Project Description: The structural and magmatic development of the Black Gap syncline area, West Texas

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(1 student position)

The geological evolution of the Black Gap syncline area, just east of Big Bend National Park, is complex and long-lived. Two major tectonic-scale events deformed rocks of the area in two distinct time periods. The first event, the Laramide orogeny, began in the Late Cretaceous (99 – 65 Ma) and created thrust faults and folds associated with a compressional stress field. The later event, associated with the extensional stress field of the Basin and Range province, began in the Early Miocene (~24 Ma) and created significant normal faults and extensional features across the region. The period of extension post-dated the period of compression, so deformation associated with extension disrupted features created by earlier compression, resulting in a complex geological puzzle. This project will address the complexities of the Black Gap syncline area utilizing palinspastic restoration of deformation. Palisptic restoration is the process of reconstructing the past geology of a region through careful observation, documentation, and analysis of rocks and structural features of the area.

The 10-week summer research program will include two weeks of field work in the Black Gap Wildlife Management area in west Texas and eight weeks of research at Trinity University. Field work will include basic geologic field mapping, which will require detailed description of important rock units, measurement of structural features associated with the syncline and surrounding large-scale deformation, documentation of fault planes, slip vectors, and joints for stereonet analysis, and description and collection of volcanic and hypabyssal samples for thin section petrographic analysis, geochemical analysis, and radiometric age dating. Lab work at Trinity will involve thin section petrography and sample preparation for geochemical and geochronological analysis. Students will present the results of their summer work during the Trinity Summer Research Conference in late July, and will continue research during the academic year as Directed Studies or Thesis projects. Students will present their final results at the Geological Society of America Cordilleran Section meeting held in Las Vegas, NV, in April 2008.