Badley Geoscience Limited

HEAT

1D WHOLE-LITHOSPHERE THERMAL MODELLING

KEY FEATURES

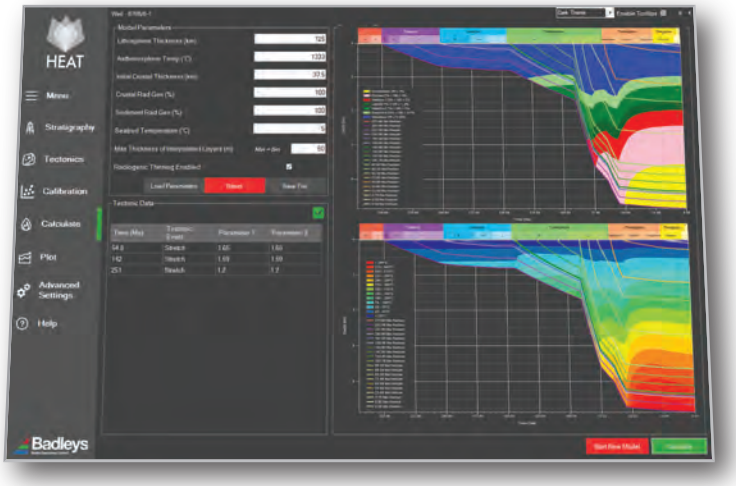
1D Whole-Lithosphere Thermal Model
Incorporating thermal contributions from the mantle, crust, sediment infill (including lithologically-controlled conductivities) & tectonic history to give a complete thermal model

Quantify Heat-flow History
Both top-basement & top-sediment heat-flows are tracked through the full geological history of the input stratigraphy

Calibrate Downhole Measurements
Predicted temperature & vitrinite reflectance can be calibrated at present-day and can be predicted for the entire burial history of the stratigraphic sequence

Fast & Efficient
Intuitive design & optimised calculation engine mean models can be set-up and run quickly

Easy To Use
Designed to be used by all geoscientists



PROGRAM OVERVIEW

Heat is a 1D forward-modelling program for predicting heat-flow history, geothermal history, maturation history and horizon-temperature history at well or pseudo-well locations.

Heat allows the user to input a 1D stratigraphic section and very quickly model the thermal history.

The following geological constraints are incorporated in Heat's calculations:

- *Tectonic history, the thermal consequences of multiple rift events and their long-term thermal relaxation*
- *Whole-lithosphere thermal perturbation through time, a consequence of the tectonic history*
- *Crust and lithosphere thinning, which can be considered as uniform with depth or as depth-dependent*
- *Burial history, defined by input stratigraphy and lithology, with compaction incorporated*
- *Lithologically-controlled thermal conductivities within the sediment fill*
- *Radiogenic heat input from both the crustal basement and the sediment fill*
- *The thermal consequences of igneous intrusion into the basement or sediment fill*

Heat produces depth-scaled temperature profiles together with predictions of source rock maturation (vitrinite reflectance, using Burnham & Sweeney Type III kinetics), both of which can be calibrated against present-day downhole measurements of temperature and maturation index (%VR).

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1D WHOLE-LITHOSPHERE THERMAL MODELLING

HEAT offers the opportunity to integrate tightly with tectonic and geodynamic modelling software, for example Stretch and Flex, thus eliminating one of the great uncertainties in many standard thermal-modelling workflows.

HEAT is easy to use and requires no specialist basin-modelling knowledge. Heat's inbuilt plotting facility will automatically generate the plots you wish to see.

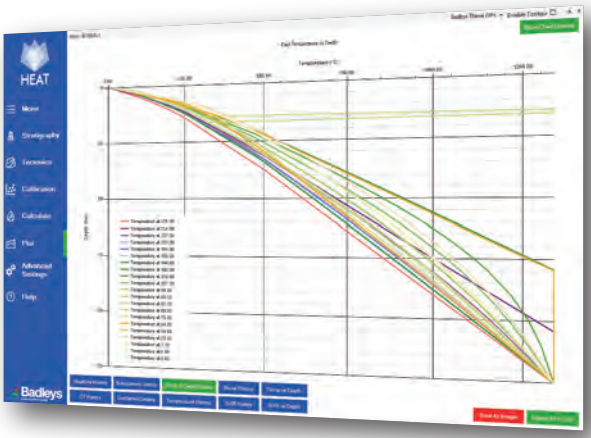
HEAT is designed to be used not just by geochemists and basin-modellers, but also by other geoscientists who wish to investigate the thermal consequences of the processes which generate extensional basins and continental margins.

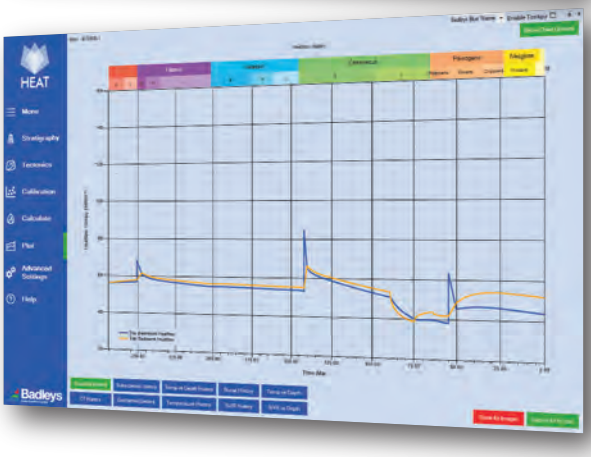
HEAT runs under Windows™

OUTPUTS

HEAT predicts and produces output for the following:

- *Top-basement and top-sediment heat-flow history*
- *Top-basement tectonic-subsidence history*
- *Basement crustal-thickness history*
- *Whole-lithosphere-temperature vs depth history (geotherm profiles)*
- *Horizon burial history, with overlay of maturation index and temperature*
- *Horizon temperature history*
- *Horizon vitrinite reflectance (%VR) history*
- *Geothermal gradient within sediment fill*
- *Present-day temperature-vs-depth profile, with temperature calibration*
- *Present-day vitrinite-reflectance-vs-depth profile, with %VR calibration*





FORMATS

HEAT produces output as:

- *In-program scalable plots*
- *Exported image files*
- *Exported CSV files*

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