

# IONOSPHERIC DATA AT SYOWA STATION (ANTARCTICA)

January – December 2019

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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 2019. 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	86.8

\* Geomagnetic latitude and longitude were calculated using IGRF-12 (2015)

## 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	Hard 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: T. Kondo

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. 2019 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	X 42	X 49	X 42	X 46	X 49	X 51	X 52	X 65	X 64	X 60	X 59	X 62	X 63	X 70	X 66	X 60	A	X 50	X 49	X 52	X 49	X 55	X 46	X 44
2	X 40	X 42	X 42	X 42	A	X 51	X 54	A	A	A	X 58	X 54	X 52	X 51	X 48	X 48	X 47	X 45	X 44	A	X 54	X 58	X 40	X 44
3	X 40	X 40	X 41	X 43	X 49	X 57	X 63	X 70	X 63	X 70	X 69	X 66	X 62	X 58	X 54	X 52	X 48	X 50	X 47	X 47	X 48	X 56	X 56	X 58
4	X 46	X 42	X 40	X 42	X 43	A	X 48	X 55	X 53	X 54	X 57	X 57	X 62	X 64	X 66	X 64	X 55	X 50	X 50	X 42	X 42	A	X 84	A
5	X 68	X 36	A	X 65	X 43	A	A	X 41	A	X 48	B	B	X 44	X 49	X 52	X 51	X 55	X 49	X 47	X 50	X 67	X 49	X 40	X 40
6	A	A	A	A	A	X 54	X 49	A	A	A	X 50	X 45	X 51	X 50	X 55	X 51	X 52	X 50	X 47	X 40	X 44	A	X 50	A
7	A	A	A	A	A	X 41	X 47	X 47	X 47	X 50	X 52	X 49	X 50	X 50	X 51	X 52	X 51	X 49	X 48	X 44	A	A	X 46	X 46
8	X 40	X A	X A	R	X 44	X 47	X 50	X 58	X 58	X 57	X 52	X 52	X 52	X 52	X 53	X 54	X 52	X 49	X 46	X 48	X 46	X 46	X 39	X 37
9	X 38	X 36	X 42	X 39	X 83	X 50	A	X 50	X 52	X 54	X 53	X 49	X 49	X 48	X 50	X 49	X 50	X 47	X 49	X 45	X 46	X 47	X 41	X 36
10	X 39	X 37	X 38	X 36	X 40	X 45	A	X 54	X 53	X 53	X 54	X 55	X 54	X 53	X 52	X 50	X 50	X 50	X 50	X 44	X 46	X 45	X 54	X 48
11	X 52	X 48	X 48	X 47	X 58	X 59	A	X 48	X 59	X 60	X 54	X 50	X 52	X 56	X 53	X 46	A	X 48	A	X 45	X 44	X 44	X 39	X 36
12	X 36	X 35	X 46	X 42	X 47	X 50	X 48	X 51	X 53	X 51	X 44	X 45	X 45	X 45	X 49	X 46	X 48	X 44	X 46	X 45	X 46	X 45	X 41	X 38
13	X 34	X 39	X 37	X 44	X 48	X 46	X 46	X 51	X 55	X 55	X 52	X 51	X 47	X 51	X 49	X 49	X 46	X 46	X 48	X 46	X 46	X 46	X 44	X 41
14	X 38	A	X 62	X 45	X 54	X 54	A	X 42	X 55	X 55	X 56	X 52	X 52	X 50	X 51	X 51	X 44	X 49	X 51	X 44	X 45	X 46	X 40	X 39
15	X 36	A	A	A	A	X 44	X 50	X 52	X 53	X 53	X 54	X 53	X 49	X 49	X 44	X 44	X 48	X 45	X 43	X 46	X 46	X 48	X 38	X 39
16	A	A	A	X 44	X 44	X 45	X 49	X 52	A	X 50	X 50	X 46	X 47	X 48	X 48	X 46	X 45	X 46	X 44	X 44	X 44	X 45	X 37	X 58
17	A	A	X 86	X 56	X 50	X 58	A	X 46	X 45	X 45	X 44	X 44	X 45	X 45	X 45	X 45	X 44	X 44	X 41	X 41	X 39	X 37	X 36	A
18	A	X 68	A	X 46	X A	X A	X A	X 48	X 50	X 46	C	X 45	X 45	X 49	X 49	X 46	X 48	X 44	X 41	X 43	X 44	X 35	X 35	X 35
19	X 32	X 36	X 35	X 39	X 42	X 46	X 50	X 50	X 45	X 46	X 49	X 50	X 47	X 45	X 45	A	A	X 45	X 46	X 46	X 46	X 40	A	X 57
20	X 39	A	A	A	A	X 45	X 67	X 41	X 42	A	X 44	X 45	X 49	R	X 48	X 50	X 47	X 47	X 44	X 43	X 44	X 38	X 36	X 39
21	X 39	A	X 53	X 54	A	A	A	X 49	X 52	X 47	X 44	X 49	X 50	X 48	X 50	X 46	X 48	X 45	X 50	X 45	X 45	X 41	X 41	X 32
22	X 40	X 57	A	R	X 66	X 50	X 50	X 50	X 51	X 48	X 46	X 48	X 47	X 48	X 52	X 49	X 50	X 49	X 46	X 44	X 43	X 36	X 58	A
23	X 79	A	A	A	A	A	A	A	X 44	X 50	X 52	X 45	X 50	X 49	X 48	X 51	X 55	X 47	X 45	X 38	A	X 42	X 40	A
24	X 46	A	A	A	A	A	A	X 42	C	C	C	C	B	X 46	X 46	X 43	X 43	X 46	X 48	X 44	X 40	X 68	X 68	X 80
25	A	A	A	X 40	X 77	A	A	A	A	A	A	A	X 48	B	X 50	X 50	B	B	X 41	X 41	X 37	X 36	X 43	X 31
26	A	A	B	A	A	X 40	X 53	X 52	X 51	X 54	X 52	X 50	X 53	B	X 47	X 47	X 46	X 47	X 48	X 51	X 41	X 43	X 37	X 45
27	A	A	A	A	A	A	A	A	X 46	X 46	X 46	X 45	X 45	X 45	X 48	X 50	X 50	X 50	X 46	X 46	X 48	X 44	X 40	X 36
28	A	A	A	A	A	X 48	X 49	X 49	X 49	X 50	X 46	X 46	X 47	X 49	X 48	X 46	X 49	X 46	X 44	X 46	X 54	X 49	X 42	A
29	X 42	X 40	X 35	X 44	X 44	X 48	X 46	X 48	X 51	X 50	X 52	X 52	X 51	X 49	X 52	X 54	X 51	X 49	X 49	X 47	X 45	X 45	X 43	X 52
30	X 45	X 44	X 51	X 44	X 46	X 48	X 50	X 59	X 54	X 54	X 52	X 55	X 53	X 52	A	X 51	X 50	X 44	X 51	X 48	A	X 42	X 48	X 40
31	X 39	X 43	X 69	X 47	X 50	X 56	X 56	X 58	X 58	X 58	X 53	X 57	X 56	A	X 58	X 60	X 57	X 52	X 43	A	X 43	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	21	16	16	18	19	20	20	25	25	26	27	28	30	27	30	30	27	30	30	29	28	27	29	26
MED	X 40	X 41	X 42	X 44	X 47	X 49	X 50	X 50	X 52	X 52	X 52	X 50	X 50	X 49	X 50	X 50	X 48	X 48	X 46	X 45	X 45	X 45	X 41	X 40
U Q	X 46	X 46	X 52	X 46	X 54	X 51	X 54	X 54	X 55	X 55	X 54	X 54	X 52	X 52	X 53	X 52	X 51	X 50	X 49	X 47	X 46	X 48	X 47	X 48
L Q	X 38	X 36	X 39	X 42	X 44	X 46	X 48	X 48	X 48	X 48	X 49	X 46	X 47	X 47	X 48	X 47	X 46	X 46	X 44	X 44	X 44	X 42	X 38	X 37

JAN. 2019 f<sub>XI</sub> (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 2019 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

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	36	36 <sup>F</sup>	36	40	39	44	46	50	58	54	53 <sup>R</sup>	56	57	52 <sup>F</sup>	60	45 <sup>F</sup>	A	44	43	46	43	43 <sup>F</sup>	40	38	
2	34	36	36	36	A	45	48	A	A	A	52	48	46	45	42	42	41	39	38	A	48	52	34	38 <sup>F</sup>	
3	34	34	35	36	43	45 <sup>F</sup>	45 <sup>F</sup>	57 <sup>F</sup>	57	64	59 <sup>F</sup>	60	56	52	48	46	42	44	41	41	42	50	50 <sup>F</sup>	46 <sup>F</sup>	
4	40	36	34	36	37	A	42	49	46	48	51	51	56	58	60	58	49	44	44	36	36	A	A	A	
5	A	30	A	58	30 <sup>F</sup>	A	A	35	A	42	B	B	38	43	46	45	49	43	41	44	A	35 <sup>F</sup>	34	34	
6	A	A	A	A	A	31	43	A	A	A	R	44	39	45	44	49	45	46	44	41	34	R	A	A	
7	A	A	A	A	A	A	35	41	41	41	44	46	43	44	45	46	45	43	42	38	A	A	40	40	
8	34	A	A	A	38	41	44	46 <sup>F</sup>	47 <sup>F</sup>	43 <sup>F</sup>	46	46	46	46	47	48	46	43	40	42	40	40	33	32	
9	32	30	36	33	49 <sup>F</sup>	39 <sup>F</sup>	A	40 <sup>F</sup>	46	48	47	43	42	42	44	43	44	41	43	39	40	41	35	30	
10	32	31	32	30 <sup>R</sup>	34	39	A	42 <sup>F</sup>	47	47	47	48	49	48	47	46	44	44	44	R	38	40	39	48	42
11	42 <sup>F</sup>	42	42	41	52	A	A	42	53	49	48	43	46	46	47	40	A	42	A	39	38	38	33	30	
12	30	29	40	36	41	39 <sup>F</sup>	41	45	47	45	38	39	39	39	43	40	42	38	R	40	39	40	39	35	32 <sup>F</sup>
13	28	31	31	38	42	40	40	37 <sup>F</sup>	39 <sup>F</sup>	45 <sup>F</sup>	46	45	41	45	43	43	40	40	42	40	40	40	38	31 <sup>F</sup>	
14	32	A	56	39	48	48	A	36	49	44	50	46	46	44	45	45	38	43	45	38	39	40	34	33	
15	30	A	A	A	A	38	42	46	47	47	48	47	43	43	38	38	42	39	37	40	40	42	32	33	
16	A	A	A	A	38	39	43	46	A	44	44	40	41	42	42	40	39	40	38	38	38	39	31	52 <sup>A</sup>	
17	A	A	A	A	A	34 <sup>F</sup>	A	A	40	39	39	38	38	39	38	39	38	38	35	35	33	31	30	A	
18	A	A	A	A	R	A	A	42	44	40	C	39	39	43	43	40	A	A	R	39	40	40	34	29	29 <sup>A</sup>
19	26	30	29	33	36	40	44	44	39	40	43	44	41	39	39	A	A	R	39	40	40	40	34	29 <sup>A</sup>	
20	A	A	A	A	A	39	A	35	36	A	38	39	43	R	R	42	44	41	41	38	37	38	32	30	33
21	R	A	A	A	A	A	A	43	41	41	38	43	44	42	44	44	40	41	39	44	39	35	35	26 <sup>A</sup>	
22	A	A	A	R	32	A	44	44	44	45	42	40	42	40	42	46	43	44	43	40	38	36	30	A	
23	A	A	A	A	A	A	A	A	38	44	46	39	44	43	42	45	49	41	39	32	A	36	34	A	
24	40	A	A	A	A	A	A	36	C	C	C	C	B	40	40	37	R	B	R	35	35	J	R	A	
25	A	A	A	A	A	A	A	A	A	A	A	A	42	B	44	44	B	B	R	35	35	31	30	37	25
26	A	A	B	A	A	34	38	46	45	48	39	44	U	R	B	41	41	40	41	42	40 <sup>F</sup>	35	37	31	39
27	A	A	A	A	A	A	A	A	39	40	40	39	39	39	39	43	44	44	44	40	40	42	38	34	30
28	A	A	A	A	A	A	42	43	43	43	44	40	40	41	43	42	40	43	40	38	40	43 <sup>F</sup>	43	36 <sup>F</sup>	
29	36	34	29	31 <sup>F</sup>	30 <sup>F</sup>	37	40	42	45	44	46	46	45	43	46	48	45	43	43	41	39	39	37	35 <sup>F</sup>	
30	33 <sup>F</sup>	29 <sup>F</sup>	40 <sup>F</sup>	38	40	42	44	47 <sup>F</sup>	48	48	46	49	47	46	A	45	44	38	45	42	A	36	42	34	
31	27 <sup>F</sup>	A	A	A	41	44	50	50	52	52	47	51	50	A	52	54	51	46	37	A	F	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	18	13	13	15	18	19	18	25	25	26	27	28	30	27	30	30	27	30	30	29	27	26	26	23	
MED	33	31	36	36	40	39	43	43 <sup>F</sup>	45	44	46	44	44	43	44	44	42	42	40	39	39	38	34	33	
U Q	36	36	40	40	42	44	44	46 <sup>F</sup>	48	48	48	48	46	46	47	46	45	44	43	40	40	40	38	38	
L Q	30	30	32	33	36	38	41	40	40	42	42	40	41	41	42	41	40	40	38	38	38	35	32	30	

JAN. 2019 foF2 (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 2019 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	34	38	24 <sup>G</sup>	35	26	40	37	28	28	35	48 <sup>E B</sup>	45	49	38	43	42	81	76	93	28	34	28	74	57	
2	57	39	78	57	82	59	46	80	75	124	30	30	42	62	54	64	64	56	56	71	58	34	59	27	
3	30	55	58	116	36	25	25	25	26		30	30	30	33	36	34	34	60	30	26	26	18 <sup>G</sup>	21	35	
4	29	20	20	22	27	90	40	28	30	61	34	101	35	45	46	33	39	32		30	30	78	61	58	
5	60	54	56	38	26	73	58		80	40			84	91	35	34	29	71	26	26	37		138	30	
6	40	48	56	67	57	59	29	58	66	53	35	68	60	35	55		66	28 <sup>E B E B</sup>	28	28	57	46	44	42	
7	52	58	54	54	49	68	30	37	50	32	30	28	32	58	63	58	32	27 <sup>E B</sup>	26	22	131	102	30	57	
8		47	58	36	30	31	39	32	33	40	33	32	36	34	33	32	28	28 <sup>E B E B</sup>	29		24	30		22	
9	27	24	29	52	55	29	45	33	115	31	21	27	31	31	31	31	47	45	49	30	25	23	24	16	
10	36	18 <sup>G</sup>	31	49	56	116 <sup>A</sup>	38		28	30	30	28	31	31	34	32	33	21	24	32	27	27	71	26	
11	18	16	16		28	52	52	66	29	31	31	39	43	32	36	30	75	60	110	58			24	16	
12	19	24	56	56	36	67	26		26	27		32	32	41	34	38	54	56	64	25	23	20	18	10	
13		19	18	17	20	28	27	32	28	28	67	57	32	30	33	59	57	60	60	38	21	18	22	33	
14	28	71	38	33	41	40	53	33	28	28	32	32	33	54	58	32	41	44	30	24	24	40	23	19	
15	29	29	72	58	47	36	27	27	27	28	32	35	33	34	36	38	31	22		30	21	18	19	37	
16	47	100	45	34	33	24	34	26	57	54	36	35		58	34	33	31	28	28	26	23	17	35	39	
17	57	58	66	44	96	23	32	46	38		61	30	30	60	50	32	31	28	48	24	30	24	33	39	
18	46	51	46	44	29	50	52	33	33	27		32	32	32	32	54	31	29	29	26	24	20	18	33	
19	55	22	15	18			25	30	42	35	30	30	32	32	32	65	96	53	56	58	24	38	38	39	
20	44	50	57	57	56	56	47	100	58	58	40	50	31	33	33	43	43	28	28	26	24		19	19	
21	38	48	37	56	78	52	54		66	28	35	35	31	31	31	30	28	28	46	53	25	18	16		
22	36	39	38			48	36	34	34	29	31	31	48	62	58	30	41	34	31	23	22	22	16	35	
23	41	40	34	54	59	59	46	58	53	65	33	33	34	39	34	30				24	48	34	32	42	
24	66	42	68	61	49	57	56	27						56	56		27	25	26	24	21	44	52	53	
25	63	74	84	37	48	62	47	45	52	60	64	42	128		68	30				30	30	22	36	19	28
26	53	42		49	45	38	27		30	33	36						29	32	29		22	22	22	29	
27	44	38	38	38	59	50	58	49	28	28	28	30	30	33	40	28	27	24	18			18	15	20	
28	34	48	47	45	57	39	24	24	67	27	31		57	36	36	31	37	17	30	23	23	17	17	12	
29	13	17		24	21	21	26	26	28	33	33	70	32	32	32	32	36	28		16	26	16	18	18	
30	11 <sup>E B E B</sup>	10	10	14		22	22	30	28	28	39	28	31	40	54	30	59	31	29	29	60	56	25	22	
31	31	32	32	51	33	33	20	18	25	31	31	45	45	92	40	38	28	28	28	50	112	52	54	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	31	31	31	31	30	30	28	29	30	29	31	31	30	30	31	31	31	31	31	31	
MED	36	40	42	44	41	48	37	30	33	31		32	32	36	36	32	35	28	29	26	24	23	24	30	
U Q	52	51	57	56	56	59	47	45	57	40	36	44	43	57	54	38	54	53	48	30	34	38	44	39	
L Q	28	24	29	33	27	29	27	25	28	28	30	30	31	32	33	31	31	28		24	22		18	19	

JAN. 2019 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 2019 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	6	6	16	12	8	10	10	10	5	9	48	32	25	16	12	10	48	9	12	6	6	15	15	13
2	13	8	9	8	10	6	7	9	8	8	8	8	8	9	8	7	7	8	7	7	7	7	6	6
3	10	8	8	10	15	10	8	8	7	11	8	8	8	9	14	12	9	12	12	9	9	9	8	6
4	6	6	8	7	8	14	7	8	8	8	7	8	9	16	14	9	7	9	7	12	12	7	6	7
5	7	6	11	6	6	10	7	7	12	13	B	B	18	33	13	18	18	26	13	18	10	11	8	8
6	10	13	17	28	19	17	10	18	13	20	13	13	17	16	16	14	32	28	27	14	11	16	9	24
7	17	36	28	18	14	15	9	9	17	9	10	16	24	33	28	24	24	15	26	14	13	10	8	9
8	11	12	10	14	12	9	12	10	8	7	11	8	8	8	12	10	20	28	29	17	10	16	9	12
9	8	9	16	11	15	8	10	7	7	9	8	7	5	13	9	9	11	10	7	8	10	9	7	8
10	10	10	10	10	14	14	12	8	8	8	7	6	6	11	10	12	11	8	13	20	22	15	12	13
11	13	8	6	8	10	16	11	10	8	8	9	39	18	14	14	12	12	18	18	22	11	14	7	7
12	8	8	7	8	8	14	6	7	7	8	7	9	9	9	8	11	8	8	8	8	9	10	8	8
13	8	7	7	7	7	7	9	9	9	10	14	10	11	8	8	8	8	9	8	9	8	8	5	5
14	8	14	20	8	12	7	9	7	7	7	7	7	7	11	11	12	9	10	10	17	10	9	7	7
15	7	13	12	16	16	13	9	7	7	6	9	9	9	9	9	9	10	10	10	8	8	7	7	8
16	11	11	9	8	10	8	8	8	14	7	11	7	9	9	13	17	12	12	10	15	11	8	10	20
17	10	10	10	9	9	6	11	12	8	8	7	13	10	10	8	10	10	11	9	7	8	8	8	8
18	12	9	10	13	13	16	12	8	8	8	C	7	7	7	7	33	32	19	10	12	8	6	6	8
19	10	10	10	7	9	9	9	9	17	19	14	11	8	16	32	24	19	19	19	12	8	8	8	11
20	13	6	9	23	8	14	10	7	8	8	9	9	9	8	8	11	11	15	11	8	8	8	11	7
21	10	16	10	11	10	10	10	8	6	9	7	7	7	7	7	9	8	9	8	8	8	8	6	8
22	10	10	9	16	15	14	10	6	6	9	8	8	8	7	9	9	8	7	7	7	7	9	7	8
23	12	11	13	20	12	12	11	15	8	8	12	17	14	8	8	14	31	20	12	8	11	10	7	8
24	9	10	7	15	11	10	17	14	C	C	C	C	B	19	18	16	12	10	10	10	9	9	9	6
25	15	24	11	8	12	16	14	8	14	14	14	18	31	B	31	18	B	B	16	12	9	14	7	7
26	8	8	B	15	8	11	11	8	20	24	15	19	19	B	29	32	29	13	9	9	10	10	10	7
27	8	8	15	24	21	10	10	13	10	10	10	11	11	12	10	10	16	14	12	13	10	7	8	8
28	12	12	10	20	21	15	8	8	9	9	11	11	8	8	8	8	8	8	10	9	9	8	8	8
29	9	9	9	8	8	8	8	8	8	11	9	9	8	13	12	12	8	12	16	16	16	16	13	10
30	11	10	11	9	9	8	11	8	8	12	12	10	12	12	10	10	11	10	10	10	11	11	10	7
31	7	14	12	16	10	10	9	9	9	7	7	7	8	8	8	9	9	13	9	13	11	8	11	11
	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	29	30	31	31	31	31	31	31	31	31	31	31	31	31
MED	10	10	10	11	10	10	10	8	8	9	9	9	9	11	10	11	11	12	10	10	10	9	8	8
U Q	12	12	13	16	14	14	11	10	10	11	12	13	17	16	14	16	20	18	13	14	11	11	10	10
L Q	8	8	9	8	8	8	8	8	7	8	8	8	8	8	8	9	8	9	9	8	8	8	7	7

JAN. 2019 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 2019 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	E A	E A	A	214	A	218	198	194	202	B	210	A	188	212	200	A	200	212	212	220	E A	E A	E A			
2	E A	E A	E A	A	A	236	198	A	A	A	184	204	198	198	198	196	194	198	198	A	198	198	198	228			
3	216	E A	E A	A	A	208	196	196	178	198	194	180	H	H	198	198	H	H	E A	200	200	210	222	204	226		
4	214	194	260	124	202	A	224	214	224	200	204	200	196	A	202	208	206	208	200	A	A	A	A	A			
5	A	A	A	A	A	A	A	196	A	202	B	B	216	E B	226	200	214	214	88	216	216	A	230	230	A		
6	A	A	A	A	A	230	202	A	A	A	234	202	194	222	A	204	E B	216	200	206	202	240	A	A	A		
7	A	A	A	A	A	A	204	A	A	194	200	196	200	E B	230	194	216	212	200	208	200	A	A	208	200		
8	E A	A	A	A	A	200	A	204	E A	242	192	180	208	198	194	200	206	200	218	218	202	220	E A	E A	E A		
9	E A	A	A	E A	A	E A	A	A	A	204	196	188	178	H	198	210	202	206	A	A	A	192	190	218	236	202	
10	E A	A	A	A	232	A	A	208	194	166	H	H	200	210	198	198	198	208	198	210	210	E A	E A	E A	E A		
11	E A	224	218	A	226	A	A	254	208	194	188	B	188	204	212	194	A	212	A	198	198	230	228	216			
12	E A	212	212	A	A	E B	222	204	202	190	188	188	206	206	206	204	204	198	210	196	212	214	220	220	224		
13	200	228	230	248	206	196	198	248	204	198	A	194	192	196	188	196	184	202	E A	E A	234	236	200	218	100	246	
14	E A	A	A	A	A	A	A	A	194	198	210	200	200	200	A	216	222	E A	230	200	200	200	A	232	220	A	
15	E A	A	A	A	A	E A	294	198	198	198	198	204	196	188	180	176	198	198	198	196	206	222	208	228	A		
16	A	A	A	A	246	224	202	190	A	196	198	194	198	198	198	198	200	208	194	210	210	208	A	194	A		
17	A	A	A	A	A	208	A	A	216	180	180	202	198	204	196	192	194	192	196	242	220	E A	A	A	A		
18	A	A	A	A	A	A	A	A	200	186	C	208	202	184	194	A	216	200	220	208	208	200	238	258	E A		
19	E A	E A	A	A	A	212	214	210	190	E A	A	190	210	190	190	198	A	A	A	E A	222	222	A	A	A		
20	A	A	A	A	A	246	A	A	196	A	212	200	200	200	190	204	182	H	198	198	198	224	208	216	E A		
21	A	A	A	A	A	A	A	198	196	196	188	192	198	194	202	196	186	196	204	A	206	212	212	220	A		
22	A	A	A	A	346	A	E A	256	200	182	190	198	192	206	198	186	186	210	200	194	200	196	212	230	A		
23	A	A	A	A	A	A	A	A	A	A	230	204	198	230	210	200	200	E B	216	216	208	A	E A	E A	A		
24	E A	A	A	A	A	A	A	A	C	C	C	C	B	A	218	214	188	196	186	H	H	224	A	A	A	196	
25	A	A	A	A	A	A	A	A	A	A	A	A	A	238	E B	210	196	B	B	196	232	202	A	236	E A		
26	A	A	B	A	A	A	228	188	194	194	194	200	202	B	214	232	198	198	188	202	220	222	240	A			
27	A	A	A	A	A	A	A	A	178	H	174	204	188	188	206	204	186	198	198	198	198	222	208	E A	254		
28	A	A	A	A	A	A	202	H	H	174	174	232	190	210	200	200	200	200	192	202	202	218	224	224	208		
29	E A	E A	A	E A	228	210	220	196	192	190	236	200	204	196	180	196	196	208	196	196	198	224	220	210	A		
30	232	280	234	234	224	204	204	178	214	188	192	176	H	190	198	A	H	196	198	188	220	A	210	216	234		
31	E A	A	A	A	A	210	210	210	184	H	184	200	200	A	A	200	204	194	194	216	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	17	12	10	7	11	15	17	20	23	25	25	27	28	27	28	29	26	29	28	27	25	23	24	21			
MED	E A	220	U	228	237	226	211	204	198	195	194	198	200	198	198	200	198	198	199	200	204	212	215	222	217		
U Q	E A	E A	E A	E A	266	272	260	240	230	219	209	208	198	204	202	205	206	203	205	210	209	211	216	221	E A	E A	E A
L Q	229	219	218	234	212	208	200	193	190	H	187	188	192	193	196	195	195	194	198	196	200	200	208	216	209		

JAN. 2019 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 2019 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	41	50	A	A	A	O	X	A	X	X	X	X	X	X	A	X	X	A	A				
2	A	A	A	O	X	36	86	A	A	A	B	A	X	B	B	B	B	O	X	B	O	X	R	O	X	A	A	B
3	X	A	A	A	A	A	A	B	A	A	B	A	B	O	X	B	O	X	V	X	X	O	X	X	X	X	X	X
4	A	A	A	X		O	X	O	X	X	X	X	X	X	X	A	A	X	X	X	O	X	X	X	X	X	X	A
5	A	A	A	A	A	A	A	A	X	X	X	X	O	X	A	A	X	X	X	X	X	X	X	X	X	X	X	A
6	A	A	X	A	X	X	A	A	X	X	X	X	X	X	X	X	X	B	X	X	X	X	X	X	X	X	X	A
7	A	A	A	A	A	67		A	A	X	X	O	X	O	X	X	O	X	A	A	A	X	X	X	X	X	X	A
8	A	A	A	A	B	A	A	A	A	A	X	X	X	X	B	O	X	X	X	O	X	X	X	X	X	X	X	A
9	A	A	A	A	B	A		A	A	X	X	X	X	A	A	O	X	X	X	O	X	X	X	X	X	X	X	A
10	A	71	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	A
11	X	A	A	A	A	A	A	O	X	X	X	X	O	X	X	O	X	X	X	X	X	X	B	O	X	A	A	A
12	A	43	57	A	A	A	68	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
13	X	34	43	A	A	A	A	A	X	X	A	X	X	O	X	B	X	O	X	B	B	B	B	B	B	B	B	X
14	A	A	X	A	A	A	A	A	A	B	A	O	X	X	X	B	B	B	X	X	X	X	X	X	X	X	X	X
15	64	A	57	29	42	A	R	X	O	X	O	X	X	X	R	R	R	X	X	X	X	X	X	X	X	X	X	X
16	21	30	36	31	36	40	43	45	46	48	50	51	50	52	46	44	46	44	48	44	X	X	X	X	X	X	X	X
17	A	41	A	34	34	44	44	46	46	47	49	49	49	50	48	52	50	48	43	44	44	43	44	43	42	42	A	
18	34	A	A	A	A	A	41	A	A	X	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A
19	A	48	A	68	57	86	O	X	A	47	49	50	50	50	46	44	48	50	50	48	48	48	45	40	42	A	A	
20	A	A	X	A	O	X	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A
21	A	80	A	51	A	56	A	X	X	X	B	X	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	A
22	57	91	71	A	A	A	X	X	O	X	X	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23	X	28	31	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
24	30	30	A	37	35	44	48	48	48	52	53	52	54	55	49	48	49	49	46	49	46	49	46	42	46	35	32	
25	46	50	47	46	43	38	54	47	52	54	52	52	48	54	51	50	49	48	47	44	38	38	36	A	A	A	A	
26	30	57	63	56	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A
27	X	32	72	58	57	A	X	X	X	X	X	X	O	X	X	X	X	X	X	X	X	A	A	A	A	A	A	A
28	76	A	A	A	47	56	56	A	A	A	B	O	X	O	X	O	X	B	B	X	A	B	A	O	X	104	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	13	13	11	11	15	15	15	14	19	20	23	25	23	22	21	23	23	24	26	24	27	24	20	10				
MED	32	48	57	37	42	40	45	47	47	48	48	45	48	48	48	48	46	48	46	43	41	39	36	33				
U Q	52	72	63	56	53	56	50	49	50	48	50	50	51	51	51	50	49	48	47	44	42	42	40	42				
L Q	29	36	36	34	35	38	42	45	46	46	42	43	43	45	45	44	45	46	44	42	39	36	33	30				

FEB. 2019 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 2019 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		F	F	A	A	A	R	A				R				A		A	A	A
2	A	A	B		27	29	35				36		36	38	31	43	37	35	32		31	A	A	B
3		A	A	A		A	B	A	A	B	A	B					V							
4	A	A	A		F		R										A							
5	A	A	A	A	A	A	A	A					U	R	A	A								
6	A	A		A	30	34	A	A									B							
7	A	A	A	A	A	A	A	A									A	A	A					
8	A	A	A	A	B	A	A	A																
9	A	A	A	A	B	A	F	A	A							R								
10	A	A	A	A	A		A	A																F
11		A	A	A	A	A	A																	F
12	A	A	A	A	A	A	A	A																F
13	28	30	A	A	A	A	A																	F
14	A	A		A	A	A	A	A																A
15	A	A	A		F	A	A																	F
16	F	F	F		30																			A
17	A	A	A	Z	28	38	38	40	40	41	43	43												F
18	F	A	A	A	A	A	F	A	A															A
19	A	A	A	A	A	A																		F
20	A	A		A																				A
21	A	A	A	A	A	A																		F
22	A	A	A	A	A	A																		A
23	22	F	A	A																				F
24	F	F	A	F	F	F	F																	F
25	F	F	F	F	F	F	F																	A
26	F	A	A	A	A	A																		F
27	26	A	A	A	A																			F
28	A	A	A	A	F	A	A	A	A	A	B													F
29																								F
30																								F
31																								F
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	10	5	6	7	11	11	13	14	19	20	23	25	23	22	21	23	23	24	26	24	26	21	18	9
MED	21	F	24	26	28	33	36	41	40	42	42	39	40	42	42	42	40	42	40	37	35	32	28	F
U Q	25	F	28	28	30	34	38	42	43	42	44	44	44	45	45	44	43	42	41	38	36	34	31	F
L Q	F	F																						F
	15	20	22	23	27	31	33	39	40	40	36	37	37	39	39	38	39	40	38	36	33	29	25	20

FEB. 2019 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 2019 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	38	47	52	58	23	28	26	57	64	56	53	40	31	29	54	59		25	36	44	30	37	40	44	
2	51	66	54	32	63	58	44	58	B	36	31	B	B	B	B	B <sup>E</sup>	B <sup>B</sup>	B	G	23		27	40	42	B
3	65	50	64	59	60	60		61	58	B	47	B	B	G	B		31	26	26	G <sup>E</sup>	B <sup>B</sup>	21	56	G	34
4	38	36	58	19	24	28	56	G	G	G	G	G	40	58	56	32	64	23	G	40	30	23	G	48	48
5	48	39	92	22	54	49	43	44	29	26	31	30	60	86	46	64	G	26	24	22	20	16	G	34	
6	38	33	58	61	15	34	56	50	32	34	49	55	32	30	31	39	B <sup>E</sup>	B <sup>B</sup>	G			19	24	15	37
7	46	67	53	54	57	52	57	54	38	G	64	G	44	62	51	53	58	72	G	G <sup>E</sup>	B <sup>B</sup>	20	54	E <sup>B</sup>	41
8	74	109	79	E <sup>B</sup>	64	48	54	56	56	58	32	G	G	B <sup>E</sup>	B <sup>B</sup>	G	G	G	G		20	22	52	G	93
9	86	59	53	49	B	40	20	53	55	35	118	59	115	122	63	30	31	G	G	28	22	14	36	9	40
10	49	36	35	33	36	29	59	48	G	G	30	28	73	32	30	52	G	G	22	G	G	G		14	14
11	14	31	45	56	42	34	37	G	G	24	51	G	28	31	30	24	26	23	17	G	30	43	31	42	
12	46	58	30	53	51	51	53	56	50	33	34	32	32	32	39	55	65	24	G	B		56	18	18	
13	18	34	53	53	78	48	50	30	55	61	58	58	54	B	G <sup>E</sup>	B <sup>B</sup>	B	B	B	43	43	28	26		
14	30	71	66	78	40	66	66	57	50	B	47	G	G	32	B	B	B	G	G	G <sup>E</sup>	B <sup>B</sup>	23	21	34	
15	48	32	32	21	25	44	38	G	G	33	G	G	G	32	30	28	27	G	31	21	G <sup>E</sup>	B <sup>B</sup>	55	E <sup>B</sup>	10
16	52	47	16	41	62	16	20	22	22	32	32	48	G	31	31	26	51	58	34	56	G	39	32	27	
17	30	34	38	19	G	17	G	G	G	19	30	26	30	84	32	31	31	60	34	34	70	24	24	12	42
18	25	38	90	57	58	52	23	55	62	49	29	30	30	30	30	30	G	G	59	E <sup>B</sup>	B <sup>E</sup>	17	32	32	34
19	46	32	36	41	42	46	56	48	48	G	26	28	29	57	104	30	G	30	24	23	23	23	34	28	
20	29	30	38	44	38	45	42	G	24	34	27	68	32	32	32	26	26	28	20	20	18	18	13	41	
21	52	46	62	32	69	39	59	38	24	28	68	56	30	28	28	31	G <sup>E</sup>	B <sup>E</sup>	B <sup>B</sup>	B <sup>B</sup>	G	32	56	86	53
22	41	58	60	50	66	G	112	16	16	105	27	37	40	34	45	G	G	16	21	23	28	18	14	26	
23	E <sup>B</sup>	10	23	36	44	26	17	G	21	22	26	G	27	28	33	30	38	39	35	18	G	18	E <sup>B</sup>	E <sup>B</sup>	10
24	14	14	44	44	15	15	17	19	24	24	29	29	31	32	28	29	29	29	22	31	15	19	23	34	
25	E <sup>B</sup>	13	10	24	12	E <sup>B</sup>	11	G	G	G	25	27	22	23	30	30	67	35	38	43	G	26	16	28	51
26	17	41	32	38	29	57	32	G	23	26	26	29	29	29	23	29	26	20	23	G	G	14	19	14	23
27	17	31	37	36	52	36	27	27	27	30	29	122	51	70	68	31	26	26	26	G	50	44	51	52	
28	89	70	69	59	33	26	51	63	48	70	B <sup>E</sup>	B <sup>E</sup>	B <sup>E</sup>	B <sup>B</sup>	B <sup>B</sup>	B	B <sup>E</sup>	B <sup>B</sup>	44	B	44	G	45	70	85
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	28	28	28	28	27	28	27	28	27	26	27	26	26	25	24	25	24	26	26	27	28	28	28	27	
MED	40	38	52	44	42	40	43	41	27	31	32	30	G	32	31	31	26	E <sup>G</sup>	G	G	21	20	24	22	34
U Q	50	58	61	55	60	50	56	56	50	36	G	48	44	46	52	38	38	33	30	30	26	44	37	44	
L Q	22	32	36	32	25	27	23	G	G	24	G	29	G	30	30	30	28	G	G	G	G	18	13	26	

FEB. 2019 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 2019 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	10	10	8	8	8	10	14	14	16	16	14	12	21	21	17	12	10	14	10	10	9	13	
2	14	19	34	17	35	21	21	20	B	16	14	B	B	B	B	B	31	B	17	14	14	8	8	B	
3	8	21	14	21	16	16	B	13	30	B	13	B	B	B	B	20	13	12	15	24	16	8	9	8	
4	22	13	11	9	9	17	13	11	8	10	10	12	17	12	10	10	10	12	13	8	11	8	9	15	
5	16	17	10	8	27	17	14	14	10	8	8	10	13	13	12	11	13	11	10	8	8	8	7	7	
6	12	7	8	7	6	8	14	12	8	7	10	10	11	10	10	14	B	27	15	9	8	6	8	10	
7	12	16	17	12	17	8	18	14	9	11	18	20	23	14	12	13	17	12	12	14	20	11	13	7	
8	10	11	11	24	43	13	8	12	14	9	8	14	10	B	31	15	15	16	16	8	9	13	12	13	
9	13	17	18	15	B	24	8	13	12	8	11	13	30	34	28	23	19	12	24	18	11	9	9	9	
10	12	10	8	8	8	14	24	12	11	9	9	9	14	11	14	14	10	10	9	8	11	8	8	8	
11	7	10	22	16	9	12	9	14	14	17	27	17	16	16	14	14	11	11	7	B	14	14	6	9	
12	9	9	9	15	12	11	9	14	11	7	24	12	14	11	11	9	9	9	12	13	12	10	8	9	
13	9	16	10	19	15	15	10	9	8	22	14	14	32	B	23	37	B	B	B	15	15	9	8	6	
14	8	12	8	13	7	24	12	12	16	B	22	18	15	18	B	B	B	B	21	16	12	23	7	7	8
15	8	8	11	10	12	19	16	12	12	11	15	17	22	9	10	13	12	12	10	8	8	13	7	10	
16	10	10	9	8	8	8	8	8	11	8	9	9	11	11	11	13	15	14	8	9	8	8	8	9	
17	9	9	9	10	9	9	8	8	8	10	10	8	11	11	13	9	11	11	8	8	8	9	9	9	
18	6	6	24	11	16	22	9	22	15	14	14	13	12	10	16	16	14	14	24	21	17	8	6	8	
19	7	7	9	11	16	14	14	12	15	11	9	18	11	9	11	14	16	14	12	14	11	11	11	9	
20	8	8	11	15	11	11	7	8	8	11	8	8	8	7	8	8	8	8	6	8	8	8	6	8	
21	8	8	12	8	13	23	13	9	9	8	41	37	22	12	9	11	18	33	30	17	7	10	10	10	
22	10	10	13	18	15	15	11	10	10	8	8	10	10	12	12	12	14	11	11	14	7	10	10	10	
23	10	9	9	12	7	10	12	10	8	8	9	9	9	8	8	8	8	8	8	8	8	8	8	10	
24	6	8	8	8	7	7	8	8	8	8	11	11	16	9	9	9	9	9	8	8	8	8	8	10	
25	7	10	8	9	11	7	13	10	12	14	14	14	14	14	14	14	16	13	13	13	11	10	10	10	
26	8	8	7	10	12	9	7	12	8	8	8	8	8	8	14	10	8	10	8	8	8	9	10	12	
27	10	10	9	7	8	9	8	6	6	6	6	6	8	8	8	6	6	9	9	9	9	11	11	18	
28	16	16	10	9	9	12	17	17	14	24	B	28	28	28	B	B	25	10	B	14	10	14	14	6	
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	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	
MED	9	10	10	10	12	12	12	12	11	10	11	13	14	12	12	14	14	12	12	12	10	9	8	9	
U Q	12	14	12	15	16	17	14	14	14	14	16	18	22	17	22	18	18	14	16	14	13	10	10	10	
L Q	8	8	9	8	8	9	8	10	8	8	9	10	11	10	10	10	10	10	8	8	8	8	8	8	

FEB. 2019 fmin (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 2019 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	E A	A	A	A	A	A	A	E A	A	A	A	198	H	A	A	A	A	A	A		
2	A	A	B	A	A	A	A	A	B	A	200	B	B	B	B	B	E B	218	B	E A	230	222	E A	A	B	
3	A	A	A	A	A	A	B	A	A	B	A	B	B	E A	B	202	194	216	216	212	226	E A	250	E A		
4	A	A	A	A	A	E A	E A	A	A	A	A	E A	A	A	E A	A	A	202	202	E A	E A	E A	A	A		
5	A	A	A	A	A	A	A	A	A	A	200	192	206	200	194	A	200	204	204	204	214	206	206	198	240	
6	A	A	A	A	202	224	A	A	240	194	194	194	194	194	194	198	B	E B	230	220	E A	220	E A	A		
7	A	A	A	A	A	A	A	A	A	A	250	192	204	206	206	200	218	200	A	A	208	196	216	242	240	
8	A	A	A	A	B	A	A	A	A	A	A	A	194	200	B	234	218	218	198	216	210	224	E A	E A		
9	A	A	A	A	B	A	E A	A	A	A	A	A	A	A	E A	A	204	218	204	230	232	226	A	A		
10	A	A	A	A	A	A	A	A	A	A	224	192	188	220	204	202	184	184	200	196	194	202	212	228	258	
11	E A	A	A	A	A	A	A	A	A	A	A	A	E Y	224	200	208	200	192	198	H	204	B	E A	A		
12	A	A	A	A	A	A	A	A	A	A	A	A	210	198	E A	218	192	H	H	196	204	204	204	E B	216	
13	236	A	A	A	A	A	A	A	A	A	212	244	196	206	212	B	196	B	B	B	B	A	A	E A	268	
14	A	A	A	A	A	A	A	A	A	B	A	194	196	218	B	B	B	214	202	230	220	B	E A	E B	A	
15	A	A	A	A	A	A	A	A	236	230	200	230	198	196	230	230	208	200	224	E A	210	202	202	220	212	264
16	A	E A	280	278	260	214	238	200	226	208	202	202	196	H	180	214	192	206	206	228	218	224	A	A	A	
17	A	A	A	A	216	232	212	190	190	198	192	192	A	198	200	198	198	208	202	220	A	220	232	214	A	
18	A	A	A	A	A	A	A	A	A	A	228	204	190	A	222	198	198	184	210	198	218	218	E B	E A	A	
19	A	A	A	A	A	A	210	A	202	206	196	214	H	180	198	204	H	218	202	202	220	220	232	232	A	
20	A	A	A	A	198	194	A	228	204	192	200	218	H	186	224	200	186	200	206	188	202	E A	226	226	256	
21	A	A	218	204	A	A	A	A	214	192	B	B	A	218	204	186	196	196	238	258	214	E A	E A	A	A	
22	A	A	238	A	A	A	220	200	198	186	186	214	214	214	A	162	216	206	206	198	A	224	224	228	228	
23	264	A	A	A	218	198	218	196	176	196	194	194	194	184	196	216	208	208	200	194	212	204	228	E B	290	
24	E A	258	258	A	E A	E A	O	200	210	190	172	188	188	208	208	194	204	204	204	220	220	198	228	218	E A	248
25	218	218	218	244	E B	244	210	212	212	198	198	198	190	218	200	A	A	A	214	200	216	216	216	234	A	
26	E A	268	A	A	A	A	224	200	200	200	200	190	220	A	196	186	214	198	202	184	198	220	220	220	E A	268
27	218	A	202	A	A	220	220	204	186	186	218	218	A	202	202	202	202	202	202	202	202	A	A	A	A	
28	A	A	A	A	A	A	A	A	A	A	B	E B	B	E B	B	B	218	A	B	A	232	A	A	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	7	4	4	4	9	10	12	13	18	20	20	24	22	22	21	23	22	24	26	24	24	20	17	9		
U	238	238	218	238	215	221	214	212	203	195	199	198	200	202	200	201	200	204	203	209	218	226	229	E A	264	
U Q	268	269	248	268	245	232	222	229	224	200	204	214	218	218	209	208	216	212	216	220	226	246	240	E A	279	
L Q	218	228	210	224	208	210	211	200	198	192	193	194	194	198	194	192	198	202	200	202	214	222	221	238		

FEB. 2019 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 2019 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 40	B	A	A	53	B	B	O	X	B	B	B	B	B	B	X	X	X	X	A	A		
2	A	A	A	B	B	B	B	B	B	B	B	B	O	X	O	X	O	X	B	B	O	X	O	A	A	
3	A	A	A	A	A	A	A	B	B	B	A	X	X	X	X	X	X	X	X	X	X	X	O	X	A	
4	A	A	A	A	A	A	B	A	A	A	B	O	X	B	O	X	O	X	O	X	B	O	X	A	A	
5	A	52	71	A	70	B	B	X	B	O	X	O	X	X	X	X	X	X	X	X	X	O	X	O	X	B
6	A	87	A	A	A	A	A	X	X	X	B	B	X	X	X	X	X	X	X	B	B	X	A	40	A	
7	A	A	A	A	A	R	A	X	X	X	O	X	X	X	X	X	X	X	X	O	X	A	A	A	A	
8	A	A	A	A	A	A	A	X	X	X	X	O	X	X	X	X	X	X	X	O	X	X	X	O	X	
9	X	38	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
10	A	A	64	A	A	A	A	A	A	B	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
11	34	36	32	26	26	35	30	39	45	46	50	47	48	49	54	54	53	54	44	38	36	27	A	A		
12	A	A	58	A	A	A	X	X	X	X	O	X	X	X	X	X	X	X	X	X	X	X	X	O	X	
13	A	A	A	A	A	A	A	A	B	X	38	39	49	50	51	53	53	47	45	43	37	33	24	A	A	
14	A	A	A	A	A	O	X	O	X	X	X	O	X	B	X	X	X	X	X	X	X	X	A	A	A	
15	A	A	A	A	A	A	A	A	A	A	B	B	B	O	X	X	X	X	X	X	X	X	A	A	A	
16	A	A	A	A	A	O	X	A	X	X	X	O	X	B	B	B	B	X	O	X	X	X	A	A	A	
17	A	A	A	B	A	A	B	B	A	B	B	B	B	B	B	B	B	B	X	O	X	X	R	R	R	A
18	A	42	A	44	45	A	A	X	B	O	X	X	B	X	X	X	X	X	X	X	X	X	A	A	A	
19	A	40	A	60	A	A	A	O	X	X	X	X	X	X	X	X	X	X	X	O	X	O	X	A	A	
20	A	A	A	47	56	A	A	X	X	X	O	X	X	X	X	X	X	X	X	X	X	X	A	A	R	
21	A	A	A	R	X	22	28	30	35	42	42	48	48	52	54	59	57	54	55	43	34	26	24	22	A	
22	R	B	68	A	53	45	30	40	46	49	51	57	59	55	57	59	58	55	44	35	27	22	A	O	X	
23	X	X	A	R	36	41	29	40	42	49	51	54	51	60	60	62	66	52	42	33	26	22	20	20	X	
24	O	X	B	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X	A	B	
25	X	16	62	A	67	54	A	O	X	50	59	50	58	60	61	56	56	59	66	51	45	38	R	B	B	
26	B	A	A	A	44	A	A	A	A	A	A	42	44	47	52	54	52	55	50	42	29	25	23	22	20	
27	X	20	48	A	42	43	A	A	A	X	X	X	X	X	X	X	X	X	X	O	X	X	B	A	O	X
28	A	A	A	A	A	85	52	A	A	A	A	A	A	O	X	X	X	50	51	52	50	B	R	A	54	69
29	92	B	B	A	A	A	A	A	X	B	O	X	O	X	B	X	O	X	B	B	B	B	A	A	R	
30	A	A	A	A	A	A	A	A	O	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	
31	A	O	X	A	A	B	A	A	A	B	B	A	B	B	X	X	X	X	X	O	X	O	X	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	10	5	9	10	9	10	18	19	19	21	22	27	27	28	27	28	29	28	28	25	16	11	9		
MED	X	41	64	44	44	35	32	40	42	42	44	46	47	49	50	50	48	43	35	29	26	30	24	X		
U Q	34	52	70	54	54	44	36	42	42	46	49	49	51	54	56	57	54	52	45	38	34	32	40	26	X	
L Q	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	O	X
	20	36	45	38	26	30	30	35	39	38	40	43	44	46	48	48	48	44	42	33	26	23	22	20	X	

MAR. 2019 f<sub>XI</sub> (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 2019 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	34	B	A	A	R	B	B	34	B	B	B	B	B	B	B	36	28	21	20	A	A	
2	A	A	A	B	B	B	B	B	B	B	B	B	34	34	35	36	B	B	34	27	23	A	A	A	
3	A	A	A	A	A	A	A	B	B	B	A	35	35	35	41	42	40	39	39	34	30	25	18	R	A
4	A	A	A	A	A	A	B	A	A	A	B	B	37	B	44	46	44	40	B	36	32	A	A	A	
5	A	A	A	A	A	B	B	A		B		35	36	38	39	36	40	38	36	31	28	25	26	B	
6	A	A	A	A	A	A	A	34	36	38	B	B	47	44	F	42	44	42	40	B	B	28	A	A	
7	A	A	A	A	A	A	A	34	36	36	41	40	40	39	R	44	44	45	38	38	28	A	A	A	
8	A	A	A	A	A	A	A	31	35	34	36	40	41	40	39	40	38	40	35	32	29	26	24	R	18
9	18	R	A	A	A	23	30	29	35	36	40	44	45	48	49	44	43	43	43	30	30	F	F	20	
10	A	A	A	A	A	A	A	A	A	B	B	40	42	41	44	43	43	42	39	32	26	26	22	21	
11	F	20	F	20	R	29	24	33	39	40	44	41	42	43	48	48	47	48	38	32	30	21	A	A	
12	A	A	A	A	A	A	28	28	35	39	37	41	39	39	F	F	38	42	40	32	28	32	26	18	
13	A	A	A	A	A	A	A	A	B		32	33	37	37	45	47	47	41	39	37	31	27	18	A	A
14	A	A	A	A	A	24	28	32	30	32	B	35	50	42	43	50	50	46	39	34	22	A	A	A	
15	A	A	A	A	A	A	A	A	A	A	B	B	34	34	37	36	38	36	34	30	25	A	A	A	
16	A	A	A	A	A	R	A	A																	
17	A	A	A	B	A	A	B	B	A	B	B	B	B	B	B	B	B	B	34	32	20	A	A	A	A
18	A	A	A	A	A	A	A		B	R	B	B	38	36	37	37	37	35	32	25	21	15	A	A	
19	A	A	A	A	A	A	A	29	33	36	38	38	40	44	43	44	42	40	36	29	B	17	A	A	
20	A	A	A	A	A	A	A	32	36	37	40	40	43	45	48	42	47	43	36	28	21	A	A	A	
21	A	A	A	A	16	F	24	29	36	36	42	42	46	48	53	51	48	49	37	28	R	R	R	A	
22	R	B	A	A	A	R	24	34	40	43	45	51	53	49	51	53	52	49	38	29	21	16	A	R	
23	14	14	A	A	F	F	23	34	36	43	45	48	45	54	54	56	60	46	36	27	20	16	14	14	
24	R	B	A	A	A	A	22	36	38	44	44	54	54	49	54	57	54	47	35	28	16	A	A	B	
25	10	R	A	A	A	A	41	29	F	F	F	54	55	50	50	53	60	45	39	32	20	R	B	B	
26	B	A	A	38	A	A	A	A	A	A	36	38	41	46	48	46	49	44	36	23	19	17	16	14	
27	14	A	A	F	A	A	A	A	36	38	41	42	42	48	62	58	F	F	F	26	22	B	A	18	
28	A	A	A	A	A	A	A	A	A	A	A	A	38	42	42	44	45	46	44	B	A	A	A	A	
29	A	B	B	A	A	A	A	A		B															
30	A	A	A	A	A	A	A	A	29	30	32	37	40	42	42	46	46	38	28	22	19	A	A	A	
31	A	22	A	A	B	A	A	A	B	B	A	B	B	46	38	43	44	43	39	32	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	6	5	1	4	3	7	9	15	19	19	21	22	27	27	28	27	28	29	28	28	24	15	9	8	
MED	14	19	F	32	20	24	24	32	36	36	38	40	41	43	44	44	44	42	36	29	22	20	22	18	
U Q	18	24		36	F	26	29	34	36	40	43	42	45	48	48	50	48	46	39	32	28	25	25	19	
L Q	14	13		25	16	14	24	29	33	32	34	37	37	39	40	42	42	38	36	27	20	17	16	14	

MAR. 2019 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



# IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 2019 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	65	52	41	K 22	B	54	49	30	B	BE 28	B	B	B	B	B	B	B	B	32	18	37	K 24	99	54		
2	52	46	44	50	63	B	B	B	B	B	B	BE 26	B	30	E 27	32	B	B	BE 24	BE 19	G	44	45	54		
3	38	50	61	52	51	56	48	B	91	B	40	G	26	63	G	108	18	22	E 22	BE 22	BE 15	15	29	28		
4	47	41	95	42	49	58	68	73	51	70	B	BE 32	B	BE 36	BE 41	BE 35	BE 33	B	B	55	84	58	68	45		
5	37	45	51	59	49	53	53	47	28	B	G	G	25	80	26	26	59	21	21	E 18	BE 25	BE 16	16	B		
6	45	47	31	43	63	42	56	21	G	G	B	B	G	G	26	26	G	E 30	B	B	G	17	37	34	49	
7	70	48	48	48	52	44	57	23	G	84	G	53	26	28	30	26	G	G	G	G	37	44	48	70		
8	86	52	59	53	48	31	42	22	60	23	24	24	64	24	24	24	E 26	BE 24	BE 27	BE 27	E 15	20	20	33		
9	E 10	B 52	40	30	19	E 11	B G	G	58	25	B	BE 26	B	26	28	G	21	G	14	20	18	E 15	BE 10	56	57	
10	31	51	35	51	51	59	60	66	46	B	BE 27	B	G	G	G	27	27	20	22	G	56	15	15	15	16	
11	13	13	17	54	34	28	23	G	20	20	25	G	21	G	19	37	E 24	BE 24	BE 25	BE 20	BE 18	16	19	52	52	
12	56	38	52	52	38	25	15	18	21	22	G	G	G	G	G	G	69	G	53	G	57	18	55	72		
13	40	44	54	57	54	59	44	39	B	51	51	54	30	30	28	37	E 37	BE 24	BE 24	BE 21	BE 18	19	15	31	38	
14	38	66	52	57	48	43	G	17	G	50	B	44	34	G	27	27	G	G	E 27	BE 33	BE 16	55	35	50	46	
15	58	58	63	49	51	58	32	56	55	55	B	B	G	29	26	G	B	B	BE 20	BE 23	BE 31	G	12	32	36	31
16	25	40	31	43	45	42	50	49	55	48	41	62	B	B	B	B	B	B	BE 20	BE 23	BE 31	G	48	43	44	48
17	74	59	56	B	58	58	B	B	66	B	B	B	B	B	B	B	B	B	29	G	G	19	22	18	41	
18	36	36	45	35	34	44	47	G	BE 24	BE 23	B	E 27	BE 24	27	24	24	G	G	G	BE 12	BE 56	BE 56	26	48		
19	52	50	30	30	29	50	56	35	29	17	17	29	67	G	G	G	E 21	BE 24	BE 18	BE 18	B	29	30	43		
20	69	33	46	44	32	43	35	19	G	G	G	G	24	G	17	22	22	G	G	G	17	12	K 21	67	25	
21	27	48	44	20	12	12	B	G	G	G	G	24	G	G	24	G	G	G	18	18	E 12	BE 12	14	28	50	
22	20	B	56	46	44	35	E 10	G	21	24	26	BE 28	28	G	24	G	G	38	BE 14	BE 47	46	56	57	E 9		
23	34	25	53	20	20	20	15	59	20	24	24	G	BE 25	30	28	E 26	BE 23	BE 21	BE 17	BE 18	57	11	14	13		
24	27	B	49	57	28	44	16	20	28	17	26	26	28	30	25	19	G	G	G	G	27	34	57	B		
25	28	40	38	38	40	49	23	20	37	E 27	33	28	28	27	27	G	G	G	G	G	12	13	16	43		
26	B	43	94	40	53	55	58	61	56	47	24	27	27	25	24	G	G	G	14	G	16	24	E 10	30	28	
27	30	31	67	34	25	58	52	47	24	G	26	26	E 37	BE 24	24	E 24	BE 21	BE 18	BE 16	BE 16	18	B	38	K 15		
28	35	39	24	32	27	30	90	54	54	57	56	52	59	E 36	BE 25	22	22	G	BE 36	BE B	16	36	32	35		
29	66	B	B	66	59	48	32	40	G	B	E 32	BE 24	BE 26	BE 38	BE 38	BE 33	BE 24	BE B	BE B	BE B	B	B	40	32	17	
30	32	32	38	65	57	38	42	48	32	G	24	26	28	G	G	22	18	18	16	13	E 12	30	31	29	50	
31	59	21	35	58	B	65	73	54	B	B	54	B	BE 27	BE 24	BE 22	BE 22	G	BE 17	BE 33	BE 14	54	28	38	42		
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	30	28	30	30	29	30	29	28	26	23	24	23	27	27	28	27	28	29	28	28	29	30	31	28		
MED	38	44	47	47	48	44	44	32	28	E 24	G	G	28	25	G	26	G	G	E 19	G	17	19	26	36	42	
U Q	58	50	56	54	52	56	56	52	55	50	32	28	G	30	27	G	26	E 24	BE 26	BE 18	47	37	52	50		
L Q	30	37	38	35	30	35	20	G	G	G	22	24	26	26	G	24	22	G	G	G	15	16	29	28		

## IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 2019 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	10	7	8	B	18	31	24	B	B	28	B	B	B	B	B	B	B	20	14	10	11	10	17
2	10	14	17	36	35	B	B	B	B	B	B	B	26	23	27	20	B	B	24	19	11	10	6	7
3	11	24	7	9	16	14	16	B	45	B	19	13	13	13	13	20	13	13	24	22	15	8	9	9
4	14	8	12	8	22	19	46	39	21	14	B	B	32	B	36	41	35	33	B	25	22	12	8	8
5	10	6	12	10	14	40	32	10	11	B	18	19	14	13	12	10	13	9	13	17	25	16	12	B
6	8	13	8	12	16	11	12	9	12	12	B	B	16	9	7	14	14	30	B	B	8	10	8	16
7	19	22	21	13	17	10	10	7	8	8	10	12	12	8	10	12	12	12	12	12	11	10	14	14
8	11	11	12	24	26	21	13	12	9	10	10	11	11	11	18	18	26	24	22	19	15	11	11	8
9	10	10	15	9	8	11	11	9	9	9	9	9	9	12	20	16	14	10	11	12	15	10	9	9
10	8	9	9	13	8	24	32	22	10	B	B	27	20	16	14	14	12	12	12	8	7	8	9	10
11	6	8	10	6	6	10	10	10	10	11	15	18	16	12	12	37	24	25	20	18	16	13	13	13
12	13	6	14	10	8	10	7	7	7	7	8	13	23	20	8	12	10	16	15	18	8	11	10	10
13	10	16	13	11	12	12	11	16	B	14	12	12	14	23	16	26	37	24	14	12	19	10	10	10
14	10	10	11	9	13	10	7	8	8	18	B	18	18	12	12	12	12	12	33	16	13	7	10	14
15	9	16	21	15	18	23	14	14	14	15	B	B	19	26	19	18	18	10	10	6	6	10	9	7
16	7	8	10	13	9	10	10	22	16	13	17	20	10	B	B	B	20	23	21	8	10	14	12	13
17	11	15	14	B	12	16	B	B	34	B	B	B	B	B	B	B	B	21	16	13	10	7	7	7
18	7	7	8	11	9	9	13	8	B	24	23	B	18	24	16	15	19	13	9	12	B	11	6	8
19	9	7	8	8	8	12	18	15	9	12	12	9	9	14	11	11	21	11	24	18	11	6	8	8
20	12	19	13	9	22	11	10	7	11	22	24	14	13	12	13	11	11	10	10	9	6	6	22	7
21	6	8	14	9	8	7	8	10	13	12	11	18	10	10	12	12	12	12	12	12	12	11	9	10
22	10	B	12	7	7	8	10	10	10	10	14	28	20	18	16	16	12	15	14	9	8	8	8	8
23	9	9	10	8	8	7	6	7	12	12	12	12	25	12	12	26	23	21	17	9	7	7	8	8
24	8	B	10	8	8	9	11	10	10	11	12	14	18	14	11	12	10	6	7	6	8	8	8	B
25	7	7	8	12	9	9	7	7	12	27	19	10	10	10	10	10	7	6	6	8	8	10	24	B
26	B	10	17	12	12	15	15	13	13	10	10	10	10	10	10	10	10	10	6	7	8	9	10	8
27	8	8	8	10	9	14	14	9	9	9	13	12	17	37	15	24	21	12	16	16	B	14	8	8
28	9	8	6	8	8	8	8	23	21	22	27	25	34	36	25	15	12	7	36	B	10	10	11	8
29	11	B	B	24	19	17	10	12	11	B	19	24	B	26	38	B	33	24	B	B	B	12	8	9
30	6	7	10	27	19	12	15	15	8	9	11	14	11	10	14	11	11	9	8	12	8	13	12	11
31	11	10	10	20	B	17	35	21	B	B	18	B	B	27	24	22	10	17	33	14	10	16	8	8
	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	12	12	12	12	12	14	18	18	17	14	14	16	14	13	16	13	10	10	9	9
U Q	11	16	14	13	19	17	18	22	21	B	28	B	25	26	24	26	24	24	24	18	15	12	12	13
L Q	8	8	8	8	8	10	10	9	9	10	12	12	11	12	12	12	12	10	11	9	8	8	8	8

MAR. 2019 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 2019 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

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	A	A	A	222	B	A	A	A	B	B	B	B	B	B	B	B	B	B	BE	A	A	A	A	A	
2	A	A	A	B	B	B	B	B	B	B	B	B	198	240	B	190	B	B	BE	B	266	214	A	A	A
3	A	A	A	A	A	A	A	B	B	B	A	194	194	186	196	214	202	202	240	EB	226	230	250	A	
4	A	A	A	A	A	A	B	B	A	A	B	BE	B	B	B	BE	BE	B	B	250	270	A	A	A	
5	A	A	A	A	A	B	B	A	A	B	A	216	208	198	200	220	204	192	194	194	222	216	262	260	B
6	A	A	A	A	A	A	EA	A	238	200	194	B	B	192	182	192	170	194	H	B	BE	A	A	A	
7	A	A	A	A	A	A	A	A	238	196	202	182	H	218	184	226	218	216	188	192	A	234	A	A	A
8	A	A	A	A	A	A	A	A	234	208	196	196	214	206	192	210	210	218	216	EA	EA	EA	EA	EA	EA
9	246	204	A	A	A	A	A	A	228	202	200	192	192	192	208	208	192	184	218	210	200	210	232	238	246
10	A	A	A	A	A	A	A	A	A	A	B	B	224	224	246	208	208	196	210	206	206	208	238	256	268
11	EA	EA	EA	EA	A	EA	A	A	EA	A	EA	A	EA	EA	EA	EA	B	B	EA	EA	EA	EA	EA	EA	EA
12	A	A	A	A	A	A	EA	EA	EA	EA	H	H	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
13	A	A	A	A	A	A	A	A	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
14	A	A	A	A	A	A	EA	EA	EA	EA	B	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
15	A	A	A	A	A	A	A	A	A	A	B	B	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
16	A	A	A	A	A	A	A	A	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
17	A	A	A	B	A	A	B	B	B	B	B	B	B	B	B	B	B	B	EA	EA	EA	EA	EA	EA	EA
18	A	A	A	A	A	A	EA	EA	EA	EA	B	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
19	A	A	A	196	A	A	A	A	A	A	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
20	A	A	A	A	A	A	A	A	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
21	A	A	A	A	A	A	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
22	A	B	A	A	A	A	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
23	EA	EA	A	A	A	A	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
24	EA	EA	B	A	A	A	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
25	EA	EA	A	A	A	A	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
26	B	A	A	A	A	A	A	A	A	A	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
27	EA	EA	A	EA	EA	A	A	A	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
28	A	A	A	A	A	A	A	A	A	A	A	A	B	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
29	A	B	B	A	A	A	A	A	A	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
30	A	A	A	A	A	A	A	A	A	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
31	A	196	A	A	B	A	A	A	B	B	A	B	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
	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	1	5		2	7	13	17	19	20	22	26	24	25	25	26	27	24	28	22	14	9	7	
MED	248	200	268	225		250	225	223	208	199	204	204	200	204	204	208	203	209	206	218	222	245	251	266	
UQ	EA	EA	A	A			EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	
LQ	246	196		209			220	209	201	196	192	194	192	196	196	193	196	200	197	208	216	238	242	246	

MAR. 2019 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION SHOWA-ST.

APR. 2019 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	A	A	A	O	X	X	X	B	O	X	B	B	B	O	X	B	A	A	A	A	
2	A	A	A	48	41	57	A	B	O	X	O	X	X	X	X	X	X	X	O	X	O	X	A	A	A	
3	A	50	54	A	A	A	A	32	A	A	B	B	X	51	58	53	B	B	B	A	A	A	A	A		
4	71	A	A	O	X	A	A	A	A	O	X	B	X	O	X	V	X		O	X	A	A	A	A		
5	A	A	A	48	A	A	A	B	B	O	X	B	B	B	B	B	X	B	O	X	A	A	A	A		
6	A	A	A	A	A	A	A	B	B	B	O	X	O	X	X	B	O	X	X	X	A	A	A	A		
7	A	A	A	A	A	A	A	O	X	A	A	X	X	X	X	X	X	X	B	B	B	B	B	O	X	
8	A	A	A	A	A	58	A	A	B	A	X	X	B	46	46	50	49	48	45	46	B	O	X	A	A	
9	A	A	A	A	A	A	B	A	X	X	B	B	B	B	B	B	B	B	B	B	R	A	A	R	A	
10	A	A	B	A	B	A	B	B	B	B	B	B	B	O	X	O	X	O	X	B	O	X	A	A	A	
11	A	A	A	A	A	A	A	B	R	O	X	B	B	O	X	X	B	B	O	X	O	X	A	A	B	A
12	A	A	A	A	A	A	A	A	A	X	O	X	X	O	X	B	B	X	X	X	O	X	B	B	A	A
13	A	A	A	A	A	A	A	A	A	B	B	B	X	42	40	43	46	44	40	35	28	B	A	B	A	A
14	66	A	O	X	A	A	A	O	X	B	O	X	X	X	B	B	O	X	X	X	O	X	B	B	B	A
15	A	A	A	A	O	X	A	A	A	A	A	A	X	43	52	56	56	60	57	55	39	29	22	18	58	
16	A	A	54	A	A	A	A	A	A	X	X	X	B	X	X	X	X	O	X	A	A	A	A	A	A	
17	O	X	A	A	X	A	A	A	O	X	X	X	X	62	58	66	62	58	66	52	36	30	A	A	A	A
18	A	A	O	X	A	A	A	O	X	X	X	X	X	57	53	60	53	40	24	20	25	A	A	A	A	
19	23	24	36	A	42	46	B	36	36	45	58	65	67	68	65	63	58	35	28	A	A	A	A	A	A	
20	A	A	A	61	X	X	A	A	X	X	X	X	X	X	X	X	X	X	X	O	X	A	A	A	A	
21	68	A	A	45	X	A	A	A	X	X	X	X	X	70	67	67	58	48	29	21	A	A	A	A	29	
22	55	55	A	A	42	37	39	36	41	46	57	65	58	69	71	48	46	31	22							
23	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X	B	A	A	A	A	
24	A	A	66	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	A	A	A	A	A	A	A	
25	52	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	O	X	O	X	A	A	A	X
26	O	X	58	49	38	A	A	A	O	X	X	X	X	X	X	X	X	X	A	O	X	A	A	A	A	
27	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	B	B	B	X	X	X	A	A	A	A	
28	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A	A	
29	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A	A	
30	A	X	A	A	A	A	A	A	A	A	V	X	X	57	60	52	48	29	28	B	O	X	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	8	5	7	7	5	6	5	10	17	22	22	24	25	25	24	24	24	25	21	15	4		3	7		
MED	54	50	49	48	35	44	37	32	33	38	44	49	51	56	53	53	48	39	30	22	24		50	50		
U Q	67	56	54	50	42	57	43	36	36	43	48	56	60	60	60	64	54	42	34	26	27		68	58		
L Q	51	X	O	X	X	X	O	X	X	X	X	X	X	X	X	X	X	X	O	X	X	X		27	32	

# IONOSPHERIC DATA STATION SHOWA-ST.

APR. 2019 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		27	31	30	B	F	B	B	B	R	B	A	A	A	A	A									
2	A	A	A	A	A	A	A	B		28	33	38	42	51	51	48	49	48	40	31	20	18		A	A	A							
3	A	A	A	A	A	A	A	A		A	A	B	B	F		B	B	B	A	A	A	A	A	A	A								
4	A	A	A		A	A	A	A		A		B				V		F		A	A	A	A	A	A								
5	A	A	A	44	A	A	A	B	B	R	B	B	B	B	B	B		B		A	A	A	A	A	A								
6	A	A	A	A	A	A	A	B	B	B	R	31	32	41		B	45	42		33	26	21		A	A	A	41						
7	A	A	A	A	A	A	A		A	A		38	43	43	44	46	46	50		B	B	B	B	B	B	R	44						
8	A	A	A	A	A	A	A	A	B	A		A	40	40	44	43	42	39	40		B	28		A	A	A	A						
9	A	A	A	A	A	A	B	A			B	B	B	B	B	B	B	B	B	R	A	A	R	A	A	A	A						
10	A	A	B	A	B	A	B	B		B	B	B	B			R			B	R	A	A	A	A	A	A	A						
11	A	A	A	A	A	A	A	B	A		B	B		41	43	44		B		R	A	A	B	A	A	A	A						
12	A	A	A	A	A	A	A	A		A	30	32	37	42		B	B		41	41	36	28		B	B	A	A	A					
13	A	A	A	A	A	A	A	A		A	B			36	34	37	40	38	34	29	22		B	A	B	A	A						
14	A	A	R	A	A	A	U	R	B		26	37	36	41		B	B	B			48	45	34	27	15		B	B	B	A			
15	A	A	A	A	R	A	A	A		A		37	46	50	50	54	Z									A	A	A	A				
16	A	A	A	A	A	A	A	A		A		35	34	41		B		42	45	41	42	32		A	A	A	A	A	A				
17	R	A	A			A	A	A			24	39	46	45	F	F		56	52	60	46	30	F	A	A	A	A	A	A				
18	A	A	R	A	A	A	A				20	30	41	46	48	53	45	47	54	43	R	34	18	14	15		A	A	A	A			
19	16	18	A	A	F	F	B	F			30	39	52	59	61	62	59	57	52	R	29	22		A	A	A	A	A	A	A			
20	A	A	A	A				F																		A	A	A	A	A	A		
21	A	A	A	A		28	24	21			26	35	41	48	53	54	59	58	44	37	22	14				A	A	A	A	A	A		
22	A	A	A	A	20	A	A	A			35	38	43	55	50	64	61	61	52	42	23	15				A	A	A	A	A	A		
23	A	A	A	A	A	F	F	F			30	35	40	51	59	52	63	65	42	36	25	16				B	A	A	A	A	A		
24	A	A	A	A	A	21	18	21			27	39	47	58	56	56	54	54	37	F	F	20	19				A	A	A	A	A	A	
25	A	A	A	A	A	A	A				30	31	38	42	42	48	39	43	41							A	A	A	A	A	A	A	
26	R	A	A		A	A	A				32	25	28	37	F	45	60	59	55	61	F	49	24	18	14		A	A	A	A	A	26	
27	48	A	A	32	A	A	A				17	26	34	42	46	47	46	52	44	33	28		14			A	A	A	A	A	A	A	
28	A	B	A	B	A	A	A				26	27	32	36	36	43	48		B	B	B					A	A	A	A	A	A	A	
29	A	A	A	A	A	A	A				22	28	32	37	41	44	42	36	33	22	17					A	A	A	A	A	A	A	
30	A		A	A	A	A	A				22	28	34	43	45	45	44	44	50	F	F	20	27		A	A	A	A	A	A	A	A	
31		30									A	V	42	52	48	46	F	54	46	F	32	23	22		B	R	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	2	2	3	4	4	4	9	17	22	22	24	25	25	24	24	24	24	25	21	15	4											3
MED	44	24	22	32	24	24	24	20	27	32	38	43	45	46	47	47	42	32	23	16	16											41	
U Q	48			44	29	29	28	24	30	37	42	48	52	53	54	56	47	36	28	20	20											R	44
L Q	16			23	20	20	21	19	26	28	34	38	42	44	44	42	37	28	21	14	14												26

## IONOSPHERIC DATA STATION SHOWA-ST.

APR. 2019 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	42	54	48	46	34	50	43	58	58		G	G	64	38	35		B	B	E	B	41	22	40	50	52						
2	29	29 <sup>K</sup>	34	30	34	39	56		B	33	E	B	E	B	E	B	G	E	B		E	B	12	48	34	50					
3	92	50	56	63	59	57	52	30	45	47		B	E	B	E	B	B	B			50	46	64	70	41	80					
4	47	56	45	32	56	56	50	36	55	60		B	E	B	E	B	E	B			50	46	64	70	41	80					
5	47	40	37	32	52	50	58		B	B		B	B	B	B	B	E	B		B	E	B	19	40	58	56	44	47			
6	55	55	64	53	56	58	53		B	B	E	B	G		B	E	B	E	B	E	B	10	26	48	44	32					
7	38	38	46	47	50	49	28	E	B	16	46	46	38	27	27	24		G	E	B		B	B	B	B	B	34				
8	41	85	57	65	57	42	45	57		B	57	44		G	G	E	B	E	B	E	B	E	B	E	B	E	B	69			
9	98	98	77	57	57	36		B	44	64		G	B	B	B	B	B	B	B	B		17	38	38	18	40					
10	39	37		38		34		B	B	B	B	B	B	B	E	B	E	B	E	B	B	G	B		48	43	43	39	51		
11	48	68	53	52	57	44	51	50		E	B	G	B	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	28		
12	30	50	55	78	55	58	55	52	45	46		E	B	E	B	E	B	B	B	E	B	E	B	E	B	E	B	E	B	53	
13	53	30	95	54	44	43	52	50	41		B	B	E	B	B	B	B	E	B	E	B	E	B	E	B	E	B	E	B	30	
14	35 <sup>K</sup>	46	56	25 <sup>K</sup>	94	46	47		B	41	48	51		E	B	B	B	E	B	E	B	E	B	E	B	E	B	E	B	55	
15	57	64	48	49	48	48	50	43	54	52	20		E	B	20	28		G	G		17	19	15	18	19	47	46	39	37	47	
16	55	61	31	71	51	52	62	52	49	147		G	22	20		B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	50
17	34	28	26	48	49	55	55	60	48	20		E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	32	
18	48	27	39	51	46	52	32	46		E	B	G	11	70	21	22	22	22	22		G	16		14	52	44	12	48	51	43	
19	47	47	54	46	49	48		B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	40
20	49	41	38	46	48	44	19	19	46	19	19	18	15	16	23	14	19	13	49	52	48	46	41	41							
21	52	50	54	39	47	54	54	56		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	40
22	41	41	79	89	45	47	54	45	56	19		G	23	20	21	28	24	30	17	19	11	55	55	54	66						
23	78	72	38	55	42	44	19	17	15	16	18	21	21	28	29	29	19	16	16	11			50	47	53						
24	56	58	46	59	54	35	45	55		G	14		19	19	20	18	18	28	56	59	36	55	53	47	42						
25	34	92	53	52	56	47		52	16	53	58		E	B	20	23	23		G	E	B	E	B	E	B	E	B	E	B	46	
26	34	37	57	30	53	44	47	30	48	47		G	18		G	18	18	14	18	18	48	55	47	46	27	41					
27	44	78	56	52	48	70	63	31	22		G	G	14	95	23		B	B	B		54	12	44	23	46	48	40				
28	55	47	61	52	54	52	55	46	46	46	53	21	21	19	20	52		G		16	47	45	57	42	34	56					
29	71	84	55	51	66	51	51	48	90	18	22	19	19	19	19	19	19	16	11	12	32	34	44	45	50						
30	47	47	72	48	65	58	68	49	46	46	24		G	21	21	21		G	E	B			48	54	30	41					
31																															
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23							
CNT	30	30	29	30	29	30	26	25	26	27	23	25	25	25	24	24	23	26	25	26	26	27	28	30							
MED	47	50	54	51	52	48	52	46	46	46		G	G	G	22	24	20	18	16	42	42	46	46	44	46						
U Q	55	64	57	55	56	54	55	52	49	52	26	E	B	E	B	E	B	E	B	E	B	55	50	50	52						
L Q	39	40	42	46	48	44	45	34	22		G	22	20	21	21	20	19	16	16	18	22	34	42	40	40						

APR. 2019 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

APR. 2019 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	26	12	14	15	21	22	17	15	16	12	42	38	35	B	B	B	27	B	18	8	12	10	10	
2	7	7	8	7	8	10	15	B	16	24	24	30	34	26	19	18	20	11	11	12	12	14	8	15	
3	13	19	12	16	19	24	25	17	25	28	B	B	27	23	32	B	B	B	19	10	10	8	8	8	
4	15	9	19	9	16	22	12	11	12	16	B	26	24	24	34	23	31	13	13	9	11	13	8	8	
5	10	13	14	17	26	16	18	B	B	20	B	B	B	B	B	B	24	B	19	10	20	8	8	12	
6	16	22	15	20	17	16	21	B	B	B	24	15	18	B	39	34	B	16	16	10	18	15	10	10	
7	16	20	15	13	11	10	8	16	21	24	18	16	16	16	13	18	19	B	B	B	B	B	B	12	
8	10	22	14	26	10	18	18	23	B	23	33	21	14	14	34	32	18	37	B	19	10	8	15	7	
9	7	12	12	21	13	13	B	11	12	16	B	B	B	B	B	B	B	B	B	17	16	10	8	12	
10	14	25	B	27	B	22	B	B	B	B	B	B	B	24	26	27	22	14	B	10	9	6	9	8	
11	10	20	14	14	17	9	13	36	25	17	B	B	34	33	24	B	B	23	24	16	15	15	B	14	
12	9	17	11	9	18	19	18	23	11	11	19	26	35	B	B	22	18	15	23	B	B	9	9	12	
13	6	10	24	20	22	18	11	14	24	B	26	21	9	11	12	11	8	13	B	12	B	28	9		
14	8	14	10	13	10	9	12	B	12	14	16	22	B	B	B	35	26	17	10	12	B	B	24	14	
15	7	7	17	13	13	12	10	10	8	16	12	20	8	8	13	14	11	10	9	8	9	10	10	18	
16	9	8	11	13	16	12	12	11	8	12	9	10	B	35	22	16	20	26	15	24	14	10	12	11	
17	8	11	9	9	9	16	10	12	15	12	24	25	25	23	20	25	15	10	11	8	9	9	9	9	
18	12	10	9	9	9	11	10	11	11	8	9	12	11	11	11	10	8	8	9	8	8	15	14	8	
19	8	6	10	9	9	10	B	8	10	20	26	39	26	16	13	10	18	13	13	10	13	9	9	10	
20	12	10	10	11	9	9	9	8	8	9	8	10	8	10	8	8	8	8	12	9	8	9	9	7	
21	9	9	9	10	10	18	14	9	8	9	8	9	10	11	11	8	7	8	9	9	9	13	9	9	
22	8	9	10	10	10	8	8	9	6	8	8	10	9	11	11	11	8	8	7	6	11	11	8	8	
23	8	8	9	9	9	9	7	10	8	8	8	8	10	7	8	10	9	6	8	11	B	14	10	10	
24	10	15	12	14	16	10	16	14	9	8	12	12	12	12	10	8	20	16	14	8	13	8	9	9	
25	19	13	16	23	25	13	10	7	8	5	7	20	17	12	11	18	24	12	12	10	9	12	7	10	
26	7	7	7	9	11	8	8	6	6	8	8	8	9	9	9	7	9	11	8	7	10	11	8	8	
27	15	11	17	12	20	13	11	10	8	8	9	9	12	23	B	B	B	17	12	10	12	12	16	8	
28	14	24	18	22	15	12	9	8	9	8	8	11	11	19	12	46	10	10	9	14	10	12	12	12	
29	8	22	14	14	14	14	14	13	12	10	10	10	8	9	8	8	7	7	7	B	9	14	8	8	
30	8	8	16	15	15	15	14	14	14	13	12	10	10	9	9	9	6	8	10	B	17	9	6	10	
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	12	12	13	14	13	14	12	12	14	14	20	18	18	16	18	18	13	12	10	12	12	9	10	
U Q	13	20	16	17	17	18	18	23	21	20	33	30	34	33	34	35	26	23	19	17	16	14	12	12	
L Q	8	9	10	9	10	10	10	10	8	8	9	10	11	11	11	10	9	8	9	9	9	9	8	8	

APR. 2019 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

APR. 2019 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	E A E A	B	B	B	B	B	B	B	B	B	A	A	A	A	A
2	A	A	A	A	A	A	A	B	A E B E	B E B	B	B	B E B E	A E A						A E B	A	A	A	A
3	A	A	A	A	A	A	A	A	A	B	B	B E B	B	B	B	B	B	B	A	A	A	A	A	A
4	A	A	A	202	A	A	A	A	A	A	B E B	B	B	B	B	B	250	226	210	268	A	A	A	A
5	A	A	A	A	A	A	A	B	B E A	B	B	B	B	B	B	B	B E B	B	B	A	A	A	A	A
6	A	A	A	A	A	A	A	B	B	B E B	246	236	224	A	B E B E B	B	B	222	240	218	A	A	A	A
7	A	A	A	A	A	A	A	B	A	A	A	226	200	198	200	224	222		B	B	B	B	B	A
8	A	A	A	A	A	A	A	A	B	A	B	248	206	212	H	B	B	218	B	B E B	288	A	A	A
9	A	A	A	A	A	A	B	A	A E B	B	B	B	B	B	B	B	B	B	B E B	220	A	A	A	A
10	A	A	B	A	B	A	B	B	B	B	B	B	B	B E B	B	B	B E A	B	B	204	A	A	A	A
11	A	A	A	A	A	A	A	B	A	A	B	B	B	B E B	B	B	B E B E B	246	260	288	A	A	B	A
12	A	A	A	A	A	A	A	A	A	A	228	228	256	B	B	B	228	236	230	E B	B	B	A	A
13	A	A	A	A	A	A	A	A	A	B	B E B	268	246	218	200	194	210	206	230	B	A	B	A	A
14	A	A	220	A	A	A	190	B E A	264	232	206	206		B	B	B	218	202	202	216	E A	B	B	A
15	200	A	A	A	200	A	A	A	A	A	236	226	218	202	220	E A	220	212	212	212	206	A	A	A
16	A	A	A	A	A	A	A	A	A	A	212	218		B	B	222	232	230	284	A	A	A	A	A
17	A	A	A	A	A	A	A	A E A	294	228	220	216	218	208	186	H	192	206	E A E A	A	A	A	A	A
18	A	A	228	A	A	A	A E A	268	226	214	214	192	202	200	196	210	194	196	226	A E A	262	226	A	A
19	194	200	A	A	A	A	B E A	272	220	220	216	222	228	E A	196	200	202	212	236	A	A	A	A	A
20	A	A	A	A	A	A	202	236	252	232	214	200	206	196	196	198	184	196	206	230	A	A	A	200
21	A	A	A	A	226	A	A	A E A	252	198	198	214	202	220	208	208	192	206	206	210	A	A	A	196
22	A	A	A	A	A	A	188	218	230	208	190	222	212	200	218	204	196	198	196	222	E B	A	A	A
23	A	A	A	A	A	A	A	E A	194	232	G	220	220	220	192	200	200	196	204	204	242	B	A	A
24	A	A	A	A	A	A	A	A E A	272	224	224	224	224	204	196	210	218		A	A	A	A	A	A
25	A	A	A	A	A	A	A E A	326	246	220	234	224	202	196	224	210	200	254	248	A	A	A	A	206
26	A	A	A	A	A	A	200	200	232	202	202	208	198	208	196	196	204		248	A	A	A	A	A
27	A	A	A	A	A	A	A	A E A	268	204	206	H	180	192	238	B	B	B	222	214	E A	A	A	A
28	A	B	A	B	A	A	A	A	186	A E A	226	206	196	242	218	200	196	220	216	A	A	A	A	A
29	A	A	A	A	A	A	A	A	284	E A E A	230	202	200	200	196	196	192	186	216	A	A	A	A	A
30	A	A	A	A	A	A	A	A	A	A	A	202	202	196	196	196	194	194	218	B	218	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	2	1	2	1	2		3	7	14	17	20	24	21	22	21	22	23	23	20	16	3	1		3
MED	197	200	224	202	213		190	215	222	220	216	216	209	202	198	204	201	203	213	229	222	214		200
U Q							202	272	268	247	227	235	224	220	221	224	218	222	242	250	258			206
L Q							188	200	220	217	209	204	202	200	196	198	196	198	209	219	218			196

APR. 2019 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



# IONOSPHERIC DATA STATION SHOWA-ST.

MAY 2019 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 26	A	A	A	A	80	A <sup>O</sup> X 37	X	58	76	72	90	80	X 83	42	X 28	X <sup>O</sup> X 28	X <sup>O</sup> X 25	A	58	A	A	
2	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B <sup>O</sup> X 39	X <sup>O</sup> X 46	X <sup>O</sup> X 43	X <sup>O</sup> X 39	X <sup>O</sup> X 31	B	A	A <sup>O</sup> X 26	X	A	
3	A	A	A	A	A	A	A	A	A	B	B	B	B	B	X <sup>O</sup> X 46	X <sup>O</sup> X 43	X <sup>O</sup> X 39	X <sup>O</sup> X 31	B	B	A	A	A	52	
4	A	A	A	A	R	A	A	A <sup>O</sup> X 25	B	B	B <sup>O</sup> X 36	X <sup>O</sup> X 42	X <sup>O</sup> X 44	X <sup>O</sup> X 44	X <sup>O</sup> X 50	X	X	B	B	A	B	B	A	53	
5	55	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	A	A <sup>O</sup> X 20	A	A	A	A	
6	X <sup>O</sup> X 30	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X <sup>O</sup> X 32	X <sup>O</sup> X 24	A	B	A	A	A	
7	A	A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X <sup>O</sup> X 24	X <sup>O</sup> X 20	X <sup>O</sup> X 21	A	B	A	
8	A	A	A	X 38	A	A	A <sup>O</sup> X 27	X	X	43	49	58	63	X	X	X	58	38	22	X	A	A	A	A	
9	A	67	64	X 42	X 31	X 54	A	A	A	A	47	58	B	B	X	X	X <sup>O</sup> X 39	X <sup>O</sup> X 26	X <sup>O</sup> X 24	B	A	A	A	A	
10	A	45	A	A	A	A	A	A	A	A	X	X	B	A	X	X	X	A	A <sup>O</sup> X 18	X <sup>O</sup> X 18	B	B	A	A	
11	51	A	A	81	A	A	A	A	A	A	B	B	B	A	B <sup>O</sup> X 47	X	A	A	B	72	A	86	A	A	
12	A	88	A	A	A	A	A	A	A	X	X <sup>O</sup> X 32	X <sup>O</sup> X 35	B	B	X	B	B	B	B	B	A	A	A	A	
13	X 27	X 38	A	55	A	A	A	X <sup>O</sup> X 38	X <sup>O</sup> X 38	X <sup>O</sup> X 31	41	47	48	48	B	B	44	46	A	A	72	A	A	A	
14	A	A	A	A	40	A	A	A	B	B	B	B	B	B	B	X <sup>O</sup> X 34	X <sup>O</sup> X 33	B	A	A	A	A	A	A	
15	A	A	A	A	A	A	A	R	R	X	X	X	X	X	X	X	X <sup>O</sup> X 27	X <sup>O</sup> X 20	A	B	A	A	R	56	
16	56	47	45	A	A	X 32	X <sup>O</sup> X 34	X <sup>O</sup> X 46	X <sup>O</sup> X 39	B	B	B	X	B	56	B	B	B	B	A	B	B	A	A	
17	A	A	A	52	A	A	A	A	X	X	X	X	X	X	X	X	X	X	A	A	A	A	A	A	
18	A	A	A	A <sup>O</sup> X 24	X 24	X 25	X 28	A	A <sup>O</sup> X 26	X	X	X	X	B	B	B	A	B	A	B	A	A	A	A	
19	A	A	R	A	A	A	A	A	A	A <sup>O</sup> X 25	45	48	57	50	42	34	B	B	B	A	B	A	A	R	
20	A	X 36	A	A	A	A	A	A	A	A <sup>O</sup> X 30	X	X	X	X	X	X	X	R	A	A	A	A	A	37	
21	A	A	A	A	45	A	A	A	A	A	X	X	X	X	X	X	A	B	B	A	A	A	A	A	
22	A <sup>O</sup> X 34	A	A	A	A	A	A	A	R	X <sup>O</sup> X 27	X <sup>O</sup> X 42	X <sup>O</sup> X 45	X <sup>O</sup> X 45	X <sup>O</sup> X 55	X <sup>O</sup> X 41	X <sup>O</sup> X 35	R	R	A	A	R	A	A	A	
23	R	A	A	A	A	A	A	X <sup>O</sup> X 32	X <sup>O</sup> X 26	X <sup>O</sup> X 31	X <sup>O</sup> X 32	45	46	47	50	38	32	B	A	A	R	A	A	A	
24	A	A	A	A	A	A	A	A	A	B	X	X	X	X	X	X	X	A	A	A	A	A	A	B	A
25	A	35	41	A	A	A	A	A	A	A	30	44	45	54	48	42	31	A	A	A	A	A	A	A <sup>O</sup> X 29	A
26	R	29	A	X 29	A	A	A	A	A	A <sup>O</sup> X 22	X	X	X	X	X	X	X	X	A	A	A	A	A	A	A
27	A	A	A	A	A	A	39	44	X <sup>O</sup> X 42	X <sup>O</sup> X 25	X <sup>O</sup> X 26	B	B	52	60	44	B	B	A	R	R	A	A	57	
28	52	A	A	A	A	A	R <sup>O</sup> X 25	X <sup>O</sup> X 22	X <sup>O</sup> X 22	X <sup>O</sup> X 32	X <sup>O</sup> X 36	X <sup>O</sup> X 46	X <sup>O</sup> X 42	X <sup>O</sup> X 43	X <sup>O</sup> X 26	X <sup>O</sup> X 20	X <sup>O</sup> X 21	R	A	A	A	A	32	66	
29	A	A	A	A	A	A	51	B	B	B	A	A	B	B	B	B	B	B	B	B	B	A	A	A	59
30	A	A	A	A	A	A	A	A	A	A	R	B	B	B	X <sup>O</sup> X 40	B	B	B	B	B	B	B	B	A	A
31	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B <sup>O</sup> X 41	B	B	B	B	A	B	B	B	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	6	9	4	6	4	3	5	9	9	18	22	22	21	22	24	24	15	8	5	5	1	2	4	6	
MED	52	38	43	47	36	X 32	34	X <sup>O</sup> X 38	X <sup>O</sup> X 29	X <sup>O</sup> X 30	41	44	49	48	48	40	33	X <sup>O</sup> X 24	X <sup>O</sup> X 24	X <sup>O</sup> X 21	72	72	30	56	
U Q	55	57	54	55	42	X 54	45	X <sup>O</sup> X 45	X <sup>O</sup> X 38	X <sup>O</sup> X 32	45	49	56	55	X 54	X 46	X <sup>O</sup> X 39	X <sup>O</sup> X 27	X <sup>O</sup> X 26	48			42	59	
L Q	X 30	34	34	X <sup>O</sup> X 38	X <sup>O</sup> X 28	X 24	X <sup>O</sup> X 28	X <sup>O</sup> X 26	X <sup>O</sup> X 26	X <sup>O</sup> X 26	X 34	X 41	X 46	X 46	X 42	X 34	X <sup>O</sup> X 27	X <sup>O</sup> X 22	X <sup>O</sup> X 19	X <sup>O</sup> X 19			X 28	52	

MAY 2019 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION SHOWA-ST.

MAY 2019 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	20	A	A	A	A	A	A	31	F 47	F 51	F 62	F 72	F 61	77	F 29	22	F 17	19	A	A	A	A	
2	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	33	B	B	U 18	R 18	B	A	A	R 20	A
3	A	A	A	A	A	A	A	A	A	B	B	B	B	B	40	37	33	25	R	B	B	A	A	R	A
4	A	A	A	A	R	A	A	A	U 19	R	B	B	30	36	38	R 44	B	B	B	A	B	B	A	A	A
5	A	A	A	A	A	A	A	A	A	24	33	37	43	43	45	36	27	A	A	14	A	A	A	A	A
6	24	A	A	A	A	A	A	A	A	21	28	36	43	46	60	47	53	26	R 18	A	B	A	A	A	A
7	A	A	A	A	A	A	A	A	A	A	41	F 49	52	52	49	55	26	18	R 14	R 15	A	B	A	A	A
8	A	A	A	U 32	R	A	A	A	21	23	F 30	F 39	F 49	F 57	F 41	46	F 48	F 24	16	A	A	A	A	A	A
9	A	A	A	A	25	48	A	A	A	A	F 34	F 36	B	B	53	56	43	33	R 20	18	B	A	A	A	A
10	A	A	A	A	A	A	A	A	A	A	35	43	F 51	49	49	34	F 27	A	12	12	B	B	A	A	A
11	A	A	A	A	A	A	A	A	A	A	B	30	B	A	B	41	A	A	B	A	A	A	A	A	A
12	A	A	A	A	A	A	A	A	A	21	26	29	B	B	B	28	B	B	B	B	B	A	A	A	A
13	R 21	R 32	A	A	A	A	A	A	R 32	32	25	35	41	42	42	B	38	40	A	A	A	A	A	A	A
14	A	A	A	A	J 34	R	A	A	A	B	B	B	B	B	B	28	27	B	A	A	A	A	A	A	A
15	A	A	A	A	A	A	A	A	A	A	25	30	35	37	36	30	21	14	R	A	B	A	A	A	A
16	A	A	A	A	A	26	28	40	33	B	B	B	50	B	F 40	B	B	B	B	B	A	B	B	A	A
17	A	A	A	A	A	A	A	A	21	21	28	36	42	40	43	33	18	A	A	A	A	A	A	A	A
18	A	A	A	A	R 18	18	19	22	A	20	36	38	40	B	B	B	B	B	A	B	A	A	A	A	A
19	A	A	R	A	A	A	A	A	A	19	F 31	42	41	44	36	28	B	B	B	A	B	A	A	R	A
20	A	30	A	A	A	A	A	A	A	24	28	36	36	36	33	33	22	A	R	A	A	A	A	A	A
21	A	A	A	A	A	A	A	A	A	F 20	33	35	44	41	35	28	A	B	B	A	A	A	A	A	A
22	A	R 28	A	A	A	A	A	A	R	21	R 36	39	39	49	35	29	R	R	A	A	A	A	A	A	A
23	A	A	A	A	A	A	A	20	25	R 26	F 30	F 30	41	44	32	26	R	B	A	A	R	A	A	A	A
24	A	A	A	A	A	A	A	A	A	B	28	F 32	45	41	40	Z 27	A	A	A	A	A	A	A	B	A
25	A	A	A	A	A	A	A	A	A	F 14	F 25	39	48	39	36	25	R	A	A	A	A	A	A	R 23	A
26	A	A	A	23	A	A	A	A	A	16	28	38	42	32	F 37	31	17	A	A	A	A	A	A	A	A
27	A	A	A	A	A	A	A	A	36	F 13	20	B	B	F 36	54	38	R	B	B	A	A	A	A	A	A
28	A	A	A	A	A	A	A	19	R 16	16	26	30	40	36	37	20	14	R 15	A	A	A	A	A	A	A
29	A	A	A	A	A	A	30	B	B	B	A	A	B	B	B	B	B	B	B	B	B	A	A	A	A
30	A	A	A	A	A	A	A	A	A	A	A	B	B	B	34	B	B	B	B	B	B	B	B	A	A
31	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	35	B	B	B	B	A	B	B	B	A
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	2	3	1	2	3	3	3	6	9	18	22	22	21	22	24	24	15	8	5	4			2		
MED	22	R 30	20	28	R 25	26	28	22	23	21	32	38	42	41	40	33	26	R 18	17	14			R 22		
U Q		R 32		J 34	48	30	32	32	26	36	42	49	49	46	40	29	21	R 18	17						
L Q		R 28		R 18	18	19	20	R 20	19	28	30	40	37	36	28	21	R 16	13	13						

## IONOSPHERIC DATA STATION SHOWA-ST.

MAY 2019 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	39	48	47	46	42	51	51	51	53	47	82		G	G		G	18	20	12	46	E B	16	48	45	49	94	
2	58	58	65	41	35	52	54	57	46		B	B	B	B	B	E B	24	B	B	46	B		51	45	56	41	
3	46	46	53	54	58	59	46	67	57		B	B	B	B	E B	E B	E B	E B	E B	B	B		51	40	23	59	
4	84	55	57	33	19	32	31	45	47		B	B			E B	B	B	B		B	B			30	36	44	
5	38	46	47	56	52	46	34	55	47	39	18	20	18	23	23	18	14	55	58	54		52	52	52	52		
6	52	29	34	48	45	47	59	52	48		G	18	27		E B	E B	E B	E B		E B	B		31	56	43	51	
7	44	54	44	40	50	62	48	47	42	48	E B	24	21	20		G	26	21	52	51	54	57	51		46	30	
8	33	45	45	43	38	43	30	48	13	54	17		G	18	22	17		11	47	38	42	31	36	49	46		
9	31	55	56	26	24	38	51	67	33		G	27		B	E B	E B	E B	E B			B		25	32	49	42	
10	47	59	54	54	58	63	64	46	43	62	21		G	E B	E B	E B	E B	E B							40	55	
11	37	58	43	69	82	53	53	53	61	53		E B	B	B		B	52	47	43		B	34	48	50	59	83	
12	87	43	131	49	60	33	57	57	48	18	56	44		B	E B	B	B	B	B	B			47	32	40	45	
13	17	35	62	46	48	45	56	54	46	15		G	24	26	21		G	E B	E B	E B		42	51	37	45		
14	45	64	71	50	54	58	52	49		B	B	B	B	B	B		E B	E B	B			52	40	66	49		
15	46	53	81	52	58	85	70	47	27	30	22	52		G		52	56	42	44	49	71		58	47	16	49	
16	55	48	49	47	44	44	28	33	33		B	B	E B	B	E B	B	B	B	B		B			40	41		
17	57	64	96	50	63	55	55	46	52	83		G	G	G		G	14	25	31	44	31	48	62	47	44		
18	44	44	46	53	89	52	56	47	50	34	16	19	19		G	B	B	B		B	B		48	54	49	52	
19	54	49	26	48	60	58	49	49	47	37	16	17	18		G	E B	E B	E B		B	B	B		31	44	22	
20	41	30	53	60	57	70	58	62	51	45	16	23	21	24	48	14	14	17	28	46	50	43	28	50			
21	91	50	62	37	35	55	43	51	52	47	53	20	30	E B	E B	B	G		B	B		49	29	31	40	52	
22	45	16	52	74	53	57	44	46	18	13	18	20	28	33	53	28	25	18	48	48	27	56	28	28			
23	26	34	36	34	36	46	49	48	29	30	14		G		E B	E B	E B	B			53	47	14	28	34	38	48
24	50	50	64	59	63	59	52	46	46		B		G		G		G	E B	E B							25	
25	31	32	35	30	24	36	44	66	55	28	67	22	22	16	12	11	50	54	38	52	28	36	41	31			
26	K	21	24	25	41	58	47	43	35	32	18	18	18		G	G	48	56	49	29	29	30	43	43	29		
27	39	31	47	66	56	49	48	49	27	32		G	B	B		E B	E B	E B	B	B		K	32	41	47	49	
28	46	106	58	56	53	42	31	26	26	30		G	16	16	49	E B	15	15	E B	10	32	21	50	50	50	31	88
29	52	52	72	64	62	51	26			57	52	43		B	B	B	B	B	B	B	B		45	31	40	40	
30	48	64	53	45	60	50	48	48	47	51		G	B	E B	B	B	B	B	B	B	B		52		40	91	
31	45	48	32	47	51	51	54	50	54		B	B	B	B	E B	B	B	B	B	B		B	B	B		55	
	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	30	29	24	24	23	21	23	24	24	21	19	22	21	26	26	29	31			
MED	45	48	53	48	53	51	49	49	47	36	24		G		E B	G		44	46	45	44	48	43	41	48		
U Q	52	55	62	56	60	58	55	54	52	50		G	24		E B		25	52	51	52	50	51	51	49	52		
L Q	38	35	44	41	41	45	44	46	33	29	18	20	18	20		E B	G	18	18	32	33	31	34	38	41		

MAY 2019 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

MAY 2019 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	9	8	12	23	12	10	13	12	10	9	9	8	8	11	16	14	10	12	16	
2	10	17	19	21	26	25	18	14	37	B	B	B	B	B	B	24	B	B	8	B	15	8	10	9	
3	11	9	14	15	15	26	29	19	13	B	B	B	B	B	26	26	21	17	B	B	22	10	10	10	
4	10	20	14	13	11	9	11	7	9	B	B	21	22	26	35	B	B	B	20	B	B	8	8	8	
5	7	12	16	14	12	10	16	12	9	9	10	11	18	14	12	8	7	8	8	6	8	11	11	10	
6	8	8	8	10	10	10	10	10	10	8	9	8	11	19	26	19	14	12	10	B	10	8	10	10	
7	10	10	16	12	13	13	9	9	28	18	24	15	10	13	12	9	8	8	6	7	12	B	9	7	
8	7	10	10	12	19	8	8	8	7	7	9	9	10	13	12	9	10	9	9	8	10	8	13	8	
9	8	8	8	10	10	11	15	12	11	17	14	B	B	36	39	17	15	11	13	B	13	10	9	9	
10	9	16	12	15	24	14	14	12	12	11	8	20	20	18	24	16	14	12	9	6	B	B	10	12	
11	8	19	21	17	12	12	18	13	13	23	B	16	B	23	B	30	24	10	B	9	9	11	8	8	
12	14	8	24	23	23	10	17	12	8	8	9	9	B	B	24	B	B	B	B	B	13	8	8	6	
13	7	8	8	11	14	10	6	8	8	8	10	15	11	13	B	20	16	33	8	8	10	8	8	12	
14	9	9	11	23	16	12	19	10	B	B	B	B	B	B	B	14	24	B	9	11	B	8	8	12	22
15	23	14	17	15	15	13	10	11	11	9	8	10	10	10	10	8	10	10	10	B	10	9	8	9	
16	8	8	9	9	8	8	8	9	8	B	B	B	28	B	30	B	B	B	B	25	B	B	9	8	
17	7	10	14	10	17	9	12	11	10	9	9	9	10	10	10	8	8	8	8	11	10	8	10	9	
18	8	8	6	8	8	8	8	8	8	9	9	12	12	B	B	B	43	B	25	B	21	18	22	15	
19	11	8	9	13	11	12	14	23	12	10	10	11	11	15	18	18	B	B	B	17	B	10	13	12	
20	10	8	12	10	25	23	25	20	11	9	9	14	21	16	12	10	10	13	10	9	9	9	6	8	
21	8	6	7	8	7	10	7	14	11	9	9	9	12	15	15	12	11	B	B	20	14	14	14	11	
22	11	9	10	10	7	9	9	10	12	13	10	20	14	18	12	12	10	14	12	14	10	10	8	7	
23	7	7	7	11	9	8	8	8	11	11	8	11	11	11	24	22	B	24	23	9	9	9	9	10	
24	13	14	14	22	18	14	12	8	12	B	12	12	12	12	11	15	10	10	8	12	14	12	B	11	
25	7	7	8	7	8	8	8	7	7	7	7	7	10	10	10	10	17	25	22	12	10	8	6	6	
26	7	6	6	9	9	14	10	10	10	7	7	7	7	8	7	9	8	8	8	8	8	8	14	6	
27	8	8	7	7	7	8	7	7	7	7	6	B	B	23	26	17	B	B	22	10	7	8	8	22	
28	9	12	12	13	13	9	9	8	9	8	8	7	8	13	15	10	9	9	8	8	16	16	8	9	
29	15	10	16	15	16	15	15	B	B	42	26	22	B	B	B	B	B	B	B	B	7	8	8	6	
30	11	8	12	12	12	15	12	12	14	17	14	B	B	18	B	B	B	B	B	B	38	10	9	9	
31	9	12	24	30	12	11	14	9	11	B	B	B	B	B	27	B	B	B	B	19	B	B	B	21	
	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	12	12	12	10	11	10	11	11	10	14	14	18	24	17	16	17	12	14	12	10	10	9	
U Q	11	12	16	15	16	14	15	12	13	42	26	B	B	B	39	30	B	B	B	B	21	14	12	12	
L Q	8	8	8	10	9	9	8	8	9	8	9	9	11	13	12	10	10	10	8	9	9	8	8	8	

MAY 2019 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

MAY 2019 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	E A	A	Q			E A				E B		A	A	A	A
2	A	A	A	A	B	A	A	A	B	B	B	B	B	B	B	B	B	B	E A		B	A	A	A
3	A	A	A	A	A	A	A	A	A	B	B	B	B	B				E B		B	A	A	A	A
4	A	A	A	A	A	A	A	A		B	B	B	A	B	B	B	B	B	A	B	B	A	A	A
5	A	A	A	A	A	A	A	A	A	E A	E A	E A			A			A	E A		A	A	A	A
6	192	A	A	A	A	A	A	A	A	E A	E A	E A							A	B	A	A	A	A
7	A	A	A	A	A	A	A	A	A	B	A								E A		A	B	A	A
8	A	A	A	A	A	A	A	A		266	196	204	194	212	202	198	192	202	214		A	A	A	A
9	A	A	A	A	A	A	A	A	A	E A	E A	E A	B	B	E B	E B		E	E A	E A	B	A		A
10	A	A	A	A	A	A	A	A	A	A	A	E A							E B		A	B	B	A
11	A	A	A	A	A	A	A	A	A	A	A	B	B	A	B	B	A	A	B	A	A	A	A	A
12	A	A	A	A	A	A	A	A	A	E A	E A	E A			B	B	B	B	B	B	B	A	A	A
13	198	212	A	A	A	A	A	A	A	A	E A	E A				B	E B		A	A	A	A	A	A
14	A	A	A	A	198	A	A	A	B	B	B	B	B	B	B		E B		B	A	A	A	A	A
15	A	A	A	A	A	A	A	A	A	A	E A	E A	E A	E A				A	A	B	A	A	A	A
16	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	A	B	B	A	A
17	A	A	A	A	A	A	A	A	A	A	A	E A	E A				A	A	A	A	A	A	A	A
18	A	A	A	A	220	A	A	A	A	E A	E A	E A			B	B	B	B	A	B	A	A	A	A
19	A	A	A	A	A	A	A	A	A	202	222	204	200	200	200	E B		B	B	B	A	B	A	A
20	A	200	A	A	A	A	A	A	A	A	E A	E A	E A	E B				A	A	A	A	A	A	A
21	A	A	A	A	A	A	A	A	A	A	E A	E A	A				E B	A	B	B	A	A	A	A
22	A	192	A	A	A	A	A	A	A	E B	E B	E B						A	A	A	A	A	A	A
23	A	A	A	A	A	A	A	198	A	A	194	198	E A	E A				B	A	A	A	A	A	A
24	A	A	A	A	A	A	A	A	A	B	E A	E A					A	A	A	A	A	A	B	A
25	A	A	A	A	A	A	A	A	A	E A	E A	E A					A	A	A	A	A	A	A	A
26	A	A	A	A	A	A	A	A	A	266	228	212	194	194	194	206	194		A	A	A	A	A	A
27	A	A	A	A	A	A	A	A	A	230	230	E A	B	B	E A	E B		B	B	A	A	A	A	A
28	A	A	A	A	A	A	A	A	A	204	200	240	218	218	204	198	198	220		A	A	A	A	A
29	A	A	A	A	A	A	200	B	B	B	A	A	B	B	B	B	B	B	B	B	B	A	A	A
30	A	A	A	A	A	A	A	A	A	A	A	B		200	B	B	B	B	B	B	B	B	B	A
31	A	A	A	A	A	A	A	A	A	B	B	B	B	B				B	B	B	B	A	B	B
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	2	3			2		1	1	4	14	21	22	19	21	23	23	15	6	5	3		1	3	
MED	195	200			209		200	198	U	E A	E A	E A	203	201	202	205	204	U	E A	E A		202	208	
U Q		212							260	268	235	228	218	217	216	218	220	274	272	260			298	
L Q		192							205	220	210	208	198	200	198	200	198	200	223	228			196	

MAY 2019 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 2019 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	B	A	A	56	A	A	A	A	A	X	32	40	58	48	41	O X	B	B	B	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A	A	A	38	42	40	48	32	22	A	A	A	A	A	A
3	55	64	54	A	A	A	A	A	A	O X	17	33	47	46	46	48	36	A	A	A	A	A	A	A
4	A	A	40	A	A	A	A	A	A	O X	33	34	A	46	53	34	O X	O X	A	A	X	31	A	A
5	A	A	A	54	A	A	A	A	A	A	A	A	X	37	37	39	44	32	20	A	A	A	A	A
6	O X	24	66	58	35	A	A	A	A	A	O X	26	38	38	44	45	38	X	R	A	A	A	A	A
7	A	44	A	35	A	A	A	A	A	A	A	34	44	39	40	42	B	A	A	A	A	O X	37	R
8	A	A	54	A	A	A	45	A	A	A	A	X	44	42	37	37	34	O X	R	A	R	R	69	A
9	A	A	A	A	A	95	A	A	A	O X	22	B	O X	X	X	42	O X	A	A	A	A	A	A	X
10	A	A	A	A	A	A	44	35	17	18	26	34	34	38	38	35	O X	A	A	A	R	37	A	X
11	R	A	A	X	31	A	A	U R	O X	27	20	34	41	34	A	A	A	A	A	A	A	A	A	A
12	A	A	A	A	A	A	A	X	32	34	A	A	X	X	43	32	26	A	A	A	A	A	A	A
13	A	A	A	A	A	40	A	A	A	A	O X	33	B	X	A	R	A	A	A	A	A	O X	38	A
14	A	A	A	A	A	A	O X	X	25	28	A	B	B	B	X	A	B	B	B	A	A	A	A	R
15	A	53	A	66	A	A	A	A	O X	28	O X	25	39	42	O X	34	48	28	B	B	A	A	A	A
16	A	A	52	A	A	A	A	A	A	A	B	O X	36	59	48	36	X	R	B	B	B	A	A	B
17	A	A	A	A	A	A	A	A	A	O X	19	27	41	36	41	32	B	O X	A	A	B	A	A	A
18	A	A	A	A	A	A	A	A	A	A	33	40	40	36	46	26	A	A	A	A	A	A	A	A
19	A	A	X	65	A	O X	O X	X	21	18	A	A	31	44	43	46	X	X	A	A	A	A	A	A
20	A	A	47	47	57	40	X	A	A	A	A	X	X	F	A	O X	A	A	A	A	A	A	A	A
21	62	A	55	A	A	A	A	A	X	X	26	34	35	41	33	X	A	A	B	B	B	A	A	A
22	A	A	A	41	A	A	A	A	A	A	A	X	29	37	42	43	31	O X	A	A	A	B	A	B
23	A	A	A	A	A	A	A	A	A	A	34	38	35	42	36	30	X	A	A	A	A	A	A	A
24	A	47	A	A	A	A	A	A	X	A	X	X	44	42	52	30	X	X	A	A	A	A	O X	19
25	A	A	A	A	48	A	A	A	A	A	28	40	52	44	37	30	X	X	A	A	A	R	A	A
26	A	A	A	A	A	O X	28	A	A	A	A	X	29	46	B	49	38	X	A	A	A	A	A	A
27	A	60	A	A	A	A	A	A	R	A	X	X	O X	O X	X	A	X	X	A	A	A	A	A	A
28	A	32	A	A	A	52	A	A	O X	38	24	32	47	46	40	36	24	X	A	A	A	O X	22	A
29	A	A	A	A	A	A	A	A	O X	X	16	17	29	46	39	41	O X	X	A	A	A	A	A	A
30	A	A	A	A	A	A	A	A	A	O X	21	28	32	45	45	30	40	X	A	A	A	A	O X	28
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	3	7	8	8	3	4	4	6	9	8	21	28	28	29	26	22	11	1		1		4	3	2
MED	55	53	53	44	56	46	36	30	X	O X	X	X	28	38	42	38	30	O X	45	X		O X	28	30
U Q	62	64	54	60	57	74	44	35	X	O X	33	42	46	46	45	35	O X					O X	38	
L Q	O X	44	44	X	48	40	O X	O X	O X	X	X	X	X	X	X	X	O X					O X		

# IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 2019 f<sub>o</sub>F<sub>2</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	B	A	A	A	A	A	A	A	A	A	26	29	37	F	F	R	B	B	B	A	A	A	A	A	
2	A	A	A	A	A	A	A	A	A	A	A	A	31	36	34	42	26	16	A	A	A	A	A	A	A	
3	A	A	A	A	A	A	A	A	A	A	F	F	F	F	F	F	A	A	A	A	A	A	A	A	A	
4	A	A	A	A	A	A	A	A	A	A	Z	A	F	F	F	23	R	A	A	J	R	A	A	A	A	
5	A	A	A	A	A	A	A	A	A	A	A	A	31	26	32	38	26	14	A	A	A	A	A	A	A	
6	R	A	A	A	A	A	A	A	A	A	A	20	32	U	R	F	F	R	A	A	A	A	A	A	A	
7	18	A	A	A	A	A	A	A	A	A	F	F	19	29	33	34	36	B	A	A	A	A	R	A	A	
8	A	A	A	A	A	A	20	A	A	A	J	R	38	36	31	31	28	22	R	A	R	A	A	A	A	
9	A	A	A	A	A	A	A	A	A	R	B	16	27	32	33	30	20	A	A	A	A	A	A	R	A	
10	A	A	A	A	A	A	F	29	11	12	20	28	28	32	28	22	R	A	A	A	A	A	A	J	R	
11	A	A	A	A	A	A	A	R	21	14	A	A	28	32	28	A	A	A	A	A	A	A	A	A	A	A
12	A	A	A	A	A	A	A	A	26	17	F	A	A	36	34	28	26	20	A	A	A	A	A	A	A	A
13	A	A	A	A	A	F	A	A	A	A	A	A	27	B	32	A	R	A	A	A	A	A	A	R	A	
14	A	A	A	A	A	A	A	A	19	22	A	B	B	B	33	A	B	B	B	A	A	A	A	A	R	
15	A	A	A	A	A	A	A	A	A	22	A	R	F	Z	F	F	B	B	A	A	A	A	A	A	A	
16	A	A	A	A	A	A	A	A	A	A	B	30	45	31	30	R	B	B	B	A	A	A	B	A	A	
17	A	A	A	A	A	A	A	A	A	A	13	21	30	30	35	26	18	A	A	A	B	A	A	A	A	
18	A	A	A	A	A	A	A	A	A	A	F	18	34	34	30	33	14	A	A	A	A	A	A	A	A	
19	A	A	J	R	A	A	A	15	12	A	A	F	F	F	F	22	18	A	A	A	A	A	A	A	A	
20	A	A	A	A	U	R	A	A	A	A	A	22	27	31	36	34	A	R	A	A	A	A	A	A	A	
21	A	A	A	A	A	A	A	A	A	20	14	14	22	29	32	27	A	A	B	B	B	A	A	A	A	
22	A	A	A	F	A	A	A	A	A	A	A	23	26	28	33	22	20	14	A	A	A	B	A	B	B	
23	A	A	A	A	A	A	A	A	A	A	F	16	23	29	29	30	24	A	A	A	A	A	A	A	A	
24	A	A	A	A	A	A	A	A	35	A	21	38	36	41	24	24	20	A	A	A	A	A	13	A	A	
25	A	A	A	A	A	A	A	A	A	A	F	18	24	30	29	31	24	A	A	A	A	A	A	A	A	
26	A	A	A	A	A	A	R	A	A	A	A	A	23	32	B	F	29	32	A	A	A	A	A	A	A	
27	A	A	A	A	A	A	A	A	R	A	19	J	R	U	R	R	A	21	16	A	A	A	A	A	A	
28	A	A	A	A	A	A	A	A	R	A	32	18	26	37	40	34	21	18	A	A	A	A	16	A	A	
29	A	A	A	A	A	A	A	A	10	11	18	F	F	Z	35	32	18	A	A	A	A	A	A	A	A	
30	A	A	A	A	A	A	A	A	A	A	15	15	26	34	F	F	24	26	A	A	A	A	A	R	A	
31																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	1		1	4	1	2	4	5	9	8	21	28	28	29	26	22	11			1		2	3	2		
MED	R		J	R	U	R	32	21	21	20	14	19	28	32	32	30	22	16		J	R		R	R		
U Q				36			28	28	27	16	22	31	36	34	33	24	18						R			
L Q				27			18	16	12	12	18	26	30	30	26	20	14							13		

## IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 2019 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 \ 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	78	B	68	44	38	58	66	66	60	45	16	17	E B 16	21	23	20	B	B	B	50	60	32	55	50	
2	90	36	62	63	46	47	28	46	31	40	51	16	G 16	26	20	48	29	55	47	51	51	46	46	47	
3	32	44	46	52	56	42	33	57	48	44	64	64	16	14	G	14	46	41	54	47	45	33	51	88	
4	48	49	49	49	49	33	47	48	46	31	41	54	32	G 27	36	16	63	53	44	27	45	53	53	53	
5	50	56	54	45	54	52	54	54	32	50	41	51	G 17	G 17	G 17	14	46	50	54	54	46	29	44	48	
6	38	25	34	34	44	58	58	53	72	56	105	46	51	50	18	G 22	30	47	47	46	57	42	29	32	
7	34	35	52	47	47	52	57	49	55	56	E B 10	G E 16	E B 19	E B 14	E B 25	B	48	41	48	62	46	28	33	40	
8	37	52	50	71	58	41	28	32	41	48	16	14	G 14	17	G 17	17	53	20	42	25	30	54	59	40	
9	62	74	50	58	58	70	57	48	50	40	50	53	53	G	53	40	57	57	45	50	48	24	48	44	
10	52	52	49	49	46	45	16	44	39	29	43	15	G	G 15	G E 10	B	56	56	49	54	25	25	41	27	
11	32	46	46	46	41	49	45	48	43	55	72	49	54	88	90	90	51	50	39	52	56	58	24	32	
12	63	48	78	47	49	47	51	30	22	33	54	54	G J 20	A 44	50	47	46	50	44	30	46	49	52		
13	52	49	91	156	59	46	48	56	58	60	68	45	B	B	55	16	51	51	49	54	52	45	44	36	
14	51	56	66	71	57	50	36	32	46	51	B	B	B	B	46	B	B	B	50	65	53	68	53	25	
15	47	40	58	52	52	45	47	44	47	51	54	50	E B 37	B 19	B	30	B	B	47	48	58	60	71	52	
16	56	51	51	47	51	53	54	52	45	58	B	50	21	16	57	30	B	B	B	56	48	29	B	57	
17	59	52	52	35	67	56	44	27	48	10	10	G	G 16	G E 16	B 16	B	47	47	51	B	41	49	38	33	
18	50	29	56	92	92	85	44	45	48	57	79	11	G 19	45	46	40	46	47	35	56	29	46	54	48	
19	38	26	35	30	40	45	56	42	39	39	51	51	G 15	15	32	47	58	50	44	45	51	50	45	55	
20	58	42	27	40	60	29	45	42	54	53	74	39	G 22	24	26	56	52	58	54	32	31	31	37	45	
21	45	56	50	54	56	62	57	46	40	49	50	G	E B 23	E B 26	E B 22	44	21	B	B	B	51	48	47	29	
22	37	50	58	86	52	60	58	58	52	37	20	G	54	56	52	54	53	49	54	54	B	46	B	B	
23	50	51	58	59	35	50	48	48	48	50	40	17	G 18	G	G	16	47	33	45	60	40	45	45	41	
24	38	37	38	53	62	56	59	47	29	53	25	14	G 16	21	12	14	22	32	32	32	42	50	40	47	
25	28	62	128	105	65	61	48	42	42	50	104	46	20	17	18	18	59	31	57	20	28	56	81	40	
26	47	47	54	45	80	52	52	45	82	60	63	55	53	B E 25	B	59	52	50	54	54	46	54	55	39	
27	59	40	40	45	58	50	56	47	24	40	20	49	G 16	23	46	33	34	48	28	32	46	46	53	46	
28	40	38	41	54	68	42	55	58	54	42	49	53	13	55	52	50	56	48	51	52	50	48	52	27	
29	32	51	52	45	57	35	44	52	77	49	22	16	G 107	54	54	54	54	68	53	45	48	56	57	58	
30	44	45	46	47	58	57	68	46	60	84	26	14	G 54	G 15	G	16	32	47	53	55	43	53	52	45	
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	30	29	30	30	30	30	30	30	30	30	28	29	28	27	29	27	26	25	27	28	29	30	28	29	
MED	48	48	52	49	56	50	50	47	48	50	50	45	22	22	25	30	50	48	49	50	46	46	48	45	
U Q	56	52	58	59	59	57	57	52	54	55	64	51	34	45	49	50	54	52	53	54	51	53	54	51	
L Q	38	39	46	45	47	45	44	44	40	40	24	G 16	G 17	G	G	16	46	44	44	44	40	33	42	34	

JUN. 2019 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 2019 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	29	B	14	11	10	12	12	12	11	9	9	9	16	15	13	16	B	B	B	13	13	16	16	11
2	7	8	8	20	16	11	10	9	8	9	7	7	6	5	7	6	8	6	7	9	9	13	13	8
3	7	8	10	13	11	8	9	9	6	6	7	7	7	8	7	6	8	25	9	13	8	8	11	9
4	8	8	8	13	10	7	12	9	10	7	9	26	14	11	11	11	8	6	8	7	8	11	8	12
5	9	9	14	11	14	21	13	8	5	12	16	12	11	10	8	8	8	9	14	10	12	10	9	9
6	8	6	6	8	14	11	9	9	9	9	9	22	26	14	11	13	10	9	9	9	13	10	6	9
7	8	8	8	9	10	9	10	9	8	8	10	9	19	15	25	B	13	10	8	9	7	7	6	10
8	7	11	20	11	11	7	7	7	7	7	6	8	8	8	8	8	8	9	7	6	9	9	10	10
9	15	15	22	20	20	10	23	12	9	7	37	17	20	16	16	12	19	15	15	12	10	7	14	8
10	9	9	19	9	9	9	9	7	7	8	7	7	7	8	9	10	8	8	8	8	8	8	6	6
11	6	6	6	7	7	8	8	8	7	15	16	12	9	9	9	6	7	7	7	7	7	6	8	7
12	8	6	8	8	11	10	8	8	6	8	9	7	9	9	8	7	7	9	9	9	9	8	10	11
13	9	7	78	9	9	9	8	10	10	9	9	13	B	20	21	12	11	10	16	24	12	8	11	7
14	9	10	10	12	15	10	11	10	8	16	B	B	B	25	30	B	B	B	26	26	19	24	25	14
15	11	8	12	12	11	10	10	7	8	9	10	12	15	19	23	13	B	B	13	14	14	13	14	12
16	12	8	10	10	10	10	8	9	10	21	B	16	10	8	9	13	B	B	B	24	11	10	B	22
17	16	10	8	8	10	8	7	7	6	6	7	6	6	7	16	B	12	13	12	B	8	12	9	14
18	12	10	10	8	8	6	6	6	7	7	6	6	6	8	8	5	5	6	8	9	7	8	6	6
19	6	8	8	9	8	9	10	7	7	6	6	5	5	5	8	8	8	8	8	6	9	24	9	9
20	9	9	9	8	8	8	9	8	8	10	8	8	8	8	10	16	24	20	16	15	11	9	8	9
21	24	15	10	14	14	10	10	10	8	8	8	6	13	26	22	19	12	B	B	B	18	8	6	8
22	8	8	8	9	12	12	17	12	9	8	9	7	11	11	14	11	8	10	10	7	B	14	B	B
23	11	8	8	8	8	7	6	7	8	7	10	10	8	9	9	8	8	12	16	13	16	10	17	6
24	7	6	8	13	13	12	10	10	9	6	7	7	8	8	8	7	7	8	8	8	8	10	8	8
25	8	9	9	8	8	8	8	8	10	7	8	8	7	8	8	8	10	10	10	11	8	8	6	5
26	9	8	10	9	14	10	9	8	8	10	13	19	12	B	25	12	9	24	20	19	13	13	14	11
27	12	8	12	10	10	11	12	18	12	12	8	8	8	8	8	6	8	8	7	7	9	9	14	8
28	8	8	6	7	10	10	10	12	8	8	8	7	7	7	7	8	8	6	6	7	10	7	8	9
29	7	17	9	10	10	8	8	7	6	6	7	6	8	8	10	8	8	10	10	11	11	16	26	10
30	10	10	7	8	12	14	10	8	7	9	7	7	7	7	8	6	7	11	12	11	10	9	10	6
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	9	8	9	9	10	10	10	8	8	8	8	8	8	8	9	9	8	10	10	10	10	10	10	9
U Q	11	10	12	12	13	11	10	10	9	9	10	12	14	15	16	13	12	20	16	14	13	13	14	11
L Q	8	8	8	8	9	8	8	7	7	7	7	7	7	8	8	7	8	8	8	8	8	8	8	8

JUN. 2019 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 2019 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	B	A	A	A	A	A	A	A	A	A	E A 228	220	208	198	200	220	B	B	B	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A	A	A	216	192	206	196	198	A	A	A	A	A	A	A
3	A	A	A	A	A	A	A	A	A	A	A	236	208	202	202	204	178	A	B	A	A	A	A	A
4	A	A	A	A	A	A	A	A	A	A	E A 258	E A 258	E A 226	198	198	212	E A 230	A	A	A	196	A	A	A
5	A	A	A	A	A	A	A	A	A	A	A	A	A	176	198	188	198	208	A	A	A	A	A	A
6	A	A	A	A	A	A	A	A	A	A	E A 246	E B 246	E B 226	194	186	204	A	A	A	A	A	A	A	A
7	A	A	A	A	A	A	A	A	A	A	E B 232	202	204	206	210	B	A	A	A	A	A	A	A	A
8	A	A	A	A	A	A	208	A	A	A	202	204	202	202	192	210	222	A	A	A	A	A	A	A
9	A	A	A	A	A	A	A	A	E A 288	A	E A 288	E B 248	E B 226	E A 238	204	192	A	A	A	A	A	A	A	200
10	A	A	A	A	A	A	212	230	A	A	E A 218	E A 210	196	196	196	200	198	A	A	A	A	A	A	A
11	A	A	A	A	A	A	A	A	A	A	E A 218	E A 218	218	190	A	A	A	A	A	A	A	A	A	A
12	A	A	A	A	A	A	200	E A 312	A	A	A	212	208	204	196	198	A	A	A	A	A	A	A	A
13	A	A	A	A	A	A	A	A	A	A	E A 244	A	B	226	A	A	A	A	A	A	A	A	198	A
14	A	A	A	A	A	A	194	186	A	B	A	B	E B 248	E B 248	A	B	B	B	A	A	A	A	A	A
15	A	A	A	A	A	A	A	A	A	A	E A 230	E A 210	E B 244	E B 274	E A 232	A	B	B	A	A	A	A	A	A
16	A	A	A	A	A	A	A	A	A	A	E A 280	E A 280	208	192	208	A	B	B	B	A	A	A	B	A
17	A	A	A	A	A	A	A	A	A	260	234	208	E A 210	200	206	B	212	A	A	A	A	A	A	A
18	A	A	A	A	A	A	A	A	A	A	194	188	200	194	184	190	A	A	A	A	A	A	202	A
19	A	A	A	A	A	A	A	A	A	A	E A 232	E A 194	208	208	E A 210	222	A	A	A	A	A	A	A	A
20	A	A	A	A	A	A	204	A	A	A	E A 254	E A 232	E A 226	E A 218	A	E A 248	A	A	A	A	A	A	A	A
21	A	A	A	A	A	A	A	A	202	178	252	222	E A 250	E B 240	E B 246	A	A	B	B	B	A	196	A	A
22	A	A	E A 252	A	A	A	A	A	A	A	E A 256	E A 204	E A 232	E A 198	E A 250	212	A	A	A	A	B	A	B	B
23	A	A	A	A	A	A	A	A	A	A	E B 228	E A 196	194	198	198	214	A	A	A	A	A	A	A	A
24	A	214	A	A	A	A	A	A	A	A	238	220	208	198	196	198	198	A	A	A	A	A	H 170	A
25	A	A	A	A	A	A	A	A	A	A	E A 230	188	204	184	202	210	A	A	A	A	A	A	A	A
26	A	A	A	A	A	A	208	A	A	A	E B 272	E A 238	E A 238	E B 264	E A 226	A	A	A	A	A	A	A	A	A
27	A	A	A	A	A	A	A	A	A	A	A	246	194	192	206	192	200	216	A	A	A	A	A	A
28	A	A	A	A	A	A	A	A	204	A	E A 262	E A 248	194	192	200	198	208	A	A	A	A	202	A	A
29	A	A	A	A	A	A	A	A	A	A	E A 218	E A 234	202	212	194	194	A	A	A	A	A	A	A	A
30	A	A	A	A	A	A	A	A	A	E A 280	E A 204	204	198	198	E A 218	198	A	A	A	A	A	A	192	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	2	3			1	3	4	4	3	19	27	28	29	27	22	10				1	2	4	1
MED	216	205	252		204	208	198	198	219	231	205	202	199	198	200	206				196	199	195	200	
U Q			274			212	215	258	288	252	244	222	210	210	212	222							200	
L Q			198			208	195	194	178	228	204	199	197	196	198	198								181

JUN. 2019 h'F (KM)

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## IONOSPHERIC DATA STATION SHOWA-ST.

JUL.2019 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	A	A	A	A	A	A	A	X	X	X	X	X	A	A	X	A	A	A	A		
2	52	68	A	81	A	A	A	A	A	A	A	X	X	X	0	X	A	A	A	A	26	A	A	A		
3	A	A	A	A	A	0	X	A	A	A	0	X	29	42	38	42	55	30	A	A	A	A	A	30		
4	A	A	A	A	52	39	38	A	A	A	A	X	0	X	48	32	40	0	X	A	X	A	A	A		
5	56	A	A	A	A	A	A	A	A	A	A	X	45	48	47	32	52	0	X	A	A	A	A	0	X	33
6	A	A	77	64	A	A	0	X	A	A	A	A	38	42	34	47	32	X	A	A	A	A	A	A	A	
7	A	A	A	A	A	A	A	A	A	A	A	B	0	X	X	X		R	A	A	A	A	A	A	A	
8	A	A	A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	A	A	A	A	A	A	A	A	
9	A	A	A	A	A	58	A	A	A	A	X	X	A	B	40	0	X	A	B	A	0	X	A	A	X	52
10	A	A	A	A	62	A	62	A	56	A	A	B	B	B	B	B	0	X	B	A	A	B	R	R	A	
11	A	A	A	A	A	A	A	30	A	A	B	B	B	B	B	B	B	B	A	A	A	A	A	A	A	
12	A	A	A	A	A	A	A	A	A	A	A	42	37	44	52	54		B	A	A	A	R	A	A	A	
13	A	A	A	A	A	A	A	A	A	A	X	X	X	X	0	X	X	A	A	34	A	A	A	A	A	
14	A	A	A	A	A	A	A	A	A	A	X	X	X	X	0	X	X	X	A	A	A	A	A	A	A	
15	67	69	A	A	A	A	A	A	A	A	A	X	X	X	X	X	R	A	A	A	A	A	X	A	A	
16	A	A	A	A	A	A	A	A	A	A	X	X	X	X	0	X	B	A	A	A	A	A	A	A	A	
17	34	A	A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	A	A	A	A	A	A	A	A	
18	A	A	A	A	A	A	36	A	A	A	X	X	X	X	X	X	X	A	A	A	A	A	A	A	A	
19	A	A	A	A	0	X	A	A	A	A	X	X	X	X	47	38	B	A	A	B	A	A	A	A	A	
20	37	47	A	37	42	A	X	0	X	A	A	0	X	X	X	X	X	A	0	X	A	A	A	A	A	
21	A	A	A	A	58	A	A	A	A	A	X	X	B	0	X	0	X	A	A	A	A	A	A	A	A	
22	A	A	A	A	A	A	X	A	0	X	R	B	0	X	X	X	X	A	A	A	A	A	A	A	A	
23	86	A	A	A	A	A	A	A	A	A	A	41	40	45	46	35	29	B	R	A	A	A	A	A	A	
24	59	A	60	A	A	X	A	0	X	A	X	X	X	X	X	X	X	A	0	X	A	A	A	A	68	
25	40	44	X	A	A	0	X	A	X	X	X	X	X	X	X	41	29	A	A	A	A	A	A	A	A	
26	A	A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	A	A	A	A	A	A	A	A	
27	A	A	56	42	42	A	0	X	0	X	A	X	X	X	X	X	X	A	0	X	A	A	A	A	A	
28	A	A	A	A	A	A	A	X	A	A	X	X	X	X	0	X	0	X	A	A	A	A	A	A	A	
29	A	A	A	A	A	A	A	A	A	A	0	X	34	49	51	52	52	43	48	A	A	A	R	A	A	
30	A	A	A	50	A	A	A	A	A	A	X	X	X	X	46	44	39	46	41	0	X	A	A	A	A	
31	A	A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	R	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	8	4	4	5	6	4	8	5	3	7	19	28	27	28	29	27	17	1	5	3	2		1	3		
MED	54	58	58	50	47	36	36	32	21	24	29	39	40	43	42	41	27	24	19	26	26		30	52		
U Q	63	68	68	72	58	48	40	40	56	25	34	42	44	46	47	46	30		28	38				68		
L Q	38	46	42	40	42	32	30	29	20	22	29	36	37	39	39	35	24		18	18				0	X	33

JUL.2019 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUL.2019 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	A	A	A	A	31	26	25	30	19	A	A	20	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A	A	26	29	30	29 <sup>F</sup>	29	A	A	A	A	14 <sup>F</sup>	A	A	A
3	A	A	A	A	A	24 <sup>R</sup>	A	A	A	18	18	28	28	26	40 <sup>F</sup>	24	A	A	A	A	A	A	A	A
4	A	A	A	A	A	25 <sup>R</sup>	A	A	A	A	19	31 <sup>F</sup>	32	34	26	34	18	A	12	A	A	A	A	A
5	A	A	A	A	A	A	A	A	A	A	22	32 <sup>F</sup>	31	36	26	29 <sup>F</sup>	13	A	A	A	A	A	A	27
6	A	A	A	38 <sup>U R</sup>	A	23 <sup>U R</sup>	A	A	A	A	A	25	30	28	31 <sup>F</sup>	26	A	A	A	A	A	A	A	A
7	A	A	A	A	A	A	A	A	A	A	B	33	25	31	27 <sup>F</sup>	26	R	A	A	A	A	A	A	A
8	A	A	A	A	A	A	A	A	A	A	A	28	31	34	34	26	A	A	A	A	A	A	A	A
9	A	A	A	A	A	A	A	A	A	A	23	24	A	B	34	29 <sup>R</sup>	A	B	A	32	20 <sup>R</sup>	A	A	46
10	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	R	B	A	A	B	R	R	A
11	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	A	A	A	A	A	A
12	A	A	A	A	A	A	A	A	A	A	A	31 <sup>F</sup>	31	38	37 <sup>F</sup>	35 <sup>F</sup>	B	A	A	A	R	A	A	A
13	A	A	A	A	A	A	A	A	A	A	24	34	34	30	36	35 <sup>F</sup>	A	A	A	A	A	A	A	A
14	A	A	A	A	A	A	A	A	A	A	21	30	34	33	29 <sup>R</sup>	26	14	A	A	A	A	A	A	A
15	A	A	A	A	A	A	A	A	A	A	A	29	30	33	34 <sup>F</sup>	R	A	A	A	A	A	A	A	A
16	A	A	A	A	A	A	A	A	A	A	21	29 <sup>F</sup>	32	34	34 <sup>F</sup>	34	B	A	A	A	A	A	A	A
17	A	A	A	A	A	A	A	A	A	A	A	29	35	33	35	33	21	A	A	A	A	A	A	A
18	A	A	A	A	A	A	A	A	A	A	23	30	32	31	34 <sup>F</sup>	40	16	A	A	A	A	A	A	A
19	A	A	A	A	22 <sup>R</sup>	A	A	A	A	A	25	28	30	27 <sup>F</sup>	32	B	A	A	B	A	A	A	A	A
20	A	A	A	A	A	A	21	26 <sup>R</sup>	A	A	32	29	40	29	37 <sup>F</sup>	33	21	A	R	A	A	A	A	A
21	A	A	A	A	A	A	A	A	A	A	16	25	31	B	R	33	A	A	A	A	A	A	A	A
22	A	A	A	A	A	A	35	A	15 <sup>R</sup>	A	B	30	32	37 <sup>F</sup>	33	27	A	A	A	A	A	A	A	A
23	A	A	A	A	A	A	A	A	A	A	A	32	34	28	40	29	16 <sup>F</sup>	B	R	A	A	A	A	A
24	A	A	A	A	A	27 <sup>J R</sup>	A	28	A	18	23	29	32	36	35	36	19	A	13 <sup>R</sup>	A	A	A	A	A
25	34 <sup>J R</sup>	A	22	A	A	29 <sup>R</sup>	A	14	19	23	34	36	39	30	26 <sup>F</sup>	23	A	A	A	A	A	A	A	A
26	A	A	A	A	A	A	A	A	A	14	30	39	34	34	47	33	19	A	A	A	A	A	A	A
27	A	A	A	A	A	A	24 <sup>R</sup>	22 <sup>R</sup>	A	A	23	32	40	37	36	35	22	A	15 <sup>R</sup>	A	A	A	A	A
28	A	A	A	A	A	A	A	39	A	A	26	32	32	37	37 <sup>R</sup>	30	20 <sup>F</sup>	A	A	A	A	A	A	A
29	A	A	A	A	A	A	A	A	A	A	28	32	38	46 <sup>F</sup>	37 <sup>F</sup>	37	22	A	A	A	A	A	A	A
30	A	A	A	A	A	A	A	A	A	22	31	31	40	30 <sup>F</sup>	28 <sup>F</sup>	28	35	R	A	12	A	A	A	A
31	A	A	A	A	A	A	A	A	A	19	28	33	44	43 <sup>Z</sup>	38	44	18	18	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		1	1	1	3	5	4	2	7	19	28	27	28	29	27	17	1	4	3	2			2
MED	34 <sup>J R</sup>		22	38 <sup>U R</sup>	22 <sup>R</sup>	25 <sup>R</sup>	24 <sup>R</sup>	27	14	18	23	30	32	33	34	30	19	18	12 <sup>R</sup>	20	17			36
U Q						27 <sup>J R</sup>	32	34		19	28	32	35	36	37	35	22		14 <sup>R</sup>	32				
L Q						24 <sup>R</sup>	22	24 <sup>R</sup>		16	22	29	31	30	30	27	17		12	12				

JUL.2019 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 2019 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	41	52	84	57	62	82	69	58	58	56	64	42	57	50	56	51	47	58	53	52	42	48	49	46	
2	42	62	100	60	57	61	53	49	28	50	53	63	19	25	<sup>E</sup> 13	<sup>B</sup> 93	54	50	45	51	48	55	32	44	
3	54	84	47	48	56	49	39	33	47	51	53	50	18	16	<sup>G</sup> 19	54	62	44	78	58	126	34	23	32	
4	56	53	48	56	28	21	46	64	54	55	63	50	41	36	68	50	54	54	26	32	57	53	59	46	
5	49	43	54	46	57	57	49	40	39	45	50	48	17	16	<sup>G</sup> 17	<sup>G</sup> 19	39	34	52	48	48	49	40	31	
6	44	59	27	32	42	50	47	28	45	50	54	47	20	18	18	22	45	47	52	46	46	39	47	35	
7	45	74	64	115	84	62	58	58	58	58	58	<sup>E</sup> 24	<sup>B</sup> 34	46	60	18	23	47	46	34	41	47	39	40	
8	45	103	56	59	59	62	58	58	52	50	44	26	22	22	22	16	43	51	58	37	42	32	45	45	
9	55	55	55	41	46	46	54	60	60	54	48	53	65	<sup>B</sup>	56	54	52	<sup>B</sup>	52	52	39	43	36	50	
10	48	52	36	50	54	42	49	54	42	50	52	<sup>B</sup>	<sup>B</sup>	<sup>B</sup>	<sup>B</sup>	<sup>B</sup> 26	<sup>B</sup>	<sup>B</sup>	55	72	<sup>B</sup>	26	28	32	
11	40	62	74	85	58	55	45	49	75	59	55	<sup>B</sup>	<sup>B</sup>	<sup>B</sup>	<sup>B</sup>	<sup>B</sup>	<sup>B</sup>	<sup>B</sup>	55	49	49	54	85	40	
12	55	51	40	48	43	45	48	38	46	46	56	50	50	21	<sup>E</sup> 24	<sup>B</sup> 24	<sup>B</sup>	<sup>B</sup>	42	66	53	33	52	66	50
13	57	38	63	42	42	39	50	32	44	44	44	<sup>G</sup>	20	16	26	55	58	49	49	45	40	67	45	32	
14	36	54	57	53	50	34	59	43	48	43	40	52	57	52	<sup>E</sup> 17	<sup>B</sup> 14	32	34	34	45	53	45	36	32	
15	43	42	51	68	57	68	55	48	54	54	32	<sup>G</sup> 16	<sup>G</sup>	<sup>G</sup>	16	31	56	53	56	59	57	53	40	48	
16	42	55	55	34	48	48	51	66	46	49	54	22	49	52	<sup>G</sup> 18	<sup>E</sup> 22	<sup>B</sup>	<sup>B</sup>	54	50	47	41	46	46	48
17	51	56	56	56	47	34	81	70	52	56	54	<sup>E</sup> 15	<sup>B</sup> 26	<sup>E</sup> 15	24	21	15	36	30	46	57	54	54	42	
18	38	41	45	60	48	78	31	41	46	51	12	12	15	49	46	24	31	31	55	48	47	53	53	50	
19	28	32	36	42	30	44	45	39	48	34	26	47	<sup>G</sup> 18	<sup>G</sup>	<sup>G</sup>	<sup>B</sup>	54	34	<sup>B</sup>	48	51	49	25	47	
20	33	39	79	34	36	32	33	40	44	41	12	61	52	22	18	<sup>G</sup> 14	24	44	22	39	26	45	46	42	
21	61	64	60	52	31	55	50	58	66	58	49	49	<sup>B</sup>	53	<sup>E</sup> 24	<sup>B</sup> 22	52	46	54	52	40	40	42	45	
22	51	101	55	68	55	53	47	46	47	16	<sup>B</sup> 24	<sup>B</sup> 21	28	54	36	62	82	48	32	31	54	32	42		
23	54	55	34	34	46	42	53	53	53	58	54	55	57	34	29	19	46	<sup>B</sup>	22	36	89	88	61	32	
24	25	72	46	57	52	48	56	24	30	82	27	22	22	16	<sup>G</sup>	<sup>G</sup>	54	42	43	92	56	41	51	41	42
25	35	46	48	117	56	66	47	49	55	48	58	21	15	54	55	14	28	40	38	65	54	52	68	58	
26	34	29	28	32	72	47	59	49	57	50	69	<sup>G</sup>	<sup>G</sup>	19	20	24	45	47	54	46	52	48	47	49	
27	84	39	30	34	56	46	69	52	54	54	28	26	19	19	26	47	53	50	56	48	52	55	50	41	
28	43	34	46	50	71	59	55	32	47	54	54	53	<sup>G</sup>	<sup>G</sup> 24	<sup>E</sup> 22	<sup>B</sup> 16	47	56	51	88	57	57	54	54	
29	54	58	58	58	52	58	58	56	45	48	53	28	18	18	54	17	46	48	48	53	18	29	62	49	
30	59	137	89	39	51	46	56	58	111	13	<sup>G</sup>	<sup>G</sup>	<sup>G</sup>	<sup>G</sup>	<sup>G</sup>	56	10	20	41	30	31	31	48	40	
31	52	69	76	43	51	51	57	52	46	14	54	17	<sup>E</sup> 21	<sup>B</sup> 17	19	<sup>E</sup> 10	58	18	18	27	47	51	51	68	
	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	30	29	28	28	29	28	28	27	30	31	30	31	31	31	
MED	45	55	55	50	52	49	53	49	48	50	53	28	<sup>E</sup> 20	<sup>G</sup>	<sup>G</sup>	21	22	46	47	52	48	47	49	46	44
U Q	54	64	63	59	57	59	58	58	55	55	54	50	45	41	50	50	54	51	55	53	53	54	54	49	
L Q	40	42	45	41	46	44	47	40	45	45	40	19	<sup>G</sup> 19	18	<sup>G</sup>	18	32	36	41	39	40	43	39	40	

JUL. 2019 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUL.2019 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	7	8	8	13	14	34	14	16	12	11	12	18	13	12	12	15	10	9	9	9	8	12	17	7
2	8	7	17	13	8	16	12	9	7	8	10	11	8	8	13	19	11	12	20	13	8	7	7	8
3	8	8	9	10	8	8	5	6	6	8	8	11	10	10	8	9	11	8	8	8	9	7	6	10
4	7	7	7	8	8	8	8	8	8	6	9	10	8	10	8	11	9	8	7	8	13	15	13	8
5	8	14	16	10	12	9	8	8	5	7	7	8	8	8	8	8	8	8	8	8	8	8	8	7
6	7	9	7	9	11	10	8	7	7	8	8	9	10	8	10	9	9	9	9	11	8	8	8	8
7	8	8	8	9	9	8	6	8	8	13	42	24	16	9	11	10	11	10	10	10	8	9	6	6
8	8	10	8	14	12	12	11	12	9	9	14	8	8	8	8	8	8	8	7	7	8	9	8	14
9	14	10	22	9	10	10	10	10	10	12	8	8	24	B	15	22	19	B	18	10	8	15	6	9
10	8	11	8	8	8	11	9	9	10	10	36	B	B	B	B	B	24	B	10	24	B	6	6	6
11	9	9	9	12	15	15	12	11	13	11	39	B	B	B	B	B	B	B	23	15	15	11	12	8
12	8	8	7	11	12	11	9	10	8	11	8	26	16	11	24	24	B	23	13	20	23	27	16	11
13	9	6	10	8	9	8	7	8	8	8	8	8	8	8	10	7	7	7	7	7	9	12	9	9
14	9	9	14	16	8	8	8	8	8	9	9	9	12	12	16	9	9	9	7	7	7	10	10	7
15	7	10	10	17	12	11	13	13	19	11	10	10	11	11	7	24	10	10	15	11	24	9	9	9
16	9	9	9	8	7	9	8	12	8	7	12	12	10	11	11	21	B	22	16	12	6	9	9	9
17	8	7	8	11	8	8	11	11	13	8	14	15	11	15	14	11	8	10	10	8	12	12	12	8
18	8	8	7	9	12	7	9	8	8	8	8	8	9	9	8	6	8	8	8	8	10	10	8	8
19	6	9	7	10	10	8	7	5	6	6	8	8	7	7	8	B	15	16	B	13	12	7	5	7
20	6	8	K 8	9	8	9	9	8	7	6	6	8	12	12	8	8	8	8	8	8	11	10	8	9
21	10	8	8	8	8	9	9	8	8	8	8	9	B	23	24	22	25	12	10	10	8	8	8	9
22	16	15	12	14	13	12	10	7	8	8	B	24	21	23	13	11	15	20	23	11	11	8	7	8
23	11	11	10	9	9	6	8	8	10	10	19	11	11	12	10	8	8	B	13	12	9	9	9	9
24	9	14	23	12	12	8	8	8	5	6	6	7	7	8	8	6	8	8	8	14	19	14	8	8
25	8	9	9	10	8	8	9	9	8	7	7	8	12	8	6	8	8	6	8	10	8	8	8	8
26	7	9	7	6	8	79	10	7	7	9	5	6	11	10	9	8	6	6	8	17	7	7	7	14
27	6	7	7	8	8	70	8	6	9	9	7	9	9	10	9	8	7	7	8	8	8	8	7	7
28	7	8	10	10	13	11	10	12	8	24	12	12	12	12	22	16	10	10	10	12	9	10	10	10
29	10	10	11	11	14	14	11	8	11	16	24	18	11	8	8	8	9	11	7	10	10	10	11	11
30	12	13	15	12	13	12	7	10	10	8	7	7	11	9	9	7	7	8	19	8	7	8	8	8
31	12	14	14	12	12	10	17	12	9	8	12	10	21	17	10	10	10	10	10	12	19	15	7	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	8	9	9	10	10	10	9	8	8	8	9	10	11	10	10	10	9	10	10	10	9	9	8	8
U Q	9	10	12	12	12	12	11	11	10	11	14	15	16	12	14	21	15	16	15	12	12	12	10	9
L Q	7	8	8	9	8	8	8	8	7	8	8	8	9	8	8	8	8	8	8	8	8	8	7	8

JUL.2019 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 2019 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	A	A	A	A	E A	224	222	A	A	198	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A	A	A	E A	226	198	218	E B	A	A	A	196	A	A	A
3	A	A	A	A	A	196	A	A	A	196	E A	224	196	196	196	200	A	A	A	A	A	A	A	
4	A	A	A	A	A	198	A	A	A	A	228	212	192	226	210	190	198	E A	244	A	A	A	A	
5	A	A	A	A	A	A	A	A	A	A	E A	214	194	240	198	198	210	204	A	A	A	A	A	
6	A	A	A	224	A	A	A	A	A	A	A	A	E A	220	204	226	188	A	A	A	A	A	A	
7	A	A	A	A	A	A	A	A	A	A	B	E B	E B	E B	204	204	A	A	A	A	A	A	A	
8	A	A	A	A	A	A	A	A	A	A	E A	E A	E A	E A	194	216	A	A	A	A	A	A	A	
9	A	A	A	A	A	A	A	A	A	A	E A	E A	B	E A	B	B	A	B	A	212	206	A	A	
10	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	E B	B	B	A	B	A	A	
11	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	A	A	A	A	A	
12	A	A	A	A	A	A	A	A	A	A	A	B	E A	E A	E A	230	206	230	B	A	A	A	A	
13	A	A	A	A	A	A	A	A	A	A	226	206	206	188	198	210	A	A	A	A	A	A	A	
14	A	A	A	A	A	A	A	A	A	A	228	200	192	192	200	204	192	A	A	A	A	A	A	
15	A	A	A	A	A	A	A	A	A	A	A	A	204	214	216	210	A	A	A	A	A	A	A	
16	A	A	A	A	A	A	A	A	A	A	204	218	236	220	236	216	B	A	A	A	A	A	A	
17	A	A	A	A	A	A	A	A	A	A	A	A	E A	224	206	216	210	184	A	A	A	A	A	
18	A	A	A	A	A	A	A	A	A	A	204	218	200	200	230	210	198	A	A	A	A	A	A	
19	A	A	A	A	A	A	A	A	A	A	E A	234	186	204	204	184	B	A	B	A	A	A	A	
20	196	A	A	A	A	A	196	212	A	A	200	232	190	228	198	198	208	A	A	A	A	A	A	
21	A	A	A	A	A	A	A	A	A	192	202	202	B	E B	E B	202	A	A	A	A	A	A	A	
22	A	A	A	A	A	A	A	A	A	186	A	B	248	E A	244	196	A	A	A	A	A	A	A	
23	A	A	A	A	A	A	A	A	A	A	A	A	214	200	200	188	196	260	B	A	A	A	A	
24	A	A	A	A	A	206	A	A	A	206	E A	248	210	198	196	180	192	194	E A	248	A	A	A	
25	204	A	196	A	A	A	A	A	A	196	242	272	204	196	194	200	214	198	A	A	A	A	A	
26	A	A	A	A	A	A	A	A	A	A	198	204	194	198	198	192	198	A	A	A	A	A	A	
27	A	A	A	A	A	A	202	202	A	A	194	E A	E A	216	E A	232	192	184	A	192	A	A	A	
28	A	A	A	A	A	A	A	A	A	A	192	E A	258	222	202	218	212	212	196	A	A	A	A	
29	A	A	A	A	A	A	A	A	A	A	E A	E A	E A	202	202	218	198	192	A	A	A	A	A	
30	A	A	A	A	A	A	A	A	A	E A	254	200	198	208	192	206	192	200	A	E A	240	A	A	
31	A	A	A	A	A	A	A	A	A	196	196	196	230	216	192	198	198	E B	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		3	2	3	2	6	17	26	26	28	29	26	17	1	4	3	2			2
MED	200		196	224		198	199	202	191	198	207	206	200	200	201	202	198	E B	236	222	205	201		202
U Q					206			212		242	241	222	230	219	222	212	206			E A	246	240		
L Q						196		192		196	200	204	198	198	198	196	193			196	198			

JUL. 2019 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2019 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	70	61	A	A	A	R	A	A	A	25	36	37	42	46	41	45	32	A	O	X	A	A	A	X	A
2	A	56	A	A	A	A	A	79	A	A	36	34	40	44	40	42	33	O	X	O	X	A	B	A	A
3	A	A	A	A	O	X	A	50	A	O	X	X	X	X	X	45	O	X	X	A	A	A	A	A	A
4	A	A	A	36	A	A	A	O	X	X	O	X	X	X	X	X	X	X	B	B	A	B	A	A	A
5	A	A	A	A	A	A	A	78	A	B	O	X	B	O	X	B	B	B	A	A	A	A	A	A	A
6	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	A	A	A	A	A	X	X
7	A	A	A	A	A	B	A	A	A	A	B	O	X	X	O	X	X	B	B	A	A	O	X	B	A
8	A	A	A	A	A	A	A	A	A	O	X	O	X	B	B	X	X	X	X	B	B	B	A	A	A
9	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	O	X	O	X	A	A	A
10	A	A	A	A	A	A	A	A	A	O	X	B	B	B	B	B	O	X	B	A	O	X	O	X	A
11	64	A	A	A	A	A	A	A	X	X	X	O	X	O	X	X	X	O	X	B	O	X	B	A	A
12	A	A	A	A	A	A	A	A	O	X	X	X	X	X	X	X	X	X	R	A	O	X	A	A	A
13	O	X	A	A	A	A	X	A	A	A	X	X	X	X	X	X	B	O	X	X	A	A	B	A	A
14	A	A	A	A	A	A	A	X	A	O	X	X	X	X	X	X	X	X	X	B	O	X	A	A	A
15	A	X	O	X	R	A	R	A	B	O	X	X	X	X	X	X	O	X	B	B	B	B	A	A	61
16	A	49	A	A	A	A	A	X	X	X	X	X	X	B	B	X	O	X	X	X	O	X	A	A	O
17	A	58	37	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	A	A	A	A	A	A
18	A	A	A	A	43	A	A	A	A	X	B	O	X	X	X	X	X	X	X	A	A	A	B	A	A
19	A	A	A	A	A	A	A	A	A	O	X	X	X	X	X	X	X	X	A	O	X	O	X	A	A
20	A	A	A	54	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A
21	A	A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	O	X	A	A	A
22	A	A	68	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X	A	A	X	A
23	83	A	A	A	A	A	40	A	A	A	X	X	X	O	X	X	X	X	X	O	X	O	X	A	A
24	A	A	A	A	A	A	A	A	A	O	X	X	X	X	X	X	X	X	X	X	A	A	A	A	X
25	A	A	37	A	63	A	A	A	A	A	A	A	X	X	X	X	X	X	X	O	X	A	O	X	A
26	A	A	46	A	A	A	44	32	33	37	39	46	52	47	44	B	X	O	X	B	B	A	B	A	A
27	66	A	A	A	A	A	A	A	A	A	A	X	X	X	X	B	B	B	B	A	A	A	A	A	A
28	51	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	O	X	A	A	A
29	A	A	A	A	37	A	A	A	X	X	X	X	X	X	X	X	X	X	X	O	X	B	A	A	A
30	57	59	59	A	40	44	A	A	X	X	X	O	X	X	X	X	X	O	X	X	O	X	A	A	A
31	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	A	A	R	55	A	A	78
	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	6	6	2	5	4	3	7	11	23	24	26	27	26	26	25	25	20	17	13	5	4	4	4	
MED	64	57	42	45	40	42	44	25	29	34	40	44	47	46	46	44	38	28	26	21	25	24	30	54	
U Q	70	59	59		53	45	50	78	33	38	42	46	49	49	50	48	42	32	29	25	46	30	32	70	
L Q	51	49	37		34	40	25	24	24	30	38	41	42	45	44	42	34	26	22	19	22	17	28	38	

AUG. 2019 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2019 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	R	A	A	A		19	29	31	36	40	35	39	26	A	A	A	A		A			
2	A	A	A	A	A	A	A	A	A	A		30	28	34	37	33	F 30	F 23	R 12	R 16	A	B	A	A	A		
3	A	A	A	A	26	A	A	A	A		22	33	35	40	38	34	F 31	R 26	15	A	A	A	A	A	A		
4	A	A	A	A	A	A	A	18	15	F 19	30	R 32	42	38	35	31	35	B	B	A	B	A	A	A			
5	A	A	A	A	A	A	A	A	A	B	R 35	B	22	B	B	B	B	A	A	A	A	A	A	A	A		
6	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	A	A	A	A	24	42	A		
7	A	A	A	A	A	B	A	A	A	A	B		32	40	41	42	35	B	B	A	A	R 18	B	A	A		
8	A	A	A	A	A	A	A	A	A		21	32	B	B	37	44	38	29	21	B	B	A	A	A	A		
9	A	A	A	A	A	A	A	A		15	26	36	V 37	43	39	39	39	26	21	R 21	14	A	A	A	A		
10	A	A	A	A	A	A	A	A	A		23	B	B	B	B	B	32	B	A		15	15	A	A	A	A	
11	A	A	A	A	A	A	A	A		18	25	32	39	34	42	44	42	30	B	25	B	A	A	A	A	A	
12	A	A	A	A	A	A	A	A	R 19	24	31	43	41	40	37	F 36	30	R	A	R 15	A	A	A	A	A	A	
13	R 28	A	A	A	A	40	A	A	A		23	33	F 32	36	34	39	B	24	19	A	A	A	B	A	A	A	
14	A	A	A	A	A	A	A	19	A	R 27	37	40	37	42	F 36	38	34	17	B	R 12	A	A	A	A	A	A	
15	A	23	19	R	A	A	A	A	B		32	41	41	F 37	42	45	34	26	B	B	B	B	A	A	A	A	
16	A	A	A	A	A	A	A	14	20	26	39	40	38			38	R 32	19	16	22	R	A	A	25	A	A	
17	A	A	A	A	A	A	A	A	A	A		36	34	F 43	43	45	50	F 29	22	22	A	A	A	A	A	A	
18	A	A	A	A	A	A	A	A	A		28	B	38	43	44	41	F 38	30	22	20	A	A	A	B	A	A	
19	A	A	A	A	A	A	A	A	A	R 30	35	38	37	40	47	F 40	29	20	A	R 12	15	R	A	A	A	A	
20	A	A	A	A	A	A	A	A		36	36	36	37	45	48	42	36	F 32	26	22	15	A	A	A	A	A	
21	A	A	A	A	A	A	A	A	A		28	34	35	40	42	42	40	33	24	16	R 12	A	A	A	A	A	
22	A	A	A	A	A	A	19	R 18	23	34	35	37	41	43	44	36	31	28	15	A	A	10	A	A	A	A	
23	A	A	A	A	A	A	A	A	A		34	F 33	38	41	35	39	36	F 30	22	25	19	A	A	A	A	A	
24	A	A	A	A	A	A	A	A	A	R 30	34	39	42	43	36	40	40	22	16	A	A	A	A	21	A	A	
25	A	A	A	A	A	A	A	A	F 22			44	42	40	38	37	34	28	17	16	A	12	R 11	A	A	A	
26	A	A	40	A	A	A	A	26	27	31	33	40	46	41	38		B	37	27	B	B	A	B	A	A	A	
27	A	A	A	A	A	A	A	A	A	A	A		36	36	39	F 41	B	B	B	B	A	A	A	A	A	A	A
28	A	A	A	A	A	A	A	A	A		28	30	34	35	39	38	37	37	26	22	21	R 19	A	A	A	A	
29	A	A	A	A	A	A	A	A		27	35	43	39	45	F 39	45	42	40	37	F 20	R 19	B	A	A	A	A	
30	A	A	A	A	A	A	A	A		29	F 33	37	R 41	43	48	42	44	34	36	24	R 18	A	A	A	A	A	
31	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	A	A	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	1	1	2		1	1	1	5	11	23	24	26	27	26	26	25	25	20	17	13	3	2	4	2			
MED	R 28	23	30		26	40	19	18	22	28	34	38	40	40	40	38	30	22	20	15	R 18	11	22	32			
U Q								22	27	32	36	40	43	42	44	40	34	26	22	19	R 19		24				
L Q								16	18	23	32	34	36	39	37	36	28	20	16	13	R 15		16				

AUG. 2019 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2019 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	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		38	42	53	51	52	54	48	35	60	51	G	35	45	30	G	G	17	44	55	54	48	56	22	39	51		
2		70	48	52	44	57	56	43	53	50	55	G	24	20	15	G	64	16	14	48	14	45	B	49	48	55		
3		101	52	45	35	69	57	57	54	59	25	E	18	18	48	26	49	25	G	54	38	58	39	41	46	30	59	
4		56	53	60	44	52	41	38	43	42	42	E	17	25	17	25	G	G	E	B	B	B	B	48	59	40		
5		50	51	49	56	48	48	36	48	62	B	B	B	G	B	B	B	B	B	B	46	63	35	56	44	44	70	
6		75	57	84	56	60	41	51	53	B	B	B	B	B	B	B	B	B	B	79	60	50	70	30	K	23	32	
7		36	54	52	53	56	B	54	48	57	56	B	31	26	28	E	B	E	B	B	B	B	B	B	56	51		
8		36	41	37	56	59	59	52	48	44	G	54	B	B	E	B	E	B	G	J	A	70	46	B	29	48	26	
9		32	46	53	45	44	39	97	52	46	12	G	19	22	22	E	B	E	B	G	56	48	50	53	53	46	46	46
10		48	38	95	57	62	58	48	58	47	35	50	B	B	B	B	E	B	B	B	24	20	54	52	52	46	30	
11		55	43	46	50	39	48	47	30	40	G	G	E	B	E	B	E	B	G	E	B	B	B	53	38	55	33	
12		38	41	34	37	52	52	54	44	46	12	18	22	22	G	36	20	16	G	22	31	22	22	41	58	30		
13		27	87	58	53	49	72	48	52	62	54	E	14	60	G	16	22	22	B	E	B	B	B	44	44	45		
14		40	40	45	53	48	49	49	53	54	42	53	26	26	G	27	23	23	G	23	53	B	50	22	47	35	49	
15		53	55	53	15	32	39	30	43	B	E	17	20	24	20	G	26	24	G	G	B	B	B	59	34	43	77	
16		46	28	51	51	52	44	54	30	14	30	19	G	E	B	B	B	E	B	B	G	33	48	31	30	31	29	
17		36	32	31	34	36	30	50	64	59	46	45	24	23	G	19	22	13	G	56	51	53	52	52	44	51	57	
18		57	59	53	48	36	51	58	49	32	G	B	E	B	E	B	B	G	G	52	50	51	54	43	28	B	31	
19		56	47	50	54	57	60	51	52	54	23	19	G	G	G	18	16	G	G	G	32	46	35	50	51	35	33	
20		58	53	42	46	46	41	41	41	46	59	20	G	G	G	37	24	G	G	G	E	B	B	7	26	46	55	47
21		35	35	46	54	58	48	37	32	56	52	28	22	21	G	26	20	G	48	35	33	34	52	43	32	48		
22		56	56	32	49	46	45	32	37	72	25	20	23	G	G	23	18	G	G	G	15	15	31	44	29	35	40	42
23		53	47	66	44	63	30	30	57	50	G	40	26	G	50	23	G	G	G	20	71	36	48	53	53	57		
24		32	37	58	58	50	47	41	41	40	46	20	23	28	29	20	G	23	57	54	44	42	30	51	44			
25		32	28	30	44	52	37	49	49	36	49	52	G	23	23	23	21	18	G	11	36	21	35	40	55	57		
26		43	49	35	55	58	55	32	46	47	G	22	24	24	22	E	B	B	E	B	B	B	50	B	31	96		
27		42	57	56	64	65	51	56	59	46	55	60	28	28	19	G	21	G	B	B	B	B	55	53	55	47	42	
28		39	39	68	59	55	58	81	47	56	27	22	22	22	22	G	20	20	G	14	14	28	53	53	33			
29		58	58	49	70	48	47	44	42	20	17	32	32	24	28	28	23	18	18	12	E	B	B	46	50	103		
30		42	32	51	35	33	31	49	42	66	16	G	E	B	E	B	B	G	E	B	E	B	E	B	48	47	55	48
31		51	82	100	63	56	54	68	61	49	B	B	B	B	B	B	B	B	B	B	38	43	23	43	43	50	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		31	31	31	31	31	30	31	31	29	28	27	26	27	26	26	25	25	26	25	27	27	28	30	31			
MED		46	47	51	51	52	48	49	48	49	28	24	25	24	25	23	G	G	36	46	39	48	44	48	46			
U Q		56	55	58	56	58	55	54	53	58	50	45	G	G	28	24	G	46	50	54	50	53	48	53	57			
L Q		36	39	45	44	46	41	41	42	43	G	E	B	G	G	21	18	18	20	26	23	30	34	39	33			

AUG. 2019 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2019 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	9	9	24	11	16	15	11	8	10	13	17	17	12	11	10	10	6	9	8	8	9	6	9
2	9	16	15	15	14	12	9	18	10	10	13	11	12	10	11	9	8	8	8	9	B	10	9	9
3	8	10	9	7	14	12	15	10	9	10	18	19	12	10	12	9	12	8	8	10	10	8	11	16
4	10	8	8	8	10	9	7	8	8	9	17	25	17	13	11	11	12	B	B	12	B	14	16	13
5	11	8	10	9	9	9	9	9	24	B	21	B	12	B	B	B	B	14	8	8	9	9	7	10
6	14	18	27	27	25	18	15	27	B	B	B	B	B	B	B	B	B	38	28	13	12	13	9	8
7	8	25	12	19	22	B	24	15	14	32	B	20	17	20	28	28	B	B	10	13	10	10	12	
8	10	8	10	14	15	17	20	8	10	11	16	B	B	21	15	12	10	10	B	B	B	11	9	8
9	9	8	8	8	10	10	8	8	7	6	11	12	15	21	21	12	16	8	10	12	11	10	7	10
10	6	10	16	13	15	21	14	15	11	13	37	B	B	B	B	26	B	10	10	24	14	28	21	10
11	14	12	12	16	16	13	11	8	6	11	11	28	28	24	12	10	20	B	16	B	10	8	9	9
12	9	12	10	10	14	14	15	10	7	6	10	10	14	15	14	11	8	15	12	11	10	10	10	10
13	6	10	10	11	12	12	11	14	12	9	14	11	12	10	12	B	17	12	13	11	9	8	10	
14	8	8	14	15	14	13	9	9	23	14	11	11	26	27	11	11	9	10	B	B	9	9	10	10
15	10	10	7	8	8	10	8	10	B	17	20	24	13	15	12	12	8	B	B	B	50	8	8	9
16	8	7	7	13	10	9	8	8	8	7	8	11	24	B	B	22	14	12	10	8	8	8	7	7
17	6	6	7	6	7	7	7	9	12	10	11	10	10	11	9	10	12	10	8	10	8	11	15	15
18	15	12	12	10	9	16	9	10	8	10	B	24	20	14	12	15	14	11	11	9	6	6	B	10
19	8	8	12	10	12	8	8	8	13	12	11	11	11	10	10	7	9	8	8	9	8	11	7	8
20	8	9	9	8	11	8	9	8	6	8	8	8	9	10	10	8	8	8	10	8	10	10	13	8
21	9	7	7	14	10	10	9	9	11	8	10	10	8	8	8	8	8	6	7	8	9	9	9	9
22	11	11	10	10	10	9	7	7	8	10	11	11	9	16	14	12	11	8	12	10	13	8	8	10
23	16	9	12	14	10	8	7	11	8	11	13	18	10	23	17	12	9	11	14	14	17	25	24	16
24	9	9	12	19	8	12	10	9	10	16	13	9	9	9	9	9	10	10	9	10	8	9	11	9
25	10	7	7	8	10	12	8	9	8	14	14	16	10	8	9	9	9	8	9	9	9	10	9	9
26	13	10	8	17	17	10	8	10	9	7	7	7	7	7	18	B	24	20	B	B	15	B	14	18
27	10	12	12	16	16	15	10	12	12	12	26	18	14	10	10	B	B	B	B	10	8	8	9	9
28	12	16	15	12	12	10	20	12	13	10	10	12	12	12	18	11	11	10	8	8	9	9	9	11
29	9	9	6	8	8	10	9	13	7	8	8	8	8	8	8	8	8	6	8	14	B	26	13	10
30	8	8	8	9	9	9	9	9	6	8	8	38	24	19	16	12	18	24	8	15	10	10	13	10
31	15	7	17	8	13	14	14	27	23	B	B	B	B	B	B	B	B	22	10	8	6	8	11	11
	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	11	11	12	9	10	10	10	13	16	13	14	12	12	12	11	10	10	10	10	9	10
U Q	11	12	12	15	14	14	14	12	13	14	20	25	24	23	18	26	20	24	16	14	14	13	13	11
L Q	8	8	8	8	10	9	8	8	8	8	10	11	10	10	10	9	9	8	8	9	8	8	8	9

AUG. 2019 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2019 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	202	A	A	A	A	E A 236	A	E A 226	E A 220	202	208	H 178	A	E A 256	A	A	A	A	202	A
2	A	A	A	A	A	A	A	A	A	A	E A 230	194	E A 216	206	194	198	206	192	210	A	B	A	A	A	A
3	A	A	A	A	A	A	A	A	A	E A 236	214	E B 222	E A 222	E A 222	A 206	206	198	226	A	A	A	A	A	A	A
4	A	A	A	A	A	A	A	202	198	220	204	E B 216	210	194	200	198	204	B	B	A	B	A	A	A	A
5	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	A	A	A	A	A	A	A	A
6	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	A	A	A	A	A	A	A
7	A	A	A	A	A	B	A	A	A	A	B	E A 272	E A 230	E A 218	E B 240	222		B	B	A	A		B	A	A
8	A	A	A	A	A	A	A	A	A	E A 298	A	B	B		226	202	192	E A 232	246	B	B	B	A	198	A
9	A	A	A	A	A	A	A	A	A	E A 266	216	192	210	E A 234	224	212	200	194		A	194	A	A	A	A
10	A	A	A	A	A	A	A	A	A	E A 288	B	B	B	B	B	E B 244	B	198	E A 252	E B 284	A	A	A	A	A
11	A	A	A	A	A	A	A	A	E A 294	E A 254	E A 244	E B 230	228	228	204	216	190	B	E B 220	B	A	A	A	A	A
12	A	A	A	A	A	A	A	A	E A 198	E A 234	224	212	206	202	200	194	194		A	A	194	A	A	A	A
13	208	A	A	A	A	228	A	A	E A 264	216	E A 216	190	202	202		B	218		A	A	A	A	B	A	A
14	A	A	A	A	A	A	A	230	E A 232	196	E B 228	222	222	190	200	210	192		B	E A 254	204	A	A	A	A
15	A	194	200	A	A	A	A	A	B	218	196	200	202	202	190	196	E A 208	B	B	B	B	B	A	A	A
16	A	A	A	A	A	A	A	198	E A 234	210	206	194	212		B	206	190	204	218	202		A	A	A	A
17	A	A	A	A	A	A	A	A	A	A	202	202	216	196	208	216	196	220	220	A	A	A	A	A	A
18	A	A	A	A	A	A	A	A	A	218		B	236	232	214	208	204	204	200	206	A	A	A	B	A
19	A	A	A	A	A	A	A	A	E A 256	198	204	192	192	210	196	198	204		A	E A 270	236	A	A	A	A
20	A	A	A	A	A	A	A	A	248	214	204	196	208	196	202	204	198	210	210	210		A	A	A	A
21	A		A	A	A	A	A	A	E A 276	204	206	202	202	202	202	196	208	206	228	A	A	A	A	A	A
22	A	A	A	A	A	A	206	A	E A 232	202	198	202	202	212	200	212	210	202	244	A	A	A	A	A	A
23	A	A	A	A	A	A	A	A	E A 236	E A 230	E A 242	E A 210	206	214	212	202	194	212	224	A	A	A	A	A	A
24	A	A	A	A	A	A	A	A	E A 254	210	220	206	206	198	190	196	196	256		A	A	A	A	A	200
25	A	A	A	A	A	A	A	A	A	A	E A 216		232	194	200	202	196	210	200	246	188		226	192	A
26	A	A	200	A	A	A	A	202	E A 228	200	200	200	200	190	190		B	E B 234	E B 228	B	B	A	A	A	A
27	A	A	A	A	A	A	A	A	A	A	A	240	230	208	224		B	B	B	B	A	A	A	A	A
28	A	A	A	A	A	A	A	A	E A 262	E A 246	192	192	202	206	206	212	212	236	192	206		A	A	A	A
29	A	A	A	A	A	A	A	A	E A 254	200	216	216	200	200	216	208	208	218	228	E A 240	B	A	A	A	A
30	A	A	A	A	A	A	A	A	206	206	198	B	E B 236	208	202	210	E B 228	210	210	E B 278	A	A	A	A	A
31	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	A	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	1	1	3			2	1	4	11	22	23	24	26	26	26	25	25	19	17	11	5	2	6	2	
MED	208	194	200			215	206	202	224	E A 233	201	204	206	204	202	204	201	203	219	208	205	216	200	203	
U Q			206					216	254	256	224	229	226	218	208	211	210	218	245	270	222		202		
L Q			200					200	206	214	198	201	202	200	200	196	196	198	210	194	201		196		

AUG. 2019 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 2019 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	59	B	A	A	B	B	B	B	B	B	B	B	B	B	B	A	A	A	A	113	A	
2	A	A	A	A	A	B	B	O X 47	B	A	B	B	B	B	B	B	B	O X 36	B	B	A	A	A	A	A
3	A	A	A	A	A	B	A	A	A	B	B	B	B	B	B	B	O X 41	B	B	B	A	A	A	O X 36	
4	A	A	A	A	A	A	A	A	B	B	O X 39	B	B	B	B	B	B	B	B	B	B	A	A	A	A
5	67	A	A	A	51	B	A	50	B	B	B	B	B	B	B	B	O X 48	O X 46	B	A	A	A	A	A	A
6	X 47	A	A	A	A	A	A	A	A	O X 37	B	B	B	X 43	X 42	B	O X 40	O X 37	O X 28	O X 25	O X 19	O X 44	O X 43		A
7	A	A	A	R	R	O X 30	A	A	O X 34	X 39	B	B	B	B	B	B	X 40	B	X 31	B		O X 29	O X 20	A	A
8	A	A	A	A	A	A	A	A	A	B	B	B	B	X 48	X 44	B	B	O X 36	O X 36	X 25	A	O X 24	A	A	A
9	A	A	A	A	A	68	A	A	A	A	B	B	B	O X 39	B	B	X 52	B	X 36	A	A	A	A	A	A
10	A	A	B	A	A	A	A	A	O X 40	A	B	R	X 40	A	X 46	X 44	X 44	O X 40	O X 29	B	O X 29	A	A	A	A
11	R	R	R	A	A	O X 24	X 24	X 33	X 39	X 40	X 47	X 54	X 56	X 50	X 53	X 48	X 46	X 42	X 32	X 25		A	A	A	A
12	A	A	A	O X 27	A	A	A	X 31	X 38	X 42	X 44	X 50	X 53	X 59	B	O X 52	O X 46	O X 43	O X 38	X 30	O X 23	A	A	A	A
13	A	A	A	O X 46	52	44	A	A	A	42	43	47	49	47	47	47	47	43	44	38	29	A	A	A	A
14	28	28	57	A	A	O X 36	X 26	X 36	B	B	X 39	X 49	X 54	X 54	X 50	X 49	X 47	X 42	X 40	X 34	O X 24	B	A	A	A
15	A	A	A	A	A	A	A	A	B	O X 39	46	47	51	54	56	48	46	43	42	33	34	A		91	A
16	A	A	A	A	A	A	B	A	A	B	O X 47	X 44	X 45	X 47	X 45	X 46	X 43	X 43	X 41	X 32	X 29	X 29	A	A	A
17	B	A	A	A	A	A	A	X 38	X 42	X 44	X 42	X 44	X 49	X 49	X 50	X 48	X 44	X 44	X 42	X 37	X 32	X 32	X 26	X 24	58
18	A	A	A	A	A	A	A	A	X 42	X 44	X 49	X 52	X 50	X 50	X 47	X 44					X 36	X 29	X 27	A	O X 27
19	52	41	88	A	42	A	B	O X 33	X 43	X 46	X 43	X 47	X 48	X 50	X 58	X 52	X 45	X 45	X 39	X 31		A	A	A	A
20	X 19	A	A	A	A	B	A	X 32	X 39	X 46	X 50	X 51	X 54	X 55	X 52	X 52	X 45	X 44	X 42	X 32	O X 24	X 24	R	B	A
21	A	53	65	A	A	A	O X 32	X 36	X 42	X 47	X 49	X 53	X 56	X 64	X 62	X 54	X 57	X 46	X 43	X 47		A	A	A	A
22	59	A	50	53	41	A	A	A	X 39	X 41	X 42	X 44	X 45	X 44	X 46	X 45	X 42	X 40	X 39	X 37	45	25	24	O X 24	R
23	O X 20	36	55	A	O X 33	36	O X 34	X 34	X 37	X 43	X 47	X 48	X 49	X 53	X 53	X 49	X 49	X 42	X 40	X 46	25	A	A	A	A
24	A	O X 25	49	O X 38	A	B	A	A	A	A	A	R	X 43	X 47	X 47	X 43	X 42	X 44	X 44	X 40		A	A	A	X 40
25	A	89	80	49	A	O X 70	O X 46	O X 41	O X 45	X 38	X 40	X 41	X 49	X 52	X 52	X 49	X 46	X 45	X 39	X 42	X 28	X 23	B	A	A
26	46	56	A	A	55	A	A	X 38	X 38	X 38	X 38	X 42	X 46	X 50	X 46	X 45	X 47	X 47	X 41	X 38	X 38	X 29	X 22	O X 17	A
27	A	X 18	X 44	X 34	X 40	X 30	X 36	X 40	X 46	X 45	X 45	X 49	X 55	X 54	X 51	X 53	X 51	X 52	X 44	A	A	78	62	A	A
28	A	A	A	A	50	32	X 32	B	B	B	B	B	B	B	B	B	B	B	B	O X 39	O X 34	O X 19	R	A	A
29	A	A	A	B	A	A	A	B	B	B	B	B	B	B	B	B	B	B	X 46	X 42	X 37	R	A	A	A
30	A	A	69	B	A	A	A	51	A	B	B	B	B	B	B	B	B	X 45	X 46	R	O X 29	O X 20	A	O X 28	O X 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	9	7	8	9	6	14	14	15	18	16	18	20	19	18	23	23	22	22	15	9	8	7	
MED	46	38	57	46	46	36	33	37	40	42	44	48	49	50	50	48	45	43	39	32	28	27	26	O X 36	
U Q	56	54	74	53	52	56	36	41	42	45	47	50	54	54	53	52	47	46	42	37	32	36	52	58	
L Q	X 24	X 26	50	X 34	X 40	O X 30	X 26	X 33	X 38	X 39	X 40	X 44	X 46	X 47	X 46	X 45	X 43	X 42	X 37	X 29	X 23	X 24	X 23	X 27	

SEP. 2019 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 2019 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	B	A	A	B	B	B	B	B	B	B	B	B	B	B	A	A	A	A	A	A
2	A	A	A	A	A	B	B	41	B	A	B	B	B	B	B	B	B	30	B	B	A	A	A	A
3	A	A	A	A	A	B	A	A	A	B	B	B	B	B	B	B	34	B	B	B	A	A	A	R 30
4	A	A	A	A	A	A	A	A	B	B	33	B	B	B	B	B	B	B	B	B	B	A	A	A
5	A	A	A	A	A	B	A	A	B	B	B	B	B	B	B	B	42	40		B	A	A	A	A
6	42	A	A	A	A	A	A	A	A	B	R 31	B	B	37	36	B	34	31	22	19	13	38	A	A
7	A	A	A	A	R	A	A	24	28	33	B	B	B	B	B	B	34	B	25	B	A	A	14	A
8	A	A	A	A	A	A	A	A	A	B	B	B	B	42	38	B	B	30	30	19	A	18	A	A
9	A	A	A	A	A	F 37	A	A	A	A	B	B	B	33	B	B	46	B	30	A	A	A	A	A
10	A	A	B	A	A	A	A	A	R 34	B	B	R	34	A	40	38	38	34	B	23	A	A	A	A
11	R	R	A	A	A	R 18	18	27	33	34	41	48	50	44	47	42	F 40	36	26	19	R	A	A	A
12	A	A	A	R 21	A	A	A	25	32	36	38	44	47	53	R B	46	40	37	32	24	R 17	A	A	A
13	A	A	A	40	A	R 38	A	A	A	36	37	41	43	41	41	41	37	38	32	23	A	A	A	A
14	A	22	A	A	A	A	20	30	B	B	33	43	42	F 43	F 44	43	41	36	34	28	18	B	A	A
15	A	A	A	A	A	A	A	A	B	33	40	41	45	48	50	42	40	37	36	27	15	A	A	A
16	A	A	A	A	B	B	B	A	A	B	R 41	38	39	41	39	40	37	37	35	25	23	23	A	A
17	B	A	A	A	A	A	A	32	36	38	36	38	43	43	H 44	42	38	36	31	26	26	20	18	A
18	A	A	A	A	A	A	A	A	36	38	43	46	44	44	41	38	B	B	B	30	23	21	A	R 21
19	A	A	A	A	A	A	B	B 27	37	40	37	41	42	44	52	46	39	39	33	25	A	A	A	A
20	13	A	A	A	A	B	A	26	33	40	44	45	48	49	46	46	39	38	36	26	18	R	B	A
21	A	A	A	A	A	A	R 26	30	36	41	43	47	50	51	F 56	48	51	40	37	36	F	A	A	A
22	A	A	A	A	A	A	A	A	33	35	36	38	39	38	40	39	36	34	33	31	F 27	19	18	R
23	14	A	A	A	U 27	R 28	A	28	28	31	37	41	42	43	47	47	43	43	36	34	30	19	A	B
24	A	19	A	R 32	A	B	A	A	A	A	A	A	A	R 37	41	41	37	36	38	38	34	F	A	A
25	A	A	F 30	F 26	A	A	R 40	R 35	39	32	34	35	43	46	46	43	40	39	33	31	F	22	17	B
26	A	R 46	A	A	A	A	A	32	32	32	32	36	40	43	40	39	41	41	35	32	F 27	F 18	F 15	11
27	A	12	38	28	34	24	30	34	40	39	39	43	49	48	45	47	45	46	38	A	A	A	A	A
28	A	A	A	A	A	B	B	26	B	B	B	B	B	B	B	B	B	B	B	33	28	13	R	A
29	A	A	A	B	A	A	A	B	B	B	B	B	B	B	B	B	B	B	40	36	31	A	A	A
30	A	A	A	B	A	B	A	A	A	B	B	B	B	B	B	B	39	40	A	23	14	A	R 22	R 24
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	4	2	5	2	6	6	12	14	15	18	16	18	20	19	18	23	23	22	22	14	8	5	5
MED	14	20	34	28	30	25	27	30	34	36	38	42	43	44	44	42	39	37	33	26	18	20	18	R 24
U Q	42	34		36		37	30	33	36	39	41	44	47	48	47	46	41	40	36	31	23	22	20	R 32
L Q	13	16		24		24	20	27	32	33	34	38	40	41	40	39	37	36	31	23	15	18	14	16

## IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 2019 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	50	57	52	44	B	50	53	B	B	B	B	B	B	B	B	B	B	B	40	47	44	52	101	104		
2	68	39	82	52	54	47	50	34	B	56	B	B	B	B	B	B	B	26	B	B	52	52	52	84		
3	60	47	43	66	58	B	53	47	48	B	B	B	B	B	B	B	B	25	B	B	32	33	44	34 <sup>K</sup>		
4	42	38	63	46	70	65	52	46	B	B	27	B	B	B	B	B	B	B	B	B	B	35	48	47		
5	46	52	44	44	50	B	60	48	B	B	B	B	B	B	B	B	B	25	B	B	52	52	52	50	43	
6	40	49	45	95	56	46	57	47	57	54	51	B	B	24	31	B	B	21	16	59	56	45	34	49		
7	52	44	49	35	32	46	48	36	57	G	B	B	B	B	B	B	B	24	B	18	33	32	41	48		
8	30	96	57	49	68	55	52	39	46	B	B	B	B	25	24	B	B	23	17	14	44	31	28	50		
9	46	48	80	48	54	54	59	59	51	59	B	B	B	24	B	B	G	B	G	48	45	36	36	59		
10	32	42	55	48	52	48	31	28	G	G	41	B	26	26	105	36	G	24	24	15	51	45	33	26		
11	25	25	28	60	35	22	29	14	16	25	G	B	24	24	24	21	22	18	18	17	47	28	38	31	32	
12	44	45	42	32	46	56	32	G	G	17	21	16	24	46	G	G	35	29	27	41	31	33	30	41	49	
13	46	39	40	36	45	22	46	49	51	B	B	24	26	24	G	G	G	20	19	15	16	32	59	21	30	
14	27	27	23	57	55	52	40	47	B	B	25	27	G	24	24	G	B	G	22	13	14	14		29	28	
15	39	42	56	50	53	50	45	52	B	G	33	G	B	26	G	G	23	21	23	19	17	10	52	38	44	45
16	36	47	52	53	56	54	B	44	52	B	B	38	G	G	G	G	G	22	18	14	14	9	19	41	44	
17	53	47	46	58	53	56	36	G	G	54	G	G	G	19	24	23	20	20	16	16	12	12	12	29	34	
18	47	92	61	58	58	52	52	44	G	G	28	35	26	24	23	20	B	B	B	22	17	86	32	29		
19	52	34	43	46	43	50	B	40	32	22	G	G	24	21	18	G	21	21	21	12	14	52	48	46	42	
20	45	29	46	52	67	46	54	56	G	G	23	27	G	G	G	G	G	21	17	17	14	21		44		
21	48	44	44	46	47	45	33	45	23	G	B	33	26	G	G	G	G	21	24	18	18	41	41	41	38	
22	43	87	40	40	69	57	55	46	50	50	G	G	24	21	24	29	21	21	15	20	20	13	17	16	16	
23	46	30	35	52	38	26	G	20	20	23	24	28	28	G	28	23	20	20	G	G	43	34	43	50		
24	62	47	32	59	61	B	58	64	58	58	58	36	G	G	G	23	G	18	G	18	44	46	40	47		
25	70	77	31	21	52	33	33	17	G	24	26	35	27	36	36	29	G	G	G	G	18	30		33		
26	39	48	48	48	28	52	36	G	54	22	56	G	G	26	26	26	G	24	20	20	19	15	10	30	39	
27	48	44	32	32	54	28	18	56	B	B	22	G	26	28	28	24	24	23	20	32	43	44	68	34	120	
28	62	96	62	36	27	26	47	B	B	B	B	B	B	B	B	B	B	B	B	28	19	10	12	33	51	
29	53	57	68	B	32	43	36	B	B	B	B	B	B	B	B	B	B	B	24	22	18	32	41	82	49	
30	49	68	53	53	32	71	49	42	52	B	B	B	B	B	B	B	B	22	24	38	40	10	24	30	35	
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	29	27	28	27	22	20	19	18	18	21	19	18	23	23	24	26	29	29	28	30		
MED	46	47	46	48	53	50	48	44	47	22	G	G	G	G	G	G	20	21	19	18	33	36	38	44		
U Q	52	57	56	55	57	54	53	48	52	46	33	27	26	26	28	23	24	24	21	40	44	47	44	49		
L Q	40	39	40	42	40	43	G	G	G	G	26	26	24	G	B	G	G	19	16	15	14	27	30	34		

SEP. 2019 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 2019 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	7	12	13	9	B	14	14		B	B	B	B	B	B	B	B	B	B	8	10	8	13	123	8	
2	10	9	12	22	22	40	34	23	B	37	B	B	B	B	B	B	B	26	B	B	10	8	11	8	
3	24	17	21	20	24	B	13	19	18	B	B	B	B	B	B	B	25	B	B	B	11	12	7	9	
4	8	19	10	12	8	8	10	14	B	B	27	B	B	B	B	B	B	B	B	B	B	9	10	11	
5	14	8	9	12	19	B	18	26	B	B	B	B	B	B	B	B	36	23	B	19	28	16	8	7	
6	9	12	12	16	14	12	11	11	20	40	26	B	B	24	31	B	26	21	16	12	9	7	7	7	
7	6	10	10	12	11	9	9	17	14	15	B	B	B	B	B	B	24	B	18	B	8	8	7	9	
8	7	11	10	16	14	24	16	12	14	B	B	B	B	25	24	B	B	23	17	14	10	7	6	8	
9	8	12	10	18	22	10	24	13	12	22	B	B	B	24	B	B	17	B	10	14	7	7	8	9	
10	11	8	39	9	12	12	12	10	10	34	B	15	12	12	24	15	24	24	B	15	11	10	8	8	
11	8	9	8	10	12	8	8	9	10	12	13	22	24	14	21	22	13	11	17	10	14	10	9	6	
12	7	9	9	10	13	15	12	10	12	14	14	12	14	46	B	35	29	27	12	10	7	6	7	7	
13	7	9	11	10	10	10	10	13	16	16	24	26	23	19	19	18	12	12	15	8	7	13	9	8	
14	8	8	8	9	8	9	9	17	B	B	25	16	20	10	24	14	14	22	13	14	12	B	10	8	
15	9	14	13	16	16	16	10	22	B	20	23	18	26	18	23	21	23	19	17	10	9	8	10	10	
16	10	18	18	21	30	28	B	24	22	B	38	15	16	14	14	14	22	18	13	14	9	6	10	10	
17	27	14	11	10	24	12	11	9	8	8	12	8	10	10	11	11	11	16	16	12	10	9	9	14	
18	11	15	15	22	16	25	16	13	10	12	28	35	25	24	24	20	B	B	B	22	12	9	9	7	
19	7	8	15	74	13	14	B	20	16	16	15	15	24	14	12	12	13	11	12	14	14	12	10	8	
20	9	8	8	20	14	36	22	12	11	16	16	23	17	17	15	13	13	13	17	12	14	9	B	16	
21	14	10	10	8	13	12	10	11	11	11	33	25	17	17	12	12	21	24	18	18	14	8	10	12	
22	12	12	15	15	21	14	14	11	20	20	23	12	12	14	10	10	10	16	8	10	13	9	9	10	
23	10	8	10	10	8	8	8	8	12	12	10	10	10	12	15	23	20	13	11	7	7	8	34	22	
24	15	10	8	11	13	B	25	16	13	20	19	17	20	23	18	23	14	10	11	18	8	8	8	9	
25	12	9	9	8	7	9	10	7	12	13	14	14	14	36	36	29	19	19	12	12	10	11	B	9	
26	9	19	12	12	12	14	13	13	10	12	12	12	12	12	11	11	11	10	7	7	7	10	10	11	
27	12	10	8	9	8	8	8	10	11	11	11	13	12	12	11	12	10	10	11	6	8	11	12	12	
28	12	10	13	9	10	8	37	B	B	B	B	B	B	B	B	B	B	B	20	10	10	7	9	14	
29	14	20	8	B	16	16	17	B	B	B	B	B	B	B	B	B	B	24	22	18	9	7	20	14	
30	13	9	26	37	18	38	24	16	22	B	B	B	B	B	B	B	22	24	15	13	7	7	7	6	
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	10	12	14	14	13	13	15	20	26	24	24	24	24	23	22	22	16	14	10	9	9	9	
U Q	12	14	13	20	19	25	22	20	B	B	B	B	B	B	B	B	36	27	20	18	12	11	10	11	
L Q	8	9	9	10	11	9	10	11	11	13	15	15	14	14	15	14	13	13	12	10	8	7	8	8	

SEP. 2019 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 2019 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	B	A	A	B	B	B	B	B	B	B	B	B	B	B	A	A	A	A	A	A
2	A	A	A	A	A	B	B	204	B	B	B	B	B	B	B	B	B	B	B	B	A	A	A	A
3	A	A	A	A	A	B	A	A	A	B	B	B	B	B	B	B	232	B	B	B	A	A	A	214
4	A	A	A	A	A	A	A	A	B	B	E B 260	B	B	B	B	B	B	B	B	B	B	A	A	A
5	A	A	A	A	A	B	A	A	B	B	B	B	B	B	B	B	E B 294	222	B	A	A	A	A	A
6	222	A	A	A	A	A	A	A	B	B	B	B	B	234	296	B	E B 234	E B 232	E B 260	E B 238	E B 260	188	A	A
7	A	A	A	A	A	196	A	A	E A 290	226	B	B	B	B	B	B	236	B	E B 238	B	A	A	198	A
8	A	A	A	A	A	A	A	A	A	B	B	B	B	226	242	B	B	E B 242	E B 242	E B 310	A	A	214	A
9	A	A	A	A	A	220	A	A	A	A	B	B	E B 220	B	B	B	E A 272	A	E A 260	A	A	A	A	A
10	A	A	B	A	A	A	A	A	252	B	B	E A 234	E A 230	108	218	218	236	222	B	A	A	A	A	A
11	A	A	A	A	A	A	E A 200	E A 222	204	202	218	218	210	196	206	186	202	212	212	230	E B	A	A	A
12	A	A	A	A	A	A	A	A	H	186	206	208	202	198	B	E B 252	E B 234	E B 226	E B 222	E B 232	E A 276	A	A	A
13	A	A	A	A	A	196	A	A	A	228	222	222	214	198	224	206	198	214	216	236	A	A	A	A
14	A	A	A	A	A	A	E A 238	A	B	E B 222	E B 222	E B 234	204	204	200	200	216	216	216	242	234	B	A	A
15	A	A	A	A	A	A	A	A	B	E A 302	234	206	224	202	202	208	206	228	E B 224	212	E B 254	A	A	A
16	A	A	A	A	B	B	B	A	A	B	B	202	204	200	200	214	214	222	220	220	E A 242	A	A	A
17	B	A	A	A	A	A	E A 248	E A 202	202	196	196	204	204	204	204	A	208	212	204	216	E A 218	E A 228	E A 238	A
18	A	A	A	A	A	A	A	A	A	230	240	B	220	214	206	198	B	B	B	E B 238	E B 212	E B 264	A	A
19	A	A	A	A	A	A	B	E B 304	238	198	198	200	202	202	202	196	202	206	206	206	A	A	A	A
20	E B 314	A	A	A	A	B	E A 260	E A 216	E A 208	198	202	208	198	206	204	198	198	198	208	234	A	A	B	A
21	A	A	A	A	A	A	A	A	296	246	218	B	202	204	204	206	206	234	234	228	228	A	A	A
22	A	A	A	A	A	A	A	A	E A 256	E A 232	E A 232	208	194	204	236	194	204	190	212	E A 220	E A 218	E A 278	E A 260	A
23	A	A	190	A	208	E A 242	E A 220	E A 208	220	220	200	200	212	212	198	190	200	202	202	230	A	A	B	A
24	A	196	A	A	A	B	A	A	A	A	A	A	210	236	200	190	208	232	216	240	A	A	A	224
25	A	A	198	204	A	A	A	248	222	196	196	194	202	B	B	B	224	208	204	228	E B 228	E B 262	B	A
26	228	A	A	A	A	A	A	244	196	216	194	196	204	202	202	194	210	198	200	210	A	A	A	A
27	A	E A 240	198	196	A	246	202	204	202	194	198	216	202	196	210	210	216	E A 310	A	A	A	A	A	A
28	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	E A 270	E A 270	E B 250	A	A	A
29	A	A	A	B	A	A	A	B	B	B	B	B	B	B	B	B	B	E B 234	E B 220	E B 220	A	A	A	A
30	A	A	A	B	A	B	A	A	A	B	B	B	B	B	B	B	E B 232	E B 256	A	E A 300	E A 352	A	A	198
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	3	3	2	4	2	11	13	15	15	16	18	19	18	17	23	22	22	22	14	8	4	3
MED	216	210	194	204	202	198	244	E A 244	210	211	208	202	205	203	206	202	210	216	211	221	224	247	234	214
U Q	271	324	240	206		210		E A 260	249	228	232	213	216	214	218	209	234	232	238	238	254	271	264	224
L Q	208	196	190	198		196		220	203	202	196	199	202	200	202	195	204	208	206	216	218	221	218	198

SEP. 2019 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 2019 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	79	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	O	X	X	X	O	X	O	X	A	
2	A	O	X		A	A	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	O	X	O	X	A	
3	A	A	A	A	A	A	X	X	X	X	X	A	X	X	X	X	X	X	X	X	X	X	O	X	A	A	
4	25	A	A	A	A	A	X	X	X	X	B	X	X	X	X	X	X	X	X	X	X	R	R	A	X		
5	26	A	R	X	A	A	O	X	X	X	O	X	X	X	X	X	X	X	X	X	X	X	A	A	A		
6	A	A	A	48	35	72	A	A	O	X	O	X	O	X	O	X	O	X	X	X	X	O	X	O	X	A	
7	X	23	64	A	40	35	40	42	46	46	47	48	48	51	55	51	49	49	46	46	X	X	A	A	A		
8	50	A	81	A	A	A	O	X	A	X	X	X	X	46	50	52	49	46	47	43	38	43	29	X	39		
9	A	A	A	A	A	A	A	A	A	R	X	X	X	X	X	X	B	O	X	B	X	O	X	B	A	A	
10	49	56	A	A	A	X	X	X	X	R	X	O	X	X	O	X	B	X	X	O	X	X	A	A	X	26	
11	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A	
12	A	A	A	A	A	A	A	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	
13	O	X	A	X	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	
14	29	24	22	48	24	50	50	49	46	51	53	53	50	51	52	49	53	50	44	44	X	F	O	X	A	A	
15	A	46	A	46	A	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30	
16	O	X	44	20	45	46	45	54	55	54	41	43	42	50	48	48	48	47	48	46	44	46	45	41	33	A	
17	A	A	A	49	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	29	
18	A	41	A	A	B	X	X	B	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
19	A	A	O	X	A	A	X	48	46	46	46	46	46	42	48	50	52	47	50	54	51	43	33	A	A	A	
20	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	A	A
21	A	A	A	35	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30	
22	51	54	29	31	35	40	45	48	50	48	48	48	48	49	50	50	49	48	45	44	43	46	42	X	58		
23	O	X	25	38	41	40	44	44	45	46	48	48	48	49	51	48	50	47	45	46	46	39	34	37	25		
24	A	41	26	40	46	45	46	54	50	48	50	51	54	55	B	X	73	70	54	48	A	A	A	A	49		
25	A	80	B	B	A	49	B	B	A	A	B	B	B	B	B	B	B	B	O	X	47	A	A	A	A	A	
26	A	A	A	A	A	A	B	A	A	A	B	B	B	B	B	B	B	B	O	X	A	X	X	A	A	A	
27	60	B	A	R	B	B	A	B	R	B	B	B	B	X	B	B	B	B	O	X	O	X	X	A	A	A	
28	A	B	A	R	A	A	B	X	X	B	B	B	B	46	51	B	B	B	O	X	O	X	A	A	A	56	
29	A	A	A	B	B	46	B	A	A	X	X	B	X	X	X	X	X	X	X	X	X	X	A	A	A	A	
30	A	A	A	A	45	48	53	47	47	48	46	46	48	49	49	51	46	44	40	36	82	O	X	63	52	A	
31	A	A	75	89	89	60	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	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	12	11	10	12	8	16	19	21	24	25	26	23	27	28	24	26	25	29	29	27	28	18	14	13			
MED	46	41	41	44	42	44	42	42	42	44	45	47	48	50	50	49	48	46	43	41	37	34	34	34			
U Q	54	56	45	48	46	50	46	46	46	48	47	48	49	51	52	50	50	48	46	44	44	42	41	41	46		
L Q	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	30	

## IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 2019 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

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		A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B		34	32	30	25	18	15	A
2		A	R 22	A	A	A	28	34	36	38	40	40	39	42	42	43	42	44	41	35	B	26	26	F B	A	
3		A	A	A	A	A	A	32	32	34	36	38	B	44	50	48	45	42	39	37	31	26	20	A	A	
4		A	A	A	A	A	A	33	37	40	41	42	B	47	48	45	43	44	48	40	40	R	A	A	31	
5		A	A	A	27	A	A	R 32	30	38	42	38	41	42	44	46	42	44	44	37	37	27	A	A	A	
6		A	A	A	A	A	B	A	A	34	38	42	41	44	46	47	44	41	42	37	37	28	23	F A	24	
7	17		A	A	A	A	29	34	36	40	40	41	42	42	45	49	45	43	43	40	40	18	A	A	A	
8		A	A	A	A	A	A	36	A	34	36	38	38	40	44	46	43	40	41	37	32	F 29	23	A	A	
9		A	A	A	A	A	A	A	A	A	R	40	41	43	49	50	50	B	36	B	33	26	B	A	A	
10		A	A	A	A	A	28	28	30	29	50	R 36	34	36	35	B	37	36	36	33	A	20	A	A	22	
11		A	A	A	A	A	A	32	34	33	34	38	40	42	45	45	41	41	41	40	25	26	A	A	A	
12		A	A	A	A	A	A	A	R 33	33	33	38	40	40	40	41	41	39	37	36	32	28	22	16	A	
13	R 20		A	28	A	A	A	36	39	38	38	38	40	41	44	44	42	42	40	38	35	F 29	F 24	F 22	F 21	
14	F 17	18	16		A	18	F 36	44	43	40	42	47	47	44	45	46	43	47	44	38	38	26	21	A	A	
15		A	A	A	A	A	R 23	33	31	33	33	36	35	35	37	39	41	39	39	37	32	F 28	28	F 20	F 20	
16		19	R 14	F 30	F 28	F 28	F 41	49	48	35	37	36	44	42	42	42	41	42	40	38	40	34	35	27	A	
17		A	A	A	A	A	A	A	A	33	34	38	41	41	43	44	44	44	42	42	34	32	F 32	F 19	F 19	
18		A	A	A	A	B	32	36	B	A	38	41	44	42	44	44	41	40	40	36	34	36	F 27	A	36	
19		A	A	R 38	A	A	32	F 38	40	40	40	40	36	42	44	46	41	44	48	45	36	27	A	A	A	
20		A	A	A	A	A	A	35	32	33	37	40	42	42	44	42	43	40	40	37	F 35	F 29	27	A	A	
21		A	A	A	F 23	A	A	A	34	39	34	34	36	36	38	42	40	38	36	35	35	32	29	28	F 17	
22		A	23	23	25	29	34	39	42	44	42	42	42	43	44	44	43	42	39	38	37	F 35	36	A	A	
23		A	19	A	35	29	38	38	R 39	40	42	42	42	43	45	42	44	41	39	40	40	33	28	31	19	
24		A	F 12	F 10	34	F 33	39	40	F 44	44	42	44	45	48	49	B	67	64	48	42	A	20	A	A	F 36	
25		A	F 70	B	B	A	A	B	B	A	A	B	B	B	B	B	B	B	B	41	A	A	A	A	A	
26		A	A	A	A	A	A	B	A	A	A	B	B	B	B	B	B	B	32	A	26	26	A	A	A	
27		A	B	A	A	B	B	A	B	R	B	B	B	B	46	B	B	B	36	33	34	27	A	A	A	
28		A	B	A	A	A	A	B	32	33	B	B	B	40	45	B	B	B	34	28	A	A	A	A	A	
29		A	A	A	B	B	33	B	A	A	36	36	B	42	42	42	43	42	40	41	40	33	A	A	A	
30		A	A	A	A	Z 39	R 32	38	41	41	42	40	40	42	43	43	45	40	38	34	30	A	57	A	A	
31		A	A	A	28	A	31	A	34	34	34	36	36	40	35	39	37	38	37	37	37	34	28	21	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	7	6	7	6	14	19	21	24	25	26	23	27	28	24	26	25	29	29	27	27	18	11	10	
MED		18	19	26	28	29	32	36	36	36	38	39	41	42	44	44	43	42	40	37	35	28	27	22	22	
U Q		20	23	30	34	33	36	38	40	40	42	41	42	43	45	46	44	44	44	42	40	37	32	29	27	31
L Q		17	14	16	25	28	29	33	32	33	35	38	38	40	42	42	41	40	37	36	32	26	23	19	19	

OCT. 2019 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 2019 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	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
1		52	71	39	54	50	55		B	B	B	B	B	B	B	B	B	B	E	B	E	B	22	22	18	49	49	
2		44	45	47	50	57	32	21	58	59	66	G	26	E	B	17	21	21	79	G	E	B	24	B	E	B	46	
3		36	58	48	46	49	41	53		G	52	25	100	92	E	B	29	27	27	E	B	E	B	E	B	27		
4		20	39	50	47	55	42	51	22	19	G	28		B	E	B	26	24	G	G		19	19	29	38	42	46	
5		25	58	32	21	34	50	29	G	54	G	47		G		36	28	28	E	B	E	B	E	B	E	B	32	
6		67	57	49	32	31	81	48	51	31	50	30	G	39	G		G	E	B	E	B	E	B	E	B	53		
7		44	39	46	48	34		19	G	G	G	26		G		26	31	27	27	26	24	18	36	51	40	60	53	
8		38	56	62	58	56	55	26	34	61	G	G	E	B	26	31	29	28	28	23		G	G		E	B	38	
9		24	34	48	55	55	55	110	48	46	39	36		G	E	B	E	B	E	B	B	E	B	B		49	39	
10		34	35	80	44	32	14	G	G	G	G	E	B	38	48	24	29	30		E	B	E	B	G	G	42		
11		51	49	58	71	42	34		G	G	G	45		G	G	G	G	G	G	G	G	G	19	19	33	39	34	
12		36	50	48	50	42	38	E	B	49	41	24		G	G	G	G	G	G	E	B	G	16	16	44	33	33	
13		33	43	43	42	46	42	33	25	25	G		27	30	28	28	26	22	22	18	15	14	14	E	B	12		
14		10	13	31	34	53		G	G	G	26	32	28	28	30		26	26	24	23		14	15	14	39	41		
15		55	38	64	29	51	46	22		G	48	20	17	27	27	16	16		G	18		21	22	16	13	E	B	12
16		12	59	47	26	17	23	22	22	51	51	32	31	27	31	27	27	30	32	22		G	12	12	16	38		
17		37	41	48	33	44	52	54	55	30	27		G	32	G	33		G	28	19	16	G	E	B	E	B	13	
18		27	30	43	49	B	38	21	G	B	51	43	33	34		G	G	36	26	60	G	20		E	B	34		
19		69	42	34	51	82	23	21	23		G	G	66	G	24	31	27	G	G	G	G	40	21	42	53	53		
20		46	34	43	44	54	50	32	45	55	29		G	15	G	22	27	27	22		G	G		25	19	41	41	
21		70	59	67	46	53	62	53	45		G	28	30	30	30	33	28		G	G	G	G	15	15	12	K	19	
22		29	25	27	16	20	30	27	23	28	30	29	34	18		G	27	27	31	18	21	12	15	37	91	35		
23		33	30	32	42	22		G	24	24		G	28	66	30	32	29	27		G	G	G	13		58	K	12	
24		27	25	34	G	24	24	21	E	B	31		G	27	29	29		B	E	B	E	B	61	41	64	39	36	
25		51	72	B	B	54	39		B	B	58	53		B	B	B	B	B	B	B	B		52	43	44	92		
26		55	89	51	54	46	56		B	52	47	46		B	B	B	B	B	B	B	B	28	47	56	19	46	52	121
27		35	B	43	34		B	53		B	30		B	B	B	E	B	B	B	B	E	B	E	B	E	B	47	
28		44	B	43	41	G	48		B	44	47		B	B	E	B	E	B	B	B	B	E	B	E	B	40	40	
29		52	52	67	B	B		B	51	58	50	50		B	B	B	B	B	B	B	B	23	33	37	46	46	46	
30		46	46	46	70	23		G	38	27		G	G	35	G	30	30	29		G	G	G	35	54	53	46	46	
31		51	57	40	A	33	24	44	46		G	G		26	31	36	36	36	27	50		G	G	22	10	14	14	24
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT		31	29	30	28	28	30	26	27	30	28	26	24	27	28	24	26	25	30	30	30	31	30	30	31			
MED		38	45	46	45	45	38		G	27	30	E	G	28		G	E	G	E	G	E	G	G	17		38	40	39
U Q		51	58	50	50	54	50	48	49	51	46	33	33	30	31		G	27	28	24	21	33	29	44	49	46		
L Q		29	34	40	34	32	G	22	G	G	G	G	G		G	G	G	G	G	G	G	G	15	14	24	32		

OCT. 2019 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

OCT.2019 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	19	10	10	7	13	26	B	B	B	B	B	B	B	B	B	B	B	25	20	11	12	12	10	9
2	6	7	7	24	20	13	12	13	12	12	15	14	26	17	14	14	26	14	24	B	16	28	B	8
3	8	15	14	15	21	26	14	12	12	13	13	40	35	25	22	12	24	20	21	14	10	8	8	8
4	8	8	16	25	18	11	14	11	11	11	16	B	30	23	16	12	11	9	10	8	13	9	9	10
5	9	6	9	9	20	20	14	12	12	15	14	19	19	14	30	34	22	23	12	13	7	9	8	8
6	18	17	17	10	10	37	12	14	11	16	21	14	12	20	38	35	31	24	15	16	23	12	10	10
7	12	9	15	12	14	10	10	10	10	10	10	11	11	22	18	15	13	8	10	9	6	8	14	14
8	11	21	14	23	14	11	10	8	8	10	14	26	27	20	12	11	8	11	10	8	8	9	7	6
9	7	12	16	14	9	16	8	24	26	22	18	19	17	26	38	24	B	24	B	14	16	B	18	10
10	8	10	10	12	8	8	8	10	10	38	14	31	25	24	B	16	24	24	10	8	10	8	6	7
11	8	19	19	29	16	12	9	11	11	12	17	16	11	15	15	15	12	10	10	11	6	6	8	6
12	10	14	17	18	14	13	26	12	14	12	12	12	11	12	17	14	17	21	13	9	14	11	8	7
13	8	8	11	12	13	13	10	10	10	10	10	10	10	12	10	10	10	9	9	9	8	8	9	7
14	8	7	9	9	11	11	8	8	8	26	13	14	25	10	12	9	9	11	7	7	6	9	9	9
15	18	8	10	8	18	10	8	8	8	8	8	8	8	10	7	8	9	9	9	8	6	7	9	9
16	7	8	9	11	9	10	7	9	13	11	12	10	10	11	11	11	15	10	12	8	8	6	8	8
17	8	10	14	12	15	12	24	14	12	11	11	10	12	13	10	11	11	14	17	14	12	12	9	9
18	9	8	8	18	B	12	10	B	20	16	12	14	11	22	21	12	9	11	8	12	11	14	9	10
19	11	17	11	18	16	10	10	9	8	8	10	10	8	8	8	12	12	12	11	9	8	8	15	15
20	15	15	11	11	11	10	8	10	9	9	11	11	11	11	10	9	7	10	8	10	12	10	7	9
21	9	15	15	10	14	20	10	14	9	8	8	8	10	10	8	8	8	9	8	8	8	8	10	8
22	8	7	8	8	9	10	9	9	8	9	7	8	10	12	10	8	8	10	6	8	7	9	6	9
23	8	8	8	8	9	8	9	9	8	8	8	8	8	8	8	8	9	8	10	7	8	7	7	9
24	8	8	8	7	8	8	8	25	20	15	13	11	8	11	B	26	26	21	10	8	12	8	8	7
25	7	10	B	B	13	14	B	B	38	38	B	B	B	B	B	B	B	31	12	12	8	8	9	17
26	16	10	17	12	23	24	B	18	24	28	B	B	B	B	B	B	B	12	10	10	10	12	10	11
27	9	B	24	26	B	B	31	B	23	B	B	B	B	42	B	B	B	24	24	24	10	8	9	16
28	9	B	15	23	17	24	B	15	15	B	B	B	32	28	B	B	B	26	15	8	10	14	24	
29	9	12	27	B	B	16	B	24	17	14	14	B	23	21	16	9	10	10	9	15	12	11	10	13
30	13	10	14	20	10	15	13	11	10	10	10	10	10	10	10	10	9	9	20	9	10	10	9	8
31	9	9	9	7	11	8	9	12	9	8	8	8	10	7	9	11	11	11	9	10	10	9	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	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	9	10	14	12	14	12	10	12	11	12	13	14	12	15	16	12	12	11	10	10	10	9	9	9
U Q	11	15	16	23	18	20	24	18	17	22	17	40	27	24	38	26	26	23	17	14	12	11	10	10
L Q	8	8	9	9	10	10	9	10	9	10	10	10	10	11	10	10	9	10	9	8	8	8	8	8

OCT.2019 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

OCT.2019 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

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	B	B	B	B	B	B	B	B	B	B	B	E	E	E	E	A	A	A	A				
2	A	202	214	A	A	A	260	204	204	200	208	198	194	178	180	190	236	228	238	B	262	262	326	A					
3	A	A	A	A	A	A	A	196	214	214	192	H	B	A	202	200	200	224	220	216	218	E	A	A	A				
4	A	A	A	A	A	A	E	A	A	H	202	202	B	B	G	196	210	210	202	E	A	A	A	A					
5	A	A	A	A	A	A	A	A	A	230	200	190	198	202	202	202	B	B	200	222	218	212	226	A	A				
6	A	A	A	A	A	B	A	A	204	194	210	210	206	198	B	B	232	222	204	218	E	B	B	A					
7	268	A	A	A	A	A	E	A	228	218	202	208	196	196	188	194	218	188	H	E	A	A	A	A					
8	A	A	A	A	A	A	A	A	186	198	198	208	218	202	216	216	196	202	214	214	230	A	E	B	A				
9	A	A	A	A	A	A	A	A	A	A	234	216	198	198	B	214	B	B	B	E	A	E	B	A	A				
10	A	A	A	A	A	A	A	A	E	B	E	A	250	226	196	200	B	204	222	242	160	A	A	A	200				
11	A	A	A	A	A	A	A	H	202	182	200	200	192	188	206	226	210	210	206	212	188	202	238	A	A				
12	A	A	A	A	A	A	A	A	272	186	198	180	H	206	190	208	220	202	210	204	E	A	E	A	A				
13	208	A	226	A	A	A	E	A	258	208	198	188	204	204	196	208	196	204	204	198	202	216	214	196	226	250			
14	242	272	292	560	A	A	A	A	204	192	196	236	200	200	230	194	198	198	198	208	196	214	244	310	A	A			
15	A	A	A	A	A	A	A	A	252	210	198	188	204	182	196	200	200	200	192	192	204	194	222	222	E	B	230		
16	230	A	208	196	202	202	216	216	E	A	226	228	198	194	200	200	210	182	202	204	220	202	210	202	238	A			
17	A	A	A	A	A	A	A	A	192	178	H	214	198	208	198	218	206	206	200	208	234	234	278	E	B	280			
18	A	A	A	A	B	A	232	B	A	A	224	206	206	206	206	196	196	196	200	218	194	E	E	A	A	A			
19	A	A	194	A	A	A	674	226	198	206	202	198	184	192	192	196	208	208	214	214	218	244	A	A	A	A			
20	A	A	A	A	A	A	A	A	226	190	198	206	202	206	196	208	208	208	198	218	218	E	A	E	A	A	A		
21	A	A	E	A	A	A	A	A	222	194	178	184	184	196	196	206	206	206	206	204	198	228	130	240	E	A	256		
22	A	A	210	210	230	A	230	206	196	206	204	204	198	196	196	208	200	194	208	198	230	240	A	A	A	A			
23	200	A	194	E	A	214	220	206	206	200	200	198	190	208	202	202	202	210	210	200	186	E	A	214	236	A			
24	A	236	268	268	242	224	208	E	B	200	200	202	190	200	180	H	B	224	222	224	220	A	204	A	A	260			
25	A	236	B	B	A	A	B	B	A	B	B	B	B	B	B	B	B	B	B	B	A	A	A	A	A	A			
26	A	A	A	A	A	A	B	A	A	A	B	B	B	B	B	B	B	E	A	A	E	A	200	A	A	A	A		
27	A	B	A	A	B	B	A	B	A	B	B	B	B	B	B	B	B	B	E	B	E	B	E	B	E	B	A	A	A
28	A	B	A	A	A	A	B	E	A	B	B	B	E	B	250	218	B	B	B	B	218	200	A	A	A	A	A	A	
29	A	A	A	B	B	A	B	A	A	200	192	B	208	208	196	H	196	200	220	238	A	A	A	A	A	A	A	A	
30	A	A	A	A	A	A	A	A	204	216	196	198	198	198	222	204	218	218	218	216	E	B	A	A	A	A	A	A	
31	A	A	A	A	A	A	A	A	204	196	196	190	190	206	196	188	H	212	202	202	206	206	198	208	260	E	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	5	7	7	4	5	15	20	23	24	26	23	26	25	21	24	25	29	29	24	26	18	11	8					
MED	236	236	214	203	226	214	224	208	200	199	198	198	200	200	202	207	202	208	210	210	222	221	240	236					
U Q	255	254	268	274	250	449	258	217	206	204	204	206	206	207	209	213	209	224	220	219	244	254	278	258					
L Q	219	201	208	196	216	203	216	202	196	193	196	190	196	195	196	199	200	202	203	202	204	208	230	230					

OCT.2019 h'F (KM)

## IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 2019 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 38	A	A	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	X 35	X 34	X 37	48	48	46	46	49	49	49	50	50	50	50	52	47	47	46	44	47	46	42	40	40
3	X <sup>0</sup> 30	X <sup>0</sup> 33	X <sup>0</sup> 44	A	A	A	X	51	58	54	48	50	50	51	55	52	52	48	46	45	42	44	48	48
4	58	50	X <sup>0</sup> 38	X	53	47	48	X	58	64	54	52	52	54	56	56	X	52	49	48	X	45	49	49
5	42	70	55	57	59	100	55	52	66	57	53	55	53	49	48	50	48	48	48	44	38	38	42	A
6	A	A	A	A	A	A	A	X	47	50	49	50	51	52	51	51	51	49	48	52	43	40	38	30
7	X 25	A	A	A	A	A	A	A	49	53	51	50	50	50	50	48	48	46	46	43	43	43	42	42
8	X 32	A	X 35	42	47	48	49	55	52	49	50	50	51	55	52	50	48	48	48	46	45	52	38	A
9	A	A	X 33	A	A	A	A	X	50	49	50	46	49	50	52	52	48	53	47	46	46	44	47	50
10	X <sup>0</sup> 37	X <sup>0</sup> 41	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
11	X 57	56	56	48	50	57	54	52	50	56	59	57	57	58	60	66	77	71	A	78	92	A	A	130
12	78	A	A	A	A	A	A	X	47	52	46	47	47	49	50	48	47	49	45	44	42	42	42	44
13	X 42	X 41	X 43	X 45	X 48	X 49	X 48	X 51	X 54	X 51	X 52	X 54	X 50	X 50	X 52	X 49	X 49	X 48	X 47	X 44	X 42	X 42	X 44	X 46
14	X 40	A	A	X 42	A	A	A	X	48	51	50	51	49	49	49	48	46	47	46	45	42	42	43	43
15	50	44	46	48	51	52	54	56	58	54	53	54	55	54	54	52	49	48	48	43	42	42	41	38
16	41	52	X 39	X 40	88	96	58	52	55	54	56	55	57	54	58	56	54	50	50	50	44	37	A	X
17	X 37	61	57	A	A	A	A	A	X	51	51	50	50	50	52	52	50	48	44	44	44	42	40	36
18	X 46	A	X 38	X 43	X 48	X 56	X 58	X 63	X 60	X 61	X 61	X 60	X 54	X 54	X 51	A	49	48	49	45	44	46	47	47
19	47	51	X 42	X 49	X 53	X 54	X 57	X 55	X 56	X 53	X 52	X 52	X 58	X 55	X 52	X 50	X 46	X 48	X 48	X 46	X 47	X 47	X 47	X 49
20	49	45	X 44	X 48	50	71	54	53	61	63	56	53	55	A	X	56	54	49	50	51	47	44	46	46
21	X 42	59	X 42	A	A	64	62	64	68	68	57	57	59	60	59	59	57	51	48	46	39	A	A	A
22	X 47	A	A	A <sup>0</sup> 34	X 34	A	A	A	X	49	43	48	50	50	54	B	64	55	49	51	38	40	37	A
23	A	49	A	A	X 44	78	A	A	X	53	53	46	56	55	66	X <sup>0</sup> 65	X <sup>0</sup> 49	X <sup>0</sup> 41	X <sup>0</sup> 44	A	A	A	A	A
24	X 52	A	A	X 40	B	A <sup>0</sup> 56	X 56	A	A	B	X	45	48	52	52	X <sup>0</sup> 52	X <sup>0</sup> 50	X <sup>0</sup> 53	X <sup>0</sup> 41	X <sup>0</sup> 44	R	X	X	X
25	A	A	A	A	A	X	X	X	X	X	X <sup>0</sup> 50	X	X	X	X	X	X	X	X	X	X	X	X	X
26	X 46	X 42	X 51	A	46	54	56	62	58	56	56	54	54	53	49	46	49	47	47	46	46	45	50	44
27	X 39	X 42	X 45	X 48	X 51	X 54	X 58	X 60	X 64	X 64	X 57	X 60	X 58	X 60	X 60	X 60	A	X	X	X	X <sup>0</sup> 47	X 37	X 36	A
28	48	44	X 44	X 44	A <sup>0</sup> 47	X 47	X 49	X 51	X 51	X 51	X 51	X 54	X 52	X 52	X 52	X 52	X 50	X 50	X 50	X 48	X 48	X 44	X 44	X 34
29	X 38	X 40	X 48	X 43	48	55	56	57	56	50	50	52	53	54	52	53	48	50	51	48	48	42	33	46
30	A	80	A <sup>0</sup> 43	X 43	A	A	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	24	19	20	16	16	18	21	25	29	29	29	30	30	29	29	29	29	30	29	29	28	27	25	24
MED	X 42	X 45	X 44	X 44	X 49	X 54	X 54	X 52	X 53	X 52	X 51	X 52	X 52	X 53	X 52	X 52	X 49	X 48	X 48	X 46	X 44	X 43	X 43	X 44
U Q	48	56	47	48	52	64	56	58	58	55	54	55	55	56	56	56	52	50	49	48	46	46	48	46
L Q	X 38	X 41	X 38	X 42	X 48	X 49	X 50	X 50	X 50	X 50	X 50	X 50	X 50	X 50	X 50	X 48	X 48	X 47	X 46	X 44	X 42	X 42	X 40	X 40

NOV. 2019 f<sub>XI</sub> (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 2019 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

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		A	A	32	A	A	A	A	39	44	44	43	38	40	40	41	41	41	39	39	36	36	34	34	31	
2		29	28	24	F	F	F	40	40	43	43	43	44	44	44	46	41	41	40	38	41	40	36	36	F	
3		24	R	38	A	A	A	46	44	F	F	42	42	44	44	45	49	45	46	42	40	39	36	38	42	
4		F	F	44	32	36	37	41	42	F	F	52	48	46	46	48	50	50	50	46	46	43	42	39	F	
5		F	A	F	F	31	53	A	F	F	F	51	47	49	47	42	42	44	42	42	42	38	32	F	R	
6		A	A	A	A	A	A	A	41	44	43	43	45	46	45	45	45	45	43	42	46	37	34	32	Z	
7		19	A	A	A	A	A	A	A	F	F	43	43	45	44	44	44	44	42	42	40	40	37	37	F	
8		26	A	29	F	30	41	42	43	49	46	43	44	44	45	49	46	44	42	42	42	40	39	36	32	
9		A	A	27	A	A	A	A	44	43	44	40	43	44	46	46	42	47	41	40	40	38	F	F	F	
10		31	35	A	A	A	42	44	46	49	46	46	50	54	51	44	45	43	40	40	41	36	43	44	F	
11		51	F	F	F	42	44	51	48	46	44	45	F	F	F	54	60	71	F	A	A	A	A	A	A	
12		A	A	A	A	A	A	A	41	F	F	40	41	41	43	44	42	40	43	39	38	36	36	36	38	
13		36	35	37	39	42	43	42	45	48	45	46	48	44	44	46	43	43	42	41	38	36	36	38	40	
14		34	A	A	36	A	A	A	42	45	44	45	43	43	43	44	42	40	41	40	39	36	36	36	37	
15		37	38	F	42	45	46	48	50	52	48	47	48	49	48	48	46	43	42	42	37	36	36	F	F	
16		F	F	34	33	34	A	39	46	49	48	50	49	F	48	48	52	50	48	44	44	44	F	A	30	
17		31	A	A	A	A	A	A	45	45	44	44	44	44	46	46	46	44	A	R	38	38	35	35	34	
18		40	A	32	37	42	50	52	57	54	55	55	54	48	48	45	A	41	42	43	39	38	40	41	F	
19		F	F	29	36	34	47	48	51	49	50	47	46	46	52	49	46	44	40	42	42	40	41	41	F	
20		F	F	39	32	34	F	F	F	F	F	50	47	49	A	50	48	43	44	45	41	38	40	37	40	
21		36	A	36	A	A	F	F	49	56	57	62	53	51	48	53	54	53	53	51	45	42	40	33	A	
22		41	A	A	A	28	A	A	A	43	37	42	44	44	44	48	B	F	52	49	43	45	32	34	31	
23		A	A	A	A	38	F	A	A	47	F	40	50	49	F	53	60	59	43	35	33	A	A	A	A	
24		46	A	A	34	B	A	A	50	A	A	B	39	42	46	46	46	46	44	47	35	38	R	37	32	
25		A	A	A	A	A	44	50	48	47	47	44	46	48	51	54	52	48	43	43	40	38	38	36	37	
26		40	36	34	A	32	48	50	56	F	F	50	50	48	48	47	43	40	43	A	41	41	40	40	39	
27		33	36	39	42	45	F	48	43	F	F	54	54	52	51	54	52	54	54	54	46	43	44	41	31	
28		A	38	38	A	A	A	41	43	45	45	45	48	46	46	46	46	46	44	44	44	42	42	38	A	
29		32	34	Z	37	F	F	49	50	51	50	44	44	46	47	48	46	47	42	44	45	42	V	36	27	
30		A	A	A	37	A	A	A	44	46	47	46	46	45	43	45	47	43	40	41	41	43	43	38	36	
31																										
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT		22	14	19	16	15	17	20	25	29	29	29	30	30	29	29	29	29	30	29	28	27	27	24	23	
MED		34	36	34	36	41	46	47	46	47	45	45	46	46	47	46	45	43	42	42	40	37	36	36	35	
U Q		40	38	38	38	45	49	50	50	50	48	47	48	49	50	50	50	46	44	43	41	40	38	38	38	
L Q		28	34	32	F	38	42	43	44	44	44	44	44	44	44	44	42	42	41	40	38	36	35	32	30	

NOV. 2019 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 2019 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	68	38	38	45	46	44	42	46	35	32	G	28	33	29	28	27	24	24	30	30	33	51	14	E B 9						
2	16	15	92	G	18	G	G	G	26	25	G	30	28	20	28	33	26	G	59	G	20	57	G	59	14					
3	19	31	38	46	54	57	42	28	26	32	32	32	31	31	31	28	33	24	17	G	20	16	20	15	11					
4	11	K	44	30	29	36	40	38	G	G	G	30	30	33	30	36	36	G	25	G	20	14	G	14	58					
5	31	35	38	29	48	60	56	G	29	29	29	29	29	29	29	29	24	G	G	18	18	30	30	37	40					
6	44	59	52	85	65	56	53	37	25	32	G	G	29	32	32	G	G	G	G	23	20	17	G	13	14					
7	14	42	80	58	56	60	57	55	41	G	30	29	29	29	G	60	26	G	G	23	23	19	19	19	12					
8	14	45	35	26	20	20	21	24	26	54	30	47	46	32	71	24	G	G	58	21	21	21	G	G	41					
9	59	40	34	56	48	52	53	18	29	29	29	30	G	G	G	G	G	G	G	24	23	18	20	20	16					
10	16	78	57	47	50	30	21	28	30	G	G	30	G	G	G	30	28	G	28	28	31	31	17	G	17					
11	15	38	23	14	18	20	28	56	42	G	29	29	36	G	G	E B 38	E B 27	G	48	48	48	54	47	46						
12	42	58	51	55	46	50	50	G	G	31	28	29	51	G	90	28	27	27	27	20	20	35	20	30						
13	30	58	21	28	27	20	23	28	35	36	31	44	67	41	32	30	30	30	29	35	32	32	22	29						
14	14	54	42	24	72	55	44	26	28	32	29	33	G	28	28	38	G	G	G	20	G	17	26	12						
15	G	G	14	17	20	20	22	24	G	G	80	29	40	43	31	31	34	34	18	G	16	21	16	16	33					
16	15	19	21	34	40	50	51	29	20	G	30	30	30	39	37	31	26	G	G	26	22	36	39	42	32					
17	60	52	43	62	55	53	56	37	40	32	70	32	40	33	38	58	42	G	G	22	13	18	18	16	G					
18	34	50	37	26	32	25	22	22	30	27	32	32	32	44	71	61	58	32	58	54	51	26	20	33						
19	33	46	62	28	25	25	44	27	39	39	29	32	36	36	56	60	55	28	58	33	23	27	27	G						
20	20	17	20	19	16	22	24	45	30	27	28	34	34	84	49	41	39	33	32	34	30	19	36	23						
21	35	40	66	66	51	42	18	26	28	39	33	33	42	57	40	35	40	58	40	25	25	A	50	55						
22	41	51	67	50	48	58	60	51	30	28	31	31	G	31	B E 29	B E 29	G	G	35	21	28	40	66	58						
23	53	53	61	52	51	54	81	51	46	34	31	25	31	37	119	E B 40	E B 37	E B 28	E B 26	E B 42	76	46	55	40						
24	40	69	45	32	116	48	31	58	66	53	B	55	30	G	42	40	23	E B 29	E B 32	E B 28	31	G	41	46						
25	38	52	53	48	42	29	29	43	36	30	30	E B 42	E B 38	G	26	29	32	28	G	E B 24	G	22	G	21	15					
26	19	18	29	58	57	25	119	29	29	29	32	32	28	31	22	30	22	G	28	G	12	20	132	53	15					
27	15	45	105	29	27	46	32	28	32	32	31	33	33	34	26	64	94	28	20	23	G	E B 21	31	56						
28	38	38	71	56	59	55	G	26	26	33	30	31	34	31	31	31	27	34	26	33	21	20	32	G						
29	17	21	28	29	32	22	26	26	27	28	32	34	33	44	34	26	53	24	43	23	21	19	G	36						
30	53	59	70	33	47	51	35	27	27	30	30	30	53	57	36	28	40	32	34	28	26	25	20	20						
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	29	30	30	30	29	30	30	30	30	30	30	29	30	30						
MED	30	44	44	34	46	45	38	G	29	30	30	32	32	31	G	30	27	25	26	23	22	20	24	22						
U Q	41	53	62	55	54	54	53	43	35	33	31	33	38	37	41	40	39	30	32	31	31	34	41	40						
L Q	15	31	34	28	27	25	26	26	26	27	29	29	G	G	G	30	28	G	G	G	20	20	16	16	G					

NOV. 2019 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

NOV.2019 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	10	11	13	12	12	21	12	11	12	11	11	11	11	9	8	10	8	8	8	8	8	7	9	
2	7	7	8	8	8	8	12	12	14	12	10	10	10	10	12	12	12	8	12	10	10	8	8	8	
3	8	16	19	15	15	15	8	8	8	8	8	8	8	8	8	8	10	6	10	8	8	8	6	5	
4	6	6	9	8	6	8	8	8	10	11	11	11	9	11	9	9	9	17	10	12	11	8	7	8	
5	7	8	8	5	9	9	11	11	9	9	9	7	10	8	8	8	8	8	8	8	12	7	8	10	
6	10	15	55	14	24	18	10	10	9	9	9	9	9	11	11	11	11	9	8	10	8	8	5	7	
7	7	9	9	13	12	12	12	11	12	12	14	11	11	8	8	15	12	11	10	10	7	7	6	6	
8	6	7	6	10	9	10	8	8	8	8	8	9	9	9	8	11	11	11	9	9	12	8	8	10	
9	14	10	9	15	15	13	8	8	9	9	8	11	11	12	11	10	10	9	11	11	12	9	9	8	
10	6	10	12	12	12	8	8	8	7	10	8	9	11	11	11	12	11	13	13	8	11	8	8	8	
11	11	9	8	8	7	10	10	16	14	10	10	10	10	10	10	38	27	21	21	11	12	12	12	12	
12	12	16	14	14	11	11	10	8	8	8	8	8	8	11	11	9	12	9	8	8	8	6	7	8	
13	6	7	6	7	7	7	7	7	8	7	9	10	10	11	11	11	9	5	5	7	8	8	6	6	
14	6	14	8	7	15	15	11	8	8	8	10	8	8	10	6	9	10	10	7	7	7	7	8	7	
15	7	8	6	5	8	6	7	9	9	8	8	9	10	8	8	8	8	9	8	9	8	7	7	8	
16	6	6	9	8	8	13	10	8	7	10	11	8	8	8	12	10	10	8	8	8	8	9	8	7	
17	10	12	11	12	12	12	16	10	24	13	10	10	10	10	10	10	11	10	8	8	8	7	8	8	
18	8	26	11	10	8	8	8	7	8	8	9	9	10	11	10	9	10	8	6	9	8	8	7	8	
19	6	6	7	8	8	8	9	8	8	8	8	10	11	10	10	11	11	8	9	9	7	8	8	7	
20	7	6	8	9	8	7	7	21	8	10	8	8	9	9	9	8	7	8	11	8	8	8	6	7	
21	7	10	10	7	12	7	10	10	7	14	13	9	9	9	8	8	8	8	8	20	8	8	11	8	
22	8	12	22	23	8	23	14	10	8	8	22	23	27	20	B	29	17	24	9	12	9	8	8	26	
23	20	8	13	13	11	24	24	10	17	14	11	14	23	18	40	40	37	28	26	8	8	9	11	17	
24	11	18	8	8	93	11	23	27	14	24	B	26	20	24	42	40	17	29	32	28	21	8	7	10	
25	9	135	23	32	9	10	10	10	12	14	14	42	38	22	16	22	23	22	24	13	12	12	10	8	
26	8	6	9	15	10	8	9	7	11	11	9	9	9	14	11	14	10	10	14	8	8	7	9	9	
27	8	8	8	7	12	10	10	7	7	7	8	12	8	9	15	21	13	15	9	8	16	21	7	16	
28	6	8	10	23	14	11	10	10	10	8	8	8	10	10	10	8	6	6	8	8	9	9	7	7	
29	8	8	11	9	8	8	8	8	8	8	8	8	8	8	8	8	12	11	11	8	8	8	8	8	
30	9	25	22	20	23	14	11	7	6	9	12	13	10	10	10	10	10	10	8	8	7	7	8	8	
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	9	9	10	10	10	10	8	8	9	9	10	10	10	10	10	10	10	9	8	8	8	8	8	
U Q	10	14	12	14	12	13	11	10	11	12	11	11	11	11	11	14	12	13	11	10	11	8	8	9	
L Q	6	7	8	8	8	8	8	8	8	8	8	8	9	9	8	8	10	8	8	8	8	7	7	7	

NOV.2019 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 2019 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

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		A	A	A	A	A	A	A																			
2		256	260	250	250	216	216	198	228	190	198	192	192	186	196	188	198	198	198	200	214	200	206	206	214	228	228
3		252	194							216	192	186	188	204	210	202	202	202	188	188	202	202	208	208	230	220	
4		246	232	254	234		206	226	218	196	188	196	196	196	196	200	204	204	202	216	208	212	238	216	246		
5		282						276	226	192	180	204	204	190	190	190	210	208	202	198	202	268	258	226			
6										194	186	180	188	210	200	200	200	178	204	204	204	204	204	228	240	252	
7		272								192	184	210	198	186	186	200	200	200	202	198	198	208	208	208	264		
8		254		372		222	196	196	188	188	188	192			218	206	192	194	190	192	210	210	200	230			
9									198	186	198	186	206	190	184	192	186	198	198	198	206	206	226	222	230		
10		252					216	196	186	198	206	198	198	190	196	196	198	208	196	206	220	214	214	242	220		
11		220	246	246	218	200	218	218	204	218	196	206	200	186	186	216		230	230						230		
12									204	204	198	206	198	224	214	214	214	198	204	198	198	220	260	228	234		
13		250	304	256	256	248	222	206	208	200	200	208	198	204	236	210	204	204	194	194	194	236	226	236	238		
14		254							210	194	186	202	186	190	198	198	200	200	194	196	198	192	244	222	242		
15		248	250		248	220	208	204	204	204	200	202	202	202	198	198	200	190	198	198	198	198	224	260	274		
16		264	270	292	280		198		204	198	196	188	198	194	196	208	204	196	208	202	202	244	286				
17		306											208	226	196	226	206	204	204	198	200	200	208	210	230	228	240
18		286																									
19		268	290	256	244	230	230	212	202	184	202	202	202	202	208	200	200	200	206	208	208	226	220	236	204		
20		240	244	268	244	202	204	216	204	200	196	196	196	194		298	214	200	190	200	208	212	220	242	218		
21		248					206	202	202	192	208	206	196	200	312	196	196	206	206		202						
22																											
23						196																					
24		196																									
25																											
26		240																									
27		220	236	236																							
28		300																									
29		218																									
30			198																								
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		21	12	10	11	11	15	18	24	27	29	29	27	28	28	26	26	28	29	26	28	25	26	23	21		
MED		249	222	255	248	221	207	207	204	196	196	196	198	199	198	200	200	200	202	200	204	207	214	228	224		
UQ		266	280	268	264	234	218	226	217	202	202	206	204	209	211	206	204	206	206	206	208	215	230	236	244		
LQ		240	234	246	234	202	204	202	199	192	187	188	196	190	195	196	198	198	197	198	200	202	210	222	218		

NOV. 2019 h'F (KM)

# IONOSPHERIC DATA STATION SHOWA-ST.

DEC.2019 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	73	A	80	A	A	A	52	59	60	57	52	54	52	50	50	52	49	50	52	47	49	48	B	C		
2	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	50	50	47	48	45	47	49	48	44	44	
3	52	52	50	45	55	60	68	66	61	56	54	51	53	51	51	49	50	48	48	47	44	46	44	40	40	
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	X	
5	36	39	39	54	54	59	51	54	53	53	54	54	53	A	X	X	X	X	X	X	X	X	X	X	X	
6	X	X	X	X	45	54	54	A	X	X	60	63	59	57	56	58	52	52	51	53	45	52	49	46	45	40
7	X	36	57	46	A	X	X	X	X	X	X	X	X	X	X	A	X	X	X	X	X	X	X	X	X	
8	X	52	48	40	46	50	58	54	59	57	54	52	56	57	57	55	49	47	51	47	46	44	46	48	67	
9	A	A	A	A	A	A	A	A	A	50	52	49	52	53	53	54	52	51	48	48	48	46	45	45	42	X
10	X	56	67	77	53	55	58	60	54	57	63	55	55	56	57	55	57	52	53	53	49	45	47	45	41	X
11	X	43	45	A	X	X	A	A	A	56	56	52	54	47	52	52	53	51	51	48	43	43	43	43	41	X
12	X	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
13	44	42	42	46	57	A	A	51	49	51	48	48	50	52	52	49	49	48	47	47	44	43	42	42	42	X
14	X	X	X	X	50	50	54	51	61	62	56	54	49	48	53	52	55	51	51	48	48	48	47	44	45	X
15	X	43	42	A	A	A	49	44	53	56	56	55	49	46	50	47	51	56	55	55	46	44	42	52	52	X
16	X	55	A	A	A	X	X	X	X	X	X	X	X	X	A	A	A	A	A	A	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	X	X
18	X	42	45	47	45	47	A	A	51	55	56	57	52	55	58	52	50	44	49	49	38	48	63	A	A	
19	60	42	42	A	91	40	X	A	A	93	A	X	A	X	X	X	X	X	X	X	X	X	X	X	X	A
20	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
21	X	A	45	43	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22	X	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
23	58	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
24	X	40	44	42	A	A	53	57	58	58	54	55	52	53	51	52	52	46	50	49	50	50	45	46	45	45
25	X	X	52	46	52	57	56	58	59	58	60	59	61	57	A	X	X	X	X	X	X	X	X	X	X	X
26	40	54	42	47	51	46	56	64	59	60	53	51	53	55	57	52	48	52	56	50	45	45	42	52	52	
27	X	A	X	X	X	X	A	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	X	X
29	X	42	36	41	47	58	58	58	59	60	62	62	57	56	56	50	48	49	50	50	50	48	44	43	44	44
30	X	42	40	53	48	54	52	53	54	56	59	60	58	58	52	46	51	51	50	50	52	46	46	44	45	45
31	51	50	52	54	58	60	62	61	59	61	60	53	55	56	54	52	50	A	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	29	22	27	24	26	25	22	28	31	30	31	30	30	27	28	29	30	29	30	31	31	31	28	28		
MED	X	X	X	X	50	53	56	54	56	56	53	54	54	53	52	52	50	50	48	48	46	46	44	44	44	
U Q	52	50	49	49	55	58	59	59	60	59	57	55	56	56	54	53	51	52	50	50	49	48	46	46	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	X	X

## IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 2019 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

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	R	32	A	A	A	A	A	46	53	54	51	46	48	46	44	44	46	43	44	46	41	42	42	B	C	
2		34	40	39	45	42	46	53	54	F	54	49	48	48		A	44	44	41	42	39	41	43	42	38	
3		41	41	44	39	F	54	62	F	F	50	48	45	47	45	45	43	44	42	42	41	38	40	38	34	
4		32	37	36	F	Z	53	F	F	F	50	49	49	49	44	47	48	44	45	46	42	43	46	37	38	
5		30	33	33	F	F	F	45	48	47	47	48	48	47		A	47	48	50	46	40	40	43	40	37	42
6		42	45	40	39	F	F	A	F	F	48	48	51	50	52	46	46	45	47	39	Z	43	40	39	34	
7		30	F	40	A	42	43	48	47	48	46	45	49	51	47	48		A	45	45	40	38	44	42	38	44
8	J	R	F	34	40	44	52	48	53	51	48	46	50	51	51	49	43	41	45	41	40	38	40	42	A	
9		A	A	A	A	A	A	A	A		44	46	43	46	47	47	48	46	45	42	42	42	40	39	39	36
10		50	A	A	47	49	52	54	48	51	57	F	44	49	50	51	49	51	46	47	47	43	39	41	39	35
11		37	F	A	36	43	A	A	A	F	F	45	45	46	48	41	46	46	47	45	45	42	37	37	37	F
12		35	A	31	37	40	41	45	48	46	46	47	46	46	47	39	46	43	44	43	42	40	46	42	38	
13		38	36	36	F	F	A	A	F	F	41	41	40	42	42	44	46	46	43	43	42	41	41	38	37	36
14		39	Z	38	F	F	40	48	45	55	52	50	48	43	42	47	46	49	45	45	42	42	42	41	38	39
15		37	36	A	A	A	43	A	38	47	50	50	49	43	40	44	41	45	50	49	49	40	38	36	46	
16		49	A	A	A	38	41	43	46	49	44	46	39	40		A	A	A	A	A	A	F	39	39	36	31
17		31	36	34	40	F	46	53	F	47	49	46	41	45	44	40	45	47	47	43	42	42	38	42	A	42
18		36	39	41	39	41	A	A	45	49	50	51	46	49	52	46	44	38	43	43	32	F	F	A	A	
19		A	36	F	A	A	34	A	A	A	A	R	44	39	50	50	47	46	43	41	44	39	33	33	A	
20		A	A	34	38	40	F	41	40	45	49	45	45	48	47	44	45	40	42	42	42	39	39	34	31	32
21		36	A	A	37	A	A	A	41	45	46	46	46	50	49	R	41	43	43	42	42	42	42	40	35	32
22		29	A	36	38	F	39	43	46	48	49	52	55	56	49	45	45	45	46	46	45	43	46	39	32	
23	R	44	A	43	40	42	46	53	46	43	42	45	F	46	51	46	43	46	46	50	43	44	40	40	40	40
24		34	F	36	A	A	47	F	44	52	52	48	49	46	47	45	A	46	46	40	44	43	44	44	39	40
25		39	35	39	40	46	51	50	52	53	52	50	53	55	51		A	46	44	46	44	46	42	40	40	38
26		34	F	36	41	45	40	50	F	F	47	48	47	45	47	49	51	46	42	46	50	44	39	39	36	46
27		46	A	31	38	41	45	A	45	47	50	46	47	49	48	45	40	43	42	43	42	40	36	38	38	
28		35	35	32	F	F	42	Z	53	49	48	44	45	43		A	A	48	48	41	39	41	38	40	40	41
29		36	30	35	41	F	52	52	53	54	56	56	51	50	50	44	42	43	44	44	44	42	38	37	38	
30		36	34	47	42	F	46	47	48	50	53	54	52	52	46	40	45	45	44	44	46	40	40	38	39	
31	Z	F	F	F	F	F	50	56	55	53	53	54	47	49	50	R	48	46	44	A	43	42	44	41	36	36
		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	21	24	24	25	25	22	28	30	30	31	30	30	27	28	29	30	29	30	31	31	31	28	27	
MED		36	36	36	39	F	46	48	48	49	48	47	48	48	47	46	46	44	44	42	42	40	40	38	38	
U Q		42	40	40	40	F	52	53	53	52	51	50	49	50	50	48	47	45	46	44	44	42	42	40	40	
L Q		34	34	34	38	F	41	45	46	47	46	45	46	46	45	44	43	43	42	42	40	39	39	36	34	

DEC. 2019 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

DEC.2019 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	34	44	44	57	55	55	40	33	G	33	33	72	65	36	31	35	29	25	25	22	69	20	B	C			
2	27	30	37	30	G	22	17	G	G	30	28	34	36	97	95	101	37	30	29	26	25	25	21	20	68		
3	27	16	23	25	32	23	23	38	38	35	32	54	40	76	86	30	37	26	26	30	21	21	17	G			
4	58	60	101	147	22	31	54	41	32	32	29	29	31	31	31	31	G	28	27	24	26	33	31	31			
5	48	17	29	29	22	24	31	19	G	35	31	36	33	54	79	58	103	33	26	26	29	35	26	G	14		
6	G	35	35	33	G	18	25	55	64	36	31	31	31	30	33	33	33	34	36	52	27	21	19	19	17		
7	29	36	39	39	23	22	17	28	G	G	29	32	66	32	45	72	95	90	34	25	33	29	70	68	G	13	
8	17	28	21	22	20	23	30	27	G	G	36	40	31	36	36	30	34	34	23	51	25	46	31	41			
9	94	38	48	51	67	94	59	48	30	30	30	30	30	32	30	31	G	26	26	26	58	21	17	17			
10	24	76	88	31	30	34	12	29	G	G	29	43	43	31	31	31	45	33	30	73	59	40	18	24	40		
11	40	34	81	68	56	56	56	59	35	35	31	41	34	32	32	70	64	34	26	G	23	65	24	24			
12	18	46	43	26	26	23	G	28	31	31	31	37	37	30	36	31	31	38	26	42	94	38	18	20			
13	22	22	52	65	36	49	57	39	33	66	59	61	31	35	30	31	32	44	52	58	32	19	17	27			
14	23	23	20	20	34	38	23	26	26	31	G	38	64	97	74	73	58	57	70	27	20	18	20	20			
15	20	33	46	52	47	42	53	57	34	31	31	31	31	32	30	45	34	28	25	24	23	20	20	26			
16	36	51	56	42	31	G	27	27	27	33	29	31	47	82	67	77	104	116	56	24	22	19	27	25			
17	59	72	72	56	40	35	35	25	28	58	33	33	69	63	49	55	57	56	54	52	24	30	62	56			
18	116	25	28	28	28	58	52	32	32	38	35	37	42	42	96	65	72	29	32	55	32	43	48	30			
19	43	40	28	92	54	28	89	61	56	60	68	129	92	129	G	75	62	66	82	88	27	18	24	44			
20	47	45	36	59	72	81	69	41	29	28	32	34	41	41	38	G	29	54	27	G	E	B	26	20	31	22	
21	43	43	43	45	40	56	66	26	37	32	31	31	34	E	B	64	69	39	E	B	33	29	51	56	20	32	
22	34	68	84	33	52	38	38	26	G	27	E	B	G	31	31	50	55	34	31	59	18	24	G	18	24		
23	37	51	31	35	22	27	37	27	G	47	62	62	35	30	30	36	32	29	31	G	E	B	24	58	78	58	59
24	59	25	41	53	53	42	26	34	32	42	50	97	42	72	60	56	53	20	G	26	32	28	21	21	37		
25	19	19	18	21	22	17	27	26	G	28	36	45	47	52	42	94	47	35	30	60	24	23	24	24	24		
26	18	41	27	80	28	32	46	G	32	G	36	34	44	64	48	38	60	63	32	30	23	21	21	36			
27	42	103	66	26	31	37	56	32	30	30	30	32	49	63	63	36	56	56	30	56	34	20	17	19			
28	19	23	22	22	22	G	26	26	39	29	32	34	65	68	66	37	G	G	G	18	18	25	24	35	22	116	
29	71	58	23	81	21	21	19	27	G	32	31	G	32	45	42	32	32	36	36	44	34	35	58	63	G		
30	105	42	50	32	28	68	38	70	29	29	32	33	74	35	31	G	31	31	60	38	34	53	20	20	20		
31	16	39	23	19	25	25	25	39	34	38	34	42	34	45	64	59	112	94	37	53	67	23	32	53			
	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	30	30		
MED	34	39	39	35	30	32	37	29	G	31	32	35	41	42	48	38	34	34	30	30	27	21	22	26			
U Q	48	51	52	57	47	49	55	41	35	36	36	43	54	68	66	65	58	56	52	51	40	38	31	40			
L Q	20	25	27	26	22	23	25	27	G	29	30	31	32	31	32	31	31	31	28	26	25	23	20	19	20		

DEC.2019 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

DEC.2019 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	11	11	18	20	15	12	12	8	12	12	10	8	8	10	7	8	8	7	8	8	12	9		B	C
2	8	9	9	9	11	8	9	8	8	8	9	8	9	8	9	8	9	8	8	8	7	8	6	8	
3	6	7	8	8	7	7	7	8	8	8	8	8	7	7	11	11	10	10	10	8	8	8	8	8	
4	9	8	8	6	8	8	8	8	8	8	8	8	8	8	8	8	7	9	9	9	9	8	7	7	
5	10	10	8	8	8	8	8	8	8	10	10	7	7	8	8	8	8	8	6	10	10	7	7	8	
6	8	7	10	9	8	8	8	8	8	8	8	8	8	6	8	8	8	9	8	8	8	8	8	11	
7	8	8	8	8	8	8	8	8	8	8	8	8	10	9	9	9	9	8	8	8	8	8	8	8	
8	6	6	6	8	7	8	7	8	8	8	8	8	8	9	8	6	8	8	8	9	7	8	7	9	
9	12	7	12	7	11	8	10	12	7	8	8	8	8	8	8	10	11	8	6	8	8	9	9	8	
10	8	10	12	8	7	8	8	7	8	12	25	12	9	10	8	12	10	10	8	10	10	7	8	8	
11	12	8	19	11	8	12	9	9	9	9	7	8	8	8	8	8	8	8	8	11	17	16	8	7	
12	7	7	9	8	8	8	8	7	7	8	8	10	10	10	8	9	9	8	7	8	8	8	8	8	
13	10	8	12	8	10	9	12	8	9	9	8	8	8	7	7	7	8	8	7	7	8	8	7	7	
14	8	7	7	6	7	8	8	8	8	8	8	7	6	8	8	8	8	8	8	8	8	8	7	8	
15	8	8	8	10	9	8	8	8	12	10	10	8	8	8	8	8	7	8	8	8	8	8	7	8	
16	17	10	10	8	8	7	7	8	8	8	8	9	9	9	7	8	10	8	8	8	8	7	9	8	
17	8	8	8	8	8	6	8	6	8	9	13	11	8	8	8	9	8	9	8	8	8	8	8	8	
18	7	7	7	8	8	8	9	9	9	9	8	9	7	8	8	12	12	14	11	9	8	15	11	10	
19	12	15	7	10	18	8	13	14	16	16	8	16	12	24	20	37	39	32	15	25	12	10	8	9	
20	12	8	11	24	25	10	10	10	8	9	9	21	17	17	17	11	10	11	8	8	26	10	6	8	
21	8	8	8	24	15	21	14	9	9	9	9	9	15	40	23	18	24	27	24	24	20	8	8	8	
22	8	8	8	11	10	10	10	10	9	9	40	22	17	10	10	10	8	8	8	12	12	9	9	8	
23	10	10	8	7	7	7	7	10	15	9	8	8	8	8	8	8	9	9	9	24	18	12	9	9	
24	9	8	8	8	8	7	7	7	7	7	7	7	7	8	10	8	8	10	10	8	6	7	9	9	11
25	8	8	7	7	7	7	7	12	8	8	8	8	8	9	10	10	10	8	8	8	6	6	13	7	7
26	7	11	7	6	5	12	9	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	13	
27	8	8	5	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	6	8	7	
28	7	7	8	10	8	6	7	7	8	8	8	8	8	8	8	7	8	8	8	8	8	8	8	7	
29	9	9	9	8	8	7	7	7	7	7	7	7	7	7	7	7	8	7	8	8	8	8	9	7	
30	7	11	6	7	8	8	6	8	8	8	8	7	8	8	9	8	8	8	8	8	8	9	6	7	
31	8	7	7	7	7	7	7	7	8	8	8	8	8	9	7	7	8	7	7	8	8	8	8	11	
	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	30	
MED	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
U Q	10	10	10	10	10	8	9	9	9	9	9	9	9	10	9	10	10	9	8	9	10	9	9	9	
L Q	8	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7	7	

DEC.2019 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 2019 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

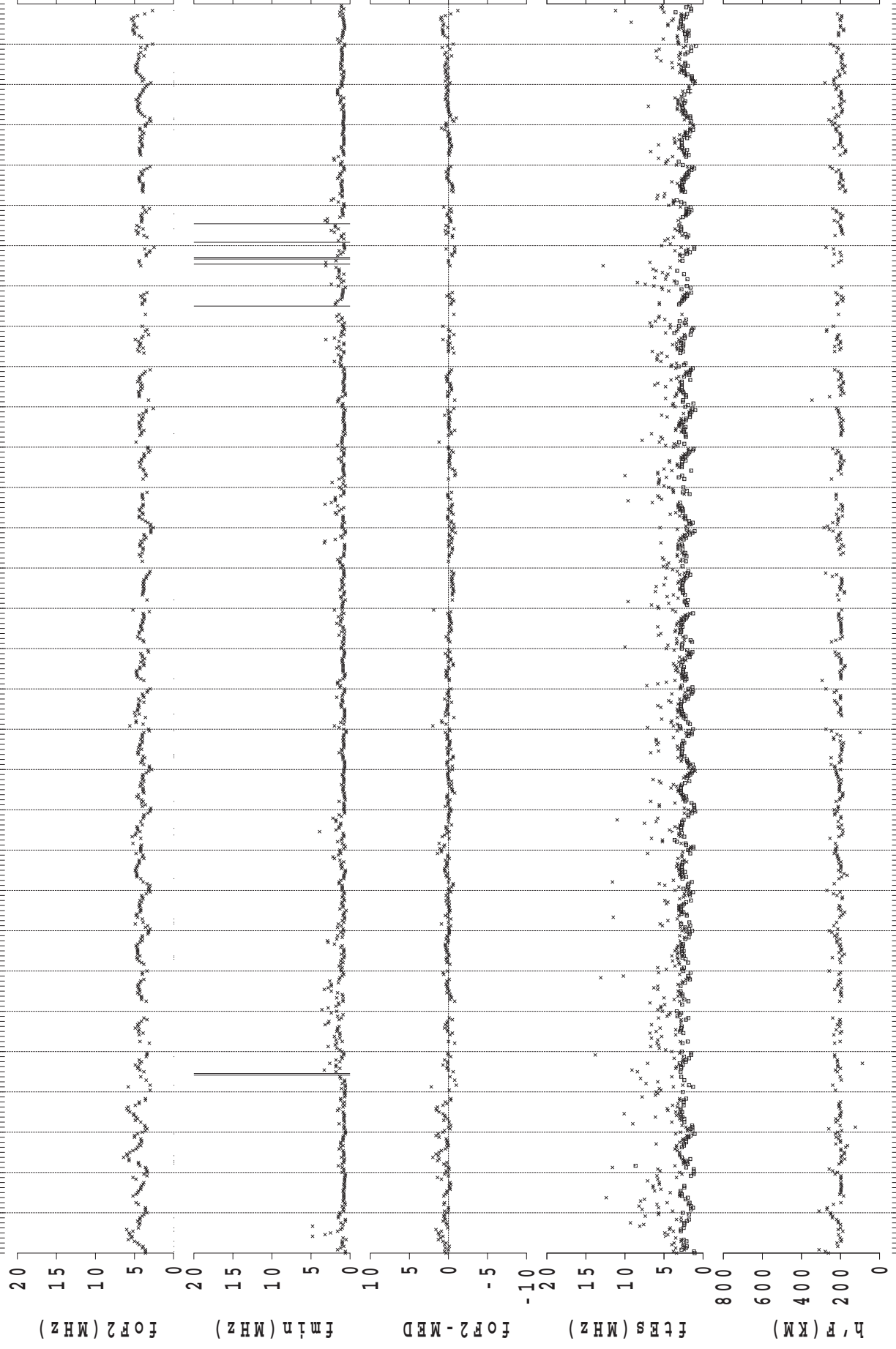
D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1		194	A	A	A	A	A	A	252	196	196	204	210	268	188	172	210	210	194	136	198	198	224	B	C		
2	E	236	A	A	A	224	202	180	184	190	178	198	204	204	A	A	198	194	188	208	200	228	204	224	234		
3		234	234	232	226	210	204	204	190	210	190	204	194	186	220	204	194	200	204	200	192	198	214	222	234		
4		234	234	234	238	202	202		200	200	186	196	188	200	196	208	202	194	194	198	198	206	206	202	204		
5		A	204	204	230	216	202	202	212	196	198	198	186		A	A	194	214	192	192	192	192	E	A	220		
6		196	208	218	240	212	212		212	194	194	180	180	194	186	204	190	190	200	200	214	194	194	202	238		
7		204	220		A	192	186	204	202	198	200	184	208	194	212	206		A	194	210	190	192	230	230	202		
8		228	250	230	190	206	204	196	196	198	178	202	198	194	200	200	192	198	192	186	224	196	220	210			
9		A	A	A	A	A	A	A	A		200	182	180	176	156	210	190	196	192	188	188	208	196	196	204	226	
10		254	A	A	E	240	220	196	210	192	192	192	204	204	196	190	188	198	196	216		244	200	200	222	E	
11		A	A	A	E	302	A	A	A		224	190	174	182	224	192	200		A	230	208	196	188	198	232	224	
12		212	A	A	212	212	212	190	190	184	190	190	190	190	176	196	196	186	204	192	210	210	216	200	208		
13	E	236	E	A	A	198		A	A	202	206	192	196	196	196	196	192	192	198	198	212	202	202	202	236		
14		200	220	E	A	216	216		202	198	188	188	192	196	204		204	200	194	200	204	214	198	200	196	200	
15	E	226	E	A	A	A	A	A		194	240	198	184	204	194	198	198	198	206	214	198	196	184	196	204	216	
16	E	228	A	A	A	E	A	298	204	200	190	198	196	196	202	184		A	A	A	A	A	202	200	192	220	
17		238	226	A	226	226	202	200	188	196	184	196	196		A	A	252		A	A		194	186	186	200	218	
18		212	E	A	230	186	210	230		210	198	188	188	206	220	200	192	204	180	232	214		A	E	A	A	
19		A	A	A	A	A	212	A	A	A	A	A	192	A	E	A	206	B	B	E	B	238	198	198	246	198	230
20		A	A	A	A	206		A	A	256	186	186	168	190	H	H	218	214	206	188	198	224	196	194	E	B	
21	E	230	A	A	208	A	A	A		196	182	182	198	198	192		B	202	202	202	202	210	210	242	214	214	
22	E	274	A	A	A	E	A	E	A	302	270	202	178	178		B	206	190	190	228	178	180	192	192	196	222	
23		A	A	224	208	212	212	190	196		202	198	186	186	184	166	222	200	200	196	204	214	224	210	220		
24		204	E	A	282	248	A	A		202	192	194	194		A	A	182	200	200	200	198	192	194	194	208	202	
25		226	236	236	222	200	208	202	192	176	186	208	254		A	A	202	E	A	H	176	178	212	212	200		
26		238	206	A	216	224	224	A	194	194	182	194	202	210	234	198	198	198	186	218	218	206	216	230	A		
27		A	A	E	A	328	218	A	E	A	A	212	196	188	188	172	196	196	204	196	210	200	192		230	194	
28		208	234	E	A	E	A	206	202	202	200	192	192	184	194		A	A	194	194	194	196	196	196	210	218	
29		214	254	226	240	202	202	198	192	202	190	186	186	216	208	202	188	194	H	194	E	A	248	204	210		
30		232	E	A	E	A	A	204	212	232	220	208	198	208	202	194	194	200	192	210	204	194	210	226	208	208	
31	E	242	A	A	234	228	240	220	216	198	204	192	192	192	192	204	216	204	194	194		A	198	198	206	218	
		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	19	15	19	22	21	18	28	29	30	29	29	27	24	28	26	28	29	29	29	30	30	27	26		
MED		220	230	227	221	212	204	202	197	196	190	194	196	196	198	200	196	194	200	196	200	205	209	210	215		
UQ		E	A	E	A	E	A	A		236	252	248	240	220	212	204	207	200	194	198	204	204	211	204	200		
LQ		210	220	220	212	204	202	198	192	191	186	185	187	190	191	195	192	192	192	193	192	195	198	198	202		

DEC. 2019 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

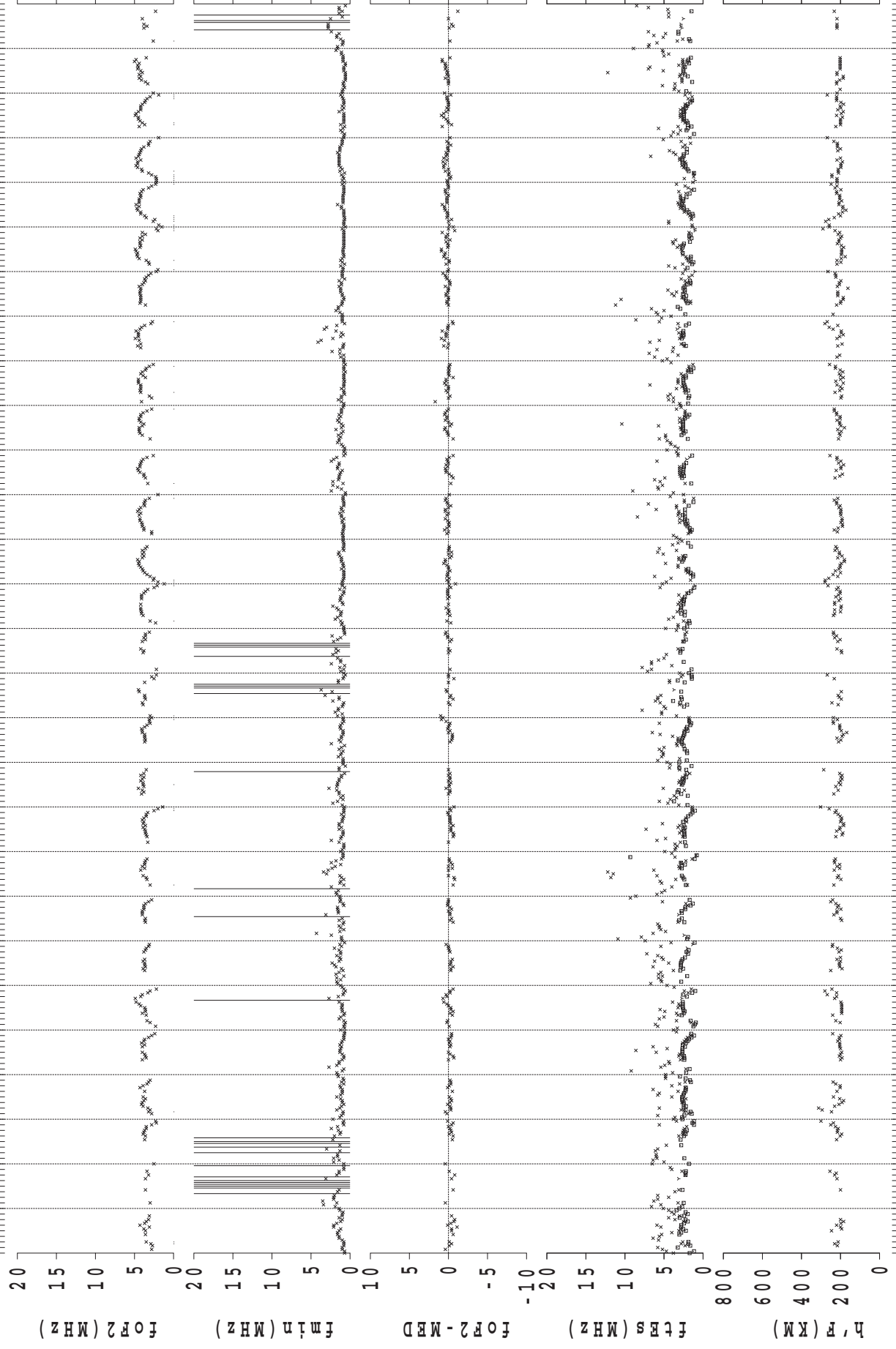


2019 0101 -> 2019 0131(99) SYOWA-ST.



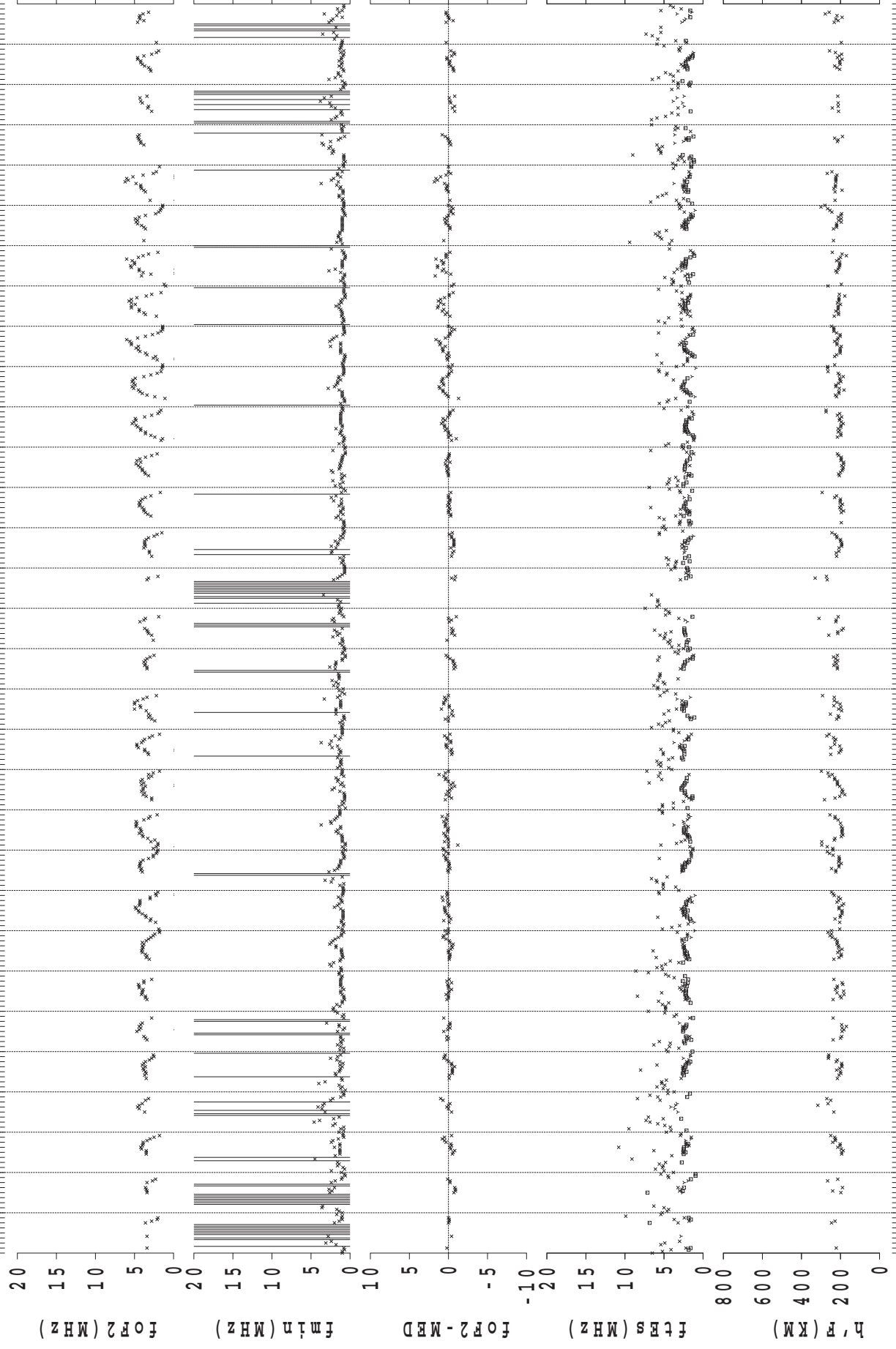
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 DAY/45 EMT

2019 0201 -> 2019 0228 (99) SYOWA-ST.



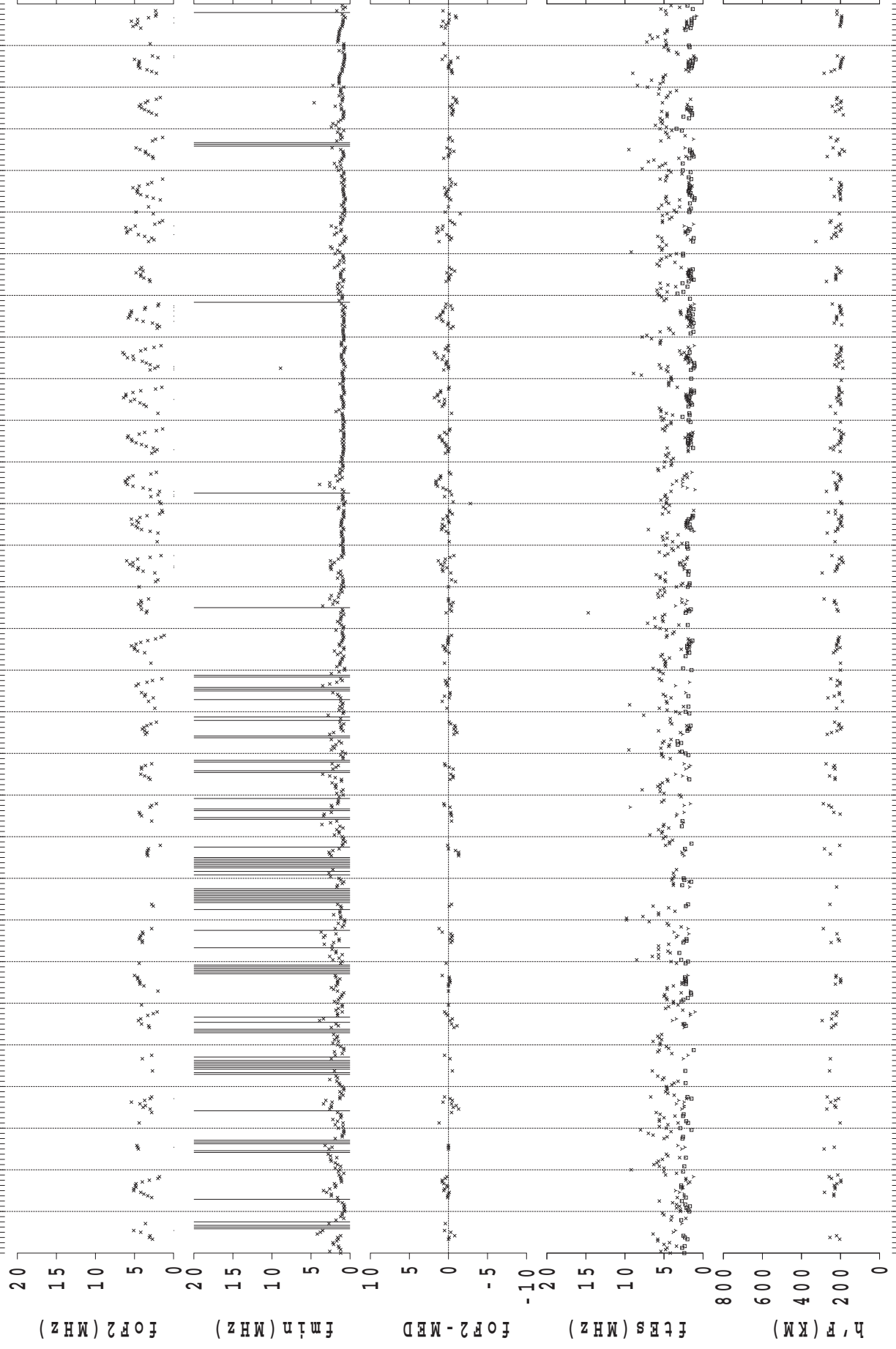
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 DAY/45 °EMT

2019 0301 -> 2019 0331(99) SYOWA-ST.

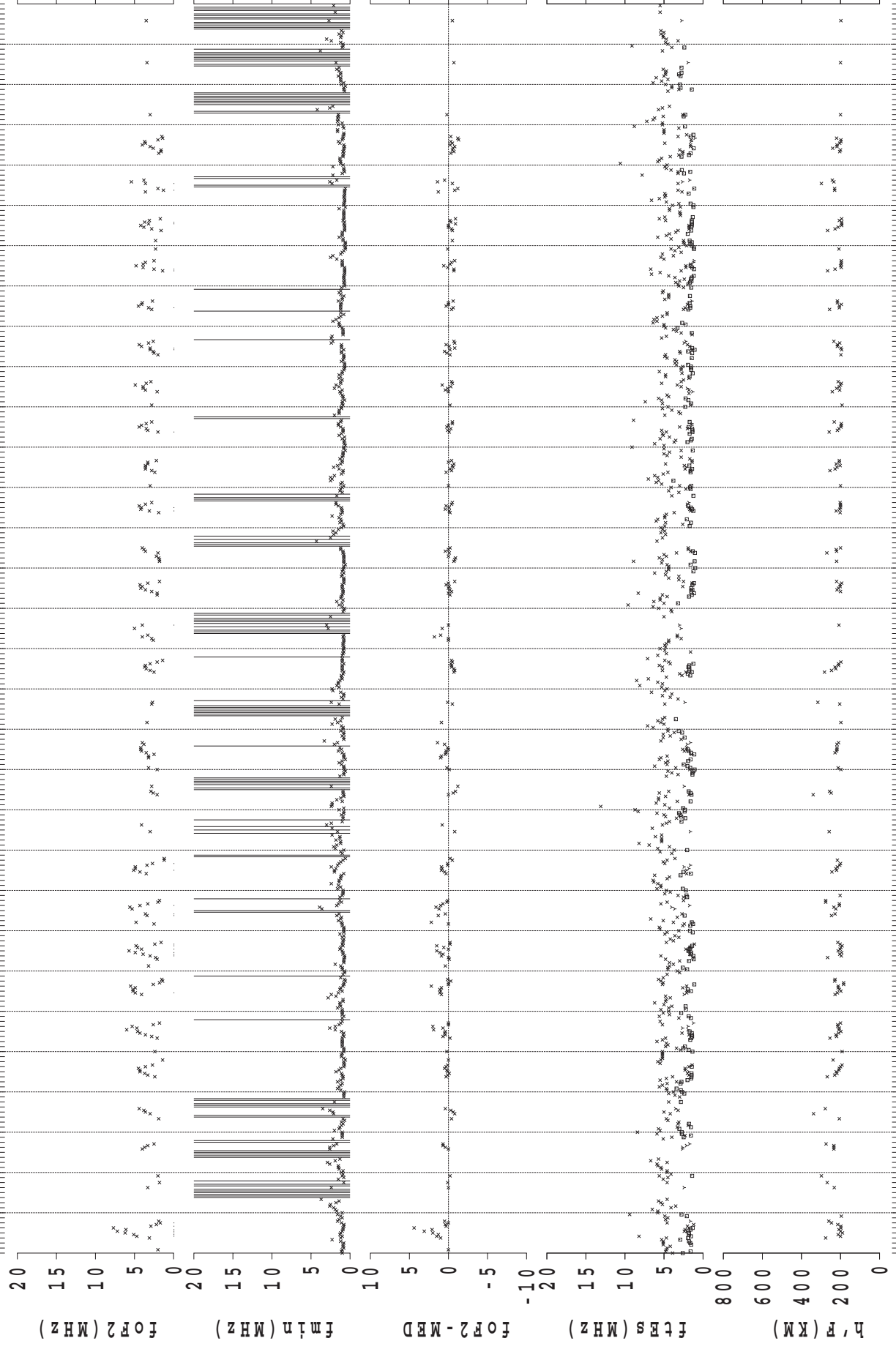


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 DAY/45 °EMT

2019 0401 -> 2019 0430 (99) SYOWA-ST.

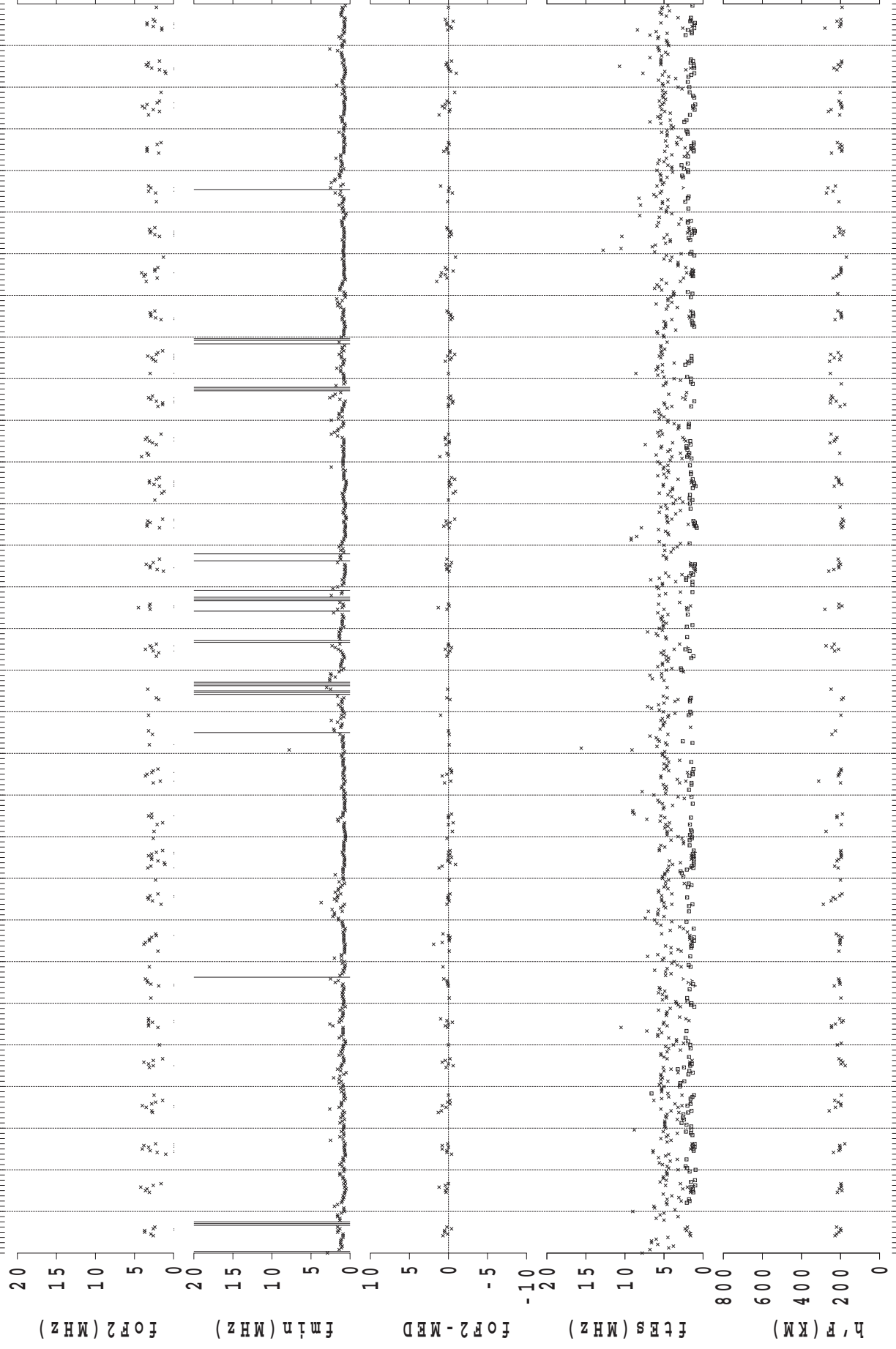


2019 0501 -> 2019 0531(99) SYOWA-ST.



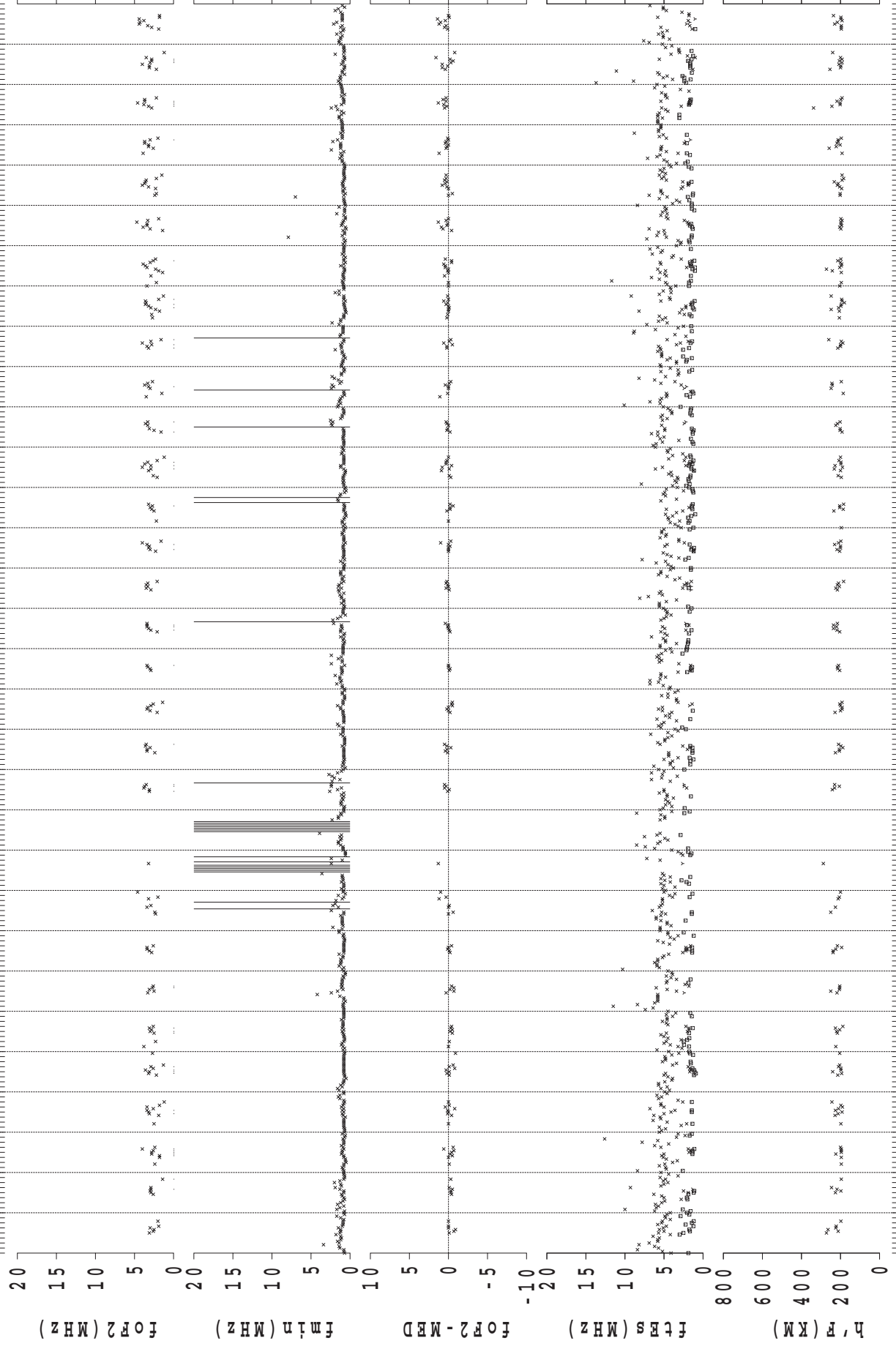
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 DAY/45 P.EMT

2019 0601 -> 2019 0630 (99) SYOWA-ST.



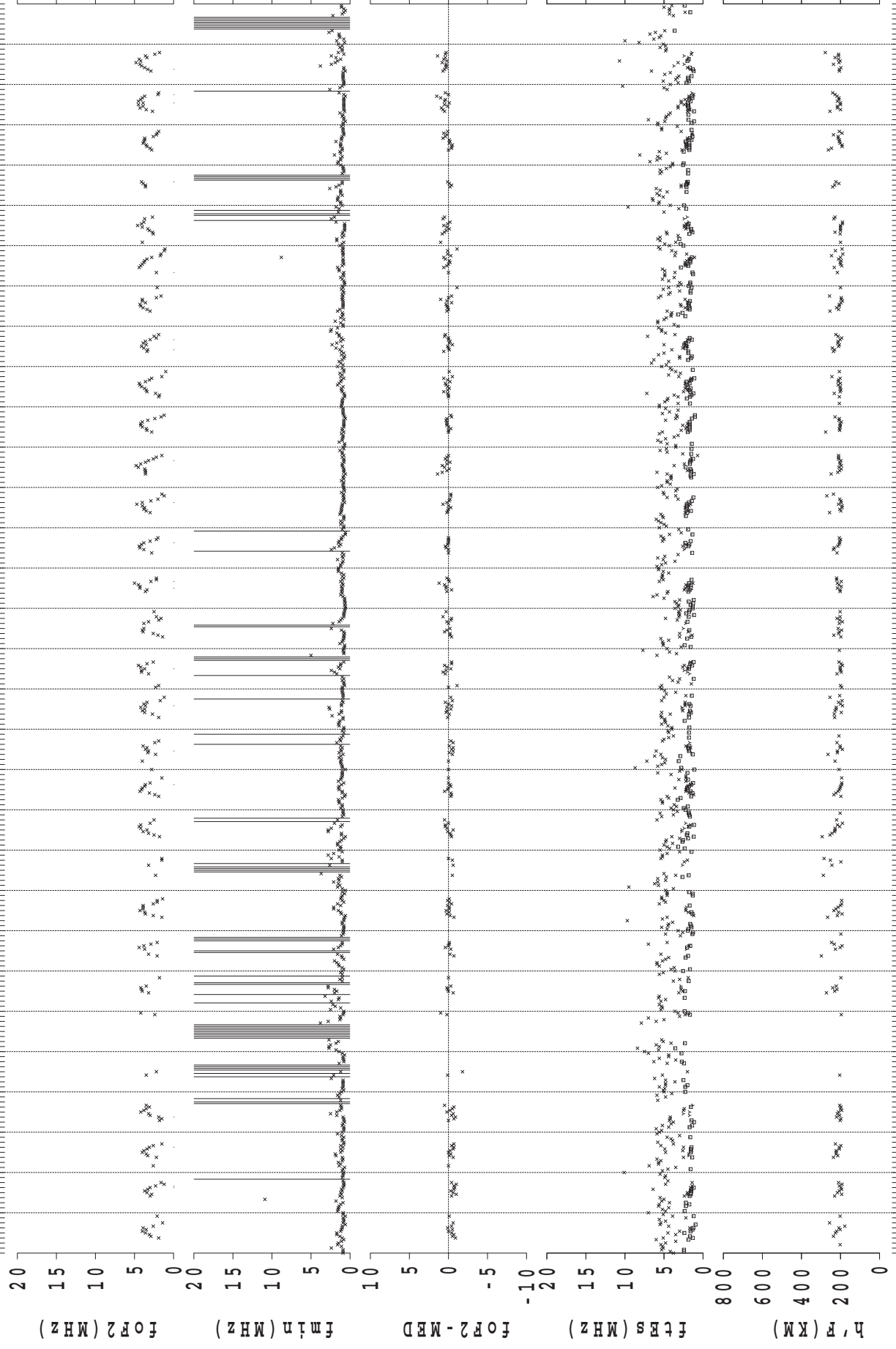
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 DAY/45 UTM

2019 0701 -> 2019 0731(99) SYOWA-ST.



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 DAY/45 P.EMT

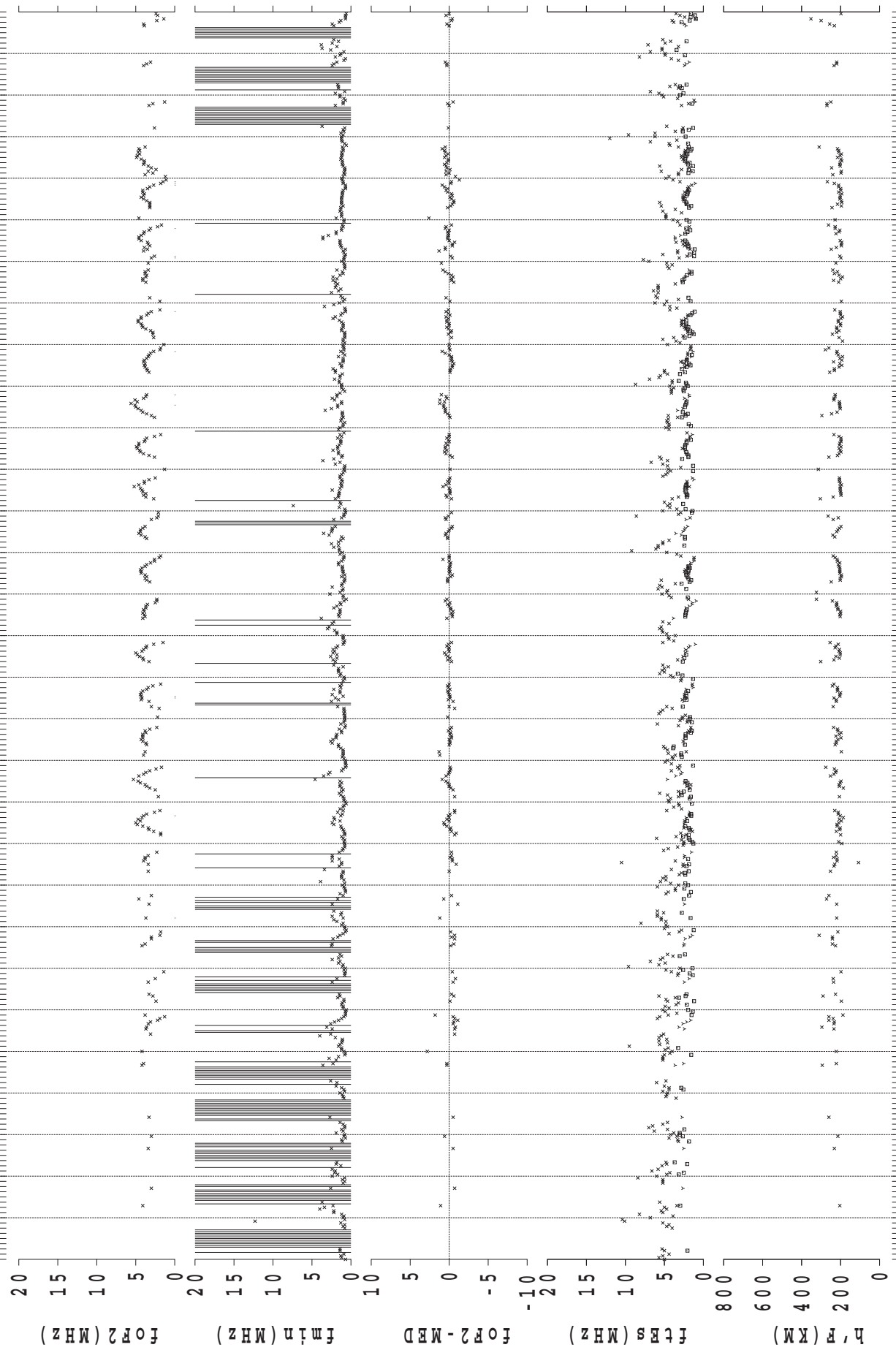
2019 0801 -> 2019 0831(99) SYOWA-ST.



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 DAY/45 P.EMT



2019 0901 -> 2019 0930 (99) SYOWA-ST.



2019 1001 -> 2019 1031(99) SYOWA-ST.



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 DAY/45 °EMT

2019 1101 -> 2019 1130 (99) SYOWA-ST.



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 DAY/45 EMT

2019 1201 -> 2019 1231(99) SYOWA-ST.

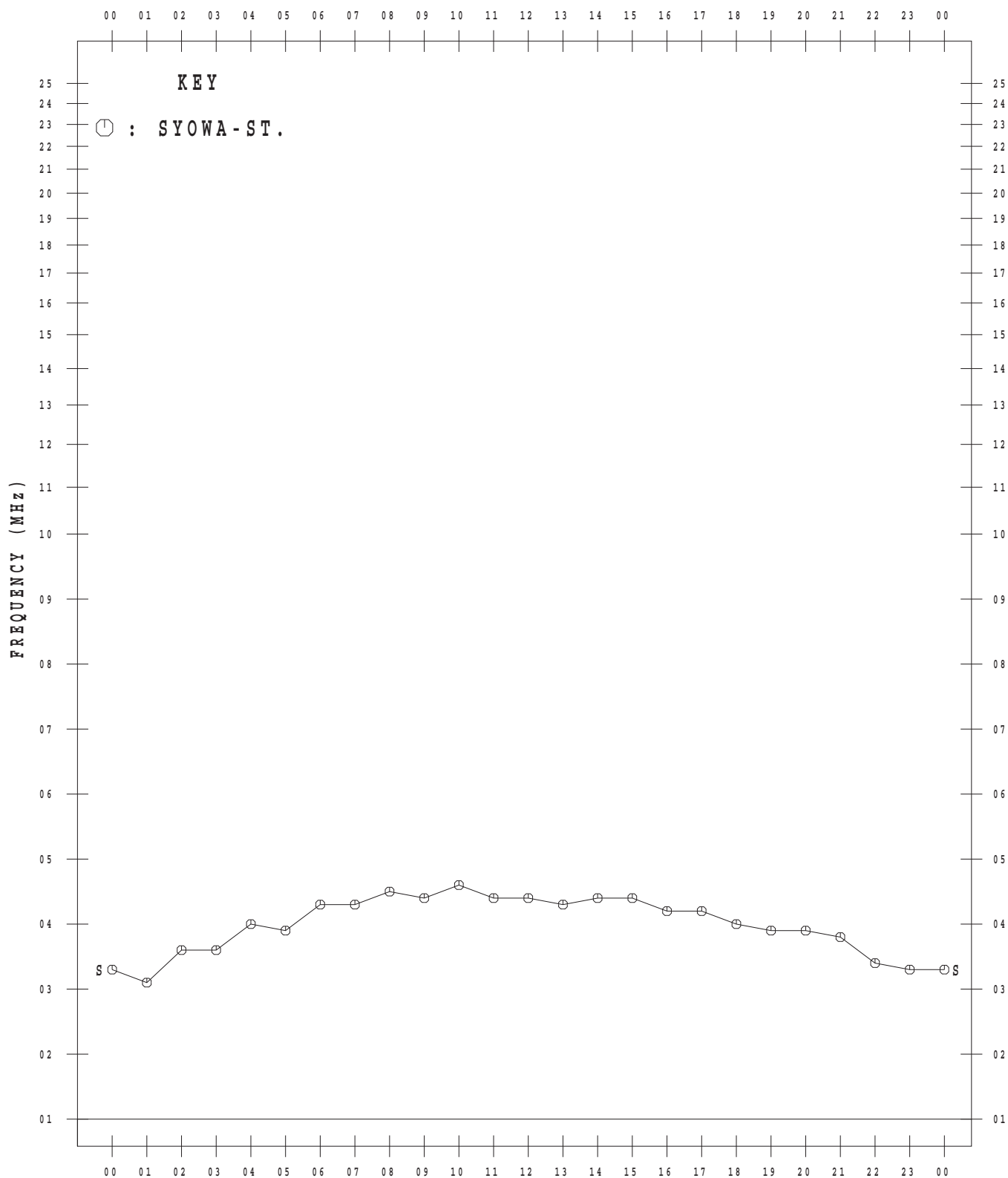


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 DAY/45 EMT

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

45°E MEAN TIME

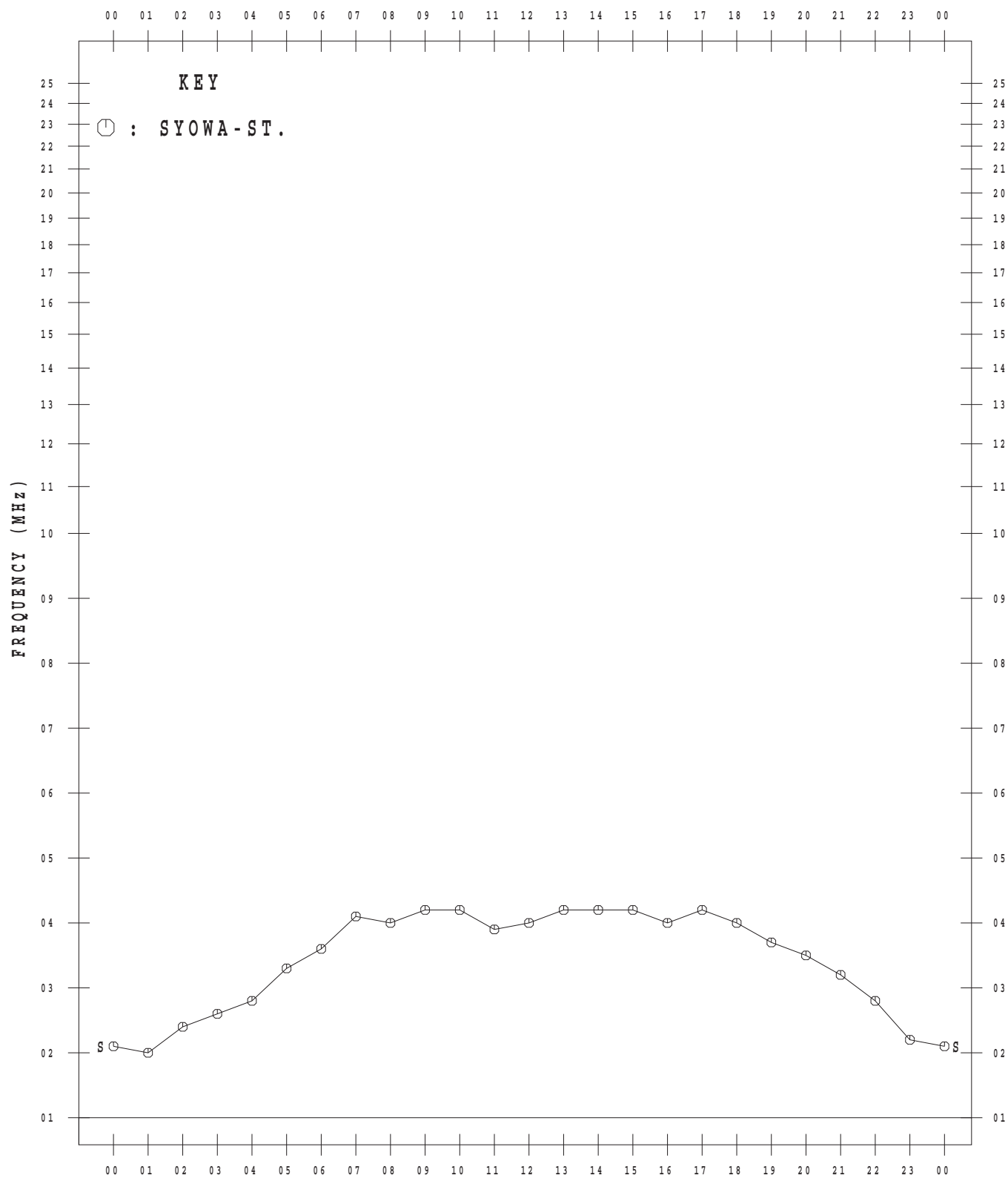
JAN. 2019



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

45°E MEAN TIME

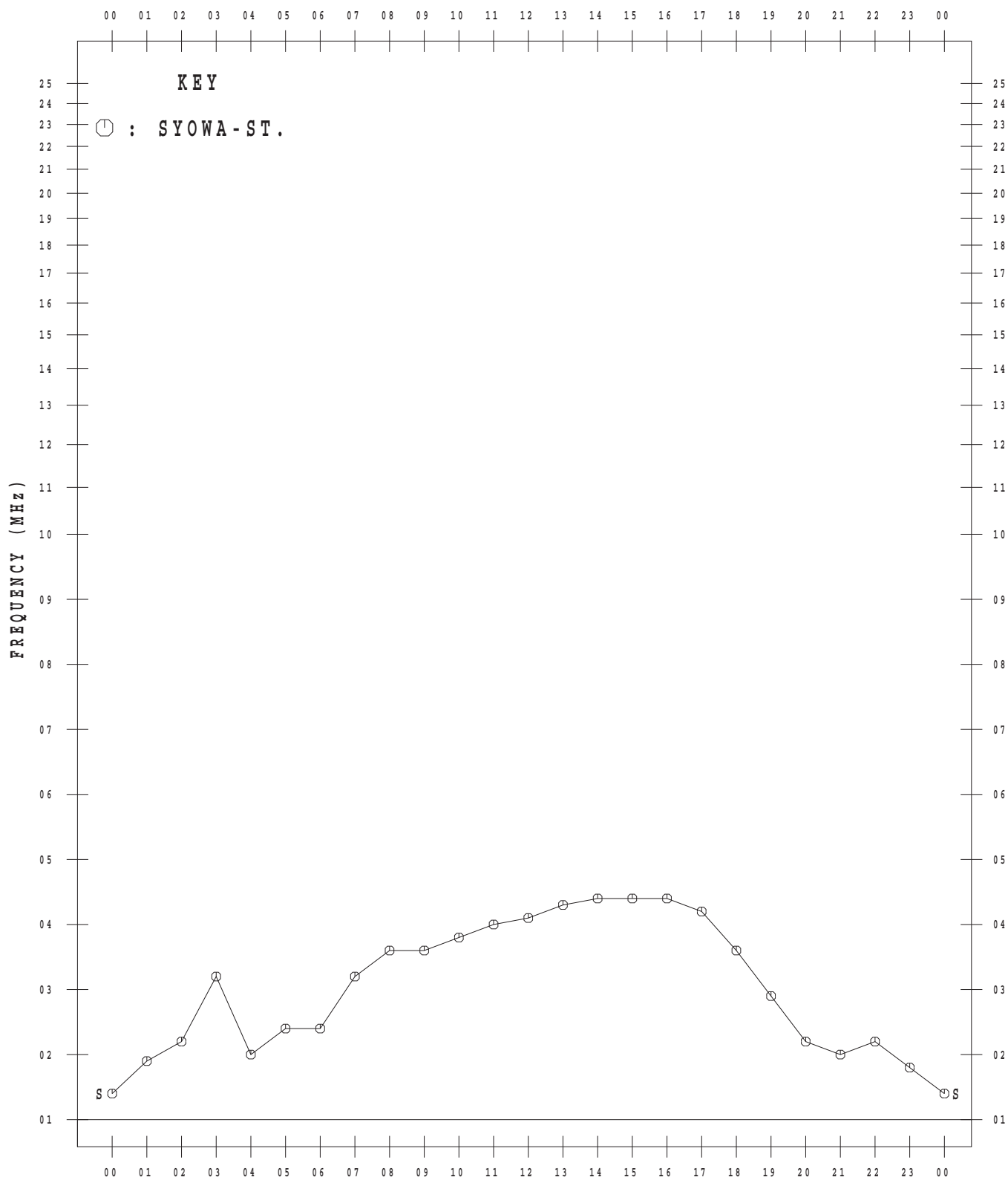
FEB. 2019



# MONTHLY MEDIAN VALUES OF $f_oF_2$

45°E MEAN TIME

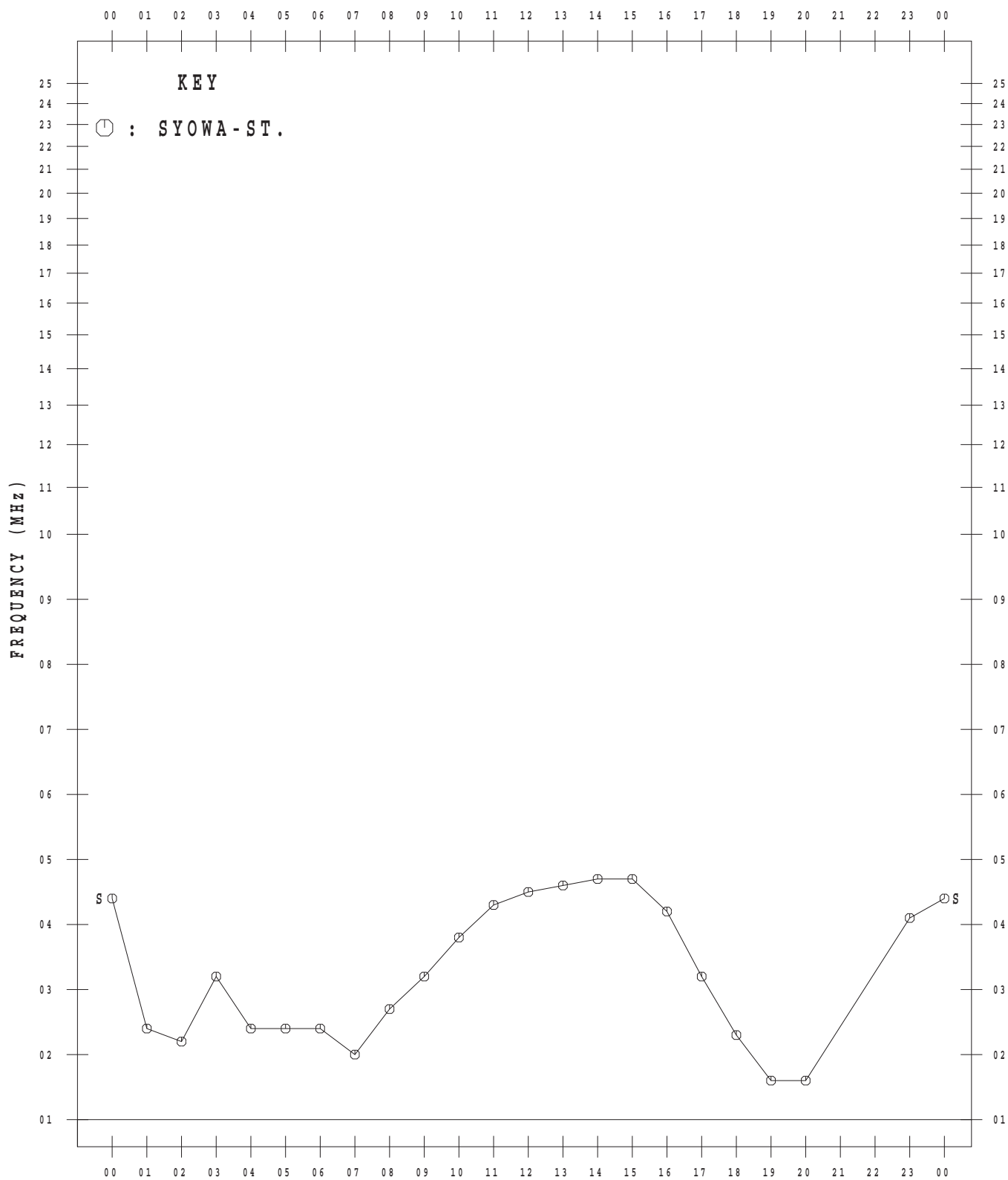
MAR. 2019



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

45°E MEAN TIME

APR. 2019

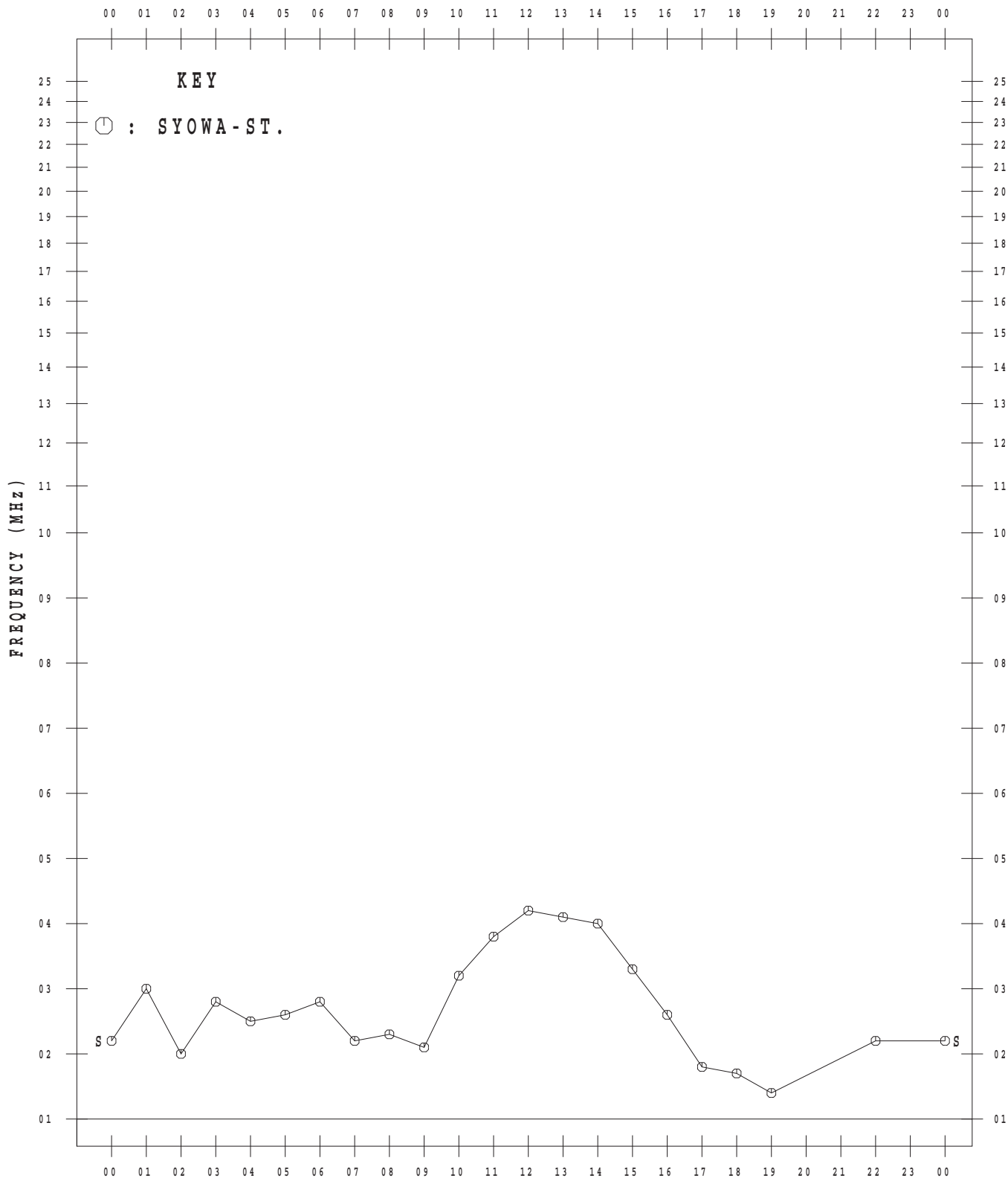




# MONTHLY MEDIAN VALUES OF f<sub>o</sub>F<sub>2</sub>

45°E MEAN TIME

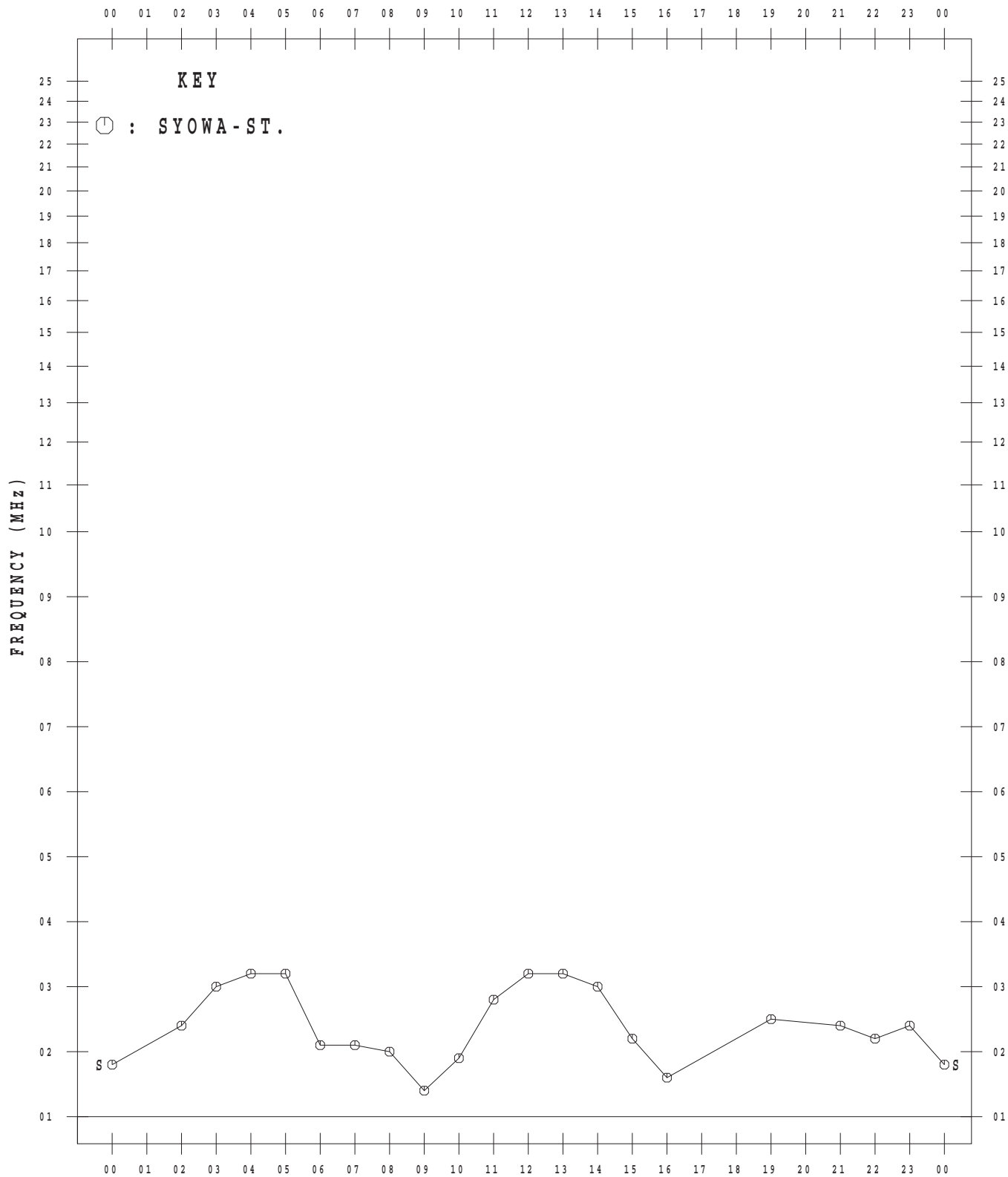
MAY 2019



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

45°E MEAN TIME

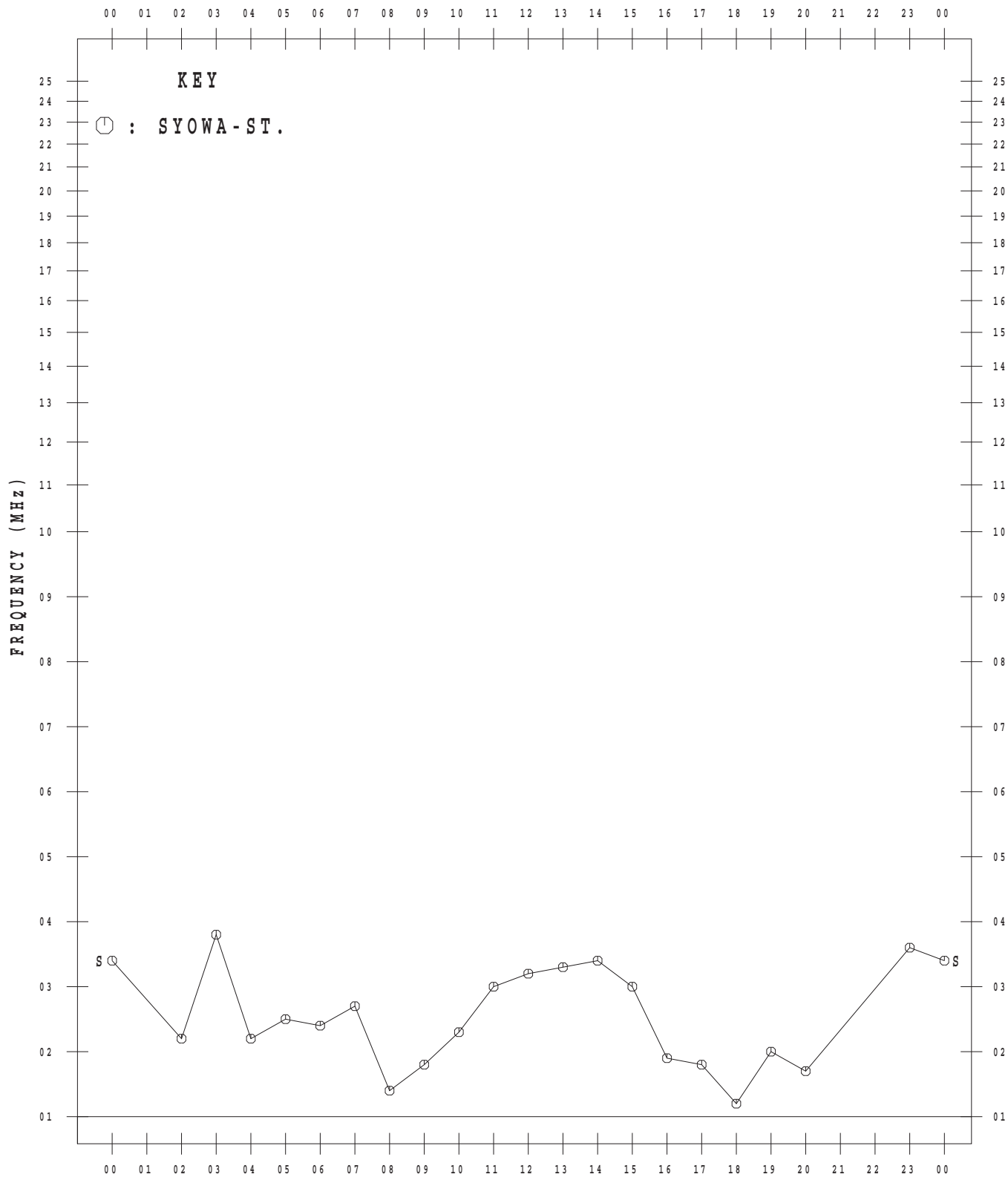
JUN. 2019



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

45°E MEAN TIME

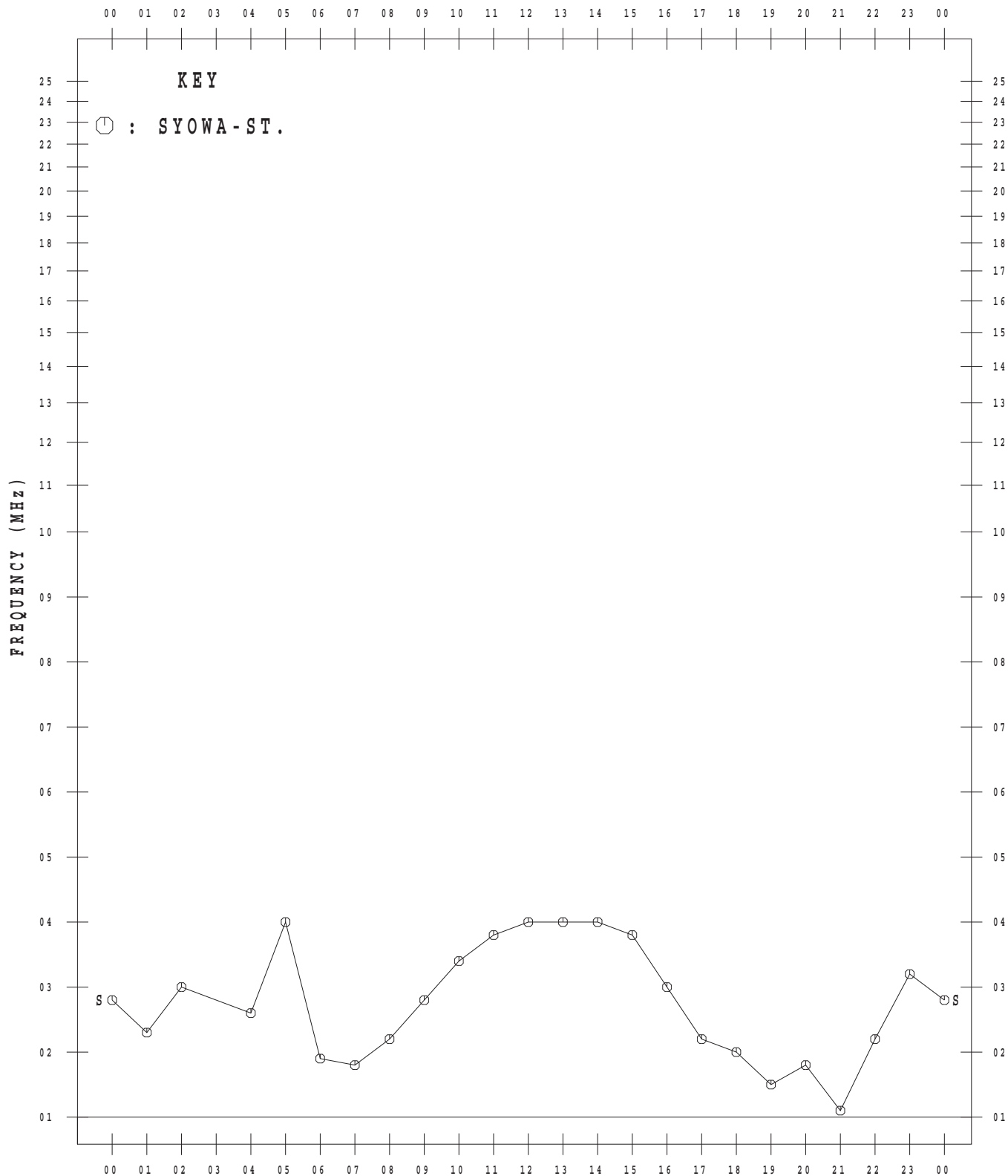
JUL. 2019



# MONTHLY MEDIAN VALUES OF $f_oF_2$

45°E MEAN TIME

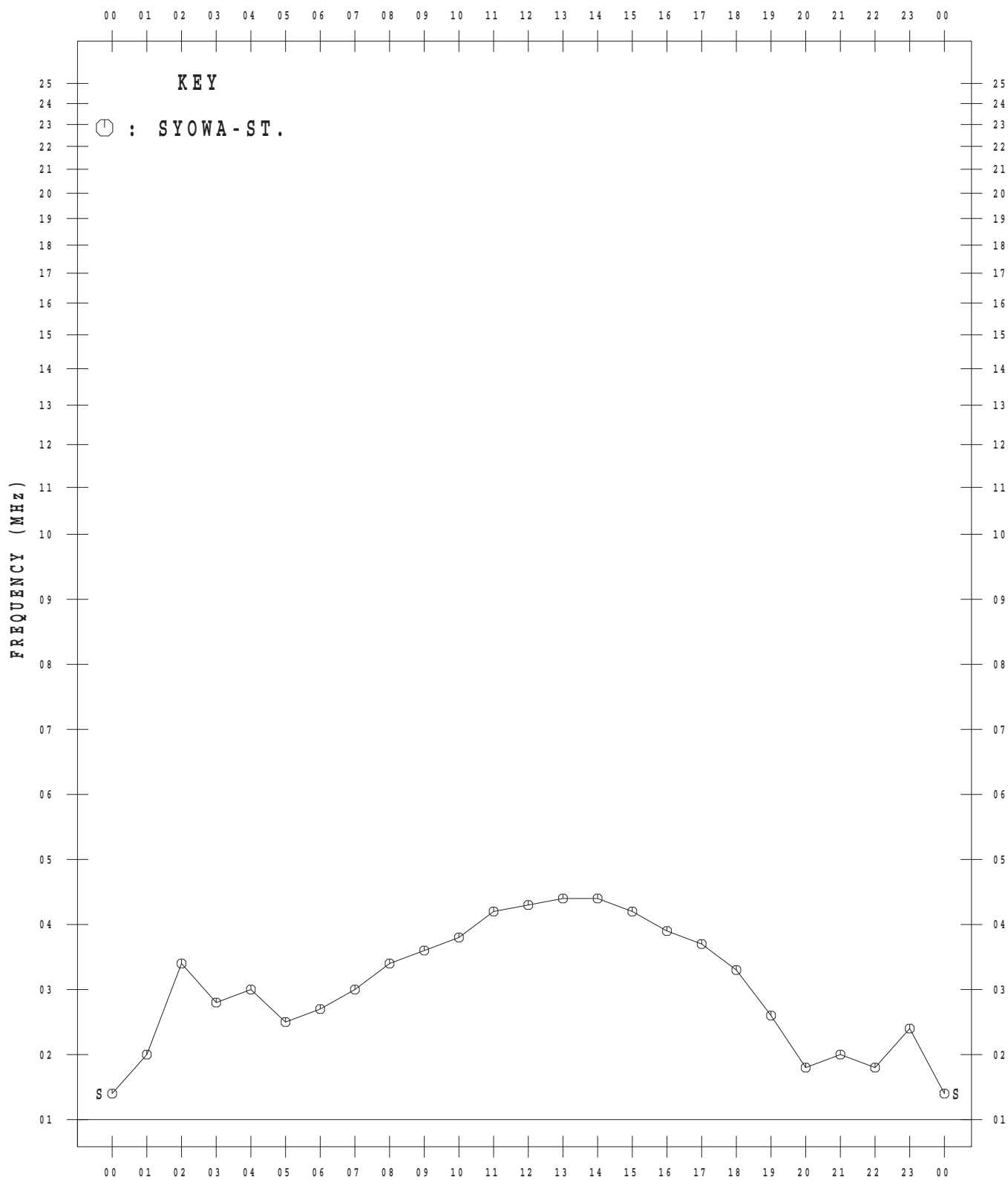
AUG. 2019



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

45°E MEAN TIME

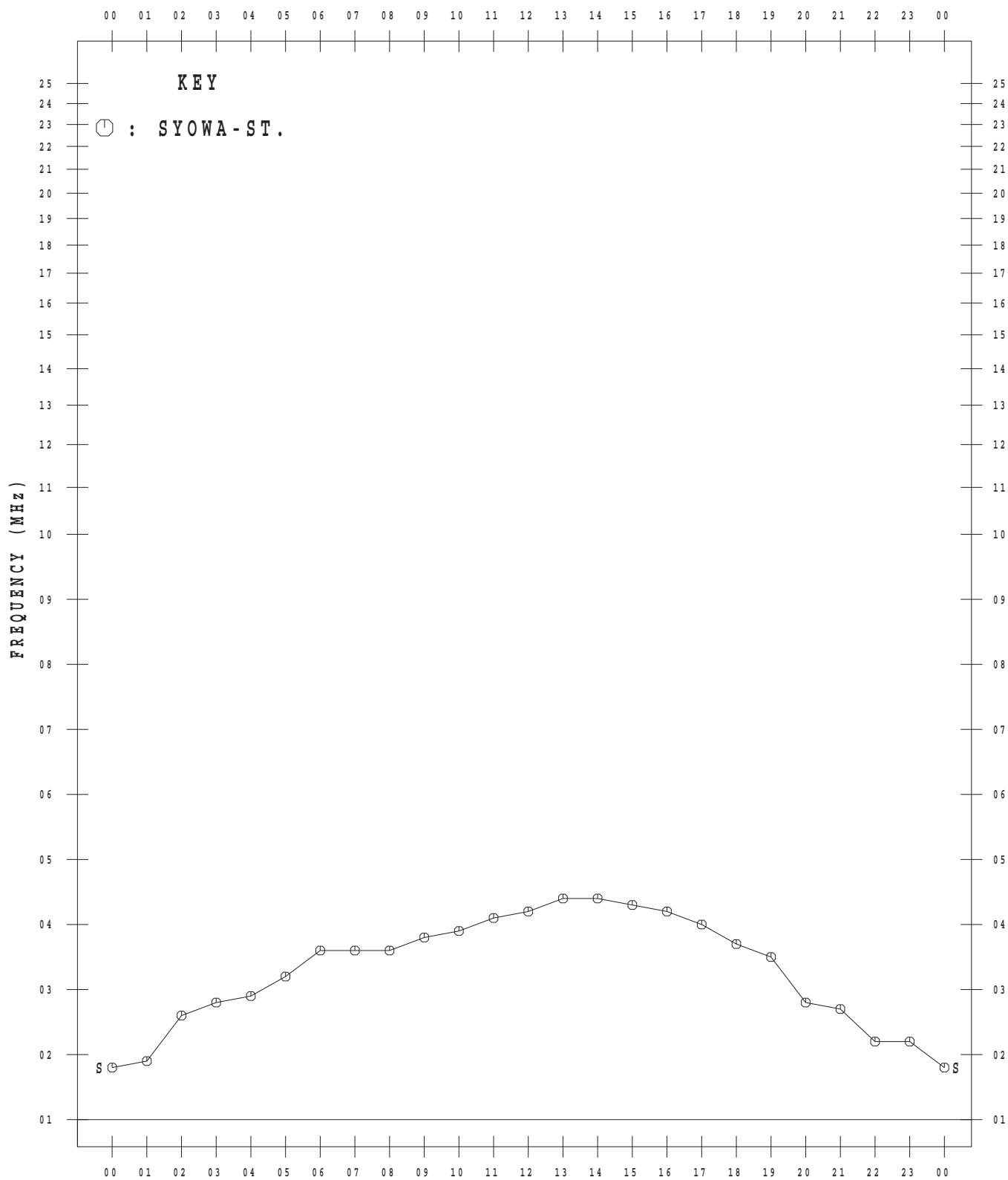
SEP. 2019



# MONTHLY MEDIAN VALUES OF foF2

45°E MEAN TIME

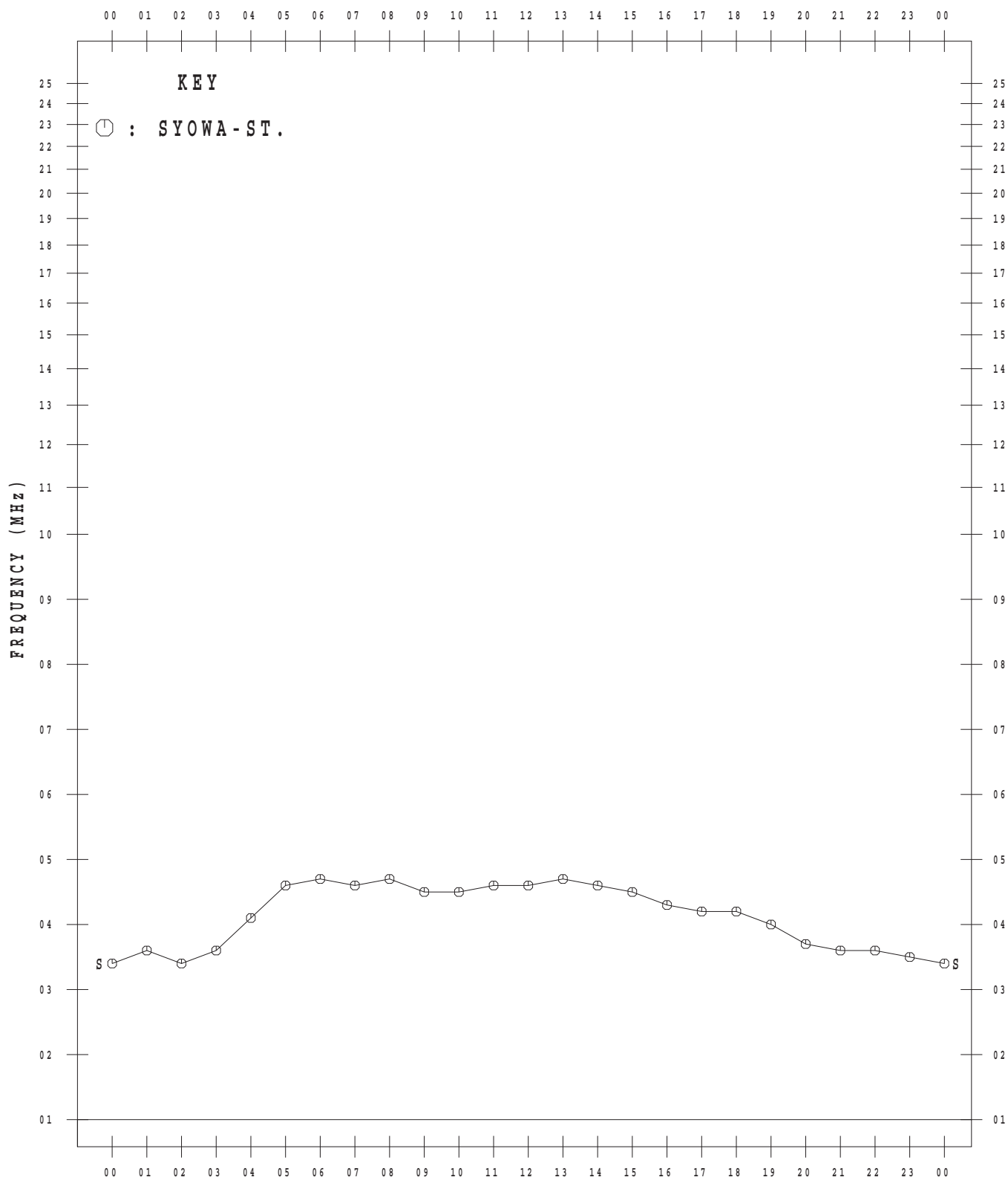
OCT. 2019



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

45°E MEAN TIME

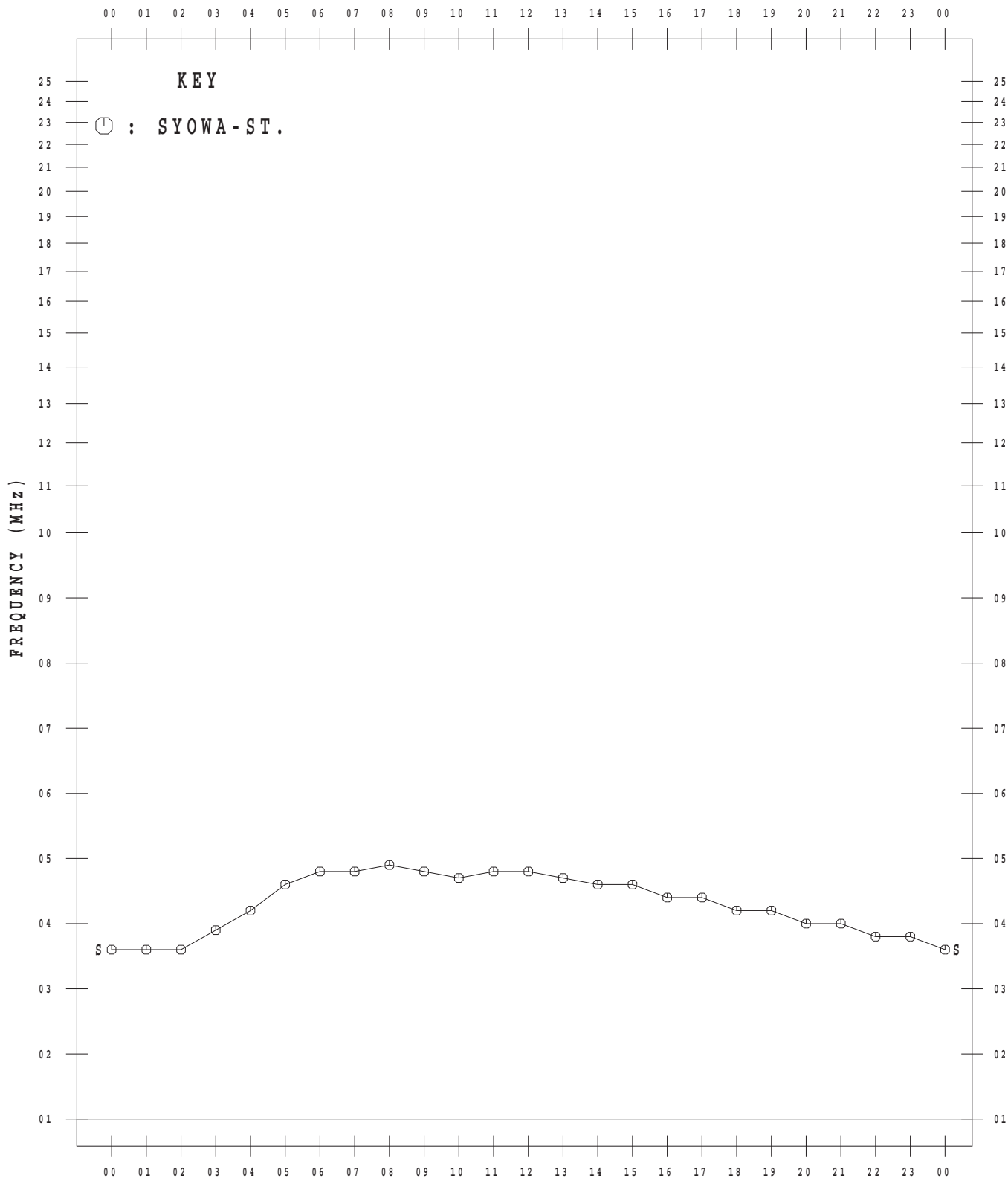
NOV. 2019



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

45°E MEAN TIME

DEC. 2019

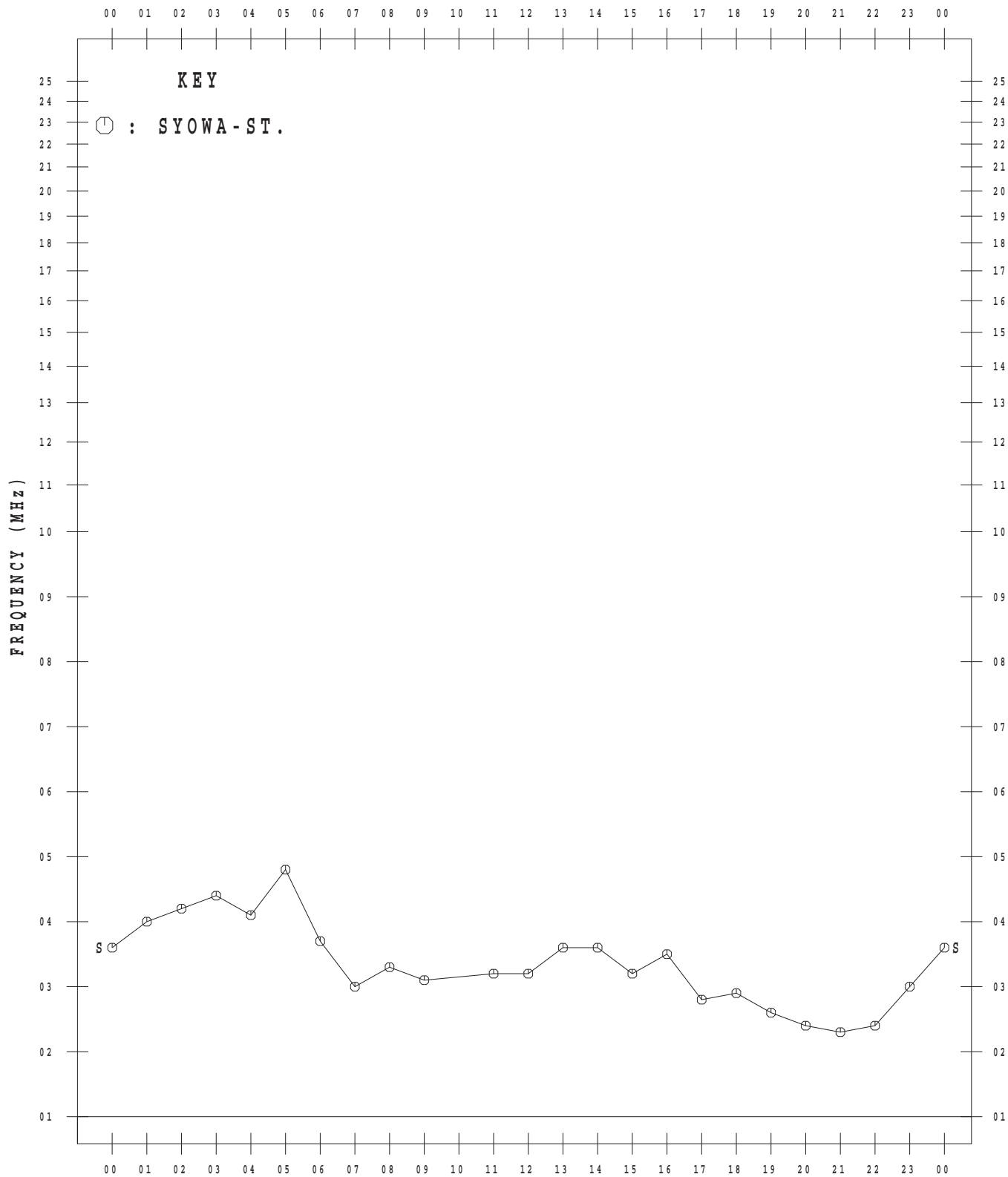




# MONTHLY MEDIAN VALUES OF f<sub>t</sub>E<sub>s</sub>

45°E MEAN TIME

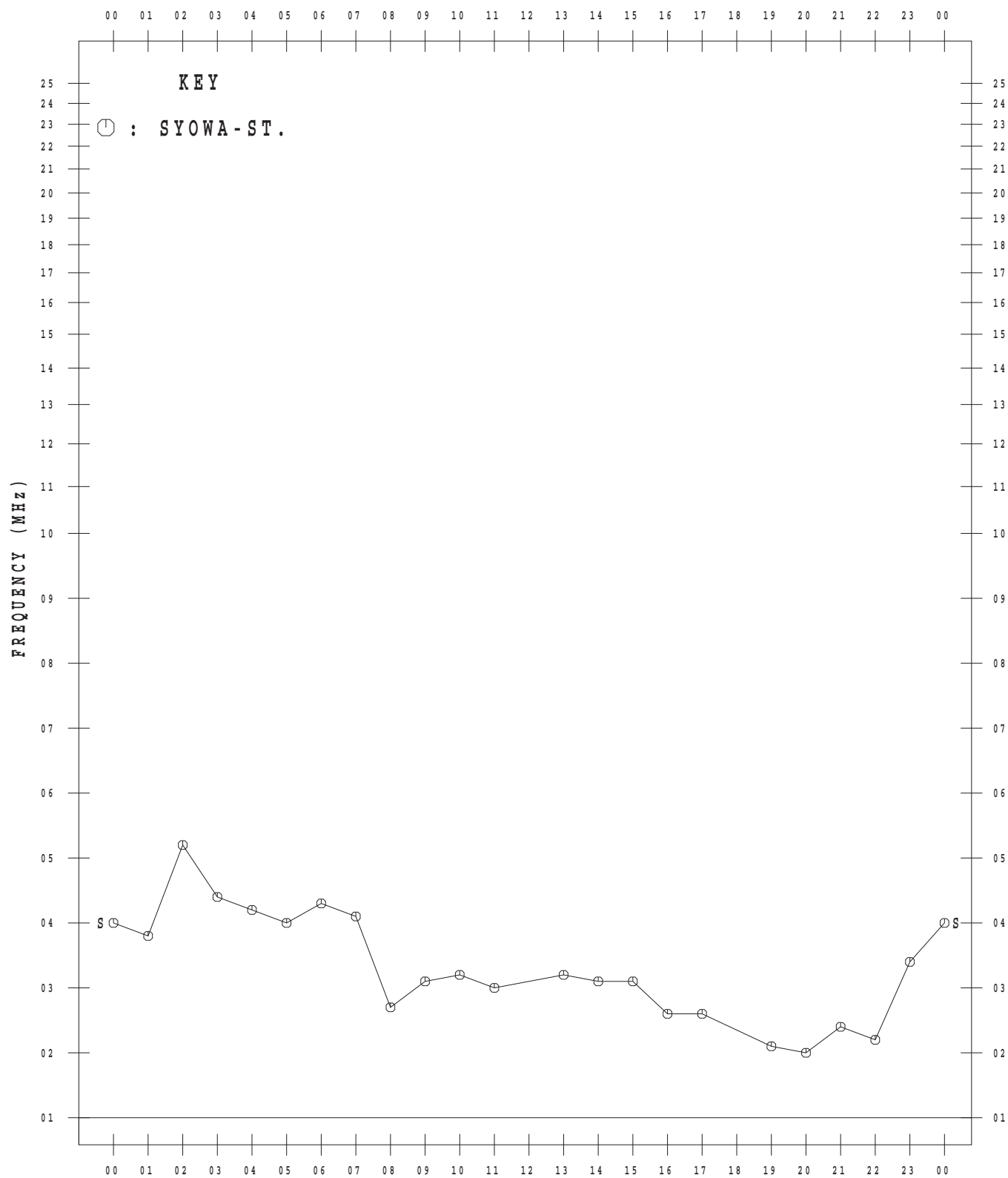
JAN. 2019



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

45°E MEAN TIME

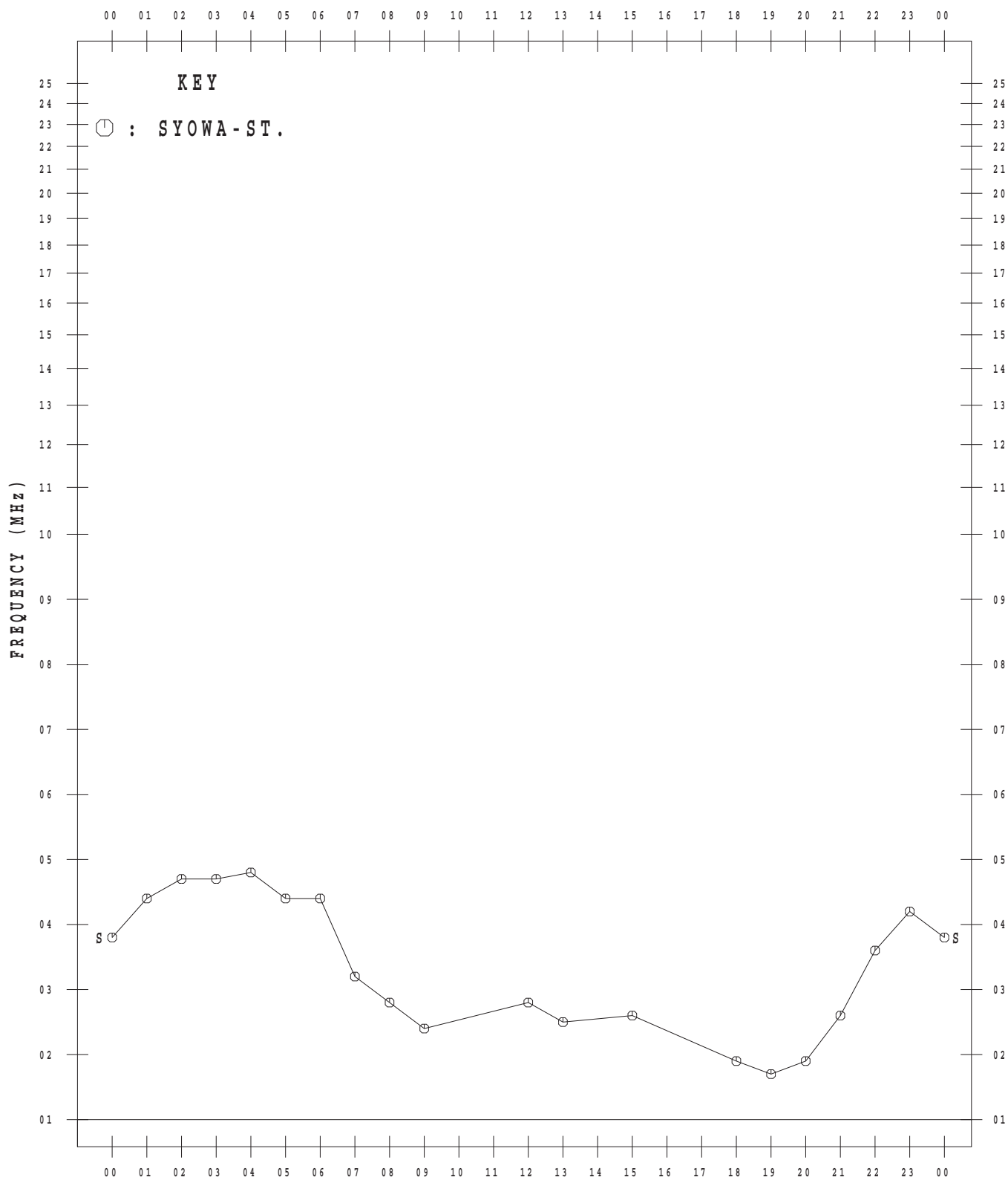
FEB. 2019



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

45°E MEAN TIME

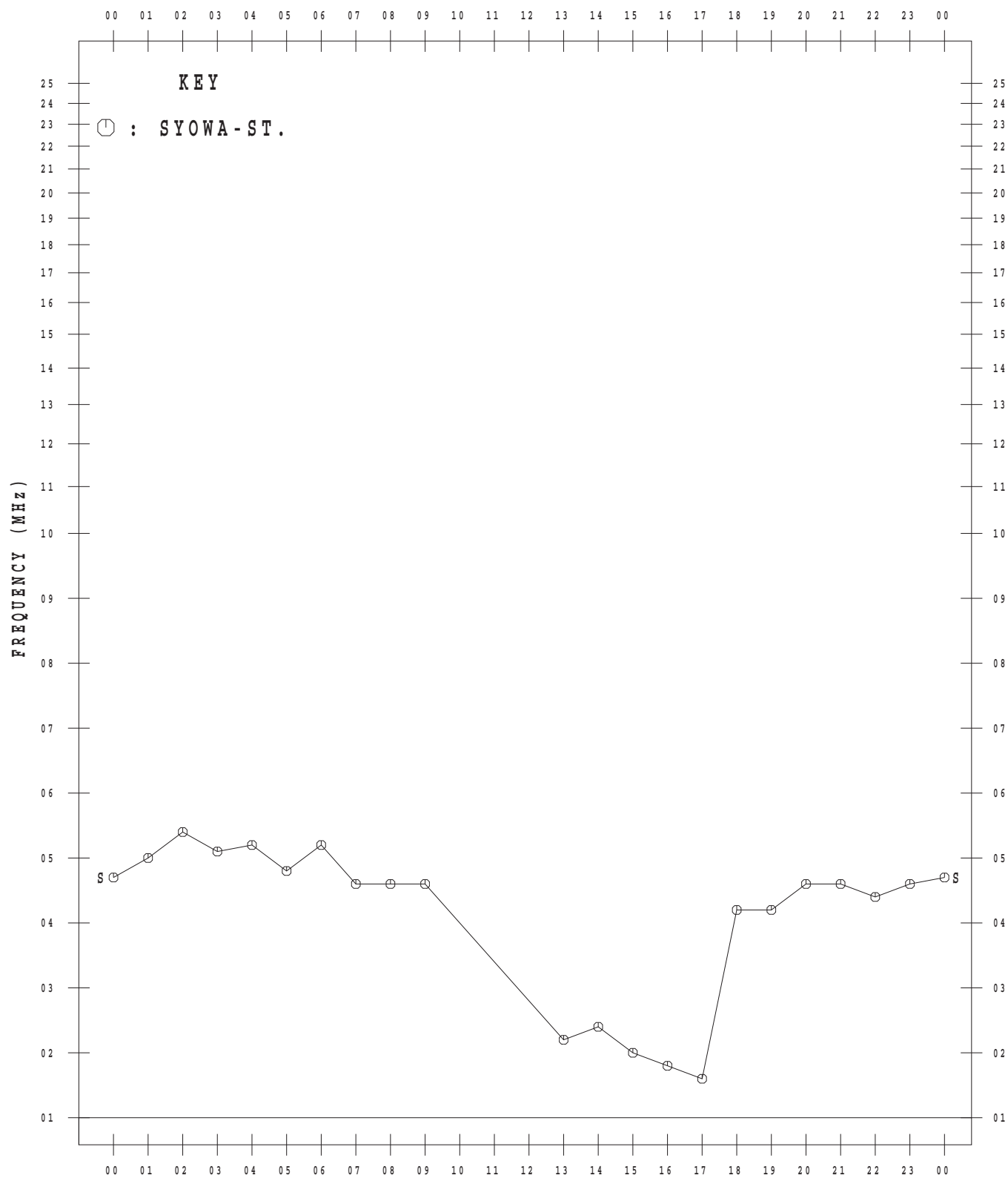
MAR. 2019



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

45°E MEAN TIME

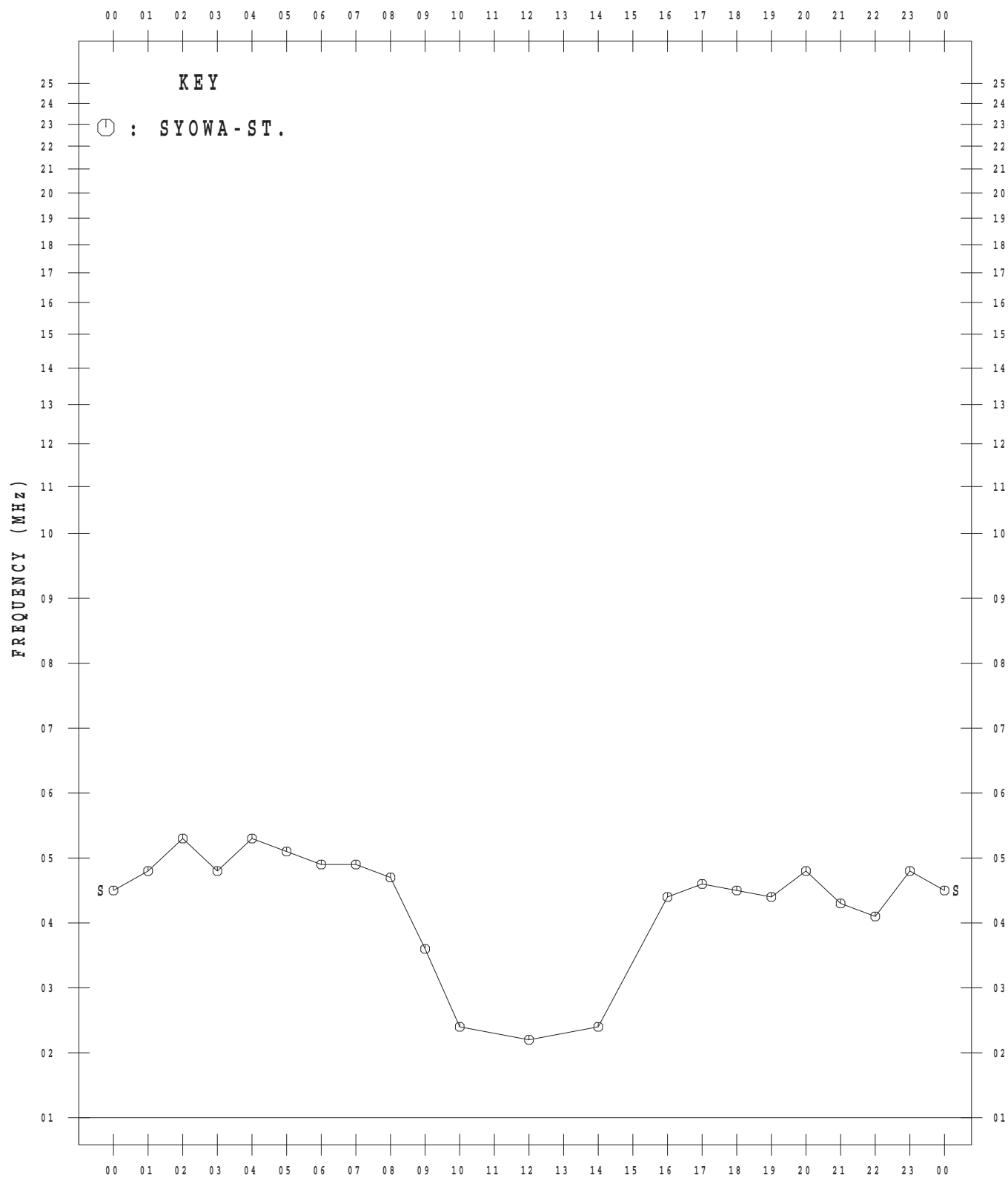
APR. 2019



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

45°E MEAN TIME

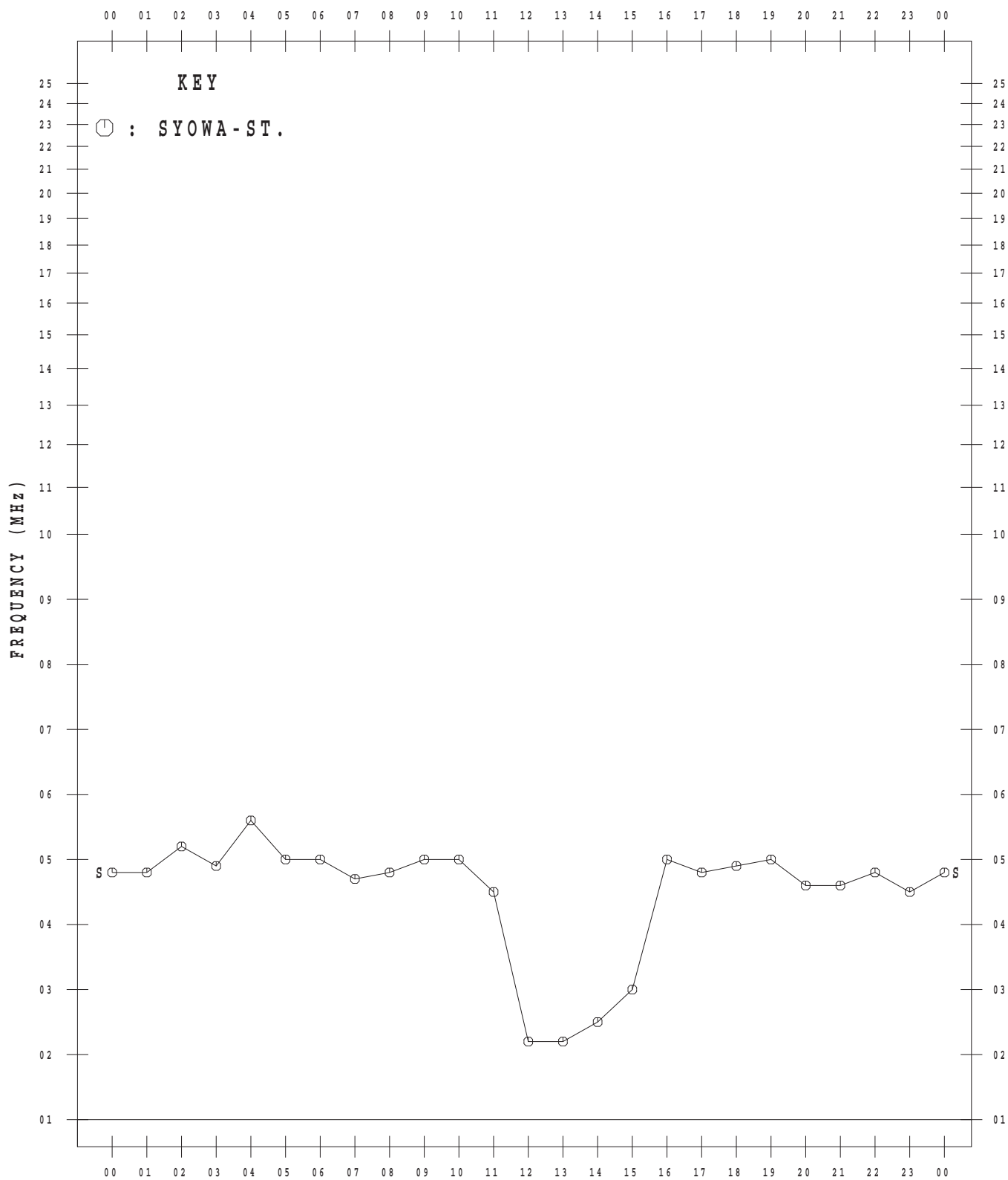
MAY 2019



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

45°E MEAN TIME

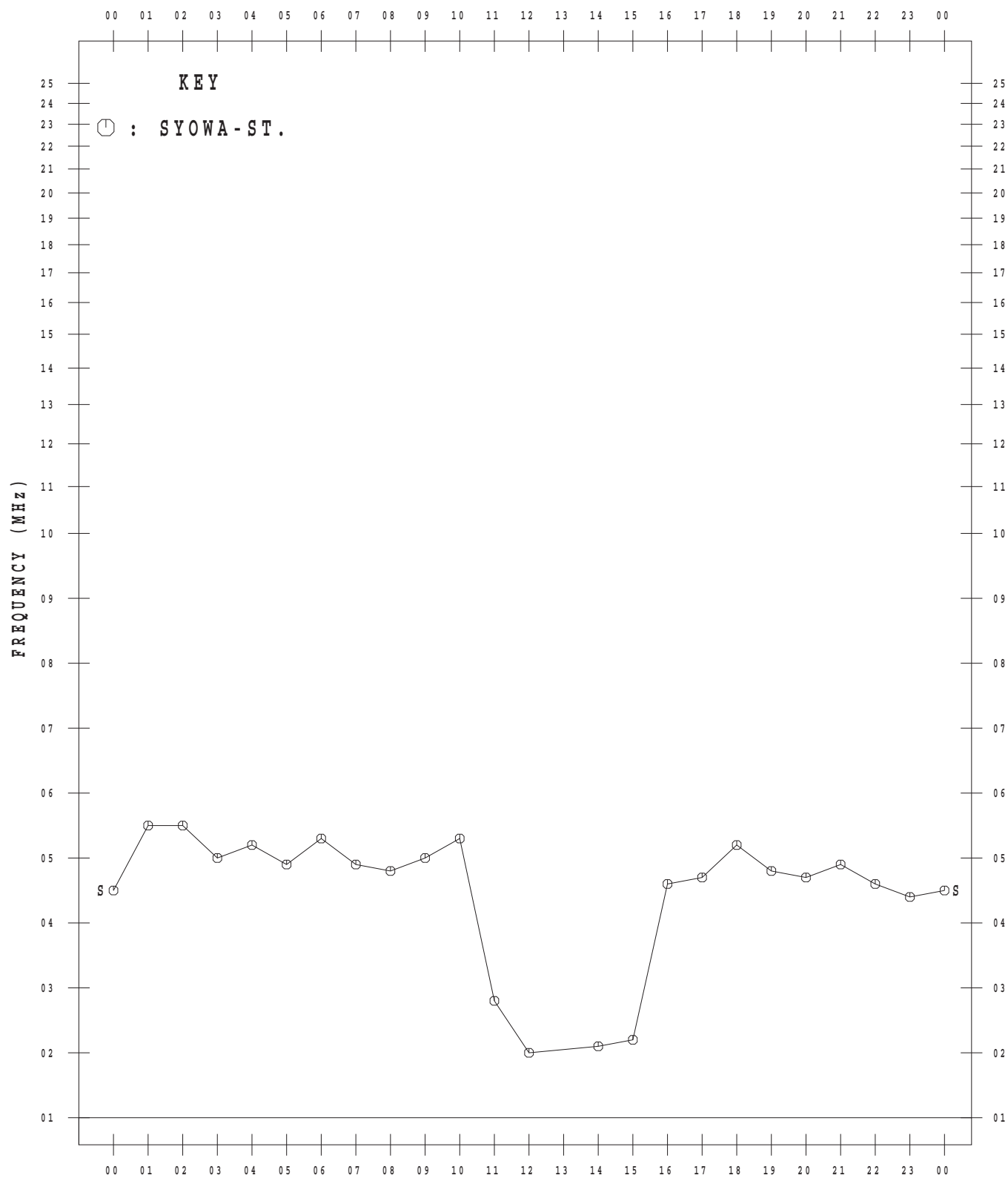
JUN. 2019



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

45°E MEAN TIME

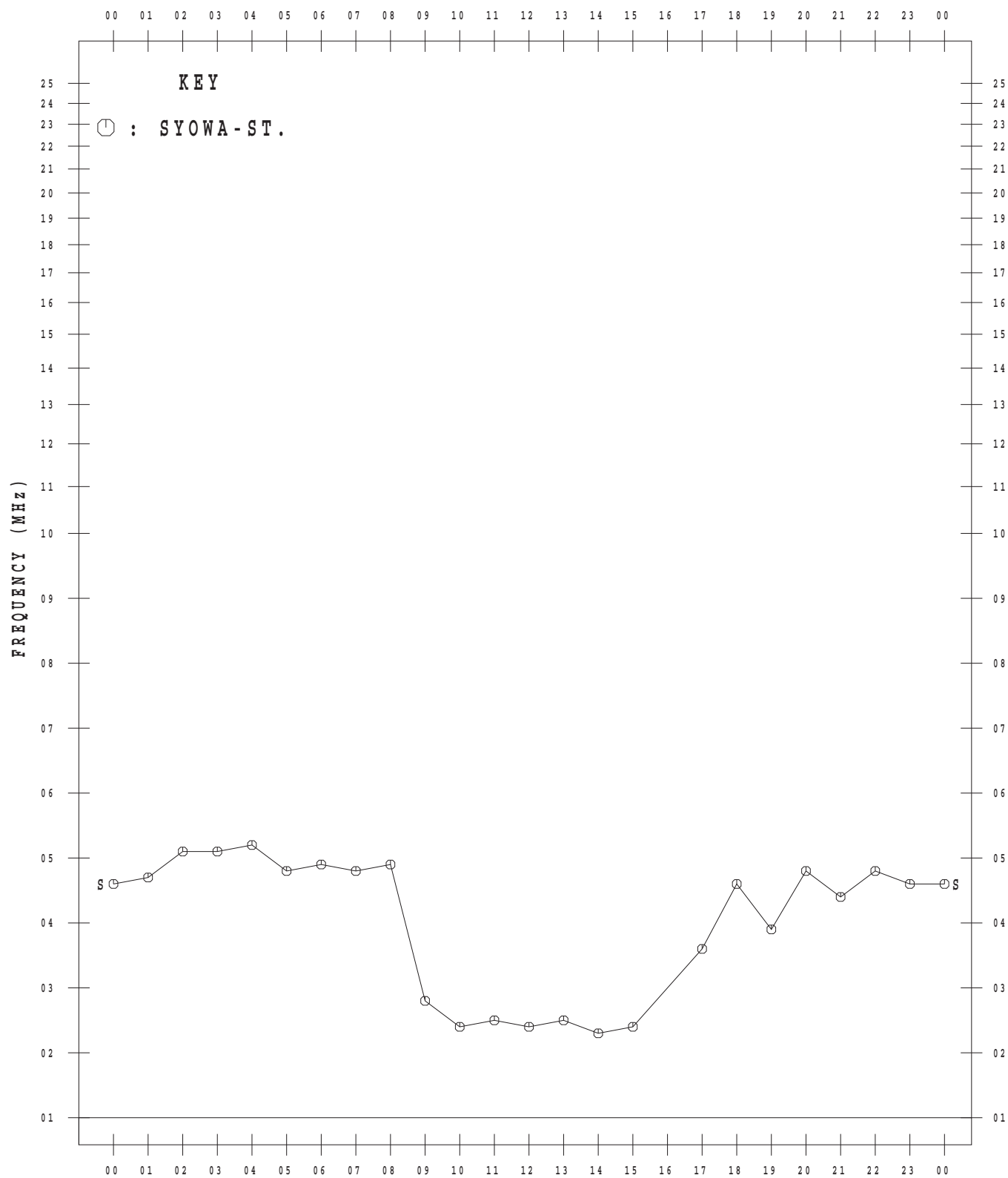
JUL. 2019



# MONTHLY MEDIAN VALUES OF fteS

45°E MEAN TIME

AUG. 2019

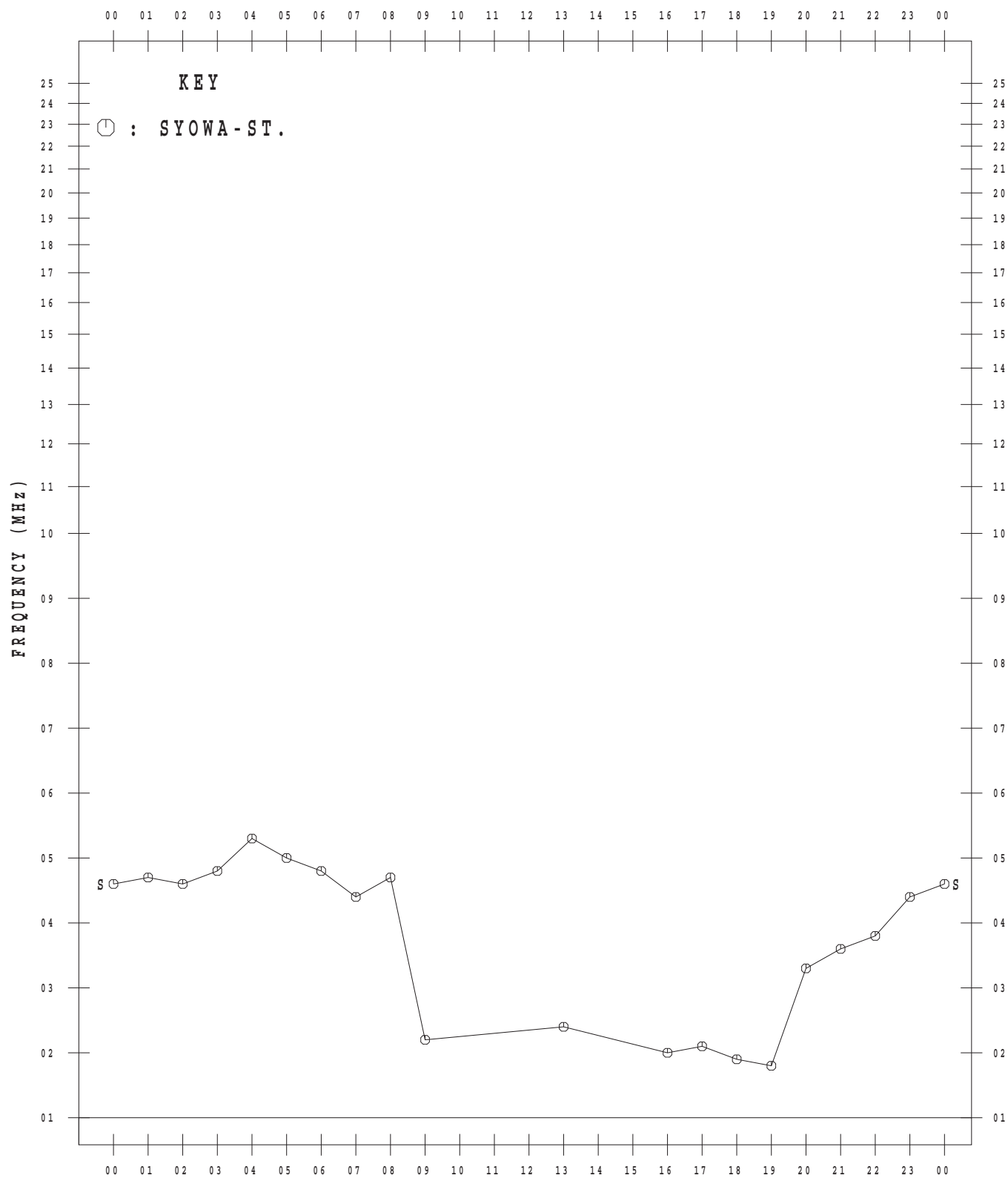




# MONTHLY MEDIAN VALUES OF f<sub>t</sub>E<sub>s</sub>

45°E MEAN TIME

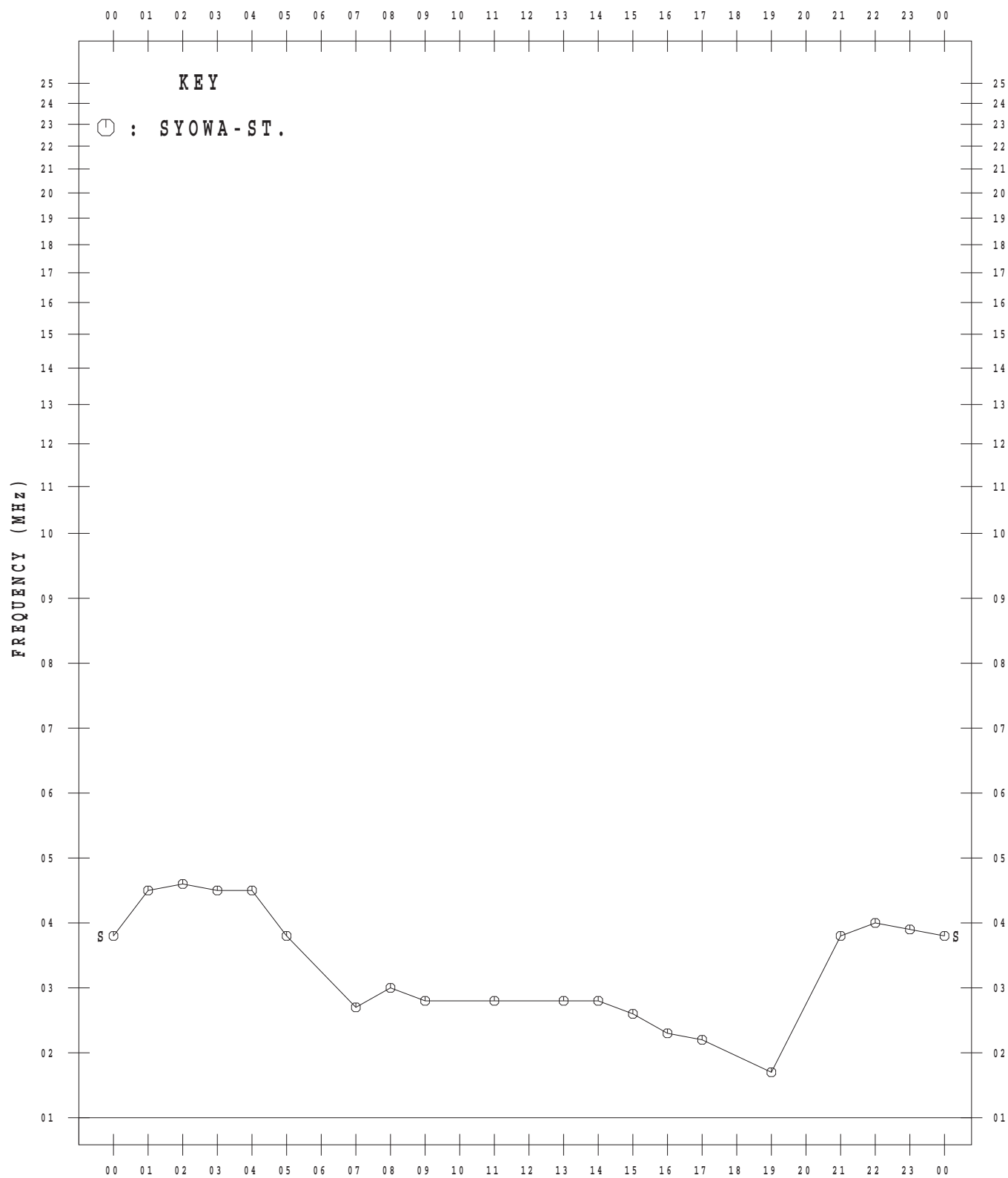
SEP. 2019



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

45°E MEAN TIME

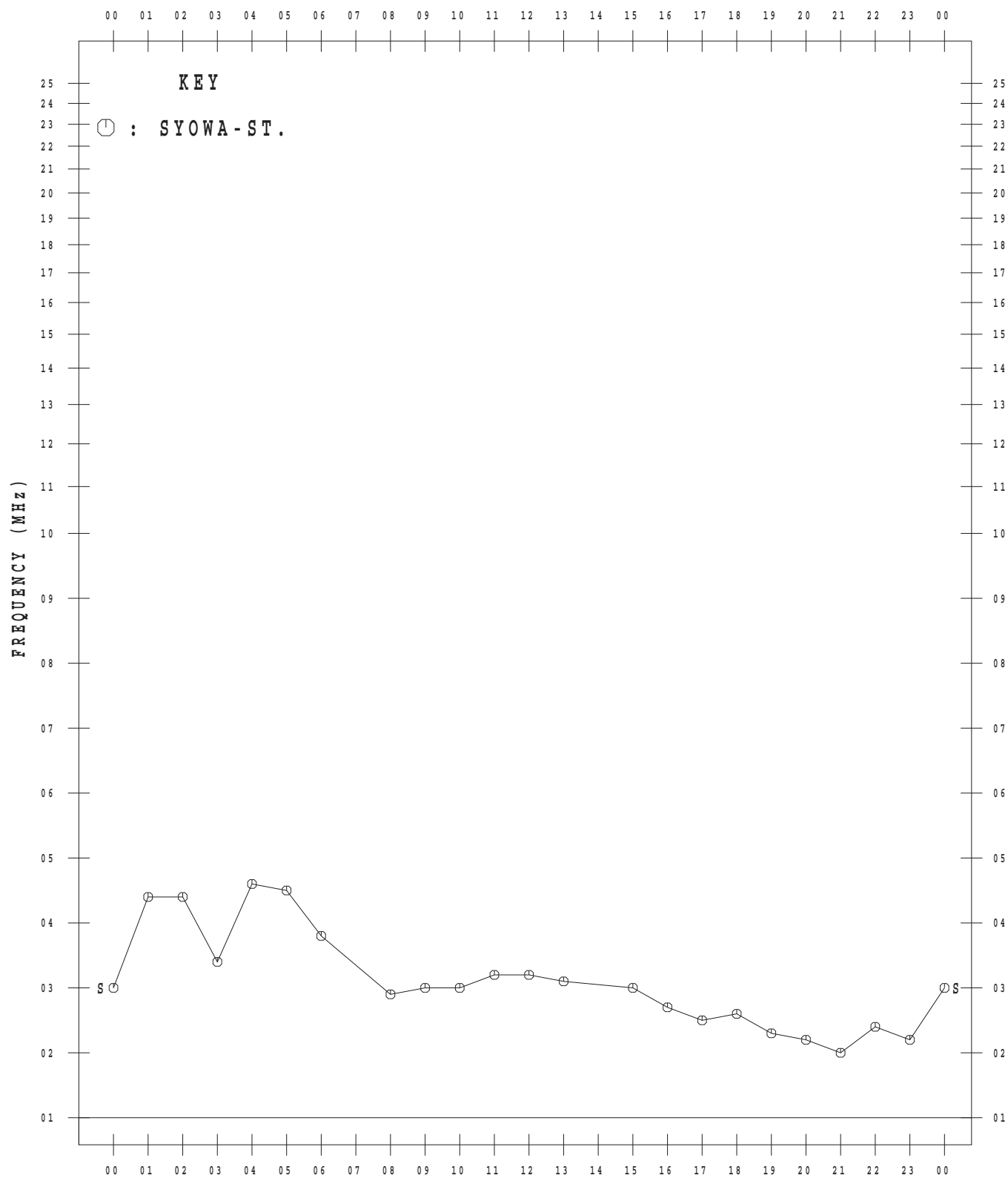
OCT. 2019



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

45°E MEAN TIME

NOV. 2019



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

45°E MEAN TIME

DEC. 2019

