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Changing Rates and Styles of Crustal Deformation at Timescales of 10 My to 10 Ky

This research seeks to fill a gap in knowledge of rates of crustal deformation in order to define how the crust deforms at different time scales. These data provide a valuable context for interpretation, prediction, and modeling of crustal deformation and assessment of seismic hazards. Overall, our work focuses on the Sierra Nevada Frontal Fault Zone (SNFFZ) in the central eastern Sierra Nevada, California, where numerous moraines, outwash surfaces, and displaced markers extending to at least 10 Ma provide a truly broad spectrum of deformation rates and styles in this transtensional setting. As well, there are data indicating that both elastic (via fault displacement) and inelastic (via both vertical-axis block rotation and folding) strain can be quantified.

The current study centers on defining the locations, magnitude, styles, and rates of Tertiary and Quaternary deformation at time scales of 10 My-10ky in three specific study areas, the Sonora Pass, Bridgeport Basin, and Bodie Hills regions. Rates and styles of deformation have been derived from: i) geologic and geomorphic mapping, ii) paleomagnetic sampling of Tertiary volcanic rocks, iii) GPS and total-station surveys of faulted landforms, and iv) detailed chronologies of glacial and alluvial deposits constructed using in-situ cosmogenic radionuclide (CRN) exposure dating techniques. This study will document rates of both focused (on-fault) and distributed (off-fault) deformation at multiple time scales, which will enable us to (1) test the constancy of fault slip rates and (2) quantify off-fault strain.

Biography:
Dylan Rood is a Technical Scholar at the Center for Accelerator Mass Spectrometry (CAMS) at Lawrence Livermore National Laboratory (LLNL; working with Bob Finkel) and a Ph.D. candidate at UC Santa Barbara (working with Doug Burbank). He was recently awarded a Student Employee Graduate Research Fellowship (SEGRF) by LLNL to support the completion of his dissertation and recruit him to work at the Lab.

Dylan was born and raised in Pasadena, California, and received a B.A in Earth and Environmental Science from Wesleyan University in Connecticut. He spent a year studying and doing research at the University of Otago in Dunedin, New Zealand, and has participated in field-based research projects in California, Mexico, Hawaii, Maine, Atlantic Canada, Montana, Puerto Rico, and Montserrat.

Currently, his Ph.D. research addresses the Miocene-to-Recent transtentional evolution of the eastern Sierra Nevada using volcanic stratigraphy, 40Ar/39Ar geochronology, paleomagnetic data, GPS and total-station surveying, and in-situ cosmogenic radionuclide (CRN) dating techniques. Recently, he received the Glicken Award from the Department of Geological Sciences at UC Santa Barbara for excellence in the field of volcanology, and the Outstanding Graduate Oral Presentation Award from the Geological Society of America for his talk at the Cordilleran Section meeting in San Jose.