

## Hourly Astronomical Tide Level at Onahama port, Fukushima Pref. in 2011 (unit: centimeter) Issued by JMA

Date	Moon	Time																								
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1-Jun	W	12	24	32	32	23	4	-22	-48	-71	-85	-87	-77	-58	-33	-8	11	22	24	18	8	-3	-10	-11	-5	
2-Jun	Th	New Moon	7	20	32	37	32	18	-6	-34	-61	-82	-92	-89	-74	-51	-24	0	18	25	24	16	5	-5	-10	-9
3-Jun	F		0	14	28	37	39	29	10	-17	-46	-72	-89	-94	-87	-67	-42	-15	8	22	26	21	12	0	-8	-11
4-Jun	Sa		-6	6	20	33	40	37	24	1	-27	-55	-79	-92	-92	-80	-58	-32	-6	13	23	24	17	7	-4	-10
5-Jun	Su		-10	-2	10	24	35	38	32	16	-8	-36	-62	-81	-89	-85	-70	-47	-22	1	17	23	21	13	2	-8
6-Jun	M		-12	-9	0	12	25	33	33	25	7	-16	-41	-63	-78	-82	-75	-58	-36	-13	7	19	22	17	8	-3
7-Jun	Tu		-11	-14	-10	-1	10	21	27	26	16	0	-21	-42	-60	-70	-71	-62	-45	-24	-4	12	20	20	14	4
8-Jun	W		-7	-15	-17	-14	-6	4	13	18	17	9	-5	-21	-38	-52	-59	-57	-48	-32	-14	3	16	21	19	11
9-Jun	Th	First Quarter	0	-11	-20	-23	-21	-15	-7	2	7	8	4	-6	-18	-30	-40	-45	-43	-34	-20	-4	10	20	22	18
10-Jun	F		9	-4	-17	-27	-33	-33	-28	-20	-11	-3	2	2	-3	-10	-20	-27	-31	-29	-21	-9	5	17	24	25
11-Jun	Sa		19	7	-7	-23	-36	-45	-47	-43	-34	-22	-11	-2	3	3	-1	-8	-15	-19	-18	-11	0	12	23	28
12-Jun	Su		28	20	6	-12	-31	-47	-58	-62	-58	-47	-32	-16	-2	8	11	9	2	-5	-9	-9	-3	7	19	28
13-Jun	M		34	32	22	5	-17	-40	-59	-72	-76	-70	-56	-37	-16	2	14	19	16	10	2	-4	-4	2	12	24
14-Jun	Tu		34	39	36	23	3	-23	-49	-71	-84	-86	-77	-60	-37	-13	7	20	25	21	13	4	-1	-1	5	16
15-Jun	W		29	40	44	38	23	-1	-30	-58	-80	-92	-92	-80	-59	-33	-7	13	25	28	23	13	3	-2	-1	7
16-Jun	Th	Full Moon	20	34	44	47	39	20	-7	-37	-65	-86	-95	-92	-76	-52	-25	0	19	28	28	20	9	-1	-5	-2
17-Jun	F		8	23	38	47	47	36	14	-14	-44	-71	-89	-94	-86	-67	-42	-15	8	24	29	25	15	3	-6	-8
18-Jun	Sa		-3	10	26	40	47	44	30	7	-22	-50	-74	-87	-87	-75	-54	-29	-4	16	26	27	20	9	-3	-11
19-Jun	Su		-11	-3	11	27	39	44	38	21	-2	-29	-54	-72	-80	-76	-61	-39	-15	7	21	27	24	14	2	-10
20-Jun	M		-15	-13	-3	11	26	35	37	28	11	-11	-35	-55	-67	-70	-61	-44	-23	-2	15	25	26	19	8	-5
21-Jun	Tu		-15	-18	-14	-4	10	22	28	27	18	1	-18	-37	-52	-59	-56	-45	-28	-8	9	22	26	23	14	2
22-Jun	W		-10	-18	-21	-16	-6	5	15	19	17	8	-6	-22	-36	-45	-47	-41	-29	-13	4	17	25	26	20	10
23-Jun	Th	Last Quarter	-3	-14	-22	-23	-19	-11	-2	6	9	7	0	-10	-21	-30	-34	-33	-26	-15	-1	12	22	26	24	17
24-Jun	F		6	-7	-18	-25	-28	-25	-19	-10	-3	1	1	-3	-9	-16	-21	-23	-21	-14	-4	8	18	25	26	22
25-Jun	Sa		14	2	-10	-22	-31	-35	-33	-27	-19	-11	-5	-2	-2	-5	-8	-11	-12	-10	-4	4	13	21	26	26
26-Jun	Su		21	12	0	-15	-28	-39	-44	-43	-36	-27	-16	-7	0	3	3	1	-2	-3	-2	2	9	17	23	27
27-Jun	M		27	21	11	-4	-21	-37	-49	-54	-52	-44	-31	-17	-4	5	10	11	9	5	2	2	5	11	19	26
28-Jun	Tu		30	29	22	9	-9	-29	-47	-60	-65	-61	-49	-32	-14	1	13	18	18	14	8	4	3	7	14	22
29-Jun	W		30	34	32	22	5	-17	-40	-59	-72	-74	-66	-50	-29	-8	9	21	25	22	16	9	4	3	8	16
30-Jun	Th		27	35	39	35	21	0	-26	-51	-71	-81	-80	-68	-47	-23	0	18	28	29	23	14	6	1	2	9

\* Note that tide levels in the calendar are astronomical tide levels. During an intense low pressure system's approaching, tide levels can be higher by a few to tens centimeters than the values in the calendar.

## Hourly Astronomical Tide Level at Onahama port, Fukushima Pref. in 2011 (unit: centimeter) Issued by JMA

Date	Moon	Time																								
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1-Jul	F	New Moon	20	32	41	43	36	18	-7	-36	-62	-81	-88	-82	-65	-41	-14	10	25	32	29	21	10	1	-3	1
2-Jul	Sa		11	25	38	46	46	34	12	-16	-46	-71	-87	-90	-79	-58	-31	-3	18	31	33	27	16	4	-5	-6
3-Jul	Su		0	13	29	42	49	45	30	5	-25	-54	-77	-88	-86	-71	-46	-18	8	26	34	32	22	8	-4	-11
4-Jul	M		-10	0	15	31	43	47	40	23	-3	-32	-58	-77	-83	-76	-57	-31	-5	18	32	35	28	15	0	-12
5-Jul	Tu		-17	-13	-2	14	30	40	42	33	15	-10	-36	-58	-71	-72	-61	-40	-15	9	27	35	32	22	6	-9
6-Jul	W		-20	-23	-17	-5	11	25	33	33	24	7	-15	-36	-52	-60	-56	-43	-22	1	20	33	35	29	15	-2
7-Jul	Th		-17	-26	-28	-22	-10	4	16	23	23	15	1	-15	-31	-42	-44	-38	-24	-5	14	29	36	34	24	8
8-Jul	F	First Quarter	-9	-23	-32	-34	-29	-18	-6	5	12	13	8	-1	-12	-22	-28	-27	-20	-6	10	25	35	37	32	20
9-Jul	Sa		4	-13	-28	-37	-40	-37	-29	-18	-7	1	5	4	0	-5	-11	-13	-11	-4	7	20	31	37	37	30
10-Jul	Su		18	1	-16	-31	-43	-48	-47	-40	-30	-19	-8	0	5	6	4	1	0	1	7	15	25	34	38	37
11-Jul	M		30	18	1	-17	-35	-49	-56	-57	-52	-41	-27	-13	0	9	13	13	11	9	9	12	18	27	34	39
12-Jul	Tu		39	32	20	2	-18	-39	-55	-65	-67	-61	-48	-30	-12	4	16	21	21	17	13	11	12	18	26	34
13-Jul	W		41	42	36	23	3	-21	-44	-63	-73	-75	-66	-50	-29	-7	11	23	28	26	19	12	8	9	15	25
14-Jul	Th		36	44	46	40	24	1	-25	-50	-70	-80	-78	-66	-46	-22	2	20	30	31	26	16	7	2	4	12
15-Jul	F	Full Moon	25	38	48	49	41	23	-3	-31	-57	-75	-82	-77	-61	-37	-11	12	28	34	31	22	9	-1	-5	-1
16-Jul	Sa		11	26	41	51	50	39	18	-10	-39	-63	-78	-80	-69	-49	-23	2	23	34	35	27	14	0	-10	-11
17-Jul	Su		-3	12	29	44	51	48	33	9	-19	-46	-66	-75	-72	-57	-33	-7	16	31	37	32	20	4	-10	-17
18-Jul	M		-15	-4	13	31	44	48	41	24	-1	-27	-50	-65	-68	-58	-39	-15	9	27	37	36	26	11	-6	-18
19-Jul	Tu		-22	-16	-3	15	32	42	42	32	13	-11	-33	-51	-59	-55	-41	-20	2	22	35	38	32	18	1	-15
20-Jul	W		-24	-25	-16	-1	15	29	35	32	20	2	-18	-35	-46	-47	-39	-22	-2	18	32	39	36	25	9	-8
21-Jul	Th		-22	-28	-26	-16	-2	13	23	27	22	10	-6	-21	-32	-37	-33	-21	-5	13	28	37	38	30	17	0
22-Jul	F		-15	-26	-30	-26	-16	-4	8	16	17	12	2	-9	-19	-25	-24	-17	-5	10	24	34	38	34	24	10
23-Jul	Sa	Last Quarter	-6	-19	-28	-31	-28	-19	-9	1	7	8	5	-1	-8	-13	-14	-11	-3	8	20	30	36	36	29	18
24-Jul	Su		5	-9	-22	-30	-33	-31	-25	-16	-7	-1	2	2	0	-2	-4	-3	1	8	16	25	31	34	32	26
25-Jul	M		15	2	-11	-24	-33	-38	-37	-32	-24	-15	-6	0	4	6	6	6	7	10	14	20	26	31	32	31
26-Jul	Tu		25	15	2	-13	-27	-39	-46	-46	-41	-31	-20	-8	2	10	14	15	15	14	14	16	20	25	30	32
27-Jul	W		32	27	17	2	-15	-33	-47	-55	-56	-49	-37	-21	-5	8	18	22	22	19	16	14	15	18	24	30
28-Jul	Th		35	36	31	19	1	-20	-41	-58	-66	-65	-55	-38	-18	1	17	27	29	26	20	14	10	10	16	24
29-Jul	F		34	41	42	35	20	-2	-28	-51	-69	-76	-71	-57	-35	-11	11	27	34	33	25	16	7	3	5	14
30-Jul	Sa		26	39	47	48	38	19	-8	-36	-61	-77	-81	-72	-52	-26	0	22	35	38	32	20	7	-2	-5	1
31-Jul	Su	New Moon	13	29	44	53	52	38	15	-15	-45	-69	-82	-81	-66	-42	-13	14	33	41	38	26	11	-4	-13	-13

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Date	Moon	Time																								
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1-Aug	M	-3	13	33	48	56	52	35	9	-22	-51	-71	-79	-72	-53	-26	3	27	41	43	33	17	-2	-17	-23	
2-Aug	Tu	-20	-6	14	34	49	54	47	28	2	-28	-53	-68	-70	-57	-35	-7	19	38	45	40	25	5	-15	-28	
3-Aug	W	-32	-25	-8	13	32	46	48	39	20	-5	-30	-49	-58	-53	-37	-13	12	34	46	45	34	15	-7	-26	
4-Aug	Th	-37	-38	-28	-11	9	27	38	38	29	12	-9	-28	-40	-43	-33	-15	7	29	44	48	42	26	5	-17	
5-Aug	F	-34	-43	-41	-30	-14	3	18	27	26	18	5	-10	-22	-27	-24	-13	5	24	40	48	47	36	18	-3	
6-Aug	Sa	First Quarter	-23	-38	-45	-43	-33	-20	-5	7	14	15	10	2	-6	-12	-12	-6	5	20	35	45	48	43	30	12
7-Aug	Su		-7	-25	-38	-44	-44	-37	-27	-15	-5	3	6	6	4	1	0	2	8	17	29	39	45	45	38	26
8-Aug	M		11	-7	-23	-36	-44	-46	-43	-35	-25	-15	-5	2	7	9	10	10	12	16	23	30	37	41	41	36
9-Aug	Tu		26	13	-3	-19	-34	-44	-50	-49	-43	-33	-21	-8	3	12	17	19	18	17	18	21	26	32	36	38
10-Aug	W		36	29	18	2	-16	-34	-48	-56	-56	-50	-38	-22	-5	9	20	25	25	21	17	14	15	19	26	33
11-Aug	Th		39	40	35	23	5	-16	-37	-53	-62	-62	-53	-37	-17	3	19	29	31	26	18	10	6	6	12	22
12-Aug	F		34	42	45	39	25	4	-20	-43	-59	-67	-63	-50	-30	-7	14	29	35	32	23	11	1	-4	-2	8
13-Aug	Sa		22	37	47	49	41	24	-1	-27	-49	-64	-67	-59	-41	-17	7	26	37	38	29	15	0	-11	-14	-7
14-Aug	Su	Full Moon	7	25	41	51	51	39	18	-8	-35	-55	-65	-63	-49	-27	-1	22	37	41	35	21	3	-13	-22	-20
15-Aug	M		-9	9	29	46	53	48	33	9	-18	-41	-57	-61	-52	-33	-9	16	34	43	41	28	9	-10	-24	-29
16-Aug	Tu		-23	-7	14	34	47	50	41	23	-1	-26	-44	-53	-50	-36	-14	10	31	43	44	35	17	-4	-22	-33
17-Aug	W		-33	-22	-3	18	36	45	44	32	12	-11	-30	-43	-44	-35	-17	6	27	42	46	40	25	4	-17	-32
18-Aug	Th		-38	-34	-19	1	20	34	40	34	20	2	-17	-30	-36	-31	-17	3	23	39	46	44	32	13	-8	-26
19-Aug	F		-38	-39	-31	-15	3	20	30	31	24	10	-5	-18	-25	-24	-15	1	19	35	45	46	37	22	2	-17
20-Aug	Sa		-32	-39	-37	-27	-12	3	16	23	22	14	3	-7	-15	-16	-11	1	16	30	41	45	40	29	12	-6
21-Aug	Su		-22	-34	-38	-34	-25	-12	0	10	14	13	8	1	-5	-7	-5	3	14	25	36	41	41	33	21	5
22-Aug	M	Last Quarter	-11	-24	-33	-36	-33	-26	-16	-6	2	6	7	5	3	2	3	7	13	22	30	36	38	35	27	16
23-Aug	Tu		3	-11	-23	-32	-36	-36	-31	-23	-14	-5	1	5	8	9	10	12	15	20	25	29	33	33	31	25
24-Aug	W		16	4	-9	-21	-32	-39	-42	-39	-31	-21	-10	0	8	14	18	19	19	19	20	22	25	28	30	30
25-Aug	Th		27	19	8	-6	-22	-36	-46	-51	-48	-39	-25	-10	4	16	23	26	24	21	17	15	16	19	25	30
26-Aug	F		33	33	26	13	-5	-25	-43	-56	-60	-56	-43	-25	-5	12	25	31	31	25	17	10	6	8	14	23
27-Aug	Sa		33	40	41	33	17	-6	-30	-51	-65	-67	-59	-41	-18	5	24	35	37	31	19	7	-2	-6	-1	10
28-Aug	Su		25	39	48	48	38	17	-10	-37	-59	-70	-69	-55	-33	-6	18	35	42	38	25	8	-8	-17	-18	-9
29-Aug	M	New Moon	8	28	45	55	53	39	15	-15	-42	-62	-70	-63	-44	-18	10	33	45	44	33	13	-8	-24	-32	-29
30-Aug	Tu		-14	8	31	50	58	53	36	10	-19	-45	-60	-62	-50	-26	2	28	45	50	42	23	-1	-25	-40	-45
31-Aug	W		-36	-17	8	33	50	56	49	30	4	-22	-43	-52	-47	-30	-5	22	43	53	50	34	10	-17	-40	-53

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Date	Moon	Time																								
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1-Sep	Th	-53	-40	-18	8	31	46	49	40	22	-1	-22	-36	-38	-28	-8	16	39	53	55	44	23	-4	-30	-50	
2-Sep	F	-59	-55	-40	-18	6	26	37	38	29	14	-4	-18	-25	-21	-7	13	34	50	57	52	36	12	-14	-38	
3-Sep	Sa	-54	-59	-53	-38	-18	2	18	26	26	19	8	-3	-11	-11	-4	11	28	44	54	55	45	27	4	-20	
4-Sep	Su	-40	-52	-55	-49	-36	-20	-4	8	14	15	11	6	0	-2	2	11	23	37	47	52	48	37	20	0	
5-Sep	M	First Quarter	-20	-36	-46	-48	-44	-35	-24	-12	-2	4	8	8	7	8	12	19	28	37	43	45	40	30	17	
6-Sep	Tu		1	-15	-28	-38	-43	-42	-37	-29	-20	-10	-1	6	11	13	15	16	18	21	26	31	35	36	33	27
7-Sep	W		18	6	-7	-21	-32	-40	-43	-41	-35	-25	-13	-1	9	17	20	21	19	17	17	18	21	25	29	30
8-Sep	Th		29	23	13	0	-16	-30	-41	-46	-45	-38	-25	-10	5	17	25	26	23	17	10	7	7	11	18	26
9-Sep	F		32	33	30	19	3	-15	-32	-45	-50	-47	-37	-20	-2	15	27	32	29	20	9	-1	-6	-5	3	14
10-Sep	Sa		27	36	40	35	22	3	-18	-37	-49	-52	-45	-30	-10	10	27	36	35	26	12	-3	-14	-18	-13	-1
11-Sep	Su		15	31	42	45	37	20	-2	-24	-42	-51	-50	-38	-18	4	24	38	41	33	18	-1	-18	-28	-28	-18
12-Sep	M	Full Moon	0	20	38	47	46	35	14	-9	-31	-45	-49	-42	-24	-2	20	37	44	40	25	5	-16	-33	-39	-33
13-Sep	Tu		-17	5	27	43	50	44	28	6	-16	-35	-44	-41	-28	-7	16	35	46	45	33	12	-11	-32	-44	-45
14-Sep	W		-33	-13	11	33	46	48	38	20	-2	-22	-35	-38	-29	-11	11	32	45	49	40	21	-3	-27	-45	-52
15-Sep	Th		-46	-29	-6	18	36	45	42	29	10	-9	-24	-31	-26	-13	7	28	43	50	45	30	7	-18	-39	-52
16-Sep	F		-53	-42	-22	1	22	36	40	33	19	2	-13	-22	-22	-12	4	23	40	49	48	37	17	-7	-30	-47
17-Sep	Sa		-54	-50	-35	-15	7	24	32	32	23	10	-3	-13	-15	-10	3	19	35	46	49	41	25	4	-19	-38
18-Sep	Su		-50	-52	-44	-28	-9	8	21	26	23	15	5	-4	-8	-6	3	16	30	41	46	43	32	14	-7	-26
19-Sep	M		-40	-48	-46	-38	-23	-8	6	15	18	16	10	3	-1	-1	5	14	25	35	41	42	35	22	5	-12
20-Sep	Tu	Last Quarter	-28	-39	-43	-42	-34	-23	-10	1	8	11	11	8	6	6	8	13	21	29	35	37	35	27	15	2
21-Sep	W		-13	-25	-35	-40	-39	-34	-26	-15	-6	2	8	11	12	12	13	15	18	22	26	29	30	28	22	14
22-Sep	Th		3	-9	-20	-31	-38	-41	-39	-32	-22	-11	0	9	15	18	19	19	18	17	18	19	21	23	24	22
23-Sep	F		18	9	-2	-15	-29	-40	-46	-45	-38	-26	-12	2	14	22	26	24	20	14	10	7	8	12	18	24
24-Sep	Sa		27	25	18	5	-12	-29	-44	-51	-51	-42	-26	-8	10	24	31	31	25	14	4	-4	-7	-4	5	16
25-Sep	Su		28	35	35	27	11	-11	-32	-48	-55	-52	-39	-20	2	22	34	38	32	18	2	-13	-22	-23	-15	0
26-Sep	M		18	34	44	44	33	13	-11	-34	-50	-55	-48	-30	-7	17	35	43	40	26	6	-16	-33	-41	-38	-24
27-Sep	Tu	New Moon	-2	21	41	51	49	35	13	-13	-35	-48	-49	-37	-15	10	33	47	48	37	15	-11	-36	-53	-57	-49
28-Sep	W		-28	-2	25	45	54	50	33	10	-14	-33	-42	-37	-20	4	29	48	55	48	29	1	-29	-54	-68	-68
29-Sep	Th		-54	-29	0	27	46	52	45	28	6	-14	-28	-30	-20	0	24	45	58	57	42	17	-14	-44	-67	-77
30-Sep	F		-72	-54	-27	2	26	42	45	37	22	3	-12	-20	-16	-2	19	40	56	61	53	33	4	-27	-54	-73

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## Hourly Astronomical Tide Level at Onahama port, Fukushima Pref. in 2011 (unit: centimeter) Issued by JMA

Date	Moon	Time																								
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1-Oct	Sa	-77	-69	-49	-24	2	23	34	35	28	15	2	-8	-9	-1	14	33	50	60	58	45	22	-6	-35	-57	
2-Oct	Su	-71	-72	-61	-43	-21	0	16	24	25	19	10	2	-2	1	11	26	41	52	56	50	35	12	-13	-36	
3-Oct	M	-54	-63	-62	-52	-37	-20	-3	9	15	16	14	9	5	5	9	19	30	41	48	48	40	25	6	-14	
4-Oct	Tu	First Quarter	-32	-45	-52	-51	-44	-33	-20	-7	2	9	12	12	11	10	10	14	20	28	34	38	36	30	19	5
5-Oct	W	-10	-24	-34	-41	-42	-39	-31	-21	-11	-1	7	12	15	15	14	13	14	16	20	23	26	26	22	16	
6-Oct	Th	7	-3	-15	-25	-33	-37	-36	-31	-22	-11	0	10	17	20	19	16	11	8	6	7	11	15	18	20	
7-Oct	F	18	13	4	-7	-19	-29	-35	-36	-31	-21	-8	5	17	24	26	22	14	4	-3	-7	-6	-1	7	15	
8-Oct	Sa	22	24	20	11	-3	-17	-29	-36	-36	-29	-16	-1	15	26	31	29	19	6	-8	-18	-21	-18	-8	5	
9-Oct	Su	18	27	30	25	14	-2	-18	-31	-36	-34	-23	-7	11	26	35	36	27	12	-7	-23	-33	-34	-25	-11	
10-Oct	M	7	24	34	36	28	14	-4	-21	-32	-34	-28	-13	5	24	37	41	35	19	-1	-23	-39	-46	-42	-28	
11-Oct	Tu	-8	14	31	40	38	27	10	-8	-24	-31	-29	-18	0	20	36	44	41	28	6	-18	-40	-53	-55	-45	
12-Oct	W	Full Moon	-25	-1	22	38	43	37	23	5	-13	-24	-27	-20	-4	15	33	45	46	36	16	-10	-35	-55	-63	-59
13-Oct	Th	-42	-18	8	29	41	42	33	17	-1	-15	-22	-19	-7	11	30	44	49	43	26	1	-27	-50	-65	-67	
14-Oct	F	-56	-35	-9	16	34	41	38	26	10	-5	-15	-17	-8	7	25	41	50	48	34	12	-15	-41	-61	-70	
15-Oct	Sa	-65	-49	-25	0	22	35	37	31	18	4	-8	-12	-8	4	20	36	47	50	41	22	-3	-29	-52	-66	
16-Oct	Su	-68	-59	-39	-16	7	24	32	31	23	11	0	-6	-6	2	15	31	43	48	44	31	9	-16	-39	-57	
17-Oct	M	-65	-62	-50	-30	-9	10	23	27	24	16	7	0	-2	2	12	24	36	44	44	35	19	-2	-25	-44	
18-Oct	Tu	-56	-60	-55	-42	-24	-6	9	19	21	18	12	6	3	4	10	19	29	37	40	36	25	9	-10	-28	
19-Oct	W	-43	-52	-54	-48	-36	-21	-6	6	14	17	15	12	9	7	9	14	21	28	32	32	27	17	3	-12	
20-Oct	Th	Last Quarter	-27	-39	-46	-48	-43	-34	-21	-8	3	11	15	16	14	13	11	12	14	18	21	23	23	20	13	3
21-Oct	F	-9	-21	-32	-40	-43	-41	-34	-23	-10	2	11	17	20	19	16	12	9	7	8	10	13	15	15	13	
22-Oct	Sa	8	-1	-12	-24	-35	-41	-41	-35	-24	-9	5	16	23	25	22	15	7	-1	-6	-7	-4	2	9	16	
23-Oct	Su	18	16	9	-3	-18	-31	-39	-40	-34	-21	-5	12	24	30	30	22	9	-5	-18	-25	-25	-18	-7	7	
24-Oct	M	20	27	27	19	4	-13	-28	-37	-38	-29	-14	5	23	34	37	31	16	-3	-23	-38	-45	-42	-30	-12	
25-Oct	Tu	9	26	36	36	26	9	-10	-26	-34	-32	-20	-2	19	36	44	42	28	6	-20	-43	-59	-64	-56	-38	
26-Oct	W	-13	12	32	43	42	30	12	-8	-22	-28	-22	-7	14	34	48	51	42	20	-8	-38	-63	-77	-78	-64	
27-Oct	Th	New Moon	-41	-12	16	37	46	43	30	12	-6	-18	-19	-10	8	29	48	57	54	37	10	-23	-55	-78	-89	-85
28-Oct	F	-66	-39	-8	19	38	45	40	27	10	-5	-12	-9	4	23	43	57	61	51	29	-3	-36	-67	-87	-93	
29-Oct	Sa	-84	-62	-34	-4	20	36	40	34	21	7	-3	-6	1	16	35	52	61	59	44	18	-14	-46	-72	-87	
30-Oct	Su	-89	-77	-55	-28	-1	19	31	33	27	16	5	-1	0	10	25	42	54	59	52	34	8	-22	-50	-71	
31-Oct	M	-81	-79	-65	-45	-21	0	17	25	25	20	12	5	2	5	15	29	42	51	51	41	23	-1	-26	-48	

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## Hourly Astronomical Tide Level at Onahama port, Fukushima Pref. in 2011 (unit: centimeter) Issued by JMA

Date	Moon	Time																								
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1-Nov	Tu	-64	-70	-66	-53	-35	-16	1	14	20	20	16	10	5	4	8	17	28	37	42	39	30	14	-6	-26	
2-Nov	W	-42	-53	-57	-52	-42	-27	-12	2	12	17	17	14	10	6	5	8	14	21	27	29	27	19	7	-7	
3-Nov	Th	First Quarter	-22	-34	-42	-44	-41	-33	-21	-9	3	12	17	18	15	11	6	3	3	6	10	14	17	16	12	5
4-Nov	F	-5	-15	-24	-31	-34	-32	-26	-16	-5	6	14	20	21	18	12	4	-2	-6	-6	-3	1	6	9	9	
5-Nov	Sa	6	1	-7	-16	-23	-27	-27	-21	-12	-1	11	20	25	24	19	9	-2	-12	-18	-20	-16	-9	-1	6	
6-Nov	Su	11	11	7	0	-10	-18	-23	-23	-17	-7	6	18	26	30	27	17	3	-12	-25	-33	-33	-27	-16	-3	
7-Nov	M	9	16	18	14	5	-6	-15	-20	-19	-12	0	14	26	33	34	26	11	-8	-27	-41	-47	-44	-33	-17	
8-Nov	Tu	0	15	24	25	19	8	-4	-14	-18	-15	-5	9	23	34	39	34	20	0	-23	-43	-56	-59	-51	-34	
9-Nov	W	-13	7	23	30	29	20	8	-5	-13	-15	-8	4	19	33	41	41	30	10	-15	-40	-59	-68	-65	-51	
10-Nov	Th	-30	-5	16	30	35	30	19	6	-6	-12	-10	0	14	30	42	45	39	21	-4	-31	-56	-72	-76	-67	
11-Nov	F	Full Moon	-47	-21	4	24	35	36	28	15	2	-7	-9	-3	9	25	39	47	45	32	9	-19	-47	-69	-80	-77
12-Nov	Sa	-62	-38	-11	13	30	36	33	23	10	-1	-7	-5	5	20	35	46	49	40	21	-5	-34	-60	-77	-82	
13-Nov	Su	-73	-54	-28	-2	20	32	34	28	17	6	-3	-5	1	14	29	42	49	45	32	9	-19	-46	-68	-79	
14-Nov	M	-78	-65	-43	-18	6	23	31	30	23	12	2	-3	-1	8	21	35	45	46	38	21	-4	-30	-54	-71	
15-Nov	Tu	-77	-71	-55	-33	-9	11	24	28	25	17	8	1	0	4	14	26	37	43	40	29	9	-14	-38	-58	
16-Nov	W	-70	-71	-62	-46	-24	-4	13	23	25	21	14	6	2	2	8	17	27	34	36	31	18	0	-21	-41	
17-Nov	Th	-56	-64	-63	-53	-37	-18	0	14	21	22	18	12	6	3	3	8	15	22	27	27	22	10	-5	-22	
18-Nov	F	-38	-50	-55	-53	-44	-30	-13	3	15	21	21	18	12	6	2	1	3	8	13	17	17	13	6	-6	
19-Nov	Sa	Last Quarter	-19	-31	-41	-45	-44	-36	-23	-8	6	17	22	23	18	11	3	-3	-7	-8	-5	-1	4	8	9	5
20-Nov	Su	-1	-11	-21	-30	-35	-35	-29	-17	-3	10	21	26	25	19	9	-3	-13	-21	-24	-22	-16	-7	1	8	
21-Nov	M	10	7	0	-10	-20	-26	-27	-22	-11	3	17	27	31	28	19	4	-13	-28	-39	-43	-40	-30	-16	-2	
22-Nov	Tu	10	17	17	11	0	-11	-18	-20	-14	-3	12	26	35	37	31	16	-4	-26	-46	-59	-62	-56	-41	-21	
23-Nov	W	-1	15	25	26	20	8	-4	-12	-13	-6	6	22	36	44	43	32	11	-15	-42	-64	-77	-78	-67	-47	
24-Nov	Th	-22	2	21	32	33	25	12	0	-7	-7	2	16	33	46	51	46	29	3	-28	-57	-80	-91	-88	-73	
25-Nov	F	New Moon	-48	-20	7	27	36	35	26	14	2	-4	-1	10	26	42	54	56	46	24	-6	-40	-70	-91	-98	-92
26-Nov	Sa	-72	-45	-15	12	30	37	34	24	12	2	-2	4	17	34	49	59	57	42	17	-16	-49	-78	-95	-99	
27-Nov	Su	-88	-66	-37	-8	16	31	35	30	20	8	0	-1	7	22	39	53	59	53	35	7	-25	-56	-80	-93	
28-Nov	M	-92	-79	-55	-28	-2	19	30	31	25	14	4	-2	0	10	25	41	52	54	45	25	-2	-32	-59	-78	
29-Nov	Tu	-86	-81	-65	-42	-18	5	21	28	26	19	9	0	-4	0	11	25	38	46	45	34	14	-10	-36	-57	
30-Nov	W	-71	-74	-66	-50	-29	-8	10	22	25	22	14	4	-3	-5	0	9	21	31	36	33	22	4	-16	-37	

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## Hourly Astronomical Tide Level at Onahama port, Fukushima Pref. in 2011 (unit: centimeter) Issued by JMA

Date	Moon	Time																								
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1-Dec	Th	-52	-61	-60	-51	-35	-17	1	15	23	23	19	10	1	-5	-7	-3	5	14	21	24	20	11	-3	-19	
2-Dec	F	First Quarter	-34	-44	-48	-45	-36	-22	-6	8	19	23	22	16	8	-1	-8	-10	-9	-3	3	9	11	9	3	-7
3-Dec	Sa		-18	-27	-34	-36	-32	-23	-11	2	14	21	24	22	15	6	-4	-12	-17	-17	-14	-8	-3	1	1	-1
4-Dec	Su		-6	-12	-19	-23	-24	-21	-13	-3	8	18	24	26	22	15	4	-8	-19	-26	-28	-26	-20	-13	-6	-2
5-Dec	M		0	-1	-5	-9	-13	-15	-12	-6	3	13	22	27	28	23	13	0	-16	-29	-38	-41	-38	-30	-19	-8
6-Dec	Tu		0	5	6	4	-1	-6	-8	-7	-1	8	17	26	30	30	23	9	-8	-26	-42	-52	-53	-47	-35	-20
7-Dec	W		-5	6	13	14	11	5	-1	-4	-3	3	12	22	31	34	31	20	3	-19	-40	-56	-64	-63	-52	-36
8-Dec	Th		-16	1	15	21	21	15	7	0	-3	0	7	18	28	36	38	31	15	-7	-32	-54	-70	-75	-69	-53
9-Dec	F		-32	-9	10	23	27	24	16	7	0	-2	2	12	24	35	41	39	27	7	-20	-46	-68	-80	-81	-69
10-Dec	Sa	Full Moon	-49	-24	0	19	29	30	24	14	4	-2	-1	6	18	31	41	45	38	21	-4	-33	-60	-79	-87	-82
11-Dec	Su		-65	-41	-14	10	25	32	29	20	10	1	-3	1	11	25	38	46	45	33	11	-17	-46	-71	-87	-89
12-Dec	M		-78	-57	-30	-4	18	30	32	26	15	5	-3	-3	4	16	31	43	47	42	25	0	-29	-58	-79	-89
13-Dec	Tu		-86	-70	-46	-19	6	23	31	29	21	10	0	-5	-3	7	21	35	44	45	35	15	-12	-40	-65	-82
14-Dec	W		-86	-78	-59	-34	-8	14	27	30	25	15	4	-5	-7	-2	9	23	35	41	38	25	4	-21	-47	-68
15-Dec	Th		-79	-78	-66	-46	-21	2	20	28	28	21	9	-1	-8	-8	-2	9	22	31	34	29	15	-5	-28	-49
16-Dec	F		-65	-71	-67	-52	-32	-9	11	24	28	25	16	4	-6	-12	-11	-5	5	15	23	25	19	6	-11	-30
17-Dec	Sa		-46	-57	-59	-52	-38	-18	1	17	26	28	22	11	-1	-11	-17	-17	-12	-4	5	12	13	10	0	-12
18-Dec	Su	Last Quarter	-26	-38	-44	-44	-37	-23	-6	10	23	28	27	19	7	-6	-17	-24	-26	-23	-16	-8	-1	3	3	-2
19-Dec	M		-9	-18	-26	-30	-29	-22	-10	4	17	27	30	27	17	4	-11	-24	-34	-39	-38	-32	-23	-13	-5	0
20-Dec	Tu		1	-2	-7	-13	-16	-16	-10	0	12	23	31	33	28	17	2	-16	-33	-46	-54	-54	-48	-36	-23	-10
21-Dec	W		0	6	8	5	0	-5	-5	-1	7	18	28	35	36	31	18	-1	-22	-43	-60	-69	-69	-61	-47	-29
22-Dec	Th		-10	5	14	17	14	8	3	1	4	11	22	33	40	41	34	19	-4	-30	-54	-73	-83	-82	-71	-52
23-Dec	F		-30	-7	11	22	24	20	13	6	3	5	14	26	38	46	46	37	18	-8	-38	-65	-85	-93	-90	-75
24-Dec	Sa		-52	-26	-1	18	28	28	22	13	4	1	5	15	29	42	51	50	38	15	-15	-46	-74	-93	-99	-91
25-Dec	Su	New Moon	-73	-46	-18	7	24	31	29	20	8	0	-2	4	16	32	46	54	50	35	9	-22	-54	-80	-96	-98
26-Dec	M		-86	-64	-36	-8	15	28	31	25	14	2	-6	-6	2	18	35	48	53	47	29	1	-30	-60	-83	-94
27-Dec	Tu		-91	-75	-50	-22	3	22	30	29	19	6	-6	-12	-9	2	18	35	47	49	39	19	-9	-38	-64	-81
28-Dec	W		-86	-78	-59	-34	-8	14	27	30	24	11	-3	-14	-17	-12	1	18	33	42	40	28	7	-18	-44	-64
29-Dec	Th		-75	-74	-61	-41	-17	6	22	29	27	17	3	-10	-19	-20	-13	0	15	27	33	29	15	-4	-26	-46
30-Dec	F		-60	-64	-57	-42	-22	-1	16	27	29	22	10	-4	-16	-23	-22	-15	-3	10	19	21	16	3	-13	-30
31-Dec	Sa		-44	-51	-50	-40	-24	-6	11	24	29	27	18	5	-9	-20	-26	-25	-18	-8	2	8	9	4	-6	-18

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