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# North America Dynamics

**E. Humphreys** (1) and D. Coblentz (2)

(1) University of Oregon, USA, (2) Las Alamos Lab, USA (genehumphreys@gmail.com / 541 346-5575)

By modeling forces acting on the margins, base and interior of the North America plate with finite element code, we predict interplate stress. We compare this with observed stress to conclude: high ocean-ridge gravitational potential energy (GPE) compresses North America; high Cordilleran GPE usually overcomes this compression; most subduction zones apply a strong outward-directed pull; transform-boundary shear and normal loads average ∼1-2TN/m; and basal tractions average 0.5 MPa (∼20% of global-flow calculations) except at the cratonic root, where they average of ∼4 MPa of drag. The last conclusion implies a thin, relatively weak asthenosphere and relatively stagnant deep Earth mantle. Fault shear stress levels average ∼20-50 MPa. San Andreas shear load drags the Sierra Nevada NNW and drives western Great Basin shear; this load is balanced by north-south compression in Washington. Western U.S. extension occurs because of: high GPE; root drag, which “shadows” western U.S. from ridge-push; and an outward pull at southern Cascadia.