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# The Mound Springs of South Australia: Their Electromagnetic Signature and Fractal Dimension

Katherine Stoate  
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Supervisors: Graham Heinson & Mike Hatch

University of Adelaide  
North Terrace, Adelaide, S.A.  
[katherine.stoate@student.adelaide.edu.au](mailto:katherine.stoate@student.adelaide.edu.au)  
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## Abstract

The importance of groundwater to remote and regional Australia cannot be understated, due to the intermittent and unreliable rainfall in these areas, as well as the unreliability of other water sources. As such the major source of water is groundwater from the Great Artesian Basin (GAB). The natural discharge of the GAB is through mound springs, unique landforms comprised of precipitated carbonates that are primarily located along the south western edge of the GAB. Due to the cultural, economic and environmental significance of these features it is important to fully understand their underlying hydrogeological structure. Geophysical studies have the potential to provide non-invasive imaging of these specific aspects of the GAB. A number of different methods were used to collect data from the springs. For this particular study a set of shallow electromagnetic data was collected. These data were processed conventionally, however to provide additional information they were also processed to extract the fractal dimension information of the data. The fractal dimension is used here as an indicator of roughness or texture with a dataset, thus differentiating between a homogenous and heterogeneous earth. All of the data were compared, including conductivity, in-phase, fractal dimension and the regolith of the area. It was hoped that this would provide added depth to the understanding of the mound springs as well as trialling an alternate method of processing data. Although the data collected did show some correlations, especially in regards to the relationships between the conductivity and the EM signature of the mound springs, there was a lack of consistent correlation between the fractal dimension and the other data sets that did not allow for conclusions as to the usefulness of fractal dimension as a means of processing data. This may be due to the small survey size of the area, thus testing on larger areas may be worthwhile in the future.

**Keywords:** Mound Springs, Great Artesian Basin, EM surveys, Fractal Dimension, Regolith.

## Table of Contents

Introduction.....	4
Background .....	6
The Great Artesian Basin: Geology and Hydrogeology.....	6
The Mound Springs of the Lake Eyre Region: .....	7
Geology of the Wabma Kadarbu .....	8
Methodology.....	9
Electromagnetic Surveys.....	9
Electro-Magnetic Survey: Survey description .....	10
Fractals, Fractal Dimension and the Power Law Spectra.....	11
Data Processing of the Fractal Dimension .....	14
Other Data Processing .....	15
ArcGIS and Regolith Map .....	15
Results.....	16
Conductivity and Inphase.....	16
Fractal Dimension.....	17
Regolith – Landform Map.....	17
Transported Regolith .....	18
Comparative Datasets .....	19
Conductivity and Fractal Dimension.....	19
Conductivity and Regolith.....	19
Fractal Dimension and Regolith.....	20
Discussion .....	21
Conductivity of the Mound Springs.....	21
In-phase and conductivity relationship:.....	23
Fractal dimension and conductivity:.....	24
Conclusion.....	27
Acknowledgements.....	29
References .....	30
Tables.....	33
Figure Caption .....	34
Figures:.....	39