

PROGNOZIRANO PLIMOVANJE MORJA  
TIDE TABLES  
2017

JADRANSKO MORJE – KOPRSKI ZALIV  
ADRIATIC SEA – THE BAY OF KOPER



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Slika na naslovnici/*Cover photo:*

Piran z Alpami v ozadju, foto: Janez Polajnar/*Piran with the Alps in the background,  
photo: Janez Polajnar*

Elektronska verzija/*Electronic version:*

<http://www.arso.gov.si/vode/morje/>

Ljubljana, Januar 2017

## UVODNA POJASNILA

**SPLOŠNO.** Prognozirano plimovanje morja je napoved višin morske gladine zaradi gravitacijskih vplivov Sonca in Lune. Dejansko gibanje gladine morja se lahko od prognoziranega razlikuje zaradi različnih vzrokov. Najbolj vpliven in pogost vzrok za to so vremenske razmere - močnejši veter, odstopanja od povprečnega zračnega pritiska in lastno nihanje Jadranskega morja.

Prognozirano plimovanje morja je v priložni publikaciji izračunano za mareografsko postajo v Kopru in dobro velja za celotno področje slovenskega morja. Lunine mene zagotavlja Astronomsko geofizikalni observatorij Golovec Univerze v Ljubljani.

**METODA PROGNOZE.** Prognozirane višine morja so izračunane na podlagi določitve plimnih prispevkov Sonca in Lune na lokaciji mareografske postaje Koper. Plimni prispevki so določeni iz niza merjenih višin morske gladine na mareografski postaji Koper s pomočjo harmonične spektralne analize.

**MAREOGRAFSKA POSTAJA KOPER.** Širina  $\phi = 45^{\circ} 33' N$ , dolžina  $\lambda = 13^{\circ} 44' E$ .

**ČASI.** Časi v knjižici so srednjeevropski (CET = UTC + 1h). Za uporabo v lokalnem poletnem času se časom prognoziranega plimovanja morja ter časom vzhoda in zahoda Sonca prišteje ena ura (CET + 1h) v obdobju od zadnje nedelje v marcu do zadnje nedelje v oktobru.

**VIŠINE.** Navedene višine morja so prikazane v centimetrih in predstavljajo odmik od dolgoletnega srednjega nivoja morja na mareografski postaji v Kopru, ki glede na ničlo vodomerne letve znaša 217 cm (primer: pri navedeni višini morja 60 cm znaša dejanska višina morja na mareografski postaji v Kopru  $217 \text{ cm} + 60 \text{ cm} = 277 \text{ cm}$ ).

## INTRODUCTORY REMARKS

**GENERAL.** Tide tables are a forecast of the sea levels due to gravitational influences of the Sun and the Moon. Measured sea levels can differ from the forecast due to several reasons. The most common reasons for this offset are meteorological influences – strong winds, air pressure and seiches of the Adriatic sea.

The forecast was calculated for the location of the tide gauge Koper but holds well for the entire region of the Slovenian sea. Moon phases are provided by the Astronomical geophysical observatory Golovec at University of Ljubljana.

**METHOD.** Forecasted sea levels are obtained using a harmonic spectral analysis on a time-series of observed sea levels at the tide gauge Koper.

**TIDE GAUGE KOPER.** Latitude:  $\phi = 45^{\circ} 33' N$ , longitude  $\lambda = 13^{\circ} 44' E$ .

**TIME.** Times in the booklet are central European (CET = UTC + 1h). To use as local daylight saving time add 1h (CET + 1h) to the forecasted times and to the sunrise/sunset times between last Sunday in March and last Sunday in October.

**HEIGHTS.** Sea levels are depicted in centimeters. The zero value corresponds to a long-time average mean sea level at tide gauge Koper, which relatively to the tide gauge zero amounts to 217 cm (example: at 60 cm of forecasted sea levels the observed sea level at tide gauge Koper amounts to  $217 \text{ cm} + 60 \text{ cm} = 277 \text{ cm}$ ).

## PODATKI O MAREOGRAFSKI POSTAJI KOPER SPECIFICATIONS OF THE TIDE GAUGE KOPER



Mareografska postaja Koper  
*Tide gauge Koper*



Reperji mareografske postaje Koper  
*Benchmarks of the tide gauge Koper*

### REPERJI IN POVEZAVE MED NJIMI BENCHMARKS AND BENCHMARK RELATIONSHIPS

Reper merilne postaje <i>Tide gauge benchmark</i>	Geodetski reper <i>Grid reference</i>	Lega <i>Location</i>
Osnovni reper <i>Tide gauge benchmark</i>	R5486	Na stavbi hotela Triglav v Kopru <i>On the building of Triglav Hotel in Koper</i>
Dodatni reper <i>Auxilliary gauge benchmark</i>	R3002	Na stavbi Uprave RS za pomorstvo v Kopru <i>On Maritime authority building</i>
Ničla vodomerne letve: 4,012 m pod R5486 in 3,955 m pod R3002 <i>Tide gauge Zero: 4,012 m below R5486 and 3,955 m below R3002</i>		

Opomba: Navajanje povezav med ničlo vodomerne letve (višinskim izhodiščem za meritve višin morja) in geodetskima reperjema ima dvojen namen: preverjanje stabilnosti višinskega izhodišča in možnost navezave na poljubno točko na obali. Na poljubno točko na obali se uporabniki lahko navežejo preko aktivnega državnega geodetskega reperja R5486. Podatke o geodetskih reperjih in geodetskih izhodiščih posreduje Geodetska uprava Republike Slovenije.

*Note: Benchmark relationships have two applications: to control the stability of the tide gauge zero and to offer the possibility to tie the benchmark zero to any point of the coast. To tie the tide gauge zero to the coast points users can use the active benchmark R5486. The data about benchmarks are available through Surveying and mapping authority of the Republic of Slovenia.*

## DOSTOP DO MERJENIH PODATKOV MAREOGRAFSKE POSTAJE

Podatki so dostopni v skoraj realnem času, časovni interval zajema podatkov s postaje je 10 minut. Polurni merjeni podatki o vodostaju in temperaturi morja so na voljo na spletnem naslovu:

[http://www.arso.gov.si/vode/podatki/amp/H17\\_g\\_1.html](http://www.arso.gov.si/vode/podatki/amp/H17_g_1.html)

## ACCESS TO THE TIDE GAUGE DATA

Near real time data, sampling frequency: 10 minutes. Observed half-hour sea levels are available on the web:

[http://www.arso.gov.si/vode/podatki/amp/H17\\_g\\_1.html](http://www.arso.gov.si/vode/podatki/amp/H17_g_1.html)

## ZAGOTAVLJANJE KVALITETE IN KONTROLA PODATKOV

Standard ISO 9001/2000 in interni ARSO kontrolni postopki

## DATA QUALITY ASSURANCE AND QUALITY CONTROL

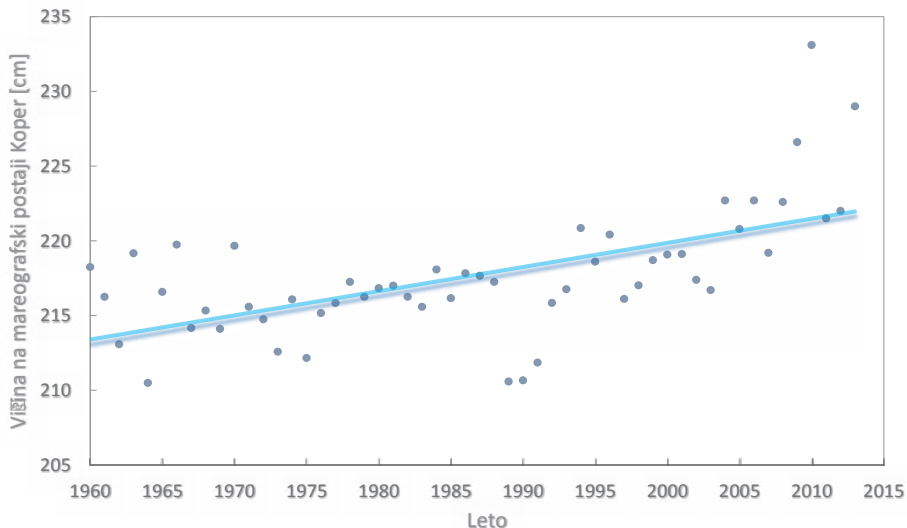
Standard ISO 9001/2000 and internal ARSO controlling procedures

## TREND SREDNJIH LETNIH VIŠIN MORJA

Gladina morja na mareografski postaji Koper se zvišuje za približno 1 mm/leto, kar je v skladu s trendom gladine Sredozemskega morja.

## ANNUAL MEAN SEA LEVEL TREND

The sea level at tide gauge Koper is rising at approximately 1 mm/year, which is in accordance with the sea level trend of the Mediterranean Sea.



Trend srednjih letnih višin morja v obdobju 1960 - 2014  
Annual mean sea level trends in the period 1960 - 2014

**VZHOD IN ZAHOD SONCA V KOPRU V LETU 2017**  
**SUNRISE AND SUNSET IN KOPER IN YEAR 2017**

Dan	Januar		Februar		Marec		April		Dan
	vzhod	zahod	vzhod	zahod	vzhod	zahod	vzhod	zahod	
	hhmm	hhmm	hhmm	hhmm	hhmm	hhmm	hhmm	hhmm	
01	0745	1632	0726	1712	0644	1752	0545	1833	01
02	0745	1633	0725	1713	0642	1753	0544	1835	02
03	0745	1634	0724	1715	0640	1755	0542	1836	03
04	0745	1635	0723	1716	0638	1756	0540	1837	04
05	0745	1636	0721	1718	0636	1758	0538	1839	05
06	0745	1637	0720	1719	0634	1759	0536	1840	06
07	0745	1638	0719	1721	0633	1800	0534	1841	07
08	0745	1640	0717	1722	0631	1802	0532	1842	08
09	0744	1641	0716	1723	0629	1803	0530	1844	09
10	0744	1642	0714	1725	0627	1804	0529	1845	10
11	0744	1643	0713	1726	0625	1806	0527	1846	11
12	0743	1644	0711	1728	0623	1807	0525	1848	12
13	0743	1646	0710	1729	0621	1808	0523	1849	13
14	0742	1647	0708	1731	0620	1810	0521	1850	14
15	0742	1648	0707	1732	0618	1811	0520	1851	15
16	0741	1649	0705	1734	0616	1812	0518	1853	16
17	0740	1651	0704	1735	0614	1814	0516	1854	17
18	0740	1652	0702	1737	0612	1815	0514	1855	18
19	0739	1653	0701	1738	0610	1816	0513	1857	19
20	0738	1655	0659	1739	0608	1818	0511	1858	20
21	0737	1656	0657	1741	0606	1819	0509	1859	21
22	0737	1657	0656	1742	0604	1820	0508	1900	22
23	0736	1659	0654	1744	0602	1822	0506	1902	23
24	0735	1700	0652	1745	0601	1823	0504	1903	24
25	0734	1702	0651	1746	0559	1824	0503	1904	25
26	0733	1703	0649	1748	0557	1826	0501	1906	26
27	0732	1704	0647	1749	0555	1827	0459	1907	27
28	0731	1706	0645	1751	0553	1828	0458	1908	28
29	0730	1707			0551	1829	0456	1909	29
30	0729	1709			0549	1831	0455	1911	30
31	0727	1710			0547	1832			31

**VZHOD IN ZAHOD SONCA V KOPRU V LETU 2017**  
**SUNRISE AND SUNSET IN KOPER IN YEAR 2017**

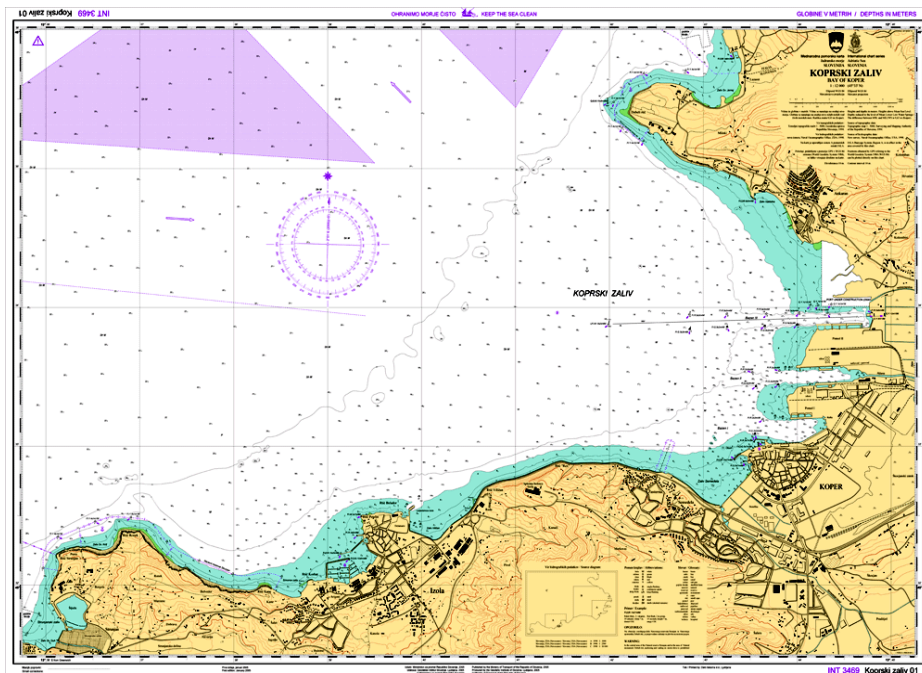
Dan	Maj		Junij		Julij		Avgust		Dan
	vzhod	zahod	vzhod	zahod	vzhod	zahod	vzhod	zahod	
	hhmm	hhmm	hhmm	hhmm	hhmm	hhmm	hhmm	hhmm	
01	0453	1912	0420	1947	0420	1958	0449	1933	01
02	0452	1913	0419	1948	0421	1957	0450	1932	02
03	0450	1915	0419	1948	0421	1957	0451	1931	03
04	0449	1916	0418	1949	0422	1957	0452	1929	04
05	0447	1917	0418	1950	0423	1957	0454	1928	05
06	0446	1918	0417	1951	0423	1956	0455	1926	06
07	0445	1920	0417	1951	0424	1956	0456	1925	07
08	0443	1921	0417	1952	0425	1955	0457	1923	08
09	0442	1922	0416	1953	0426	1955	0458	1922	09
10	0441	1923	0416	1953	0426	1954	0500	1920	10
11	0439	1924	0416	1954	0427	1954	0501	1919	11
12	0438	1926	0416	1954	0428	1953	0502	1917	12
13	0437	1927	0416	1955	0429	1952	0503	1916	13
14	0436	1928	0416	1955	0430	1952	0504	1914	14
15	0434	1929	0416	1956	0431	1951	0506	1913	15
16	0433	1930	0416	1956	0432	1950	0507	1911	16
17	0432	1932	0416	1957	0433	1949	0508	1909	17
18	0431	1933	0416	1957	0434	1948	0509	1908	18
19	0430	1934	0416	1957	0435	1948	0511	1906	19
20	0429	1935	0416	1957	0436	1947	0512	1904	20
21	0428	1936	0416	1958	0437	1946	0513	1903	21
22	0427	1937	0416	1958	0438	1945	0514	1901	22
23	0426	1938	0417	1958	0439	1944	0515	1859	23
24	0425	1939	0417	1958	0440	1943	0517	1857	24
25	0425	1940	0417	1958	0441	1942	0518	1856	25
26	0424	1941	0418	1958	0442	1941	0519	1854	26
27	0423	1942	0418	1958	0443	1939	0520	1852	27
28	0422	1943	0419	1958	0444	1938	0522	1850	28
29	0422	1944	0419	1958	0446	1937	0523	1848	29
30	0421	1945	0420	1958	0447	1936	0524	1847	30
31	0420	1946			0448	1935	0525	1845	31

**VZHOD IN ZAHOD SONCA V KOPRU V LETU 2017**  
**SUNRISE AND SUNSET IN KOPER IN YEAR 2017**





Dan	September		Oktober		November		December		Dan
	vzhod	zahod	vzhod	zahod	vzhod	zahod	vzhod	zahod	
	hhmm	hhmm	hhmm	hhmm	hhmm	hhmm	hhmm	hhmm	
01	0526	1843	0603	1745	0645	1652	0725	1623	01
02	0528	1841	0605	1743	0646	1651	0726	1623	02
03	0529	1839	0606	1742	0648	1649	0727	1622	03
04	0530	1837	0607	1740	0649	1648	0728	1622	04
05	0531	1835	0608	1738	0650	1647	0729	1622	05
06	0533	1833	0610	1736	0652	1645	0730	1622	06
07	0534	1832	0611	1734	0653	1644	0731	1622	07
08	0535	1830	0612	1732	0655	1643	0732	1621	08
09	0536	1828	0614	1730	0656	1641	0733	1621	09
10	0537	1826	0615	1729	0657	1640	0734	1621	10
11	0539	1824	0616	1727	0659	1639	0735	1621	11
12	0540	1822	0617	1725	0700	1638	0736	1622	12
13	0541	1820	0619	1723	0702	1637	0737	1622	13
14	0542	1818	0620	1721	0703	1636	0738	1622	14
15	0544	1816	0621	1720	0704	1635	0739	1622	15
16	0545	1814	0623	1718	0706	1634	0739	1622	16
17	0546	1812	0624	1716	0707	1633	0740	1623	17
18	0547	1810	0625	1714	0708	1632	0741	1623	18
19	0548	1808	0627	1713	0710	1631	0741	1623	19
20	0550	1806	0628	1711	0711	1630	0742	1624	20
21	0551	1805	0630	1709	0712	1629	0742	1624	21
22	0552	1803	0631	1708	0714	1628	0743	1625	22
23	0553	1801	0632	1706	0715	1628	0743	1625	23
24	0555	1759	0634	1704	0716	1627	0744	1626	24
25	0556	1757	0635	1703	0718	1626	0744	1627	25
26	0557	1755	0636	1701	0719	1626	0744	1627	26
27	0558	1753	0638	1700	0720	1625	0745	1628	27
28	0600	1751	0639	1658	0721	1625	0745	1629	28
29	0601	1749	0641	1657	0723	1624	0745	1630	29
30	0602	1747	0642	1655	0724	1624	0745	1630	30
31			0643	1654			0745	1631	31



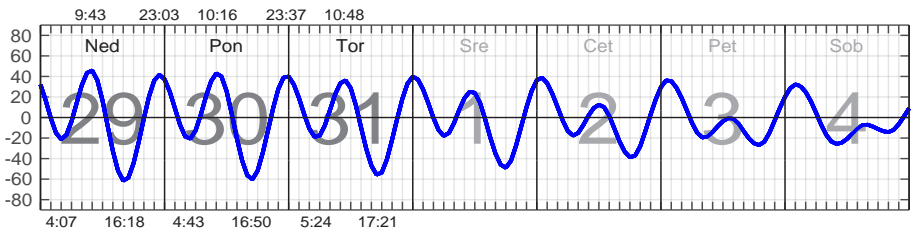
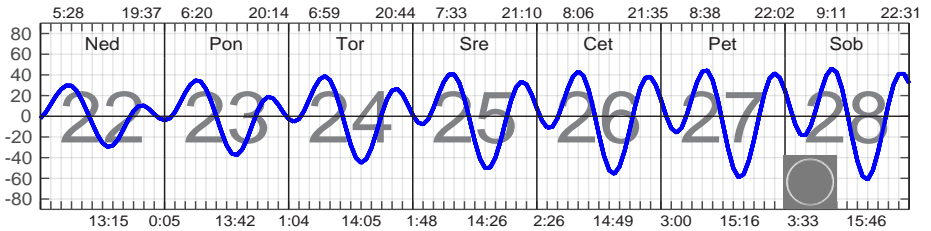
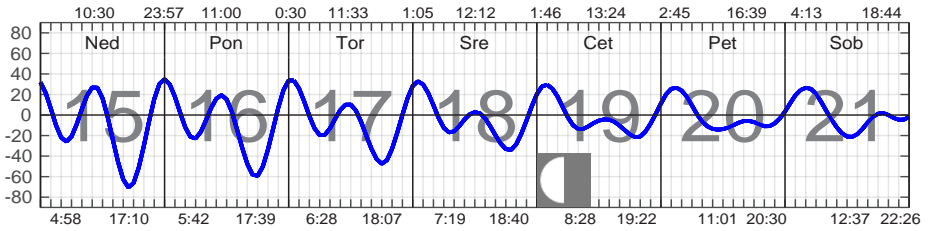
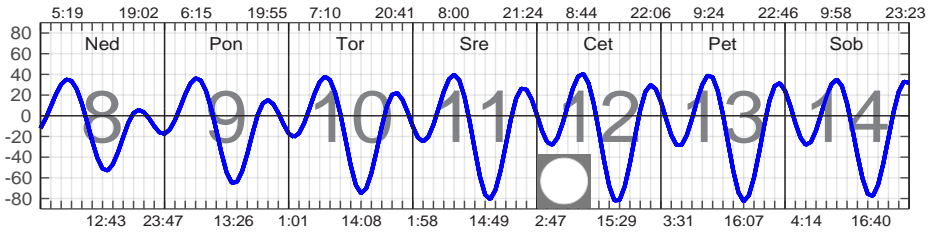
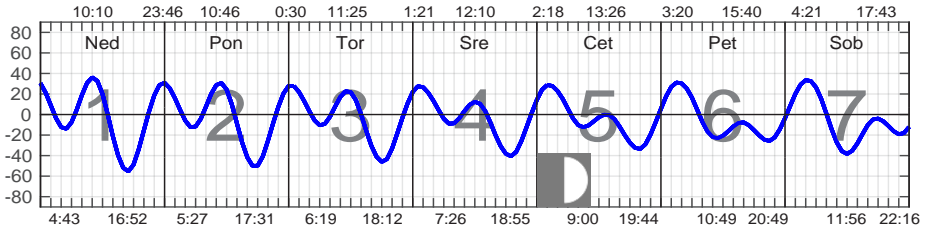
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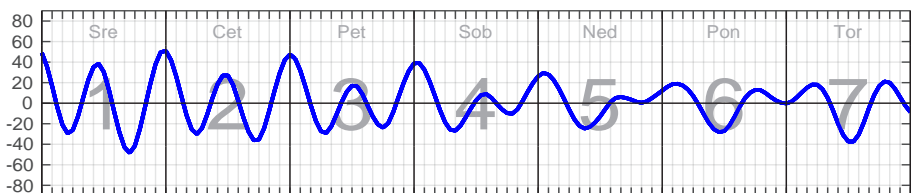
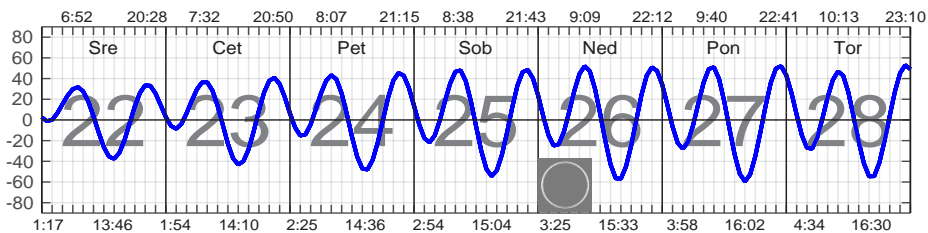
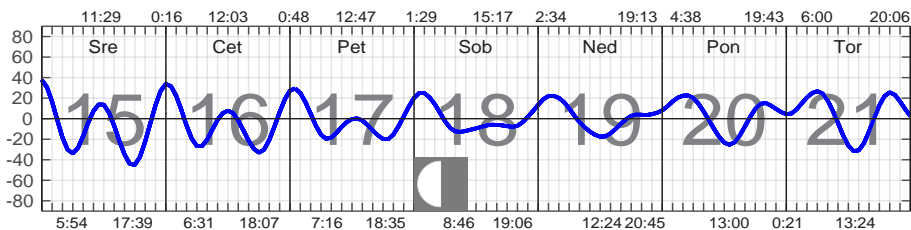
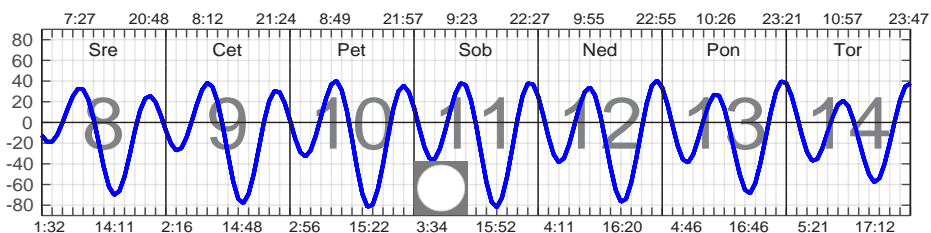
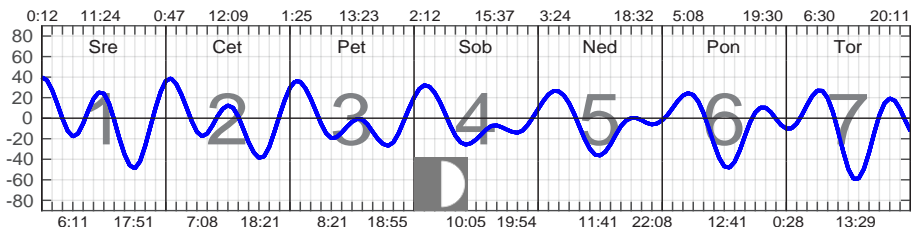
Legenda Luninih men / Moon Phase Legend :

-  prazna luna, mlaj / new moon
-  prvi krajec / first quarter
-  polna luna, ščip / full moon
-  zadnji krajec / last quarter

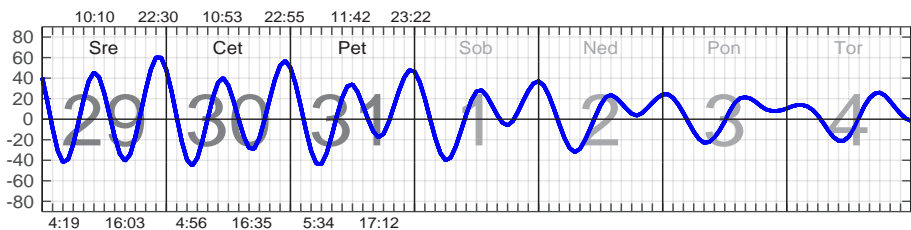
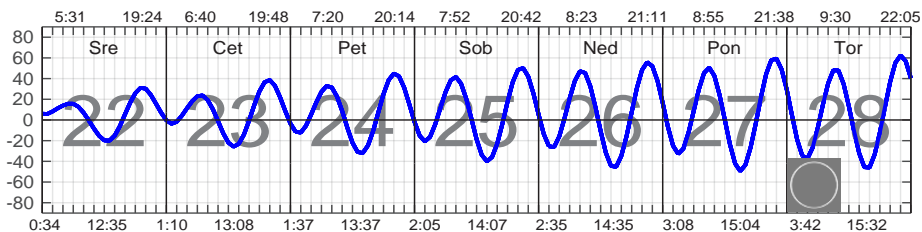
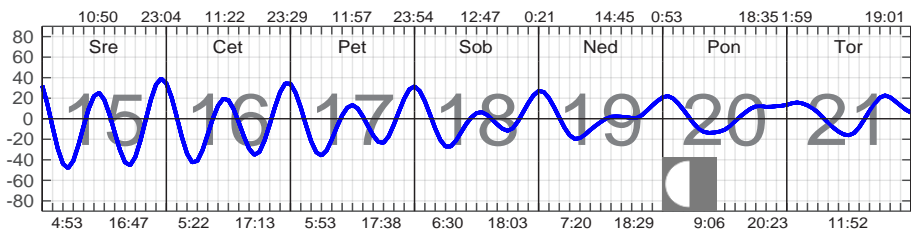
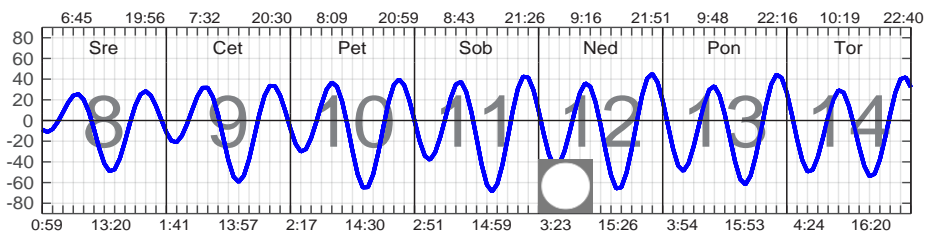
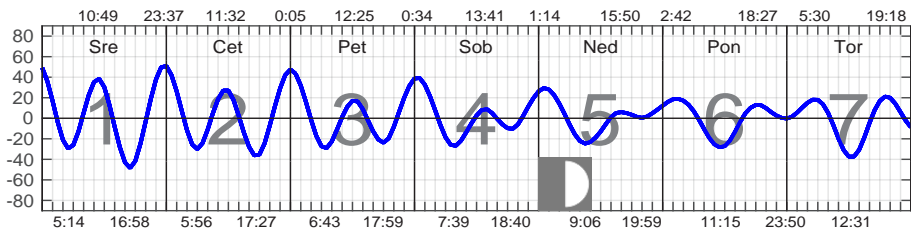
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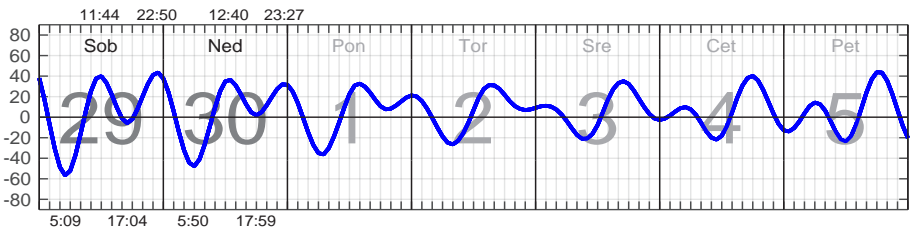
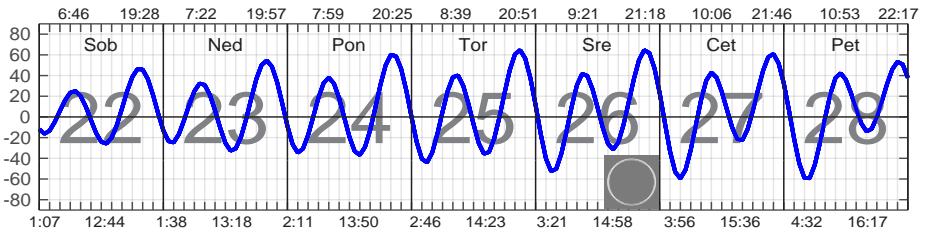
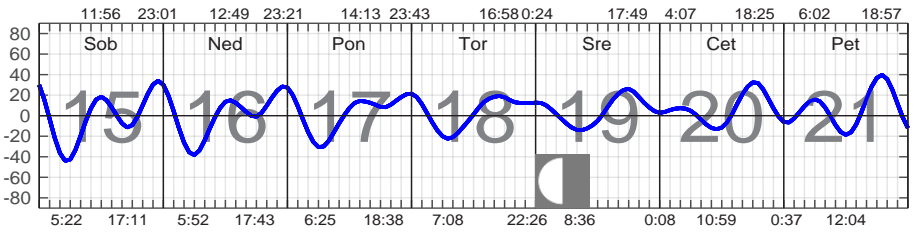
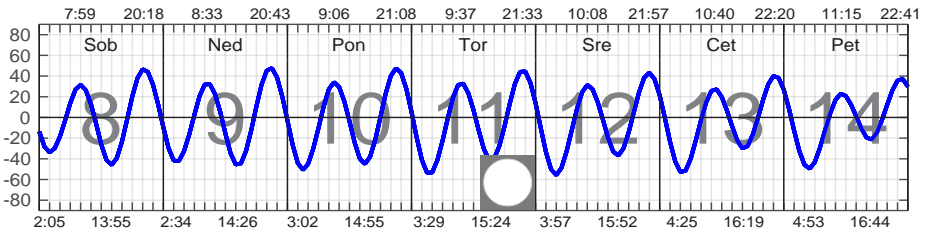
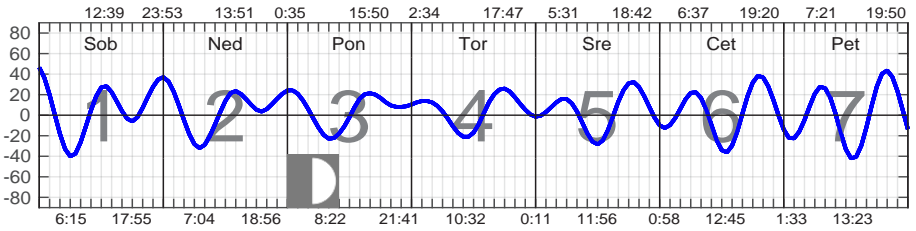
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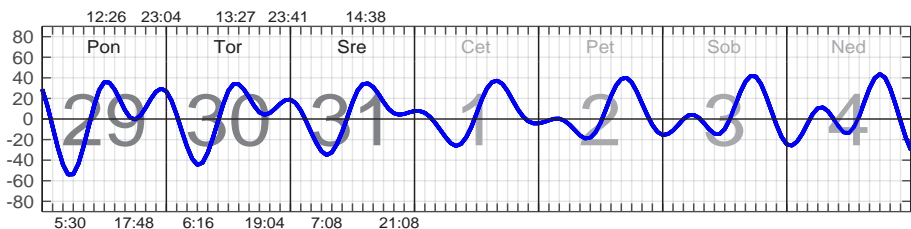
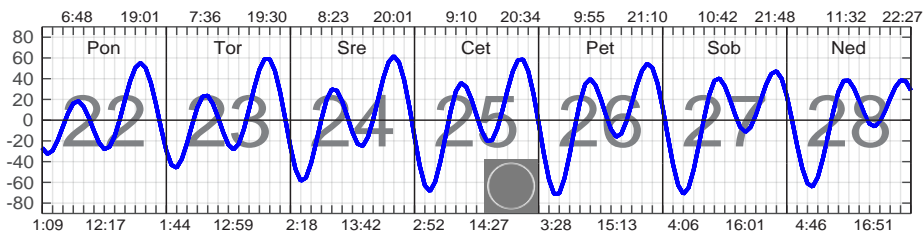
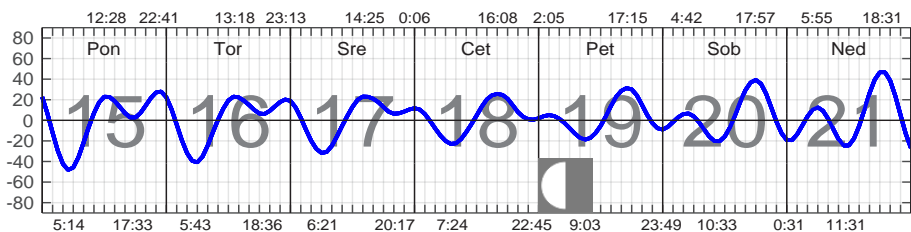
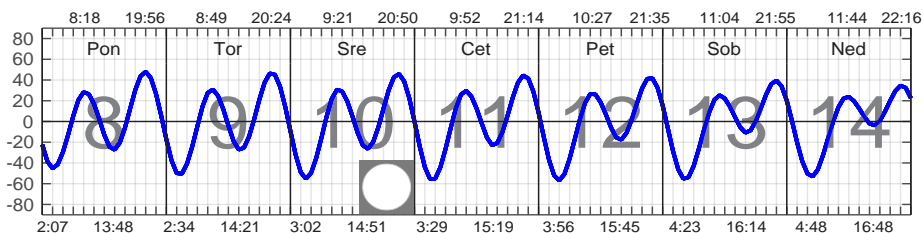
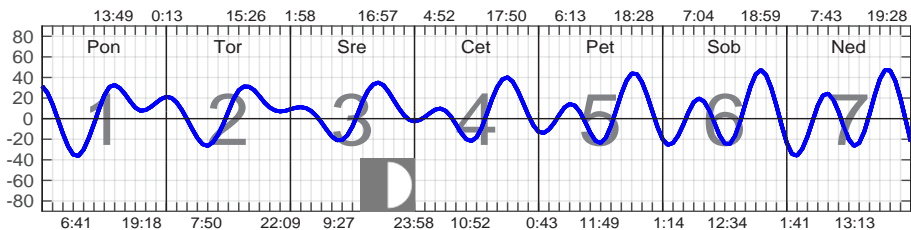
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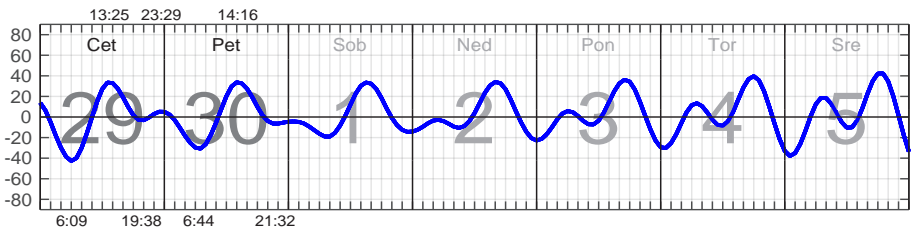
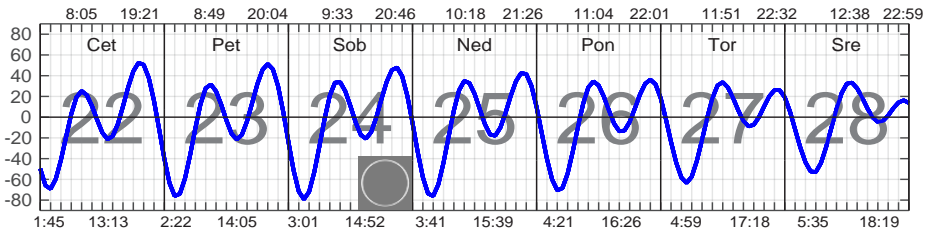
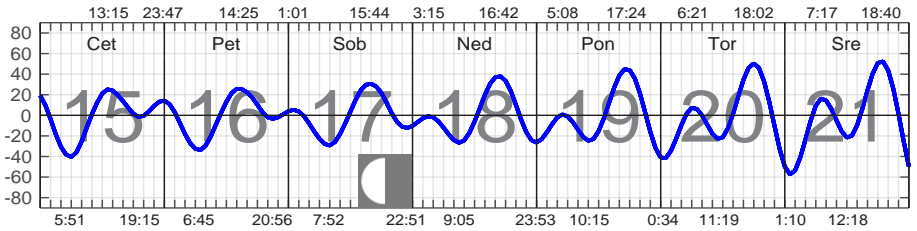
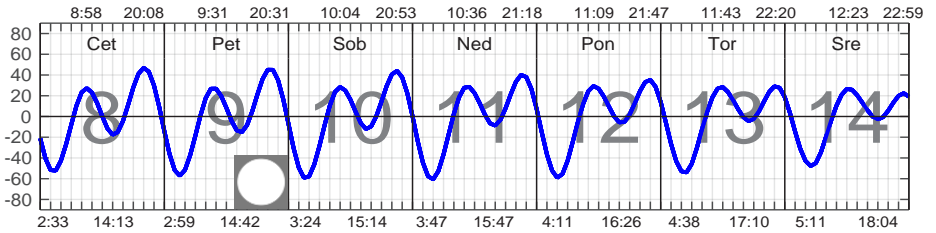
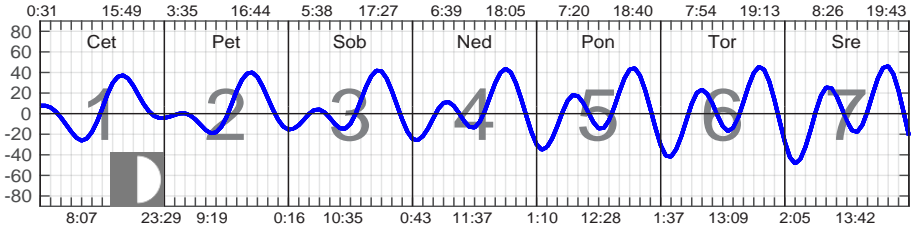
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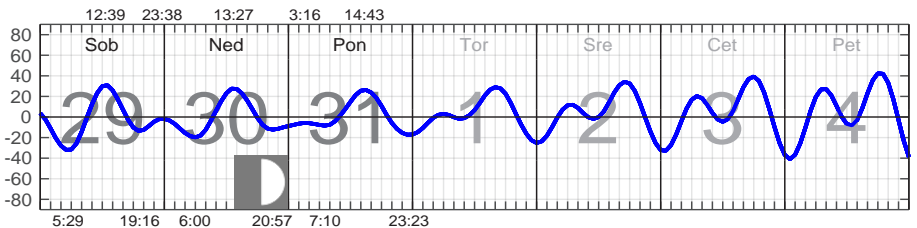
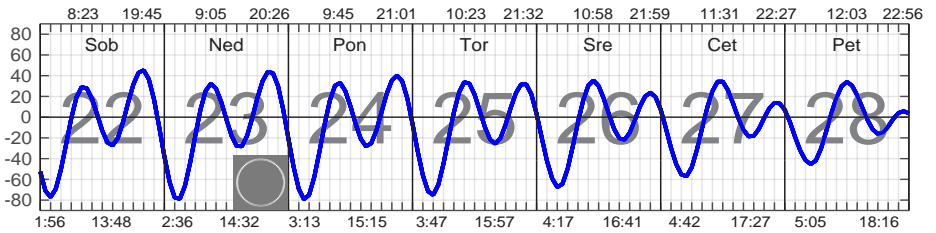
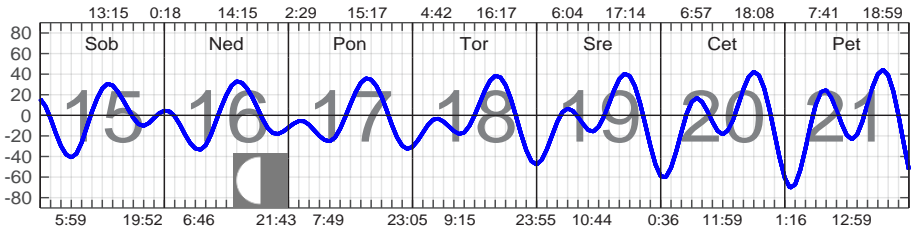
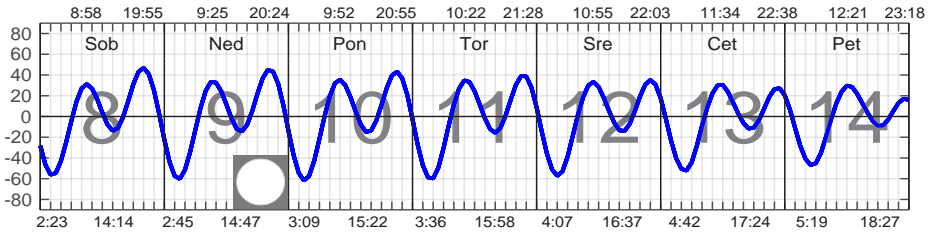
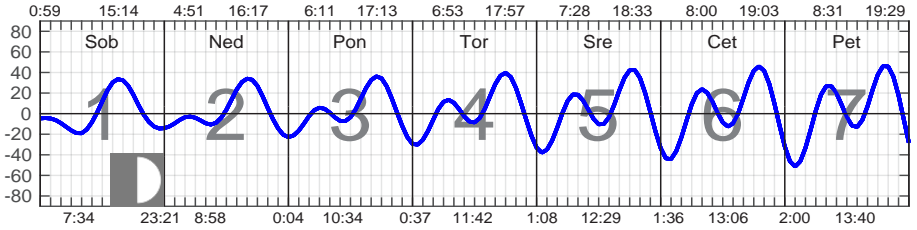
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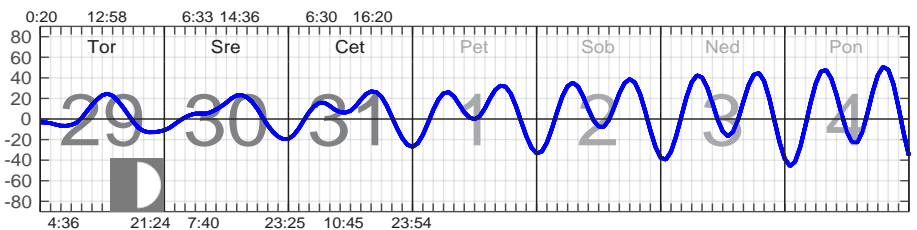
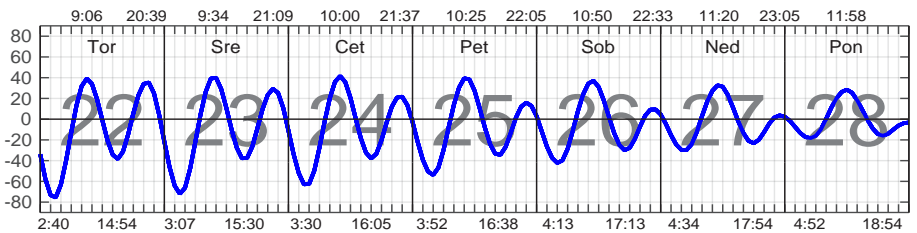
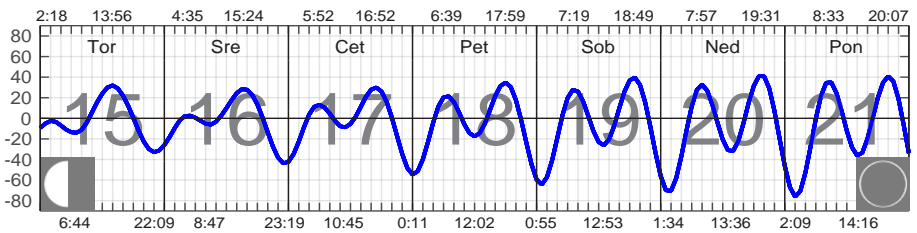
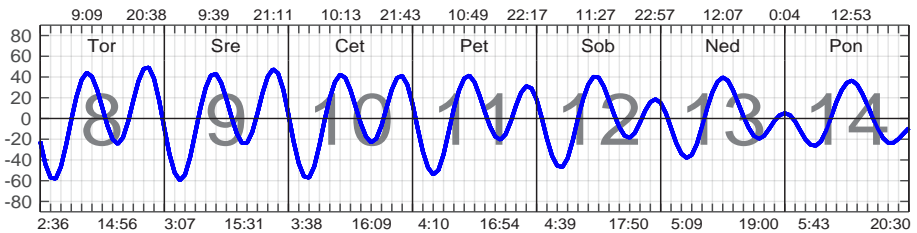
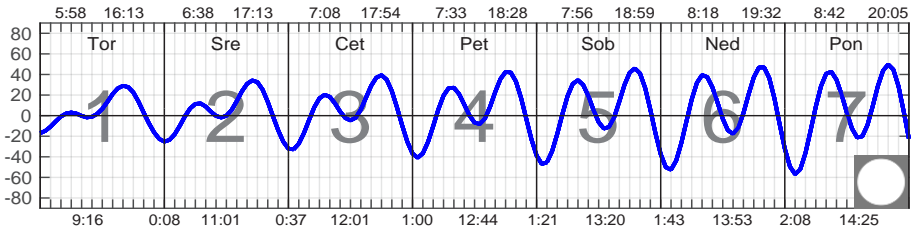


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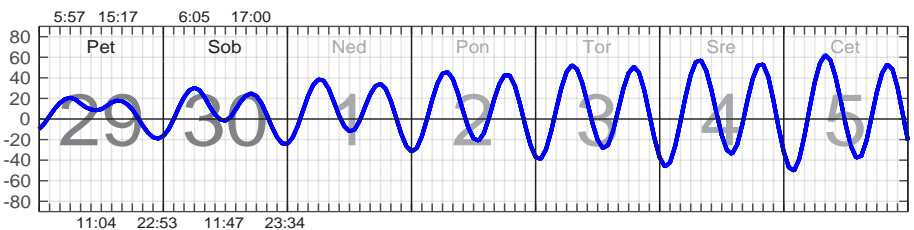
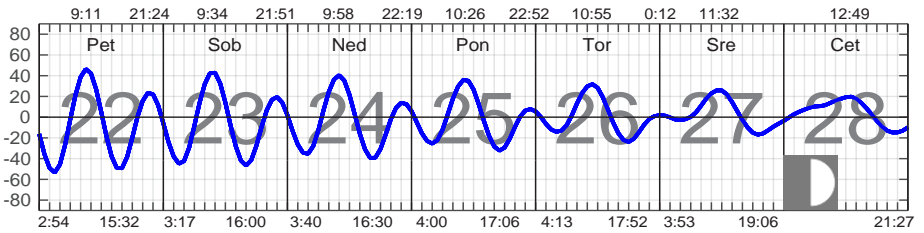
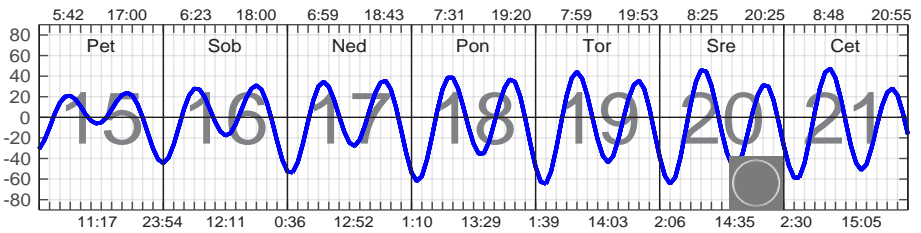
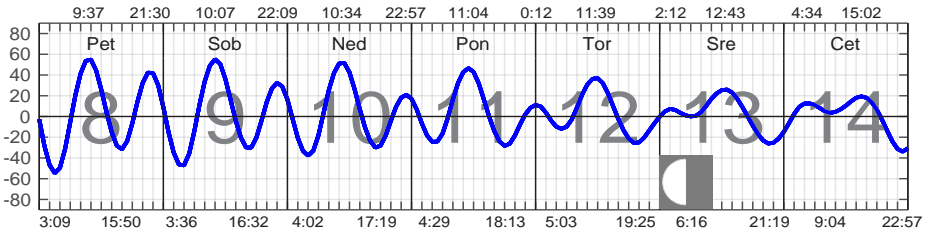
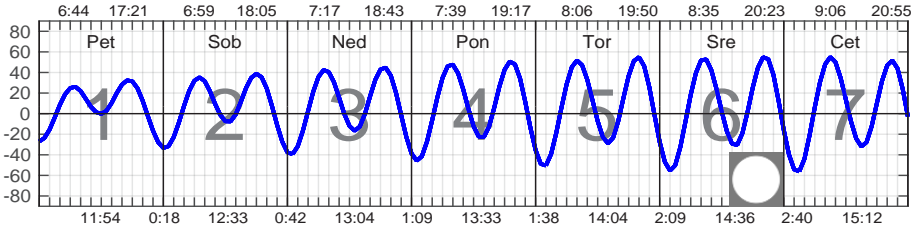




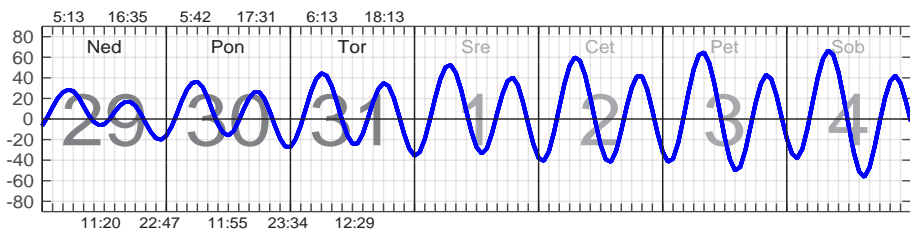
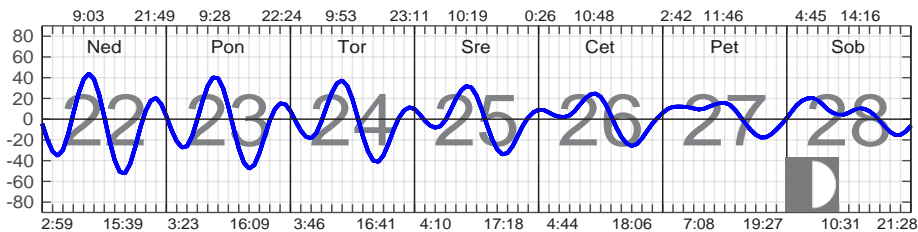
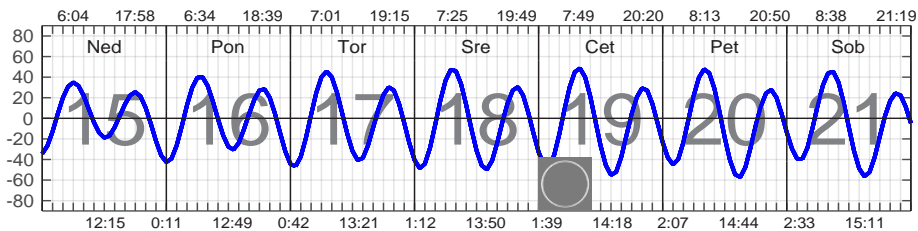
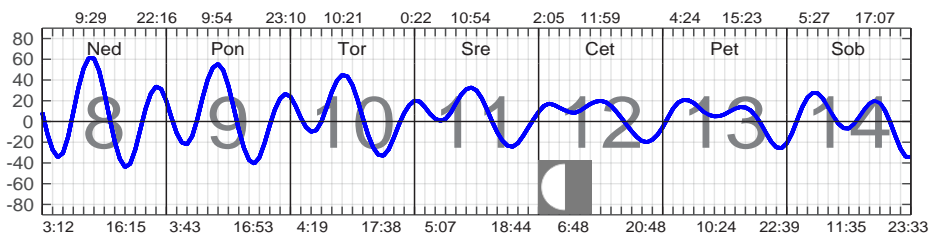
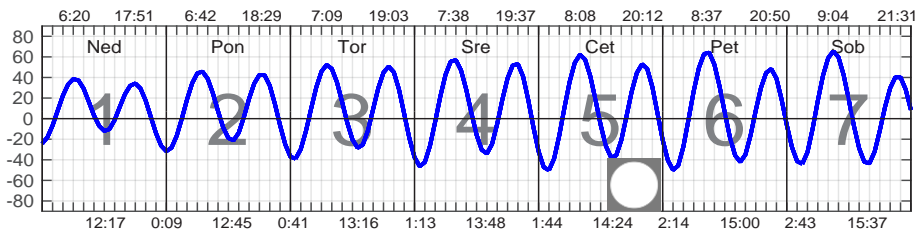
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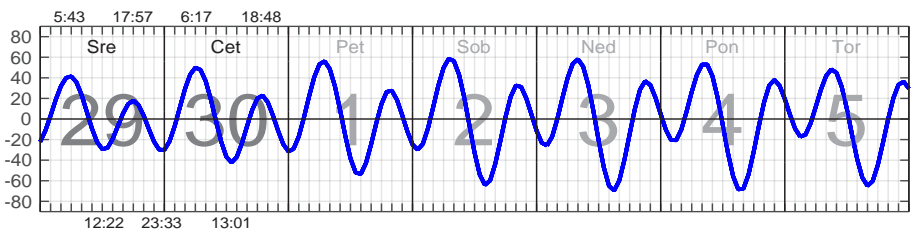
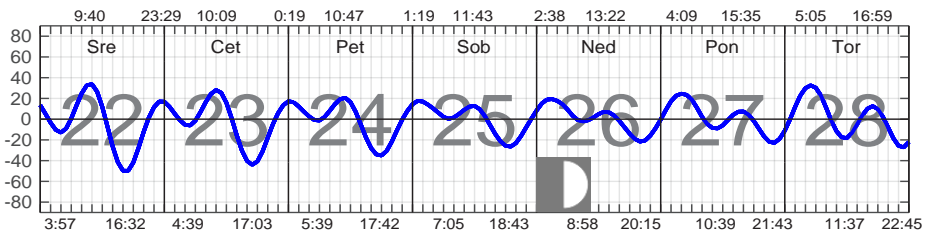
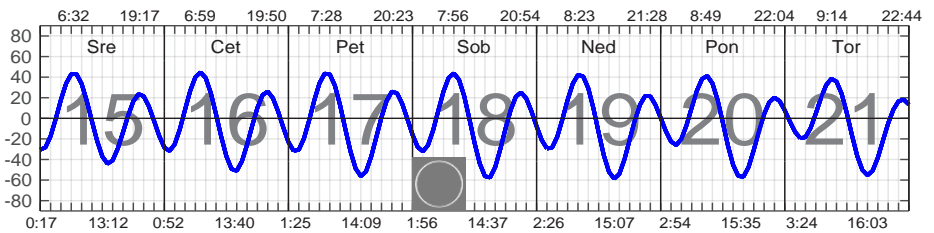
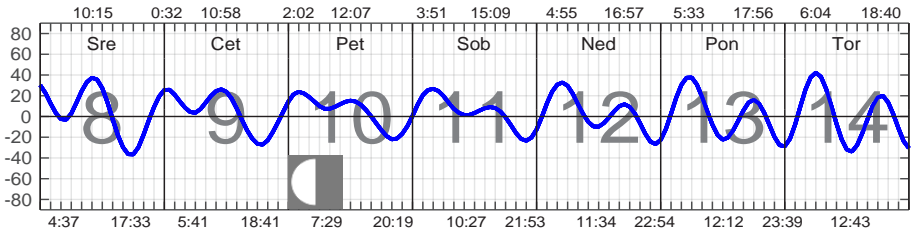
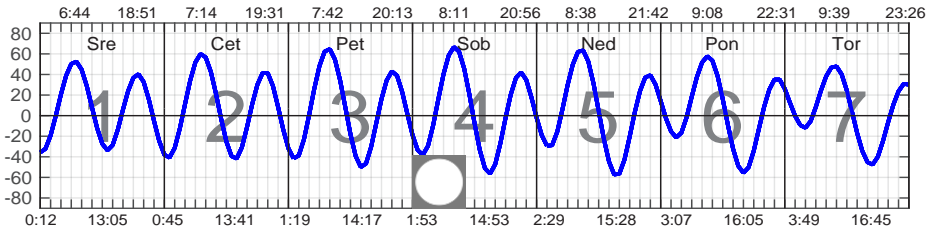
# September



# Oktober



# November



# December

