

A MAGNETIC STUDY  
OF A  
NORTHEASTERN OZARK FOLD

by

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## INTRODUCTION

Seismic and geologic evidence, to be presented later, suggest a strong possibility that there exists structure in the crystalline basement rocks in the vicinity of Eureka, Missouri, which may or may not be reflected in the sedimentary formations above. This possibility is bolstered by certain peculiarities of the physiography of the area which indicate erratic stream behavior.

A number of studies of the surface and subsurface geology of the general region in and around St. Louis, Missouri have been made in the past seventy-five years and more recently several investigators have given close attention to the area in the vicinity of Eureka. The nature of the terrain of this particular area is such, however, that a complete analysis of the geologic structure by means of geologic evidence alone is impractical if not actually impossible. Some of the difficulties encountered have been the relative inaccessibility of certain sectors, the obscuring of formation outcrops by overburden, and the masking of the true dip of some of the rock formations, where exposed, because of slumping.

An investigation of the Eureka area by geophysical methods of exploration in an attempt to determine the structure of the basement complex and, if possible, the relationship between the basement configuration, the seismic activity of the area, and the attitude of the sedimentary formations was suggested as a research problem by Dr. Ross R. Heinrich, Professor of Geophysics, St. Louis University.

in the fall of 1951.

The nature of the existing igneous-sedimentary relationship and the extent of the area indicated that gravity and magnetic surveys would provide information which could be more effectively evaluated than either seismic or electrical methods. Furthermore, these two methods would more rapidly and efficiently delineate any structural anomalous area for supplementary study by either of the other methods at a later date.

The particular problem selected, therefore, as outlined at the beginning of the field work was:

1. To find geophysical evidence of the basement structure in the vicinity of Eureka, Missouri, by means of a gravimetric and magnetic survey over this area.
2. If evidence of an anomalous structure is found:
  - a. To delineate and evaluate it by means of additional detailed observations as required.
  - b. To determine to what extent this structure influences the configuration of the overlying sediments.
  - c. To seek a correlation between this structure and each of the facts indicating its existence.
  - d. To determine, if possible, the relationship of the structure to the tectonics of the Ozark geologic province.

The gravimetric survey was accomplished by Mr. Andre Laroche, graduate student of St. Louis University, and the magnetic survey by this author. Most of the field data for these surveys were collected simultaneously in the spring of 1952 with the location of the gravity and magnetic stations coinciding as closely as terrain

and extraneous magnetic interference would permit. The interpretation of the gravity data constituted a thesis, as yet unpublished by Mr. Larochelle. The magnetic survey was extended during the summer of 1952 in order to further outline the boundary of the magnetic anomaly which appeared as work progressed, and the results constitute the thesis presented in the following pages.