

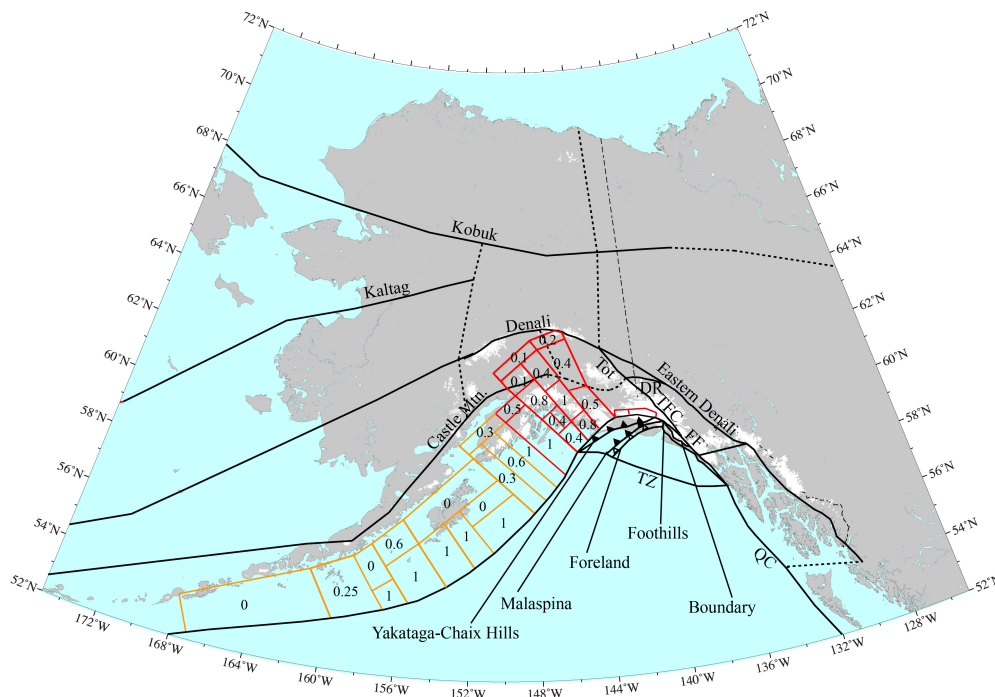
Geodetic Insights into Subduction Processes: The Example of Alaska

The Alaska subduction zone is a multi-faceted boundary that has generated a number of significant events over the last century, including the second-largest earthquake recorded, the M9.2 Prince William Sound earthquake. While it has often been assumed to be the boundary between the Pacific and North American plates, a wealth of data acquired through projects over the past 15 years reveal a more complicated situation. These projects, including Earthscope, greatly expanded the number of campaign and continuous GPS sites and established a network of real-time, high-rate collection sites. This updated data set is used in tectonic models that allow exploration of a variety of subduction parameters and the relationship of these parameters to slip behavior in the region.

Rather than a single plate, the crust above the subduction interface is comprised of multiple blocks. Counterclockwise rotation in the eastern Chugach Mountains transitions to near arc-parallel motion in the eastern Aleutian Islands. The GPS data suggest that the flat slab of the Yakutat oceanic plateau is locked or partially locked from the western edge of the Wrangell Volcanic field north to the Denali fault and west to the eastern end of the Kenai Peninsula. West of that, more steeply dipping Pacific plate provides the best fit to the data.

Areas of high slip during the 1964 earthquake correspond to areas that appear to be strongly coupled in the present, suggesting that persistent asperities may exist. The transition between the slabs, while likely a continuous surface, may influence some earthquakes and transient slip. Slow-slip events in 1998-2001 and 2009-2013 occurred along the Yakutat interface just east of the transition while a 2010-2011 slow-slip event took place to the west on the Pacific interface. Recent intraslab events bracketed the transition: the 2016 M7.1 Iniskin event occurred in the Pacific slab while the 2018 M7.1 Anchorage earthquake began in the Yakutat flat slab and may have ruptured into the interface.

Recent outreach efforts with schools in the areas of an Earthscope project in the Wrangells and a RAPID project for the Anchorage earthquake will also be discussed.



Fault model for Alaska Subduction Zone. Red is Yakutat slab, Orange is Pacific slab.