Lateral Variations of Attenuation in the Crust of Alaska using Lg Q Tomography

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We have conducted a crustal seismic (Q_{lg}) attenuation tomography study across Alaska using recordings from the EarthScope USArray from 2014-2019. The resolving power of the inversion is 150X150 km for most of Alaska, and 75X75 km in central and southern Alaska. Numerous fault systems and high mountain ranges are present across Alaska and accommodate compression in the north-south direction and shearing of southern Alaska towards the west. These mountain ranges include the Brooks Range in the North, the Alaska Range in central Alaska, and the Aleutian Range in the southwest. Average Lg Q for all of Alaska is significantly higher than in the western U.S. and Canada. This lower average attenuation impacts seismic hazard estimates for the region. According to the tomographic results, we see a significant variation of the Q_{lg} values from low to high across the southern part of the Brooks Range. Also, we found higher attenuation in the southeast region of Alaska, where the Wrangell Volcanoes are located. Moreover, we see an area of lower attenuation associated with weak frequency dependence in the south-central region of Alaska next to Anchorage. Another anomaly with lower attenuation can be seen extending from central Alaska to southeast Alaska, possibly associated with the Yukon–Tanana Terrane. There are a few areas like southwest Alaska associated with the Togiak Terrane and an area next to Fairbanks in Alaska's interior which shows lower attenuation with lower frequency dependence and higher attenuation with higher frequency dependence, respectively, for low frequencies up to 3Hz. Our model's highest η zones ($\eta \gtrsim 95$) are mostly confined to major tectonic terranes and other major tectonic elements like faults and fractures. Regional variations in crustal attenuation can impact local seismic hazard estimates if incorporated into the hazard analysis.