

## Interpreting the strongest deep earthquake ever observed

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Massive earthquakes that strike deep within the Earth may be more efficient at dissipating pent up energy than similar quakes near the surface, according to new research by Wei et al. The authors analyzed the rupture of the most powerful deep earthquake ever recorded.

On 24 May 2013, a magnitude 8.3 earthquake hit deep beneath the Sea of Okhotsk, between Russia's Kamchatka Peninsula and Japan. The main shock of the earthquake was located at 610 kilometers (379 miles) depth, a rupture in the mantle far below the Earth's crust. By inverting seismic waves that were observed during the earthquake, the authors find that this initial shock triggered four subsequent shocks. These four shocks were magnitudes 7.8, 8.0, 7.9, and 7.9. A pressure front from the initial earthquake propagated at a speed of approximately 4.0 kilometers (2.5 miles) per second, setting off three subsequent earthquakes in a line south of the main shock. The rupture of the second follow-up earthquake sent a secondary rupture front back up north, triggering a third aftershock.

In total, the entire earthquake sequence took just 30 seconds, and the bulk of the stress was released by the four major shocks. In similar <u>earthquake</u> swarms that occur near the surface, such a release could take hours to days and would likely include a large number of small aftershocks. Based on this, the authors conclude that deep earthquakes are likely more efficient in dissipating stress than shallow earthquakes.

More information: Rupture Complexity of the Mw 8.3 Sea of



Okhotsk Earthquake: Rapid Triggering of Complementary Earthquakes? *Geophysical Research Letters*, DOI: 10.1002/grl.50977, 2013 http://onlinelibrary.wiley.com/doi/10.1002/grl.50977/abstract

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