

# IONOSPHERIC DATA AT SYOWA STATION (ANTARCTICA)

January – December 2023

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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 2023. The observations were conducted by the National Institute of Information and Communications Technology. The location of the station, specifications of the ionosonde, and symbols used in this data book are as follows:

Geographic		Geomagnetic *	
Latitude	Longitude	Latitude (Deg.)	Longitude (Deg.)
69°00.4'S	39°35.4'E	- 70.5	87.3

\* 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	Solid State Drive
Power Supply	100 V - AC, 1.5 kVA
Transmitting Antenna and Receiving Antenna	40-m-high vertical delta antennas terminated by 400 $\Omega$

Note: From 2016, this type of FM/CW Ionosonde is 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 atmospheric.
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. 2023 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	52	A	56	56	62	O X	X	A	A	X		X	X	X	X	X	X	X	X	X	X	X	X	X		
2	A	X	53	54	O X	X	54	65	64	63	62	62	63	63	62	64	67	66	64	62	60	57	56	55	54	
3	X	X	B	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O X	X	
4	A	X	A		O X	O X	A	O X	A	A	A	A	A	A	X	X	X	X	B	C	O X	O X	X	X	X	
5	C	X	56	59	48	41	52	60	62	70	72	68		A	A	A	X	X	X	X	X	X	X	X	A	
6	A	88	64	A	X	X	X	X	X	X	X	X	X	X	O X	X	X	X	X	X	X	X	X	X	X	
7	57	57		A	86	53	62	56	63	51	65	72	62	67	64	64	60	61	60	59	48	51	52	52		
8	55	56	59	66	57	52	83		A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
9	X	X	X	X	O X	X	A	X	X	V	X	X	X	X	X	X	X	A	X	X	X	X	X	X	X	
10	X	X	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
11	X	X	A	A	69	55	56	64	62	53	70	68	70	69	75	78	72	67	66	66	66	51	47	50	50	
12	O X	X	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	
13	52	A	A	A	X	X	X	O X	X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	O X	A	
14	84	62	X	X	X	A	54	47	49	63	65	65	63	66	65	55	63	62	63	59	62	61	54	X	O X	
15	A	X	52	64	54	53	A	A	A	A	49	52	O X	O X	O X	O X	A	O X	X	X	X	44	113	52	A	
16	46	57	A	80	A	A	58	54	58	61	62	63	62	62	61	59	59	56	50	46	43	51	51	49	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	X	X	X	A	68	46	X	A	B	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
19	X	X	X	X	X	X	76	83	92	97	86	71	72	68	68	70	68	68	70	66	63	62	62	62	57	
20	X	55	53	56	55	60	63	60	79	75	76	76	76	72	67	68	69	67	67	57	51	55	56	52	52	
21	49	49	55	52	61	56	59	X	A	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
22	C	C	C	C	C	C	C	C	C		X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	
23	A	X	54	60	O X	O X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
24	X	X	X	O X	O X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
25	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O X	X	X	X	X	X	X	X	X	X	X	
26	65	64	70	73	78	85	91	98	100	104	96	96	89	88	82	88	85	70	58	54	55	53	50	55		
27	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
28	48	56	54	60	56	46	72	45		64	71	69	74	82	88	86	72	68	65	58	57	47	46	49		
29	52	56	52	A	X	66	68	80	85	92	89	86	84	91	88	90	88	67	60	60	52	54	58	52		
30	X	X	A	A	X	X	X	O X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
31	50	48	X	59	62	66	60	64	67	75	81	78	75	77	78	76	72	69	61	54	48	47	50	X		
32	47	X	O X	X	O X	X	X	X	X	X	X	X	X	X	X	A	A	X	X	X	X	X	X	X	X	
33	46	48	48	57	59	70	82	90	100	102	98	93	92	89	84	81	79	71	71	69	67	69	67	57	X	
34	O X	X	X	X	X	X	X	X	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
35	59	59	70	64	65	82	91	81	80		74	86	83	88	75	74	73	66	65	57	56	44	48	49		
	00	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	28	22	21	27	27	27	25	24	27	29	28	28	29	28	29	28	29	29	30	30	30	30	25		
MED	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
U Q	52	54	56	58	59	62	66	65	75	76	74	73	72	69	72	70	68	65	61	59	56	54	53	53		
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	
L Q	48	51	55	54	54	55	58	59	62	62	65	64	63	64	66	65	64	60	58	55	52	49	51	50		

JAN. 2023 f<sub>XI</sub> (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 2023 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	F 42	A	F 42	F 44	F 47	48	38	A	A	54	58	56	62	65	66	66	57	50	H	55	48	H	50	44	F 42	41
2	A	47	48	46	48	46	F 58	57	56	56	57	57	56	58	61	60	58	56	54	51	50	49	48	44	44	
3	42	45	B	A	58	70	71	80	80	84	82	82	84	76	70	64	65	65	62	55	49	43	F 47	U 48	R 48	
4	A	50	A	A	R 47	R 66	A	R 57	A	F 52	A	A	A	55	65	F 55	58	B	C	R 60	R 60	51	52	50	50	
5	C	50	F 47	42	35	46	54	56	64	66	62	A	A	A	A	J 39	R	48	51	45	38	J	R	J	R	A
6	A	40	F 46	A	36	36	38	49	54	61	53	54	55	55	54	54	58	54	54	52	56	54	52	50	50	
7	F 45	F 45	A	A	47	A	A	F 42	F 47	45	56	66	56	61	58	58	54	55	54	53	42	45	46	46	46	
8	F 47	F 43	F 47	60	51	46	R	A	A	55	61	57	60	55	58	59	58	60	56	51	52	50	43	46	46	
9	47	47	54	52	52	50	A	54	69	73	71	68	61	60	56	59	A	58	60	55	48	44	46	50	50	
10	50	46	50	A	44	49	51	59	F 55	67	70	65	67	62	64	62	61	60	52	53	48	F 51	52	49	49	
11	47	48	A	A	F 54	49	50	58	A	46	64	62	64	63	69	72	66	61	60	60	45	41	44	44	44	
12	49	44	A	A	A	53	58	63	70	72	72	72	65	66	61	58	57	56	58	56	54	43	45	45	A	
13	46	A	A	A	50	52	64	52	60	46	47	48	52	53	58	64	59	47	51	53	50	43	37	F 47	A	
14	A	F 51	50	48	53	A	F 38	41	43	57	59	59	57	60	59	49	57	56	57	53	56	55	48	R 47	47	
15	A	46	44	48	47	A	A	A	43	A	46	45	46	46	A	59	R	45	44	42	41	38	A	46	A	
16	F 37	F 34	A	A	A	A	F 42	48	52	55	56	57	56	56	55	53	53	50	44	40	37	45	45	43	43	
17	43	44	50	50	65	F 63	66	73	72	75	76	75	71	68	67	64	62	59	56	60	60	57	58	55	55	
18	55	57	F 49	F 56	A	F 54	40	A	B	A	46	59	57	59	64	64	63	59	50	53	52	49	52	52	52	
19	50	45	51	55	62	F 63	F 70	86	91	Z 80	F 57	66	62	R	62	64	62	64	60	57	56	56	56	51	51	
20	49	F 43	F 39	49	54	F 52	Z 54	Z 71	Z 69	C	70	70	70	66	61	62	63	61	61	52	45	49	50	46	46	
21	F 36	43	49	46	55	50	J	R	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22	C	C	C	C	C	C	C	C	C	F 72	77	80	78	77	76	69	69	65	52	49	45	A	42	A	A	
23	A	48	F 46	52	R 55	56	65	77	79	78	79	79	74	69	70	66	66	54	40	43	44	42	48	F 44	44	
24	40	44	F 48	R 48	46	F 48	65	69	72	74	76	79	78	72	70	70	67	62	58	56	60	59	59	62	62	
25	59	58	64	67	72	79	85	92	94	98	90	87	83	82	76	82	79	64	52	48	49	47	44	49	49	
26	42	F 45	F 40	54	50	40	F 64	39	A	58	65	63	68	F 74	82	F 77	66	62	59	52	51	41	40	43	43	
27	F 42	F 39	46	A	52	F 53	62	68	F 71	Z 86	83	80	78	85	82	84	82	61	54	54	46	48	52	46	46	
28	44	42	A	A	53	56	60	54	U	R	61	69	75	72	69	71	72	70	66	63	55	F 43	42	41	44	
29	F 36	42	R	40	52	R	Z	59	F	Z	91	90	91	84	80	75	69	A	A	57	58	55	52	53	45	44
30	F 38	42	42	51	53	64	76	84	94	96	92	87	86	83	78	75	73	65	65	63	61	63	61	51	51	
31	R 53	53	F 53	58	59	F 65	F 80	75	F 58	A	68	F 69	77	78	69	68	67	60	59	51	F 40	38	42	43	43	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	23	28	22	19	26	27	25	25	23	27	29	28	28	29	28	29	28	29	29	30	30	28	30	25		
MED	45	45	48	51	52	52	60	59	69	67	68	67	66	63	66	64	62	59	55	53	50	48	46	46		
U Q	49	48	50	55	55	63	66	74	79	78	76	79	78	74	70	70	66	62	59	55	54	52	52	50		
L Q	F 42	43	F 44	48	47	48	50	53	55	55	57	58	57	58	60	58	58	54	52	49	45	43	44	44		

JAN. 2023 foF2 (0.1MHz)

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## IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 2023 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	51	60	58	32	30	30	72	57	54	37		G	G	G	E B E B E B	36	35	35	33	32	37	30	30	35	40	35		
2	58	38	85	58	31	31	39	47	39	38	36	38	40	40	40	35	35	27	E B E B	30	29	26		G	23	32		
3	91	39		B	52	40	30	30	35	32	38	37	37	37	33	37	38	38		G		32	31	31	44	77		
4	64	41	92	56	31	39	57	35	102	48	122	74	93	131	131	114	43		B	C		62	68	62	28	42		
5	C	A		39	39	27	37	42	73	34	39	39	66	82	J A	67	92	93	39	32	37		G		32	45	49	60
6	60	33	49	68	29	29	29	42	38	39	39	39	40	35	38	36	36	36	36	32	34	34	41	36	19			
7	35	35	52	73	44	40	54	73	33	46		G	47	61	42	48	50	40	35		G		39	26	36	26	35	
8	30	27	34	37	26	41	52	60	60	48	44	44		G	43		G	40	33	32	32	37	47	45	23	22		
9	32	34	34	40	41	51	52	44	40	38	39	38	43	44	44	76	66	37	37	29	29	35	41	38				
10	34	37	72	75	139	49	37		G	41	41	41	41	41	54	44	42	42	38	31	28	39	41	49	42			
11	50	103	59	44	36	30	44	44	61	55	39	41	41	38	44	40	33	32	36	34	39	38	38	39				
12	53	65	53	57	46	42	38	37	39	39	43	35		G		36	36	36	G	32	34	39	28	37	40	48		
13	36	62	48	42	32	31	46	34	47	44	50	56	48	48	43		E B	36	55	42	84	32	40	41	58			
14	57	30	52	44	34	43	30	34	58	95	124	46	40	45	41	35	35	39	41	40	31	24	23	30				
15	51	50	42	38	27	62	62	49	40	56	63	118	113	118	113	37	G	42	34	42	43	29	38	49	55			
16	40	38	68	58	58	35	37	39	44	40	29	38	27	44	38	44	E B	33		G	32	59	26	26	26	35		
17	36	36	39	44	37	39	36	36	34		G	38	36		G	42	40	44	38	38	31	35	86	43	40	29		
18	28	22	28	51	114	80	67	60		B	46	37		G	38		G		G	34	30	30	36	32	31	30		
19	29	35	33	34	28	37	33	34	46	46	43	54	44	34	38	38	35		G		52	43	71	31	24	20		
20	23	23	33	37	28	26	29	32	33	38	45	40	44	48	48	36	36	32	32		G		30	E B	20	20		
21	28	32	34	28	28	29	50	61	67		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
22	C	C	C	C	C	C	C	C		E B E B	40	54	37		G	32	E B	G		G	G		38	40	43	40	108	
23	56	39	30	E B	41	71		G	31	31	35	36	47	38	38	53	43	44	37		G	35	33	37	36	36	42	
24	42	41	41	45	48	42	43		G	42	38	40	48	50	50	50	37	35		G		26	37	53	21			
25	34	21	43	23	25	33	32	33	40	46	47	56	39	39	61	64	39		G		34	31	33	24	20	18		
26	37	33	30	31	59	39	45	44	54	35	35	52		G	G	G	43	54	38	34	50	63	39	36	40			
27	40	28	24	89	32	31	33	32		G	34	37	37	48	47	66	36	54	30	E B	30	35	28	22	20	20		
28	28	32	50	54	41	34	50	45	50	50	41	38	36	32	53	36	31	40	34		G		27	24	34	37		
29	27	49		G E B E B	44	40	39	36	36	36	34	35	39	E B	36	38	52	146	78	90		G	25	24		19	G	
30	24	52	35	38	40	30		G	G	30	33	41		G	36	57	60	51	70	47	52	30	25	33	22	18	18	
31	42	39	39	39	22	28	28	G	36	42	56	61	53	38	38	E B	39		G	39	32	30	27	38	37	39	G	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT	29	29	29	30	30	30	30	30	29	30	30	30	30	30	30	30	30	29	29	30	30	30	30	30	30			
MED	37	37	41	44	34	36	38	36	40	40	39	40	40	42	43	39	37	34	32	34	32	36	36	35				
U Q	52	45	52	56	44	41	50	47	52	46	47	52	48	48	51	50	42	38	36	39	39	40	40	42				
L Q	30	32	34	38	28	30	32	34	34	38	37	37	36		G	G	38	36	35		G	G	28	28	26	23	20	

JAN. 2023 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 2023 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	11	16	12	10	10	16	24	16	10	14	16	32	23	35	35	34	11	16	9	14	10	10	14
2	16	16	17	38	11	15	17	12	15	10	10	18	15	12	12	14	11	23	30	29	14	12	14	12
3	14	20	B	15	16	12	6	10	7	11	12	13	9	17	13	10	12	14	16	9	10	9	11	7
4	9	13	8	9	7	9	9	10	12	24	16	17	38	16	16	16	24	B	C	12	9	8	7	7
5	C	12	10	8	7	7	11	10	9	7	8	8	13	11	8	8	8	12	8	11	8	11	14	6
6	9	8	8	8	11	9	10	8	8	9	8	8	10	10	10	10	11	10	9	7	8	9	8	8
7	9	10	8	8	10	9	8	7	11	16	21	15	15	15	14	12	11	12	11	11	10	8	8	8
8	12	17	14	10	7	11	10	14	14	14	17	18	17	12	12	11	14	15	15	11	12	17	7	8
9	7	8	7	12	8	12	15	9	7	8	8	8	20	9	13	9	10	10	7	7	8	7	12	8
10	7	14	10	12	12	16	11	11	13	12	10	10	10	10	11	11	11	12	9	11	10	13	11	14
11	14	10	16	9	12	14	10	10	14	15	12	14	10	10	9	10	12	14	19	16	10	8	8	7
12	20	10	24	20	13	10	11	11	8	12	14	16	29	14	19	12	17	10	12	11	7	7	9	16
13	8	14	10	9	14	11	15	12	14	16	27	21	22	28	20	22	36	32	39	18	12	11	9	8
14	10	8	8	18	9	10	8	9	10	14	36	33	16	14	16	14	13	10	15	18	14	11	8	9
15	15	12	8	8	10	10	16	16	14	12	10	31	24	17	22	20	30	19	14	9	8	7	10	16
16	5	8	21	8	6	8	8	12	10	15	15	12	13	28	12	19	33	17	9	9	9	7	7	6
17	8	11	15	8	18	13	9	8	22	19	13	13	16	16	13	14	11	10	9	9	9	9	6	7
18	7	7	7	22	8	7	10	37	B	35	20	18	14	14	16	16	12	10	8	11	10	8	7	7
19	8	7	11	8	11	8	8	8	10	25	13	14	13	13	12	15	16	14	23	26	16	8	9	7
20	8	8	7	8	10	11	8	8	10	8	10	11	13	12	9	15	13	15	10	10	15	30	13	12
21	10	11	11	12	12	12	12	13	18	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22	C	C	C	C	C	C	C	C	C	15	54	37	26	24	40	15	11	14	11	9	14	12	11	9
23	16	12	17	41	24	20	10	10	8	9	12	15	15	14	8	8	11	8	10	9	9	8	8	20
24	8	10	17	32	30	14	8	8	8	10	9	10	16	14	16	16	11	8	8	10	9	7	6	6
25	6	6	6	7	6	7	6	9	9	9	15	14	11	31	21	14	14	10	8	9	17	11	7	9
26	10	9	10	7	10	10	16	11	12	9	7	23	26	25	24	17	22	20	16	14	12	6	8	8
27	8	8	8	14	14	9	8	8	9	13	13	17	21	20	12	12	11	11	30	10	10	9	10	10
28	8	9	17	31	24	14	14	30	17	12	16	26	18	28	17	12	15	18	18	19	9	12	8	8
29	8	12	16	44	40	14	11	7	10	10	15	30	35	11	10	11	11	8	8	8	14	17	8	8
30	8	9	12	10	14	10	10	9	9	9	10	10	12	13	13	13	12	12	11	12	12	9	8	7
31	15	8	10	15	8	8	8	12	14	12	14	15	15	18	39	18	15	13	11	8	9	10	23	17
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30	30	30	30
MED	8	10	10	11	11	10	10	10	10	12	13	15	16	14	13	14	12	12	11	10	10	9	8	8
U Q	13	12	16	18	14	13	12	12	14	15	16	18	22	20	19	16	16	15	16	12	14	11	11	12
L Q	8	8	8	8	8	9	8	8	9	9	10	12	13	12	12	11	11	10	9	9	9	8	8	7

JAN. 2023 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 2023 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 318	A	A	A	252	246		A	A	A	200	194	198	212	230	E B 220	208	208	192	212	E A 246	230	E A 252	E A 300	A	
2	A	A	A	B	E A 264	E A 248	E A 278		A	E A 234	196	190	H 198	210	H 186	216	198	H 210	214	H 214	H 226	E A 226	E A 212	E A 240	A	
3	204	A	B	A	A	260	210	202	188	200	200	216	200	206	204	196	H 210	206	196	204	E A 230	E A 270	192	224	A	
4	A	A	A	A	A	200		A	196	188	A	A	A	A	238	198	244	E A 242	B	C	A	E A 280	E A 272	H 156	H 150	
5	C	314	E A 302	E A 284	E A 256	E A 236	218	198	H 186	224	204		A	A	110		A	A			E A 264	E A 296	A	A	A	
6	A	A	176	A	E B 264	238	222	198	206	218	198	198	214	208	216	206	132	208	140	122	254	E A 264	118	208		
7	A	A	A	A	A	206		A	A	212	180	240	226	228	192	224	198	198	212	218	242	202	304	A	E A 264	
8	A	E A 310	226	202	218	270		A	A	A	E A 272	E A 272	216	204	224	198	206	224	214	214	228	E A 248	E A 260	A	E A 254	
9	E A 274	E B 290	A	E A 274	212			A	A	A	H 208	196	216	210	230	212	208		A	210	230	236	236	228	A	
10	A	E A 300	A	A	A	A	270	E A 230	208	196	204	204	214	230	212	198	198	H 228	198	236	266	244	322	278		
11	E A 286	E A 264	A	A	232	238	330	290	A	H 176	218	232	214	210	216	218	210	220	238	238	252	298	270	314	A	
12	A	212	A	A	A	A	340	E A 258	210	208	218	204	218	218	230	216	218	228	H 224	240	240		A	A	A	
13	188	A	A	A	E A 352	290		A	A	A	250	234	210	198	226	226	226	258	352	264	248	298				
14	A	A	A	E A 346	E A 306		212		A	E A 260	224	236	214	214	208	200	212	240	E A 234	232	E A 236	E A 234	246	208	A	
15	A	A	A	E A 288	A	A	A	A	A	A	A	E A 230	E A 258	E A 260		220	238	E A 260	E A 260	276		A	A	204	A	
16	H	A	A	A	A	A	230		A	E A 266	222	222	222	212	212	212	218	226	226	224	E A 306	238	266		E A 278	
17	E A 306	E A 300	E A 342	E A 326	E A 270	252	250	202	216	226	210	210	202	198	210	210	208	208	210	228	218	242	248	252		
18	E A 254	E A 246	E A 264	A	A	A	A	A	B	A	202	192	192	212	220	228	214	208	202	202	E A 250	E A 262		256		
19	E A 278	E A 302	202	A	E A 298	272	H 234	H 204	242	E A 242	E A 216	216	216	202	220	216	220	212		A	E A 250	E A 244	E A 244	E A 264	E A 258	
20	E A 316	A	A	A	A	198	214	202	214	200	198	232	224	218	224	214	206	218	218	274	262		250	A	A	
21	A	A	A	A	E A 250	A	A	A	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
22	C	C	C	C	C	C	C	C	C		B	E B 234	216	216	218	214	214	214	240	250	E A 300	A	A	A	A	
23	A	A	A	E B 424	E A 248	A	H 224	218	218	208	202	202	204	210	204	204	204	194	242	260	E A 260	E A 288				
24	A	A	A	A	E A 288	250	220	232	218	204	200	198	198	208	262	214	198	228	208	244	E A 238	E A 246	E A 250			
25	E A 242	E A 280	E A 280	E A 282	282	246	226	222	230	216	230	244	200	236	224	232	222	204	248	272	E A 296	232	238	252		
26	A	A	206	284	E A 286	206		A	A	A	216	198	202	194	220	234	E A 228	218	238	E A 256	E A 282			218		
27	A	A	212	A	E A 258	242	214	214	210	198	212	228	222	224	206	306	E A 220	236		A	256	E A 250	E A 238	E A 238		
28	A	A	A	A	E A 294	A	A	A	A	E A 230	224	216	214	244	196	222	204	214	202	210	E A 246	232		A		
29	248	A	A	B	E B 348	E A 314	290	206	206	206	206	206	192	190	296				A	A	208	198	238	238	250	242
30	A	292	E A 350	A	E A 280	230	214	210	210	188	200	202	202		E A 246		200	E A 276	200	222	E A 228	E A 242	E A 236	E A 236		
31	200	234	A	E A 262	E A 280	248	214	202		A	A	218	196	218	224	204	206	216	222	248	200				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	12	10	9	17	22	19	18	19	26	25	28	28	29	28	26	28	28	28	28	29	23	18	18		
MED	E A 264	E A 291	245	E A 284	E A 270	243	226	206	212	208	203	212	212	211	216	210	212	214	218	220	E A 244	E A 250	E A 243	E A 232		
U Q	E A 296	E A 301	E A 302	E A 336	E A 293	272	270	222	232	222	220	228	216	221	224	220	223	223	237	258	E A 261	E A 270	E A 250	E A 258		
L Q	223	255	206	E A 268	250	238	218	202	208	196	198	202	201	200	209	204	207	208	211	224	230	238	232	224		

JAN. 2023 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 2023 fxI (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	X 49	A	A	A	X 46	A	O 59	X 59	X 63	X 67	X 68	X 68	X 72	X 72	C	X 70	X 68	X 66	X 65	X 58	X 61	X 56	X 48	A
2	A	X 46	A	O 60	A	X 54	X 54	X 59	X 60	X 65	X 64	X 64	X 64	X 64	X 61	X 67	X 60	X 66	X 62	X 58	X 55	X 58	X 56	X 45
3	X 51	X 46	X 50	A	X 52	X 56	X 43	A	X 65	X 75	X 70	X 69	X 76	X 78	X 74	X 72	X 71	X 67	X 67	X 56	127	A	A	A
4	X 54	X 44	X 53	X 58	A	A	X 59	X 47	A	X 62	X 60	X 64	X 64	X 65	X 66	X 64	X 62	X 65	X 63	X 60	X 57	X 58	X 58	X 59
5	X 59	X 62	X 62	X 52	X 56	X 67	X 73	X 58	X 81	X 79	X 92	X 85	X 83	X 92	X 86	X 79	X 77	X 72	X 72	X 66	X 67	X 65	X 56	X 52
6	X 58	X 56	X 56	X 55	X 65	X 54	X 64	X 53	X 76	A	X 52	X 52	X 62	X 63	X 63	X 69	X 68	X 64	X 60	X 59	X 55	X 46	A	A
7	X 55	X 59	A	A	X 46	X 56	X 56	A	A	A	A	O 49	X 59	X 64	X 69	X 69	X 65	X 61	X 52	X 45	X 44	X 77	A	A
8	A	X 44	A	A	A	O 51	X 48	X	A	O 50	X 54	X 52	X 50	X	B	X 59	X 61	X 60	X 58	X 60	X 61	X 48	X 45	X 43
9	A	B	A	A	O 58	X	A	A	A	A	X 60	X 60	B	X 61	X 54	X 61	X 64	X 62	X 61	X 54	X 54	X 52	A	A
10	X 94	X 54	X 56	B	A	A	A	A	X 65	X 59	X 64	X 68	X 53	X 66	X 67	X 69	X 69	X 64	X 58	X 53	X 54	X 58	X 58	X 59
11	X 59	R	X 51	X 52	X 51	X 53	X 55	R	X 63	B	B	X 61	X 63	X 67	X 65	X 66	X 66	X 66	X 60	X 64	X 61	X 60	X 58	X 55
12	X 54	X 52	X 55	X 57	X 56	X 51	X 60	X 56	X 59	X 61	X 71	X 75	X 75	X 72	X 74	X 76	X 73	X 71	X 67	X 67	X 64	X 45	X 46	X 39
13	O 40	X	A	A	X 56	X 66	X 61	X 70	X 83	X 85	X 95	X 96	X 92	X 88	X 84	X 84	X 77	X 77	X 76	X 70	X 70	X 64	X 61	X 56
14	X 46	X 55	X 54	X 58	X 79	X 68	X 70	X 84	X 99	X 106	X 101	X	X 107	X 106	X 100	X 98	X 88	X 90	X 81	X 72	X 68	X 54	X 59	R
15	X 57	A	X 47	A	X 62	X 75	X 78	A	A	A	X 52	A	A	X 53	X 74	X 85	X 78	X 54	R	A	A	X 59	X 45	X 92
16	A	X 52	X 50	X 36	X 47	X 47	X 54	X 65	X 45	X 54	A	X 53	X 63	X 65	X 70	X 59	X 54	X 71	X 68	A	X 56	X 48	X 47	A
17	O 46	X 44	X 41	X 48	X 43	A	X 50	X 52	A	X	X 62	X 56	X 64	X 68	X 61	X 66	X 65	X 63	X 62	X 60	X 62	X 58	X 54	X 48
18	O 50	X 49	X 54	X 58	X 62	X 72	X 78	X 88	X 85	X 95	X 95	X 91	X 91	X 98	X 90	X 83	X 80	X 78	X 78	X 75	X 68	X 60	X 56	A
19	X 52	X 51	O 45	X 45	A	X 64	X 64	X 76	X 93	X 87	X 84	X 89	X 89	X 89	X 95	X 92	X 89	X 86	X 70	X 61	X 68	X 58	X 43	A
20	X 56	X 50	X 58	X 58	X 62	X 79	X 80	X 93	X 101	X 106	X 106	X 108	X 107	X 107	X 103	X 97	X 93	X 85	X 78	X 81	X 66	X 56	X 54	X 59
21	X 80	O 45	X 51	X 53	X 56	A	A	X 55	X 62	A	X 77	X 74	X 70	X 82	X 92	X 76	X 62	X 60	X 65	X 55	X 57	X 56	X 47	X 39
22	X 46	X 56	X 39	A	X 64	X 52	X 62	X 74	X 79	X 78	X 78	X 80	X 87	X 89	X 87	X 87	X 96	X 85	X 80	X 71	X 58	X 50	A	A
23	A	A	X 65	X 46	X 57	X 47	A	A	A	A	X 56	X 67	X 72	X 78	X 88	X 88	X 87	X 76	X 54	X 62	X 68	A	R	A
24	O 44	X	A	A	X 56	X 55	X 59	X 64	X 75	X 75	X 81	X 86	X 86	X 75	X 80	X 75	X 69	X 67	X 65	X 64	X 60	X 61	X 54	X 53
25	X 53	X 57	X 55	X 52	X 54	X 56	X 65	X 76	X 91	X 93	X 100	X 100	X 98	X 98	X 99	X 99	X 102	X 102	X 76	X 57	A	X 70	X 93	A
26	A 47	O 47	A	O 48	X 50	X 53	X 60	B	O 64	X 80	X 83	X 73	X 84	X 84	X 80	X 83	X 75	X 66	X 67	X 62	X 54	X 49	X 45	A
27	A	A	X 58	A	A	B	A	A	B	B	R	A	B	B	B	B	O 44	X 45	X 50	X 50	X 54	X 79	X 89	A
28	A	A	A	A	A	B	R	O 40	A	B	A	B	B	O 58	X 61	X 63	X 57	X 59	X 59	X 56	X 54	X 42	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	20	19	20	17	20	20	22	19	19	20	23	24	24	26	26	27	28	28	27	26	27	24	20	14
MED	X 54	X 51	X 54	X 53	X 56	X 56	X 60	X 59	X 75	X 75	X 71	X 68	X 74	X 74	X 74	X 75	X 69	X 66	X 65	X 61	X 58	X 56	X 55	X 52
U Q	X 58	X 56	X 57	X 58	X 62	X 66	X 70	X 76	X 85	X 90	X 92	X 86	X 88	X 89	X 88	X 85	X 79	X 76	X 70	X 66	X 66	X 60	X 58	X 59
L Q	X 48	X 46	X 50	X 48	X 50	X 53	X 55	X 53	X 63	X 62	X 60	X 62	X 64	X 64	X 66	X 66	X 62	X 62	X 60	X 56	X 54	X 50	X 47	X 42

FEB. 2023 fxI (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 2023 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E pSWEEP 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	43	A	A	A	40	A	53	53	57	61	62	62	66	66	C	64	62	60	59	52	55	50	42	Z	A				
2	A	40	A	R	A	48	U	R	H	54	59	58	58	58	55	61	54	55	F	56	52	49	52	50	39				
3	F	J	R	A	46	50	R	A	59	69	64	63	70	72	68	66	65	61	61	50	A	A	A	A					
4	F	F	37	46	A	A	53	41	A	56	54	58	F	F	55	60	58	56	59	57	54	51	52	52	53				
5	53	56	F	46	50	52	F	F	R	F	F	F	F	77	86	80	73	71	66	66	60	61	59	51	46				
6	A	50	F	49	R	R	58	J	R	F	A	46	46	56	57	57	F	62	58	54	53	49	40	A	A				
7	49	R	A	A	40	50	52	A	A	A	A	R	43	53	58	63	63	F	56	55	46	39	38	A	A				
8	A	F	A	A	A	A	R	R	A	R	R	R	R	B	53	55	54	R	52	54	55	F	32	39	A	R			
9	A	B	F	A	A	R	A	A	A	R	R	41	53	54	B	55	48	55	58	56	55	48	48	46	A	A			
10	A	F	F	B	A	A	A	A	44	53	58	R	F	F	56	61	63	63	58	52	47	48	39	F	A	46			
11	F	J	R	R	J	R	49	R	57	B	B	55	57	61	59	60	60	60	60	54	58	55	54	52	49				
12	48	46	49	44	50	45	54	50	53	55	65	69	69	66	68	70	67	65	61	61	58	39	40	33					
13	34	A	A	45	51	55	64	72	79	89	90	86	82	78	78	71	71	70	64	64	58	55	50	36					
14	38	F	F	E	A	62	F	Z	F	F	F	B	101	100	94	J	R	82	84	75	66	62	42	49	A				
15	39	A	41	A	56	F	72	A	A	A	46	A	A	47	68	79	72	48	R	A	F	49	39	33					
16	A	46	44	R	41	41	R	48	59	39	48	A	47	57	59	R	R	64	53	48	65	40	F	45	42	41			
17	R	F	35	F	37	A	44	46	A	56	50	58	F	55	60	59	57	56	54	56	52	48	42	28	F				
18	R	F	F	52	56	66	72	66	F	F	F	Z	Z	Z	F	77	74	72	72	69	62	54	A	A	A				
19	46	F	R	39	A	F	54	58	Z	Z	81	78	83	83	83	89	86	83	80	64	55	62	52	37	R	A			
20	F	44	52	52	F	F	74	87	88	100	100	102	101	101	101	97	91	87	79	72	75	60	39	48	F	J	R	A	
21	74	R	45	F	Z	A	A	49	52	F	A	71	68	64	69	86	70	56	54	F	53	49	48	45	41	33	A	A	
22	A	F	33	A	F	46	56	64	63	72	72	74	81	83	81	81	90	79	74	65	52	32	A	A	A	A	A		
23	A	A	F	40	51	41	A	A	A	A	50	61	66	72	F	78	82	81	70	48	38	A	A	A	A	A	A		
24	R	A	A	A	F	45	49	53	58	60	69	75	80	80	69	74	69	63	61	59	58	54	55	48	47	R	A	A	
25	47	51	49	Z	48	50	59	70	85	87	94	94	92	92	93	93	96	F	90	70	51	A	A	49	R	A	A		
26	A	R	A	A	R	R	54	B	R	58	74	77	67	78	78	74	77	70	60	61	56	R	48	43	39	R	A	A	
27	A	A	52	A	A	B	A	A	B	B	R	A	B	B	B	B	R	R	38	39	44	40	48	A	A	F	39	A	
28	A	A	A	A	A	B	R	R	A	B	A	B	B	R	52	55	57	R	51	53	53	50	48	36	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	17	19	20	16	20	20	22	19	19	20	23	24	24	26	26	27	28	28	27	26	25	22	17	13					
MED	42	40	44	46	48	50	54	53	58	66	65	62	68	68	68	69	63	60	57	54	51	46	48	39					
U Q	48	46	46	50	51	53	59	70	79	78	78	77	81	83	80	79	73	70	64	60	58	52	50	46					
L Q	38	F	40	40	42	47	R	R	53	56	53	56	56	57	60	59	56	56	53	50	48	39	40	33					

FEB. 2023 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 2023 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	E B 22	49	53	55	58	66	42	42	43	G	34	37	37	37	C	34	30	25	29	26	24	G	16	83	
2	82	42	71	58	58	42	45	40	35	32	36	36	36	34	36	35	33	40	30	45	29	40	80	17	
3	36	46	47	48	36	38	36	55	49	G	38	44	64	55	45	46	53	44	34	G	G	52	57	50	
4	43	29	33	21	107	53	38	50	110	50	33	G	G	G	G	32	32	27	G	G	G	23	21	22	16
5	18	37	G 26	29	27	24	30	37	35	32	G	36	39	46	54	38	34	34	28	28	28	28	20	32	
6	46	36	35	36	58	51	46	52	58	80	50	50	36	59	46	40	E B 31	30	30	66	45	34	99	58	
7	39	66	92	58	40	37	36	62	48	82	54	40	G	G	G	39	G	31	G	31	36	50	49	48	
8	74	31	52	54	59	48	37	37	59	E B 40	43	G	62	B E B 36	B	G	E B 36	36	30	24	30	42	104		
9	50	B	44	69	97	23	60	52	52	42	42	E B 34	B E B 42	B	G	G	G	33	36	24	E B 24	92	50		
10	68	30	30	B	62	48	86	41	48	44	50	40	40	G E B E B 35	34	38	G	34	30	34	25	42	K 48		
11	K 32	54	43	58	108	53	34	47	34	B	B	G	G	G	G E B 36	32	E B 30	30	34	28	22	19	15		
12	36	31	27	35	45	46	43	42	48	48	41	E B E B E B 52	40	38	G	47	G	G	36	25	G	33	24		
13	86	50	49	34	30	34	G	47	33	G E B 39	37	E B E B 36	G	48	38	32	31	E B 31	G	23	21	23	12	15	
14	30	25	28	27	21	30	30	48	39	39	32	B E B E B 45	37	52	G	G	31	E B 28	G	25	G	G	37		
15	38	45	31	54	40	29	32	78	74	78	34	56	59	34	G	G E B 29	35	G	70	41	68	48	36		
16	75	32	37	35	G	23	24	42	30	44	61	G	34	32	G E B E B 36	36	30	49	35	38	42	40	40	48	
17	K 39	29	64	20	20	61	42	36	50	60	31	38	32	34	34	30	G	G	25	25	G	25	18	20	14
18	51	34	28	23	21	32	25	46	46	33	33	32	34	45	45	38	38	G	28	22	28	20	38	39	
19	34	32	64	84	60	39	44	44	42	32	G	G	37	37	37	31	31	G	G	19	19	36	44		
20	36	32	44	29	31	33	28	32	30	38	32	49	38	40	37	39	32	36	G	21	19	21	35	47	46
21	47	107	22	21	G	62	54	66	44	52	47	34	G	G	30	35	E B E B 32	31	70	71	29	31	19	19	
22	30	31	63	70	48	34	41	30	G	32	42	43	49	35	57	47	43	31	26	23	23	18	44	64	
23	51	42	27	30	19	28	58	58	53	64	46	E B E B 35	33	34	G	33	E B 31	31	26	28	46	50	35	52	
24	68	54	56	59	18	24	G	34	27	G	G	42	42	37	44	46	38	42	31	G	G	15	15	15	
25	18	14	28	30	24	37	36	32	28	G	G E B 40	B	G	G E B E B 31	36	36	30	G	G	23	40	50	22	57	
26	57	35	48	43	27	48	E B 39	B E B 48	48	46	33	47	E B E B 41	35	38	39	E B E B 27	32	36	E B E B 30	23	17	53		
27	53	61	35	54	60	B	42	41	B	B	32	47	B	B	B	B	G	29	49	37	21	40	80	73	40
28	59	59	47	54	60	B	32	52	39	B	36	B	B E B E B 46	41	45	36	34	27	33	B	25	54	80	78	
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	27	28	27	28	26	28	27	27	25	27	26	25	26	25	27	28	28	28	28	28	28	28	28	28
MED	44	36	44	43	40	38	37	44	44	40	35	36	36	38	36	36	32	30	28	28	26	26	37	45	
U Q	58	50	52	58	60	48	44	52	50	51	46	43	44	G	45	39	37	36	32	36	35	45	48	52	
L Q	35	31	29	29	22	30	31	37	34	32	G	G	G	G	35	G	G	G	G	G	24	20	20	22	

FEB. 2023 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 2023 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	22	16	14	24	24	24	13	12	11	12	8	12	12	11	C	10	15	16	14	14	14	14	8	9	
2	9	9	11	15	13	12	13	12	10	10	14	13	11	8	13	10	12	12	12	12	10	7	7	6	
3	8	12	10	15	8	10	12	11	10	8	8	7	10	11	11	10	9	7	7	9	15	13	6	9	
4	8	10	7	8	24	11	9	8	9	24	17	16	24	19	13	8	8	12	15	15	12	8	6	10	
5	6	6	9	13	14	12	13	12	16	11	9	9	11	15	16	11	13	10	12	10	13	10	8	7	
6	10	10	10	8	14	10	10	15	12	18	25	16	15	26	35	22	31	17	13	14	21	11	9	17	
7	8	10	16	14	13	8	16	16	8	26	27	23	26	18	24	16	22	13	21	10	6	12	14	8	
8	8	9	7	31	10	11	8	13	20	40	34	28	37	B	36	20	17	36	13	24	9	8	9	14	
9	16	B	13	9	15	7	12	14	12	15	24	34	B	42	37	25	15	15	17	11	23	24	13	10	
10	8	10	11	B	20	12	16	12	10	11	20	11	15	18	34	34	24	25	12	10	6	8	8	12	
11	9	34	10	12	18	11	8	13	10	B	B	21	26	13	17	36	11	30	15	26	20	10	9	10	
12	7	7	8	16	15	8	10	26	10	11	25	52	40	38	23	16	14	23	15	15	13	12	8	7	
13	13	13	13	14	25	17	28	14	10	24	39	37	36	22	11	10	22	31	23	13	12	13	9	8	
14	8	9	10	10	10	14	11	15	13	15	14	B	45	37	52	30	15	14	28	9	14	12	8	9	
15	22	7	12	24	8	9	12	12	12	24	14	13	36	15	12	12	29	11	10	12	10	13	6	10	
16	11	13	9	9	10	6	9	13	15	17	18	12	10	18	36	36	11	11	12	8	14	11	12	8	
17	8	8	8	8	9	16	13	9	12	11	11	14	12	10	12	12	16	11	8	18	16	12	8	6	
18	9	8	8	8	6	8	14	17	17	14	14	14	10	13	13	17	11	11	11	11	11	8	9	8	
19	8	9	15	17	17	17	14	14	12	11	11	13	12	12	8	17	9	11	10	14	12	8	8	9	
20	8	7	12	12	12	16	7	10	11	9	10	14	13	14	14	10	10	8	11	8	6	10	8	8	
21	8	8	8	8	8	17	11	10	14	14	18	10	8	14	16	12	32	31	18	13	10	12	7	8	
22	7	9	8	11	12	15	16	13	13	10	11	10	10	24	10	7	15	12	6	11	10	7	9	9	
23	6	7	6	7	9	8	14	11	16	15	16	35	33	16	20	15	31	14	17	8	17	12	10	10	
24	12	8	10	9	7	11	26	11	10	13	16	15	16	17	16	12	9	13	12	11	12	8	6	6	
25	6	6	9	7	10	16	16	13	14	14	16	40	20	16	36	36	30	16	16	12	18	14	12	11	
26	10	12	15	12	20	37	39	B	48	48	46	34	22	41	35	38	39	27	32	36	30	23	17	24	
27	19	18	10	12	25	B	23	22	B	B	22	38	B	B	B	B	18	13	14	10	13	24	11	8	
28	10	10	9	25	14	B	18	12	32	B	26	B	B	46	41	45	36	34	27	33	14	8	11	11	
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	27	28	28	28	28	28	28	28	28	28	28
MED	8	9	10	12	13	12	13	13	12	14	16	16	18	18	17	16	15	14	14	12	13	12	8	9	
U Q	10	12	12	16	18	16	16	14	16	24	25	34	36	32	36	32	26	24	17	14	16	13	10	10	
L Q	8	8	8	8	10	10	10	12	10	11	12	12	12	14	13	10	11	11	12	10	10	8	8	8	

FEB. 2023 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

FEB. 2023 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E PSWEEP 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	B	A	A	A	E A	A	A	E A	E A	A	196	194	232	204	196	H	C	210	208	208	H	210	220	240	E A	E A	E A	A
2	A	A	A	190	A	A	A	A	188	232	224	214	206	222	216	208	208	212	220	E A	232	218	E A	E A	250	252		
3	A	A	A	A	A	A	A	A	A	202	198	224	A	198	E A	230	208	E A	218	194	204	A	A	A	A	A		
4	A	202	328	A	212	A	A	A	A	A	A	H	206	196	232	214	206	204	210	216	226	228	A	A	A	A		
5	274	294	E A	318	200	204	244	E A	A	236	200	200	204	204	E A	E A	204	124	210	210	222	242	240	230	E A	298		
6	A	278	A	A	A	A	A	A	A	A	E A	226	202	218	250	E B	242	228	228	226	236	E A	E A	E A	A	A	A	
7	A	A	A	A	A	A	254	A	A	A	A	A	254	238	234	226	222	222	222	A	E A	302	A	A	A	A		
8	A	A	A	A	A	A	A	E A	A	E B	A	E A	E A	232	232	224	228	240	258	232	242	204	E A	E A	328	A		
9	A	B	A	A	A	298	A	A	A	A	A	216	B	E B	E B	214	220	220	220	A	E A	272	E B	E B	A	A		
10	A	A	A	B	A	A	A	A	A	A	A	224	214	232	238	238	220	236	242	E A	E A	250	E A	E A	236	A		
11	A	A	E A	294	A	E A	E A	A	A	B	B	226	238	234	236	232	220	240	238	254	E A	E A	E A	260	A	A		
12	302	A	A	A	A	A	A	A	A	E A	A	266	216	B	E B	E B	242	258	232	206	E A	E A	236	236	256	266	A	
13	A	A	E A	402	312	A	E A	A	A	E B	E B	232	226	220	250	218	218	234	232	202	242	238	226	256	E A	A		
14	E A	332	A	A	G	E A	E A	A	A	246	236	202	B	E B	E B	342	220	220	224	E B	E A	E A	E A	E A	E A	A		
15	A	A	A	A	A	E A	A	A	A	A	A	206	A	A	246	222	236	160	270	A	E A	288	A	204	206	A		
16	A	206	A	206	246	198	196	A	E A	256	234	A	244	210	224	E B	328	246	198	262	A	E A	E A	E A	A	A		
17	A	230	298	E A	264	A	A	204	A	A	A	214	214	214	212	216	216	218	216	H	222	246	240	236	252	302		
18	E A	294	294	E A	306	E A	E A	E A	E A	E A	202	198	228	220	220	204	208	226	218	A	E A	240	224	240	224	A		
19	344	E A	316	A	A	A	A	A	A	218	188	214	206	206	226	226	226	200	214	218	204	228	E A	246	A			
20	A	A	A	202	204	A	E A	H	A	E A	A	208	236	222	208	208	214	200	216	228	234	E A	234	A	A	A		
21	A	A	248	304	338	A	A	196	A	A	E A	234	244	E A	280	240	252	242	254	254	244	258	244	250	E A	312		
22	A	Q	302	A	A	A	A	A	H	A	A	234	234	212	220	208	214	222	230	228	E A	256	312	A	A	A		
23	A	A	310	E A	E A	A	A	A	A	E A	A	270	240	230	212	224	218	230	246	228	E A	314	A	A	A	A		
24	A	A	A	A	E A	A	Y	212	222	228	234	240	230	208	230	208	216	212	226	250	242	232	224	242	A	A		
25	264	282	302	A	A	A	282	282	250	206	212	294	234	222	236	250	230	214	E A	E A	238	250	A	234	A	A		
26	A	A	A	E A	302	198	B	B	B	B	B	216	258	320	248	264	252	234	E B	E B	246	256	256	260	270	A		
27	A	A	A	A	A	B	A	A	B	B	202	B	B	B	B	B	A	A	E A	E A	E A	E A	A	A	206	198		
28	A	A	A	A	A	B	A	A	B	B	A	B	B	B	E B	B	B	256	272	250	250	250	250	262	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	5	11	6	8	11	9	9	12	13	15	20	23	23	25	26	26	27	27	25	25	24	19	15	10				
MED	274	286	298	228	276	223	278	220	227	217	208	221	222	222	227	216	219	218	227	242	247	256	236	241				
U Q	323	E A	316	310	305	318	297	286	283	253	236	227	236	238	240	242	232	230	240	241	252	257	286	268	302			
L Q	233	240	294	204	246	199	249	208	215	202	202	214	214	212	222	208	208	214	220	224	240	238	226	242				

FEB. 2023 h'F (KM)

# IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 2023 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

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	O X 87	X 72	X 50	56	57	X 42	51	72	82	X 76	X 77	X 77	X 74	X 70	X 70	X 69	X 65	X 60	X 54	X 46	A	62
2	X 43	X 39	A O X 42	X 62	66	71	80	X 78	79	74	O X 87	X 86	X 82	X 83	84	X 84	X 78	X 78	X 74	X 63	X 55	X 45	65	A
3	A	A	X 52	X 70	X 40	44	56	X A	A	B	A O X 57	O X 64	O X 65	X 71	X 73	X 67	X 61	X 57	X 51	X 49	X 44	A	A	
4	A	A	70	A 48	X 58	44	X 44	R	R	X 51	X 58	B	X 66	X 71	X 69	X 73	X 73	X 69	X 65	X 52	X 33	57	X 37	
5	A	A	A O X 51	X 69	O X 44	X 50	X 54	X 51	B	X 62	X 64	X 66	X 78	X 76	X 78	X 63	X 48	X 52	X 40	X 52	X 87	A	A	
6	A	57	A	A	A	61	A	A O X 62	X 66	X 70	X 68	X 69	X 71	X 68	X 67	X 60	X 44	X 44	X A	X A	X A	A	A	
7	A	A	A	A	X 44	X 58	X 62	X 70	A	B	B	X 75	X 80	X 76	X 70	X 68	X 60	X 58	X 54	X 43	X 37	A	A	
8	A	A	A	A	X 53	X 58	X 54	X 59	X 92	X 73	X 83	X 88	X 102	X 106	X 105	X 98	X 89	X 84	X 77	X 63	X 42	A	A	
9	A	X 51	A	X 44	X 43	64	A	A	A	X 67	B O X 50	X 68	X 93	X 90	X 86	X 72	X 68	X 48	X 48	X A	X A	A	A	
10	A	A	A	X 47	R 53	X 72	X 64	X 78	X 80	X 78	X 77	X 90	X 85	X 85	X 81	X 82	X 80	X 78	X 59	X A	X A	X A	X A	
11	49	A	A	X 53	X 53	X 72	X 50	X 68	X 68	X 77	X 80	X 79	X 78	X 79	X 80	X 77	X 77	X 73	X 71	X 70	X 67	X 63	X 49	X 68
12	52	47	83	A	A	49	X 51	X 65	X 74	X 74	X 83	X 78	X 84	X 90	X 93	X 80	X 84	X 77	X 72	X 62	X 56	X 47	X 40	
13	A	A	53	43	44	71	52	64	78	78	84	96	106	110	109	109	96	86	82	76	63	57	56	51
14	57	X 42	X 35	X 91	X 87	X 58	X 66	X 62	X 77	X 89	X 89	X 89	X 102	X 94	X 96	X 98	X 121	X 112	O X 66	O X 56	B	A	A	A
15	O X 46	X 45	B	B	X O 52	X 56	B	B	B	B	B O X 62	X 66	X 70	X 74	X 85	X 70	X 62	X 60	X 56	X 53	X 49	X 38	X 64	
16	O X 61	X 48	A	X 57	X 41	X O 40	X 46	X 51	X 56	X 60	X 72	X 79	X 85	X 84	X 87	X 89	X 86	X 82	X 74	X 65	X 59	X 54	X 43	X 37
17	X 31	X 38	X 36	X 46	X 40	X 44	X 54	X 64	X 60	X 68	X 72	X 81	X 92	X 100	X 114	X 105	X 95	X 100	X 106	X 84	X 67	X 64	X 53	X 42
18	X 38	X O 53	X 49	A	A	X 65	X 76	X 82	X 85	X 65	X 71	X 80	X 85	X 97	X 98	X 106	X 109	X 100	X 92	X 72	X 74	X 41	X 68	A
19	X 46	X 58	X 58	X 56	X 52	A O X 54	R O X 58	X 62	X 72	X 81	X 81	X 82	X 101	X 90	X 92	X 94	X 87	X 84	X 46	X 48	A	A	A	A
20	A	57	58	60	X O 74	X 54	X 56	X 80	X 79	X 80	X 82	X 89	X 90	X 92	X 92	X 96	X 94	X 97	X O 60	X 27	X 36	X 43	X 28	
21	X 31	A	X 42	A	X 58	X 73	X 65	X 68	X 69	X 79	X 89	X 95	X 102	X 112	X 115	X 114	X 102	X 94	X 90	X 71	X 68	X 52	X 56	X 45
22	X 42	A	56	A	67	68	A	A	B	B O X 67	X 82	B	B	X 117	X 117	X 128	X 101	X 93	X 85	X 56	X 43	X 38	A	
23	X 42	X 42	A O X 46	X 48	X 52	X 52	X 51	X 62	X 69	X 74	X 81	X 81	X 126	X 132	X 114	X 43	X 44	A	A	60	A	A	A	A
24	71	A	85	54	A	A	A	A	A	X 39	X 43	B	B	X 57	X 60	X 54	X 46	X 48	X 55	A	A	A	A	A
25	A	A	A	A	A	55	X 45	X 49	A	B	X 53	B O X 63	X 87	X 89	X 90	X 72	X 64	X 51	R	R	A	A	A	A
26	A	A	A O X 36	A	A	A	A	X 36	X 48	B	X 61	X 70	X 69	X 86	X 91	X 93	X 85	X 80	X 73	X 65	X 46	X 37	X 40	A
27	B	A	A	A	X 34	A	X 36	X 45	X 55	X 65	X 74	X 84	X 91	X 101	X 96	X 98	X 95	X 87	X 71	X 63	X 54	X 40	X 34	X 26
28	A	44	A	A	A	A	A	X 49	X 55	X 61	X 67	X 75	X 83	X 92	X 104	X 101	X 101	X 96	X 82	X 68	X 43	A	A	A
29	A	A	A	A	A	A	X 50	X 50	X 53	X 60	X 60	X 70	X 74	X 85	X 96	X 98	X 101	X 108	X 90	X 68	X 57	X 42	A	A
30	49	X 47	A	A	A	A	A	A	A	A	X 58	X 66	X 64	X 75	X 82	X O 90	X 95	X 77	X 48	X 113	A	A	A	B
31	B	A	A	X 54	X 40	A	B	B	B	B	B	X 59	B	B	X 76	X 72	X 65	X 54	X 54	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	14	14	13	17	19	22	23	22	21	22	24	27	25	28	30	31	31	31	31	29	23	20	17	12
MED	X 46	X 47	56	53	48	56	56	63	60	68	72	78	82	83	90	90	86	80	71	65	54	46	48	41
U Q	52	53	76	58	58	65	65	68	78	79	81	83	90	93	101	101	98	94	82	72	63	55	56	56
L Q	X 42	X 42	X 46	X 45	X 41	52	50	50	54	62	64	67	68	70	80	76	73	68	60	55	48	42	42	37

# IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 2023 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	81	F 38	F 44	F 44	F 41	36	41	62	Z 73	70	71	71	68	64	64	63	59	54	48	40	A	A
2	37	33	A	R 36	F 50	F 52	61	Z 72	72	73	U 68	81	80	76	77	74	72	72	68	57	49	F 31	A	A
3	A	A	46	64	34	F 31	50	A	A	B	A	51	R 58	U 59	Z 65	67	61	54	51	45	43	38	A	A
4	A	A	A	A	42	F 46	38	R	A	45	52	B	F 56	65	63	67	67	67	63	59	46	27	A	31
5	A	A	A	R 45	F 58	R 38	J 44	R 48	R 41	F	B	56	58	B	60	72	70	72	57	42	46	34	F 40	R 41
6	A	46	A	A	A	A	48	A	A	R	56	60	64	62	63	65	62	61	61	54	38	38	A	A
7	A	A	A	A	38	52	56	F 56	A	A	B	B	B	69	74	70	64	62	54	52	48	37	F 22	A
8	A	A	A	A	A	47	52	48	53	F 80	Z 67	F 73	82	96	100	99	92	83	78	71	57	F 28	A	A
9	A	45	A	38	37	F 40	A	A	A	61	B	44	B 44	J 62	R 84	84	80	66	62	42	42	A	A	A
10	A	A	A	41	R	47	F 60	58	72	74	Z 72	71	84	79	79	75	76	74	72	53	A	A	A	A
11	A	A	A	47	F 47	58	44	62	62	71	70	73	72	73	74	71	71	67	65	64	61	57	42	A
12	A	A	A	A	A	Z 43	45	59	64	F 63	F 77	72	70	78	F 76	87	74	78	71	66	56	Z 50	F 26	F 29
13	A	A	42	Z 37	F 38	F 37	46	58	63	F 72	78	90	100	104	103	103	90	80	76	70	57	51	50	45
14	F 41	36	29	F 62	42	52	60	56	71	83	83	83	F 94	88	90	92	F 108	F 90	R 60	50	B	A	A	A
15	R 40	39	B	B	46	50	B	B	B	B	B	R 56	60	64	68	79	V 64	56	54	50	47	F 34	32	58
16	R 55	42	A	F 46	35	34	40	45	50	54	66	69	79	78	81	83	80	76	68	59	F 48	F 37	37	31
17	26	32	30	F 34	34	38	48	F 47	54	62	66	75	F 80	94	108	99	89	94	100	78	61	58	47	36
18	32	47	43	A	A	59	F 54	F 68	F 66	59	F 58	74	79	90	Z 92	100	103	94	86	66	68	F 23	A	A
19	40	F 40	F 40	F 40	F 37	A	R 48	A	R 52	56	66	74	Z 75	76	Z 95	84	86	Z 88	81	F 63	F 30	A	R 31	A
20	A	F 32	F 42	Z 52	68	R 48	J 50	R 60	F 73	74	76	83	84	86	86	90	88	91	54	21	A	30	37	22
21	25	A	36	A	52	F 47	F 46	Z 62	63	73	83	89	96	106	109	108	96	88	79	65	62	Z 46	F 28	F 22
22	36	A	39	A	A	F 53	F 52	A	A	B	B	R 61	R 76	B	111	103	F 112	F 95	87	75	44	A	37	F 25
23	36	A	A	R 40	42	F 40	46	45	56	63	68	75	B	B	120	126	F 80	37	38	A	A	A	A	A
24	F 49	A	F 70	F 30	A	A	A	A	A	33	37	B	B	51	54	48	40	42	A	A	A	A	A	A
25	A	A	A	A	A	R 42	A	F 33	F 34	A	B	47	B	R 57	81	83	F 82	66	58	45	R	A	A	A
26	A	A	A	R 30	A	A	A	30	42	B	55	64	63	80	85	87	79	74	67	59	40	31	A	A
27	B	A	A	A	28	A	30	39	V 49	V 59	68	78	85	95	90	92	89	81	65	57	48	34	28	20
28	A	A	A	A	A	A	A	43	49	55	61	69	77	86	98	95	95	88	76	58	F 20	A	A	A
29	A	A	A	A	A	A	44	F 38	47	54	54	64	68	79	90	92	95	102	84	58	F 42	F 32	F	A
30	F 33	41	A	A	A	A	A	A	A	A	52	60	58	69	76	R 84	89	71	F 34	A	A	A	A	B
31	B	A	A	48	34	A	B	B	B	B	B	B	B	53	B	B	70	66	59	48	F 34	A	A	A
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	12	11	11	17	19	22	23	21	21	22	24	27	25	28	30	31	31	31	30	28	23	19	13	10
MED	36	40	42	40	42	46	48	48	54	62	66	71	76	77	82	84	80	74	65	58	48	37	37	30
U Q	40	45	46	48	47	52	52	60	65	73	72	75	83	87	95	95	90	88	76	64	57	46	42	36
L Q	32	33	36	36	35	40	44	41	48	56	57	61	62	64	74	70	67	62	54	48	42	31	F 28	22

MAR. 2023 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



# IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 2023 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E PSWEEP 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	150	136	55	53	45	28	34	32	46	36		G	G	35	35	35	48	29	27		G	25	20	K	K							
2	K	39	52	56	56	E B	G	G		31		G	43	60	46	35	45	30	28	GE B	G	23	GE B	12	16	57	66					
3	77	106	K	25	35	26	27		G	46	56		B	63	43	E B	E B	E B	E B	E B		G	31	31	34	51	31	69	55			
4	50	38	49	50	32	32	39	28	44	44	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	GE B	B	20	26	19	22	39	30				
5	37	58	56	42	32	35	E B	E B		37	43	64		B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	41				
6	42	36	92	60	49	53	E B	E B		40	57	48	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	41				
7	116	57	58	39	62	37	GE B	GE B		28	39	57	61		B	B	B	B	B	B	B	B	B	B	B	B	B	41				
8	32	34	40	41	44	K	36	38	51	43	57	44	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	41				
9	42	K	28	55	32	36	G	32	49	54	57	31		E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	44				
10	46	59	54	29	34	34		G	E B		40	57	30	30	30	30	33	33	30		G		G	29		G	24	18	101	58	72	41
11	37	62	60	34	37	25	25	45	31	41	36	29	33	32	32	34		G	G			G	24	24	17	17	12	34				
12	24	31	70	61	44	32	32	40	40	40		G	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	30			
13	36	36	70	16	12	27	K	29	29	26		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	15			
14	15	15	K	19	K	24	41	45	53	49	57	56	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	54			
15	58	78	87		E B	E B		B	B	B	B	B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	41			
16	40	64	45	33	22	16	32		G		36		G		33	30	30		G										15			
17	20	26	20	38	34	45	31	22	32	E B	E B	34	30	35	31	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	19			
18	57	34	50	48	38	37	42	40	44	44	43	31	31	31	27	40	72	30	31	34	25	14	37	66								
19	K	K	K	23	25	23	55	40	50	50	49	45		G	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	75			
20	47	K	20	52	37	51	38		G	G		G		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	29			
21	K	19	32	46	58	41	30		G	G	19	24	28	28		G	G	G	G	G	G	G	G	G	G	G	G	G	18			
22	32	40	K	35	88	58	39	27	46	44		E B	B	B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	26			
23	24	58	K	34	32	23	29	44	40	33		G	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	75			
24	25	48	24	18	54	56	59	66	48	50	30		B	B	G		31	31		G									71			
25	45	63	60	60	64	39	39		G	B		E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	42			
26	41	74	50	43	50	47	60	E B	20		G	B		E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	42			
27		B	46	43	40	K	24	34	27	19		G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	14			
28	30	38	51	53	54	44	31	31	35	36	33		E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	35			
29	49	K	39	54	62	50	61	33	33		G	G	G		G	G	G	G	G	G	G	G	G	G	G	G	G	G	48			
30	K	32	39	41	60	62	46	58	58	64	56		E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	B			
31		B	50	59	41	K	29	48		B	B	B		E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	47		
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23								
CNT	29	31	31	30	31	31	29	30	29	25	25	27	25	28	30	31	31	31	31	31	31	30	31	31	30							
MED	39	40	51	41	39	37	32	40	40	38	E G	33	32	32	34	32	30	30	30	30	27	24	22	22	30	40	41					
U Q	48	59	58	56	50	45	41	49	53	48	37	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	54			
L Q	31	34	K	40	33	29	32		G		28		G		G		G		G		G		G		G		G		29			

MAR. 2023 ftEs (0.1MHz)  
NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 2023 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	26	15	21	7	8	10	8	14	16	18	14	14	14	14	11	13	13	15	15	8	10	8	8	7
2	10	11	22	16	22	18	13	7	15	14	28	23	18	45	20	16	29	14	12	11	12	8	10	10
3	7	10	12	13	8	11	12	16	13	B	16	15	50	49	32	37	13	16	12	15	7	8	9	16
4	12	11	11	11	12	12	14	14	15	21	34	B	37	34	49	34	12	17	21	9	9	8	6	8
5	9	10	16	13	13	16	37	13	20	B	21	37	B	44	38	39	39	27	14	13	8	8	7	12
6	14	15	11	10	11	23	40	34	23	44	34	32	24	33	16	12	17	13	14	9	8	7	12	8
7	10	8	11	10	17	20	15	39	17	19	B	B	B	34	58	31	15	35	26	34	27	7	7	7
8	7	9	11	14	17	13	13	20	20	16	24	46	32	35	38	38	35	26	25	13	8	6	9	10
9	10	X 14	9	7	10	10	33	12	16	13	B	36	B	48	33	16	29	16	10	8	10	7	12	10
10	10	7	16	9	8	11	15	18	57	17	17	18	14	16	16	16	13	9	8	8	12	10	15	14
11	13	9	15	13	12	11	10	17	15	16	12	24	18	16	17	15	12	13	9	8	9	8	6	8
12	6	7	16	10	8	10	12	11	15	13	14	14	33	37	31	22	23	29	16	7	7	8	8	9
13	7	5	10	6	6	10	10	9	12	16	18	18	19	14	12	15	11	16	22	15	14	9	10	9
14	9	9	8	8	10	11	14	22	16	19	37	34	18	16	12	21	27	27	40	38	B	46	35	34
15	27	25	74	B	39	37	B	B	B	B	B	34	26	19	18	32	29	18	17	20	12	12	12	12
16	12	11	11	16	11	10	14	14	17	21	14	16	17	20	11	17	15	15	22	12	13	9	9	8
17	8	9	10	12	7	10	10	9	15	34	18	21	17	53	32	18	20	39	14	13	23	17	13	12
18	9	9	12	17	14	16	13	11	18	44	23	15	16	15	16	40	72	30	31	34	19	7	10	11
19	16	11	11	12	12	13	26	25	25	21	22	18	38	32	16	16	14	33	16	9	8	10	12	12
20	10	13	15	13	20	17	25	15	15	12	12	14	14	13	11	14	14	34	12	11	12	12	11	11
21	10	10	12	17	11	10	9	11	12	13	12	12	11	12	11	12	14	11	8	8	6	16	11	12
22	10	14	11	20	12	15	13	36	44	B	B	52	49	B	52	40	26	36	16	18	18	11	8	11
23	11	9	12	10	11	14	21	18	18	17	16	32	B	B	31	36	18	15	12	8	7	7	12	14
24	6	9	9	11	14	10	12	24	13	11	15	B	B	22	19	21	18	14	12	12	15	7	9	9
25	8	14	9	10	8	10	13	10	13	22	B	33	B	46	47	39	12	42	27	16	8	7	8	10
26	12	37	20	12	18	16	13	20	18	B	20	31	18	20	19	20	18	18	12	31	14	8	10	16
27	B	24	18	13	13	18	12	11	12	18	18	20	16	18	18	14	13	12	12	13	13	11	8	9
28	7	10	12	17	31	15	12	14	19	19	15	38	40	24	19	27	38	15	16	12	8	8	6	8
29	12	12	17	11	16	14	15	13	12	14	12	15	14	21	16	15	34	18	24	34	11	8	8	13
30	14	12	12	22	15	12	15	29	16	16	37	38	42	40	16	58	43	16	17	9	10	10	6	B
31	B	15	10	9	14	12	B	51	B	B	B	B	38	B	B	39	28	36	25	8	8	7	7	23
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	10	11	12	12	12	12	13	15	16	19	20	31	26	32	19	21	18	17	16	12	10	8	9	11
U Q	13	14	16	16	16	16	21	24	20	44	37	38	49	45	33	37	29	30	22	16	14	10	12	13
L Q	8	9	11	10	10	10	12	11	15	16	15	16	17	16	16	15	13	15	12	8	8	7	8	9

MAR. 2023 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

MAR. 2023 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E OSWEEP 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	E A	A	236	234	222	214	212	224	G	222	250	E A	E A	A	A				
2	A	A	A	A	244	200	294	236	266	250	A	272	202	B	218	216	222	E B	230	E A	E A	E B	206	290				
3	A	A	276	272	A	A	278	A	A	B	A	E A	B	B	E B	E B	E A	E A	E A	E A	E A	E A	A	A				
4	A	A	A	A	A	A	A	224	A	A	284	B	E B	236	B	E B	240	202	248	190	E A	E A	250	306				
5	A	A	A	A	360	A	B	A	E A	A	B	E A	E B	B	E B	E B	E B	A	204	A	A	200	200	A				
6	A	A	A	A	A	A	246	A	A	B	E B	248	240	220	232	242	234	228	246	E A	E A	E A	A	A				
7	A	A	A	A	B	A	A	B	A	A	B	B	E B	E B	B	E B	244	262	256	E B	E B	124	276	A				
8	A	A	A	A	A	A	A	A	A	A	E A	224	314	332	226	234	252	244	244	242	240	226	220	310				
9	A	258	A	A	A	E A	A	A	A	A	226	B	E B	B	E B	240	228	234	234	322	200	E A	A	A				
10	A	A	A	A	A	A	E A	A	B	A	258	228	228	242	222	226	212	226	212	E A	204	A	A	A				
11	A	A	A	A	A	A	A	A	A	E A	298	262	330	222	242	224	224	240	238	E A	E A	H	214	A				
12	A	A	A	A	A	A	A	A	A	A	198	236	226	E B	E B	B	254	270	230	218	228	262	E A	E A				
13	A	A	212	214	198	A	A	A	222	222	228	220	220	E A	E A	E A	236	216	218	226	218	224	224	240				
14	256	294	A	212	202	A	A	A	A	A	272	244	242	216	244	238	234	234	B	B	B	A	A	A				
15	E B	292	A	B	B	B	B	B	B	B	B	B	B	E A	E A	E A	250	238	242	260	268	264	302	A				
16	E A	206	E A	A	A	A	A	A	E A	A	350	254	230	218	214	226	222	214	E A	E A	E A	240	230	230	260			
17	E A	358	186	A	A	A	200	E A	E A	E A	282	302	302	236	230	220	B	E B	214	244	222	214	238	238	214	276		
18	A	212	214	A	A	E A	A	A	E A	A	324	234	220	224	230	220	270	280	228	214	226	226	226	A	A			
19	A	A	E A	E A	E A	A	A	A	A	E A	A	370	240	E B	232	232	228	238	E B	E B	E A	208	A	200	A			
20	A	A	E A	A	A	E A	A	A	A	A	324	212	202	202	H	H	H	202	220	228	218	250	222	224	160	A		
21	E A	330	E A	A	E A	E A	E A	E A	E A	240	206	236	220	226	238	234	224	202	E A	E A	E A	230	238	252	304			
22	238	A	A	A	A	E A	E A	B	B	B	B	B	B	E B	B	E B	302	254	238	238	228	244	294	A	A	314		
23	E A	306	A	A	202	A	A	A	E A	A	302	216	212	E B	B	B	E B	E B	E A	A	A	A	A	A	A			
24	280	A	E A	E A	A	A	A	A	A	E A	A	260	260	B	B	E A	E A	E A	A	A	A	A	A	A	A			
25	A	A	A	A	A	A	A	A	A	A	198	A	B	B	E B	E B	E B	E B	E B	E B	E B	246	246	A	A	A		
26	A	A	A	A	A	A	A	E A	E A	E A	288	330	B	256	274	218	238	228	228	226	E A	220	218	224	216	232	A	
27	B	A	A	A	A	A	A	E A	E A	E A	306	244	228	236	232	232	232	228	222	E A	236	224	212	208	220	216	246	264
28	A	A	A	A	A	A	A	A	A	E A	276	238	276	268	238	232	244	228	216	222	214	264	A	A	A	A		
29	A	A	A	A	A	A	A	A	A	H	276	224	196	234	230	230	232	230	230	226	232	232	228	328	E A	A	A	
30	E A	274	A	A	A	A	A	A	A	A	E A	E A	E A	E A	E A	E A	E A	258	E A	200	A	A	A	A	A	A	B	
31	B	A	A	A	A	A	B	B	B	B	B	B	B	E B	E B	B	B	308	250	270	252	324	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	9	5	7	9	7	6	8	7	14	17	22	25	24	25	28	30	30	30	30	27	27	22	19	10	7			
MED	280	235	245	269	248	350	244	282	238	215	236	230	225	232	230	228	232	229	230	E	E	226	234	224	270			
U Q	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	250	290	252	314			
L Q	247	199	214	213	202	278	224	236	240	219	228	229	220	227	228	224	226	222	218	214	220	226	214	260				

MAR. 2023 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION SHOWA-ST.

APR. 2023 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 PSWEEP 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	77	A	A	A	R	X	A	X	X	X		X	X	X	X	X	X	X	X	X	57	58	A	A	65	
2	A	A	A	A	X	R	B	B	B	B	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
3	A	A	A	B	A	A	B	A	A	X	X	X	X	X	X	X	X	X	X	X	B		A	A		
4	A	A	A	A	A		B	B	B	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	71	
5	B	A	A	A	B	A	A	B	A	R	O	X	X	X	X	X	X	X	X	X		A		A	A	
6	A	A	A		A	45	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	
7	R	A	A	A	A	A	A	O	X	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
8	X	X	X	A	A	A	A	A	B	B	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
9	X	X	X	A	A	A	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
10	A	A	A	A	A	60	A	A	B	A	B	A	X	X	X	X	X	X	X	X	A	A	X	X	A	
11	A	A		X	X	X		X	X	X	X		O	X	X	X	X	X	X	X	X	X	X	X	A	
12	A	O	X																						X	
13	48	57	57	56	O	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	
14	A	A		A	A	X	76	72	70	72	80	90	90	91	91	94	111	116	110	103	X	X	X	X	X	
15	34	46	A	A	A	A	83	75	80	83	86	95	107	127	134	140	135	135	111	91	57	O	X	A	56	
16	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	55	
17	X	A	X	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	
18	A	A		X	X	X	44	51	60	71	75	83	82	90	97	94	98	83	74	66	52	32	A	A	A	
19	A	57	55	X	A	A																			X	
20	X	34	52	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	C	C	C	C	
21	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
23	A	A	A	A	A	A	A	A	A		O	X	X	X	X	X	X	X	X	X	B	A	A	O	X	A
24	71	85	60	66	82	65			49	49	31	33	37	38	42	50	45	54	35		A	A	A	A	A	
25	A	A	A	A	A		O	X	X	X	O	X	X	X	X	X	X	X	X	X	O	X	A	A	A	A
26	A	A	A	A	A	X	A	X	R	B	B	X	X	X	X	X	X	X	X	X	B	A	A	A	70	
27	A	A	X	A	A	A																			A	
28	A	A	A	A	A	R	A	A	B	B	B	B	B	X	X	X	X	X	X	R					A	
29	A	A	A	O	X	B	A	A	A	R	B	B	B	B	X	X	X	X	X	A	R	A	A	A	A	
30	A	A	A	A	A	A	A	A	A	B	A	B	X	X	X	X	X	X	X	X	X	X	X	X	A	
31																										
CNT	8	8	9	7	7	14	10	15	15	17	24	26	28	30	30	29	29	28	26	21	20	18	13	11		
MED	44	49	55	48	54	50	58	58	57	64	70	74	82	90	96	100	94	83	70	60	46	34	45	55		
U Q	60	57	58	62	73	60	60	64	69	72	74	86	90	99	108	110	110	94	78	70	56	48	58	65		
L Q	X	O	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	34	40	46	45	46	45	45	51	50	60	61	67	71	72	87	88	86	76	59	44	40	29	29	36		

APR. 2023 f<sub>XI</sub> (0.1MHz)

## IONOSPHERIC DATA STATION SHOWA-ST.

APR. 2023 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E OSWEEP 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	45	51	56	61	66	72	74	89	94	83	71	46	27	A	A	A	A						
2	A	A	A	A	41	R	B	B	B	B	A	46	52	64	70	78	67	73	65	53	37	28	23	R	A					
3	A	A	A	B	A	A	B	A	A	47	54	60	67	79	84	96	84	77	64	Z	B	A	A	A	A					
4	A	A	A	A	A	F	B	B	B	A	46	53	J R	68	75	83	82	78	60	41	34	20	A	A						
5	B	A	A	A	B	A	A	B	A	R	47	60	R	78	86	78	81	82	76	F	F	A	A	A	A					
6	A	A	A	F	A	F	A	A	47	54	59	63	71	84	94	96	89	74	64	52	F	A	A	A	A					
7	R	A	A	A	A	B	A	A	58	A	A	52	Z	F	F	V	86	82	68	58	F	34	25	23	A					
8	44	30	A	A	A	A	A	A	B	B	56	60	F	73	88	97	99	91	79	64	58	40	23	R	20					
9	20	J R	A	A	A	45	A	48	58	63	67	74	84	92	102	103	94	90	72	60	34	22	F	A	A					
10	A	A	A	A	A	A	A	A	B	A	B	A	54	64	87	84	F	76	72	70	A	A	26	39	A					
11	A	A	F	28	28	J R	F	F	46	53	57	68	F	86	93	91	88	74	72	50	F	40	21	A	A					
12	A	R	40	36	40	F	F	F	50	56	64	F	V	86	94	94	90	77	80	66	F	F	F	F	19					
13	17	F	F	F	48	R	A	A	57	62	70	J R	92	94	104	112	115	104	81	73	68	26	19	R	A	A				
14	A	A	A	A	A	48	F	F	F	66	74	84	84	85	85	88	F	F	F	F	F	59	29	F	A	30				
15	A	31	A	A	A	A	F	F	F	62	77	80	89	101	113	122	134	129	121	105	F	F	F	F	A	A				
16	A	A	A	A	A	A	A	47	55	55	59	70	79	Z	F	F	Z	Z	105	63	F	35	20	14	A	A				
17	U R	A	42	A	A	A	38	42	54	61	69	77	76	84	91	88	92	77	68	60	46	26	A	A	A	A				
18	A	A	F	52	37	48	F	F	F	40	24	49	66	72	82	97	108	111	117	105	86	65	61	38	47	F	R	48	48	
19	A	A	A	49	A	A	F	F	F	47	52	52	57	70	82	94	95	F	130	110	99	46	F	A	F	A	F	40	31	
20	28	A	A	A	31	33	33	35	44	58	68	78	90	90	94	97	85	70	50	F	C	C	C	C	C	C	C	C	C	
21	C	C	C	C	C	C	C	C	C	C	C	66	86	J R	107	113	113	C	C	C	C	C	C	C	C	C	C	C	C	
22	C	C	C	C	C	C	C	C	C	C	C	64	68	F	F	F	F	77	66	50	26	22	26	5	A	A	A	A	A	
23	A	A	A	A	A	A	A	A	A	F	50	49	67	77	98	106	112	J R	F	B	A	A	A	R	A	A	A	A	A	
24	F	F	F	F	F	F	A	A	F	F	25	37	25	27	31	32	36	44	39	44	29	A	A	A	A	A	A	A	A	
25	A	A	A	A	A	F	F	R	31	42	58	52	63	60	56	52	51	42	46	24	R	A	A	A	A	A	A	A	A	
26	A	A	A	A	A	33	A	50	R	B	50	57	F	J R	68	83	82	84	B	F	J R	A	A	A	A	A	A	A	A	
27	A	A	29	A	A	A	U R	B	A	A	B	38	B	R	F	F	Z	B	F	F	A	A	A	A	A	A	A	A	A	
28	A	A	A	A	A	R	A	A	B	B	B	B	50	52	52	60	62	57	Z	R	A	F	A	A	A	A	A	A	A	
29	A	A	A	R	B	A	A	A	R	B	B	B	B	65	78	101	103	F	F	A	A	A	A	A	A	A	A	A	A	
30	A	A	A	A	A	A	A	A	A	B	A	B	54	54	58	55	52	45	38	23	17									
31																														
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
CNT	6	6	8	7	7	12	10	15	15	18	24	26	28	30	30	29	29	28	26	20	18	16	8	5						
MED	30	34	37	36	41	36	43	47	51	56	60	68	74	84	90	91	86	76	64	56	34	26	23	30						
U Q	44	40	46	40	48	46	47	52	56	63	68	78	84	92	97	102	98	84	72	60	40	36	40	40						
L Q	20	31	31	27	40	32	33	35	46	50	55	60	64	65	78	82	76	70	46	38	26	22	20	20						

APR. 2023 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

APR. 2023 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23					
1	56	78	64	51	43	41	46	31	21	21	25	26	26		GE	BE	BE	BE	B		GE	B	K						
2	51	63	58	47	35	19		B	B	B	B	52	E	BE	BE	BE	BE	BE	BE	BE	B		K	K					
3	60	49	42		47	49		B		49	53	39	40	39	39	35	61	36	35	24	14			35	42	96	94		
4	55	57	43	58	59	25		B	B	B	50	E	BE	BE	BE	BE	BE	BE	BE	BE	B			20	16	16	40	63	
5		50	43	59		52	46		B		60	44	42	54	39	36	26	25	43	50	31	15	40	41	45	48			
6	41	49	47	24	43	35	34	60	37	24	25	28	28	E	BE	BE	BE	BE	BE	BE	B								
7	21	33	30	64	53	48	48	E	B		47	56	41	E	BE	BE	BE	BE	BE	BE	BE	B							
8	50	32	35	46	53	48	54	51		B	B	G	E	BE	BE	B		G											
9	36	34	67	56	51	E	B	32	61	36		G	G		36														
10	K	32	49	49	60	53	66	52	60		B		B		51	38	33	34	24	26	19	28	39	36	30	36	34		
11	40	64	24	17	24	24	30	16		GE	B		GE	BE	BE	BE	BE	B		E	B		E	BE	BE	B			
12	46	35	33	33	31	22	K	20	12	19	23	E	BE	BE	B		G			24	33	20	35	15	16	18	14	16	14
13	14	30	35	20	42	64	54	41	24	24	24	25	25	25	18	30	26	14	13	11									
14	70	45	67	59	62	44	K	30	K	14		G	23	23	26	26		G	GE	BE	BE	BE	B		E	B	K		
15	27	32	68	58	56	56	38	36	40	49	26	56	33	28	34	25	33	29	27		27	20	46	56	44				
16	55	62	59	48	49	49	56	45	34	20		GE	BE	BE	BE	B		E	B	GE	BE	BE	BE	BE	BE	BE	B		
17	34	38	30	58	52	55	40	28		G	21	19	26		G	G	G			24	22	22	18	15	32	K			
18	34	34	40	34	18	16	K	13	13		G	G			G	G	G		GE	B		G	K						
19	45	39	35	74	47	51	30	19	15	17		G	25	32	24	76	43	24	25	25	36								
20	28	35	35	49	29	21	K	17	20		G	17	22	23	25	30	26	19	24	14	14		C	C	C	C	C	C	
21	C	C	C	C	C	C	C	C	C	C		25	22	24	E	BE	B		C	C	C	C	C	C	C	C	C	C	
22	C	C	C	C	C	C	C	C	C	C		41	31		GE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	B			
23	55	63	60	55	55	57	52	56	53	39	39	39	36	25	27	35	56	45	20										
24	47	44	31	56	45	56	57	61	25	20	26		G		26	30	31	35	26	24	E	B							
25	43	46	36	52	50	41	16	52	57	26	54	27		G		24	29		J	A		33	16	16	49	29	38	50	
26	46	47	63	59	60	K	47	47	41		BE	BE	BE	BE	BE	BE	BE	BE	B		BE	BE	BE	B					
27	34	77	52	48	58	58	19		B		61	37		BE	B		BE	BE	BE	BE	BE	B							
28	61	51	55	47	45	14	64	48		B	B	B		BE	BE	BE	BE	BE	B		K								
29	50	45	51	56		48	44	54	38		B	B	B		BE	BE	BE	BE	BE	B									
30	62	62	54	48	48	57	61	52	56		B		BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	B					
31																													
00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
CNT	27	28	28	27	26	28	25	24	23	22	26	27	28	30	30	29	28	28	28	27	28	28	28	28	28				
MED	46	46	45	52	48	48	46	44	34	24		GE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	
U Q	55	60	58	58	53	56	54	53	53	39	40	38	36	36	38	36	34	27	26	30	42	42	49	58					
L Q	34	35	35	47	43	24	30	24		G	14	21	25	26		G	G	G		E	B		E	B					

APR. 2023 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

APR. 2023 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	15	12	10	13	36	29	20	16	13	13	12	16	17	14	30	60	29	18	20	9	9	10	9	11	
2	12	23	24	24	11	7	B	B	B	B	26	37	34	37	38	26	36	25	19	15	14	11	11	7	
3	14	14	18	B	24	12	B	25	17	20	40	39	39	35	59	36	35	24	10	B	8	10	18	22	
4	14	10	14	21	35	12	B	B	B	37	39	38	45	40	39	27	36	24	18	14	9	7	9	12	
5	B	22	14	24	B	21	31	B	21	36	28	54	39	36	26	20	43	50	31	11	8	8	11	10	
6	10	15	15	11	25	16	11	14	16	13	14	19	22	32	33	28	51	35	28	19	8	8	13	9	
7	9	10	22	20	16	31	29	54	25	24	25	34	32	33	36	38	32	36	21	17	16	14	9	8	
8	8	11	11	16	12	11	14	17	B	B	22	31	30	18	20	18	19	10	7	10	17	18	13	9	
9	8	8	14	13	20	32	16	12	10	12	12	12	14	32	22	10	10	7	7	11	8	9	7	9	
10	9	16	11	16	21	8	15	17	B	41	B	17	16	33	18	7	13	10	6	7	8	8	8	8	
11	11	12	14	6	10	11	7	8	9	22	17	38	60	36	26	17	23	15	19	17	10	6	7	6	
12	8	11	12	10	10	6	7	8	11	16	28	28	17	16	14	16	6	7	7	15	18	14	9	7	
13	7	7	8	10	12	10	11	10	11	10	11	10	12	12	11	6	7	6	5	6	6	6	6	8	
14	13	7	7	12	9	13	9	8	8	12	12	12	12	12	14	12	16	14	21	13	12	9	14	7	
15	9	8	9	14	14	16	10	12	13	18	11	56	33	28	34	25	33	29	27	12	8	11	9	6	
16	9	18	15	20	12	12	16	10	7	7	14	46	40	26	20	26	12	12	13	14	11	15	20	6	
17	8	8	12	10	16	11	10	8	9	12	12	10	12	10	11	13	10	7	6	6	6	8	8	9	
18	8	6	9	9	8	7	6	6	8	10	12	14	12	15	12	10	8	11	6	7	6	8	8	9	
19	10	5	7	8	13	14	11	10	7	7	12	11	12	11	76	43	24	25	10	9	7	6	6	6	
20	8	8	8	7	8	7	7	7	8	8	8	11	11	11	10	8	7	8	7	C	C	C	C	C	
21	C	C	C	C	C	C	C	C	C	C	11	12	15	28	48	C	C	C	C	C	C	C	C	C	
22	C	C	C	C	C	C	C	C	C	C	17	31	20	36	25	22	15	13	13	11	10	9	10	11	
23	11	18	15	22	32	19	18	24	18	24	39	36	25	27	35	56	45	21	B	24	26	31	32	14	
24	20	14	18	12	16	15	6	12	10	12	22	12	13	16	13	24	15	17	18	11	14	12	12	10	
25	8	6	10	8	6	7	5	6	6	10	8	14	14	15	14	12	10	11	16	16	20	8	10	12	
26	11	7	19	16	13	12	23	12	28	B	36	32	34	48	38	36	44	B	20	23	9	6	10	6	
27	8	11	8	16	21	14	10	B	16	26	B	36	B	39	40	28	33	17	12	8	7	10	15	16	
28	16	14	18	12	17	8	11	12	B	B	B	B	32	39	35	26	23	14	10	8	8	8	9	9	
29	18	14	10	23	B	28	12	23	17	B	B	B	B	30	40	37	25	15	12	10	8	17	9	14	
30	10	13	9	12	14	12	15	14	14	B	B	23	B	37	30	31	24	20	12	14	12	8	8	9	11
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	30	30	30	30	30	29	29	29	29	28	28	28	28	28	
MED	10	11	12	13	15	12	12	12	14	19	20	31	24	29	28	24	23	15	13	12	8	9	9	9	
U Q	14	14	15	20	22	16	19	24	B	B	36	38	37	36	38	32	34	24	20	16	13	12	12	11	
L Q	8	8	9	10	12	9	10	9	9	12	12	12	14	15	14	12	11	10	7	9	8	8	8	7	

APR. 2023 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

APR. 2023 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	188	E A 278	A 246	218	H 180	H 222	E B 244	E B 248	284	252	196	B 244	A 298	A	A	A	A	
2	A	A	A	A	A	A	B	B	B	B	A	B	E B 350	E B 280	E B 298	234	250	242	E B 230	B 240	240	262	E A 324	A	
3	A	A	A	B	A	A	B	A	A	E A 308	B	E B 308	E B 308	E B 268	E B 322	258	230	240	A	B	A	A	A	A	
4	A	A	A	A	A	A	B	B	B	B	B	E B 322	E B 322	E B 286	E B 280	248	222	216	226	236	236	290	A	A	
5	B	A	A	A	B	A	A	B	A	B	E A 322	B	E B 290	E B 262	E B 238	244	E B 260	E B 242	E B 242	222	A	A	A	A	
6	A	A	A	A	A	A	A	A	A	A	E A 230	E A 244	E B 236	E B 220	E B 248	E B 240	E B 232	232	212	E B 220	220	226	A	A	
7	A	A	B	A	A	B	A	E B 248	A	A	A	E B 300	E B 266	E B 260	E B 278	242	232	224	E B 220	226	214	E A 250	E A 258	A	
8	A	E A 296	A	A	A	A	A	A	B	B	E A 272	E B 228	E A 244	E A 238	E A 232	E A 238	E A 222	E B 224	212	212	226	E B 284	272	262	
9	E A 316	A	A	A	E B 332	A	A	A	H	E A 178	E A 252	E A 244	242	224	246	E A 242	E A 226	E A 222	194	210	204	220	276	A	
10	A	A	A	A	A	A	A	A	B	B	B	A	E B 300	E B 250	E B 236	246	220	238	A	A	A	A	A	A	
11	A	A	276	194	212	268	A	A	A	E B 216	252	232	272	E B 312	E B 242	E B 222	224	218	208	226	210	224	E A 278	A	
12	A	246	A	244	240	A	A	A	A	E A 294	E A 206	E B 244	E B 246	E B 242	E A 230	E A 222	E A 238	214	204	210	204	204	220	E A 266	278
13	A	316	232	E A 258	A	A	A	A	A	E A 260	E A 254	228	228	228	202	E A 220	E A 220	202	196	200	212	238	A	A	
14	A	A	A	A	A	A	A	202	H 184	206	234	240	230	232	224	200	200	200	216	214	250	288	A	A	
15	A	A	A	A	A	A	338	318	A	E A 262	A	E B 276	232	220	226	226	E B 222	E A 228	222	242	E A 270	A	A	A	
16	A	A	A	A	A	A	A	A	A	A	198	234	E B 286	272	232	226	236	E A 236	202	202	204	210	E B 236	A	A
17	216	A	A	A	A	A	A	A	198	242	200	226	242	218	236	E A 220	196	210	218	242	240	A	A	A	
18	A	A	202	A	A	A	E A 336	E A 300	E A 228	E A 228	E A 224	E A 216	E A 224	E A 232	E A 222	E A 214	196	190	210	224	210	E A 348	E A 342	A	
19	A	A	A	A	A	A	A	Q 310	A	A	198	228	234	234	304	E B 248	232	238	306	Q	E A 298	A	294	258	
20	232	A	A	A	A	A	406	334	206	E A 254	240	226	236	A	224	186	H 184	H 192	196	C	C	C	C	C	
21	C	C	C	C	C	C	C	C	C	C	C	E A 220	206	224	238	222	C	C	C	C	C	C	C	C	
22	C	C	C	C	C	C	C	C	C	C	C	E A 268	E B 256	E B 244	E B 256	E B 234	E B 228	206	210	210	226	216	6	A	A
23	A	A	A	A	A	A	A	A	A	E A 274	E A 316	E B 280	258	258	278	302	242	242	B	A	A	A	A	A	
24	A	A	A	A	H 178	204	A	A	A	E A 300	A	E A 298	E A 276	E A 280	A	A	E A 238	E A 260	E B 274	A	A	A	A	A	
25	A	A	A	A	A	A	A	E A 354	E A 302	E A 280	E A 332	214	252	224	232	226	Q	E A 232	E B 228	E B 228	288	A	A	A	
26	A	A	A	A	A	A	A	196	A	B	B	274	266	280	250	242	252	B	218	E B 262	A	A	A	A	
27	A	A	220	A	A	A	194	B	A	A	B	B	B	B	B	Q	E B 260	E B 272	E A 292	E A 282	A	A	A	A	
28	A	A	A	A	A	R	A	A	B	B	B	B	B	B	B	E B 312	E B 254	E B 254	E B 246	238	A	A	A	A	
29	A	A	A	A	B	A	A	A	A	B	B	B	B	B	B	E B 238	224	212	A	A	A	A	A	A	
30	A	A	A	A	A	A	A	A	A	B	A	B	E B 286	E B 258	E B 256	E B 234	E B 234	210	220	234	268	A	A	A	
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	4	4	3	3	3	3	4	10	10	16	18	23	25	27	27	27	29	28	25	20	17	11	6	3	
MED	U 249	U 248	U 220	U 219	U 212	U 236	U 337	U 261	U 196	E A 252	E A 237	U 229	E 236	E 246	E 232	E 231	225	212	216	223	225	U 256	U 272	262	
U Q	316	282	276	E A 258	E A 240	E B 332	372	318	E A 260	E A 268	E A 268	280	274	268	256	248	244	238	234	241	245	288	E A 324	278	
L Q	224	239	202	H 194	H 178	204	265	202	198	236	224	226	229	232	226	226	216	203	210	212	215	236	266	258	

APR. 2023 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION SHOWA-ST.

MAY 2023 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	52	44	X 51	A	A	A	A	A	X 40	58	56	65	77	94	107	86	78	89	70	54	A	62	A	48
2	A	A	A	A	B	X 45	A	A	A	B	X 44	O 57	X 62	B	B	X 72	63	49	54	37	O 22	X 24	A	O 46
3	A	A	50	62	A	46	48	52	52	X 55	X 69	X 77	X 90	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	82	79	93	X	C	C	C	C	C	C	C	C	C
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
15	C	C	C	A	A	A	X 52	57	58	50	68	87	94	98	100	97	70	56	56	38	O 27	X 23	X 61	A
16	R	A	36	62	63	A	A	A	X 58	59	B	X 72	X 85	X 94	X 99	X 80	X 78	X 62	X 39	X 31	O 26	X 25	X 35	A
17	O 37	X A	A	A	A	A	X 36	A	X 40	X 47	X 58	X 78	X 88	X 94	X 90	X 86	X 52	X 39	X 47	27	O 22	X 24	X 22	X 24
18	X 20	X 22	41	64	42	45	43	49	47	81	71	86	87	97	92	71	59	46	60	36	O 21	X A	X 22	X 20
19	A	A	O 28	X 46	39	46	55	59	46	58	80	X 80	X 91	X 98	X 93	X 68	58	38	42	O 22	X 21	A	A	A
20	A	59	A	52	A	C	C	A	A	A	C	C	C	C	C	C	X 95	C	R	R	R	A	A	47
21	A	A	A	B	C	C	C	C	C	C	C	C	X 65	X 75	X 77	X 81	X 60	X 54	B	A	A	A	A	58
22	B	A	O 50	X 41	X 50	A	B	A	B	B	B	B	B	B	B	X 87	X 83	X 70	X 76	X 73	B	B	B	A
23	B	A	A	A	B	B	A	A	B	B	B	B	B	B	B	O 67	X 59	X 56	B	B	B	B	R	R
24	R	A	B	R	B	A	A	R	B	B	O 48	X 60	X 77	X 75	X 74	X 71	X 69	X 60	60	B	R	R	O 47	A
25	B	O 48	X B	B	B	B	B	R	X 40	X 40	B	B	B	O 89	X 80	X B	O 88	X 70	56	B	R	B	53	R
26	R	R	R	B	B	A	A	B	B	B	B	X 68	O 81	X 92	X 92	67	55	47	37	A	B	A	R	R
27	R	A	A	X 30	A	A	A	O 42	A	A	X 54	X 70	X 72	X 78	X 88	X 72	X 39	X 44	X 27	X 27	A	O 22	A	O 50
28	A	A	A	A	A	A	A	A	A	A	X 48	A	A	X 63	X 79	X 96	X 97	X 93	X 72	A	A	A	A	70
29	A	A	C	A	A	A	A	A	A	X 34	X 65	X 63	X 76	X 77	X 77	X 68	X 45	X 40	X 28	B	A	A	O 21	X 22
30	O 40	X 35	A	A	A	A	40	43	45	45	61	75	87	91	92	66	56	52	36	20	X	A	A	A
31	A	55	A	O 46	A	O 33	A	51	51	44	B	O 55	X 81	X 97	X 86	X 79	X 67	X 58	X 58	49	O 26	A	60	57
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	4	6	6	8	4	5	6	7	10	11	12	15	17	17	17	17	19	17	14	10	7	6	8	10
MED	38	46	46	49	46	45	46	51	46	50	60	72	81	92	90	72	63	54	50	34	O 22	X 24	X 41	X 48
U Q	46	55	50	62	56	46	52	57	52	58	68	80	88	96	94	84	78	66	58	38	O 26	X 25	56	57
L Q	X 28	X 35	X 36	X 44	40	39	40	43	40	44	51	63	74	78	78	68	56	45	37	27	X 21	X 23	X 22	X 24

MAY 2023 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

MAY 2023 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	45	A	A	A	A	A	34	50	50	F	R	F	F	80	72	72	F	F	F	A	A	A	A	
2	A	A	A	A	B	R	A	A	A	B	R	51	56	B	B	66	52	43	F	F	31	R	F	A	40	
3	A	A	A	A	A	F	F	F	F	F	49	63	71	84	C	C	C	C	C	C	C	C	C	C	C	
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
12	C	C	C	C	C	C	C	C	C	C	C	F	72	73	87	C	C	C	C	C	C	C	C	C	C	
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
15	C	C	C	A	A	A	46	35	43	44	62	81	88	92	94	91	60	50	50	32	R	21	17	55	A	
16	A	A	R	F	A	A	A	A	52	44	F	B	66	79	88	87	74	72	56	33	25	R	A	A	A	
17	R	A	A	A	A	A	30	A	34	41	52	72	82	88	84	80	46	33	F	F	17	R	16	18	R	
18	14	16	A	A	F	F	F	F	F	F	F	F	70	81	91	86	65	53	Z	F	F	R	A	16	14	
19	A	A	R	F	F	F	F	F	F	F	F	74	74	85	92	87	Z	F	F	Z	R	A	A	A	A	
20	A	A	A	R	A	C	C	A	A	A	C	C	C	C	C	C	J	R	C	R	A	A	A	A	A	
21	A	A	A	B	C	C	C	C	C	C	C	C	59	69	71	74	54	48	B	A	A	A	A	A	A	
22	B	A	R	R	A	B	A	B	B	B	B	B	B	F	70	77	64	70	R	R	B	B	B	A	A	A
23	B	A	A	A	B	B	A	A	B	B	B	B	B	B	R	61	53	50	B	B	B	B	R	A	A	A
24	A	A	B	A	B	A	A	A	B	B	R	42	54	71	69	68	65	63	R	F	B	R	R	R	A	A
25	B	R	B	B	B	B	B	A	34	34	B	B	B	U	R	83	74	B	R	F	F	B	R	B	A	R
26	R	R	R	B	B	A	A	B	B	B	B	62	75	80	79	52	46	41	F	F	A	B	A	R	A	
27	A	A	A	A	A	A	A	R	A	A	48	62	66	72	82	66	33	24	F	F	21	21	A	R	A	R
28	A	A	A	A	A	A	A	A	A	A	42	A	F	51	73	90	91	61	F	F	A	A	A	A	A	A
29	A	A	C	A	A	A	A	A	A	A	28	44	57	70	71	71	62	39	34	22	B	A	A	R	16	
30	A	R	A	A	A	A	F	F	R	Z	F	F	F	F	80	71	60	F	F	F	14	A	A	A	A	
31	A	A	A	R	A	R	A	R	F	B	R	J	R	F	F	70	61	43	F	F	F	R	A	A	A	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	2	3	4	6	3	5	6	7	10	11	12	15	17	17	17	17	19	16	13	10	7	5	5	5	5	
MED	22	29	33	38	28	27	30	35	36	41	49	62	74	80	79	66	54	46	36	24	R	16	17	16	18	
U Q		42	44	40	44	34	31	36	39	49	57	72	82	88	87	77	R	F	F	F	R	18	48	42		
L Q		16	21	24	16	21	28	24	34	37	43	56	68	72	71	62	46	35	24	17	15	14	16	15		

MAY 2023 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION SHOWA-ST.

MAY 2023 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	46	36	62	K 39	50	48	55	42	59		G 25	E 32	E 42	E 37	E 23	E 25	E 31	E 31	E 27	E 16	50	37	47	44	
2	64	77	93	60	B 48	47	60	46		B 51	46	E 37	B 42	B 37	B 42	B 42	B 36	B 36	24	20	15	31	38	37	
3	36	55	35	42	33	27	14	14	12	20	20	26	26	C 26	C 26	C 26	C 26	C 26	C 26	C 26	C 26	C 26	C 26	C 26	
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
12	C	C	C	C	C	C	C	C	C	C	C	E 29	E 27	E 29	C	C	C	C	C	C	C	C	C	C	
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
15	C	C	C	46	46	44	40	26	K 19	16	15	20		G 22	22	22	16	16	12	E 11	12	59	41	47	
16	29	51	18	41	53	64	66	64	42	42		E 42	E 31	22	20		G 12	E 14	10	11	K 16	13	34	44	
17	34	47	62	57	49	45	28	51	K 20	30	25	22		G 18	G 18	G 18	14	E 13	E 12	47	45	56	56	52	
18	40	34	23	27	29	20	15	12	10	18	E 14	E 23	22	E 26	E 18	E 14	E 14	E 14	E 14	E 12	56	66	31	55	
19	53	54	54	22	12	62	23	12	51	K 16	30	70		G 20	E 20	E 13	E 17	E 13	E 12	E 10	35	36	39	30	
20	36	46	75	69	53		C 60	C 58	C 60	C	C	C	C	C	C	C	E 54	C	26	32	38	40	37	33	
21	45	48	58		B C	C	C	C	C	C	C	C	E 44	E 34	E 20	E 35	E 18	E 30	B	35	29	30	44	28	
22	B	54	41	46	K 21	69		B 44	B	B	B	B	B	E 41	E 36	E 44	E 48	E 51	B	B	B	38	45	49	
23	B	66	69	33	B B		58	58	B	B	B	B	B	E 38	E 43	E 31	E B	B	B	B	B	22	35	45	
24	42	59		46	B 77	49	42		B	E 32	E 26	E 39	E 40	E 37	E 19	E 38	E 42	E 18	B	29	28	37	45		
25	B	K 35	B	B	B	B		B 44	42	28		B	B	E 51	E 42		E 66	E 26	E 22	B	K 22	B	39	39	
26	32	36	46		B 59	59		B 59	B	B	B	E 46	E 46	E 35	E 24	19	K 15	E 76	E 15	E 57	B	28	K 18	30	
27	31	42	54	26	47	K 35	52	46	44	41	22		G 21	21	18		E 12	E 12	E 14	E 55	E 16	56	48	38	40
28	41	34	40	56	52	58	92	57	68	60	55	64	44	44	58		E 25	E 24	E 29	E 64	E 82	60	50	46	33
29	95	47		49	41	36	52	48	52	39	14	18	19	27	16	13	15	15	22		B	45	39	42	42
30	60	66	44	41	52	44	35	19	19	64	18	18	20		G 14	E 17	E 21	E 12	E 45	E 28	53	58	28	40	
31	90	51	61	K 41	53	36	55	33	26	33		E 39	E 62	E 28	E 30	32	18	18	18	15	53	46	38	45	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	16	19	16	17	14	16	16	18	15	14	12	16	17	17	17	17	19	17	16	14	16	18	19	19	
MED	42	48	54	42	48	46	50	44	42	32	U 22	U 24	E 27	E 28	E 22	E 19	E 18	E 18	E 18	E 18	42	38	38	42	
U Q	56	55	62	52	52	60	56	57	52	42	31	44	43	38	36	34	36	34	26	35	53	50	44	45	
L Q	35	36	40	36	33	36	32	26	19	20	16	21	G 20	22	18		G 15	E 14	E 13	E 12	26	30	35	33	

## IONOSPHERIC DATA STATION SHOWA-ST.

MAY 2023 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	8	8	14	14	16	11	11	12	12	10	25	32	42	37	23	26	31	31	27	17	15	8	12	10
2	9	8	18	18	B	15	20	20	14	B	33	28	37	B	B	42	36	36	15	14	9	8	7	8
3	7	9	10	11	11	8	8	8	7	10	12	14	14	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
12	C	C	C	C	C	C	C	C	C	C	C	29	27	13	C	C	C	C	C	C	C	C	C	C
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
15	C	C	C	14	13	13	11	8	7	8	8	11	12	13	12	10	7	9	8	11	7	7	7	9
16	13	12	10	12	17	16	14	13	9	18	B	42	31	15	12	10	12	14	10	7	9	9	7	9
17	7	12	7	13	9	11	9	10	9	8	10	9	6	10	10	8	10	13	12	10	10	8	10	7
18	8	8	7	8	8	8	9	8	6	10	14	14	18	26	18	14	14	13	14	12	12	10	10	8
19	8	10	11	8	9	8	8	9	9	10	12	16	15	20	12	14	12	13	12	10	8	8	9	9
20	11	11	10	13	10	C	C	16	14	14	C	C	C	C	C	C	54	C	15	14	12	14	13	12
21	24	35	36	B	C	C	C	C	C	C	C	C	44	34	15	35	18	14	B	12	18	13	14	12
22	B	22	14	19	12	42	B	19	B	B	B	B	B	41	36	44	48	51	B	B	B	12	13	10
23	B	21	24	14	B	B	48	40	B	B	B	B	B	B	38	43	31	B	B	B	B	11	12	16
24	16	22	B	26	B	28	34	29	B	B	32	26	39	40	37	19	38	42	18	B	15	14	14	17
25	B	14	B	B	B	B	B	31	13	13	B	B	B	51	42	B	66	26	22	B	13	B	12	26
26	18	14	37	B	B	34	34	B	B	B	B	46	46	35	24	9	10	14	15	16	B	12	12	8
27	8	11	12	10	10	14	10	13	12	14	9	8	12	14	12	12	12	14	14	16	13	10	8	10
28	16	14	14	12	12	25	9	12	15	8	18	17	13	14	16	25	24	13	12	17	13	8	9	9
29	11	10	C	14	12	12	12	14	11	15	7	10	10	12	9	10	15	12	14	B	13	7	8	8
30	7	14	14	17	9	11	8	9	9	6	8	10	14	12	14	17	21	12	12	11	20	16	8	9
31	9	11	17	18	15	10	12	11	12	11	B	39	62	28	30	24	14	18	13	8	12	12	10	16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	19	19	18	20	19	18	18	19	19	19	18	19	20	19	18	18	19	18	19	19	19	19	19	19
MED	11	12	14	14	12	14	12	13	12	13	22	26	29	26	17	18	18	14	14	14	13	10	10	9
U Q	B	18	14	24	18	B	28	34	20	15	B	B	42	45	40	36	35	36	31	22	B	B	18	13
L Q	8	10	10	12	10	11	9	9	9	10	10	11	14	13	12	10	12	13	12	11	10	8	8	8

MAY 2023 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION SHOWA-ST.

MAY 2023 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	A	A	E A	A	E B	E B	226	236	246	224	224	238	238		A	A	A	A		
2	A	A	A	A	B	A	A	A	A	B	E B	A	B	B	B	E B	E B	E B	Q	240	252	E A	E A	A	A		
3	A	A	A	A	A	E A	E A	E A	E A	E A	E A	A	C	C	C	C	C	C	C	C	C	C	C	C	C		
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
11	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
12	C	C	C	C	C	C	C	C	C	C	C	220	198	226													
13	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
14	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
15	C	C	C	A	A	A	A	A	282	238	176	214	210	204	200	202	202	202	204	226	Q	214	E A	A	A		
16	A	A	A	Q	A	A	A	A	A	A	B	E B	E B	E A	E A	210	210	202	194	234	228	E A	A	A	A		
17	A	A	A	A	A	A	A	A	322	278	238	224	216	200	214	200	188	228	Q	222	216	224	236	252	A		
18	292	E A	202	A	E A	A	A	A	258	232	230	224	208	206	E B	206	200	200	234	228	E A	A	A	A	A		
19	A	A	296	E A	A	E A	A	A	300	300	218	216	210	206	222	194	190	196	206	198	198	E A	A	A	A		
20	A	A	A	A	A	C	C	A	A	A	C	C	C	C	C	C	246		C	A	A	A	A	A	A		
21	A	A	A	B	C	C	C	C	C	C	C	C	E B	254	224	210	218	E A	B	A	A	A	A	A	A		
22	B	A	E A	E A	Q	A	B	A	B	B	B	B	B	E B	E B	E B	E B	E B		B	B	B	A	A	A		
23	B	A	A	A	B	B	B	B	B	B	B	B	B	B	E B	E B	E B		B	B	B	B	A	A	A		
24	A	A	B	A	B	A	B	A	B	B	E B	E B	E B	E B	E B	E B	E B	E B	Q	B	A	A	A	A	A		
25	B	A	B	B	B	B	B	A	A	A	B	B	B	E B	E B	E B	E B	E B	Q	B	A	B	A	A	A		
26	A	A	A	B	B	A	A	B	B	B	B	E B	268	224	224	212	188	188	258	212	A	B	A	A	A		
27	A	A	E A	E A	A	A	A	A	A	A	E A	A	256	206	214	202	208	206	198	E B	E B	E A	A	A	A		
28	A	192	A	A	A	A	A	A	A	A	E A	A	E A	E A	E A	E A	218	238	248	Q	A	A	A	A	A		
29	A	A	C	A	A	A	A	A	A	E A	E A	E A	E A	372	246	230	210	206	224	196	208	208	282	A	A	A	
30	A	A	A	A	A	A	A	328	E A	E A	E A	E A	E A	E A	E A	230	204	198	208	222	262	214	E B	A	A	A	
31	A	A	A	A	A	A	A	A	292	368	A	B	E B	E B	E B	350	286	208	208	232	E B	Q	240	224	E A	A	A
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	1	2	3	6	2	3	2	3	7	10	12	14	16	17	17	17	19	17	14	10	7	5	2	3			
MED	292	245	222	253	293	U	E A	334	328	292	248	242	230	214	213	209	205	210	224	219	228	E A	E A	248	245		
U Q			296	E A	E A	364		356	302	300	260	268	245	226	229	236	246	260	238	238	258	309		E A	280		
L Q			202	202		226		300	282	238	221	220	210	205	207	198	200	207	208	224	224	241		A	244		

MAY 2023 h'F (KM)

# IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 2023 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	O X 80 47	A X 62	A	A	A	A	A	A	A	B	A	X 56 68	X 68	68	56	57	X 84	A	A	A	A	A	
2	A	A	A	A	A	A	A	A	A	A	O X 48	B	X 80	X 84	X 84	57	50	40	26	X A	A	A	27	53	
3	49	58	A	A	A	A	X 33	45	X 31	X 36	X 52	X 62	X 65	X 82	X 92	56	41	28	X 33	A	A	A	B	A	
4	54	65	A	78	X 50	62	64	70	70	88	79	73	74	X 78	X 96	92	O X 55	O X 37	X A	A	A	A	58	68	
5	56	46	A	48	A	X 48	X 58	X 58	X 58	58	70	84	107	87	X 66	70	57	58	X 36	X 26	R	B	O X 24		
6	A	56	X 31	53	A	A	63		72	56	78	80	79	X 89	X 85	89	58	X 60	X 22	X 22	A	B	R	A	
7	R O 46	X 52	58	49	X 38	46	53	58	62	88	70	76	84	X 82	X 53	59	58	X 27	X 28	A	A	A	A	A	
8	X O 28	X 35	A	X 41	X 46	X 59	X 71	71	76	69	74	69	81	X 94	X 82	78	89	72	O X 37	A	O X 25	A	X 15	43	
9	A	A	32	46	51	44			58	62	80	68	68	X 78	X 85	63	58	42	42	27	O X 24	O X 18	37	A	
10	A	A	A	41	X 38	52	X 49	51	55	45	58	63	79	84	X 66	X 52	X 60	X 56	X 39	22	28	27	O X 31	44	
11	A	52	52	A	X 48	66	70	70	68	80	64	83	99	86	X 76	X 57	55	43	47	31	O X 21	O X 20	A	A	
12	67	70	A	45	A	A	41	56	58	46	50	71	69	80	X 94	X 56	56	57	X 37	31	O X 31	O X 21	19	A	
13	A	A	90	A	A	X 37	44	44	46	57	57	109	78	100	82	69	54	89	O X 36	34	A	B	A	A	
14	A	53	A	A	46	A	A	X 52	49	45	50	59	77	75	X 70	58	45	42	28	21	X 20	X 19	O X 24	20	
15	O X 18	O X 24	A	O X 30	X 62	45	A	52	60	62	67	71	94	88	X 76	71	64	71	80	45	X A	A	50	84	
16	A	A	A	84	84	A	A	A	A	B	A	A	B	X 55	O X 60	O X 50	X 59	X 38	A	A	A	A	A	39	
17	A	A	A	A	A	O X 37	A	A	A	A	A	A	B	80	78	80	74	X 52	B O 32	A	R	A	R	A	
18	A	A	A	A	A	A	A	A	A	O X 37	57	56	58	B	X 92	X 83	59	59	48	23	54	A	A	A	
19	A	A	46	A	A	A	A	A	A	A	A	A	A	56	109	76	80	59	X 42	X 37	A	A	A	67	
20	A O 41	X A	A	A	A	62	A	A	A	A	X 40	54	57	70	X 68	X 88	69	58	B	A	O X 26	A	A	46	
21	A	A	A	A	X 52	A	A	A	A	A	X 49	X 65	X 72	83	X 84	X 59	42	33	34	X 22	O X 18	O X 19	O X 20	A	
22	A	X 59	A	A	A	44	46	44			45	60	63	70	X 110	83	52	60	50	O X 44	46	58		65	
23	A	A	A	A	A	48	A	A	A	A	56	68	65	80	X 94	X 109	90	90	50	O X 28	O X 53	O X 66		66	
24	A O 35	X A	A	A	A	A	A	A	47	A	A	A	44	63	X 72	X 78	81	50	57	47	B	O X 31	R	A	
25	34	A	A	A	A	A	A	A	A	B	A	X 55	X 69	X 86	X 84	X 94	66	59	28	55	87	52	O X 51	A	
26	44	A	38	A	A	A	A	A	A	A	X 43	X 59	O X 62	B	X 99	O X 77	X 58	X 72	X 56	A	A	A	A	A	
27	56	X 50	A	A	A	A	B	A	X 38	41	A	B	O X 68	X 78	X 93	X 83	62	56	42	25	A	A	X 52	A	
28	X 44	A	A	A	A	A	A	A	A	A	O X 48	60	67	77	X 79	X 70	62	66	26	A	X 21	O X 20	A	A	
29	59	A	A	A	A	A	A	A	A	A	A	B	B	O X 55	X 87	X 117	O X 54	X 63	A	O X 27	A	A	57	A	
30	50	A	A	A	A	A	A	A	O X 30	O X 28	X 36	X 51	O X 65	O X 68	X 89	X 93	71	65	B	A	A	A	A	A	
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	12	14	8	11	10	14	11	13	16	17	22	23	27	28	30	30	30	29	24	18	13	11	12	12	
MED	50	51	49	47	50	48	49	52	58	56	56	65	70	80	83	72	58	58	37	28	26	21	34	50	
U Q	56	58	66	58	52	62	64	64	67	62	70	71	79	86	92	83	62	64	47	34	50	52	52	66	
L Q	O X 39	X 41	X 35	X 41	X 46	X 44	X 44	X 46	X 48	X 40	X 49	X 59	X 65	X 74	X 76	X 59	X 52	X 42	X 30	X 23	X 21	X 19	X 22	X 41	

JUN. 2023 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 2023 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	41	A	J R	A	A	A	A	A	B	A	50	62	F	F	51	A	A	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A	42	B	74	78	78	51	35	28	20	A	A	A	A	A
3	A	A	A	A	A	A	27	27	25	30	46	56	59	76	83	F	F	30	22	27	A	A	A	B
4	A	A	A	A	44	F	F	F	F	F	F	F	68	72	75	F	F	R	A	A	A	A	A	A
5	A	F	A	A	A	J R	R	F	F	F	F	F	F	81	60	F	F	F			R	B	A	R
6	A	A	25	22	A	A	A	A	F	F	F	F	F	83	79	F	52	54	16	R	A	B	A	A
7	R	R	A	R	A	F	F	F	F	F	F	64	70	78	76	47	F	R			A	A	A	A
8	22	R	A	J R	J R	J R	65	59	60	52	61	63	J R	88	76	F	F	F	R	A	R	A	9	A
9	Z	A	F	R	A	A	A	A	F	F	F	F	F	72	74	F	25	28	24	13	18	12	A	A
10	A	A	A	A	32	F	43	F	F	F	F	57	73	75	60	F	46	34	22	14	F	A	R	A
11	A	A	A	A	42	F	F	F	F	F	F	F	F	68	70	51	36	37	41	25	R	R	R	A
12	A	A	A	A	A	A	F	F	F	F	F	Z	F	F	88	50	37	51	26	14	F	R	R	A
13	A	A	A	A	A	F	F	F	F	F	F	F	F	70	88	F	F	F	F	F	A	B	A	A
14	A	A	A	A	F	A	A	46	43	39	44	53	62	69	64	Z	46	39	31	22	15	14	13	F
15	R	R	A	R	R	A	A	A	F	F	F	F	F	82	70	60	58	51	46	39	A	A	44	A
16	A	A	A	A	A	A	A	A	A	B	A	A	B	49	51	F	R	A	A	A	A	A	A	A
17	A	A	A	A	A	R	A	A	A	A	A	B	F	68	65	F	F	B	R	A	A	A	A	A
18	A	A	A	A	A	A	A	A	A	R	F	A	B	B	F	F	F	F	F		A	A	A	A
19	A	A	A	A	A	A	A	A	A	A	A	A	A	50	84	F	F	Z	Z	36	31	A	A	A
20	A	R	A	A	A	A	A	A	A	A	F	F	F	62	62	F	F	B	A	R	A	A	A	A
21	A	A	A	A	J R	A	A	A	A	A	43	59	66	F	74	78	53	36	27	28	R	12	R	R
22	A	53	A	A	A	F	F	A	A	F	F	F	F	64	74	F	F	F	F	F	A	A	A	A
23	A	A	A	A	A	A	A	A	A	A	F	F	F	74	82	F	F	F	F	F	A	R	A	A
24	A	R	A	A	A	A	A	F	A	A	A	A	38	57	66	72	75	J R	F	F	B	A	R	A
25	F	A	A	A	A	A	A	A	A	B	A	49	63	70	78	88	51	50	22	28	R	A	A	R
26	A	A	F	A	A	A	A	A	A	A	J R	R	B	B	F	R	93	71	52	56	F	A	A	A
27	A	44	A	A	A	A	B	A	32	30	F	A	B	R	F	F	74	77	56	50	36	19	A	A
28	38	A	A	A	A	A	A	A	A	A	R	F	F	62	68	74	77	56	50	36	19	A	A	A
29	A	A	A	A	A	A	A	A	A	A	A	B	B	R	R	F	F	A	A	R	A	A	A	A
30	A	A	A	A	A	A	A	A	R	R	30	45	59	62	74	76	60	59	B	A	A	A	A	A
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	4	8	3	6	7	11	10	13	15	16	21	23	27	28	30	30	30	29	24	17	9	8	8	2
MED	24	34	21	30	40	39	39	38	42	40	42	56	62	72	74	59	46	48	29	19	16	14	20	16
U Q	32	42	25	41	44	J R	F	F	F	F	F	63	70	78	78	74	52	52	32	24	19	20	44	
L Q	17	29	F	R	32	32	34	32	32	30	36	50	57	66	70	51	39	33	22	16	14	13	13	

JUN. 2023 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN





## IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 2023 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	12	11	11	12	18	14	16	12	15	8	16	B	12	36	34	26	20	9	8	12	8	8	12	14	
2	15	12	15	17	17	12	16	25	13	14	28	B	37	39	26	13	12	17	12	13	11	13	8	8	
3	6	12	15	12	10	11	8	7	8	8	8	8	12	10	16	12	10	9	12	18	18	13	B	12	
4	9	7	8	9	9	9	8	8	8	15	14	13	10	15	16	16	23	16	15	16	16	9	8	10	
5	8	7	14	12	13	10	12	12	11	8	10	14	14	10	13	14	14	11	12	12	11	B	10	10	
6	10	7	8	8	15	16	32	14	10	10	7	8	9	8	16	12	12	11	9	8	14	B	10	9	
7	9	10	12	11	7	10	9	9	11	10	10	8	11	11	10	14	12	10	12	12	10	10	8	6	
8	6	6	8	9	8	10	10	8	7	7	7	9	9	6	8	25	11	10	18	19	14	14	10	8	
9	8	7	7	7	7	10	10	10	8	7	6	8	8	6	8	8	8	8	9	9	10	7	6	8	
10	10	8	8	8	8	8	6	8	8	8	7	8	8	8	8	8	7	8	8	8	10	9	9	11	
11	8	9	10	14	12	10	7	7	10	7	10	13	8	7	7	7	16	17	12	16	6	6	7	8	
12	8	14	14	9	9	8	8	8	6	7	7	7	7	7	8	7	6	6	5	8	8	10	10	10	
13	8	8	9	10	10	8	8	8	6	7	6	6	24	10	10	16	10	20	16	12	10	B	8	12	
14	8	8	11	10	8	10	7	8	8	8	11	7	8	7	6	8	7	6	7	8	8	8	8	8	
15	9	8	10	7	7	7	10	10	9	8	8	8	7	8	5	6	7	10	8	6	8	9	7	8	
16	9	10	13	16	15	13	17	10	25	B	18	15	B	17	38	36	10	14	10	8	8	6	8	26	
17	7	9	8	16	15	10	10	8	7	9	11	B	40	45	25	30	25	B	16	13	9	11	9	10	
18	19	13	14	12	10	12	12	12	10	9	10	10	14	B	34	40	23	12	14	10	8	9	9	11	
19	9	9	13	10	11	11	14	12	11	8	12	17	38	19	28	24	16	11	10	14	8	8	8	9	
20	14	15	13	18	12	11	16	10	14	8	12	25	23	17	15	9	8	27	B	10	11	8	7	7	
21	8	11	10	10	13	12	19	14	10	7	11	34	11	8	10	9	8	8	8	8	8	8	6	6	
22	8	7	17	11	14	9	8	8	11	16	14	14	31	34	33	24	20	12	9	9	9	9	10	7	
23	9	9	11	20	15	9	15	11	10	13	10	9	9	13	45	20	14	7	21	11	8	8	8	12	
24	14	12	12	13	14	13	10	8	11	18	11	17	16	42	40	39	30	8	9	B	10	7	12	12	
25	6	26	9	10	7	21	15	13	24	B	19	37	26	24	11	14	11	23	15	8	10	6	8	13	
26	11	25	9	14	14	13	15	14	10	12	14	35	48	B	45	56	36	18	17	7	7	11	7	10	
27	12	12	13	11	11	18	B	20	10	9	18	B	51	44	37	64	42	41	16	12	8	8	8	8	
28	8	15	13	12	12	11	16	11	12	29	19	9	14	42	33	31	28	32	15	12	10	8	9	8	
29	9	12	11	17	10	12	22	10	20	9	16	B	B	17	25	15	13	20	18	12	9	8	11	12	
30	12	14	10	18	28	12	13	13	11	10	11	7	35	46	40	26	25	32	B	19	15	16	19	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	9	10	11	12	12	11	12	10	10	9	11	13	14	16	16	16	12	12	12	12	10	9	8	10	
U Q	11	12	13	14	14	12	16	12	11	13	14	B	34	35	39	34	26	23	20	16	13	11	11	10	12
L Q	8	8	9	10	9	10	8	8	8	8	8	8	8	9	8	10	9	10	9	9	8	8	8	8	8

JUN. 2023 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 2023 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	272	A	234	A	A	A	A	A	B	A	E	B	B	270	246	A	A	A	A	A	A		
2	A	A	A	A	A	A	A	A	A	A	E	A	B	E	B	B	220	E	B	E	B	A	A	A	A	
3	A	A	A	A	A	A	E	A	362	292	242	242	238	218	224	224	208	220	E	A	A	A	B	A		
4	A	A	A	A	A	344	A	A	312	302	302	278	276	242	240	210	212	282	E	A	A	A	A	A		
5	A	A	A	A	A	A	A	A	A	A	Q	Q	E	A	196	194	204	268	222	212	E	B	A	A		
6	A	198	198	210	A	A	A	A	Q	302	226	210	226	202	226	194	204	232	222	E	A	A	B	A		
7	A	A	A	A	A	A	A	A	Q	324	264	238	192	208	204	228	210	190	204	220	206	220	A	A		
8	E	A	A	A	A	E	A	A	Q	360	314	250	242	254	226	216	230	188	208	238	208	264	A	A		
9	A	A	A	A	A	A	A	A	A	A	A	Q	E	A	E	A	200	222	200	200	194	194	220	224	260	
10	A	A	A	A	A	E	A	A	E	B	342	336	306	278	232	218	222	206	202	206	200	210	216	208	272	
11	A	A	A	A	A	Q	Q	Q	Q	324	322	274	264	272	244	210	218	204	214	E	B	236	244	218	226	
12	A	A	A	A	A	A	A	A	A	340	272	248	226	226	208	220	212	200	Q	Q	222	220	206	248	250	
13	A	A	A	A	A	A	A	A	A	E	A	E	A	370	334	280	304	238	216	216	E	A	220	230	262	
14	A	A	A	A	A	A	A	A	A	A	A	A	A	242	232	236	198	208	200	194	202	Q	210	242	202	
15	A	196	A	A	A	A	A	A	A	A	A	A	A	Q	Q	220	220	228	216	E	A	244	194	252	274	
16	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	E	B	278	304	306	346	E	A	A	A	
17	A	A	A	A	A	A	A	A	A	A	A	A	B	A	240	254	224	218	236	B	E	A	A	A	A	
18	A	A	A	A	A	A	A	A	A	A	A	A	E	A	B	E	B	234	236	206	222	230	A	A	A	A
19	A	A	A	A	A	A	A	A	A	A	A	A	A	E	B	Q	B	294	230	210	218	214	244	252	A	
20	A	A	A	A	A	A	A	A	A	E	A	E	A	E	B	A	E	A	244	218	218	228	206	246	B	A
21	A	A	A	A	A	A	A	A	A	A	E	A	E	A	E	A	202	210	198	246	226	220	240	256	272	
22	A	208	A	A	A	A	A	A	A	A	E	A	E	B	E	B	E	B	262	250	310	A	A	A	A	
23	A	A	A	A	A	A	A	A	A	A	A	A	Q	E	A	274	244	212	240	242	230	226	232	220	288	
24	A	A	A	A	A	A	A	A	A	A	A	A	E	A	E	B	E	A	290	278	256	212	284	256	290	
25	A	A	A	A	A	A	A	A	A	A	B	A	E	B	E	B	E	B	298	230	230	216	226	244	244	
26	A	A	A	A	A	A	A	A	A	A	A	A	E	B	B	E	B	282	320	246	252	240	242	230	B	
27	240	270	A	A	A	A	B	A	E	A	346	300	A	B	E	B	294	248	256	256	262	300	262	262	A	
28	A	A	A	A	A	A	A	A	A	A	A	A	E	A	E	B	E	B	250	222	242	224	222	218	254	
29	A	A	A	A	A	A	A	A	A	A	A	A	B	B	A	E	B	268	274	284	258	A	166	A	A	
30	A	A	A	A	A	A	A	A	A	A	A	A	E	B	E	B	258	240	266	272	242	232	214	232	B	
31																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	2	4	2	3	4	4	4	10	12	15	19	23	27	26	30	30	30	29	24	14	7	6	8	1		
MED	290	203	210	U	241	249	266	348	318	266	242	247	238	214	223	214	216	226	236	222	238	243	252	238	228	
U Q		239		304	299	343	361	340	302	288	278	276	244	242	242	232	262	248	259	272	256	272	321			
L Q		197		210	207	239	330	312	257	232	226	222	210	218	210	204	214	222	215	224	224	220	210			

JUN. 2023 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 2023 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	X	X									X	X	A	R	A	A					
2	A	A	A	X	A	A	A	X	A	O	X								X	B	A	B	B	29					
3	34	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X		X	O	X	O	X				
4	60	A	A	40	A	86	A	X	O	X	X	X	X	X	X	X	X	X	X	O	X	A	O	X	A	O	X	40	
5	A	A	A	A	A	A	A	A		44	46	58	67	74	67	71	64	43	41	29	28	31	22	41					
6	A	A	O	X		A	A	A	A	A	X									A	A	A	A	A	A	A	A	A	
7	A	93	A	A	A	A	A	A	A	A	A	X	O	X	B	B	X		X	O	X	A	A	A	A	A	A	A	
8	A	73	A	A	A	A	A	A	A	A	A	B	X							B	A	A	A	A	O	X	38	38	
9	X	56	O	X	O	X	49	52	55	56	42	46	61	71	78	69	67	41	59	43		B	X	A	A	A	A	A	
10	A	A	O	X	A		A	A	A		48	51	58	70	69	72	62	53	45	44	O	X	A	O	X	O	X	A	
11	A	A	A	A	A	A	A	A	A	A	X									X	O	X	A	A	X				
12	A	A	A	A	56	A	A	A		O	X	O	X							X	X	B	A	O	X	A	O	X	54
13	A	A	A	A	A	A	69	64	71	87	81	64	80	74	92	56	56	43	44	26		X	O	X	X				
14	X	O	X	O	X	A	A		A	A	O	X								X	O	X	A	A	A	O	X	X	46
15	50	44	A	70	A	A	A	44	44	A	45	58	68	70	81	80	66	69	44		A	A	A	A	X	A	A	A	
16	A	A	A	A	A	42	34	35	46	38	51	61	84	84	93	90	44	57	42	25		A	A	A	A	A	A	A	
17	A	A	A	47	O	X	A	A	X	A	X	B		O	X				A	A	A	A	A	A	X	A	A	A	
18	O	X	A	A	A	A	B	A	B	B	B	B	B	B	B	X	O	X	X	O	X	B	B	B	B	B	B	R	
19	R	R	X	O	X	55	53	52	55	60	42	59	59	76	90	88	78	48	62	40	31	A	A	A	A	A	A	A	
20	A	57	R	A		47	47	66	66	58	50	71	78	96	92	75	71	61	52	28		O	X	B	A	A	A	58	
21	A	A	112	50	A	A	O	X	R	O	X	X	X	X	X	X	84	68	70	70	43	O	X	A	O	X	O	X	52
22	77	55	O	X	A	A	A			89	48	51	53	70	73	110	90	105	90	38		O	X	B	R	R	R	A	
23	X	X	A	A	A	37	36	32	32	40	63	59	84	85	79	73	60	70	60		A	A	O	X	A	A	A	A	
24	A	47	A	A	48	A	A	A	B	B		54	66	75	73	85	90	60	71	41	O	X	A	A	A	A	A	A	
25	49	A	O	X	A	A	X	X		47	47	49	51	62	65	98	70	99	73	65	50		A	A	A	A	A	A	
26	68	55	67	A	O	X	A	A	A		68	A	B		56	65	71	92	93	71	X	A	A	A	A	A	A	A	
27	A	O	X	A	X	A	A	X		33	43	54	64	74	72	85	69	68	48	38	38	O	X	A	A	A	X	54	
28	A	36	43	A	A	36	42	44	44	44	64	76	87	80	88	84	73	60	57	58		O	X	O	X	X	X	54	
29	A	A	A	A	A	78	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A	A	A	A	A
30	A	A	O	X	X	O	X	X	X		B	O	X	X	X	X	X	114	115	70		B	B	A	A	A	A	X	43
31	A	82	A	A	A	A	A	A	A	A	B	B	O	X		X	X	X	X		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	10	13	11	13	9	11	13	13	19	21	26	24	29	29	29	31	31	30	27	15	7	11	12	13					
MED	52	56	O	X	55	47	49	47	47	46	44	54	62	74	74	84	75	60	58	42	28	X	O	X	X	X	X	X	
U Q	60	66	63	68	53	60	56	55	60	50	58	65	80	86	88	86	71	69	50	31	36	22	35	54					
L Q	49	48	O	X	48	44	42	39	38	33	40	50	59	68	70	72	68	51	48	35	25	19	18	21	39				

JUL. 2023 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 2023 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		39	34	40	F	F	F	F	F	F	F	F	A	A	A	A		
2	A	A	A	36	A	A	A	42	A	R	F	F	F	F	Z	F	F	Z	Z	27	B	A	B	B	18	
3	A	A	A	A	A	A	26	30	27	28	44	57	80	52	69	51	30	30	26	12	13	12	12	18		
4	A	A	A	A	A	A	A	33	U	R	25	32	38	53	73	60	56	69	24	24	28	18	A	R	A	34
5	A	A	A	A	A	A	A	A	F	F	F	F	F	J	R	65	53	37	22	F	F	F	F	A	A	
6	A	A	R	A	A	A	A	A	A	A	46	48	53	58	66	69	70	53	50	A	A	A	A	A	A	
7	A	A	A	A	A	A	A	A	A	A	A	A	49	44	B	B	110	86	35	27	A	A	A	A	A	
8	A	A	A	A	A	A	A	A	A	A	A	A	B	51	56	50	56	28	26	B	A	A	A	A	R	32
9	50	F	R	F	R	F	F	F	F	F	F	F	F	Z	Z	61	35	51	32	F	B	12	A	A	A	
10	A	A	R	A	F	A	A	A	A	F	F	F	Z	63	66	56	47	33	32	U	R	A	12	R	A	
11	A	A	A	A	A	A	A	A	A	A	52	B	63	63	64	48	44	38	38	22	A	A	26	A	A	
12	A	A	A	A	A	A	A	A	F	R	R	F	Z	75	77	48	59	50	32	B	A	R	A	R	48	
13	A	A	A	A	A	A	F	F	F	F	F	F	Z	74	68	81	50	45	27	32	15	14	12	15	A	
14	32	R	R	R	A	A	A	A	A	A	R	B	F	F	F	Z	F	F	R	A	A	A	R	40		
15	A	A	A	F	A	A	A	38	36	A	39	52	62	64	75	72	60	48	38	A	A	A	18	A	A	
16	A	A	A	A	A	F	28	28	29	28	32	40	55	78	59	72	80	38	40	36	19	R	A	A	A	
17	A	A	A	F	R	A	A	A	24	A	26	B	B	56	F	Z	80	102	58	A	A	A	48	A	A	
18	U	R	A	A	A	A	B	A	B	B	B	B	B	B	B	J	R	R	R	B	B	B	B	B	R	
19	R	A	40	49	F	F	F	F	F	F	36	53	53	70	82	82	72	42	56	34	R	A	A	A	A	
20	A	A	A	A	A	F	F	F	F	F	F	F	F	F	Z	Z	65	55	33	22	B	A	A	A	A	
21	A	A	A	R	A	A	R	R	R	R	44	44	48	52	61	64	72	59	58	56	37	22	A	R	R	A
22	A	F	J	R	A	A	A	A	A	Z	Z	R	R	64	67	83	84	87	68	32	B	R	A	R	A	
23	46	50	A	A	A	Z	F	26	26	34	57	53	78	79	73	67	54	64	49	A	A	26	A	A	A	
24	A	A	A	A	A	A	A	A	B	B	48	60	69	67	79	84	54	54	20	22	A	15	16	A	A	
25	A	A	U	R	A	A	36	41	29	38	45	56	59	78	59	84	59	53	44	A	A	A	A	A	A	
26	A	49	A	A	R	F	A	A	A	F	A	B	50	57	65	64	84	65	A	A	A	A	A	A	A	
27	A	U	R	A	A	R	A	A	27	37	48	58	68	66	79	63	52	42	31	23	15	R	A	A	48	
28	A	30	A	A	A	Z	F	F	F	F	38	58	65	81	74	82	78	67	54	51	52	30	14	15	A	
29	A	A	A	A	A	A	A	A	A	42	52	76	70	72	80	80	64	63	68	47	B	B	A	A	A	
30	A	A	47	45	36	46	48	48	A	B	R	47	50	61	80	Z	76	95	97	64	A	A	A	A	A	
31	A	A	A	A	A	A	A	A	A	A	B	B	R	F	76	96	83	76	78	85	44	A	A	A	A	A
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	4	7	8	9	7	9	11	13	17	21	26	24	29	29	29	31	31	30	27	15	6	10	10	7		
MED	46	44	45	40	40	30	30	33	29	36	45	53	64	66	73	67	53	49	32	22	14	14	16	34		
U Q	48	50	48	47	41	50	38	42	38	41	48	58	72	74	80	78	64	56	38	23	18	15	25	48		
L Q	39	39	40	36	26	29	26	28	26	32	40	52	61	62	66	56	42	35	28	18	13	12	15	18		

JUL. 2023 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUL.2023 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	56	46	57	52	46	57	60	52	34	24	21	21	21	21	40	19	15	E B 14	59	58	81	22	26	56
2	32	42	37	35	46	44	43	32	52	57	38	G	28	18	E B 24	29	38	79	52	B	56	B	B	42
3	44	35	47	45	45	46	27	20	46	26	22	28	20	29	29	32	17	56	58	45	46	40	34	42
4	44	32	43	39	38	54	42	30	57	29	51	19	19	23	17	16	E B 14	10	41	57	32	46	54	78
5	31	155	105	34	48	56	45	49	21	17	30	18	22	23	G 16	16	18	24	34	49	46	40	32	44
6	56	57	70	37	53	56	59	59	53	45	29	30	28	26	17	22	14	27	68	57	38	38	33	45
7	47	52	60	53	64	69	49	51	43	64	68	E B 38	57	B	B	E B 25	E B 59	57	46	40	54	83	106	51
8	53	23	79	55	56	60	57	56	76	55	66	B	E B 32	22	G	K E 17	E B 20	52	B	84	56	61	60	26
9	40	37	K 30	42	32	32	13	15	11	10	12	G 16	22	22	G	22	E B 17	E B 20	E B 17	B	54	50	55	44
10	46	43	30	31	49	51	54	49	47	27	27	27	G 17	G 21	E B 16	21	36	20	22	40	38	41	14	53
11	36	69	42	70	49	54	48	58	50	61	38	B	E B 43	E B 24	G E 24	E B 24	13	15	21	54	58	60	55	39
12	41	50	52	52	38	82	54	54	38	46	33	E B 41	26	23	E B 20	E B 16	20	24	E B 17	B	58	55	41	42
13	37	34	34	38	32	61	35	35	30	24	18	26	21	30	30	21	18	15	E B 10	54	44	46	21	32
14	32	37	36	40	71	81	47	59	60	68	40	B	E B 40	E B 25	E B 25	21	18	19	40	55	43	44	52	30
15	40	32	87	34	62	43	39	40	32	40	28	G 38	E B 21	22	15	E B 39	E B 35	E B 28	23	50	54	26	24	28
16	27	29	96	64	38	22	30	45	40	55	70	96	E B 34	E B 31	34	E B 15	71	18	28	51	46	56	50	28
17	56	55	51	24	43	48	47	41	52	58	G	B	B	E B 41	38	32	E B 34	49	78	55	41	32	78	78
18	58	69	68	60	60	56	B	57	B	B	B	B	B	B	B	B	E B 51	E B 36	E B 34	E B 24	B	B	B	22
19	22	32	32	29	46	40	E B 14	E B 16	E B 16	E B 15	E B 32	E B 37	E B 48	E B 35	E B 29	E B 29	E B 26	E B 36	55	53	78	78	46	45
20	56	55	22	36	66	28	22	16	E B 14	E B 14	E B 16	G	20	20	22	22	23	20	17	47	B	40	76	44
21	58	77	105	32	56	59	40	32	46	22	22	22	19	21	22	G E 23	E B 21	19	67	52	46	45	40	
22	44	36	56	61	58	60	60	63	58	31	35	G E 41	36	36	30	G E 16	E B 25	E B 24	E B 24	B	24	28	23	44
23	49	82	53	55	42	26	43	14	21	16	16	G 16	28	18	G	16	16	23	19	55	47	50	46	42
24	46	38	112	56	39	58	59	57	B	B	23	G	G	23	40	16	14	20	13	44	44	56	23	33
25	34	103	59	41	36	49	33	14	20	74	G	G E 20	E B 48	E B 37	E B 30	E B 26	20	E B 12	27	40	45	34	44	69
26	39	42	51	80	52	44	63	70	67	34	59	B	59	E B 30	40	41	21	K 21	40	43	41	44	55	59
27	52	66	71	71	62	57	47	44	19	13	17	G 37	17	G	18	27	E B 17	14	17	17	40	32	34	38
28	35	34	40	40	65	28	15	15	13	13	22	20	19	26	34	36	23	16	16	20	20	42	33	43
29	74	68	47	40	50	64	43	50	60	37	E B 35	E B 42	E B 42	E B 42	E B 36	E B 25	E B 17	E B 14	31	K 21	53	42	45	45
30	52	43	53	28	34	37	39	36	54	B	E B 42	E B 36	E B 35	E B 47	E B 34	E B 38	E B 33	E B 17	E B 20	B	B	36	43	40
31	70	52	58	52	42	51	46	54	36	59	B	B	E B 60	E B 44	E B 40	E B 33	E B 44	E B 38	E B 24	56	58	62	53	57
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	30	31	29	28	29	24	29	29	29	31	31	31	30	25	28	29	29	31
MED	44	43	53	41	48	54	44	45	43	32	30	E G 26	24	22	27	19	18	20	24	51	46	44	45	43
U Q	56	66	70	55	58	59	54	56	54	56	39	38	E B 41	E B 33	34	E B 32	E B 34	E B 34	41	56	55	56	54	51
L Q	36	35	40	35	39	43	35	30	21	20	22	G	20	22	21	17	17	16	19	42	41	37	32	38

JUL.2023 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 2023 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E OSWEEP 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	9	9	14	10	9	8	17	13	10	9	11	9	10	14	10	9	8	14	9	12	12	10	11	8
2	7	7	7	7	9	10	10	8	8	13	14	10	10	9	24	18	18	16	15	B	11	B	B	7
3	7	8	8	11	9	9	8	7	8	7	7	7	8	7	8	8	7	7	6	6	8	8	6	8
4	7	7	7	9	8	8	9	8	8	10	9	6	8	9	9	8	10	10	10	6	9	12	9	7
5	7	6	10	7	7	13	9	7	6	7	7	7	8	6	8	6	6	7	5	21	6	7	7	8
6	8	7	8	9	9	11	13	11	9	8	8	8	9	11	B	B	9	10	20	12	10	8	6	8
7	9	8	15	10	8	10	10	14	8	11	11	38	17	B	B	25	60	10	12	10	10	8	9	8
8	12	7	14	9	25	9	10	13	14	11	18	B	32	13	12	11	20	19	B	19	16	15	11	8
9	6	8	7	9	8	8	8	8	6	6	7	8	9	8	10	11	17	19	17	B	10	9	8	7
10	7	8	7	7	8	10	17	9	9	8	7	8	9	9	8	21	24	12	14	10	12	14	6	7
11	10	10	8	10	11	8	9	10	12	13	12	B	43	24	12	24	13	10	12	15	15	12	9	8
12	10	9	10	8	8	17	9	14	10	10	33	33	16	12	20	15	12	24	17	B	14	10	9	9
13	8	7	8	10	13	11	10	8	9	8	8	11	10	10	8	8	8	9	11	10	10	7	7	6
14	6	6	7	7	7	9	10	14	11	40	18	B	40	25	25	22	18	19	11	11	8	7	6	7
15	6	8	8	6	14	7	10	8	10	11	14	14	22	17	8	39	35	28	16	19	18	9	6	7
16	7	7	10	13	9	8	8	7	10	11	12	21	34	31	15	15	9	9	12	14	9	14	11	8
17	15	14	16	9	14	17	15	15	9	21	14	B	B	B	41	12	24	34	10	7	7	7	8	10
18	7	8	10	8	24	19	B	42	B	B	B	B	B	B	B	51	36	34	24	B	B	B	B	16
19	15	15	16	17	14	10	13	15	16	15	32	37	48	35	29	29	26	36	24	16	12	12	11	12
20	12	12	12	12	13	12	10	10	14	14	16	14	10	13	8	11	9	8	10	10	B	11	11	13
21	10	10	12	10	11	12	11	15	17	9	10	11	14	15	8	14	23	12	8	20	10	8	7	8
22	17	10	18	11	15	13	12	15	8	12	14	41	19	16	18	16	25	24	24	B	12	12	14	13
23	7	9	14	11	10	8	8	10	7	7	8	8	10	10	8	8	7	9	8	11	8	7	7	8
24	10	6	10	11	7	17	17	12	B	B	14	9	12	12	11	8	8	10	8	7	7	9	8	8
25	9	49	12	13	14	13	9	10	7	8	11	14	48	37	30	12	10	12	14	10	12	12	12	16
26	13	12	9	17	11	20	13	16	11	10	12	B	18	30	40	41	12	11	10	8	8	8	9	14
27	10	10	16	7	11	15	19	10	9	8	8	11	12	12	13	10	17	8	8	7	8	6	8	6
28	9	8	8	11	7	9	7	8	7	7	7	11	13	13	10	8	8	9	10	7	9	11	7	8
29	8	11	9	12	12	12	13	12	24	25	35	42	42	42	36	25	16	14	14	13	15	16	15	13
30	14	13	14	11	14	15	14	14	28	B	42	36	34	47	34	38	33	17	20	B	B	9	12	12
31	12	15	20	12	12	11	10	13	15	16	B	B	60	44	40	33	44	38	24	37	11	12	12	10
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	9	8	10	10	11	11	10	11	10	11	12	14	16	14	12	15	16	12	12	12	10	10	9	8
U Q	12	11	14	11	14	13	13	14	14	15	18	42	40	35	29	25	25	19	17	21	14	12	11	12
L Q	7	7	8	8	8	9	9	8	8	8	8	9	10	10	8	9	9	9	9	10	8	8	7	7

JUL. 2023 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION SHOWA-ST.

JUL. 2023 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E pSWEEP 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	278	238	242	210	220	238	194	190	272	222	242	A	A	A	A
2	A	A	A	A	A	A	A	A	A	A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	A	B	B	200
3	204	A	A	A	A	A	A	A	A	A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	A	A	A	200
4	A	A	A	A	A	A	A	A	A	A	212	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	A	A	A	222
5	A	A	A	A	A	A	A	A	A	A	262	240	208	222	198	204	188	220	234	238	240	244	180	A	A
6	A	A	212	A	A	A	A	A	A	A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	A	A	A	A
7	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
8	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
9	A	A	224	288	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
10	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
11	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
12	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
13	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
14	A	298	E A	220	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
15	A	A	A	200	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
16	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
17	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
18	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
19	A	A	310	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
20	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
21	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
22	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
23	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
24	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
25	A	A	244	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
26	A	194	198	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
27	A	206	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
28	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
29	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
30	A	A	216	210	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
31	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	00	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	6	8	6	1	3	5	8	9	17	24	24	27	29	29	30	31	30	27	15	6	8	7	5	
MED	253	225	224	216	198	E A	U	E	295	284	263	235	229	217	208	209	210	222	226	220	220	233	203	224	200
U Q		284	301	280		E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A
L Q		206	214	210		198	320	248	268	258	225	215	210	204	203	196	200	216	214	216	228	186	200	196	

JUL. 2023 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2023 fxI (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
1	O X 49	A	A	A	A	A	A	A	X	45	52	70	77	90	99	93	100	91	79	X	62	52	O X 34	A	A	A	
2	A	A	A	A	A	A	X	42	50	55	40	45	59	64	102	107	105	118	100	X	78	R	R	R	A	A	
3	74	A	54	A	58	41	X 45	X	A	X 46	X 44	X 62	X 72	X 74	X 86	X 96	X 94	X 86	X 86	R	B	R	O X 20	X 22	O X 22		
4	A	A	A	A	A	48	O X 26	45	45	49	X	X	70	78	96	94	89	85	83	106	88	38	A	70	56	A	
5	67	A	A	A	A	A	A	A	A	A	A	A	A	X	X	X	X	O X 60	X 40	X	A	A	R	R	A	A	
6	O X 41	X 44	47	A	A	A	A	X	25	38	53	70	76	78	75	78	X	71	68	68	56	27	A	R	R	A	
7	R	43	A	A	A	A	A	A	A	A	X	X	X	X	O X	X	X	X	X	X	X	X	B	A	A	A	
8	A	A	A	A	A	O X 44	A	A	X	43	54	60	73	74	87	88	75	92	81	57	35	O X	A	O X 37	A	A	
9	A	A	A	A	A	69	A	O X 40	X	40	42	61	71	78	94	96	88	78	72	68	49	B	58	O X 51	O X 44		
10	A	X 47	A	A	X 51	A	A	A	X	56	56	62	80	86	99	109	106	X	78	84	61	44	A	R	A	X 29	
11	A	V 36	X 55	X	A	A	A	A	X	43	55	69	78	87	94	104	97	61	83	62	44	X	30	X 20	X 29	A	
12	A	A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	B	A	A	A	
13	X 47	O X 55	A	A	A	A	X	X	44	44	46	57	64	83	83	98	100	88	76	70	57	46	X	O X 32	X 22	X 19	X 21
14	X 20	A	A	A	A	A	X	46	45	49	58	70	85	94	102	100	88	X	85	70	59	55	O X 30	O X 24	A	56	
15	A	A	A	A	79	A	A	53	55	61	77	89	92	94	94	93	X	82	64	64	39	X	X	A	A	A	
16	A	A	56	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A	A	
17	A	A	A	A	A	A	A	A	A	58	65	74	76	73	81	77	74	72	71	52	O X	28	56	O X 43	X 40		
18	A	A	52	46	55	45	36	A	O X 58	X 52	X 49	X 58	X 74	X 86	X 103	X 115	X 113	64	59	50	O X	43	A	A	A	A	
19	A	A	B	A	A	A	36	40	X	42	54	61	78	85	92	90	79	78	79	54	37	O X	O X 22	O X 20	O X 20	89	
20	A	A	A	A	A	A	A	A	X	46	58	60	70	84	92	82	95	85	72	63	59	O X	O X 34	O X 25	A	A	
21	58	A	A	A	A	A	A	A	A	X	48	60	78	80	99	95	86	86	93	96	70	B	R	A	A		
22	A	A	A	A	A	A	A	A	A	A	B	B	B	X	X	X	X	X	X	X	X	B	A	R	R	A	
23	R	R	A	A	A	A	39	40	X	46	62	78	85	91	98	94	109	88	72	66	56	X	X	A	X 23		
24	X 20	O X 58	X 32	X 29	X 32	37	38	51	45	56	69	85	97	96	94	88	86	74	62	48	32	X	X	A	A	A	
25	A	A	A	A	O X 50	X 51	A	50	58	61	74	86	89	88	100	98	84	76	58	44	O X	O X 41	B	A	X 26		
26	42	A	A	O X 26	X 31	X 42	58	A	64	63	71	89	108	109	115	110	94	86	68	50	X	A	A	A	A		
27	A	A	A	A	A	A	A	A	A	X	48	52	68	70	80	89	84	80	90	61	40	A	A	A	A	A	
28	A	A	A	54	A	A	A	A	A	A	X	63	69	78	86	98	109	99	96	68	36	56	A	A	A	A	
29	56	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O X	34	38	A	A	A	A	
30	O X 26	57	70	A	81	A	X 56	64	66	72	82	98	106	95	104	102	104	X	94	82	43	X	A	A	A	A	
31	49	56	50	44	X 45	O X 50	X 55	53	X 45	71	72	110	112	102	113	92	94	70	90	46	X	X	X	X	A	67	
	00	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	8	8	5	9	12	13	15	23	29	29	29	31	31	31	31	31	31	29	28	16	12	8	11			
MED	48	51	53	44	51	46	X 42	45	46	56	66	78	86	94	95	93	85	79	64	46	X	X	X	X	X	X	
U Q	57	56	56	50	68	52	X 50	53	56	62	72	85	94	99	102	103	92	88	79	52	38	46	O X 47	56			
L Q	X 34	44	48	X 28	X 38	X 42	37	40	X 45	X 50	X 60	X 70	X 78	X 86	X 89	X 85	X 78	X 70	X 60	X 39	X 30	X 20	X 21	X 23			

AUG. 2023 fxI (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



## IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2023 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	R 43	A	A	A	A	A	A	A	39	F 40	64	71	84	J 93	R 87	94	F 81	F 69	56	F 34	28	A	A	A			
2	A	A	A	A	A	A	36	F 36	F 38	34	39	53	Z 58	F 90	101	F 91	112	94	F 49	R	R	R	A	A			
3	A	A	A	A	A	35	39	A	40	R 38	56	66	68	80	90	88	80	80	R	B	R	R	14	16	R 16		
4	A	A	A	A	A	F 37	R 20	A	F 23	43	64	72	90	88	R 83	R 79	F 70	F 82	32	A	A	50	A	A			
5	A	A	A	A	A	A	A	A	A	F 44	A	A	44	42	45	55	R 54	A	A	R	A	A	A	A	A		
6	R 35	38	A	A	A	A	A	19	30	47	64	F 64	72	69	F 61	65	Z 61	J 62	R 50	R	21	A	R	R	A		
7	R	A	A	A	A	A	A	A	A	F 47	60	63	64	F 72	79	77	F 66	F 62	F 68	42	B	A	A	A	A		
8	A	A	A	A	A	38	A	A	37	48	54	67	68	F 74	V 82	F 69	F 78	F 75	F 39	R 29	A	U	R	A	A		
9	A	A	A	A	A	R	A	R	J 34	R 34	36	55	61	F 72	F 83	F 85	F 80	72	66	62	39	B	R	R	R 38		
10	A	41	A	A	45	A	A	A	50	50	56	74	80	92	F 94	100	Z 72	F 58	55	37	A	A	A	23	A		
11	A	R	49	A	A	A	A	A	37	49	63	72	81	88	98	91	55	71	56	25	24	14	A	A	A		
12	A	A	A	A	A	A	A	A	A	36	46	56	F 88	F 96	82	82	F 57	F 50	F 40	F 27	F 16	B	A	A	A		
13	41	49	A	A	A	A	38	38	F 33	Z 51	58	77	77	92	94	82	70	64	J 51	R 28	F 26	16	13	15	R		
14	14	A	A	A	A	A	40	F 28	F 35	F 52	64	79	88	96	94	82	79	64	Z 53	F 46	R 24	18	A	A	A		
15	A	A	A	A	A	A	A	F 40	F 37	F 46	Z 69	F 78	86	88	88	84	Z 76	Z 58	58	33	23	A	A	A	A		
16	A	A	A	A	A	A	A	F 37	F 48	F 56	F 68	89	88	93	96	97	J 85	R 54	F 54	F 22	A	A	A	A	A		
17	A	A	A	A	A	A	A	A	A	F 50	59	68	F 64	67	75	71	68	66	65	39	F 22	R	A	R	34	A	
18	A	A	A	A	32	39	F 28	A	F 44	46	43	52	68	80	F 86	F 89	F 99	F 53	F 53	F 30	F 37	R	A	A	A	A	
19	A	A	B	A	A	A	Z 27	Z 32	36	48	55	72	79	86	84	J 73	R 72	73	42	F 28	F 16	U	R	R	R	R	
20	A	A	A	A	A	A	A	A	40	52	54	64	78	86	76	89	79	66	52	46	F 28	R	19	A	A	A	
21	A	A	A	A	A	A	A	A	A	42	54	63	F 74	F 89	F 83	80	F 74	F 75	F 90	F 58	B	R	A	A	A	A	
22	A	A	A	A	A	A	A	A	A	B	B	B	81	93	F 89	78	74	73	F 68	F 42	B	A	R	A	A	A	
23	R	R	A	A	A	A	F 23	R 28	40	56	72	J 79	R 85	92	88	F 93	J 82	R 66	60	F 31	F 23	20	A	A	17	A	
24	14	A	R 26	23	26	F 23	F 24	R 29	39	50	63	79	91	90	F 86	F 76	80	68	56	42	26	A	A	A	A	A	
25	A	A	A	A	F 39	45	A	F 34	F 44	55	68	80	83	82	94	92	78	70	53	38	35	R	B	A	20	A	
26	A	A	A	R 20	25	F 20	52	A	Z 58	57	65	83	102	Z 103	F 97	98	F 85	80	Z 62	44	A	A	A	A	A	A	
27	A	A	A	A	A	A	A	A	A	J 42	R 46	J 62	R 64	J 74	R 83	R 72	F 74	F 63	F 55	J 34	R	A	A	A	A	A	
28	A	A	A	A	A	A	A	A	A	A	57	63	72	80	F 85	103	F 91	F 90	F 53	F 25	F 37	A	A	A	A	A	A
29	F 40	A	A	A	A	F 23	F 23	33	48	62	68	J 66	R 82	85	88	J 99	R 94	F 85	F 61	F 28	A	A	A	A	A	A	A
30	R 20	F 47	F 53	A	A	A	50	F 47	F 52	F 60	76	F 82	F 90	89	98	F 92	F 98	F 88	F 76	J 37	R	A	A	A	A	A	A
31	A	45	F 38	F 33	39	44	R 49	30	39	F 56	66	85	F 97	F 96	F 107	80	F 82	F 64	F 61	F 40	33	12	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	7	5	4	3	6	9	13	14	23	29	29	29	31	31	31	31	31	31	29	28	15	9	6	8			
MED	35	45	44	23	36	37	36	34	39	48	60	71	80	88	87	82	78	66	56	34	26	16	26	22			
U Q	41	48	51	F 33	39	42	44	F 37	44	54	66	79	88	92	94	92	82	75	62	41	33	20	45	36			
L Q	14	40	32	R 20	26	F 23	F 24	29	36	42	54	63	68	80	83	77	70	62	F 52	F 28	23	14	14	16			

AUG. 2023 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2023 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E pSWEEP 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	45	50	46	66	42	52	51	50	36	18	G	20	24	32	27	18	18	19	15	16	K	23	47	43	49																			
2	50	56	102	58	55	48	46	31	16	23	30	29	28	E	B	E	B	E	B	B	16	37	44	37	45	43	46	57																
3	52	44	36	36	70	68	61	56	30	33	23	28	51	37	26	22	G	E	B	B	14	68	B	23	45	31	30																	
4	59	46	44	42	46	24	53	56	E	B	E	B	G	G	27	G	22	16	18	G	18	20	17	18	46	50	42	46																
5	43	44	82	69	44	65	63	63	70	38	71	70	24	24	G	E	B	E	B	E	B	35	45	25	53	57	23	33	61	56														
6	32	30	32	31	36	88	37	70	21	21	22	26	E	B	E	B	E	B	E	B	B	19	50	42	31	32	49	20	24	27														
7	17	58	61	57	50	46	45	57	40	49	40	E	B	E	B	E	B	E	B	E	B	G	E	B	E	B	E	B	E	B	B	33	58	68										
8	54	61	60	56	70	68	56	58	32	24	30	36	34	32	39	31	40	26	24	24	E	B	E	B	E	B	E	B	E	B	E	B	59	26	36	43								
9	43	30	57	52	67	45	50	48	48	65	41	E	B	E	B	E	B	E	B	E	B	34	23	11	15	16	B	33	36	45														
10	62	40	51	46	39	42	42	63	44	G	E	B	E	B	E	B	E	B	E	B	E	B	24	24	41	41	42	34	24	26	13	12	46	32	53	53								
11	44	37	40	41	37	51	42	28	16	18	G	23	33	29	23	G	16	14	14	20	15	55	14	27																				
12	32	42	42	50	48	46	57	95	52	28	E	B	E	B	E	B	E	B	E	B	E	B	25	28	25	25	25	G	G	E	B	E	B	E	B	E	B	B	26	36				
13	43	43	52	56	58	50	30	26	21	G	21	25	24	24	22	G	14	11	12	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	50	46	52	40			
14	40	51	47	44	54	42	28	19	10	G	23	26	26	22	22	18	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	9	34	39	
15	39	35	46	54	53	47	47	32	E	B	G	21	33	31	27	22	22	17	13	10	12	E	B	9	30	26	46																	
16	80	46	35	82	56	59	52	35	24	18	21	24	24	28	23	29	20	12	E	B	8	30	86	54	55	48																		
17	54	38	68	112	56	49	49	54	53	40	31	E	B	E	B	E	B	26	13	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	14	33	33	31					
18	38	40	33	39	33	31	24	44	41	44	31	29	G	E	B	E	B	E	B	E	B	26	37	32	25	21	16	13	31	30	36	81												
19	65	38	B	52	39	34	16	20	G	30	25	25	G	25	24	22	20	E	B	E	B	20	13	13	16	28	28	14	39															
20	86	48	49	51	57	69	59	55	31	43	34	24	27	25	35	22	24	16	15	21	48	56	26	48																				
21	45	55	56	50	86	D	S	D	S	G	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	B	17	25	34
22	36	47	52	46	48	44	64	62	54	B	B	E	B	E	B	E	B	54	44	36	30	19	34	16	20	B	56	14	48															
23	33	36	42	48	39	36	28	11	G	17	24	G	24	27	29	25	23	19	19	E	B	12	17	E	B	9	52	24																
24	44	42	66	48	15	19	11	10	G	19	G	24	27	27	27	23	20	23	10	13	26	30	45	70																				
25	52	65	56	46	28	64	54	33	29	20	21	G	26	28	26	22	22	17	14	E	B	E	B	14	13	10	14	54	29															
26	38	54	42	66	100	15	45	55	37	E	B	E	B	E	B	E	B	G	G	G	45	36	11	37	44	44	53	47																
27	46	48	41	78	64	48	79	66	65	E	B	E	B	E	B	G	G	G	G	K	14	14	69	50	36	27																		
28	46	46	45	36	69	68	64	66	66	61	43	31	28	E	B	E	B	E	B	E	B	28	25	24	28	17	56	32	83	47	57													
29	47	47	46	48	32	26	26	99	70	20	24	38	42	23	21	22	20	20	21	57	31	35	47	44																				
30	57	37	33	56	37	80	47	39	33	G	24	36	32	27	G	G	23	23	18	32	59	47	101	44	46																			
31	29	34	32	31	79	27	29	E	B	E	B	40	45	28	35	26	22	25	20	19	22	15	E	B	15	56	56	47																
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23																				
CNT	31	31	30	31	31	31	31	31	31	30	30	30	31	31	31	31	31	31	31	31	30	27	29	31	31																			
MED	45	44	46	50	50	48	47	50	G	E	G	24	27	26	26	24	24	G	U	E	B	16	16	16	31	35	42	46																
U Q	54	50	56	57	64	64	56	62	48	40	36	E	B	E	B	E	B	E	B	E	B	24	26	21	30	47	52	52	49															
L Q	38	38	41	44	39	36	30	31	21	19	G	25	27	25	22	22	18	14	13	13	15	30	26	34																				

## IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2023 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	9	12	10	12	14	16	15	9	10	10	12	13	14	14	11	8	7	6	7	7	9	8	7
2	11	12	14	14	13	9	7	8	6	10	14	14	15	24	55	34	6	9	8	8	7	6	9	6
3	8	7	7	6	7	8	14	8	11	17	13	12	12	10	14	16	9	14	40	B	8	10	11	9
4	8	8	6	11	8	9	10	14	16	14	12	12	13	13	11	7	9	7	6	9	8	8	8	9
5	8	10	6	19	14	10	6	9	11	10	12	11	13	14	16	35	45	25	20	14	8	14	10	10
6	9	8	9	9	10	9	12	12	9	16	14	17	33	26	25	19	14	12	10	7	14	10	8	8
7	8	10	9	10	13	15	18	14	18	24	22	37	31	27	12	24	17	12	9	25	B	11	13	11
8	14	18	24	16	29	21	39	20	14	24	30	36	34	32	39	31	40	26	24	24	19	13	14	12
9	15	12	12	12	12	14	26	13	12	25	41	34	38	31	28	18	16	11	16	16	B	11	10	12
10	11	11	11	13	11	13	16	26	20	15	24	25	41	41	42	34	24	26	13	12	10	13	10	9
11	9	8	8	10	8	11	10	10	8	10	15	11	14	17	14	11	5	8	8	9	10	7	7	8
12	8	8	11	12	10	8	9	11	15	13	25	28	25	17	25	14	11	12	16	12	11	B	10	7
13	18	18	10	13	13	13	13	9	15	13	11	11	8	12	16	7	9	10	12	8	8	9	8	7
14	8	7	8	7	14	9	8	8	7	8	12	12	13	11	6	13	13	13	16	14	13	9	9	9
15	8	8	9	12	24	12	10	8	9	11	14	16	17	18	16	12	9	8	8	9	8	8	7	9
16	8	8	11	9	8	10	10	8	7	9	12	12	13	14	14	10	10	8	8	6	10	11	8	10
17	10	8	9	11	14	12	13	11	14	16	12	37	34	35	13	12	10	9	16	19	14	8	9	8
18	8	10	15	16	9	8	11	11	14	13	12	20	16	26	37	32	17	21	16	13	11	7	7	8
19	9	8	B	10	12	10	10	7	9	18	19	14	14	14	14	13	12	13	13	8	9	6	8	9
20	12	14	19	15	18	13	15	16	12	18	10	11	10	7	35	22	24	16	15	14	13	10	9	6
21	7	18	16	12	14	14	10	9	18	7	18	42	30	38	34	56	22	34	20	26	B	12	8	6
22	8	8	13	11	12	14	14	8	23	B	B	B	54	44	36	30	19	34	16	20	B	16	8	10
23	7	11	12	10	11	9	8	9	7	8	8	13	12	11	9	9	7	5	8	8	8	9	15	9
24	8	7	6	7	7	7	6	7	7	9	15	14	13	12	11	12	14	14	10	6	6	8	7	9
25	9	17	17	14	10	8	10	11	9	12	12	12	14	11	11	13	11	8	12	10	6	B	14	6
26	7	10	8	8	10	7	12	10	10	44	16	62	35	39	33	19	24	36	10	8	9	7	14	10
27	8	9	9	13	13	14	14	16	16	38	45	34	38	29	18	14	8	16	9	7	14	7	9	6
28	8	10	11	10	6	11	10	11	16	12	24	11	16	40	28	25	24	15	16	8	12	6	7	8
29	13	16	15	10	9	8	9	8	7	8	12	9	7	6	12	6	8	10	12	14	6	8	12	9
30	9	8	9	11	9	13	10	8	9	11	16	22	15	20	9	12	13	11	14	10	12	10	8	8
31	8	7	9	10	8	8	10	17	18	17	16	16	18	22	15	14	13	15	16	13	14	14	9	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	8	9	11	11	11	10	10	10	11	13	14	14	15	18	16	14	13	12	13	10	10	9	9	9
U Q	10	12	14	13	13	13	14	14	16	18	22	34	33	31	33	25	19	16	16	14	14	12	10	9
L Q	8	8	9	10	9	8	10	8	9	10	12	12	13	12	12	12	9	9	9	8	8	8	8	7

AUG. 2023 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2023 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 256	A	A	A	A	A	A	A	A	208	196	194	208	198	206	222	200	202	222	220	196	A	A	A
2	A	A	A	A	A	A	182	A	A	A	A	A	E A 284	E B 280	E B 254	E B 278	220	284	214	A	A	A	A	A
3	A	A	A	A	A	186	A	A	A	A	238	E A 228	210	206	222	218	196	196	A	B	A	250	A	210
4	A	A	A	A	A	A	A	A	342	B	214	208	E A 232	E A 236	E A 214	E A 200	192	210	204	204	A	E A 284	A	A
5	A	A	A	A	A	A	A	A	A	E A 280	A	A	A	E A 278	E A 294	E B 334	E B 350	E B 266	A	A	A	A	A	A
6	A	264	A	A	A	A	E A 364	E A 266	E A 230	E A 230	208	222	212	194	196	204	226	212	212	A	A	A	A	
7	A	A	A	A	A	A	A	A	A	A	252	E B 234	E B 218	230	208	208	204	246	212	310	B	A	A	A
8	A	A	A	A	A	A	A	E A 346	E A 236	220	242	E B 214	E B 216	E B 228	204	242	228	222	286	E B	A	200	A	A
9	A	A	A	A	A	A	A	E A 410	E A 260	E B 230	226	E B 234	E B 202	202	198	240	226	236	E B	B	258	A	A	
10	E A 312	A	A	A	A	A	A	E A 306	E A 232	E B 248	222	E B 252	E B 226	E B 226	220	212	236	216	232	A	A	A	208	
11	A	222	218	A	A	A	A	A	288	198	208	198	222	220	216	208	188	228	190	226	204	E A 268	192	A
12	A	A	A	A	A	A	A	A	E A 288	E B 238	218	238	216	216	208	202	196	220	194	186	B	A	A	A
13	A	222	A	A	A	A	E A 346	E A 312	196	202	214	212	234	222	202	198	178	194	198	220	222	196	252	
14	E A 274	A	A	A	A	A	A	A	268	196	228	228	204	198	226	198	196	220	236	210	E B 234	218	A	A
15	A	A	A	A	A	A	A	E A 230	E B 198	E A 228	232	222	218	214	212	E A 206	196	220	204	212	A	A	A	A
16	A	A	A	A	A	A	A	A	260	206	206	246	236	218	204	202	202	218	216	264	A	A	A	A
17	A	A	A	A	A	A	A	A	E A 270	E A 252	B	244	B	238	E A 242	E A 222	220	220	230	E B 298	A	A	324	A
18	A	A	A	A	A	E A 298	A	A	A	A	266	E A 244	E B 246	Q 244	Q 222	E A 236	E A 218	E A 218	230	254	240	A	A	A
19	222	A	B	A	A	A	A	E A 370	E A 320	E A 266	E A 296	E A 224	E A 208	E A 218	E A 214	198	196	220	214	202	202	216	206	194
20	A	A	A	A	A	A	A	E A 344	E A 294	E A 244	206	E A 230	E A 228	E B 212	E B 224	210	206	238	224	E A 264	E A 270	A	A	A
21	A	A	A	A	A	A	A	A	A	204	238	312	256	Q 230	220	252	206	E B 238	226	214	B	A	A	A
22	A	A	A	A	A	A	A	A	A	A	B	E B 292	E B 220	E B 230	216	214	240	208	232	B	A	200	198	A
23	A	A	A	A	A	A	A	204	196	A	208	212	212	212	202	202	196	202	200	198	198	204	E A 284	A
24	E A 288	A	A	A	E A 366	E A 376	E A 260	196	196	200	212	230	214	202	198	198	204	202	206	E A 256	A	A	A	A
25	A	A	A	310	A	A	E A 330	E A 260	204	200	228	228	196	196	204	200	200	174	202	222	B	A	190	A
26	A	A	A	A	A	A	A	A	276	324	262	B	228	214	234	224	208	228	218	298	A	A	A	A
27	A	A	A	A	A	A	A	A	A	A	B	E B 302	E B 274	E B 244	E B 238	222	E A 222	E A 220	224	238	A	A	A	A
28	A	A	A	A	A	A	A	A	A	A	A	E A 260	E A 242	E B 264	E B 230	248	E B 226	E A 228	222	266	E A 336	A	A	A
29	E A 234	A	A	A	A	A	E A 290	E A 194	E A 236	E A 230	208	206	220	226	212	206	216	194	266	A	A	A	A	A
30	224	A	200	A	A	A	E A 350	E A 278	E A 190	E A 252	230	216	216	186	H 196	208	214	232	242	A	A	A	190	A
31	A	A	218	A	E A 370	A	A	E B 192	E B 262	Q 240	244	240	226	E A 230	212	216	208	202	218	218	228	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	4	3		1	3	4	9	19	21	26	26	30	30	31	31	31	31	29	28	15	9	4	9
MED	E A 245	A U 232	218		310	E A 366	A U 287	E A 320	E A 268	U 213	U 218	218	222	216	212	210	203	214	218	219	U 210	214	196	203
U Q	E A 274	288	218			E A 370	E A 373	E A 348	E A 312	E A 275	E A 248	240	242	E B 234	E B 228	224	E 218	228	223	248	E A 256	E A 263	242	268
L Q	224	222	200			186	240	232	260	198	208	208	216	214	204	202	198	202	203	205	204	205	194	192

AUG. 2023 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 2023 fXI (0.1MHz)

45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	O X 31	O X 64	56	O X 72	A	A	A	A	X 48	O X 49	X 61	X 70	X 83	X 82	X 114	X 125	X 105	X 110	70	54	A	A	76	A
2	A	55	A	A	X 42	A	A	B	B	A	B	B	B	75	130	68	69	55	32	A	59	A	50	A
3	A	A	A	A	A	O X 53	A	A	A	A	A	O X 50	62	64	80	72	95	56	58	A	O X 35	A	A	A
4	A	O X 52	A	A	A	X 34	65	66	43	44	O X 49	X 57	X 60	X 62	X 65	X 66	X 70	X 69	X 53	X 42	A	A	A	A
5	A	A	A	A	46	82	80	45	52	58	70	85	98	98	105	106	90	90	64	55	A	X 32	A	X 34
6	A	A	A	A	A	A	A	X 51	60	63	75	83	86	100	103	93	90	82	76	63	47	O X 24	34	57
7	55	A	A	A	A	A	A	X 51	60	65	73	92	98	102	104	100	90	80	75	70	X 57	O X 24	A	59
8	A	57	A	A	X 46	A	A	A	60	74	76	80	92	96	97	100	95	70	78	62	34	A	A	A
9	A	57	O X 38	A	A	A	A	X 57	66	75	80	83	85	100	115	94	92	93	69	A	A	A	A	A
10	43	59	79	O X 49	65	43	56	O X 51	X 56	X 69	X 78	X 89	X 90	X 100	X 102	X 99	X 112	X 72	X 60	X 59	X 50	X 36	X 27	58
11	59	62	A	A	58	54	77	X 54	64	76	95	103	102	105	112	107	102	89	68	60	42	39	26	60
12	78	64	A	A	A	A	A	X 46	64	72	83	95	103	102	94	94	97	90	82	66	43	A	A	65
13	A	X 53	A	A	X 36	A	X 45	50	40	A	O X 48	64	57	57	57	66	58	60	57	82	A	A	A	A
14	A	O X 34	X 68	A	A	A	A	A	A	A	X 56	61	67	73	76	75	68	68	59	51	46	X 72	69	90
15	58	A	A	O X 58	X 27	X 40	80	A	X 44	X 56	61	71	73	82	84	85	87	O X 92	68	53	X 29	O X 24	A	O X 32
16	O X 38	A	50	O X 47	X 48	X 46	X 54	X 63	X 71	X 82	X 80	X 94	X 95	X 94	X 89	X 84	X 93	X 78	X 74	X 32	X 80	A	A	A
17	A	A	67	53	62	A	A	A	A	X 66	67	78	88	86	96	93	X 90	X 90	X 78	X 68	54	70	A	58
18	A	A	52	A	50	A	A	A	X 63	O X 61	R	X 45	X 57	X 56	X 65	X 73	X 74	X 68	X 48	X 39	A	O X 46	A	92
19	A	80	78	A	A	A	B	A	A	A	B	O X 45	O X 44	O X 44	O X 53	O X 50	X 60	X 36	X 50	A	A	A	64	A
20	A	A	A	A	A	A	A	A	A	X 49	B	O X 56	X 59	X 65	X 68	X 74	X 69	X 66	X 62	X 57	42	A	60	X 42
21	61	A	A	A	A	59	66	64	66	70	74	76	76	82	77	69	72	66	55	47	O X 33	O X 33	A	A
22	58	A	B	A	A	O X 58	X 46	X 47	X 63	X 69	X 68	X 76	X 79	X 80	X 78	X 85	X 88	X 84	X 73	X 64	A	A	A	A
23	A	A	A	O X 46	O X 59	O X 55	O X 55	O X 61	O X 66	O X 66	O X 68	O X 78	O X 76	O X 80	O X 84	O X 91	O X 91	O X 91	O X 86	O X 67	O X 69	O X 57	R	59
24	A	A	A	O X 59	O X 49	O X 59	X 54	A	O X 61	O X 60	X 65	X 76	X 69	X 83	X 90	X 92	X 88	X 75	X 70	X 61	X 63	X 58	A	A
25	A	78	47	A	60	52	A	A	X 39	A	X 47	X 44	X 50	X 56	X 54	X 63	X 68	X 61	X 56	X 52	O X 46	O X 24	A	R
26	58	A	A	81	78	A	X 47	O X 50	X 52	B	B	B	X 52	X 100	X 93	X 64	X 55	X 67	X 51	X 42	X 37	A	A	84
27	A	A	51	B	56	58	A	X 59	X 71	X 72	X 76	X 80	X 90	X 90	X 82	X 76	X 70	X 70	X 69	X 62	X 58	X 53	X 52	A
28	50	X 49	X 64	X 68	A	A	X 74	X 51	X 67	X 62	X 73	X 88	X 100	X 109	X 116	X 114	X 94	X 91	X 84	X 71	X 62	X 58	X 49	X 36
29	31	69	X 51	X 67	A	A	A	A	B	B	B	R	X 69	X 134	X 113	B	B	81	71	71	X 56	X 70	X 51	X 36
30	40	40	O X 32	X 44	A	A	X 56	X 63	80	80	112	114	117	145	135	127	X 107	X 73	X 62	X 57	O X 50	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	13	15	12	11	15	13	15	16	23	22	23	26	29	30	30	29	29	30	30	28	21	19	11	15
MED	55	57	54	58	50	55	55	52	61	66	73	78	79	84	94	89	88	78	68	60	47	41	51	58
U Q	58	64	68	68	60	59	66	60	66	71	78	88	95	100	104	100	94	90	76	68	58	58	64	65
L Q	39	X 52	X 50	X 46	X 46	X 46	X 47	X 50	X 52	X 60	X 61	X 64	X 60	X 60	X 73	X 76	X 71	X 70	X 68	X 56	O X 40	O X 32	X 34	X 36

SEP. 2023 fXI (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 2023 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E 0SWEEP 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	R 25	R 58	A	R 66	A	A	A	A		R 42	R 43	55	64	77	76	108	F 98	99	F 99	F 54	F 30	A	A	44	A	
2	A	A	A	A	36	A	A	B	B	A	B	B	B	52	124	62	63	47	F 26	A	R	A	F 36	A		
3	A	A	A	A	A	A	R 47	A	A	A	A	A	R 44	F 49	Z 58	Z 74	Z 66	F 67	F 50	52		A	R 29	A	A	
4	A	R 46	A	A	A	J 28	R	A	A		R 37	R 38	43	51	54	56	59	60	J 64	R 63	F 47	F 36	A	A	A	
5	A	A	A	A	A	A	A	F	F	30	38	52	64	79	92	92	99	100	Z 84	J 84	R 60	F 58	F 36	A	A	28
6	A	A	A	A	A	A	A	45	F 46	F 54	F 69	J 77	R 80	92	97	97	87	84	J 84	R 76	F 70	57	F 24	R 18	J 28	A
7	A	A	A	A	A	A	A	45	54	59	67	86	92	96	94	94	94	84	65	F 69	64	J 51	R 18	A	A	A
8	A	A	A	A	40	A	A	Z 54	J 68	R 70	J 74	R 86	R 90	R 91	R 91	R 94	R 89	64	F 72	55	J 28	R A	A	A	A	
9	A	A	A	R 32	A	A	A	A	A	51	60	69	74	77	79	94	F 96	88	86	F 82	62	A	A	A	A	A
10	A	F 43	F 40	F 43	R 31	F 37	F 29	A	45	50	63	72	83	84	94	96	93	J 106	R 66	54	53	44	30	F 18	A	
11	A	A	A	A	F 29	F 29	A	48	X 58	R 62	F 74	F 93	Z 96	99	106	101	96	Z 83	62	54	36	33	20	A	A	
12	A	A	A	A	A	A	A	40	52	66	77	83	F 91	F 96	88	88	91	84	F 49	F 44	A	A	A	A	A	
13	A	47	A	A	30	A	A	F 39	F 34	34	A	42	56	51	51	51	Z 60	52	54	37	A	A	A	A	A	
14	A	R 28	62	A	A	A	A	A	A	A	A	50	55	61	67	69	69	62	F 53	53	41	F 32	F 66	F 36	A	
15	A	A	A	F 39	R 21	34	A	A	38	50	52	65	67	76	78	79	81	R 86	52	40	23	18	A	R 26	A	
16	R 32	A	F 39	A	R 41		40	48	57	65	75	74	88	89	88	83	78	J 87	R 72	F 66	22	F A	A	A	A	
17	A	A	F 48	F 43	F 44	A	A	A	A	60	61	72	82	80	90	Z 81	F 84	F 82	F 70	57	F 23	A	A	A	A	
18	A	A	A	A	F 30	A	A	A	J 57	R 55	R	A	39	51	50	59	F 61	F 68	F 62	42	25	A	R 40	A	F 46	
19	A	A	A	A	A	A	B	A	A	A	B	R 39	R 38	R 38	47	44	R 47	F 30	F 30	A	A	A	A	A	A	
20	A	A	A	A	A	A	A	A	A	43	B	50	53	59	62	68	63	56	56	44	28	A	A	A	36	
21	A	A	A	A	A	F 48	F 38	F 56	60	64	68	70	70	76	71	63	65	60	49	30	F 27	R 27	A	A	A	
22	A	A	B	A	A	F 43	R 40	R 41	57	63	62	70	73	71	72	79	82	V 78	R 67	58	A	A	A	A	A	
23	A	A	A	40	R 53	F 43	R 49	R 55	60	58	57	69	70	74	78	85	85	85	F 69	61	F 43	51	R A	A	A	
24	A	A	A	F 51	R 43	F 48	F 48	A	55	54	59	62	63	69	73	F 86	Z 79	F 69	F 64	55	F 51	F 42	A	A	A	
25	A	A	F 27	A	F 43	F 40	A	A	33	41	38	44	50	48	57	62	55	F 50	46	F 33	R 18	A	U 27	R A	A	
26	A	A	A	A	A	A	41	U 44	R 46	B	B	B	46	80	83	58	49	F 55	45	36	31	A	A	A	A	
27	A	A	F 36	B	F 43	F 43	A	53	65	66	70	74	84	84	76	70	64	64	63	56	45	A	A	A	A	
28	A	43	58	50	A	F 59	J 45	R	61	56	67	82	88	103	110	102	88	85	78	65	56	49	36	30	30	
29	F 22	A	45	53	F A	A	A	A	B	B	B	R	63	114	94	F B	B	F 70	Z 65	65	50	Z 49	F 33	F 27	F	
30	F 24	F 26	R 26	38	A	A	50	57	67	74	86	81	F 104	F 99	F 115	F 115	F 101	67	V 56	F 43	R 44	A	A	A	A	
31																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	4	7	9	10	13	11	11	15	23	22	23	26	29	30	30	29	29	30	30	27	19	15	8	7		
MED	24	43	40	43	40	43	41	45	54	60	67	71	73	78	86	81	81	66	56	53	33	30	34	28		
U Q	28	47	53	51	43	48	48	54	60	64	72	81	88	92	96	94	88	83	69	58	45	49	36	36		
L Q	23	28	32	39	30	34	39	41	42	54	55	56	54	59	69	62	64	60	49	40	27	18	24	27		

SEP. 2023 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 2023 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	K 11	43	36	102	60	61	53	63	46	52	E B 47	E B 53	E B 26	E B 28	E B 27	E B 37	E B 18	E B 42	E B 32	30	29	29	59	96	
2	63	39	51	70	29	70	60	B	B	64	B	B	B	38	E B 29	E B 48	E B 40	G	G	89	32	108	D D 160	90	
3	67	70	62	65	63	61	44	58	48	62	68	65	E B 40	E B 27	E B 27	E B 26	E B 28	E B 27	E B 26	26	41	42	44	37	
4	36	44	74	34	67	54	44	50	53	58	E B 38	E B 28	E B 28	G	26	30	23	22	18	K 14	K 13	35	32	K 26	142
5	88	53	51	33	32	53	50	32	G 20	G	24	24	28	32	28	28	G 22	G 17	E B 17	22	60	23	48	94	
6	53	46	81	40	70	36	44	112	38	27	23	E B 44	E B 54	E B 31	E B 27	G 24	G 24	24	20	38	22	53	36	56	90
7	42	39	50	64	58	63	55	25	19	24	28	29	29	28	28	32	22	26	22	19	21	52	49	37	
8	51	50	54	50	38	52	66	44	G	G	G	G	G	G	G	G	22	17	20	16	12	53	43	79	60
9	56	41	42	69	61	83	57	60	41	41	26	30	27	27	27	G	G	E B 15	E B 22	E B 22	K 41	35	40	46	
10	38	38	26	35	30	32	E B 17	G	E B 23	E B 33	G 30	G 59	G 31	G 31	G 26	G 28	G 27	G 22	E B 14	E B 13	E B 14	10	18	35	
11	39	42	51	53	25	43	49	47	28	26	28	28	32	31	29	30	24	18	18	9	12	12	17	30	
12	34	46	53	45	48	55	51	45	32	G	G	28	36	27	G	G	G	37	32	26	33	93	111	92	
13	106	42	65	80	26	56	30	22	30	62	39	39	32	65	G	26	23	20	29	33	47	43	40	44	
14	60	78	48	46	69	45	53	67	62	63	E B 37	E B 38	E B 30	G	G	26	24	E B 19	E B 19	E B 10	46	48	57		
15	36	83	49	37	31	39	58	46	42	42	28	31	G	G	26	25	27	18	G	24	20	46	58	76	
16	58	76	31	58	37	39	42	22	G	G	27	31	31	31	28	26	24	30	28	23	K 12	30	40	56	
17	48	46	42	39	41	52	58	58	66	40	28	G	34	E B 37	E B 29	E B 27	G	E B 22	E B 24	E B 20	E B 14	E B 27	E B 30	59	
18	52	51	45	66	24	44	68	70	65	49	46	33	35	36	32	29	28	24	22	36	66	46	51	70	
19	80	49	48	56	56	55	B	58	66	56	B	66	G	61	G	G	50	52	G	91	52	56	48	57	
20	54	40	58	74	59	65	51	70	53	46	E B 42	E B 42	E B 37	E B 27	E B 29	E B 30	E B 24	E B 22	E B 17	26	46	51	70		
21	70	63	52	78	49	27	34	44	37	27	G	37	G	G	G	G	G	E B 24	E B 25	E B 25	28	35	50	45	
22	46	52	B	63	59	34	54	58	32	G	E B 46	E B 40	G	G	G	32	32	G	17	17	34	34	40	46	
23	76	47	52	55	34	30	39	44	55	48	43	32	G	31	G	G	E B 31	E B 32	E B 25	E B 40	21	18	28	37	38
24	48	63	82	62	62	31	41	56	54	50	47	46	E B 33	E B 39	G	G	E B 30	E B 28	E B 27	E B 22	E B 18	E B 20	E B 14	E B 47	126
25	139	62	K 24	48	37	26	54	54	25	47	44	29	41	30	G	30	30	30	25	20	G	E B 10	43	43	43
26	34	52	35	54	42	41	45	42	E B 38	B	B	B	40	30	29	29	30	32	21	G	23	35	58	52	
27	45	61	25	B	34	42	44	35	25	30	28	G	E B 41	E B 50	E B 30	G	E B 29	E B 28	E B 25	E B 19	16	33	36	38	
28	35	37	42	40	68	44	81	B	G	G	G	G	E B 31	E B 37	E B 34	G	E B 27	E B 30	E B 26	E B 25	E B 18	E B 17	E B 58	E B 12	
29	57	38	37	45	88	52	56	67	B	B	B	49	G	50	32	B	B	G	32	30	22	23	20	K 20	19
30	30	K 29	32	52	64	44	41	44	G	G	E B 36	E B 36	E B 36	E B 34	G	G	30	E B 66	E B 35	E B 22	38	43	69	124	81
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	29	30	30	29	28	28	28	25	28	29	30	30	29	29	30	30	30	30	30	30	30	
MED	52	46	49	54	48	44	51	48	38	40	E G 28	G	30	G	30	30	26	24	G	G	27	35	48	56	
U Q	63	61	54	66	62	55	56	59	53	51	41	45	E B 39	37	G	G	G	32	26	26	41	46	58	81	
L Q	38	41	36	42	34	39	43	43	31	G	G	30	30	30	G	G	24	22	19	19	E B 18	28	40	38	

## IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 2023 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	7	6	7	12	11	13	12	28	30	47	53	26	28	27	37	18	42	32	14	12	13	15	12	
2	13	14	16	15	16	12	12	B	B	34	B	B	B	18	29	48	40	19	12	8	15	13	10	7	
3	15	10	7	8	6	12	11	14	16	12	12	19	40	15	27	26	28	27	26	11	8	9	6	6	
4	7	12	16	9	14	13	15	19	16	10	38	28	24	17	16	10	14	10	8	11	7	8	14	9	
5	10	8	8	7	7	15	6	9	7	12	12	12	13	12	13	13	13	17	7	9	11	11	9	8	
6	13	12	12	11	10	14	13	14	16	13	11	44	54	24	14	13	11	6	11	13	10	6	7	7	
7	8	6	8	10	10	15	9	11	11	12	14	16	18	12	16	12	11	10	8	12	14	12	7	9	
8	9	10	13	16	11	12	13	10	9	10	15	16	16	14	15	13	12	10	7	6	6	6	6	8	
9	7	8	7	12	10	12	11	15	12	11	8	9	12	13	18	12	16	15	12	9	7	7	8	8	
10	9	12	10	10	9	11	17	11	15	33	17	31	23	18	15	14	13	14	10	13	14	6	6	7	
11	9	8	9	10	8	9	10	8	12	12	12	13	12	16	12	12	10	10	6	5	6	7	6	7	
12	7	8	11	11	11	10	10	10	10	11	12	12	12	12	11	10	10	14	8	6	5	8	7	11	
13	8	10	6	7	7	13	8	10	13	17	25	18	17	20	13	13	19	12	7	8	7	6	9	9	
14	6	12	14	8	17	12	16	15	15	15	37	20	38	26	12	15	10	11	19	19	10	10	13	7	
15	7	16	14	8	9	8	11	10	11	12	12	16	25	16	16	10	9	6	5	6	6	10	15	13	
16	15	9	13	13	14	9	9	7	11	12	12	13	12	14	11	14	9	6	6	6	7	8	8	12	
17	10	8	12	10	14	14	14	22	26	12	13	12	18	37	20	15	16	14	24	20	14	13	10	12	
18	16	14	15	17	15	14	19	26	31	18	34	26	34	29	20	19	28	19	11	7	8	9	9	11	
19	9	9	8	10	13	11	B	25	26	39	B	16	19	15	16	12	18	16	10	7	7	9	7	14	
20	8	6	6	8	12	19	34	26	21	14	B	42	42	37	27	29	30	17	22	8	7	7	9	9	
21	13	10	8	10	14	10	10	33	15	17	22	26	15	20	17	17	17	24	12	6	8	8	12	7	
22	7	12	B	15	15	18	24	15	12	16	19	46	40	24	20	20	32	16	11	9	8	7	8	8	
23	9	13	12	12	13	10	25	24	17	28	17	25	18	14	17	14	13	25	40	17	10	8	10	7	
24	5	14	9	15	12	14	18	13	12	18	14	12	33	19	20	30	28	27	22	18	20	14	14	14	
25	14	13	14	15	13	16	15	18	14	18	14	12	10	15	14	16	12	12	11	8	10	7	6	10	
26	10	11	10	7	8	9	12	16	38	B	B	B	15	15	12	12	13	20	12	9	9	8	12	11	
27	17	6	10	B	14	13	14	16	16	16	18	20	40	50	30	17	29	28	25	7	6	7	7	7	
28	9	8	14	12	15	13	35	B	16	15	16	20	18	37	34	22	27	30	26	25	18	17	14	12	
29	8	9	10	12	14	17	16	18	B	B	B	35	26	15	14	B	B	20	23	12	16	10	11	7	
30	9	9	12	12	11	13	14	12	14	21	36	34	24	16	14	21	66	35	13	9	11	8	8	7	
31																									
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	10	10	10	12	12	14	15	15	16	17	20	21	16	16	14	16	16	12	9	8	8	9	8	
U Q	13	12	14	13	14	14	17	22	21	21	37	34	34	24	20	21	28	24	22	13	12	10	12	11	
L Q	7	8	8	8	10	11	11	11	12	12	12	13	15	15	14	12	12	11	8	7	7	7	7	7	

SEP. 2023 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



IONOSPHERIC DATA STATION SHOWA-ST.

SEP. 2023 h'F (KM)

45°E MEAN TIME (G.M.T. + 3 H)

LAT. 69°00.4'S LON. 039°35.4'E pSWEEP 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	206	192	A	A	A	A	A	A	A	A	E B	E B	E B	E B	E B	E B	220	232	272	308	A	A	246	A		
2	A	A	A	A	236	A	A	B	B	A	B	B	E B	E B	E B	E B	220	240	284	206	A	A	202	A		
3	A	A	A	A	A	A	A	A	A	A	A	A	E B	E B	E B	E B	E B	E B	E B	258	258	A	A	A	A	
4	A	A	A	A	A	A	A	A	A	216	E B	E B	A	A	A	A	E A	204	216	216	A	A	A	A		
5	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	E A	200	200	204	E A	A	E A	E A	A	
6	A	A	A	A	A	A	A	A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	214	E A	A	A	A	
7	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	210	E A	A	A	A	
8	A	A	A	A	248	A	A	E A	A	300	200	222	216	230	220	210	220	212	200	212	202	238	A	A	A	
9	A	A	A	274	A	A	A	A	A	A	A	A	A	A	A	A	E A	E A	E A	E A	A	A	A	A	A	
10	A	300	242	368	A	A	E B	206	E B	E B	E B	E B	E B	E B	E B	E B	A	200	202	216	194	204	A	A		
11	A	A	A	A	A	A	A	A	A	254	198	202	206	E A	E A	E A	E A	E A	E A	E A	214	212	270	A	A	
12	A	A	A	A	A	A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	A	A	A	A	A	
13	E A	358	A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	A	A	A	A	A	
14	A	A	A	A	A	A	A	A	A	A	A	B	E B	E B	E B	E B	210	194	224	224	224	242	214	A	A	
15	A	A	A	A	224	A	A	E A	A	302	280	238	206	E A	E A	E A	218	200	202	A	A	A	A	194	A	
16	190	A	A	A	A	A	A	E A	A	240	222	200	156	216	220	202	E A	210	214	196	214	260	A	A	A	
17	A	A	E A	E A	E A	A	A	A	A	200	210	192	238	E B	E B	E B	228	224	218	220	250	206	A	A	A	
18	A	A	A	E A	E A	A	A	A	A	A	A	A	E A	E A	E A	E A	E A	E A	E A	E A	A	A	A	A	A	
19	A	A	A	A	A	A	B	A	A	A	A	E A	E A	E A	E A	E A	A	A	A	A	A	A	A	A	A	
20	A	A	A	A	A	A	A	A	A	H	B	B	E B	E B	E B	E B	E B	E B	E B	E B	E A	A	A	A	A	
21	A	A	A	A	A	228	A	E A	A	318	238	206	240	202	208	216	208	238	E B	E A	A	A	A	A	A	
22	A	A	B	A	A	A	A	A	A	196	232	248	E B	E B	E B	E B	E B	236	196	224	234	A	A	A	A	
23	A	A	A	A	A	A	A	A	A	A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	240	218	234	A	A	A
24	A	A	A	A	A	A	A	A	A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E B	E B	E B	A	A	
25	A	A	A	A	E A	E A	A	E A	E A	A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	A	A	
26	A	A	A	A	A	A	A	A	B	B	B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E A	E A	E A	A	A	
27	A	E A	E A	B	A	A	A	A	A	232	118	226	200	E B	E B	E B	E A	242	232	230	212	220	A	A	A	
28	A	A	A	A	E A	E A	A	B	A	210	208	210	212	E B	E B	E B	E B	E B	E B	E B	222	224	226	248	Q	Q
29	304	A	A	A	A	A	A	A	B	B	B	A	276	E A	E A	E A	E A	E A	E A	E A	228	E A	E A	E A	A	A
30	A	A	242	268	A	A	E A	A	E A	356	254	234	234	228	222	226	224	254	B	254	206	A	A	A	A	A
31																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	3	3	4	4	6	3	1	5	15	17	19	22	27	30	30	29	25	28	27	23	17	11	6	4		
MED	206	246	241	286	277	362	326	300	225	212	216	216	226	218	224	221	218	208	214	219	221	223	228	234		
U Q	304	358	268	347	364	368		359	282	242	238	238	264	256	238	248	239	243	238	238	255	286	270	293		
L Q	190	192	240	271	236	228		245	214	204	206	206	220	216	216	211	211	200	206	216	214	212	214	221		

SEP. 2023 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 2023 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 0SWEEP 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	69	55	85	70	X <sup>O</sup> 56	X 45	X 56		73	76	78	88	104	106	109	113	120	108	90	78	68	58	58	46
2	X <sup>O</sup> 44	84	60	69	A	A	X 56	X 67	70	76	81	X 81	96	100	101	109	107	92	93	89	X 62	X <sup>O</sup> 47	X 53	55	
3	A	X 50	A	68	57	57	X 63	X 75	90	86	105	102	109	108	103	111	106	92	X 71	54		A	A	X 50	
4	X <sup>O</sup> 48	A	A	67	69	58	X 66	X 59	67	75	74	X 74	X 78	84	88	X 96	98	90	84	70	X 56	42	48	45	
5	52	A	55	A	A	A	A	A	A	B	65	66	73	79	87	99	97	88	78	66	65	47	X <sup>O</sup> 37	X 43	
6	X 42	X <sup>O</sup> 41	X 40	A	64	A	A	X 68		81	80	X 80	X 90	X 91	X 89	X 91	X 87	X 78	X 74	X 67	X 68	58	50	X 45	
7	X <sup>O</sup> 35	64	64	90	81	X 56	X 78	X 78	95	99	102	108	110	109	106	X 98	X 95	X 88	X 82	X 76	X 70	66	55	50	
8	66	X 54	X 72	70	A	62	65	A	A	X 88	79	X 87	X 94	X 103	X 112	X 114	X 113	X 95	X 88	X 76	X 67	55	43	A	
9	X 54	X 62	X 56	56	A	56	A	A	X 79	X 91	X 100	X 100	X 104	X 114	X 125	X 126	X 120	X 114	X 77	X 55	X 70	64	A	X <sup>O</sup> 59	
10	X <sup>O</sup> 53	X 36	X 72	50	57	57	X 62	X 71	77	86	92	X 98	X 102	X 115	X 115	X 115	X 110	X 102	X 95	X 84	X 74	61	53	56	
11	54	58	67	54	56	X 65	X 83	X 104	110	113	113	121	121	125	126	128	119	111	103	90	74	67	66	75	
12	X 59	X 44	X 48	X <sup>O</sup> 50	X 64	X 57	X 70	X 81	X 86	X 88	X 91	X 90	X 93	X 95	X 96	X 96	X 94	X 88	X 84	X 74	X 67	X 58	X 58	X 59	
13	X 57	X 55	X 51	55	70	64	X 58	X 72	90	76	55	89	76	83	88	92	92	105	90	73	48	46	A	X <sup>O</sup> 46	
14	X 49	89	A	91	X 43	X 48	X 55	X 62	69	73	86	91	96	104	105	107	99	84	83	78	68	59	58	62	
15	88	57	57	60	65	74	89	102	112	114	104	104	106	105	106	103	101	92	78	79	73	61	58	58	
16	X 36	51	57	69	X <sup>O</sup> 58	75	X 82	X 91	X 102	X 108	X 110	X 112	X 113	X 118	X 118	X 112	X 104	X 104	X 89	X 82	X 72	X 77	X 71	X 69	
17	X 58	X 71	X 69	77	85	80	X 90	X 103	X 100	X 115	X 113	X 117	X 115	X 117	X 114	X 115	X 110	X 106	X 100	X 83	X 77	X 72	X 67	X 70	
18	X 58	X 54	X 55	X 61	X 65	X 80	X 94	X 106	X 114	X 117	X 120	X 116	X 116	X 113	X 116	X 116	X 110	X 112	96	73	47	A	A	A	
19	A	63	75	76	X 62	X 64	X 55	X 55	A	A	X <sup>O</sup> 61	X 70	82	87	97	92	84	69	72	58	48	X <sup>O</sup> 46	A	A	A
20	A	58	56	60	X 68	56	64	X 73	X 82	90	84	83	86	93	95	88	82	79	77	71	59	56	56	A	
21	64	71	76	X 53	X 62	X 47	X <sup>O</sup> 42	X 42	A	A	A	X 46	X <sup>O</sup> 46	X 46	X 63	X 58	X 52	X 51	X 57	X <sup>O</sup> 62	X 46	A	A	A	
22	A	70	53	A	X 50	X 58	A	A	X 60	X 58	X 56	X 62	X 69	X 73	X 75	X 74	X 75	X 68	X 61	X 56	X 49	X 47	R	X 27	
23	A	57	44	X 53	X 56	X 65	X 79	X 83	X 82	X 87	X 85	X 79	X 81	X 79	X 80	X 84	X 83	X 83	X 75	X 68	X 65	X 62	X 63	X 65	
24	X 62	X 60	X 61	X 62	X 66	X 74	X 86	X 95	X 97	X 101	X 106	X 108	X 104	X 100	X 88	X 86	X 78	X 73	X 70	X 69	X 72	X 62	X 58	54	
25	X 27	X 55	X 57	X 50	X 58	X 66	X 85	X 92	X <sup>O</sup> 94	X 96	X 95	X 100	X 100	X 97	X 94	X 92	X 85	X 84	X 75	X 70	X 59	X 57	X 56	X 43	
26	X 37	A	X 53	X 69	X 63	X 66	X 82	X 72	X 83	90	X 88	X 91	X 91	X 94	X 101	X 112	X 108	X 60	X <sup>O</sup> 49	X 51	X 56	X 52	X 51	A	
27	A	A	X 52	X 56	A	A	R	R	X 54		56	X 66	X 69	X 76	X 68	X 68	X 66	X 67	X 65	X 66	X 65	X 51	X 48	X 47	
28	52	46	58	81	X <sup>O</sup> 58	X 68	X 73	X 82	X 74	X 78	X 65	X 88	X 102	X 105	X 100	X 66	X 66	X 47	X 66	X 63	X <sup>O</sup> 63	X 86	A	X 44	
29	X <sup>O</sup> 48	A	A	A	52	56	54	69	X	R	X <sup>O</sup> 56	X 59	B	B	X 74	X 70	X 58	X 47	X 41	X 46	X 45	62	A	A	
30	A <sup>O</sup> 53	X 58	B	56	B	A	56	65	64	64	66	68	73	83	83	83	70	49	60	55	X 61	X 55	X 44	49	
31	58	A	X 53	X 56	68	A	A	69	73	77	85	82	83	87	97	95	88	77	67	66	66	61	55	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	23	25	27	26	25	25	23	25	25	27	30	31	30	30	31	31	31	31	31	30	31	30	27	23	23
MED	X 53	57	57	62	63	58	68	73	82	87	85	88	94	98	97	98	95	88	78	70	65	58	56	50	
U Q	X 58	X 66	X 64	X 70	X 68	X 66	X 83	X 92	X 96	X 99	X 102	X 102	X 104	X 108	X 109	X 112	X 108	X 102	X 89	X 78	X 70	X 62	X 58	X 59	
L Q	X 44	X 52	X 53	X 55	X 56	X 56	X 58	X 68	X 72	X 76	X 74	X 74	X 81	X 84	X 88	X 86	X 78	X 72	X 67	X 62	X 56	X 51	X 50	X 45	

OCT. 2023 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 2023 foF2 (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	A	F	F	F	F	50	39	50	F	F	72	82	93	100	103	107	114	102	84	F	55	F	44	F
2	38	F	Z	F	A	A	50	53	Z	70	72	75	90	V	96	98	101	86	87	83	56	41	47	A
3	A	44	A	F	F	F	57	66	84	F	F	83	Z	102	97	105	100	86	65	F	A	A	A	44
4	R	A	A	F	F	52	54	53	Z	Z	68	F	72	78	82	90	F	84	F	F	64	48	36	A
5	F	A	F	A	A	A	A	A	A	B	F	55	60	67	F	81	93	91	82	67	60	Z	58	R
6	36	35	R	A	F	A	A	A	X	F	Z	74	V	85	83	85	81	72	68	61	62	46	44	39
7	29	F	F	F	F	50	57	72	84	93	96	102	101	99	100	92	89	82	76	70	64	55	49	40
8	F	48	F	F	A	F	F	A	A	F	F	60	67	81	88	97	106	102	107	89	82	70	F	F
9	48	A	50	F	A	F	A	A	73	85	91	94	98	108	119	120	114	108	71	49	A	F	A	R
10	47	R	A	F	F	F	56	65	71	80	86	92	96	105	109	109	104	96	89	78	68	55	47	F
11	36	F	F	F	R	59	77	94	F	F	107	107	115	115	119	120	122	J	R	105	97	84	68	61
12	52	38	42	44	58	51	64	75	80	82	85	84	87	89	90	90	88	82	78	68	61	52	52	53
13	51	49	45	44	48	58	52	66	F	70	49	68	70	77	82	86	86	99	84	67	42	40	A	R
14	J	R	A	A	37	42	49	56	63	67	80	85	90	94	99	J	R	101	93	J	R	77	72	F
15	R	F	F	F	F	64	77	81	F	F	90	98	98	100	99	100	97	95	86	72	73	67	55	F
16	30	F	F	F	R	Z	76	85	96	102	104	106	107	112	112	106	98	98	83	76	66	71	65	63
17	52	F	F	F	F	74	77	81	94	F	F	J	R	109	111	108	109	104	100	94	77	71	66	61
18	52	48	43	55	59	74	88	100	108	111	114	110	110	107	110	110	104	106	80	F	F	A	A	A
19	A	F	F	J	R	58	49	A	A	55	64	71	67	80	86	78	F	66	48	Z	R	A	A	A
20	A	F	Z	F	F	62	43	52	67	76	74	78	77	80	82	89	82	76	73	71	65	53	44	A
21	F	F	70	47	F	41	A	R	A	A	A	40	40	40	R	57	52	46	45	51	56	40	A	A
22	A	A	40	A	44	52	A	A	54	52	50	56	63	67	F	67	68	69	62	55	50	43	41	A
23	A	F	38	47	50	59	73	H	76	81	79	73	75	73	74	78	77	77	69	62	59	56	57	59
24	56	54	55	56	60	68	80	89	91	95	100	102	98	94	82	80	72	67	64	63	66	56	52	F
25	21	F	F	44	46	60	70	86	88	90	89	94	94	91	88	86	79	78	69	64	53	51	40	A
26	31	A	47	53	57	52	50	57	F	F	64	68	82	85	85	88	95	106	102	R	43	45	50	46
27	A	A	J	R	J	R	A	A	R	A	B	50	60	F	F	F	62	60	61	59	60	59	45	F
28	Z	40	F	60	A	52	62	67	F	F	65	52	58	59	F	Z	J	R	75	60	60	41	F	
29	R	A	A	A	F	50	38	63	A	B	R	50	53	B	B	R	68	64	52	41	A	35	40	39
30	A	R	52	B	47	B	A	50	59	58	58	60	62	67	77	77	64	43	54	49	55	49	38	F
31	R	A	47	50	F	A	A	F	Z	67	71	79	76	77	81	91	89	82	71	61	60	60	55	Z
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	23	22	24	24	25	25	23	25	25	27	30	31	30	30	31	31	31	31	30	31	29	27	20	20
MED	42	44	44	50	50	52	57	66	73	74	79	81	88	92	91	90	89	82	71	64	58	51	47	41
U Q	48	48	50	54	56	60	76	81	88	90	91	94	98	100	103	106	102	96	82	70	63	55	52	53
L Q	31	38	F	F	F	F	50	56	62	67	64	66	72	78	82	78	72	66	61	50	49	41	42	38

OCT. 2023 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 2023 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
1	56	38	30	29	60	44	30	32	G	G		G	E B	G	E B	33	30	38	E B	E B	40	38	71	38				
2	92	40	36	29	56	70	32	41	52	52	47	G	G	G	G	G	G	G	E B	E B	G	11	36	K	41			
3	46	46	50	41	44	34	29	47		G	33	43	42	33	32	32	G	E B		G	32	69	70	57	33			
4	52	68	74	33	35	50	37	54	53	48	36	33	36	E B	E B	31	G	E B	E B	E B	24	24	37	27	36	36		
5	34	79	39	63	54	64	56	42	64	B	45	E B	E B	34	38	24	33	G	E B	E B	30	25	22	71	58	34		
6	35	33	36	78	20	62	63	52	66	45	G	E B	E B	E B	G	G	G	G		G	16	16	19	30	33			
7	37	28	36	58	36	47	44	34	30	38	G	39	35	35	G	35	32	29	20	26	G	13	20	11	12			
8	34	40	46	49	52	35	38	67	71	50	38	G	G	G	E B	E B	E B	E B	G	E B	E B	G	E B	12	28	38		
9	36	31	32	20	53	38	58	50	42	33	36	36	34	33	37	36	26	28	36	43	43	50	40	46				
10	40	35	62	29	36	36	34	34	44	36	G	37	G	G	35	35	G	G	G	G	G	16	11	12	12			
11	12	12	13	14	20	G	34	34	28	G	G	G	G	G	E B	E B	G	G	G	G	G	21	15	15	E B	12		
12	22	36	40	58	53	41	34	G	G	35	G	G	38	58	42	45	35	31	G	G	34	25	26	15	15	12		
13	15	34	30	29	29	23	34	30	41	54	63	40	33	G	G	37	26	29	29	23	15	34	37	45	57			
14	42	36	38	41	41	31	37	28	33	36	36	41	35	28	G	27	22	G	G	G	G	14	20	12	10	16	35	
15	31	26	23	28	30	20	G	G	G	G	G	G	G	35	35	34	G	G	G	G	G	22	19	14	11	15	12	
16	E B	10	22	17	36	38	24	24	31	33	34	38	38	38	34	40	37	28	26	23	G	13	13	E B	10	16		
17	E B	8	12	12	17	24	41	44	33	30	37	37	37	G	34	33	34	28	G	G	G	24	18	15	9	E B	E B	9
18	13	26	39	42	27	18	G	32	32	36	36	39	36	18	33	33	33	26	27	33	G	52	56	61				
19	49	30	26	38	G	30	G	27	71	76	46	40	G	G	G	E B	E B	E B	E B	E B	30	30	45	44	54	55	54	
20	40	42	42	36	47	33	39	40	43	G	G	37	E B	E B	E B	E B	G	G	G	G	G	21	G	41	81			
21	39	43	57	38	35	24	59	58	59	45	68	32	34	E B	E B	E B	G	31	44	43	39	34	48	38	46			
22	46	46	38	90	25	40	57	52	45	35	35	31	35	E B	E B	46	62	E B	E B	E B	G	G	20	37	45			
23	41	37	29	28	28	26	26	31	31	32	35	35	68	55	G	G	G	31	30	23	25	17	13	11	10			
24	15	25	24	16	18	26	29	31	34	34	30	37	32	32	34	29	G	G	30	29	26	24	17	13	19	19		
25	28	18	27	33	37	46	39	48	G	G	35	35	34	38	38	30	29	26	23	21	17	16	38	40				
26	40	55	48	28	36	32	32	48	56	36	32	33	37	36	33	42	33	30	38	26	31	29	37	66				
27	56	46	24	24	57	62	34	48	42	B	46	43	G	G	G	G	33	29	G	E B	E B	20	32	21	37			
28	34	37	34	46	102	36	29	46	47	46	46	G	E B	E B	E B	E B	E B	E B	E B	E B	32	35	44	46	58	52	70	
29	64	70	68	55	30	37	37	37	58	B	42	33	B	E B	E B	E B	E B	46	44	32	29	40	24	28	30	40	59	
30	77	42	43	B	35	B	51	49	G	G	29	34	29	G	G	G	G	G	G	G	34	26	30	24	21	30	33	
31	45	44	E B	E B	30	62	64	46	37	G	40	40	37	32	E B	G	G	E B	E B	E B	G	23	21	20	94			
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT	31	31	31	30	31	30	31	31	31	28	31	31	30	30	31	31	31	31	31	31	31	31	31	31	31	31		
MED	39	37	36	34	36	36	34	41	41	36	36	38	36	35	G	G	G	G	G	26	24	20	21	36	37			
U Q	46	44	43	46	52	46	44	49	53	45	42	39	G	G	37	35	31	30	30	28	34	38	41	54				
L Q	28	28	27	28	28	26	29	G	G	G	G	35	34	33	33	33	29	27	23	21	13	13	15	16				

OCT. 2023 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 2023 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	24	10	12	12	9	12	12	16	17	21	19	45	29	25	40	13	14	26	28	22	8	14	13	7
2	9	9	12	14	18	18	18	15	15	16	17	24	14	15	23	23	19	14	31	12	8	7	8	8
3	8	12	11	12	12	13	15	10	11	19	19	22	16	17	16	12	31	13	15	14	12	9	9	8
4	8	8	11	10	10	13	15	11	14	13	15	16	26	38	24	15	41	25	24	18	8	6	8	6
5	8	12	8	8	19	36	20	15	37	B	20	40	24	17	16	33	18	31	16	12	11	10	10	6
6	8	8	8	12	9	34	18	14	16	13	23	36	36	16	14	13	12	9	11	8	7	7	7	7
7	6	8	10	10	7	13	14	10	9	11	11	12	11	10	12	10	10	9	7	6	6	6	8	7
8	8	11	10	16	39	16	14	21	16	14	12	26	27	25	33	36	30	22	24	19	8	12	9	9
9	9	9	12	6	14	22	15	16	12	9	11	12	11	15	12	14	10	15	12	8	9	12	8	9
10	10	10	10	10	12	16	13	10	17	22	25	16	12	16	14	16	13	16	11	14	12	7	6	7
11	7	8	7	7	8	12	14	11	12	16	18	18	14	24	24	31	17	15	13	10	7	8	8	12
12	7	9	9	10	12	11	10	10	12	11	10	12	11	12	12	11	10	10	8	8	7	6	7	7
13	8	8	8	12	9	8	9	9	8	12	12	12	12	9	11	9	10	8	10	11	6	9	7	10
14	11	10	8	8	8	8	11	8	13	13	12	15	12	14	17	17	13	10	6	7	6	7	5	7
15	8	16	10	10	10	7	7	10	11	11	14	11	13	11	12	15	16	11	10	7	6	5	6	8
16	10	9	9	13	14	11	11	9	9	12	10	13	11	12	13	12	11	10	12	8	6	7	10	10
17	8	7	7	7	8	11	12	16	9	11	10	10	12	11	12	11	11	11	9	8	6	6	10	9
18	6	7	11	11	8	9	8	8	7	8	8	10	12	9	7	10	10	13	11	7	11	12	7	7
19	11	11	8	16	8	9	15	15	28	16	15	18	13	24	20	39	32	17	13	6	8	8	12	12
20	8	14	14	19	18	17	14	23	18	18	16	14	36	35	24	22	15	12	17	8	12	6	9	7
21	10	10	14	11	12	9	26	18	26	12	20	12	14	33	31	14	11	12	11	11	14	11	10	11
22	8	11	7	11	10	17	20	13	11	11	12	15	25	39	31	40	35	38	17	8	9	8	8	8
23	10	8	8	6	13	8	8	11	10	11	12	13	12	12	10	11	8	7	9	7	7	8	7	7
24	7	7	8	8	8	7	8	7	8	10	14	14	18	11	13	12	12	8	7	9	7	6	7	6
25	6	6	8	12	13	11	11	24	17	12	13	13	18	15	11	11	10	10	10	10	7	7	6	8
26	10	12	12	13	16	14	11	14	17	13	10	14	12	7	16	42	33	10	10	12	8	7	12	11
27	32	15	8	10	27	22	13	14	14	B	29	26	20	26	25	15	18	16	25	23	15	7	10	8
28	8	13	6	12	12	16	11	14	13	13	13	18	32	32	42	35	23	15	10	10	12	7	6	9
29	9	9	15	14	15	16	13	14	24	B	28	24	B	B	46	44	19	17	12	11	12	7	12	6
30	11	25	13	B	26	B	15	19	19	20	16	17	24	14	10	16	14	8	17	13	11	6	6	7
31	13	20	34	32	12	19	19	15	12	13	11	13	12	19	36	15	11	28	13	14	13	9	8	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	8	10	10	11	12	13	13	14	13	13	14	15	14	16	16	15	14	13	12	10	8	7	8	8
U Q	10	12	12	13	15	17	15	16	17	18	19	22	25	25	25	31	19	17	17	13	12	9	10	9
L Q	8	8	8	10	9	9	11	10	11	11	11	12	12	12	12	12	11	10	10	8	7	6	7	7

OCT. 2023 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 2023 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	E A	E A		A	A	E A	A		252	238	E B	E A	E A	E B	232	228	220	220	212	A	238	250	A	
2	A	E A	A	E A	A	A	A	A	A	A	E A	268	234	230	228	224	230	226	224	228	222	208	A	A	A	
3	A	A	A	A	A	A	E A	A	A	E A	Q	E A	220	218	224	212	242	234	E A	A	A	A	A	A	A	
4	258	A	A	A	A	A	A	A	A	E A	A	E A	214	236	E B	234	214	E B	238	E B	222	E A	A	A	A	
5	A	A	A	H	A	A	A	A	A	B	A	G	266	224	238	240	242	224	240	E B	E A	E A	E A	E A	E A	
6	A	A	A	A	A	A	A	A	A	A	A	E B	E B	240	216	210	218	E A	234	224	214	198	230	242	242	A
7	A	A	A	A	A	A	A	A	A	A	A	210	216	208	218	218	224	224	214	202	E A	202	210	E A	224	
8	A	A	A	A	B	A	A	A	A	A	A	230	E A	234	228	228	228	234	234	E B	222	232	258	A	A	
9	A	A	A	A	A	A	A	A	E A	A	E A	214	214	206	230	230	222	E A	E A	A	A	A	A	A	A	
10	A	A	E A	A	A	A	A	A	E A	A	E A	218	216	214	A	220	234	234	222	218	214	214	244	244	Q	
11	252	270	310	328	344	298	292	238	224	216	206	214	220	220	228	228	226	192	218	218	202	228	234	228	Q	
12	248	A	A	A	A	A	E A	A	270	234	222	224	218	218	210	230	218	230	226	216	216	214	210	220	222	242
13	254	302	270	372	200	A	196	184	A	344	204	250	210	204	210	220	220	232	214	198	A	A	A	A	A	
14	A	A	A	A	A	A	204	208	232	238	216	216	208	198	204	222	224	214	210	E A	196	220	252	280	Q	
15	264	332	E A	E A	A	206	240	204	224	220	218	202	218	218	200	212	218	202	214	214	194	210	220	238	Q	
16	282	296	A	A	A	E A	286	248	222	218	218	206	218	212	200	200	226	226	220	216	214	202	228	208	228	
17	Q	Q	Q	Q	E A	E A	E A	A	230	218	202	200	210	216	222	218	202	214	224	E A	200	212	214	224	224	
18	Q	E A	A	A	A	282	236	226	232	220	210	214	206	188	204	218	230	228	A	A	A	A	A	A	Q	
19	A	A	280	E A	E A	E A	E A	A	A	A	E A	E A	E A	E A	224	238	E B	E B	E B	A	A	A	A	A	A	
20	A	A	A	E A	E A	E A	E A	A	A	270	224	214	214	230	240	206	232	218	226	216	222	208	278	A	A	
21	A	A	A	A	A	E A	254	A	A	A	A	A	220	E A	E B	264	238	202	236	A	A	A	A	A	A	
22	A	A	A	A	A	A	A	A	A	202	202	220	234	E B	E A	294	252	B	E B	E B	E A	202	270	E A	A	
23	A	E A	A	A	A	222	232	236	212	216	226	212	220	220	208	208	222	222	218	212	222	224	222	240	A	
24	242	262	288	310	294	258	224	228	222	214	214	228	204	202	210	206	216	216	218	224	234	216	224	244	A	
25	HE	HE	A	A	A	E A	E A	A	A	A	A	A	H	202	194	202	210	210	224	222	218	186	202	254	A	
26	A	A	A	A	A	E A	328	222	A	420	210	220	198	226	222	210	E B	E B	E B	A	E A	E A	E A	A	A	
27	A	A	288	A	A	A	A	A	A	A	B	E A	E A	A	230	232	230	226	234	234	E B	E B	E A	A	A	
28	A	A	A	A	A	A	A	E A	A	362	302	244	232	218	E B	E B	272	224	266	A	A	A	A	A	A	
29	224	A	A	A	A	E A	E A	A	A	B	E A	A	B	B	B	B	E A	A	A	A	E A	E A	E A	E A	A	
30	A	A	A	B	A	B	A	A	A	224	188	222	206	206	218	212	238	230	E A	270	224	232	236	256	306	
31	A	E B	B	E A	A	A	A	A	A	226	210	220	220	204	220	224	232	230	222	242	232	234	244	260	A	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	11	9	12	10	10	11	17	16	18	26	29	31	30	30	29	29	31	30	26	25	25	24	17	12		
MED	248	279	280	E A	E A	E A	U	229	230	224	220	220	216	217	218	215	223	225	226	217	210	214	221	233	239	
U Q	258	317	311	352	294	298	284	240	250	238	245	232	230	232	232	232	234	238	234	232	237	255	259	244		
L Q	228	259	274	296	244	222	223	224	222	216	212	214	210	208	210	213	224	222	216	212	204	215	222	226		

OCT. 2023 h'F (KM)

IONOSPHERIC DATA STATION SHOWA-ST.

NOV.2023 fXI (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	042	A	55	56	B	62	A	A	X	X	X	X	X	X	X	X	X	X	X	X	85	64	54	63	
2	58	55	59	63	O	63	71	69	76	80	86	84	86	90	91	91	88	86	76	70	58	57	59	51	
3	51	56	60	64	70	74	94	103	106	106	105	102	100	99	93	88	81	79	77	75	68	68	80	70	
4	70	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	X	O	X	X	56	
5	O	X	O	X	O	X	O	X	X	X	X	X	X	X	O	X	O	X	X	X	X	X	32	A	
6	92	A	52	A	A	A	48	O	X	X	O	X	X	B	O	X	B	X	X	X	X	47	44	47	
7	A	A	56	B	X	A	X	X	X	X	X	O	X	X	X	X	X	X	X	X	X	54	34	A	
8	A	X	O	X	X	X	X	X	R	A	X	X	X	X	X	X	X	X	X	X	X	X	X	A	
9	X	52	56	59	58	R	A	A	O	X	O	X	X	X	X	X	X	X	X	X	X	X	O	X	
10	A	X	X	X	X	X	O	X	A	X	X	O	X	X	X	X	X	X	X	X	X	X	X	X	
11	X	O	X	X	X	X	74	94	93	106	99	92	90	85	81	78	75	74	66	63	65	58	62	61	
12	X	X	V	X	X	X	86	96	95	102	104	114	114	128	135	106	116	91	77	68	68	66	64	63	
13	X	X	X	X	A	A	59	62	79	79	67	66	66	66	64	68	67	68	64	54	57	48	59	55	
14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	
15	X	X	X	X	A	A	60	67	70	74	73	69	72	74	70	69	63	65	60	44	A	A	53	O	X
16	A	59	59	59	57	61	64	63	71	73	72	77	77	80	84	79	69	63	56	52	50	52	45	45	
17	X	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
18	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
19	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
20	X	X	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
22	46	A	O	X	X	X	O	X	A	A	B	O	X	O	X	X	X	X	F	X	X	A	A	A	
23	58	57	50	60	57	59	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
24	X	X	X	X	X	X	A	X	A	O	X	O	X	X	X	X	X	X	X	X	X	X	X	X	
25	O	X	X	X	A	X	A	O	X	O	X	X	X	B	X	R	R	R	R	A	90	42	92	A	
26	O	X	A	A	67	58	O	X	A	O	X	O	X	O	X	X	X	X	X	X	X	X	X	X	
27	60	53	61	56	61	69	76	87	94	89	98	101	76	81	81	76	76	71	69	62	58	57	59	58	
28	57	58	54	57	68	71	78	88	90	92	94	85	88	88	86	84	80	70	68	64	54	53	60	71	
29	58	61	O	X	X	X	X	X	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
30	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
31	60	62	72	77	74	78	78	82	86	86	89	89	81	79	76	75	77	76	76	72	66	58	61	61	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	26	23	28	27	25	25	25	22	26	29	29	30	30	28	30	28	29	30	28	29	30	29	28	23	
MED	56	58	59	60	64	66	69	81	81	84	83	81	78	80	78	76	73	69	66	62	58	57	56	55	
U Q	60	62	62	67	68	72	80	88	94	92	94	91	89	87	84	81	78	73	70	66	65	64	61	61	
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	

NOV.2023 fXI (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

# IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 2023 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 36	A 41	Z 49	50	B 56	A 62	A 67	62	72	71	73	82	89	88	88	87	76	65	62	F 62	58	48	F 34	
2	F 40	F 41	53	57	57	65	63	F 63	F 67	F 72	78	80	80	84	85	85	82	80	70	64	V 51	51	48	45
3	F 42	F 37	54	58	R 59	F 68	F 80	97	100	100	99	96	94	93	87	82	75	73	71	69	62	62	F 64	64
4	64	65	76	82	87	63	71	82	Z 100	F 97	F 101	106	98	96	J 96	R 93	R 88	78	75	64	58	R 54	52	50
5	R 50	J 66	R 53	R 48	U 58	R 51	48	59	65	75	65	65	65	59	R 54	R 44	R 44	44	46	F 41	33	32	26	A A
6	A A	A A	28	A A	A A	A A	39	R 39	R 41	R 46	F 44	R 44	R 44	B 55	R 44	B 56	56	54	53	54	41	F 34	41	A A
7	A A	A A	50	B 53	A 61	A 45	50	54	57	56	54	55	58	59	55	56	54	51	46	46	F 37	A A	A A	
8	A A	41	R 42	F 46	47	52	51	R A	49	56	59	60	63	60	60	J 59	R 55	59	56	46	43	43	A A	
9	46	F 39	53	52	A A	A A	A A	A A	57	61	63	65	64	64	68	70	61	61	58	50	F 44	46	45	R 49
10	A A	40	50	F 43	46	53	63	R 60	A 62	63	69	R 69	69	69	71	70	72	67	60	60	54	51	50	44
11	43	R 42	51	47	56	56	Z 68	F 81	87	89	86	86	84	79	75	72	69	J 68	R 60	H 57	Z 59	52	56	55
12	56	V 58	62	65	F 59	66	80	F 82	89	96	98	108	Z 108	122	F 93	F 100	F 94	85	71	62	62	60	58	57
13	55	F 52	61	J 48	R A	A A	53	F 50	F 59	73	61	60	60	60	58	62	61	62	58	48	51	42	53	49
14	52	54	59	62	62	68	76	80	82	82	82	85	84	80	77	72	69	62	62	54	49	46	A A	A A
15	43	J 48	R 49	50	F 47	A A	54	61	64	68	67	63	66	68	64	63	57	59	54	38	A 41	F 47	R 47	
16	A A	F 47	F 46	F 48	F 35	F 33	58	F 50	62	64	66	71	71	73	78	73	63	57	50	46	44	46	39	F 36
17	41	A A	A A	44	53	61	71	80	85	78	79	77	76	72	70	67	63	58	56	54	J 52	R 36	39	39
18	43	46	50	57	61	68	77	84	88	90	87	85	83	79	72	71	65	66	63	60	60	57	62	55
19	39	F 42	51	58	62	F 56	F 65	F 73	F 76	86	84	80	73	67	71	71	67	64	64	59	56	54	51	48
20	42	52	56	A 46	54	58	72	75	79	77	78	78	80	75	75	70	64	62	61	56	54	45	45	
21	45	54	53	F 50	J 52	R 60	74	78	88	90	89	93	Z 108	F 96	F 68	60	63	56	A 46	50	54	49	46	
22	F 35	A A	51	51	F 56	52	52	R A	A A	A A	B 44	46	54	62	55	43	54	42	48	52	A A	A A	A A	
23	F 38	A A	F 44	R 44	54	51	51	A A	56	58	61	61	65	64	61	60	58	58	58	58	55	60	56	52
24	56	61	66	F 68	A 60	55	55	A A	A A	R 63	R 50	R 53	F 56	F 57	F 57	F 56	R 58	R 54	R 53	F 51	A 52	A 51	44	J 44
25	R 54	A A	A A	A A	F 43	R 37	39	Z 46	F 50	F 53	F 56	F 57	F 57	F 57	Z 75	70	67	65	63	56	52	51	53	52
28	F 42	52	48	51	V 62	65	72	82	75	F 72	88	70	82	82	80	78	74	64	62	58	48	47	54	65
29	Z 52	51	53	F 54	F 58	66	F 63	F 61	F 61	F 67	F 66	F 66	75	77	F 75	75	73	66	61	60	60	59	59	46
30	54	56	66	F 62	F 68	64	A 64	F 76	80	80	83	83	75	73	70	69	71	70	70	66	60	52	55	
31																								
CNT	25	23	28	26	25	25	25	22	26	29	29	30	30	28	30	28	29	30	29	29	29	27	26	23
MED	43	49	52	50	56	56	63	69	66	72	70	70	72	72	72	70	67	63	60	56	52	51	50	48
U Q	53	54	56	58	60	65	72	81	85	84	85	83	83	81	77	75	72	67	64	60	58	57	54	55
L Q	40	F 42	50	48	50	52	52	59	61	62	62	61	63	64	62	61	60	56	55	50	46	43	44	44



## IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 2023 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	57	54	40	52	B	27	53	46	44	G	G	E B	G	G	G	G	E B	G	E B	23	22	22	19				
2	28	31	34	33	E B	41	53	48	47	43	38	G	38	36	36	34	30	G	G	22	19	19	17	30			
3	32	32	38	46	G	E B	41	43	42	35	38	38	46	35	35	G	31	30	E B	G	E B	20	17	18	E B		
4	14	E B	E B	E B	E B	33	38	39	G	G	G	G	G	34	G	39	36	28	G	23	42	94	50	89			
5	50	48	34	46	37	26	27	31	31	32	38	G	G	G	G	105	35	47	37	38	32	36	21	56	64	49	151
6	51	92	32	88	44	66	36	31	30	53	41	47	33	B	G	B	E B	E B	E B	E B	E B	G	30	23	28	71	
7	43	66	38	B	47	70	49	37	40	G	E B	E B	G	G	G	G	G	E B	G	25	28	33	36	54			
8	59	52	36	42	32	27	36	44	60	45	G	G	G	E B	E B	E B	G	G	G	31	29	23	23	38	49	80	
9	G	24	38	G	50	56	58	43	46	50	E B	G	G	G	G	E B	G	G	G	29	26	G	31	36	27	33	
10	48	43	45	34	G	E B	37	60	54	37	E B	E B	E B	E B	E B	E B	E B	G	G	E B	E B	G	25	G	G		
11	26	37	45	G	G	G	40	G	32	36	36	G	G	G	G	G	G	G	G	23	23	18	26	14			
12	14	19	22	36	39	36	38	35	35	G	40	40	E B	E B	E B	E B	G	G	G	27	23	23	23	24			
13	32	30	33	33	66	55	45	45	40	47	G	34	38	38	34	32	36	31	28	26	30	29	40	27			
14	31	24	22	33	28	G	32	32	32	39	36	49	53	59	53	37	35	34	31	28	24	38	43	A			
15	37	40	42	46	41	53	46	43	43	32	37	39	35	35	50	32	G	G	G	28	25	40	58	42	104		
16	56	40	24	G	26	32	50	41	36	36	38	36	E B	E B	E B	E B	G	G	E B	E B	30	31	29	G			
17	29	66	49	38	G	G	32	32	36	38	38	38	38	38	G	G	G	G	G	34	34	G	21	22	30	30	
18	17	17	17	17	29	29	31	33	36	34	35	35	39	39	36	39	32	32	30	28	28	30	20	22			
19	34	G	46	41	46	40	32	36	36	39	39	39	52	38	38	38	G	44	36	34	G	23	26	29	36		
20	38	43	31	54	41	33	34	34	36	36	40	40	43	42	35	35	35	G	G	32	32	36	24	23	32	23	
21	30	G	37	28	54	29	32	35	32	39	39	39	37	45	36	45	G	34	39	42	44	36	48	39			
22	29	62	39	36	34	37	52	64	72	72	B	58	35	42	G	34	33	35	35	29	28	47	92	69			
23	19	54	38	38	28	28	43	60	47	43	36	E B	E B	G	40	32	31	31	28	G	G	26	G	24	20		
24	23	20	29	26	47	50	44	68	64	50	35	39	43	40	39	32	36	36	32	28	G	29	36	32	32		
25	37	42	42	37	77	34	60	52	54	47	58	G	G	B	G	E B	42	39	40	45	35	58	38	24	60	103	
26	70	62	44	36	42	51	54	64	44	38	E B	45	35	E B	48	38	36	33	30	35	29	E B	28	30	25	30	32
27	35	46	43	42	28	29	G	40	45	41	36	39	37	36	36	37	43	G	G	G	26	28	23	22	36		
28	38	41	44	44	41	32	40	38	55	45	40	43	36	40	36	34	G	34	33	32	26	32	39	34	34		
29	34	34	45	50	46	37	47	46	43	44	39	39	38	54	51	37	32	G	G	37	39	73	48	35			
30	19	32	31	33	34	47	61	54	43	37	40	43	53	85	43	61	49	49	33	30	32	29	24	19			
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	30	30	30	30	30	29	30	30	28	30	29	30	30	30	30	30	30	30	29			
MED	33	40	38	G	38	35	41	42	42	38	E G	38	38	37	38	40	37	G	G	G	28	28	29	30	32		
U Q	43	52	43	45	46	47	50	48	47	45	40	43	43	40	G	G	36	34	32	28	32	38	43	62			
L Q	G	24	31	33	28	29	34	34	36	36	36	G	G	G	36	34	32	31	29	G	23	23	24	21			

NOV. 2023 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 2023 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	26	20	14	18	B	16	20	18	20	14	17	37	22	25	25	18	37	19	13	28	14	9	7	7	
2	9	16	23	18	48	14	20	16	21	16	14	13	11	17	19	18	13	19	8	10	10	10	7	6	
3	8	8	18	34	14	15	43	12	9	12	12	13	13	14	15	15	19	17	38	13	13	17	9	12	
4	8	12	14	18	12	14	13	10	7	10	10	12	17	15	13	10	8	12	13	9	16	13	10	12	
5	13	13	11	10	12	12	11	13	13	12	10	11	7	11	15	21	18	14	35	11	10	12	8	15	
6	9	8	7	11	8	11	8	12	11	14	14	23	14	B	20	B	37	36	29	24	7	7	8	28	
7	12	14	14	B	17	19	22	11	16	13	43	45	17	16	22	24	12	30	16	12	10	7	11	14	
8	25	10	27	12	12	12	8	39	18	13	8	12	21	38	34	16	13	11	8	9	7	9	12	16	
9	25	8	8	24	22	26	16	10	14	36	48	26	16	12	24	35	16	12	11	14	8	8	15	7	
10	15	16	24	13	16	22	37	37	24	26	48	52	38	41	38	17	19	24	26	28	16	13	12	11	
11	12	16	17	22	24	28	15	12	14	14	24	24	20	14	13	9	11	12	12	13	9	8	12	9	
12	8	8	7	13	12	7	7	11	11	11	13	10	59	39	25	37	13	14	22	15	6	7	5	7	
13	7	12	5	6	27	26	8	10	10	12	15	13	16	12	11	10	7	7	7	7	8	10	7	6	
14	7	5	8	6	6	7	7	8	8	8	10	13	11	12	12	12	9	8	7	7	8	6	12	9	
15	14	8	7	7	17	12	12	12	12	12	8	12	10	12	14	13	12	9	8	8	8	8	11	16	
16	24	12	10	7	7	14	11	10	10	9	11	16	46	34	35	25	24	12	32	18	8	7	12	11	
17	15	35	13	12	12	11	9	7	8	8	12	12	10	11	14	15	12	9	8	8	7	6	8	8	
18	9	8	7	7	8	9	8	8	9	10	12	12	12	9	11	10	11	8	9	6	8	8	8	6	
19	8	11	12	15	11	11	7	6	7	7	10	10	12	11	11	11	9	10	7	8	6	6	7	9	
20	12	9	7	14	12	7	7	8	8	8	9	11	14	12	13	13	11	12	7	7	8	8	7	8	
21	8	13	11	7	10	9	7	10	8	8	8	8	30	32	13	10	22	13	12	8	8	8	7	10	
22	7	13	6	9	9	8	14	8	13	28	B	28	22	14	16	19	11	14	11	8	10	13	8	8	
23	8	20	24	25	12	10	13	13	13	12	28	46	39	24	12	14	12	11	18	20	16	14	13	9	
24	8	6	8	13	14	13	14	23	15	12	12	12	12	12	10	8	9	9	10	10	10	10	7	8	
25	8	9	9	8	14	11	12	20	16	24	26	18	25	B	21	39	11	10	8	8	9	12	9	10	
26	7	25	9	6	13	16	10	14	13	11	45	23	48	26	24	14	17	14	14	28	18	11	8	8	
27	10	12	16	15	13	11	12	13	12	14	13	11	11	14	12	11	11	12	12	8	9	10	7	9	
28	10	13	13	15	17	11	8	6	25	13	14	12	15	13	14	26	16	16	12	11	12	8	8	9	
29	8	11	31	19	13	12	12	16	10	22	14	14	26	20	17	18	15	14	24	17	15	14	8	10	
30	7	8	7	9	14	13	18	11	8	9	10	13	14	15	11	12	9	10	12	13	11	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	9	12	11	13	13	12	12	12	12	12	13	13	16	14	14	15	12	12	12	10	9	8	8	9	
U Q	13	14	16	18	17	15	15	14	15	14	24	23	25	26	22	21	17	14	18	15	12	12	11	11	
L Q	8	8	7	8	12	11	8	10	9	10	10	12	12	12	12	11	11	10	8	8	8	7	7	8	

NOV. 2023 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 2023 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	A	A	230	224	E B	220	224	222	228	E B	222	A	236	E A	E A	E A	E A
2	A	E A	A	E A	B	A	A	A	E A	240	224	208	200	220	232	216	216	226	208	200	E A	242	250	286
3	350	E A	A	A	E A	E B	212	204	H	214	214	198	222	200	212	212	224	218	244	200	200	B	Q	Q
4	248	270	E B	E B	E A	E A	276	248	222	210	202	208	196	212	212	220	210	216	202	208	E A	188	A	A
5	A	E A	A	A	E A	A	246	218	244	222	214	214	218	226	228	E A	E A	222	246	192	192	H	A	A
6	A	A	186	A	A	A	208	E A	222	A	244	Q E A	204	B	232	B	E B	E B	E B	E B	E A	300	A	A
7	A	A	A	B	A	A	A	A	E A	A	B	B	214	214	196	218	218	230	230	260	E A	A	A	A
8	A	A	A	E A	E A	A	278	278	242	B	A	212	196	208	E B	E B	218	204	226	226	240	E A	E A	A
9	E A	214	232	A	A	A	A	A	E A	A	B	204	230	224	218	E B	236	214	202	224	204	310	224	292
10	A	A	A	A	E A	A	282	284	266	B	E A	B	242	264	254	226	206	242	232	248	260	E B	E A	A
11	E A	A	E A	E A	E A	E A	296	286	224	232	230	222	204	220	200	204	218	208	204	214	216	196	202	240
12	E A	E A	A	A	A	A	286	252	230	210	210	204	204	B	E B	E B	E A	A	A	E A	252	202	244	278
13	E A	Q	E A	E A	A	A	A	264	224	226	206	194	266	228	216	212	220	218	218	246	248	240	226	270
14	E A	Q	E A	E A	276	252	230	214	214	210	214	E A	248	216	286	214	210	E A	206	222	E A	E A	E A	A
15	A	A	A	234	A	A	A	A	E A	A	H	208	204	222	212	212	212	224	236	236	A	A	A	A
16	A	A	A	E A	E A	A	E A	A	E A	A	A	202	B	E B	A	216	216	238	E B	E A	A	E A	E A	A
17	E A	A	E A	E A	286	250	244	210	210	202	194	H	200	206	218	216	212	228	214	214	190	H	E A	E A
18	222	204	266	258	240	228	218	218	204	208	224	194	H	224	200	224	204	210	210	212	228	238	232	202
19	E A	A	A	A	A	E A	232	210	212	202	204	212	218	206	198	218	216	220	220	204	228	214	E A	E A
20	E A	E A	A	A	E A	A	276	248	214	206	202	202	206	230	214	212	198	212	212	230	250	252	172	A
21	E A	E A	E A	E A	A	200	220	214	202	216	222	216	216	246	218	212	214	E A	242	A	A	A	A	A
22	E A	A	A	A	E A	A	214	268	256	A	A	A	B	E A	236	202	226	226	234	274	326	E A	A	A
23	A	A	A	E A	E A	296	270	266	A	A	192	224	B	E B	242	244	216	202	212	212	222	234	248	254
24	E A	E A	E A	E A	A	E A	A	A	A	A	A	H	202	202	192	236	218	202	210	200	232	234	212	A
25	A	A	E A	E A	E A	A	A	A	E A	E A	E A	E A	196	B	E A	E B	E A	A	A	A	A	E A	A	A
26	A	A	A	A	A	E A	258	E A	A	A	B	H	208	B	232	212	216	228	226	238	E B	240	E A	A
27	E A	E A	A	A	202	222	206	260	E A	E A	228	210	214	204	198	212	204	216	210	222	204	248	242	264
28	E A	274	A	A	A	292	264	210	A	240	226	196	H	200	H	H	H	H	218	232	A	A	A	A
29	E A	A	A	A	A	A	230	A	E A	E A	A	238	218	212	212	222	222	214	216	234	236	E A	E A	A
30	A	A	A	A	A	A	A	A	A	230	198	208	192	228	A	210	E A	E A	E A	E A	222	230	E A	E 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	16	12	7	12	11	17	21	16	22	26	26	27	27	27	30	29	30	30	28	26	25	20	18	14
MED	E A	E A	E A	E A	U	U	258	239	218	216	212	212	206	215	217	215	215	214	219	224	U	E A	E A	E A
U Q	316	306	280	320	294	289	266	254	232	230	224	216	228	236	226	226	222	230	235	246	260	259	264	282
L Q	E A	259	232	257	240	248	225	213	210	206	204	202	204	206	212	212	210	212	216	204	227	219	236	246

NOV. 2023 h'F (KM)

## IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 2023 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 66	X 68	X 70	X 76	71	B	A	X 59	A		O 53	X 54	X 58	51	X 54	X 52	A	X 47	X 50	X 52	X 48	A	A	50		
2	X 43	A	A	70	A	88	59	A	A	A	A	52	50	52	52	54	51	55	55	54	55	54	52	54		
3	X 55	X 57	X 52	X 52	X 56	X 63	68	70	75	75	77	76	75	70	68	67	68	68	65	68	67	64	45	X 51		
4	X 53	X 56	A	V 58	58	66		68	64	68	68	68	68	67	66	69	63	64	61	60	60	53	55	48		
5	A 57	O 50	X 55	X 63		A		70	67	A	X 51	X 62	X 61	X 62	X 70	X 69	X 74	X 73	X 64	X 59	X 57	X 49	X 57	X 54	X 48	
6	X 48	A	A	X 51	X 57	X 58	61	65	66	64	73	O 71	X 73	X 75	X 72	X	X 70	X 64	X 57	X 48	X 52	X 50	X 58	X 54	X 46	
7	X 52	X 56	X 57	X 48	X 53	X 58	67	64	62	70	72	65	62	62	62	64	63	65	58	59	57	54	52	48		
8	X 44	A	A	A	X 56	X 67	X 74	X 83	X 84	X 86	X 84	X 84	X 79	X 74	X 70	X 67	X 65	X 65	X 62	X 61	X 56	X 48	X 48	X 51		
9	X 48	X 52	X 61	X 63	X 70	X 79	X 83	X 85	X 88	X 91	X 86	X 83	X 81	X 74	X 71	X 68	X 67	X 65	X 64	X 63	X 58	X 56	X 52	X 54		
10	X 58	X 58	X 66	X 73	X 72	X 63	X 61	X 72	X 74	X 94	X 98	X 97	X 91	X 81	X 73	X 70	X 71	X 70	X 72	X 70	X 62	X 57	X 52	X 52		
11	X 56	X 57	X 62	X 66	X 79	X 89	X 91	X 95	X 89	X 97	X 91	X 82	X 76	X 72	X 72	X 74	X 69	X 70	X 67	X 67	X 66	X 62	X 59	X 61		
12	X 54	X 52	X 57	X 64	X 70	X 80	X 89	X 92	X 87	X 74	X 77	X 81	X 78	X 74	X 77	X 75	X 70	X 60	X 53	X 57	X 51	X 66	A	X 54		
13	X 57	X 54	X 58	X 61	X 60	X 67	X 77	X 70	X 54	X 81	X 88	O 62	X 81	X 76	X 70	X 80	X 73	X 68	X 60	X 46	X 57	X 51	X 54	X 51		
14	X 50	X 48	X 51	X 61	X 69	A	A	O 54	X A	F	A	A	X 49	X 59	X 76	X 61	X 56	X 54	X 56	X 52	X 54	X 59	X 49	X 46		
15	X 50	X 50	X 68	X 58	X 54	A	A	X 53	X 60	X 61	X 57	X 58	X 58	X 60	X 60	X 61	X 61	X 56	X 58	X 50	X 56	X 52	A	A		
16	A 45	O 53	X 51	X A	A	A	A	A	A	A	O 60	X 61	X 59	X 64	X 61	X 63	X 64	X 62	X 61	X 60	X 57	X 58	X 52	X 58		
17	A	X 62	X 57	X 62	X 62	X 52	X 65	A	A	A	A	O 52	X 50	X 69	X 65	X 50	X A	X A	X 46	X 47	X 84	X 72	X 49	X 50		
18	70	63	58	55	60	68	66	81	68	74	66	88	52	61	65	62	54	52	57	58	56	52	51	56		
19	X 52	A	A	X 58	59	A	A	A	A	O 54	X 58	X 59	X 60	X 62	X 60	X 60	X 63	X 59	X 60	X 60	X 57	X 58	X 54	X 54		
20	X 57	X 52	A 54	O 54	X 54	X 66		A	A		62	66	74	72	72	73	75	76	68	60	56	48	61	61	53	56
21	64	59	66	54	54	63	71	75	81	82	80	76	78	83	85	77	73	66	60	58	58	55	52	56		
22	X 58	X 59	X 57	X 70	X 64	X 70	X 72	X 71	X 74	X 80	X 80	X 78	X 75	A	X 70	X 67	X 67	X 64	X 64	X 63	X 60	X 62	X 59	X 56		
23	X 54	X 55	X 61	X 68	X 64	X 74	X 89	X 96	X 104	X 111	X 107	X 105	X 96	X 82	X 82	X 76	X 71	X 67	X 62	X 64	X 63	X 60	X 64	X 64		
24	X 64	X 62	X 69	O 59	X 68	X 63	X 61	X A	A	A	A	X 66	X 66	X 64	X 69	X 71	X 74	X 72	X 64	X 64	X 58	X 61	X 61	X 61		
25	X 59	X 60	X 59	X 60	X 68	X 74	X 67	X 73	X 88	X 88	X 80	X 79	X 81	X 73	X 72	X 70	X 70	X 69	X 68	X 67	X 68	X 66	X 60	X 63		
26	60	61	66	67	71	70	87	89	94	94	92	89	88	84	79	78	75	72	67	66	60	62	62	60		
27	X 55	X 64	X 63	X 70	X 68	X 60	X 63	X 71	X 72	X 80	X 85	X 84	X 83	X 80	X 79	X 77	X 68	X 70	X 68	X 65	X 66	X 66	X 66	X 64		
28	X 63	X 61	X 66	X 64	X 72	X 76	X 81	X 88	X 94	X 94	X 94	X 92	X 92	X 86	X 82	X 78	A	X 73	X 68	X 65	X 63	X 64	X 66	X 65		
29	X 67	X 72	X 80	X 89	X 88	X 86	X 95	X 101	X 99	X 97	X 100	X 102	X 97	X 89	X 85	X 82	X 80	X 72	X 72	X 68	X 61	X 61	X 56	X 58		
30	X 56	X 50	X 57	X 58	O 56	X 63	X 71	X 73	X 77	X 83	C	C	C	C	C	X 68	X 70	X 71	X 66	X 58	X 61	X 63	X 65	X 62		
31	X 63	X 66	X 69	X 73	X 82	X 92	X 98	X 107	X 102	X 100	X 107	X 93	X 95	X 90	X 80	X 72	X 69	X 69	X 69	X 68	X 69	X 66	X 57	X 56		
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	28	27	25	30	29	25	24	25	23	26	26	28	30	29	30	31	29	30	31	31	31	30	28	30		
MED	56	57	61	61	64	67	71	73	77	80	80	77	75	73	70	70	68	65	61	60	58	60	54	55		
U Q	62	62	66	68	70	78	85	88	89	94	91	86	81	80	77	76	71	70	67	65	63	63	60	60		
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		
	52	52	57	55	56	63	66	68	66	68	68	64	60	62	66	64	63	60	57	54	56	55	52	51		

DEC. 2023 f<sub>XI</sub> (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 2023 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	60	62	64	70	F	B	A		A	F	R				R		A					A	A	40				
2	37		A	A	A	A		F	A	A	A		46	44	46	46	48	45	49	49	48	49	48	46	48			
3	49	51	46	46	50	57	58	F	62	69	69	71	70	69	64	62	61	62	62	59	62	61	58	39	45			
4	47	50		V	F	F	F	F	52	58	62	62	62	62	61	60	63	57	58	55	54	54	47	49	42			
5		R		Z	Z	A		F	A		45	56	55	56	64	63	68	67	F	54	53	51	43	51	48	42		
6	42		A		45	51	52	55	59	60	R	F	R		Z		64	58	51	42	46	44	R	48	40			
7	46	F			47	52	F	F			Z						58	57	59	52	53	51	48	46	42			
8	38		A	A	50	61	68	77	78	80	78	78	73	68	64	61	59	59	56	55	50	42	42	45				
9	42	46	F		64	73	77	79	82	85	80	77	75	68	65	62	61	59	58	57	52	50	46	48				
10	52	52	60	67	66	57	55	66	68	Z	Z	F											F	41	46			
11	50	51	56	60	73	83	85	F	F	F														53	55			
12	48	46	51	55	64	74	75	F	F	F	68	71	75	72	68	71	69	64	54	47	51	45	60	A	J	R	48	
13	45	F	J	R	Z		70	F	J	R	48	75	62	56	59	62	64	65	F	67	62	54	40	51	45	48	45	
14	44	F		F	F	A		A	R		A	F			A			J	R			R	F	43	40			
15	44	44	F	56	52	48		A	J	R	47	54	55	51	52	52	54	R	55	55	50	52	44	50	46	A	A	
16		A	R		47	45		A	A	A	A		54	55	53	58	55	57	58	56	55	54	51	52	46	47	F	
17		A	56	F	56	R	J	R	R	A	A	A		46	44	63	59	R	44	A		40	41	43		43	44	
18	F	F	F	F	54	62	60	58	62	68	60	R	F		R		J	R	R			40	41	43		43	F	
19	46		A		49	F	A	A	A		R	48	52	53	54	56	54	54	57	53	54	54	51	52	48	48		
20	51	46		R	48	R	R	A	A	F	Z	F										R		55	55	47	50	V
21	F	48	51	Z	48	48	57	65	69	V	V	75	76	74	70	72	77	79	71	67	60	54	52	52	49	46	50	
22	52	53	51	F	58	58	66	J	R			74	74	72	69		A	J	R			60	54	52	52	49	46	50
23	48	49	F	F	58	68	83	90	98	105	101	99	90	78	76	70	65	61	56	58	58	57	57	54	58			
24	J	R	F	F	62	57	55		A	A			60	60	58	63	65	68	66	58	58	52	55	55	55	55		
25	53	53	53	54	62	56	61	67	F	F			73	75	67	66	64	64	63	62	61	57	60	54	57			
26	F	48	55	60	61	F	Z	Z	Z	86	88	86	83	82	78	73	72	69	66	61	60	54	56	56	54			
27	49	58	57	64	51	54	57	65	66	74	79	78	77	74	73	71	62	A	64	62	59	60	60	60	60	58		
28	57	55	F	J	R	66	70	J	R	F	88	88	88	86	86	80	76	72		67	62	59	57	58	60	59		
29	61	66	74	83	V	F	F	F	F	F	91	94	96	91	83	79	76	74	66	66	62	55	55	50	52			
30	50	44	51	F	R	57	65	67	71	77		C	C	C	C		62	64	65	60	52	55	57	59	56			
31	57	60	63	67	76	86	92	Z	V	F		J	R	F			66	63	63	63	62	63	F	49	51	50		
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT	28	27	25	29	29	24	23	25	23	27	26	28	30	29	30	31	29	30	31	31	31	29	28	30				
MED	48	51	52	54	54	59	65	66	71	74	72	70	68	66	64	64	62	59	55	54	52	52	48	48				
U Q	52	55	59	59	63	66	75	78	78	83	85	78	75	74	71	69	65	64	61	59	56	56	54	54				
L Q	44	46	48	48	50	56	57	F	54	60	60	60	56	54	56	60	58	57	54	51	48	50	48	46	45			

DEC. 2023 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 2023 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	28	46	31	28	27 <sup>G</sup>	66 <sup>B</sup>	45	52	44	55	55	37	35 <sup>G</sup>	42	44	53	34	39	30	32	61	52	42	
2	26	60	65	59	60	47	54	59	58	47	60	39	39	40	39	50	40 <sup>G</sup>	30	34	59	25 <sup>G</sup>	29	29	
3	36	30	32	31	35	35	38	44	34 <sup>G</sup>	39	39	36 <sup>E B</sup>	36 <sup>G</sup>	36	42	36	42	42	28	26	22	35	55	
4	31	31	50	44	38	58	49	42	51	53	36	39	36 <sup>G</sup>	37	33 <sup>G</sup>	33 <sup>G</sup>	29 <sup>G</sup>	29	31	31	33	38		
5	50	68	39	21	29	64	55	60	70	42	42	38	60	56 <sup>G</sup>	36	36	36	38	37	28	27	38	40	36
6	36 <sup>G</sup>	48	70	39	45	40	43	45	66	64	44	47 <sup>E B E B E B E B</sup>	40	38	36	33	33 <sup>G</sup>	40	28	36	25 <sup>G</sup>	21	21	
7	22	39	37 <sup>G</sup>	68	81	30 <sup>G</sup>	46	48	51	38	35	36	32	34	51	35	41	42	32	22 <sup>G</sup>	31	35		
8	56	56	54	56	36	28 <sup>G</sup>	31	31	36	38	35 <sup>G</sup>	35	37	35	44	37	32	33	33	26 <sup>G</sup>	31	27	30	36
9	46	39	32	28	34	35	42	33	36	37	39	42	45	43	34	30	30	30	26	26	28	30	22 <sup>G</sup>	
10	25	23	23	31	43	44	42	34	37	36	40	52	48	48	48	43	40	32	93	44	32	22 <sup>G</sup>	35	20 <sup>G</sup>
11	20	26	37	23	30	37	33	37	38	36	38	38	44	38	39	36	38	34	34	32	24	24	32	31
12	20	34	37	31	26	27	30	35	48	45	48	104 <sup>G</sup>	36	58	38	36	31	42	32	43	58	52	44	
13	42	45	24	36	32	26	33	33	41	38	37	34	36	42	92	36	32	31	29	32	38	39	42	37
14	39	57	66	35	50	57	56	40	70	43	48	52	48	80	44	80	38	39	85	32	36 <sup>G</sup>	45	40	38
15	42	42	35	75	63	62	53	50	53	42	40	40	49	47 <sup>E B</sup>	47 <sup>G</sup>	42	30	30	44	40	89	71		
16	53	34	25	33	120	58	45	112	62	121	116	125	116	36	38	38	32	32	30	26	25	23	29	
17	52 <sup>G</sup>	52	34	30	81	94	95	129	120	71	131	110	72	40	71	78	60	35	30	41	54	43	39	
18	36	36	24	34	34	32	31	34	35	37	41	40	44	41	36	40	36	38	38	31	37	36	56	42
19	48	40	57	34	48	66	70	116	55	71	43	37	39	41	36 <sup>G</sup>	41 <sup>G</sup>	37	36	32	32	27	23	40	37
20	34	51	52	134	122	117	117	114	61	118	37	40	39	37	38	38	32	40	35	30	36			
21	36	31	32	112	44	32	33	39	41	41	42	42	45	38	54	45	36	32	32	29	34	36	28	
22	44	36	30	29	37	44	44	39	39	40	43	41	41	85	63	102	70	32	30	33	22	26	26	
23	38	36	24	43	39	36	34	38	34	30	56 <sup>E B E B</sup>	41	43	40	36	34	38	33	32	44 <sup>E B E B</sup>	28	72	39	
24	37	40	38	25	49	40	58	69	60	60	62	39	44	43	110	110	37	35	35	32	71	48	71	
25	40	30	35	35	30	31 <sup>G</sup>	41	43	38	40	37	96	37	34	36	34	36	36	33	30	43	30	30	32
26	26	24	26	33	32	26 <sup>G</sup>	31	34	39	35	38	39	41	41	47	38	51	36	34	32	26	24	20	21
27	42	22	32	35	43	44	50	39	37	35	37	37	42	40	39	39	35	32	32	47	35	33	31	
28	20 <sup>G</sup>	21	31	34	31	30	30	34	37	38	44	58	44	42	52	61	149	55	39	80	28	23	23	21
29	21	20	31	44	30	31	35	42	34	36	40	44	40	36	46	35	37	32	114	36	28	42	30	20
30	32	41	38	39	33	29	30	37	43	40	44	40	36	46	46	46	38	50	39	70	47	43	42	
31	80	20	28	32	40	41	97	44	50	46	46	64	52	66	48	61	34	49	41	44	43	24 <sup>G</sup>	31 <sup>G</sup>	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	31	31	31	31	31	30	31	31	31	31	30	30	30	30	30	31	31	31	31	31	31	31	31	31
MED	36	36	34	34	38	38	43	42	43	40	41	41	42	39	36	36	34	32	32	30	33	36		
U Q	44	46	39	44	49	57	55	50	58	47	46	52	45	44	48	46	41	39	40	33	43	40	43	42
L Q	26	30	30	31	32	31	33	34	37	37	37	38	37	36	36	36	36	32	30	28	24	30	28	

DEC. 2023 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 2023 fmin (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

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

$\frac{H}{D}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	12	8	8	8	8	B	14	14	12	12	15	11	16	10	12	13	15	10	11	11	11	12	7	8
2	8	8	12	6	7	6	8	12	12	9	11	14	12	13	13	8	10	17	16	14	7	8	8	7
3	9	8	6	5	8	10	6	8	8	8	11	36	18	20	12	12	14	13	9	10	17	7	5	6
4	7	6	14	15	11	7	9	11	11	12	11	9	25	23	12	14	10	10	16	22	11	9	6	6
5	6	7	7	8	7	14	12	7	15	10	17	16	15	10	18	10	8	22	9	14	6	8	10	14
6	21	12	12	12	12	15	14	16	15	15	16	47	40	38	36	17	16	20	8	11	6	9	7	12
7	10	9	16	10	52	13	12	11	10	11	8	6	12	12	11	12	10	10	16	11	8	6	8	11
8	9	15	15	11	8	11	8	8	8	10	14	15	15	26	16	14	12	11	8	7	7	9	9	12
9	16	12	8	9	8	8	6	7	7	9	12	12	13	15	15	15	13	13	11	10	8	10	10	10
10	6	9	8	9	10	13	10	10	10	10	12	12	9	16	15	14	11	9	7	11	7	6	9	12
11	8	8	12	9	7	7	8	8	18	14	10	8	9	9	8	8	8	8	7	8	8	8	10	6
12	6	8	9	10	8	7	8	10	11	13	14	17	14	13	12	10	11	10	15	11	9	7	6	6
13	7	6	7	6	8	8	12	8	9	11	15	9	11	15	12	16	20	10	11	11	8	10	8	10
14	12	6	9	7	14	11	13	12	14	12	14	16	11	14	12	14	15	15	9	7	27	12	6	7
15	10	8	13	18	14	13	14	14	14	14	13	20	16	15	47	25	14	14	13	14	16	18	21	16
16	15	15	15	17	23	27	24	25	18	18	21	26	20	16	14	10	10	12	11	10	10	10	10	12
17	14	12	12	12	9	11	14	16	31	17	34	40	36	15	24	15	13	13	9	12	9	11	9	9
18	6	7	8	6	6	8	10	10	10	10	10	13	15	22	10	10	10	10	9	8	E	E	7	10
19	6	7	7	6	12	10	16	15	9	14	12	16	10	14	12	8	9	7	11	9	8	7	8	E
20	5	12	12	27	19	14	18	12	13	14	13	18	39	23	17	37	10	14	13	6	7	8	14	8
21	6	7	10	26	15	11	11	10	10	13	10	14	13	16	14	16	16	13	11	7	14	8	8	10
22	7	6	8	21	25	16	17	12	12	8	13	16	14	14	10	10	9	7	7	9	8	8	6	8
23	7	8	7	10	8	8	8	8	7	10	16	56	41	26	16	15	16	9	6	32	44	17	24	16
24	8	9	11	11	13	11	25	17	13	11	10	10	14	15	7	14	15	24	15	17	14	9	7	7
25	14	9	11	8	9	8	8	6	10	10	14	16	14	15	12	10	10	10	12	9	9	6	7	11
26	8	6	8	8	8	8	7	9	10	8	10	12	11	9	12	12	9	8	8	7	6	7	7	8
27	5	8	9	16	15	12	12	9	10	8	8	10	14	6	12	13	8	10	13	9	8	8	9	6
28	8	7	8	10	8	7	6	6	8	12	12	10	12	11	10	9	10	11	11	9	10	6	6	8
29	7	7	6	13	13	7	7	7	6	6	7	14	10	7	17	14	18	14	14	13	9	7	8	7
30	6	7	6	7	8	6	6	6	6	8	C	C	C	C	C	7	7	8	8	7	7	7	6	6
31	6	5	5	6	6	8	8	7	7	7	10	12	13	14	11	8	8	9	7	7	7	9	8	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	30	30	30	30	30	31	31	31	31	31	31	31	31	31
MED	8	8	9	10	9	10	10	10	10	11	12	14	14	15	12	13	10	10	11	10	8	8	8	8
U Q	10	9	12	13	14	13	14	12	13	13	14	17	16	16	16	15	15	14	13	12	11	10	9	11
L Q	6	7	7	7	8	8	8	8	8	9	10	11	12	12	12	10	9	9	8	8	7	7	7	7

DEC. 2023 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

## IONOSPHERIC DATA STATION SHOWA-ST.

DEC. 2023 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

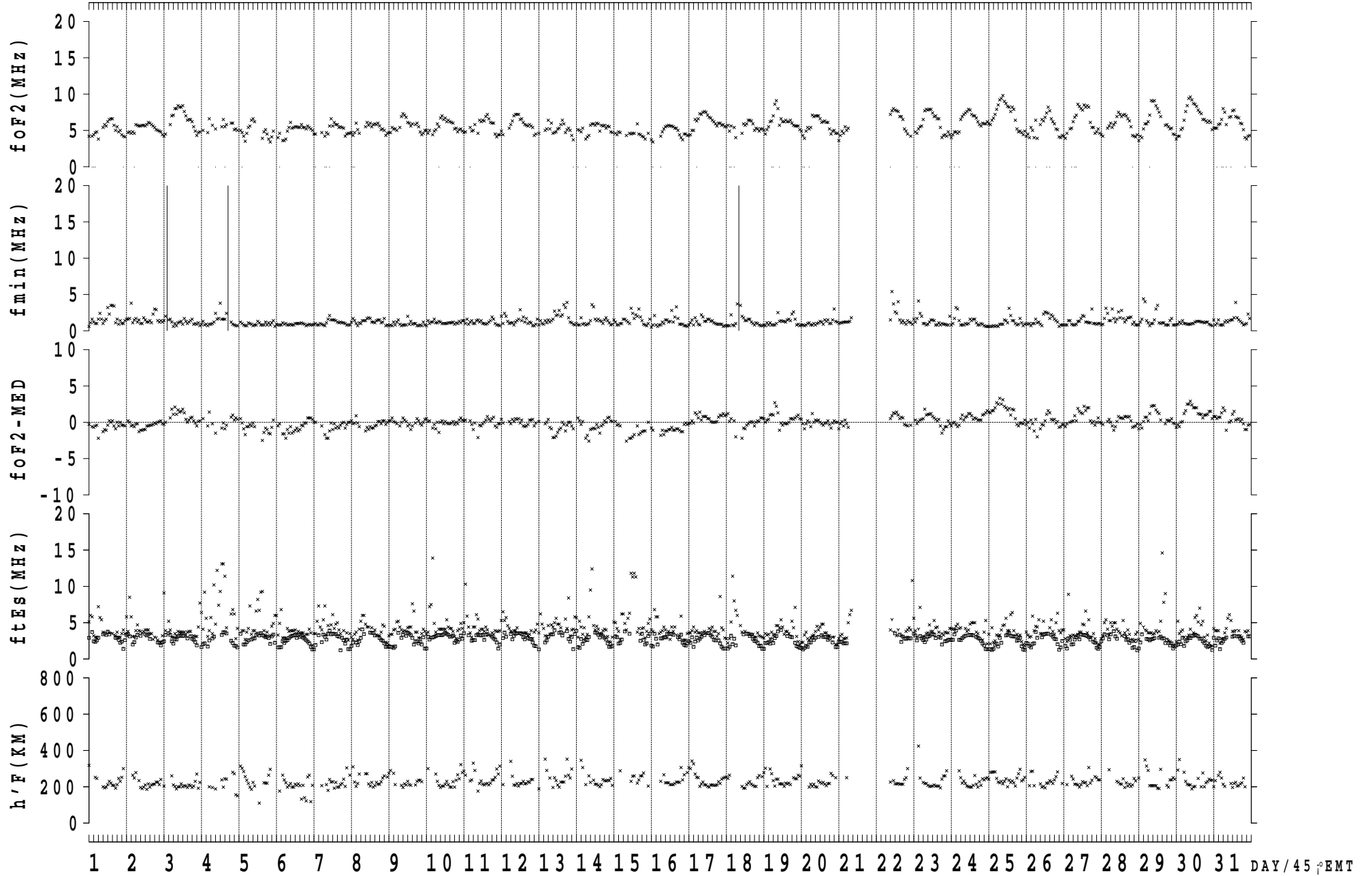
H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
1	E A	E A	E A	206	250	B	A E	A	A	A	A	A	A	E A	E A	A	A	A	204	208	A	A	A	A				
2	A	A	A	A	A	A	228	A	A	A	A	A	E A	238	230	218	212	E A	E A	E A	E A	212	244	266	268			
3	E A	E A	A	A E	282	246	212	212	200	206	198	234	248	214	212	212	212	212	230	214	E A	232	232	332	A			
4	A	A	A E	A	A	A	A	A	A	A	200	208	H	222	194	214	212	200	214	228	E A	E A	E A	E A	226			
5	A	A	A E	A E	A	A	A	A	A	A	196	242	228	A	A	A	220	220	204	E A	E A	A	E A	A				
6	A	A	A	A	A	A	A	A	A	A E	A	B	G	244	220	210	210	H	H	A	A	220	A	E A	E A			
7	A	A	A	E B	406	244	A	A E	A	276	238	198	188	H	202	202	A	202	208	210	218	216	220	238	274	262		
8	A	A	A	E A	360	254	226	202	188	200	212	204	200	212	204	202	H	214	228	218	220	218	A	224	284			
9	A	A	A	A	248	232	E A	250	206	200	190	204	194	E A	226	218	212	204	202	212	208	200	E A	E A	E A	E A		
10	A E	A	116	A	234	A	270	234	208	200	212	202	274	212	E A	234	216	218	220	242	250	234	226	282	248			
11	A E	A	268	A	256	248	234	224	212	234	206	190	194	206	198	202	208	214	204	216	216	222	236	236	246			
12	194	A	A E	A	242	244	220	220	220	256	202	190	A	H	A	206	198	222	A	A	A	A	206	A	A			
13	E A	E A	E A	E A	240	236	212	222	A	202	208	212	198	210	222	244	222	212	216	264	318	264	238	A	B			
14	A	A	A	A	A	A	A E	A	A	A	A	A	E A	A	H	274	202	228	216	240	222	252	E A	A E	A E	A		
15	A	A E	A E	A E	274	276	236	A	A	A	A	194	198	226	192	218	218	236	218	266	220	232	A	A	A			
16	A	A	196	A	A	A	A	A	A	A	A	206	198	200	210	220	204	212	218	216	216	212	238	230	244			
17	A E	A	312	214	282	A	212	A	A	A	A	A	E B	H	E A	E A	E A	A	E A	240	204	E A	A	A E	A	262		
18	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	E A	A		
19	A	A	A	A	A	A	A	A	A	A	196	206	176	H	H	200	236	208	202	H	200	202	218	218	244	244	194	A
20	272	A	A	A	A	A	A	A	A	A	218	176	184	226	214	206	214	212	214	218	248	266	242	206	274	E A		
21	A	A	A	A	A	266	224	234	212	196	194	200	200	228	A	A	204	212	212	212	218	168	264	258	200			
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23	E A	E A	A	A E	338	236	210	218	202	206	202	A	B E	B E	E A	204	216	208	224	264	E B	E B	E B	E B	E A			
24	E A	E A	E A	E A	A E	A	A	A	A	A	A	A	H	E A	E A	E A	H	228	232	232	226	248	218	266	274	A		
25	Q	A	A	E A	204	268	220	246	226	196	190	190	212	198	208	206	186	206	224	220	198	224	230	252	A			
26	E A	A	A E	A	202	246	226	216	214	200	200	202	208	H	206	200	214	E A	236	216	212	218	214	238	240	252		
27	A	A E	A E	A E	A E	A	A E	A E	A	258	214	214	206	H	210	206	214	212	206	196	228	222	E A	E A	E A	E A		
28	E A	E A	A E	A E	276	292	296	258	214	214	206	206	H	A	196	190	262	A	E A	274	210	250	196	224	238	236		
29	E A	E A	E A	E A	E A	258	218	202	200	206	206	190	198	202	194	218	206	218	214	226	226	H	206	224	262	196		
30	A	A	A	A	A E	A	248	222	206	202	190	C	C	C	C	C	H	192	208	206	222	214	E A	E A	E A	E A		
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	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
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MED	E A	E A	E A	E A	250	232	220	215	203	204	203	202	204	211	212	208	210	214	220	218	E A	234	234	246	252			
U Q	276	288	274	279	282	254	226	234	217	213	210	211	227	218	220	218	218	235	232	248	260	245	266	272	A	A		
L Q	232	259	224	231	244	226	212	212	200	196	198	196	200	202	206	204	205	212	216	216	214	229	235	240	A	A		

DEC. 2023 h'F (KM)

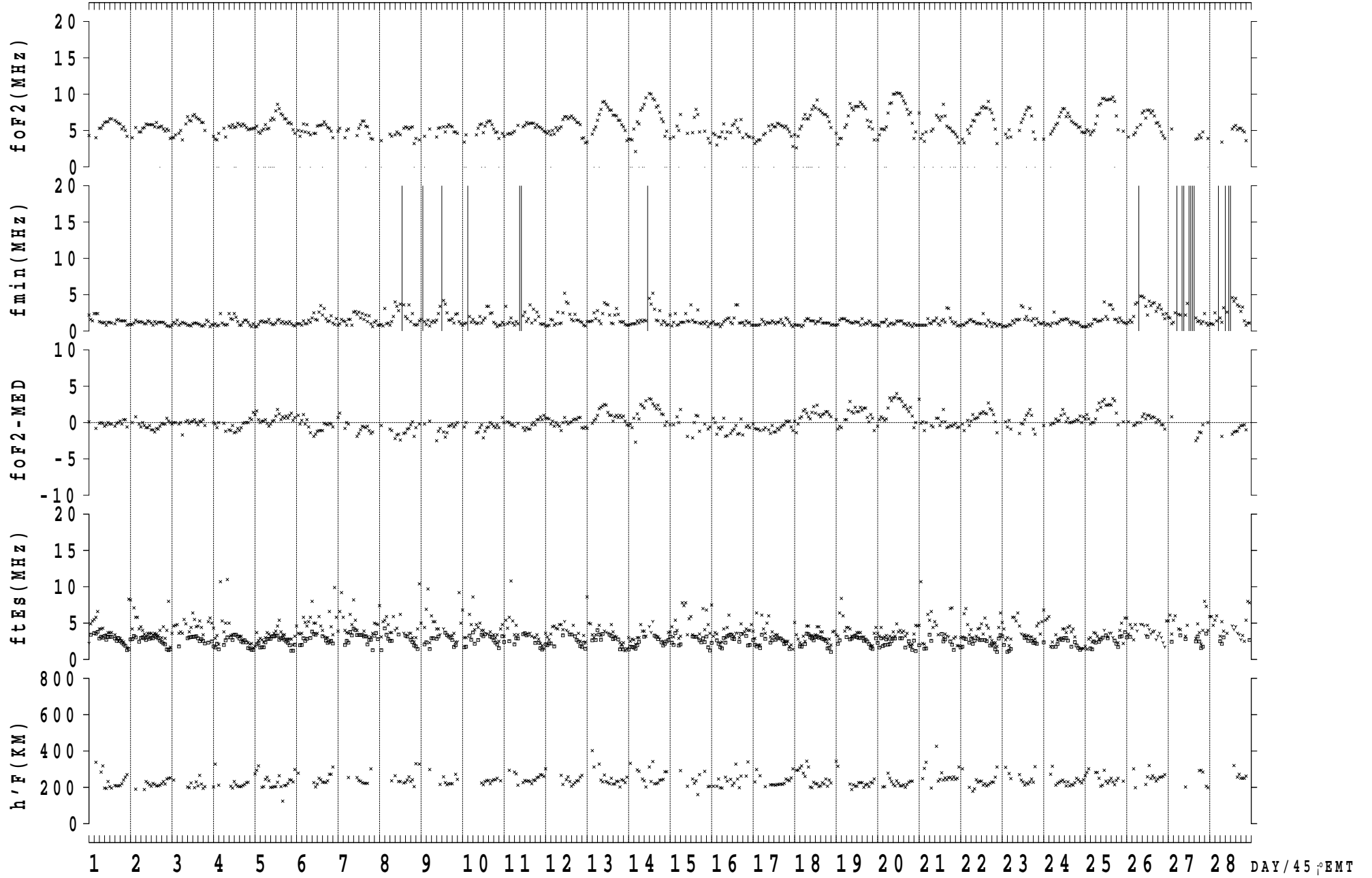
NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN



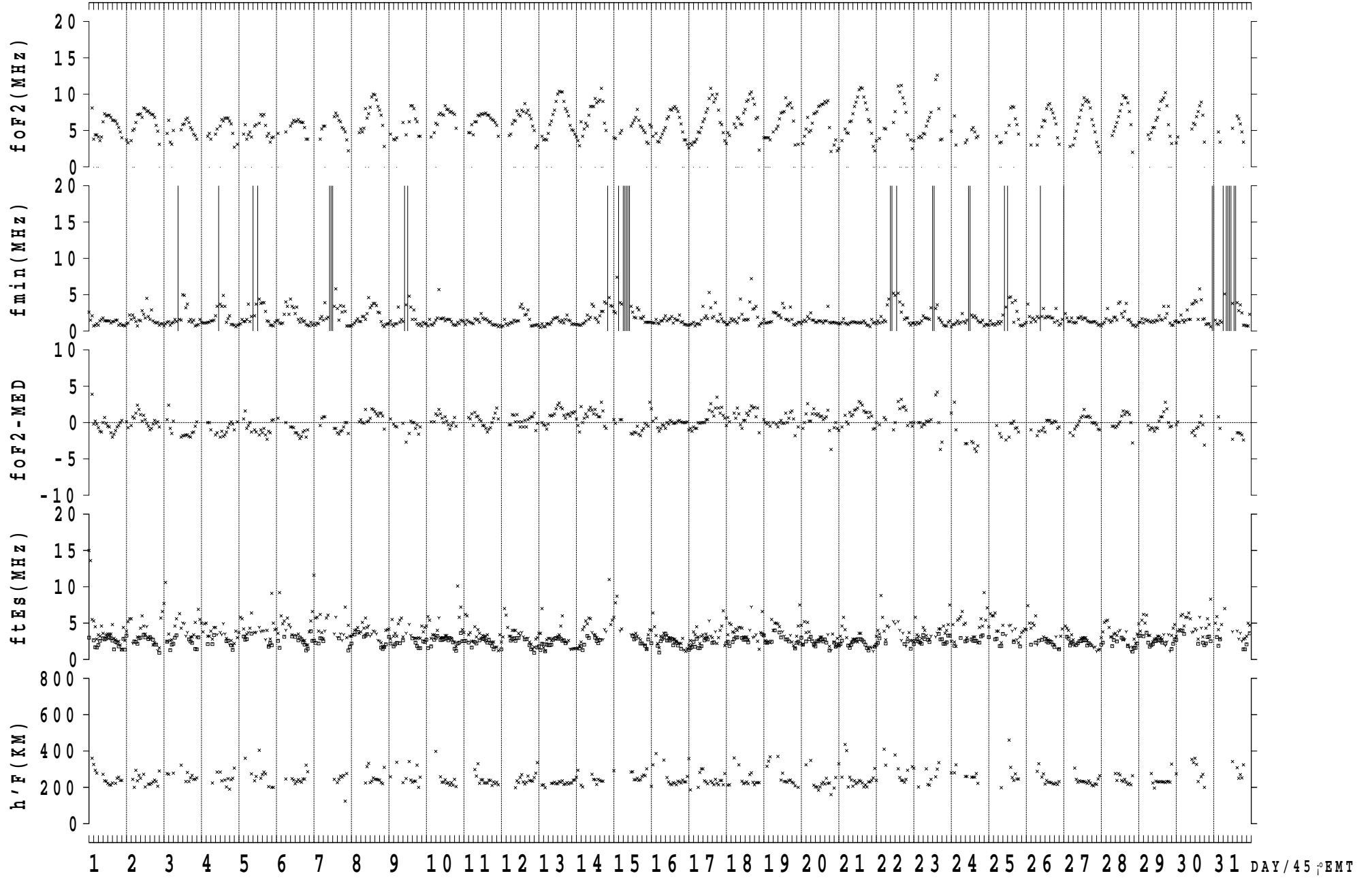
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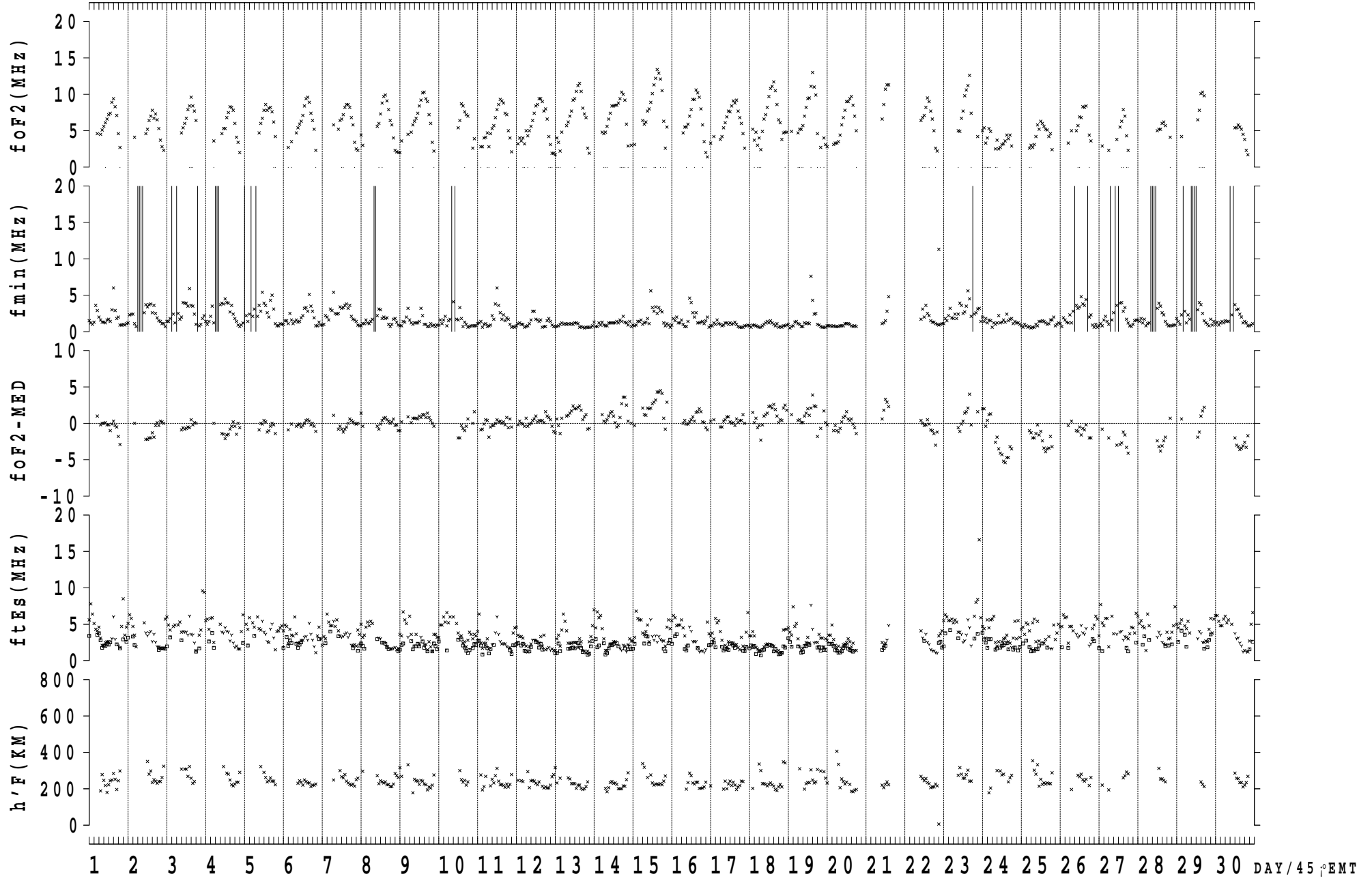
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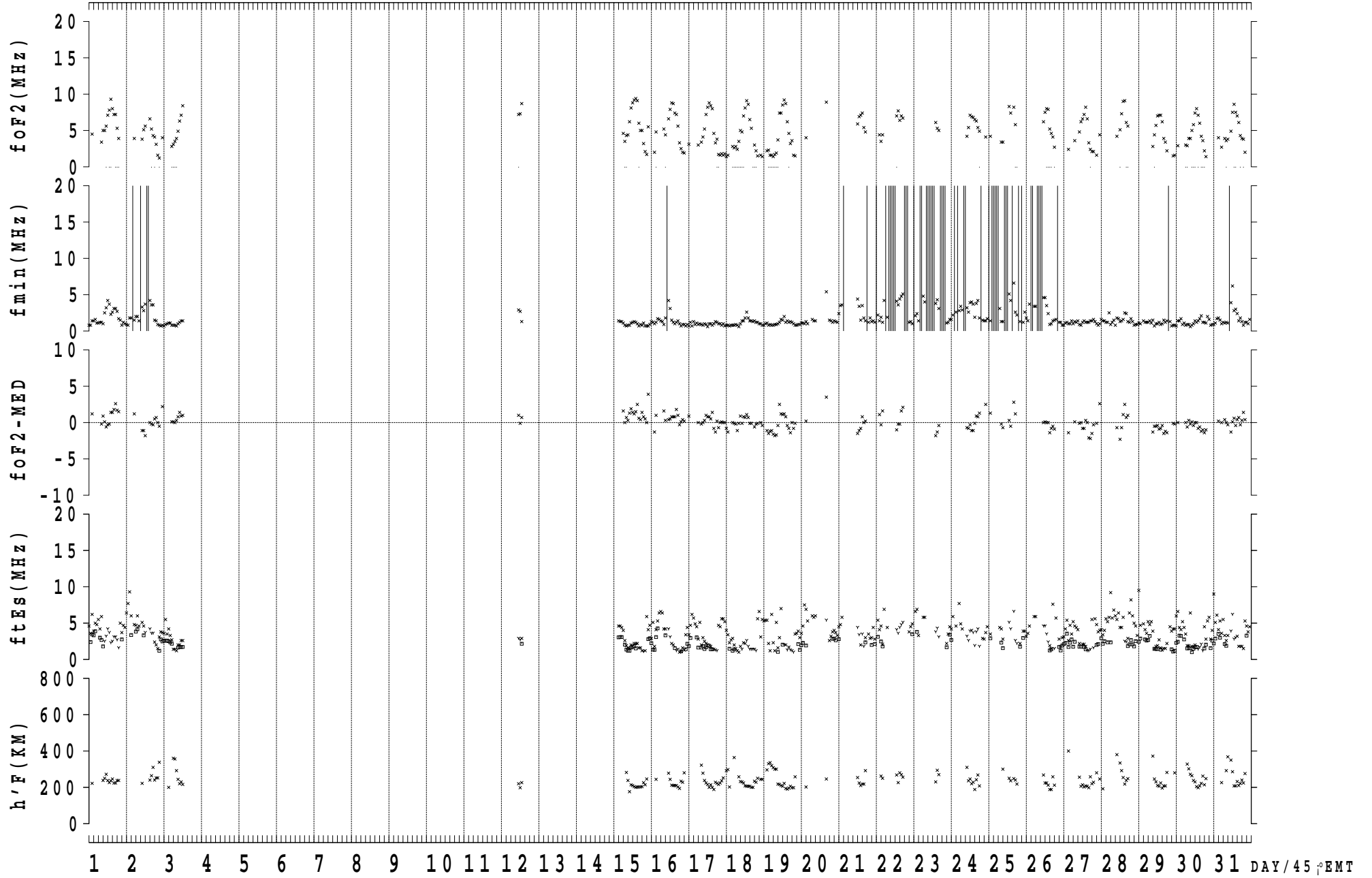
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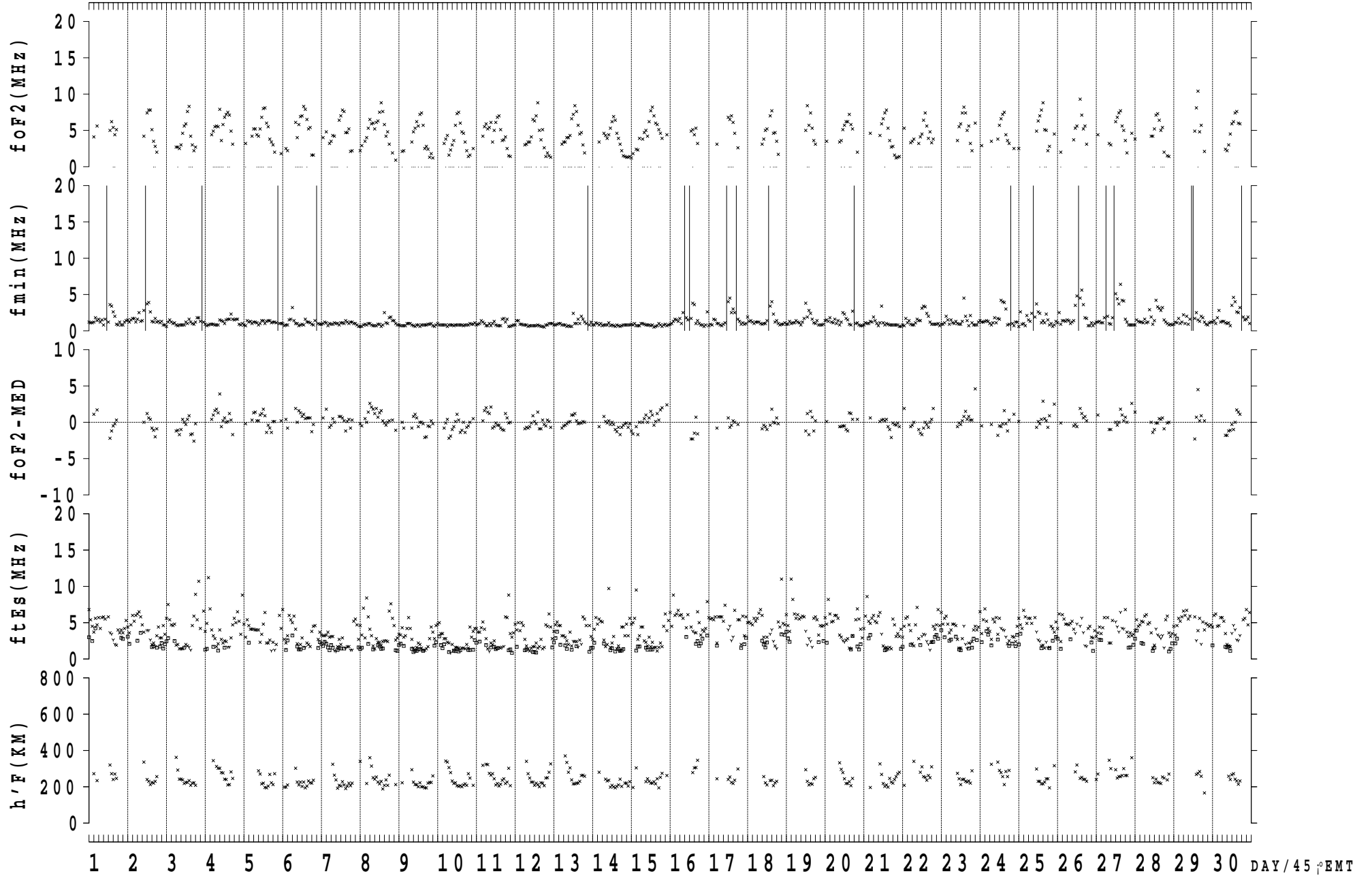
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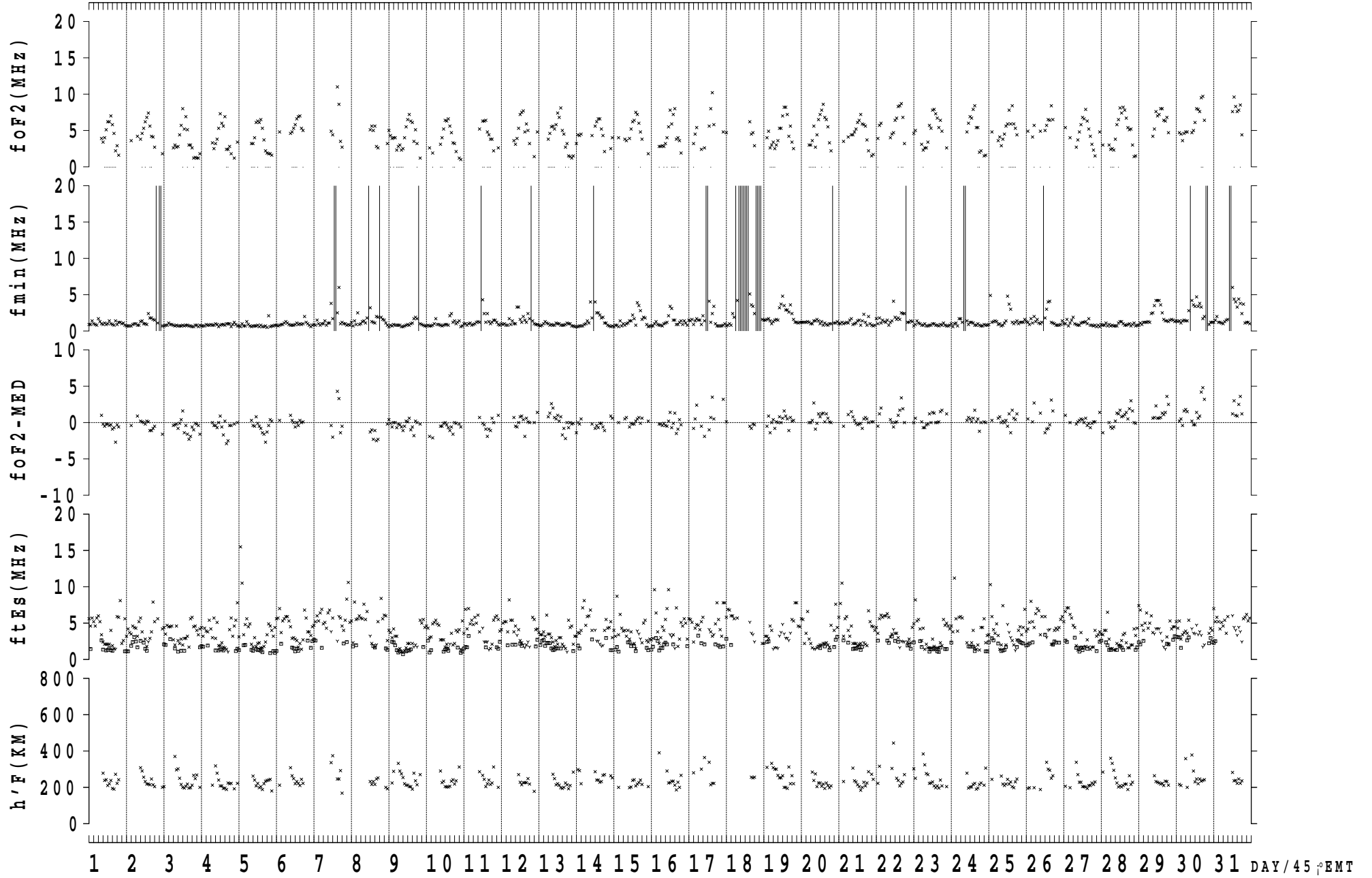
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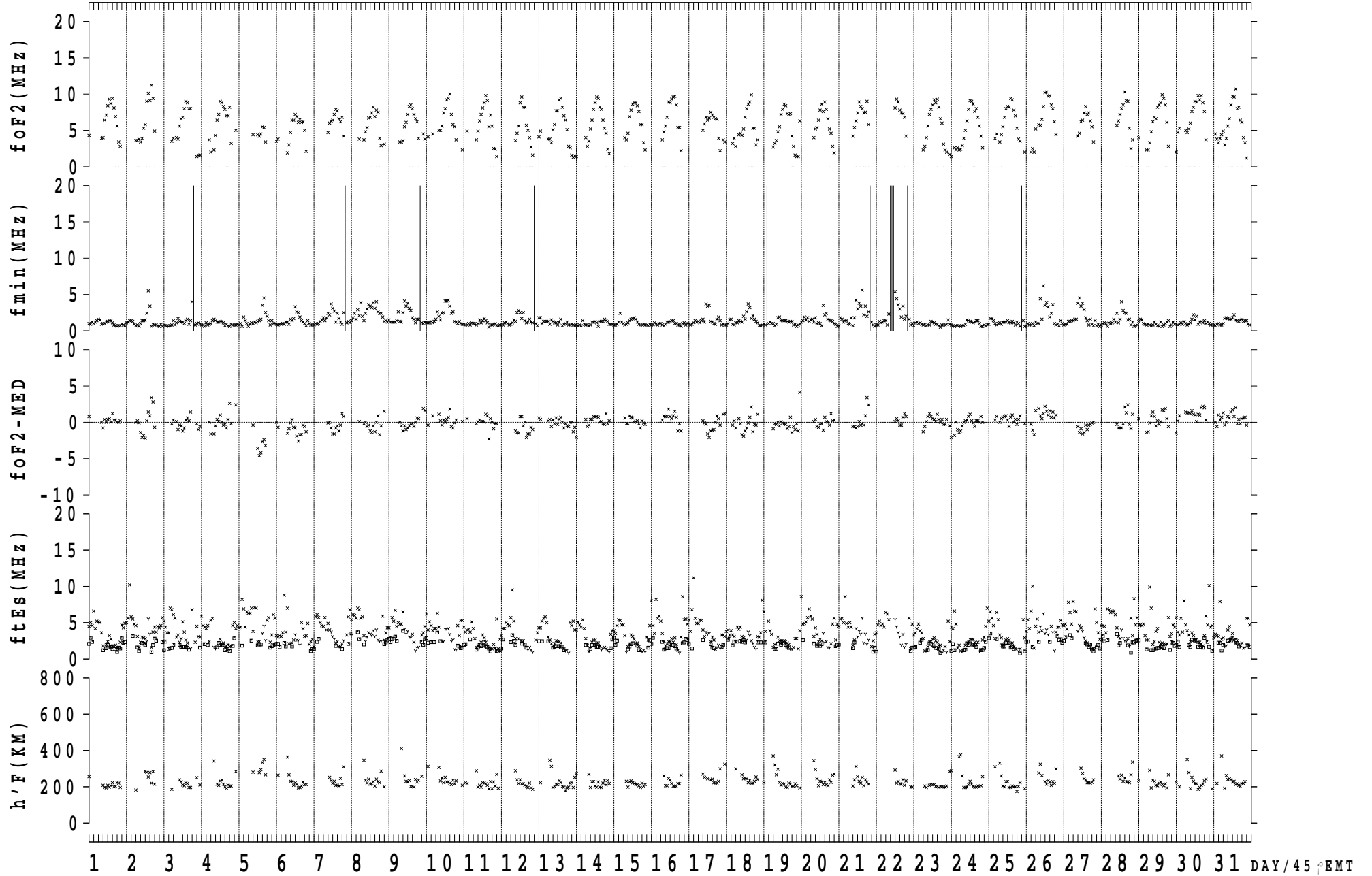
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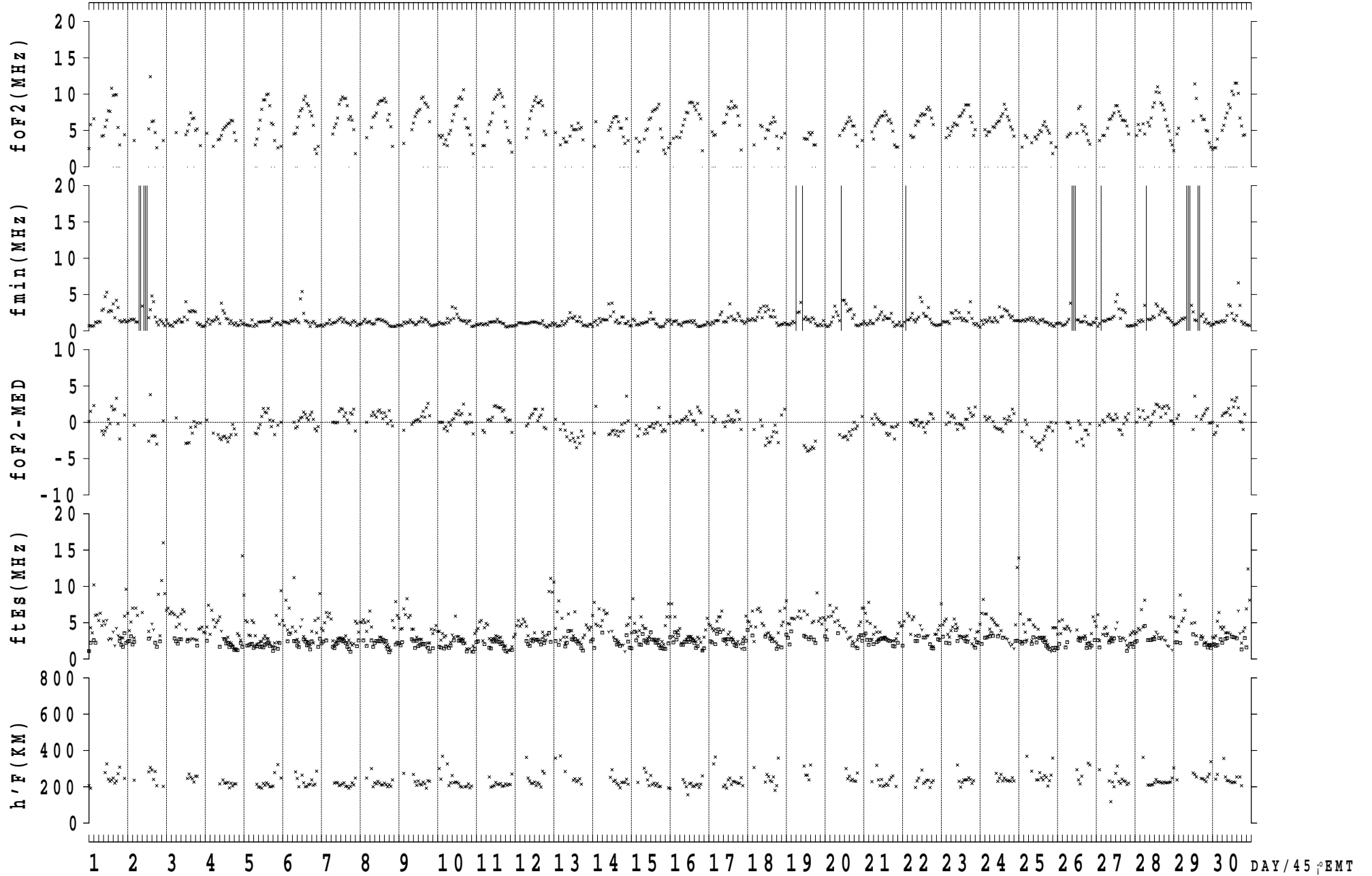


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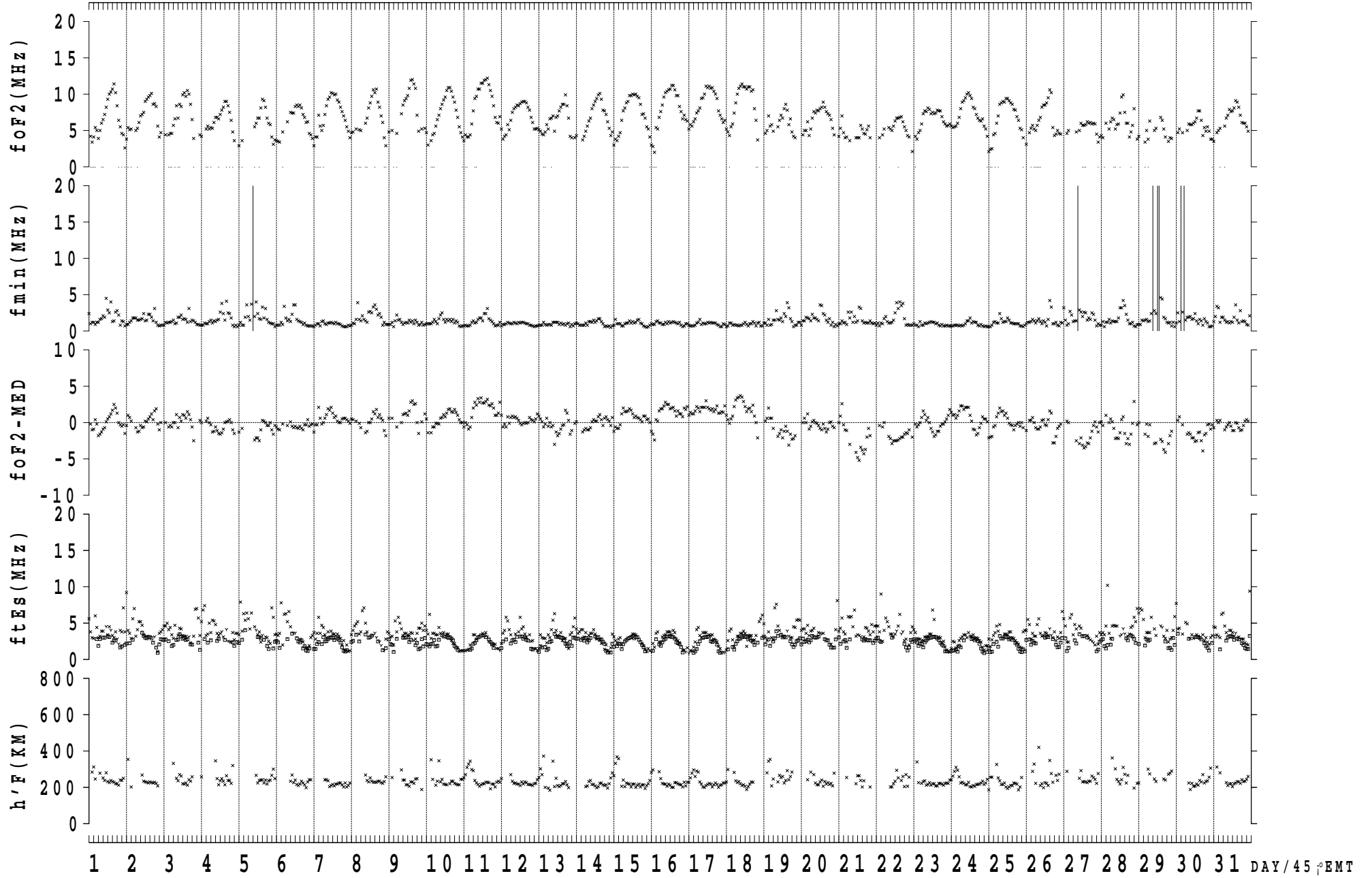




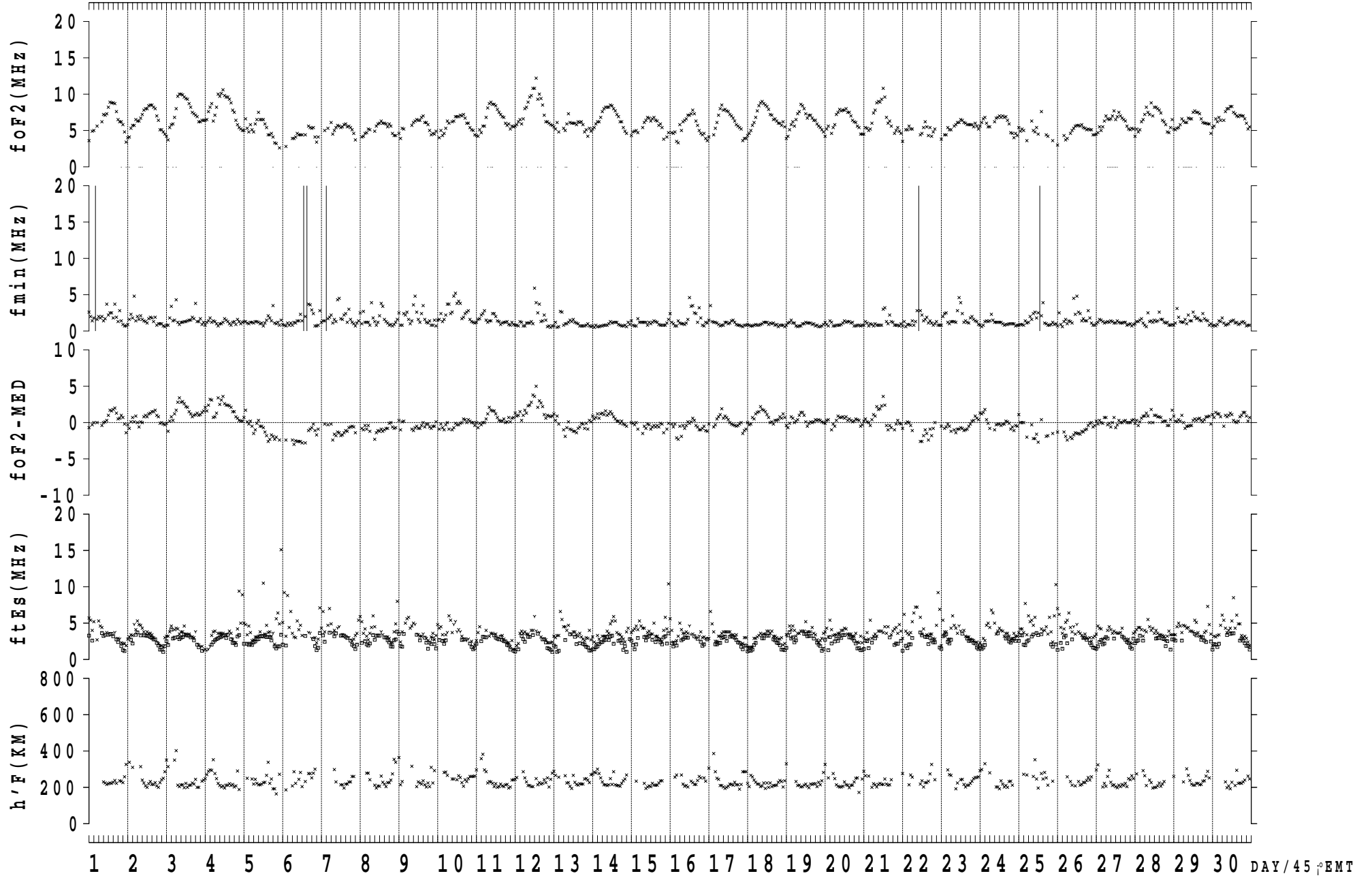
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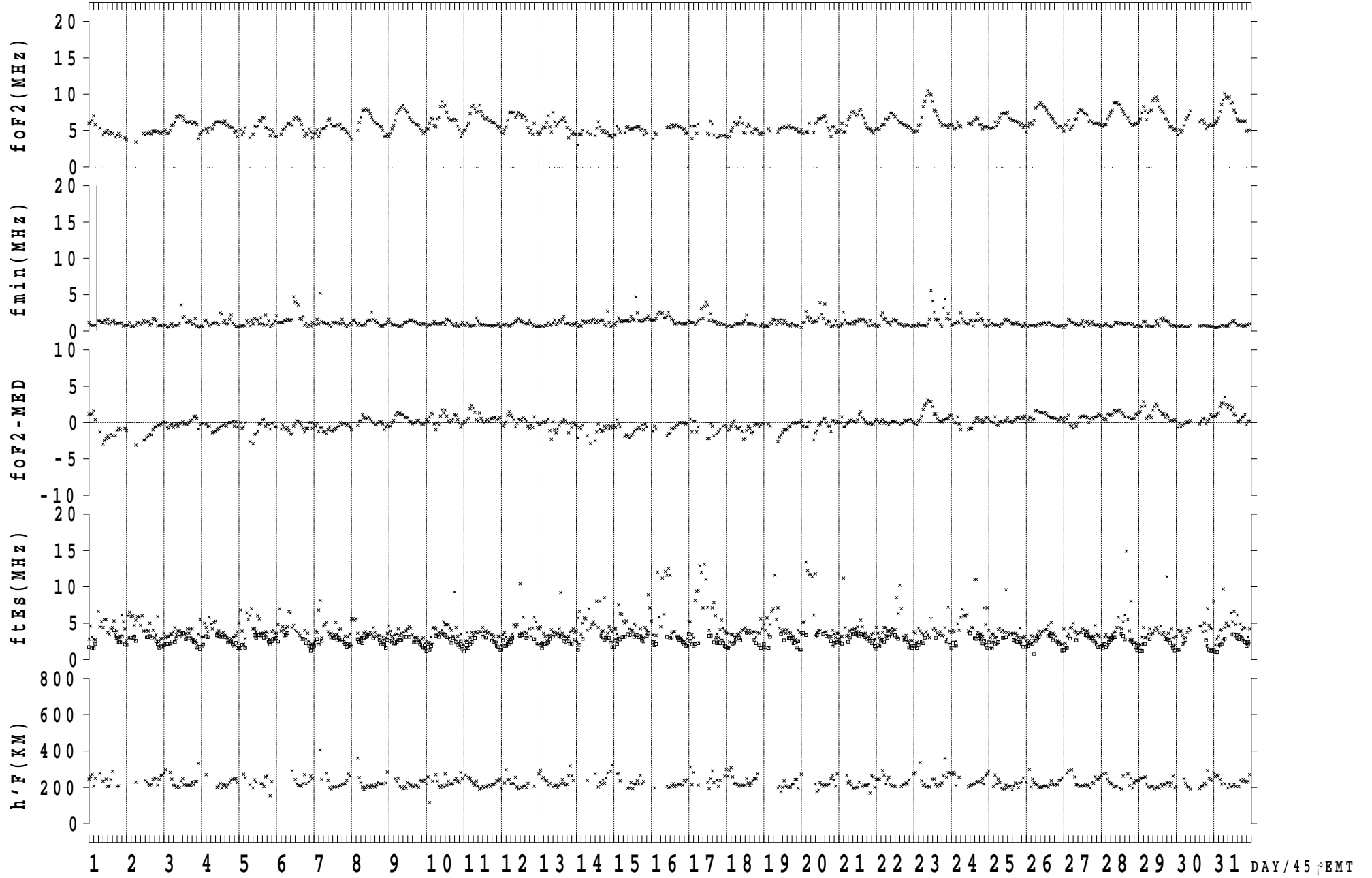
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2023 1101 -> 2023 1130(99) SYOWA-ST.



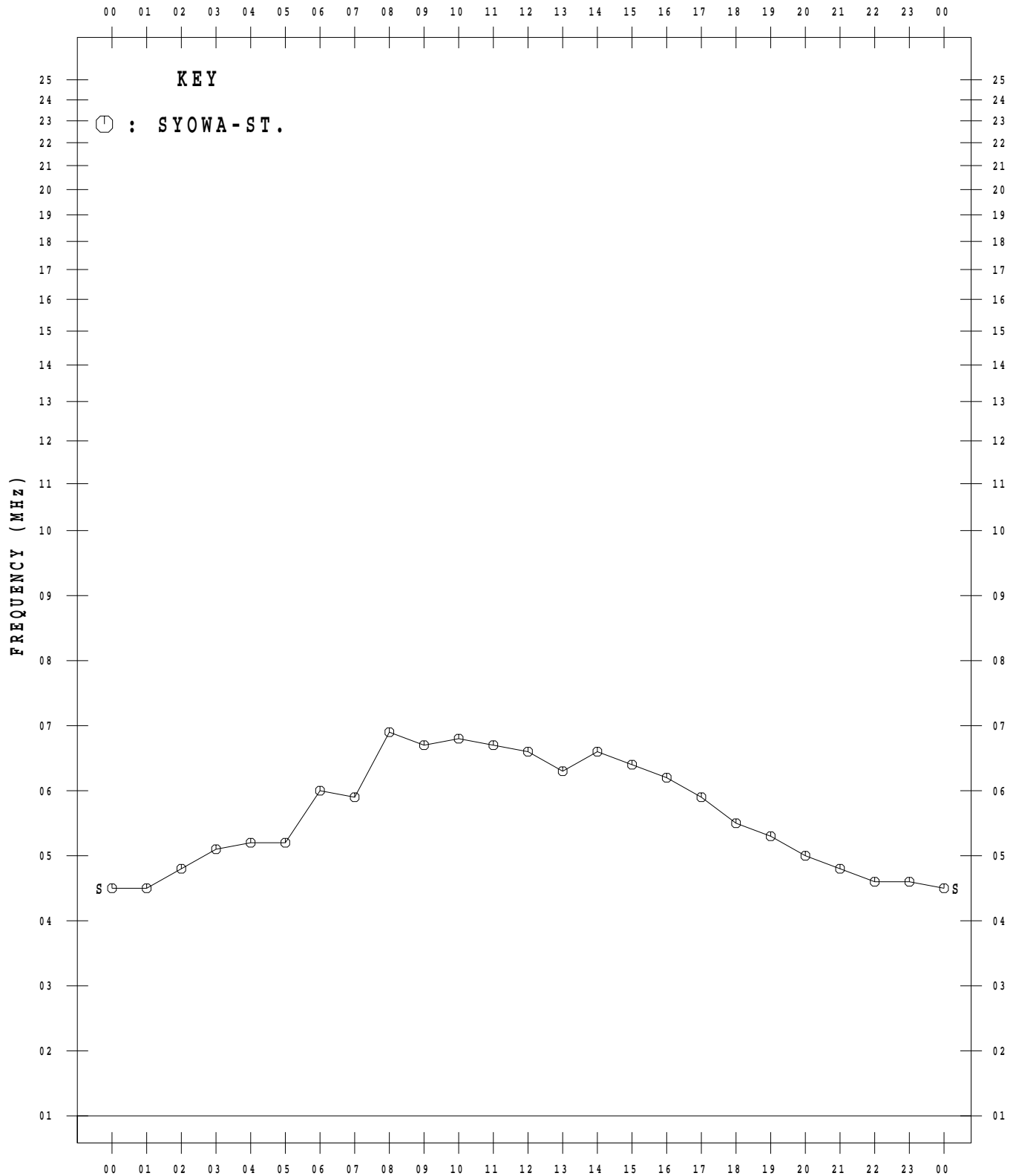
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# MONTHLY MEDIAN VALUES OF f<sub>o</sub>F<sub>2</sub>

45°E MEAN TIME

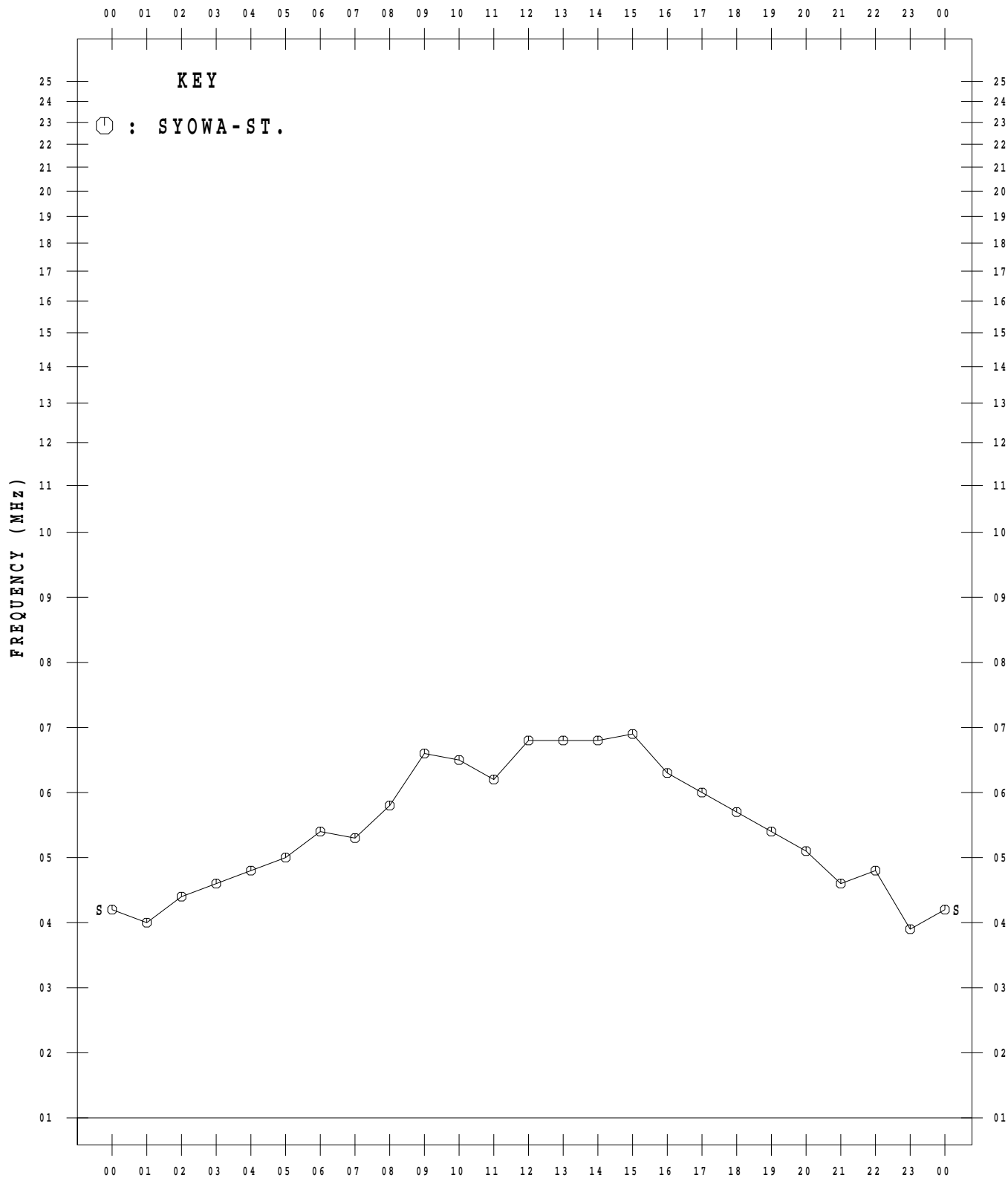
JAN. 2023



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

45°E MEAN TIME

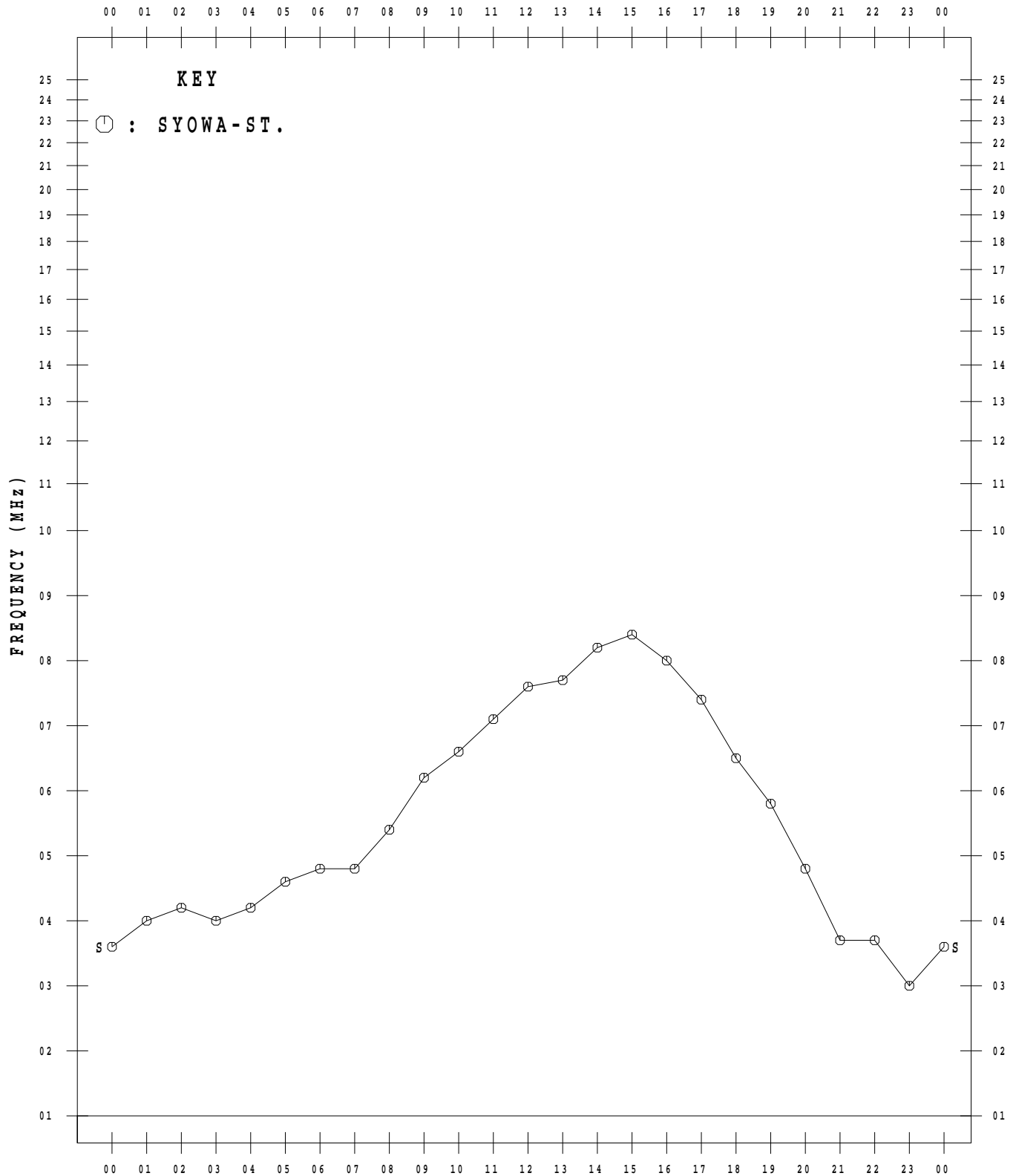
FEB. 2023



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

45°E MEAN TIME

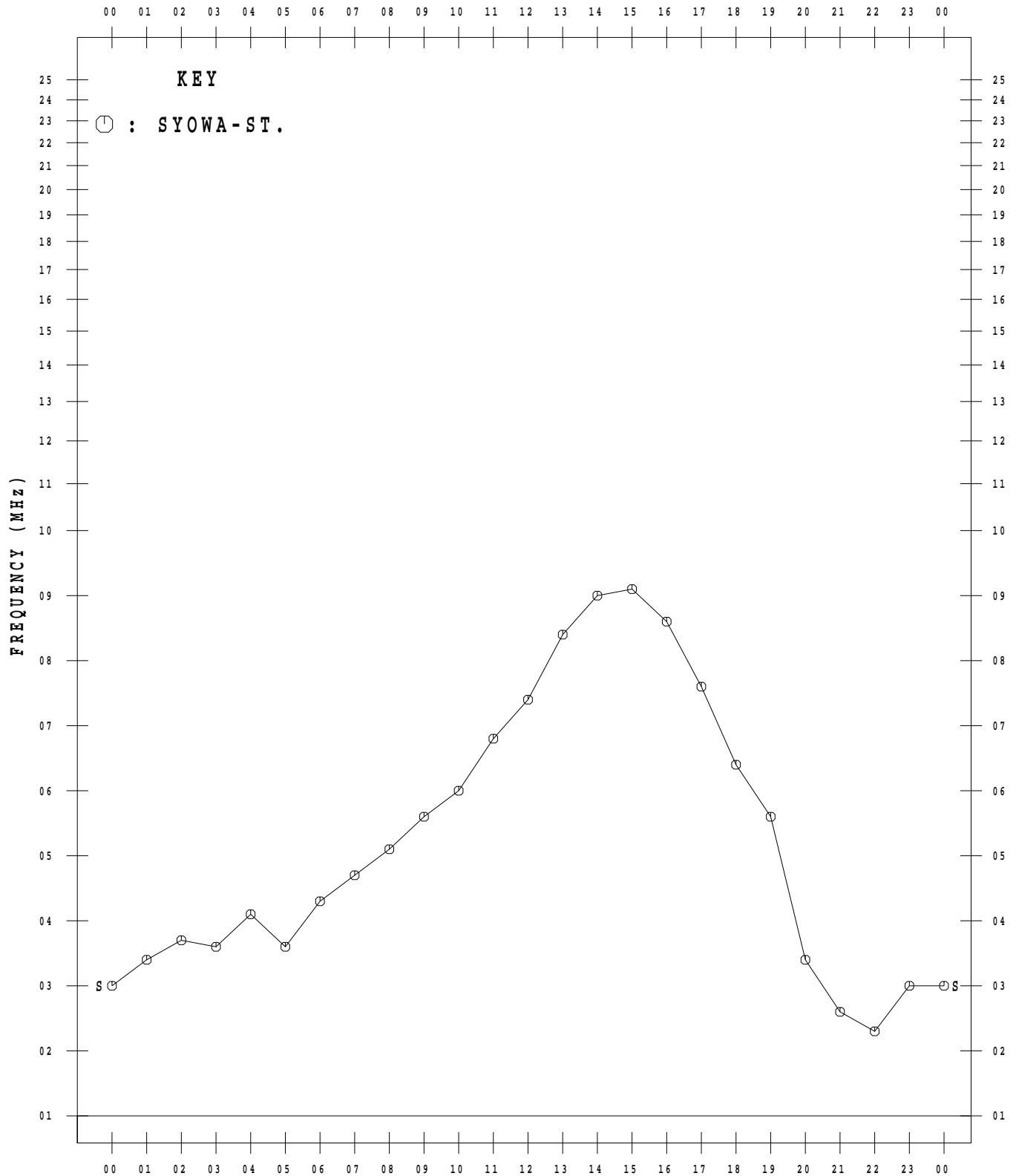
MAR. 2023



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

45°E MEAN TIME

APR. 2023

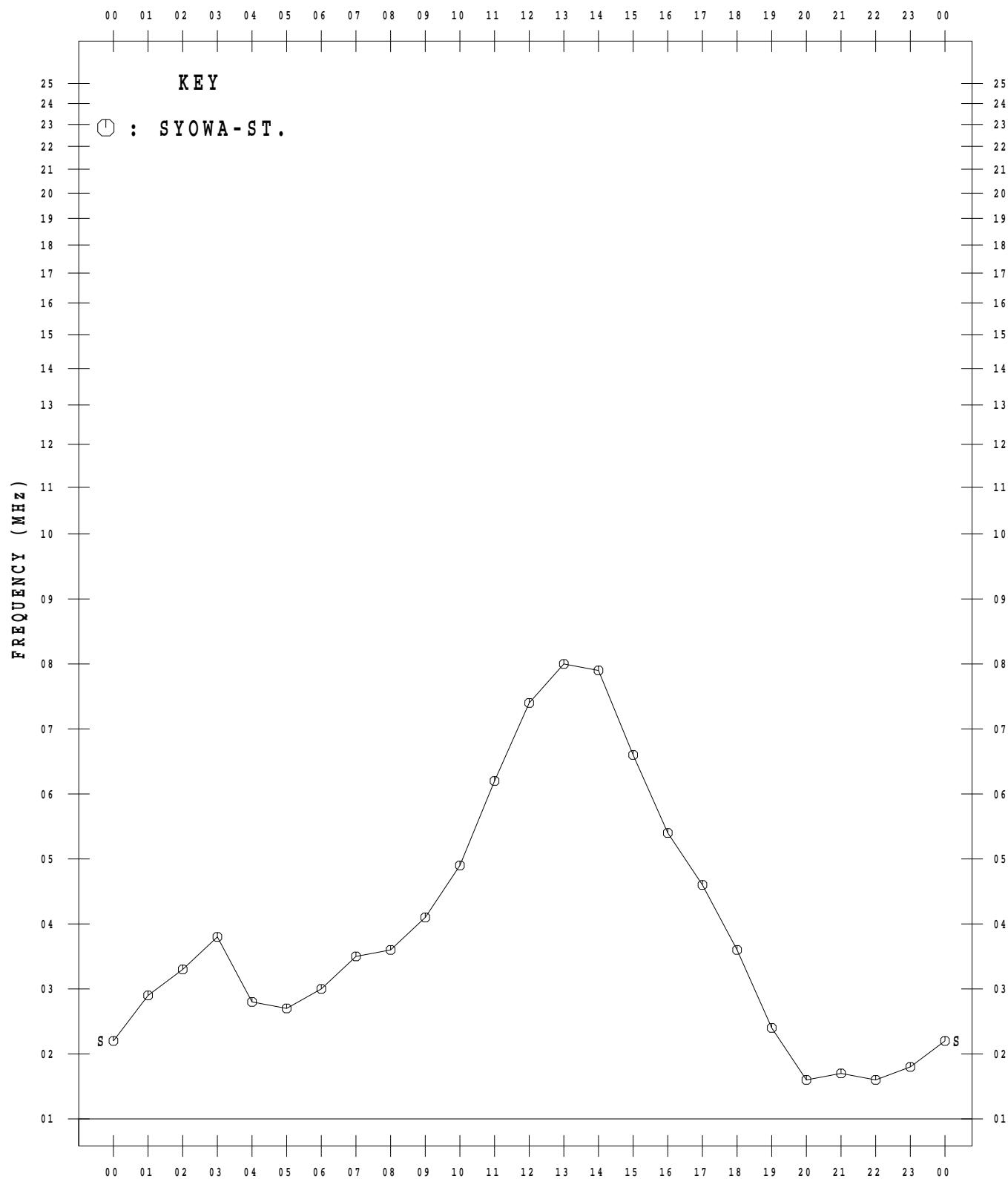




# MONTHLY MEDIAN VALUES OF f<sub>o</sub>F<sub>2</sub>

45°E MEAN TIME

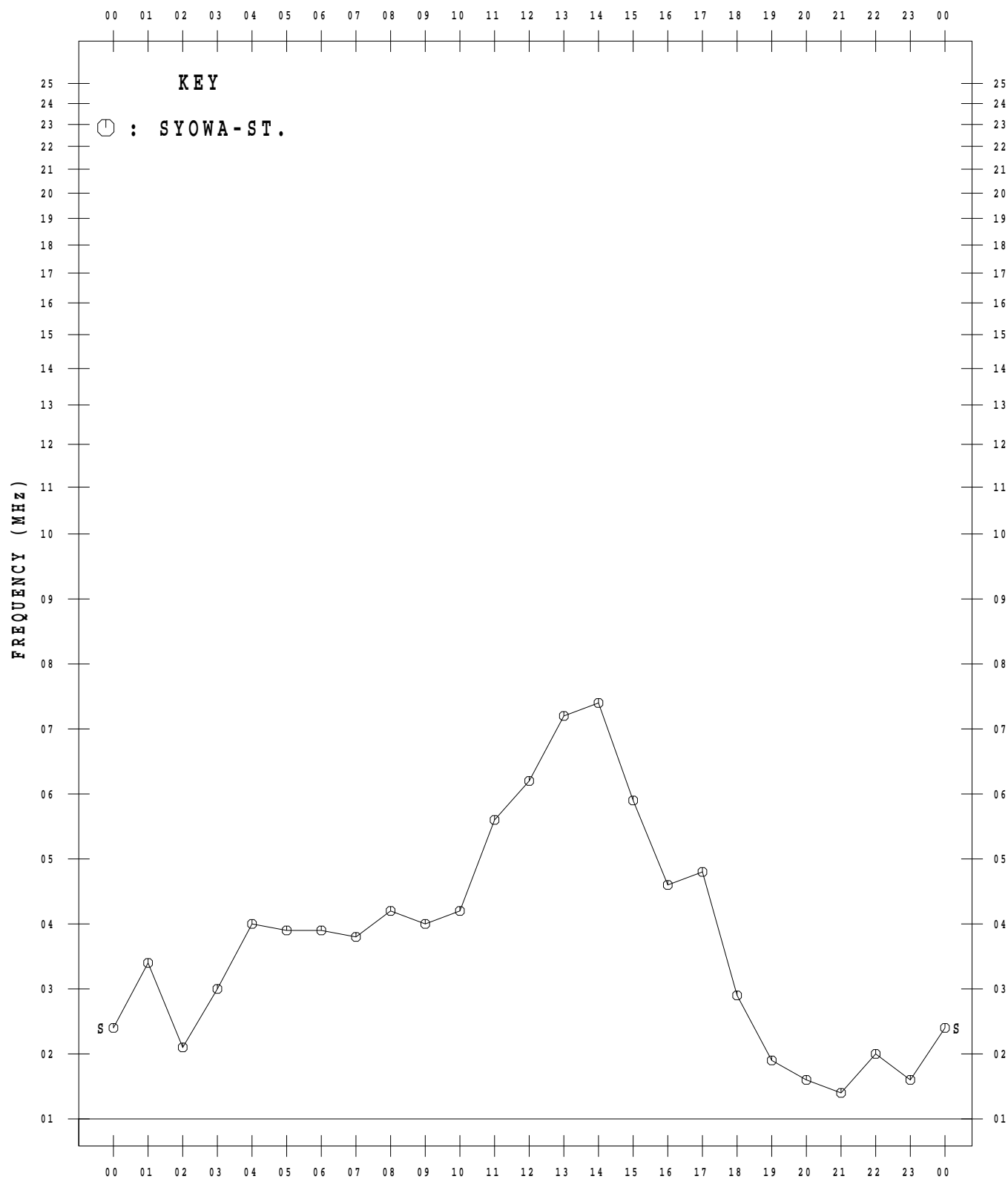
MAY 2023



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

45°E MEAN TIME

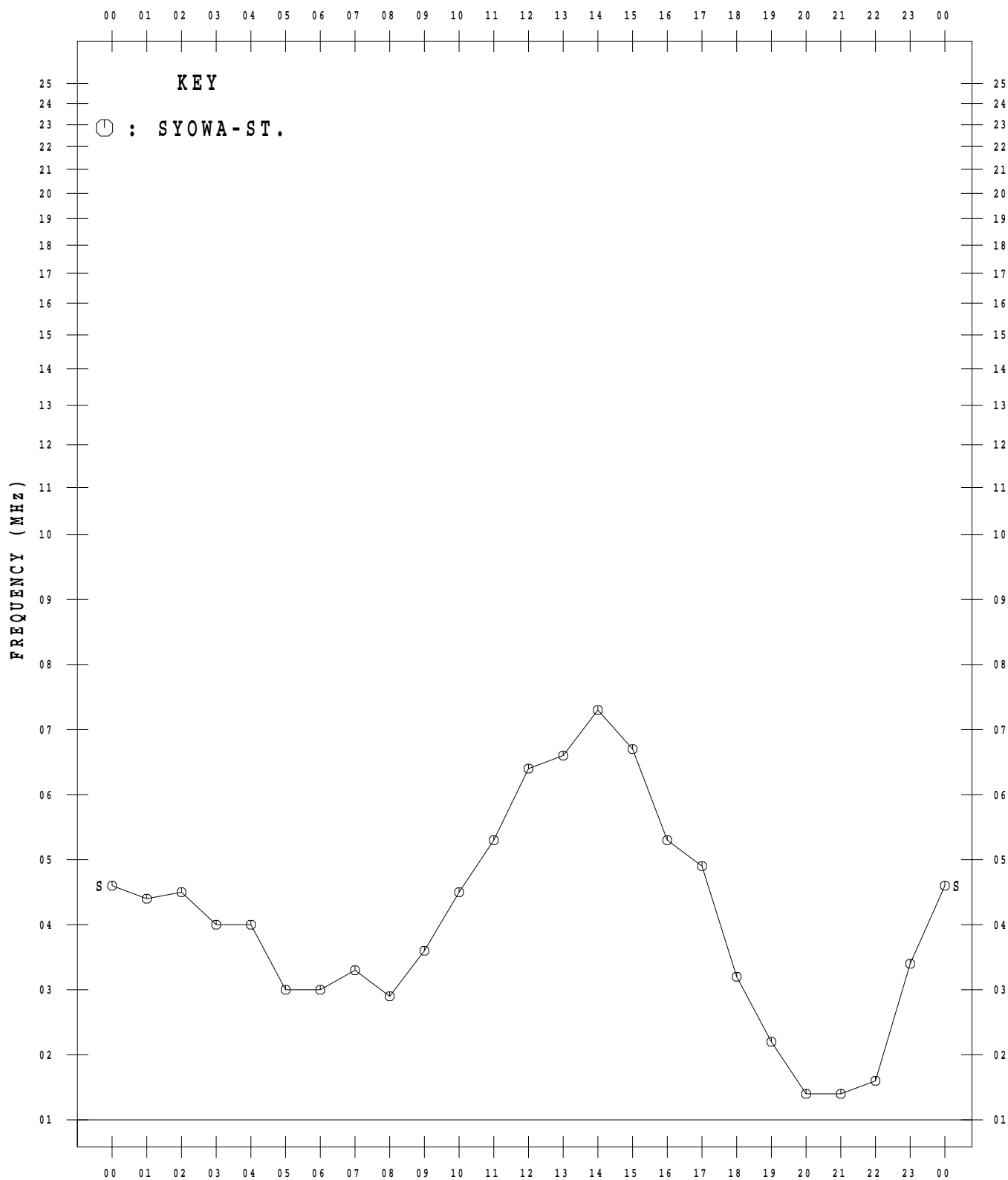
JUN. 2023



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

45°E MEAN TIME

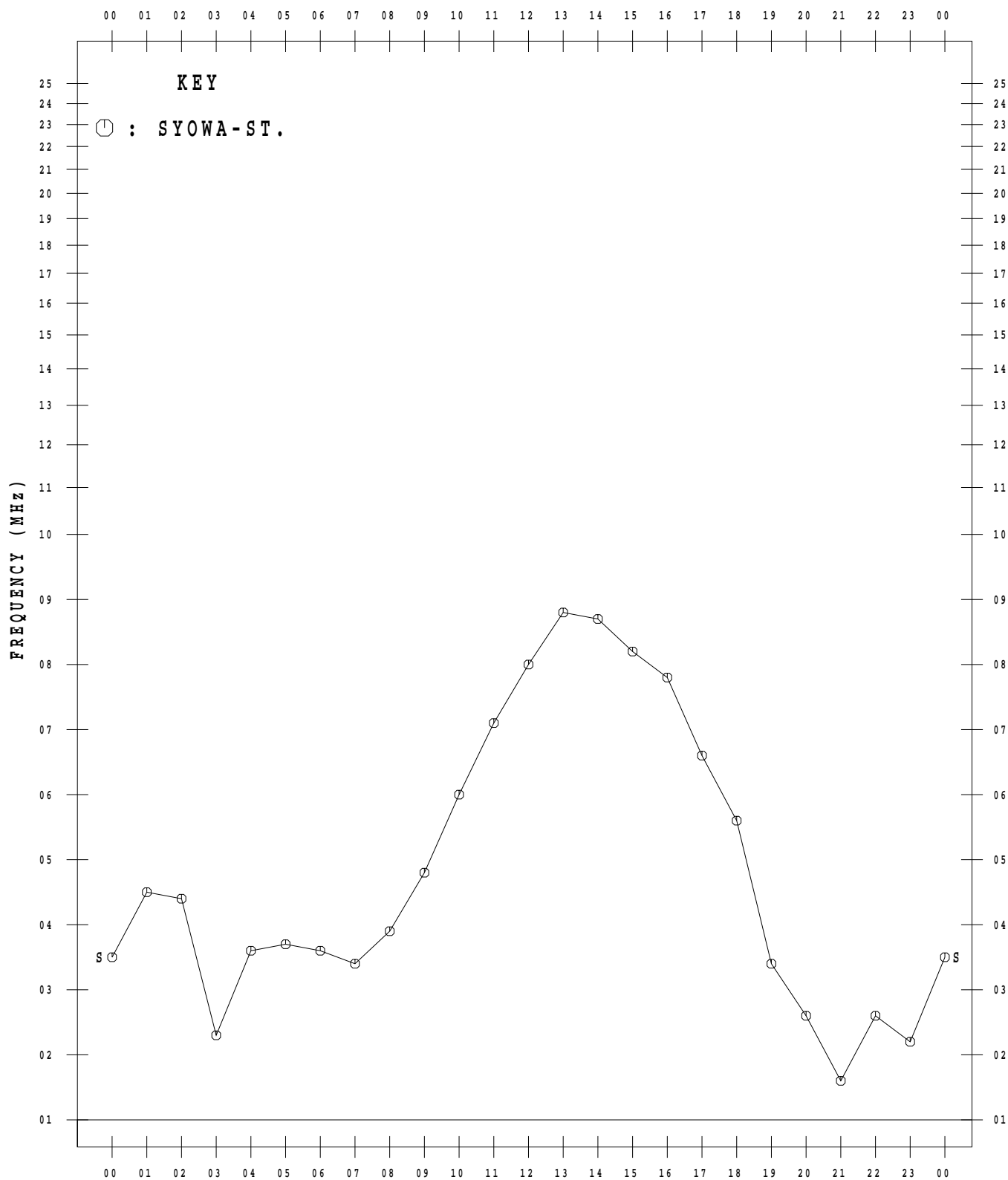
JUL. 2023



# MONTHLY MEDIAN VALUES OF foF2

45°E MEAN TIME

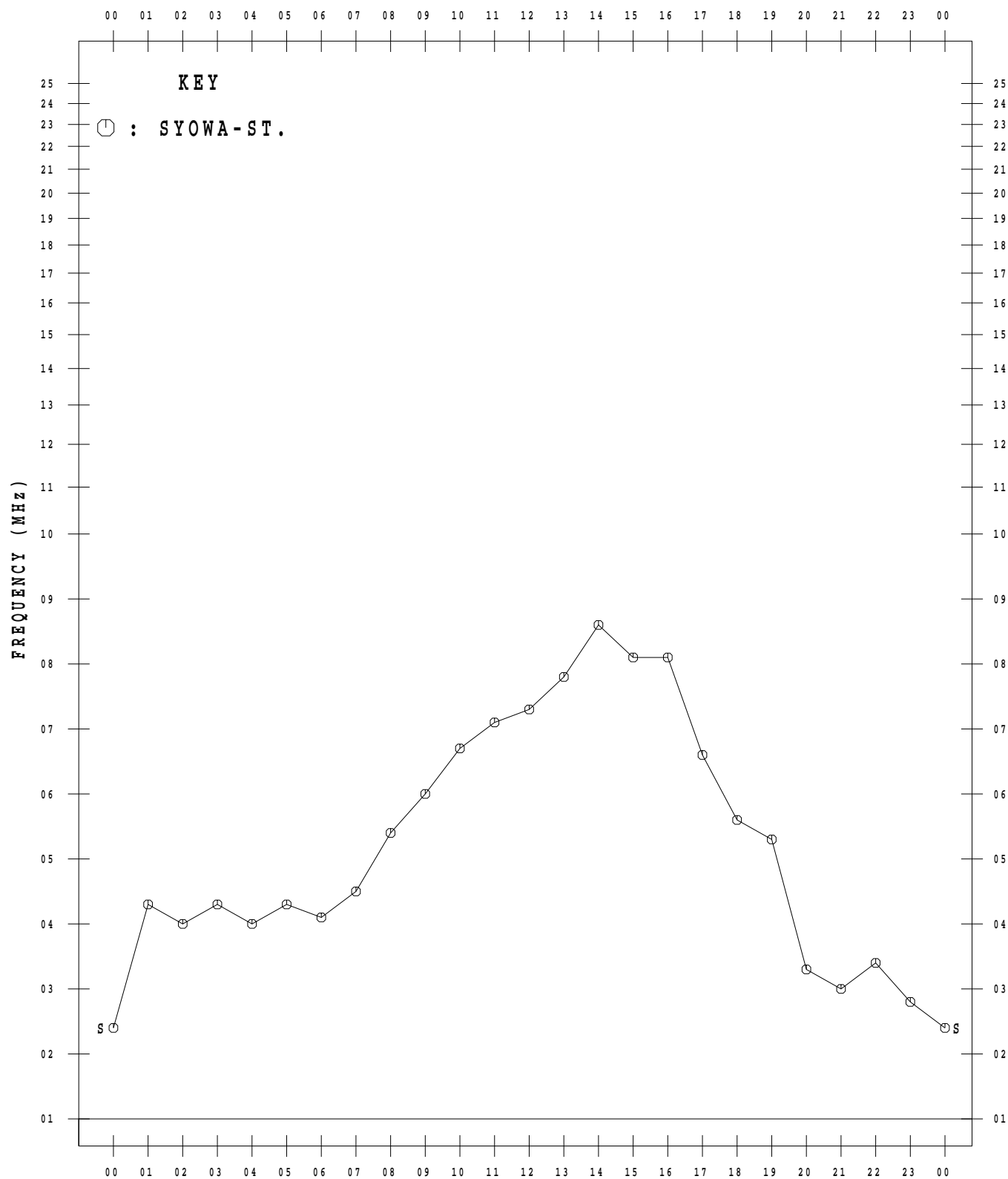
AUG. 2023



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

45°E MEAN TIME

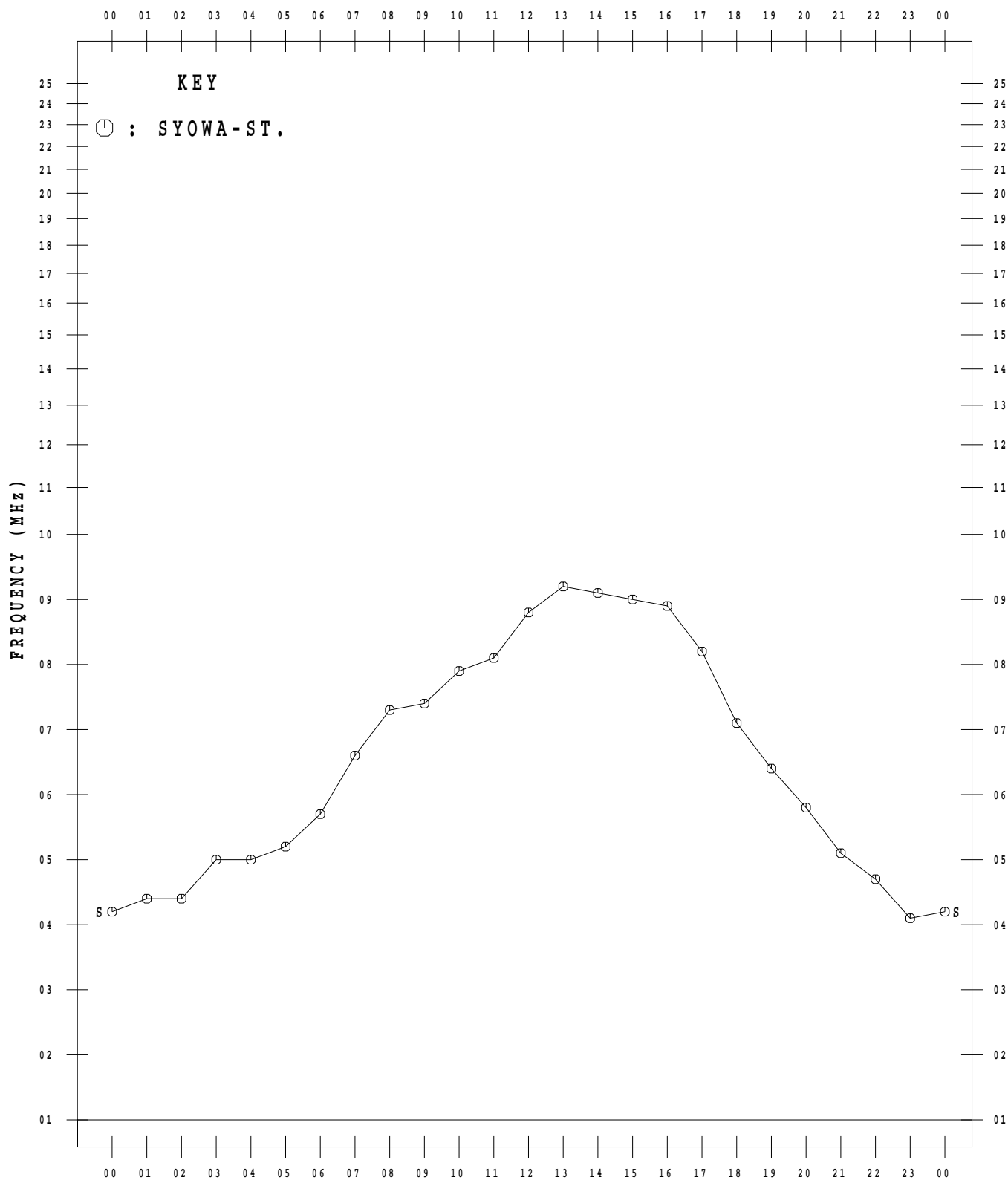
SEP. 2023



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

45°E MEAN TIME

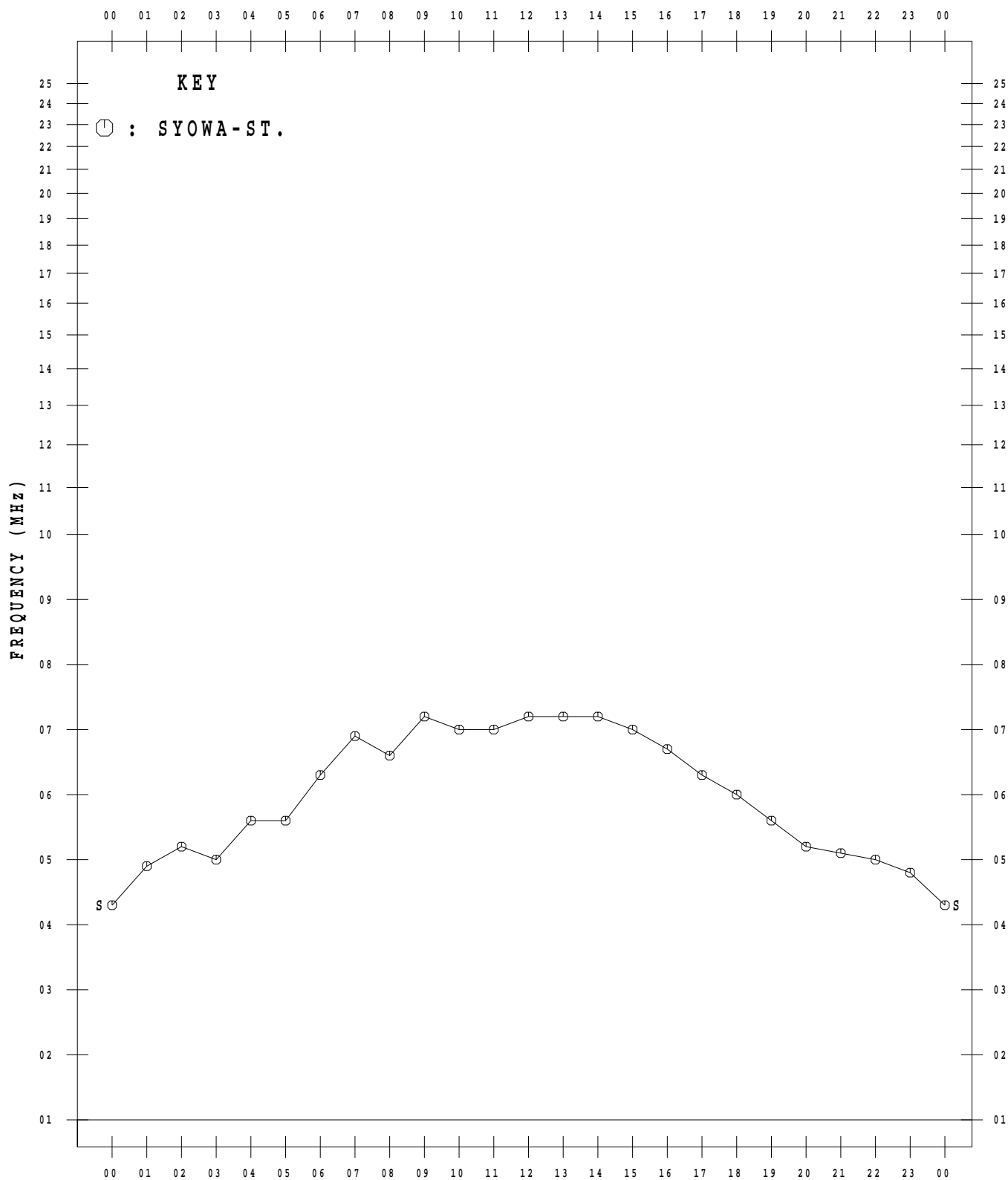
OCT. 2023



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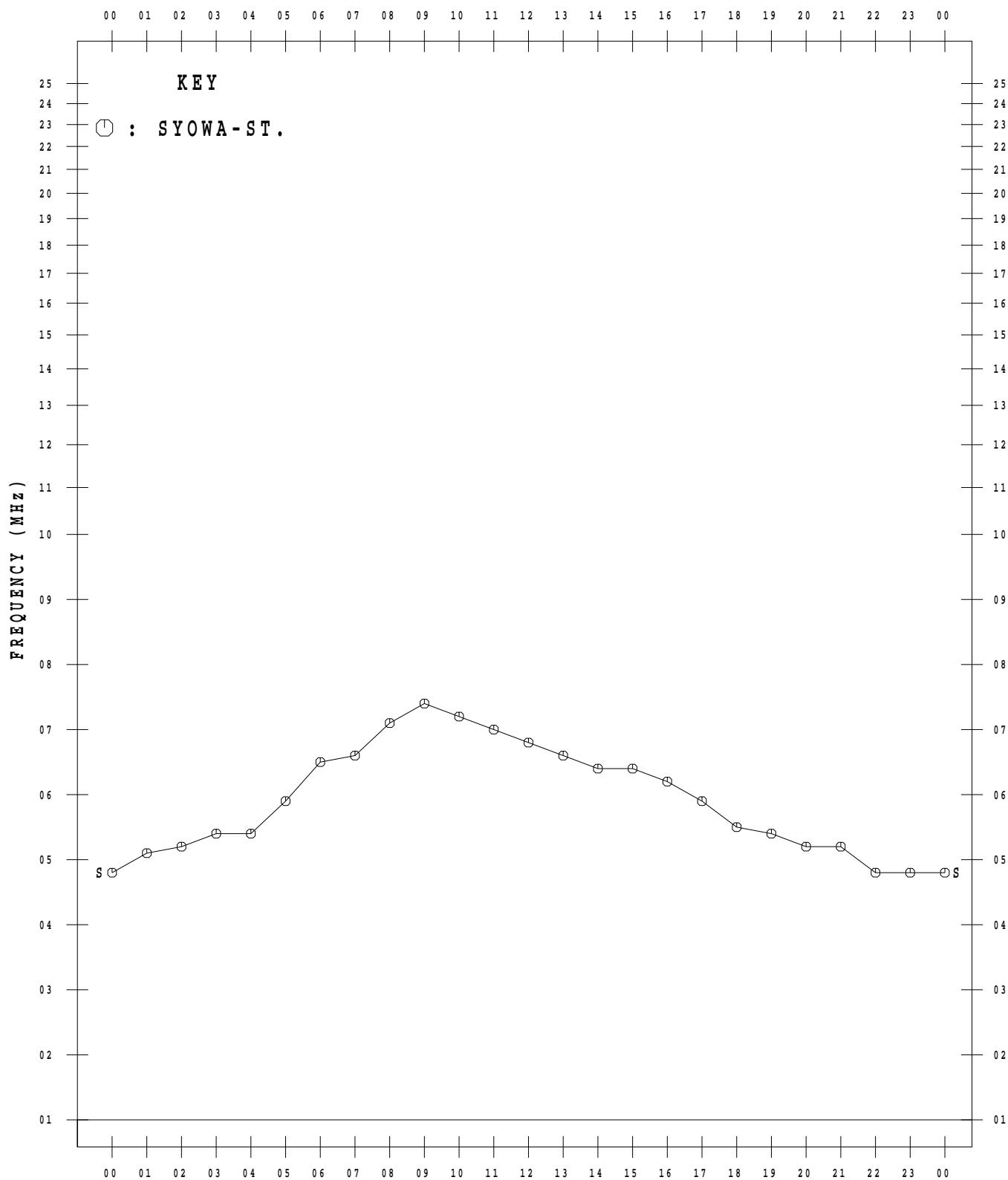
NOV. 2023



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

45°E MEAN TIME

DEC. 2023

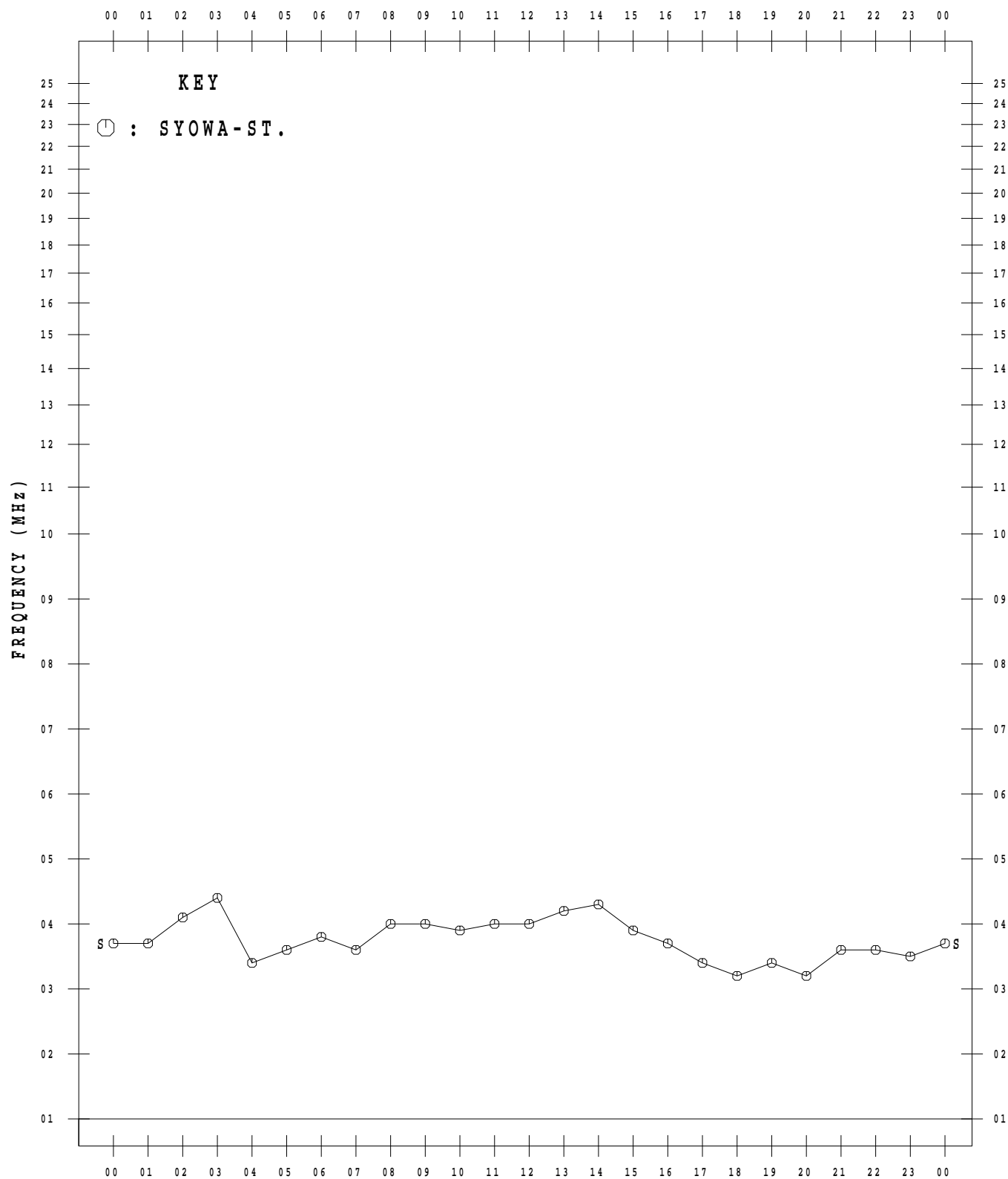




# MONTHLY MEDIAN VALUES OF f<sub>tEs</sub>

45°E MEAN TIME

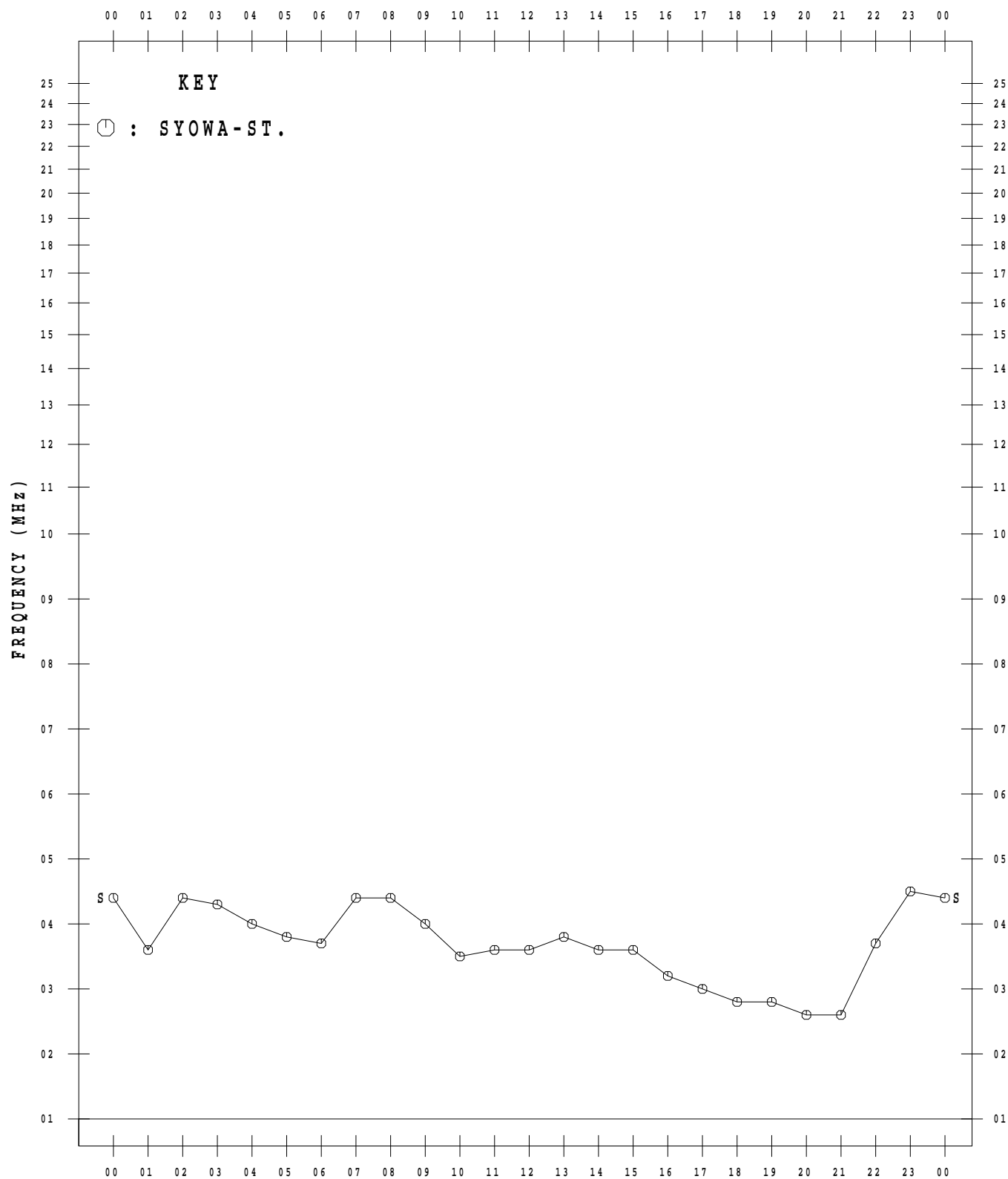
JAN. 2023



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

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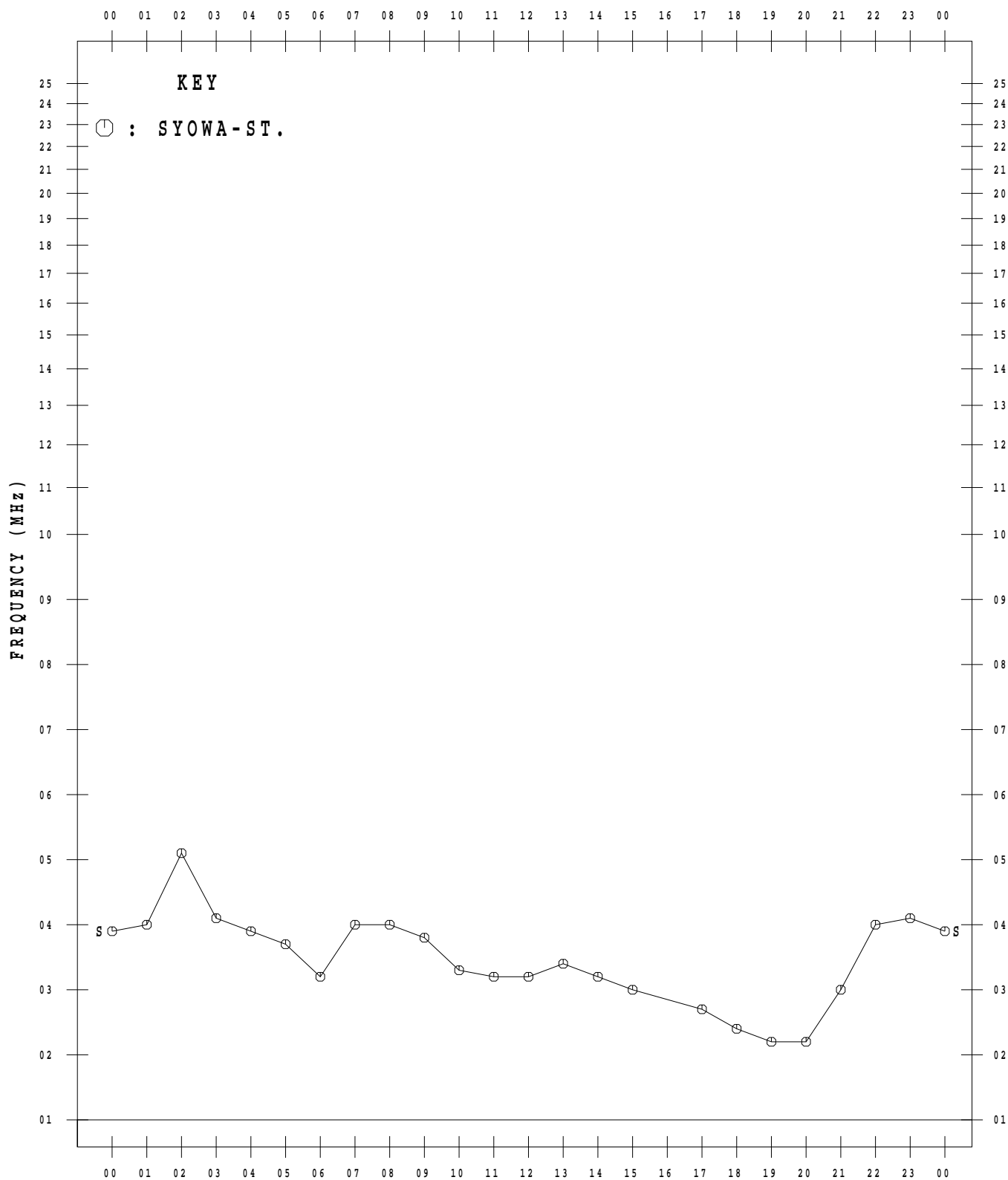
FEB. 2023



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

45°E MEAN TIME

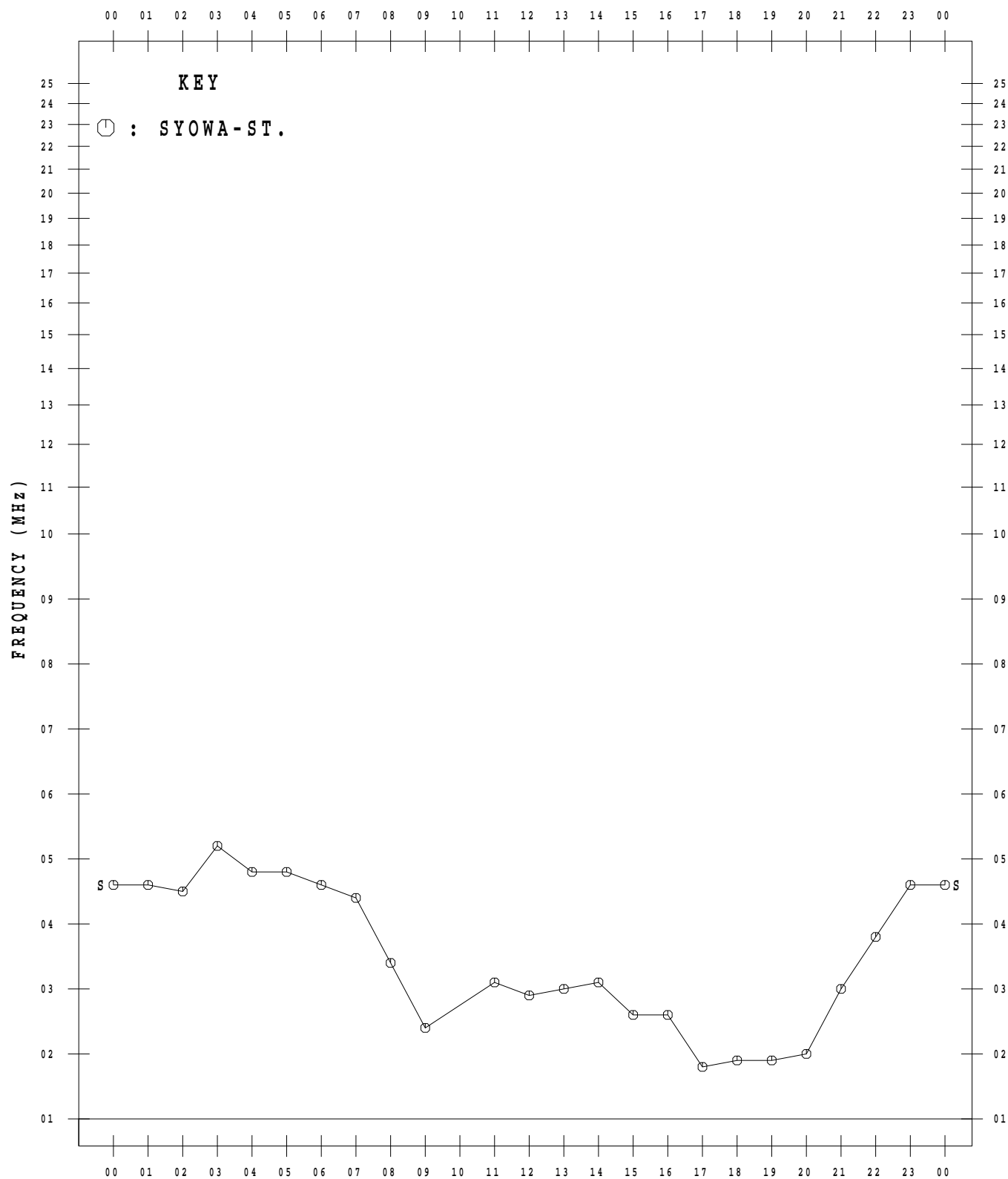
MAR. 2023



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

45°E MEAN TIME

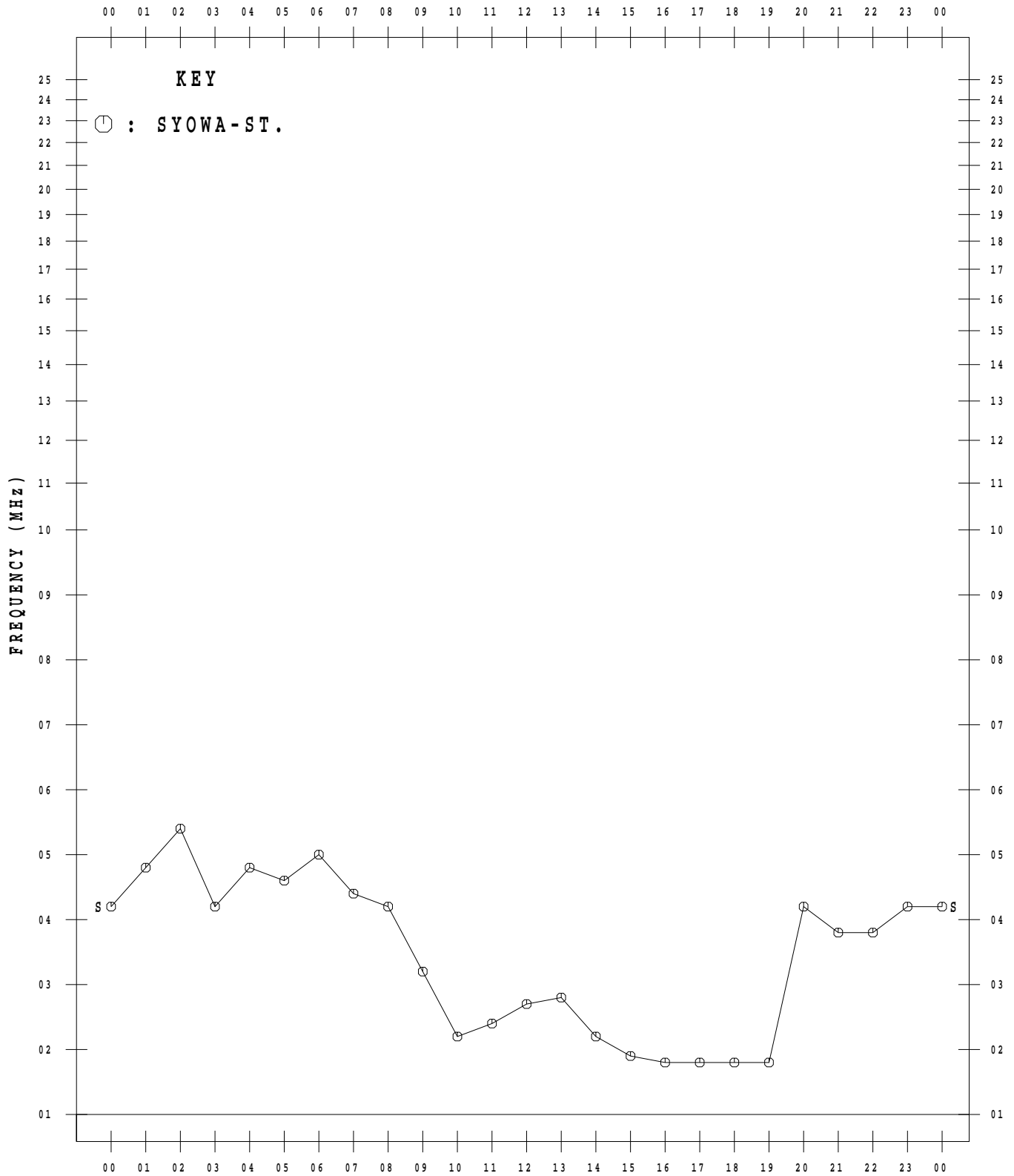
APR. 2023



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

45°E MEAN TIME

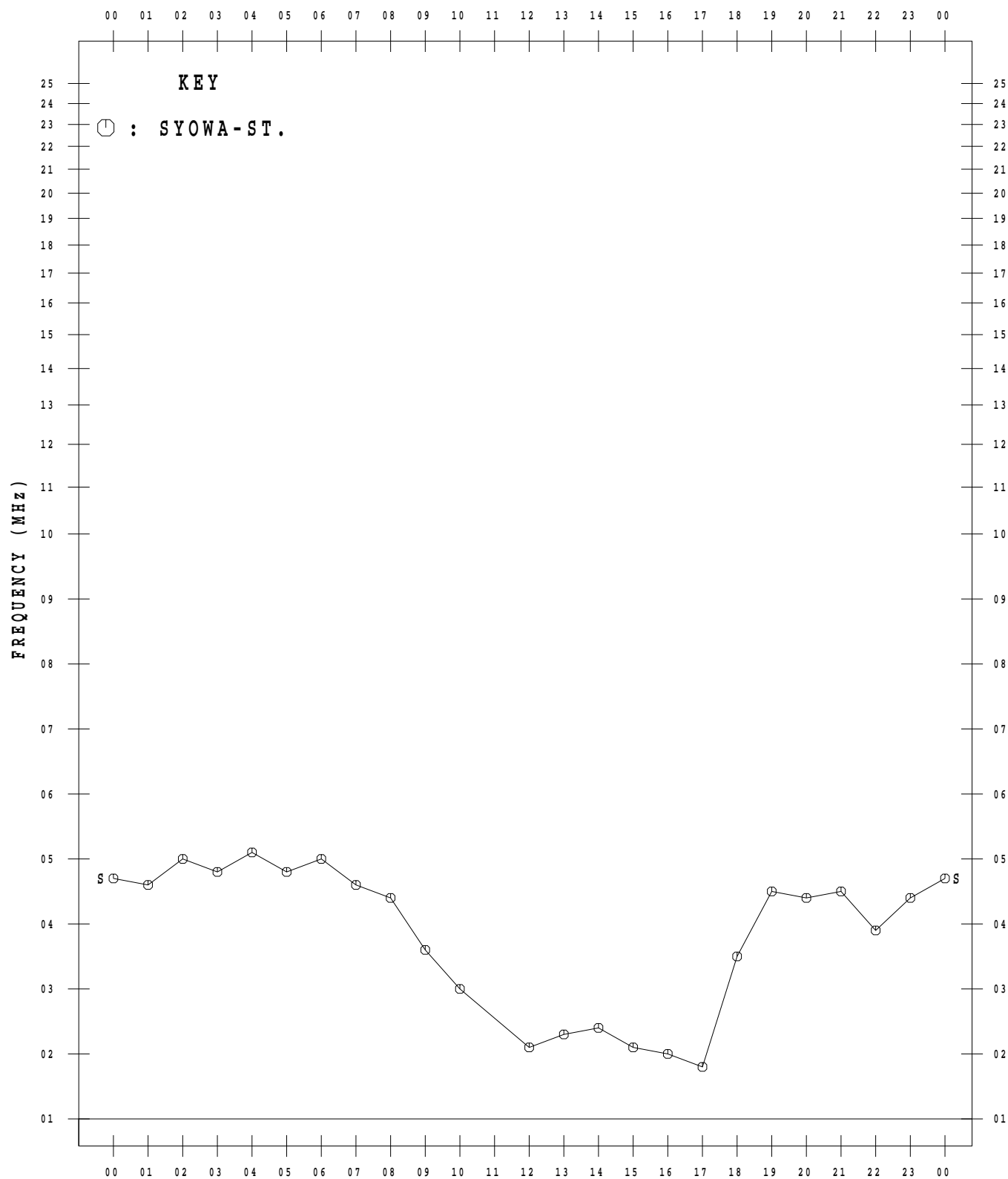
MAY 2023



# MONTHLY MEDIAN VALUES OF fteS

45°E MEAN TIME

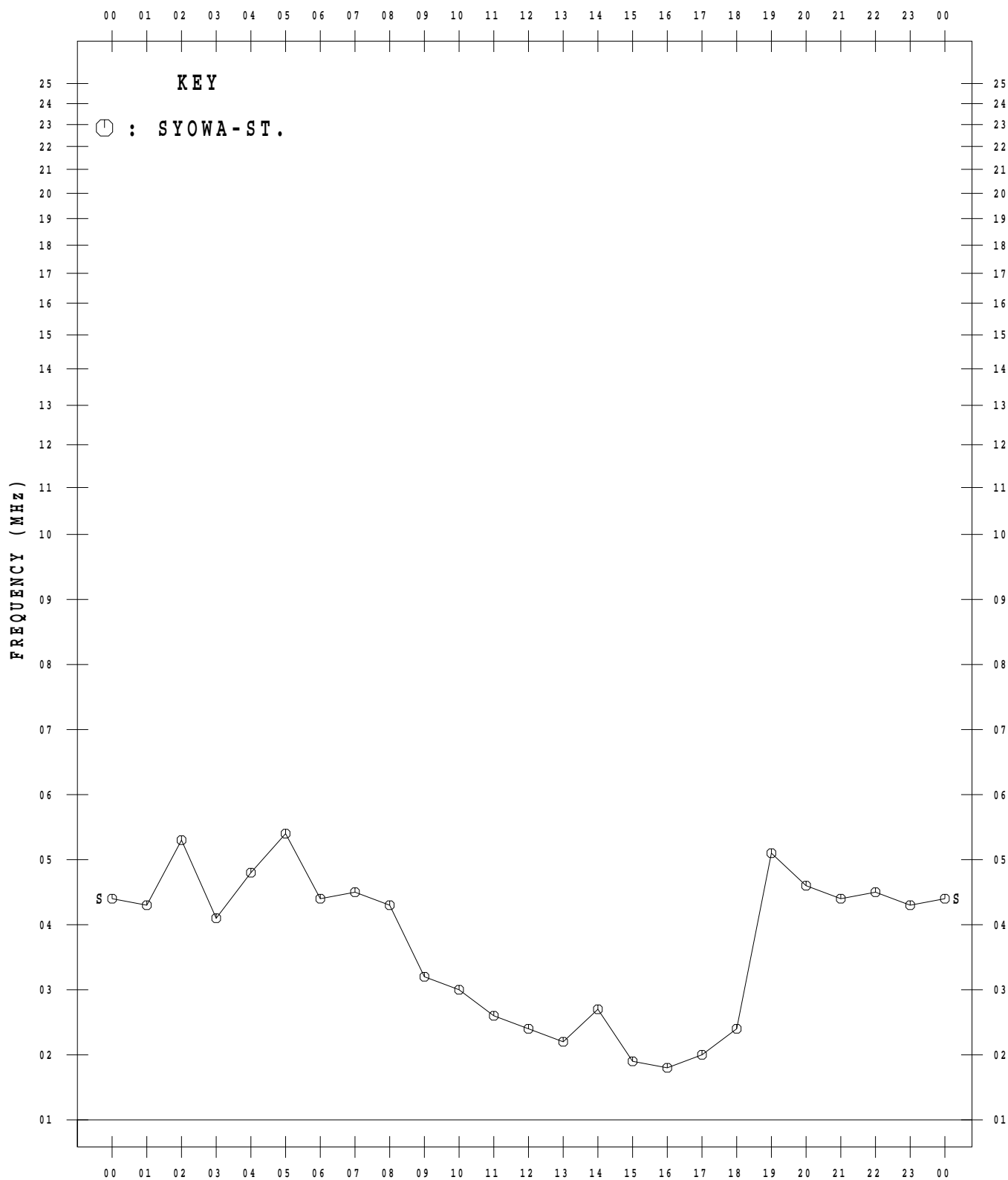
JUN. 2023



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

45°E MEAN TIME

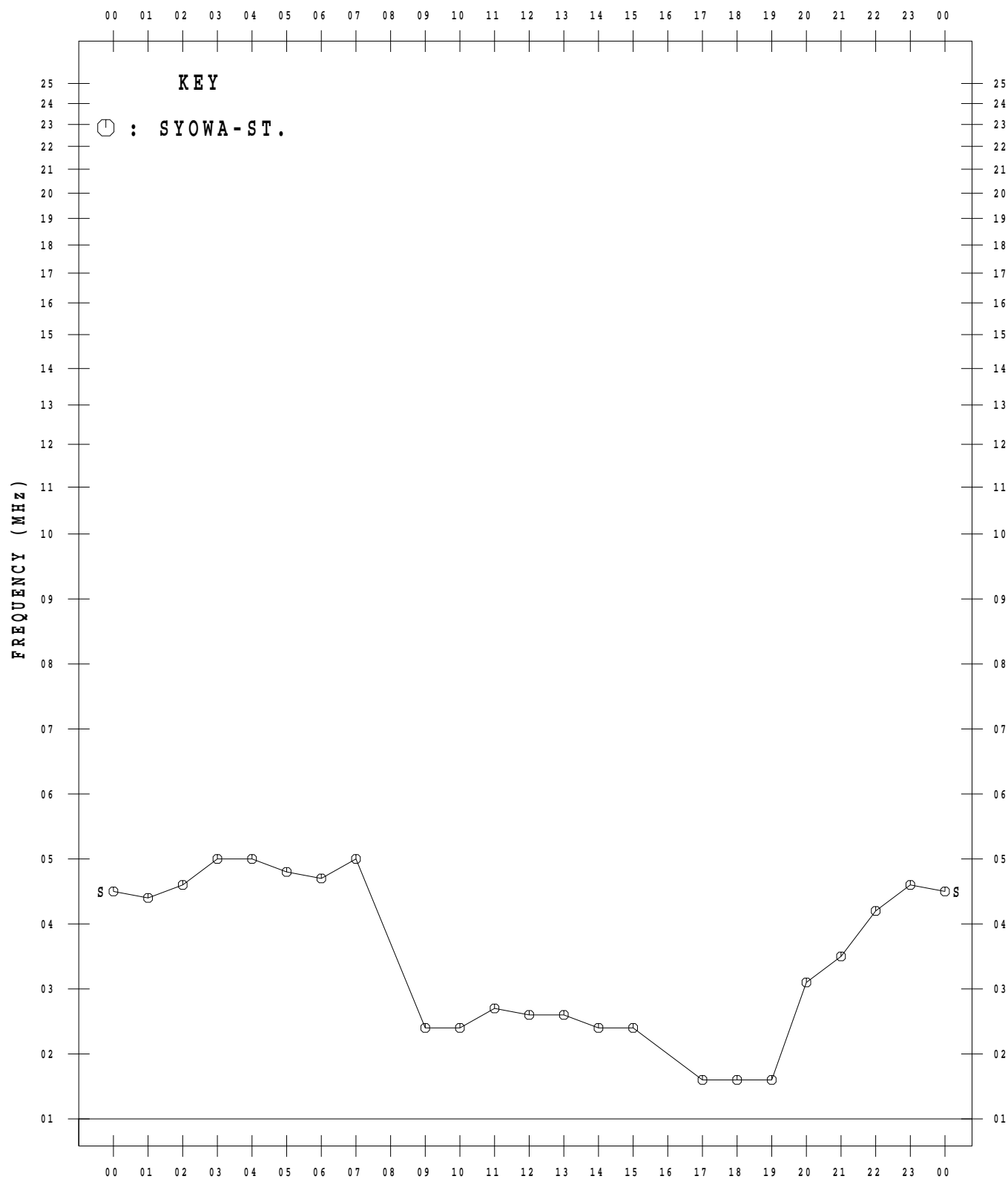
JUL. 2023



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

45°E MEAN TIME

AUG. 2023

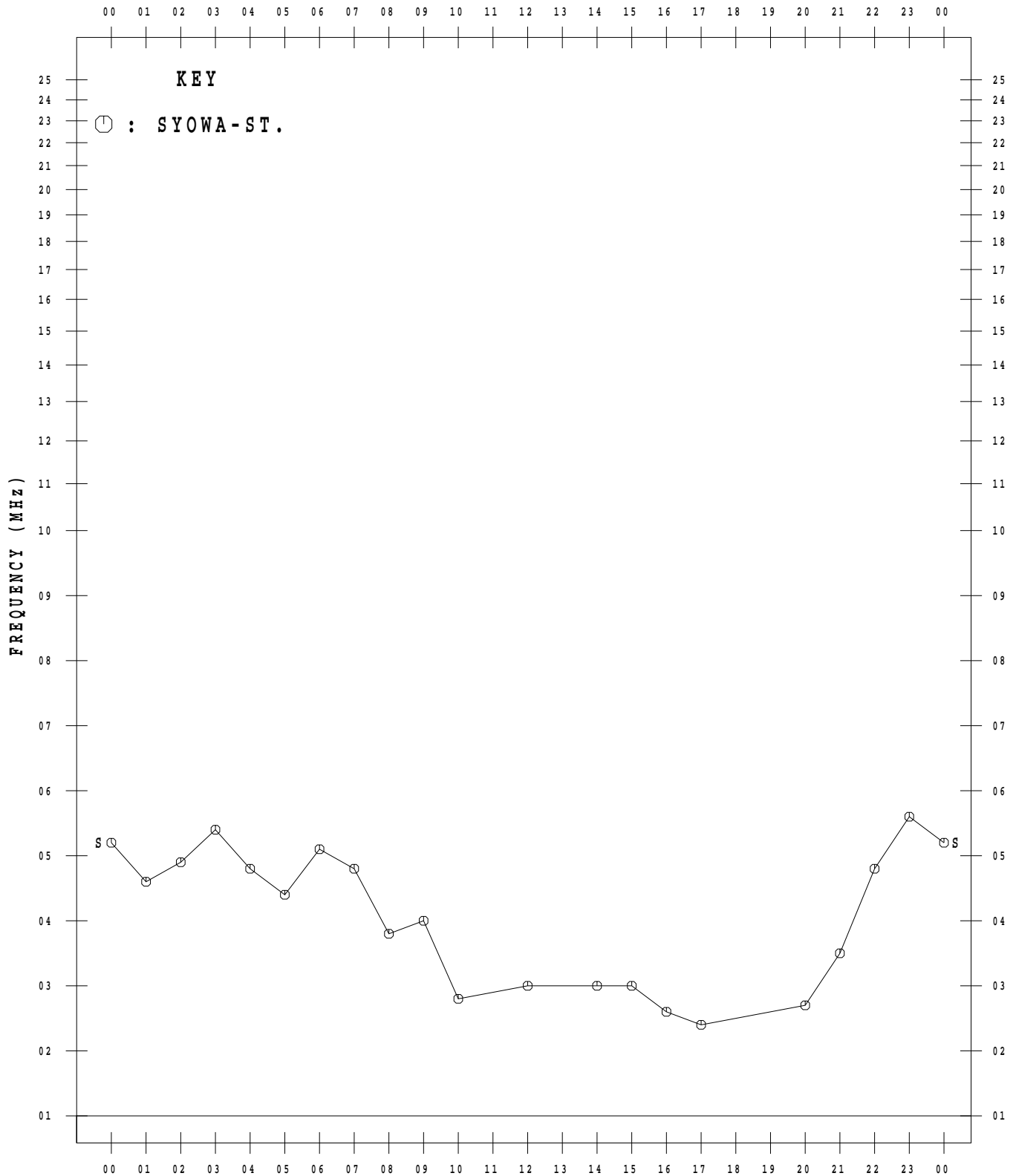




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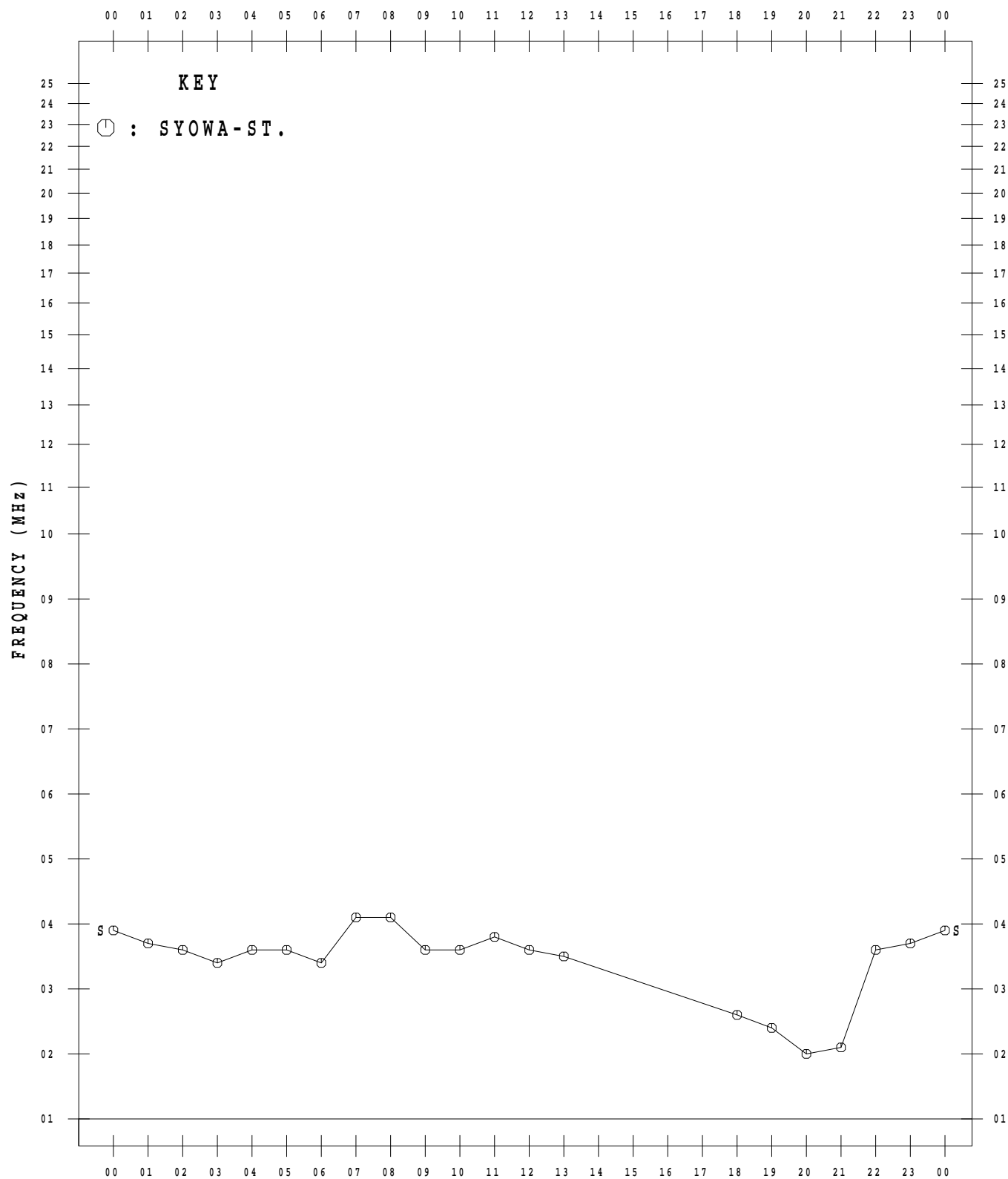
SEP. 2023



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

45°E MEAN TIME

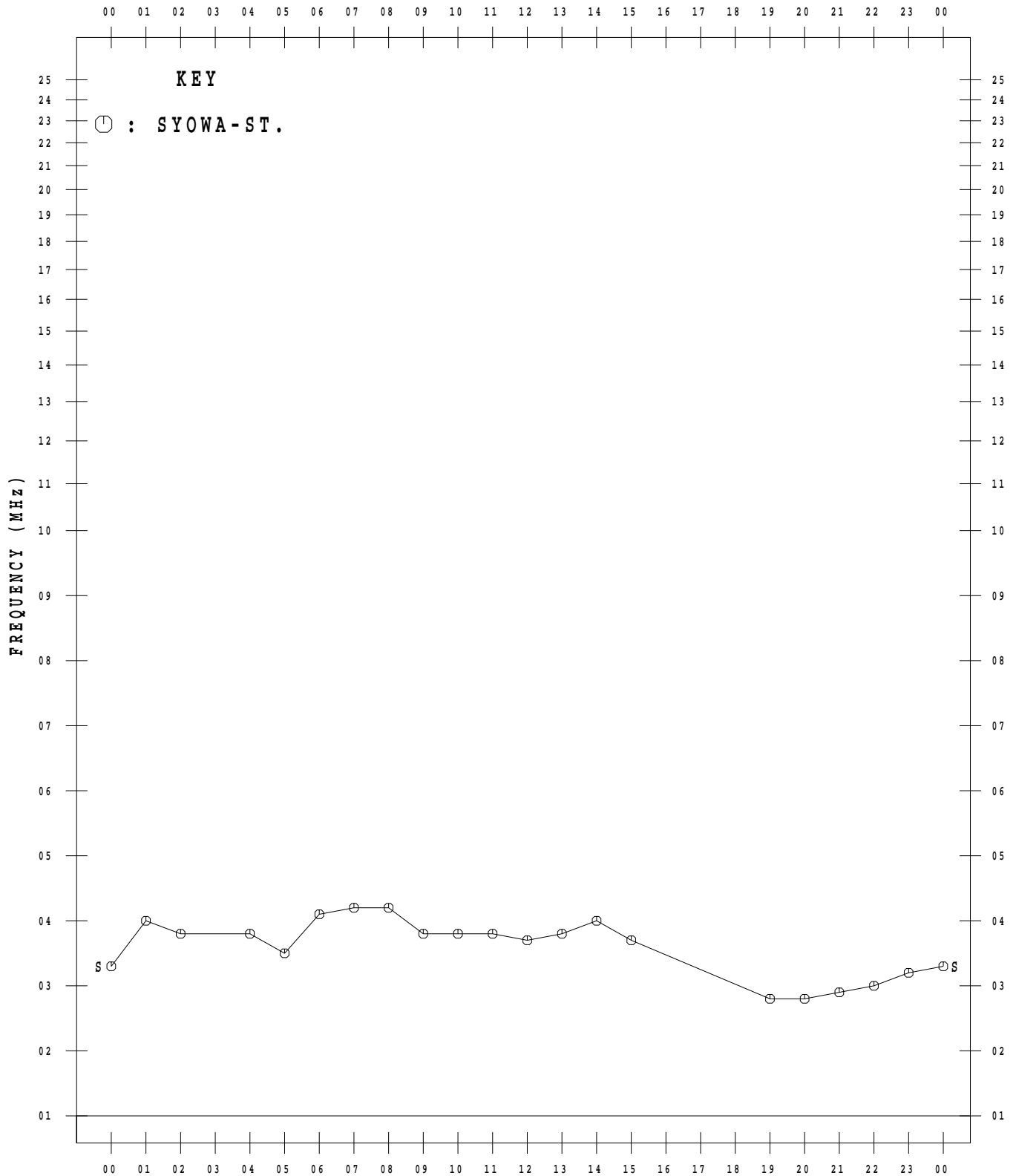
OCT. 2023



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

45°E MEAN TIME

NOV. 2023



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

45°E MEAN TIME

DEC. 2023

