Report on

Possible meteotsunami events along the east coast USA

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Methods

Sea level time series with 1-min time resolution coming from 20 east coast USA tide gauge stations were extracted from the NOAA CO-OPS website: http://opendap.co-ops.nos.noaa.gov/axis/webservices/waterlevelrawonemin/index.jsp
Stations from which data were extracted and data availability period are listed in Table 1.
All time series were de-tided with MATLAB t-tide toolbox and filtered with a 6 hour Keiser-Bessel window. One-point positive and negative peaks with amplitudes higher than 20 cm were automatically detected and removed from series. Multiple data problems still remained (see Figure 1 for example of data problems). Series were further visually checked to detect periods with corrupted data – those periods were removed from series. In order to do more detailed analysis of data a throughout quality checked is still necessary. Time series were further examined to detect peaks which were simultaneously registered by at least three tide gauges.

Table 1. List of stations used in analysis

Station ID	Name	Latitude	Longitude	Availability period
8410140	Eastport	44,9033	-66,985	July 2007 – October 2011
8413320	Bar Harbor	44,3917	-68,205	July 2007 – October 2011
8418150	Portland	43,6567	-70,2467	July 2007 – October 2011
8443970	Boston	42,355	-71,0517	July 2007 – October 2011
8449130	Nantucket Island	41,285	-70,0967	September 2007 – October 2011
8510560	Montauk	41,0483	-71,96	September 2007 – October 2011
8531680	Sandy Hook	40,4667	-74,01	November 2007 – October 2011
8534720	Atlantic City	39,355	-74,4183	May 2007 – October 2011
8570283	Ocean City Inlet	38,32833	-75,091667	May 2006 – October 2011
8638863	Chesapeake Bay Bridge Tunnel	36,966667	-76,113333	December 2006 – October 2011
8651370	Duck	36,183333	-75,746667	March 2007 – October 2011
8656483	Beaufort	34,72	-76,67	December 2006 – October 2011
8658163	Wrightsville Beach	34,2133	-77,7867	December 2006 – October 2011
8661070	Springmaid Pier	33,655	-78,9183	December 2006 – October 2011
8670870	Fort Pulaski	32,0333	-80,9017	December 2006 – October 2011
8720218	Mayport	30,3967	-81,43	March 2006 – April 2008; March 2011 - October 2011
8721604	Trident Pier	28,415	-80,5933	March 2006 – October 2011
8722670	Lake Worth Pier	26,6117	-80,0333	June 2010 – October 2011
9751364	Christiansed	17,75	-64,705	February 2006 – October 2011
9755371	San Juan	18,45894	-66,116417	August 2005 – October 2011

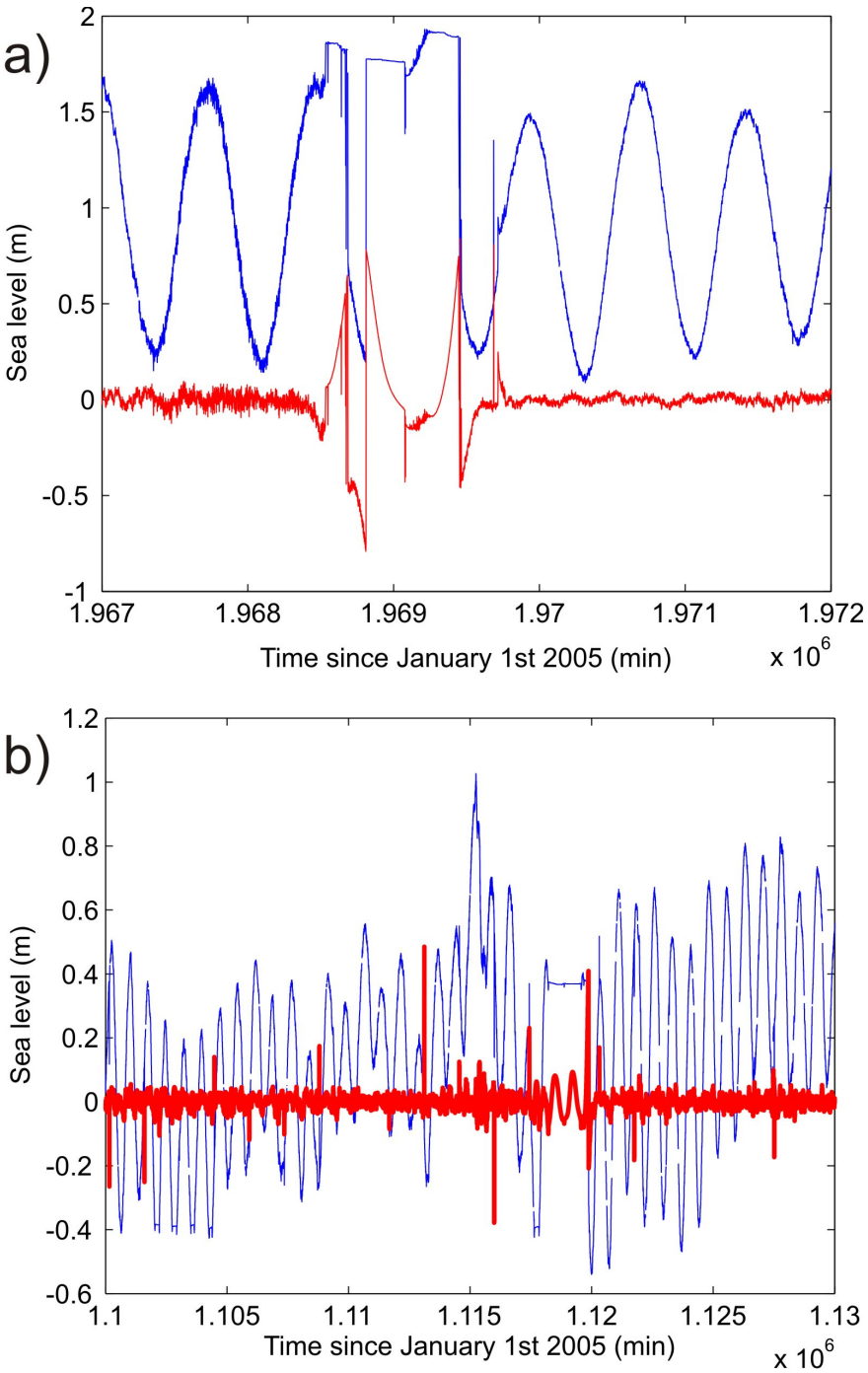

Figure 1. Original (blue line) and de-tided and high-pass (6-hour) filtered (red-line) sea level time series from the Atlantic City and Ocean City tide gagues.

Possible events

As it can be seen from Figure 2., sea level oscillations with periods lower than 6 hours were often simultanously recorded at several or even all tide gauge stations. Nine events were preliminary identified for further examination. Additional analysis is possible and could allow for detection of more events.

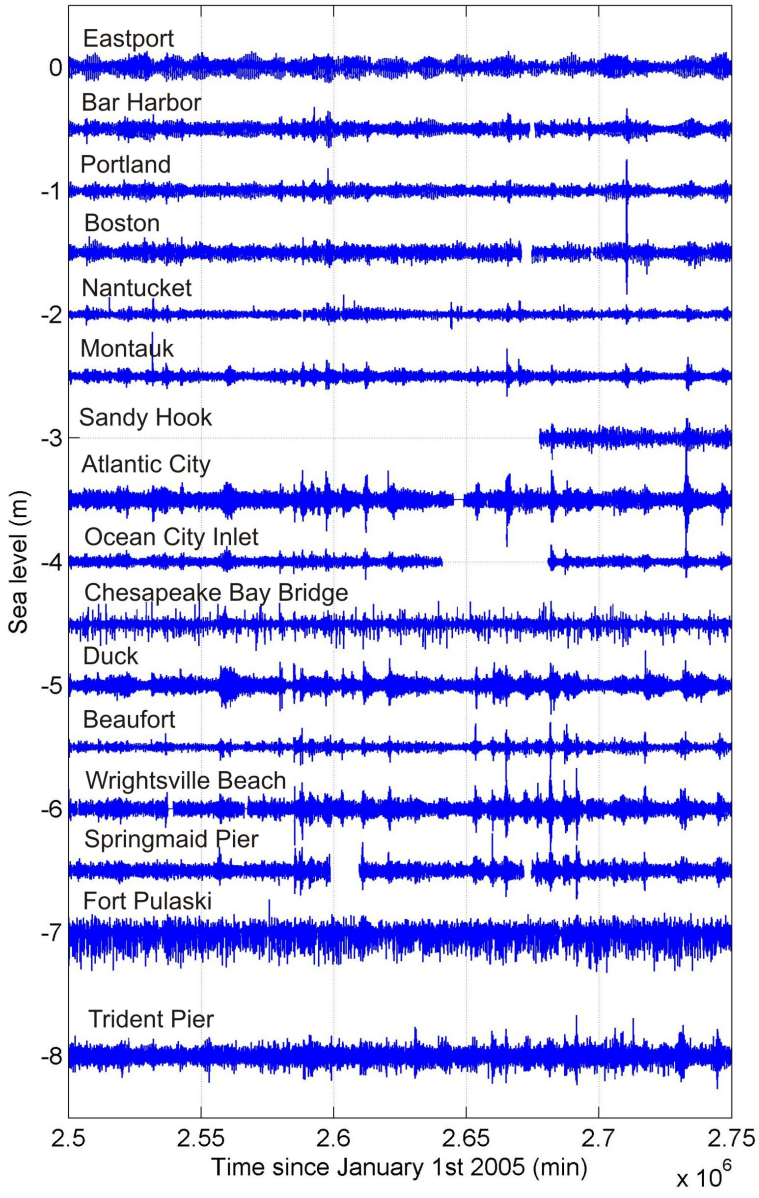

Figure 2. Sea level time series from 16 selected tide gauge stations during half a year period.

Event 1
Date: 5 March 2008
Detected at stations: Montauk, Sandy Hook, Atlantic City
Maximum wave-height: 0.5 m (Atlantic City)
Period: 5-6 hours
Duration: 24 hours

Event 2
Date: 17 June 2008
Detected at stations: Montauk, Sandy Hook, Atlantic City, Ocean City, Chesapeake Bay Bridge, Duck
Maximum wave-height: 0.4 m (Duck)
Period: 60 min
Duration: 20 h

Event 3
Date: 8 January 2009
Detected at stations: Eastport, Bar Harbor, Boston, Montauk, Atlantic City, Chesapeake Bay Bridge, Duck, Beaufort, Wrightsville Beach, Springmaid
Maximum wave-height: 0.5 m (Montauk)
Period: 3 - 4 h
Duration: 24 hours
Other: South to north propagation

Event 4
Date: 29 January 2009
Detected at stations: Atlantic City, Ocean City, Duck
Maximum wave-height: 0.6 m (Duck)
Period: 1 hour
Duration: 1 hour

Event 5
Date: 29 March 2009
Detected at stations: Duck, Beaufort, Wrightsville Beach, Springmaid Pier
Maximum wave-height: 0.5 m (Wrightsville Beach)
Period: 5-6 hours
Duration: 24 hours

Event 6
Date: 26 February 2010
Detected at stations: Bar Harbor, Portland, Boston
Maximum wave-height: 1 m (Boston)
Period: 3 hours
Duration: 17 hours

Event 7
Date: 13 March 2010
Detected at stations: Montauk, Sandy Hook, Atlantic City, Ocean City, Chesapeake, Duck, Beaufort, Wrightsville Beach
Maximum wave-height: 1 m (Atlantic City)

Period: 60 min
Duration: 48 hours

Event 8
Date: 5 April 2011
Detected at stations: Atlantic City, Ocean City, Chesapeake Bay Bridge, Duck, Beaufort, Wrightsville Beach, Springmaid Pier, Fort Pulaski, Trident Pier.
Maximum wave-height: 0.7 m (Trident Pier)
Period: 60 min
Duration: 16 hours

Event 9
Date: 28 October 2011
Detected at stations: Atlantic City, Ocean City, Chesapeake, Duck
Maximum wave-height: 0.5 m (Duck)
Period: 40 min
Duration: 6 hours