TECTONICS AND EARTH RESOURCES RESEARCH GROUP

FACULTY OF SCIENCE AND INFORMATION TECHNOLOGY

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

OVERVIEW

The research priority of the TERG is to understand the role of plate tectonics in the global earth system; whether it is related to the formation of mineral deposits, in defining the mechanisms leading to continental growth or the evolution of landscapes.

Research outcomes of the TERG directly contribute to models of lithosphere evolution, feedbacks between landscape and tectonic processes, resources needed for carbonate mineral sequestration in NSW and granite genesis and evolution. These outcomes directly contribute to research, as well as industry-government driven initiatives.

The Research Group comprises a diverse group of geoscientists that provide expertise in the following fields:

- Structural geology and tectonics
- Metamorphic geology and mineral equilibria
- Geochronology and thermochronology
- Base metal mineralisation
- Analysis and dating of brittle deformation
- Petrogenesis of igneous rocks
- Coal utilisation
- Sedimentary facies analysis
- Geophysics

As a member of the TERG, you will be involved in University research seminars, regional discussion groups with local experts as well as national and international conferences. You will also receive considerable financial support from local and national partners that range from the University, Industry and Government sectors.

OBJECTIVES

The principle objective of the TERG is to provide information on geological systems. Current research carried out by the TERG is contributing to our understanding of:

- **How do continents grow?**
  Over the last 3 billion years, the shapes and sizes of the continents have dramatically changed. Recent journal publications from members of the TERG have contributed to unravelling the processes responsible for continental growth and deformation.

- **Can we combat the drivers of climate change?**
  Clean coal technology has the potential to allow continual energy production in NSW, without the problems associated with CO2 emissions. Current research is providing a detailed resource estimate of chemically suitable materials for mineral sequestration in NSW.

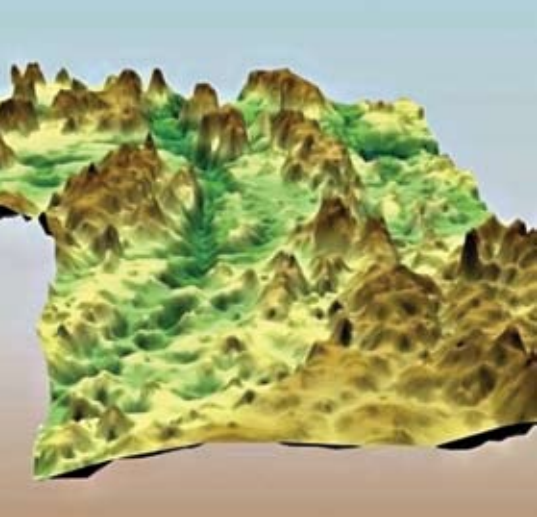
EXTERNAL COLLABORATORS

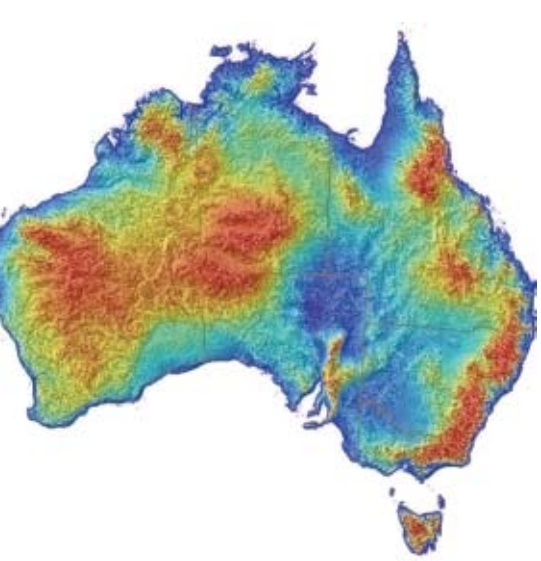
The research group has active links throughout Australia and internationally. Current projects benefit through collaboration with:

- The Australian National University
- The University of Adelaide
- The University of Melbourne
- Macquarie University
- University of Wollongong
- The University of Bremen (Germany)
- Ehime University (Japan)

In addition to national and international universities, the TERG also collaborates with and gains funding from the following government and industry partners:

- The NSW Department of Primary Industries
- Orica Australia
- Xstrata Coal
- CSIRO Petroleum
- Scientific Committee of Antarctic Research (SCAR)
- Bundesanstalt fur Geowissenschaften und Rohstoffe (Germany)





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EXAMPLES OF CURRENT PROJECTS

Evolution of convergent margins and continental accretion
Accretionary orogenic systems lead to the growth of continents and the development of world-class mineral deposits - yet the active processes that occur along these margins are not well understood. Current projects are focussed on characterising the architecture of the New England Orogen, which contains an ancient accretionary orogenic system that existed off the eastern margin of Australia 300–360 million years ago. The aim of this project is to combine geological mapping with cutting edge geophysical techniques and isotope geochemistry to unravel the evolution of an ancient accretionary orogenic system.

Potential for mineral sequestration of CO2 in NSW
Sequestration of CO2 via mineral carbonation is an emerging technique that has the potential to convert large volumes of CO2 into stable, non-polluting materials. Mineral sequestration involves reactivating CO2 with serpentinite, a rock that occurs in great abundance in NSW. The aim of this project is to assess the volume and chemistry of serpentenite bodies in NSW, and to determine whether this material can be used to sequester large volumes of CO2. This research directly contributes to clean coal technology in NSW.

Mechanisms for dyke emplacement associated with the opening of the Tasman Sea
Igneous dykes are emplaced in the continental lithosphere during periods of crustal extension. The opening of the Tasman Sea during the Cretaceous (~ 85 million years ago) was driven by significant extension, expressions of which are preserved in eastern Australia. This project is aimed at determining the age and composition of dykes emplaced prior to, and during, the formation of the Tasman Sea, the outcomes of which will result in the clarification of why continents have broken-up and dispersed through time.

RESEARCH TOPICS

- Unravelling the structural architecture of accretionary wedges
- Metamorphic environs in subduction zones – modelling mineral dynamics in high-pressure low-temperature settings
- Development and exhumation of lower crustal rocks
- Relationships between dyke emplacement and continental break-up – with reference to the opening of the Tasman Sea
- Using igneous rocks as proxies for tectonic setting
- Investigating the potential of CO2 sequestration by mineral carbonation or storage in NSW.

GROUP MEMBERS

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