



**TABLICE MORSKIH MIJENA
JADRANSKO MORE – ISTOČNA OBALA**

2024.

***TIDE TABLES
ADRIATIC SEA – EAST COAST***

2023.

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„Tablice morskih mijena, Jadransko more – istočna obala” izdaju se od 1974. godine.

Izlaze jedanput godišnje na hrvatskom i engleskom jeziku.

Sve primjedbe, opažanja i sugestije za unapređenje ove publikacije primit ćemo sa zahvalnošću.

Split, listopad 2023.

ODGOVORNI UREDNIK

Srđan Čupić, prof. fizike i politehnike

PREFACE

“Tide Tables, Adriatic Sea – East Coast” have been published since 1974.

Tide Tables are issued annually in Croatian and English.

All remarks, observations and suggestions for the improvement of this publication would be welcomed.

Split, October 2023

MANAGING EDITOR

Srđan Čupić, B.Sc.

UVOD

Općenito

Položaj luka (mareografskih postaja) na istočnoj obali Jadrana za koje su prognozirana vremena nastupa visokih i niskih voda za svaki dan u godini prikazan je na unutarnjoj strani prednjih korica. Izrazi „glavna luka” i „sporedna luka” ne odnose se na geografski položaj, veličinu ili važnost navedenih luka.

U prvom dijelu navedeni su opći podaci i harmoničke konstante za osam glavnih luka te prognozirana vremena nastupa i visine visokih i niskih voda za svaki dan u 2024. godini.

U drugom dijelu prikazani su popravci vremena i visina te druge potrebne konstante za određivanje vremena nastupa i visine visokih i niskih voda za devet sporednih luka na istočnoj obali Jadrana.

Na kraju publikacije nalazi se kalendar Mjesečevih mijena za 2024. godinu te naslovi, simboli i kratice na hrvatskom i engleskom jeziku.

Metoda prognoze

Prognozirana vremena nastupa i visine visokih i niskih voda za osam glavnih luka izračunani su po harmoničkom postupku iz sedam glavnih komponenta morskih mijena. Harmoničke konstante za luke Rovinj, Bakar, Split i Dubrovnik određene su iz kontinuiranog niza mareografskih registracija od 18.6 godina (Hrvatski visinski referentni sustav za epohu 1971.5 – HVRS71). Za luke Mali Lošinj, Vis i Ploče harmoničke konstante određene su iz višegodišnjeg kontinuiranog niza mareografskih registracija. Za luku Zadar harmoničke konstante određene su iz niza mareografskih registracija od 18.6 godina (2003.5 ± 9.3 godine).

Vrijeme

Vrijeme nastupa visokih i niskih voda jest srednjoeuropsko vrijeme (SEV = UTC + 1h). Kada je na snazi „ljetno vrijeme”, prognoziranom vremenu treba dodati jedan sat.

INTRODUCTION

General arrangement

Diagram showing locations of ports (tide gauge stations) on the East Adriatic Coast is given on the inside front cover. The terms Standard Port and Secondary Port have no reference with their geographic position, size or importance.

Part I of these tables gives general data and harmonic constants for eight Standard Ports with daily predictions of the times and heights of high and low waters in 2024.

Part II gives time and height differences and other constants which are used for prediction at nine Secondary Ports on the East Adriatic Coast.

This volume also contains Phases of the Moon given at the end of the book, as well as the list of titles, symbols and abbreviations in Croatian and English.

Methods of Prediction

All predicted times and heights of high and low waters are calculated from seven major constituents using the harmonic method. Harmonic constants for the Standard Ports Rovinj, Bakar, Split and Dubrovnik are calculated based on continuous observations of the tide over a period of 18.6 years (Croatian vertical reference system for Epoch 1971.5 – HVRS71). For the Standard Ports Mali Lošinj, Vis and Ploče, harmonic constants are calculated based on continuous multiannual series of tide gauge registrations. Harmonic constants for the Standard Port Zadar are calculated based on continuous observations of the tide over a period of 18.6 years (2003.5 ± 9.3 years).

Times

All times of predictions are given in the Central European Time (CET = UTC + 1 h). When Summer Time is being kept, one hour should be added to the predicted times

Visine

Prognozirane visine visokih i niskih voda navedene su u centimetrima iznad razine hidrografske nule. Hidrografska nula jest razina mora u odnosu na koju su prikazane dubine na pomorskim kartama Hrvatskog hidrografskog instituta.

Morske mijene na istočnoj obali Jadrana mješovitog su tipa, s izraženim nejednakostima u visini. Hidrografska nula definirana je kao ploha geoida koja je određena srednjom razinom nižih niskih voda živih morskih mijena na mareografima u Dubrovniku, Splitu, Bakru, Rovinju i Kopr u epohi 1971.5, koja se naziva „Hrvatski referentni sustav dubina mora za epohu 1971.5 – HRSDM71”. Ona je određena kao srednjak nižih niskih voda na dane sizigija iz istog niza mareografskih registracija iz kojeg je određena i srednja razina mora

Meteorološki utjecaji na morske mijene

Podaci u tablicama izračunani su za meteorološke uvjete bez vjetrova i s barometarskim tlakom zraka od 1013 hPa. Uslijed promjene meteoroloških uvjeta nastaju razlike između stvarnih i prognoziranih podataka morskih mijena. Razlike su uglavnom uzrokovane jakim i dugim puhanjem vjetrova i neobično visokim ili niskim barometarskim tlakom zraka. Pri nižem barometarskom tlaku razina mora će se uzdizati, a pri višem će se spuštati. Razlike u visini razine mora koje nastaju uslijed promjene tlaka zraka obično ne prelaze 30 cm. Međutim, kad se razina mora uzdiže ili spušta pod djelovanjem jakog vjetrova, utjecaj tlaka može biti značajan.

Utjecaj vjetrova na kolebanje razine mora različit je i zavisi od reljefa određenog područja te smjera, brzine i trajanja vjetrova. Na istočnoj obali Jadrana vjetrovi koji pušu s obale snižavaju razinu mora, dok vjetrovi koji pušu s mora tu razinu povisuju.

Heights

All predicted heights are given in centimetres above Chart Datum. Chart Datum is understood to be the datum of soundings on the latest edition of a nautical chart edited by the Hydrographic Institute of the Republic of Croatia.

In the area of the East Adriatic, tides are of mixed type with pronounced inequalities in height. Chart Datum is defined as geoid surface which is determined as Mean Lower Low Waters of Spring Tide on the tide gauges Dubrovnik, Split, Bakar, Rovinj and Koper in the epoch 1971.5, called “Croatian vertical reference system for epoch 1971.5 – HVR571”. Chart Datum is defined on the days of syzygy from the same series of tide records as the one used for the calculation of Mean Sea Level.

Meteorological Effects on Tides

Tidal predictions in these tables are computed for meteorological conditions without wind and a barometric pressure of 1013 hPa (1013 millibars). Changes in meteorological conditions will cause corresponding differences between the predicted and the actual tide. Variations in tidal heights are mainly caused by strong or prolonged winds and by unusually high or low barometric pressure. A low barometric pressure will tend to raise sea level and high barometric pressure will tend to depress it. Changes in level due to barometric pressure seldom exceed 30 cm but, when sea level is raised or lowered by strong winds, this effect can be important.

The effect of wind on sea level is very variable and largely depends on the topography of the area, as well as on the wind direction, speed and duration. In general, it can be said that in the area of the East Adriatic a strong wind blowing straight onshore will cause high waters to be higher than predicted, while winds blowing off the land will have the reverse effect.

DIO I. / PART I

Tablica 1. / Table 1

Glavne luke (Opći podaci i harmoničke konstante)
Standard Ports (General data and harmonic constants)

Br. No.	Glavna luka Standard Port	Geografske koordinate Geographical coordinates	Z ₀	Harmoničke konstante / Harmonic constants							
				konst	M ₂	S ₂	N ₂	K ₂	K ₁	O ₁	P ₁
1.	ROVINJ	φ = 45°05' N λ = 13°38' E	49	H g	18.49 276.0	10.33 281.5	3.12 275.7	2.72 289.8	14.87 77.1	4.37 54.3	5.51 68.1
2.	BAKAR	φ = 45°18' N λ = 14°32' E	33	H g	10.50 250.2	5.44 251.9	1.87 250.1	1.36 255.9	12.73 72.8	3.74 49.1	4.70 62.8
3.	MALI LOŠINJ	φ = 44°32' N λ = 14°28' E	34	H g	7.86 239.9	4.52 244.8	1.30 243.9	1.41 231.7	13.20 64.5	4.48 49.1	4.36 61.5
4.	ZADAR	φ = 44°07' N λ = 15°14' E	23	H g	5.76 221.6	3.06 220.5	1.08 228.7	0.74 199.6	11.40 52.9	3.27 53.6	3.98 53.7
5.	SPLIT	φ = 43°30' N λ = 16°26' E	20	H g	7.63 133.9	5.17 134.7	1.21 134.0	1.26 144.6	7.77 64.5	2.34 40.1	2.90 54.4
6.	VIS	φ = 43°04' N λ = 16°12' E	17	H g	7.35 107.0	5.16 110.9	1.30 103.6	1.23 112.9	7.89 56.4	2.38 42.3	2.73 49.2
7.	PLOČE	φ = 43°03' N λ = 17°27' E	24	H g	9.00 114.2	6.14 121.5	1.41 131.5	1.90 114.7	7.80 52.0	2.49 39.8	2.66 46.3
8.	DUBROVNIK	φ = 42°40' N λ = 18°04' E	19	H g	8.61 121.6	5.12 126.4	1.40 124.3	1.32 140.9	4.59 72.9	1.55 46.4	1.79 63.3

OBJAŠNENJE SIMBOLA / EXPLANATION OF SYMBOLS:

Z ₀	Visina srednje razine mora u centimetrima iznad razine po kojoj su izračunane dubine na kartama	Mean water level above Chart Datum (cm)
H	Amplituda komponente reducirana na srednju vrijednost u centimetrima	Mean amplitude of a tidal constituent (cm)
g	Modificirani oblik faznog kašnjenja komponente u stupnjevima koji omogućava direktnu upotrebu astronomskog argumenta u odnosu na grinički meridijan	The lag of the phase (tidal epoch) of the maximum of a tidal constituent behind the phase of a reference wave
M ₂	Glavna Mjesečeva poludnevna komponenta	Principal lunar semidiurnal constituent
S ₂	Glavna Sunčeva poludnevna komponenta	Principal solar semidiurnal constituent
N ₂	Eliptična Mjesečeva poludnevna komponenta	Larger lunar elliptic semidiurnal constituent
K ₂	Deklinacijska lunisolarna poludnevna komponenta	Lunisolar semidiurnal constituent
K ₁	Deklinacijska lunisolarna dnevna komponenta	Lunisolar diurnal constituent
O ₁	Glavna Mjesečeva dnevna komponenta	Lunar diurnal constituent
P ₁	Glavna Sunčeva dnevna komponenta	Solar diurnal constituent

VRIJEME I VISINA VISOKIH I NISKIH VODA
TIMES AND HEIGHTS OF HIGH AND LOW WATER

Dan Day	Vrijeme Time (h : min)	Visina Heights (cm)	Vrijeme Time (h : min)	Visina Heights (cm)	Vrijeme Time (h : min)	Visina Heights (cm)	Vrijeme Time (h : min)	Visina Heights (cm)
1	00:00	69	08:52	28				
2	01:10	62	10:51	26	19:00	64		
3	00:20	53	04:38	60	11:58	21	19:12	71
4	01:00	44	06:07	64	12:44	17	19:34	77
5	01:33	35	07:02	69	13:22	14	19:58	83
6	02:05	27	07:46	73	13:56	13	20:23	87
7	02:36	20	08:27	76	14:28	13	20:49	89
8	03:08	15	09:05	76	14:58	16	21:15	90
9	03:40	12	09:42	75	15:27	21	21:40	89
10	04:13	11	10:21	72	15:54	27	22:05	87
11	04:47	12	11:01	67	16:19	34	22:27	83
12	05:24	14	11:49	61	16:40	42	22:48	78
13	06:06	19	12:57	56	16:49	49	23:02	72
14	07:00	24	22:55	66				
15	08:32	28	19:42	64				
16	10:33	28	19:08	68				
17	01:58	50	04:32	51	11:43	26	19:16	73
18	01:38	44	06:09	55	12:27	24	19:28	76
19	01:47	37	06:58	59	12:59	23	19:43	79
20	02:03	30	07:35	63	13:27	23	19:57	82
21	02:22	24	08:08	66	13:51	24	20:13	84
22	02:43	19	08:39	67	14:14	26	20:31	86
23	03:07	14	09:10	68	14:37	28	20:50	88
24	03:32	11	09:42	67	15:00	31	21:10	88
25	04:01	9	10:17	66	15:24	35	21:33	87
26	04:32	9	10:56	63	15:49	39	21:57	85
27	05:08	10	11:45	60	16:16	45	22:23	80
28	05:50	14	12:53	58	16:48	51	22:51	74
29	06:44	18	14:57	58	17:45	57	23:21	66
30	08:01	22	17:00	64	22:57	57		

VRIJEME I VISINA VISOKIH I NISKIH VODA
TIMES AND HEIGHTS OF HIGH AND LOW WATER

Dan Day	Vrijeme Time (h : min)	Visina Heights (cm)	Vrijeme Time (h : min)	Visina Heights (cm)	Vrijeme Time (h : min)	Visina Heights (cm)	Vrijeme Time (h : min)	Visina Heights (cm)
1	08:28	15	17:23	48				
2	09:25	16	17:26	50				
3	00:10	32	03:40	35	10:13	18	17:39	53
4	00:27	27	05:12	36	10:53	20	17:58	55
5	00:55	21	06:19	36	11:28	23	18:18	57
6	01:26	16	07:18	37	11:59	26	18:40	58
7	01:59	12	08:15	37	12:25	29	19:01	59
8	02:34	9	09:16	37	12:44	33	19:22	59
9	03:10	7	10:30	37	12:50	36	19:41	59
10	03:48	7	19:57	57				
11	04:28	7	20:09	56				
12	05:11	8	20:09	53				
13	05:56	10	19:36	51				
14	06:45	13	18:01	49				
15	07:35	15	17:25	50				
16	08:22	18	17:17	50				
17	09:03	21	17:18	51				
18	01:09	28	04:36	30	09:38	24	17:25	53
19	01:04	23	06:07	30	10:07	26	17:36	55
20	01:18	18	07:14	32	10:31	29	17:50	57
21	01:39	14	08:15	33	10:51	31	18:09	59
22	02:06	10	09:16	34	11:07	33	18:30	60
23	02:35	7	10:39	35	11:03	35	18:54	61
24	03:07	5	19:20	61				
25	03:42	4	19:47	59				
26	04:19	4	20:13	56				
27	04:58	6	20:37	53				
28	05:39	8	20:42	48				
29	06:23	11	15:36	48				
30	07:08	14	15:51	51				
31	07:55	18	16:13	53				

VRIJEME I VISINA VISOKIH I NISKIH VODA
TIMES AND HEIGHTS OF HIGH AND LOW WATER

Dan Day	Vrijeme Time (h : min)	Visina Heights (cm)	Vrijeme Time (h : min)	Visina Heights (cm)	Vrijeme Time (h : min)	Visina Heights (cm)	Vrijeme Time (h : min)	Visina Heights (cm)
1	01:05	7	17:04	54				
2	01:34	4	10:03	44	12:04	43	17:48	55
3	02:01	3	10:01	45	13:05	42	18:27	54
4	02:26	3	10:09	46	13:48	41	19:01	53
5	02:49	4	10:20	46	14:26	39	19:34	52
6	03:09	6	10:32	46	15:02	38	20:04	49
7	03:27	9	10:44	47	15:41	36	20:31	46
8	03:41	12	10:56	47	16:25	34	20:56	42
9	03:50	16	11:11	48	17:21	33	21:16	37
10	03:53	19	11:29	50	18:50	31	21:18	32
11	03:43	21	11:53	51				
12	02:56	23	12:26	51				
13	00:35	21	13:15	51				
14	00:12	16	14:30	52				
15	00:27	12	15:52	52				
16	00:49	8	16:57	53				
17	01:13	6	09:01	43	12:17	40	17:50	54
18	01:38	4	09:00	45	13:09	37	18:36	54
19	02:04	4	09:10	47	13:53	35	19:18	53
20	02:30	6	09:27	48	14:35	32	19:57	51
21	02:54	8	09:46	50	15:17	30	20:36	47
22	03:17	11	10:08	51	16:02	28	21:13	43
23	03:36	15	10:32	51	16:54	27	21:52	38
24	03:50	20	10:57	52	18:02	26	22:36	32
25	03:48	24	11:25	51	19:53	25		
26	00:14	27	02:28	27	11:57	50	22:24	21
27	12:40	49	23:22	16				
28	14:05	48	23:59	12				
29	09:28	45	11:10	44	15:49	48		
30	00:30	9	08:42	46	12:23	42	16:58	48
31	00:58	7	08:39	46	12:59	40	17:48	49

VRIJEME I VISINA VISOKIH I NISKIH VODA
TIMES AND HEIGHTS OF HIGH AND LOW WATER

Dan Day	Vrijeme Time (h : min)	Visina Heights (cm)	Vrijeme Time (h : min)	Visina Heights (cm)	Vrijeme Time (h : min)	Visina Heights (cm)	Vrijeme Time (h : min)	Visina Heights (cm)
1	03:18	28	08:58	9	14:49	30	21:12	1
2	03:34	30	09:27	8	15:11	28	21:24	1
3	03:52	32	09:55	8	15:30	26	21:37	1
4	04:12	33	10:24	8	15:48	24	21:49	2
5	04:34	34	10:54	9	16:04	22	22:02	2
6	04:59	34	11:30	11	16:18	20	22:15	3
7	05:27	33	12:14	12	16:27	17	22:25	5
8	06:00	32	13:29	14	16:13	15	22:27	6
9	06:45	29	21:48	9				
10	08:10	27	19:35	8				
11	10:44	26	19:15	6				
12	02:20	19	05:48	17	12:04	28	19:25	4
13	02:01	23	07:00	14	12:54	29	19:44	2
14	02:13	27	07:46	11	13:33	29	20:05	0
15	02:34	30	08:25	8	14:09	29	20:27	0
16	02:58	34	09:03	6	14:42	28	20:50	0
17	03:25	36	09:40	5	15:13	27	21:13	0
18	03:53	37	10:18	5	15:43	24	21:35	0
19	04:22	38	10:58	6	16:12	21	21:54	2
20	04:53	37	11:43	7	16:39	18	22:10	4
21	05:24	36	12:39	9	17:03	15	22:16	6
22	05:58	33	14:15	11	17:16	12	21:54	9
23	06:38	30	18:51	9				
24	07:41	27	18:39	6				
25	10:08	25	18:56	5				
26	02:39	22	06:31	19	11:45	25	19:14	4
27	02:18	24	07:24	16	12:38	25	19:31	3
28	02:21	27	08:00	14	13:16	25	19:46	2
29	02:32	30	08:31	11	13:47	24	20:01	2
30	02:46	32	09:01	9	14:14	23	20:15	2
31	03:04	35	09:30	8	14:38	22	20:29	2

VRIJEME I VISINA VISOKIH I NISKIH VODA
TIMES AND HEIGHTS OF HIGH AND LOW WATER

Dan Day	Vrijeme Time (h : min)	Visina Heights (cm)	Vrijeme Time (h : min)	Visina Heights (cm)	Vrijeme Time (h : min)	Visina Heights (cm)	Vrijeme Time (h : min)	Visina Heights (cm)
1	03:27	40	10:45	6	15:20	14	20:26	3
2	03:54	41	11:19	5	15:57	13	20:52	4
3	04:23	41	11:56	5	16:41	13	21:19	6
4	04:54	39	12:37	5	17:36	13	21:46	8
5	05:27	37	13:24	5	18:57	13	22:10	11
6	06:04	34	14:17	5				
7	06:45	30	15:14	4				
8	07:38	26	16:08	4				
9	00:22	24	05:06	20	09:03	22	16:58	3
10	00:46	28	07:03	17	10:47	20	17:41	3
11	01:16	32	08:01	13	12:10	18	18:21	2
12	01:47	36	08:45	10	13:15	17	18:57	2
13	02:19	39	09:26	7	14:08	16	19:31	2
14	02:51	41	10:05	5	14:57	15	20:02	3
15	03:22	42	10:44	3	15:43	14	20:32	4
16	03:54	42	11:23	2	16:28	14	20:59	6
17	04:24	41	12:01	2	17:16	13	21:24	8
18	04:53	39	12:40	3	18:11	13	21:44	10
19	05:21	37	13:20	3	19:27	13	21:51	13
20	05:46	34	14:00	4				
21	06:06	30	14:41	5				
22	06:14	26	15:22	6				
23	04:29	23	16:02	6				
24	01:17	26	16:41	6				
25	01:21	29	17:18	6				
26	01:37	32	09:49	12	12:07	13	17:54	6
27	01:58	35	09:50	10	13:23	12	18:29	5
28	02:22	38	10:04	7	14:15	12	19:05	5
29	02:48	40	10:24	5	14:58	12	19:41	5
30	03:16	41	10:47	4	15:38	13	20:18	5
31	03:44	42	11:12	3	16:19	14	20:55	6

DIO II. / PART II

Tablica 2. / Table 2

Sporodne luke (Opći podaci, popravci vremena i visina)
 Secondary Ports (General data, time and height differences)

SPOREDNA LUKA SECONDARY PORT	GEOGRAFSKE KOORDINATE GEOGRAPHICAL COORDINATES		POPRAVAK VREMENA TIME DIFFERENCES		POPRAVAK VISINE HEIGHT DIFFERENCES			
	Širina Latitude N	Dužina Longitude E	Visoka voda High water	Niska voda Low water	Visoka voda High water		Niska voda Low water	
					Sizigij Syzygy	Kvadratura Quadrature	Sizigij Syzygy	Kvadratura Quadrature
	(° ')	(° ')	(h min)	(h min)	(cm)	(cm)	(cm)	(cm)
KORČULA	42 58	17 08	+0 13	+0 13	- 1	- 1	- 1	- 1
LASTOVO – UBLI	42 45	16 50	+0 13	+0 11	+ 1	+ 1	+ 1	+ 1
ZLARIN	43 42	15 50	+0 43	+0 24	+ 4	+ 3	0	+ 1
SUĆURAJ	43 08	17 12	- 0 23	- 0 20	+ 1	0	- 1	0
MALI STON	42 50	17 42	- 0 13	- 0 11	+ 3	+ 2	+ 1	+ 2
NOVALJA	44 33	14 53	- 0 28	- 0 29	- 3	- 3	- 3	- 3
BAŠKA	44 58	14 48	+0 14	+0 14	+ 2	+ 2	- 3	- 2
CRES	44 58	14 25	+0 8	+0 6	+ 5	+ 3	- 4	- 2
PULA	44 53	13 51	- 0 13	- 0 15	- 11	- 7	- 3	- 5

Vremena nastupa i visine visokih i niskih voda u devet sporednih luka na istočnoj obali Jadranskog mora određuju se dodavanjem popravaka vremena i visina podacima iz tablice 1. Ti se popravci odnose na glavne luke koje su u tablici 2. otisnute polumasnim slovima iznad podataka za sporedne luke.

Primjer:

Treba odrediti vrijeme nastupa i visinu prve visoke i prve niske vode u Puli za 25. siječnja 2024.

1. Za sporednu luku Pula glavna luka je Rovinj (tablica 2.).
2. U tablici 2. popravci vremena za Pulu:
 - popravak vremena nastupa visoke vode $\Delta t_{VV} = - 0 \text{ h } 13 \text{ min}$
 - popravak vremena nastupa niske vode $\Delta t_{NV} = - 0 \text{ h } 15 \text{ min}$
3. U kalendaru Mjesečevih mijena 25. siječnja 2024. doba je sizigija.
4. U tablici 2. popravci visina za Pulu:
 - popravak visine visoke vode $\Delta h_{VV} = - 11 \text{ cm}$
 - popravak visine niske vode $\Delta h_{NV} = - 3 \text{ cm}$
5. Na str. 9 za glavnu luku Rovinj navedeni su podaci za 25. siječnja 2024.:
 - vrijeme nastupa prve visoke vode $t'_{VV} = 8 \text{ h } 25 \text{ min}$
 - vrijeme nastupa prve niske vode $t'_{NV} = 3 \text{ h } 01 \text{ min}$
 - visina prve visoke vode $h'_{VV} = 80 \text{ cm}$
 - visina prve niske vode $h'_{NV} = 50 \text{ cm}$
6. Algebarski se računa vrijeme nastupa prve visoke i prve niske vode u Puli za 25. siječnja 2024.:
$$t_{VV} = t'_{VV} + \Delta t_{VV} = 8 \text{ h } 25 \text{ min} + (- 0 \text{ h } 13 \text{ min}) = 8 \text{ h } 12 \text{ min}$$
$$t_{NV} = t'_{NV} + \Delta t_{NV} = 3 \text{ h } 01 \text{ min} + (- 0 \text{ h } 15 \text{ min}) = 2 \text{ h } 46 \text{ min}$$
7. Algebarski se računa visina prve visoke i prve niske vode u Puli za 25. siječnja 2024.:
$$h_{VV} = h'_{VV} + \Delta h_{VV} = 80 \text{ cm} + (- 11 \text{ cm}) = 69 \text{ cm}$$
$$h_{NV} = h'_{NV} + \Delta h_{NV} = 50 \text{ cm} + (- 3 \text{ cm}) = 47 \text{ cm}$$

The times and heights of high and low water for nine Secondary Ports on the East Adriatic Coast are obtained by applying Time and Height Differences tabulated in this Table to the daily prediction for the closest Standard Port. The Standard Port to be used is that which appears in bold type above the associated Secondary Ports.

Example:

To find the time and height of the first high water and first low water at Secondary Port Pula on 25 January 2024.

1. For Secondary Port Pula the Standard Port is Rovinj (Table 2).

2. Time differences for Pula in Table 2 are as follows:

- time difference of high water $\Delta t_{HW} = - 0 \text{ h } 13 \text{ min}$
- time difference of low water $\Delta t_{LW} = - 0 \text{ h } 15 \text{ min}$

3. On 25 January 2024 the Moon is in syzygy.

4. Height differences for Pula in Table 2 are as follows:

- height difference of high water $\Delta h_{HW} = - 11 \text{ cm}$
- height difference of low water $\Delta h_{LW} = - 3 \text{ cm}$

5. Times and heights of the first high and the first low water for Standard Port Rovinj on 25 January 2024 are as follows:

- time of the first high water $t'_{HW} = 8 \text{ h } 25 \text{ min}$
- time of the first low water $t'_{LW} = 3 \text{ h } 01 \text{ min}$
- height of the first high water $h'_{HW} = 80 \text{ cm}$
- height of the first low water $h'_{LW} = 50 \text{ cm}$

6. Times of high and low waters at Pula on 25 January 2024 are obtained by adding time differences as follows :

$$t_{HW} = t'_{HW} + \Delta t_{HW} = 8 \text{ h } 25 \text{ min} + (- 0 \text{ h } 13 \text{ min}) = 8 \text{ h } 12 \text{ min}$$

$$t_{LW} = t'_{LW} + \Delta t_{LW} = 3 \text{ h } 01 \text{ min} + (- 0 \text{ h } 15 \text{ min}) = 2 \text{ h } 46 \text{ min}$$

7. Heights of high and low waters at Pula on 25 January 2024 are obtained by adding height differences as follows :

$$h_{HW} = h'_{HW} + \Delta h_{HW} = 80 \text{ cm} + (- 11 \text{ cm}) = 69 \text{ cm}$$

$$h_{LW} = h'_{LW} + \Delta h_{LW} = 50 \text{ cm} + (- 3 \text{ cm}) = 47 \text{ cm}$$

**MJESEČEVE MIJENE
PHASES OF THE MOON**

2024.

	d	h	min	d	h	min	d	h	min								
☾ Posljednja četvrt / <i>Last Quarter</i>	Siječanj / January	4	04	30	Travanj / April	2	04	15	Lipanj / June	28	22	53	Rujan / September	24	19	50	
● Mlad Mjesec / <i>New Moon</i>	11	12	57	8	19	21	8	19	21	23	57	13	23	49	10	19	55
☾ Prva četvrt / <i>First Quarter</i>	18	04	53	15	20	13	15	20	13	23	49	21	11	17	17	12	26
○ Pun Mjesec / <i>Full Moon</i>	25	18	54	24	00	49	24	00	49	21	11	17	17	12	26		
☾ Posljednja četvrt / <i>Last Quarter</i>	Veljača / February	3	00	18	Svibanj / May	1	12	27	Srpanj / July	28	03	51	Listopad / October	24	09	03	
● Mlad Mjesec / <i>New Moon</i>	9	23	59	8	04	22	8	04	22	4	12	13	Studeni / November	1	13	47	
☾ Prva četvrt / <i>First Quarter</i>	16	16	01	15	12	48	15	12	48	12	16	19	9	06	56		
○ Pun Mjesec / <i>Full Moon</i>	24	13	30	23	14	53	23	14	53	19	19	26	15	22	29		
☾ Posljednja četvrt / <i>Last Quarter</i>	Ožujak / March	3	16	24	Svibanj / May	30	18	13	Kolovoz / August	26	10	26	Studeni / November	23	02	28	
● Mlad Mjesec / <i>New Moon</i>	10	10	00	10	Lipanj / June	6	13	38	Rujan / September	3	02	56	Prosinac / December	1	07	22	
☾ Prva četvrt / <i>First Quarter</i>	17	05	11	14	06	18	14	06	18	11	07	06	8	16	27		
○ Pun Mjesec / <i>Full Moon</i>	25	08	00	22	02	08	22	02	08	18	03	34	15	10	02		
☾ Posljednja četvrt / <i>Last Quarter</i>													Prosinac / December	22	23	18	
● Mlad Mjesec / <i>New Moon</i>													30	23	27		

NAPOMENA: Mjesecne mijene navedene su prema srednjoeuropskom vremenu (SEV = UTC + 1 h). Kad se primjenjuje ljetno računanje vremena, treba dodati 1 sat.
NOTE: Phases of the Moon are given in Central European Time (CET = UTC + 1 h). When Summer Time is being kept, one hour should be added.

NASLOVI, SIMBOLI I KRATICE
TITLES, SYMBOLS AND ABBREVIATIONS

Dan (d)	<i>Day</i>
Vrijeme (h, min)	<i>Time (Hour, Minute)</i>
Popravak vremena	<i>Time differences</i>
Visina	<i>Height</i>
Popravak visina	<i>Height differences</i>
Siječanj	<i>January</i>
Veljača	<i>February</i>
Ožujak	<i>March</i>
Travanj	<i>April</i>
Svibanj	<i>May</i>
Lipanj	<i>June</i>
Srpanj	<i>July</i>
Kolovoz	<i>August</i>
Rujan	<i>September</i>
Listopad	<i>October</i>
Studeni	<i>November</i>
Prosinac	<i>December</i>
Luka	<i>Port</i>
Glavna luka	<i>Standard Port</i>
Sporedna luka	<i>Secondary Port</i>
Geografske koordinate	<i>Geographical coordinates</i>
Širina (φ)	<i>Latitude</i>
Dužina (λ)	<i>Longitude</i>
Harmoničke konstante	<i>Harmonic constants</i>
Z_0	<i>Mean water level above Chart Datum</i>
H	<i>Mean amplitude of a tidal constituent</i>
g	<i>Modified epoch of a tidal constituent</i>
M_2	<i>Principal lunar semidiurnal constituent</i>
S ₂	<i>Principal solar semidiurnal constituent</i>
N_2	<i>Larger lunar elliptic semidiurnal constituent</i>
K_2	<i>Lunisolar semidiurnal constituent</i>
K_1	<i>Lunisolar diurnal constituent</i>
O_1	<i>Lunar diurnal constituent</i>
P_1	<i>Solar diurnal constituent</i>
Sizigij	<i>Syzygy</i>
Kvadratura	<i>Quadrature</i>
Mlad Mjesec	<i>New Moon</i>
Prva četvrt	<i>First Quarter</i>
Pun Mjesec	<i>Full Moon</i>
Posljednja četvrt	<i>Last Quarter</i>
Visoka voda (VV)	<i>High Water (HW)</i>
Niska voda (NV)	<i>Low Water (LW)</i>

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BAKAR	21
MALI LOŠINJ	33
ZADAR	45
SPLIT	57
VIS	69
PLOČE	81
DUBROVNIK	93

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BAKAR	21
MALI LOŠINJ	33
ZADAR	45
SPLIT	57
VIS	69
PLOČE	81
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