THE TUCSON MOUNTAINS CALDERA: USING GRAVITY AND MAGNETIC ANOMALIES TO TEST TRAPDOOR SUBSIDENCE AND LOCATE SUBSURFACE PLUTONIC BODIES.

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Peter W. Lipman mapped the surficial geology of the Tucson Mountains in 1993, theorizing that the range had once been part of an enormous caldera that had undergone trapdoor-style collapse. Trapdoor subsidence is characterized by one caldera rim or “hinge” still intact, a ring fault, asymmetrical collapse, and uneven, thick layering of intracaldera fill. Lipman’s evidence relied heavily upon the use of the mountains’ lithology and faulting behavior, as well as marking the boundaries of the possible ring fault. This study utilizes geophysical techniques to support Lipman’s interpretations. Gravity and magnetic anomaly data may be used to infer the caldera’s apparent trapdoor geometry and expose the presence of plutonic bodies remaining from the magma chamber.

Volcanic structures can be identified by mapping the variations in gravity, provided that there is adequate density contrast between the structures of interest and the surrounding lithics. Additionally, volcanic rocks are strongly magnetized, and studying the distribution of their magnetic effects can reveal structures within volcanoes or the depth and volume of lava flows. By mapping points of gravity and magnetic anomaly data collected from the USGS and an online database from the University of Texas-El Paso, our preliminary results demonstrate that we have an adequate distribution of both gravity and magnetic data over the Tucson Mountains. Detail work performed via gravimeter on areas in the Tucson Mountains with less available data will ensure thoroughness of final results. Analysis of data may demonstrate either agreement with or variation from Lipman’s theory.

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