

## Hourly Astronomical Tide Level at Kamaishi port, Iwate 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	31	41	45	40	26	4	-22	-48	-67	-77	-74	-61	-38	-13	10	27	35	34	27	17	8	4	6	14	
2-Jun	Th	New Moon	26	39	47	48	38	19	-7	-35	-60	-77	-82	-75	-56	-31	-4	18	32	37	33	24	14	7	5	10
3-Jun	F		20	34	45	51	48	34	10	-18	-47	-70	-82	-83	-70	-48	-21	5	25	35	36	30	20	11	5	6
4-Jun	Sa		14	26	40	50	52	44	26	1	-28	-55	-75	-83	-78	-62	-38	-11	13	29	36	34	26	16	8	4
5-Jun	Su		8	17	30	43	50	49	38	18	-9	-36	-60	-75	-79	-70	-51	-27	-2	19	31	35	30	21	11	4
6-Jun	M		3	8	19	32	42	47	43	30	9	-16	-40	-60	-70	-70	-58	-39	-15	7	24	32	32	26	16	7
7-Jun	Tu		1	1	7	17	29	38	40	35	22	3	-19	-40	-55	-61	-57	-45	-26	-4	15	27	33	30	22	11
8-Jun	W		2	-4	-3	2	11	21	29	31	26	15	-1	-18	-34	-45	-48	-43	-30	-13	6	22	31	33	28	18
9-Jun	Th	First Quarter	6	-4	-10	-11	-7	1	10	17	21	18	11	0	-13	-25	-32	-33	-28	-16	0	16	28	34	33	26
10-Jun	F		14	1	-11	-19	-22	-19	-12	-3	5	11	13	10	4	-4	-12	-18	-19	-13	-3	11	24	34	38	34
11-Jun	Sa		25	11	-5	-19	-30	-35	-34	-28	-17	-6	4	11	13	12	7	0	-5	-5	-1	8	20	32	40	42
12-Jun	Su		37	25	8	-11	-29	-43	-51	-50	-42	-29	-14	1	12	19	21	17	11	6	5	8	17	28	39	46
13-Jun	M		46	39	25	5	-18	-40	-57	-65	-64	-54	-38	-18	1	17	26	29	26	19	13	11	15	23	34	44
14-Jun	Tu		51	51	42	25	1	-26	-51	-69	-77	-74	-61	-41	-17	5	23	33	35	31	23	17	14	18	27	38
15-Jun	W		50	56	55	43	23	-4	-34	-60	-78	-84	-79	-62	-39	-12	11	29	38	38	32	23	16	14	19	29
16-Jun	Th	Full Moon	42	54	60	57	43	19	-11	-41	-67	-83	-87	-78	-58	-32	-4	19	34	40	37	29	20	13	12	18
17-Jun	F		31	45	58	62	56	39	13	-18	-48	-71	-84	-83	-70	-48	-21	5	26	37	40	34	24	14	8	9
18-Jun	Sa		18	32	47	59	61	52	33	6	-25	-52	-71	-79	-75	-58	-34	-8	15	32	39	37	29	18	8	3
19-Jun	Su		7	17	32	47	56	56	45	24	-3	-30	-54	-68	-71	-62	-43	-19	5	24	36	38	33	22	11	2
20-Jun	M		-1	5	17	31	44	51	48	35	14	-10	-34	-52	-60	-58	-45	-26	-3	17	32	38	36	28	16	4
21-Jun	Tu		-3	-4	3	15	28	39	42	37	24	5	-16	-34	-46	-49	-43	-28	-9	11	27	37	38	33	22	10
22-Jun	W		-1	-7	-7	0	11	22	30	32	26	14	-2	-17	-30	-36	-35	-26	-12	5	22	34	39	37	29	17
23-Jun	Th	Last Quarter	5	-5	-11	-10	-4	5	14	21	22	17	8	-4	-15	-22	-25	-21	-11	2	17	30	38	39	34	25
24-Jun	F		13	0	-10	-15	-16	-11	-3	5	11	13	11	5	-2	-8	-12	-12	-7	2	13	25	35	39	38	32
25-Jun	Sa		21	9	-4	-15	-22	-23	-20	-12	-4	4	8	9	8	5	1	-1	0	4	12	21	30	37	40	37
26-Jun	Su		30	19	5	-10	-22	-30	-33	-29	-21	-11	-1	7	12	14	13	11	9	9	12	18	26	34	39	41
27-Jun	M		37	29	16	0	-17	-31	-41	-43	-38	-28	-14	-1	11	18	22	21	19	16	15	17	22	29	36	42
28-Jun	Tu		43	38	28	12	-7	-26	-43	-52	-53	-46	-32	-14	3	17	26	30	28	24	20	18	19	25	32	40
29-Jun	W		45	46	40	27	7	-15	-37	-54	-63	-61	-50	-32	-10	10	25	34	36	32	26	21	18	20	26	35
30-Jun	Th		45	50	50	41	24	0	-26	-49	-65	-71	-66	-50	-27	-3	18	33	40	39	33	25	18	16	20	28

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## Hourly Astronomical Tide Level at Kamaishi port, Iwate 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	40	50	56	53	41	19	-8	-36	-60	-74	-76	-66	-46	-20	6	27	39	43	39	30	21	14	14	20
2-Jul	Sa		31	44	55	59	54	37	12	-17	-46	-67	-78	-76	-61	-37	-9	16	35	44	43	35	24	14	9	11
3-Jul	Su		20	34	48	59	60	51	32	5	-26	-53	-71	-77	-70	-51	-25	3	26	41	45	40	29	17	7	4
4-Jul	M		8	20	35	50	59	58	46	24	-3	-32	-55	-69	-70	-58	-36	-10	16	35	45	44	35	21	8	-1
5-Jul	Tu		-2	5	18	34	48	55	52	38	17	-9	-34	-53	-61	-57	-42	-19	6	28	42	46	40	27	12	-2
6-Jul	W		-9	-8	0	14	30	42	47	43	29	10	-12	-32	-45	-48	-40	-23	-1	21	38	47	45	35	19	3
7-Jul	Th		-10	-16	-15	-6	8	22	32	36	32	21	6	-11	-25	-32	-31	-20	-3	16	34	46	49	43	29	12
8-Jul	F	First Quarter	-5	-17	-23	-22	-13	-2	11	21	25	23	16	5	-5	-14	-16	-12	-1	14	30	44	51	49	39	24
9-Jul	Sa		6	-11	-23	-30	-30	-23	-13	-2	8	14	16	14	9	3	0	-1	4	14	27	40	50	53	48	37
10-Jul	Su		21	3	-14	-28	-37	-39	-34	-25	-14	-2	7	13	16	16	14	12	13	17	25	35	45	52	53	48
11-Jul	M		37	21	2	-17	-33	-44	-48	-45	-37	-24	-10	3	14	21	24	24	23	22	25	30	38	47	53	54
12-Jul	Tu		50	39	23	3	-19	-38	-52	-58	-55	-45	-30	-12	5	19	29	33	32	29	26	27	31	38	46	53
13-Jul	W		56	53	42	25	2	-22	-44	-59	-65	-62	-50	-31	-10	11	27	36	39	36	30	25	24	27	35	46
14-Jul	Th		55	59	57	45	25	0	-27	-50	-66	-71	-64	-49	-26	-2	19	35	42	41	35	26	20	18	23	33
15-Jul	F	Full Moon	46	57	63	59	46	23	-5	-33	-56	-70	-71	-61	-42	-17	9	29	42	45	40	30	19	12	12	19
16-Jul	Sa		32	48	60	65	59	43	17	-12	-40	-60	-70	-67	-52	-29	-3	21	38	46	44	35	22	10	4	6
17-Jul	Su		17	33	50	62	64	55	36	9	-20	-45	-61	-65	-57	-38	-13	13	33	45	47	40	27	12	1	-3
18-Jul	M		3	16	34	51	60	60	48	26	0	-26	-47	-57	-55	-42	-20	5	27	43	49	44	33	17	2	-7
19-Jul	Tu		-8	1	17	35	49	56	52	37	16	-9	-30	-44	-48	-40	-23	-1	22	40	49	48	39	24	7	-6
20-Jul	W		-13	-10	1	17	34	45	48	41	26	6	-14	-29	-37	-34	-23	-4	17	35	47	50	44	31	14	-2
21-Jul	Th		-13	-16	-11	1	16	30	38	38	30	16	0	-15	-24	-25	-18	-4	14	31	45	51	48	38	23	6
22-Jul	F		-8	-16	-18	-12	0	13	24	29	28	21	9	-2	-11	-14	-11	-2	12	28	41	49	50	43	31	15
23-Jul	Sa	Last Quarter	0	-12	-19	-19	-14	-4	7	16	20	20	15	7	1	-3	-2	3	13	25	37	46	49	47	38	25
24-Jul	Su		10	-3	-15	-21	-22	-18	-10	-1	8	13	14	13	10	8	7	10	15	23	33	41	47	48	43	34
25-Jul	M		22	8	-6	-17	-25	-27	-25	-18	-8	1	8	13	16	17	17	18	20	24	30	37	43	46	46	41
26-Jul	Tu		33	21	7	-8	-21	-31	-35	-33	-26	-15	-3	8	16	22	25	26	26	26	28	32	37	42	45	46
27-Jul	W		42	34	22	6	-12	-28	-40	-45	-43	-33	-19	-4	11	23	30	33	33	31	29	28	31	36	42	47
28-Jul	Th		49	46	37	23	3	-18	-37	-51	-55	-51	-38	-20	0	18	31	38	39	36	31	26	25	28	34	43
29-Jul	F		50	54	51	41	22	-1	-26	-48	-61	-63	-55	-38	-15	8	28	40	44	41	34	26	20	19	24	33
30-Jul	Sa		45	56	60	56	42	20	-8	-35	-57	-68	-67	-54	-32	-5	19	38	47	47	39	28	17	11	12	20
31-Jul	Su	New Moon	34	49	61	65	59	41	15	-15	-43	-63	-70	-64	-46	-20	8	31	46	50	44	32	17	6	1	5

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## Hourly Astronomical Tide Level at Kamaishi port, Iwate 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-Aug	M	17	35	52	65	67	57	37	8	-22	-48	-63	-66	-54	-32	-4	23	43	52	50	38	21	4	-7	-9	
2-Aug	Tu	-1	15	35	53	64	64	52	30	2	-26	-47	-57	-54	-38	-13	15	38	52	54	45	28	8	-9	-19	
3-Aug	W	-18	-6	12	33	51	60	57	44	22	-3	-26	-41	-45	-36	-16	9	33	51	57	52	37	16	-5	-21	
4-Aug	Th	-28	-24	-10	9	29	44	51	47	34	15	-5	-22	-30	-27	-14	6	29	48	59	58	47	28	5	-16	
5-Aug	F	-29	-34	-28	-14	4	22	34	39	36	25	11	-3	-13	-15	-8	7	26	45	58	62	56	40	19	-3	
6-Aug	Sa	First Quarter	-22	-33	-36	-30	-18	-3	12	22	27	25	19	10	3	-1	2	11	25	40	54	62	61	51	34	14
7-Aug	Su		-6	-23	-34	-37	-33	-23	-11	1	10	16	17	16	14	12	12	16	25	36	48	57	61	58	47	31
8-Aug	M		13	-5	-21	-32	-37	-36	-30	-20	-10	1	9	15	18	20	21	23	27	33	41	49	55	57	54	45
9-Aug	Tu		32	16	-1	-18	-31	-39	-41	-38	-29	-18	-5	7	17	24	28	30	30	31	34	39	45	50	53	52
10-Aug	W		46	36	21	3	-16	-32	-43	-47	-44	-35	-21	-5	11	24	32	36	35	32	29	29	32	38	45	51
11-Aug	Th		53	50	41	25	5	-16	-35	-48	-53	-49	-37	-19	1	19	33	40	40	35	28	22	21	24	32	42
12-Aug	F		52	57	55	45	27	4	-20	-41	-53	-56	-48	-32	-11	11	30	42	45	40	30	20	12	11	17	28
13-Aug	Sa		43	55	61	59	46	25	-1	-26	-46	-56	-55	-43	-22	2	24	41	48	46	35	21	8	1	2	12
14-Aug	Su	Full Moon	28	45	59	64	59	43	19	-9	-33	-50	-55	-48	-31	-7	18	38	49	50	41	26	9	-4	-9	-4
15-Aug	M		11	30	49	62	64	55	35	10	-17	-38	-49	-48	-35	-14	11	34	49	53	47	32	13	-4	-15	-15
16-Aug	Tu		-6	12	34	52	62	60	47	25	0	-23	-38	-43	-35	-18	5	29	47	55	52	39	20	0	-15	-22
17-Aug	W		-18	-4	16	37	52	58	52	36	15	-7	-25	-33	-31	-18	2	24	44	55	56	46	28	7	-12	-24
18-Aug	Th		-26	-18	-1	19	38	49	50	42	25	6	-11	-22	-24	-16	1	21	40	53	57	51	36	16	-4	-20
19-Aug	F		-28	-26	-15	2	21	36	43	41	31	16	1	-10	-15	-11	1	18	36	50	57	55	43	25	5	-13
20-Aug	Sa		-25	-29	-24	-12	4	20	31	35	31	22	10	1	-5	-4	4	17	33	46	55	56	48	34	16	-2
21-Aug	Su		-17	-26	-27	-21	-10	3	16	24	26	23	16	9	5	4	9	18	30	42	51	54	51	41	26	10
22-Aug	M	Last Quarter	-6	-18	-25	-25	-21	-12	-1	9	16	18	18	15	13	12	15	20	28	38	46	51	51	45	35	22
23-Aug	Tu		7	-6	-17	-24	-26	-23	-17	-8	1	9	14	17	19	20	21	24	29	34	40	45	47	46	41	33
24-Aug	W		22	9	-4	-16	-25	-30	-30	-25	-16	-5	5	14	21	25	28	30	31	32	35	38	41	44	44	41
25-Aug	Th		35	26	13	-2	-17	-30	-38	-39	-33	-23	-9	6	19	28	34	35	34	32	30	30	32	36	41	45
26-Aug	F		45	41	31	16	-2	-22	-38	-47	-48	-40	-25	-7	11	27	37	41	39	33	27	22	21	25	32	41
27-Aug	Sa		49	52	49	37	18	-5	-28	-46	-55	-53	-42	-22	0	21	37	45	44	37	26	16	10	10	17	29
28-Aug	Su		43	55	60	55	41	18	-9	-34	-52	-59	-53	-36	-12	13	34	47	49	42	28	13	1	-5	-1	11
29-Aug	M	New Moon	29	47	61	66	59	41	14	-14	-39	-54	-56	-45	-23	3	29	47	54	49	34	15	-4	-16	-19	-11
30-Aug	Tu		7	29	51	65	68	58	37	10	-18	-39	-49	-46	-30	-5	22	45	57	56	43	22	-2	-22	-32	-31
31-Aug	W		-18	4	30	52	65	65	53	31	5	-19	-35	-39	-29	-9	17	41	58	62	53	33	7	-18	-37	-44

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

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## Hourly Astronomical Tide Level at Kamaishi port, Iwate 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	-69	-55	-31	-4	20	38	45	43	33	20	9	3	6	17	35	54	68	73	66	47	19	-11	-39	-58	
2-Oct	Su	-67	-63	-48	-26	-3	17	30	35	33	26	17	11	10	17	29	45	60	69	69	57	37	11	-15	-38	
3-Oct	M	-53	-58	-53	-40	-22	-4	12	22	26	25	22	17	15	18	25	36	49	59	63	60	47	29	7	-14	
4-Oct	Tu	First Quarter	-32	-43	-47	-43	-33	-19	-5	7	15	20	22	21	20	20	23	28	36	45	51	53	49	38	24	7
5-Oct	W		-9	-23	-32	-36	-34	-28	-18	-7	3	12	19	22	24	24	23	24	26	30	35	40	41	39	33	23
6-Oct	Th		12	-1	-13	-22	-28	-30	-26	-18	-8	3	14	22	27	29	27	24	20	19	20	23	27	31	32	31
7-Oct	F		26	18	7	-5	-16	-24	-28	-25	-17	-6	7	19	29	34	33	28	20	12	7	6	9	16	24	30
8-Oct	Sa		33	32	25	13	-1	-14	-24	-27	-24	-14	0	15	28	37	39	34	24	11	-1	-8	-8	-2	9	22
9-Oct	Su		33	39	38	30	16	0	-15	-24	-26	-20	-7	10	26	39	44	41	30	14	-3	-17	-22	-20	-9	8
10-Oct	M		25	38	45	42	32	16	-2	-16	-24	-22	-12	4	22	38	47	48	38	21	0	-20	-32	-35	-27	-10
11-Oct	Tu		11	31	45	49	44	30	12	-5	-17	-21	-15	-1	18	36	49	52	46	29	6	-17	-36	-45	-42	-28
12-Oct	W	Full Moon	-6	18	38	50	51	42	26	8	-7	-15	-14	-4	13	32	48	55	52	38	15	-11	-34	-50	-53	-44
13-Oct	Th		-24	1	26	44	52	49	37	20	4	-8	-11	-4	10	28	46	56	57	46	25	-1	-27	-48	-58	-55
14-Oct	F		-40	-16	10	33	47	50	44	30	14	1	-5	-3	8	24	42	55	60	53	36	11	-17	-41	-57	-60
15-Oct	Sa		-52	-32	-7	18	37	46	45	36	23	10	1	0	7	21	37	52	60	58	44	23	-4	-30	-49	-59
16-Oct	Su		-57	-44	-22	2	23	37	42	38	29	17	8	4	8	18	32	47	57	59	51	33	9	-16	-38	-53
17-Oct	M		-57	-50	-35	-14	8	25	35	36	31	23	14	9	10	17	28	41	52	57	53	41	21	-2	-24	-41
18-Oct	Tu		-51	-51	-42	-27	-8	10	23	30	30	26	20	15	13	17	24	35	45	51	51	44	31	12	-8	-26
19-Oct	W		-40	-46	-44	-35	-22	-6	9	20	25	26	24	20	18	18	22	29	36	43	46	43	35	23	7	-9
20-Oct	Th	Last Quarter	-24	-34	-39	-38	-31	-20	-6	16	23	25	25	23	22	22	24	28	32	35	37	35	29	19	7	
21-Oct	F		-6	-18	-27	-33	-34	-29	-20	-8	5	16	23	27	28	26	24	21	20	20	22	24	27	27	25	21
22-Oct	Sa		13	2	-9	-20	-28	-31	-29	-20	-8	6	19	28	32	32	28	21	14	8	6	7	11	17	23	27
23-Oct	Su		27	22	12	-1	-14	-25	-30	-27	-18	-4	12	26	35	38	34	25	12	-1	-10	-13	-10	-2	10	23
24-Oct	M		32	35	32	22	6	-9	-22	-27	-23	-12	5	22	36	44	42	32	16	-3	-20	-31	-33	-26	-12	7
25-Oct	Tu		25	39	45	41	29	12	-6	-18	-21	-15	-1	18	36	48	51	43	26	2	-22	-42	-52	-51	-39	-18
26-Oct	W		7	30	45	51	46	32	14	-2	-12	-13	-3	14	33	50	59	56	40	15	-14	-42	-62	-70	-64	-46
27-Oct	Th	New Moon	-20	9	34	50	54	48	33	15	1	-6	-2	11	30	49	63	66	56	33	2	-31	-59	-77	-81	-70
28-Oct	F		-48	-18	12	36	50	53	45	30	15	4	2	9	25	44	62	71	68	51	24	-10	-44	-70	-84	-84
29-Oct	Sa		-69	-44	-14	15	36	47	47	39	26	15	8	10	20	37	56	70	74	65	43	13	-21	-52	-74	-84
30-Oct	Su		-79	-62	-37	-9	16	34	41	40	33	22	14	12	17	29	46	61	71	70	57	34	4	-27	-54	-71
31-Oct	M		-76	-69	-51	-28	-4	17	30	35	33	27	20	14	15	22	34	49	61	66	61	47	24	-3	-29	-50

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## Hourly Astronomical Tide Level at Kamaishi port, Iwate 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	-62	-64	-56	-39	-20	0	16	26	30	28	23	18	15	17	24	34	46	54	56	50	36	16	-6	-27	
2-Nov	W	-42	-50	-50	-42	-29	-12	3	16	24	27	26	22	18	16	17	22	29	37	43	43	37	26	11	-5	
3-Nov	Th	First Quarter	-21	-32	-38	-37	-31	-20	-7	6	17	24	27	26	23	19	15	14	16	20	25	29	30	27	20	10
4-Nov	F	-1	-12	-21	-26	-27	-22	-13	-2	10	20	27	30	29	24	18	11	7	5	7	11	16	20	20	18	
5-Nov	Sa	13	5	-4	-12	-18	-19	-16	-8	3	15	25	32	34	31	24	14	4	-4	-8	-7	-2	6	13	19	
6-Nov	Su	20	18	12	4	-5	-12	-14	-11	-2	9	21	32	38	38	32	21	6	-8	-19	-23	-20	-12	0	12	
7-Nov	M	21	26	25	19	9	-1	-8	-10	-6	4	16	29	39	43	40	29	13	-6	-23	-34	-36	-30	-17	0	
8-Nov	Tu	16	28	33	31	23	12	1	-6	-6	0	12	26	38	46	47	38	22	0	-22	-40	-48	-47	-35	-17	
9-Nov	W	4	23	35	39	35	25	13	2	-3	-1	8	21	36	47	51	46	32	9	-16	-39	-54	-59	-52	-35	
10-Nov	Th	-12	12	31	42	43	36	24	11	2	0	5	17	32	46	54	53	42	21	-6	-33	-54	-66	-65	-51	
11-Nov	F	Full Moon	-29	-3	21	38	45	43	33	21	10	3	5	13	27	42	54	57	50	33	7	-22	-48	-65	-71	-64
12-Nov	Sa	-46	-20	7	29	42	46	40	29	17	8	6	11	22	37	51	59	57	43	21	-8	-36	-59	-71	-71	
13-Nov	Su	-59	-36	-9	16	34	43	43	35	24	14	8	10	18	31	46	57	59	51	33	7	-21	-47	-65	-72	
14-Nov	M	-67	-50	-26	0	22	36	41	38	29	19	12	10	15	25	39	51	58	55	43	21	-5	-32	-54	-66	
15-Nov	Tu	-68	-58	-39	-15	8	26	36	38	33	24	16	12	13	20	31	43	52	54	47	32	10	-15	-38	-55	
16-Nov	W	-63	-61	-48	-29	-7	13	27	34	34	29	21	15	13	16	23	33	43	48	47	38	22	1	-20	-39	
17-Nov	Th	-52	-56	-51	-38	-20	-1	16	27	32	31	26	20	15	14	17	23	31	37	40	37	28	14	-3	-21	
18-Nov	F	-35	-45	-47	-41	-29	-13	4	18	28	32	30	25	19	14	12	13	17	22	27	29	27	21	10	-3	
19-Nov	Sa	Last Quarter	-16	-27	-35	-36	-31	-21	-7	8	21	30	33	30	25	17	10	5	4	5	9	14	18	19	17	11
20-Nov	Su	3	-7	-17	-23	-26	-22	-13	0	14	26	33	35	32	24	13	2	-7	-12	-12	-8	-1	7	14	17	
21-Nov	M	17	12	4	-5	-13	-16	-14	-5	7	21	33	39	39	33	21	5	-11	-24	-31	-31	-25	-14	0	13	
22-Nov	Tu	22	25	23	16	6	-3	-7	-5	3	16	30	41	46	44	33	15	-6	-27	-43	-51	-50	-40	-23	-4	
23-Nov	W	14	28	34	33	25	14	5	0	3	13	26	41	51	54	47	31	7	-20	-45	-63	-70	-65	-50	-28	
24-Nov	Th	-4	19	34	41	39	30	19	10	7	11	22	37	51	60	60	48	26	-3	-34	-61	-78	-83	-75	-55	
25-Nov	F	New Moon	-29	0	24	40	46	42	32	21	13	12	18	31	47	61	67	63	46	19	-14	-47	-73	-89	-90	-77
26-Nov	Sa	-54	-25	5	28	42	46	41	31	20	14	15	24	38	55	67	71	62	41	11	-24	-56	-80	-92	-89	
27-Nov	Su	-73	-47	-17	10	31	42	44	37	27	18	13	17	28	44	60	70	70	57	34	2	-32	-61	-81	-88	
28-Nov	M	-82	-63	-37	-8	16	33	40	39	32	22	14	12	18	30	46	60	68	64	49	24	-6	-37	-62	-77	
29-Nov	Tu	-79	-69	-49	-24	1	21	34	38	34	26	17	11	10	17	30	45	56	60	54	38	14	-13	-38	-58	
30-Nov	W	-67	-65	-53	-34	-11	10	26	34	35	30	21	12	7	8	16	27	39	48	49	42	26	5	-17	-37	

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

Date	Day	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		-50	-55	-50	-37	-19	1	18	29	34	32	26	17	9	5	5	12	21	30	36	36	29	16	-1	-17
2-Dec	F	First Quarter	-31	-40	-40	-34	-22	-6	11	24	32	34	31	24	15	6	1	1	5	11	18	23	23	18	9	-3
3-Dec	Sa		-14	-23	-27	-26	-20	-9	5	18	29	34	35	30	22	12	3	-4	-7	-5	-1	5	11	13	11	6
4-Dec	Su		0	-7	-13	-15	-14	-8	1	13	24	33	37	36	30	20	9	-3	-12	-18	-18	-13	-6	1	6	9
5-Dec	M		9	6	2	-2	-5	-4	1	9	19	29	36	39	37	29	17	3	-12	-24	-30	-30	-25	-15	-4	5
6-Dec	Tu		12	15	14	11	6	3	3	7	15	24	33	40	41	37	27	12	-6	-24	-37	-44	-42	-33	-19	-4
7-Dec	W		9	19	23	23	18	13	8	8	12	19	29	38	44	44	37	23	3	-18	-38	-51	-55	-50	-37	-19
8-Dec	Th		0	16	27	31	29	23	16	11	11	15	24	35	44	48	45	34	16	-8	-32	-52	-64	-64	-54	-36
9-Dec	F		-14	8	25	34	36	32	24	16	12	13	19	30	41	50	52	45	29	5	-22	-47	-65	-73	-69	-53
10-Dec	Sa	Full Moon	-30	-5	17	33	40	38	31	22	15	12	15	24	36	48	55	53	42	21	-7	-35	-60	-75	-78	-68
11-Dec	Su		-47	-21	5	26	38	42	37	28	19	12	12	18	29	43	54	57	52	35	10	-20	-48	-70	-80	-77
12-Dec	M		-62	-38	-11	15	33	41	41	33	23	14	10	13	22	35	48	57	57	46	26	-2	-32	-58	-75	-80
13-Dec	Tu		-72	-53	-26	1	23	37	42	38	28	18	11	9	14	25	39	51	57	53	38	15	-14	-41	-63	-76
14-Dec	W		-75	-62	-40	-14	11	30	39	40	33	23	13	7	8	15	27	41	50	52	45	28	4	-23	-47	-64
15-Dec	Th		-71	-65	-49	-27	-2	20	34	40	37	28	17	8	4	6	15	26	38	45	44	35	18	-4	-27	-47
16-Dec	F		-59	-61	-52	-35	-13	10	27	37	39	33	22	11	2	-1	3	11	21	31	36	34	25	9	-9	-27
17-Dec	Sa		-42	-49	-47	-36	-19	1	19	33	39	37	28	16	5	-3	-7	-4	3	11	19	24	23	16	5	-9
18-Dec	Su	Last Quarter	-22	-31	-35	-31	-20	-5	12	28	37	40	35	24	11	-1	-11	-15	-15	-10	-2	6	12	13	11	5
19-Dec	M		-4	-12	-18	-19	-15	-5	8	23	35	41	41	34	21	7	-8	-20	-27	-29	-25	-18	-8	0	7	9
20-Dec	Tu		9	5	1	-3	-4	-1	7	19	31	40	45	42	34	20	2	-16	-31	-41	-45	-42	-33	-21	-8	4
21-Dec	W		12	16	16	13	9	8	10	16	26	37	46	49	46	35	19	-2	-24	-43	-56	-61	-58	-46	-30	-12
22-Dec	Th		5	18	25	26	23	18	15	16	22	32	42	51	54	50	37	17	-8	-34	-56	-71	-75	-70	-55	-34
23-Dec	F		-11	9	25	33	34	29	23	19	19	25	35	46	56	59	54	39	15	-14	-43	-67	-82	-85	-76	-58
24-Dec	Sa		-33	-7	16	32	38	37	31	23	18	18	25	37	50	60	63	56	38	11	-21	-52	-76	-89	-89	-76
25-Dec	Su	New Moon	-54	-26	1	23	37	41	37	28	19	14	15	24	38	53	64	66	56	35	5	-28	-59	-81	-90	-86
26-Dec	M		-70	-44	-15	11	30	40	40	33	22	12	8	12	23	39	55	65	64	51	28	-3	-36	-63	-81	-86
27-Dec	Tu		-77	-57	-30	-2	21	36	41	36	26	14	5	2	9	22	39	54	62	58	43	18	-12	-41	-64	-77
28-Dec	W		-76	-63	-40	-14	11	30	39	39	30	18	5	-3	-2	6	21	38	51	55	48	31	7	-20	-44	-61
29-Dec	Th		-67	-61	-44	-21	3	23	36	40	35	23	10	-2	-8	-6	4	19	33	43	44	36	19	-3	-25	-44
30-Dec	F		-54	-53	-43	-25	-3	17	33	40	38	30	16	2	-8	-12	-9	1	14	26	33	32	23	8	-10	-27
31-Dec	Sa		-38	-42	-37	-25	-7	12	29	39	41	36	25	11	-3	-12	-15	-12	-4	7	16	21	19	11	0	-13

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