# Southward extent of the western Idaho shear zone, Owyhee Mountains, Idaho: Constraining along-strike variations in transpressional shear zones

Benford*, Bryn and Tikoff, Basil
University of Wisconsin - Madison
* bryn@geology.wisc.edu, (608) 262-8960

The Late Cretaceous western Idaho shear zone (WISZ) continues south of the western Snake River Plain into the northern Owyhee Mountains. The shear zone mainly occurs in two blocks of granitic basement rocks that are surrounded by Miocene-aged basalts. A solid-state fabric exists in the western part of the field area, with a consistent strike of 020, a steep eastern dip, and a down-dip mineral lineation. Shape preferred orientation (potassium feldspar, quartz, plagioclase, and mafic minerals) and lattice preferred orientation (quartz) analyses show weak fabric. Anisotropy of magnetic susceptibility analyses indicate weakly developed flattening fabrics with no clear spatial variation. New strontium analyses, performed at the Boise State University Isotope Geology Laboratory, indicate initial $^{87}Sr/^{86}Sr$ ratios exhibit a sharp west-to-east transition from 0.704595 to 0.707899, over a distance of ~30 kilometers. Samples for the strontium analyses are from within the field area and elsewhere in the Owyhee Mountains.

The southern continuation ("Owyhee segment") has three major distinctions from the main segment of the WISZ: 1) significantly less-developed solid-state fabrics, 2) a trend of 020 rather than north-south, and 3) a ~30-km transition in initial strontium ratios from 0.704 to 0.708 compared to a ~6-km transition near McCall, ID. A tectonic model explains these differences, assuming a rigid-body collision, transpressional kinematics, and an along-strike change in trend of the shear zone. A lower finite strain magnitude, a different strain path (larger simple shear and smaller pure shear components), and an increased width for the shear zone in the northern Owyhee Mountains is predicted, relative to the northern segment of the WISZ. More specifically, for the Owyhee Mountains, the model predicts a local oblique convergence angle between 24º and 39º, 40-69 km of convergent movement, 85-99 km of transcurrent movement, and overall lower finite strain. For the main segment of the shear zone, the model predicts a local oblique convergence angle of 44º-59º, 65-94 km of convergent movement, and 57-67 km of transcurrent movement. The differences predicted by the model for the two segments explain the less steep strontium gradient and the weaker fabric documented in the northern Owyhee Mountains.