

A five years super-slow aseismic precursor to the M8.3 Hokkaido Toho-oki subduction earthquake recorded by tide gauges

Kei Katsumata[1], Minoru Kasahara[1], Shinzaburo Ozawa[2], Alexei Ivashchenko[3]

[1] ISV, Hokkaido Univ, [2] Geographical Survey Institute, [3] IMG

Earthquakes are made up of seismic waves from ruptured fault planes within the Earth's crust. The speed of propagation is usually as fast as that of shear waves (approximately 3km/s). However, slow or silent slip events devoid of strong ground motions also occur. Examples of such events are creep events on the San Andreas Fault, a slower process preceding high-speed rupture and a slow slip after a main shock at the Japan Trench. Here we report on a super-slow aseismic event prior to the magnitude 8.3 Kurile Island (Hokkaido Toho-oki) earthquake on 4 October 1994 as recorded by two tide gauges, located 50-150 km from the earthquake epicenter. Both instruments recorded several cm of subsidence during a five-year period prior to the earthquake. The observed signals are consistent with a precursory quasi-stable slip on the western half of the Hokkaido Toho-oki fault plane. When recognized, such aseismic events can considerably improve our intermediate-term (several years) prediction capability.