



REPUBLIKA SLOVENIJA
MINISTRSTVO ZA OKOLJE IN PROSTOR
AGENCIJA REPUBLIKE SLOVENIJE ZA OKOLJE

Prognozirano plimovanje morja

Tide tables

2019

Jadransko morje – Koprski zaliv
Adriatic Sea – The Bay of Koper



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Slika na naslovnici / *Cover photo:*
Piran z Alpami v ozadju / *Piran with the Alps in the background*
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Ljubljana, januar 2019

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 pričujoči 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 odklik od dolgoletnega srednjega nivoja morja na mareografski postaji v Kopru, ki za celotno obdobje meritev 1960-2018 znaša 218 cm glede na izhodišče vodomerne letve. Primer: pri navedeni višini gladine morja 60 cm znaša dejanska višina gladine morja na mareografski postaji v Kopru $218 \text{ cm} + 60 \text{ cm} = 278 \text{ cm}$.

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 $\lambda = 13^{\circ} 44' E$.

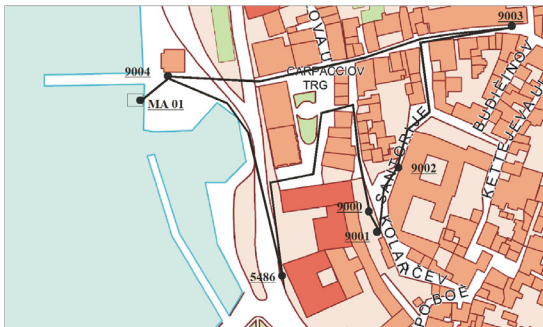
TIME. Times in the booklet are central European (CET = UTC + 1h). To use as local daylight saving time add 1h (CET + 1h) to the forecasted times and to the sunrise/sunset times between last Sunday in March and last Sunday in October.

HEIGHTS. Sea levels in tide tables are depicted in centimeters from mean sea level, which is a long-term average of measured sea levels in the period 1960-2018. Mean sea level is 218 cm above tide gauge zero. Example: 60 cm of forecasted sea level presents $218 \text{ cm} + 60 \text{ cm} = 278 \text{ cm}$ at tide gauge Koper.

NIVELMANSKA MREŽA MAREOGRAFSKE POSTAJE KOPER BENCHMARKS OF THE TIDE GAUGE KOPER



Mareografska postaja Koper
Tide gauge Koper



Nivelmanska mreža mareografske postaje Koper
(vir: DPK-1000 GURS)
Benchmarks of the tide gauge Koper (source: DPK-1000 GURS)

Nivelmanska mreža mareografske postaje Koper <i>Tide gauge Koper benchmarks</i>	Oznaka GURS <i>Grid reference by GURS</i>	Lega reperja <i>Benchmark location</i>	Ničla vodomerne letve glede na reper <i>Tide gauge zero bellow benchmark</i>
Reper mareografske postaje <i>Tide gauge benchmark</i>	9000	V skali za hotelom Koper <i>On the rock behind hotel Koper</i>	-9,720 m
Dodatni reper <i>Auxiliary benchmark</i>	9004	Na stavbi URSP <i>On Maritime authority building</i>	-3,486 m
Dodatni reper <i>Auxiliary benchmark</i>	5486	Na stavbi hotela Koper <i>On the building of hotel Koper</i>	-4,023 m

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 9000. 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 9000. The data about benchmarks are available through Surveying and mapping authority of the Republic of Slovenia.

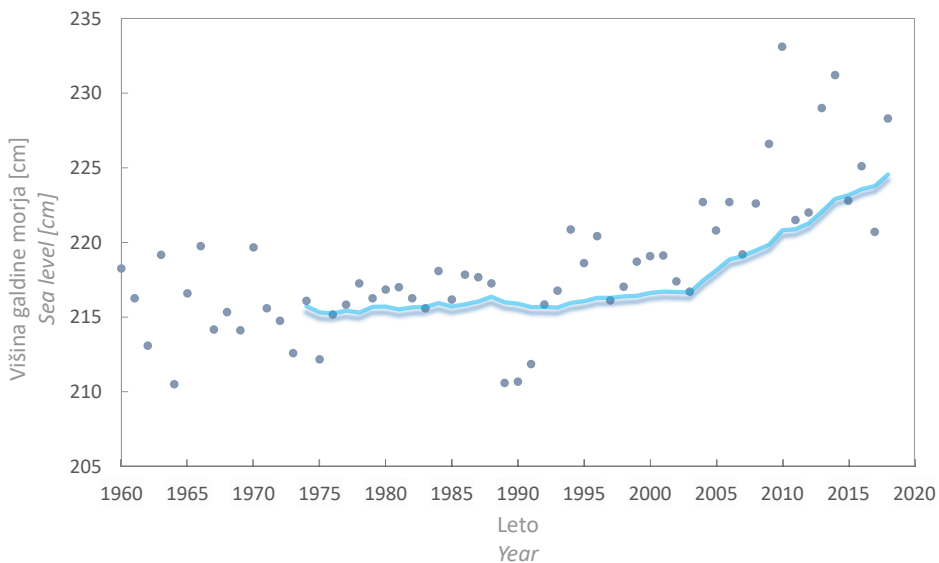
MERITVE PODATKOV O VIŠINI GLADINE MORJA MEASURED SEA LEVEL DATA

Časovni interval zajema podatkov na mareografski postaji Koper je 10 minut. Podatki so dostopni v skoraj realnem času na naslovu:

http://www.arso.gov.si/vode/podatki/amp/H17_g_1.html

Data sampling frequency at tide gauge Koper is 10 minutes. Data is available in near real time at:

http://www.arso.gov.si/vode/podatki/amp/H17_g_1.html



Trend srednjih letnih višin morja (15-letno drseče povprečje) v obdobju 1960–2018
Annual mean sea level trend (15-year moving average) for the period 1960–2018

VZHOD IN ZAHOD SONCA V KOPRU V LETU 2019
SUNRISE AND SUNSET IN KOPER IN YEAR 2019

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	0727	1711	0644	1751	0546	1833	01
02	0745	1633	0726	1712	0643	1753	0544	1834	02
03	0745	1634	0724	1714	0641	1754	0543	1835	03
04	0745	1635	0723	1715	0639	1756	0541	1837	04
05	0745	1636	0722	1717	0637	1757	0539	1838	05
06	0745	1637	0721	1718	0635	1758	0537	1839	06
07	0745	1638	0719	1720	0634	1800	0535	1840	07
08	0745	1639	0718	1721	0632	1801	0533	1842	08
09	0744	1640	0716	1723	0630	1802	0531	1843	09
10	0744	1641	0715	1724	0628	1804	0530	1844	10
11	0744	1642	0714	1726	0626	1805	0528	1846	11
12	0743	1644	0712	1727	0624	1806	0526	1847	12
13	0743	1645	0711	1729	0622	1808	0524	1848	13
14	0742	1646	0709	1730	0620	1809	0522	1850	14
15	0742	1647	0708	1731	0619	1810	0520	1851	15
16	0741	1649	0706	1733	0617	1812	0519	1852	16
17	0741	1650	0704	1734	0615	1813	0517	1853	17
18	0740	1651	0703	1736	0613	1814	0515	1855	18
19	0739	1653	0701	1737	0611	1816	0513	1856	19
20	0738	1654	0700	1739	0609	1817	0512	1857	20
21	0738	1655	0658	1740	0607	1818	0510	1859	21
22	0737	1657	0656	1742	0605	1820	0508	1900	22
23	0736	1658	0655	1743	0603	1821	0507	1901	23
24	0735	1700	0653	1744	0601	1822	0505	1902	24
25	0734	1701	0651	1746	0600	1824	0503	1904	25
26	0733	1702	0650	1747	0558	1825	0502	1905	26
27	0732	1704	0648	1749	0556	1826	0500	1906	27
28	0731	1705	0646	1750	0554	1827	0459	1908	28
29	0730	1707			0552	1829	0457	1909	29
30	0729	1708			0550	1830	0455	1910	30
31	0728	1710			0548	1831			31

VZHOD IN ZAHOD SONCA V KOPRU V LETU 2019
SUNRISE AND SUNSET IN KOPER IN YEAR 2019

Dan	Maj		Junij		Julij		Avgust		Dan
	vzhod	zahod	vzhod	zahod	vzhod	zahod	vzhod	zahod	
	hhmm	hhmm	hhmm	hhmm	hhmm	hhmm	hhmm	hhmm	
01	0454	1911	0420	1946	0420	1958	0448	1934	01
02	0452	1913	0419	1947	0420	1958	0450	1933	02
03	0451	1914	0419	1948	0421	1957	0451	1931	03
04	0449	1915	0418	1949	0422	1957	0452	1930	04
05	0448	1916	0418	1950	0422	1957	0453	1928	05
06	0447	1918	0417	1950	0423	1956	0454	1927	06
07	0445	1919	0417	1951	0424	1956	0455	1926	07
08	0444	1920	0417	1952	0424	1955	0457	1924	08
09	0442	1921	0416	1952	0425	1955	0458	1923	09
10	0441	1923	0416	1953	0426	1954	0459	1921	10
11	0440	1924	0416	1954	0427	1954	0500	1920	11
12	0439	1925	0416	1954	0428	1953	0501	1918	12
13	0437	1926	0416	1955	0429	1953	0503	1917	13
14	0436	1927	0416	1955	0429	1952	0504	1915	14
15	0435	1929	0416	1956	0430	1951	0505	1913	15
16	0434	1930	0416	1956	0431	1950	0506	1912	16
17	0433	1931	0416	1956	0432	1950	0507	1910	17
18	0432	1932	0416	1957	0433	1949	0509	1908	18
19	0431	1933	0416	1957	0434	1948	0510	1907	19
20	0430	1934	0416	1957	0435	1947	0511	1905	20
21	0429	1935	0416	1958	0436	1946	0512	1903	21
22	0428	1937	0416	1958	0437	1945	0514	1902	22
23	0427	1938	0417	1958	0438	1944	0515	1900	23
24	0426	1939	0417	1958	0439	1943	0516	1858	24
25	0425	1940	0417	1958	0440	1942	0517	1856	25
26	0424	1941	0418	1958	0442	1941	0518	1855	26
27	0423	1942	0418	1958	0443	1940	0520	1853	27
28	0423	1943	0418	1958	0444	1939	0521	1851	28
29	0422	1944	0419	1958	0445	1938	0522	1849	29
30	0421	1945	0419	1958	0446	1936	0523	1847	30
31	0421	1945			0447	1935	0525	1846	31

VZHOD IN ZAHOD SONCA V KOPRU V LETU 2019
SUNRISE AND SUNSET IN KOPER IN YEAR 2019

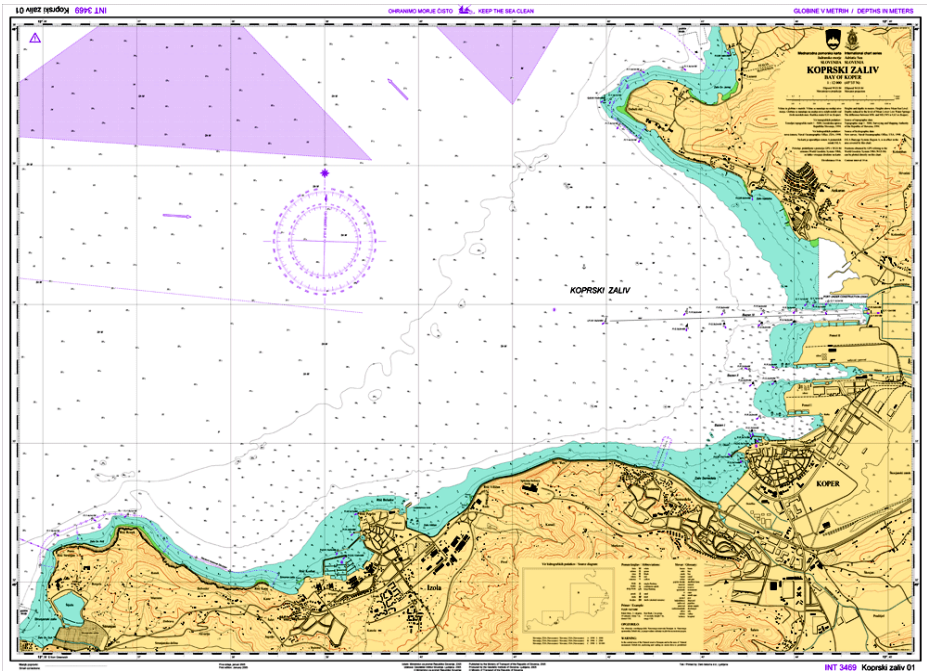
Dan	September		Oktober		November		December		Dan
	vzhod	zahod	vzhod	zahod	vzhod	zahod	vzhod	zahod	
	hhmm	hhmm	hhmm	hhmm	hhmm	hhmm	hhmm	hhmm	
01	0526	1844	0603	1746	0644	1653	0724	1623	01
02	0527	1842	0604	1744	0645	1651	0725	1623	02
03	0528	1840	0605	1742	0647	1650	0727	1623	03
04	0529	1838	0606	1741	0648	1649	0728	1622	04
05	0531	1836	0608	1739	0650	1647	0729	1622	05
06	0532	1834	0609	1737	0651	1646	0730	1622	06
07	0533	1832	0610	1735	0652	1645	0731	1622	07
08	0534	1831	0612	1733	0654	1643	0732	1621	08
09	0536	1829	0613	1731	0655	1642	0733	1621	09
10	0537	1827	0614	1729	0657	1641	0734	1621	10
11	0538	1825	0615	1728	0658	1640	0735	1621	11
12	0539	1823	0617	1726	0659	1638	0736	1621	12
13	0540	1821	0618	1724	0701	1637	0737	1622	13
14	0542	1819	0619	1722	0702	1636	0737	1622	14
15	0543	1817	0621	1720	0704	1635	0738	1622	15
16	0544	1815	0622	1719	0705	1634	0739	1622	16
17	0545	1813	0623	1717	0706	1633	0740	1622	17
18	0547	1811	0625	1715	0708	1632	0740	1623	18
19	0548	1809	0626	1713	0709	1631	0741	1623	19
20	0549	1807	0627	1712	0710	1630	0741	1623	20
21	0550	1805	0629	1710	0712	1630	0742	1624	21
22	0551	1804	0630	1708	0713	1629	0743	1624	22
23	0553	1802	0632	1707	0714	1628	0743	1625	23
24	0554	1800	0633	1705	0716	1627	0743	1626	24
25	0555	1758	0634	1703	0717	1627	0744	1626	25
26	0556	1756	0636	1702	0718	1626	0744	1627	26
27	0558	1754	0637	1700	0719	1625	0744	1628	27
28	0559	1752	0638	1659	0721	1625	0745	1628	28
29	0600	1750	0640	1657	0722	1624	0745	1629	29
30	0601	1748	0641	1656	0723	1624	0745	1630	30
31			0643	1654			0745	1631	31

Prognozirano plimovanje morja





Tide tables

2019

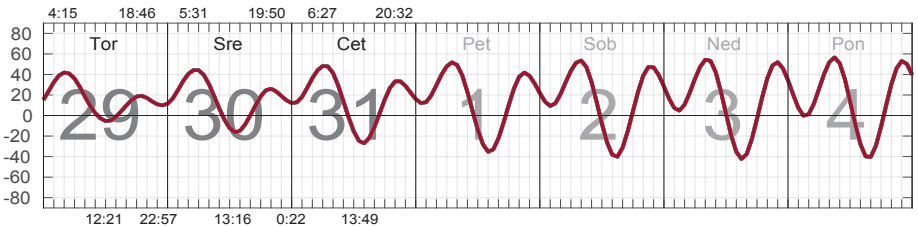
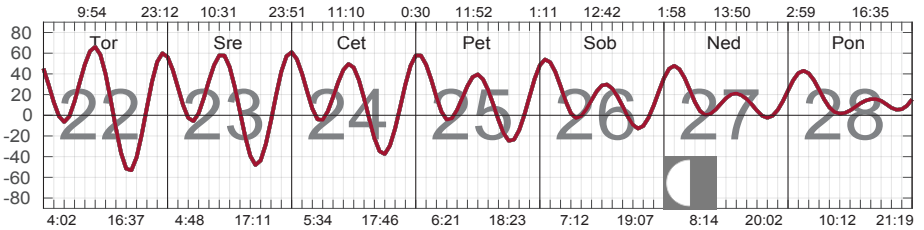
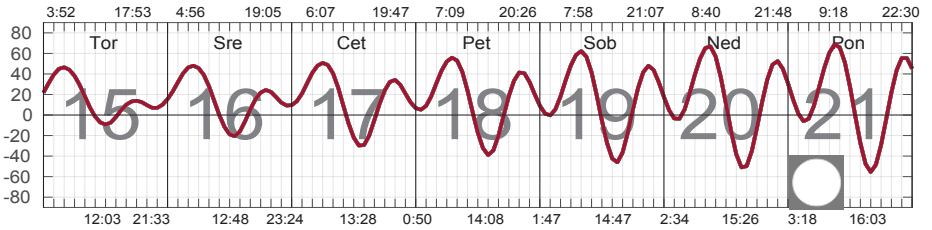
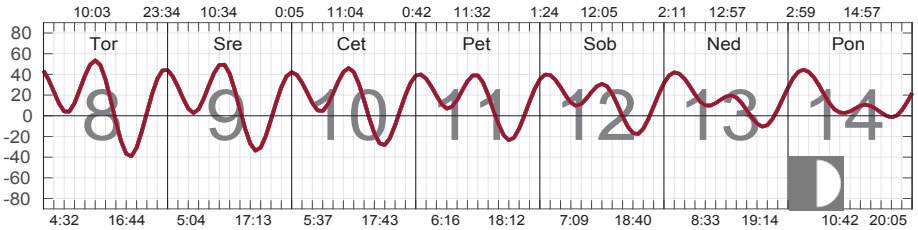
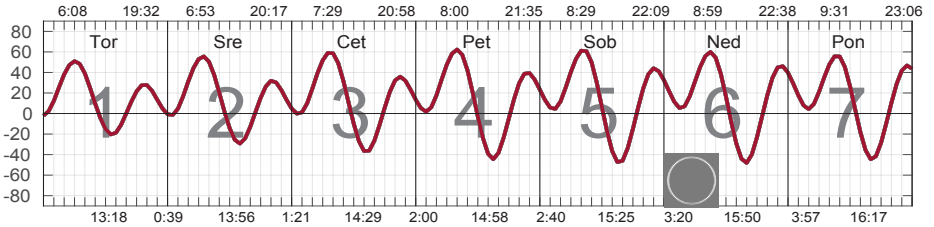
Jadransko morje – Koprski zaliv
Adriatic Sea – The Bay of Koper



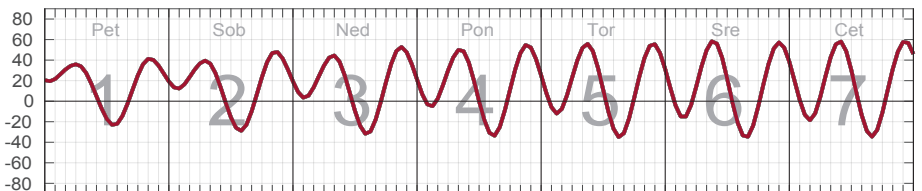
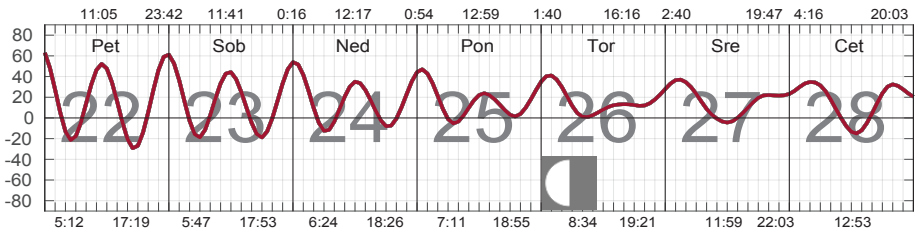
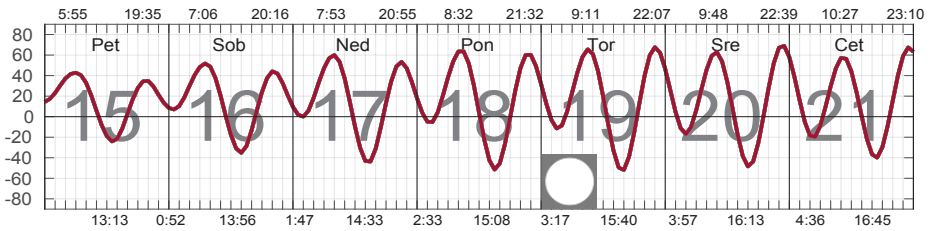
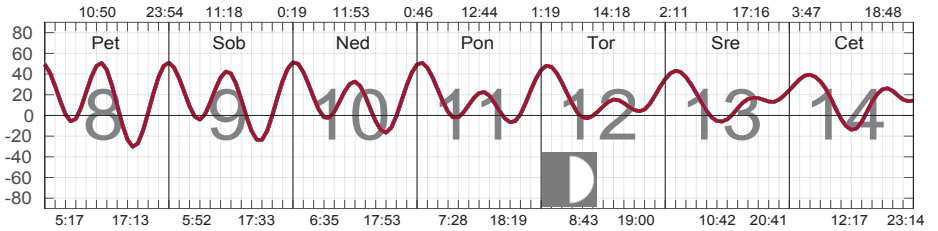
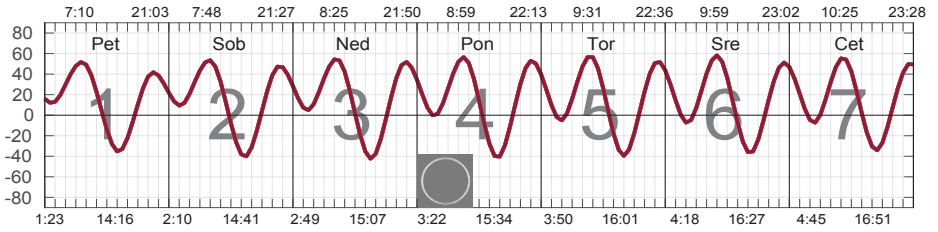
Legenda Luninih men / Moon Phase Legend :

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

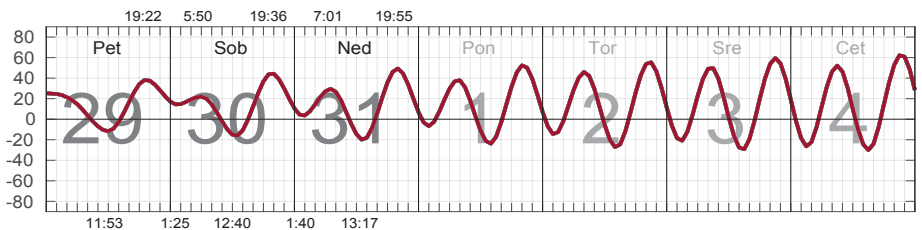
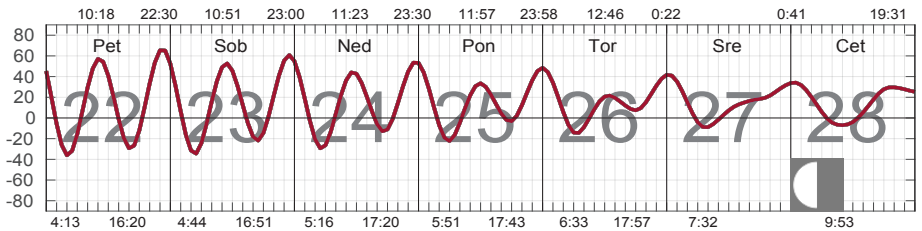
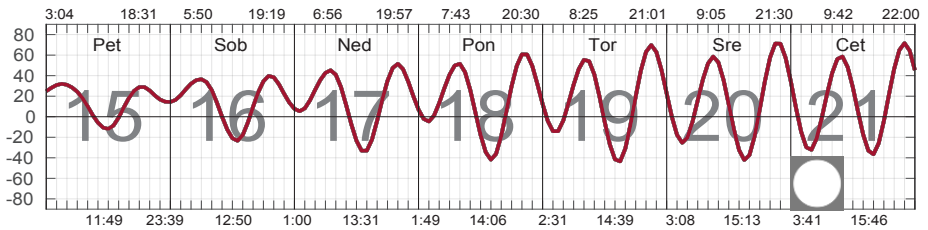
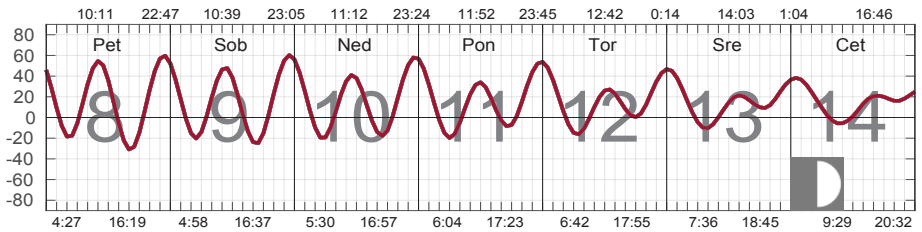
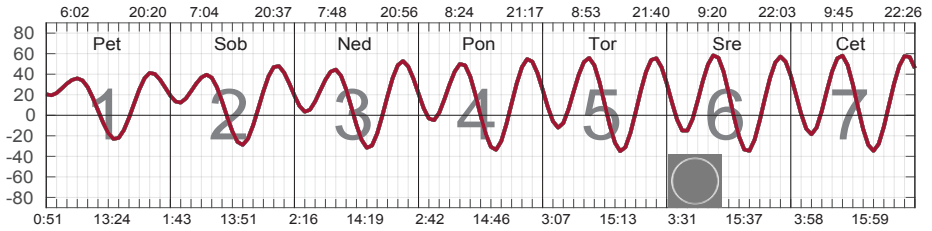
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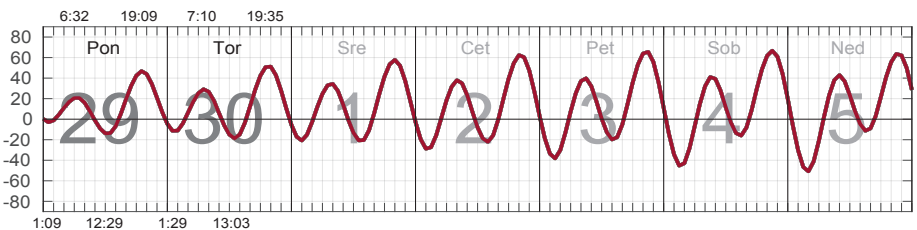
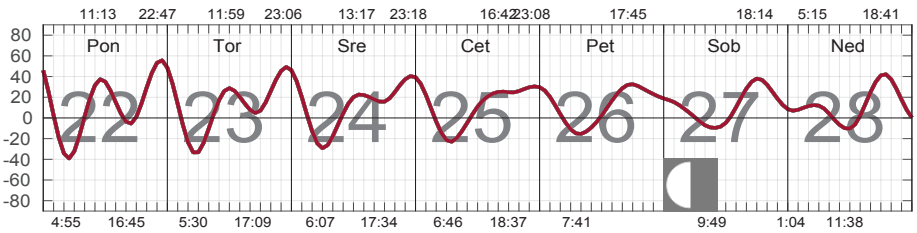
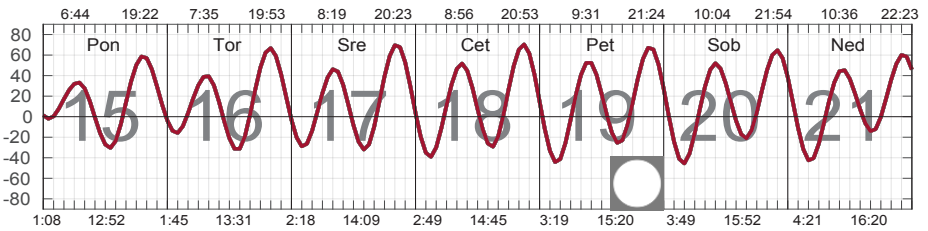
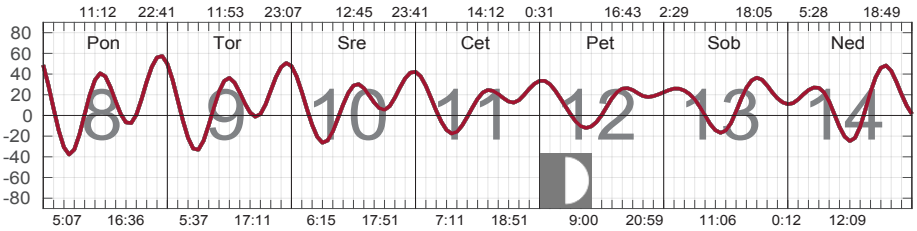
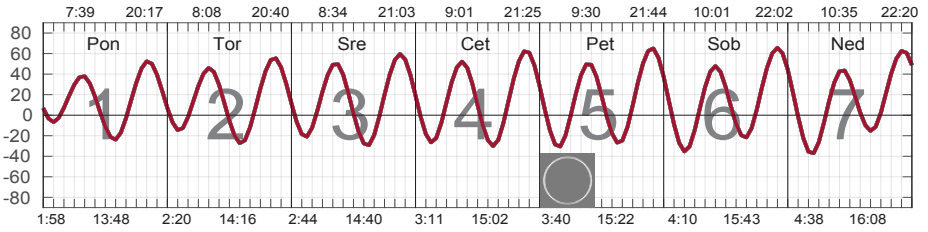
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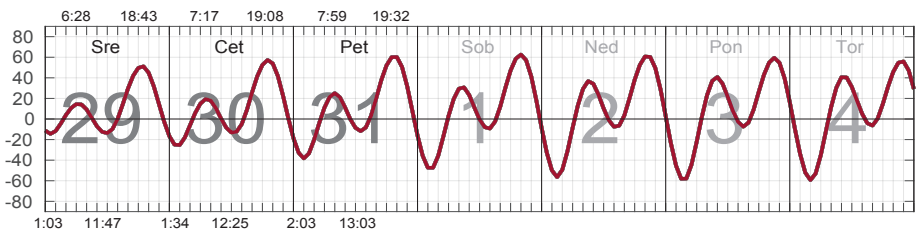
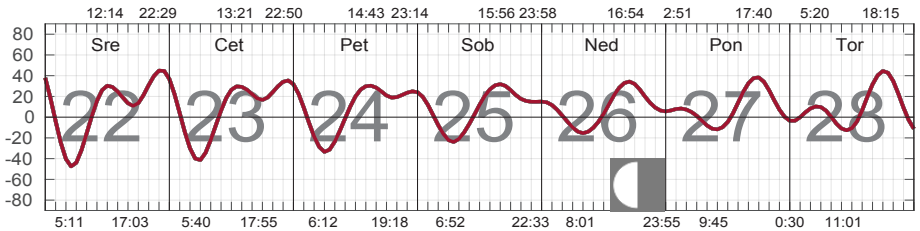
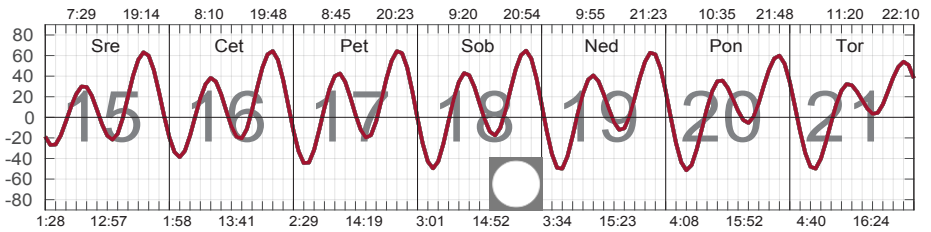
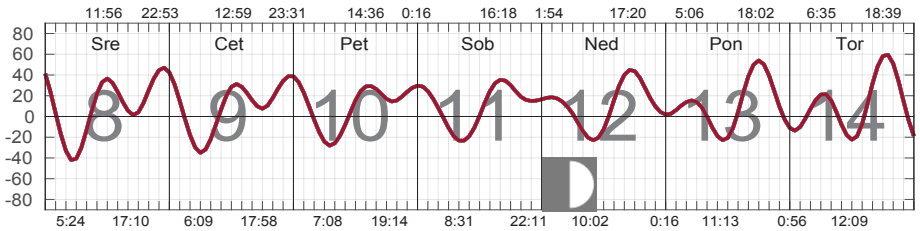
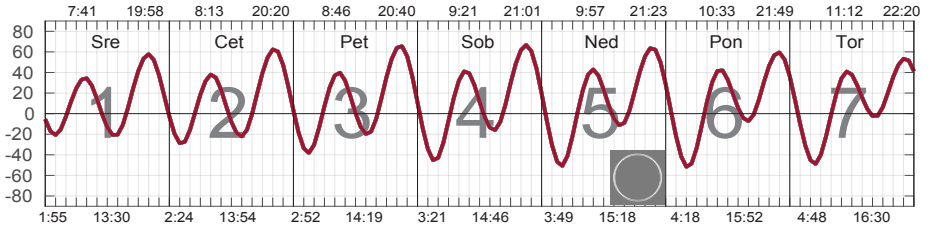
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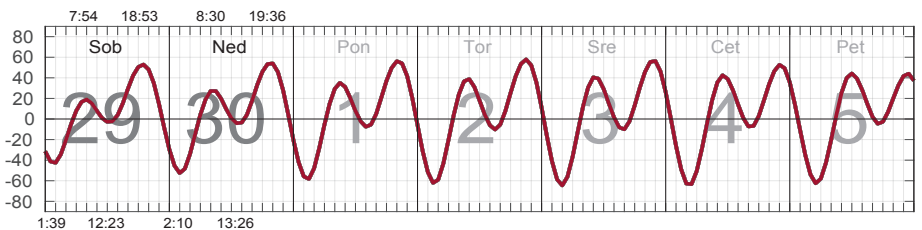
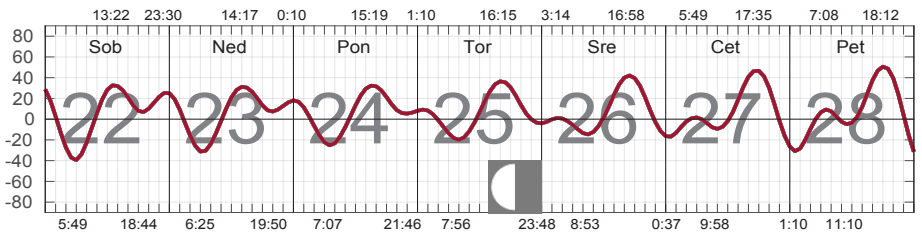
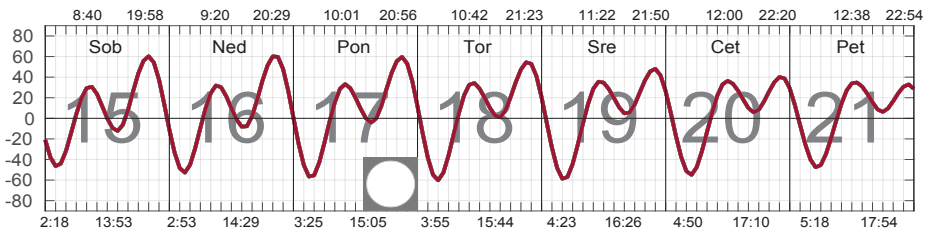
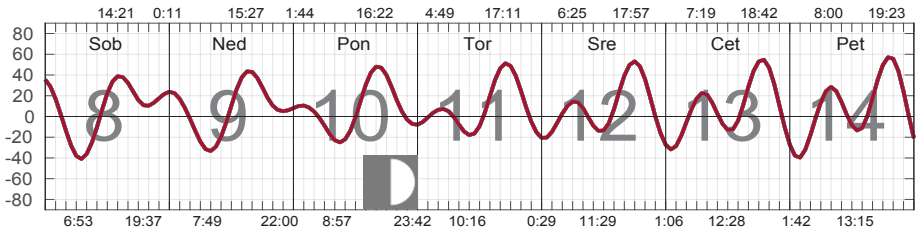
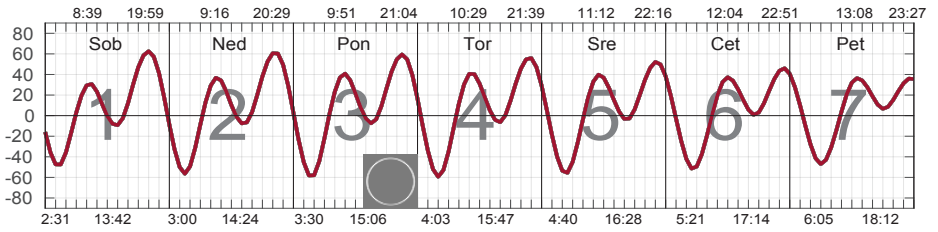
April



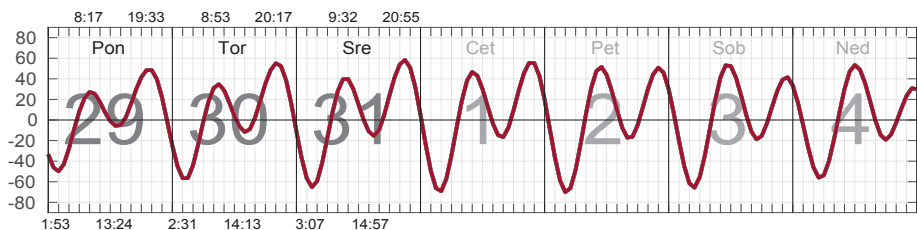
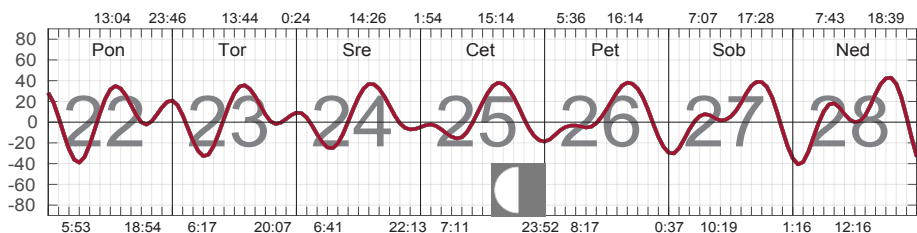
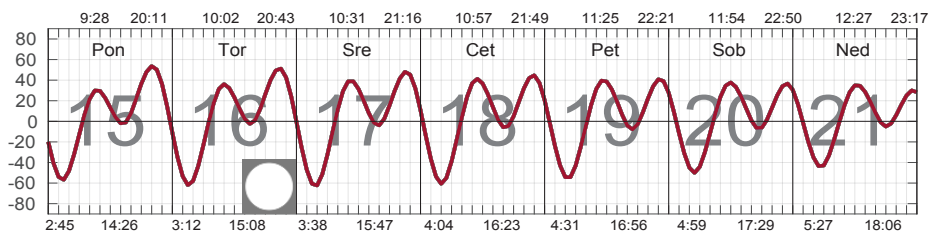
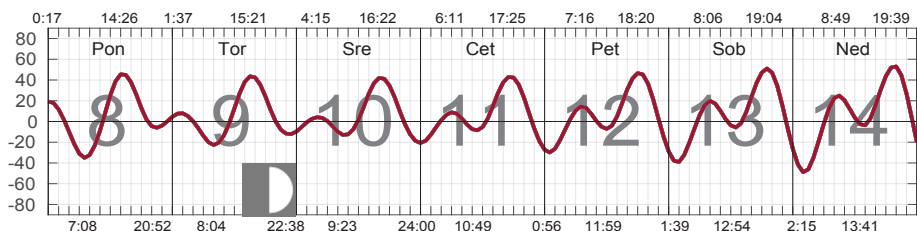
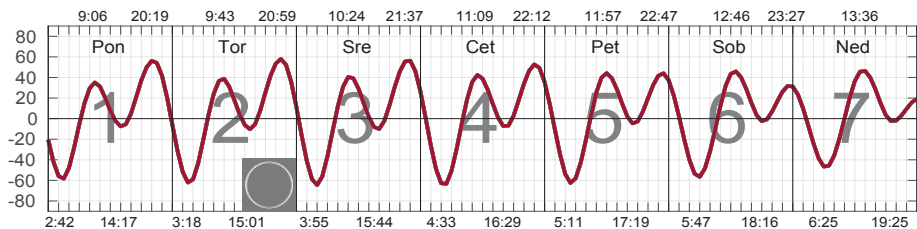
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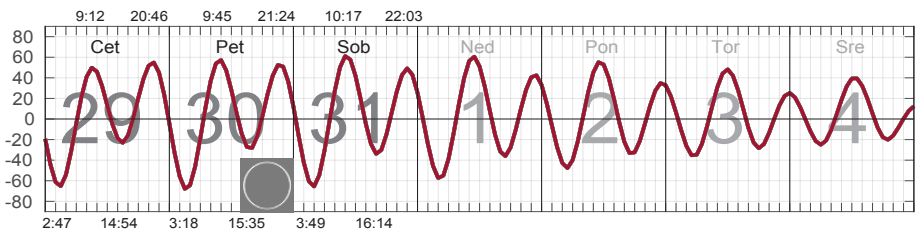
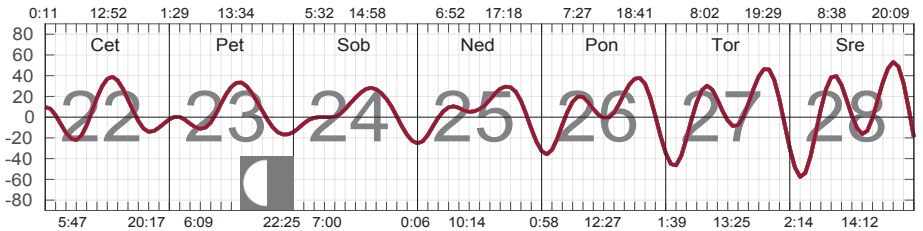
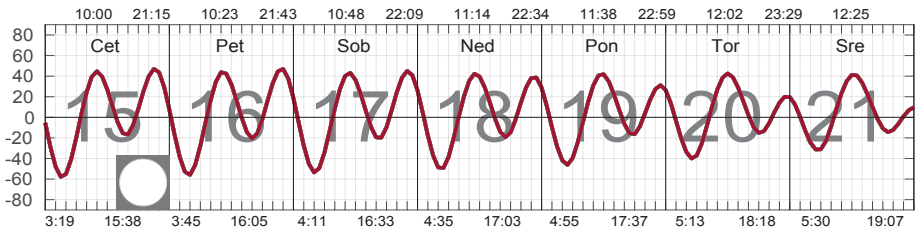
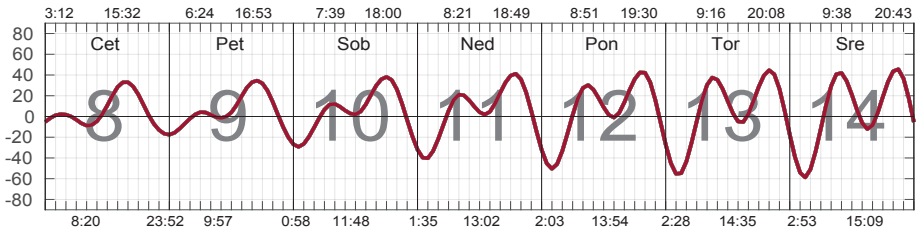
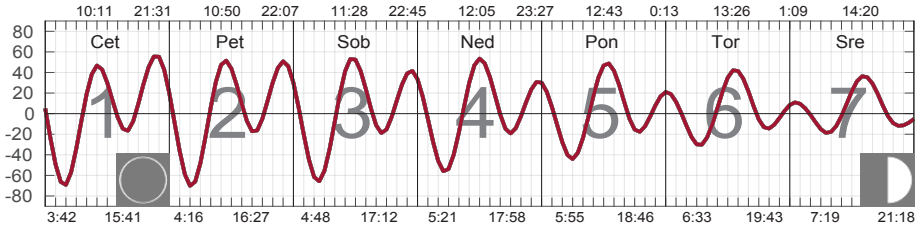
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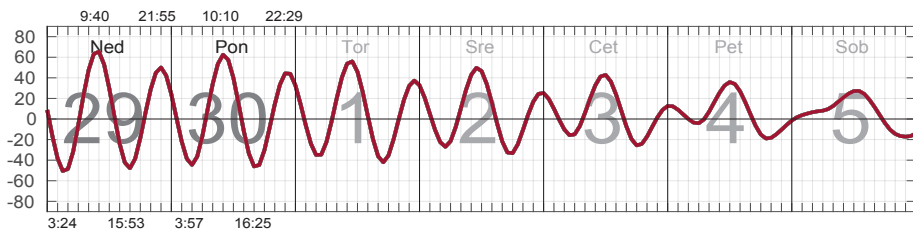
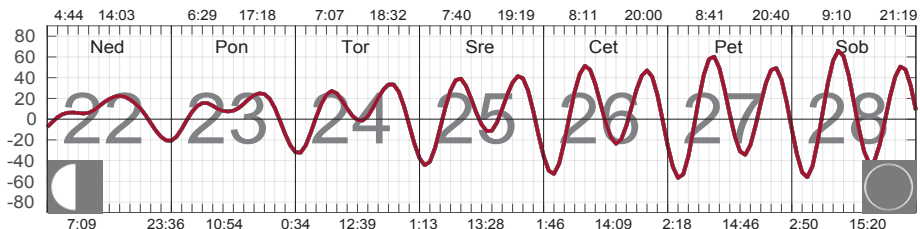
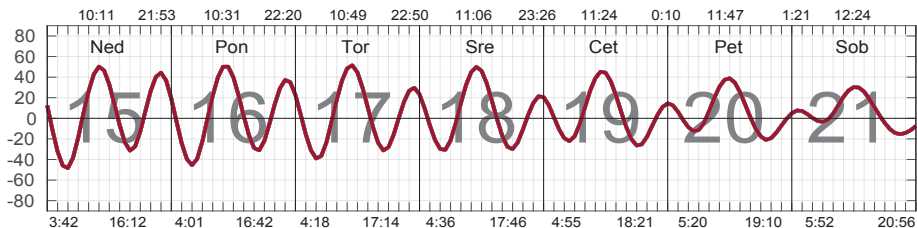
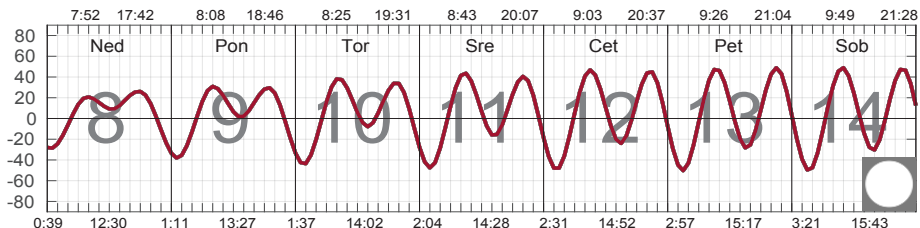
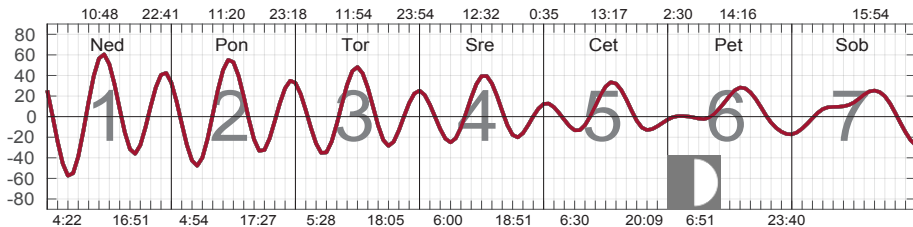
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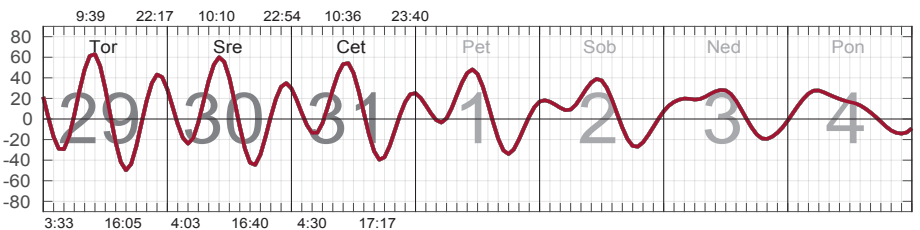
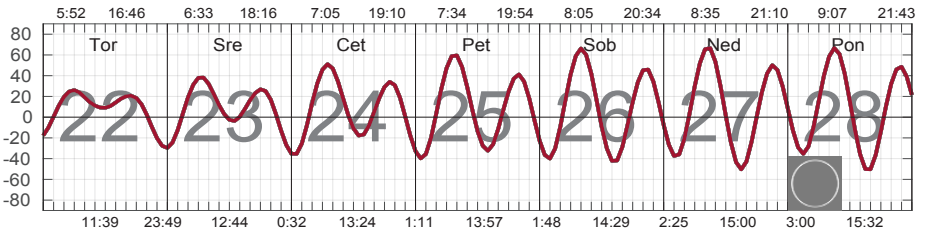
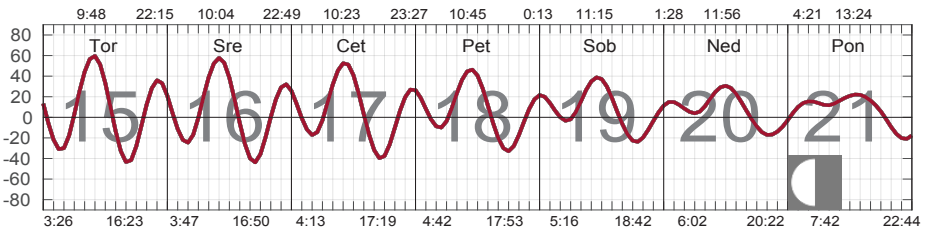
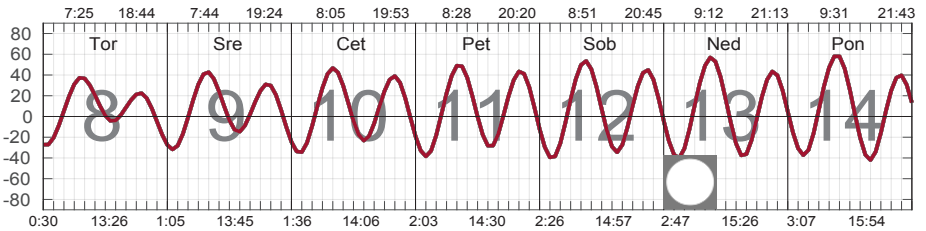
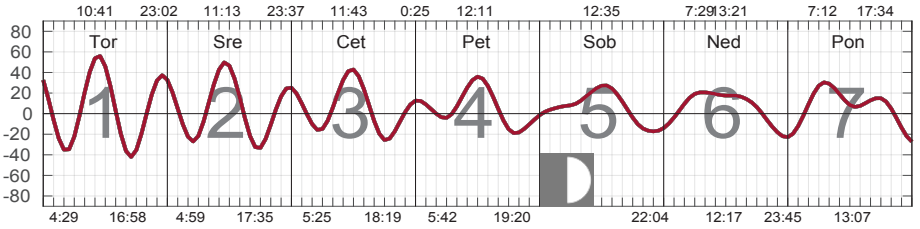
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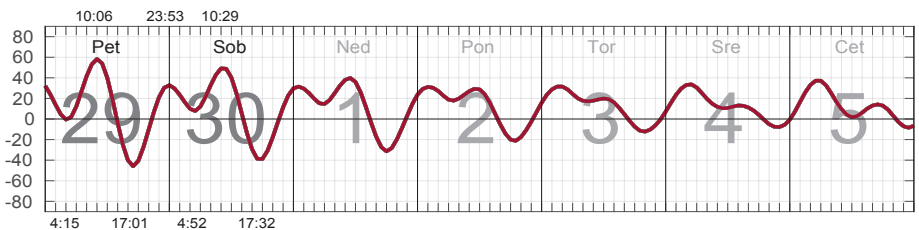
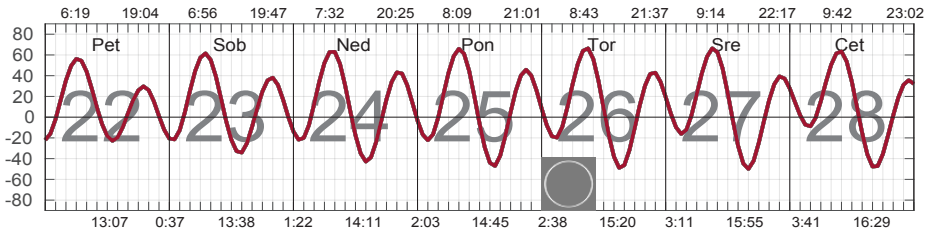
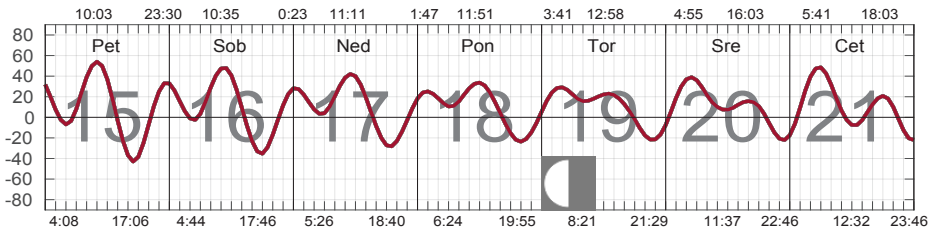
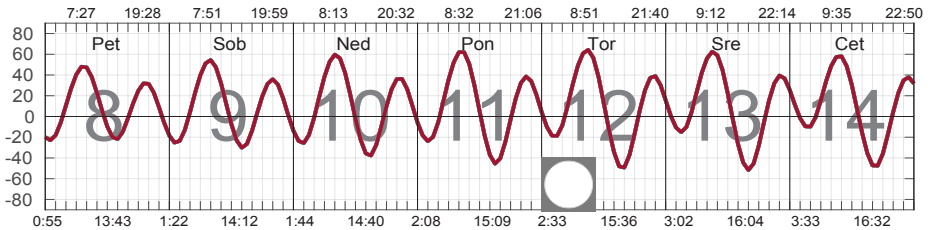
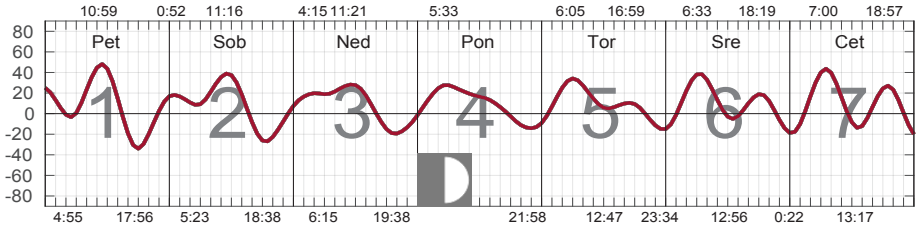
September



Oktober



November



December

