

Stormquakes

October 22, 2019

Manifest pedagogy: Stormquake is a new geo-physical phenomenon which has been discovered recently but has not been completely understood. In recent time hurricanes are becoming more intense and deadlier which are responsible for seismic activity along the ocean floor. The topic could be asked at prelim stage. Basic understanding of topic will suffice. Like, Madden Julian Oscillation (MJO) which also needs to be understood fully have been asked earlier.

In news: Scientists have discovered a combination of two feared natural disasters – hurricanes and earthquakes and have named them “stormquakes”.

Placing it in syllabus: Geophysical phenomena

Dimensions: What are stormquakes & How to determine a stormquake?

Content:

- Researchers have uncovered a new geophysical phenomenon where a **hurricane or other strong storm can spark seismic events** in the nearby ocean as strong as a 3.5 magnitude earthquake.
- They were not noticed before because they were considered seismic background noise.
- **Storms trigger giant waves in the sea, which cause another type of wave.**
- These **secondary waves** then **interact with the seafloor only in certain places** and that causes the shaking.

- The seismic sources caused by hurricanes **can last from hours to days.**
- Researchers have found **evidence** of more than 10,000 stormquakes from 2006 to 2019 **offshore of New England, Florida, in the Gulf of Mexico, offshore of Nova Scotia, Newfoundland and British Columbia in Canada.**

Formation of stormquake

Not all hurricanes cause stormquakes. There are hotspots. Researchers found that stormquakes are limited to places along the edge of continental shelves or on ocean banks. Hurricane Sandy, one of the costliest storms on record in the United States, did not spur stormquakes.

They are strongly **influenced by the local oceanographic features and seafloor topography.** It only happens in places where there is a **large continental shelf and shallow flat land.** A special type of **military sensor is needed to spot them.**

Large storms such as hurricanes and Nor'easters generate strong long-period ocean waves, which can interact with shallow seafloor features located near the edge of continental shelves known as ocean banks. Such interactions produce seismic sources with equivalent earthquake magnitudes that can be greater than 3.5. These seismic sources are termed "stormquakes," and they can excite coherent seismic wavefields that are well recorded across various parts of the world. Stormquake is a newly identified geophysical phenomenon, which involves interactions of the atmosphere, ocean, and the solid Earth.

A stormquake must occur during a **stormy day** and meet other **geophysical standards** to determine the robustness of the correlation between the storm and the seismic event.

E.g. **Hurricane Bill**, an Atlantic hurricane that originated in August, 2009, strengthened into a **Category 4 hurricane** and

ultimately struck Newfoundland as a tropical storm. When it approached offshore New England numerous seismic events were located off the New England and Nova Scotia coasts, which produced transcontinental surface waves.

Similarly, **Hurricane Ike in 2008** caused storm quake activity in the Gulf of Mexico and **Hurricane Irene in 2011** caused storm quakes near Little Bahama Bank off Florida's shore.

Scientists hope stormquakes could **help them better understand ocean dynamics or even earth's structure.**