

[General Information for this Meeting](#)

Rocky Mountain Section - 59th Annual Meeting (7–9 May 2007)

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MAGNETIC EXPLORATION AND MODELING OF THE THUMB, NAVAJO VOLCANIC FIELD

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The Thumb, one of the approximately 80 mid-Tertiary diatremes of the Navajo Volcanic Field, lacks an exposed dike. Most of the other diatremes are associated with at least one dike, often several radiating dikes. The relationship of diatremes and their associated dikes has prompted two competing hypotheses concerning their formation. Some geologists proposed, on observing the radial pattern of dikes extending from a central diatreme, that diatremes were formed as classical volcanoes supplied from an underlying magma chamber. Others suggested that the diatremes formed as buds off of upward propagating dikes. This second hypothesis is currently preferred for most diatremes. The Keck Consortium conducted a ground magnetic survey of The Thumb in July 2006 to determine the subsurface structure in the close vicinity and suggest constraints about its mechanism of intrusion and thus contribute to the discussion about this unique feature. The data reveal a NE-SW trending magnetic anomaly crossing the diatreme that we interpret to be a dike beneath The Thumb, corroborating the second hypothesis for this volcanic center. Ongoing analysis of the data aims to model depth and size of this dike as well as the effect of topography on magnetic data acquisition.

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