

## News Notes

### Tectonics

## Measuring the Sumatra quake

The motions on the fault that set off the Dec. 26, 2004, earthquake that sent a tsunami across the Indian Ocean continue to puzzle seismologists.



As part of continued examination of the region and its potential to have another large earthquake, a team of scientists led by Jean-Philippe Avouac of Caltech in Pasadena, Calif., looked at measurements from before and after the 2004 Sumatra event. The data came from a network of GPS stations across the Sunda thrust fault, where the Indian and Australian plates meet and dive beneath the Eurasian plate.

The flat top of this coral marks the highest tides from its past, when the land beneath the corals was low enough to keep them underwater, and the waterline marks the high tide after the Dec. 26, 2004, Sumatra earthquake. Photo is by J. Galetzka.

Part of the ground movements they documented came from measurements of the elevation of corals, the flat tops of which mark the last time the land beneath the corals was low enough so as to keep them underwater during high tides. The tidewater lines mark how much previous tectonic events have pushed up or sunk the corals.

Taking all of their data together, Avouac and colleagues report in the March 2 *Nature* that the fault slipped as much as 20 to 30 meters in the first few minutes of the magnitude-9-plus earthquake — and continued to slip an estimated 30 percent more during the weeks that followed, which came as a surprise. Their measurements have implications for where the fault is “stuck,” where it might move again, and how it has moved and continues to move deep in the crust. All of these factors should help scientists figure out the likelihood of a large earthquake on the portions of the subduction fault that lie to the south, which did not break in the 2004 event.

“The results show that we have much to learn about how deformation is accommodated across these zones of dramatic plate convergence,” wrote Charles Ammon of Pennsylvania State University in University Park, in a comment accompanying the *Nature* paper. Ammon noted that many questions still remain, including why the fault ruptured again on March 28, 2005, in a magnitude-8.7 earthquake, why the rupture in the first large event petered out to the north, and whether more earthquakes are in store for the southern section of the fault.

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### Links:

"Sumatra quake stronger than thought," *Geotimes*, April 2005

"Sumatra seismic risk," *Geotimes* online, Web Extra, March 28, 2005

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