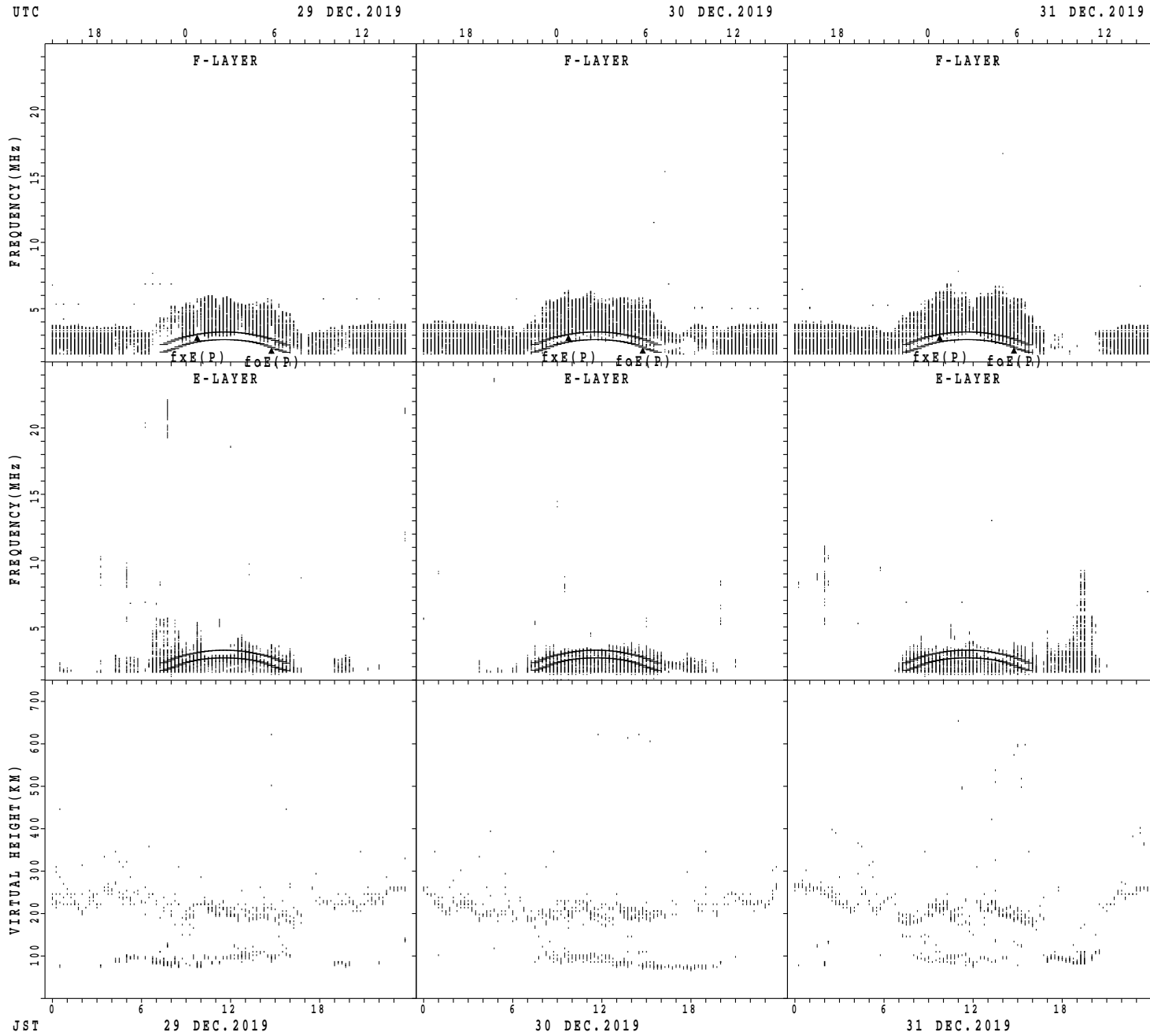
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $f_oE(P)$; PREDICTED VALUE FOR f_oE

SUMMARY PLOTS AT Wakkanai



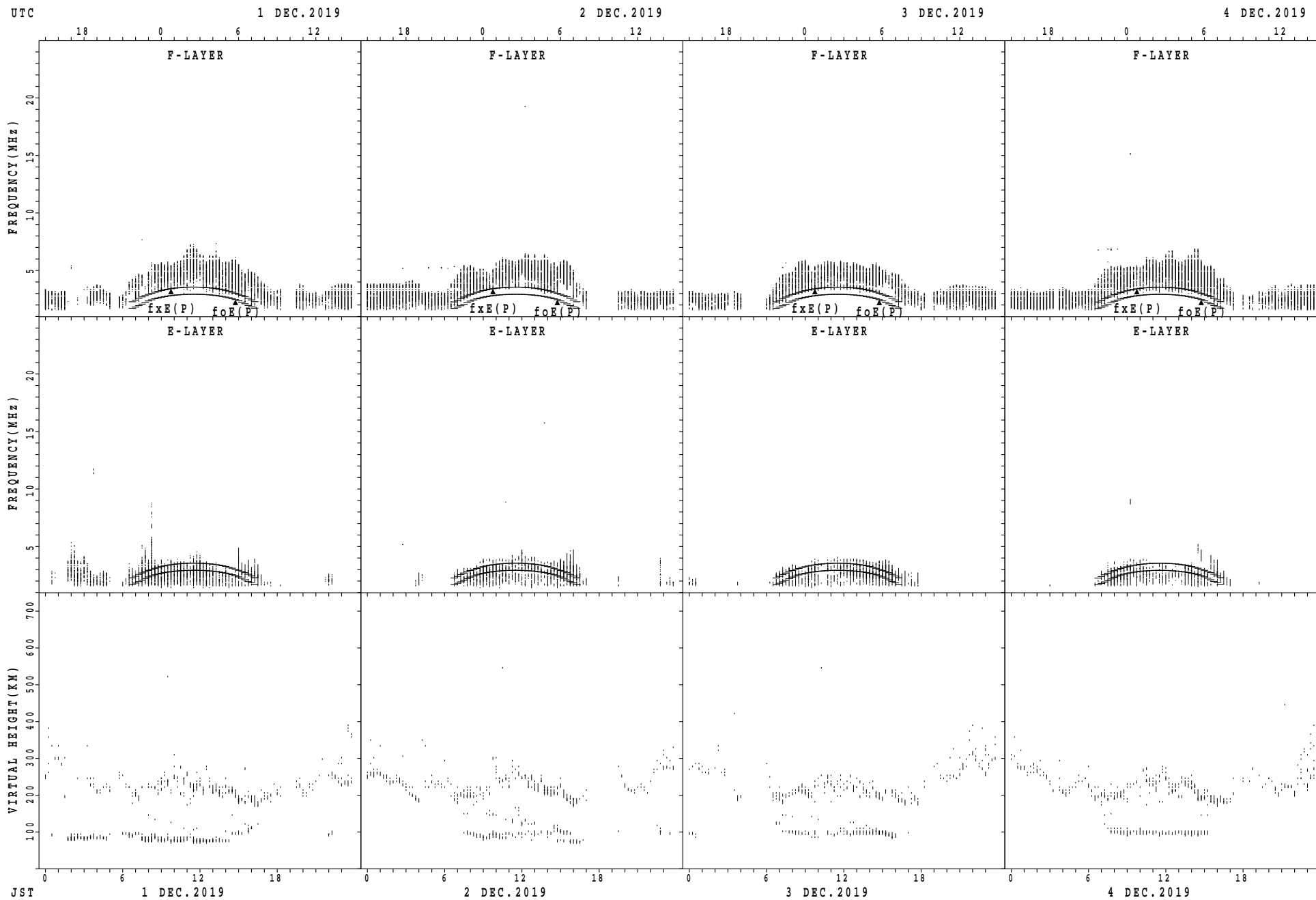
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $f_oE(P)$; PREDICTED VALUE FOR f_oE

SUMMARY PLOTS AT Wakkanai



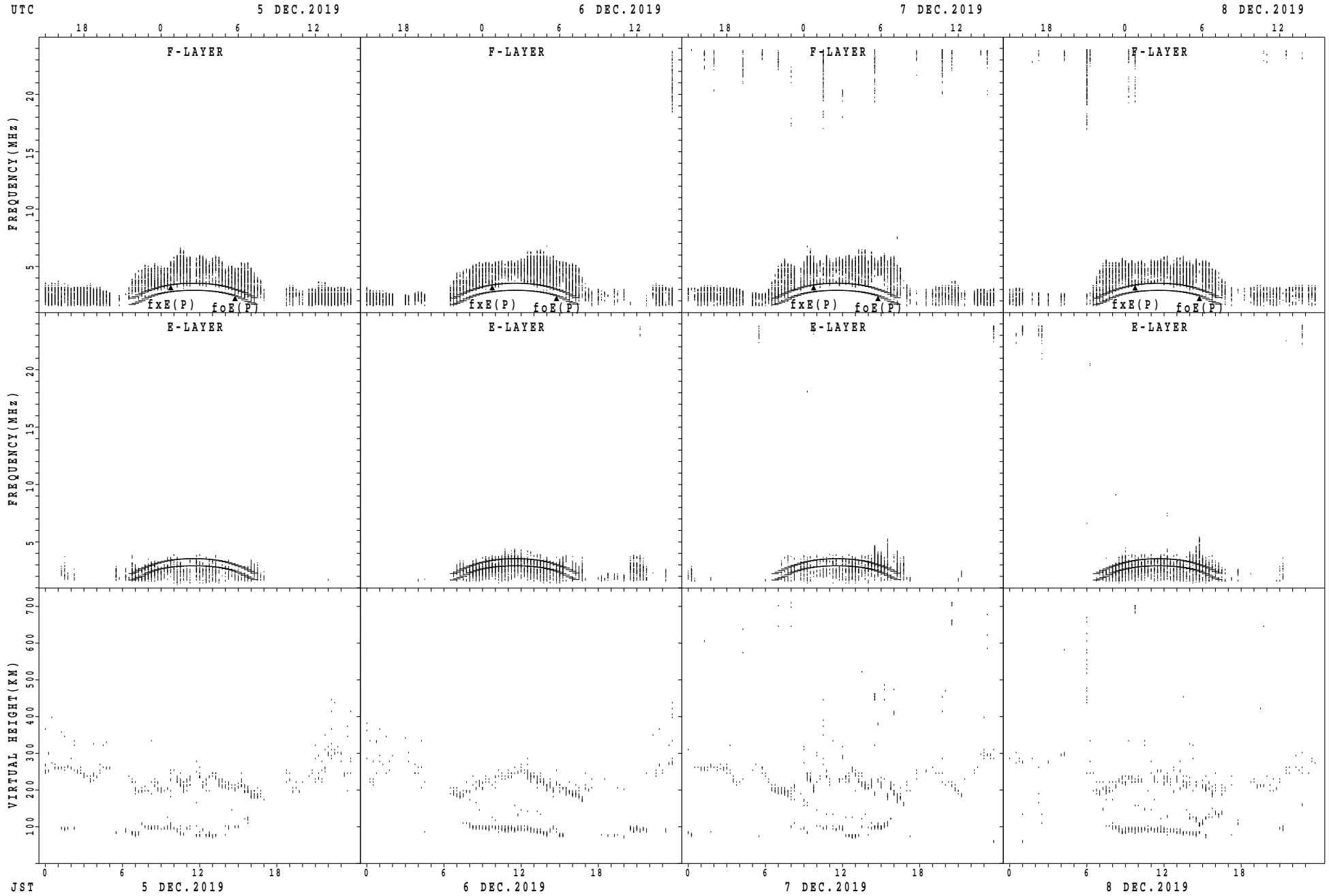
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $f_oE(P)$; PREDICTED VALUE FOR f_oE

SUMMARY PLOTS AT Kokubunji



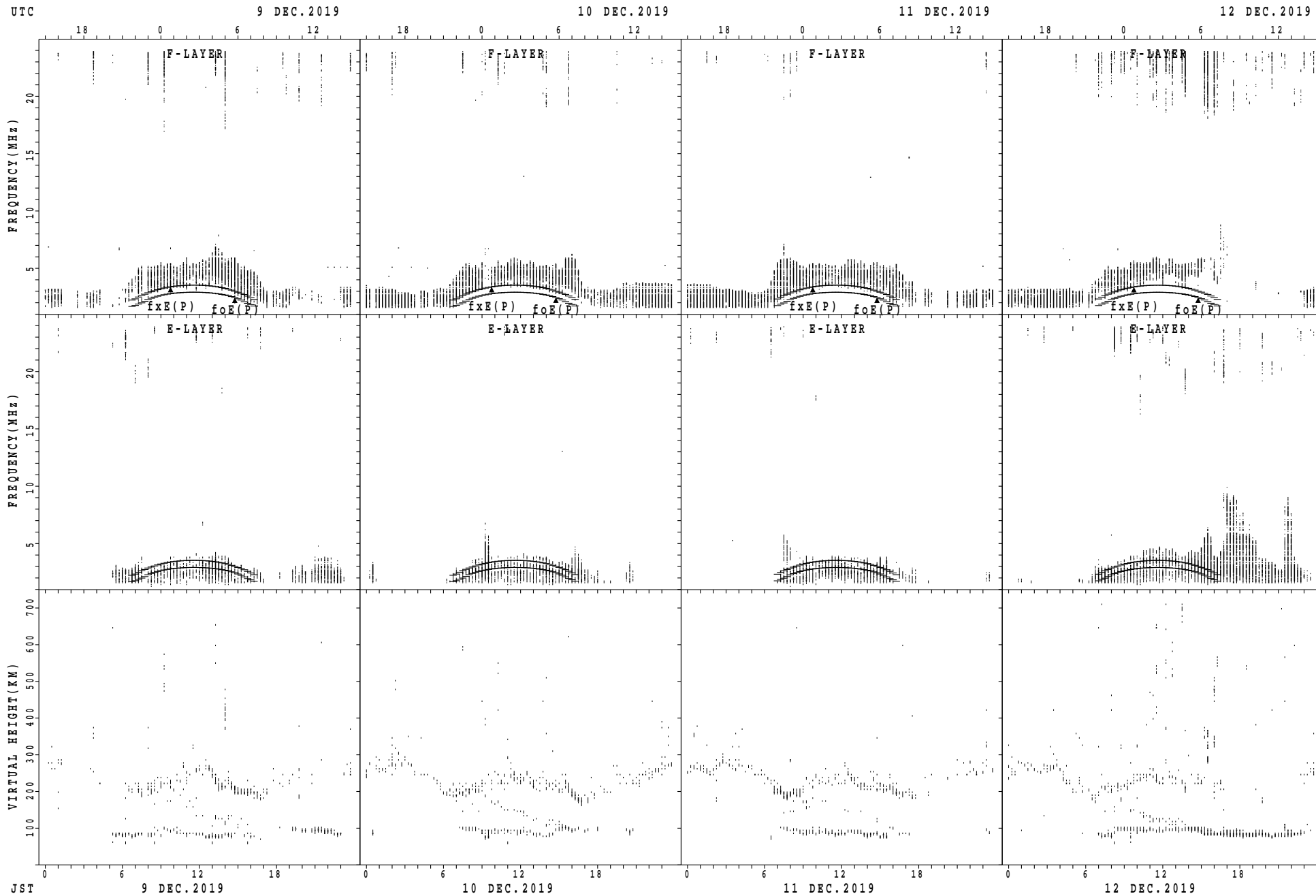
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $f_oE(P)$; PREDICTED VALUE FOR f_oE

SUMMARY PLOTS AT Kokubunji



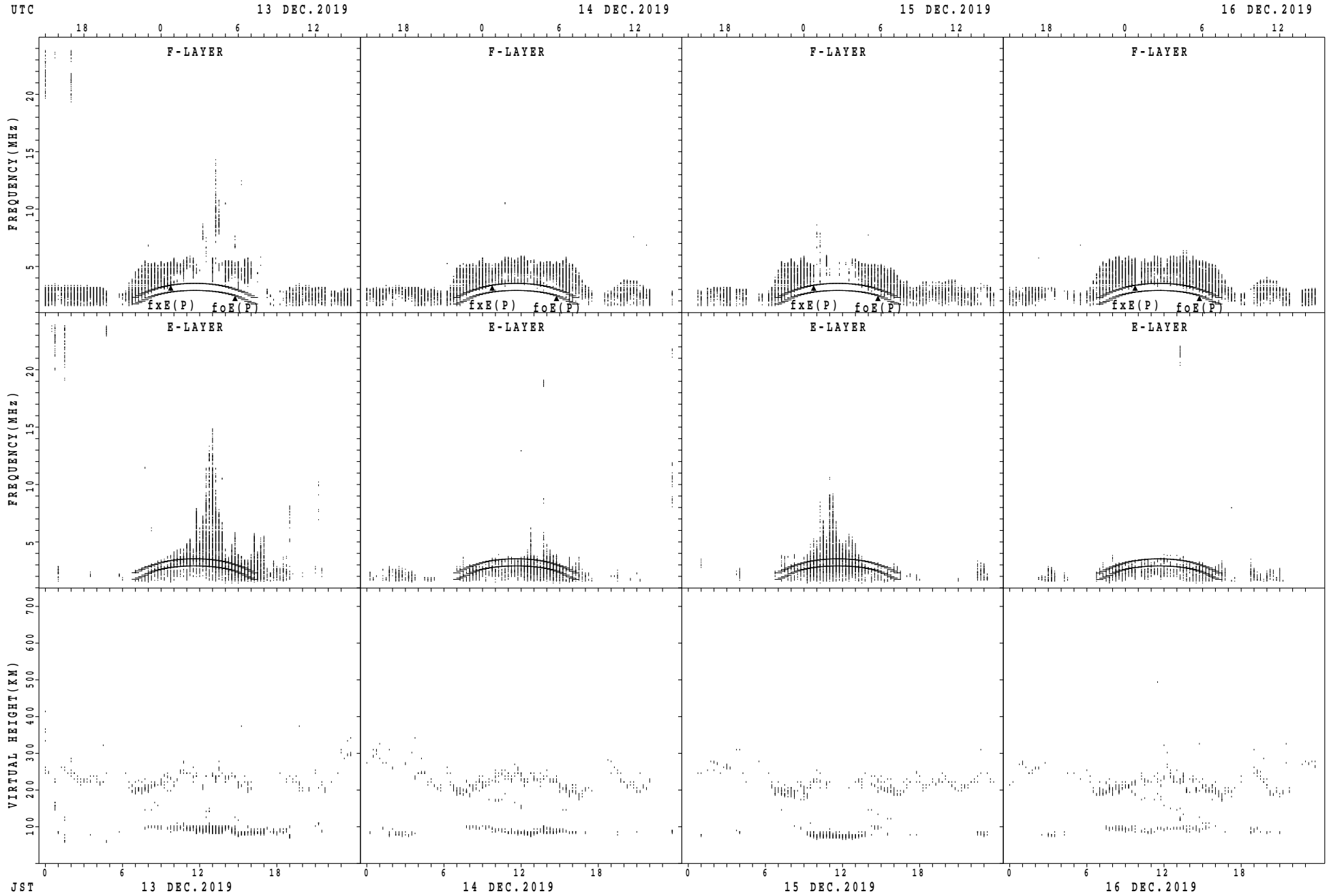
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $f_oE(P)$; PREDICTED VALUE FOR f_oE

SUMMARY PLOTS AT Kokubunji



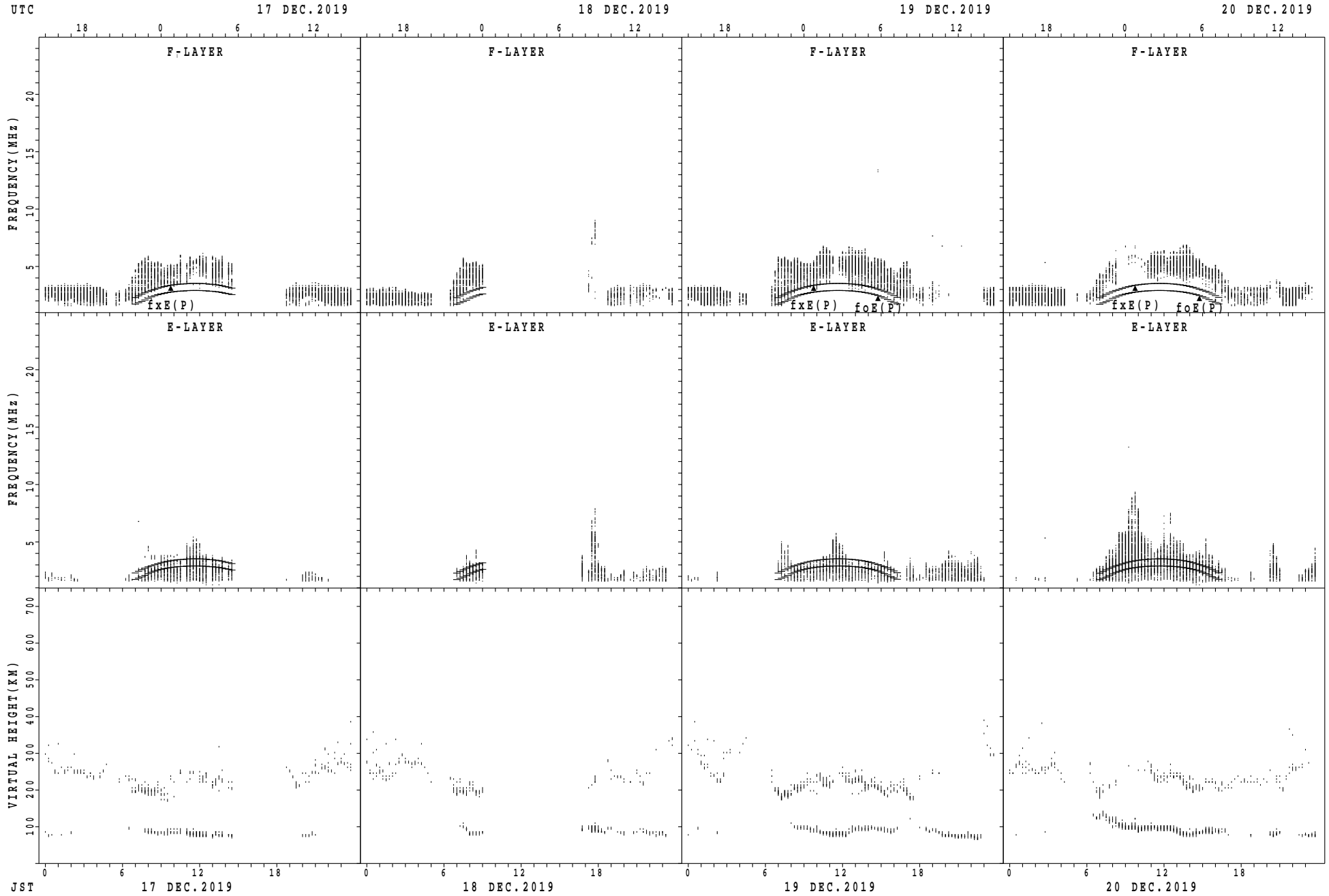
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $f_oE(P)$; PREDICTED VALUE FOR f_oE

SUMMARY PLOTS AT Kokubunji



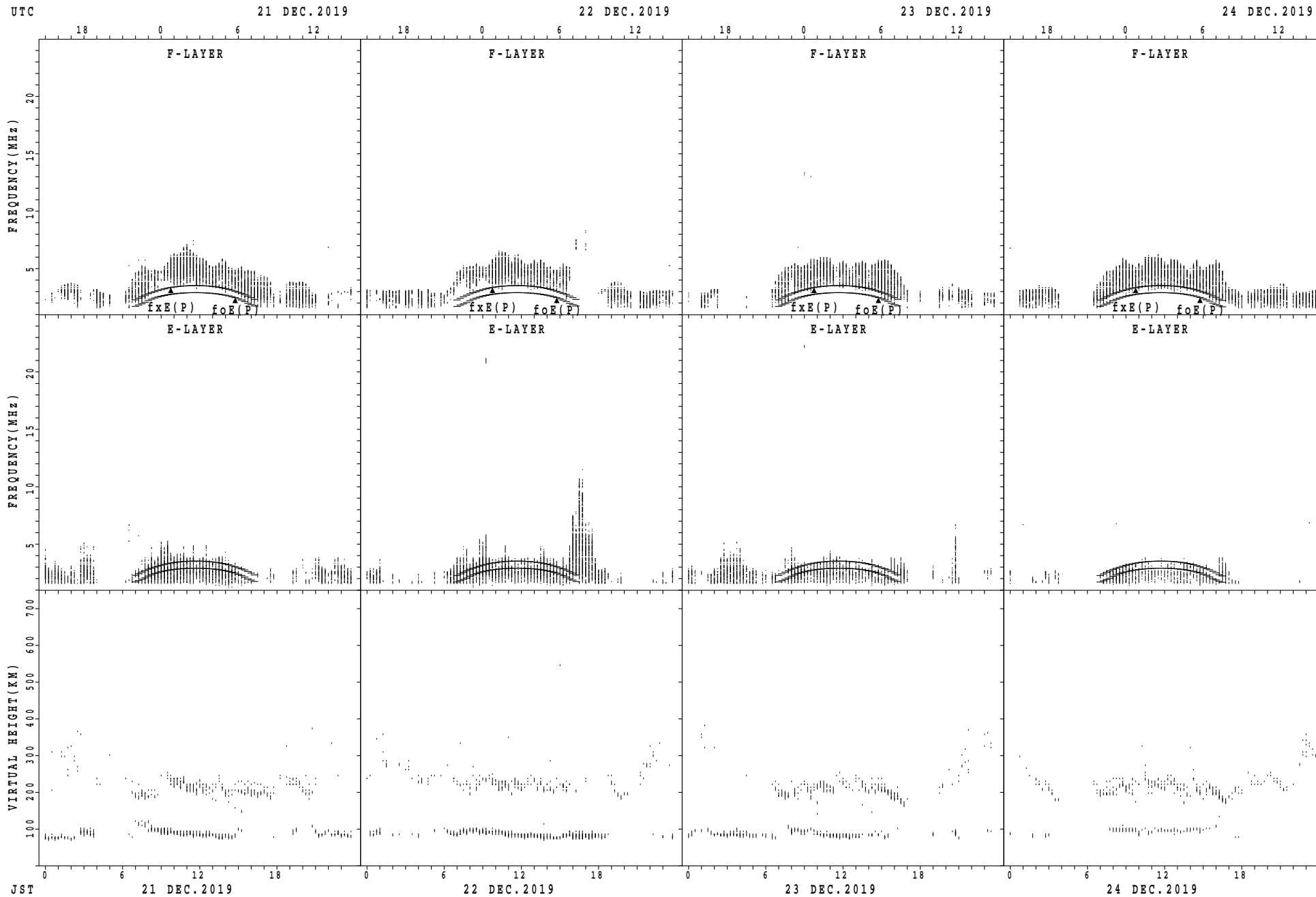
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $f_oE(P)$; PREDICTED VALUE FOR f_oE

SUMMARY PLOTS AT Kokubunji



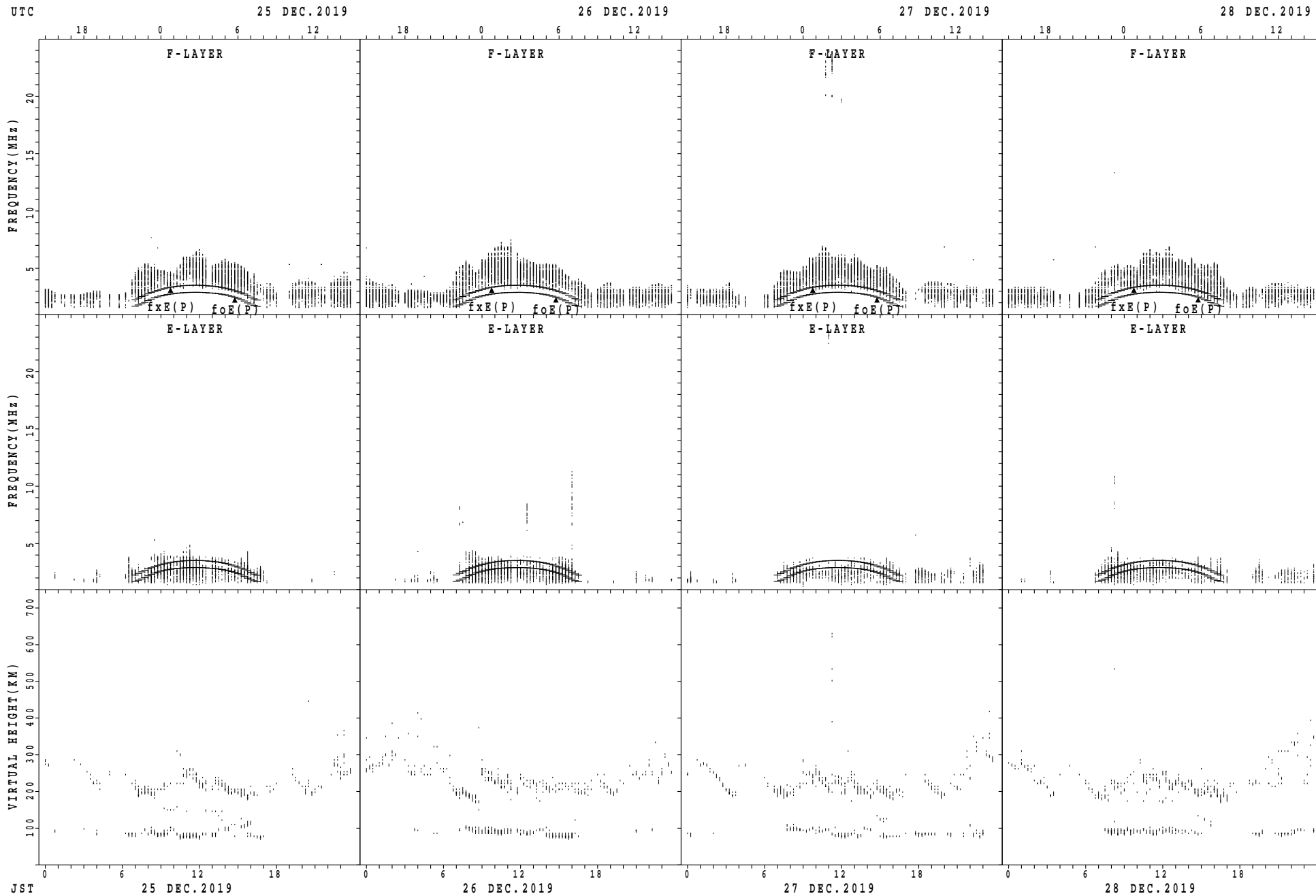
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $f_oE(P)$; PREDICTED VALUE FOR f_oE

SUMMARY PLOTS AT Kokubunji



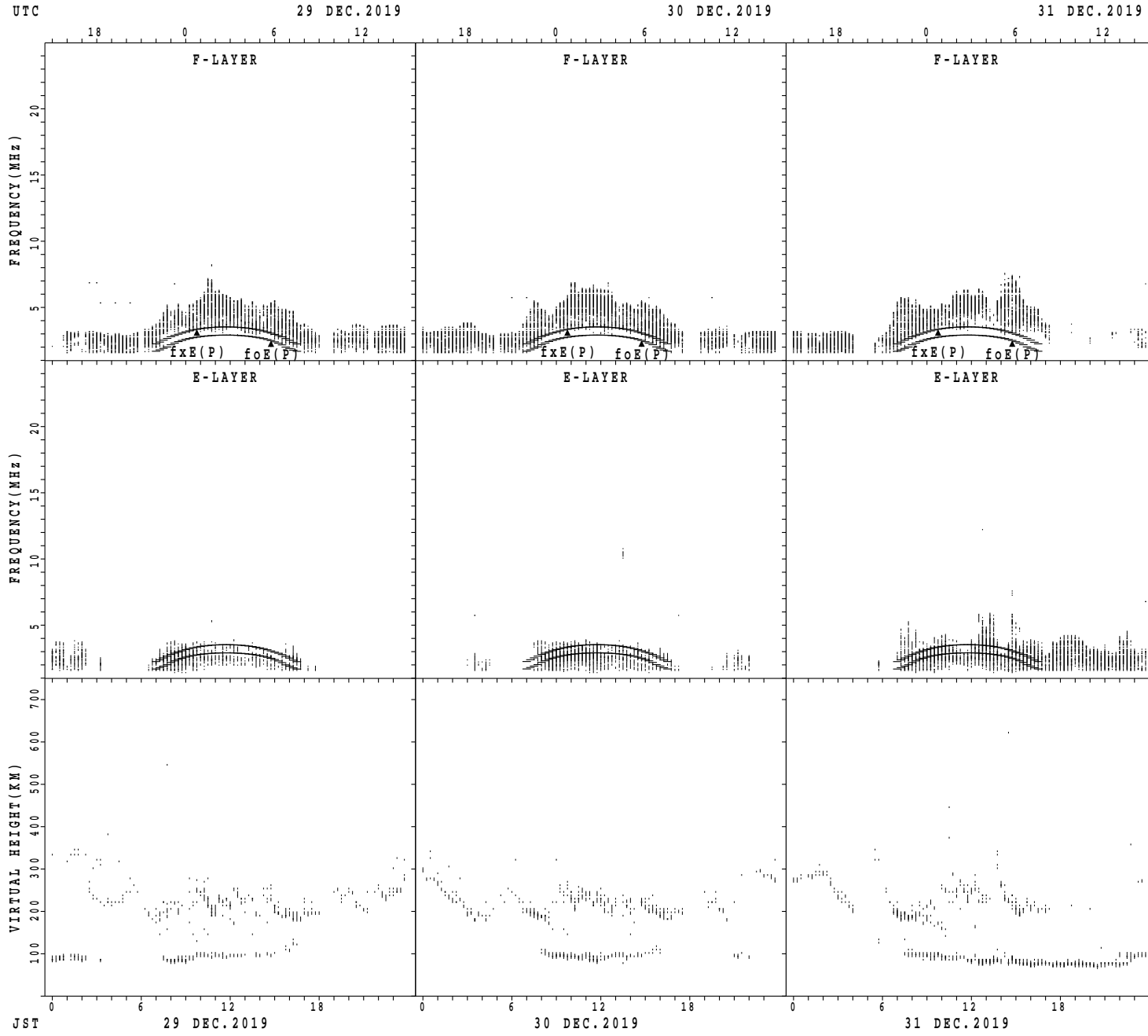
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $f_oE(P)$; PREDICTED VALUE FOR f_oE

SUMMARY PLOTS AT Kokubunji



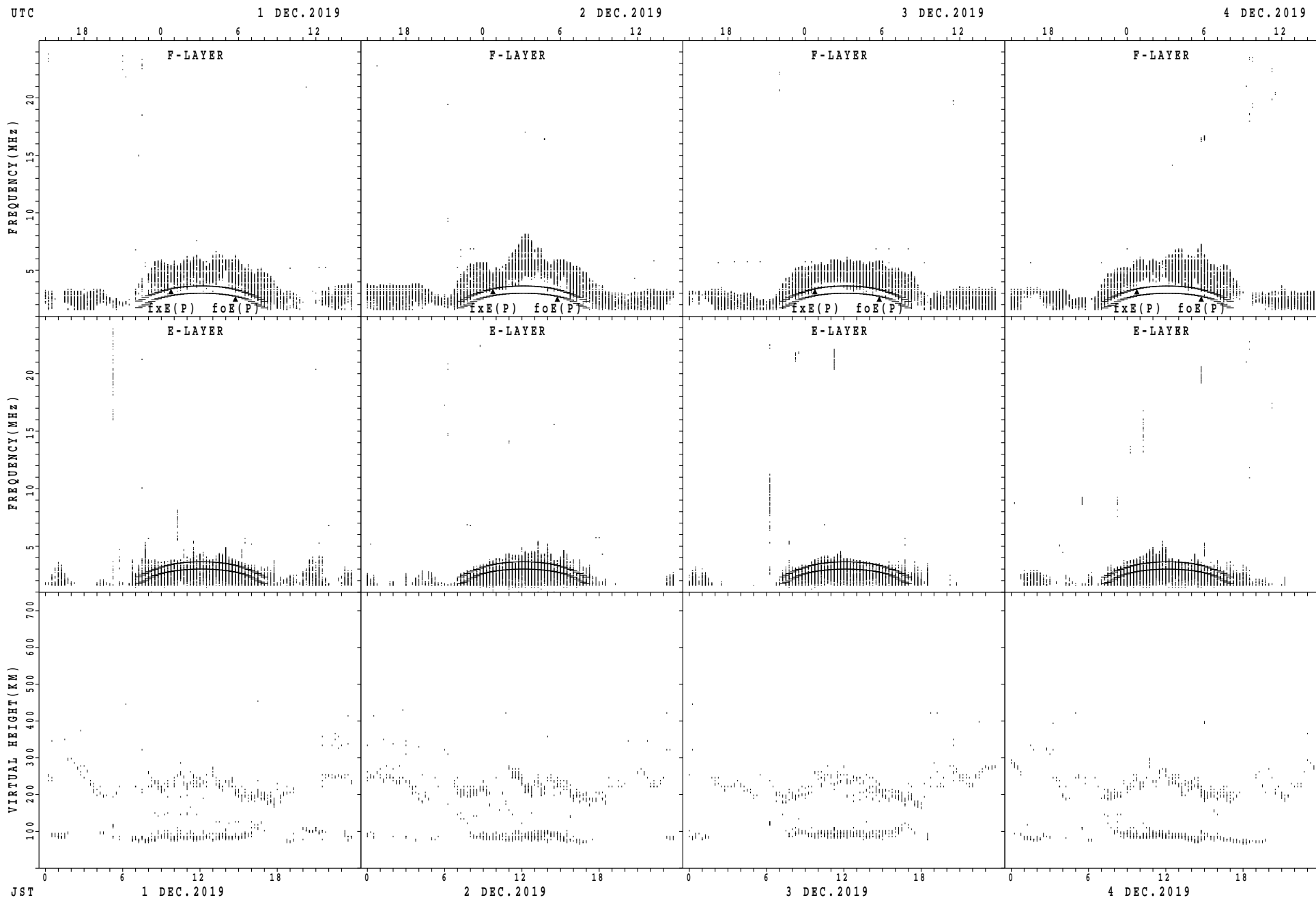
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $foE(P)$; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



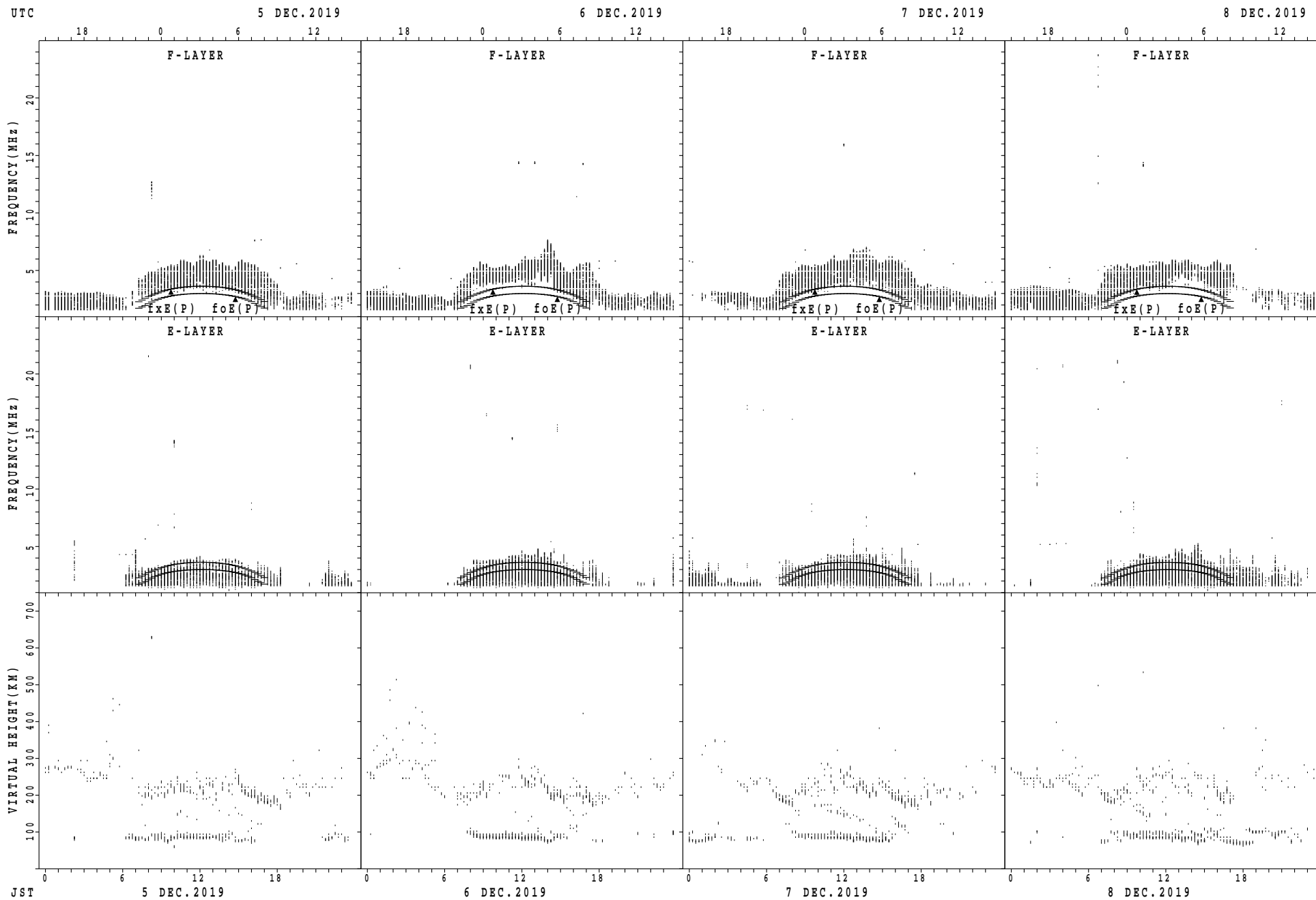
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $foE(P)$; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



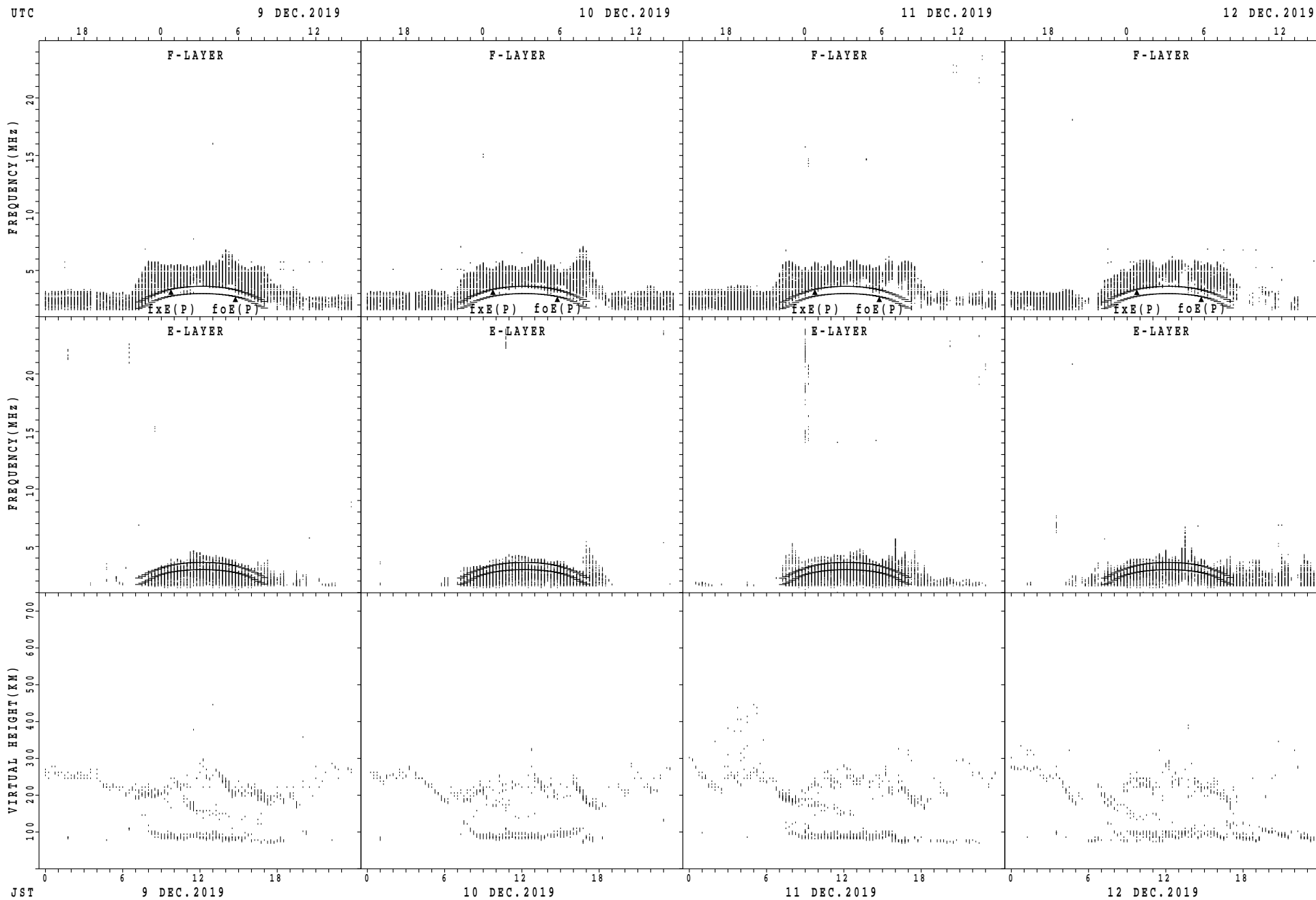
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



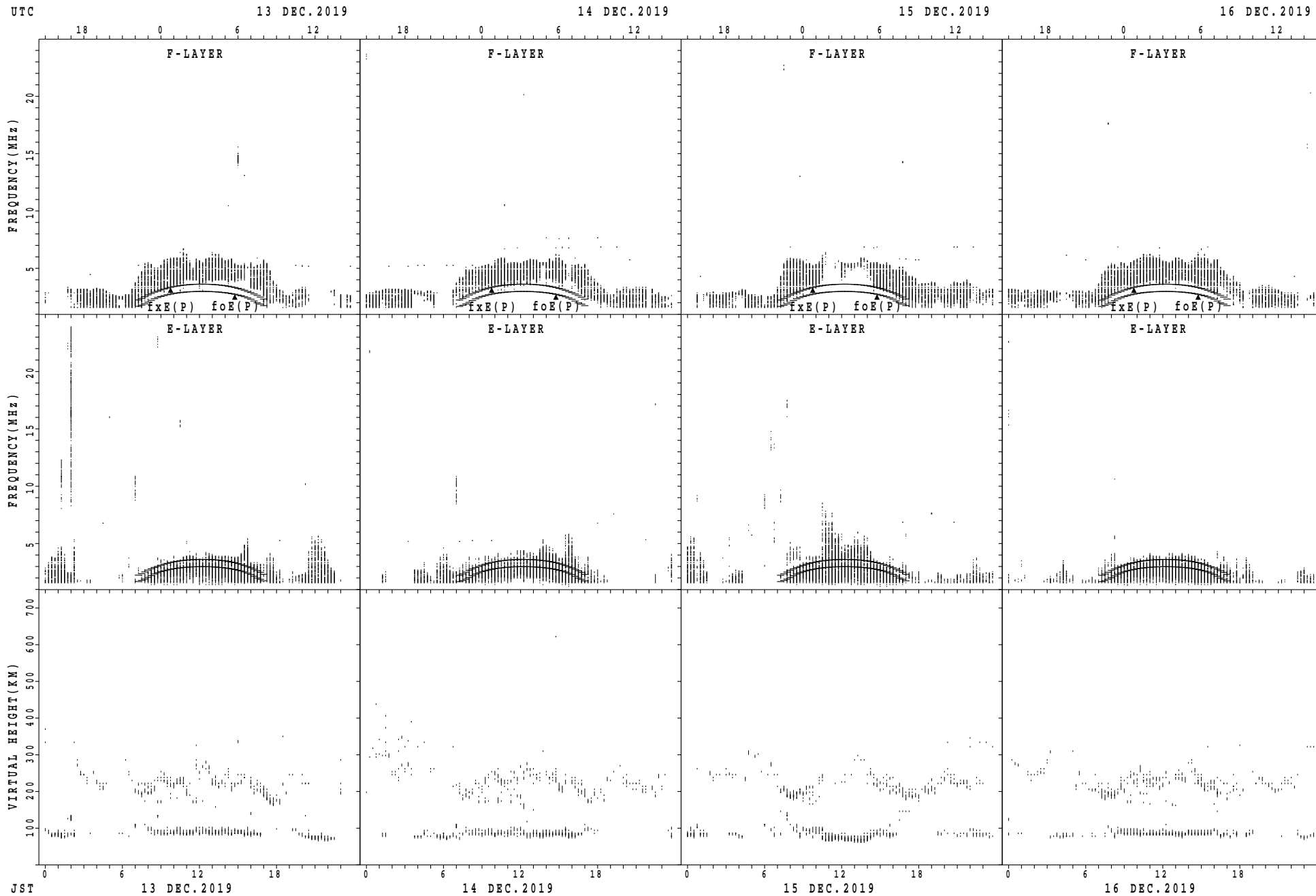
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



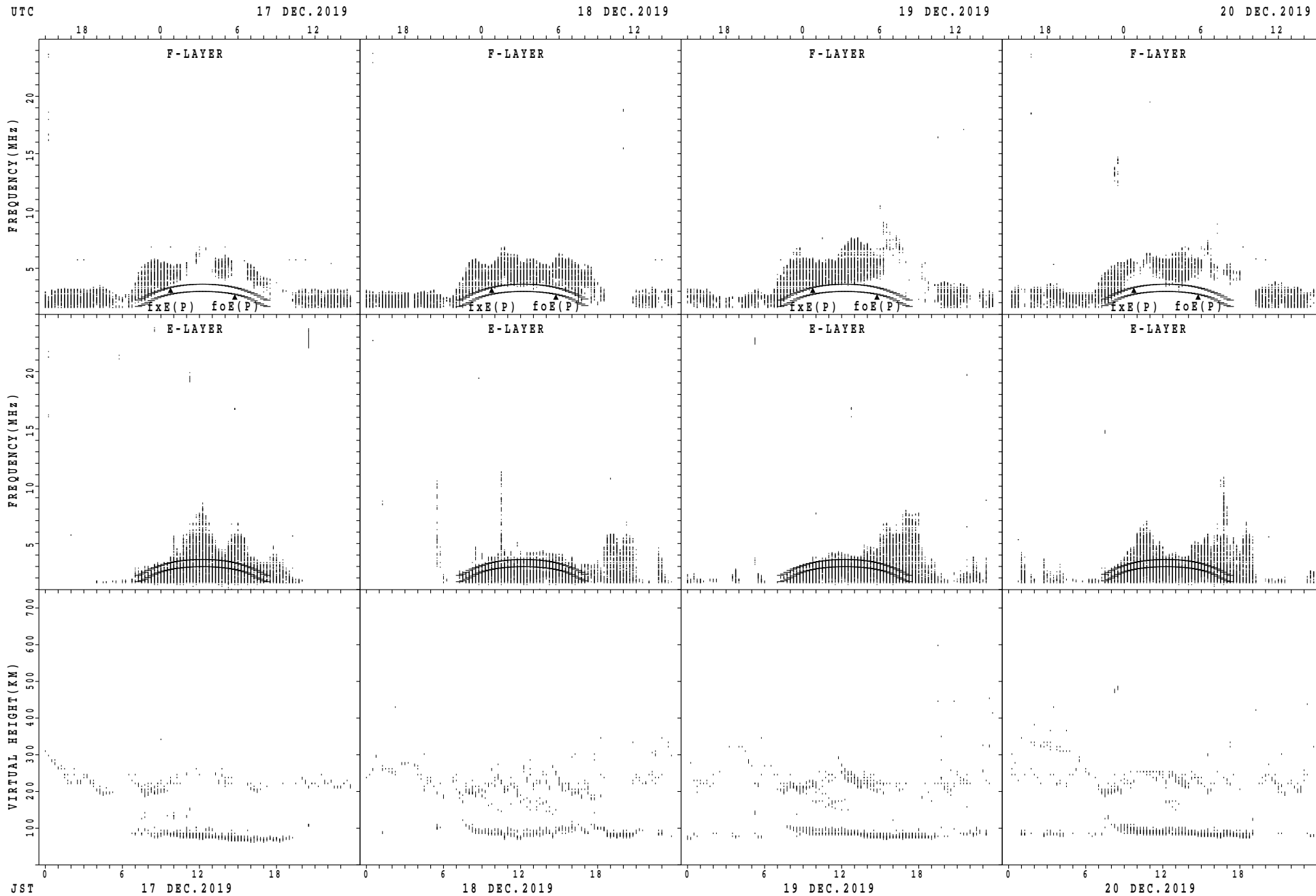
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $foE(P)$; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



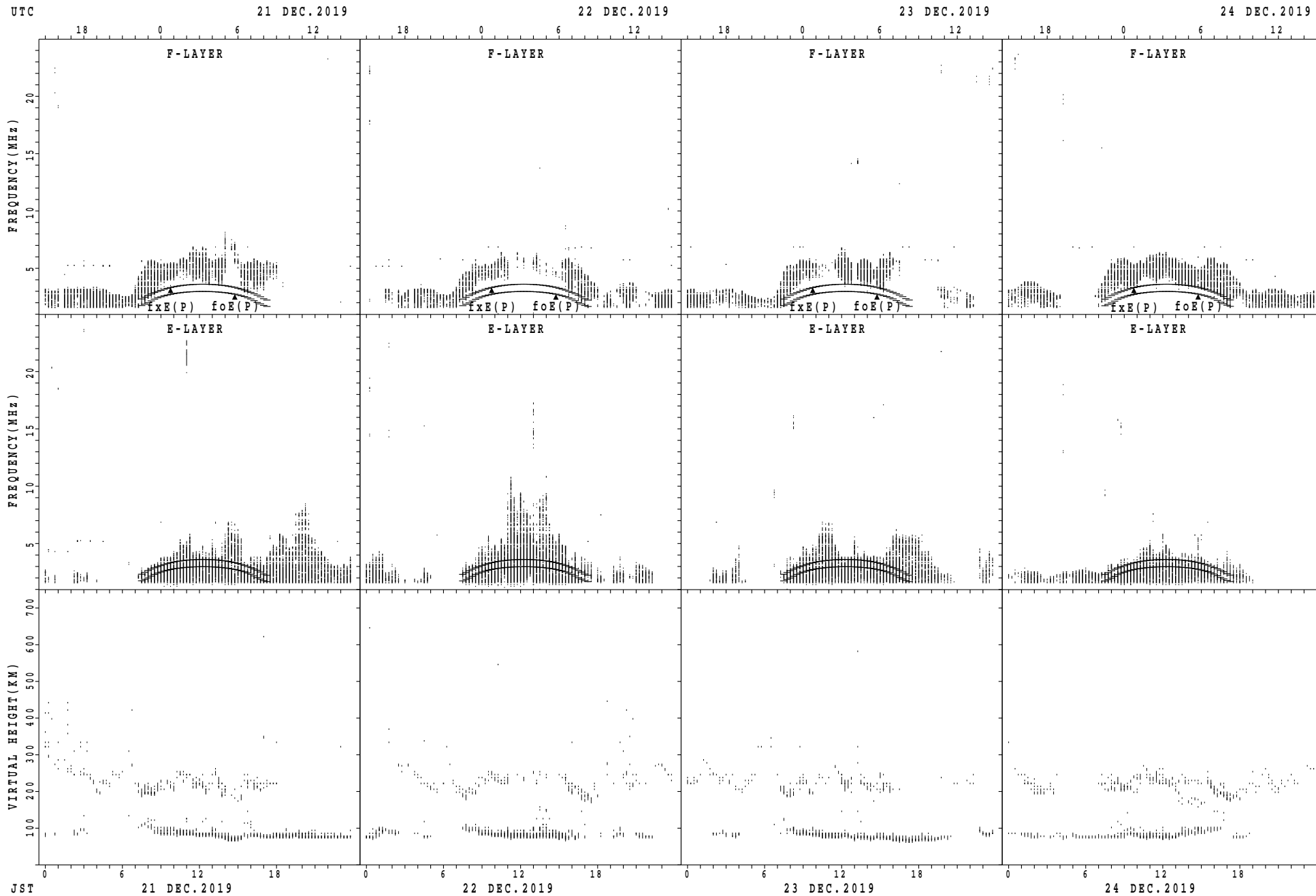
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $foE(P)$; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



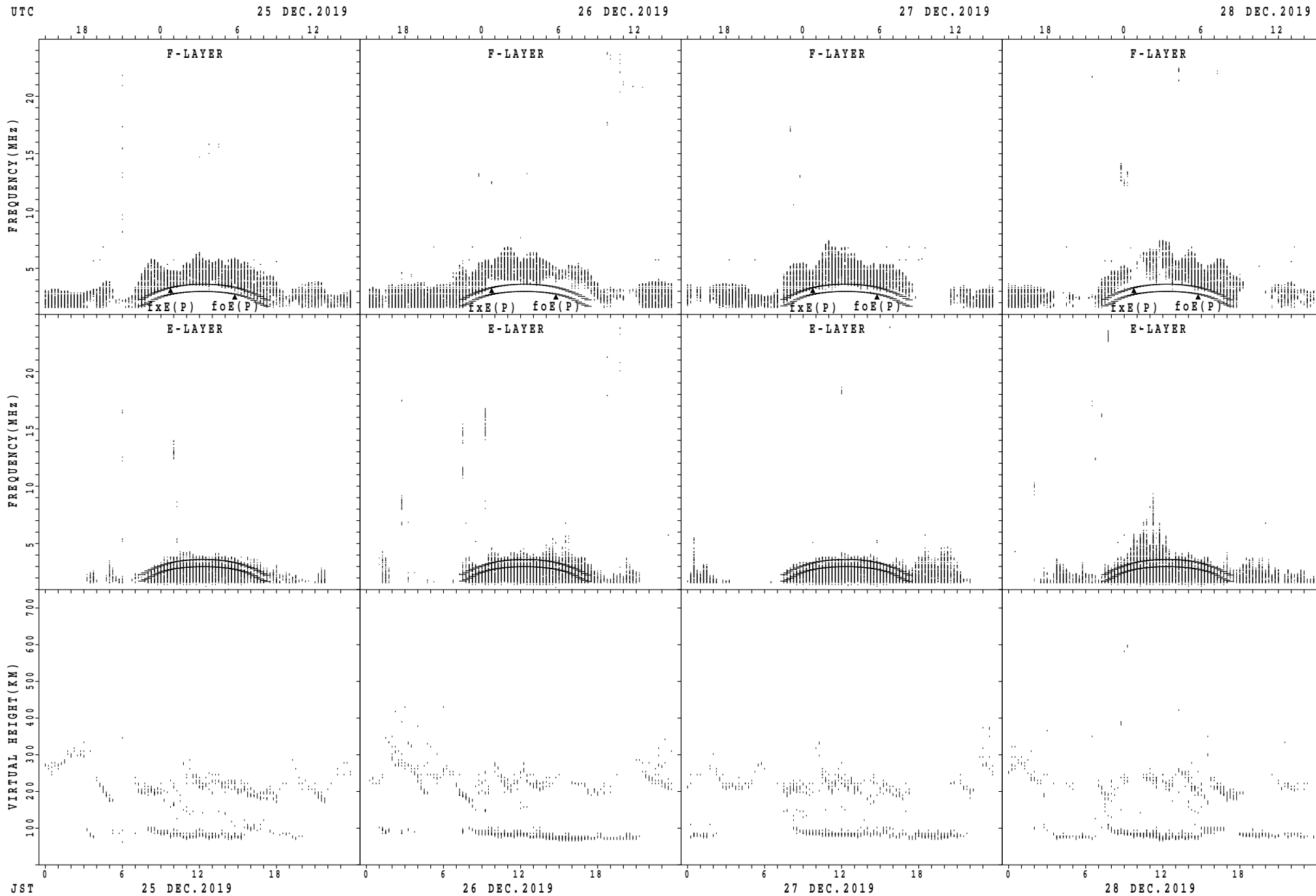
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $foE(P)$; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



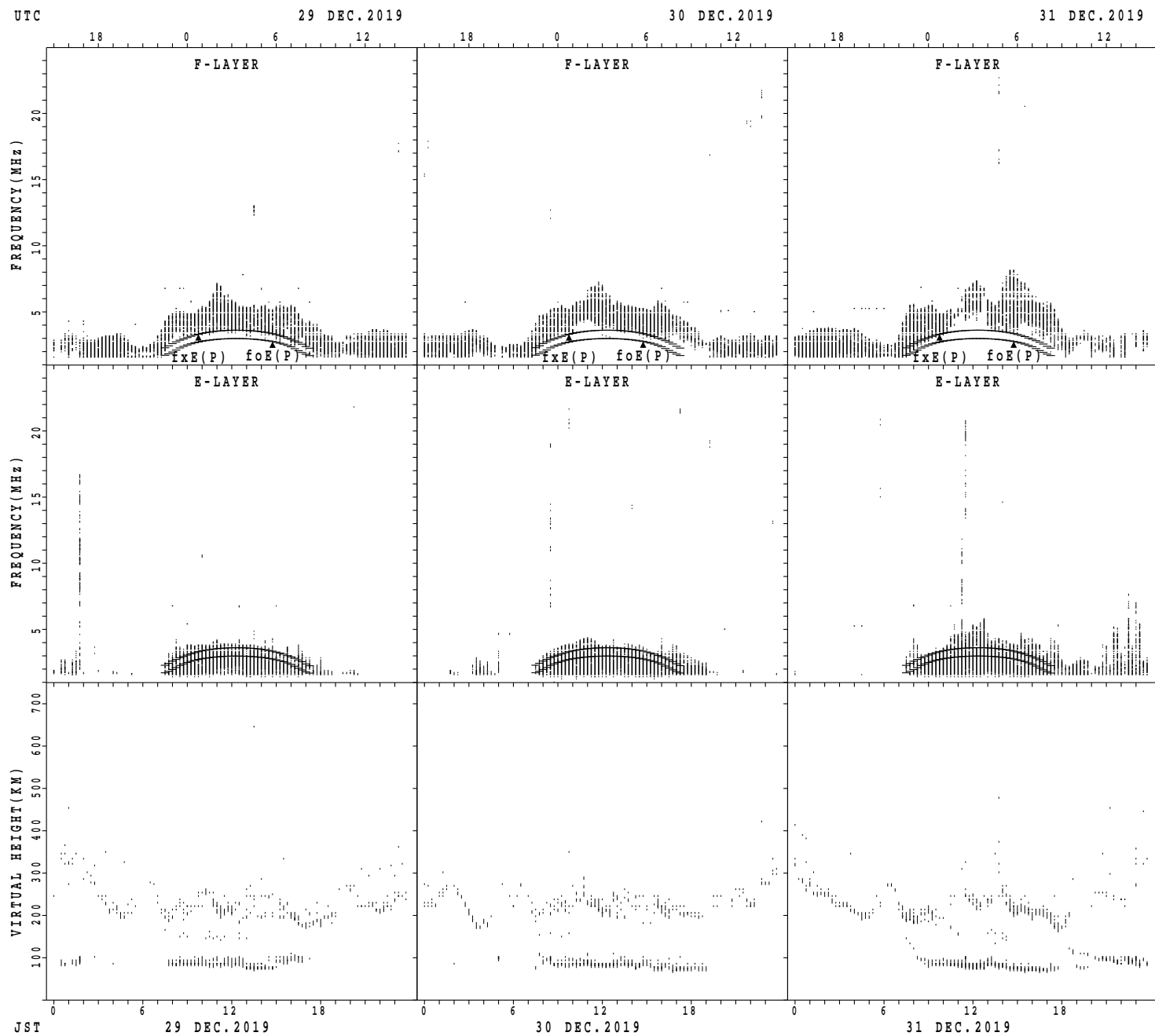
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $foE(P)$; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



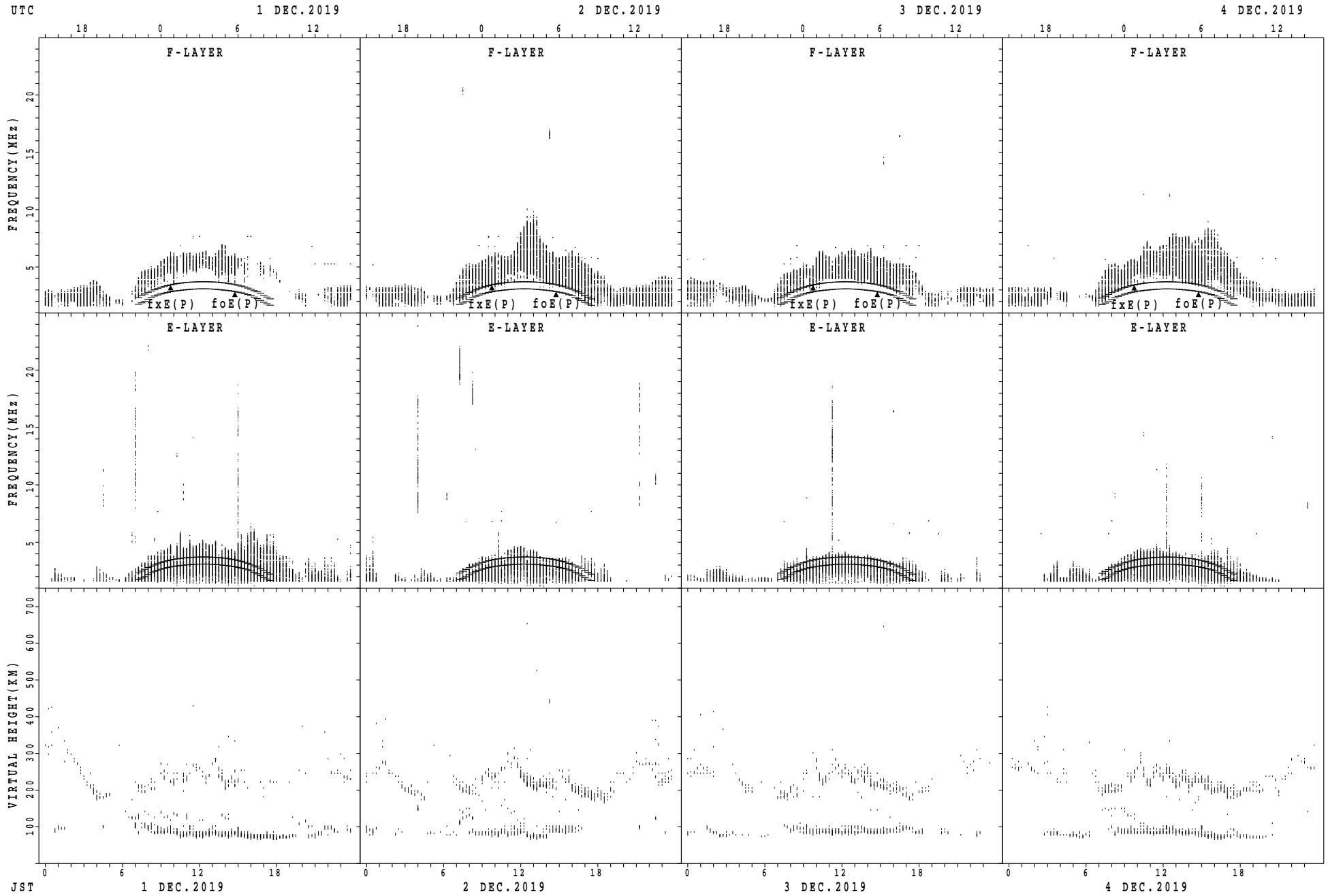
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



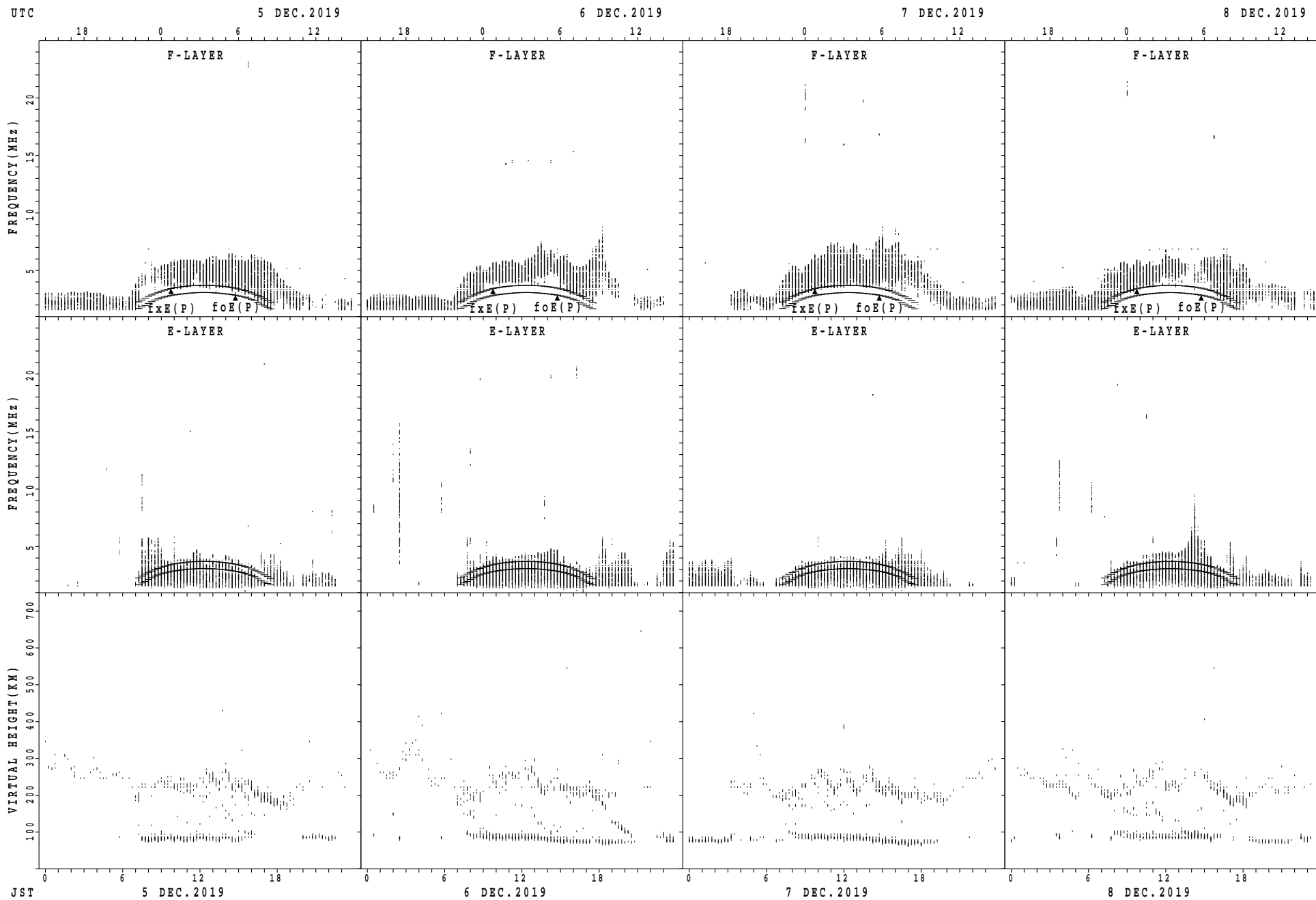
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



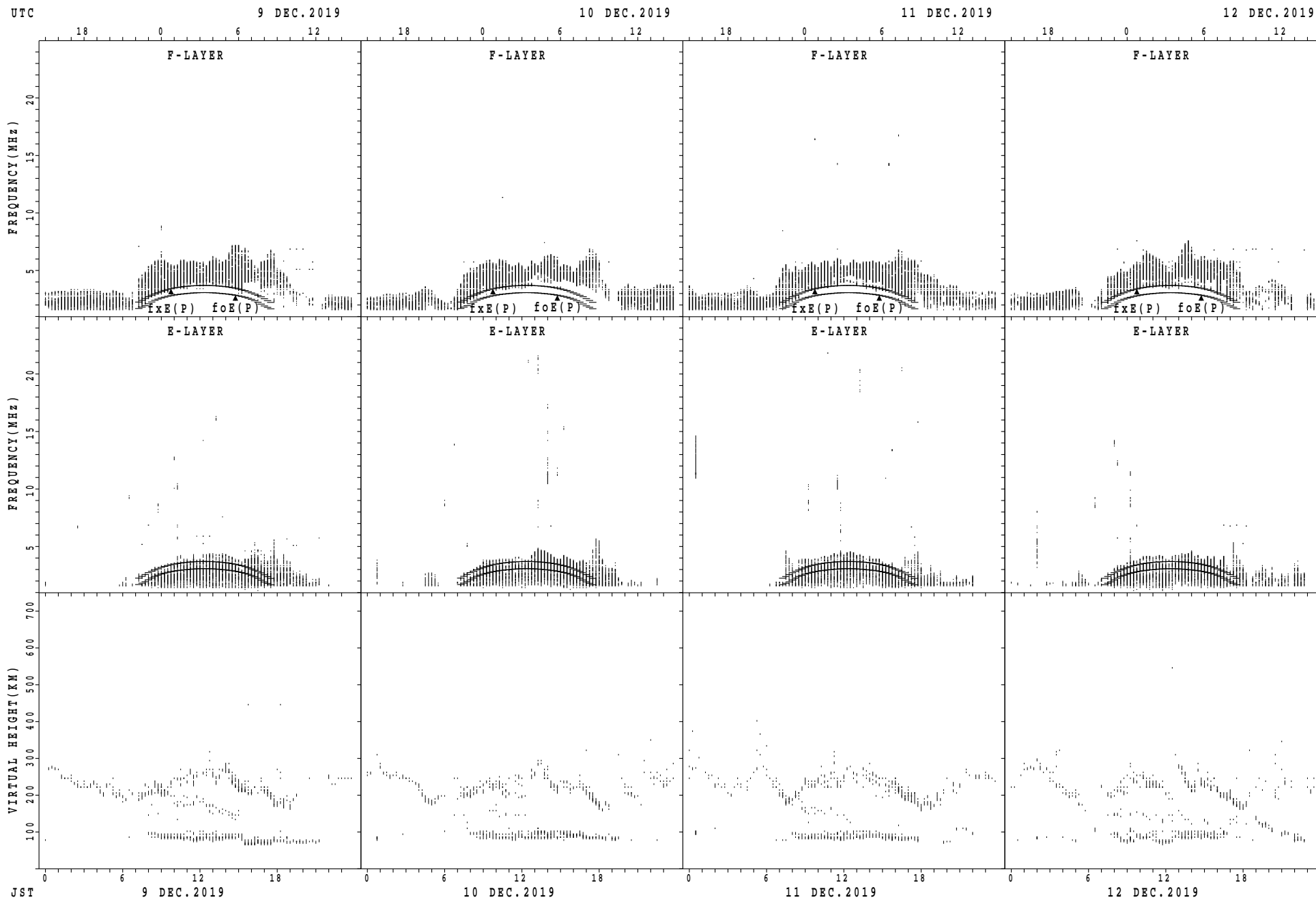
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $foE(P)$; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa

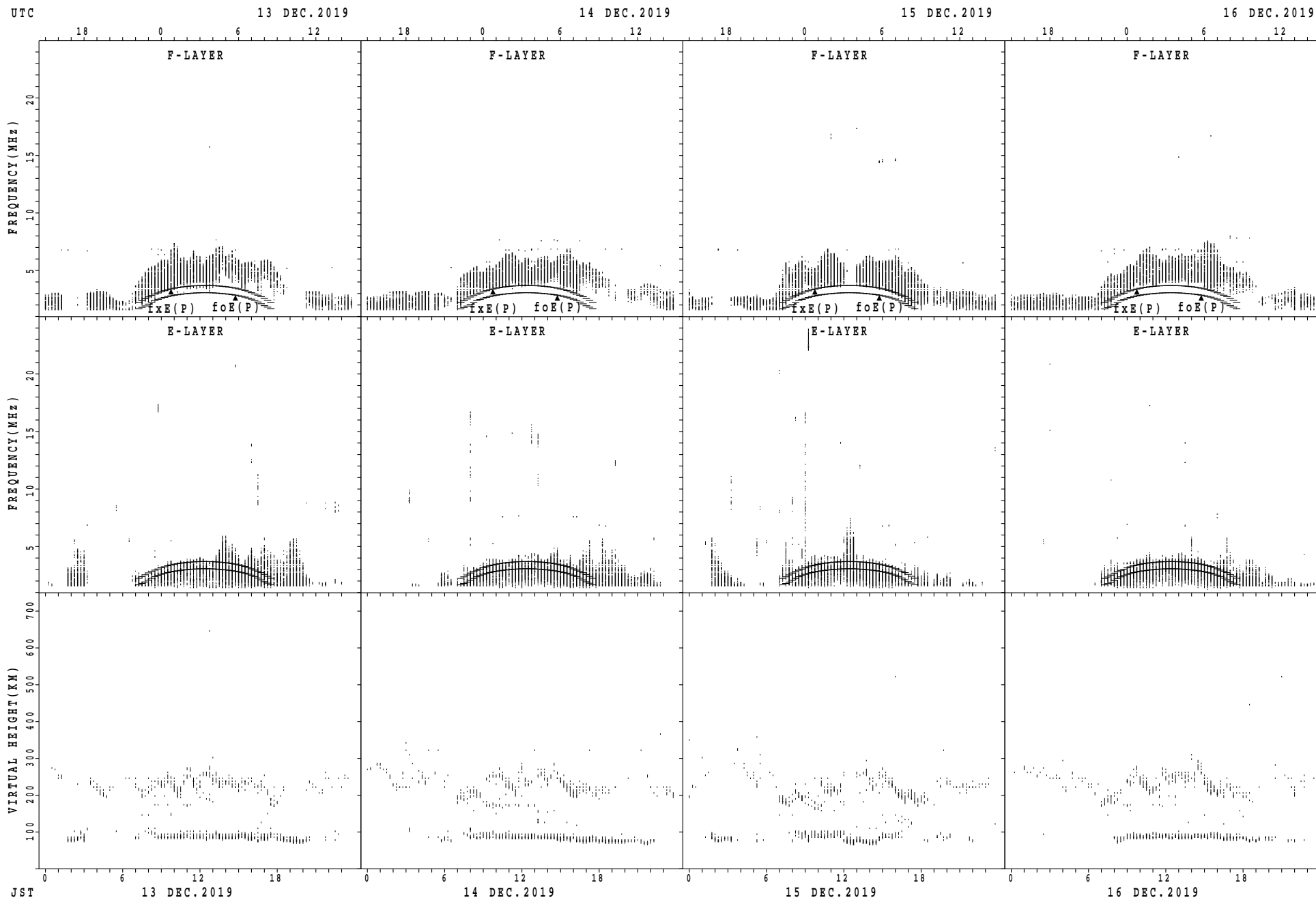


fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa

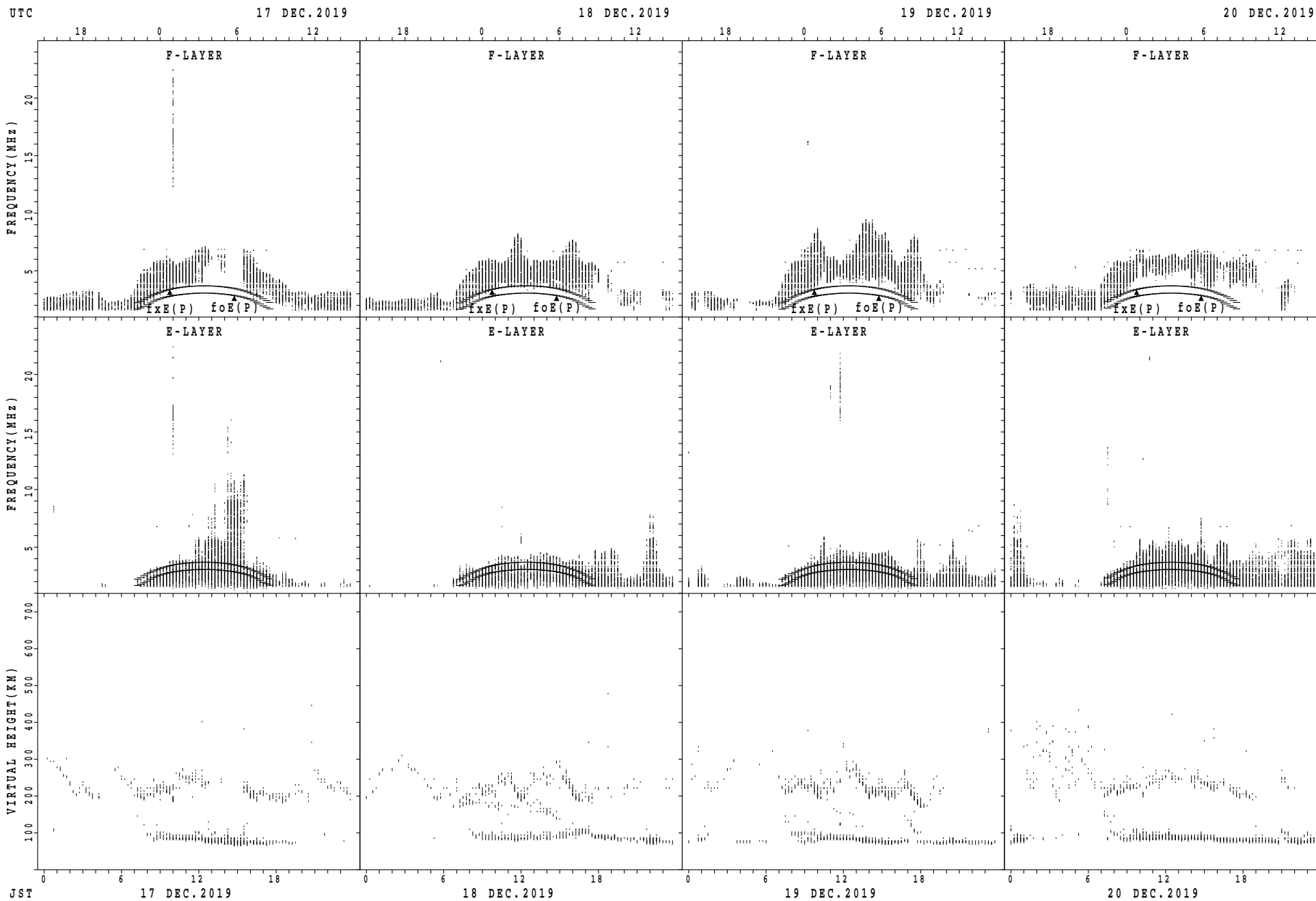


SUMMARY PLOTS AT Okinawa



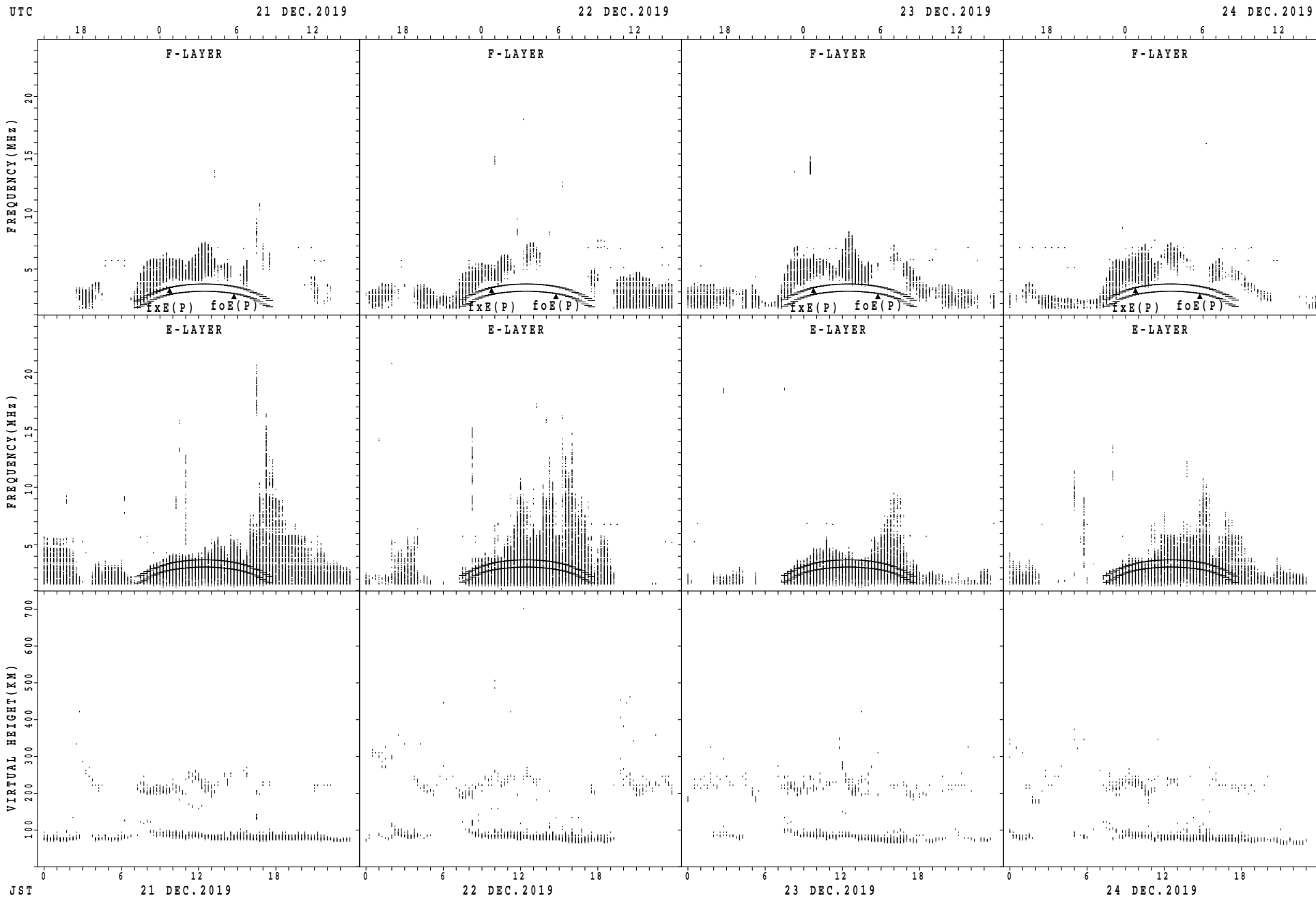
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $foE(P)$; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



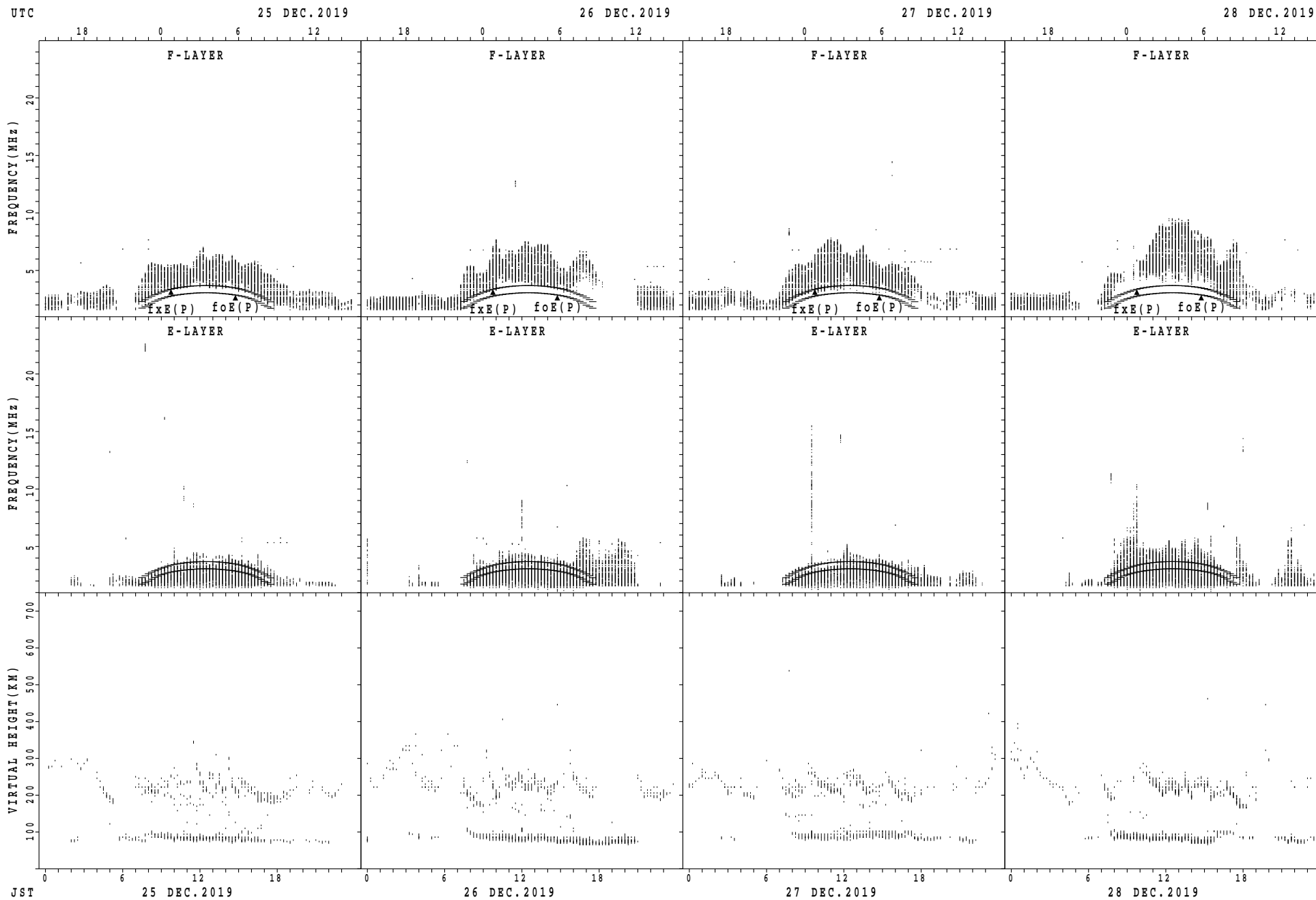
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $foE(P)$; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



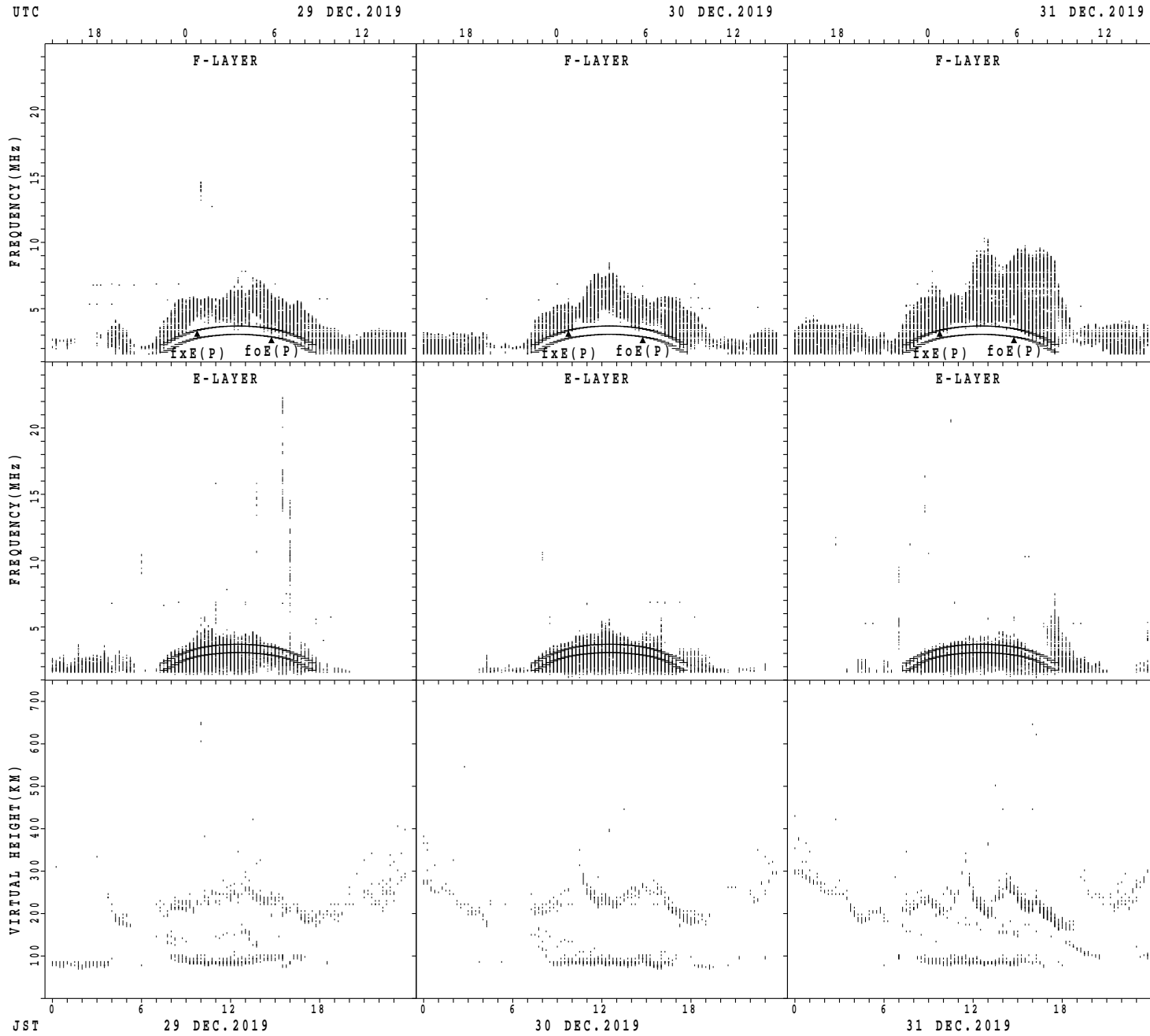
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $foE(P)$; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $foE(P)$; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $foE(P)$; PREDICTED VALUE FOR foE

MONTHLY MEDIANS OF h'F AND h'Es
 DEC.2019 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

h'F STATION Wakkanai LAT. 45°10.0'N LON. 141°45.0'E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							1			2	6	6	4	2					1					
MED							282			202	222	226	220	237					246					
U Q							141			204	232	228	228	254					123					
L Q							141			200	212	208	215	220					123					

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	9	6	6	2	2	15	13	21	30	28	28	25	27	25	22	22	25	16	14	18	16	17	16	10
MED	97	83	81	86	97	95	91	93	111	119	107	101	101	107	113	97	167	99	92	98	87	87	88	80
U Q	114	87	83	89	105	107	98	144	155	143	131	131	167	140	131	113	171	112	103	107	93	94	95	83
L Q	85	77	75	83	89	91	89	84	91	97	90	90	95	92	95	89	83	86	89	93	84	83	83	79

h'F STATION Kokubunji LAT. 35°43.0'N LON. 139°29.0'E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT											2	8	6	3	1	1								
MED											237	224	237	232	226	214								
U Q											238	248	248	234	113	107								
L Q											236	219	234	198	113	107								

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	7	5	5	5	4	1	3	14	23	25	21	21	22	20	16	19	24	13	8	7	8	13	10	10
MED	87	87	87	85	87	83	85	127	99	103	119	95	96	98	97	97	98	95	87	87	84	89	91	87
U Q	89	95	89	91	88	41	105	139	113	165	164	154	135	133	117	113	125	180	99	91	91	96	95	89
L Q	83	80	85	83	87	41	83	87	89	91	91	86	83	82	86	85	86	84	85	73	79	85	87	83

h'F STATION Yamagawa LAT. 31°12.0'N LON. 130°37.0'E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT										1	1	7			7	5	1	1						
MED										226	238	220			232	226	218	198						
U Q										113	119	236			234	289	109	99						
L Q										113	119	218			210	211	109	99						

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	9	10	9	6	9	7	6	10	25	30	29	30	30	30	30	27	29	28	26	14	12	12	9	10
MED	85	88	89	88	83	83	81	86	101	104	101	104	101	105	97	95	97	93	88	80	84	86	83	90
U Q	93	89	106	89	91	101	83	107	149	143	141	149	143	143	113	119	122	130	167	89	102	96	91	105
L Q	80	83	82	87	81	81	81	83	95	93	88	89	89	89	89	83	83	79	79	75	81	81	79	83

MONTHLY MEDIANS OF h'F AND h'Es
 DEC.2019 135E MEAN TIME(UTC+9H) AUTOMATIC SCALING

h'F STATION Okinawa LAT. 26°41.0'N LON. 128°09.0'E

	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										3	9					9	8	5	1					
MED										228	234					224	216	202	204					
U Q										240	245					244	222	234	102					
L Q										226	198					222	211	201	102					

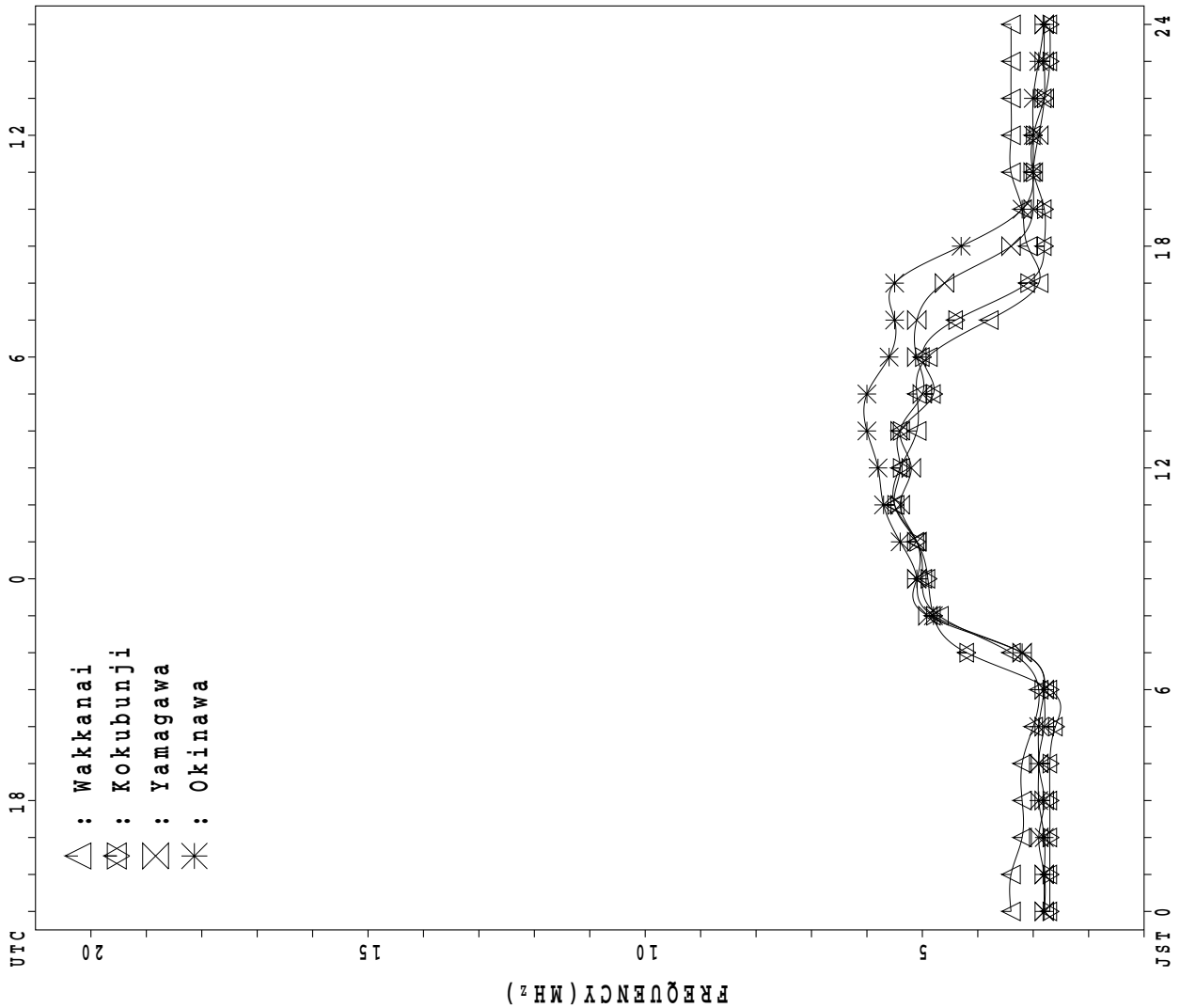
h'Es

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	11	6	12	7	7	6	4	9	26	31	29	28	30	31	30	31	27	29	28	24	15	13	12	7
MED	83	86	85	83	89	85	82	105	128	107	101	95	96	107	107	95	99	89	89	81	83	83	80	79
U Q	95	89	104	89	91	127	83	162	149	143	141	125	125	165	123	125	125	122	100	125	89	89	86	91
L Q	79	83	81	81	79	79	81	86	93	95	89	89	91	89	87	83	87	81	81	75	77	78	77	73

MONTHLY MEDIANS PLOT OF fOF2

DEC. 2019

AUTOMATIC SCALING



IONOSPHERIC DATA STATION Wakkanai

DEC.2019 f_{XI} (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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		36	X	X	X	X	X													X	X	X	X	X	X
2		38	X	X	X	X	X													29	29	34	33	37	37
3		X	X	X	X	X	X													X	X	X	X	52	X
4		X	X	X	X	X	X													X	X	X	X	X	X
5		38	X	X	X	X	X													X	X	X	X	38	38
6		38	38	38	38	40	38	37												X	X	36	40	42	43
7		40	37	X	X	X	X													X	X	X	44	X	F
8		X	X	X	X	X	X													X	X	X	X	X	F
9		F	X	X	X	X	X													X	X	X	X	X	
10		X	X	X	X	X	X													X	X	X	X	43	44
11		57	52	43	38	40	33	33												X	X	X	X	X	X
12		X	X	X	X	51	50													X	X	X	X	X	X
13		41	48	41	39	39	37													X	X	X	X	X	X
14		X	X	X	X	X	X													A	A	X	X	X	X
15		X	X	X	X	X	X													X	X	X	X	X	X
16		42	42	39	37	39	33	32												X	X	X	X	X	X
17		X	X	X	X	X	X													X	X	X	X	X	X
18		X	X	X	X	X	X													X	X	X	X	X	X
19		X	X	X	X	X	X													X	X	X	X	X	X
20		52	48	39	42	42	44	36	45											X	X	X	X	X	X
21		48	55	55	55	55	42	36												X	X	X	X	46	48
22		45	41	41	45	43	43	45	46											X	X	X	X	X	X
23		X	X	X	X	X	X													X	X	X	X	X	X
24		38	39	38	39	41	41													X	X	X	X	X	X
25		X	X	X	X	X	X													X	X	X	X	57	57
26		54	52	55	55	53	39													X	X	X	X	X	X
27		X	X	X	X	X	X													X	X	X	X	X	X
28		X	X	X	X	X	X													X	X	X	X	X	X
29		X	X	X	X	X	X													X	X	X	X	X	X
30		X	X	X	X	X	X													X	X	X	X	X	X
31		X	X	X	X	X	X													X	X	X	X	X	X
		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	31	11	2											30	30	31	31	31	29
MED		X	X	X	X	X	X													X	X	X	X	X	X
U Q		41	41	40	41	40	38	37												X	X	X	X	X	X
L Q		X	X	X	X	X	X													X	X	X	X	X	X
		38	37	36	34	33	33	33												30	33	35	34	37	37

DEC.2019 f_{XI} (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC.2019 foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	29	26	22	26	25	25	18	39	48	52	57	55	61	47	51	51	41	26	23	24	26	28	27	F
2	F	27	31	33	30	28	27	24	39	41	46	53	51	47	50	51	46	35	26	22	22	27	26	30	30
3	F	32	32	31	32	27	F	24	22	37	J	R	47	48	51	54	52	49	48	43	43	25	26	30	F
4	F	33	30	31	F	31	31	26	36	48	V	50	52	56	52	49	50	V	40	25	20	26	30	30	F
5	F	24	26	26	23	23	22	24	30	39	46	46	48	56	47	49	43	36	22	22	27	F	27	26	F
6	F	27	F	F	F	F	F	F	F	38	44	45	45	51	55	50	52	51	39	26	22	27	F	F	F
7	F	F	F	25	26	F	F	19	23	19	34	58	51	46	46	50	45	48	49	41	24	24	26	28	F
8	F	31	27	26	25	F	F	F	F	18	35	50	46	47	52	49	49	53	46	34	25	24	26	30	F
9	F	32	31	29	29	28	F	F	F	24	36	43	43	50	54	54	49	52	50	34	20	20	26	32	F
10	F	31	31	33	29	26	27	24	35	44	48	46	49	44	47	47	44	40	V	28	30	30	32	F	
11	F	F	F	37	36	31	29	26	21	37	48	50	46	56	46	42	48	50	39	F	27	21	25	27	F
12	F	31	31	30	30	F	F	F	F	20	29	46	44	48	48	52	50	48	A	31	31	27	31	26	F
13	F	31	32	34	32	32	30	23	30	42	42	48	57	48	40	49	51	32	22	23	23	28	26	26	F
14	F	31	27	F	F	F	27	22	34	42	40	57	52	51	48	47	46	38	22	A	A	32	33	30	F
15	F	28	28	26	26	F	F	24	30	A	A	44	48	47	51	54	44	54	39	37	26	31	31	34	F
16	F	30	30	F	F	F	F	20	36	50	45	58	54	51	48	48	50	32	22	29	30	37	37	27	F
17	F	32	31	27	F	25	24	A	36	41	48	60	54	48	48	46	47	32	20	24	28	31	32	32	F
18	F	32	26	F	F	26	22	19	18	29	36	52	50	45	55	48	46	44	34	21	24	24	30	30	F
19	F	27	26	25	22	23	19	19	35	46	60	47	54	66	58	45	47	40	28	30	33	28	F	40	F
20	F	34	30	F	F	28	27	F	F	24	32	51	54	50	58	56	59	45	48	38	25	27	F	32	F
21	F	30	F	F	F	F	F	F	F	22	22	32	39	53	56	54	53	50	49	56	39	25	29	30	F
22	F	30	F	F	F	38	36	F	F	28	32	45	51	58	55	56	46	54	46	32	26	31	F	38	F
23	F	30	27	F	F	27	26	F	F	21	31	47	54	52	52	58	51	53	42	33	26	30	33	32	F
24	F	26	32	F	F	32	34	34	24	39	43	48	54	55	48	42	54	46	43	28	28	32	34	31	F
25	F	29	31	F	F	26	31	Z	31	26	30	41	49	46	53	54	54	55	42	39	28	34	42	38	F
26	F	34	34	F	F	30	30	F	F	24	27	31	51	60	58	54	52	49	52	40	32	28	28	35	F
27	F	32	32	31	29	28	26	20	30	49	53	56	55	53	50	50	42	31	30	28	30	33	34	32	F
28	F	32	30	F	F	27	26	27	19	31	46	50	46	62	59	50	V	48	V	40	27	23	25	25	F
29	F	30	30	29	F	24	F	F	F	24	22	35	48	49	50	52	50	48	50	44	39	22	27	30	F
30	F	34	34	34	F	F	26	30	F	23	30	47	50	51	55	49	52	47	46	34	25	30	30	28	F
31	F	33	32	32	32	F	24	27	27	32	42	50	58	48	43	56	54	48	39	25	24	25	27	27	F
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT		29	29	29	28	28	30	29	30	31	31	31	31	31	31	31	31	30	31	30	30	31	31	30	29
MED		31	30	29	28	26	26	22	34	46	49	50	54	52	49	49	46	38	25	26	29	31	30	31	30
U Q		32	32	32	30	30	30	24	36	48	52	56	55	56	50	52	50	40	27	29	31	33	31	32	F
L Q		29	27	26	26	F	24	23	20	31	42	46	47	51	49	47	48	44	34	22	23	26	28	27	29

DEC.2019 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC.2019 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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											L	L	L	L	L									
2											364	L	L											
3							L			L	L	L						L						
4							264				L				L		L							
5							A			L			L	L	L			196						
6								272		L	L	L	L	L	L	L								
7										L														
8							264		L	264		L	L	L										
9											L	L	L	L	L									
10										L	L	L	L	L										
11										L	L	L	L											
12								L		L	L							A						
13											L	L	L	L	L									
14								L	L	L	L	L	L						A					
15							A	A		L	L	L	L	L										
16									L		L	L	L			L								
17							A				L	L	L	L	L									
18											L	L	L	L										
19											L	L	L	L			252		L					
20												L	L	L	L									
21											L	L	L	L	L									
22											L	L	L											
23											L		L	L										
24											L	L	L	L										
25											L	L	L	L	L									
26							L		L	L	L	L	L	L										
27											L	L	L	L	L									
28								L				L	L	L										
29										L		L	L			L								
30									L	L	L	L	L	L										
31											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	2		1	1		1				1	1						
MED							264	268		264	364		L 348				252	196						
U Q																								
L Q																								

DEC.2019 foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC.2019 foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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							B	A										B						
2							B		200	240	240	260	248	244	212	188	324	B	B					
3								204	228	252	252	252	252	252	228			A	B					
4							212	184	212	260	256	252	252	244	244	168								
5							B		180	196	232	256	256	256	228	200	276	B						
6							B		204	184	224	232	260		A	240	216	172	A	B				
7							B		196	232	248	264	276	244	228	260		A	B					
8							B		196	300	248	248	248	260	244	244		B	A	A				
9							B		244	180	224	248	268	276	256	220	184	208						
10							B			172	232	252	272	260	260	236	168	184	B					
11							B		A	200	220	244	260	252	240	236	192		B	A				
12							B			184	232	256	268	260	252	220	192		A	B				
13							B		196	212	224	260	260	260	248	224	188		A	A				
14							B		A	196	232	244	256	264	248	228	192		B	200				
15							B		A	200	232	252	276	272	256	224	180	172		A				
16							A		A	192	232	268	268	252	244	232	188		B	B				
17							B			192	200	228	252		A	252	244	220	208		B	156		
18							B		A	200		244	256	264	256	220	188		A	B				
19							B		A	200		236	244	256	256	244	212	196		A	A			
20							B		B	156	224	236	248	248	240	224	204	220	188		A			
21							B		A		240	260	256	228	236	224	212	232		A	A			
22							B		B	200	240	248	260	260	256	220	196		A	A				
23							B			204	232	272	268	272	248				B	B				
24							B		B	200	224		252	252	256	232	228	188		B	B			
25							B		A	188	232	236	268	268	252	228	188		B	A				
26							B		A		224	248	248	252	236	216	232		B	A				
27							B		B	196	248	264	280	284	248	248	192		B	B				
28							B			184	200	220	244	256	256	252	228	188	164		B	B		
29							B		B	204	228	244	268	268	244	244	220		A	B				
30							B		6	123	224	224	292	264	252	252	236	216		A	A			
31							B		B	216	232	248	272	268	248	248	212		B	A				
							B			208	216	228	244	244	252	252	236	196		B	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							1	13	28	29	31	30	30	31	30	28	8	3						
MED							212	196	200	232	248	260	258	248	228	192	214	188						
U Q								204	212	238	256	268	268	252	236	206	254	200						
L Q								184	194	224	244	256	252	244	220	188	178	156						

DEC.2019 foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC.2019 foEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	25	J A	30	22	E B	23	28	24	33	24	27	27	30	30	28	26	G	G	31	33	23	E B	E B	J A	26	20								
2	22	30	27	20	E B	16	19	J A	83	30	24	27	29	29	28	J A	57	26	26	21	E B	16	28	E B	16	19	E B	16	24	20				
3	J A	J A	21	23	19	22	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	16	18	27	27								
4	E B	17	23	27	E B	16	20	27	20	J A	86	26	29	32	31	30	27	27	J A	J A	J A	J A	J A	J A	J A	J A	J A	27	33	28	23			
5	E B	E B	16	16	18	22	E B	16	27	24	28	22	27	30	J A	63	66	28	24	24	24	J A	E B	E B	E B	E B	E B	E B	E B	E B	E B			
6	J A	E B	J A	E B	J A	J A	23	22	20	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A			
7	E B	E B	E B	E B	J A	43	27	19	18	G	J A	63	32	84	32	35	30	32	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A			
8	21	21	22	23	20	22	J A	J A	J A	84	26	21	32	30	53	29	29	32	J A	J A	E B	16	21	21	J A	J A	J A	J A	J A	J A	J A			
9	22	E B	16	19	E B	16	25	24	38	24	J A	27	30	32	30	32	28	31	28	G	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A			
10	E B	17	18	18	E B	19	23	21	32	23	22	28	28	32	30	32	28	28	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A			
11	28	20	16	26	J A	110	19	E B	J A	16	46	20	36	32	30	31	31	28	26	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A			
12	J A	J A	E B	16	48	20	30	J A	25	26	26	26	34	34	J A	39	41	31	47	J A	59	74	100	60	J A	J A	J A	J A	J A	J A	J A			
13	30	24	E B	16	25	20	162	35	28	32	26	42	33	J A	27	28	25	27	E B	16	26	44	39	60	J A	J A	J A	J A	J A	J A	J A			
14	180	25	25	24	24	19	J A	J A	J A	48	49	23	28	30	31	42	29	27	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A			
15	35	J A	97	33	J A	108	28	86	100	86	24	84	G	31	28	27	25	J A	E B	23	15	83	62	34	J A	J A	J A	J A	J A	J A	J A			
16	28	J A	E B	17	21	25	21	35	23	31	27	39	J A	81	28	27	27	J A	E B	24	15	29	46	27	28	36	37	34	J A	J A	J A			
17	38	24	25	20	J A	26	25	44	59	J A	40	85	50	37	26	57	23	20	23	20	J A	E B	16	21	J A	J A	J A	J A	J A	J A	J A			
18	J A	J A	E B	16	16	26	J A	21	32	37	26	26	26	26	28	85	32	32	J A	J A	J A	E B	16	19	19	E B	16	20	J A	J A	J A			
19	J A	E B	E B	16	19	20	20	E B	E B	E B	J A	25	26	26	36	30	26	38	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A		
20	28	28	19	23	22	20	J A	52	22	J A	63	27	34	28	27	27	25	33	J A	G	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A			
21	20	28	E B	16	21	17	E B	E B	J A	40	26	35	34	J A	37	38	31	25	48	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A		
22	E B	E B	J A	24	25	24	26	22	16	51	28	24	35	34	G	23	28	27	27	53	51	28	16	51	15	E B	J A	E B	E B	E B	E B			
23	34	34	J A	27	24	29	25	28	19	34	27	34	28	30	J A	48	26	15	22	16	16	16	16	16	16	16	16	16	16	16	16	16		
24	J A	E B	E B	E B	E B	E B	E B	E B	J A	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
25	J A	J A	J A	29	28	35	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
26	30	J A	37	30	32	21	24	19	22	24	29	37	28	J A	31	29	J A	33	33	15	20	16	26	26	31	E B	16	27	J A	J A	J A	J A		
27	E B	16	29	36	21	J A	J A	E B	141	16	21	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A		
28	24	26	21	J A	E B	15	24	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
29	27	26	19	J A	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
30	J A	84	57	28	E B	E B	E B	E B	E B	E B	16	16	32	22	29	G	G	G	G	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
31	23	27	J A	E B	E B	E B	E B	E B	E B	E B	16	20	16	G	23	28	28	27	33	29	29	26	E B	16	42	34	77	60	24	16	16	16	16	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23										
CNT	31	31	31	31	31	31	31	31	31	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	28	25	22	22	22	24	24	26	J A	26	28	30	31	30	29	27	26	J A	24	26	28	26	28	28	27	21								
U Q	J A	J A	J A	28	26	25	27	38	49	34	30	37	35	35	35	31	29	G	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
L Q	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	18	21	22	27	28	29	28	28	26	24	E B	16	21	18	20	21	19	20	17					

DEC.2019 foEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC.2019 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	E	B	E	B	E	B	E	B		E	B					G	G	E	B	E	B	E	B	E	B
2	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
3	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
4	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
5	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
6	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
7	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
8	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
9	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
10	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
11	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
12	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
13	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
14	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
15	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
16	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
17	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
18	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
19	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
20	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
21	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
22	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
23	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
24	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
25	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
26	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
27	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
28	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
29	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
30	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
31	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	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	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	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
UQ	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B
LQ	E	B	E	B	E	B	E	B		E	B							E	B	E	B	E	B	E	B

DEC.2019 fbEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC.2019 fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

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

DEC.2019 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC. 2019 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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		254 ^F	281 ^F	295 ^F	333	309	309	313	400	379	383	368	370	370	383	376	378	395	368	367	327	346	276	285	290 ^F
2		285 ^F	316 ^F	312	334	324	339	322	386	396	392	399	370	399	344	373	394	406	373	313	314	318	333	280	334 ^F
3		313	295	292	281	319 ^F	393 ^F	306	377		402 ^R	365	377	358	382	383	380	395	306	323	335	317	305	276 ^F	292 ^F
4		267 ^F	301 ^F	304 ^F	316 ^F	346	346	295	360	396	370 ^V	338	365	367	397	367	384	358 ^V	375	408	332	303	330	306	262 ^F
5		293 ^F	304 ^F	286 ^F	327 ^F	327 ^F	358 ^F	329 ^F	385	381	378	360	374	385	381	383	377	392	309	309	310	310	315	280 ^F	314 ^F
6		268 ^F		289 ^F			426 ^F	326 ^F	384	395	406	397	365	366	377	374	372	416	370	300	320	328 ^F	318 ^F	279 ^F	224 ^F
7		265 ^F	289 ^F	298 ^F	301 ^F	317 ^F	325 ^F	308	360	386	373	392	387	369	368	382	384	395	352	311	339	343	307	298	
8		275 ^F	310 ^F	296 ^F	302 ^F	286 ^F	310 ^F	296 ^F	399	391	373	389	353	358	378	398	389	380	315	326	332	355	356	329	
9			302 ^F	284 ^F	301 ^F	315 ^F		342 ^F	367	400	353	368	384	331	363	374	387	369	305	348	328	359	374	276 ^F	288 ^F
10		305 ^F	312 ^F	315 ^F	312 ^F	322 ^F	334 ^F	353 ^F	370	408	348	378	379	373	383	339	411	379	361	335 ^V	323	322	321	299 ^F	296 ^F
11			273 ^F	306 ^F	286 ^F	297 ^F	304 ^F	336 ^F	357	396	410	361	380	376	413	369	396	377	376	362	356	325	325	344	315 ^F
12		320 ^F	303 ^F	328 ^F	329 ^F	297 ^F	373 ^F	309	398	408	405	372	372	389	392	385	373		354	351	332	382	344	336	323 ^F
13		297 ^F	329 ^F	306 ^F	326 ^F	313 ^F	334 ^F	293	377	415	419	364	364	367	370	349	387	356	303	357	345	361	349	300	289 ^F
14		285 ^F	294 ^F				302 ^F	368 ^F	370	399	392	391	399	376	342	412	343	400	320			355	347	334	299 ^F
15		343 ^F	286 ^F	272 ^F	307 ^F	324 ^F	309 ^F			387	399	407	318	389	379	401	400	374	356	384	327	353	326	286 ^F	297 ^F
16		301 ^F	305 ^F	302 ^F	321 ^F	317 ^F	312 ^F	291 ^F	386	383	356	368	307	377	377	370	383	401	281	363	344	312	380	283	311 ^F
17		309 ^F	279 ^F	307 ^F	332 ^F	290 ^F	335 ^F		387	395	411	366	390	370	393	361	399	369	340	324	348	347	330	338	274 ^F
18		284 ^F	262 ^F	295 ^F	302 ^F	287 ^F	341 ^F	365 ^F	339	398	386	416	410	365	395	397	372	393	329	356	350	343	318	279 ^F	293 ^F
19		294 ^F	283 ^F	328 ^F	307 ^F	296 ^F	291 ^F	277 ^F	370	399	398	385	315	367	375	385	398	355	344	332	362	364	318	299 ^F	313 ^F
20			269 ^F	304 ^F	309 ^F	323 ^F	328 ^F	262 ^F	340 ^F	384	387	370	335	356	373	370	346	366	315	297	337	337	338	304	271 ^F
21		250 ^F					288 ^F	289 ^F	369 ^F	415	370	388	386	373	397	368	390	399	353	315	342	337	305	305	305 ^F
22		312 ^F	331 ^F	309 ^F	305 ^F	315 ^F	349 ^F	361 ^F	382	383	382	406	395	399	349	382	381	355	325	299	323	317	315	286 ^F	
23		263 ^F	310 ^F	346 ^F	347 ^F	311 ^F	299 ^F	333 ^F	357 ^F	401	385	383	400	374	366	379	388	373	374	330	355	364	330	306	280 ^F
24		310 ^F	331 ^F	272 ^F	354 ^F	333 ^F	404 ^F	339	383	415	371	344	386	391	389	370	378	381	411	332	338	318	347	309	329 ^F
25		326 ^F	305 ^F	314 ^F	315 ^F	334 ^F	335 ^F	396 ^F	373	407	372	395	366	326	381	335	396	388	359	355	350	335	328	343	
26		288 ^F	315 ^F	289 ^F	315 ^F	268 ^F	334 ^F	339	354	372	392	369	392	394	369	376	396	367	347	353	349	313	343	283	335 ^F
27		328 ^F	324 ^F	341 ^F	343 ^F	318 ^F	342 ^F	308	362	398	378	360	397	382	395	387	410	381	349	335	345	320	333	311	273 ^F
28		289 ^F	301 ^F	333 ^F	324 ^F	325 ^F	347 ^F	291 ^F	365	421	373	399	377	366	353	369	355	369	359	305	375	345	321	302	294 ^F
29		312 ^F	312 ^F	311 ^F	307 ^F	296 ^F	352 ^F	365 ^F	387	389	376	351	391	403	381	343	387	397	295	355	371	352	330	318	294 ^F
30		262 ^F	320 ^F	320 ^F	313 ^F	364 ^F	350 ^F	347 ^F	365	354	365	383	380	369	353	386	395	369	353	300	348	345	301	313	338 ^F
31		279 ^F	290 ^F	287 ^F	330 ^F	347 ^F	312 ^F	312 ^F	379	406	388	364	381	377	371	374	390	402	373	364	339	335	354	286	290 ^F
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT		28	29	29	28	28	30	29	30	30	31	31	31	31	31	31	31	30	31	30	30	31	31	31	28
MED		291	303	304	315	317	334	322	370	396	383	372	379	373	379	374	387	381	353	334	339	337	330	302	294
U Q		311	314	314	330	324	347	344	385	406	398	391	390	385	392	385	396	395	368	356	349	353	344	315	314
L Q		272	288	290	306	297	310	296	361	386	372	364	365	366	369	368	378	369	315	315	328	320	318	283	287

DEC. 2019 M(3000)F2 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC.2019 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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											L	L	L	L	L									
2											404	L	L											
3							L			L		L	L					L						
4							293					L			L		L							
5							A			L			L	L	L			394						
6							435		L	L	L	L	L	L	L									
7									L															
8							417		L	414		L	L	L										
9											L	L	L	L	L									
10										L	L	L	L	L										
11									L	L	L	L												
12								L		L	L						A							
13											L	L	L	L	L									
14								L	L	L	L	L	L					A						
15							A	A		L	L	L	L	L										
16									L		L	L	L		L									
17							A					L	L	L	L									
18											L	L	L											
19											L	L	L	L			434		L					
20												L	L	L	L									
21											L	L	L	L	L									
22											L	L	L											
23											L		L	L										
24											L	L	L	L										
25											L	L	L	L	L									
26							L		L	L	L	L	L	L										
27											L	L	L	L	L									
28								L				L	L	L										
29										L		L	L		L									
30									L	L	L	L	L	L										
31											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	2		1	1		1				1	1						
MED							293	426		414	404		425				434	394						
U Q																								
L Q																								

DEC.2019 M(3000)F1 (0.01)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

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DEC.2019 h'F2 (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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											228	214	230	234	234									
2											218	244	204											
3							282		208		230	246						334						
4							304				228			228		228								
5							E A 312			224			224	224	216			324						
6								220	214	216	214	240	244	224	224									
7										216														
8								236	226	218		234	234	234										
9												234	234	224	238									
10										238	218	232	212	250										
11										200	226	226	236											
12								210		218	262						A							
13											244	244	216	216	256									
14								222	212	212	212	214	228					E A 242						
15							A	A		222	202	240	218	218										
16									202		236	242	222		240									
17							A					214	232	232	228									
18											212	216	234											
19											214	284	226	220			230	248						
20												260	232	226	218									
21											214	214	224	204	220									
22											220	206	214											
23										214		204	230											
24											250	218	218	218										
25										218	218	230	286	240	298									
26							220		234	202	222	212	212	224										
27											212	220	208	230	230									
28									214			232	246	246										
29										210		218	218		242									
30										224	228	222	232	232	242									
31											242	216	254		228									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							4	4	7	15	20	28	28	18	14		2	4						
MED							U 272	221	214	216	219	229	229	225	229		229	286						
U Q							308	229	226	222	232	237	234	234	240			329						
L Q							251	215	212	210	214	215	218	220	224			245						

DEC.2019 h'F2 (KM)

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DEC. 2019 h'F (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	278	278	268	218	252	216	228	192	214	216	196	178	220	200	190	204	192	192	238	238	204	270	232	276
2	264	266	236	236	214	210	240	202	190	208	208	202	144	240	226	214	184	222	244	244	222	222	222	222
3	272	260	246	240	214	200	246	210	206	184	222	214	188	220	214	208	192	188	226	226	240	248	266	266
4	258	270	258	234	224	214	194	212	194	214	214	194	234	210	192	204	188	208	220	232	264	254	266	266
5	276	254	264	258	246	202		202	202	202	220	220	192	192	192	194	194	216	216	222	222	202	242	214
6	288	274	276	248	232	210	210	186	178	196	166	214	202	202	202	218	194	194	206	238	202	218	258	272
7	262	244	244	266	260	214	248	208	224	190	210	210	232	224	214	214	214	242	214	234	254	224	254	246
8	234	224	266	272	278	242	238	200	198	192	224	196	196	204	206	204	204	248	232	260	204	204	204	242
9	244	244	256	264	218	236	240	208	198	208	228	196	204	208	214	214	186		248	230	216	202	256	248
10	226	242	256	248	240	232	224	202	202	200	178	200	180	222	232	202	208	220	202	204	210	234	248	240
11	258	258	244	230	256	246	214	200	202	190	190	212	212	210	228	212	200	236	202	214	232	252	268	260
12	226	246	210	266	240	200	182	198	198	188	208	216	236	216	212	210		230	198	198	198	234	234	246
13	256	240	226	238	238	210	250	212	200	196	196	220	176	196	218	206	190	248	226	214	214	230	262	246
14	242	242	242	242	242	236	210	184	188	188	194	194	194	218	204	218	194		A	A	A	A	A	230
15	250	250	270	234	234				A	A	A	204	192	166	198	202	194	208	194	206	244	216	254	228
16	220	226	254	246	236	212	222	192	192	202	178	192	184	216	204	214	184		A		212	240	228	208
17	242	266	258	258	260	238		216	196	194	216	186	190	202	186	202	192	E	A		214	226	222	232
18	274	268	268	248	238	260	236	216	200	212	190	180	172	216	216	218	192		A		228	228	238	250
19	272	280	238	290	272	272	300	208	192	204	178	202	200	200	204	198	176	222	252	222	224	288	268	216
20	262	252	244	264	222	234	190	214	212	206	232	198	206	206	188	208	202	256	232	222	228	234	258	258
21	262	228	246	236	278	244	210	210	194	208	208	192	192	186	178	202	196	218	244	218	218	200	224	224
22	224	234	232	230	238	216	202	214	212	212	198	194	210	200	234	214	200	216	234	234	236	220	242	260
23	296	244	238	222	246	246	220	226	188	188	226	196	196	232	216	200	188	206	206	206	208	208	280	260
24	250	218	244	218	210	186	206	206	190	222	212	202	186	186	222	198	198	198	230	230	230	222	254	226
25	258	258	258	246	226	228	214	206	196	188	176	202	196	196	210	206	194	210	222	222	208	240	226	226
26	222	246	246	252	244	258	192	214	206	196	188	188	188	194	210	200	212	234	234	220	220	212	248	248
27	242	234	238	244	244	220	260	224	194	222	198	202	202	202	202	202	188	234	234	222	222	222	262	276
28	252	216	224	232	228	214	196	196	182	214	218	200	178	198	216	216	196	250	258	234	E	A	E	A
29	234	234	208	224	240	222	226	206	206	170	236	202	202	218	192	212	198	E	B		218	228	206	210
30	252	228	240	218	198	198	198	208	194	198	198	198	194	194	214	202	198	224	224	238	238	252	224	224
31	260	264	246	232	202	222	222	210	194	222	216	186	186	222	204	218	192	212	200	216	222	222	236	264
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	30	28	30	31	31	31	31	31	31	31	31	30	27	30	30	31	30	31	31
MED	256	246	246	242	238	218	219	208	198	200	208	198	196	204	210	206	194	221	226	226	222	226	248	248
U Q	264	264	258	258	246	238	239	212	204	212	218	202	204	218	216	214	200	238	234	234	232	248	262	264
L Q	242	234	238	232	224	210	204	200	192	190	190	194	186	196	202	202	190	210	214	218	210	218	232	230

DEC. 2019 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC.2019 h'E (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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							B	A										B							
2							B		110	106	106	106	110	110	110	112	108	B	B						
3								108	120	108	114	114	102	100	110			A	B						
4							110	124	116	102	108	108	108	108	108	90			B						
5							B		126	126	112	112	112	112	112	112	112	A	B						
6							B		116	116	116	116	96	A	104	104	104	A	B						
7							B	A		114	114	110	110	108	108	108	108	A	B						
8							B	G		116	112	112	106	112	102	102	B	A							
9							B		104	104	112	112	112	112	112	100	126	B	B						
10							B	A		110	110	118	118	112	120	120	120	B	A						
11							B	A		110	98	104	106	108	104	100	104	A	B						
12							B	A		108	120	112	112	112	112	106		A	A						
13							B	E	B	122	122	124	102	110	104	104	104	A	A						
14							B	A		114	114	114	102	102	106	106	130	B	128						
15							B	A		126	114	114	114	114	114	114	114	106	A						
16							A	A		106	106	104	112	96	110	110	110	B	B						
17							B	A		92	110	110	110	A	110	116	116	110	B	B					
18							B	A		128	A	108	108	104	104	104	112	A	B						
19							B		102	A	102	102	110	106	106	102	102	A	A						
20							B	B		108	108	108	102	116	144	106	106	92	108						
21							B	A		A		112	106	106	106	106	92	106	A	A					
22							B	B		110	120	120	120	120	104	104	104	A	A						
23							B	B		120	100	104	104	104	104			B	B						
24							B	A		94	100	A	100	112	112	110	110	B	B						
25							B	A		110	110	108	108	108	108	108	108	B	A						
26							B	A		A	108	108	106	106	106	106	106	B	A						
27							B	B		122	114	114	114	106	106	106	106	B	B						
28							B	B		114	114	112	100	110	110	100	112	112	130	B	B				
29							B	B		114	114	108	108	98	114	104	104	B	B						
30							B	A		B	104	104	104	104	108	108	124	A	B						
31							B	B		124	124	108	108	108	108	106	100	A	A						
							B	B		120	106	108	108	108	118	122	108	B	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							1	10	27	29	31	30	30	31	30	28	7	3							
MED							110	108	114	112	108	108	108	108	108	107	108	114							
U Q								122	120	114	112	112	112	112	112	112	126	128							
L Q								102	110	106	104	106	104	104	104	104	106	108							

DEC.2019 h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC.2019 h'Es (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	98	106	92	B	106	106	102	102	146	152	134	156	156	152	130	G	96	116	106	106	B	B	106	98
2	90	90	90	90	B	90	110	94	140	128	164	146	132	84	142	110	84	B	90	B	116	B	98	98
3	94	94	94	94	94	B	110	102	92	88	136	144	88	96	94	80	88	88	90	226	B	88	88	88
4	B	88	102	B	90	106	106	100	150	150	140	136	126	126	126	86	92	82	88	106	98	98	98	98
5	B	B	98	102	B	102	102	102	136	122	166	90	90	138	138	132	82	86	B	B	86	B	B	B
6	92	B	94	94	94	96	B	96	110	154	90	90	154	152	136	106	116	116	B	122	110	112	B	B
7	B	B	B	100	114	110	102	G	100	90	108	154	114	128	122	110	102	102	102	102	88	92	92	106
8	98	98	98	94	94	94	94	94	146	96	160	112	148	158	120	134	126	B	132	132	96	100	100	B
9	100	B	108	B	108	100	104	104	96	158	140	132	132	152	126	120	G	122	116	116	116	108	108	108
10	B	100	108	B	110	106	106	106	104	132	136	154	156	138	122	110	86	98	90	90	90	146	110	94
11	98	98	B	92	92	102	B	94	132	104	162	150	168	136	124	114	114	114	150	140	114	100	98	98
12	98	88	B	90	100	100	110	146	146	126	126	120	112	112	112	106	100	100	100	100	100	100	90	90
13	96	96	B	86	106	92	92	94	100	118	92	108	110	168	154	142	B	126	106	118	94	94	108	B
14	114	96	96	96	92	92	116	88	170	168	136	166	100	146	138	100	100	102	102	116	118	120	100	84
15	84	84	92	104	100	100	90	104	102	102	G	168	168	150	174	114	B	124	106	96	96	104	104	104
16	96	108	B	98	98	98	98	88	100	152	98	94	134	134	154	142	B	98	104	100	100	100	100	94
17	Q	94	94	100	90	106	104	104	104	92	96	90	154	124	124	142	96	94	94	B	102	102	102	102
18	92	92	92	B	B	108	104	96	96	132	132	132	124	160	88	88	88	88	88	B	88	88	B	92
19	118	B	B	100	96	96	B	B	102	150	146	92	166	152	90	90	86	100	102	102	90	100	100	100
20	96	90	90	94	94	94	98	102	102	102	98	128	120	100	100	90	G	102	102	102	94	94	96	96
21	94	94	B	88	88	B	B	88	100	128	102	108	96	90	102	94	94	88	88	88	88	86	86	86
22	B	B	96	96	96	88	88	B	112	136	106	114	92	G	106	84	86	92	106	106	106	B	106	B
23	90	90	90	90	90	90	90	90	110	94	106	148	158	148	90	90	B	90	B	B	B	B	B	90
24	106	B	B	B	B	B	106	B	104	94	138	96	120	152	140	138	B	B	B	108	100	116	102	94
25	114	96	96	96	96	110	102	102	102	102	96	142	90	132	132	88	B	110	B	84	84	100	B	B
26	96	92	92	92	88	88	88	138	146	98	98	130	90	158	92	92	B	92	B	92	Q	94	94	94
27	B	94	94	94	104	104	B	138	96	106	120	138	106	130	168	G	G	B	B	106	106	116	96	96
28	92	92	92	112	B	102	92	90	116	148	98	98	98	140	140	122	B	84	106	106	100	100	100	88
29	88	88	88	88	B	100	126	100	94	158	92	136	120	120	120	110	110	110	B	94	94	94	94	B
30	120	106	96	B	B	B	B	92	150	100	G	G	G	92	92	92	82	82	82	82	92	106	106	106
31	106	96	96	B	B	96	B	G	138	138	132	146	146	158	160	124	B	110	110	116	108	108	B	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	25	24	23	23	23	27	24	26	31	31	29	30	30	30	31	29	19	27	24	26	28	26	24	23
MED	96	94	94	94	96	100	102	100	104	126	126	132	122	138	124	110	94	100	102	106	97	100	100	94
U Q	103	97	96	100	104	106	106	104	140	150	139	146	154	152	140	123	102	110	106	116	107	106	105	100
L Q	92	90	92	90	92	94	93	94	100	100	98	108	100	124	102	90	86	88	90	96	91	94	96	90

DEC.2019 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC.2019 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	F1	F1	F1		F1	F1	L2	L3	H2	HL22	HL22	HL21	HL11	HL21	HL21		CL21	L1	F1	F2			F1	F1	
2	F1	F1	F1	F1		F1	L1	LC11	CL21	CL21	CL21	HL21	HL21	LH11	HL21	C4	L1		F1		F1		F1	F1	
3	F1	F1	F1	F1	F1		LC11	LC11	LC12	L3	CL21	HL21	L3	LC11	LC12	LC12	L1	L1	F1	F1		F1	F1	F1	
4		F1	F1		F1	F1	C1	LC11	HL21	HL21	HL21	HL21	C2	C1	C2	LC11	LC11	L1	F1	F1	F2	F2	F1	F1	
5			F1	F2		F1	L1	LC11	CL21	CL21	HL11	LC32	L4	CL21	C2	C2	L1	L2			F1				
6	F1		F1	F2	F1	F1	L1	C2	CL21	LC12	LC22	H2	H2	CL21	LC11	C2	C2		F1	F1	F1	FF11			
7				F1	F1	F1	L1		LC31	LC22	LC21	CL22	CL22	LC12	CL21	C3	L4	L4	FF21	F4	F4	F4	FF21	F1	
8	F1	F1	F1	F2	F1	F1	L2	L4	CL11	LC11	CL21	CL21	CL21	C2	CL21	C2	C1		F1	F1	FQ31	FQ31	F1		
9	F1		F1		F1	F3	L2	C2	C2	C2	H2	C2	CL21	C2	C2	C2		L3	F2	F2	F1	F1	F2	F1	
10		F1	F1		F1	F1	L3	L1	LC21	C2	C2	C2	HL21	CL21	C3	C4	L3	L2	F1	F1	F1	F1	FQ11	F3	
11	F2	F1		F1	F1	F1	L1	C3	L3	L1	H2	H2	H2	C2	C2	C1	L3	C2	FF21	FF23	FF12	F2	F4	F2	
12	F3	F2		L2	L2	L2	L21	HL22	H2	C2	C2	C3	C3	C5	C2	C6	L6	L4	F3	F2	F2	FQ11	FQ21	FQ21	
13	F1	F1		F1	F1	F1	L2	L2	LC11	C2	CL32	C2	CL21	H1	H2	H1		C2	F3	F1	F2	F1	F1		
14	F2	F2	F2	F1	F2	F1	L2	L1	C3	H2	C2	HL11	LL31	HL22	C2	LC11	L1	L4	F8	FF13	FQ51	FFQ24	FQ21	F3	
15	F3	F1	F1	F1	F2	F5	L8	LQ52	LC12	LC12		H1	H1	H1	H1	C2		C1	FQ21	FF21	F1	FQ11	FQ11	F2	
16	F1	FF11		F1	FQ11	F1	L1	L1	LC21	HL11	L2	L4	C1	C1	H2	H2		L2	F3	F1	F2	F1	F2	F2	
17	FQ31	F2	F1	F1	F1	F2	L6	FQ53	L1	L5	L4	LC21	HL21	C1	C2	C2	L1	L1	F1		F1	F2	F1	F1	
18	F1	F1	F1		C3	L3	L3	L3	L1	CL21	CL21	CL21	C2	CL21	LC12	LC11	L1	L1	F1		F1	F1		F1	
19	F1			F1	F1	F2			C4	HL11	HL11	LC11	H2	H1	LC11	LC11	LC11	L1	F1	FQ11	F3	F3	F6	F1	
20	F2	F2	F1	F2	F2	F1	L1	L1	L3	L2	LC21	CL21	CL21	C3	C2	CC21		L5	F2	F1	F1	F2	F3	F2	
21	F1	F2		F1	F2		L1	L1	C2	C2	C2	LC31	LC21	LC11	LC11	L1	LQ3	LQ21	F1	F1	F1	F1	F1	F1	
22			F1	F1	F2	F2	L1		LC21	C2	CL11	C1	LC11		C1	L1	L1	L1	F3	FF11	F1		F2		
23	F1	F1	F2	F2	F2	F1	L1	LC11	LC11	L3	C1	H1	C1	H1	LC11	L2		L1						F1	
24	F1					L1		LC11	LC11	CL21	LC21	CL21	HL11	HL11	HL11	CL11			F2	F4	FF21	F2	F3		
25	FF12	F2	F2	F2	F2	F1	L3	L4	L2	LC21	LC11	CL11	LC11	C1	C1	LC21		L1		F1	F1	F1			
26	F1	F3	FF21	FQ11	F1	F1	L1	C1	HL21	LC21	LC21	CL21	LC21	HL11	LC21	LC21		L1		F1	F1	F1		F1	
27		F3	F4	F1	F1	F1		CL11	LC12	C3	C2	C2	C2	C2	C2				F1	F1	F1	FQ11	FQ21	FQ21	
28	F1	F1	F1	F1		FF11	FF11	LC11	CQ11	H2	LC12	LC11	LC11	H2	C1	C2		L1	F3	F2	F4	F3	FQ11	FQ11	
29	FQ11	F1	F1	F1		F1	L1	L2	LC31	H1	L2	C1	C1	C2	C1	C2	L3	L1	F2	F2	F2	F1	F1	F1	
30	F1	F1	F1			F1	H1	LC22						LC11	LC11	LC21	L2	L2	F2	FQ11	F1	F1	F1	F1	
31	F1	F1	F1		F1		C1	CL21	C2	C2	C2	HL11	H1	H2	CL33		LQ21	F2	F3	FQ41	F1				
	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																									

DEC.2019 TYPES OF Es

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.2019 f_{XI} (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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		36	X 31	X 38	36	X 37	X 31	X 30											X 40	X 36	X 32	X 38	X 32	X 36	X 40	
2		41	X 35	X 39	43	X 38	X 36	X 30											X 35	X 31	X 31	X 36	X 32	X 30	X 36	
3		X 33	X 31	X 31	X 31	X 30	X 25	X 26											X 38	X 29	X 31	X 36	X 40	X 40	X 39	
4		37	40	38	38	X 33	X 32	X 32											X 36	X 31	X 32	X 34	X 37	X 38	X 40	
5		37	40	32	36	X 31	X 26	X 25											X 32	X 27	X 36	X 31	X 32	X 38	X 38	
6		33	32	X 24	X 26	X 27	X 25	X 24											X 38	X 32	X 31	X 31	X 30	X 32	X 32	
7		X 32	X 32	X 33	X 32	X 31	X 27	X 26											X 37	X 30	X 33	X 37	X 37	X 30	X 32	
8		X 31	X 32	X 31	X 29	X 28													X 36	X 32	X 36	X 36	X 34	X 32	X 35	
9		X 35	X 34	X 33	X 31	X 32			X 45											X 34	X 34	X 33	X 28	X 30	X 32	
10		38	X 34	X 32	X 30	X 32	X 30	X 32											X 36	X 33	X 29	X 38	X 38	X 41	X 36	
11		38	36	34	33	X 31	X 28	X 30											X 40	X 30	X 31	X 31	X 31	X 32	X 32	
12		X 32	X 32	38	38	X 31	X 32	X 29											A	X 32	X 42	X 32	X 29	A	X 32	
13		34	33	34	33	33	30	26												29	34	34	32	30	30	
14		33	X 31	X 31	X 31	X 31	X 30												X 37	X 27	X 32	X 39	X 38	X 31	X 28	
15		X 31	X 32	X 32	X 32	X 32	X 28	X 27	X 49										X 39	X 38	X 38	X 38	X 36	X 34	X 36	
16		X 35	X 34	X 34	X 33	X 32	X 30	X 30												28	36	42	34	29	30	
17		X 33	X 34	X 34	39	X 33	X 29										C	C	C	C		X 35	X 36	X 38	X 38	
18		X 30	X 29	36	32	X 26	X 27	X 23					C	C					X 43	A	X 34	X 38	X 38	X 35	X 33	
19		35	35	32	28	X 27	X 25	X 23											X 55	X 34	X 38	A	A	X 29	X 31	
20		X 33	X 36	X 38	X 33	X 30	X 29	X 27											X 38	X 34	X 36	X 36	X 40	X 36	X 38	
21		A	X 35	X 39	X 32	X 32	X 29	X 30											X 45	X 32	X 37	X 39	X 30	X 29	X 30	
22		X 34	X 31	X 32	X 32	X 32	X 31	X 30													32	39	34	32	32	32
23		X 31	X 30	X 32	X 34	X 29	X 25	X 26													X	X	X	X	X	X
24		X 31	X 32	X 35	X 35	X 28	X 29														X	X	X	X	X	X
25		X 32	X 30	X 28	X 29	X 31	X 29		X 48											X	X	X	X	X	X	X
26		48	39	37	37	35	32	32												X	X	X	X	X	X	X
27		X 36	X 34	X 35	X 38	X 30	X 28	X 28												X	X	X	X	X	X	X
28		X 33	X 34	X 34	X 35	X 29	X 28	X 31	X 43											X	X	X	X	X	X	X
29		40	36	32	32	X 29	X 35	X 31												X	X	X	X	X	X	X
30		38	X 33	X 36	X 38	X 31	X 32	X 30												X	X	X	X	X	X	X
31		X 34	X 32	X 31	X 31	X 30	X 25													X	A	A	A	X	X	X
		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	29	24	4										23	28	30	29	30	30	31	
MED		X 34	X 33	X 34	X 33	X 31	X 29	X 30	X 46										X	X	X	X	X	X	X	X
U Q		37	35	36	36	X 32	X 31	X 30	X 48										X	X	X	X	X	X	X	X
L Q		X 32	X 32	X 32	X 31	X 29	X 27	X 26	X 44										X	X	X	X	X	X	X	X

DEC.2019 f_{XI} (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.2019 foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	25	F	F	31	25	24	41	44	53	52	64	60	58	53	51	44	34	30	26	32	26	30	34
2	F	29	33	F	32	F	24	42	50	46	54	55	57	60	57	54	46	29	25	25	30	26	24	F
3	27	25	25	25	24	19	20	39	45	55	50	53	54	51	47	46	42	32	23	25	30	F	F	F
4	F	F	F	F	28	26	26	42	48	49	48	57	61	53	60	50	38	30	25	26	28	31	32	F
5	F	F	26	F	25	20	19	40	45	46	52	55	57	54	50	46	44	26	20	30	25	26	F	F
6	F	F	18	20	21	19	18	40	43	47	49	50	52	57	54	50	47	32	26	25	25	24	26	26
7	26	26	27	26	25	21	20	45	47	52	52	54	48	56	52	54	54	31	24	27	31	30	24	26
8	25	26	25	23	22	21	22	44	48	51	50	53	53	52	49	49	42	29	26	30	30	28	26	29
9	29	28	27	25	26	23	24	39	48	50	47	55	53	61	54	50	45	31	28	28	27	22	24	26
10	F	28	26	24	26	24	26	40	50	44	47	54	53	50	47	45	58	30	27	23	32	32	F	30
11	F	30	28	27	25	22	24	50	54	48	49	48	48	52	47	47	46	34	24	25	25	25	26	26
12	26	26	F	F	24	26	23	37	44	46	50	51	49	49	50	54	42	A	26	35	26	23	A	26
13	28	27	28	27	27	24	20	41	48	50	53	54	48	58	52	48	51	31	23	28	28	26	24	24
14	F	25	25	25	25	24	20	44	47	53	49	54	56	51	49	47	48	31	21	26	33	32	25	22
15	25	26	26	26	26	22	21	43	52	54	49	53	46	52	48	48	43	33	32	32	32	30	28	30
16	29	28	28	27	26	24	24	46	51	53	50	52	49	54	51	52	45	30	22	30	36	28	23	24
17	27	28	28	F	27	23	22	42	56	47	46	50	56	54	54	C	C	C	C	29	30	30	F	F
18	24	23	F	F	20	21	17	40	48	48	56	65	R	C	C	49	46	46	37	A	28	32	31	29
19	F	F	26	22	21	19	17	54	51	48	56	60	59	61	54	52	42	49	28	32	A	A	23	25
20	27	F	F	27	24	23	21	39	45	A	55	57	58	58	62	48	47	32	28	30	30	F	F	F
21	A	29	F	26	26	23	24	42	45	42	58	66	55	48	52	46	44	39	26	31	33	24	23	24
22	27	25	26	26	26	25	24	41	48	47	57	57	53	53	46	48	A	A	26	33	28	26	26	26
23	25	24	26	28	23	19	20	40	47	47	54	55	51	52	48	52	45	27	26	29	27	29	26	24
24	25	26	29	29	22	23	26	37	45	53	49	56	53	53	42	46	54	32	24	28	28	32	26	25
25	26	24	22	23	25	23	23	42	50	43	41	55	61	49	54	49	38	32	28	28	34	32	29	F
26	F	F	F	F	F	F	F	42	49	54	63	65	53	52	50	46	36	32	30	34	27	29	28	30
27	30	28	29	32	24	21	22	37	44	47	58	60	58	58	48	47	39	26	28	35	30	31	F	28
28	27	28	28	29	23	22	25	37	46	47	46	59	58	52	50	49	49	30	20	30	30	31	F	F
29	F	F	26	25	23	F	25	37	43	44	54	58	53	48	46	50	44	34	26	27	30	32	28	31
30	F	27	30	32	25	F	24	39	45	45	64	60	62	50	47	49	44	33	24	28	32	24	27	28
31	28	26	25	25	24	19	24	48	47	44	47	57	55	53	59	64	44	36	A	A	A	30	28	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	18	24	24	23	30	27	30	31	31	30	31	31	30	30	31	30	29	28	28	30	29	28	23	22
MED	27	26	26	26	25	23	23	41	47	48	50	55	54	53	50	49	44	32	26	28	30	29	26	26
U Q	28	28	28	27	26	24	24	43	50	52	55	59	58	57	54	51	47	34	28	30	32	31	28	29
L Q	25	25	26	25	23	21	20	39	45	46	49	53	52	51	48	47	42	30	24	26	28	26	24	25

DEC.2019 foF2 (0.1MHz)

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IONOSPHERIC DATA STATION Kokubunji

DEC.2019 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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										L	U L	U L			L	L									
2											388	404	L	A	A										
3										L	L	L	A	L											
4											L	L	U L	U L	U L										
5												L	U L	U L											
6												L	L	A	L										
7								L	L	U L	U L			A	L										
8									L	L	A	U L	U L	U L	L										
9							A		L	U L	A	U L			A										
10									L		U L	U L		A	A	U L									
11										L	U L	U L	U L	L											
12											384	364	388		A	U L		A							
13										L	A	A	A	A	L										
14									L	L	U L	U L	A	A											
15										L	L	L	A	A	U L	L									
16										L	L	U L	U L	U L	A	L		C	C						
17											L	U L	U L	A	L										
18											L	U L	L	C	C										
19											U L	U L	L	L	L										
20										A	A	U L		A											
21											L		L	L	L										
22											L	L	L	L			A	A							
23											L	L	L	L	L										
24									L	L	L	L	L	L											
25										L		U L			A										
26										U L	L	404	L	L	L										
27										L	U L	L	U L	U L											
28												L	U L	L											
29											L		L	U L	L										
30										U L	A	U L	U L	L	U L	U L									
31										392	404	392		L	U L	U L									
											U L	U L	U L	L	U 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										4	8	14	9	4	4	2									
MED										U L	U L	U L	U L	U L	U L	U L									
U Q										374	392	404	392	382	392	342									
L Q										U L	U L	U L	U L	U L	U L										
										402	396	404	412	384	412										
										U L	U L	U L	U L	U L	U L										
										346	386	388	388	372	374										

DEC.2019 foF1 (0.01MHz)

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IONOSPHERIC DATA STATION Kokubunji

DEC.2019 foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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								B	A	A	A	U	R	A	R	R	A	B							
2								B	U	A	A	U	A	A	A	A	A	B							
3								B	U	A	A	A	U	R	A	A	A	A							
4								B	U	R	R	U	A	A	U	R	R	A	B						
5								B	U	A	R	A	A	U	R	U	A	R	B						
6								B	232	276	U	R	A	U	A	A	A	B							
7								B	U	R	R	R	A	A	A	A	A	B							
8					B	B	B	U	R	A	A	U	A	A	A	A	A								
9					B	A	U	R	U	U	A	U	A	U	A	A	A	B	B						
10								B	U	R	A	A	A	U	A	A	A	B							
11								B	U	R	R	R	A	U	A	A	A								
12								A	U	A	A	A	A	A	A	A	A	B							
13								B	A	A	A	A	A	A	A	A	A	B							
14						B	B	R	U	R	U	R	A	R	A	R	A	U	R						
15								U	A	U	R	A	A	A	A		A	U	R						
16								B	R	U	R	R	R	U	A	A	A	U	R	B					
17							B	B	U	A	U	R	R	A	A	A	C	C							
18								B	A	A	R	R	C	C	A	A	A	B							
19								B	U	R	A	U	R	A	U	R	R	A	U	R					
20								B	A	A	A	A	A	A	A	A	A	A							
21								B	A	A	A	U	R	A	U	R	U	A	B						
22								A	A	A	A	A	A	A	A	A	A	A	A						
23								B	A	A	U	R	A	U	R	R	U	A	U	R	B				
24						B	B	U	R	R	U	R	U	R	R	U	A	A	B						
25						B	U	R	A	A	A	A	A	U	A	A	A	B							
26								B	U	R	A	U	R	R	R	U	A	A							
27								B	U	R	A	R	R	A	R	U	A	A	B						
28								A	U	R	U	U	U	R	U	A	A	U	R						
29								B	A	A	U	A	U	R	A	U	R	U	R						
30								B	U	R	A	U	A	A	U	R	U	A	A	B					
31						B	B	A	R	U	U	A	A	A	U	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									19	18	17	12	11	11	14	6	8								
MED									U	R	U	U	U	R	U	A	U	U	R						
U Q									224	268	288	300	308	280	260	226	194								
L Q									U	R	U	U	U	R	U	A	U	R							
									236	276	302	312	312	288	264	236	206								
									U	A	U	U	U	R	U	A	U	R							
									216	264	284	294	296	272	256	224	182								

DEC.2019 foE (0.01MHz)

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IONOSPHERIC DATA STATION Kokubunji

DEC.2019 foEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

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	
D	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	G	J A	J A	J A	G	J A	J A	J A	J A	J A	J A	J A	J A	J A
1	16	23	50	37	24	23	22	24	44	36	36		41	32		27	28	22	21	20	E B	E B	J A	E B	
2	21	22	22	E B	E B	E B	E B	E B		28	35	36	37	41	36	32	J A	J A	J A	E B	E B	E B	E B	E B	
3	24	19	E B	E B	E B	E B	20	20	22	29	30	33		37	34	32	J A	J A	J A	E B	E B	E B	E B	E B	
4	E B	E B	E B	E B	E B	E B	E B	E B	G	G				G	G	G	26	19	E B	E B	E B	E B	E B	E B	
5	E B	E B	E B	E B	E B	E B	19	21	23	33	26		32	33		31	31		G	E B	E B	E B	E B	E B	
6	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	G	J A	J A	J A	J A	J A	J A	E B	E B	E B	E B	E B	E B	
7	25	16	23	16	16	17	19	16		G	G			G	J A	J A	J A	E B	E B	E B	E B	E B	E B	E B	
8	E B	E B	E B	E B	E B	E B	E B	E B	G	J A					J A	J A	J A	J A	E B	E B	E B	E B	E B	E B	
9	E B	E B	E B	E B	E B	E B	E B	E B	G	G					J A	J A	J A	J A	E B	E B	E B	E B	E B	E B	
10	E B	E B	E B	E B	E B	E B	E B	E B	G	G					J A	J A	J A	J A	E B	E B	E B	E B	E B	E B	
11	E B	E B	E B	E B	E B	E B	E B	E B	G	G					J A	J A	J A	J A	E B	E B	E B	E B	E B	E B	
12	E B	22	22	E B	E B	E B	20	J A							J A	J A	J A	J A	E B	E B	E B	E B	E B	E B	
13	14	26	23	22	21	15	22	18	25	30	36	45	62	151	48	39	39	53	25	31	33	33	22	16	
14	23	22	J A	26	22	J A	25	20	15						J A	J A	J A	J A	E B	E B	E B	E B	E B	E B	
15	J A	E B	J A	E B	J A	E B	E B	E B	E B	E B	E B	G	J A	J A	J A	J A	J A	J A	E B	E B	E B	E B	E B	E B	
16	20	16	20	29	24	19	17	16		G	G				J A	J A	J A	J A	E B	E B	E B	E B	E B	E B	
17	J A	25	22	22	E B	E B	E B	E B	22	20	25				J A	J A	J A	J A	E B	E B	E B	E B	E B	E B	
18	E B	E B	E B	E B	E B	E B	E B	E B	J A	30	30				G	G	C	C	J A	J A	J A	J A	J A	J A	
19	23	J A	25	18	E B	E B	E B	E B	E B	E B	16				J A	J A	J A	J A	E B	E B	E B	E B	E B	E B	
20	E B	E B	E B	E B	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	E B	E B	E B	E B	
21	J A	J A	J A	J A	J A	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	E B	E B	E B	E B	
22	J A	34	26	50	33	15	22	22	29	48	38	38	37	37	36	38	31	71	91	34	22	16	16	16	
23	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	E B	E B	E B	E B	
24	J A	E B	23	J A	E B	E B	E B	E B	E B	E B	E B				G	G	G	G	E B	E B	E B	E B	E B	E B	
25	E B	E B	E B	E B	J A	27	23	25	32	42	34	44	41	34	31	30	J A	J A	J A	E B	E B	E B	E B	E B	
26	26	E B	E B	J A	J A	J A	20	E B	J A	J A	G	G	G	G	G	J A	J A	J A	E B	E B	E B	E B	E B	E B	
27	22	E B	22	E B	22	20	16	16		G	G				G	G	G	G	J A	J A	J A	E B	E B	E B	
28	E B	25	E B	J A	E B	E B	E B	E B	J A	J A	J A	G	G	G	32	30	26		E B	E B	E B	E B	E B	E B	
29	J A	J A	J A	E B	E B	E B	E B	E B	J A	J A	J A				G	G	G	G	E B	E B	E B	E B	E B	E B	
30	E B	E B	E B	E B	E B	E B	E B	E B	G	G					G	G			E B	E B	E B	E B	E B	E B	
31	E B	E B	E B	E B	E B	E B	E B	E B	G	G					J A	J A	J A	J A	J A	J A	J A	J A	J A	J 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	31	31	31	31	31	31	31	31	31	31	31	31	30	30	31	30	30	30	30	31	31	31	31	31	
MED	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	
U Q	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
L Q	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	

DEC.2019 foEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.2019 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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 E B	16 16	21	21	19 18	E B	16 22	24	23	30	G	G	34 27	G	25	19	16 15	16 17	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B	E B E B
2	E B E B	16 16	16	E B	E B E B	E B E B	E B E B	26	34	32	34	38	34	30	32	21	E B	16 16	15 15	16 16	E B E B	E B E B	E B E B	E B E B	
3	E B E B	16 16	16	16	16	16	16	21	28	28	32	G	33	32	29	28	22	16 16	16 16	15 17	16 16	17 16	16 16	16 16	
4	E B E B	16 14	16	16	15	16	16	16	14	G	G	32	33	G	G	G	24	17	E B	15 17	16 16	16 16	15 16	16 16	
5	E B E B	16 16	16	16	16	16	16	16	19	24	G	30	33	G	30	30	G	19	E B	16 14	16 16	16 16	16 16	16 16	
6	E B E B	16 16	17	16	16	16	16	16	16	28	30	G	34	35	34	26	25	20	E B	16 16	16 16	16 16	E B E B	E B E B	
7	E B E B	16 16	16	16	16	16	17	16	16	G	G	33	G	34	28	34	31	20	E B	16 16	16 16	16 16	16 16	16 16	
8	E B E B	16 16	16	16	16	16	16	15	17	G	28	33	34	34	33	34	28	22	22	E B	16 17	16 16	16 16	16 18	
9	E B E B	16 16	16	16	16	15	15	20	20	G	G	34	32	34	35	34	26	20	E B	E B	E B	E B	E B	E B	
10	E B E B	16 16	16	16	15	16	15	16	16	G	28	34	34	32	32	30	26	21	15	16	16	16	16	16	
11	E B E B	16 16	16	16	16	15	15	15	18	25	G	G	G	30	31	28	25	18	E B	E B	E B	E B	E B	E B	
12	E B E B	16 16	16	16	16	16	16	16	16	23	29	33	39	34	36	34	34	34	A A	9 2	23	26	20	19	
13	E B E B	14 15	16	16	16	15	17	18	18	23	28	34	40	40	36	27	29	30	22	19	16	16	17	15	
14	E B E B	16 16	16	16	15	15	14	15	15	G	G	G	25	31	34	32	24	23	16	15	19	16	17	16	
15	E B E B	16 16	16	16	16	16	16	16	16	24	G	33	37	36	32	28	24	G	16	16	17	16	15	16	
16	E B E B	16 16	16	17	16	16	17	16	16	G	G	G	G	G	G	G	G	16	16	16	16	16	16	14	
17	E B E B	16 16	16	16	16	16	15	16	16	23	G	G	30	30	30	20	G	C	C	C	C	E B	16	16	
18	E B E B	16 16	16	16	15	16	17	16	16	23	25	G	G	C	C	33	31	24	17	A A	E B	E B	E B	18	
19	E B E B	15 16	15	16	16	16	16	16	16	G	30	G	32	30	G	G	24	18	E B	E B	E B	E B	E B	E B	
20	E B E B	16 16	16	16	16	16	16	16	20	A A	34	59	45	32	30	35	28	30	18	E B	E B	E B	E B	E B	
21	A A	48	19	16	17	16	15	15	17	25	36	31	24	30	G	21	26	19	E B	17	16	16	16	15	
22	E B E B	16 16	16	16	16	16	16	24	24	28	29	31	29	29	27	28	28	A A	A A	E B	E B	E B	E B	E B	
23	E B E B	16 16	16	20	E B	E B	E B	22	28	G	G	G	30	23	24	29	25	G	E B	E B	E B	E B	E B	E B	
24	E B E B	16 16	16	15	16	20	20	16	16	G	G	31	G	G	G	G	24	20	E B	15	16	16	16	16	
25	E B E B	15 16	15	16	16	16	16	19	19	G	26	32	31	33	31	29	26	21	E B	E B	E B	E B	E B	E B	
26	E B E B	16 16	16	16	16	16	16	16	16	G	28	G	G	G	G	G	G	20	21	E B	E B	E B	E B	E B	
27	E B E B	16 15	16	16	16	16	16	16	16	G	29	G	G	32	G	30	26	19	E B	20	16	15	16	16	
28	E B E B	16 16	16	16	16	15	15	16	16	19	22	G	G	31	28	24	G	16	16	16	16	16	16	16	
29	E B E B	16 15	15	15	16	15	15	16	16	25	29	31	G	G	30	29	G	G	E B	E B	E B	E B	E B	E B	
30	E B E B	17 16	16	15	16	16	16	15	15	G	32	31	32	G	G	29	24	19	E B	15	17	16	16	16	
31	E B E B	16 16	16	16	16	16	16	16	16	23	G	G	32	32	34	29	24	24	21	A A	A A	A A	A	22	
CNT		31	31	31	31	31	31	31	31	31	31	31	31	30	30	31	30	30	30	30	31	31	31	31	31
MED		E B	E B	E B	E B	E B	E B	E B	E B	23	28	31	G	G	29	26	20	16	16	16	16	16	16	16	16
U Q		E B	E B	E B	E B	E B	E B	18	24	29	33	33	34	33	30	28	21	17	17	16	16	16	16	16	16
L Q		E B	E B	E B	E B	E B	E B	E B	E B	G	G	G	G	G	31	G	24	G	E B	E B	E B	E B	E B	E B	E B

IONOSPHERIC DATA STATION Kokubunji

DEC.2019 fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	16	16	17	16	16	16	16	17	16	16	15	14	13	14	17	15	15	16	15	16	17	16	16	16
2	16	16	16	15	15	14	14	16	14	16	13	14	12	16	14	14	15	16	16	15	15	15	15	17
3	16	16	16	16	16	16	16	16	14	15	16	13	15	16	16	16	15	16	16	16	15	17	16	16
4	16	14	16	15	16	16	16	14	17	14	14	16	16	16	16	15	14	15	17	16	16	15	16	16
5	16	16	16	16	16	16	16	16	15	16	14	15	13	15	16	15	15	16	14	16	16	16	16	16
6	16	16	17	16	16	16	16	16	16	15	17	14	15	16	16	14	16	16	16	16	16	16	16	16
7	16	16	16	16	16	17	16	16	15	16	17	18	16	15	17	16	16	16	16	16	16	16	16	16
8	16	16	16	16	16	16	15	17	13	14	14	16	14	16	15	16	16	16	16	17	16	16	16	18
9	16	16	16	16	15	16	15	15	16	15	18	16	15	15	16	14	16	16	16	16	16	16	16	16
10	16	16	16	15	16	15	16	16	15	14	15	11	16	15	15	14	15	15	16	16	16	16	16	16
11	16	16	16	16	15	15	15	15	16	14	16	15	16	14	15	15	15	16	15	15	16	16	16	16
12	16	16	16	16	16	16	16	16	12	13	13	13	15	16	16	15	16	15	16	16	15	16	15	16
13	14	15	16	16	16	15	17	15	12	16	16	16	14	15	15	15	16	16	16	16	16	17	15	16
14	16	16	16	16	15	15	14	15	15	16	14	13	16	16	15	16	16	15	19	16	17	16	17	16
15	16	16	16	16	16	16	16	16	15	16	13	15	13	16	17	15	16	16	16	17	16	15	16	16
16	16	16	16	16	16	16	17	16	15	16	17	16	18	15	16	15	14	16	16	16	16	16	14	16
17	16	16	16	16	16	15	16	16	16	16	14	15	17	14	16	C	C	C	C	16	16	16	16	16
18	16	16	16	16	15	14	17	16	15	16	14	21	C	C	18	16	15	16	16	16	16	16	16	16
19	15	16	15	16	16	16	16	16	17	15	16	17	15	16	13	14	16	16	16	16	16	16	16	16
20	16	16	16	16	16	16	16	15	16	15	15	16	16	15	14	15	14	16	16	16	16	16	16	16
21	16	16	16	17	16	15	15	17	16	16	17	16	16	15	14	14	16	17	16	16	16	15	16	16
22	16	16	16	16	16	16	16	14	13	16	14	16	16	16	16	14	15	16	15	16	16	16	16	16
23	16	16	16	16	16	16	16	16	15	16	15	15	14	16	14	14	13	16	18	16	16	16	16	15
24	16	16	16	15	16	20	20	16	16	17	17	15	15	16	16	16	14	15	16	16	16	16	16	16
25	15	16	15	16	16	16	16	16	15	16	16	15	13	16	16	16	16	17	16	15	16	16	17	16
26	16	16	16	16	16	16	16	16	16	15	18	20	18	16	14	16	15	16	16	16	16	16	16	16
27	16	15	16	16	16	16	16	16	16	14	16	16	12	16	15	14	16	16	16	16	15	16	16	17
28	16	16	16	16	15	15	16	16	16	16	14	15	16	18	17	14	16	16	16	16	16	16	16	16
29	16	15	15	15	16	15	15	16	16	12	16	16	18	15	17	14	14	15	16	16	16	15	16	16
30	17	16	16	15	16	16	16	15	15	16	16	15	14	17	13	13	13	15	15	17	16	16	16	16
31	16	16	16	16	16	16	16	16	16	13	15	17	15	15	16	13	16	16	16	16	16	15	16	16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	30	30	31	30	30	30	30	31	31	31	31	31
MED	16	16	16	16	16	16	16	16	15	16	15	15	15	16	16	15	15	16	16	16	16	16	16	16
U Q	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
L Q	16	16	16	16	16	15	16	15	15	14	14	15	14	15	15	14	15	16	16	16	16	16	16	16

DEC.2019 fmin (0.1MHz)

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DEC.2019 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	293	F	F	384	359	352	396	355	360	362	327	343	392	379	417	388	369	364	324	369	349	294	321	
2	F	301	328	F	383	F	335	401	394	425	352	375	360	383	389	359	410	375	344	330	345	359	312	F	
3	326	314	328	331	375	332	358	389	372	387	382	367	382	382	372	379	375	380	354	333	328	F	F	F	
4	F	F	F	F	357	344	368	385	401	391	359	369	361	378	374	375	417	384	364	338	352	349	366	F	
5	F	F	F	F	332	328	361	398	386	391	360	377	376	366	382	354	396	418	391	363	386	344	F	F	
6	F	F	339	330	344	358	353	404	400	390	375	380	353	354	397	389	393	331	368	314	381	322	331	333	
7	329	331	330	339	350	327	365	394	393	320	324	366	321	345	386	393	405	370	353	344	369	385	321	304	
8	327	316	320	343	310	319	356	377	393	382	383	367	392	377	332	386	363	380	314	356	308	359	330	325	
9	318	310	317	319	339	358	352	389	377	400	393	378	352	353	383	395	394	375	352	344	369	384	332	336	
10	F	313	315	310	330	340	389	374	393	394	365	334	381	400	382	347	394	384	350	388	333	350	F	304	
11	F	287	307	290	304	341	349	393	404	385	359	374	350	388	390	388	374	358	359	352	340	322	319	312	
12	326	315	F	F	312	368	363	395	380	374	382	358	381	383	340	381	414	A	359	370	329	331	A	319	
13	331	335	334	350	360	348	371	399	393	392	392	376	330	363	378	384	398	381	300	344	358	337	343	319	
14	F	308	324	310	295	355	370	390	402	399	383	364	377	380	374	394	388	385	330	327	346	374	340	354	
15	347	330	311	326	332	352	352	383	411	408	339	387	385	379	366	382	386	361	347	354	342	375	352	329	
16	359	330	322	342	338	349	366	372	393	381	377	349	332	359	368	367	388	376	358	315	358	385	325	343	
17	308	320	319	F	350	330	368	363	406	413	370	344	383	388	395	C	C	C	C	329	339	308	F	F	
18	304	311	F	F	341	370	330	395	390	409	361	391	R	C	C	358	371	368	366	A	342	345	344	338	
19	F	F	329	314	315	302	320	396	370	391	354	392	355	371	377	389	373	394	329	333	A	A	324	312	
20	308	F	F	311	344	329	341	401	391	A	376	355	384	349	388	392	375	349	344	337	338	F	F	F	
21	A	308	F	325	339	314	339	391	401	394	377	397	392	381	400	369	369	366	349	335	352	363	321	339	
22	351	327	307	319	348	359	353	380	364	372	367	391	387	364	380	351	A	A	323	350	376	346	304	316	
23	301	283	307	339	362	319	343	392	396	377	378	391	382	373	383	379	399	398	332	346	366	347	300	291	
24	335	333	336	380	388	309	335	389	372	398	381	379	380	392	399	356	376	358	367	343	317	361	355	288	
25	310	307	310	327	360	340	336	366	405	394	407	353	380	374	384	393	374	352	351	334	360	370	330	F	
26	F	F	F	F	F	F	F	381	416	359	372	356	357	386	383	384	394	367	343	370	326	330	311	309	
27	330	320	334	377	316	337	364	382	397	366	350	389	374	397	382	396	399	353	323	362	364	363	F	272	
28	306	328	349	363	349	326	354	386	359	348	340	356	360	380	352	357	367	388	403	362	325	288	F	F	
29	F	F	336	364	398	F	337	394	391	368	358	397	380	380	352	394	381	359	380	323	334	351	324	323	
30	F	297	326	353	389	F	326	378	404	320	378	365	375	381	368	372	399	376	334	339	342	354	313	305	
31	302	319	321	331	368	309	324	405	393	404	372	369	369	367	343	379	378	372	A	A	A	361	308	302	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT		18	24	24	23	30	27	30	31	31	30	31	31	30	30	31	30	29	28	28	30	29	28	23	22
MED		326	314	323	331	346	340	352	390	393	390	372	369	376	380	380	382	388	374	350	342	345	350	324	318
U Q		331	328	332	350	362	355	364	396	401	398	381	387	382	383	386	392	398	382	362	354	365	363	338	329
L Q		308	308	314	319	332	326	337	381	380	372	359	356	355	366	368	369	374	360	333	333	334	340	312	304

DEC.2019 M(3000)F2 (0.01)

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DEC.2019 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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										L	U	L	L		L	L								
2											409	406	L	A	A									
3										L	L	L	A	L										
4										L	L	L	U	L	L	U	L							
5											L	L	U	L	U	L								
6											L	L	A	L										
7								L	L	U	L	U	L		A	L								
8									L	L	A	U	L	L	U	L	L							
9							A		L	U	L	A	U	L	A									
10									L		L	U	L	A	A	U	L							
11										L	U	L	U	L	L									
12											L	A		A	U	L		A						
13										L	A	A	A	A	L									
14										L	U	L	U	L	A	A								
15										L	L	L	A	A	U	L	L							
16										L	L	L	U	L	A	L								
17										L	L	U	L	U	L	A	L	C	C					
18										L	U	L	L	C	C									
19											L	U	L	L	L	L								
20										A	A	U	L	A										
21											L		L	L	L									
22											L	L	L	L			A	A						
23											L	L	L	L	L									
24										L	L	L	L	L	L									
25											L	U	L		A									
26										U	L	L	L	L	L	L								
27										L	U	L	L	L	U	L								
28											L	U	L	L										
29											L		L	U	L	L								
30										U	L	A	U	L	U	L	L							
31										384	410	384	L	L	U	L	458							
										U	L	U	L	U	L	L	U	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										4	8	14	9	4	4	2								
MED										U	L	U	L	U	L	U	L	U	L					
U Q										402	403	410	401	422	380	424								
L Q										U	L	U	L	U	L	U	L							
										430	424	417	422	428	384									
										U	L	U	L	U	L	U	L							
										379	390	398	392	414	375									

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DEC.2019 h'F2 (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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										248	256	266		234	244									
2											266	238	252	226										
3										232	236	230	222	246										
4										238	246	234	248	236	224									
5											254	230	248	242										
6											250	254	248	252										
7								218	216	308	302		E A 230	256										
8									228	238	244	254	236	238	246									
9							E A 274		232	236	220	248	266	256										
10									214		270	296	234	222		330								
11										224	248	244	260	246										
12											248	246		234	300		208							
13										234	228	238	E A 296	238	232									
14									228	230	242	248	238	246										
15									214	206	264	220	228	240	252									
16									218	236	246	248	264	234	250									
17										214	240	246	244	220	216		C	C						
18										220	258	222		C	C									
19											258	228	258	242	218									
20										A E A 244	262		244											
21										242		220	230	206										
22											238	226	230	242			A	A						
23											252	234	228	250	234									
24									240	226	246	238	230	236										
25										220		252			220									
26											268	238	246	242	230	230								
27											252	266	216	222	224									
28												240	250	230		270								
29											254		222		294	216								
30											322	240	240	232	230	232	222							
31												270	252	252	242	266								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT							1	1	8	19	29	28	26	28	15	4	1							
MED							E A 274	218	223	236	246	242	242	237	232	246	208							
U Q									230	252	258	250	252	243	252	300								
L Q									215	224	240	230	230	230	220	219								

DEC.2019 h'F2 (KM)

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DEC.2019 h'F (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	228	E B E A	272	260	228	210	214	E B	236	204	202	188	198	182	230	204	192	192	194	188	210	E B	234	204	210	E B E B	258	226
2	E B E B	252	E B	252	224	208	192	210	210	176	198	198	194	208	A	A	208	210	186	198	E B	230	216	218	206	E B E B	232	268
3	E B E B E B	260	264	256	228	200	240	E B E B	258	196	202	202	186	176	A	202	200	198	194	188	194	226	226	230	E B E B E B	288	246	
4	E B E B E B	270	264	262	228	206	E B	222	214	170	202	190	194	204	190	198	184	194	188	184	210	226	222	212	204	E B E B	218	
5	E B E B E B E B	244	256	262	234	236	260	E B E B	262	196	200	210	192	192	174	180	210	208	194	190	206	218	200	212	E B E B	260	270	
6	E B E B E B E B	260	254	278	270	222	E B	244	206	188	198	206	204	204	A	208	204	206	194	180	204	E B	236	210	E B E B	236	246	
7	E B E B E B E B	260	254	254	254	220	E B E B	246	232	182	178	172	200	214	A	200	204	210	196	196	208	224	210	198	E B E B	248	274	
8	E B E B E B E B	274	282	274	266	292	E B	274	244	198	188	184	A	198	210	186	204	206	198	190	206	226	200	204	E B E B	228	244	
9	E B E B E B E B	250	256	262	268	248	A	210	198	184	184	A	196	188	A	218	208	202	192	198	216	230	192	E B E B	254	252		
10	E B E B E B E B	224	250	270	282	234	E B E B	242	198	188	182	210	202	198	A	A	216	202	206	180	182	194	216	208	E B E B	220	238	
11	E B E B E B E B	250	256	246	272	264	E B E B	260	226	204	192	182	180	182	200	210	210	212	206	188	196	200	230	240	E B E B	230	248	
12	E B E B E B E B	220	260	254	256	256	E B E B	200	204	184	196	214	202	A	220	A	214	212	A	A	E A	E A	E A	E A	E A	E A	E B	244
13	234	E B E B	246	242	218	218	E B	214	246	198	204	206	A	A	A	194	210	200	190	258	224	206	224	204	E B	204	274	
14	E B E B E B E B	266	276	258	262	236	E B E B	220	200	204	194	186	180	192	A	A	210	200	196	190	232	240	214	206	E B	214	236	
15	E B E B E B E B	240	246	254	248	252	E B	218	250	202	190	184	194	A	A	178	202	206	194	202	214	218	216	194	E A	202	240	
16	E B E B E B E B	218	250	246	260	246	E B E B	246	228	196	196	198	202	184	176	A	192	206	200	188	218	E B	238	210	E B	202	258	
17	E B E B E B E B	258	242	250	246	220	E B E B	250	216	204	204	178	182	176	200	A	190	C	C	C	C	228	224	E B E B	240	258		
18	E B E B E B E B	264	242	226	274	250	E B E B	316	200	208	182	198	198	C	C	216	216	210	192	A	E B	234	228	E B E B	226	318		
19	E B E B E B E B	292	268	230	268	302	E B E B	292	298	194	192	212	196	184	206	208	194	202	200	196	208	E B	238	A	E B E B	238	302	
20	E B E B E B E B	248	244	248	248	236	E B E B	238	242	194	202	A	A	190	228	A	208	202	198	192	208	224	212	198	E B E B	248	268	
21	A	E A E B	280	248	280	222	E B E B	256	238	192	200	208	212	212	180	186	178	204	202	194	202	E B	212	206	E B E B	212	258	
22	E B E B E B E B	214	E B E B	286	264	252	E B E B	220	228	232	222	204	202	190	196	194	196	202	218	A	A	E B	240	216	E B E B	212	252	
23	E B E B E B E B	284	306	286	254	282	E B E B	282	278	200	200	184	184	186	186	180	206	210	196	182	230	240	216	214	E B E B	242	294	
24	E B	E B	270	258	230	206	E B	190	226	258	194	198	198	200	184	192	196	190	200	206	180	194	220	236	E B	216	286	
25	E B E B E B E B	272	274	280	264	218	E B E B	244	238	208	200	188	198	182	222	208	A	200	190	216	198	E B	246	208	E B	224	244	
26	E B E B E B E B	250	262	250	260	246	E B E B	246	248	204	200	180	208	192	188	190	182	202	202	204	218	200	210	E B E B	270	244		
27	E B E B E B E B	238	262	256	210	258	E B E B	270	226	196	202	214	206	194	192	180	208	208	194	200	E A	274	200	188	E B E B	240	306	
28	E B E B E B E B	262	256	226	212	216	E B	246	216	196	200	200	180	192	180	188	206	194	206	188	196	212	228	E B	E B	216	210	
29	E B E B E B E B	268	296	260	226	216	E B E B	230	224	184	208	198	214	198	188	194	194	184	204	190	190	240	228	206	E B E B	232	228	
30	E B E B E B E B	284	258	222	200	188	E B E B	202	224	206	194	208	A	198	184	188	190	184	204	192	218	216	198	200	E B E B	254	274	
31	E B E B E B E B	262	276	282	236	210	E B E B	190	252	202	196	196	180	204	188	190	202	202	202	192	A	A	A	220	E A E A	306	264	
	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	31	30	31	31	30	26	28	22	21	30	30	28	28	28	30	29	30	30	31				
MED	E B E B E B E B	259	258	254	252	206	E B E B	240	234	196	200	198	197	193	191	194	203	205	199	190	204	219	212	209	E B E B	239	252	
U Q	E B E B E B E B	268	274	262	266	250	E B E B	250	204	202	206	202	198	206	203	208	210	203	195	224	234	227	224	E B E B	256	274		
L Q	E B E B	240	252	246	228	216	E B E B	218	216	192	194	184	186	184	186	186	192	200	194	188	198	216	206	202	E	224	244	

DEC.2019 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.2019 h'E (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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								B	A		A		A				B								
2								B		114		112		110	110	118		B							
3								B		112	110	110	116	112	106	112	110								
4								B		120	116	110	116	116	114	116		A	A						
5								B		128	112	118	114	116	114	112	118								
6								B		118	118	108	112	108	106	114	114								
7								B		108	122	124		110	110	110		A	B						
8						B	B	B		116	116	110	112	112		114		A	B						
9						B	A			120		116	110	112	112	112	112		A						
10								B		112	112	112	108	112	112	108	112			B					
11								B		114	114	106	106	112	104	100	108			B					
12								B		110	108	108	110		110		A	A							
13								A		116	118	112	110	112	108		A	A	B						
14								B		114	110	108		A	A	A	A	A	B						
15								B		122	118	114		A		A		A							
16								B		120	114		A	A	A		104	106	124						
17								B		114	116	120	118	120	118	118	118	120		B					
18								B		118	116	116		A	A		C	C							
19								B		A	A			C	C	A	A	B							
20								B		116	A	114		A	A	116	114	A							
21								B		A	A			A	A	A	A	A							
22								B		132															
23								B		112	A	A		A				B							
24								B		A		A		A											
25								B		110	112	112	108	110	110	108	108	114							
26								B		108		110		A		110	110	112							
27								B		122	A						A								
28								B		122	120	118	114	110	108	114	106								
29								B		A															
30								B		124	118	116	110	108	108	108	116								
31								B		A	A														
								B		114	124	122	116	114	110	110	114								
								B		110	118	120	120		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									25	22	26	21	19	22	25	18	9								
MED									116	116	112	114	112	110	112	112	116								
U Q									120	118	118	116	114	112	114	114	123								
L Q									112	112	110	110	110	108	108	108	113								

DEC.2019 h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.2019 h'Es (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	B	98	90	96	86	90	106	106	92	92	86	G	86	90	G	130	116	88	88	82	B	B	100	B	
2	112	98	98	B	B	B	B	B	136	150	140	130	118	116	118	110	84	78	B	B	B	106	B	108	
3	102	104	B	B	B	94	134	132	132	144	122	G	112	114	114	106	102	102	B	140	B	92	B	B	
4	B	B	B	92	B	B	90	B	G	G	146	120	G	G	G	130	128	B	B	B	B	B	B	B	
5	B	B	102	100	108	100	96	94	176	G	108	120	G	134	154	G	120	B	B	B	B	B	122	B	
6	B	B	B	B	102	B	B	B	158	154	G	102	124	120	94	92	134	B	90	90	90	98	B	104	
7	98	B	92	B	B	B	90	B	G	G	152	G	F	86	114	104	116	B	B	B	B	B	B	B	
8	B	B	B	98	114	B	B	B	G	G	98	148	144	136	118	130	118	132	88	110	B	94	B	B	
9	B	B	B	B	102	102	88	90	G	G	156	148	142	130	124	120	94	B	112	B	106	104	104	104	
10	B	B	B	B	B	B	B	B	G	156	164	154	142	118	108	108	102	96	96	B	106	B	B	B	
11	B	B	B	B	B	B	B	126	146	G	G	G	98	146	90	84	102	94	B	B	B	B	B	B	
12	B	96	98	B	B	102	94	90	142	156	124	124	128	114	112	100	96	94	92	90	90	88	90	92	
13	B	94	92	88	88	B	98	130	136	132	118	100	106	100	98	92	94	94	92	100	112	106	98	B	
14	98	96	94	94	92	94	96	B	G	G	96	96	152	94	100	102	94	94	B	94	94	90	92	B	
15	82	B	88	B	88	B	B	B	140	G	G	G	G	80	86	80	146	128	G	88	84	82	98	108	88
16	94	B	94	94	94	92	B	B	G	G	G	G	G	134	128	114	G	98	98	100	96	90	B	B	
17	96	94	88	B	B	B	100	106	144	G	G	98	84	88	88	C	C	C	C	92	84	84	84	B	
18	B	B	B	B	B	82	156	122	92	98	G	G	C	C	106	132	124	112	100	88	88	88	88	92	
19	84	100	100	B	B	B	B	B	G	G	98	G	92	84	G	G	100	94	102	108	100	88	82	88	80
20	B	B	100	B	90	86	92	134	122	104	100	102	94	100	92	92	96	90	90	88	92	90	B	86	
21	86	86	82	90	100	B	90	116	114	100	102	100	94	G	94	152	128	92	88	96	98	100	92	92	
22	108	92	98	90	90	90	104	96	100	96	104	96	92	94	86	88	90	94	92	88	B	B	B	92	
23	90	98	98	98	98	92	92	94	110	108	G	88	90	90	142	138	G	B	88	88	84	92	84	94	
24	94	B	94	96	B	B	B	B	G	G	160	G	G	G	G	148	122	102	88	B	B	B	B	B	
25	B	B	B	98	98	100	100	90	G	96	148	94	90	142	116	124	110	86	88	80	B	B	100	100	
26	104	B	B	106	100	100	96	B	G	110	G	G	G	G	G	94	94	B	B	B	B	98	92	98	
27	104	B	88	B	90	94	B	B	G	150	G	G	136	G	136	128	118	90	92	88	B	90	96	88	
28	B	88	B	88	B	B	B	B	102	102	G	G	G	96	152	120	G	B	B	102	90	88	84	96	
29	98	98	94	B	100	B	102	100	94	136	G	G	136	132	G	G	B	B	B	B	B	B	B	B	
30	B	B	B	B	B	B	B	B	G	144	154	120	G	G	132	118	120	B	B	B	98	98	100	B	
31	B	B	B	B	B	B	136	126	132	G	G	138	96	96	144	92	86	86	84	84	84	108	106	94	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	15	13	18	14	16	15	18	16	18	20	20	20	22	23	26	28	25	20	20	19	16	22	17	16	
MED	98	96	94	95	96	94	96	106	132	106	130	102	102	114	115	112	102	94	91	90	91	93	92	93	
U Q	104	98	98	98	101	100	104	126	142	147	150	127	136	130	132	128	121	97	97	100	98	98	102	99	
L Q	90	93	90	90	90	90	92	94	102	98	103	96	90	94	98	97	94	88	88	88	88	90	88	90	

DEC.2019 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.2019 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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		F2	F5	F4	F5	F2	F3	L4	L3	L2	L2		L3	L2		C2	C3	F1	F1	F2			F2		
2	F1	F1	F2						H2	H2	H1	H1	C2	C2	C2	CL22	L3	F2				F1		F2	
3	F2	F1			F1	F1	C4	C2	H1	C2			C2	C2	C2	L2	L3	F1		F1		F1			
4			F2			F2					H1	C1				C1	C2								
5		F1	F1	F1	F2	F2	L4	H1		C2	C2			HL12	H1		C1						F1		
6				F2				H1	H1		L2	C2	C2	C2	L2	L3	C2		F1	F2	F2	F2		F1	
7	F2		F1			F1				H1		C1	C1	LH21	C2	L4	C2	L3	F3	F1					
8			F1	F2				L3	HL12	H1	C2	C2	C1	CL21	C2	L2	F3	F1				F1			
9			F1	L2	L6	L5			H2	H1	H1	H1	H1	HL22	C2	C1	L2		F1		F4	F3	F2	F2	
10								H2	H2	H1	H1	C2	C2	C2	C3	L3	F1	F1			F1				
11							C2	H1				L1	H1	L3	L3	L2	F3								
12		F1	F1		F1	F1	L1	HL23	H2	C2	C2	C2	C1	L2	L3	L4	F7	F4	F5	F5	F5	F6	F4	F2	
13		F2	F2	F1	F1		F2	H2	C2	C2	L3	L2	L2	L4	L3	L3	L4	F2	F2	F1	F1	F1	F1		
14	F2	F1	F2	F2	F2	F2	L1			H2	L3	L4	L3	L2	L2	L1	L1	L3		F2	F2	F1	F1		
15	F1		F1		F2				H2		L3	L4	L3	L2	L3	C1		F1	F2	F1		F1	F1	F3	
16	F1		F1	F2	F1	F1								C1	C2	C2		L1	F1	F2	F1	F1			
17	F2	F2	F4			L1	L1	H2			L2	F2	L2							F2	F2	F2	F1		
18				F1	F1	L1	L4	L2						LL11	CL21	C2	F7	F7	F3	F4	F2	F4	F6	F6	
19	F2	F1	F1					L2		L4	L3	L2	L2	L2	L2	L3	L2	F1	F1	F3	F8	F5	F6	F2	
20			F1		F1	F4	F2	C2	C4	L3	L3	L2	L2	L2	L2	L3	L2	F1	F1	F2	F2	F2		F5	
21	F4	F4	F4	F2	F1		F2	CL11	C2	L2	L3	L2	L2	L2	L2	H1	C1	F1	F1	F1	F1	F1	F2	F3	
22	F2	F2	F2	F1	F2	F1	F3	L6	L3	L2	L2	L2	L1	L2	L3	L2	L5	L5	F4	F2				F2	
23	F2	F1	F2	F3	F3	F2	F2	L1	L2	C1		L2	L2	L2	H1	H1			F1	F2	F1	F3	F1	F2	
24	F2		F2	F3							H1					H1	C1	L1	F1						
25			F2	F3	F1	L2	L3		L2	H1	L2	LH22	H2	C2	C2	CL21	F1	F1	F1			F1		F1	
26	F1		F1	F2	F2	F2			L2							L1	L2					F3	F2	F1	
27	F2		F2		F2	F2			H1				CL12		H2	H2	CL21	F1	F3	F3		F2	F1	F2	
28		F2		F1				LC32	L2					L2	H1	C2			F3	F1	F2	F2	F2	F1	
29	F2	F2	F2		F1		L1	L4	L3	H1				C1	H2						F3	F1	F2		
30									CL22	HL12	CL12				C2	C1	C2		F1		F1	F1	F2		
31						C1	C1	C2			H1	L2	L2	HL12	L2	L3	F2	F4	F6	F5	F5	FF35	FF33	F2	
		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																									

DEC.2019 TYPES OF Es

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Yamagawa

DEC.2019 f_{XI} (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	37	38	X	X	X	X	X	X											X	X	X	X	X	X	X
2	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
3	X	X	X	X	X	X	X	X								X			X	X	X	X	X	X	X
4	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
7	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
8	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
9	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
10	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
11	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
12	X	X	X	X	X	X	X	X											X	X	X	A	X	X	X
13	X	X	X	X	X	X	X	X											X	X	X	A	A	A	A
14	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
15	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
16	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
17	X	X	X	X	X	X	X	X									X		X	X	X	X	X	X	X
18	X	X	X	X	X	X	X	X											X	A	A	X	X	X	X
19	X	X	X	X	X	X	X	X											A	X	X	X	X	X	X
20	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
21	X	X	X	X	X	X	X	X											X	A	A	A	A	A	X
22	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
23	X	X	X	X	X	X	X	X											A	A	X	X	X	X	X
24	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
25	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
26	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
27	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
28	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
29	X	X	X	X	X	X	X	X										X	X	X	X	X	X	X	X
30	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
31	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X
	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	30	30	30	6								1	1	2	29	28	29	28	29	31	
MED	X	X	X	X	X	X	X	X								X	X	X	X	X	X	X	X	X	
U Q	34	35	36	36	34	32	30	38											40	34	36	36	36	34	
L Q	X	X	X	X	X	X	X	X											X	X	X	X	X	X	
	32	31	31	31	31	29	25	36											37	32	32	33	30	30	

DEC.2019 f_{XI} (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Yamagawa

DEC.2019 foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	F	28	F	28	23	19	31	43	56	55	58	55	61	54	54	45	45	31	27	24	28	29	31	
2	31	F	32	31	32	26	22	35	52	53	48	58	75	62	52	55	50	44	31	26	26	26	30	27	
3	27	27	28	26	26	23	19	31	44	48	52	56	54	54	53	53	47	48	26	26	26	31	30	30	
4	28	30	30	27	28	18	18	32	46	48	57	56	58	65	59	60	48	47	27	27	27	32	26	26	
5	26	26	24	F	F	F	24	22	34	46	48	48	52	60	56	51	54	52	44	34	23	26	24	24	
6	27	25	F	F	F	22	19	30	44	50	47	47	56	57	72	54	46	52	35	27	24	23	25	23	
7	24	24	24	26	26	24	22	37	44	50	50	56	54	62	64	52	53	48	32	30	32	27	25	22	
8	28	31	30	28	27	27	24	36	48	52	50	50	50	51	50	48	56	53	31	29	30	29	25	26	
9	28	29	29	29	28	26	26	34	54	50	50	50	49	51	63	52	48	46	32	28	24	24	23	25	
10	26	28	27	26	26	27	27	31	45	52	49	50	48	55	50	44	54	63	33	26	28	28	31	26	
11	27	28	29	29	F	F	26	43	54	48	52	54	51	56	49	46	A	53	38	25	29	24	26	28	
12	26	26	26	25	26	24	22	30	42	44	54	52	52	56	49	51	52	41	26	28	28	A	22	25	
13	24	26	26	26	27	24	21	33	52	48	56	58	52	61	54	49	50	53	32	24	30	A	A	F	
14	20	25	26	F	24	24	22	33	46	48	51	51	50	54	51	58	48	49	32	24	30	30	27	22	
15	20	24	25	24	26	F	21	31	58	52	50	55	52	50	52	49	46	42	32	35	29	32	32	26	
16	27	27	26	25	25	25	24	32	50	50	54	58	52	56	49	57	54	41	33	27	31	28	25	21	
17	24	26	27	27	30	26	22	32	52	51	47	51	65	53	57	53	48	37	33	26	28	28	28	28	
18	26	25	24	23	24	25	21	28	50	48	52	59	49	54	49	60	51	46	34	A	A	27	27	27	
19	27	26	23	21	20	F	F	32	55	57	50	53	64	72	67	58	A	A	A	32	F	F	24	F	
20	F	F	F	F	F	23	23	33	47	51	51	58	58	60	57	53	A	50	50	44	26	29	34	27	24
21	F	25	26	26	F	24	20	29	54	49	50	54	60	52	52	A	50	48	48	A	A	A	A	24	
22	24	F	24	25	27	26	22	29	43	47	52	54	A	56	50	47	50	40	30	27	F	28	24	24	
23	26	24	26	26	25	21	19	27	48	51	48	48	64	47	53	56	56	A	A	A	29	29	F	24	
24	25	31	31	24	22	A	A	26	49	55	50	57	58	55	49	47	57	50	34	26	26	29	24	24	
25	26	26	24	24	27	34	19	28	50	47	44	50	60	51	47	53	46	43	34	26	32	35	24	24	
26	27	26	F	F	F	26	F	F	41	51	54	64	52	60	52	45	47	45	32	30	28	29	31	32	
27	31	28	30	31	30	24	21	29	47	51	48	70	63	59	47	49	48	38	28	26	32	29	27	26	
28	27	27	28	23	A	22	19	29	44	48	52	62	68	50	62	50	52	46	37	22	27	32	34	27	
29	26	25	25	25	26	24	18	26	45	43	48	67	55	48	50	50	50	39	32	23	27	29	30	F	
30	F	27	28	30	25	20	20	25	43	48	52	60	63	54	48	46	51	42	34	24	29	25	28	26	
31	26	29	30	30	30	24	20	28	52	50	45	48	68	56	63	70	59	52	32	28	28	28	30	F	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	27	27	28	26	25	27	28	30	31	31	31	31	30	31	31	30	29	29	29	28	27	27	28	27	
MED	26	26	26	26	26	24	21	31	47	50	50	55	56	56	52	52	50	46	32	26	28	28	27	26	
U Q	27	28	29	28	28	26	22	33	52	51	52	58	63	60	57	55	52	50	34	28	30	30	30	27	
L Q	25	25	25	25	25	23	19	29	44	48	48	51	52	52	49	49	48	42	31	26	26	27	24	24	

DEC.2019 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Yamagawa

DEC.2019 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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											L	U L	A	U L	A	L								
2									L		U L	U L	U L	U L	L									
3											L	L	L	L	L									
4											L	A	U L	U L	U L		L							
5									L			L	L	U L	L	A								
6										L		L	U L	A	A									
7												U L	A			L								
8												A	U L	U L	U L									
9											L	L	A	L	A	L	L							
10									L	L	L	L	L	U L	L	L								
11										L	A	A	U L	A			A							
12									L		L		A	A	U L	L								
13											L		L	L	L									
14										L	L	L	L	L	U L		L							
15										L	L	A	U L	A	U L									
16											L	U L	L	U L	U L	L	L							
17												L	A	U L	L	A								
18											L	L	L	L	A									
19										L		U L	U L	L	L		A	A						
20											A		U L	A	L									
21											L	L	U L	L	A	A								
22											A		A	L	L									
23												L	A	A	U L	U L					A			
24											L	U L	L	L	L	U L	L							
25									L	L		U L	U L	L			L							
26											L	U L	L	L	L	A	A							
27											L	U L	U L	U L		L								
28												U L	U L	U L	L	L								
29												L		U L	L	L								
30												U L	A	U L	U L	L								
31										L		U L	L	U L	U L	L	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											5	12	14	13	9	2								
MED											U L	U L	U L	U L	U L	U L								
U Q											400	400	406	408	396	378								
L Q											414	412	416	416	428									
											U L	U L	U L	U L	U L									
											394	390	400	402	388									

DEC.2019 foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Yamagawa

DEC.2019 foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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									A	U	R	U	A	U	R	A	A	A	B						
2								B	U	R	U	A	U	A	A	A	A	A	B						
3								U	R	R	A	A	A	A	U	R		A	B						
4								B	U	A	A	A	A	U	R	U	A	A	B						
5								B	U	R	U	R		A	U	R	U	A	R	B					
6								U	A	A	A	U	R	A	A	A	A	B							
7								B	U	R	A		U	A	A	A	A	B							
8								B	U	A	A	A	A	A	A	A	A	R	B						
9								B	U	A	A	U	R	U	A	A	A	A	B						
10								B	U	R	U	R	U	A	U	A	A	A	B						
11								B	U	R	U	A	A	A	A	A	A	A	A						
12								B	U	R	A	A	A	A	A	A	A	A	B						
13								B	U	A	A	A	A	A	A	A	A	A	R						
14								B	U	R	U	A	U	A	A	A	A	A	R						
15								B	U	A	U	R	A	A	A	A	A	A	R						
16								B	U	A	A	U	R	U	R	A	A	U	A						
17								U	R	R	A	A	A	A	A	A	A		B						
18								B	U	R	U	R	U	A	U	R	A	A	A						
19								B	U	R	A	U	A	U	A	A	A	A	B						
20								B	U	R	R	A	A	A	A	A	A	A	A						
21								B	U	R	A	A	A	A	A	A	A	R	B						
22								B	A	A	A	A	A	A	A	A	A	R	B						
23								B	U	R	A	A	A	A	A	A	A	A	B						
24								U	A	A	A	A	A	A	A	A	A	R							
25								B	U	R	U	A	U	A	U	R	A	A	B						
26								U	R	R	A	A	U	R	U	A	A	A	A						
27								B	A	A	A	U	A	U	A	U	R	R	B						
28								B	U	R	A	A	A	A	A	A	A	R	B						
29								B	U	R	A	U	A	U	A	U	R	A							
30								B	U	A	A	A	U	R	U	R	R	A	B						
31								B	U	R	U	A	A	A	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									27	25	17	17	18	15	16	15	13	5							
MED									U	R	U	A	U	A	U	A	U	R							
U Q									204	252	280	300	308	300	292	268	228	176							
L Q									U	U	A	U	U	U	U	U	U	R							
									200	250	276	296	304	296	276	256	216	170							

DEC.2019 foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Yamagawa

DEC.2019 foEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	J A	J A	E B				J A	J A		G				G	J A	J A			J A	J A	J A	J A	J A	J A		
2	J A	J A	J A	J A						G				J A	J A	J A					E B		E B	J A		
3	J A	J A	E B	E B	E B	E B	J A			G				J A	J A				E B	J A	J A	J A	E B	E B		
4	E B	J A	J A	J A	J A		J A			G				J A	J A				J A	J A			E B	E B		
5	E B	E B	E B	J A	J A		E B	J A		G				G	G			E B		E B	E B	E B	J A	J A		
6	J A	J A	E B	E B	E B	E B	E B	E B		J A	J A		J A						J A				E B			
7	J A	J A	J A	J A			E B	E B		G									J A	E B						
8	E B		E B	E B	E B	E B	E B	J A						J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A		
9	E B	J A	E B	E B	J A		J A			G									J A		J A	E B	J A	E B		
10	J A		E B	E B	E B	E B				G										J A		E B	E B			
11	J A					J A	E B			G								J A	J A	J A						
12	E B	E B	E B	E B	E B					G					J A		J A	J A	J A	J A	J A	J A	J A	J A		
13	J A	J A	J A	J A	J A		J A			G				J A	J A	J A	J A					J A	J A	J A		
14	J A	J A	J A	J A	J A		J A	J A		G				J A	J A	J A	J A				E B	J A	J A	J A		
15	J A	J A	E B	J A	J A	E B	E B	E B		G				J A	J A	J A	J A				J A	J A	J A	J A		
16	J A	J A	J A			J A			J A	G				G	J A				J A	J A	J A			J A		
17	J A	J A	E B			J A			J A	G				J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	E B		
18	E B	E B	E B	E B	E B	E B	E B			G				G					J A	J A	J A	J A	J A	J A		
19	J A	J A				E B		E B		G				J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A		
20	E B	J A		J A	J A					G				J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A		
21	J A	J A	J A	J A						G				J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A		
22	J A	J A	J A	J A			E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A		
23	E B		J A	J A	J A		J A	E B		G				J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	J A		
24	J A	J A	J A	J A	J A		J A	J A	J A					J A	J A	J A	J A				E B	E B	E B	E B		
25	E B		E B			J A	J A	J A		G				G		J A	J A	J A	J A	J A	J A	J A	E B	E B		
26	E B	J A	J A			J A	E B	E B		G				G		J A	J A	J A	J A	J A	J A	J A	J A	J A		
27	J A	J A	J A	J A		E B	E B	E B		G				G					J A	J A	J A	J A	E B	E B		
28	E B	E B	J A	J A	J A		J A			G				J A	J A	J A	J A				J A	J A	J A	J A		
29	J A	J A	J A	J A		E B	E B			G				G				E B	E B	E B	E B		E B	E B		
30	E B	E B		E B	E B	J A		J A		G				G		J A	J A	J A	J A	J A	J A	J A	E B	E B		
31	J A	J A	E B	E B	E B	E B	E B	E B		G				J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J 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	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	J A	J A	21	22	22	20	21	21			27	35	37	38	37	36	32	30	23	J A	J A	25	23	22	21	23
U Q	J A	J A	J A	J A	J A		J A	J A			J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
L Q	E B	E B	E B	E B	E B	E B	E B	E B		G				G	G	G	G						E B	E B	E B	

DEC.2019 foEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Yamagawa

DEC.2019 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
2	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
3	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
4	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
5	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
6	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
7	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
8	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
9	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
10	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
11	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
12	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
13	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
14	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
15	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
16	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
17	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
18	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
19	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
20	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
21	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
22	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
23	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
24	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
25	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
26	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
27	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
28	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
29	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
30	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
31	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	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	31	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	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
UQ	16	16	16	16	16	16	16	16	22	28	33	35	35	35	33	31	27	20	20	18	16	16	16	16	16	
LQ	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B

DEC.2019 fbEs (0.1MHz)

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IONOSPHERIC DATA STATION Yamagawa

DEC.2019 fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

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

DEC.2019 fmin (0.1MHz)

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IONOSPHERIC DATA STATION Yamagawa

DEC.2019 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	F	287	F	365	352	295	371	359	375	376	377	378	357	359	394	385	372	353	352	292	319	319	322		
2	330		F	317	314	392	393	300	372	390	379	347	346	357	351		384	384	381	359	345	319	326	359	295		
3	335	303	349	352	347	396	372	361	383	383	358	372	342	361	361	396	372	322	400	314	317	316	344	302			
4	317	317	317	287	368	355	335	364	384	381	380	382	358	376	365	412	387	373	362	323	314	395	368	318			
5	305	300	312	325	337	291	336	362	385	377	384	383	376	375	354	360	359	373	361	342	321	366	379	324			
6	326	296		F	F	F	307	357	378	371	380	383	389	357	373	380	391	355	388	367	363	332	372	310	356		
7	299	326	327	334	351	352	344	391	376	360	369	377	368	376	356	352	357	368	333	341	349	389	327	348			
8	312	315	317	323	308	308	354	383	354	380	378	365	363	389	310	363	366	375	374	339	339	345	346	332			
9	333	334	336	339	317	338	353	366	391	384	367	381	351	359	372	375	378	387	371	376	377	339	316	344			
10	313	337	345	321	338	357	389	371	389	395	360	387	350	373	360	368	352	401	386	290	352	327	354	327			
11	306	328	344	299		F	F	351	371	402	388	388	375	336	364	386	361	A		376	384	303	359	326	329	355	
12	317	316	316	338	349	397	396	369	371	370	371	403	356	382	327	372	389	400	392	316	382		A	332	343		
13	331	342	342	348	370	325	325	368	374	345	378	417	376	376	362	368	371	392	391	332	350		A	A	F		
14	310	311	312		F	326	325	380	385	400	370	370	392	345	345	356	386	369	402	350	353	334	342	369	368		
15	368	349	348	348	311		F	329	347	400	395	348	387	366	354	380	369	369	372	371	358	320	365	388	314		
16	315	304	335	335	332	338	357	369	398	374	364	387	375	364	345	378	364	402	340	340	344	356	357	330			
17	296	351	342	344	362	375	332	356	378	380	383	369	384	329	384	384	397	393	374	350	346	347	341	333			
18	332	312	313	315	318	379	384	369	394	397	382	399	385	386	375	367	392	390	407		A	A	343	346	316		
19	324	355	352	293	309		F	F	356	354	376	382	375	344	366	365	366		A	A	A	F	F	400	F		
20		F	F	F	F		F	305	334	360	382	372	379	391	371	372	378	377	363	385	394	329	324	344	343	302	
21		F	319	301	293		F	349	322	348	380	382	381	360	375	382	393		A		345	357	386		326		
22	354		F	322	312	317	356	372	357	379	363	368	375		A	362	373	331	397	395	395	324		F	365	356	315
23	338	306	342	348	376	339	307	337	397	397	398	383	380	374	384	347	385		A	A	A	361	333		F	330	
24	332	321	378	342	368		A	A	345	356	383	369	373	379	388	384	355	386	390	389	350	314	344	336	295		
25	304	316	298	299	338	402	312	351	381	399	389	369	397	364	391	391	379	364	382	297	348	374	368	321			
26	347	347		F	F	F	311		F	F	416	361	331	381	348	380	380	356	361	375	374	358	339	324	328	327	
27	341	322	330	360	361	332	314	340	374	364	311	372	372	397	372	375	378	406	322	344	346	347	388	286			
28	313	298	321	301		A	369	330	371	378	370	349	381	368	354	374	378	348	393	404	319	321	346	367	377		
29	335	299	270	309	370	357	339	351	379	387	366	386	386	354	350	359	375	374	393	387	328	330	331		F		
30		F	333	294	362	390	360	364	349	376	362	342	380	384	387	363	364	385	373	392	321	337	311	351	305		
31	283	296	305	305	348	373	333	368	401	384	370	307	365	364	352	368	387	373	376	330	358	341	342		F		
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	27	27	28	26	25	27	28	30	31	31	31	31	30	31	30	30	29	29	29	28	27	27	28	27			
MED	324	317	322	324	348	352	338	365	381	380	370	381	368	372	368	368	375	381	376	340	339	344	346	326			
U Q	335	334	342	344	368	373	360	371	394	384	382	387	378	380	380	384	386	393	392	352	350	365	368	343			
L Q	310	304	312	305	322	325	327	351	374	370	360	372	356	359	356	361	362	373	362	322	321	327	332	314			

DEC.2019 M(3000)F2 (0.01)

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DEC.2019 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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											L	U L	A	U L	A	L								
2									L		U L	U L	U L	U L	L									
3											L	L	L	L	L									
4											L	A	U L	U L	U L		L							
5									L			L	L	U L	L	A								
6										L		L	U L	A	A									
7												U L	A			L								
8												A	U L	U L	U L									
9											L	L	A	L	A	L	L							
10								L	L	L	L	L	U L	L	L		L							
11									L	A	A	U L	A				A							
12								L		L		A	A	U L	L									
13											L		L	L	L									
14									L	L	L	L	U L	L			L							
15									L	L	A	U L	A	U L										
16											L	U L	L	U L	U L	L	L							
17												L	A	U L	L	A								
18											L	L	L	L	A									
19									L		U L	U L	L	L		A	A							
20											A	U L	A	L										
21											L	L	U L	L	A	A								
22										A		A	L	L										
23												L	A	A	U L	U L		A						
24											L	U L	L	L	L	U L	L							
25								L	L		U L	U L	L				L							
26											L	U L	L	L	L	A	A							
27											L	U L	U L	U L		L								
28											U L	U L	U L	L	U L	L								
29											L			U L	L	L								
30											U L	A	U L	U L	L									
31									L		U L	L	U L	U L	L	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											5	12	14	13	9	2								
MED											U L	U L	U L	U L	U L	U L								
U Q											404	430	412	419	419									
L Q											U L	U L	U L	U L	U L									
											381	384	401	397	383									

DEC.2019 M(3000)F1 (0.01)

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DEC.2019 h'F2 (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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											232	232	232	260	246	228									
2									232		278	278	242	242	240										
3											252	252	272	250	250										
4											242	242	260	240	234		216								
5									230			228	226	242	256	242									
6									240		252	250	248	218											
7											242	242				256									
8											246	270	252	228	406										
9											248	238	268	260	232	242	224								
10									218	224	252	238	284	256	256		254								
11										220	218	226	288	246			A								
12									236		244		262	240	318	252									
13											232		242	240	248	246									
14									238	244	220	276	264	264		238									
15										226	254	222	248	248	246										
16											256	234	232	250	284	228	240								
17												256	246	274	230	238									
18											232	216	234	220	234										
19									224		240	262	240	228			A	A							
20											238		248	236	234										
21											228	240	234	234	218		A								
22										240			A	252	252										
23												230	230	228	232	258				A					
24											242	236	228	228	230	252									
25									234	218		236	222	252			226								
26										240	262	228	258	226	240	240	234								
27										250	326	226	224			236									
28											274	246	236	248	236		244								
29											254			278	268	262									
30											272	240	228	236	248										
31										238		368	238	238	260	234	206								
	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	11	22	26	29	29	27	14	9								
MED									232	238	247	238	242	242	246	242	234								
U Q									235	240	256	246	261	252	256	252	242								
L Q									224	224	238	228	232	236	232	236	220								

DEC.2019 h'F2 (KM)

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IONOSPHERIC DATA STATION Yamagawa

DEC. 2019 h'F (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT. 31°12.0'N LON. 130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	E B	E B	E B	E B	204	202	188	202	218	216	182	200	A	182	A	184	196	196	196	204	E A	E A	E B	E B
2	E B	E B	E B	E B	204	188	E B	258	216	184	200	208	192	214	196	196	202	198	198	198	202	218	E B	E B
3	E B	E B	E B	E B	218	202	E B	230	190	190	200	202	206	202	192	192	202	202	184	E B	E B	E B	E B	
4	E B	E B	E B	E B	202	242	E B	242	198	198	200	210	A	190	188	168	194	178	188	190	208	E B	204	210
5	E B	E B	E B	E B	254	242	E B	258	240	202	180	204	202	202	198	190	180	A	194	192	188	188	204	202
6	E B	E B	E B	E B	E B	280	E B	224	196	196	200	200	198	200	196	A	A	198	198	198	196	200	216	E B
7	E B	E B	E B	E B	232	238	E B	238	200	194	212	198	216	A	214	206	194	194	192	192	208	200	200	230
8	E B	230	E B	E B	222	224	E B	214	228	208	194	212	A	196	196	192	204	204	208	188	210	226	212	E B
9	E B	E B	E B	E B	252	216	E B	212	202	208	206	182	190	A	200	A	200	178	190	190	190	198	E B	E B
10	E B	E B	E B	E B	242	214	E B	194	190	176	188	180	184	202	210	200	196	206	194	174	E B	254	200	E B
11	E B	E B	E B	E B	224	258	E B	234	204	192	184	A	A	192	A	226	210	A	202	190	190	190	190	E B
12	E B	E B	E B	E B	226	184	E B	184	190	186	216	210	206	A	A	204	196	208	196	198	E A	254	206	E B
13	E B	E B	E B	E B	224	240	E B	238	206	206	204	194	202	192	178	190	184	210	200	192	E B	238	226	A
14	E B	E B	E B	E B	264	254	E B	244	204	200	174	202	180	180	202	180	208	200	200	188	194	214	214	208
15	E A	E B	E B	E B	244	256	E B	280	248	212	198	194	178	A	178	A	178	204	204	196	190	196	216	212
16	E B	E B	E B	E B	252	252	E B	266	220	200	196	200	200	180	178	184	194	198	186	198	194	234	214	E B
17	E B	E B	E B	E B	226	212	E B	206	254	226	208	208	208	210	A	180	186	A	204	204	226	214	214	214
18	E B	E B	E B	E B	248	220	E B	200	200	206	194	182	188	188	192	A	218	202	200	210	A	A	224	E B
19	E A	204	E B	E B	282	252	E B	252	210	210	198	218	202	194	208	208	216	A	A	A	214	210	E B	
20	E B	E B	E B	E B	220	234	E B	240	210	210	208	A	220	194	A	196	208	216	206	212	224	218	196	E B
21	E B	E B	E B	E B	204	212	E B	254	214	212	212	202	190	188	188	A	A	206	210	206	A	A	A	E B
22	E B	E B	E B	E B	262	238	E B	206	206	204	200	A	220	222	A	214	204	206	206	190	182	220	220	E B
23	E B	E B	E B	E B	206	212	E B	294	230	202	208	200	180	A	A	184	184	202	A	A	A	202	202	E A
24	E B	E B	E B	E B	A	A	A	222	220	208	196	184	194	190	188	174	206	190	180	218	E B	232	198	E B
25	E B	E B	E B	E B	230	188	E B	298	218	184	184	200	182	194	184	208	210	188	184	184	E B	258	216	E B
26	E B	E B	E B	E B	228	224	E B	244	210	190	196	190	186	182	174	196	A	A	196	192	192	208	E B	
27	E B	E B	E B	E B	210	226	E B	266	212	204	198	192	190	176	208	198	190	190	190	E A	272	E A	E B	
28	E B	E B	E B	E B	A	208	E B	288	208	208	214	212	212	210	194	194	208	188	194	194	E A	E B	258	E B
29	E B	E B	E B	E B	216	200	E B	280	216	208	206	206	218	220	196	192	190	204	192	190	194	224	220	E B
30	E B	E B	E B	E B	192	182	E B	202	216	202	212	212	A	200	194	186	204	204	202	198	218	218	E B	
31	E B	E B	E B	E B	208	198	E B	208	214	196	196	208	224	212	180	214	202	A	202	178	232	196	E 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	31	31	31	31	30	30	30	31	31	30	28	27	24	25	26	27	27	29	29	28	29	28	29	31
MED	E B	E B	E B	E B	214	207	E B	239	207	200	202	201	200	194	192	195	202	202	196	192	204	211	208	E B
U Q	E B	E B	E B	E B	242	240	E B	254	214	208	208	208	210	201	201	204	208	206	201	198	233	225	228	E B
L Q	234	244	230	226	208	202	208	200	192	196	193	186	188	184	186	194	194	191	188	198	205	203	207	224

DEC. 2019 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Yamagawa

DEC.2019 h'E (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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									A							A		B							
2								B								A	A		B						
3									120	118	110	110	118	112				112							
4								B					A	A				B							
5									112	112	114	114			114		114								
6								B				A	A					B							
7									116	116	116			116	112	112	112								
8								B										B							
9									114	114	114	110	110	110	112	112	112								
10								B										B							
11									112	112	114	118	124	112	112	114	118								
12								B										B							
13									118	112	98	100	100	106	106	114	114								
14								B										B							
15									116	118	110	110	108	108	108	108	130								
16								B										B							
17									130	112	112	112	112	112	116	112	112								
18								B										B							
19									118	112	110	112	112	116	116	116	116								
20								B									A	A							
21									118	118	114	114	114	114	114	114									
22								B									A	B							
23									114	120	120	114	114	112	112	112									
24								B						A	A	A	A								
25									112	112			110					126							
26								B							A		A								
27									110	110	110	110	112	112		114		128							
28								B																	
29									126	120	120		114			114	114	118							
30								B																	
31									118	118	116	118			118	118	118	118							
								B										B							
									118	120															
								B										A							
									114	114	114	114	108	108	110	110	114								
								B										B							
									114																
								B																	
									114																
								B																	
									114																
								B																	
									120	124	118					116	108								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT									28	28	24	19	22	20	22	22	19	5							
MED									117	117	114	112	112	112	112	113	114	124							
U Q									119	120	117	114	114	114	116	114	118	127							
L Q									114	112	110	110	110	109	110	110	112	118							

DEC.2019 h'E (KM)

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IONOSPHERIC DATA STATION Yamagawa

DEC.2019 h'Es (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

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	98	96	96	B	94	98	92	96	96	142	G	140	126	G	116	100	108	118	88	88	110	110	90	102	
2	102	112	100	100	100	94	96	96	G	150	150	152	110	122	100	98	122	90	90	88	B	102	B	104	
3	102	94	94	B	B	B	100	102	G	G	114	114	104	102	G	102	110	110	B	102	84	84	84	B	
4	B	84	84	92	100	100	92	90	142	G	130	106	98	G	G	144	142	100	88	80	80	80	B	B	
5	B	B	B	94	86	86	B	90	146	G	G	144	116	G	G	140	G	B	B	B	B	B	86	90	
6	96	92	B	B	B	B	B	B	152	114	114	162	94	114	114	136	148	G	98	98	86	92	B	100	
7	94	88	94	94	94	98	B	B	G	156	162	158	148	128	118	124	122	112	90	B	110	86	100	100	
8	B	94	B	B	B	B	B	84	164	164	164	140	146	114	114	112	112	90	84	106	106	106	106	110	
9	B	96	B	B	98	98	98	98	144	146	G	G	158	148	140	138	126	88	90	90	96	B	88	B	
10	94	84	80	B	B	B	B	86	G	G	G	150	138	130	118	108	114	104	90	92	92	B	B	90	
11	82	100	100	100	98	98	106	B	G	G	158	158	138	126	118	116	100	92	92	92	88	88	86	86	
12	B	B	B	B	B	94	94	92	G	152	136	152	112	122	116	116	104	120	104	94	104	104	104	102	
13	100	96	96	96	96	100	100	96	142	160	102	102	114	106	104	104	100	G	100	100	100	92	88	90	
14	96	96	98	98	90	90	90	90	G	G	166	G	G	154	100	118	98	G	98	98	B	98	104	96	
15	96	96	B	96	96	B	B	B	136	G	G	92	92	86	86	150	124	G	80	84	84	84	94	94	
16	92	90	90	88	88	90	90	90	98	G	G	G	G	98	134	G	150	108	102	98	98	96	96	90	
17	86	86	96	B	90	102	102	98	G	G	96	96	92	90	90	84	84	82	80	80	92	B	B	B	
18	B	B	B	B	B	B	B	98	G	G	G	160	G	154	146	120	114	102	102	98	96	104	98	98	
19	92	92	92	88	92	92	B	B	G	G	98	160	162	162	152	92	86	86	86	86	86	84	104	104	104
20	B	94	94	94	94	94	100	96	G	G	110	100	98	158	92	92	90	94	92	96	100	96	100	100	
21	88	96	122	96	96	94	92	90	G	112	120	98	98	98	90	86	98	94	92	92	90	90	88	86	
22	86	94	100	96	96	96	92	B	G	98	96	92	92	88	88	88	88	98	98	108	102	96	96	90	
23	B	104	96	94	94	100	100	B	G	100	102	96	150	86	152	154	86	84	84	84	82	80	B	94	
24	94	90	90	86	86	84	88	88	114	116	94	90	94	92	G	G	142	G	88	88	B	B	B	B	
25	B	88	B	92	94	96	96	96	G	G	150	148	136	G	G	128	94	102	126	90	88	88	84	B	
26	B	106	106	106	98	98	96	B	G	G	96	96	G	G	148	146	94	88	88	88	88	88	98	B	
27	98	96	96	96	94	B	B	B	126	142	122	136	160	140	140	G	G	142	98	100	96	94	B	B	
28	B	B	100	100	94	94	92	88	G	G	90	90	82	82	160	148	G	138	90	92	88	88	88	88	
29	88	94	100	100	100	B	B	104	170	144	140	136	134	134	124	G	122	B	B	B	122	88	B	B	
30	B	B	98	B	B	98	98	100	156	148	142	114	G	G	G	G	92	92	92	90	86	B	92	98	
31	100	98	B	B	B	B	B	B	G	G	154	98	92	96	148	154	84	84	84	84	84	84	98	96	98
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	19	26	22	20	23	21	21	21	14	16	24	28	26	25	26	26	28	24	29	28	27	25	21	21	
MED	94	94	96	96	94	96	96	96	142	143	126	125	113	114	117	116	106	96	90	92	92	92	94	98	
U Q	98	96	100	99	98	98	100	98	152	151	152	151	138	137	140	140	122	111	98	98	100	100	100	101	
L Q	88	90	94	93	92	94	92	90	114	113	102	97	94	94	100	98	96	89	88	88	86	87	88	90	

DEC.2019 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Yamagawa

DEC.2019 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	F	F		F	F	F	L	L	H		H	C		C	L	C	C	F	F	F	F	F	F	F	
2	F	F	F	F	F	F	F	L		H	H	H	C	C	L	L	C	L	F	F					F	
3	F	F	F				F	L				C	C	L	L		C	C	C		F	F	F	F		
4		F	F	F	F	F	F	L	H		H	L	L	L		H	H	L	F	F	F	F	F			
5				F	F	F		L	H			H	C			H			F					F	F	
6	F	F							H	C	C	H	L	C	CL	H	H		F	F	F	F			F	
7	F	F	F	F	F	F			H	H	H	H	H	C	C	CL	C	C	F		F	F	F	F	F	
8		F						L	H	H	H	H	H	C	C	CL	L	L	F	F	F	F	F	F	F	
9		F			F	F	F	L	H	H			H	H	H	H	C	L	L	F	F	F	F	F	F	
10	F	F	F					L				H	H	H	H	C	C	L	F	F	F	F			F	
11	F	F	F	F	F	F	F				H	H	H	CL	C	C	L	L	F	F	F	F	F	F	F	
12					F	F	L		H	C	H	C	C	C	C	C	L	C	F	F	F	F	F	F	F	
13	F	F	F	F	F	F	L	H	H	L	L	L	L	L	L	L	L		F	F	F	F	F	F	F	
14	F	F	F	F	F	F	L			H				H	L	C	L		F	F			F	F	F	
15	F	F		F	F			H				L	L	L	L	H	C		F	F	F	F	F	F	F	
16	F	F	F	F	F	F	L	L						L	C		H	L	F	F	F	F	F	F	F	
17	F	F	F		F	F	F			L	L	L	L	L	L	L	L	L	F	F	F	F				
18							L				H	H	H	H	C	C	L	F	F	F	F	F	F	F	F	
19	F	F	F	F	F		F		L	H	H	H	H	L	L	L	L	L	F	F	F	F	F	F	F	
20		F	F	F	F	F	L			C	L	L	L	H	L	L	L	L	F	F	F	F	F	F	F	
21	F	F	F	F	F	F	L		C	C	L	L	L	L	L	L	L	L	F	F	F	F	F	F	F	
22	F	F	F	F	F	F		L	L	L	L	L	L	L	L	L	L	L	F	F	F	F	F	F	F	
23		F	F	F	F	F			L	L	L	L	HL	L	HL	HL	L	L	F	F	F	F	F		F	
24	F	F	F	F	F	F	F	C	C	L	L	L	L	L			H		F	F	F	F				
25		F		F	F	F	L			H	H	H		H	L	L	C	F	F	F	F	F	F	F	F	
26		F	F	F	F	F				L	L	L			H	H	L	L	F	F	F	F	F	F	F	
27	F	F	F	F	F			C	H	C	H	H	H	H	H			H	F	F	F	F	F	F	F	
28			F	F	F	F	L			L	L	L	L	L	L	H		H	F	F	F	F	F	F	F	
29	F	F	F	F	F		L	HL	HL	H	H	H	H	H	CL		CL					F	F			
30			F		F	F	L	H	H	H	C	C					L	L	L	L	L	L	F	F	F	
31	F	F								H	L	L	L	L	HL	HL	L	L	F	F	F	F	F	F	F	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT																										
MED																										
U Q																										
L Q																										

IONOSPHERIC DATA STATION Okinawa

DEC.2019 f_{XI} (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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		33	X	X		38	25	X													X	X	X	X	X	
2		34	33	33	36	34	24	X													34	34	34	37	43	
3		X	X	X	X	X	X	X															X	X	X	X
4		X	X	X	X	X	X	X														X	X	X	X	X
5		X	X	X	X	X	X	X														X	X	X	X	X
6		X	X	X	X	X	X	X														X	A	X	X	X
7		X	X	X	X	X	X	X												X	X	X	X	X	X	X
8		X	X	X	X	X	X	X													X	X	X	X	X	X
9		X	X	X	X	X	X	X														X	X	X	X	X
10		X	X	X	X	X	X	X														X	X	X	X	X
11		X	X	X	X	X	X	X	45													X	X	X	X	X
12		X	X	X	X	X	X	X														X	X	X	X	X
13		X	X	X	X	X	X	X														A	X	X	X	X
14		X	X	X	X	X	X	X														X	X	X	X	X
15		X	X	X	X	X	X	X														X	X	X	X	X
16		X	X	X	X	X	X	X														X	X	X	X	X
17		X	X	X	X	X	X	X														X	X	X	X	X
18		X	X	X	X	X	X	X														A	X	X	A	X
19		X	X	X	X	X	X	X														X	X	A	X	X
20		X	X	X	X	X	X	X														X	X	X	X	X
21		A	A	X	X	X	A	X														A	X	X	X	X
22		X	X	X	X	X	X	X														X	X	X	X	X
23		X	X	X	X	X	X	X														X	X	X	X	A
24		X	X	X	X	X	X	X														X	X	X	X	X
25		X	X	X	X	X	X	X														X	X	X	X	X
26		X	X	X	X	X	X	X	35													X	X	X	X	X
27		X	X	X	X	X	X	X														X	X	X	X	X
28		X	X	X	X	X	X	X														X	X	X	X	X
29		X	X	X	X	X	X	X														X	X	X	X	X
30		X	X	X	X	X	X	X														X	X	X	X	X
31		X	X	X	X	X	X	X														X	X	X	X	X
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT		30	30	31	31	31	30	30	2											1	27	30	30	30	30	
MED		X	X	X	X	X	X	X												X	X	X	X	X	X	
U Q		34	33	34	36	35	33	28	40											60	37	35	34	33	32	
L Q		X	X	X	X	X	X	X														X	X	X	X	X
		30	30	31	31	31	27	24														34	32	31	30	30

DEC.2019 f_{XI} (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2019 foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	24	24	25	F	F	19	18	31	43	50	58	57	57	53	64	52	A	48	42	25	25	23	28	28			
2		28	F	27	30	28	18	20	32	47	52	57	55	76	84	65	53	59	50	42	28	28	28	31	37			
3		37	31	31	28	27	24	18	31	41	48	54	54	58	60	58	53	48	46	34	24	26	26	28	27			
4		28	27	28	F	F	F	F	32	48	48	50	63	64	75	71	J	R	82	58	40	33	26	26	23	24		
5		26	25	27	26	25	24	23	34	47	49	54	55	52	58	V	56	55	59	53	43	32	24	23	22	22		
6		22	26	25	F	F	24	20	30	44	45	52	52	50	61	58	58	49	51	72	39	A	24	20	23			
7		24	24	26	26	28	24	22	32	49	50	57	70	H	64	67	56	H	74	70	54	54	37	28	24	22	22	
8		24	26	27	29	29	F	28	24	34	48	51	54	50	63	56	52	56	54	58	51	33	33	32	27	29		
9		27	28	30	30	29	27	27	33	50	62	50	52	50	58	57	67	56	56	47	34	26	22	24	24			
10		24	25	26	26	27	28	20	30	47	48	50	51	49	51	59	49	45	60	54	28	32	29	30	32			
11		32	25	27	26	28	F	F	F	46	48	48	51	50	52	52	50	58	56	44	39	33	29	27	28			
12		27	24	25	26	27	J	B	30	40	45	52	58	H	49	59	66	57	56	54	32	30	36	32	22	26		
13	F	23	25	25	25	28	24	19	31	47	55	69	54	58	60	57	54	53	54	44	A	30	28	24	24			
14		23	24	27	26	26	25	25	32	46	45	51	59	53	53	57	60	56	51	45	33	29	30	34	27			
15		22	22	23	22	22	23	20	33	48	50	50	61	52	51	58	53	59	47	38	31	30	30	27	25			
16		25	25	25	25	25	24	22	32	42	50	60	58	56	58	61	70	60	50	43	28	26	27	31	26			
17		22	24	27	27	28	20	20	30	46	55	53	56	63	60	62	65	62	45	38	32	28	25	27	27			
18		22	20	20	21	22	25	19	28	44	54	54	61	H	74	55	54	58	74	52	48	A	30	30	A	28		
19		26	28	24	22	20	18	19	29	52	64	82	57	58	70	88	76	54	65	58	32	31	A	24	23			
20	F	28	F	F	F	F	F	F	33	53	54	62	58	57	57	62	62	57	54	56	48	29	33	41	26			
21	A	A	27	27	34	A	19	27	52	58	54	50	63	64	51	45	56	68	A	A	A	36	37	32	22			
22	F	F	F	F	F	F	27	22	28	48	49	49	57	60	67	56	A	A	A	41	27	33	42	31	30			
23		30	29	31	29	25	28	17	25	55	58	53	50	63	62	53	52	66	51	39	30	32	28	25	A			
24		24	27	28	22	19	18	18	24	52	55	61	55	62	64	52	46	52	53	41	32	26	25	24	23			
25		24	26	25	26	28	31	17	26	50	50	50	48	63	58	52	51	51	43	37	30	29	28	28	19			
26		23	23	23	22	F	F	F	F	49	46	72	63	66	66	68	48	53	60	38	27	31	32	33	30			
27		28	27	28	32	28	24	21	26	47	50	66	74	62	62	54	47	50	48	33	26	26	26	27	23			
28	F	24	26	24	25	25	18	A	26	44	48	53	72	82	90	81	73	51	62	42	30	25	30	30	25			
29		24	24	24	25	31	21	17	24	44	52	50	54	59	57	H	65	54	48	45	34	31	26	27	27	26		
30	F	26	F	26	26	27	J	B	J	B	24	42	48	47	62	70	69	H	59	52	54	52	44	31	25	24	26	F
31	F	27	F	33	33	33	34	25	27	27	49	59	52	56	79	94	H	76	92	H	87	89	53	31	34	33	34	28
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT		30	30	31	31	31	30	30	31	31	31	31	31	31	31	31	30	29	30	30	28	30	30	30	30			
MED		24	26	26	26	27	24	20	30	47	50	53	56	60	60	58	54	56	53	42	31	29	28	27	26			
U Q		27	27	28	28	28	26	22	32	49	55	58	61	64	67	65	65	60	58	48	33	32	30	31	28			
L Q		24	24	25	25	24	21	18	26	44	48	50	52	53	57	54	52	52	50	38	28	26	25	24	23			

DEC.2019 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2019 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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										376	L 400	L 404	L 424	A	A	A	A									
2											408	412	A	412	408	U 388	L									
3									280	L 400	412	416	420	408			L									
4										L 404	U 412	L 420	416	404	380	L										
5										L 404	404	U 412	U 424	L 400	U 344	L										
6										L 416	L 420	408				A	L									
7									U 276	L 396	L 428	U 408	L 464	412	U 424	L 384		L								
8										328	U 396	L 408	408	404		A	L									
9										L 360	L 408	412	420	392			L									
10											L 412	L 412	392				L									
11									L A	A 396	U L	L 396	L 376			U L	L L									
12									260		408		L 408	408	388											
13										L 404	L 396	416	412	400		L	A									
14									L 296	U 416	L 416	U 412	U 428	400	388		L									
15										L 400			432	412	400	396										
16										U 328	L 392	412	412	424	416	384	336									
17									L	L	L	408	424	416	420		A									
18										L 388	U 432	L 416	416		A	L 416		A								
19										L 408	416	440	420			A	A									
20											L A	L 420		A	L 400	A										
21										L 400	U 408	420	412	392		A	A			A						
22										L 404	U 408	424	412		A	A	A	A								
23									L	L	396	408	412	416	400		A	A	L							
24									L	L	396	412	424	420	400		A	U 320	L							
25										L 396	412	404	408	408			L	L		236						
26									U 360	L 400	416	408	420	408	328	324										
27											392	412	412	416		L 384										
28											388	408	420	416	412	384										
29											400	404	424	400	408	396				244						
30										L 404	U 400	L 412	416	400	392		L									
31									U 240	L 376	400	416	404	412			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									4	8	24	28	28	28	23	15	3	2								
MED									268	360	400	408	416	416	400	384	324	240								
U Q									278	376	404	412	424	420	408	392	336									
L Q									250	328	396	408	412	412	400	380	320									

DEC.2019 foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2019 foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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								A	A				A	A		A	A	A								
2								B		268	300	304			300				B							
3								B	188	236	292	308	324	320	304	280	240	172		A	J	K				
4								B	216	268	296	308		312		280	228		A	A	128					
5								B	204	252	280		A	A		296	264		A	A	B					
6								B	A	A	A								A	B						
7								B	308	312	304	300	276	240					A	A						
8								B	192	260	292	312	328	304				240		A	A					
9								B	200	252	272	296	300	300	292			A	A	A						
10								B	192	248	280	296	316	296	284	260	248		A	B						
11								B	200	252	280	296	312	304	292	268		A	A	B						
12								B	176	A	280	292	304	304	296	276	240		A	A						
13								B	172	232	268	300	300	288	300	272	232		A	B						
14								B	200	252	276	300	308	320	304	284	240	180		B						
15								B	200	252	288	296	308	312		A	A	A	A	B						
16								B	A	A	A	A		A	A	A	A	A	A	A						
17								B	184	256	292	312	324		A	A	284	236		A	B					
18								B	A	252	284	308	312		A	A	A	A	A	A						
19								B	176	240		A	A	A	A	A		244		A	B					
20								B	204	264	276	292	308	304	296	276	248		A	A						
21								B	A	252		A	A	A	A	A	A	A	A	A						
22								B	176	240	284		A	A	A	A	A	A	A	A						
23								B	216	232	280		A	A	A	A	A	A	A	A						
24								B	212		A	A	A	A	A	A	A	A	A	A						
25								B	204		A	A	A		308	300			A	A	B					
26								B	204	260	292	300		A	A	A	A	A	A	A						
27								B	196	256	284	288	300	300	304	248		A	B							
28								B	200	244	284		A		316	304		A	A	A						
29								B	176	232	276	304	308	316	308	284	248		A	B						
30								B	220		A	A	A	A	A	A		240	176		B					
31								B	A	248		A	A		308	300	276	252	176		B					
32								B	192	252	284	304		A	A	296	280		A	B						
33								B	B	252	288	288	320	312	304	280	244	172		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									24	25	23	20	17	18	19	16	15	7							1	
MED									200	252	284	300	308	306	300	276	240	176		J	K					128
U Q									204	256	292	308	318	312	304	280	248	196								
L Q									186	242	280	296	304	304	296	270	240	172								

DEC.2019 foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2019 foEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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		J A	J A	J A	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
2	J A	J A	J A	J A	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
3	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
4	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
5	E B	E B	E B	E B	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
6	E B	E B	E B	J A	J A	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
7	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
8	J A	E B	E B	E B	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
9	J A	E B	E B	E B	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
10	J A	E B	E B	E B	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
11	E B	E B	E B	E B	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
12	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
13	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
14	E B	E B	E B	E B	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
15	J A	J A	J A	J A	J A	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
16	E B	E B	E B	E B	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
17	E B	E B	E B	J A	J A	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
18	E B	E B	E B	E B	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
19	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
20	J A	J A	J A	J A	J A	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
21	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
22	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
23	E B	J A	J A	J A	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
24	J A	J A	J A	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
25	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
26	J A	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
27	E B	E B	E B	J A	J A	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
28	E B	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
29	J A	J A	J A	J A	J A	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
30	E B	E B	E B	E B	J A	J A	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
31	E B	E B	E B	E B	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J 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	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	E B	E B	J A	J A	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
U Q	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
L Q	E B	E B	E B	E B	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A

DEC.2019 foEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2019 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	A	A	E	B	E	B	E	B	
2	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
3	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
4	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
5	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
6	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
7	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
8	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
9	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
10	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
11	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
12	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
13	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
14	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
15	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
16	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
17	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
18	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
19	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
20	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
21	A	A	A	E	B	A	A	E	B	E	B	E	B	E	B	E	B	A	A	A	A	E	B	E	B
22	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
23	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
24	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
25	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
26	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
27	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
28	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
29	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
30	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
31	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	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	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	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
UQ	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
LQ	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	

DEC.2019 fbEs (0.1MHz)

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IONOSPHERIC DATA STATION Okinawa

DEC.2019 fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

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

DEC.2019 fmin (0.1MHz)

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DEC.2019 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	290	305	309	F	F	344	420	395	317	371	371	366	388	372	352	342	397	392	A	397	374	412	320	315	331	343		
2	F	372	328	329	391	379	419	320	367	394	363	364	333	352	371	363	347	393	381	364	382	331	314	304	317				
3	F	324	323	324	345	352	385	359	387	400	384	353	368	372	375	360	386	383	398	403	340	346	325	318	331				
4	F	319	325	327	F	F	F	F	357	342	372	388	342	361	384	366	376	372	J	R	306	388	374	361	351	396	352	319	
5	F	329	306	323	331	324	334	351	373	393	379	386	390	378	360	343	373	373	395	392	356	378	362	385	344				
6	F	305	316	344	F	F	309	311	330	342	401	406	400	391	359	341	346	371	376	384	346	382	363	A	318	367	328		
7	F	312	319	325	356	372	302	350	378	390	345	343	362	317	385	331	369	378	379	400	367	357	324	356	317				
8	F	334	324	323	357	335	376	334	363	386	397	379	362	391	396	335	370	377	402	361	340	348	323	342	334				
9	F	311	333	338	336	353	352	393	381	373	407	371	374	360	359	335	365	379	386	386	431	345	346	353	346				
10	F	333	322	331	346	369	414	351	359	388	374	376	377	382	369	360	372	385	377	416	361	350	356	318	347				
11	F	310	317	360	371	373	330	F	F	F	380	381	359	353	351	367	363	369	365	366	378	363	347	317	344	329	339		
12	F	352	303	307	333	357	393	B	361	386	360	325	381	368	H	342	381	354	385	393	420	333	339	316	358	346			
13	F	331	330	344	329	349	358	328	357	384	364	385	354	368	364	362	380	376	379	396	A	340	351	331	347				
14	F	322	324	344	372	335	300	365	375	383	371	359	380	346	317	376	360	386	374	369	374	355	322	379	358				
15	F	365	323	323	344	322	350	344	388	381	398	349	399	369	348	360	350	389	366	371	361	353	355	364	352				
16	F	330	317	330	334	351	372	366	395	391	353	371	376	357	318	321	360	383	382	383	440	322	337	374	334				
17	F	314	313	352	347	392	333	359	367	375	381	378	368	373	375	329	369	388	379	368	358	362	309	351	354				
18	F	391	327	329	329	321	383	368	371	402	391	401	320	402	370	370	336	373	360	375	A	358	354	A	355				
19	F	337	342	362	342	311	292	344	341	367	374	366	378	306	341	368	363	384	357	405	329	358	A	359	306				
20	F	306	310	321	F	F	F	F	F	389	336	353	379	369	392	384	363	367	353	335	380	365	374	367	321	328	363	373	
21	A	A	A	335	321	377	A	322	332	386	388	388	366	365	418	366	367	355	397	A	A	A	354	363	357	319			
22	F	301	321	343	F	F	F	F	F	354	354	322	365	401	390	345	390	350	381	361	A	A	A	397	329	306	345	357	317
23	F	383	350	357	334	330	376	289	321	379	384	400	392	345	400	370	362	385	392	360	330	318	341	393	A				
24	F	302	351	423	377	346	381	338	335	382	372	359	397	358	386	384	381	363	382	370	400	329	347	330	347				
25	F	326	306	329	313	338	394	B	337	381	384	385	392	369	359	389	375	376	385	363	352	336	355	385	369				
26	F	323	331	322	304	343	341	F	F	329	347	387	352	406	366	372	357	373	332	356	372	384	325	319	330	360	375		
27	F	353	318	324	370	370	383	318	335	375	349	355	378	363	372	396	386	382	401	371	351	306	360	357	361				
28	F	313	344	325	354	369	394	A	337	393	339	348	356	363	355	381	355	353	372	403	388	324	326	373	354				
29	F	316	328	315	327	373	402	311	338	367	394	398	370	367	345	327	371	386	394	363	372	342	324	340	320	F			
30	F	296	325	343	379	396	B	B	339	372	383	370	356	367	360	330	332	366	384	378	409	329	339	332	351				
31	F	307	306	322	329	374	386	410	341	372	373	373	353	351	324	309	352	333	367	389	302	326	334	347	347				
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT		30	30	31	31	31	29	28	31	31	31	31	31	31	31	31	30	29	30	30	28	30	30	30	30				
MED		322	323	329	340	353	376	340	363	384	374	371	372	365	363	363	366	379	382	376	361	340	338	356	346				
U Q		334	328	344	356	373	391	355	375	391	388	388	384	369	375	373	373	385	393	396	378	353	354	364	354				
L Q	F	310	316	323	329	335	338	322	339	375	360	355	359	352	346	335	354	366	372	369	340	322	324	332	328				

DEC.2019 M(3000)F2 (0.01)

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DEC.2019 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHZ TO 30.0MHZ IN 15.0SEC 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										389	L 378	A	A	A	A	A	A									
2											385	422	A	383	398	U 405	L									
3									433	L	399	397	408	397	391		L	L								
4										L	U 386	L 398	403	400	416	409										
5										L	396	413	U 418	U 420	L 413	U 444	L									
6										L	L	395	U 399	L 407	A	A	L									
7									U 430	L 392	L 373	U 395	L 386	415	U 406	L 392		L								
8										477	421	U 435	L	398												
9									402	L	L	423	U 415	L 428	L 420		L									
10											L	L	413	399												
11									L	A	A	U 412	L	L	L	U 388	L 406	L								
12									461			389	L	413		396										
13										L	L	377	420	407	416	421	L	A								
14									L	446	U 384	L 417	U 419	U 423	407	386	L	L								
15											L	419	418	427	402	393										
16										U 438	L 399	398	416	U 393	L 390	L 374	409	L								
17									L	L	L	402	403	A	393	L	A									
18										L	422	U 395	L 399	415	L	A	L	A								
19										L	395	419	U 389	L 395			A	A								
20											L	A	L	A	L	A										
21											L	406	U 427	L 413	395	424	A	A		A						
22											L	411	U 410	L 390	408	A	A	A	A							
23									L	L	411	436	435	395	429		A	A	L							
24									L	L	401	415	400	389	429	A	U 418	L								
25										L	406	424	431	430	421	L	L	L	476							
26									U 420	L	392	422	444	403	404	454	L	L								
27											394	395	424	425	L	416										
28											397	410	392	404	393	388										
29											409	410	L 389	L 464	390	396			427							
30											L	U 399	L 404	A 402	410	406	U 400	L								
31									U 411	L	391	390	405	418	424			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									4	8	24	27	26	27	21	15	2	2								
MED									432	411	398	410	408	408	406	396	414	452								
U Q									447	442	408	422	418	423	420	409										
L Q									U 420	L 392	L 388	398	399	397	392	388										

DEC.2019 M(3000)F1 (0.01)

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DEC.2019 h'F2 (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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										258	230	242	258	242	218	222	A							
2											250	294	250	220	224	248								
3									200	244	274	244	248	232	248	224	216							
4										278	254	222	242	224	224	230								
5										230	228	226	242	254	278	238								
6										216	232	258	270	270	230	230								
7									216	274	272	234	280	216	288	220	216							
8										216	238	274	226	226	262	244	A							
9										214	244	246	248	262	280	230								
10											238	240	236	252	256	240								
11									202	242	250	260	252	252	256	246	244							
12									208			238	238	288	224	236								
13										238	228	262	236	246	230	222	230							
14									208	190	268	230	278	320	238	250	212							
15										206	266		258	270	246	268								
16										248	246	228	260	270	276	244	214							
17									218	226	230	252	236	236	258	236								
18										220	212	276	204	256	246	290	216							
19										236	212	238	322	270		226	210							
20											230	232	254	246	254	236								
21										218	224	232	250	204	246	E A 252	256			A				
22											222	268	228	264	232	242	A	A	A					
23									228	226	214	220	282	216	244	256	216	200						
24									230	248	238	220	264	232	234	232	230							
25										226	240	232	246	254	226	230	224	196						
26										252	206	242	238	246	218	224	254							
27											244	222	236	242	222	228								
28											276	244	218	216	204	230	220							
29											216	242	248	272	246	238		196						
30											238	248	260	236	230	254	260	246						
31											222	240	242	252	244	206		220						
	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									9	24	30	30	31	31	29	29	16	3						
MED									216	233	239	241	248	246	246	236	220	196						
U Q									225	246	250	252	260	262	256	247	237	200						
L Q									205	219	228	230	236	226	225	229	216	196						

DEC.2019 h'F2 (KM)

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DEC.2019 h'F (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	322	286	286	228	184	214	E B 334	208	208	E A 232	224		A	A	A	A	A		204	222	198	214	E A 356	254	236	
2	210	250	226	200	190	200	280	210	204	228	210	208		A E A 218	198	184	212	196	194	190	234	266	264	218		
3	242	248	238	228	226	194	254	186	176	186	180	204	178	208	200	202	192	194	186	226	244	266	250	252		
4	268	252	256	234	Q 206	218	246	198	210	210	232	210	200	202	180	194	202	194	184	194	210	192	250	270		
5	262	278	272	256	Q 264	254	232	198	212	210	214	198	192	176	220	160	230	198	182	180	194	214	204	226		
6	282	262	244	Q 284	Q 288	232	254	186	198	192	202	192	214	E A 214	A	172	216	214	196	198		A	226	222	270	
7	272	298	272	226	218	256	230	182	176	224	194	212	200	196	172	204	212	198	180	184	182	258	230	276		
8	256	258	258	220	Q 226	Q 192	242	214	202	168	190	192		A	218	240	222	190	188	182	198	230	220	226		
9	252	258	244	222	220	216	188	200	210	198	190	194	188	184	218	226	216	216	176	168	208	228	232	236		
10	246	270	256	244	220	182	234	202	210	214	196	204	186	214		212	204	220	180	E A 238	214	192	250	222		
11	242	266	226	204	212	Q 258	Q 248	206	186		A	A	E A 212	232	220	230	200	202	202	168	166	234	210	256	244	
12	224	254	270	244	206	196		B 232	170	216	214	224	200	186		A	204	222	206	170	218	E A 256	196	226	226	
13	250	250	256	264	220	204	284	220	206	208	192	176	200	192	190	194		A	208	184		228	224	232	222	
14	250	274	232	218	228	266	214	192	180	178	244	176	194	182	214	198	204	206	182	188	208	256	208	220		
15	192	302	260	246	282	242	270	192	194	192	180	214	172	172	166	220	220	208	192	182	226	208	218	222		
16	242	270	254	248	220	220	214	186	192	196	184	200	194	180	224	212	200	206	190	186	246	236	208	228		
17	286	288	228	226	194	266	242	210	194	200	210	198	196	A 198		A	204	204	188	190	204	250	222	224		
18	198	264	270	282	266	216	236	218	198	184	176	166	192	H 186	H 218	A E A 218		A	210	210		A	200	202	A 234	
19	240	226	202	252	322	354	282	230	222	212	206	180	166	166	208		A	A	232	182	208	222		A 228	300	
20	268	250	246	300	Q 248	204	Q 268	220	228	222	226		A	204	A E A 236		A	220	214	206	176	224	242	198	226	
21	A	A E A 308	A 252	218		A	298	236	212	208	202	182	174	180	176		A	A	214		A	212	208	192	280	
22	296	258	256	276	208	196	244	204	208	212	208	200	E A 242	A 216			A	A		190	198	220	208	196	244	
23	186	212	220	230	242	200	E B 448	238	214	200	188	170	160	204	184		A	A	184	180	220	208	216	196		
24	292	236	174	206	270	266	324	238	218	208	200	190	202	180	196		A	168	210	184	194	220	E A 268	248	234	
25	260	270	262	272	244	194		B 228	212	194	184	186	196	186	182	200		A	194	176	184	196	230	210	196	230
26	264	246	268	302	260	234	Q 288	226	192	170	192	182	168	210	158	156		A	200	182	270	E A 288	230	202	198	
27	218	252	254	206	208	196	280	238	210	214	204	200	190	172	208	184	218	202	190	222	254	216	220	228		
28	Q 298	246	264	226	212	222		A 232	200	238	236	186	210	204	194	222	192	216	178	198	260	248	198	214		
29	238	260	286	258	200	184	E B 392	222	224	224	196	208	222	164	220	196	198	190	192	196	224	242	220	Q		
30	Q 274	Q 256	250	206	194		B 232	210	218	208	212	E A 228	184	176	190	224	214	184	174		230	232	246	242		
31	Q 296	278	258	252	202	194	188	234	148	212	196	190	198	168	252	244	198	198	178	E A 216	214	224	230	230		
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	30	30	31	31	31	29	27	31	31	30	30	29	28	28	24	23	23	30	30	28	30	30	30	29		
MED	254	258	256	244	220	216	249	214	206	208	201	198	194	186	198	200	204	205	184	192	219	226	222	230		
U Q	274	270	268	258	248	248	284	232	212	216	210	208	203	209	219	218	220	214	190	212	234	248	246	244		
L Q	240	250	238	222	206	196	234	198	192	194	190	184	187	180	181	190	198	198	180	183	208	210	204	223		

DEC.2019 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2019 h'E (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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								A	A				A	A		A	A	A	A					
2								B		106	106	102			102				B					
3								B	118	106	100	106	102	102	102	106	106	114						
4								B		106	106	100	100	A	104		104	106		A	A	B		
5								B	102	102	104			A	A		104	104		A	A	B		
6								B	A	A	A		104	104	104	104	104	104		A	B			
7								B	104	102	102	102	102	102		A	A		A	A				
8								B	104	104	102	102	102	102	102			A	A		A	B		
9								B	108	106	106	104	104	102	102	102	102		A	A	B			
10								B	102	102	102	102	102	102	102	102			A	A	B			
11								B	102	A									A	A				
12								B	104		104	104	104	104	104	104	104		A	B				
13								B	104	102	102	102	102	102	102	106	104	104		A	B			
14								B	102	102	102	102	102	102	104	104	104	118		A	B			
15								B	106	106	106	102	102	102		A	A	A	A	A	A			
16								B	A	A	A	A		A	A	A	A	A	A	A				
17								B	104	104					A	A			A	B				
18								B	102	104	104	102	102			106	104		A	B				
19								B	A						A	A	A	A	A	A				
20								B	106	106	102		A	A	A		A	A	A	A				
21								B	106	106	102		A	A	A	102		A	A	A	A			
22								B	118	102	102		A	A	A	A	A	A	A	A				
23								B	106	A	A	A		A	A		A	A	A	B				
24								B	106				A	A	A	A	A	A	A	A				
25								B	106	102	102	102		A	A	A	A	A	A	A				
26								B	102	102	98	98	100	100	100	100		A	112	B				
27								B	106	102	102		A	A	102	102			A	A				
28								B	102	102	104	104	104	104	106	106	106		A	B				
29								B	108	A	A	A		A	A	A		108	102	B				
30								B	A				A		102	102	102	104	102					
31								B	114	114	110	110		A	A	106	108		A	108	B			
								B		B									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									24	25	23	20	17	18	19	16	15	7						
MED									106	104	102	102	102	102	102	104	104	108						
U Q									106	106	104	104	104	104	104	106	106	114						
L Q									103	102	102	102	102	102	102	103	104	102						

DEC.2019 h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2019 h'Es (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	84	106	98	104	B	B	B	130	138	138	146	132	92	118	124	92	88	84	86	86	116	86	104	102
2	98	98	94	94	B	92	90	90	94	150	166	146	120	114	G	140	162	164	B	B	B	B	B	94
3	90	94	94	88	90	92	84	B	G	G	G	106	106	146	100	140	112	104	96	B	94	90	86	B
4	B	B	B	90	90	90	90	90	144	144	118	112	106	100	96	146	86	146	84	82	82	78	B	B
5	B	B	B	B	B	B	B	B	92	98	140	132	120	156	150	90	170	136	B	82	94	94	92	B
6	92	B	B	B	92	B	B	B	158	156	156	150	160	142	118	90	184	84	86	86	114	82	96	96
7	88	88	88	88	88	88	94	88	G	G	162	166	176	160	90	88	88	82	80	80	80	98	94	B
8	90	B	B	B	92	94	B	B	170	150	148	176	134	120	102	106	148	132	92	86	84	84	84	88
9	86	B	B	B	B	B	80	B	154	154	G	180	162	162	170	152	84	82	86	84	82	78	82	B
10	82	B	B	94	B	B	B	B	154	148	158	158	156	114	110	112	104	100	100	94	96	84	134	B
11	B	B	B	B	100	88	84	168	168	156	150	140	130	118	114	118	94	104	B	86	112	104	B	
12	86	B	B	98	90	88	88	86	140	146	156	138	140	148	124	132	130	126	98	142	124	104	92	88
13	B	B	88	92	88	88	B	96	156	154	148	104	102	G	98	98	96	96	96	90	86	90	90	86
14	B	B	B	B	98	88	92	100	106	166	104	148	170	170	96	176	92	88	86	86	86	84	82	B
15	96	84	92	92	88	B	B	86	154	142	G	150	G	88	106	156	144	126	B	108	98	98	90	B
16	B	B	B	B	106	94	90	86	152	174	106	102	102	188	160	100	96	94	92	90	90	B	86	82
17	B	B	B	100	94	96	B	B	134	106	164	96	110	96	92	86	156	86	84	84	84	106	86	B
18	86	B	B	B	92	92	B	B	G	G	152	G	122	162	158	134	130	116	102	100	96	86	88	88
19	84	92	96	90	86	92	88	88	142	150	102	98	100	96	88	88	88	138	112	88	88	88	88	84
20	110	92	92	92	100	112	B	B	160	132	104	104	108	100	100	96	96	96	94	94	94	86	88	88
21	88	90	90	90	88	88	88	92	134	114	106	102	102	94	94	102	92	94	92	92	94	92	92	82
22	86	90	114	96	96	88	88	B	G	98	98	100	94	94	98	90	88	88	102	86	88	B	B	B
23	B	84	94	100	86	B	B	B	126	106	104	94	98	94	92	88	88	86	94	84	84	94	86	86
24	100	90	82	B	86	94	84	90	136	G	G	92	92	94	92	92	88	88	88	82	82	82	82	80
25	B	B	86	86	86	86	96	88	172	G	G	156	164	148	G	120	118	154	86	84	88	82	82	B
26	82	B	B	94	94	94	94	98	G	G	G	98	112	148	94	86	134	86	82	82	96	78	82	B
27	B	B	108	94	90	B	B	B	160	146	138	178	114	146	172	112	158	110	96	94	98	90	84	132
28	B	B	B	98	B	B	94	94	112	100	102	94	100	96	100	90	124	120	84	98	90	94	88	86
29	92	92	84	90	96	86	B	B	148	150	120	154	96	G	126	112	G	124	B	B	88	B	B	B
30	B	B	B	B	94	96	92	B	150	140	136	114	100	98	96	102	108	170	102	86	84	106	104	100
31	B	B	B	B	92	B	B	B	172	G	G	104	164	96	170	160	164	142	152	128	110	110	B	122
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	18	12	15	20	24	19	20	15	25	25	24	29	30	29	29	31	30	31	27	27	30	27	26	19
MED	88	91	92	93	91	92	90	90	148	146	143	114	111	114	102	102	115	100	94	86	89	90	88	88
U Q	92	93	96	97	94	94	94	94	157	152	156	152	140	148	138	134	148	132	100	94	96	94	94	96
L Q	86	89	88	90	88	88	88	86	134	110	106	101	100	96	95	90	88	88	86	84	84	84	84	84

DEC.2019 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2019 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC 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	F	F	F				H	HC	H	H	HL	LCH	CL	C	L	L	L	L	F	FF	FF	F	F	
2	FQ	F	F	F		F	F	L	L	H	H	H	C	C		H	H	H						F	
3	F	F	F	F	F	F	F					C	C	H	CH	H	C	C	L	K	FQ	FQ	F		
4				F	F	F	F	L	H	H	C	CQ	CQ	C	L	HL	L	HL	L	F	F	F	F		
5									L	L	HC	HC	C	H	H	L	H	H		F	F	F	F		
6	F			F				H	H	H	H	HC	H	CL	LH	HL	L	L	FF	FF	FF	F	F	F	
7	F	F	F	F	F	F	L			H	H	H	H	L	L	LQ	LQ	L	F	F	F	F	F		
8	F			F		F		H	H	H	HH	H	C	C	CH	H	H	L	L	F	F	F	F	F	
9	F					F		H	H		HC	HC	H	H	H	L	L	L	F	F	F	F	F		
10	F		F					HC	HC	H	HC	HC	C	C	C	C	C	C	F	F	F	F	F		
11					F	F	L	HC	HC	H	H	HC	HC	C	C	C	L	C		F	FF	F	F		
12	F			F	F	F	L	H	H	H	H	HL	H	C	C	H	C	L	F	F	F	F	F	F	
13			F	F	F		L	H	H	H	C	C			3	LQ	LQ	LQ	LQ	F	F	F	F	F	
14				F	F	F		C	C	H	C	HL	HL	HL	LQ	HCQ	LQ	LQ	FQ	FQ	F	F	F	F	
15	F	F	F	F	F		L	H	HL		H		L	CL	H	H	C		F	F	F	F	F		
16				F	F	F	L	HC	H	C		CH	C	HC	HC	C	LH	LH	F	F	F	F	F	F	
17			F	F		F		H	C	HC	L	CL	LQ	LQ	L	HL	L	L	F	F	F	F	F	F	
18	F			F	F			H		H		CL	H	H	H	H	C	C	F	F	F	F	F	F	
19	F	FQ	F	F	F	F	L	HC	HL	C	L	L	L	L	L	L	HL	CL	CL	F	FF	FF	F	F	
20	FF	F	F	F	F	F		HH	HC	C	C	C	C	C	L	L	L	L	F	F	F	F	F	F	
21	F	F	F	F	F	FQ	L	H	C	C	C	C	L	L	C	L	L	LQ	FQ	F	F	F	F	F	
22	F	F	FF	F	F	F		L	LH	C	L	L	L	L	L	L	L	CL	CL	F	F	F	F		
23		F	F	F	F			C	CQ	C	L	L	L	L	L	L	L	L	F	F	F	F	F	F	
24	F	F	F		F	F	L	H			L	L	L	L	L	L	L	LQ	FQ	F	F	F	F	F	
25			F	F	F	F	L	H			H	H	H		C	CL	HL	L	F	F	F	F	F		
26	F		F	F	F	F	L				L	CL	H	L	L	HL	LQ	LQ	FQ	FF	FF	F	F		
27			F	F	F			HC	H	H	HH	C	H	H	C	H	C	L	F	F	F	F	F	F	
28			F			F	L	C	C	C	LH	LH	LH	LH	CLH	LH	C	L	F	F	F	F	F	F	
29	F	F	F	F	F	F		HC	H	CLH	HL	LHQ		C	C		C		F	F	F	F	F		
30				F	F	F		H	HL	HL	C	C	L	LH	CH	CL	H	C	F	F	F	F	F	F	
31				F		F		H			C	H	L	H	H	H	H	H	FF	F	F	F	F	F	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																									
MED																									
U Q																									
L Q																									

DEC.2019 TYPES OF Es
NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

f-PLOTS OF IONOSPHERIC DATA

KEY OF f-PLOT	
	SPREAD
◊	f _o F ₂ , f _o F ₁ , f _o E
×	f _x F ₂
*	DOUBTFUL f _o F ₂ , f _o F ₁ , f _o E
⊗	f _b E _s
└	ESTIMATED f _o F ₁
†, ‡	f _{min}
^	GREATER THAN
∨	LESS THAN

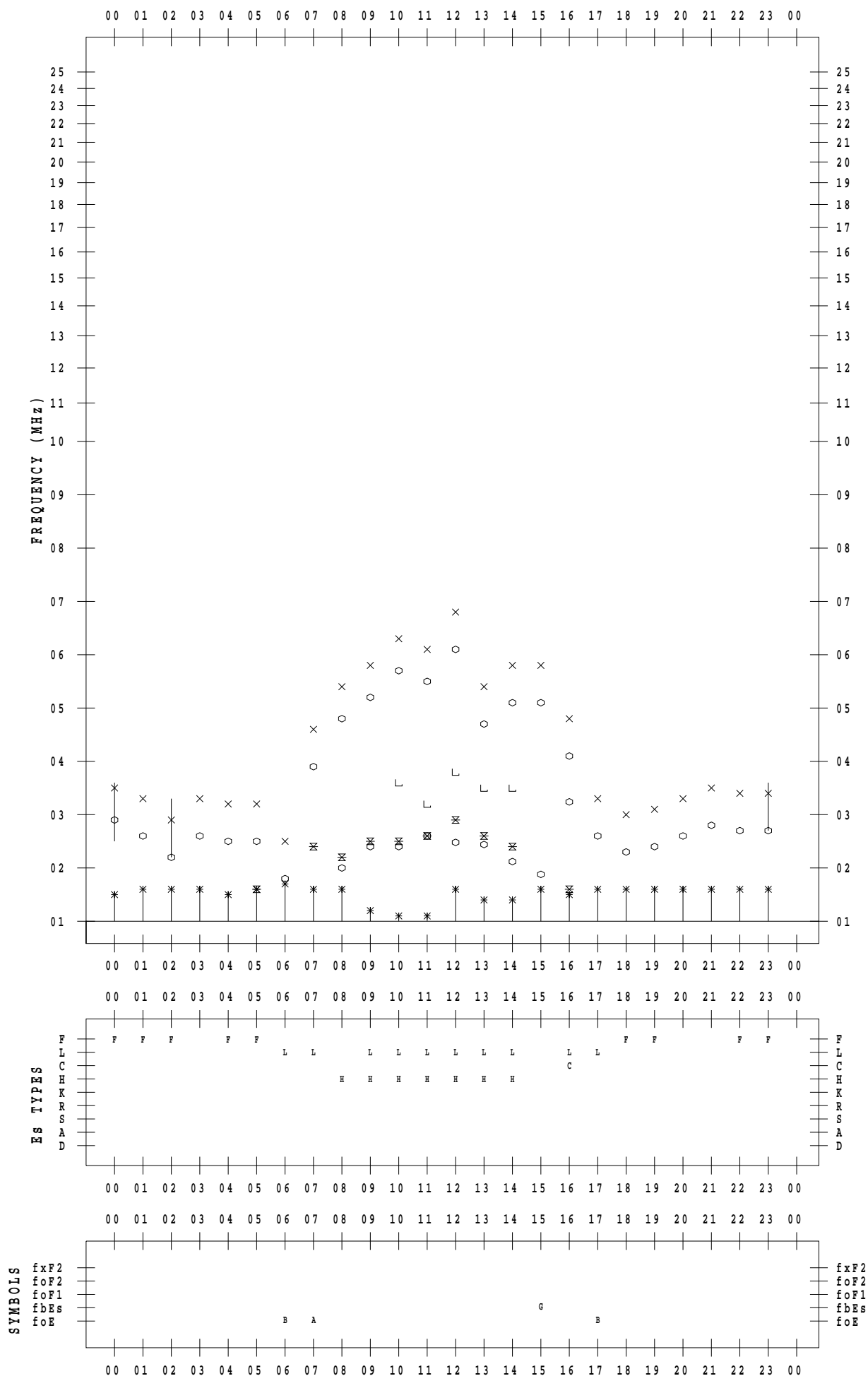
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/ 1

135 ° E MEAN TIME



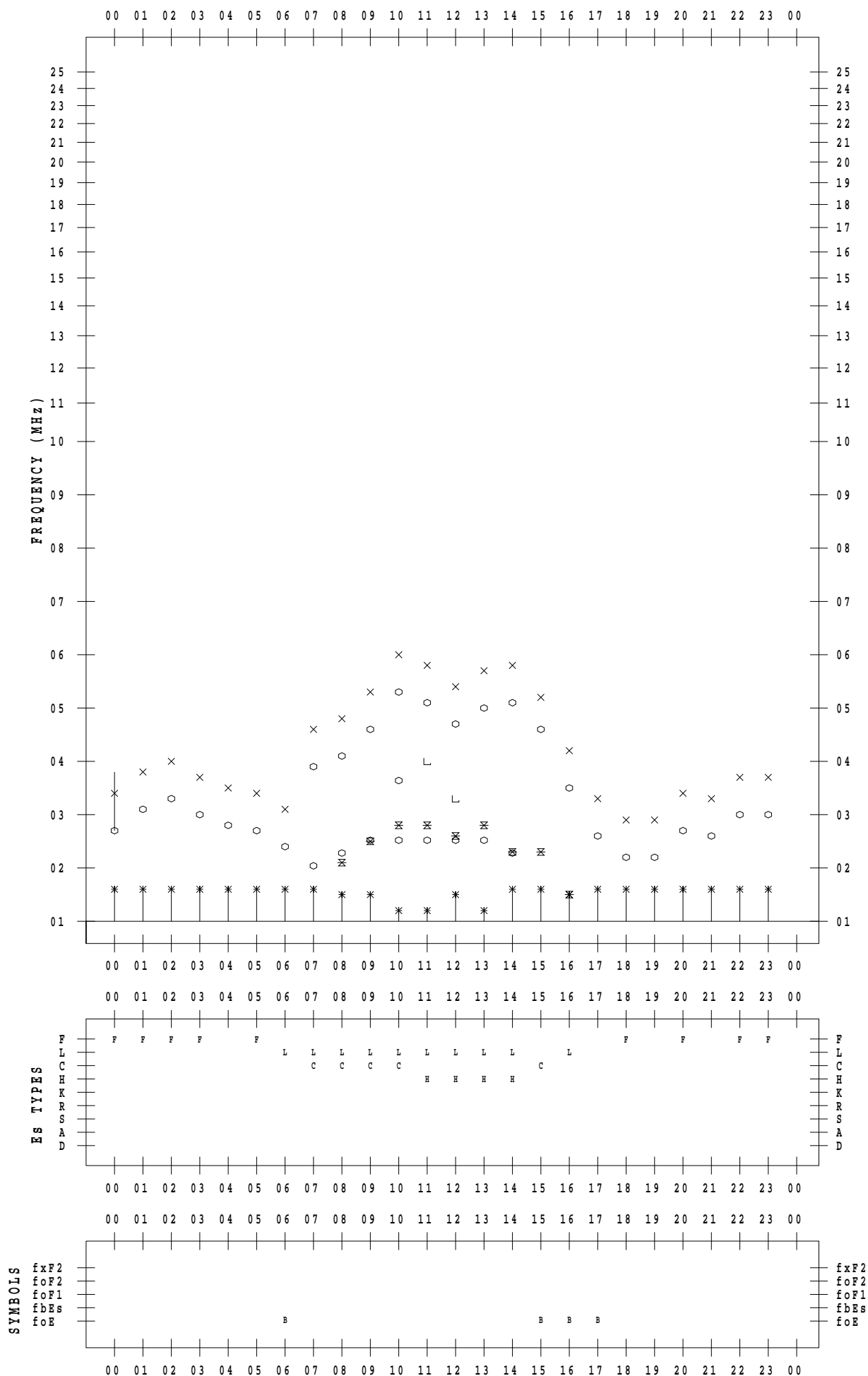
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/ 2

135 ° E MEAN TIME



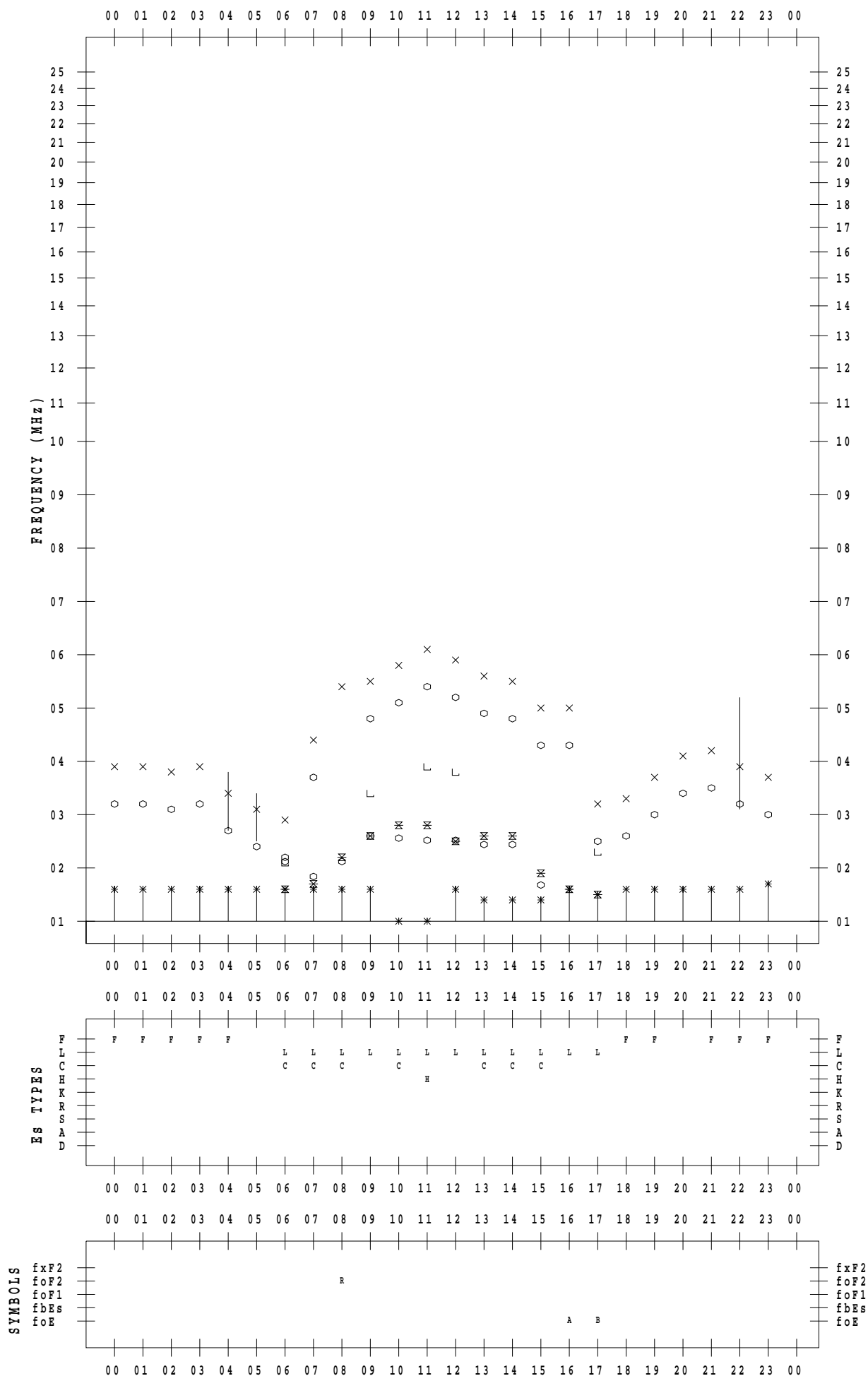
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/ 3

135 ° E MEAN TIME



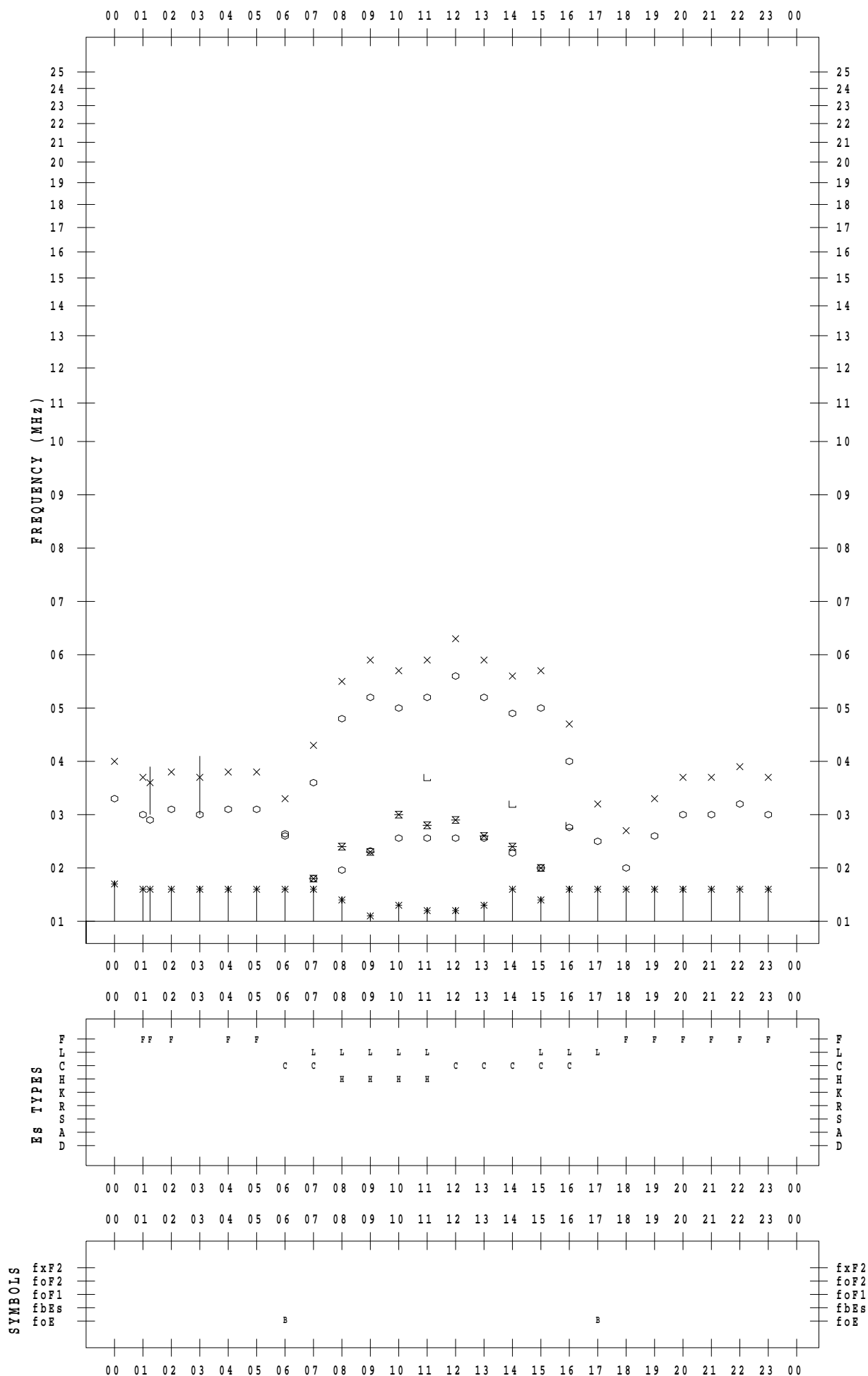
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/ 4

135 ° E MEAN TIME



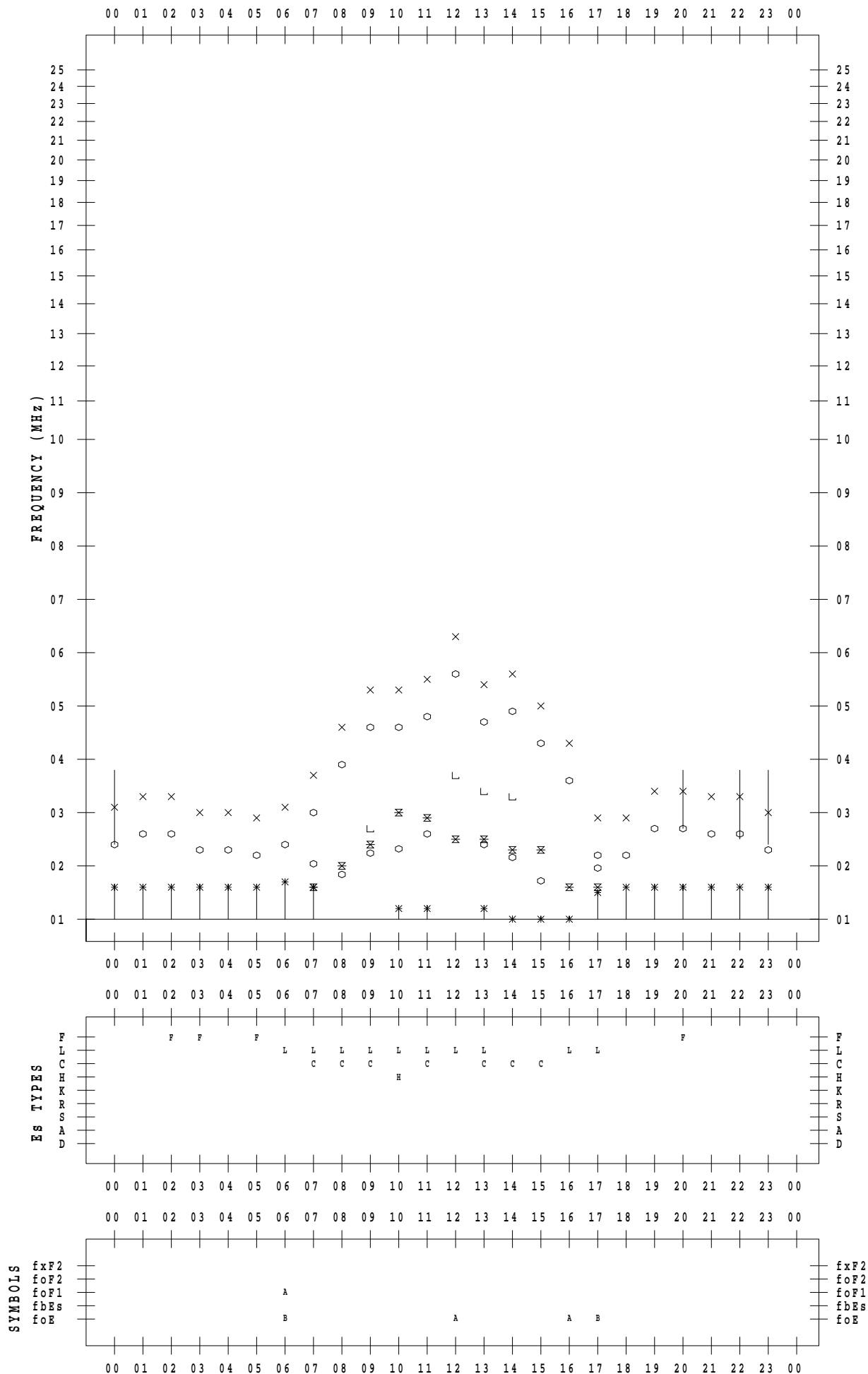
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/ 5

135 ° E MEAN TIME



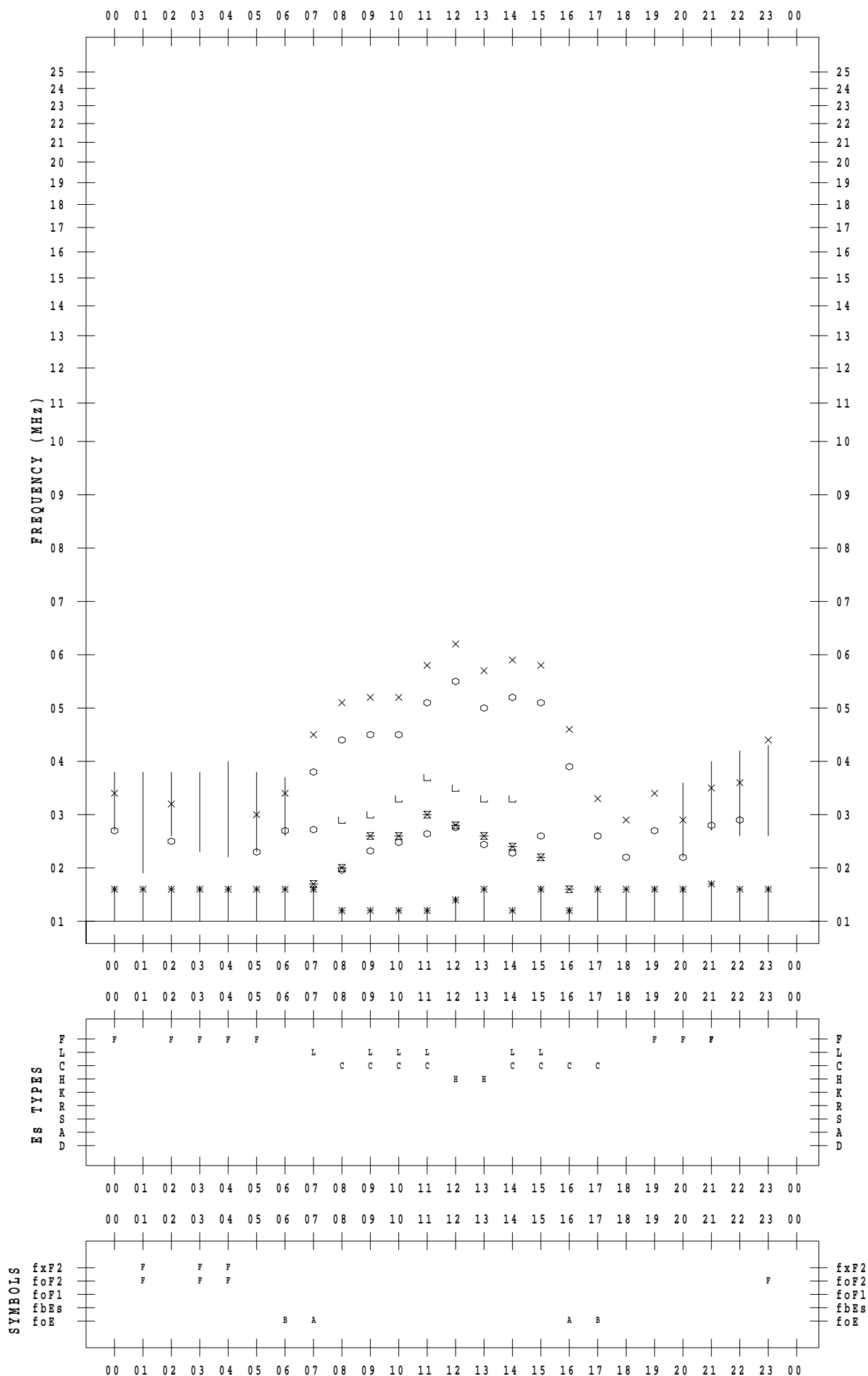
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/ 6

135 ° E MEAN TIME



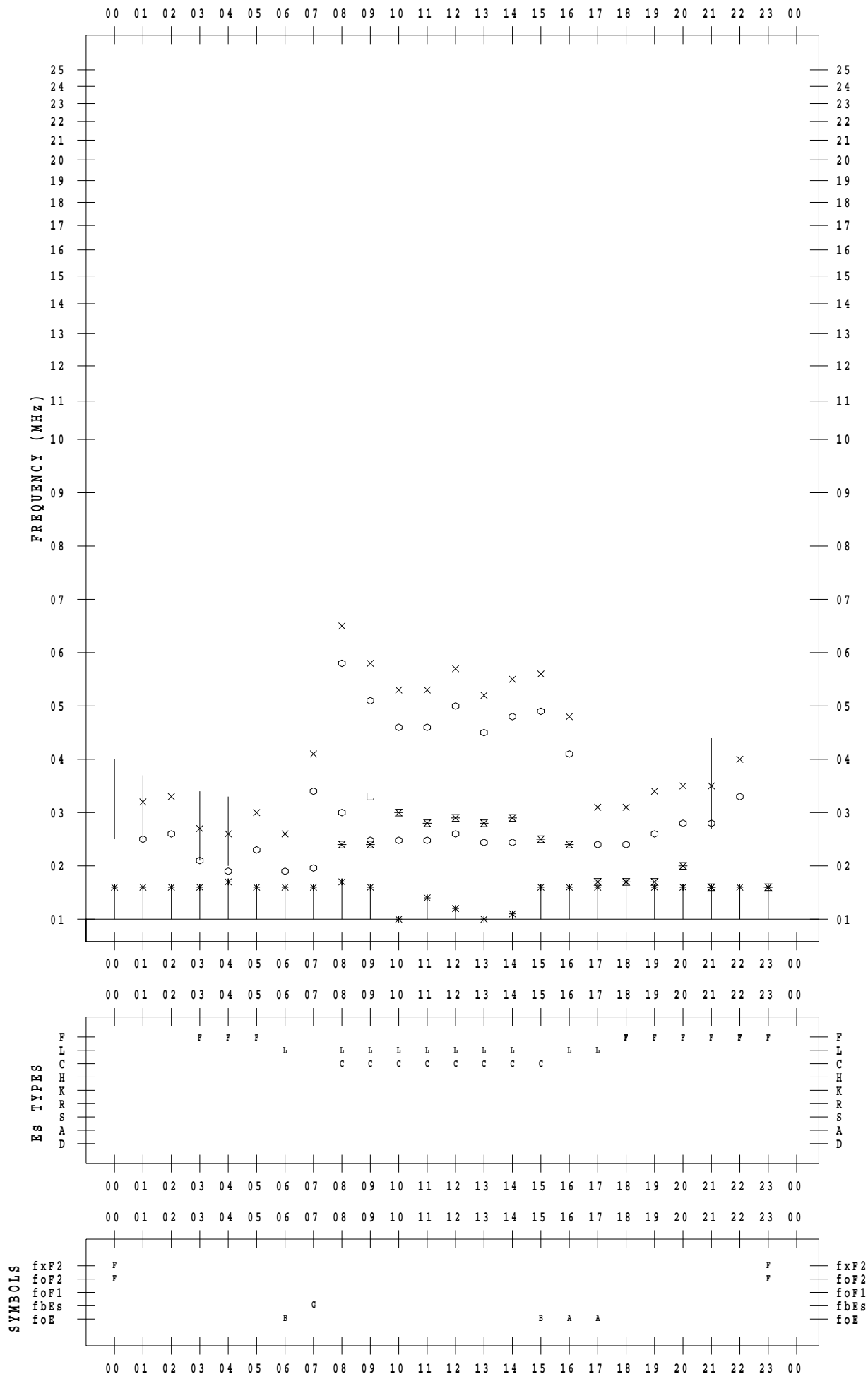
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/ 7

135 ° E MEAN TIME



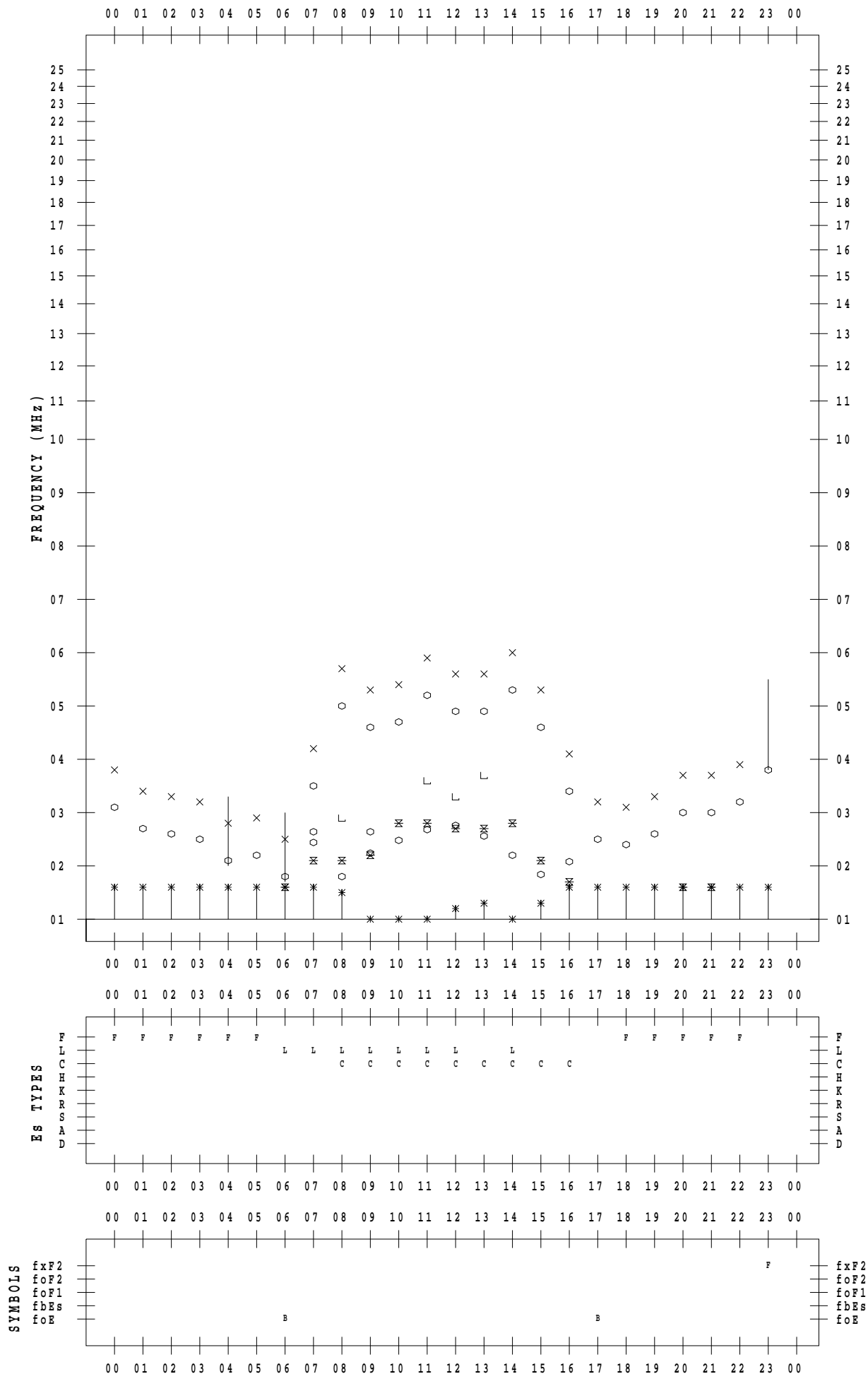
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/ 8

135 ° E MEAN TIME



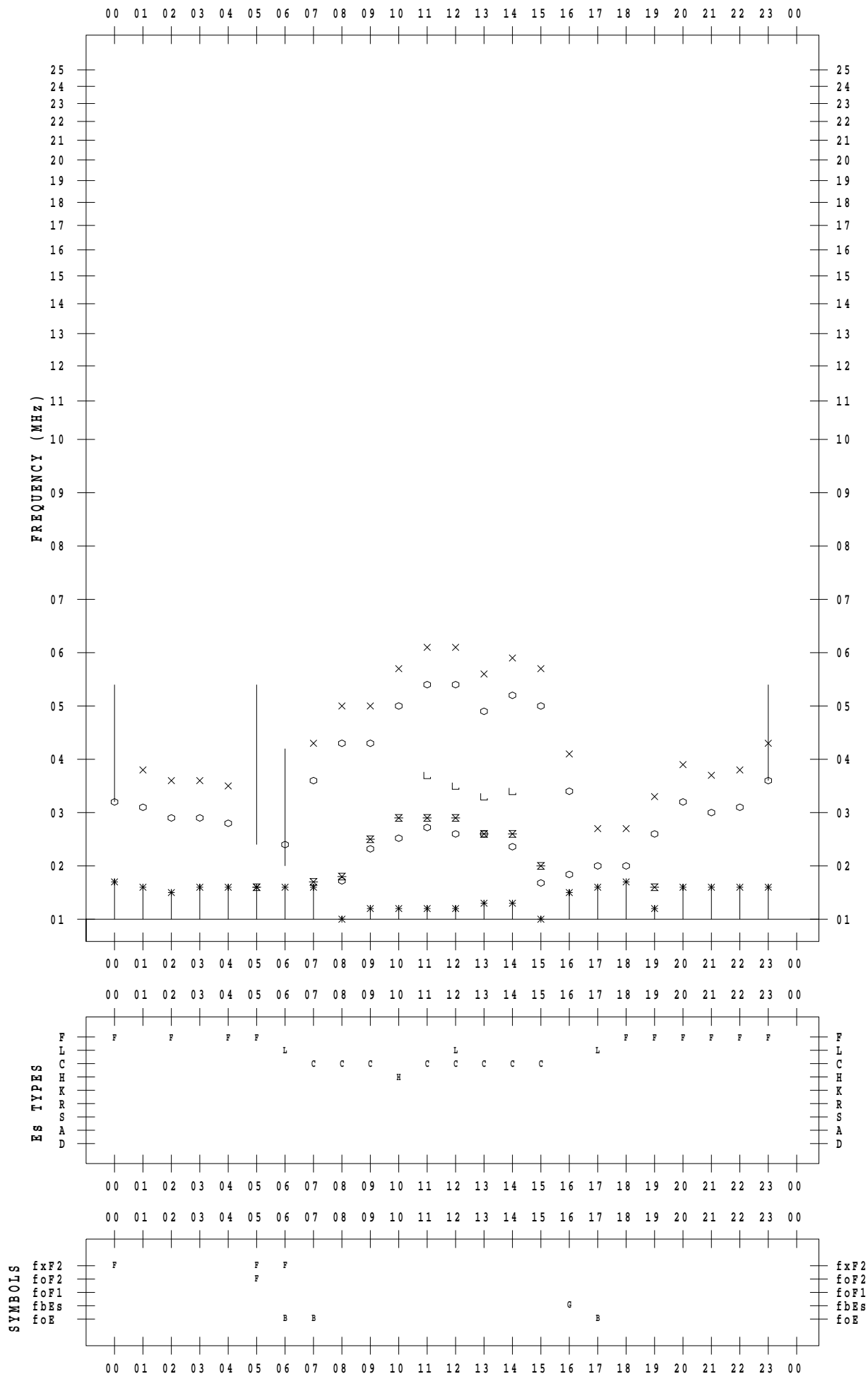
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/ 9

135 ° E MEAN TIME



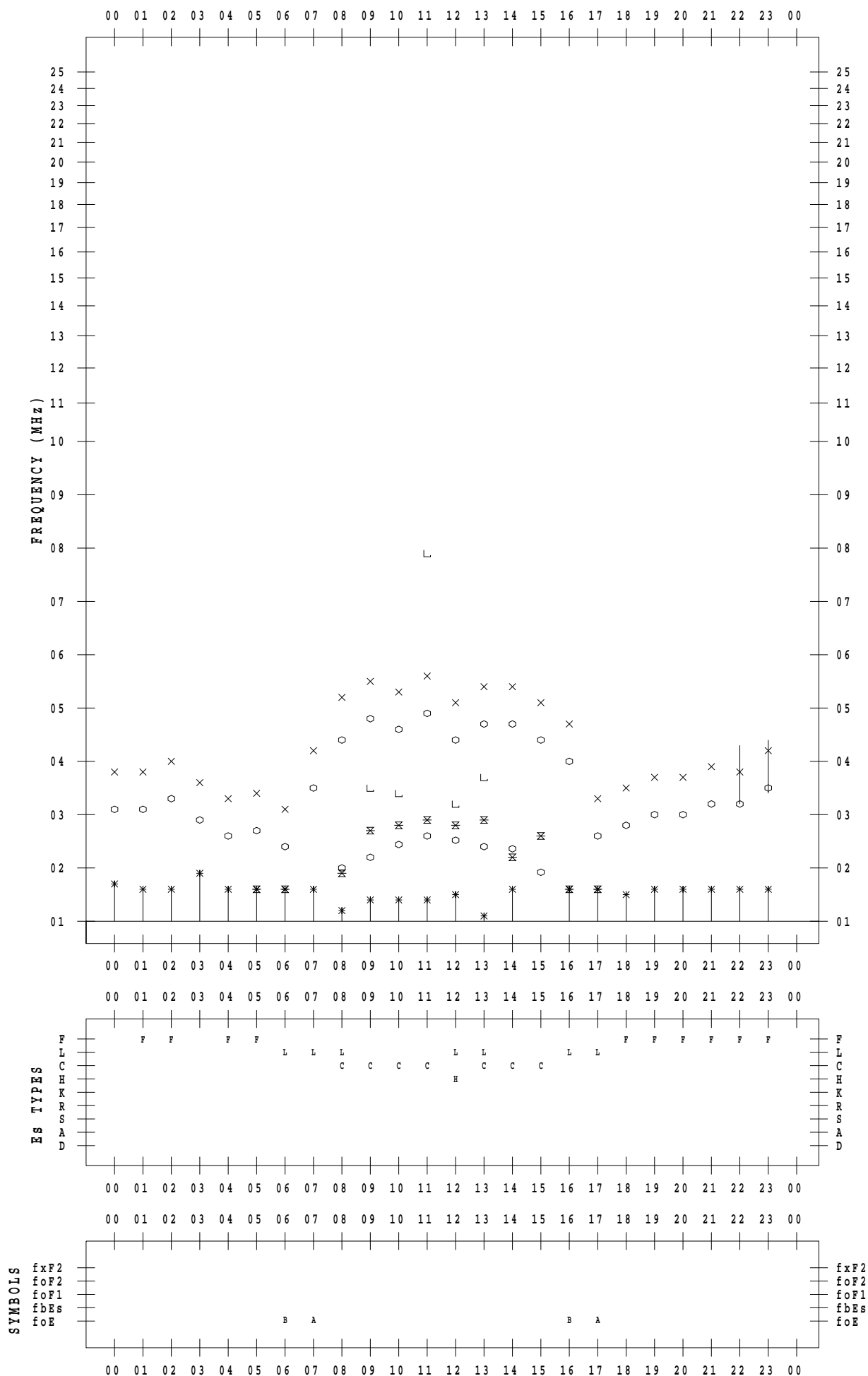
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/10

135 ° E MEAN TIME



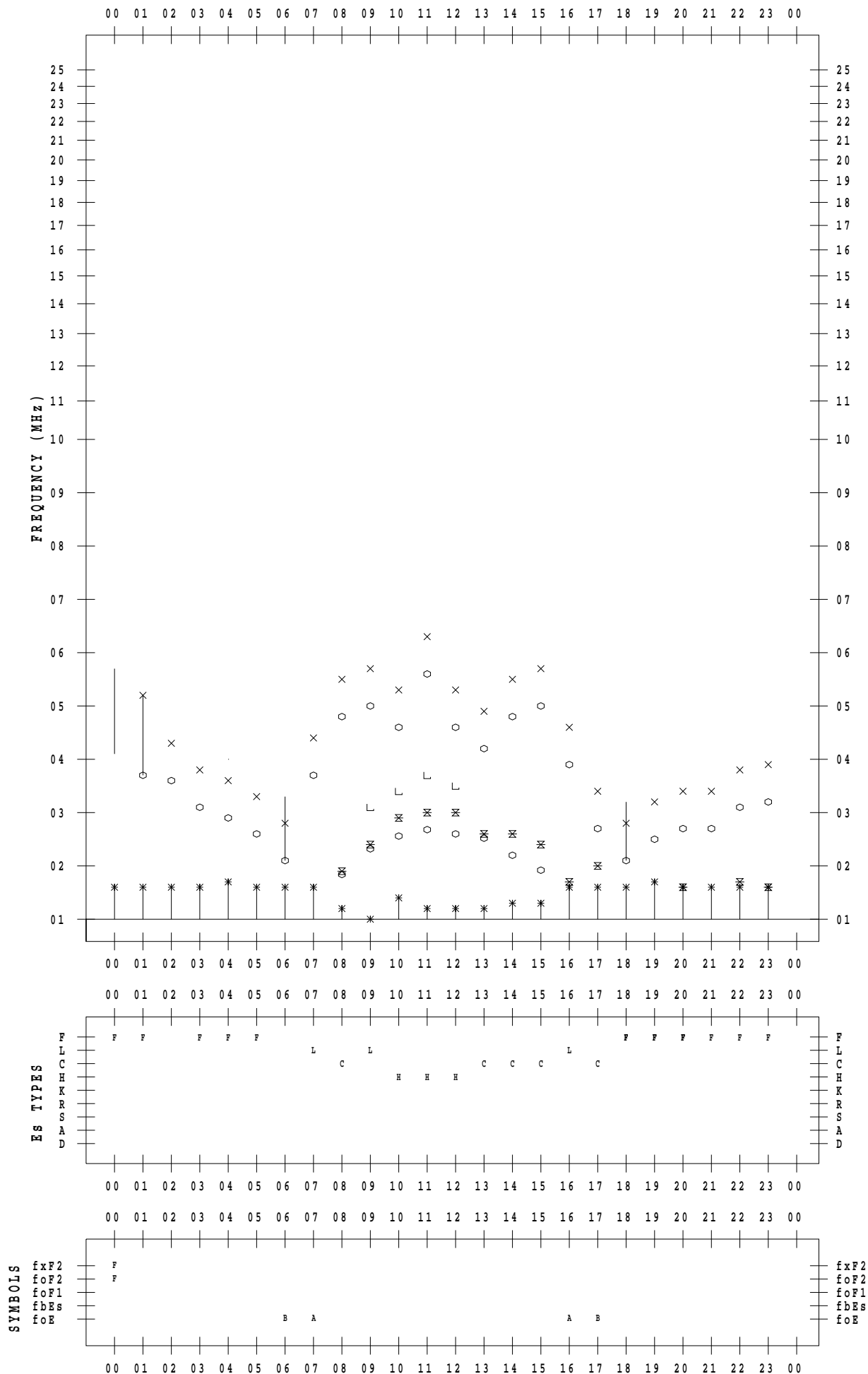
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/11

135 ° E MEAN TIME



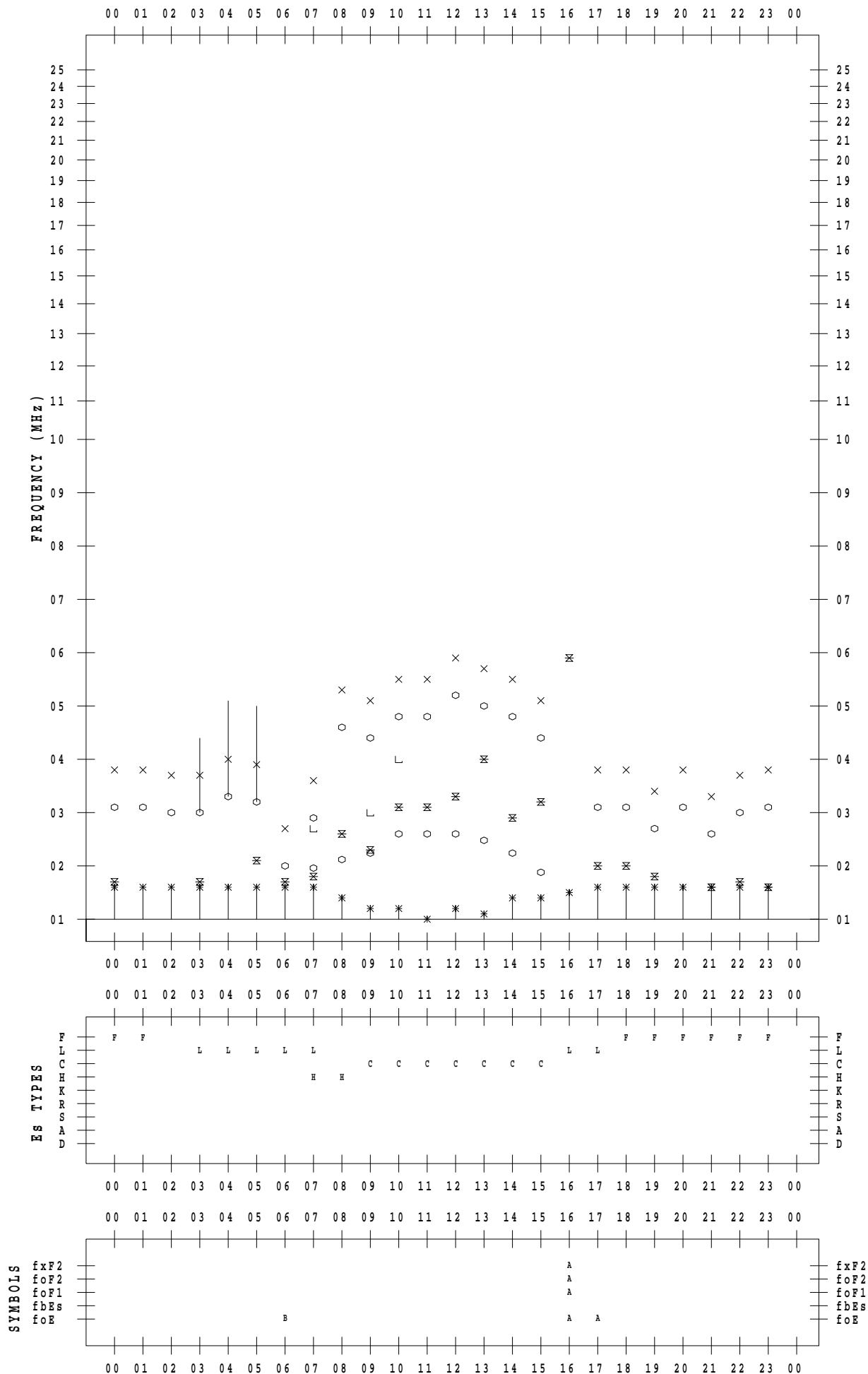
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/12

135 ° E MEAN TIME



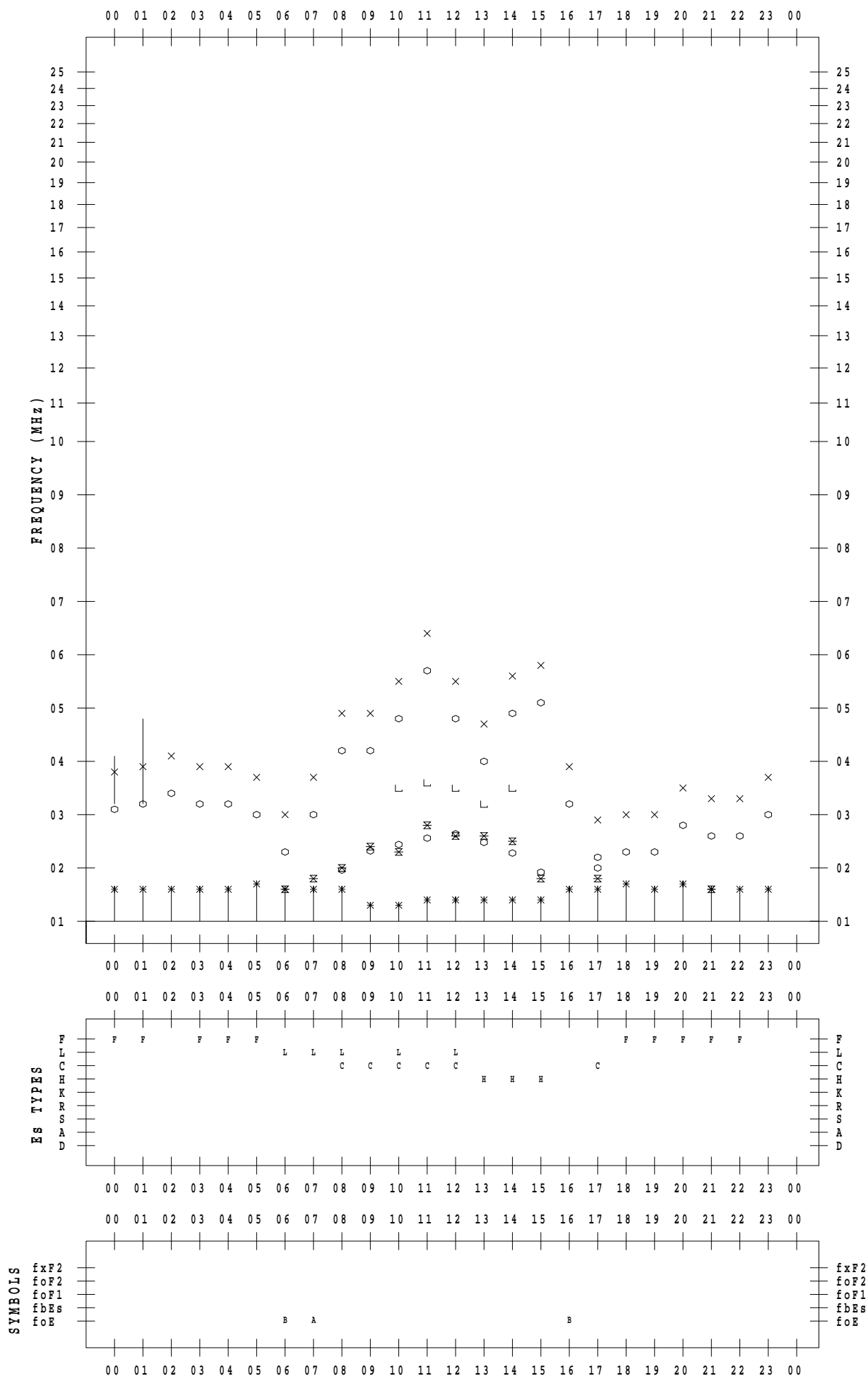
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/13

135 ° E MEAN TIME



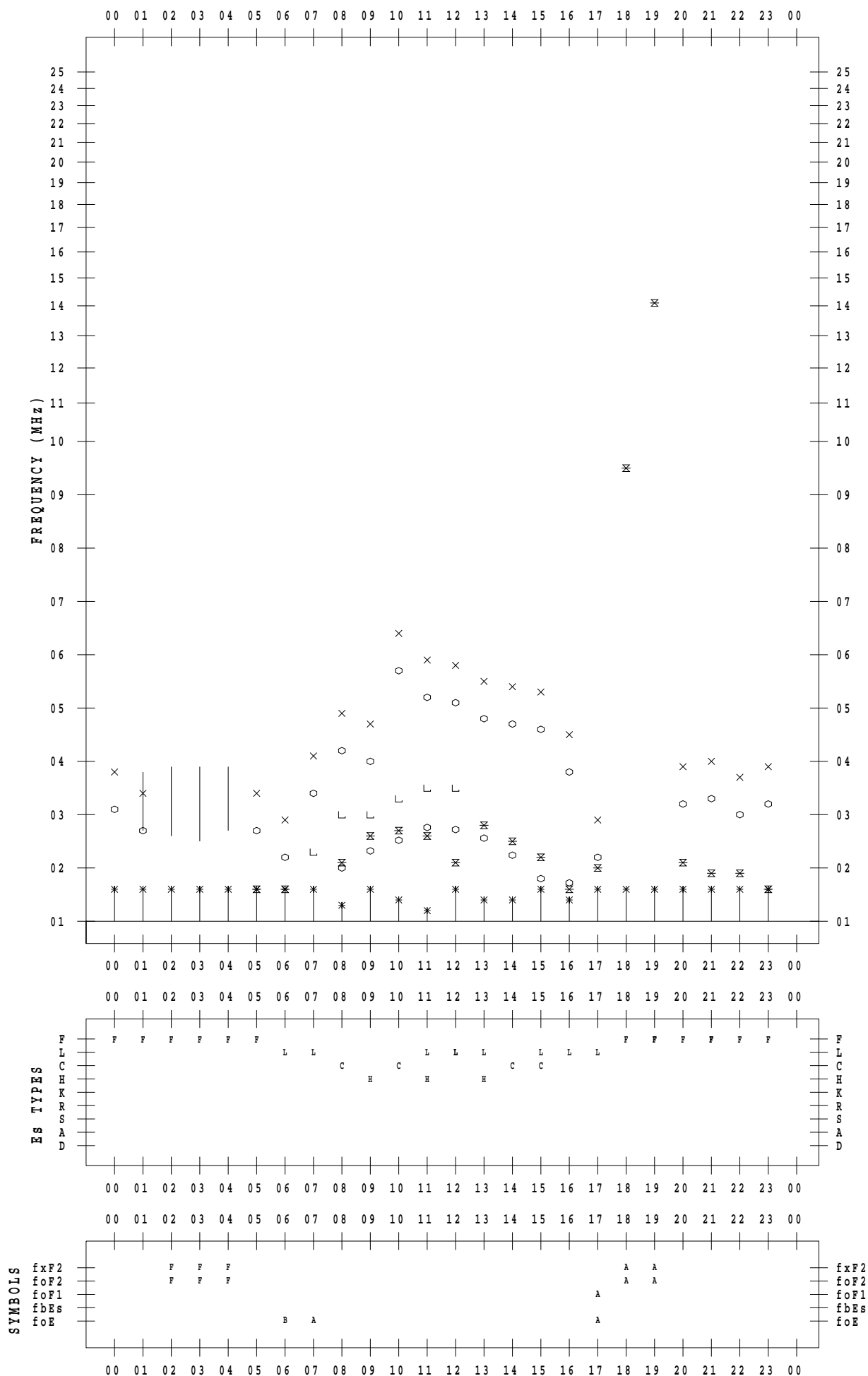
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/14

135 ° E MEAN TIME



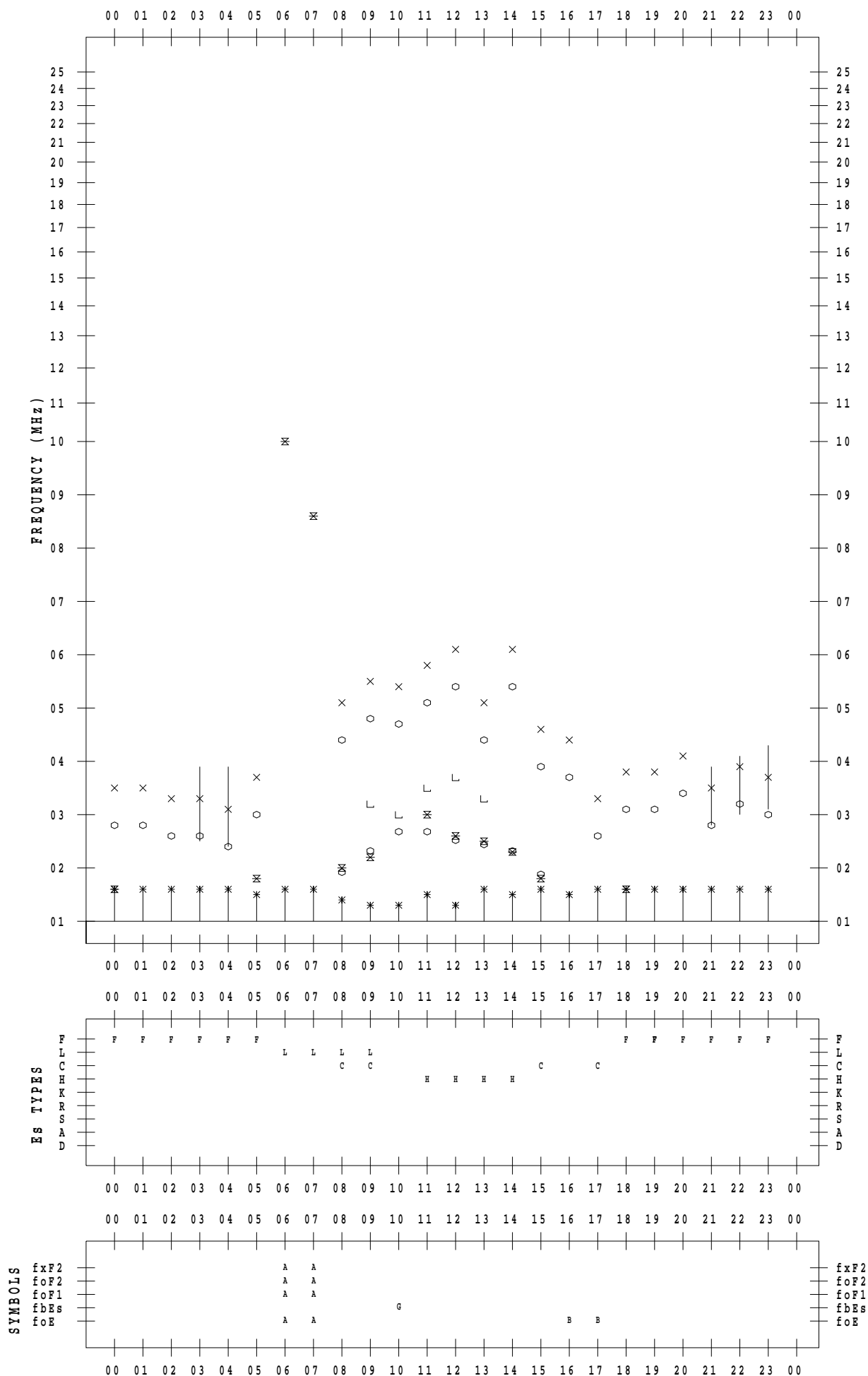
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/15

135 ° E MEAN TIME



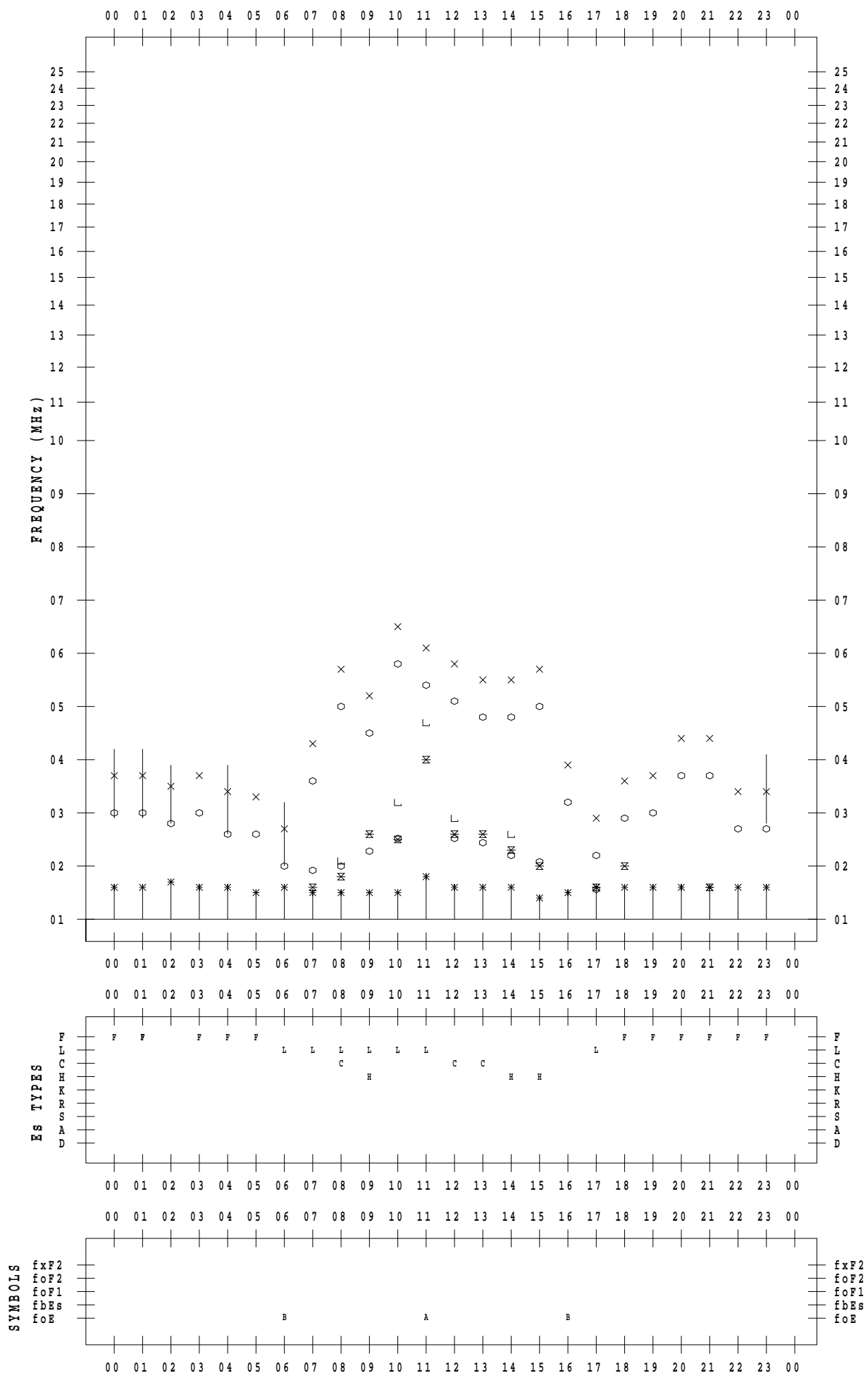
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/16

135 ° E MEAN TIME



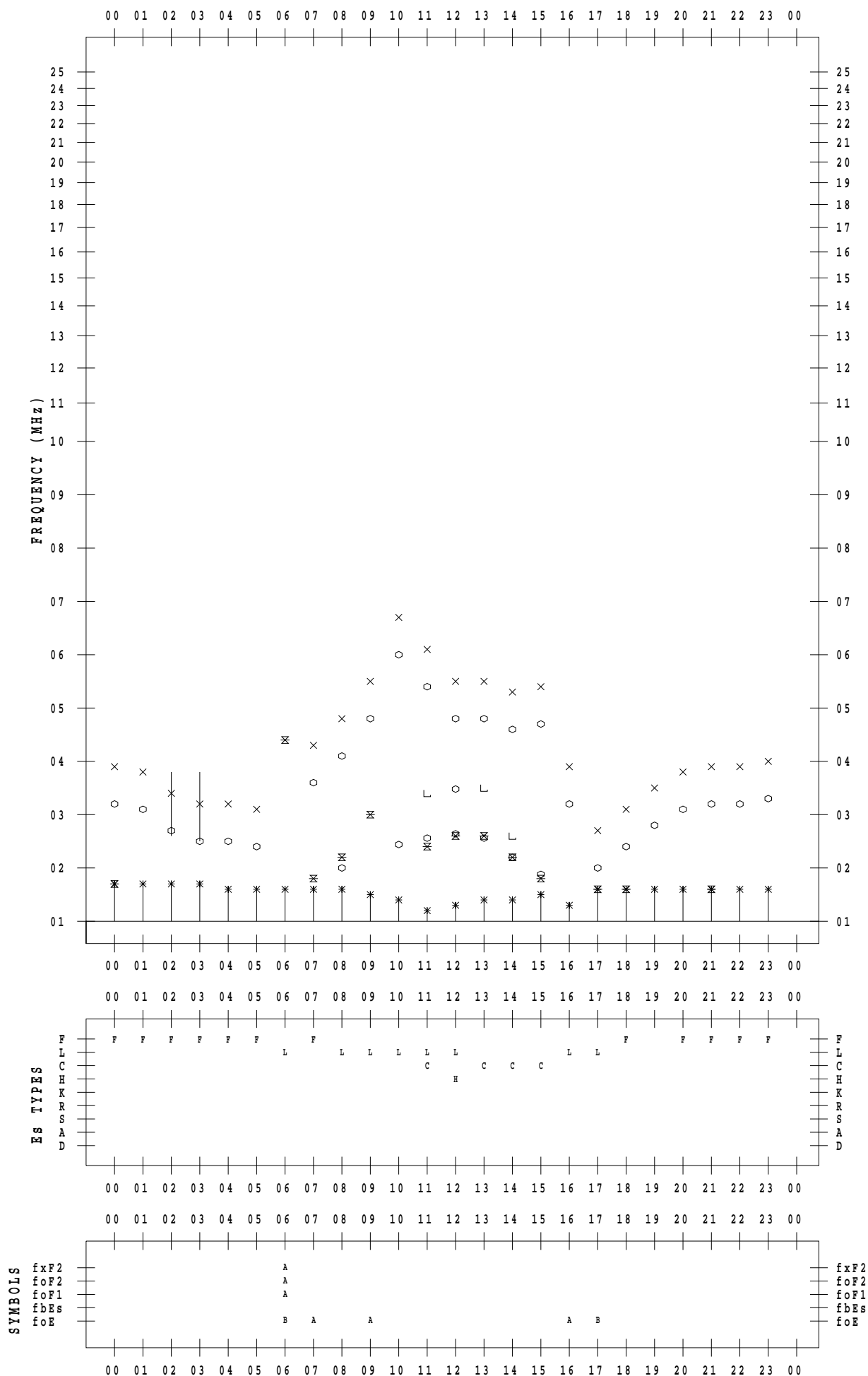
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/17

135 ° E MEAN TIME



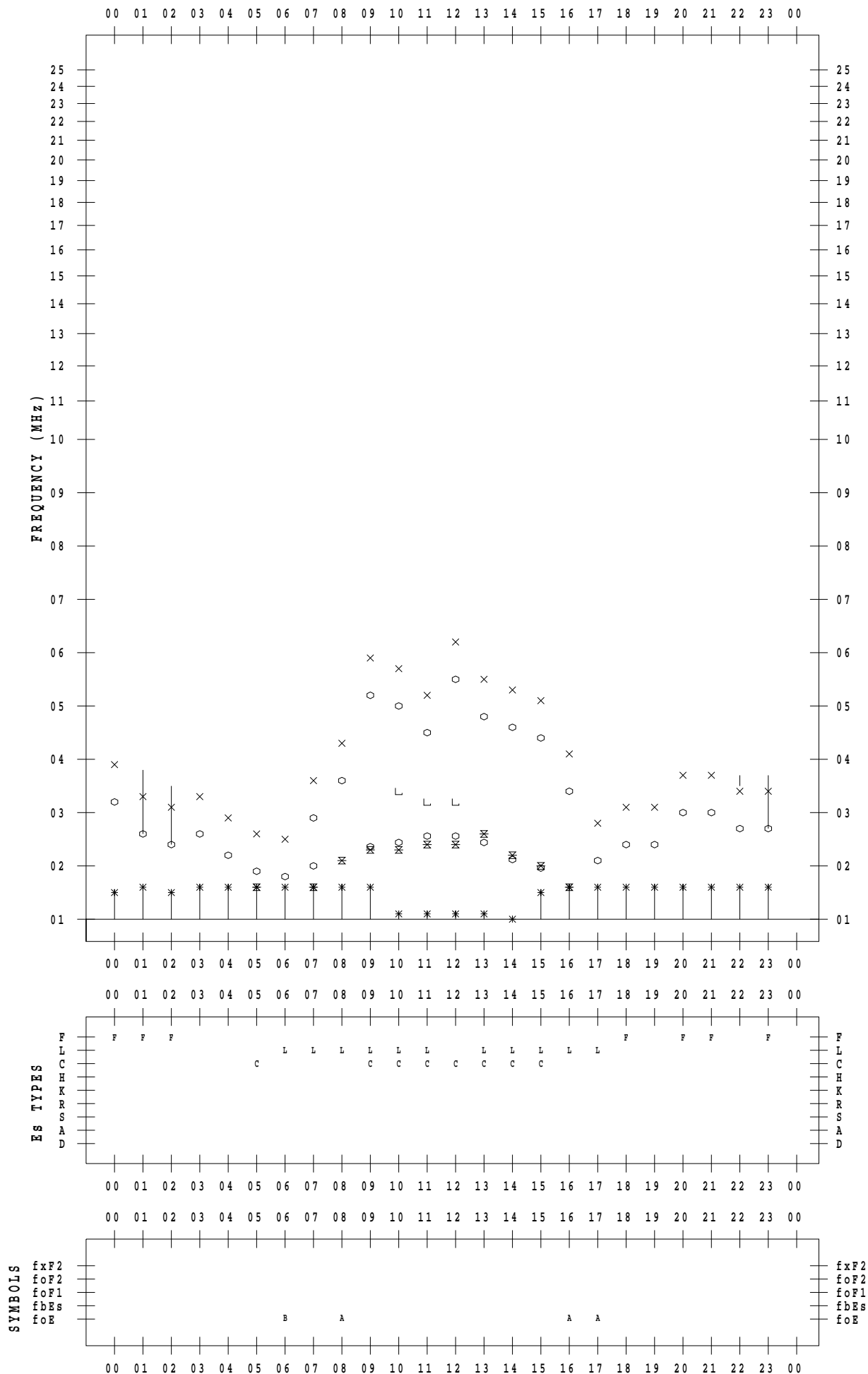
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/18

135 ° E MEAN TIME



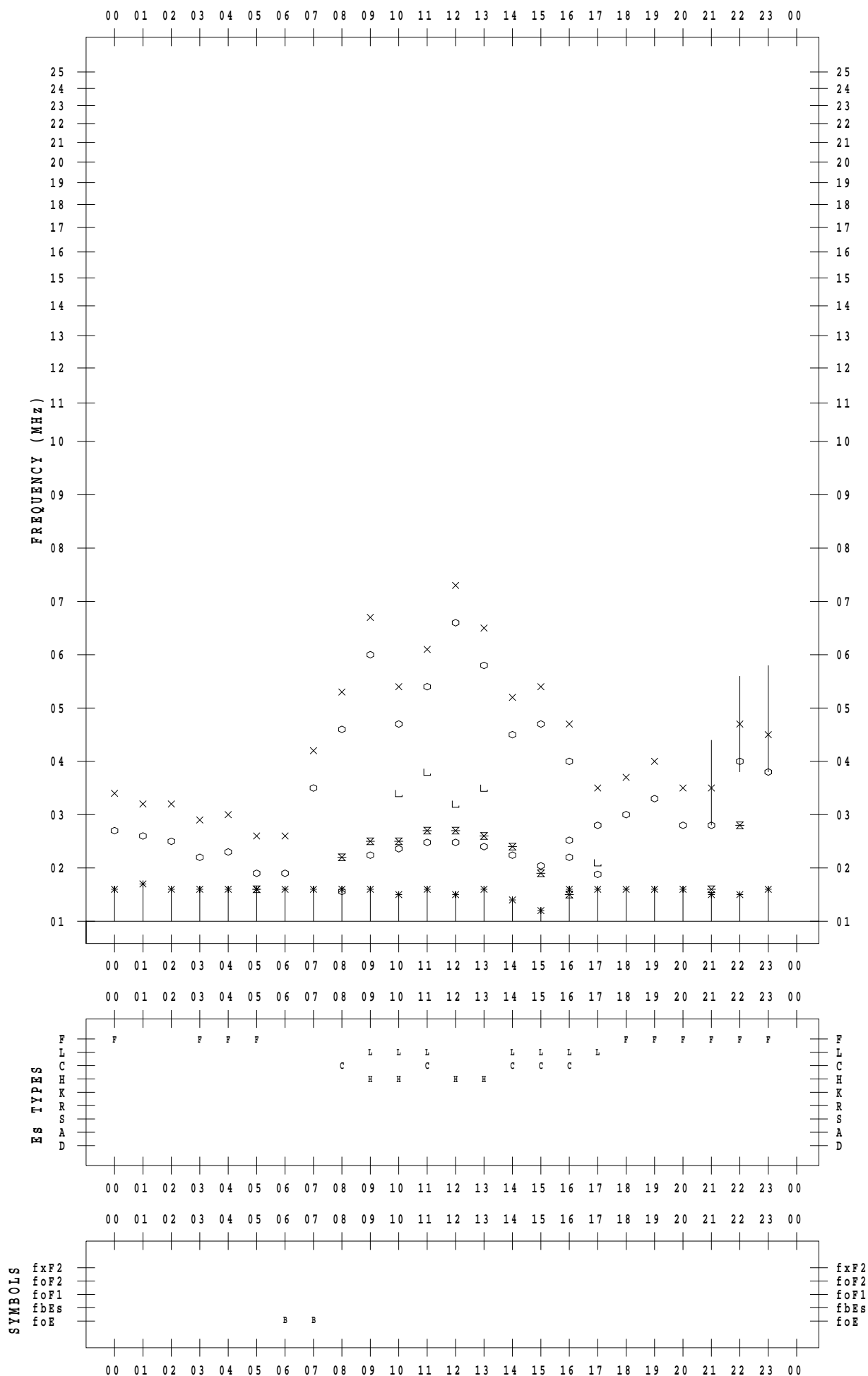
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/19

135 ° E MEAN TIME



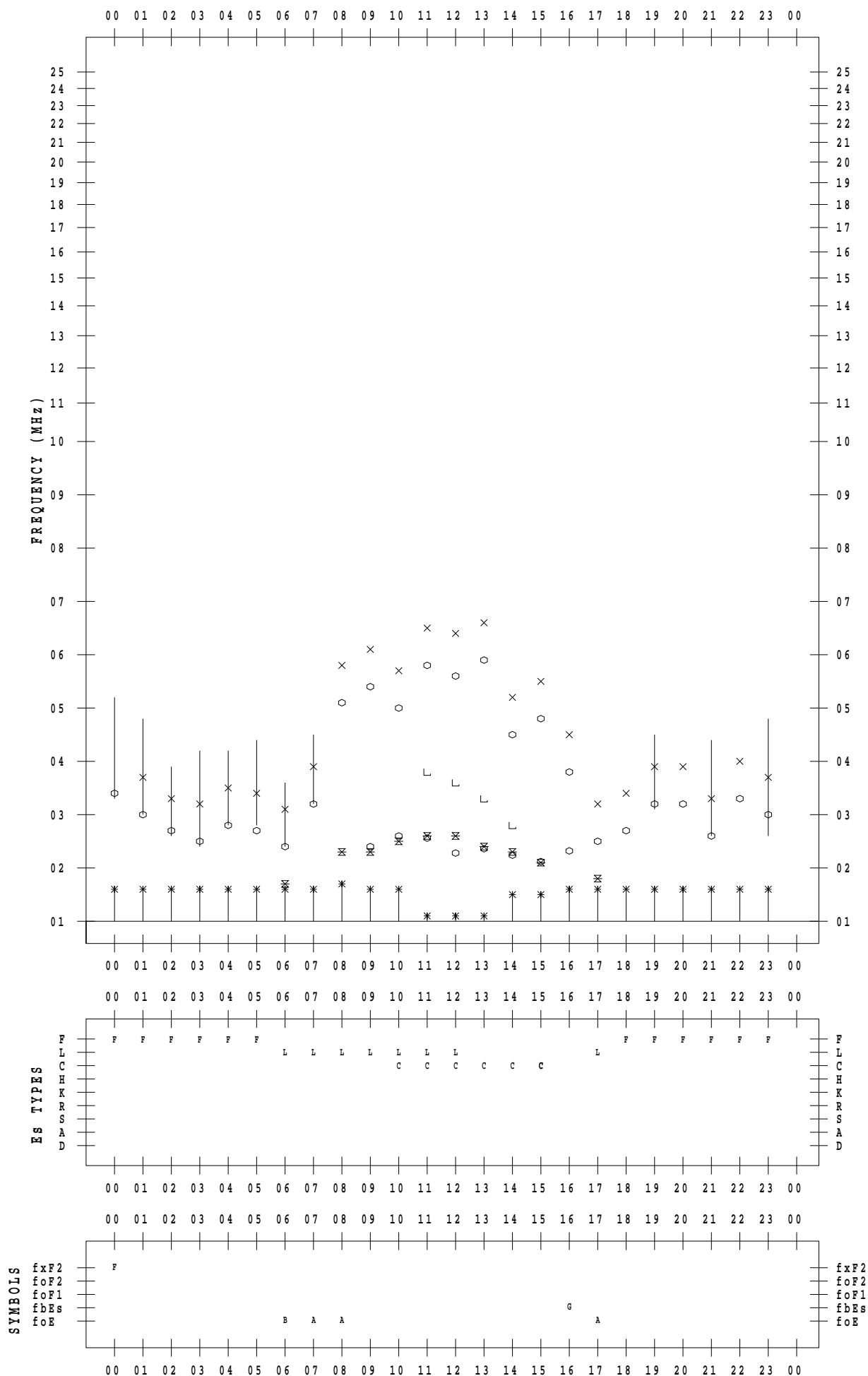
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/20

135 ° E MEAN TIME



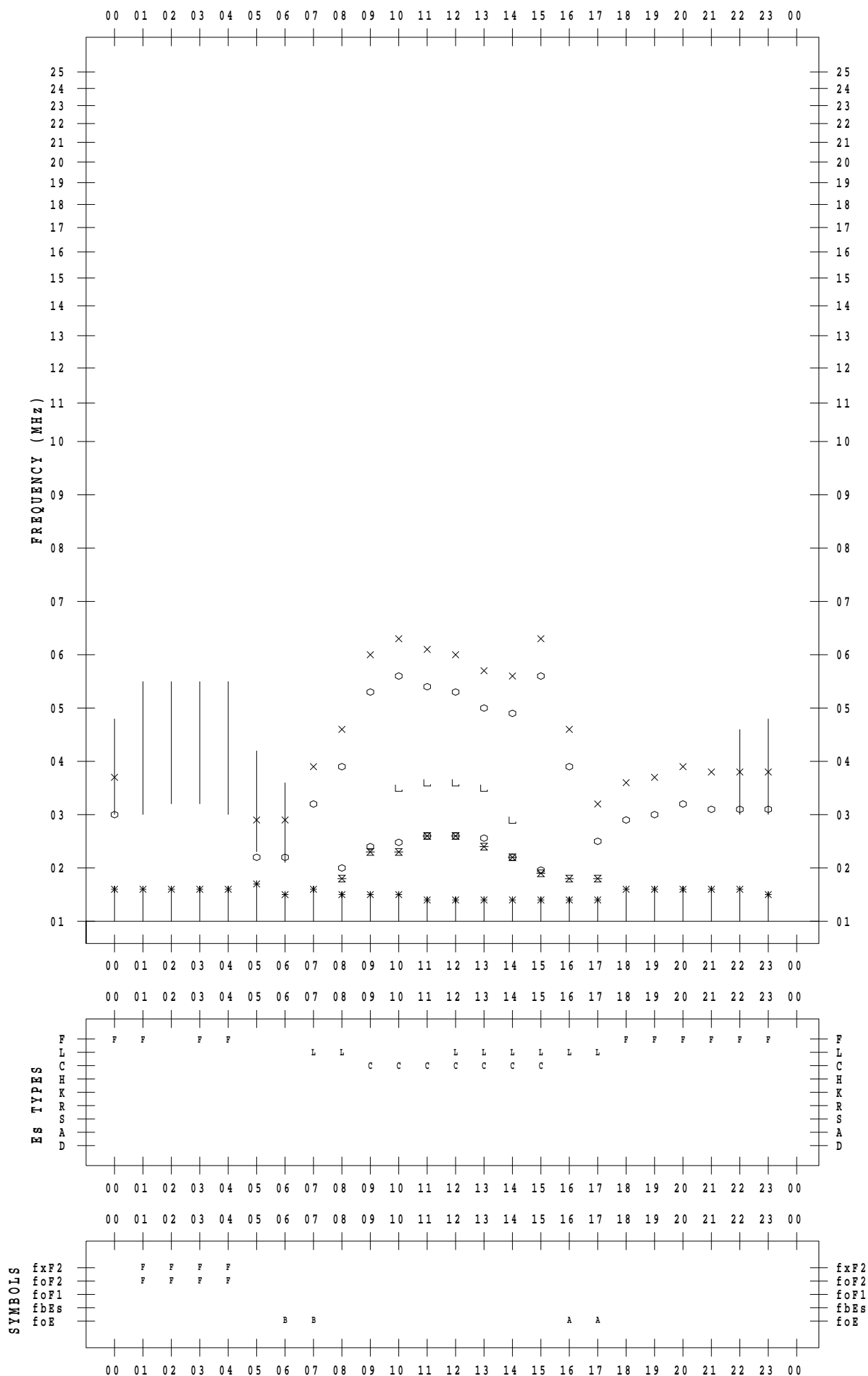
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/21

135 ° E MEAN TIME



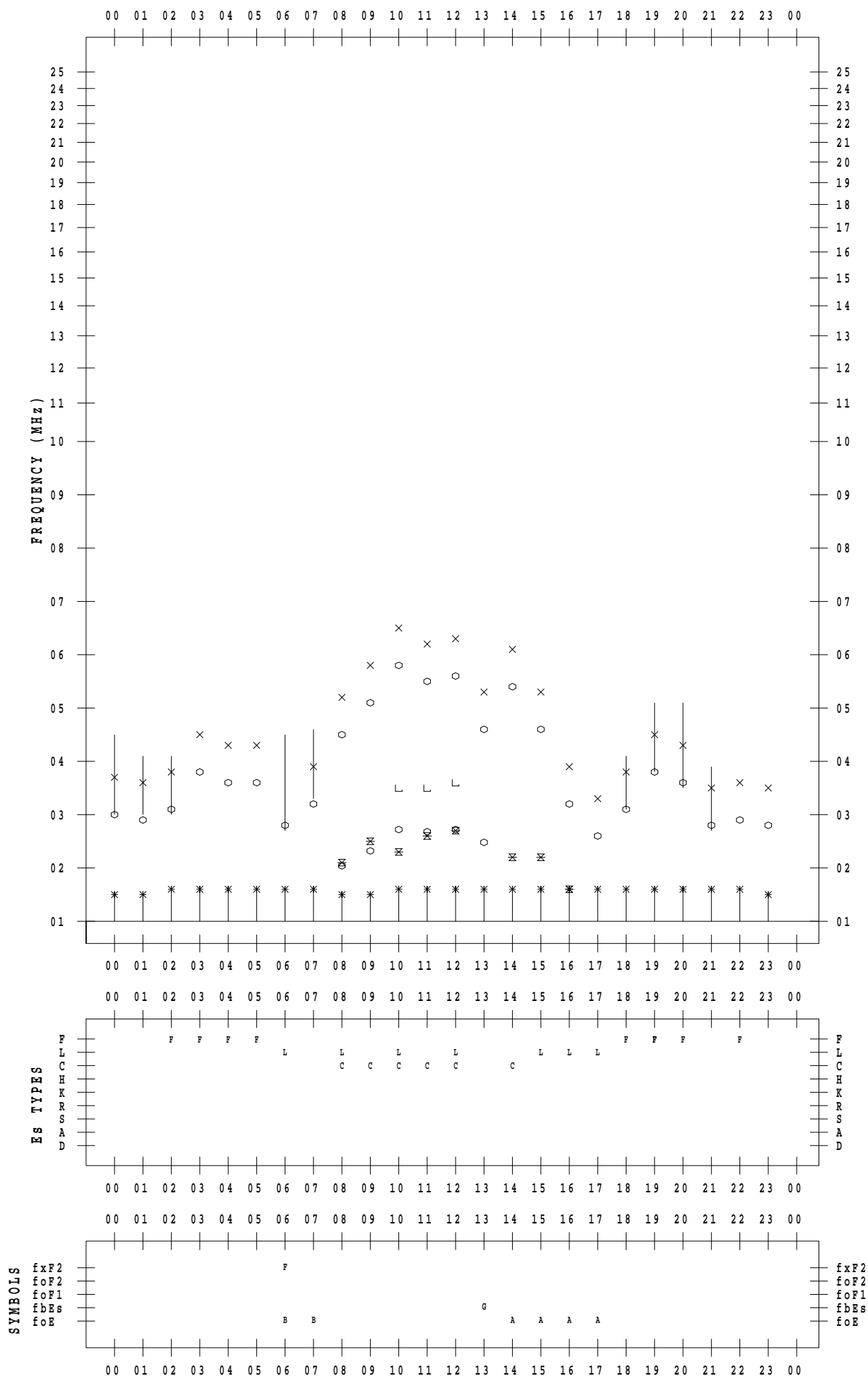
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/22

135 ° E MEAN TIME



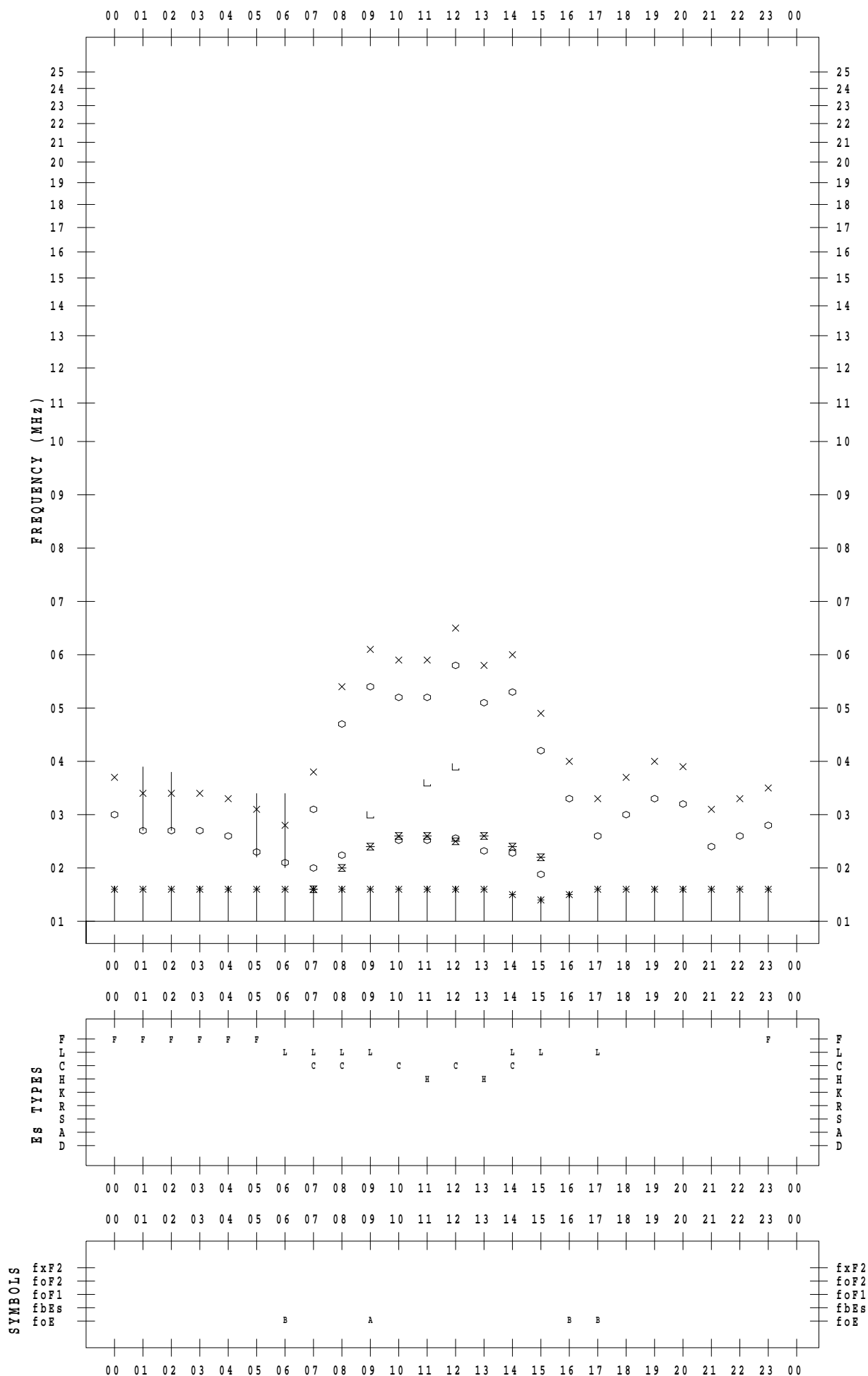
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/23

135 ° E MEAN TIME



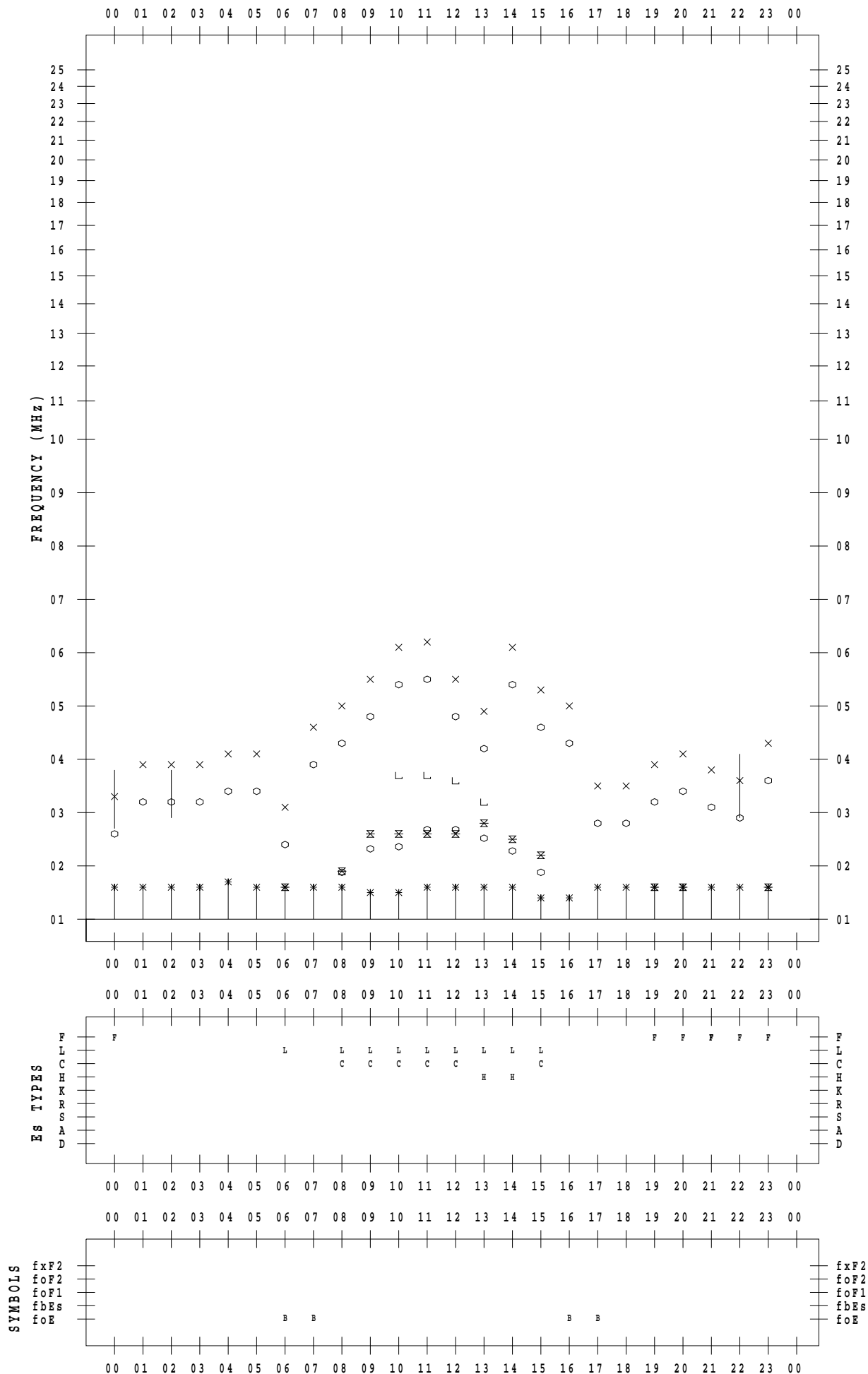
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/24

135 ° E MEAN TIME



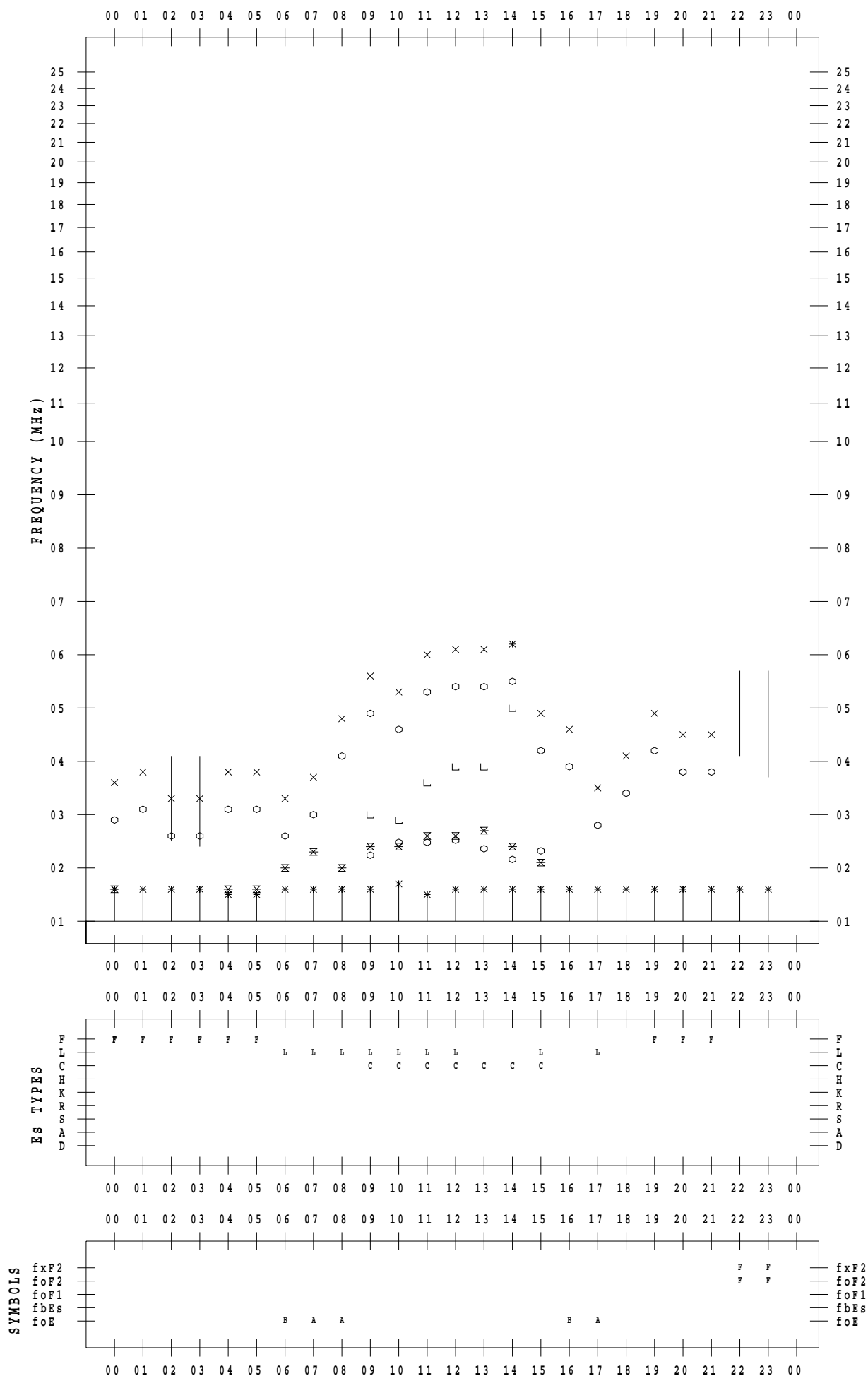
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/25

135 ° E MEAN TIME



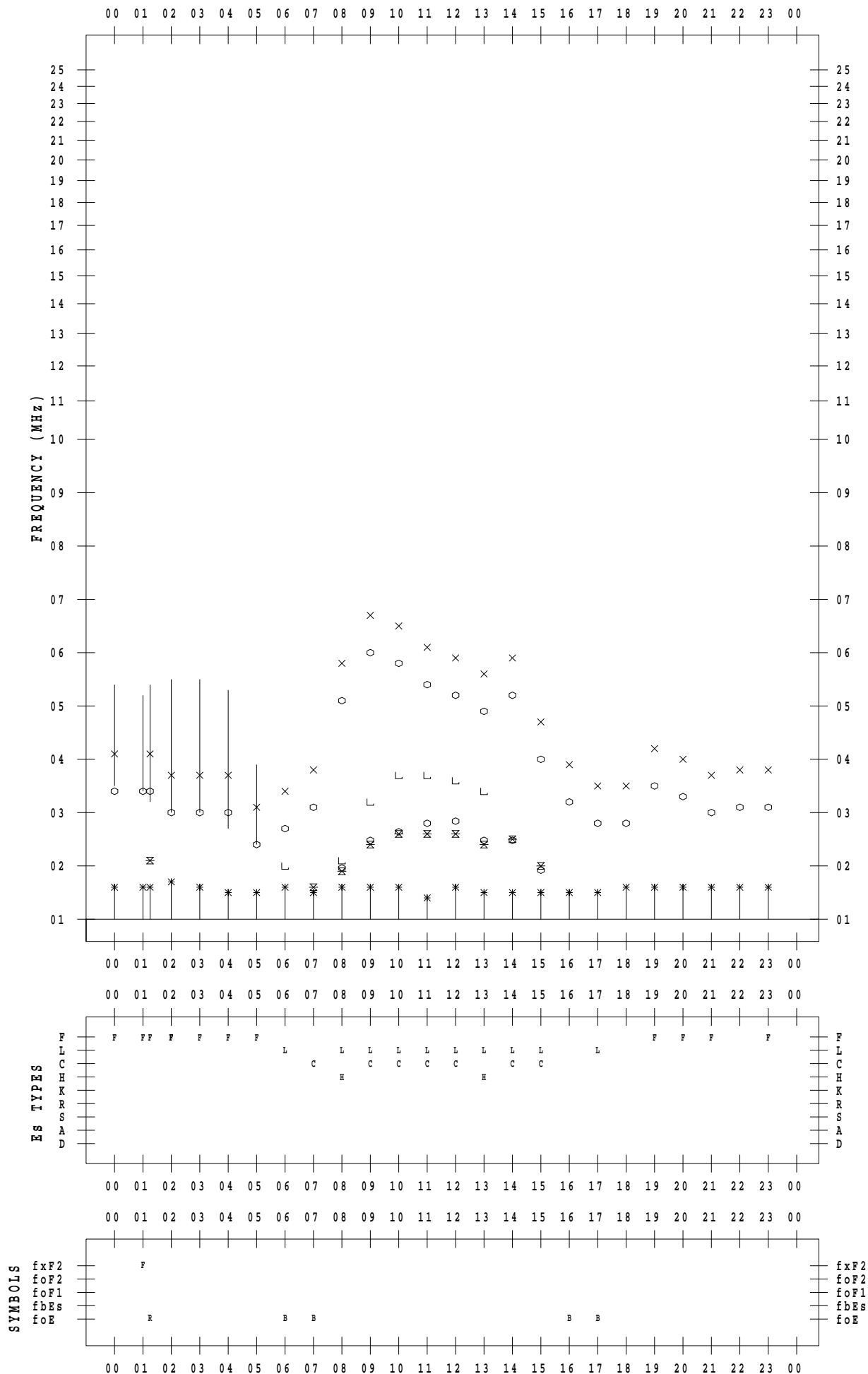
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/26

135 ° E MEAN TIME



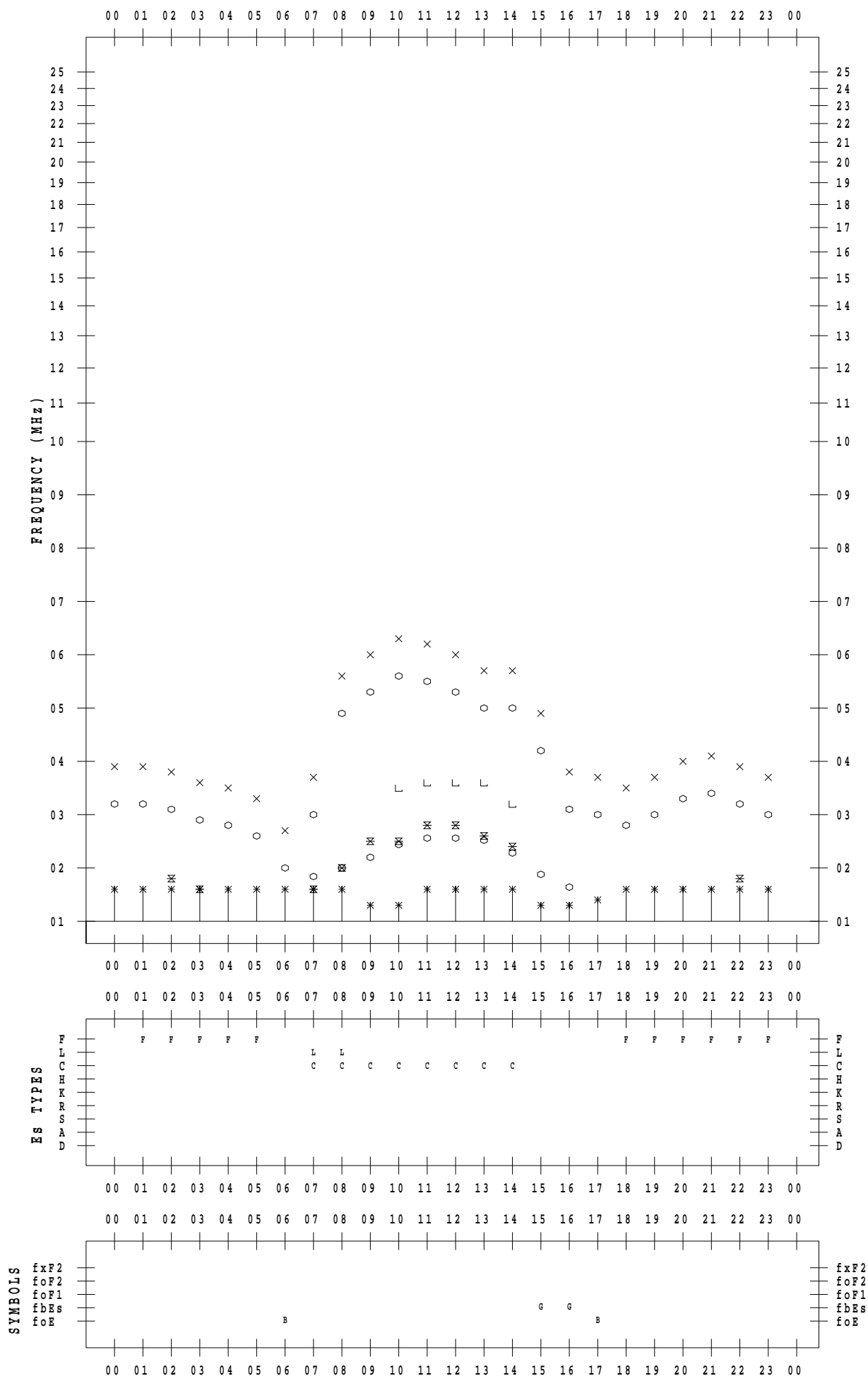
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/27

135 ° E MEAN TIME



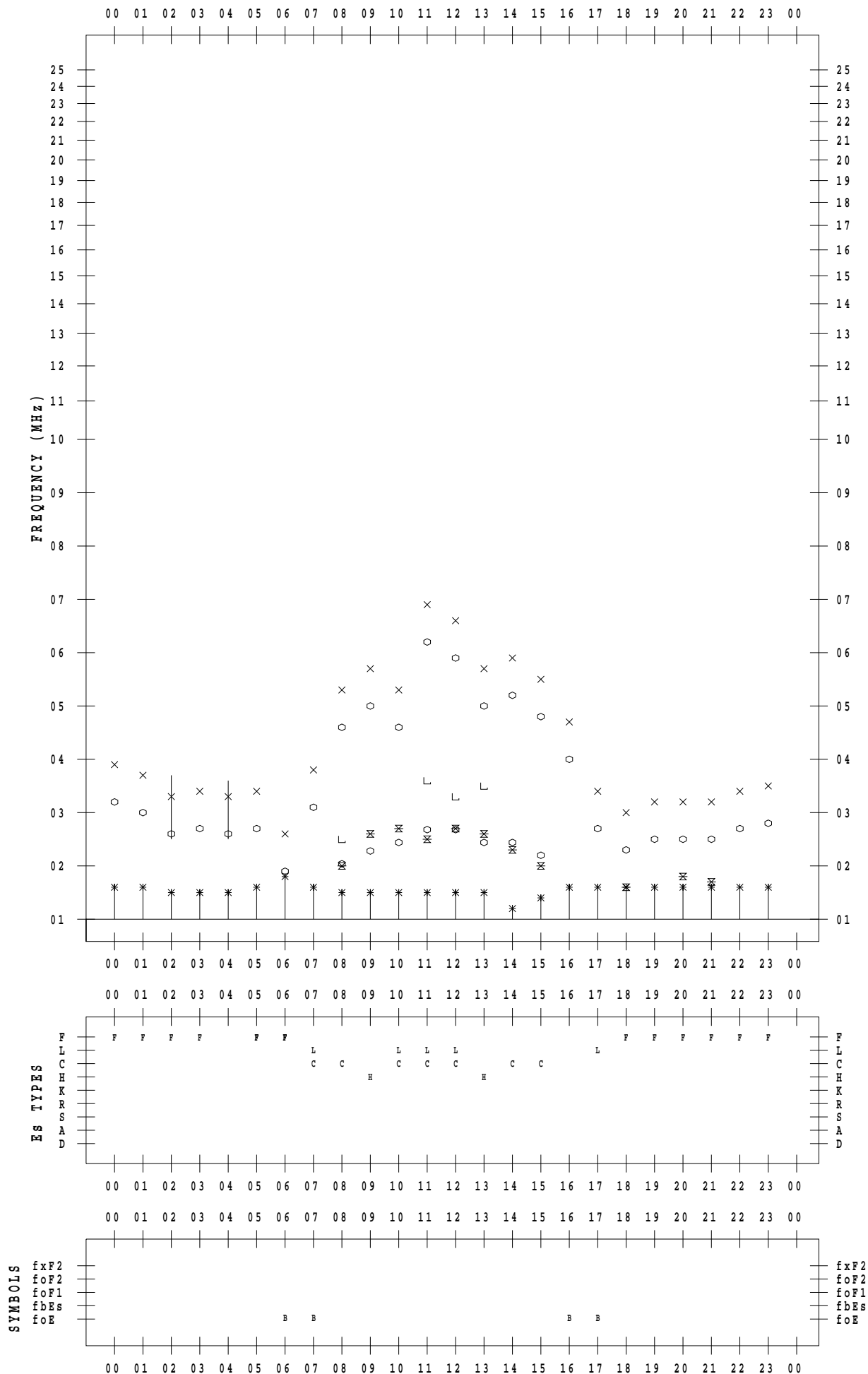
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/28

135 ° E MEAN TIME



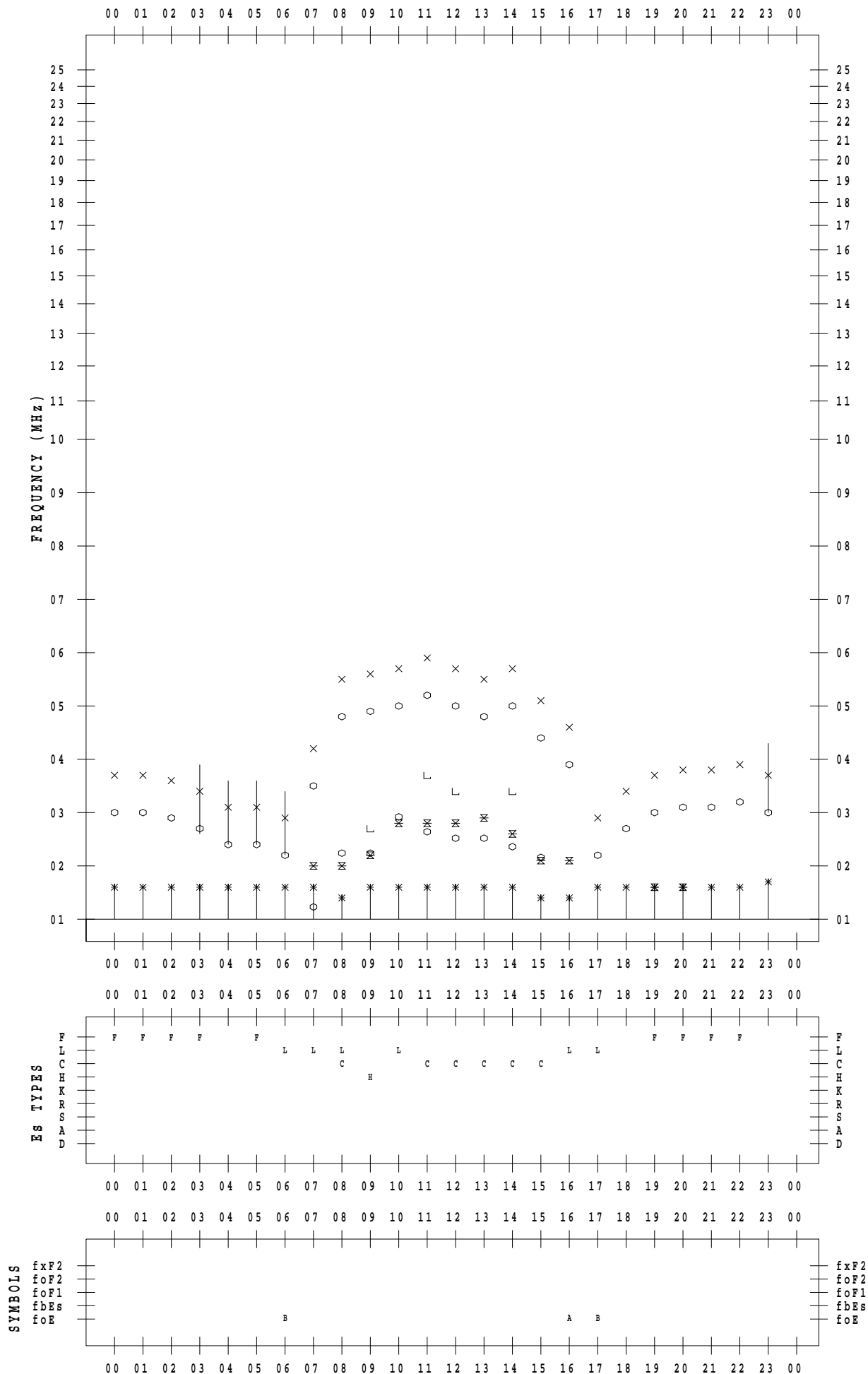
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/29

135 ° E MEAN TIME



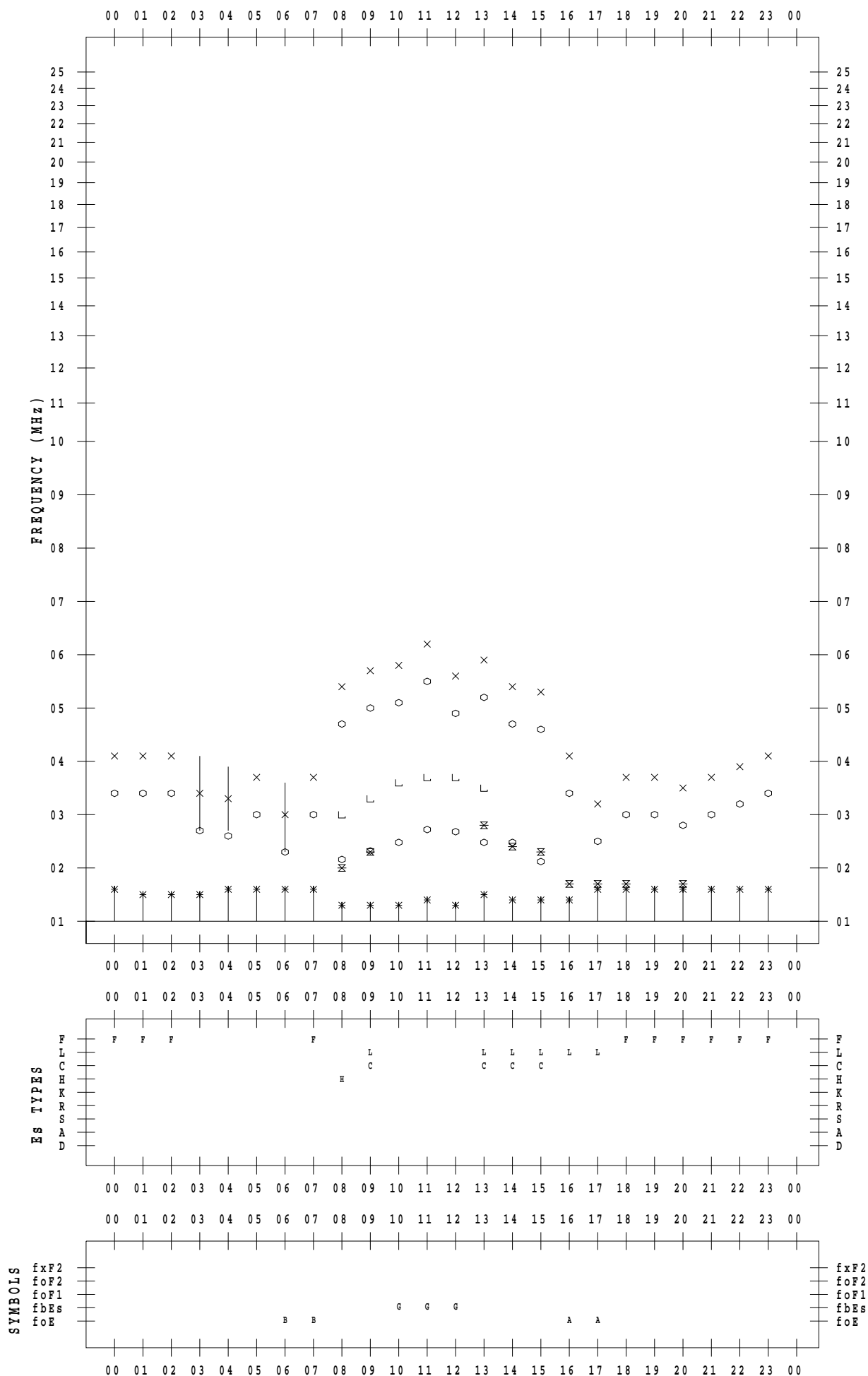
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/30

135 ° E MEAN TIME



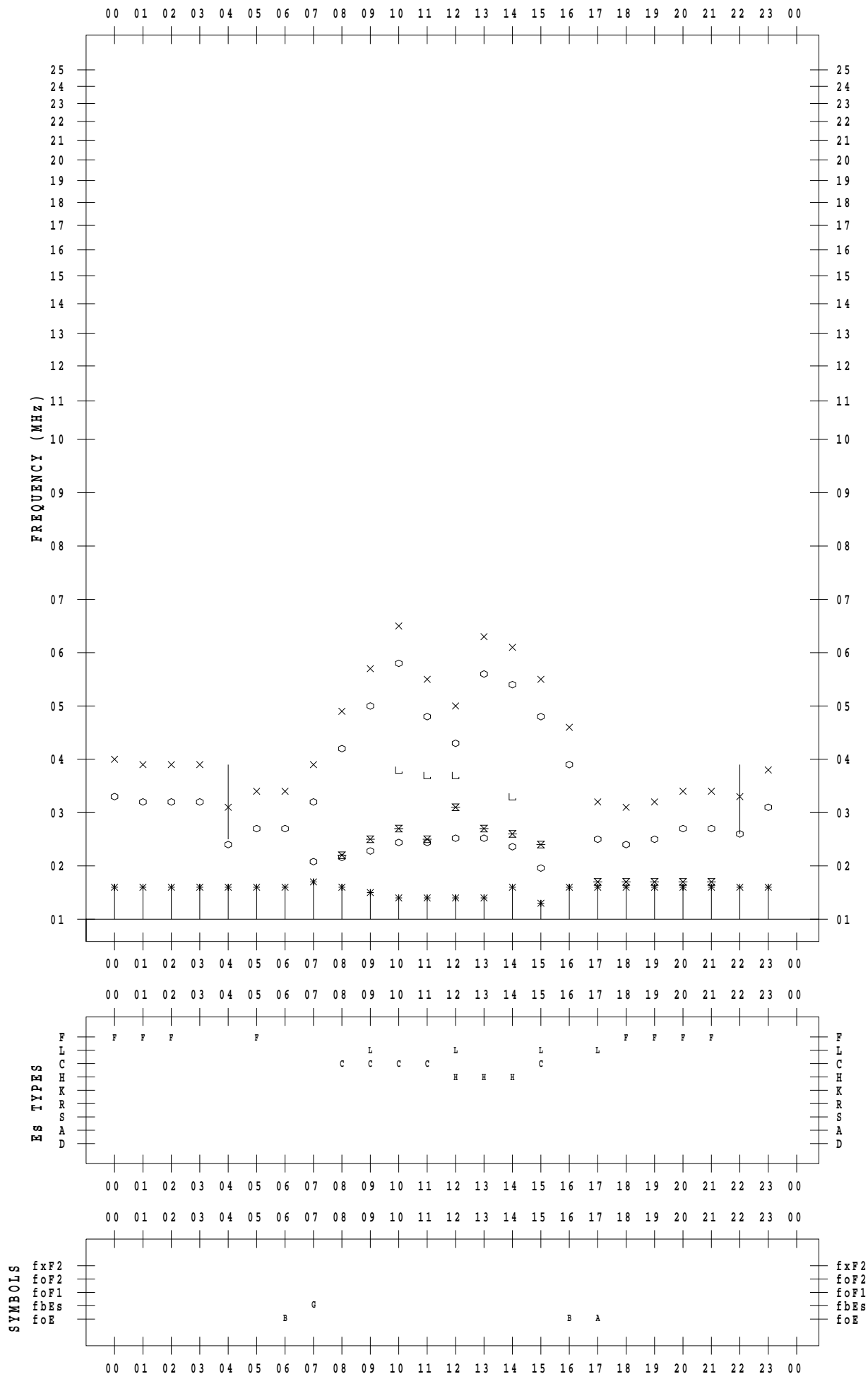
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2019/12/31

135 ° E MEAN TIME



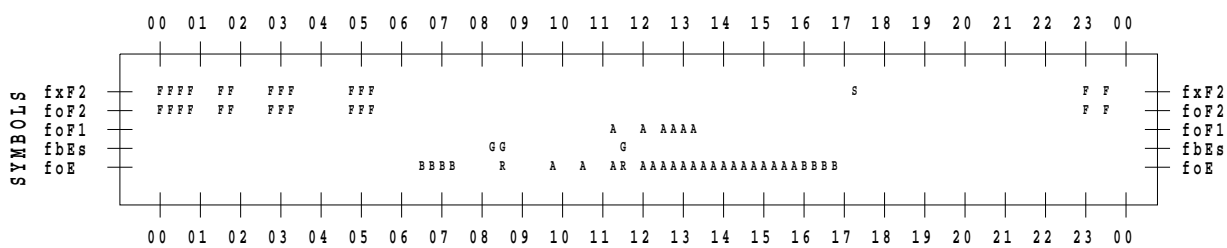
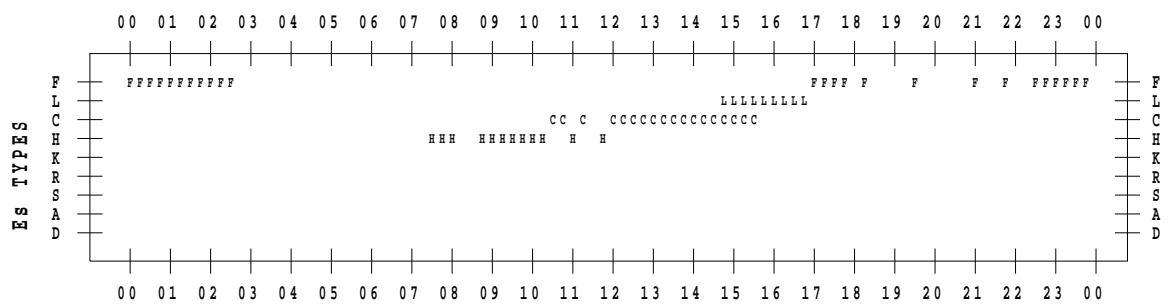
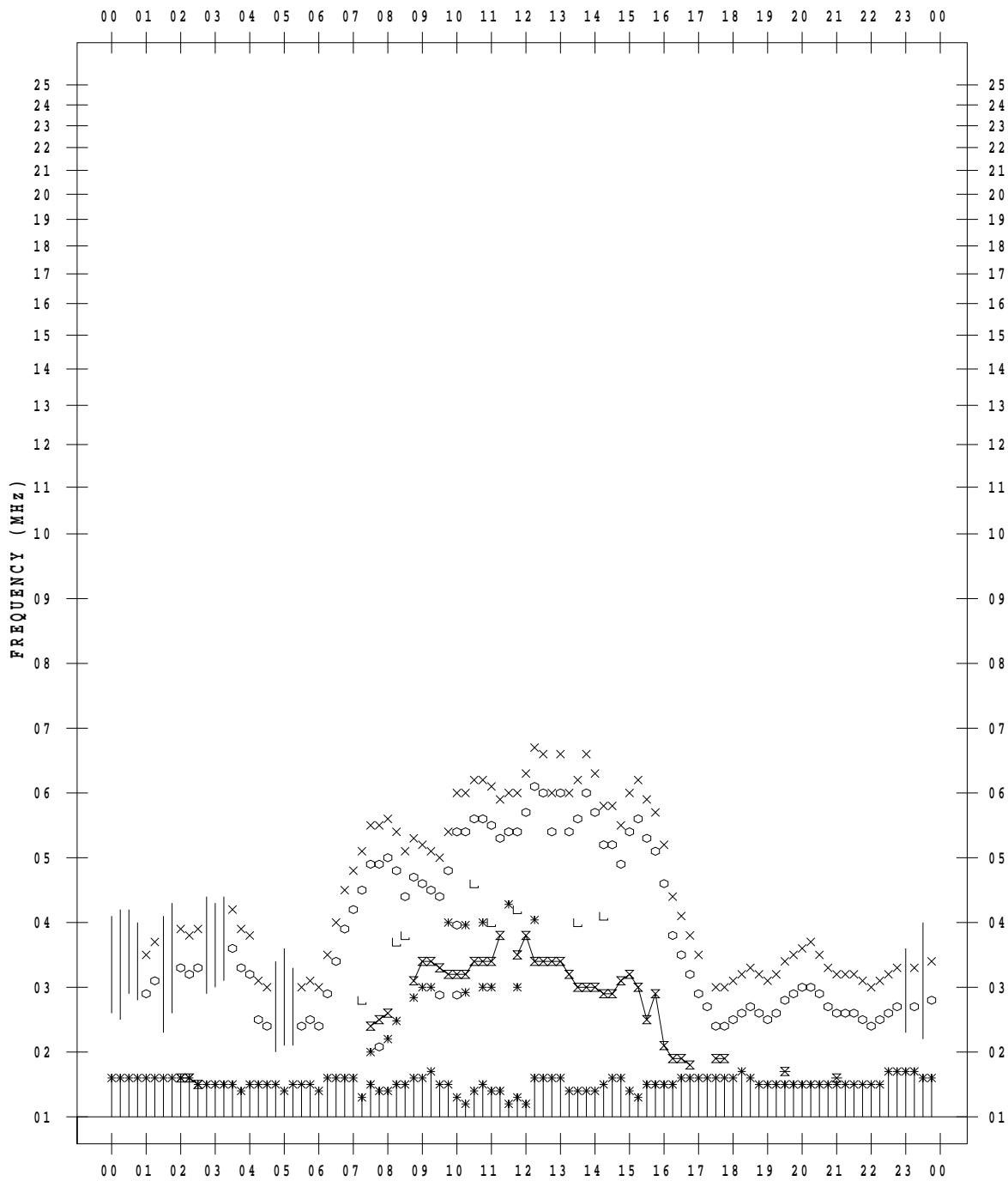
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/ 2

135 ° E MEAN TIME



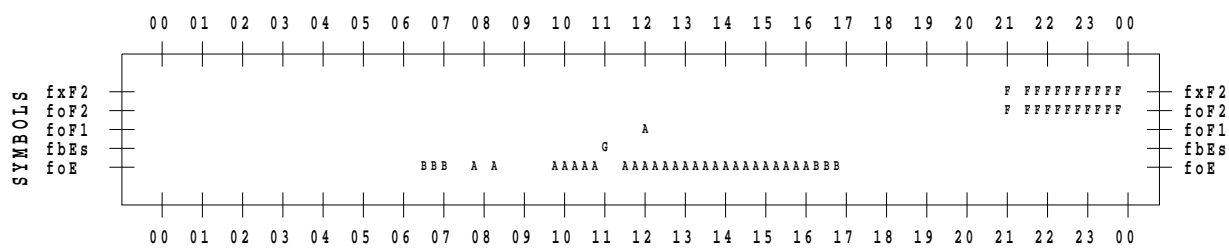
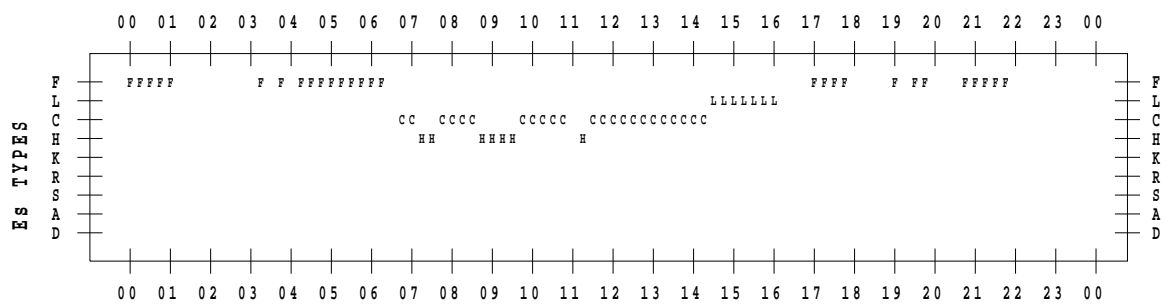
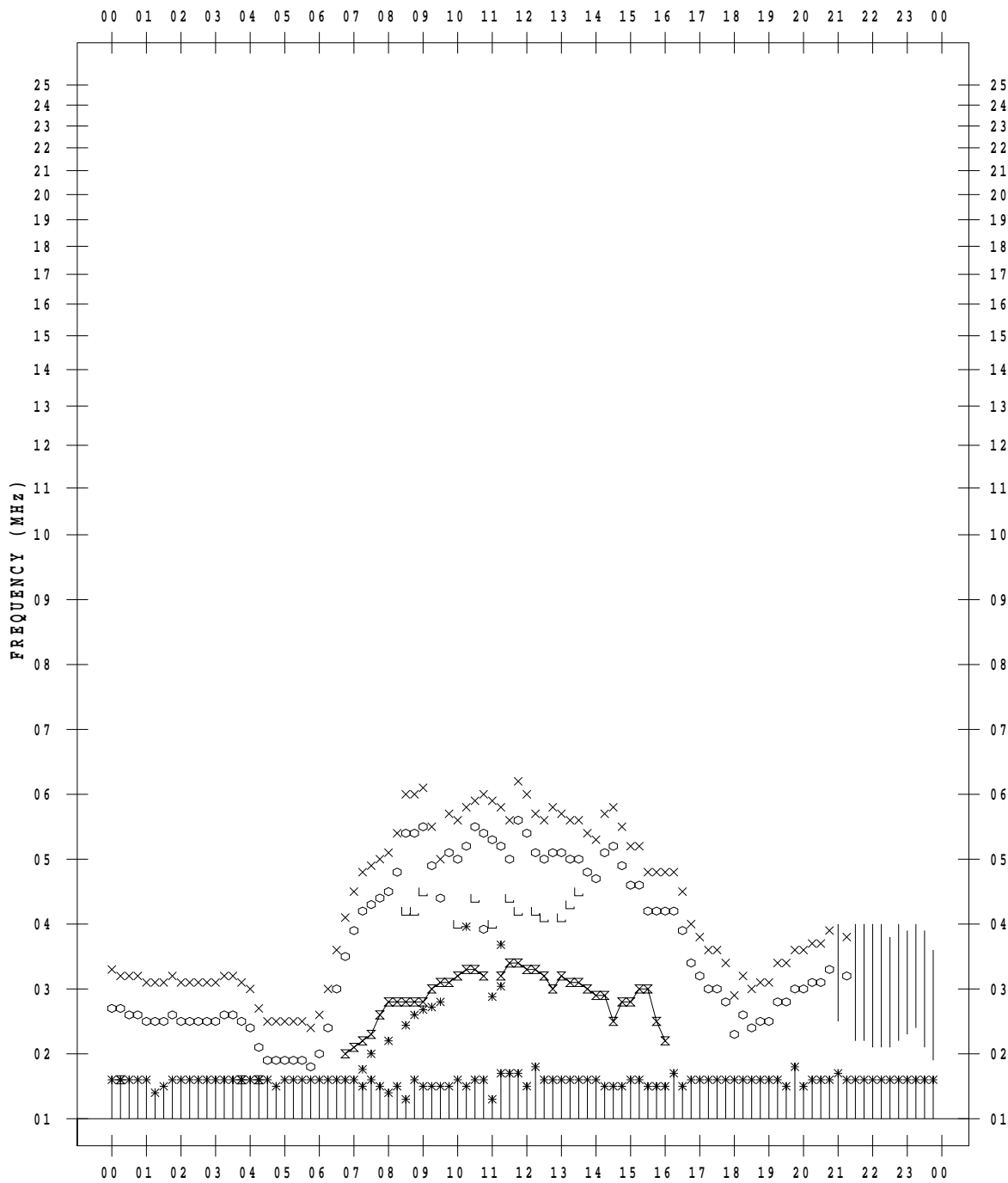
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/ 3

135 ° E MEAN TIME



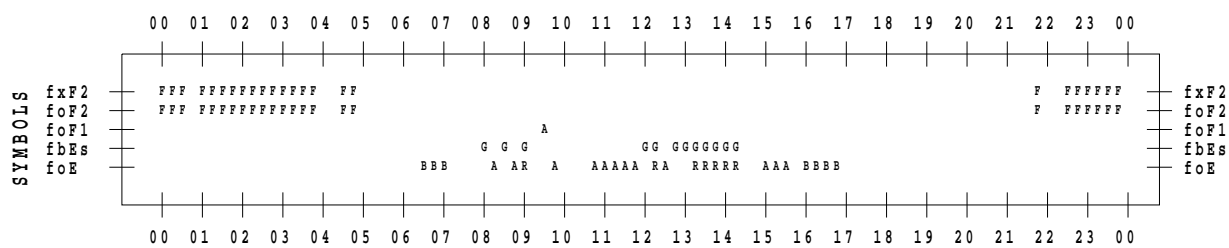
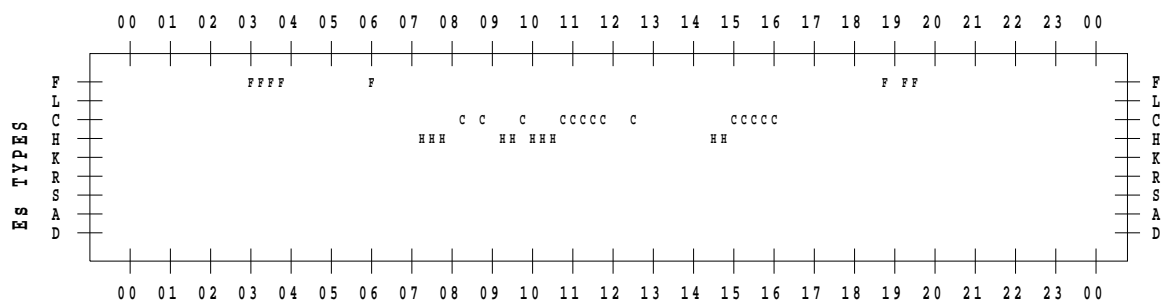
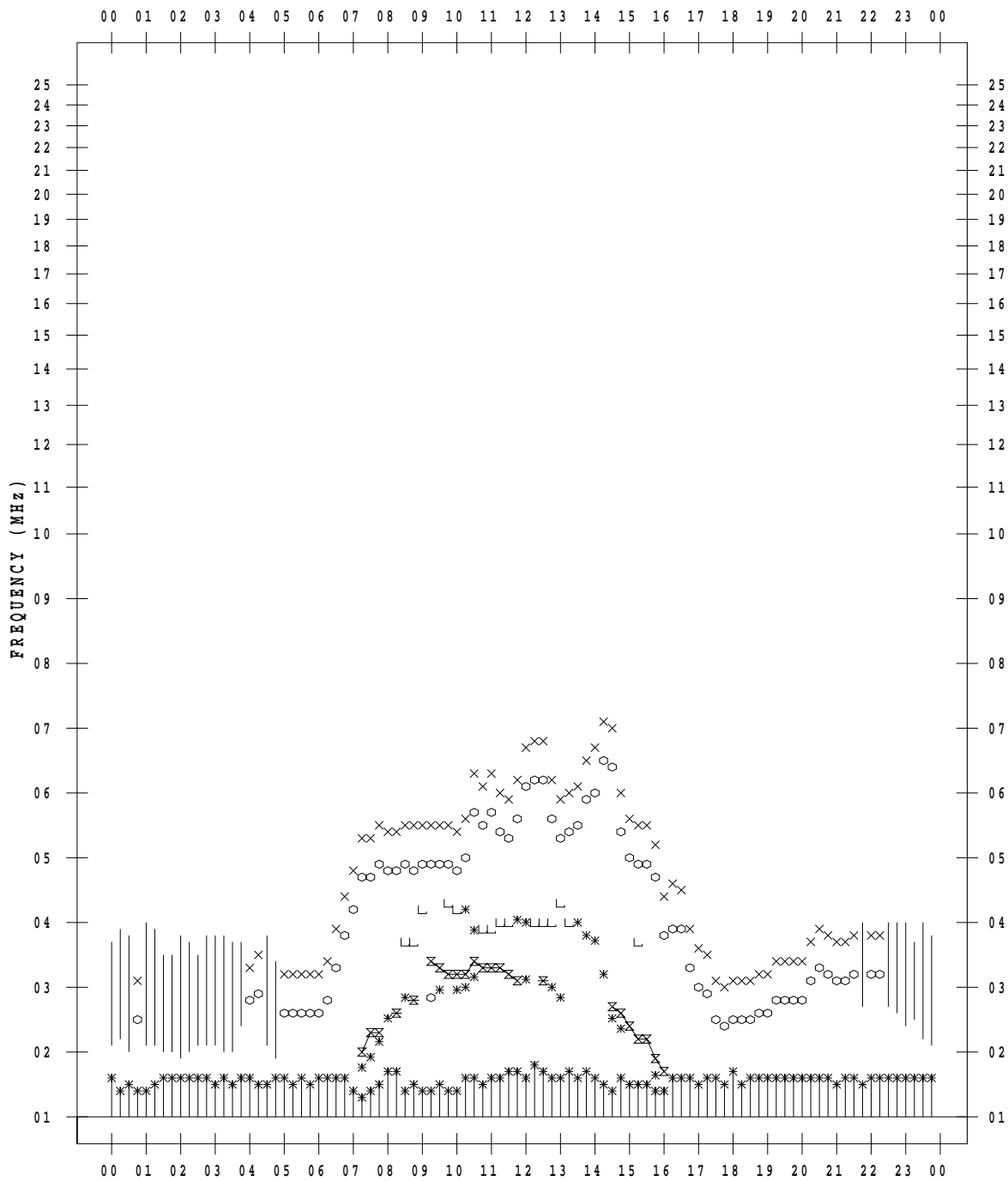
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/ 4

135 ° E MEAN TIME



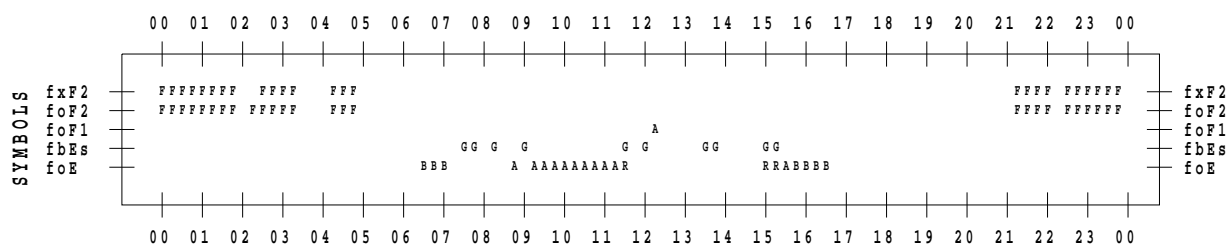
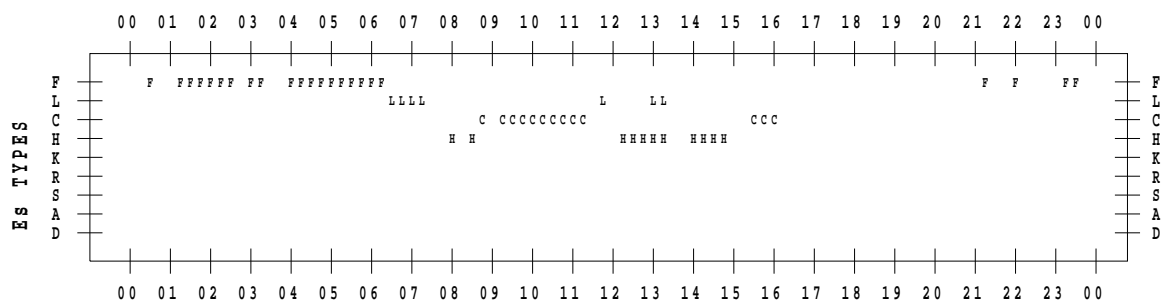
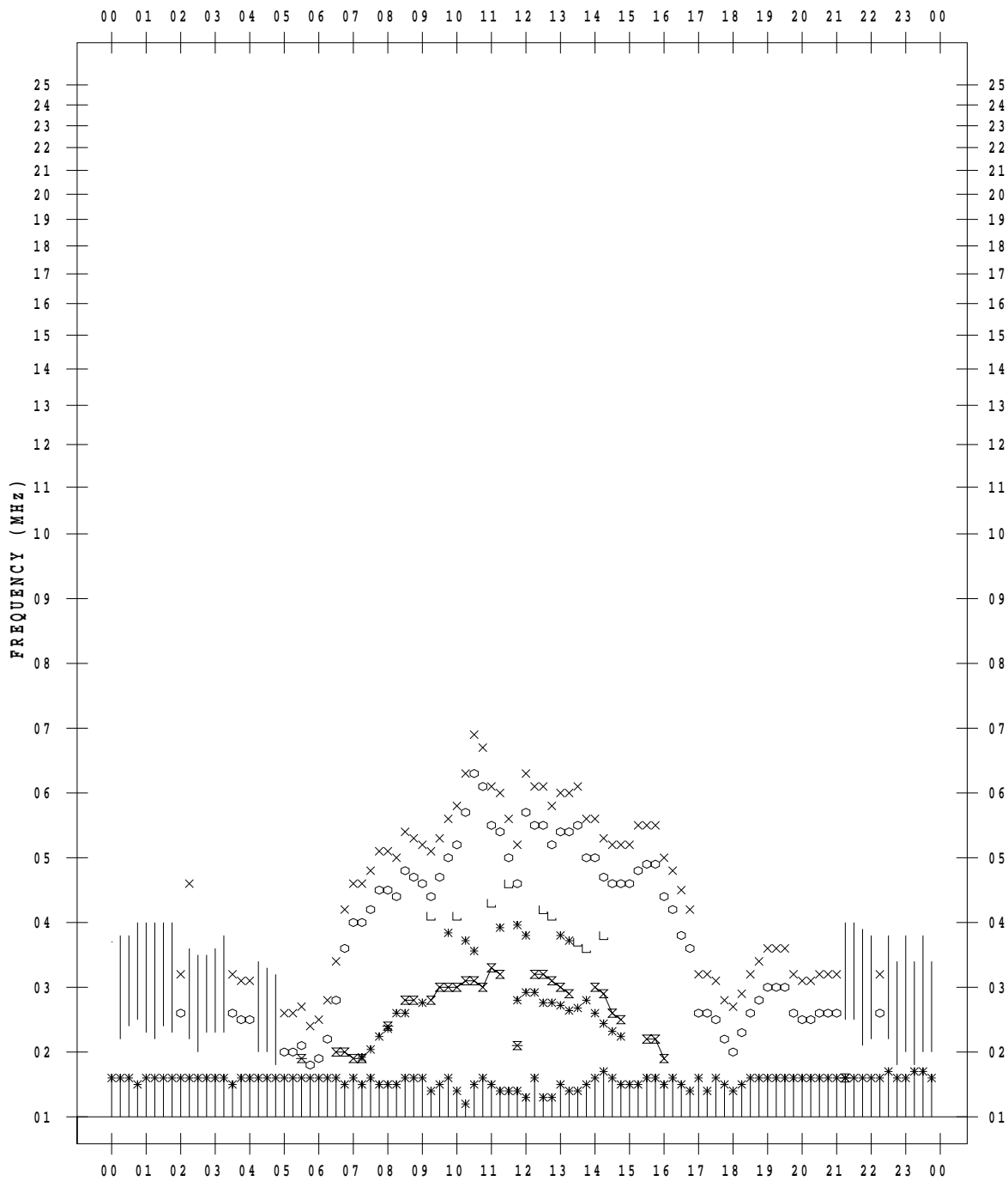
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/ 5

135 ° E MEAN TIME



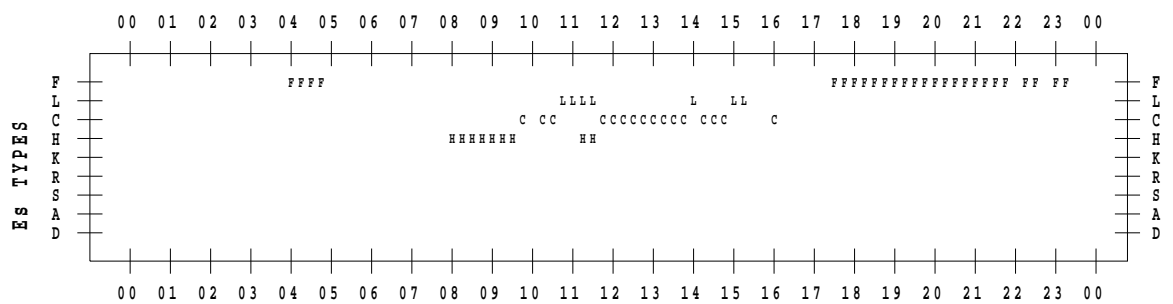
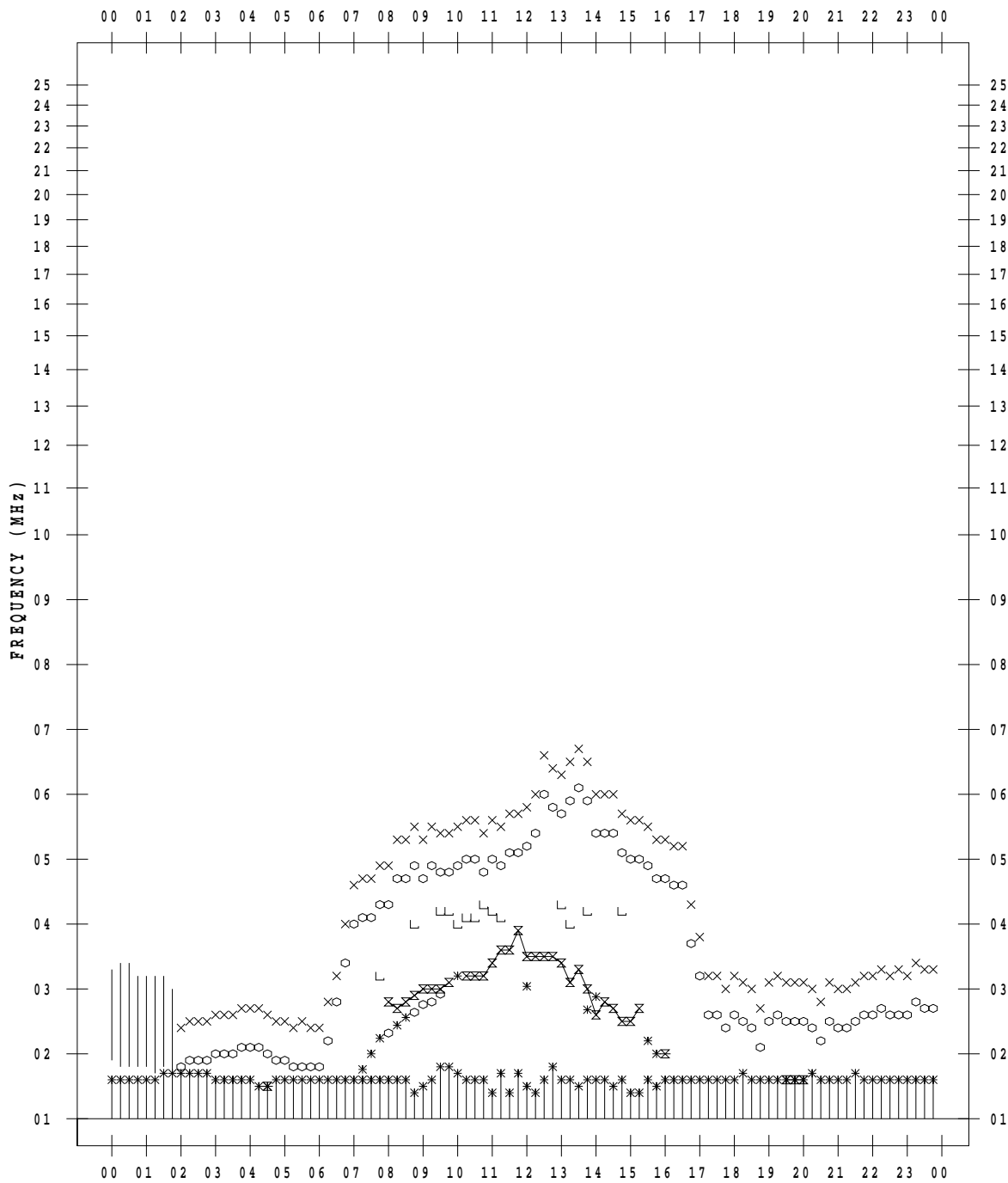
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/ 6

135 ° E MEAN TIME



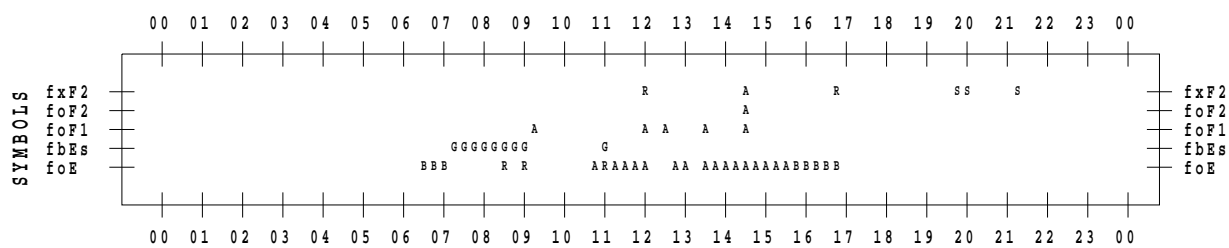
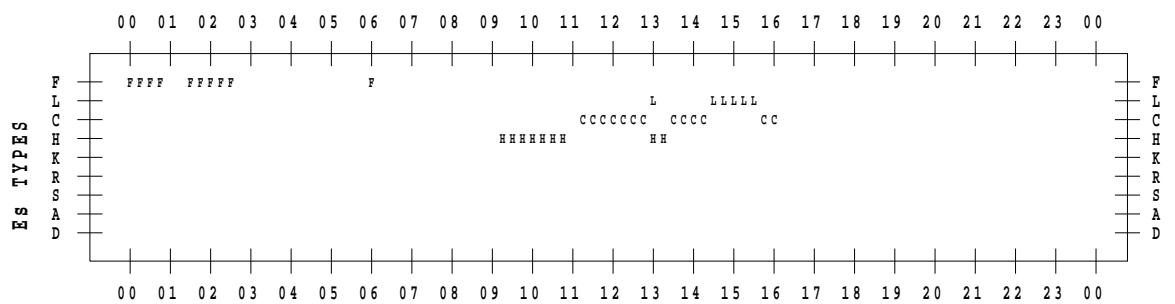
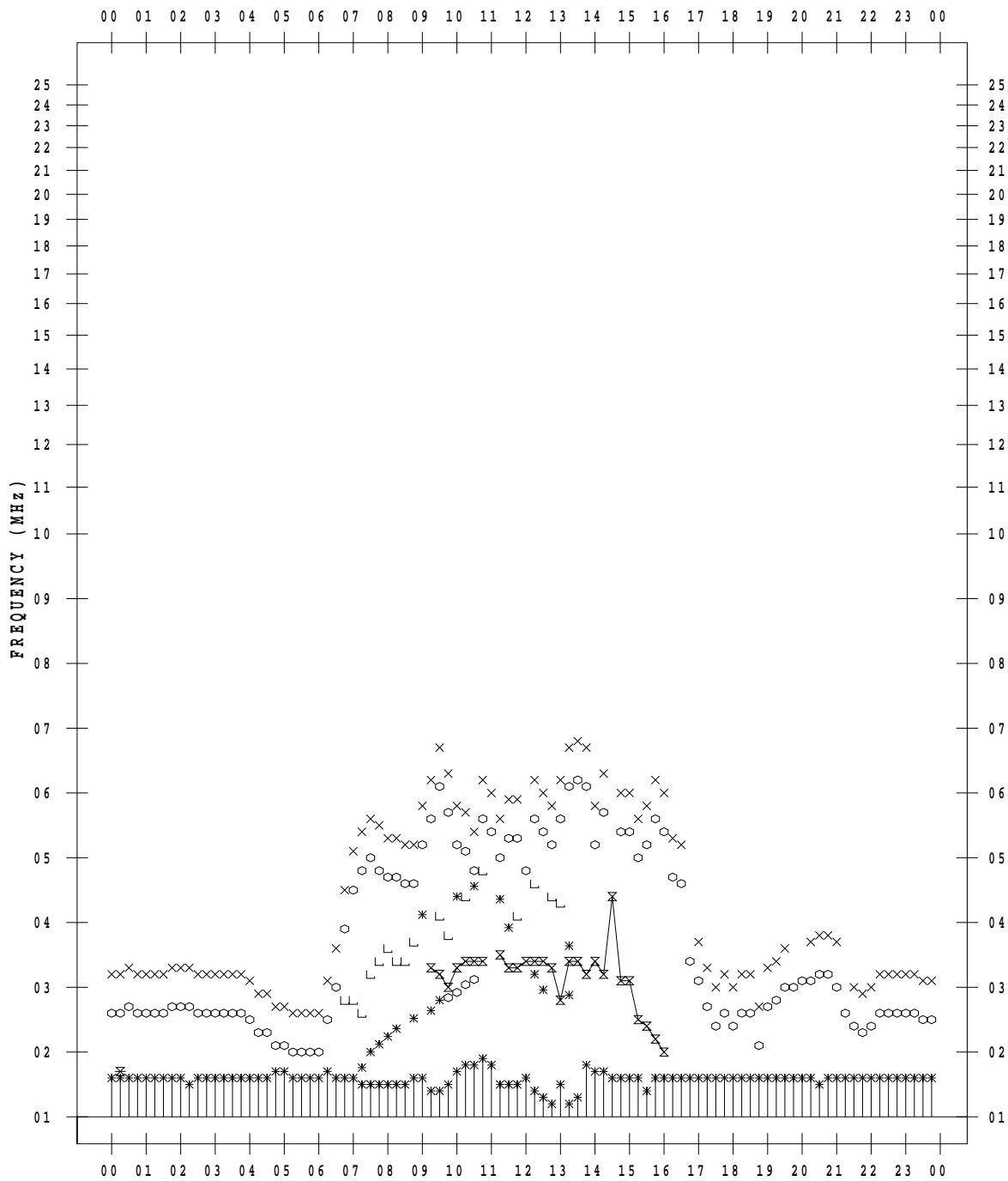
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/ 7

135 ° E MEAN TIME



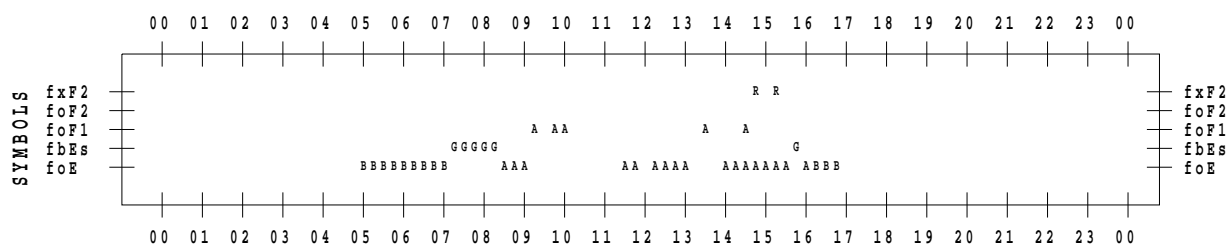
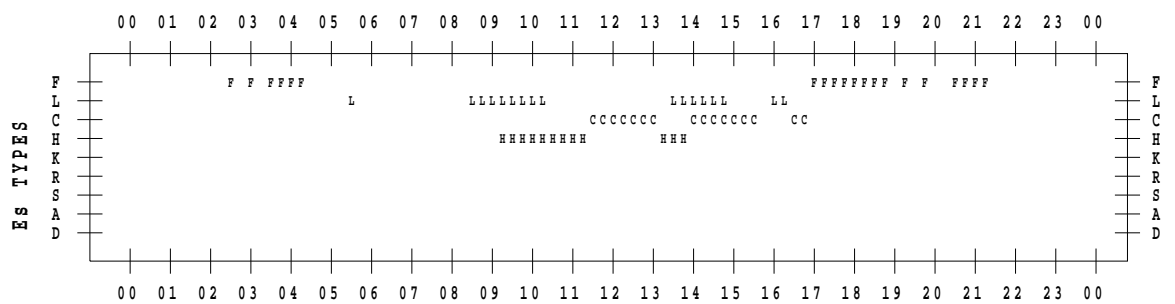
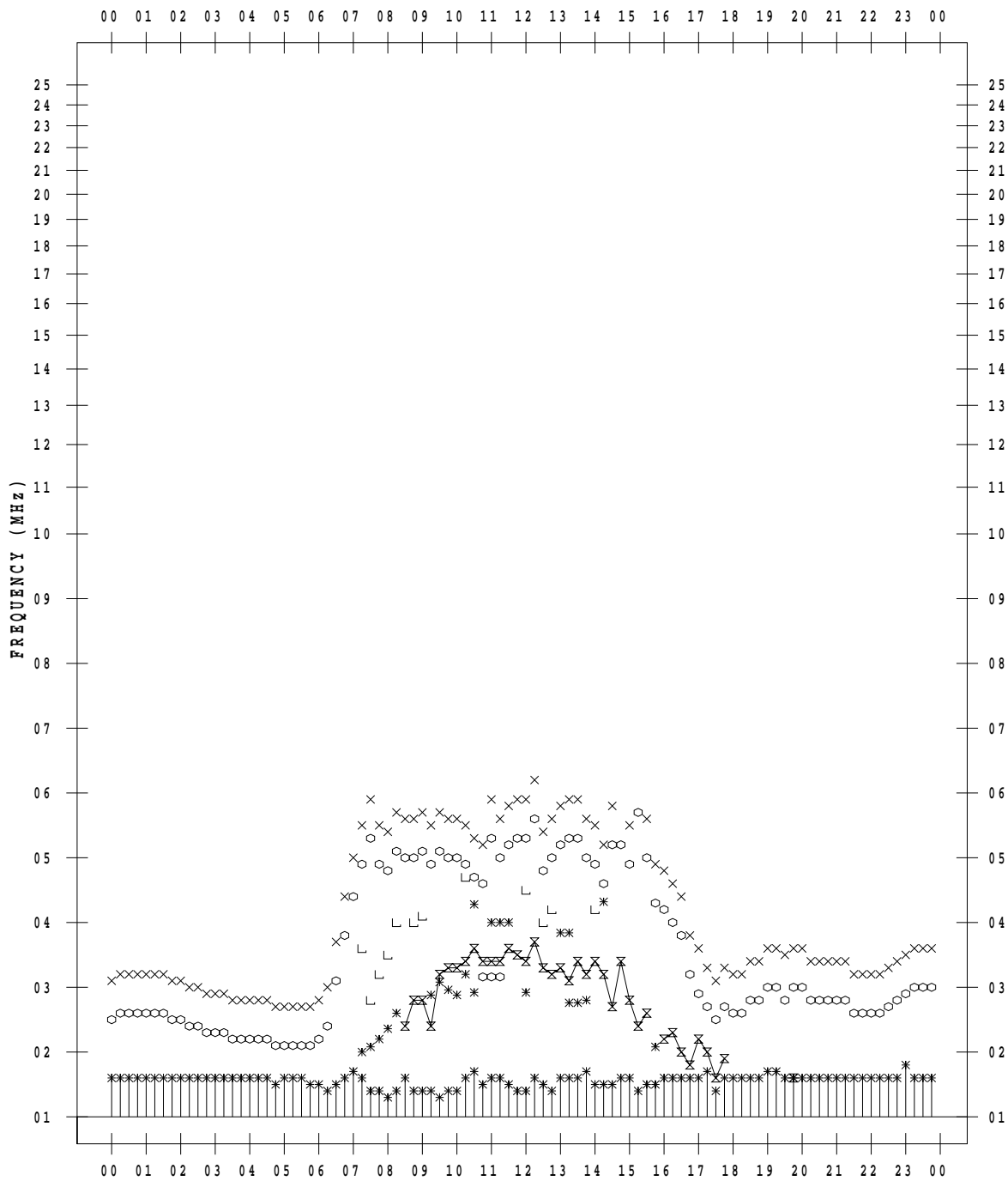
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/ 8

135 ° E MEAN TIME



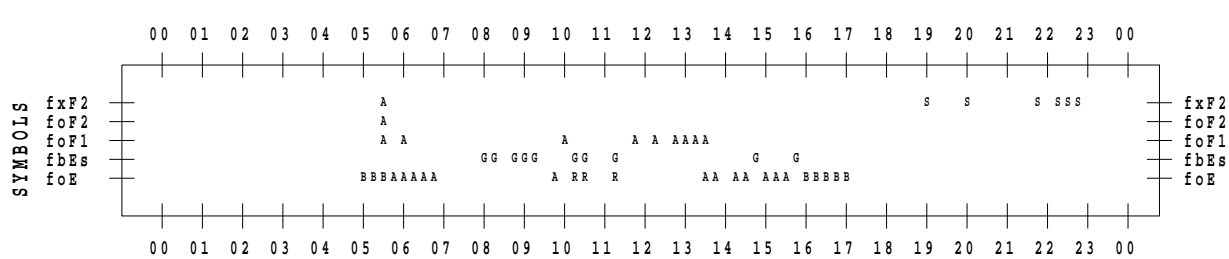
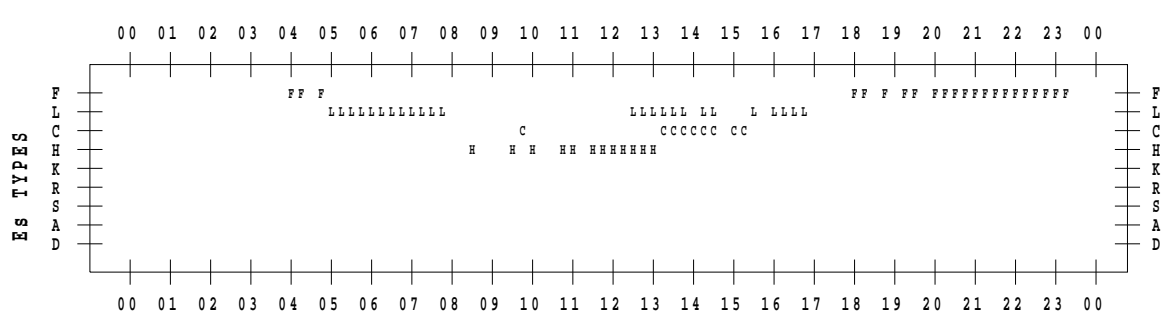
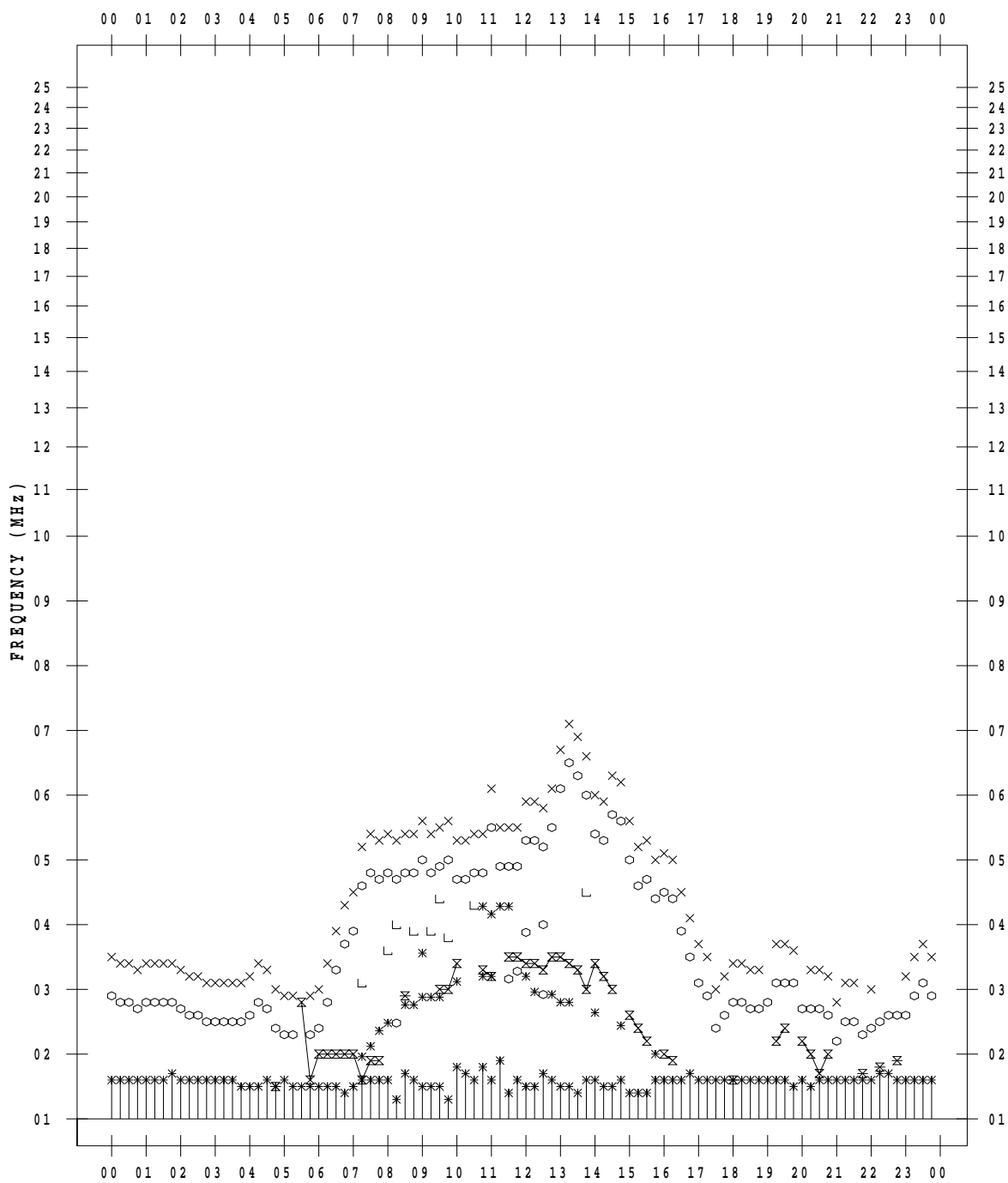
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/ 9

135 ° E MEAN TIME



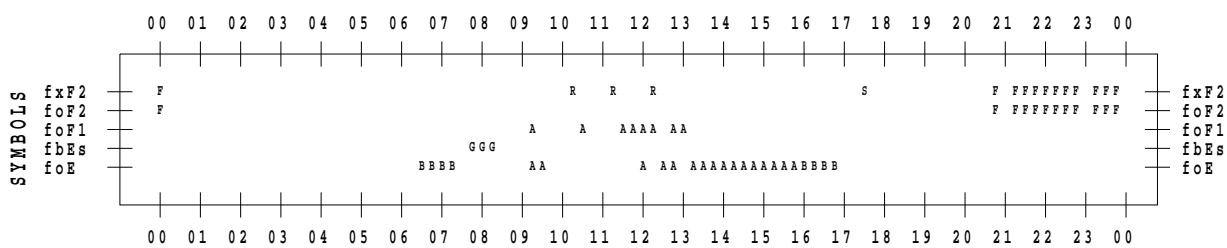
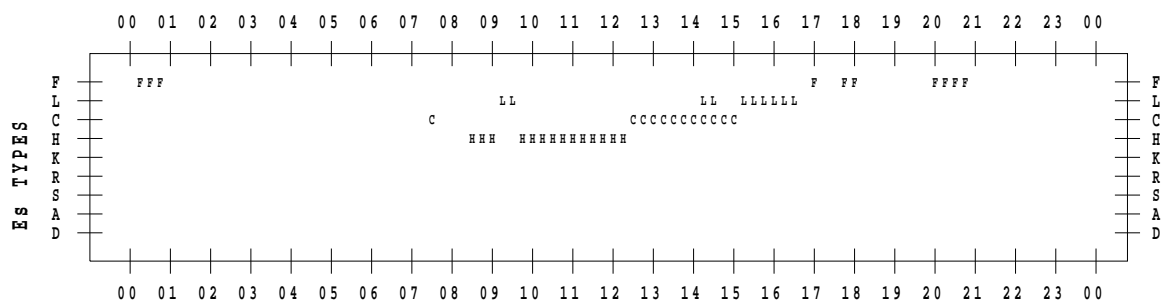
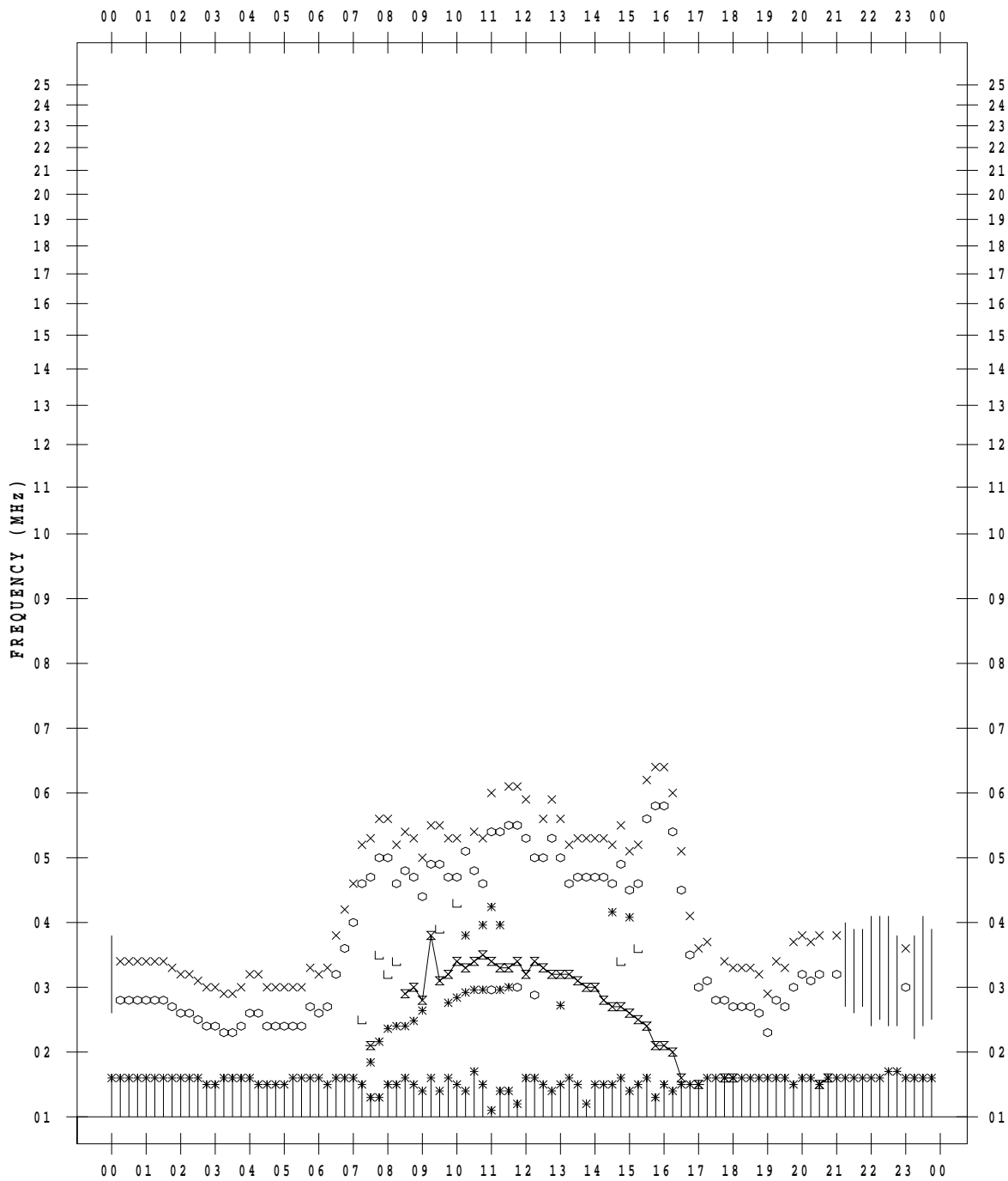
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/10

135 ° E MEAN TIME



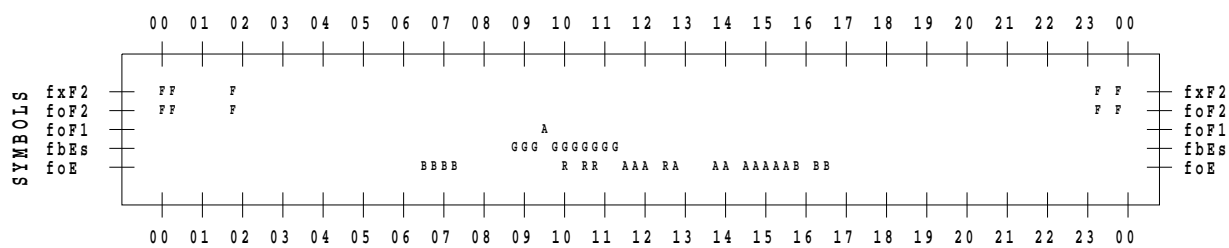
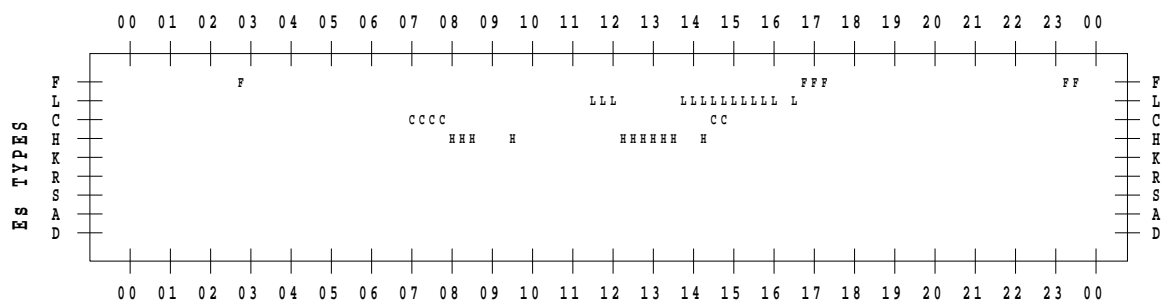
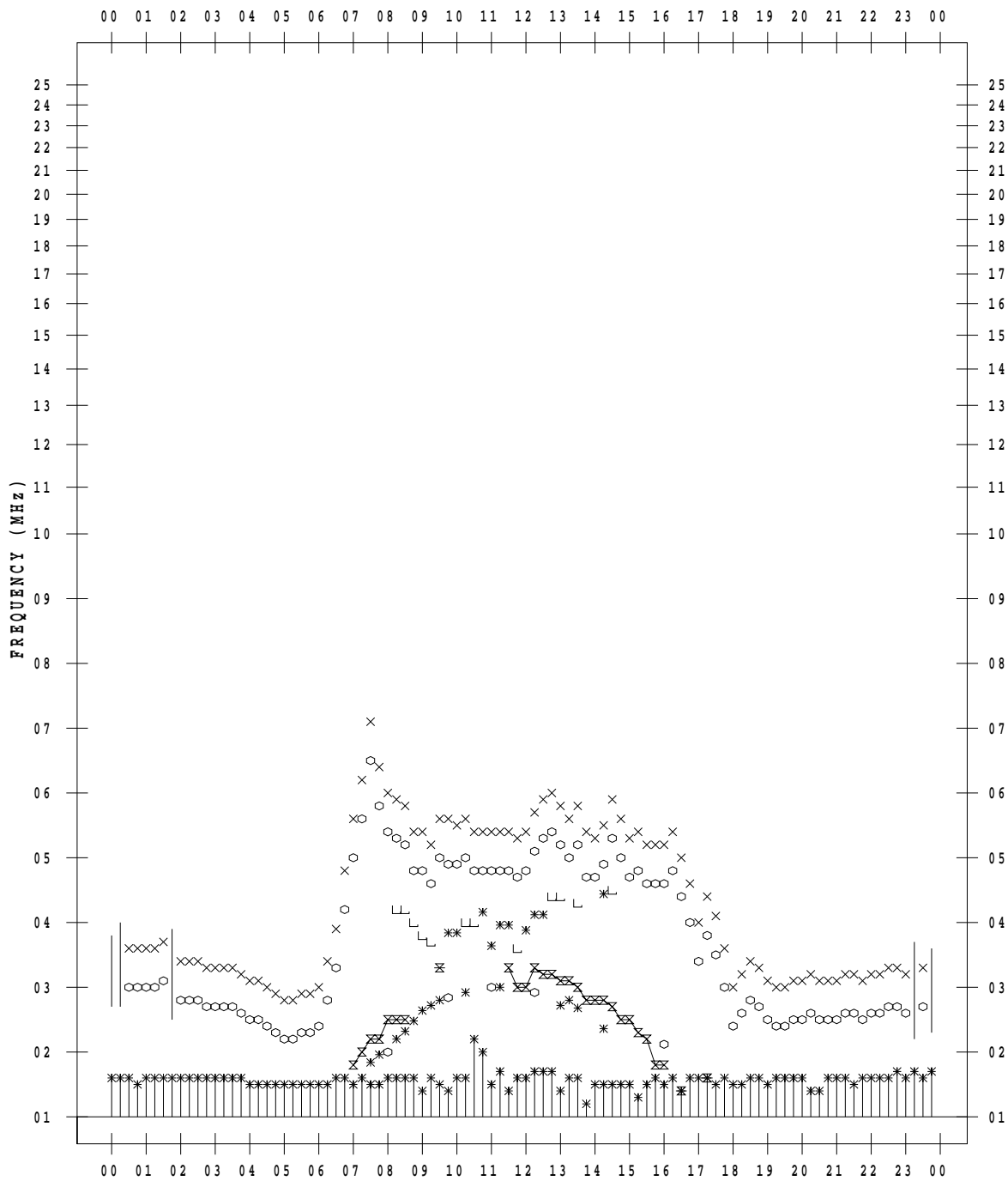
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/11

135 ° E MEAN TIME



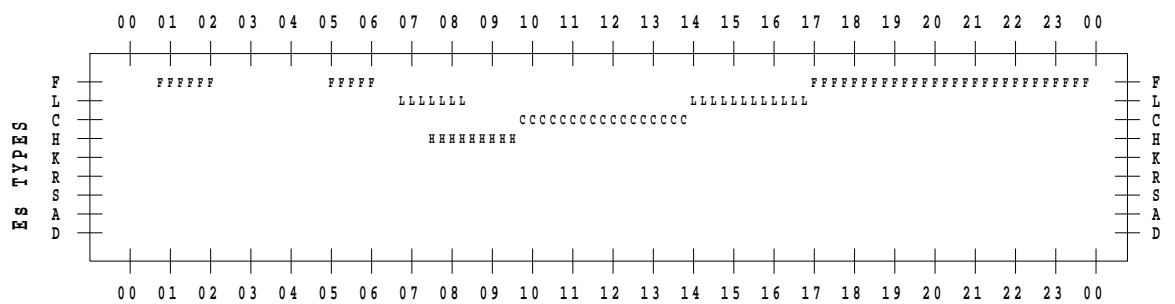
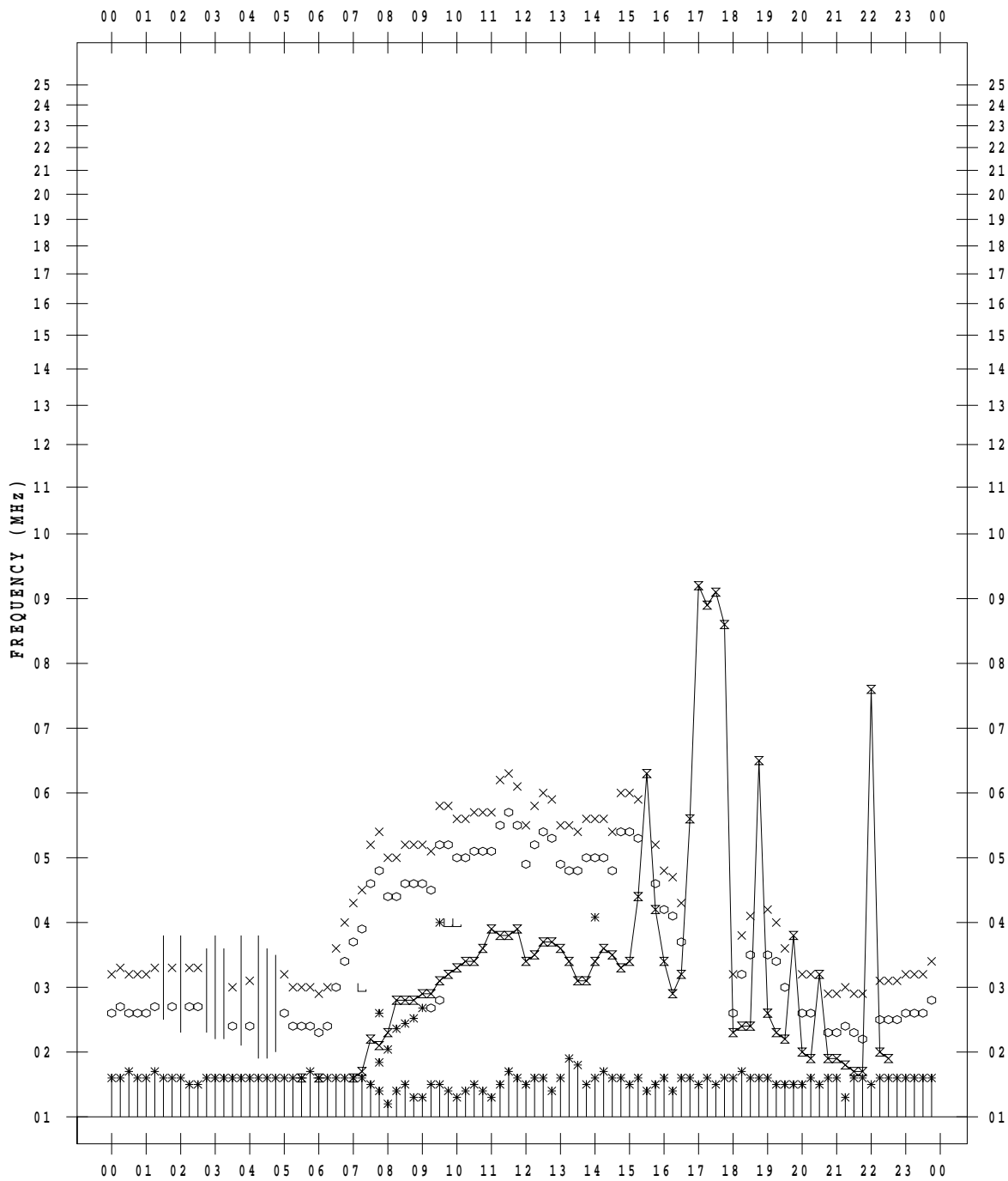
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/12

135 ° E MEAN TIME



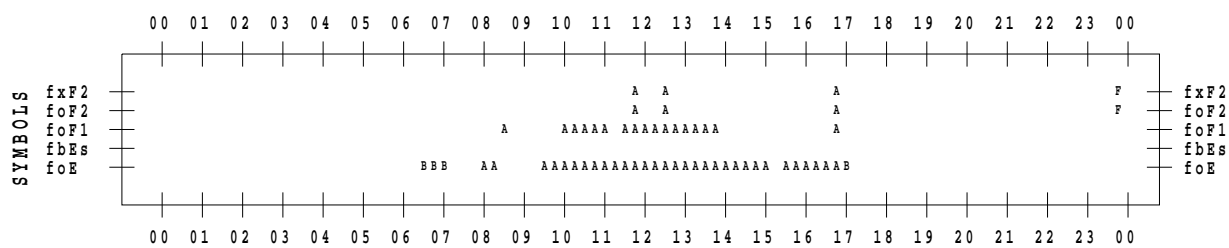
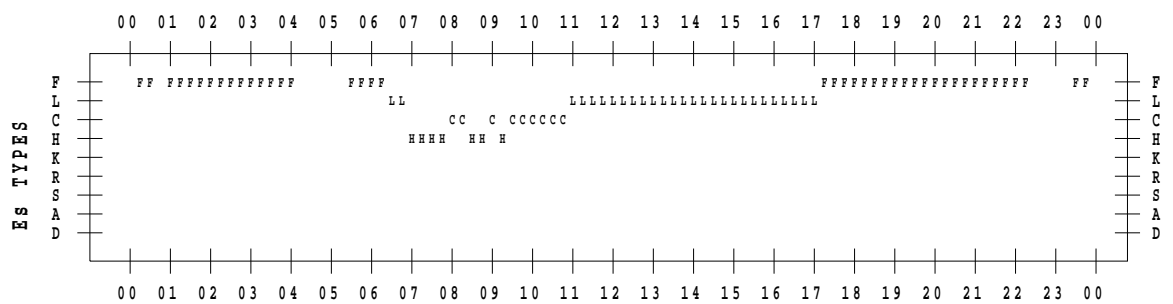
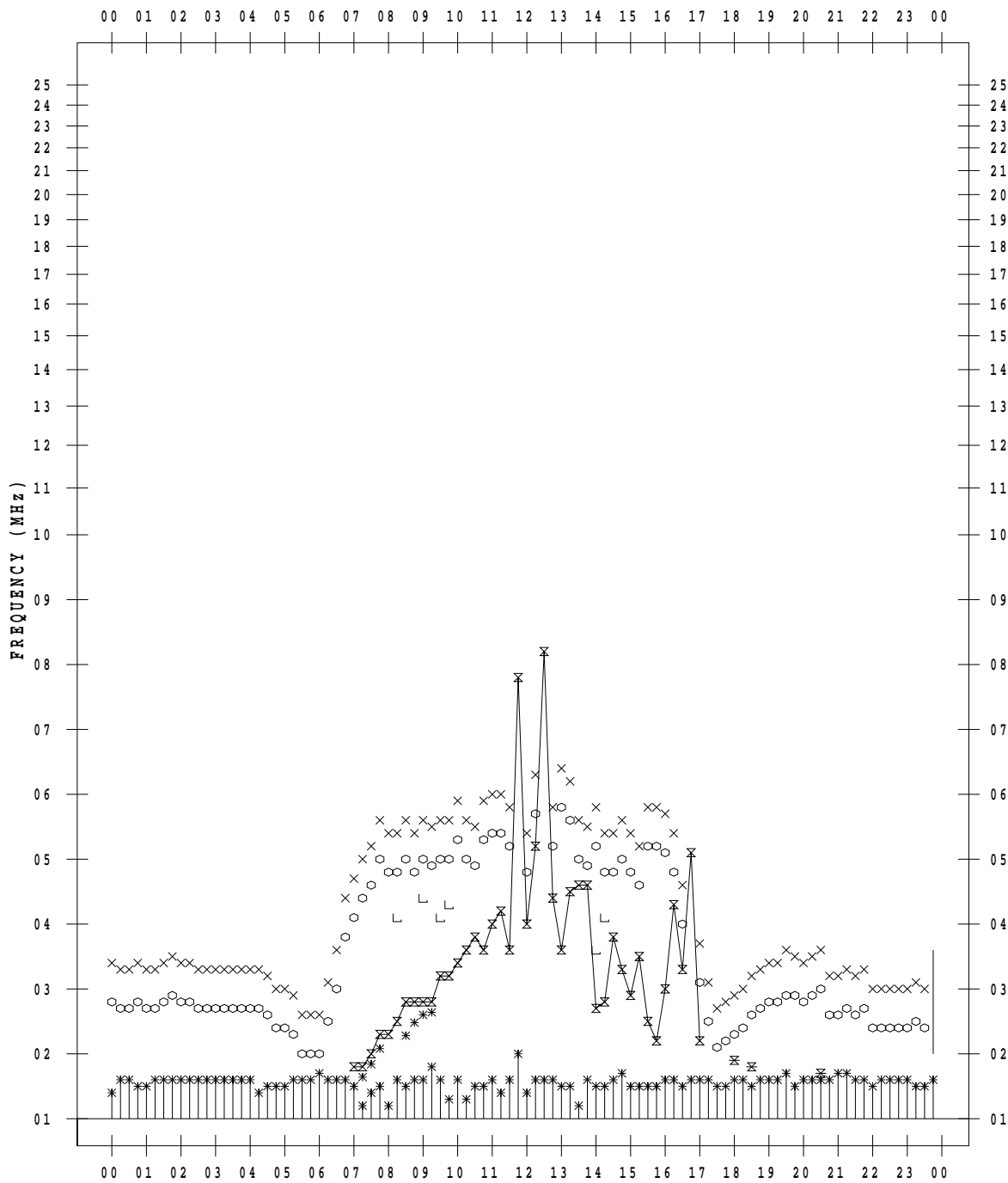
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/13

135 ° E MEAN TIME



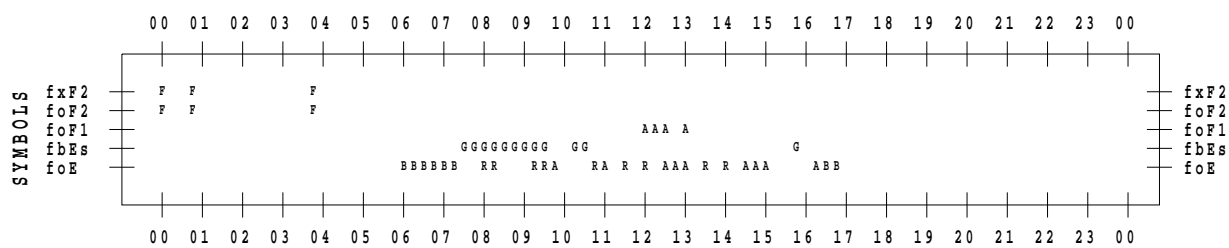
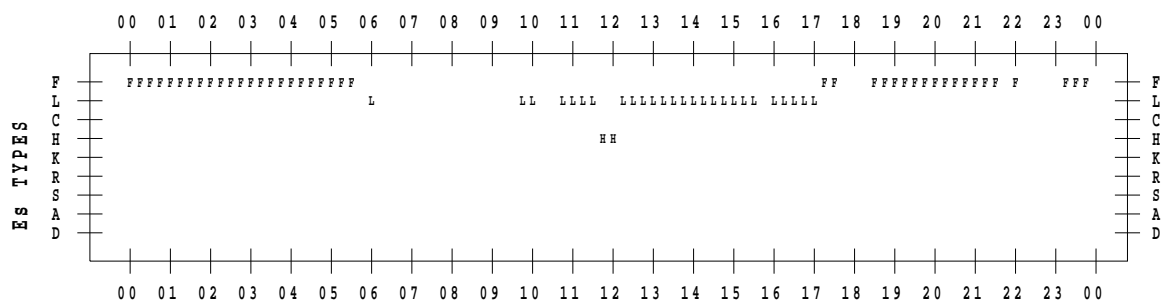
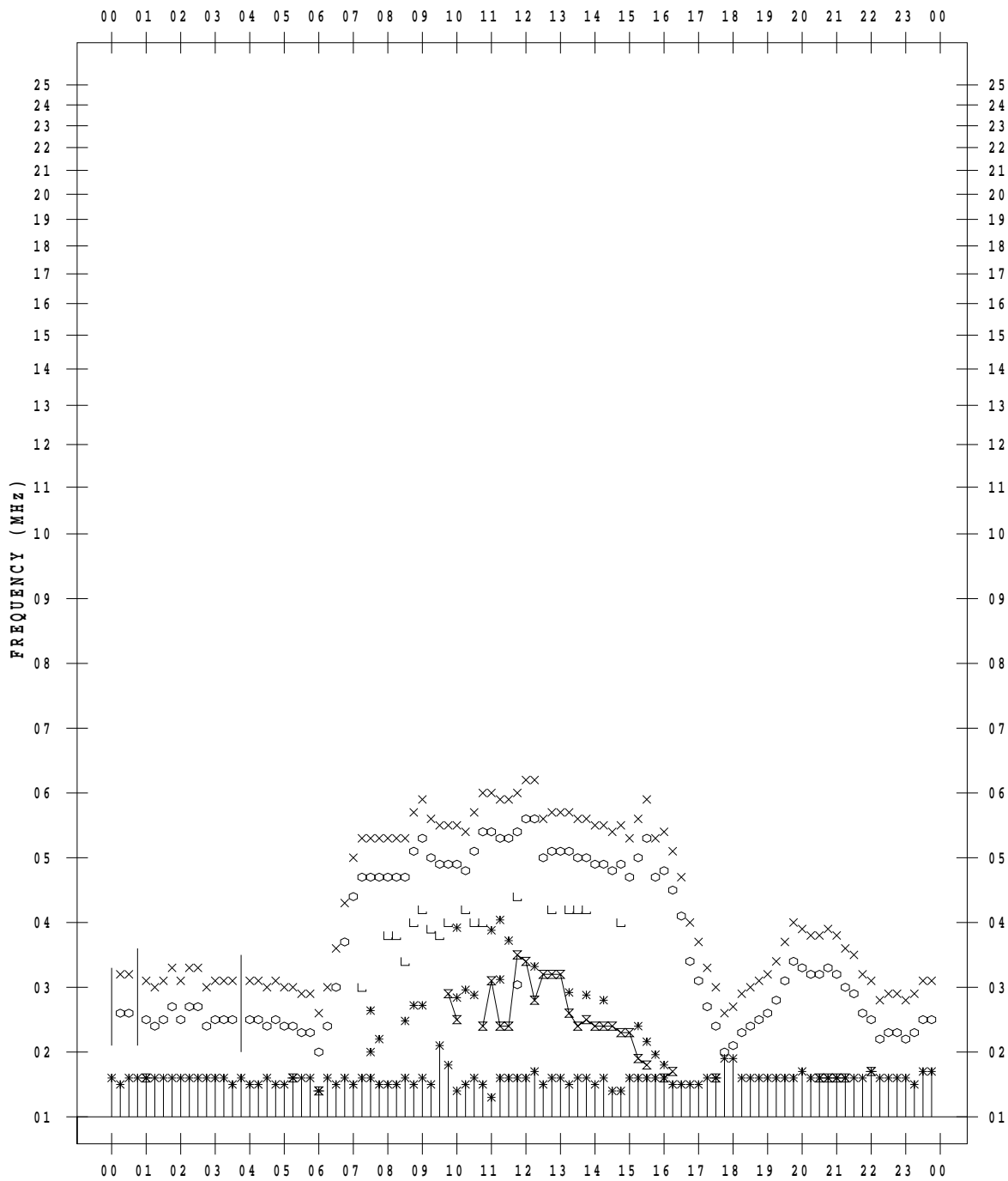
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/14

135 ° E MEAN TIME



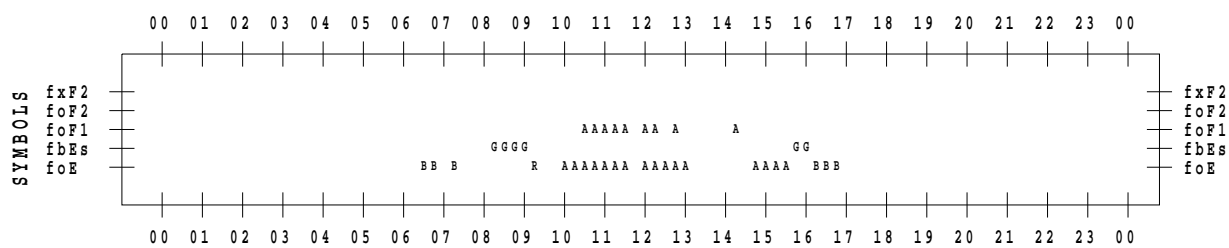
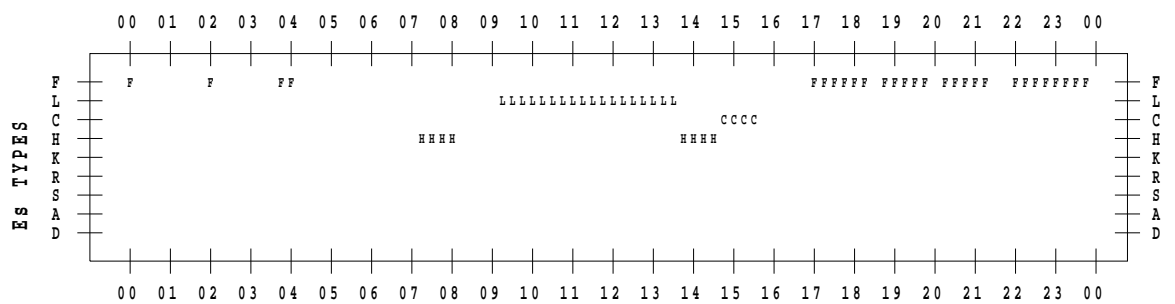
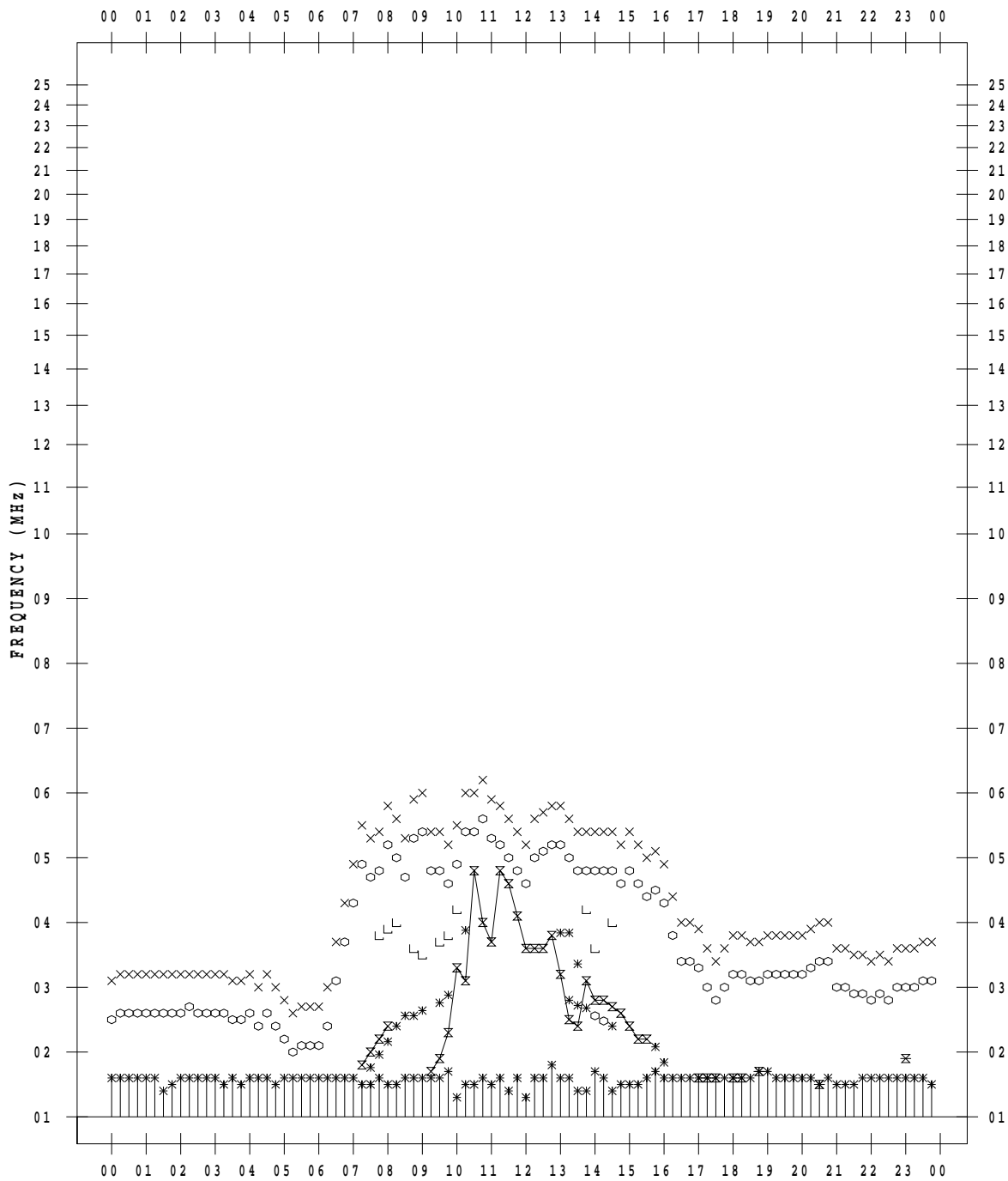
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/15

135 ° E MEAN TIME



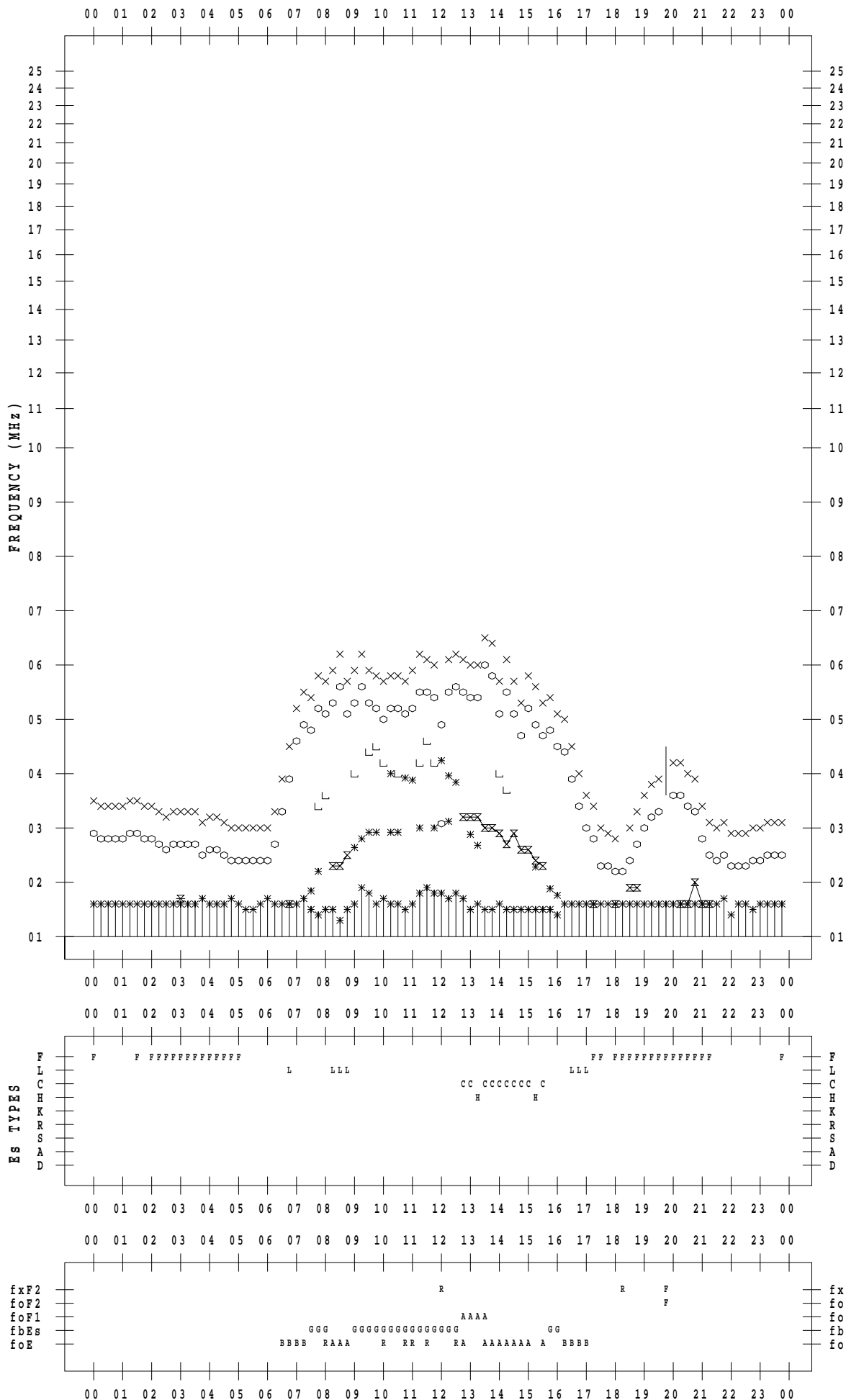
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/16

135 ° E MEAN TIME



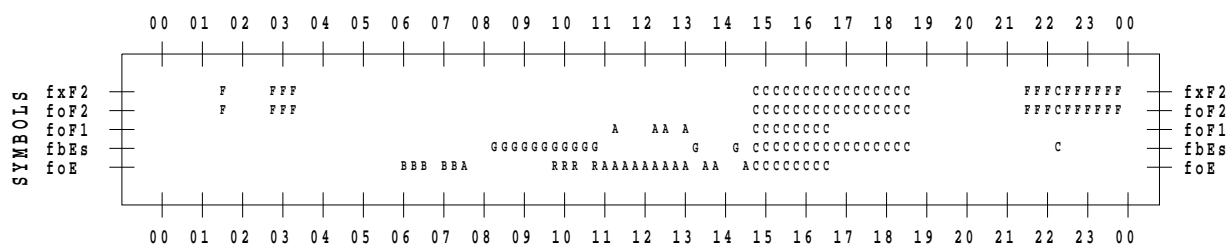
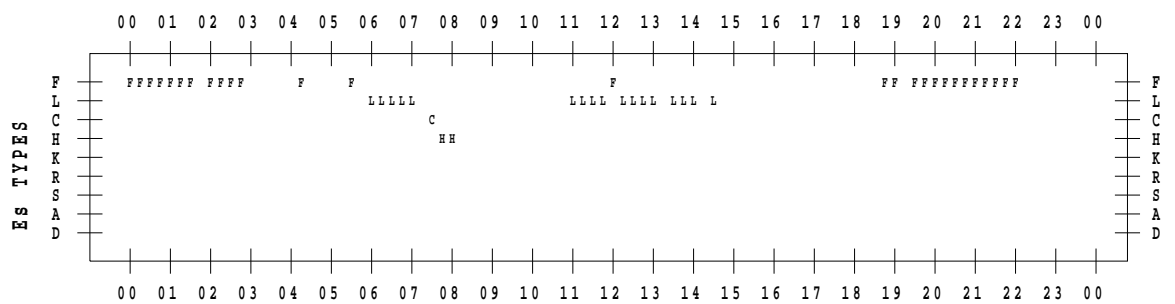
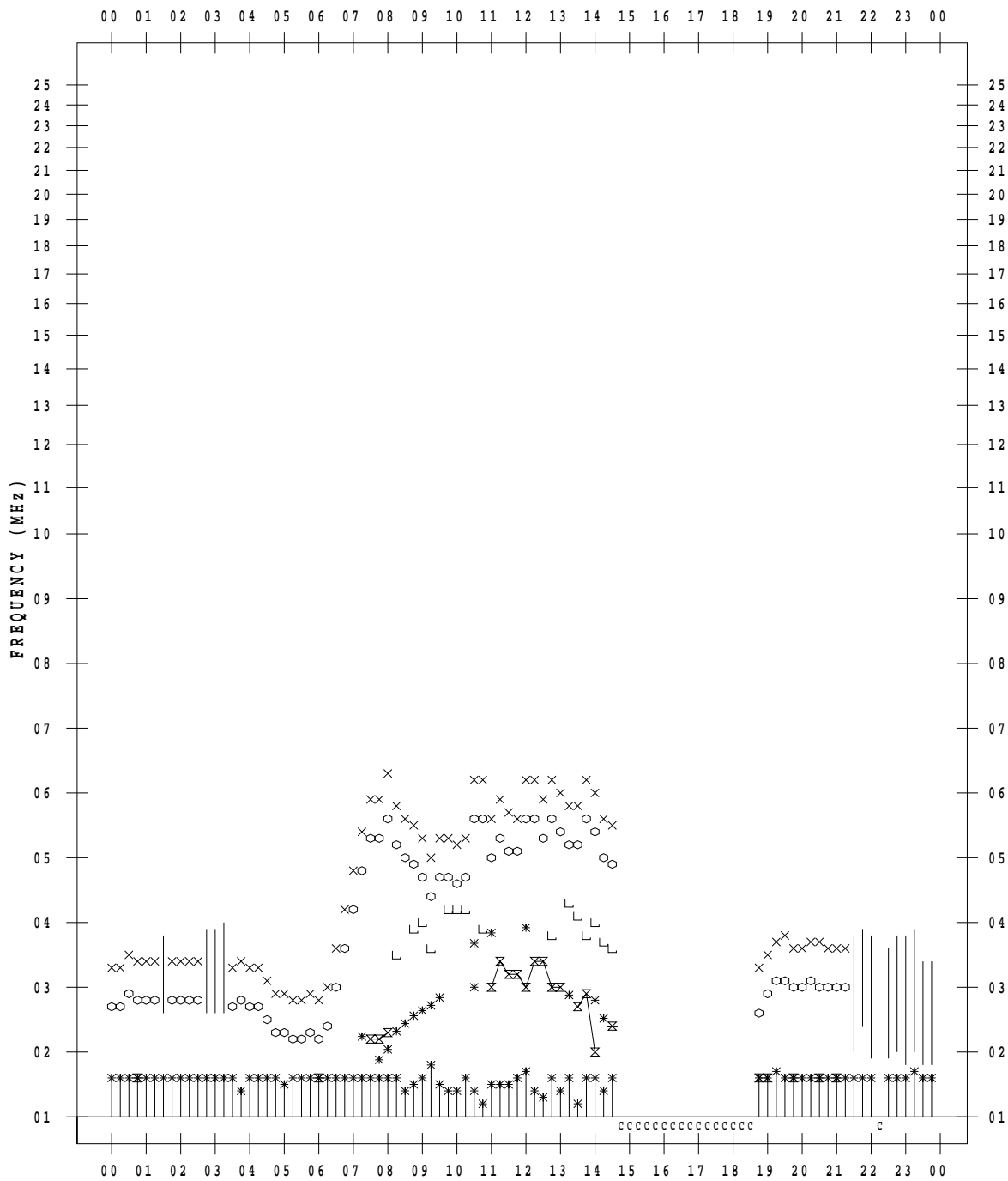
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/17

135 ° E MEAN TIME



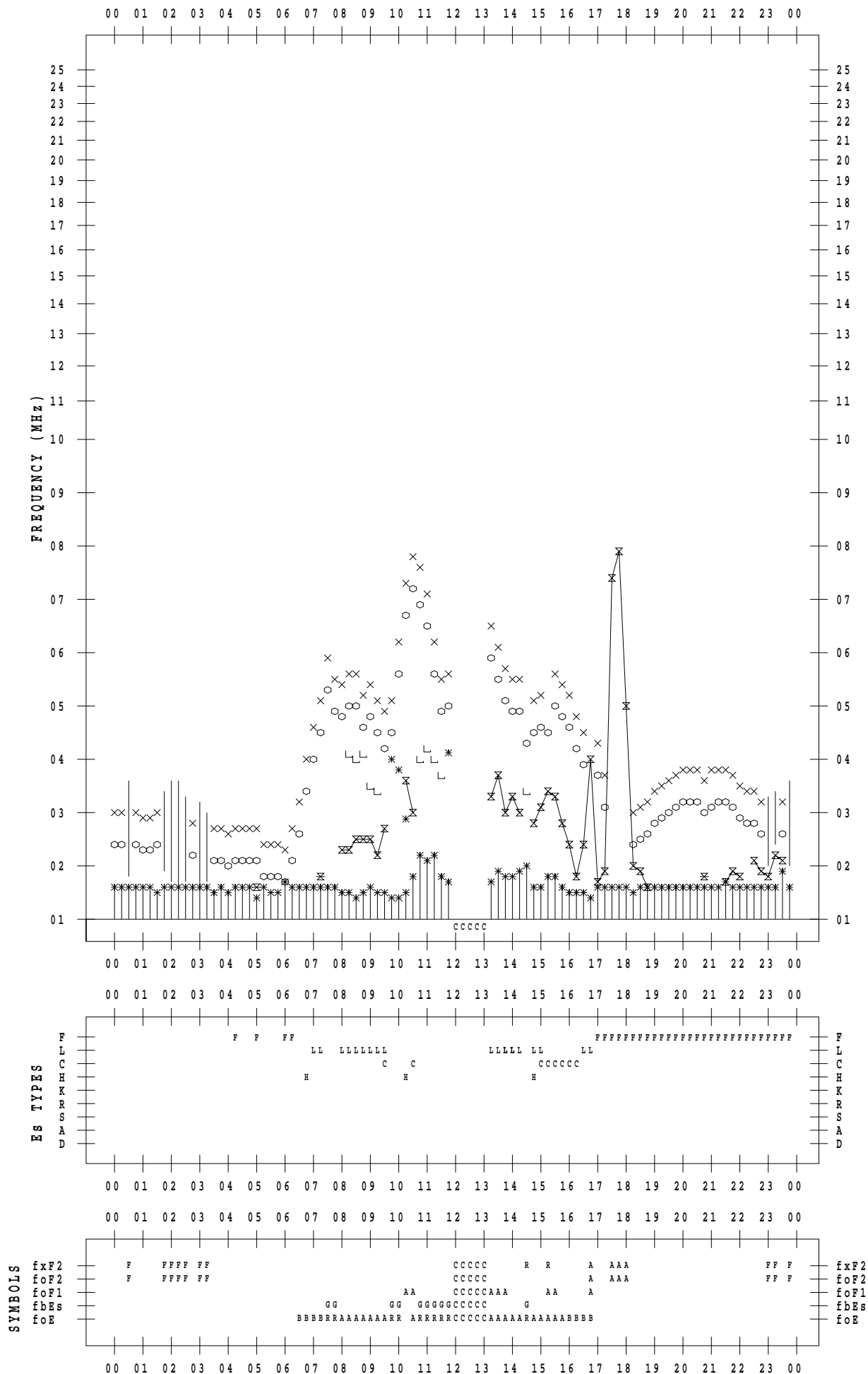
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/18

135 ° E MEAN TIME



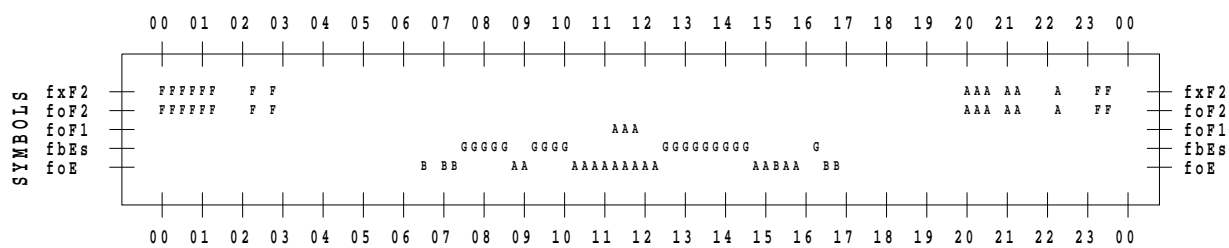
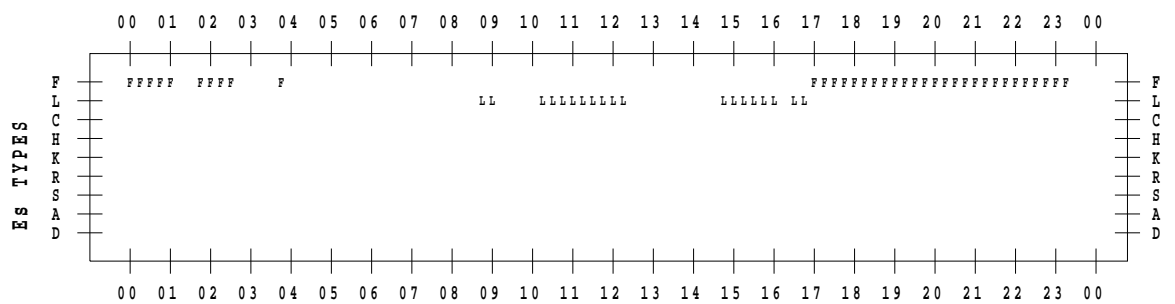
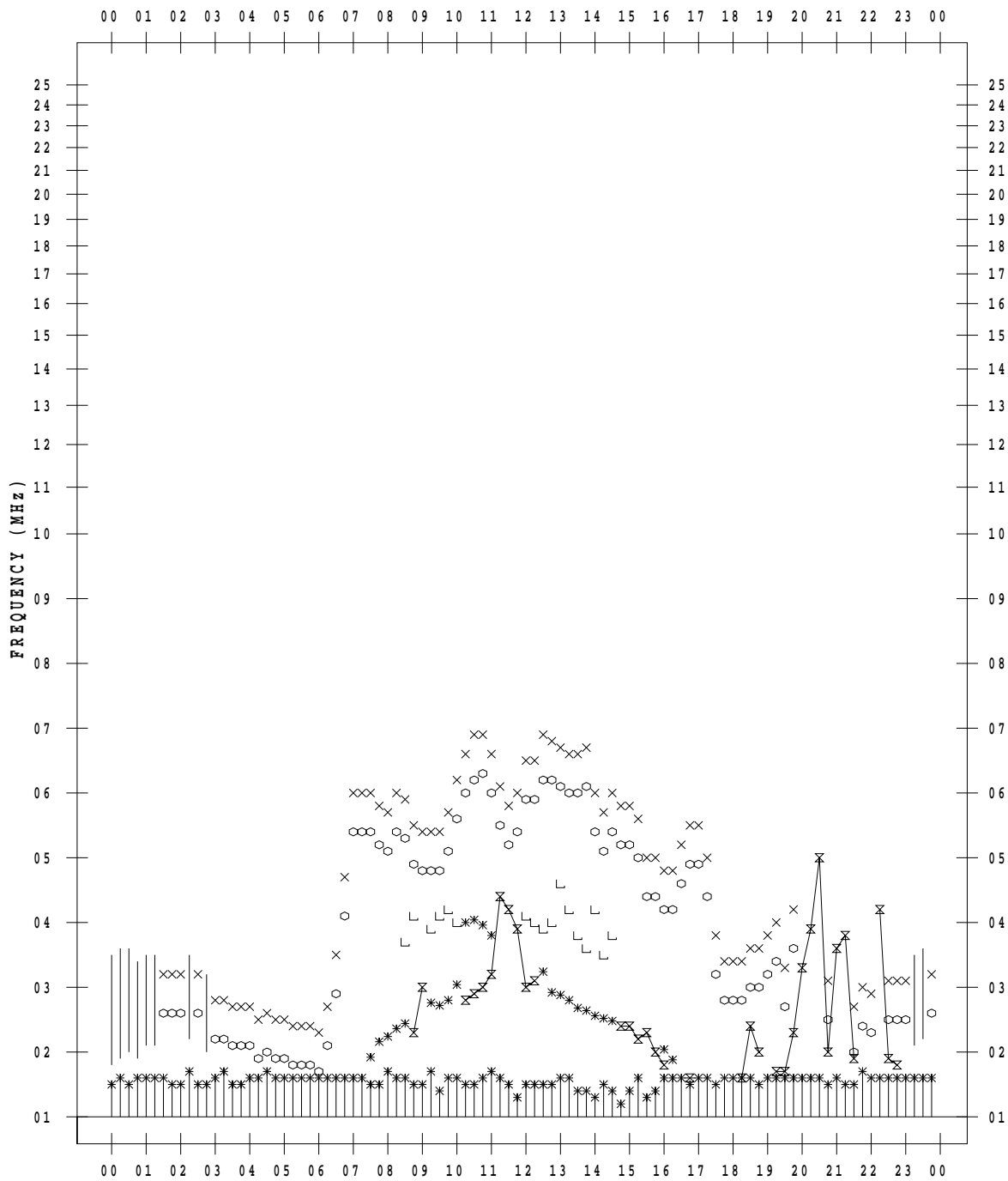
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/19

135 ° E MEAN TIME



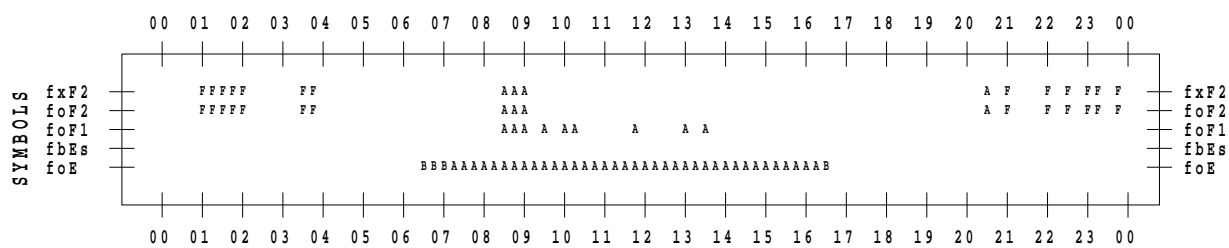
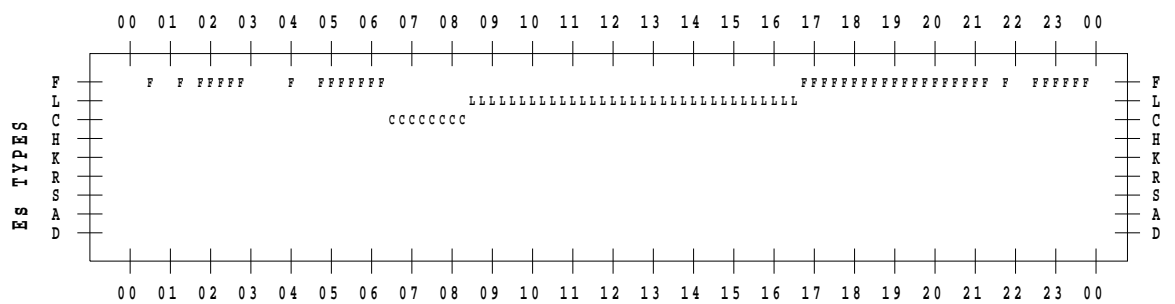
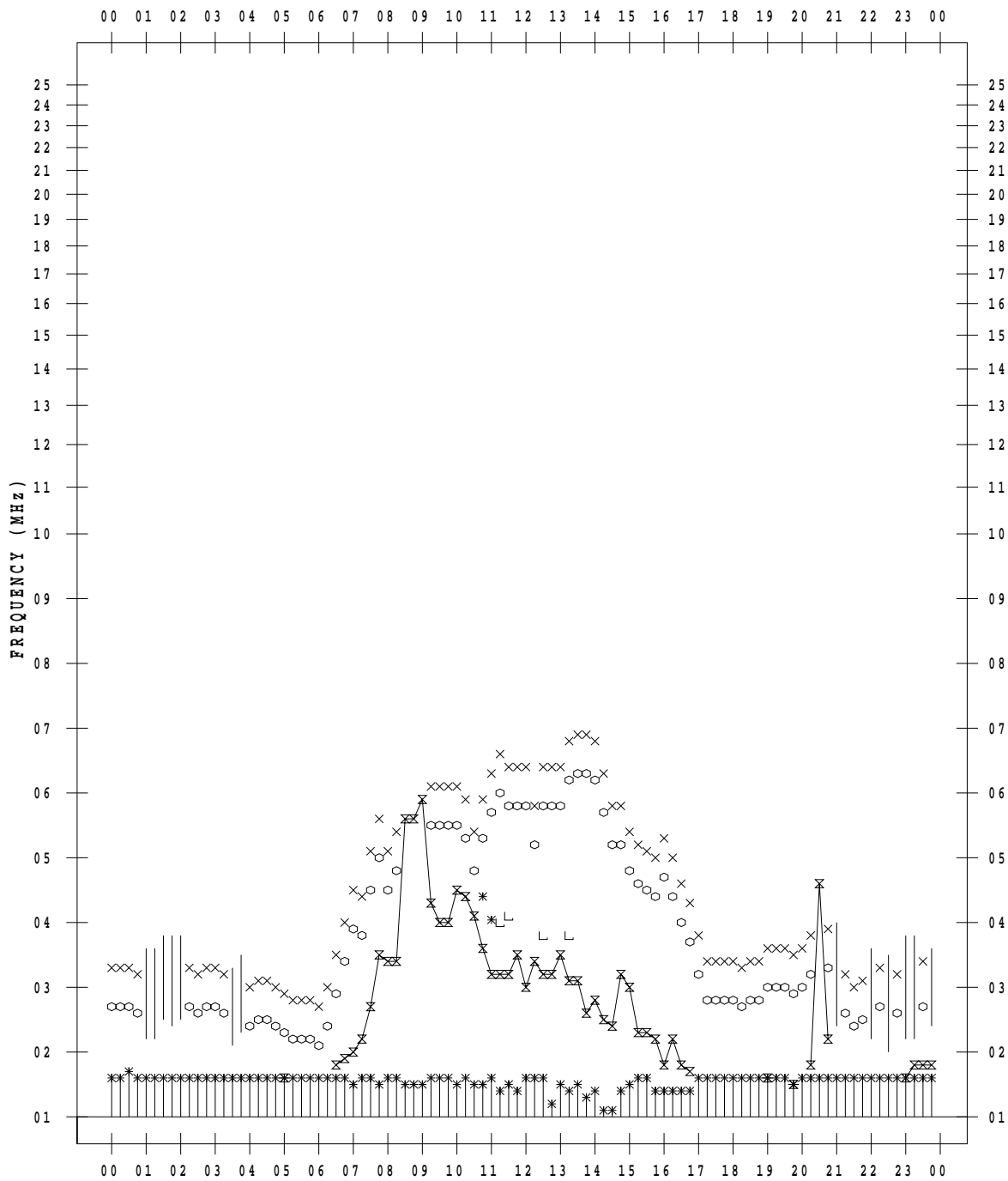
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/20

135 ° E MEAN TIME



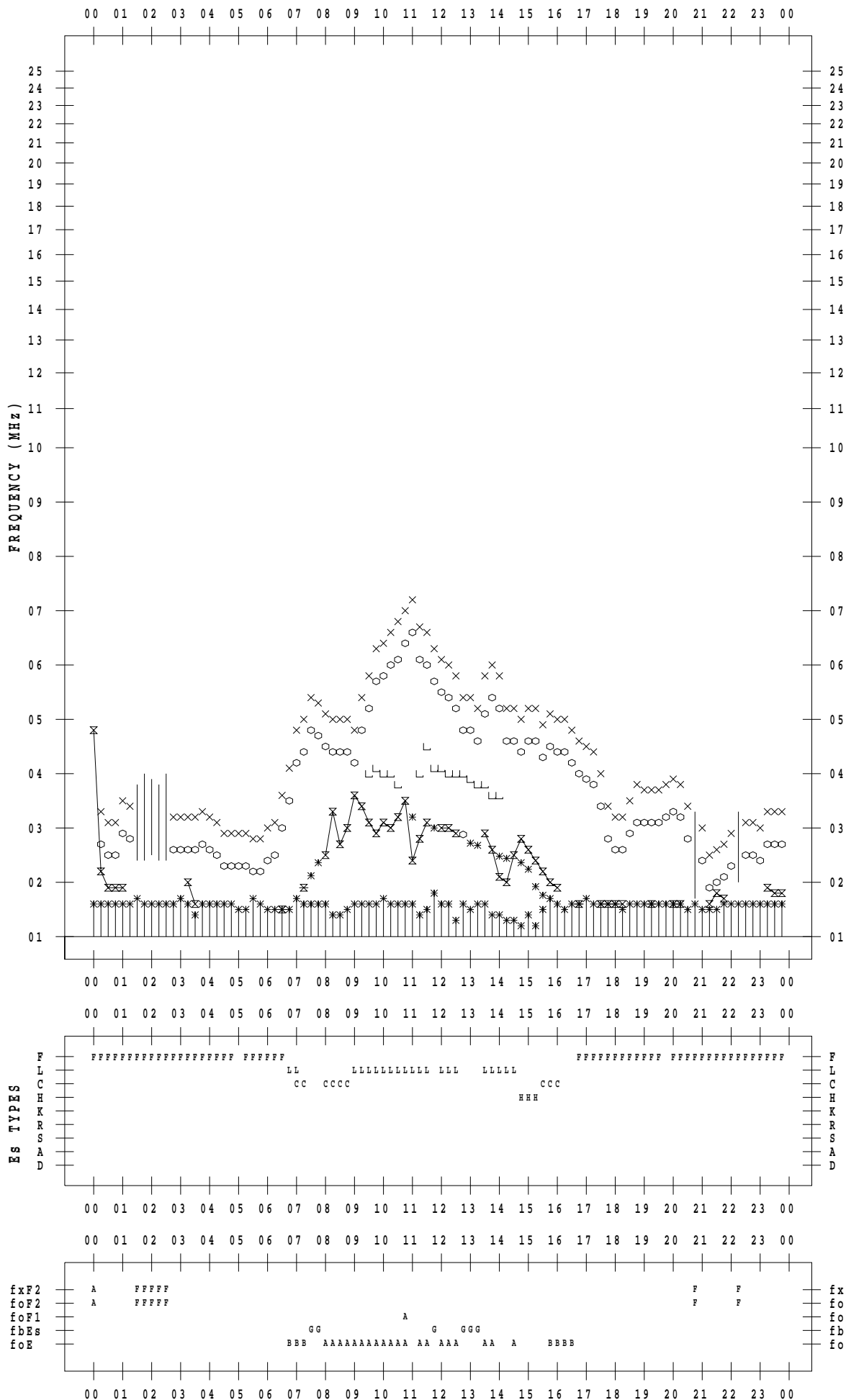
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/21

135 ° E MEAN TIME



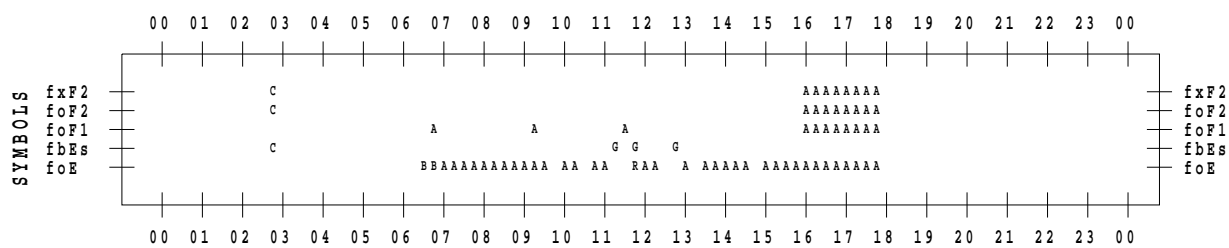
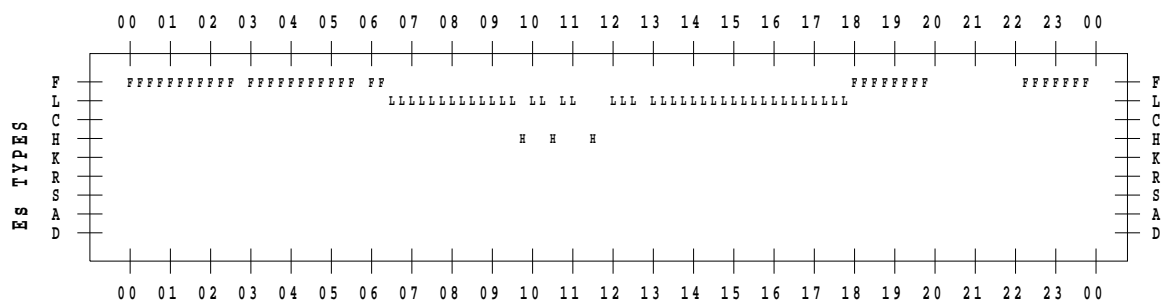
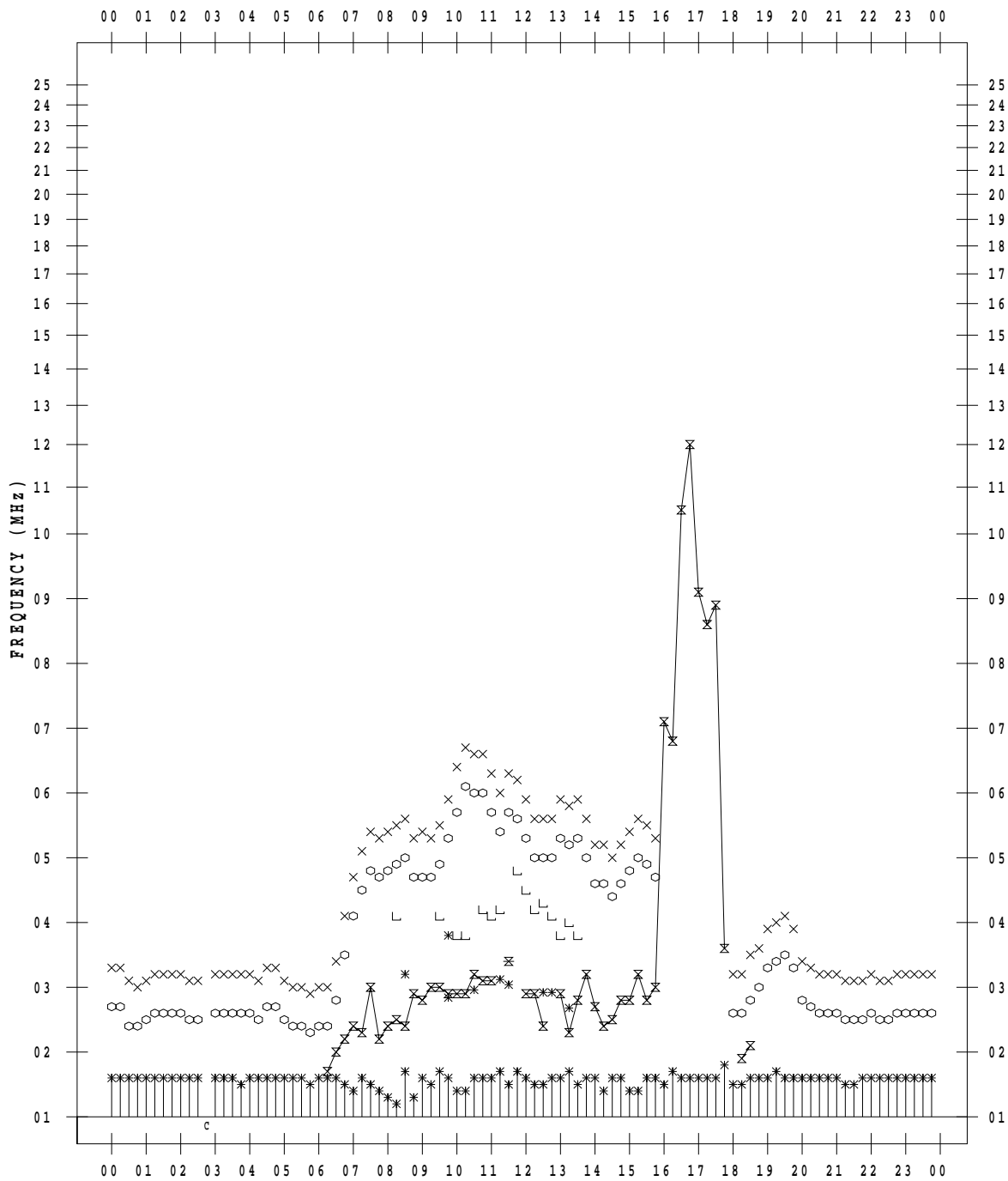
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/22

135 ° E MEAN TIME



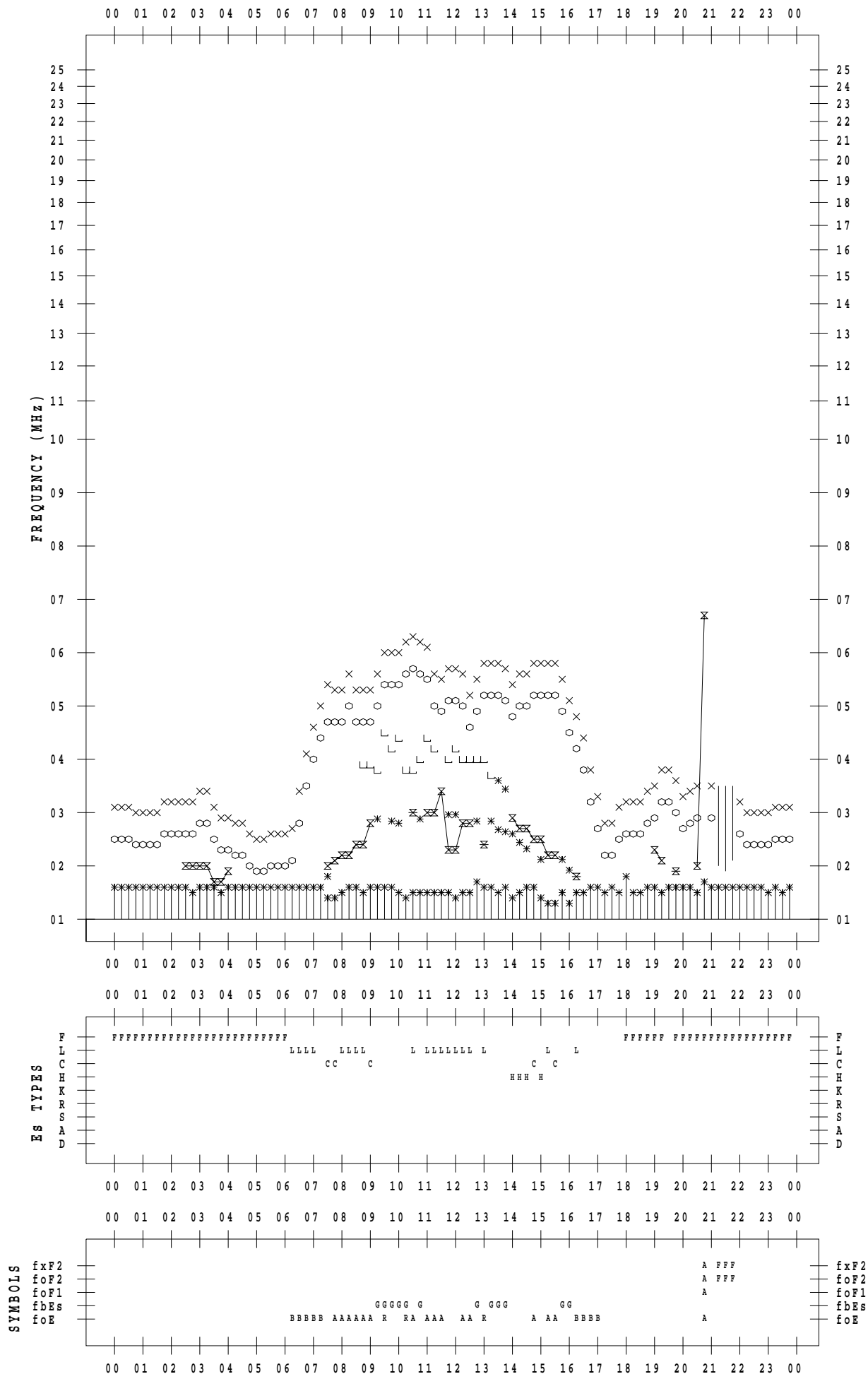
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/23

135 ° E MEAN TIME



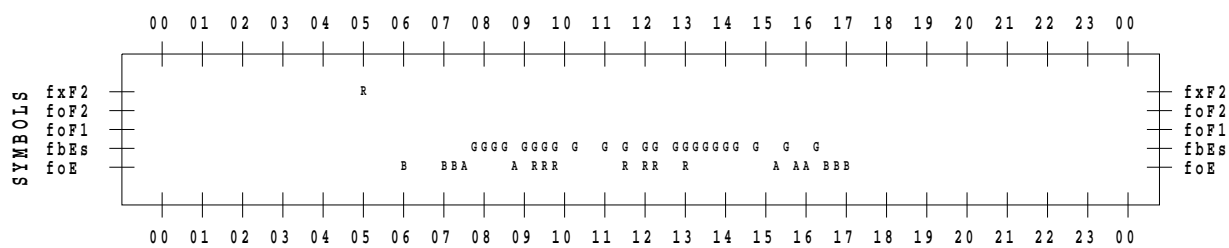
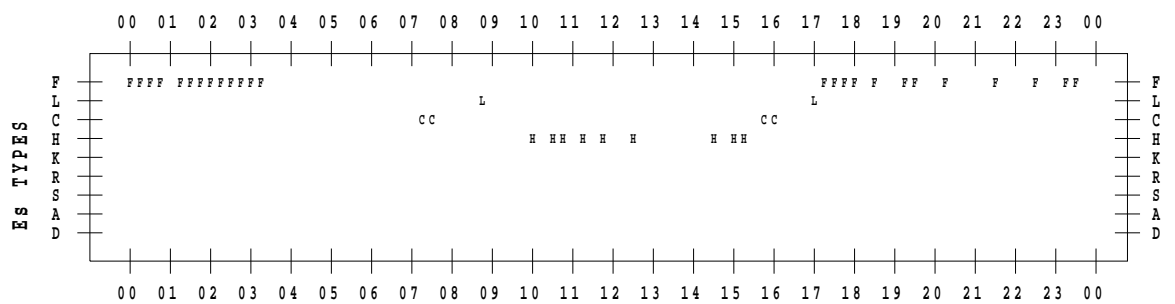
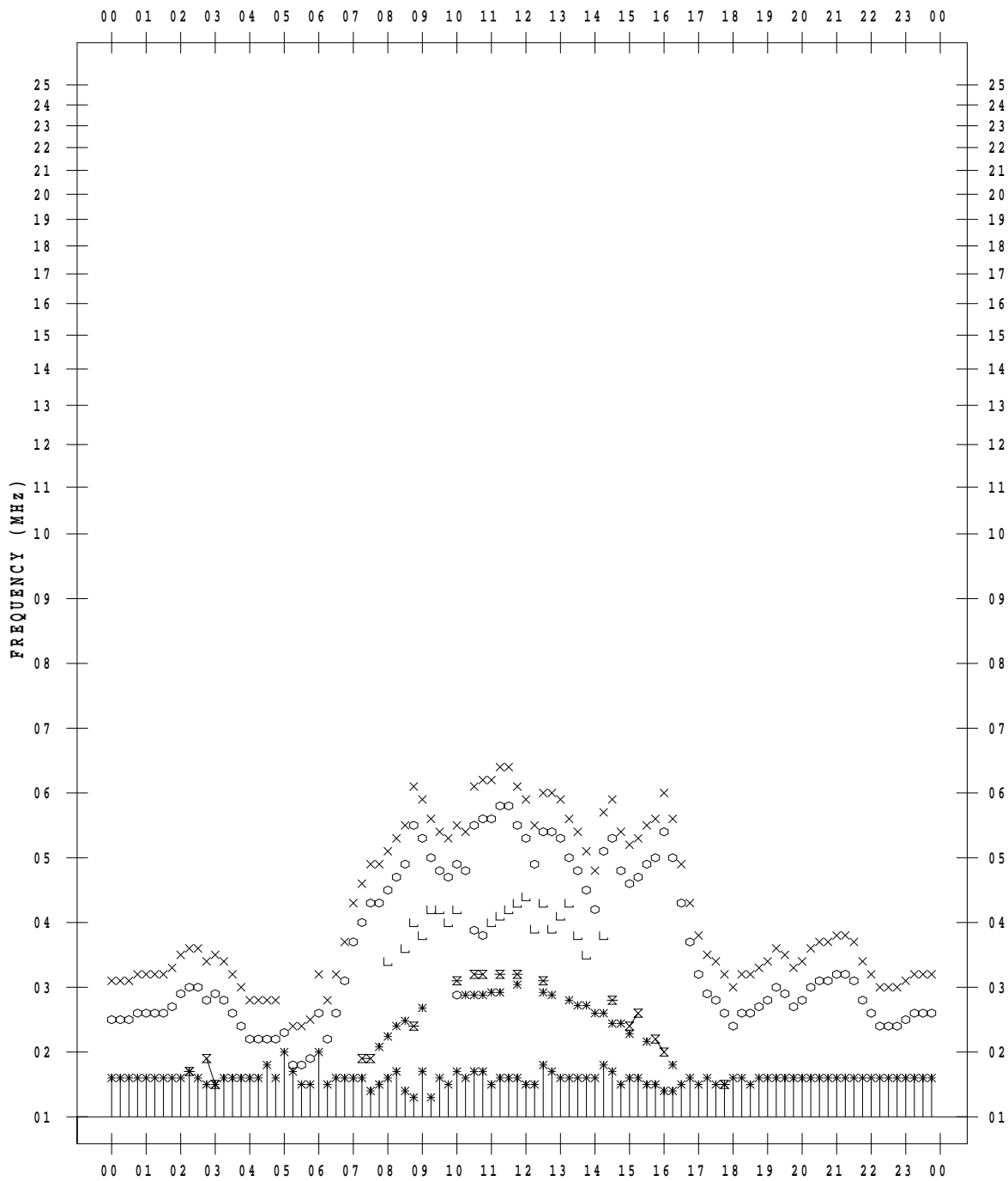
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/24

135 ° E MEAN TIME



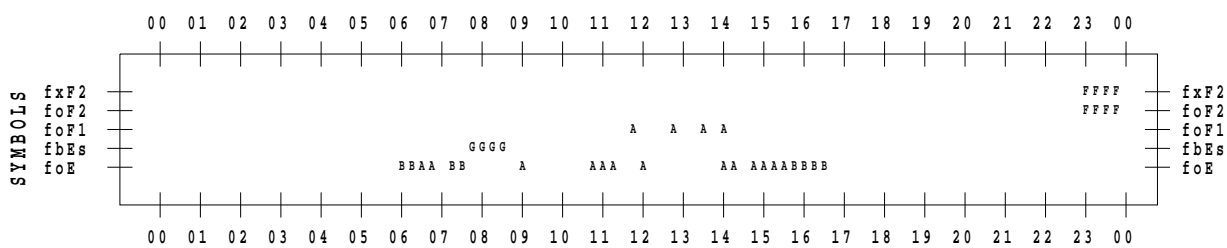
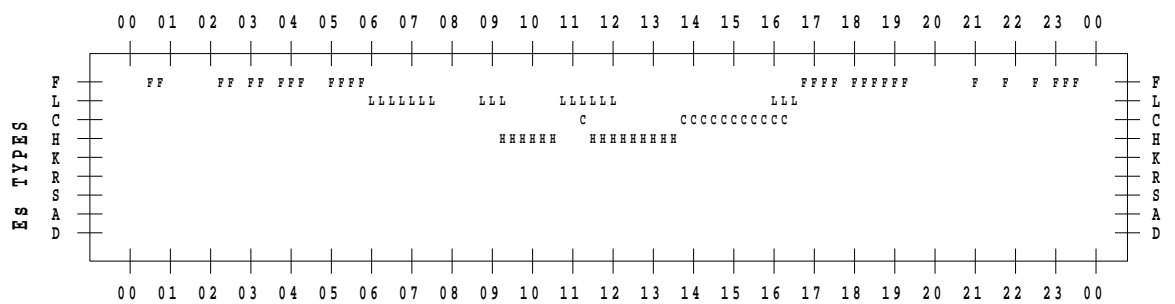
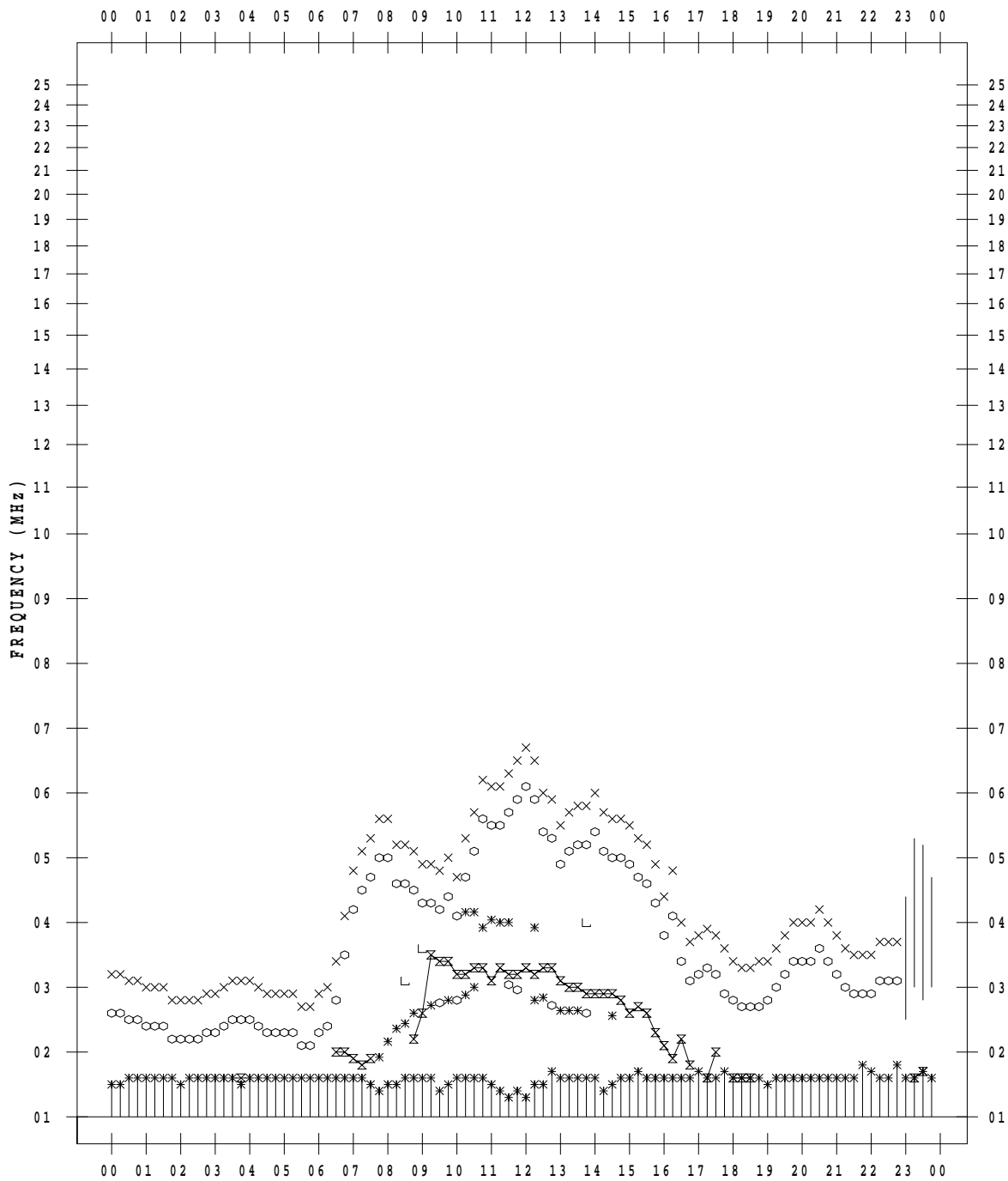
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/25

135 ° E MEAN TIME



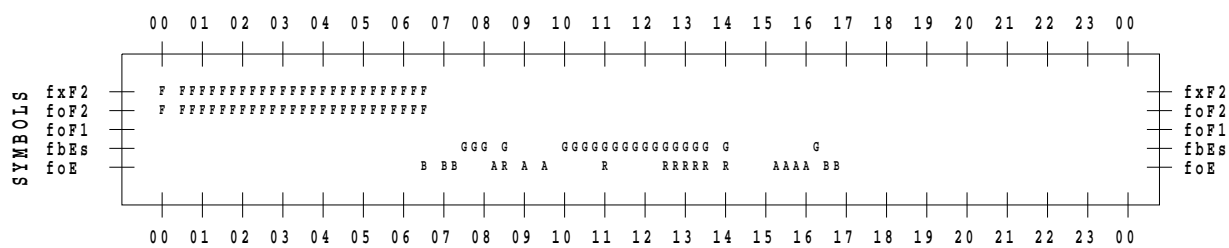
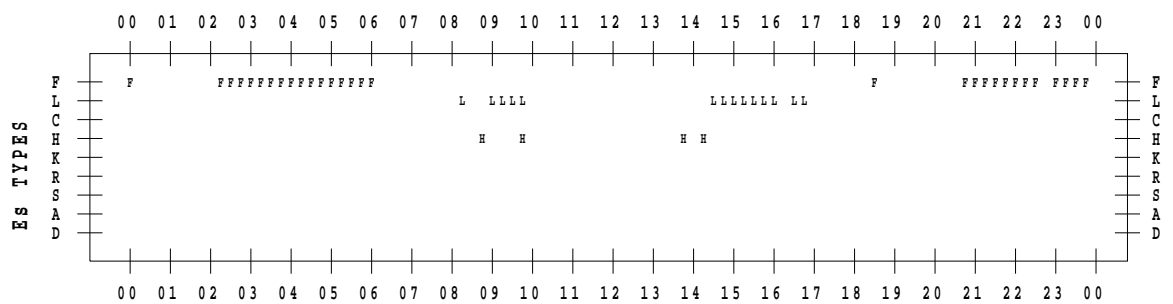
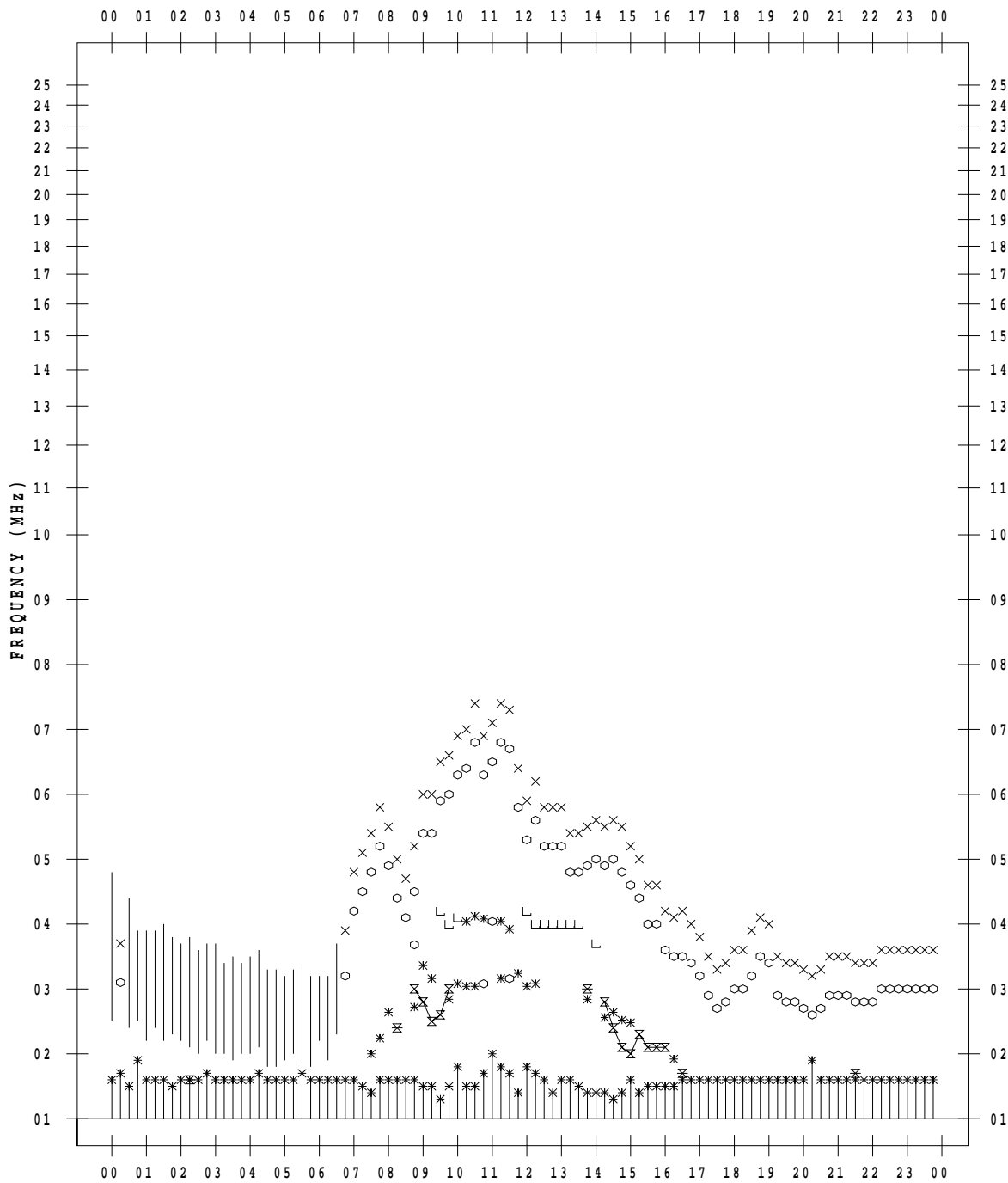
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/26

135 ° E MEAN TIME



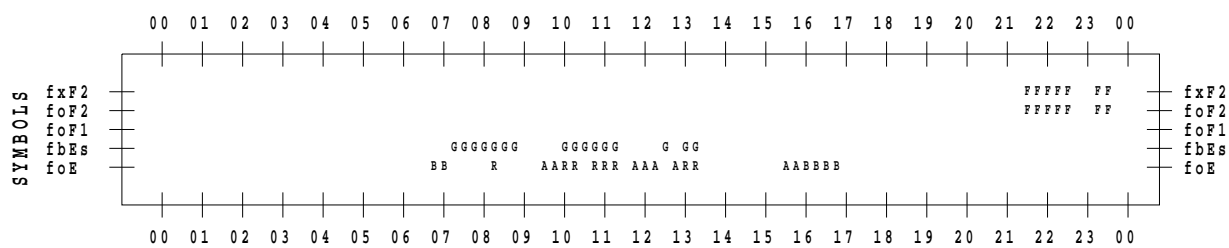
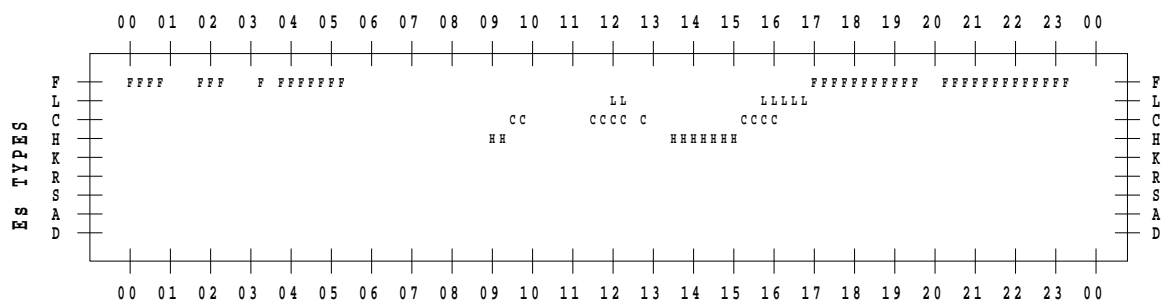
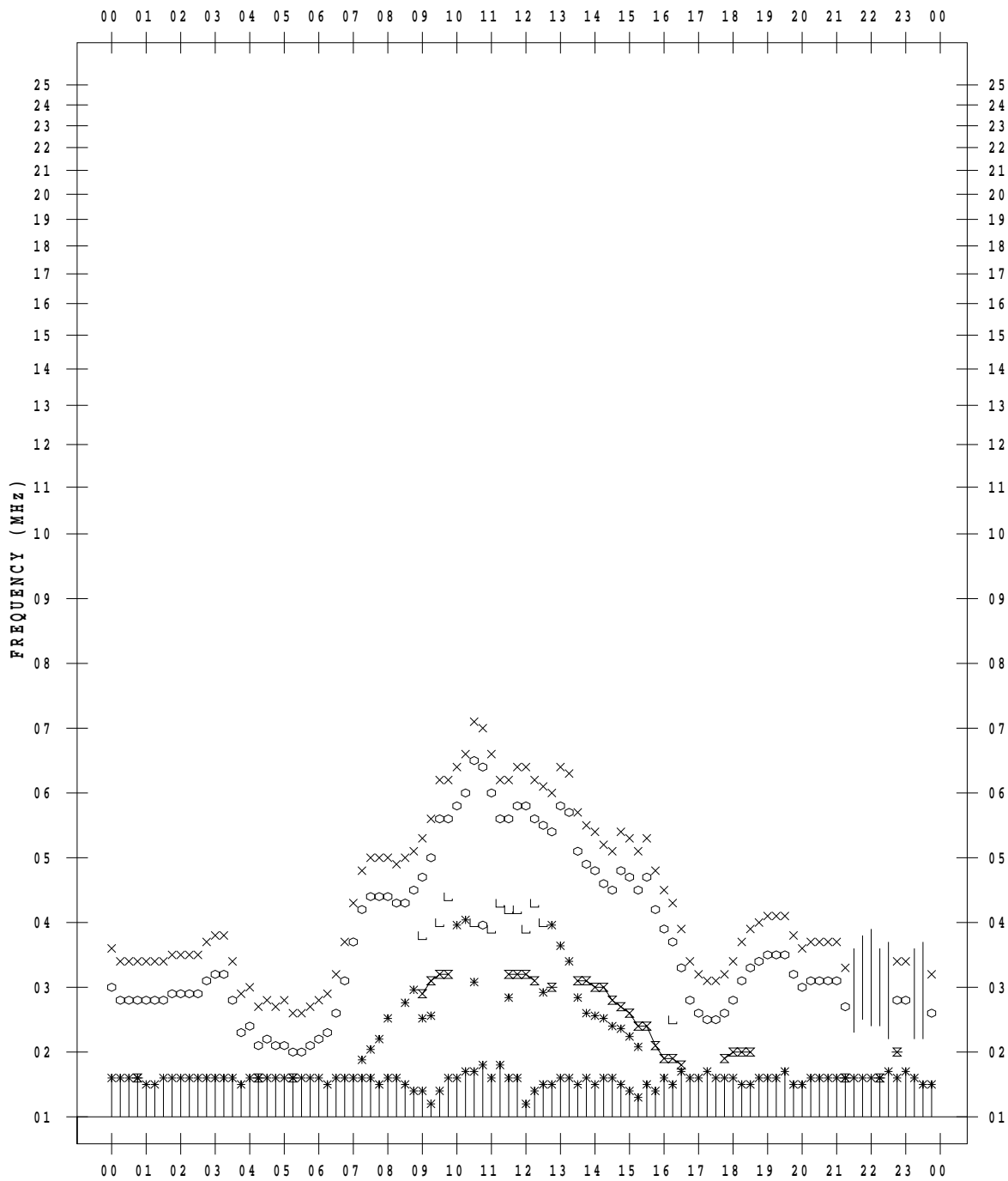
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/27

135 ° E MEAN TIME



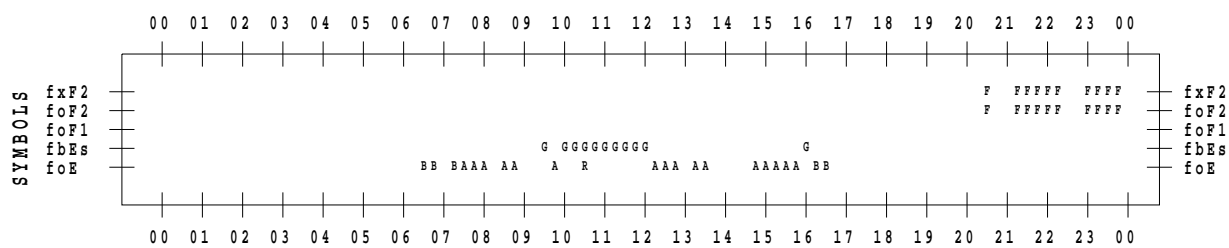
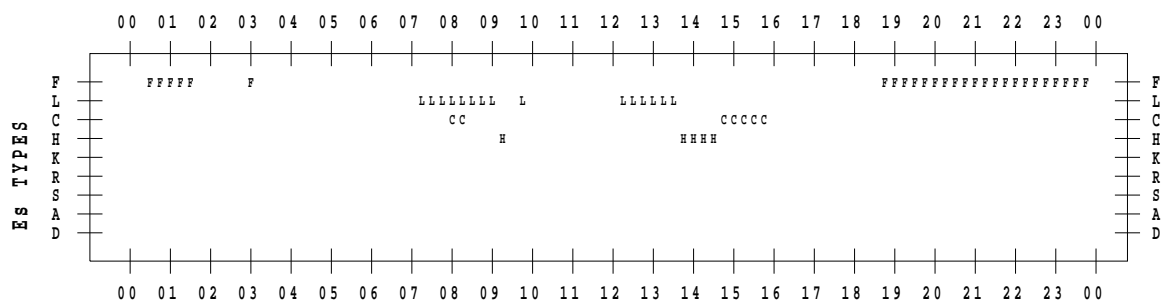
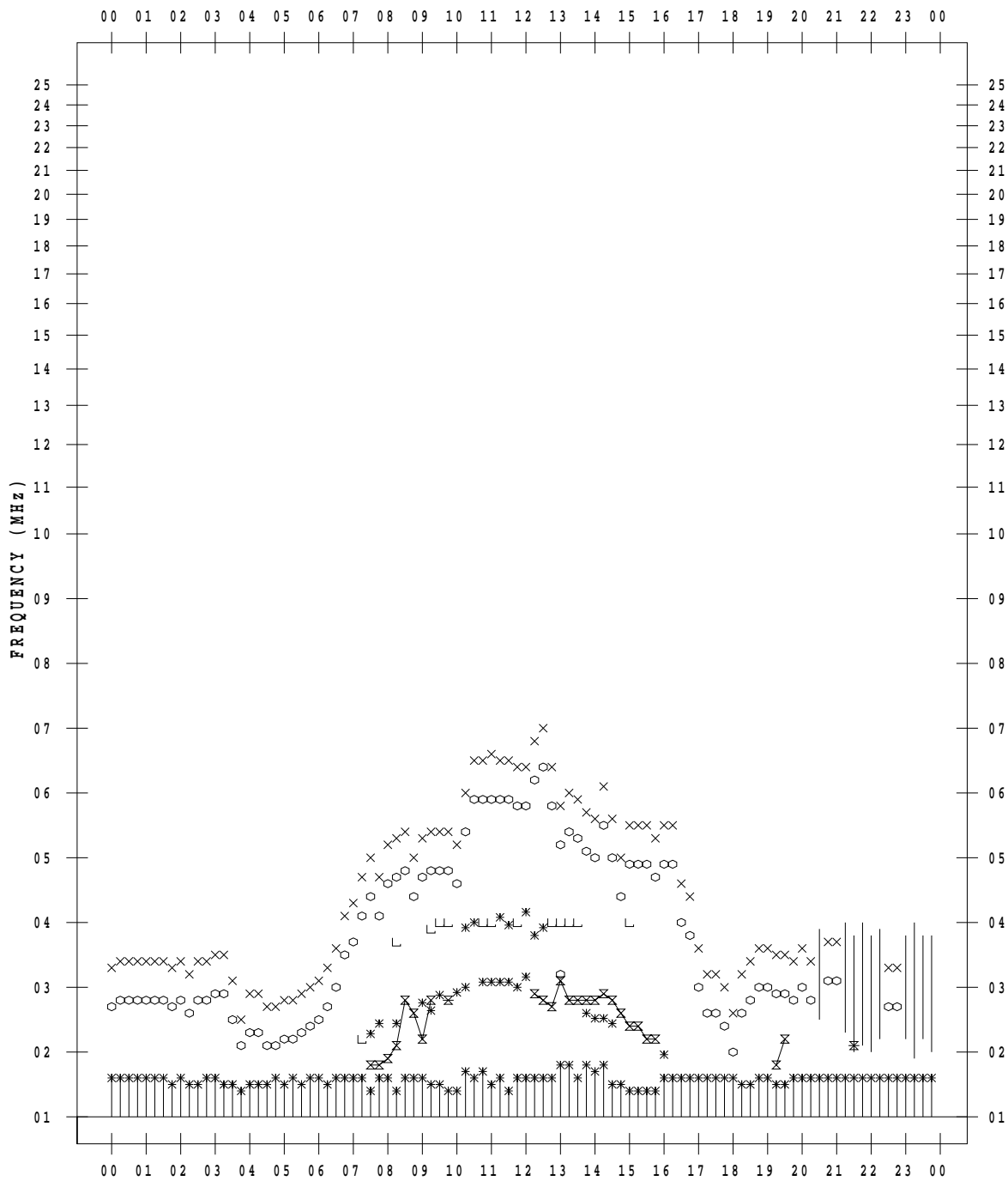
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/28

135 ° E MEAN TIME



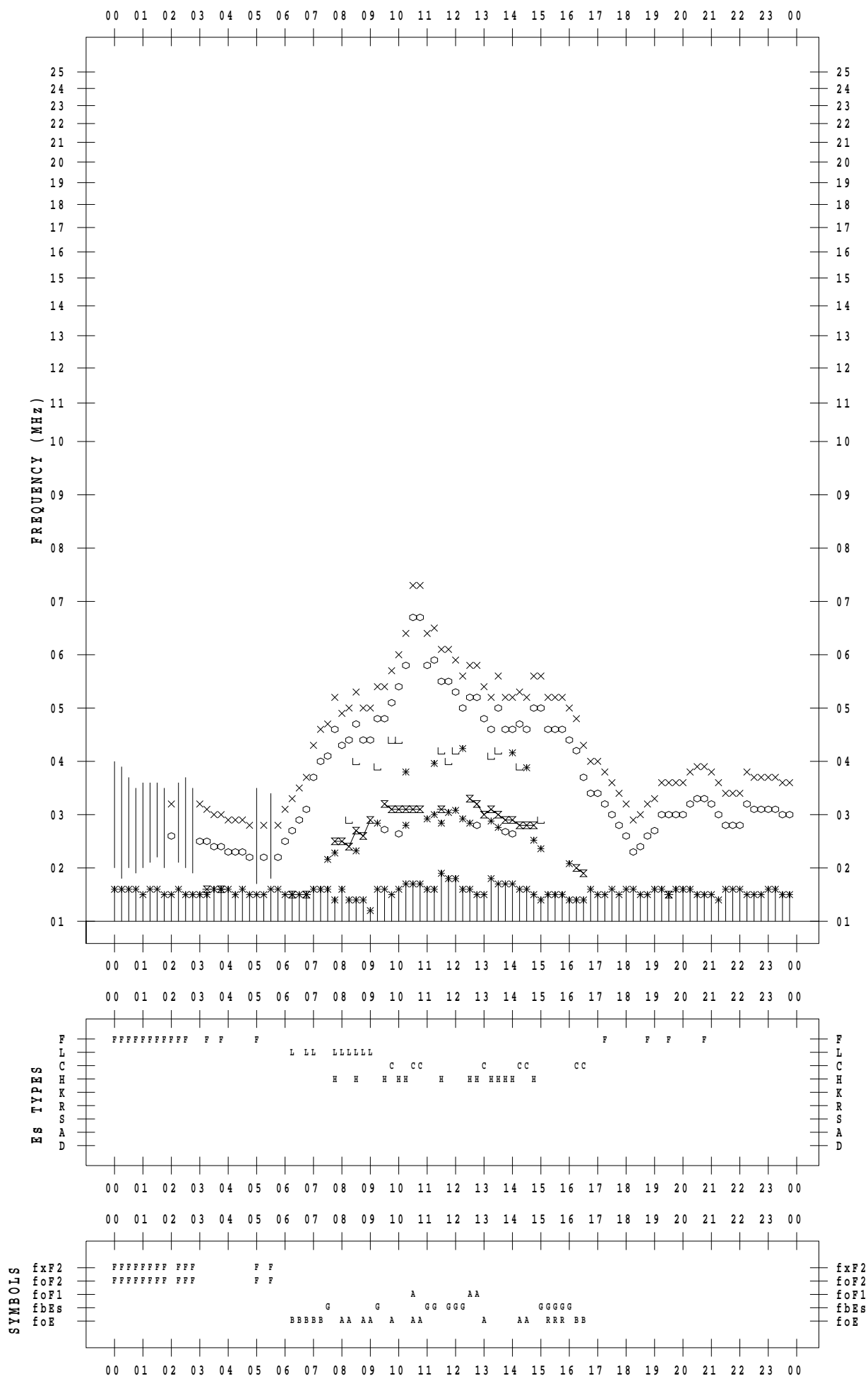
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/29

135 ° E MEAN TIME



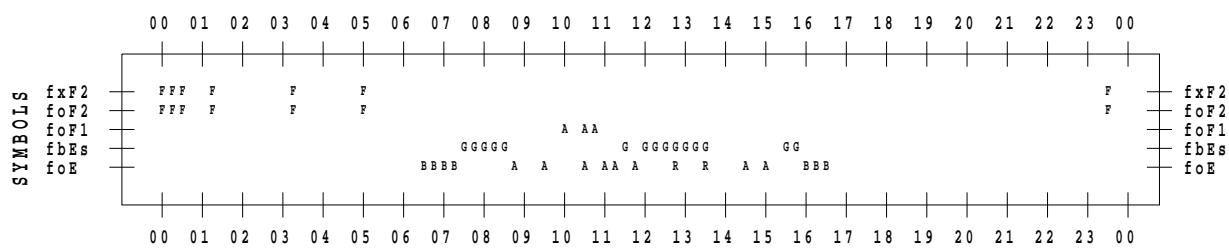
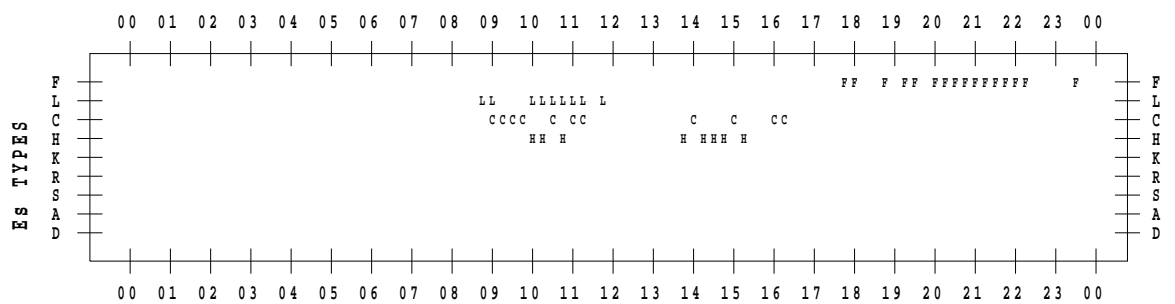
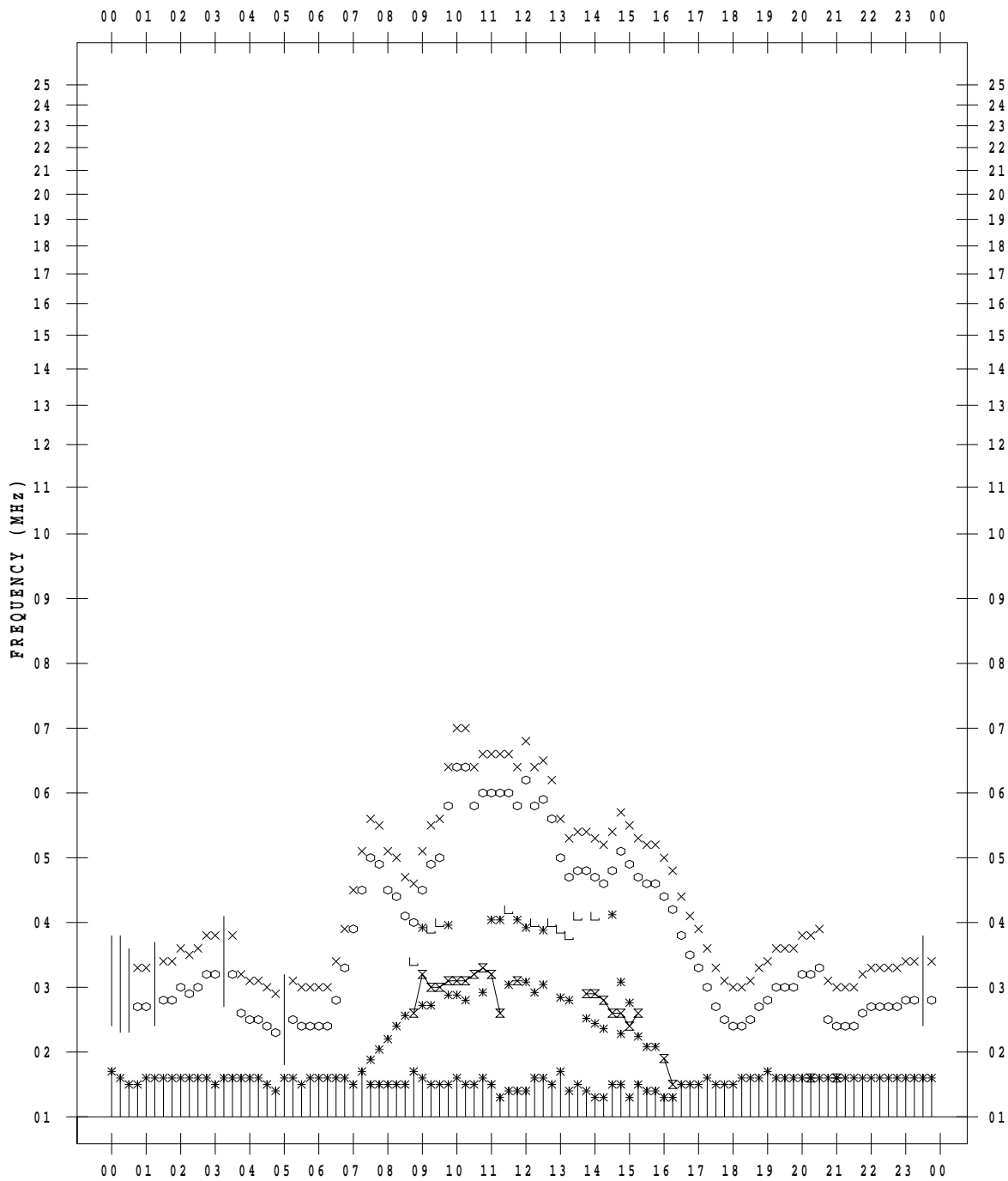
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/30

135 ° E MEAN TIME



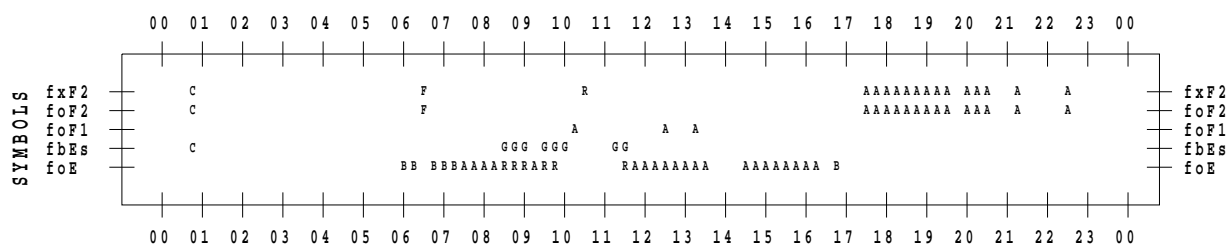
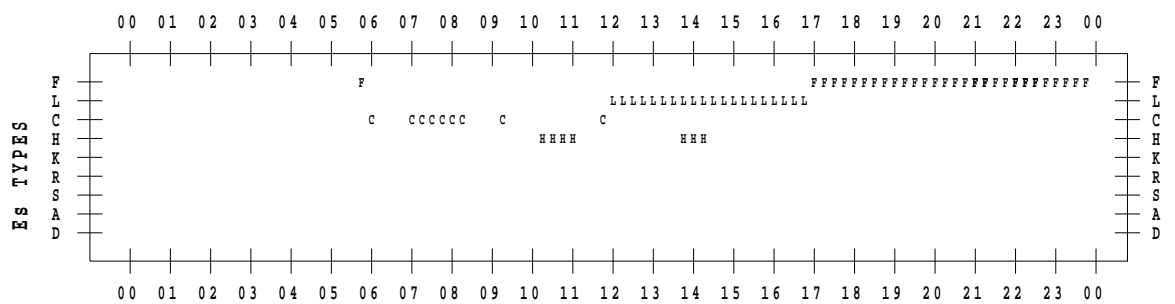
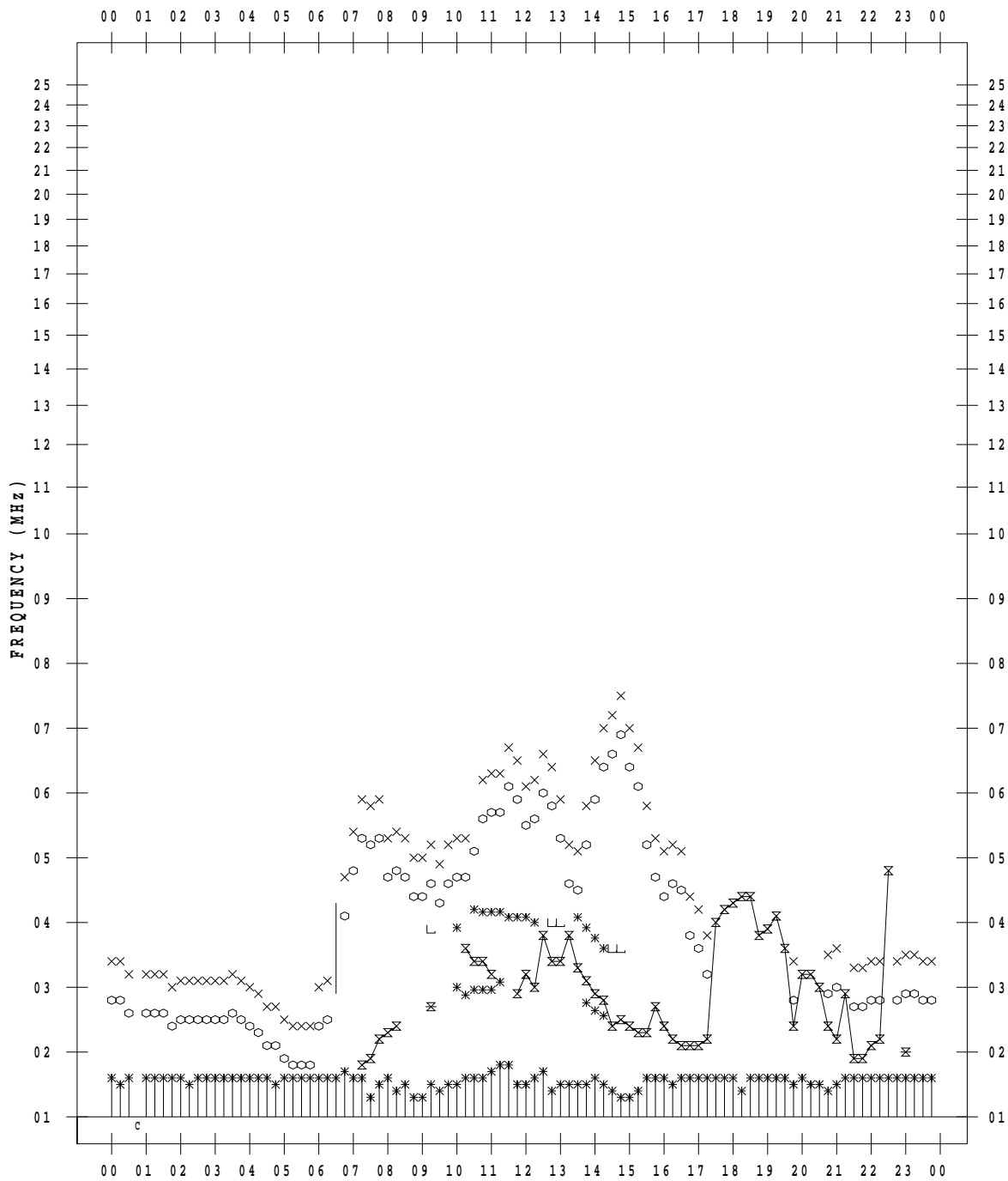
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2019/12/31

135 ° E MEAN TIME



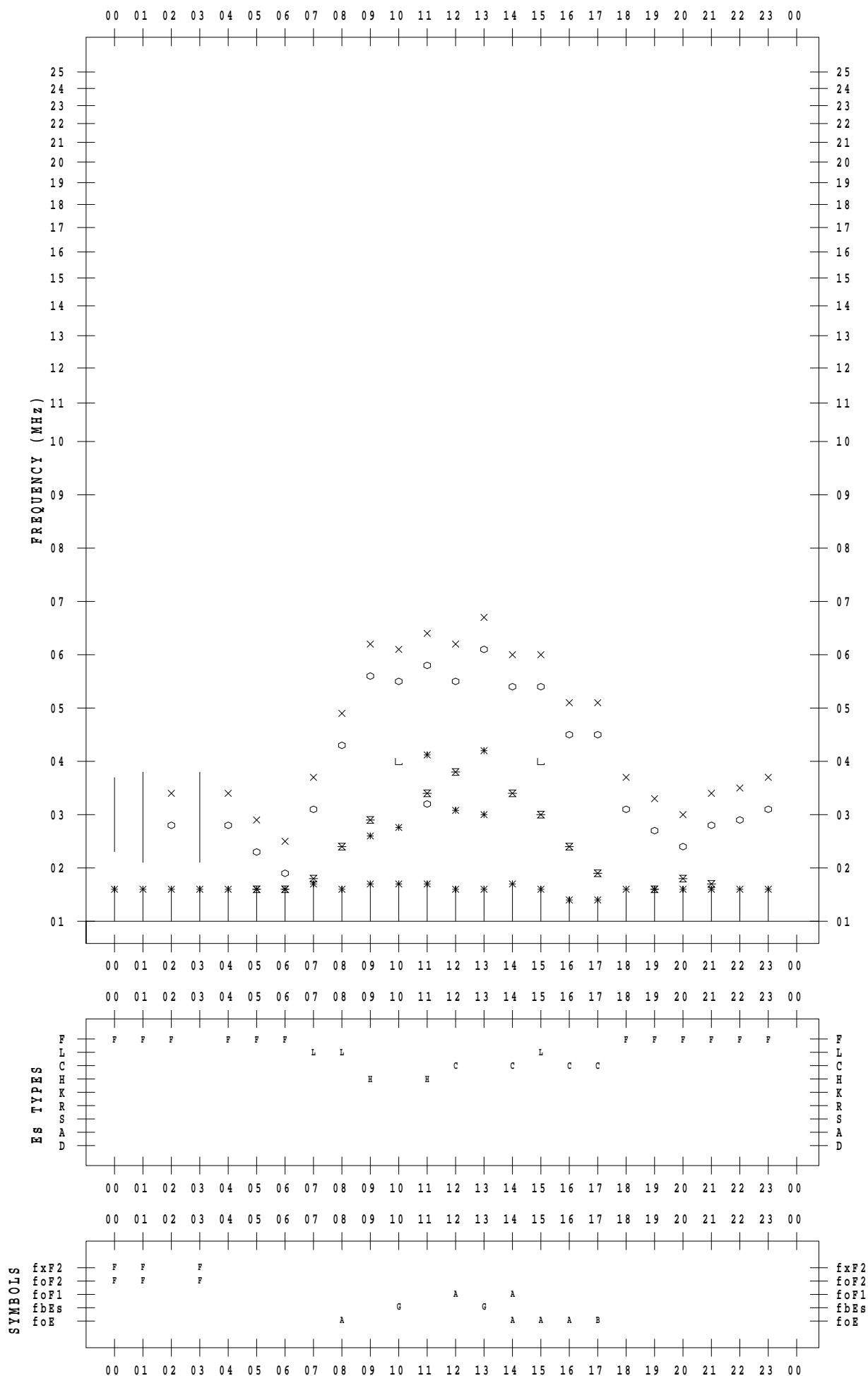
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/ 1

135 ° E MEAN TIME



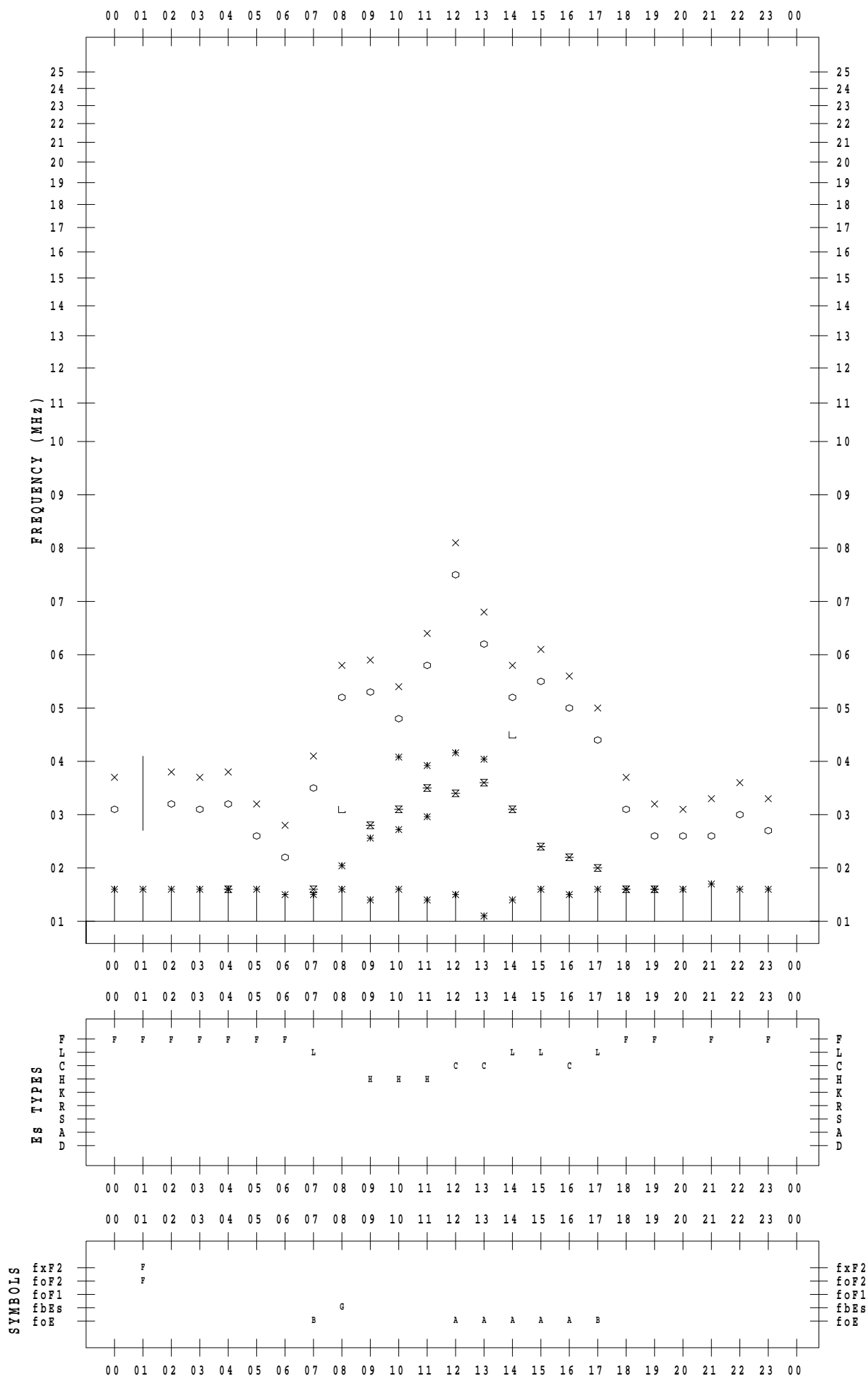
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/ 2

135 ° E MEAN TIME



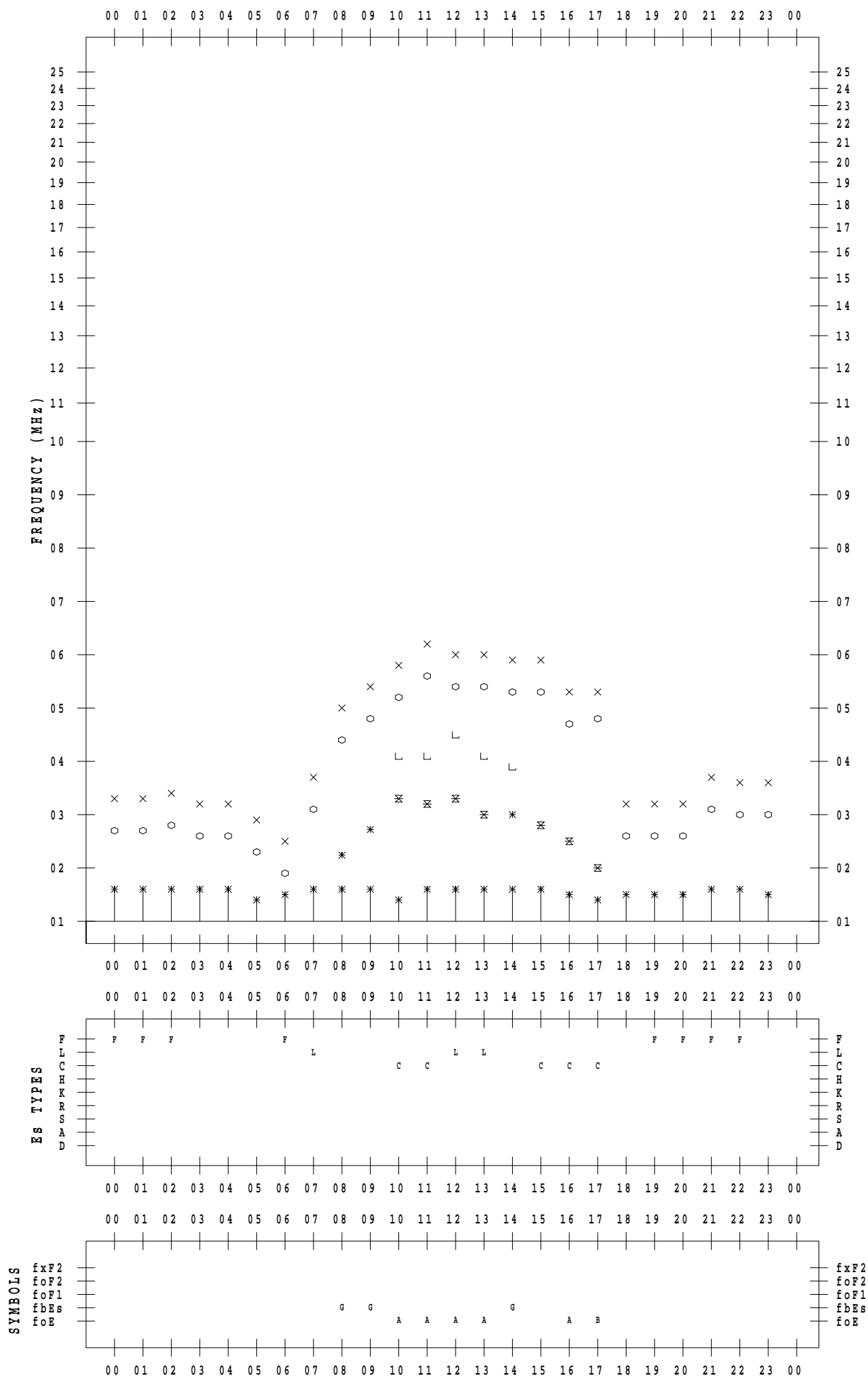
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/ 3

135 ° E MEAN TIME



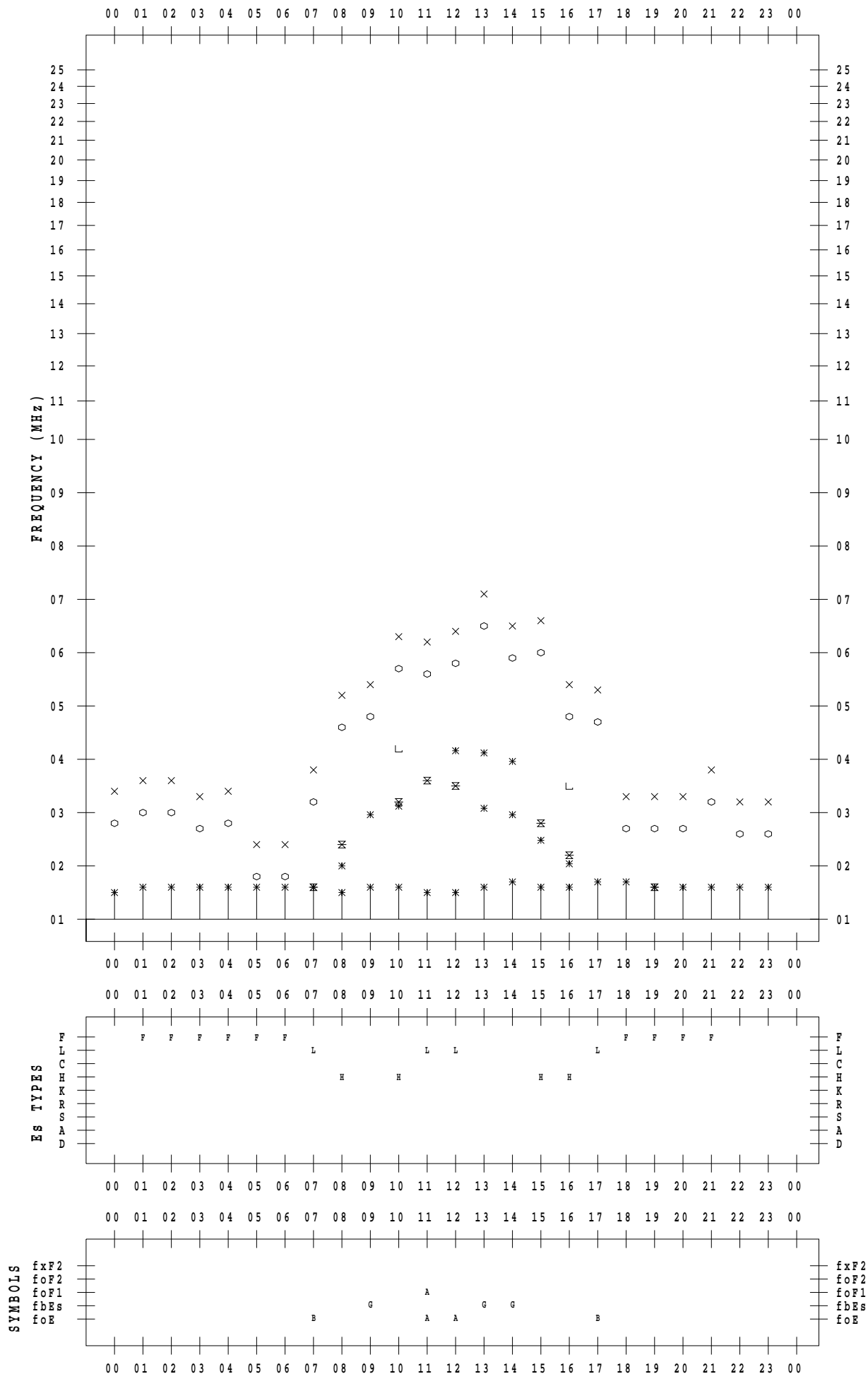
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/ 4

135 ° E MEAN TIME



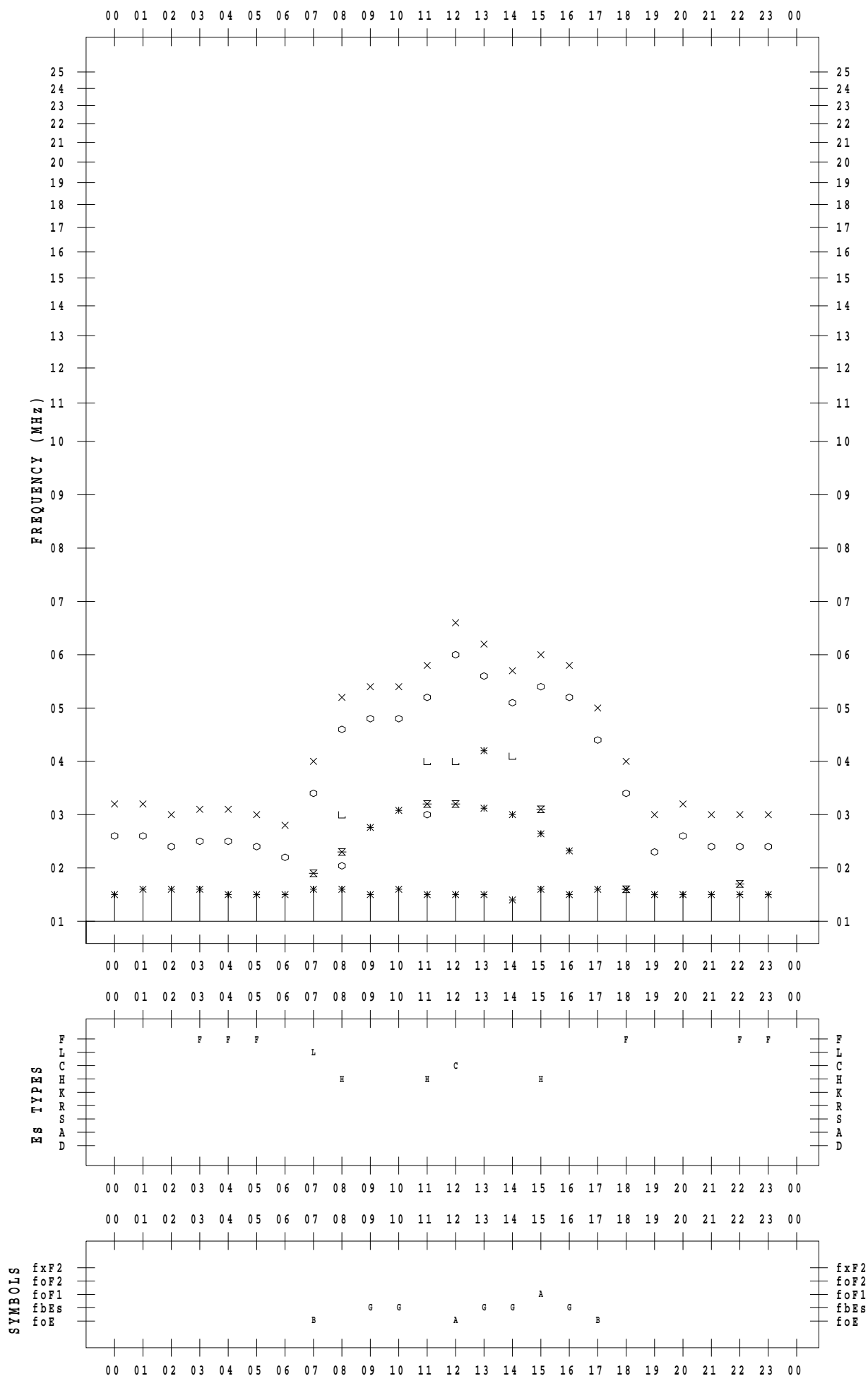
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/ 5

135 ° E MEAN TIME



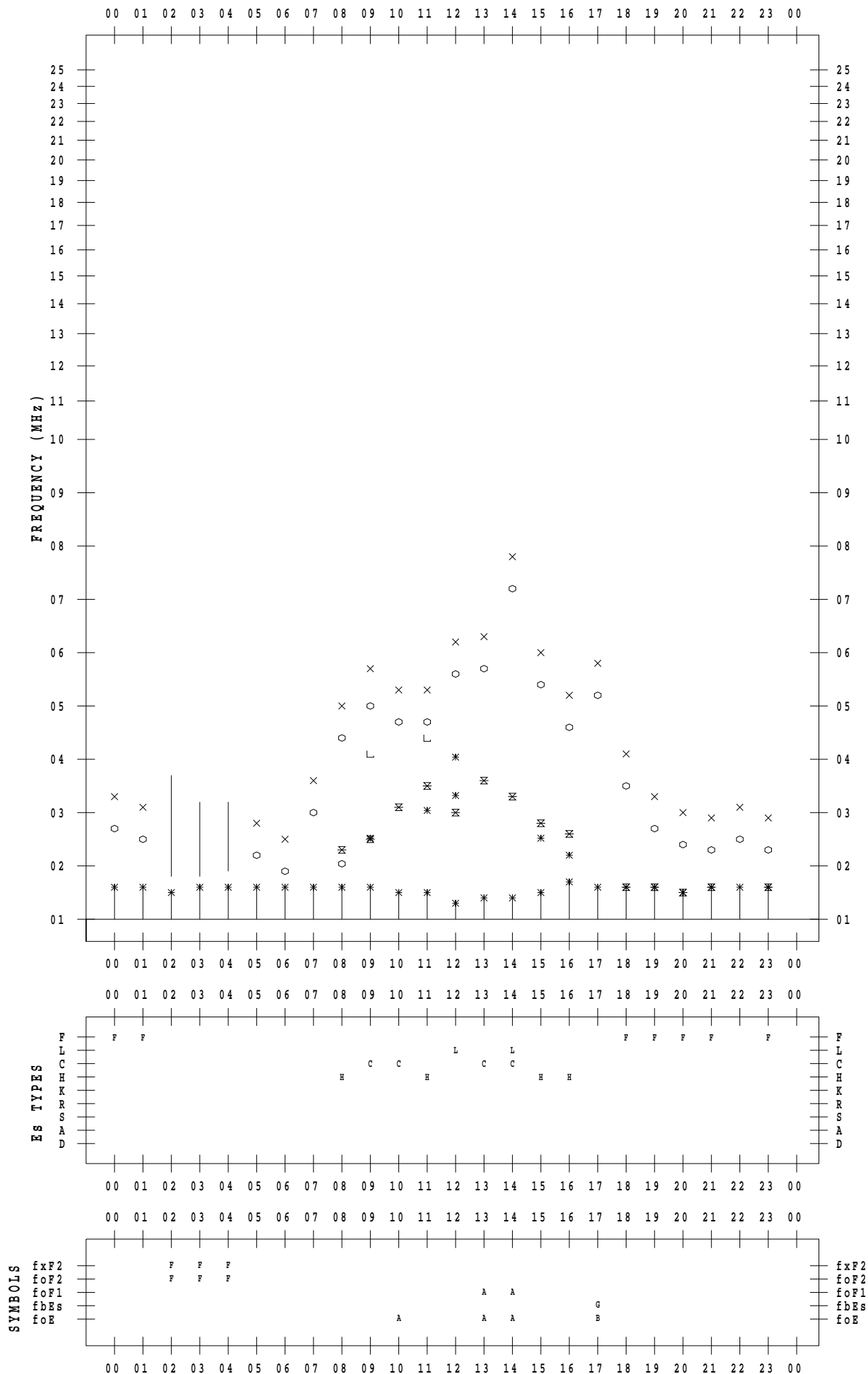
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/ 6

135 ° E MEAN TIME



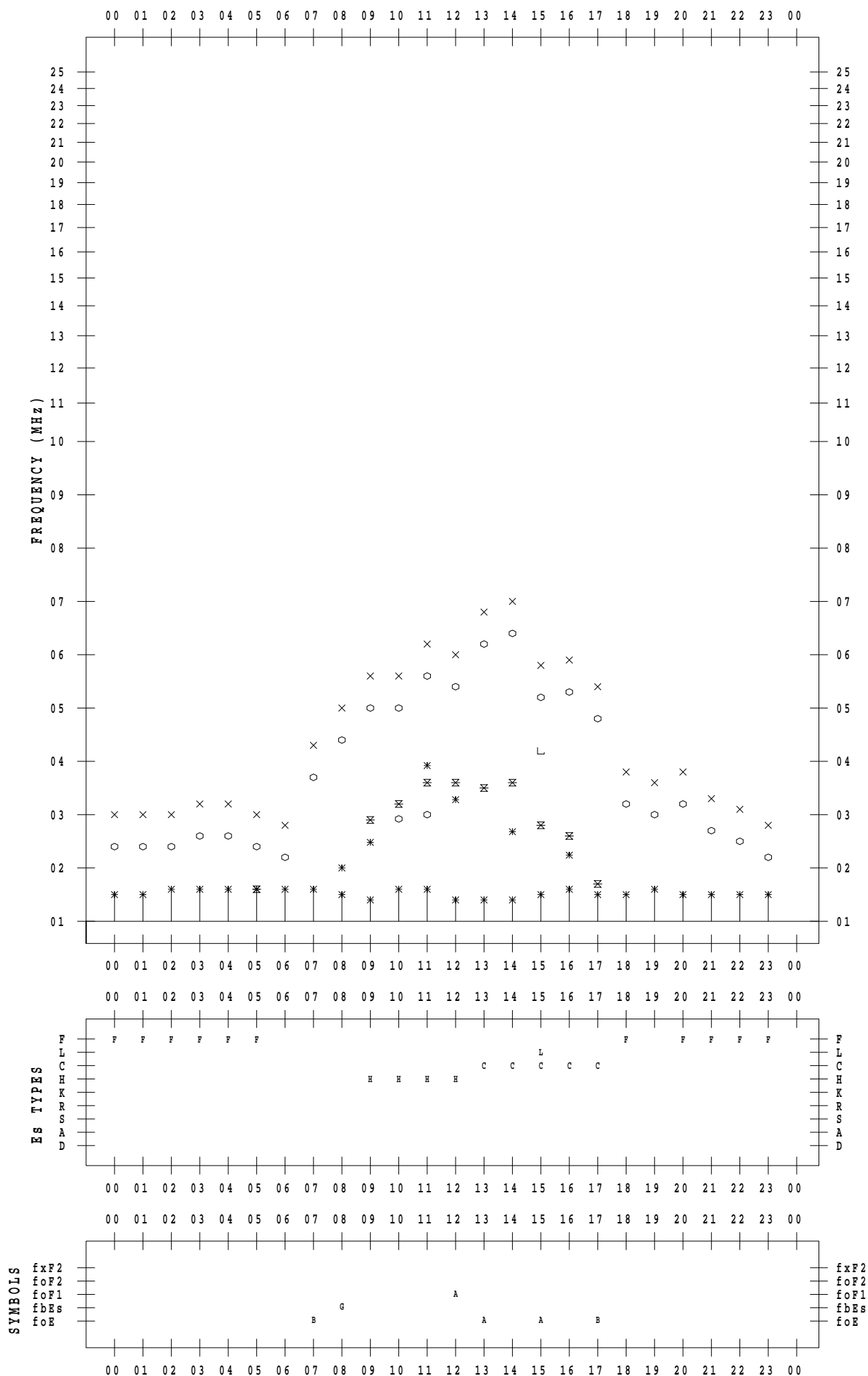
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/ 7

135 ° E MEAN TIME



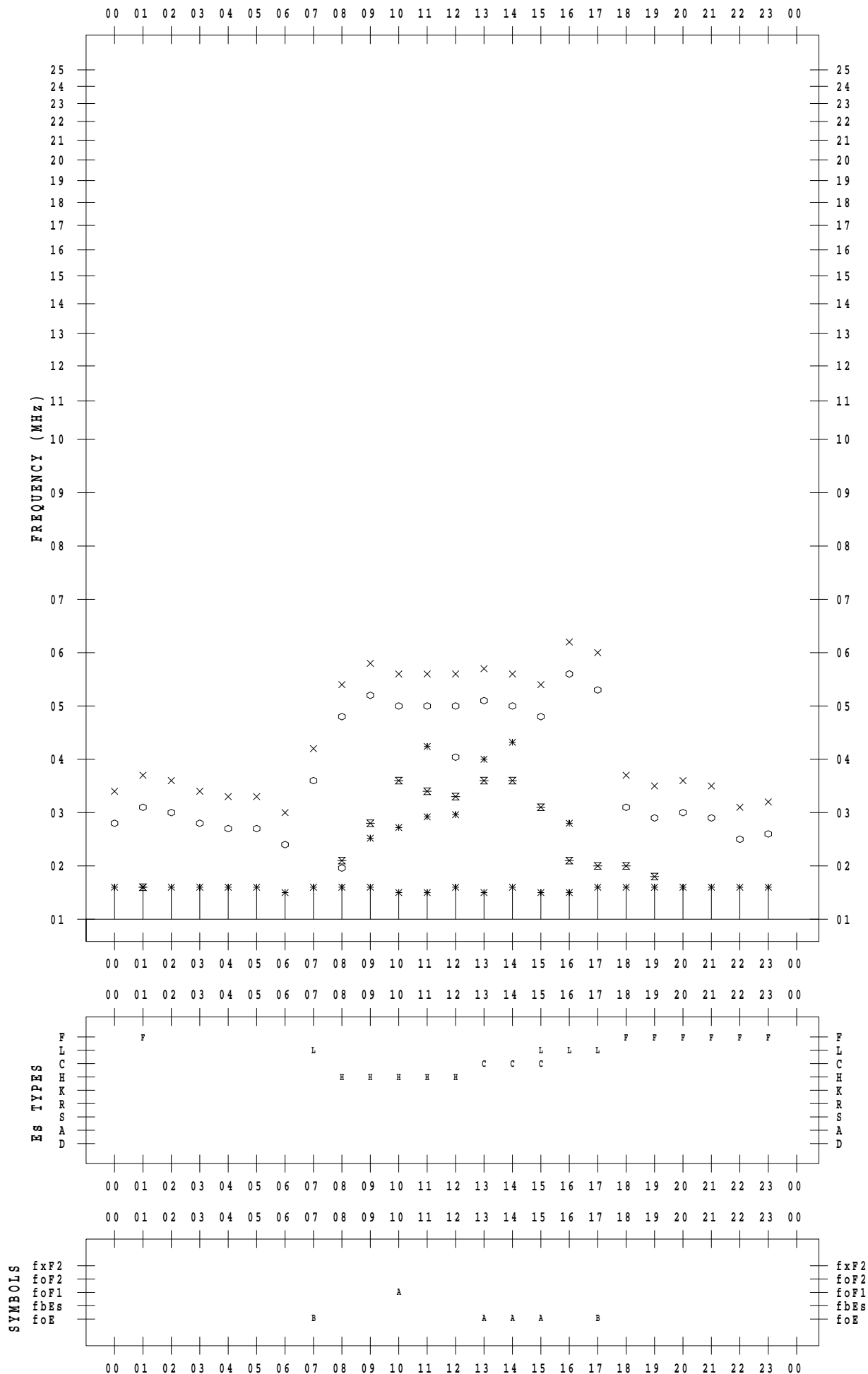
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/ 8

135 ° E MEAN TIME



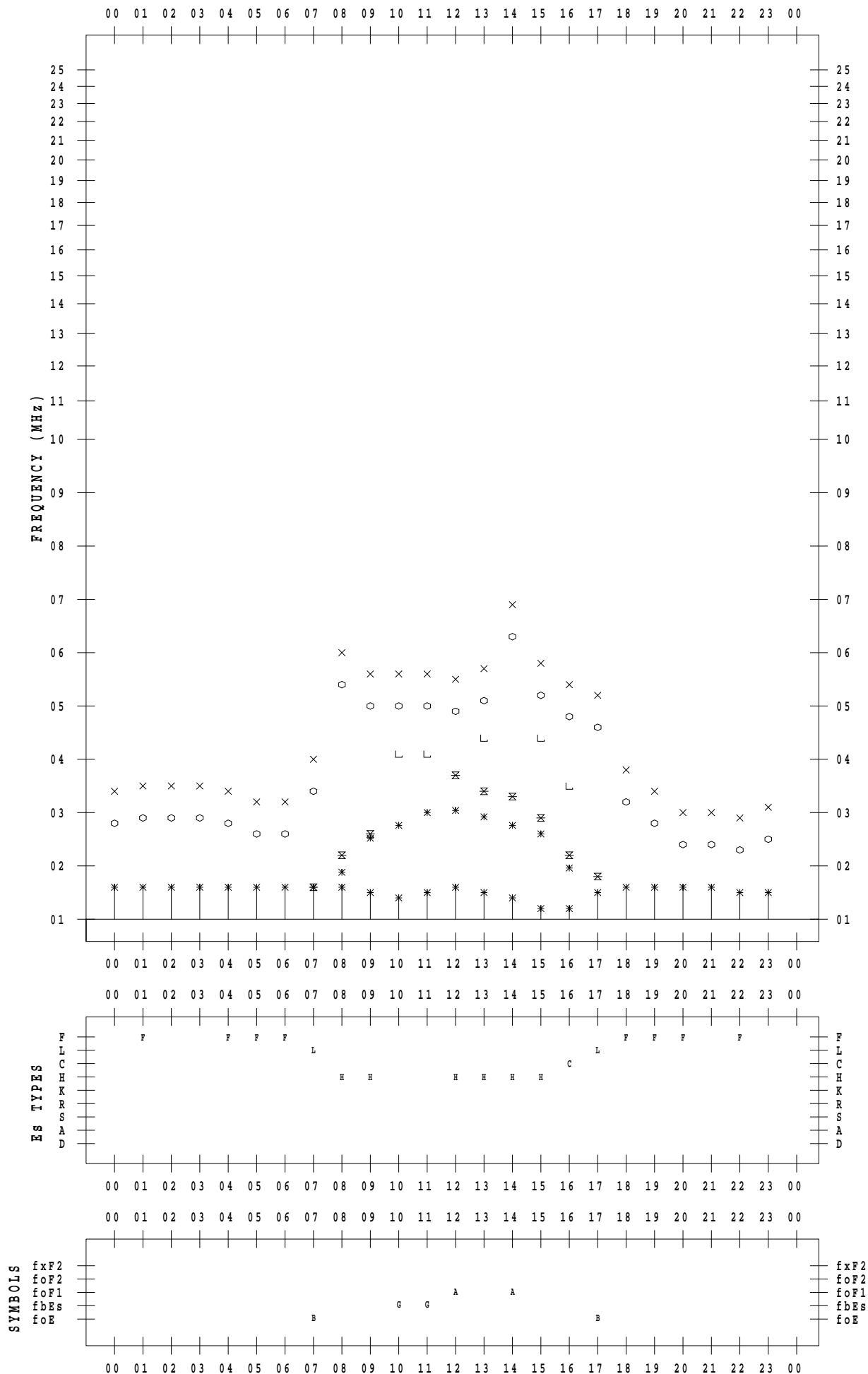
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/ 9

135 ° E MEAN TIME



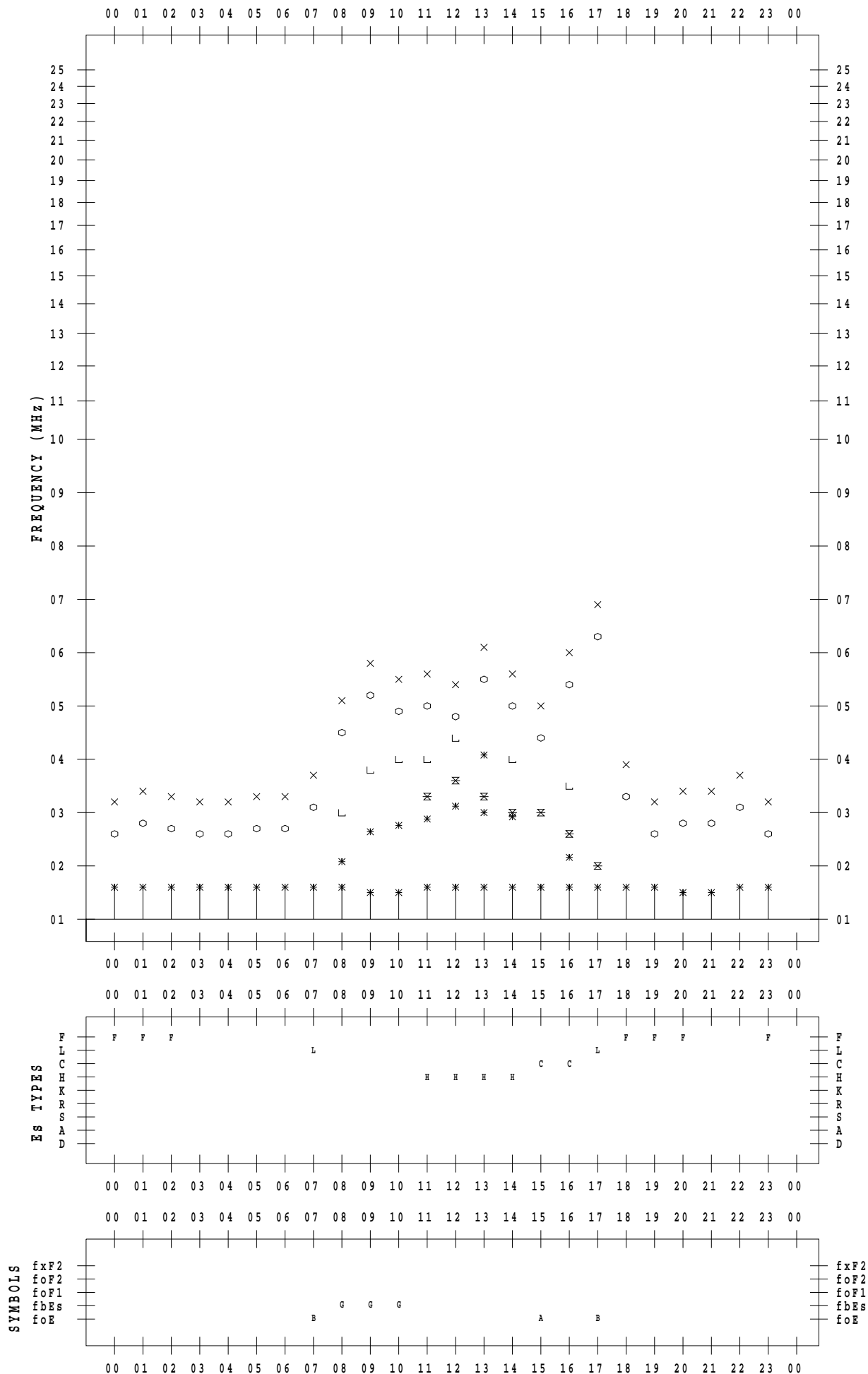
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/10

135 ° E MEAN TIME



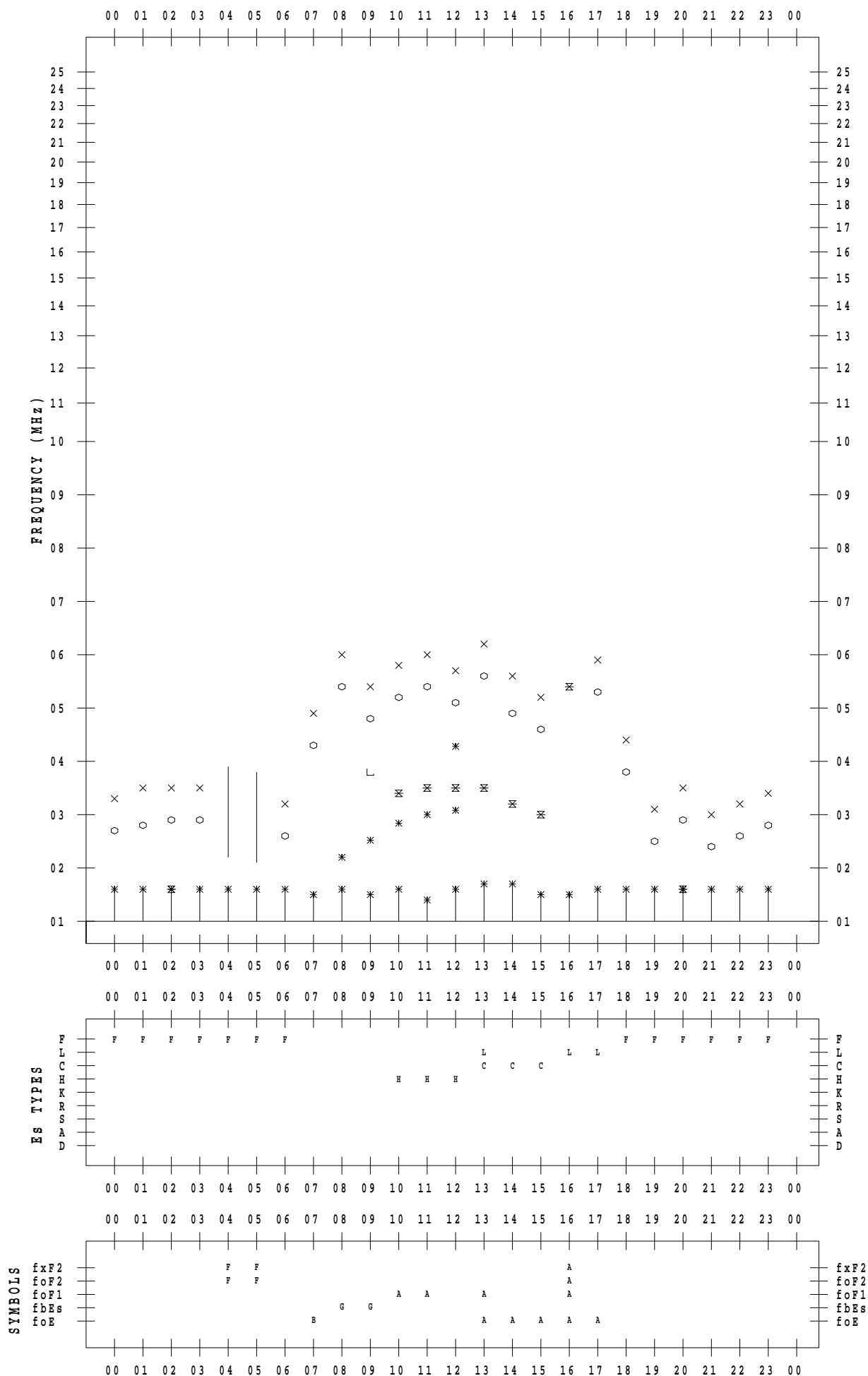
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/11

135 ° E MEAN TIME



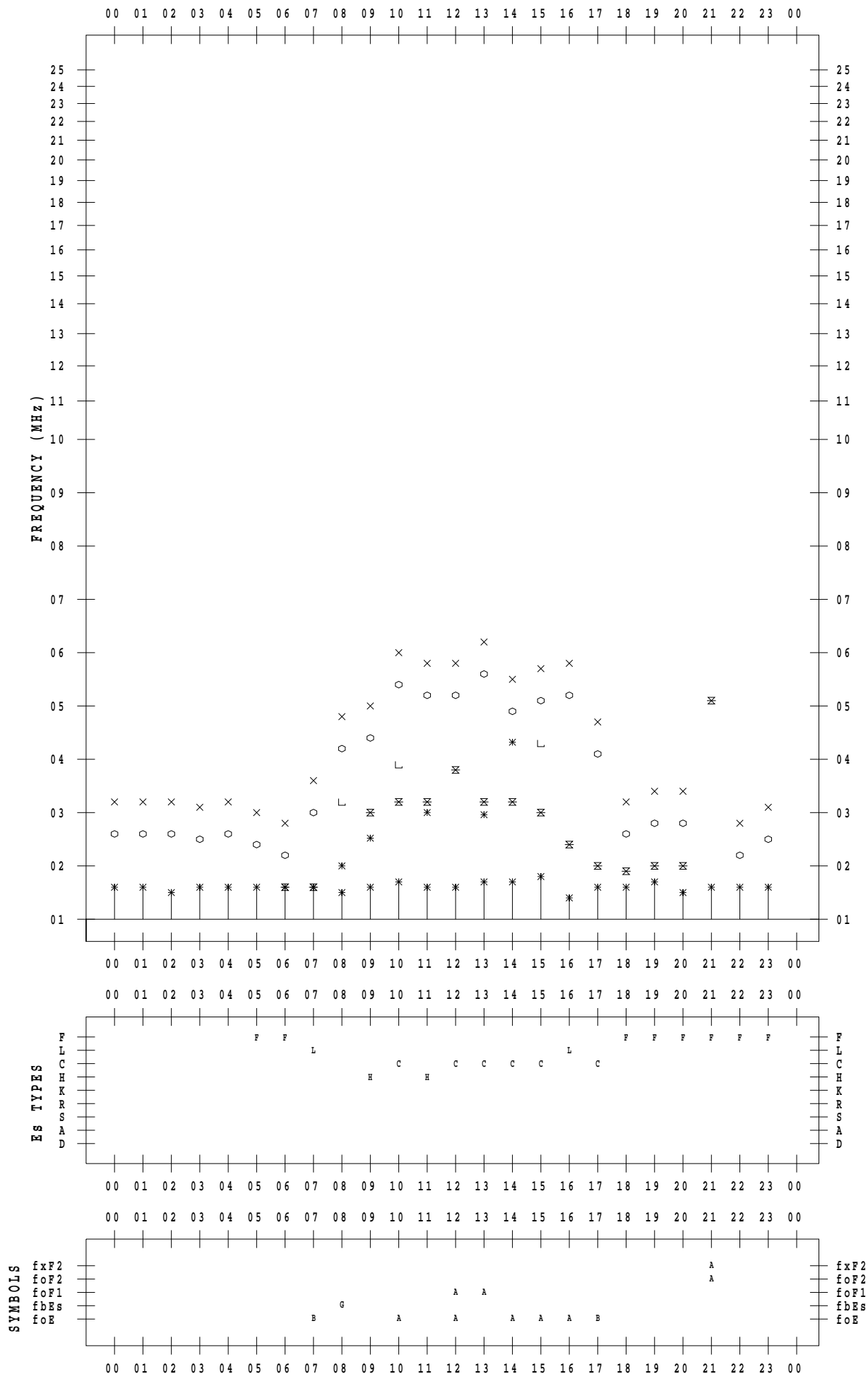
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/12

135 ° E MEAN TIME



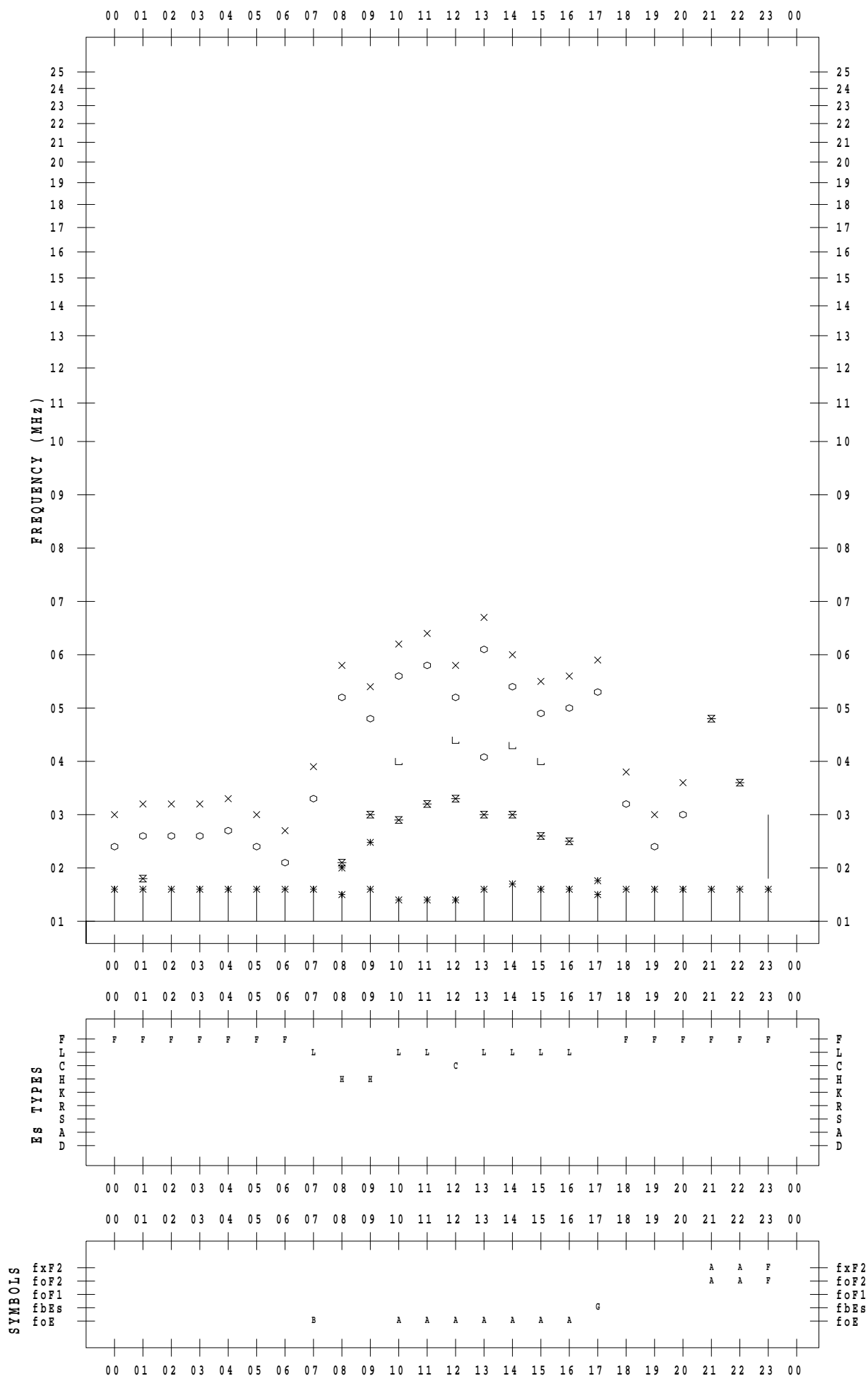
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/13

135 ° E MEAN TIME



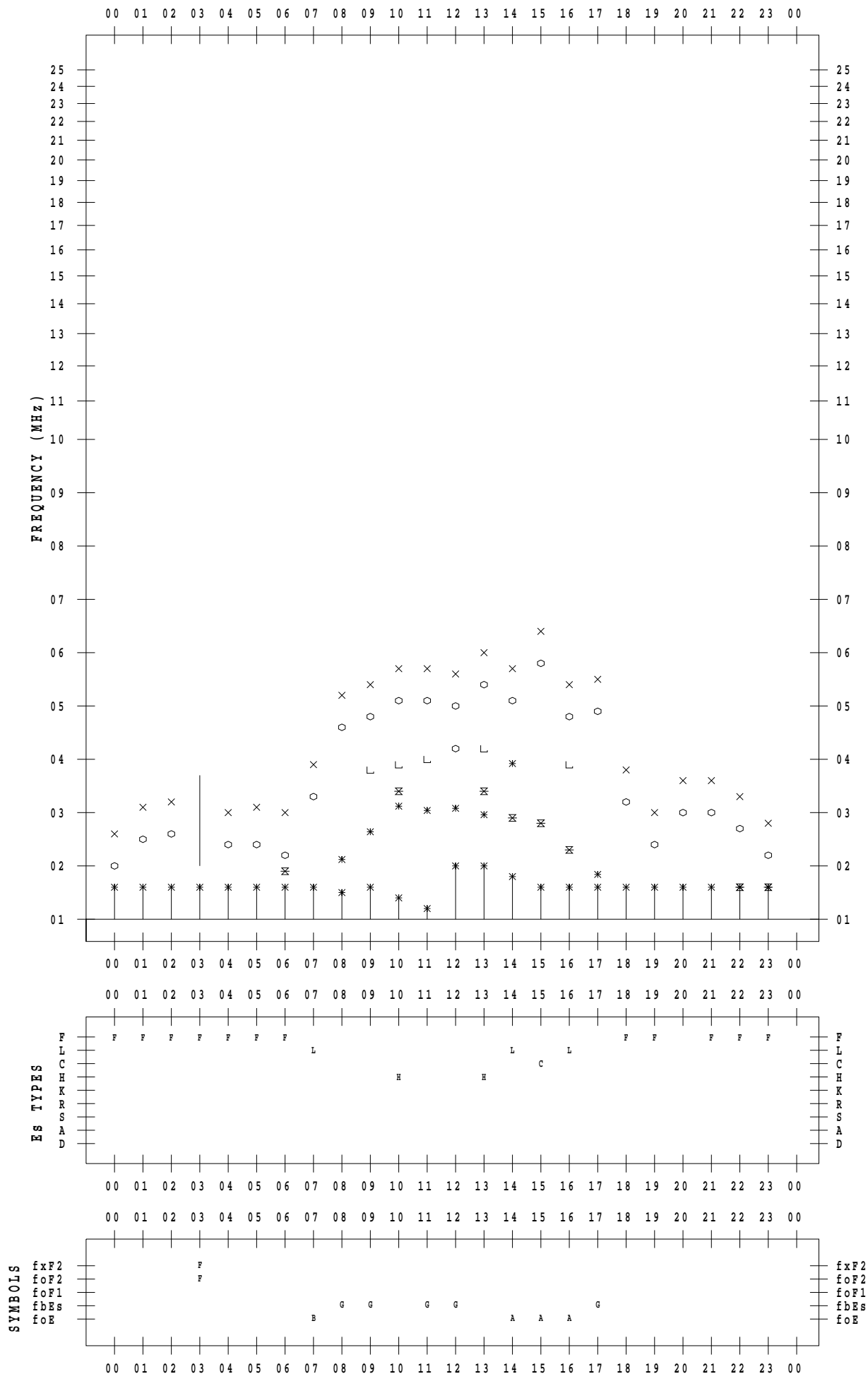
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/14

135 ° E MEAN TIME



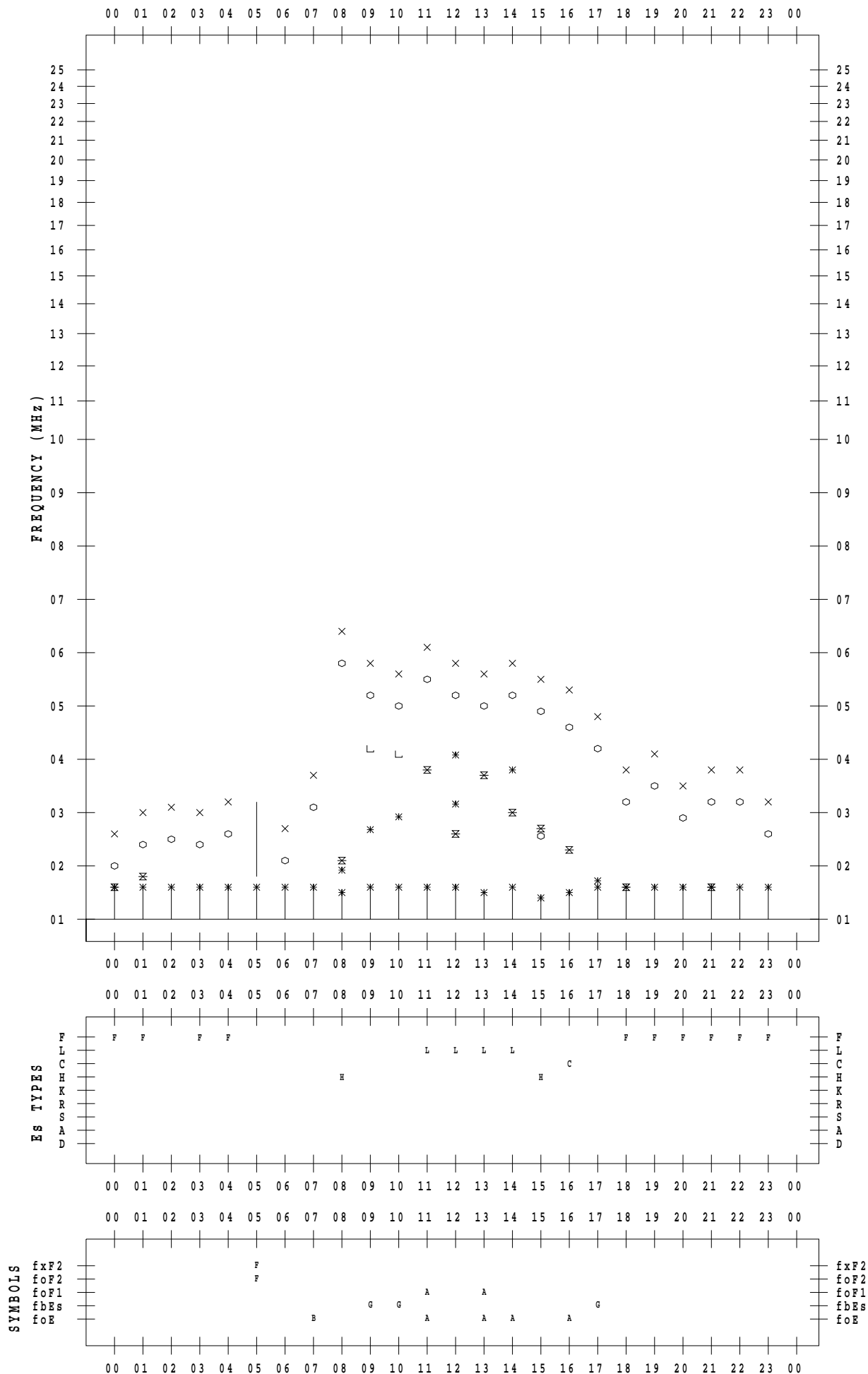
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/15

135 ° E MEAN TIME



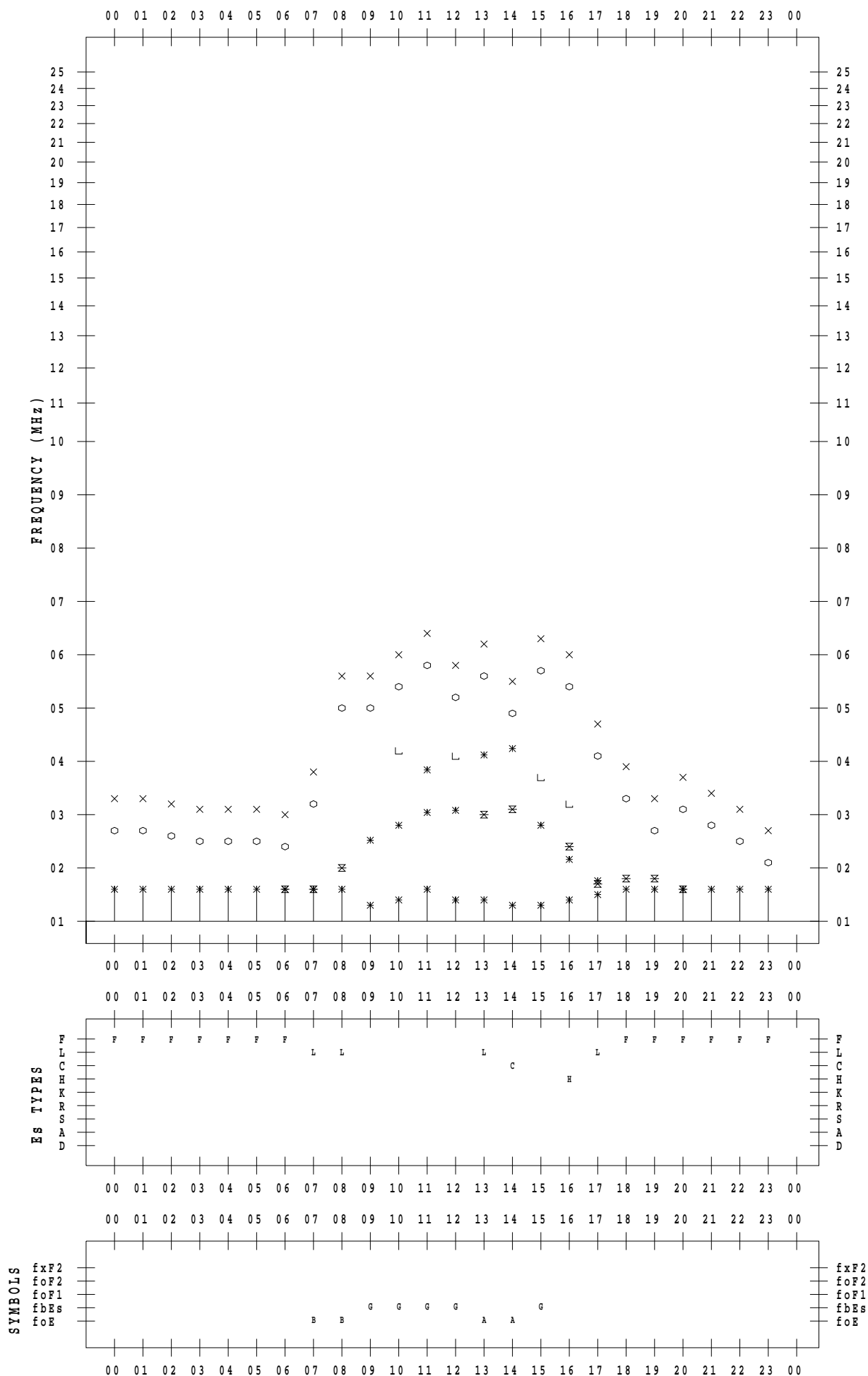
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/16

135 ° E MEAN TIME



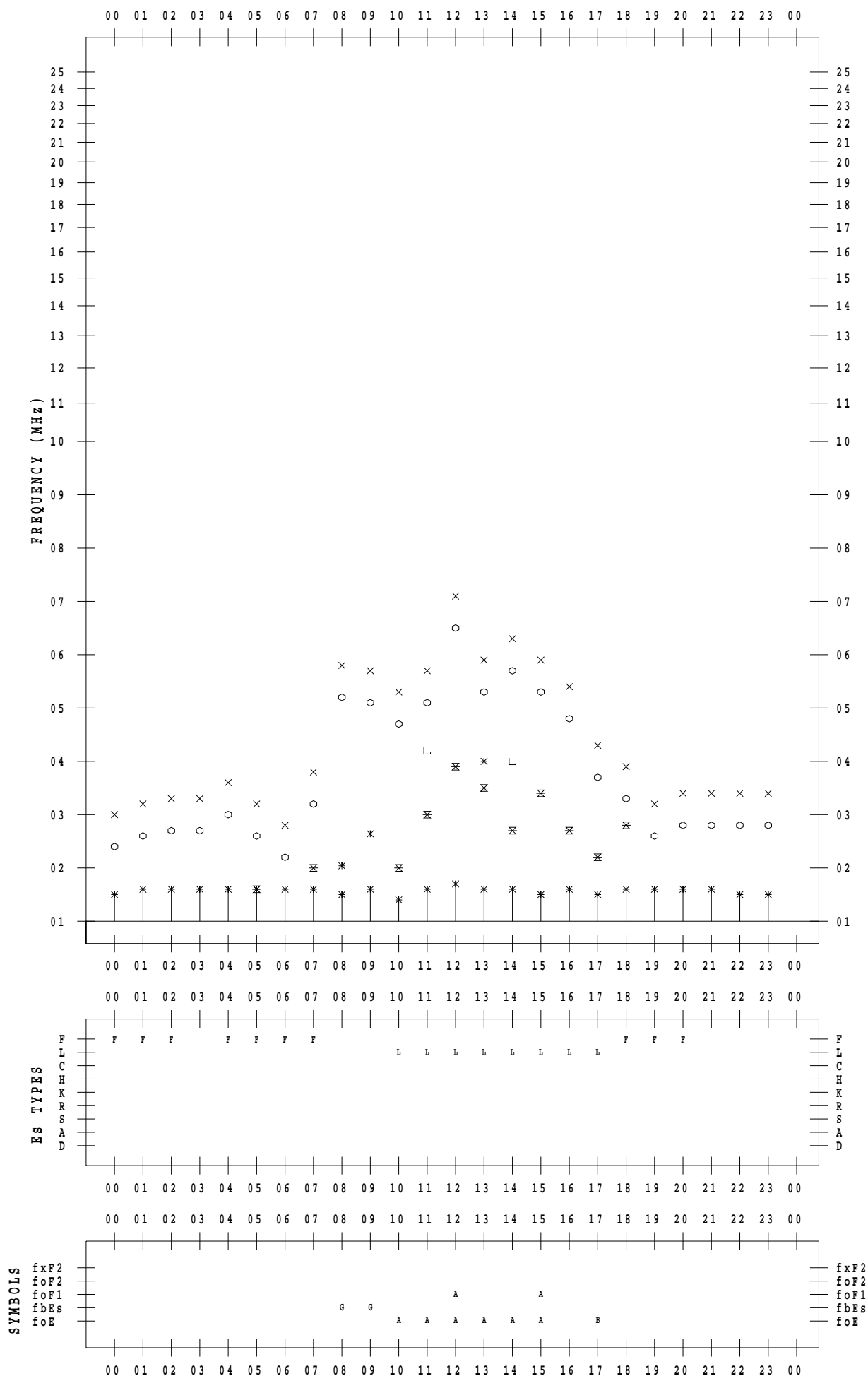
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/17

135 ° E MEAN TIME



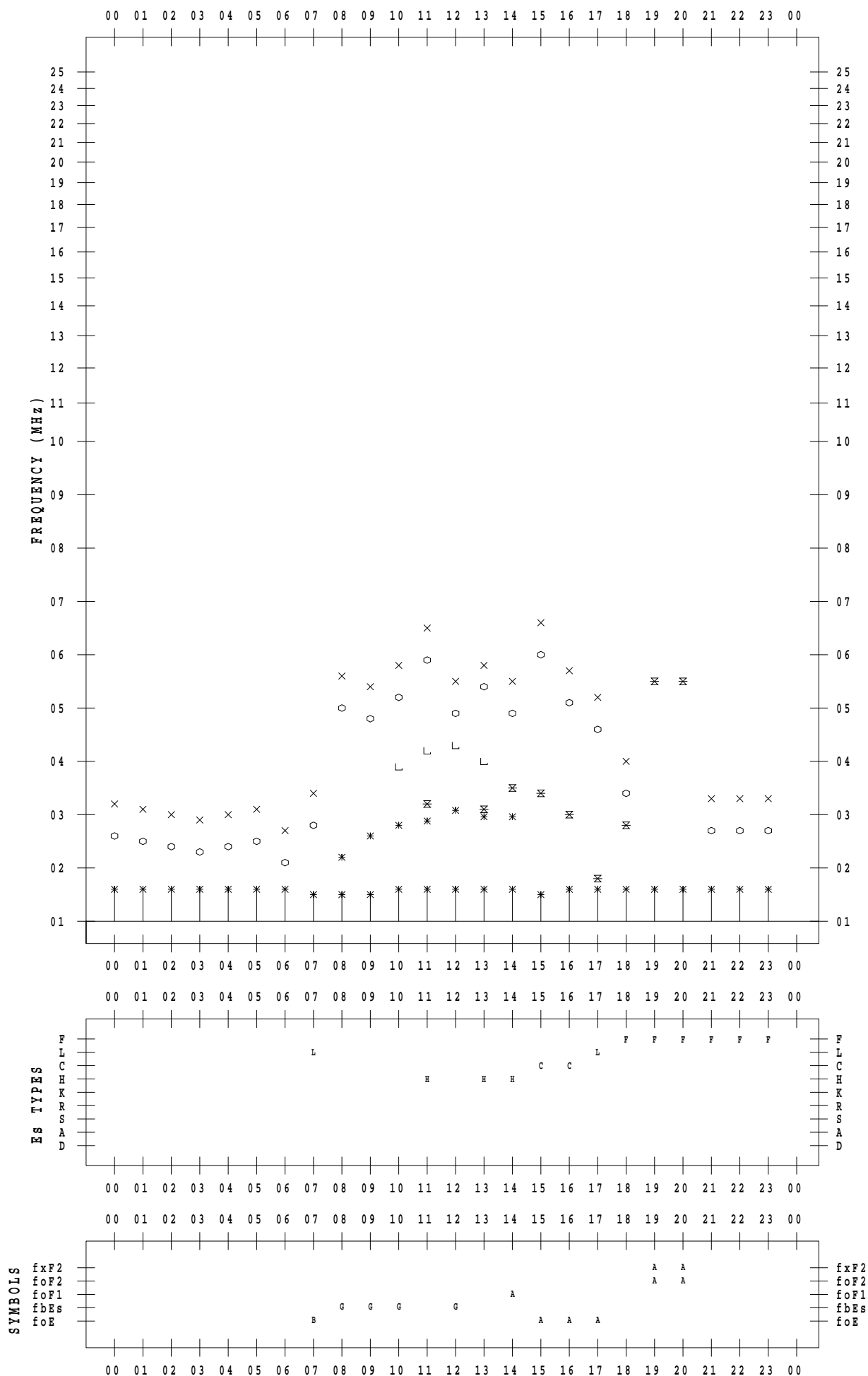
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/18

135 ° E MEAN TIME



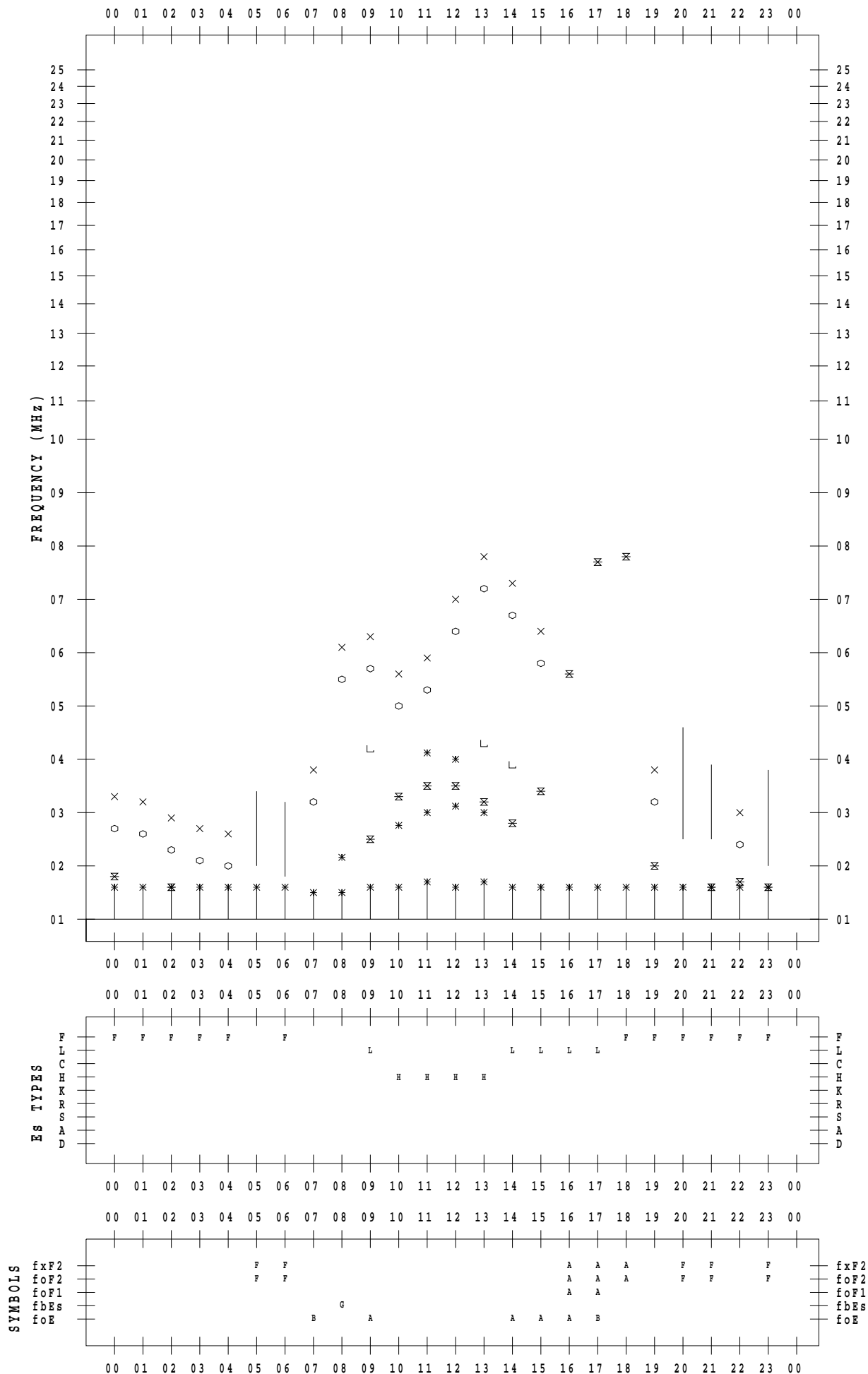
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/19

135 ° E MEAN TIME



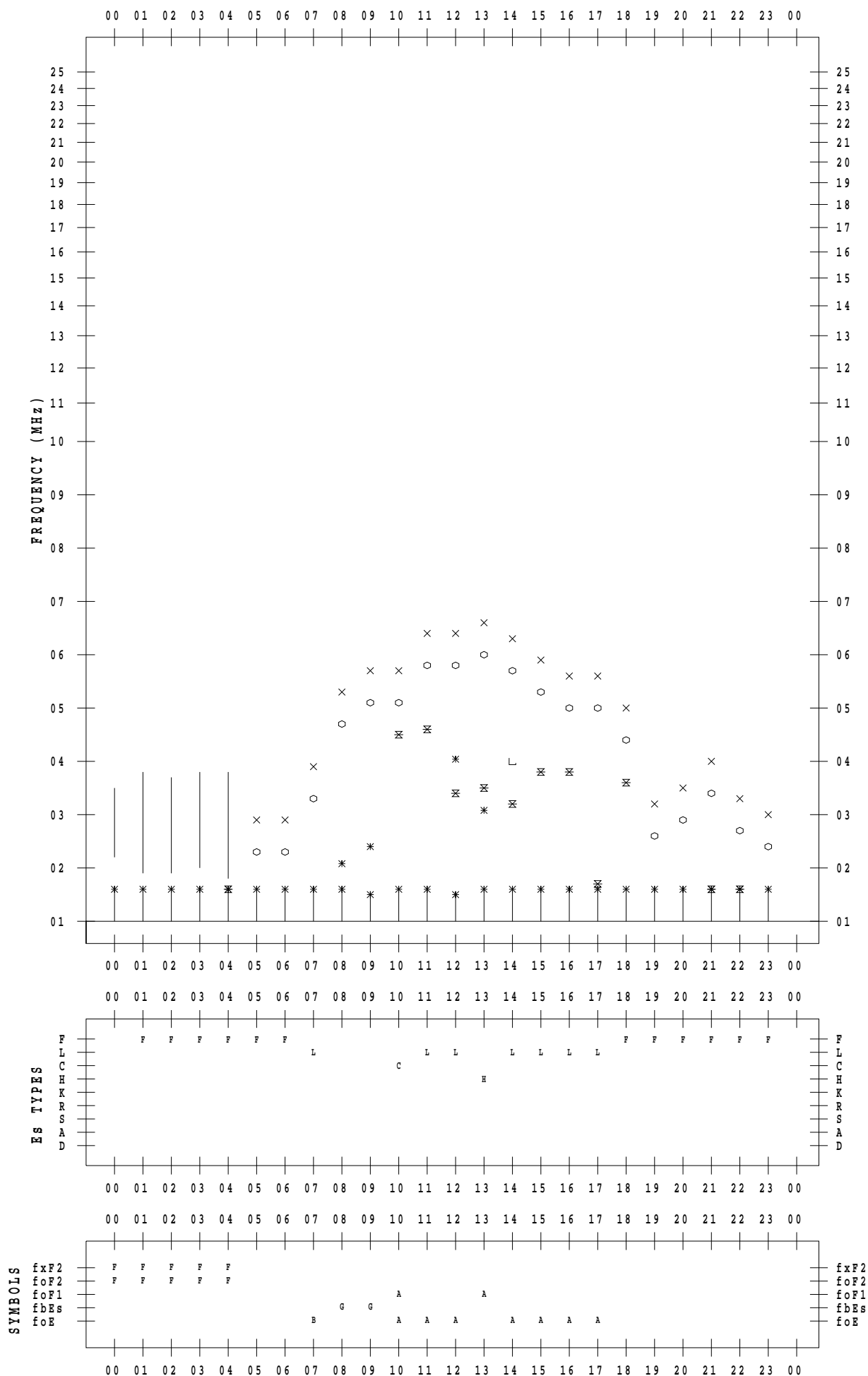
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/20

135 ° E MEAN TIME



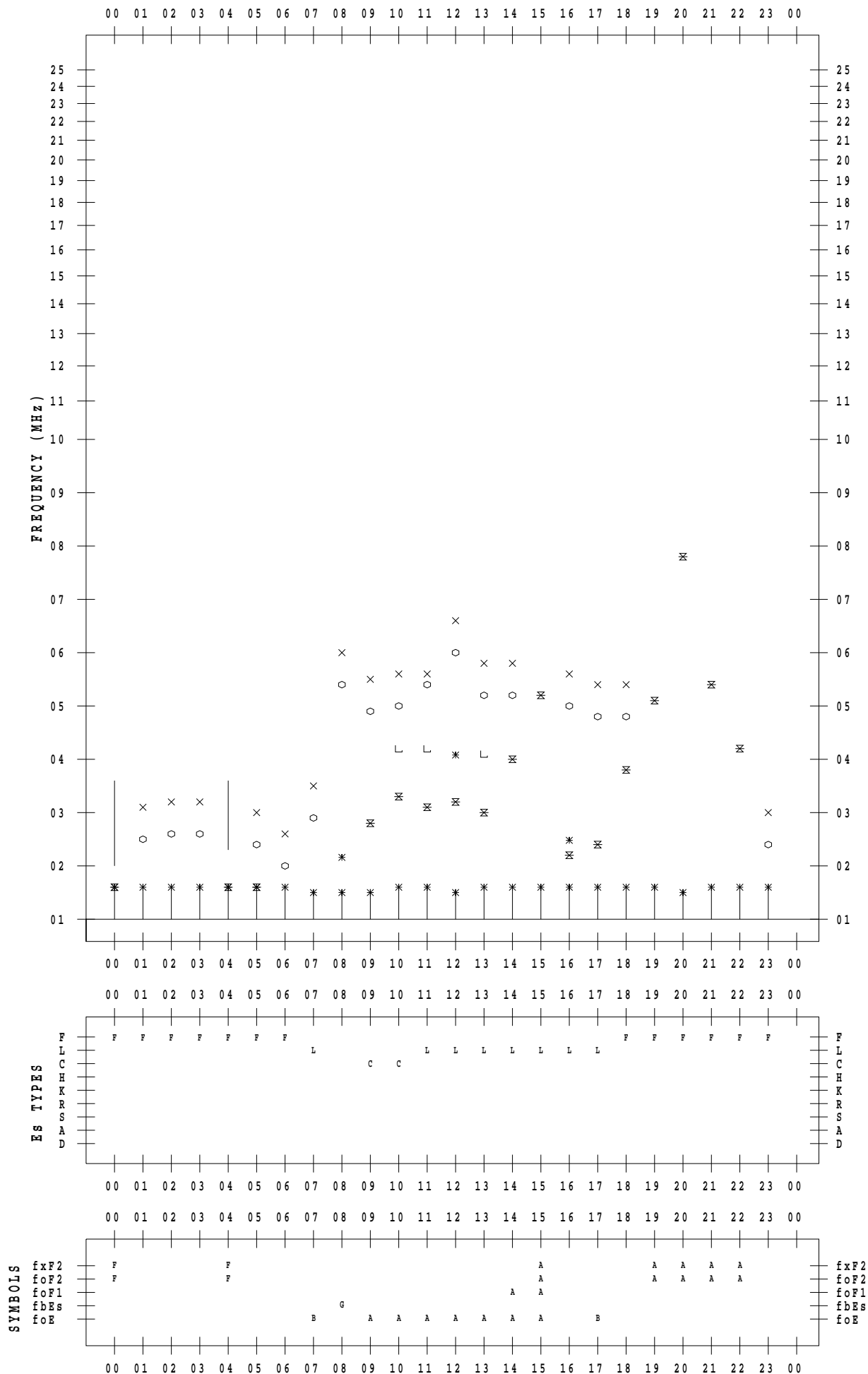
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/21

135 ° E MEAN TIME



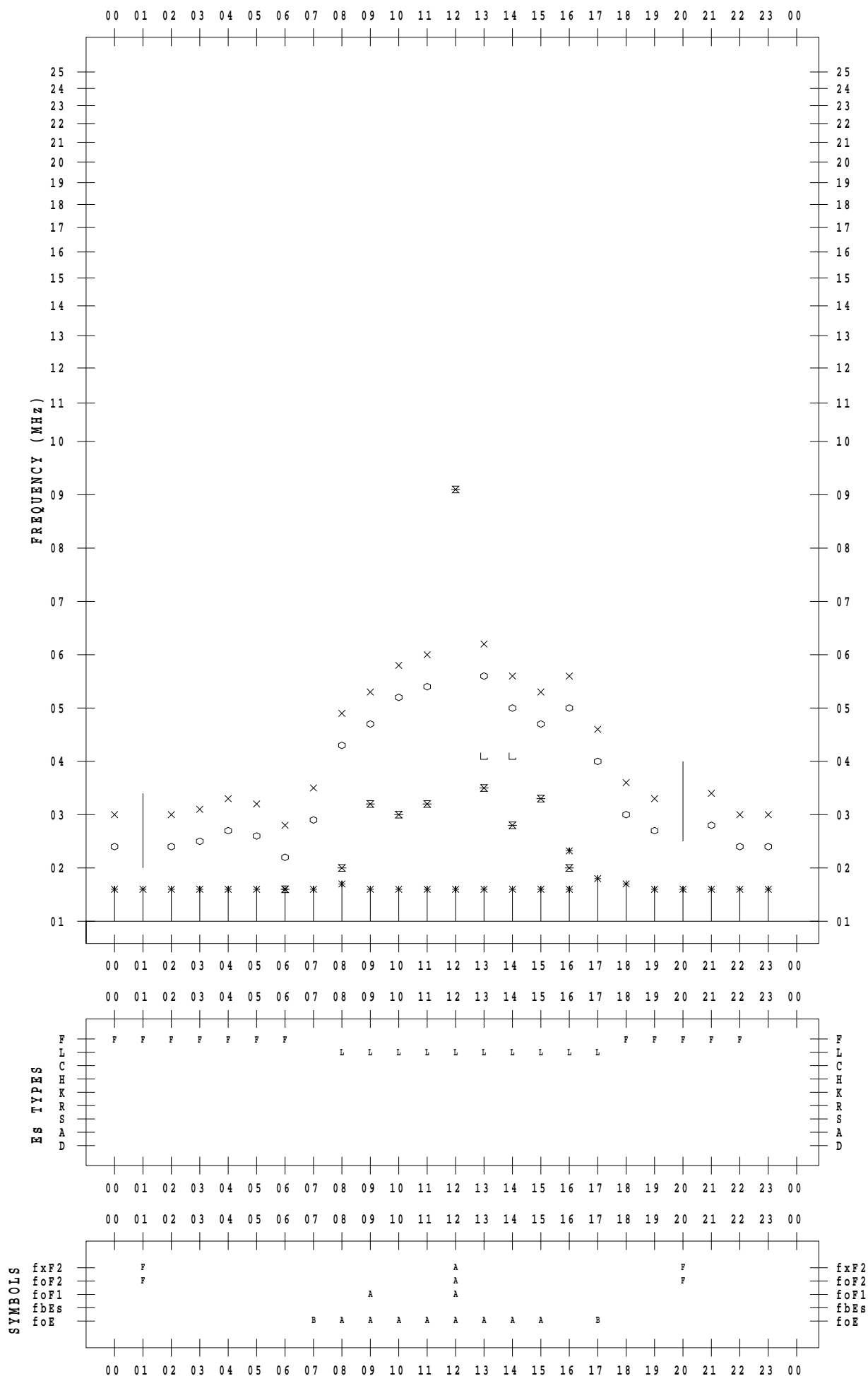
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/22

135 ° E MEAN TIME



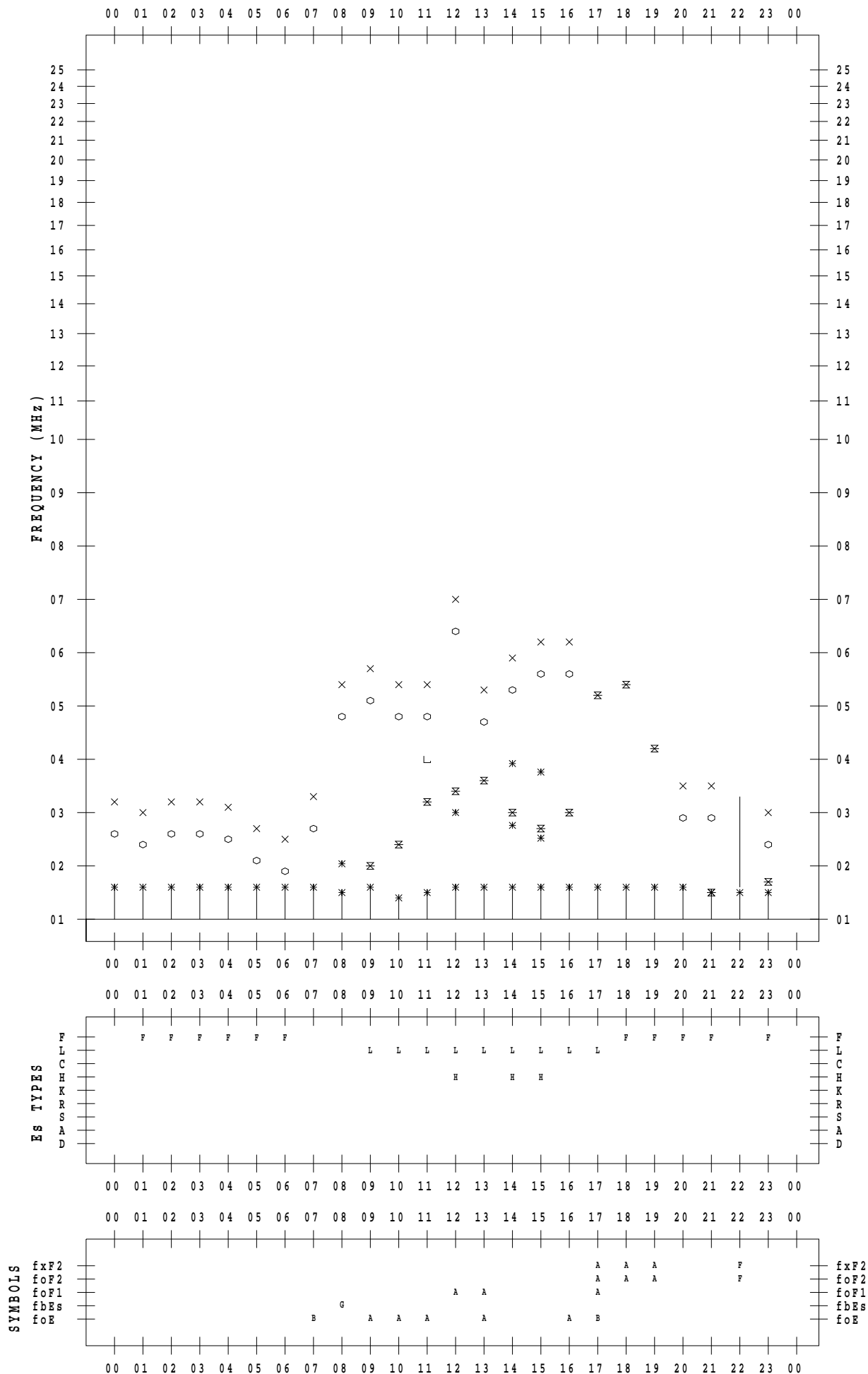
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/23

135 ° E MEAN TIME



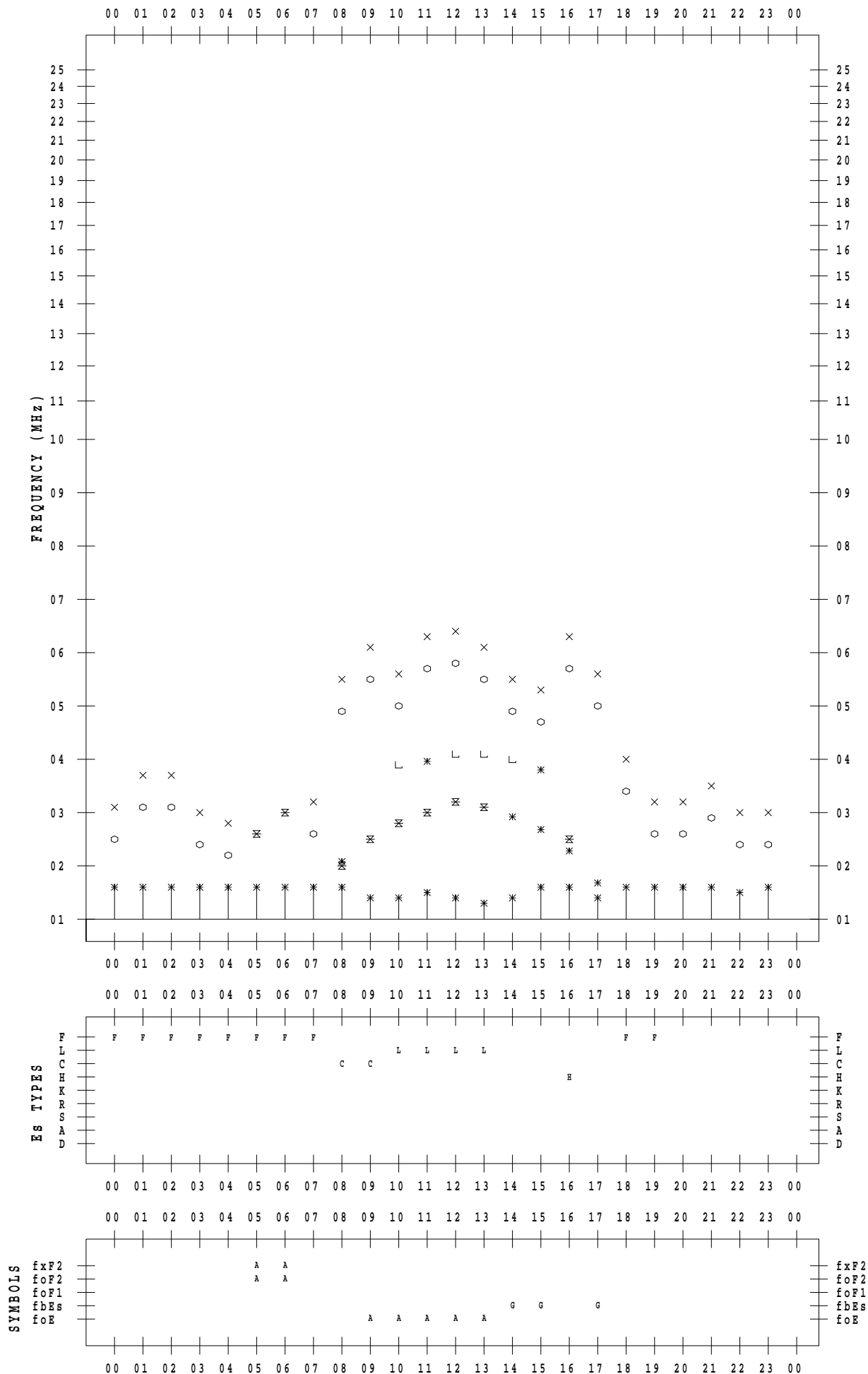
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/24

135 ° E MEAN TIME



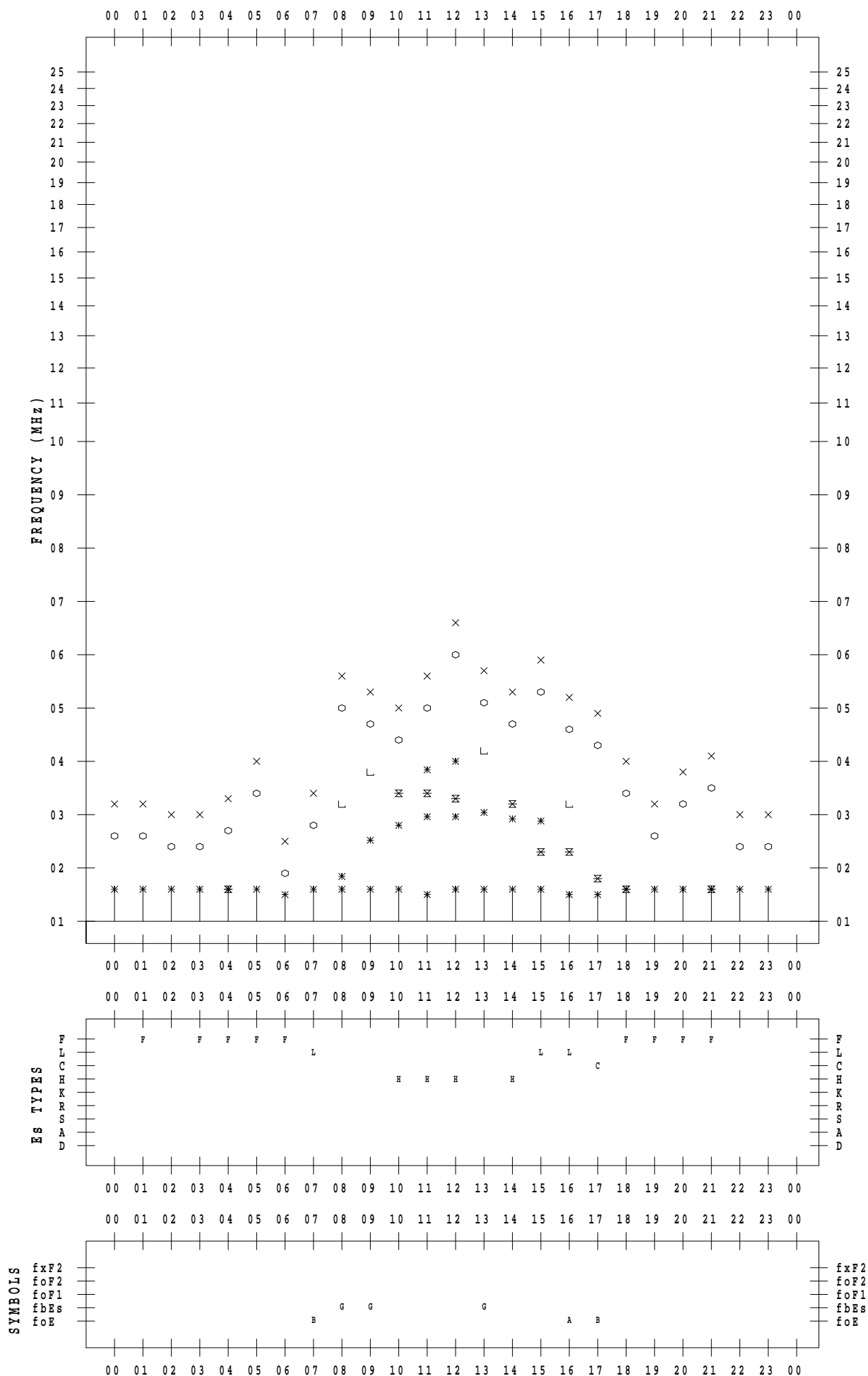
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/25

135 ° E MEAN TIME



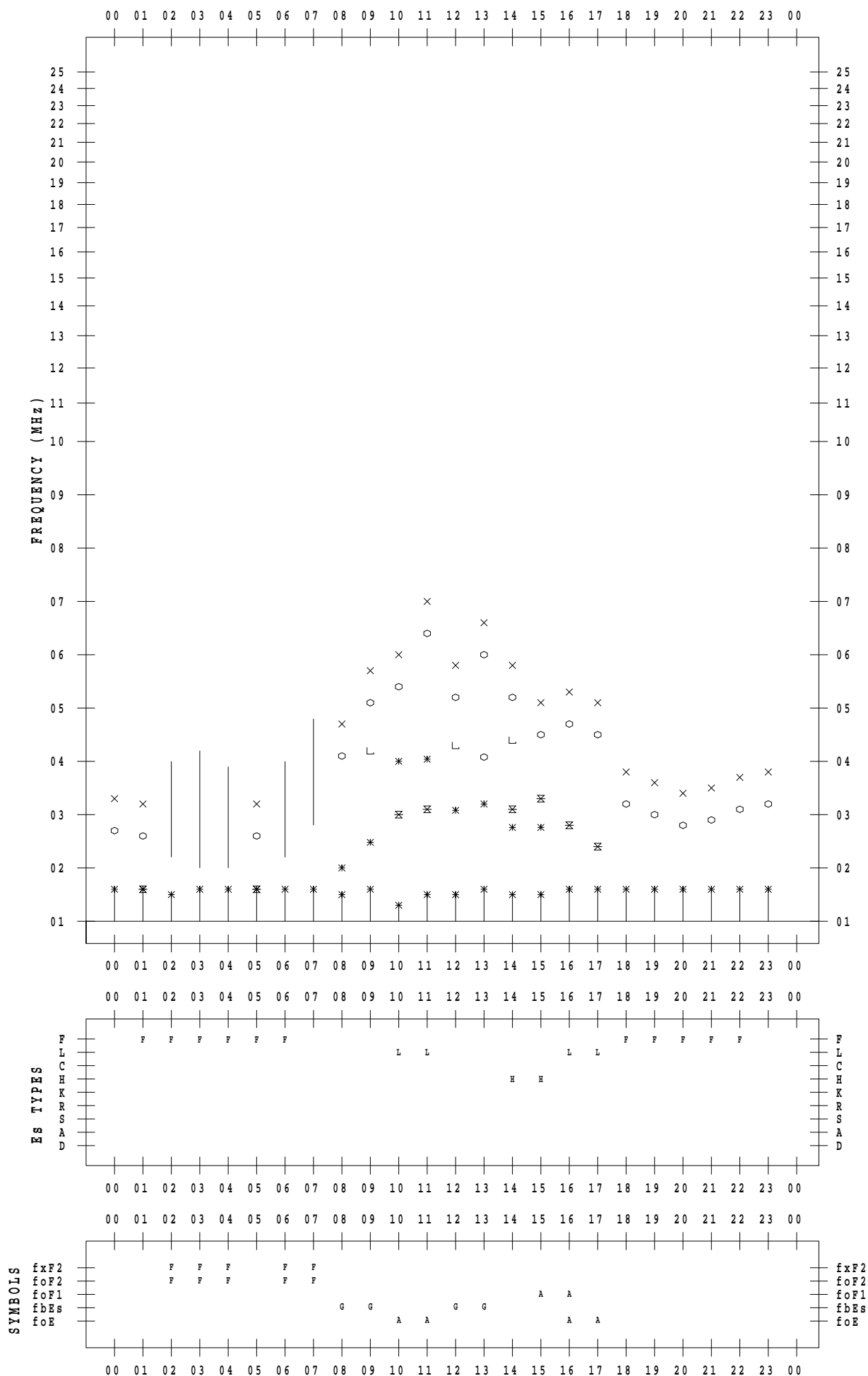
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/26

135 ° E MEAN TIME



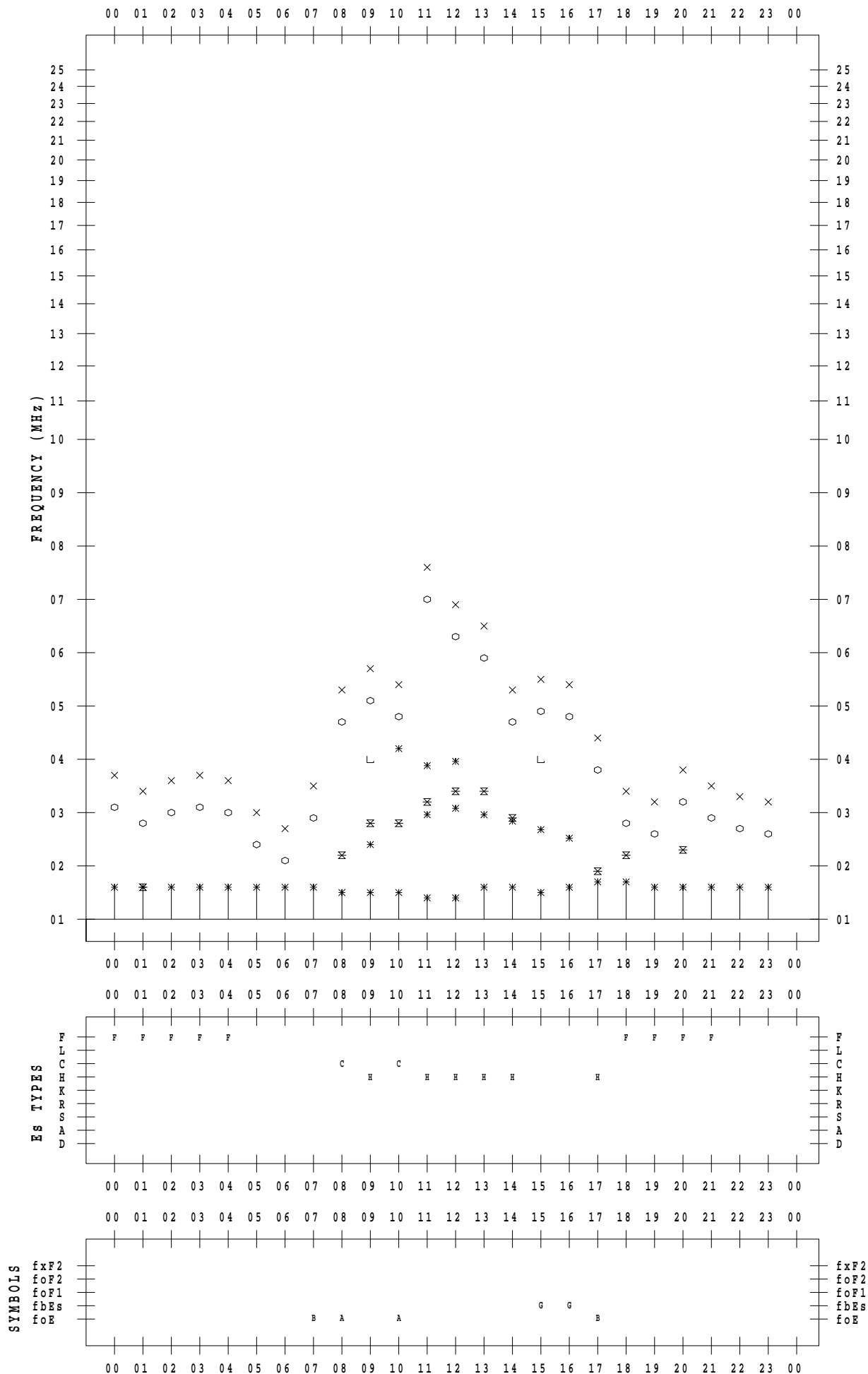
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/27

135 ° E MEAN TIME



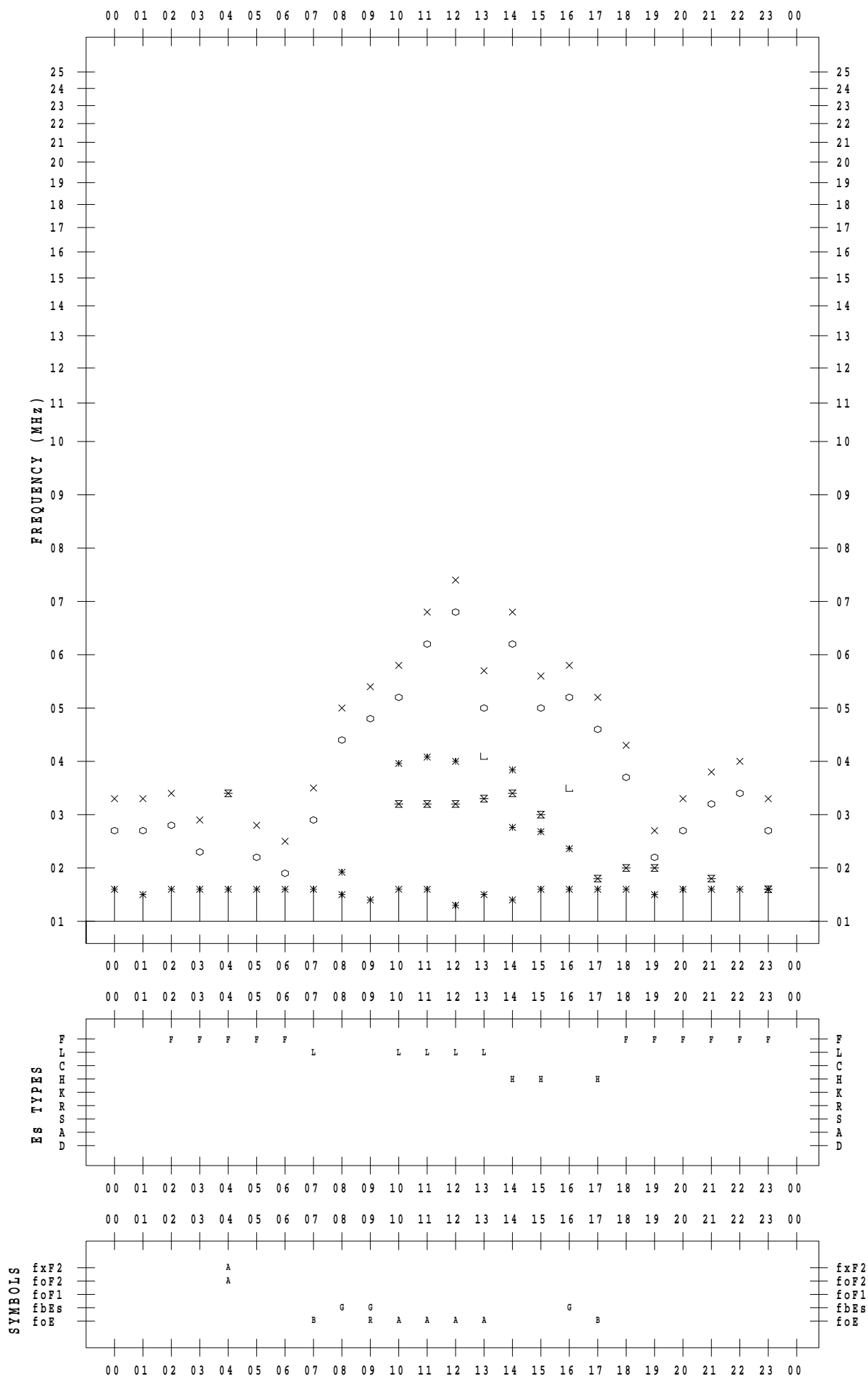
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/28

135 ° E MEAN TIME



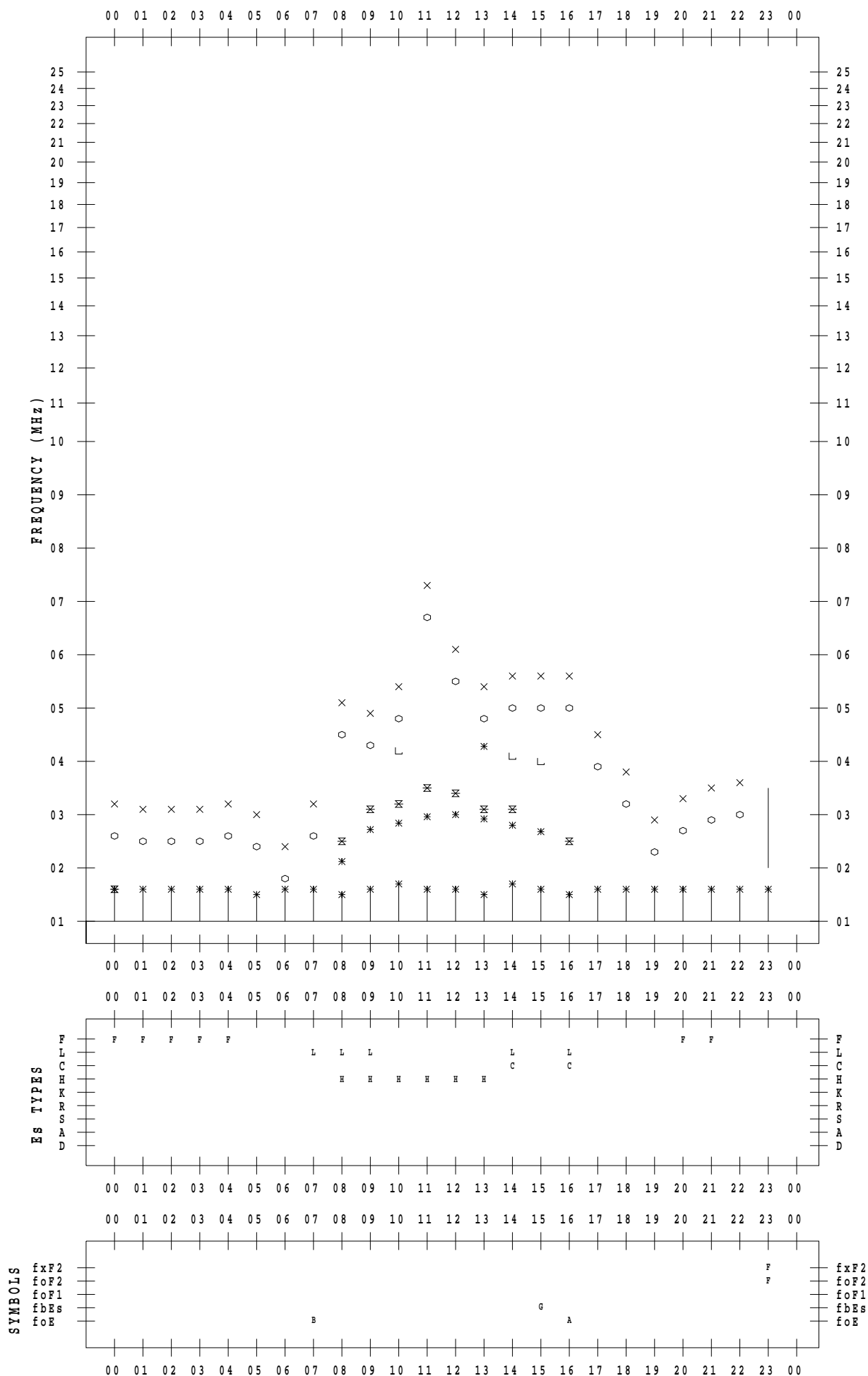
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/29

135 ° E MEAN TIME



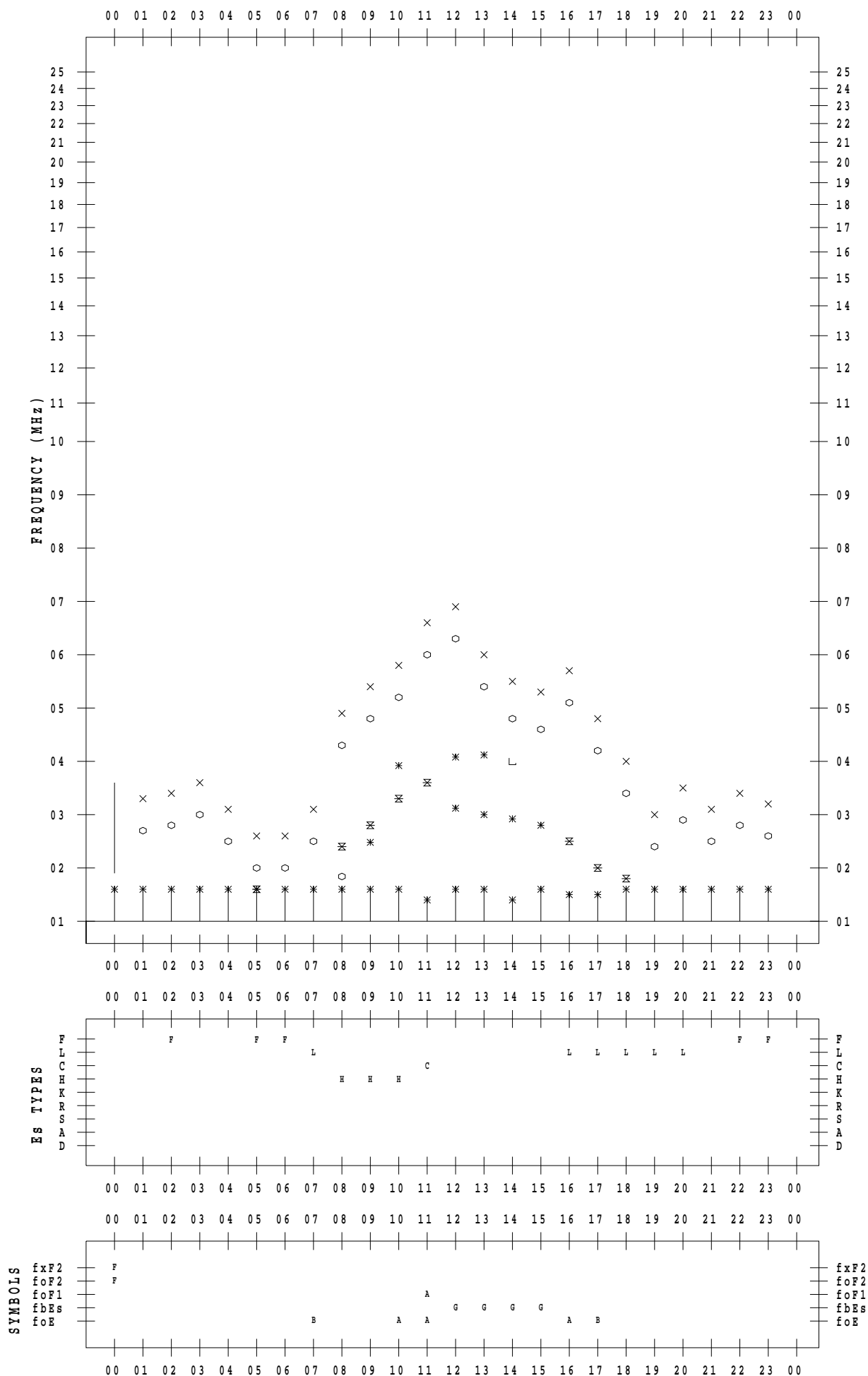
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/30

135 ° E MEAN TIME



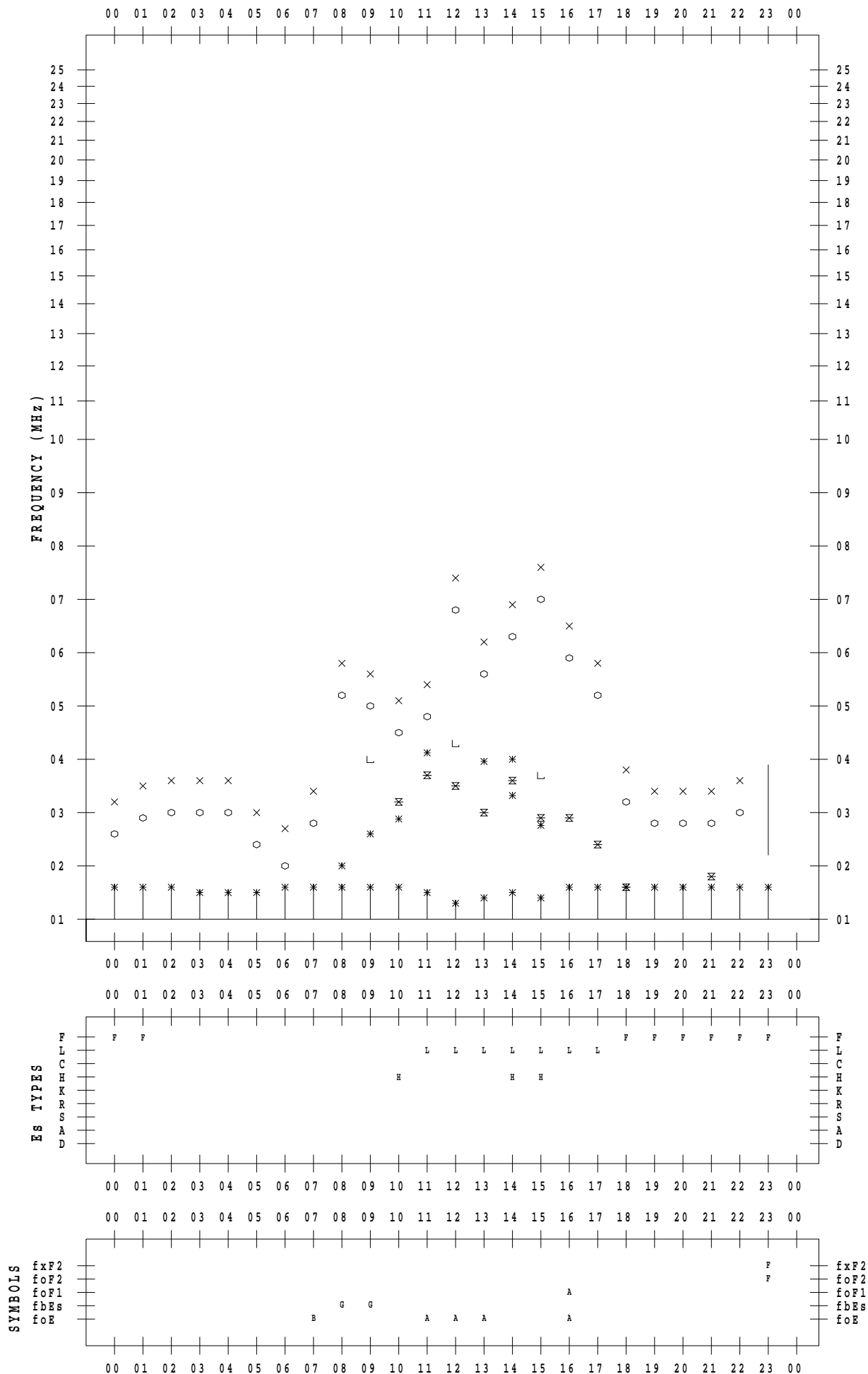
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2019/12/31

135 ° E MEAN TIME



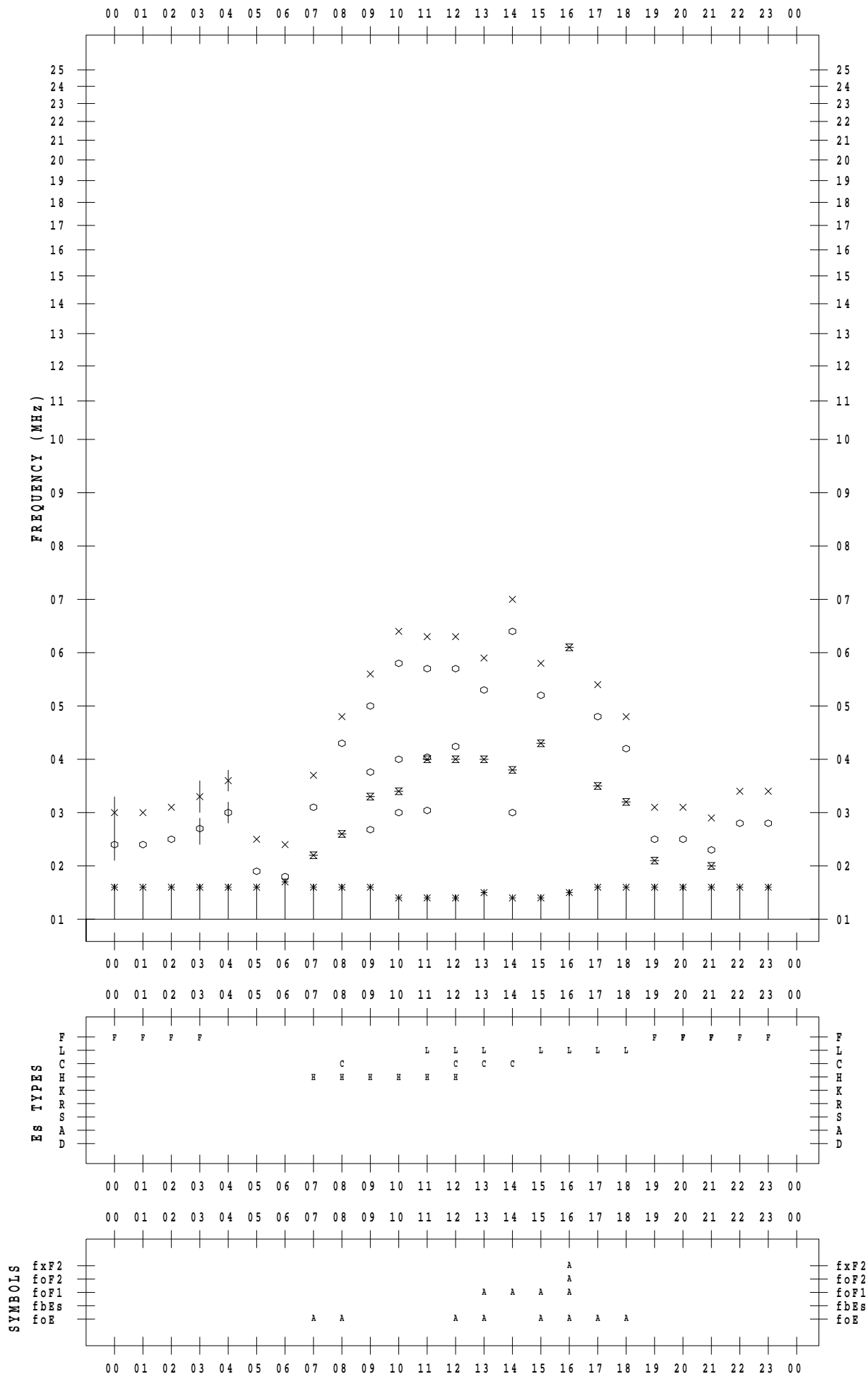
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/ 1

135 ° E MEAN TIME



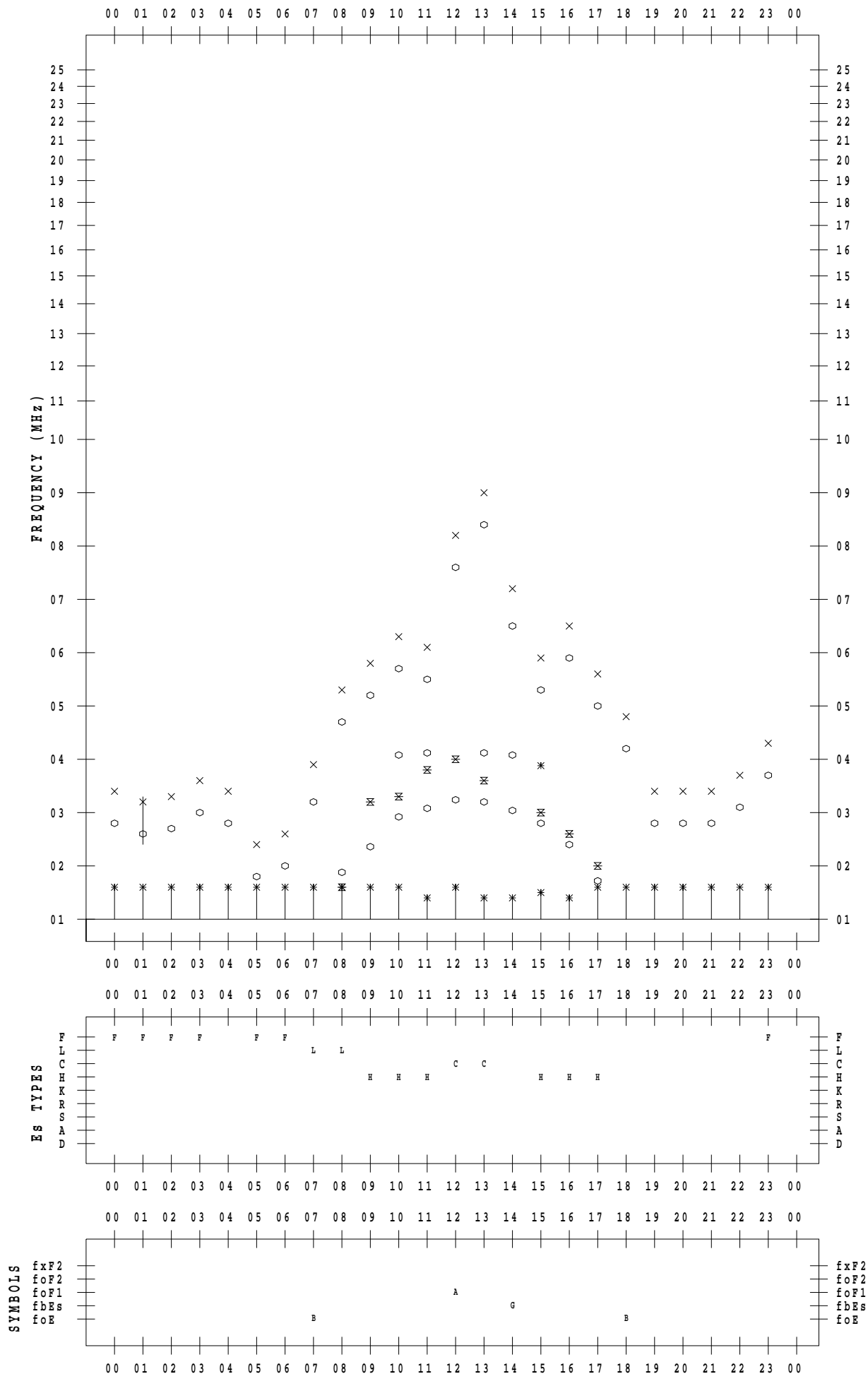
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/ 2

135 ° E MEAN TIME



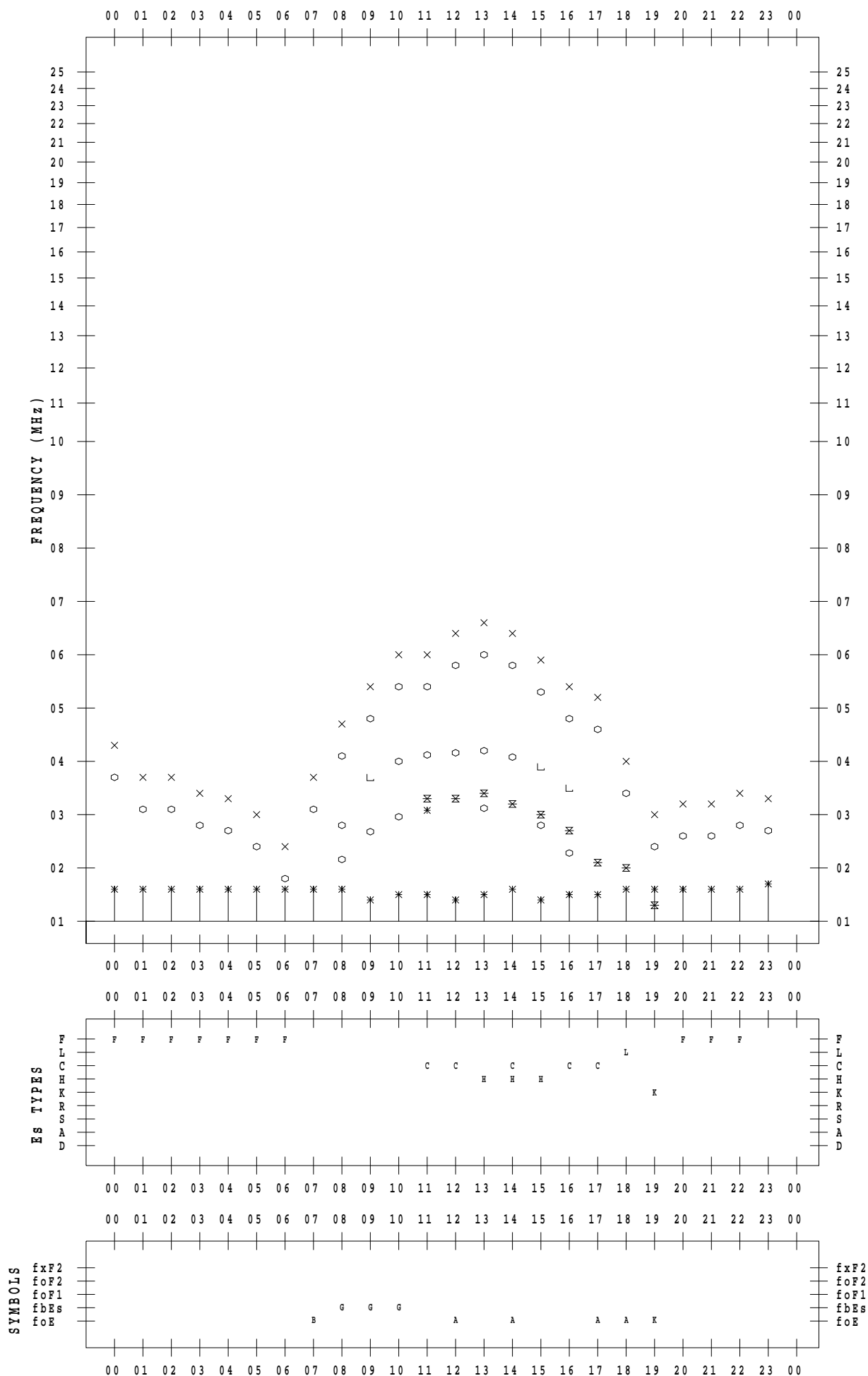
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/ 3

135 ° E MEAN TIME



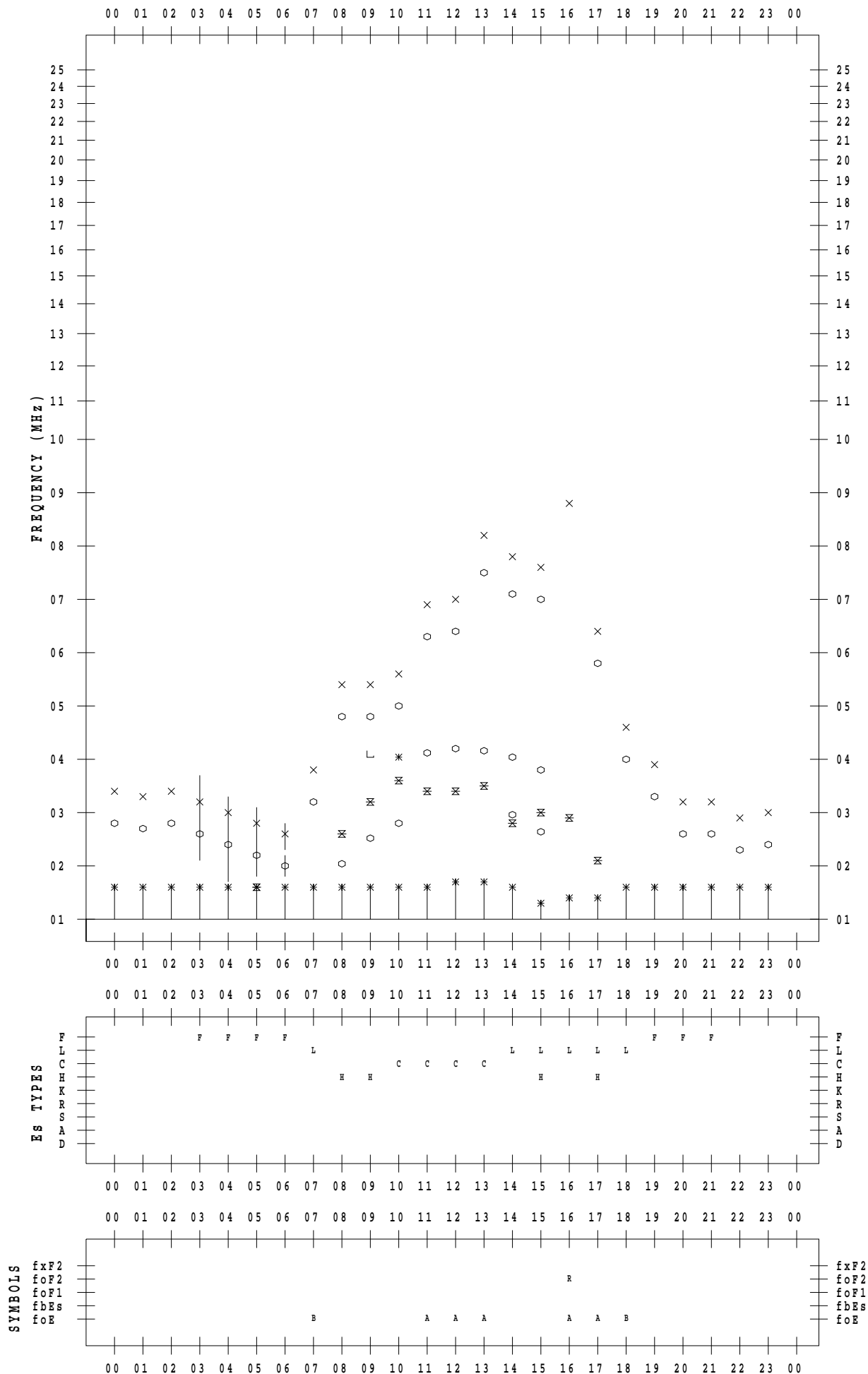
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/ 4

135 ° E MEAN TIME



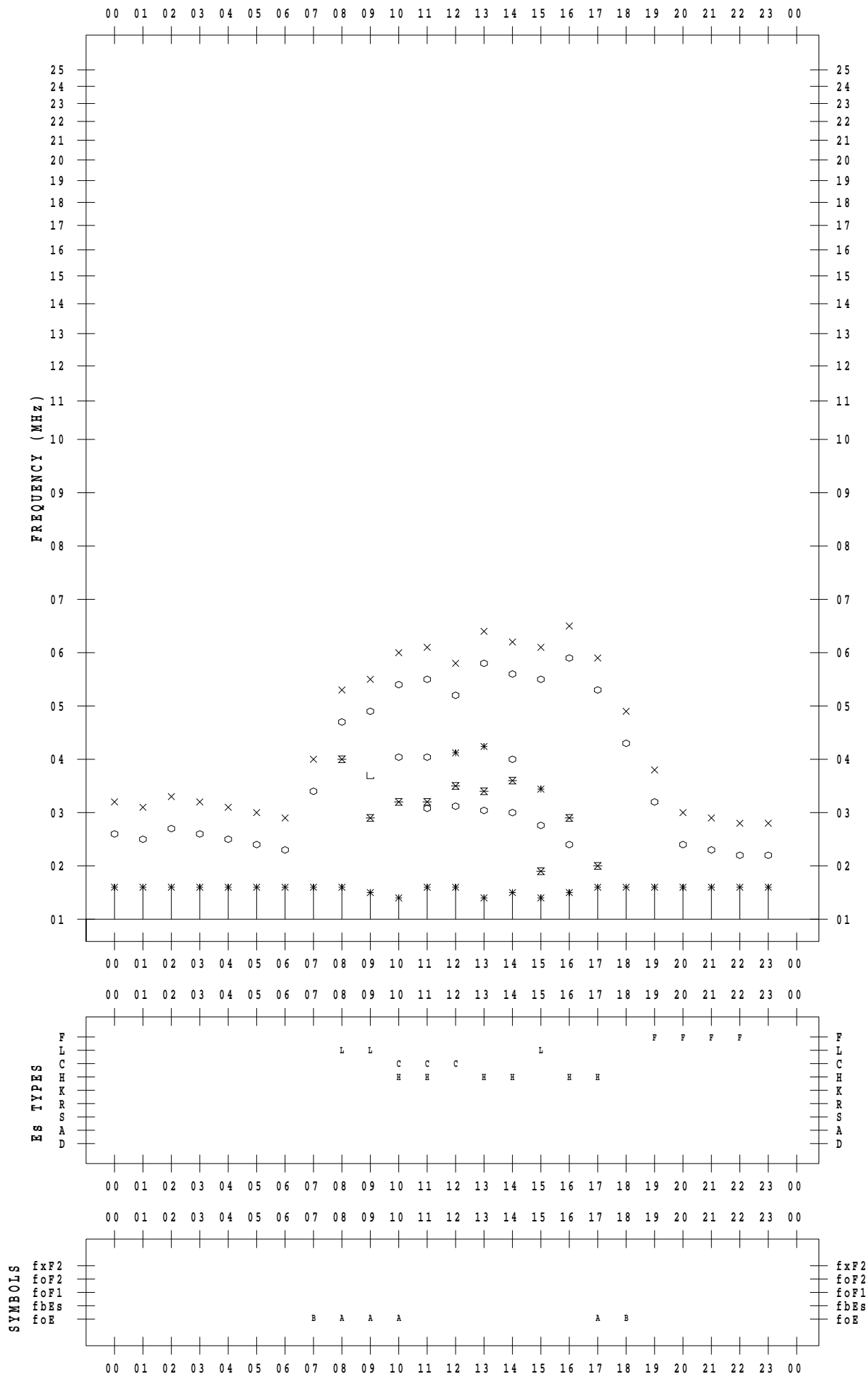
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/ 5

135 ° E MEAN TIME



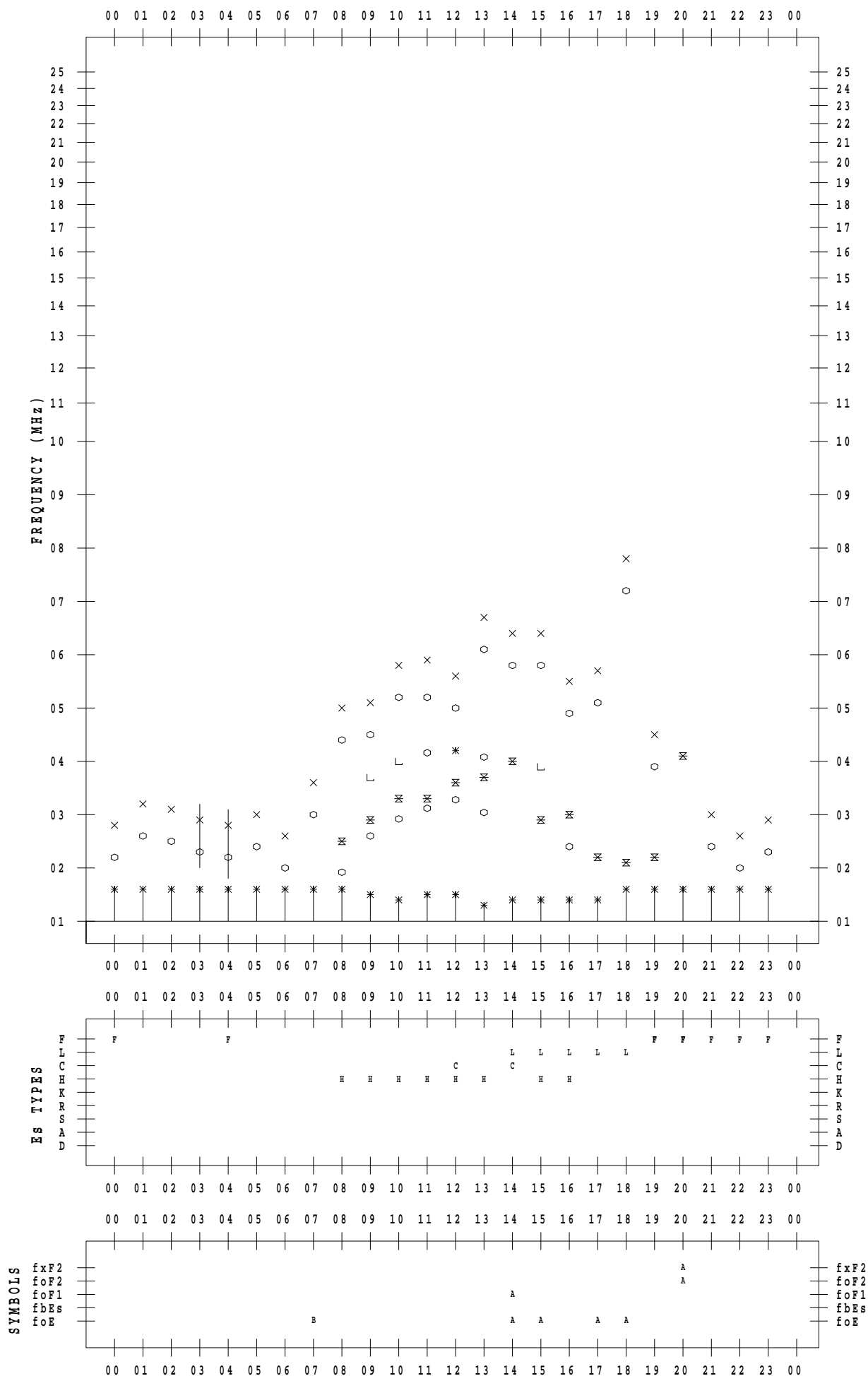
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/ 6

135 ° E MEAN TIME



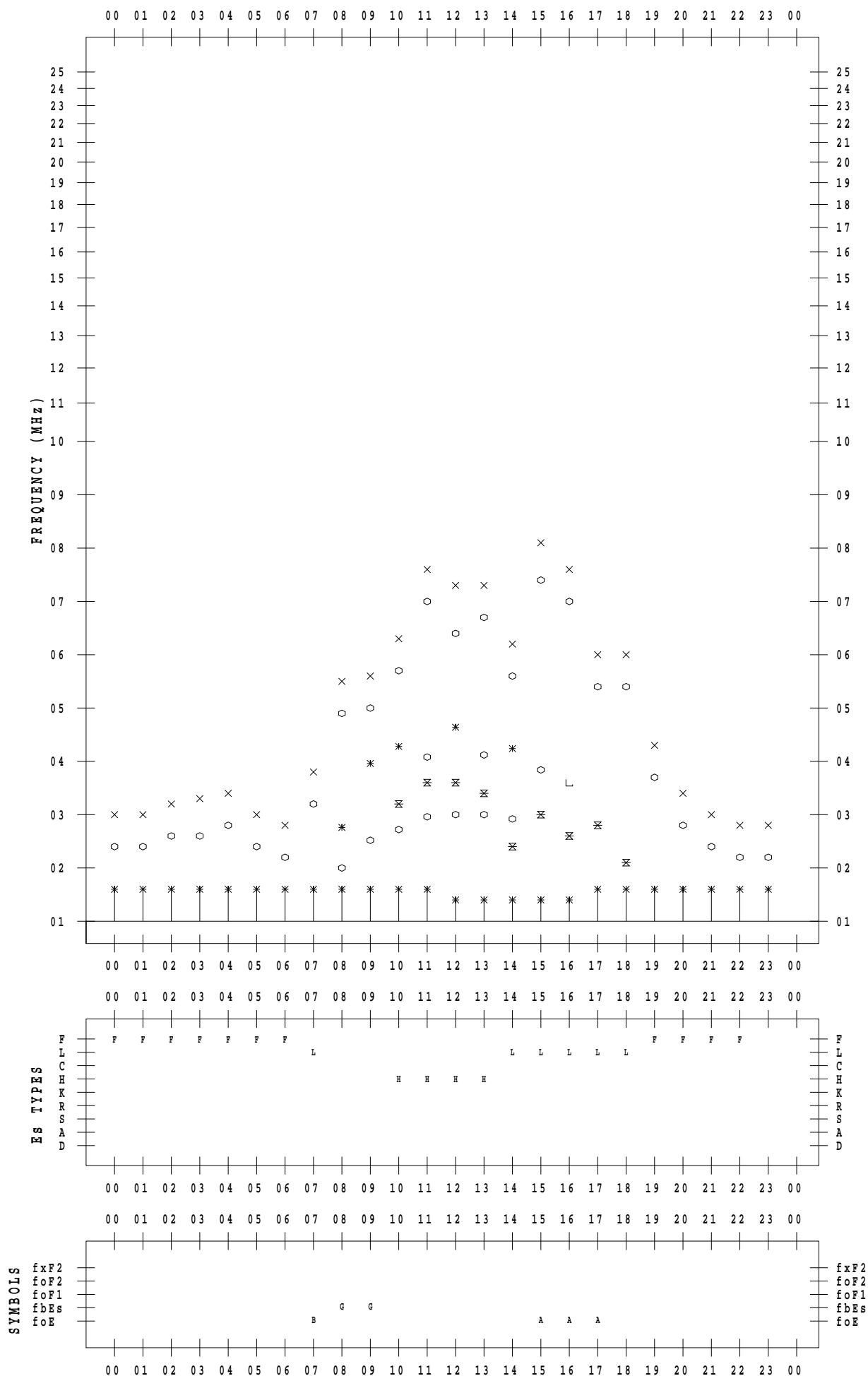
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/ 7

135 ° E MEAN TIME



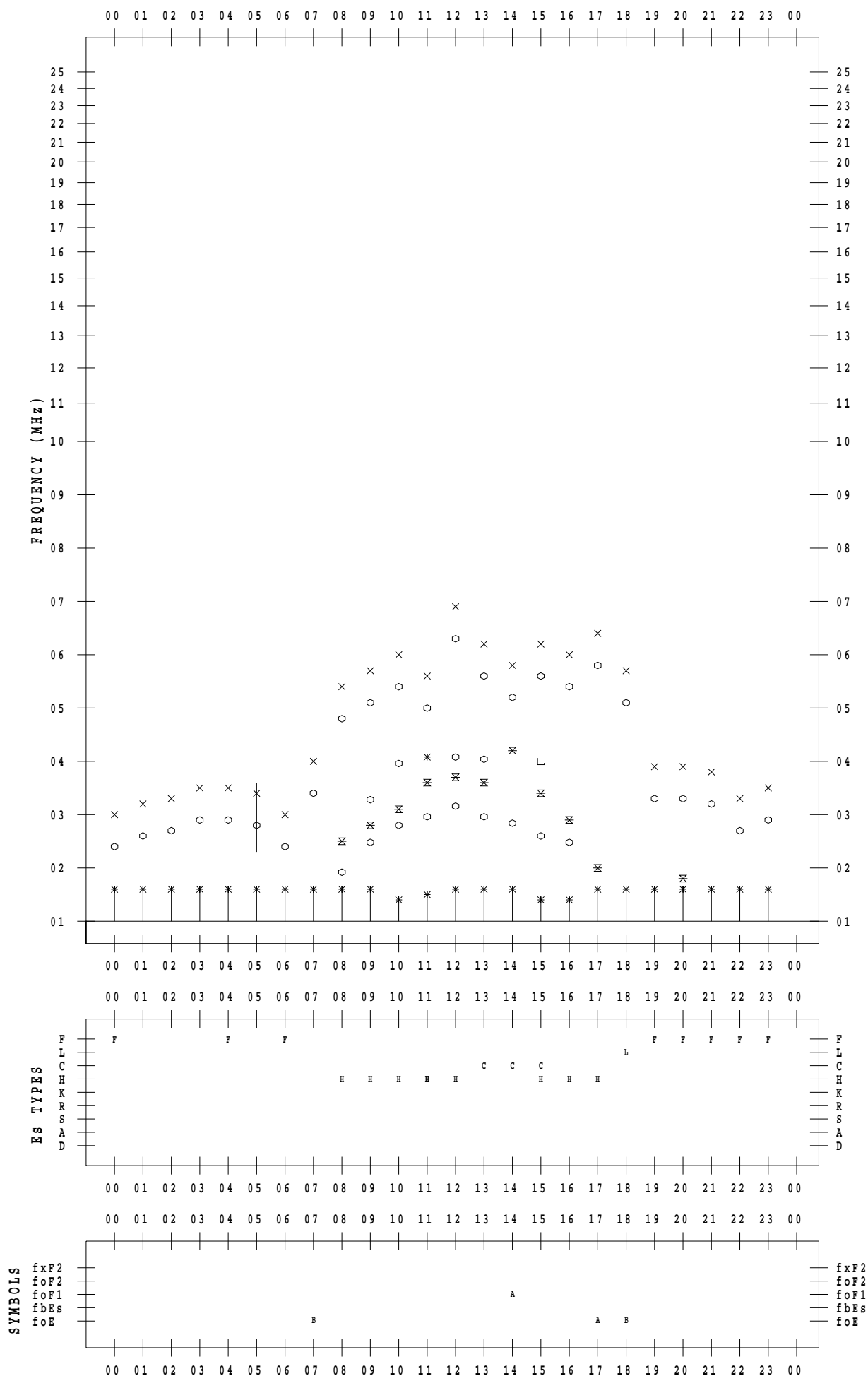
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/ 8

135 ° E MEAN TIME



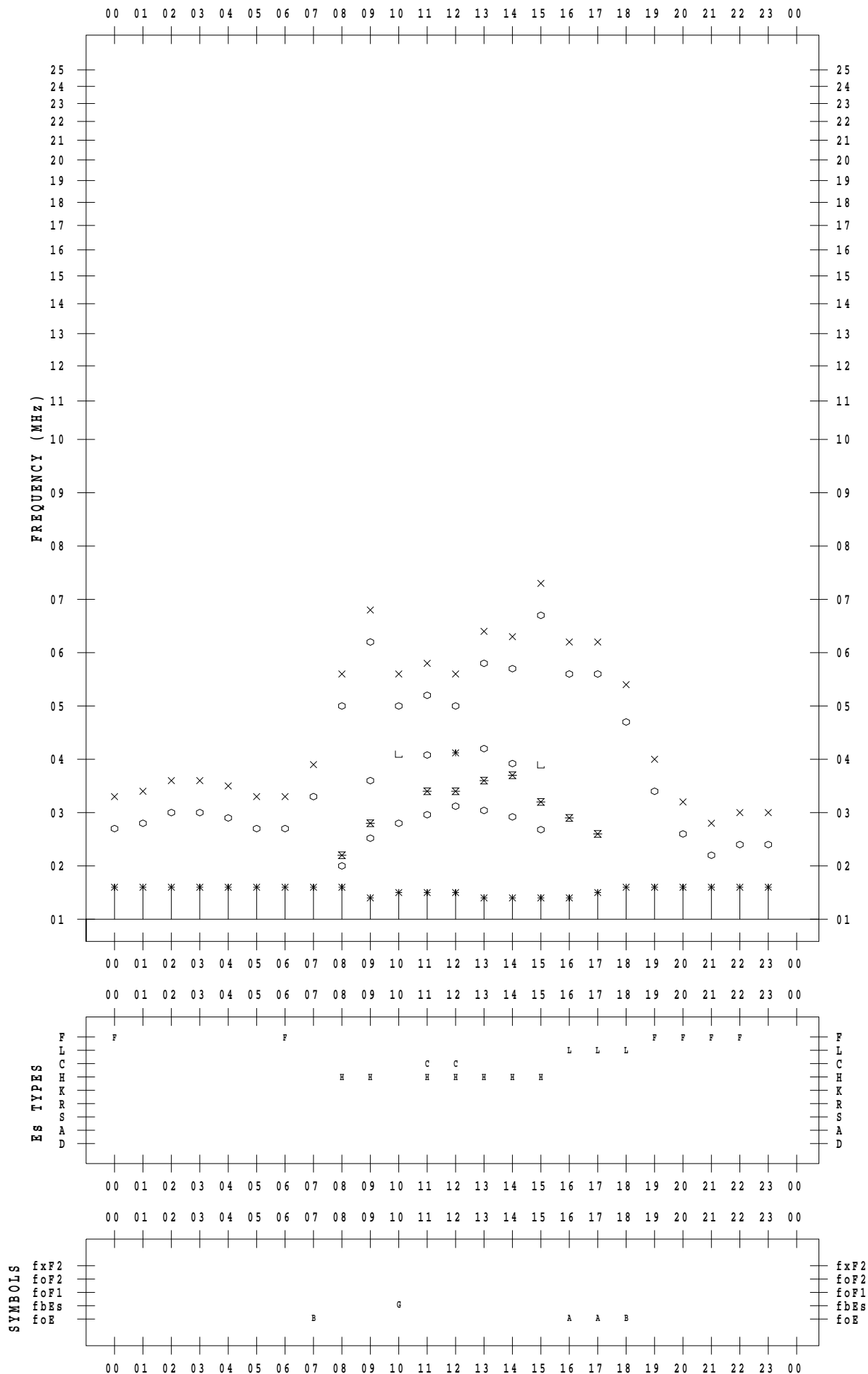
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/ 9

135 ° E MEAN TIME



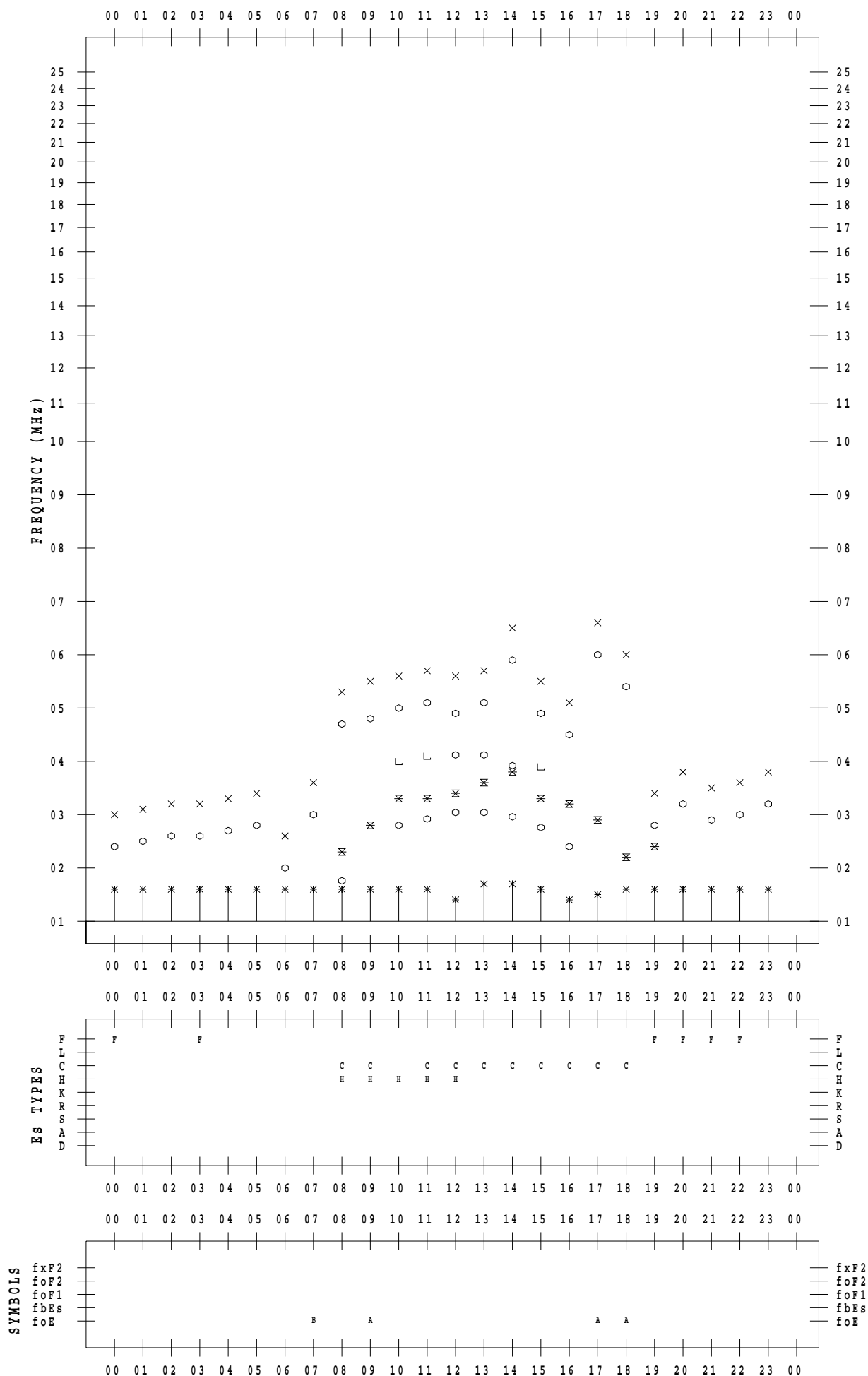
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/10

135 ° E MEAN TIME



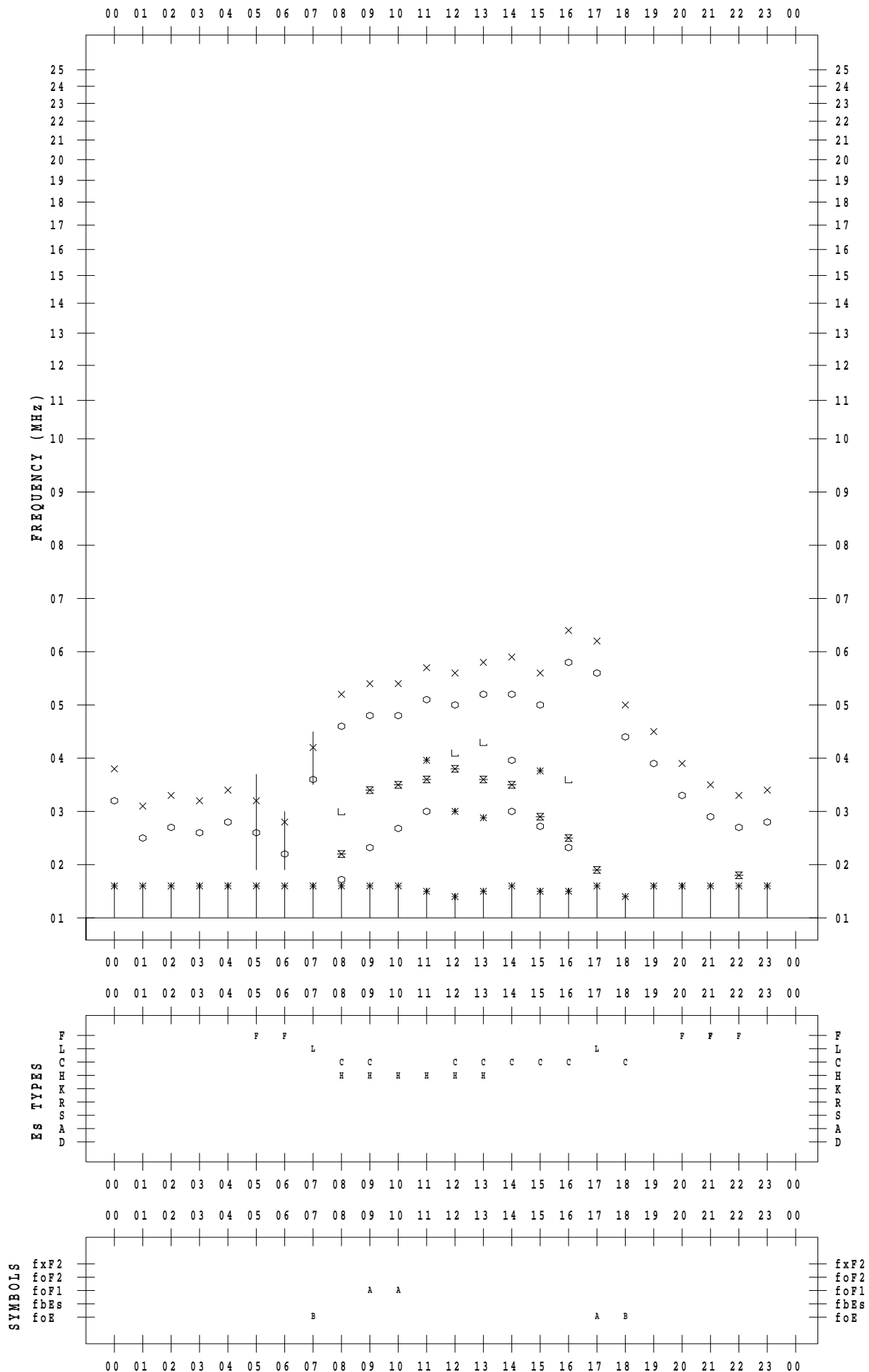
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/11

135 ° E MEAN TIME



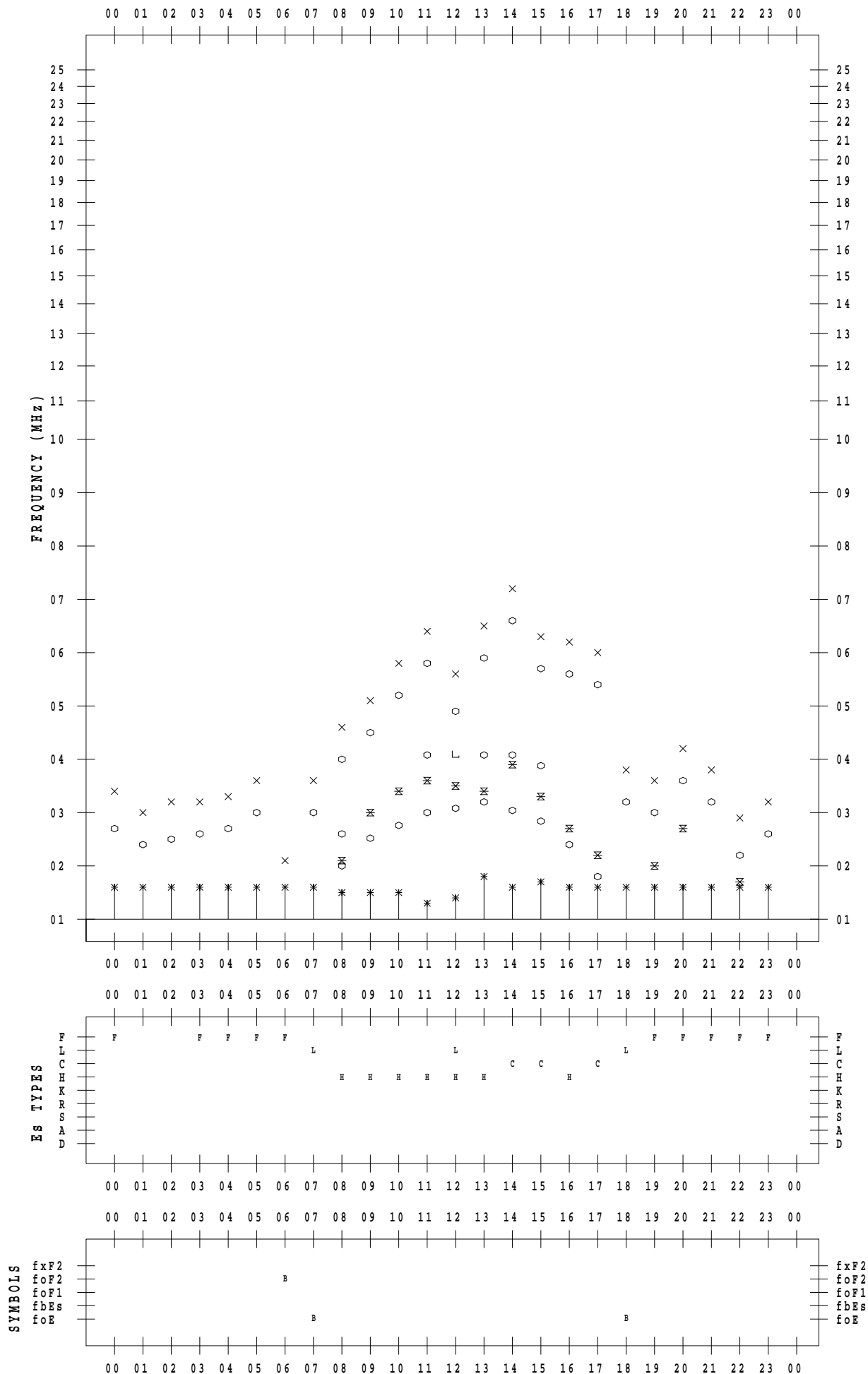
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/12

135 ° E MEAN TIME



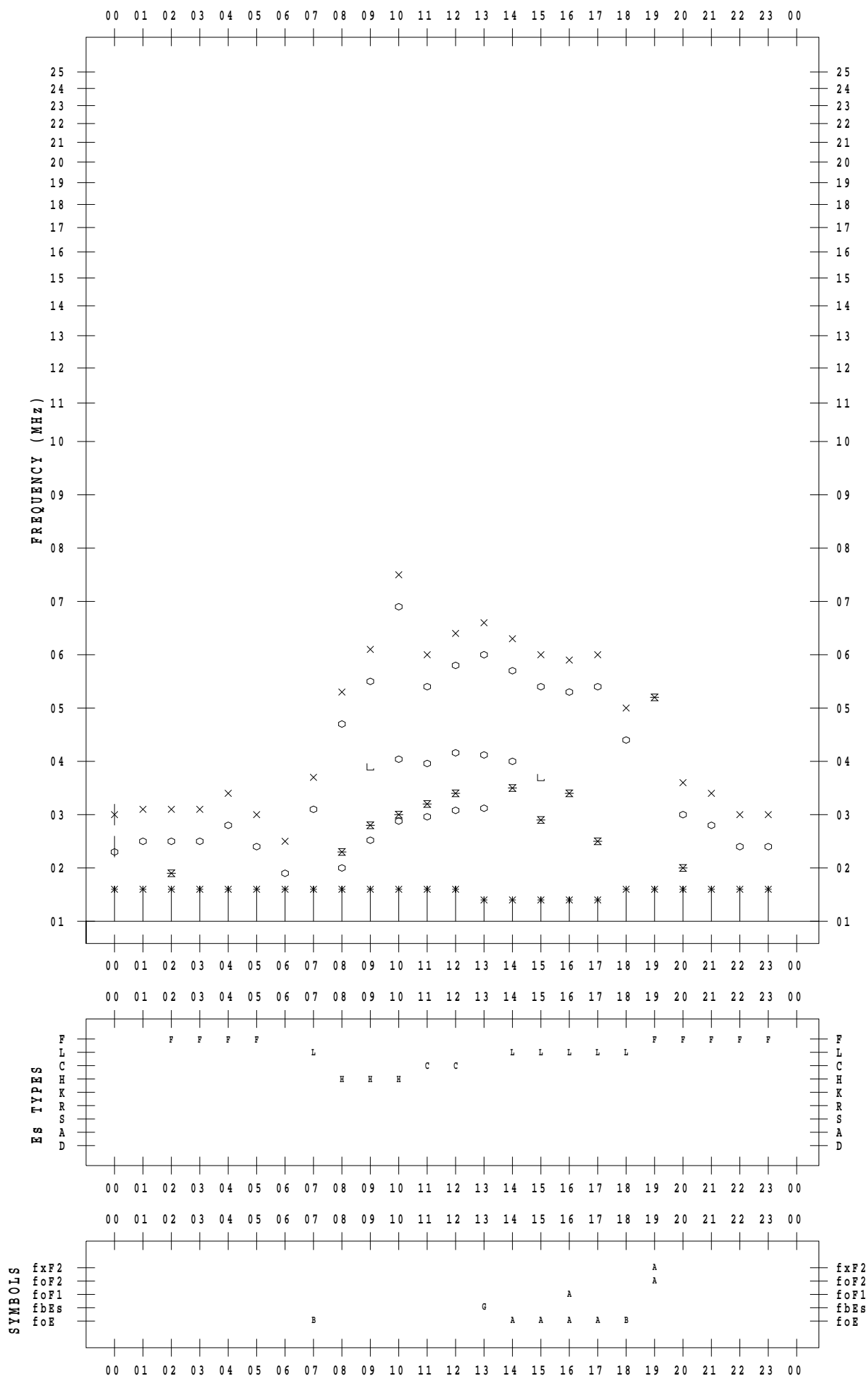
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/13

135 ° E MEAN TIME



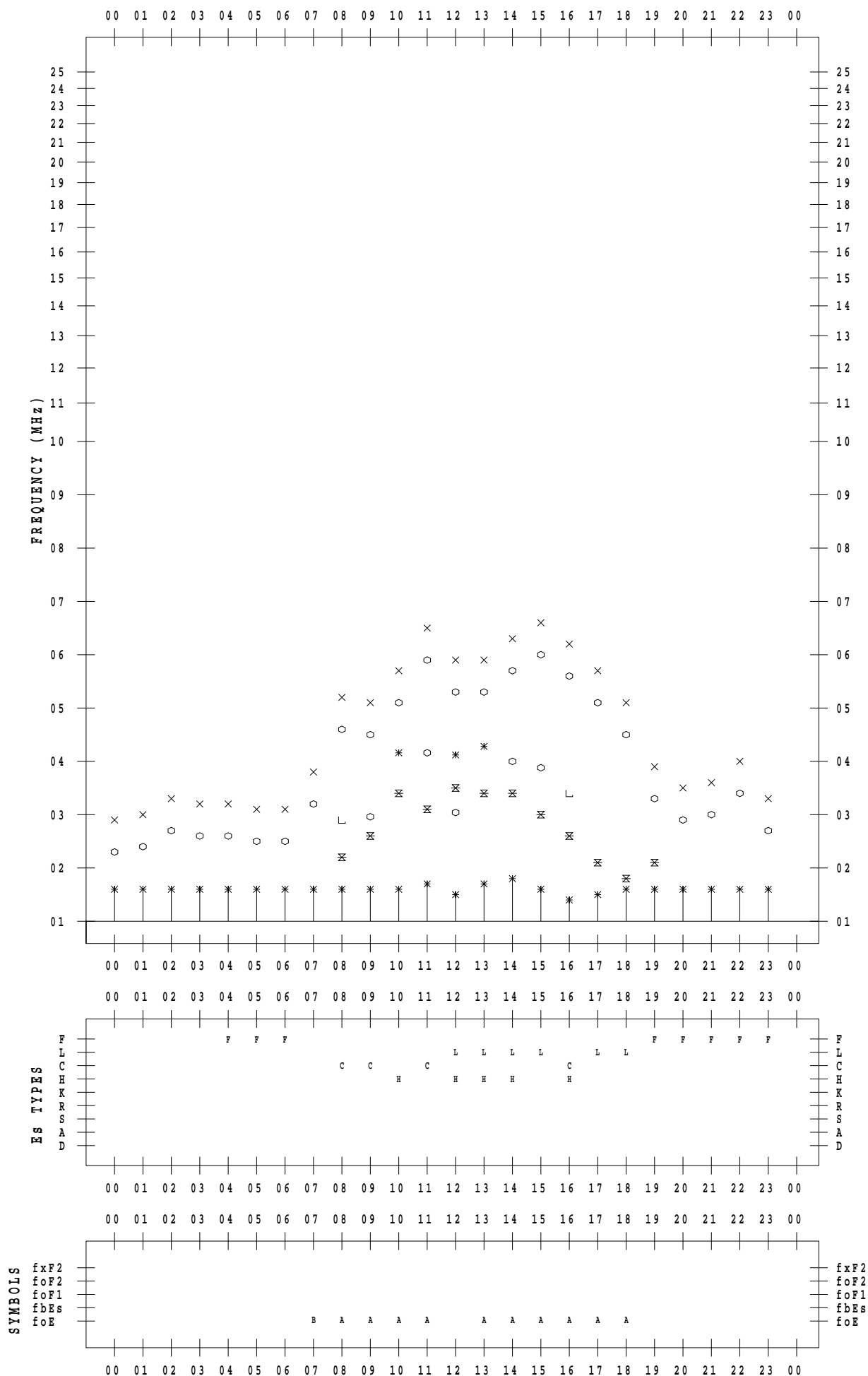
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/14

135 ° E MEAN TIME



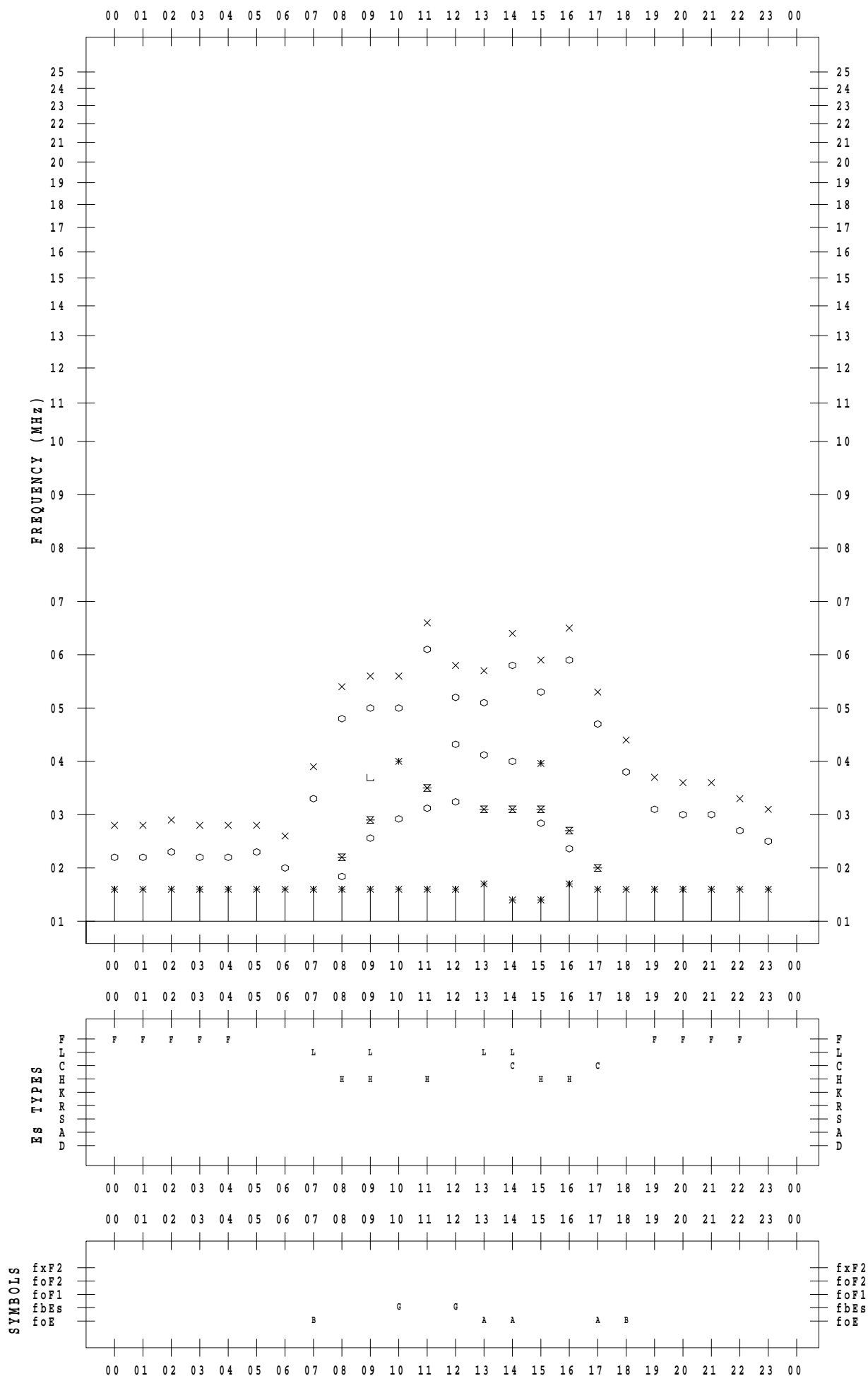
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/15

135 ° E MEAN TIME



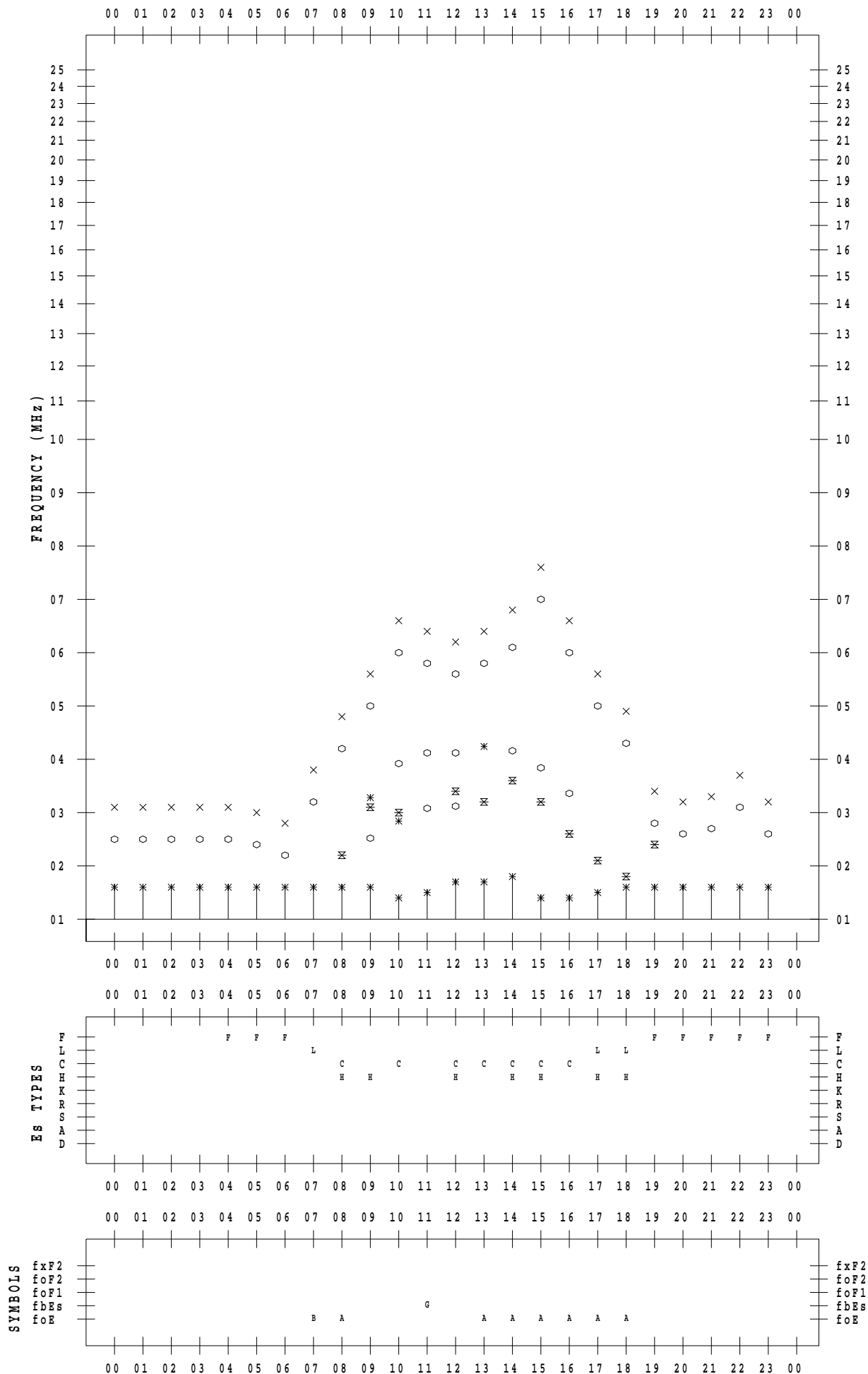
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/16

135 ° E MEAN TIME



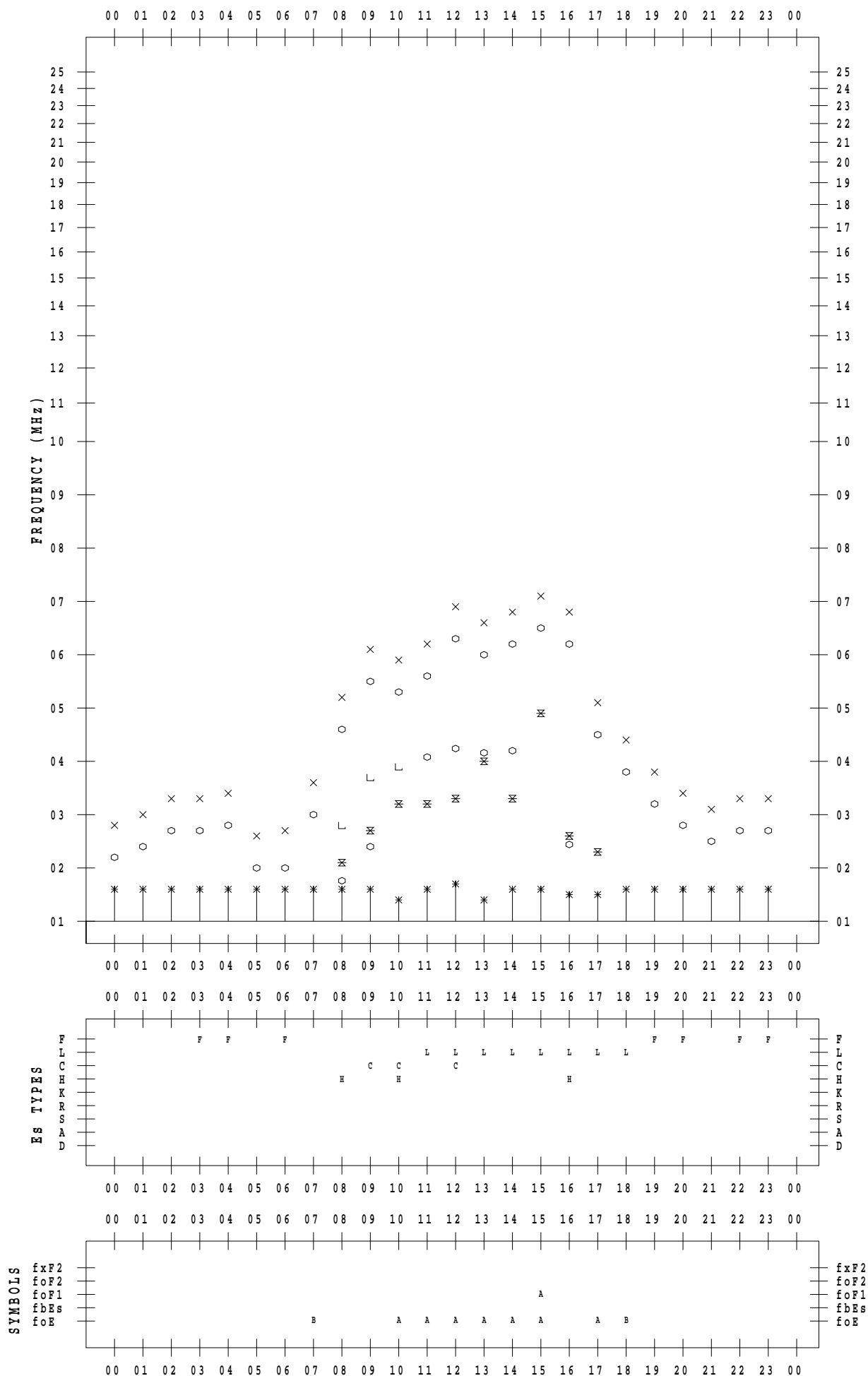
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/17

135 ° E MEAN TIME



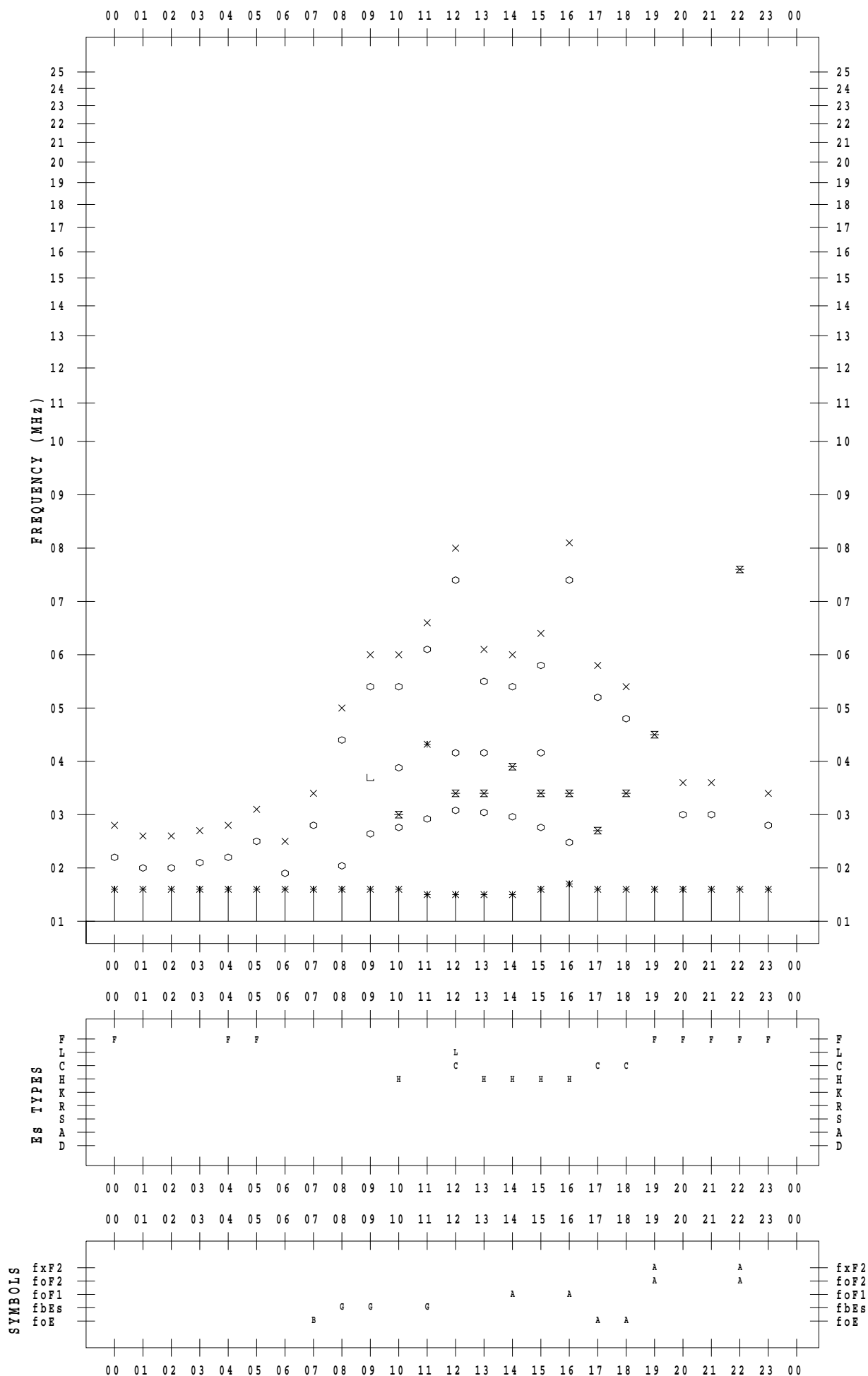
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/18

135 ° E MEAN TIME



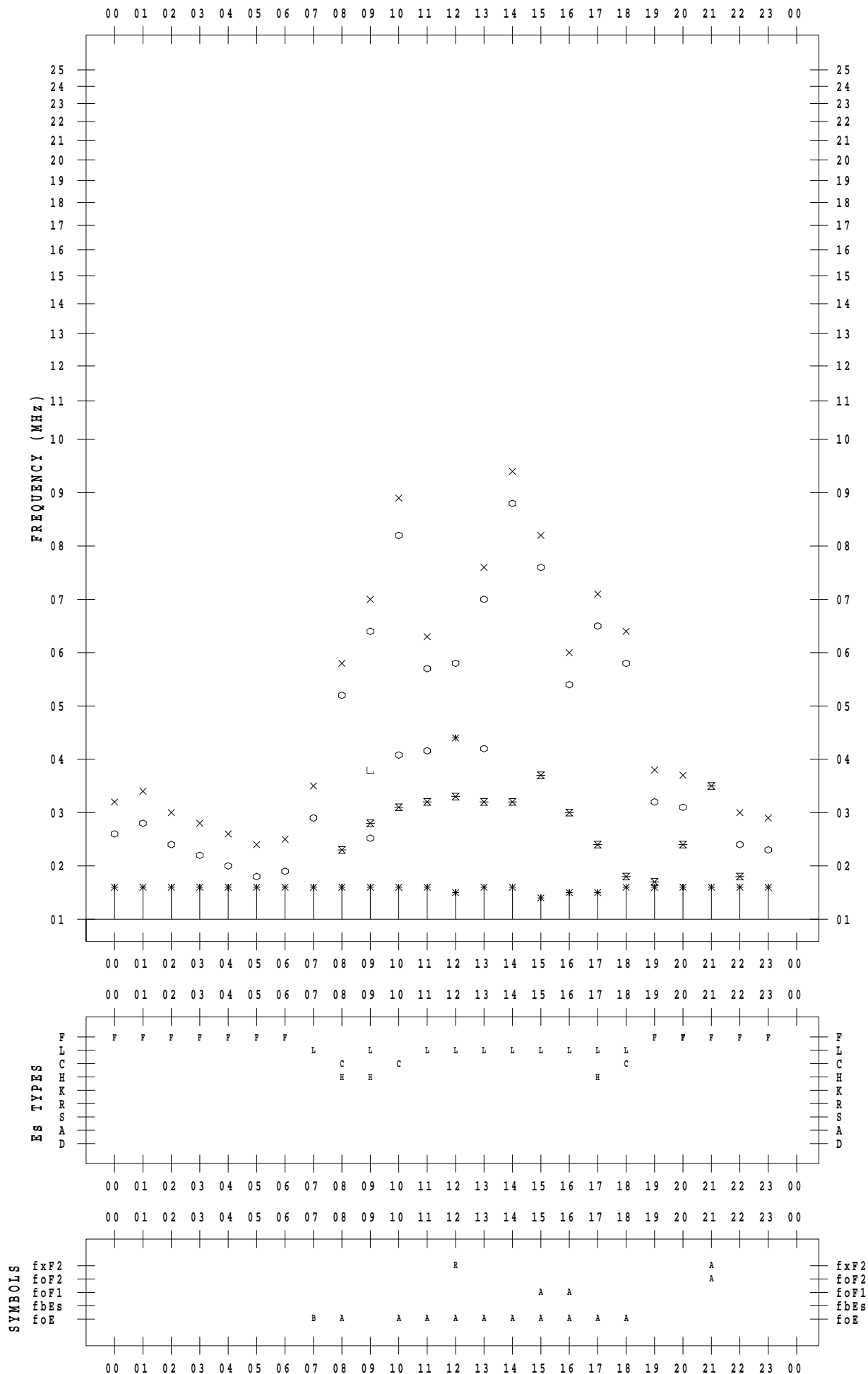
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/19

135 ° E MEAN TIME



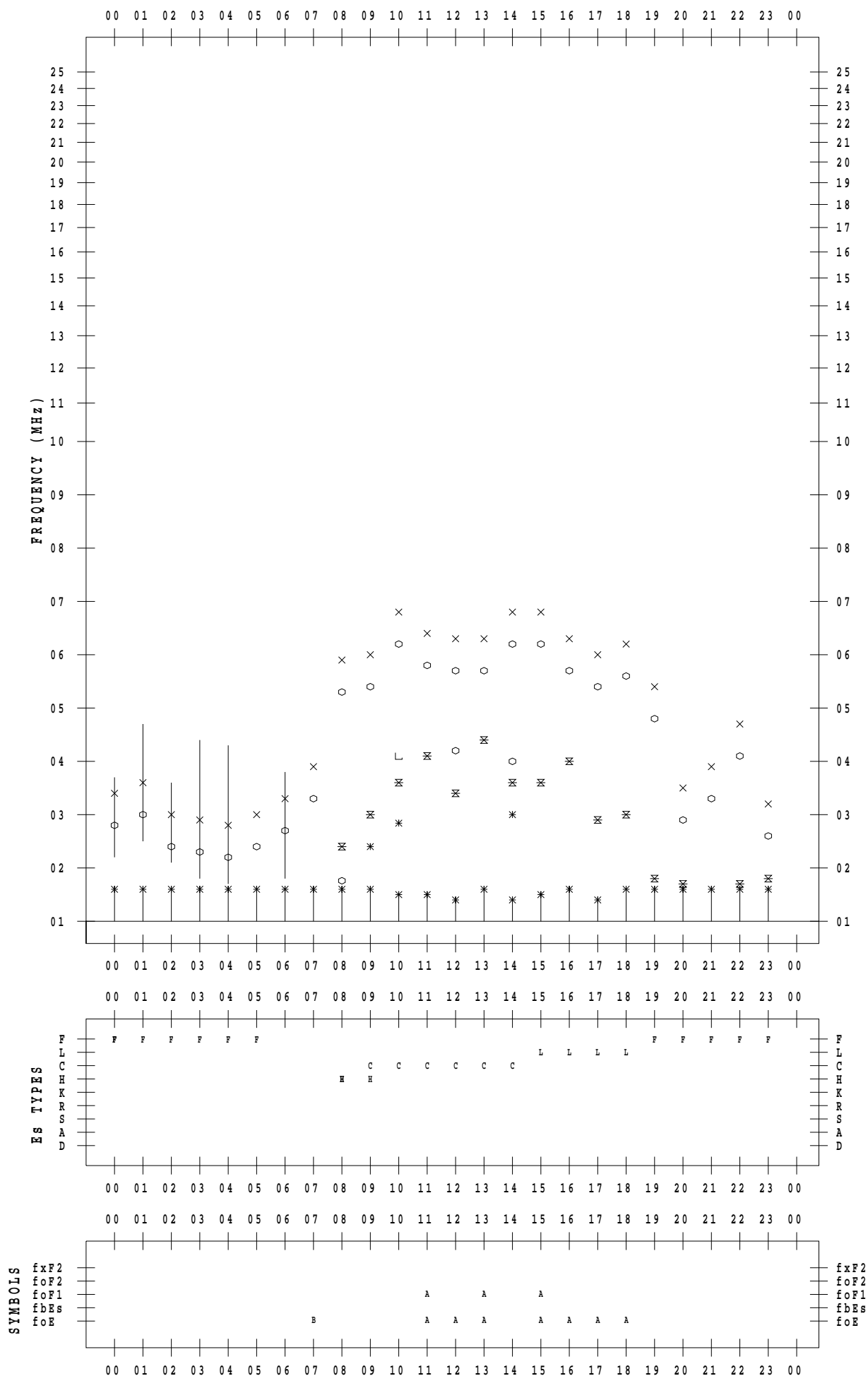
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/20

135 ° E MEAN TIME



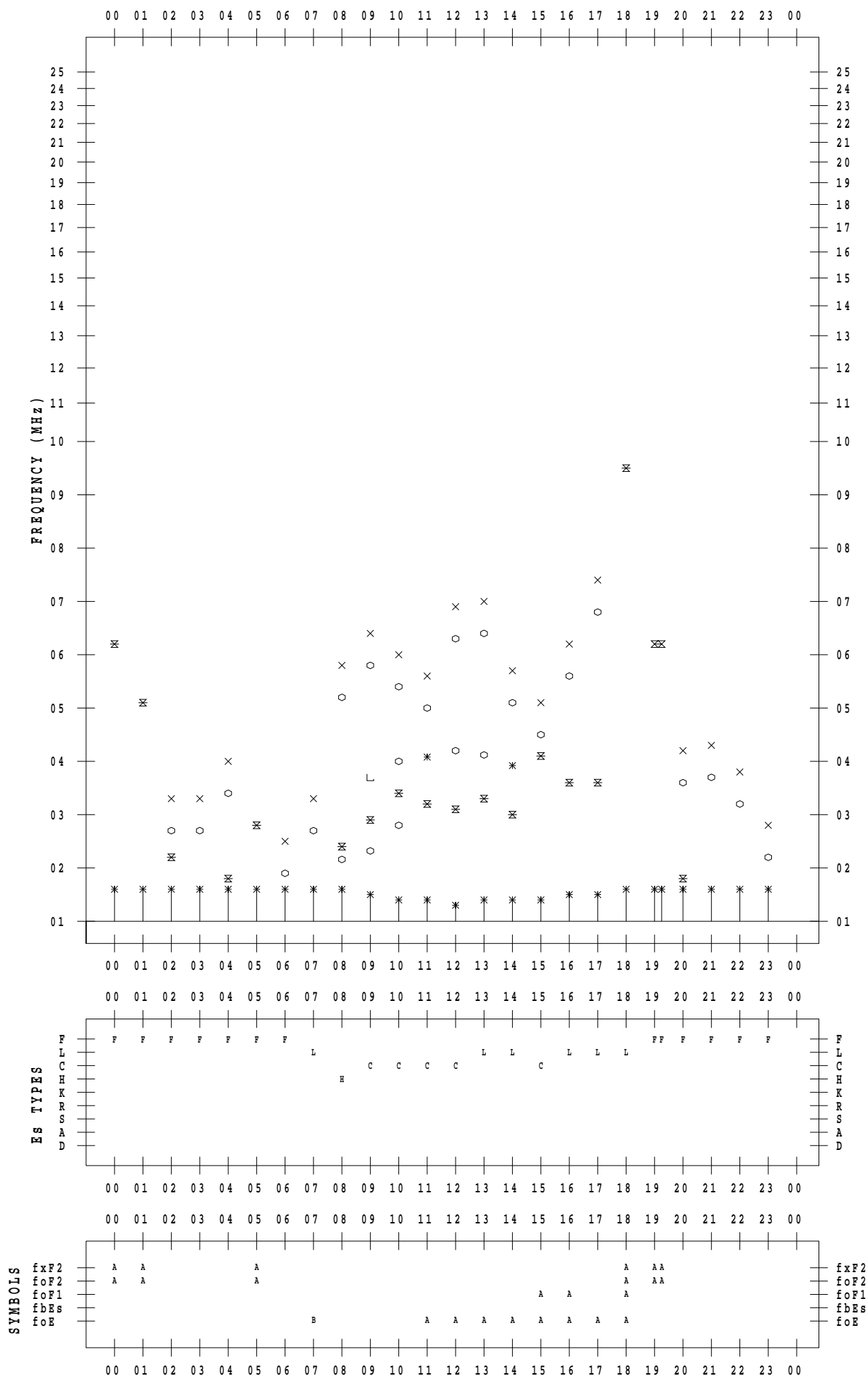
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/21

135 ° E MEAN TIME



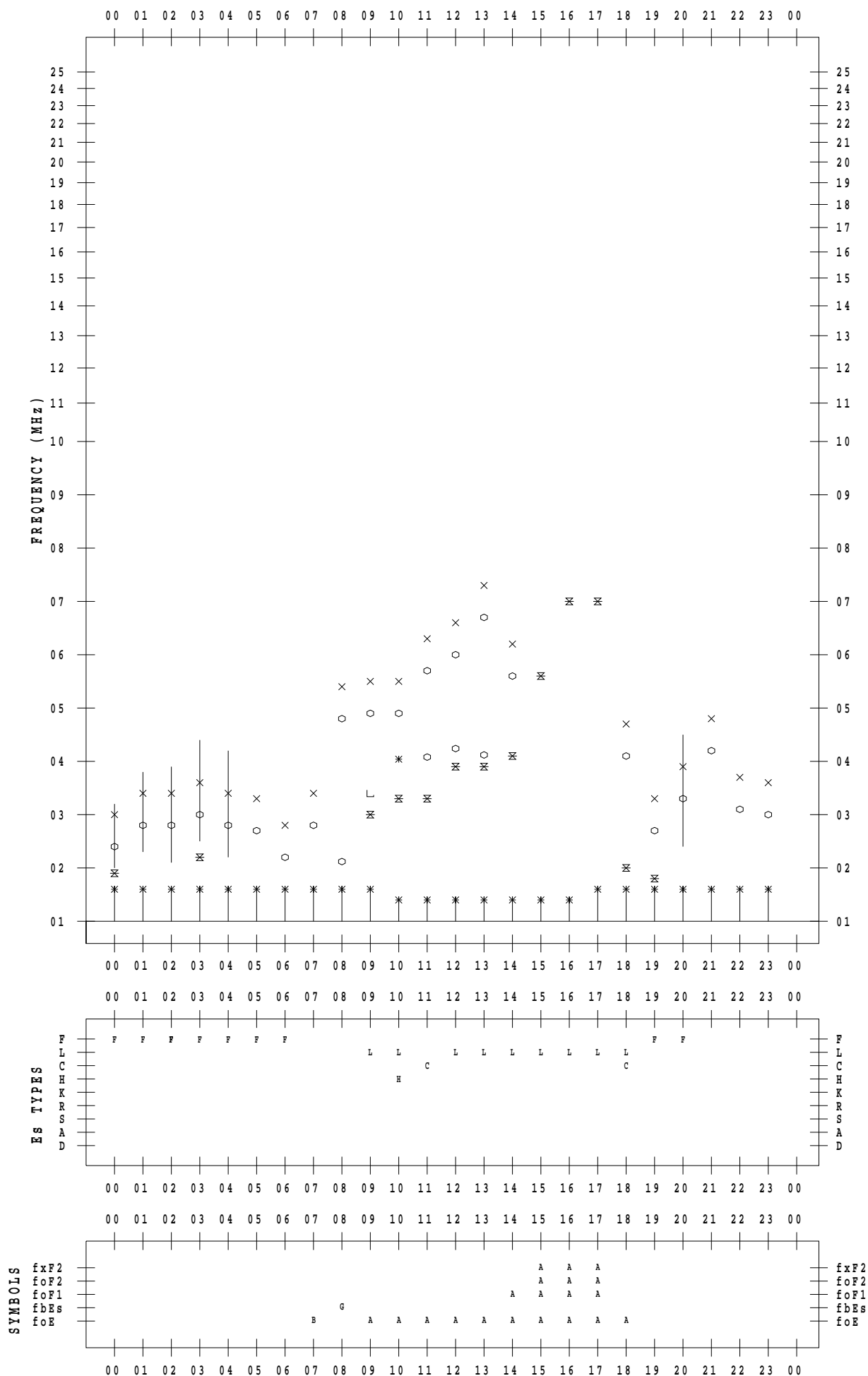
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/22

135 ° E MEAN TIME



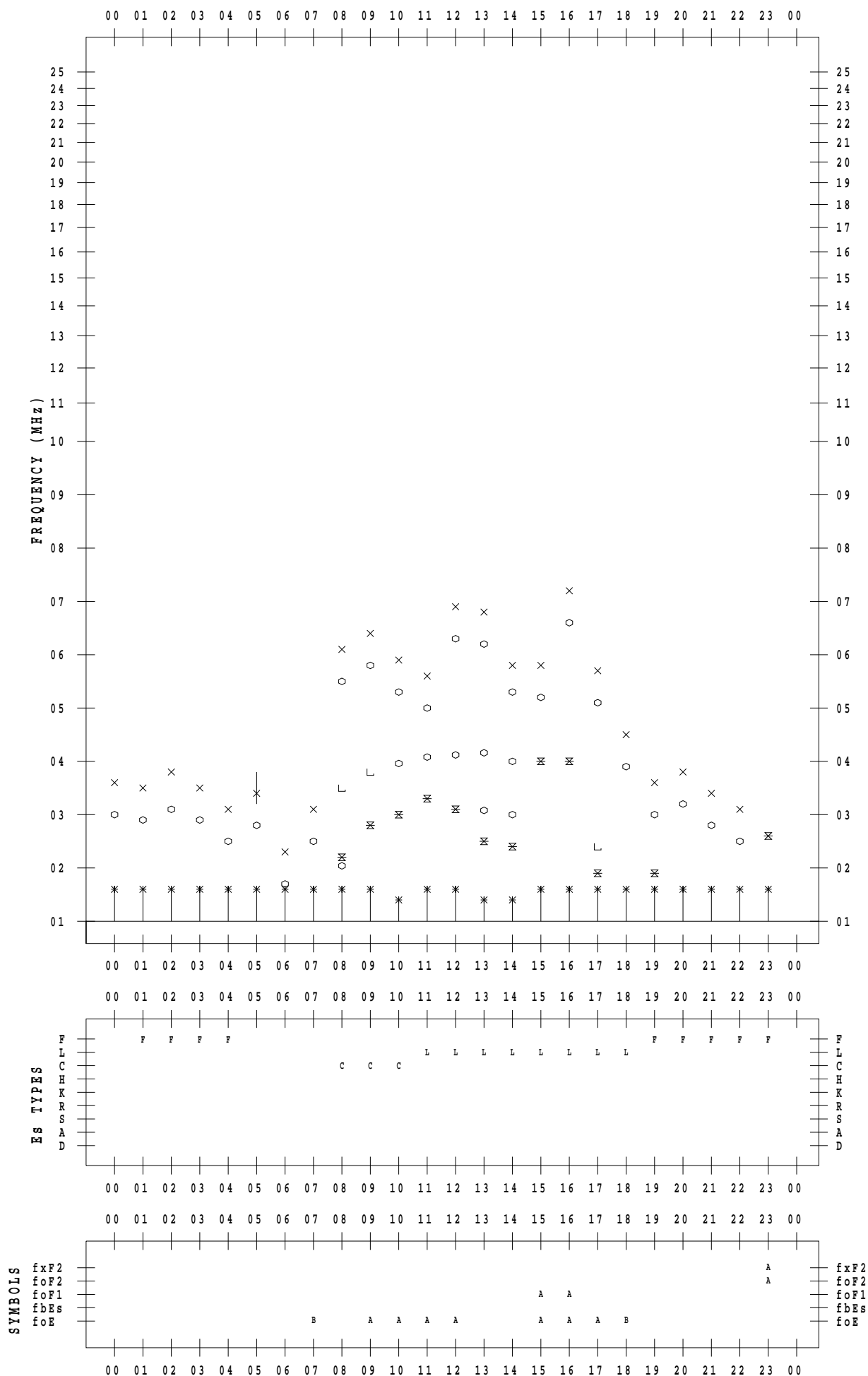
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/23

135 ° E MEAN TIME



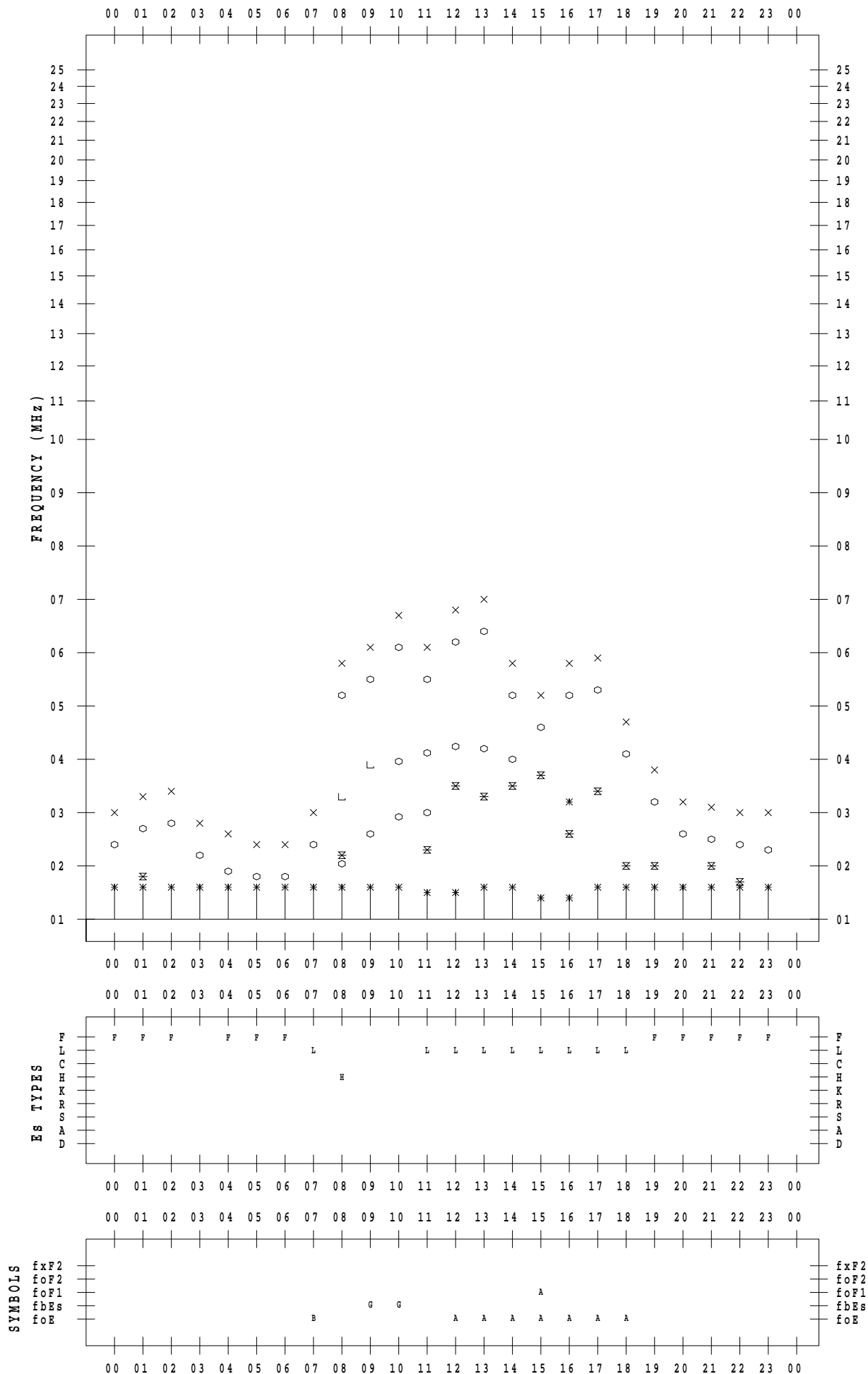
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/24

135 ° E MEAN TIME



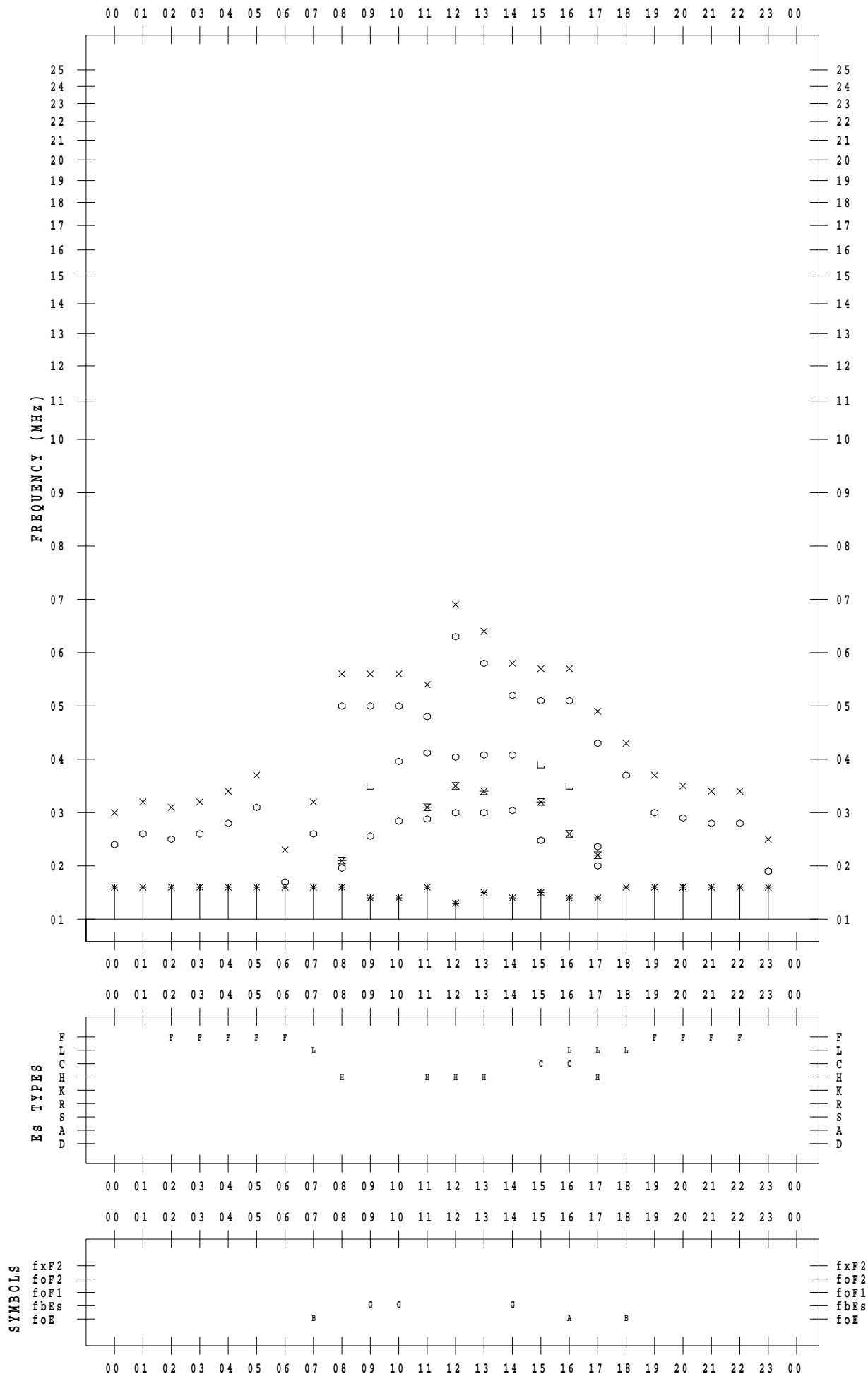
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/25

135 ° E MEAN TIME



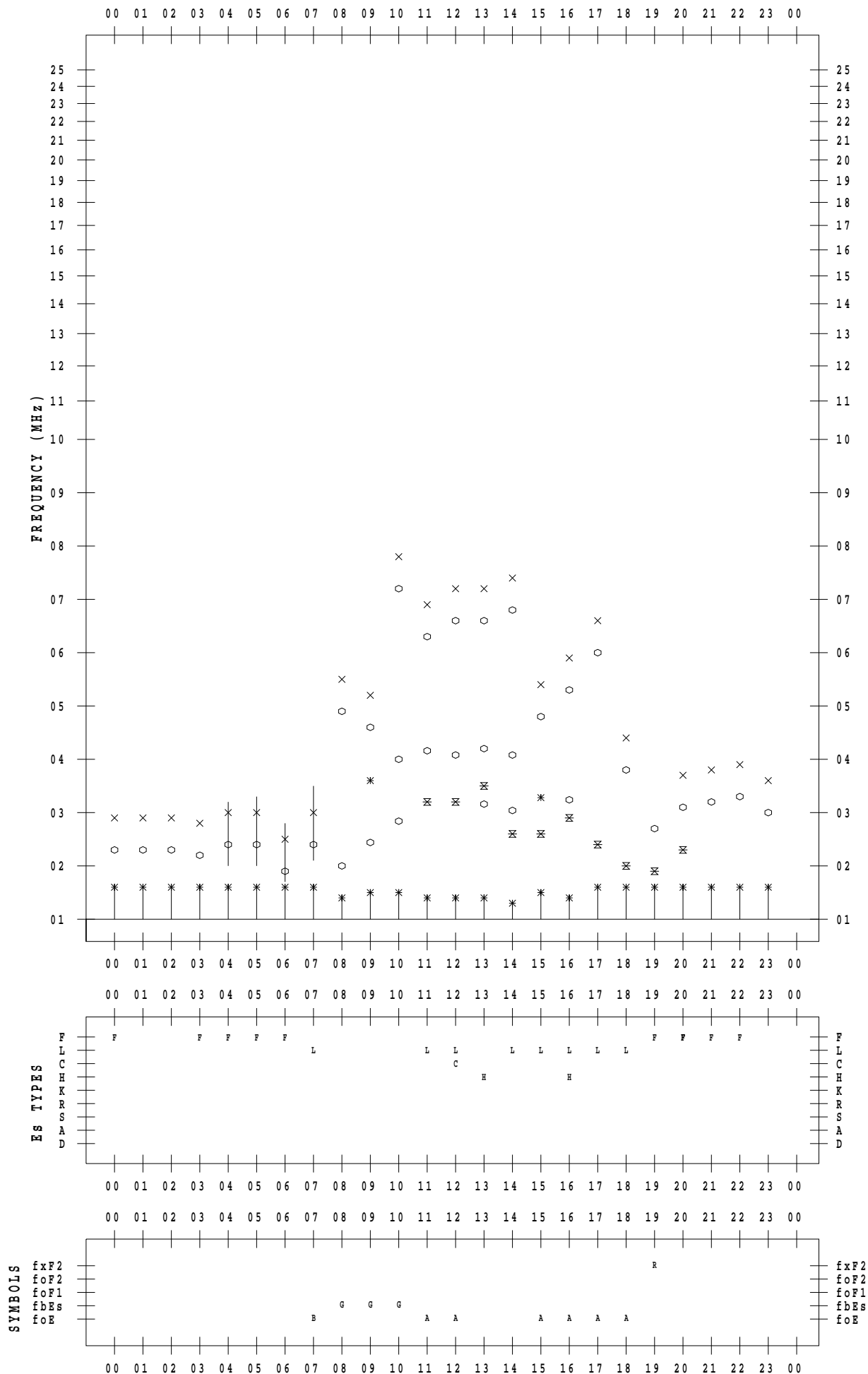
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/26

135 ° E MEAN TIME



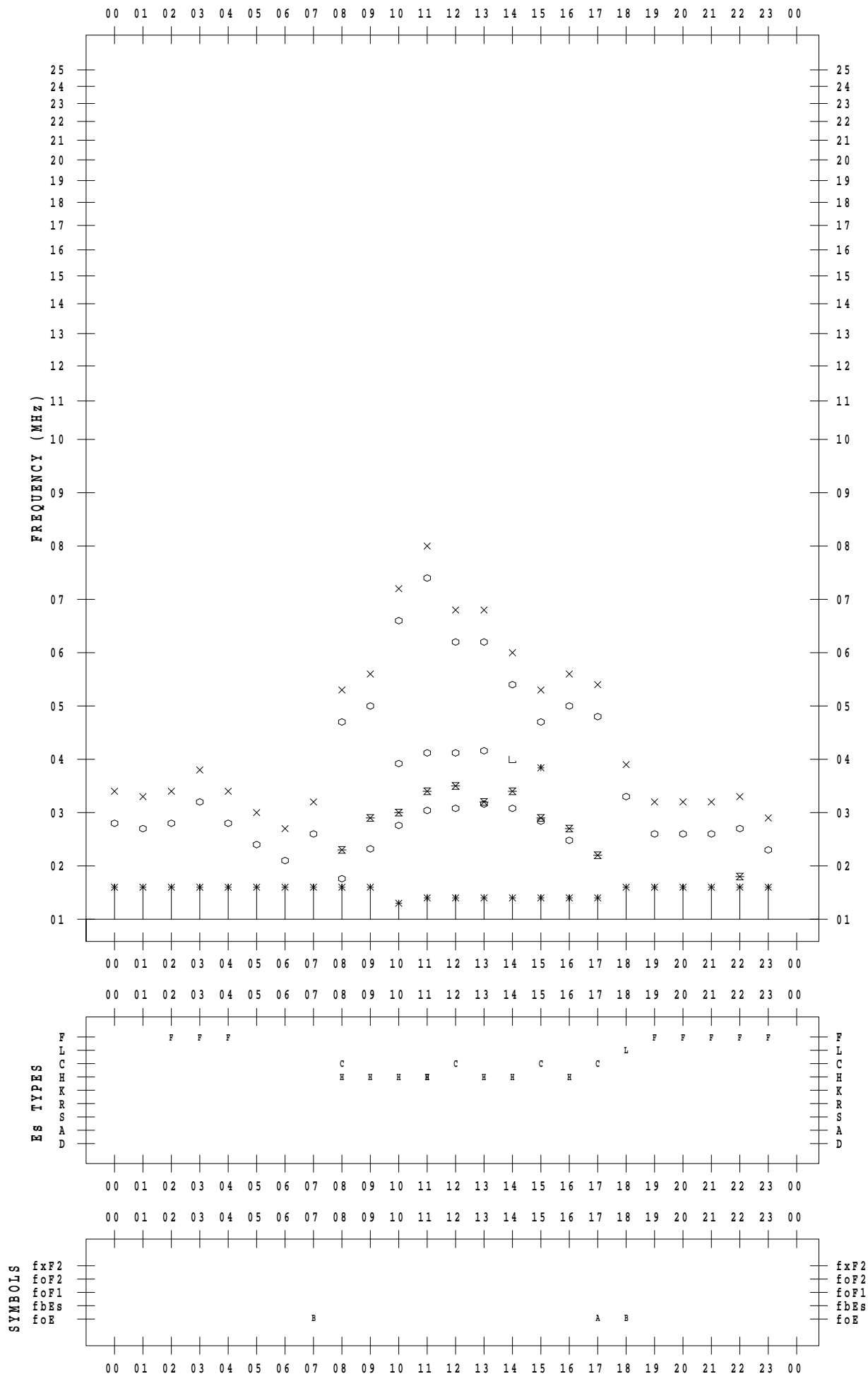
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/27

135 ° E MEAN TIME



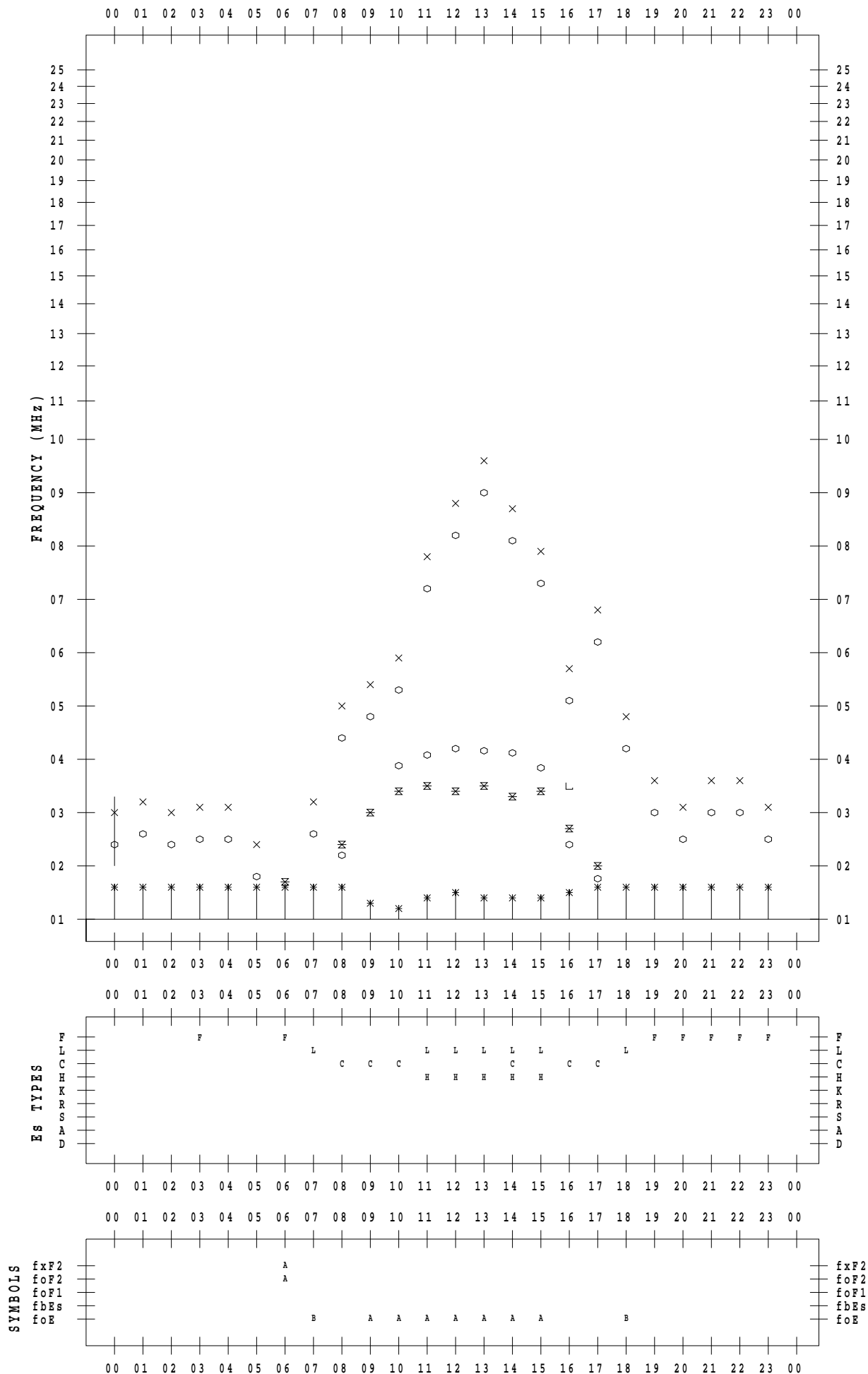
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/28

135 ° E MEAN TIME



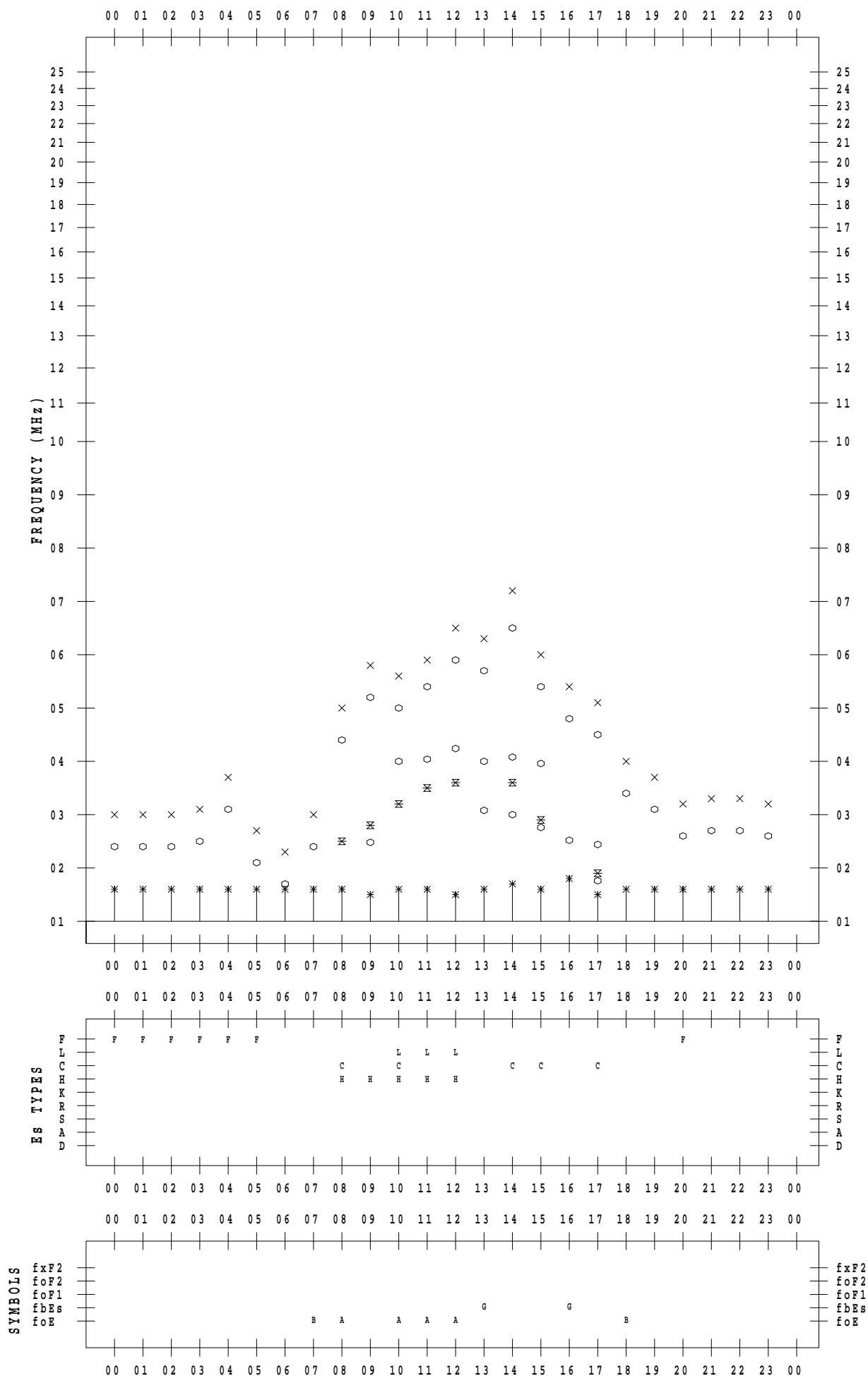
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/29

135 ° E MEAN TIME



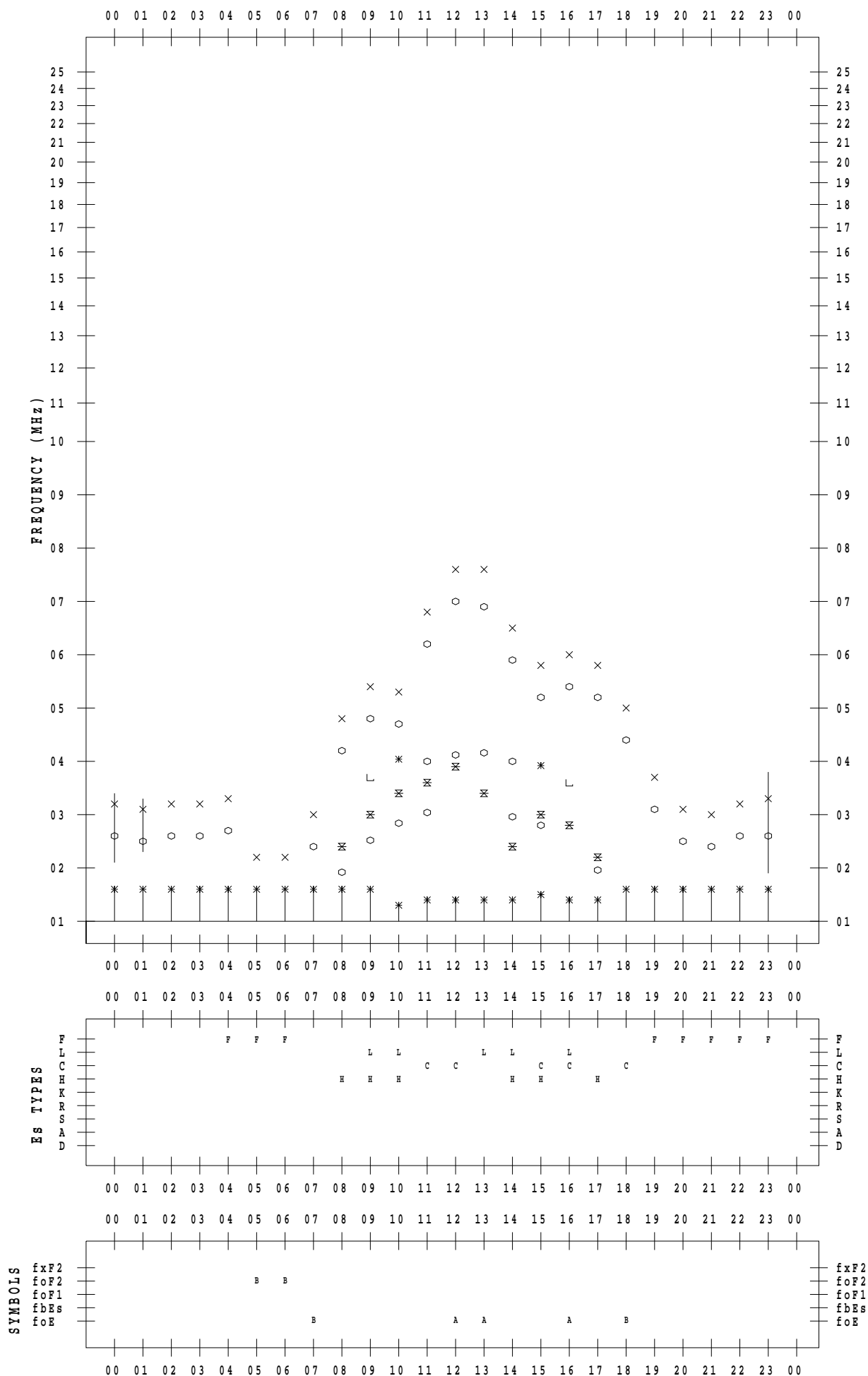
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/30

135 ° E MEAN TIME



f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2019/12/31

135 ° E MEAN TIME

