KINEMATIC HISTORY OF THE BIGHORN MOUNTAINS THROUGH A COUPLED SOURE TO SINK MULTIDISCIPLINARY APPROACH

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The timing and mechanism of Laramide (thick-skinned) deformation is still debated in the Geoscience community. Previous studies have tried to understand the tectonic history of the Laramide Ranges, but as of today both timing and processes remain unclear. This study aims to understand the kinematic history of the mountains with implications for understanding the nature of trapping of rich hydrocarbon resources in the adjacent basins. A dense sampling of thermochronological ages in the Bighorn Mountains in the context of structural offset and the use of Earthscope data, will define a three-dimensional kinematic model of exhumation in the Bighorn Mountains. Apatite fission track (AFT) in the Bighorn Mountains taken in vertical transects and dense regional sampling, will help constrain the un-roofing history of the range. The sedimentary record of the Bighorn basin, well document in published literature, combined with exhumation record determined in this study will reconstruct the source to sink history of the range and basin. Coupling the surface structure with lithospheric relations and thermally constrained tectonic uplift of the Bighorn Mountains creates the most accurate and precise model of the tectonic history of the Bighorn Mountains. Understanding the Bighorn Mountains and Bighorn Basin's kinematic history is the first step to unraveling the mystery that still surrounds Laramide deformation. This project helps identifies important thermal relations of complicated and economically important structural features in the western US and is applicable in similar active settings such as the Sierras Pampeanas in South America.

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