In 2001, a paper found a silent slip event on the deeper Cascadia Subduction Interface [*Dragert et al.*, 2001]. This discovery comes from the observation of the GPS stations that reversed their direction of motion (see the following figure). This paper conducted a slip inversion to model the observation. And they found that the sudden displacements are best explained by ~2 centimeters of aseismic slip over a 50-kilo-meter-by-300-kilometer area on the subduction interface downdip from the
seismogenic zone, a rupture equivalent to an earthquake of moment magnitude
6.7. This paper provides evidence that slip of the hotter, plastic part of the subduction interface, and hence stress loading of the megathrust earthquake zone, can occur in discrete pulses.



In 2002, anther paper in science found the periodicity of slow earthquakes in Cascadia [*Miller*, 2002]. They found the slow earthquakes occur on average every 14.5±1 months over 10 years. The conclusion from this paper is: the regular and cyclical nature of the transient events indicates that they are a fundamental mode of strain release in subduction zones.

The tremor first found in Non-volcanic setting is from Japan [*Obara*, 2002], it shows the tremor in southwest Japan. The predominant frequency of the tremors ranged from 1 to 10 Hz, and was lower than that of ordinary earthquakes of similar size. The tremors are around depth of 30 km. The following figure shows the location of the tremor, but we can see two gaps where there’s no tremors.



The possible cause of the tremor this paper gave is: considering the long duration and mobility of the tremor activity, the generation of tremors may be related to the movement of fluid in the subduction zone. At high temperature and pressure, aqueous fluid mixed with silicate melts exists as a supercritical fluid. The presence of supercritical fluid may reduce the friction and change the fracture criterion of the rock by increasing the pore pressure and/or create new cracks through hydraulic fracturing. Therefore, tremor activity with a long duration time might be caused by a chain reaction of small fractures caused by the supercritical fluid.

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