

A GRAVITY AND MAGNETIC SURVEY IN SOUTHEASTERN
MISSOURI

By

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Digest of Thesis Presented to the Faculty of
the Graduate School of Saint Louis University
in Partial Fulfillment of the Requirements for
the Degree of Master of Science (Research).

1956

DIGEST

THE PROBLEM

The Gravimetric Map of Missouri issued by the Missouri Geological Survey and Water Resources displays a large positive Bouguer anomaly in southeastern Missouri near the town of Malden. The anomaly is a pronounced circular feature which rises over twenty milligals above the gravity distribution of the immediate area and the isogals are influenced over an area of approximately 350 square miles.

The relative simplicity and regularity of the gravity anomaly is contrasted with a complex magnetic anomaly illustrated on the Magnetic Map of Missouri published by the Missouri Geological Survey. Upon the author's inquiry, the Missouri Geological Survey reported that the magnetic distribution, as mapped, was incorrect for this area and the correct distribution was unknown. Further investigation, by the author, revealed that the United States Bureau of Mines had drilled a mineral prospect well* in the center of the anomalous area during World War II. The well was drilled to a depth of 3728 feet and was

*well log #8882, Mo. Geological Survey Headquarters.

abandoned at that depth within the Bonneterre formation due to drilling complications. No structure or mineral concentration was encountered to this depth which could explain the anomalous conditions of the magnetic and gravity fields.

The object of the present geophysical investigation was twofold:

1. to find the correct vertical magnetic field intensity for this area
2. to investigate, by geophysical techniques, the structure responsible for the anomalous condition of the gravity and magnetic fields.

METHOD OF ATTACK

Since the state maps indicated that the materials forming the anomalous feature were both paramagnetic and more dense than the surrounding rocks, a detailed gravimeter and magnetometer survey was conducted during the spring and summer of 1954 to investigate these respective properties. A total of 188 gravimeter stations and 126 vertical magnetometer stations were occupied to investigate the anomaly.

CONCLUSIONS

The analysis of the gravity and magnetic data

indicates that the origin of the anomalous gravity and magnetic fields may be a plug-like peridotite intrusion with the top of the intrusion at a maximum depth of 15,000 feet. The intrusion probably terminates within the granitic basement because the sedimentary sequence is only 7,000 feet thick in this area.

The plotting of the magnetic data into a map revealed that the vertical magnetic field intensity illustrated on the Magnetic Map of Missouri is definitely incorrect for the immediate surveyed area. The correct magnetic distribution is shown on Plate I (Vertical Magnetic Map).