Abstract: The Denali Fault is a major strike-slip fault extending from British Columbia, into western Alaska. Mount McKinley, at 6,114 m, is the highest peak in North America and is located to the south of a bend in the Denali Fault (Fig. 1). To the north, at the apex of the bend in the fault, Peters Dome is at (3,221 m). The highest peak and north-side peak elevations rapidly decrease moving away from the bend’s apex.

Topographic development is predicted to be transient along strike-slip faults as crustal blocks move through bends, which are regions where a component of horizontal slip is partitioned into a vertical component. We applied apatite fission-track (AFT) thermochronology analysis (Fig. 2) to samples collected along both sides of the Mount McKinley restraining bend. The preliminary data suggests a fission-track pattern of ages decreasing to the west on both sides of the fault. As the crustal block of Mount McKinley is moving through the bend, it is likely the bend itself is also migrating-deforming to the west, causing the crust north of the bend’s apex to shorten (Peters Dome) and that it is deforming and migrating to the west at ~4 mm/yr (relative position).

Discussion: The Denali fault is a right-lateral fault with a horizontal slip rate of about ~6 mm/yr. It is predicted the low angle (17°) Mount McKinley restraining bend at ~4 mm/yr based on kaolin analog experiments (Cook et al., 2013). We believe that the Mount McKinley restraining bend is not in a fixed position relative to the crustal block to the south (i.e. Mount McKinley) and that it is deforming and migrating to the west at ~4 mm/yr causing the crust north of the bend’s apex to shorten (Peters Dome area). This tectonic scenario is responsible for the regionally unique elevation and broad width of Mount McKinley. The granitic lithology of the mountain and the fact that it is composed of granitic plutons that are not dissected by many faults contributes to the low resistivity of the Mountain and hence it’s large size (Wilson et al., 1998).