

## Hourly Astronomical Tide Level at Oarai port, Ibaraki 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		27	39	47	48	38	19	-7	-34	-58	-73	-76	-67	-47	-21	6	26	38	41	36	26	15	7	5	10
2-Jun	Th	New Moon	21	35	46	51	46	32	8	-21	-49	-70	-81	-79	-64	-40	-12	14	32	41	41	33	22	12	6	7
3-Jun	F		15	28	41	51	52	42	23	-5	-34	-60	-78	-84	-77	-57	-30	-2	22	37	42	38	29	17	8	5
4-Jun	Sa		9	20	34	46	52	49	35	13	-16	-45	-68	-82	-82	-70	-47	-20	8	28	39	41	34	24	13	6
5-Jun	Su		5	11	24	38	48	50	43	27	3	-25	-51	-71	-80	-76	-60	-36	-9	15	32	39	38	30	19	9
6-Jun	M		3	5	13	26	38	45	45	36	19	-6	-31	-53	-68	-72	-65	-48	-24	1	22	35	39	35	25	14
7-Jun	Tu		5	1	4	12	24	34	40	38	29	12	-10	-31	-49	-60	-61	-52	-34	-12	10	27	37	38	32	21
8-Jun	W		10	1	-3	-1	8	18	26	31	30	22	9	-9	-27	-41	-48	-47	-37	-21	-1	19	32	39	37	29
9-Jun	Th	First Quarter	17	5	-5	-9	-8	-2	7	16	22	23	18	9	-5	-18	-28	-34	-32	-23	-8	10	26	37	40	36
10-Jun	F		26	13	-1	-12	-18	-19	-15	-7	4	13	17	13	5	-6	-14	-19	-17	-10	4	19	33	41	42	
11-Jun	Sa		36	24	9	-8	-22	-31	-34	-30	-20	-8	5	15	20	15	8	-1	-5	-5	3	14	27	38	45	
12-Jun	Su		44	37	23	5	-16	-33	-45	-49	-45	-33	-17	1	15	25	29	26	20	12	6	6	11	21	33	44
13-Jun	M		49	47	38	21	-2	-26	-46	-60	-64	-57	-43	-23	-1	19	31	37	35	28	20	13	12	17	27	39
14-Jun	Tu		49	54	50	38	17	-9	-36	-58	-72	-75	-66	-48	-24	2	24	38	43	41	33	23	16	15	20	31
15-Jun	W		43	54	57	52	36	12	-17	-46	-69	-82	-82	-69	-48	-20	8	29	43	47	43	33	22	15	15	22
16-Jun	Th	Full Moon	34	47	57	60	51	32	6	-26	-54	-76	-86	-83	-67	-42	-13	15	35	46	47	40	29	18	12	14
17-Jun	F		23	37	51	60	59	48	26	-3	-33	-61	-79	-85	-77	-58	-31	-3	23	40	47	45	35	23	13	9
18-Jun	Sa		13	24	39	53	59	56	42	18	-11	-40	-63	-77	-78	-66	-44	-18	10	30	43	45	39	28	16	7
19-Jun	Su		6	13	26	40	52	55	49	33	10	-18	-43	-62	-70	-66	-51	-28	-3	21	37	44	42	33	20	9
20-Jun	M		2	4	13	26	39	48	49	40	23	1	-23	-43	-56	-59	-50	-33	-11	12	31	42	44	38	26	14
21-Jun	Tu		3	-2	2	12	24	35	41	40	30	14	-6	-25	-39	-46	-44	-32	-15	6	25	38	44	42	33	21
22-Jun	W		8	-2	-5	-1	9	20	28	32	30	21	8	-8	-22	-31	-33	-27	-15	2	19	34	43	44	39	28
23-Jun	Th	Last Quarter	16	4	-5	-7	-4	4	12	20	23	22	15	5	-6	-15	-19	-18	-11	1	15	29	39	45	43	36
24-Jun	F		25	12	1	-9	-12	-10	-5	4	11	15	16	13	7	1	-5	-7	-5	3	13	24	35	42	45	42
25-Jun	Sa		33	22	8	-5	-15	-20	-19	-14	-6	3	10	14	14	13	10	7	6	8	13	21	30	38	44	45
26-Jun	Su		40	31	18	3	-12	-24	-30	-30	-24	-14	-3	8	16	20	20	19	17	15	15	19	26	33	40	45
27-Jun	M		45	40	29	14	-5	-22	-35	-42	-40	-32	-19	-4	11	21	27	29	27	23	20	19	22	28	35	43
28-Jun	Tu		47	46	39	25	7	-15	-34	-48	-54	-50	-38	-21	-2	16	28	35	35	32	26	22	20	23	30	38
29-Jun	W		46	50	47	37	20	-3	-27	-48	-61	-64	-56	-40	-18	5	24	36	41	39	33	26	21	19	23	31
30-Jun	Th		41	50	53	48	35	13	-14	-40	-61	-72	-71	-59	-37	-12	13	32	43	45	40	32	23	17	17	23

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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-Jul	F	New Moon	34	46	54	56	48	30	4	-25	-52	-71	-79	-73	-56	-30	-3	23	40	47	46	38	27	18	13	15
2-Jul	Sa		24	38	51	58	57	45	23	-6	-36	-62	-78	-81	-70	-48	-20	10	32	46	50	44	33	20	11	9
3-Jul	Su		14	26	41	54	60	56	40	16	-15	-44	-67	-79	-77	-61	-36	-6	22	41	50	49	39	26	13	5
4-Jul	M		5	13	28	44	55	59	52	34	8	-22	-48	-67	-74	-67	-47	-20	9	33	48	52	46	33	17	4
5-Jul	Tu		-2	1	12	28	43	53	54	45	27	3	-25	-47	-61	-62	-51	-29	-2	24	43	52	51	40	24	8
6-Jul	W		-4	-8	-3	10	25	39	47	47	38	21	-2	-24	-40	-48	-45	-31	-10	16	37	50	54	47	33	16
7-Jul	Th		-1	-11	-14	-8	5	19	32	39	39	31	17	-1	-17	-29	-32	-26	-11	10	31	47	55	53	43	27
8-Jul	F	First Quarter	9	-7	-17	-19	-14	-4	10	21	29	30	26	16	4	-7	-14	-14	-6	8	25	42	53	56	51	38
9-Jul	Sa		21	4	-12	-23	-26	-23	-14	-3	10	19	23	23	19	13	7	3	4	11	23	36	48	55	55	48
10-Jul	Su		35	18	-1	-17	-29	-35	-33	-26	-15	-2	10	19	24	25	23	20	17	18	23	31	42	51	56	55
11-Jul	M		47	34	17	-3	-21	-36	-44	-45	-38	-26	-11	5	19	28	33	33	30	27	26	29	35	43	51	55
12-Jul	Tu		55	48	35	17	-5	-26	-44	-54	-56	-49	-34	-16	5	22	34	41	41	37	32	29	29	34	42	50
13-Jul	W		56	56	50	36	16	-9	-33	-52	-63	-64	-55	-38	-15	9	28	42	47	46	39	31	26	26	31	40
14-Jul	Th		50	58	59	52	37	14	-14	-40	-60	-70	-69	-56	-35	-9	17	36	48	51	46	36	26	20	20	28
15-Jul	F	Full Moon	39	52	60	61	53	34	9	-21	-47	-66	-73	-68	-51	-26	3	27	44	52	51	41	29	18	13	16
16-Jul	Sa		26	40	54	63	62	50	29	2	-28	-53	-68	-70	-60	-39	-12	16	38	51	53	47	34	19	9	6
17-Jul	Su		13	26	43	57	63	59	45	21	-8	-34	-55	-65	-61	-46	-22	6	31	47	54	51	39	24	9	1
18-Jul	M		2	12	28	45	57	61	53	36	12	-15	-38	-53	-56	-46	-27	-2	24	43	54	54	45	30	13	-1
19-Jul	Tu		-6	-1	13	30	46	55	55	45	27	4	-19	-37	-45	-42	-28	-6	18	39	53	57	51	37	20	4
20-Jul	W		-7	-8	-1	15	31	44	50	47	35	18	-3	-20	-31	-32	-24	-7	15	35	50	57	55	45	28	11
21-Jul	Th		-4	-11	-9	1	15	29	39	42	38	27	12	-4	-15	-20	-16	-5	13	31	47	56	58	51	37	21
22-Jul	F		5	-8	-13	-10	-1	12	24	31	33	29	20	9	-1	-7	-6	1	14	29	43	53	58	54	45	30
23-Jul	Sa	Last Quarter	14	-1	-10	-14	-12	-4	7	16	23	25	23	18	12	7	6	9	16	27	39	49	55	55	50	39
24-Jul	Su		25	10	-4	-13	-18	-16	-10	-2	8	15	20	21	19	17	16	17	21	27	35	44	50	53	52	45
25-Jul	M		35	21	7	-7	-18	-24	-24	-19	-10	-1	10	17	22	24	25	26	27	29	33	39	45	49	51	49
26-Jul	Tu		43	33	19	4	-13	-25	-33	-34	-29	-19	-6	8	19	27	32	34	34	33	33	35	38	43	47	49
27-Jul	W		49	43	32	17	-2	-20	-35	-44	-45	-38	-25	-8	10	25	35	40	41	38	34	32	32	35	41	46
28-Jul	Th		51	51	45	33	14	-9	-30	-47	-56	-55	-45	-27	-6	16	33	43	47	44	38	32	28	27	32	39
29-Jul	F		48	54	55	48	32	10	-17	-41	-59	-66	-62	-46	-24	3	26	42	50	50	44	34	25	20	21	29
30-Jul	Sa		40	52	60	60	50	30	4	-26	-51	-68	-72	-62	-42	-15	14	37	51	55	50	38	25	15	12	16
31-Jul	Su	New Moon	27	43	57	65	63	50	26	-4	-34	-58	-71	-71	-56	-31	-1	28	48	58	56	45	29	14	4	3

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

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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-Sep	Th		-36	-24	-1	26	50	65	69	60	42	19	-4	-19	-23	-13	8	33	57	72	74	64	43	16	-12	-33
2-Sep	F		-42	-39	-23	1	26	47	59	60	51	35	17	2	-7	-5	9	30	52	69	76	72	56	31	4	-21
3-Sep	Sa		-38	-43	-37	-21	1	23	39	48	49	42	31	18	10	8	14	28	46	63	73	74	65	46	22	-3
4-Sep	Su		-23	-36	-39	-33	-19	-2	16	29	37	39	35	29	23	19	21	29	42	55	66	71	67	56	38	17
5-Sep	M	First Quarter	-4	-20	-30	-34	-29	-19	-7	8	19	27	31	32	30	29	29	32	38	47	56	62	63	58	48	34
6-Sep	Tu		17	1	-14	-24	-29	-28	-22	-13	-2	11	21	28	33	35	36	36	37	40	45	49	53	53	51	44
7-Sep	W		34	22	8	-7	-19	-27	-30	-27	-19	-8	6	19	30	38	41	41	39	36	35	36	39	42	45	46
8-Sep	Th		44	38	28	14	-3	-17	-28	-33	-32	-23	-9	8	24	37	45	47	43	36	30	25	24	27	34	41
9-Sep	F		47	48	44	33	17	-2	-20	-32	-38	-34	-23	-5	15	33	45	51	48	40	28	18	12	12	19	30
10-Sep	Sa		42	51	54	49	36	17	-5	-24	-36	-39	-32	-16	6	27	44	54	54	45	31	16	4	-2	3	15
11-Sep	Su		31	46	57	59	51	35	13	-10	-28	-38	-36	-24	-4	20	41	55	58	52	37	18	1	-11	-12	-2
12-Sep	M	Full Moon	16	36	53	63	62	50	31	8	-15	-30	-34	-27	-10	14	37	54	62	58	44	24	3	-15	-22	-17
13-Sep	Tu		-2	21	43	59	66	61	46	25	2	-18	-27	-26	-13	9	32	52	63	63	52	32	8	-14	-27	-28
14-Sep	W		-17	4	29	50	63	66	57	39	18	-3	-17	-20	-12	6	28	49	63	67	59	40	17	-8	-27	-34
15-Sep	Th		-29	-13	12	36	55	64	61	49	31	12	-4	-11	-9	5	25	46	62	68	64	49	26	1	-21	-34
16-Sep	F		-36	-25	-5	20	42	56	60	54	41	24	9	-1	-2	7	23	42	59	68	67	56	36	12	-12	-30
17-Sep	Sa		-37	-33	-19	3	26	43	53	53	45	33	19	9	6	10	22	38	54	65	67	60	44	23	-1	-21
18-Sep	Su		-33	-35	-28	-12	9	27	40	46	45	37	27	18	13	14	22	35	49	60	65	61	50	32	12	-9
19-Sep	M		-24	-32	-31	-22	-7	10	25	35	38	37	31	25	20	20	24	32	43	54	60	59	52	39	23	5
20-Sep	Tu	Last Quarter	-12	-24	-29	-27	-19	-7	7	19	27	31	31	29	26	25	27	32	39	46	52	54	51	43	32	17
21-Sep	W		3	-11	-21	-26	-26	-21	-11	1	12	21	27	30	31	31	32	33	36	39	43	46	46	43	37	29
22-Sep	Th		18	6	-7	-18	-26	-28	-26	-18	-7	6	17	27	33	37	38	37	35	34	34	35	36	38	38	36
23-Sep	F		31	23	12	-3	-17	-28	-34	-33	-25	-13	4	19	32	40	43	42	37	31	26	23	23	27	32	37
24-Sep	Sa		40	39	31	18	1	-17	-32	-39	-39	-29	-13	7	26	40	48	48	42	32	20	12	8	10	18	30
25-Sep	Su		41	48	49	40	24	3	-19	-36	-43	-40	-27	-7	17	37	50	54	49	36	19	4	-7	-9	-2	14
26-Sep	M		32	48	58	58	48	28	4	-21	-37	-43	-36	-18	7	32	50	59	57	44	23	2	-17	-26	-24	-10
27-Sep	Tu	New Moon	12	36	56	67	65	52	30	3	-21	-35	-36	-24	-3	24	48	63	65	54	33	7	-19	-37	-42	-34
28-Sep	W		-14	14	42	62	72	68	52	29	3	-18	-27	-23	-7	18	43	63	71	65	46	18	-12	-38	-53	-53
29-Sep	Th		-39	-14	17	45	65	72	66	49	27	5	-12	-15	-7	14	38	60	73	73	59	34	3	-28	-51	-62
30-Sep	F		-57	-39	-11	20	46	63	67	59	44	24	7	-3	-1	13	33	55	72	77	70	50	21	-11	-39	-58

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## Hourly Astronomical Tide Level at Oarai port, Ibaraki 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	-63	-54	-34	-7	22	43	56	58	51	38	23	12	9	15	29	48	66	76	74	61	39	10	-19	-43	
2-Oct	Su	-56	-58	-47	-28	-4	20	37	47	48	42	33	23	18	19	27	41	56	68	72	66	51	29	3	-22	
3-Oct	M	-40	-49	-48	-38	-22	-3	16	30	37	39	36	31	26	24	27	35	46	57	63	63	55	41	22	1	
4-Oct	Tu	First Quarter	-18	-32	-39	-38	-30	-18	-4	11	22	30	33	33	31	29	29	31	37	44	50	53	51	45	33	19
5-Oct	W		4	-10	-22	-28	-29	-25	-17	-6	7	18	27	32	34	34	33	31	31	32	35	38	40	40	37	30
6-Oct	Th		21	11	-2	-12	-20	-24	-23	-17	-8	5	18	28	35	38	38	34	29	24	22	22	25	29	32	34
7-Oct	F		32	27	18	7	-6	-16	-22	-23	-18	-7	8	22	34	41	43	39	31	21	13	8	8	13	21	30
8-Oct	Sa		36	37	34	25	12	-3	-16	-23	-23	-16	-2	15	31	42	48	45	36	23	9	-3	-7	-4	6	19
9-Oct	Su		32	41	44	40	29	14	-4	-17	-23	-20	-10	8	26	41	51	51	43	28	10	-7	-18	-20	-12	4
10-Oct	M		22	38	49	51	44	30	12	-5	-17	-21	-14	1	20	38	52	56	51	36	15	-7	-24	-32	-28	-14
11-Oct	Tu		7	29	46	56	55	45	28	10	-7	-16	-15	-4	14	34	51	59	57	44	23	-2	-24	-38	-41	-31
12-Oct	W	Full Moon	-11	15	38	54	60	56	42	24	6	-7	-12	-5	10	30	48	60	62	52	33	7	-19	-39	-49	-44
13-Oct	Th		-28	-3	24	46	59	61	52	37	19	4	-5	-4	8	25	44	59	64	59	42	17	-11	-35	-50	-53
14-Oct	F		-42	-20	8	33	52	60	58	46	30	15	4	1	7	22	40	56	65	63	50	28	1	-26	-46	-55
15-Oct	Sa		-51	-35	-10	18	40	54	57	51	39	24	12	6	8	19	35	51	62	64	56	38	13	-15	-38	-52
16-Oct	Su		-55	-45	-25	1	25	42	51	51	43	31	19	12	11	17	30	45	58	63	58	45	24	-2	-26	-43
17-Oct	M		-52	-50	-37	-16	8	27	41	46	43	36	26	18	15	17	26	39	51	58	58	49	33	11	-12	-31
18-Oct	Tu		-44	-48	-43	-29	-10	11	26	36	39	37	30	24	19	19	24	32	43	51	53	49	38	22	3	-17
19-Oct	W		-32	-41	-42	-36	-23	-7	10	23	31	34	33	29	25	23	24	28	34	41	45	44	39	29	15	-1
20-Oct	Th	Last Quarter	-16	-28	-35	-37	-32	-21	-8	7	19	28	32	32	30	28	26	26	27	30	34	35	35	31	24	15
21-Oct	F		3	-10	-21	-29	-32	-30	-22	-10	4	17	27	33	35	34	30	26	22	20	20	22	24	26	27	25
22-Oct	Sa		19	11	-1	-13	-24	-30	-30	-23	-12	4	19	31	38	40	36	29	20	12	7	5	7	13	21	28
23-Oct	Su		31	29	21	9	-6	-19	-28	-29	-23	-10	8	25	38	45	44	36	23	8	-5	-13	-14	-8	5	20
24-Oct	M		32	40	40	33	18	1	-16	-26	-27	-19	-3	18	35	48	51	45	31	11	-10	-26	-33	-31	-19	1
25-Oct	Tu		22	40	50	51	42	25	5	-12	-22	-21	-10	10	31	48	57	55	42	20	-7	-31	-47	-52	-45	-26
26-Oct	W		1	27	48	59	58	47	29	9	-8	-15	-11	4	24	45	60	63	55	34	6	-25	-50	-65	-66	-53
27-Oct	Th	New Moon	-28	3	32	54	64	61	49	30	11	-4	-7	2	19	40	59	69	66	50	23	-10	-42	-66	-77	-73
28-Oct	F		-55	-26	7	36	56	64	60	46	29	12	3	4	15	33	54	68	72	63	41	11	-24	-55	-75	-82
29-Oct	Sa		-73	-51	-21	11	38	54	60	54	42	26	14	9	14	27	45	63	72	70	56	31	-2	-34	-61	-77
30-Oct	Su		-78	-66	-43	-14	15	37	50	53	47	36	24	15	14	22	36	53	65	70	63	46	20	-11	-39	-60
31-Oct	M		-71	-69	-55	-33	-8	16	34	44	45	40	31	22	17	19	27	41	54	62	62	53	35	11	-15	-38

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## Hourly Astronomical Tide Level at Oarai port, Ibaraki 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	-54	-60	-56	-43	-24	-3	17	31	38	38	34	27	21	18	21	29	39	48	53	50	41	25	6	-15	
2-Nov	W	-32	-43	-47	-42	-31	-16	2	17	28	34	34	31	26	21	19	21	26	33	38	40	38	30	18	4	
3-Nov	Th	First Quarter	-11	-23	-32	-34	-30	-22	-10	5	18	27	33	33	30	26	20	17	16	18	22	25	27	27	23	16
4-Nov	F	7	-4	-14	-20	-23	-21	-15	-5	8	20	29	34	35	32	25	18	11	7	6	8	12	17	20	21	
5-Nov	Sa	18	13	5	-4	-11	-15	-15	-10	-1	12	24	33	38	38	32	23	12	1	-7	-9	-6	2	10	18	
6-Nov	Su	23	24	21	14	5	-5	-10	-11	-6	6	18	31	40	43	40	31	17	1	-13	-21	-23	-17	-5	9	
7-Nov	M	21	29	32	28	20	9	-1	-7	-7	-1	12	26	38	46	46	39	25	6	-14	-29	-36	-34	-23	-6	
8-Nov	Tu	13	28	38	40	34	24	12	1	-5	-3	7	20	35	46	51	47	34	14	-10	-31	-44	-48	-40	-23	
9-Nov	W	-2	21	37	45	45	37	25	11	2	-2	4	15	30	44	53	53	43	24	-2	-27	-47	-57	-55	-41	
10-Nov	Th	-19	7	30	45	51	47	36	23	10	3	3	11	25	40	52	57	50	34	10	-19	-44	-61	-65	-57	
11-Nov	F	Full Moon	-36	-10	17	38	50	52	45	33	19	8	4	8	20	35	50	58	56	43	21	-8	-35	-58	-69	-67
12-Nov	Sa	-53	-28	1	27	44	52	50	40	27	15	7	7	15	30	45	56	59	51	32	6	-23	-49	-67	-72	
13-Nov	Su	-64	-44	-17	11	34	47	50	45	33	21	11	8	12	23	38	51	58	55	41	19	-9	-37	-59	-71	
14-Nov	M	-70	-57	-34	-6	19	37	46	46	38	27	16	10	10	18	31	44	54	55	47	30	6	-22	-46	-63	
15-Nov	Tu	-69	-63	-47	-23	3	24	38	43	40	32	22	14	11	14	23	35	46	51	48	37	18	-6	-30	-50	
16-Nov	W	-62	-63	-54	-36	-14	9	27	37	39	35	27	19	13	12	17	26	36	43	45	39	27	9	-13	-33	
17-Nov	Th	-48	-56	-55	-44	-27	-7	13	27	35	36	32	24	17	13	13	17	24	31	36	36	30	19	4	-14	
18-Nov	F	-30	-42	-47	-45	-35	-20	-2	15	28	34	35	30	23	16	12	10	12	17	22	25	26	23	15	4	
19-Nov	Sa	Last Quarter	-10	-23	-32	-37	-35	-27	-14	3	18	29	35	35	30	22	14	7	2	2	4	9	14	18	19	16
20-Nov	Su	9	-1	-12	-21	-26	-26	-20	-8	8	22	33	38	37	30	20	8	-4	-12	-15	-13	-7	3	12	19	
21-Nov	M	21	19	12	2	-9	-16	-18	-13	-2	14	28	38	42	39	29	15	-3	-19	-30	-34	-31	-20	-6	10	
22-Nov	Tu	22	29	30	24	13	2	-8	-11	-6	7	21	36	45	47	41	27	6	-17	-37	-50	-53	-47	-31	-11	
23-Nov	W	11	29	39	40	34	22	9	-1	-4	3	15	30	45	53	52	41	21	-6	-33	-55	-69	-70	-59	-38	
24-Nov	Th	-12	15	35	47	48	41	28	14	5	3	10	24	40	54	59	55	38	13	-19	-49	-72	-83	-81	-65	
25-Nov	F	New Moon	-39	-9	20	41	52	52	43	29	16	8	8	18	33	49	61	64	54	33	3	-31	-62	-83	-92	-85
26-Nov	Sa	-65	-36	-5	25	44	53	51	41	27	15	10	13	24	40	56	65	64	50	25	-8	-42	-70	-89	-93	
27-Nov	Su	-82	-59	-29	3	29	45	51	47	36	23	13	10	16	29	46	60	66	60	43	16	-17	-49	-74	-88	
28-Nov	M	-87	-73	-49	-19	10	32	44	47	41	30	18	10	10	18	32	48	59	61	52	33	6	-24	-52	-72	
29-Nov	Tu	-80	-76	-59	-35	-9	16	34	42	41	34	23	12	7	10	19	33	46	53	52	42	23	-3	-29	-51	
30-Nov	W	-65	-68	-60	-43	-21	3	22	35	39	36	27	17	8	5	9	18	30	39	44	41	30	13	-9	-29	

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## Hourly Astronomical Tide Level at Oarai port, Ibaraki 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		-45	-54	-53	-43	-27	-8	12	27	35	36	31	22	12	5	3	6	14	23	30	32	29	20	6	-11
2-Dec	F	First Quarter	-25	-36	-40	-37	-27	-13	4	19	30	36	34	28	19	10	3	-1	1	6	13	18	20	18	12	3
3-Dec	Sa		-9	-18	-24	-26	-22	-13	-1	13	25	33	36	34	27	17	7	-2	-7	-8	-5	1	6	10	11	9
4-Dec	Su		5	-2	-8	-12	-13	-10	-3	8	19	29	35	37	34	26	15	3	-9	-16	-19	-17	-12	-4	4	9
5-Dec	M		11	11	8	4	-1	-3	-1	5	14	24	32	38	39	34	24	11	-5	-19	-28	-32	-29	-21	-10	2
6-Dec	Tu		12	17	19	17	13	8	5	5	10	18	27	36	41	40	34	21	4	-16	-32	-42	-45	-39	-27	-11
7-Dec	W		5	18	26	28	25	19	12	8	8	13	22	32	40	44	41	31	14	-8	-30	-47	-56	-55	-45	-28
8-Dec	Th		-8	12	26	34	34	29	21	14	9	10	16	26	37	45	46	40	25	3	-22	-45	-62	-68	-62	-46
9-Dec	F		-24	1	21	34	40	38	30	20	12	9	12	20	32	43	49	47	36	16	-11	-38	-60	-74	-75	-63
10-Dec	Sa	Full Moon	-42	-16	10	29	40	43	37	27	17	9	8	14	25	38	48	52	45	29	4	-26	-53	-73	-82	-77
11-Dec	Su		-60	-34	-6	19	36	44	42	33	22	12	7	9	17	31	44	52	51	40	18	-10	-40	-65	-81	-84
12-Dec	M		-74	-52	-23	5	28	41	44	38	27	15	7	5	10	22	37	49	53	47	31	7	-24	-52	-74	-84
13-Dec	Tu		-81	-65	-40	-11	16	34	42	41	32	20	9	3	4	13	27	41	50	50	41	21	-6	-35	-60	-77
14-Dec	W		-82	-73	-53	-27	2	24	38	42	37	26	14	4	1	5	15	29	42	47	44	32	11	-16	-42	-62
15-Dec	Th		-74	-74	-61	-39	-13	12	30	40	39	32	19	8	-1	-2	5	16	29	38	41	36	22	2	-22	-43
16-Dec	F		-59	-66	-61	-46	-25	-1	21	35	40	36	26	13	2	-5	-5	2	13	23	31	33	27	15	-4	-23
17-Dec	Sa		-39	-50	-53	-46	-31	-10	11	28	38	39	32	21	8	-4	-10	-10	-5	5	14	21	23	19	10	-4
18-Dec	Su	Last Quarter	-18	-30	-37	-37	-30	-16	3	20	33	39	38	29	17	3	-9	-17	-19	-15	-8	1	9	13	13	9
19-Dec	M		1	-9	-17	-22	-21	-15	-3	13	27	37	40	37	27	13	-3	-16	-26	-31	-30	-23	-14	-4	6	11
20-Dec	Tu		12	10	4	-3	-7	-7	-2	9	21	32	40	42	37	26	10	-8	-25	-39	-46	-46	-39	-27	-13	2
21-Dec	W		13	19	20	17	12	7	5	8	15	26	36	43	44	39	26	8	-15	-36	-53	-62	-63	-54	-38	-19
22-Dec	Th		1	17	27	30	28	21	15	11	13	19	29	40	47	48	41	26	4	-23	-48	-67	-77	-76	-65	-45
23-Dec	F		-21	4	23	35	38	35	26	18	13	14	21	32	44	51	52	43	25	-2	-31	-59	-80	-89	-85	-70
24-Dec	Sa		-46	-18	9	30	41	43	37	26	16	11	13	22	34	48	56	55	43	22	-9	-40	-69	-89	-95	-88
25-Dec	Su	New Moon	-69	-41	-11	17	36	44	43	34	22	11	7	11	22	37	51	59	55	41	16	-17	-49	-76	-93	-95
26-Dec	M		-84	-60	-31	-1	25	40	44	39	27	14	4	2	9	23	40	53	59	52	35	8	-25	-56	-79	-91
27-Dec	Tu		-88	-72	-46	-17	12	32	42	41	32	18	5	-4	-3	9	25	41	53	55	45	25	-3	-33	-59	-77
28-Dec	W		-82	-74	-55	-28	-1	23	37	42	36	23	8	-5	-9	-5	9	25	40	48	47	35	15	-12	-38	-58
29-Dec	Th		-70	-69	-56	-35	-10	15	32	40	39	29	14	-1	-11	-12	-6	9	23	35	40	36	24	4	-19	-39
30-Dec	F		-53	-57	-51	-35	-14	8	27	38	40	34	21	7	-7	-14	-14	-6	7	19	28	30	25	13	-5	-21
31-Dec	Sa		-35	-42	-41	-31	-15	4	22	35	41	38	29	16	2	-11	-16	-15	-9	2	11	17	18	14	4	-8

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