

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 Ω

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 atmospherics.
T	Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
V	Forked trace that may influence the measurement.

W	Measurement influenced or impossible because the echo lies outside the recorded height range.
X	Measurement refers to the extraordinary component.
Y	Lacuna phenomena, severe layer tilt.
Z	Third magneto- electronic component present.

(ii) Qualifying Letters

The following letters are entered in the first column before numerical values on the monthly tabulation sheets.

D	Greater than.
E	Less than.
J	Ordinary component characteristic deduced from the extraordinary component.
M	Mode interpretation uncertain.
O	Extraordinary component characteristic deduced from the ordinary component. (Used for x-characteristics only.)
T	Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
U	Uncertain or doubtful numerical value.
Z	Measurement deduced from the third magneto-electronic component.

(iii) Definitions of CNT, MED, UQ, and LQ

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

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

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

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

Acknowledgment

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

IONOSPHERIC DATA STATION SHOWA-ST.

JAN. 2023 f_{XI} (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	X	A
13	52	A	A	A	X	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	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	71	83	72	79	78	81	82	81	77	74	73	70	68	65	62	66	66	63	64	61	X
18	X	X	62	68	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	X	X	X	X	X	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	C		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	X	O X	O X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
25	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	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	X	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	X	O X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
31	O X	X	X	X	59	62	66	60	64	67	75	81	78	75	77	78	76	72	69	61	54	48	47	50	
	47	X	O X	X	O X	X	X	X	X	X	X	X	X	X	X	X	A	A	X	X	X	X	X	X	X
	46	48	48	57	59	70	82	90	100	102	98	93	92	89	84	81	79	71	71	69	67	69	67	57	
	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
	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
	56	56	60	65	65	70	72	82	85	84	82	86	84	82	76	76	72	68	65	61	60	60	58	56	
	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
	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_{XI} (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		
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 34	R 41	J 49	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		
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		
8	F 47	F 43	F 47	60	51	R 46	A	A	A	55	61	57	60	55	58	59	58	60	56	51	52	50	43	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		
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		
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	A	
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 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	A	
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		
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		
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		
19	50	45	51	55	62	F 63	F 70	86	91	Z 80	F 57	66	62	R 62	64	62	62	64	60	57	56	56	56	51		
20	49	F 43	F 39	49	54	F 52	Z 54	Z 71	Z 69	C	70	70	66	61	62	63	61	61	52	45	49	50	46	46		
21	F 36	43	49	46	55	50	J 53	R C	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	F 72	77	80	78	77	76	69	69	65	52	49	45	A	42	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		
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		
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		
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		
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		
28	44	42	A	A	53	56	60	54	U 58	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 59	Z 59	62	F 71	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		
31	R 53	F 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		
	00	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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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	G	23	32
3	91	39	B	52	40	30	30	35	32	38	37	37	37	37	33	37	38	38	G	C	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	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	G	36	36	36	32	G	34	39	28	37	40	48	
13	36	62	48	42	32	31	46	34	47	44	50	56	48	48	43	G 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		38	G	G	34	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	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	G 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	G	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	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

$\begin{matrix} H \\ D \end{matrix}$	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	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	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	A	210	230	236	236	228
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	E A 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	E A 248	A	196	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	
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	E A 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	A	E A 278
17	E A 306	E A 300	E A 342	E A 326	E A 270	252	E A 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	A	A	A
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	A	A	218	
27	A	A	212	A	E A 258	242	214	214	210	198	212	228	222	224	206	306	E A 220	236		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	246	232		A	
29	248	A	A	B	E B 348	E A 314	290	206	206	206	206	206	192	190	296				208	198	E A 238	E A 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				
	00	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	E A 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 65	X 66	X 64	X 62	X 65	X 63	X 60	X 57	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 62	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	X	B	X 61	X 54	X 61	X 64	X 62	X 61	X 54	X 54	X 52	X 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	B	X 107	X 106	X 100	X 98	X 88	X 90	X 81	X 72	X 68	X 54	X 59
15	X 57	A	X 47	A	X 62	X 75	X 78	A	A	A	X 52	A	A	A	X 53	X 74	X 85	X 78	X 54	R	A	X 59	A	X 45
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	X 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	X A
19	X 52	O 51	X 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	X 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	X A	X 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	X 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	X 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	X 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 A	X 79	X 89
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	X A	X 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	F	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	A	J	R	R	J	R	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	47	57	59	R	R	64	53	48	65	40	F	45	42	41					
17	R	F	35	F	37	37	A	44	46	A	56	50	58	F	55	60	59	57	56	54	56	52	48	42	28					
18	R	F	F	52	56	66	72	66	66	71	79	84	81	92	Z	Z	Z	F	77	74	72	72	69	62	54	A	A			
19	46	F	R	39	A	F	54	58	70	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	F	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	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	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	A	A	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	A		
26	A	R	A	A	R	R	54	B	R	74	77	67	78	78	74	77	70	60	61	56	R	48	43	39	R	A	A	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	A	A	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	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 E B 36	G	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 E B 42	B E B 42	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 35	B E B 34	B E B 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	B E B 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 52	B E B 40	B E B 38	G	47	G	G	36	25	G	33	24		
13	86	50	49	34	30	34	G	47	33	G E B 39	B E B 37	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 45	B E B 37	B E B 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	B E B 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 36	B E B 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 32	B E B 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 35	B E B 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 E B 31	B E B 36	B E B 36	B E B 30	G	G	23	40	50	22	57			
26	57	35	48	43	27	48	E B 39	B E 48	B E 48	B E 46	B E 33	47	E B E 41	B E B 35	B E B 38	39	B E 27	B E 32	B E 36	B E 30	B E 23	B E 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 46	B E 41	B E 45	B E 36	B E 34	B E 27	B 33	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	

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

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	B	A	A	A	E A	A	A	E A	E A	A	196	194	232	204	196		210	208	208	210	220	240	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	252	
3	A	A	A	A	A	A	A	A	A	202	198	224		198	E A	208	E A	218	194	204		A	A	A	A	
4	A	202	328	A	212	A	A	A	A	A	206	196	232	214	206	204	204	210	216	226	228	A	A	A	A	
5	274	294	E A	A	200	204	244	E A	A	200	200	204	204	228	E A	204	124	210	210	222	242	240	230	E A		
6	A	278	A	A	A	A	A	A	A	A	E A	226	202	218	250	242	228	228	226	236	E A	E A	E A	A	A	
7	A	A	A	A	A	A	254	A	A	A	A	254	238	234	226	222	222	222		A	302	A	A	A	A	
8	A	A	A	A	A	A	E A	E A	E B	A	E A	E A	232	232		224	228	240	258	232	242	204	E A	E A	328	
9	A	B	A	A	A	298	A	A	A	A	A	216		E B	E B	214	220	220	220		A	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	A	E A	A	A	
11	A	A	E A	A	A	E A	E A	A		B	B	226	238	234	236	232	220	240	238	254	256	270	268	260	A	
12	302	A	A	A	A	A	A	A	A	E A	216		E B	E B	E B	206	216	226	236	236	256	266		A	A	
13	A	A	E A	A	A	A	E A	A		E B	E B	232	226	220	250	218	218	234	232	202	242	238	226	256	A	
14	E A	A		A	G E	E A	E A	A		246	236	202		E B	E B	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	206	A	A	246	222	236	160	270	A	A	288	A	A	204	206	
16	A	206	A	206	246	198	196		E A	A	256	234	244	210	224	328	246	198	262		E A	E A	E A	A	A	
17	A	230	298	E A	A	A	A	204	A	A	214	214	214	212	216	216	218	216	222	E A	246	240	236	252	302	
18	A	E A	A	E A	E A	E A	E A	E A	E A	202	198	228	220	220	204	208	226	218	246	206	240	224		A	A	
19	344	E A	A	A	A	A	A	A		218	188	214	206	206	226	226	200	214	218	204	228	224	246	A	A	
20	A	A	A	202	204	A	E A	H		A	E A	236	222	208	208	214	200	216	228	234	E A	A	A	A	A	
21	A	A	248	304	338	A	A	196		A	E A	234	244	E A	240	252	242	254	254	244	258	244	250	E A	312	
22	A	Q	A	A	A	A	A	A		H		234	234	212	220	208	214	222	230	228	256	312	A	A	A	
23	A	A	310	E A	E A	A	A	A		A	E A	240	230	212	224	218	230	246	228	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	
25	264	282	302	A	A	A	282	282	250	206	212	294	234	222	236	250	230	214	E A	E A		A	A	234	A	
26	A	A	A	E A	A	302	198	B	B	B	B	216	258	320	248	264	252	234	E B	E B	E B	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	E B	E B	E B	E A	284		A	A	A
29															320		256	272	250	250	250	262				
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_{XI} (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 87	X 72	X 50	X 56	X 57	X 42	X 51	X 72	X 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	X 66	X 71	X 80	X 78	X 79	X O 74	X 87	X 86	X 82	X 83	X 84	X 78	X 78	X 74	X 63	X 55	X 45	X 65	A	A
3	A	A	X 52	X 70	X 40	X 44	X 56	X A	A	B	A O X 57	X O 64	X O 65	X 71	X 73	X 67	X 61	X 57	X 51	X 49	X 44	X A	A	A
4	A	A	70	A 48	X 58	X 44	X R	R	X 51	X 58	X B	X 66	X 71	X 69	X 73	X 73	X 69	X 65	X 52	X 33	X 57	X 37	A	A
5	A	A	A O X 51	X 69	O X 44	X 50	X 54	X 51	X A	O 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	A
6	A	57	A	A	A	A	61	A	A O X 62	X 66	X 70	X 68	X 69	X 71	X 68	X 67	X 67	X 60	X 44	X 44	X A	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	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	X A	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	X A	X 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	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	X 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	X
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	91	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 O 66	X 56	X B	X A	X 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	X
16	O X 61	X 48	A	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	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	58	58	56	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	X A	X 48	X A	A
20	A	57	58	60	74	X O 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	X
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 O 82	X 117	X 117	X 128	X 101	X 93	X 85	X 56	X 43	X 38	X A	X 43	X 38	X
23	X 42	42	A O X 46	X 48	X 52	X 52	X 51	X 62	X 69	X 74	X 81	X B	X B	X 126	X 132	X 114	X 43	X 44	X A	X A	X 60	X A	X A	A
24	71	A	85	54	A	A	A	A	A	X 39	X 43	X B	X B	X 57	X 60	X 54	X 46	X 48	X 55	X A	X A	X A	X A	A
25	A	A	A	A	A	55	X 45	X 49	X A	X B	X 53	X 63	X 87	X 89	X 90	X 72	X 64	X 51	X R	X R	X A	X A	X A	A
26	A	A	A O X 36	A	A	A	A	X 36	X 48	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	X A	A
27	B	A	A	A	X 34	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	X
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	X A	X 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	X 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	X A	X A	X A	B
31	B	A	A	X 54	X 40	A	B	B	B	B	B	X 59	X B	X B	X 76	X 72	X 65	X 54	X 54	X A	X A	X A	X 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

MAR. 2023 f_{XI} (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

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

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	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	R 65	Z 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	J 62	R 62	84	84	80	66	62	42	42	A	A	A
10	A	A	A	41	R	F 47	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	F 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	80	F 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 37	F 37	A	R 48	R 48	A	R 52	56	66	Z 74	75	76	Z 95	84	86	Z 88	81	F 63	F 30	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	F 87	F 75	F 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	A	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	F 58	F 42	F 32	A	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 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 0SWEEP 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	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	238	A	
3	A	A	276	272	A	A	278	A	A	B	A	E A	B	B	E B	E B	E B	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	274	A	204	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	226	244	262	256	266	124	E A	
8	A	A	A	A	A	A	A	A	A	A	224	314	332	226	234	252	244	244	242	240	226	220	310	A	
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	E A	238	210	230	220	228	
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	A	A	222	222	228	220	220	232	228	236	E A	216	218	226	218	224	
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 B	E A	E A	250	238	242	260	268	264	302	A	
16	E A	206	324	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	
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	
18	A	212	214	A	A	E A	A	A	E A	A	324	234	220	224	230	220	270	E B	E B	E B	E B	226	226	A	
19	A	A	E A	E A	E A	A	A	A	A	E A	A	A	240	E B	232	232	228	238	E B	E B	E A	208	A	200	
20	A	A	A	E A	A	A	E A	A	A	A	324	212	202	202	H	H	H	202	220	228	218	250	222	224	
21	E A	330	A	E A	E A	E A	E A	E A	E A	240	206	236	220	226	238	234	224	202	E A	214	202	230	230	238	
22	238	A	A	A	A	E A	E A	A	B	B	B	B	B	E B	B	E B	302	254	238	238	228	244	294	A	
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	
24	280	A	E A	E A	A	A	A	A	A	E A	A	260	260	B	A	E A	256	256	256	276	222	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	
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	
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	
28	A	A	A	A	A	A	A	A	A	E A	276	238	276	E B	E B	268	238	232	244	228	216	222	214	264	
29	A	A	A	A	A	A	A	A	A	H	276	224	196	234	230	230	232	230	230	226	232	232	228	E 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	354	336	360	326	232	B	258	E A	
31	B	A	A	A	A	A	B	B	B	B	B	B	B	E B	E B	B	B	342	B	308	250	270	252	324	
	00	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_{XI} (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	X	
5	B	A	A	A	B	A	A	B	A	R	O	X	X	X	X	X	X	X	X	X	X	X	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	X	
17	X	A	X	A	A	A	X	44	51	60	71	75	83	82	90	97	94	98	83	74	66	52	32	A	A	
18	A	A		X	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
19	A	57	55	X	A	A	60	66	69	71	76	88	100	101	119	136	116	108	61	A		39	39	58	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	B	A	A	O	X	A	A
24	71	85	60	66	82	65		A	A		49	49	31	33	37	38	42	50	45	54	35		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	B	64	42	A	A	A	70
27	A	A	X	A	A	A		59	B	A	A	B	X	B	O	X	X	X	X	X	A	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	A	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	X	
31																										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	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	
	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_{XI} (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	53	68	75	83	82	78	60	41	34	20	A	A	A					
5	B	A	A	A	B	A	A	B	A	R	47	60	67	78	86	78	81	82	76	62	42	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	A	A	52	64	66	72	82	86	86	82	68	58	F	34	25	23	A					
8	44	30	A	A	A	A	A	A	B	B	56	60	73	88	97	99	91	79	64	58	40	23	21	20	R	A				
9	20	J	R	A	A	A	A	A	F	63	67	74	84	92	102	103	94	90	72	60	34	22	A	A	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	A				
11	A	A	F	28	28	J	R	F	F	46	53	57	68	79	86	93	91	88	74	72	50	40	21	A	A	A				
12	A	R	32	40	36	F	F	F	F	50	56	64	74	84	86	94	94	90	77	80	66	42	31	19	19	F	F	F		
13	17	40	F	F	F	R	A	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	56	66	74	84	84	85	85	88	F	F	F	F	59	29	A	30	F	A	A		
15	A	31	A	A	A	A	F	F	F	64	59	62	77	80	89	101	113	122	134	129	121	105	63	26	55	F	F	A	A	
16	A	A	A	A	A	A	A	A	47	55	55	59	70	79	93	Z	F	106	102	Z	Z	80	58	35	20	14	A	A	A	
17	U	R	A	A	A	A	A	A	Z	54	61	69	77	76	84	91	88	92	77	68	60	46	26	A	A	A	A	A	A	
18	A	A	52	37	48	F	F	F	F	40	24	49	66	72	82	97	108	111	117	105	86	65	61	38	47	48	48	F	R	
19	A	A	49	A	A	A	F	F	F	47	52	52	57	70	82	94	95	111	130	110	99	46	F	A	F	A	F	A	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	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	64	68	86	F	F	95	90	F	77	66	50	26	22	26	5	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	
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	R	31	42	58	52	63	60	56	52	51	42	46	24	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	Z	B	F	J	R	A	A	A	A	A	
27	A	A	29	A	A	A	U	R	B	A	A	B	B	R	F	F	84	Z	B	F	F	A	A	A	A	A	A	A	A	
28	A	A	A	A	A	R	A	A	B	B	B	B	B	50	52	52	60	62	57	Z	R	A	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	98	F	F	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	A	A	A	A	A	A	A	A	
31																														
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
CNT	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		19	19	17	17	17	57										
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	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	BE	B					11	34	46	30								
7	21	33	30	64	53	48	48	E	B		47	56	41	E	BE	BE	BE	BE	BE	BE	BE	B					22	20	42	36								
8	50	32	35	46	53	48	54	51		B	B	G	E	BE	BE	B		G									E	BE	B	15	17							
9	36	34	67	56	51	E	B		G	G		36		G	E	B		G			G						17	18	15	17								
10	K	32	49	49	60	53	66	52	60		B		B		E	B											13	36	36	32								
11	40	64	24	17	24	24	30	16		GE	B		GE	BE	BE	BE	BE	B		E	B		E	BE	B		18	13	38	45								
12	46	35	33	33	31	22	K		20	12	19	23	E	BE	BE			G									E	BE	BE	B	16	14						
13	14	30	35	20	42	64	54	41	24	24	24	25	25	25	18	30	26	14	13	11						13	26	33	48									
14	70	45	67	59	62	44	K	K		G		23	23	26	26		G	GE	BE	BE	BE	B				E	B	K	30	27								
15	27	32	68	58	56	56	38	36	40	49	26	56	33	28	34	25	33	29	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	BE	B	11	15	53	37					
17	34	38	30	58	52	55	40	28		G		21	19	26		G	G	G									24	22	22	18	15	32	20	17	39	66		
18	34	34	40	34	18	16	K		13	13		G	G			G	G	G			GE	B					G	K		11	42	43	43					
19	45	39	35	74	47	51	30	19	15	17		G		25	32	24	76	43	24	25	25	36					31	31	19	30								
20	28	35	35	49	29	21	K		17	20		G																										
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	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	BE	BE	BE	BE	B	10	34	37	41				
23	55	63	60	55	55	57	52	56	53	39	E	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	B																
24	47	44	31	56	45	56	57	61	25	20	26		G		G																							
25	43	46	36	52	50	41	16	52	57	26	54	27				24	29		J	A							33	16	16	49	29	38	50					
26	46	47	63	59	60	K	47	47	41		BE	BE	BE	E	BE	BE	BE	BE	BE	BE	B							BE	BE	BE	B	44	49	61	57			
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	BE	B																		
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		50		BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	B	12	27	50	66				
31																																						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23														
CNT	27	28	28	27	26	28	25	24	23	22	26	27	28	30	30	29	28	28	28	27	28	28	28	28														
MED	46	46	45	52	48	48	46	44	34	24		GE	BE	GE	BE	BE	BE	BE	BE	BE	BE	BE	BE															
U Q	55	60	58	58	53	56	54	53	53	39	40	E	BE	BE	BE	BE	BE	BE	B																			
L Q	34	35	35	47	43	24	30	24		G		14	21	25	26		G	G	G																			

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	A 240	240	262	E A 324	A
3	A	A	A	B	A	A	B	A	E A 308	A	E A 308	E B 308	E B 308	E B 268	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	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	236	220	E B 248	E B 240	232	232	212	E B 220	220	226	A	A
7	A	A	B	A	A	B	E B 248	A	A	A	E B 272	E B 228	E B 244	E B 244	E B 238	278	242	232	224	E B 220	226	E A 214	E A 250	A
8	E A 316	E A 296	A	A	A	E B 332	A	A	H E A 178	E A 252	E A 244	242	224	246	E A 242	E A 226	E A 222	E B 224	212	212	226	E B 284	272	262
9	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
10	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
11	A	246	A	244	240	A	A	A	E A 294	E A 206	E A 244	246	242	E B 230	E B 222	238	214	204	210	204	204	220	E A 266	278
12	A	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	A
13	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
14	A	A	A	A	A	A	338	318	E A 262	A	E B 276	232	220	226	226	E B 222	E B 228	222	242	E A 270	A	A	A	A
15	A	A	A	A	A	A	A	A	A	198	234	286	272	232	226	236	236	202	202	204	210	E B 236	A	A
16	216	A	A	A	A	A	A	A	198	242	200	226	242	218	236	220	196	210	218	242	240	A	A	A
17	A	A	202	A	A	A	E A 336	E A 300	E A 228	E A 228	224	216	224	232	222	214	196	190	210	224	210	E A 348	E A 342	A
18	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
19	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
20	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
21	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
22	A	A	A	A	A	A	A	A	E A 274	E A 316	280	258	258	278	302	242	242	B	A	A	A	A	A	A
23	A	A	A	A	H 178	204	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	A
24	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	Q E A 228	E B E B 228	E B E B 288	A	A	A	A	A
25	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	A
26	A	A	220	A	A	A	194	B	A	A	B	B	B	B	B	Q E B 260	Q E B 272	E A 292	E A 282	A	A	A	A	A
27	A	A	A	A	A	R	A	A	B	B	B	B	B	B	B	E B E B 312	E B E B 254	E B E B 254	238	A	A	A	A	A
28	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
29	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
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	4	4	3	3	3	3	4	10	10	16	18	23	25	27	27	27	29	28	25	20	17	11	6	3
U	249	248	220	U 219	212	236	337	U 261	U 196	E A 252	E A 237	U 229	236	E 246	232	231	225	212	216	223	225	U 256	U 272	262
MED	A 316	A 282	A 276	E A 258	E A 240	E B 332	372	318	E A 260	E A 268	E A 268	280	274	E B 268	E B 256	E B 248	244	238	234	241	245	E A 288	E A 324	278
U Q	316	282	276	258	240	332	372	318	260	268	268	280	274	268	256	248	244	238	234	241	245	288	324	278
L Q	224	239	202	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_{XI} (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	0 77	X 94	107	86	X 78	X 89	70	54	A	62	A	48	
2	A	A	A	A	B O	X 45	A	A	A	B	O	X 44	X 57	X 62	B	B	X 72	63	49	54	37	O 22	X 24	A O	X 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	X 79	X 93	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	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 X 37	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 X 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 X 21	A	X 22	X 20	
19	A	A	O X 28	46	39	46	55	59	46	58	80	X 80	X 91	X 98	X 93	X 68	58	38	42	O X 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 X 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	O X 67	X 59	X 56	B	B	B	B	B	R	R	
24	R	A	B	R	B	A	A	R	B	B	O X 48	X 60	X 77	X 75	X 74	X 71	X 69	X 60	60	B	R	R	O X 47	A	
25	B O X 48	X	B	B	B	B	B	R	X 40	X 40	B	B	B	O X 89	X 80	B	O X 88	70	56	B	R	B	53	R	
26	R	R	R	B	B	A	A	B	B	B	B	X 68	O X 81	92	92	67	55	47	37	A	B	A	R	R	
27	R	A	A	X 30	A	A	A	O X 42	A	A	X 54	70	72	78	88	72	39	44	27	27	A	O X 22	A	O X 50	
28	A	A	A	A	A	A	A	A	A	A	X 48	A	X 63	X 79	X 96	X 97	X 93	X 72	A	A	A	A	A	70	
29	A	A	C	A	A	A	A	A	A	X 34	65	63	76	77	77	68	45	40	28	B	A	A	O X 21	X 22	
30	O X 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 X 46	A	O X 33	A	51	51	44	B	O X 55	X 81	97	86	79	67	58	58	49	O X 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 X 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 X 26	25	56	57	
L Q	X 28	X 35	X 36	X 44	40	39	40	43	X 40	X 44	X 51	X 63	X 74	X 78	X 78	X 68	X 56	X 45	X 37	X 27	X 21	X 23	X 22	X 24	

MAY 2023 f_{XI} (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	67	R	U	R	B	B	B
23	B	A	A	A	B	B	A	A	B	B	B	B	B	B	R	61	53	50	B	B	B	B	B	R	A
24	A	A	B	A	B	A	A	A	B	B	R	42	54	71	69	68	65	63	54	49	B	R	R	R	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
26	R	R	R	B	B	A	A	B	B	B	B	62	75	80	79	52	46	41	27	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	21	21	A	R	A	R	44
28	A	A	A	A	A	A	A	A	A	A	42	A	F	51	73	90	91	61	56	F	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	42	36	22	14	A	A	A	A
31	A	A	A	R	A	R	A	R	F	B	R	J	R	F	F	70	61	43	39	38	R	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	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	16	17	16	18	18
U Q		42	44	40	44	34	31	36	39	49	57	72	82	88	87	77	70	56	45	32	20	18	48	42	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	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	39 ^K	50	48	55	42	59		25	32	42	37	23	25	31	31	27	16	50	37	47	44	
2	64	77	93	60	48	47	60	46		51	46	37			42	36	36	24	20	15	31	38	37		
3	36	55	35	42	33	27	14	14	12	20	20	26	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	29	27	29												
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	19	16	15	20		22	22	22	16	16	12	11	12	59	41	47	
16	29	51	18	41	53	64	66	64	42	42	42	31	22	20		12	14	10	11	16	13	34	44		
17	34	47	62	57	49	45	28	51	20	30	25	22		18		14	13	12	47	45	56	56	52		
18	40	34	23	27	29	20	15	12	10	18	14	23	22	26	18	14	14	14	14	12	56	66	31	55	
19	53	54	54	22	12	62	23	12	51	16	30	70		20	20	13	17	13	12	10	35	36	39	30	
20	36	46	75	69	53		60	58	60							54			26	32	38	40	37	33	
21	45	48	58		C	C	C	C	C	C	C	C	44	34	20	35	18	30		35	29	30	44	28	
22	B	54	41	46	21	69		44		B	B	B	B	41	36	44	48	51		B	B	38	45	49	
23	B	66	69	33	B	B		58	58	B	B	B	B	B	38	43	31		B	B	B	22	35	45	
24	42	59		46	B	77	49	42		B	32	26	39	40	37	19	38	42	18		29	28	37	45	
25	B	35	B	B	B	B		44	42	28		B	B	51	42		66	26	22		B	K	B	39	39
26	32	36	46	B	B	59	59		B	B	B	46	46	35	24	19	15	76	15	57	B	28	18	30	
27	31	42	54	26	47	35	52	46	44	41	22		21	21	18		12	12	14	55	16	56	48	38	40
28	41	34	40	56	52	58	92	57	68	60	55	64	44	44	58		25	24	29	64	82	60	50	46	33
29	95	47		49	41	36	52	48	52	39	14	18	19	27	16	13	15	15	22		45	39	42	42	
30	60	66	44	41	52	44	35	19	19	64	18	18	20		14	17	21	12	45	28	53	58	28	40	
31	90	51	61	41	53	36	55	33	26	33		39	62	28	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	22	24	27	28	22	19	18	18	18	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	20	22	18		15	14	13	12	26	30	35	33	

MAY 2023 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	A	A	A	A	A	A	A	A	A	E A	E A	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	E B	Q	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		
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	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		
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	A	A	282	238	176	214	210	204	200	202	202	202	204	226	Q	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		
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		
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		
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		
20	A	A	A	A	A	C	C	A	A	A	C	C	C	C	C	C	246		C	A	A	A	A	A		
21	A	A	A	B	C	C	C	C	C	C	C	C	E B	254	224	210	218	218	E A	B	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		
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		
24	A	A	B	A	B	A	B	A	B	E B	E B	E B	E B	E B	E B	E B	E B	E B	Q	B	A	A	A	A		
25	B	A	B	B	B	B	B	A	A	300	B	B	B	E B	E B	E B	E B	E B	Q	B	A	B	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		
27	A	A	E A	E A	A	A	A	A	A	E A	E A	256	206	214	202	208	206	198	E B	E B	E A	E A	A	246		
28	A	192	A	A	A	A	A	A	A	E A	E 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	E A	210	206	224	196	208	208	282	A	B	A		
30	A	A	A	A	A	A	A	328	E A	E A	E A	E A	E A	E A	230	204	198	208	222	262	214	E B	A	A		
31	A	A	A	A	A	A	A	A	292	368	A	B	E B	E B	E B	208	208	232	E B	Q	240	224	E A	A		
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	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	330	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			244	

MAY 2023 h'F (KM)

IONOSPHERIC DATA STATION SHOWA-ST.

JUN. 2023 f_{XI} (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 60	52	X 56	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	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	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	O X 22	X 18	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	109	90	90	50	O X 28	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	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	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_{XI} (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	Z	F	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	A
4	A	A	A	A	44	F	49	55	F	55	F	79	36	58	68	72	F	F	R	31	A	A	A	A	A
5	A	F	A	A	A	J R	R	R	F	F	F	F	F	F	F	F	F	F	F	30	20	R	B	A	R
6	A	A	25	22	R	A	A	A	F	F	F	F	F	F	F	F	F	F	R	R	A	B	A	A	
7	R	R	A	R	A	F	F	F	F	F	F	F	64	70	78	76	47	F	R	21	22	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	F	F	F	F	F	F	F	R	12	A	A	
10	A	A	A	A	32	F	43	16	23	30	36	57	73	75	60	F	F	F	F	F	F	A	R	A	
11	A	A	A	A	42	F	59	52	54	61	34	50	61	68	70	51	36	37	41	25	15	14	A	A	
12	A	A	A	A	A	A	F	F	F	F	F	Z	F	F	F	F	F	F	F	F	F	R	R	A	
13	A	A	A	A	A	F	31	34	34	40	40	43	66	72	84	76	57	45	47	30	19	A	B	A	A
14	A	A	A	A	F	A	A	A	46	43	39	44	53	62	69	64	46	39	31	22	15	14	13	F	R
15	R	R	A	R	R	A	A	A	F	F	F	F	F	F	F	F	F	F	F	F	A	A	A	A	A
16	A	A	A	A	A	A	A	A	A	A	B	A	A	B	49	F	R	53	32	A	A	A	A	A	A
17	A	A	A	A	A	R	A	A	A	A	A	A	B	F	F	F	F	B	R	A	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	A	A
19	A	A	A	A	A	A	A	A	A	A	A	A	A	50	F	F	Z	Z	36	31	A	A	A	A	A
20	A	R	A	A	A	A	A	A	A	A	F	F	F	F	F	F	F	B	A	R	A	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	A
22	A	53	A	A	A	F	F	38	A	A	F	F	F	64	74	56	39	48	33	38	A	A	A	A	A
23	A	A	A	A	A	A	A	A	A	A	F	F	F	74	82	74	F	F	F	F	A	R	A	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	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	A
26	A	A	F	A	A	A	A	A	A	A	J R	R	R	B	B	R	R	F	F	A	A	A	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	A
28	38	A	A	A	A	A	A	A	A	A	R	F	F	F	71	73	64	50	54	20	A	R	A	A	A
29	A	A	A	A	A	A	A	A	A	A	A	B	B	R	R	F	F	A	R	A	A	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	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	55	52	54	49	45	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 ftEs (0.1MHz) 45°E MEAN TIME (G.M.T. + 3 H)

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

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
1	68	54	45	37	56	47	57	42	57	58	55	B	58	36	34	26	20	19	40	36	40	36	42	53			
2	44	36	47	60	52	60	62	65	58	47	37	B	39	39	26	20	22	E	32	44	29	29	46	34			
3	56	75	54	47	46	48	19	20	14	14	14	G	20	18	E	E	46	59	89	54	107	42	B	66			
4	38	49	112	69	40	32	28	17	21	40	27	22	25	24	E	E	29	47	56	50	65	52	34	88			
5	48	30	54	46	41	41	41	40	40	40	23	34	48	64	22	22	26	E	E	E	20	B	60	42			
6	68	27	22	K	60	54	50	59	41	K	K	20	29	G	E	22	20	17	38	45	46	B	27	37			
7	33	32	32	33	37	30	31	31	E	E	B	11	10	17	27	20	29	G	E	E	E	52	55	47	27		
8	46	33	70	29	84	58	41	32	18	14	28	G	23	19	24	25	25	24	66	76	56	46	26	29			
9	34	33	43	30	32	42	57	42	27	15	12	K	16	22	20	15	12	12	14	17	28	44	37	28	46		
10	48	50	35	35	28	28	23	22	E	B	8	E	20	12	16	16	G	15	15	14	20	15	44	30	38	42	
11	42	37	37	43	51	41	28	14	E	B	10	22	20	25	15	G	16	15	E	E	E	88	35	30	36		
12	48	40	50	39	50	46	27	18	K	14	11	15	17	17	22	15	17	27	14	16	47	45	62	44	28		
13	38	47	51	46	46	32	32	30	25	20	37	18	E	24	24	24	16	E	E	E	46	B	46	31			
14	27	41	57	48	55	52	51	26	17	20	97	G	16	22	31	G	14	18	K	11	44	44	32	48	32	56	
15	48	50	56	95	27	32	44	44	25	23	18	30	17	23	16	16	11	16	22	17	45	62	39	53			
16	64	45	88	60	62	67	60	61	56	B	43	61	B	44	E	E	36	36	65	50	33	40	38	42	79		
17	57	55	56	54	58	22	58	58	58	52	74	B	E	E	E	E	B	B	B	B	K	20	59	32	58		
18	50	51	49	47	56	52	56	63	68	60	30	22	30	B	E	E	E	E	E	E	E	44	110	49	47		
19	61	46	38	110	82	62	56	61	55	57	59	58	E	E	E	E	E	E	E	E	K	33	46	45	46		
20	57	48	82	62	51	52	60	60	56	33	30	E	E	E	E	E	15	14	K	K	B	54	69	55	41	29	
21	42	59	86	52	49	56	60	52	50	59	64	E	B	18	15	16	14	16	14	55	47	31	35	31	41		
22	30	45	56	58	47	39	21	18	47	71	28	G	31	34	33	24	20	12	23	45	41	47	68	46			
23	64	48	56	59	48	36	40	48	48	46	27	G	15	15	28	45	20	14	22	21	24	40	45	40	44		
24	65	35	54	69	52	42	38	27	55	51	57	34	56	E	E	E	E	B	B	B	B	B	31	30	24	45	
25	56	47	42	67	58	49	56	56	49	B	57	E	E	E	E	B	G	19	15	E	E	E	K	45	42	37	51
26	42	62	24	61	55	48	48	47	49	52	41	E	E	E	E	E	45	56	36	18	17	42	45	30	29	39	
27	31	36	44	35	43	57	B	57	22	22	53	B	E	E	E	E	E	E	E	E	E	31	36	32	34		
28	39	54	45	47	52	51	59	61	48	50	36	15	19	E	E	E	E	E	E	E	E	54	59	36	31	35	
29	45	33	46	56	52	58	66	60	67	55	59	B	B	E	B	39	56	20	E	B	B	49	47	45	47		
30	44	60	62	45	46	57	57	52	35	20	18	K	17	E	E	E	E	E	E	E	B	54	56	68	47	64	
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	29	30	30	28	30	25	28	28	30	30	30	29	28	29	30	27	29	30			
MED	47	46	50	48	51	48	50	46	44	36	30	G	U	U	E	E	U	20	18	35	44	45	39	44			
U Q	57	51	56	60	56	56	58	59	55	52	55	34	E	E	E	E	E	29	32	56	54	52	55	46	53		
L Q	39	36	43	39	46	39	32	27	21	20	18	17	20	20	16	15	16	15	E	B	18	30	33	36	31	35	

JUN. 2023 ftEs (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

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	272	A	234	A	A	A	A	A	B	A	E	B	E	B	Q	A	A	A	A	A	A				
2	A	A	A	A	A	A	A	A	A	A	E	A	B	E	B	E	B	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	234	208	220	E	A	A	A	B	A			
4	A	A	A	A	A	A	A	A	344	A	312	302	302	278	H	E	A	E	A	E	A	A	A	A	A			
5	A	A	A	A	A	A	A	A	A	A	Q	Q	E	A	E	A	196	194	204	268	222	E	B	A	A			
6	A	198	198	210	A	A	A	A	Q	302	226	210	226	E	A	202	226	194	204	232	222	E	A	A	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	A			
8	E	A	A	A	A	E	A	A	360	314	250	242	254	226	E	A	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	E	A	A	A	342	336	306	A	E	B	E	A	206	202	206	200	210	216	208	E	A			
11	A	A	A	A	A	Q	Q	Q	324	322	274	264	272	244	E	A	210	218	204	214	E	B	A	A	A			
12	A	A	A	A	A	A	A	A	340	272	248	226	226	E	A	208	220	212	200	Q	Q	222	220	206	A			
13	A	A	A	A	A	A	A	A	E	A	E	A	A	E	A	E	A	220	230	262	264	258	A	A	A			
14	A	A	A	A	A	A	A	A	280	A	A	A	242	232	236	198	208	200	194	202	Q	210	242	202	E	A		
15	A	196	A	E	A	A	A	A	304	A	A	A	228	244	230	220	Q	Q	220	228	216	E	A	Q	A			
16	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	B	A	E	B	E	B	E	A	A	A			
17	A	A	A	A	A	A	A	A	A	A	A	A	A	B	240	254	224	218	236	E	B	E	A	A	A			
18	A	A	A	A	A	A	A	A	A	A	A	A	E	A	E	B	E	B	E	B	234	236	206	222	230			
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	E	A	E	A	B	A	A	A		
21	A	A	A	A	196	A	A	A	A	A	E	A	E	A	E	A	E	A	332	296	278	244	218	218	228	206	246	
22	A	208	A	A	A	A	E	A	A	A	A	A	E	A	E	B	E	B	E	B	E	B	E	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	A		
24	A	A	A	A	A	A	A	A	A	A	A	A	E	A	E	A	E	B	336	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	E	B	E	A	B	A	A	A		
26	A	A	A	A	A	A	A	A	A	A	A	A	A	E	B	E	B	E	B	E	B	298	230	216	226	244	244	194
27	240	270	A	A	A	A	B	A	E	A	A	A	A	B	E	B	282	320	246	252	240	242	230	B	A	A	A	
28	A	A	A	A	A	A	A	A	A	A	A	A	E	A	E	A	E	B	E	B	E	B	E	B	E	A	A	
29	A	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	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	A	A	A
31																												
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT	2	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	U	U	E	A		
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_{XI} (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
5	A	A	A	A	A	A	A	A		44	46	58	67	74	67	71	64	43	41	29	28	31	22	41	A
6	A	A	O	X		A	A	A	A	A	X									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
8	A	73	A	A	A	A	A	A	A	A	A	B	X						X	B	A	A	A	O	X
9	X	56	O	X	O	X	49	52	55	56	42	46	61	71	78	69	67	41	59	43		X	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
11	A	A	A	A	A	A	A	A	A	A	X	B							X	O	X	A	A	X	A
12	A	A	A	A	56	A	A	A		O	X	O	X						X	X	B	A	O	X	A
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	A
14	X	O	X	O	X	A	A		A	A	O	X	B						X	O	X	A	A	A	X
15	50	44	A	70	A	A	A	44	44	A	45	58	68	70	81	80	66	69	44	A	A	A	A	24	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
17	A	A	A	47	O	X	A	A	X	A	X	B	B	O	X				A	A	A	A	A	X	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	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
20	A	57	R	A		47	47	66	66	58	50	71	78	96	92	75	71	61	52	28	O	X	A	A	58
21	A	A	112	50	A	A	O	X	R	O	X	X	X	X	X	X	70	84	68	70	70	43	O	X	A
22	77	55	O	X	A	A	A			89	48	51	53	70	73	110	90	105	90	38	O	X	B	R	R
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
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
25	49	A	O	X	A	A	X	X			51	62	65	98	70	99	73	65	50	X	A	A	A	A	A
26	68	X	55	67	A	O	X	A	A	A	68	A	B						X	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
28	A	X	36	43	A	A	36	42	44	44	44	64	76	87	80	88	84	73	60	57	58	36	O	X	A
29	A	A	A	A	A	A	78	A	A	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A
30	A	A	O	X	X	O	X	X	X		B	O	X	X	X	X	X	X	X	X	B	B	A	A	X
31	A	82	A	A	A	A	A	A	A	A	B	B	O	X	X	X	X	X	X	X	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
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_{XI} (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
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
5	A	A	A	A	A	A	A	A	A	F	F	F	F	F	J	R	53	37	22	F	F	F	F	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
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
8	A	A	A	A	A	A	A	A	A	A	A	A	B	51	56	50	56	28	26	B	A	A	A	R
9	50	F	R	F	R	F	F	F	F	F	F	F	F	Z	Z	61	35	51	32	F	B	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	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
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
13	A	A	A	A	A	A	F	F	F	F	F	F	Z	81	50	45	27	32	15	F	R	R	A	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
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
17	A	A	A	F	R	A	A	A	A	A	B	B	B	B	F	Z	A	A	A	A	A	A	48	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	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
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
21	A	A	A	R	A	A	R	R	R	R	44	44	48	52	61	64	72	59	58	37	22	A	R	R
22	A	F	J	R	A	A	A	A	A	Z	Z	R	F	F	Z	F	F	R	B	R	A	R	A	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
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
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
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
27	A	U	R	A	A	R	A	A	A	Z	48	58	68	66	79	63	52	42	31	23	F	R	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
29	A	A	A	A	A	A	A	A	A	A	42	52	76	70	72	80	80	64	63	68	47	A	A	A
30	A	A	47	45	36	46	48	48	A	B	R	47	50	61	80	Z	76	95	97	64	B	B	A	A
31	A	A	A	A	A	A	A	A	A	A	B	B	R	F	F	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	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	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	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	B	B	B	B	B	B	B	B	B	E B 51	E B 36	E B 34	E B 24	B	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	E B 40	E B 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	308	290	256	232	218	218	214	246	214	204	B	A	B	B	200							
3	204	A	A	A	A	A	A	A	A	A	370	296	302	250	216	200	196	206	218	196	198	212	266	248	268	200						
4	A	A	A	A	A	A	A	A	A	A	212	318	278	240	208	208	194	196	188	224	220	222	A	192	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	A						
6	A	A	212	A	A	A	A	A	A	A	308	264	248	220	232	222	210	244	222	A	A	A	A	A	A	A						
7	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	246	246	292	168	A	A	A	A	A	A						
8	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	232	216	232	216	246	252	B	A	A	200	192					
9	A	A	224	288	A	A	A	A	A	A	332	290	274	254	220	212	212	204	204	190	278	236	214	B	A	A	A					
10	A	A	A	A	A	A	A	A	A	A	290	226	234	204	202	202	206	234	242	218	236	A	A	A	A	A						
11	A	A	A	A	A	A	A	A	A	A	286	B	B	B	B	B	266	244	204	220	240	216	224	312	A	A	200					
12	A	A	A	A	A	A	A	A	A	A	270	228	214	226	226	226	226	248	218	B	A	178	A	A	A	A						
13	A	A	A	A	A	A	A	A	A	A	272	248	214	220	212	198	194	200	224	214	192	210	A	A	A	284	A					
14	A	298	292	220	A	A	A	A	A	A	A	A	A	B	B	B	286	240	240	228	232	266	270	A	A	A	264	252				
15	A	A	A	200	A	A	A	A	A	A	198	202	238	242	208	218	E	B	226	240	216	A	A	A	A	204	A					
16	A	A	A	A	A	A	A	A	A	A	390	290	224	226	234	234	212	186	228	200	266	A	A	A	A	A	A					
17	A	A	A	280	A	A	A	A	A	A	300	364	A	B	B	B	338	214	222	222	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	B	B	A				
19	A	A	310	A	A	A	A	A	A	A	332	308	300	300	266	252	252	264	200	200	194	E	B	312	220	264	220	A	A	A	A	
20	A	A	A	A	A	A	A	A	A	A	284	238	274	204	224	224	206	218	194	224	210	198	208	B	A	A	A	A	A			
21	A	A	A	232	A	A	A	A	A	A	306	236	230	214	204	184	200	228	208	224	286	A	A	A	A	A	A	A	A			
22	A	A	A	316	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		
23	302	250	A	A	A	A	A	A	A	A	384	324	276	270	222	224	230	208	198	208	196	240	208	A	A	204	A	A	A	A		
24	A	A	A	A	A	A	A	A	A	A	278	196	202	202	216	222	190	196	216	224	A	A	A	A	A	A	A	A	A	A		
25	A	A	244	A	A	A	A	A	A	A	262	218	210	218	244	218	230	204	198	230	246	A	A	A	A	A	A	A	A	A		
26	A	194	198	A	A	A	A	A	A	A	198	A	B	A	B	B	338	300	294	250	264	A	A	A	A	A	A	A	A	A		
27	A	206	A	A	198	A	A	A	A	A	338	270	228	228	204	204	202	194	210	210	224	216	230	A	A	A	A	A	A	A		
28	A	284	A	A	A	A	A	A	A	A	360	332	294	252	224	202	208	202	210	218	218	188	264	216	228	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	A	A	A	A	A	A	
30	A	A	216	210	A	A	A	A	A	A	358	200	A	B	B	B	264	232	228	224	218	222	210	234	232	212	B	B	A	A	A	
31	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	00	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	332	345	295	284	263	235	229	217	208	209	210	222	226	220	220	233	203	224	200								
U Q		284	301	280		390	372	328	300	304	282	250	238	238	231	222	246	242	242	266	248	270	284	237								
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)

IONOSPHERIC DATA STATION SHOWA-ST.

AUG. 2023 f_{XI} (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	78	R	R	R	A	A	
3	74	A	54	A	58	41	X 45	X 46	X 44	X 62	X 72	X 74	X 86	X 96	X 94	X 86	X 86	X 86	X 86	R	B	R	O X 20	X 22	O X 22	
4	A	A	A	A	A	O X 48	X 26	45	45	49	70	78	96	94	89	85	83	106	88	38	X	A	70	56	A	
5	67	A	A	A	A	A	A	A	A	A	62	A	A	X	50	48	51	61	60	40	X	A	R	R	A	
6	O X 41	X 44	47	A	A	A	A	X	25	38	53	70	76	78	75	78	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 85	X 94	X 72	X 68	X 80	X 48	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	O X 35	A	O X 37	A	A	
9	A	A	A	A	A	69	A	O X 40	X 40	X 42	X 61	X 71	X 78	X 94	X 96	X 88	X 78	X 72	X 68	X 49	X	B	58	O X 51	X 44	
10	A	X 47	A	A	X 51	A	A	A	X	56	56	62	80	86	99	109	106	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	
12	A	A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	B	42	A	
13	O X 47	X 55	A	A	A	A	X	X 44	X 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	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	
16	A	A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	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	X	O X 56	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 22	O X 20	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 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	
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	
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 41	B	A	X 26		
26	42	A	A	O X 26	X 31	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	31	
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	
29	56	A	A	A	A	X	36	39	39	54	68	74	72	88	91	94	105	100	94	83	O X 34	X	A	A	A	
30	O X 26	57	70	A	81	A	X 56	64	66	72	82	98	106	95	104	102	104	94	82	43	X	A	A	A	A	
31	49	56	50	44	X 45	O X 50	X 55	53	45	X 71	X 72	110	112	102	X 113	92	94	70	90	46	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		
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	X 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 f_{XI} (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 R 93	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	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	34	A	A	R	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 R 62	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	F 77	66	62	F 68	42	B	A	A	A			
8	A	A	A	A	A	38	A	A	37	48	54	67	68	F 74	V 82	69	F 78	75	F 39	R	A	U	R	A	A		
9	A	A	A	A	A	R	A	R	J R 34	36	55	61	72	F 83	F 85	F 80	72	66	62	F 39	B	R	R	R	45	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	F 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 R 51	F 28	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	R	A	A	A		
15	A	A	A	A	A	A	A	F 40	F 37	F 46	Z 69	78	86	88	88	84	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 R 85	F 54	F 54	F 22	A	A	A	A	A		
17	A	A	A	A	A	A	A	A	A	F 50	59	68	64	67	75	71	68	66	65	F 39	R	A	R	37	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 R 73	72	73	F 42	F 28	U	R	U	R	R	14	63
20	A	A	A	A	A	A	A	A	40	52	54	64	78	86	76	89	79	66	F 52	F 46	28	19	A	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 R 79	85	92	88	F 93	J R 82	66	60	F 31	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	B	A	A	20	A	
26	A	A	A	R 20	25	F 20	52	A	Z 58	57	65	83	102	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 R 42	J R 46	62	64	74	83	72	74	63	55	J R 34	A	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	90	53	F 25	F 37	A	A	A	A	A	
29	F 40	A	A	A	A	F 23	F 23	33	48	62	68	J R 66	82	85	88	J R 99	94	F 85	F 61	R 28	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	98	88	76	J R 37	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	96	107	80	F 82	F 64	F 61	F 40	33	12	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	F 34	26	R 16	R 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	R 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

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	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	B	E	B	B	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	B	B	23	45	31	30				
4	59	46	44	42	46	24	53	56	E	B	E	B	B	B	G	G	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	B	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	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	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	24	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	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	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	26	36						
13	43	43	52	56	58	50	30	26	21	G	21	25	24	24	22	G	14	11	12	8	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	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	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	31	30	36	81					
19	65	38	B	52	39	34	16	20	G	30	25	25	25	G	25	24	22	20	E	B	E	B	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	17	25	34					
22	36	47	52	46	48	44	64	62	54	B	B	E	B	E	B	E	B	E	B	E	B	B	56	14	48					
23	33	36	42	48	39	36	28	11	G	17	24	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	26	28	26	22	22	17	14	E	B	E	B	14	54	29					
26	38	54	42	66	100	15	45	55	37	E	B	44	39	E	B	E	B	E	B	E	B	45	36	11	37	44	44	53	47	
27	46	48	41	78	64	48	79	66	65	E	B	E	B	E	B	E	B	G	G	G	G	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	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	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		
CNT	31	31	30	31	31	31	31	31	31	30	30	30	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	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	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						

AUG. 2023 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

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	E 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	B	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	E A 220	242	E B 214	E B 216	E B 228	204	242	228	222	E B 286	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 236	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	E A 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	E B 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	
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	
18	A	A	A	A	A	E A 298	A	A	A	A	E 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	204	238	312	256	Q 230	220	252	206	E B 238	226	214	B	A	A	A	A
22	A	A	A	A	A	A	A	A	A	B	B	E B 292	220	230	216	214	240	208	232	B	A	200	198	
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	E A 196	E A 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	E A 204	200	228	228	196	196	204	200	200	174	202	222	B	A	190	
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	B	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	E A 260	E A 242	E B 264	E B 230	248	E B 226	E A 228	222	E A 266	E A 336	A	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	
30	224	A	200	A	A	A	E A 350	E A 278	E A 190	E A 252	230	216	216	186	196	208	214	232	242	A	A	A	190	
31	A	A	218	A	E A 370	A	A	E B 192	Q 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 U 366	E A U 287	E A E 320	E A E 268	E A E 213	E A E 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 64	X 56	O X 72	A	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	X 68	X 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	X 56	X 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	A	X 57	66	75	80	83	85	100	115	94	92	93	69	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	32	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	39	A	O X 46	A	92
19	A	80	78	A	A	A	B	A	A	A	B	O X 45	X 44	X 44	X 53	X 50	X 60	X 36	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 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	A
23	A	A	A	X 46	O X 59	55	O X 55	O X 61	O X 66	66	68	78	76	80	84	91	91	91	86	67	69	57	R	59
24	A	A	A	O X 59	X 49	59	X 54	A	O X 61	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	O X 50	X 56	X 54	X 63	X 68	X 61	X 56	X 52	O X 46	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	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 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	R 25	R 58	A	R 66	A	A	A	A	42	43	55	64	77	76	108	F 98	F 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	F 52	124	62	63	47	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	A	A	
4	A	R 46	A	A	A	J 28	R	A	A	37	38	43	51	54	56	59	60	J 64	R 63	F 47	36	A	A	A	
5	A	A	A	A	A	A	A	F	F	30	38	52	64	79	92	92	99	Z 100	J 84	R 60	F 58	36	A	28	
6	A	A	A	A	A	A	A	45	46	54	F 69	J 77	R 80	Z	92	97	87	J 84	R 76	F 70	57	F 24	R 18	J 28	
7	A	A	A	A	A	A	A	45	54	59	67	86	92	96	94	94	84	F 65	F 69	64	J 51	R 18	R	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	F 64	F 72	55	J 28	R	A	A	
9	A	A	A	R 32	A	A	A	A	51	60	69	74	77	79	94	F 96	F 88	F 86	F 82	62	A	A	A	A	
10	A	F 43	F 40	R 43	F 31	F 37	F 29	A	45	50	63	72	83	84	94	96	93	J 106	R 66	F 54	53	44	30	F 18	
11	A	A	A	A	F 29	F 29	A	X 48	R 58	F 62	F 74	F 93	Z 96	F 99	F 106	F 101	Z 96	F 83	F 62	54	36	33	20	A	
12	A	A	A	A	A	A	A	40	52	66	77	83	F 91	F 96	F 88	F 88	Z	91	F 84	F 49	F 44	A	A	A	
13	A	47	A	A	30	A	39	F 34	34	A	42	56	51	51	51	60	Z	52	F 54	F 37	A	A	A	A	
14	A	R 28	62	A	A	A	A	A	A	A	50	55	61	67	69	69	62	F 53	F 53	F 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	F 52	40	23	18	A	26	
16	R 32	A	F 39	A	R 41	A	40	48	57	65	75	74	88	89	88	83	78	J 87	R 72	F 66	F 22	A	A	A	
17	A	A	F 48	F 43	F 44	A	A	A	60	61	72	82	80	90	Z 81	F 84	F 82	F 70	F 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	F 42	F 25	A	R	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	
20	A	A	A	A	A	A	A	A	A	43	B	50	53	59	62	68	63	56	56	44	28	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	F 30	F 27	R	A	A	
22	A	A	B	A	A	F 43	R 40	R 41	57	63	62	70	73	71	72	79	V	R	F 67	58	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	
24	A	A	A	F 51	R 43	F 48	48	A	55	54	59	62	63	69	F 73	Z 86	F 79	F 69	F 64	55	F 51	F 42	A	A	
25	A	A	F 27	A	F 43	F 40	A	A	33	41	38	44	50	48	57	62	55	50	46	F 33	R 18	A	U	R 27	
26	A	A	A	A	A	A	41	U 44	R 46	B	B	B	46	80	83	58	49	F 55	F 45	36	31	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	
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	
29	F 22	A	45	53	A	A	A	A	B	B	B	R	63	F 114	F 94	F	B	B	F 70	Z 65	Z 65	F 50	F 49	F 33	
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	F 67	V 56	F 43	F 44	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	F 43	41	45	54	60	67	71	73	78	86	81	81	66	56	53	33	30	F 34	28	
U Q	R 28	47	53	F 51	43	F 48	48	54	60	64	72	81	88	92	96	94	88	83	69	58	45	49	F 36	36	
L Q	F 23	28	F 32	39	30	34	F 39	41	42	54	55	56	54	59	69	62	64	60	49	F 40	F 27	R 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	G 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	E B 24	E B 24	E B 20	E B 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	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	G 14	G 13	E B 14	E B 10	E B 18	E B 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	26	24	G	E B 19	E B 19	E B 10	E B 46	E B 48	E B 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	37	G	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	G	E B 46	E B 40	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 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	E B 16	E B 33	E B 36	E B 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	E B 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	G	26	24	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	G	24	22	19	E B 18	28	40	38	

SEP. 2023 ftEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

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	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	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	
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	
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	15	15	12	12	13	20	12	9	9	8	12	
27	17	6	10		B	14	13	14	16	16	16	18	20	40	50	30	17	29	28	25	7	6	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	
29	8	9	10	12	14	17	16	18		B	B	B	35	26	15	14		B	B	20	23	12	16	10	
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																									
	00	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	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	Q E	B E	A	A	A	A	A	A			
2	A	A	A	A	236	A	A	B	B	A	B	B	B E	A	282	306	292	240	284	206	A	A	A	202	A		
3	A	A	A	A	A	A	A	A	A	A	A	A	B E	A E	B E	B E	B E	B E	B E	258	258	A	A	A	A		
4	A	A	A	A	A	A	A	A	A	216	B E	B	A	220	224	194	E A	220	204	216	216	A	A	A	A		
5	A	A	A	A	A	A	A	A	A	214	198	198	192	218	208	222	214	200	200	204	278	A E	A	A E	A		
6	A	A	A	A	A	A	A	A	E A	E A	E A	282	246	200	B E	B E	A	E A	E A	E A	208	214	286	A	A		
7	A	A	A	A	A	A	A	A	220	224	222	206	210	216	222	202	202	192	202	222	210	248	A	A	A		
8	A	A	A	A	248	A	A E	A	300	200	222	216	230	220	210	210	220	212	200	212	202	238	A	A	A		
9	A	A	A	274	A	A	A	A	A E	A	268	228	208	232	214	210	226	E A	192	E A	234	230	A	A	A		
10	A	300	242	368	A	A E	B	222	262	222	226	224	218	202	198	A	200	202	216	194	204	A	A	A	A		
11	A	A	A	A	A	A	A	A	254	198	202	206	E A	214	212	E A	202	204	216	208	214	212	270	A	A		
12	A	A	A	A	A	A	A E	A E	A E	A E	A	362	248	232	218	218	E A	206	222	214	198	286	274	A	A	A	
13	A E	A	A	A E	A	A	A	A	A	A	A	A	236	244	228	234	A E	A	A	A	A	A	A	A	A		
14	A	A	A	A	A	A	A	A	A	A	B	252	E B	E A	E A	218	210	194	224	224	Q	242	214	A	A		
15	A	A	A	A	224	A	A	A E	A	302	280	238	206	E A	212	220	206	218	200	202	A	A	A	A	194		
16	190	A	A	A	A	A	A	A E	A	240	222	200	156	216	220	202	E A	210	214	196	214	260	A	A	A		
17	A	A	A E	A E	A	A	A	A	200	210	192	238	E B	248	212	230	228	224	218	220	250	206	A	A	A		
18	A	A	A	A E	A	A	A	A	A	A	A	226	268	256	234	228	E B	H	A E	A	A	A	A	A	A		
19	A	A	A	A	A	A	B	A	A	A	B 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	B E	B	300	244	258	E B	E A	E B	E A	276	A	A	A		
21	A	A	A	A	A	228	A	B E	A	318	238	206	240	202	208	216	208	238	E B	E A	A	202	A	A	A		
22	A	A	B	A	A	A	A	A	196	232	248	B E	B	292	218	226	236	E B	E A	236	196	224	234	A	A	A	
23	A	A	A	A	A	A	A	A	A	A E	A	320	230	198	224	238	238	E A	E B	238	250	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	B E	A	E B	E B	E B	H	A E	A	250	232	A	A	A	
25	A	A	A	A	A E	A	A E	A	A	A E	A	A E	A E	A E	A E	A	A	A	A	A	A	A	A	A	A	A	
26	A	A	A	A	A	A	A	A	B	B	B	B E	A E	A E	A E	A E	A	A	A E	A E	A	320	A	A	A	A	
27	A	A E	A	B	A	A	A	A	232	118	226	200	E B	E B	E B	E A	242	232	E B	E A	A	A	A	A	A		
28	A	A	A	A	A E	A	A	B	210	208	210	212	222	E B	E B	E B	E B	224	220	E B	E B	222	222	224	226	248	
29	304	A	A	A	A	A	A	A	B	B	B	A	276	E A	254	B	B	Q	Q E	A	228	E A	E A	E A	E A		
30	A	A	242	268	A	A	A E	A	356	254	234	234	228	222	226	224	254	B	254	206	A	A	A	A	A		
31																											
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)

IONOSPHERIC DATA STATION SHOWA-ST.

OCT. 2023 f_{XI} (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

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	69	55	85	70	X ^O 56	X 45	X 56		76	78	X 88	X 104	X 106	X 109	X 113	X 120	X 108	X 90	X 78	68	58	58	46	
2	X ^O 44	X 84	X 60	X 69	A	A	X 56	X 67	X 70	X 76	X 81	X 81	X 96	X 100	X 101	X 109	X 107	X 92	X 93	X 89	X 62	X 47	X ^O 53	X 55	
3	A	X 50	A		68	57	X 57	X 63	X 75	X 90	X 86	X 105	X 102	X 109	X 108	X 103	X 111	X 106	X 92	X 71	54	A	A	X 50	
4	X ^O 48	X A	A		67	X 69	X 58	X 66	X 59	X 67	X 75	X 74	X 74	X 78	X 84	X 88	X 96	X 98	X 90	X 84	X 70	X 56	X 42	X 45	
5	X 52		X 55		A	A	A	A	A	A	B	X 65	X 66	X 73	X 79	X 87	X 99	X 97	X 88	X 78	X 66	X 65	X 47	X ^O 43	
6	X 42	X ^O 41	X 40		A	A	A	X 68		X 81	X 80	X 80	X 90	X 91	X 89	X 91	X 87	X 78	X 74	X 67	X 68	X 58	X 50	X 45	
7	X ^O 35	X 64	X 64	X 90	X 81	X 56	X 78	X 78	X 95	X 99	X 102	X 108	X 110	X 109	X 106	X 98	X 95	X 88	X 82	X 76	X 70	X 66	X 55	X 50	
8	X 66	X 54	X 72	X 70	A	X 62	X 65	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	70	64	X ^O 59	
9	X 54	X 62	X 56	X 56	A	X 56		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	X 64	A	X 59	
10	X ^O 53	X 36	X 72	X 50	X 57	X 57	X 62	X 71	X 77	X 86	X 92	X 98	X 102	X 115	X 115	X 115	X 110	X 102	X 95	X 84	X 74	X 61	X 53	X 56	
11	X 54	X 58	X 67	X 54	X 56	X 65	X 83	X 104	X 110	X 113	X 113	X 121	X 121	X 125	X 126	X 128	X 119	X 111	X 103	X 90	X 74	X 67	X 66	X 75	
12	X 59	X 44	X 48	X ^O 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	X 55	X 70	X 64	X 58	X 72	X 90	X 76	X 55	X 89	X 76	X 83	X 88	X 92	X 92	X 105	X 90	X 73	X 48	X 46	A	X 46	
14	X 49	X 89		X 91	X 43	X 48	X 55	X 62	X 69	X 73	X 86	X 91	X 96	X 104	X 105	X 107	X 99	X 84	X 83	X 78	X 68	X 59	X 58	X 62	
15	X 88	X 57	X 57	X 60	X 65	X 74	X 89	X 102	X 112	X 114	X 104	X 104	X 106	X 105	X 106	X 103	X 101	X 92	X 78	X 79	X 73	X 61	X 58	X 58	
16	X 36	X 51	X 57	X 69	X ^O 58	X 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	X 77	X 85	X 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	X 96	X 73	X 47	A	A	A	
19	A	X 63	X 75	X 76	X 62	X 64	X 55	A	A ^O X	X 61	X 70	X 82	X 87	X 97	X 92	X 84	X 69	X 72	X 58	X 48	X ^O 46	A	A	A	
20	A	X 58	X 56	X 60	X 68	X 56	X 64	X 73	X 82	X 90	X 84	X 83	X 86	X 93	X 95	X 88	X 82	X 79	X 77	X 71	X 59	X 56	X 56	A	
21	X 64	X 71	X 76	X 53	X 62	X 47	A ^O X	X 42	A	A	A	X 46	X ^O 46	X 46	X 63	X 58	X 52	X 51	X 57	X ^O 62	X 46	A	A	A	
22	A	X 70	X 53		X 50	X 58		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	X 57	X 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	X 54	
25	X 27	X 55	X 57	X 50	X 58	X 66	X 85	X 92	X ^O 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	X 90	X 88	X 91	X 91	X 94	X 101	X 112	X 108	X ^O 60	X 49	X 51	X 56	X 52	X 51	A	
27	A	A	X 52	X 56	A	A	R	R	X 54		X 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	X 52	X 46	X 58	X 81	A ^O X	X 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 ^O 63	X 86	A ^O X	X 44	
29	X ^O 48	X A	X A	X A	X 52	X 56	X 54	X 69	X R	X B ^O	X ^O X	X B	X B ^O	X X	X 74	X 70	X 58	X 47	X A	X 41	X 46	X 45	X 62	A	
30	A ^O X	X 53	X 58	X B	X 56	X B	X A	X 56	X 65	X 64	X 64	X 66	X 68	X 73	X 83	X 83	X 70	X 49	X 60	X 55	X 61	X 55	X 44	X 49	
31	X 58	A	X 53	X 56	X 68	A	A	X 69	X 73	X 77	X 85	X 82	X 83	X 87	X 97	X 95	X 88	X 77	X 67	X 66	X 66	X 61	X 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	X 57	X 57	X 62	X 63	X 58	X 68	X 73	X 82	X 87	X 85	X 88	X 94	X 98	X 97	X 98	X 95	X 88	X 78	X 70	X 65	X 58	X 56	X 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_{XI} (0.1MHz)

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	47	48	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	97	84	68	61	60	69	
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	93	J	R	77	72	62	53	F	
15	R	F	F	F	F	F	77	81	F	F	90	98	98	100	99	100	97	95	86	72	73	67	55	52	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	F	74	77	F	94	95	100	111	109	111	108	109	104	100	94	77	71	66	61	64	
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	F	52	67	76	74	78	77	80	82	89	82	76	73	71	65	53	44	A	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	21	
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	F	F	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	54	R	43	45	50	46	45
27	A	A	J	R	J	A	A	R	A	B	50	60	57	F	F	F	62	60	61	59	60	59	45	34	41	
28	Z	40	F	60	A	52	62	67	F	F	58	59	74	F	Z	J	R	75	60	60	41	48	F	57	80	
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	A	
30	A	R	52	B	47	B	A	50	59	58	58	60	62	67	77	77	64	43	54	49	55	49	38	38		
31	R	A	47	50	F	A	A	F	Z	67	71	79	76	77	81	91	89	82	71	61	60	60	55	49	F	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	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	39	39		G	G		E B	40	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	E B	E B	G	11	36	38	41				
3	46	46	50	41	44	34	29	47			33	43	42	33	32	32		E B	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		E B	E B	E B	E B	24	24	37	27	36	36		
5	34	79	39	63	54	64	56	42	64		B	E B	E B			G	E B	E B	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		G	G	G	G	G		16	16	19	30	33			
7	37	28	36	58	36	47	44	34	30	38		G				G													
8	34	40	46	49	52	35	38	67	71	50	38		G			E B	E B	E B	E B	E B									
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																	
11	12	12	13	14	20		34	34	28								E B	E B	E B	E B									
12	22	36	40	58	53	41	34			35		G	G																
13	15	34	30	29	29	23	34	30	41	54	63	40	33																
14	42	36	38	41	41	31	37	28	33	36	36	41	35	28															
15	31	26	23	28	30	20																							
16	E B	10	22	17	36	38	24	24	31	33	34	38	38	38	34	40	37	28	26	23		13	13		E B	16			
17	E B	8	12	12	17	24	41	44	33	30	37	37	37		34	33	34	28				18	15	9	E B	E B			
18	13	26	39	42	27	18			32	32	36	36	39	36	18	33	33	33	26	27	33		52	56	61				
19	49	30	26	38		G	30	27	71	76	46	40					E B	E B	E B	E B		44	54	55	54				
20	40	42	42	36	47	33	39	40	43			37	36	35	36							21			41	81			
21	39	43	57	38	35	24	59	58	59	45	68	32	34	E B	E B	E B						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														
23	41	37	29	28	28	26	26	31	31	32	35	35	68	55															
24	15	25	24	16	18	26	29	31	34	34	30	37	32	32	34	29													
25	28	18	27	33	37	46	39	48			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																
28	34	37	34	46	102	36	29	46	47	46	46																		
29	64	70	68	55	30	37	37	37	58		B	42	33																
30	77	42	43		35		51	49			G	G	G	G	G	G													
31	45	44	E B	E B	30	62	64	46	37		G		40	40	37	32	E B												
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23					
CNT	31	31	31	30	31	30	31	31	31	28	31	31	30	30	31	31	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								26	24	20	21	36	37		
U Q	46	44	43	46	52	46	44	49	53	45	42	39																	
L Q	28	28	27	28	28	26	29																						

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	270	262	220	218	224	212	242	234	258	E A	A	A	A	A	A					
4	258	A	A	A	A	A	A	A	A	E A	346	248	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	266	224	238	240	242	224	240	218	E A	E A	240	E A	E A	248					
6	A	A	A	A	A	A	A	A	A	A	234	268	226	240	216	210	218	E A	234	224	214	198	230	242	242					
7	A	A	A	A	A	A	A	A	A	A	242	242	236	204	210	216	208	218	218	224	224	214	202	E A	E A					
8	A	A	A	A	B	A	A	A	A	A	268	238	230	252	234	228	228	228	234	234	E B	222	232	258	A					
9	A	A	A	A	A	A	A	A	E A	A	296	240	240	214	214	206	230	230	222	246	248	A	A	A	A					
10	A	A	A	E A	A	A	A	A	E A	A	352	244	212	234	346	230	244	218	216	214	A	220	234	234	222	218				
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	A	A	270	234	222	224	218	218	210	230	218	230	226	216	216	214	210	220	222	242	Q	
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	A	A	A	Q	
14	A	A	A	A	A	A	204	208	232	238	216	216	208	198	204	222	224	214	210	E A	214	196	220	252	280	Q				
15	264	332	368	358	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	Q	Q	Q		
17	228	252	278	296	260	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	224	Q		
18	230	298	A	A	A	282	236	226	232	220	210	214	206	188	204	218	230	228	A	A	A	A	A	A	A	A	A	A		
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	292	242	260	284	A	A	A	A	A	A	A	A		
20	A	A	A	A	E A	E A	E A	A	A	A	270	224	214	214	230	240	206	232	218	226	216	222	208	278	A	A	A	A		
21	A	A	A	A	A	E A	254	A	A	A	A	A	A	220	E A	E B	264	238	202	236	A	A	A	A	A	A	A	A	A	
22	A	A	A	A	A	A	A	A	A	A	202	202	220	234	294	252	A	B	E B	E B	E B	E A	270	206	256	A	A	A	A	
23	A	A	E A	A	A	222	232	236	212	216	226	212	220	220	208	208	222	222	218	212	222	224	222	240	A	A	A	A	A	
24	242	262	288	310	294	258	224	228	222	214	214	228	204	202	210	206	216	216	218	224	H	234	216	224	244	A	A	A	A	
25	186	256	256	A	A	326	252	236	216	216	224	202	194	202	210	210	224	222	218	186	H	202	254	A	A	A	A	A	A	
26	A	A	A	A	E A	288	328	222	A	420	210	220	198	226	222	210	348	276	228	E A	E A	266	E A	E A	A	A	A	A	A	
27	A	A	288	A	A	A	A	A	A	A	B	E A	E A	E A	A	230	232	230	226	234	234	262	254	244	222	276	A	A	A	
28	A	A	A	A	A	A	A	E A	A	A	362	302	244	232	218	E B	242	310	272	224	266	A	A	A	A	A	A	A	A	
29	224	A	A	A	A	E A	E A	A	A	B	246	232	E A	B	B	B	B	E A	A	A	A	E A	E A	E A	E A	E A	E A	E A	E A	
30	A	A	A	B	A	B	A	A	A	A	224	188	222	206	206	218	212	238	230	E A	270	224	232	236	256	306	A	A	A	
31	A	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	A	A	A	A
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
CNT	11	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	282	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)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION SHOWA-ST.

NOV. 2023 f_{XI} (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 42	A	55	X 56	B	X 62	A	A	X 68	X 78	X 77	X 79	X 88	X 95	X 94	X 94	X 93	X 82	X 71	X 68	85	X 64	X 54	X 63
2	58	55	X 59	O X 63	X 63	X 71	X 69	X 76	X 80	X 86	X 84	X 86	X 90	X 91	X 91	X 88	X 86	X 76	X 70	58	X 57	X 59	X 51	
3	51	56	O X 60	X 64	X 70	X 74	X 94	X 103	X 106	X 106	X 105	X 102	X 100	X 99	X 93	X 88	X 81	X 79	X 77	X 75	X 68	X 68	X 80	X 70
4	X 70	X 71	X 82	X 88	X 93	X 69	X 77	X 88	X 106	X 110	X 116	X 112	X 104	X 102	X 102	X 99	X 94	X 84	X 81	X 70	X 64	O X 60	X 58	X 56
5	O X 56	O X 72	X 59	O X 54	X 64	X 57	X 54	X 65	X 71	X 84	X 71	X 71	X 71	X 65	X 60	X 50	X 50	X 52	X 64	X 39	X 38	X 92	X 32	X A
6	92	A	52	A	A	A	O X 48	X 45	X 47	X 52	X 59	O X 50	X 50	B	O X 50	X 62	X 60	X 59	X 60	X 47	X 44	X 47	X A	
7	A	A	X 56	B	X 59	X 67	X 51	X 56	X 60	X 63	X 62	X 60	X 61	X 64	X 65	X 61	X 62	X 60	X 57	X 52	X 54	X 34	X A	
8	A	X 47	O X 48	X 56	X 53	X 58	X 57	R	A	X 55	X 62	X 65	X 66	X 69	X 66	X 65	X 61	X 65	X 62	X 52	X 49	X 49	X A	
9	X 52	X 56	X 59	X 58	R	A	A	O X 63	X 67	X 69	X 71	X 70	X 70	X 74	X 76	X 67	X 67	X 64	X 56	X 55	X 52	X 51	X 55	
10	A	X 46	X 56	X 60	X 52	X 59	X 69	X 66	X 68	X 69	X 75	X 75	X 75	X 75	X 76	X 78	X 73	X 66	X 66	X 60	X 57	X 56	X 50	
11	X 49	O X 48	X 57	X 53	X 62	X 62	X 74	X 94	X 93	X 106	X 99	X 92	X 90	X 85	X 81	X 78	X 75	X 74	X 66	X 63	X 65	X 58	X 62	X 61
12	X 62	X 64	V 68	X 71	X 71	X 72	X 86	X 96	X 95	X 102	X 104	X 114	X 114	X 128	X 135	X 106	X 116	X 91	X 77	X 68	X 68	X 66	X 64	X 63
13	X 61	X 70	X 67	X 54	A	A	X 59	X 62	X 79	X 79	X 67	X 66	X 66	X 66	X 64	X 68	X 67	X 68	X 64	X 54	X 57	X 48	X 59	X 55
14	X 58	X 60	X 65	X 68	X 68	X 74	X 82	X 86	X 88	X 88	X 88	X 91	X 90	X 86	X 83	X 78	X 75	X 68	X 68	X 60	X 55	X 52	X A	X A
15	X 49	X 54	X 55	X 56	A	A	A	X 60	X 67	X 70	X 74	X 73	X 69	X 72	X 74	X 70	X 69	X 63	X 65	X 60	X 44	X A	X 53	X 53
16	A	X 59	X 59	X 59	X 57	X 61	X 64	X 63	X 71	X 73	X 72	X 77	X 77	X 80	X 84	X 79	X 69	X 63	X 56	X 52	X 50	X 52	X 45	X 45
17	X 47	A	A	X 50	X 59	X 67	X 77	X 86	X 91	X 84	X 85	X 83	X 82	X 78	X 76	X 73	X 69	X 64	X 62	X 60	X 58	X 42	X 45	X 45
18	X 49	X 52	X 56	X 63	X 67	X 73	X 83	X 90	X 94	X 96	X 93	X 91	X 89	X 85	X 78	X 77	X 71	X 72	X 69	X 66	X 66	X 63	X 68	X 61
19	X 45	X 56	X 57	X 64	X 68	X 70	X 82	X 90	X 94	X 92	X 90	X 86	X 79	X 73	X 77	X 77	X 73	X 70	X 70	X 65	X 62	X 60	X 57	X 54
20	X 48	X 58	X 62	A	X 52	X 60	X 64	X 78	X 81	X 85	X 83	X 84	X 84	X 86	X 81	X 81	X 76	X 70	X 68	X 67	X 62	X 60	X 51	X 51
21	X 51	X 60	X 59	X 65	X 58	X 66	X 80	X 84	X 94	X 96	X 95	X 99	X 114	X 109	X 80	X 66	X 69	X 62	A	X 52	X 56	X 60	X 55	X 52
22	X 46	A	O X 57	X 57	X 72	X 58	X 58	A	A	A	B	O X 50	X 52	X 60	X 68	X 61	X 49	X 60	F	X 54	X 58	X 78	X A	X A
23	X 58	X 57	X 50	X 60	X 57	X 59	A	X 62	X 64	X 67	X 67	X 71	X 70	X 67	X 66	X 64	X 64	X 64	X 64	X 61	X 66	X 62	X 58	X 58
24	X 62	X 67	X 72	X 78	X 66	X 61	X 61	A	X 78	X 78	X 74	X 76	X 74	X 76	X 74	X 75	X 70	X 65	X 53	X 52	X 56	X 52	X 56	X 56
25	O X 60	X 55	X 58	X 69	A	X 42	A	O X 69	X 56	X 54	X 60	X 51	X 82	B	X 82	X R	X R	X R	X 70	A	X 90	X 42	X 92	X A
26	O X 36	A	A	X 67	X 58	X 43	X 45	A	O X 52	X 56	X 59	X 62	X 63	X 63	X 62	X 64	X 60	X 59	X 57	X 58	X 57	X 57	X 50	X 50
27	X 60	X 53	X 61	X 56	X 61	X 69	X 76	X 87	X 94	X 89	X 98	X 101	X 76	X 81	X 81	X 76	X 76	X 71	X 69	X 62	X 58	X 57	X 59	X 58
28	X 57	X 58	X 54	X 57	X 68	X 71	X 78	X 88	X 90	X 92	X 94	X 85	X 88	X 88	X 86	X 84	X 80	X 70	X 68	X 64	X 54	X 53	X 60	X 71
29	X 58	O X 61	X 59	X 64	X 64	X 72	X 79	X 78	X 81	X 93	X 86	X 88	X 81	X 83	X 84	X 81	X 79	X 72	X 67	X 66	X 66	X 65	X 65	X 52
30	X 60	X 62	X 72	X 77	X 74	X 78	A	X 78	X 82	X 86	X 86	X 89	X 89	X 81	X 79	X 76	X 75	X 77	X 76	X 76	X 72	X 66	X 58	X 61
31																								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	26	23	28	27	25	25	25	22	26	29	29	30	30	28	30	28	29	30	28	29	30	29	28	23
MED	X 56	X 58	X 59	X 60	X 64	X 66	X 69	X 81	X 81	X 84	X 83	X 81	X 78	X 80	X 78	X 76	X 73	X 69	X 66	X 62	X 58	X 57	X 56	X 55
U Q	X 60	X 62	X 62	X 67	X 68	X 72	X 80	X 88	X 94	X 92	X 94	X 91	X 89	X 87	X 84	X 81	X 78	X 73	X 70	X 66	X 65	X 64	X 61	X 61
L Q	X 49	X 54	X 56	X 56	X 58	X 58	X 59	X 65	X 68	X 68	X 68	X 67	X 69	X 70	X 68	X 67	X 66	X 62	X 64	X 56	X 54	X 52	X 50	X 51

NOV. 2023 f_{XI} (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

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 36	A 49	Z 50	B 56	A 62	A 72	62	72	71	73	82	89	88	88	87	76	65	62	F 62	F 58	48	F 34			
2	F 40	F 41	53	57	57	65	63	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	F 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	A 26	A	
6	A	A	28	A	A	A	39	R 39	R 41	R 46	F 44	R 44	R 44	B	R 44	B	56	54	53	54	F 41	F 34	F 41	A	
7	A	A	50	B	53	A	61	45	50	54	57	56	R 54	R 55	58	59	55	56	54	51	46	F 37	A	A	
8	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	
9	46	F 39	53	52	A	A	A	A	57	61	63	65	64	64	68	70	61	61	58	50	F 44	46	45	R 49	
10	A	40	50	F 43	46	53	63	R 60	A	62	63	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	82	F 82	89	96	98	Z 108	108	122	F 93	F 100	94	85	71	62	62	60	58	57
13	55	F 52	61	J 48	R 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	
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	F 41	R 47	
16	A	F 47	F 46	F 48	F 35	F 33	58	50	F 62	64	66	71	71	73	78	73	63	57	50	46	J 44	R 46	39	F 36	
17	41	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	51	51	F 56	52	52	R A	A	A	B	44	46	54	62	55	43	54	F 42	48	52	A	A	A	
23	F 38	A	F 44	R 44	54	51	51	A	56	58	61	61	65	64	61	60	58	58	58	58	55	60	56	52	
24	56	61	66	F 68	F 60	A 55	A 55	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	52	50	F 36	R	A	A	R 63	R 50	R 48	54	45	B	76	R	R 44	R 44	F 42	A	A	36	A	A	
26	R 30	A	A	A	F 43	R 37	39	A	R 46	R 50	R 53	56	57	57	56	58	54	53	51	52	51	51	44	J 44	
27	F 45	47	55	50	55	63	70	Z 66	F 65	F 66	F 70	F 77	F 65	F 69	F 75	70	67	65	63	56	52	51	53	52	
28	F 42	52	48	51	V 62	65	72	82	F 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	F 64	76	80	80	83	83	75	73	70	69	71	70	70	66	60	52	55	
31																									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	25	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	

NOV. 2023 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

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	30	G	25	28	33	36	54			
8	59	52	36	42	32	27	36	44	60	45	G	G	G	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	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	G	G	E B	E B	G	25	G	G	20			
11	26	37	45	G	G	G	40	G	32	36	36	G	G	G	G	G	G	G	28	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	E B	31	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	A			
14	31	24	22	33	28	G	32	32	32	39	36	49	53	59	53	37	35	34	31	28	24	38	43					
15	37	40	42	46	41	53	46	43	43	32	37	39	35	35	50	32	G	G	28	25	40	58	42	104	G			
16	56	40	24	G	26	32	50	41	36	36	38	36	E B	E B	E B	E B	G	30	G	E B	32	38	30	31	29	G		
17	29	66	49	38	G	G	32	32	36	38	38	38	38	38	G	G	G	34	G	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	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	G	G	28	28	43	60	47	43	36	E B	E B	G	40	32	31	31	28	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	G	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	216	220	224	222	228	E B	238	222	A	236	E A	E A	E A	E A
2	A	E A	A	E A	B	A	A	A	E A	314	240	224	208	200	220	232	216	216	226	208	200	E A	242	250	286	
3	350	E A	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	Q	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	A	E A	246	218	244	222	214	214	218	226	228	E A	E A	222	246	192	192	H	A	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	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	A	
8	A	A	A	E A	E A	E A	278	278	242	B	A	212	196	208	E B	E B	218	204	226	226	240	E A	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	A	
10	A	A	A	A	E A	282	284	266	B	A	E A	B	B	242	264	254	226	206	242	232	248	260	E B	E A	E A	
11	E A	A	E A	E A	E A	E A	E A	224	232	230	222	204	220	200	204	218	208	204	214	216	196	202	240	242	A	
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	E A	E A	E A	E A	A	
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	E A	226	270	A	
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	A	
15	A	A	A	234	A	A	A	A	E A	222	194	202	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	A	A	A	202	B	E B	A	216	216	238	E B	E A	A	E 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	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	236	
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	A	
20	E A	A	E A	A	E A	A	276	248	214	206	202	202	206	230	214	212	198	212	212	230	250	252	172	A	E 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	A	
22	E A	A	A	A	E A	214	268	256	A	A	A	B	E A	218	236	202	226	226	234	274	326	E A	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	E A	E A
24	E A	E A	E A	E A	A	E A	A	A	A	A	A	H	H	292	236	218	202	210	200	232	234	212	A	A	A	
25	A	A	E A	E A	E A	A	A	A	E A	E A	E A	E A	E A	196	B	E A	E B	E A	A	A	A	E A	E A	A	A	
26	A	A	A	A	A	E A	258	A	E A	A	B	H	B	232	212	216	228	226	238	254	E B	240	E A	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	E A	E A	E A	E A	
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	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	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	222	222	230	E A	E A	E 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	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	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_{XI} (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	64	59	57	49	57	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 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	X 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	A	X 49	X 59	X 76	X 61	X 56	X 54	X 56	X 52	X 54	X 59	X 46
15	X 50	X 50	X 68	X 58	X 54	A	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	X 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	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
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
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	A	66	66	64	69	71	74	72	64	64	58	61	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	73	68	65	63	64	66	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_{XI} (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	53	53	56	64	66	59	56	56	56	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		57	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	83	85	75	67	64	65	64	66	64	56	51	F	46						
11	50	51	56	60	73	83	85	F	F	F	76	85	76	70	66	66	68	63	64	61	61	60	56	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	F	J	R	Z	54	61	70	Z	F	J	R	48	75	62	56	59	62	64	F	67	62	54	40	51	45	48	45				
14	44	F		F	F	A		A	R		A	F			A		43	53	F	J	R		R	F	43	40					
15	44	44	56	52	48		A	A	J	R	47	54	55	51	52	52	54	R	55	55	50	52	44	50	46	A	A				
16		R			A	A	A	A	A	A		R	54	55	53	58	55	57	58	56	55	54	51	52	46	47	F				
17	A	56	39	F	56	R	J	R	R	A	A	A	A	A	R	46	44	63	59	R	44		A	40	41	43	F	A	43	44	
18	F	F	F	F	54	62	60	58	62	68	60	R	F		R		55	59	56	J	R	R		48	46	51	52	50	46	45	47
19	46		A		52	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	48	R	R	A	A	F	Z	F				66	66	67	69	70	62	54	50	42	55	R	55	47	50	V
21	F	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	56	58	58	66	J	R	65	68	74	74	72	69		A	J	R	61	58	58	57	54	56	53	50				
23	48	49	F	F	58	68	83	90	98	105	101	99	90	78	F	76	70	65	61	56	58	58	57	R	57	54	58				
24	J	R	F		62	57	R	J	R	A	A	A		60	60	58	63	65	68	66	58	58	52	55	55	55					
25	53	53	53	54	62	56	61	67	F	F	73	74	74	73	75	67	66	64	64	63	62	61	57	F	60	54	57				
26	F	55	60	61	58	64	Z	Z	81	83	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	78	88	88	88	86	86	80	76	72		67	62	59	57	58	60	59				
29	61	66	74	83	77	65	74	F	F	F	F	91	94	96	91	83	79	76	74	66	66	62	55	55	50	52					
30	50	44	51	48	50	57	65	67	71	77	C	C	C	C	C		62	64	65	60	52	55	57	59	56						
31	57	60	63	67	76	86	92	Z	V	101	96	94	96	87	J	R	F	74	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	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 ^G	66	45	52	44	55	55	37	35 ^G	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 ^G	30	34	59	25 ^G	29	29	
3	36	30	32	31	35	35	38	44	34 ^G	39	39	36 ^{E B}	36 ^G	36	42	36	42	42	28	26	22	35	55	
4	31	31	50	44	38	58	49	42	51	53	36	39	36 ^G	37	33 ^G	33 ^G	29 ^G	29 ^G	31	31	33	38		
5	50	68	39	21	29	64	55	60	70	42	42	38	60	56 ^G	36 ^G	36	36	38	37	28	27	38	40	36
6	36 ^G	48	70	39	45	40	43	45	66	64	44	47 ^{E B}	40 ^{E B}	38 ^{E B}	36 ^{E B}	33	33 ^G	40	28	36	25 ^G	21	21	
7	22	39	37 ^G	68	81	30 ^G	46	48	51	38	35	36	32	34	51	35	41	42	32	22 ^G	31	35		
8	56	56	54	56	36	28 ^G	31	31	36	38	35 ^G	35	37	35	44	37	32	33	33	26 ^G	31	27	30	36
9	46	39	32	28	34	35	42	33	36	37	39	42	45	43	34	30	30 ^G	30	26	26	28	30	22 ^G	
10	25	23	23	31	43	44	42	34	37	36	40	52	48	48	48	43	40	32	93	44	32	22 ^G	35	20 ^G
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 ^G	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 ^G	45	40	38
15	42	42	35	75	63	62	53	50	53	42	40	40	49	47 ^{E B}	47 ^G	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 ^G	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 ^G	41 ^G	37	36	32	32	27	23	40	37
20	34	51	52	134	122	117	117	114	61	118	37	40	39	37	38	37	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 ^{E B}	41 ^{E B}	43	40	36	34	38	33	32	44	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 ^G	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 ^G	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 ^G	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 ^G	31 ^G	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)

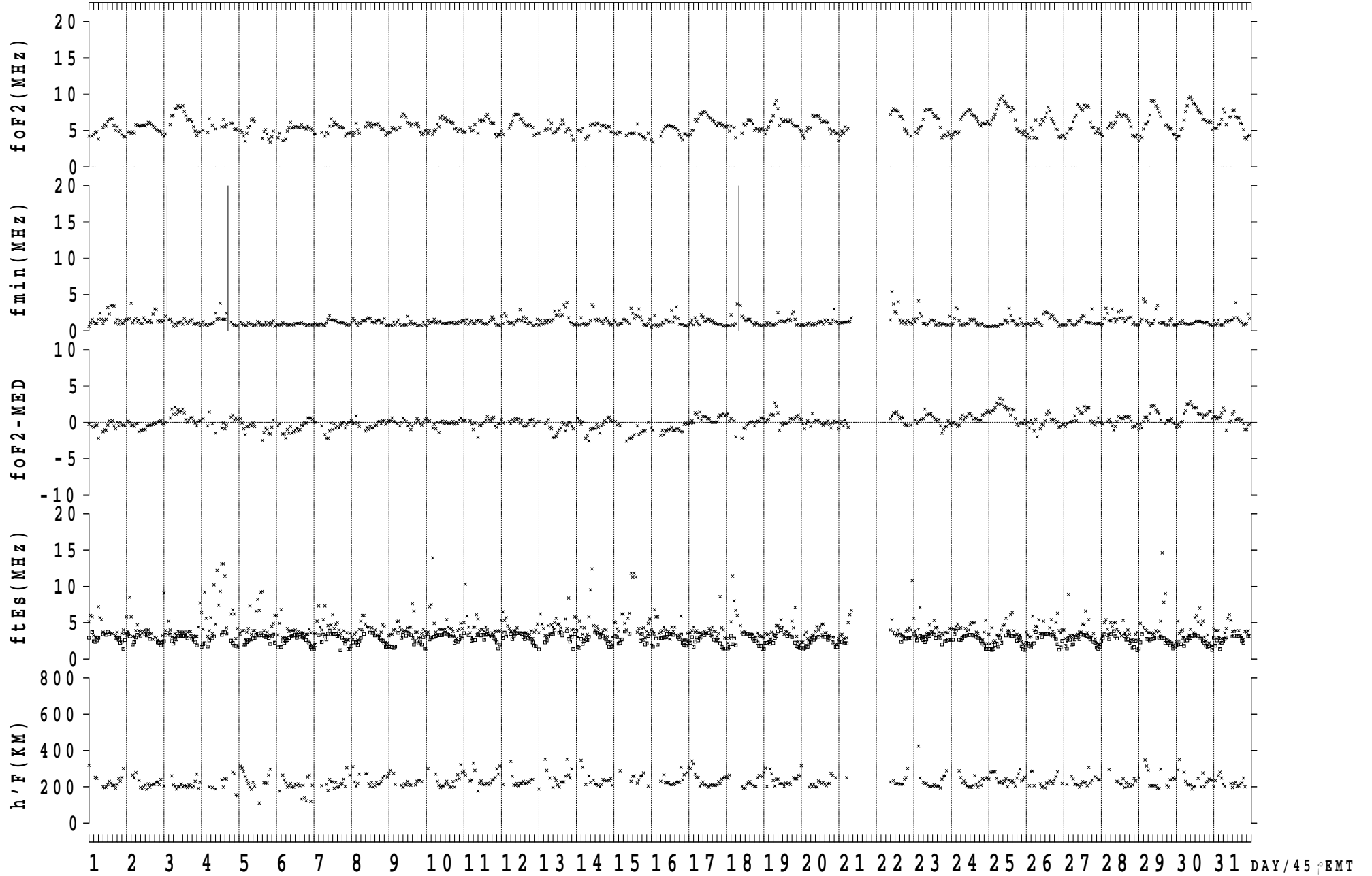
LAT. 69°00.4'S LON. 039°35.4'E SWEEP 1.0MHz TO 15.0MHz IN 15.0SEC IN MANUAL SCALING

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 246	E A 260	E A 272	A 206	A 250	B A	A 276	A 234	A A	A A	A A	A 246	A 204	E A 208	E A 244	E A 288	A A	A A	A 204	A 208	A A	A A	A A	A A
2	A A	A A	A A	A A	A A	A A	228	A A	A A	A A	A A	A A	E A 238	230	218	212	E A 216	E A 244	E A 252	E A 248	212	244	E A 266	E A 268
3	E A 278	E A 296	A A	E A 282	E A 246	212	212	200	206	198	234	248	214	212	212	212	212	212	230	214	E A 232	E A 232	E A 332	A A
4	A A	A A	E A 270	A A	A A	A A	A A	A A	A A	A A	200	208	H 222	194	214	212	200	214	228	E A 242	E A 246	E A 246	E A 248	226
5	A A	A A	E A 272	E A 254	A A	A A	A A	A A	A A	A A	196	242	228	A A	A A	220	220	204	E A 258	E A 264	A A	E A 154	E A 232	A A
6	A A	A A	A A	A A	A A	A A	A A	A A	A A	A A	E A 292	B A	G 244	220	210	210	H 206	H 222	H 270	A 220	A A	E A 232	E A 262	E A 248
7	A A	A A	A A	E B 406	244	A A	A A	E A 276	238	198	188	H 202	202	A A	202	208	210	218	216	220	238	E A 274	E A 262	A A
8	A A	A A	A A	E A 360	254	226	202	188	200	212	204	200	212	204	H 202	214	228	218	220	218	A A	E A 224	E A 284	A A
9	A A	A A	A A	A A	A A	E A 250	206	200	190	204	194	E A 226	218	212	204	202	212	208	200	E A 238	E A 236	E A 234	E A 244	A A
10	A 220	E A 258	116	A 234	A A	270	234	208	200	212	202	274	212	E A 234	216	218	220	A 242	E A 250	234	E A 226	E A 282	E A 248	A A
11	A 268	A A	256	248	234	224	212	234	206	190	194	206	198	202	208	214	204	216	216	222	236	236	246	A A
12	194	A 224	E A 296	242	244	220	220	220	256	202	190	A 200	H 208	A 206	198	222	A A	A A	A A	A A	A A	206	A A	A A
13	E A 274	E A 294	E A 248	E A 256	E A 240	E A 236	212	222	A 202	208	212	198	210	222	E A 244	222	212	216	264	E A 318	E A 264	E A 238	B A	
14	A A	A A	A A	A A	A A	A A	E A 238	A A	A A	A A	A A	E A 274	A A	H 202	228	216	240	222	252	E A 278	A A	E A 288	E A 324	A A
15	A A	E A 274	E A 276	236	A A	A A	A A	A A	A A	194	198	226	192	218	B 236	218	E A 266	220	E A 232	A A	A A	A A	A A	A A
16	A A	196	A A	A A	A A	A A	A A	A A	A A	A A	206	198	H 200	210	220	204	212	218	E A 216	E A 216	E A 212	E A 238	E A 230	E A 244
17	E A 312	E A 214	E A 282	A A	A A	212	A A	A A	A A	A A	A A	E B 228	H 192	H 248	E A 290	E A 226	A A	E A 240	E A 204	E A 238	A A	A A	E A 262	A A
18	E A 298	E A 262	E A 292	E A 308	E A 258	E A 220	222	216	206	212	212	A 208	H 212	H 248	224	210	224	E A 238	E A 248	E A 248	274	A A	A A	A A
19	A A	A A	A A	A A	A A	A A	A A	A A	A A	196	206	H 176	H 200	H 236	208	202	H 200	202	218	218	244	244	194	A A
20	272	A A	A A	A A	A A	A A	A A	A A	A A	A A	218	H 176	H 184	226	214	206	214	212	214	218	E A 248	E A 266	E A 242	E A 274
21	A A	A A	A A	A A	A A	E A 266	224	E A 234	212	196	194	H 200	H 200	A 228	A A	A A	H 204	212	212	212	218	E A 168	E A 264	E A 258
22	244	E A 246	E A 244	A A	E A 292	E A 268	218	240	256	216	204	E A 210	204	A A	A A	A A	204	216	216	224	218	242	A A	A A
23	E A 274	E A 282	A A	E A 338	E A 236	210	218	202	206	202	A 202	B 246	E A 246	E A 216	E A 204	216	208	224	264	E A 358	E A 256	E A 280	E A 280	A A
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25	Q 290	A A	A A	E A 204	E A 268	E A 220	E A 246	E A 226	196	190	190	212	198	208	206	186	E A 206	E A 224	E A 220	198	224	230	252	A A
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31	E A 280	E A 260	E A 268	264	244	218	A 220	A A	196	218	202	206	216	204	H A	204	242	232	244	E A 234	E A 228	E A 234	E A 270	A A
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U Q	E A 276	E A 288	E A 274	E A 279	E A 282	254	226	E A 234	E A 217	213	210	211	227	218	220	218	218	235	232	248	260	245	266	272
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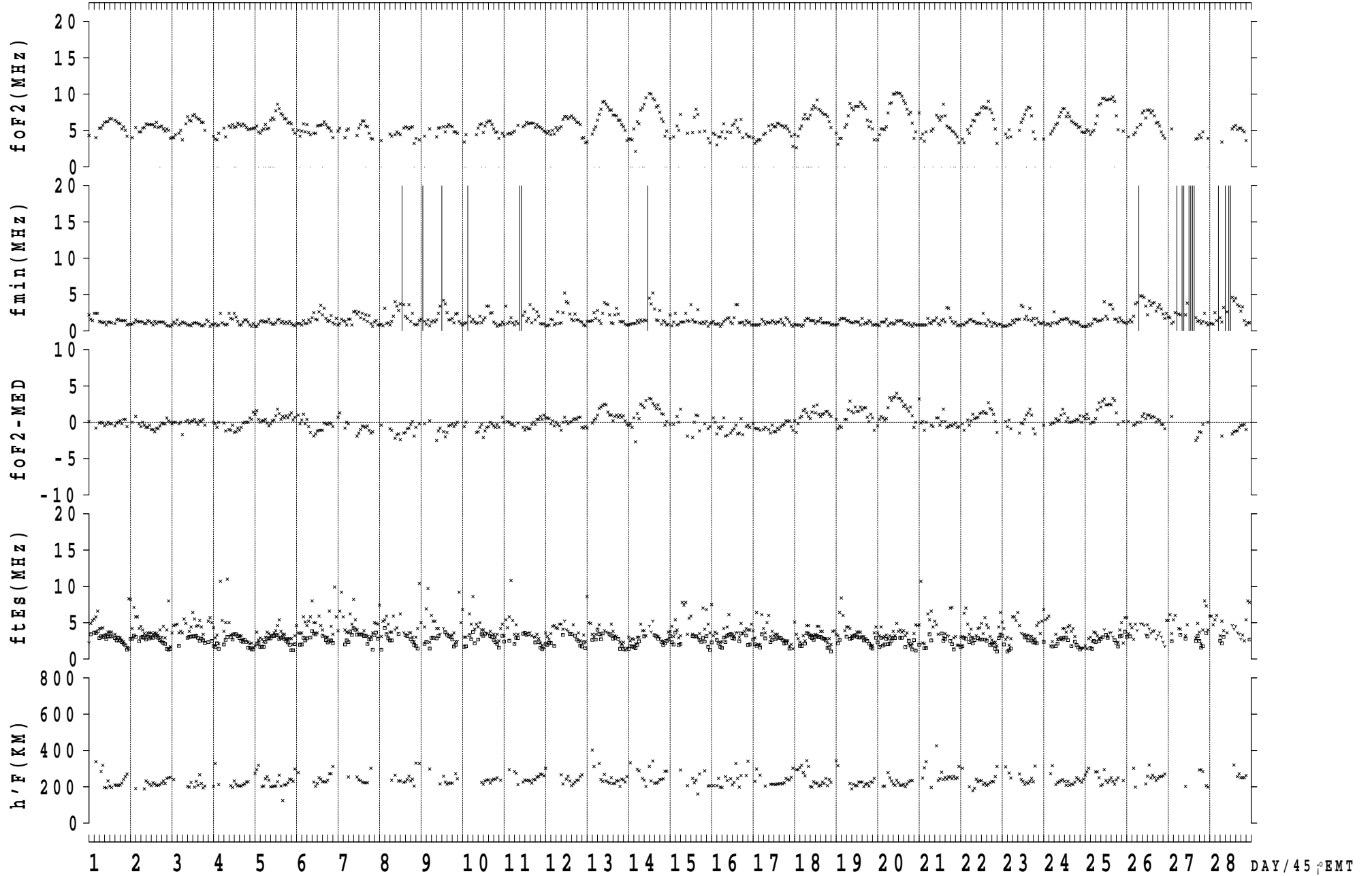
DEC. 2023 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

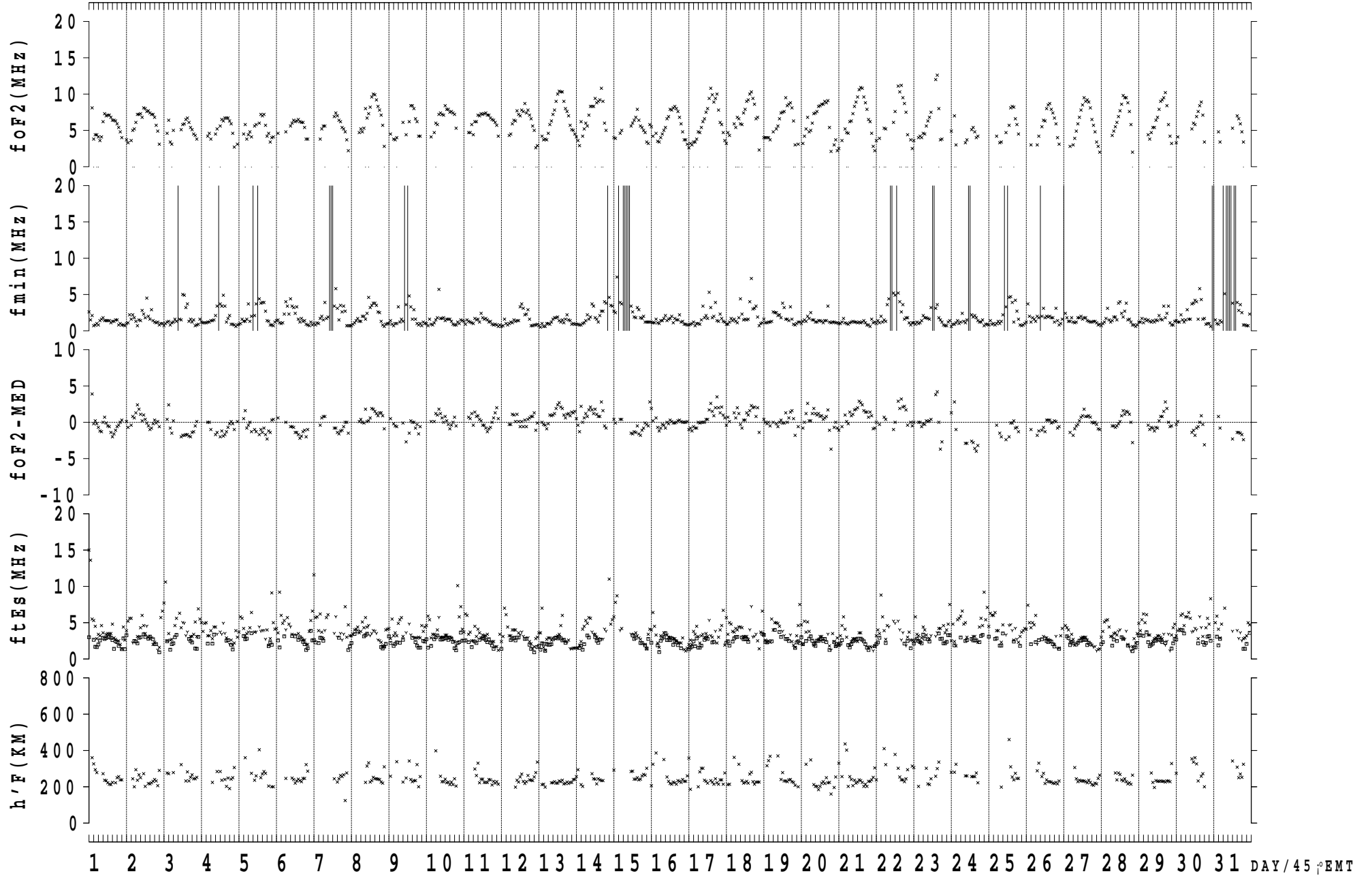
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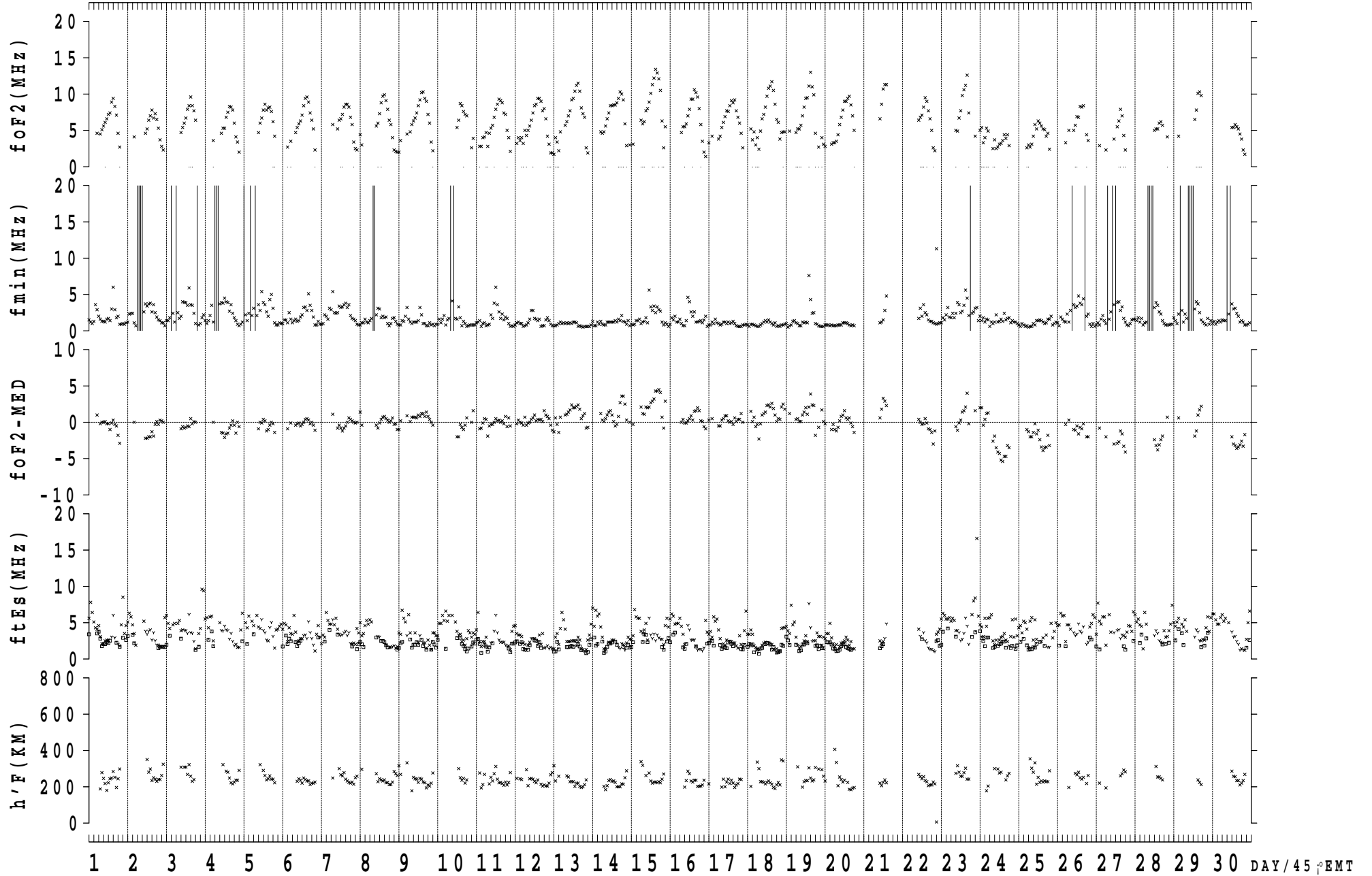
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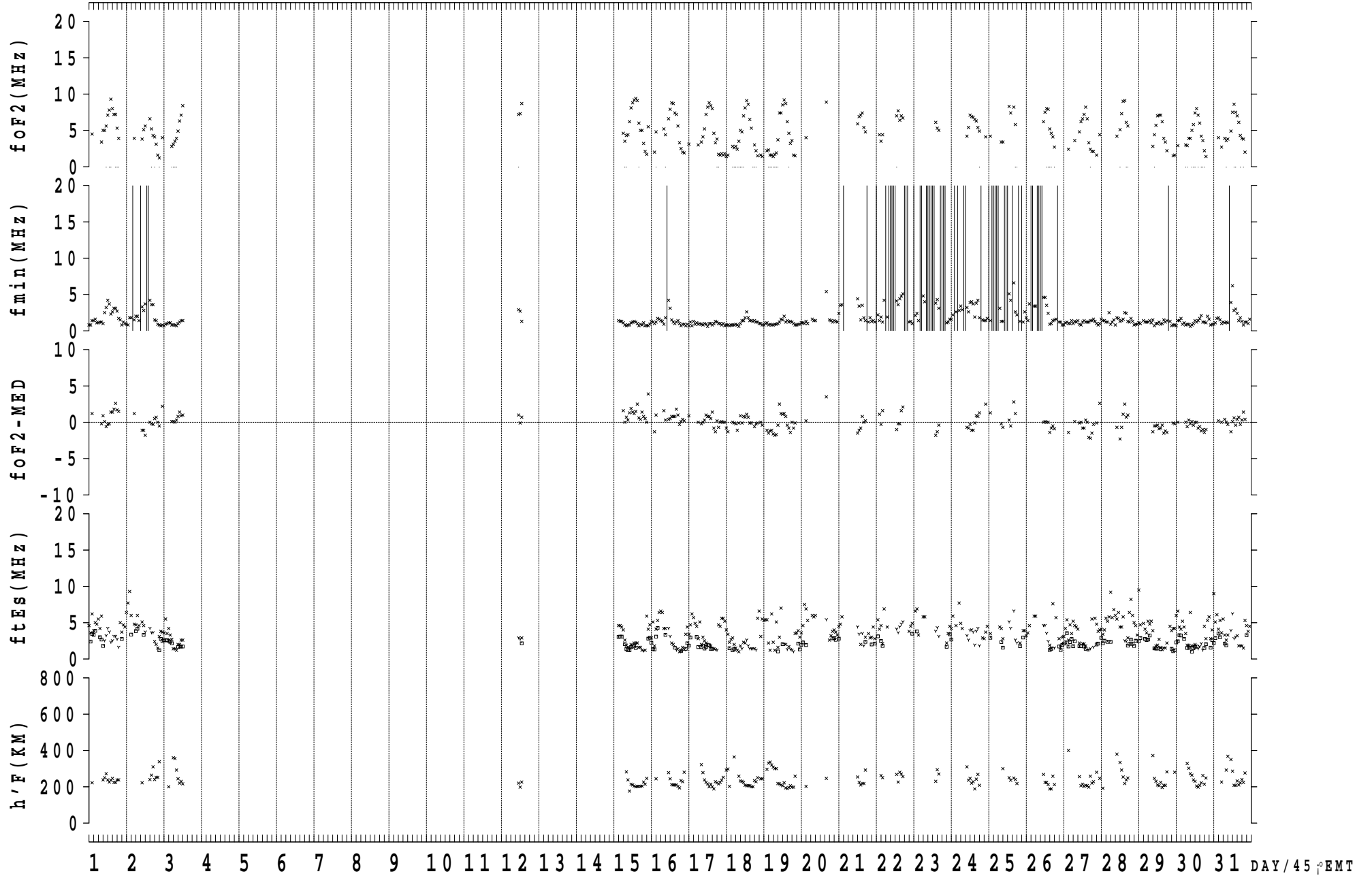
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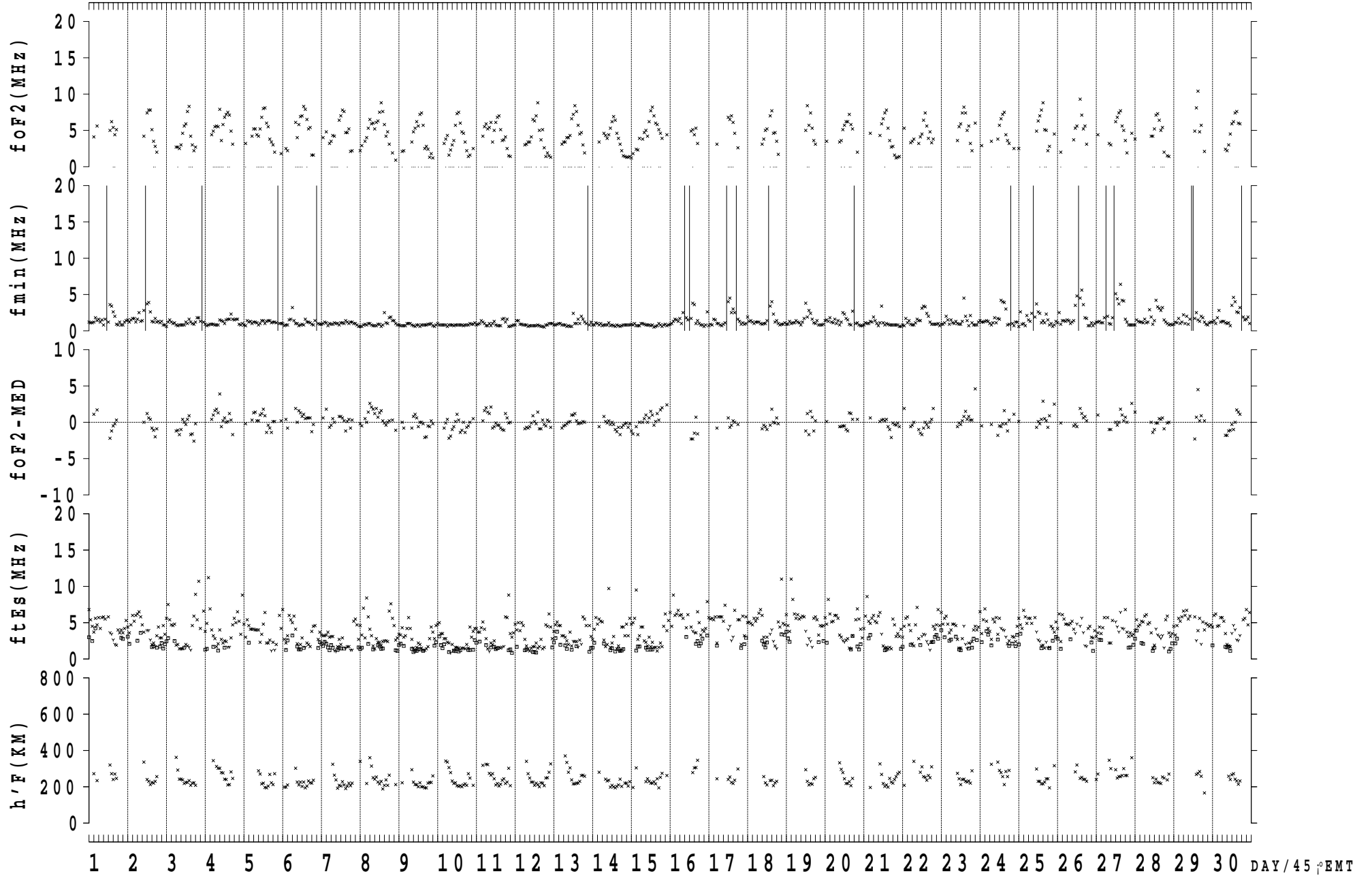
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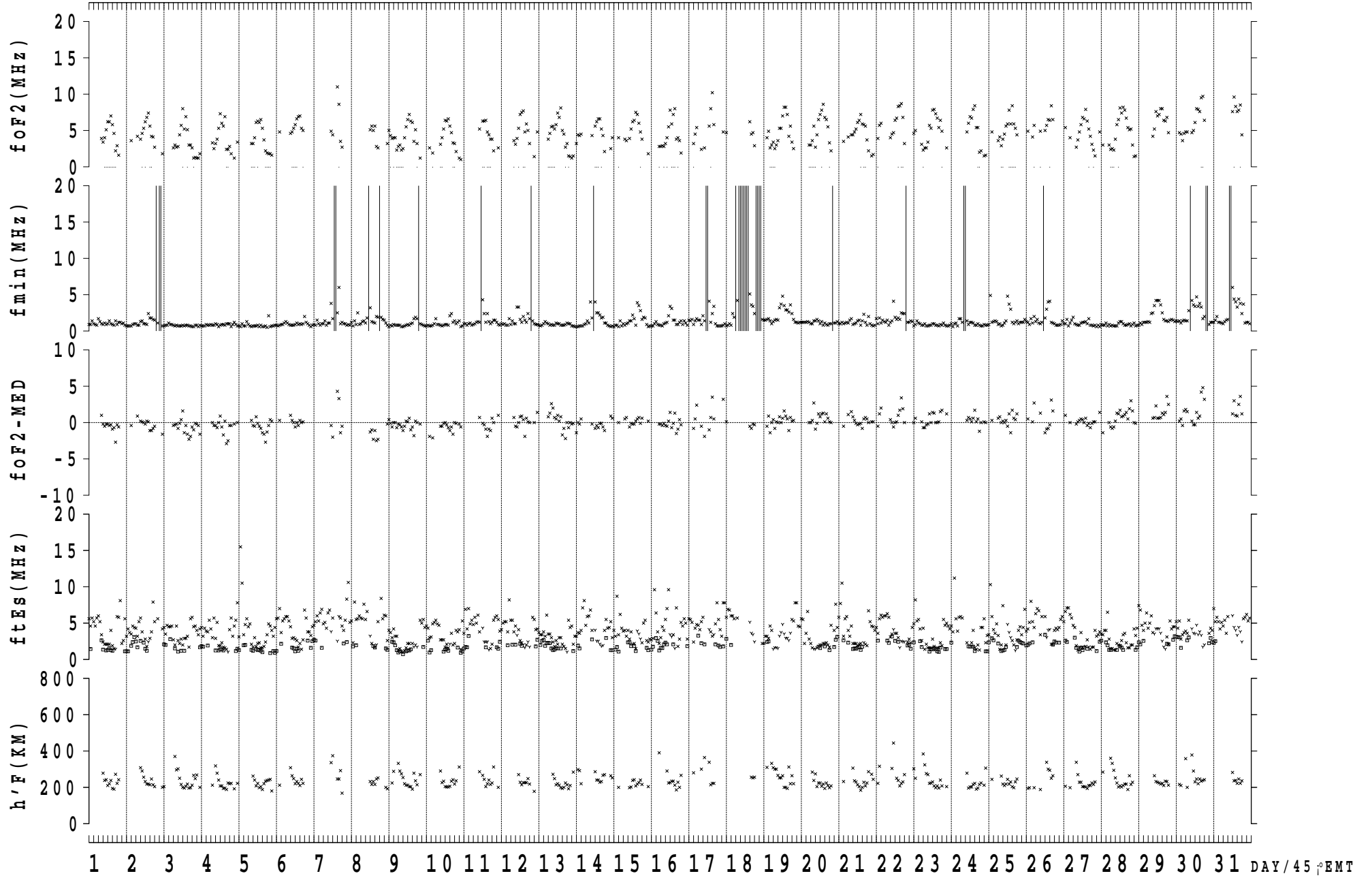
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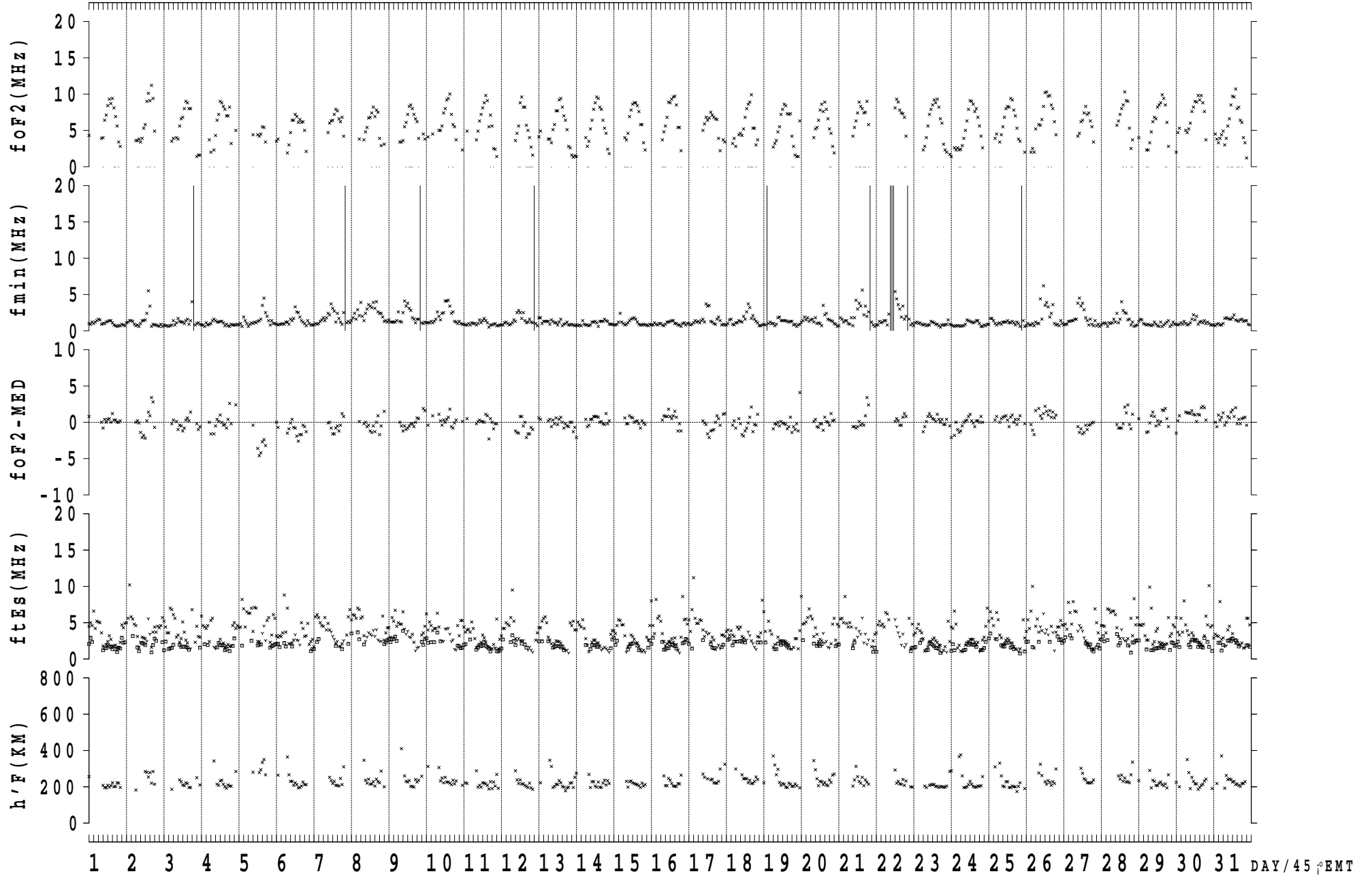
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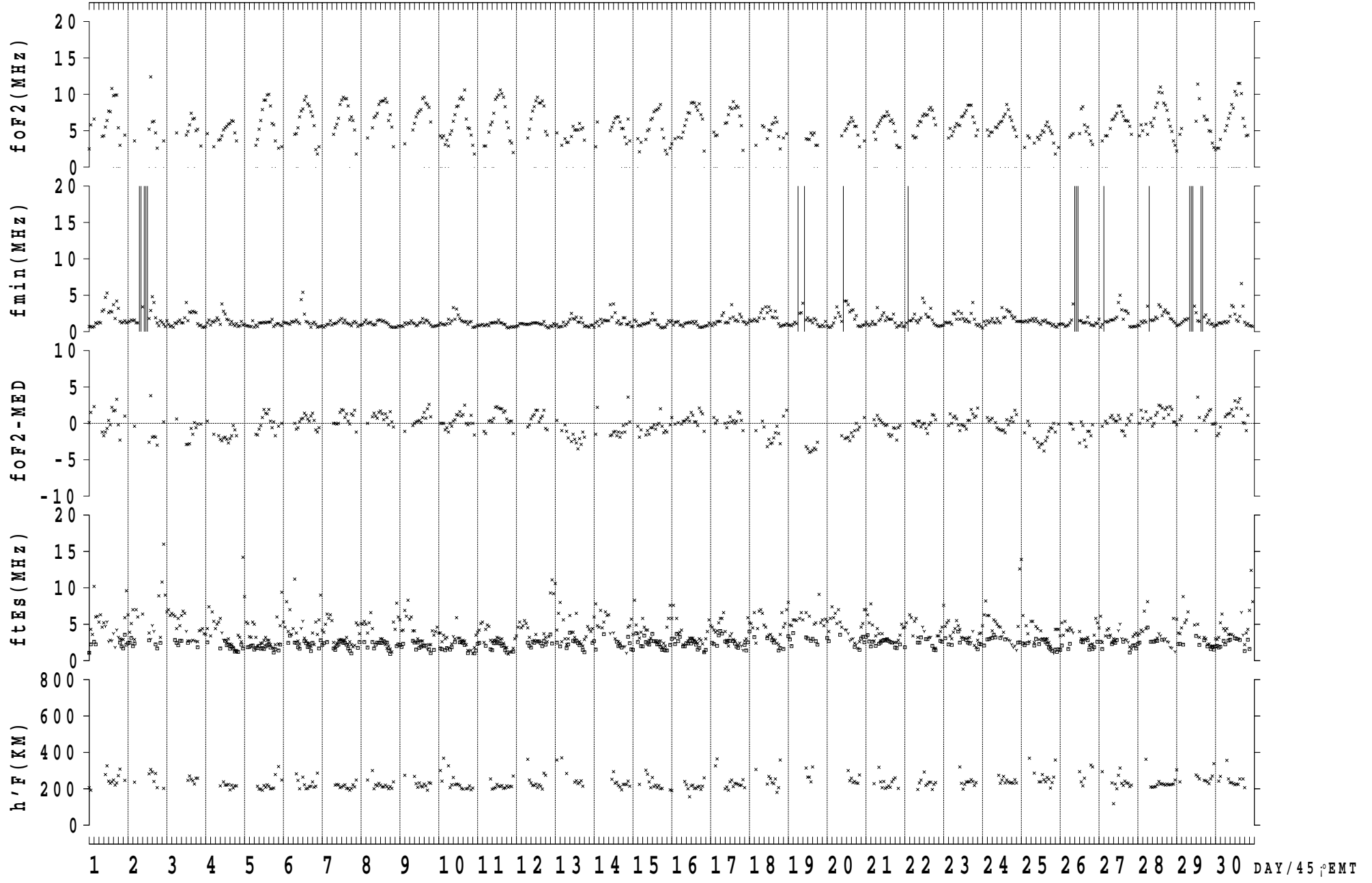
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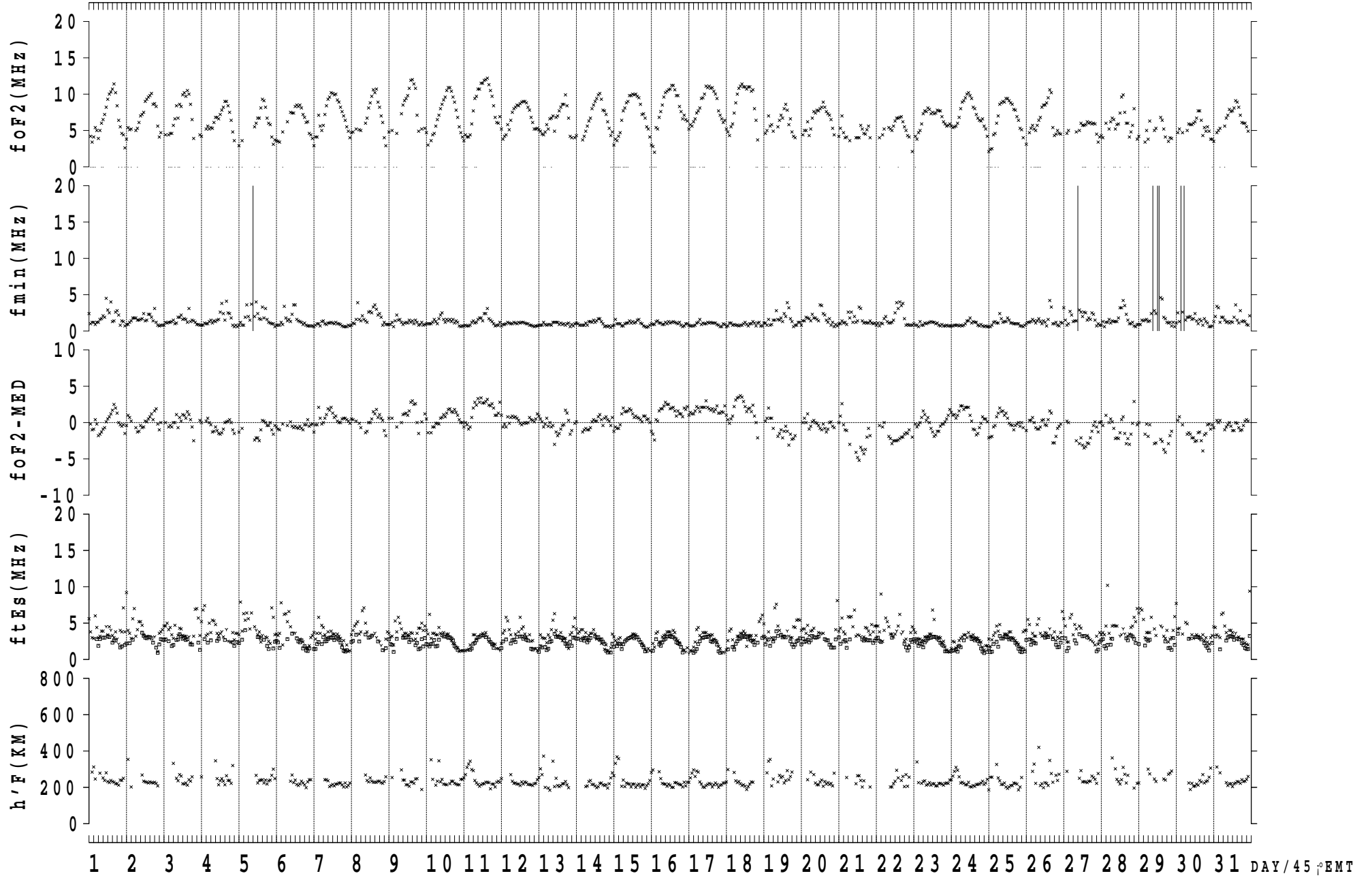
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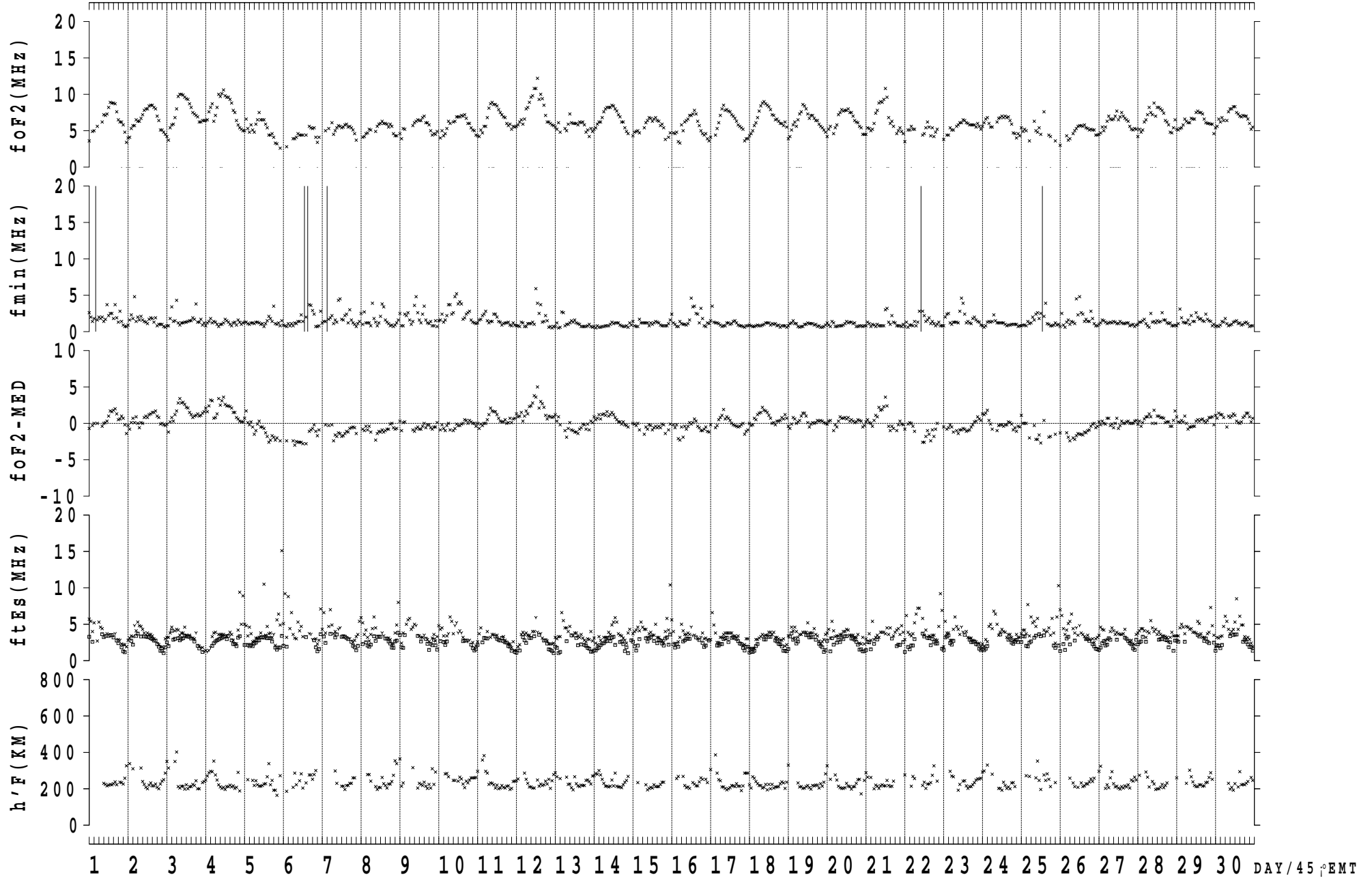
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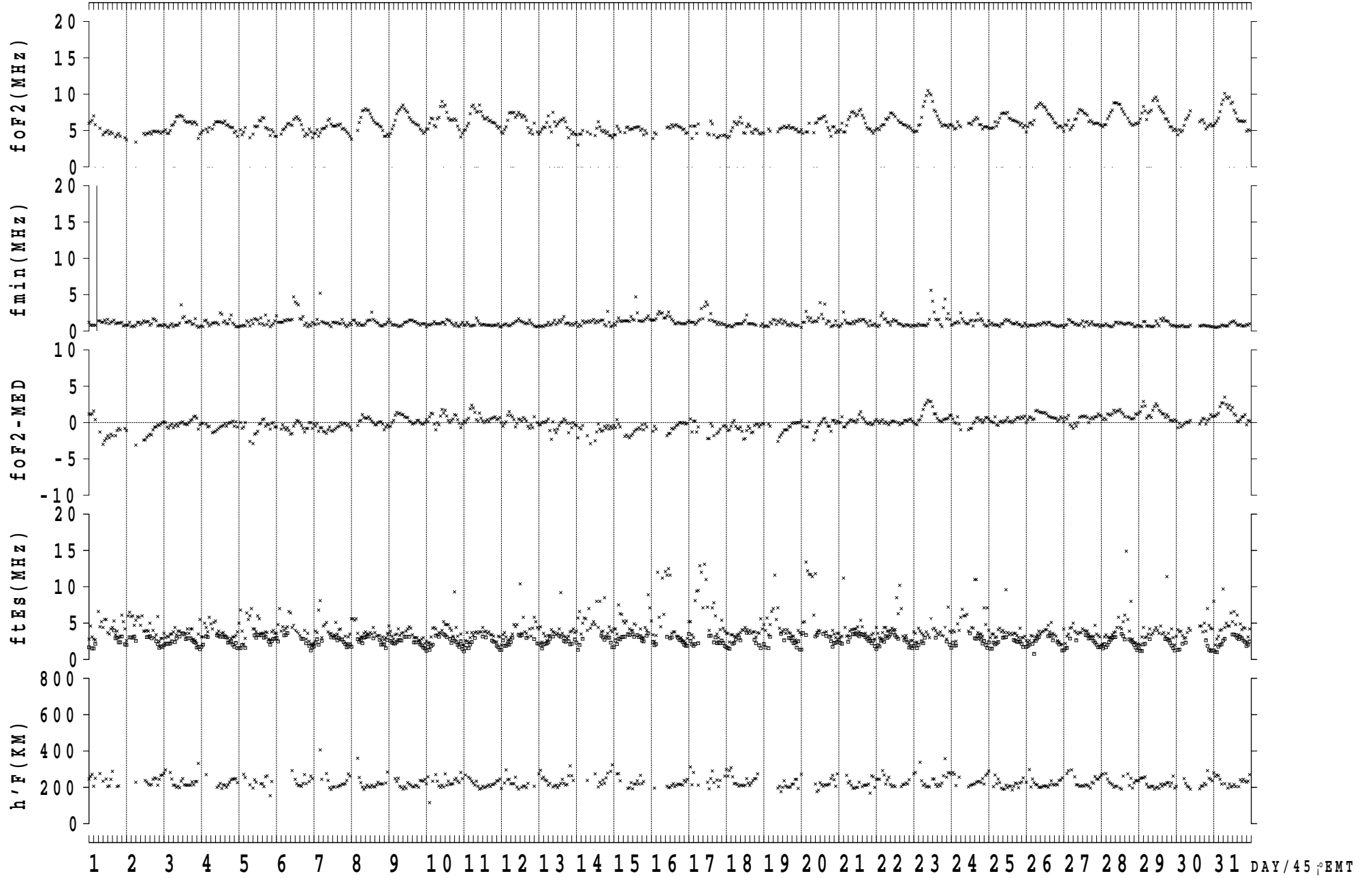
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2023 1101 -> 2023 1130(99) SYOWA-ST.



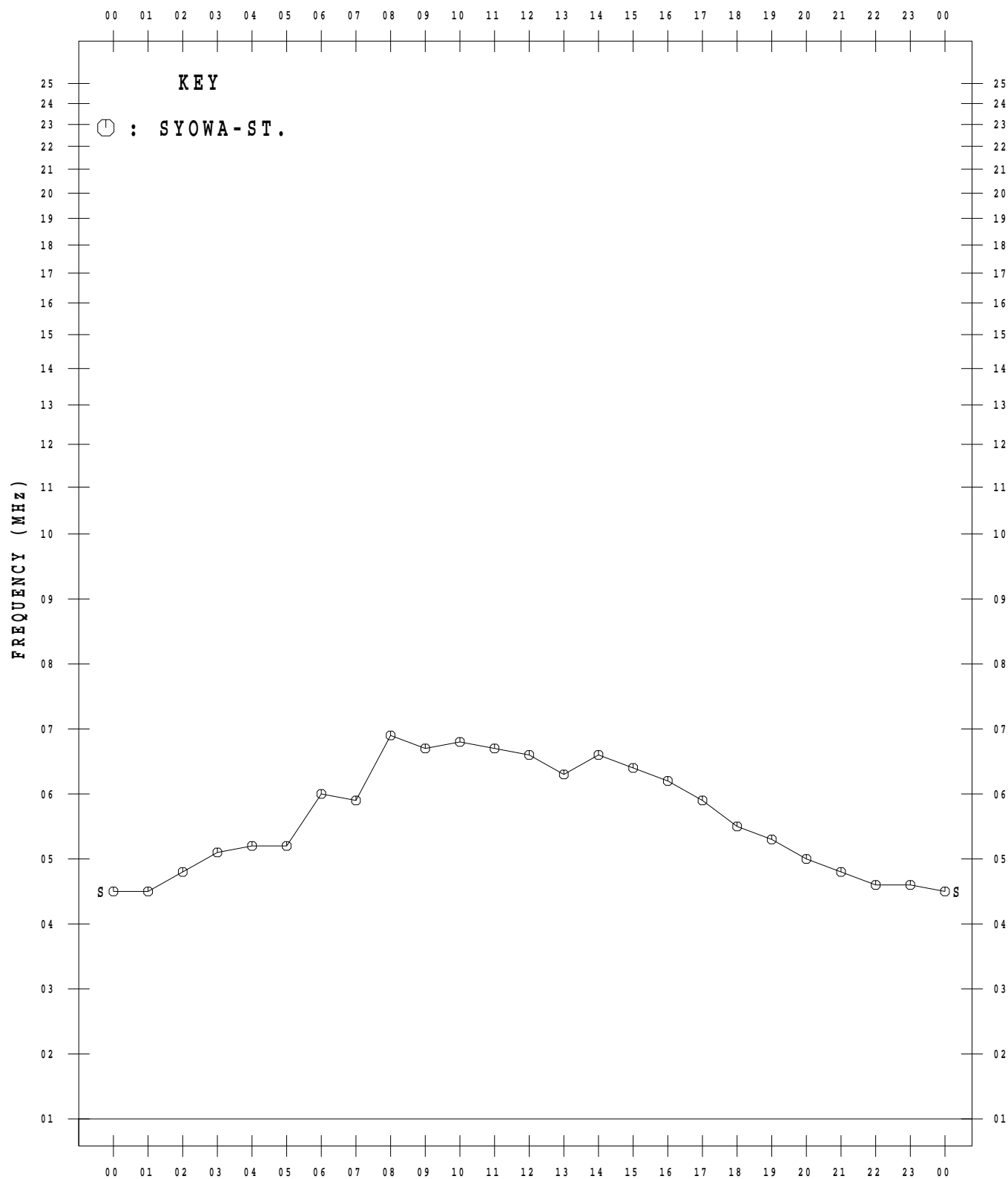
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MONTHLY MEDIAN VALUES OF f_oF₂

45°E MEAN TIME

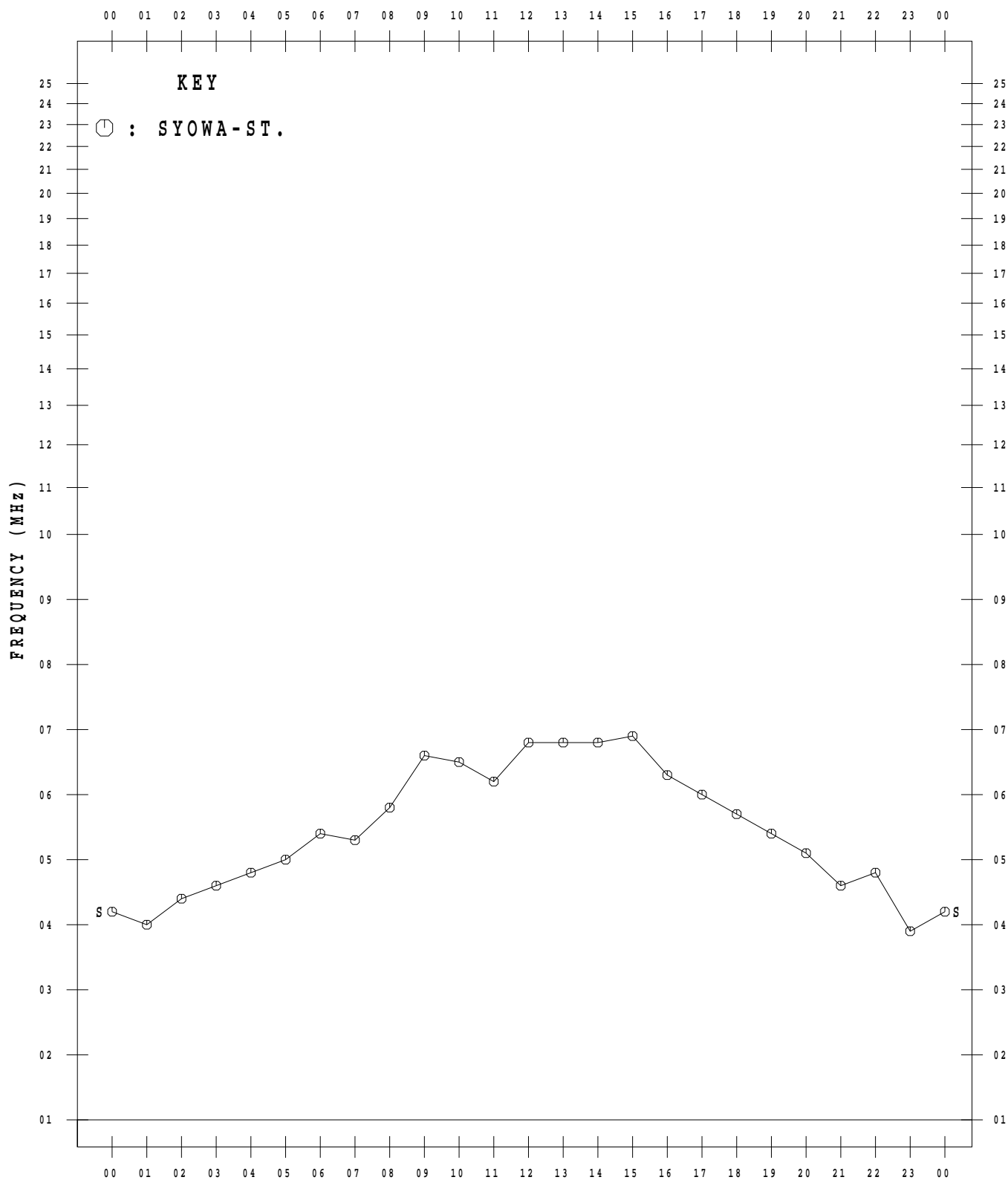
JAN. 2023



MONTHLY MEDIAN VALUES OF f_oF₂

45°E MEAN TIME

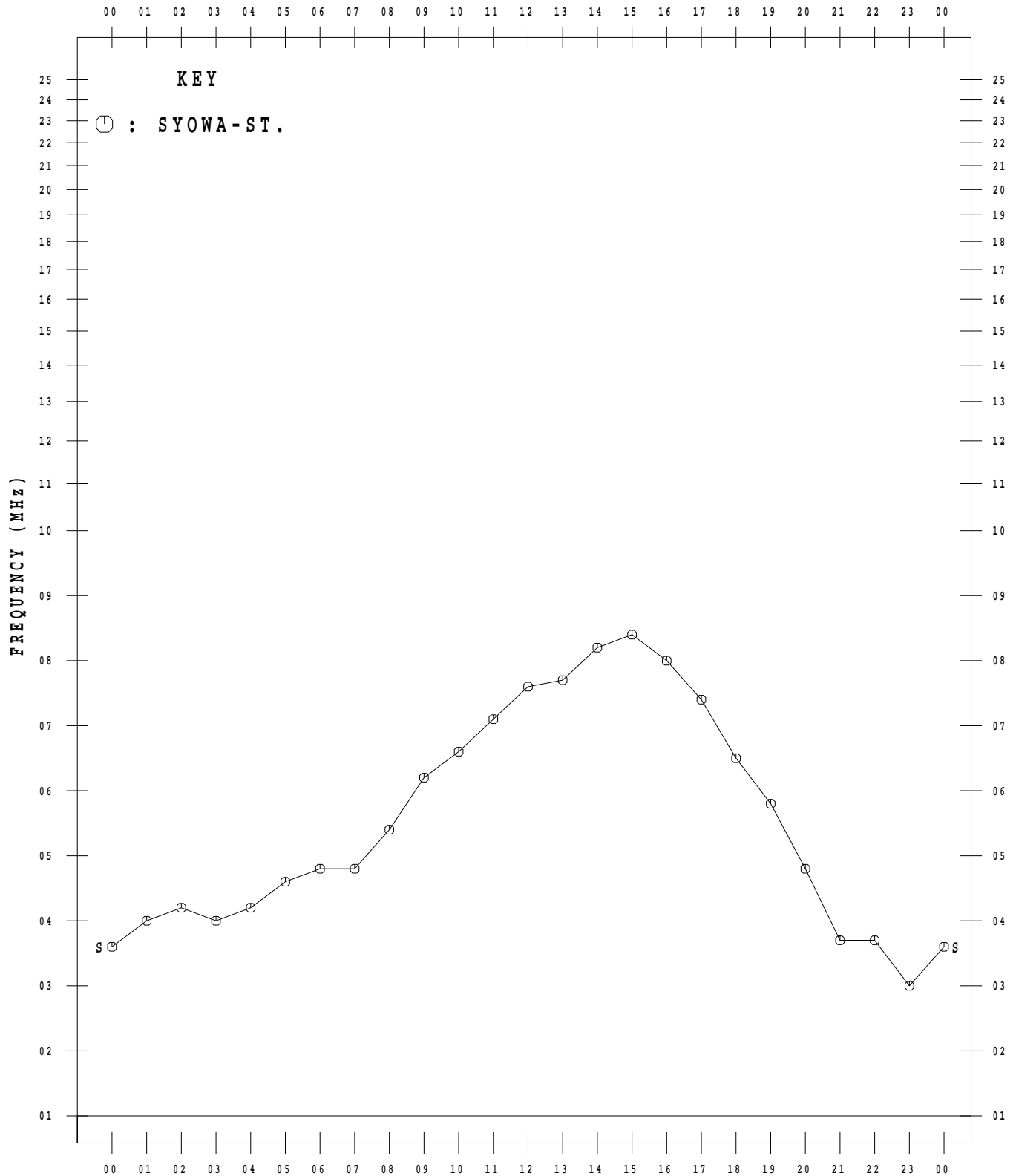
FEB. 2023



MONTHLY MEDIAN VALUES OF f_oF₂

45°E MEAN TIME

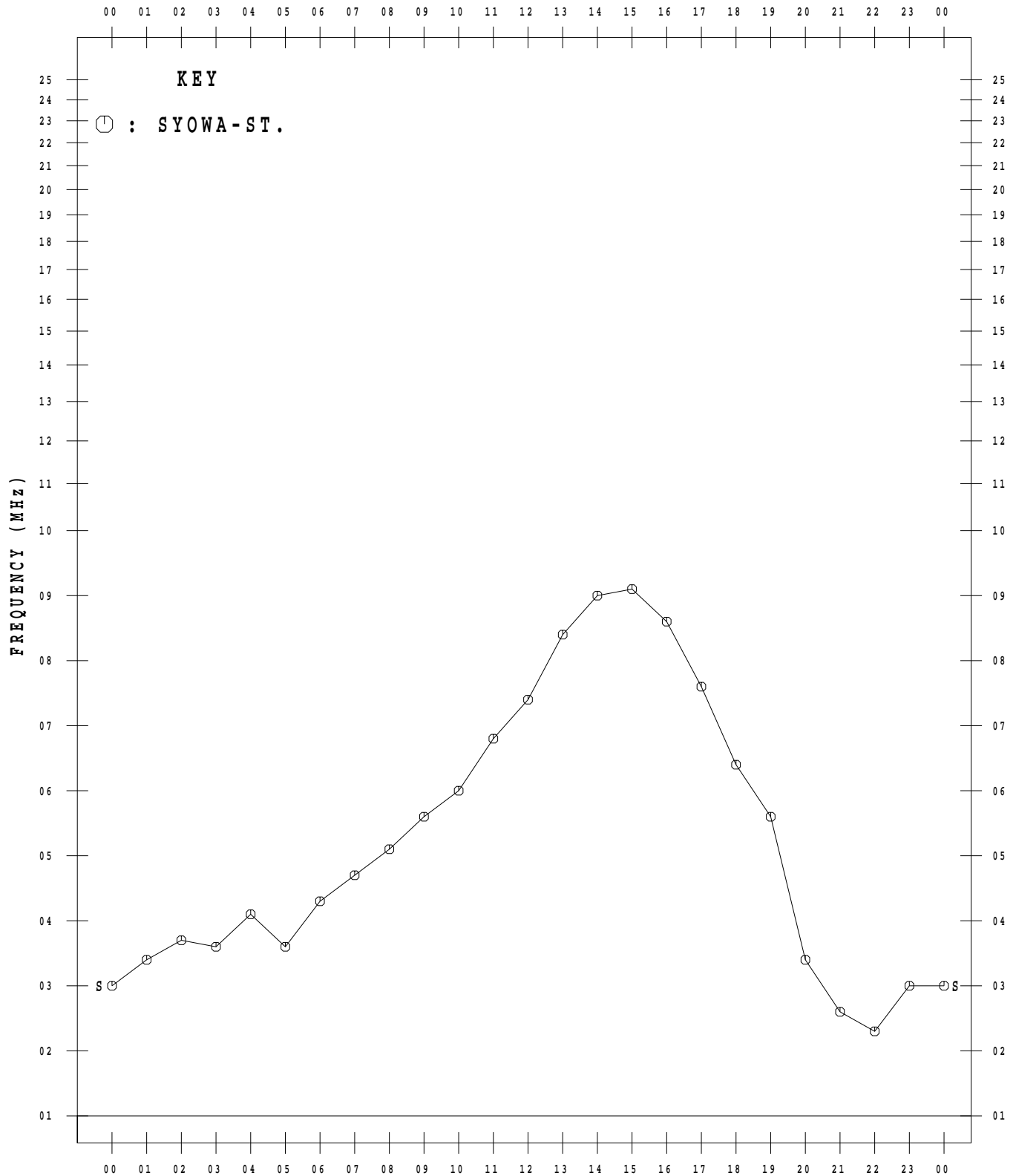
MAR. 2023



MONTHLY MEDIAN VALUES OF f_oF₂

45°E MEAN TIME

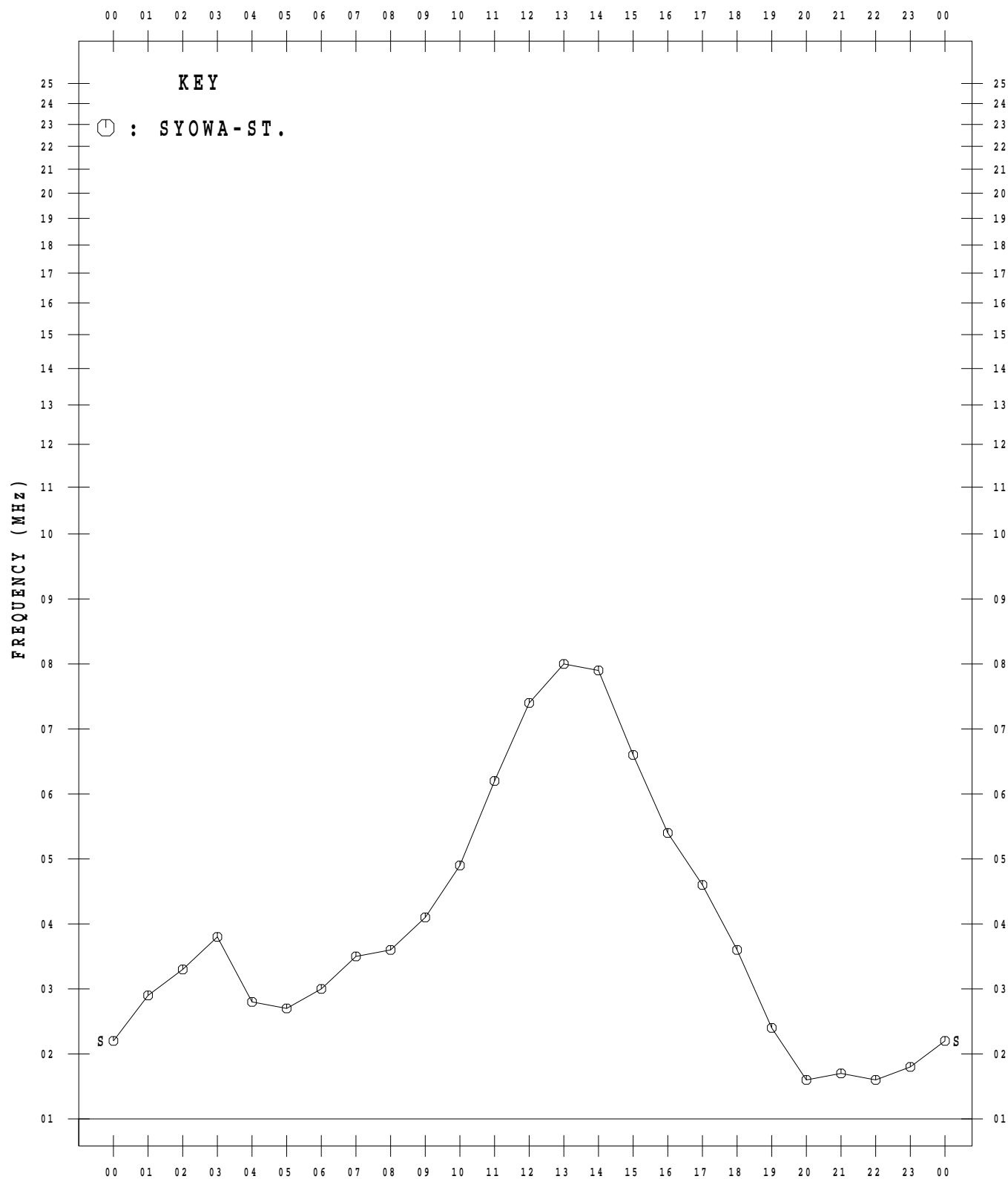
APR. 2023



MONTHLY MEDIAN VALUES OF f_oF₂

45°E MEAN TIME

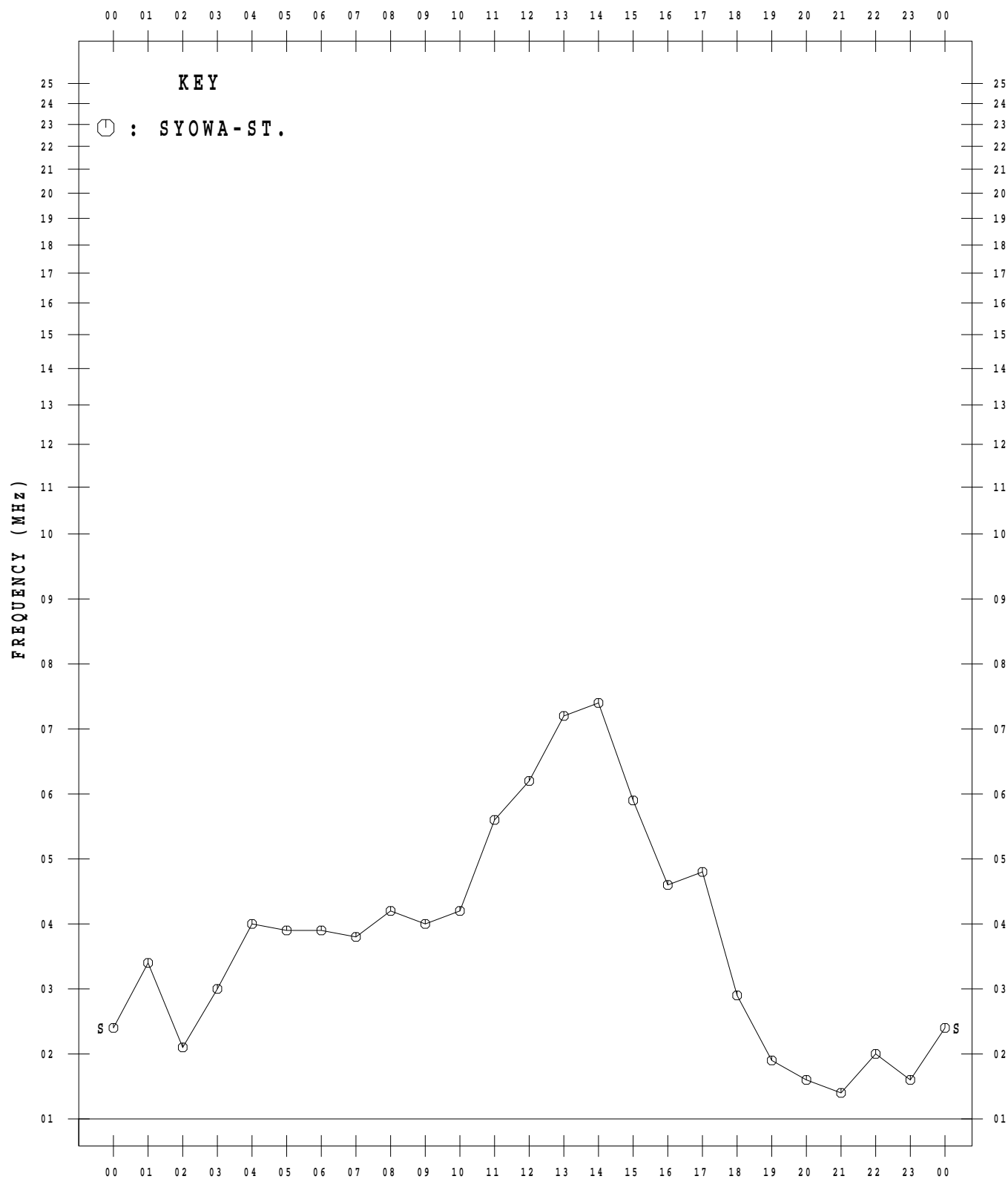
MAY 2023



MONTHLY MEDIAN VALUES OF f_oF₂

45°E MEAN TIME

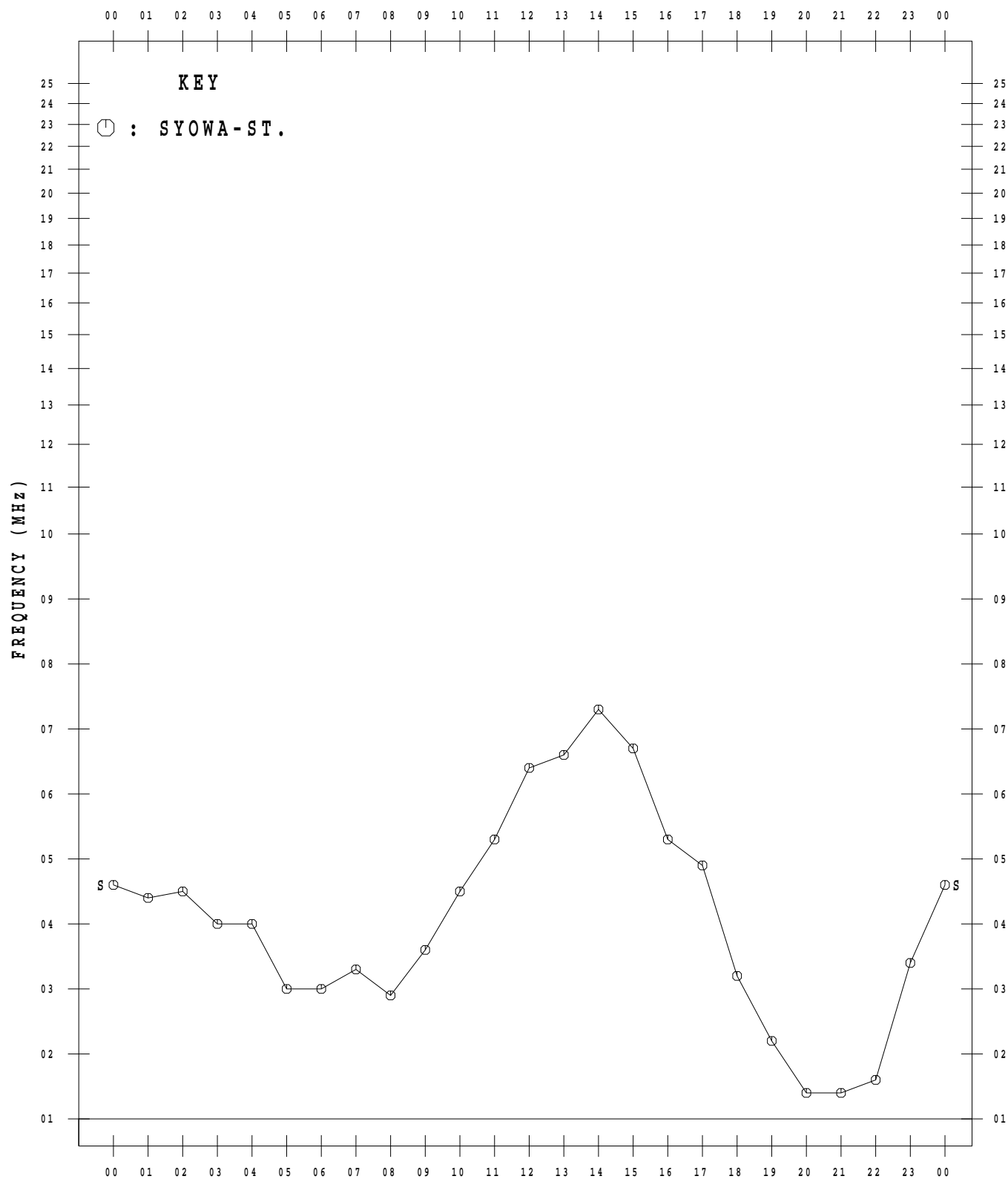
JUN. 2023



MONTHLY MEDIAN VALUES OF f_oF₂

45°E MEAN TIME

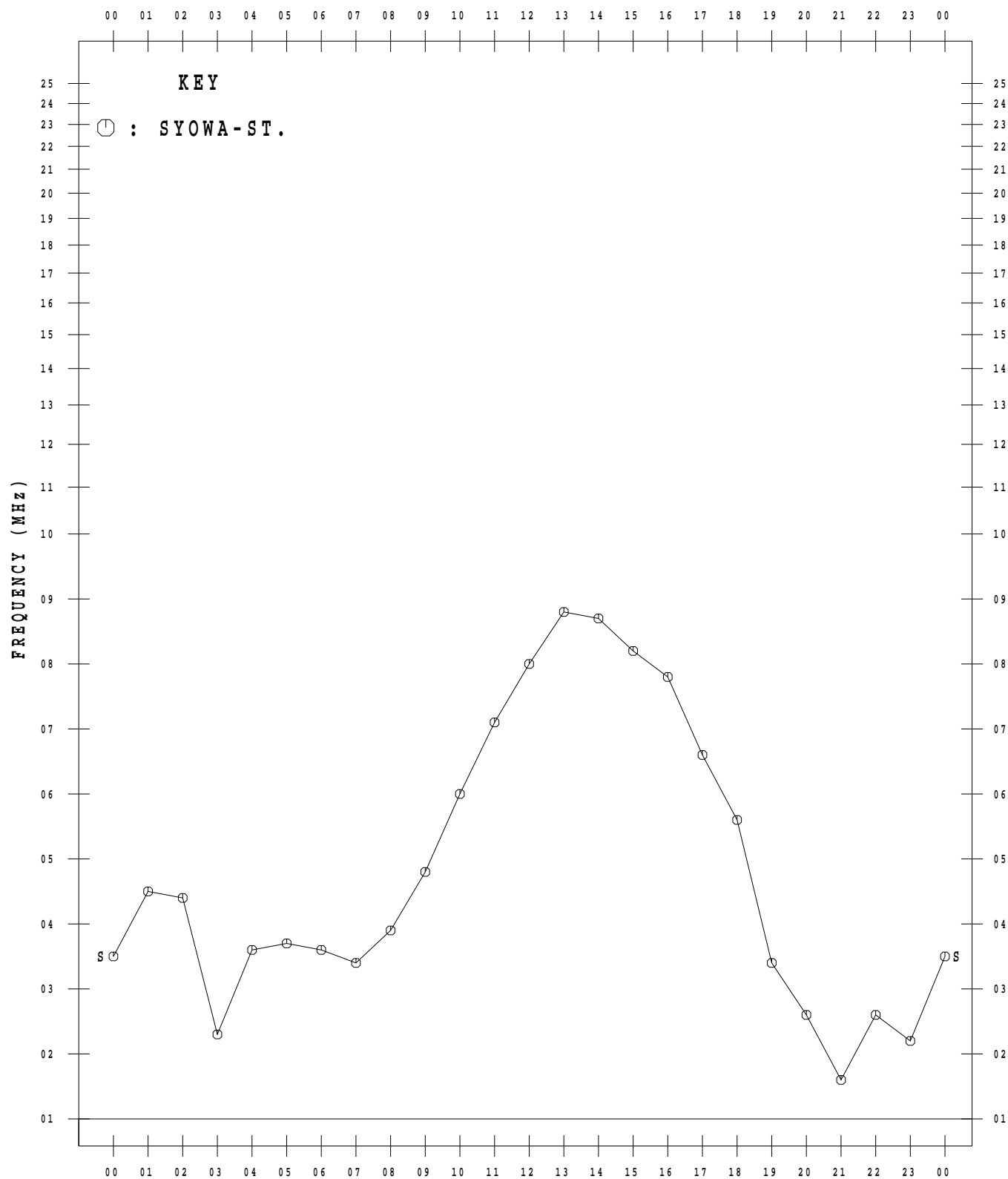
JUL. 2023



MONTHLY MEDIAN VALUES OF f_oF₂

45°E MEAN TIME

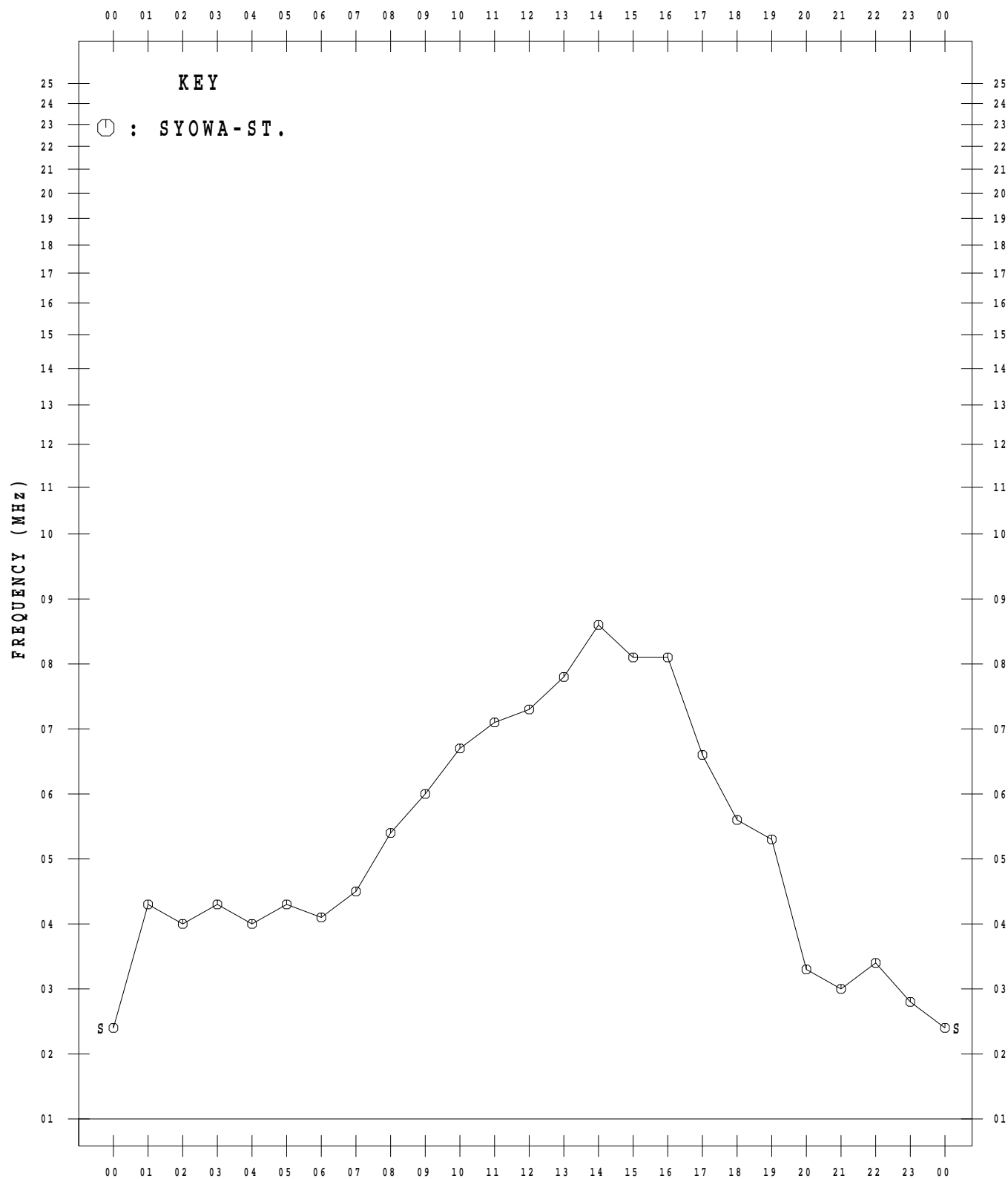
AUG. 2023



MONTHLY MEDIAN VALUES OF f_oF₂

45°E MEAN TIME

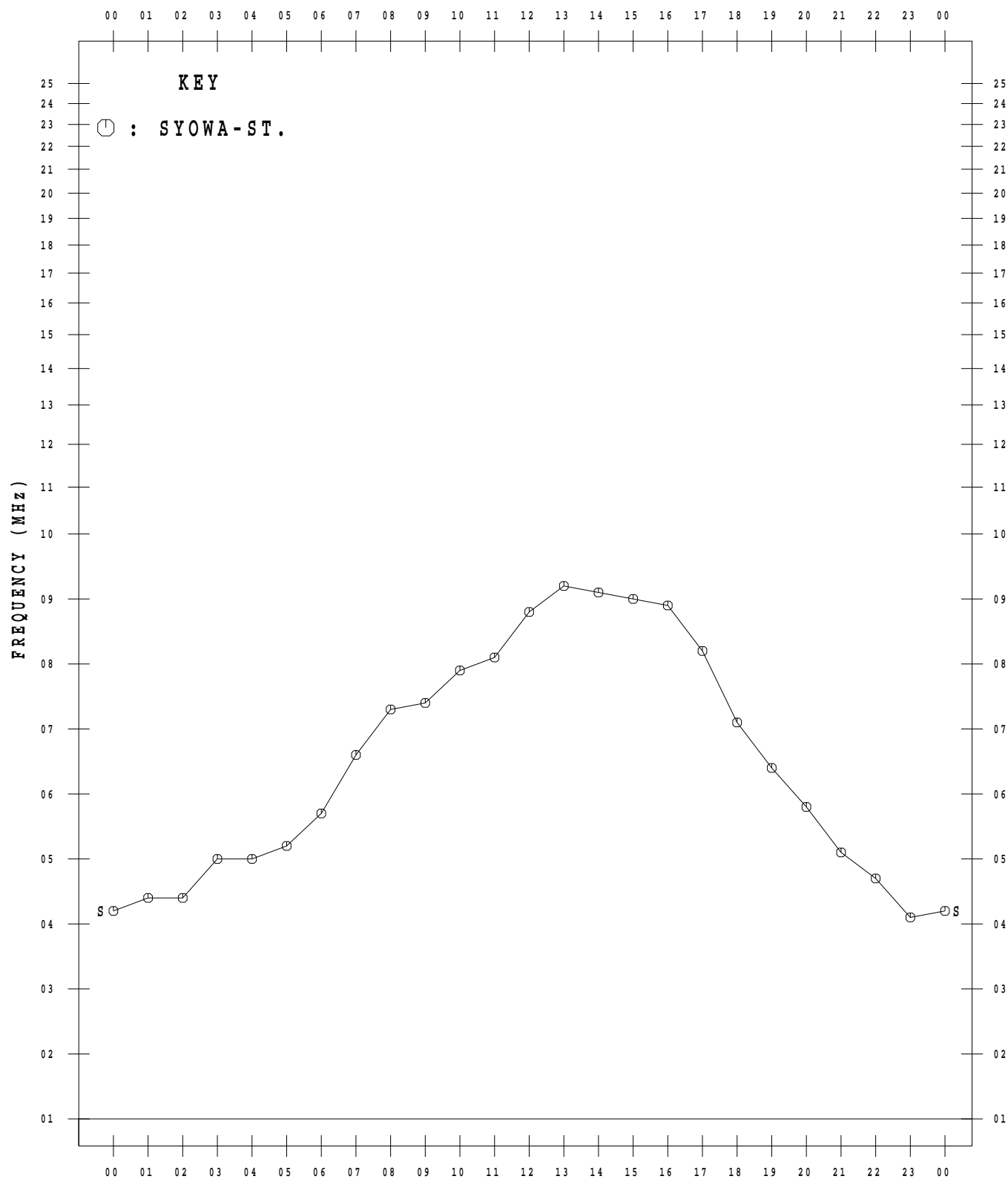
SEP. 2023



MONTHLY MEDIAN VALUES OF f_oF₂

45°E MEAN TIME

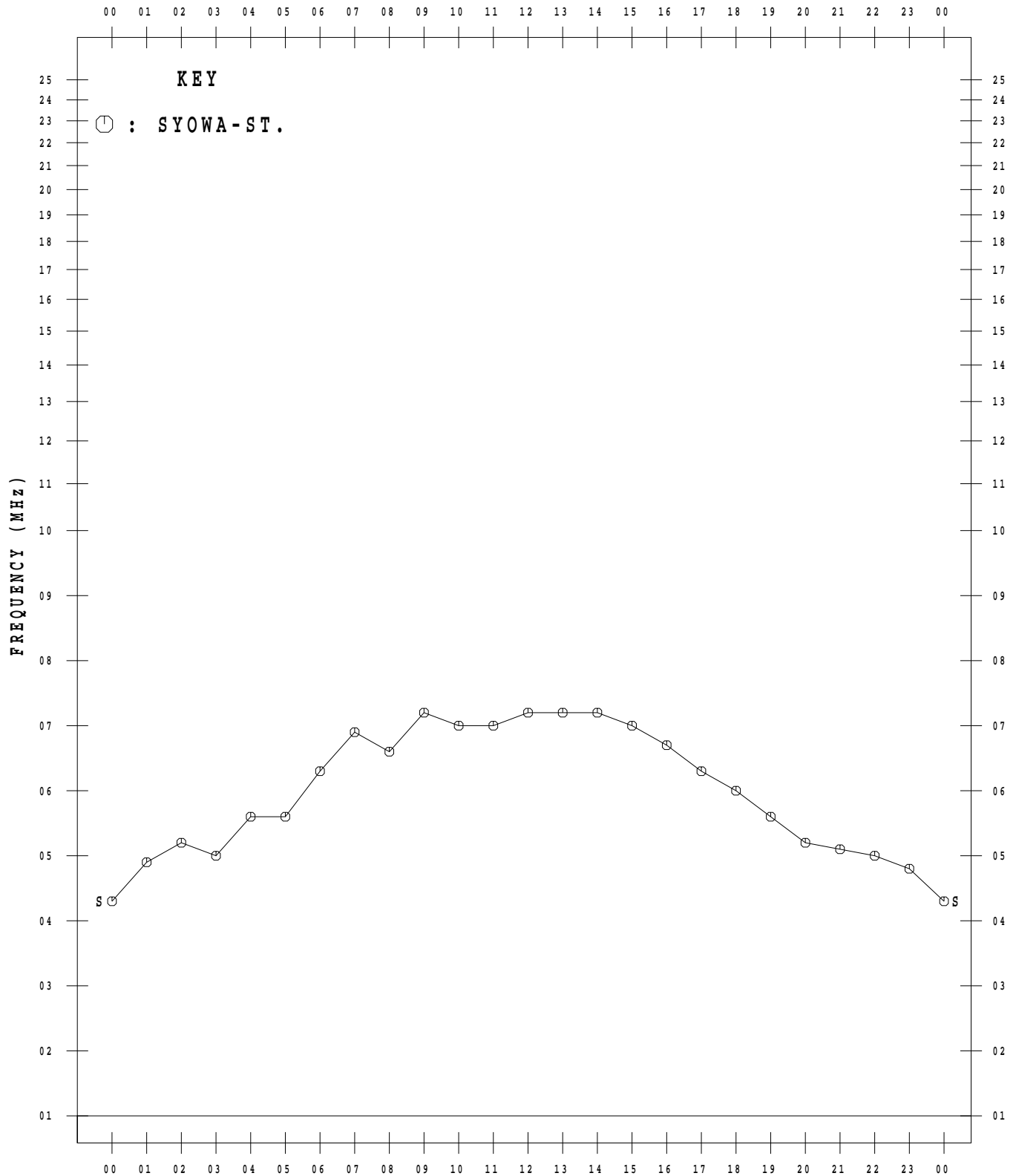
OCT. 2023



MONTHLY MEDIAN VALUES OF f_oF₂

45°E MEAN TIME

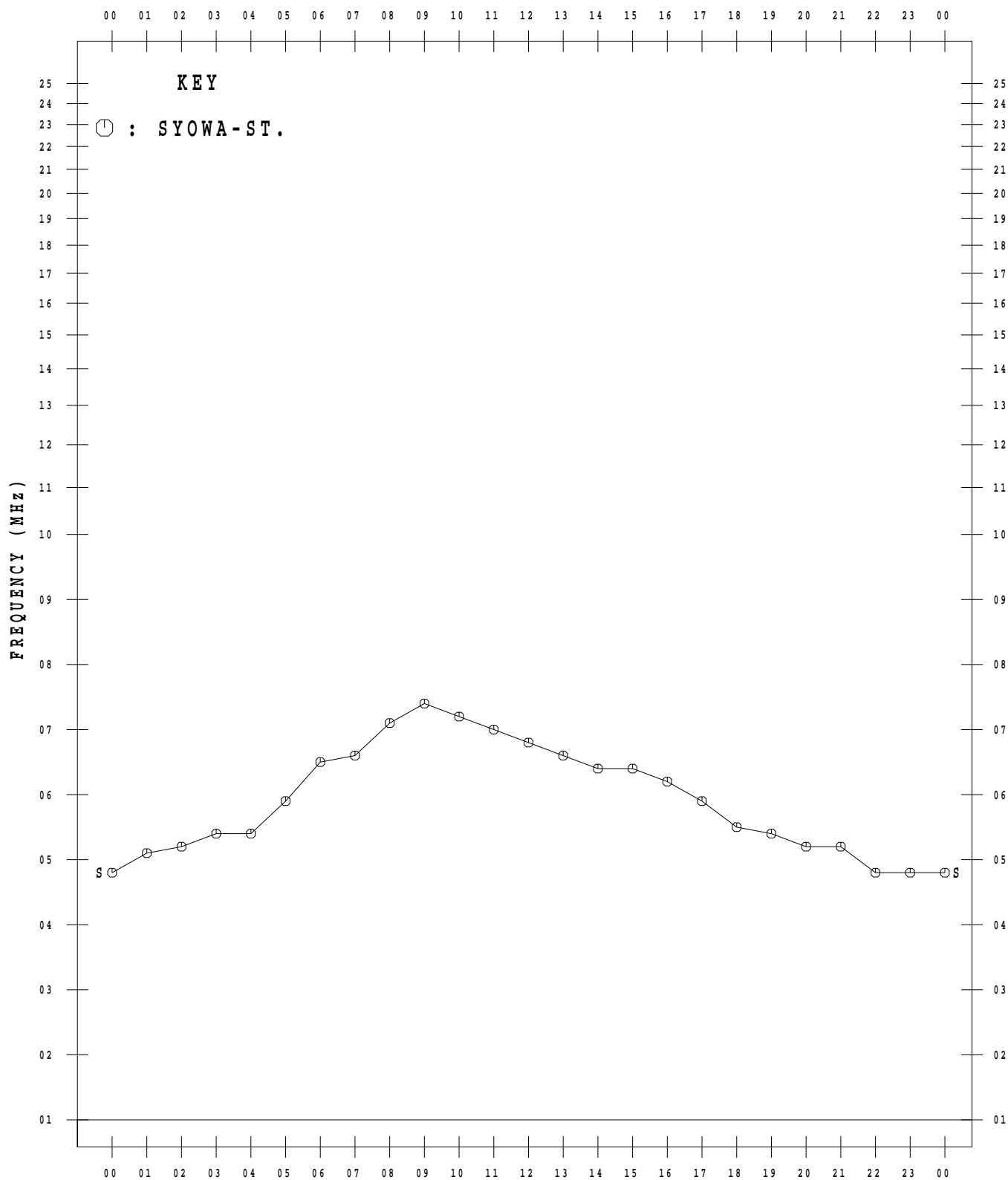
NOV. 2023



MONTHLY MEDIAN VALUES OF f_oF₂

45°E MEAN TIME

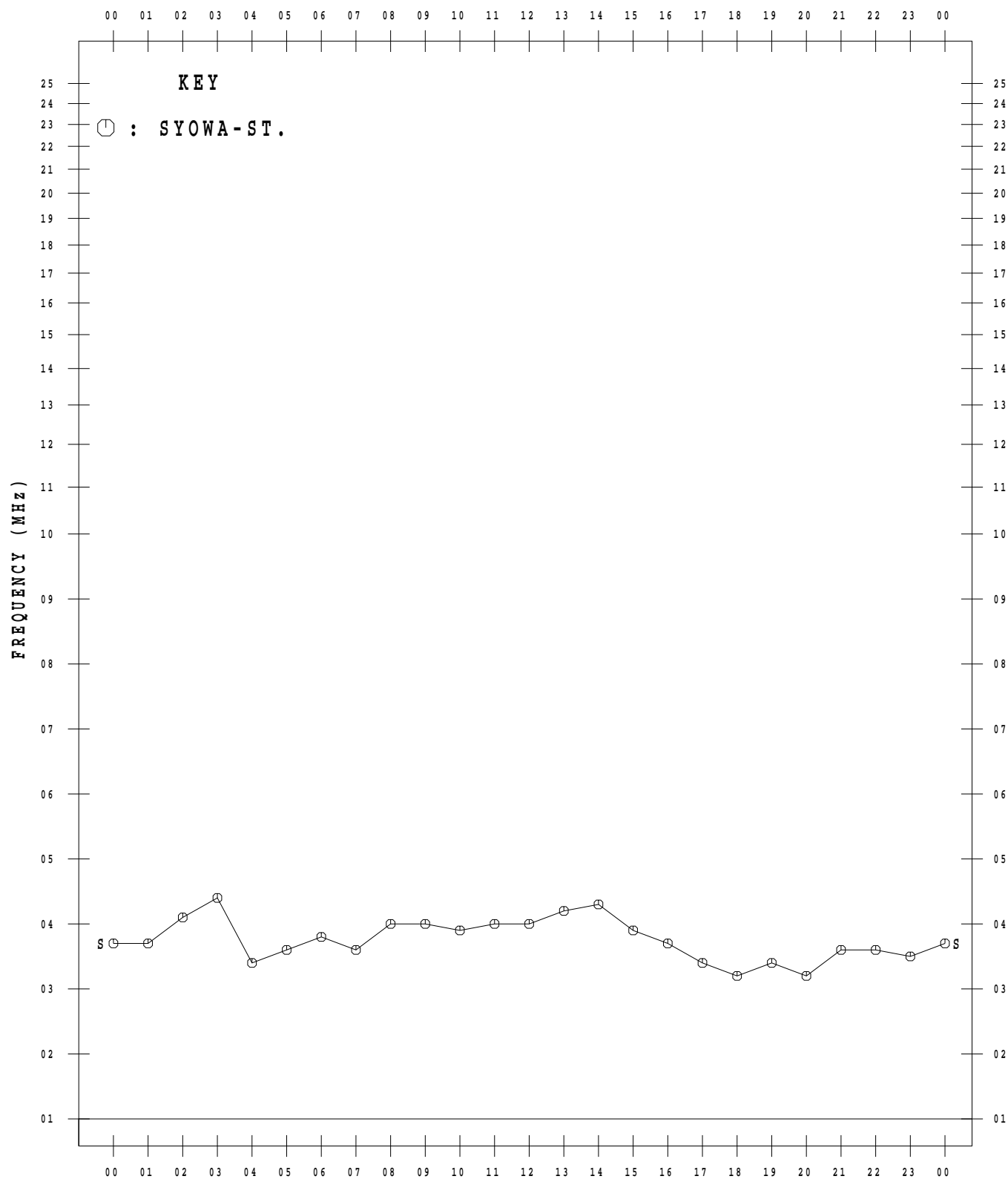
DEC. 2023



MONTHLY MEDIAN VALUES OF f_{tEs}

45°E MEAN TIME

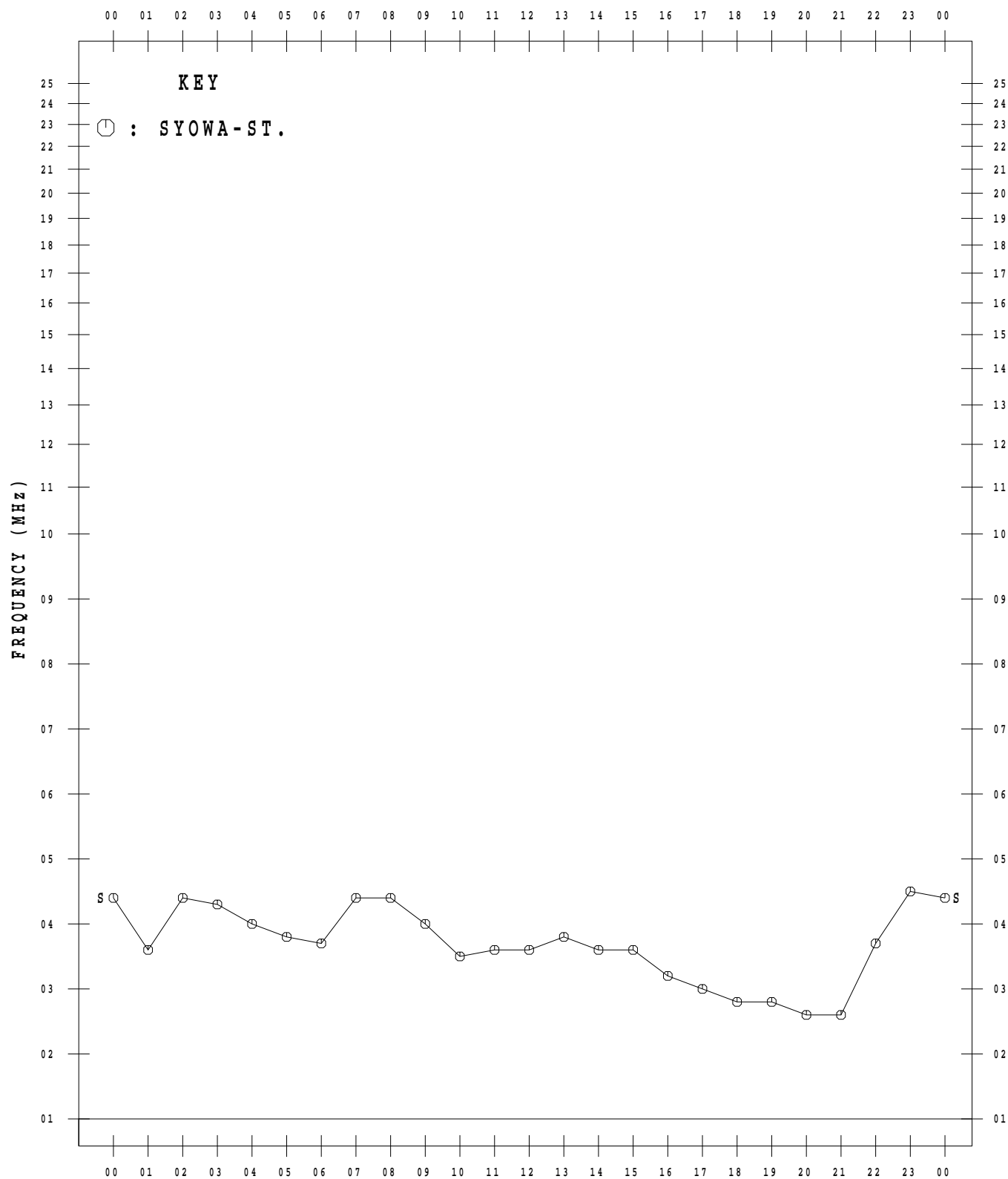
JAN. 2023



MONTHLY MEDIAN VALUES OF f_{tEs}

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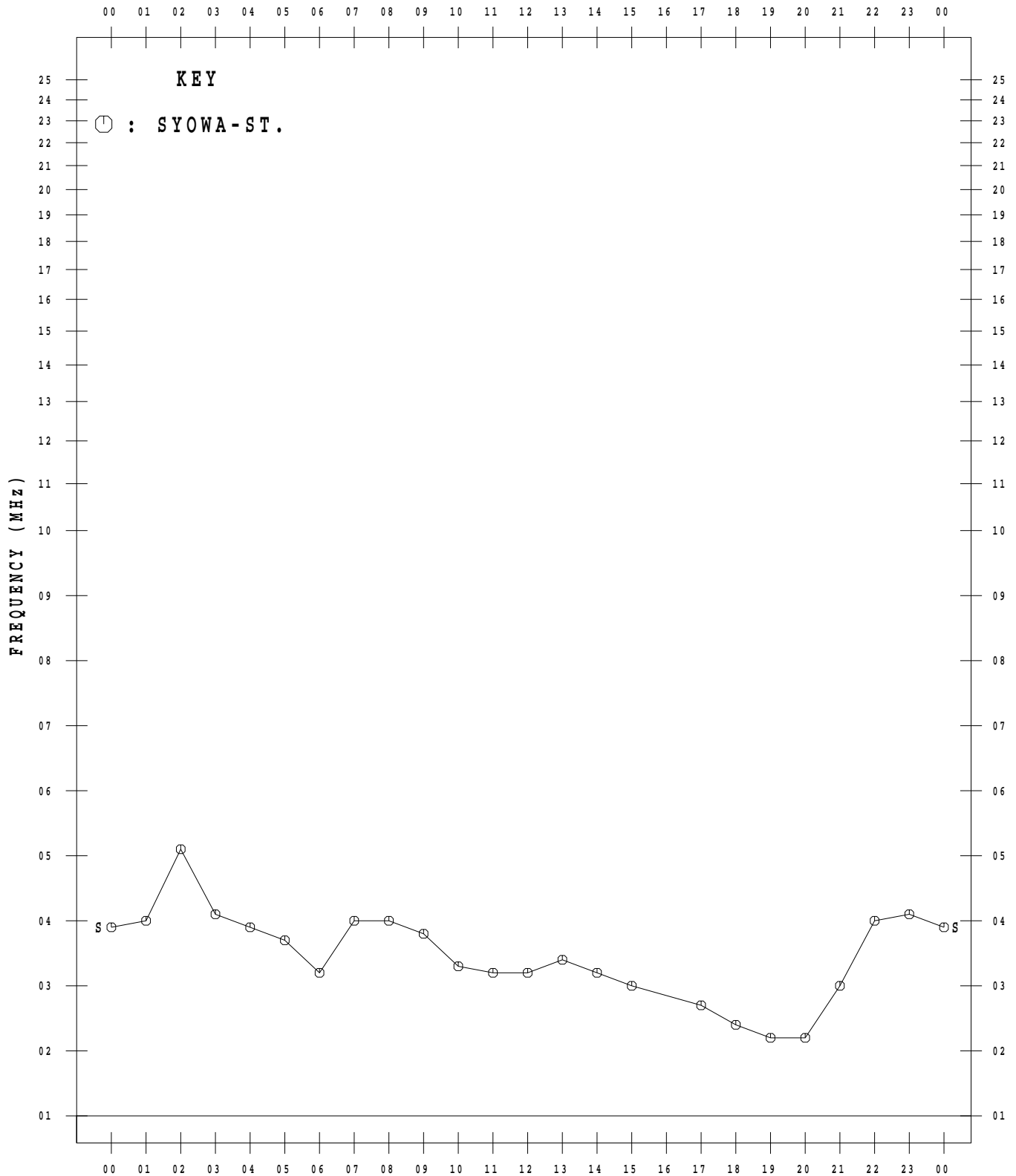
FEB. 2023



MONTHLY MEDIAN VALUES OF f_{tEs}

45°E MEAN TIME

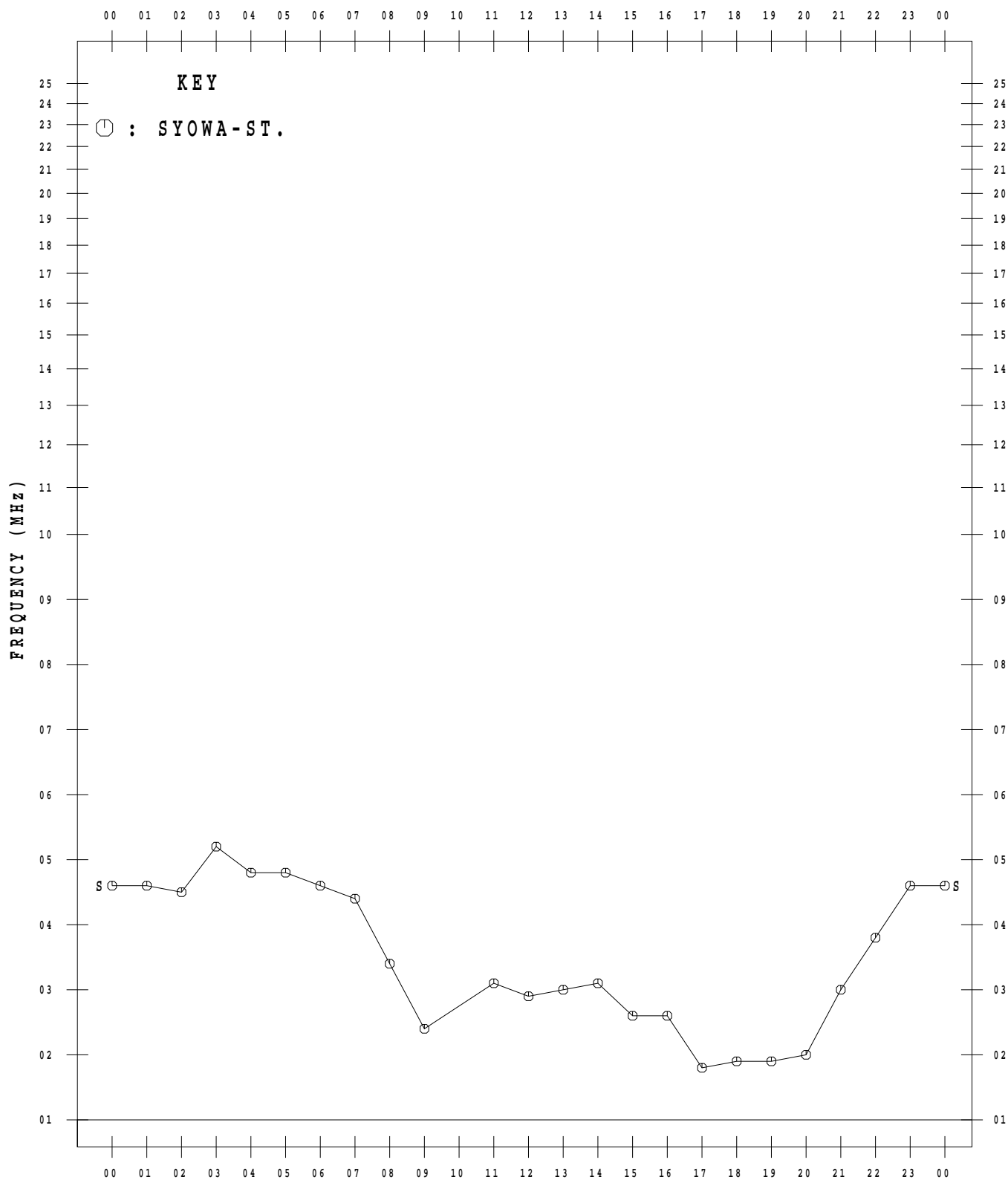
MAR. 2023



MONTHLY MEDIAN VALUES OF f_{tEs}

45°E MEAN TIME

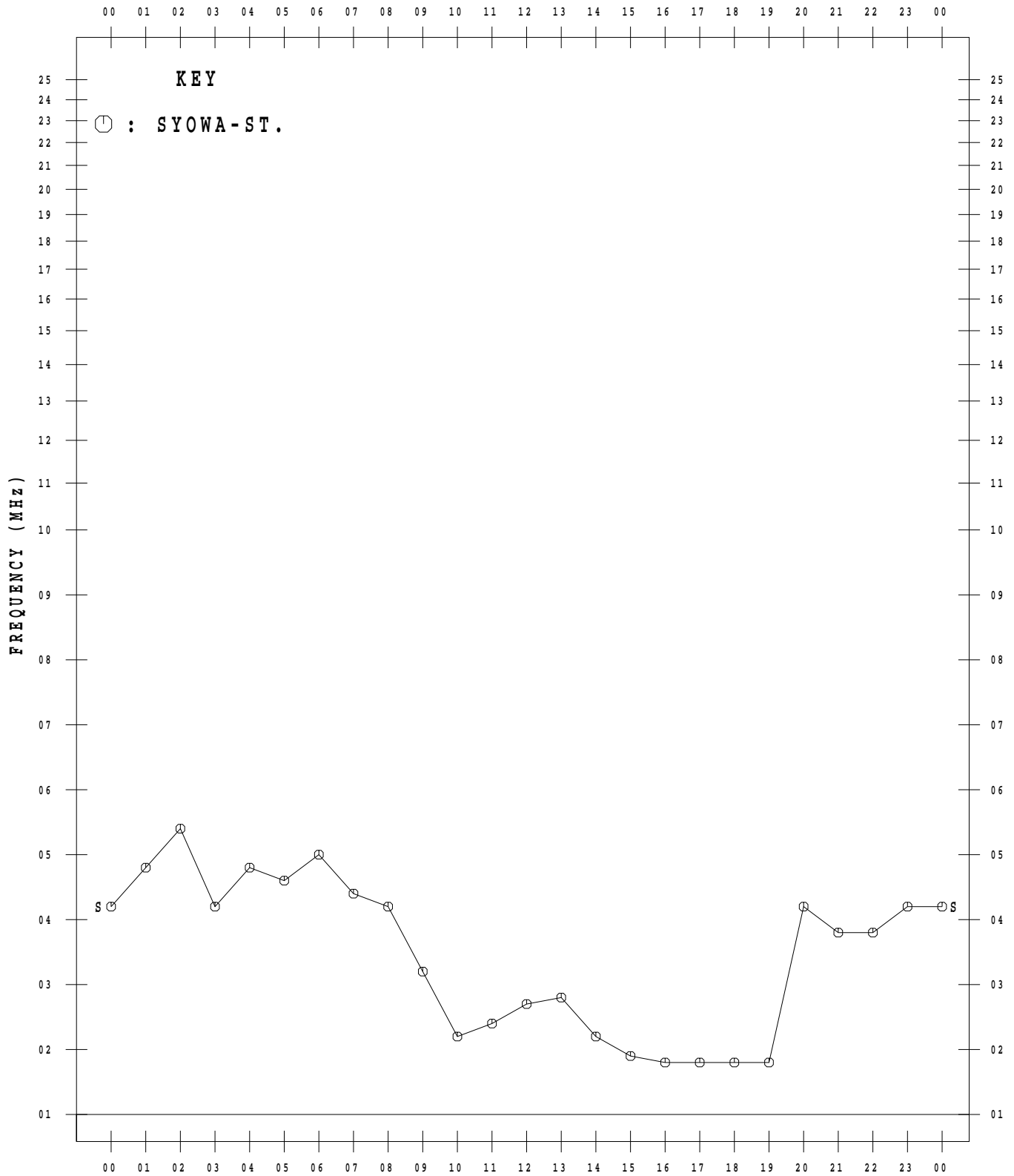
APR. 2023



MONTHLY MEDIAN VALUES OF f_{tEs}

45°E MEAN TIME

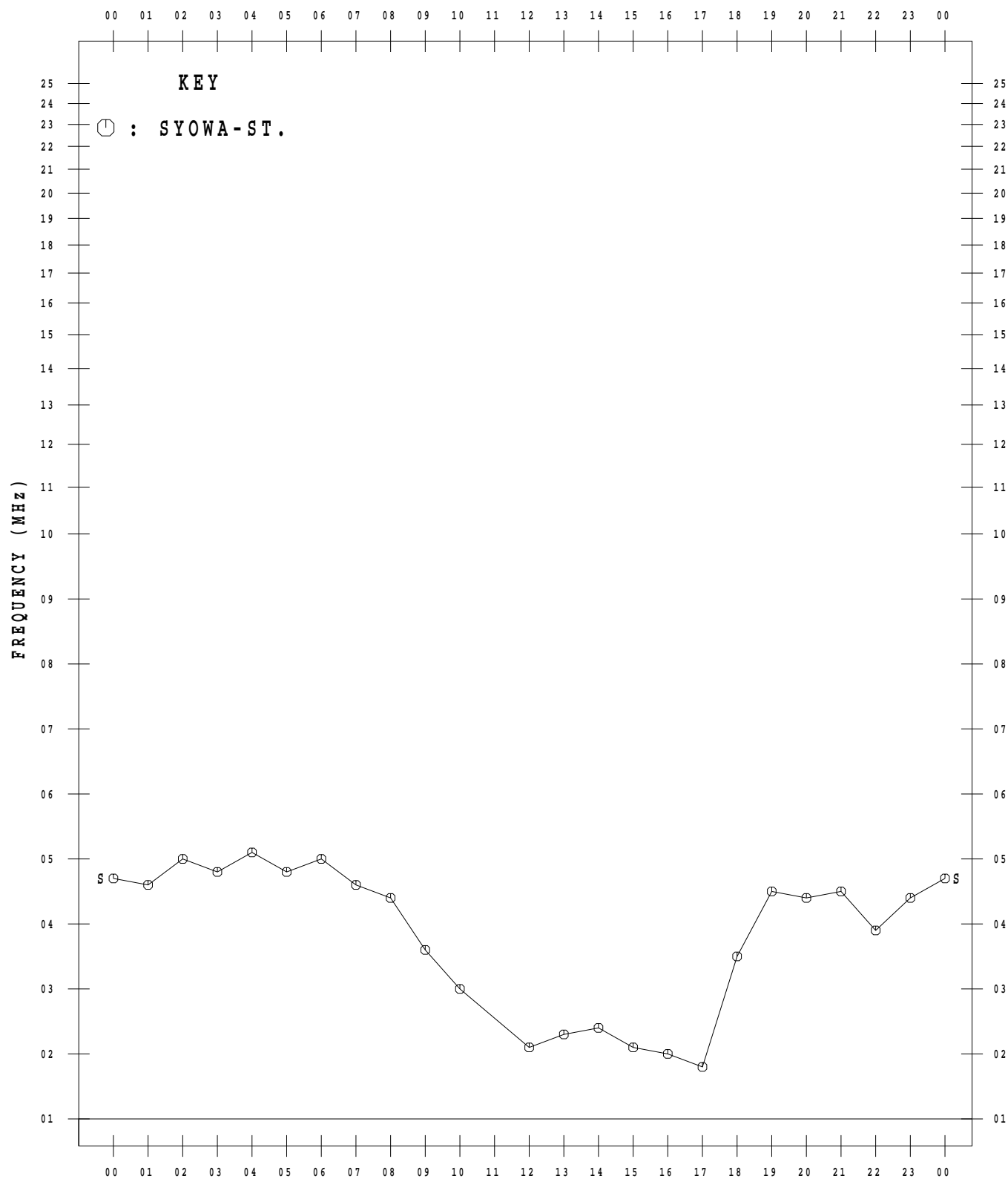
MAY 2023



MONTHLY MEDIAN VALUES OF f_{te}s

45°E MEAN TIME

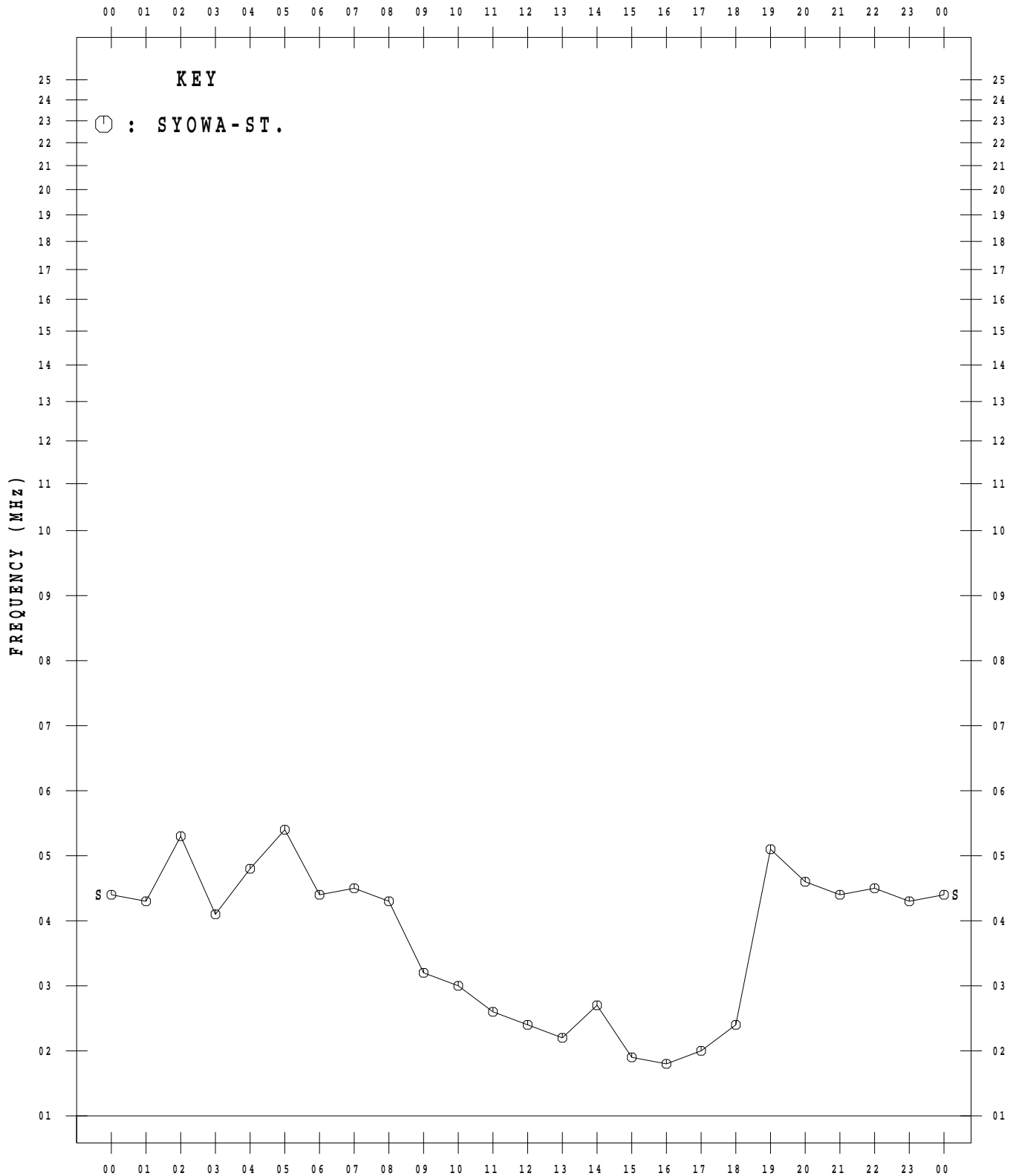
JUN. 2023



MONTHLY MEDIAN VALUES OF f_{TE}s

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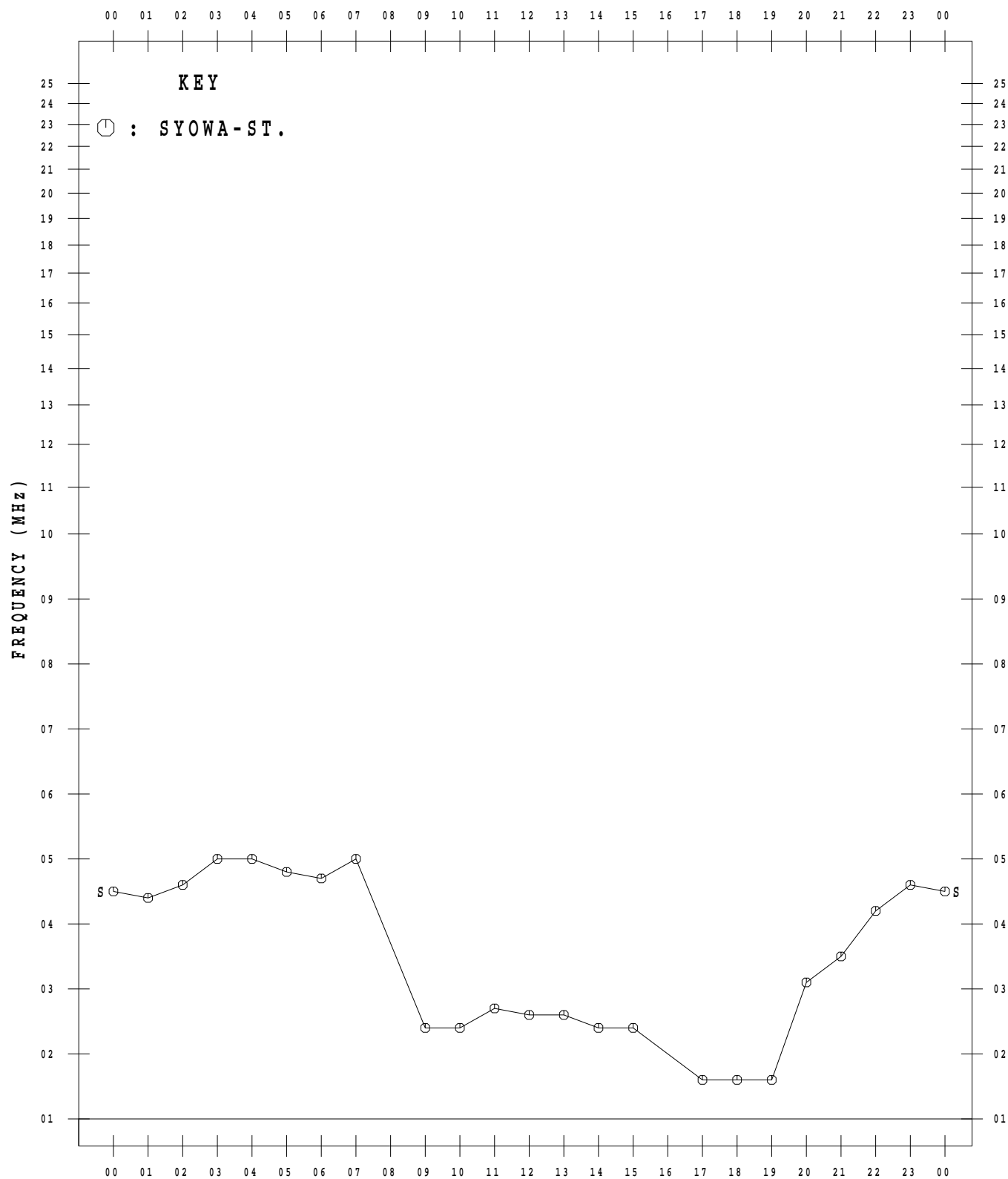
JUL. 2023



MONTHLY MEDIAN VALUES OF f_{tEs}

45°E MEAN TIME

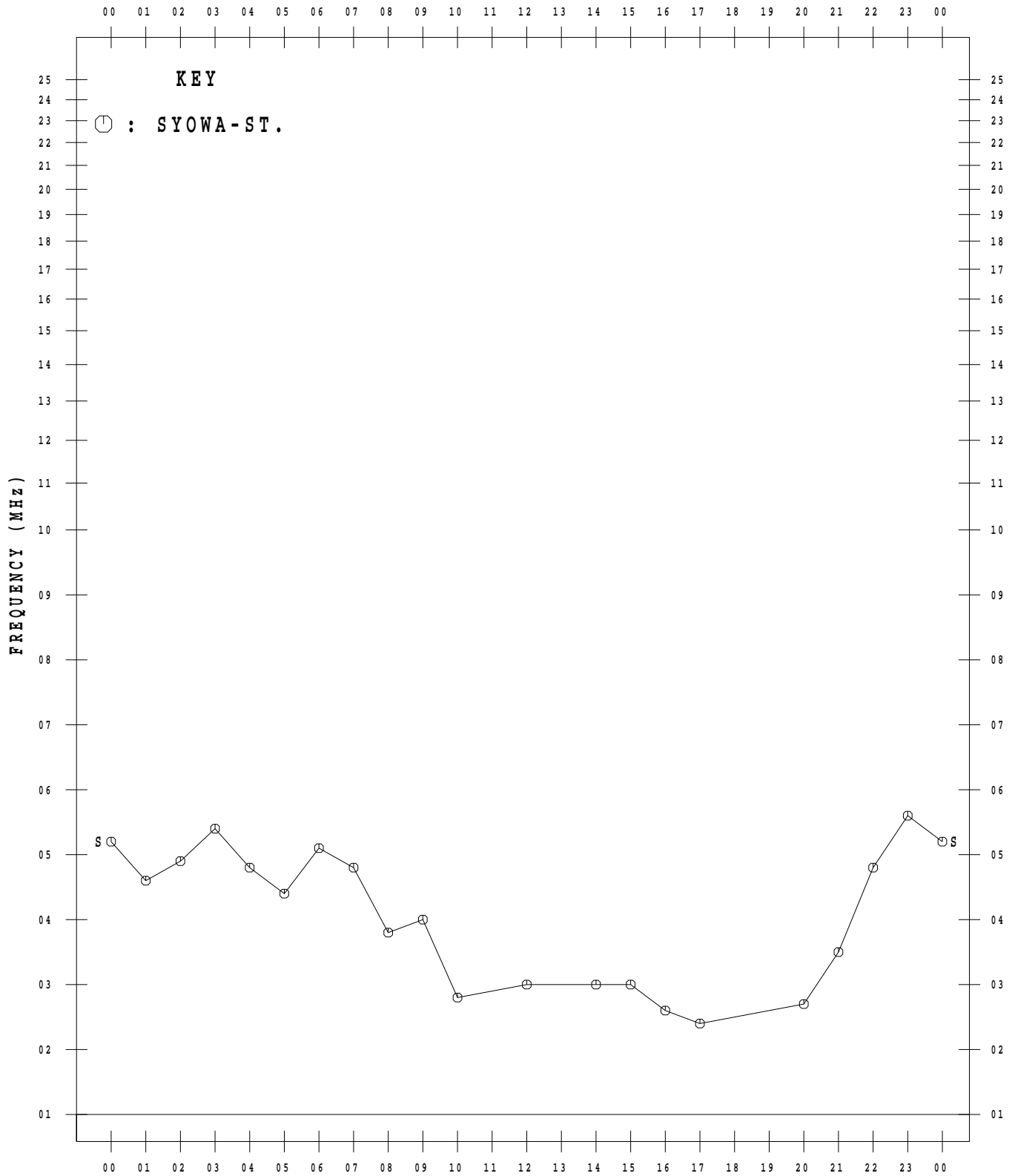
AUG. 2023



MONTHLY MEDIAN VALUES OF f_{tEs}

45°E MEAN TIME

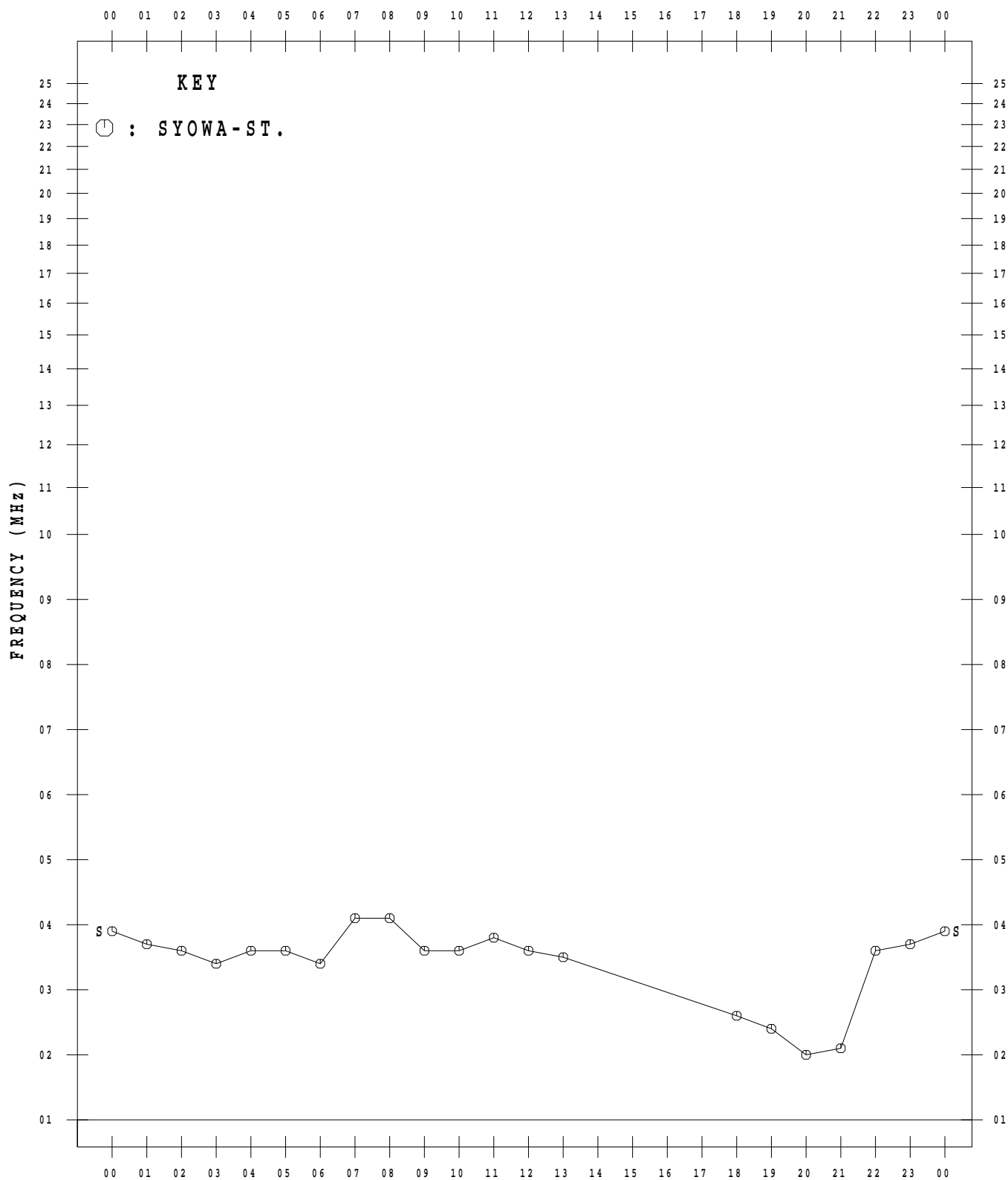
SEP. 2023



MONTHLY MEDIAN VALUES OF f_{tEs}

45°E MEAN TIME

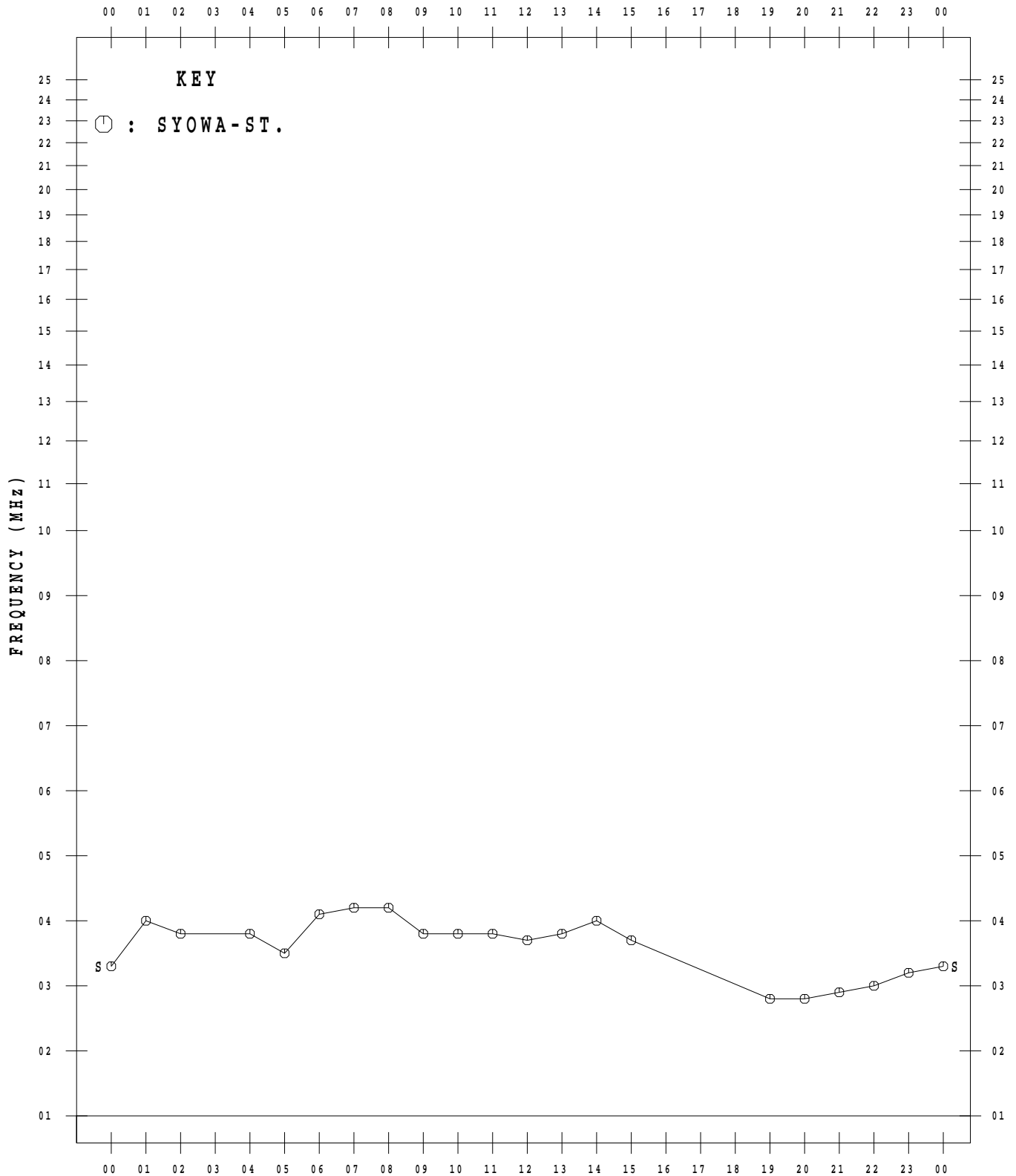
OCT. 2023



MONTHLY MEDIAN VALUES OF f_{tEs}

45°E MEAN TIME

NOV. 2023



MONTHLY MEDIAN VALUES OF f_{tEs}

45°E MEAN TIME

DEC. 2023

