Short-Term Slow Slip Events at Alaska Subduction Zone and their Association with Tremors in the Vicinity

Dhamsith Weerasinghe[1], Yuning Fu[1]

[1]Department of Geology, School of Earth, Environment and Society, Bowling Green State University, Ohio, United States

In addition to significant earthquakes, the Alaska-Aleutian subduction zone has hosted several long-term Slow Slip Events (SSEs). Besides these year-long events, GPS data also have indicated week-long events such as the one observed in September 2010. Careful analysis of the GPS data shows many such possible events in the region. The objective of the study is to identify those short-term SSEs, estimate slip distribution and discuss their correlations with local tremors in the region. GPS time series from 12 stations in the area was used to invert for the slip of each observed week-long event. These events were then correlated with the tremor time series to confirm their tectonic nature. Our results revealed 15 potential short-term SSEs, with 11 of them correlating with the tremor time series. These events had moment magnitudes ranging from 6.81 to 7.54. The average depth of the events was around 58 km, and the slip areas of these short-term SSEs were located closer to the 2008-2013 long-term SSE. According to our results, 5 of the short-term SSEs slipped in a typical trench normal (south-southeast) direction. It was interesting to observe 10 short-term SSEs with trench-parallel fault slip (south-southwest), which was not previously reported in this region.

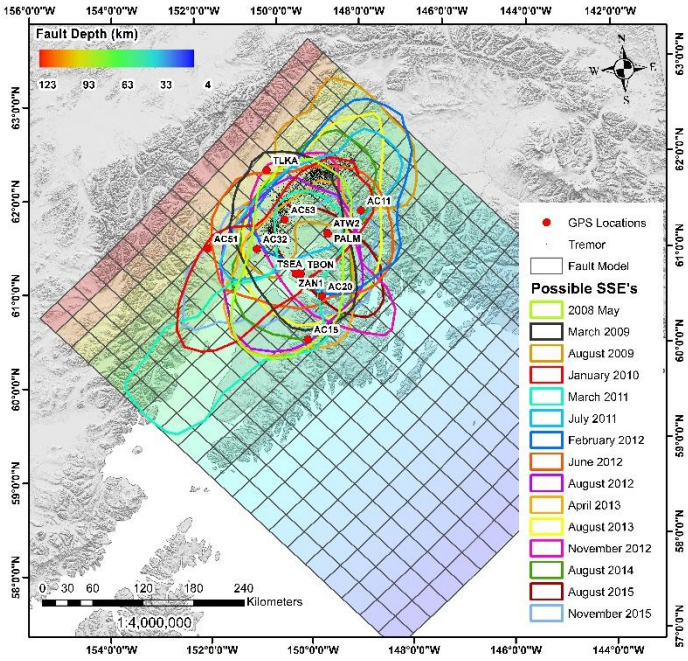

Figure 1: Distribution of the 15 short-term SSEs from 2008 to 2016. GPS stations are shown by red circles. The black dots show the tremors recorded in the region from 2008 to 2015 (Wech, 2016).