



STRATIGRAPHY, HYDROTHERMAL ALTERATION AND PALEO-THERMAL HISTORY OF THE OLKARIA - DOMES GEOTHERMAL FIELD, KENYA

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OUTLINE

Introduction



Objectives of the study



Methodology



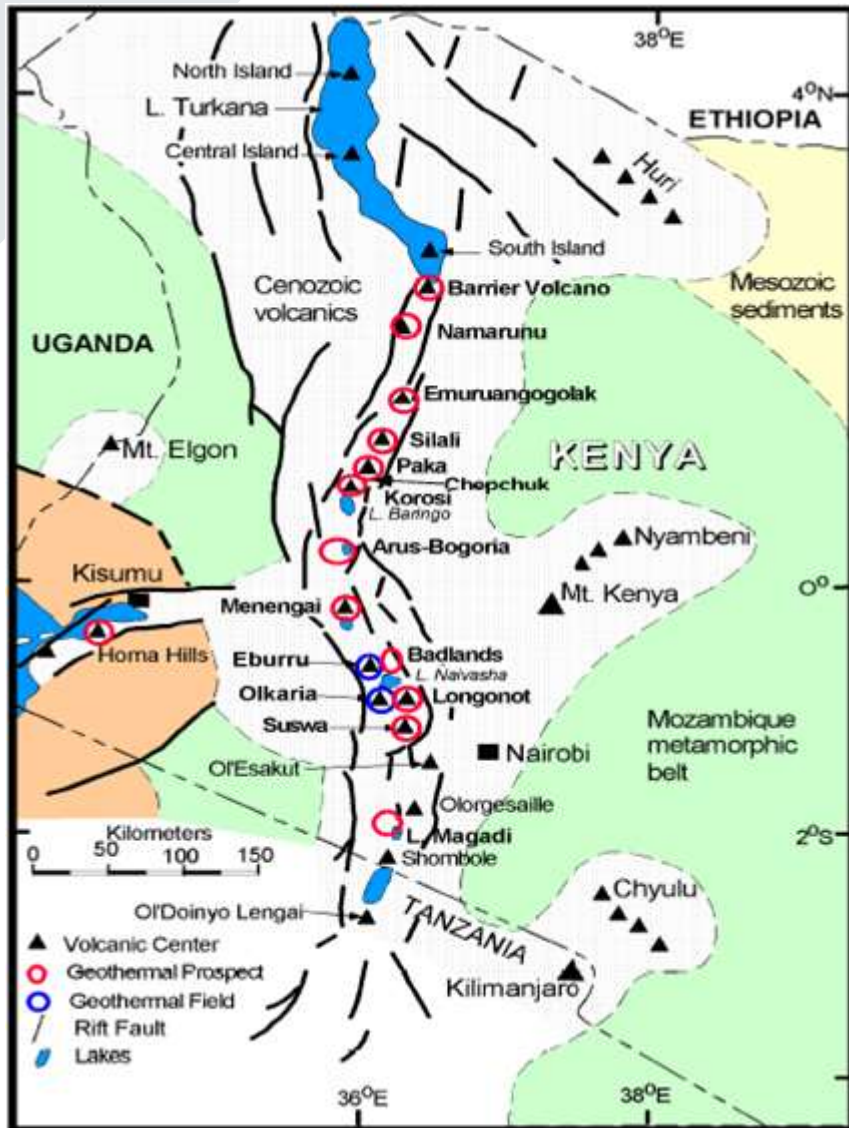
Results



Conclusions and recommendations

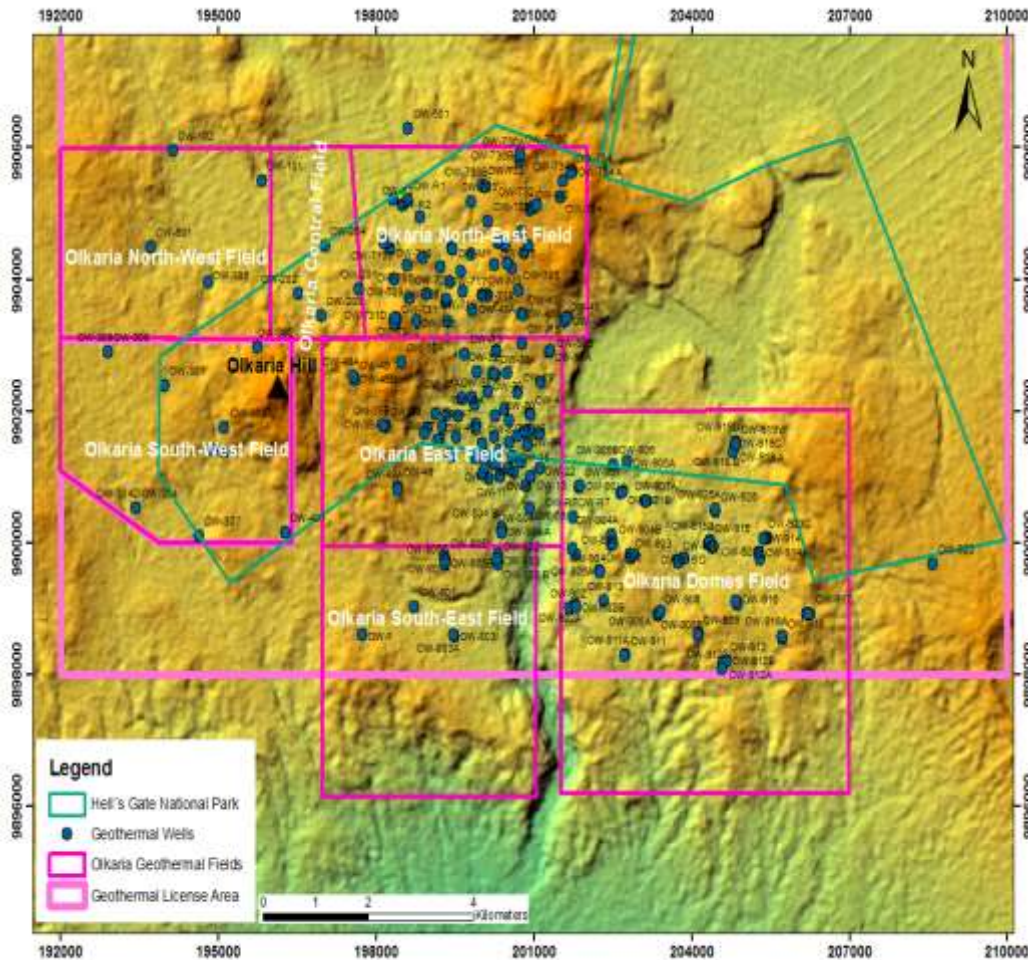
INTRODUCTION

Location map



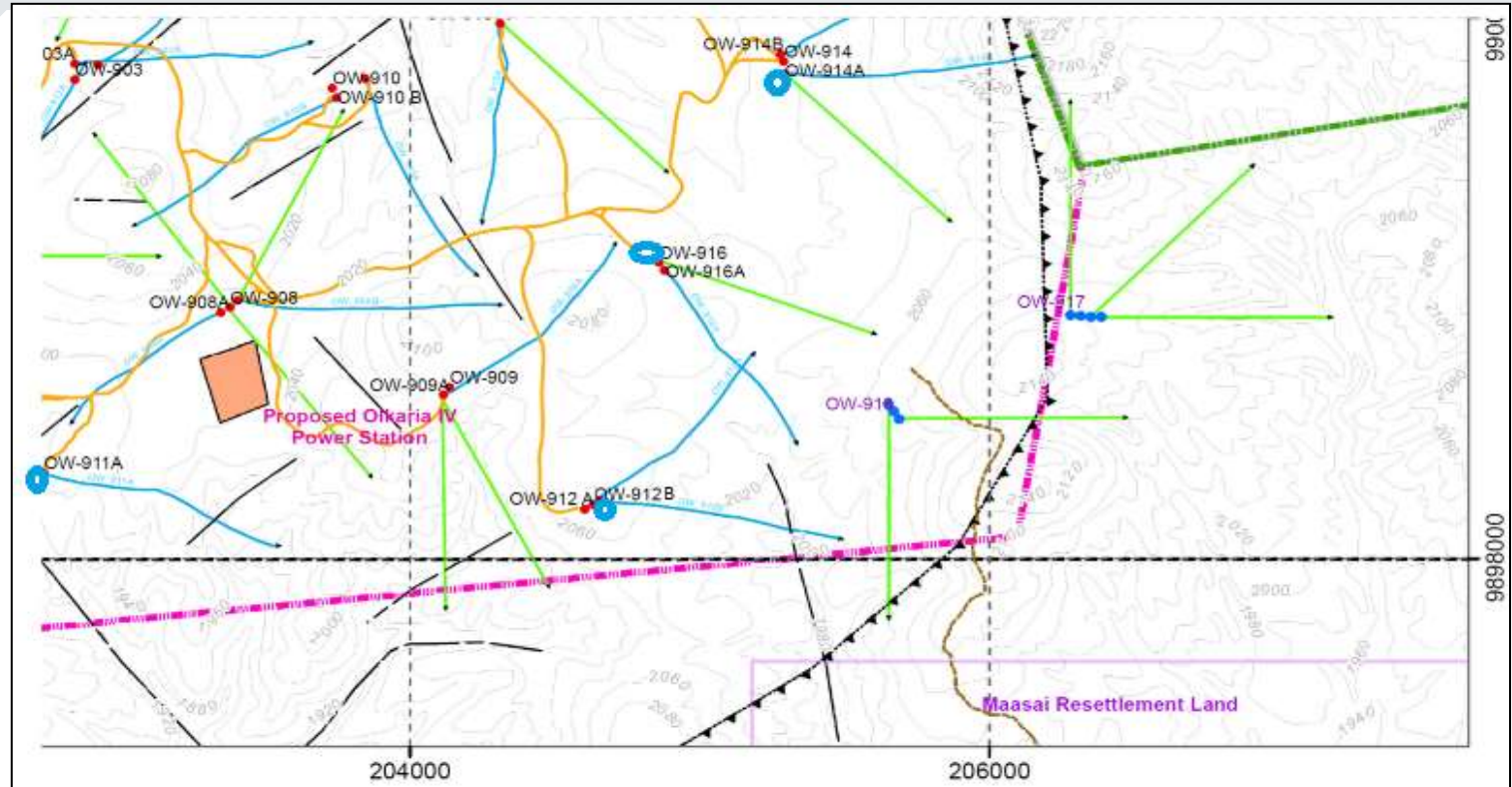
- Located in southern central sector of Kenyan rift
- Other volcanic centres also located within axial of rift
- Olkaria, Eburru and Menengai at production stage
- Study focuses on Olkaria-Domes (OW-911A, OW-912B, OW-916 and OW-914A)

Olkaria geothermal field



- Surface geology comprise of ash deposits, pumice lapilli, pyroclasts and comenditic lava
- Sub-surface geology comprise of basalt, rhyolite, tuff, trachyte, dykes and intrusives
- Divided into seven field
- Total installed capacity of 677 MWe

OBJECTIVES



- To review and compare stratigraphy and hydrothermal alteration minerals
- Compare the paleo-thermal trends in the study area

METHODOLOGY

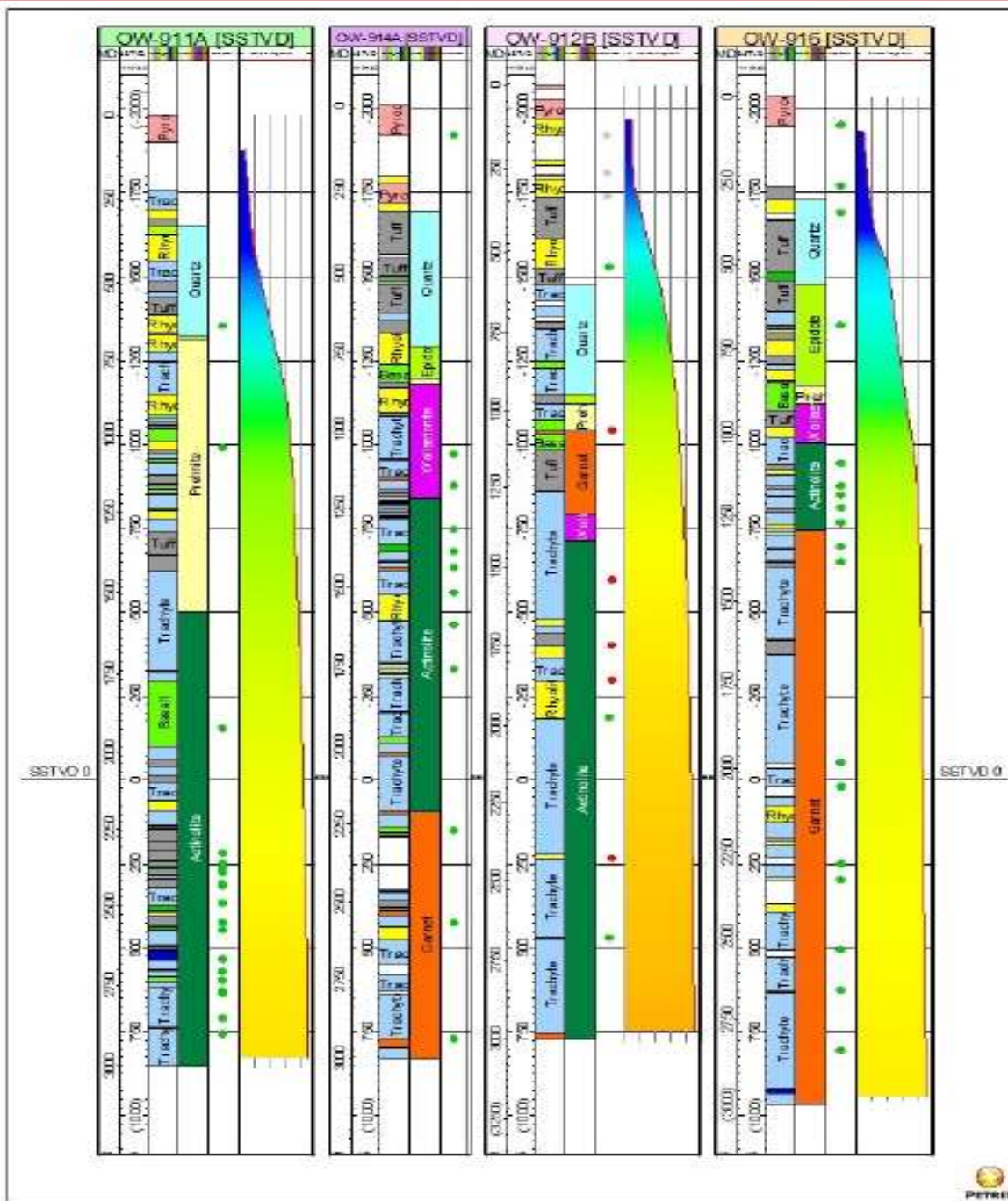
- Samples collected at 2 m interval during drilling
- 1200-1400 samples collected in each well
- Analytical methods include:
 - i. Binocular microscope analysis
 - ii. Petrographic microscope analysis
 - iii. X-ray diffractometer analysis
 - iv. Fluid inclusion analysis



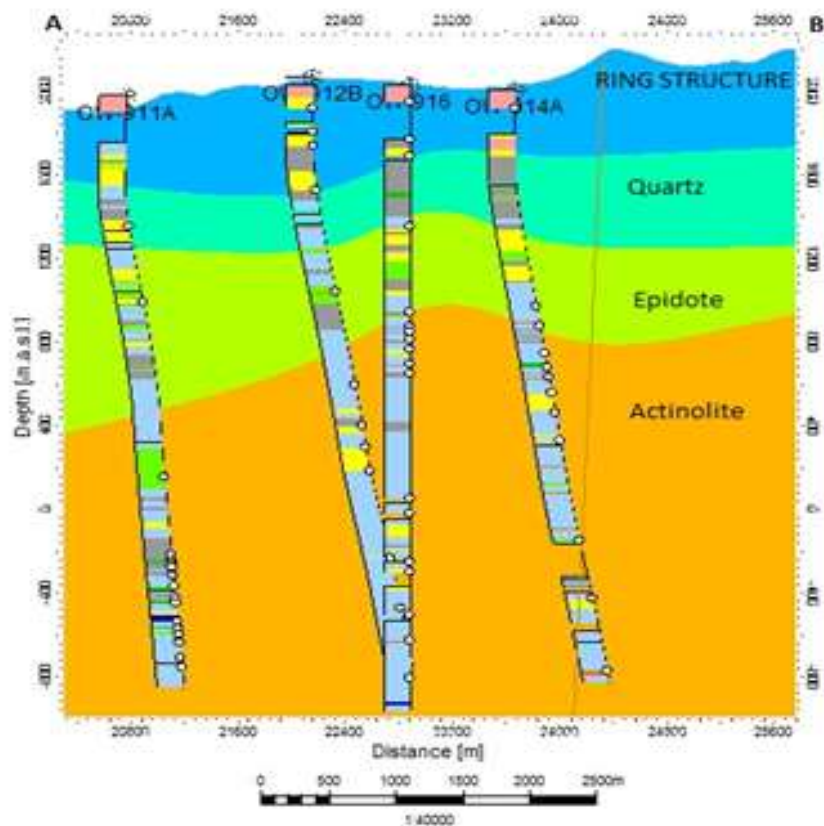
RESULTS

Stratigraphy

- Pyroclastics 0-100 m
- Rhyolite 100-500 m
- Basalt 500-1000 m
- Trachyte 500-3000
- Tuff



Occurrence and distribution of common alteration minerals

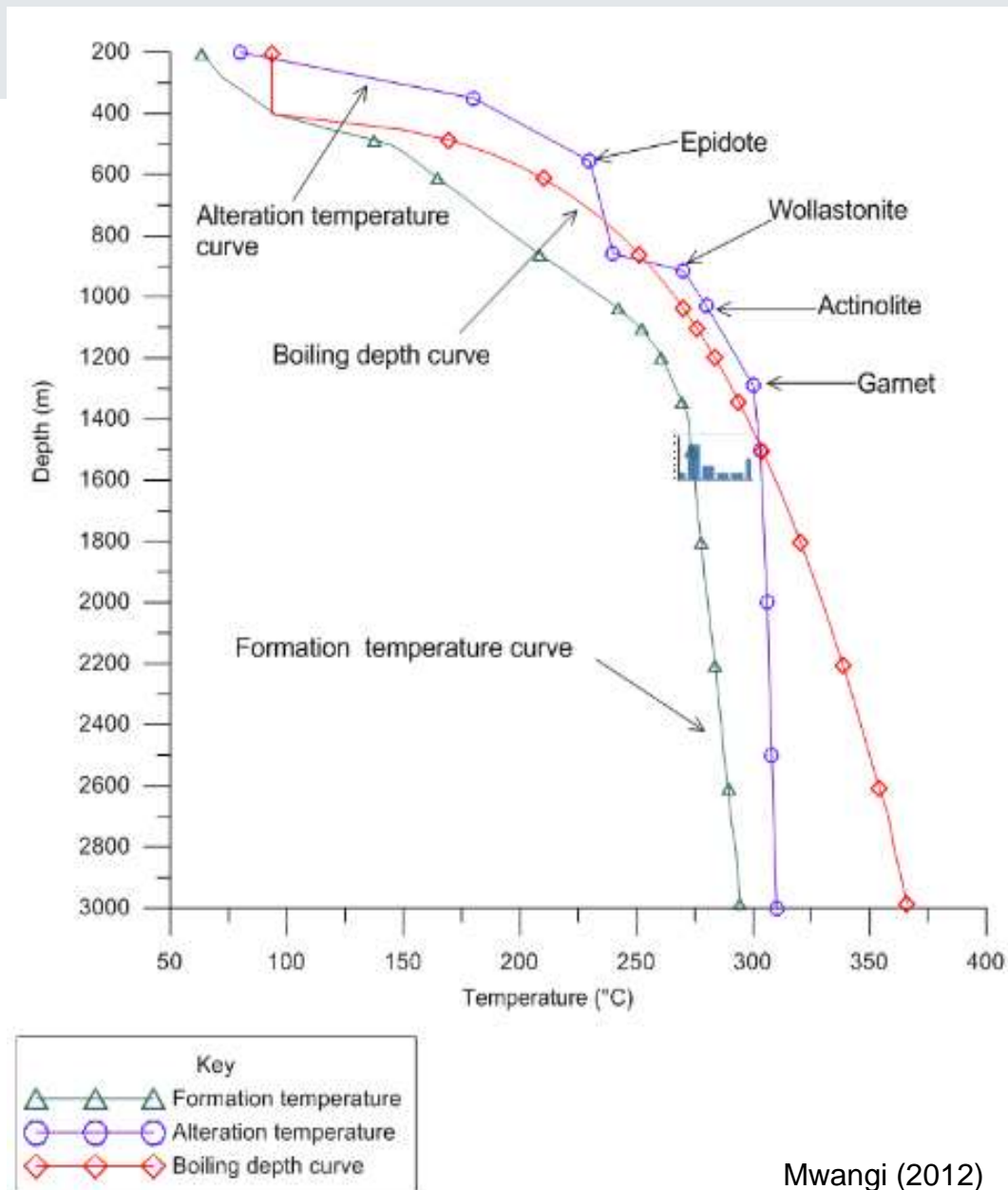


- Minerals found:- zeolites, calcite, pyrite, chalcedony, opal, quartz, epidote, prehnite, wollastonite, actinolite, sphene, haematite and clays
- Low temp zeolites found at shallow depth
- High temp minerals found in abundance in OW-916 and OW-914A compared to OW-912B and OW-911A

Paleo-thermal reconstruction

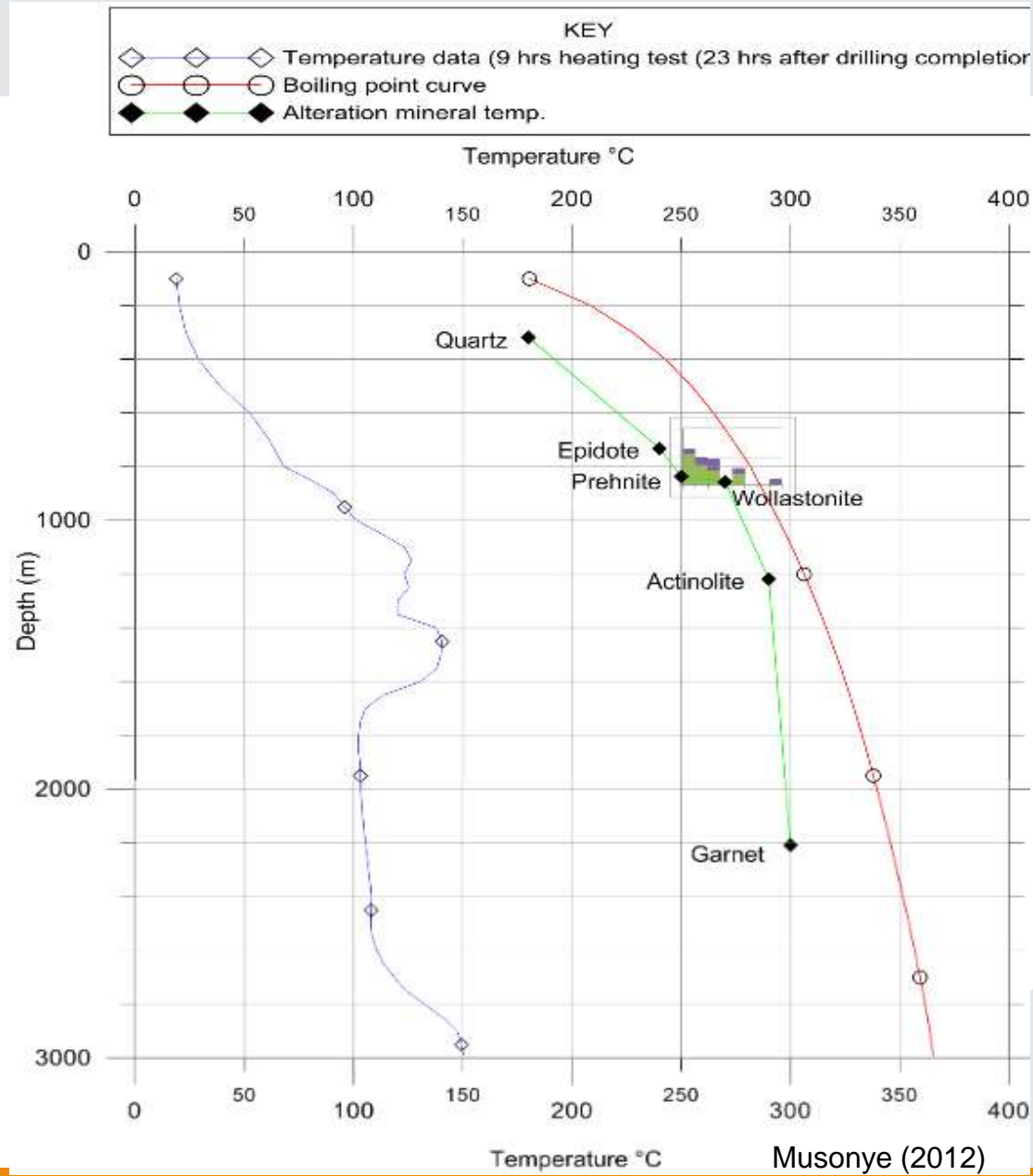
Well OW-916

- Homogenisation temp range between 275 °C and 305 °C- average of 282 °C
- Formation temp is 276 °C
- Formation temp, alteration mineral temp and fluid inclusion lie in the same path
- System has maintained more or less steady state of equilibrium



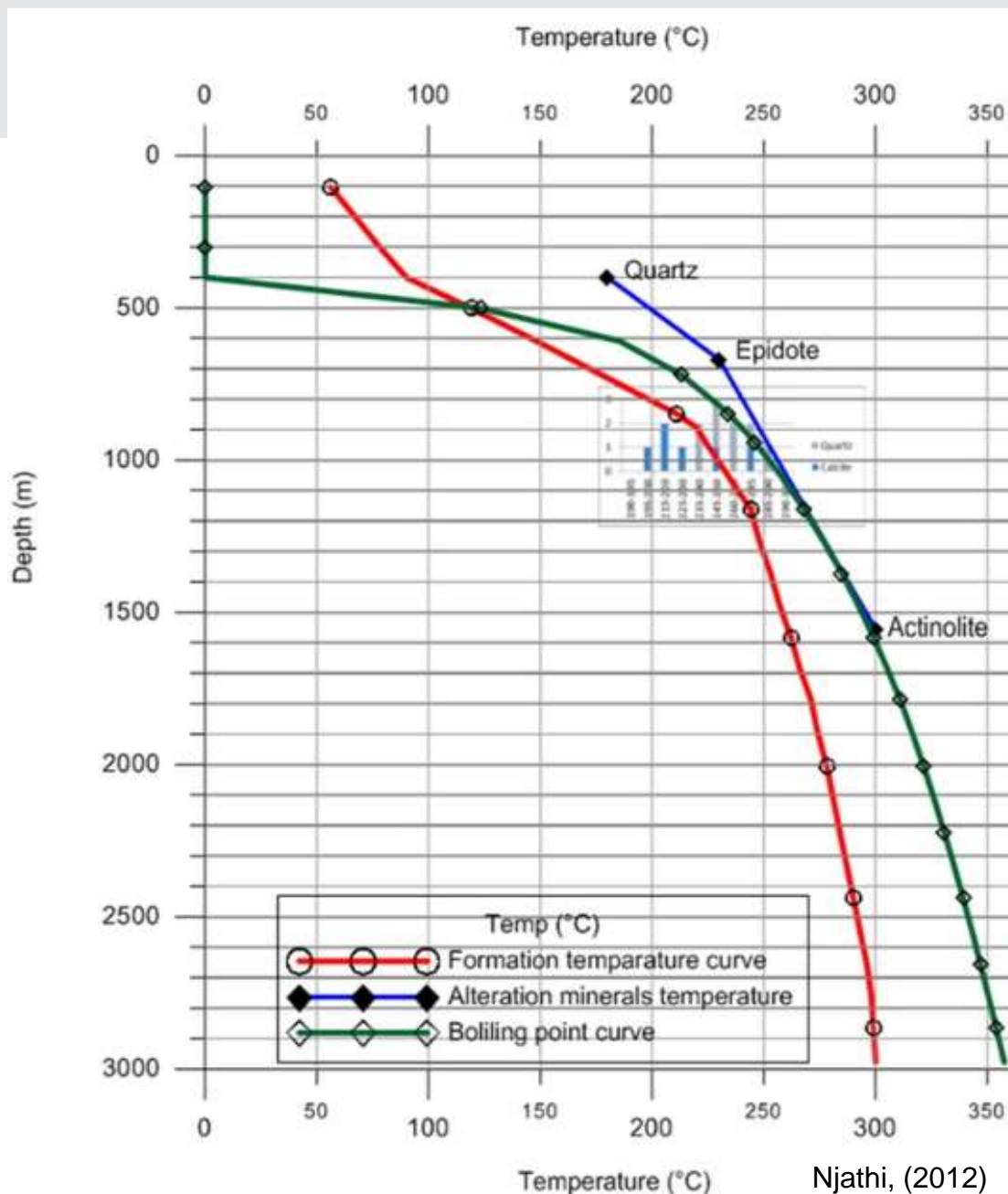
Well OW-914A

- Homogenisation temp range between 250 °C and 290 °C- average of 255 °C
- Alteration mineral temp and fluid inclusion lie in the same path
- System has maintained more or less steady state of equilibrium



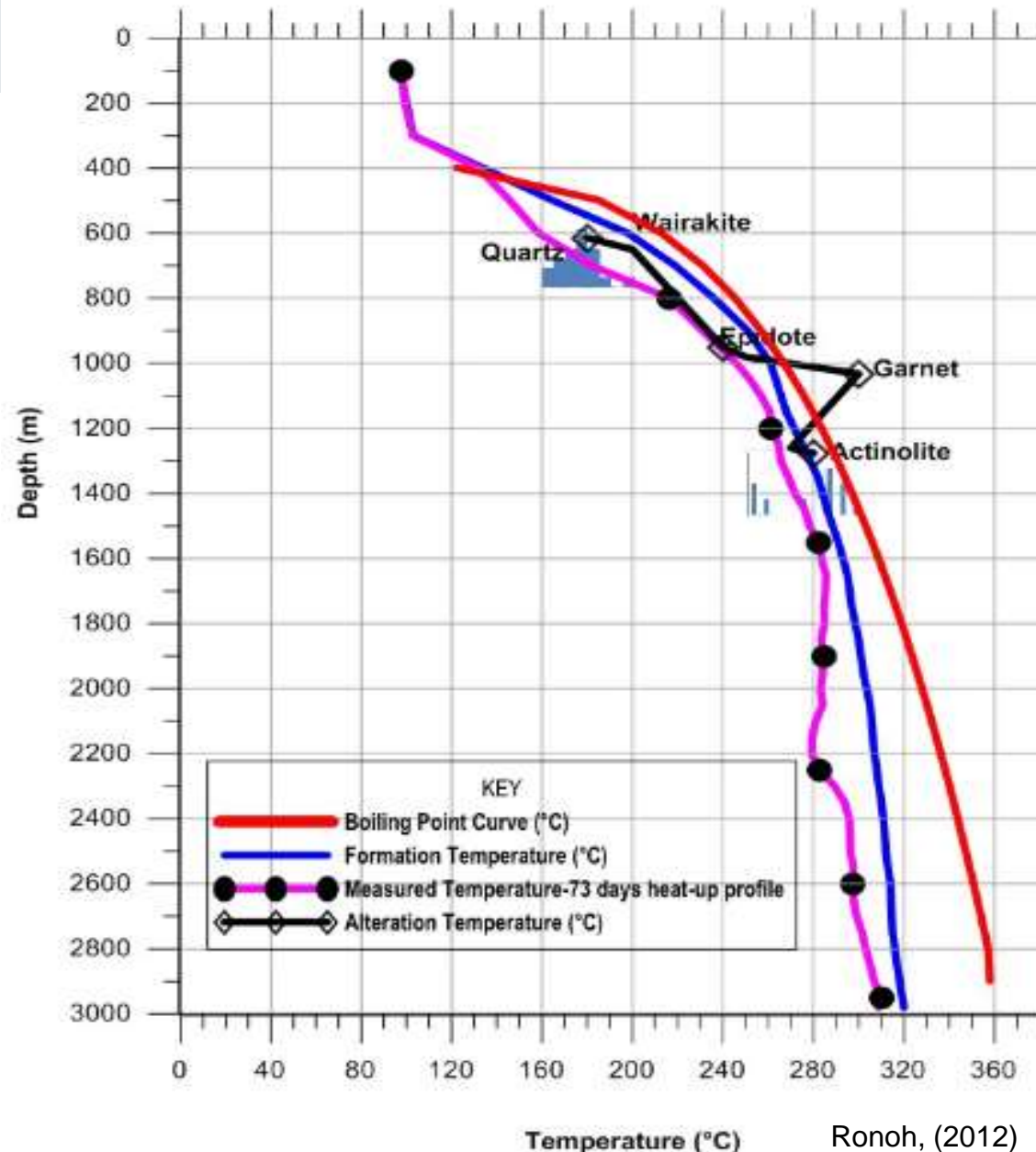
Well OW-911A

- Homogenisation temp range between 195 °C and 286 °C - average of 220 °C
- Formation temp is 220 °C
- Formation temp, alteration mineral temp and fluid inclusion lie in the same path
- System has maintained more or less steady state of equilibrium



Well OW-912B

- Homogenisation temp at 756 m is between 160 °C and 200 °C- average of 175 °C
- At 1456 m is between 250 °C and 300 °C- average of 260 °C
- Formation temp is 280 °C
- Formation temp, alteration mineral temp and fluid inclusion lie in the same path



CONCLUSIONS AND RECOMMENDATIONS

Conclusion

- The stratigraphy comprises of five lithological units; pyroclastics, rhyolite, tuff, basalt and trachyte.
- High temp alteration minerals are noted at shallower depth at the region of wells OW-916 and OW-914A.
- Well OW-912B recorded the greatest depth at which high temperature alteration mineral were observed
- Area around wells OW-916 and OW-914A has the heat closer to the surface
- Temp curves shows that the system has maintained a steady state of thermal equilibrium over time



Recommendations

- More fluid inclusion studies need to be done in wells drilled in Domes area in order to get a detailed picture of the temperature variation in the whole of the Domes field





THANKS