

# MAGNITUDE OF THE PROBLEM

Experts say East Coast's geology can amplify earthquake's energy

BY JENNIFER SMITH

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Earthquakes happen far less frequently on the East Coast than they do in seismically tumultuous places such as California or Japan.

But when big temblors like yesterday's magnitude 5.8 Virginia quake do hit, experts say the shock waves can be felt across a much broader area than their West Coast equivalents.

Scientists say that long-distance punch — and the relative rarity of such events here — is due to differences in regional geology.

"Whenever an earthquake occurs, it generates energy that is transmitted through the rocks in the Earth's crust," said Arthur Lerner-Lam, a seismologist and interim director of Columbia University's Lamont-Doherty Earth Observatory.

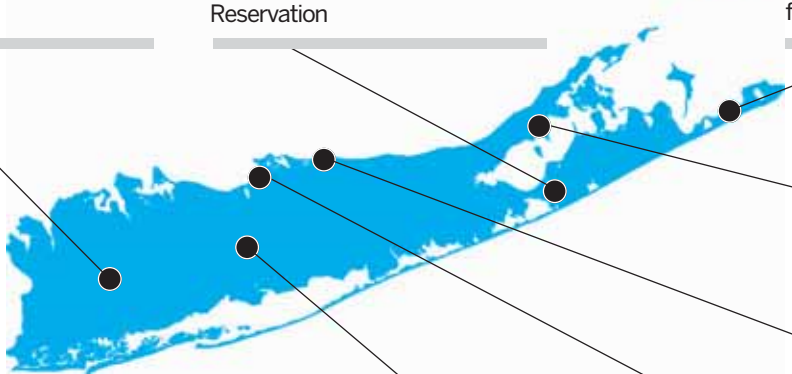
"As it turns out," he said, "the rocks in the East are much more efficient at transmitting that energy than rocks in California."

The East Coast was once a hotbed of geologic activity, back when continents collided some 300 million to 500 million years ago to form the Appalachian Mountain chain. But these days, the biggest seismic action is much more likely to happen at either edge of the North American tectonic plate in California or far off in the middle of the Atlantic Ocean.

Still, quakes do happen here, and more often than most people might think.

"There is a good amount of seismic activity on the East Coast," said Peter Powers, a research geophysicist with the U.S. Geological Survey. "The

## How it felt on Long Island



**f** "Roof started crackling and then floor started moving and shaking!"  
— Roseanne Lombardi Dorfman, Uniondale

"Sitting on the couch and it started swaying. The water in the dogs' water dish was splashing back and forth."  
— Lisa Votino Tarrant, Shinnecock Reservation

**t** "I'm in Montauk and was sitting in a house on some bluffs. I thought the wind was really strong. Nope, just lived through my first earthquake" — @thezog

"It felt like armageddon. The women across the street ran out the building waving their arms," he said, laughing. "I missed my YouTube moment."  
— David Dominski, Cutchogue

**f** "My bird felt it before everyone. She flew across the house. I said to my husband, 'The couch is shaking like I was on a train.' OMG. Scary."  
— Toni Zaccaria-Ericson, Miller Place

**f** "Reminds us of how fragile the world is & how quickly things can change. Cherish what you have & protect it well."  
— Steven Gomez, Hauppauge

"stonybrook hospital rocked for at least a minute. very bizarre yet VERY cool"  
— squisheel1

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majority of it is not felt by humans ever. For the East Coast, it has to be a [magnitude] 3 or 3.5 or higher for it to be felt."

Some experts say earthquakes can occur in areas that used to be tectonic plate boundaries long ago, in what Lerner-Lam called "geologic relics of previous mountain-building episodes."

Powers said the Central Virginia seismic zone where yesterday's quake occurred has historically been active, with a number of small earthquakes, the largest being around a mag-

nitude of 4.

"So this is much larger than the historical average," he said. "I would say it's a very rare event, at least in terms of our living history on the East Coast."

People reported feeling yesterday's earthquake as far away as Georgia, Ohio and upstate New York, according to the U.S. Geological Survey.

It took one minute and seven seconds for the first wave from the Virginia quake to reach New York, according to measurements at Lamont-Doherty's facility in Palisades, N.Y.

After that initial jolting sensation came what scientists call the shear wave — a side-to-side motion. Last to arrive were the surface waves, the biggest and slowest moving.

"They're like the rolling motion in an ocean," Lerner-Lam said. "They are very large compared to other waves in the earthquake wave train and can be felt, particularly in our taller buildings."

The bedrock that supports the Eastern Seaboard is much older and denser than rock in the West, allowing seismic

waves to travel much farther.

Those effects may be amplified on Long Island and in parts of Queens, where up to a mile of soft, sandy soil separates the surface from bedrock.

"Sediment liquefies when shaken," said Lillian Hess, an associate professor of geology at Long Island University's C.W. Post Campus in Brookville. "The quake occurs in the bedrock along a fault line, but the sediment is on top of that and sediment shakes. . . . We're sitting on a huge chunk of sediment on Long Island."