

Worldwide Observations for Continuous Tremor and Low-Frequency Events in Subduction Zones

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The recent observations continuous tremor and low-frequency events associated with subduction zones in Japan, Cascadia, Alaska, New Zealand and other regions of the world, have sparked interest in processes that are occurring near the slab in this region. There is still little known about the physical mechanisms for these events, and even their position relative to the subducting slab is uncertain, because the low amplitude and emergent waveforms hamper precise locations. Some of the notable characteristics of the events include, episodic sequences, triggered occurrences from regional and teleseismic earthquakes, and propagation of events over distances greater than a hundred kilometers. Sometimes there are close associations of the occurrence of the events with slow slip events that are on the plate interface.

Since it is difficult to analyze the waveforms of continuous tremor, much of the information is inferred from the discreet low-frequency seismic events, which are assumed to have similar mechanisms to the continuous tremor. From locations of low-frequency events, their position relative to the slab varies depending on the region. In some places low-frequency events occur close to the slab interface while in other places they are 10 to 20 km above the interface. These events are often associated with fluid flow or pressure changes. This is inferred from the triggering stresses of teleseisms and the propagation across long distances. The long durations of continuous tremor that last for minutes to hours may be due to a fluid pressure change with a feedback mechanism that can continually induce further pressure changes.