

# IONOSPHERIC DATA AT SYOWA STATION (ANTARCTICA)

January – December 2021

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NATIONAL INSTITUTE OF INFORMATION  
AND COMMUNICATIONS TECHNOLOGY  
TOKYO, JAPAN

## INTRODUCTION

This data book summarizes the results for vertical soundings of the ionosphere at Syowa Station, Antarctica in 2021. The observations were conducted by the National Institute of Information and Communications Technology. The location of the station, specifications of the ionosonde, and symbols used in this data book are as follows:

Geographic		Geomagnetic *	
Latitude	Longitude	Latitude (Deg.)	Longitude (Deg.)
69°00.4'S	39°35.4'E	- 70.5	87.1

\* Geomagnetic latitude and longitude were calculated using IGRF-13 (2021)

## SPECIFICATIONS OF THE IONOSONDE USED AT SYOWA STATION

Items	FM/CW Ionosonde Specifications
Frequency Range	0.5 MHz - 16 MHz
Transmitting Power	100 W
Duration of Sweep	max 155 s
Transmitted Pulse Width	1-10 ms
Pulse Repetition Frequency	1 kHz
Height Range	60 - 1000 km
Recording Media	Solid State Drive
Power Supply	100 V - AC, 1.5 kVA
Transmitting Antenna and Receiving Antenna	40-m-high vertical delta antennas terminated by 400 $\Omega$

Note: From 2016, new type of FM/CW Ionosonde will be used for routine ionospheric observations at Syowa Station.

## OBSERVERS

Observer: M.Nagahara

Scaler: K. Fukushima

## DESCRIPTION

a. All symbols and terminology in the tables or figures of ionospheric data are used in accordance with the *URSI Handbook of Ionogram Interpretation and Reduction* (second edition 1972)

b. Characteristics of Ionosphere

$fxI$	Top frequency of spread $F$ traces or oblique traces.
$foF2$	Ordinary wave critical frequency for the $F2$ layer.
$fEs(ftEs)$	Top frequency of $Es$ layer as reflected overhead
$fmin$	Lowest frequency of the vertical ionospheric reflections.
$h'F$	Minimum virtual height of the ordinary wave $F$ trace as a whole.

## Symbols

( i ) Descriptive Letters.

The following letters are entered after, or used to replace, numerical values on the monthly tabulation sheets.

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.
E	Measurement influenced by, or impossible because of, the lower limit of the normal frequency range.
F	Measurement influenced by, or impossible because of, the presence of spread echoes.
G	Measurement influenced or impossible because the ionization density of the layer is too small to enable it to be made accurately.
H	Measurement influenced by, or impossible because of, the presence of 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 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	Spur type spread present.
Q	Range spread present.
R	Measurement influenced by, or impossible because of, attenuation in the vicinity of a critical frequency.
S	Measurement influenced by, or impossible because of, interference or atmospherics.
T	Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
V	Forked trace that may influence the measurement.

W	Measurement influenced or impossible because the echo lies outside the recorded height range.
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 numerical values on the monthly tabulation sheets.

D	Greater than.
E	Less than.
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 ) Definitions of CNT, MED, UQ, and LQ

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

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

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

LQ (lower quartile) is the median value of the lower half.

Acknowledgment

*Ionospheric observation at Syowa Station is based on the consignment study from the Ministry of Internal Affairs and Communications.*

## IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 2021 fxI (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	X	X	X	X	X	X	X	X	X	X	X	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	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	X	X	X	X	X	X	X	X
4	X	X	X	X	X	X	X	X	X	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	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	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	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	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	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	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	X	X	X	X	X	X	X	X	X
12	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14	X	X	X	X	X	X	X	X	X	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	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	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	X	X	X	X	X	X	X	X
18	X	X	X	X	X	X	X	X	X	X	X	X	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	X	X	X	X	X	X	X	X	X	X	X	X
20	X	X	X	X	X	X	X	X	X	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	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
24	X	X	X	X	X	X	X	X	X	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	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	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	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	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	X	X	X	X	X	X	X	X
30	X	X	X	X	X	X	X	X	X	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	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	25	21	24	24	24	22	26	25	26	29	29	30	30	28	29	28	31	31	30	30	29	31	27	26
MED	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
U Q	42	44	45	44	50	53	56	59	62	59	57	56	56	56	55	54	53	52	51	50	48	46	48	44
L Q	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	40	42	41	42	46	49	52	55	55	52	52	52	53	52	53	52	51	50	49	48	46	43	42	40

JAN. 2021 fxI (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 2021 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	34 <sup>F</sup>	35 <sup>J R</sup>	40	48	53	60	64	66	62	60	63	61	54	51	48	47	45	45	47	50	46	44	38
2	34	35	41	43	44	49	60	63	64	63	59	64	58	55	51	48	42	44	47	46	46	48	44	42
3	43	45	44	50	46 <sup>F</sup>	54 <sup>F</sup>	65	68	68	78 <sup>V</sup>	76	68	64	55	52	44	46	46	46	50	50	46	43	41
4	39	38	33	38	62	78 <sup>F</sup>	82	75 <sup>F</sup>	80	85	80	72	66	61	53	52	54	46	50	53	59	56	50	46
5	44	40	41 <sup>F</sup>	48 <sup>R</sup>	46 <sup>F</sup>	36 <sup>F</sup>	46 <sup>F</sup>	62 <sup>F</sup>	60 <sup>F</sup>	58 <sup>F</sup>	63 <sup>F</sup>	66 <sup>F</sup>	68 <sup>F</sup>	56 <sup>F</sup>	55	51	48	48	45	A	A	40 <sup>J R</sup>	44 <sup>J R</sup>	42
6	50 <sup>J R</sup>	40 <sup>F</sup>	32 <sup>F</sup>	28	A	A	A	36	A	46	A	51 <sup>F</sup>	53 <sup>F</sup>	47	48	46	45	41	44	43	38	35	34	32
7	36 <sup>U R</sup>	A	A	34	32	A	A	A	45	46	50	50	48	49	49	46	43	40	42	45	45	36	31	38
8	A	A	35	39	44	48	49	57	58 <sup>V</sup>	53	50	51	51	50	49	50	49	44	42	42	A	45	45	42
9	41	38	38	44	45 <sup>F</sup>	51 <sup>F</sup>	51	53	47 <sup>F</sup>	49 <sup>F</sup>	50	46	43	A	53	50	52	43	44	42	42	40 <sup>F</sup>	A	43 <sup>A</sup>
10	47	47	44	28 <sup>F</sup>	41 <sup>F</sup>	48 <sup>F</sup>	48	54	54	54	46	47	47	47	48	49	50	52	48	46	39	36 <sup>F</sup>	43 <sup>F</sup>	A
11	A	A	34	36	A	A	A	44 <sup>F</sup>	48	47	49	48	47	47	47	48	47	50	37	A	A	A	A	Z 41
12	36	A	A	A	A	A	A	A	A	33	42	46	47	45	47	47	44	43	45	42	40	36	40	38
13	28	33	24	A	38	47	46	50	53	53	53	52	50	51	51	51	51	46	47	44	40	41	43	34
14	35	A	A	34	37	43	49	53	56	59	60	58	56	50	48	48	48	46	44	44	44	44	42	44
15	36	36	39	34 <sup>F</sup>	44 <sup>F</sup>	35	44	C	C	C	C	C	C	C	C	42	44	45	48	46	41	36	33	31
16	31	32	38	31 <sup>F</sup>	41 <sup>R</sup>	48 <sup>R</sup>	51	52	51	56	54	58	52	50	U R	A	47	49	48	43	44	44	41	32
17	25 <sup>F</sup>	A	A	37	44	45	34	A	A	47 <sup>F</sup>	47 <sup>F</sup>	47	46	48	47	47	44	46	43	42	42	42	39	37 <sup>A</sup>
18	37	37	35	37	45	A	A	58	54 <sup>F</sup>	49	46	48	50	50	53	47	47	47	43	42	40	40	42	A
19	A	A	A	A	A	A	A	40 <sup>F</sup>	48	44	39 <sup>R</sup>	42	40	45	50	51	51	48	48	46	39	38	39 <sup>F</sup>	41
20	A	A	36	45	49	48 <sup>F U R</sup>	52 <sup>F U R</sup>	49	45	44	45	47	48	A	45	46	47	45	42	40	39 <sup>V</sup>	37	33	31
21	29	36	A	A	36	43	50	49 <sup>F</sup>	50	48	46	46	48	48	47	A	47	45	A	42	49	49	43	39 <sup>F</sup>
22	40	43	41	36 <sup>F</sup>	48	54	60	62	63	55	52	51	52	50	50	50	46	46	46	46	44	47	48	35 <sup>F</sup>
23	34	32 <sup>F</sup>	39	A	38	48	53	56	61	66	66	57	54 <sup>F</sup>	54	55	55	49	45	45	46	40	40	34	A
24	A	A	A	A	38	45	54 <sup>F</sup>	64	64	62	66	65	65	64	50	52	50	49	50	46	43	40	A	A
25	A	30 <sup>F</sup>	A	A	38 <sup>F</sup>	31	33	A	49 <sup>F</sup>	53 <sup>F</sup>	54	50	52	65	B	B	39	38	36	42	A	33 <sup>F</sup>	A	A
26	34	A	B	A	A	47	32	A	A	A	36	38	38	38	42 <sup>R</sup>	44	46	45	38	38	35	35	A	A
27	A	A	A	B	A	A	A	A	A	45	42	40	42	42	44	47	46	46	48	36	33	36	34	30
28	30	A	A	A	41	B	32	40	41	43	43	42	44	44	44	44	42	42	42	42	40	36	36	36
29	36	34	34	36	38	40	41 <sup>F</sup>	50	48	53	51	48	47	46	47	46	51	50	47	45	47	41 <sup>F</sup>	37	26 <sup>F</sup>
30	36	A	B	34 <sup>F</sup>	32 <sup>F</sup>	44	44	49	56	57	57	52	52	46	50	48	48	43	45	45	42	38	38	35 <sup>F</sup>
31	34	29	30	36	A	A	44	47	49	50	46	43	44	46	46	47	46	46	46	42	42	41	38	34
	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	18	19	22	22	22	24	25	25	29	29	30	30	28	29	28	31	31	30	29	27	30	26	25
MED	36	36	36	36	42	47	48	53	54	53	50	50	50	50	49	48	47	46	45	44	42	40	40	38
U Q	40	40	41	40	45	48	54	61	62	60	60	57	56	54	51	50	49	47	47	46	45	44	43	42
L Q	34	33	34	34	38	43	42	48	48	46	46	46	47	46	47	46	45	44	43	42	40	36	36	33

JAN. 2021 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 2021 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	31	22	35	32	22	22	24	29	27	29	32	32	36	35	50	32	32	28	31	G	23	21	24	G	
2	G 18	20	20	27	27	23	29	35	32	32	32	46	44	36	34	40	38	35	41	27	32	32	42	42	
3	20	31	88	24	24	23	42	34	32	42	38	35	35	36	35	35	36	36	27	33	30	66	24	26	
4	26	26	17	37	30	43	26	27	31	31	35	32	34	34	34	40	40	34	34	G	24	30	28	113	
5	71	24	38	41	38	58	42	34	31	31	36	36	36	36	38	52	33	28	28	45	50	35	46	41	
6	26	26	26	19	56	58	55	29	110	50	64	38	38	G	E 32	B 30	71	33	80	56	38	22	21	30	
7	31	55	47	28	30	56	56	72	57	41	G	30	32	37	32	57	31	31	33	41	37	20	21	27	
8	68	44	G	32	32	72	34	28	28	29	40	33	33	33	30	32	65	32	32	58	59	34	28	G	
9	22	18	30	30	58	104	69	71	46	31	34	34	56	56	48	48	39	30	26	30	30	30	71	33	
10	14	G	24	22	21	28	26	31	30	34	31	45	37	37	37	32	32	43	27	26	23	23	41	47	
11	39	46	25	36	53	52	46	41	28	31	29	33	35	34	34	32	30	26	G	43	52	55	47	64	32
12	58	46	33	47	66	69	56	55	56	70	B	68	93	85	61	30	67	28	26	26	27	30	43	25	
13	16	29	38	49	34	24	14	26	29	30	48	34	32	34	G	35	G	70	31	22	23	27	27	26	
14	48	48	47	29	29	G	31	30	30	32	45	33	40	35	35	38	29	36	31	G	16	63	24	24	G 16
15	16	27	31	31	43	57	37	31	C	C	C	C	C	C	C	34	31	61	G	25	22	18	19	26	
16	22	22	36	30	29	70	44	44	44	33	36	41	74	68	63	63	66	36	68	41	36	66	13	16	
17	32	49	49	27	20	26	68	70	57	G	30	34	42	51	35	35	67	71	66	26	24	89	25	68	
18	46	23	29	31	38	56	63	51	41	30	34	34	34	34	34	32	32	59	66	56	24	21	22	48	
19	41	63	50	66	60	62	53	37	38	30	31	34	41	36	50	32	42	58	G	28	24	21	39	41	
20	56	126	31	37	40	36	24	28	28	32	55	29	33	73	66	61	44	39	30	26	32	28	22	32	
21	34	31	48	70	57	27	71	58	34	82	64	64	36	36	49	67	39	48	78	34	22	22	22	43	
22	112	21	37	18	21	39	30	J 79	A 52	44	32	32	34	51	31	64	36	38	38	28	37	42	27	39	
23	25	30	30	56	37	30	G	30	30	30	30	30	40	33	49	36	29	29	29	25	25	18	33	42	
24	47	71	35	57	30	G	22	18	G	G	30	36	41	35	47	39	53	B 32	B 27	27	22	17	21	44	41
25	48	51	47	39	27	27	27	36	46	32	32	70	35	34	B 34	B 30	32	32	28	32	44	30	57	47	
26	56	58	B	70	58	38	26	58	129	70	32	30	34	50	K 56	30	141	134	56	24	29	65	41	41	
27	52	52	52	47	B	30	56	58	54	G	52	32	48	33	31	E 30	B 30	30	26	26	G	21	25	20	23
28	29	102	52	49	56	B	52	30	32	20	30	31	31	52	34	33	30	G	G	G	G	17	56	18	58
29	53	124	28	17	21	G	26	29	29	43	30	30	32	34	42	42	93	38	G	38	22	22	22	28	18
30	37	48	B	28	47	21	30	28	30	33	32	32	32	34	34	44	42	36	33	36	32	22	20	G	
31	G	20	26	32	52	51	33	32	26	32	34	32	40	45	39	29	32	30	25	22	22	19	22	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	31	29	31	30	30	31	31	30	30	29	30	30	30	29	30	31	31	31	31	31	31	31	31	31
MED	34	31	35	32	36	37	34	34	32	32	34	34	36	36	35	35	36	34	31	26	27	27	27	32	
U Q	52	52	47	47	53	57	55	55	46	34	39	38	40	50	49	52	42	43	41	36	37	35	41	42	
L Q	22	23	27	28	27	26	26	29	30	30	31	32	34	34	34	32	31	28	27	G 22	23	21	22	23	

JAN. 2021 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 2021 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	8	8	8	9	8	8	8	7	9	12	10	13	11	11	11	11	11	9	7	7	7	12	12	13
2	6	8	6	9	7	7	7	7	7	8	8	8	8	8	8	8	8	7	8	8	8	8	5	6
3	7	6	6	8	6	6	6	8	7	8	8	8	8	8	8	9	9	9	10	10	8	7	9	8
4	6	6	8	6	8	8	8	8	6	8	8	9	11	19	16	14	14	12	12	12	13	18	16	15
5	16	12	7	11	10	8	9	9	7	7	9	8	8	7	9	8	7	7	8	8	8	8	8	7
6	8	8	8	6	8	10	8	8	7	8	26	16	16	12	13	30	12	10	10	13	9	9	8	8
7	10	13	10	10	10	8	11	10	12	21	10	10	12	12	11	11	11	12	12	12	8	8	8	10
8	19	17	12	11	12	9	9	8	9	9	9	9	10	12	12	10	10	10	9	9	9	9	8	8
9	5	8	8	12	9	8	9	10	11	10	8	9	9	9	10	10	10	8	8	9	10	9	9	7
10	8	9	8	8	9	7	7	7	10	10	10	10	9	10	10	12	14	14	10	10	10	8	8	11
11	20	12	8	9	9	8	10	8	8	8	9	9	8	11	8	9	9	8	12	6	8	7	7	8
12	8	8	8	8	25	20	8	11	14	9	39	28	19	16	17	18	12	13	14	8	12	9	8	9
13	9	8	18	12	10	8	7	7	8	8	8	9	8	12	24	24	9	15	10	8	8	8	8	8
14	8	8	8	9	10	9	6	8	8	8	7	8	8	8	10	9	9	9	7	7	7	7	6	6
15	5	8	10	8	9	14	8	8	C	C	C	C	C	C	C	9	9	9	9	9	8	7	9	8
16	8	9	9	10	8	8	7	9	14	15	11	8	8	8	8	7	8	8	8	6	10	9	6	6
17	5	15	8	7	8	8	8	13	11	8	8	8	8	8	8	8	8	8	8	8	8	7	6	6
18	6	5	8	8	8	9	9	8	11	8	8	8	8	8	8	8	8	8	8	8	8	7	7	10
19	10	10	8	8	19	9	9	7	8	8	8	8	8	8	8	7	7	7	7	7	7	7	6	11
20	8	7	7	8	8	8	7	8	6	8	11	11	11	8	6	8	8	8	8	12	10	9	6	8
21	6	7	7	8	8	8	8	10	18	10	12	10	10	8	8	10	8	8	8	9	6	8	7	7
22	8	8	12	7	8	7	7	7	7	11	7	7	6	8	8	11	8	8	8	7	8	8	6	6
23	6	8	13	13	6	8	8	9	10	9	9	9	9	9	9	10	10	10	8	8	7	7	8	6
24	12	9	8	11	8	8	8	8	8	8	10	10	10	12	12	7	7	7	11	11	11	8	7	8
25	13	9	8	8	8	8	8	12	9	10	10	10	10	19	B	B	26	15	15	12	12	8	10	12
26	9	22	B	10	12	16	10	10	18	11	12	8	8	16	29	12	27	28	18	14	14	8	7	20
27	9	25	25	12	B	12	20	15	12	10	22	19	18	18	12	30	26	20	13	9	9	9	9	7
28	7	16	10	16	8	B	12	12	12	12	12	12	12	8	10	11	11	13	10	10	10	8	8	5
29	7	9	9	10	11	11	10	8	9	10	10	11	11	10	10	10	19	22	25	11	14	10	8	7
30	11	11	B	10	9	10	9	9	14	20	9	7	8	10	10	8	8	10	10	8	8	8	9	10
31	9	8	11	18	18	10	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	6	6
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	30	30	30	30	30	30	30	31	31	31	31	31	31	31	31	31
MED	8	8	8	9	9	8	8	8	9	9	9	9	9	10	10	10	9	9	9	9	8	8	8	8
U Q	10	12	11	11	10	10	9	10	12	10	11	10	11	12	12	12	12	13	12	11	10	9	9	10
L Q	6	8	8	8	8	8	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7	6	6

JAN. 2021 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 2021 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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 A 254	E A 256	E A 258	262	204	216	202	200	192	192	192	198	210	200	200	200	200	190	210	202	220	220	E A 232	E A 232	
2	E A 232	E A 274	196	222	214	202	212	198	188	192	198	E A 220	202	198	198	192	190	190	E A 218	214	226	218	E A 228	216	
3	E A 228	E A 248	252	242	220	196	200	198	204	196	200	202	200	226	190	198	214	202	212	234	234	210	204	232	
4	E A 218	E A 266	198	208	208	206	186	194	194	198	190	194	176	208	210	194	194	190	230	232	222	E A 230	E A 220	216	
5	E A 262	E A 250	A	A	E A 264	A	A	210	194	194	200	188	184	202	196	196	192	204	204	A	A	A	A	A	
6	A	200	E A 220	212	A	A	A	198	A	A	A	218	204	210	210	212	194	220	220	236	E A 268	E A 236	E A 240	A	
7	E A 224	A	A	A	A	A	A	A	A	A	200	206	206	206	194	A	200	200	214	A	246	214	E A 262	196	
8	A	A	A	A	E A 242	E A 286	200	184	212	198	198	206	194	200	200	200	200	200	200	202	A	E A 222	E A 214	214	
9	E A 242	E A 242	E A 266	A	A	A	A	A	210	200	196	194	194	A	A	A	E A 228	202	202	202	E A 224	216	A	E A 244	
10	218	236	E A 240	194	202	202	206	198	186	208	190	190	194	202	202	172	196	204	196	198	200	216	A	A	
11	A	A	194	A	A	A	A	198	176	228	204	202	206	202	196	196	196	202	A	A	A	A	E A 262	A	
12	E A 236	A	A	A	A	A	A	A	A	202	B	202	202	202	202	198	194	204	156	212	E A 238	E A 246	E A 274	E A 238	
13	E A 258	224	A	A	A	206	188	202	192	202	182	198	198	198	238	206	206	200	222	204	212	228	226	262	
14	E A 264	A	A	A	260	206	222	216	218	190	H 204	194	196	196	196	186	198	204	222	214	E A 218	E A 236	E A 202	A	
15	E A 238	E A 254	E A 286	A	A	A	A	198	C	C	C	C	C	C	C	192	198	198	212	212	200	226	154	E A 240	
16	E A 242	220	220	202	208	202	A	204	A	202	E A 240	198	214	200	202	H 202	202	196	236	A	E A 236	E A 246	E A 202	E A 216	
17	A	A	A	A	H 202	220	A	A	A	194	184	204	204	204	204	202	216	200	200	206	202	E A 222	198	E A 240	
18	E A 244	242	E A 268	A	208	A	A	A	E A 240	190	190	194	194	228	190	196	196	190	202	206	218	218	204	228	
19	A	A	A	A	A	A	A	A	E A 274	204	192	208	E A 242	208	212	196	210	A	206	206	A	214	A	A	
20	A	A	E A 218	206	A	206	206	206	202	A	192	198	A	212	202	202	202	202	218	210	224	E A 234	E A 230	E A 256	
21	A	A	A	E A 256	E A 238	E A 216	A	196	202	190	172	200	200	A	A	188	A	200	196	202	200	216	210	206	216
22	E A 230	E A 246	A	E A 256	A	A	204	190	204	196	196	196	216	192	206	A	200	196	202	200	216	A	E A 220	A	
23	216	230	210	A	A	248	196	182	182	188	188	188	202	196	222	204	206	194	194	200	216	204	A	A	
24	A	A	A	A	298	236	204	210	204	198	218	200	200	224	200	208	202	202	202	202	174	204	A	A	
25	A	A	A	A	A	204	204	A	A	A	224	206	E A 226	226	B	B	E A 218	198	224	A	A	A	A	A	
26	A	A	B 212	A	A	A	222	A	A	A	196	172	202	E A 222	A	206	206	E A 226	220	214	E A 248	218	A	A	
27	A	A	A	A	B	A	A	A	A	238	202	202	208	218	204	222	198	204	222	190	198	214	E A 236	A	
28	A	A	A	A	A	E A 288	242	212	194	184	198	178	194	202	230	176	190	212	212	198	214	E A 244	E A 236	A	
29	E A 230	E A 250	E A 280	E A 256	198	226	218	218	A	210	210	198	208	194	214	200	A	192	A	192	218	210	214	E A 260	
30	A	A	E A 346	A	A	220	208	206	E A 224	206	194	190	190	196	E A 224	200	216	196	196	218	204	216	E A 238	E A 248	
31	E A 246	E A 278	A	A	A	A	224	204	196	198	196	196	208	E A 258	196	196	196	192	200	200	190	212	220	204	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	18	17	13	12	14	16	19	21	21	27	26	29	30	28	26	25	30	29	28	26	26	27	22	21	
MED	E A 237	E A 248	E A 240	216	208	208	205	200	195	200	196	198	202	202	202	199	199	199	206	206	210	216	E A 223	E A 232	
U Q	E A 246	E A 261	E A 267	256	256	231	222	208	211	206	200	202	208	214	210	205	206	202	219	214	226	226	236	246	
L Q	E A 228	233	204	210	204	203	202	198	190	194	190	193	194	197	196	196	194	193	201	200	202	214	206	216	

JAN. 2021 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 2021 fxI (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	X 40	X 46	X 41	X 44	X 53	53	X 50	71	64	68	58	64	53	53	52	53	57	55	55	44	X 46	X 40	X 37	A	
2	64	65	58	48	65	A	A	55	A	55	A	O 44	X 46	X 46	X 48	X 48	50	50	42	41	37	37	X 32	X 34	
3	A	A	A	A	O 37	X A	A	A	A	A	X 43	X 45	X 47	X 48	X 46	X 45	X 44	X 46	X 46	X 43	X 36	X 89	X 80	A	
4	60	A	A	A	10 48	O 48	A	A	A	A	X 43	X 44	B	R	R	R	B	O 48	X 46	X 45	X 45	X 43	O 50	X 44	
5	X 33	A	58	A	A	R	A	A	X 47	X 48	X 46	X 45	X 44	X 47	X 47	X 48	X 49	X 49	X 47	X 47	X 44	X 41	X 38	A	
6	A	A	A	A	A	A	50	50	55	53	52	50	52	50	50	50	46	49	46	48	A	A	80	A	
7	A	A	A	A	41	A	A	A	A	A	A	B	B	B	X 54	X 61	X 64	X A	O 44	X 42	X 47	X 40	X 32	A	
8	A	A	A	A	A	O 47	X 49	X 48	X 50	X 50	X 49	X 49	X 44	X 50	X 52	X 54	X 52	X 48	X 45	X 44	X 42	X 37	X 40	X 28	
9	A	A	A	X 42	X 47	X 68	X 55	X 58	X 58	X 48	X 50	X 50	X 52	X 58	X 60	X 58	X 49	X 47	X 47	X 45	X 42	X 41	X 42	X 40	
10	X 41	45	39	38	39	45	51	52	51	49	51	52	56	53	55	57	52	51	48	46	43	43	39	44	
11	38	47	46	42	43	48	54	54	56	54	53	52	54	64	64	60	51	50	50	47	A	A	40	47	
12	44	43	39	39	50	56	50	52	53	54	56	59	62	53	55	58	51	51	49	47	O 46	O 35	A	A	
13	A	A	A	57	A	A	A	A	A	A	A	O 51	X 46	X 48	X 55	X 57	X 56	X 64	X 51	X 45	X 46	X 48	X 42	X 35	
14	49	A	A	A	A	A	A	A	A	A	O 49	X 46	X 48	X 52	X 52	X 54	X 52	X 47	X 46	X 44	X 45	X 41	X 38	X 37	
15	A	40	33	35	36	44	46	49	54	58	51	51	54	X 58	X 56	X 52	X 54	X 52	X 52	X 50	X 45	X 43	A	A	
16	A	A	A	A	38	A	X 47	X 47	A	A	A	A	O 46	X 59	X 56	X 56	X 54	X 47	X 46	X 42	A	A	A	A	
17	A	A	A	X 36	X 38	44	A	50	49	51	53	50	53	X 53	X 53	X 50	X 52	X 50	X 49	X 46	X 43	X 35	X 28	A	
18	A	A	A	X 46	A	83	A	A	X 44	X 46	C	X 52	X 54	X 59	X 52	X 50	X 48	X 48	X 47	X 45	X 45	X 42	X 40	X 46	
19	34	27	A	A	A	A	A	51	X 48	X 50	X 52	X 54	X 54	X 55	X 49	X 52	X 55	X 55	A	X 38	A	96	88	A	
20	A	A	58	A	A	A	A	A	60	A	B	A	O 43	X 43	X 43	X 46	X 47	X 40	A	A	A	A	A	A	
21	A	A	A	A	B	A	A	A	54	A	B	X 42	B	B	B	X 51	B	X 41	X 42	X 40	X 38	X 32	A	A	
22	A	A	A	A	A	A	R	B	A	A	A	C	C	C	O 48	X 51	X 50	X 48	X 44	A	X 40	X 31	X 27	A	
23	A	A	A	A	A	47	46	64	A	B	B	B	B	O 47	X 56	X 59	X 58	X 41	A	X 41	X 34	R	A	A	
24	B	S	A	A	B	B	B	A	A	A	C	C	C	C	C	R	B	X 48	O 40	X 38	C	C	C	C	
25	C	C	C	A	O 35	X 40	S	O 40	A	R	A	B	B	O 42	X 47	X 50	X 50	X 42	X 40	R	A	A	A	A	
26	A	A	A	A	A	R	44	A	A	R	O 44	X 40	X 42	O 42	S	C	C	C	C	C	C	C	C	C	
27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	X 40	X 40	X 37	X 47
28	X 34	A 24	X 34	X 40	X 37	X 42	X 49	X 48	B	X 54	X 53	X 56	X 57	X 60	X 55	X 61	X 52	X 47	X 43	X 40	X 38	X 65	A	A	
29																									
30																									
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	10	7	9	11	13	13	12	15	15	13	17	20	20	20	22	23	23	24	23	24	21	21	19	9	
MED	40	45	41	42	41	47	50	51	53	51	51	50	52	53	52	53	52	49	46	44	43	40	39	44	
U Q	49	47	58	46	52	54	50	55	56	54	53	52	54	56	56	56	55	51	48	46	45	42	50	46	
L Q	X 34	X 40	X 36	X 36	X 38	X 44	X 46	X 49	X 48	X 48	X 48	X 45	X 46	X 48	X 48	X 50	X 49	X 48	X 44	X 42	X 40	X 36	X 35	X 36	

FEB. 2021 fxI (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 2021 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	34	40	35	38	R 47	F 41	F 44	F 53	F 58	F 55	F 52	F 53	47	47	46	47	51	49	49	R 44	J 46	R 34	R 31	A
2	F 49	R	F 42	42	F 39	A	A	F 44	A	F 40	A	R 38	R 40	40	R 40	R 42	44	44	J 36	R 35	31	31	26	28
3	A	A	A	A	31	A	A	A	A	A	37	R 39	R 41	42	R 40	J 39	R 38	40	40	37	30	A	A	A
4	A	A	A	A	A	R 42	A	A	A	A	37	R 38	B	R	R	R	B	R 42	R 40	39	39	37	44	38
5	27	A	A	A	A	R	A	A	41	42	40	R 39	R 38	41	41	42	43	43	41	41	38	35	28	A
6	A	A	A	A	A	A	44	44	49	47	46	44	46	44	44	44	40	43	40	42	A	A	A	A
7	A	A	A	A	F 24	A	A	A	A	A	A	B	B	B	48	55	58	A	R 38	R 36	F 34	34	26	A
8	A	A	A	A	A	41	F 38	42	44	44	43	43	38	44	46	48	46	42	39	38	36	31	34	22
9	A	A	A	36	F 36	A	49	F 46	F 45	42	44	44	46	52	54	52	43	41	41	39	36	35	36	34
10	35	F 32	F 33	32	33	39	45	46	45	43	45	46	50	47	49	51	46	45	42	40	37	37	33	F 33
11	F 22	41	F 30	F 36	37	42	48	B 48	50	48	47	46	48	58	58	54	45	44	44	41	A	A	34	Z 38
12	F 28	F 34	F 28	F 28	44	F 44	44	46	47	48	50	R 53	56	47	49	J 52	R 45	45	43	41	R 40	R 29	A	A
13	A	A	A	A	A	A	A	A	A	A	45	40	42	49	51	50	52	F 45	39	40	42	36	29	A
14	A	A	A	A	A	A	A	A	A	A	R 43	R 40	42	46	46	48	46	41	40	38	39	35	32	31
15	A	F 24	27	R 29	30	R 38	40	43	48	52	45	45	48	52	50	46	48	46	46	44	39	37	A	A
16	A	A	A	A	F 22	A	R 41	F 36	A	A	A	A	40	B	R 53	50	R 48	41	40	36	A	A	A	A
17	A	A	A	30	F 32	F 34	A	44	43	45	47	44	47	R 47	47	44	46	44	43	40	37	29	22	A
18	A	A	A	40	A	A	A	A	38	40	C	46	48	53	46	44	42	42	41	39	39	36	34	30
19	F 22	21	A	A	A	A	A	F 40	42	44	46	48	48	49	43	46	49	49	A	32	A	A	A	A
20	A	A	A	A	A	A	A	A	A	A	B	A	R 37	R 37	R 37	40	41	34	A	A	A	A	A	A
21	A	A	A	A	B	A	A	A	A	A	B	36	B	B	B	45	B	35	36	34	32	26	A	A
22	A	A	A	A	A	A	R	B	A	A	A	C	C	C	R 42	R 45	R 44	R 42	R 38	A	34	25	21	A
23	A	A	A	A	A	A	A	A	A	B	B	B	B	R 41	R 50	R 53	R 52	R 35	A	35	28	C	C	C
24	B	S	A	A	B	B	B	A	A	A	C	C	C	C	C	R 43	B	42	B	34	32	C	C	C
25	C	C	C	A	C	R 29	A	R 34	A	A	A	B	B	36	R 41	B	R 44	B	R 36	34	A	A	A	A
26	A	A	A	A	A	R	A	A	A	A	R 38	U 34	U 36	S	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	34	34	31	F 33
28	28	A	R 18	F 24	34	31	F 28	43	42	B	48	47	50	51	55	49	55	46	41	37	34	32	A	A
29																								
30																								
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	8	6	7	10	12	10	10	14	13	13	17	20	20	20	22	24	23	24	23	23	21	19	15	9
MED	28	33	30	34	34	40	44	44	45	44	45	44	46	47	46	46	46	43	40	39	36	34	31	33
U Q	34	40	35	38	38	42	45	46	48	48	47	46	48	50	50	50	49	45	42	41	39	36	34	36
L Q	F 24	24	27	F 29	30	34	F 40	42	42	42	42	R 39	40	42	42	44	43	42	R 38	36	34	29	26	29

FEB. 2021 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 2021 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	G 14	24	32	31	25	63	46	38	30	30	31	33	31	33	39	39	29	25	24	22	18	G 15	40	48
2	38	42	36	38	36	59	A 42	56	35	112	64	35	61	71	56	23	G 31	50	E 24	B 24	22	17	22	20
3	46	37	81	48	28	64	66	64	54	56	51	E 30	B 34	E 37	B 30	32	63	52	G 24	16	38	50	53	
4	40	62	70	66	52	52	50	52	69	51	50	G 32	E 29	B 73	35	46	25	23	E 24	B 21	21	57	23	34
5	44	36	35	48	E 70	B 31	52	50	40	34	G 32	E 29	B 73	35	46	25	23	E 24	B 21	21	57	23	34	
6	36	31	54	54	48	51	23	24	26	30	29	G 20	34	34	34	34	26	31	42	35	40	48	64	52
7	52	46	58	41	36	58	55	97	67	59	52	B 38	B 40	B 33	E 52	B 145	B 56	26	59	17	38	G 19		
8	42	50	82	57	49	52	40	30	39	48	33	31	35	35	32	28	27	23	66	22	22	18	G 24	
9	86	50	64	31	37	43	43	32	34	28	30	G 27	G 38	E 30	B 34	31	G 26	E 26	B 23	B 19	G 14	G 24		
10	E 22	B 12	14	23	18	18	28	G 28	30	28	28	32	38	67	31	39	28	G 22	A 22	94	30			
11	27	27	25	G 17	G 30	30	44	32	32	30	30	31	38	32	38	25	26	30	27	57	48	69	19	
12	15	26	26	18	G 21	G 22	21	21	21	G 33	51	45	60	63	38	25	18	22	24	32	46	50		
13	48	118	53	40	47	64	57	57	57	37	31	28	28	29	29	E 28	B 28	22	26	26	49	57	37	
14	37	80	46	54	51	52	52	58	58	52	34	38	30	33	30	30	40	45	23	E 24	B 24	G 66	33	30
15	47	25	25	32	23	50	30	20	26	28	28	28	29	G 34	51	59	37	28	20	G 22	39	41		
16	79	58	50	47	20	63	40	49	84	55	68	47	32	B 38	E 29	B 33	B 28	G 36	38	33	48	38		
17	42	57	42	45	27	28	41	34	49	49	58	32	28	28	32	111	E 26	B 26	E 24	B 22	22	20	46	
18	63	48	52	50	45	52	52	44	26	G 30	C 30	30	32	35	28	28	G 21	G 17	G 14	E 13	B 8			
19	12	22	36	48	56	54	46	38	26	G 27	67	31	36	32	29	G 25	G 42	47	48	53	50	77		
20	68	54	50	58	B 51	40	48	56	48	50	B 55	E 31	B 92	G 28	E 28	B 36	G 42	47	47	55	51	64		
21	56	55	56	32	B 54	46	56	60	52	B C	C C	C C	E 30	B 38	B 36	B 28	B 26	52	46	66	42	36		
22	53	45	42	53	S 52	44	28	B 48	54	43	B B	B B	E 35	B 38	B 26	B 28	B 24	44	22	20	14	34		
23	40	34	48	24	S 52	B 30	B 44	B 53	43	C C	C C	C C	C 30	E 30	B B	B G	B B	G 26	C C	C C	C C	C C	C C	
24	B 26	S 26	C 26	S 31	C 42	C 41	C 33	C 45	C 51	C 33	C 48	S 32	G 25	E 29	B C	C C	C C	C C	C C	C C	C C	C C	C C	
25	C C	C C	C C	C 42	C 41	C 33	C 45	C 51	C 33	C 48	S 32	G 25	E 29	B C	C C	C C	C C	C C	C C	C C	C C	C C	C C	
26	50	44	71	51	49	28	52	57	53	34	32	30	25	29	C C	C C	C C	C C	C C	C C	C C	C C	C C	
27	C C	C C	C C	C C	C C	C C	C C	C C	C C	C C	C C	C C	C C	C C	C C	C C	C C	C C	C C	C C	C C	C C	C C	
28	45	45	48	16	E 20	B 17	E 21	B 24	B 24	B 39	E 33	B 28	B 28	B 28	B 28	B 26	B 34	B 33	B 56	B 50	B 19	B 36	B 36	
29																								
30																								
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	26	26	27	24	26	25	26	27	25	22	22	20	22	23	25	23	25	25	26	26	26	26	26
MED	44	44	48	42	U 38	50	44	44	43	35	32	31	31	34	32	31	G 25	G 24	25	24	25	34	39	36
U Q	52	54	56	51	51	54	52	56	56	52	50	33	34	38	38	40	33	32	38	36	40	53	50	46
L Q	36	27	35	31	24	30	30	32	28	30	29	G 28	G 29	31	30	E 28	B 26	B 26	B 22	B 22	B 20	B 20	B 20	B 24

FEB. 2021 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 2021 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	7	7	7	14	7	10	8	8	9	14	12	8	8	8	7	10	7	10	8	8	9	12	14	16	
2	10	12	9	7	7	16	12	8	10	12	20	24	18	14	18	30	14	11	25	24	8	7	8	6	
3	9	11	11	12	10	8	12	8	13	10	10	30	34	23	15	11	13	13	10	8	7	8	16	8	
4	9	10	12	18	19	12	9	22	20	23	11	16	B	31	24	24	B	38	35	24	19	12	10	7	
5	8	10	14	15	38	16	12	11	8	9	10	13	29	37	22	16	10	13	23	12	11	10	10	11	
6	8	19	20	26	15	17	10	11	11	10	10	13	12	12	12	12	11	11	8	12	12	18	13	8	
7	12	9	12	9	11	17	17	14	16	24	14	B	B	B	38	40	20	42	28	24	10	10	8	8	
8	6	18	16	23	12	16	10	11	22	25	19	19	14	14	14	14	12	12	16	14	11	11	10	10	
9	10	11	15	12	16	24	13	12	20	16	21	12	12	24	34	21	20	26	26	23	15	11	10	12	
10	10	12	9	13	11	11	11	11	13	13	13	25	23	21	18	18	18	16	16	12	9	10	12	10	
11	10	8	7	9	10	10	10	10	10	7	11	10	11	11	11	11	11	12	16	10	10	11	12	12	
12	9	9	10	9	9	9	10	10	11	14	14	12	12	11	11	11	11	11	11	11	10	14	12	11	
13	10	8	16	13	14	10	10	14	14	10	8	10	10	10	19	28	18	17	12	11	9	9	9	10	
14	9	12	11	16	16	16	16	14	10	10	18	17	12	15	10	12	10	10	14	24	13	10	10	7	
15	8	8	9	10	10	11	10	10	11	11	12	12	14	13	12	12	13	12	12	12	10	10	11	10	
16	18	13	9	12	11	14	10	13	11	12	12	18	20	B	40	29	33	14	18	12	9	10	8	8	
17	8	8	8	9	10	11	11	11	13	8	10	10	10	12	11	21	26	26	24	11	11	11	6	18	
18	10	8	9	14	14	17	12	13	11	10	C	10	12	10	18	14	12	12	13	14	12	10	8	8	
19	7	8	8	13	22	14	12	12	10	11	8	18	16	18	12	10	13	10	14	10	11	11	9	9	
20	10	7	9	12	12	11	10	12	10	10	B	14	31	23	18	28	16	10	8	11	12	9	13	9	
21	8	12	15	12	B	26	20	22	26	18	B	15	B	B	B	26	B	11	17	17	11	10	8	6	
22	14	10	12	16	14	25	21	B	18	12	25	C	C	C	30	38	36	24	19	28	10	10	6	12	
23	13	12	10	10	12	11	24	36	18	B	B	B	B	35	B	38	26	28	17	27	10	11	6	8	
24	B	15	9	9	B	B	B	13	11	25	C	C	C	C	C	30	B	18	B	14	12	C	C	C	
25	C	C	C	9	C	12	11	15	25	18	25	B	B	32	30	B	27	B	29	15	8	9	8	8	
26	9	14	9	11	14	17	22	22	19	21	15	15	14	29	C	C	C	C	C	C	C	C	C	C	
27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
28	9	9	6	8	7	20	17	21	24	B	39	33	15	12	14	15	13	10	17	14	8	8	10	8	
29																									
30																									
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	26	26	26	27	26	27	27	27	27	27	25	25	25	25	25	26	26	26	26	26	27	26	26	26	
MED	9	10	10	12	12	14	12	12	13	12	14	15	15	18	18	20	15	12	16	13	10	10	10	9	
U Q	10	12	12	14	16	17	17	15	19	21	23	24	32	32	30	29	26	24	24	23	12	11	12	11	
L Q	8	8	9	9	10	11	10	11	10	10	10	12	12	12	12	12	12	11	12	11	9	10	8	8	

FEB. 2021 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 2021 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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 A 230	E A 224	A 214	E A 210	A 198	A A	A A	A A	188	200	198	E A 232	A 202	194	200	200	200	190	H 196	198	220	A	A	A		
2	202	202	A	A 230	A	A	A	234	A	198	A	198	208	208	212	218	202	A	E B 226	210	238	E A 252	A	220		
3	A	196	A	A	A	A	A	A	A	A	196	224	252	216	198	196	200	210	H 182	226	H 180	A	A	A		
4	A	A	A	A	A	254	A	A	A	A	E A 268	198	B 208	E B 236	A 218	B	B	B	B	B	234	240	E A 258	A	226	
5	216	A	A	A	A	A	A	A	A	A	200	188	208	214	A	214	A	198	214	214	216	E A 222	E A 228	E A 240	A	
6	A	A	A	A	A	A	210	216	200	196	196	H 180	194	E A 228	206	206	H 184	222	198	234	A	A	A	A		
7	A	A	A	E A 266	A	A	A	A	A	A	A	B	B	B	B	B	E A 238	A	B	E B 266	274	E A 260	E A 244	276	A	
8	A	A	A	A	A	A	A	200	A	A	206	206	198	204	204	212	200	198	E A 220	224	224	E A 238	E A 230	282	A	
9	A	A	E A 272	A	A	A	A	206	206	198	212	208	204	200	242	216	206	202	236	222	210	242	226	236	A	
10	228	E B 252	E A 250	E A 272	250	220	204	200	196	206	202	H 218	E A 240	A	186	248	194	212	204	206	222	228	214	234	A	
11	E A 234	246	254	248	236	218	202	226	190	194	202	208	196	200	208	222	202	202	240	202	A	A	E B 228	230	A	
12	250	252	270	E A 284	A 248	240	216	200	204	198	202	214	E A 278	A 210	A	E A 250	202	202	216	208	222	A	A	A	A	
13	A	A	A	A	A	A	A	A	A	A	196	192	202	222	218	242	206	218	218	226	A	E A 252	A	A	A	
14	A	A	A	A	A	A	A	A	A	A	232	232	208	222	200	200	214	204	204	E B 228	E A 228	E A 228	E A 228	E A 228	A	
15	A	264	E A 266	E A 346	E A 346	A	E A 242	202	202	194	194	202	198	190	216	204	210	210	196	198	212	220	A	A	A	
16	A	A	A	A	A	A	A	E A 264	A	A	A	A	A	236	B	B	E B 236	E B 260	242	242	308	A	A	A	A	
17	A	A	A	E A 224	E A 228	200	A	A	200	A	200	198	190	198	198	198	232	216	208	230	A	E A 230	E A 230	274	A	
18	A	A	E A 288	A	A	A	A	A	226	198	C	206	202	216	216	208	210	210	204	228	E A 234	E A 222	232	218	A	
19	264	296	A	A	A	A	A	A	202	238	204	204	H 192	212	198	222	202	210	A	E A 318	A	A	A	A	A	
20	A	A	A	A	A	A	A	A	A	A	B	A	E B 240	224	198	236	198	A	A	A	A	A	A	A	A	
21	A	A	A	A	B	A	A	A	A	A	B	198	B	B	B	228	B	E A 234	A	E A 300	E A 272	E A 310	A	A	A	
22	A	A	A	A	A	A	A	A	B	A	A	A	C	C	C	E B 230	B	B	E A 252	232	A	E A 262	A	A	A	
23	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	E B 220	E B 304	E A 226	A	E A 254	E A 276	A	A	A	
24	B	A	A	A	B	B	B	A	A	A	C	C	C	C	C	E B 238	B	210	B	E A 268	A	C	C	C	A	
25	C	C	C	A	C	A	A	A	A	A	A	B	B	E B 268	E B 258	B	E B 236	B	E B 272	234	A	A	A	A	A	
26	A	A	A	A	A	A	A	A	A	A	200	204	196	198	C	C	C	C	C	C	C	C	C	C	C	
27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
28	222	A	A	A	A	B	220	222	E B 240	B	B	E B 268	200	196	208	198	196	E A 212	A	220	228	E A 228	E A 224	A	A	
29																										
30																										
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	8	8	4	8	8	6	6	10	11	11	16	20	20	19	20	21	22	21	21	23	18	17	11	9		
MED	224	242	256	E A 272	236	219	210	208	201	198	200	205	200	206	206	213	201	210	211	225	218	E A 238	229	230		
U Q	242	258	268	E A 286	E A 258	240	220	226	A	206	200	205	216	225	222	217	236	E	214	220	234	234	238	255	240	239
L Q	219	213	252	236	229	200	204	200	196	196	196	198	197	198	199	202	200	203	204	210	220	E A 228	228	223		

FEB. 2021 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 2021 f<sub>XI</sub> (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	O X 46	A	B	A	B	B	A	A	X	B	X	X	X	X	X	X	A	A	A	
2	A	A	A	A	48	A	O X 41	64	A	O X 46	O X 47	O X 50	O X 52	X	53	58	53	55	49	40	A	R	A	A	
3	A	A	A	A	A	B	B	B	A	B	B	B	B	B	B	O X 49	O X 48	O X 44	X	X	X	X	X	X	
4	A	A	A	A	B	A	B	O X 41	O X 39	O X 42	O X 40	O X 41	O X 45	X	46	48	45	46	43	40	42	35	A	A	
5	A	A	A	A	A	A	A	A	A	A	X	B	O X 52	O X 50	X	53	56	50	46	45	42	O X 37	O X 31	A	A
6	A	A	A	A	A	60	A	B	A	X	O X 43	O X 48	O X 47	O X 52	X	56	56	58	48	44	44	O X 34	O X 31	X	58
7	O X 44	A	64	A	A	A	O X 47	O X 46	B	O X 47	O X 48	O X 48	O X 52	X	57	64	62	57	52	48	39	O X 29	B	A	
8	A	A	A	A	52	37	42	44	46	48	52	53	51	50	50	54	55	53	45	40	34	30	O X 24	A	
9	A	A	X	A	A	O X 29	O X 42	O X 44	50	52	54	52	48	49	50	48	50	44	44	40	36	30	O X 33	O X 24	
10	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	X	26
11	X	21	22	27	26	56	43	36	46	51	56	58	64	61	57	60	62	66	56	49	46	37	32	40	23
12	O X 21	O X 47	62	A	86	A	A	X	46	57	50	54	B	B	X	51	59	64	57	50	O X 33	X	24	93	A
13	106	76	A	A	A	A	38	A	A	B	B	B	B	B	B	B	O X 47	O X 46	O X 41	O X 41	38	A	80	51	A
14	A	A	A	A	A	B	A	B	B	B	B	B	B	B	B	B	B	O X 46	O X 44	39	69	75	A	101	B
15	A	A	A	A	A	56	A	A	A	B	B	B	B	B	B	B	O X 45	O X 45	O X 41	O X 41	36	O X 26	O X 20	B	B
16	A	O X 27	A	A	A	A	O X 32	X	39	44	49	52	54	58	58	58	54	50	47	44	38	O X 30	O X 18	A	A
17	R	A	60	60	A	A	A	X	42	46	48	51	54	54	55	60	59	58	50	44	36	44	A	A	A
18	A	A	A	45	40	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O X 20	X
19	56	46	44	R	A	A	A	A	A	A	A	X	48	54	55	61	60	62	X	X	X	X	X	A	A
20	A	A	A	A	A	A	A	O X 42	X	52	50	A	B	O X 39	O X 39	O X 39	55	48	45	50	33	A	104	67	O X 36
21	69	A	A	B	A	B	A	A	O X 36	X	38	39	43	43	46	48	47	47	43	A	72	A	A	A	A
22	A	A	B	A	A	A	A	A	B	B	B	B	B	B	B	B	O X 51	O X 46	O X 45	O X 41	X	B	B	A	31
23	X	27	64	64	57	B	A	A	B	B	O X 38	X	48	48	54	58	66	62	56	50	42	29	A	A	A
24	A	A	A	A	A	A	A	A	B	O X 44	B	B	B	O X 54	O X 50	O X 56	O X 52	O X 45	O X 40	O X 36	B	O X 29	O X 24	B	B
25	80	A	A	80	B	A	A	A	A	A	X	O X 43	O X 47	B	O X 58	X	55	55	51	B	O X 47	O X 40	A	A	A
26	50	54	A	B	A	A	A	A	A	B	B	B	O X 56	X	59	B	O X 63	B	48	45	32	A	A	89	A
27	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O X 29	O X 22	A
28	A	X	A	67	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	O X 31	O X 26	B	A
29	A	A	A	A	A	O X 29	O X 31	O X 30	O X 42	O X 52	O X 49	O X 53	O X 57	O X 69	O X 63	O X 61	O X 56	O X 51	O X 43	O X 36	O X 30	A	B	A	A
30	A	A	A	A	A	O X 29	O X 30	O X 32	O X 37	O X 43	O X 49	O X 53	O X 57	O X 60	O X 57	O X 58	O X 54	O X 48	O X 40	O X 36	O X 30	O X 24	A	78	A
31	A	A	A	A	A	A	A	A	A	A	A	B	O X 53	X	56	54	55	O X 54	O X 48	O X 48	A	O X 23	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	9	9	8	7	6	9	12	16	15	20	21	20	23	26	24	30	30	30	30	28	22	15	10	9	
MED	50	46	52	57	50	37	38	43	44	48	48	52	53	56	58	56	54	48	44	38	32	30	34	31	
U Q	74	59	63	67	56	51	42	46	50	50	52	54	57	58	60	62	57	50	46	41	36	32	51	68	
L Q	X	X	X	X	O X 40	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O X 29	O X 24	O X 24	O X 24

MAR. 2021 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 2021 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	38	A	B	A	B	B	A	A	36	B	42	39	38	35	35	32	A	A	A
2	A	A	A	A	A	A	R	R	A	R	R									A	A	A	A	A
3	A	A	A	A	A	B	B	B	A	B	B	B	B	B	B	R	R	R						
4	A	A	A	A	B	A	B	R		R														
5	A	A	A	A	A	A	A	A	A	A	A	B												
6	A	A	A	A	A	A	A	B	A															
7	38	A	A	A	A	A		R	B	R														
8	A	A	A	A	A	F	36	38	40	42	46	47	45	44	44	48	49	47	39	34	28	F	R	A
9	A	A		A	A	F	32	38	44	46	48	46	42	43	44	42	44	38	37	34	30	24	23	18
10	A	20	20	21	20	24	33	39	42	46	50	50	52	52	54	56	55	46	39	35				
11	15	16	21	20	16	21	30	40	45	50	52	58	55	51	54	56	60	50	43	40	31	26	22	17
12	R	41	A	A	A	A	A	40	38	44	48													
13	A	A	A	A	A	A	F	A	A	B	B													
14	A	A	A	A	A	B	A	B	B	B	B	B	B	B	B	B	R	R						
15	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	R	R	R						
16	A	R	A	A	A	A	R																	
17	R	A	A	A	A	A	A	36	40	42	45	48	48	49	54	53	52	44	38	30				
18	A	A	A	A	A	A	A	A																
19	A	A	J	R	A	A	A	A	A	A														
20	A	A	A	A	A	A	A	R	F															
21	R	A	A	B	A	B	A	A	R	F														
22	A	A	B	A	A	A	A	A	B	B	B	B	B	B	B	R	R							
23	21	21	A	A	B	A	A	B	B	R														
24	A	A	A	A	A	A	A	A	B	R														
25	A	A	A	A	B	A	A	A	A	A														
26	A	A	A	B	A	A	A	A	A	B	B	B	R	R	R	R	R							
27	A	A	A	A	A	A																		
28	A	J	R	A	A	A	A																	
29	A	A	A	A	A																			
30	A	A	A	A	A																			
31	A	A		A	A	A	A	A	A	A	B	R												
	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	6	4	2	2	7	11	15	15	20	21	20	23	26	24	30	30	30	30	26	20	12	7	6
MED	18	21	28	20	18	23	30	36	38	42	42	46	47	50	51	50	48	42	37	32	24	22	20	18
U Q	30	34	37			25	35	40	40	44	46	48	51	52	54	55	51	44	39	35	30	25	23	20
L Q	15	20	20			23	25	32	33	36	40	42	45	44	46	44	42	38	35	30	23	17	18	17

MAR. 2021 foF2 (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 2021 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	17	18	8	18	10	11	13	79	14	B	B	20	23	18	B	17	17	12	8	8	9	7	11	10
2	13	10	10	8	9	12	10	12	16	33	15	29	21	17	14	11	16	23	10	12	12	6	12	10
3	16	11	10	7	11	B	B	B	18	B	B	B	B	B	B	30	34	28	15	14	10	10	7	10
4	15	15	8	12	B	12	B	29	22	17	17	16	18	17	16	14	23	10	10	13	21	7	7	8
5	15	10	12	9	11	16	16	18	18	19	16	B	18	37	37	29	19	14	12	12	14	11	11	8
6	14	16	16	10	11	10	23	B	18	23	32	27	39	37	32	24	36	34	24	13	18	8	7	10
7	10	12	12	11	12	16	24	12	B	19	18	16	16	13	32	17	19	20	15	11	7	B	11	13
8	10	28	13	12	12	10	11	12	10	10	11	14	25	26	17	18	15	20	22	11	10	8	8	10
9	14	14	14	14	11	12	12	10	10	11	14	8	11	14	14	14	14	14	10	10	9	9	10	7
10	9	10	10	8	9	8	7	8	9	10	12	13	13	12	11	14	10	9	8	10	10	8	7	9
11	8	10	10	10	10	8	8	8	10	10	12	13	18	28	29	18	15	10	10	8	10	9	8	8
12	9	10	9	10	10	10	10	10	10	18	41	B	B	26	37	38	36	14	13	20	11	8	8	12
13	12	10	7	10	14	11	11	12	12	B	B	26	26	B	B	35	25	12	12	10	8	10	9	12
14	17	28	14	12	22	B	19	B	B	B	B	B	B	B	B	B	36	25	18	26	9	9	23	12
15	10	10	22	12	14	19	27	22	16	B	B	B	B	B	B	35	24	22	15	12	11	9	B	B
16	9	9	12	14	12	13	10	16	14	14	14	14	14	17	13	13	13	13	10	8	10	9	9	9
17	9	10	9	10	15	13	12	9	11	10	9	10	11	10	11	12	13	9	10	8	14	8	10	9
18	10	10	10	10	10	8	24	18	14	13	15	16	13	12	14	16	11	8	12	10	9	9	8	10
19	8	8	11	16	8	11	17	19	19	19	20	15	21	25	24	25	16	13	14	14	10	9	10	8
20	9	24	11	20	10	11	12	14	8	9	31	B	20	17	26	13	16	16	10	7	10	10	9	12
21	9	23	12	B	33	B	33	26	14	14	15	18	15	16	16	14	19	14	11	9	14	10	15	8
22	12	17	B	16	24	16	21	22	B	B	B	B	B	B	B	34	24	27	18	10	B	B	8	10
23	10	10	10	10	B	13	15	B	B	26	29	38	37	36	26	26	28	28	16	B	16	8	14	14
24	14	9	10	16	16	24	23	24	B	31	B	B	B	40	38	34	38	30	26	24	B	15	15	B
25	10	17	20	12	B	20	16	17	26	36	25	35	B	36	32	26	36	B	25	20	16	10	7	10
26	8	11	11	B	26	24	17	18	26	B	B	B	38	40	B	40	B	22	22	20	9	10	10	18
27	20	10	18	11	12	11	10	10	12	12	11	12	13	15	19	23	19	14	12	11	10	10	13	11
28	12	12	20	10	15	24	12	12	11	11	11	15	18	16	16	13	12	14	12	13	11	B	10	12
29	12	9	12	10	11	10	9	15	28	16	13	16	14	14	14	11	11	15	9	10	10	11	B	12
30	8	12	11	11	11	9	12	12	9	14	15	17	17	16	16	16	10	9	10	8	7	10	10	8
31	13	14	14	26	11	28	16	24	18	23	30	B	40	39	36	25	42	33	20	9	10	9	10	10
	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	10	11	11	11	12	12	15	17	16	19	18	20	21	25	26	18	19	14	12	11	10	9	10	10
U Q	14	16	14	16	16	20	23	24	B	B	B	B	40	39	38	30	34	25	18	14	14	10	12	12
L Q	9	10	10	10	10	10	11	12	11	12	14	15	15	16	16	14	14	12	10	9	9	8	8	9

MAR. 2021 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 2021 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	192	A	B	A	B	B	A	A		B	232	222	224	AE A	AE A	AE A	A	A	A	A			
2	A	A	A	A	A	A	A	A	A	B	A	218	216	202	204	204	222	222	214	A	A	A	A	A	A			
3	A	A	A	A	A	B	B	B	A	B	B	B	B	B	B	BE B	BE B	BE B	BE B	AE A	AE A	AE A	AE A	AE A	AE A			
4	A	A	A	A	B	A	BE B	BE B	A		E A	242	220	216	186	202	222	200	256	AE A	AE B	A	A	A	A			
5	A	A	A	A	A	A	A	A	A	A	204		216		B	BE B	216	216	208	208	222	244	268	A	A			
6	A	A	A	A	A	A	A	B	A	H	B	216		B	BE B	250	218		BE B	BE B	BE B	AE A	AE A	A	A			
7	200	A	A	A	A	AE A	A	A	B		216	216	198	210	194		212	248	228	212	208	210		B	A	A		
8	A	A	A	A	A	224	276	228	200	200	190	212	200	190	190	198	210	210	224	184	198	280	200		A	A		
9	A	A	H	A	A	200		224	220	208	208	184	180	194	174	188	220	204	204	198	200		270	210				
10	A	256	282	270	282	254	234	212	208	214	196	190	198	202	202	220	202	222	200	214		A	A	AE A	256			
11	EA	290	260	258	262	316	250	216	212	204	202	204	206	202	210	196	194	224	206	202	194	202	232	238	270			
12	EA	EA	EA	A	A	A	A	A	A	E A		B	B	B	B	B	B	B	226	226		BE B	A	A	A			
13	A	A	A	A	A	A	A	A	A	A	B		236	210		B	B	B	230	230		230	A	A	A			
14	A	A	A	A	A	B	A	B	B	B	B	B	B	B	B	B	B	BE B	BE B	AE A	A	A	A	A	A			
15	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	BE B	BE B	BE B	AE A	AE B	236	256	182	B	B		
16	A	202	A	A	A	A	A	A	A	A	A	210	206	218	198	188	200	200	204	194	198	218	308	A	A			
17	A	A	A	A	A	A	A	A	A	H	212	190	206	208	182	198	198	202	202	202	208	238	A	A	A			
18	A	A	A	A	A	A	A	A	A	A	A	214	200	216	202	208	204	202	202	218	214	208	194	222	238	250	292	
19	A	A	A	A	A	A	A	A	A	A	A	226	210	236	236	236	222	218	222	228	228	232	A	A	A	A		
20	A	A	A	A	A	A	A	A	A	A	220	206		BE B	AE B	AE B	256	266	268	220	286	256	230	A	A	A	A	
21	A	A	A	B	A	B	A	A	A	A	210	A	218	214	240	266	280	268	A	A	A	A	A	A	A	A		
22	A	A	B	A	A	A	A	A	B	B	B	B	B	B	B	BE B	BE B	B	BE B	BE B	AE A	B	B	A	A			
23	A	208	196	A	B	A	A	B	B	BE B	B	B	B	B	B	240	224	230	236	240		190	A	A	A	A		
24	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	BE B	BE B	BE B	BE B	BE B	276	326	338	B	A	A	B
25	A	A	A	A	B	A	A	A	A	BE B	B	B	B	B	BE B	230	270		B	B	Q	A	A	A	A	A		
26	A	A	A	B	A	A	A	A	A	B	B	B	B	B	B	B	B	B	BE B	BE B	314	A	A	A	A	A		
27	A	A	A	A	A	A	AE A	AE A	A	194	240	216	202	214	216	202	212	190	208	212	198	266	A	A	A	A		
28	A	206	A	A	A	A	A	212	210	210	236	226	212	226	218	196	226	206	202	222	234		B	A	A	A		
29	A	A	A	A	A	A	316	A	B	228	198	232	204	198	212	212	200	200	208	214	228		A	B	A	A		
30	A	A	A	A	A	A	AE A	AE A	A	258	204	190	218	206	206	202	200	220	214	206	204	238	226	246	A	A		
31	A	A	A	A	A	A	A	A	A	A	A	B	BE B	BE B	B	B	BE B	BE B	BE B	AE A	A	192	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	3	6	4	2	2	5	6	9	13	16	17	18	19	21	20	26	27	27	27	22	20	11	7	4				
MED	EA	270	211	227	266	299	224	273	220	210	206	208	210	209	204	204	212	218	213	212	213	U	EA	U	U	248		
U Q	EA	290	256	270		252	290	268	221	215	231	218	216	231	245	224	248	236	240	238	247	308	282	281	A	A		
L Q	200	206	188			196	234	212	204	200	202	206	202	198	197	202	214	206	208	208	201	238	200	233				

MAR. 2021 h'F (KM)

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## IONOSPHERIC DATA STATION SHOWA-ST.

APR. 2021 fxI (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	B	A	A	A	A	A	A	A	B	X	X	X	X	X	X	O	X	O	X	O	X	O	X	B	O	X	18	63	
2	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A	A	A	A	A	A	A	A	A	
3	A	A	A	O	X	50	54	A	A	A	A	X	X	X	X	X	X	X	O	X	O	X	A	A	R	O	X	A	A	A		
4	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
5	A	O	X	X	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
6	O	X	A	A	A	A	A	X	O	X	V	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
7	44	53	43	34	O	X	X	A	X	X	X	X	X	X	B	X	X	X	X	A	A	A	A	A	A	A	A	A	A	A	A	
8	A	52	A	A	57	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
9	A	A	A	A	A	A	A	X	R	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
10	B	R	O	X	A	A	A	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
11	A	A	A	A	A	A	O	X	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
12	A	A	A	A	O	X	A	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
13	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
14	A	O	X	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
15	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
16	A	56	X	A	A	A	A	A	A	A	B	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
17	97	A	A	A	81	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
18	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
19	A	A	A	A	A	A	A	A	B	65	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
20	A	A	B	A	B	B	O	X	A	A	O	X	O	X	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
21	A	A	A	B	B	A	A	A	A	B	B	O	X	X	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
22	A	A	A	A	A	A	A	A	A	B	X	X	B	X	O	X	X	X	B	B	O	X	B	A	B	A	B	A	B	A	A	
23	58	65	52	A	A	A	A	A	A	B	O	X	X	X	B	X	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
24	A	A	B	B	A	A	A	A	A	B	B	B	O	X	O	X	B	B	B	O	X	B	B	B	B	B	B	B	B	B	B	
25	65	A	53	A	B	A	B	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
26	B	X	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
27	A	58	A	A	A	B	A	A	B	B	B	O	X	O	X	B	O	X	B	O	X	B	B	B	B	B	B	B	B	B	B	
28	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
29	46	X	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
30	A	A	48	68	58	38	42	X	X	A	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
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	6	9	8	8	9	6	11	12	17	16	19	21	23	20	23	22	25	23	20	17	10	6	3	2								
MED	52	52	46	43	44	41	37	34	38	44	49	51	53	56	57	56	53	43	34	27	23	24	18	46								
U Q	65	57	51	64	58	47	39	40	45	45	50	56	59	64	61	60	56	46	38	31	25	66	55									
L Q	44	O	X	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	X								

APR. 2021 fxI (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

APR. 2021 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	B	A	A	A	A	A	A	A	B				F	40	34	29	24	R	B	R	A
2	A	A	A	A	A	A	A	28	32	38	39	42	44	43	46	50	44	40	F	A	A	A	A	A
3	A	A	A	R	U	R	A	A	A	A	A			F	50	48	F	41	30	R	A	A	R	
4	A	A	A	A	A	A														F				
5	A		20	26	A	A	A	21	24	33	38	38	42	47	49	51	46	44	42	28	19	17	15	A
6	R	A	A	A	A	A														F	R	A	A	A
7	A	A	A	A	R		A													A	A	A	A	A
8	A	A	A	A	A	A	A	J	R	30	24	29	35	39	39	40	44	46	45	F	R	A	A	A
9	A	A	A	A	A	A														F	R	A	B	B
10	B	A	A	R		A																		
11	A	A	A	A	A	F	R	A																
12	A	A	A	A																				
13	A	A	A	R	A	A																		
14	A	R	A	A	A	A																		
15	A	A	A	A	A	A																		
16	A	A		F	A	R	A	A	A	B														
17	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	A	A	A	A
18	A	A	A	A	A	A	A	A	B	A	B	B	B	B	B	B	B	B	B	A	A	A	A	A
19	A	A	A	A	A	A	A	A	B	A	B	B	B	B	B	B	B	B	R	R	R	A	A	A
20	A	A	B	A	B	B	R	A	A	R	R	B	B	B	B	B	B	B	B	R	B	R	A	A
21	A	A	A	B	B	A	A	A	A	B	B	R												
22	A	A	A	A	A	A	A	A	A	B														
23	A	R	A	A	A	A	A	A	A	B	R													
24	A	A	B	B	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A
25	A	A	A	A	B	A	B	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A
26	B		A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	A	A
27	A	A	A	A	A	B	B	B	B	B	B	R	R	B	R	B	R	B	B	B	B	A	B	A
28	A	A	A	A	A	A																		
29	A		A	A	A	A	A	A																
30	A	A	A	A	A																			
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	1	5	2	4	4	4	10	11	15	16	19	21	23	20	23	22	25	23	20	17	9	4	2	1
MED	R	28	32	R	22	32	30	24	32	38	43	43	45	50	51	50	44	37	28	21	R	13	12	22
U Q		42		42	26	36	33	28	33	39	44	50	53	56	53	54	50	40	30	22	R	18	18	
L Q		22		R	21	31	22	F	26	36	39	40	42	46	46	46	40	32	R	26	19	14	10	

APR. 2021 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

APR. 2021 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	66	52	86	44	56	54	29	44	52	52	44														
2	42	71	42	56	56	59	37	26	57																
3	49	57	29	19	28	24	51	51	52	39	29	28	31												
4	52	51	58	48	48	32	12	14	17	26	21	23	26												
5	57	67	49	38	48	41	48		14	16	22	24	24	24	20	19	20	17							
6	28	35	35	32	27	34	25	58																	
7	55	44	54	26	31	17	55	40	30																
8	52	40	55	57	45	40	59		68	18															
9	57	54	31	43	95	41	28	54	69	23	77														
10		29	32	37	30	57	51	56	22	20															
11	40	60	50	54	46	39	47	62	60	38	24														
12	72	58	58	46	31	34	57	12	14																
13	52	38	50	59	48	33		45																	
14	34	27	63	33	33	29	48	48	55																
15	30	38	58	58	52	46	56	48	17																
16	54	35	22	39	51	53	53	42	44																
17	55	74	51	47	50	55	49	57	40	57	49														
18	49	71	45	58	57	58	56	59																	
19	53	42	67	102	59	58	54		53	47															
20	68	66		43			50	50	50	24	25														
21	74	66	60	62		40	38	34	58																
22	32	50	32	48	45	43	42	46	45																
23	31	39	40	62	53	46	60	60	53																
24	70	84	54		54	46	54	61																	
25	38	44	46	52		52		65	55	52															
26		20	38	54	55	50	52																		
27	50	33	62	54	54	56	60	49																	
28	41	55	41	50	58	51	36	30																	
29	34	33	45	45	43	47	51	49	53	58	19	19	27	27	31	35	14								
30	31	34	34	34	41	32	66	35	24	16	18	21	21	102	23	23	16	16	16	41	36	45	32	40	
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	28	30	29	29	27	29	29	28	26	21	22	22	23	20	23	22	25	23	26	25	28	26	28	28	
MED	51	47	49	48	48	46	51	48	48	22	24														
U Q	56	60	58	56	55	54	56	56	55	50	44	26	28	26	31	24	24	26	39	52	47	45	55	50	
L Q	36	35	36	38	41	34	38	34	17																

APR. 2021 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

APR. 2021 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz IN 15.0SEC IN MANUAL SCALING

$\frac{H}{D}$	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	10	17	11	34	15	15	16	16	20	37	33	B	16	18	19	24	26	20	15	14	11	B	7	9	
2	10	20	12	24	16	14	9	9	12	14	14	14	14	13	13	11	9	14	12	11	11	13	11	12	
3	15	15	21	15	15	10	9	9	12	14	10	10	14	17	14	14	14	14	19	15	16	11	12	8	
4	10	10	13	16	12	11	9	7	8	8	10	9	9	9	7	10	10	8	8	7	8	10	9	10	
5	8	8	9	8	10	8	8	9	8	8	10	12	12	9	10	10	10	17	15	14	11	11	11	9	
6	9	9	9	9	8	8	8	8	10	10	11	8	9	9	10	8	8	8	8	9	9	8	8	9	
7	12	9	9	7	8	9	10	9	10	11	11	15	10	B	44	22	14	14	9	17	10	12	9	9	
8	7	9	8	17	12	10	12	8	10	18	14	12	10	11	12	14	11	9	8	10	11	9	8	10	
9	9	10	10	8	10	8	8	24	14	12	13	13	11	23	11	16	20	10	9	14	14	21	B	B	
10	B	10	7	8	9	14	13	10	9	10	10	10	10	10	10	10	11	15	10	9	9	15	10	10	
11	10	22	16	13	12	10	12	24	14	13	24	14	11	11	16	14	14	15	15	9	10	9	10	10	
12	10	16	20	14	10	11	8	8	9	10	11	12	11	12	13	12	14	11	10	10	10	10	9	11	
13	10	16	19	13	13	10	9	10	9	11	B	24	23	17	23	20	20	15	17	14	10	9	9	8	
14	8	8	8	8	10	10	12	10	8	10	12	13	13	12	16	12	11	11	13	11	10	11	11	8	
15	8	11	9	13	25	15	14	15	12	B	B	30	16	16	24	19	16	17	10	13	9	8	8	10	
16	8	8	8	8	16	15	10	10	16	B	24	16	40	24	15	13	18	28	14	13	11	9	14	12	
17	9	19	22	15	8	14	16	41	14	20	36	B	B	B	B	B	B	B	12	6	10	10	10	15	
18	8	8	9	17	13	17	17	13	B	B	B	B	B	B	B	B	B	B	10	9	9	7	9	9	
19	16	10	8	20	X 20	11	10	B	18	37	B	B	B	B	B	B	33	24	21	11	9	11	12	13	
20	10	12	B	14	B	B	14	14	22	24	25	B	B	B	B	B	B	B	15	B	9	10	22	12	
21	11	9	26	53	B	19	12	8	12	B	B	26	26	B	35	B	B	B	B	B	24	B	9	12	
22	6	8	8	12	20	15	14	10	10	B	26	29	B	44	37	29	23	B	B	11	B	15	B	14	
23	11	17	25	20	25	22	13	18	10	B	35	24	26	B	44	40	29	18	15	11	11	12	9	9	
24	11	12	37	B	20	22	19	25	B	B	B	B	37	34	B	B	B	25	B	B	B	B	8	7	
25	16	16	15	23	B	23	B	34	21	32	B	B	B	B	B	25	22	13	12	14	9	7	8	8	
26	B	11	20	8	11	14	22	B	B	B	40	B	B	B	B	B	24	18	12	24	10	8	9	7	
27	10	8	16	23	14	40	36	33	B	B	B	26	32	B	34	B	24	B	B	B	16	B	9	9	
28	6	10	11	16	21	14	10	9	8	8	10	10	10	14	11	10	9	14	16	11	14	16	12	12	
29	8	9	13	13	13	10	11	17	10	12	19	12	18	27	31	19	14	B	20	B	16	11	11	B	
30	17	10	8	6	9	10	10	17	12	16	18	21	21	18	16	14	8	9	10	10	8	8	8	9	
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
MED	10	10	12	14	13	14	12	12	12	17	24	18	17	20	21	19	17	16	14	12	10	11	9	10	
U Q	11	16	20	20	20	15	14	24	18	B	B	B	40	B	44	B	26	28	17	15	14	15	11	12	
L Q	8	9	9	8	10	10	9	9	10	11	11	12	11	12	13	12	11	13	10	10	9	9	9	9	

APR. 2021 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

APR. 2021 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	B	A	A	A	A	A	B	B	B	210	228	244	244	E B	B	E B	E B	E B	E B	E B	B	A	A
2	A	A	A	A	A	A	A	E A	E A	E A	E A	196	234	220	196	224	216	212	212	208	A	A	A	A	A	
3	A	A	A	A	A	A	A	A	A	A	248	224	E A	E A	222	222	214	222	214	E A	B	E B	A	A	A	208
4	A	A	A	A	A	A	A	E A	A	208	204	200	200	224	202	214	208	196	E A	206	198	E A	234	E A	252	264
5	A	A	A	A	A	A	A	E A	A	248	196	198	204	204	208	212	204	184	226	210	E A	220	214	E A	214	A
6	216	A	A	A	A	A	A	E A	A	252	200	222	204	200	200	206	210	210	210	194	202	222	236	E A	280	A
7	A	A	A	E A	A	A	A	A	E A	274	200	246	214	198		B	B	E B	240	A	A	A	A	A	A	A
8	A	A	A	A	A	A	202	E A	250	210	E B	234	222	200	196	196	212	206	200	A	210	210	E B	280	202	A
9	A	A	A	A	A	A	218	A	A	A	208	196	206	210	210	202	E A	234	208	206	206	252	A	A	B	B
10	B	A	A	A	A	A	A	250	210	214	200	206	200	204	204	226	210	200	200	242	A	A	A	A	A	A
11	A	A	A	A	A	A	216	A	A	A	A	B	208	228	226	226	204	E A	214	218	234	224	A	208	204	A
12	A	A	A	A	A	A	A	A	220	198	198	206	222	202	218	208	208	208	206	240	B	A	H	A	A	A
13	A	A	A	A	A	A	228	204	244	220	E A	A	B	248	232	192	234	214		B	E A	E A	B	A	H	A
14	A	198	A	A	A	A	A	E A	278	246	200	218	212	212	200	206	204	204	218	E A	E A	A	A	A	A	A
15	A	A	A	A	A	A	A	A	A	A	B	B	A	214	216	226	224	E B	224	210	216	208	232	244	266	274
16	A	A	196	A	A	202	A	A	A	A	A	A	E A	264	244	220	230	E B	264	B	B	250	196	A	A	A
17	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	A	A	A	A	A
18	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	A	A	A	A	A
19	A	A	A	A	A	A	A	A	B	A	B	B	B	B	B	B	B	B	298	282	A	A	A	A	A	A
20	A	A	B	A	B	B	226	A	E B	E B	E B	B	B	B	B	B	B	B	B	B	240	B	206	A	A	A
21	A	A	A	B	B	A	A	A	A	B	B	E B	262	262	B	E B	B	B	B	B	B	B	A	B	A	A
22	A	A	A	A	A	A	A	A	A	B	E B	E B	E B	E B	E B	B	B	B	B	E A	274	B	A	B	A	A
23	A	198	A	A	A	A	A	A	A	B	E B	E B	E B	E B	B	240	220	E B	220	216	234	224	204	A	A	A
24	A	A	B	B	A	A	A	A	A	B	B	B	E B	E B	E B	B	B	B	E B	278	B	B	B	B	A	A
25	A	A	A	A	B	A	B	B	A	B	B	B	B	B	B	B	310	E B	280	260	A	A	A	A	A	A
26	B	260	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	E B	284	A	A	A	A	A	A
27	A	A	A	A	A	B	B	B	B	B	B	E B	292	296	B	E B	B	B	E B	248	B	B	B	A	B	A
28	A	A	A	A	A	A	A	E A	E A	E A	E A	266	246	230	222	216	216	210	210	210	220	B	A	A	A	A
29	A	A	A	A	A	A	A	A	E A	E A	E A	266	230	220	222	218	224	220	210	198	244	B	A	A	A	B
30	A	A	A	A	A	A	A	E A	E A	E B	E B	310	228	214	216	208	222	208	206	186	206	230	234	A	A	A
31																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	1	4	1		1	1	5	8	13	15	17	21	22	20	22	22	21	20	18	17	8	5	2	1		
MED	216	217	196		E A	202	218	E A	U	U	209	208	211	214	206	216	211	209	212	216	229	U	222	236	239	208
U Q		248					227	E A	E A	E A	E B	E B		E B					E B		E A	E B	A			
L Q		198					209	E A	243	209	200	200	206	208	202	210	208	206	207	206	223	210	205			

APR. 2021 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION SHOWA-ST.

MAY 2021 f<sub>XI</sub> (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	X	X			X	X	X		X	X	X		O	X	O	X	O	X	A	A	A			
2	A		63	A	A	A	A	A	A	A	A	B	O	X	O	X	X	X	O	X	O	X	R	B	O	X	A	A	26
3	36	A	A	A	48	44	O	X	O	X	O	X	X	X	X	X	X	R	B	A	A	A	A	B	A				
4	A	R	A	A	A	A	A	A		30	42	46	55	55	60	60	46	36	A	O	X	A	O	X	O	X	32	36	
5	A	42	A	A	33	42	A	A	A	X	X	X	X	X	X	X	X	A	A	A	A	A	O	X	B	B			
6	A	83	54	37	A	A	A	A	O	X	26	50	68	64	63	73	56	45	36	32	A	R	R	B	A	B			
7	R	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	R	A	A	O	X	O	X	A	A			
8	A	A	A	28	A	O	X	A	O	X	40	35	52	56	62	59	58	50	29	A	B	B	A	A	A	A			
9	A	A	A	A	R	O	X	A			36	35	46	60	63	55	57	43	26	22	22	22	R	B	B	B			
10	44	A	37	38	X	O	X	X	R	R	X	X	X	O	X	X	X	X	X	X	A		O	X	O	X	A	49	
11	A	A	A	A	A	A	A	A	O	X	24	34	44	56	56	60	56	42	28	21	17	A	O	X	O	X	A	19	
12	30	A	46	78	A	A	O	X	X	X	X	X	O	X	X	X	X	A	A	A	A	A	A	A	A	A	50		
13	52	A	A	A	62	A	A	A	A	A	B	B	B	B	B	B	B	O	X	A	A	A	A	A	A	A			
14	A	A	A	A	A	A	A	O	X	O	X	B	X	X	X	X	0	X	O	X	A	B	R	B	O	X	72		
15	A	A	A	A	A	A	A	A	B	O	X	34	33	50	58	58	B	B	B	B	B	B	B	B	A	A			
16	59	39	A	A	44	A	A	A	X	X	X	X	X	64	64	77	X	B	B	B	A	B	B	R	A	A			
17	47	A	A	A	49	A	A	A	O	X	O	X	26	26	50	69	83	69	52	46	39	24	27	21	B	R	A	A	
18	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	A	R	A	A	A	A			
19	R	X	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	O	X	O	X	A	A	A	R	A	63		
20	A	A	A	A	A	A	A	A	A	A	B	B	A	B	X	X	X	X	A	A	A	A	A	A	A	A			
21	B	A	B	A	A	B	A	A	A	A	B	B	B	O	X	B	B	O	X	B	B	A	A	B	A	A	A		
22	A	A	A	A	A	A	A	A	A	A	X	29	35	55	61	61	58	52	B	A	O	X	A	B	B	A	50		
23	A	O	X	A	A	R	A	O	X	O	X	A	A	X	O	X	60	66	48	36	X	B	R	A	B	B	O	X	A
24	A	A	A	O	X	A	B	A	R	O	X	X	X	X	X	X	X	O	X	A	A	A	A	A	A	A	A		
25	A	A	A	A	A	38	42	A	A	O	X	25	38	53	46	51	48	40	A	A	R	A	R	B	R	A			
26	A	55	A	A	A	A	34	25	24	29	33	52	51	55	39	40	X	A	A	B	B	B	A	A	A	64			
27	X	A	52	B	127	A	A	A	O	X	84	53	48	B	B	B	B	58	40	X	B	B	A	A	O	X	41	58	
28	A	A	A	A	A	A	O	X	A	A	X	X	X	X	X	X	X	O	X	A	A	R	R	B	A	A			
29	A	A	A	A	A	A	R	A	B	B	X	35	51	60	48	44	X	A	A	A	A	A	A	R	B	R			
30	A	A	A	A	A	X	A	A	A	A	A	X	34	50	55	49	46	X	X	O	X	A	A	A	A	A			
31	A	O	X	A	A	O	X	X	A	X	X	A	O	X	31	50	57	58	52	31	22	X	X	A	R	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	7	8	6	5	8	9	9	10	15	21	26	24	27	28	28	27	22	10	10	3	5	7	6	9					
MED	44	44	53	38	46	O	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X	O	X	O	X	O	X	26	50
U Q	52	52	58	62	56	O	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X	O	X	X	39	39	41	60	
L Q	31	O	X	46	32	X	X	O	X	X	X	X	X	X	X	X	X	O	X	O	X	O	X	O	X	O	X	O	X

MAY 2021 f<sub>XI</sub> (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

MAY 2021 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	44	A	A	34	33	19	F	F	35	40	51	53	58	66	51	F	R	R	R	R	A	A	A	
2	A	A	A	A	A	A	A	A	A	A	A	A	B	R	R	R	31	25	22	R	A	B	R	A	A	
3	A	A	A	A	A	A	A	R	R	22	31	39	44	47	55	49	40	R	R	B	A	A	A	B	A	
4	A	R	A	A	A	A	A	A	F	F	36	40	49	49	54	54	40	R	A	15	A	R	R	A	A	
5	A	A	A	A	A	F	A	A	A	A	29	42	49	61	53	50	34	34	A	A	A	A	R	B	B	
6	A	A	A	31	A	A	A	A	R	F	F	28	46	58	57	63	50	39	30	26	A	R	R	B	A	B
7	R	A	A	A	A	A	A	A	A	A	29	39	44	49	44	51	38	25	A	A	A	R	R	A	A	
8	A	A	A	18	A	44	A	42	F	F	29	46	50	56	53	52	44	22	A	B	B	A	A	A	A	
9	A	A	A	A	A	A	R	A	F	F	29	40	46	57	49	51	37	20	16	16	16	R	B	B	B	
10	A	A	A	A	31	40	40	R	R	R	26	38	52	57	64	54	35	26	28	20	A	A	R	A	43	
11	A	A	A	A	A	A	A	A	R	R	28	38	50	50	J	R	54	50	36	22	15	11	R	A	R	R
12	18	A	A	A	A	A	R	23	22	F	30	33	43	46	62	68	47	30	A	48	A	A	A	A	A	
13	46	A	A	A	A	A	A	A	A	A	B	B	B	B	36	35	41	32	17	A	A	A	A	A	A	
14	A	A	A	A	A	A	A	R	R	B	34	43	55	58	Z	56	42	R	R	A	B	A	B	R	A	
15	A	A	B	A	A	A	A	A	B	R	28	27	B	R	R	52	B	B	B	B	B	B	A	A	A	
16	A	A	A	A	A	A	A	A	22	26	31	40	45	45	71		B	B	B	A	B	B	R	A	A	
17	A	A	A	A	A	A	A	A	20	R	F	F	F	F	60	46	40	33	18	21	15	B	R	A	A	
18	A	A	A	A	A	A	A	A	A	B	B	B	B	F	B	B	B	B	B	B	A	R	A	A	A	
19	R	42	A	A	A	A	A	26	26	22	41	42	52	F	50	47	43	22	15	A	A	A	R	A	A	
20	A	A	A	A	A	A	A	A	A	A	B	B	B	A	B	J	R	44	48	67	A	A	A	A	A	
21	B	A	B	A	A	B	A	A	A	B	B	B	R	B	B	B	R	B	B	A	A	B	A	A	A	
22	A	A	A	A	A	A	A	A	A	23	29	44	51	39	40	35	B	A	R	A	B	B	A	A	A	
23	A	R	A	A	A	A	R	20	A	A	37	40	48	42	38	30	B	R	A	B	B	B	R	A	A	
24	A	A	A	R	A	B	A	R	R	17	20	31	41	45	45	47	33	20	R	A	B	A	A	A	A	
25	A	A	A	A	A	A	A	A	A	R	19	32	46	40	42	42	29	F	A	A	R	A	R	B	A	
26	A	A	A	A	A	A	F	22	19	18	23	27	40	37	49	33	34	A	A	B	B	B	A	A	A	
27	25	A	A	B	A	A	A	A	A	47	30		F	B	B	B	F	45	34	B	B	A	A	R	A	
28	A	A	A	A	A	A	R	16	A	A	20	25	35	37	J	R	41	36	27	16	A	A	R	A	B	F
29	A	A	A	A	A	A	R	A	B	B	29	45	50	42	38	A	A	A	A	A	A	A	R	B	R	
30	A	A	A	A	A	J	R	13	A	A	A	A	28	F	F	41	43	40	30	21	13	R	A	A	A	
31	A	R	A	A	R	27	A	26	13	A	R	25	38	39	46	42	25	16	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	3	3	1	3	2	6	8	9	14	21	26	24	27	28	28	27	22	10	10	3	4	6	3	2		
MED	25	27	44	31	28	32	25	22	19	28	34	44	49	49	48	38	26	18	19	15	14	13	14	28		
U Q	46	42		39		40	36	26	22	30	40	50	55	54	52	42	32	25	21	16	14	22	15			
L Q	18	21		18		27	20	19	17	22	29	40	44	42	40	33	22	15	16	14	12	12	10			

MAY 2021 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

MAY 2021 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	41	44	44	52	58	29	56	64	98	15	18	26	65	28	E B	24	56	59	E B	E B	43	55	58	39				
2	44	66	55	52	45	52	58	59	68	54	49	B	E B	E B	E B	E B	E B	E B	E B	E B	24	47	43	28	21			
3	45	32	30	40	35	35	53	34	47	15	17	19	28	27	27	30	24	27	B	31	28	34	B	54				
4	56	24	35	57	67	45	55	51	44	54	22	22	22	22	23	51	20	48	E B	E B	28	55	44	31				
5	31	42	36	56	33	18	37	52	52	58	24	G	E B	G	17	25	23	54	54	28	50	E B	B	B				
6	54	32	32	26	54	56	52	57	52	28	17	18	17	15	19	19	56	21	36	17	22	B	55	B				
7	G	20	39	48	33	47	33	50	56	49	14	15	21	22	18	21	G	48	24	32	32	E B	47	45	49			
8	55	30	54	34	48	34	52	55	E B	G	9	14	18	19	23	18	28	24	53	B	44	29	50	53				
9	54	70	60	28	28	62	31	31	33	50	65	22	22	20	G	19	12	33	49	21	14	B	B	B				
10	30	30	26	32	37	32	38	34	32	62	32	16	16	22	38	31	44	48	43	43	37	28	38	45				
11	52	51	50	46	55	47	53	47	41	G	15	19	18	18	18	G	70	49	49	46	70	49	49	44				
12	40	31	35	57	40	42	48	50	53	12	19	E B	E B	E B	G	106	11	16	43	31	50	47	47	53	44			
13	69	58	53	46	51	51	63	60	54	46	B	B	B	E B	E B	E B	20	17	28	E B	43	44	47	28	26	54		
14	36	44	56	56	41	30	55	49	52	B	25	19	19	19	G	20	E B	E B	E B	B	18	B	41	34				
15	81	48	42	52	63	50	55	46	B	19	19	B	E B	E B	E B	E B	35	B	B	B	B	54	37	37				
16	37	35	32	69	51	51	52	58	30	58	14	G	20	24	22	B	B	B	66	B	B	K	47	47				
17	42	46	46	49	34	45	55	48	40	28	48	44	22	G	G	16	44	32	49	50	B	20	41	57				
18	57	51	47	66	62	22	78	61	61	B	B	B	E B	E B	E B	B	B	B	B	52	18	48	55	55				
19	22	34	35	51	50	54	33	30	43	57	69	G	E B	E B	E B	G	38	31	31	40	52	13	34	41				
20	72	47	59	61	54	51	62	71	68	48	B	B	58	B	E B	E B	E B	E B	21	49	44	46	60	40	51	47		
21	B	60	B	58	70	B	48	55	60	B	B	B	E B	E B	E B	E B	B	B	B	56	51	B	58	39	31			
22	30	38	38	39	58	47	51	36	26	31	19	E B	27	26	G	26	15	B	46	14	53	B	46	41				
23	41	21	35	38	26	45	24	50	50	47	54	E B	24	19	22	E B	25	B	20	55	B	60	36	40				
24	45	36	50	43	58	B	44	20	19	29	58	G	E B	B	B	17	14	14	35	20	34	49	30	38	46	50	52	52
25	48	40	48	57	44	44	22	44	53	10	15	24	22	22	22	54	72	50	18	54	24	B	25	29				
26	28	38	55	64	52	33	16	54	29	12	12	G	E B	E B	E B	K	15	16	15	34	50	B	44	34	44	35		
27	34	36	48	60	46	66	48	59	61	41	24	B	B	B	B	E B	E B	E B	B	B	50	35	45	64	44			
28	38	41	36	36	34	41	50	47	47	24	44	G	G	19	21	39	30	30	28	39	18	25	B	28	35			
29	50	44	60	88	34	30	16	59	B	B	E B	13	23	22	27	50	47	40	52	57	51	52	21	B	23			
30	58	41	59	58	50	45	30	50	36	44	57	28	28	26	25	27	29	43	50	50	29	29	40	30				
31	29	K	73	48	47	46	34	17	55	49	49	24	27	24	48	20	E B	10	23	18	56	56	40	31	40			
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT	30	31	30	31	31	29	31	31	29	27	27	24	28	28	28	28	25	25	25	26	24	25	27	28				
MED	43	40	48	52	48	45	50	50	49	31	22	23	21	E G	20	22	22	29	46	39	45	40	40	44	41			
U Q	54	47	55	58	55	51	55	58	54	50	49	G	26	24	33	30	44	50	50	51	48	50	51	48				
L Q	34	32	35	39	37	33	34	44	34	G	G	17	19	G	G	18	G	E B	20	28	24	31	24	28	36	34		

MAY 2021 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

MAY 2021 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	8	7	9	10	10	10	9	10	10	10	11	16	19	19	20	11	9	9	11	11	9	9	9	10
2	12	12	14	10	11	13	14	18	13	10	24	B	24	31	25	24	14	14	15	14	37	10	10	9
3	10	10	10	14	11	9	9	9	12	12	17	20	18	27	18	18	18	17	B	11	11	8	B	10
4	12	12	9	8	10	8	8	8	8	9	13	14	14	14	14	16	14	9	10	14	9	10	9	7
5	14	10	10	8	8	9	8	10	8	8	10	14	19	14	10	13	10	9	8	8	11	9	B	B
6	9	8	8	8	9	14	14	12	10	10	9	10	11	11	11	10	10	10	10	10	10	B	26	B
7	11	11	12	11	9	10	10	8	8	12	13	12	13	13	12	10	8	8	8	10	10	15	11	10
8	8	10	17	9	16	10	10	9	9	8	11	12	11	12	10	10	14	16	B	B	12	12	11	16
9	11	10	10	8	8	13	10	9	10	8	10	9	14	11	11	11	9	10	9	9	9	B	B	B
10	10	8	9	9	9	9	8	8	8	7	9	9	9	10	8	7	7	8	8	10	9	8	7	9
11	12	16	25	20	16	19	15	10	8	9	9	10	9	10	9	10	11	10	9	10	11	8	8	9
12	10	8	8	9	10	16	10	10	10	8	10	B	B	12	17	7	9	10	8	10	9	9	10	12
13	10	29	16	16	12	14	16	24	24	12	B	B	B	20	17	15	19	B	10	10	10	10	10	10
14	10	15	22	12	11	12	10	8	8	B	12	8	8	10	10	9	12	12	10	B	12	B	11	10
15	16	19	24	22	16	14	18	14	B	11	9	B	30	39	35	B	B	B	B	B	B	10	8	9
16	9	8	8	8	8	14	14	9	9	8	10	10	10	12	11	B	B	B	11	B	B	7	9	14
17	9	10	10	10	9	12	14	10	11	11	10	21	11	11	11	7	10	10	15	10	B	10	10	11
18	11	10	10	12	18	12	16	17	16	B	B	B	B	24	B	B	B	B	B	24	13	10	16	16
19	16	9	16	18	16	9	7	7	8	8	9	12	18	17	16	15	12	11	14	10	11	8	8	10
20	10	20	15	14	10	15	19	11	17	20	B	B	26	B	31	38	16	23	9	10	10	9	11	12
21	B	11	B	18	20	B	16	21	12	B	B	B	35	B	B	26	B	B	13	20	B	22	11	8
22	8	7	7	9	17	10	11	10	9	9	9	27	16	16	12	15	B	8	8	18	B	B	8	13
23	8	12	11	9	9	8	8	8	11	18	11	24	13	9	26	14	B	11	32	B	B	43	7	8
24	7	11	13	11	15	B	10	13	10	10	10	11	14	14	12	11	13	10	23	12	14	18	16	10
25	8	8	9	9	9	10	9	8	9	10	15	12	11	10	10	7	11	9	10	10	10	B	14	10
26	7	12	11	9	15	10	8	8	8	6	7	8	9	15	16	8	8	8	B	36	B	7	9	9
27	9	8	16	43	10	23	16	11	22	16	8	B	B	B	B	30	24	B	B	15	10	10	9	9
28	8	8	9	9	8	14	10	12	9	9	12	10	11	11	10	12	14	11	10	12	11	B	9	7
29	8	9	9	9	9	10	8	10	B	B	13	14	11	14	14	12	19	12	16	28	19	11	B	9
30	14	11	11	12	10	9	10	10	10	10	10	7	10	10	8	10	9	10	8	8	8	9	10	7
31	8	9	14	11	8	10	9	9	10	11	11	11	11	12	12	12	10	10	10	11	12	10	10	10
	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	10	10	11	10	10	12	10	10	10	10	11	14	14	14	12	12	13	10	10	11	11	10	10	10
U Q	12	12	16	14	15	14	14	12	12	12	13	B	27	24	20	20	18	19	17	B	B	B	B	37
L Q	8	8	9	9	9	10	9	8	8	8	9	10	11	11	10	10	10	9	9	10	10	9	9	9

MAY 2021 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

MAY 2021 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	240	A	A	210	A	272	E A E A	A	A	A	212	212	212	196	196	210	E B E B	E A	A	A	A	A		
2	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	254	E B E B	A	B	A	A	A		
3	A	A	A	A	A	A	A	A	E A E A	E B		E A	B		A	A	A	B	A	A	A	B	A	A		
4	A	A	A	A	A	A	A	A	258	216	202	202	202	208	208	200	200	A	B	A	A	E A	A	A		
5	A	A	A	A	A	A	A	A	A	E A E A	A	A	212	198	194	194	194	A	A	A	A	200	B	B		
6	A	A	198	A	A	A	A	A	E A E A	250	202	198	E A	212	106	192	192	194	216	A	A	A	B	A	B	
7	A	A	A	A	A	A	A	A	E A E A	232	212	202	202	204	198	188	194	A	A	A	E B	212	A	A		
8	A	A	A	A	A	A	A	A	B	E A E A	256	232	222	190	198	210	208	186	216	A	B	B	A	A	A	
9	A	A	A	A	A	A	A	A	E A E A	294	226	196	210	208	190	202	192	196	E A	254	242	220	A	B	B	B
10	A	A	A	A	A	A	A	A	E A E A	238	240	224	206	192	202	204	204	236	E A	224	A	A	200	A	A	
11	A	A	A	A	A	A	A	A	E A E A	248	224	212	216	200	202	194	192	246	212	A	232	A	216	216	A	
12	208	A	A	A	A	A	216	A	E A E A	278	222	230	B	E B	240	232	198	208	E A	376	190	A	A	A	A	
13	212	A	A	A	A	A	A	A	A	A	B	B	B	E B E A	228	226	234	262	B	204	A	A	A	A	A	
14	A	A	A	A	A	A	A	A	B	E A E A	264	216	216	202	198	198	202	226	A	B	A	B	E B	A	A	
15	A	A	B	A	A	A	A	A	B	E A E A	304	278	B	E B	234	234	230	B	B	B	B	B	A	A	A	
16	A	A	A	A	A	A	A	A	A	E A E A	292	228	238	196	202	210	B	B	B	A	B	B	A	A	A	
17	A	A	A	A	A	A	A	A	E A E A	320	316	260	246	198	196	204	186	208	208	252	228	A	B	A	A	A
18	A	A	A	A	A	A	A	A	A	B	B	B	B	224			B	B	B	B	A	A	A	A	A	
19	204		A	A	A	A	A	E A E A	326	220	214	E A	216	214	206	196	208	E A	226	248	A	A	A	A	A	
20	A	A	A	A	A	A	A	A	A	A	B	B	A	B	B	B	B	228	A	A	A	A	A	A	A	
21	B	A	B	A	A	B	A	A	A	B	B	B	226	B	B	226	B	B	A	A	B	A	A	A	A	
22	A	A	A	A	A	A	A	A	A	A	E A	300	252	222	208	194	208	202	B	A	202	A	B	B	A	A
23	A	204	A	A	A	A	224	A	A	A	E A E A	226	244	198	202	212	236	B	A	A	B	B	B	206	A	
24	A	A	A	A	A	B	A	A	A	A	222	202	198	196	204	196	A	A	B	A	A	A	A	A	A	
25	A	A	A	A	A	A	A	A	A	B	284	228	214	200	200	200	192	A	A	A	A	A	B	A	A	
26	A	A	A	A	A	A	A	A	E A E A	292	242	204	210	196	202	188	196	A	A	B	B	B	A	A	A	
27	E A	A	A	B	A	A	A	A	A	194	A	B	B	B	B	E B	236	270	B	B	A	A	A	A	A	
28	A	A	A	A	A	A	196	A	A	230	256	224	206	196	216	204	224	A	A	A	A	A	B	A	A	
29	A	A	A	A	A	A	A	A	B	B	E A	232	232	204	206	220			A	A	A	A	A	B	A	
30	A	A	A	A	A	A	A	A	A	A	E A	230	200	212	204	206	202	200	200	A	A	A	A	A	A	
31	A	198	A	A	204	182					A	E A E A	266	232	212	190	196	204	194	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	4	2	1	1	1	2	2	3	9	20	25	23	26	26	27	25	20	10	9	3	4	5	3	1		
MED	208	201	240	198	204	196	206	U	248	267	226	228	213	204	202	203	199	200	226	212	224	U	241	206	211	216
U Q	224							E A	326	293	267	246	226	214	208	212	208	227	248	247	298	281	232	220		
L Q	206							224	253	224	213	202	200	196	198	193	195	210	203	220	227	200	206			

MAY 2021 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 2021 f<sub>XI</sub> (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	X	A	A	A	O	X	X	X	X	X	X		A	A	A	A	R	A	R	A				
2	A	A	49	X	A	A		A	O	X	X	X	X	X	X		X	A	X	R	A	A	A	A				
3	A	A	A	A	A		39	46	A	A	A	O	X	B	X	X	A	B	A	A	B	A	A	A				
4	A	A	A	A	A		A	R	B	A	B	O	X	X	X	X	B	A	A	R	A	A	A	A				
5	A	A	A	A		O	X	X	X	A	A		O	X	X	X	A	A	A	A	A	A	A	A				
6	A	A	A	A	A		A	A	A	A	A		49	53	46	38	28	A	O	X	O	X	A	B	O	X	20	28
7		A	A	X	A	A	O	X	R	A		X	X	X	X	X		A	B	R	A	A	A	46	A			
8	A	A	A	A	A		A	A	A	A	R	O	X	B	O	X	O	X	A	B	A	A	A	A	R			
9	A	A	A	A	A		A	A	A	A	B	A	X	X	X	X	O	X	A	A	A	A	B	B	A			
10	A	B	A	A	A		A	A	A	O	X	A	X	X	X	X	O	X	R	A	A	A	O	X	A	B		
11	A	A		A	A		B	A	A	A	A	B	A	A	X	X	A		A	A	A	A	A	A	A	A		
12	A	A	45	A	A		58		63	A	A	B	B	O	X	X	X	A	R	B	B	R	O	X	A			
13	X	A	A	A	A		A	A	A	A	A	X	X	X	X	X	O	X	B	B	A	A	B	A	A			
14	A		A	A	A		53	50		A	O	X	O	X	O	X	B	B	B	R	B	B	B	A	R	B		
15	A	A	A	A	A		A	A	A	A	A	X	X	X	X	X	O	X	B	A	A	A	A	A	A			
16	A	A	A	A	A		A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	O	X	A		
17	A	A	A	A	A		A	A	B	A	B	B	B	B	B	B	B	B	B	B	B	R	B	B	O	X	41	
18	X	A	O	X	A		A	A	A	A	A	A	B	B	O	X	X	O	X	B	B	A	R	B	A	A	A	
19	A	44	A	A	A		A	A	A	A	A	29	39	49	35	49		A	A	A	A	R	A	A	A	A		
20	A	A	A	A	A		A	O	X	A	A	A	X	X	X	X		A	A	A	A	A	A	A	A	A		
21	A	X	A	A	A		A	O	X	A	X		X	X	O	X	X		A	A	A	A	A	A	O	X	30	
22	A	A	A	A	A		A	A	A	A	A	O	X	X	X	X		B	B	B	A	A	B	A	A	A		
23	A	A	64	A	A		A	A	A	A	X	X	X	X	X	X		O	X	A	A	A	A	O	X	O	X	A
24	A	A	A	A	A		A	A	A	O	X	C	C	C	C	C		C	C	C	C	C	C	C	C	C	C	
25	C	C	C	C	C		C	C	C	C	C	C	C	C	C	C		C	C	C	C	C	C	C	C	C	C	
26	C	C	C	C	C		C	C	C	C	C	C	C	C	C	C		C	C	C	C	C	C	C	C	C	C	
27	C	C	C	C	C		C	C	C	C	C	C	C	C	C	C		C	C	C	C	C	C	C	C	C	C	
28	C	C	C	C	C		A	X	O	X	O	X	X	X	X	X		X	O	X	A	A	A	A	A	A	A	
29	O	X	O	X	A		A	X	X	X	A	X	X	X	X	X		X	X	A	A	A	A	A	A	A	A	
30	A	A	A	A	A		A	O	X	A	A	O	X	X	X	X		B	R	A	A	A	A	A	A	A	A	
31																												
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT	4	3	6	2	2	4	7	6	7	8	15	20	19	23	23	22	11	3	2			4	4	5				
MED	X	44	47	40	29	48	25	24	26	22	31	40	48	46	45	40	25	25	20			O	X	O	X			
U Q	34	57	53			84	46	27	43	25	34	44	52	50	52	42	28	59				34	35	41				
L Q	X	O	X	X			X	X	X	O	X	X	X	X	X	X	O	X	O	X			O	X	O	X		
	23	30	29			32	24	22	24	20	29	38	45	44	39	33	23	21				18	20	29				

JUN. 2021 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 2021 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	20	A	A	A	R	R	26	36	42	50	F	F	A	A	A	A	R	A	R	A
2	A	A	22	A	A	A	A	A	18	18	25	33	44	41	F	F	19	A	14	R	A	A	A	A
3	A	A	A	A	A	F	F	A	A	A	R	F	B	43	F	42	A	B	A	A	B	A	A	A
4	A	A	A	A	A	A	R	B	A	B	R	F	40	39	38	33	R	B	A	A	R	A	A	A
5	A	A	A	A	A	R	J	R	A	A	F	A	48	44	F	36	23	A	A	A	A	A	A	F
6	A	A	A	A	A	A	A	A	A	A	A	F	38	47	40	32	22	A	R	R	A	B	A	R
7	A	A	A	J	R	A	A	R	A	A	F	35	26	31	41	47	40	36	18	F	A	B	A	A
8	A	A	A	A	A	A	A	A	A	A	R	B	B	R	R	R	R	A	B	A	A	A	A	R
9	A	A	A	A	A	A	A	A	A	B	A	34	38	44	29	23	R	A	A	A	A	B	B	A
10	A	B	A	A	A	A	A	A	R	A	18	22	35	34	39	35	28	R	R	A	A	A	R	B
11	A	A	A	A	A	A	B	A	A	A	A	B	A	A	46	51	A	A	A	A	A	A	A	A
12	A	A	A	A	A	A	A	A	A	A	A	B	B	R	35	29	38	A	R	B	B	R	A	R
13	20	A	A	A	A	A	A	A	A	A	A	34	36	35	35	33	19	R	B	B	A	A	B	A
14	A	A	A	A	A	A	A	A	A	R	R	14	23	30	36	44	B	R	B	B	B	A	R	B
15	A	A	A	A	A	A	A	A	A	A	A	28	36	44	40	42	34	20	19	R	B	A	A	A
16	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	R	A	A
17	A	A	A	A	A	A	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	R	B	R
18	32	A	R	A	A	A	A	A	A	A	A	B	B	42	47	30	R	B	B	A	R	B	A	A
19	A	F	A	A	A	A	A	A	A	A	23	F	F	29	F	36	A	A	A	A	R	A	A	A
20	A	A	A	A	A	A	R	A	A	A	A	25	45	32	33	18	F	A	A	A	A	A	A	A
21	A	A	A	A	A	A	A	R	A	A	F	F	44	32	R	42	27	F	A	A	A	A	A	R
22	A	A	A	A	A	A	A	A	A	A	A	32	41	39	F	30	37	B	B	B	A	A	B	A
23	A	A	52	A	A	A	A	A	A	20	24	32	37	35	F	28	24	17	R	A	A	A	R	R
24	A	A	A	A	A	A	A	A	A	R	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
26	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
28	C	C	C	C	C	C	A	21	23	R	R	F	J	R	F	34	19	R	A	A	A	A	A	A
29	R	R	A	A	A	A	18	12	17	A	18	36	42	44	Z	38	26	18	A	A	A	A	A	A
30	A	A	A	A	A	A	A	R	A	A	A	R	F	48	F	36	B	A	A	A	A	A	A	A
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	3	2	3	1	1	2	5	5	5	8	15	20	19	23	23	22	11	2	2			3	3	4
MED	20	28	23	J	R	20	24	18	16	18	16	24	34	41	40	36	29	19	17	14		14	14	21
U Q	32		52				26	20	22	19	26	37	44	44	42	36	19					26	18	30
L Q	R		22				16	14	18	14	23	30	36	35	31	26	17					11	14	18

JUN. 2021 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 2021 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	54	35	24	48	30	34	50	50	48	39	52	18	18	25	57	20	36	46	80	41	15	32	20	41	
2	44	34	48	29	51	54	29	47	57	50	51	27	17 <sup>G</sup>	22	18	56	64	34	51	19	32	54	45	48	
3	43	34	53	47	50	27	24	48	62	52	42	22		46	22	33	58		51	41		49	46	46	
4	58	54	51	29	45	60	15		55		30	19	24	18 <sup>GE</sup>	15 <sup>BE</sup>	26 <sup>B</sup>		53	51	23	52	53	41	48	
5	32	32	39	36	33	45	21	46	43	41	25	21	21	16 <sup>G</sup>		8 <sup>GE</sup>	25	38	27	30	41	34	99	22	
6	34	52	54	57	48	67	58	39	39	31	42	32	23	20 <sup>G</sup>	14 <sup>G</sup>	45	43	33	15	32		46	55	13 <sup>EB</sup>	
7	45	40	59	24	88	68	26	24	34	17	13	23	89	30	22	58	14	51		21	37	44	33	68	
8	68	69	52	56	55	53	56	41	53	28	12 <sup>EB</sup>			26 <sup>BE</sup>	24 <sup>BE</sup>	16 <sup>BE</sup>	27	34		34	50	57	40	17	
9	41	44 <sup>B</sup>	45	59	56	38	56	61	42		38	16 <sup>EB</sup>	16 <sup>G</sup>	16	21	14	34	30	59	37	48			54 <sup>B</sup>	
10	47		24	58	52	38	52	48	39	33	18	18	18	18	18		22	20	48	45	26	23	23		
11	29	41	39	46	46	41	57	28	33	57	53		56	64	61	38	57	42	38	48	41	42	209 <sup>A</sup>	48	
12	68	56	56	60	54	60	78	67	63	58	54			24 <sup>BE</sup>	24 <sup>BE</sup>	21	29	23			20	57	18	32	
13	42	47	28	38	52	67	65	56	50	52	38			23	19	16	16			49	64		46	38	
14	38	31	70	32	22	29	29	24	47	47	15	20 <sup>EB</sup>	22 <sup>EB</sup>	28 <sup>EB</sup>				32				48	14		
15	32	57	72	64	56	54	57	42	52	53	58	27	19	19	22	59	54	47		41	46	46	53	59	
16	76	52	52	38	62	52	62	48	52	47												55	46	56	
17	41	74	60	35	44	51	55		64												22			21	
18	31	34	49	30	43	52	62	65	58	60	53			29 <sup>BE</sup>	34 <sup>BE</sup>	66			56	30		48	33	36	
19	41	38	33	46	49	44	56	56	45	36	49	16 <sup>EB</sup>	15 <sup>EB</sup>	30 <sup>EB</sup>	24 <sup>EB</sup>	50	56	41	72	22	35	44	64	78	
20	44	59	33	39	53	52	45	63	120	112	120	67	57	53	58	54	48	58	47	25	57	57	43	30	
21	44	36	66	52	58	61	47	50	26	42	34	31	31	25	16 <sup>EB</sup>		26	47	40	28	57	27	35	45	
22	43	34	116	50	51	52	52	32	66	62	46		20 <sup>G</sup>	23 <sup>EB</sup>	20 <sup>EB</sup>	15			55	55		58	57		
23	49	55	50	59	49	55	46	50	40	58	38		18 <sup>G</sup>			51	51	50	53	55	55	31	38	48	
24	31	46	48	36	46	46	60	54	32	22															
25																									
26																									
27																									
28							56	26	54	50	14 <sup>K</sup>	16 <sup>G</sup>	16 <sup>G</sup>	16			20	25	39	39	44	47	30	42	44
29	50	54	69	80	53	49	49	18	48	43	49	21	22	62		17	36 <sup>B</sup>	58	58	26	26	36	36	48	
30	38	35	48	57	60	46	46	32	32	46	58	54	56	34	57	49									
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	26	25	26	26	26	26	27	25	27	24	24	20	20 <sup>G</sup>	24	23	23	19	20	17	22	21	22	24	24	
MED	43	44	50	46	51	52	52	48	48	47	42	20		23	20 <sup>U</sup>	24	36	40	51	36	46	45	42	47	
U Q	49	54	59	57	55	55	57	55	57	55	52	27	28	30	24	51	54	48	57	45	54	53	50	55	
L Q	38	34	39	36	46	44	45	32	39	38	28		18 <sup>G</sup>	20	15 <sup>GE</sup>	16 <sup>B</sup>	25	34	40	26	29	34	34	34	

JUN. 2021 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION SHOWA-ST.

JUN.2021 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	10	11	10	8	9	10	15	10	9	10	12	9	10	10	9	9	10	10	10	10	9	10	10	10
2	8	8	8	8	8	8	10	6	8	9	16	19	12	9	7	10	8	8	8	10	10	10	10	10
3	10	10	15	8	11	10	9	12	24	14	14	10	B	17	14	19	12	B	15	16	B	12	10	10
4	9	10	9	10	10	10	10	B	26	B	18	12	16	12	15	26	B	17	15	12	10	9	8	8
5	8	9	12	10	10	8	7	8	8	8	8	8	8	9	8	8	10	10	10	8	10	11	12	10
6	9	12	12	10	10	10	10	11	11	8	13	14	10	9	7	10	10	10	10	10	B	20	10	14
7	9	9	11	9	6	9	8	8	9	10	9	9	20	16	12	10	10	12	B	14	14	12	8	8
8	10	18	26	14	23	14	10	12	14	8	10	B	B	26	24	16	13	11	B	15	11	15	8	10
9	12	10	8	17	13	13	11	8	9	B	16	16	10	10	9	9	10	10	10	10	10	B	B	10
10	12	B	12	11	11	8	12	11	11	11	9	8	8	9	10	12	9	12	11	11	8	12	8	B
11	11	10	12	11	14	10	40	18	8	11	15	B	21	25	13	38	28	14	13	10	8	9	7	9
12	11	13	10	18	23	32	14	31	15	17	23	B	B	24	24	14	9	14	B	B	9	10	8	10
13	7	7	8	9	27	15	20	16	12	14	13	11	10	10	10	10	11	B	B	12	12	B	7	8
14	8	8	9	8	7	6	7	7	7	16	10	20	22	28	B	B	B	17	B	B	B	10	8	B
15	10	8	10	12	9	10	10	7	12	10	12	11	7	8	7	7	9	8	B	8	10	9	14	16
16	14	16	18	11	14	16	11	24	14	24	B	B	B	B	B	B	B	B	B	B	B	11	8	8
17	8	24	16	20	15	15	15	B	19	B	B	B	B	B	B	B	B	B	B	B	10	B	B	10
18	8	8	12	10	13	23	12	20	22	10	19	B	B	29	34	18	B	B	23	14	B	16	9	8
19	8	8	8	11	19	10	14	28	13	13	10	16	15	18	24	22	20	16	11	14	10	9	11	9
20	7	10	10	10	9	10	9	8	9	9	9	9	9	10	10	8	8	10	9	10	10	15	8	6
21	9	10	12	9	10	10	8	8	8	9	9	8	6	8	8	10	8	10	10	10	10	10	10	8
22	10	8	8	10	10	9	9	8	10	11	13	14	13	23	14	16	B	B	B	15	12	B	10	11
23	11	14	23	17	15	17	13	9	9	9	9	10	11	10	9	9	10	10	8	10	11	9	7	8
24	8	8	8	8	8	8	9	8	7	10	C	C	C	C	C	C	C	C	C	C	C	C	C	C
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
26	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
28	C	C	C	C	C	C	7	8	10	10	9	8	10	8	10	10	9	9	10	11	10	9	10	10
29	10	10	23	9	9	8	8	9	9	9	8	8	9	8	9	9	B	10	8	9	9	9	9	9
30	9	9	9	8	8	8	8	8	9	9	14	11	10	16	14	16	B	18	15	11	7	9	11	9
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	26	26	26	26	26	27	27	27	27	26	26	26	26	26	26	26	26	26	26	26	26	26	26
MED	9	10	10	10	10	10	10	9	10	10	12	12	12	11	11	11	10	12	14	11	10	10	10	10
U Q	10	12	12	11	14	14	13	18	14	14	16	20	22	24	24	19	B	18	B	B	15	12	15	10
L Q	8	8	9	9	9	8	8	8	9	9	9	9	10	9	9	9	9	10	10	10	10	9	8	8

JUN.2021 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 2021 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	E A 274	A	A	A	A	A	A	E A 212	E A 208	A	186	202	A	A	A	A	A	A	A	A		
2	A	A	192	A	A	A	A	A	A	A	E A 292	E A 218	212	192	204	198	190	A	E A 280	A	A	A	A	A		
3	A	A	A	A	A	A	A	A	A	A	E A 310	E A 244	B	E A 244	E A 234	E B 228	A	B	A	A	B	A	A	A		
4	A	A	A	A	A	A	A	B	A	B	A	256	198	192	A	200	212	B	A	A	A	A	A	A		
5	A	A	A	A	A	190	224	218	A	A	A	236	218	208	208	198	198	A	A	A	A	A	A	212		
6	A	A	A	A	A	A	A	A	A	A	A	E A 242	E A 216	210	204	204	A	A	A	A	A	B	A	206	230	
7	210	A	A	120	A	A	A	A	A	A	A	E A 230	E A 226	214	218	202	208	208	A	B	A	A	A	A		
8	A	A	A	A	A	A	A	A	A	A	E B 260	B	B	E B 236	E B 218	E B 268	E A 244	A	B	A	A	A	A	A		
9	A	A	A	A	A	A	A	A	A	B	A	A	224	212	214	180	188	202	A	A	A	A	B	B	A	
10	A	B	A	A	A	A	A	A	A	A	A	206	204	204	204	200	200	200	A	A	A	A	A	A	B	
11	A	A	A	A	A	A	B	A	A	A	A	A	B	A	A	A	E B 264	A	A	A	A	A	A	A	A	
12	A	A	A	A	A	A	A	A	A	A	A	A	B	B	E B 258	E B 264	232	A	A	B	B	A	220	206	A	
13	190	A	A	A	A	A	A	A	A	A	A	E A 238	E A 232	204	194	214	224	B	B	B	A	B	B	B	A	
14	A	A	A	A	A	A	A	A	A	A	E A 284	E A 232	218	224	A	A	A	A	B	B	B	B	A	A	B	
15	A	A	A	A	A	A	A	A	A	A	A	E A 244	E A 214	E A 232	216	212	246	E A 246	A	B	A	A	A	A	A	
16	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	198	A	
17	A	A	A	A	A	A	A	B	A	B	B	B	B	B	B	B	B	B	B	B	B	B	A	B	B	A
18	A	A	198	A	A	A	A	A	A	A	A	A	B	B	E B 240	E B 232	246	A	A	A	A	B	A	A	A	
19	A	E A 232	A	A	A	A	A	A	A	A	A	E B 240	E B 224	E B 252	208	A	A	A	A	A	A	A	A	A	A	
20	A	A	A	A	A	A	A	A	A	A	A	A	A	200	212	220	220	A	A	A	A	A	A	A	A	
21	A	A	A	A	A	A	A	A	A	E A 266	E A 248	E A 246	E A 210	A	200	200	224	220	A	A	A	A	A	A	A	
22	A	A	A	A	A	A	A	A	A	A	A	E A 266	E A 218	E A 218	208	210	B	B	B	A	A	B	A	A	A	
23	A	A	200	A	A	A	A	A	A	E A 276	E A 248	E A 212	E A 196	A	200	200	200	200	A	A	A	A	200	196	A	
24	A	A	A	A	A	A	A	A	A	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
25	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
26	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
27	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
28	C	C	C	C	C	C	A	A	A	A	A	248	192	200	212	230	206	206	A	A	A	A	A	A	A	
29	206	200	A	A	A	A	A	E A 250	E A 196	E A 218	E A 218	E A 196	E A 192	E A 198	234	A	A	A	A	A	A	A	A	A	A	
30	A	A	A	A	A	A	A	210	A	A	A	E A 298	E A 280	E A 234	E A 276	E A 264	B	A	A	A	A	A	A	A	A	
31																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	3	2	3	1	2	1	1	2	1	2	14	19	19	22	22	22	11		2			3	3	2		
MED	206	216	198	120	239	190	224	214	E A 250	E A 271	234	226	211	208	202	208	205		260			200	206	221		
U Q	210		200								E A 260	E A 244	218	E B 234	E B 220	228	E A 234					220	206			
L Q	190		192								230	212	204	204	200	200	200					198	196			

JUN. 2021 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUL.2021 f<sub>XI</sub> (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	X 48	74	A	A	A	A	O	X	X	X	X	X	X	O	X	B	A	A	A	A	O	X		
2	A	A	A	A	A	A	A	A	X	O	X	X	X	A	52	62	39	A	A	A	A	A	O	X	A		
3	A	A	A	A	A	A	A	A	A	A	A	B	X	54	58	A	X	X	A	R	A	A	O	X	A		
4	R	A	A	A	O	X	42	A	A	A	A	O	X	42	42	47	50	38	O	X	A	A	A	A	A		
5	A	A	A	A	A	A	A	A	X	A	42	39	48	47	44	44	33	26	20	26	A	O	X	A	A		
6	A	33	A	A	A	A	A	A	A	B	A	B	B	O	X	O	X	O	X	B	B	B	B	B	A		
7	54	A	A	A	A	A	A	A	A	A	B	A	O	X	B	O	X	A	A	A	A	A	A	A	O	X	
8	A	A	A	A	A	50	A	A	45	25	A	46	43	45	42	38	29	A	A	A	A	R	B	A	A		
9	A	A	O	X	B	A	A	A	A	A	A	X	X	38	52	57	55	50	O	X	A	A	A	A	A		
10	A	A	B	A	50	A	A	A	A	A	A	50	47	43	38	33	28	18	A	O	X	O	X	O	X		
11	A	A	A	A	A	A	A	O	X	X	X	X	X	19	22	31	39	45	46	48	33	23	A	A	A		
12	A	A	A	A	O	X	35	28	23	23	24	28	39	42	45	47	32	21	A	O	X	O	X	A	A		
13	A	58	55	80	A	A	A	A	O	X	X	X	X	X	X	X	32	32	A	A	A	A	A	A	A		
14	A	A	A	A	O	X	22	23	A	A	O	X	X	44	45	39	43	47	34	A	A	31	82	70	70		
15	67	A	A	A	O	X	37	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	58		
16	55	64	A	A	A	A	A	A	A	A	A	X	X	34	38	44	50	37	40	A	R	A	X	O	X		
17	A	A	A	A	A	A	A	A	X	X	X	X	X	34	34	46	44	45	45	28	A	A	A	A	A		
18	A	A	A	A	A	X	30	41	41	A	O	X	X	24	37	42	47	49	48	35	30	A	A	A	A		
19	A	A	75	A	A	A	A	A	A	A	A	A	X	44	45	45	43	44	36	30	26	18	X	O	X		
20	A	A	A	A	A	A	A	A	A	A	A	X	X	34	42	46	51	40	47	32	X	B	B	B	A		
21	A	A	A	B	A	A	A	A	A	A	A	X	X	38	42	50	47	44	40	38	30	28	A	A	A		
22	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	34		
23	A	A	A	X	37	42	55	A	A	52	28	B	B	O	X	O	X	48	43	38	B	B	A	A	A		
24	A	39	A	A	A	39	33	O	X	O	X	O	X	54	53	57	57	52	39	29	22	A	O	X	B		
25	58	A	X	A	A	A	A	O	X	O	X	X	X	55	47	60	47	47	36	28	24	A	A	A	A		
26	A	54	57	A	A	A	A	A	A	A	A	X	X	39	48	52	53	48	41	31	25	26	20	X	O	X	
27	A	A	A	O	X	X	33	42	42	26	39	45	56	53	48	45	26	26	30	19	O	X	A	A	O	X	
28	A	A	A	54	A	A	56	A	A	A	O	X	X	34	40	46	45	50	48	36	30	26	30	A	54	A	
29	A	A	42	A	A	A	A	A	B	A	O	X	X	B	O	X	X	X	X	31	31	34	A	B	B	R	
30	A	A	A	A	A	A	A	A	O	X	25	55	52	52	47	F	B	O	X	O	X	O	X	A	B	O	X
31	A	A	A	O	X	33	61	A	X	O	X	X	X	47	57	60	51	49	38	33	24	A	A	A	X	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	4	5	6	6	8	9	5	7	11	15	19	24	27	28	28	28	26	12	12	9	7	8	6	6			
MED	56	54	48	53	36	39	33	31	25	25	34	43	47	48	46	40	30	28	26	20	20	29	30	47			
U Q	62	61	57	64	46	52	48	41	42	28	39	48	52	55	48	47	36	30	27	25	22	44	56	70			
L Q	54	36	36	48	30	31	30	23	20	24	31	40	44	45	41	33	26	26	24	18	18	20	20	28			

JUL.2021 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUL.2021 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	42	A	A	A	A	A	R	19	23	34	34	F	37	32	26	18	B	A	A	A	A	R	19		
2	A	A	A	A	A	A	A	20	17	19	27	A	F	37	Z	54	33	A	A	A	A	A	A	R	A	A		
3	A	A	A	A	A	A	A	A	A	A	A	B	J	R	F	A	J	R	A	R	A	A	R	A	A	A		
4	R	A	A	A	22	A	A	A	A	A	A	R	F	36	36	F	37	F	R	A	A	A	A	A	A	A		
5	A	A	A	A	A	A	A	A	36	A	F	F	37	41	38	J	R	38	27	20	14	R	A	A	A	A		
6	A	A	A	A	A	A	A	A	A	B	A	B	B	R	R	R	R	B	B	B	B	B	B	A	A	A		
7	A	A	A	A	A	A	A	A	A	A	B	A	R	30	B	F	R	A	A	A	A	A	A	A	A	R	30	
8	A	A	A	A	A	A	A	A	A	19	B	40	37	39	F	29	32	F	A	A	A	A	A	A	B	A		
9	A	A	30	A	B	A	A	A	A	A	A	32	46	42	F	F	F	R	A	A	A	A	A	A	A	A		
10	A	A	B	A	31	A	A	A	A	A	A	F	41	37	32	F	23	22	12	R	A	R	R	R	B	A		
11	A	A	A	A	A	A	A	A	R	13	16	25	33	36	F	Z	Z	42	27	16	A	A	12	A	A	A		
12	A	A	A	A	A	U	R	F	17	17	18	22	33	36	39	F	33	26	15	A	R	R	A	A	A	A		
13	A	A	A	A	A	A	A	A	A	R	18	22	27	32	31	29	26	19	F	A	A	A	A	A	A	A		
14	A	A	A	A	16	17	A	A	A	R	14	24	30	39	33	37	41	28	A	A	A	A	A	A	A	A		
15	A	A	A	A	R	31	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	A	A	A	A		
16	U	R	A	A	A	A	A	A	A	A	A	28	32	38	44	31	34	A	R	A	A	R	A	A	A	A		
17	A	A	A	A	A	A	A	A	21	19	28	28	40	38	39	J	R	F	A	A	A	A	A	A	A	A		
18	A	A	A	A	A	F	F	A	R	18	31	36	41	43	42	Z	29	24	A	A	A	A	A	A	A	A		
19	A	A	A	A	A	A	A	A	A	A	A	38	39	39	37	38	Z	30	18	16	12	12	15	A	A	A		
20	A	A	A	A	A	A	A	A	A	A	28	36	40	37	34	F	F	26	B	B	B	R	A	A	A	A		
21	A	A	A	B	A	A	A	A	A	A	32	36	44	Z	41	38	R	34	32	24	R	A	A	A	R	A		
22	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	F	F	52	48	A	A	A	A	A	A	A		
23	A	A	A	J	R	A	A	A	A	A	22	B	B	51	41	Z	42	37	32	B	B	A	A	A	A	A		
24	A	A	A	A	A	18	12	25	14	22	34	42	42	51	46	F	46	33	23	16	A	R	B	A	A			
25	A	A	J	R	A	A	A	R	R	14	14	24	35	49	41	F	F	F	27	22	18	A	A	A	A	A		
26	A	A	A	A	A	A	A	A	A	A	33	42	46	47	42	35	25	19	20	14	R	R	R	R	A	A		
27	A	A	A	A	R	28	26	15	22	17	20	33	39	50	47	42	39	20	20	20	F	R	A	A	R	A		
28	A	A	A	A	A	A	A	A	A	A	R	28	R	34	40	39	44	42	30	24	R	R	R	A	A	A		
29	A	A	A	A	A	A	A	A	B	A	R	30	40	B	R	51	47	46	J	R	25	25	28	A	B	B	A	A
30	A	A	A	A	A	A	A	A	A	19	B	49	46	46	41	B	R	R	24	22	R	R	R	A	B	R	A	A
31	A	A	A	A	27	A	A	27	R	19	25	36	41	51	47	F	F	36	32	20	F	R	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	1		2	2	6	5	4	7	9	15	19	24	27	28	28	28	26	12	11	8	6	6	4	2				
MED	U	R		26	36	28	24	F	R	17	19	28	36	40	40	38	34	24	21	20	13	R	R	R	R	R		
U Q					31	28	24	F	27	20	22	33	40	46	46	42	38	30	24	R	20	14	16	20	18			
L Q					22	18	14	F	R	17	14	18	24	33	37	38	33	27	20	R	18	16	12	12	13	13		

JUL.2021 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 2021 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	83	83	85	33	52	52	52	51	31	43	29	19	18	21	68	28	53	B	42	58	46	32	42	36						
2	54	46	42	39	46	46	42	56	51	50	20	66	53	31	66	63	49	86	59	62	43	34	49	31						
3	50	48	47	50	49	54	49	46	36	54	44	B <sup>E</sup>	B <sup>B</sup>	36	30	46	44	40	30	21	47	42	25	56	26					
4	22	56	112	56	45	48	57	57	47	61	52	42	G	G <sup>E</sup>	B <sup>B</sup>	17	53	55	46	63	52	37	59	51	30					
5	52	47	34	57	52	53	53	55	46	44	E <sup>B</sup>	9	16	20	14	58	29	15	57	23	30	28	35	46	48					
6	51	61	49	108	64	61	52	50	57	B	59	B	B	G	31	24	18	B	B	B	B	B	62	34	30					
7	42	38	51	50	54	50	46	53	55	53	B	56	56	B	57	58	62	53	54	111	54	33	33	33						
8	50	60	67	56	61	54	56	48	39	51	B	37	G	G	G	57	41	45	36	36	55	25	B	42						
9	45	57	43	26	B	58	58	49	55	46	43	26	113	29	20	21	40	34	34	40	62	34	52	55						
10	44	55	B	58	40	54	56	57	66	54	47	G	G	G	18	10	12	14	38	43	43	43	B	28						
11	31	66	61	53	44	44	37	39	40	46	40	G	16	16	26	16	56	56	56	33	68	29	31	46						
12	35	43	51	55	55	26 <sup>K</sup>	67	42	40	28	43	17	17	17	12	14	14	27	37	36	38	36	56	27						
13	42	36	46	55	51	62	64	60	51	42	48	15	28	G	23	14	54	30	52	43	50	31	47	26						
14	30	33	43	30	33	48	57	30	30	10	38	38	53	54	G	57	50	52	31	24	54	36	93	61						
15	59	64	48	52	55	63	65	49	58	52	B	B	B	B	B	B	B	B	B	B	B	39	45	42	35					
16	40	55	55	52	60	54	41	48	41	31	42	18	54	22	14	19	32	14 <sup>K</sup>	23	28	43	26	28	28						
17	28	28	67	40	57	53	51	40	18	16	G	51	20	G	G	20	12 <sup>K</sup>	27	32	43	34	30	32	31						
18	43	30	47	70	48	39	30	22	28	E <sup>B</sup>	10	B	B	19	65	17	G	17	41	28	33	25	53	30	48					
19	78	75	41	48	50	58	36	32	47	47	45	G	18	16	14	15	44	44	53	29	44	56	32	76						
20	30	35	90	67	67	58	59	31	55	44	30	G	E <sup>B</sup>	23	22	22	G	E <sup>B</sup>	B	B	B	K	14	40	53	67				
21	55	58	45	81	53	51	60	51	55	33	22	G	G	G	19	20	E <sup>B</sup>	24	19	19	E <sup>B</sup>	15	38	34	46	30	32			
22	36	31	27	52	44	55	46	54	57	62	B	B	B	B	B	E <sup>B</sup>	B	G	22	23	33	58	31	27	41	41	36			
23	32	37	39	48	36	34	35	31	43	57	B	B	E <sup>B</sup>	B	50	E <sup>B</sup>	20	57	54	B	B	33	29	46	48	54				
24	56	34	46	37	31	37	28	28	36	57	22	E <sup>B</sup>	E <sup>B</sup>	15	16	18	22	G	14	18	31	48	53	B	52	29				
25	41	44	45	28	50	54	34	41	34	50	15	G	G	G	E <sup>B</sup>	B	G	18	18	23	15	18	30	12	48	48	18	50	53	
26	79	38	31	54	50	43	42	46	52	48	G	G	16	19	21	20	17	20	15	30	30	46	41	35	55					
27	42	34	54	45	59	51	46	20	23	12	G	20	20	G	20	20	47	11	11	58	35	50	29	54						
28	32	55	35	37	61	66	49	77	62	54	41	E <sup>B</sup>	E <sup>B</sup>	E <sup>B</sup>	23	25	21	E <sup>B</sup>	16	12	36	E <sup>B</sup>	10	E <sup>B</sup>	9	32	45	43	E <sup>B</sup>	16
29	36	36	45	51	54	69	53	54	B	60	40	24	B	E <sup>B</sup>	B	45	36	21	23	12	13	55	B	B	29	38				
30	41	40	43	60	70	98	57	44	56	14	B	E <sup>B</sup>	E <sup>B</sup>	E <sup>B</sup>	24	22	24	E <sup>B</sup>	B	B	E <sup>B</sup>	E <sup>B</sup>	E <sup>B</sup>	B	B	18	57	36		
31	40	46	71	53	31	35	47	37	28	28	18	G	18	22	22	22	20	18	19	54	56	55	35	26	52					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
CNT	31	31	30	31	30	31	31	31	30	30	24	25	27	28	29	29	29	26	28	28	28	29	29	29	31					
MED	42	46	46	52	52	53	51	48	46	46	39	E <sup>G</sup>	18	20	24	20	19	23	30	33	39	43	36	42	36					
U Q	52	57	55	56	57	58	57	54	55	54	44	32	35	G	28	36	50	45	53	50	52	46	52	53						
L Q	35	36	43	40	45	46	42	37	36	31	G	G	18	20	17	G	G	16	18	E <sup>B</sup>	22	30	34	30	32	30				

JUL. 2021 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUL.2021 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	9	12	15	9	9	12	14	12	9	8	8	8	8	8	10	11	10	B	12	13	10	8	7	9	
2	8	7	8	6	10	11	9	7	8	8	8	20	15	11	20	25	20	18	18	10	8	10	14	10	
3	9	9	8	7	13	13	10	10	8	10	22	B	36	16	16	12	12	14	15	10	12	10	11	14	
4	13	12	14	10	8	12	10	7	7	14	24	20	12	11	17	13	12	11	13	20	11	12	11	11	
5	14	12	10	12	10	11	10	8	10	8	9	9	10	10	10	8	9	9	8	9	7	9	9	9	
6	10	10	16	11	10	14	16	13	10	B	16	B	B	24	14	18	B	B	37	B	B	11	7	8	
7	9	10	10	10	8	12	8	8	9	15	B	20	16	B	18	13	13	8	14	14	13	13	11	9	
8	9	10	10	14	9	7	12	9	8	9	B	18	10	10	9	11	10	11	7	11	10	9	B	9	
9	8	8	8	7	B	12	11	11	13	12	10	9	11	12	12	11	8	8	10	10	10	14	14	14	
10	12	10	B	11	13	14	12	15	15	13	15	9	9	10	8	7	7	7	9	9	9	11	B	11	
11	6	11	14	11	8	8	8	10	8	8	9	9	9	8	9	10	8	8	7	8	9	7	8	9	
12	10	7	12	16	11	8	7	10	8	7	8	8	8	9	9	8	9	8	8	7	6	6	10	9	
13	8	7	16	12	15	23	14	10	10	10	10	9	10	10	9	9	10	10	10	10	11	10	9	7	
14	8	8	10	10	10	8	10	10	8	8	9	12	12	10	8	10	11	8	7	9	9	8	9	8	
15	11	18	14	14	13	15	15	14	15	17	B	B	B	B	B	B	B	B	B	B	20	8	8	11	
16	8	18	22	15	18	14	10	15	14	10	8	10	10	10	9	10	10	10	10	9	10	8	9	7	
17	10	10	10	9	21	16	10	8	8	8	8	9	9	9	8	8	10	10	9	8	8	8	8	9	
18	9	9	9	10	10	9	8	8	8	10	10	14	11	14	10	7	7	9	8	7	10	13	8	8	
19	8	8	8	10	10	10	10	9	11	16	14	9	10	10	10	8	10	7	7	9	13	8	9	10	
20	8	8	11	10	10	10	7	9	10	10	10	9	23	12	12	10	12	B	B	B	9	10	12	12	
21	15	11	19	40	13	16	27	16	14	15	10	10	12	10	14	24	10	13	15	7	13	13	10	6	
22	8	8	7	9	11	14	12	10	15	20	B	B	B	B	B	22	14	20	12	9	9	10	8	8	
23	9	9	10	8	11	8	10	10	11	10	B	B	34	24	20	10	10	B	B	16	10	10	8	9	
24	10	9	10	10	10	10	8	10	10	11	11	15	16	13	11	9	12	10	12	10	12	B	10	10	
25	11	11	9	10	9	8	8	8	8	9	8	10	12	18	15	10	10	10	12	21	12	8	8	8	
26	8	8	8	10	8	8	9	9	7	6	8	10	10	8	8	8	10	8	10	9	9	9	9	10	
27	8	8	8	10	9	8	6	9	8	8	8	12	13	11	9	8	8	7	7	9	9	8	9	9	
28	9	9	8	14	14	12	12	20	14	14	19	23	32	18	16	16	11	11	10	9	9	9	14	16	
29	12	10	10	18	16	17	20	17	B	19	10	13	B	45	24	21	14	12	13	15	B	B	11	8	
30	8	9	13	10	12	10	10	8	11	10	B	25	22	12	30	B	16	16	13	10	B	10	10	8	
31	9	9	14	12	9	10	10	8	10	8	10	8	12	12	10	9	8	10	11	11	10	10	9	10	
	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	9	9	10	10	10	11	10	10	10	10	10	12	12	11	11	10	10	10	11	10	10	10	9	9	
U Q	10	11	14	12	13	14	12	12	13	14	22	B	20	23	18	17	16	B	16	14	14	12	11	11	10
L Q	8	8	8	10	9	8	8	8	8	8	8	9	10	10	9	8	9	8	8	9	9	8	8	8	

JUL.2021 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 2021 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	A	A	298	E A 224	A 224	200	200	202	196	B	A	A	A	A	A	A	196
2	A	A	A	A	A	A	A	A	A	E A 274	A 260	E A 236	E A 212	E A 214	A	A	A	A	A	A	A	A	242	A	A
3	A	A	A	A	A	A	A	A	A	A	A	B E 282	B E 222	A	A	200	E A 240	A	A	A	A	A	A	A	A
4	A	A	A	A	A	210	A	A	A	A	A	E A 254	E A 206	188	244	244	A	A	A	A	A	A	A	A	A
5	A	A	A	A	A	A	A	A	226	A	E B 246	A 220	A 204	194	194	200	226	216	A	A	A	A	A	A	A
6	A	A	A	A	A	A	A	A	A	B	A	B	B	E A 218	E A 226	A	B	B	B	B	B	B	A	A	A
7	A	A	A	A	A	A	A	A	A	A	B	E A 300	A	B E 238	E A 292	A	A	A	A	A	A	A	A	A	A
8	A	A	A	A	A	A	A	A	A	A	A	B E 234	A 202	188	194	208	234	A	A	A	A	A	A	B	A
9	A	A	194	A	B	A	A	A	A	A	A	E A 240	E A 228	208	206	202	212	A	A	A	A	A	A	A	A
10	A	A	B	E A 254	A	A	A	A	A	A	A	E A 238	198	204	212	188	188	216	A	226	194	194	B	A	
11	A	A	A	A	A	A	A	A	A	A	A	E A 222	204	196	206	196	208	A	A	A	202	A	A	A	A
12	A	A	A	A	A	E A 206	E A 326	288	278	254	254	E A 228	E A 212	200	182	202	270	A	A	270	216	A	A	A	A
13	A	A	A	A	A	926	A	A	A	E A 292	E A 264	E A 232	E A 224	210	196	234	222	A	A	A	A	A	A	A	A
14	A	A	A	A	200	A	A	A	A	A	306	238	E A 244	E A 214	E A 212	198	220	188	A	A	A	A	A	A	A
15	A	A	A	A	210	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	A	A	A
16	A	A	A	A	A	A	A	A	A	A	E A 234	210	198	208	200	216	A	A	A	A	232	204	A	A	A
17	A	A	A	A	A	A	A	A	222	270	208	202	E A 224	202	202	196	210	A	A	A	A	A	A	A	A
18	A	A	A	A	A	A	A	A	A	A	258	220	220	210	196	196	202	212	A	A	A	A	A	A	A
19	A	A	A	A	A	A	A	A	A	A	A	A	H 186	216	202	200	196	204	196	260	214	194	202	A	A
20	A	A	A	A	A	A	A	A	A	A	A	E A 212	E A 234	234	210	200	214	196	B	B	B	A	A	A	A
21	A	A	A	B	A	A	A	A	A	A	E A 238	210	222	204	E A 228	E A 242	E A 212	E A 244	E A 254	A	A	A	A	198	A
22	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	242	250	B	A	A	A	A	A	A
23	A	A	A	A	A	A	A	A	A	A	A	B	B E 230	B E 246	E B 244	E B 214	E B 214	A	A	A	A	A	A	A	A
24	A	A	A	A	A	E A 354	E A 280	A	A	A	A	A	220	202	202	194	206	194	228	238	A	200	B	A	A
25	A	A	218	A	A	A	A	A	208	198	E A 232	E A 214	E A 214	198	204	192	230	228	248	A	A	A	198	A	A
26	A	A	A	A	A	A	A	A	A	A	A	198	200	E A 220	206	200	200	200	216	232	198	198	198	198	A
27	A	A	A	A	A	E A 300	E A 338	A	320	226	200	A	210	208	198	202	186	246	218	196	A	A	196	A	
28	A	A	A	A	A	A	A	A	A	A	A	204	B	B E 242	B E 242	B E 218	198	218	232	208	A	A	A	A	A
29	A	A	A	A	A	A	A	A	B	A	A	E A 208	E A 234	B	B E 228	B E 236	214	236	230	A	B	B	A	A	A
30	A	A	A	A	A	A	A	A	A	A	184	B E 250	B E 250	220	236	A	262	266	234	A	B	A	A	A	A
31	A	A	A	A	196	A	A 196	A	214	A	E A 216	202	200	204	202	214	198	270	284	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			2		4	4	4	1	7	11	17	21	26	26	28	28	26	12	11	8	6	6	3	2	
MED			206		202	U 232	E A 332	288	226	U 242	222	E A 222	208	204	200	204	209	222	236	215	199	200	198	197	
U Q					232	E A 613	E A 346		278	280	250	E A 234	E A 230	E A 212	E A 216	223	230	245	260	229	204	242	198		
L Q					198	208	A 261		214	198	210	210	204	200	197	200	198	216	230	205	194	198	196		

JUL. 2021 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2021 fxI (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	O	X	O	X	X	X	X	X	X	X	X	A	A	A	A	A	A	
2	A	X	A		A	A	A	A	O	X	X	X	X	X	X	X	X	X	X	X	A		A	A	
3	A	A		65	67	83		A	A	A	A	B	A	X	B	B	B	B	B	O	X	A	B	A	
4	42	A	A		A	A	A	A	A	O	X	O	X	X	X	X	X	B	B	A	B	A	A	A	
5	A	A	R	A	A	A	X	A	A	O	X	X	X	X	X	O	X	O	X	B	A	A	O	X	
6	A	R	A	A	A		A	A	O	X	B	B					X			X	R	A	A	A	
7	A	A	A	A	A	A		A	A	A	O	X	O	X	O	X	X	X	X	A	A	A	A	A	
8	A	A	A	A	A	B		A	A	X	X	X	X	X	X	X	X	X	A	B	B	B	A	A	
9	67		A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	O	X	O	X	A	O	X	
10	45	40	58	46		A	X	A	A	A	X	X	X	X	X	X	X	X	X	B	B	A	A	R	
11	O	X	A	A	A	A	A	A	X	B	A	X	X	X	X	X	X	X	X	X	O	X	A	A	
12	O	X		A	A	X	X	X													O	X	O	X	
13	A	A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	A		21	35	A	
14	A	A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	A	A	R	A	A	
15	A	A	A	A	A	A	A	A	A	X	B	A	B	B							R	B	B	A	
16	A	A	B	A	A	A	A	A	X	X	X	X	X	O	X	X	X		O	X	O	X	B	A	
17	A	A	A	R	A	A	A	A	X	X	X	X	X	X	X	X	X	O	X	X	R	O	X	A	
18	A	A	A	A	A	A	A	A	B	B	X	X	X	X	X	X	X	X	X	X	O	X	A	A	
19	A	A	A	R	A	A	A	R	B	O	X	X	X	X	X	X	O	X	B	B	X	A	A	A	
20	A	A	A	A	A	A	A	A	A	A	X	X	X	O	X	X	X	X	A	A	A	A	A	A	
21	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	O	X	O	X	
22	A	O	X	A		O	X	A	A												O	X	A	A	
23	A	A	A		X	X	X	X	X	X	X	X	X	X	X	O	X	X	X	X	X	O	X	A	
24	38	A	A	A		X	X	X	X	X	X	X	X	X	X	X	X	X	O	X	A	A	A	A	
25	A	A	A		A	A	A	A	A	A	A	A	A	B	O	X	X	X	O	X	X	A	A	O	
26	A	A	A	A	A	A	A	A	X	O	X	O	X	X	X	X	O	X	O	X	B	A	B	A	
27	A	A	A	A	A	A	A	A	X	X	X	O	X	O	X					A	A	O	X	A	
28	A	A	A	A	A	A	A	A	B	A	A	B	B	B	B	B	B	O	X	B	O	X	A	A	
29	A	A	A	A	A	A	A	A	O	X	X	O	X	X	X	X	X	X	X	O	X	X	X	A	
30	A			A		A	A	A	A	O	X	X	X	O	X	X	X	X	B	B	B	B	O	X	
31	A	A	A	A	A	A	B	A	A	B	B	X	X	X	X	X	X	X	X	O	X	A	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	6	5	3	7	7	5	6	5	15	21	23	27	27	28	29	28	28	23	18	13	11	6	6	6	
MED	40	28	65	54	53	47	38	33	31	38	45	50	53	52	52	52	52	47	37	31	28	23	20	28	
U Q	45	56	75	61	67	52	102	47	36	42	47	53	56	58	58	54	52	42	33	32	43	31	54	66	
L Q	O	X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	O	X	X
	26	27	58	44	40	36	33	25	29	34	42	47	47	50	49	48	42	32	28	23	20	18	26	31	

AUG. 2021 fxI (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2021 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	R	25	27	40	41	42	38	48	F	25	22	A	A	A	A	A	A				
2	A	20	A	A	A	A	A	A	R	18	22	34	44	48	52	41	50	J	R	26	22	25	V	A	A	A	A	A
3	A	A	A	A	A	A	A	A	A	A	B	A	32	B	B	B	B	B	R	A	B	A	A	A	A			
4	A	A	A	A	A	A	A	A	A	R	22	28	34	37	45	45	39	B	B	A	B	A	A	A	A			
5	A	A	A	A	A	A	27	A	A	R	28	40	47	43	41	44	35	R	B	A	A	R	A	A	A			
6	A	R	A	A	A	A	A	A	R	28	B	F	F	F	F	36	36	27	F	20	R	A	A	A	A			
7	A	A	A	A	A	A	A	A	A	A	A	A	38	38	39	39	43	39	34	A	A	A	A	A	A			
8	A	A	A	A	A	B	A	A	A	28	32	42	38	43	41	39	32	A	28	B	B	B	A	A				
9	A	A	A	A	A	A	A	A	A	30	37	B	52	46	46	44	27	F	R	R	R	A	R	A	A			
10	A	A	F	A	A	A	37	A	A	A	36	43	48	55	F	46	48	33	26	B	B	A	A	R	A			
11	17	A	A	A	A	A	A	A	20	B	A	46	48	50	44	42	38	26	F	25	16	14	R	A	A	A		
12	R	20	18	A	A	A	24	17	20	F	21	31	39	44	51	45	45	40	Z	37	24	22	16	R	R	R	A	A
13	A	A	A	A	A	A	A	A	A	28	35	41	40	46	39	42	32	20	A	15	A	A	A	A	A	R	R	
14	A	A	A	A	A	A	A	A	A	31	39	38	44	54	R	48	F	Z	A	A	A	A	A	A	A	A	A	
15	A	A	A	A	A	A	A	A	22	B	A	B	B	F	44	49	47	B	B	23	A	B	B	A	A	A		
16	A	A	B	A	A	A	A	A	24	31	35	34	40	44	F	42	46	F	R	R	B	A	B	A	A	A		
17	A	A	A	U	R	A	A	A	A	J	R	24	41	44	48	46	43	47	Z	Z	R	22	R	R	R	A	A	
18	A	A	A	A	A	A	A	A	B	B	36	42	42	45	51	43	42	28	26	22	R	A	A	A	R	28		
19	A	A	A	R	A	A	A	R	B	R	39	41	46	52	46	52	48	R	B	B	25	A	A	A	A	A		
20	A	A	A	A	A	A	A	A	A	32	38	42	50	46	55	55	51	44	V	A	A	A	A	A	A	A		
21	A	A	A	A	A	A	A	A	24	36	41	44	44	51	56	47	48	28	25	25	R	17	12	A	12	A		
22	A	R	A	A	A	R	A	A	F	F	24	39	45	49	46	59	52	44	39	34	20	19	15	R	R	A	A	A
23	A	A	A	A	34	F	39	A	43	25	37	45	54	59	51	50	49	45	31	23	21	15	10	A	A	A	A	
24	A	A	A	A	A	A	27	27	27	40	48	46	58	59	54	44	46	32	R	A	R	18	A	A	A	A	A	
25	A	A	A	A	F	A	A	A	A	A	A	A	B	35	36	36	36	R	R	34	R	27	22	A	A	R	A	A
26	A	A	A	A	A	A	A	A	30	R	R	33	37	42	44	50	44	43	43	30	B	A	B	A	A	A	A	
27	A	A	A	A	A	A	A	A	32	36	40	45	41	52	56	B	B	46	40	A	A	R	A	A	A	A	A	
28	A	A	A	A	A	A	A	A	B	A	A	B	B	B	B	B	34	B	B	26	B	A	A	A	A	A	A	
29	A	A	A	A	A	A	A	A	R	30	35	41	40	47	B	43	41	45	40	R	32	32	A	A	A	A	A	
30	A	B	A	A	A	A	A	A	A	R	33	40	47	41	V	R	44	46	44	F	B	B	B	B	B	20	A	
31	A	A	A	A	A	A	B	A	A	B	B	45	44	52	50	52	46	41	F	34	27	R	A	B	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	2	3	1	1	2	3	4	4	15	21	23	27	27	28	29	28	28	23	18	13	8	6	3	3	R	R	R	
MED	18	20	F	U	R	38	39	27	24	24	31	39	44	44	46	46	44	40	28	25	21	15	14	21	25	R	R	
U Q		R	22			R	45	32	35	28	36	41	46	48	52	50	47	45	34	27	25	18	25	23	28	R	R	
L Q		18				24	22	19	22	28	36	41	41	44	43	40	34	26	22	17	14	12	20	12				

AUG. 2021 foF2 (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2021 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	28	40	97	66	61	52	51	51	53	15	15	22	20	20	36	22	44	17	63	56	50	58	29	52	
2	46	45	34	27	50	55	34	31	42	26	18	19	30	26	19	25	E B 8	49	E B 11	39	44	79	66	54	
3	52	52	34	78	68	71	52	49	41	B	57	E B 24	B	B	B	B	B	B	49	55	B	30	40	38	
4	40	70	56	41	54	61	49	33	44	G	44	30	G	22	E B 24	E B 24	B	B	71	B	29	30	50	46	
5	47	36	26	43	35	32	44	42	40	20	21	28	36	38	52	E B 25	E B 16	B	B	49	32	39	39	24	24
6	42	15	55	25	59	36	38	30	48	B	E B 31	E B 23	G	22	18	17	18	34	16	K	37	47	58	52	
7	36	50	58	62	57	64	48	62	62	56	50	E B 34	E B 32	E B 30	E B 23	G	E B 26	20	42	47	34	45	48	45	
8	44	42	52	62	65	69	58	47	48	16	G	G	G	23	G	G	K	30	32	K	B	58	B	58	35
9	41	44	53	66	49	59	52	41	44	G	18	B	E B 25	E B 20	24	19	16	50	56	49	52	33	66	49	
10	59	50	33	38	53	52	48	46	54	45	G	29	E B 25	E B 23	23	18	G	E B 12	E B 14	B	53	54	48	23	29
11	46	42	94	68	66	55	48	44	19	B	56	31	33	23	20	G	14	13	14	28	64	49	33	28	
12	K 22	26	63	111	112	86	43	14	E B 10	18	26	24	24	25	25	G	G	K	K	E B 10	38	28	24	22	43
13	35	41	34	46	55	99	79	54	48	24	31	G	22	22	E B 24	24	16	30	34	28	27	34	28	30	
14	30	59	47	40	50	33	35	31	31	56	19	34	32	29	27	E B 23	B	40	48	18	31	29	31	38	
15	28	33	39	51	61	56	46	36	16	B	52	B	B	25	25	35	E B 13	E B 21	E B 10	23	B	B	44	40	
16	44	62	B	48	60	40	46	48	K 14	46	19	19	22	33	32	25	13	21	21	B	46	B	54	31	
17	42	53	30	37	34	43	37	K 25	16	26	20	24	21	20	G	G	E B 23	15	31	19	19	14	36	62	29
18	49	80	49	58	52	46	62	58	46	B	22	31	24	22	G	G	16	16	10	16	56	34	48	25	
19	42	31	45	23	36	44	48	30	E B 24	E B 20	24	24	28	37	25	E B 22	E B 35	B	B	B	18	42	41	41	41
20	42	42	50	50	47	48	42	43	35	30	19	24	38	G	27	E B 23	E B 20	E B 15	38	43	34	31	36	40	
21	47	51	32	32	49	21	23	86	29	G	22	22	30	30	21	18	52	48	E B 9	12	12	31	33		
22	38	23	57	24	27	27	51	50	25	G	19	27	27	25	30	23	20	14	14	13	14	23	20	40	
23	27	103	54	55	36	30	50	27	G	17	20	22	22	28	27	23	23	16	55	13	27	30	56	32	
24	34	76	51	46	34	32	25	26	G	21	26	24	22	22	20	20	G	21	25	27	46	24	41		
25	48	49	55	56	34	52	62	56	52	53	56	46	B	E B 26	E B 26	22	24	16	15	12	38	38	29	27	
26	29	29	40	54	52	73	55	55	39	45	E B 26	G	E B 27	E B 24	E B 36	32	32	23	B	26	43	30	40		
27	45	54	52	49	45	61	51	54	17	21	24	G	E B 36	G	E B 22	E B 22	B	31	18	28	45	76	102	105	85
28	73	56	46	50	42	48	55	55	B	53	53	B	B	B	B	B	E B 26	B	E B 20	B	31	31	30	44	
29	32	48	36	32	84	55	44	51	26	27	32	25	38	B	35	G	E B 20	E B 16	E B 16	14	24	51	40	43	
30	59	53	77	58	52	43	40	45	48	29	25	25	33	31	24	22	20	12	B	B	B	85	53	52	
31	38	59	59	60	63	67	B	67	67	46	B	37	37	E B 29	E B 26	E B 21	E B 20	E B 23	E B 18	E B 16	55	B	47	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	31	31	30	31	31	31	30	31	29	26	29	28	27	28	29	28	28	25	27	26	27	27	31	31	
MED	42	49	50	50	52	52	48	46	40	G	23	E G 25	26	G	G	G	18	17	21	26	37	38	40	40	
U Q	47	56	56	60	61	61	52	54	48	45	38	31	32	29	28	E B 24	E B 25	30	48	43	52	48	54	45	
L Q	34	40	36	38	42	40	42	31	18	24	20	24	22	22	24	22	16	E B 16	E B 15	E B 16	27	30	29	31	

AUG. 2021 ftEs (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2021 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	10	8	10	9	7	12	11	8	9	8	8	9	10	9	9	9	9	8	8	12	8	10	8	7
2	8	7	9	9	11	11	9	8	9	9	9	9	12	8	9	8	8	12	11	8	9	8	8	13
3	14	11	7	22	9	7	11	11	9	B	24	24	B	B	B	B	B	B	10	15	B	8	14	12
4	10	9	11	8	14	16	11	13	10	11	14	14	12	9	24	24	B	B	17	B	14	10	13	9
5	8	6	7	7	8	8	9	12	12	14	15	16	21	16	18	25	16	B	15	9	7	7	8	6
6	8	10	8	8	8	8	10	11	11	B	B	31	23	16	10	10	8	10	9	11	8	8	8	8
7	10	10	18	11	14	10	10	18	12	16	15	34	32	30	23	16	26	15	7	17	8	7	9	10
8	11	7	15	10	16	41	24	16	10	8	12	12	13	14	13	13	10	8	10	B	41	B	10	8
9	12	13	13	8	12	20	11	9	8	10	12	B	25	20	14	14	10	10	10	9	12	12	14	8
10	7	7	8	11	11	10	8	8	25	18	15	12	12	23	23	11	12	14	B	41	9	10	10	9
11	9	7	12	12	10	15	10	8	10	B	22	31	12	9	14	11	10	13	12	11	10	10	10	6
12	7	6	8	7	8	7	7	6	10	12	13	14	16	17	16	12	8	7	10	10	7	5	7	8
13	8	8	9	15	14	14	14	16	12	12	19	14	13	12	24	10	11	15	10	7	6	7	10	9
14	8	7	15	10	8	9	9	8	8	9	9	9	10	14	27	14	14	10	8	9	8	9	8	8
15	6	8	7	10	19	9	9	10	8	B	14	B	B	12	16	35	B	B	11	15	B	B	9	8
16	8	8	B	10	19	20	16	10	10	11	10	12	14	33	32	25	9	21	21	B	12	B	15	6
17	9	10	11	11	14	14	10	9	8	13	11	14	11	11	16	15	15	12	8	11	7	8	8	7
18	7	10	10	10	14	10	17	13	27	B	14	16	16	12	12	11	10	16	10	16	21	18	20	6
19	9	7	8	8	8	10	8	10	B	24	14	16	15	16	16	22	34	B	B	10	8	10	8	10
20	10	8	10	8	14	11	9	9	8	9	11	13	38	18	18	23	20	15	13	13	13	9	9	8
21	10	8	8	8	8	6	6	7	7	8	12	11	12	12	11	10	9	8	8	9	8	8	9	7
22	8	8	8	8	8	8	15	11	10	13	14	16	17	13	11	13	12	12	9	8	7	7	7	9
23	8	11	7	7	10	8	7	8	7	8	10	15	16	13	12	10	10	6	9	7	7	8	8	7
24	7	8	10	12	9	7	7	6	6	10	12	12	13	13	16	11	9	10	10	12	10	9	7	9
25	10	10	8	7	11	7	21	12	20	38	24	23	B	26	26	22	24	16	15	7	11	9	8	7
26	7	8	9	15	15	10	10	13	10	14	26	20	26	24	36	32	32	23	B	16	B	10	7	7
27	11	9	10	13	14	17	9	11	8	12	8	36	21	22	22	B	31	9	14	8	7	7	11	8
28	9	9	9	22	9	10	19	38	B	24	25	B	B	B	B	B	26	B	20	B	8	8	8	8
29	8	9	9	9	10	10	9	9	12	27	32	25	38	B	35	16	21	16	16	14	7	8	6	8
30	8	34	18	14	11	10	10	8	14	25	18	16	33	15	14	18	20	11	B	B	B	73	10	7
31	21	10	14	20	13	15	B	24	23	36	B	23	24	29	26	21	20	23	18	16	16	B	10	9
	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	8	8	9	10	11	10	10	10	10	13	14	16	16	16	16	15	14	14	11	12	9	9	9	8
U Q	10	10	12	12	14	14	14	13	12	27	22	25	32	24	26	24	26	23	B	B	14	10	10	9
L Q	8	7	8	8	8	8	9	8	8	10	11	12	12	12	13	11	10	10	9	9	7	8	8	7

AUG. 2021 fmin (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2021 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	A	232	232	212	E A	198	194	E A	188	204	226	A	A	A	A	A	A					
2	A	A	A	A	A	A	A	A	A	308	E A	264	204	E A	222	220	206	200	E A	182	284	248	A	A	A	A	A			
3	A	A	A	A	214	A	A	A	A	A	B	A	264	B	B	B	B	B	B	B	300	A	B	A	A	A				
4	A	A	A	A	A	A	A	A	A	198	E A	324	248	E A	228	208	208	214	E B	B	B	A	B	A	A	A	H			
5	A	A	A	A	A	A	A	A	A	198	E A	216	206	206	218	212	216	194	B	A	A	E A	250	A	A	A	A			
6	A	A	A	A	A	A	A	A	A	A	B	B	256	E B	236	202	214	204	198	196	E A	A	A	A	A	A	A			
7	A	A	A	A	A	A	A	A	A	A	A	A	316	E B	266	302	240	258	210	242	E A	A	A	A	A	A	A			
8	A	A	A	A	A	B	A	A	A	E A	E A	E A	256	244	204	210	218	216	252	240	A	258	B	B	B	A	A			
9	A	A	A	A	A	A	A	A	A	E A	E A	260	208	B	236	216	198	206	196	202	280	242	A	A	A	A	A			
10	A	A	218	A	A	A	A	A	A	A	E A	E A	226	216	226	232	222	202	202	E B	B	B	A	A	A	A	A			
11	194	A	A	A	A	A	A	A	E A	316	B	A	238	218	E A	212	198	210	212	262	256	262	236	A	A	A	A			
12	200	202	A	A	A	210	A	A	256	200	212	206	206	212	194	204	200	188	202	228	266	218	A	A	A	A	A			
13	A	A	A	A	A	A	A	A	A	E A	E A	E A	230	218	218	218	212	212	200	240	E A	E A	264	A	A	A	A	204	200	
14	A	A	A	A	A	A	A	A	A	198	208	216	194	204	200	E A	212	210	A	A	A	A	A	A	A	A	A	A	A	
15	A	A	A	A	A	A	A	A	A	A	B	A	B	E A	E A	E A	B	B	B	B	204	A	B	B	A	A	A	A	A	
16	A	A	B	A	A	A	A	A	A	218	202	202	198	208	212	220	214	198	B	268	B	A	B	A	B	A	A	A	A	
17	A	A	A	200	A	A	A	A	E A	290	206	228	200	E A	214	202	204	198	226	202	274	A	246	E A	A	A	A	A	A	
18	A	A	A	A	A	A	A	A	B	B	E A	E A	236	250	248	212	214	182	206	242	270	232	E B	A	A	A	A	198	A	
19	A	A	A	A	A	A	A	A	A	B	E B	228	186	220	212	200	222	206	212	B	B	E A	274	A	A	A	A	A	A	A
20	A	A	A	A	A	A	A	A	A	A	A	202	202	210	274	198	218	232	222	250	E B	A	A	A	A	A	A	A	A	A
21	A	A	A	A	A	A	A	A	E A	248	206	E A	238	198	188	218	226	218	204	204	E A	250	220	E A	E A	A	A	A	A	A
22	A	A	A	A	A	180	A	A	E A	E A	E A	250	234	214	214	206	220	204	200	208	202	282	250	206	A	A	A	A	A	A
23	A	A	A	A	A	206	A	A	296	196	E A	228	230	216	218	206	214	214	204	184	240	200	A	248	194	A	A	A	A	A
24	A	A	A	A	A	A	A	A	302	206	212	212	200	238	192	198	206	206	208	E A	266	194	A	A	A	A	202	A	A	A
25	A	A	A	A	196	A	A	A	A	A	A	A	A	B	B	B	B	B	B	252	234	238	A	A	A	A	240	A	A	A
26	A	A	A	A	A	A	A	A	E A	322	A	B	218	E B	242	232	274	220	E B	230	262	B	A	B	A	A	A	A	A	A
27	A	A	A	A	A	A	A	A	E A	194	242	230	B	212	212	212	B	E B	240	210	A	A	228	A	A	A	A	A	A	A
28	A	A	A	A	A	A	A	B	B	B	A	A	B	B	B	B	B	E B	284	B	274	B	B	A	A	A	A	A	A	A
29	A	A	A	A	A	A	A	A	A	E A	E A	E A	288	300	230	272	236	220	208	212	238	220	B	B	A	A	A	A	A	A
30	A	B	A	A	A	A	A	A	E A	E A	E A	300	252	214	E B	E A	E A	E A	E B	200	B	B	B	A	A	A	A	198	A	A
31	A	A	A	A	A	A	B	A	A	A	B	E A	E A	284	276	250	236	228	228	226	238	260	A	B	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	2	1	1	1	2	3		2	12	19	22	26	27	27	28	26	27	22	18	13	9	5	4	2						
MED	197	202	218	200	205	206		299	U	U	225	213	212	212	210	209	208	206	210	253	235	237	203	199						
U Q					210				E A	E A	E A	299	256	236	238	242	220	222	218	222	246	274	263	258	271	222				
L Q					180				212	202	208	206	208	204	204	204	200	202	238	224	217	206	200							

AUG. 2021 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 2021 f<sub>XI</sub> (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	59	56	A	A	A	A	A	A	X	O	X	X	X	X	O	X	X	X	X	X	A	A	A	A
2	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	O	X	A	O	X	A
3	A	45	A	A	A	A	A	X	X	X	X	X	X	X	X	O	X	X	X	X	A	A	48	A
4	A	A	40	A	A	A	A	X	X	X	X	X	X	X	X	B	O	X	O	X	O	X	B	B
5	X	A	68	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	O	X	O	X	A	A
6	38	60	58	A	A	A	A	B	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A
7	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	O	X	A	A	A	A
8	A	A	A	A	A	A	A	A	X	X	X	X	X	B	X	X	X	X	X	O	X	A	A	A
9	A	A	A	A	A	A	X	X	O	X	X	X	X	X	X	X	X	X	X	X	A	O	X	O
10	53	A	A	A	A	A	O	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A
11	A	A	A	76	38	56	61	36	39	43	48	48	B	X	X	X	X	X	X	O	X	O	X	X
12	40	A	38	47	37	43	27	37	45	49	53	57	67	72	70	77	76	68	62	55	25	R	A	A
13	A	A	A	75	A	A	A	X	O	X	X	X	X	X	X	X	X	X	X	O	X	A	A	A
14	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A
15	A	A	A	A	A	A	A	B	B	A	X	X	X	B	B	O	X	O	X	O	A	B	O	X
16	A	X	51	A	A	X	X	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X
17	R	55	A	A	A	A	X	B	B	X	X	X	X	X	X	X	X	X	O	X	A	A	A	A
18	A	A	X	A	A	A	A	A	A	B	B	X	X	X	X	B	X	X	X	X	O	X	O	X
19	52	51	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	35	26	X	A
20	A	A	R	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A
21	59	O	X	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A
22	A	A	A	O	X	O	X	A	A	A	A	X	B	B	B	B	X	X	X	X	B	A	A	A
23	A	A	A	A	101	A	A	A	B	X	X	B	B	X	X	X	X	X	X	X	X	X	X	X
24	43	43	56	A	56	A	52	55	49	50	59	65	80	72	72	65	64	63	52	42	60	A	R	A
25	A	A	A	A	42	A	A	B	A	X	X	X	B	X	X	X	X	X	X	X	O	X	O	X
26	A	A	A	A	A	35	38	40	46	53	54	58	61	61	62	65	54	59	54	48	42	38	37	31
27	X	A	A	A	A	A	B	A	O	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X
28	37	51	70	48	O	X	O	X	X	O	X	O	B	X	X	B	O	X	X	X	O	X	O	X
29	A	A	A	A	X	X	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
30	A	A	39	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	36	33	66
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	10	9	10	5	10	7	14	18	23	26	29	27	26	28	27	26	30	30	30	28	20	18	13	13
MED	46	51	54	48	44	40	35	38	43	47	50	56	59	60	62	60	58	54	49	41	36	28	29	27
U Q	53	56	58	76	77	52	48	47	45	50	53	58	65	67	68	65	64	59	53	48	38	33	40	32
L Q	38	44	40	44	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X	O	X

SEP. 2021 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 2021 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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		R					R		R				A	A	A	A		
2	A	A	A	A	A	A	A	A	26	31	36	40	47	52	54	50	54	58	41	F	R	A	R	A	A	
3	A	A	A	A	A	A	A	A	31	34	41	50	56	62	61	69	R	F			A	A	A	A		
4	A	A	A	A	A	A	A	A	31	35	38	41	46	48	51	59	B	R		R	R	B	B	A		
5	42	A	A	A	A	A	A	A	A	A	A	41	45	48	53	50	52	51	49	R	R	R	A	A		
6	A	A	A	A	A	A	A	B													R	A	A	A		
7	A	A	A	A	A	A		F		F									F	R	F	F	A	A	A	
8	A	A	A	A	A	A	A	A						B				F		R	R	A	A	A	A	
9	A	A	A	A		A		U	R	J	R		F									A	R	R	R	
10	A	A	A	A	A	A	R	A											F	F	F	25	15	A	A	
11	A	A	A	A	32	A	A	U	R					B						R	R	R	A	14		
12	A	A	A	A	A	F												F	F	F	43	19	R	A	A	
13	A	A	A	A	A	A	A	A	34	36	44	38	49	54	F	53	60	54	V	F	R	A	A	A	A	
14	A	A	A	A	A	A	A	A	31	35	42	40	44	49	51	50	50	46	46	F	41	40	26	A	A	A
15	A	A	A	A	A	A	A	B	B	A	F	46	54	59	F	63		B	R	R	R	A	B	R	R	
16	A	J	R	A	A	A	F			R																
17	A	A	A	A	A	A	20	23	30	34	39	44	54	54	58	60	55	50	42	30	30	30	22	22	22	
18	A	A		A	A	A	A	A	A	B	B		40	48	54	53	71	F	F	R	A	A	A	A		
19	A	A	37	A	A	A	A	A	A	B			40	48	38	41		B			R	R	A	A		
20	A	A	A	A	A	A	A	A																		
21	A	R	A	A	A	A																				
22	A	16	A	A	A	A	31	37	37	40	44	50	54	56	62	59	56	58	42	37		B	A	A	A	
23	A	A	A	A	A	A	A	A	B																	
24	23	A	A	A	A	A	F		F					F												
25	A	A	A	A	A	A	A	B	A					B				V				F	R	R	R	
26	A	A	A	A	A	F																				
27	18	A	A	A	A	A	B	A	R												Z					
28	A	A	A	J	R	R	R	F	F	R	R	B		50	54		B	B	R		R	R	F	A	R	
29	A	A	A	A	A	A	R																			
30	A	A	33	A	A	A	F														Z					
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	3	2	2	2	4	6	13	17	23	26	29	27	26	28	27	26	30	30	30	28	18	16	10	11		
MED	23	R	35	R	30	28	27	31	37	41	44	50	52	54	56	54	52	48	42	35	27	20	22	R	19	
U Q	42				36	34	F	35	36	39	44	47	52	56	60	62	59	58	52	46	41	31	26	R	22	
L Q	18				26	F	20	22	30	34	38	40	46	48	52	50	50	46	41	36	30	22	15	15	17	

SEP. 2021 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 2021 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	32	38	43	53	50	47	42	40	27	E B E B	G	29	26	26	41	37	37	21	16	14	K	28	52	51	37		
2	52	57	48	52	53	48	42	53	20	20	24	G	27	27	G	26	26	22	G E B E B	19	33	44	42	36			
3	36	33	36	87	50	60	54	21	G	21	32	28	E B E B E B E B	28	34	36	50	20	24	33	16	28	28	40	67		
4	62	90	87	64	62	60	44	65	45	G	20	24	25	G E B	G	B E B E B E B E B	43	29	15	12	E B	B	B	38			
5	39	43	70	58	48	55	59	50	48	58	31	31	G	G	25	31	22	20	35	15	47	29	49	51			
6	35	44	K	51	65	59	54	B	32	18	24	19	G	24	23	G	23	21	18	23	14	26	40	34	42		
7	42	81	55	52	52	42	31	16	19	21	22	G	G	G	G	25	G E B	20	26	26	41	42	32	37			
8	32	82	61	58	51	60	60	57	30	G	26	72	27	B E B E B E B E B	24	26	34	26	23	15	40	40	37	31			
9	46	56	57	52	47	47	40	G	40	48	48	36	24	G	30	G E B	24	20	16	16	51	51	22	50			
10	38	50	56	48	39	34	24	56	32	36	33	27	G	G	G	G	G	G	16	20	20	10	40	66			
11	54	64	92	44	34	41	36	38	28	24	24	26	B E B E B	27	23	24	24	19	19	56	45	18	19	48			
12	37	40	25	24	30	12	K	G	G	G	23	25	E B	G	26	G E B E B E B E B	20	30	16	15	15	17	28	41			
13	46	40	60	52	52	55	42	24	G	G	22	24	36	26	26	26	G	20	20	G E B	16	28	37	26	49		
14	50	50	48	63	35	54	41	26	G	26	G	27	30	30	G	24	G E B E B E B E B	20	17	16	14	35	40	42			
15	40	67	40	43	53	41	39	B	43	53	34	G	31	26	B	B E B E B E B E B	36	37	32	42	B	46	32	23			
16	36	40	35	44	28	43	48	14	G E B E B	G	24	24	24	26	28	G	G	G	19	18	13	13	16	16	49		
17	21	32	52	54	45	40	20	B	B	G	G	28	30	E B	25	G E B E B E B E B	42	35	36	34	32	45	51	76	82		
18	86	55	74	66	44	55	55	42	45	B	B E B E B	28	24	G	G	B E B	24	22	G E B	16	50	33	44	28			
19	35	K	67	46	57	46	63	G	G	54	23	55	24	28	59	G	G	G	G	K	9	9	42	30			
20	28	28	17	34	34	49	46	50	G	23	24	G	28	34	24	G	G	G	19	20	18	10	E B	7	54	24	28
21	33	33	35	55	60	41	29	G	64	14	27	30	30	28	28	24	24	20	G E B	9	46	45	56	55			
22	52	52	40	52	18	55	56	56	60	54	44	B	B	B	B E B E B	34	27	24	G E B	17	B	43	46	50			
23	62	48	44	46	54	52	56	B	32	G	B	B E B E B E B E B	41	31	42	25	28	24	15	9	9	56	58				
24	58	29	34	77	38	55	44	24	26	24	28	E B E B	39	29	32	G	G	30	15	G	36	36	19	25			
25	29	36	36	50	49	52	54	B	65	G	36	G	B E B E B E B	40	36	26	G E B	21	10	E B E B	12	14	48	25			
26	30	36	63	54	34	108	95	G	G	G	G	G	30	28	28	G	G	G	13	13	E B	9	10	53	12		
27	59	29	29	55	47	54	B	45	36	83	28	32	29	29	29	18	G	23	G E B	10	10	19	23	26			
28	30	32	32	28	34	42	20	20	G	G E B	28	38	B E B E B	32	32	B	B E B E B	46	24	20	E B E B	18	47	44			
29	40	85	56	51	24	18	17	17	G	G	24	24	27	G	G	G	G	G	G	G E B	11	18	24	19			
30	42	44	K	47	58	29	G	G	G	G	G	G	102	32	37	28	39	18	19	28	14	K	47	58			
31																											
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	30	30	30	29	30	30	29	26	28	29	29	27	26	28	27	26	30	30	30	30	28	29	29	30			
MED	40	44	46	52	47	48	42	25	26	28	24	28	28	G	G	24	G	E G	16	14	23	33	40	42			
U Q	52	56	60	56	52	55	54	50	42	34	32	31	30	G E B E B E B E B	30	28	27	24	23	17	40	44	48	50			
L Q	33	34	35	46	34	41	30	G	G	22	G	27	25	26	26	G	22	20	G	E B	12	18	25	28			

SEP. 2021 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 2021 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	8	8	11	14	15	13	15	14	15	28	27	18	16	26	42	37	37	20	16	9	16	10	10	10	
2	14	12	12	18	14	7	11	7	10	10	14	12	14	14	7	12	12	10	26	19	10	7	9	8	
3	8	9	7	9	15	12	10	8	9	9	12	12	28	34	36	50	20	16	18	8	8	7	6	10	
4	8	17	16	13	16	13	16	8	10	11	11	10	22	24	18	B	43	29	15	12	14	B	B	6	
5	7	7	13	15	16	12	15	15	16	20	22	20	20	14	13	30	22	20	35	15	10	10	10	12	
6	10	10	10	14	11	13	16	B	16	11	11	10	11	12	12	10	10	10	7	7	8	9	7	10	
7	10	14	11	16	14	10	10	8	8	10	12	15	14	B	14	18	14	18	20	12	8	8	10	7	10
8	8	10	11	26	15	17	16	16	9	14	14	15	16	B	24	26	34	26	12	15	12	8	7	10	
9	9	14	8	15	11	9	8	8	20	10	16	13	13	13	16	16	24	13	16	18	13	9	9	8	
10	6	11	23	14	14	12	10	11	14	11	33	27	16	B	17	14	9	12	10	9	9	8	7	9	9
11	10	20	13	16	9	10	10	10	10	10	10	10	B	26	21	17	15	14	12	16	15	10	20	8	
12	7	7	7	8	7	6	7	8	9	11	14	14	25	16	13	14	20	30	16	15	15	9	7	8	
13	8	10	8	7	15	12	9	9	13	10	12	18	15	13	12	12	14	21	13	15	8	8	8	6	
14	8	13	22	32	15	14	14	8	10	10	10	12	24	24	15	12	12	20	17	20	14	8	8	6	
15	X 7	10	10	11	18	10	11	B	37	14	12	14	18	16	B	B	36	37	32	26	B	16	14	10	
16	8	10	19	13	13	9	8	8	19	21	13	16	14	12	12	15	14	11	8	8	8	8	14	10	
17	10	8	10	10	8	8	11	B	B	14	14	16	15	25	11	42	35	36	34	17	8	8	9	11	
18	17	15	10	12	9	14	14	9	12	B	B	28	24	20	17	B	22	16	12	16	12	10	7	6	
19	8	5	14	11	10	8	9	11	9	10	12	10	11	11	12	10	10	14	8	6	6	6	6	7	
20	7	7	7	7	7	15	14	14	11	11	11	12	12	12	13	9	9	9	8	7	7	7	6	8	
21	6	8	8	13	13	12	11	11	10	10	10	10	11	10	10	10	8	9	8	9	9	8	13	11	
22	13	13	14	11	10	24	24	26	23	12	12	B	B	B	B	34	26	10	10	17	B	16	8	8	
23	X 8	13	13	10	24	10	19	16	B	14	23	B	B	41	31	42	25	28	24	15	9	9	8	9	
24	8	8	7	9	9	13	7	13	19	14	14	39	29	18	23	16	17	14	9	6	10	14	9	8	
25	8	8	7	14	15	12	14	B	14	14	9	15	B	40	36	26	18	21	10	10	12	14	10	8	
26	7	10	23	15	11	10	7	9	9	9	12	15	11	13	13	7	10	10	8	8	8	8	7	6	
27	8	8	8	18	11	27	B	14	11	11	12	11	9	12	10	8	11	12	10	10	7	7	6	6	
28	8	6	15	8	10	8	8	8	8	12	38	B	31	32	B	B	46	24	12	15	20	9	9	15	
29	14	33	14	12	14	9	8	8	10	10	11	11	14	12	11	14	11	12	10	8	11	10	7	8	
30	7	9	14	19	19	14	11	10	10	11	9	11	7	11	10	10	8	7	8	6	6	7	11	9	
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
MED	8	10	11	13	14	12	11	10	11	11	12	14	16	16	14	16	18	15	12	11	10	9	8	8	
U Q	10	13	14	15	15	13	15	15	16	14	14	18	25	26	24	37	25	21	16	16	14	10	10	10	
L Q	7	8	8	10	10	9	9	8	10	10	11	11	13	12	12	10	11	10	9	8	8	8	7	8	

SEP. 2021 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 2021 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	E B	198	266	242	228	228	E B	244	224	224	206	236	222	A	A	A	A
2	A	A	A	A	A	A	A	A	E A	254	196	232	216	234	200	198	E A	228	216	222	244	240	A	A	A
3	A	A	A	A	A	A	A	E A	324	214	220	220	210	232	300	254	280	204	A	276	242	A	A	A	A
4	A	A	A	A	A	A	A	E A	334	244	228	198	222	204	222	218	B E B	256	B	236	210	224	224	B	B
5	218	A	A	A	A	A	A	A	A	A	E A	E A	284	254	232	216	202	220	226	232	278	210	220	E A	A
6	A	A	A	A	A	A	A	B E A	274	206	A	224	210	222	208	224	206	206	196	208	A	A	A	A	A
7	A	A	A	A	A	A	A	A	208	196	194	222	228	200	200	200	200	220	E A	274	236	216	A	A	A
8	A	A	A	A	A	A	A	E A	288	198	216	194	202	B	228	236	248	236	216	264	A	A	A	A	A
9	A	A	A	A	A	A	A	A	234	A	A	248	202	220	208	222	228	E A	238	250	250	A	240	200	198
10	A	A	A	A	A	A	A	E A	310	222	298	242	216	226	212	210	200	200	204	218	228	270	A	A	A
11	A	A	A	E A	240	A	E A	318	204	200	230	206	B	226	214	220	E A	E A	E A	216	220	216	274	E A	A
12	A	A	A	196	A	A	274	E A	240	204	186	H	204	214	222	206	202	228	212	234	218	218	E B	A	A
13	A	A	A	A	A	A	A	E A	274	206	202	224	224	224	198	198	200	200	238	E A	238	238	A	A	A
14	A	A	A	A	A	A	A	E A	288	204	236	E A	218	198	232	224	212	216	E B	222	B	252	244	A	A
15	A	A	A	A	A	A	A	B	B	A	198	214	234	208	B	B	E B	234	E B	234	272	A	B	A	188
16	A	A	A	A	A	A	226	E B	208	236	216	204	212	194	204	194	204	206	202	202	204	212	246	270	A
17	A	A	A	A	A	A	A	B	B	202	196	200	200	210	196	E B	290	E B	E B	E B	A	A	A	A	A
18	A	A	194	A	A	A	A	A	A	B	B	E B	256	208	194	232	B	E B	E B	E A	236	236	E A	E A	A
19	A	A	A	A	A	A	200	208	228	202	214	198	H	180	214	206	190	196	208	198	194	194	210	A	A
20	A	A	A	A	A	A	A	A	200	206	200	200	212	212	198	198	198	198	206	200	186	220	234	234	A
21	A	222	A	A	A	E A	320	E A	214	202	212	220	202	E A	212	214	202	224	210	190	218	A	A	A	A
22	A	A	A	A	198	A	A	A	A	A	198	B	B	B	B	B	B	E B	E B	A E A	E B	B	A	A	A
23	A	A	A	A	A	A	A	A	A	B	252	248	B	B	B	220	B E B	224	238	226	214	214	214	224	244
24	196	198	A	A	A	A	204	E A	248	222	226	B	E B	226	200	220	204	212	208	192	196	A	A	A	A
25	A	A	A	A	A	A	A	B	A	244	222	212	B	B	268	214	214	E B	220	202	200	244	244	298	202
26	A	A	A	A	E A	318	238	200	238	202	196	212	200	200	214	202	206	198	E A	208	206	206	210	230	E A
27	E A	270	A	A	A	A	A	B	A	A	230	226	E A	268	208	194	200	200	218	218	194	196	216	258	208
28	A	A	A	256	A	E A	248	216	198	214	B	B	E B	E B	B	B	254	222	200	226	E B	E A	A	196	
29	A	A	A	A	A	A	266	232	220	206	206	194	204	204	186	200	200	E B	230	200	198	226	262	A	308
30	A	A	A	A	A	A	216	212	212	196	196	202	212	212	212	226	E A	230	Q	220	192	208	254	202	A
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	3	2	1	2	2	1	8	15	21	25	26	26	26	26	27	24	30	29	30	28	18	16	7	11	
MED	U	207	210	194	226	219	E A	U	218	208	206	210	212	212	210	212	211	211	221	209	218	220	236	232	212
U Q	E A	270					270	E A	288	246	225	226	224	232	222	220	225	E	228	236	244	237	244	266	270
L Q	196						221	208	204	201	198	202	204	200	200	201	204	208	200	205	214	217	224	198	

SEP. 2021 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 2021 f<sub>XI</sub> (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	58	53	A	O	X	A	A	A	X	54	58	X	B	X	X	O	X	X	X	80	80	50	56	38	32	X	A	A	A			
2	A	A	A	44	37	33	41	47	51	56	59	60	65	78	84	92	110	57	47	46	X	A	A	A	A	A	A	A	A	A			
3	A	A	O	X	A	A	42	43	46	49	56	60	62	60	64	61	61	57	55	52	50	44	31	X	A	43	X	X	X	A			
4	58	A	A	A	A	A	A	A	A	A	X	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
5	X	A	A	A	A	A	O	X	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
6	X	23	41	56	56	56	A	56	48	51	54	60	57	61	72	77	85	80	49	68	86	77	A	A	A	O	X	X	R				
7	A	A	O	X	54	48	52	40	42	44	46	46	50	49	52	55	59	62	59	57	49	A	A	A	O	X	35	X	A	A			
8	A	A	58	A	A	A	42	46	48	51	51	52	57	62	63	65	61	54	54	48	48	42	33	X	A	X	X	X	A	A			
9	O	X	A	O	X	A	A	A	A	A	57	61	56	62	65	64	71	67	62	60	58	53	49	49	48	28	X	O	X	A			
10	A	A	A	56	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A	A	A	A	A	51	A		
11	A	A	A	A	58	52	B	B	B	O	X	X	B	X	O	X	X	O	X	O	X	A	A	A	A	A	A	A	A	A	A		
12	A	A	A	B	B	B	B	A	A	A	A	B	B	O	X	B	O	X	O	X	A	A	80	86	A	A	X	A	A	X	A		
13	A	A	A	A	A	B	B	A	X	O	X	B	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
14	A	A	A	A	A	A	A	B	51	54	54	52	54	57	57	57	57	54	46	41	68	A	A	A	A	A	A	A	A	A	A		
15	A	A	A	A	A	O	X	34	49	A	A	50	52	43	50	B	56	58	57	54	52	52	47	44	44	43	42	X	X	X	X		
16	42	A	A	A	46	B	A	X	45	50	51	49	52	56	58	56	56	51	48	52	52	42	41	41	40	X	X	X	X	X			
17	X	37	48	40	37	42	46	49	53	55	57	58	59	57	63	78	92	87	60	58	58	48	A	A	A	A	A	A	A	A	A		
18	A	A	A	A	A	A	A	O	X	56	A	A	A	O	X	O	X	O	X	O	X	X	X	X	X	X	X	X	X	X	X	X	
19	A	44	A	47	52	75	48	A	A	A	O	X	O	X	O	X	O	X	O	X	X	X	X	X	X	X	X	X	X	X	X	X	
20	A	A	56	81	44	45	44	A	50	48	52	55	56	56	59	58	59	58	53	50	46	40	X	X	X	X	X	X	X	X	X		
21	A	78	A	A	X	38	44	A	A	50	50	51	53	55	52	54	54	52	52	54	45	44	39	42	34	X	O	X	X	X	X		
22	44	A	A	A	X	39	43	48	52	55	56	60	57	55	56	57	61	59	59	59	48	44	40	42	45	X	X	X	X	X	X		
23	X	40	34	45	43	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
24	39	40	40	46	46	53	57	58	64	64	64	63	65	66	63	69	65	60	56	49	49	41	A	A	A	A	A	A	A	A	A		
25	62	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
26	54	A	A	A	A	A	A	A	A	A	52	53	55	57	58	61	58	56	54	54	50	48	44	42	44	X	X	X	X	X	X		
27	X	47	A	A	X	55	53	63	65	67	65	65	67	65	64	66	63	61	59	56	54	52	46	54	58	X	X	X	X	X	X		
28	60	56	48	47	48	55	56	71	74	78	78	76	75	70	70	64	66	62	56	56	55	52	57	59	X	X	X	X	X	X	X		
29	X	58	58	50	55	55	62	69	75	79	80	81	80	73	75	73	65	66	62	65	56	52	55	48	52	X	X	X	X	X	X		
30	47	A	A	O	X	A	O	X	A	A	61	62	62	59	68	63	60	58	59	56	53	52	44	A	A	A	A	A	A	A	A	A	
31	A	A	A	A	B	A	A	A	A	A	X	X	X	X	X	X	X	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	15	9	13	13	15	17	18	17	24	29	29	28	29	31	30	31	31	30	30	29	27	20	16	15									
MED	44	48	50	47	46	44	49	52	51	53	54	56	57	58	60	61	58	56	52	49	48	44	42	45									
U Q	58	58	56	56	55	53	56	58	60	56	61	60	64	64	66	64	64	59	56	54	52	48	46	53									
L Q	X	37	40	40	44	39	41	44	46	48	48	50	52	54	56	57	57	54	52	49	46	44	40	34	42								

OCT. 2021 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

OCT.2021 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	R 27	A	A	A	45	F 40	52	B	52	60	R 69	F 74	F 57	F 44	50	F 27	26	A	A	A
2	A	A	A	A	31	27	35	41	45	50	53	54	59	72	J 78	R 86	F 96	F 45	41	40	A	A	A	A
3	A	A	R 23	A	A	F 32	37	40	43	50	54	56	54	58	55	55	51	49	46	44	38	25	A	A
4	A	A	A	A	A	A	A	A	A	41	46	50	50	51	51	51	48	47	41	40	31	B	R 27	A
5	J 29	R	A	A	A	A	R 45	38	40	42	44	46	50	50	59	56	48	45	40	35	34	31	F 30	F 23
6	17	F 20	A	A	A	A	A	A	42	45	48	54	51	55	66	71	79	F 54	43	A	A	A	R 29	A
7	A	A	A	R 42	A	A	36	38	40	40	44	43	46	49	53	56	53	51	43	A	A	A	R 29	A
8	A	A	A	A	A	A	36	40	42	45	45	46	51	56	57	59	55	48	48	42	F 40	F 28	F 23	A
9	R 29	A	R 22	A	A	A	A	F 46	55	50	56	59	58	65	61	56	54	52	47	43	F 39	F 42	R 22	A
10	A	A	A	A	A	33	40	40	41	42	44	48	J 47	R 52	55	54	58	57	45	A	A	A	A	A
11	A	A	A	A	A	J 46	R B	B	B	R 36	36	B	J 40	R 47	49	51	R 49	R 44	41	F 36	A	A	A	A
12	A	A	A	B	B	B	B	A	A	A	A	B	B	R 36	B	47	R 34	A	A	A	A	A	A	47
13	A	A	A	A	A	B	B	A	41	43	B	43	46	44	45	46	44	44	41	41	38	32	28	A
14	A	A	A	A	A	A	A	B	45	48	48	46	48	51	51	51	V 51	48	40	35	A	A	A	A
15	A	A	A	A	A	R 28	F 30	A	44	46	37	44	B	50	52	51	48	46	46	41	38	38	37	36
16	A	A	A	A	A	B	A	39	44	45	43	46	50	52	50	50	45	42	46	Z 46	A	36	35	34
17	31	F 37	34	31	36	40	43	47	49	51	52	53	51	57	72	86	81	Z 54	38	A	38	A	A	A
18	A	A	A	A	A	A	A	R 50	A	R 37	R 35	R 34	R 37	R 37	R 39	R 40	R 40	R 38	R 38	36	27	A	A	R 32
19	A	F 28	A	A	41	32	F 34	A	A	A	R 38	R 36	38	44	44	46	44	44	43	40	A	A	A	A
20	A	A	F 32	J 32	R 38	39	38	A	44	R 42	46	49	50	50	53	52	53	52	47	44	40	34	A	A
21	A	A	A	A	32	F 28	A	A	42	44	45	47	49	46	48	48	46	46	48	39	38	33	R 36	A
22	A	A	A	A	33	37	42	46	49	50	54	51	49	50	51	55	53	53	53	42	38	34	36	39
23	34	F 18	19	37	38	41	F 50	54	56	57	53	54	53	53	56	53	51	58	50	48	J 40	R 38	F 24	F 19
24	F 19	A	F 14	F 36	F 32	F 47	F 44	52	58	58	58	57	59	60	57	63	59	F 54	F 46	43	F 34	A	A	A
25	A	A	A	A	A	A	46	45	47	49	53	51	53	52	53	55	51	51	47	47	42	41	F 29	38
26	A	A	A	A	A	A	A	A	46	47	49	51	52	55	52	50	48	48	44	42	38	36	38	38
27	41	A	A	40	39	47	F 52	59	61	59	59	61	59	58	60	57	55	53	50	48	46	40	48	F 46
28	F 50	50	F 31	F 35	42	49	50	F 60	68	72	72	70	69	64	F 59	58	60	56	50	F 46	F 45	46	42	53
29	52	F 48	F 36	F 43	V 49	56	63	69	73	74	75	74	67	69	67	59	60	56	59	50	46	49	Z 42	F 29
30	F 27	A	A	39	A	A	A	A	F 52	F 52	56	51	F 54	F 57	54	54	52	53	50	47	46	38	A	A
31	A	A	A	A	B	A	A	A	47	49	51	57	55	54	56	56	49	44	43	40	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	10	7	8	9	11	16	17	17	24	29	29	28	29	31	30	31	31	30	30	26	23	18	16	12
MED	30	F 28	27	37	36	38	41	46	45	46	48	50	51	52	54	55	52	49	46	42	38	36	32	37
U Q	41	48	F 33	41	41	46	46	51	53	50	55	54	56	58	59	58	57	53	48	46	42	40	36	42
L Q	F 27	F 20	20	34	32	32	36	40	42	42	44	46	48	50	51	51	48	45	41	40	36	33	28	F 30

OCT.2021 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

OCT.2021 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	75	38	40	81	26	52	56	50	36	E B E B	28 38	E B E B	43 45	E B E B	54	G	G	38	26	G	48	31	28	42					
2	30	31	28	24	16	16	18	22	G	G	28	30	36	31	E B E B	E B E B	E B E B	E B E B	34	40	44	26	27	43					
3	28	30	31	40	30	30	32	33	G	G	33	33	34	29	31	G	G	E B	19	G	E B E B	E B	8	28	30				
4	40	40	58	70	49	56	46	53	56	57	E B	42	G	E B	G	G	G	G	G	E B E B	E B	15	12	15	51				
5	33	51	48	44	84	86	54	64	G	G	26	26	27	26	28	30	30	G	G	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	22	20	34	47	61	52	52	54	35	G	31	30	G	G	28	28	E B E B	E B E B	E B	G	45	66	66	50	50				
7	38	35	28	36	32	36	17	22	G	G	26	28	30	38	30	27	27	27	22	G	19	41	34	44	34	30			
8	32	36	41	68	68	52	40	27	G	G	28	G	G	G	30	34	28	G	G	18	20	20	12	15	42				
9	24	40	26	55	77	62	52	30	G	E B	26	G	G	30	36	29	G	G	G	G	16	14	E B	12	32	24	34		
10	31	40	50	49	49	44	20	G	30	G	G	G	28	29	29	G	G	E B	24	41	44	48	35	52	48				
11	84	96	53	49	40	34	B	B	B	B	G	G	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	G	40	71	71	54					
12	56	78	85	B	B	B	B	60	50	54	55	B	E B E B	E B E B	E B E B	E B E B	29	36	42	49	66	40	50	52	46	34			
13	63	54	54	44	40	B	B	50	36	33	E B	31	G	31	31	27	27	23	23	G	18	15	12	31					
14	48	57	64	34	50	40	46	B	34	34	G	G	G	G	G	G	24	E B	34	19	37	44	93	47	50				
15	48	60	60	53	46	28	25	53	53	G	27	28	B	E B E B	E B E B	E B E B	E B E B	E B E B	E B	22	22	28	33	19	15				
16	77	50	62	40	40	B	58	34	36	G	G	G	G	E B	29	G	G	G	G	E B	20	17	25	12	10	8			
17	E B	9	10	E B	9	12	E B	11	18	20	G	G	G	G	29	29	E B E B	E B E B	E B E B	29	26	45	45	42	55	76	66		
18	43	88	55	48	54	48	70	49	54	45	48	32	G	34	34	37	E B	34	34	31	22	20	34	45	35				
19	60	72	93	32	32	32	G	57	56	48	G	E B E B	E B E B	29	G	G	G	G	27	27	39	57	50	62	77	47			
20	99	63	27	29	28	32	G	45	G	E B	37	30	30	30	30	30	29	G	24	21	G	G	G	K	31	36			
21	48	28	47	56	26	21	50	43	36	28	G	33	29	30	E B	G	E B	E B	E B	E B	20	13	31	28	33				
22	35	56	50	38	31	21	G	58	G	G	29	29	31	G	29	29	27	27	24	21	18	14	G	12	10				
23	12	20	20	31	50	37	30	G	30	30	36	31	31	J A	G	31	29	G	G	25	18	G	13	13	17				
24	18	E B	9	11	13	50	36	30	30	31	31	31	34	31	34	34	34	G	21	G	16	23	G	40	40				
25	43	42	45	47	49	52	27	73	29	31	G	G	31	G	G	G	G	G	26	20	28	23	38	19	21				
26	42	71	48	46	51	43	53	60	44	37	G	33	33	33	31	32	32	30	25	G	G	G	12	E B	8				
27	E B	10	105	51	34	22	G	G	G	G	28	137	32	33	42	33	33	24	28	28	12	18	16	13	13	10			
28	10	29	13	17	26	42	42	37	30	30	30	30	30	J A	G	31	24	33	29	36	25	28	33	31	E B E B	E B	9		
29	E B E B	9	10	26	13	19	28	24	26	G	G	G	G	G	G	G	G	G	G	G	G	E B E B	E B E B	E B E B	E B E B	E B E B			
30	25	45	49	31	40	26	49	46	39	32	E B E B	E B E B	48	46	37	G	G	24	24	24	28	23	25	21	E B	19	29	42	43
31	85	92	58	51	B	55	51	82	57	40	E B	30	32	G	32	30	31	G	G	36	22	42	42	42	69				
	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	30	29	28	28	29	30	31	30	28	29	30	30	31	31	31	31	31	31	31	30	31	31				
MED	38	42	48	42	40	36	36	45	47	G	G	G	G	30	G	G	G	G	28	25	G	23	31	28	34				
U Q	56	63	55	49	50	52	52	56	G	G	32	32	34	G	31	33	G	G	G	28	37	42	42	45	47				
L Q	24	30	28	31	27	28	20	G	34	30	30	G	G	29	29	28	28	24	20	18	14	13	13	E B	15				

OCT.2021 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

OCT.2021 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	10	8	8	12	7	11	18	20	14	28	38	B	43	46	54	21	21	26	20	8	7	10	6	7	
2	8	7	7	8	7	7	9	10	10	10	10	10	11	15	54	67	37	26	13	23	22	7	7	7	
3	7	7	6	10	6	12	9	9	18	13	10	12	12	12	22	15	14	22	11	9	13	B	7	17	
4	9	9	19	21	11	11	27	24	16	12	42	25	21	33	19	14	17	14	11	15	12		7	7	
5	7	15	14	14	13	25	36	19	13	12	12	10	10	10	19	17	12	12	11	18	15	14	9	11	
6	10	8	9	9	35	16	17	11	10	10	10	14	14	16	10	41	38	27	15	16	19	10	10	10	
7	9	8	8	7	14	9	8	9	9	9	10	10	10	10	12	12	12	9	6	7	7	11	8	7	
8	7	8	11	9	18	12	15	8	12	12	10	13	10	10	10	10	11	8	8	8	8	8	10	7	
9	7	8	8	15	16	16	10	9	8	26	15	12	12	16	14	11	11	10	11	13	12	13	9	8	
10	7	11	14	10	12	9	10	10	9	9	9	8	10	8	10	10	13	24	13	17	9	8	11	16	
11	8	10	26	14	17	12	B	B	B	15	15	B	40	40	22	36	38	36	28	11	11	8	7	40	
12	36	11	22	B	B	B	B	38	31	34	23	B	B	29	B	36	28	16	13	10	8	14	6	7	
13	13	7	11	12	16	B	B	15	13	24	B	31	24	20	17	20	21	23	18	12	12	8	8	8	
14	20	8	11	8	26	24	27	B	19	18	16	13	16	19	20	15	14	34	12	12	10	13	15	15	
15	12	13	10	11	21	9	10	20	15	12	12	14	B	38	34	30	X	25	25	22	12	9	10	7	6
16	23	22	16	23	23	B	18	13	12	12	14	13	13	14	29	18	17	15	14	17	10	12	10	8	
17	9	8	9	7	11	9	9	9	15	12	15	15	14	10	29	32	29	13	15	10	11	10	8	10	
18	10	10	17	13	13	16	26	20	16	15	24	20	18	24	22	27	34	21	12	10	8	8	7	11	
19	19	10	10	8	9	10	10	17	19	25	25	28	29	14	18	16	14	12	11	9	6	8	8	8	
20	14	14	13	15	12	16	13	18	18	37	14	11	11	11	11	11	14	11	10	9	9	6	7	7	
21	12	8	10	14	9	10	13	8	10	17	23	23	21	30	21	20	28	16	24	10	8	8	7	7	
22	17	18	26	14	15	14	11	11	10	12	12	12	12	12	12	12	8	9	12	7	6	7	7	7	
23	7	7	7	16	13	10	10	10	10	8	10	10	10	8	12	11	10	10	10	9	8	8	7	7	
24	6	9	6	7	11	8	8	8	8	8	9	11	11	9	9	8	10	10	13	8	6	6	9	9	
25	10	10	11	18	17	14	8	8	8	10	10	17	11	11	11	11	10	8	10	9	6	8	9	6	
26	8	8	9	8	9	11	15	18	10	10	10	14	10	14	9	13	10	9	7	10	12	12	8	8	
27	10	12	10	10	9	8	7	10	6	12	9	10	11	12	9	9	7	8	6	6	7	5	6	6	
28	6	6	7	6	7	20	14	14	14	13	14	14	12	12	10	7	10	6	7	9	5	8	8	8	
29	10	10	8	13	19	28	24	17	17	17	18	18	15	11	14	16	16	14	12	13	18	16	14	14	
30	14	18	15	20	21	21	28	24	20	22	48	46	27	18	16	16	15	15	11	12	19	11	14	13	
31	16	14	21	23	B	20	20	26	23	21	30	16	15	14	14	12	12	18	17	16	16	14	14	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	10	9	10	12	13	12	14	14	13	12	14	14	13	14	16	15	14	14	12	10	9	9	8	8	
U Q	14	12	15	15	19	20	26	20	18	21	23	23	21	20	22	21	25	23	15	13	12	12	10	11	
L Q	7	8	8	8	9	10	10	9	10	10	10	11	11	11	11	11	11	10	10	9	7	8	7	7	

OCT.2021 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 2021 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	238	A	A	A	E A 282	A	B	B	B	B	B	220	E B E A 246 270	Q E A 242 290	A	A	A	A	A	A
2	A	A	A	A	A E A 270	234	222	222	194	222	214	214	200	B	B	B	E B 232	A E A 282	A	A	A	A	A	A
3	A	A	212	A	A	A	A	A E A 338	236	224	196	212	212	216	216	196	218	230	224	220	214	228	A	196
4	204	A	A	A	A	A	A	A	A	A	B	206	212	E B 256	208	214	224	228	216	232	232	B	194	A
5	A	A	A	A	A	A	A	E B E A 248 282	218	200	208	172	222	208	210	224	214	232	216	230	236	234	234	E B 264
6	E A 336	A 290	A 198	A	A	A	A	A E A 280	238	188	208	196	196	198	B	B	E B 256	240	A	200	A	A	A	A
7	A	A	A	242	A	A	A	A	252	218	222	204	218	212	210	194	194	212	202	202	224	A	A	A
8	A	A	A	A	A	A	A	A	222	204	212	212	202	208	202	200	212	220	204	204	E A 224	220	236	242
9	206	A	H	A	A	A	A	A	236	208	200	228	200	220	198	198	196	206	206	200	212	240	E A 346	202
10	A	A	A	A	A	A	A	242	230	224	194	206	196	214	198	210	214	220	224	A	A	A	A	196
11	A	A	A	A	A	186	B	B	B	228	220	B	B	B	202	B	E B E B 274 246	E A 268	A	A	A	A	A	A
12	B	A	A	B	B	B	B	B	A	A	A	B	E B 248	B	B	E B 324	A	A	A	A	A	A	A	204
13	A	A	A	A	A	B	B	A E A 250	292	B	E B 228	214	238	224	214	220	232	232	220	220	210	238	A	A
14	A	A	A	A	A	A	A	B E A 244	260	200	200	200	216	200	206	224	204	B E A 230	A	A	A	A	A	A
15	A	A	A	A	A	A E A 258	230	A	A	196	198	220	B	B	B	236	212	234	E B 232	214	212	236	236	228
16	A	A	A	A	A	B	A	A	214	198	198	186	190	220	216	202	212	212	224	216	E A 226	240	240	234
17	244	256	276	272	260	244	228	216	208	216	202	204	214	214	204	240	E B E B 258	254	A	A	210	A	A	A
18	A	A	A	A	A	A	A	204	200	200	266	196	258	A E A 258	A	B	A	E A E A 272 262	A	A	A	A	A	262
19	A E A 262	A	A	A	A	A E A 248	A	A	A E A 302	216	216	214	214	214	232	244	E A 284	240	A	A	A	A	A	A
20	A	A	A	226	204	190	A	216	B	202	194	192	218	E B 228	204	210	210	210	210	196	E A 234	A	A	A
21	A	A	A	A	A	200	A	A	A	238	218	208	204	212	202	218	218	212	228	200	200	E A 248	A	A
22	A 192	A	A	A	A	250	222	202	194	192	200	222	208	208	198	212	204	194	210	212	206	206	236	226
23	248	A	A	A	A	A	260	222	208	208	200	196	196	200	208	208	204	194	210	200	202	214	246	272
24	A 272	308	290	E A 274	E A 324	A	A	214	192	208	196	188	196	196	204	204	204	208	210	192	230	260	A	A
25	A	A	A	A	A	A	260	224	220	204	226	202	190	204	194	216	214	200	206	232	228	E A 278	278	258
26	A	A	A	A	A	A	A	A	A	200	200	200	206	206	212	206	210	210	226	216	202	226	244	258
27	242	A	A	A E A 292	236	222	222	214	224	214	204	200	204	196	212	212	210	202	212	226	214	224	240	Q
28	Q 236	266	254	Q 278	E B 254	256	244	222	230	196	204	196	196	218	202	216	206	200	206	228	E A E A 234	224	246	Q 234
29	Q 228	254	266	B 250	E B 278	224	216	204	212	204	202	200	196	204	222	208	200	224	224	E A 208	E B E B 228	240	242	A
30	E A 328	A	A E A 364	A E A 274	A	A	A	A E A 262	242	B	B	E A 240	226	216	198	208	206	224	234	B E A 278	A	A	A	A
31	A	A	A	A	B	A	A	A	A	222	190	212	212	208	188	208	208	332	282	268	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	11	6	6	6	7	10	14	16	22	27	26	27	27	27	27	26	28	28	27	25	20	18	15	13
MED	235	264	260	U 254	246	223	234	221	214	206	202	203	208	206	203	212	210	210	217	218	214	230	237	237
U Q	E A 272	290	276	278	E A E A 292 270	248	227	236	228	218	212	214	218	214	218	220	233	232	237	229	E A 248	244	260	A
L Q	206	256	212	242	238	236	224	216	208	200	200	196	196	200	198	206	206	205	210	212	204	224	224	227

OCT. 2021 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

NOV.2021 f<sub>XI</sub> (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	X 48	B O	X 44	X 51	X 46	B	A	X 48	O	X 53	X 60	X 58	O	X 64	B O	X 54	O	X 53	X 54	X 52	X 51	X 51	R O	X 36
2	X 36	A	X 46	55	A	A	A	A	104	B	B	O	X 46	X 46	X 52	X 53	O	X 60	X 61	54	51	46	X 42	A	A	A
3	A	A	A	A	B	A	X 52	X 57	X 59	X 60	X 60	X 60	X 59	X 59	X 61	X 57	X 56	X 58	X 52	X 48	X 48	X 48	X 48	X 48	X 48	B
4	A	B	A	56	A	B	A	A	A	B	B	A	X 47	B	A	61	87	A	A	X 36	A	A	A	A	A	X 31
5	X 29	A O	X 48	X 48	X 46	X 53	59	59	60	60	62	58	54	53	53	52	52	53	50	46	50	X 50	X 46	X 76	A	A
6	A	A	B	X 41	X 51	X 53	58	A	X 52	X 56	62	62	69	62	62	X 59	O	X 54	X 54	X 49	X 51	X 36	X 38	B	A	A
7	A	A	X 41	A	B	B	A	X 50	53	51	49	47	48	50	48	48	52	51	48	46	46	44	45	44	X 44	X
8	X 44	X 45	X 50	X 51	X 54	X 53	54	59	64	66	66	64	66	60	59	58	56	59	55	54	51	53	35	31	X 31	X
9	56	A	B	X 40	X A	X A	X 50	X 54	61	63	61	62	61	60	61	56	53	54	53	52	52	48	38	X 38	A	A
10	A O	X 39	A	A	B	A	A	X 54	55	58	60	O	X 55	X 58	61	X 58	O	X 53	X 51	X 53	50	50	X 45	X 46	X 40	X 57
11	A	A O	X 41	50	48	51	59	63	67	68	63	58	54	54	53	56	56	58	X 52	X 50	X 48	X 48	X 50	X 50	X 50	X
12	X 48	X 48	X 48	X 54	58	R	A	A	56	64	62	62	62	60	59	60	55	53	54	53	55	47	49	57	X 57	X
13	X 45	X 42	X 47	56	55	61	57	60	62	64	61	60	56	57	58	56	54	52	51	50	49	49	48	45	X 45	X
14	43	43	50	53	A	A	X 48	X 51	54	60	61	60	58	58	56	53	50	49	54	50	48	43	54	A	A	A
15	A	A	A	A	X 45	X 48	54	59	57	52	52	53	55	57	57	54	53	53	53	51	51	52	A	A	A	A
16	A	A	60	52	A	51	50	A	O	X 45	A	X 44	X 44	X 48	X 53	X 53	X 50	X 48	X 46	X 44	X 43	X 43	X 39	X 44	X	X
17	X 38	A	A	A	X 41	X 46	A	A	42	46	47	B	X 51	X 53	B	B	X 50	X 52	X 47	X 47	X 48	X 44	X 42	X 38	X	X
18	X 40	74	A	A	A	48	53	54	59	57	60	59	57	57	54	51	52	51	52	52	49	47	41	38	X 38	X
19	X 37	X 41	X A	A	X 44	51	51	54	60	61	59	59	54	53	54	55	52	53	49	48	46	46	42	33	X 33	X
20	X 40	A	X 48	A	A O	X 43	50	54	55	57	58	58	65	58	59	66	55	50	50	46	38	44	59	A	A	A
21	A	64	A	A	44	A	A	A	A	X 49	X 50	X 50	X 48	X 53	X 47	X 54	X 50	X 48	X 51	X 45	X 45	X 39	X 37	X 37	X	A
22	A	X 39	A	A	A	A	X 44	A	A	52	53	45	45	49	50	51	46	49	48	45	42	47	35	36	X	X
23	43	A	A	A	A	R	X 50	X 54	X 56	56	52	52	56	56	B O	X 57	X 57	X 53	X 48	X 48	X 41	X 46	X 46	X 39	X	X
24	B	A	A	A	A	A	A	49	52	52	54	56	48	54	58	56	51	52	52	46	48	51	47	44	X	X
25	X 44	X 45	X 44	A	X 43	A	X 52	A	A	A	X 50	X 52	X 48	X 51	X 52	X 52	X 53	X 51	X 49	X 51	X 46	X 43	X 43	X 40	X	X
26	X 42	X 46	X 45	X 49	X 52	X 54	60	59	66	68	70	67	64	56	57	56	56	56	55	55	48	52	54	49	X 49	X
27	X 52	X 54	X 56	X 65	X 62	X 66	70	75	72	70	69	68	68	72	65	A	X 61	X 64	X 63	X 57	X 52	X 50	X 45	X 37	X	X
28	X 44	X 48	X 52	A	A	A	O	X 55	X 44	X 58	X 56	X 59	X 54	X 58	X 55	X 58	X 56	X 58	X 53	X 51	X 52	X 52	X 55	X 52	X	X
29	X 51	A	90	44	A	62	A	A	A	A	X 46	X 46	X 46	X 45	X 51	X 50	X 49	X 49	X 49	X 47	X 44	X 43	X 46	X	X	X
30	X 40	X 40	X 42	X 51	X 56	X 55	X 55	X 55	X 66	X 67	X 66	X 60	X 55	X 56	X 56	X 54	X 53	X 52	X 52	X 54	X 52	X 52	X 52	X 45	X 45	X
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	18	14	17	15	15	16	20	20	23	26	25	28	30	29	27	27	30	29	29	30	29	27	25	21		
MED	X 43	X 45	X 48	51	48	52	54	54	59	58	60	58	56	56	56	56	54	53	51	50	48	47	45	44		
U Q	X 45	X 48	X 51	55	55	54	58	59	64	64	62	60	60	59	59	58	56	54	53	52	51	51	51	48		
L Q	X 40	X 41	X 44	X 48	X 44	X 50	X 50	X 52	X 55	X 52	X 52	X 52	X 48	X 52	X 53	X 52	X 52	X 51	X 49	X 46	X 45	X 44	X 40	X 36		

NOV.2021 f<sub>XI</sub> (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

NOV.2021 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	42	B	38	45	40	B	A	42	A	47	54	52	R	B	R	R	48	46	45	45	R	R		
2	30	A	40	F	A	A	A	A	F	B	B	40	40	46	47	54	55	48	45	40	36	A	A	A		
3	A	A	A	A	B	A	46	51	53	54	54	54	53	53	55	51	50	52	46	42	42	42	42	B		
4	A	B	A	F	A	B	A	A	A	B	B	A	41		B	A	F	F	A	A	30	A	A	25		
5	23	A	R	42	42	40	47	F	53	54	54	56	52	48	47	47	46	46	47	44	40	R	A	A		
6	A	A	B	35	45	47	F	A	46	50	F	F	F	56	56	R	48	48	43	F	30	32	B	A		
7	B	A	35	A	B	B	A	F	F	F	43	41	42	44	42	42	46	45	42	40	40	38	39	38		
8	38	39	44	45	48	47	48	53	58	60	60	58	60	54	53	52	50	53	49	48	45	Z	R	25		
9	A	A	B	34	A	A	44	48	55	57	55	56	55	54	55	50	47	48	47	46	46	42	32	A		
10	A	R	A	A	B	A	A	48	49	52	F	49	52	55	52	47	45	47	44	44	39	40	34	A		
11	A	A	R	A	F	Z	53	57	61	62	57	52	48	48	47	50	50	52	R	44	42	42	44	44		
12	42	42	42	48	F	R	A	A	F	F	F	50	56	54	53	54	49	47	48	47	49	41	43	F		
13	39	36	41	38	F	F	44	51	54	56	58	55	54	50	51	52	50	48	46	45	44	43	43	39		
14	37	34	F	F	A	A	42	45	48	54	55	54	52	52	50	47	44	43	48	44	42	37	F	A		
15	A	A	A	A	39	42	48	53	51	46	46	47	49	51	51	48	47	47	47	45	42	40	A	A		
16	A	A	A	F	A	F	A	A	A	R	A	38	38	42	47	47	44	42	40	38	37	37	33	Z		
17	32	A	A	A	35	R	A	A	36	40	41	R	B	44	47	B	B	44	46	41	R	42	38	36	32	
18	34	35	A	A	A	F	F	44	48	53	51	54	53	51	51	48	45	46	45	46	46	43	41	35	32	
19	31	35	A	A	38	F	42	45	48	54	55	53	53	48	47	48	49	46	47	43	42	40	40	36	27	
20	34	A	42	A	A	R	37	44	48	49	51	52	52	59	52	53	R	60	49	44	44	40	32	38	43	A
21	A	A	A	A	F	A	A	A	A	A	43	44	44	44	42	47	41	48	44	42	45	39	33	31	A	
22	A	33	A	A	A	A	38	A	A	A	46	47	39	39	43	44	45	40	43	42	39	36	36	F	F	
23	F	A	A	A	A	A	44	48	50	44	42	46	50	50		B	R	R	R	A	35	40	40	33		
24	B	A	A	A	A	A	A	43	46	46	48	50	42	48	52	50	45	46	46	40	42	45	41	38		
25	38	39	R	A	A	A	46	A	A	A	44	46	42	45	46	46	47	45	43	45	40	37	37	34		
26	36	40	39	43	46	48	F	F	53	58	64	61	58	50	51	50	A	50	50	49	49	42	46	48	R	
27	46	48	51	F	56	60	64	69	66	64	63	62	62	66	59		55	58	57	51	46	44	39	31		
28	38	F	46	A	A	A	F	R	52	50	53	48	52	53	49	52	50	52	47	45	46	46	49	46		
29	45	A	A	A	A	A	A	A	A	A	A	40	40	40	39	45	44	43	43	43	41	38	37	35		
30	34	34	36	35	A	F	42	49	Z	61	60	54	49	50	50	48	47	46	46	48	46	46	46	39		
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	17	13	15	14	14	15	20	19	22	26	25	28	30	29	27	27	30	29	29	29	29	27	24	20		
MED	36	36	41	38	40	45	44	48	52	52	53	51	50	50	50	49	47	47	45	44	42	40	38	34		
U Q	38	40	42	43	45	47	48	53	55	58	56	54	54	53	53	51	50	48	47	46	44	44	42	39		
L Q	33	34	38	35	37	40	43	48	48	46	46	46	42	46	47	46	46	45	43	40	38	38	34	30		

NOV.2021 foF2 (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

NOV.2021 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	56	53	38	B	38	28	31	B	46	32	44	34	39	E	B	B	B	E	B	B	G	22	22	22	37	24					
2	34	68	20	29	99	63	63	58	G	B	B	E	B	G	41	27	30	23	G	E	B	B	30	23	24	23	40	40	52		
3	55	42	47	48	B	63	35	30	G	G	30	30	30	34	G	29	29	G	E	B	B	E	B	E	B	E	B	B			
4	48	B	51	28	57	B	55	56	60	B	B	50	23	G	B	32	33	39	35	35	24	47	36	46	51						
5	26	41	G	31	31	24	19	19	G	G	28	31	31	G	34	32	31	G	36	24	24	26	E	B	33	43	43	46			
6	54	60	B	48	36	32	34	56	E	B	G	G	34	E	B	E	B	E	B	E	B	E	B	25	34	27	32	B	74		
7	46	46	56	46	B	B	50	43	43	33	36	33	G	G	26	31	30	30	28	G	22	20	16	15	G						
8	14	14	15	18	G	25	25	30	32	34	30	G	G	46	30	30	28	G	G	22	19	G	17	33	33						
9	36	55	B	32	55	71	42	34	40	38	42	E	B	E	B	E	B	G	29	G	G	E	B	E	B	21	19	15	69		
10	97	56	46	96	B	64	35	38	G	31	27	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	17	34
11	48	36	G	44	22	46	41	G	30	32	32	32	G	33	32	32	17	30	38	24	22	19	19	19	G						
12	16	G	56	35	31	31	60	51	30	30	34	G	34	32	32	28	28	26	26	22	20	G	12	16							
13	16	32	G	30	26	26	40	40	G	34	G	23	34	31	31	31	32	32	27	27	G	18	16	18							
14	G	30	42	28	47	54	38	34	34	34	34	34	34	34	34	20	19	26	15	23	22	33	45								
15	53	52	52	47	G	33	46	30	33	12	35	35	35	35	35	35	35	32	30	22	35	25	53	58							
16	87	57	40	34	69	33	49	52	61	51	51	33	36	33	33	24	G	G	G	E	B	24	24	35	40	27	23				
17	33	E	B	56	51	32	53	62	54	40	28	E	B	B	E	B	B	G	E	B	E	B	E	B	21	34	38	27			
18	30	E	B	46	48	59	30	30	30	30	29	G	E	B	G	32	23	31	G	33	28	G	24	23	20	G	G	16			
19	17	34	47	50	G	64	27	35	35	32	34	34	37	35	35	35	31	G	G	G	30	24	23	23	14						
20	14	36	41	60	52	34	26	32	32	G	36	36	33	31	34	32	32	G	G	G	25	30	22	21	40	43					
21	81	81	57	49	29	47	56	52	48	34	64	32	24	50	49	G	E	B	G	32	27	35	55	19	34	42					
22	49	40	56	51	63	51	34	53	39	24	G	30	32	J	A	32	G	32	26	24	23	19	32	G	20						
23	29	43	48	52	41	G	46	46	46	36	31	33	30	32	B	E	B	E	B	E	B	G	31	25	43	33					
24	B	54	40	47	44	44	53	30	32	35	35	32	32	34	43	32	G	30	G	G	25	25	17	17	15						
25	G	32	G	64	43	49	41	48	49	47	34	34	36	49	38	32	25	G	G	G	G	21	21	16	16						
26	19	19	G	23	23	26	31	42	36	37	36	32	E	B	36	40	35	36	51	37	44	29	29	23	82	111					
27	G	26	17	17	22	23	26	29	29	32	33	E	B	34	40	38	33	70	37	28	24	39	39	34	34	E	B	22			
28	22	22	33	62	52	44	29	47	39	32	33	37	35	37	48	35	35	37	30	26	42	35	26	18							
29	36	122	61	52	58	54	57	62	51	55	48	G	67	30	31	37	31	G	G	G	27	27	23	20	26	30					
30	22	32	33	58	37	35	29	29	G	32	36	36	34	33	38	32	32	G	G	G	28	24	24	21	18	16					
31																															
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23							
CNT	29	29	28	29	27	28	30	29	30	28	28	29	30	28	28	28	30	30	30	30	30	29	29	29							
MED	33	41	42	47	38	40	39	40	34	32	34	32	G	33	32	E	G	G	E	G	G	E	G	G	21	26	27				
U Q	51	56	52	52	55	54	50	52	46	36	36	34	35	38	35	36	35	30	27	27	29	33	39	46							
L Q	16	31	G	30	G	29	30	30	30	30	31	G	G	32	32	32	29	G	24	23	21	20	16	18							

NOV.2021 ftEs (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

NOV.2021 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	12	20	16	B	24	13	16	B	37	20	26	19	21	42	42	B	43	36	23	15	14	12	11	10	
2	12	15	11	16	24	17	33	21	63	B	B	41	21	14	16	39	39	14	16	17	16	20	15	24	
3	24	15	18	20	B	20	16	16	16	17	18	16	19	16	16	17	17	14	25	24	22	24	25	B	
4	34	B	23	17	40	B	24	20	26	B	B	19	15	B	19	14	14	10	10	9	10	10	8	7	
5	8	10	13	16	16	12	7	10	11	21	14	11	12	13	13	11	11	11	10	9	33	14	10	20	
6	20	19	B	15	10	11	14	35	22	35	19	21	12	30	32	41	34	28	11	11	14	12	B	10	
7	36	24	10	33	B	B	28	20	14	13	13	14	19	16	17	14	12	12	12	10	10	7	7	9	
8	8	7	6	9	7	8	8	9	10	11	13	24	22	17	12	17	15	11	15	13	13	9	21	8	
9	21	27	B	23	14	17	12	9	16	15	42	42	31	25	16	16	16	16	15	17	21	19	8	16	
10	13	16	13	24	B	25	12	14	14	12	21	39	33	32	32	40	27	28	26	24	18	14	9	10	
11	11	10	20	25	10	14	8	9	8	7	9	10	12	18	15	15	12	14	38	24	22	8	11	11	
12	9	9	10	16	8	15	14	10	10	10	8	10	10	9	9	8	10	9	8	8	9	7	8	8	
13	7	7	12	10	10	10	8	12	9	9	9	9	10	11	11	11	10	8	9	10	11	7	6	6	
14	14	14	14	7	14	11	11	10	8	8	10	10	10	10	10	12	13	10	10	10	6	8	7	12	
15	12	10	18	13	14	17	12	7	7	7	9	9	9	11	11	10	10	8	8	7	8	11	12	7	
16	14	9	7	7	11	7	12	15	15	12	14	11	10	8	11	16	18	15	24	7	11	7	6	7	
17	7	10	16	10	18	19	19	13	8	10	37	B	29	16	B	B	15	26	24	26	12	16	8	6	
18	8	28	15	26	13	10	7	8	8	14	18	31	16	12	14	14	14	20	14	10	11	10	10	8	
19	7	7	11	16	16	9	10	10	10	11	12	11	11	13	13	9	10	12	10	12	12	9	9	7	
20	7	24	10	16	12	10	10	8	9	8	11	9	11	14	9	12	14	14	10	8	8	14	7	7	
21	8	8	19	12	15	17	26	16	25	11	15	15	15	16	22	23	31	15	11	10	8	8	7	8	
22	14	13	24	32	14	14	17	19	25	15	15	10	14	14	13	13	10	10	10	10	19	9	9	8	
23	8	35	37	19	18	24	16	17	22	10	13	10	10	12	B	44	43	38	20	15	11	10	8	9	
24	B	33	12	16	16	25	13	11	9	9	11	14	11	11	20	20	17	14	14	10	10	8	10	8	
25	8	10	19	14	12	13	10	16	11	12	12	11	10	12	11	16	19	16	16	11	7	7	8	11	
26	6	6	9	6	7	9	14	14	8	17	20	10	36	26	22	14	11	8	10	10	8	12	17	19	
27	14	10	6	6	10	8	8	9	12	12	12	34	22	18	17	11	11	11	19	15	15	7	7	22	
28	8	9	14	16	10	8	8	8	8	8	8	11	10	10	10	10	10	9	9	8	12	7	6	6	
29	9	9	9	10	10	8	11	21	26	16	16	15	14	12	12	11	15	13	15	9	8	6	7	7	
30	7	7	11	11	14	10	10	8	8	8	8	12	15	15	10	11	12	12	10	13	9	8	9	7	
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
MED	10	10	14	16	14	13	12	12	11	12	14	13	14	14	14	14	14	14	13	10	11	9	8	8	
U Q	14	20	19	20	18	17	16	17	22	16	19	21	21	18	20	20	18	16	19	15	15	12	11	11	
L Q	8	9	10	10	10	10	10	9	8	9	11	10	10	12	11	11	11	10	10	9	9	7	7	7	

NOV.2021 fmin (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 2021 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	B	A	266	250		B	A	A	A	222	216		B	B	B	B	B	B	A	A	A	A						
2	222	242	222	194	A	A	A	A	206		B	B	B	218	228	212	B	B	B	B	B	232	236	A	A						
3	A	A	A	A	B	A	A	326	220	218	194	198	198	208	210	204	204	H	H		B	230	234	E	B						
4	A	B	A	A	B	B	A	A	A	B	B	A		212		B	A	A		194	A	A	A	A	A						
5	A	A	220	A	A	220	220	220	210	210	202	198	208	208	208	208	208	198	216	196	H	B	A	A	A						
6	A	A	B	A	A	E	A	E	A	A	A	E	B	272	210	216	210	204	E	B	B	B	236	222	232						
7	B	A	A	B	B	B	A	E	A	310	210	194	188	212	218	214	214	202	202	212	214	214	228	E	A						
8	250	E	A	A	224	254	220	220	206	230	220	208	198	208	196	202	208	200	202	202	202	198	212	228	E	B					
9	A	A	B	A	A	A	A		214	196		B		214	224	218	202	216	216	226	226	248	228	222	A	A					
10	A	234	A	A	B	A	A	A		208	224	210		216	216	234		216	226	226	230	228	240	236	A	A					
11	A	A	196	A	E	A	A	A	200	222	224	196	196	192	230	202	202	198	232		B	E	B	240	226	240	234				
12	E	A	E	A	E	A	A	A	A	206	202	198	196	196	196	208	194	204	198	200	198	214	222	228	230	O					
13	E	A	E	A	E	A	A	H		202	202	190	190	202	192	218	204	198	212	212	212	212	208	232	240	A	A				
14	A	A	A	A	A	A	A	E	A	264	212	204	186	184	218	202	210	202	204	204	200	212	208	206	A	A					
15	A	A	A	A	206	228	204	226	196	214	202	202	202	202	202	202	202	202	202	210	210	A	E	A	A	A					
16	A	A	A	A	A	A	A	A	A	A	A	A	A		204	204	204	218	202	216	230	228	A	A	E	A	A				
17	216	A	A	A	E	A	A	A	A	A	220	B	B	214	206		B	B	206	206	216	220	220	E	A	A	E	A			
18	206	E	B	A	A	220	204	204	210	196	192	196	188	210	202	224	208	206	216	200	224	220	232	250	E	A	A	A			
19	250	E	A	A	242	214	200	194	220	196	192	230	194	194	196	200	210	194	206	218	E	A	E	A	A	244	A	A			
20	196	A	A	A	A	A	232	208	204	196	196	196	214	206	206	128	206	206	196	234	226	A	A	A	A	A	A	A			
21	A	A	A	A	A	A	A	A	A	226	194	204	206	206	204	218	214	210	186	218	A	258	A	A	A	A	A	A			
22	A	A	A	A	A	A	A	A	A	212	202	188	214	206	190	200	200	214	188	222	218	284	A	A	A	A	A	A			
23	A	B	A	A	A	A	A	A	A	260	244	194	200	184	204		B	B	B	B	202	A	E	A	A	A	E	A	A		
24	B	A	A	A	A	A	A	A	A	218	202	200	200	196	198	198	214	196	202	198	208	200	230	198	224	206	E	A	A		
25	200	E	A	A	A	A	A	A	A	A	A	206	192	220		204	204	204	204	214	200	218	218	218	244	E	A	A	A		
26	A	E	A	244	244	226	220	220	220	208	226	208	200	216	232	202	202	E	A	A	A	E	A	A	A	E	A	A	A		
27	250	E	A	A	E	A	234	224	206	192	196	196	196	214	200	198	224	A	206	214	214	214	224	224	252	284	E	A	E	B	
28	250	E	A	A	A	A	A	A	210	240	202	202	190	212	222	208	212	200	202	208	192	200	E	A	E	A	A	226	204	A	
29	210	A	A	A	A	A	A	A	A	A	A	A		184	220	194	214	200	214	210	222	238	242	242	272	206	E	A	A	A	
30	A	A	A	A	A	A	206	220	206	210	200	200	188	206	206	194	196	200	222	222	212	224	218	224	218	208	A	A	A	A	
31																															
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23							
CNT	12	10	8	6	9	11	14	17	19	25	23	24	30	27	26	22	29	28	27	27	24	23	17	16							
MED	221	E	A	230	220	237	221	210	213	208	206	198	198	208	206	206	202	203	210	213	216	222	226	E	A	E	A	244	A	A	
U Q	250	E	A	E	A	E	A	282	228	232	233	212	222	202	208	216	210	214	204	212	217	222	226	236	246	256	275	E	A	E	A
L Q	208	242	221	214	227	220	204	202	202	196	192	196	200	198	202	200	201	203	202	202	218	220	225	219							

NOV. 2021 h'F (KM)

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## IONOSPHERIC DATA STATION SHOWA-ST.

DEC.2021 f<sub>XI</sub> (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	45	A	A	54	A	64	55	A	48	53	B	B	X	X	X	59	A	X	55	X	X	A	A
2	A	A	A	A	A	A	62	A	58	56	B	B	O	X	X	X	O	X	X	X	O	X	A	X
3	O	X	O	X	A	A	A	X	X	X	X	X	X	X	X	X	X	X	O	X	X	X	X	X
4	A	A	44	78	O	X	A	A	A	X	X	B	O	X	X	X	X	X	X	X	X	X	X	X
5	X	X	O	X	X	X	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A
6	A	B	X	B	A	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	47	44	X	X	X	X	52	63	66	55	62	58	55	57	64	64	57	56	56	55	51	46	42	46
9	X	X	X	X	O	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10	X	X	X	X	X	X	68	71	71	66	66	63	61	59	59	59	59	54	53	54	53	53	49	45
11	X	A	A	A	A	X	48	58	A	A	X	X	O	X	X	X	X	X	X	X	X	X	X	X
12	X	X	X	X	O	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
13	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14	X	X	X	X	X	X	55	52	59	64	68	68	66	67	63	60	58	57	60	56	45	45	49	44
15	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16	A	91	54	A	49	50	56	A	A	X	X	O	X	X	X	X	O	X	X	X	X	X	X	X
17	X	X	X	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18	X	X	X	X	X	X	51	52	58	59	62	61	60	57	58	57	58	57	55	52	53	56	56	
19	X	X	X	X	X	X	55	52	59	64	68	68	66	67	63	60	58	57	60	56	45	45	49	44
20	A	A	A	O	X	50	52	61	58	A	A	X	X	X	X	R	O	X	X	X	X	X	X	X
21	50	A	A	A	R	48	A	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22	X	X	X	X	A	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	X	X	X	X
23	B	O	X	R	A	B	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
24	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
25	X	A	A	A	58	51	67	76	74	78	75	78	81	82	75	72	66	56	57	60	51	51	R	
26	X	O	X	X	X	A	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
27	X	X	X	X	X	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
28	X	X	X	X	X	A	A	A	X	A	A	A	54	54	58	62	62	56	53	55	54	47	46	42
29	X	X	X	X	X	X	X	X	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	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	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	23	22	23	20	20	22	23	24	26	28	29	28	30	31	30	31	31	29	31	31	31	30	28	27
MED	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
U Q	48	49	51	52	56	52	58	59	60	64	62	62	59	59	60	60	57	55	53	54	50	50	49	46
L Q	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	50	51	54	56	58	58	65	70	71	72	68	66	67	67	66	64	62	58	57	56	53	54	52	50
	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	45	45	44	48	51	50	55	54	57	56	56	55	55	56	57	57	54	53	50	50	47	46	46	44

DEC.2021 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

DEC.2021 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	F 35	A	A	F 42	A	A	R 49	A	R 42	47	B	B	57	62	58	F 48	A	40	44	F 40	48	A	A
2	A	A	R 32	A	A	A	F 46	A	52	50	B	B	R 52	55	50	49	R 47	47	35	44	R 37	A	A	38
3	R 36	R 34	A	A	A	A	44	50	53	50	51	53	53	51	51	57	52	45	R 40	46	R 44	40	50	38
4	A	A	32	35	34	A	A	A	42	47	44	B	48	50	46	48	48	48	44	41	41	39	41	F 39
5	36	32	R 44	43	51	50	A	A	F 48	45	46	47	47	48	53	54	56	53	46	46	42	33	A	A
6	A	B	38	B	A	44	51	54	54	52	54	55	55	53	54	57	56	49	38	36	35	45	38	38
7	A	A	A	A	A	44	47	50	48	48	48	47	49	49	47	47	47	45	46	44	40	43	38	31
8	F 35	38	38	42	F 44	46	F 46	F 48	49	49	52	V 49	51	58	58	51	50	50	49	45	40	36	36	40
9	J 38	R 38	V 36	F 46	R 43	A	45	52	54	60	58	56	53	51	48	51	46	46	47	50	46	40	41	42
10	42	40	46	48	49	50	F 53	F 61	F 60	60	60	57	55	R 53	53	53	48	47	48	47	47	43	43	39
11	37	A	A	A	A	42	F 48	A	A	44	50	47	44	42	48	52	47	46	44	44	47	44	40	40
12	39	42	A	40	J 40	R 44	50	A	52	50	55	52	51	49	51	49	48	47	45	44	42	R 38	36	36
13	R 41	36	38	A	44	45	52	A	51	53	55	F 50	49	50	52	49	46	47	44	44	46	48	45	45
14	42	44	50	50	52	52	F 42	46	53	F 47	Z 61	F 57	60	61	57	54	52	51	54	50	39	39	43	38
15	40	A	38	41	F 44	33	54	40	41	58	58	59	61	63	66	53	46	48	46	38	44	38	39	35
16	A	A	A	A	A	44	F 40	A	A	41	54	R 48	53	45	51	51	R 51	49	48	48	42	36	36	38
17	44	39	F 38	A	A	A	45	46	52	53	56	55	54	51	52	51	52	52	51	49	46	47	50	50
18	45	45	F 42	42	48	56	F 53	Z 63	74	Z 70	65	64	64	65	64	60	56	56	56	51	49	47	45	Z 45
19	46	43	50	52	52	58	F 63	76	77	74	74	68	63	64	60	58	58	54	54	54	42	A	40	A
20	A	A	A	R 44	F 38	A	F 43	A	A	A	48	45	46	J 47	R 47	R 52	R 44	J 47	R 40	39	40	44	47	44
21	F 39	A	A	A	R	Z 42	A	R 45	49	49	50	56	53	53	53	52	50	45	44	45	42	44	40	40
22	39	45	46	48	A	42	45	48	50	A	50	50	R 52	R 52	56	61	57	48	45	48	48	50	48	B
23	B	R 40	A	A	B 41	J 41	R 48	A	55	62	55	49	54	52	52	55	54	52	52	54	52	50	44	F 36
24	42	49	49	49	F 44	F 48	52	50	62	68	67	56	46	R 59	56	56	55	50	52	53	48	40	37	40
25	43	A	A	A	F 44	F 36	A	F 50	V 70	68	72	69	72	75	76	69	66	60	50	51	54	45	V 45	R
26	38	43	38	41	A	45	A	54	56	61	61	59	60	61	63	61	62	62	57	56	52	56	52	50
27	53	45	45	51	54	A	A	54	F 58	F 65	61	63	66	66	63	63	64	50	51	49	45	44	42	40
28	40	F 40	46	A	A	A	A	52	A	A	A	43	F 44	F 45	F 54	F 56	50	47	49	48	41	40	47	36
29	44	46	46	45	F 43	51	60	F 63	F 69	F 63	F 59	F 54	F 56	F 60	F 59	59	56	54	47	45	44	44	43	39
30	45	J 48	R 43	45	F 46	52	64	65	F 52	F 52	56	65	67	62	54	50	52	54	49	50	45	44	43	38
31	45	45	46	45	52	53	F 58	68	73	76	79	73	66	56	54	55	51	A	49	50	46	45	43	44
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	23	21	21	18	19	21	22	23	25	28	29	28	30	31	30	31	31	29	31	31	31	29	28	26
MED	41	42	43	45	44	45	49	50	53	52	55	55	53	53	54	54	51	49	47	47	44	44	43	39
U Q	44	45	46	48	51	52	53	61	61	62	61	58	60	61	60	58	56	52	51	50	47	46	45	42
L Q	38	38	38	42	F 43	42	45	48	50	48	50	49	49	50	51	51	48	47	44	44	41	40	40	38

DEC.2021 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

DEC.2021 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz IN 15.0SEC IN MANUAL SCALING

D <sup>H</sup>	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	51	24	51	46	44	75	91	32	55	55	32	B	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	G						
2	102	47	23	64	54	42	39	54	42	32	G	B	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	G							
3	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	45	46	54	45	38	27	33	33	33	36	35	32	G	G							
4	48	42	30	41	56	52	56	56	60	31	G	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	33	29	26	26	G	24	21
5	26	35	35	32	36	37	54	48	43	34	62	34	34	34	34	31	28	G		25	26	31	22	56
6	54	B	47	63	50	40	37	30	33	33	34	34	32	32	31	G		28	27	G	G	29	33	37
7	48	41	44	50	60	53	44	34	29	32	36	36	32	32	61	66	35	28	27	23	23	20	18	32
8	20	20	17	22	33	45	38	38	28	41	35	33	34	G	34	31	31	28	27	24	22	20	58	26
9	G	21	24	60	55	50	49	42	33	30	24	G	32	32	34	34	34	29	G	25	24	20	18	16
10	18	28	34	26	24	19	34	27	32	34	34	36	49	86	71	65	35	30	30	35	26	25	20	17
11	18	54	51	52	47	31	51	35	62	58	33	38	35	34	35	41	32	27	30	25	25	32	20	22
12	51	42	51	43	40	39	49	62	42	30	34	44	95	68	34	34	34	30	30	27	21	21	36	26
13	35	35	35	42	47	40	47	63	83	50	31	46	65	41	38	72	35	31	27	25	25	31	34	19
14	19	19	24	29	29	34	34	58	49	32	31	34	G	34	41	36	36	37	32	22	38	28	35	35
15	37	52	114	71	30	28	41	46	46	33	36	38	39	37	38	35	35	G		34	41	43	26	34
16	52	60	45	58	53	43	47	56	66	37	35	B <sup>E</sup>	B <sup>E</sup>	G	32	32	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	31	43	27	39	39
17	31	43	45	57	48	44	58	37	35	35	36	34	33	36	36	34	34	36	38	32	34	23	19	19
18	19	24	34	45	36	46	48	35	35	35	38	48	57	60	45	34	40	36	32	28	28	26	47	36
19	32	30	32	37	37	44	32	34	34	36	36	41	37	39	39	37	37	33	35	26	30	46	40	63
20	84	77	59	58	36	35	45	55	57	52	35	36	40	63	32	35	60	G	34	34	G	37	42	40
21	36	51	51	54	45	29	52	38	G	34	34	26	39	G	32	32	35	G	G	70	68	32	25	38
22	26	37	34	42	56	38	40	36	36	56	41	38	37	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	G	35	35	32	27	38	29
23	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	41	52	B	50	50	39	34	36	36	38	38	33	38	33	33	22	29	29	34	34	36
24	31	25	34	34	30	46	38	45	37	37	33	45	52	62	44	44	42	33	33	33	27	22	22	34
25	58	58	54	54	41	44	63	32	32	36	36	36	32	39	38	42	34	33	108	37	37	37	37	G
26	32	40	40	37	47	41	54	42	41	41	41	38	36	34	34	44	32	32	32	40	32	42	21	21
27	32	26	30	32	42	60	63	36	35	35	36	G	G	34	34	32	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	30	29	28	31	36
28	36	36	33	52	66	51	42	45	65	51	51	G	B <sup>E</sup>	B <sup>E</sup>	G	33	37	G	32	50	42	24	36	56
29	85	41	40	34	46	39	37	47	44	42	38	36	39	37	35	38	30	36	27	27	25	25	28	37
30	56	45	44	36	24	28	26	31	31	32	35	44	40	31	B <sup>E</sup>	B <sup>E</sup>	G	34	46	24	24	57	22	28
31	33	30	32	26	28	29	28	80	42	33	33	47	42	79	80	84	66	74	27	26	G	22	21	20
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	31	31	30	31	31	31	31	31	30	28	30	31	31	31	30	31	31	31	31	31	31	30
MED	34	36	40	45	44	42	45	39	37	35	35	36	36	34	34	G	34	30	G	G	28	28	36	34
U Q	51	45	47	54	53	46	52	54	49	41	36	42	40	39	38	41	35	34	35	37	34	38	40	40
L Q	26	28	32	34	36	35	38	34	33	33	33	34	34	32	33	33	31	27	29	26	24	22	21	22

DEC.2021 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

DEC.2021 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz 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	12	6	14	11	8	8	16	12	20	15	16	B	B	38	33	29	19	13	9	7	7	10	7	10
2	10	17	10	14	20	24	12	16	12	8	B	B	42	13	34	31	20	15	10	9	9	6	14	15
3	31	30	35	18	18	12	8	10	9	9	9	12	12	11	13	20	20	11	20	10	8	10	24	18
4	16	24	8	20	11	32	37	17	10	9	15	B	36	34	32	19	14	12	8	11	11	8	8	9
5	16	7	19	15	15	15	22	10	10	8	13	11	11	11	10	10	13	10	20	9	8	8	7	12
6	12	B	7	54	32	24	12	8	8	10	10	22	12	12	16	16	10	9	9	9	8	8	8	8
7	8	16	20	20	14	10	11	11	10	10	10	10	14	9	10	10	9	9	8	7	9	9	8	9
8	6	7	7	6	10	12	8	8	8	8	8	7	11	16	15	10	12	11	8	8	6	6	14	5
9	6	6	9	11	13	12	12	8	8	15	15	15	14	10	10	10	7	9	9	11	13	9	8	8
10	8	5	8	8	9	9	8	8	8	8	9	9	13	13	11	11	9	7	8	8	12	10	8	8
11	7	21	8	11	7	9	6	8	14	12	8	8	8	8	9	8	8	7	9	9	9	10	6	6
12	8	11	8	11	11	8	12	10	10	7	8	8	8	8	8	9	10	10	8	8	6	8	16	8
13	8	8	8	17	14	10	10	10	14	10	11	13	13	9	10	10	7	9	12	8	10	12	9	8
14	6	6	5	8	8	6	9	9	9	9	9	9	13	10	8	15	13	13	9	15	8	8	6	6
15	5	22	11	6	5	6	6	11	10	10	8	10	10	6	15	17	9	18	27	7	10	7	6	6
16	8	10	8	13	20	20	9	12	10	9	14	43	15	15	15	14	34	30	28	14	15	7	10	7
17	8	11	12	18	10	10	8	7	6	8	11	10	8	8	8	10	9	9	8	8	8	7	6	8
18	6	7	7	12	12	12	8	9	8	11	7	8	8	16	18	22	13	9	9	6	9	9	5	10
19	8	8	8	19	17	10	8	8	8	8	6	6	9	9	8	9	6	8	8	8	7	7	6	7
20	7	10	10	9	7	9	7	12	9	15	10	10	19	38	32	14	19	12	10	10	10	10	12	12
21	23	17	10	33	19	10	20	10	11	10	10	15	24	11	11	14	12	12	17	14	12	14	8	11
22	12	8	7	8	25	10	12	10	10	34	15	24	24	39	38	35	22	10	10	15	8	8	8	B
23	B	34	34	16	B	20	14	12	11	12	10	10	10	14	17	17	14	11	11	14	9	8	8	8
24	9	10	9	9	9	11	8	9	8	8	10	10	14	11	11	19	19	14	10	8	6	10	10	10
25	20	20	16	20	12	18	23	9	8	8	15	15	24	28	20	14	13	15	18	8	8	8	8	24
26	13	19	11	15	16	10	12	10	8	15	21	20	13	12	12	14	14	14	16	13	8	8	8	10
27	6	10	14	20	16	16	37	13	10	8	10	18	22	15	10	9	44	30	14	8	6	10	11	6
28	13	8	12	12	17	10	10	15	11	15	19	20	35	24	22	37	16	15	26	8	8	8	9	7
29	7	11	8	10	10	11	10	11	17	16	15	14	11	19	14	12	17	14	7	10	16	10	10	6
30	8	16	9	7	6	9	7	8	9	7	7	9	8	13	35	10	11	12	11	8	7	8	14	8
31	6	6	6	6	8	8	6	6	7	9	14	14	14	10	10	14	9	8	8	8	7	5	14	6
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	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	8	10	9	12	12	10	10	10	10	9	10	12	13	12	13	14	13	11	10	8	8	8	8	8
U Q	13	19	12	18	17	15	12	12	11	12	15	20	22	16	20	19	19	14	16	11	10	10	11	10
L Q	7	7	8	9	9	9	8	8	8	8	9	9	10	10	10	10	9	9	8	8	7	8	7	7

DEC.2021 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

DEC.2021 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT.69°00.4'S LON.039°35.4'E SWEEP 1.0MHz TO 15.0MHz IN 15.0SEC IN MANUAL SCALING

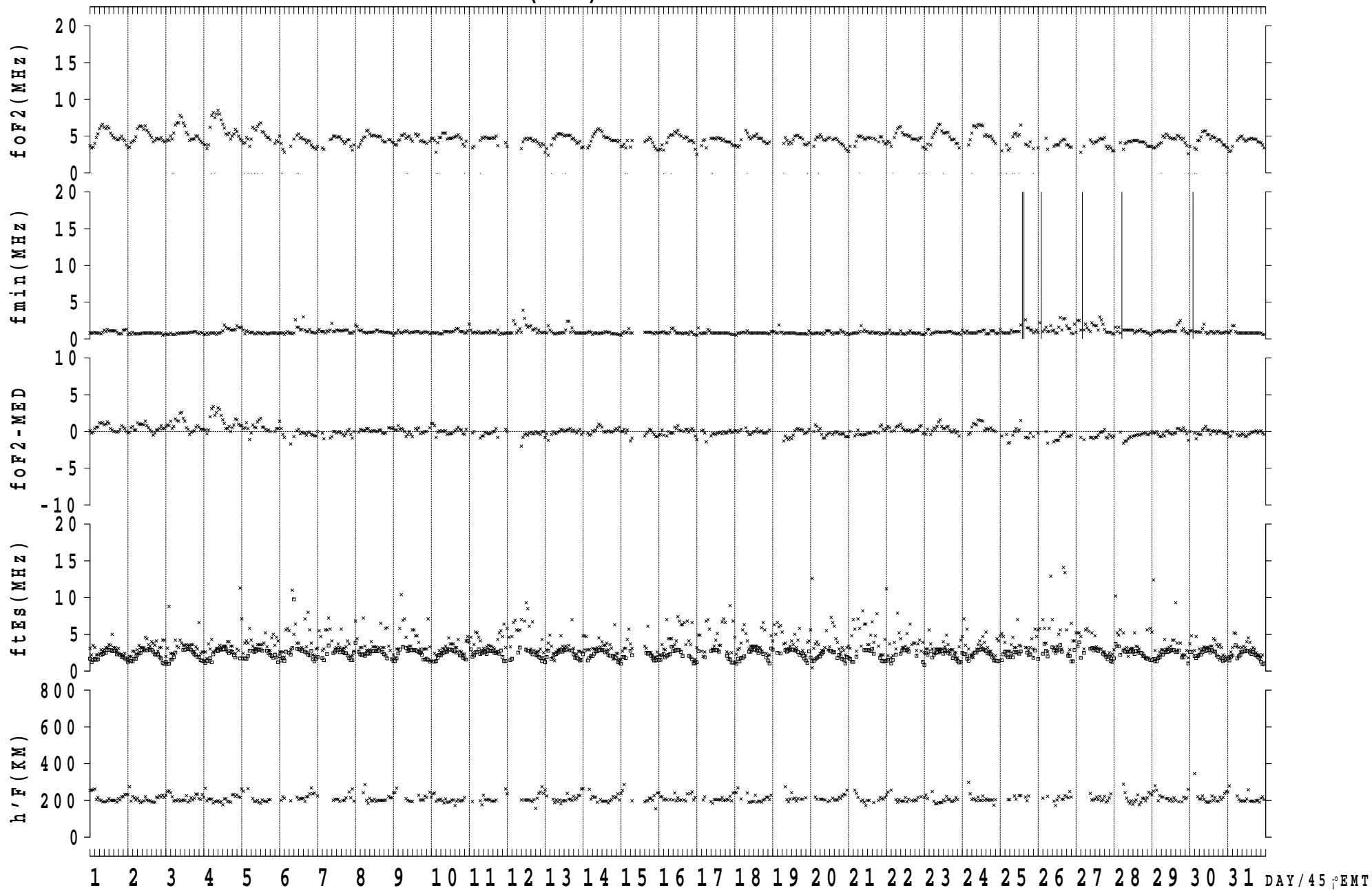
H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23									
1	A	E A	A	A	A	A	A	202	A	A	218	B	B	E B	212	212	232	A	A	E A	A	A	O	A	A								
2	A	A	A	A	A	A	E A	A	E A	198	B	B	B	188	E B	224	198	204	204	A	A	A	A	A	A								
3	B	B	B	A	A	A	E A	282	212	200	200	196	188	H	H	186	210	E A	236	210	198	A	A	A	A								
4	A	A	E A	274	196	324	A	B	A	212	190	182	B	E B	244	226	204	E A	230	210	208	210	214	204	238	H	176	186					
5	A	A	A	A	A	A	A	A	A	A	192	192	180	186	198	206	202	198	198	216	232	E A	254	200	A	A	A	A					
6	A	B	A	B	B	A	E A	326	198	194	200	192	214	198	200	196	204	202	202	198	208	E A	246	A	A	A	A	A					
7	A	A	A	A	A	A	A	A	E A	250	206	188	208	190	190	200	200	200	198	198	H	194	218	206	224	224	176	A	A				
8	256	244	200	E A	E A	A	E A	E A	E A	254	254	200	196	182	202	188	186	196	204	216	188	200	208	204	194	E A	238	224	A	A			
9	230	E A	312	272	A	A	A	A	A	A	200	188	198	188	H	H	200	194	184	200	200	200	200	204	210	214	218	A	A				
10	238	E A	240	244	228	220	216	198	202	196	196	196	194	H	A	A	214	198	198	198	226	220	202	228	196	E A	228	196	A	A			
11	E A	244	A	A	A	A	210	A	A	A	214	176	178	202	190	204	216	200	204	198	208	218	218	210	216	A	A	A	A	A			
12	A	A	A	A	A	A	224	200	A	A	196	182	198	A	202	212	198	198	200	200	212	218	218	A	A	A	A	A	A	A			
13	A	A	A	A	E A	290	264	A	A	A	206	188	194	204	200	206	202	200	196	196	206	198	H	238	226	226	A	A	A	A			
14	214	196	204	246	250	212	212	A	212	202	192	194	H	210	210	210	210	210	202	224	216	E A	262	240	A	A	A	A	A	A			
15	A	A	E A	294	218	260	204	218	234	204	196	192	H	208	218	222	228	212	202	E A	228	A	236	A	A	226	A	A	A	A			
16	A	A	A	A	A	A	A	A	A	A	E A	286	200	B	188	230	202	216	216	236	216	216	214	E A	274	A	A	A	A	A			
17	A	A	A	A	A	A	A	A	228	208	192	194	194	186	190	196	208	208	204	204	224	210	214	226	240	A	A	A	A	A			
18	222	A	E A	322	A	A	A	A	A	A	226	196	194	188	210	A	202	214	190	204	192	H	198	204	204	210	210	A	A	A	A		
19	A	E A	276	202	236	A	E A	238	200	222	202	198	198	198	202	192	A	200	196	192	H	196	214	198	198	A	A	A	A	A			
20	A	A	A	A	A	A	A	A	A	A	A	A	H	184	200	A	B	214	212	212	218	E A	E A	256	242	A	A	A	A	A	A		
21	A	A	A	B	A	204	A	A	H	H	230	200	180	208	202	216	198	214	214	198	198	E A	234	216	A	E A	A	E A	234	A	A		
22	A	A	A	A	A	A	A	A	A	A	246	216	A	208	208	192	E B	226	240	240	206	188	264	262	222	268	230	A	A	B	A		
23	B	B	A	A	B	A	A	A	A	A	244	222	206	184	210	198	196	212	196	204	204	216	214	230	234	216	A	A	A	A	A		
24	208	E A	286	A	A	E A	264	A	E A	298	270	240	200	188	222	E A	E A	E A	198	228	212	196	196	214	214	214	252	E A	276	A	A		
25	E A	276	A	A	A	E A	320	A	A	A	214	200	194	194	202	222	208	204	210	200	192	212	E A	E A	E A	E A	E A	E A	E A	E A	A	A	
26	E A	294	194	A	A	A	A	A	A	A	228	A	228	228	228	210	192	204	204	204	206	214	224	230	230	220	A	A	A	A	A		
27	260	A	A	E A	342	A	A	A	A	A	236	212	200	190	190	202	214	196	214	B	214	200	208	244	A	A	E A	E A	220	A	A		
28	A	A	A	A	A	A	A	A	A	A	A	A	A	A	208	222	200	200	244	192	H	206	200	E A	266	A	200	E A	264	246	A	A	
29	E A	286	230	268	A	A	A	E A	286	A	A	E A	198	H	216	202	208	202	198	198	E A	266	192	202	212	E A	E A	E A	E A	E A	A	A	
30	A	A	A	A	A	H	200	202	202	200	194	192	190	H	E A	224	200	192	240	198	H	184	202	E A	254	210	208	E A	E A	E A	E A	A	
31	E A	252	E A	E A	E A	A	E A	264	208	204	A	202	186	186	202	204	A	A	208	196	A	210	216	202	214	208	232	264	252	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	12	10	10	8	10	11	14	17	22	26	29	27	25	28	29	31	30	29	30	28	26	25	18	15									
MED	U	233	E A	245	232	232	U	236	210	207	221	202	196	192	200	201	200	204	209	201	201	202	212	212	220	218	220	218	220	218	220		
U Q	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A
L Q	226	230	204	223	250	204	202	207	200	192	187	194	189	194	199	200	198	197	198	208	204	212	214	216	216	216	216	216	216	216	216	216	216

DEC.2021 h'F (KM)

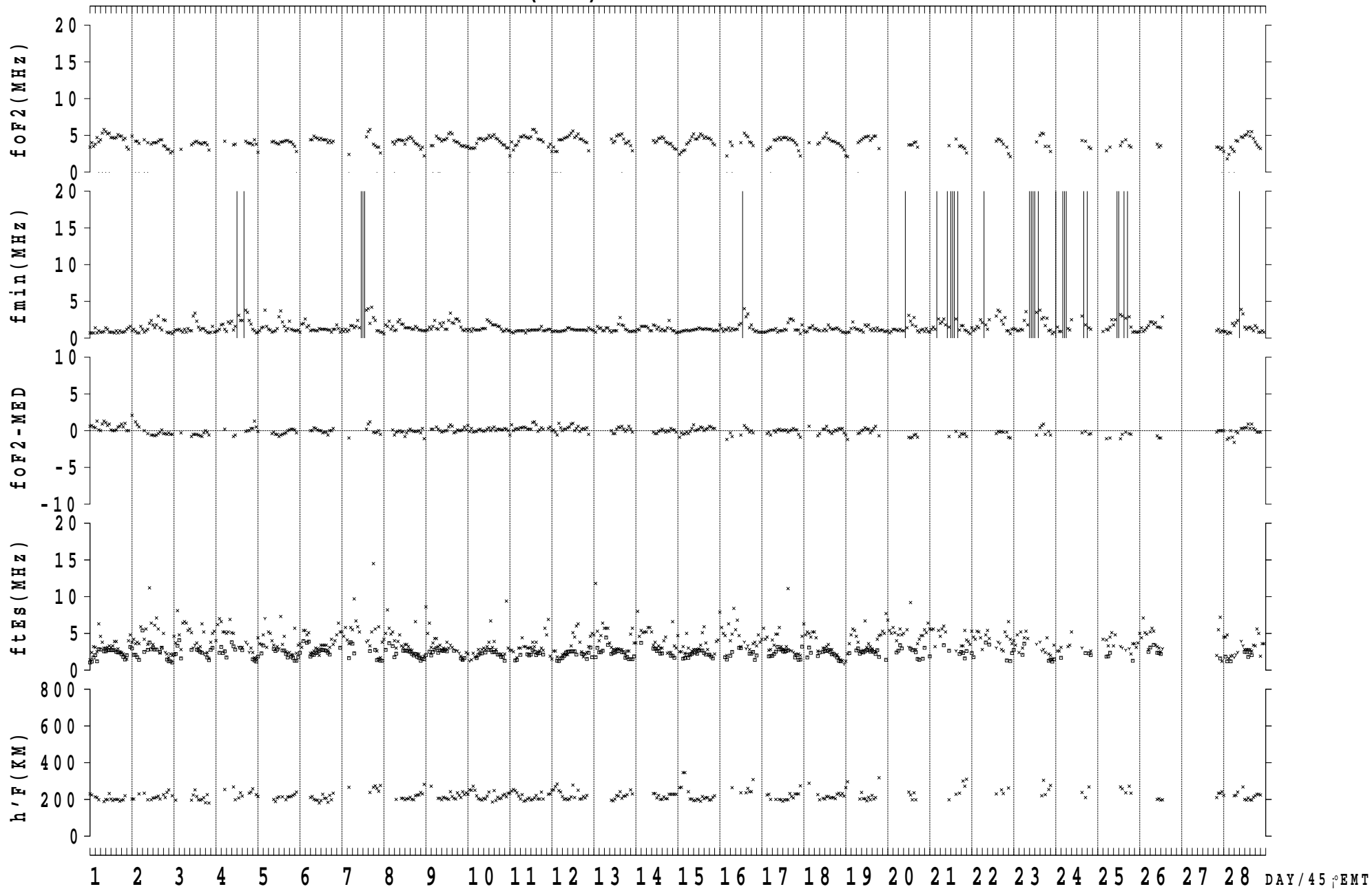
NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



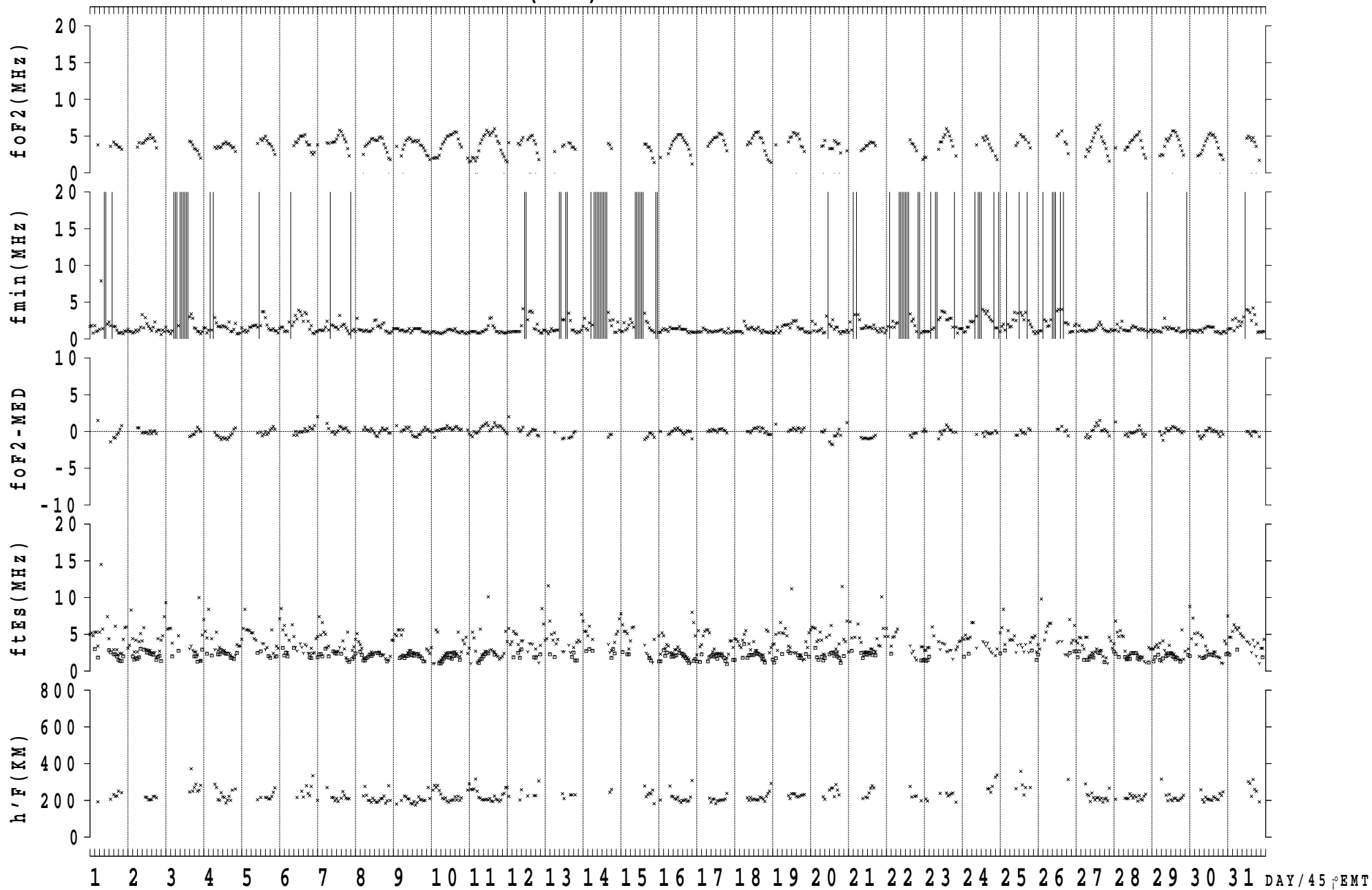
2021 0101 -&gt; 2021 0131(99) SYOWA-ST.



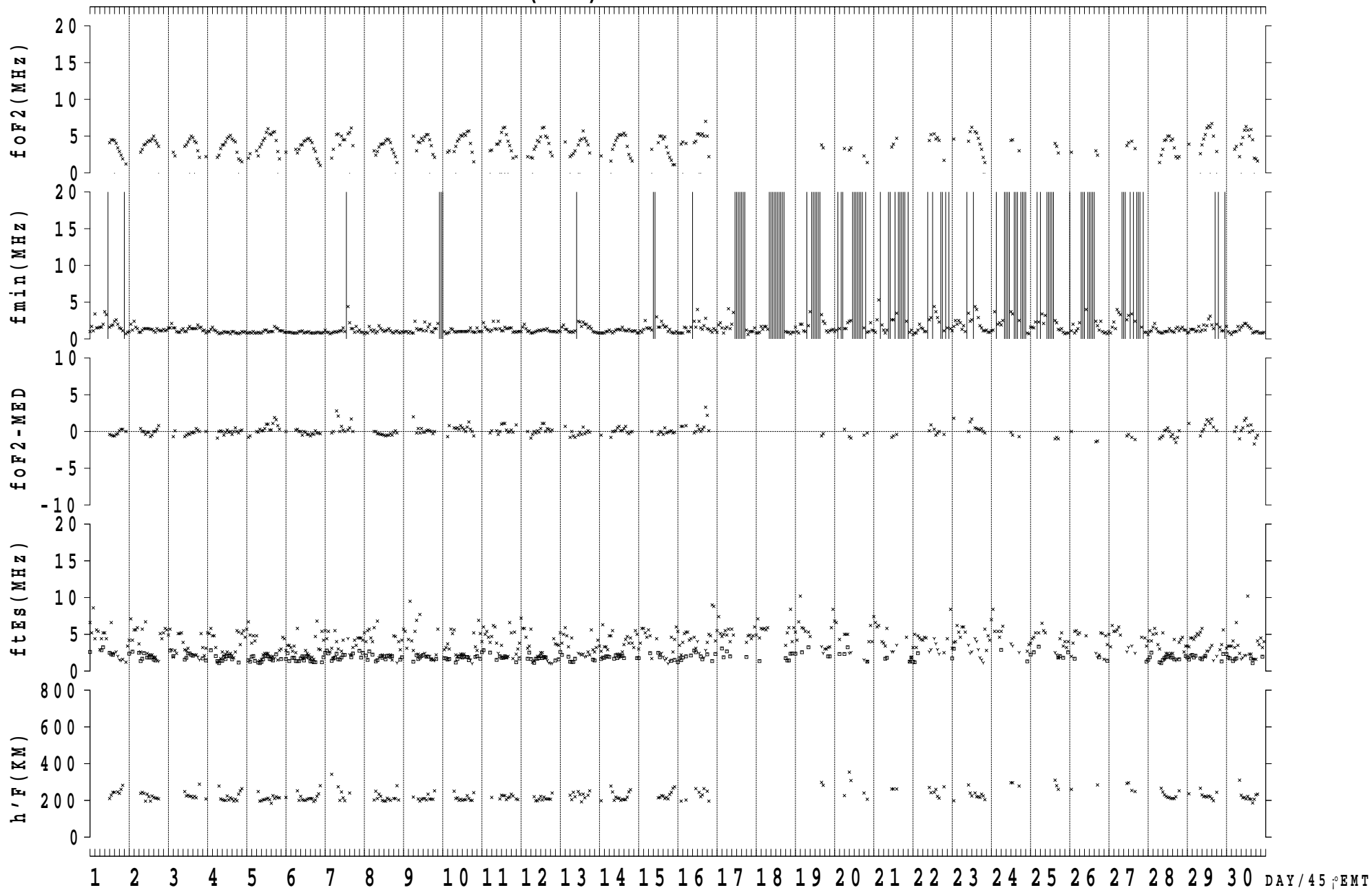
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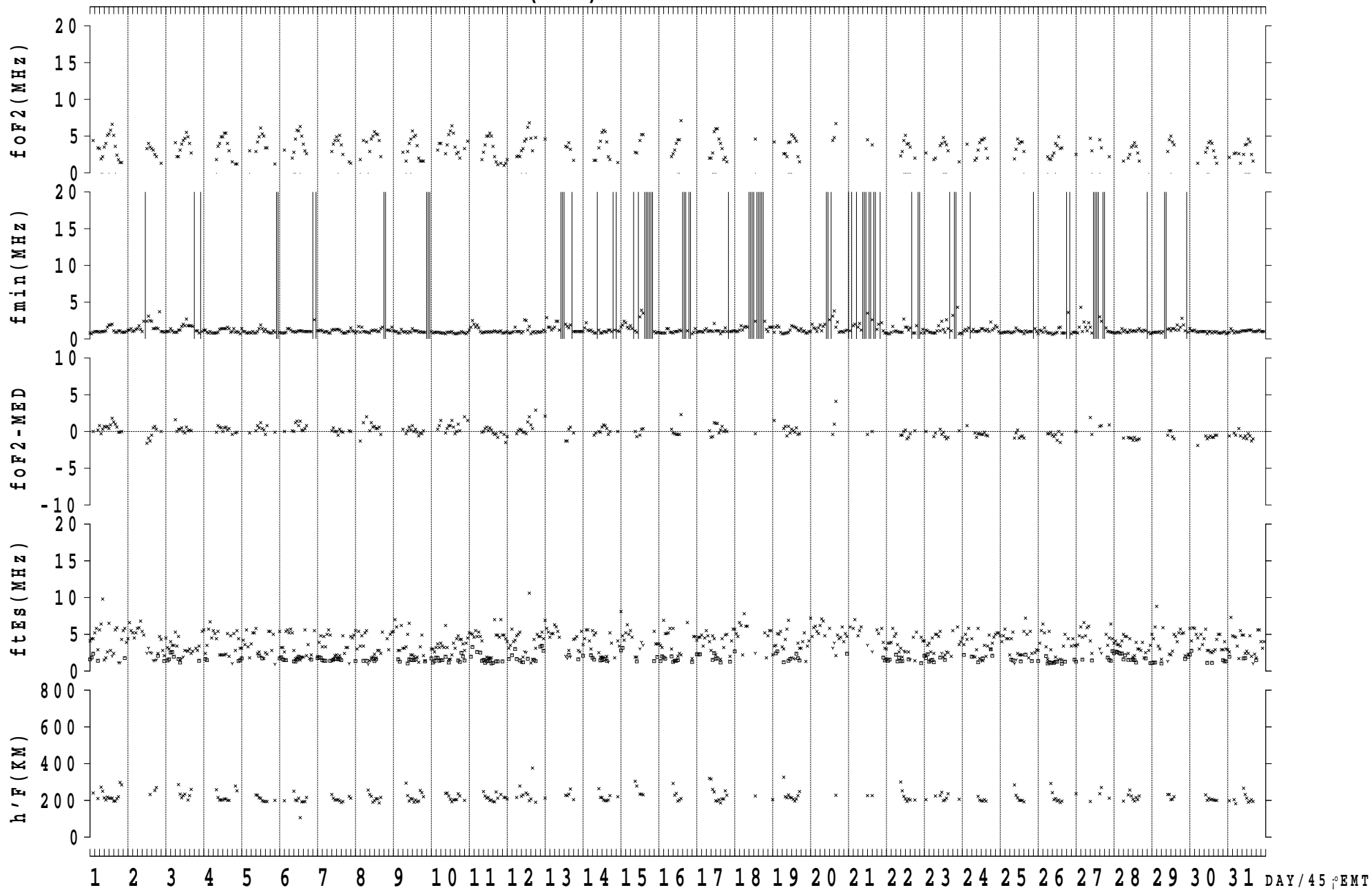
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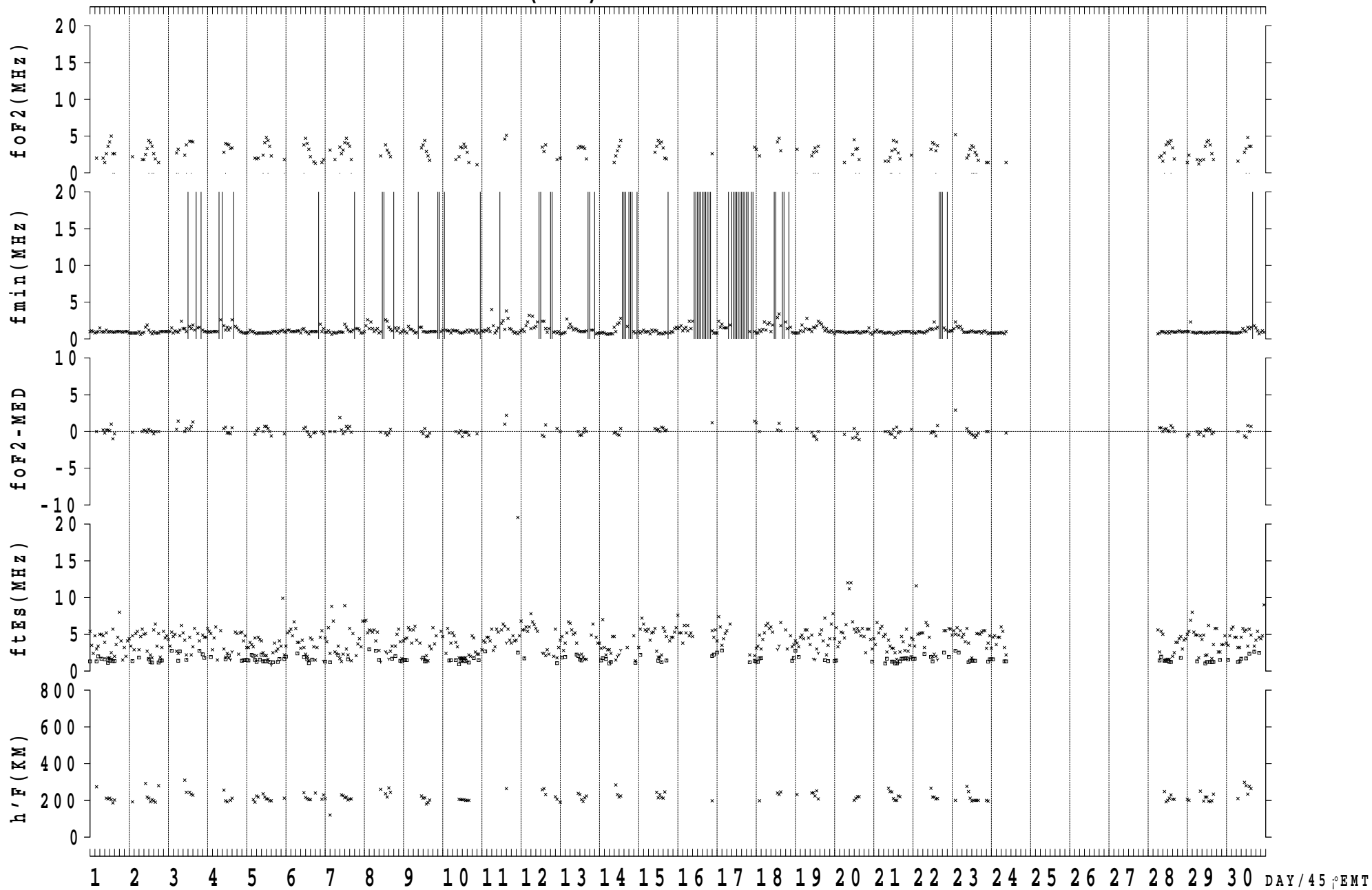
2021 0401 -&gt; 2021 0430(99) SYOWA-ST.



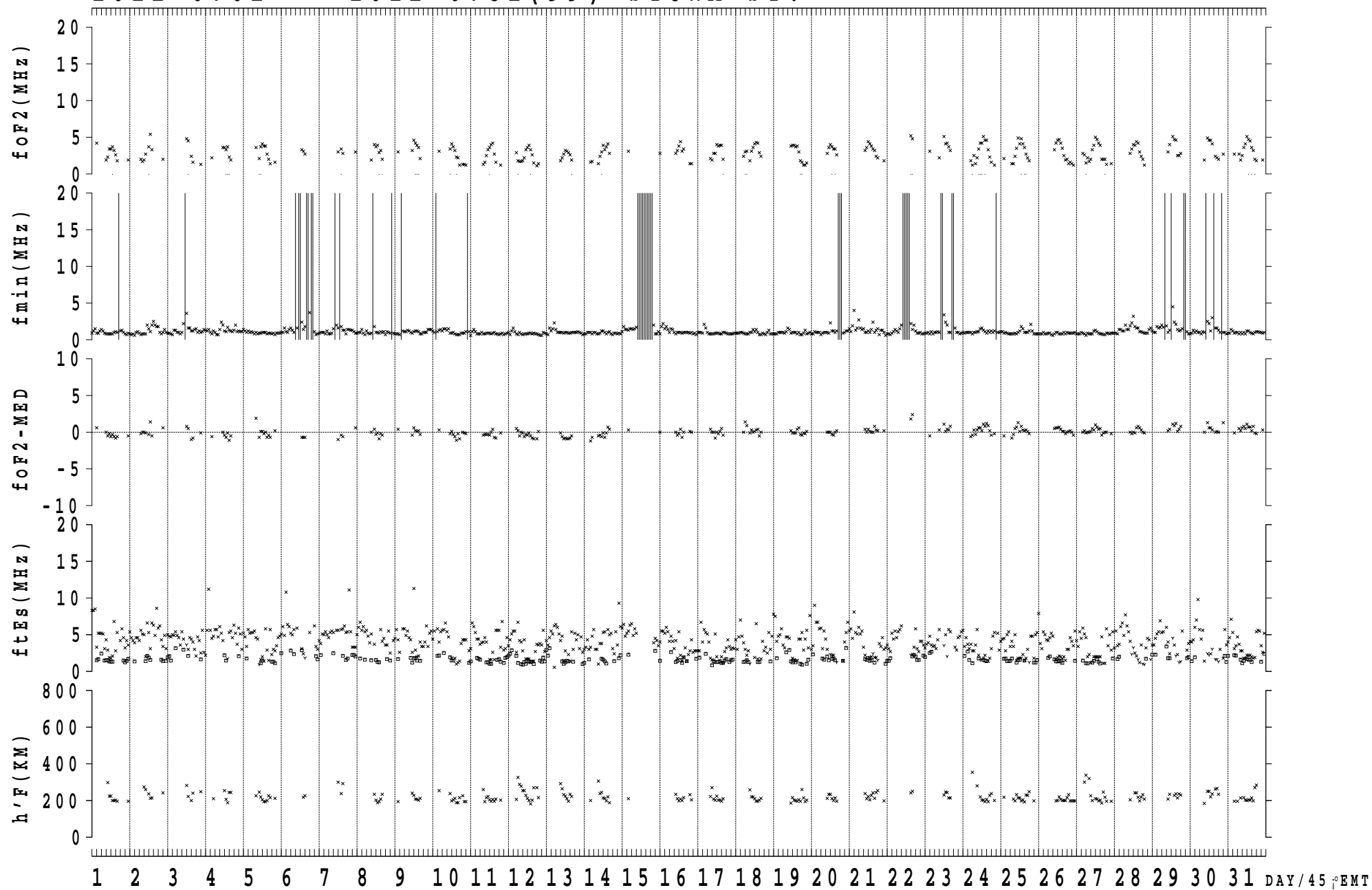
2021 0501 -&gt; 2021 0531(99) SYOWA-ST.



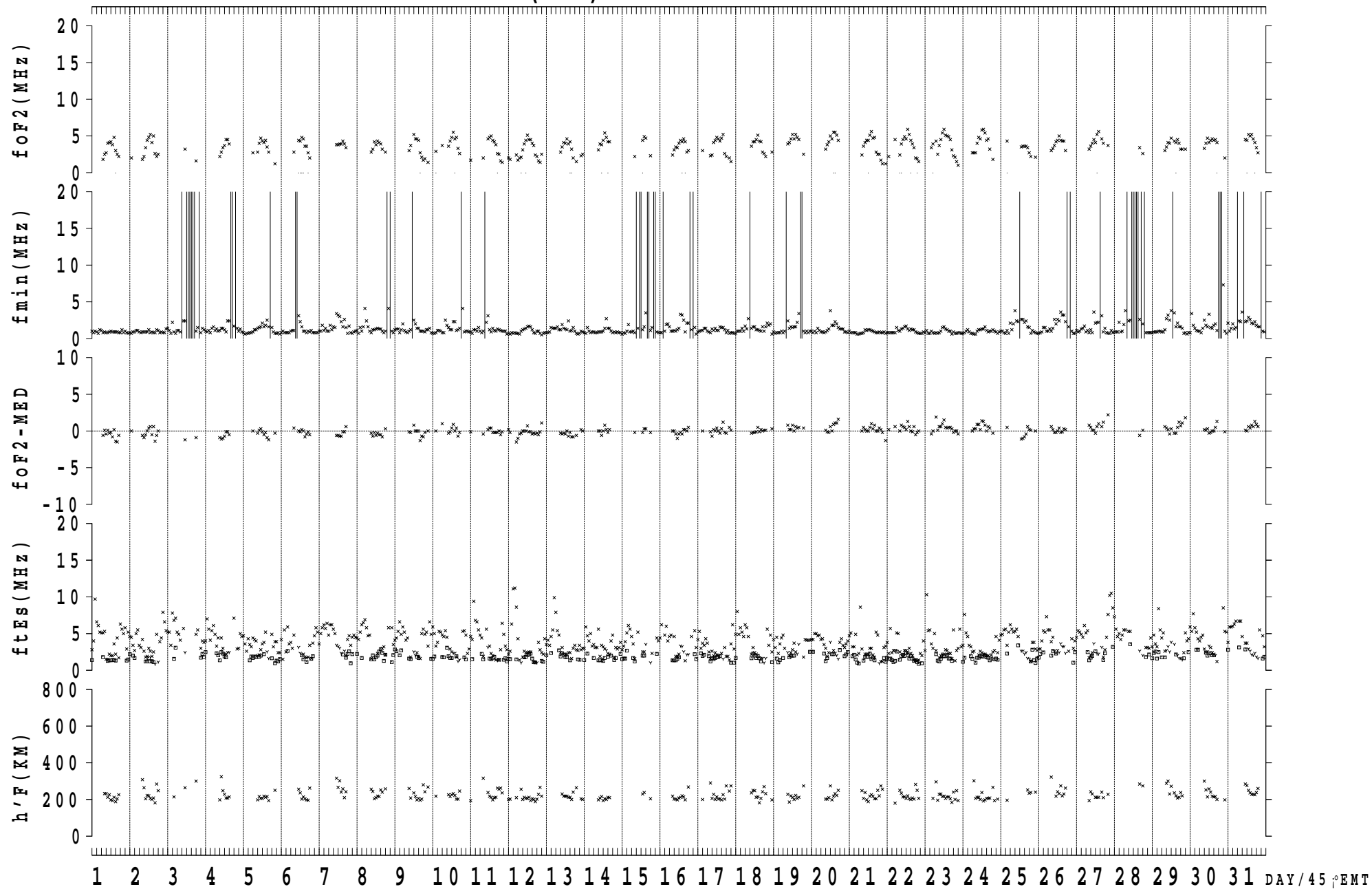
2021 0601 -&gt; 2021 0630(99) SYOWA-ST.



2021 0701 -&gt; 2021 0731(99) SYOWA-ST.

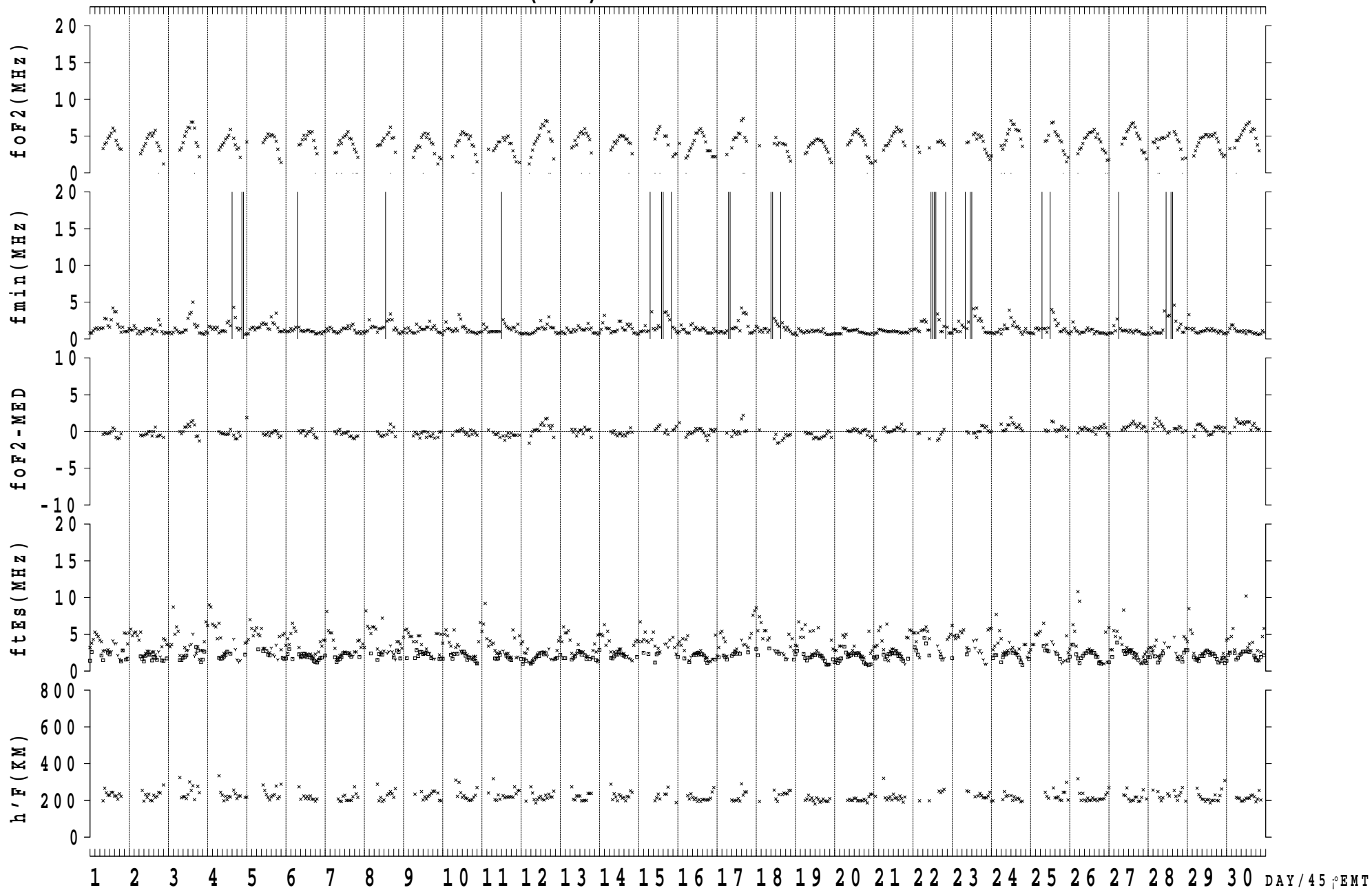


2021 0801 -&gt; 2021 0831(99) SYOWA-ST.

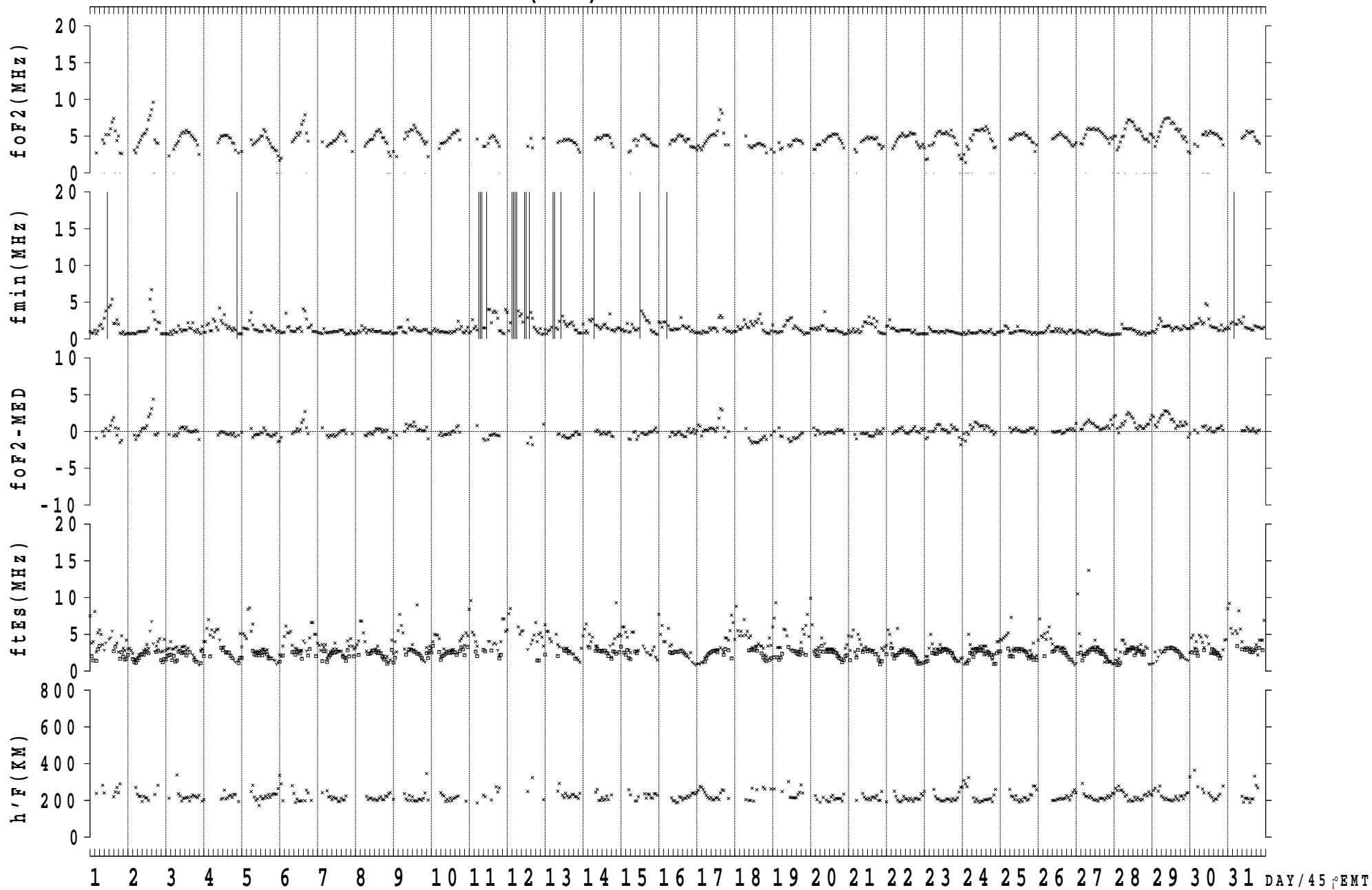




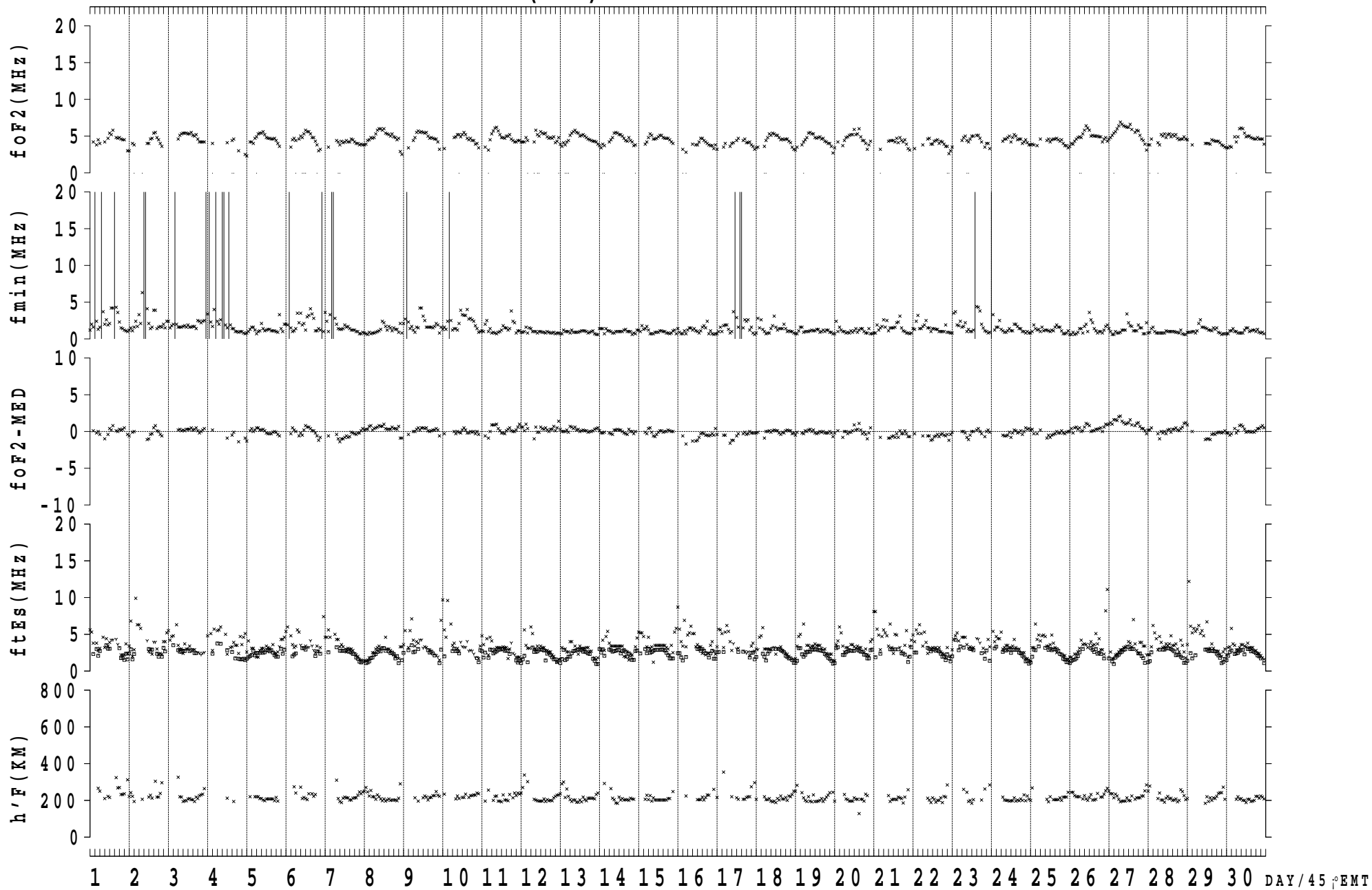
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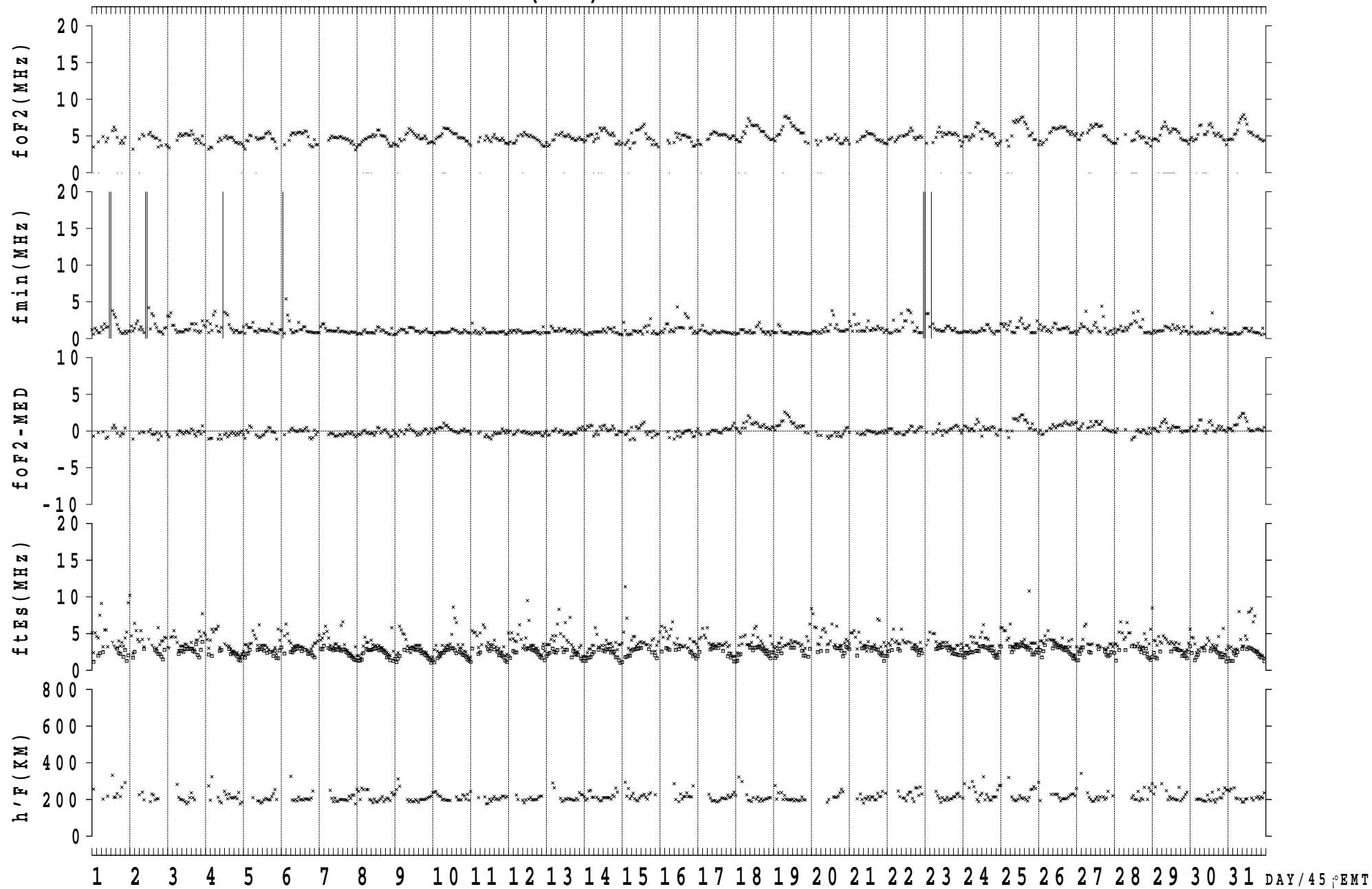
2021 1001 -&gt; 2021 1031(99) SYOWA-ST.



2021 1101 -&gt; 2021 1130(99) SYOWA-ST.



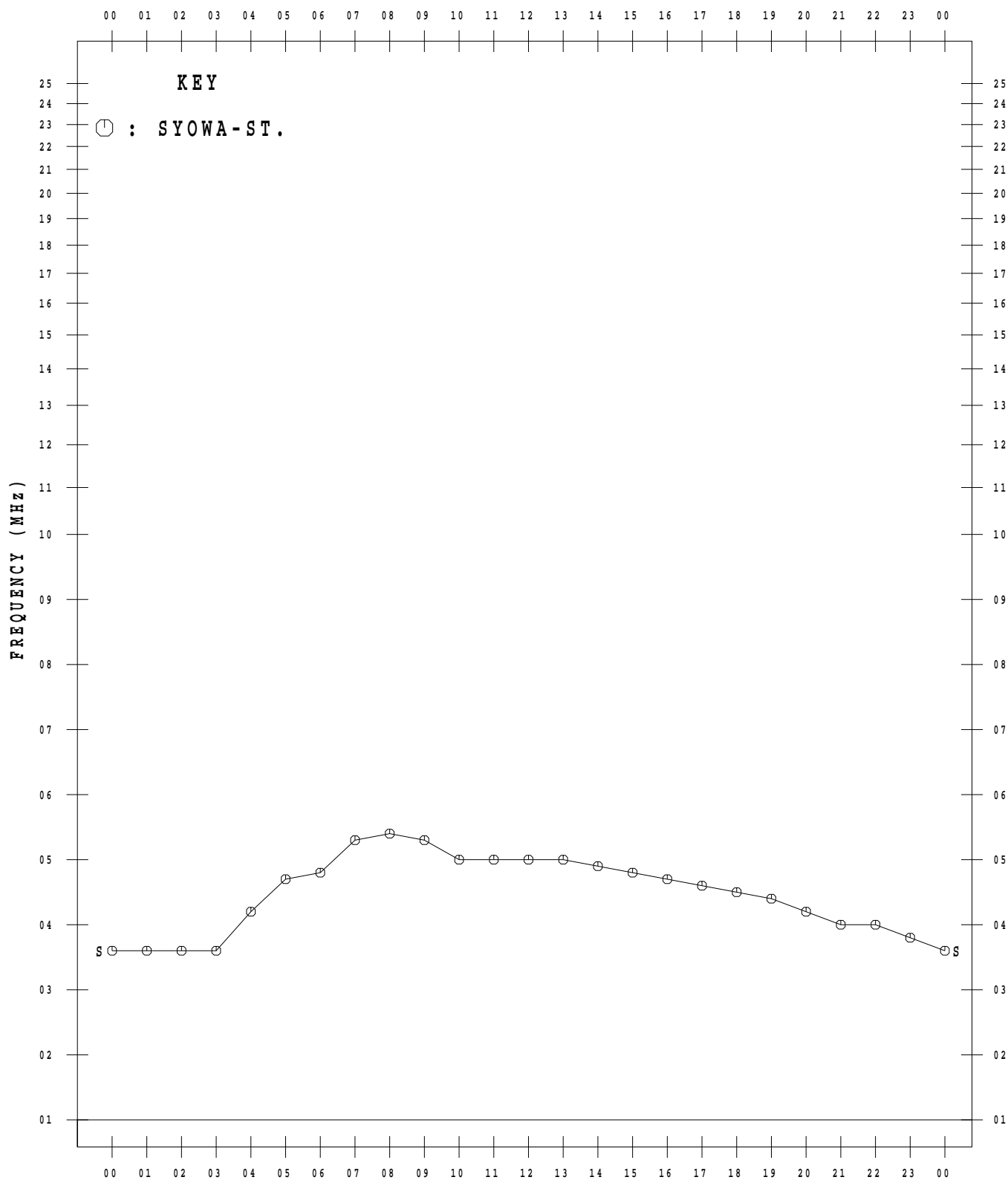
2021 1201 -&gt; 2021 1231(99) SYOWA-ST.



# MONTHLY MEDIAN VALUES OF f<sub>o</sub>F<sub>2</sub>

45°E MEAN TIME

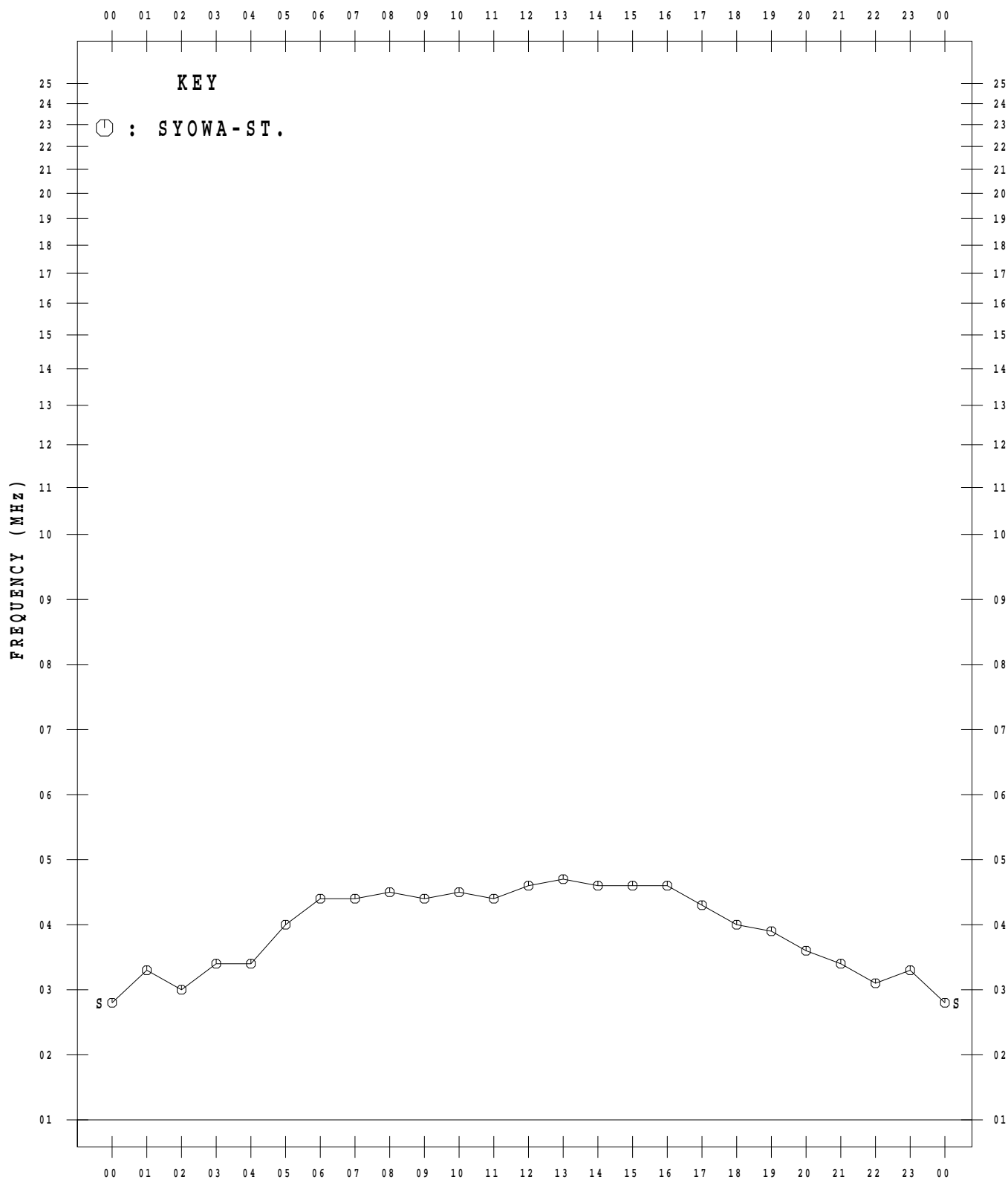
JAN. 2021



# MONTHLY MEDIAN VALUES OF f<sub>o</sub>F<sub>2</sub>

45°E MEAN TIME

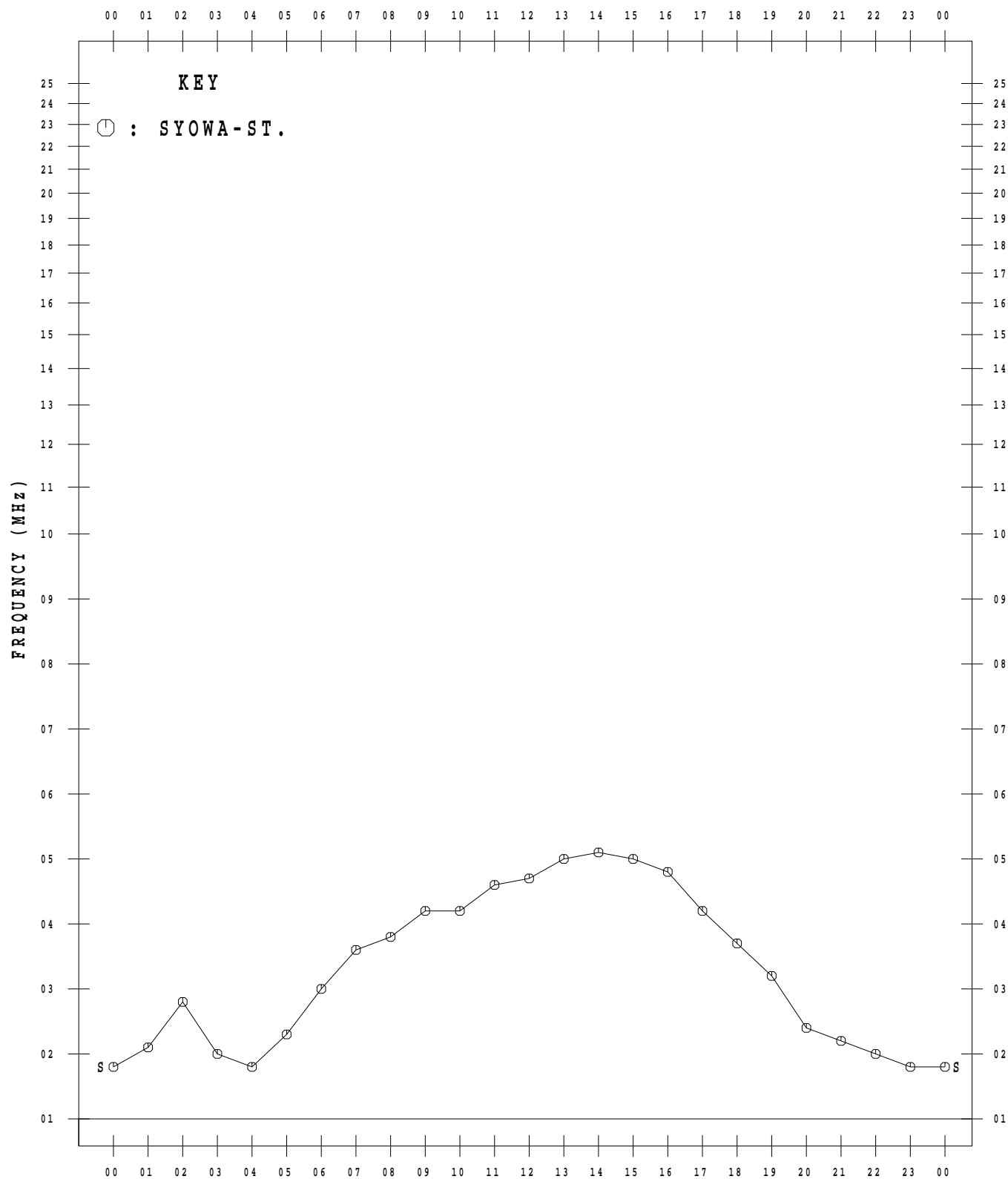
FEB. 2021



# MONTHLY MEDIAN VALUES OF f<sub>o</sub>F<sub>2</sub>

45°E MEAN TIME

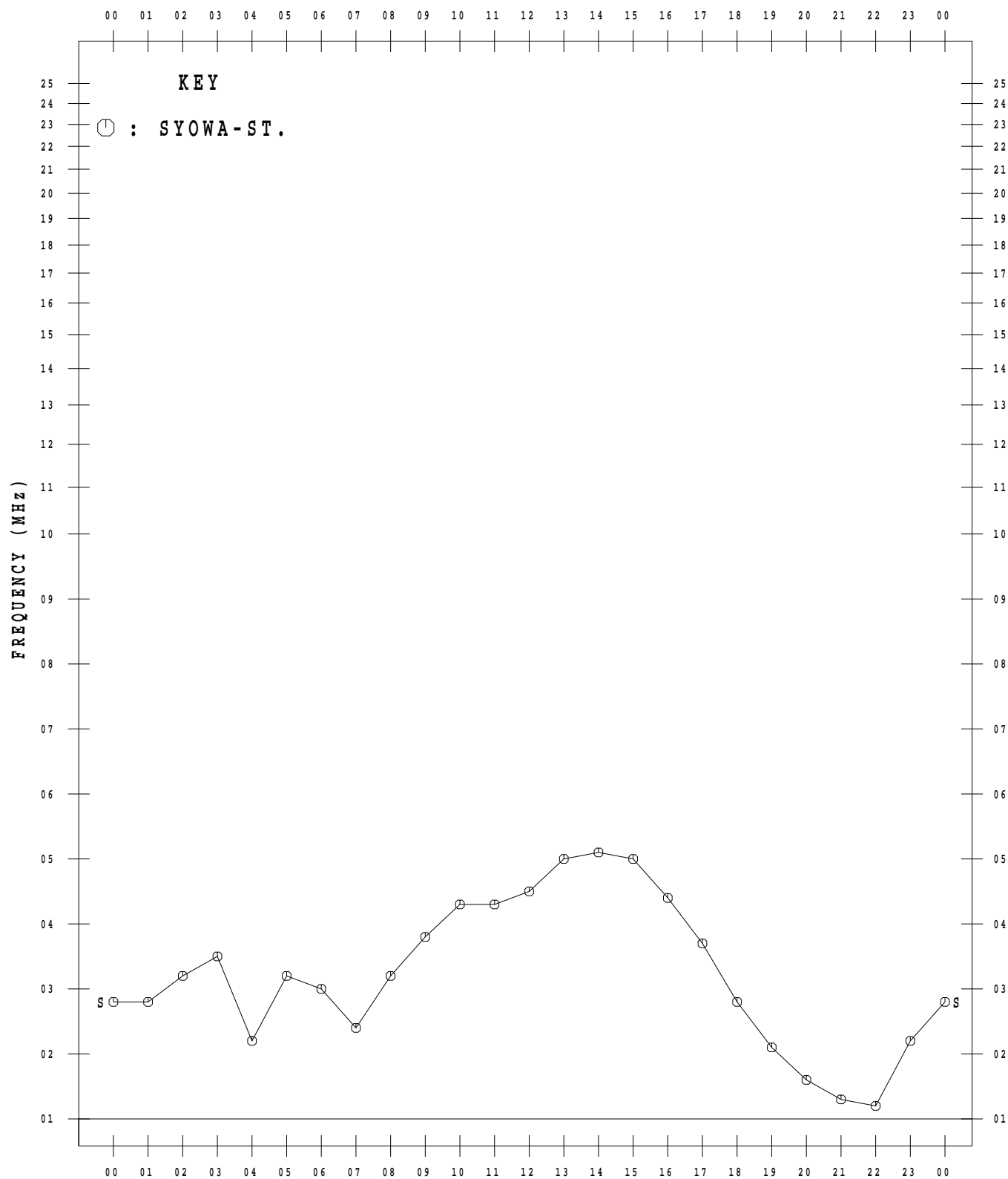
MAR. 2021



# MONTHLY MEDIAN VALUES OF f<sub>o</sub>F<sub>2</sub>

45°E MEAN TIME

APR. 2021

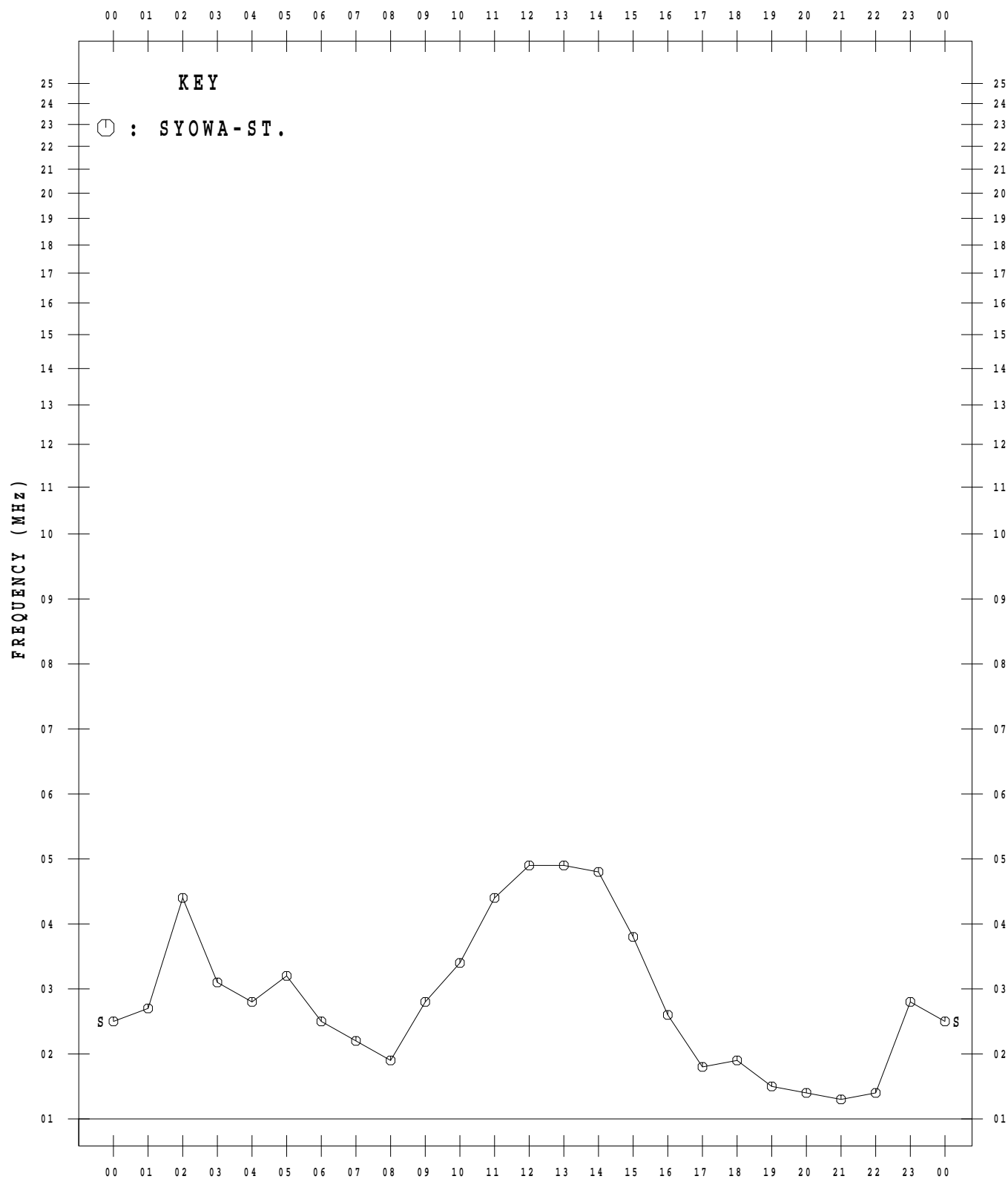




# MONTHLY MEDIAN VALUES OF f<sub>o</sub>F<sub>2</sub>

45°E MEAN TIME

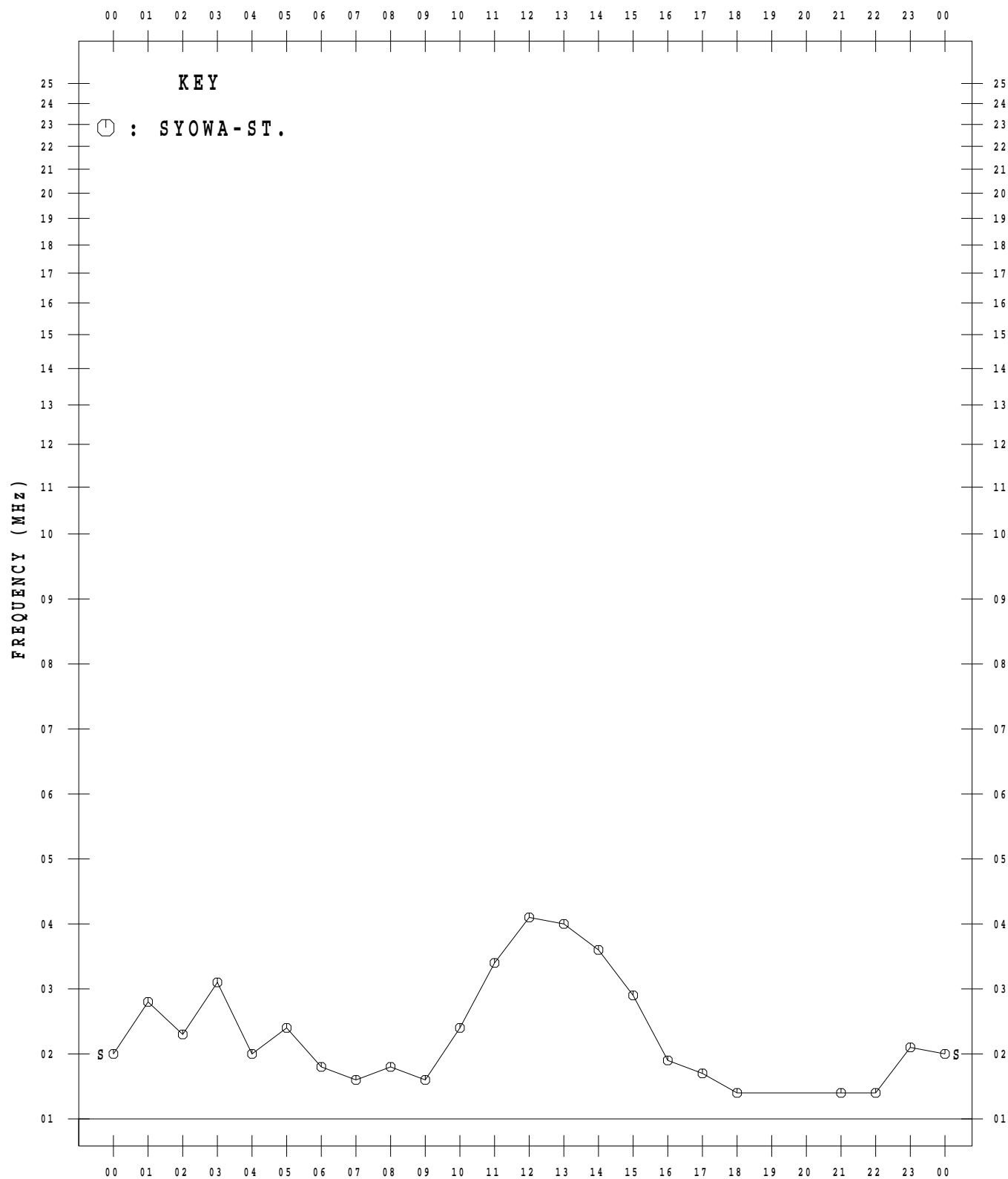
MAY 2021



# MONTHLY MEDIAN VALUES OF f<sub>o</sub>F<sub>2</sub>

45°E MEAN TIME

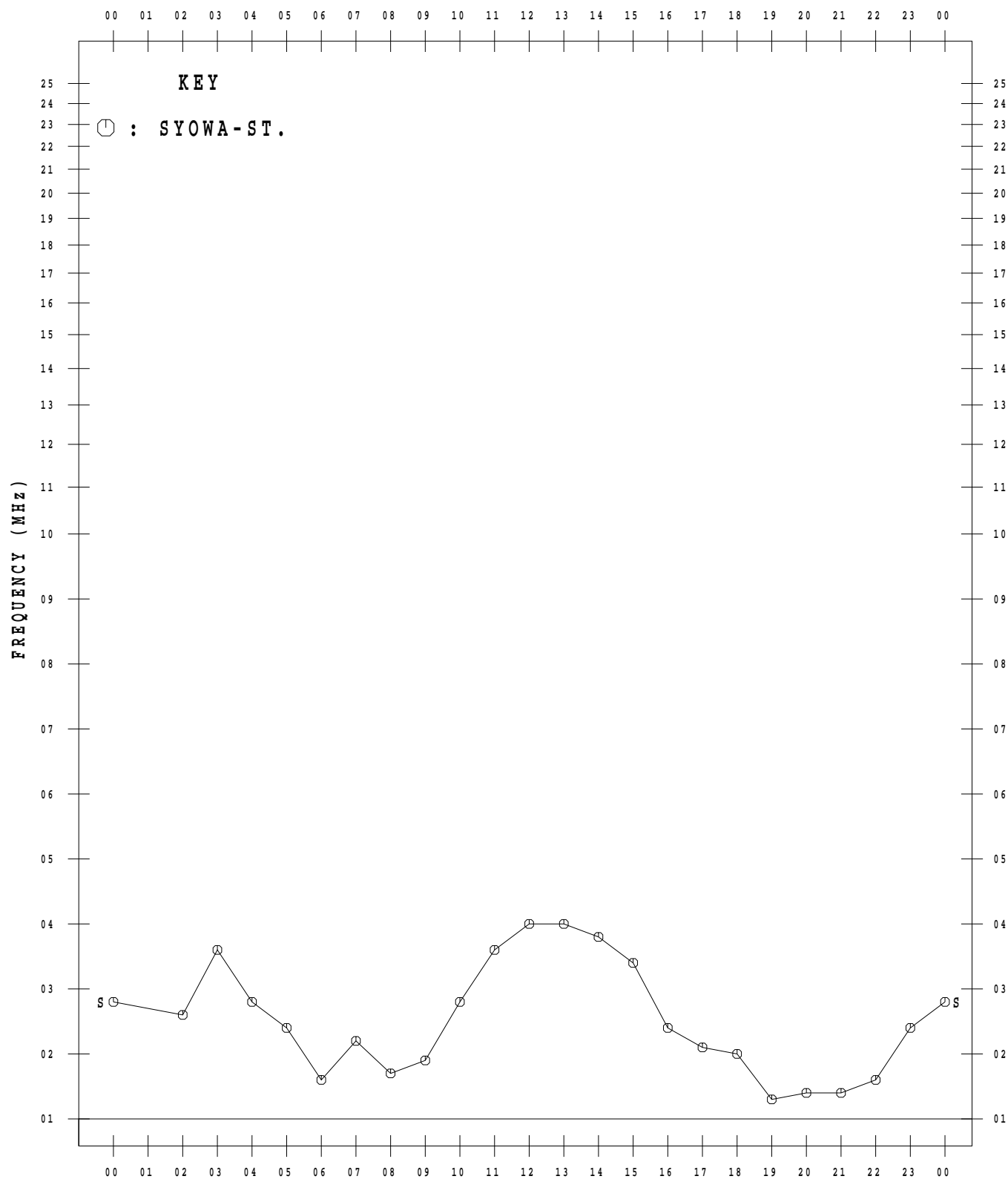
JUN. 2021



# MONTHLY MEDIAN VALUES OF f<sub>o</sub>F<sub>2</sub>

45°E MEAN TIME

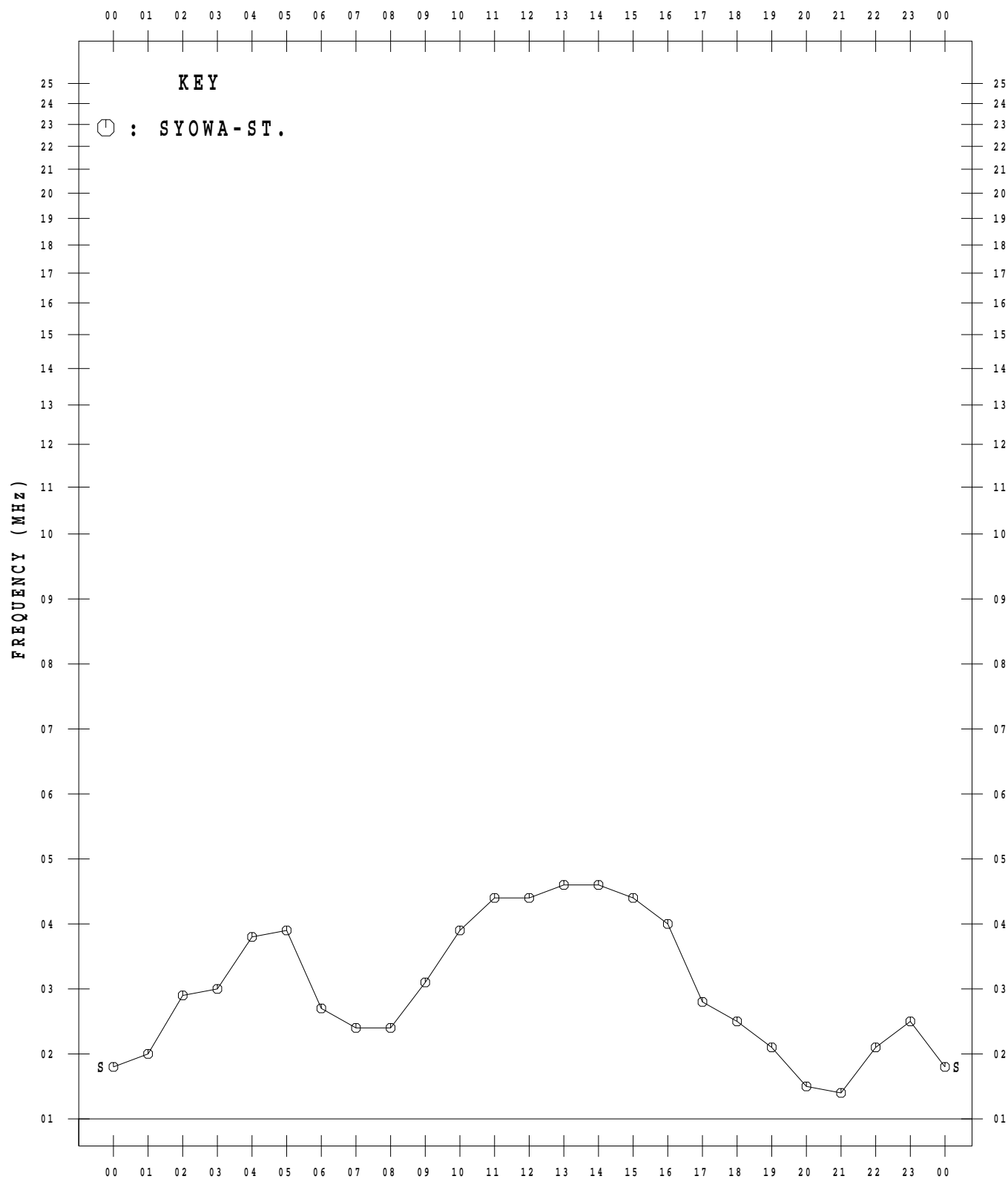
JUL. 2021



# MONTHLY MEDIAN VALUES OF f<sub>o</sub>F<sub>2</sub>

45°E MEAN TIME

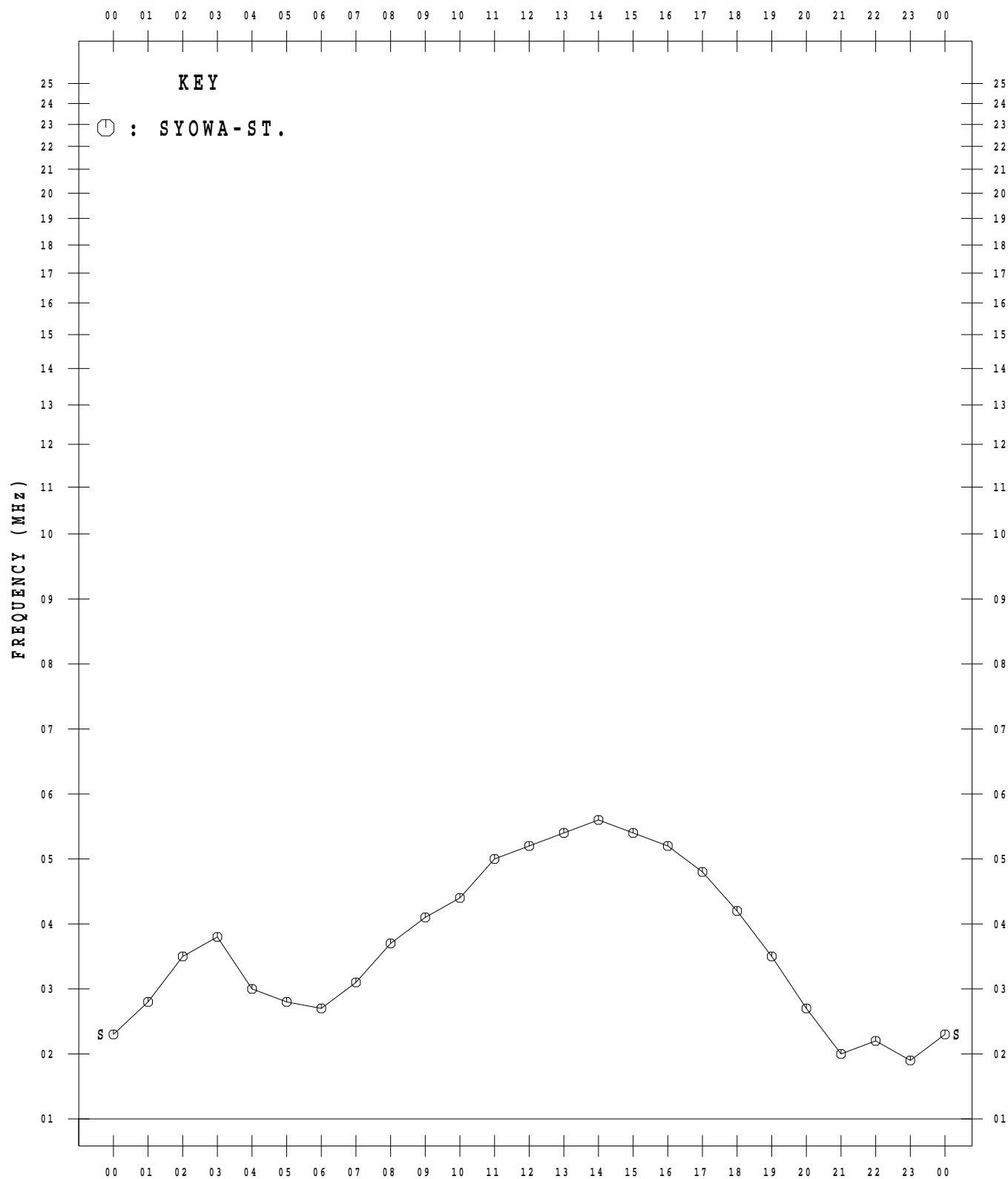
AUG. 2021



# MONTHLY MEDIAN VALUES OF f<sub>o</sub>F<sub>2</sub>

45°E MEAN TIME

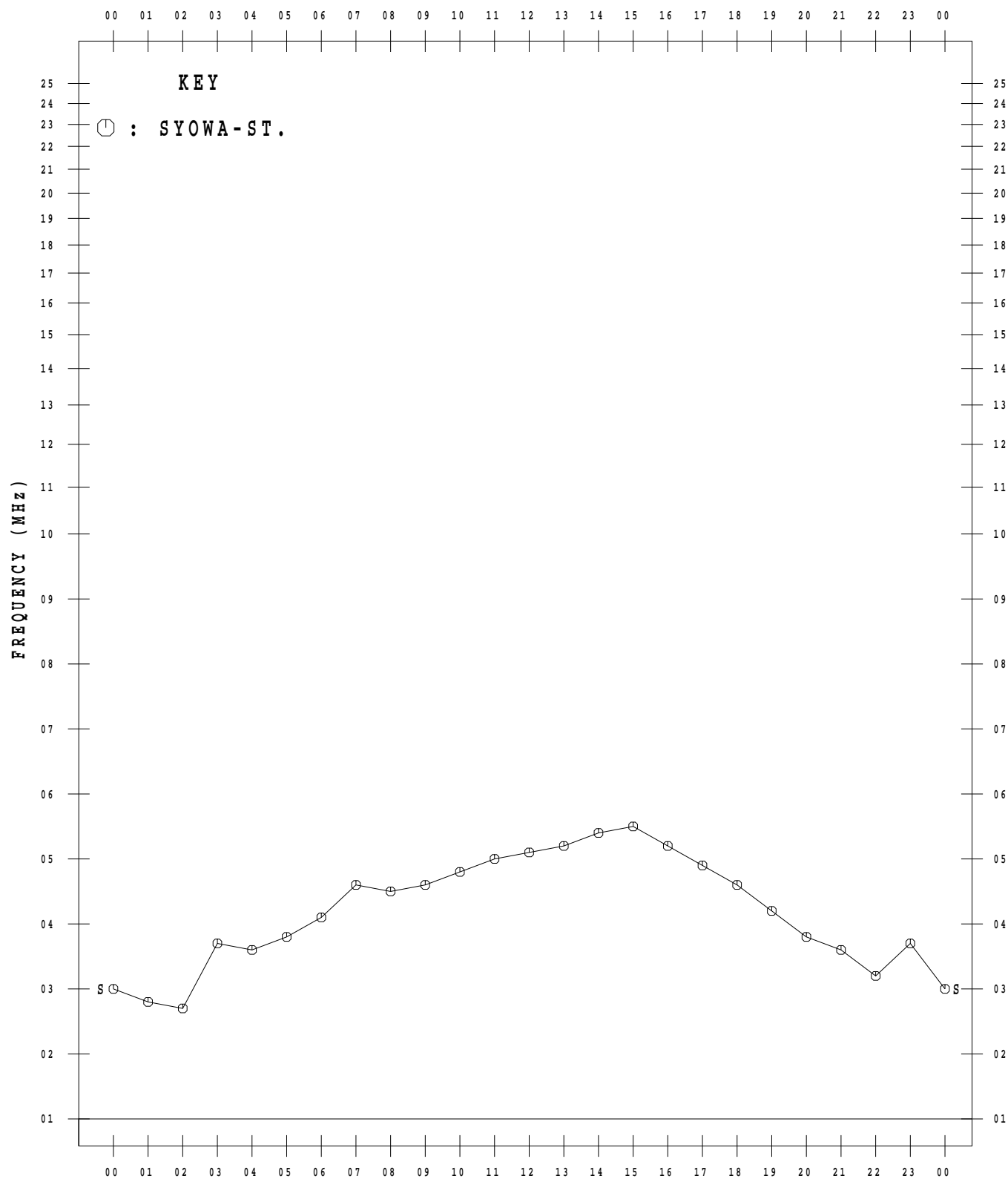
SEP. 2021



# MONTHLY MEDIAN VALUES OF f<sub>o</sub>F<sub>2</sub>

45°E MEAN TIME

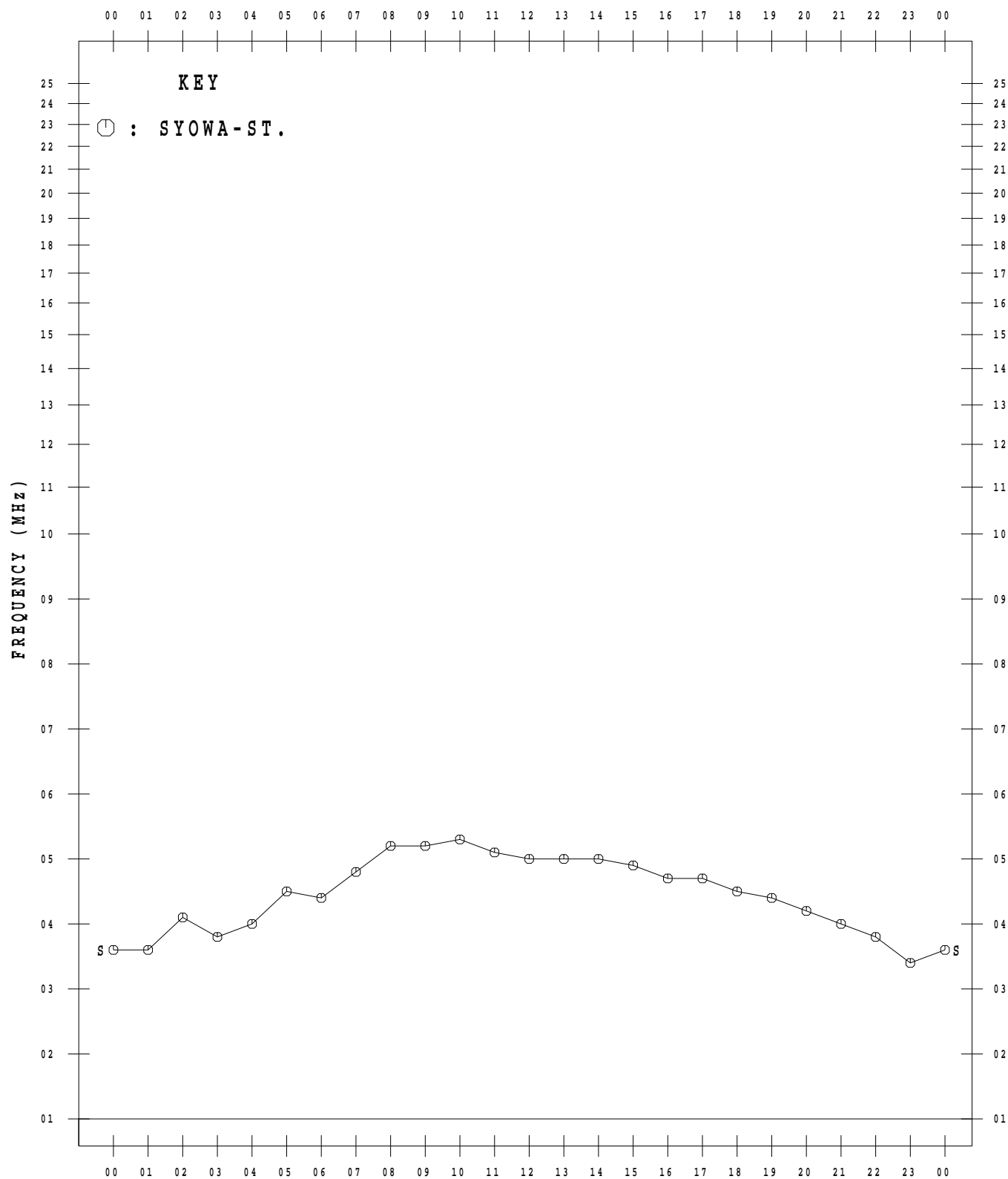
OCT. 2021



# MONTHLY MEDIAN VALUES OF f<sub>o</sub>F<sub>2</sub>

45°E MEAN TIME

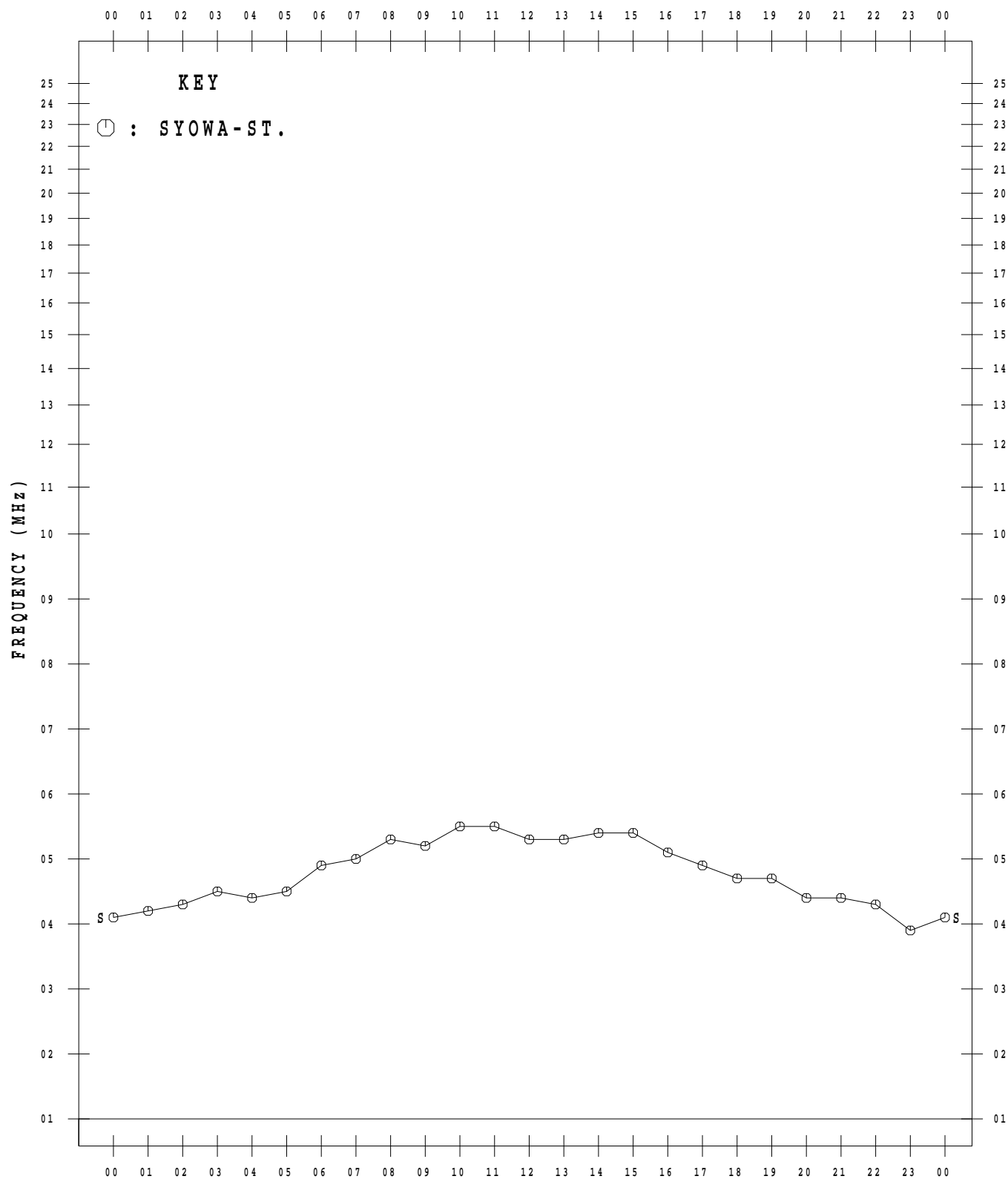
NOV. 2021



# MONTHLY MEDIAN VALUES OF f<sub>o</sub>F<sub>2</sub>

45°E MEAN TIME

DEC. 2021

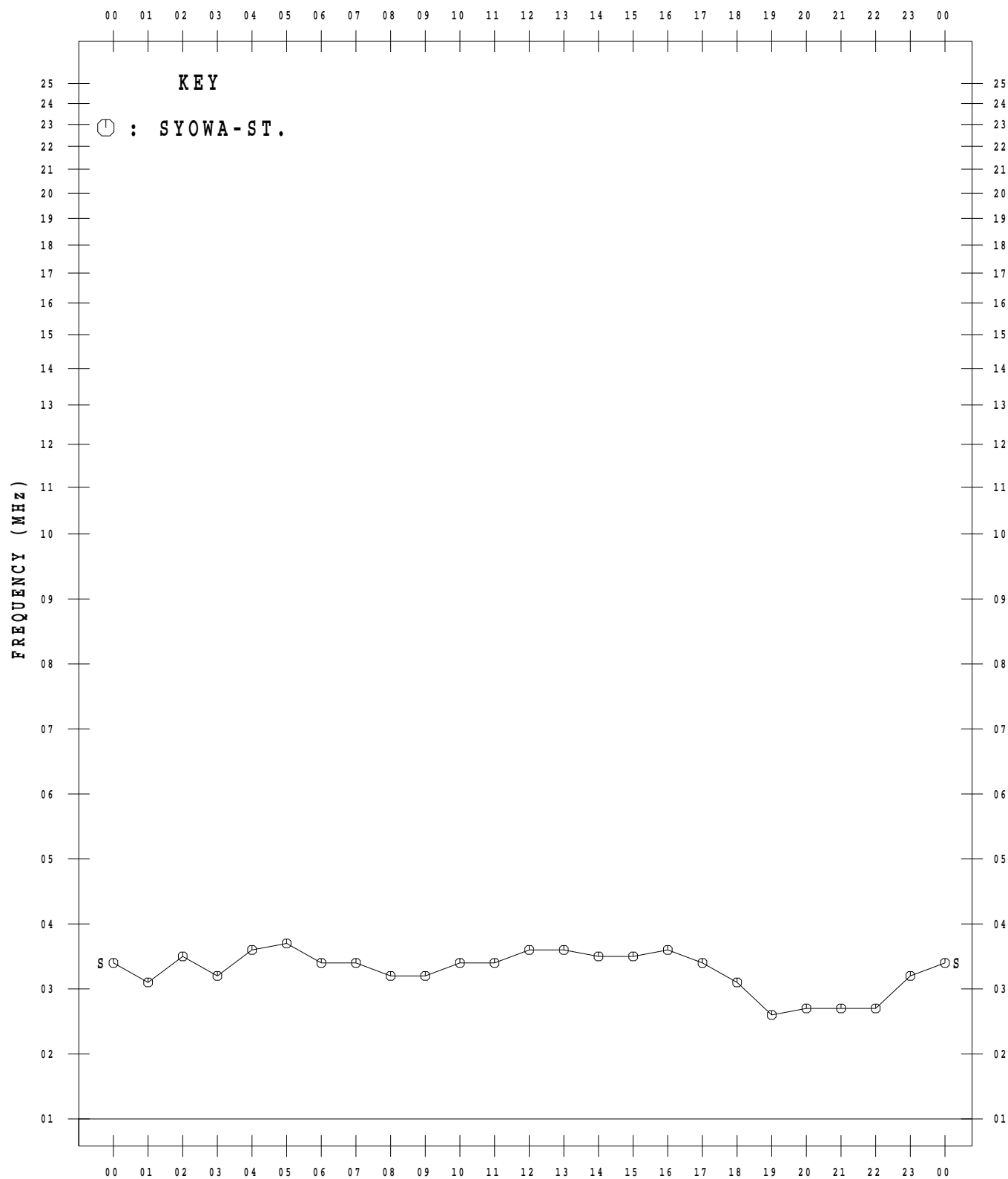




# MONTHLY MEDIAN VALUES OF f<sub>TE</sub>s

45°E MEAN TIME

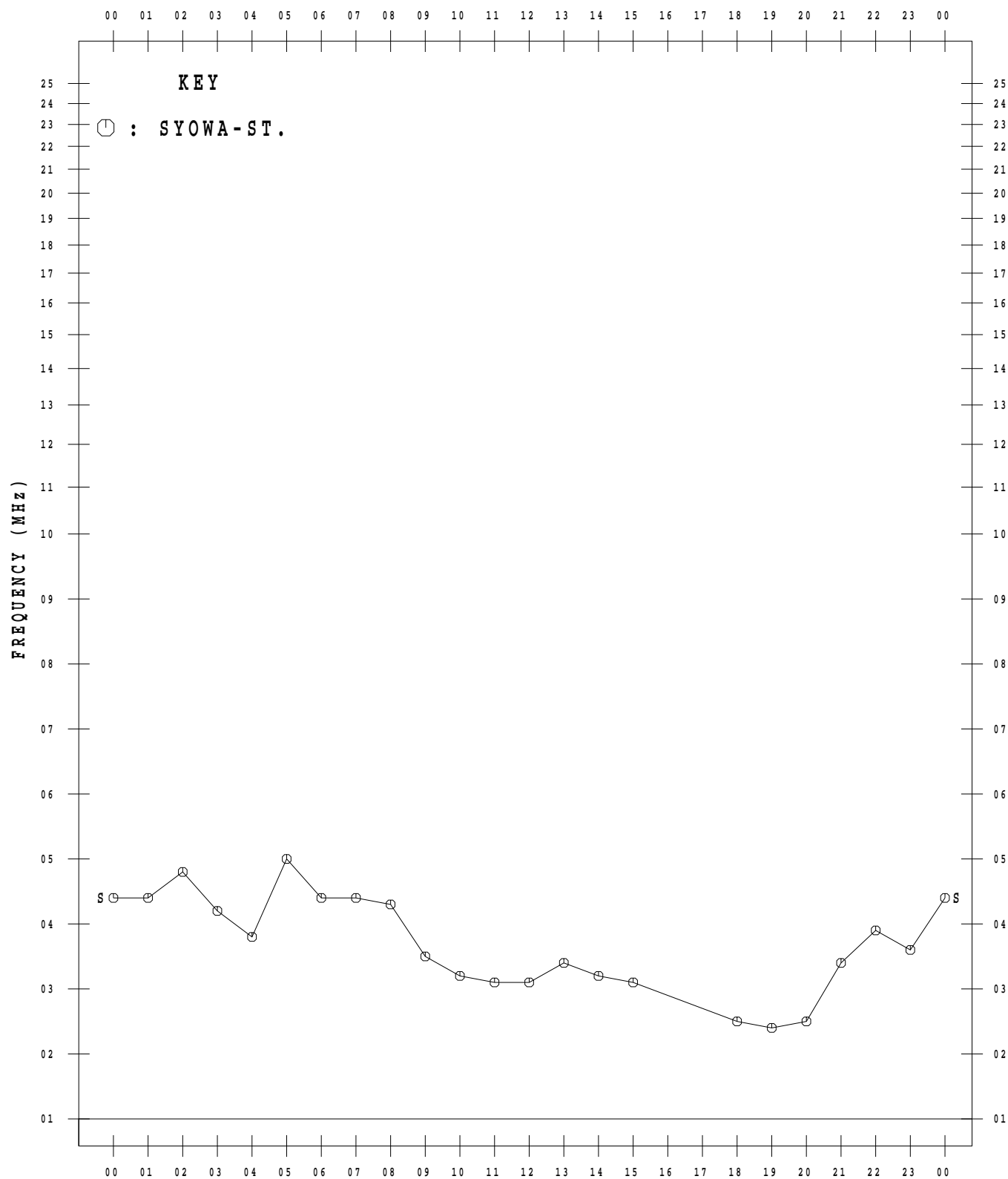
JAN. 2021



# MONTHLY MEDIAN VALUES OF f<sub>tEs</sub>

45°E MEAN TIME

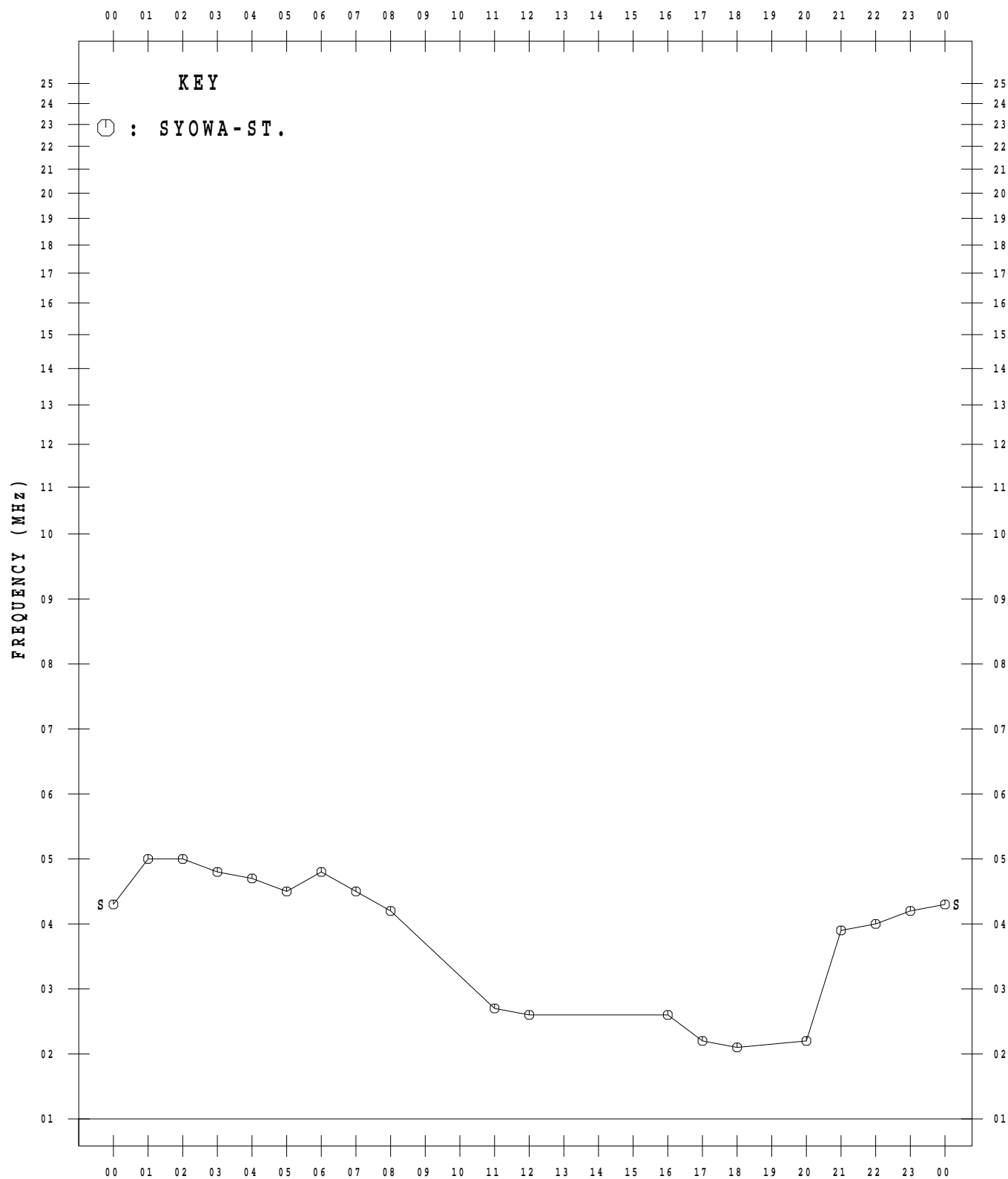
FEB. 2021



# MONTHLY MEDIAN VALUES OF f<sub>tEs</sub>

45°E MEAN TIME

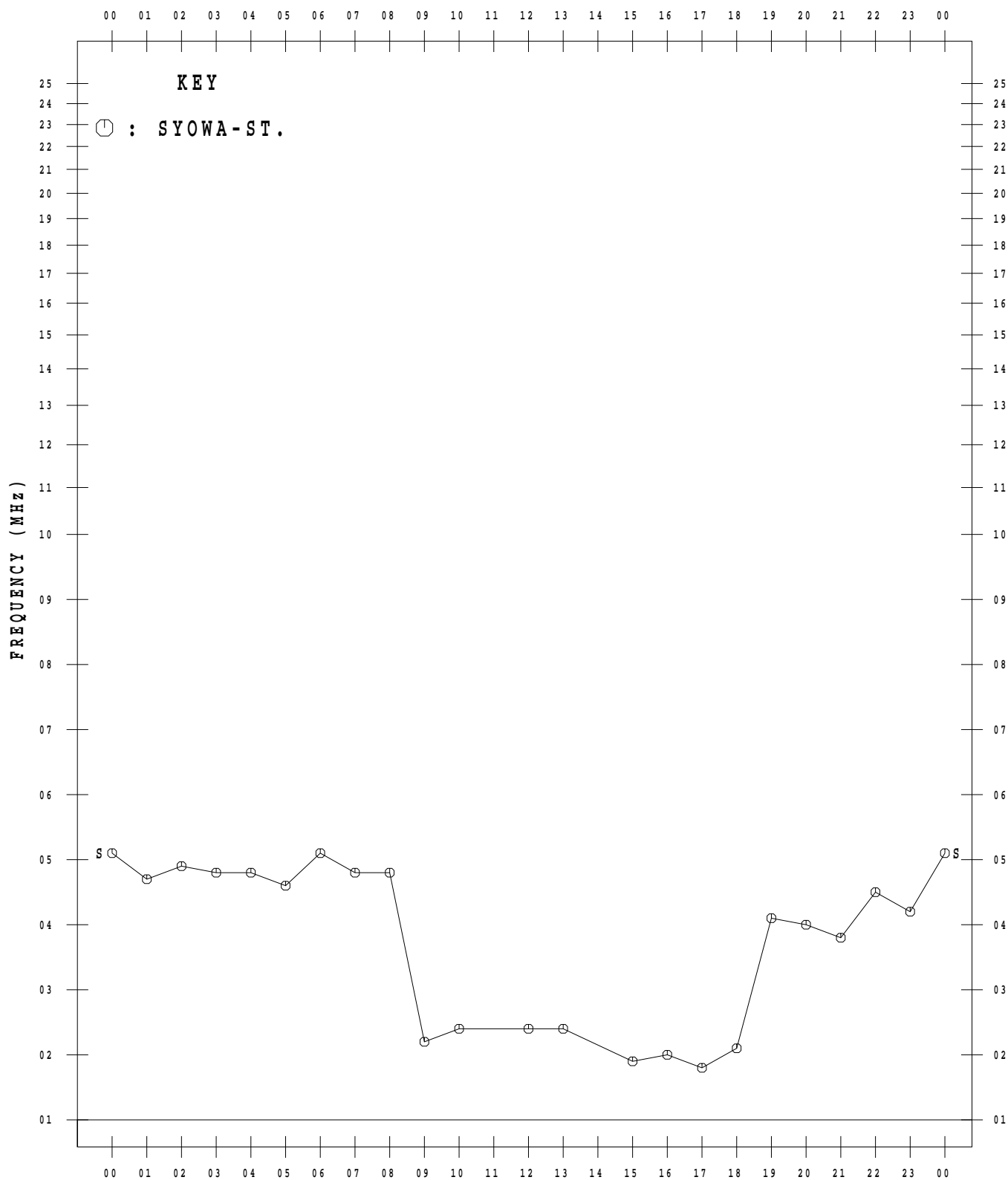
MAR. 2021



# MONTHLY MEDIAN VALUES OF f<sub>tEs</sub>

45°E MEAN TIME

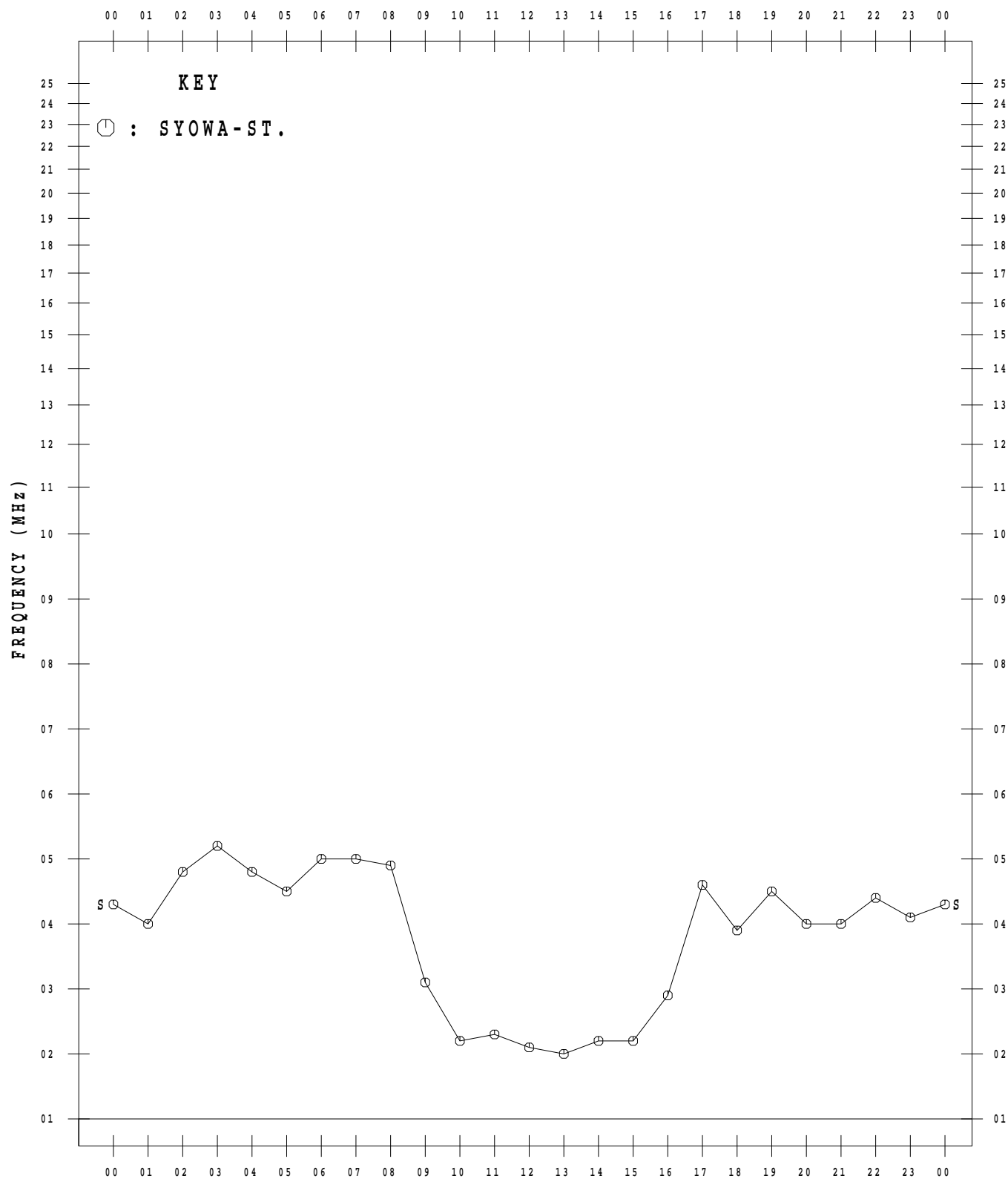
APR. 2021



# MONTHLY MEDIAN VALUES OF f<sub>TE</sub>s

45°E MEAN TIME

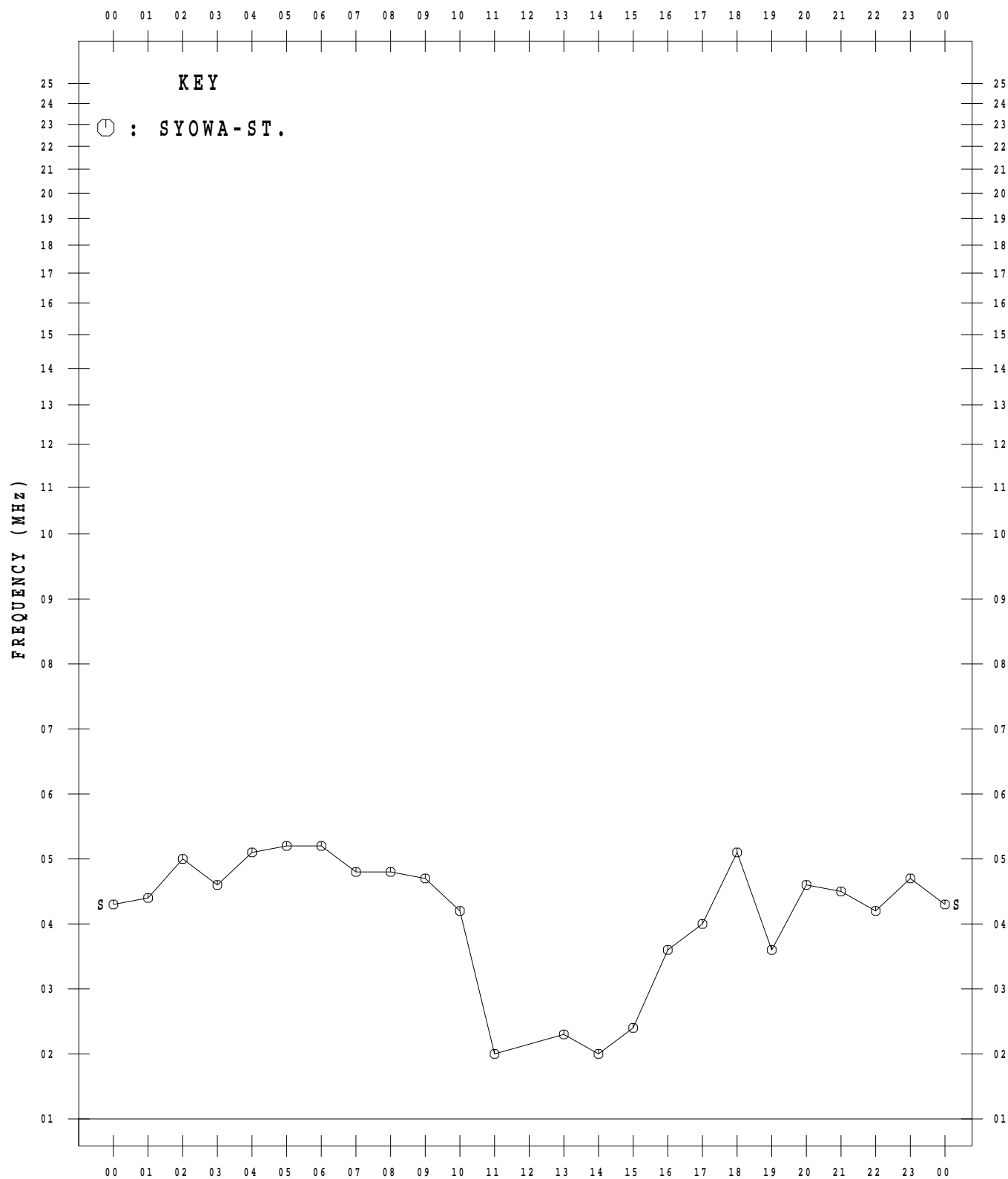
MAY 2021



# MONTHLY MEDIAN VALUES OF f<sub>TE</sub>s

45°E MEAN TIME

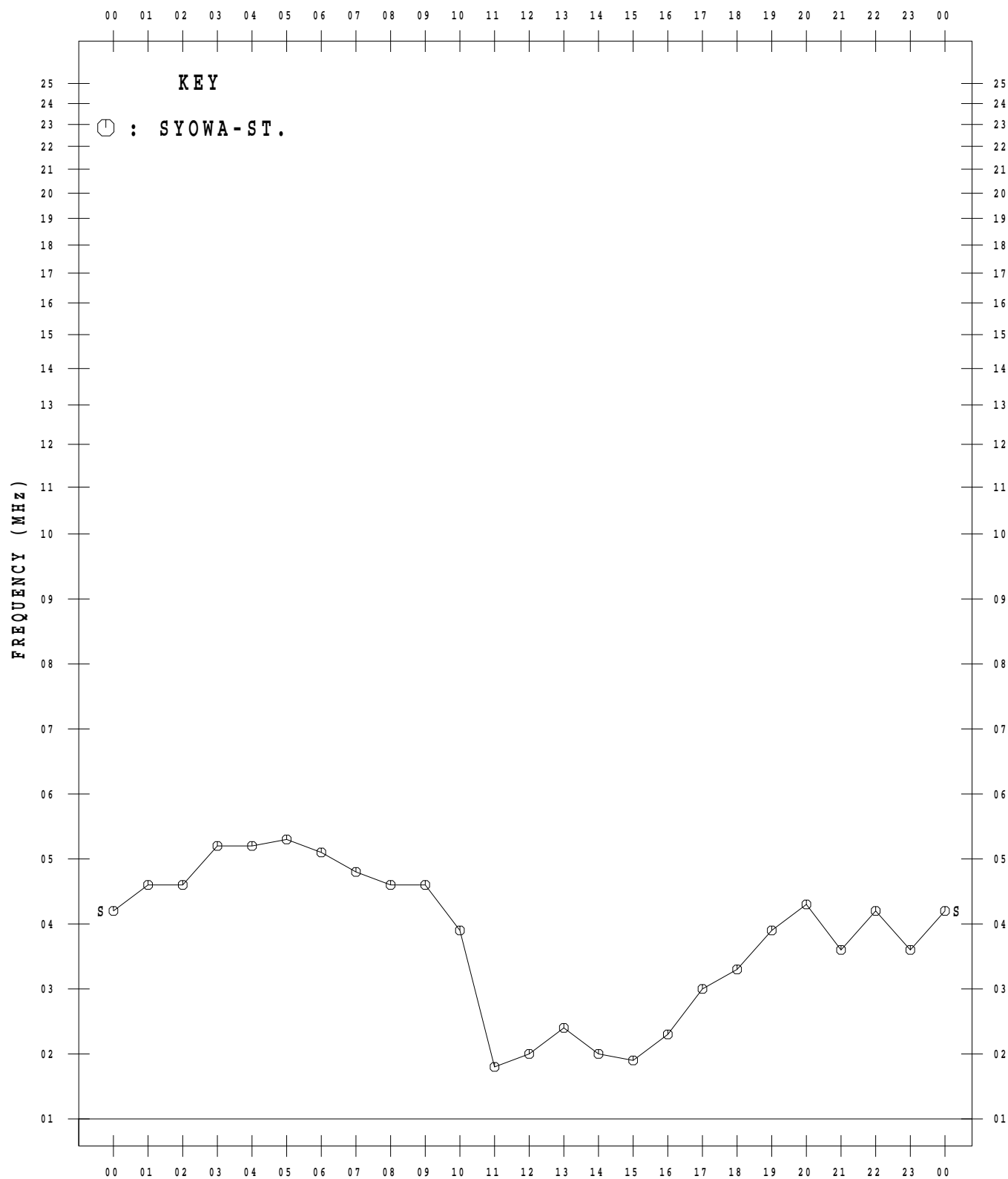
JUN. 2021



# MONTHLY MEDIAN VALUES OF f<sub>TE</sub>s

45°E MEAN TIME

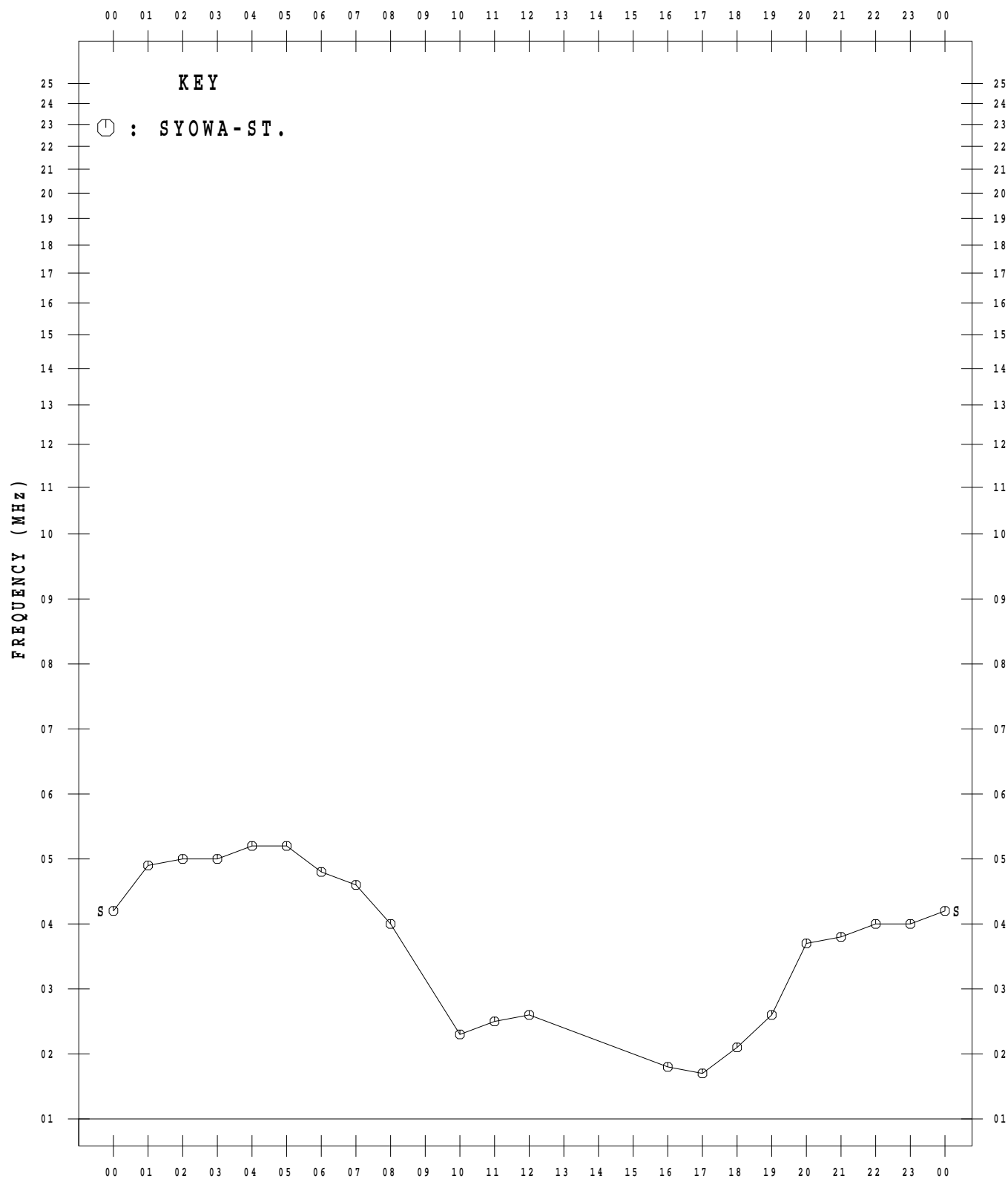
JUL. 2021



# MONTHLY MEDIAN VALUES OF f<sub>tEs</sub>

45°E MEAN TIME

AUG. 2021

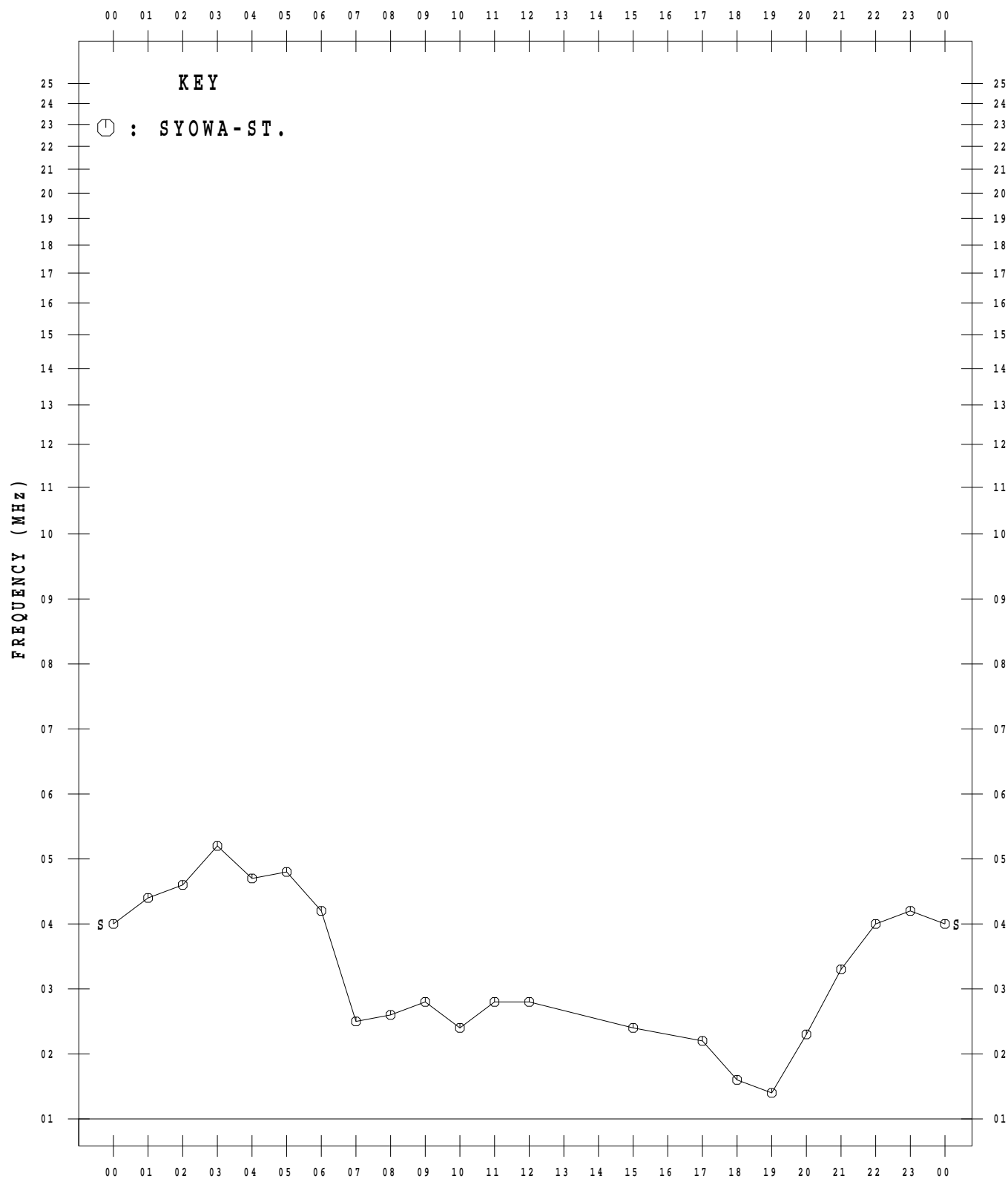




# MONTHLY MEDIAN VALUES OF f<sub>t</sub>E<sub>s</sub>

45°E MEAN TIME

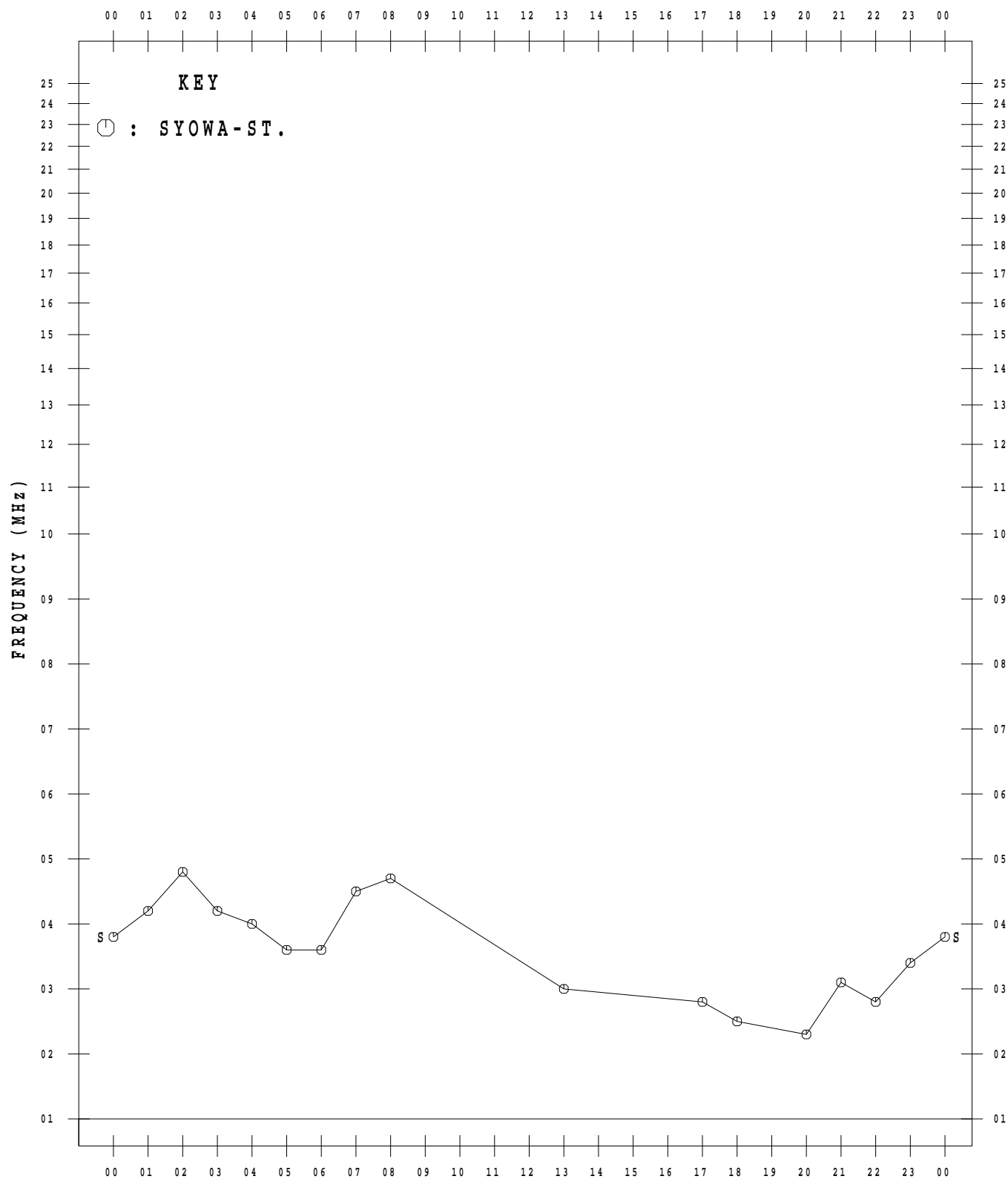
SEP. 2021



# MONTHLY MEDIAN VALUES OF f<sub>tEs</sub>

45°E MEAN TIME

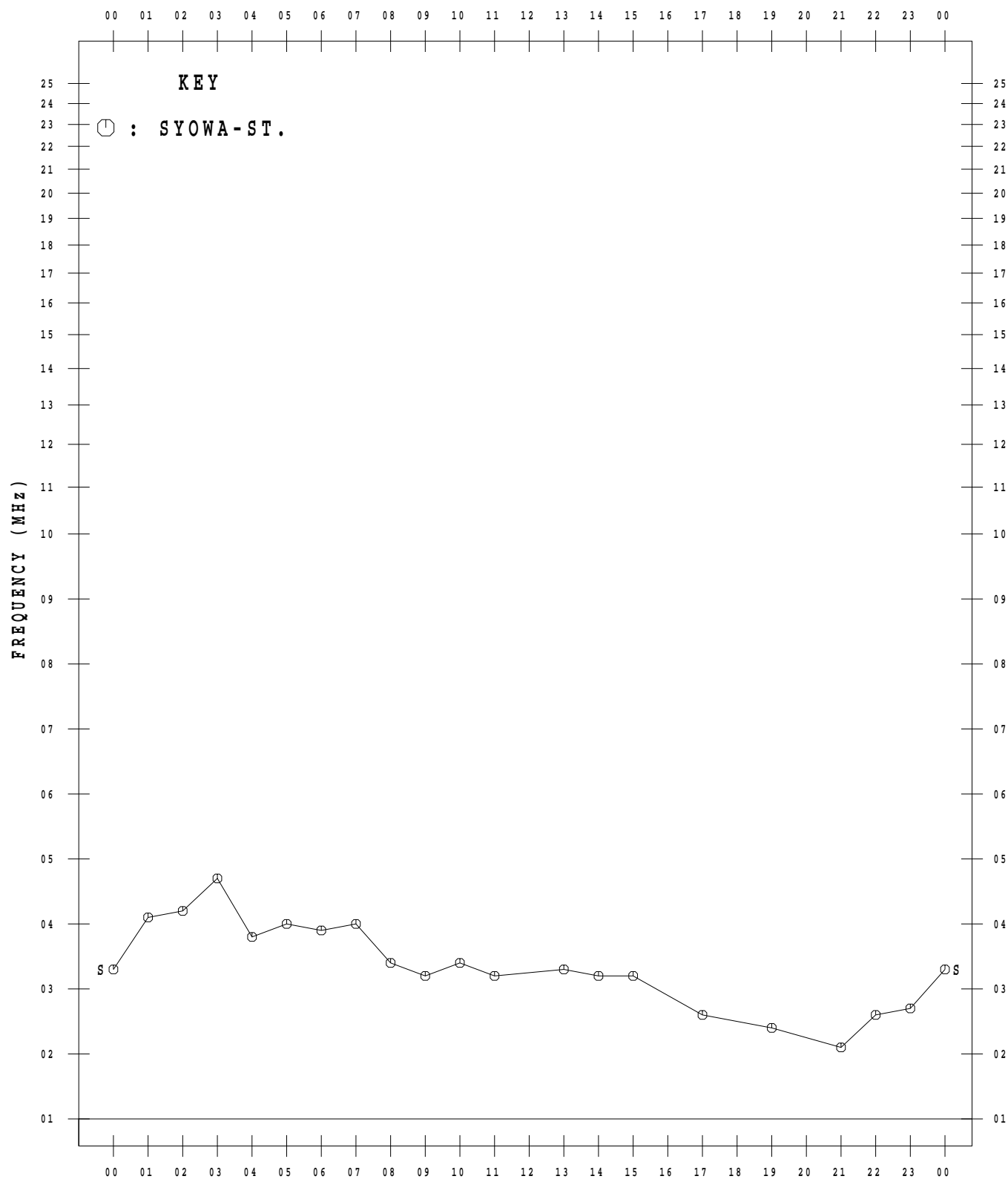
OCT. 2021



# MONTHLY MEDIAN VALUES OF f<sub>t</sub>E<sub>s</sub>

45°E MEAN TIME

NOV. 2021



# MONTHLY MEDIAN VALUES OF f<sub>tEs</sub>

45°E MEAN TIME

DEC. 2021

