Research Infrastructure Handbook
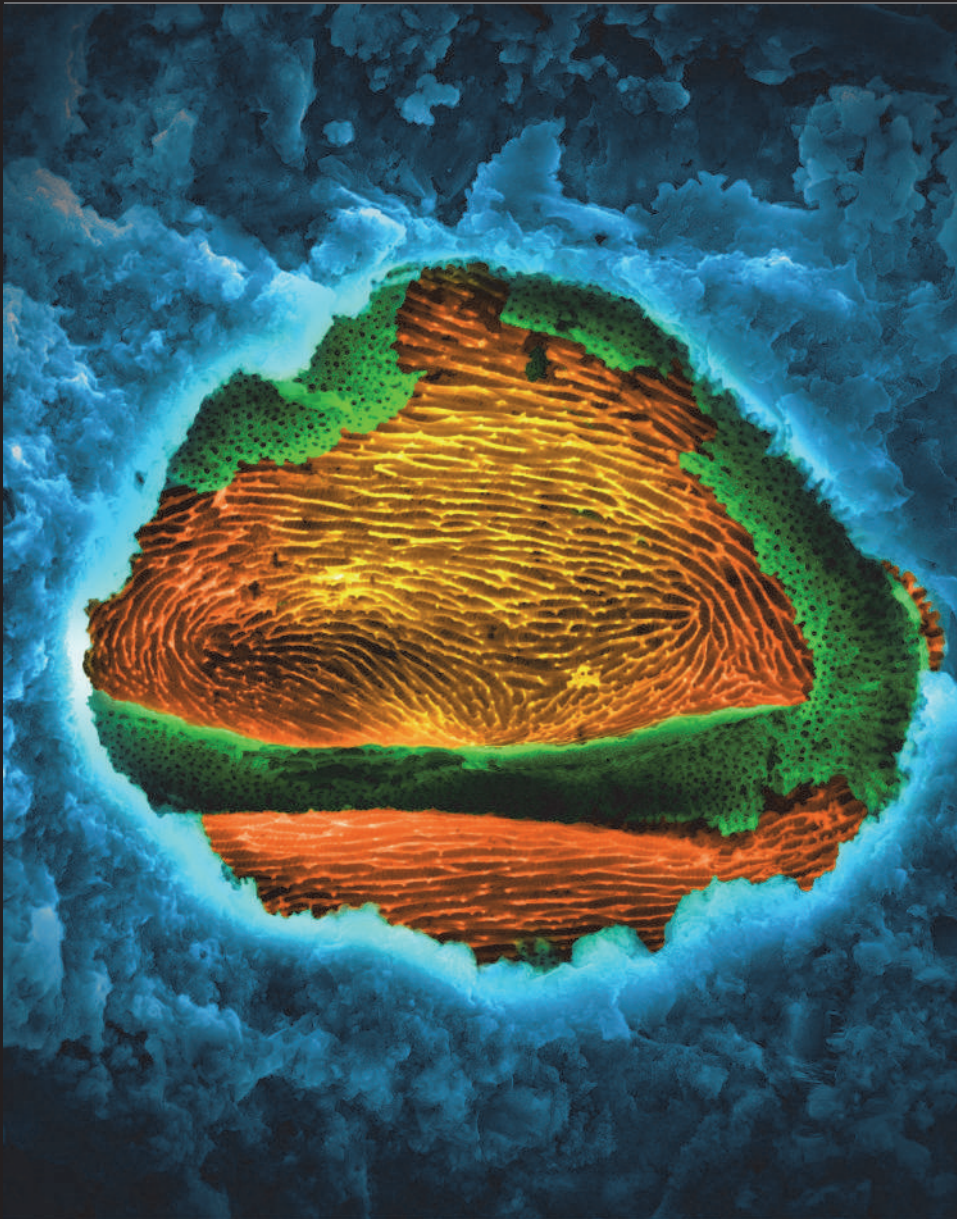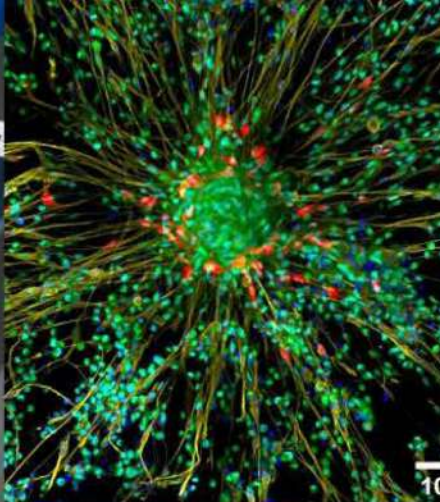
Australian National University

Introduction

Research infrastructure at the Australian National University (ANU) is a broad term capturing not only the physical facilities, equipment and assets we host, but critical services, datasets, software and expertise that underpins research. In this booklet we present a snapshot of the services and support available to research and collaborators, made possible by the expertise of our highly skilled people.

At ANU, we are dedicated to serving society through transformational research and to tackling some of the world's most pressing issues through cross-disciplinary collaboration. We are fortunate to host around a dozen national research facilities and nodes (supported by the Australian Government's National Collaborative Research Infrastructure Strategy), and over 100 ANU-based facilities and labs. We encourage our teams to make facilities and resources broadly available and accessible – working together to contribute towards cross-disciplinary research themes such as synthetic biology, climate change, critical minerals and space technologies.

Whether you are a member of the ANU community, a current or potential collaborator, or simply an interested observer, we hope that this booklet gives a sense of the diversity and scope of our research infrastructure. We look forward to refining and building on this initial work to develop more interactive tools that can promote our infrastructure and connect you to it.

PROFESSOR UTE ROESSNER AM FAA
Academic Director, Research Initiatives and Infrastructure
November 2023

Contents

Advanced Instrumentation and Technology Centre (AITC)

Located at Mt Stromlo, the AITC is part of the Research School of Astronomy and Astrophysics. It is the largest instrumentation research, design and development facility for astronomy and space in Australia with a track record spanning decades of expertise in those fields.

The core mission of the AITC is to develop and deliver world-leading, innovative solutions for ground and space-based astronomy at visible, infrared, and ultra-violet wavelengths. AITC is also part of the Astralis Instrumentation Consortium.

At the AITC, we combine our extensive knowledge and expertise in optics, mechanics, electronics, detectors, control, software, astronomy, and space technologies to design and build cutting edge instruments. We integrate robust system engineering, project management and quality assurance to deliver bespoke instruments and capabilities to our customers around the world. We leverage world-class instrumentation technologies to fields beyond astronomy such as remote sensing and laser communications.

SERVICES

The AITC hosts the National Space Testing Facility (NTSF), a hub for space environment testing of instrument payloads and spacecrafts. We provide research services to the space community including academia, industry, and government agencies.

CAPABILITIES

Key AITC capabilities include:

- Telescopes and instrumentation for astronomy and space
- Laser Guide Start (LGS) Adaptive Optics (AO) for astronomy, space situational awareness and laser communications
- Low noise scientific detector systems
- Software for astronomy, space telescopes and instrumentation
- Remote sensing for astronomy and earth observation
- Laser communications
- National space testing facilities
- End-to-end engineering management

COST

For details about costing of instrument projects and access to the National Space Test Facility and other unique laboratory equipment and services, please contact us via email.

To access a list of expert contacts for specific enquiries, please email us or refer to our capability brochures available at the AITC Expo Table.

Contact

E: aitc@anu.edu.au
W: https://rsaa.anu.edu.au/aitc

ANSIR National Facility for Earth Sounding

Australian National Seismic Imaging Resource (ANSIR) is a partnership of universities and government agencies in Australia and New Zealand that provides researchers with equipment and services for Earth imaging across Australasia. As part of ANSIR, ANU houses the national pool of state-of-the-art passive seismic equipment. The facility supplies instrumentation for seismological experiments around Australasia. ANSIR experiment support includes seismic instrumentation, equipment maintenance, data archiving, training, and logistics.

This project was enabled by AuScope and the Australian Government via NCRIS.

REASONS TO WORK WITH US

- With over 800 instruments, we have the largest pool of seismic instruments available for research in Australasia;
- We specialise in robust, low-power instruments appropriate for remote work in the harshest of environments from the heat of the Australian desert to the cold of Antarctica; and
- Our team have decades of experience with planning, installation, and maintenance of seismic arrays

CAPABILITIES

- **BROADBAND SEISMOMETERS**: A fleet of Nanometrics Trillium compact, Guralp 3ESP, and Guralp 40T sensors. These seismometers are three-component seismometers capable of sensing ground motions over a wide frequency band from 120 seconds to 100 Hz.
- **SHORT-PERIOD SEISMOMETERS**: A fleet of Lennartz 3Dlite MkII, and Sercel L28-3D sensors. These are more rugged three-component seismometers that cover the frequency band from 1 Hz to 100 Hz.
- **ALL-IN-ONE SEISMOMETERS**: A fleet of SmartSolo IGU-16HR 3-component nodes. These seismic instruments are compact all-in-one 3-channel sensor & datalogger with integrated GPS timing, and a self-contained power supply that are useful sensors for both active and short-term passive experiments.
- **OCEAN BOTTOM SEISMOMETERS**: A pool of Guralp Libre with 6T seismometers and Nanometrics Abalones with Trillium Compact seismometers.
- **DISTRIBUTED ACOUSTIC SENSING (DAS)**: Silixa iDAS v2 interrogator. The interrogator measures strain rate along fibre optic cables at broadband frequency (0.01 - 1000 Hz) in meter-scale spacing with typical array length of 25 to 40 km.
- **DATA LOGGERS**: A fleet of ANU TerraSawr, ANU LPR200, Nanometrics Centaur, and Kenda Earthdata. Dataloggers are all 24 bit and are capable of recording up to at least 1000 samples per second.

Contact

Dr Michelle Salmon
T: 02 6125 1168
E: michelle.salmon@anu.edu.au
W: auscope.org.au/ansir

ANU Argon Geochronology Laboratory

The Argon Laboratory was designed and built to undertake precision temperature-controlled step-heating to allow production of detailed age spectra at the same time as 39Ar diffusion experiments are conducted. The unique dual extraction lines each with its own precision furnace and automated sample chamber with robotic capabilities, enabling 24/7 operation and ensures significantly enhanced data quality. Diffusion parameters estimated from the ultra-high-vacuum experiments allow sample characterisation and quantitative modelling of the effect of temperature, pressure, and time.
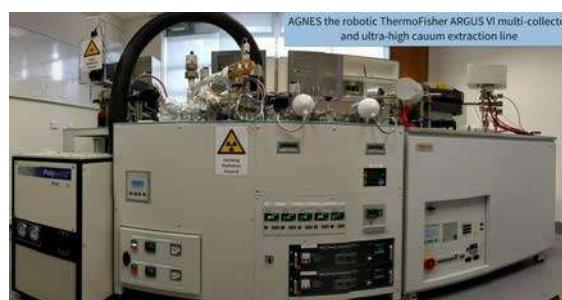
The detail in the argon age spectrum is vital to the understand of complex geological processes. Quantitative modelling is essential to test hypotheses as to various tectonic scenarios such as the evolution of geological terranes, and the effects of complex periods of deformation.

CAPABILITIES

- **THERMOFISHER ARGUS VI Mass Spectrometer**: This multi-collector mass spectrometer allows all five argon isotopes to be measured simultaneously.
- **PHOTON CO2 Laser**: Research grade laser suitable to undertake fusion experiments and reconnaissance step-heating laser work.
- **Custom Designed Line**: Two fully independent, automated and robotic gas extraction lines, each with its own fully automated furnace and sample chamber.
- **Fully Automated and Robotic**: The entire system is fully automated and controlled by Agnes the argon robot, including valves, sample changers. Capacity of 90 samples allows >3 months continuous operation without opening the sample chamber.
- **Precision Calibration**: Furnace design allows optical calibration with an array of pure metals melting point observation.
- **Custom Application Software**: Software specifically written for data processing (XML), output compatible with FAIR principles, data interpretation and quantitative modelling

REASONS TO WORK WITH US

- The ANU Argon Laboratory is unique in its ability to produce robust and reproducible quantitative detail in measured argon spectra and associated Arrhenius plots.
- In our laboratory the unmatched high precision temperature-controlled dual furnaces operate independently so one furnace can be cleaning a sample overnight while the other furnace is analysing a sample. Our cleaning process occurs under vacuum prior to analysis so extraneous gases are pumped away prior to analysis. This allows the results to show information that would normally not be detectable.
- Our quantitative modelling made possible by the Arrhenius data, allows extraction of temperature-time information for complex geological processes over time.
- We offer training as well as courses in the theory and practice of argon geochronology, data processing and quantitative temperature-time modelling.

Fully automated, RSES built and designed, dual furnaces and sample chambers

AGNES the robotic ThermoFisher ARGUS VI multi-collector and ultra-high cavuum extraction line

Contact

Marnie Forster and Davood Vasegh
T: 02 6125 5541
E: marnie.forster@anu.edu.au
   davood.vasegh@anu.edu.au

ANU Bioinformatics Consultancy (ABC)

The ANU Bioinformatics Consultancy (ABC) has been providing bioinformatics, data, and computational support services since 2011

We offer a range of best-practice service options covering all popular molecular sequencing platforms and protocols working in conjunction with the BRF on a daily basis, as well as custom programming, pipelining, data analysis and integration.

GENOMICS/TRANSCRIPTOMICS SERVICES

Quantitative analysis
- Gene expression – RNAseq, scRNAseq, ATACseq, ChIPseq...
- Genomic variant calling and functional annotation
- Biomarker/critical pathway discovery

Custom analysis
- De novo or guided assembly
- Reduced representation sequencing
- Amplicons and target capture

Any platform
- Illumina, Nanopore, PacBio, Sanger
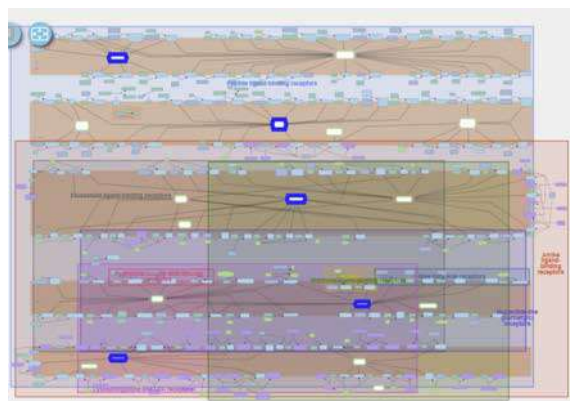
COMPUTATIONAL AND PROGRAMMING SERVICES

- Custom programming (Python/R/C/C++/Javascript)
- Service and platform development – lab automation, pipelines, web portals
- Development resources for the Centre for Computational Biomedical Sciences
- Custom hardware at the National Computational Infrastructure's Gadi supercomputer

For pricing enquiries, please contact us.

Contact

E: abc@anu.edu.au
W: jcsmr.anu.edu.au/research/centres/abc

Cameron Jack   Dr Zhi-ping Feng   Gabrielle Ryan   Dr Eslam Ibrahim

ANU Centre for Therapeutic Discovery (ACTD)

The ANU Centre for Therapeutic Discovery (ACTD) is a fully automated, state-of-the-art high throughput screening facility that design and execute an array of projects including early assay development to large-scale therapeutic and biomarker discovery screening of biologics and small molecules, in both cell-free and mammalian cell-based systems. We are an NCRIS service node of Phenomics Australia and Therapeutic Innovation Australia and provide services to academic and industry clients that are located both domestically and internationally.

WHAT WE OFFER
- Open to all research disciplines
- 'Collaborative' screening and fee-for-service models available
- Consultation about screen design and assay workflows
- Custom robotic automation pipeline generation
- Assistance with grant applications (screening aims)
- Enabling access to biological/chemical libraries for screening
- (e.g., compounds/RNAi/CRISPR libraries)
- General screening consumables and reagents for purchase
- Boutique microplate applications and pilot experiments using automation
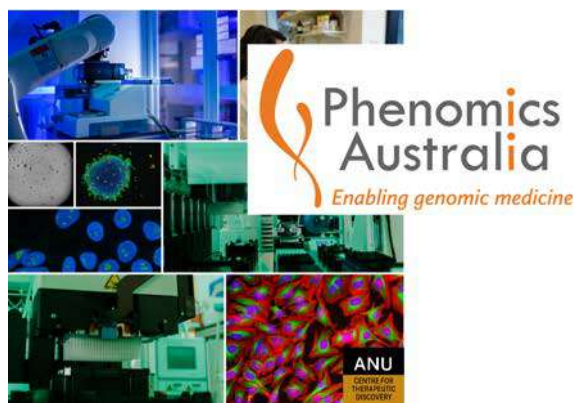
Our flagship equipment includes:
- PerkinElmer Opera Phenix High Content Imaging Microscope (spinning-disc confocal)
- IntelliCyt iQue Screener PLUS High-Throughput FACS analyser
- PerkinElmer Envision Microplate Reader equipped with a variety of filters/mirrors to detect absorbance, fluorescence, luminescence and chemistries including Alphascreen®
- Inventia Life Science Rastrum and CellInk BioCellX 3D bioprinters
- Precision and bulk liquid dispensing robotics
- Contact-free liquid dispensing options
- Automated microplate washers
- Microplate humidified incubators
- All equipment housed in BSC cabinets and serviced with a 6-axis Denso robotic arm
- All instruments controlled with dynamic scheduling software
- Plate peelers/sealers and lid handlers to ensure sterility

New services in 2023 and beyond!

Non-contact liquid dispensing capabilities:
- Low volume (> 8nL) dispensing in microplates (Revvity FlexDrop iQ) – reagent minimisation

New 3D screening services:
- Phenomics Australia in vitro technology node
- Cellular models/organoids/tissues in Matrigel (96/384 well formats)
- CELLINK Bio CellX 3D biodispenser facilitating printing of other hydrogels
- Both approaches amenable for biochemical/phenotypic (imaging) readouts

Contact

T: +61 2 6125 4326
E: actd.brf@anu.edu.au
W: jcsmr.anu.edu.au/research/centres/actd

🐦 @ANU_Therapeutic

ANU Collections

ANU holds over 50 specialist research, teaching and heritage collections

These collections include Australian First Nations objects and cultural material, as well as cultural material from the Asia Pacific and Africa, artworks, antiquities, a herbarium, geological and archaeological samples, biological specimens, scientific instruments, mid-century furniture and a wood library (or Xylarium).

When curated and discoverable, the University's collections can be:

- Reimagined and actively built upon by researchers, students and communities to allow for complex, multidisciplinary research and teaching;
- Promote cross-College and cross-institution collaboration and engagement;
- Allow the ANU to connect to, and engage with, rich networks of researchers, alumni, donors, museums, galleries and communities around the world; and
- Present a tangible connection to the University's past – a window to explore and understand world-class research, teaching, design and innovation.

Since 2015, the ANU has been actively working to strengthen its capacity to curate, manage and make discoverable its diverse collections as research and teaching infrastructure, in line with industry best practice standards.

SERVICES

- Management and activation of the University's cultural and scientific collections and research material.
- Coordination of, and access to, the University's cultural and scientific physical collections for use in multidisciplinary research, object-based learning and teaching, and community engagement and repatriation.

Contact

E: collections.anu@anu.edu.au
W: anu.edu.au/research/research-infrastructure/anu-collections

Australasian Pollen and Spore Atlas (APSA)

The Australasian Pollen and Spore Atlas (APSA) is designed to enable free online access to the largest collection of pollen and spores in the Australasian region

The collection currently holds details on over 15,000 species of flowering plants. On this site you can filter or search all species, or browse by family and genus.

The APSA project has been funded through grants from the ARC e-Research Scheme, ARC Linkage Infrastructure, Equipment and Facilities, ARC Environmental Futures Network, and the Department of Archaeology and Natural History, College of Asia and the Pacific, ANU.

CAPABILITIES
The Atlas is a flexible and powerful knowledge management tool applicable to research development by a wide range of users — particularly those within palynology, palaeoecology, archaeology, biology, geology, and the airborne allergy fields. Through an open and free exchange of information we hope to encourage greater collaboration among researchers across a wide range of research areas, creating the potential for new and innovative research.

When curated and discoverable, the APSA collection can be:
- A catalyst for researchers, students and communities to allow for complex, multidisciplinary research and teaching;
- Promote cross-College and cross-institution collaboration and engagement;
- Present a tangible connection to the University's past – a window to explore and understand world-class research, teaching, design and innovation.

SERVICES
To make the APSA collection available to the widest range of people we have created a searchable database that is freely accessible over the web and suitable for use by professional as well as the amateur person interested in pollen and spore identification.

Contact

Prof Simon Haberle
E: simon.haberle@anu.edu.au
W: https://apsa.anu.edu.au
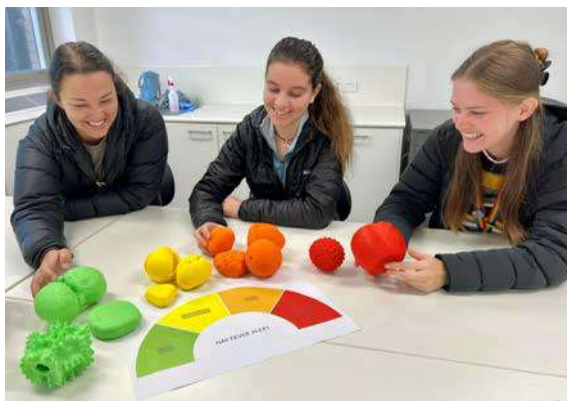
The Australian Data Archive (ADA) provides a national service for the preservation and dissemination of digital research data to facilitate secondary analysis by researchers

The ADA was established in 1981 at ANU. The archive is based in the ANU Centre for Social Research Methods (CSRM). The collection includes more than 6,000 datasets from more than 1,500 projects. Popular datasets include national cohort studies, social attitudes surveys, health studies, election and political studies as well as public opinion polls.

The ADA is also the project lead on three co-investment projects with the Australian Research Data Commons (ARDC). The projects aim to have more data reused and shared safely using tools to assist with curation and harmonisation of various social science datasets.

SERVICES
- Assistance with data and metadata curation;
- Secure file transfer and long-term storage;
- Data access management.

COST
The Archive is free for data users as well as data custodians looking to archive their data.

Contact

E: projects.ada@anu.edu.au
W: https://ada.edu.au/
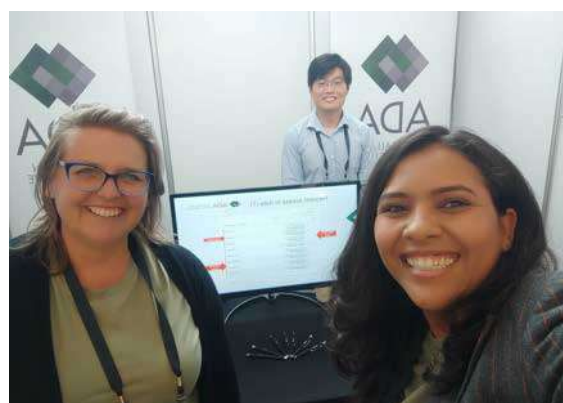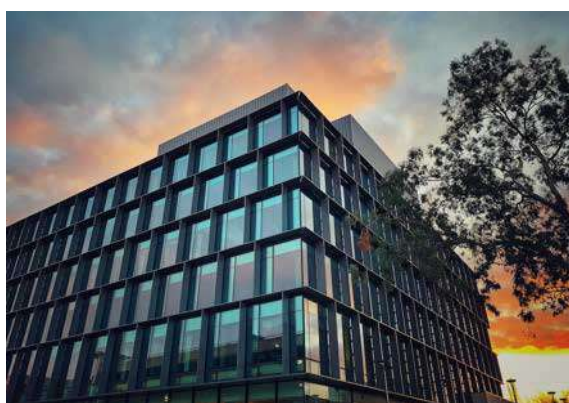
ACCESS-NRI provides open access and user support to world-class computer simulations of past and future climate, weather and Earth systems, specifically designed for the Southern Hemisphere

The Australian Earth System Simulator (ACCESS-NRI) is Australia's National Research Infrastructure for Earth system modelling, enabled by the Australian Government through the National Collaborative Research Infrastructure Strategy (NCRIS).

Our mission is to address the nation's research needs in weather, climate and Earth System simulation needed to navigate environmental change by:

- Fostering a collaborative, diverse, interdisciplinary and inclusive research community;
- Building, releasing and supporting cutting-edge modelling systems, software tools and data frameworks; and
- Transforming the quality, scale, significance, efficiency and relevance of Australia's weather, climate and Earth system science research.

SERVICES

We offer research software engineering expertise, user training and ACCESS Community support for all ACCESS-NRI supported model source code, configurations, data, tools and documentation.

WHAT WE DO

- Create and curate open-source software infrastructure in collaboration with Australian research communities;
- To build Australia's capability in climate science, observations and high performing computational modelling research;
- Support software, data and tools for the ACCESS community; and
- Develop transparent, quality-assured climate prediction systems and enhance current Australian climate modelling systems.
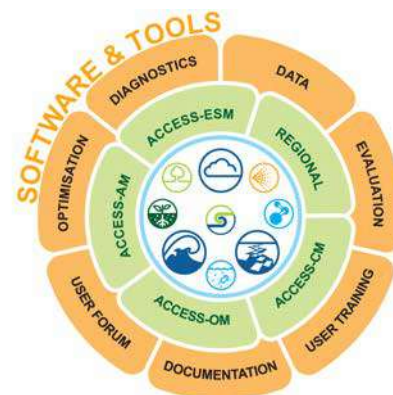
ACCESS

We are an open-source software infrastructure. There are two main ways to access our services:

1. Our user portal, the ACCESS-Hive: https://access-hive.org.au/
2. Join the community forum at https://forum.access-hive.org.au - This is a place for the ACCESS Community to come together, share information, have fruitful discussions, organise and plan shared activities.

Contact

E: access.nri@anu.edu.au
W: https://www.access-nri.org.au/

Australian Mountain Research Facility (AMRF)

Australia's high mountains are a vital environmental resource, providing critical water, clean energy, biodiversity, recreation, and educational opportunities. In the face of climate and land use change, AMRF

- Brings together leading institutions and researchers across ACT, NSW, TAS, VIC
- Produces world-leading ecosystem, evolutionary and biophysical science
- Supports research to assess the effects and extent of changing climate
- Examines the impact of water and fire regimes on ecosystem processes
- Informs adaptive management of Australia's high mountain regions
- Provides a structure for integrated research, management, and governance of Australia's mountains

CAPABILITIES

AMRF Consists of replicated sites spread across ACT, NSW, VIC and TAS. Sites are comprised of:

AMON

Australian Mountain Observation Network: sensor arrays to assess microclimatic conditions & detect species on the move.

Mountain Flows

Fresh water warming and flow regime experiment to monitor abiotic and biotic components of stream health.

DroughtNet

Link to international network to deliver data on impact of altered precipitation on vegetation growth community composition.

FutureClim

Climate control chambers for realistic, replicated, factorial field simulation of future warming & precipitation regimes.

REASONS TO WORK WITH US

- The replicated sites across Australian alpine ecosystems provide an opportunity to conduct interdisciplinary research
- State of the art facilities
- Interdisciplinary collaborations with strong links to industry and management stakeholders
- Network of world class researchers passionate about the Australian high country
- Live, open access data streams can inform studies on hydrology, ecology, and landscape scale modelling

Contact

E: AMRF@anu.edu.au
W: amrf.org.au

Australian National Fabrication Facility (ANFF)

The Australian National Fabrication Facility (ANFF) is funded by the Australian Government through the NCRIS program. The ANFF ACT Node is hosted by the Research School of Physics and provides open-access to micro- and nano-fabrication equipment and services to any researcher in the public, private and education sector. The available tools are invaluable in materials research and/or device fabrication requiring sub-micrometre feature size. Research carried out by some of our users covers areas like meta-optical devices, nanoscale lasers and detectors, silicon and perovskites photovoltaics, quantum computing and devices, resistive switching memories for neural networks, sensors and 2D materials.

Some of the state-of-the-art equipment hosted by ANFF ACT Node include:

- Metal organic chemical vapour deposition systems for the growth of III-V compound semiconductors
- High-throughput, large area electron beam lithography systems
- Nanoimprint and optical lithography systems
- Focussed ion beam
- Atomic layer deposition systems for metal oxides and nitrides
- Plasma etching and deposition tools
- DC/RF magnetron sputtering system
- Flip-chip and wire bonders
- Atomic force microscopy
- Cathodoluminescence and spectroscopic ellipsometer

SERVICES

If you have a project, come and talk to us. You can either be trained by our staff to use the equipment yourself or have your task completed via a fee-for-service agreement. ANFF helps to realize your research, development, and commercialization by providing low-barrier, open-access to world-class nanofabrication facilities.

Together with the affiliated research groups within the Research School of Physics, the ANFF ACT Node can also offer various structural, electrical and optical characterisation services such as high-resolution x-ray diffraction, time-resolved photoluminescence, Raman spectroscopy, deep level transient spectroscopy, Hall effect, photocurrent, and set-ups for lasers, LEDs, solar cells and photodetectors measurements.

COST

The ANFF reviews its Access & Pricing Policy each year. The cost for services varies depending on the scope of works. Details can be found on the Safety, Policy & Pricing page on our official website.

Contact

Dr Horst Punzmann
T: (02) 6125 0001
E: Horst.Puzmann@anu.edu.au
W: https://anff-act.anu.edu.au/

The Australian Passive Seismic Server (AusPass)

AusPass is a service dedicated to the acquisition, management, and distribution of passive seismic data. Extensive fieldwork projects are conducted throughout greater Australia typically organized in distinct arrays (i.e., groups of seismic stations) and often utilising ANSIR instrumentation. The list of open-access network arrays, as well as how to access them, is available at auspass.edu.au.

This project was enabled by AuScope and the Australian Government via the National Collaborative Research Infrastructure Strategy (NCRIS).

CAPABILITIES

AusPass is an initiative to provide access to passive seismic data collected in and around Australia, both on-shore and off. To facilitate knowledge, discovery, and innovation, AusPass uses and supports F.A.I.R. data principles. AusPass also adopts community agreed procedures, data formats, and protocols used by international seismic data centers such as:

- the International Federation of Digital Seismograph Networks (FDSN),
- the Incorporated Research Institutions in Seismology (IRIS),

The AusPass archive currently spans nearly three decades across 45 unique projects and 2000+ stations, a list of which are accessible from our web page or metadata archive. To date, over 22 Terabytes of seismic data have been made available and this grows at a rate of 3+ Gb per day. AusPass users are predominantly international (over 90%) and download as much as 10 Terabytes of data per month across hundreds of thousands of individual requests. The AusPass website also hosts data and codes from researchers here at the Research School of Earth Science at ANU.
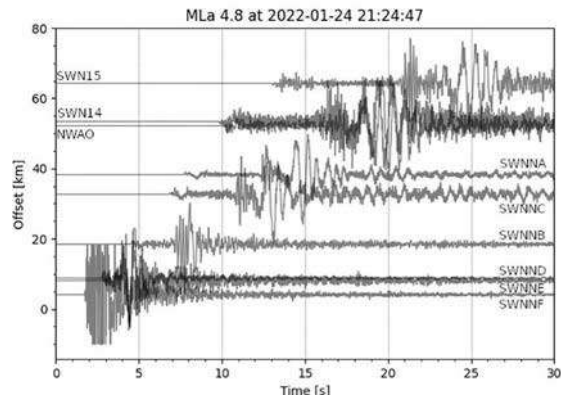
Magnitude 4.8 event in SW Australia captured by the temporary SWAN array in early 2022.

REASONS TO WORK WITH US

AusPass data can be accessed with our graphical interface or through a standard FDSN request. We mirror much of Geoscience Australia's national network seismic data and their global earthquake catalogue.

The AusPass website features an interactive map that allows users to search for networks or stations by type, as well as view the duration, location, and quality of the data available. New data are perpetually added, in addition to new archival data, so check back periodically for the latest updates. If you have seismic waveform data you'd like to host with us, please get in touch!

For any questions or comments contact our team via Email. We are eager to receive your feedback and improve our services.

Contact

T: 02 6125 1168
E: auspass@anu.edu.au.
W: auspass.edu.au

Australian Phenomics Facility (APF)

The Australian Phenomics Facility (APF) supports open access large-scale phenotyping of humans and mice to uncover the biological drivers in human disease

We specialise in the development, characterising and archiving of mouse models of human disease. We have an experienced genomics and bioinformatics capability, focused on the identification of single nucleotide polymorphisms and the phenotyping capability to make biological associations with probable human disease traits. Our goals are to first derive the underlying genetic mechanisms and then look to extend this across the population and better understand cohort differences and responses.

The facility was established in 2005 and receives funding from the Australian Government's NCRIS, Super Science and CRIS programmes through Phenomics Australia and contributions from ANU. We have an open access policy and support academic and corporate research programmes in Australia and internationally.

APF ANIMAL SERVICES
Animal Services at the APF offers a broad range of services to researchers. All services are compliant with relevant legislation including those governed by the Office of the Gene Technology Registrar (OGTR), Animal Ethics Committee (AEC), Department of Agriculture and other relevant legislative authorities.

The animal facility operates to best practice. We are committed to providing services of the highest quality across all capabilities, including:
- Animal housing (mice and rats)
- Breeding and supply of wild type and genetically modified rodent strains
- Exportation and importation of animals or cryopreserved lines
- Rederivation and reanimation of lines
- Embryo and sperm cryopreservation
- Technical assistance provision e.g. bleeding, weighing, phenotyping
- Training
- Consultation and planning

Please contact us for details regarding these services and cost.

LOCATION
Hugh Ennor Building, 117 Garran Road
The Australian National University
Canberra ACT 2601

Personnel must undergo a safety and compliance induction before access is granted. Access is tailored to suit individual needs and access will be restricted to those areas deemed essential only.

Contact

Dr Anna Acuna, Head of Animal Services
T: +61 2 6125 5529
E: anna.acuna@anu.edu.au
W: jcsmr.anu.edu.au/research/facilities/apf

Australian Plant Phenomics Facility (APPF)

The APPF is a world-leading research infrastructure facility offering researchers open access to end-to-end plant phenotyping solutions

The facility is a distributed network of research infrastructure platforms currently located across two nodes:
- The Plant Accelerator® (TPA) at the University of Adelaide
- Research School of Biology, ANU

The APPF is supported by NCRIS and contributions from ANU and the University of Adelaide.

APPF-ANU

The APPF node at ANU has a range of highly controlled plant growth facilities, equipment for measuring plant physiological traits (such as gas exchange and chlorophyll fluorescence) and cutting-edge tools for characterizing 3D plant architecture and hyperspectral signatures that can be linked to biochemical, physiological and physical leaf traits.

At APPF-ANU, we can help with project design and provide support for data management and data analysis for projects that use our facilities.

We provide the only quarantine approved growth cabinets in Canberra for research purposes.

Our shipping container-based Growth Capsule systems support dynamic multispectral LED lighting and high-precision environmental controls for growing wheat and other tall crops in high light environments.

The APPF ANU node is a leader in the development of systems for visualising phenomics and environmental sensing data and point clouds in virtual and augmented reality (VR and AR).

CAPABILITIES AND SERVICES
- **On-site phenomics and plant growth services:** NextGen growth and phenotyping facilities for Australian and international researchers including greenhouses and growth chambers with time-lapse imaging;
- **Genomics and bioinformatics, study design and data analysis support**: Analysis of phenotypic and genomics data and the opportunity to collaborate with world-class researchers in genomics, photosynthesis and bioinformatics;
- **Development and streamlining** of cross-scale approaches in monitoring for scaling from lab to field, chamber to crop, and forest;
- **Research and development** of open-source hardware and software pipelines and visualization tools for enabling lower cost high through-put phenotyping (HTP) and environmental monitoring;
- **Collaborative, cross-disciplinary approach** to tackling the grand challenges associated with HTP and environmental monitoring.

COST

Please contact us for services and cost. Pricing is available for ANU users, academic (other universities) and industry users. Rates for APPF instrument hire start from $15 per day. Weekly and monthly rates are available for our chambers and capsules from $33 per week/$132 per month.

Contact

E: appf@anu.edu.au
W: www.plantphenomics.org.au

Australian Seismometers in Schools (AUSIS) Network

The AUSIS network is an innovative outreach initiative aimed at introducing earthquake-measuring seismometers to Australian schools. Our mission is to cultivate an interest in geoscience by allowing students to witness the dynamic Earth in action.

AuSIS aspires to:
· **Heighten Community Earthquake Awareness**: We're here to inform and engage communities about regional earthquakes, fostering an understanding of these natural phenomena;
· **Spotlight Seismology and Geoscience**: We aim to shed light on the fascinating world of seismology and geoscience, encouraging students to explore these fields;
· **Inspire Science as a Career Path**: Through hands-on experiences, we hope to spark a passion for science among students; and
· **Empower Educators with Powerful Tools**: We equip teachers with a valuable resource to enrich their physics and earth science instruction.

Australian Earthquakes 1955-2023
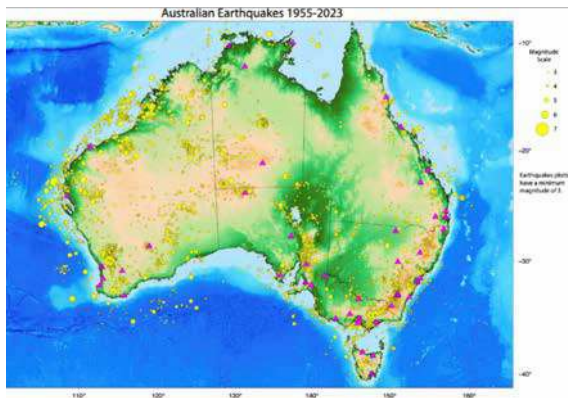
CAPABILITIES
Our AuSIS team deploys state-of-the-art seismometers in Australian schools, alongside valuable teaching resources. This empowers every educational institution across the country with unprecedented access to real-time earthquake data.

SERVICES
Thanks to the AuSIS network, we offer researchers access to top-tier seismic data via the AusPass server, which can be found at auspass.edu.au

We're more than just data providers. We're educators too. We craft educational materials designed to aid teachers in the creation of engaging lesson plans.

REASONS TO WORK WITH US
- Our team is passionately dedicated to the fields of seismology and educational resource development.
- Become a part of an expanding national network that's driving cutting-edge research and igniting the curiosity of future geoscientists. When you collaborate with us, you're connected to a dynamic community with a shared vision for progress.
- We take pride in our commitment to innovation and education. As proof of our dedication, we are honoured to have received the prestigious Shell Australian Innovation Award for Education.

Contact

Dr Michelle Salmon
T: 02 6125 1168
E: sis@anu.edu.au
W: ausis.edu.au

Biopolymer and Polymer Facility (BPF)

The Biopolymer and Polymer Facility (BPF) is located in the Chemical Biology division of the Research School of Chemistry (RSC). This facility allows the large scale production of recombinant proteins and synthetic polymers and their characterization. The facility has a dedicated Technical Officer that manages and maintains all equipment and trains new users.

The facility houses comprehensive equipment for small, medium and large-scale protein production using in vivo expression and cell-free (in vitro) protein synthesis, as well as instrumentation for sample preparation and storage of biomolecules for structural studies. The facility further complements other analytical facilities in RSC, such as the Joint Mass Spectrometry Facility (JMSF) and the Magnetic Resonance Facility (MRF), which house state-of-the-art instrumentation for (bio-)polymer characterization.

CAPABILITIES

The equipment housed within the BPF allows both protein production and protein characterization.

Protein production

- Large scale recombinant protein expression: 20L Sartorius Biostat C Plus fermenter
- Medium scale protein production: 1.5L and 3.6L INFORS HT fermenters and New Brunswick shaker-incubators
- Small scale 96-well high throughput protein production: Heidolf and Ohaus microplate format incubators
- Post-express cell harvesting: large-volume Beckman centrifuges and bench mounted 96-well plate Eppendorf and Sigma centrifuges
- Cell lysis: Emulsiflex homogenisers (C5 and B15), Omni sonicator, and French press.
- Protein purification: 7 GE/Cytiva FPLC systems
- Biotage Initiator+ Alstra peptide synthesizer

Protein Characterization

- Formulatrix microfluidics protein crystallization facility
- Chirascan CD spectrophotometer
- DAWN Multi Angle Laser Light Scattering
- UV/Vis and fluorescence spectroscopy
- Absorption and fluorescence 96-well plate readers
- Nano ITC (TA instruments)

REASONS TO WORK WITH US

- Protein expression and purification from sub-microgram to gram scale
- In-cell and cell-free protein synthesis
- Production of proteins with non-canonical amino acids
- Isotope labelling of proteins and conjugation
- Size, shape and functional characterization of (bio-)polymers

Contact

Dr Eiri Heyno
E: eiri.heyno@anu.edu.au
W: chemistry.anu.edu.au/bpf

Biomolecular Resource Facility (BRF)

Established in 1988, the Biomolecular Resource Facility (BRF) is a service node of NCRIS Bioplatforms Australia

Our facility remains at the forefront of technology services, with significant expertise in Next Generation DNA (NGS) & RNA sequencing, hosting a comprehensive fleet of cutting-edge instruments and a team of specialists providing high quality services for academic researchers and industry clients.

WE OFFER

- A wide-range of standard and specialised experimental approaches and services
- Specialist technical staff with high-level expertise
- Consultation and collaboration with clients for experimental design
- Training and support for self-use equipment

SERVICES

Genome library preparation and DNA sequencing services:

- High accuracy DNA sequencing for *de novo* assembly
- High-throughput resequencing
- Detection of base modifications in DNA
- Large 100kb read lengths for contig assembly
- Plasmid sequencing
- Spatial 3D genome structure and organisation projects utilising Hi-C protocols
- Automated high-throughput genotype by amplicon sequencing service

RNA library preparation and sequencing services:

- Bulk RNA sequencing
- Small RNA and long-read sequencing
- Native RNA sequencing for methylation analysis
- Single-cell sequencing (scRNAseq; facility-made libraries):
  » scRNAseq for transcriptomics, immune profiling, barcoding, fixed RNA profiling and full-length transcripts (coming late 2024)
  » scRNAseq is amenable for mouse and human cells (fresh, fixed cells and protoplasts)

Our fleet of cutting-edge sequencers enable sequencing at the length, depth and quality required for your specific application and needs. These include:

- Short-read NGS: Illumina NovaSeq X plus, NovaSeq 6000, NextSeq2000 and MiSeq
- Long-read NGS: PacBio Revio (shared with CSIRO), Oxford Nanopore PromethION, Oxford Nanopore MinION
- Sanger Sequencing: Life Technologies ABI3730xl
- Single Cell Genomics: Chromium iX

We also have a large array of equipment available for users to access directly which facilitate a variety of applications, including instruments for measuring quantity and quality of nucleic acids; fragmenting DNA; quantitative and digital PCR instrumentation; and protein imaging equipment.

We also offer new services in the facility, including:

- **Spatial Transcriptomics** (Vizgen MERSCOPE, in conjunction with the ANU Cytometry, Histology and Spatial Multiomics (CHaSM) facility), providing high-throughput genomic profiling of >100K cells in histology sectioned tissue slides, with up to 500 genes which can be multiplexed in a single sample, and high resolution imaging for capturing RNA transcripts.
- **ANU Nanobody Facility**, enabling monoclonal nanobody generation, selection, and characterisation to produce antibodies against specific targets, for an array of innovative research and therapeutic discovery applications.
- **Highly Multiplexed Amplicon Service**, enabling the generation of highly multiplexed amplicon libraries (using our Echo 525 Liquid Handler), with up to 4000 individual amplicons able to be pooled per library which can be run in a single Illumina MiSeq run. Please chat to our team for how we can assist with developing an approach customised for your application.

ACCESS AND COST

- **Use of shared equipment and project consultancy**: Free to ANU staff/students and external users.
- **Service provision and consumables:** Charges apply to ANU staff/students and external suers
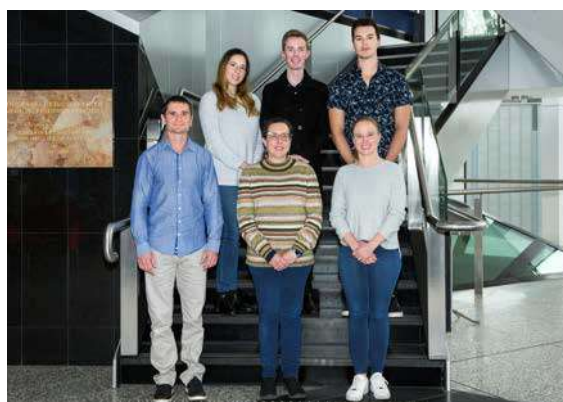
Please contact us for pricing enquiries.

Contact

T: +61 2 6125 4326
E: brf@anu.edu.au
W: jcsmr.anu.edu.au/research/facilities/brf

🐦 @ANUbiomolecular

Centre for Advanced Microscopy (CAM)

The Centre for Advanced Microscopy (CAM) provides open-access, state-of-the-art microscopy and microanalysis equipment and expertise to national and international researchers and industry partners in the materials and life sciences

Built around staff expertise in various disciplines, this ANU central facility manages three essential roles within the research community:

1. Research, Training and Teaching Facility: CAM staff provide the interface between advanced instrumentation and leading researchers, fostering interdisciplinary, cross-school research activities. Our service is delivered via a collaborative or a fee-for-service approach. Users gain theoretical and practical knowledge in microscopy and microanalysis via CAM workshops and through one-on-one instrument training. CAM staff also teach into various disciplines of the ANU's undergraduate and graduate program.

2. Novel Instrument Incubator: extends the ANU engagement beyond a research service unit to facilitate instrument development and translation, leveraging the CAM staff expertise in championing new technologies and methodologies with the ANU materials and biological research strengths.

3. Industry support: CAM supports industry clients across a broad range of sciences and engineering, providing expert advice for study design and technical guidance, professional analytical services by expert operators with a fast turn-around time and data collection, analysis and reporting via a fee-for-service model.

CAM and the National Laboratory for X-ray Micro Computed Tomography (CTLab) constitute the ANU Advanced Imaging Precinct (AIP). The AIP is part of Microscopy Australia (MA), a national network of Australian microscopy facilities, supported by the Australian Government through NCRIS.

CAM instrumentation and expertise include:
- Basic and advanced light and electron microscopy in the materials and life sciences including sample preparation (cryo and ambient temperatures);
- Qualitative and quantitative microanalysis for geological, metallurgical and materials science applications;
- Morphological, topological and structural analysis (crystalline, amorphous), particle size distribution, grain orientation;
- Data processing and analysis.

ACCESS AND COST

CAM's microscopes can be accessed through these steps:
1. attend an occupational health and safety induction;
2. register your details in CAM's online booking system; and
3. meet with CAM staff to discuss your project requirements.

CAM staff will induct new users on instrument operation and provide assistance as needed. Please visit our website or contact CAM staff to discuss potential collaborative rates and subscriptions.
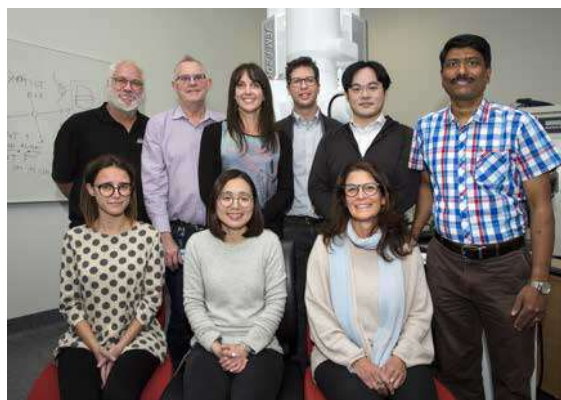
Contact

T: 02 6125 3543
E: microscopy@anu.edu.au
W: microscopy.anu.edu.au/facilities/equipment

Cytometry, Histology and Spatial MultiOmics (CHaSM) Facility

The CHaSM Facility offers cutting edge instrumentation and expertise in high dimensional flow cytometry cell analysis, cell sorting, Histology, Automated Immunochemistry and Spatial Multiomics services

The facility has been providing exceptional quality services for over four decades to all researchers across the Canberra region by enabling access to our suite of advanced instruments and the expertise of our friendly staff.

SERVICES

Cell Characterization by Cytometry
- Fluorescence Activated Cell Sorting: High speed cell sorting of samples with up to 16 fluorescent markers, allowing simultaneous sorting of up to four populations or single cell deposition.
- Cell analysis: Spectral and conventional flow cytometry analysis (up to 40 parameters) available through our six analyzers.
- Imaging flow cytometry

Histology and Automated stains
- Tissue processing, embedding, sectioning and staining of formalin fixed paraffin embedded samples
- IHC and multiplex antibody staining using the Leica Bond RX staining platform
- Cryo-sectioning of fresh frozen tissues
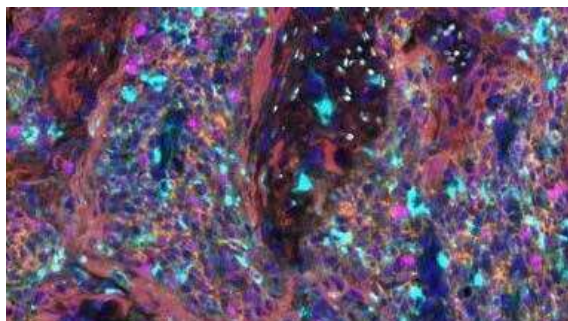
Spatial MultiOmics
- Single-cell spatial proteomic data providing comprehensive insight into tissue biology and the discovery of novel biomarker signatures. This imaging based method allows large-scale analysis of over 100 proteins and their localization/dynamics within tissue at single-cell resolution. (Phenocycler Fusion, Akoya Biosciences)
- Using the Vizgen Merscope platform, this service allows for in situ single-cell spatial genomics to directly map and quantify the spatial distribution of hundreds to tens of thousands of RNA species in individual cells, without the need for downstream sequencing.

Miscellaneous
- Nanoparticle Tracking analyzer, blood analyzer, metabolic analyzer (Sea Horse), wide-field fluorescence, and confocal microscopy.

ACCESS AND COST
- CHaSM is a fee-for-service facility available to all, including clients external to the ANU and commercial clients.
- Free consultations are offered for experiment plan and analysis.

Contact

Dr Harpreet Vohra
T: +61 2 612 53694
E: harpreet.vohra@anu.edu.au
W: https://jcsmr.anu.edu.au/

Distributed Energy Resources Laboratory (DERlab)

The Distributed Energy Resources Laboratory (DERlab) is a state-of-the-art facility to study, develop, prototype, test, and verify the DER technologies and devices, and their integration into the power and distribution systems.

Renewable resources now account for over 30% of electricity generation in Australia, and their share is rapidly growing. This growth has led to an increasing penetration of distributed generation (mostly rooftop solar) and a fast transition towards a decentralised distribution network.

The DERlab aims to support Australian universities and the industry sector in engaging with and responding to these rapid changes and their impact on the distribution network. The lab specialises in building setups and solutions for a range of applications including DER device and software testing, comparison and certification against Australian and international standards, power hardware in the loop, real-time simulation, and more. Our potential customers and users include software and device developers, electricity network operators, electricity and energy policymakers, market regulators, university conveners, students and researchers.

ACCESS & COST

- ANU researchers can use the facility potentially free of charge under an ANU program or course.
- For external researchers and industry partners, the lab charges a fee for services and use of equipment.
- The lab can also engage in a research agreement for broader collaborations.
- The lab grants the user physical access to the facility if required. However, it's primarily designed for remote user activities.

CAPABILITIES

The lab offers the following components and systems to users which can be combined in different loops to create the desirable test scenario:

- DER devices such as PV inverters, hybrid inverters and battery storage systems
- PV arrays on the rooftop as well as one PV simulator
- Grid simulator and amplifier capable of creating arbitrary grid and fault scenarios
- EV charger station including standard and bi-directional chargers
- Precise measuring instruments and energy monitoring devices with ultra-fast sampling rates to acquire, record, process, and compare electrical data
- Microgrid system capable of operating island or grid modes
- Real-time simulators (RTS) including Opal-RT, Typhoon and dSpace Microlab units
- On-load tap changer transformer (OLTC)
- Safe power distribution system and connection points representing average household customers
- Sophisticated computer programs and graphical interfaces
- Desks and computers for students and researchers

Contact

Mehdi Nikpendar, DERlab manager
E: Mehdi.nikpendar@anu.edu.au
W: https://der-lab.net.au/

EcoGenomics and BioInformatics Laboratory (EBL)

The EcoGenomics and BioInformatics Lab (EBL) is a shared multi-user state of the art laboratory environment designed specifically for the preparation of sample libraries for genome sequencing.

Based in the Research School of Biology, the EBL is a joint initiative of ANU and CSIRO that seeks to support training, collaboration and cross-pollination of research.

The EBL lab provides both access to the specialised lab instrumentation necessary and also, importantly, an opportunity to interact in a hands-on manner with others (likely from outside their research area) carrying out similar techniques in both the wet-lab, as well as computational biologists located in the EBL. In addition, the EBL also provides training opportunities for both molecular procedures as well as computational analysis.

Once inducted to the EBL, users can book lab bench space for as short or long a time as is necessary to complete their libraries to the point of sequencing. Individual benches are equipped with the basic requirements (pipettes, racks, etc), and extensive specialised lab instrumentation and robotic automation equipment is available to all users. Support and training is available for those instruments and to users who are less experienced in genomic libraries.

In addition to the large main genomics lab, the EBL lab comprises a dedicated DNA free room, under positive air pressure and with dedicated equipment and UV hoods etc, for setting up reactions and preparing adapters etc. In addition, there is a Trace DNA lab for handling samples that are highly degraded and of low concentration, such as ancient or museum speciments. Access to the Trace DNA lab is closely controlled.

The EBL complements the capacity of the ANU Biomolecular Resources Facility (BRF, JCSMR), which provides the high-throughput sequencing capacity.

ACCESS & COST

EBL Lab induction required. Experience in molecular lab skills expected. Appropriate compliance with home institution's training requirements eg ANU Biological Safety Course is required.

There is currently no cost to access the EBL lab facility or equipment per se, though there is a charge to cover basic consumable use. Some additional reagents (or aliquots thereof) are available for purchase at reimbursement cost. Contact us for more details.

Contact

Niccy Aitken, Facility Manager
T: +61 2 6125 4248
E: ebl@anu.edu.au

🐦 @EBL_ANU

Fenner School of Environment & Society Labs

The Fenner School Labs specialise in analysing environmental samples, including soils, waters, flora and fauna.

The School has a range of analytical capacities, consolidated into separate laboratories. The individual lab facilities within the School include:

- the **Wet Chemistry Lab**, where samples are digested, extracted and chemically analysed;
- the **Dry Lab**, where soils and 'dirty' samples are processed;
- the **Dendrochronology Lab**, where tree-ring and invertebrate analyses occur;
- the **Genetics Lab**, where DNA is extracted from floral, faunal and soil samples;
- the **Teaching Laboratory**, where demonstrations and space-intensive experiments can be performed; and
- the **Grinding Lab**, where grinding and sieving of plants and soils occurs.

REASONS TO WORK WITH US

We specialise in a range of environmental samples, including large and 'dirty' media like soils and agricultural samples that other labs cannot accommodate.

- Working with soils, we perform nutrient analyses, physical characterisations and genetic work on soils.
- Field-based science that supports researchers and students with field sampling across a range of rugged terrain.
- Conservation work is supported by the Fenner School Labs. Genetic sequencing of floral, faunal, scat and other biological samples facilitates conservation works in a range of species including bettongs, quolls, elephants, curlews, snow gums, mountain ash, honey eaters, spiders and more.
- Dendrochronology and wood sciences with expertise, equipment and reference collections, including a xylarium.
- Agricultural research on crop and soil samples, which are commonly too voluminous or dirty for other laboratories

CAPABILITIES

- The **Wet Chemistry Lab** is where hazardous chemicals are used. Key equipment includes a plate spectrometer, a continuous flow analyser spectrometer, a CNS combustion analyser, a microwave digestor, fume cupboards, centrifuges and shakers, assorted probes (pH, EC, redox, ion-specific, etc).

- The **Dry Lab** is where many soils samples are processed. Ovens, desiccators and balances facilitate a range of common physical soil analyses, including bulk density, slaking, sodicity, particle size classing, and more. Particle size distributions can also be determined using a Mastersizer laser ablation instrument.

- The **Dendrochronology Lab** is used for dendro-microscopy and the analysis of tree-rings and plant structure. Invertebrate work is also undertaken in this facility, including olfactory behavioural experiments and native bee observations.

- The **Genetics Lab** is used for the extraction of DNA and other genetic information. Key equipment in this facility includes biological containment cabinets, centrifuges, PCR equipment, tissue lysers, ultra-low temperature freezer. The genetics labs are split over three rooms, demarcated by post- and pre-PCR workflows to ensure reduced DNA cross-contamination.

- The **Teaching Lab** is used for undergraduate teaching and research that requires significant bench-space. Class-sets of soils, rocks and mineral samples are housed in this lab, along with a collection of stereo and compound microscopes.

- The **Grinding Lab** is used for activities that generate significant dust and particulate material. This facility houses a jaw crusher, puck mill, rotational grinders (including cyclotecs), mortars and pestles, nested sieves consistent with a range of classification systems, wet and dry sieve shakers, muffle furnace, and numerous ovens

Contact

Dr James Latimer - chemical analyses and Dr Linda Neaves - genetic analyses

E: james.latimer@anu.edu.au
   linda.neaves@anu.edu.au

W: fennerschool.anu.edu.au

Health Data Analytics Team (HDAT)

The Health Data Analytics Team (HDAT) is responding to government needs for data analysis and insights to improve population health and strengthen health systems.

HDAT is an ANU College of Health and Medicine entity created to make a significant contribution to the University's nation-building tradition through impactful research in partnership with public service departments and other organisations operating in the areas of health policy and service delivery.

HDAT is a research, analytics and policy collaborative committed to:
- Respond to data analytic needs and generate timely evidence when engaging with Commonwealth, state and territory policy departments.
- Undertake research and data analysis.
- Enhance data access and data governance.
- Strengthen partnerships between the College and public service departments and agencies.

HDAT will work closely with research teams within the College of Health and Medicine, including the recently established National Centre for Health Workforce Studies (NCHWS), and more broadly across ANU. HDAT also proactively engages with Australian Public Service departments, jurisdictional health departments, international organisations, and not-for-profit organisations.

SERVICES
- Assistance with understanding data access processes;
- Improving data access through partnership building;
- Exploring a range of emerging and evolving data initiatives; and,
- Undertaking analysis of existing data assets (for example, administrative, census, registry, clinical, environmental, survey and linked data) with practical policy and programmatic impacts.

Contact

Associate Professor Tomoko Sugiura
T: +61 2 6125 4127
E: tomoko.sugiura@anu.edu.au
W: nceph.anu.edu.au/research/centres-departments/health-data-analytics-team

Heavy Ion Accelerators (HIA)

World-leading accelerators for Australian science and industry

The capabilities of the Heavy Ion Accelerators (HIA) network are unique in Australia and rare in the world. HIA enables researchers to build our fundamental understanding of nuclear physics, develop new medical treatments and tools to fight cancer, build advanced quantum computing technologies, monitor and protect our environment, even test equipment destined for space – and that's just the beginning.

Understanding the structure of matter and how it behaves is at the heart of what we do at HIA. That knowledge is vital for developing many unique, cutting-edge technologies and applications:

- We can test whether **spacecraft are ready** for the harsh conditions of space and build our understanding of space weather and environmental conditions
- **New cancer therapies** such as accelerated proton beams require an in-depth understanding of how radiation impacts human body cells and how detector technologies work
- **Environmental radiation monitoring** technologies can help stop soil erosion, make sure bush foods are safe to eat, and protect our precious Great Barrier Reef from the impacts of sediment run-off
- We can make **advanced materials and sensors** for quantum computers, solar cells, electronics and more by using carefully-controlled ion beams to modify and fabricate materials.

The HIA network, funded by NCRIS, spans three nodes: two at ANU and one at the University of Melbourne, all with distinct yet complementary research and application functions.

Heavy Ion Accelerator Facility (HIAF):
- Operates the highest energy ion accelerator in Australia and one of the highest voltage accelerators in the world.
- Enables world-leading nuclear, quantum, and materials research, and cutting-edge ultraprecision atom counting for climate and environmental research.
- A unique national resource for nuclear science teaching and training for government policymakers, nuclear medicine and industry.
- Applications in cancer therapies, agriculture, environment and climate research, semiconductors, spacecraft and satellites, and advanced materials fabrication.

Australian Facility for Advanced Ion Implantation Research (AFAiiR):
- Operates a coordinated suite of small accelerators for physics, engineering and materials science research.
- Applications in microelectronics, photonics, nanotechnology, photovoltaics and quantum devices.
- Unique ion-implantation capabilities for a broad national and international user base.

The Experimental Condensed Matter Physics Laboratory (ECMP): University of Melbourne:
- Operates a nuclear ion microprobe, for state-of the-art imaging and microanalysis.
- Applications in quantum atom manipulation, nanofabrication, minerals and mining exploration.
- National and international linkages include two ARC Centres of Excellence.

Contact

Dr Tom McGoram
T: +61 2 6125 7358
E: thomas.mcgoram@anu.edu.au
W: https://accelerators.org.au

Joint Mass Spectrometry Facility (JMSF)

The Joint Mass Spectrometry Facility (JMSF) was established in 2016 by the Research School of Chemistry and Research School of Biology to consolidate and grow mass spectrometry capabilities at the ANU.

In partnership with the CSIRO Black Mountain campus, the JMSF is supporting research in the greater Canberra region as an important aspect of the Science and Industry Endowment Fund (SIEF) supported Analytical Precinct.

The JMSF is focusing on three main application areas using a variety of mass spectrometry instruments. These application areas include:
- Metabolomics and absolute small molecule target quantitation
- Proteomics and intact protein structure analysis (native and non-native)
- Synthetic (single) molecule structural

CAPABILITIES
The JMSF is ANU's core facility for the mass-spectrometric analysis of organic and organometallic chemicals, large and small, of biological and synthetic origin.

Using a suite of complementary world-class liquid- and gas-chromatography / mass spectrometry instruments, together with advanced sample preparation robotics, powerful computers and software (including commercial, open-source and in-house-written software), the JMSF supports a diverse array of research areas spanning chemistry, biology, medicine, physics, geochemistry, archaeology, and other fields.

SERVICES
The JMSF offers mass spectrometry facilities, services and training to all academic, government and commercial researchers across Australia.

REASONS TO WORK WITH US
- Diverse instrumentation and expertise for high analytical coverage of chemical space
- Strong expertise in chemistry, biology, data analysis, computer programming, robotics and fabrication
- Extensive method development experience from experimental design through sample preparation, data acquisition and data analysis – the JMSF team loves developing innovative solutions to research problems
- Excellent training: you don't need mass spectrometry experience to use the JMSF – we're passionate about transforming beginners into competent and independent users of mass spectrometry
- Open for business: anyone can use the JMSF – whether you are based inside or outside the ANU, from academia, government or industry
- Outstanding value for money: very low user fees for ANU and CSIRO researchers. Competitive rates for external organisations

Contact

Dr Adam Carroll
T: 02 6125 7969
E: contact.jmsf@anu.edu.au
W: chemistry.anu.edu.au/jmsf

Laser and Spectrophotometer Facility (LSF)

The Laser and Spectrophotometer Facility (LSF) is a delocalized multiuser/multiplatform facility, with many different kinds of lasers and various spectrophotometers distributed throughout the Research School of Chemistry. It provides expert technical support for the School's catalogue of specialized laser and analytical instrumentation, including a femtosecond laser and high-power pulsed lasers, which are used primarily for the preparation and characterization of functional materials

CAPABILITIES

The lasers that the facility houses include:

- Femtosecond (fs) pulsed laser system (wavelength tuning range from 290 nm to 2600 nm).
- Nanosecond (ns) pulsed laser system (wavelength tuning range from 450 nm to 2100 nm).
- Nanosecond (ns) pulsed lasers (wavelengths 1064 nm, 532 nm and 355 nm).
- Continuous wave (CW) lasers (wavelengths 1064 nm, 532 nm or 375 nm).
- High-energy excimer laser (wavelength 248 nm).

The spectrophotometers that the facility houses include:

- PerkinElmer Lambda 465 UV-VIS Spectrophotometer with diffuse reflectance accessory (DRA)
- Agilent Cary 60 UV-VIS Spectrophotometer
- PerkinElmer Frontier FTIR/MIR-FIR, FTIR/MIR NIR, Spectrum 2 FTIR
- Bruker Alpha II FTIR , Bruker Vertex 80V FTIR
- Various Spex monochromators
- Various OceanOptics spectrometers

The lasers and spectrophotometers are widely used for research projects, for analytical measurements, for photo-induced reactions/synthesis, for material properties investigations and composition identification, and for industrial applications

REASONS TO WORK WITH US

The Laser and Spectrophotometer Facility consists of both unique and routine equipment:

- in the former category, the femtosecond laser system has been interfaced to electrochemistry equipment, providing a capability for assessing nonlinear optical properties of materials across accessible oxidation states that is unique worldwide.
- in the latter category, a range of routine spectrometers provide facile access to vibrational and electronic spectra of molecules and solid-state materials.

SERVICES

A dedicated expert staff member is available on a contract basis to advise with complex problem solving, to assist in reconfiguration of equipment and the construction of new experiments, and to obtain routine data for external users.
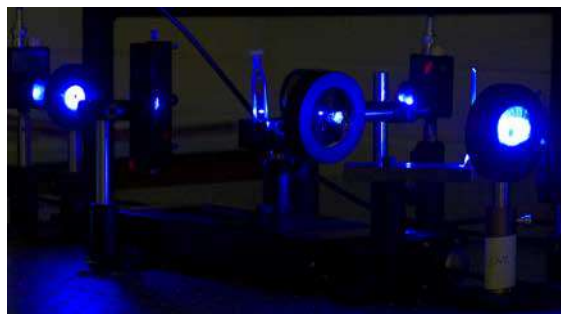
Contact

Dr Genmiao Wang
T: 02 6125 3712
E: genmiao.wang@anu.edu.au
W: chemistry.anu.edu.au/lsf

Magnetic Resonance Facility (MRF)

The Magnetic Resonance Facility (MRF) is based at the Research School of Chemistry (RSC) and caters for both Nuclear Magnetic Resonance (NMR) and Electron Paramagnetic Resonance (EPR). Magnetic Resonance has applications in all fields of the experimental sciences; it is the single most powerful method available to chemists for studying the composition, structure and function of molecules. It has many important applications in biological and material sciences including, but not limited to, small to macro- molecular chemistry, surface science, catalysis, photochemistry, medicine and physics. The MRF caters for researchers from the RSC as well as other ANU Schools and Colleges; external users are also most welcome.

CAPABILITIES
The NMR Centre at ANU is one of the most advanced in Australia, catering for over 100 staff and students across the RSC and ANU. ANU was a joint recipient of an Australian Research Council grant for the purchase of an 800 MHz NMR spectrometer and cryoprobe. The Centre has six NMR spectrometers with field strengths from 9.4 to 18.8 Tesla, equipped with a variety of probes including two H/C/N cryoprobes, and several broad-band H/X probes able to observe a wide range of hetero-nuclei. They are used for structural elucidation, identification, quantitation, and the study of dynamics and kinetics. Also catering for solids, the facility has very fast Magic Angle Spinning (MAS) probes at 150 KHz (0.5 mm, H/C/N, 18.8 Tesla) and 60 KHz (1.2 mm, H/X/Y, 16.5 Tesla).

The EPR Centre at ANU is Australia's premier facility, hosting the only High-Field EPR instrument in the Southern Hemisphere. It contains three instruments operating at X (9 GHz), Q (34 GHz) and W (94 GHz) bands with field strengths of 0.3 to 6 Tesla. The facility is available to all researchers across Australia and New Zealand, and the Asia Pacific. It allows for continuous wave, pulsed, transient measurements, in situ electrochemistry, in situ gas exchange and in situ light (Solar, UV, LED, laser) excitation. Low temperature measurements from 3.8 K to room temperature are supported. The facility has been developed with the support of the Australian Research Council and the Max Planck Institute of Chemical Energy Conversion

REASONS TO WORK WITH US
- World-class instrumentation and expertise
- Excellent training – you don't need experience in magnetic reonance to use the MRF – we're passionate about transforming beginners into competent and independent users
- Extensive method development. For example, RSC researchers are developing new methods for the site-specific analysis of protein structure and the responses of proteins to ligand binding, such as protein–protein, protein–DNA and protein–drug complexes. This has applications in biotechnology, such as the analysis of drug binding to the SARS-CoV2 main protease
- Open for business: anyone can use the MRF – whether you are based inside or outside the ANU, from academia, government or industry
- Outstanding value for money: very low user fees for ANU and CSIRO researchers. Competitive rates for external organisations.

Contact

Dr Doug Lawes
T: 02 6125 8074
E: douglas.lawes@anu.edu.au
W: chemistry.anu.edu.au/nmr

National Computational Infrastructure (NCI)

NCI Australia enables transformative science through big data and computing technologies, platforms and expertise

NCI is Australia's leading high-performance data, storage and computing organisation, providing expert services to benefit all domains of science, government and industry. Based in ANU, the facility brings together the Australian government, universities, national science agencies and industries.

Services

NCI provides access to computing, data, and virtual environments through schemes allowing access to researchers from many different institutional and discipline backgrounds. Among the services NCI offer include:

- Supercomputing
- Data Services
- Data Collections Management
- Virtual Research Environments
- Data Storage
- Visualisation
- HPC Optimisation

USER ACCESS

NCI offers a range of methods for users to access its systems and services, including:

- **Access schemes:** Offering a variety of access schemes that accommodates to the researchers' needs;
- **Collaborating organisations:** Around 75% of NCI's HPC resources are reserved for researchers at our collaborating organisations;
- **NCI Flagship Allocation Scheme:** Providing access to HPC, data-intensive and storage services at NCI for projects identified by the NCI Board as being of high-impact or national strategic importance;
- **Virtual Research Environments:** Bringing together communities of researchers across multiple organisations to enhance collaboration on national and international science priorities;
- **Data Services:** Allowing users, data portals and external science cloud environments to access, interact with and extract value from our data collections;
- **Data Collections:** NCI provides the research community vast, publicly funded data collections co-located alongside petascale supercomputing facilities; and
- Commercial and Industry Access.

Contact

T: 02 6125 9800
E: help@nci.org.au
W: nci.org.au

National Laboratory for X-ray Micro Computed Tomography (CTLab)

The National Laboratory for X-ray Micro Computed Tomography (CTLab) is a world-leading Micro-CT imaging, reconstruction and visualization facility in the Research School of Physics at ANU

CTLab exists to make cutting-edge X-ray computed tomography (CT) available to researchers across all possible applications. We operate as an open-access facility and take on a broad range of work, from small student projects, to large research collaborations, and major industrial projects. CTLab aims to: 'Enable world-class ground-breaking research by supporting academic and commercial activity that maximizes positive global impacts.'

CAPABILITIES
At CTLab we use X-rays to probe, analyze and reconstruct the 3D structure of materials, with resolutions as fine as 1 micron.

Our CT instruments collect thousands of 2D projection images from various angles and then reconstruct them into detailed 3D structure maps. Materials that can be studied in this way include (but are not limited to); rocks, soil, minerals, 3D printed components, foams, composites, biological samples (e.g. insects, bone and other tissues, even living samples like leaves, plants and coral).

SERVICES
'Non-destructive 3D X-ray scanning of materials and objects (Micro-CT).
Our CT instruments are operated by expert staff to ensure great outcomes on the first attempt.

Upon completion of the scanning process, you will receive highly detailed and accurate 3D volumetric models. These resultant models are suitable for analysis and visualisation using 3rd party software, or you can leverage the power of the on-campus supercomputer (GADI@NCI) using our in-house WebMango software package.

REASONS TO WORK WITH US
- CTLab provides access to the greatest pool of experienced scientists dedicated to X-ray micro-CT in Australia.
- CTLab has a comprehensive suite of evolving instruments that ensure capacity, specificity and the economies of scale.
- CTLab provides access to cutting-edge scientific developments through our in-house-built custom CT systems years before they filter down to commercial instruments.
- CTLab has an archive of >12000 tomograms across all applications – it is highly likely that we have experience with samples like yours.
- CTLab has over 15 years' experience working with academic partners, government agencies and multi-national industrial clients.

Unsure whether X-ray micro-CT will give you the answers you need?
Contact us and we will be happy to explain more and arrange a tour of our facility.

LOCATION
CTLab
131 Garran Road
The Australian National University Acton, ACT 2601

Contact

Levi Beeching
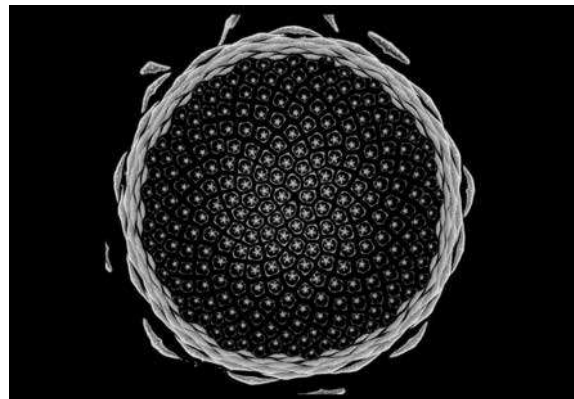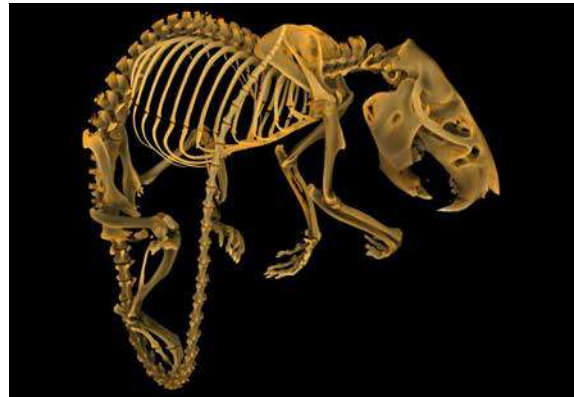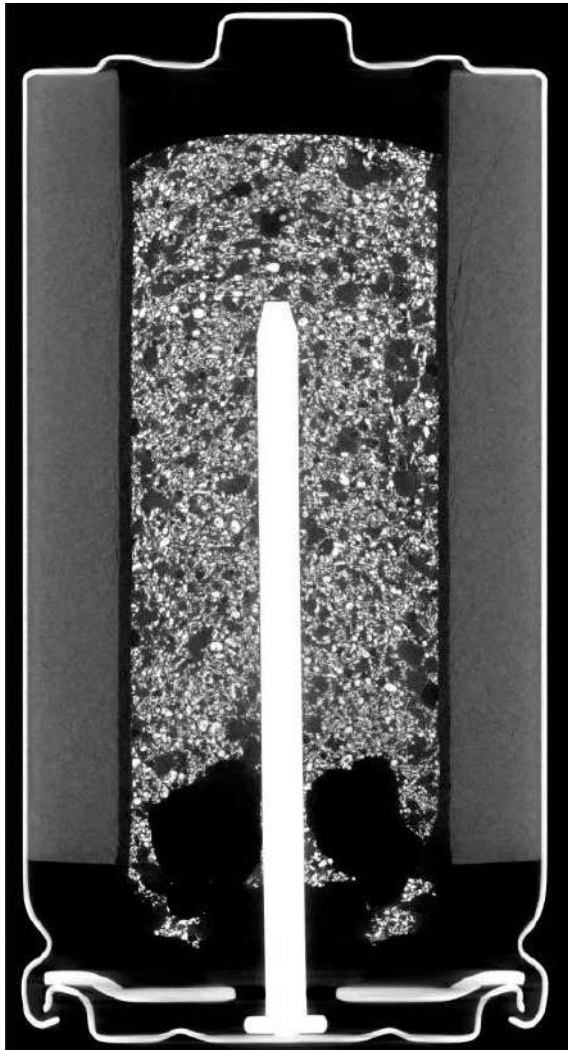T: 02 6125 6231
E: levi.beeching@anu.edu.au

Image credits
Laptop: Levi Beeching, CTLab
Giant Rat: M3D / Australian Museum
Thistle: Beeta Tworek, National Gallery of
Australia
C-Cell Battery: Levi Beeching, CTLab

The Pacific and Regional Archive for Digital Sources in Endangered Cultures (PARADISEC)

PARADISEC is a digital archive of records of some of the many small cultures and languages of the world.

We hold over 18,000 hours of audio and video recordings that might otherwise have been lost. These recordings are of performance, narrative, singing, and other oral traditions and represent 1,370 languages, mainly from the Pacific region.

We have established a framework for accessioning, cataloguing and digitising audio, text and visual material, and preserving digital copies. A primary goal is to safely preserve material that would otherwise be lost. In this way we can make field recordings available to the people and communities recorded, and to their descendants.

PARADISEC is a consortium of three universities: the University of Sydney, the University of Melbourne, and ANU. The ANU unit is located in the Coombs Building, and consists of three digitising studios for audio cassette and reel-to-reel tapes, as well as manuscript/field notes digitising.

SERVICES

We offer advice on archiving and data management, audio and manuscript digitising, transcoding born-digital media to different formats, and how to increase archival engagement on your research.

We also offer cross-discipline guest lectures on these topics and we run occasional workshops and offer hands-on training for researchers, including students, wanting to learn about digitising.

Contact

E: admin@paradisecorg.au

For workshops, training, guest lectures and digitising queries. please contact julia.miller@anu.edu.au

Phenomics Australia is a forward-thinking research infrastructure provider enabling research discovery and high-impact healthcare outcomes in precision medicine

We are a founding member of NCRIS and have since grown to span seventeen locations across Australia. Through these openly accessible service delivery centres, we offer specialised infrastructure, research services and technical expertise dedicated to advancing our fundamental understanding of health and disease and enabling next-generation innovations in healthcare and therapeutic development to benefit all Australians.

OUR EXPERTISE

Through openly accessible service delivery centres, we offer specialised infrastructure, research services and technical expertise dedicated to advancing our fundamental understanding of health and disease, and enabling next-generation innovations in healthcare and therapeutic development to benefit all Australians.

- **Biobanking:** Our Biobanking service provides a database and cryobank of mouse sperm and embryos essential for discovering and distributing disease models in Australia.
- **In vivo Genome Engineering & Disease Modelling:** We provide a national capability to explore the human genome and the genetic basis of health and disease. One way we achieve this is through the production of bespoke in vivo models possessing targeted mutations of interest and which can replicate clinical findings. These in vivo models serve as a crucial tool to study rare disease and enable new clinical understanding and treatments.

- **In vitro Genome Engineering & Disease Modelling:** To complement our established in vivo capabilities, and address an important capability gap for the research community, we have actively expanded our range of in vitro engineering and disease modelling system to include cell-, organoid- and tissue-based models, as well as 3D bioprinting.
- **Genotyping & Phenotyping:** Using next-generation screening and sequencing technology, with integrated bioinformatics capabilities, we enable researchers to identify new genomic variants and understand how they contribute to disease.
- **Functional Genomics & High-Throughput Screening:** Genome-scale cell-based CRISPR, RNAi, and compound screening in both 2D cell lines and 3D cell lines, PDX, patient-derived cells, and complex disease models using sophisticated liquid handling automation, high content cellular phenotyping, and reporter-based readouts.
- **Pathology:** Detailed description of the pathological changes in every tissue of in vivo disease models to efficiently determine the biological consequences of genetic mutations and to relate mutant and other disease phenotypes to human disease. Histopathology is also an essential component for drug development, to provide pre-clinical models to test the utility of drugs and identify off-target effects.
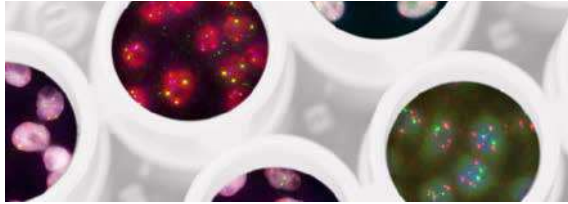
OUR NODES IN THE ACT
Biobanking
- Australian National University – The Australian Phenome Bank

In vivo Genome Engineering & Disease Modelling
- Australian National University – Phenogenomics Targeting Facility (PTF)

In vitro Genome Engineering & Disease Modelling
- Australian National University – ANU Centre for Therapeutic Discovery (ACTD)

Functional Genomics & High-Throughput Screening
- Australian National University – ANU Centre for Therapeutic Discovery (ACTD)

We are here to help – please get in contact if you are interested in anything Phenomics Australia has to offer.

Contact

E: contact@australianphenomics.org.au
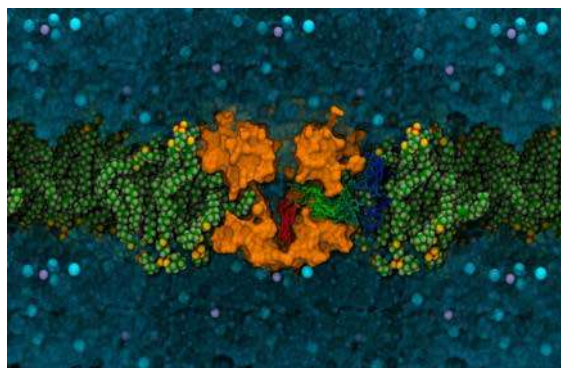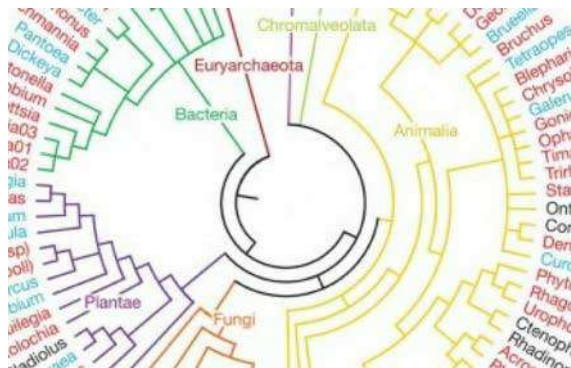W: https://phenomicsaustralia.org.au/

in Phenomics Australia
@phenomics

Quantitative Biology & Bioinformatics

Quantitative biology and bioinformatics are interdisciplinary fields that develop and apply advanced computational and quantitative methods to understand complex biological processes. At RSB these capabilities include investigating evolutionary processes, genetic variation, genomics and metabolomics, and protein structure and function. The approaches often involve the development of advanced statistical models and mathematical theory to analyse and understand large and complex biological datasets.

CAPABILITIES

- Genome analysis: we assemble, annotate, and analyse genomes from across the tree of life
- Phylogenetic software: we write world-leading software for the reconstruction of phylogenetic trees from DNA sequence data
- Genomic epidemiology: we analyse pathogen genomes to determine track their spread and evolution
- Molecular evolution: we build and study large genome databases to understand the origins and spread of mutations – from mutations in individual bases to large structural variations
- Evolutionary biology: we reconstruct and analyse evolutionary process from past to present and utilise insights predict how species will respond to future challenges and accelerating climate change
- Computational biophysics: a combination of computational techniques including quantum calculations, atomistic and coarse grained molecular dynamics, and macroscopic modelling

REASONS TO WORK WITH US

RSB is home to a range of research labs with an interest in advanced bioinformatics and quantitative biology approaches, spanning method development to applications. There are opportunities to develop new computational approaches and harness innovative bioinformatic methods into experimental/wet-laboratory research in the field, glasshouse, aquarium, or incubator. We study organisms from across the tree of life, both for fundamental science (e.g. evolutionary biology) and for applied use (e.g. biosecurity, conservation management, diagnostics and therapeutics)

Contact

Associate Professor Robert Lanfear, Professor Ben Corry, and Professor Gavin Huttley
E: rob.lanfear@anu.edu.au
ben.corry@anu.edu.au
gavin.huttley@anu.edu.au
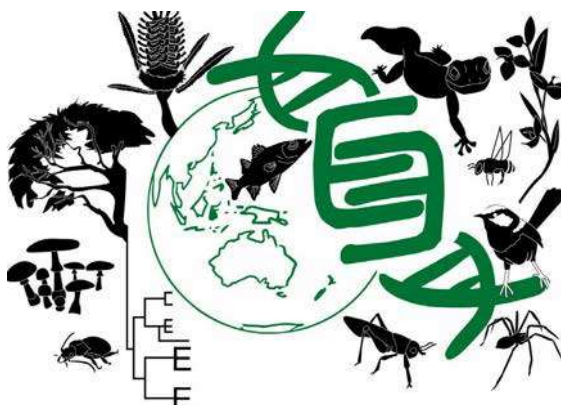
Research School of Chemistry Workshop

The Workshop facility provides high level technical support for research laboratories and projects, instrumentation and general infrastructure within the Research School of Chemistry and the Teaching facilities. Our team consists of highly skilled, innovative engineering trade technicians. We work closely with a broad range of people who are directly or indirectly involved in the School's research and education programs and interact with academics, students and staff from both ANU and other Australian institutions who seek the expertise and skills of our team.

CAPABILITIES

Electronics and Electrical

Precision electronic circuit design, circuit board production, maintenance and calibration, instrument design and modification, consultation, research and development, Laser and optics design and repair, purchase and supply of electronic components and materials. The group specialises in the development of innovative solutions to the technical challenges posed by research activities, and endeavours to provide professionally engineered products and solutions built to industry standards. To underpin these capabilities, the group maintains a range of engineering and technical facilities, including electronic CAD workstations, production equipment and test and measurement instrumentation all within a neat workshop facility.

Mechanical Engineering, Design and Construction

The team provide a wide range of technical support for mechanical design and manufacture, assembly and installation of experimental laboratory apparatus and supporting infrastructure to aid the Schools in their pursuit of academic research and teaching goals. Technical challenges are the RSC workshop's specialty. The group has a proven track record in providing high quality solutions to the difficult problems faced in the research and development fields. Ongoing development of staff skills and expansion of equipment has empowered the facility to carry out a broad range of mechanical engineering processes with both common and exotic materials.

REASONS TO WORK WITH US

To underpin these capabilities the group maintains a range of engineering and technical facilities, including:

- mechanical CAD workstations
- 3D FDM printing
- test and measurement instrumentation
- precision metal working machines
- heavy fabrication and welding facilities

SERVICES

- high tolerance manufacturing of components for scientific instrumentation and experimentation
- scientific equipment maintenance
- instrument fault diagnosis repair and modification
- consultation to develop engineered solutions for complex research problems
- instrumentation design, research and development
- purchase and supply of unique mechanical components and exotic materials

Contact

Mr Michael Hill
E: michael.hill@anu.edu.au
W: https://chemistry.anu.edu.au/research/research-facilities/rsc-workshop

RSB Plant Services

The Research School of Biology compound houses a large number of state-of-the-art plant growing facilities including greenhouses, climate controlled capsules, growth chambers and shade houses. A small team of qualified and highly skilled horticulturists are on hand for all plant related work and advice. The facilities provide climate control, PC2 and biosecurity containment, CO2 enrichment and 24/7 monitoring.

CAPABILITIES
Greenhouses and Potting Facilities
- A total of 50 temperature controlled greenhouses, 46 of them PC2 certified
- 4 biosecurity greenhouses with attached lab
- 6 greenhouses capable of elevated CO2 up to 1500ppm
- 2 greenhouses with high intensity speed breeding LED lighting
- 2 large shade houses
- Soil prep facility with steaming facility for soil pasteurisation
- Root wash facility

Controlled Environment Facility
- A total of 54 growth chambers, 20 of which are large walk in rooms
- 6 walk in rooms are capable of elevated CO2
- 2 Autoclaves – for sterilisation of waste and potting media
- Wide range of sizes of reach in chambers with various temperature and lighting capabilities
- Temperature logging and alarm monitoring for all chambers
- CO2 scrubbing capabilities coming soon

SERVICES
- Operation and maintenance of all growing areas and related facilities
- Plant propagation and maintenance including irrigation, pest and disease control, general plant health, soil/potting mix preparation
- Expert horticultural advice

REASONS TO WORK WITH US
The Research School of Biology (RSB) plant growth facilities are available to the College of Science community.

The Plant Services Team provide: advice on the capabilities of each facility, horticultural best practices, ongoing support and maintenance of research plants. This includes:
- Management of plant stock
- Equipment and facilities maintenance
- Setting up and monitoring 365 days/year - temperature graphs available
- Autoclaving and waste management
- Watering, fertilising and potting assistance
- OGTR and Quarantine procedures and compliance
- Supply of growth media, fertilisers and pots
- Pest and disease control

Contact

Christine Larsen
E: plant.services.rsb@anu.edu.au
W: biology.anu.edu.au/plant-services

RSES Mineralogical Laboratory

The RSES Mineralogical Laboratory provides infrared (IR) spectroscopy and other specialised equipment:

Portable IR equipment
- Reflectance, grazing angle & attenuated total reflectance analysis

Geochemical field equipment
- Multi-meter with probes for measuring pH, ionic species, conductivity, dissolved O2, total dissolved solids, temperature & barometric pressure; gas sensors; humidity–temperature data loggers

Thermal analysis equipment
- Thermogravimentric analyser <1200°C
- Differential thermal analyser <1200°C
- Differential scanning calorimeter <725°C

Materials preparation facility
- Controlled-atmosphere horizontal furnaces (<1500°C)

IR spectroscopy
FTIR spectrometer:
- Mid-IR: 400-5600 cm-1 (1.8-25 µm)
- Reflectance, transmittance & attenuated total reflectance
- Microscope (15x & 32x objectives) with mapping stage that provides automated collection of spectra with ≥1µm step over >1cm2
- Attenuated Total Reflection (ATR)

Small-scale environmental chamber
- Environmental stage for in situ microanalyses: - 196 to 900°C with vacuum or gas flow

Environmental chamber
- Diffuse reflectance in a controlled-temperature reaction chamber
- -150 to 450°C vacuum or gas flow

CAPABILITIES
- Infrared spectrometer with microscope & mapping stage
- In-situ infrared analyses under controlled gas/vacuum, -150 to 900 °C suitable for powders, single crystals & wafers
- Portable infrared & geochemical equipment for field work
- High-temperature furnaces with gas flow control for toxic gases
- Thermal analysers and differential scanning calorimeter

REASONS TO WORK WITH US
- IR spectroscopy is useful for molecules with a dipole moment like polar groups, substituents on organic molecules, bonds in solids (e.g., SiO, Al-O, B-O, H-O, C-O, C-H, N-O, S-O).
- Samples can be crystalline, microcrystalline, amorphous or liquid
- Very small samples can be analysed (<6µm lateral resolution)
- Fast (1-10 minutes)
- Qualitative ID is straightforward
- Quantitative molecular abundances may be determined
- Determine the spectral signatures of materials relevant to remote sensing

Contact

Dr Penny King
T: +61 2 6125 0667
E: penny.king@anu.edu.au
W: earthsciences.anu.edu.au/spec-e

Scholarly Information Services (SIS)

Scholarly Information Services (SIS) provides a range of services to support the research, teaching, and learning needs of the University.

The Division includes the ANU Library, University Archives and Records, ANU Press, Open Research, Academic Skills, CartoGIS, and more.

Across these different areas, SIS has extensive infrastructure to support ANU researchers.

Research support
SIS provides a range of academic support that can help you achieve your research goals. The ANU Library has a wealth of resources (online and in-person), and 24/7 access to study spaces. You can also book a research consultation with subject specialists, who can help you find materials to support your research.

Join training sessions for essential research skills like Research Data Management, referencing, researching, editing, presenting, and using software like EndNote and NVivo. The library website has subject guides to help you find resources, how-to guides to improve your skills, training videos, and online access to millions of items.

ANU Open Research
Browse the ANU Open Research repository to access an extensive collection of ANU open access research including journals, articles, theses, books, and more. The Data Commons holds a variety of research data created by ANU researchers across a wide range of disciplines. The collections are free to browse, and all members of the ANU community are encouraged to deposit their data.

Publishing
The ANU Library has agreements with many leading scholarly journal publishers, allowing ANU researchers to publish their work open access without paying a processing fee.

ANU Archives
The Archives collects and preserves a range of archival records. Collections include the University's own archives, the Pacific Research Archives, the National AIDS Archive Collection and the Noel Butlin business and labour records. The Archives staff, catalogue, and subject guides can help you find relevant archives. Digitised Archives resources are available online through the ANU Open Research Repository.

The Archives Reading Room can be used to review archives and for quiet study.

Contact
E: library.info@anu.edu.au
W: services.anu.edu.au/business-units/scholarly-information-services

An ANU login is required to access the page.

Separation and Reaction Facility

The Separation and Reaction Facility (SRF) consolidates the Research School of Chemistry's extensive capabilities and instrumentation in the production, separation and isolation of synthetic compounds. These include organic and inorganic complexes as well as larger peptide and protein systems. The SRF houses high performance liquid chromatography (HPLC), gas chromatography (GC) and supercritical fluid chromatography (SFC) instrumentation along with photochemical reactors, microwave reactors, high-pressure reactors and flow chemistry equipment.

The Facility serves both expert and non-expert users. User support is provided primarily in the form of maintenance and training. Occasional more complex service jobs (or requests from non-expert users) are delivered on a fee for service basis.

REASONS TO WORK WITH US
- Co-localised instrumentation for analytical and preparative chromatography needs
- State-of-the-art reaction facilities for modern chemical synthesis
- Convenient walk-on usage as well as pre-bookings available for most platforms
- Extensive support, including routine maintenance and user training, for specialist equipment
- Custom service jobs available for non-expert users

CAPABILITIES

The Facility consists of two related sub-facilities: a separation sub-facility and a reactions sub-facility.

Separation Facility

A suite of analytical and preparative high performance and ultra high performance liquid chromatography (HPLC/UPLC) instrumentation is available for the analysis and purification of crude reaction mixtures and synthetic compounds, including small molecules, peptides and proteins. Reverse-phase, normal-phase and chiral stationary supports are available to facilitate a wide range of research applications.
- 2 x Waters preparative HPLC system
- Shimadzu UPLC-MS
- 3 x Agilent analytical HPLC
- 2 x Waters analytical
- Waters LC-MS/MS
- Waters UPC2
- Agilent GC-MS

Reactions Facility

The reactions facility houses state-of-the art instrumentation to meet the demands of modern synthetic chemistry, including batch and flow reactors, an ultra-high pressure reactor and solvent purification systems. Support and training are provided to aid reaction design and setup.
- Vapourtec-R Flow Reactor
- Vapourtec-E Flow Reactor
- 2 x Syrris Asia Reactor 1
- Syrris Globe batch reactor
- Ultra-High-Pressure Reactor (19kbar)
- Solvent purification systems (SPS

Contact

W: chemistry.anu.edu.au/srf

SHRIMP Ion Microprobe Laboratory

The RSES SHRIMP laboratory is one of the leading secondary ion mass spectrometry (SIMS) centres in the world, equipped with three SIMS instruments, each with different capabilities.

Staffed by experienced personnel, and supported by electronic and mechanical workshops, and an IT specialist, the laboratory provides analytical facilities for researchers both internal and external to the ANU. The laboratory is world-leading in the analysis 4-sulfur isotopes at small scales in planetary materials. The capability of the SHRIMP SI to analyse thin sections of animal biominerals (e.g., teeth, earbones) for oxygen isotopes is second to none.

The laboratory is supported by funding from the ANU, AuScope and the ARC. It recently received an ARC LIEF grant to upgrade one instrument for multiple-collector analysis of light metal isotopes.

CAPABILITIES
- **SHRIMP II**: Trace and major light to heavy element isotopes. Positive and negative secondary ions, 3-channel multiple collector.
- **SHRIMP RG**: Trace and major elements.Reverse geometry. Very high mass resolution. Positive secondary ions. 'Dual' collector for very high dynamic range.
- **SHRIMP SI**: Light stable isotopes of major elements. Negative secondary ions. 5-channel multiple collector.
- Assistance with reference materials, sample preparation and isotopic analysis is provided by the laboratory staff

REASONS TO WORK WITH US

Surface isotopic analysis of solids on a 15 micron scale (polished mounts, thin sections)

U-Th-Pb radioisotopic dating
- Main target minerals: Zircon, Monazite, Titanite, Xenotime, Rutile, Baddeleyite, Perovskite
- Magmatism, Metamorphism, Sedimentation
- Meteorites

Oxygen isotopes
- Palaeoclimate, biominerals
  - Marine fossils
  - Otoliths
  - Teeth
- Magma genesis
- Gemstones
- Meteorites: 3-isotopes

Sulfur isotopes: sulfides, sulfates
- Ore deposits
- Volcanoes
- Search for early life: 4-isotopes

Carbon-Oxygen isotopes: carbonates
- Corals
- Shells
- Foraminifera

Nuclear
- Mineral and particle analysis

Contact

T: 02 6125 6719
E: shrimp.rses@anu.edu.au
W: earthsciences.anu.edu.au/shrimp

Simulating the Solid Earth's Dynamics and Evolution

Our group has internationally recognised expertise in modelling plate tectonics and Earth evolution. We create and use state of the art computational models that allow us and collaborators to solve problems that directly align with national research priorities.

We provide the research software that underpins finite element modelling and optimization for geophysical fluid dynamics, with a focus on the dynamics and evolution of the Solid Earth. Recent application areas include the dynamics of Earth's engine – the mantle; the response of Earth's surface to melting polar ice-caps – Glacial Isostatic Adjustment; and groundwater flows through the Great Artesian Basin. We build models that work from the Earth's Inner Core to the flow of water and ice across the Earth's surface.
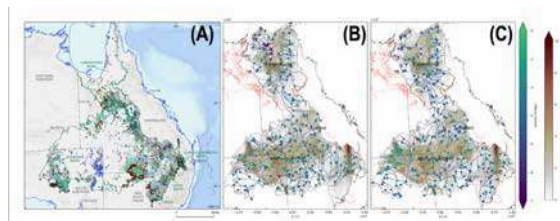
REASONS TO WORK WITH US

Building models is a special skill that requires mathematical, computational and domain expertise. Our group has extensive experience with model creation, testing and validation. We are highly skilled in computational fluid mechanics and solid mechanics, and we can quickly adapt to new problems. We are approachable and helpful - don't try to work alone, we can help!

We have strong national and international networks and collaborations built upon our reputation for excellent and innovative research and tools. The software we develop and coordinate is widely used and well supported by ourselves and our collaborators. We have experience in developing applications that are robust and long-lasting. The skills you learn working with us will be transferable to other areas of modelling and technical development.

CAPABILITIES

We develop and maintain two main computational modelling frameworks:

1. **Underworld**: a particle-based finite element code that is specialised for large-scale flow in visco-elastic-plastic deformation in geomaterials with complex (history dependent) rheology such as silicate rock and ice.

2. **G-Adopt (Geodynamics ADjoint Optimization PlaTform):** a transformational new framework for inverse geodynamics, based on two novel software libraries, Firedrake (www.firedrakeproject.org) and dolfin-adjoint (www.dolfin-djoint.org/en/latest). When combined, these libraries provide a state-of-the-art finite element platform that offers a radical new approach for rigorously integrating geoscientific data with multi-resolution, time-dependent, geodynamical models, through high-performance computing.

Recent years have seen these tools applied across several geoscientific areas. These include understanding the response of Earth's surface and global sea level to melting polar ice sheets (through the Australian Centre of Excellence for Antarctic Science - ACEAS), seismic wave propagation, the renewable energy sector, and groundwater, all of which have significant societal and economic implications
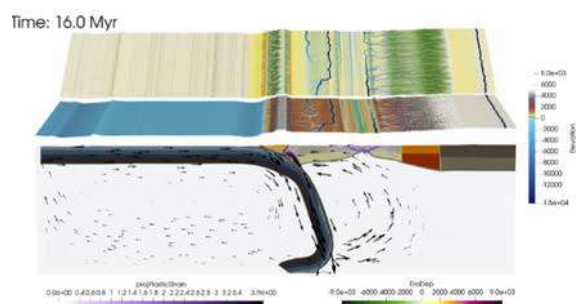
Contact

Louis Moresi
T: 02 6125 5590
E: louis.moresi@anu.edu.au

Stable Isotope Analysis Facility

The Stable Isotope Analysis Facility has grown within Professor Graham Farquhar's Environmental Biology Laboratory. The facility integrates isotope mass spectrometry with laser isotope analysis. The analysis centre underpins fundamental plant physiology research led by Farquhar and other researchers at RSB and ANU. It features three stable isotope mass spectrometers and lasers and offers the analysis of $\delta 18O$, $\delta 2H$, $\delta 13C$ and $\delta 15N$ of gases, water and solid samples. Laboratory members (Farquhar Group) provide guidance in the design of the analysis and interpretation of the results.

Today the facility provides isotope analysis services to Australian academics - spanning from plant scientists to anthropologists (30% ANU / 20% other universities) and industry users (50%), including private businesses and government agencies.

CAPABILITIES

The laboratory contains both the theoretical and practical skills to analyse the most diverse biological sample types, from leaves to oils, bark, seeds, soils, blood, feathers, and animal tissues and faeces. Normally we work with a few mg of material at natural abundances but we are also able to analyse enriched materials. The bulk of our analyses are $\delta 13C$ of plant material which we use to determine relative Water Use Efficiency (WUE) and characterise plants' interaction with their environment.

Equipment:

1x Picarro 1102-I measures water vapour isotope ratios of $\delta 18O$ and $\delta 2H$ by cavity ring-down spectroscopy (CRDS), with a precision better than 0.2 permille for $\delta 18O$ and 0.5 permille for $\delta 2H$.

1x Picarro 2130-I. Similar to 1102-I, with improved time resolution (~1 sec), enabling near real-time monitoring of the isotopic composition of water vapour ($\delta 18O$, $\delta 2H$) exchanged by biological systems (i.e. plant leaves) with the atmosphere. When connected to the Aerodyne laser the equipment can provide simultaneous analysis of carbon dioxide $\delta 13C$ and $\delta 18O$.

2x Isoprime isotope-ratio mass spectrometers by Elementar provides routine analysis of $\delta 15N$ and $\delta 13C$. When connected to an Elemental Analyser EA1110 (Carlo Erba Instruments), the relative amounts of C, N, H and S are measured by flash combustion followed by gas chromatography separation. Routinely used to assess $\delta 15N$ and $\delta 13C$ and percentages of C and N. Additional gas or liquid chromatographic systems can be connected to perform compound-specific isotopic analysis.

Thermo Delta V Plus is currently being refurbished and will soon commence analysis of samples.
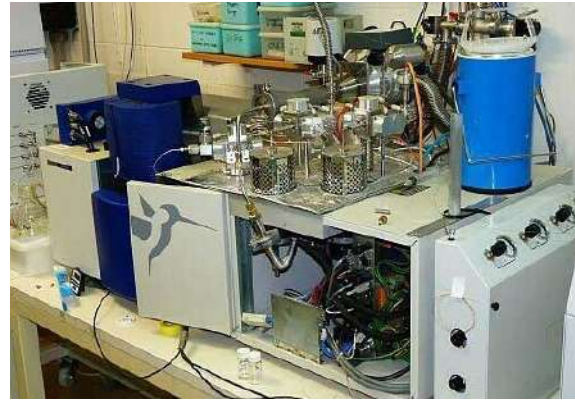
REASONS TO WORK WITH US

- Tens of thousands of analyses have guided the breeding of improved strains of wheat, sorghum and canola.
- Oxygen isotopes give information on both how water moves through leaves and how leaves interact with the atmosphere around them.
- Hydrogen isotopes from water and lipids give a profound view of water movement and atmospheric interactions, including past water comparison and environmental conditions.
- Nitrogen isotopes give information on nutrient uptake and trophic level.

We analyse other types of sample too! Including isotopic analysis of ants, sea-lion whisker, bird feathers, sewage, eel grass, and surface and ground water from across Australia.

COST

Costs of analysis depend on the number of samples, urgency, processing difficulty, and collaboration, if any. Lower rates are offered to students and for exploratory projects supporting grant applications.

Contact

E: rsb.isotopes@anu.edu.au

W: https://biology.anu.edu.au/research/facilities/stable-isotope-laboratory

Statistical Support Network (SSN)

The Statistical Support Network (SSN) is the hub with spokes where every ANU HDR student and researcher is welcome to find collaboration with statistical experts to achieve excellent research results

The Statistical Support Network is a network of statisticians that specialises in statistical applications in academic research in the sciences and humanities. Its predecessor, the Statistical Consulting Unit, was established in 1982 and built a strong reputation for expert statistical advice in study design, data collection and data analysis across all disciplines. Research collaboration is central to our role. The Statistical Support Network replaced the SCU in August 2021 and it aims to be the most significant source of statistical advice in ANU.

The Network has the technical expertise to keep abreast of the fast-evolving research methodologies in a data-driven research environment, across a broad range of disciplines. It consistently advocates for appropriate study designs for experiments and surveys, and provides advice in data management, exploratory data analysis, statistical modelling and data presentation. It offers short courses and workshops in statistics tailored to specific research areas, as well as more generalist online courses.

SERVICES

Researchers and research students can access statistical advice through:

- face-to-face consultations;
- online courses in introductory statistics, experimental design, and statistical modelling;
- targeted courses and workshops when available; and
- SharePoint resources (an ANU login is required to access the page).

COST

Statistical support is available, free of charge, to Honours students with research projects, Higher Degree Research students (e.g. Masters, PhD) and staff in all parts of the University.

Contact

E: ssn@anu.edu.au

W: https://services.anu.edu.au/business-units/research-initiatives-and-infrastructure/statistical-support-network

X-Ray Diffraction Facility

The X-Ray Diffraction Facility has a broad range of capabilities for studying various sample types in a range of sample environments. Researchers from vastly diverse fields of research use the Facility. Common sample types include, but are not limited to, pure and heterogeneous powders, single crystals of small molecules and macromolecules, solid state materials, polymers, thin films and fibres.

REASONS TO WORK WITH US

- Expertise in handling difficult chemical crystallography structures and problems.
- Wide capabilities of powder diffraction measurements.
- The Facility functions as a portal to access various national and international X-ray and neutron-based research facilities by providing initial powder and single crystal laboratory X-ray source measurements that are often mandatory.
- Access to the MX1/2 crystallography beamlines at the Australian Synchrotron is available with limited lag time via an established Collaborative Access Program.

Contact

Dr Michael Gardiner
T: 02 6125 3766
E: michael.gardiner@anu.edu.au
W: chemistry.anu.edu.au/xrd

CAPABILITIES

The diffractometers are housed in the Research School of Chemistry in a large purpose-built laboratory with climate control, and are maintained by a full time experienced crystallographer. Samples may be submitted for measurement and analysis by staff, or inducted instrument users can collect their own data. All instrument data is backed up automatically on an ANU central storage drive that can be accessed remotely by users. Access to various licenced data analysis and structure visualisation software packages is available, as well as the leading crystal structure databases through RSC/ANU subscriptions.

The diffractometers are:

- Agilent SuperNova - this dual micro focus sealed tube source (Cu and Mo) system is used for smaller crystals and those structures that need accurately measured anomalous diffraction signals (for the unambiguous determination of absolute structure). The instrument has been upgraded with a state-of-the-art HYPIX-6000 direct photon counting detector.
- Agilent xCalibur - this fine focus sealed tube source (Mo) system is the major workhorse for efficient throughput of routine chemical structures for larger/more strongly diffracting crystals.
- Panalytical Empyrean - this multi-purpose high resolution powder diffractometer (Cu and Cr radiation available) with a sensitive 1D multi-channel detector has wide capabilities with many incident/diffracted beam optic configurations possible (transmitted, reflected, capillary geometries, mirror-focussed beam, hybrid monochromator, parallel plate collimator allowing thin film/textured sample analysis, non-ambient temperature and pressure measurements).

Single crystal diffractometers have Oxford Cryostream nitrogen cooling apparatus incorporated for routine cryo-measurements, while the powder diffractometer has an Anton Paar TTK450 non-ambient sample stage allowing automated collection between -150 and 450°C.

Australian National University

Contact us

ANU Research Initiatives and Infrastructure

E   RII@anu.edu.au

W   anu.edu.au/research/research-infrastructure