

# Geographically constraining the South Australian Heat Flow Anomaly

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## ABSTRACT

The South Australian Heat Flow Anomaly is a large contiguous region of anomalously high heat flow ( $>90 \text{ mWm}^{-2}$ ) in otherwise tectonically quiescent Proterozoic lithosphere. The broad anomaly ( $>400 \text{ km}$ ) is nearly  $40 \text{ mWm}^{-2}$  greater than the global average for terranes of similar tectonic age, but is poorly constrained geographically due to relatively few and poorly distributed heat flow data. This study reports four new heat flow determinations, located to improve the spatial sampling. The product method and thermal resistance were used to calculate heat flow.

Data were obtained from drillhole core samples that traverse the anomaly. The samples were then scanned for thermal conductivity using a Thermal Conductivity Scanner. Temperature logs of the drillhole are used to determine the thermal gradient with depth. The product of thermal conductivity and thermal gradient determines surface heat flow.

The spatial extent will become better defined with each new heat flow datum as well as increase the confidence of the pre-existing data source of the anomalously high heat flow was ascertained by evaluating bias in previous data measurements, recent tectonic and magmatic activity. Using existing data and measurements made in this study, evidence for and against a primarily deep mantle and shallow crustal radiogenic source will be examined.

## KEYWORDS

Heat Flow, Thermal Conductivity, South Australia, Anomaly, Drillholes

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