UNIVERSITY OF NEWCASTLE AUSTRALIA

EARTH SCIENCES

SCHOOL OF SCIENCE

Honours and Undergraduate Research Projects

2026

Earth Sciences spans the study of the critical and connected (bio)physical systems that control the environmental conditions and change on Earth, and support life on Earth. Knowledge and skills in Earth Science is at the forefront of addressing the great challenges of our time, such as living in a changing climate and with finite resources – Earth Science is critical to shaping a sustainable future on Earth.

Figure 1. Earth is formed of several interconnected process spheres between which energy and matter are continuously exchanged, driving the planet's dynamics and evolution through time.

Where can study in Earth Sciences take you? Check out the *Geosciences for the Future* poster on the back of this booklet to see the broad range of fields that Earth Sciences graduates work in.

Study Earth Sciences at the University of Newcastle through the *Bachelor of Science (Earth Science)*, *Bachelor of Environmental Science & Management*, and *Bachelor of Coastal & Marine Science*.

A range of Earth Sciences courses are offered through the ***first***, ***second*** and ***third***-year undergraduate levels to develop your knowledge and skills across a range of subdiscipline specialisations:

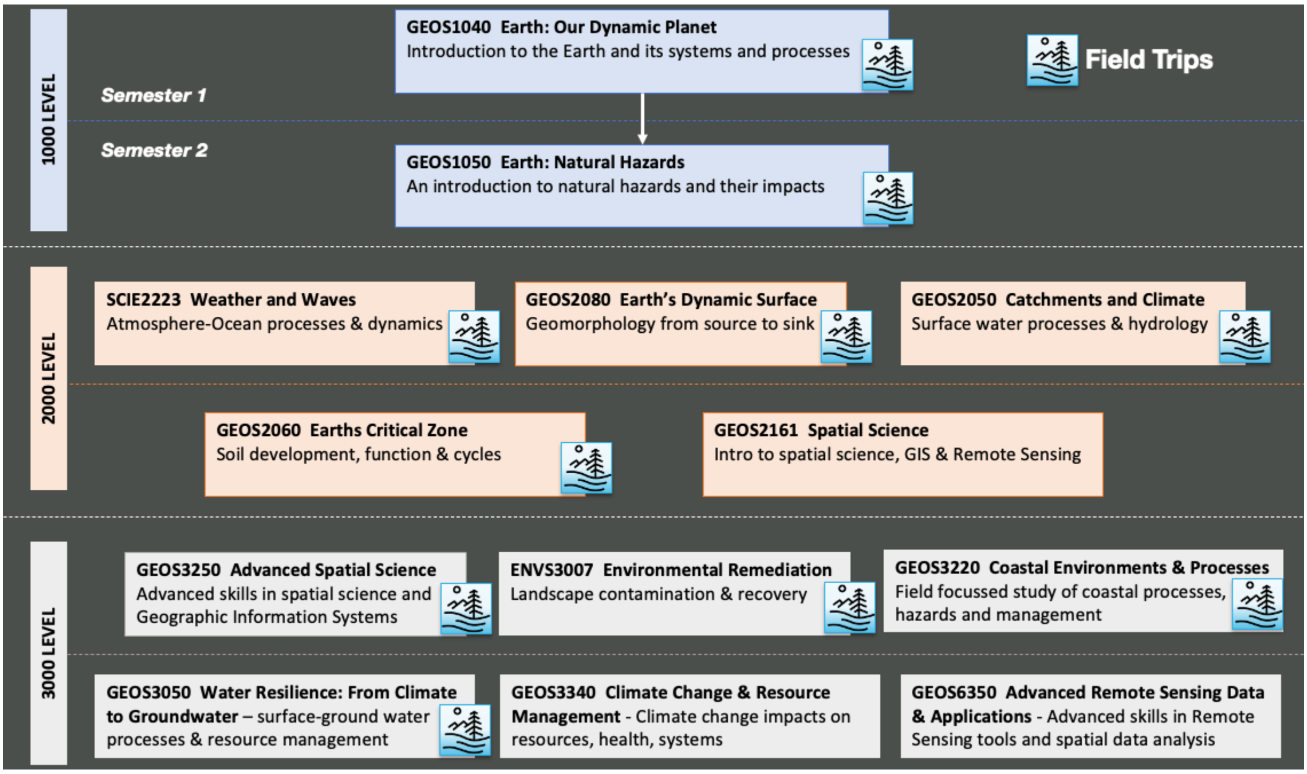

Figure 2. Earth Sciences courses offered at first (1000), second (2000) and third (3000) year undergraduate levels.

Research in Earth Sciences

By taking a research opportunity in Earth Sciences, you will gain sought-after skills that will provide you with a strong foundation for your career in the industry & commercial, government or academic sectors.

As well as growing your knowledge and skills in a specific area of Earth Sciences, you will also develop a range of generic skills that are highly sought after by employers:

- discovering, reading (effectively) and critically analysing scientific papers and technical reports
- experimental research, spatial analysis, computer modelling, field work and laboratory work
- presenting scientific information in a clear and concise manner, both orally and in writing
- higher order thinking, data interpretation and critical analysis
- project management, organisation and time management

You can build research opportunities into your undergraduate studies through the following options:

***SCIE3500: Research Integrated Learning* –** A 10-unit course offered in both semesters that is open to third year students who have completed 140 units with a GPA of at least 5.0. You complete a one-semester research project supervised by an academic staff member. [more information]

***Honours Research Project* –** A one-year (full-time) research project taken after completion of your three-year undergraduate degree. A minimum GPA of 5.0 is required for admission. You complete a full-year research project under the supervision of an academic staff member. [more information]

Earth Sciences academic staff currently research across the following sub-discipline areas:

- Hydrology (surface water) and hydrogeology (groundwater)
- Climatology, climate change and climate hazards
- River systems and terrestrial geomorphology
- Coastal geomorphology and marine geology
- Ocean processes, sea level rise and coastal hazards
- Earth observation, remote sensing and spatial science
- Earth's critical zone and blue carbon
- Near-surface geophysics and sub-surface imaging.
- Earth's natural hazards

This booklet describes the research areas in which Earth Sciences staff are currently offering projects. Browse project opportunities by academic supervisor as listed below:

Dr **Brady Flinchum**	*Near-surface geophysics*	.............................page 3
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Students should contact staff members directly via contact details on the following pages to discuss specific project opportunities, or contact the *Earth Sciences Honours Coordinator* for general advice – michael.kinsela@newcastle.edu.au

Dr Brady Flinchum

Near-surface geophysical methods, Earth's critical zone

Ground penetrating radar (GPR), seismic refraction and reflection, nuclear magnetic resonance, Earth's critical zone and regolith science

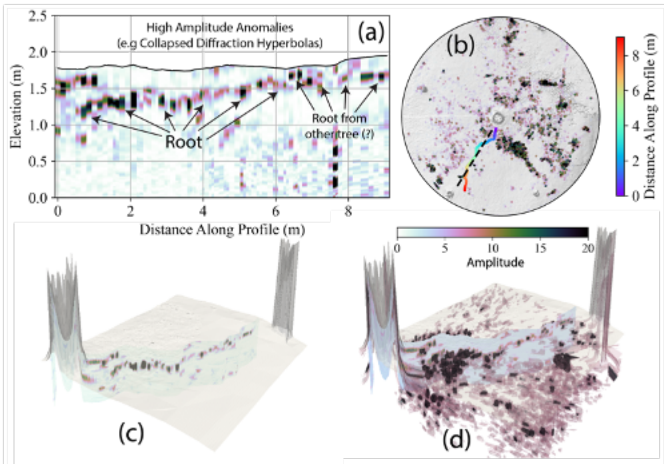
Profile: https://www.newcastle.edu.au/profile/brady-flinchum

Contact: brady.flinchum@newcastle.edu.au

As geoscientists, we venture into the realm of the unknown, constantly striving to expand our understanding of Earth's complex processes. Dr Flinchum believes that research requires passion, curiosity, and resilience. He is dedicated to sharing his technical knowledge to help students reach their full potential. He is seeking students who are curious about the earth hidden just a few centimetres below our feet.

Dr Flinchum employs near-surface geophysical methods to characterise Earth's critical zone (CZ), which spans from treetops to bedrock and supports terrestrial life. The CZ, where regolith forms, is an interdisciplinary hub that attracts many earth scientists. His work in CZ science involves bridging gaps between measurements that span a variety of temporal and spatial scales. His research focuses on using geophysics' unique imaging capabilities to create new perspectives and enhance understanding of the physical and chemical processes that create regolith. He specialises in shallow seismic refraction but is familiar with ground penetrating radar (GPR), seismic reflection, direct current (DC) electrical resistivity, and surface and borehole nuclear magnetic resonance (NMR). Dr Flinchum will work with you to create a research project related to imaging and characterising the shallow subsurface (< 60 m) using near-surface geophysical methods. The project will likely be themed around the following geophysical methods:

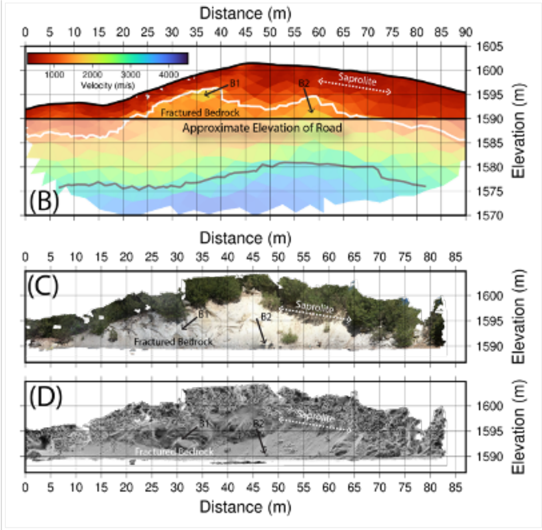
Project 1: Ground Penetrating Radar (GPR)



Understanding the detailed structure of the shallowest layers (< 5 m) is critical to water infiltration rates, nutrient and water availability for plants, and even for mapping man-made infrastructure such as pipes and power lines. Ground penetrating radar is a geophysical tool frequently used in urban, archaeological, and geological investigations. GPR is a fantastic method for obtaining high-resolution images of soil structure. GPR uses a transmitter to send electromagnetic (EM) waves that travel through the subsurface and are reflected at boundaries with a large contrast in dielectric permittivity. The transmitting antenna's frequency controls the signal's resolution and depth penetration. Higher frequency antennas provide higher resolution, but since energy is lost every cycle, higher frequencies result in a shallower depth of investigation. Project ideas for the application of GPR data include:

- Characterising the extent of the largest tree roots from large trees.
- Mapping the stratigraphy of active dune systems or geological stratigraphy.
- Mapping soil thickness and structure.
- Characterising water content in soils over large spatial scales.
- Miscellaneous archaeological and geotechnical applications such as grave finding or checking for cracks in concrete structures.

Project 2: Seismic Refraction



Understanding the underground structure of landscapes is important for studying how water moves, how plants grow, and how rocks break down over time. This project will use seismic refraction, a technique that measures how fast sound waves travel through the ground, to characterise subsurface structure. Seismic refraction exposes subsurface structure along two-dimensional profiles ranging from ten to hundreds of metres long. However, it remains challenging to extrapolate structure from the profiles to large areas spanning tens of kilometres. The method excels at imaging strong contrasts in the compressibility of the material—making it ideal for determining the boundary between bedrock and overlying sediments. Project ideas for the application of seismic refraction data include:

- Exploring the relationship between bedrock structure and other spatial variables such as curvature, slope, and vegetation patterns
- Defining the depth and extent of roots around large trees
- Exploring connections between bedrock structure and overlying ecosystems

Dr Chris Owers

Earth observation and remote sensing

Landscape change, ecosystems, vegetation science, biogeography

Profile: https://www.newcastle.edu.au/profile/chris-owers

Contact: chris.owers@newcastle.edu.au

Chris is a Spatial Scientist, and a specialist in using remote sensing to generate critical information about environmental change. Dr Owers has broad interests using remote sensing in environmental applications including coastal science, biogeography, geomorphology, carbon storage, biodiversity, and ecosystem services. He has expertise in using a variety of remote sensing technologies including Earth Observation, airborne imagery, Lidar (Light Detection and Ranging), TLS (Terrestrial Laser Scanning), as well as state-of-the-art analytics such as machine learning, deep learning, time-series analysis, and 3D modelling. Chris is keen on understanding spatio-temporal dynamics of the natural world captured through remote sensing technologies.

Project 1: Seeing through canopy: estimating above-ground biomass (AGB) of coastal forests using Lidar drone technology

Quantifying above-ground biomass (AGB) is important to understand the current state of coastal forests (mangrove and supratidal) and potential future changes, as AGB influences Earth's carbon budget and contributes to carbon sequestration. Forest AGB is commonly estimated based on individual tree measurements. However, given the unfeasibility of conducting ground measurements for entire forests, allometric equations relating tree characteristics to biomass are normally developed. This project will make use of state-of-the-art drone and laser technologies to determine the biomass of temperate coastal forests in NSW in conjunction with field inventory data. This airborne laser technology is capable of penetrating forest canopy and provide structural parameters of large areas of forest.

Students interested in this project will need to have completed GEOS2161 (Spatial Science).

Project 2: Supratidal extent mapping of Australia and southeast Asia

The lack of continental-wide information on supratidal forests is a significant missing link in knowledge of the distribution of coastal blue carbon ecosystems in Australia. Without the ability to classify supratidal forests using remotely sensed imagery, it is currently not possible to identify where this ecosystem exists across Australia or to track changes over time, including increases in extent from restoration projects. This project will help develop a national supratidal forest mapping workflow and associated spatial datasets for Australia. The outputs from this project will look to integrate into Australia's Ocean Accounts, providing a missing piece in national mapping and reporting on Australia's ocean-based natural assets.

Students interested in this project will need to have completed GEOS2161 (Spatial Science).

Project 3: Mapping the 'woodiness' of our world

Vegetation plays and important role in the global carbon cycle. Identifying and understanding vegetation dynamics, principally carbon stored as biomass in vegetation wood and leaves, is critical for global climate modelling. We can measure this from space using NASA's Global Ecosystem Dynamics Investigation (GEDI) or ESAs Sentinel-1 Synthetic Aperture Radar (SAR) These platforms offer untapped potential due to their unique measurements and high spatio-temporal collection. In this project, you will explore the use of SAR/GEDI to measure vegetation structural attributes, an important variable in biomass density, and calibrate this to on ground measurements of 'woodiness'.

This project will work closely with CSIRO as well as international partners in the UK. Students interested in this project will need to have completed GEOS2161 (Spatial Science).

Project 4: Towards an Australia-wide remote sensing approach to understanding coastal dune activity

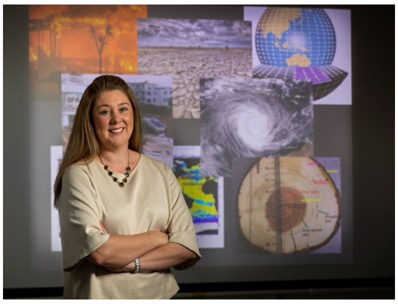
Several studies have established patterns and phases of dune activity around Australia's coastline, relating these patterns to a range of environmental and anthropogenic forcings. However, many of these have been on a local scale and often relied on manual processes. In this project, you will develop a machine learning approach that will enable an Australia-wide mapping framework to understanding dune activity from the Landsat archive. The project will develop methods to distinguish bare sand (i.e. active dunes) from vegetated dunes and map changes in the extent of bare sand over time (1987-present). The outcome will be an improved understanding of coastal dune activity over three decades and development of a methodology that can be applied on a continental scale.

This project will be co-supervised by Dr Tom Oliver (UNSW ADFA). Students interested in this project will need to have completed GEOS2161 (Spatial Science).

Project 5: Can inundation depth and spatial extent be observed from spaceborne sensors for coastal ecosystems and floodplains?

Identifying varying inundation depths and spatial extents that are drive by coastal processes (e.g., tides and storm surges) across coastal landscapes provides fundamental information about how processes affect the response of vegetated coastal landscapes to change. These measurements are typically achieved via in situ monitoring through tide gauges, however, a lack of measurement data in remote locations leaves many sites lacking monitoring data to inform how they are responding to change. Given the importance of understanding tidal dynamics as drivers of change in coastal ecosystems, this is a critical knowledge gap. Using spaceborne sensors to identify landscape characteristics provides a suitable approach for large scale analysis particularly in remote areas. Globally available optical and SAR datasets, such as the Landsat and Sentinel-1/2 programs, have demonstrated capacity to measure inundation dynamics in areas of open water. However, vegetated ecosystems, common throughout large coastal floodplains, often obstruct the detection of inundation in these systems. ICESat-2 provides an approach to identifying coastal inundation dynamics as it is a spaceborne sensor with capacity to detect inundation under vegetation. This study aims to demonstrate the capacity of spaceborne sensors such as ICESat-2 for detecting coastal inundation dynamics in remote estuaries.

This project will be co-supervised by Dr Hannah Power. Students interested in this project will need to have completed GEOS2161 (Spatial Science).



A/Prof Danielle Verdon-Kidd

Climate science and palaeoclimatology

Climate science, climate extremes, palaeoclimatology and hydrology

Profile: https://www.newcastle.edu.au/profile/danielle-verdon

Contact: danielle.verdon@newcastle.edu.au

Danielle is researching the nature and triggers of extreme weather events, such as droughts, bushfires and storms to help our nation better prepare for what lies ahead. Lying at the nexus of climate science, hydrology and palaeoclimatology, A/Prof Verdon-Kidd's research seeks to understand what causes climate-related disasters, and what can be done about them.

Project 1: Dendrochronology of floodplain Eucalypts in the Murray Darling Basin

In the vast expanse of the Murray-Darling Basin, ancient sentinels stand testament to the region's enduring ecological history. Old trees, some dating back centuries, play a crucial role in preserving the Basin's unique biodiversity and maintaining ecosystem balance. This project will employ advanced techniques, such as radiocarbon dating, to unravel the age of these trees, peeling back layers of time to reveal the stories embedded in their rings.

This research will allow us to appreciate and protect these venerable trees, ensuring they continue to thrive and contribute to the ecological harmony of the Murray-Darling Basin. Students interested in this project will need to have completed GEOS2161 (Spatial Science).

Project 2: Climate clues in Callitris: decoding tree rings along Australia's arid zone margin

The transition zone between arid and semi-arid regions of eastern Australia represents a critical ecological boundary where environmental conditions are already at the edge of species' tolerance limits. This zone experiences highly variable rainfall, extreme temperatures, and prolonged dry periods, presenting significant challenges to native flora and fauna. Endemic species in this region have evolved to endure Australia's natural cycle of "droughts and flooding rains." However, with climate change projected to increase the frequency and intensity of extreme weather events, it is unclear whether these species can adapt to conditions that may exceed their historical thresholds. To accurately assess their adaptive capacity, a much longer perspective on climate history is needed, as existing instrumental records in this region are both short and sparse. This project aims to reconstruct multi-century climate history of the arid zone margin from tree rings of Callitris glaucophylla (White Cypress), a species highly sensitive to changes in aridity. With visible annual growth rings Callitris species hold excellent potential for extracting high-resolution climate information.

Project 3: Compound climate extremes effecting global food bowls

The Murray Darling Basin (MDB) is well known at the nation's food bowl, supporting ~40% of Australia's agriculture. Similarly, across the globe there are other equally significant agricultural regions supporting large populations. These 'food bowls' are sensitive to climate driven extremes, such as droughts, insect attack, flood and fire. In some cases more than one climate extreme may impact individual regions (known as compound events). Multiple failures across global food bowls could therefore be catastrophic in terms of world food supply.

This project will investigate the risk of compound events to global food bowls by studying a range of global climate datasets. Students interested in this project will need to have completed GEOS2161 (Spatial Science).

Dr Gabriel Rau

Hydrogeology and groundwater processes

Groundwater flows & storage, subsurface hydraulics & geomechanics, groundwater in coastal wetlands, surface-groundwater interactions

Profile: https://www.newcastle.edu.au/profile/gabriel-rau

Contact: gabriel.rau@newcastle.edu.au

Gabriel has a passion for designing specialist field and laboratory experiments, acquiring, compiling and interpreting geoscience information using advanced data science tools provided through the Python programming language. Dr Rau's work aims to develop and apply methods for the quantification of subsurface processes and properties, leading to improved fundamental process understanding. This includes water flows across the surface/subsoil boundary and the impact of underground resource extraction.

What is your interest related to groundwater systems?

Bring your ideas and passion and we will find a suitable project that can enhance your skillset.

Other topic ideas:

- **The role of groundwater in supporting coastal wetlands**
  Groundwater is a vital force in coastal wetlands, playing a crucial role in maintaining their hydrological balance, buffering against extreme conditions, and influencing nutrient cycling. It acts as a stable water source, impacting surface water levels, salinity gradients, and vegetation dynamics. Groundwater's contribution is essential for sustaining biodiversity and ecological resilience in coastal wetland ecosystems, emphasising the need for thoughtful conservation and management strategies especially because sea levels are projected to rise due to climate change.
- **Quantifying hydraulic and geomechanical properties using the groundwater response to natural forces**
  Sustainable subsurface resource management demands a deep understanding of processes and properties. Predicting the impact of long-term climate-related changes on the global subsurface water balance is challenging due to limited knowledge of hydro-geomechanical properties' spatial distribution. I'm advancing Passive Subsurface Characterisation (PSC), using Earth tides and atmospheric forcing signatures in pressure measurements to quantify hydro-geomechanical processes. Objectives include validating PSC, automating its application to existing datasets, and establishing a global database of hydro-geomechanical properties. The aim is to integrate large-scale surface models with the subsurface, enhancing predictions of groundwater balance changes in climate change scenarios.
- **The spatiotemporal dynamics of water movement through the critical zone of drylands**
  In drylands (semi- to hyper-areas) water resources are scarce, and groundwater sustains human activities and the environment. The Earth's critical zone is located between the atmosphere and groundwater as one of the largest water stores. Interactions through this zone constantly change in space and time and are difficult to investigate. Quantifying hydro-geophysical processes such as water fluxes across this interface is a prerequisite for sustainably managing Earth's resources under a changing climate. My research objective is to better understand and quantify the spatiotemporal dynamics of water movement through the critical zone.

A/Prof Hannah Power

Coastal processes and hazards

Waves, tides, and currents on beaches and in estuaries; sea level rise impacts; changing dynamics under sea level rise; tsunamis and storms

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Contact: hannah.power@newcastle.edu.au

Hannah is a coastal geomorphologist who investigates beaches, estuaries, rivers, and reefs and examines how processes such as waves, tides, and currents change the shape of our coast over time. Hannah also works on improving predictions of extreme events and hazards such as extreme wave runup, tsunami, and coastal inundation.

Project 1: Extreme water levels in estuaries – driving processes and their timescales

This project will investigate extreme water levels in estuaries and assess the driving processes and their timescales. The project will use existing estuarine and ocean tide gauge data and complement that with additional estuarine hydrodynamic deployments. Data will be analysed to determine how each driving process (e.g., tides, sea level rise, atmospheric pressure, long period coastal trapped waves, and climate drivers) contributes to extreme water levels and their relative frequency, magnitude, and period distributions. These data will be used to assess future risks to estuaries from ongoing sea level rise and thus inform coastal management/planning processes.

Students interested in this project will need to have completed GEOS3220 (Coastal Environments and Processes).

Project 2: Morphological and hydrodynamic influences on extreme wave runup

This project will investigate the morphological and hydrodynamic drives of extreme wave runup on sandy beaches. The project will use existing data collected by the Coasts and Estuaries Research Group over the past several years and supplement it with additional, targeted field experiments to further investigate the key drivers of extreme wave runup. Factors such as offshore wave spectra, surf zone hydrodynamics, surf and swash zone morphology, and wave-wave interactions will be assessed as to their relative influence on driving extreme wave runup and on the wave runup distribution. This research will inform coastal management by enhancing predictions of open coast wave runup, hence improving predictions of open coast inundation and dune erosion.

Students interested in this project will need to have completed GEOS3220 (Coastal Environments and Processes).

Project 3: Wave overwash hazards and risk management on coastal rock platforms

This project will investigate the conditions that drive ocean wave overwash on coastal rock platforms. The project will use an extensive remote sensing and hydrodynamics observation dataset collected at the famous Figure Eight Pools site in the Royal National Park south of Sydney to assess how water level, wave height, wave period, and offshore directional wave spectra influence the frequency and magnitude of wave overtopping that poses a hazard to visitors on the rock platform. Hydrodynamic data and remotely sensed data will be analysed to investigate the roles of offshore hydrodynamic conditions and platform morphology on wave overtopping. A predictive hazard warning system will be evaluated and further developed to apply to other coastal rock platforms in NSW. New field data will be collected at dangerous rock platforms in the Newcastle region to inform the modelling. This research will inform rocky shore coastal management and safety advisories for recreational visitors to rock platforms for activities such as tourism and rock fishing.

Students interested in this project will need to have completed GEOS3220 (Coastal Environments and Processes). This project is a joint project with Dr Mike Kinsela.

Dr Mike Kinsela

Coastal evolution and marine geology

Coastal landscapes and dynamics, marine seabed mapping and geology, sea level change, coastal erosion and climate change impacts

Profile: https://www.newcastle.edu.au/profile/michael-kinsela

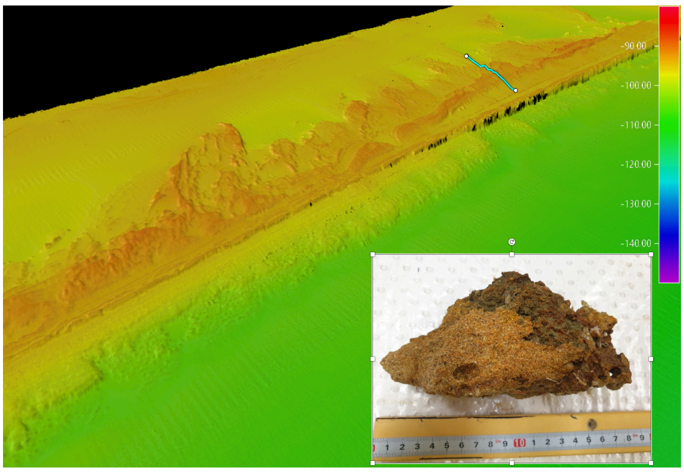
Contact: michael.kinsela@newcastle.edu.au

Mike is a coastal and marine geologist focused on the interconnected sedimentary systems of beaches, dunes, estuaries and the continental shelf. Dr Kinsela researches the formation and evolution of these settings in response to drivers such as sea level change by mapping and sampling using remote sensing techniques (e.g., laser scanners, drones, vessel-based echosounders), sediment sampling as well as spatial analysis (GIS) and modelling. He aspires to improve our understanding of and ability to predict coastal change hazards, to shape better coastal futures in a changing climate.

Project 1: Tipping point change of beach-dune sand barriers to storms and sea level rise

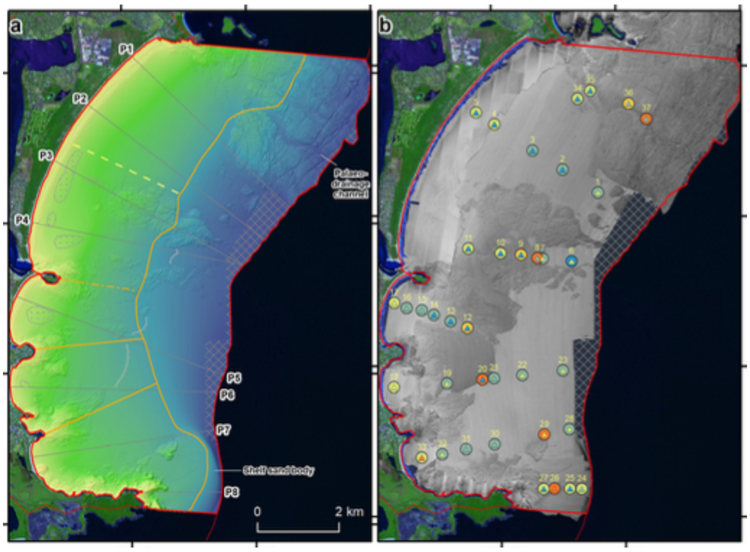
Coastal sand barriers provide critical buffers, absorbing shoreline change caused by storms and sea level rise. Whereas sea level has been stable for the past several thousand years, it is now rising at the fastest rate since the end of the last ice age. This can allow increased wave attack of previously stable dunes, eventually leading to tipping-point responses. The sand barrier at Manning Point, for example, has been eroded over recent decades to a point where it is at risk of breaking through and forming a new entrance to the Manning River. This project will investigate wave overtopping and erosion of coastal sand barriers, and their sensitivity to storms and sea level rise. Historical coastal change data (aerial and satellite imagery) and recent morphological survey data will be analysed along with coastal hydrodynamic (waves and tides) to investigate past and potential future tipping-point thresholds in different settings. The research will inform coastal planning and management by helping to identify and predict future threshold changes.

Project 2: Discovering ancient coasts to investigate climate influences on coastal evolution



Only 20,000 years ago, sea levels were 120 m lower than today and the Australian coastline was located many kilometres seaward of its present position. Indigenous Australians were living on today's drowned continental shelf and would have migrated inland over generations as sea levels rose over 100 m rapidly due to the melting of Earth's ice caps after the last glacial maximum. Sea levels have fluctuated between those positions over hundreds of thousands of years, leaving behind drowned coasts on the continental shelf. This project will investigate the origins and evolution of drowned coastal landforms, such as beaches & dunes, forming Barwon Bank on the southeast Queensland continental shelf. Marine geology and geophysical data collected during an *RV Investigator* research voyage in 2022 and prior voyages will be analysed to study the geomorphology, sedimentology and stratigraphy. A focus will be on identifying old coastlines from different sea levels to investigate coastal dynamics including sediment transport along the southeast Australian coast during lower sea levels.

Project 3: How the underwater sediment system controls beach resilience to climate change



Until recently the coastal seabed off NSW was largely unknown apart from general bathymetry mapping for navigation. The NSW Government has recently mapped much of this area in high-resolution for coastal hazard management purposes. The resilience and response of beaches to sea level rise will vary between locations and depends on the distribution of sand in the *underwater* beach system.

This project will investigate sources, sinks and pathways for sediment transport and sand connectivity along the mid-north coast. High-resolution seabed mapping, sediment sampling and underwater video will be used to study the secrets of the seafloor. Seabed geomorphology, sediment bedforms, and the sedimentology and stratigraphy will be analysed to trace sand pathways and the dynamics of modern coastal sedimentary systems. The research will inform the development of “sediment budgets” that are needed to model future shoreline change and coastal erosion under a changing climate. This project includes collaboration with the NSW Department of Climate Change, Energy, the Environment & Water.

Dr Sara Polanco

Earth surface processes and modelling

Hydrology, climate science, data science, spatial analysis, numerical modelling

Profile: https://www.newcastle.edu.au/profile/sara-polanco

Contact: sara.polanco@newcastle.edu.au

My research focuses on understanding how and why terrestrial and coastal systems change, using a combination of geographic information science, numerical modelling, and fieldwork. I work at the intersection of geoscience, climate, and sustainability, with a goal of informing efforts to mitigate environmental change, sustainably manage water resources, and implement nature-based CO_2 removal solutions. By studying key environmental drivers, my work highlights how understanding natural processes can lead to solutions that align with Earth's systems. I'm passionate about the role of Earth Sciences in advancing the UN Sustainable Development Goals.

Project 1: The effect of climate extremes on the Murray Darling Basin

The Murray–Darling Basin is Australia's largest and most important river system, supporting communities, ecosystems, and agriculture across southeastern Australia. This project explores how global climate phenomena — including the El Niño–Southern Oscillation (ENSO) and the Indian Ocean Dipole — influence regional hydrology and landscape evolution within the basin. By integrating geographic information systems (GIS), field observations, and numerical simulations, the research aims to reconstruct past hydrological events and assess how future climate variability may impact water availability and catchment behaviour. The project offers insights into managing water resources in a changing climate, linking global drivers to regional-scale environmental responses.

Students interested in this project should have completed GEOS2161 (Spatial Science). Programming skills in Python are beneficial but not required.

Project 2: Fresh water hidden beneath the sea: A new frontier for water security

Beneath the seafloor, freshwater is stored in the tiny pores of sediments and rocks — a hidden reservoir stretching along continental margins. This project uses 3D numerical simulations to investigate how these offshore aquifers formed and evolved through time. By reconstructing the structure and layering of the seafloor, the research explores how sea-level changes, sediment deposition, and crustal flexing have influenced groundwater flow. During past periods of low sea level, rainwater may have recharged these aquifers as the continental shelf was exposed. This work reveals the deep connections between shifting coastlines, changing landscapes, and the movement of freshwater beneath the ocean floor.

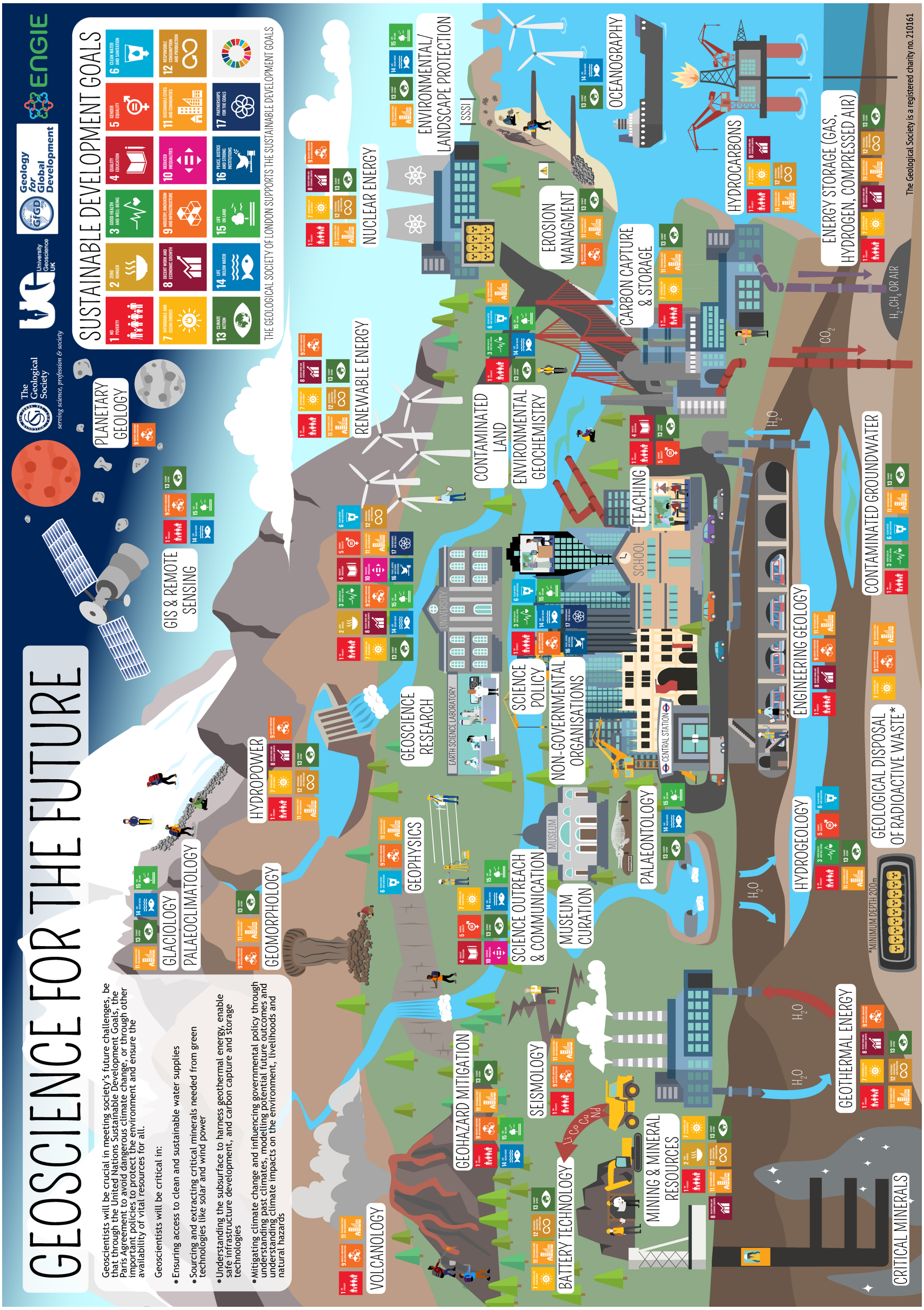
Students interested in this project should have completed GEOS2161 (Spatial Science). Programming skills in Python are beneficial but not required.

This project is part of a collaboration between Australia and the International Ocean Discovery Program. https://www.iodp.org.au/2025/04/29/freshwater-beneath-the-sea/

Project 3: Model Atlas of the Earth (M@te): advancing the interoperability of digital twins

Numerical modelling is essential for understanding Earth's complex systems and addressing environmental change. M@TE is an open science framework that supports the entire modelling lifecycle — from setup to output and analysis — making models reproducible, AI-ready, and accessible. In this project, you will help develop automated workflows for metadata validation, model documentation, and DOI creation, enhancing the accessibility and reproducibility of Earth system models. The outcome will be a robust platform that improves how environmental models are shared and reused, benefiting research on critical regions such as the Murray–Darling Basin.

Students should have completed GEOS2161 (Spatial Science) and will develop skills in Python programming, automated workflows, and collaborate closely with software developers.



Source: https://www.geolsoc.org.uk/education-and-resources/geoscience-for-the-future-poster