One of the outstanding geologic questions related to active and ancient mountain building is the understanding of the mechanisms for generating foreland deformation far into the continental interior. The archetypal expression of this style of foreland deformation is found in the Laramide ranges of the North American Rocky Mountain West. The present-day orientation of these ranges is variable (from east-west to north-south in present-day coordinates), which suggests that a complex series of tectonics events led to the distribution of deformation seen today. These tectonic events overlapped and proceeded Sevier deformation, which occurred closer to the hinterland, experienced far greater amounts of crustal shortening, and did not include basement deformation. Together, Sevier and Laramide deformation events were responsible for the formation of what are today the Rocky Mountains. The Sevier Orogeny is characterized as "thin skinned"; meaning that it incorporated low angle thrust faults that accommodated crustal displacements over large distances. The Laramide Orogeny exemplifies "thick skinned" deformation that incorporated high angle reverse faults and large-scale vertical uplift of basement rock over a variety of orientations and scales.

This summer I will assist Professor Arlo Weil in working to determine the geodynamic processes that influenced the formation and orientations of basement arches and the relationship of these structures to plate margin stresses.

For three weeks of July we will collect oriented samples from two stratigraphic layers that are well exposed throughout the state of Wyoming. This summer, sampling will mainly focus on the following localities: the Owl Creek, Bighorn, Ferris, and Seminoe Mountains. At each of these localities bedding orientations, mesoscopic structure, paleomagnetic, strain, and anisotropy of magnetic susceptibility (AMS) data will be collected. Strain will be measured using bedding orientations, calcite twin analyses, reduction spots, AMS and tectonic stylolites.

In August, the collected samples will be analyzed in the paleomagnetic lab at Bryn Mawr College. Paleomagnetism will be used to quantify rotations that occurred subsequent to rock formation. From these datasets, paleostress and layer parallel shortening directions will be determined and used to construct and evaluate models for the processes responsible for the initiation, buildup and termination of the Laramide tectonic event.