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OP-ED CONTRIBUTOR

Confusing Patterns With Coincidences

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IN the aftermath of the earthquake at L'Aquila, Italy, on Monday that killed nearly 300 people, splashy headlines suggested that these victims didn't have to die.

An Italian researcher, Giampaolo Giuliani, began to sound alarm bells a month earlier, warning that an earthquake would strike near L'Aquila on March 29. The prediction was apparently based on anomalous radon gas concentrations in the air; the region had also experienced a number of small tremors starting in mid-January. Mr. Giuliani was denounced for inciting panic by Italy's Civil Protection Agency, and he was forced to take his warning off the Web after March 29 came and went without significant activity.

Should Italian officials have listened? Should the public have heeded the warnings? With 20-20 hindsight the answer certainly appears to be yes. The real answer is no.

Scientists have been chasing earthquake prediction — the holy grail of earthquake science — for decades. In the 1970s American seismologists declared that the goal was reachable. Yet we have little to no real progress to show for our efforts. We have a good understanding of the planet's active earthquake zones. We're pretty good at forecasting the long-term rates of earthquakes in different areas. But prediction per se, which involves specifying usefully narrow windows in time, location and magnitude, has eluded us.

The key question is, can we find precursors that tell us that a large earthquake is imminent? Various phenomena have been investigated: radon levels, changes in earthquake wave speeds, the warping of the earth's crust, even the behavior of cockroaches and other animals.

The game goes like this: you look back at past recordings of X, where X is radon or whatever, and find that X had shown anomalies before large earthquakes. But the problem is that X is typically what we call a "noisy signal" — data that includes a lot of fluctuations, often for varied and not entirely understood reasons — so finding correlations looking backward is about as meaningful as finding animals in the clouds.

We do know that some earthquakes, including the L'Aquila event, have foreshocks, but we can't sound alarm bells every time little earthquakes happen because the overwhelming majority — 95 percent or so — will not indicate a coming major quake.

The public heard about Mr. Giuliani's prediction because it appears to have been borne out, albeit several days after he said the earthquake would happen. But there are scores of other predictions that the public never hears about. And that is a good thing because scientists have yet to be able to accurately predict coming earthquakes. Investigating precursors like radon is a legitimate avenue of research, but until and unless the

track record of a method is shown to be statistically significant, making public predictions is irresponsible.

Progress is slow in developing prediction methods, since, after all, they can be tested only by waiting for earthquakes to happen, and the earthquakes we care most about, like the deadly 6.3 magnitude quake in Italy, fortunately don't happen every day. In the meantime, society's keen interest in the subject occasionally collides with deliberative research, and misunderstandings like that involving Mr. Giuliani are the unfortunate consequences.

The public would like scientists to predict earthquakes. We can't do that. We might never be able to do that. What people and government can do is work to make sure our houses, schools and hospitals don't fall down when the next big one strikes, and that we're all prepared for the difficult aftermaths. We can look around our homes and our workplace and think about what would happen to them if the terra firma suddenly ceased being firm. We can stop worrying about predicting the unpredictable, and start doing more to prepare for the inevitable.

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