Appendix E: Summary of tidal harmonic analysis based on 2019 simulation

Station	Station ID	Tide	River Mile	Amplitude (cm)			Phase (degree)			Phase (hours)		
				Predicted	Data	Difference	Predicted	Data	Difference	Predicted	Data	Difference
NOAA LEWES	8557380	M2	0	0.592	0.604	-1.230	358.460	356.030	2.430	12.367	12.284	0.084
NOAA LEWES	8557380	S2	0	0.098	0.106	-0.800	30.620	27.160	3.460	1.021	0.905	0.115
NOAA LEWES	8557380	N2	0	0.132	0.140	-0.760	304.300	300.900	3.400	10.700	10.580	0.120
NOAA LEWES	8557380	K1	0	0.098	0.095	0.250	226.310	225.300	1.010	15.046	14.979	0.067
NOAA LEWES	8557380	M4	0	0.009	0.012	-0.310	78.720	117.650	-38.930	1.358	2.030	-0.672
NOAA LEWES	8557380	O1	0	0.075	0.072	0.250	131.780	129.450	2.330	9.451	9.284	0.167
NOAA LEWES	8557380	M6	0	0.009	0.006	0.330	280.180	243.440	36.740	3.222	2.800	0.423
NOAA LEWES	8557380	Q1	0	0.013	0.013	0.050	95.280	88.390	6.890	7.111	6.597	0.514
NOAA LEWES	8557380	K2	0	0.021	0.023	-0.160	107.170	104.580	2.590	3.563	3.476	0.086
NOAA CAPE MAY	8536110	M2	2	0.737	0.719	1.780	0.940	353.320	7.620	0.032	12.190	0.263
NOAA CAPE MAY	8536110	S2	2	0.116	0.121	-0.500	37.560	25.830	11.730	1.252	0.861	0.391
NOAA CAPE MAY	8536110	N2	2	0.156	0.159	-0.300	308.520	300.460	8.060	10.848	10.565	0.283
NOAA CAPE MAY	8536110	K1	2	0.102	0.097	0.480	225.640	223.190	2.450	15.002	14.839	0.163
NOAA CAPE MAY	8536110	M4	2	0.018	0.013	0.430	35.540	30.330	5.210	0.613	0.523	0.090
NOAA CAPE MAY	8536110	O1	2	0.076	0.073	0.290	131.280	126.400	4.880	9.415	9.065	0.350
NOAA CAPE MAY	8536110	M6	2	0.007	0.009	-0.220	324.650	282.980	41.670	3.734	3.254	0.479
NOAA CAPE MAY	8536110	Q1	2	0.013	0.012	0.110	97.670	88.550	9.120	7.290	6.609	0.681
NOAA CAPE MAY	8536110	K2	2	0.025	0.027	-0.140	111.990	100.480	11.510	3.723	3.340	0.383
NOAA BRANYWINE	8555889	M2	10	0.752	0.726	2.650	7.710	2.020	5.690	0.266	0.070	0.196
NOAA BRANYWINE	8555889	S2	10	0.118	0.120	-0.170	44.090	33.860	10.230	1.470	1.129	0.341
NOAA BRANYWINE	8555889	N2	10	0.161	0.159	0.190	314.470	308.260	6.210	11.057	10.839	0.218
NOAA BRANYWINE	8555889	K1	10	0.107	0.100	0.710	228.450	226.360	2.090	15.188	15.049	0.139
NOAA BRANYWINE	8555889	M4	10	0.005	0.007	-0.180	352.370	67.490	-75.120	6.079	1.164	-1.296
NOAA BRANYWINE	8555889	O1	10	0.081	0.074	0.630	132.810	129.890	2.920	9.525	9.316	0.209
NOAA BRANYWINE	8555889	M6	10	0.003	0.005	-0.200	28.570	307.880	80.690	0.329	3.541	0.928
NOAA BRANYWINE	8555889	Q1	10	0.014	0.012	0.120	95.210	91.630	3.580	7.106	6.839	0.267

Station	Station ID	Tide	River Mile	Amplitude (cm)			Phase (degree)			Phase (hours)		
				Predicted	Data	Difference	Predicted	Data	Difference	Predicted	Data	Difference
NOAA BRANYWINE	8555889	K2	10	0.025	0.027	-0.150	120.270	110.360	9.910	3.998	3.669	0.329
NOAA SHIP JOHN SHOAL	8537121	M2	37	0.942	0.849	9.320	38.580	36.230	2.350	1.331	1.250	0.081
NOAA SHIP JOHN SHOAL	8537121	S2	37	0.132	0.122	1.000	84.990	74.320	10.670	2.833	2.477	0.356
NOAA SHIP JOHN SHOAL	8537121	N2	37	0.180	0.166	1.320	348.220	345.710	2.510	12.244	12.156	0.088
NOAA SHIP JOHN SHOAL	8537121	K1	37	0.105	0.104	0.160	241.690	244.250	-2.560	16.069	16.239	-0.170
NOAA SHIP JOHN SHOAL	8537121	M4	37	0.055	0.037	1.850	3.640	321.250	42.390	0.063	5.542	0.731
NOAA SHIP JOHN SHOAL	8537121	O1	37	0.079	0.075	0.420	146.980	147.230	-0.250	10.541	10.559	-0.018
NOAA SHIP JOHN SHOAL	8537121	M6	37	0.026	0.022	0.430	169.780	168.210	1.570	1.953	1.935	0.018
NOAA SHIP JOHN SHOAL	8537121	Q1	37	0.013	0.012	0.100	119.280	107.800	11.480	8.902	8.046	0.857
NOAA SHIP JOHN SHOAL	8537121	K2	37	0.030	0.029	0.050	155.640	150.280	5.360	5.174	4.996	0.178
NOAA REEDY POINT	8551910	M2	58.5	0.878	0.806	7.140	71.830	72.450	-0.620	2.478	2.500	-0.021
NOAA REEDY POINT	8551910	S2	58.5	0.111	0.102	0.860	121.620	112.070	9.550	4.054	3.736	0.318
NOAA REEDY POINT	8551910	N2	58.5	0.153	0.148	0.490	23.440	22.250	1.190	0.824	0.782	0.042
NOAA REEDY POINT	8551910	K1	58.5	0.082	0.088	-0.600	261.940	266.810	-4.870	17.415	17.739	-0.324
NOAA REEDY POINT	8551910	M4	58.5	0.092	0.056	3.580	77.570	54.290	23.280	1.338	0.937	0.402
NOAA REEDY POINT	8551910	O1	58.5	0.062	0.062	-0.050	163.520	167.920	-4.400	11.728	12.043	-0.316
NOAA REEDY POINT	8551910	M6	58.5	0.034	0.034	-0.050	307.090	305.110	1.980	3.532	3.509	0.023
NOAA REEDY POINT	8551910	Q1	58.5	0.009	0.010	-0.090	144.010	136.920	7.090	10.748	10.219	0.529
NOAA REEDY POINT	8551910	K2	58.5	0.026	0.027	-0.110	186.410	186.070	0.340	6.197	6.185	0.011
NOAA DELAWARE CITY	8551762	M2	60.7	0.881	0.812	6.930	78.520	77.680	0.840	2.709	2.680	0.029
NOAA DELAWARE CITY	8551762	S2	60.7	0.111	0.103	0.790	129.010	117.430	11.580	4.300	3.914	0.386
NOAA DELAWARE CITY	8551762	N2	60.7	0.153	0.148	0.460	30.230	27.210	3.020	1.063	0.957	0.106
NOAA DELAWARE CITY	8551762	K1	60.7	0.093	0.098	-0.440	265.860	268.460	-2.600	17.676	17.848	-0.173
NOAA DELAWARE CITY	8551762	M4	60.7	0.100	0.069	3.080	90.560	68.290	22.270	1.562	1.178	0.384
NOAA DELAWARE CITY	8551762	O1	60.7	0.072	0.073	-0.100	169.240	170.950	-1.710	12.138	12.261	-0.123
NOAA DELAWARE CITY	8551762	M6	60.7	0.035	0.035	-0.010	308.760	312.700	-3.940	3.551	3.596	-0.045
NOAA DELAWARE CITY	8551762	Q1	60.7	0.011	0.011	-0.010	146.460	133.780	12.680	10.931	9.985	0.946

Station	Station ID	Tide	River Mile	Amplitude (cm)			Phase (degree)			Phase (hours)		
				Predicted	Data	Difference	Predicted	Data	Difference	Predicted	Data	Difference
NOAA DELAWARE CITY	8551762	K2	60.7	0.025	0.027	-0.160	194.250	189.440	4.810	6.457	6.297	0.160
NOAA MARCUS HOOK	8540433	M2	79.3	0.811	0.807	0.410	115.790	111.170	4.620	3.995	3.836	0.159
NOAA MARCUS HOOK	8540433	S2	79.3	0.095	0.096	-0.040	167.700	151.870	15.830	5.590	5.062	0.528
NOAA MARCUS HOOK	8540433	N2	79.3	0.137	0.144	-0.750	66.800	59.510	7.290	2.349	2.092	0.256
NOAA MARCUS HOOK	8540433	K1	79.3	0.093	0.098	-0.560	286.290	286.120	0.170	19.034	19.023	0.011
NOAA MARCUS HOOK	8540433	M4	79.3	0.130	0.097	3.260	148.990	123.770	25.220	2.570	2.135	0.435
NOAA MARCUS HOOK	8540433	O1	79.3	0.072	0.074	-0.150	188.190	187.800	0.390	13.497	13.469	0.028
NOAA MARCUS HOOK	8540433	M6	79.3	0.035	0.039	-0.320	44.750	51.610	-6.860	0.515	0.594	-0.079
NOAA MARCUS HOOK	8540433	Q1	79.3	0.011	0.011	-0.010	165.690	152.800	12.890	12.366	11.404	0.962
NOAA MARCUS HOOK	8540433	K2	79.3	0.022	0.026	-0.360	232.270	223.460	8.810	7.721	7.428	0.293
NOAA PHILADELPHIA	8545240	M2	98.5	0.860	0.862	-0.160	154.220	148.220	6.000	5.321	5.114	0.207
NOAA PHILADELPHIA	8545240	S2	98.5	0.095	0.093	0.180	211.000	192.640	18.360	7.033	6.421	0.612
NOAA PHILADELPHIA	8545240	N2	98.5	0.139	0.147	-0.810	105.280	96.610	8.670	3.702	3.397	0.305
NOAA PHILADELPHIA	8545240	K1	98.5	0.095	0.102	-0.660	303.580	305.200	-1.620	20.183	20.291	-0.108
NOAA PHILADELPHIA	8545240	M4	98.5	0.092	0.090	0.200	218.520	181.550	36.970	3.770	3.132	0.638
NOAA PHILADELPHIA	8545240	O1	98.5	0.072	0.075	-0.240	203.490	205.330	-1.840	14.594	14.726	-0.132
NOAA PHILADELPHIA	8545240	M6	98.5	0.042	0.054	-1.170	130.070	139.650	-9.580	1.496	1.606	-0.110
NOAA PHILADELPHIA	8545240	Q1	98.5	0.011	0.011	-0.040	182.990	172.220	10.770	13.657	12.854	0.804
NOAA PHILADELPHIA	8545240	K2	98.5	0.023	0.026	-0.300	274.620	261.840	12.780	9.129	8.704	0.425
NOAA BURLINGTON	8539094	M2	117.5	1.053	1.034	1.900	177.630	177.930	-0.300	6.129	6.139	-0.010
NOAA BURLINGTON	8539094	S2	117.5	0.119	0.116	0.250	238.560	228.360	10.200	7.952	7.612	0.340
NOAA BURLINGTON	8539094	N2	117.5	0.166	0.171	-0.430	130.220	128.150	2.070	4.579	4.506	0.073
NOAA BURLINGTON	8539094	K1	117.5	0.101	0.105	-0.400	313.850	320.080	-6.230	20.866	21.280	-0.414
NOAA BURLINGTON	8539094	M4	117.5	0.184	0.131	5.270	293.650	267.080	26.570	5.066	4.607	0.458
NOAA BURLINGTON	8539094	O1	117.5	0.075	0.076	-0.150	212.890	218.850	-5.960	15.269	15.696	-0.427
NOAA BURLINGTON	8539094	M6	117.5	0.026	0.031	-0.520	225.440	241.170	-15.730	2.593	2.774	-0.181
NOAA BURLINGTON	8539094	Q1	117.5	0.012	0.012	-0.030	193.710	186.090	7.620	14.457	13.889	0.569

Station	Station ID	Tide	River Mile	Amplitude (cm)			Phase (degree)			Phase (hours)		
				Predicted	Data	Difference	Predicted	Data	Difference	Predicted	Data	Difference
NOAA BURLINGTON	8539094	K2	117.5	0.028	0.030	-0.130	300.630	295.130	5.500	9.994	9.811	0.183
NOAA NEWBOLD	8548989	M2	126.3	1.115	1.116	-0.040	181.530	182.790	-1.260	6.263	6.307	-0.043
NOAA NEWBOLD	8548989	S2	126.3	0.127	0.122	0.480	242.550	233.280	9.270	8.085	7.776	0.309
NOAA NEWBOLD	8548989	N2	126.3	0.176	0.185	-0.910	134.940	133.640	1.300	4.745	4.699	0.046
NOAA NEWBOLD	8548989	K1	126.3	0.103	0.107	-0.340	315.670	321.600	-5.930	20.987	21.381	-0.394
NOAA NEWBOLD	8548989	M4	126.3	0.230	0.166	6.460	301.670	275.610	26.060	5.204	4.755	0.450
NOAA NEWBOLD	8548989	O1	126.3	0.076	0.080	-0.410	214.630	221.410	-6.780	15.393	15.880	-0.486
NOAA NEWBOLD	8548989	M6	126.3	0.040	0.068	-2.750	270.870	285.130	-14.260	3.115	3.279	-0.164
NOAA NEWBOLD	8548989	Q1	126.3	0.011	0.012	-0.070	194.260	189.170	5.090	14.498	14.119	0.380
NOAA NEWBOLD	8548989	K2	126.3	0.029	0.031	-0.130	303.900	300.710	3.190	10.102	9.996	0.106

Appendix F: Tidal harmonics analysis based on predicted water surface elevation

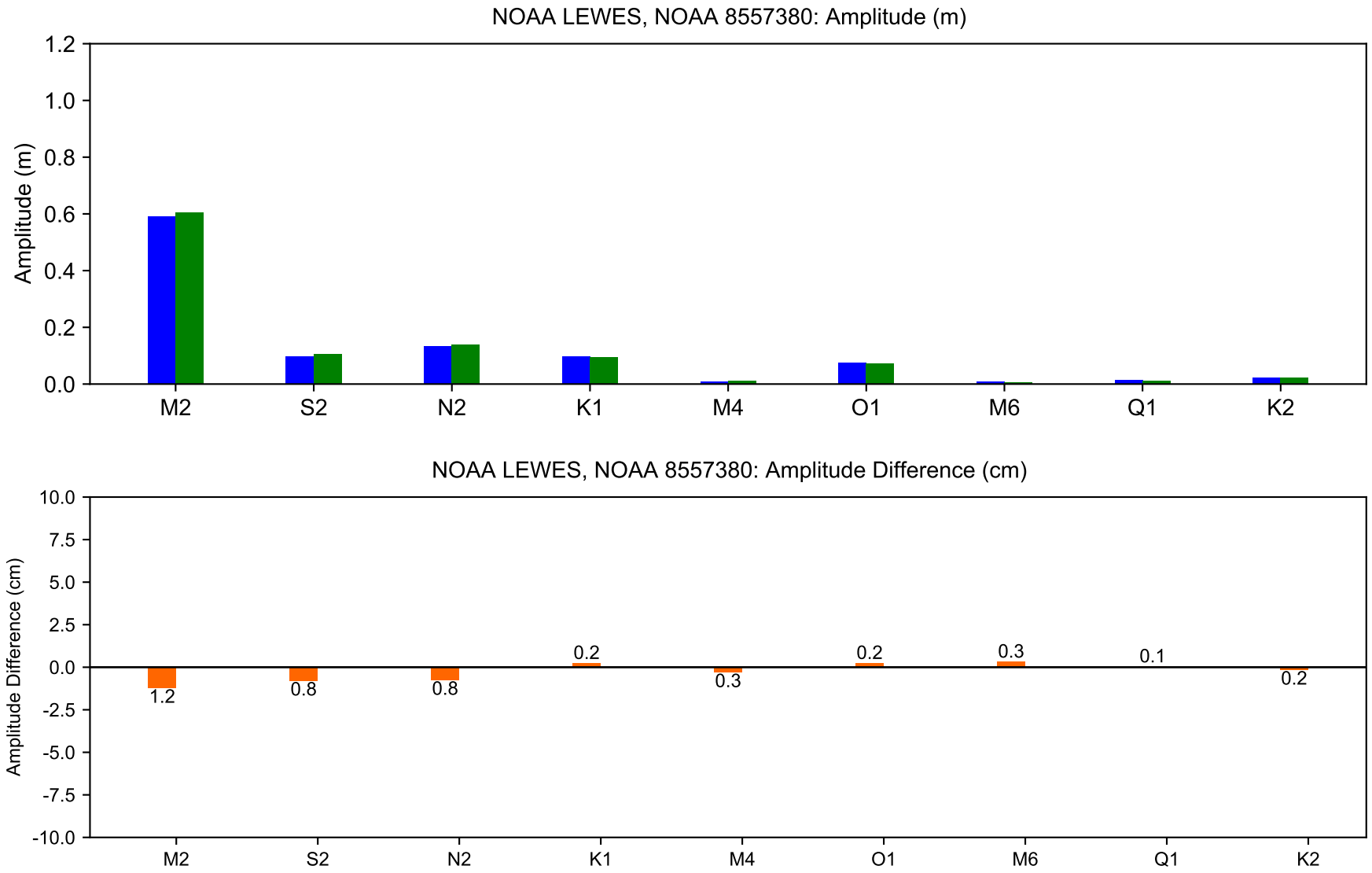

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Figure 3.3-2 (1a)

Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Amplitude at NOAA LEWES, NOAA Station 8557380

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

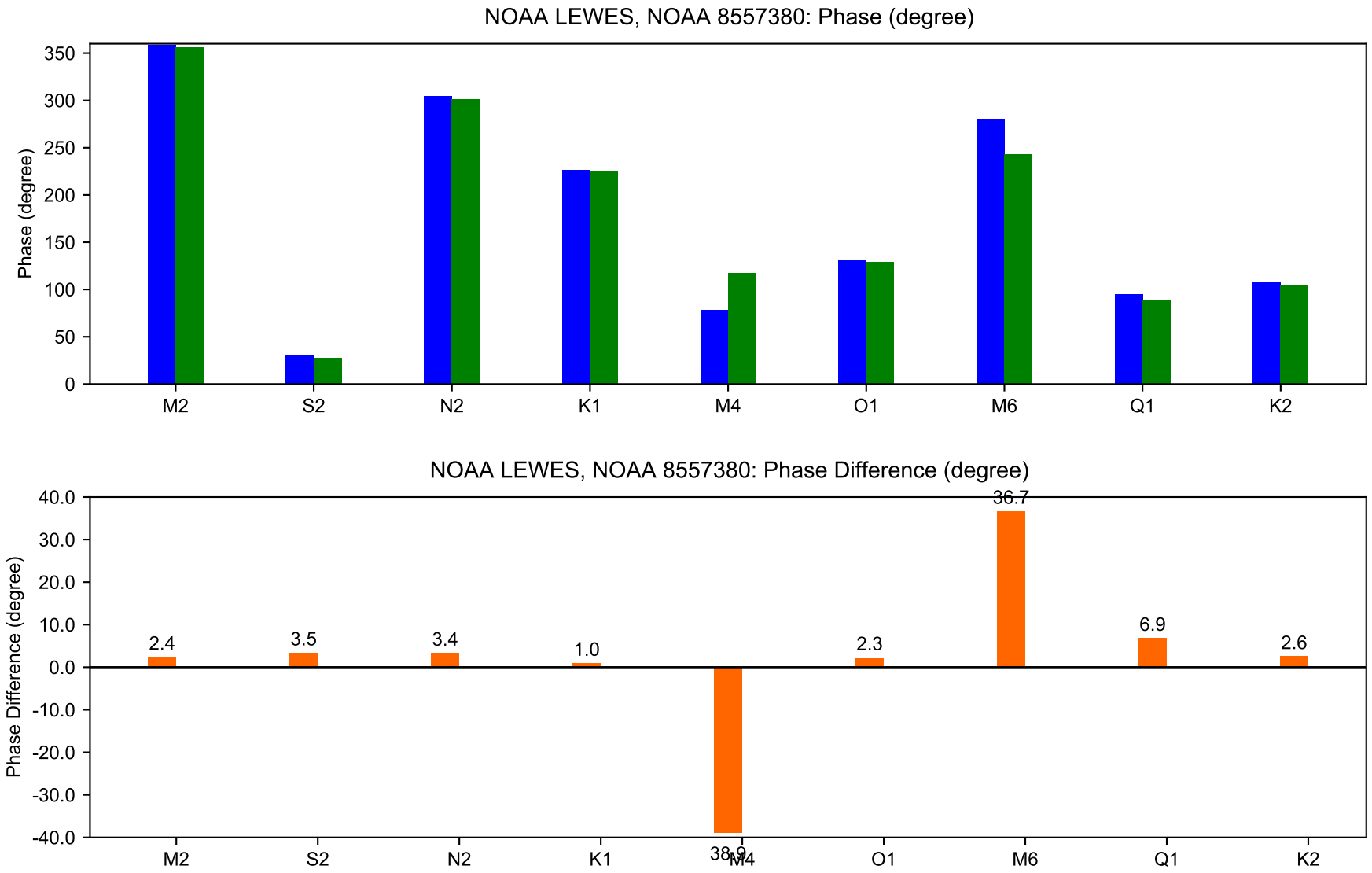

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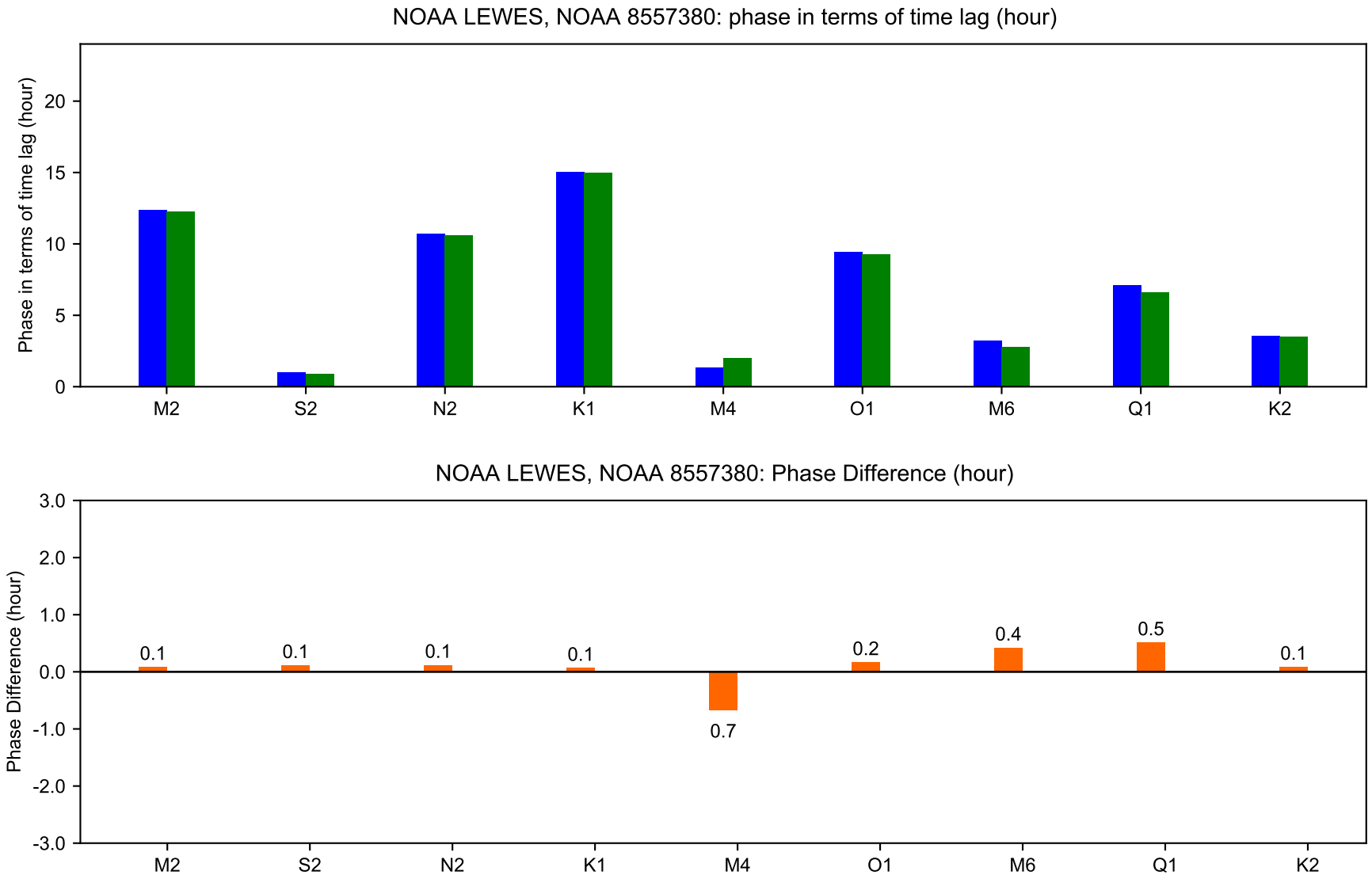
Figure 3.3-2 (1b)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA LEWES, NOAA Station 8557380

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.



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EFDC Model (T-Tide)
NOAA Data (T-Tide)
Difference (EFDC - NOAA)

Figure 3.3-2 (1c)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA LEWES, NOAA Station 8557380

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

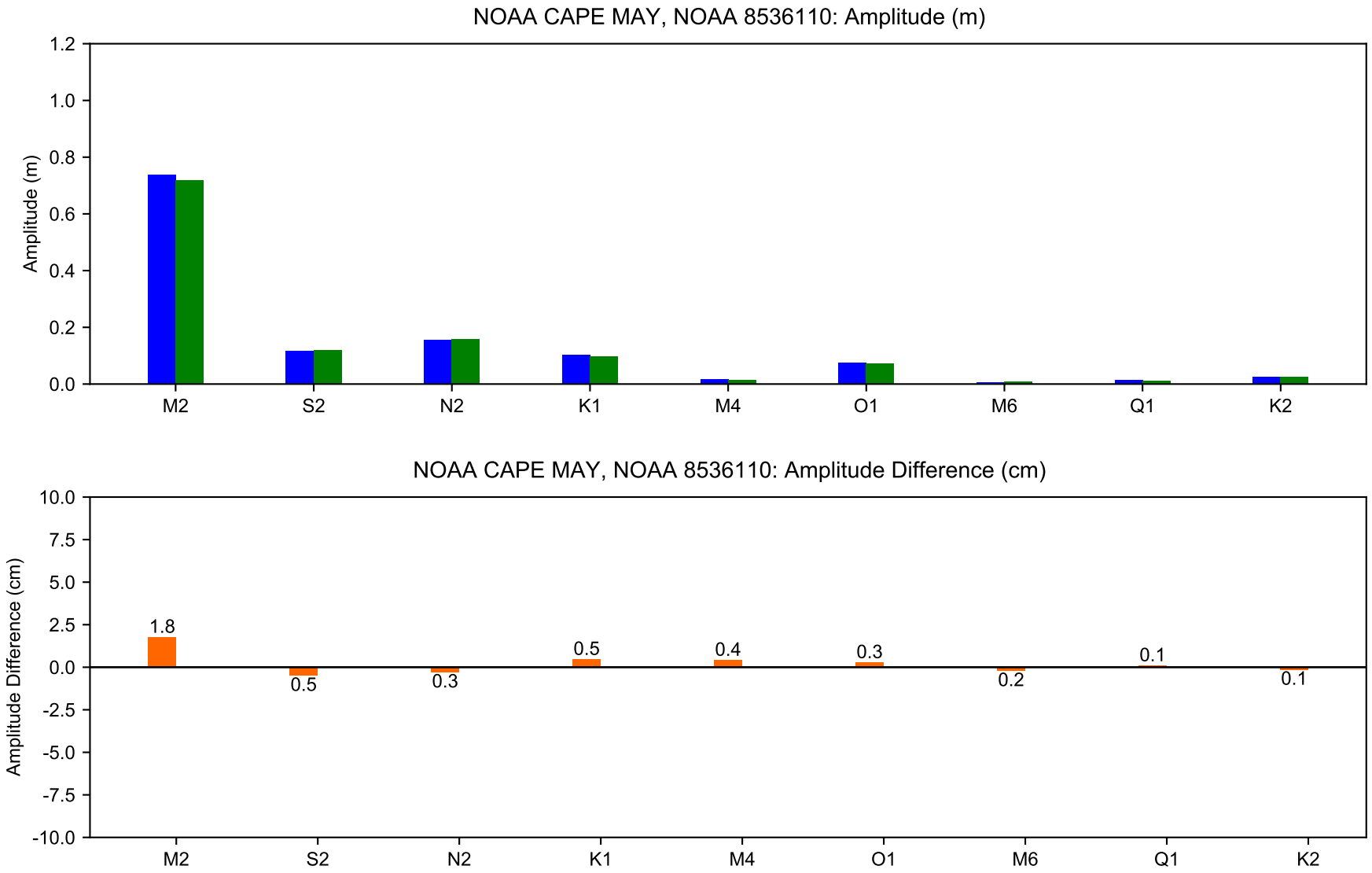

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Figure 3.3-2 (2a)

Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Amplitude at NOAA CAPE MAY, NOAA Station 8536110

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

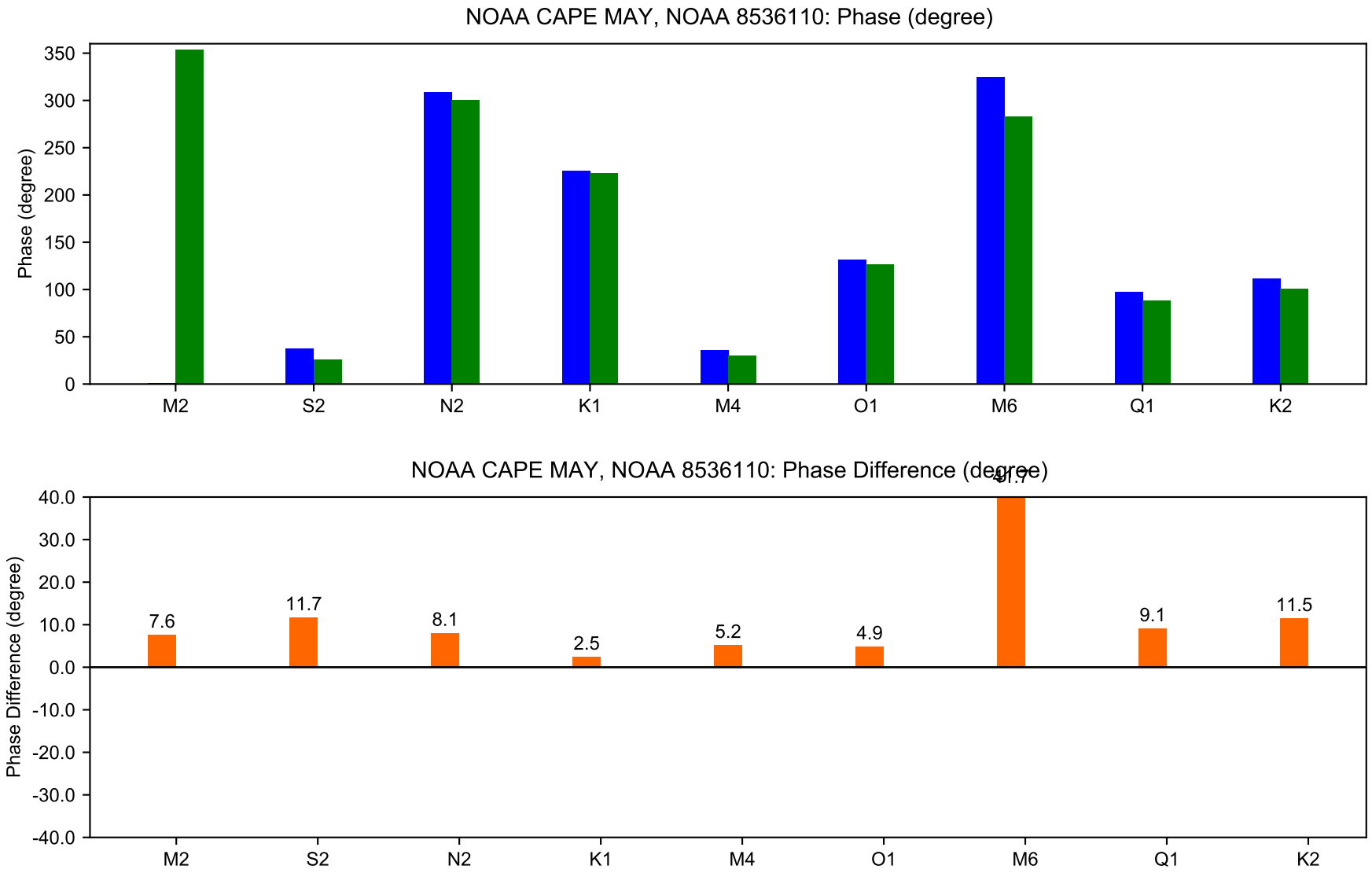

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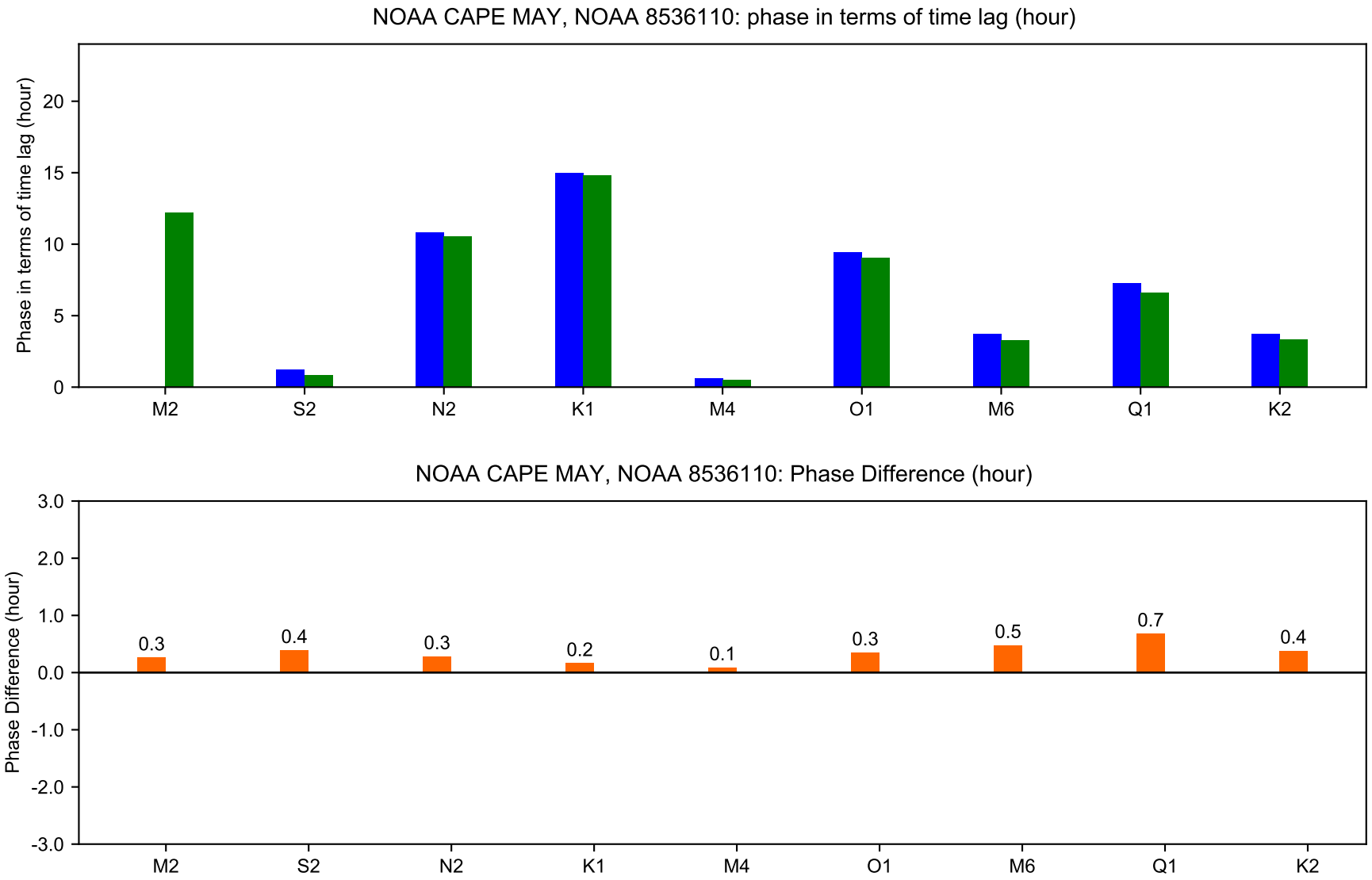
Figure 3.3-2 (2b)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA CAPE MAY, NOAA Station 8536110

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.



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EFDC Model (T-Tide)
NOAA Data (T-Tide)
Difference (EFDC - NOAA)

Figure 3.3-2 (2c)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA CAPE MAY, NOAA Station 8536110

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

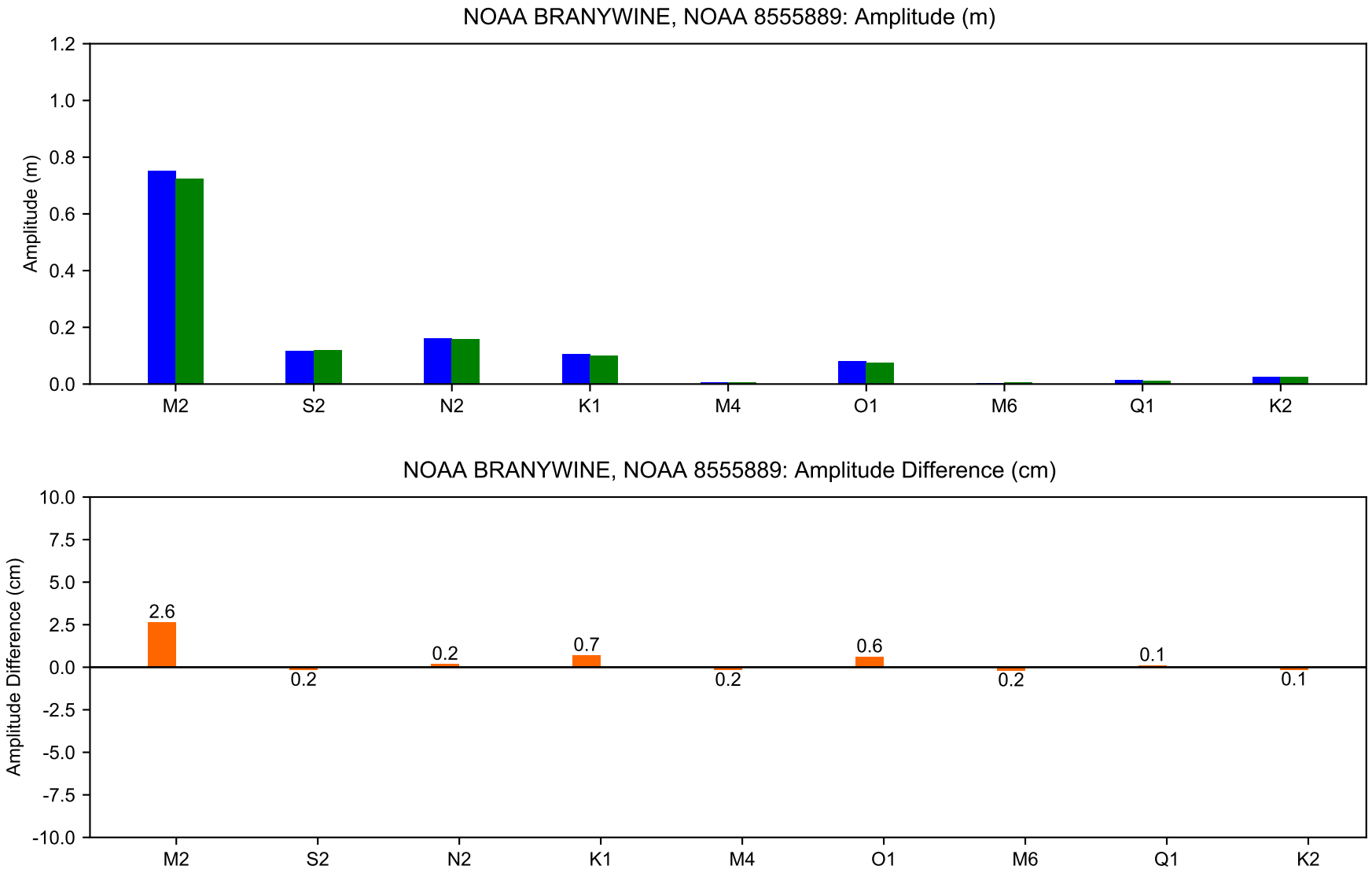

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Figure 3.3-2 (3a)

Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Amplitude at NOAA BRANYWINE, NOAA Station 8555889

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

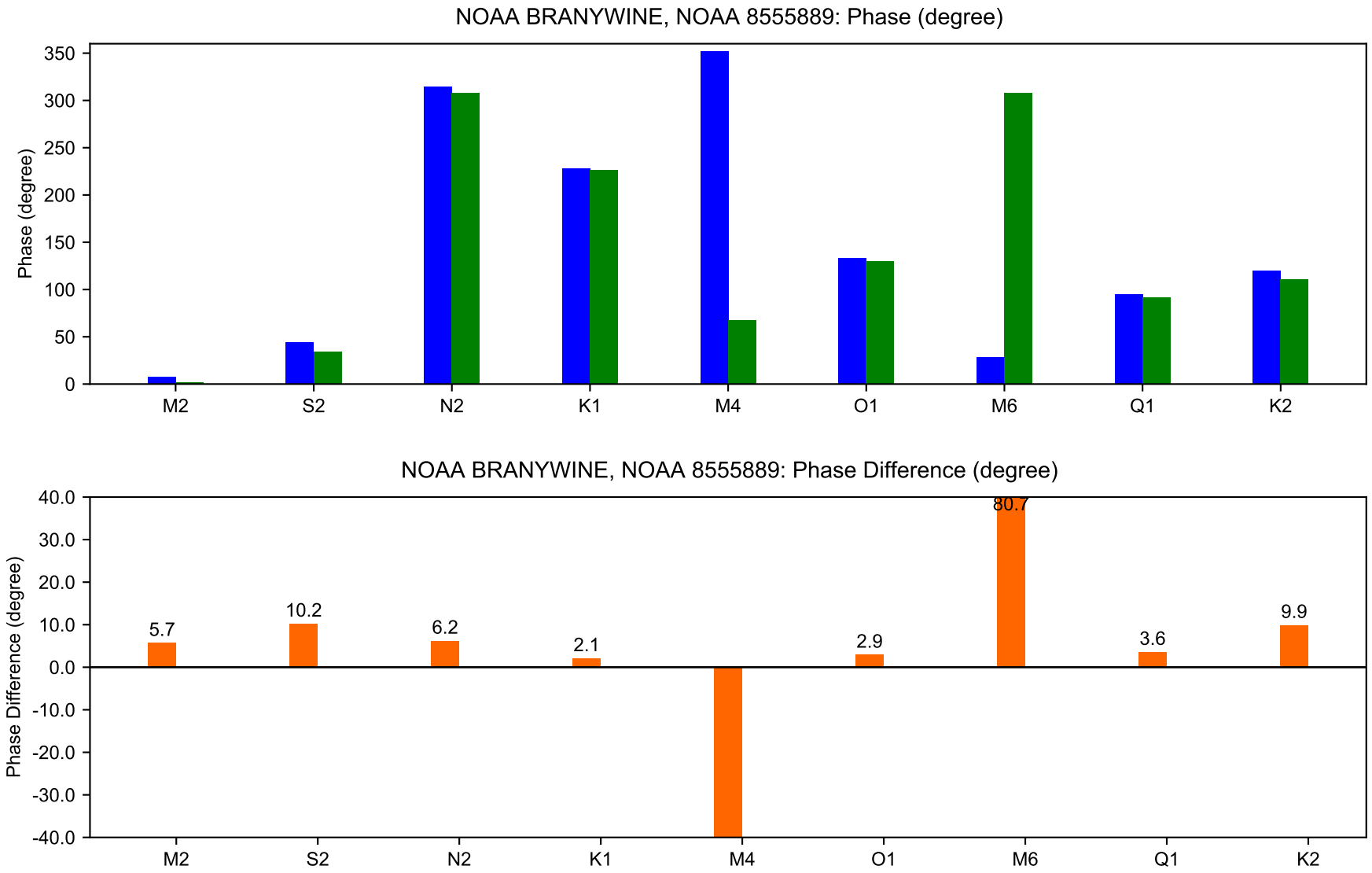

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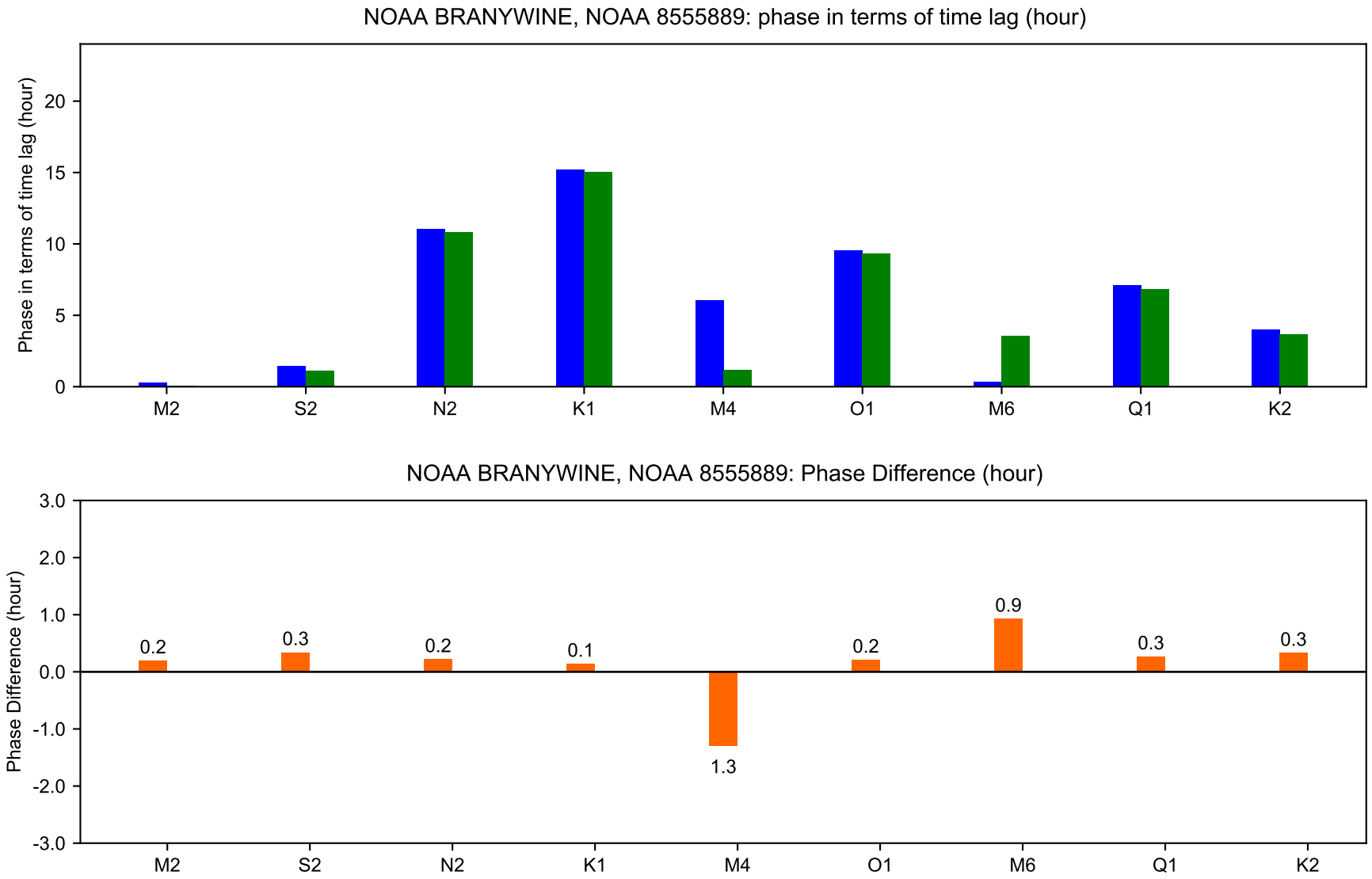
Figure 3.3-2 (3b)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA BRANYWINE, NOAA Station 8555889

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.



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EFDC Model (T-Tide)
NOAA Data (T-Tide)
Difference (EFDC - NOAA)

Figure 3.3-2 (3c)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA BRANYWINE, NOAA Station 8555889

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

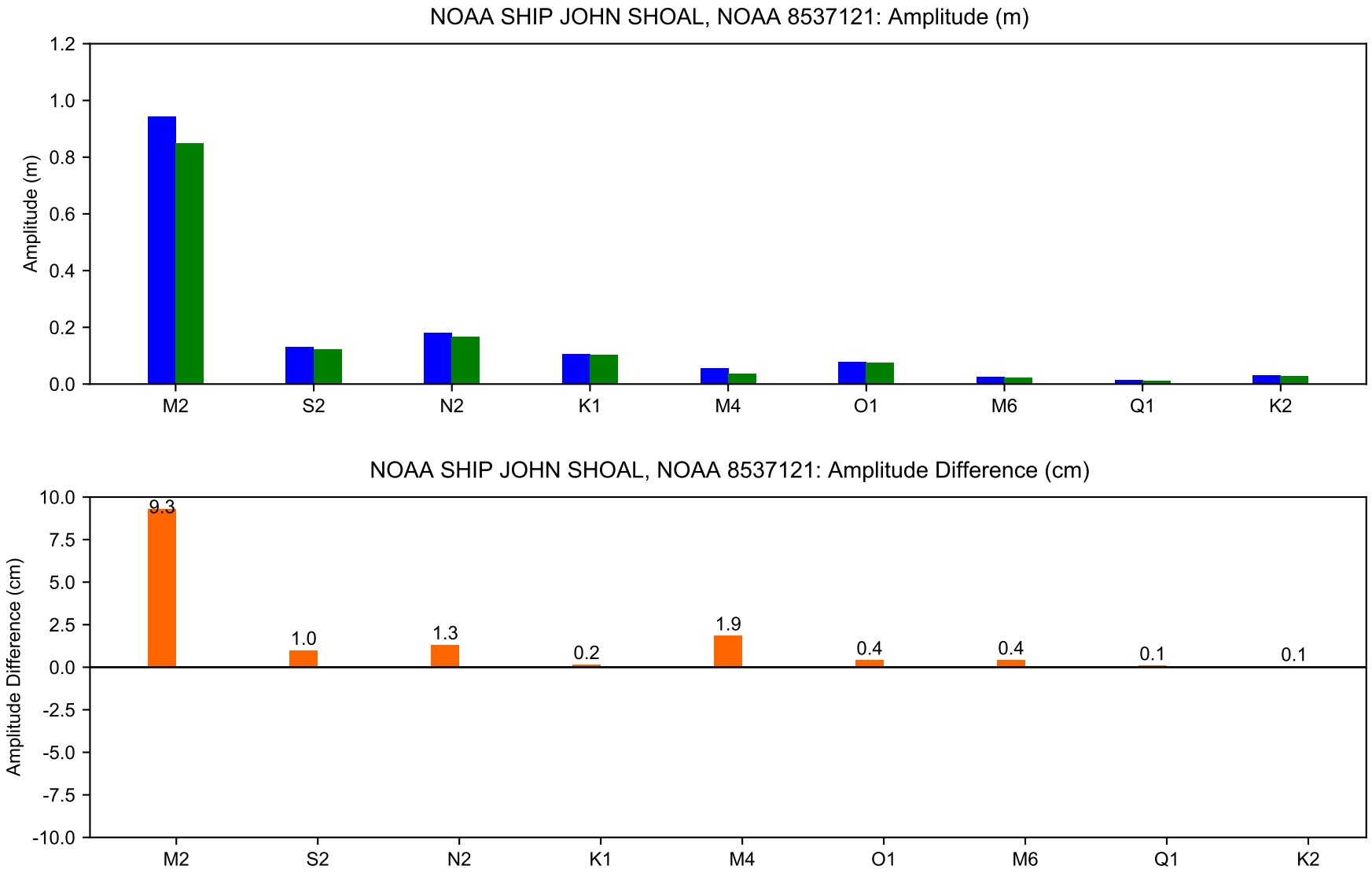

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Figure 3.3-2 (4a)

Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Amplitude at NOAA SHIP JOHN SHOAL, NOAA Station 8537121

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

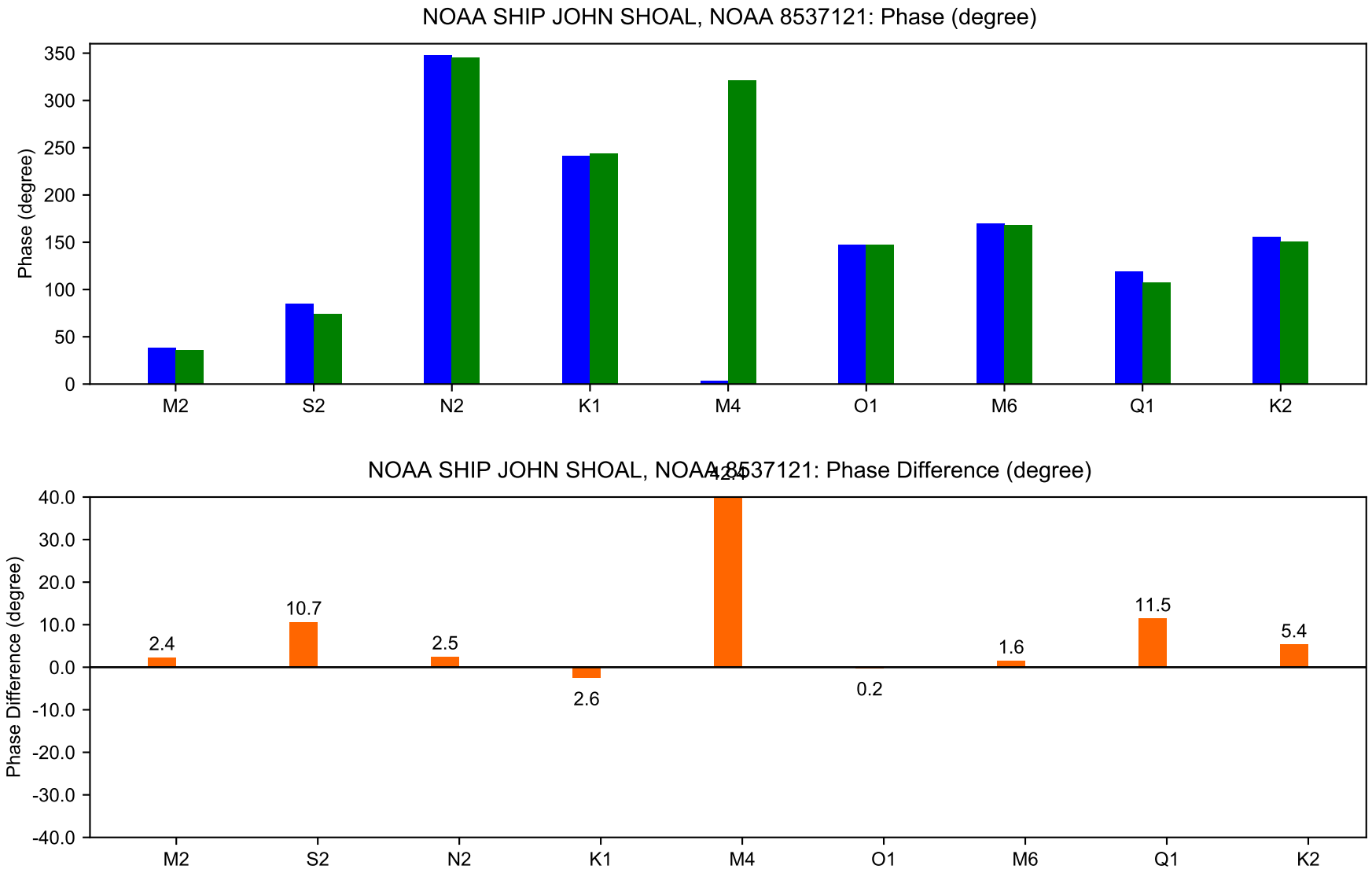

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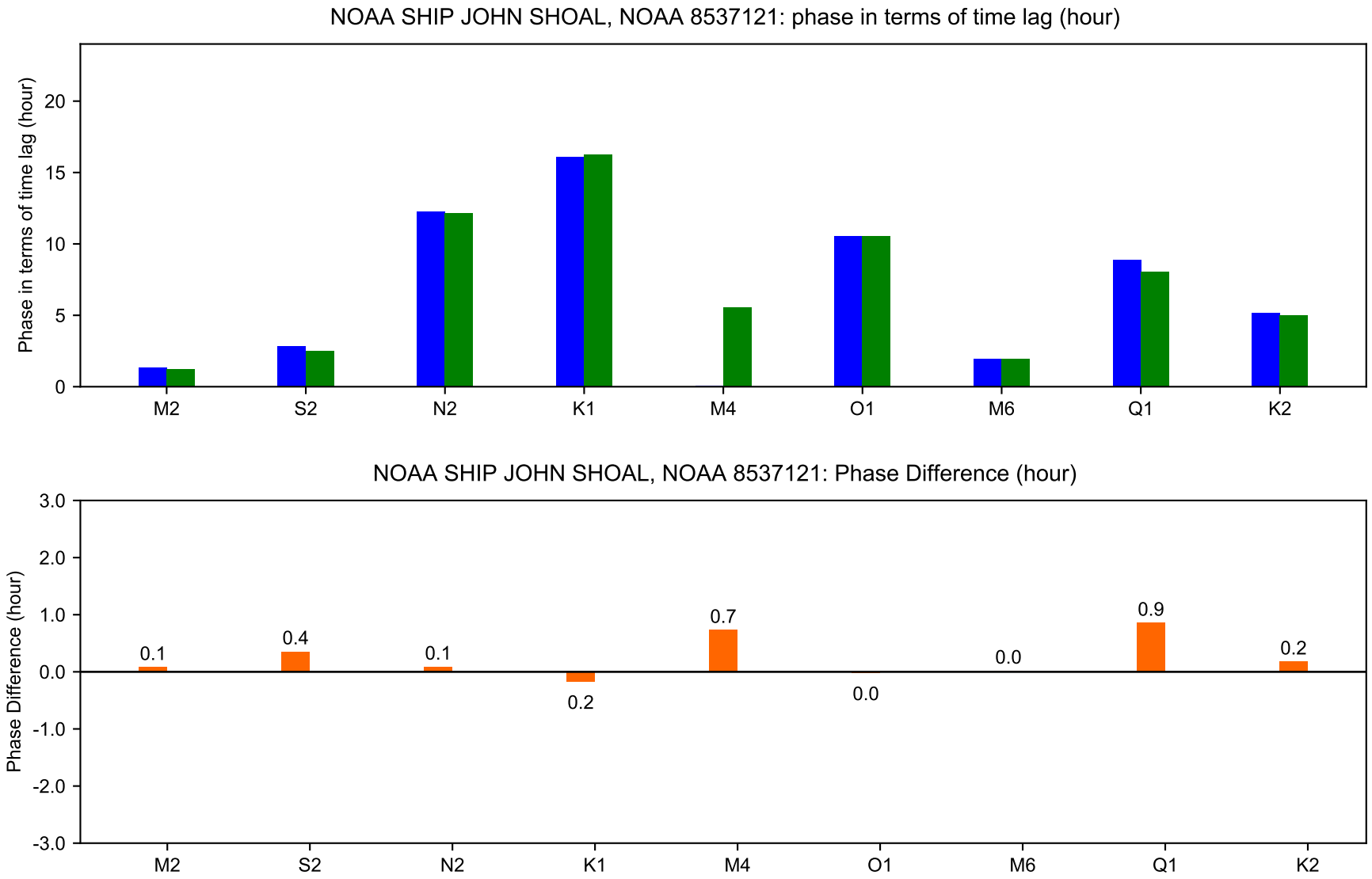
Figure 3.3-2 (4b)

Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA SHIP JOHN SHOAL, NOAA Station 8537121

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.



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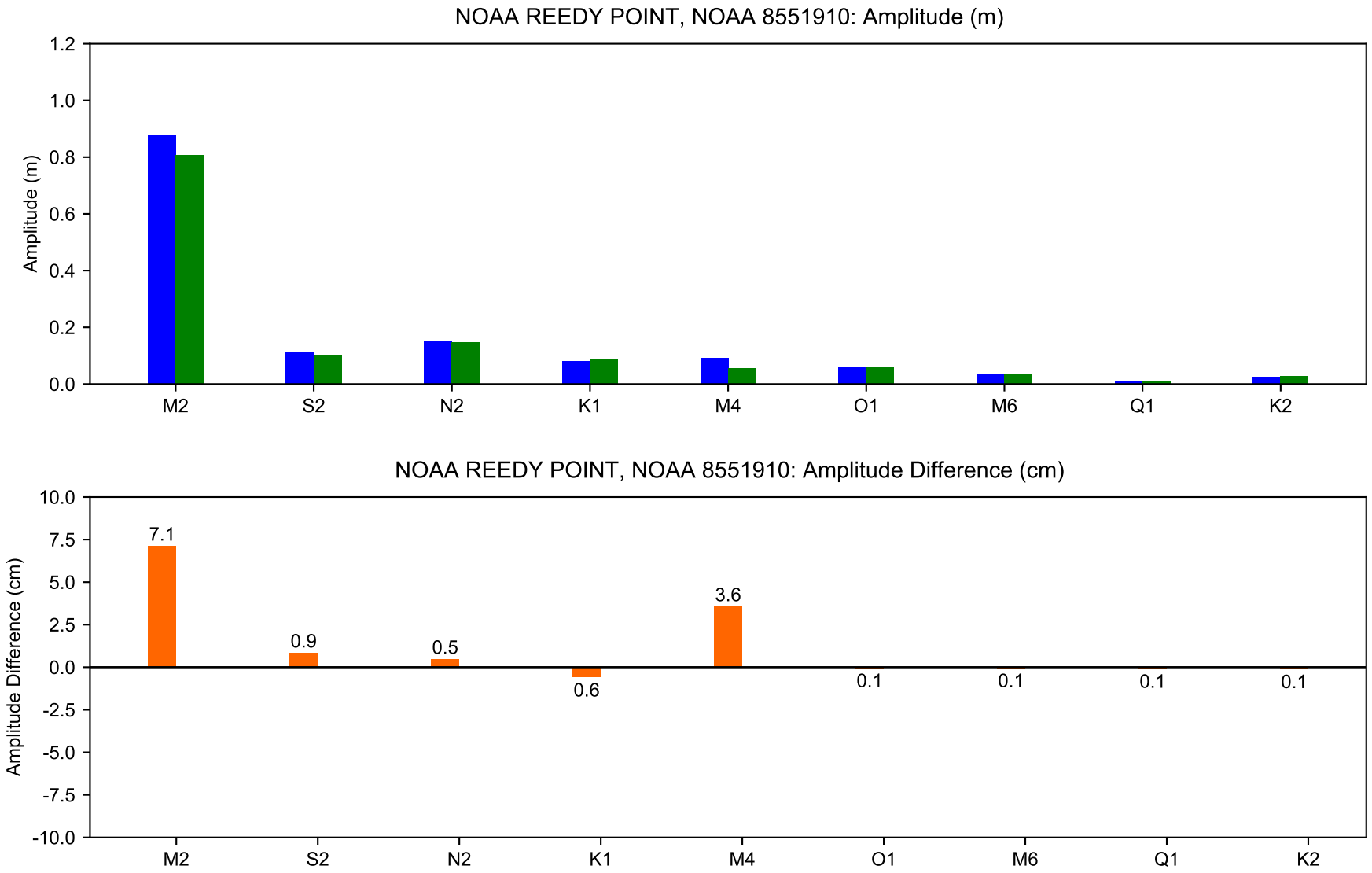
EFDC Model (T-Tide)
NOAA Data (T-Tide)
Difference (EFDC - NOAA)

Figure 3.3-2 (4c)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA SHIP JOHN SHOAL, NOAA Station 8537121

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.



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EFDC Model (T-Tide)
NOAA Data (T-Tide)
Difference (EFDC - NOAA)

Figure 3.3-2 (5a)

Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Amplitude at NOAA REEDY POINT, NOAA Station 8551910

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

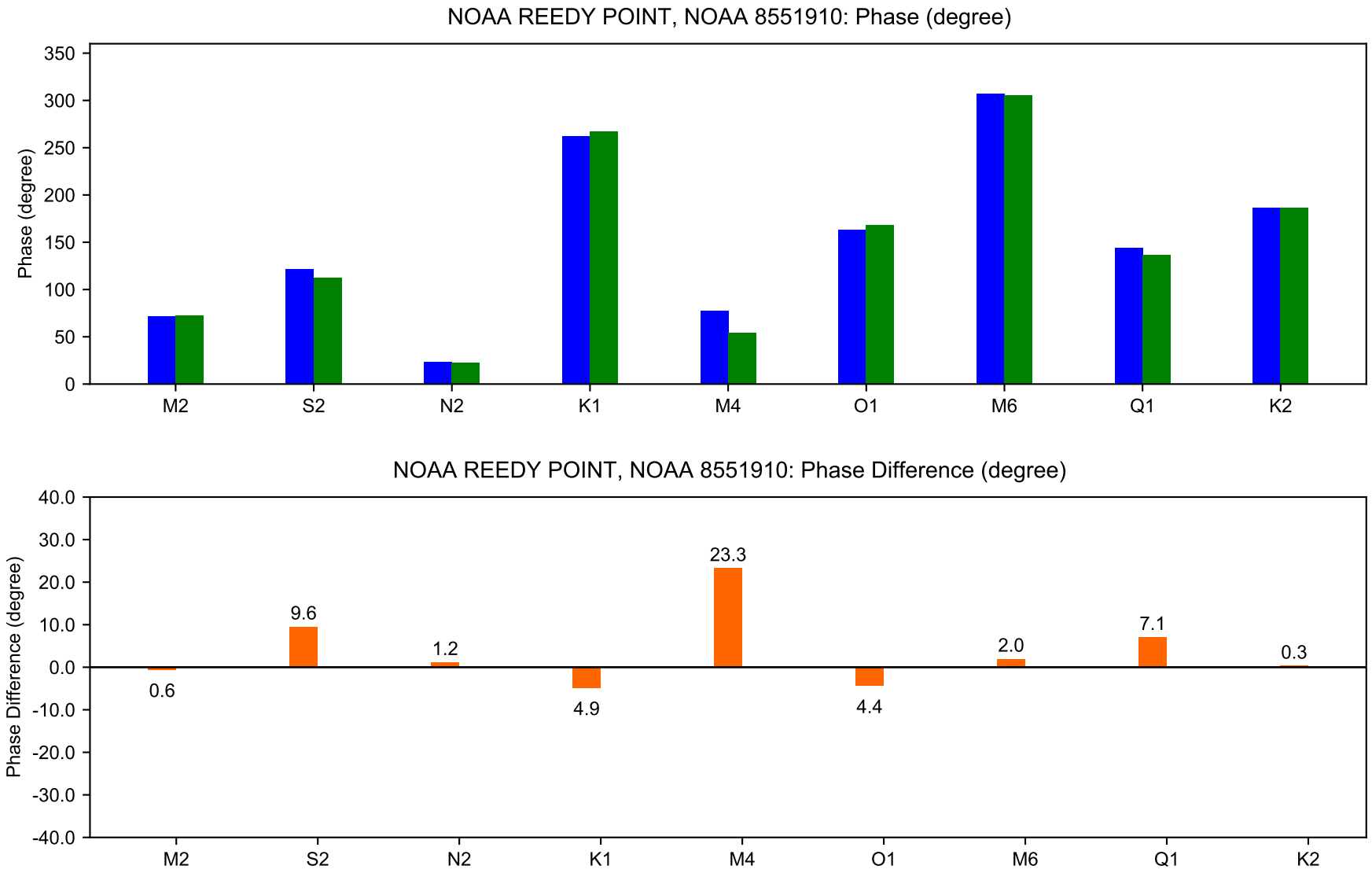

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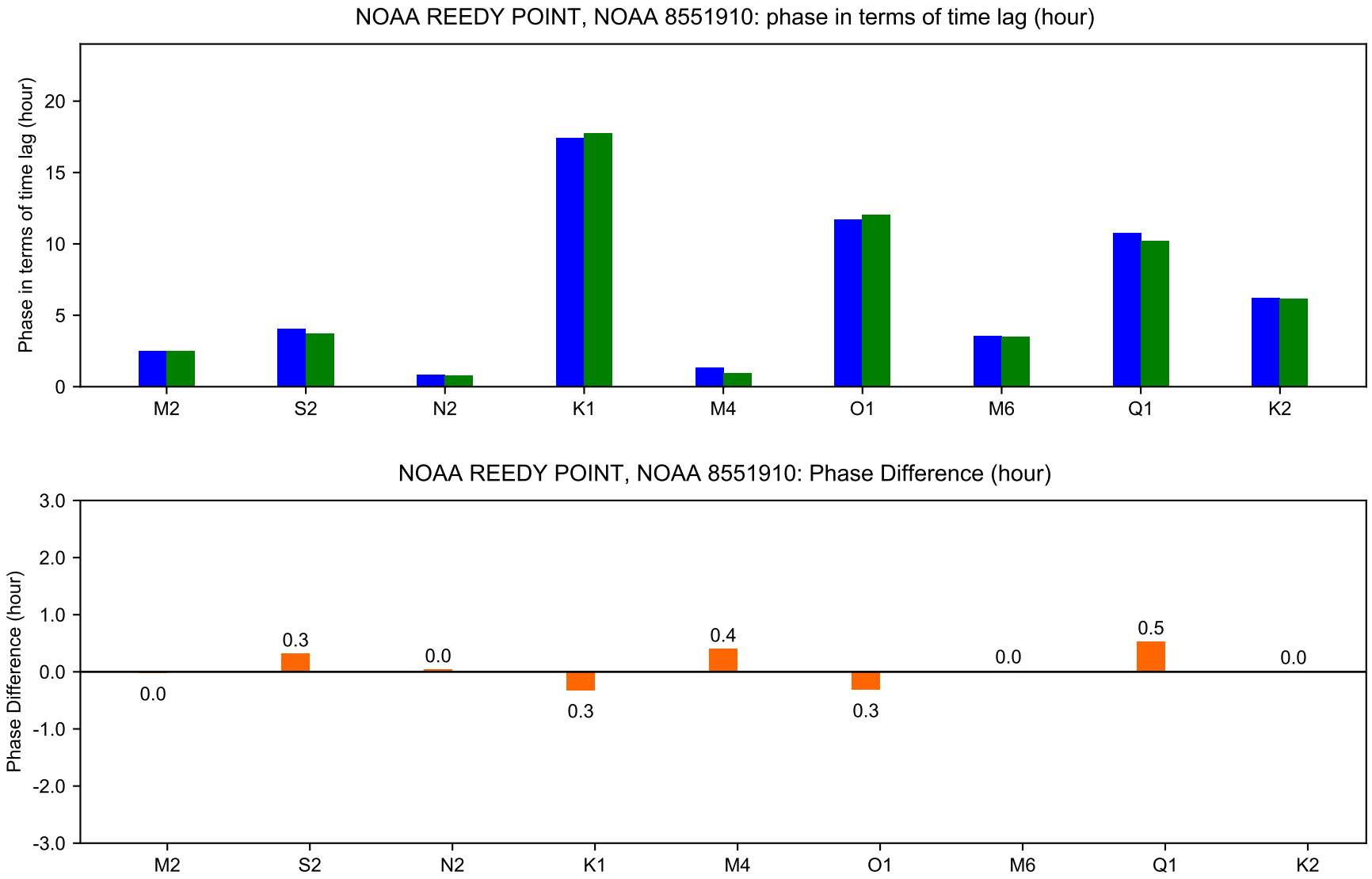
Figure 3.3-2 (5b)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA REEDY POINT, NOAA Station 8551910

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.



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EFDC Model (T-Tide)
NOAA Data (T-Tide)
Difference (EFDC - NOAA)

Figure 3.3-2 (5c)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA REEDY POINT, NOAA Station 8551910

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

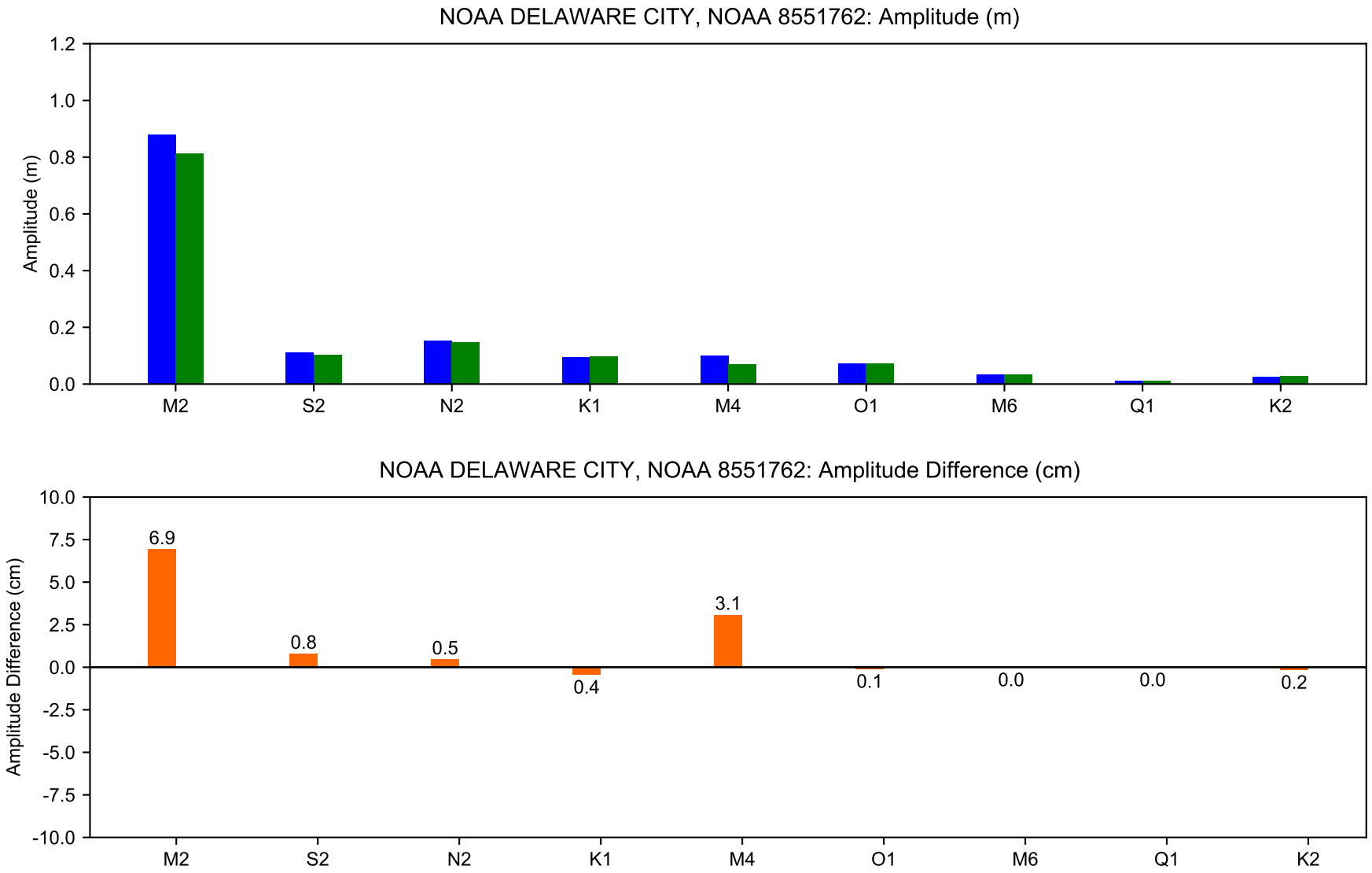

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Figure 3.3-2 (6a)

Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Amplitude at NOAA DELAWARE CITY, NOAA Station 8551762

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

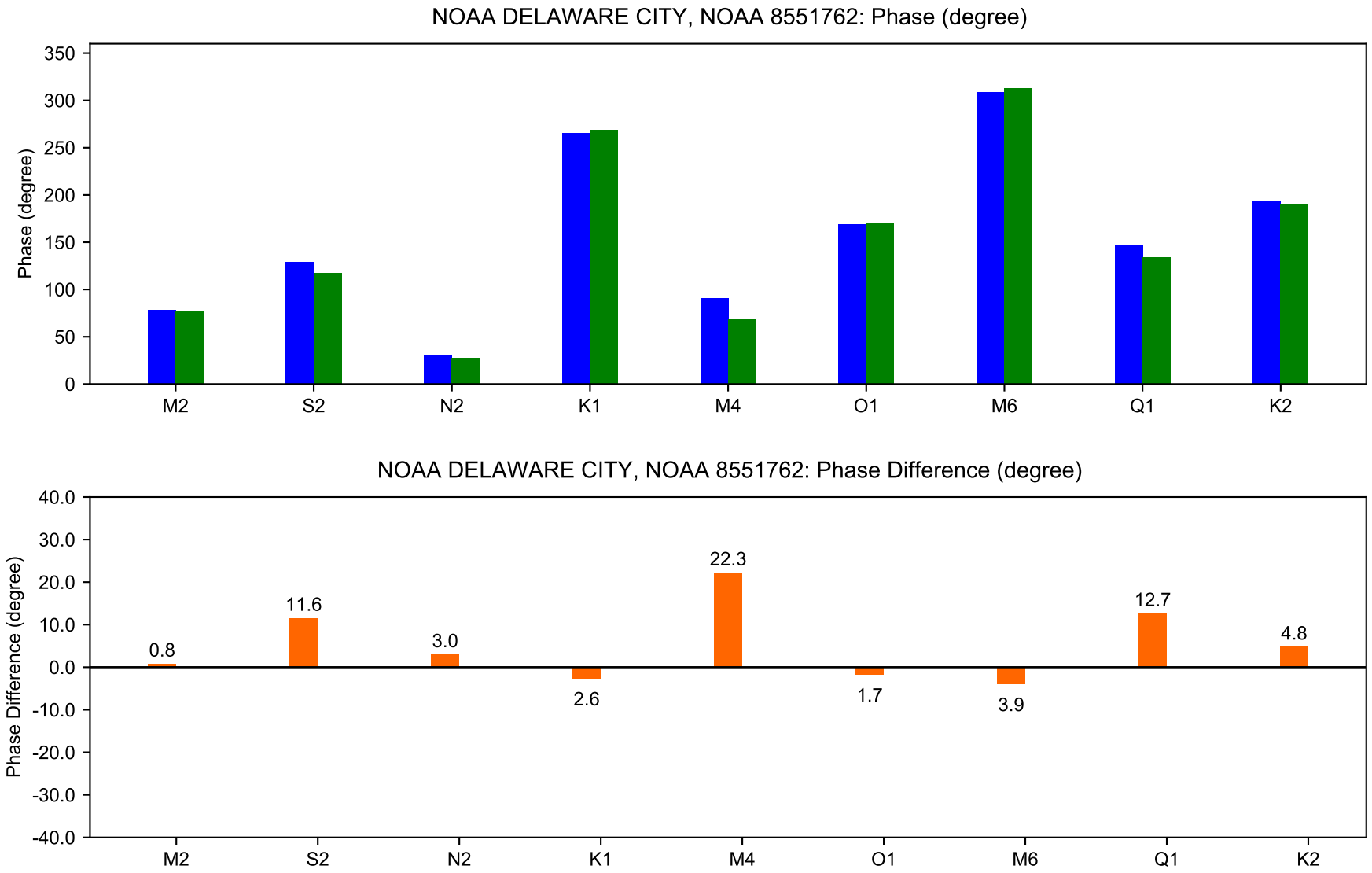

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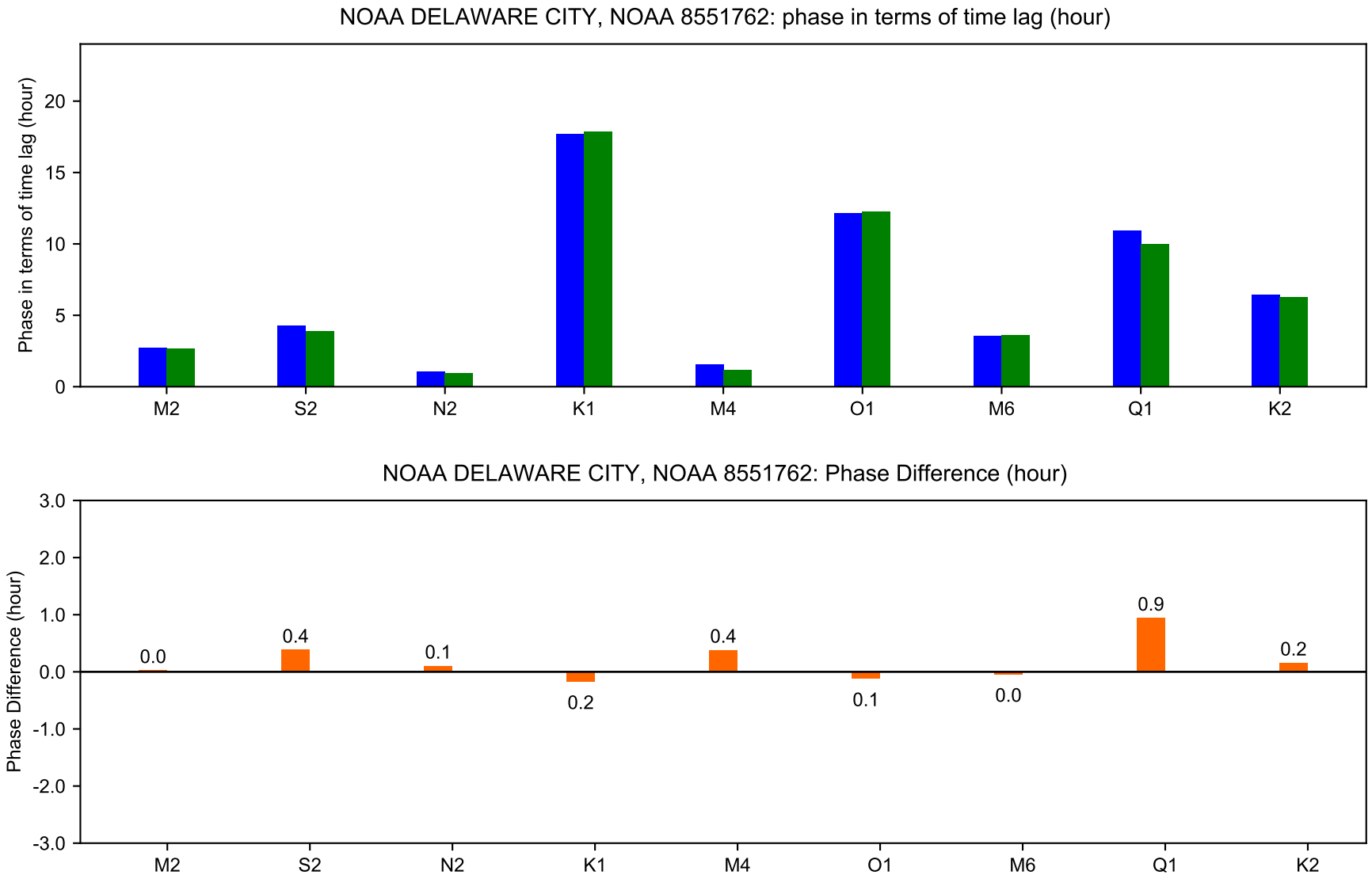
Figure 3.3-2 (6b)

Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA DELAWARE CITY, NOAA Station 8551762

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.



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EFDC Model (T-Tide)
NOAA Data (T-Tide)
Difference (EFDC - NOAA)

Figure 3.3-2 (6c)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA DELAWARE CITY, NOAA Station 8551762

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

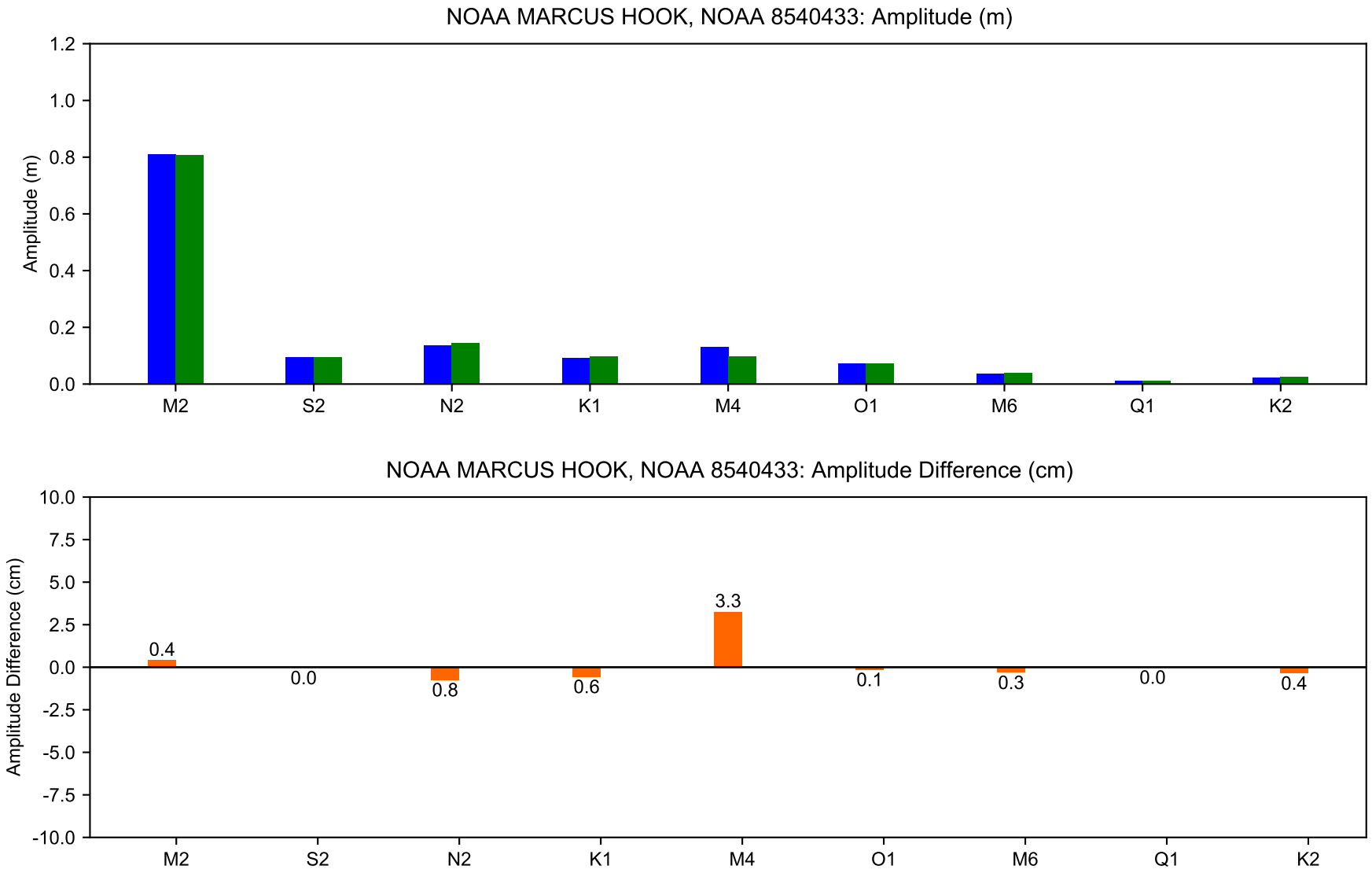

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Figure 3.3-2 (7a)

Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Amplitude at NOAA MARCUS HOOK, NOAA Station 8540433

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

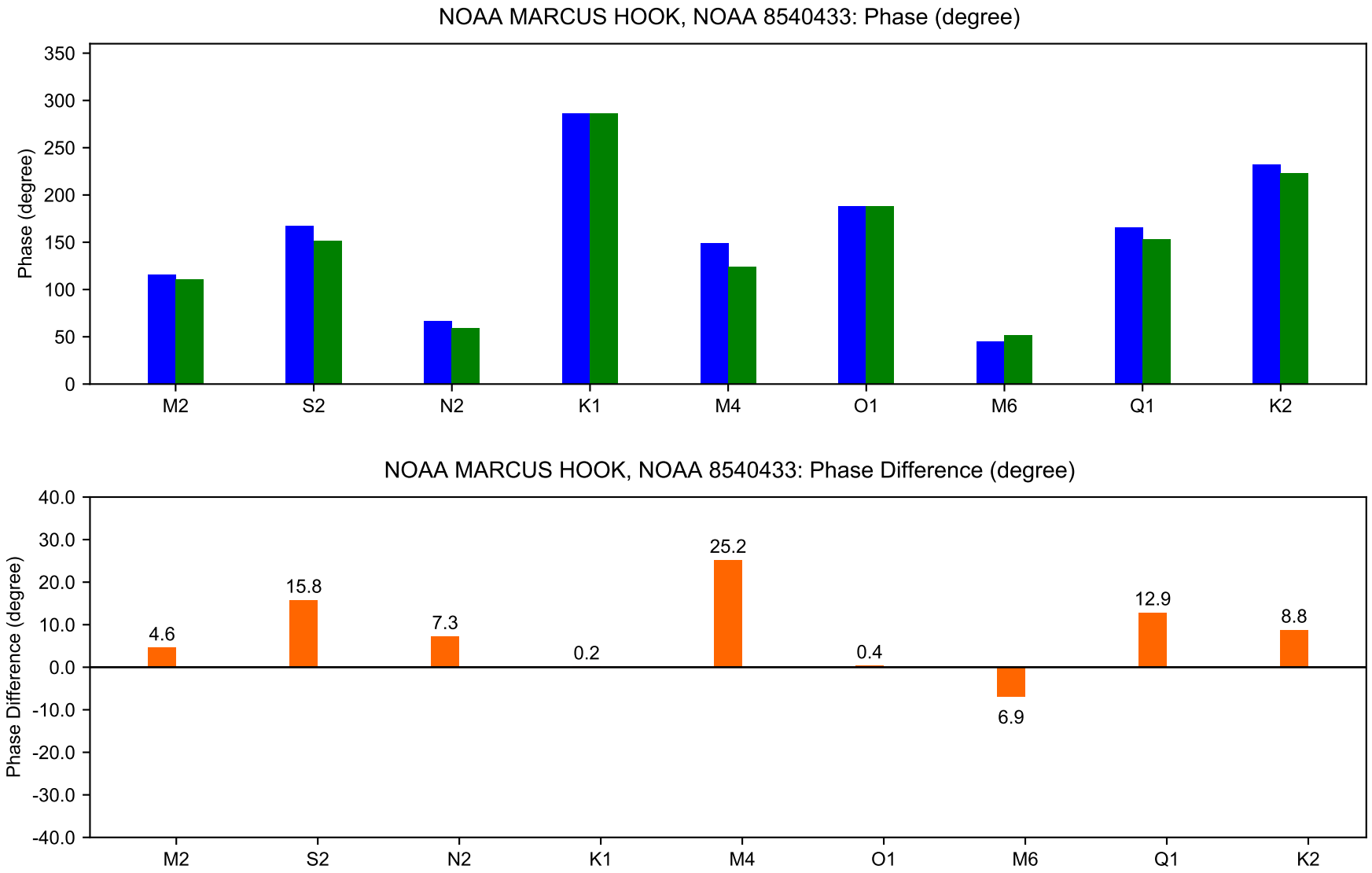

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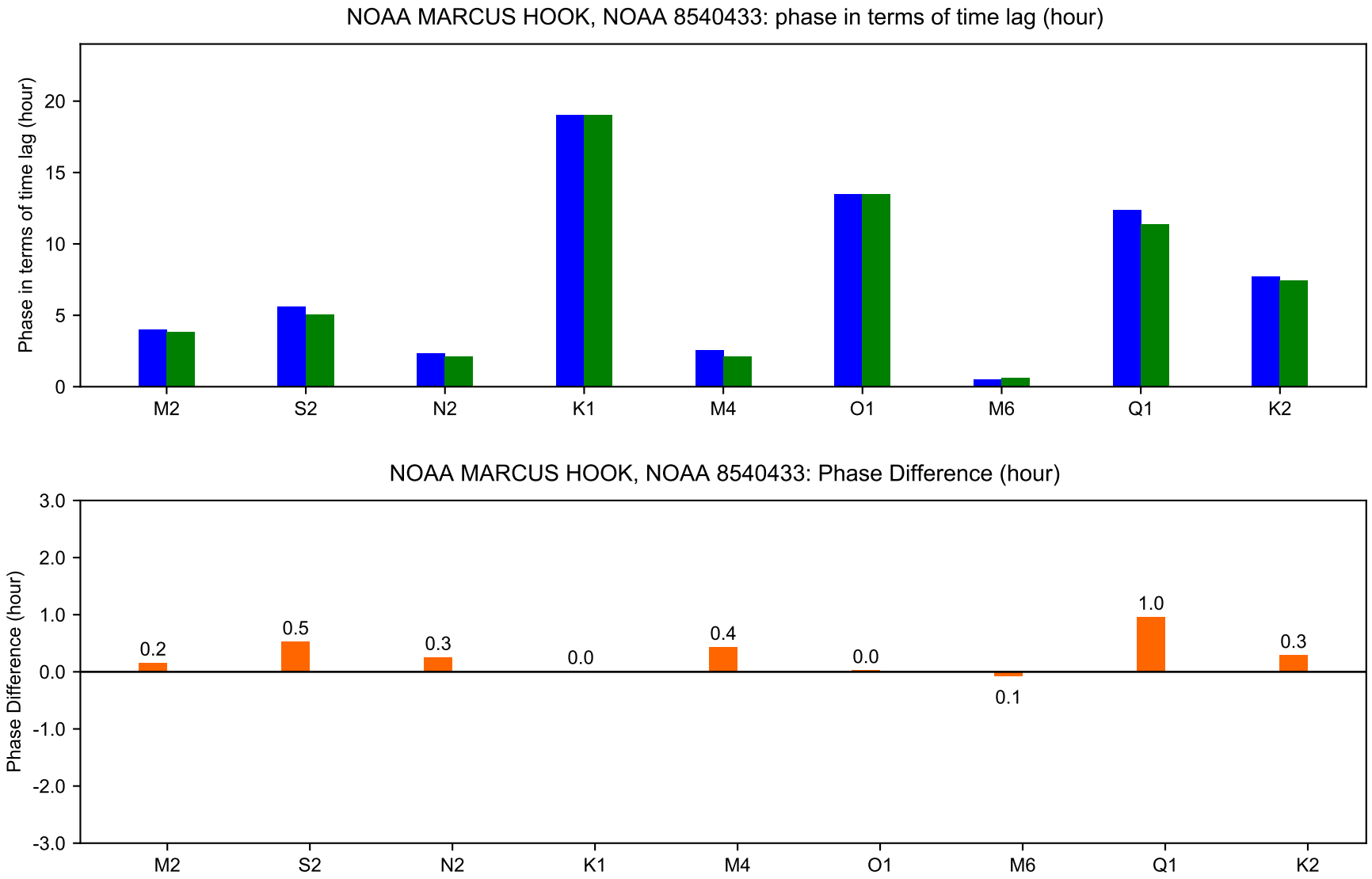
Figure 3.3-2 (7b)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA MARCUS HOOK, NOAA Station 8540433

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.



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EFDC Model (T-Tide)
NOAA Data (T-Tide)
Difference (EFDC - NOAA)

Figure 3.3-2 (7c)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA MARCUS HOOK, NOAA Station 8540433

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

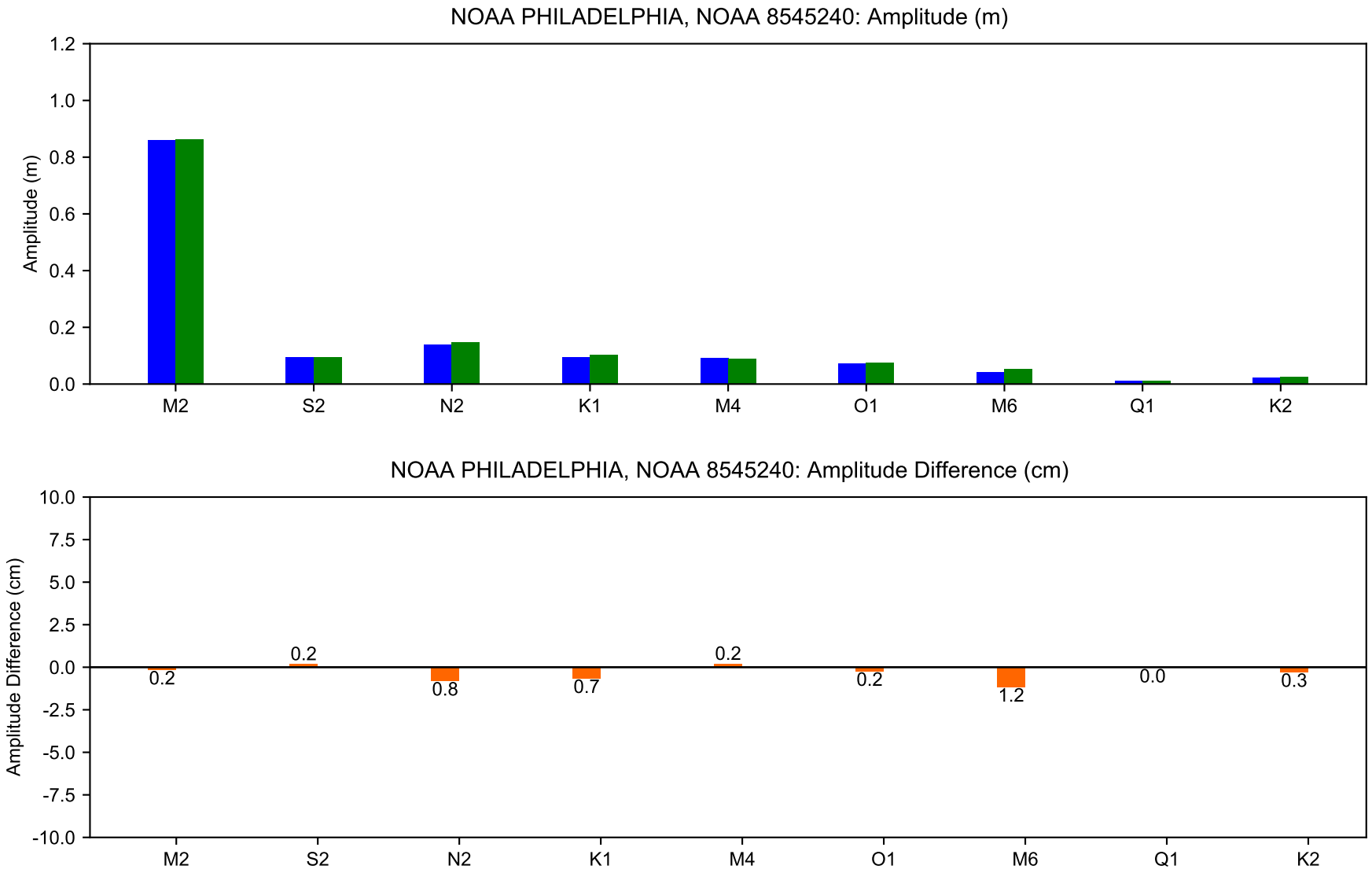

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Figure 3.3-2 (8a)

Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Amplitude at NOAA PHILADELPHIA, NOAA Station 8545240

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

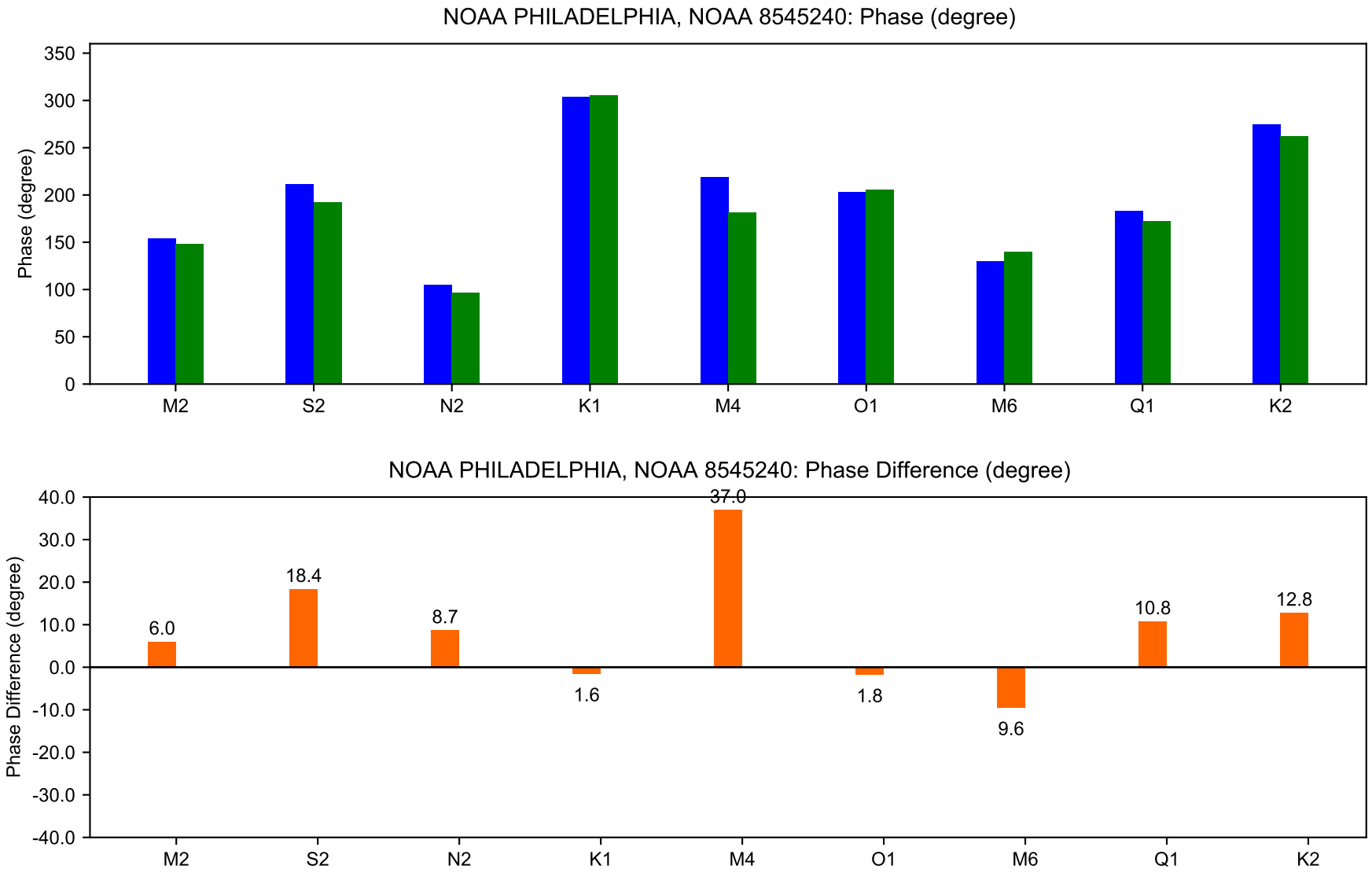

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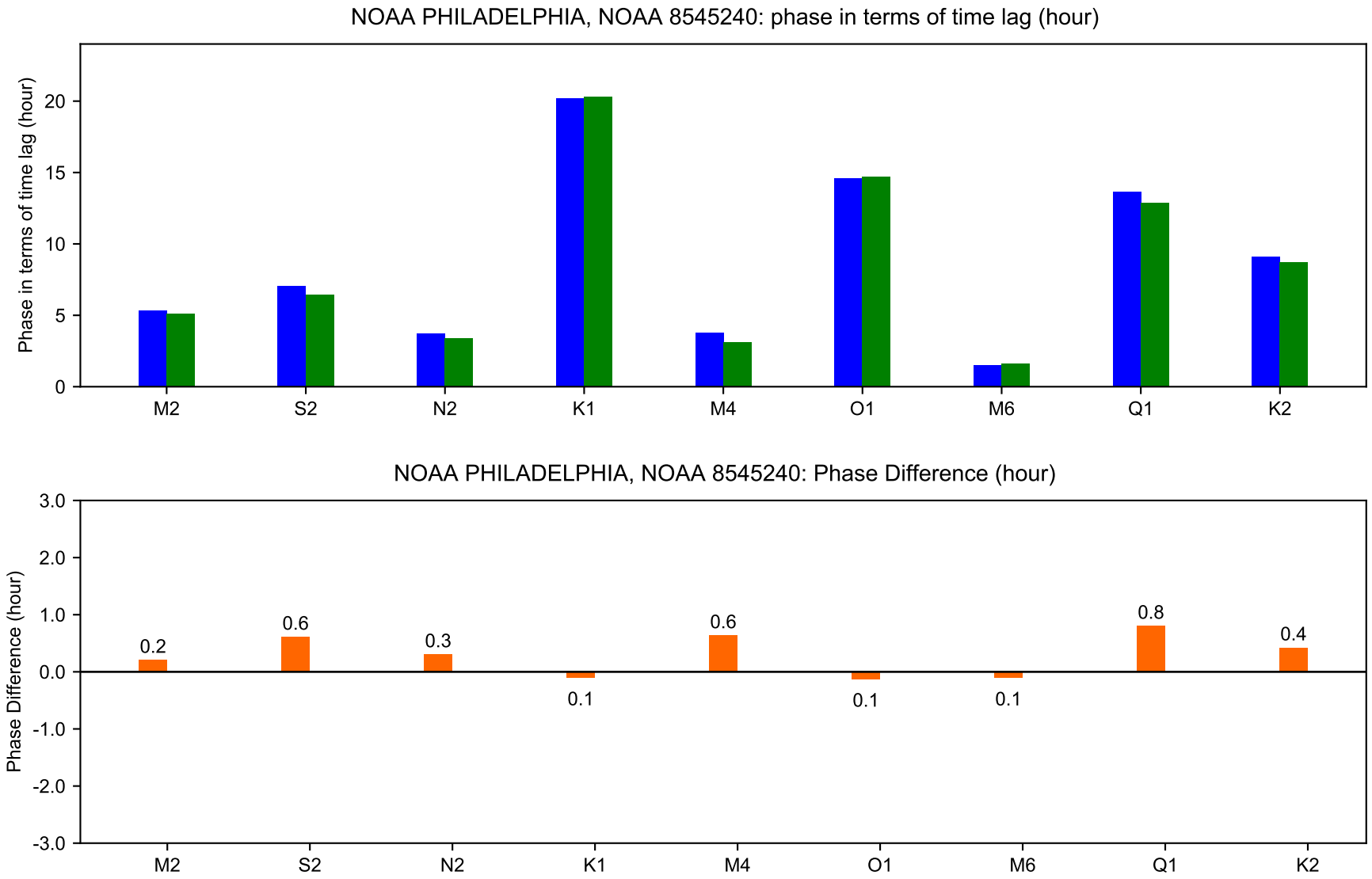
Figure 3.3-2 (8b)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA PHILADELPHIA, NOAA Station 8545240

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.



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EFDC Model (T-Tide)
NOAA Data (T-Tide)
Difference (EFDC - NOAA)

Figure 3.3-2 (8c)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA PHILADELPHIA, NOAA Station 8545240

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

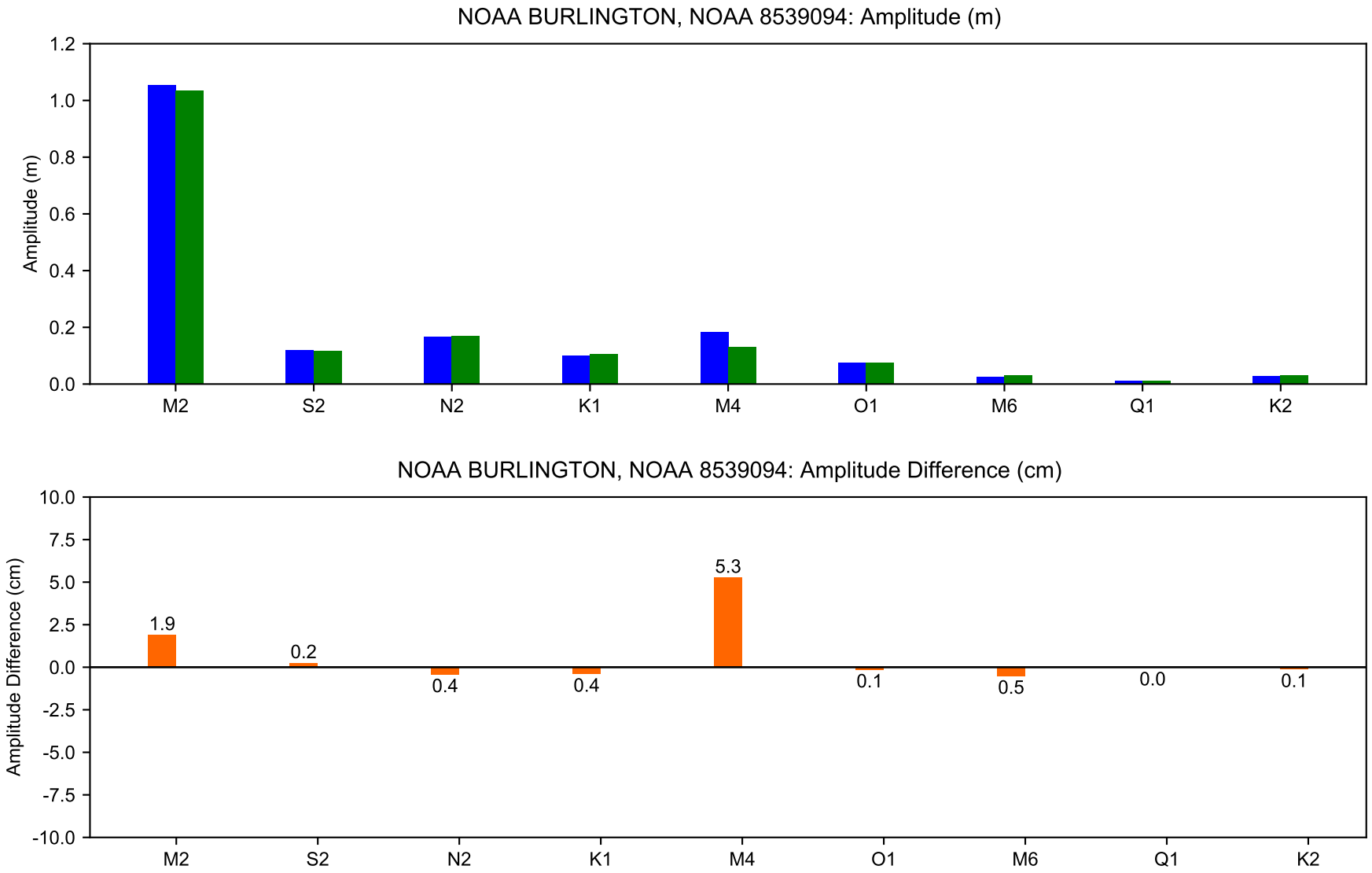

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Figure 3.3-2 (9a)

Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Amplitude at NOAA BURLINGTON, NOAA Station 8539094

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

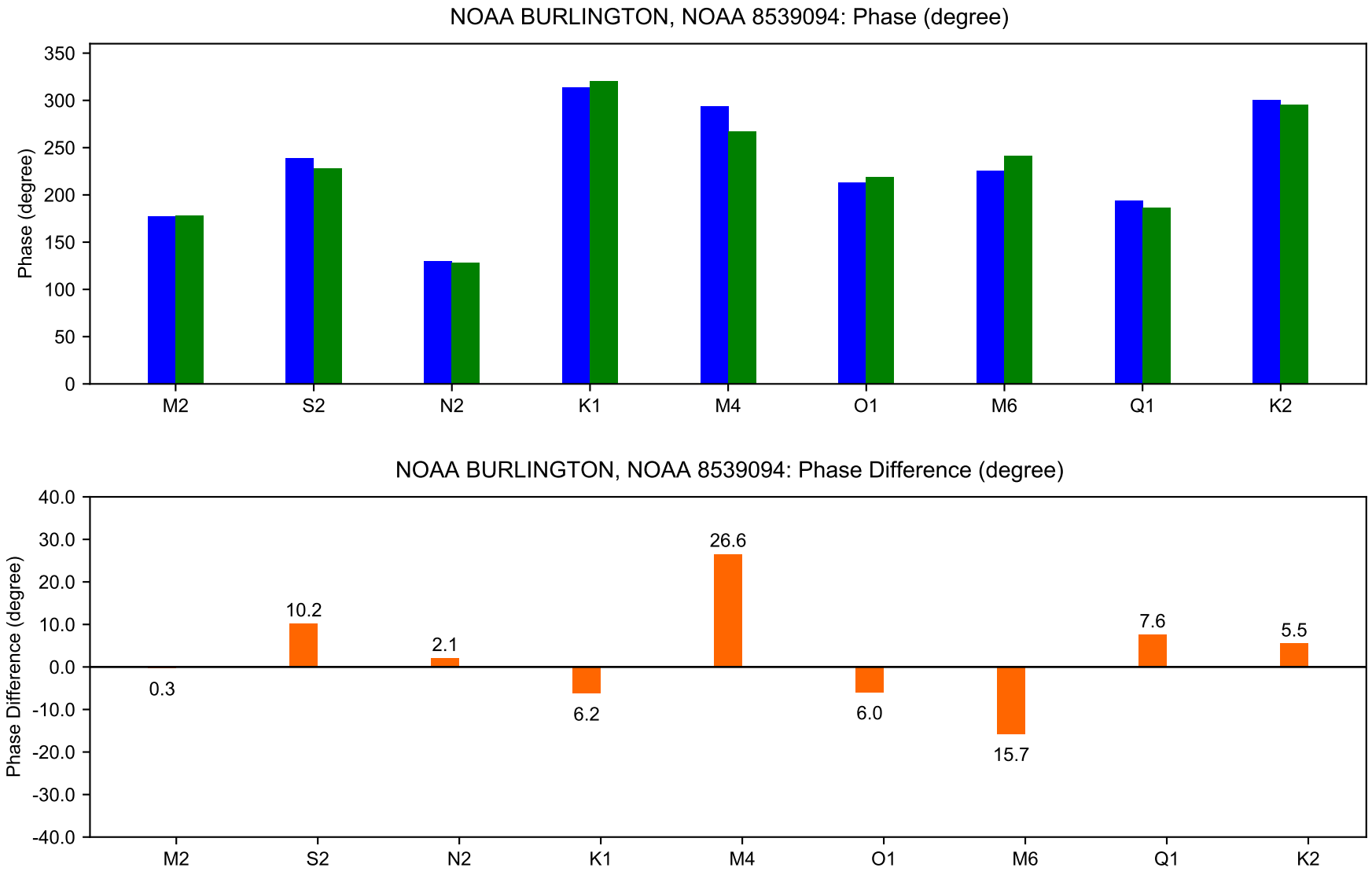

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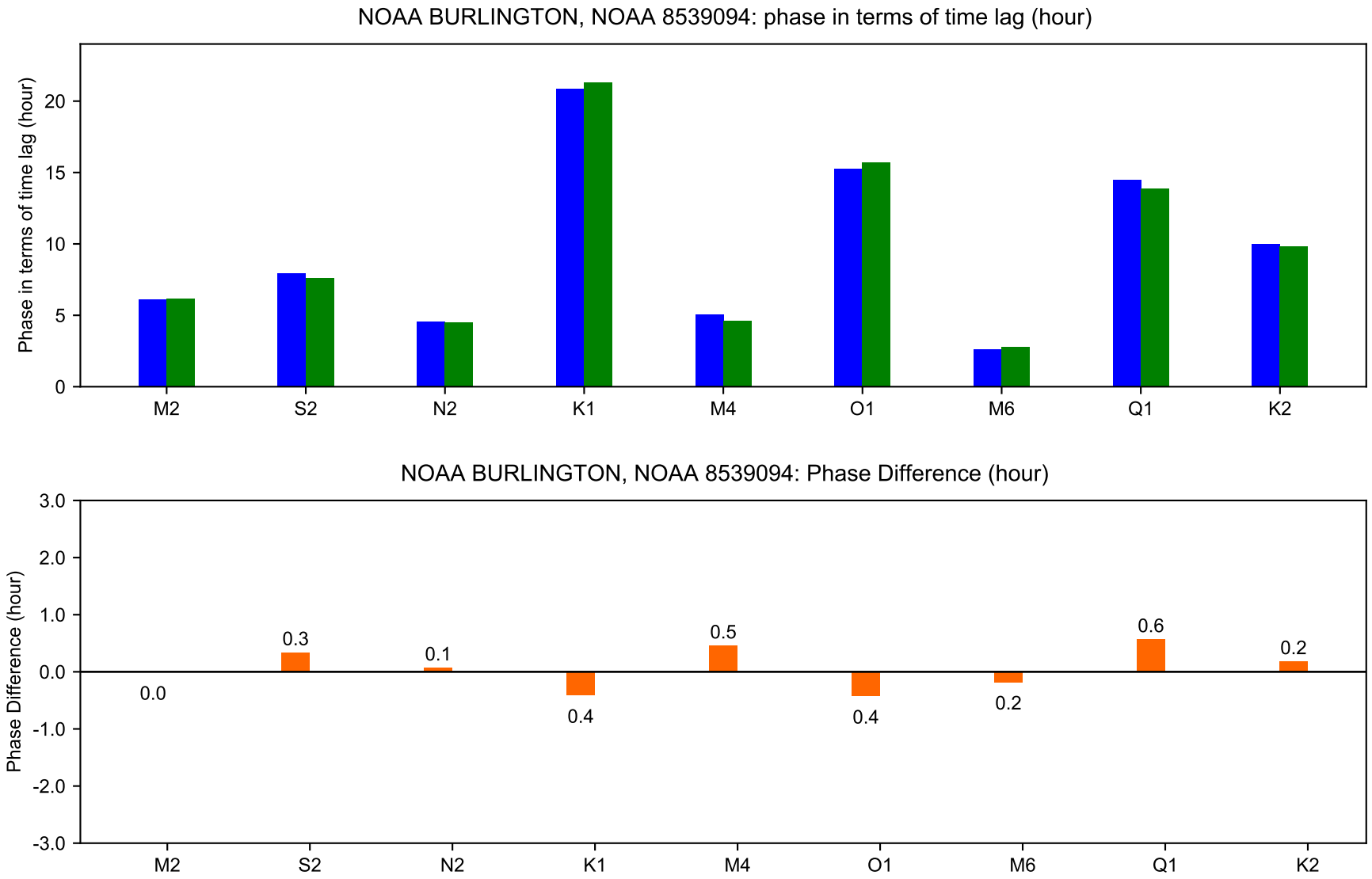
Figure 3.3-2 (9b)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA BURLINGTON, NOAA Station 8539094

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.



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EFDC Model (T-Tide)
NOAA Data (T-Tide)
Difference (EFDC - NOAA)

Figure 3.3-2 (9c)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA BURLINGTON, NOAA Station 8539094

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

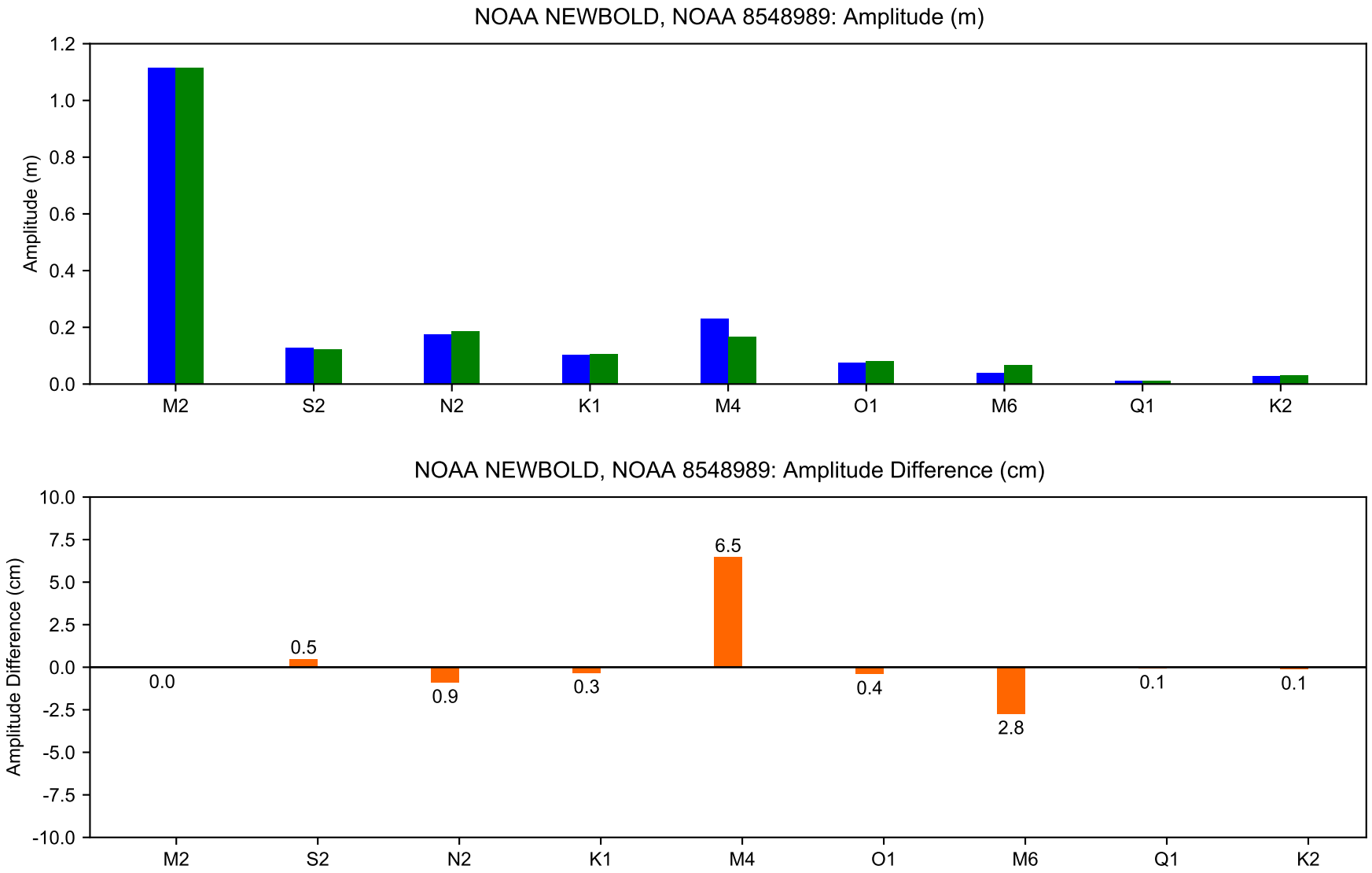

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Figure 3.3-2 (10a)

Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Amplitude at NOAA NEWBOLD, NOAA Station 8548989

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

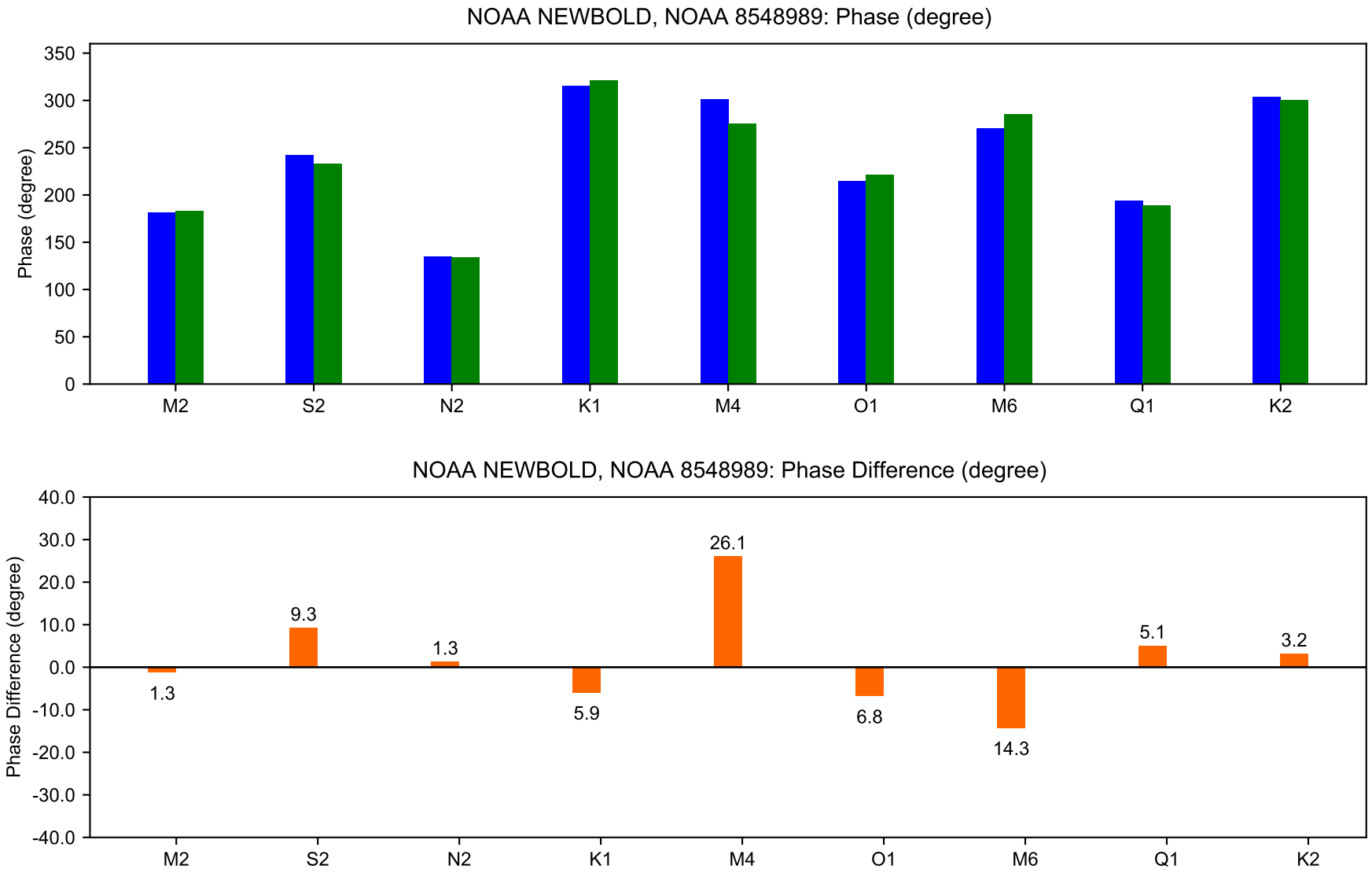

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Figure 3.3-2 (10b)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA NEWBOLD, NOAA Station 8548989

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

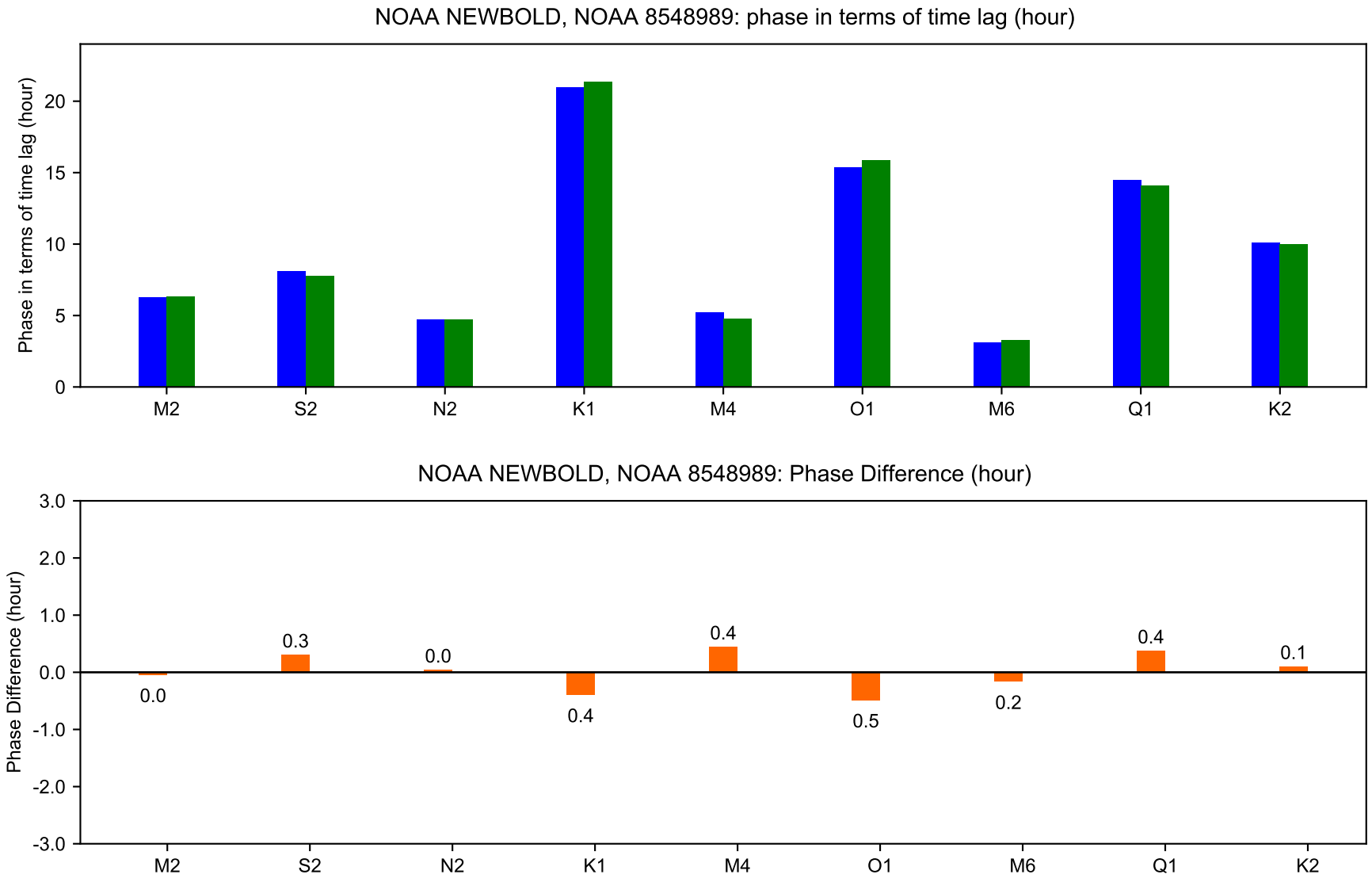

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Figure 3.3-2 (10c)
Tidal Harmonics Analysis Based on Predicted Water Surface Elevation: Phase at NOAA NEWBOLD, NOAA Station 8548989

Notes: Run ID: EFDC_HYDRO_G72_2020-05-16, Fine grid GVC, Grid 7.2, KC = 12.
Results from 01-01-2018 to 12-31-2019 were used for tidal harmonic analysis using T_Tide program.

Appendix G: Observed and predicted water surface elevations

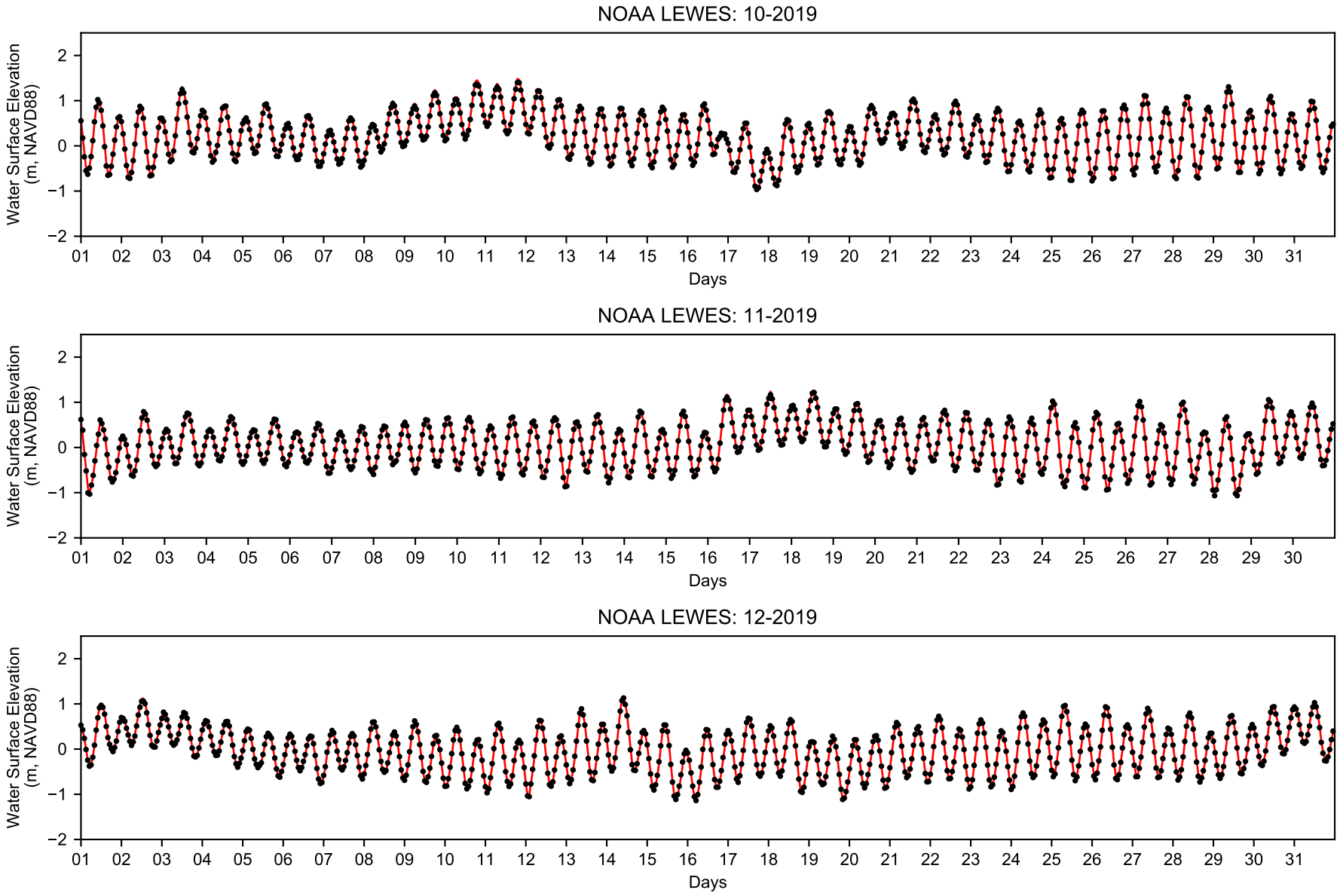

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Figure 3.3-3 (1)

Observed and Predicted Water Surface Elevation at NOAA LEWES

NOAA hourly verified data were used. Station ID: 8557380
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

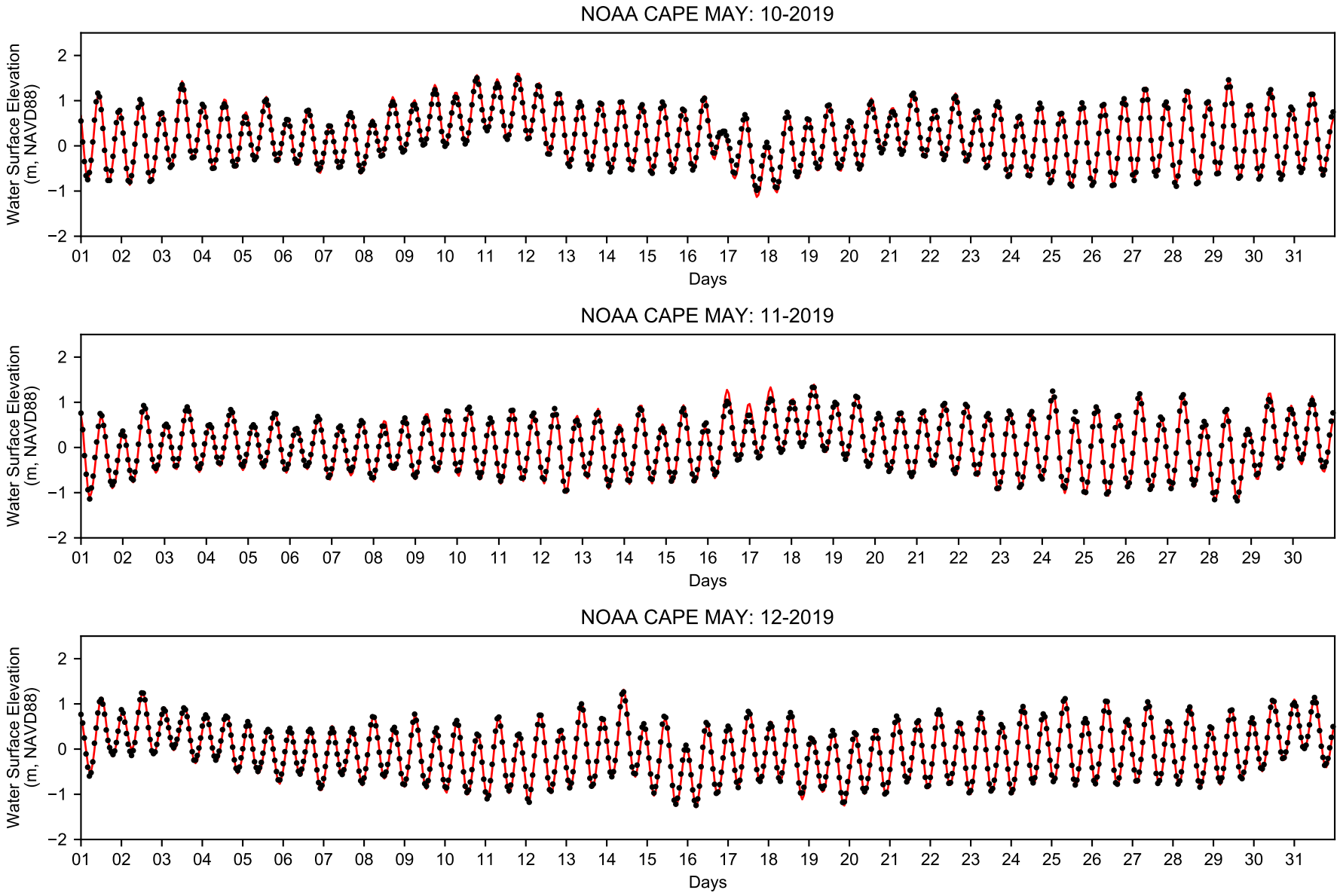

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Figure 3.3-3 (2)

Observed and Predicted Water Surface Elevation at NOAA CAPE MAY

NOAA hourly verified data were used. Station ID: 8536110
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

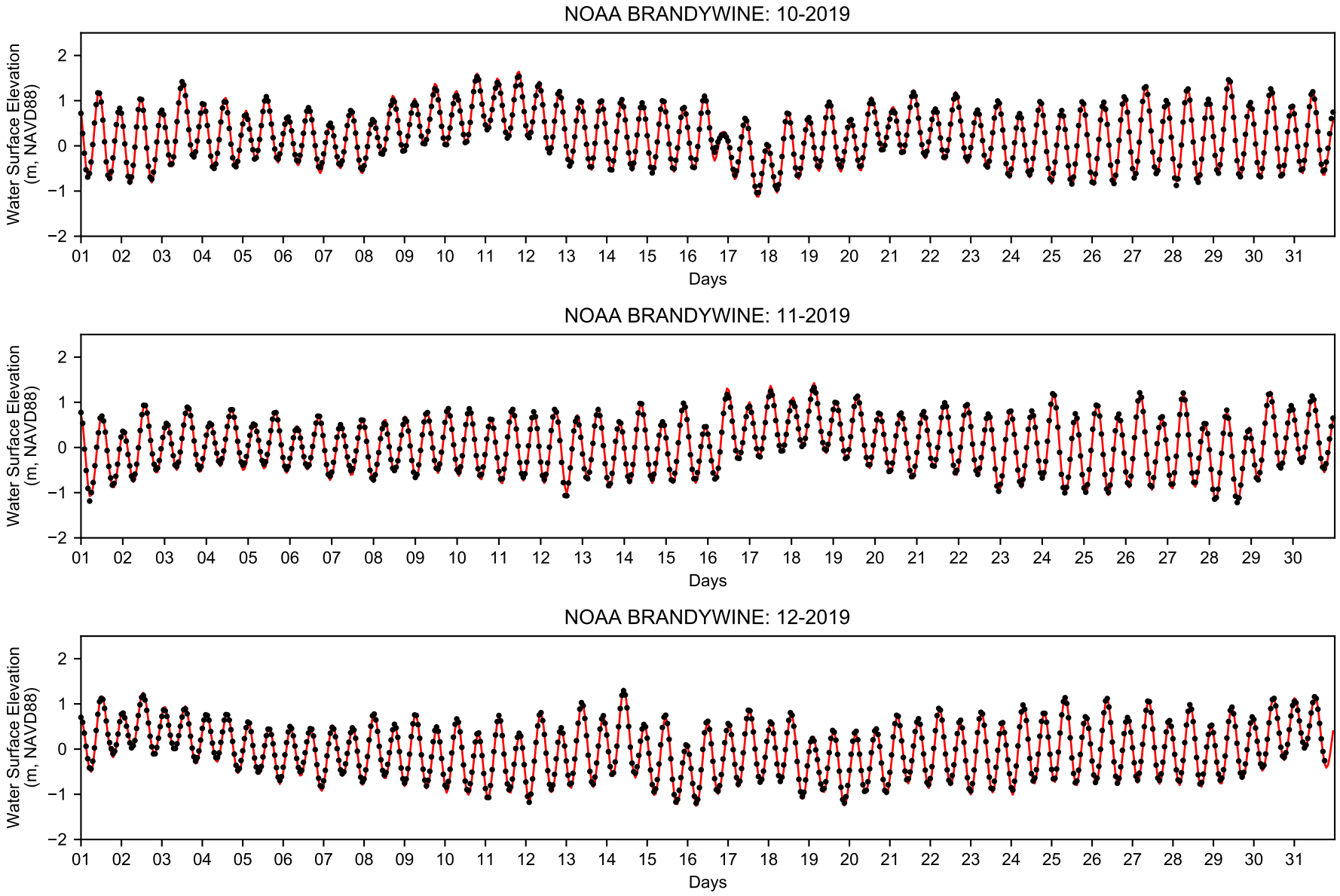

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Figure 3.3-3 (3)

Observed and Predicted Water Surface Elevation at NOAA BRANDYWINE

NOAA hourly verified data were used. Station ID: 8555889
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

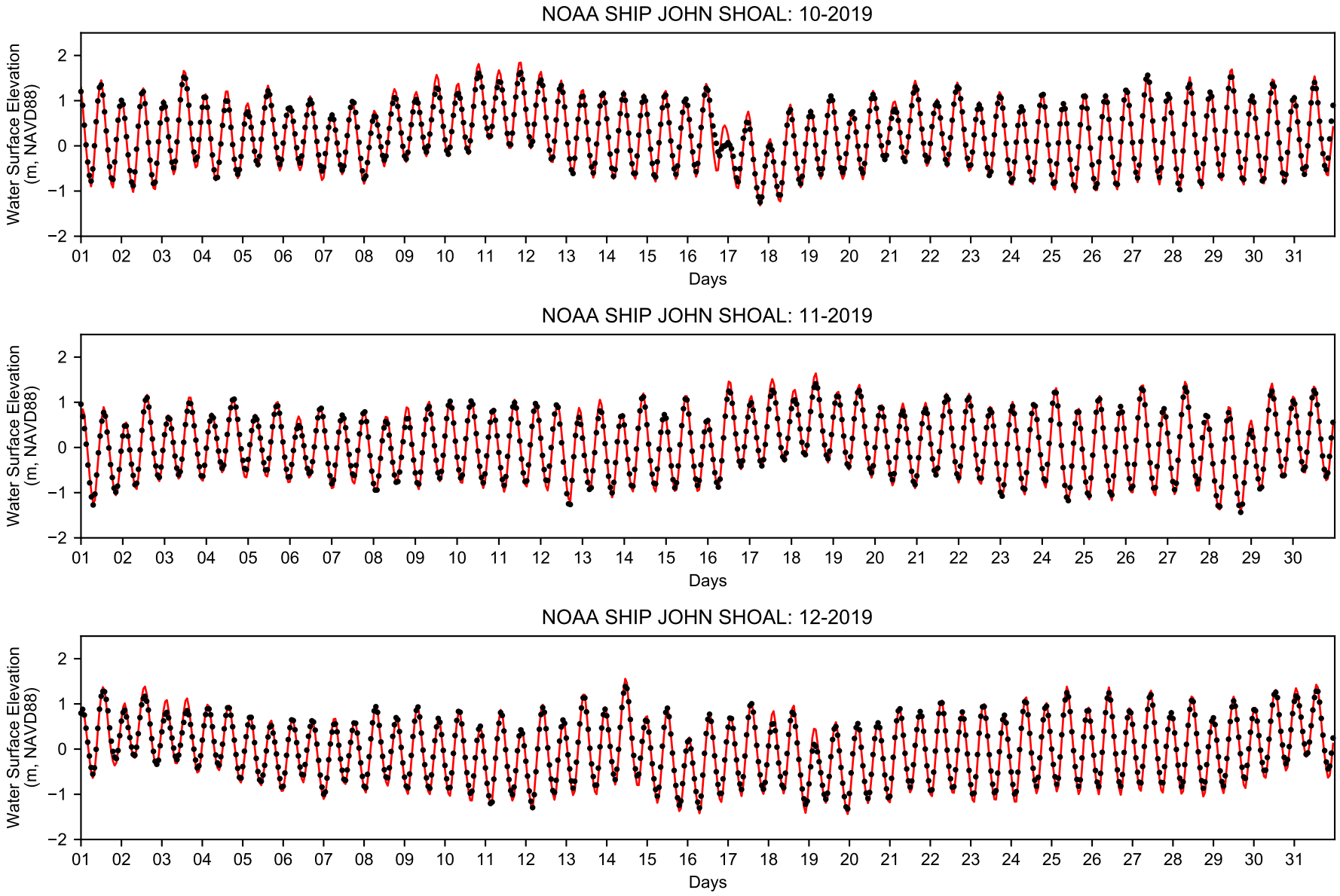

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Figure 3.3-3 (4)

Observed and Predicted Water Surface Elevation at NOAA SHIP JOHN SHOAL

NOAA hourly verified data were used. Station ID: 8537121
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

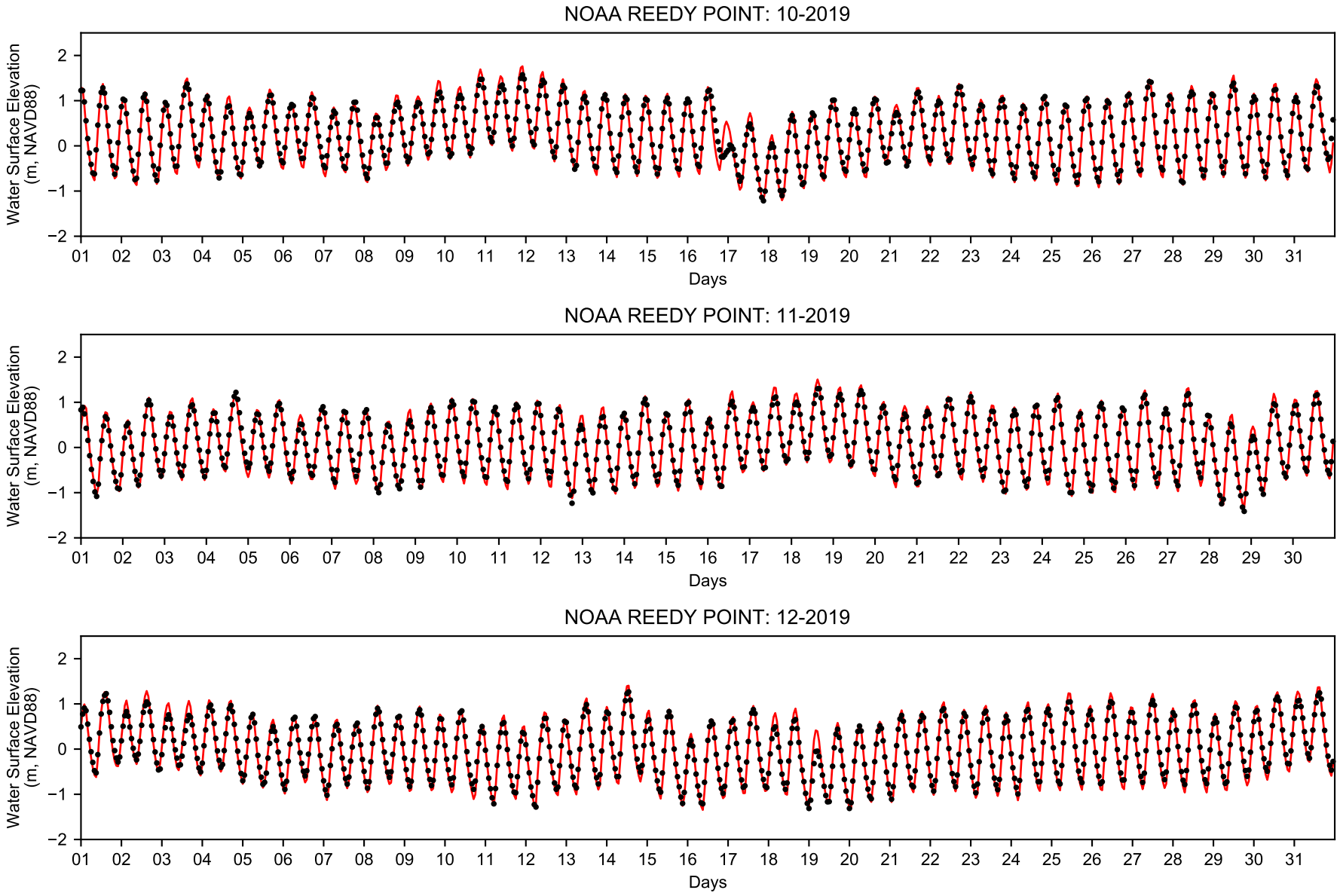

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Figure 3.3-3 (5)

Observed and Predicted Water Surface Elevation at NOAA REEDY POINT

NOAA hourly verified data were used. Station ID: 8551910
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

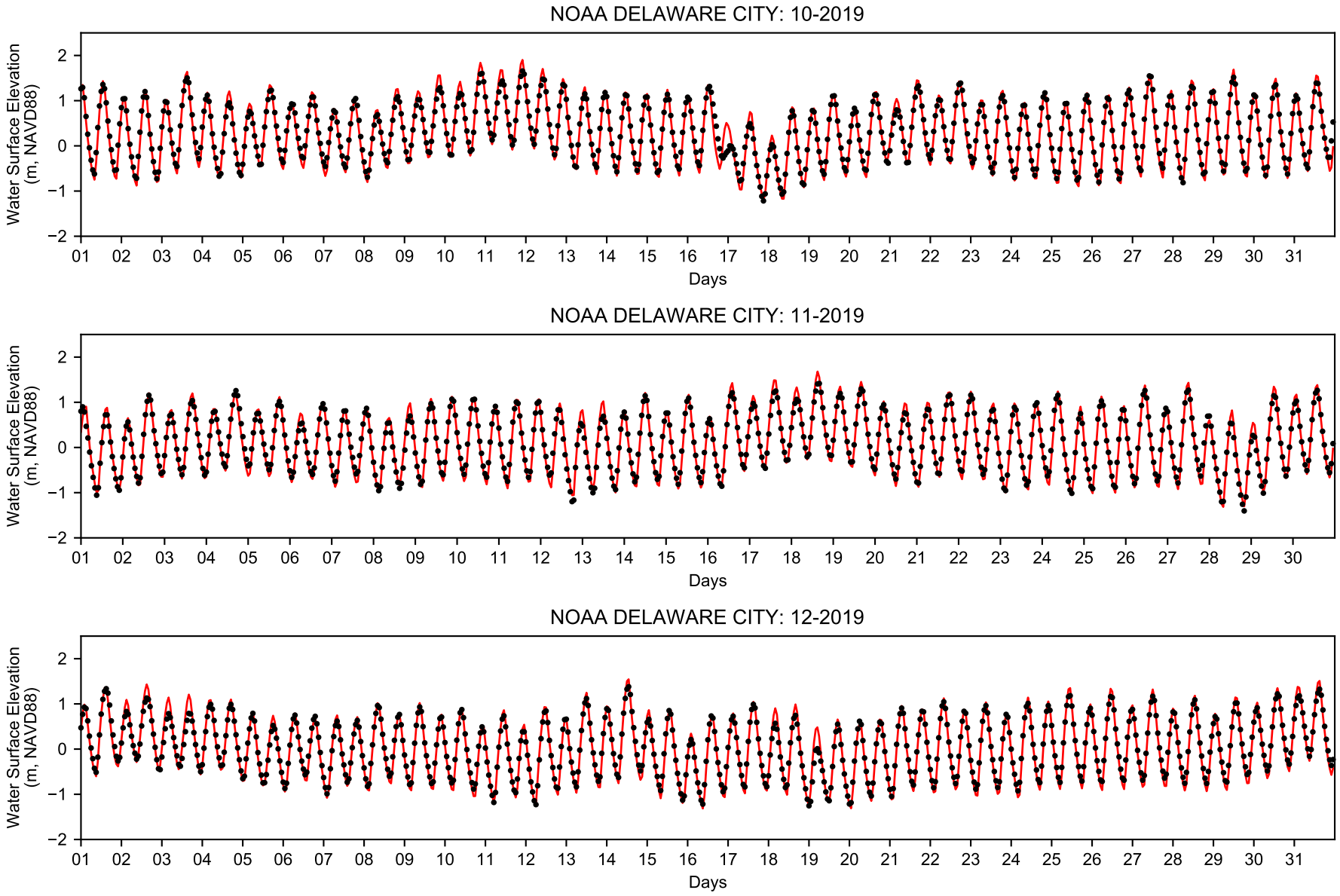

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Figure 3.3-3 (6)

Observed and Predicted Water Surface Elevation at NOAA DELAWARE CITY

NOAA hourly verified data were used. Station ID: 8551762
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

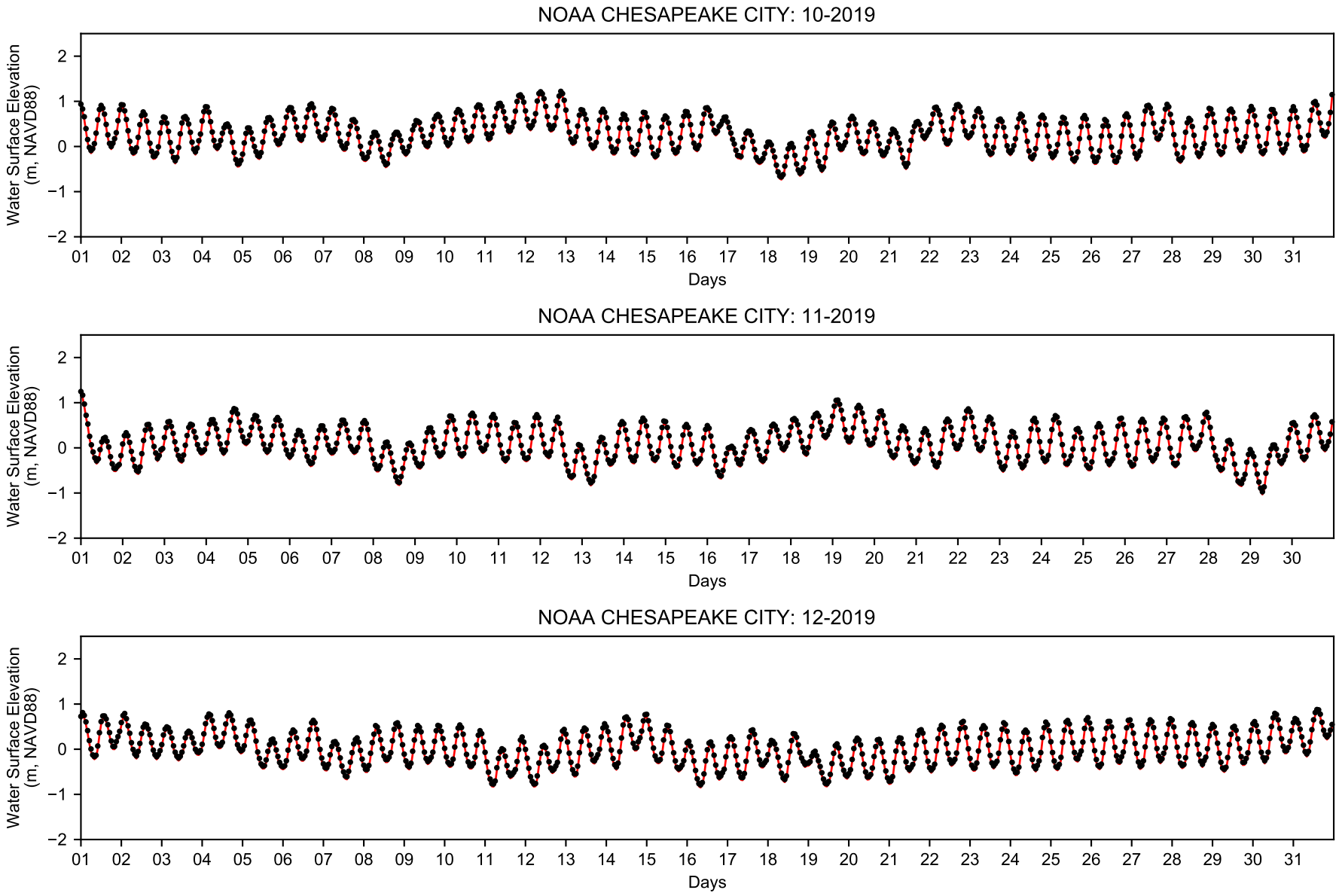

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Figure 3.3-3 (7)

Observed and Predicted Water Surface Elevation at NOAA CHESAPEAKE CITY

NOAA hourly verified data were used. Station ID: 8573927
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

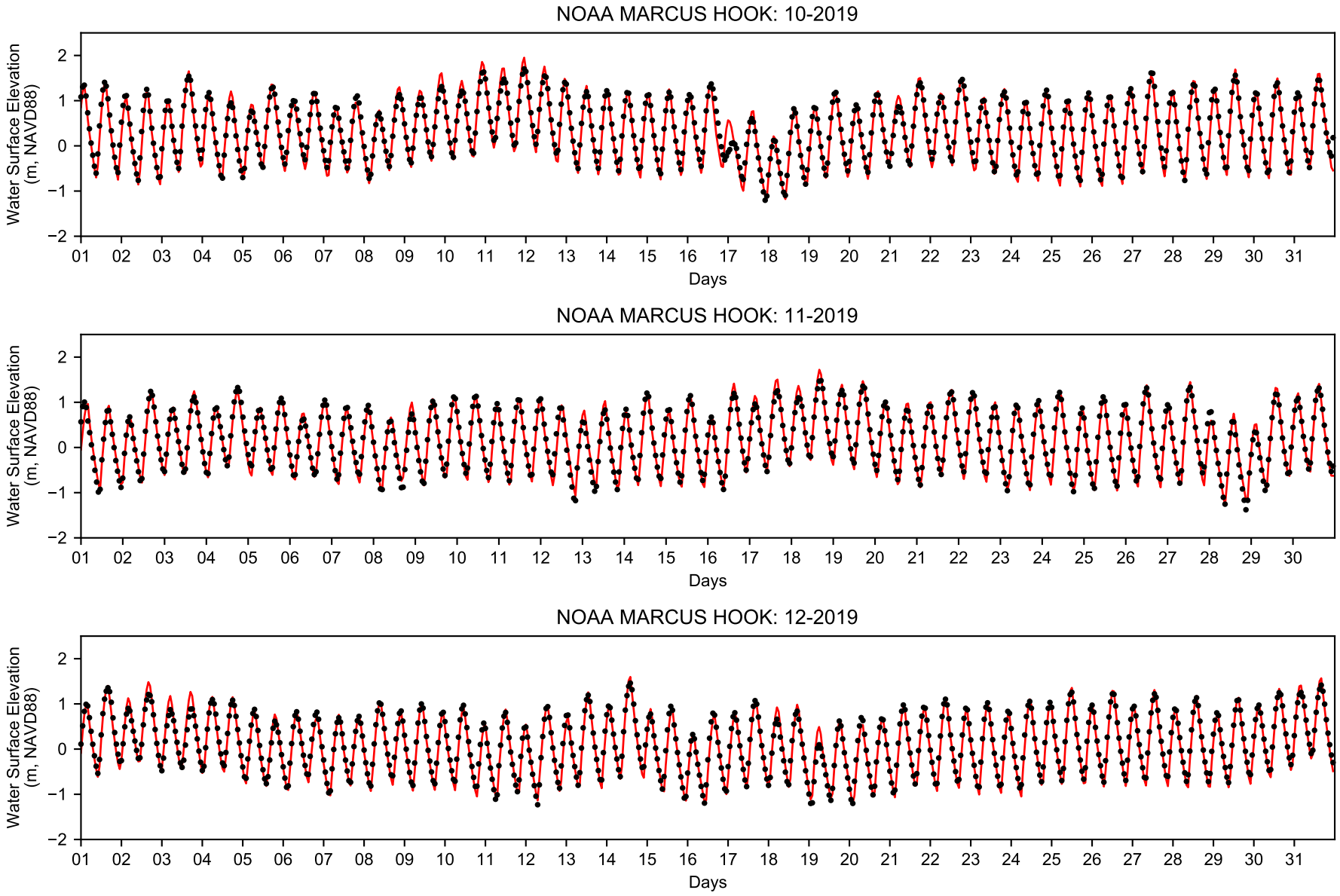

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Figure 3.3-3 (8)

Observed and Predicted Water Surface Elevation at NOAA MARCUS HOOK

NOAA hourly verified data were used. Station ID: 8540433
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

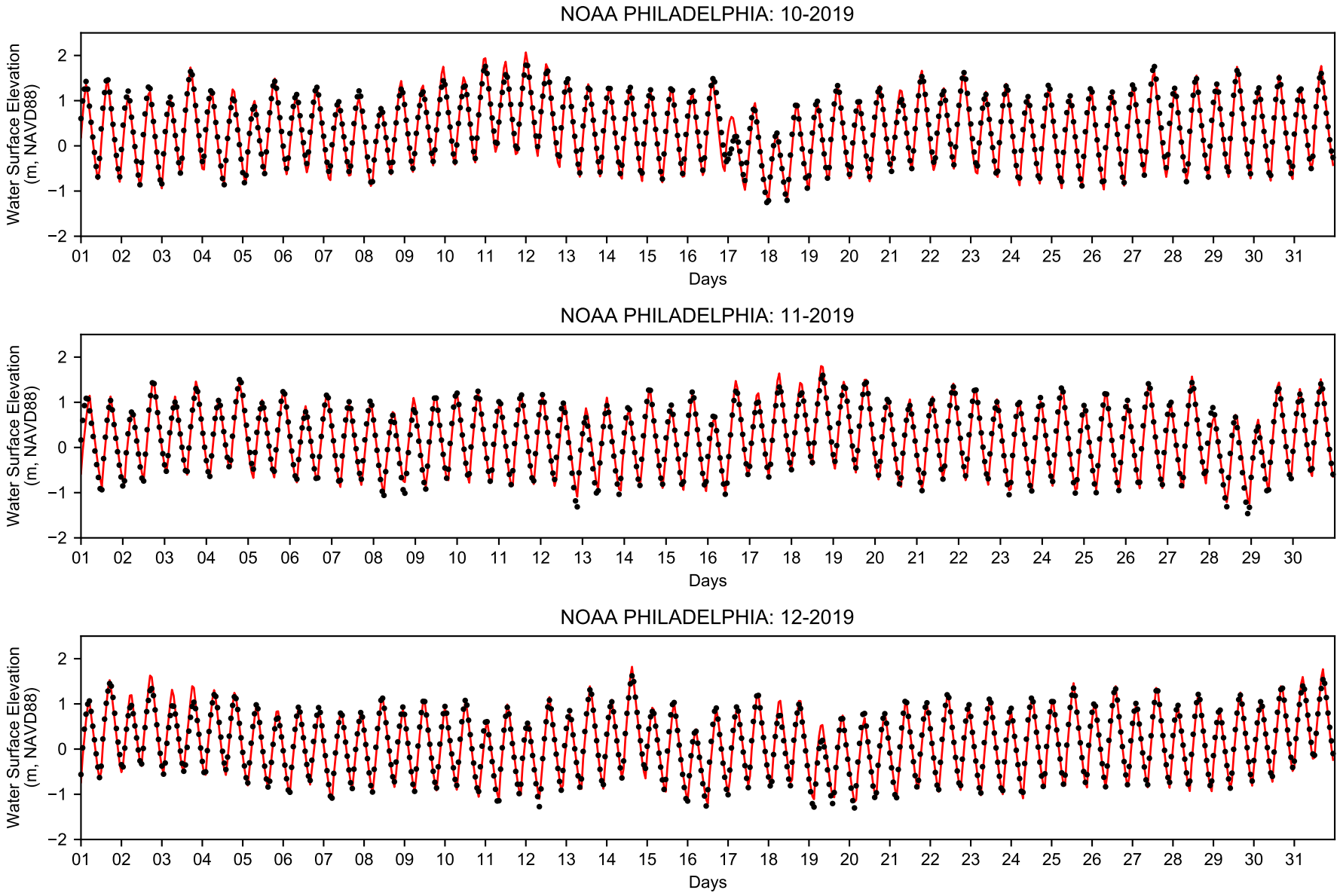

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Figure 3.3-3 (9)

Observed and Predicted Water Surface Elevation at NOAA PHILADELPHIA

NOAA hourly verified data were used. Station ID: 8545240
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

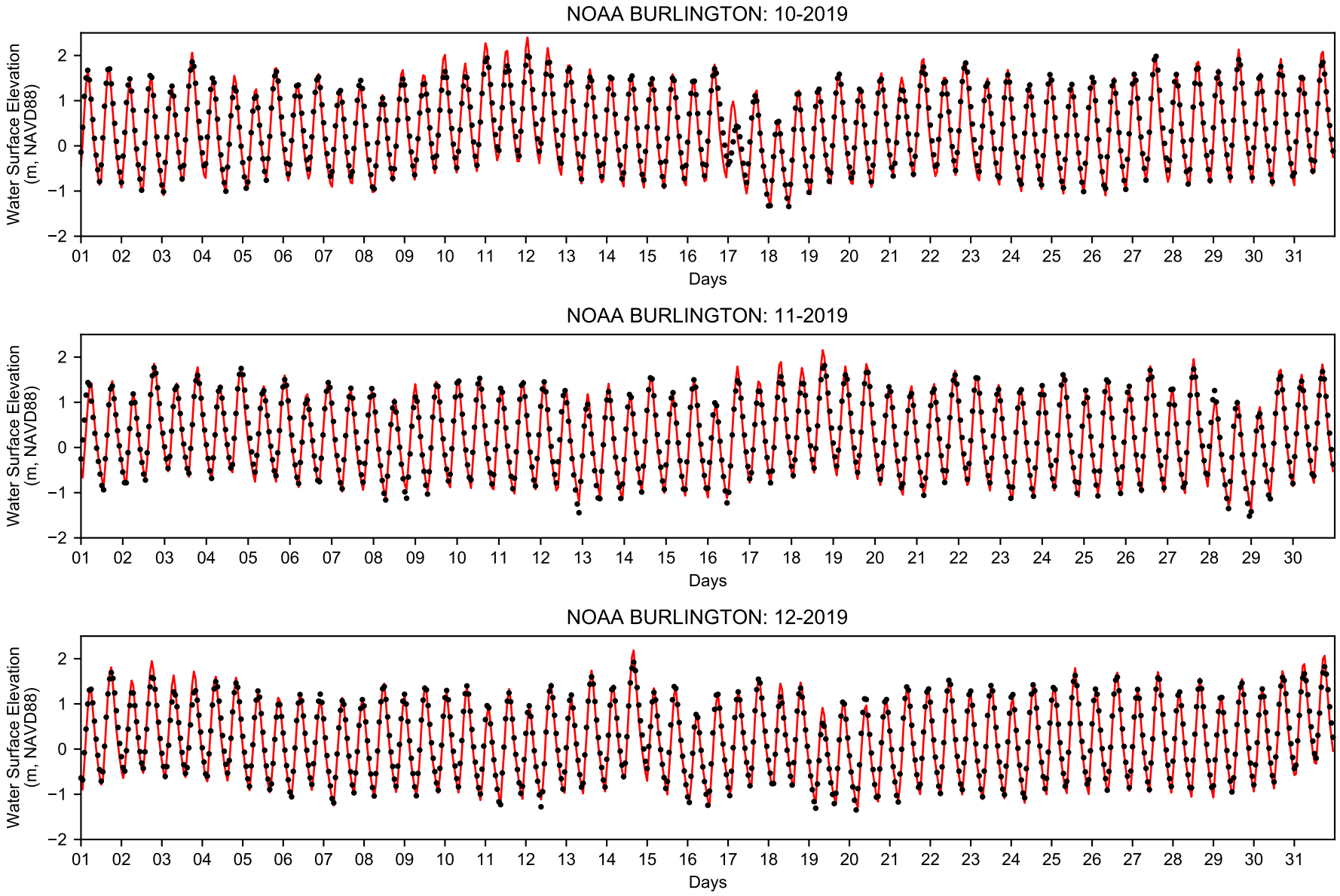

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Figure 3.3-3 (10)

Observed and Predicted Water Surface Elevation at NOAA BURLINGTON

NOAA hourly verified data were used. Station ID: 8539094
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

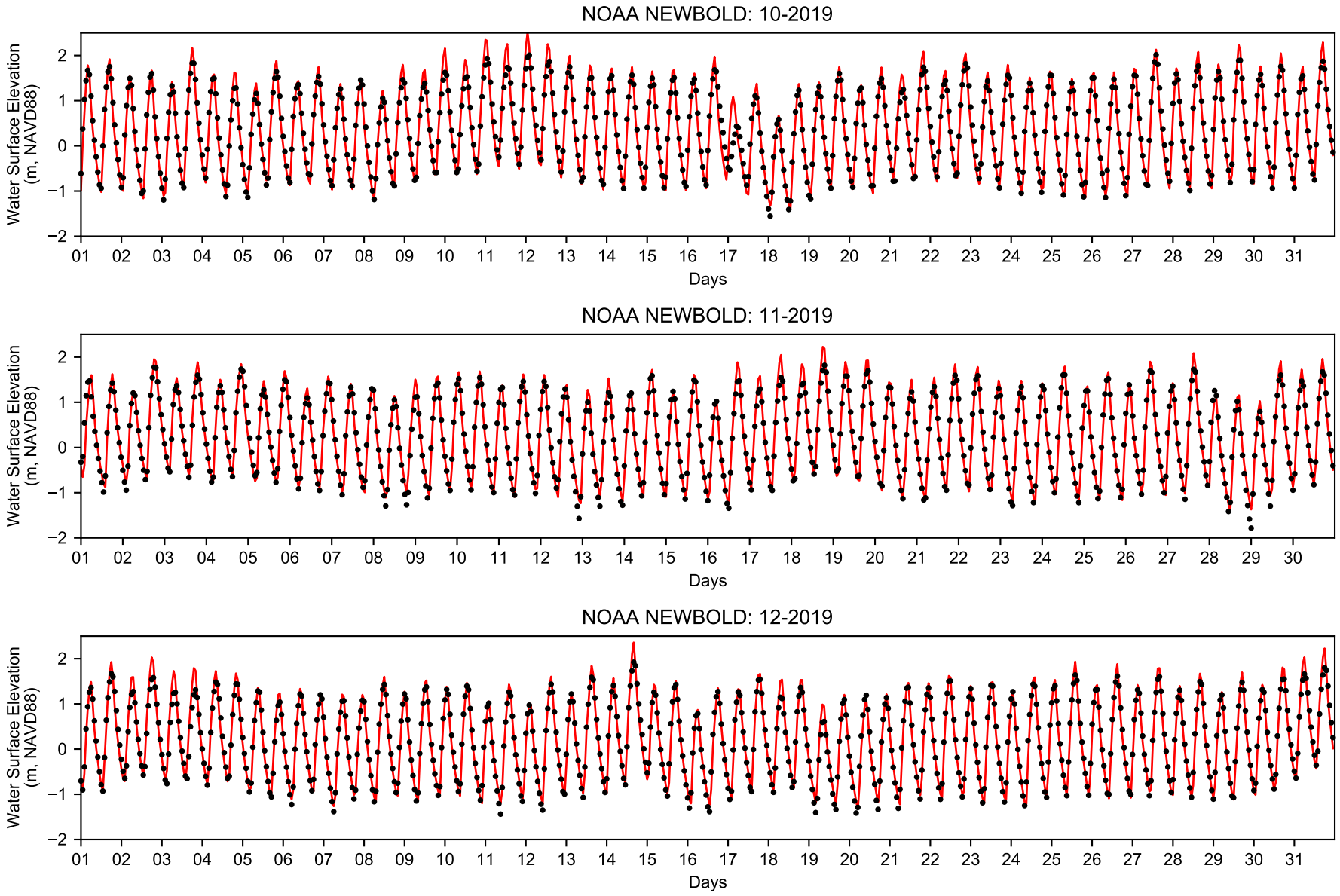

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Figure 3.3-3 (11)

Observed and Predicted Water Surface Elevation at NOAA NEWBOLD

NOAA hourly verified data were used. Station ID: 8548989
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

Appendix H: Comparison of observed and predicted water surface elevation

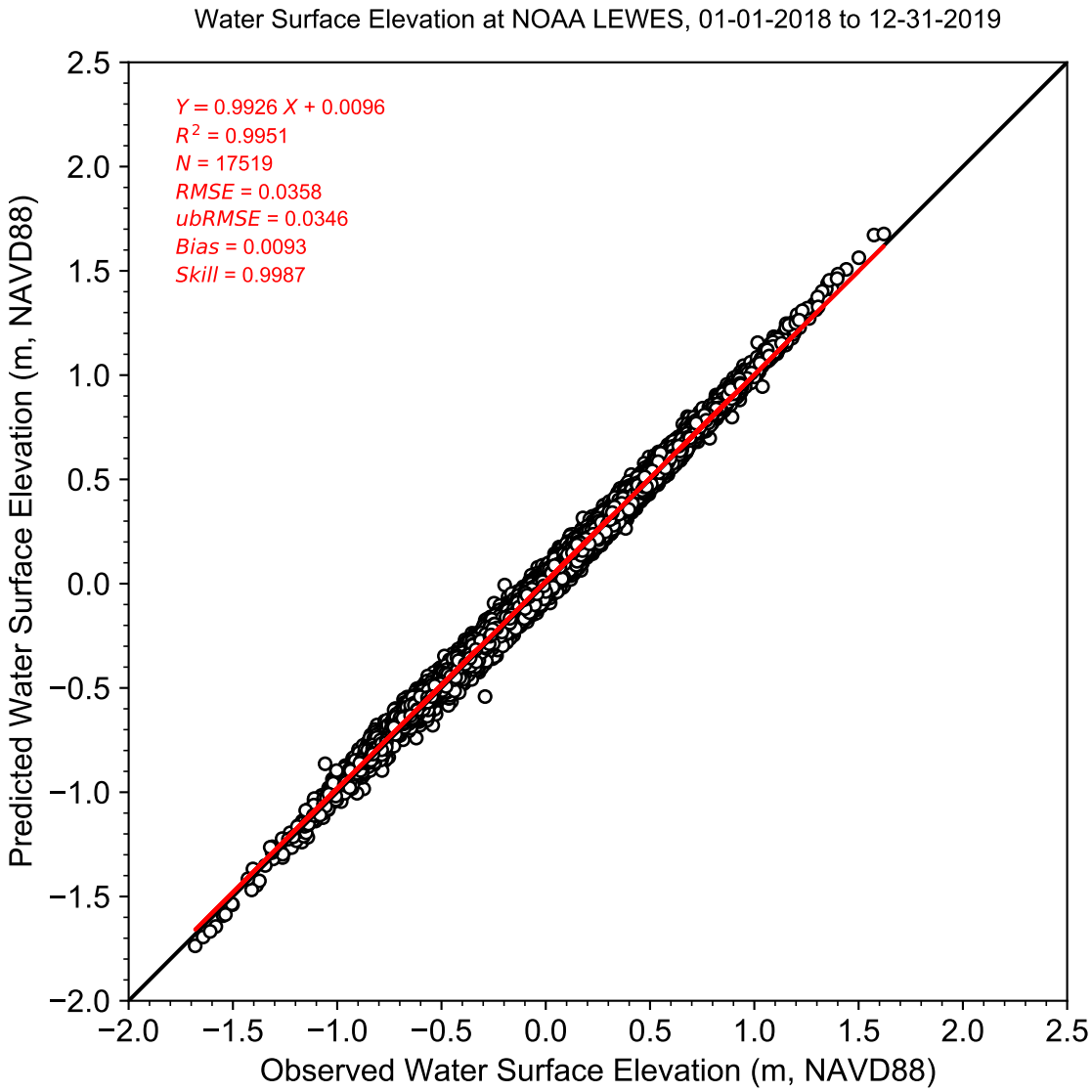

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Figure 3.3-4 (1)
Comparison of Observed and Predicted Water Surface Elevation at NOAA LEWES

NOAA hourly verified data were used. Station ID: 8557380
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

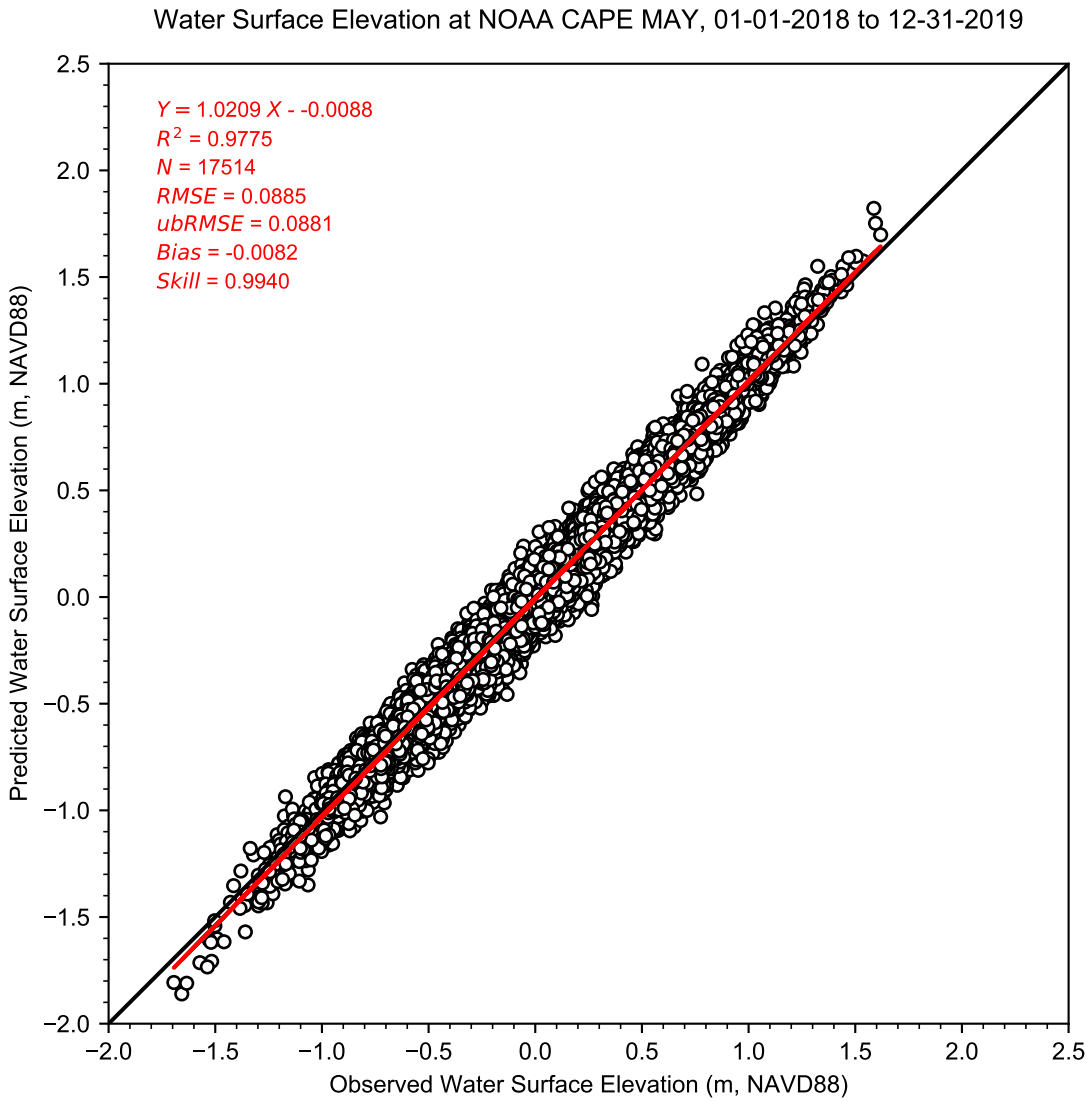

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Figure 3.3-4 (2)
Comparison of Observed and Predicted Water Surface Elevation at NOAA CAPE MAY

NOAA hourly verified data were used. Station ID: 8536110
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

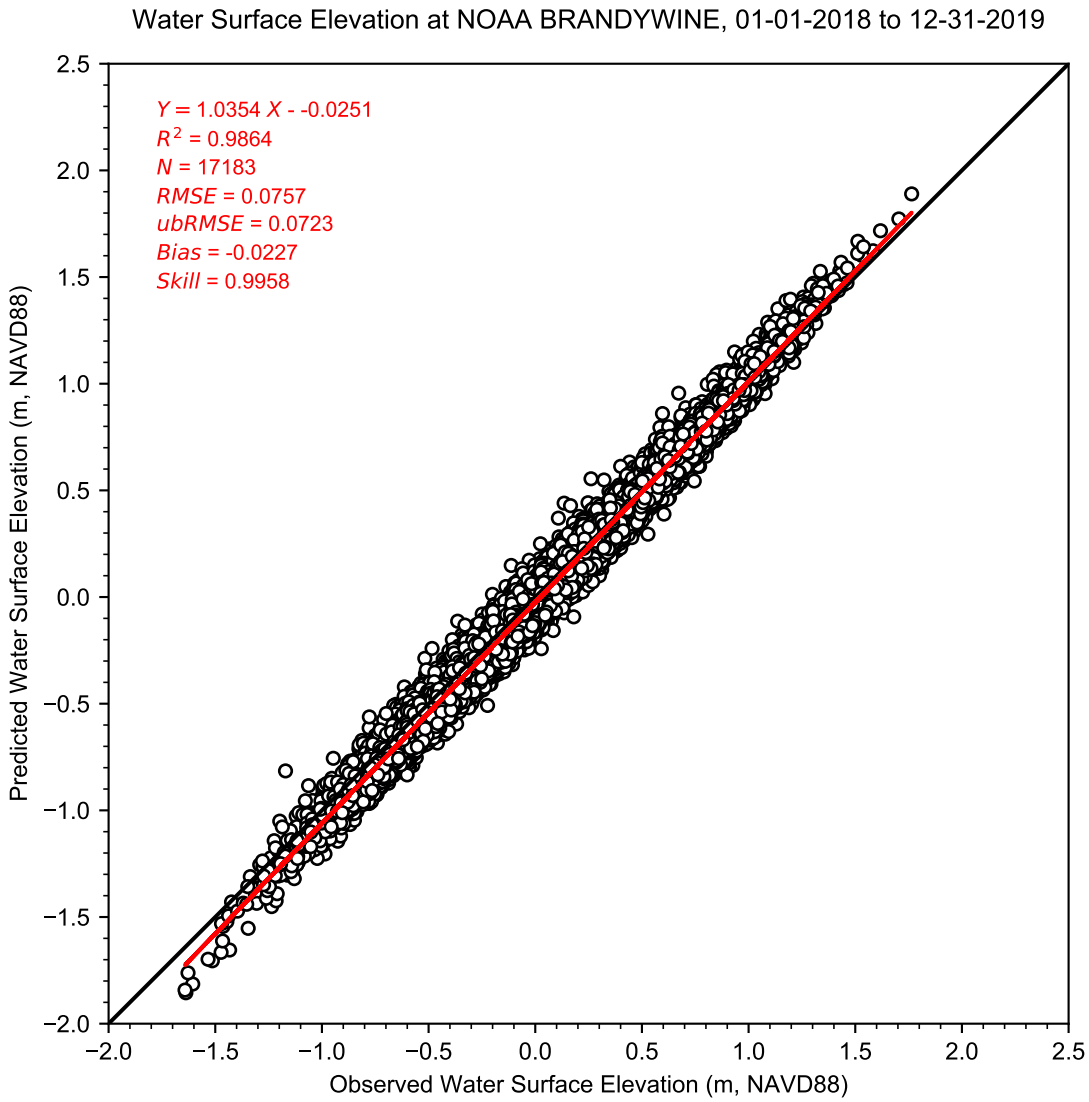

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Figure 3.3-4 (3)
Comparison of Observed and Predicted Water Surface Elevation at NOAA BRANDYWINE

NOAA hourly verified data were used. Station ID: 8555889
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

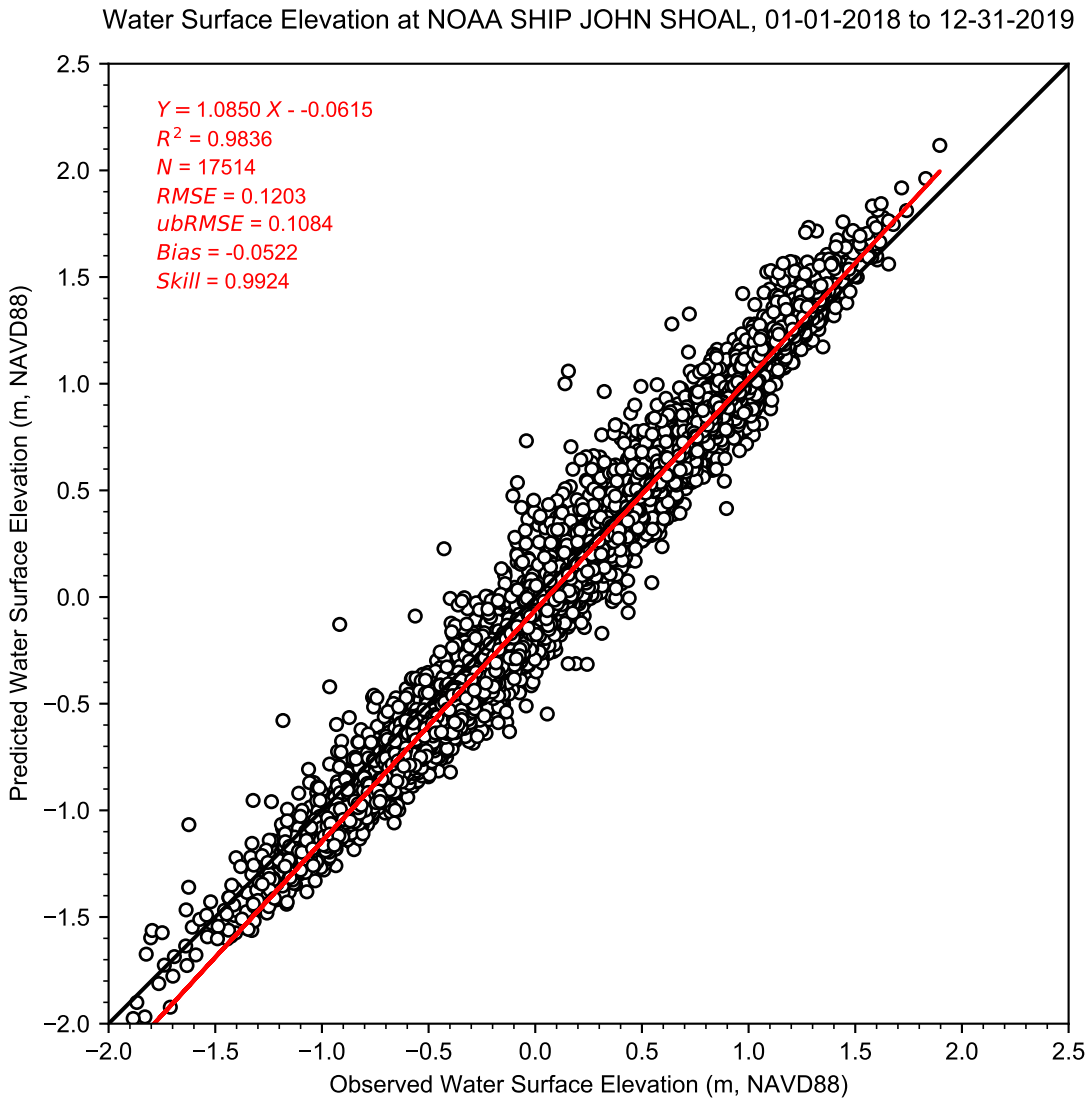

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Figure 3.3-4 (4)
Comparison of Observed and Predicted Water Surface Elevation at NOAA SHIP JOHN SHOAL

NOAA hourly verified data were used. Station ID: 8537121
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

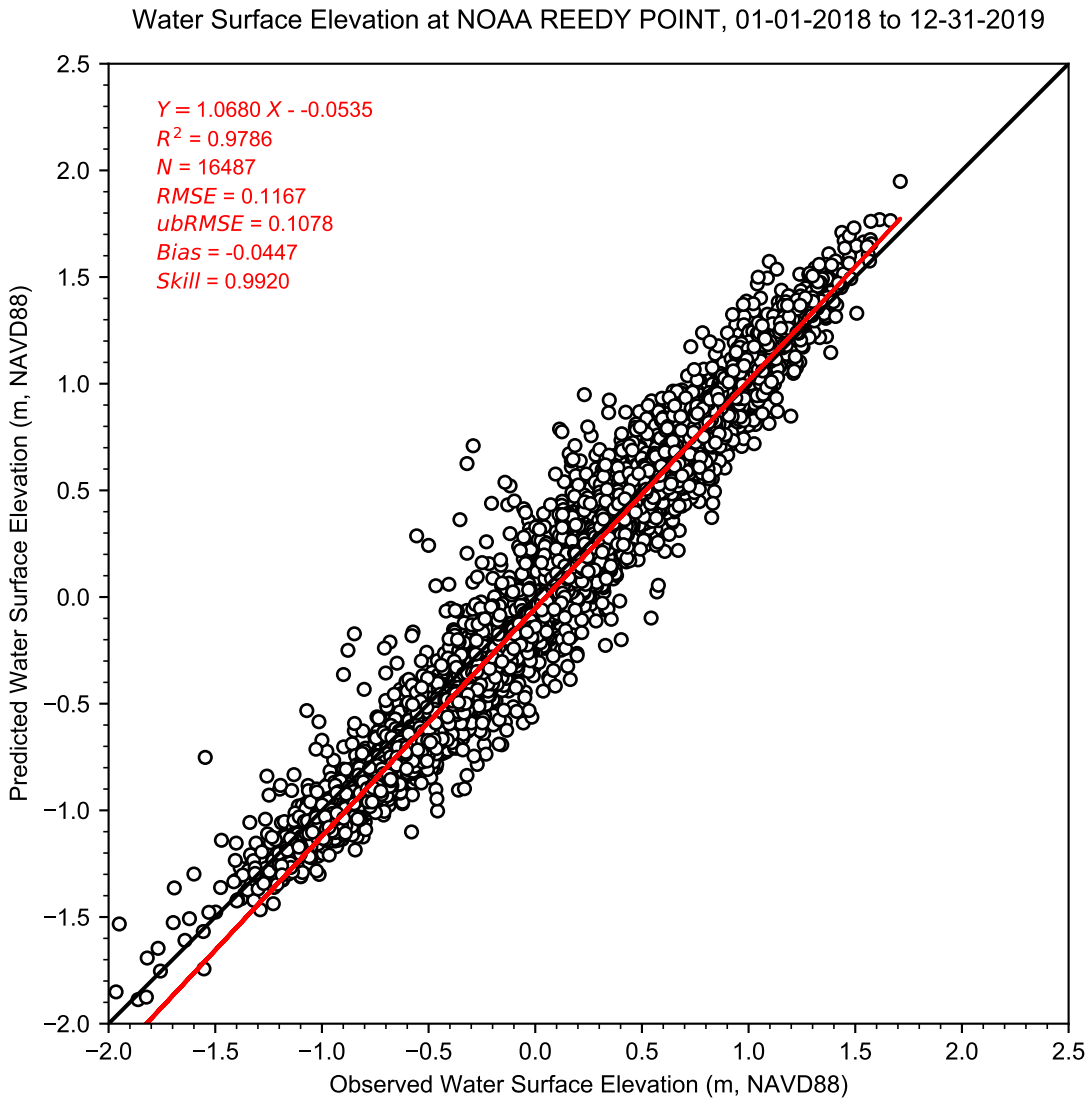

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Figure 3.3-4 (5)
Comparison of Observed and Predicted Water Surface Elevation at NOAA REEDY POINT

NOAA hourly verified data were used. Station ID: 8551910
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

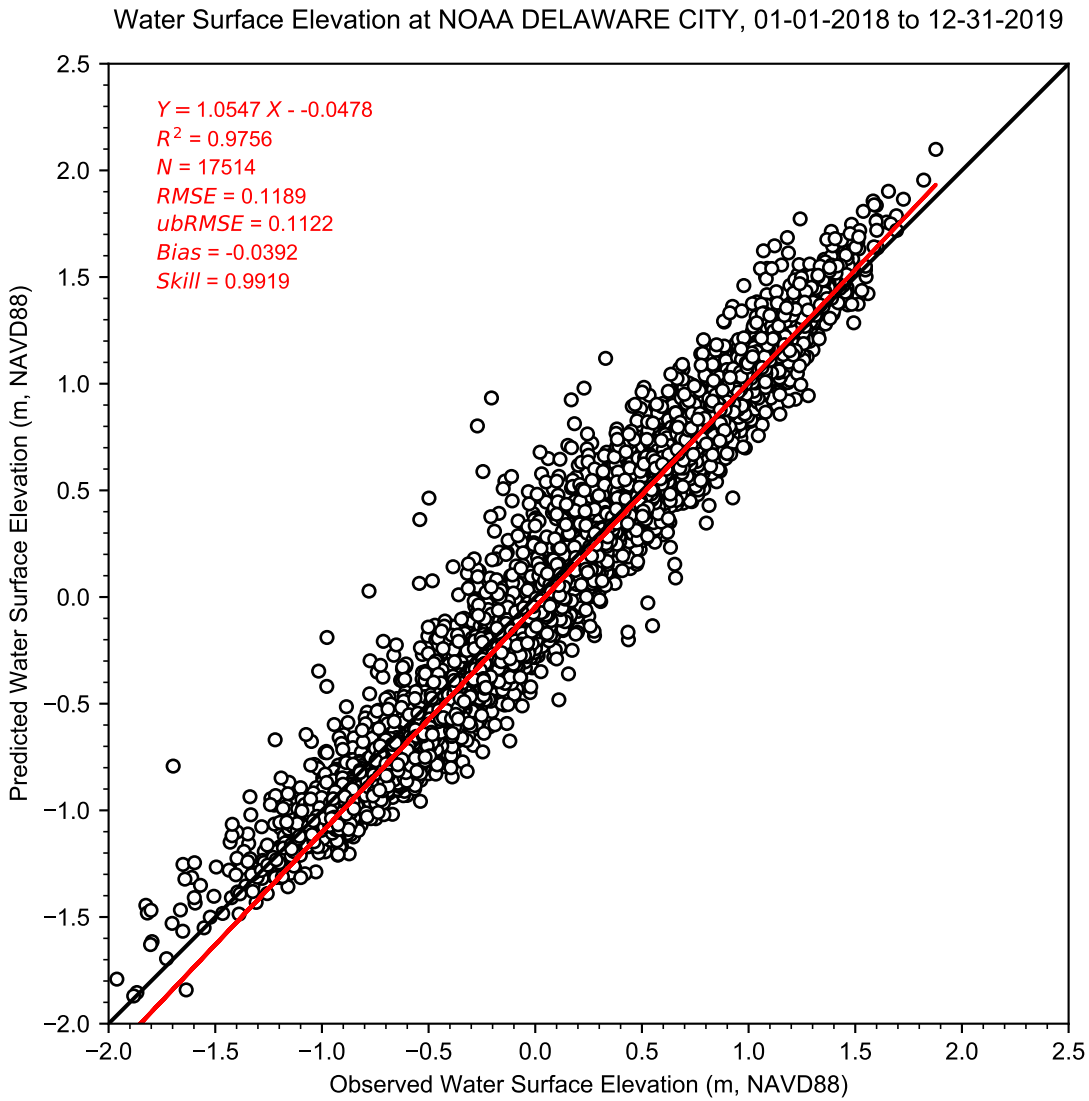

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Figure 3.3-4 (6)
Comparison of Observed and Predicted Water Surface Elevation at NOAA DELAWARE CITY

NOAA hourly verified data were used. Station ID: 8551762
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

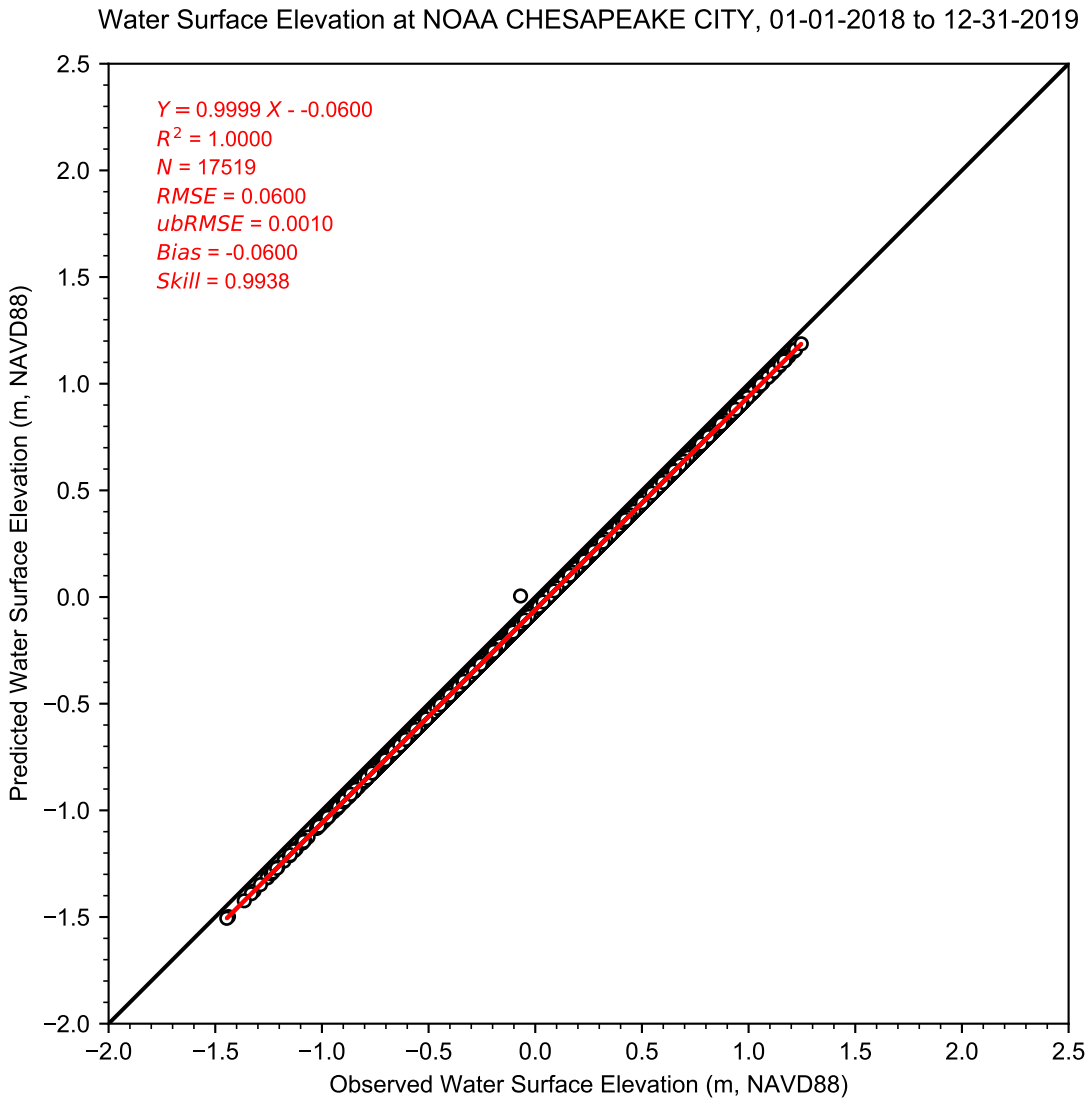

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Figure 3.3-4 (7)
Comparison of Observed and Predicted Water Surface Elevation at NOAA CHESAPEAKE CITY

NOAA hourly verified data were used. Station ID: 8573927
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

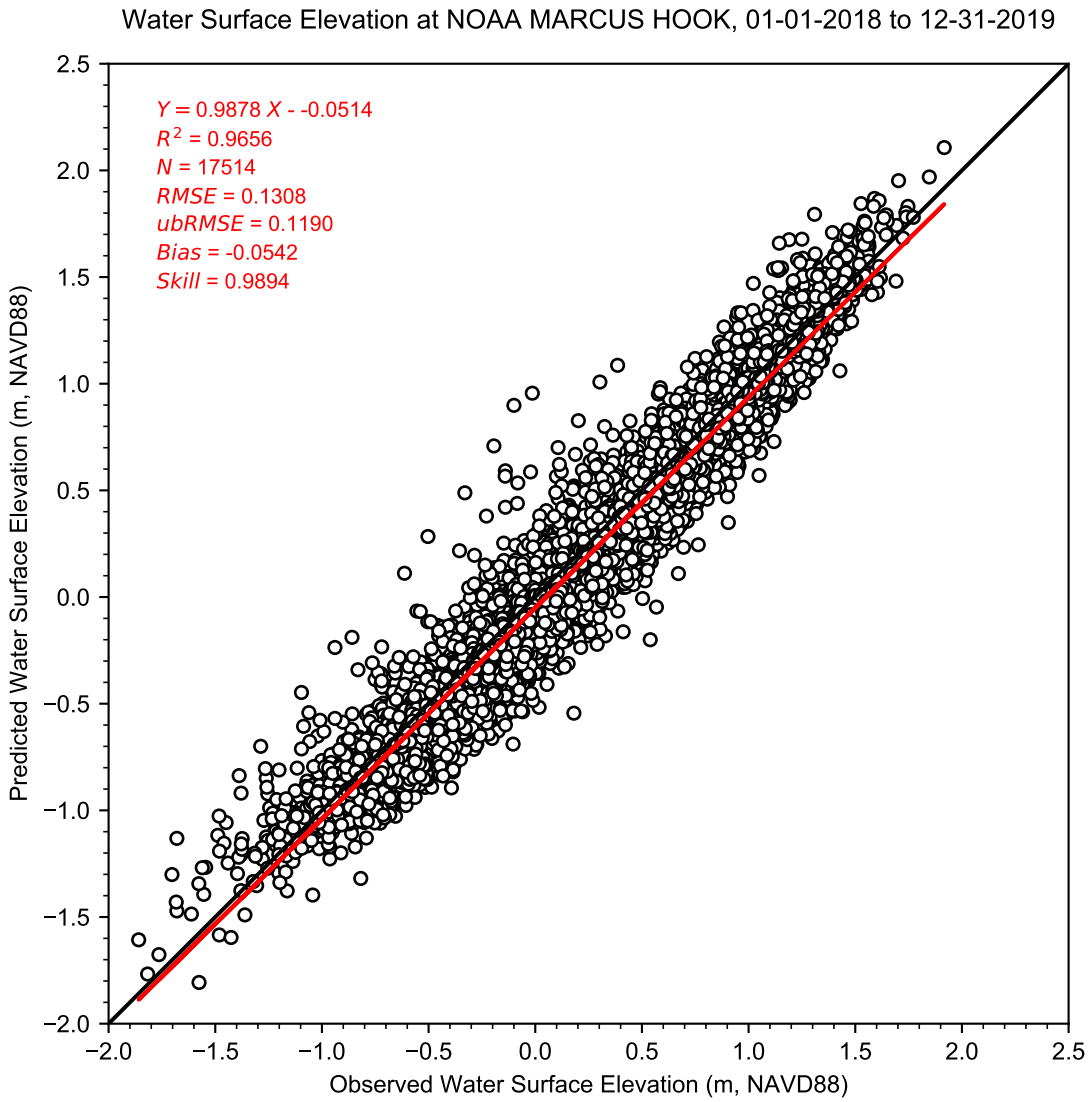

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Figure 3.3-4 (8)
Comparison of Observed and Predicted Water Surface Elevation at NOAA MARCUS HOOK

NOAA hourly verified data were used. Station ID: 8540433
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

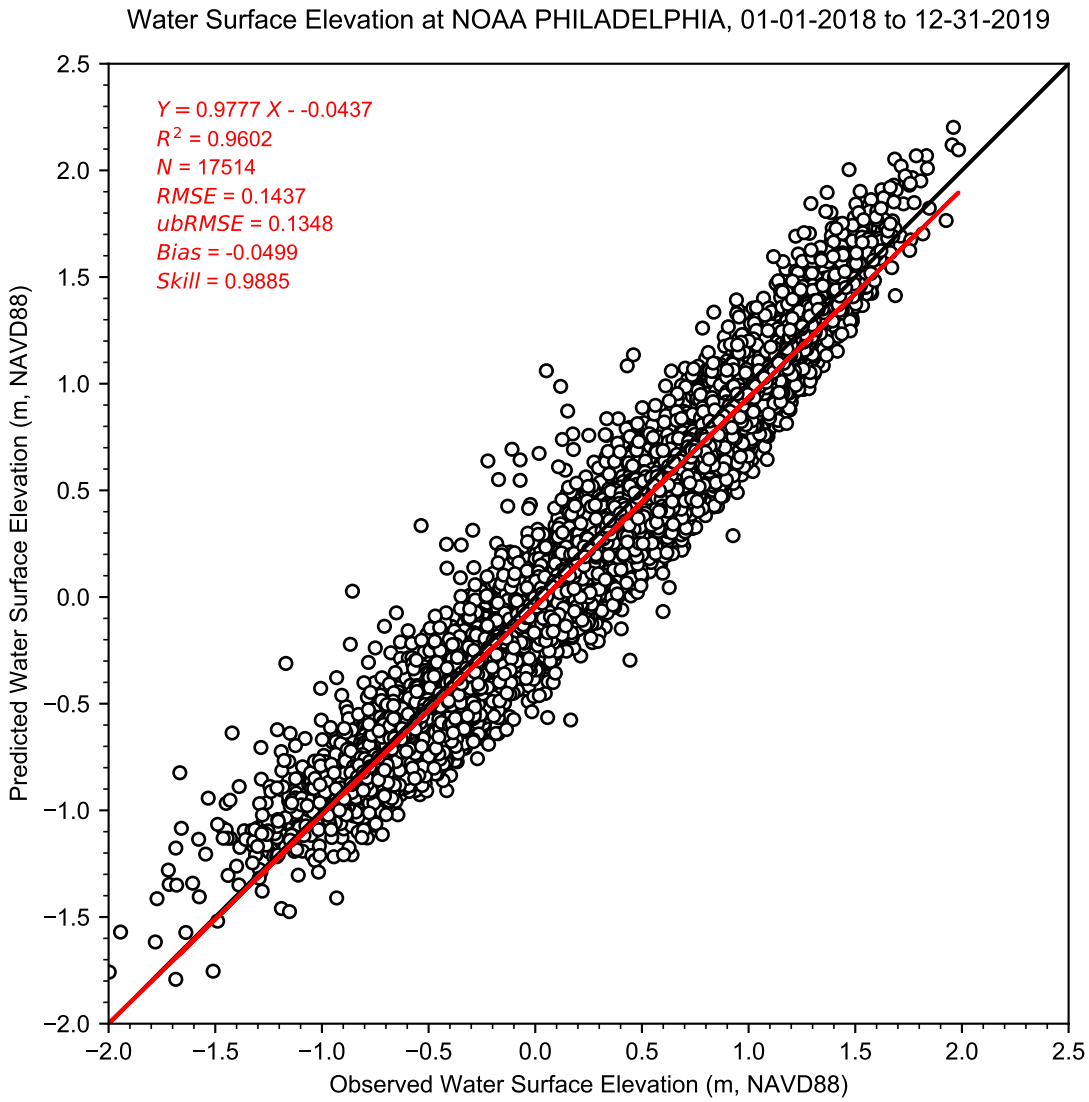

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Figure 3.3-4 (9)
Comparison of Observed and Predicted Water Surface Elevation at NOAA PHILADELPHIA

NOAA hourly verified data were used. Station ID: 8545240
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

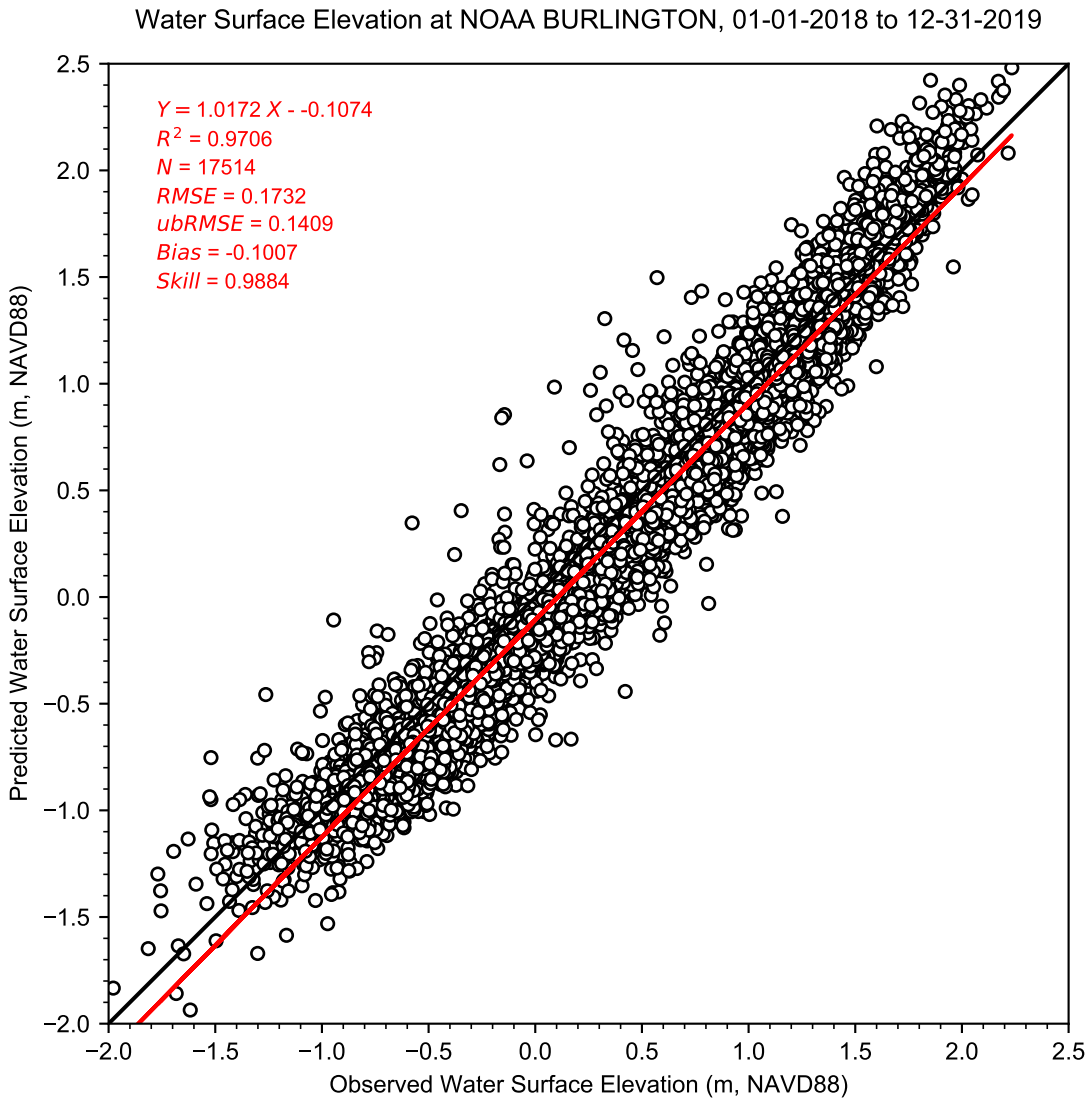

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Figure 3.3-4 (10)
Comparison of Observed and Predicted Water Surface Elevation at NOAA BURLINGTON

NOAA hourly verified data were used. Station ID: 8539094
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

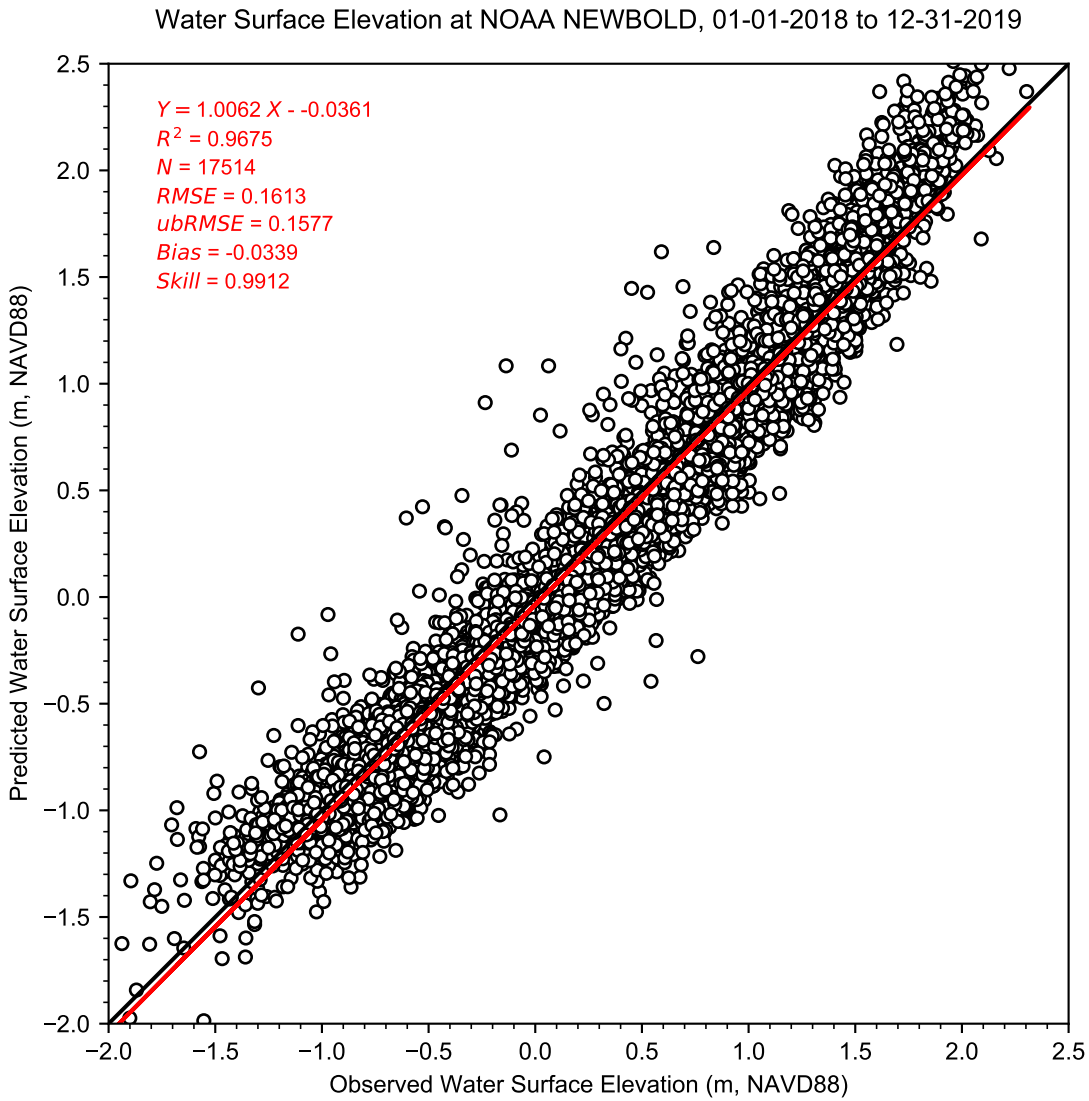

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Figure 3.3-4 (11)
Comparison of Observed and Predicted Water Surface Elevation at NOAA NEWBOLD

NOAA hourly verified data were used. Station ID: 8548989
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2 CTE3=12.

Appendix I: Observed and predicted depth-averaged current velocity magnitude

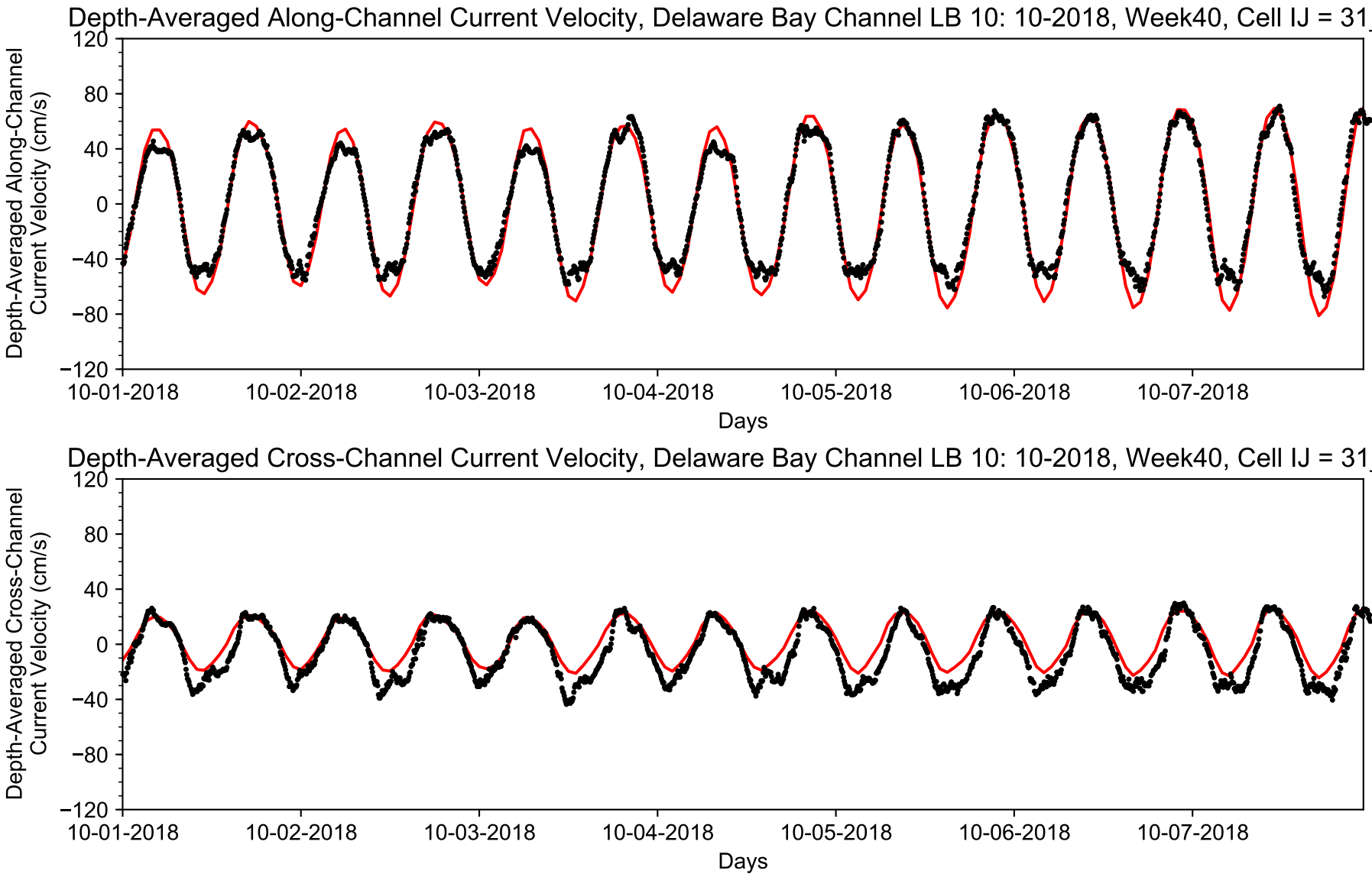

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Figure 3.3-5
Observed and Predicted Depth-Averaged Along and Cross-Channel Current Velocity at Delaware Bay Channel LB 10

Notes: Station ID: DB0502, Delaware Bay Channel LB 10
Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2.

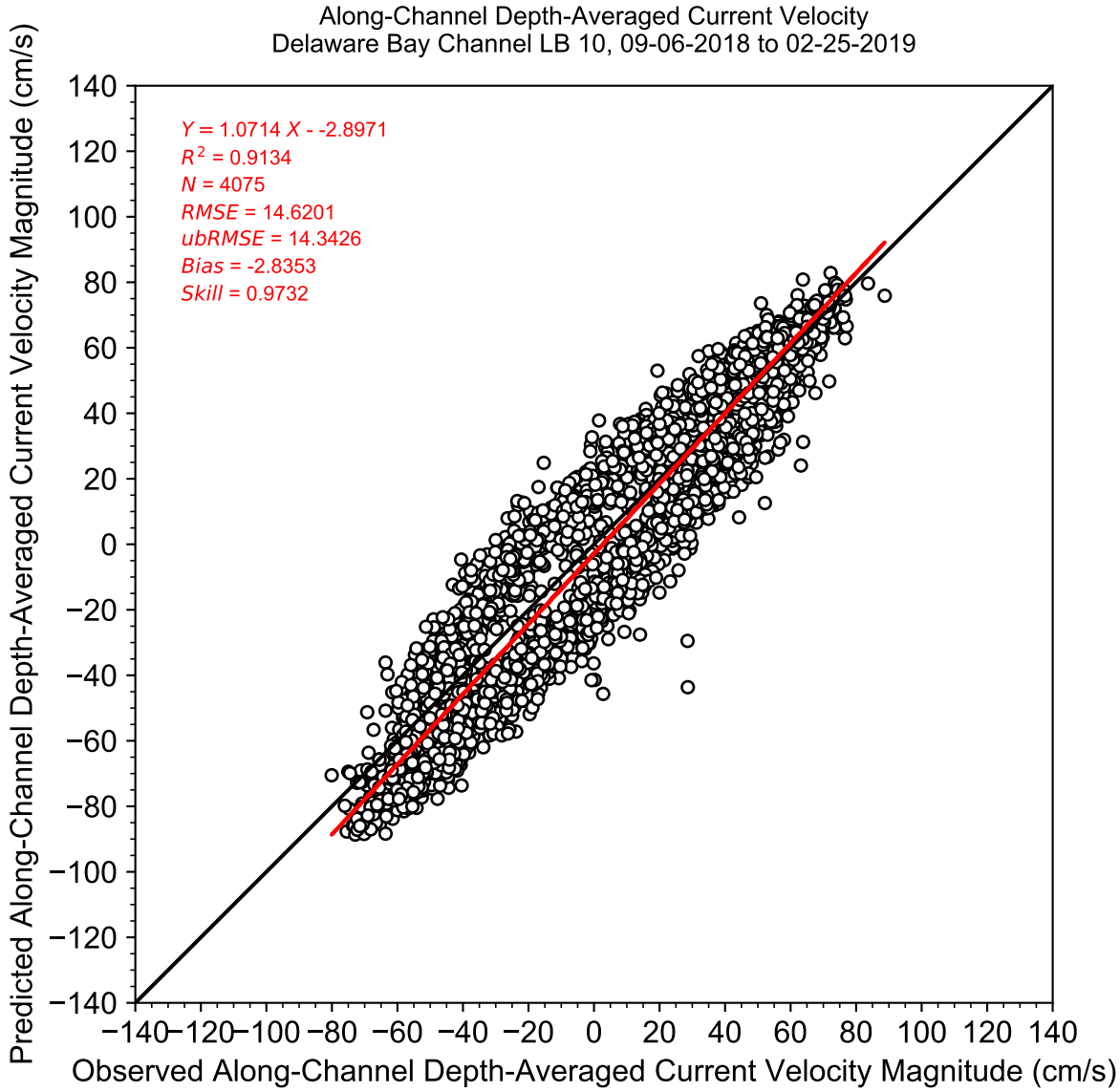

Figure 3.3-6

Comparison of Observed and Predicted Along-Channel Depth-Averaged Current Velocity Magnitude at Delaware Bay Channel LB 10 during 09-06-2018 to 02-25-2019 period.

Station ID: DB0502

Run ID: EFDC_HYDRO_G72_2020-05-16, GVC, KC =12, Grid 7.2.

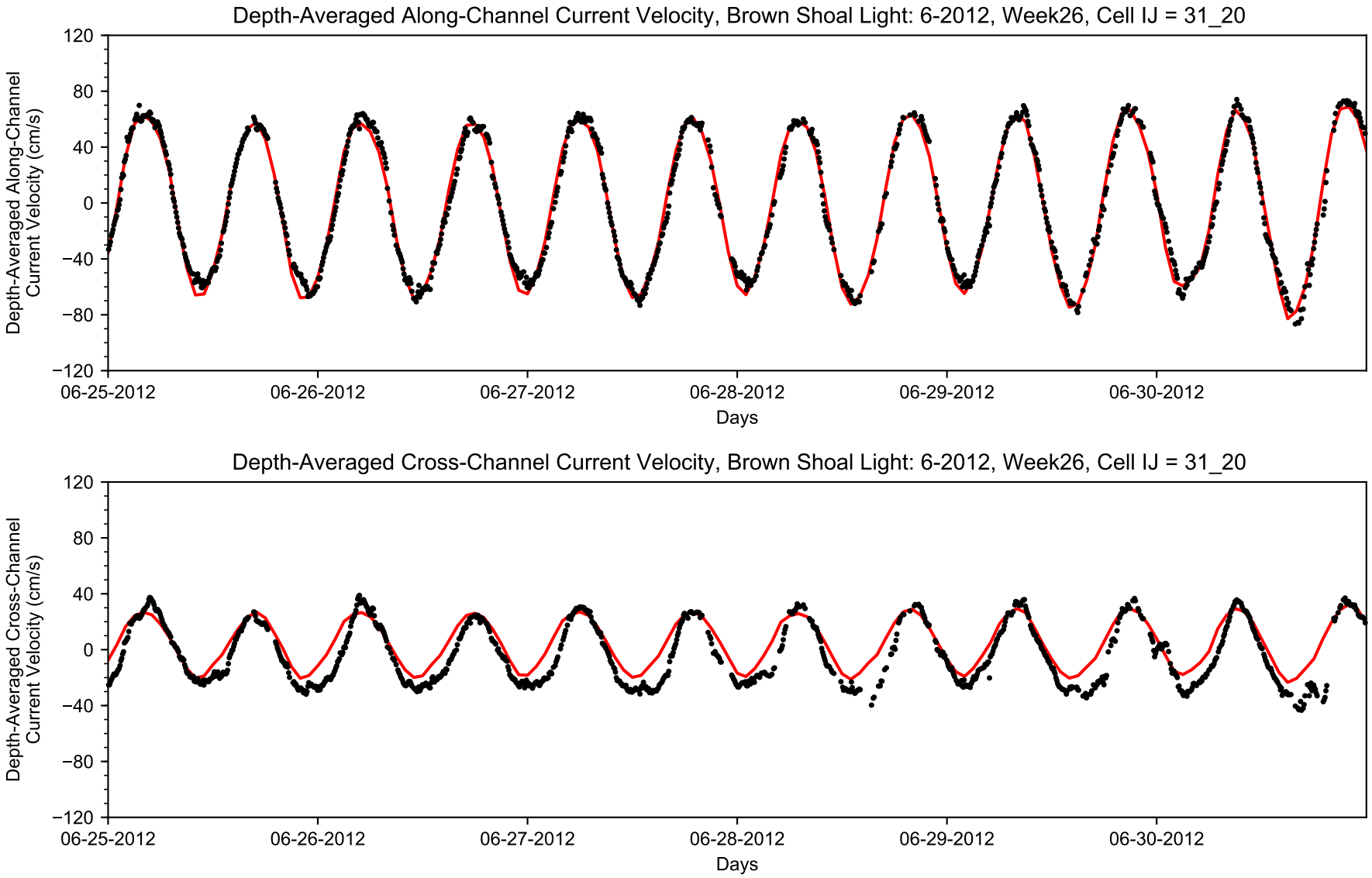

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Figure 3.3-7

Observed and Predicted Depth-Averaged Along and Cross-Channel Current Velocity at Brown Shoal Light

Notes: Station ID: DB0501, Brown Shoal Light
Run ID: EFDC_HYDRO_G72_2020-07-04, GVC, KC =12, Grid 7.2.

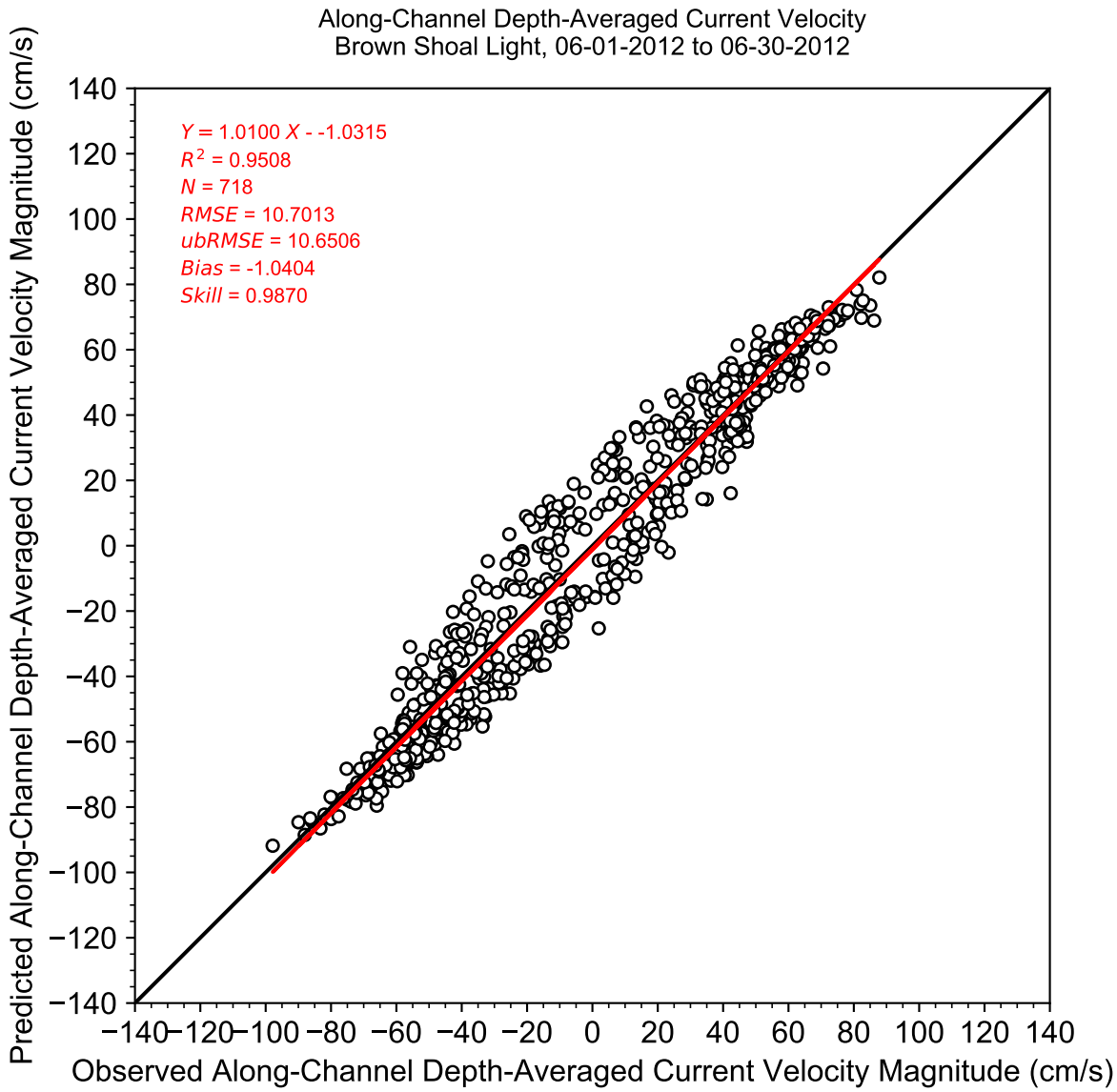

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Figure 3.3-8

Comparison of Observed and Predicted Along-Channel Depth-Averaged Current Velocity Magnitude at Brown Shoal Light during 06-01-2012 to 06-30-2012 period.

Station ID: DB0501

Run ID: EFDC_HYDRO_G72_2020-07-04, GVC, KC =12, Grid 7.2.

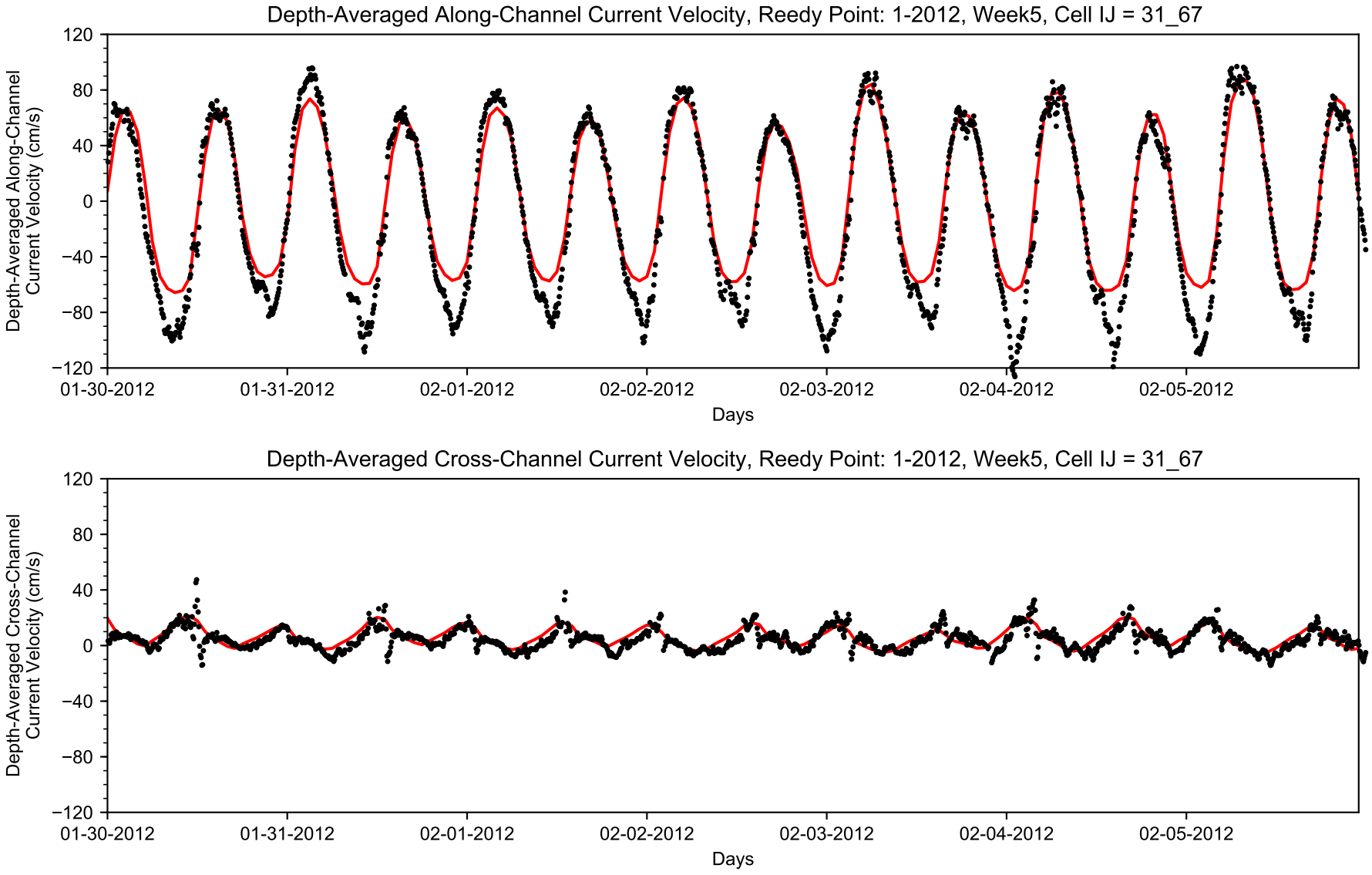

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Figure 3.3-9

Observed and Predicted Depth-Averaged Along and Cross-Channel Current Velocity at Reedy Point

Notes: Station ID: DB0201, Reedy Point
Run ID: EFDC_HYDRO_G72_2020-07-04, GVC, KC =12, Grid 7.2.

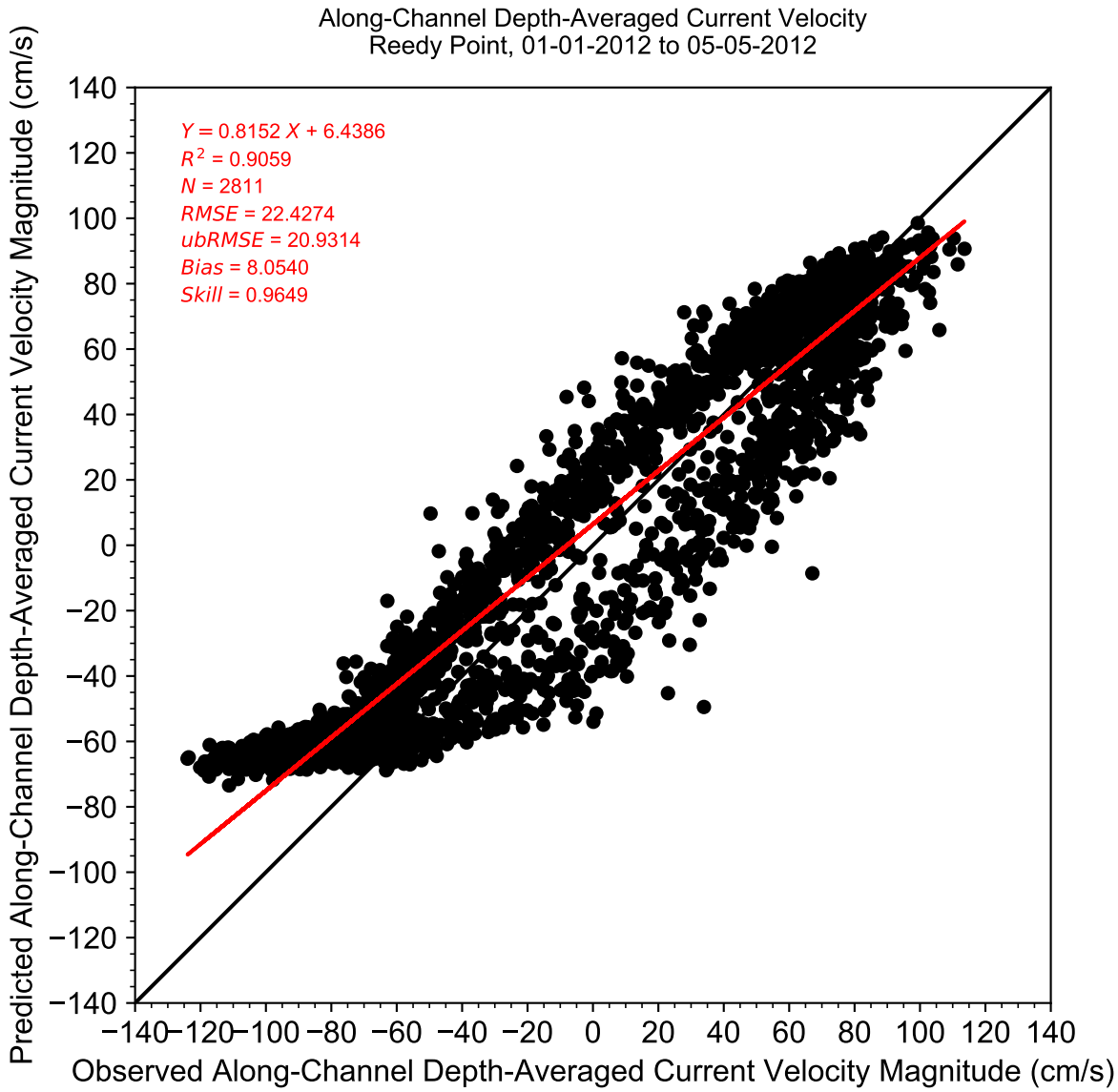

Figure 3.3-10

Comparison of Observed and Predicted Along-Channel Depth-Averaged Current Velocity Magnitude at Reedy Point during 01-01-2012 to 05-05-2012 period.

Station ID: DB0201

Run ID: EFDC_HYDRO_G72_2020-07-04, GVC, KC =12, Grid 7.2.

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