

Earth sciences



MACQUARIE
University
SYDNEY · AUSTRALIA



Investigating themes from the early evolution of life to Earth's deep plumbing system and the eruption of volcanoes, Macquarie's earth sciences researchers are uniquely positioned to help resolve the complex issues that define the future of humanity.

Our multifaceted research spans a wide range of topics in earth and planetary sciences, with concentrations in the following five areas:

- Geodynamics, including geophysics, numerical modelling of mantle and crustal processes, as well as high-pressure experimentation.
- Geochemical and isotope tracers in earth processes, ranging from the movement of fluids and melts in the upper mantle and beneath island arc volcanoes to the study of contaminants in drinking water.
- Geobiology, including organic geochemistry, the effects of oxygenation events on the evolution of life, the micro- and nanostructure and composition of biominerals, and surface aspects of the global carbon cycle.
- The evolution of the crust and mantle, merging the petrology and structure of high-grade metamorphic rocks with the isotope dating of zircons to map age distributions in continental blocks.

- Planetary evolution, coalescing dynamic models of planetary accretion and formation, the chemistry and deformation of meteorites, and the detection of microbial life.

Apart from these concentrations, other researchers are allied to marine geoscience through the International Ocean Discovery Program and ANSTO's Bragg Institute. Here, our research interests include biomarkers in ancient rocks, high-pressure mineral physics, and the quantification of microstructures in rocks and ice.

Our researchers enjoy an international reputation as leaders in their fields with strong national and international collaborative links. Macquarie is currently ranked in the top 100 in the world in the field of earth and marine sciences (QS, 2017), and in the most recent Excellence in Research for Australia evaluation, our earth sciences research received a rating of performance above world standard.



AREAS OF SPECIALISATION

- Experimental petrology and mineral physics
- Geobiology
- Geochemistry
- Geodynamics
- Geophysics and numerical modelling
- Marine sciences



FACILITIES

- Electron microprobe, SEM, XRF, several ICP-MS instruments with laser ablation microprobe, mass spectrometry, clean laboratories for radiogenic isotope work, Raman and FTIR spectrometry
- High-performance computing clusters, planetary simulation software suite, geophysical modelling and inversion programs, and geographic information systems software
- High-pressure experimental apparatuses, including multi-anvil, piston cylinder, deformation, diamond anvil cells and ambient pressure furnaces
- Organic geochemistry laboratory and instruments, including GCxGC-MS and LC-MS
- Seismic, gravity, magnetic, GPR and electrical equipment (FEM, TEM, Resistivity), digital data acquisition system for monitoring geophysical experiments in the field and laboratory



RESEARCH HUBS

- ARC Centre of Excellence for Core to Crust Fluid Systems
- ARC National Key Centre for Geochemical Evolution and Metallogeny of Continents
- Genes to Geoscience
- Macquarie University Marine Research Centre
- Macquarie University Planetary Research Centre



OUR RESEARCH PRIORITIES

We pursue excellence in a broad range of research areas. Our five interdisciplinary strategic research priorities – Healthy People, Resilient Societies, Prosperous Economies, Secure Planet and Innovative Technologies – respond to globally significant challenges and opportunities to improve the lives of millions. Together, these research priorities provide a focal point for research, with discoveries made under these priorities translating into real improvements in the lives of local, national and global communities.

JOINTLY SUPERVISED PHD PROGRAMS

Macquarie actively encourages cotutelles and joint degrees – shared supervision arrangements with universities whose research activity strongly aligns with ours. Under each model, you are enrolled at two universities with a principal supervisor at each and may be eligible for additional scholarship support.

mq.edu.au/cotutelle-and-joint-phd