Geothermal energy research at Monash University
Monash Sustainability Institute (MSI) — a multi-disciplinary, cross-faculty institute that delivers solutions to key climate change and sustainability challenges through research, education and action.

Deep Geothermal Research (Engineering) — (Ranjith Pathegama Gamage) High P,T test rig; 2 PhD students in CO2 injection; Australia / India research collaboration funding in geothermal; LIEF grant for well simulation infrastructure.

Earth Modelling Group (Geoscience, Mathematics, MeRC) — (Moresi, Quenette, Cruden, Betts, Aillères) Natural hydrofractures as analogues of geothermal reservoirs; 3D numerical forward models at basin scale; Geology from Geophysics; Geology from Geodynamics; LIEF grant; NeCTAR funding; 3D Alive.

Geotechnical and Hydrogeological Research Group (GHERG) (Mackay; Churchill Campus) — Latrobe Valley brown coal geology and geophysical properties; coupled thermo-hydro-mechanical modelling; mining environmental impact analysis; aquifer thermal energy storage (ATES).
Underworld – “continent” scale geothermal models

Heat flow models at the 1000km scale

- Incorporating 3D structure — ingest 3D structural models from geophysical interpretation

- Import structural models from GoCAD / 3D Geomodeller / Earthvision

- Constraints from temperature measurements in drill-holes — multiple runs / workflow to study best fit and uncertainty.

- Energy-content assessments for geothermal exploration

- Towards a risk analysis for management of basins with competing uses (groundwater, geothermal, CO₂ storage, petroleum extraction)
Otway basin

Structural *interpretation* of geophysics:

- Yellow - primary
- Blue - secondary

Developed with GoCAD

David Willis (Honours thesis, Monash University, 2011)
Otway basin

Structural *interpretation* of geophysics:
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David Willis (Honours thesis, Monash University, 2011)
Towards the Whole of Basin models

Data registered in 4D plate model

Interactivity

Plate-boundary models

3D / 4D structural + geodynamics models

Mantle dynamics & 4D mantle history

Physical models of rock deformation