

What is a... Meteotsunami?

On June 13, 2013, despite clear skies and calm weather, tsunami-like waves crashed upon the New Jersey and southern Massachusetts coasts. In Barnegat Inlet, New Jersey, three people were injured when a six-foot wave swept them off a jetty and into the water. The waves were captured by National Oceanic and Atmospheric Administration (NOAA) coastal water-level stations from Puerto Rico to New England as well as a Deep-Ocean Assessment and Reporting of Tsunamis (DART) buoy 150 miles offshore. Due to the wave's coincidence with a severe weather pattern and the lack of a detected earthquake or landslide, scientists deemed the event a "meteotsunami."

What is a Meteotsunami?

Meteotsunamis have characteristics similar to earthquake-generated tsunamis, but they are caused by air pressure disturbances often associated with fast moving weather systems, such as squall lines. These disturbances can generate waves in the ocean that travel at the same speed as the overhead weather system. Development of a meteotsunami depends on several factors such as the intensity, direction, and speed of the disturbance as it travels over a water body with a depth that enhances wave magnification.



This weather system generated the June 13, 2013, meteotsunami. Credit: Buddy Denham

Like an earthquake-generated tsunami, a meteotsunami affects the entire water column and can become dangerous when it hits shallow water, which causes it to slow down and increase in height and intensity. Even greater magnification can occur in semi-enclosed water bodies like harbors, inlets, and bays.

Most meteotsunamis are too small to notice, but large meteotsunamis can have devastating coastal impacts (although not to the extreme of the 2004 Indian Ocean and 2011 Japan tsunamis). Damaging waves, flooding, and strong currents can last from several hours to a day and can cause significant damage, injuries, and deaths.

A meteotsunami should not be confused with storm surge associated with tropical storms and other large coastal storms. Storm surge is a wind-driven effect that occurs when strong winds push water onshore, causing water levels to steadily rise over the course of several hours. Recent research has shown that meteotsunamis are more common than previously thought and suggests that some past events may have been mistaken for other types of coastal floods, such as storm surges or seiches, which also tend to be wind-driven.

Where Do Meteotsunamis Happen?

Meteotsunamis are regional in nature. In the United States, conditions for destructive meteotsunamis are most favorable along the East Coast, Gulf of Mexico, and in the Great Lakes, where they may pose a greater threat than earthquake-generated tsunamis. In addition to the 2013 event, notable U.S. meteotsunamis include:

- **May 27, 2012**—Lake Erie: A seven-foot wave hit the shoreline near Cleveland, Ohio, sweeping beach-goers off of their feet and swamping boats in harbors.
- **October 28, 2008**—Boothbay Harbor, Maine: A series of waves up to 12 feet high emptied and flooded the harbor at least three times over 15 minutes, damaging boats and shoreline infrastructure.

