2012 Geothermal Technologies Student Competition

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Geothermal Project Title: Assessing the Faults

Approach and Methodology
Our team proposes to gather data from LandSAT and Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) and use it in mapping and imaging software, such as ArcGIS, to create a detailed profile of the Snake River Valley and its relevant geothermal features. As Wendy Calvin discusses in her articles on the application of remote sensing, recent improvements in various imaging capabilities and quality of remote sensing imagery has allowed for vastly improved data for site exploration and profiling, especially by coupling traditional site analyses with newer data and imagery as we propose. Additionally, Freek van der Meer et al. discussed the new new and expansive capabilities of ASTER to produce a qualitative surface mineral map, allowing for better identification of optimal thermal locations, in his article on Multi- and hyper-spectral geologic remote sensing. Specifically, we intend to focus on using our profile to develop a clearer image of various geological components of the Idaho Snake River Plain region as well as on locating fault lines in the region that may have previously gone unnoticed or only recently developed with the goal of guiding geothermal installations to more effective and sustainable locations. We have several reasons to be interested in these fault lines. First, incomplete knowledge and mapping of these fault lines often inhibits geothermal projects because a bore hole cannot be drilled too close to a fault line since it might have unintended consequences not only on the physical geothermal system but also on the surrounding region since it might induce a minor earthquake. An example of the environmental and system damage that can occur as a result of incomplete fault line knowledge was discussed in Olga Sarychikhina et al.'s article on land subsidence in the Cerro Prieto Geothermal Field in Baja California, Mexico. Additionally, fault lines provide water that is essential to the efficiency of a productive geothermal system since they bring in water to recharge the geothermal system. As a result, an optimal location for a geothermal borehole and system is a compromise: it needs to be close enough to the fault line to achieve maximum productivity and yet far enough that the system and its surrounding will not be damaged during the drilling process or into the future as the fault line potentially grows. By profiling the area as we described, our project would be able to successfully discover a location that accomplished such a compromise, allowing for the creation of a geothermal system that would be more effective and productive than previous systems and that could be sustainably maintained with limited impact on the surrounding region.

Our profile will also be able to incorporate geological and geophysical properties of the region that will help select prime locations by indicating specific areas of greater thermal potential from a topographical perspective. Combining this view with our below surface data will allow our project to guide geothermal installations to their most effective, productive, and sustainable locations.