MGS Luncheon Meeting

Tuesday, January 29th, 2019

12:00 PM at the Billings Petroleum Club

Save the Date!

RSVP – montanageologicalsociety@gmail.com

BASIL TIKOFF

EARTHSCOPE SPEAKER SERIES

The Jagged Western Edge of North America: The Profound Influence of Precambrian Rifting on Subsequent Mountain Building

---

The Precambrian rifted margin of western North America is arguably the single most important tectonic event that occurred in the development of the Cordilleran orogen. Along most of western North America, there are 330-oriented rift segments and 060-oriented transform segments which formed within the Neoproterozoic rifted margin. This inherited rift-transform geometry influenced sedimentation of the passive margin (e.g., miogeocline), Mesozoic orogenies, and influences the modern day geodetic field. The western edge of North America is dramatically expressed along the Idaho segment of the Cordilleran margin: The recently completed EarthScope IDOR (IDaho-ORegon) project was designed to constrain the lithospheric geometry and tectonic history of this boundary. In western Idaho, accreted terranes of the Blue Mountains are directly juxtaposed against cratonic North America along the NS-oriented western Idaho shear zone and the EW oriented Ahsahka shear zone. These shear zones are continuous, although a 90° change in shear zone orientation occurs near the town of Orofino (Idaho). Paleomagnetic data indicates that the entire Idaho segment has rotated ~30° clockwise, and that rotation occurred after 85 Ma. If so, the NS- and EW-oriented shear zone segments currently in Idaho were originally parallel to the trends of the Precambrian rifted margin in the rest of western North America (330 and 060, respectively), indicating that the Precambrian margin acted as a "backstop" for accretionary deformation. The jagged rift-transform geometry was particularly problematic for the northward translation of accreted terranes that initiated at ~100 Ma: The Blue Mountain terranes were caught in the structural "corner" (or syntaxis) at Orofino. Moreover, the same structural corner exerts a fundamental influence on modern geodetic movements in the Pacific Northwest. The Orofino corner acts as a fulcrum – with the Blue Mountains terranes acting as the lever arm – that controls the clockwise rotation in the Pacific Northwest.

Biography

Basil Tikoff is a structural geologist and tectonicist – with admittedly geophysical tendencies - at the University of Wisconsin – Madison. He has a long-standing interest in the tectonic development of the Cordillera of western North America, with an emphasis on deformation associated with obliquely convergent and obliquely divergent plate margins (transpression and transtension). In particular, he has studied strike-slip faults at a variety of lithospheric levels, including the surface, mid-crust, deep crust, and lithospheric mantle. He has also worked worldwide on the interaction of magmatism and deformation within magmatic arcs. He

received an A.B. degree in physics (minor: geology) from Oberlin College and a Ph.D. from the University of Minnesota. He is also interested in developing digital databases, geoscience education, and working with cognitive scientists to understand spatial thinking (which, despite what it seems, are really all related).