

Powerful Quake Shakes South Pacific

A scant six hours after a severe earthquake shook the seafloor southwest of New Zealand last week, seismologists had sketched a portrait of the fault fracture that generated this quake, the Earth's largest in at least 12 years.

"This is sort of the beginning of a new era in seismology," says Harvard University's Adam M. Dziewonski. "We have a nearly real-time capability to assess not just quake location — which has been done for a long time — but also the mechanism and the type of forces."

The May 23 earthquake, measured at 8.2 to 8.3 on the Richter scale of magnitude, struck along the Macquarie ridge about 500 miles from New Zealand. "It was an extremely large earthquake. But it was just out in the middle of nowhere and there appears to be no damage," says

Bruce W. Presgrave from the U.S. Geological Survey's National Earthquake Information Center in Golden, Colo.

Seismologists define the geologic structures that produce quakes by analyzing seismic waves traveling through the Earth. Among other things, the waves indicate whether horizontal or vertical motion caused the quake and characterize the orientation of this motion. To perform these calculations, seismologists usually must wait several months for seismic data from stations around the world to reach large information networks.

Dziewonski and his colleagues cut this time to hours by retrieving digital data from two seismic stations on either side of North America via computer modems — his group's first opportunity to test the



Plate map shows quake site at border of Australian and Pacific plates.

technique on such a large quake. Researchers at the University of Paris and at the California Institute of Technology in Pasadena use the same process.

Based on limited data, these estimates serve only as first approximations but can provide important information. "An earthquake like this occurring anywhere near a populated region could cause tremendous damage, and you really want to know, very soon afterward, the tectonic significance of the earthquake in order to assess the likelihood of large aftershocks," Dziewonski says.

The fault that spawned last week's tremor sits along the Macquarie ridge complex, a line of underwater ridges and troughs that form the boundary between the Pacific plate and a southern tongue of the Australian plate.

Richard G. Gordon, a geophysicist at Northwestern University in Evanston, Ill., says the Macquarie region is tectonically complex. The Indian plate is moving northeast relative to the Pacific plate, and if the plate boundary pointed exactly parallel to that motion, the plates would slide past each other. However, models suggest the boundary points about 20° counterclockwise from the direction of motion, so the plates are crunching together as they slide, says Gordon.

Earthquakes in the area support this idea because some release horizontal stress by sliding and others release compressional stress by forcing one crustal block to override the other. According to the Harvard researchers, last week's tremor involved both types of motion.

Because the earthquake relieved a substantial portion of the stress in that area, it will help scientists resolve some questions about the region's tectonics. Some studies suggest that the southern extension of the Australian plate may not attach firmly to the main plate because the extension appears to be migrating westward relative to the main plate. Gordon says the plate may deform to allow this motion, or the southern piece may be an independent microplate. The recent quake, he says, "will help tell us whether the Australian plate is behaving rigidly or not."

— R. Monastersky

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HIV can linger years with no antibodies

The AIDS-causing virus, HIV, can reside in individuals for three years without triggering production of the antibodies doctors use as evidence of AIDS infection, new research indicates.

The findings, which suggest that prolonged viral latency in HIV-infected people may be more common than previously recognized, add a dark cloud to an already bleak AIDS horizon. But a potential silver lining emerges as well, researchers say. On the one hand, the study suggests that many people who test negative for HIV antibodies may in fact be infected. If these people can infect others via sexual contact or blood transfusion — something researchers stress remains uncertain in these individuals — then the likelihood of inadvertent disease transmission may be substantially increased. On the other hand, the research suggests some infected individuals can suppress viral activity so effectively that for years they may show no antibody response, let alone symptoms of disease. This provides hope that scientists may eventually develop drugs or other treatment approaches that could delay disease onset indefinitely in infected individuals.

David T. Imagawa of the University of California, Los Angeles, School of Medicine and his colleagues followed 133 homosexual men who at six-month intervals repeatedly tested negative for HIV antibodies despite continued high-risk sexual activity. Using sensitive viral culture techniques, the researchers detected HIV in 31 (23 percent) of these men, 27 of whom have remained without detectable antibodies for up to 36

months after infection.

Previous studies had hinted at the possibility of such long latencies in apparently infected individuals with extremely low antibody levels, says William A. Haseltine of the Dana-Farber Cancer Institute in Boston. But methodological uncertainties and the possibilities of contamination clouded interpretation of these studies. "In the present study, the presence of infection is clear," he says in an editorial accompanying the research report in the June 1 *NEW ENGLAND JOURNAL OF MEDICINE*. The finding, he adds, "raises the sobering possibility that HIV infections may be transmitted by blood and organ donors who are silently infected."

However, Imagawa told *SCIENCE NEWS*, "you must also remember that [high-risk] individuals should know they shouldn't be donating blood. So the added risk there may not be as large as we think." Moreover, he says, the study population of antibody-negative individuals engaged in high-risk behaviors may not be representative of the population at large. These individuals may have mechanisms of suppressing viral activation or may be infected with mutant viruses incapable of replicating.

Indeed, Imagawa adds, the research provides preliminary evidence that a subpopulation of white blood cells called CD8 cells may play a heretofore unrecognized role in suppressing viral activity in some infected individuals. Researchers may learn to manipulate such natural mechanisms to forestall disease progression after HIV infection.

— R. Weiss