

# Are we in danger of a 'big one'?

By JAMIE BATE  
Daily News Staff

ST. THOMAS — When the question is about earthquakes rocking the Virgin Islands and Puerto Rico, it's not "if" or even "when" — it's "how big?"

A tremor centered about 25 miles east of Anegada at 10:42 p.m. Wednesday registered 4.2 on the Richter scale. While the moderate quake shook St. Thomas without causing any damage, it was a reminder of just how seismically active the Eastern Caribbean is — and always has been.

Over the last century, the United States Geological Survey says more than 16,000 earthquakes have been recorded in the Caribbean region. Last year alone, the V.I. and Puerto Rico felt 622 earthquakes, according to the Puerto Rico Seismic Network at the University of Puerto Rico, Mayaguez campus. Although seismographs were the only things that detected the majority of those shakers, at least 13 were felt by people in the region.

Already this year, six "felt" quakes have dotted the Eastern Caribbean. Seismological records show that 1993 was the most active year during the 1990s with 820 tremors. The fewest amount of quakes occurred in 1990 with 344. But 1990 also had the most that were felt: 21.

An earthquake is considered dangerous when it causes visible damage, said Rafael Abreu Paris, a data analyst with the Puerto Rico Seismic Network. On an average, any earthquake with a magnitude of 5.7 or higher on the Richter Scale is considered dangerous, he said. Factors like the depth and distance of the epicenter to populated areas and the local geology can increase or decrease damage.

"In general, however, any earthquake higher than 5.0 in magnitude

is potentially dangerous and will scare the living daylights out of the toughest soul," Paris said. "The most recent event with a magnitude higher than 5.0 for this area was the Dec. 7, 1998 event located south of Anegada, that reached a 5.6 magnitude. It's depth of nearly 70 km, explains why its intensity was so low, producing very little damage."

Like California, the territory is classified as a "Zone 4." In seismological lingo, that means an area of highest risk. Puerto Rico is a Zone 3. Paris said there are at least five identified fault zones that are seismically active in the Puerto Rico and Virgin Islands area, but quake activity usually occurs in the Sombrero Seismic Zone, Virgin Islands Basin and the Anegada Trough.

In addition to the frequency of small quakes, the area has experienced over the last decade, there exist terrifying benchmarks.

On November 18, 1867, 20 days after Puerto Rico was devastated by Hurricane San Narciso, a powerful earthquake occurred with an approximate magnitude of 7.3 on the Richter Scale, according to Jose Molinelli Freytes, Puerto Rico Civil Defense.

The epicenter was in the Anegada Passage, between Puerto Rico and St. Croix. The earthquake produced a tsunami — or tidal wave — that washed over Water Island and Hassel Island and flooded Charlotte Amalie.

Just 24 years before that, however, the largest earthquake in the Eastern Caribbean's recorded history rocked the region. In 1843, thousands were killed on the islands between St. Kitts and Dominica. In Guadeloupe alone, more than 5,000 people died, 30 in Antigua and six in Montserrat — home of the infamous Soufriere Hills Volcano.

According to the Puerto Rico Seismic Network, the geological

## Measuring earthquakes

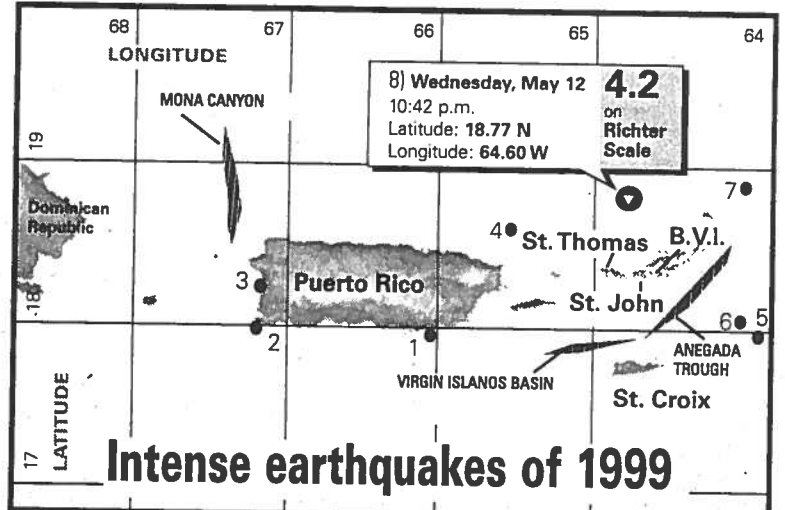
The Richter Magnitude Scale was developed in 1935 by Charles F. Richter of the California Institute of Technology as a mathematical device to compare the size of earthquakes.

Although it was originally devised to compare the magnitudes of earthquakes in California, it has been adopted worldwide.

The Richter Scale is logarithmic. This means that each whole number step represents a ten-fold increase in measured strength. A magnitude 7 earthquake is 10 times larger than a 6, 100 times larger than a magnitude 5 and 1000 times as large as a 4 magnitude.

The Mercalli scale is used to determine how a quake is felt. The scale goes from 1 to 12. A 4 on the Mercalli scale is one that is felt by people both indoors and out, but causes no damage.

Seismologists sometimes refer to the size of an earthquake as moderate (magnitude 5), large (magnitude 6), major (magnitude 7), or great (magnitude 8). Earthquakes are three-dimensional events, the waves move outwards from the focus, but can travel in both the horizontal and vertical plains. This produces three different types of waves that have their own distinct characteristics.



Daily News Graphic by BILL SILVERFARB

- 1) Jan. 12, 5:59 a.m., 4.5 rs
- 2) Jan. 18, 3:43 p.m., no richter no.
- 3) Feb. 26, 7:40 a.m., 3.3 rs
- 4) April 20, 1:16 a.m., 4.1 rs
- 5) May 5, 5:28 a.m., 3.4 rs
- 6) May 7, 4:31 a.m., 3.8 rs
- 7) May 9, 6:48 a.m., 3.5 rs

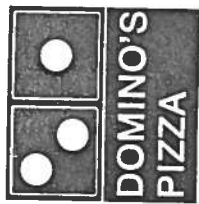
Information provided by the University of Puerto Rico's Seismic Center at Mayaguez.

Magnitude on Richter Scale	Possible effects
1-3.9	Normally detected only by instruments.
4-4.9	Faint tremor that makes objects inside buildings shake but causes little damage.
5-5.9	Strong quake, windows break and structural damage is caused.
6-7.9	Distinct shaking, less well-constructed buildings collapse.
8-8.9	Large buildings destroyed. Fissures appear in the ground.
9-plus	Massive devastation and loss of life.

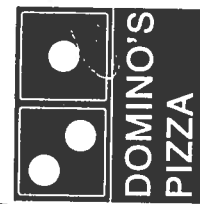
forces that created the Caribbean islands through volcanoes are responsible for the earthquakes in the region. Earthquake activity in the

area is caused when the North American Plate, a portion of the earth's crust, slides under another portion, the Caribbean Plate, at the

Puerto Rico Trench. This subduction occurs at a rate of two centimeters a year.



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