



May 7, 2012  
JAMSTEC

### **Slow seismic slip along the plate boundary**

Plate convergence near trenches has been believed to occur as 'aseismic' slip either along the megathrust plate boundary or along splay faults branching updip into the sedimentary wedge. Although "tsunami earthquakes", which generate tsunamis disproportionately large for their seismic energy, and "very-low-frequency" earthquakes are known to occur infrequently in this region, they still remain as enigmatic events by lack of any close-in observations.

JAMSTEC had a seismic observation on the seafloor in the rupture zone of the 1944 Tonankai Earthquake using three broadband ocean-bottom seismometers from August 2008 to September 2009. As for a series of the "very-low-frequency earthquakes" along the Nankai Trough in March 2009, we successfully determined the location of their epicenters as well as their mechanisms including the angle of faults and the direction of fault movements with high accuracy. Slow yet still seismic slip suggests that the shallowest plate boundary can be a source of "tsunami earthquakes".

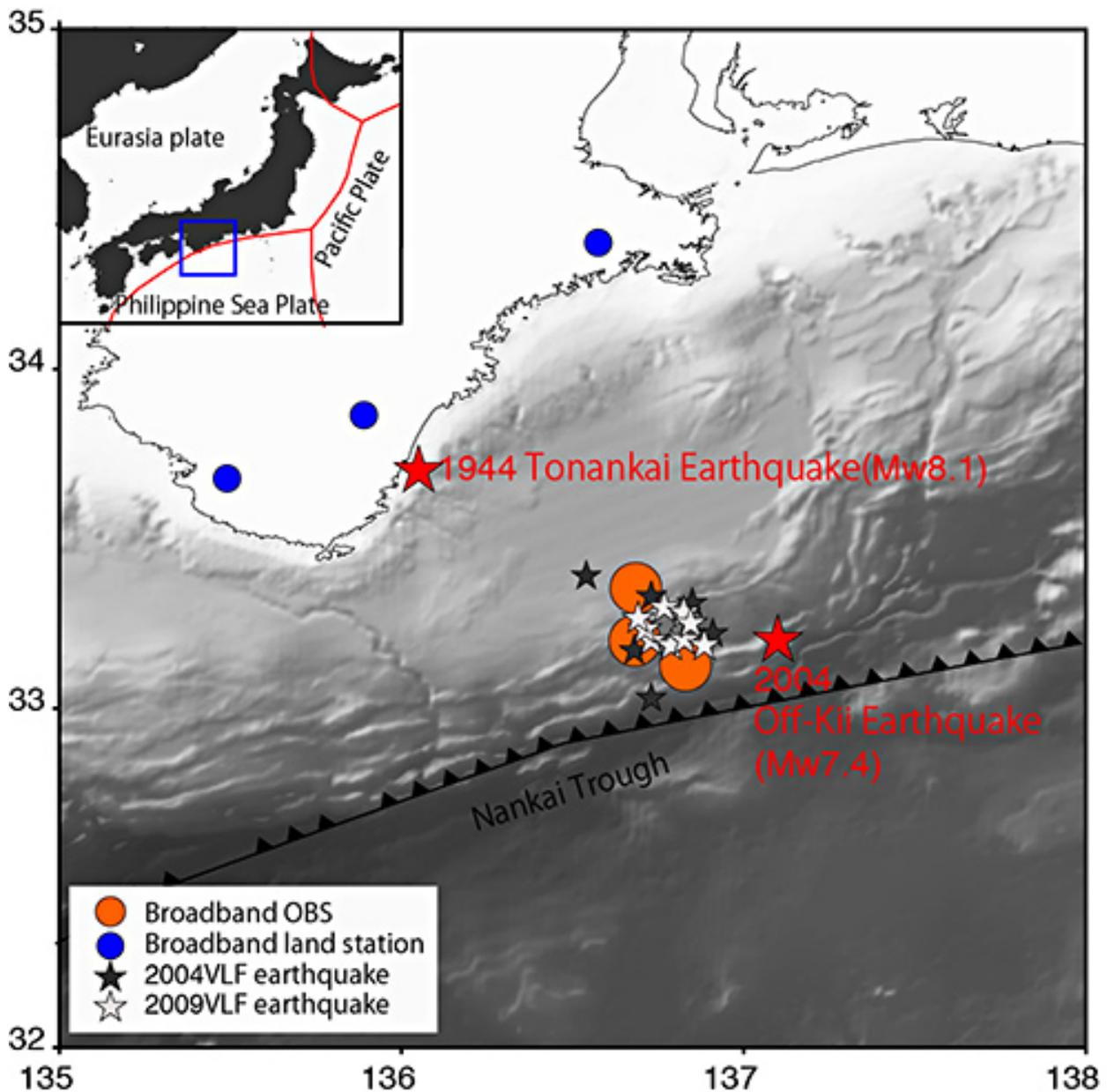
It was published in Nature Geoscience on 6th of May.

<http://www.nature.com/ngeo/journal/vaop/ncurrent/full/ngeo1466.html>

Title: Tsunamigenic potential of the shallow subduction plate boundary inferred from slow seismic slip.

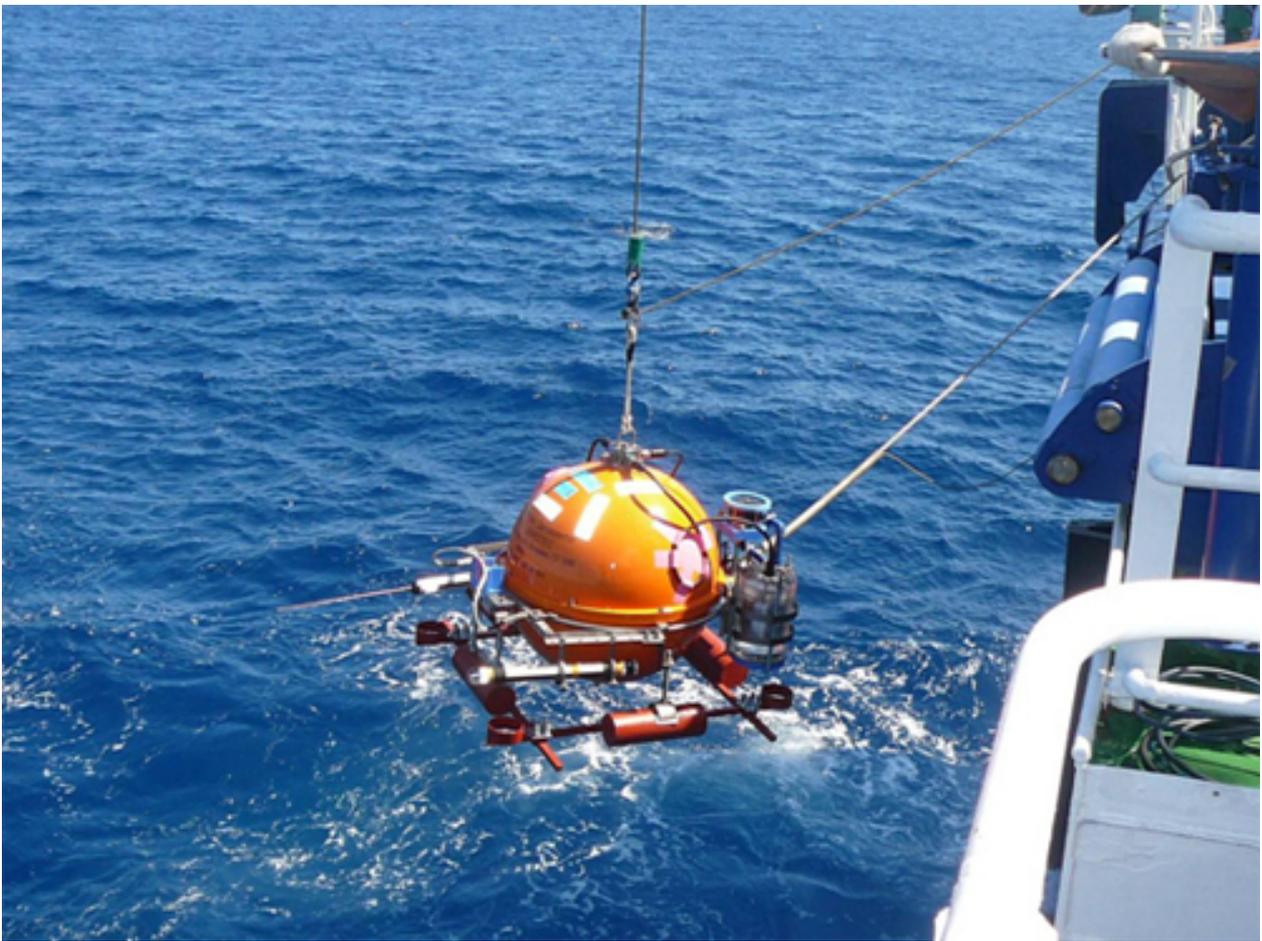
Authors: Authors; Hiroko Sugioka, Taro Okamoto, Takeshi Nakamura, Yasushi Ishihara, Aki Ito, Koichiro Obana, Masataka Kinoshita, Kazuo Nakahigashi, Masanao Shinohara, Yoshio Fukao

Correspond to Hiroko Sugioka E-mail: [hikari@jamstec.go.jp](mailto:hikari@jamstec.go.jp)



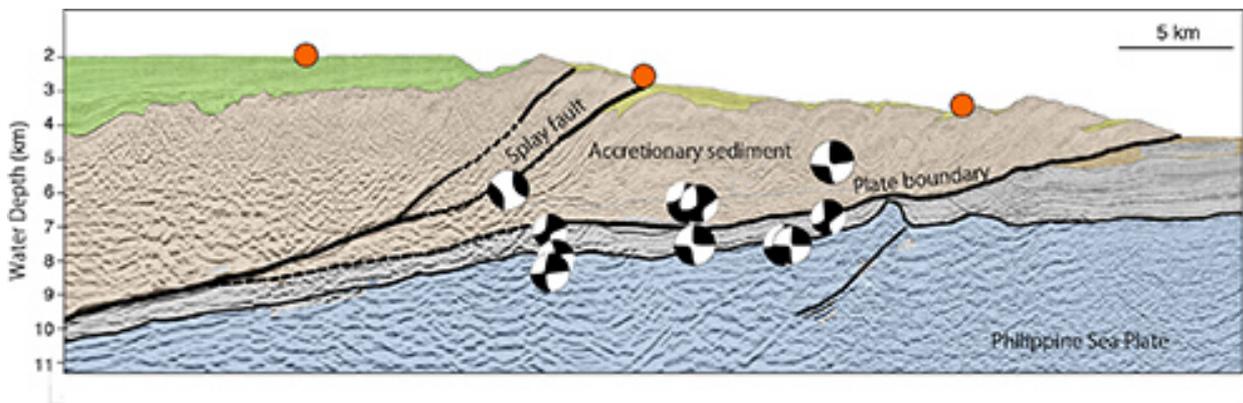
**Figure 1. Broadband seismic observation for VLF earthquakes near the Nankai Trough**

Distributions of ocean-bottom seismic stations of six broadband ocean bottom seismometers (orange circles) including those at three sites near the very-low-frequency (VLF) sources region and the land broadband seismic stations (blue circles). The epicenters of the VLF earthquakes that occurred in 2004 (black stars) and 2009 (white stars) are shown along with those of ordinary submarine earthquakes with comparable magnitudes. The epicenters of the 1944 Tonankai earthquake and the 2004 Off Kii earthquake (red stars) are added.



**Figure 2. Photo of the broadband ocean-bottom seismometers**

These seismometers have a long-period corner of up to 360 seconds, and are well suited for observation of earthquakes with unusually-slow fault rupture processes



**Figure 3. Hypocenters of the 2009 VLF earthquakes**

Moment tensor solutions of the 2009 VLF earthquakes are viewed from the side and the locations of the three broadband stations (orange circles)

Contacts:

Japan Agency for Marine-Earth Science and Technology

(For the study)

Hiroko Sugioka

Institute for Research on Earth Evolution (IFREE)

(For publication)

Kazushige Kikuchi, e-mail: [press@jamstec.go.jp](mailto:press@jamstec.go.jp)  
Senior Administrative Specialist, Planning Department Press Office