Model Shows Islands Muted Tsunami After Latest Indonesian Quake

In the first days after a magnitude 8.7 earthquake leveled buildings on the Sumatran islands of Nias and Simeulue on 28 March, experts wondered why it failed to generate a significant tsunami. After all, the monster quake that struck just to the north in December spawned a tsunami that killed more than a quarter-million people. Now that they’ve had a chance to locate the fault rupture more precisely and to run some simulations, they believe that the islands that bore the brunt of the March quake largely stifled its tsunami.

Quakes generate tsunamis by moving the sea floor, along with a lot of overlying water. The March quake was not only about a third as large as its December predecessor, but it apparently had another disadvantage: It didn’t reach as far, vertically. The December quake appears to have ruptured the fault—the inclined, deep-diving boundary between two tectonic plates—from tens of kilometers deep all the way up to the sea floor in the deep-sea trench off northern Sumatra, says seismologist Seth Stein of Northwestern University in Evanston, Illinois. The vertical displacement of the sea floor along the rupture would have transferred more of the quake’s energy into heaving up the tsunami, he says. In contrast, the rupture caused by the March quake didn’t breach the sea floor, which means that it would have transferred less energy to the water column.

Further weakening any tsunami, the March quake occurred under relatively shallow water. (The deeper the water over a quake, the more water it will displace and the larger the tsunami will be.) The movements of the overlying islands, in fact, displaced no water at all—and that turned out to be a critical factor.

When hydrodynamicists Costas Synolakis of the University of Southern California in Los Angeles and Diego Arcas of the National Oceanic and Atmospheric Administration’s Pacific Marine Environmental Laboratory in Seattle, Washington, simulated the March quake’s tsunami with the islands removed from their model, the resulting tsunami was much larger. Significant waves reached the distant islands of the Maldives south of India in the islandless simulation. “Had the two islands not been there” off Sumatra, says Synolakis, “we would have had another damaging transoceanic tsunami, although smaller in impact than the December one.”

Such vagaries of tsunami generation are reinforcing the tsunami community’s conviction that it won’t be able to predict tsunamis reliably anytime soon from seismic observations alone; only a dense network of tsunami detectors on the ocean floor will do.

—RICHARD A. KERR

INFECTIONOUS DISEASES

Veterinary Scientists Shore Up Defenses Against Bird Flu

PARIS—It took just a few years for avian influenza to move from a veterinary backwater into the global spotlight. Now researchers are trying hard to catch up. At a meeting here last week, more than 200 bird flu scientists called for more aggressive research and control efforts—from improved surveillance to finding more humane ways of killing birds. They also launched a new international lab network to coordinate research and share virus strains.

Asia’s lethal H5N1 is grabbing most of the headlines, but it’s not the only strain of so-called highly pathogenic avian influenza (HPAI) on the march worldwide. There have been 15 known outbreaks of HPAI between 2000 and 2004, which killed or led to the culling of some 200 million birds, Ilaria Capua of the Istituto Zooprofilattico Sperimentale della Venezia in Italy said at the meeting. In the 40 years before, she said, there were just 18 outbreaks, affecting 23 million birds: “We’ve gone from a few snowflakes to an avalanche.” Several strains other than H5N1—including H9N2 in China and Hong Kong, H7N2 in the United States, H7N3 in Canada, and H7N7 in the Netherlands—have also caused human infection, disease, or even death.

Researchers aren’t exactly sure what triggered the change or how big a threat it poses to humans. That’s why meeting participants called for more funding to study the panoply of strains. Most also welcomed a new network, proposed by the meeting organizers, the World Organization for Animal Health (OIE) and the Food and Agricultural Organization of the United Nations. Mirroring a similar network for human influenza, the new structure, dubbed OFFLU, would pool veterinary expertise, stimulate closer collaboration with human flu researchers, and facilitate the exchange of samples—often a thorny issue because of intellectual property concerns, says Capua, whose lab will host the network’s secretariat for the first 3 years. “It’s a great idea, if they can get it to work,” says Nancy Cox, chief flu scientist at the U.S. Centers for Disease Control and Prevention in Atlanta, Georgia.

Other changes are afoot to limit the spread of avian influenza as well. OIE has proposed that countries be required to search for and report outbreaks of low-pathogenicity avian influenza (LPAI) as well as its higher-pathogenicity kin. LPAI outbreaks cause little mortality and are easy to miss, says OIE’s Alejandro Thiermann—but they can evolve to become HPAI.

At the same time, OIE plans to introduce a new strategy called “compartmentalization” that could help protect international trade during an outbreak. Currently, entire regions or countries are shut off from the international market when they have bird flu. In the future, parts of the poultry industry could keep their disease-free status if they can show that their entire operation—including, for instance, feed supply, farm workers, and pets—operate within a biosafe “compartment” out of reach for the virus. Thiermann hopes the measure, which will be formally discussed by OIE’s 167 member countries next month, will spur investment in flu-proof poultry facilities.

—MARTIN ENSEINK