REGIONAL TECTONIC ANALYSIS OF LARAMIDE OROGENESIS USING FIELD STUDIES, APATITE FISSION TRACK, AND (U-TH)/HE THERMOCHRONOLOGY

Jacob Thacker
University of New Mexico, Earth and Planetary Sciences/Structure and Tectonics, Albuquerque, NM, USA
jacoboliverthacker@gmail.com

ABSTRACT

The Cretaceous-Tertiary Laramide orogeny remains a controversial episode of tectonic activity. Characteristics such as inboard deformation, magmatic shutoff, and anastomosing basement-cored arches have made the Laramide difficult to explain by traditional plate tectonic theory, and have invoked models whereby flat-slab (<15º) subduction of the Farallon plate is attributed to the progressive eastward "sweep" of stress and magmatism from ~90 to ~45 Ma. This event culminated in uplift of the Rocky Mountains. Active flat-slab subduction accompanied by magmatic shutoff and basement-cored arches is observed in Argentina, providing a modern-day analog for the flat-slab model. However, recent criticism of this "guiding paradigm" and areas of anomalously non-sweep magmatism (Colorado Mineral Belt) suggests that a thorough study is required to review and test geodynamic models for Laramide deformation. Proposed geodynamic mechanisms for the Laramide orogeny includes slab shallowing, passage of conjugate oceanic plateaus, widespread distributed basal tractions and crustal detachment, mid-crustal flow, west-dipping subduction, and/or lack of a flat-slab. I propose that timing data from apatite fission track (AFT) and (U-Th)/He (AHe) thermochronology, given their sensitivity to <4 km crustal uplift, will be appropriate methods to test the kinematic plausibility of these geodynamic models. In order to do so, a compilation of all AFT and AHe data for the Laramide ranges is currently underway, and will be supplemented with strategic sampling conducted in this study. The completed dataset will then be modeled and used to interpret the regional distribution, timing, and kinematic sense of Laramide deformation from Montana to Arizona/New Mexico.

AAPG Search and Discovery Article #90298 2016 Grants-in-Aid Projects