Characterizing Structure and Geology with Potential Field Geophysics to Assess Geothermal Resource Potential near Battle Mountain, NV

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Abstract: The northeastern extent of the Reese River Valley near the town of Battle Mountain, NV, is the focus of new geothermal characterization efforts under the INnovative Geothermal Exploration through Novel Investigations Of Undiscovered Systems (INGENIOUS) project, which aims to accelerate discoveries of new, commercially viable hidden geothermal systems while reducing exploration and development risks. The study area, referred to as Argenta Rise, is a candidate for hosting a hidden geothermal system as it occupies a favorable structural setting thought to be conducive to hydrothermal upwelling. The absence of surface thermal features (hot springs, fumaroles, or paleo-geothermal deposits) at Argenta Rise makes it challenging to locate potential geothermal resources and necessitates a detailed geophysical investigation. New gravity and ground based magnetic data were acquired to help resolve subsurface geology and intra-basinal structures that may be locally influencing any potential hydrothermal fluid flow. The gravity data delineate at least three structurally controlled basins, as well as a broad intra-basinal gravity high which may reflect structural relief in the basement surface. Anomalies in the ground based magnetic data coincide with the traces of numerous mapped faults within the basin, and in some cases suggest that the faults extend well beyond their mapped traces. Additionally, some anomalies do not appear to be associated with any currently mapped structural features and may represent previously unknown, concealed faults or contacts. The magnetic data also reveal an extensive network of small, shallow dikes along the western flank of the northern Shoshone Range, likely related to the emplacement of the mid-Miocene Northern Nevada Rift (NNR). Additional data and modeling will continue to further define the basin geometry, constrain geophysically inferred contacts, and delineate concealed faults and fault offsets. Ultimately, these results will help guide future geothermal characterization efforts in this region.