A comparison of porosity values inferred from magnetotelluric and bore-hole density data; case studies from two geothermal regions in South Australia

Thesis submitted in accordance with the requirements of the University of Adelaide for an Honours Degree in Geophysics.

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October 2012
ABSTRACT

Porosity is one of the main determining factors of the prospectivity of geothermal regions and can be estimated in a number of ways from geophysical surveys. The objective of this work was to better understand the link between porosity, permeability and electrical resistivity through Archie’s law. This was achieved by comparing porosity values derived from magnetotelluric (MT) data with those derived from density measurements taken in a petroleum borehole. Two case studies were used and are located in north-eastern South Australia. The outcomes of these studies will help to minimise exploration risk by proving the effectiveness of MT as a primary survey of geothermal regions. This study provides a stepping stone to understand the ways in which permeability can be determined from MT surveys in order to better quantify expected fluid flow rates in geothermal prospects.

KEYWORDS

Porosity, Geothermal, Magnetotellurics, Resistivity, Density, Archie’s law, permeability.
# Table of Contents

## Introduction

## Background Information

## Methods

## Observations and Results

- Case Study 1: Moomba North ........................................... 18
- Case Study 2: Mungerannie ............................................. 21

## Discussion

- Case Study 1: Moomba North ........................................... 27
- Case Study 2: Mungerannie ............................................. 32
- Permeability ................................................................. 34

## Conclusions

## Acknowledgments

## References

## Appendix A: additional information – part I

## Appendix B: additional information – part II
List of Figures

1. MT survey and borehole locations ........................................ 9
2. Typical apparent resistivity and phase for the Mungerannie MT survey 14
3. Typical apparent resistivity and phase for the Moomba North MT survey 15
4. Resistivity profile of the Moomba North MT survey ....................... 19
5. 1-D resistivity-depth profile of the Moomba North MT survey ........... 20
6. Porosity-depth profile of the Moomba 086 borehole data with moving average filters ......................................................... 21
7. Porosity vs depth for the Moomba North MT survey ...................... 22
8. Resistivity profile of the Mungerannie MT survey ........................... 23
10. Porosity vs depth for the Mungerannie MT survey ........................ 25
11. Porosity-depth profile of the Mulkurra West 001 borehole data with moving average filters ..................................................... 26
12. Moomba North porosity data with a linear regression ..................... 29
13. The effect of changing variables in Archie’s law on calculated porosity values for the Moomba North Case study .......................... 31
14. Mungerannie porosity data with a linear regression ....................... 36
15. The effect of changing variables in Archie’s law on calculated porosity values ................................................................. 37
16. Permeability of Mungerannie estimated using MT data and an approximately exponential relationship between porosity and permeability .... 38
17. permeability of Moomba North estimated using MT data and Archie’s law 38
18. Porosity-depth for the Moomba North MT Survey (depth 0-10000 m) .... 43
19. Porosity-depth for the Mungerannie MT Survey (depth 0-10000 m) .... 43
List of Tables

1. Summary of parameter value ranges for Archie’s law (Equation 7) . . . . 18
2. Values for Archie’s law used in Equation 7 to produce the Moomba North 1-D porosity profile. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 22
3. Values for Archie’s law used in Equation 7 to produce the Mungerannie 1-D porosity profile . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 24
4. Mean and standard deviation data for the magnetotelluric and borehole surveys in the Moomba North case study . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 28
5. Linear regression statistics for case study 1. . . . . . . . . . . . . . . . . . . 30
6. Mean and standard deviation data for the magnetotelluric and borehole surveys in the Mungerannie case study . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 33
7. Linear regression statistics for case study 1 . . . . . . . . . . . . . . . . . . . 33
8. Locations of MT stations for the Mungerannie Survey . . . . . . . . . . . . 41
9. Locations of MT stations for the Mommba North Survey . . . . . . . . . . 42