

[Journal Name]

Supporting Information for

Contributions of different sea-level processes to high-tide flooding along the U.S. coastline

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Introduction

Additional 7 figures and 1 table supporting our manuscript are shown here. Figure S1 and Table S1 are results from a sensitivity analysis to complement the information provided in the Methods section. Figure S2-S7 contain supplementary information referenced in the Results section. Data and methods to derive Figure S2 are similar to those used for Figure 2, but applying a different approach to calculate the contribution of each component (the approach is detailed in the main text). Figure S3 is an extension of Figure 2 and uses the same data and methods. Figure S4 shows the ratio of HTF duration caused by tides alone to total HTF duration (given in hours). The data and methods are similar to those used for Figure 4, but considering only tidal anomalies. Figure S5 depicts seasonal patterns of the different sea-level components in San Francisco, where TA and NTR are the monthly 99th percentile values. Figure S6 is similar to Figure S5, but values are averaged for each month over the entire period. Figure S7 complements the analysis of compounding effects by assessing the sensitivity to using different HTF thresholds. Data and methods are the same as used for Figure 5, but considering different HTF thresholds and compounding effects are expressed in terms of total hours, instead of a histogram as in Figure 5.

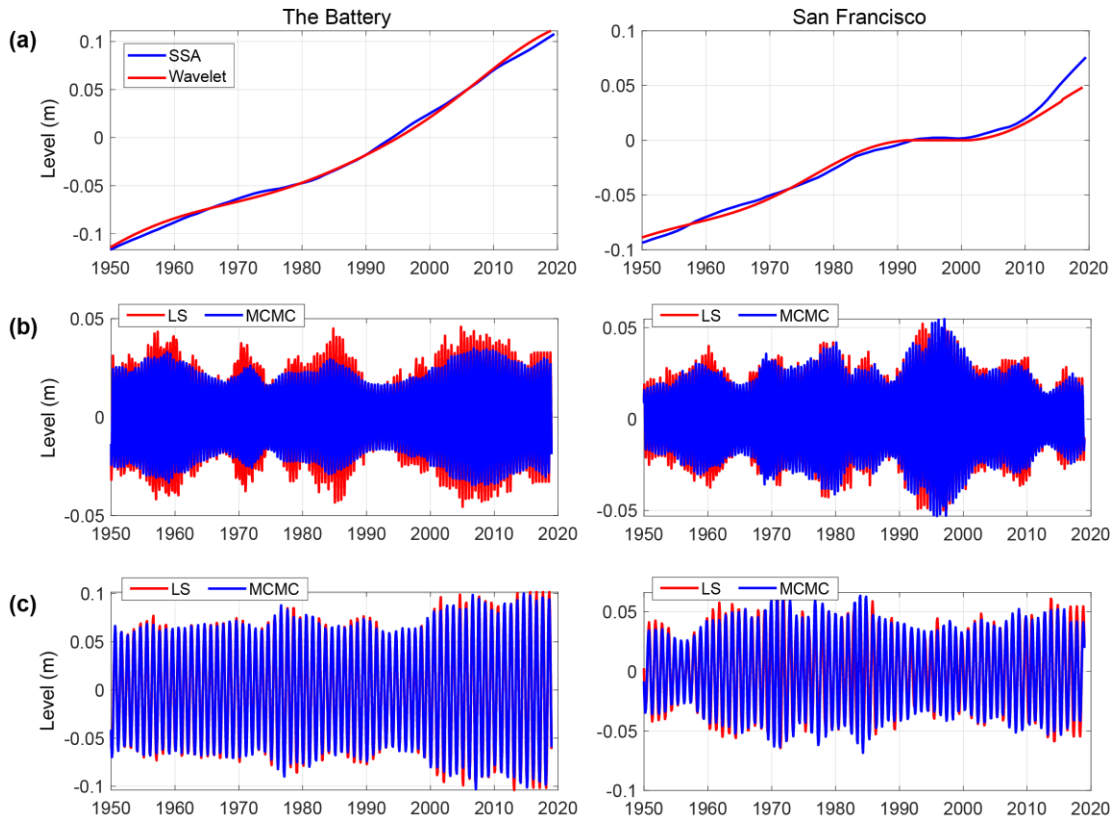


Figure S1. Sensitivity analysis for SLR and SC components at The Battery (left) and San Francisco (right). **(a)** Comparison of SLR derived from SSA and wavelet. **(b)** Semi-annual cycle from least-squares regression model (LS) versus MCMC. **(c)** same as (b) but for the annual cycle.

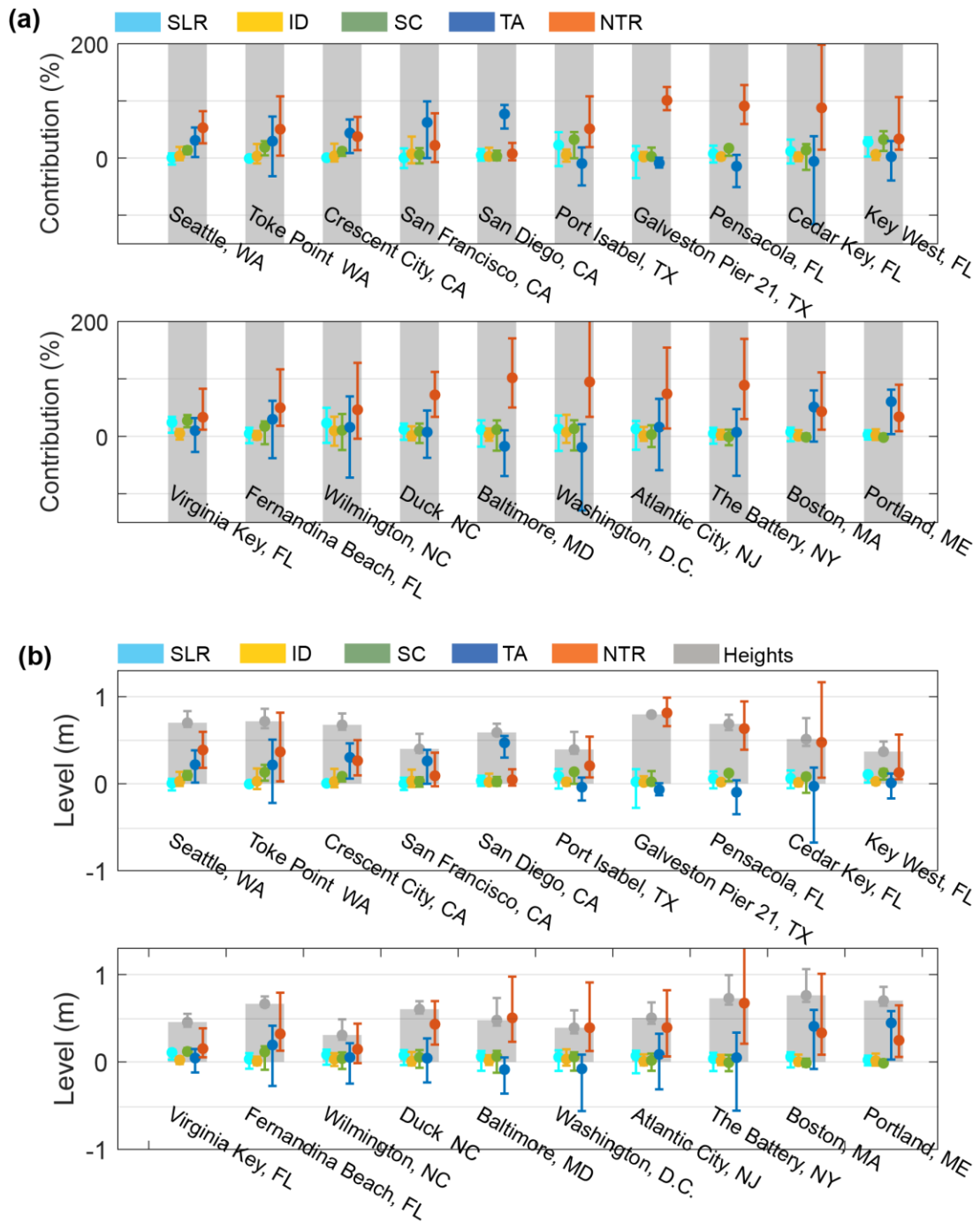


Figure S2. Same as Figure 2 in the main manuscript but using a different approach to quantify the contribution of individual components (as outlined in the main text); this affects the results shown in (a) but not the ones in (b) where absolute values are depicted.

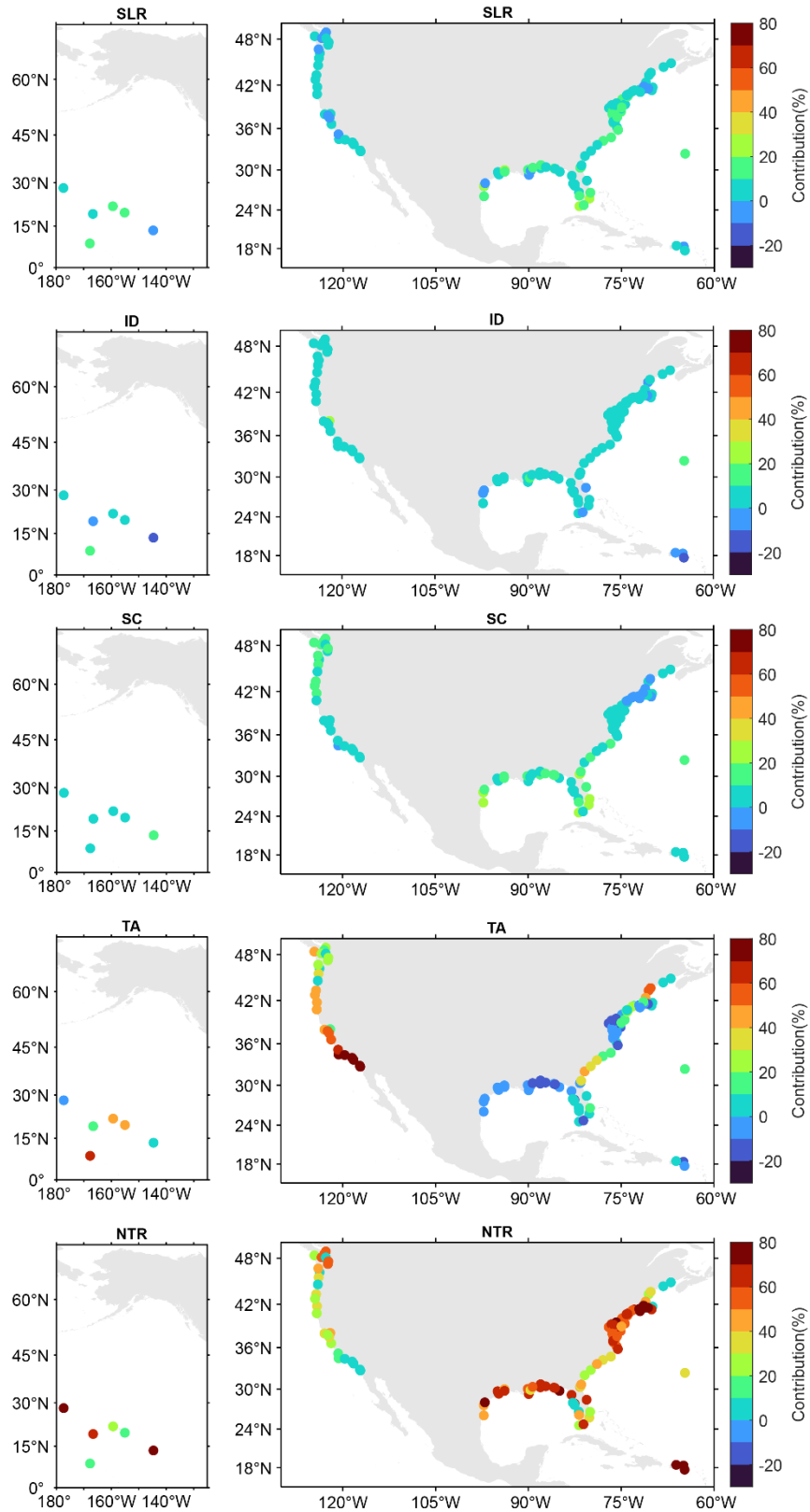


Figure S3. The 50th percentile of contributions (expressed in percent) of (a) SLR, (b) ID, (c) SC, (d) TA, (e) NTR to past HTF events along the U.S. coastline.

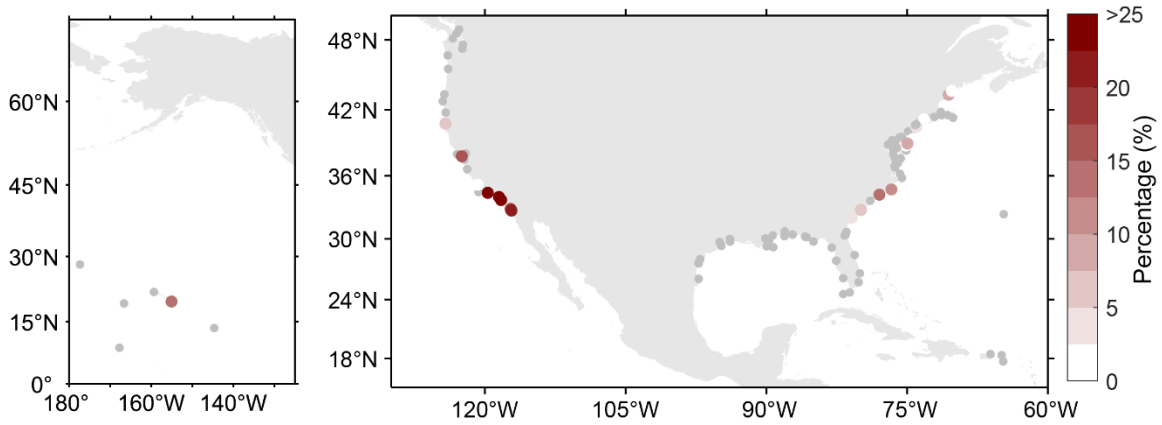


Figure S4. Ratio of HTF hours caused by TA alone to the sum of HTF hours. Grey color indicates that no past HTF events could have been caused by TA (superimposed on SLR) alone.

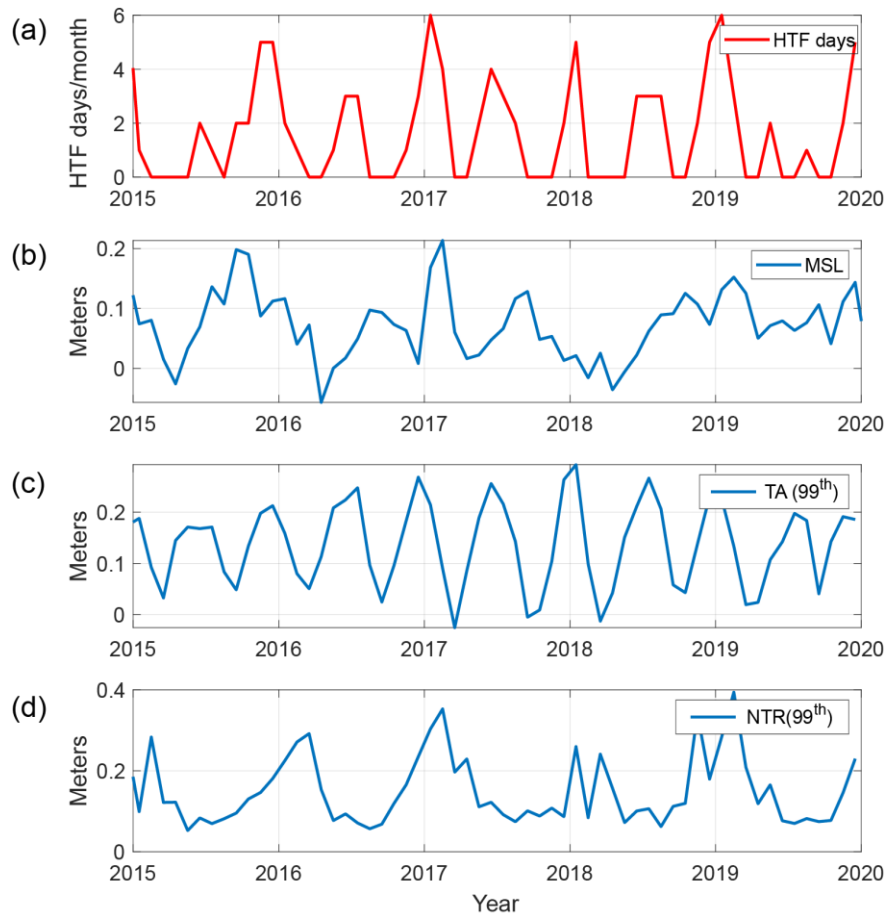


Figure S5. Seasonal pattern of components in San Francisco. **(a)** HTF days/month, **(b)** monthly mean sea level, **(c)** 99th percentile of TA, and **(d)** 99th percentile of NTR.

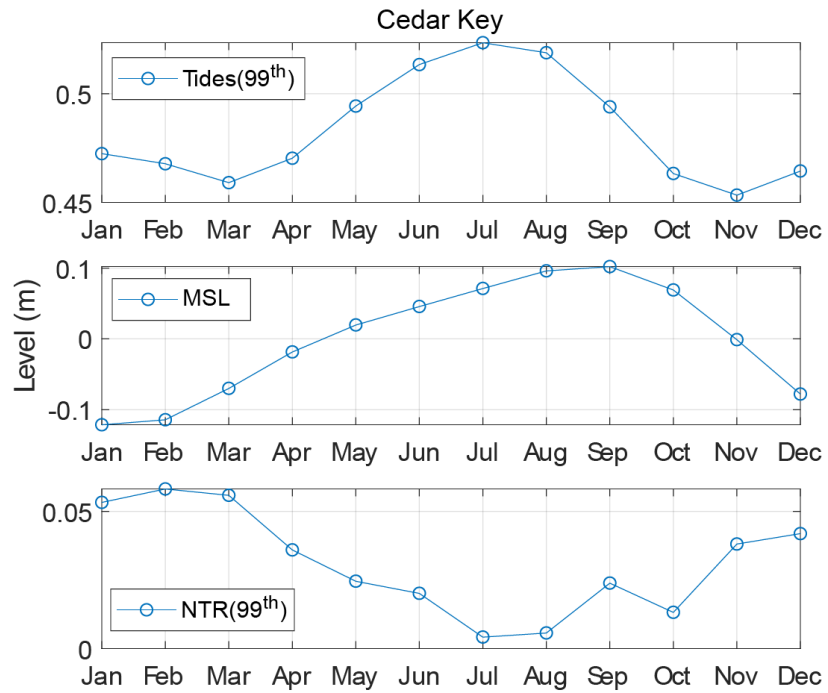


Figure S6. Seasonal cycles in Cedar Key of (a) 99th percentile of tides, (b) mean sea level, and (c) 99th percentile of NTR.

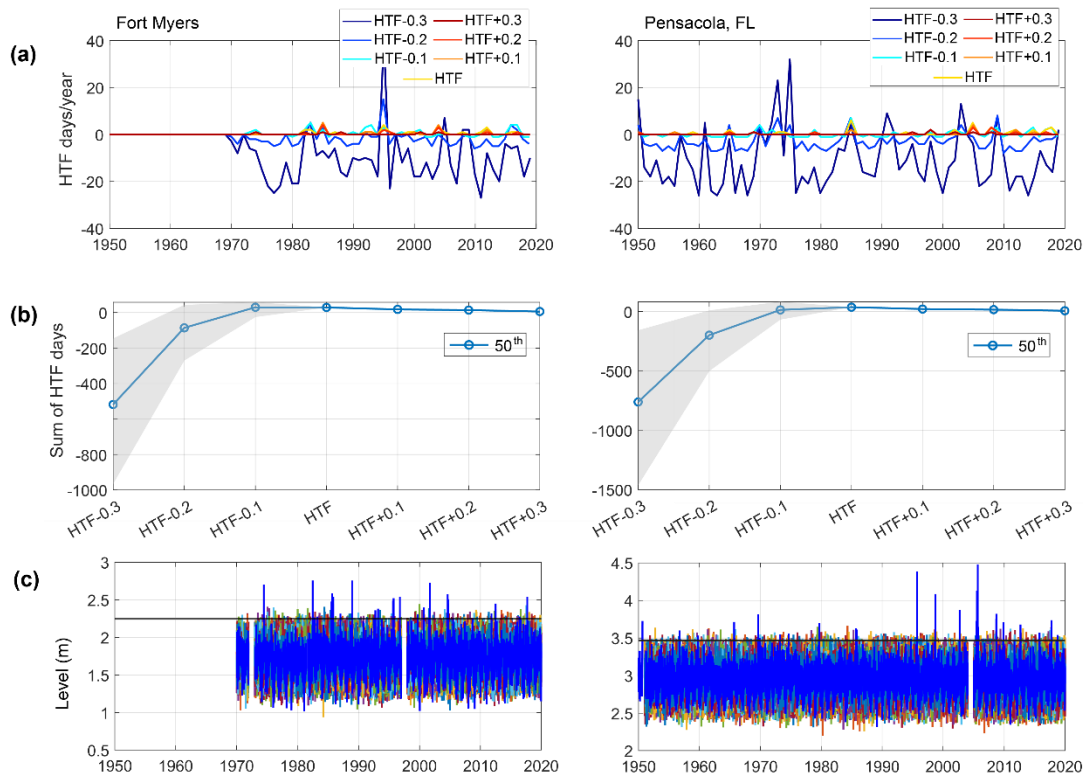


Figure S7. Sensitivity to using different HTF thresholds when assessing compounding effects. **(a)** The difference of HTF days between observations and surrogate time series under different HTF thresholds in Fort Myers (left) and Pensacola (right). **(b)** Accumulated difference in HTF days over time under different HTF thresholds. **(c)** Observations (blue) and surrogate time series (colored); black horizontal line indicates the current HTF threshold.

Table S1. RMSE of the ID component when using different setups in the wavelet analysis

Test-A*	Db15	Db25	Db35	Db45
RMSE (m)	0.0048	0.0027	0.0047	0
Test-B**	Level 11	Level 12	Level 13	Level 14
RMSE (m)	9.0724e-04	0	5.8576e-04	9.3578e-04
Test-C***	12.8:0.1:13.2	355:5:370		
RMSE (m)	9.3264e-04	0.0011		

*Comparison of wavelet type between db15, db25, db35 and db45. We set ‘db45’ as the default.

**Comparison of decomposition levels from 11-14. We set ‘Level 12’ as default.

***Comparison of using different cutoff frequencies (expressed in month): from 12.8 to 13.2 with 0.1 months increments, and from 355 to 370 with 5 months increments.

Table S2. NOAA tidal gauge information

No.	Station ID	HTF Threshold	Name
1	1611400	1.590	'Nawiliwili, HI'
2	1617760	2.201	'Hilo, Hilo Bay, Kuhio Bay, HI'
3	1619910	1.722*	'Sand Island, Midway Islands '
4	1630000	1.650*	'Apra Harbor, Guam'
5	1820000	2.633*	'Kwajalein, Marshall Islands'
6	1890000	2.507*	'Wake Island, Pacific Ocean'
7	2695540	2.424*	'Bermuda, St, Georges Island, Bermuda'
8	8410140	8.474	'Eastport, ME'
9	8413320	5.782	'Bar Harbor, ME'
10	8418150	6.267	'Portland, ME'
11	8419317	8.032*	'Wells, ME'
12	8443970	4.886	'Boston, MA'
13	8447386	8.490	'Fall River, MA'
14	8447435	3.746	'Chatham, Lydia Cove, MA'
15	8447930	2.839	'Woods Hole, MA'
16	8449130	2.433	'Nantucket Island, MA'
17	8452660	2.560	'Newport, RI'
18	8452944	7.784	'Conimicut Light, RI'
19	8454000	3.199	'Providence, RI'
20	8454049	8.849	'Quonset Point, RI'
21	8461490	2.583	'New London, CT'
22	8465705	8.242	'New Haven, CT'
23	8467150	3.325	'Bridgeport, CT'
24	8510560	0.610	'Montauk, NY'
25	8516945	6.973	'Kings Point, NY'
26	8518750	3.192	'The Battery, NY'
27	8519483	3.492	'Bergen Point West Reach, NY'
28	8531680	2.809	'Sandy Hook, NJ'
29	8534720	3.344	'Atlantic City, NJ'
30	8536110	2.779	'Cape May, NJ'
31	8539094	7.975	'Burlington, Delaware River, NJ'
32	8551910	2.612	'Reedy Point, DE'
33	8557380	2.675	'Lewes, DE'
34	8570283	3.669	'Ocean City Inlet, MD'
35	8571892	1.822	'Cambridge, MD'
36	8573364	2.110	'Tolchester Beach, MD'
37	8573927	2.633	'Chesapeake City, MD'
38	8574680	2.166	'Baltimore, Fort McHenry, Patapsco River, MD'
39	8575512	2.104	'Annapolis, MD'

No.	Station ID	HTF Threshold	Name
40	8577330	1.975	'Solomons Island, MD'
41	8594900	2.673	'Washington, DC'
42	8631044	2.683	'Wachapreague, VA'
43	8632200	2.483	'Kiptopeke, VA'
44	8635750	2.374	'Lewisetta, VA'
45	8636580	1.587	'Windmill Point, VA'
46	8638610	2.706	'Sewells Point, VA'
47	8639348	8.111	'Money Point, VA'
48	8651370	7.338	'Duck, NC'
49	8652587	1.702	'Oregon Inlet Marina, NC'
50	8656483	1.930	'Beaufort, Duke Marine Lab, NC'
51	8658120	2.423	'Wilmington, NC'
52	8661070	11.214	'Springmaid Pier, SC'
53	8665530	2.980	'Charleston, Cooper River Entrance, SC'
54	8670870	3.873	'Fort Pulaski, GA'
55	8720030	3.148	'Fernandina Beach, FL'
56	8720219	2.765	'Dames Point, FL'
57	8720226	0.650	'Southbank Riverwalk, St Johns River, FL'
58	8721604	7.324	'Trident Pier, Port Canaveral, FL'
59	8722670	10.455	'Lake Worth Pier, Atlantic Ocean, FL'
60	8723214	4.173	'Virginia Key, Biscayne Bay, FL'
61	8723970	1.663	'Vaca Key, Florida Bay, FL'
62	8724580	2.272	'Key West, FL'
63	8725110	1.877	'Naples, Gulf of Mexico, FL'
64	8725520	2.553	'Fort Myers, FL'
65	8726384	1.551	'Port Manatee, FL'
66	8726520	2.556	'St, Petersburg, Tampa Bay, FL'
67	8726607	10.193	'Old Port Tampa, FL'
68	8726724	2.192	'Clearwater Beach, FL'
69	8727520	2.137	'Cedar Key, FL'
70	8728690	2.448	'Apalachicola, FL'
71	8729108	1.946	'Panama City, FL'
72	8729210	9.327	'Panama City Beach, FL'
73	8729840	3.562	'Pensacola, FL'
74	8735180	1.854	'Dauphin Island, AL'
75	8737048	1.564	'Mobile State Docks, AL'
76	8747437	1.724	'Bay Waveland Yacht Club, MS'
77	8761305	10.589	'Shell Beach, LA'
78	8761724	2.771*	'Grand Isle, LA'
79	8761927	2.068	'New Canal Station, LA'

No.	Station ID	HTF Threshold	Name
80	8770520	1.981*	'Rainbow Bridge, TX'
81	8770570	0.580*	'Sabine Pass North, TX'
82	8770613	2.717	'Morgans Point, Barbours Cut, TX'
83	8771013	2.523	'Eagle Point, Galveston Bay, TX'
84	8771450	2.555	'Galveston Pier 21, TX'
85	8774770	2.749	'Rockport '
86	8775792	1.559	'Packery Channel, TX'
87	8775870	7.240	'Bob Hall Pier, Corpus Christi, TX'
88	8779770	1.934	'Port Isabel, TX'
89	9410170	3.449	'San Diego, San Diego Bay, CA'
90	9410230	3.464	'La Jolla, CA'
91	9410660	3.297	'Los Angeles, CA'
92	9410840	2.886	'Santa Monica, CA'
93	9411340	3.097	'Santa Barbara, CA'
94	9411406	15.811	'Oil Platform Harvest, CA'
95	9412110	3.437	'Port San Luis, CA'
96	9413450	3.223*	'Monterey, CA'
97	9414290	3.953	'San Francisco, CA'
98	9414523	5.154*	'Redwood City, CA'
99	9414750	3.607*	'Alameda, CA9416841 Arena Cove, CA'
100	9414863	5.947*	'Richmond, CA'
101	9415020	3.533*	'Point Reyes, CA'
102	9415144	3.273*	'Port Chicago, CA'
103	9418767	7.083	'North Spit, CA'
104	9419750	3.829	'Crescent City, CA'
105	9431647	9.833*	'Port Orford, OR'
106	9432780	4.062*	'Charleston, OR'
107	9435380	5.055	'South Beach, OR'
108	9437540	4.354*	'Garibaldi, OR'
109	9439040	4.341	'Astoria, OR'
110	9440910	4.727	'Toke Point, WA'
111	9443090	3.633*	'Neah Bay, WA'
112	9444090	11.979*	'Port Angeles, WA'
113	9444900	4.531	'Port Townsend, WA'
114	9446484	4.423*	'Tacoma, WA'
115	9447130	6.533	'Seattle, WA'
116	9449424	5.333*	'Cherry Point, WA'
117	9449880	4.133*	'Friday Harbor, WA'
118	9751401	11.113*	'Lime Tree Bay, VI'
119	9751639	2.351*	'Charlotte Amalie, VI'
120	9755371	2.031*	'San Juan, La Puntilla, San Juan Bay, PR'

